



# **Stratix III Device Handbook,**

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# **Volume 2**



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<b>Chapter Revision Dates</b> .....	About–v
<b>Additional Information</b> .....	About–vii
How to Contact Altera .....	1–vii
Typographic Conventions .....	1–vii
<b>Chapter I. DC &amp; Switching Characteristics of Stratix III Devices</b>	
Revision History .....	I–1
<b>Chapter 1. Stratix III Device Datasheet: DC and Switching Characteristics</b>	
Electrical Characteristics .....	1–1
Operating Conditions .....	1–1
Absolute Maximum Ratings .....	1–1
Recommended Operating Conditions .....	1–3
DC Characteristics .....	1–5
I/O Standard Specifications .....	1–9
Power Consumption .....	1–12
Switching Characteristics .....	1–13
Core Performance Specifications .....	1–13
Clock Tree Specifications .....	1–13
PLL Specifications .....	1–13
DSP Block Specifications .....	1–17
TriMatrix Memory Block Specifications .....	1–18
Configuration and JTAG Specifications .....	1–20
Periphery Performance .....	1–21
High-Speed I/O Specifications .....	1–21
External Memory Interface Specifications .....	1–25
OCT Calibration Block Specifications .....	1–30
DCD Specifications .....	1–30

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I/O Timing .....	1-30
Timing Model .....	1-30
Preliminary and Final Timing .....	1-31
I/O Timing Measurement Methodology .....	1-31
I/O Default Capacitive Loading .....	1-36
Programmable IOE Delay .....	1-37
Programmable Output Buffer Delay .....	1-38
User I/O Pin Timing .....	1-38
EP3SL50 I/O Timing Parameters .....	1-38
EP3SL70 I/O Timing Parameters .....	1-66
EP3SL110 I/O Timing Parameters .....	1-93
EP3SL150 I/O Timing Parameters .....	1-119
EP3SL200 I/O Timing Parameters .....	1-146
EP3SL340 I/O Timing Parameters .....	1-174
EP3SE50 I/O Timing Parameters .....	1-202
EP3SE80 I/O Timing Parameters .....	1-229
EP3SE110 I/O Timing Parameters .....	1-255
EP3SE260 I/O Timing Parameters .....	1-283
Dedicated Clock Pin Timing .....	1-310
EP3SL50 Clock Timing Parameters .....	1-310
EP3SL70 Clock Timing Parameters .....	1-312
EP3SL110 Clock Timing Parameters .....	1-313
EP3SL150 Clock Timing Parameters .....	1-315
EP3SL200 Clock Timing Parameters .....	1-316
EP3SL340 Clock Timing Parameters .....	1-318
EP3SE50 Clock Timing Parameters .....	1-319
EP3SE80 Clock Timing Parameters .....	1-321
EP3SE110 Clock Timing Parameters .....	1-322
EP3SE260 Clock Timing Parameters .....	1-324
Glossary .....	1-326
Chapter Revision History .....	1-330

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The chapter in this book was revised on the following date. Where chapters or groups of chapters are available separately, part numbers are listed.

Chapter 1 Stratix III Device Datasheet: DC and Switching Characteristics  
Revised: *July 2010*  
Part Number: *SIII52001-2.3*



This handbook provides comprehensive information about the Altera® Stratix® III family of devices.

## How to Contact Altera

For the most up-to-date information about Altera products, see the following table.

Contact <i>(Note 1)</i>	Contact Method	Address
Technical support	Website	<a href="http://www.altera.com/support">www.altera.com/support</a>
Technical training	Website	<a href="http://www.altera.com/training">www.altera.com/training</a>
	Email	<a href="mailto:custrain@altera.com">custrain@altera.com</a>
Product literature	Website	<a href="http://www.altera.com/literature">www.altera.com/literature</a>
Non-technical support (General) (Software Licensing)	Email	<a href="mailto:nacomp@altera.com">nacomp@altera.com</a>
	Email	<a href="mailto:authorization@altera.com">authorization@altera.com</a>








**Note:**

(1) You can also contact your local Altera sales office or sales representative.

## Typographic Conventions

The following table shows the typographic conventions that this document uses.

Visual Cue	Meaning
<b>Bold Type with Initial Capital Letters</b>	Command names, dialog box titles, checkbox options, and dialog box options are shown in bold, initial capital letters. Example: <b>Save As</b> dialog box.
<b>bold type</b>	External timing parameters, directory names, project names, disk drive names, file names, file name extensions, and software utility names are shown in bold type. Examples: <b>f<sub>MAX</sub></b> , <b>\qdesigns</b> directory, <b>d:</b> drive, <b>chiptrip.gdf</b> file.
<i>Italic Type with Initial Capital Letters</i>	Document titles are shown in italic type with initial capital letters. Example: <i>AN 75: High-Speed Board Design.</i>
<i>Italic type</i>	Internal timing parameters and variables are shown in italic type. Examples: <i>t<sub>PIA</sub></i> , <i>n + 1</i> .  Variable names are enclosed in angle brackets (< >) and shown in italic type. Example: <file name>, <project name>.pof file.
Initial Capital Letters	Keyboard keys and menu names are shown with initial capital letters. Examples: Delete key, the Options menu.
"Subheading Title"	References to sections within a document and titles of on-line help topics are shown in quotation marks. Example: "Typographic Conventions."

Visual Cue	Meaning
Courier type	Signal and port names are shown in lowercase Courier type. Examples: <code>data1</code> , <code>tdi</code> , <code>input</code> . Active-low signals are denoted by suffix <code>n</code> , e.g., <code>resetn</code> .  Anything that must be typed exactly as it appears is shown in Courier type. For example: <code>c:\qdesigns\tutorial\chiptrip.gdf</code> . Also, sections of an actual file, such as a Report File, references to parts of files (e.g., the AHDL keyword <code>SUBDESIGN</code> ), as well as logic function names (e.g., <code>TRI</code> ) are shown in Courier.
1., 2., 3., and a., b., c., etc.	Numbered steps are used in a list of items when the sequence of the items is important, such as the steps listed in a procedure.
	Bullets are used in a list of items when the sequence of the items is not important.
	The checkmark indicates a procedure that consists of one step only.
	The hand points to information that requires special attention.
	A caution calls attention to a condition or possible situation that can damage or destroy the product or the user's work.
	A warning calls attention to a condition or possible situation that can cause injury to the user.
	The angled arrow indicates you should press the Enter key.
	The feet direct you to more information on a particular topic.



When Stratix® III devices are implemented in a system, they are rated according to a set of defined parameters. To maintain the highest possible performance and reliability of Stratix III devices, system designers must consider the operating requirements discussed in the following chapter:

- [Chapter 1, Stratix III Device Datasheet: DC and Switching Characteristics](#)

### Revision History

Refer to each chapter for its own specific revision history. For information on when each chapter was updated, refer to the Chapter Revision Dates section, which appears in the full handbook.



## Electrical Characteristics

This chapter describes the electrical characteristics, switching characteristics, and I/O timing for Stratix® III devices. Electrical characteristics include operating conditions and power consumption. Switching characteristics include core performance specifications and periphery performance. A glossary is also included for your reference.

## Operating Conditions

When Stratix III devices are implemented in a system, they are rated according to a set of defined parameters. To maintain the highest possible performance and reliability of Stratix III devices, system designers must consider the operating requirements described in this chapter.

Stratix III devices are offered in both commercial and industrial grades. Commercial devices are offered in -2 (fastest), -3, -4, and -4L speed grades. Industrial devices are offered only in -3, -4, and -4L speed grades.



In this chapter, a prefix associated with the operating temperature range is attached to the speed grades; commercial with a “C” prefix and industrial with an “I” prefix. For example, commercial devices are indicated as C2, C3, C4, and C4L per respective speed grades. Industrial devices are indicated as I3, I4, and I4L.

### Absolute Maximum Ratings

Absolute maximum ratings define the maximum operating conditions for Stratix III devices. The values are based on experiments conducted with the device and theoretical modeling of breakdown and damage mechanisms. The functional operation of the device is not implied at these conditions. Conditions beyond those listed in [Table 1-1](#) may cause permanent damage to the device. Additionally, device operation at the absolute maximum ratings for extended periods may have adverse effects on the device.

**Table 1-1.** Absolute Maximum Ratings for Stratix III Devices (*Note 1*) (Part 1 of 2)

Symbol	Parameter	Minimum	Maximum	Unit
$V_{CCL}$	Selectable core voltage power supply	-0.5	1.65	V
$V_{CC}$	I/O registers power supply	-0.5	1.65	V
$V_{CCD\_PLL}$	Phase-locked loop (PLL) digital power supply	-0.5	1.65	V
$V_{CCA\_PLL}$	PLL analog power supply	-0.5	3.75	V
$V_{CCPT}$	Programmable power technology power supply	-0.5	3.75	V
$V_{CCPGM}$	Configuration pins power supply	-0.5	3.9	V
$V_{CCPD}$	I/O pre-driver power supply	-0.5	3.9	V
$V_{CCIO}$	I/O power supply	-0.5	3.9	V

**Table 1-1.** Absolute Maximum Ratings for Stratix III Devices (*Note 1*) (Part 2 of 2)

Symbol	Parameter	Minimum	Maximum	Unit
$V_{CC\_CLKIN}$	Differential clock input power supply (top and bottom I/O banks only)	-0.5	3.75	V
$V_{CCBAT}$	Battery back-up power supply for design security volatile key register	-0.5	3.75	V
$V_I$	DC Input voltage	-0.5	4.0	V
$T_J$	Operating junction temperature	-55	125	°C
$I_{OUT}$	DC output current, per pin	-25	40	mA
$T_{STG}$	Storage temperature (No bias)	-65	150	°C

**Note to Table 1-1:**

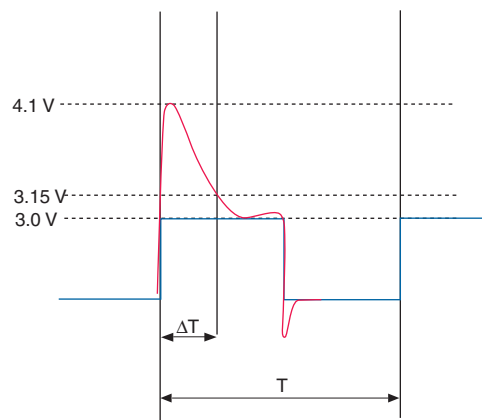
(1) Supply voltage specifications apply to voltage readings taken at the device pins, not the power supply.

**Sinusoidal Maximum Allowed Overshoot/Undershoot Voltage**

During transitions, input signals may overshoot to the voltage listed in [Table 1-2](#) and undershoot to  $-2.0$  V for input currents less than 100 mA and periods shorter than 20 ns.

[Table 1-2](#) lists the maximum allowed input overshoot voltage and the duration of the overshoot voltage as a percentage over the lifetime of the device. The maximum allowed overshoot duration is specified as percentage of high-time over the lifetime of the device.

A DC signal is equivalent to 100% duty cycle. For example, a signal that overshoots to 4.2 V can only be at 4.2 V for 15.8% over the lifetime of the device; for a device lifetime of 10 years, this is equivalent to 15.8% of ten years which is 18.96 months. [Figure 1-1](#) shows how to determine the overshoot duration.

**Figure 1-1.** Overshoot Duration

In the example shown in [Figure 1-1](#), the overshoot voltage is shown in red and is present at the Stratix III pin, up to 4.1 V. From [Table 1-2](#), for an overshoot of up to 4.1 V, the percentage of high time for overshoot  $> 3.15$  V can be as high as 46% over an 11.4-year period. The percentage of high time is calculated as  $(\Delta T/T) * 100$ . This 11.4-year period assumes the device is always turned on with 100% I/O toggle rate and 50% duty cycle signal. For lower I/O toggle rates and situations where the device is in an idle state, lifetimes are increased.

**Table 1-2.** Maximum Allowed Overshoot During Transitions

Symbol	Parameter	Condition	Overshoot Duration as a % of High Time	Unit
Vi (AC)	AC Input Voltage (1)	4	100.000	%
		4.05	79.330	%
		4.1	46.270	%
		4.15	27.030	%
		4.2	15.800	%
		4.25	9.240	%
		4.3	5.410	%
		4.35	3.160	%
		4.4	1.850	%
		4.45	1.080	%
		4.5	0.630	%
		4.55	0.370	%
		4.6	0.220	%
		4.65	0.130	%
		4.7	0.074	%
		4.75	0.043	%
4.8	0.025	%		
4.85	0.015	%		

**Note to Table 1-2:**

(1) This input voltage is regardless of the  $V_{CCIO}$  supply which is used to power up the input buffer.

### Recommended Operating Conditions

This section lists the functional operation limits for AC and DC parameters for Stratix III devices. Table 1-3 lists the steady-state voltage and current values expected from Stratix III devices. All supplies are required to monotonically reach their full-rail values within  $t_{RAMP}$ .

**Table 1-3.** Recommended Operating Conditions for Stratix III Devices (Part 1 of 2)

Symbol	Parameter	Conditions	Minimum	Typical	Maximum	Unit
V <sub>CCL</sub>	Selectable core voltage power supply for internal logic and input buffers	—	1.05	1.1	1.15	V
	Selectable core voltage power supply for internal logic and input buffers	—	0.86	0.9	0.94	V
V <sub>CC</sub>	I/O registers power supply	—	1.05	1.1	1.15	V
V <sub>CCD_PLL</sub>	PLL digital power supply	—	1.05	1.1	1.15	V
V <sub>CCA_PLL</sub>	PLL analog power supply	—	2.375	2.5	2.625	V
V <sub>CCPT</sub>	Power supply for the programmable power technology	—	2.375	2.5	2.625	V

**Table 1-3.** Recommended Operating Conditions for Stratix III Devices (Part 2 of 2)

Symbol	Parameter	Conditions	Minimum	Typical	Maximum	Unit
$V_{CCPGM}$	Configuration pins power supply, 3.3 V	—	3.135	3.3	3.465	V
	Configuration pins power supply, 3.0 V	—	2.85	3	3.15	V
	Configuration pins power supply, 2.5 V	—	2.375	2.5	2.625	V
	Configuration pins power supply, 1.8 V	—	1.71	1.8	1.89	V
$V_{CCPD}$ (1)	I/O pre-driver power supply, 3.3 V	—	3.135	3.3	3.465	V
	I/O pre-driver power supply, 3.0 V	—	2.85	3	3.15	V
	I/O pre-driver power supply, 2.5 V	—	2.375	2.5	2.625	V
$V_{CCIO}$	I/O power supply, 3.3 V	—	3.135	3.3	3.465	V
	I/O power supply, 3.0 V	—	2.85	3	3.15	V
	I/O power supply, 2.5 V	—	2.375	2.5	2.625	V
	I/O power supply, 1.8 V	—	1.71	1.8	1.89	V
	I/O power supply, 1.5 V	—	1.425	1.5	1.575	V
	I/O power supply, 1.2 V	—	1.14	1.2	1.26	V
$V_{CCCLKIN}$	Differential clock input power supply (top and bottom I/O banks only)	—	2.375	2.5	2.625	V
$V_{CCBAT}$ (3)	Battery back-up power supply for design security volatile key register	—	1.0	—	3.3	V
$V_I$	DC Input voltage	—	-0.3	—	3.6	V
$V_O$	Output voltage	—	0	—	$V_{CCIO}$	V
$T_J$	Operating junction temperature	For commercial use	0	—	85	°C
		For industrial use (2)	-40	—	100	°C
$t_{RAMP}$	Power Supply Ramptime (For $V_{CCPT}$ )	Normal POR (PORSEL=0)	50 $\mu$ s	—	5 ms	—
		Fast POR (PORSEL=1)	50 $\mu$ s	—	5 ms	—
	Power Supply Ramptime (For all power supplies except $V_{CCPT}$ )	Normal POR (PORSEL=0)	50 $\mu$ s	—	100 ms	—
		Fast POR (PORSEL=1)	50 $\mu$ s	—	12 ms	—

**Notes to Table 1-3:**

- $V_{CCPD}$  is 2.5, 3.0, or 3.3 V. For a 3.3-V I/O standard,  $V_{CCPD} = 3.3$  V. For a 3.0-V I/O standard,  $V_{CCPD} = 3.0$  V. For a 2.5-V or lower I/O standard,  $V_{CCPD} = 2.5$  V.
- For the EP3SL340, EP3SE260, and EP3SL200 devices in the I4L ordering code, the industrial junction temperature range is from 0° C to 100° C, regardless of supply voltage.
- Altera recommends a 3.0-V nominal battery voltage when connecting  $V_{CCBAT}$  to a battery for volatile key backup. If you do not use the volatile security key, you may connect the  $V_{CCBAT}$  to either GND or a 3.0-V power supply.

## DC Characteristics

This section lists the input pin capacitances, on-chip termination tolerance, and hot-socketing specifications.

### Supply Current

Standby current is the current the device draws after the device is configured with no inputs/outputs toggling and no activity in the device. Because these currents vary largely with the resources used, use the Excel-based Early Power Estimator (EPE) to get supply current estimates for your design.

Table 1-4 lists supply current specifications for  $V_{CC\_CLKIN}$  and  $V_{CCPGM}$ . Use the EPE to get supply current estimates for the remaining power supplies.

**Table 1-4.** Supply Current Specifications for  $V_{CC\_CLKIN}$  and  $V_{CCPGM}$

Symbol	Parameter	Min	Max	Unit
$I_{CLKIN}$	$V_{CC\_CLKIN}$ current specifications	0	250	mA
$I_{PGM}$	$V_{CCPGM}$ current specifications	0	250	mA

### I/O Pin Leakage Current

Table 1-5 lists Stratix III I/O pin leakage current specifications.

**Table 1-5.** I/O Pin Leakage Current for Stratix III Devices (Note 1), (2)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_I$	Input Pin Leakage Current	$V_I = V_{CCIO\_MAX}$ to 0 V	-10	—	10	$\mu A$
$I_{OZ}$	Tri-stated I/O Pin Leakage Current	$V_O = V_{CCIO\_MAX}$ to 0 V	-10	—	10	$\mu A$

**Notes to Table 1-5:**

- (1) This value is specified for normal device operation. The value may vary during power-up. This applies for all  $V_{CCIO}$  settings (3.3, 3.0, 2.5, 1.8, 1.5, and 1.2 V).
- (2) The 10- $\mu A$  I/O leakage current limit is applicable when the internal clamping diode is off. A higher current can be observed when the diode is on.

### Bus Hold Specifications

Table 1-6 lists the Stratix III device family bus hold specifications.

**Table 1-6.** Bus Hold Parameters for Stratix III Devices (Part 1 of 2)

Parameter	Symbol	Conditions	$V_{CCIO}$										Unit
			1.2 V		1.5 V		1.8 V		2.5 V		3.0 V/3.3 V		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Low sustaining current	$I_{SUSL}$	$V_{IN} > V_{IL}$ (maximum)	22.5	—	25.0	—	30.0	—	50.0	—	70.0	—	$\mu A$
High sustaining current	$I_{SUSH}$	$V_{IN} < V_{IH}$ (minimum)	-22.5	—	-25.0	—	-30.0	—	-50.0	—	-70.0	—	$\mu A$
Low overdrive current	$I_{ODL}$	$0V < V_{IN} < V_{CCIO}$	—	120	—	160	—	200	—	300	—	500	$\mu A$

**Table 1-6.** Bus Hold Parameters for Stratix III Devices (Part 2 of 2)

Parameter	Symbol	Conditions	$V_{CCIO}$										Unit
			1.2 V		1.5 V		1.8 V		2.5 V		3.0 V/3.3 V		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
High overdrive current	$I_{ODH}$	$0V < V_{IN} < V_{CCIO}$	—	-120	—	-160	—	-200	—	-300	—	-500	$\mu A$
Bus-hold trip point	$V_{TRIP}$	—	0.45	0.95	0.50	1.00	0.68	1.07	0.70	1.70	0.80	2.00	V

**On-Chip Termination (OCT) Specifications**

If you enable OCT calibration, calibration is automatically performed at power-up for the I/Os connected to the calibration block. [Table 1-7](#) lists the Stratix III OCT calibration block accuracy specifications.

**Table 1-7.** On-Chip Termination Calibration Accuracy Specifications for Stratix III Devices (*Note 1*)

Symbol	Description	Conditions	Calibration Accuracy			Unit
			C2	C3, I3	C4, I4	
25- $\Omega$ $R_S$ (2) 3.3, 3.0, 2.5, 1.8, 1.5, 1.2	Internal series termination with calibration (25- $\Omega$ setting)	$V_{CCIO} =$ 3.3, 3.0, 2.5, 1.8, 1.5, 1.2 V	$\pm 8$	$\pm 8$	$\pm 8$	%
50- $\Omega$ $R_S$ 3.3, 3.0, 2.5, 1.8, 1.5, 1.2	Internal series termination with calibration (50- $\Omega$ setting)	$V_{CCIO} =$ 3.3, 3.0, 2.5, 1.8, 1.5, 1.2 V	$\pm 8$	$\pm 8$	$\pm 8$	%
50- $\Omega$ $R_T$ 2.5, 1.8, 1.5, 1.2	Internal parallel termination with calibration (50- $\Omega$ setting)	$V_{CCIO} =$ 2.5, 1.8, 1.5, 1.2 V	$\pm 10$	$\pm 10$	$\pm 10$	%
20- $\Omega$ $R_S$ to 60- $\Omega$ $R_S$ 3.3, 3.0, 2.5, 1.8, 1.5, 1.2	Expanded range for internal series termination with calibration (Between 20- $\Omega$ to 60- $\Omega$ setting)	$V_{CCIO} =$ 3.3, 3.0, 2.5, 1.8, 1.5, 1.2 V (3)	$\pm 10$	$\pm 10$	$\pm 10$	%
25- $\Omega$ $R_{S\_left\_shift}$	Internal left shift series termination with calibration (25- $\Omega$ $R_{S\_left\_shift}$ setting)	$V_{CCIO} =$ 3.3, 3.0, 2.5, 1.8, 1.5, 1.2 V	$\pm 10$	$\pm 10$	$\pm 10$	%
$R_{OCT\_CAL}$	Internal series termination with calibration	(4)				

**Notes to Table 1-7:**

- OCT calibration accuracy is valid at the time of calibration only.
- 25- $\Omega$   $R_S$  not supported for 1.5 V and 1.2 V in Row I/O.
- 1.5 V and 1.2 V only supports 40- $\Omega$  to 60- $\Omega$  expanded range.
- For resistance tolerance after power-up calibration, refer to [Equation 1-1](#) and [Table 1-9](#) on page 1-8.



The accuracy listed in Table 1-7 is valid at the time of calibration. If the voltage or temperature changes, the termination resistance value varies. Table 1-8 lists the resistance tolerance for Stratix III OCT.

**Table 1-8.** On-Chip Termination Resistance Tolerance Specification for Stratix III Devices

Symbol	Description	Conditions	Resistance Tolerance			Unit
			C2	C3, I3	C4, I4	
$R_{OCT\_UNCAL}$	Internal series termination without calibration		—			
25- $\Omega$ $R_S$ 3.3, 3.0, 2.5	Internal series termination without calibration (25- $\Omega$ setting)	$V_{CCIO} = 3.3, 3.0, 2.5$ V	$\pm 30$	$\pm 40$	$\pm 40$	%
25- $\Omega$ $R_S$ 1.8, 1.5	Internal series termination without calibration (25- $\Omega$ setting)	$V_{CCIO} = 1.8, 1.5$ V	$\pm 30$	$\pm 50$	$\pm 50$	%
25- $\Omega$ $R_S$ 1.2	Internal series termination without calibration (25- $\Omega$ setting)	$V_{CCIO} = 1.2$ V	$\pm 35$	$\pm 60$	$\pm 60$	%
50- $\Omega$ $R_S$ 3.3, 3.0, 2.5	Internal series termination without calibration (50- $\Omega$ setting)	$V_{CCIO} = 3.3, 3.0, 2.5$ V	$\pm 30$	$\pm 40$	$\pm 40$	%
50- $\Omega$ $R_S$ 1.8, 1.5	Internal series termination without calibration (50- $\Omega$ setting)	$V_{CCIO} = 1.8, 1.5$ V	$\pm 30$	$\pm 50$	$\pm 50$	%
50- $\Omega$ $R_S$ 1.2	Internal series termination without calibration (50- $\Omega$ setting)	$V_{CCIO} = 1.2$ V	$\pm 35$	$\pm 60$	$\pm 60$	%
$R_D$	Internal differential termination for LVDS technology (100- $\Omega$ setting)	$V_{CCIO} = 2.5$ V	-15 to 35			%

Table 1-9 lists OCT variation with temperature and voltage after power-up calibration. Use Table 1-9 and Equation 1-1 to determine OCT variation without re-calibration.

**Equation 1-1.** OCT Variation Without Re-Calibration (Note 1)

$$R_{OCT} = R_{SCAL} \left( 1 + \left\langle \frac{dR}{dT} \times \Delta T \right\rangle \pm \left\langle \frac{dR}{dV} \times \Delta V \right\rangle \right)$$

**Notes to Equation 1-1:**

- (1)  $R_{OCT}$  value calculated from Equation 1-1 shows the range of OCT resistance with the variation of temperature and  $V_{CCIO}$ .
- (2)  $R_{SCAL}$  is the OCT resistance value at power-up.
- (3)  $\Delta T$  is the variation of temperature with respect to the temperature at power-up.
- (4)  $\Delta V$  is the variation of voltage with respect to the  $V_{CCIO}$  at power-up.
- (5)  $dR/dT$  is the percentage change of  $R_{SCAL}$  with temperature.
- (6)  $dR/dV$  is the percentage change of  $R_{SCAL}$  with voltage.

**Table 1-9.** On-Chip Termination Variation after Power-up Calibration (Note 1)

Symbol	Description	V <sub>CCIO</sub> (V)	Commercial Typical	Unit
dR/dV	OCT variation with voltage without re-calibration	3	0.029	%/mV
		2.5	0.036	%/mV
		1.8	0.065	%/mV
		1.5	0.104	%/mV
		1.2	0.177	%/mV
dR/dT	OCT variation with temperature without re-calibration	3	0.294	%/°C
		2.5	0.301	%/°C
		1.8	0.355	%/°C
		1.5	0.344	%/°C
		1.2	0.348	%/°C

**Note to Table 1-9:**(1) Valid for V<sub>CCIO</sub> range of ± 5% and temperature range of 0° to 85° C.**Pin Capacitance**

Table 1-10 lists the Stratix III device family pin capacitance.

**Table 1-10.** Pin Capacitance for Stratix III Device Family

Symbol	Parameter	Typical	Unit
C <sub>IOTB</sub>	Input capacitance on top and bottom I/O pins	4	pF
C <sub>IOLR</sub>	Input capacitance on left and right I/O pins	4	pF
C <sub>CLKTB</sub>	Input capacitance on top and bottom non-dedicated clock input pins	4	pF
C <sub>CLKLR</sub>	Input capacitance on left and right non-dedicated clock input pins	4	pF
C <sub>OUTFB</sub>	Input capacitance on dual-purpose clock output and feedback pins	5	pF
C <sub>CLK1</sub> , C <sub>CLK3</sub> , C <sub>CLK8</sub> , and C <sub>CLK10</sub>	Input capacitance for dedicated clock input pins	2	pF

**Hot-Socketing**

Table 1-11 lists the hot-socketing specifications for Stratix III devices.

**Table 1-11.** Hot-Socketing Specifications for Stratix III Devices

Symbol	Parameter	Maximum
I <sub>IOPIN</sub>  (DC)	DC current per I/O pin	300 μA
I <sub>IOPIN</sub>  (AC)	AC current per I/O pin	8 mA (1)

**Note to Table 1-11:**(1) The I/O ramp rate is 10 ns or more. For ramp rates faster than 10 ns, |I<sub>IOPIN</sub>| = C dv/dt, in which C is I/O pin capacitance and dv/dt is the slew rate.

### Internal Weak Pull-Up Resistor

Table 1-12 lists the weak pull-up resistor values for Stratix III devices.

**Table 1-12.** Internal Weak Pull-Up Resistor for Stratix III Devices (Note 1), (3)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>PU</sub>	Value of the I/O pin pull-up resistor before and during configuration, as well as user mode if the programmable pull-up resistor option is enabled	V <sub>CCIO</sub> = 3.3 V ± 5% (2)	—	25	—	kΩ
		V <sub>CCIO</sub> = 3.0 V ± 5% (2)	—	25	—	kΩ
		V <sub>CCIO</sub> = 2.5 V ± 5% (2)	—	25	—	kΩ
		V <sub>CCIO</sub> = 1.8 V ± 5% (2)	—	25	—	kΩ
		V <sub>CCIO</sub> = 1.5 V ± 5% (2)	—	25	—	kΩ
		V <sub>CCIO</sub> = 1.2 V ± 5% (2)	—	25	—	kΩ

**Notes to Table 1-12:**

- (1) All I/O pins have an option to enable weak pull-up except configuration, test, and JTAG pins.
- (2) Pin pull-up resistance values may be lower if an external source drives the pin higher than V<sub>CCIO</sub>.
- (3) The internal weak pull-down feature is only available for the JTAG TCK pin. The typical value for this internal weak pull-down resistor is approximately 25k Ω.

### I/O Standard Specifications

The following tables list input voltage sensitivities (V<sub>IH</sub> and V<sub>IL</sub>), output voltages (V<sub>OH</sub> and V<sub>OL</sub>), and current drive characteristics (I<sub>OH</sub> and I<sub>OL</sub>) for all I/O standards supported by Stratix III devices. V<sub>OL</sub> and V<sub>OH</sub> values are valid at the corresponding I<sub>OL</sub> and I<sub>OH</sub>, respectively.

Table 1-13 through Table 1-18 list the Stratix III device family I/O standard specifications. Refer to “Glossary” on page 1-326 for an explanation of terms used in the Table 1-14 through Table 1-18.

**Table 1-13.** Single-Ended I/O Standards Specifications

I/O Standard	V <sub>CCIO</sub> (V)			V <sub>IL</sub> (V)		V <sub>IH</sub> (V)		V <sub>OL</sub> (V)	V <sub>OH</sub> (V)	I <sub>OL</sub> (mA)	I <sub>OH</sub> (mA)
	Min	Typ	Max	Min	Max	Min	Max	Max	Min		
3.3-V LVTTTL	3.135	3.3	3.465	-0.3	0.8	1.7	3.6	0.4	2.4	2	-2
3.0-V LVTTTL	2.85	3	3.15	-0.3	0.8	1.7	3.6	0.4	2.4	2	-2
3.3-V LVCMOS	3.135	3.3	3.465	-0.3	0.8	1.7	3.6	0.2	V <sub>CCIO</sub> - 0.2	0.1	-0.1
3.0-V LVCMOS	2.85	3	3.15	-0.3	0.8	1.7	3.6	0.2	V <sub>CCIO</sub> - 0.2	0.1	-0.1
2.5-V LVTTTL / LVCMOS	2.375	2.5	2.625	-0.3	0.7	1.7	3.6	0.2	2.1	0.1	-0.1
		2.5	2.625	-0.3	0.7	1.7	3.6	0.4	2	1	-1
		2.5	2.625	-0.3	0.7	1.7	3.6	0.7	1.7	2	-2
1.8-V LVTTTL / LVCMOS	1.71	1.8	1.89	-0.3	0.35 * V <sub>CCIO</sub>	0.65 * V <sub>CCIO</sub>	V <sub>CCIO</sub> + 0.3	0.45	V <sub>CCIO</sub> - 0.45	2	-2
1.5-V LVTTTL / LVCMOS	1.425	1.5	1.575	-0.3	0.35 * V <sub>CCIO</sub>	0.65 * V <sub>CCIO</sub>	V <sub>CCIO</sub> + 0.3	0.25 * V <sub>CCIO</sub>	0.75 * V <sub>CCIO</sub>	2	-2
1.2-V LVTTTL / LVCMOS	1.14	1.2	1.26	-0.3	0.35 * V <sub>CCIO</sub>	0.65 * V <sub>CCIO</sub>	V <sub>CCIO</sub> + 0.3	0.25 * V <sub>CCIO</sub>	0.75 * V <sub>CCIO</sub>	2	-2
3.0-V PCI	2.85	3	3.15	—	0.3 * V <sub>CCIO</sub>	0.5 * V <sub>CCIO</sub>	3.6	0.1 * V <sub>CCIO</sub>	0.9 * V <sub>CCIO</sub>	1.5	-0.5
3.0-V PCI-X	2.85	3	3.15	—	0.35 * V <sub>CCIO</sub>	0.5 * V <sub>CCIO</sub>	—	0.1 * V <sub>CCIO</sub>	0.9 * V <sub>CCIO</sub>	1.5	-0.5

Refer to the figure in “Single-Ended Voltage Referenced I/O Standard” in the “Glossary” on page 1-326 for voltage referenced receiver input waveform and explanation of terms used in Table 1-14.

**Table 1-14.** Single-Ended SSTL and HSTL I/O Reference Voltage Specifications

I/O Standard	$V_{CCIO}$ (V)			$V_{REF}$ (V)			$V_{TT}$ (V)		
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
SSTL-2 CLASS I, II	2.375	2.5	2.625	$0.49 * V_{CCIO}$	$0.5 * V_{CCIO}$	$0.51 * V_{CCIO}$	$V_{REF} - 0.04$	$V_{REF}$	$V_{REF} + 0.04$
SSTL-18 CLASS I, II	1.71	1.8	1.89	0.833	0.9	0.969	$V_{REF} - 0.04$	$V_{REF}$	$V_{REF} + 0.04$
SSTL-15 CLASS I, II	1.425	1.5	1.575	$0.47 * V_{CCIO}$	$0.5 * V_{CCIO}$	$0.53 * V_{CCIO}$	$0.47 * V_{CCIO}$	$V_{REF}$	$0.53 * V_{CCIO}$
HSTL-18 CLASS I, II	1.71	1.8	1.89	0.85	0.9	0.95	—	$V_{CCIO}/2$	—
HSTL-15 CLASS I, II	1.425	1.5	1.575	0.68	0.75	0.9	—	$V_{CCIO}/2$	—
HSTL-12 CLASS I, II	1.14	1.2	1.26	$0.47 * V_{CCIO}$	$0.5 * V_{CCIO}$	$0.53 * V_{CCIO}$	—	$V_{CCIO}/2$	—

**Table 1-15.** Single-Ended SSTL and HSTL I/O Standards Signal Specifications (Note 1) (Part 1 of 2)

I/O Standard	$V_{IL(DC)}$ (V)		$V_{IH(DC)}$ (V)		$V_{IL(AC)}$ (V)	$V_{IH(AC)}$ (V)	$V_{OL}$ (V)	$V_{OH}$ (V)	IOL (mA)	IOH (mA)
	Min	Max	Min	Max	Max	Min	Max	Min		
SSTL-2 CLASS I	-0.3	$V_{REF} - 0.15$	$V_{REF} + 0.15$	$V_{CCIO} + 0.3$	$V_{REF} - 0.31$	$V_{REF} + 0.31$	$V_{TT} - 0.57$	$V_{TT} + 0.57$	8.1	-8.1
SSTL-2 CLASS II	-0.3	$V_{REF} - 0.15$	$V_{REF} + 0.15$	$V_{CCIO} + 0.3$	$V_{REF} - 0.31$	$V_{REF} + 0.31$	$V_{TT} - 0.76$	$V_{TT} + 0.76$	16.2	-16.2
SSTL-18 CLASS I	-0.3	$V_{REF} - 0.125$	$V_{REF} + 0.125$	$V_{CCIO} + 0.3$	$V_{REF} - 0.25$	$V_{REF} + 0.25$	$V_{TT} - 0.475$	$V_{TT} + 0.475$	6.7	-6.7
SSTL-18 CLASS II	-0.3	$V_{REF} - 0.125$	$V_{REF} + 0.125$	$V_{CCIO} + 0.3$	$V_{REF} - 0.25$	$V_{REF} + 0.25$	0.28	$V_{CCIO} - 0.28$	13.4	-13.4
SSTL-15 CLASS I	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.175$	$V_{REF} + 0.175$	$0.2 * V_{CCIO}$	$0.8 * V_{CCIO}$	8	-8
SSTL-15 CLASS II	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.175$	$V_{REF} + 0.175$	$0.2 * V_{CCIO}$	$0.8 * V_{CCIO}$	16	-16
HSTL-18 CLASS I	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.2$	$V_{REF} + 0.2$	0.4	$V_{CCIO} - 0.4$	8	-8
HSTL-18 CLASS II	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.2$	$V_{REF} + 0.2$	0.4	$V_{CCIO} - 0.4$	16	-16
HSTL-15 CLASS I	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.2$	$V_{REF} + 0.2$	0.4	$V_{CCIO} - 0.4$	8	-8
HSTL-15 CLASS II	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.2$	$V_{REF} + 0.2$	0.4	$V_{CCIO} - 0.4$	16	-16
HSTL-12 CLASS I	-0.15	$V_{REF} - 0.08$	$V_{REF} + 0.08$	$V_{CCIO} + 0.15$	$V_{REF} - 0.15$	$V_{REF} + 0.15$	$0.25 * V_{CCIO}$	$0.75 * V_{CCIO}$	8	-8

**Table 1-15.** Single-Ended SSTL and HSTL I/O Standards Signal Specifications (Note 1) (Part 2 of 2)

I/O Standard	$V_{IL(DC)} (V)$		$V_{IH(DC)} (V)$		$V_{IL(AC)} (V)$	$V_{IH(AC)} (V)$	$V_{OL} (V)$	$V_{OH} (V)$	IOL (mA)	IOH (mA)
	Min	Max	Min	Max	Max	Min	Max	Min		
HSTL-12 CLASS II	-0.15	$V_{REF} - 0.08$	$V_{REF} + 0.08$	$V_{CCIO} + 0.15$	$V_{REF} - 0.15$	$V_{REF} + 0.15$	$0.25 * V_{CCIO}$	$0.75 * V_{CCIO}$	16	-16

Note to Table 1-15:

- (1) Use the current strength settings that are equal or larger than the IOL and IOH values listed to meet the VOL and VOH specifications for each line. OCT or lower current strengths may provide better signal integrity and lower power.

Refer to the figures for “Differential I/O Standards” in “Glossary” on page 1-326 for the receiver input and transmitter output waveforms, and for all the differential I/O standards (LVDS, mini-LVDS, RSDS).  $V_{CC\_CLKIN}$  is the power supply for the differential column clock input pins.  $V_{CCPD}$  is the power supply for the row I/Os and all other column I/Os.

**Table 1-16.** Differential SSTL I/O Standard Specifications

I/O Standard	$V_{CCIO} (V)$			$V_{SWING(DC)} (V)$		$V_{X(AC)} (V)$			$V_{SWING(AC)} (V)$		$V_{OX(AC)} (V)$		
	Min	Typ	Max	Min	Max	Min	Typ	Max	Min	Max	Min	Typ	Max
SSTL-2 CLASS I, II	2.375	2.5	2.625	0.3	$V_{CCIO} + 0.6$	$V_{CCIO}/2 - 0.2$	—	$V_{CCIO}/2 + 0.2$	0.62	$V_{CCIO} + 0.6$	$V_{CCIO}/2 - 0.15$	—	$V_{CCIO}/2 + 0.15$
SSTL-18 CLASS I, II	1.71	1.8	1.89	0.25	$V_{CCIO} + 0.6$	$V_{CCIO}/2 - 0.175$	—	$V_{CCIO}/2 + 0.175$	0.5	$V_{CCIO} + 0.6$	$V_{CCIO}/2 - 0.125$	—	$V_{CCIO}/2 + 0.125$
SSTL-15 CLASS I, II	1.425	1.5	1.575	0.2	—	—	$V_{CCIO}/2$	—	0.35	—	—	$V_{CCIO}/2$	—

**Table 1-17.** Differential HSTL I/O Standards Specifications

I/O Standard	$V_{CCIO} (V)$			$V_{DIF(DC)} (V)$		$V_{X(AC)} (V)$			$V_{CM(DC)} (V)$			$V_{DIF(AC)} (V)$	
	Min	Typ	Max	Min	Max	Min	Typ	Max	Min	Typ	Max	Min	Max
HSTL-18 CLASS I, II	1.71	1.8	1.89	0.2	—	0.78	—	1.12	0.78	—	1.12	0.4	—
HSTL-15 CLASS I, II	1.425	1.5	1.575	0.2	—	0.68	—	0.9	0.68	—	0.9	0.4	—
HSTL-12 CLASS I, II	1.14	1.2	1.26	0.16	$V_{CCIO} + 0.3$	—	$0.5 * V_{CCIO}$	—	$0.4 * V_{CCIO}$	$0.5 * V_{CCIO}$	$0.6 * V_{CCIO}$	0.3	$V_{CCIO} + 0.48$

**Table 1-18.** Differential I/O Standard Specifications (Part 1 of 2)

I/O Standard	$V_{CCIO} (V)$			$V_{ID} (V) (1)$			$V_{ICM(DC)} (V)$			$V_{OD} (V) (2)$			$V_{OCM} (V) (2)$		
	Min	Typ	Max	Min	Condition	Max	Min	Condition	Max	Min	Typ	Max	Min	Typ	Max
2.5 V LVDS (Row I/O)	2.375	2.5	2.625	0.1	$V_{CM} = 1.25$	—	0.05 (6)	$D_{max} \leq 700$ Mbps	1.8 (6)	0.247	—	0.6	1.125	1.25	1.375
	2.375	2.5	2.625	0.1	$V_{CM} = 1.25$	—	1.05 (6)	$D_{max} > 700$ Mbps	1.55 (6)	0.247	—	0.6	1.125	1.25	1.375

**Table 1-18.** Differential I/O Standard Specifications (Part 2 of 2)

I/O Standard	$V_{CCIO}$ (V)			$V_{ID}$ (V) (1)			$V_{ICM(DC)}$ (V)			$V_{OD}$ (V) (2)			$V_{OCM}$ (V) (2)		
	Min	Typ	Max	Min	Condition	Max	Min	Condition	Max	Min	Typ	Max	Min	Typ	Max
2.5 V LVDS (Column I/O)	2.375	2.5	2.625	0.1	$V_{CM} = 1.25$	—	0.05 (6)	$D_{max} \leq 700$ Mbps	1.8 (6)	0.247	—	0.6	1.0	1.25	1.5
	2.375	2.5	2.625	0.1	$V_{CM} = 1.25$	—	1.05 (6)	$D_{max} > 700$ Mbps	1.55 (6)	0.247	—	0.6	1.0	1.25	1.5
RSDS (Row I/O)	2.375	2.5	2.625	0.1	$V_{CM} = 1.25$	—	0.3	—	1.4	0.1	0.2	0.6	0.5	1.2	1.4
RSDS (Column I/O)	2.375	2.5	2.625	0.1	$V_{CM} = 1.25$	—	0.3	—	1.4	0.1	0.2	0.6	0.5	1.2	1.5
Mini-LVDS (Row I/O)	2.375	2.5	2.625	0.2	—	0.6	0.4	—	1.325	0.25	—	0.6	0.5	1.2	1.4
Mini-LVDS (Column I/O)	2.375	2.5	2.625	0.2	—	0.6	0.4	—	1.325	0.25	—	0.6	0.5	1.2	1.5
LVPECL (3)	2.375 (5)	2.5 (5)	2.625 (5)	0.3	—	—	0.6	$D_{max} \leq 700$ Mbps	1.8 (4)	—	—	—	—	—	—
	2.375 (5)	2.5 (5)	2.625 (5)	0.3	—	—	1.0	$D_{max} > 700$ Mbps	1.6 (4)	—	—	—	—	—	—

**Notes to Table 1-18:**

- (1) The minimum  $V_{ID}$  value is applicable over the entire common mode range,  $V_{CM}$ .
- (2) RL range:  $90 \leq RL \leq 110 \Omega$ .
- (3) Column and row I/O banks support LVPECL I/O standards for input operation only on dedicated clock input pins. Differential clock inputs in column I/O use  $V_{CC\_CLKIN}$  that must be powered by 2.5 V. Differential clock inputs in row I/O banks are powered by  $V_{CCPD}$ .
- (4) The receiver voltage input range for the data rate when  $D_{max} > 700$  Mbps is  $0.85 V \leq V_{IN} \leq 1.75 V$ .  
The receiver voltage input range for the data rate when  $D_{max} \leq 700$  Mbps is  $0.45 V \leq V_{IN} \leq 1.95 V$ .
- (5) Power supply for the column I/O LVPECL differential clock input buffer is  $V_{CC\_CLKIN}$ .
- (6) The receiver voltage input range for the data rate when  $D_{max} > 700$  Mbps is  $1.0 V \leq V_{IN} \leq 1.6 V$ .  
The receiver voltage input range for the data rate when  $D_{max} \leq 700$  Mbps is zero  $V \leq V_{IN} \leq 1.85 V$ .

## Power Consumption

Altera offers two ways to estimate power for a design: the Excel-based Early Power Estimator (EPE) and the Quartus® II **PowerPlay Power Analyzer** feature.

The interactive Excel-based Early Power Estimator is typically used prior to designing the FPGA in order to get a magnitude estimate of the device power. The Quartus II **PowerPlay Power Analyzer** provides estimation based on the specifics of the design after place-and-route is complete. The **PowerPlay Power Analyzer** can apply a combination of user-entered, simulation-derived, and estimated signal activities which, when combined with detailed circuit models, can yield very accurate power estimation.

Refer to [Table 1-4 on page 1-5](#) for supply current estimates for  $V_{CCPGM}$  and  $V_{CC\_CLKIN}$ . Use the EPE and PowerPlay Power Analyzer for current estimates of remaining power supplies.



For more information about power estimation tools, refer to the *PowerPlay Early Power Estimator User Guide For Stratix III FPGAs* and the *PowerPlay Power Analysis* chapter in the *Quartus II Handbook*.

## Switching Characteristics

This section provides performance characteristics of Stratix III core and periphery blocks for commercial grade devices.

These characteristics can be designated as **Preliminary** and **Final** and each designation is defined below.

**Preliminary**—Preliminary characteristics are created using simulation results, process data, and other known parameters.

**Final**—Final numbers are based on actual silicon characterization and testing. These numbers reflect the actual performance of the device under worst-case silicon process, voltage, and junction temperature conditions. The upper-right hand corner of a table shows the designation as **Preliminary** or **Final**.

## Core Performance Specifications

These sections describe the Clock Tree, PLL, digital signal processing (DSP), TriMatrix, and Configuration and JTAG specifications.

### Clock Tree Specifications

Table 1-19 lists the clock tree performance specifications for the logic array, DSP blocks, and TriMatrix Memory blocks for Stratix III devices.

**Table 1-19.** Clock Tree Performance for Stratix III Devices

Device	C2	C3, I3	C4, I4	C4L, I4L		Unit
	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
EP3SL50	730	700	450	450	375	MHz
EP3SL70	730	700	450	450	375	MHz
EP3SL110	730	700	450	450	375	MHz
EP3SL150	730	700	450	450	375	MHz
EP3SL200	730	700	450	450	375	MHz
EP3SE260	730	700	450	450	375	MHz
EP3SL340	730	700	450	450	375	MHz
EP3SE50	730	700	450	450	375	MHz
EP3SE80	730	700	450	450	375	MHz
EP3SE110	730	700	450	450	375	MHz

### PLL Specifications

Table 1-20 lists the Stratix III PLL specifications when operating in both the commercial junction temperature range (0 to 85° C) and the industrial junction temperature range (-40 to 100° C), except for EP3SL340, EP3SE260, and EP3SL200 devices in the I4L ordering code, where the industrial junction temperature range is from 0° C to 100° C, regardless of supply voltage. Refer to the figure in “PLL Specifications” in “Glossary” on page 1-326 for the PLL block diagram.

**Table 1–20.** PLL Specifications for Stratix III Devices (Part 1 of 3)

Symbol	Parameter	C2			C3, I3			C4, I4			C4L, I4L						Unit
		V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 0.9 V			
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f <sub>IN</sub>	Input clock frequency	5	—	800 (1)	5	—	717 (1)	5	—	717 (1)	5	—	717 (1)	5	—	717 (1)	MHz
f <sub>INPFD</sub>	Input frequency to the PFD	5	—	325	5	—	325	5	—	325	5	—	325	5	—	325	MHz
f <sub>VCO</sub>	PLL VCO operating range	600	—	1600	600	—	1300	600	—	1300	600	—	1300	600	—	1300	MHz
t <sub>EINDUTY</sub>	Input clock or external feedback clock input duty cycle	40	—	60	40	—	60	40	—	60	40	—	60	40	—	60	%
f <sub>OUT</sub>	Output frequency for internal global or regional clock	—	—	600 (2)	—	—	500 (2)	—	—	450 (2)	—	—	450 (2)	—	—	375 (2)	MHz
f <sub>OUT_EXT</sub>	Output frequency for dedicated external clock output	—	—	800 (2)	—	—	717 (2)	—	—	717 (2)	—	—	717 (2)	—	—	717 (2)	MHz
t <sub>OUTDUTY</sub>	Duty cycle for external clock output (when set to 50%)	45	50	55	45	50	55	45	50	55	45	50	55	45	50	55	%
t <sub>FCOMP</sub>	External feedback clock compensation time	—	—	10	—	—	10	—	—	10	—	—	10	—	—	10	ns
t <sub>CONFIGPLL</sub>	Time required to reconfigure scan chain	—	3.5	—	—	3.5	—	—	3.5	—	—	3.5	—	—	3.5	—	scanclk cycles
t <sub>CONFIGPHASE</sub>	Time required to reconfigure phase shift	—	1	—	—	1	—	—	1	—	—	1	—	—	1	—	scanclk cycles
f <sub>SCANCLK</sub>	scanclk frequency	—	—	100	—	—	100	—	—	100	—	—	100	—	—	100	MHz
t <sub>LOCK</sub>	Time required to lock from end of device configuration	—	—	1	—	—	1	—	—	1	—	—	1	—	—	1	ms
t <sub>DLOCK</sub>	Time required to lock dynamically (after switchover or reconfiguring any non-post-scale counters/delays)	—	—	1	—	—	1	—	—	1	—	—	1	—	—	1	ms



**Table 1-20.** PLL Specifications for Stratix III Devices (Part 2 of 3)

Symbol	Parameter	C2			C3, I3			C4, I4			C4L, I4L						Unit
		V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 0.9 V			
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f <sub>CLBW</sub>	PLL closed-loop low bandwidth	—	0.3	—	—	0.3	—	—	0.3	—	—	0.3	—	—	0.3	—	MHz
	PLL closed-loop medium bandwidth	—	1.5	—	—	1.5	—	—	1.5	—	—	1.5	—	—	1.5	—	MHz
	PLL closed-loop high bandwidth (6)	—	4	—	—	4	—	—	4	—	—	4	—	—	4	—	MHz
t <sub>PLL_PSERR</sub>	Accuracy of PLL phase shift	—	—	±50	—	—	±50	—	—	±50	—	—	±50	—	—	±50	ps
t <sub>ARESET</sub>	Minimum pulse width on areset signal	10	—	—	10	—	—	10	—	—	10	—	—	10	—	—	ns
t <sub>INCCJ</sub> (3), (4)	Input clock cycle to cycle jitter (F <sub>REF</sub> ≥ 100 MHz)	—	—	0.15	—	—	0.15	—	—	0.15	—	—	0.15	—	—	0.1	UI (p-p)
	Input clock cycle to cycle jitter (F <sub>REF</sub> < 100 MHz)	—	—	±750	—	—	±750	—	—	±750	—	—	±750	—	—	±500	ps (p-p)
t <sub>OUTPJ_DC</sub> (5)	Period Jitter for dedicated clock output (F <sub>OUT</sub> ≥ 100 MHz)	—	—	175	—	—	175	—	—	175	—	—	175	—	—	225	ps (p-p)
	Period Jitter for dedicated clock output (F <sub>OUT</sub> < 100 MHz)	—	—	17.5	—	—	17.5	—	—	17.5	—	—	17.5	—	—	22.5	mUI (p-p)
t <sub>OUTCCJ_DC</sub> (5)	Cycle to Cycle Jitter for dedicated clock output (F <sub>OUT</sub> ≥ 100 MHz)	—	—	175	—	—	175	—	—	175	—	—	175	—	—	225	ps (p-p)
	Cycle to Cycle Jitter for dedicated clock output (F <sub>OUT</sub> < 100 MHz)	—	—	17.5	—	—	17.5	—	—	17.5	—	—	17.5	—	—	22.5	mUI (p-p)
t <sub>OUTPJ_IO</sub> (5), (8)	Period Jitter for clock output on regular IO (F <sub>OUT</sub> ≥ 100 MHz)	—	—	600	—	—	600	—	—	600	—	—	600	—	—	750	ps (p-p)
	Period Jitter for clock output on regular IO (F <sub>OUT</sub> < 100 MHz)	—	—	60	—	—	60	—	—	60	—	—	60	—	—	75	mUI (p-p)

**Table 1–20.** PLL Specifications for Stratix III Devices (Part 3 of 3)

Symbol	Parameter	C2			C3, I3			C4, I4			C4L, I4L						Unit
		V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 1.1 V			V <sub>CCL</sub> = 0.9 V			
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
t <sub>OUTCCJ_IO</sub> (5), (8)	Cycle to Cycle Jitter for clock output on regular IO (F <sub>OUT</sub> ≥ 100 MHz)	—	—	600	—	—	600	—	—	600	—	—	600	—	—	750	ps (p-p)
	Cycle to Cycle Jitter for clock output on regular IO (F <sub>OUT</sub> < 100 MHz)	—	—	60	—	—	60	—	—	60	—	—	60	—	—	75	mUI (p-p)
t <sub>CASC_OUTPJ_DC</sub> (5), (7)	Period Jitter for dedicated clock output in cascaded PLLs (F <sub>OUT</sub> ≥ 100 MHz)	—	—	250	—	—	250	—	—	250	—	—	250	—	—	325	ps (p-p)
	Period Jitter for dedicated clock output in cascaded PLLs (F <sub>OUT</sub> < 100 MHz)	—	—	25	—	—	25	—	—	25	—	—	25	—	—	32.5	mUI (p-p)
f <sub>DRIFT</sub>	Frequency drift after PFDENA is disabled for duration of 100 μs	—	—	±10	—	—	±10	—	—	±10	—	—	±10	—	—	±10	%

**Notes to Table 1–20:**

- (1) This specification is limited in the Quartus II software by the I/O maximum frequency. The maximum I/O frequency is different for each I/O standard.
- (2) This specification is limited by the lower of the two: I/O f<sub>max</sub> or f<sub>out</sub> of the PLL.
- (3) A high input jitter directly affects the PLL output jitter. To have low PLL output clock jitter, you must provide a clean clock source, which is less than 120 ps.
- (4) F<sub>REF</sub> is f<sub>IN</sub>/N when N = 1.
- (5) Peak-to-peak jitter with a probability level of 10<sup>-12</sup> (14 sigma, 99.9999999974404% confidence level). The output jitter specification applies to the intrinsic jitter of the PLL, when an input jitter of 30 ps is applied.
- (6) High bandwidth PLL settings are not supported in external feedback mode.
- (7) The cascaded PLL specification is only applicable with the following conditions:
  - a) Upstream PLL: 0.59 MHz ≤ Upstream PLL BW < 1 MHz
  - b) Downstream PLL: Downstream PLL BW > 2 MHz
- (8) External memory interface clock output jitter specifications use a different measurement method and are available in Table 1–33 on page 1–29.

## DSP Block Specifications

Table 1-21 lists the Stratix III DSP block performance specifications.

**Table 1-21.** DSP Block Performance Specifications for Stratix III Devices (Note 1)

Mode	Number of Multipliers	C2 (5)	C3	C4	C4L		I3	I4	I4L	Unit
		V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
9×9-bit multiplier (a, c, e, g) (2)	1	440	365	315	315	240	345	315	225	MHz
9×9-bit multiplier (b, d, f, h) (2)	1	500	410	375	375	270	385	375	250	MHz
12×12-bit multiplier (a, e) (3)	1	440	365	315	315	240	345	315	225	MHz
12×12-bit multiplier (b, d, f, h) (3)	1	500	410	375	375	270	385	375	250	MHz
18×18-bit multiplier	1	600	495	440	440	320	470	440	300	MHz
36×36-bit multiplier	1	440	365	315	315	220	345	315	205	MHz
Double mode	1	440	365	315	315	220	345	315	205	MHz
18×18-bit multiply adder	2	490	405	345	345	250	380	345	235	MHz
18×18-bit multiply adder	4	490	405	345	345	250	380	345	235	MHz
18×18-bit multiply adder with loop back	2	490	405	345	345	250	380	345	235	MHz
18×18-bit multiply adder with loop back (4)	2	390	320	300	240	180	300	300	135	MHz
18×18-bit multiply accumulator	4	475	390	330	330	240	370	330	225	MHz
18×18-bit multiply adder with chainout	4	475	390	330	330	240	370	330	225	MHz
Input Cascade Independent output of four 18×18 bit multiplier	4	550	455	415	415	270	430	415	250	MHz
36-bit shift (32 bit data)	1	475	390	330	330	250	370	330	235	MHz

### Notes to Table 1-21:

- (1) Maximum is for a fully pipelined block with **Round** and **Saturation** disabled.
- (2) The DSP block implements eight independent 9b×9b multiplies using a, b, c, d for the top DSP half block and e, f, g, h for the bottom DSP half block multipliers.
- (3) The DSP block implements six independent 12b×12b multiplies using a, b, d for the top DSP half block and e, f, h for the bottom DSP half block multipliers.
- (4) Maximum for loopback input registers disabled, **Round** and **Saturation** disabled, pipeline and output registers enabled.
- (5) The F<sub>max</sub> for the EP3SL200, EP3SE260, and EP3SL340 devices at the C2 speed grade is 7% slower than the C2 values shown in the table.

## TriMatrix Memory Block Specifications

Table 1-22 lists the Stratix III TriMatrix Memory Block specifications.

**Table 1-22.** TriMatrix Memory Block Performance Specifications for Stratix III Devices (*Note 1*) (Part 1 of 3)

Memory Block Type	Mode	ALUTs	TriMatrix Memory	C2 (6)	C3	C4	C4L		I3	I4	I4L	Unit
				V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
MLAB	Single port 16 × 10	0	1	600	500	450	450	340	475	450	320	MHz
	Simple dual-port 16 × 20	0	1	600	500	450	450	340	475	450	320	MHz
	ROM 64 × 10	0	1	600	500	450	450	370	475	450	350	MHz
	ROM 32 × 20	0	1	600	500	450	450	340	475	450	320	MHz
M9K (2)	Single-port 8K × 1	0	1	550	465	390	390	245	440	390	230	MHz
	Single-port 4K × 2 or 2K × 4	0	1	575	485	405	405	255	460	405	230	MHz
	Single-port 1K × 9, 512 × 18, or 256 × 36	0	1	565	475	395	395	245	450	395	220	MHz
	Simple dual-port, 8K × 1	0	1	545	460	385	385	240	435	385	225	MHz
	Simple dual-port, 4K × 2 or 2K × 4	0	1	570	480	400	400	250	455	400	225	MHz
	Simple dual-port, 1K × 9, 512 × 18, or 256 × 36	0	1	565	475	395	395	245	450	395	220	MHz
	Simple dual-port, 8K × 1, 4K × 2 or 2K × 4 with read-during-write option set to <b>Old Data</b>	0	1	375	312	265	265	205	295	265	185	MHz
	Simple dual-port, 1K × 9, 512 × 18, 256 × 36 with read-during-write option set to <b>Old Data</b>	0	1	375	312	265	265	200	295	265	180	MHz
	True dual-port, 8K × 1	0	1	530	440	370	370	230	420	370	215	MHz
	True dual-port, 4K × 2 or 2K × 4	0	1	550	460	385	385	240	435	385	215	MHz
	True dual-port, 1K × 9 or 512 × 18	0	1	545	460	380	380	235	435	380	210	MHz
	True dual-port, 8K × 1, 4K × 2, or 2K × 4 with read-during-write option set to <b>Old Data</b>	0	1	350	295	245	245	175	280	245	160	MHz
	True dual-port, 1K × 9 or 512 × 18 with read-during-write option set to <b>Old Data</b>	0	1	340	285	240	240	165	270	240	150	MHz
	ROM 1P, 8K × 1, 4K × 2, or 2K × 4	0	1	580	485	405	405	260	460	405	235	MHz
	ROM 1P, 1K × 9, 512 × 18, or 256 × 36	0	1	575	485	405	405	255	460	405	230	MHz
	ROM 2P, 8K × 1, 4K × 2, or 2K × 4	0	1	580	485	405	405	265	460	405	240	MHz
	ROM 2P, 1K × 9, or 512 × 18	0	1	575	485	405	405	260	460	405	235	MHz
	Min Pulse Width (Clock High Time)	—	—	800	1000	1100	1100	1800	1000	1100	1800	ps
Min Pulse Width (Clock Low Time)	—	—	500	625	690	690	1100	625	690	1100	ps	

**Table 1-22.** TriMatrix Memory Block Performance Specifications for Stratix III Devices (*Note 1*) (Part 2 of 3)

Memory Block Type	Mode	ALUTs	TriMatrix Memory	C2 (6)	C3	C4	C4L		I3	I4	I4L	Unit
				V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
M144K (3), (4)	True dual-port 16K × 9 or 8K × 18	0	1	350	300	245	245	180	280	245	170	MHz
	True dual-port 4K × 36	0	1	520	430	365	365	250	405	365	235	MHz
	Simple dual-port 16K × 9 or 8K × 18	0	1	350	300	245	245	180	280	245	170	MHz
	Simple dual-port 4K × 36 or 2K × 72	0	1	565	470	395	395	225	440	395	210	MHz
	ROM 1Port	0	1	580	470	425	425	260	470	425	260	MHz
	ROM 2 Port	0	1	545	450	380	380	260	425	380	245	MHz
	Single-port 16K × 9 or 8K × 18	0	1	385	330	270	270	240	310	270	195	MHz
	Single-port 4K × 36	0	1	580	470	425	425	210	470	425	195	MHz
	True dual-port 16K × 9, 8K × 18, or 4K × 36 with read-during-write option set to <b>Old Data</b>	0	1	325	270	225	225	165	255	225	155	MHz
	Simple dual-port 16K × 9, 8K × 18, 4K × 36, or 2K × 72 with read-during-write option set to "Old Data"	0	1	350	292	250	250	200	275	250	190	MHz
	Simple dual-port 2K × 64 (with ECC)	0	1	255	210	180	180	130	195	180	120	MHz
	Min Pulse Width (Clock High Time)	—	—	800	1000	1100	1100	1800	1000	1100	1800	ps
	Min Pulse Width (Clock Low Time)	—	—	500	625	690	690	1100	625	690	1100	ps
M144K (3), (5)	True dual-port 16K × 9 or 8K × 18	0	1	425	360	300	300	210	340	300	195	MHz
	True dual-port 4K × 36	0	1	520	430	365	365	250	405	365	235	MHz
	Simple dual-port 16K × 9 or 8K × 18	0	1	425	360	300	300	210	340	300	195	MHz
	Simple dual-port 4K × 36 or 2K × 72	0	1	565	470	395	395	225	440	395	210	MHz
	ROM 1Port	0	1	580	470	425	425	260	470	425	260	MHz
	ROM 2 Port	0	1	545	450	380	380	260	425	380	245	MHz
	Single-port 16K × 9 or 8K × 18	0	1	475	405	335	335	210	380	335	195	MHz
	Single-port 4K × 36	0	1	580	470	425	425	210	470	425	195	MHz
	True dual-port 16K × 9, 8K × 18, or 4K × 36 with read-during-write option set to <b>Old Data</b>	0	1	325	270	225	225	165	255	225	155	MHz
	Simple dual-port 16K × 9, 8K × 18, 4K × 36, or 2K × 72 with read-during-write option set to <b>Old Data</b>	0	1	350	292	250	250	200	275	250	190	MHz

**Table 1-22.** TriMatrix Memory Block Performance Specifications for Stratix III Devices (*Note 1*) (Part 3 of 3)

Memory Block Type	Mode	ALUTs	TriMatrix Memory	C2 (6)	C3	C4	C4L		I3	I4	I4L	Unit
				V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
M144K (3), (5)	Simple dual-port 2K × 64 (with ECC)	0	1	255	210	180	180	130	195	180	120	MHz
	Min Pulse Width (Clock High Time)	—	—	800	1000	1100	1100	1800	1000	1100	1800	ps
	Min Pulse Width (Clock Low Time)	—	—	500	625	690	690	1100	625	690	1100	ps

**Notes to Table 1-22:**

- (1) Use a memory block clock that comes through global clock routing from an on-chip PLL set to 50% output duty cycle to achieve the maximum memory block performance. Use the Quartus II software to report timing for this and other memory block clocking schemes.
- (2) The  $F_{max}$  shown for M9K degrades 2% when you use the Error Detection CRC feature on the device, except for the C4L speed grade with  $V_{CCL} = 0.9$  V. For the C4L speed grade with  $V_{CCL} = 0.9$  V, there is no degradation in  $F_{max}$  when you use the Error Detection CRC feature.
- (3) The  $F_{max}$  shown for M144K degrades 10 MHz when you use byte-enable support on M144K.
- (4)  $F_{max}$  is applicable when the **COMPTABILITY** option is turned ON.
- (5)  $F_{max}$  is applicable when the **COMPTABILITY** option is turned OFF. This option is turned ON by default in Quartus II software.
- (6) The  $F_{max}$  for the EP3SL200, EP3SE260, and EP3SL340 devices at the C2 speed grade is 7% slower than the C2 values shown in the table.

**Configuration and JTAG Specifications**

Table 1-23 lists the Stratix III configuration mode specifications.

**Table 1-23.** Configuration Mode Specifications for Stratix III Devices (*Note 1*)

Programming Mode	DCLK $F_{max}$	Unit
Passive Serial	100	MHz
Fast Passive Parallel (2)	100	MHz
Fast Active Serial (3)	40	MHz

**Notes to Table 1-23:**

- (1) DCLK  $F_{max}$  is restricted when you enable the Remote Update feature. For more information, refer to the *Remote Update Circuitry (ALTRREMOTE\_UPDATE) Megafunction User Guide*.
- (2) The data rate must be 4× slower than the clock when you use decompression and/or encryption.
- (3) For more information about the minimum and typical DCLK  $F_{max}$  value in Fast Active Serial configuration, refer to the *Configuring Stratix III Devices* chapter.

Table 1-24 lists the JTAG timing parameters and values for Stratix III devices. Refer to the figure for “HIGH-SPEED I/O Block” in the “Glossary” on page 1-326 for the JTAG timing requirements.

**Table 1-24.** JTAG Timing Parameters and Values for Stratix III Devices

Symbol	Parameter	Min	Max	Unit
$t_{JCP}$	TCK clock period	30	—	ns
$t_{JCH}$	TCK clock high time	14	—	ns
$t_{JCL}$	TCK clock low time	14	—	ns
$t_{JPSU}$ (TDI)	JTAG port setup time for TDI	1	—	ns
$t_{JPSU}$ (TMS)	JTAG port setup time for TMS	3	—	ns
$t_{JPH}$	JTAG port hold time	5	—	ns
$t_{JPCO}$	JTAG port clock to output	—	11	ns
$t_{JPZX}$	JTAG port high impedance to valid output	—	14	ns
$t_{JPXZ}$	JTAG port valid output to high impedance	—	14	ns

## Periphery Performance

This section describes periphery performance, including high-speed I/O and external memory interface.

I/O performance supports several system interfacing, such as the LVDS high-speed I/O interface, external memory interface, and the PCI/PCI-X bus interface. For example, Stratix III devices I/O configured with voltage referenced I/O standards can achieve up to the stated system interfacing speed as indicated in “[External Memory Interface Specifications](#)” on page 1–25. General-purpose I/O standards such as 3.3, 3.0, 2.5, 1.8, or 1.5 LVTTTL/LVCMOS are capable of typical 167 MHz and 1.2 LVCMOS at 100MHz interfacing frequency with 10pF load.



Actual achievable frequency depends on design- and system-specific factors. You must perform HSPICE/IBIS simulations based on your specific design and system setup to determine the maximum achievable frequency in your system.

### High-Speed I/O Specifications

Refer to the “[Glossary](#)” on page 1–326 for the definitions of the high-speed timing specifications.

[Table 1–25](#) lists the true and emulated LVDS specifications for Stratix III devices.

**Table 1–25.** True and Emulated LVDS Specifications for Stratix III Devices ([Note 1](#)), ([2](#)) (Part 1 of 3)

Symbol	Conditions	C2			C3, I3			C4, I4			C4L, I4L			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{\text{HSCLK\_in}}$ (input clock frequency)—True Differential I/O Standards	Clock boost factor $W = 1$ to 40 ( <a href="#">3</a> )	5	—	800	5	—	717	5	—	717	5	—	717	MHz
$f_{\text{HSCLK\_in}}$ (input clock frequency)—Single Ended I/O Standards ( <a href="#">9</a> )	Clock boost factor $W = 1$ to 40 ( <a href="#">3</a> )	5	—	800	5	—	717	5	—	717	5	—	717	MHz
$f_{\text{HSCLK\_out}}$ (output clock frequency)	—	5	—	800 ( <a href="#">7</a> )	5	—	717 ( <a href="#">7</a> )	5	—	717 ( <a href="#">7</a> )	5	—	717 ( <a href="#">7</a> )	MHz
<b>Transmitter</b>														
$f_{\text{HSDR}}$ (data rate)	SERDES factor $J = 3$ to 10 ( <a href="#">8</a> )	( <a href="#">4</a> )	—	1600	( <a href="#">4</a> )	—	1250	( <a href="#">4</a> )	—	1250	( <a href="#">4</a> )	—	1250	Mbps
	SERDES factor $J = 2$ , Uses DDR Register	( <a href="#">4</a> )	—	( <a href="#">4</a> )	( <a href="#">4</a> )	—	( <a href="#">4</a> )	( <a href="#">4</a> )	—	( <a href="#">4</a> )	( <a href="#">4</a> )	—	( <a href="#">4</a> )	Mbps
	SERDES factor $J = 1$ , Uses SDR Register	( <a href="#">4</a> )	—	( <a href="#">4</a> )	( <a href="#">4</a> )	—	( <a href="#">4</a> )	( <a href="#">4</a> )	—	( <a href="#">4</a> )	( <a href="#">4</a> )	—	( <a href="#">4</a> )	Mbps
LVDS_E_3R - $f_{\text{HSDR}}$ (data rate)	SERDES factor $J = 4$ to 10	( <a href="#">4</a> )	—	1100	( <a href="#">4</a> )	—	1100	( <a href="#">4</a> )	—	800	( <a href="#">4</a> )	—	800	Mbps

**Table 1-25.** True and Emulated LVDS Specifications for Stratix III Devices (Note 1), (2) (Part 2 of 3)

Symbol	Conditions	C2			C3, I3			C4, I4			C4L, I4L			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
LVDS_E_1R -f <sub>HSDR</sub> (data rate)	SERDES factor J = 4 to 10	(4)	—	311	(4)	—	200	(4)	—	200	(4)	—	200	Mbps
t <sub>x Jitter</sub> (5)	Total Jitter for Data Rate, 600 Mbps – 1.6 Gbps	—	—	160	—	—	160	—	—	160	—	—	160	ps
	Total Jitter for Data Rate, < 600 Mbps	—	—	0.1	—	—	0.1	—	—	0.1	—	—	0.1	UI
t <sub>DUTY</sub>	T <sub>x</sub> output duty cycle for both True and Emulated Differential I/O	45	50	55	45	50	55	45	50	55	45	50	55	%
t <sub>RISE</sub> & t <sub>FALL</sub>	True Differential I/O Standards	—	—	160	—	—	200	—	—	200	—	—	200	ps
t <sub>RISE</sub> & t <sub>FALL</sub>	Emulated Differential I/O Standards with Three External Output Resistor Network	—	—	310	—	—	310	—	—	350	—	—	350	ps
t <sub>RISE</sub> & t <sub>FALL</sub>	Emulated Differential I/O Standards with One External Output Resistor Network	—	—	460	—	—	500	—	—	500	—	—	500	ps
TCCS	True Differential I/O Standards	—	—	100	—	—	100	—	—	100	—	—	100	ps
TCCS	Emulated Differential I/O Standards	—	—	250	—	—	250	—	—	250	—	—	250	ps
<b>Receiver</b>														
f <sub>HSDRDPA</sub> (data rate)	SERDES factor J = 3 to 10	150	—	1600	150	—	1250	150	—	1250	150	—	1250	Mbps
f <sub>HSDR</sub> (data rate)	SERDES factor J = 3 to 10	(4)	—	(6)	(4)	—	(6)	(4)	—	(6)	(4)	—	(6)	Mbps
	SERDES factor J = 2, Uses DDR Registers	(4)	—	(6)	(4)	—	(6)	(4)	—	(6)	(4)	—	(6)	Mbps
	SERDES factor J = 1, Uses an SDR Register	(4)	—	(6)	(4)	—	(6)	(4)	—	(6)	(4)	—	(6)	Mbps
DPA														
DPA run length	—	—	—	10000	—	—	10000	—	—	10000	—	—	10000	UI
Soft CDR mode														
Soft-CDR PPM tolerance	—	—	—	300	—	—	300	—	—	300	—	—	300	± PPM



**Table 1-25.** True and Emulated LVDS Specifications for Stratix III Devices (Note 1), (2) (Part 3 of 3)

Symbol	Conditions	C2			C3, I3			C4, I4			C4L, I4L			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
<b>Non DPA Mode</b>														
Sampling Window	—	—	—	300	—	—	300	—	—	300	—	—	300	ps

**Notes to Table 1-25:**

- (1) When J = 3 to 10, the SERDES block is used.
- (2) When J = 1 or 2, the SERDES block is bypassed.
- (3) Clock Boost Factor (W) is the ratio between the input data rate to the input clock rate.
- (4) The minimum and maximum specification depends on the clock source (for example, the PLL and clock pin) and the clock routing resource (global, regional, or local) used. The I/O differential buffer and input register do not have a minimum toggle rate.
- (5) The  $t_{x,jitter}$  specification is for the true LVDS I/O standard only.
- (6) You can estimate the achievable maximum data rate for non-DPA mode by performing link timing closure analysis. Consider the board skew margin, transmitter delay margin, as well as the receiver sampling margin to determine the maximum data rate supported.
- (7) This is achieved by using the LVDS and DPA clock network.
- (8) If the receiver (with DPA enabled) and the transmitter are using shared PLLs, the minimum data rate is 150 Mbps.
- (9) This is only applied to DPA and Soft-CDR modes.

Table 1-26 lists the DPA lock time specifications for Stratix III devices.

**Table 1-26.** DPA Lock Time Specifications for Stratix III Devices (Note 1), (2), (3) (Part 1 of 2)

Standard	Training Pattern	Number of Data Transitions in one Repetition of Training Pattern	Number of repetitions per 256 Data Transition (4)	Condition (5)	Min	Typ	Max
SPI-4	0000000000 1111111111	2	128	without DPA PLL calibration	256 data transitions	—	—
				with DPA PLL calibration	3×256 data transitions + 2×96 slow clock cycles (6)	—	—
Parallel Rapid I/O	00001111	2	128	without DPA PLL calibration	256 data transitions	—	—
				with DPA PLL calibration	3×256 data transitions + 2×96 slow clock cycles (6)	—	—
	10010000	4	64	without DPA PLL calibration	256 data transitions	—	—
				with DPA PLL calibration	3×256 data transitions + 2×96 slow clock cycles (6)	—	—

**Table 1-26.** DPA Lock Time Specifications for Stratix III Devices (Note 1), (2), (3) (Part 2 of 2)

Standard	Training Pattern	Number of Data Transitions in one Repetition of Training Pattern	Number of repetitions per 256 Data Transition (4)	Condition (5)	Min	Typ	Max
Miscellaneous	10101010	8	32	without DPA PLL calibration	256 data transitions	—	—
				with DPA PLL calibration	3×256 data transitions + 2×96 slow clock cycles (6)	—	—
	01010101	8	32	without DPA PLL calibration	256 data transitions	—	—
				with DPA PLL calibration	3×256 data transitions + 2×96 slow clock cycles (6)	—	—

**Notes to Table 1-26:**

- (1) The DPA lock time is for one channel.
- (2) One data transition is defined as a 0-to-1 or 1-to-0 transition.
- (3) The DPA lock time stated in this table applies to both commercial and industrial grade.
- (4) These are the number of repetitions for the stated training pattern to achieve 256 data transitions.
- (5) Altera recommends PLL re-calibration for the situations below to guarantee DPA locking:
  - Sparse data transitions. For example: Repeating sequences of ten 1s and ten 0s.
  - 0 PPM frequency difference and/or 0° phase difference between the clock and data.
- (6) Slow clock = data rate (Hz)/ Deserialization factor.

Figure 1-2 shows the DPA time specification with DPA PLL calibration enabled.

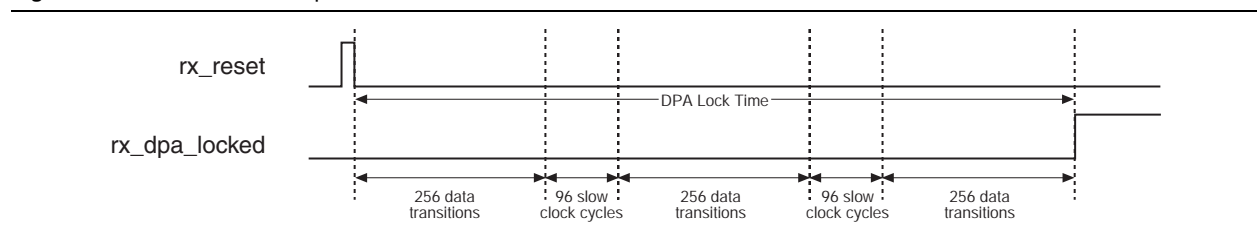
**Figure 1-2.** DPA Lock Time Specification with DPA PLL Calibration Enabled

Figure 1-3 shows the LVDS Soft-CDR/ DPA sinusoidal jitter tolerance specifications for Stratix III devices.

**Figure 1-3.** LVDS Soft-CDR/DPA Sinusoidal Jitter Tolerance Specification for Stratix III Devices

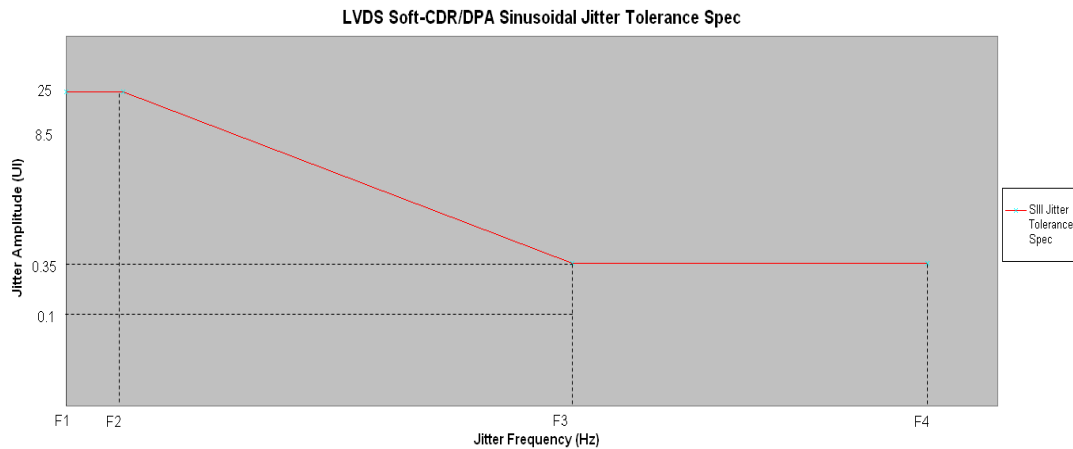



Table 1-27 lists the LVDS Soft-CDR/ DPA sinusoidal jitter mask values for Stratix III devices.

**Table 1-27.** LVDS Soft-CDR/DPA Sinusoidal Jitter Mask Values for Stratix III Devices

Jitter Frequency (Hz)	Jitter Amplitude	Unit
F1	10,000	UI
F2	17,565	UI
F3	1,493,000	UI
F4	50,000,000	UI

### External Memory Interface Specifications

The following sections describe the external memory I/O timing specifications and the DLL and DQS block specifications.

 For more information about the maximum clock rate support for external memory interfaces with a half-rate or full-rate controller, refer to *Section III: System Performance Specifications* of the *External Memory Interfaces Handbook*.

### External Memory I/O Timing Specifications

Table 1-28 and Table 1-29 list Stratix III device timing uncertainties on the read and write data paths. Use these specifications to determine timing margins for source synchronous paths between the Stratix III FPGA and the external memory device. For more information, refer to the figure for “SW (sampling window)” in the “Glossary” on page 1-326.

**Table 1-28.** Sampling Window (SW)—Read Side (Note 1)

Memory Type	I/O Standard	Width	C2		C3, I3		C4, I4		C4L, I4L		C4L, I4L	
			V <sub>CCL</sub> = 1.1 V		V <sub>CCL</sub> = 1.1 V		V <sub>CCL</sub> = 1.1 V		V <sub>CCL</sub> = 1.1 V		V <sub>CCL</sub> = 0.9 V	
			SW (ps)		SW (ps)		SW (ps)		SW (ps)		SW (ps)	
			Setup	Hold	Setup	Hold	Setup	Hold	Setup	Hold	Setup	Hold
DDR3 SDRAM (with 8 or 10 tap phase offset, 300 MHz–400 MHz)	1.5-V SSTL	×4, ×8	172	296	234	296	257	311	257	311	257	311
DDR3 SDRAM (with Deskew circuitry, 401 MHz–533 MHz)	1.5-V SSTL	×4, ×8	300	213	—	—	—	—	—	—	—	—
DDR3 SDRAM (Non-leveling interface)	1.5-V SSTL	×4, ×8	172	296	234	296	257	311	257	311	257	311
DDR2 SDRAM Differential DQS	1.8-V SSTL	×4, ×8	181	306	234	326	257	326	257	326	257	326
DDR2 SDRAM Single-ended DQS	1.8-V SSTL	×4, ×8	231	256	284	276	307	276	307	276	307	276
DDR SDRAM Single-ended DQS	2.5-V SSTL	×4, ×8	231	256	284	261	307	261	307	261	307	261
QDRII/II+ SRAM	1.5-V HSTL	×9, ×18, ×36	261	286	314	291	337	291	337	291	337	291
QDRII/II+ SRAM Emulation (2)	1.5-V HSTL	×36	261	328	314	337	337	350	337	350	337	350
QDRII/II+ SRAM	1.8-V HSTL	×9, ×18, ×36	261	286	314	291	337	291	337	291	337	291
QDRII/II+ SRAM Emulation (2)	1.8-V HSTL	×36	261	328	314	337	337	350	337	350	337	350
RLDRAM II	1.5-V HSTL	×9, ×18	211	336	264	356	287	356	287	356	287	356
RLDRAM II	1.8-V HSTL	×9, ×18	211	336	264	356	287	356	287	356	287	356

**Notes to Table 1-28:**

- (1) The values apply to Column I/Os, Row I/Os and Hybrid mode interface. Column I/Os refer to top and bottom I/Os. Hybrid mode refers to DQ/DQS groups wrapping over Column I/Os and Row I/Os of the device.
- (2) For implementation, refer to the “Supporting ×36 QDRII+/QDRII SRAM Interfaces in the F780 and F1152-Pin Packages” section in the *External Memory Interfaces in Stratix III Devices* chapter.

**Table 1-29.** Transmitter Channel-to-Channel Skew (TCCS)—Write Side (*Note 1*) (Part 1 of 2)

Memory Type	I/O Standard	Width	C2		C3, I3		C4, I4		C4L, I4L		C4L, I4L	
			V <sub>CCL</sub> = 1.1 V		V <sub>CCL</sub> = 1.1 V		V <sub>CCL</sub> = 1.1 V		V <sub>CCL</sub> = 1.1 V		V <sub>CCL</sub> = 0.9 V	
			TCCS (ps)		TCCS (ps)		TCCS (ps)		TCCS (ps)		TCCS (ps)	
			Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
DDR3 SDRAM (with Deskew circuitry, 401 MHz–533 MHz)	1.5-V SSTL	×4, ×8	253	262	—	—	—	—	—	—	—	—
DDR3 SDRAM (8-tap phase offset, 375 MHz–400 MHz)	1.5-V SSTL	×4, ×8	293	284	341	332	—	—	—	—	—	—
DDR3 SDRAM (8-tap phase offset, 360 MHz–375 MHz)	1.5-V SSTL	×4, ×8	293	284	341	373	—	—	—	—	—	—
DDR3 SDRAM (10-tap phase offset, 333 MHz–360 MHz)	1.5-V SSTL	×4, ×8	169	470	217	496	258	528	258	528	—	—
DDR3 SDRAM (10-tap phase offset, 300 MHz–333 MHz)	1.5-V SSTL	×4, ×8	169	470	217	496	258	528	258	528	—	—
DDR3 SDRAM (Non-leveling interface)	1.5-V SSTL	×4, ×8	268	246	230	355	250	388	250	388	250	388
DDR2 SDRAM Differential DQS	1.8-V SSTL	×4, ×8	229	246	230	355	250	388	250	388	350	488
DDR2 SDRAM Single-ended DQS	1.8-V SSTL	×4, ×8	316	168	318	239	346	260	346	260	446	360
DDR SDRAM Single-ended DQS	2.5-V SSTL	×4, ×8	313	157	315	222	343	242	343	242	443	342
QDRII/II+ SRAM	1.5-V HSTL	×9, ×18, ×36	290	278	292	388	315	421	315	421	415	521
QDRII/II+ SRAM Emulation (2)	1.5-V HSTL	×36	310	298	312	408	335	441	335	441	435	541

**Table 1-29.** Transmitter Channel-to-Channel Skew (TCCS)—Write Side (*Note 1*) (Part 2 of 2)

Memory Type	I/O Standard	Width	C2		C3, I3		C4, I4		C4L, I4L		C4L, I4L	
			$V_{CC1} = 1.1\text{ V}$		$V_{CC1} = 1.1\text{ V}$		$V_{CC1} = 1.1\text{ V}$		$V_{CC1} = 1.1\text{ V}$		$V_{CC1} = 0.9\text{ V}$	
			TCCS (ps)		TCCS (ps)		TCCS (ps)		TCCS (ps)		TCCS (ps)	
			Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
QDRII/II+ SRAM	1.8-V HSTL	×9, ×18, ×36	259	276	260	385	280	418	280	418	380	518
QDRII/II+ SRAM Emulation (2)	1.8-V HSTL	×36	279	296	280	405	300	438	300	438	400	538
RLDRAM II	1.5-V HSTL	×9, ×18	290	278	292	388	315	421	315	421	415	521
RLDRAM II	1.8-V HSTL	×9, ×18	259	276	260	385	280	418	280	418	380	518

**Notes to Table 1-29:**

- (1) The values apply to Column I/Os, Row I/Os, and Hybrid mode interfaces. Column I/Os refer to top and bottom I/Os. Hybrid mode refers to DQ/DQS groups wrapping over Column I/Os and Row I/Os of the device.
- (2) For implementation, refer to the “Supporting ×36 QDRII+/QDRII SRAM Interfaces in the F780 and F1152-Pin Packages” section in the *External Memory Interfaces in Stratix III Devices* chapter.

**DLL and DQS Logic Block Specifications**

Table 1-30 lists the DLL frequency range specifications for Stratix III devices.

**Table 1-30.** DLL Frequency Range Specifications for Stratix III Devices

Frequency Mode	Frequency Range (MHz)				Available Phase Shift	Number of Delay Chains	DQS Delay Buffer Mode (1)
	C2	C3, I3	C4, I4	C4L, I4L			
0	90 – 150	90 – 140	90 – 120	90 – 120	22.5°, 45°, 67.5°, 90°	16	Low
1	120 – 200	120 – 190	120 – 170	120 – 170	30°, 60°, 90°, 120°	12	Low
2	150 – 240	150 – 230	150 – 200	150 – 200	36°, 72°, 108°, 144°	10	Low
3	180 – 300	180 – 290	180 – 250	180 – 250	45°, 90°, 135°, 180°	8	Low
4	240 – 370	240 – 350	240 – 310	240 – 310	30°, 60°, 90°, 120°	12	High
5	290 – 450	290 – 420	290 – 370	290 – 370	36°, 72°, 108°, 144°	10	High
6	360 – 560	360 – 530	360 – 460	360 – 460	45°, 90°, 135°, 180°	8	High
7	470 – 740	470 – 700	470 – 610	470 – 610	60°, 120°, 180°, 240°	6	High

**Note to Table 1-30:**

- (1) “Low” indicates a 6-bit DQS delay setting; “high” indicates a 5-bit DQS delay setting.

Table 1-31 lists the average DQS phase offset delay per setting for Stratix III devices.

**Table 1-31.** Average DQS Phase Offset Delay per Setting for Stratix III Devices (Note 1), (2), (3)

Speed Grade	Min	Typ	Max	Unit
C2	7	10	13	ps
C3, I3	7	11	15	ps
C4, I4	7	11.5	16	ps
C4L, I4L	7	11.5	16	ps

**Notes to Table 1-31:**

- (1) The valid settings for phase offset are -64 to +63 for frequency modes 0 to 3 and -32 to +31 for frequency modes 4 to 6.
- (2) The typical value equals the average of the minimum and maximum values.
- (3) The delay settings are linear with a cumulative delay variation of  $\pm 20$  ps for all speed grades. For example, when using a C2 speed grade and applying 10° phase offset settings to a 90° phase shift at 400 MHz, the expected minimum cumulative delay is  $[625 \text{ ps} + (10 \times 7 \text{ ps}) - 20 \text{ ps}] = 675 \text{ ps}$ .

Table 1-32 lists the DQS phase shift error specification for DLL-delayed clock ( $t_{\text{DQS\_PSERR}}$ ) for Stratix III devices.

**Table 1-32.** DQS Phase Shift Error Specification for DLL-Delayed Clock ( $t_{\text{DQS\_PSERR}}$ ) for Stratix III Devices (Note 1)

Number of DQS Delay Buffer	C2	C3, I3	C4, C4L, I4, I4L	Unit
1	$\pm 13$	$\pm 14$	$\pm 15$	ps
2	$\pm 26$	$\pm 28$	$\pm 30$	ps
3	$\pm 39$	$\pm 42$	$\pm 45$	ps
4	$\pm 52$	$\pm 56$	$\pm 60$	ps

**Note to Table 1-32:**

- (1) This error specification is the absolute maximum and minimum error. For example, skew on three DQS delay buffers in a C2 speed grade is  $\pm 39$  ps.

Table 1-33 lists the memory output jitter specification for Stratix III devices.

**Table 1-33.** Memory Output Clock Jitter Specification for Stratix III Devices (Note 1), (2)

Parameter	Clock Network	Symbol	C2		C3, I3		C4, I4		C4L, I4L				Unit
			$V_{\text{CCL}} = 1.1\text{V}$		$V_{\text{CCL}} = 1.1\text{V}$		$V_{\text{CCL}} = 1.1\text{V}$		$V_{\text{CCL}} = 1.1\text{V}$		$V_{\text{CCL}} = 0.9\text{V}$		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Clock period jitter	Regional	tJIT(per)	-75	75	-85	85	-100	100	-100	100	-120	120	ps
Cycle-to-cycle period jitter	Regional	tJIT(cc)	-150	150	-170	170	-190	190	-190	190	-230	230	ps
Duty cycle jitter	Regional	tJIT(duty)	-80	80	-90	90	-100	100	-100	100	-140	140	ps
Clock period jitter	Global	tJIT(per)	-113	113	-128	128	-150	150	-150	150	-180	180	ps
Cycle-to-cycle period jitter	Global	tJIT(cc)	-225	225	-255	255	-285	285	-285	285	-340	340	ps
Duty cycle jitter	Global	tJIT(duty)	-120	120	-135	135	-150	150	-150	150	-180	180	ps

**Notes to Table 1-33:**

- (1) The memory output clock jitter measurements are for 200 consecutive clock cycles, as specified in the JEDEC DDR2/DDR3 standard.
- (2) The clock jitter specification applies to memory output clock pins generated using differential signal-splitter and DDIO circuits clocked by a PLL output routed on a regional or global clock network as specified. Altera recommends using the regional clock networks whenever possible.

## OCT Calibration Block Specifications

Table 1–34 lists the on-chip termination calibration block specifications for Stratix III devices.

**Table 1–34.** On-Chip Termination Calibration Block Specification

Symbol	Description	Min	Typical	Max	Unit
OCTUSRCLK	Clock required by OCT calibration blocks	—	—	20	MHz
$t_{\text{OCTCAL}}$	Number of OCTUSRCLK clock cycles required for OCT Rs and Rt calibration	—	1000	—	cycles
$t_{\text{OCTSHIFT}}$	Number of OCTUSRCLK clock cycles required for OCT code to shift out per OCT calibration block	—	28	—	cycles
$t_{\text{RS_RT}}$	Time required to dynamically switch from Rs to Rt	—	2.5	—	ns

## DCD Specifications

Table 1–35 lists the worst case duty cycle distortion for Stratix III devices.

**Table 1–35.** Duty Cycle Distortion on Stratix III I/O Pins (Note 1)

Symbol	C2		C3		C4		Unit
	Min	Max	Min	Max	Min	Max	
Output Duty Cycle	45	55	45	55	45	55	%

**Note to Table 1–35:**

- (1) The DCD specification applies to clock outputs from the PLLs, global clock tree, and IOE driving dedicated and general-purpose I/O pins.

## I/O Timing

The following sections describe the timing models, preliminary and final timings, I/O timing measurement methodology, I/O default capacitive loading, programmable IOE delay, programmable output buffer delay, user I/O timing, and dedicated clock pin timing.

### Timing Model

The DirectDrive technology and MultiTrack interconnect ensure predictable performance, accurate simulation, and accurate timing analysis across all Stratix III device densities and speed grades. This section describes the performance of the Stratix III device I/Os.

All specifications except the fast model are representative of worst-case supply voltage and junction temperature conditions. Fast model specifications are representative of best case process, supply voltage, and junction temperature conditions.

The timing numbers listed in this section are extracted from the Quartus II software version 8.1.



## Preliminary and Final Timing

Timing models can have either preliminary or final status. The Quartus II software issues an informational message during design compilation if the timing models are preliminary. Table 1-36 lists the status of the Stratix III device timing models.

Preliminary status means that the timing models are subject to change in future Quartus II releases. Initially, timing numbers are created using simulation results, process data, and other known parameters. Parts of the timing models may be correlated to silicon measurements. Various tests are used to make the preliminary numbers as close to the actual timing parameters as possible.

Final timing models are based on simulation models that are characterized versus the actual device measurements under all allowable operating conditions. When the timing models are final, all or most of the Stratix III family devices have been completely characterized and no further changes to the timing model are expected.

**Table 1-36.** Timing Model Status for Stratix III Devices

Device	Preliminary	Final
EP3SL50	—	✓
EP3SL70	—	✓
EP3SL110	—	✓
EP3SL150	—	✓
EP3SL200	—	✓
EP3SL340	—	✓
EP3SE50	—	✓
EP3SE80	—	✓
EP3SE110	—	✓
EP3SE260	—	✓

## I/O Timing Measurement Methodology

Altera characterizes timing delays at the worst-case process, minimum voltage, and maximum temperature for input register setup time ( $t_{su}$ ) and hold time ( $t_h$ ). The Quartus II software uses the following equations to calculate  $t_{su}$  and  $t_h$  timing for the Stratix III devices input signals.

$$t_{su} =$$

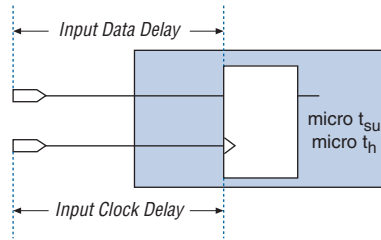
- + data delay from the input pin to the input register
- + micro setup time of the input register
- clock delay from the input pin to the input register

$$t_h =$$

- data delay from the input pin to the input register
- + micro hold time of the input register
- + clock delay from the input pin to the input register

Figure 1-4 shows the setup and hold timing diagram for input registers.

**Figure 1-4.** Input Register Setup and Hold Timing Diagram



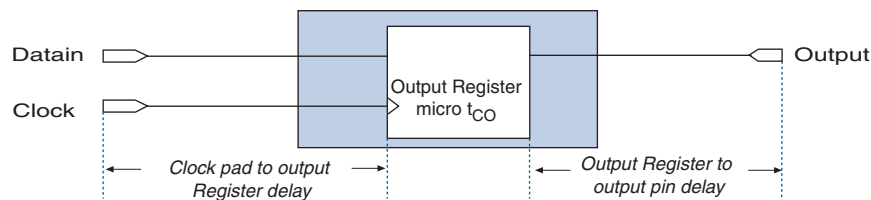
For output timing, different I/O standards require different baseline loading techniques for reporting timing delays. Altera characterizes timing delays with the required termination for each I/O standard and with 0 pF (except for PCI and PCI-X, which use 10 pF) loading. The timing is specified up to the output pin of the FPGA device. The Quartus II software calculates I/O timing for each I/O standard with a default baseline loading as specified by the I/O standards.

The following measurements are made during device characterization. Altera measures clock-to-output delays ( $t_{co}$ ) at worst-case process, minimum voltage, and maximum temperature (PVT) for default loading conditions listed in [Table 1-37 on page 1-34](#). The following equation describes clock-pin-to-output-pin timing for Stratix III devices.

The  $t_{co}$  from the clock pin to the I/O pin =  
 + delay from the clock pad to the I/O output register  
 + IOE output register clock-to-output delay  
 + delay from the output register to the output pin

Figure 1-5 shows the output register clock to output timing diagram.

**Figure 1-5.** Output Register Clock to Output Timing Diagram



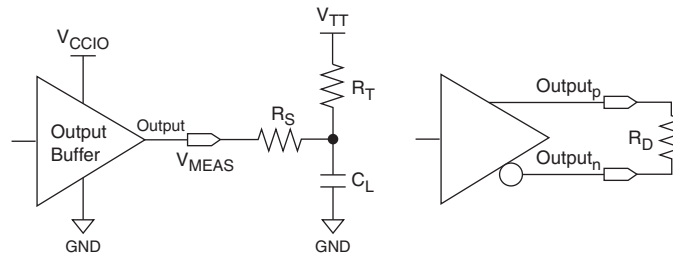
Simulation using IBIS models is required to determine the delays on the PCB traces in addition to the output pin delay timing reported by the Quartus II software and the timing model in the Stratix III Device Handbook. Perform the following steps:

1. Simulate the output driver of choice into the generalized test setup using values from [Table 1-37](#).
2. Record the time to  $V_{MEAS}$  at the far end of the PCB trace.
3. Simulate the output driver of choice into the actual PCB trace and load using the appropriate IBIS model or capacitance value to represent the load.
4. Record the time to  $V_{MEAS}$  at the far end of the PCB trace.

- Compare the results of steps 2 and 4. The increase or decrease in delay must be added to or subtracted from the I/O Standard Output Adder delays to yield the actual worst-case propagation delay (clock-to-output) of the PCB trace.

The Quartus II software reports the timing with the conditions listed in [Table 1-37](#) using [Equation 1-1 on page 1-7](#). [Figure 1-6](#) shows the circuit that is represented by the output timing of the Quartus II software.

**Figure 1-6.** Output Delay Timing Report Setup for Single-Ended Outputs and Dedicated Differential Outputs *(Note 1)*

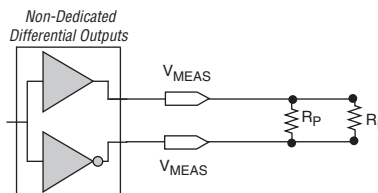


**Note to Figure 1-6:**

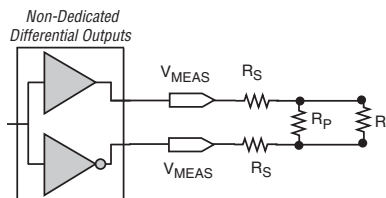
- Output pin timing is reported at the output pin of the FPGA device. Additional delays for loading and board trace delay must be accounted for with IBIS model simulations.

[Figure 1-7](#) and [Figure 1-8](#) show the circuit that is represented by the output timing of the Quartus II software for differential outputs with single and multiple external resistors, respectively.

**Figure 1-7.** Output Delay Timing Report Setup for Differential Outputs with Single External Resistor



**Figure 1-8.** Output Delay Timing Report Setup for Differential Outputs with Three External Resistor



**Table 1-37.** Output Timing Measurement Methodology for Output Pins (Part 1 of 3)

I/O Standard	Loading and Termination									Measurement Point
	$R_S$	$R_D$	$R_T$	$R_P$	$V_{CCIO}$	$V_{CCPD}$	$V_{CC}$	$V_{TT}$	$C_L$ (pF)	$V_{MEAS}$ (V)
3.3-V LVTTTL	—	—	—	—	3.135	3.135	1.05	—	0	1.5675
3.3-V LVCMOS	—	—	—	—	3.135	3.135	1.05	—	0	1.5675
3.0-V LVTTTL	—	—	—	—	2.85	2.85	1.05	—	0	1.425
3.0-V LVCMOS	—	—	—	—	2.85	2.85	1.05	—	0	1.425
2.5-V	—	—	—	—	2.375	2.375	1.05	—	0	1.1875
1.8-V	—	—	—	—	1.71	2.375	1.05	—	0	0.855
1.5-V	—	—	—	—	1.425	2.375	1.05	—	0	0.7125
1.2-V	—	—	—	—	1.14	2.375	1.05	—	0	0.57
PCI	—	—	—	—	2.85	2.85	1.05	—	10	1.425
PCI-X	—	—	—	—	2.85	2.85	1.05	—	10	1.425
SSTL-2 CLASS I	25	—	50	—	2.325	2.325	1.02	1.25	0	1.1625
SSTL-2 CLASS II	25	—	25	—	2.325	2.325	1.02	1.25	0	1.1625
SSTL-18 CLASS I	25	—	50	—	1.66	2.325	1.02	0.90	0	0.83
SSTL-18 CLASS II	25	—	25	—	1.66	2.325	1.02	0.90	0	0.83
SSTL-15 CLASS I	25	—	50	—	1.375	2.325	1.02	0.75	0	0.6875
SSTL-15 CLASS II	25	—	25	—	1.375	2.325	1.02	0.75	0	0.6875
1.8-V HSTL CLASS I	—	—	50	—	1.66	2.325	1.02	0.90	0	0.83
1.8-V HSTL CLASS II	—	—	25	—	1.66	2.325	1.02	0.90	0	0.83
1.5-V HSTL CLASS I	—	—	50	—	1.375	2.325	1.02	0.75	0	0.6875
1.5-V HSTL CLASS II	—	—	25	—	1.375	2.325	1.02	0.75	0	0.6875
1.2-V HSTL CLASS I	—	—	50	—	1.09	2.325	1.02	0.60	0	0.545
1.2-V HSTL CLASS II	—	—	25	—	1.09	2.325	1.02	0.60	0	0.545
Differential SSTL-2 CLASS I	25	—	50	—	2.325	2.325	1.02	1.25	0	1.1625
Differential SSTL-2 CLASS II	25	—	25	—	2.325	2.325	1.02	1.25	0	1.1625
Differential SSTL-18 CLASS I	25	—	50	—	1.66	2.325	1.02	0.90	0	0.83
Differential SSTL-18 CLASS II	25	—	25	—	1.66	2.325	1.02	0.90	0	0.83
1.8-V Differential HSTL CLASS I	—	—	50	—	1.66	2.325	1.02	0.90	0	0.83
1.8-V Differential HSTL CLASS II	—	—	25	—	1.66	2.325	1.02	0.90	0	0.83
1.5-V Differential HSTL CLASS I	—	—	50	—	1.375	2.325	1.02	0.75	0	0.6875

**Table 1-37.** Output Timing Measurement Methodology for Output Pins (Part 2 of 3)

I/O Standard	Loading and Termination									Measurement Point
	$R_s$	$R_D$	$R_T$	$R_P$	$V_{CCIO}$	$V_{CCPD}$	$V_{CC}$	$V_{TT}$	$C_L$ (pF)	$V_{MEAS}$ (v)
1.5-V Differential HSTL CLASS II	—	—	25	—	1.375	2.325	1.02	0.75	0	0.6875
1.2-V Differential HSTL CLASS I	—	—	50	—	1.09	2.325	1.02	0.60	0	0.545
1.2-V Differential HSTL CLASS II	—	—	25	—	1.09	2.325	1.02	0.60	0	0.545
LVDS	—	100	—	—	2.325	2.325	1.02	—	0	1.1625
MINI-LVDS	—	100	—	—	2.325	2.325	1.02	—	0	1.1625
RSDS	—	100	—	—	2.325	2.325	1.02	—	0	1.1625
LVDS_E_1R	—	100	—	120	2.325	2.325	1.02	—	0	1.1625
LVDS_E_3R	120	100	—	170	2.325	2.325	1.02	—	0	1.1625

**Table 1-37.** Output Timing Measurement Methodology for Output Pins (Part 3 of 3)

I/O Standard	Loading and Termination									Measurement Point
	$R_s$	$R_D$	$R_T$	$R_P$	$V_{CCIO}$	$V_{CCPD}$	$V_{CC}$	$V_{TT}$	$C_L$ (pF)	$V_{MEAS}$ (v)
MINI-LVDS_E_1R	—	100	—	120	2.325	2.325	1.02	—	0	1.1625
MINI-LVDS_E_3R	120	100	—	170	2.325	2.325	1.02	—	0	1.1625
RSDS_E_1R	—	100	—	120	2.325	2.325	1.02	—	0	1.1625
RSDS_E_3R	120	100	—	170	2.325	2.325	1.02	—	0	1.1625

**Notes to Table 1-37:**

- (1) Hyper transport is not supported by Stratix III devices.
- (2) LVPECL outputs are not supported by Stratix III devices.
- (3) You can change the Quartus II timing conditions using the Advanced I/O Timing feature.
- (4)  $V_{CC}$  is nominally 1.1 V less 50 mV (1.05 V).
- (5) Terminated I/O standards require an additional 30 mV IR drop on  $V_{CC}$  (1.02 V).
- (6) Terminated I/O standards require an additional 50 mV IR drop on  $V_{CCIO}$  and  $V_{CCPD}$ .

## I/O Default Capacitive Loading

Table 1-38 lists the default capacitive loading of various I/O standards.

**Table 1-38.** Default Loading of Various I/O Standards for Stratix III Devices (Part 1 of 2)

I/O Standard	Capacitive Load	Unit
3.3-V LVTTTL	0	pF
3.3-V LVCMOS	0	pF
3.0-V LVTTTL	0	pF
3.0-V LVCMOS	0	pF
2.5-V LVTTTL/LVCMOS	0	pF
1.8-V LVTTTL/LVCMOS	0	pF
1.5-V LVTTTL/LVCMOS	0	pF
3.0-V PCI	10	pF
3.0-V PCI-X	10	pF
SSTL-2 CLASS I	0	pF
SSTL-2 CLASS II	0	pF
SSTL-18 CLASS I	0	pF
SSTL-18 CLASS II	0	pF
1.5-V HSTL CLASS I	0	pF
1.5-V HSTL CLASS II	0	pF
1.8-V HSTL CLASS I	0	pF
1.8-V HSTL CLASS II	0	pF
1.2-V HSTL	0	pF
Differential SSTL-2 CLASS I	0	pF
Differential SSTL-2 CLASS II	0	pF
Differential SSTL-18 CLASS I	0	pF

**Table 1-38.** Default Loading of Various I/O Standards for Stratix III Devices (Part 2 of 2)

I/O Standard	Capacitive Load	Unit
Differential SSTL-18 CLASS II	0	pF
1.8-V Differential HSTL CLASS I	0	pF
1.8-V Differential HSTL CLASS II	0	pF
1.5-V Differential HSTL CLASS I	0	pF
1.5-V Differential HSTL CLASS II	0	pF
1.2-V Differential HSTL CLASS I	0	pF
1.2-V Differential HSTL CLASS II	0	pF
LVDS	0	pF

## Programmable IOE Delay

Table 1-39 lists the Stratix III IOE programmable delay settings.



For more information about the annotation of delays in the IOE, refer to Figure 7-7 in the *Stratix III Device I/O Features* chapter.

**Table 1-39.** IOE Programmable Delay for Stratix III Devices (Note 1)

Parameter	Available Settings	Min Offset (2)	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Unit
			Industrial	Commercial	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	
			Max Offset	Max Offset	Max Offset	Max Offset	Max Offset	Max Offset	Max Offset	Max Offset	Max Offset	Max Offset	Max Offset	
D1	15	0	442	491	748	829	916	871	833	870	957	915	833	ps
D2	7	0	248	285	387	412	442	427	411	433	464	448	411	ps
D3	7	0	1625	1806	2747	3058	3371	3218	3084	3210	3540	3382	3084	ps
D4	15	0	491	517	726	872	884	844	808	845	928	887	808	ps
D5	15	0	452	503	764	801	930	887	850	889	977	932	850	ps
D6	6	0	179	199	305	337	370	354	339	354	389	371	339	ps

**Notes to Table 1-39:**

- (1) You can set the parameter values in the Quartus II software by selecting D1, D2, D3, D4, D5, and D6 in the Assignment Name column.
- (2) The minimum offset represented in this table does not include the intrinsic delay.

## Programmable Output Buffer Delay

Table 1–40 lists the delay chain settings that control the rising and falling edge delays of the output buffer. The default delay is 0 ps.

**Table 1–40.** Programmable Output Buffer Delay (Note 1)

Symbol	Parameter	Typical	Unit
$D_{\text{OUTBUF}}$	Rising and/or Falling Edge delay	0 (default)	ps
		50	ps
		100	ps
		150	ps

**Note to Table 1–40:**

- (1) You can set the programmable output buffer delay in the Quartus II software by setting the **Output Buffer Delay Control** assignment to either positive, negative, or both edges with the specific values stated in this table for the **Output Buffer Delay** assignment.

## User I/O Pin Timing

Table 1–41 through Table 1–140 list user I/O pin timing for Stratix III devices. I/O buffer  $t_{\text{su}}$ ,  $t_{\text{h}}$ , and  $t_{\text{co}}$  are reported for the cases when the I/O clock is driven by a non-PLL global clock (GCLK) and the PLL is driven by the global clock (GCLK-PLL). For  $t_{\text{su}}$ ,  $t_{\text{h}}$ , and  $t_{\text{co}}$  using the regional clock, add the value from the adder tables listed for each device to the GCLK/GCLK-PLL values for the device.

### EP3SL50 I/O Timing Parameters

Table 1–41 through Table 1–44 list the maximum I/O timing parameters for EP3SL50 devices for single-ended I/O standards.

Table 1–41 lists the EP3SL50 column pins input timing parameters for single-ended I/O standards.

**Table 1–41.** EP3SL50 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{\text{CCL}}=1.1\text{ V}$	$V_{\text{CCL}}=1.1\text{ V}$	$V_{\text{CCL}}=1.1\text{ V}$	$V_{\text{CCL}}=1.1\text{ V}$	$V_{\text{CCL}}=0.9\text{ V}$	$V_{\text{CCL}}=1.1\text{ V}$	$V_{\text{CCL}}=1.1\text{ V}$	$V_{\text{CCL}}=1.1\text{ V}$	$V_{\text{CCL}}=0.9\text{ V}$	
3.3-V LVTTTL	GCLK	$t_{\text{su}}$	-0.690	-0.689	-1.004	-1.103	-1.311	-1.266	-1.627	-1.103	-1.311	-1.266	-1.627	ns
		$t_{\text{h}}$	0.816	0.814	1.182	1.304	1.531	1.475	1.830	1.304	1.531	1.475	1.830	ns
	GCLK PLL	$t_{\text{su}}$	-0.975	-0.975	-1.405	-1.532	-1.773	-1.713	-2.026	-1.532	-1.773	-1.713	-2.026	ns
		$t_{\text{h}}$	1.226	1.226	1.774	1.947	2.232	2.148	2.471	1.947	2.232	2.148	2.471	ns
3.3-V LVCMOS	GCLK	$t_{\text{su}}$	-0.690	-0.689	-1.004	-1.103	-1.311	-1.266	-1.627	-1.103	-1.311	-1.266	-1.627	ns
		$t_{\text{h}}$	0.816	0.814	1.182	1.304	1.531	1.475	1.830	1.304	1.531	1.475	1.830	ns
	GCLK PLL	$t_{\text{su}}$	-0.975	-0.975	-1.405	-1.532	-1.773	-1.713	-2.026	-1.532	-1.773	-1.713	-2.026	ns
		$t_{\text{h}}$	1.226	1.226	1.774	1.947	2.232	2.148	2.471	1.947	2.232	2.148	2.471	ns
3.0-V LVTTTL	GCLK	$t_{\text{su}}$	-0.701	-0.700	-1.003	-1.105	-1.310	-1.265	-1.626	-1.105	-1.310	-1.265	-1.626	ns
		$t_{\text{h}}$	0.827	0.825	1.181	1.306	1.530	1.474	1.829	1.306	1.530	1.474	1.829	ns
	GCLK PLL	$t_{\text{su}}$	-0.986	-0.986	-1.404	-1.534	-1.772	-1.712	-2.025	-1.534	-1.772	-1.712	-2.025	ns
		$t_{\text{h}}$	1.237	1.237	1.773	1.949	2.231	2.147	2.470	1.949	2.231	2.147	2.470	ns



**Table 1-41.** EP3SL50 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.0-V LVCMOS	GCLK	$t_{su}$	-0.701	-0.700	-1.003	-1.105	-1.310	-1.265	-1.626	-1.105	-1.310	-1.265	-1.626	ns
		$t_h$	0.827	0.825	1.181	1.306	1.530	1.474	1.829	1.306	1.530	1.474	1.829	ns
	GCLK PLL	$t_{su}$	-0.986	-0.986	-1.404	-1.534	-1.772	-1.712	-2.025	-1.534	-1.772	-1.712	-2.025	ns
		$t_h$	1.237	1.237	1.773	1.949	2.231	2.147	2.470	1.949	2.231	2.147	2.470	ns
2.5 V	GCLK	$t_{su}$	-0.696	-0.695	-1.012	-1.117	-1.329	-1.284	-1.645	-1.117	-1.329	-1.284	-1.645	ns
		$t_h$	0.822	0.820	1.190	1.318	1.549	1.493	1.848	1.318	1.549	1.493	1.848	ns
	GCLK PLL	$t_{su}$	-0.981	-0.981	-1.413	-1.546	-1.791	-1.731	-2.044	-1.546	-1.791	-1.731	-2.044	ns
		$t_h$	1.232	1.232	1.782	1.961	2.250	2.166	2.489	1.961	2.250	2.166	2.489	ns
1.8 V	GCLK	$t_{su}$	-0.716	-0.715	-1.052	-1.153	-1.327	-1.282	-1.643	-1.153	-1.327	-1.282	-1.643	ns
		$t_h$	0.844	0.842	1.230	1.354	1.547	1.491	1.846	1.354	1.547	1.491	1.846	ns
	GCLK PLL	$t_{su}$	-1.003	-1.003	-1.453	-1.582	-1.789	-1.729	-2.042	-1.582	-1.789	-1.729	-2.042	ns
		$t_h$	1.256	1.256	1.822	1.997	2.248	2.164	2.487	1.997	2.248	2.164	2.487	ns
1.5 V	GCLK	$t_{su}$	-0.706	-0.705	-1.029	-1.121	-1.257	-1.212	-1.573	-1.121	-1.257	-1.212	-1.573	ns
		$t_h$	0.834	0.832	1.207	1.322	1.477	1.421	1.776	1.322	1.477	1.421	1.776	ns
	GCLK PLL	$t_{su}$	-0.993	-0.993	-1.430	-1.550	-1.719	-1.659	-1.972	-1.550	-1.719	-1.659	-1.972	ns
		$t_h$	1.246	1.246	1.799	1.965	2.178	2.094	2.417	1.965	2.178	2.094	2.417	ns
1.2 V	GCLK	$t_{su}$	-0.654	-0.653	-0.952	-1.022	-1.101	-1.056	-1.417	-1.022	-1.101	-1.056	-1.417	ns
		$t_h$	0.782	0.780	1.130	1.223	1.321	1.265	1.620	1.223	1.321	1.265	1.620	ns
	GCLK PLL	$t_{su}$	-0.941	-0.941	-1.353	-1.451	-1.563	-1.503	-1.816	-1.451	-1.563	-1.503	-1.816	ns
		$t_h$	1.194	1.194	1.722	1.866	2.022	1.938	2.261	1.866	2.022	1.938	2.261	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.625	-0.624	-0.924	-1.006	-1.103	-1.058	-1.419	-1.006	-1.103	-1.058	-1.419	ns
		$t_h$	0.753	0.751	1.102	1.207	1.323	1.267	1.622	1.207	1.323	1.267	1.622	ns
	GCLK PLL	$t_{su}$	-0.912	-0.912	-1.325	-1.435	-1.565	-1.505	-1.818	-1.435	-1.565	-1.505	-1.818	ns
		$t_h$	1.165	1.165	1.694	1.850	2.024	1.940	2.263	1.850	2.024	1.940	2.263	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.625	-0.624	-0.924	-1.006	-1.103	-1.058	-1.419	-1.006	-1.103	-1.058	-1.419	ns
		$t_h$	0.753	0.751	1.102	1.207	1.323	1.267	1.622	1.207	1.323	1.267	1.622	ns
	GCLK PLL	$t_{su}$	-0.912	-0.912	-1.325	-1.435	-1.565	-1.505	-1.818	-1.435	-1.565	-1.505	-1.818	ns
		$t_h$	1.165	1.165	1.694	1.850	2.024	1.940	2.263	1.850	2.024	1.940	2.263	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.619	-0.618	-0.912	-1.001	-1.103	-1.056	-1.417	-1.001	-1.103	-1.056	-1.417	ns
		$t_h$	0.747	0.745	1.089	1.199	1.320	1.264	1.615	1.199	1.320	1.264	1.615	ns
	GCLK PLL	$t_{su}$	-0.906	-0.906	-1.312	-1.427	-1.562	-1.500	-1.816	-1.427	-1.562	-1.500	-1.816	ns
		$t_h$	1.159	1.159	1.681	1.839	2.018	1.934	2.256	1.839	2.018	1.934	2.256	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.619	-0.618	-0.912	-1.001	-1.103	-1.056	-1.417	-1.001	-1.103	-1.056	-1.417	ns
		$t_h$	0.747	0.745	1.089	1.199	1.320	1.264	1.615	1.199	1.320	1.264	1.615	ns
	GCLK PLL	$t_{su}$	-0.906	-0.906	-1.312	-1.427	-1.562	-1.500	-1.816	-1.427	-1.562	-1.500	-1.816	ns
		$t_h$	1.159	1.159	1.681	1.839	2.018	1.934	2.256	1.839	2.018	1.934	2.256	ns

**Table 1-41.** EP3SL50 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.608	-0.607	-0.903	-0.990	-1.084	-1.037	-1.398	-0.990	-1.084	-1.037	-1.398	ns
		$t_h$	0.736	0.734	1.079	1.188	1.301	1.245	1.596	1.188	1.301	1.245	1.596	ns
	GCLK PLL	$t_{su}$	-0.895	-0.895	-1.301	-1.416	-1.543	-1.481	-1.797	-1.416	-1.543	-1.481	-1.797	ns
		$t_h$	1.148	1.148	1.669	1.828	1.999	1.915	2.237	1.828	1.999	1.915	2.237	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.608	-0.607	-0.903	-0.990	-1.084	-1.037	-1.398	-0.990	-1.084	-1.037	-1.398	ns
		$t_h$	0.736	0.734	1.079	1.188	1.301	1.245	1.596	1.188	1.301	1.245	1.596	ns
	GCLK PLL	$t_{su}$	-0.895	-0.895	-1.301	-1.416	-1.543	-1.481	-1.797	-1.416	-1.543	-1.481	-1.797	ns
		$t_h$	1.148	1.148	1.669	1.828	1.999	1.915	2.237	1.828	1.999	1.915	2.237	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.619	-0.618	-0.912	-1.001	-1.103	-1.056	-1.417	-1.001	-1.103	-1.056	-1.417	ns
		$t_h$	0.747	0.745	1.089	1.199	1.320	1.264	1.615	1.199	1.320	1.264	1.615	ns
	GCLK PLL	$t_{su}$	-0.906	-0.906	-1.312	-1.427	-1.562	-1.500	-1.816	-1.427	-1.562	-1.500	-1.816	ns
		$t_h$	1.159	1.159	1.681	1.839	2.018	1.934	2.256	1.839	2.018	1.934	2.256	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.619	-0.618	-0.912	-1.001	-1.103	-1.056	-1.417	-1.001	-1.103	-1.056	-1.417	ns
		$t_h$	0.747	0.745	1.089	1.199	1.320	1.264	1.615	1.199	1.320	1.264	1.615	ns
	GCLK PLL	$t_{su}$	-0.906	-0.906	-1.312	-1.427	-1.562	-1.500	-1.816	-1.427	-1.562	-1.500	-1.816	ns
		$t_h$	1.159	1.159	1.681	1.839	2.018	1.934	2.256	1.839	2.018	1.934	2.256	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.608	-0.607	-0.903	-0.990	-1.084	-1.037	-1.398	-0.990	-1.084	-1.037	-1.398	ns
		$t_h$	0.736	0.734	1.079	1.188	1.301	1.245	1.596	1.188	1.301	1.245	1.596	ns
	GCLK PLL	$t_{su}$	-0.895	-0.895	-1.301	-1.416	-1.543	-1.481	-1.797	-1.416	-1.543	-1.481	-1.797	ns
		$t_h$	1.148	1.148	1.669	1.828	1.999	1.915	2.237	1.828	1.999	1.915	2.237	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.608	-0.607	-0.903	-0.990	-1.084	-1.037	-1.398	-0.990	-1.084	-1.037	-1.398	ns
		$t_h$	0.736	0.734	1.079	1.188	1.301	1.245	1.596	1.188	1.301	1.245	1.596	ns
	GCLK PLL	$t_{su}$	-0.895	-0.895	-1.301	-1.416	-1.543	-1.481	-1.797	-1.416	-1.543	-1.481	-1.797	ns
		$t_h$	1.148	1.148	1.669	1.828	1.999	1.915	2.237	1.828	1.999	1.915	2.237	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.596	-0.595	-0.893	-0.979	-1.068	-1.021	-1.382	-0.979	-1.068	-1.021	-1.382	ns
		$t_h$	0.724	0.722	1.069	1.177	1.285	1.229	1.580	1.177	1.285	1.229	1.580	ns
	GCLK PLL	$t_{su}$	-0.883	-0.883	-1.291	-1.405	-1.527	-1.465	-1.781	-1.405	-1.527	-1.465	-1.781	ns
		$t_h$	1.136	1.136	1.659	1.817	1.983	1.899	2.221	1.817	1.983	1.899	2.221	ns
3.0-V PCI	GCLK	$t_{su}$	-0.596	-0.595	-0.893	-0.979	-1.068	-1.021	-1.382	-0.979	-1.068	-1.021	-1.382	ns
		$t_h$	0.724	0.722	1.069	1.177	1.285	1.229	1.580	1.177	1.285	1.229	1.580	ns
	GCLK PLL	$t_{su}$	-0.883	-0.883	-1.291	-1.405	-1.527	-1.465	-1.781	-1.405	-1.527	-1.465	-1.781	ns
		$t_h$	1.136	1.136	1.659	1.817	1.983	1.899	2.221	1.817	1.983	1.899	2.221	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.701	-0.700	-1.003	-1.105	-1.310	-1.265	-1.626	-1.105	-1.310	-1.265	-1.626	ns
		$t_h$	0.827	0.825	1.181	1.306	1.530	1.474	1.829	1.306	1.530	1.474	1.829	ns
	GCLK PLL	$t_{su}$	-0.986	-0.986	-1.404	-1.534	-1.772	-1.712	-2.025	-1.534	-1.772	-1.712	-2.025	ns
		$t_h$	1.237	1.237	1.773	1.949	2.231	2.147	2.470	1.949	2.231	2.147	2.470	ns

Table 1-42 lists the EP3SL50 row pins input timing parameters for single-ended I/O standards.

**Table 1-42.** EP3SL50 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-0.884	-0.914	-1.291	-1.412	-1.634	-1.580	-1.842	-1.428	-1.639	-1.588	-1.875	ns
		t <sub>h</sub>	0.997	1.040	1.554	1.774	1.924	1.808	1.834	1.768	1.931	1.777	1.885	ns
	GCLK PLL	t <sub>su</sub>	0.910	0.917	1.476	1.619	1.864	1.796	2.057	1.645	1.878	1.814	2.090	ns
		t <sub>h</sub>	-0.661	-0.656	-1.291	-1.412	-1.634	-1.580	-1.842	-1.428	-1.639	-1.588	-1.875	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.884	-0.914	-1.291	-1.412	-1.634	-1.580	-1.842	-1.428	-1.639	-1.588	-1.875	ns
		t <sub>h</sub>	0.997	1.040	1.554	1.774	1.924	1.808	1.834	1.768	1.931	1.777	1.885	ns
	GCLK PLL	t <sub>su</sub>	0.910	0.917	1.476	1.619	1.864	1.796	2.057	1.645	1.878	1.814	2.090	ns
		t <sub>h</sub>	-0.661	-0.656	-1.288	-1.413	-1.637	-1.583	-1.845	-1.427	-1.644	-1.593	-1.880	ns
3.0-V LVTTL	GCLK	t <sub>su</sub>	-0.890	-0.925	1.473	1.620	1.867	1.799	2.060	1.644	1.883	1.819	2.095	ns
		t <sub>h</sub>	1.003	1.051	-1.288	-1.413	-1.637	-1.583	-1.845	-1.427	-1.644	-1.593	-1.880	ns
	GCLK PLL	t <sub>su</sub>	0.904	0.906	1.557	1.773	1.921	1.805	1.831	1.769	1.926	1.772	1.880	ns
		t <sub>h</sub>	-0.655	-0.645	1.473	1.620	1.867	1.799	2.060	1.644	1.883	1.819	2.095	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.890	-0.925	1.482	1.633	1.882	1.814	2.075	1.653	1.893	1.829	2.105	ns
		t <sub>h</sub>	1.003	1.051	-1.297	-1.426	-1.652	-1.598	-1.860	-1.436	-1.654	-1.603	-1.890	ns
	GCLK PLL	t <sub>su</sub>	0.904	0.906	1.548	1.760	1.906	1.790	1.816	1.760	1.916	1.762	1.870	ns
		t <sub>h</sub>	-0.655	-0.645	1.482	1.633	1.882	1.814	2.075	1.653	1.893	1.829	2.105	ns
2.5 V	GCLK	t <sub>su</sub>	-0.878	-0.918	1.551	1.770	1.914	1.799	1.828	1.772	1.922	1.804	1.879	ns
		t <sub>h</sub>	0.991	1.044	1.554	1.698	1.914	1.845	2.111	1.718	1.928	1.862	2.141	ns
	GCLK PLL	t <sub>su</sub>	0.916	0.913	-1.369	-1.491	-1.684	-1.629	-1.895	-1.501	-1.688	-1.635	-1.926	ns
		t <sub>h</sub>	-0.667	-0.652	1.551	1.770	1.914	1.799	1.828	1.772	1.922	1.804	1.879	ns
1.8 V	GCLK	t <sub>su</sub>	-0.940	-0.982	1.575	1.802	1.982	1.867	1.896	1.803	1.987	1.869	1.944	ns
		t <sub>h</sub>	0.930	0.925	1.530	1.666	1.846	1.777	2.043	1.687	1.863	1.797	2.076	ns
	GCLK PLL	t <sub>su</sub>	1.054	1.109	-1.345	-1.459	-1.616	-1.561	-1.827	-1.470	-1.623	-1.570	-1.861	ns
		t <sub>h</sub>	-0.930	-0.971	1.654	1.903	2.141	2.026	2.055	1.899	2.142	2.024	2.099	ns
1.5 V	GCLK	t <sub>su</sub>	0.940	0.936	1.451	1.565	1.687	1.618	1.884	1.591	1.708	1.642	1.921	ns
		t <sub>h</sub>	1.044	1.098	-1.266	-1.358	-1.457	-1.402	-1.668	-1.374	-1.468	-1.415	-1.706	ns
	GCLK PLL	t <sub>su</sub>	-0.870	-0.918	1.634	1.869	2.126	2.010	2.036	1.872	2.133	1.979	2.087	ns
		t <sub>h</sub>	1.000	0.989	1.396	1.524	1.662	1.594	1.855	1.541	1.676	1.612	1.888	ns
1.2 V	GCLK	t <sub>su</sub>	0.984	1.045	-1.228	-1.331	-1.452	-1.396	-1.664	-1.342	-1.461	-1.407	-1.699	ns
		t <sub>h</sub>	-0.821	-0.860	1.692	-1.331	-1.452	-1.396	-1.664	-1.342	-1.461	-1.407	-1.699	ns
	GCLK PLL	t <sub>su</sub>	0.973	0.971	1.413	1.536	1.680	1.611	1.876	1.557	1.698	1.633	1.910	ns
		t <sub>h</sub>	0.935	0.987	-1.228	1.930	2.146	2.032	2.059	1.931	2.149	2.032	2.106	ns

Table 1-42. EP3SL50 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.821	-0.860	1.692	1.930	2.146	2.032	2.059	1.931	2.149	2.032	2.106	ns
		$t_h$	0.973	0.971	1.413	-1.483	-1.648	-1.564	-1.586	-1.477	-1.641	-1.554	-1.632	ns
	GCLK PLL	$t_{su}$	0.935	0.987	-1.228	-1.331	-1.452	-1.396	-1.664	-1.342	-1.461	-1.407	-1.699	ns
		$t_h$	-0.844	-0.883	1.692	1.536	1.680	1.611	1.876	1.557	1.698	1.633	1.910	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	1.026	1.024	1.413	1.930	2.146	2.032	2.059	1.931	2.149	2.032	2.106	ns
		$t_h$	0.958	1.010	-1.228	-1.483	-1.648	-1.564	-1.586	-1.477	-1.641	-1.554	-1.632	ns
	GCLK PLL	$t_{su}$	-0.844	-0.883	-1.309	-1.321	-1.434	-1.378	-1.646	-1.331	-1.444	-1.390	-1.682	ns
		$t_h$	1.026	1.024	-1.213	1.526	1.662	1.593	1.858	1.546	1.681	1.616	1.893	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	0.958	1.010	1.399	1.940	2.164	2.050	2.077	1.942	2.166	2.049	2.123	ns
		$t_h$	-0.830	-0.871	1.692	1.940	2.164	2.050	2.077	1.942	2.166	2.049	2.123	ns
	GCLK PLL	$t_{su}$	1.040	1.036	1.413	-1.493	-1.666	-1.582	-1.604	-1.488	-1.658	-1.571	-1.649	ns
		$t_h$	0.944	0.998	-1.228	-1.321	-1.434	-1.378	-1.646	-1.331	-1.444	-1.390	-1.682	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.844	-0.883	1.692	-1.483	-1.648	-1.564	-1.586	-1.477	-1.641	-1.554	-1.632	ns
		$t_h$	1.026	1.024	1.413	-1.331	-1.452	-1.396	-1.664	-1.342	-1.461	-1.407	-1.699	ns
	GCLK PLL	$t_{su}$	0.958	1.010	-1.228	1.536	1.680	1.611	1.876	1.557	1.698	1.633	1.910	ns
		$t_h$	-0.844	-0.883	-1.309	1.930	2.146	2.032	2.059	1.931	2.149	2.032	2.106	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	1.026	1.024	-1.213	-1.483	-1.648	-1.564	-1.586	-1.477	-1.641	-1.554	-1.632	ns
		$t_h$	0.958	1.010	1.399	-1.331	-1.452	-1.396	-1.664	-1.342	-1.461	-1.407	-1.699	ns
	GCLK PLL	$t_{su}$	-0.830	-0.871	1.707	1.536	1.680	1.611	1.876	1.557	1.698	1.633	1.910	ns
		$t_h$	1.040	1.036	-1.309	1.930	2.146	2.032	2.059	1.931	2.149	2.032	2.106	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	0.944	0.998	-1.213	-1.483	-1.648	-1.564	-1.586	-1.477	-1.641	-1.554	-1.632	ns
		$t_h$	-0.830	-0.871	-1.318	1.940	2.164	2.050	2.077	1.942	2.166	2.049	2.123	ns
	GCLK PLL	$t_{su}$	1.040	1.036	-1.204	-1.493	-1.666	-1.582	-1.604	-1.488	-1.658	-1.571	-1.649	ns
		$t_h$	0.944	0.998	1.390	-1.321	-1.434	-1.378	-1.646	-1.331	-1.444	-1.390	-1.682	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.821	-0.859	1.716	1.526	1.662	1.593	1.858	1.546	1.681	1.616	1.893	ns
		$t_h$	1.049	1.048	-1.318	1.940	2.164	2.050	2.077	1.942	2.166	2.049	2.123	ns
	GCLK PLL	$t_{su}$	0.935	0.986	-1.204	-1.493	-1.666	-1.582	-1.604	-1.488	-1.658	-1.571	-1.649	ns
		$t_h$	-0.821	-0.859	-1.318	1.950	2.180	2.066	2.093	1.951	2.182	2.065	2.139	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	1.049	1.048	-1.288	-1.503	-1.682	-1.598	-1.620	-1.497	-1.674	-1.587	-1.665	ns
		$t_h$	0.935	0.986	1.557	-1.311	-1.418	-1.362	-1.630	-1.322	-1.428	-1.374	-1.666	ns
	GCLK PLL	$t_{su}$	-0.890	-0.925	1.473	1.516	1.646	1.577	1.842	1.537	1.665	1.600	1.877	ns
		$t_h$	1.003	1.051	-1.288	1.950	2.180	2.066	2.093	1.951	2.182	2.065	2.139	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	0.904	0.906	1.557	-1.503	-1.682	-1.598	-1.620	-1.497	-1.674	-1.587	-1.665	ns
		$t_h$	-0.655	-0.645	1.473	-1.311	-1.418	-1.362	-1.630	-1.322	-1.428	-1.374	-1.666	ns
	GCLK PLL	$t_{su}$	-0.890	-0.925	1.473	1.516	1.646	1.577	1.842	1.537	1.665	1.600	1.877	ns
		$t_h$	1.003	1.051	1.473	1.950	2.180	2.066	2.093	1.951	2.182	2.065	2.139	ns

**Table 1-42.** EP3SL50 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.2-V HSTL CLASS I	GCLK	$t_{su}$	0.904	0.906	1.473	-1.503	-1.682	-1.598	-1.620	-1.497	-1.674	-1.587	-1.665	ns
		$t_h$	-0.655	-0.645	1.473	-1.311	-1.418	-1.362	-1.630	-1.322	-1.428	-1.374	-1.666	ns
	GCLK PLL	$t_{su}$	-0.884	-0.914	-1.291	-1.412	-1.634	-1.580	-1.842	-1.428	-1.639	-1.588	-1.875	ns
		$t_h$	0.997	1.040	1.554	1.774	1.924	1.808	1.834	1.768	1.931	1.777	1.885	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	0.910	0.917	1.476	1.619	1.864	1.796	2.057	1.645	1.878	1.814	2.090	ns
		$t_h$	-0.661	-0.656	-1.291	-1.412	-1.634	-1.580	-1.842	-1.428	-1.639	-1.588	-1.875	ns
	GCLK PLL	$t_{su}$	-0.884	-0.914	-1.291	-1.412	-1.634	-1.580	-1.842	-1.428	-1.639	-1.588	-1.875	ns
		$t_h$	0.997	1.040	1.554	1.774	1.924	1.808	1.834	1.768	1.931	1.777	1.885	ns
3.0-V PCI	GCLK	$t_{su}$	0.910	0.917	1.476	1.619	1.864	1.796	2.057	1.645	1.878	1.814	2.090	ns
		$t_h$	-0.661	-0.656	-1.288	-1.413	-1.637	-1.583	-1.845	-1.427	-1.644	-1.593	-1.880	ns
	GCLK PLL	$t_{su}$	-0.890	-0.925	1.473	1.620	1.867	1.799	2.060	1.644	1.883	1.819	2.095	ns
		$t_h$	1.003	1.051	-1.288	-1.413	-1.637	-1.583	-1.845	-1.427	-1.644	-1.593	-1.880	ns
3.0-V PCI-X	GCLK	$t_{su}$	0.904	0.906	1.557	1.773	1.921	1.805	1.831	1.769	1.926	1.772	1.880	ns
		$t_h$	-0.655	-0.645	1.473	1.620	1.867	1.799	2.060	1.644	1.883	1.819	2.095	ns
	GCLK PLL	$t_{su}$	-0.890	-0.925	1.482	1.633	1.882	1.814	2.075	1.653	1.893	1.829	2.105	ns
		$t_h$	1.003	1.051	-1.297	-1.426	-1.652	-1.598	-1.860	-1.436	-1.654	-1.603	-1.890	ns

Table 1-43 lists the EP3SL50 column pins output timing parameters for single-ended I/O standards.

**Table 1-43.** EP3SL50 Column Pins output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.168	3.156	4.382	4.742	5.210	5.092	5.294	4.742	5.210	5.092	5.294	ns	
		GCLK PLL	t <sub>co</sub>	3.524	3.524	4.905	5.304	5.820	5.677	5.944	5.304	5.820	5.677	5.944	ns	
	8mA	GCLK	t <sub>co</sub>	3.101	3.089	4.273	4.631	5.097	4.979	5.181	4.631	5.097	4.979	5.181	ns	
		GCLK PLL	t <sub>co</sub>	3.457	3.457	4.796	5.193	5.707	5.564	5.831	5.193	5.707	5.564	5.831	ns	
	12mA	GCLK	t <sub>co</sub>	3.015	3.003	4.170	4.532	5.005	4.887	5.089	4.532	5.005	4.887	5.089	ns	
		GCLK PLL	t <sub>co</sub>	3.371	3.371	4.692	5.094	5.615	5.472	5.739	5.094	5.615	5.472	5.739	ns	
	16mA	GCLK	t <sub>co</sub>	3.008	2.996	4.153	4.504	4.964	4.846	5.048	4.504	4.964	4.846	5.048	ns	
		GCLK PLL	t <sub>co</sub>	3.364	3.364	4.675	5.066	5.574	5.431	5.698	5.066	5.574	5.431	5.698	ns	
	3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.174	3.162	4.387	4.747	5.217	5.099	5.301	4.747	5.217	5.099	5.301	ns
			GCLK PLL	t <sub>co</sub>	3.530	3.530	4.909	5.309	5.827	5.684	5.951	5.309	5.827	5.684	5.951	ns
		8mA	GCLK	t <sub>co</sub>	3.019	3.007	4.180	4.549	5.016	4.898	5.100	4.549	5.016	4.898	5.100	ns
			GCLK PLL	t <sub>co</sub>	3.375	3.375	4.702	5.111	5.626	5.483	5.750	5.111	5.626	5.483	5.750	ns
12mA		GCLK	t <sub>co</sub>	3.026	3.014	4.174	4.528	4.990	4.872	5.074	4.528	4.990	4.872	5.074	ns	
		GCLK PLL	t <sub>co</sub>	3.382	3.382	4.696	5.090	5.600	5.457	5.724	5.090	5.600	5.457	5.724	ns	
16mA		GCLK	t <sub>co</sub>	3.010	2.998	4.151	4.503	4.961	4.843	5.045	4.503	4.961	4.843	5.045	ns	
		GCLK PLL	t <sub>co</sub>	3.366	3.366	4.674	5.065	5.571	5.428	5.695	5.065	5.571	5.428	5.695	ns	
3.0-V LVTTL		4mA	GCLK	t <sub>co</sub>	3.132	3.120	4.349	4.710	5.177	5.059	5.261	4.710	5.177	5.059	5.261	ns
			GCLK PLL	t <sub>co</sub>	3.488	3.488	4.872	5.272	5.787	5.644	5.911	5.272	5.787	5.644	5.911	ns
		8mA	GCLK	t <sub>co</sub>	3.021	3.009	4.219	4.576	5.040	4.923	5.122	4.576	5.040	4.923	5.122	ns
			GCLK PLL	t <sub>co</sub>	3.377	3.377	4.742	5.138	5.650	5.508	5.773	5.138	5.650	5.508	5.773	ns
	12mA	GCLK	t <sub>co</sub>	2.985	2.973	4.156	4.507	4.966	4.849	5.049	4.507	4.966	4.849	5.049	ns	
		GCLK PLL	t <sub>co</sub>	3.341	3.341	4.679	5.069	5.576	5.434	5.699	5.069	5.576	5.434	5.699	ns	
	16mA	GCLK	t <sub>co</sub>	2.967	2.955	4.127	4.479	4.937	4.819	5.021	4.479	4.937	4.819	5.021	ns	
		GCLK PLL	t <sub>co</sub>	3.323	3.323	4.650	5.041	5.547	5.404	5.671	5.041	5.547	5.404	5.671	ns	

**Table 1-43.** EP3SL50 Column Pins output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
3.0-V LVC MOS	4mA	GCLK	$t_{CO}$	3.046	3.034	4.253	4.610	5.075	4.958	5.157	4.610	5.075	4.958	5.157	ns	
		GCLK PLL	$t_{CO}$	3.402	3.402	4.776	5.172	5.685	5.543	5.808	5.172	5.685	5.543	5.808	ns	
	8mA	GCLK	$t_{CO}$	2.967	2.955	4.130	4.481	4.940	4.823	5.022	4.481	4.940	4.823	5.022	ns	
		GCLK PLL	$t_{CO}$	3.323	3.323	4.652	5.043	5.550	5.408	5.673	5.043	5.550	5.408	5.673	ns	
	12mA	GCLK	$t_{CO}$	2.962	2.950	4.122	4.474	4.931	4.813	5.015	4.474	4.931	4.813	5.015	ns	
		GCLK PLL	$t_{CO}$	3.318	3.318	4.645	5.036	5.541	5.398	5.665	5.036	5.541	5.398	5.665	ns	
	16mA	GCLK	$t_{CO}$	2.953	2.941	4.108	4.459	4.916	4.798	5.000	4.459	4.916	4.798	5.000	ns	
		GCLK PLL	$t_{CO}$	3.309	3.309	4.631	5.021	5.526	5.383	5.650	5.021	5.526	5.383	5.650	ns	
	2.5 V	4mA	GCLK	$t_{CO}$	3.168	3.156	4.460	4.837	5.322	5.205	5.405	4.837	5.322	5.205	5.405	ns
			GCLK PLL	$t_{CO}$	3.524	3.524	4.983	5.399	5.932	5.790	6.055	5.399	5.932	5.790	6.055	ns
		8mA	GCLK	$t_{CO}$	3.068	3.056	4.341	4.711	5.190	5.073	5.272	4.711	5.190	5.073	5.272	ns
			GCLK PLL	$t_{CO}$	3.424	3.424	4.864	5.273	5.800	5.658	5.923	5.273	5.800	5.658	5.923	ns
12mA		GCLK	$t_{CO}$	3.024	3.012	4.254	4.620	5.094	4.976	5.178	4.620	5.094	4.976	5.178	ns	
		GCLK PLL	$t_{CO}$	3.380	3.380	4.777	5.182	5.704	5.561	5.828	5.182	5.704	5.561	5.828	ns	
16mA		GCLK	$t_{CO}$	2.986	2.974	4.215	4.578	5.051	4.933	5.135	4.578	5.051	4.933	5.135	ns	
		GCLK PLL	$t_{CO}$	3.342	3.342	4.738	5.140	5.661	5.518	5.785	5.140	5.661	5.518	5.785	ns	

Table 1-43. EP3SL50 Column Pins output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
1.8 V	2mA	GCLK	t <sub>co</sub>	3.359	3.347	4.782	5.197	5.726	5.608	5.810	5.197	5.726	5.608	5.810	ns	
		GCLK PLL	t <sub>co</sub>	3.715	3.715	5.304	5.759	6.336	6.193	6.460	5.759	6.336	6.193	6.460	ns	
	4mA	GCLK	t <sub>co</sub>	3.178	3.166	4.503	4.888	5.379	5.262	5.461	4.888	5.379	5.262	5.461	ns	
		GCLK PLL	t <sub>co</sub>	3.534	3.534	5.025	5.450	5.989	5.847	6.112	5.450	5.989	5.847	6.112	ns	
	6mA	GCLK	t <sub>co</sub>	3.096	3.084	4.396	4.773	5.268	5.150	5.352	4.773	5.268	5.150	5.352	ns	
		GCLK PLL	t <sub>co</sub>	3.452	3.452	4.918	5.335	5.878	5.735	6.002	5.335	5.878	5.735	6.002	ns	
	8mA	GCLK	t <sub>co</sub>	3.076	3.064	4.337	4.719	5.202	5.084	5.286	4.719	5.202	5.084	5.286	ns	
		GCLK PLL	t <sub>co</sub>	3.432	3.432	4.860	5.281	5.812	5.669	5.936	5.281	5.812	5.669	5.936	ns	
	10mA	GCLK	t <sub>co</sub>	3.013	3.001	4.276	4.644	5.121	5.003	5.205	4.644	5.121	5.003	5.205	ns	
		GCLK PLL	t <sub>co</sub>	3.369	3.369	4.799	5.206	5.731	5.588	5.855	5.206	5.731	5.588	5.855	ns	
	12mA	GCLK	t <sub>co</sub>	2.995	2.983	4.256	4.623	5.098	4.980	5.182	4.623	5.098	4.980	5.182	ns	
		GCLK PLL	t <sub>co</sub>	3.351	3.351	4.778	5.185	5.708	5.565	5.832	5.185	5.708	5.565	5.832	ns	
	1.5 V	2mA	GCLK	t <sub>co</sub>	3.305	3.293	4.710	5.129	5.664	5.546	5.748	5.129	5.664	5.546	5.748	ns
			GCLK PLL	t <sub>co</sub>	3.661	3.661	5.233	5.691	6.274	6.131	6.398	5.691	6.274	6.131	6.398	ns
4mA		GCLK	t <sub>co</sub>	3.093	3.081	4.391	4.773	5.272	5.154	5.356	4.773	5.272	5.154	5.356	ns	
		GCLK PLL	t <sub>co</sub>	3.449	3.449	4.914	5.335	5.882	5.739	6.006	5.335	5.882	5.739	6.006	ns	
6mA		GCLK	t <sub>co</sub>	3.068	3.056	4.324	4.713	5.205	5.087	5.289	4.713	5.205	5.087	5.289	ns	
		GCLK PLL	t <sub>co</sub>	3.424	3.424	4.847	5.275	5.815	5.672	5.939	5.275	5.815	5.672	5.939	ns	
8mA		GCLK	t <sub>co</sub>	3.057	3.045	4.307	4.688	5.185	5.067	5.269	4.688	5.185	5.067	5.269	ns	
		GCLK PLL	t <sub>co</sub>	3.413	3.413	4.830	5.250	5.795	5.652	5.919	5.250	5.795	5.652	5.919	ns	
10mA		GCLK	t <sub>co</sub>	3.002	2.990	4.269	4.637	5.115	4.997	5.199	4.637	5.115	4.997	5.199	ns	
		GCLK PLL	t <sub>co</sub>	3.358	3.358	4.792	5.199	5.725	5.582	5.849	5.199	5.725	5.582	5.849	ns	
12mA		GCLK	t <sub>co</sub>	2.997	2.985	4.253	4.626	5.104	4.986	5.188	4.626	5.104	4.986	5.188	ns	
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.775	5.188	5.714	5.571	5.838	5.188	5.714	5.571	5.838	ns	



**Table 1-43.** EP3SL50 Column Pins output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
1.2 V	2mA	GCLK	$t_{CO}$	3.221	3.209	4.636	5.065	5.608	5.490	5.692	5.065	5.608	5.490	5.692	ns	
		GCLK PLL	$t_{CO}$	3.577	3.577	5.159	5.627	6.218	6.075	6.342	5.627	6.218	6.075	6.342	ns	
	4mA	GCLK	$t_{CO}$	3.098	3.086	4.411	4.803	5.322	5.204	5.406	4.803	5.322	5.204	5.406	ns	
		GCLK PLL	$t_{CO}$	3.454	3.454	4.933	5.365	5.932	5.789	6.056	5.365	5.932	5.789	6.056	ns	
	6mA	GCLK	$t_{CO}$	3.060	3.048	4.318	4.714	5.209	5.091	5.293	4.714	5.209	5.091	5.293	ns	
		GCLK PLL	$t_{CO}$	3.416	3.416	4.841	5.276	5.819	5.676	5.943	5.276	5.819	5.676	5.943	ns	
	8mA	GCLK	$t_{CO}$	3.013	3.001	4.290	4.665	5.153	5.035	5.237	4.665	5.153	5.035	5.237	ns	
		GCLK PLL	$t_{CO}$	3.369	3.369	4.813	5.227	5.763	5.620	5.887	5.227	5.763	5.620	5.887	ns	
	SSTL-2 CLASS I	8mA	GCLK	$t_{CO}$	3.013	3.001	4.247	4.612	5.084	4.966	5.168	4.612	5.084	4.966	5.168	ns
			GCLK PLL	$t_{CO}$	3.369	3.369	4.770	5.174	5.694	5.551	5.818	5.174	5.694	5.551	5.818	ns
		10mA	GCLK	$t_{CO}$	3.010	2.998	4.244	4.609	5.080	4.962	5.164	4.609	5.080	4.962	5.164	ns
			GCLK PLL	$t_{CO}$	3.366	3.366	4.767	5.171	5.690	5.547	5.814	5.171	5.690	5.547	5.814	ns
12mA		GCLK	$t_{CO}$	3.008	2.996	4.244	4.610	5.081	4.963	5.165	4.610	5.081	4.963	5.165	ns	
		GCLK PLL	$t_{CO}$	3.364	3.364	4.767	5.172	5.691	5.548	5.815	5.172	5.691	5.548	5.815	ns	
SSTL-2 CLASS II	16mA	GCLK	$t_{CO}$	2.999	2.987	4.230	4.594	5.066	4.948	5.150	4.594	5.066	4.948	5.150	ns	
		GCLK PLL	$t_{CO}$	3.355	3.355	4.752	5.156	5.676	5.533	5.800	5.156	5.676	5.533	5.800	ns	
SSTL-18 CLASS I	4mA	GCLK	$t_{CO}$	3.020	3.008	4.259	4.626	5.100	4.982	5.184	4.626	5.100	4.982	5.184	ns	
		GCLK PLL	$t_{CO}$	3.376	3.376	4.782	5.188	5.710	5.567	5.834	5.188	5.710	5.567	5.834	ns	
	6mA	GCLK	$t_{CO}$	3.016	3.004	4.257	4.624	5.098	4.980	5.182	4.624	5.098	4.980	5.182	ns	
		GCLK PLL	$t_{CO}$	3.372	3.372	4.780	5.186	5.708	5.565	5.832	5.186	5.708	5.565	5.832	ns	
	8mA	GCLK	$t_{CO}$	3.005	2.993	4.247	4.615	5.089	4.971	5.173	4.615	5.089	4.971	5.173	ns	
		GCLK PLL	$t_{CO}$	3.361	3.361	4.770	5.177	5.699	5.556	5.823	5.177	5.699	5.556	5.823	ns	
	10mA	GCLK	$t_{CO}$	2.994	2.982	4.235	4.602	5.076	4.958	5.160	4.602	5.076	4.958	5.160	ns	
		GCLK PLL	$t_{CO}$	3.350	3.350	4.757	5.164	5.686	5.543	5.810	5.164	5.686	5.543	5.810	ns	
	12mA	GCLK	$t_{CO}$	2.994	2.982	4.234	4.602	5.076	4.958	5.160	4.602	5.076	4.958	5.160	ns	
		GCLK PLL	$t_{CO}$	3.350	3.350	4.757	5.164	5.686	5.543	5.810	5.164	5.686	5.543	5.810	ns	

**Table 1-43.** EP3SL50 Column Pins output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
SSTL-18 CLASS II	8mA	GCLK	$t_{CO}$	3.000	2.988	4.233	4.599	5.071	4.953	5.155	4.599	5.071	4.953	5.155	ns	
		GCLK PLL	$t_{CO}$	3.356	3.356	4.756	5.161	5.681	5.538	5.805	5.161	5.681	5.538	5.805	ns	
	16mA	GCLK	$t_{CO}$	3.003	2.991	4.241	4.608	5.083	4.965	5.167	4.608	5.083	4.965	5.167	ns	
		GCLK PLL	$t_{CO}$	3.359	3.359	4.764	5.170	5.693	5.550	5.817	5.170	5.693	5.550	5.817	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{CO}$	3.024	3.012	4.269	4.638	5.113	4.995	5.197	4.638	5.113	4.995	5.197	ns	
		GCLK PLL	$t_{CO}$	3.380	3.380	4.791	5.200	5.723	5.580	5.847	5.200	5.723	5.580	5.847	ns	
	6mA	GCLK	$t_{CO}$	3.010	2.998	4.258	4.628	5.104	4.986	5.188	4.628	5.104	4.986	5.188	ns	
		GCLK PLL	$t_{CO}$	3.366	3.366	4.781	5.190	5.714	5.571	5.838	5.190	5.714	5.571	5.838	ns	
	8mA	GCLK	$t_{CO}$	2.999	2.987	4.245	4.614	5.090	4.972	5.174	4.614	5.090	4.972	5.174	ns	
		GCLK PLL	$t_{CO}$	3.355	3.355	4.767	5.176	5.700	5.557	5.824	5.176	5.700	5.557	5.824	ns	
	10mA	GCLK	$t_{CO}$	2.998	2.986	4.248	4.617	5.094	4.976	5.178	4.617	5.094	4.976	5.178	ns	
		GCLK PLL	$t_{CO}$	3.354	3.354	4.770	5.179	5.704	5.561	5.828	5.179	5.704	5.561	5.828	ns	
	12mA	GCLK	$t_{CO}$	2.995	2.983	4.242	4.612	5.088	4.970	5.172	4.612	5.088	4.970	5.172	ns	
		GCLK PLL	$t_{CO}$	3.351	3.351	4.765	5.174	5.698	5.555	5.822	5.174	5.698	5.555	5.822	ns	
	SSTL-15 CLASS II	8mA	GCLK	$t_{CO}$	2.997	2.985	4.231	4.598	5.071	4.953	5.155	4.598	5.071	4.953	5.155	ns
			GCLK PLL	$t_{CO}$	3.353	3.353	4.754	5.160	5.681	5.538	5.805	5.160	5.681	5.538	5.805	ns
16mA		GCLK	$t_{CO}$	3.000	2.988	4.238	4.607	5.082	4.964	5.166	4.607	5.082	4.964	5.166	ns	
		GCLK PLL	$t_{CO}$	3.356	3.356	4.761	5.169	5.692	5.549	5.816	5.169	5.692	5.549	5.816	ns	

**Table 1-43.** EP3SL50 Column Pins output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.007	2.995	4.233	4.598	5.069	4.951	5.153	4.598	5.069	4.951	5.153	ns	
		GCLK PLL	t <sub>co</sub>	3.363	3.363	4.756	5.160	5.679	5.536	5.803	5.160	5.679	5.536	5.803	ns	
	6mA	GCLK	t <sub>co</sub>	3.000	2.988	4.231	4.596	5.068	4.950	5.152	4.596	5.068	4.950	5.152	ns	
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.754	5.158	5.678	5.535	5.802	5.158	5.678	5.535	5.802	ns	
	8mA	GCLK	t <sub>co</sub>	2.992	2.980	4.224	4.589	5.061	4.943	5.145	4.589	5.061	4.943	5.145	ns	
		GCLK PLL	t <sub>co</sub>	3.348	3.348	4.746	5.151	5.671	5.528	5.795	5.151	5.671	5.528	5.795	ns	
	10mA	GCLK	t <sub>co</sub>	2.995	2.983	4.227	4.592	5.065	4.947	5.149	4.592	5.065	4.947	5.149	ns	
		GCLK PLL	t <sub>co</sub>	3.351	3.351	4.749	5.154	5.675	5.532	5.799	5.154	5.675	5.532	5.799	ns	
	12mA	GCLK	t <sub>co</sub>	2.992	2.980	4.229	4.596	5.069	4.951	5.153	4.596	5.069	4.951	5.153	ns	
		GCLK PLL	t <sub>co</sub>	3.348	3.348	4.752	5.158	5.679	5.536	5.803	5.158	5.679	5.536	5.803	ns	
	1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.000	2.988	4.228	4.593	5.065	4.947	5.149	4.593	5.065	4.947	5.149	ns
			GCLK PLL	t <sub>co</sub>	3.356	3.356	4.751	5.155	5.675	5.532	5.799	5.155	5.675	5.532	5.799	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.012	3.000	4.242	4.608	5.080	4.962	5.164	4.608	5.080	4.962	5.164	ns	
		GCLK PLL	t <sub>co</sub>	3.368	3.368	4.764	5.170	5.690	5.547	5.814	5.170	5.690	5.547	5.814	ns	
	6mA	GCLK	t <sub>co</sub>	3.008	2.996	4.243	4.609	5.083	4.965	5.167	4.609	5.083	4.965	5.167	ns	
		GCLK PLL	t <sub>co</sub>	3.364	3.364	4.765	5.171	5.693	5.550	5.817	5.171	5.693	5.550	5.817	ns	
	8mA	GCLK	t <sub>co</sub>	3.004	2.992	4.238	4.605	5.078	4.960	5.162	4.605	5.078	4.960	5.162	ns	
		GCLK PLL	t <sub>co</sub>	3.360	3.360	4.761	5.167	5.688	5.545	5.812	5.167	5.688	5.545	5.812	ns	
	10mA	GCLK	t <sub>co</sub>	2.997	2.985	4.231	4.598	5.071	4.953	5.155	4.598	5.071	4.953	5.155	ns	
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.754	5.160	5.681	5.538	5.805	5.160	5.681	5.538	5.805	ns	
	12mA	GCLK	t <sub>co</sub>	2.998	2.986	4.238	4.606	5.081	4.963	5.165	4.606	5.081	4.963	5.165	ns	
		GCLK PLL	t <sub>co</sub>	3.354	3.354	4.761	5.168	5.691	5.548	5.815	5.168	5.691	5.548	5.815	ns	
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.996	2.984	4.219	4.584	5.055	4.937	5.139	4.584	5.055	4.937	5.139	ns	
		GCLK PLL	t <sub>co</sub>	3.352	3.352	4.742	5.146	5.665	5.522	5.789	5.146	5.665	5.522	5.789	ns	

**Table 1-43.** EP3SL50 Column Pins output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V		
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.015	3.003	4.256	4.625	5.101	4.983	5.185	4.625	5.101	4.983	5.185	ns	
		GCLK PLL	t <sub>co</sub>	3.371	3.371	4.778	5.187	5.711	5.568	5.835	5.187	5.711	5.568	5.835	ns	
	6mA	GCLK	t <sub>co</sub>	3.007	2.995	4.247	4.616	5.092	4.974	5.176	4.616	5.092	4.974	5.176	ns	
		GCLK PLL	t <sub>co</sub>	3.363	3.363	4.769	5.178	5.702	5.559	5.826	5.178	5.702	5.559	5.826	ns	
	8mA	GCLK	t <sub>co</sub>	3.008	2.996	4.254	4.624	5.101	4.983	5.185	4.624	5.101	4.983	5.185	ns	
		GCLK PLL	t <sub>co</sub>	3.364	3.364	4.777	5.186	5.711	5.568	5.835	5.186	5.711	5.568	5.835	ns	
	10mA	GCLK	t <sub>co</sub>	2.997	2.985	4.241	4.611	5.087	4.969	5.171	4.611	5.087	4.969	5.171	ns	
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.764	5.173	5.697	5.554	5.821	5.173	5.697	5.554	5.821	ns	
	12mA	GCLK	t <sub>co</sub>	2.997	2.985	4.241	4.611	5.088	4.970	5.172	4.611	5.088	4.970	5.172	ns	
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.764	5.173	5.698	5.555	5.822	5.173	5.698	5.555	5.822	ns	
	1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.018	3.006	4.257	4.626	5.101	4.983	5.185	4.626	5.101	4.983	5.185	ns
			GCLK PLL	t <sub>co</sub>	3.374	3.374	4.780	5.188	5.711	5.568	5.835	5.188	5.711	5.568	5.835	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.121	3.109	4.302	4.660	5.126	5.008	5.210	4.660	5.126	5.008	5.210	ns	
		GCLK PLL	t <sub>co</sub>	3.477	3.477	4.825	5.222	5.736	5.593	5.860	5.222	5.736	5.593	5.860	ns	
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.121	3.109	4.302	4.660	5.126	5.008	5.210	4.660	5.126	5.008	5.210	ns	
		GCLK PLL	t <sub>co</sub>	3.477	3.477	4.825	5.222	5.736	5.593	5.860	5.222	5.736	5.593	5.860	ns	

Table 1-44 lists the EP3SL50 row pins output timing parameters for single-ended I/O standards.

**Table 1-44.** EP3SL50 Row Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.197	3.438	4.781	5.176	5.684	5.549	5.751	5.305	5.818	5.682	5.828	ns
		GCLK PLL	t <sub>co</sub>	1.482	1.677	2.061	2.175	2.372	2.388	2.308	2.295	2.495	2.512	2.303	ns
	8mA	GCLK	t <sub>co</sub>	3.104	3.333	4.651	5.038	5.540	5.405	5.607	5.164	5.669	5.533	5.679	ns
		GCLK PLL	t <sub>co</sub>	1.415	1.606	1.951	2.037	2.228	2.244	2.164	2.154	2.346	2.363	2.154	ns
	12mA	GCLK	t <sub>co</sub>	3.014	3.233	4.532	4.915	5.412	5.277	5.479	5.037	5.537	5.401	5.547	ns
		GCLK PLL	t <sub>co</sub>	1.336	1.517	1.845	1.930	2.100	2.116	2.036	2.046	2.214	2.260	2.022	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.207	3.442	4.789	5.181	5.689	5.554	5.756	5.311	5.823	5.687	5.833	ns
		GCLK PLL	t <sub>co</sub>	1.492	1.684	2.065	2.180	2.377	2.393	2.313	2.301	2.500	2.517	2.308	ns
	8mA	GCLK	t <sub>co</sub>	3.018	3.237	4.538	4.921	5.418	5.283	5.485	5.043	5.544	5.408	5.554	ns
		GCLK PLL	t <sub>co</sub>	1.340	1.521	1.856	1.945	2.106	2.122	2.042	2.058	2.221	2.269	2.029	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.151	3.384	4.733	5.129	5.641	5.506	5.708	5.262	5.776	5.640	5.786	ns
		GCLK PLL	t <sub>co</sub>	1.442	1.638	2.028	2.128	2.329	2.345	2.265	2.252	2.453	2.470	2.261	ns
	8mA	GCLK	t <sub>co</sub>	3.026	3.257	4.580	4.970	5.477	5.342	5.544	5.100	5.612	5.475	5.621	ns
		GCLK PLL	t <sub>co</sub>	1.341	1.526	1.891	1.969	2.165	2.181	2.101	2.090	2.289	2.305	2.096	ns
	12mA	GCLK	t <sub>co</sub>	2.987	3.206	4.498	4.887	5.389	5.254	5.456	5.014	5.519	5.382	5.528	ns
		GCLK PLL	t <sub>co</sub>	1.304	1.488	1.831	1.903	2.077	2.093	2.013	2.016	2.196	2.222	2.003	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.065	3.303	4.627	5.022	5.530	5.395	5.597	5.154	5.665	5.528	5.674	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.550	1.926	2.021	2.218	2.234	2.154	2.144	2.342	2.358	2.149	ns
	8mA	GCLK	t <sub>co</sub>	2.969	3.188	4.463	4.848	5.350	5.215	5.417	4.974	5.479	5.342	5.488	ns
		GCLK PLL	t <sub>co</sub>	1.291	1.472	1.803	1.874	2.038	2.054	1.974	1.986	2.156	2.193	1.963	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.177	3.420	4.865	5.283	5.813	5.678	5.880	5.422	5.955	5.818	5.964	ns
		GCLK PLL	t <sub>co</sub>	1.468	1.675	2.136	2.282	2.501	2.517	2.437	2.412	2.632	2.648	2.439	ns
	8mA	GCLK	t <sub>co</sub>	3.067	3.321	4.710	5.120	5.643	5.508	5.710	5.255	5.781	5.644	5.790	ns
		GCLK PLL	t <sub>co</sub>	1.383	1.572	2.012	2.119	2.331	2.347	2.267	2.245	2.458	2.474	2.265	ns
	12mA	GCLK	t <sub>co</sub>	3.021	3.245	4.599	5.001	5.517	5.382	5.584	5.132	5.651	5.514	5.660	ns
		GCLK PLL	t <sub>co</sub>	1.326	1.528	1.928	2.015	2.205	2.221	2.141	2.132	2.328	2.354	2.135	ns

**Table 1-44.** EP3SL50 Row Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
1.8 V	2mA	GCLK	$t_{co}$	3.410	3.667	5.251	5.711	6.288	6.153	6.355	5.859	6.439	6.303	6.449	ns	
		GCLK PLL	$t_{co}$	1.695	1.941	2.589	2.710	2.976	2.992	2.912	2.849	3.116	3.133	2.924	ns	
	4mA	GCLK	$t_{co}$	3.191	3.465	4.924	5.343	5.883	5.748	5.950	5.494	6.033	5.896	6.042	ns	
		GCLK PLL	$t_{co}$	1.470	1.739	2.262	2.342	2.571	2.587	2.507	2.484	2.710	2.726	2.517	ns	
	6mA	GCLK	$t_{co}$	3.120	3.363	4.771	5.193	5.724	5.589	5.791	5.326	5.860	5.724	5.870	ns	
		GCLK PLL	$t_{co}$	1.405	1.637	2.109	2.192	2.412	2.428	2.348	2.316	2.537	2.554	2.345	ns	
	8mA	GCLK	$t_{co}$	3.098	3.327	4.698	5.111	5.630	5.494	5.701	5.242	5.766	5.630	5.776	ns	
		GCLK PLL	$t_{co}$	1.367	1.563	2.032	2.099	2.316	2.332	2.252	2.221	2.443	2.460	2.251	ns	
	1.5 V	2mA	GCLK	$t_{co}$	3.321	3.585	5.161	5.625	6.216	6.081	6.283	5.766	6.363	6.227	6.373	ns
			GCLK PLL	$t_{co}$	1.606	1.859	2.499	2.624	2.904	2.920	2.840	2.756	3.040	3.057	2.848	ns
		4mA	GCLK	$t_{co}$	3.114	3.344	4.756	5.188	5.725	5.590	5.792	5.320	5.859	5.723	5.869	ns
			GCLK PLL	$t_{co}$	1.383	1.602	2.094	2.187	2.413	2.429	2.349	2.310	2.536	2.553	2.344	ns
6mA		GCLK	$t_{co}$	3.087	3.318	4.683	5.103	5.630	5.494	5.701	5.235	5.762	5.627	5.773	ns	
		GCLK PLL	$t_{co}$	1.356	1.554	2.021	2.091	2.307	2.323	2.243	2.212	2.431	2.448	2.239	ns	
8mA		GCLK	$t_{co}$	3.068	3.307	4.666	5.079	5.611	5.475	5.682	5.211	5.743	5.608	5.754	ns	
		GCLK PLL	$t_{co}$	1.337	1.545	1.999	2.073	2.288	2.304	2.224	2.194	2.409	2.426	2.217	ns	
1.2 V		2mA	GCLK	$t_{co}$	3.264	3.510	5.071	5.539	6.141	6.006	6.208	5.678	6.279	6.143	6.289	ns
			GCLK PLL	$t_{co}$	1.549	1.784	2.409	2.538	2.829	2.845	2.765	2.668	2.956	2.973	2.764	ns
		4mA	GCLK	$t_{co}$	3.119	3.348	4.778	5.216	5.766	5.631	5.833	5.345	5.901	5.765	5.911	ns
			GCLK PLL	$t_{co}$	1.388	1.595	2.116	2.215	2.454	2.470	2.390	2.335	2.578	2.595	2.386	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.008	3.232	4.577	4.973	5.485	5.350	5.552	5.099	5.613	5.477	5.623	ns	
		GCLK PLL	$t_{co}$	1.330	1.516	1.921	2.006	2.173	2.189	2.109	2.119	2.290	2.340	2.098	ns	
	12mA	GCLK	$t_{co}$	3.003	3.228	4.571	4.968	5.477	5.342	5.544	5.095	5.606	5.470	5.616	ns	
		GCLK PLL	$t_{co}$	1.325	1.512	1.918	2.004	2.166	2.184	2.106	2.118	2.284	2.339	2.096	ns	
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	2.994	3.217	4.556	4.952	5.450	5.315	5.517	5.078	5.579	5.452	5.589	ns	
		GCLK PLL	$t_{co}$	1.316	1.501	1.903	1.988	2.149	2.167	2.089	2.101	2.266	2.321	2.078	ns	

**Table 1-44.** EP3SL50 Row Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V		
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.047	3.271	4.617	5.015	5.525	5.389	5.596	5.141	5.653	5.518	5.664	ns	
		GCLK PLL	t <sub>co</sub>	1.316	1.519	1.927	1.998	2.198	2.216	2.138	2.111	2.316	2.333	2.127	ns	
	6mA	GCLK	t <sub>co</sub>	3.042	3.266	4.615	5.014	5.524	5.388	5.595	5.139	5.651	5.516	5.662	ns	
		GCLK PLL	t <sub>co</sub>	1.311	1.505	1.924	1.997	2.197	2.215	2.137	2.109	2.314	2.331	2.125	ns	
	8mA	GCLK	t <sub>co</sub>	3.031	3.255	4.605	5.004	5.514	5.378	5.585	5.130	5.642	5.507	5.653	ns	
		GCLK PLL	t <sub>co</sub>	1.300	1.493	1.907	1.987	2.187	2.205	2.127	2.100	2.305	2.322	2.116	ns	
	10mA	GCLK	t <sub>co</sub>	3.020	3.244	4.592	4.991	5.501	5.365	5.572	5.118	5.630	5.495	5.641	ns	
		GCLK PLL	t <sub>co</sub>	1.289	1.476	1.891	1.974	2.174	2.192	2.114	2.088	2.293	2.310	2.104	ns	
	12mA	GCLK	t <sub>co</sub>	3.020	3.243	4.592	4.991	5.501	5.365	5.572	5.117	5.630	5.495	5.641	ns	
		GCLK PLL	t <sub>co</sub>	1.289	1.475	1.890	1.974	2.174	2.192	2.114	2.087	2.293	2.310	2.104	ns	
	SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.028	3.250	4.591	4.988	5.496	5.360	5.567	5.113	5.624	5.489	5.635	ns
			GCLK PLL	t <sub>co</sub>	1.297	1.482	1.888	1.971	2.169	2.187	2.109	2.083	2.287	2.304	2.098	ns
16mA		GCLK	t <sub>co</sub>	3.029	3.253	4.597	4.996	5.506	5.370	5.577	5.122	5.635	5.500	5.646	ns	
		GCLK PLL	t <sub>co</sub>	1.298	1.485	1.892	1.979	2.179	2.197	2.119	2.092	2.298	2.315	2.109	ns	
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.050	3.274	4.626	5.026	5.538	5.402	5.609	5.151	5.665	5.530	5.676	ns	
		GCLK PLL	t <sub>co</sub>	1.319	1.515	1.938	2.009	2.211	2.229	2.151	2.121	2.328	2.345	2.139	ns	
	6mA	GCLK	t <sub>co</sub>	3.036	3.260	4.615	5.016	5.528	5.392	5.599	5.142	5.656	5.521	5.667	ns	
		GCLK PLL	t <sub>co</sub>	1.305	1.493	1.920	1.999	2.201	2.219	2.141	2.112	2.319	2.336	2.130	ns	
	8mA	GCLK	t <sub>co</sub>	3.025	3.248	4.602	5.003	5.515	5.379	5.586	5.129	5.643	5.508	5.654	ns	
		GCLK PLL	t <sub>co</sub>	1.294	1.480	1.903	1.986	2.188	2.206	2.128	2.099	2.306	2.323	2.117	ns	

Table 1-44. EP3SL50 Row Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.035	3.256	4.590	4.986	5.494	5.358	5.565	5.112	5.621	5.486	5.632	ns	
		GCLK PLL	t <sub>co</sub>	1.304	1.491	1.894	1.969	2.167	2.185	2.107	2.082	2.284	2.301	2.095	ns	
	6mA	GCLK	t <sub>co</sub>	3.028	3.250	4.588	4.985	5.493	5.357	5.564	5.111	5.621	5.486	5.632	ns	
		GCLK PLL	t <sub>co</sub>	1.297	1.482	1.885	1.968	2.166	2.184	2.106	2.081	2.284	2.301	2.095	ns	
	8mA	GCLK	t <sub>co</sub>	3.019	3.242	4.581	4.978	5.486	5.350	5.557	5.104	5.614	5.479	5.625	ns	
		GCLK PLL	t <sub>co</sub>	1.288	1.474	1.877	1.961	2.159	2.177	2.099	2.074	2.277	2.294	2.088	ns	
	10mA	GCLK	t <sub>co</sub>	3.022	3.244	4.584	4.981	5.490	5.354	5.561	5.107	5.617	5.482	5.628	ns	
		GCLK PLL	t <sub>co</sub>	1.291	1.476	1.879	1.964	2.163	2.181	2.103	2.077	2.280	2.297	2.091	ns	
	12mA	GCLK	t <sub>co</sub>	3.018	3.241	4.586	4.984	5.493	5.357	5.564	5.110	5.622	5.487	5.633	ns	
		GCLK PLL	t <sub>co</sub>	1.287	1.473	1.881	1.967	2.166	2.184	2.106	2.080	2.285	2.302	2.096	ns	
	1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.026	3.249	4.584	4.981	5.489	5.353	5.560	5.106	5.616	5.481	5.627	ns
			GCLK PLL	t <sub>co</sub>	1.295	1.481	1.879	1.964	2.162	2.180	2.102	2.076	2.279	2.296	2.090	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.041	3.262	4.599	4.996	5.505	5.369	5.576	5.121	5.632	5.497	5.643	ns	
		GCLK PLL	t <sub>co</sub>	1.310	1.498	1.905	1.979	2.178	2.196	2.118	2.091	2.295	2.312	2.106	ns	
	6mA	GCLK	t <sub>co</sub>	3.035	3.257	4.600	4.998	5.507	5.371	5.578	5.123	5.635	5.500	5.646	ns	
		GCLK PLL	t <sub>co</sub>	1.304	1.489	1.901	1.981	2.180	2.198	2.120	2.093	2.298	2.315	2.109	ns	
	8mA	GCLK	t <sub>co</sub>	3.031	3.253	4.595	4.993	5.502	5.366	5.573	5.118	5.629	5.494	5.640	ns	
		GCLK PLL	t <sub>co</sub>	1.300	1.485	1.895	1.976	2.175	2.193	2.115	2.088	2.292	2.309	2.103	ns	
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.043	3.264	4.612	5.012	5.524	5.388	5.595	5.137	5.651	5.516	5.662	ns	
		GCLK PLL	t <sub>co</sub>	1.312	1.497	1.916	1.995	2.197	2.215	2.137	2.107	2.314	2.331	2.125	ns	
	6mA	GCLK	t <sub>co</sub>	3.034	3.256	4.603	5.003	5.515	5.379	5.586	5.128	5.642	5.507	5.653	ns	
		GCLK PLL	t <sub>co</sub>	1.303	1.488	1.905	1.986	2.188	2.206	2.128	2.098	2.305	2.322	2.116	ns	
	8mA	GCLK	t <sub>co</sub>	3.033	3.256	4.610	5.011	5.524	5.388	5.595	5.137	5.652	5.517	5.663	ns	
		GCLK PLL	t <sub>co</sub>	1.302	1.488	1.909	1.994	2.197	2.215	2.137	2.107	2.315	2.332	2.126	ns	
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.114	3.338	4.626	5.016	5.494	5.359	5.561	5.144	5.625	5.513	5.635	ns	
		GCLK PLL	t <sub>co</sub>	1.436	1.622	1.973	2.052	2.208	2.226	2.148	2.167	2.327	2.382	2.139	ns	
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.114	3.338	4.626	5.016	5.494	5.359	5.561	5.144	5.625	5.513	5.635	ns	
		GCLK PLL	t <sub>co</sub>	1.436	1.622	1.973	2.052	2.208	2.226	2.148	2.167	2.327	2.382	2.139	ns	



Table 1-45 through Table 1-48 list the maximum I/O timing parameters for EP3SL50 devices for differential I/O standards.

Table 1-45 lists the EP3SL50 column pins input timing parameters for differential I/O standards.

**Table 1-45.** EP3SL50 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
LVDS	GCLK	t <sub>su</sub>	-0.697	-0.717	-1.072	-1.182	-1.294	-1.237	-1.524	-1.183	-1.296	-1.242	-1.562	ns
		t <sub>h</sub>	0.814	0.849	1.257	1.389	1.522	1.454	1.740	1.398	1.532	1.469	1.777	ns
	GCLK PLL	t <sub>su</sub>	1.143	1.159	1.821	2.053	2.279	2.166	2.172	2.063	2.288	2.173	2.219	ns
		t <sub>h</sub>	-0.892	-0.893	-1.424	-1.606	-1.781	-1.696	-1.696	-1.608	-1.782	-1.694	-1.742	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.697	-0.717	-1.072	-1.182	-1.294	-1.237	-1.524	-1.183	-1.296	-1.242	-1.562	ns
		t <sub>h</sub>	0.814	0.849	1.257	1.389	1.522	1.454	1.740	1.398	1.532	1.469	1.777	ns
	GCLK PLL	t <sub>su</sub>	1.143	1.159	1.821	2.053	2.279	2.166	2.172	2.063	2.288	2.173	2.219	ns
		t <sub>h</sub>	-0.892	-0.893	-1.424	-1.606	-1.781	-1.696	-1.696	-1.608	-1.782	-1.694	-1.742	ns
RSDS	GCLK	t <sub>su</sub>	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		t <sub>h</sub>	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	t <sub>su</sub>	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		t <sub>h</sub>	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		t <sub>h</sub>	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	t <sub>su</sub>	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		t <sub>h</sub>	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.717	-0.740	-1.091	-1.204	-1.329	-1.272	-1.559	-1.205	-1.329	-1.275	-1.595	ns
		t <sub>h</sub>	0.834	0.872	1.277	1.411	1.557	1.489	1.775	1.420	1.565	1.502	1.810	ns
	GCLK PLL	t <sub>su</sub>	1.123	1.136	1.802	2.031	2.244	2.131	2.137	2.041	2.255	2.140	2.186	ns
		t <sub>h</sub>	-0.872	-0.870	-1.404	-1.584	-1.746	-1.661	-1.661	-1.586	-1.749	-1.661	-1.709	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.717	-0.740	-1.091	-1.204	-1.329	-1.272	-1.559	-1.205	-1.329	-1.275	-1.595	ns
		t <sub>h</sub>	0.834	0.872	1.277	1.411	1.557	1.489	1.775	1.420	1.565	1.502	1.810	ns
	GCLK PLL	t <sub>su</sub>	1.123	1.136	1.802	2.031	2.244	2.131	2.137	2.041	2.255	2.140	2.186	ns
		t <sub>h</sub>	-0.872	-0.870	-1.404	-1.584	-1.746	-1.661	-1.661	-1.586	-1.749	-1.661	-1.709	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		t <sub>h</sub>	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	t <sub>su</sub>	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		t <sub>h</sub>	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		t <sub>h</sub>	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	t <sub>su</sub>	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		t <sub>h</sub>	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns

**Table 1-45.** EP3SL50 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.717	-0.740	-1.091	-1.204	-1.329	-1.272	-1.559	-1.205	-1.329	-1.275	-1.595	ns
		$t_h$	0.834	0.872	1.277	1.411	1.557	1.489	1.775	1.420	1.565	1.502	1.810	ns
	GCLK PLL	$t_{su}$	1.123	1.136	1.802	2.031	2.244	2.131	2.137	2.041	2.255	2.140	2.186	ns
		$t_h$	-0.872	-0.870	-1.404	-1.584	-1.746	-1.661	-1.661	-1.586	-1.749	-1.661	-1.709	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.717	-0.740	-1.091	-1.204	-1.329	-1.272	-1.559	-1.205	-1.329	-1.275	-1.595	ns
		$t_h$	0.834	0.872	1.277	1.411	1.557	1.489	1.775	1.420	1.565	1.502	1.810	ns
	GCLK PLL	$t_{su}$	1.123	1.136	1.802	2.031	2.244	2.131	2.137	2.041	2.255	2.140	2.186	ns
		$t_h$	-0.872	-0.870	-1.404	-1.584	-1.746	-1.661	-1.661	-1.586	-1.749	-1.661	-1.709	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.724	-0.746	-1.103	-1.209	-1.329	-1.274	-1.558	-1.209	-1.324	-1.273	-1.591	ns
		$t_h$	0.841	0.878	1.290	1.419	1.560	1.492	1.779	1.427	1.565	1.501	1.811	ns
	GCLK PLL	$t_{su}$	1.116	1.130	1.790	2.026	2.244	2.129	2.138	2.037	2.260	2.142	2.190	ns
		$t_h$	-0.865	-0.864	-1.391	-1.576	-1.743	-1.658	-1.657	-1.579	-1.749	-1.662	-1.708	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.724	-0.746	-1.103	-1.209	-1.329	-1.274	-1.558	-1.209	-1.324	-1.273	-1.591	ns
		$t_h$	0.841	0.878	1.290	1.419	1.560	1.492	1.779	1.427	1.565	1.501	1.811	ns
	GCLK PLL	$t_{su}$	1.116	1.130	1.790	2.026	2.244	2.129	2.138	2.037	2.260	2.142	2.190	ns
		$t_h$	-0.865	-0.864	-1.391	-1.576	-1.743	-1.658	-1.657	-1.579	-1.749	-1.662	-1.708	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.697	-0.717	-1.072	-1.182	-1.294	-1.237	-1.524	-1.183	-1.296	-1.242	-1.562	ns
		$t_h$	0.814	0.849	1.257	1.389	1.522	1.454	1.740	1.398	1.532	1.469	1.777	ns
	GCLK PLL	$t_{su}$	1.143	1.159	1.821	2.053	2.279	2.166	2.172	2.063	2.288	2.173	2.219	ns
		$t_h$	-0.892	-0.893	-1.424	-1.606	-1.781	-1.696	-1.696	-1.608	-1.782	-1.694	-1.742	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.697	-0.717	-1.072	-1.182	-1.294	-1.237	-1.524	-1.183	-1.296	-1.242	-1.562	ns
		$t_h$	0.814	0.849	1.257	1.389	1.522	1.454	1.740	1.398	1.532	1.469	1.777	ns
	GCLK PLL	$t_{su}$	1.143	1.159	1.821	2.053	2.279	2.166	2.172	2.063	2.288	2.173	2.219	ns
		$t_h$	-0.892	-0.893	-1.424	-1.606	-1.781	-1.696	-1.696	-1.608	-1.782	-1.694	-1.742	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		$t_h$	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	$t_{su}$	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		$t_h$	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns

Table 1-46 lists the EP3SL50 row pins input timing parameters for differential I/O standards.

**Table 1-46.** EP3SL50 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
LVDS	GCLK	t <sub>su</sub>	-0.919	-0.939	-0.988	-0.952	-1.089	-1.040	-1.316	-0.916	-1.048	-1.000	-1.349	ns
		t <sub>h</sub>	1.042	1.077	1.209	1.205	1.369	1.306	1.580	1.182	1.339	1.280	1.613	ns
	GCLK PLL	t <sub>su</sub>	0.882	0.896	1.863	2.243	2.446	2.322	2.342	2.291	2.500	2.376	2.393	ns
		t <sub>h</sub>	-0.625	-0.625	-1.430	-1.749	-1.896	-1.802	-1.817	-1.783	-1.936	-1.843	-1.865	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.919	-0.939	-0.988	-0.952	-1.089	-1.040	-1.316	-0.916	-1.048	-1.000	-1.349	ns
		t <sub>h</sub>	1.042	1.077	1.209	1.205	1.369	1.306	1.580	1.182	1.339	1.280	1.613	ns
	GCLK PLL	t <sub>su</sub>	0.882	0.896	1.863	2.243	2.446	2.322	2.342	2.291	2.500	2.376	2.393	ns
		t <sub>h</sub>	-0.625	-0.625	-1.430	-1.749	-1.896	-1.802	-1.817	-1.783	-1.936	-1.843	-1.865	ns
RSDS	GCLK	t <sub>su</sub>	-0.919	-0.939	-0.988	-0.952	-1.089	-1.040	-1.316	-0.916	-1.048	-1.000	-1.349	ns
		t <sub>h</sub>	1.042	1.077	1.209	1.205	1.369	1.306	1.580	1.182	1.339	1.280	1.613	ns
	GCLK PLL	t <sub>su</sub>	0.882	0.896	1.863	2.243	2.446	2.322	2.342	2.291	2.500	2.376	2.393	ns
		t <sub>h</sub>	-0.625	-0.625	-1.430	-1.749	-1.896	-1.802	-1.817	-1.783	-1.936	-1.843	-1.865	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.734	-0.764	-1.085	-1.186	-1.286	-1.234	-1.505	-1.193	-1.291	-1.242	-1.543	ns
		t <sub>h</sub>	0.850	0.893	1.274	1.394	1.516	1.451	1.720	1.410	1.531	1.470	1.758	ns
	GCLK PLL	t <sub>su</sub>	1.077	1.081	1.776	2.019	2.257	2.138	2.163	2.024	2.263	2.144	2.209	ns
		t <sub>h</sub>	-0.827	-0.819	-1.375	-1.570	-1.756	-1.667	-1.687	-1.565	-1.751	-1.663	-1.730	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.734	-0.764	-1.085	-1.186	-1.286	-1.234	-1.505	-1.193	-1.291	-1.242	-1.543	ns
		t <sub>h</sub>	0.850	0.893	1.274	1.394	1.516	1.451	1.720	1.410	1.531	1.470	1.758	ns
	GCLK PLL	t <sub>su</sub>	1.077	1.081	1.776	2.019	2.257	2.138	2.163	2.024	2.263	2.144	2.209	ns
		t <sub>h</sub>	-0.827	-0.819	-1.375	-1.570	-1.756	-1.667	-1.687	-1.565	-1.751	-1.663	-1.730	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.743	-0.776	-1.094	-1.196	-1.302	-1.250	-1.521	-1.202	-1.307	-1.258	-1.559	ns
		t <sub>h</sub>	0.859	0.905	1.283	1.404	1.532	1.467	1.736	1.419	1.547	1.486	1.774	ns
	GCLK PLL	t <sub>su</sub>	1.068	1.069	1.767	2.009	2.241	2.122	2.147	2.015	2.247	2.128	2.193	ns
		t <sub>h</sub>	-0.818	-0.807	-1.366	-1.560	-1.740	-1.651	-1.671	-1.556	-1.735	-1.647	-1.714	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.743	-0.776	-1.094	-1.196	-1.302	-1.250	-1.521	-1.202	-1.307	-1.258	-1.559	ns
		t <sub>h</sub>	0.859	0.905	1.283	1.404	1.532	1.467	1.736	1.419	1.547	1.486	1.774	ns
	GCLK PLL	t <sub>su</sub>	1.068	1.069	1.767	2.009	2.241	2.122	2.147	2.015	2.247	2.128	2.193	ns
		t <sub>h</sub>	-0.818	-0.807	-1.366	-1.560	-1.740	-1.651	-1.671	-1.556	-1.735	-1.647	-1.714	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.757	-0.788	-1.107	-1.206	-1.320	-1.268	-1.539	-1.213	-1.324	-1.275	-1.576	ns
		t <sub>h</sub>	0.873	0.917	1.295	1.414	1.550	1.485	1.754	1.430	1.564	1.503	1.791	ns
	GCLK PLL	t <sub>su</sub>	1.054	1.057	1.754	1.999	2.223	2.104	2.129	2.004	2.230	2.111	2.176	ns
		t <sub>h</sub>	-0.804	-0.795	-1.354	-1.550	-1.722	-1.633	-1.653	-1.545	-1.718	-1.630	-1.697	ns

**Table 1-46.** EP3SL50 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.757	-0.788	-1.107	-1.206	-1.320	-1.268	-1.539	-1.213	-1.324	-1.275	-1.576	ns
		$t_h$	0.873	0.917	1.295	1.414	1.550	1.485	1.754	1.430	1.564	1.503	1.791	ns
	GCLK PLL	$t_{su}$	1.054	1.057	1.754	1.999	2.223	2.104	2.129	2.004	2.230	2.111	2.176	ns
		$t_h$	-0.804	-0.795	-1.354	-1.550	-1.722	-1.633	-1.653	-1.545	-1.718	-1.630	-1.697	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.743	-0.776	-1.094	-1.196	-1.302	-1.250	-1.521	-1.202	-1.307	-1.258	-1.559	ns
		$t_h$	0.859	0.905	1.283	1.404	1.532	1.467	1.736	1.419	1.547	1.486	1.774	ns
	GCLK PLL	$t_{su}$	1.068	1.069	1.767	2.009	2.241	2.122	2.147	2.015	2.247	2.128	2.193	ns
		$t_h$	-0.818	-0.807	-1.366	-1.560	-1.740	-1.651	-1.671	-1.556	-1.735	-1.647	-1.714	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.743	-0.776	-1.094	-1.196	-1.302	-1.250	-1.521	-1.202	-1.307	-1.258	-1.559	ns
		$t_h$	0.859	0.905	1.283	1.404	1.532	1.467	1.736	1.419	1.547	1.486	1.774	ns
	GCLK PLL	$t_{su}$	1.068	1.069	1.767	2.009	2.241	2.122	2.147	2.015	2.247	2.128	2.193	ns
		$t_h$	-0.818	-0.807	-1.366	-1.560	-1.740	-1.651	-1.671	-1.556	-1.735	-1.647	-1.714	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.757	-0.788	-1.107	-1.206	-1.320	-1.268	-1.539	-1.213	-1.324	-1.275	-1.576	ns
		$t_h$	0.873	0.917	1.295	1.414	1.550	1.485	1.754	1.430	1.564	1.503	1.791	ns
	GCLK PLL	$t_{su}$	1.054	1.057	1.754	1.999	2.223	2.104	2.129	2.004	2.230	2.111	2.176	ns
		$t_h$	-0.804	-0.795	-1.354	-1.550	-1.722	-1.633	-1.653	-1.545	-1.718	-1.630	-1.697	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.757	-0.788	-1.107	-1.206	-1.320	-1.268	-1.539	-1.213	-1.324	-1.275	-1.576	ns
		$t_h$	0.873	0.917	1.295	1.414	1.550	1.485	1.754	1.430	1.564	1.503	1.791	ns
	GCLK PLL	$t_{su}$	1.054	1.057	1.754	1.999	2.223	2.104	2.129	2.004	2.230	2.111	2.176	ns
		$t_h$	-0.804	-0.795	-1.354	-1.550	-1.722	-1.633	-1.653	-1.545	-1.718	-1.630	-1.697	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.756	-0.787	-1.112	-1.212	-1.321	-1.270	-1.540	-1.214	-1.320	-1.273	-1.573	ns
		$t_h$	0.872	0.916	1.300	1.422	1.554	1.489	1.759	1.434	1.563	1.502	1.792	ns
	GCLK PLL	$t_{su}$	1.045	1.048	1.739	1.983	2.212	2.092	2.118	1.993	2.224	2.103	2.169	ns
		$t_h$	-0.795	-0.786	-1.339	-1.532	-1.708	-1.619	-1.638	-1.531	-1.709	-1.621	-1.686	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.756	-0.787	-1.112	-1.212	-1.321	-1.270	-1.540	-1.214	-1.320	-1.273	-1.573	ns
		$t_h$	0.872	0.916	1.300	1.422	1.554	1.489	1.759	1.434	1.563	1.502	1.792	ns
	GCLK PLL	$t_{su}$	1.045	1.048	1.739	1.983	2.212	2.092	2.118	1.993	2.224	2.103	2.169	ns
		$t_h$	-0.795	-0.786	-1.339	-1.532	-1.708	-1.619	-1.638	-1.531	-1.709	-1.621	-1.686	ns

Table 1-47 lists the EP3SL50 column pins output timing parameters for differential I/O standards.

**Table 1-47.** EP3SL50 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial				V <sub>CCL</sub> =1.1 V	V <sub>CCL</sub> =1.1 V			V <sub>CCL</sub> =1.1 V	V <sub>CCL</sub> =1.1 V		V <sub>CCL</sub> =0.9 V
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	t <sub>co</sub>	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	t <sub>co</sub>	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	t <sub>co</sub>	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.056	3.279	4.646	5.054	5.571	5.431	5.649	5.181	5.698	5.560	5.717	ns	
		GCLK PLL	t <sub>co</sub>	3.046	3.269	4.636	5.043	5.561	5.421	5.639	5.170	5.688	5.550	5.707	ns	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.046	3.269	4.639	5.047	5.565	5.425	5.643	5.175	5.693	5.555	5.712	ns	
		GCLK PLL	t <sub>co</sub>	3.039	3.263	4.632	5.041	5.559	5.419	5.637	5.168	5.687	5.549	5.706	ns	
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.038	3.261	4.629	5.038	5.556	5.416	5.634	5.165	5.683	5.545	5.702	ns	
		GCLK PLL	t <sub>co</sub>	3.060	3.283	4.650	5.058	5.575	5.435	5.653	5.185	5.703	5.565	5.722	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.050	3.272	4.629	5.035	5.550	5.410	5.628	5.161	5.676	5.538	5.695	ns	
		GCLK PLL	t <sub>co</sub>	3.045	3.268	4.629	5.035	5.551	5.411	5.629	5.162	5.678	5.540	5.697	ns	
	6mA	GCLK	t <sub>co</sub>	3.043	3.266	4.628	5.034	5.549	5.409	5.627	5.161	5.677	5.539	5.696	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.257	4.618	5.024	5.540	5.400	5.618	5.151	5.667	5.529	5.686	ns	
	8mA	GCLK	t <sub>co</sub>	3.036	3.259	4.624	5.031	5.548	5.408	5.626	5.159	5.676	5.538	5.695	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.256	4.607	5.012	5.526	5.386	5.604	5.138	5.652	5.514	5.671	ns	
	10mA	GCLK	t <sub>co</sub>	3.047	3.269	4.625	5.030	5.544	5.404	5.622	5.157	5.671	5.533	5.690	ns	
		GCLK PLL	t <sub>co</sub>	3.043	3.266	4.626	5.032	5.548	5.408	5.626	5.159	5.675	5.537	5.694	ns	
	12mA	GCLK	t <sub>co</sub>	3.033	3.255	4.615	5.021	5.536	5.396	5.614	5.148	5.663	5.525	5.682	ns	
		GCLK PLL	t <sub>co</sub>	3.031	3.253	4.613	5.018	5.534	5.394	5.612	5.146	5.661	5.523	5.680	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.031	3.254	4.616	5.023	5.539	5.399	5.617	5.150	5.667	5.529	5.686	ns
			GCLK PLL	t <sub>co</sub>	3.035	3.257	4.613	5.018	5.533	5.393	5.611	5.145	5.660	5.522	5.679	ns

**Table 1-47.** EP3SL50 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.061	3.286	4.658	5.066	5.583	5.443	5.661	5.193	5.710	5.572	5.729	ns	
		GCLK PLL	$t_{co}$	3.047	3.272	4.646	5.055	5.573	5.433	5.651	5.183	5.701	5.563	5.720	ns	
	6mA	GCLK	$t_{co}$	3.035	3.259	4.629	5.037	5.555	5.415	5.633	5.165	5.683	5.545	5.702	ns	
		GCLK PLL	$t_{co}$	3.035	3.259	4.632	5.041	5.559	5.419	5.637	5.169	5.688	5.550	5.707	ns	
	8mA	GCLK	$t_{co}$	3.031	3.255	4.625	5.033	5.552	5.412	5.630	5.162	5.680	5.542	5.699	ns	
		GCLK PLL	$t_{co}$	3.035	3.257	4.618	5.024	5.540	5.400	5.618	5.151	5.667	5.529	5.686	ns	
	10mA	GCLK	$t_{co}$	3.036	3.259	4.626	5.034	5.551	5.411	5.629	5.161	5.679	5.541	5.698	ns	
		GCLK PLL	$t_{co}$	3.064	3.289	4.657	5.064	5.581	5.441	5.659	5.192	5.708	5.570	5.727	ns	
	12mA	GCLK	$t_{co}$	3.053	3.277	4.645	5.052	5.569	5.429	5.647	5.180	5.696	5.558	5.715	ns	
		GCLK PLL	$t_{co}$	3.048	3.273	4.645	5.053	5.570	5.430	5.648	5.181	5.698	5.560	5.717	ns	
	DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.034	3.258	4.627	5.034	5.551	5.411	5.629	5.162	5.680	5.542	5.699	ns
			GCLK PLL	$t_{co}$	3.032	3.256	4.625	5.032	5.549	5.409	5.627	5.160	5.677	5.539	5.696	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.036	3.258	4.617	5.022	5.537	5.397	5.615	5.149	5.664	5.526	5.683	ns	
		GCLK PLL	$t_{co}$	3.036	3.259	4.625	5.032	5.549	5.409	5.627	5.160	5.677	5.539	5.696	ns	
	6mA	GCLK	$t_{co}$	3.052	3.276	4.641	5.047	5.563	5.423	5.641	5.175	5.690	5.552	5.709	ns	
		GCLK PLL	$t_{co}$	3.052	3.276	4.641	5.047	5.563	5.423	5.641	5.175	5.690	5.552	5.709	ns	
	8mA	GCLK	$t_{co}$	3.042	3.266	4.631	5.037	5.553	5.413	5.631	5.165	5.681	5.543	5.700	ns	
		GCLK PLL	$t_{co}$	3.035	3.258	4.617	5.022	5.537	5.397	5.615	5.149	5.664	5.526	5.683	ns	
	10mA	GCLK	$t_{co}$	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	$t_{co}$	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
	12mA	GCLK	$t_{co}$	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	$t_{co}$	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns
			GCLK PLL	$t_{co}$	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns

**Table 1-47.** EP3SL50 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.056	3.279	4.646	5.054	5.571	5.431	5.649	5.181	5.698	5.560	5.717	ns	
		GCLK PLL	$t_{co}$	3.046	3.269	4.636	5.043	5.561	5.421	5.639	5.170	5.688	5.550	5.707	ns	
	6mA	GCLK	$t_{co}$	3.046	3.269	4.639	5.047	5.565	5.425	5.643	5.175	5.693	5.555	5.712	ns	
		GCLK PLL	$t_{co}$	3.039	3.263	4.632	5.041	5.559	5.419	5.637	5.168	5.687	5.549	5.706	ns	
	8mA	GCLK	$t_{co}$	3.038	3.261	4.629	5.038	5.556	5.416	5.634	5.165	5.683	5.545	5.702	ns	
		GCLK PLL	$t_{co}$	3.060	3.283	4.650	5.058	5.575	5.435	5.653	5.185	5.703	5.565	5.722	ns	
	10mA	GCLK	$t_{co}$	3.050	3.272	4.629	5.035	5.550	5.410	5.628	5.161	5.676	5.538	5.695	ns	
		GCLK PLL	$t_{co}$	3.045	3.268	4.629	5.035	5.551	5.411	5.629	5.162	5.678	5.540	5.697	ns	
	12mA	GCLK	$t_{co}$	3.043	3.266	4.628	5.034	5.549	5.409	5.627	5.161	5.677	5.539	5.696	ns	
		GCLK PLL	$t_{co}$	3.035	3.257	4.618	5.024	5.540	5.400	5.618	5.151	5.667	5.529	5.686	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.036	3.259	4.624	5.031	5.548	5.408	5.626	5.159	5.676	5.538	5.695	ns
			GCLK PLL	$t_{co}$	3.035	3.256	4.607	5.012	5.526	5.386	5.604	5.138	5.652	5.514	5.671	ns
16mA		GCLK	$t_{co}$	3.047	3.269	4.625	5.030	5.544	5.404	5.622	5.157	5.671	5.533	5.690	ns	
		GCLK PLL	$t_{co}$	3.043	3.266	4.626	5.032	5.548	5.408	5.626	5.159	5.675	5.537	5.694	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.033	3.255	4.615	5.021	5.536	5.396	5.614	5.148	5.663	5.525	5.682	ns	
		GCLK PLL	$t_{co}$	3.031	3.253	4.613	5.018	5.534	5.394	5.612	5.146	5.661	5.523	5.680	ns	
	6mA	GCLK	$t_{co}$	3.031	3.254	4.616	5.023	5.539	5.399	5.617	5.150	5.667	5.529	5.686	ns	
		GCLK PLL	$t_{co}$	3.035	3.257	4.613	5.018	5.533	5.393	5.611	5.145	5.660	5.522	5.679	ns	
	8mA	GCLK	$t_{co}$	3.061	3.286	4.658	5.066	5.583	5.443	5.661	5.193	5.710	5.572	5.729	ns	
		GCLK PLL	$t_{co}$	3.047	3.272	4.646	5.055	5.573	5.433	5.651	5.183	5.701	5.563	5.720	ns	
	10mA	GCLK	$t_{co}$	3.035	3.259	4.629	5.037	5.555	5.415	5.633	5.165	5.683	5.545	5.702	ns	
		GCLK PLL	$t_{co}$	3.035	3.259	4.632	5.041	5.559	5.419	5.637	5.169	5.688	5.550	5.707	ns	
	12mA	GCLK	$t_{co}$	3.031	3.255	4.625	5.033	5.552	5.412	5.630	5.162	5.680	5.542	5.699	ns	
		GCLK PLL	$t_{co}$	3.035	3.257	4.618	5.024	5.540	5.400	5.618	5.151	5.667	5.529	5.686	ns	
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.036	3.259	4.626	5.034	5.551	5.411	5.629	5.161	5.679	5.541	5.698	ns	
		GCLK PLL	$t_{co}$	3.064	3.289	4.657	5.064	5.581	5.441	5.659	5.192	5.708	5.570	5.727	ns	
	16mA	GCLK	$t_{co}$	3.053	3.277	4.645	5.052	5.569	5.429	5.647	5.180	5.696	5.558	5.715	ns	
		GCLK PLL	$t_{co}$	3.048	3.273	4.645	5.053	5.570	5.430	5.648	5.181	5.698	5.560	5.717	ns	

**Table 1-47.** EP3SL50 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.034	3.258	4.627	5.034	5.551	5.411	5.629	5.162	5.680	5.542	5.699	ns
		GCLK PLL	$t_{co}$	3.032	3.256	4.625	5.032	5.549	5.409	5.627	5.160	5.677	5.539	5.696	ns
	10mA	GCLK	$t_{co}$	3.036	3.258	4.617	5.022	5.537	5.397	5.615	5.149	5.664	5.526	5.683	ns
		GCLK PLL	$t_{co}$	3.036	3.259	4.625	5.032	5.549	5.409	5.627	5.160	5.677	5.539	5.696	ns
	12mA	GCLK	$t_{co}$	3.052	3.276	4.641	5.047	5.563	5.423	5.641	5.175	5.690	5.552	5.709	ns
		GCLK PLL	$t_{co}$	3.052	3.276	4.641	5.047	5.563	5.423	5.641	5.175	5.690	5.552	5.709	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.042	3.266	4.631	5.037	5.553	5.413	5.631	5.165	5.681	5.543	5.700	ns
		GCLK PLL	$t_{co}$	3.035	3.258	4.617	5.022	5.537	5.397	5.615	5.149	5.664	5.526	5.683	ns

Table 1-48 lists the EP3SL50 row pins output timing parameters for differential I/O standards.

**Table 1-48.** EP3SL50 Row Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
LVDS	—	GCLK	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
		GCLK PLL	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
LVDS_E_1R	—	GCLK	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
		GCLK PLL	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
		GCLK PLL	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
MINI-LVDS	—	GCLK	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
		GCLK PLL	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
		GCLK PLL	$t_{co}$	3.098	3.331	4.730	5.145	5.672	5.528	5.727	5.280	5.809	5.665	5.794	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.084	3.317	4.717	5.132	5.659	5.515	5.714	5.266	5.796	5.652	5.781	ns
		GCLK PLL	$t_{co}$	3.080	3.313	4.715	5.132	5.660	5.516	5.715	5.266	5.798	5.654	5.783	ns
RSDS	—	GCLK	$t_{co}$	3.096	3.328	4.716	5.129	5.654	5.510	5.709	5.263	5.791	5.647	5.776	ns
		GCLK PLL	$t_{co}$	3.085	3.318	4.712	5.125	5.651	5.507	5.706	5.260	5.788	5.644	5.773	ns



**Table 1-48.** EP3SL50 Row Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
RSDS_E_1R	—	GCLK	$t_{co}$	3.082	3.315	4.710	5.123	5.649	5.505	5.704	5.258	5.787	5.643	5.772	ns
		GCLK PLL	$t_{co}$	3.093	3.325	4.711	5.124	5.648	5.504	5.703	5.257	5.785	5.641	5.770	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.083	3.316	4.709	5.122	5.647	5.503	5.702	5.257	5.785	5.641	5.770	ns
		GCLK PLL	$t_{co}$	3.069	3.302	4.694	5.107	5.633	5.489	5.688	5.242	5.770	5.626	5.755	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.066	3.298	4.690	5.103	5.629	5.485	5.684	5.238	5.766	5.622	5.751	ns
		GCLK PLL	$t_{co}$	3.063	3.296	4.691	5.106	5.632	5.488	5.687	5.241	5.770	5.626	5.755	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	6mA	GCLK	$t_{co}$	3.064	3.296	4.681	5.094	5.619	5.475	5.674	5.228	5.756	5.612	5.741	ns
		GCLK PLL	$t_{co}$	3.113	3.349	4.752	5.167	5.695	5.551	5.750	5.302	5.832	5.688	5.817	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	8mA	GCLK	$t_{co}$	3.089	3.325	4.734	5.150	5.678	5.534	5.733	5.285	5.817	5.673	5.802	ns
		GCLK PLL	$t_{co}$	3.071	3.306	4.712	5.128	5.656	5.512	5.711	5.263	5.795	5.651	5.780	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.117	3.352	4.752	5.167	5.694	5.550	5.749	5.302	5.832	5.688	5.817	ns
		GCLK PLL	$t_{co}$	3.102	3.337	4.738	5.152	5.679	5.535	5.734	5.287	5.817	5.673	5.802	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	6mA	GCLK	$t_{co}$	3.091	3.326	4.733	5.149	5.676	5.532	5.731	5.284	5.815	5.671	5.800	ns
		GCLK PLL	$t_{co}$	3.071	3.306	4.710	5.125	5.653	5.509	5.708	5.261	5.791	5.647	5.776	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	8mA	GCLK	$t_{co}$	3.068	3.302	4.706	5.122	5.649	5.505	5.704	5.257	5.788	5.644	5.773	ns
		GCLK PLL	$t_{co}$	3.073	3.306	4.697	5.110	5.635	5.491	5.690	5.244	5.772	5.628	5.757	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.066	3.299	4.696	5.111	5.638	5.494	5.693	5.247	5.777	5.633	5.762	ns
		GCLK PLL	$t_{co}$	3.094	3.328	4.724	5.138	5.664	5.520	5.719	5.273	5.802	5.658	5.787	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	6mA	GCLK	$t_{co}$	3.076	3.311	4.709	5.123	5.649	5.505	5.704	5.258	5.787	5.643	5.772	ns
		GCLK PLL	$t_{co}$	3.062	3.295	4.686	5.099	5.624	5.480	5.679	5.234	5.762	5.618	5.747	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	8mA	GCLK	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
		GCLK PLL	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	10mA	GCLK	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
		GCLK PLL	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	12mA	GCLK	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
		GCLK PLL	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns

**Table 1-48.** EP3SL50 Row Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
		GCLK PLL	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
		GCLK PLL	$t_{co}$	3.098	3.331	4.730	5.145	5.672	5.528	5.727	5.280	5.809	5.665	5.794	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	6mA	GCLK	$t_{co}$	3.084	3.317	4.717	5.132	5.659	5.515	5.714	5.266	5.796	5.652	5.781	ns
		GCLK PLL	$t_{co}$	3.080	3.313	4.715	5.132	5.660	5.516	5.715	5.266	5.798	5.654	5.783	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.096	3.328	4.716	5.129	5.654	5.510	5.709	5.263	5.791	5.647	5.776	ns
		GCLK PLL	$t_{co}$	3.085	3.318	4.712	5.125	5.651	5.507	5.706	5.260	5.788	5.644	5.773	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.082	3.315	4.710	5.123	5.649	5.505	5.704	5.258	5.787	5.643	5.772	ns
		GCLK PLL	$t_{co}$	3.093	3.325	4.711	5.124	5.648	5.504	5.703	5.257	5.785	5.641	5.770	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	6mA	GCLK	$t_{co}$	3.083	3.316	4.709	5.122	5.647	5.503	5.702	5.257	5.785	5.641	5.770	ns
		GCLK PLL	$t_{co}$	3.069	3.302	4.694	5.107	5.633	5.489	5.688	5.242	5.770	5.626	5.755	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.066	3.298	4.690	5.103	5.629	5.485	5.684	5.238	5.766	5.622	5.751	ns
		GCLK PLL	$t_{co}$	3.063	3.296	4.691	5.106	5.632	5.488	5.687	5.241	5.770	5.626	5.755	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	10mA	GCLK	$t_{co}$	3.064	3.296	4.681	5.094	5.619	5.475	5.674	5.228	5.756	5.612	5.741	ns
		GCLK PLL	$t_{co}$	3.113	3.349	4.752	5.167	5.695	5.551	5.750	5.302	5.832	5.688	5.817	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	12mA	GCLK	$t_{co}$	3.089	3.325	4.734	5.150	5.678	5.534	5.733	5.285	5.817	5.673	5.802	ns
		GCLK PLL	$t_{co}$	3.071	3.306	4.712	5.128	5.656	5.512	5.711	5.263	5.795	5.651	5.780	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.117	3.352	4.752	5.167	5.694	5.550	5.749	5.302	5.832	5.688	5.817	ns
		GCLK PLL	$t_{co}$	3.102	3.337	4.738	5.152	5.679	5.535	5.734	5.287	5.817	5.673	5.802	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.091	3.326	4.733	5.149	5.676	5.532	5.731	5.284	5.815	5.671	5.800	ns
		GCLK PLL	$t_{co}$	3.071	3.306	4.710	5.125	5.653	5.509	5.708	5.261	5.791	5.647	5.776	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.068	3.302	4.706	5.122	5.649	5.505	5.704	5.257	5.788	5.644	5.773	ns
		GCLK PLL	$t_{co}$	3.073	3.306	4.697	5.110	5.635	5.491	5.690	5.244	5.772	5.628	5.757	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	12mA	GCLK	$t_{co}$	3.066	3.299	4.696	5.111	5.638	5.494	5.693	5.247	5.777	5.633	5.762	ns
		GCLK PLL	$t_{co}$	3.094	3.328	4.724	5.138	5.664	5.520	5.719	5.273	5.802	5.658	5.787	ns

**Table 1-48.** EP3SL50 Row Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.076	3.311	4.709	5.123	5.649	5.505	5.704	5.258	5.787	5.643	5.772	ns
		GCLK PLL	$t_{co}$	3.062	3.295	4.686	5.099	5.624	5.480	5.679	5.234	5.762	5.618	5.747	ns

Table 1-49 and Table 1-50 list the EP3SL50 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-49 lists the EP3SL50 column pin delay adders when using the regional clock.

**Table 1-49.** EP3SL50 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	
RCLK input adder	0.239	0.258	0.341	0.365	0.39	0.377	0.439	0.375	0.399	0.388	0.441	ns
RCLK PLL input adder	0.008	0.009	0.014	0.017	0.019	0.017	0.02	0.018	0.019	0.017	0.02	ns
RCLK output adder	-0.068	-0.07	-0.09	-0.092	-0.094	-0.091	-0.169	-0.086	-0.087	-0.09	-0.17	ns
RCLK PLL output adder	1.614	1.649	2.575	2.89	3.164	3.011	3.22	2.908	3.217	3.063	3.338	ns

Table 1-50 lists the EP3SL50 row pin delay adders when using the regional clock.

**Table 1-50.** EP3SL50 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	
RCLK input adder	0.111	0.124	0.178	0.193	0.208	0.2	0.263	0.197	0.213	0.203	0.266	ns
RCLK PLL input adder	0.101	0.107	0.156	0.174	0.194	0.184	0.251	0.177	0.196	0.188	0.249	ns
RCLK output adder	-0.113	-0.127	-0.181	-0.196	-0.213	-0.205	-0.271	-0.199	-0.217	-0.209	-0.273	ns
RCLK PLL output adder	-0.107	-0.113	-0.164	-0.185	-0.213	-0.2	-0.266	-0.184	-0.212	-0.198	-0.262	ns

**EP3SL70 I/O Timing Parameters**

Table 1-51 through Table 1-54 list the maximum I/O timing parameters for EP3SL70 devices for single-ended I/O standards.

Table 1-51 lists the EP3SL70 column pins input timing parameters for single-ended I/O standards.

**Table 1-51.** EP3SL70 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTL	GCLK	$t_{su}$	-0.812	-0.811	-1.154	-1.261	-1.312	-1.266	-1.645	-1.261	-1.312	-1.266	-1.645	ns
		$t_h$	0.934	0.934	1.327	1.457	1.533	1.475	1.850	1.457	1.533	1.475	1.850	ns
	GCLK PLL	$t_{su}$	-0.965	-0.965	-1.395	-1.522	-1.763	-1.703	-2.094	-1.522	-1.763	-1.703	-2.094	ns
		$t_h$	1.216	1.216	1.764	1.937	2.222	2.138	2.540	1.937	2.222	2.138	2.540	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.812	-0.811	-1.154	-1.261	-1.312	-1.266	-1.645	-1.261	-1.312	-1.266	-1.645	ns
		$t_h$	0.934	0.934	1.327	1.457	1.533	1.475	1.850	1.457	1.533	1.475	1.850	ns
	GCLK PLL	$t_{su}$	-0.965	-0.965	-1.395	-1.522	-1.763	-1.703	-2.094	-1.522	-1.763	-1.703	-2.094	ns
		$t_h$	1.216	1.216	1.764	1.937	2.222	2.138	2.540	1.937	2.222	2.138	2.540	ns
3.0-V LVTTL	GCLK	$t_{su}$	-0.823	-0.822	-1.153	-1.263	-1.311	-1.265	-1.644	-1.263	-1.311	-1.265	-1.644	ns
		$t_h$	0.945	0.945	1.326	1.459	1.532	1.474	1.849	1.459	1.532	1.474	1.849	ns
	GCLK PLL	$t_{su}$	-0.976	-0.976	-1.394	-1.524	-1.762	-1.702	-2.093	-1.524	-1.762	-1.702	-2.093	ns
		$t_h$	1.227	1.227	1.763	1.939	2.221	2.137	2.539	1.939	2.221	2.137	2.539	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.823	-0.822	-1.153	-1.263	-1.311	-1.265	-1.644	-1.263	-1.311	-1.265	-1.644	ns
		$t_h$	0.945	0.945	1.326	1.459	1.532	1.474	1.849	1.459	1.532	1.474	1.849	ns
	GCLK PLL	$t_{su}$	-0.976	-0.976	-1.394	-1.524	-1.762	-1.702	-2.093	-1.524	-1.762	-1.702	-2.093	ns
		$t_h$	1.227	1.227	1.763	1.939	2.221	2.137	2.539	1.939	2.221	2.137	2.539	ns
2.5 V	GCLK	$t_{su}$	-0.818	-0.817	-1.162	-1.275	-1.330	-1.284	-1.663	-1.275	-1.330	-1.284	-1.663	ns
		$t_h$	0.940	0.940	1.335	1.471	1.551	1.493	1.868	1.471	1.551	1.493	1.868	ns
	GCLK PLL	$t_{su}$	-0.971	-0.971	-1.403	-1.536	-1.781	-1.721	-2.112	-1.536	-1.781	-1.721	-2.112	ns
		$t_h$	1.222	1.222	1.772	1.951	2.240	2.156	2.558	1.951	2.240	2.156	2.558	ns
1.8 V	GCLK	$t_{su}$	-0.840	-0.839	-1.202	-1.311	-1.328	-1.282	-1.661	-1.311	-1.328	-1.282	-1.661	ns
		$t_h$	0.964	0.964	1.375	1.507	1.549	1.491	1.866	1.507	1.549	1.491	1.866	ns
	GCLK PLL	$t_{su}$	-0.993	-0.993	-1.443	-1.572	-1.779	-1.719	-2.110	-1.572	-1.779	-1.719	-2.110	ns
		$t_h$	1.246	1.246	1.812	1.987	2.238	2.154	2.556	1.987	2.238	2.154	2.556	ns
1.5 V	GCLK	$t_{su}$	-0.830	-0.829	-1.179	-1.279	-1.258	-1.212	-1.591	-1.279	-1.258	-1.212	-1.591	ns
		$t_h$	0.954	0.954	1.352	1.475	1.479	1.421	1.796	1.475	1.479	1.421	1.796	ns
	GCLK PLL	$t_{su}$	-0.983	-0.983	-1.420	-1.540	-1.709	-1.649	-2.040	-1.540	-1.709	-1.649	-2.040	ns
		$t_h$	1.236	1.236	1.789	1.955	2.168	2.084	2.486	1.955	2.168	2.084	2.486	ns
1.2 V	GCLK	$t_{su}$	-0.778	-0.777	-1.102	-1.180	-1.102	-1.056	-1.435	-1.180	-1.102	-1.056	-1.435	ns
		$t_h$	0.902	0.902	1.275	1.376	1.323	1.265	1.640	1.376	1.323	1.265	1.640	ns
	GCLK PLL	$t_{su}$	-0.931	-0.931	-1.343	-1.441	-1.553	-1.493	-1.884	-1.441	-1.553	-1.493	-1.884	ns
		$t_h$	1.184	1.184	1.712	1.856	2.012	1.928	2.330	1.856	2.012	1.928	2.330	ns

**Table 1-51.** EP3SL70 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.749	-0.748	-1.074	-1.164	-1.104	-1.058	-1.437	-1.164	-1.104	-1.058	-1.437	ns
		$t_h$	0.873	0.873	1.247	1.360	1.325	1.267	1.642	1.360	1.325	1.267	1.642	ns
	GCLK PLL	$t_{su}$	-0.902	-0.902	-1.315	-1.425	-1.555	-1.495	-1.886	-1.425	-1.555	-1.495	-1.886	ns
		$t_h$	1.155	1.155	1.684	1.840	2.014	1.930	2.332	1.840	2.014	1.930	2.332	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.749	-0.748	-1.074	-1.164	-1.104	-1.058	-1.437	-1.164	-1.104	-1.058	-1.437	ns
		$t_h$	0.873	0.873	1.247	1.360	1.325	1.267	1.642	1.360	1.325	1.267	1.642	ns
	GCLK PLL	$t_{su}$	-0.902	-0.902	-1.315	-1.425	-1.555	-1.495	-1.886	-1.425	-1.555	-1.495	-1.886	ns
		$t_h$	1.155	1.155	1.684	1.840	2.014	1.930	2.332	1.840	2.014	1.930	2.332	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.743	-0.742	-1.061	-1.156	-1.104	-1.056	-1.435	-1.156	-1.104	-1.056	-1.435	ns
		$t_h$	0.867	0.867	1.234	1.349	1.322	1.264	1.635	1.349	1.322	1.264	1.635	ns
	GCLK PLL	$t_{su}$	-0.896	-0.896	-1.302	-1.417	-1.552	-1.490	-1.884	-1.417	-1.552	-1.490	-1.884	ns
		$t_h$	1.149	1.149	1.671	1.829	2.008	1.924	2.325	1.829	2.008	1.924	2.325	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.743	-0.742	-1.061	-1.156	-1.104	-1.056	-1.435	-1.156	-1.104	-1.056	-1.435	ns
		$t_h$	0.867	0.867	1.234	1.349	1.322	1.264	1.635	1.349	1.322	1.264	1.635	ns
	GCLK PLL	$t_{su}$	-0.896	-0.896	-1.302	-1.417	-1.552	-1.490	-1.884	-1.417	-1.552	-1.490	-1.884	ns
		$t_h$	1.149	1.149	1.671	1.829	2.008	1.924	2.325	1.829	2.008	1.924	2.325	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.732	-0.731	-1.050	-1.145	-1.085	-1.037	-1.416	-1.145	-1.085	-1.037	-1.416	ns
		$t_h$	0.856	0.856	1.222	1.338	1.303	1.245	1.616	1.338	1.303	1.245	1.616	ns
	GCLK PLL	$t_{su}$	-0.885	-0.885	-1.291	-1.406	-1.533	-1.471	-1.865	-1.406	-1.533	-1.471	-1.865	ns
		$t_h$	1.138	1.138	1.659	1.818	1.989	1.905	2.306	1.818	1.989	1.905	2.306	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.732	-0.731	-1.050	-1.145	-1.085	-1.037	-1.416	-1.145	-1.085	-1.037	-1.416	ns
		$t_h$	0.856	0.856	1.222	1.338	1.303	1.245	1.616	1.338	1.303	1.245	1.616	ns
	GCLK PLL	$t_{su}$	-0.885	-0.885	-1.291	-1.406	-1.533	-1.471	-1.865	-1.406	-1.533	-1.471	-1.865	ns
		$t_h$	1.138	1.138	1.659	1.818	1.989	1.905	2.306	1.818	1.989	1.905	2.306	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.743	-0.742	-1.061	-1.156	-1.104	-1.056	-1.435	-1.156	-1.104	-1.056	-1.435	ns
		$t_h$	0.867	0.867	1.234	1.349	1.322	1.264	1.635	1.349	1.322	1.264	1.635	ns
	GCLK PLL	$t_{su}$	-0.896	-0.896	-1.302	-1.417	-1.552	-1.490	-1.884	-1.417	-1.552	-1.490	-1.884	ns
		$t_h$	1.149	1.149	1.671	1.829	2.008	1.924	2.325	1.829	2.008	1.924	2.325	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.743	-0.742	-1.061	-1.156	-1.104	-1.056	-1.435	-1.156	-1.104	-1.056	-1.435	ns
		$t_h$	0.867	0.867	1.234	1.349	1.322	1.264	1.635	1.349	1.322	1.264	1.635	ns
	GCLK PLL	$t_{su}$	-0.896	-0.896	-1.302	-1.417	-1.552	-1.490	-1.884	-1.417	-1.552	-1.490	-1.884	ns
		$t_h$	1.149	1.149	1.671	1.829	2.008	1.924	2.325	1.829	2.008	1.924	2.325	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.732	-0.731	-1.050	-1.145	-1.085	-1.037	-1.416	-1.145	-1.085	-1.037	-1.416	ns
		$t_h$	0.856	0.856	1.222	1.338	1.303	1.245	1.616	1.338	1.303	1.245	1.616	ns
	GCLK PLL	$t_{su}$	-0.885	-0.885	-1.291	-1.406	-1.533	-1.471	-1.865	-1.406	-1.533	-1.471	-1.865	ns
		$t_h$	1.138	1.138	1.659	1.818	1.989	1.905	2.306	1.818	1.989	1.905	2.306	ns

**Table 1-51.** EP3SL70 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.732	-0.731	-1.050	-1.145	-1.085	-1.037	-1.416	-1.145	-1.085	-1.037	-1.416	ns
		$t_h$	0.856	0.856	1.222	1.338	1.303	1.245	1.616	1.338	1.303	1.245	1.616	ns
	GCLK PLL	$t_{su}$	-0.885	-0.885	-1.291	-1.406	-1.533	-1.471	-1.865	-1.406	-1.533	-1.471	-1.865	ns
		$t_h$	1.138	1.138	1.659	1.818	1.989	1.905	2.306	1.818	1.989	1.905	2.306	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.720	-0.719	-1.040	-1.134	-1.069	-1.021	-1.400	-1.134	-1.069	-1.021	-1.400	ns
		$t_h$	0.844	0.844	1.212	1.327	1.287	1.229	1.600	1.327	1.287	1.229	1.600	ns
	GCLK PLL	$t_{su}$	-0.873	-0.873	-1.281	-1.395	-1.517	-1.455	-1.849	-1.395	-1.517	-1.455	-1.849	ns
		$t_h$	1.126	1.126	1.649	1.807	1.973	1.889	2.290	1.807	1.973	1.889	2.290	ns
3.0-V PCI	GCLK	$t_{su}$	-0.720	-0.719	-1.040	-1.134	-1.069	-1.021	-1.400	-1.134	-1.069	-1.021	-1.400	ns
		$t_h$	0.844	0.844	1.212	1.327	1.287	1.229	1.600	1.327	1.287	1.229	1.600	ns
	GCLK PLL	$t_{su}$	-0.873	-0.873	-1.281	-1.395	-1.517	-1.455	-1.849	-1.395	-1.517	-1.455	-1.849	ns
		$t_h$	1.126	1.126	1.649	1.807	1.973	1.889	2.290	1.807	1.973	1.889	2.290	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.823	-0.822	-1.153	-1.263	-1.311	-1.265	-1.644	-1.263	-1.311	-1.265	-1.644	ns
		$t_h$	0.945	0.945	1.326	1.459	1.532	1.474	1.849	1.459	1.532	1.474	1.849	ns
	GCLK PLL	$t_{su}$	-0.976	-0.976	-1.394	-1.524	-1.762	-1.702	-2.093	-1.524	-1.762	-1.702	-2.093	ns
		$t_h$	1.227	1.227	1.763	1.939	2.221	2.137	2.539	1.939	2.221	2.137	2.539	ns

Table 1-52 lists the EP3SL70 row pins input timing parameters for single-ended I/O standards.

**Table 1-52.** EP3SL70 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTL	GCLK	$t_{su}$	-0.811	-0.836	-1.185	-1.296	-1.513	-1.460	-1.732	-1.306	-1.513	-1.464	-1.763	ns
		$t_h$	0.925	0.962	1.582	1.801	1.915	1.799	1.814	1.796	1.923	1.804	1.865	ns
	GCLK PLL	$t_{su}$	0.937	0.945	1.371	1.505	1.747	1.679	1.951	1.526	1.756	1.693	1.982	ns
		$t_h$	-0.688	-0.684	-1.185	-1.296	-1.513	-1.460	-1.732	-1.306	-1.513	-1.464	-1.763	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.811	-0.836	-1.185	-1.296	-1.513	-1.460	-1.732	-1.306	-1.513	-1.464	-1.763	ns
		$t_h$	0.925	0.962	1.582	1.801	1.915	1.799	1.814	1.796	1.923	1.804	1.865	ns
	GCLK PLL	$t_{su}$	0.937	0.945	1.371	1.505	1.747	1.679	1.951	1.526	1.756	1.693	1.982	ns
		$t_h$	-0.688	-0.684	-1.182	-1.297	-1.516	-1.463	-1.735	-1.305	-1.518	-1.469	-1.768	ns
3.0-V LVTTL	GCLK	$t_{su}$	-0.817	-0.847	1.368	1.506	1.750	1.682	1.954	1.525	1.761	1.698	1.987	ns
		$t_h$	0.931	0.973	-1.182	-1.297	-1.516	-1.463	-1.735	-1.305	-1.518	-1.469	-1.768	ns
	GCLK PLL	$t_{su}$	0.931	0.934	1.585	1.800	1.912	1.796	1.811	1.797	1.918	1.799	1.860	ns
		$t_h$	-0.682	-0.673	1.368	1.506	1.750	1.682	1.954	1.525	1.761	1.698	1.987	ns

**Table 1-52.** EP3SL70 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V LVCMOS	GCLK	$t_{su}$	-0.817	-0.847	1.377	1.519	1.765	1.697	1.969	1.534	1.771	1.708	1.997	ns
		$t_h$	0.931	0.973	-1.191	-1.310	-1.531	-1.478	-1.750	-1.314	-1.528	-1.479	-1.778	ns
	GCLK PLL	$t_{su}$	0.931	0.934	1.576	1.787	1.897	1.781	1.796	1.788	1.908	1.789	1.850	ns
		$t_h$	-0.682	-0.673	1.377	1.519	1.765	1.697	1.969	1.534	1.771	1.708	1.997	ns
2.5 V	GCLK	$t_{su}$	-0.805	-0.840	1.518	1.758	1.994	1.874	1.798	1.758	1.917	1.798	1.849	ns
		$t_h$	0.919	0.966	1.447	1.676	1.892	1.823	2.114	1.723	1.933	1.867	2.146	ns
	GCLK PLL	$t_{su}$	0.943	0.941	-1.259	-1.469	-1.662	-1.607	-1.898	-1.507	-1.694	-1.641	-1.931	ns
		$t_h$	-0.694	-0.680	1.518	1.758	1.994	1.874	1.798	1.758	1.917	1.798	1.849	ns
1.8 V	GCLK	$t_{su}$	-0.946	-0.899	1.542	1.790	2.062	1.942	1.866	1.789	1.982	1.863	1.914	ns
		$t_h$	0.914	0.891	1.423	1.644	1.824	1.755	2.046	1.692	1.868	1.802	2.081	ns
	GCLK PLL	$t_{su}$	1.060	1.028	-1.235	-1.437	-1.594	-1.539	-1.830	-1.476	-1.629	-1.576	-1.866	ns
		$t_h$	-0.936	-0.888	1.621	1.891	2.221	2.101	2.025	1.885	2.137	2.018	2.069	ns
1.5 V	GCLK	$t_{su}$	0.924	0.902	1.344	1.543	1.665	1.596	1.887	1.596	1.713	1.647	1.926	ns
		$t_h$	1.050	1.017	-1.156	-1.336	-1.435	-1.380	-1.671	-1.380	-1.474	-1.421	-1.711	ns
	GCLK PLL	$t_{su}$	-0.876	-0.835	1.662	1.896	2.117	2.001	2.016	1.900	2.125	2.006	2.067	ns
		$t_h$	0.984	0.955	1.291	1.410	1.545	1.477	1.749	1.422	1.554	1.491	1.780	ns
1.2 V	GCLK	$t_{su}$	0.990	0.964	-1.118	-1.309	-1.430	-1.374	-1.667	-1.348	-1.467	-1.413	-1.704	ns
		$t_h$	-0.747	-0.781	1.659	-1.309	-1.430	-1.374	-1.667	-1.348	-1.467	-1.413	-1.704	ns
	GCLK PLL	$t_{su}$	1.000	0.999	1.306	1.514	1.658	1.589	1.879	1.562	1.703	1.638	1.915	ns
		$t_h$	0.862	0.908	-1.118	1.918	2.223	2.104	2.029	1.917	2.144	2.026	2.076	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.747	-0.781	1.659	1.918	2.223	2.104	2.029	1.917	2.144	2.026	2.076	ns
		$t_h$	1.000	0.999	1.306	-1.472	-1.722	-1.633	-1.557	-1.461	-1.635	-1.548	-1.601	ns
	GCLK PLL	$t_{su}$	0.862	0.908	-1.118	-1.309	-1.430	-1.374	-1.667	-1.348	-1.467	-1.413	-1.704	ns
		$t_h$	-0.850	-0.800	1.659	1.514	1.658	1.589	1.879	1.562	1.703	1.638	1.915	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	1.010	0.990	1.306	1.918	2.223	2.104	2.029	1.917	2.144	2.026	2.076	ns
		$t_h$	0.964	0.929	-1.118	-1.472	-1.722	-1.633	-1.557	-1.461	-1.635	-1.548	-1.601	ns
	GCLK PLL	$t_{su}$	-0.850	-0.800	-1.276	-1.299	-1.412	-1.356	-1.649	-1.337	-1.450	-1.396	-1.687	ns
		$t_h$	1.010	0.990	-1.105	1.504	1.640	1.571	1.861	1.551	1.686	1.621	1.898	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	0.964	0.929	1.294	1.928	2.241	2.122	2.047	1.928	2.161	2.043	2.093	ns
		$t_h$	-0.836	-0.788	1.659	1.928	2.241	2.122	2.047	1.928	2.161	2.043	2.093	ns
	GCLK PLL	$t_{su}$	1.024	1.002	1.306	-1.482	-1.740	-1.651	-1.575	-1.472	-1.652	-1.565	-1.618	ns
		$t_h$	0.950	0.917	-1.118	-1.299	-1.412	-1.356	-1.649	-1.337	-1.450	-1.396	-1.687	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.850	-0.800	1.659	-1.472	-1.722	-1.633	-1.557	-1.461	-1.635	-1.548	-1.601	ns
		$t_h$	1.010	0.990	1.306	-1.309	-1.430	-1.374	-1.667	-1.348	-1.467	-1.413	-1.704	ns
	GCLK PLL	$t_{su}$	0.964	0.929	-1.118	1.514	1.658	1.589	1.879	1.562	1.703	1.638	1.915	ns
		$t_h$	-0.850	-0.800	-1.276	1.918	2.223	2.104	2.029	1.917	2.144	2.026	2.076	ns



**Table 1-52.** EP3SL70 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
SSTL-15 CLASS I	GCLK	$t_{su}$	1.010	0.990	-1.105	-1.472	-1.722	-1.633	-1.557	-1.461	-1.635	-1.548	-1.601	ns
		$t_h$	0.964	0.929	1.294	-1.309	-1.430	-1.374	-1.667	-1.348	-1.467	-1.413	-1.704	ns
	GCLK PLL	$t_{su}$	-0.836	-0.788	1.674	1.514	1.658	1.589	1.879	1.562	1.703	1.638	1.915	ns
		$t_h$	1.024	1.002	-1.276	1.918	2.223	2.104	2.029	1.917	2.144	2.026	2.076	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	0.950	0.917	-1.105	-1.472	-1.722	-1.633	-1.557	-1.461	-1.635	-1.548	-1.601	ns
		$t_h$	-0.836	-0.788	-1.285	1.928	2.241	2.122	2.047	1.928	2.161	2.043	2.093	ns
	GCLK PLL	$t_{su}$	1.024	1.002	-1.096	-1.482	-1.740	-1.651	-1.575	-1.472	-1.652	-1.565	-1.618	ns
		$t_h$	0.950	0.917	1.285	-1.299	-1.412	-1.356	-1.649	-1.337	-1.450	-1.396	-1.687	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.827	-0.776	1.683	1.504	1.640	1.571	1.861	1.551	1.686	1.621	1.898	ns
		$t_h$	1.033	1.014	-1.285	1.928	2.241	2.122	2.047	1.928	2.161	2.043	2.093	ns
	GCLK PLL	$t_{su}$	0.941	0.905	-1.096	-1.482	-1.740	-1.651	-1.575	-1.472	-1.652	-1.565	-1.618	ns
		$t_h$	-0.827	-0.776	-1.285	1.938	2.257	2.138	2.063	1.937	2.177	2.059	2.109	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	1.033	1.014	-1.182	-1.492	-1.756	-1.667	-1.591	-1.481	-1.668	-1.581	-1.634	ns
		$t_h$	0.941	0.905	1.585	-1.289	-1.396	-1.340	-1.633	-1.328	-1.434	-1.380	-1.671	ns
	GCLK PLL	$t_{su}$	-0.817	-0.847	1.368	1.494	1.624	1.555	1.845	1.542	1.670	1.605	1.882	ns
		$t_h$	0.931	0.973	-1.182	1.938	2.257	2.138	2.063	1.937	2.177	2.059	2.109	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	0.931	0.934	1.585	-1.492	-1.756	-1.667	-1.591	-1.481	-1.668	-1.581	-1.634	ns
		$t_h$	-0.682	-0.673	1.368	-1.289	-1.396	-1.340	-1.633	-1.328	-1.434	-1.380	-1.671	ns
	GCLK PLL	$t_{su}$	-0.817	-0.847	1.368	1.494	1.624	1.555	1.845	1.542	1.670	1.605	1.882	ns
		$t_h$	0.931	0.973	1.368	1.938	2.257	2.138	2.063	1.937	2.177	2.059	2.109	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	0.931	0.934	1.368	-1.492	-1.756	-1.667	-1.591	-1.481	-1.668	-1.581	-1.634	ns
		$t_h$	-0.682	-0.673	1.368	-1.289	-1.396	-1.340	-1.633	-1.328	-1.434	-1.380	-1.671	ns
	GCLK PLL	$t_{su}$	-0.811	-0.836	-1.185	-1.296	-1.513	-1.460	-1.732	-1.306	-1.513	-1.464	-1.763	ns
		$t_h$	0.925	0.962	1.582	1.801	1.915	1.799	1.814	1.796	1.923	1.804	1.865	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	0.937	0.945	1.371	1.505	1.747	1.679	1.951	1.526	1.756	1.693	1.982	ns
		$t_h$	-0.688	-0.684	-1.185	-1.296	-1.513	-1.460	-1.732	-1.306	-1.513	-1.464	-1.763	ns
	GCLK PLL	$t_{su}$	-0.811	-0.836	-1.185	-1.296	-1.513	-1.460	-1.732	-1.306	-1.513	-1.464	-1.763	ns
		$t_h$	0.925	0.962	1.582	1.801	1.915	1.799	1.814	1.796	1.923	1.804	1.865	ns
3.0-V PCI	GCLK	$t_{su}$	0.937	0.945	1.371	1.505	1.747	1.679	1.951	1.526	1.756	1.693	1.982	ns
		$t_h$	-0.688	-0.684	-1.182	-1.297	-1.516	-1.463	-1.735	-1.305	-1.518	-1.469	-1.768	ns
	GCLK PLL	$t_{su}$	-0.817	-0.847	1.368	1.506	1.750	1.682	1.954	1.525	1.761	1.698	1.987	ns
		$t_h$	0.931	0.973	-1.182	-1.297	-1.516	-1.463	-1.735	-1.305	-1.518	-1.469	-1.768	ns
3.0-V PCI-X	GCLK	$t_{su}$	0.931	0.934	1.585	1.800	1.912	1.796	1.811	1.797	1.918	1.799	1.860	ns
		$t_h$	-0.682	-0.673	1.368	1.506	1.750	1.682	1.954	1.525	1.761	1.698	1.987	ns
	GCLK PLL	$t_{su}$	-0.817	-0.847	1.377	1.519	1.765	1.697	1.969	1.534	1.771	1.708	1.997	ns
		$t_h$	0.931	0.973	-1.191	-1.310	-1.531	-1.478	-1.750	-1.314	-1.528	-1.479	-1.778	ns



Table 1-53 lists the EP3SL70 column pins output timing parameters for single-ended I/O standards.

**Table 1-53.** EP3SL70 Column Pins Output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V		
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.187	3.187	4.411	4.765	5.226	5.105	5.313	4.765	5.226	5.105	5.313	ns	
		GCLK PLL	t <sub>co</sub>	3.514	3.514	4.895	5.293	5.823	5.680	5.963	5.293	5.823	5.680	5.963	ns	
	8mA	GCLK	t <sub>co</sub>	3.120	3.120	4.302	4.654	5.113	4.992	5.200	4.654	5.113	4.992	5.200	ns	
		GCLK PLL	t <sub>co</sub>	3.447	3.447	4.786	5.182	5.710	5.567	5.850	5.182	5.710	5.567	5.850	ns	
	12mA	GCLK	t <sub>co</sub>	3.034	3.034	4.198	4.556	5.021	4.900	5.108	4.556	5.021	4.900	5.108	ns	
		GCLK PLL	t <sub>co</sub>	3.361	3.361	4.682	5.083	5.618	5.475	5.760	5.083	5.618	5.475	5.760	ns	
	16mA	GCLK	t <sub>co</sub>	3.028	3.028	4.182	4.528	4.980	4.859	5.067	4.528	4.980	4.859	5.067	ns	
		GCLK PLL	t <sub>co</sub>	3.354	3.354	4.665	5.055	5.577	5.434	5.718	5.055	5.577	5.434	5.718	ns	
	3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.193	3.193	4.415	4.770	5.233	5.112	5.320	4.770	5.233	5.112	5.320	ns
			GCLK PLL	t <sub>co</sub>	3.520	3.520	4.899	5.298	5.830	5.687	5.971	5.298	5.830	5.687	5.971	ns
		8mA	GCLK	t <sub>co</sub>	3.038	3.038	4.209	4.573	5.032	4.911	5.119	4.573	5.032	4.911	5.119	ns
			GCLK PLL	t <sub>co</sub>	3.365	3.365	4.692	5.100	5.629	5.486	5.770	5.100	5.629	5.486	5.770	ns
12mA		GCLK	t <sub>co</sub>	3.045	3.045	4.203	4.552	5.006	4.885	5.093	4.552	5.006	4.885	5.093	ns	
		GCLK PLL	t <sub>co</sub>	3.372	3.372	4.686	5.079	5.603	5.460	5.746	5.079	5.603	5.460	5.746	ns	
16mA		GCLK	t <sub>co</sub>	3.029	3.029	4.180	4.527	4.977	4.856	5.064	4.527	4.977	4.856	5.064	ns	
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.664	5.054	5.574	5.431	5.717	5.054	5.574	5.431	5.717	ns	
3.0-V LVTTL		4mA	GCLK	t <sub>co</sub>	3.150	3.150	4.378	4.733	5.193	5.072	5.280	4.733	5.193	5.072	5.280	ns
			GCLK PLL	t <sub>co</sub>	3.478	3.478	4.862	5.261	5.790	5.647	5.954	5.261	5.790	5.647	5.954	ns
		8mA	GCLK	t <sub>co</sub>	3.043	3.043	4.250	4.602	5.056	4.936	5.142	4.602	5.056	4.936	5.142	ns
			GCLK PLL	t <sub>co</sub>	3.367	3.367	4.732	5.127	5.652	5.510	5.837	5.127	5.652	5.510	5.837	ns
	12mA	GCLK	t <sub>co</sub>	3.005	3.005	4.184	4.530	4.982	4.862	5.068	4.530	4.982	4.862	5.068	ns	
		GCLK PLL	t <sub>co</sub>	3.331	3.331	4.669	5.058	5.578	5.436	5.773	5.058	5.578	5.436	5.773	ns	
	16mA	GCLK	t <sub>co</sub>	2.986	2.986	4.156	4.503	4.953	4.832	5.040	4.503	4.953	4.832	5.040	ns	
		GCLK PLL	t <sub>co</sub>	3.313	3.313	4.640	5.030	5.550	5.407	5.750	5.030	5.550	5.407	5.750	ns	

**Table 1-53.** EP3SL70 Column Pins Output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V LVC MOS	4mA	GCLK	$t_{co}$	3.067	3.067	4.284	4.635	5.091	4.971	5.177	4.635	5.091	4.971	5.177	ns
		GCLK PLL	$t_{co}$	3.392	3.392	4.766	5.161	5.687	5.545	5.873	5.161	5.687	5.545	5.873	ns
	8mA	GCLK	$t_{co}$	2.988	2.988	4.160	4.505	4.956	4.836	5.042	4.505	4.956	4.836	5.042	ns
		GCLK PLL	$t_{co}$	3.313	3.313	4.642	5.032	5.552	5.410	5.763	5.032	5.552	5.410	5.763	ns
	12mA	GCLK	$t_{co}$	2.981	2.981	4.152	4.498	4.947	4.826	5.034	4.498	4.947	4.826	5.034	ns
		GCLK PLL	$t_{co}$	3.308	3.308	4.635	5.025	5.544	5.401	5.732	5.025	5.544	5.401	5.732	ns
	16mA	GCLK	$t_{co}$	2.972	2.972	4.137	4.482	4.932	4.811	5.019	4.482	4.932	4.811	5.019	ns
		GCLK PLL	$t_{co}$	3.299	3.299	4.621	5.010	5.529	5.386	5.737	5.010	5.529	5.386	5.737	ns
2.5 V	4mA	GCLK	$t_{co}$	3.187	3.187	4.490	4.860	5.338	5.218	5.424	4.860	5.338	5.218	5.424	ns
		GCLK PLL	$t_{co}$	3.514	3.514	4.973	5.388	5.934	5.792	6.081	5.388	5.934	5.792	6.081	ns
	8mA	GCLK	$t_{co}$	3.090	3.090	4.371	4.735	5.206	5.086	5.292	4.735	5.206	5.086	5.292	ns
		GCLK PLL	$t_{co}$	3.414	3.414	4.854	5.262	5.802	5.660	5.957	5.262	5.802	5.660	5.957	ns
	12mA	GCLK	$t_{co}$	3.045	3.045	4.284	4.644	5.110	4.989	5.197	4.644	5.110	4.989	5.197	ns
		GCLK PLL	$t_{co}$	3.370	3.370	4.767	5.171	5.707	5.564	5.879	5.171	5.707	5.564	5.879	ns
	16mA	GCLK	$t_{co}$	3.006	3.006	4.245	4.602	5.067	4.946	5.154	4.602	5.067	4.946	5.154	ns
		GCLK PLL	$t_{co}$	3.332	3.332	4.728	5.129	5.664	5.521	5.822	5.129	5.664	5.521	5.822	ns

**Table 1-53.** EP3SL70 Column Pins Output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.8 V	2mA	GCLK	$t_{co}$	3.378	3.378	4.810	5.219	5.742	5.621	5.829	5.219	5.742	5.621	5.829	ns
		GCLK PLL	$t_{co}$	3.705	3.705	5.294	5.748	6.339	6.196	6.478	5.748	6.339	6.196	6.478	ns
	4mA	GCLK	$t_{co}$	3.200	3.200	4.533	4.912	5.395	5.275	5.481	4.912	5.395	5.275	5.481	ns
		GCLK PLL	$t_{co}$	3.524	3.524	5.015	5.439	5.991	5.849	6.147	5.439	5.991	5.849	6.147	ns
	6mA	GCLK	$t_{co}$	3.115	3.115	4.424	4.796	5.284	5.163	5.371	4.796	5.284	5.163	5.371	ns
		GCLK PLL	$t_{co}$	3.442	3.442	4.908	5.324	5.881	5.738	6.035	5.324	5.881	5.738	6.035	ns
	8mA	GCLK	$t_{co}$	3.095	3.095	4.366	4.742	5.218	5.097	5.305	4.742	5.218	5.097	5.305	ns
		GCLK PLL	$t_{co}$	3.422	3.422	4.850	5.270	5.815	5.672	5.958	5.270	5.815	5.672	5.958	ns
	10mA	GCLK	$t_{co}$	3.032	3.032	4.306	4.668	5.137	5.016	5.224	4.668	5.137	5.016	5.224	ns
		GCLK PLL	$t_{co}$	3.359	3.359	4.789	5.195	5.734	5.591	5.889	5.195	5.734	5.591	5.889	ns
	12mA	GCLK	$t_{co}$	3.015	3.015	4.285	4.647	5.114	4.993	5.201	4.647	5.114	4.993	5.201	ns
		GCLK PLL	$t_{co}$	3.341	3.341	4.768	5.174	5.711	5.568	5.856	5.174	5.711	5.568	5.856	ns
1.5 V	2mA	GCLK	$t_{co}$	3.324	3.324	4.739	5.152	5.680	5.559	5.767	5.152	5.680	5.559	5.767	ns
		GCLK PLL	$t_{co}$	3.651	3.651	5.223	5.680	6.277	6.134	6.423	5.680	6.277	6.134	6.423	ns
	4mA	GCLK	$t_{co}$	3.112	3.112	4.420	4.795	5.288	5.167	5.375	4.795	5.288	5.167	5.375	ns
		GCLK PLL	$t_{co}$	3.439	3.439	4.904	5.324	5.885	5.742	6.037	5.324	5.885	5.742	6.037	ns
	6mA	GCLK	$t_{co}$	3.088	3.088	4.353	4.737	5.221	5.100	5.308	4.737	5.221	5.100	5.308	ns
		GCLK PLL	$t_{co}$	3.414	3.414	4.837	5.264	5.818	5.675	5.960	5.264	5.818	5.675	5.960	ns
	8mA	GCLK	$t_{co}$	3.076	3.076	4.337	4.712	5.201	5.080	5.288	4.712	5.201	5.080	5.288	ns
		GCLK PLL	$t_{co}$	3.403	3.403	4.820	5.239	5.798	5.655	5.943	5.239	5.798	5.655	5.943	ns
	10mA	GCLK	$t_{co}$	3.021	3.021	4.298	4.661	5.131	5.010	5.218	4.661	5.131	5.010	5.218	ns
		GCLK PLL	$t_{co}$	3.348	3.348	4.782	5.188	5.728	5.585	5.880	5.188	5.728	5.585	5.880	ns
	12mA	GCLK	$t_{co}$	3.015	3.015	4.281	4.648	5.120	4.999	5.207	4.648	5.120	4.999	5.207	ns
		GCLK PLL	$t_{co}$	3.343	3.343	4.765	5.177	5.717	5.574	5.859	5.177	5.717	5.574	5.859	ns

**Table 1-53.** EP3SL70 Column Pins Output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.2 V	2mA	GCLK	$t_{co}$	3.240	3.240	4.665	5.087	5.624	5.503	5.711	5.087	5.624	5.503	5.711	ns
		GCLK PLL	$t_{co}$	3.567	3.567	5.149	5.616	6.221	6.078	6.363	5.616	6.221	6.078	6.363	ns
	4mA	GCLK	$t_{co}$	3.118	3.118	4.440	4.827	5.338	5.217	5.425	4.827	5.338	5.217	5.425	ns
		GCLK PLL	$t_{co}$	3.444	3.444	4.923	5.354	5.935	5.792	6.078	5.354	5.935	5.792	6.078	ns
	6mA	GCLK	$t_{co}$	3.080	3.080	4.347	4.737	5.225	5.104	5.312	4.737	5.225	5.104	5.312	ns
		GCLK PLL	$t_{co}$	3.406	3.406	4.831	5.265	5.822	5.679	5.964	5.265	5.822	5.679	5.964	ns
	8mA	GCLK	$t_{co}$	3.031	3.031	4.318	4.687	5.169	5.048	5.256	4.687	5.169	5.048	5.256	ns
		GCLK PLL	$t_{co}$	3.359	3.359	4.803	5.216	5.766	5.623	5.917	5.216	5.766	5.623	5.917	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.032	3.032	4.275	4.634	5.100	4.979	5.187	4.634	5.100	4.979	5.187	ns
		GCLK PLL	$t_{co}$	3.359	3.359	4.760	5.163	5.697	5.554	5.874	5.163	5.697	5.554	5.874	ns
	10mA	GCLK	$t_{co}$	3.029	3.029	4.272	4.630	5.096	4.975	5.183	4.630	5.096	4.975	5.183	ns
		GCLK PLL	$t_{co}$	3.356	3.356	4.757	5.160	5.693	5.550	5.869	5.160	5.693	5.550	5.869	ns
	12mA	GCLK	$t_{co}$	3.028	3.028	4.272	4.631	5.097	4.976	5.184	4.631	5.097	4.976	5.184	ns
		GCLK PLL	$t_{co}$	3.354	3.354	4.757	5.161	5.694	5.551	5.870	5.161	5.694	5.551	5.870	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.019	3.019	4.259	4.617	5.082	4.961	5.169	4.617	5.082	4.961	5.169	ns
		GCLK PLL	$t_{co}$	3.345	3.345	4.742	5.145	5.679	5.536	5.854	5.145	5.679	5.536	5.854	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.039	3.039	4.287	4.648	5.116	4.995	5.203	4.648	5.116	4.995	5.203	ns
		GCLK PLL	$t_{co}$	3.366	3.366	4.772	5.177	5.713	5.570	5.893	5.177	5.713	5.570	5.893	ns
	6mA	GCLK	$t_{co}$	3.035	3.035	4.285	4.646	5.114	4.993	5.201	4.646	5.114	4.993	5.201	ns
		GCLK PLL	$t_{co}$	3.362	3.362	4.770	5.175	5.711	5.568	5.891	5.175	5.711	5.568	5.891	ns
	8mA	GCLK	$t_{co}$	3.025	3.025	4.276	4.637	5.105	4.984	5.192	4.637	5.105	4.984	5.192	ns
		GCLK PLL	$t_{co}$	3.351	3.351	4.760	5.166	5.702	5.559	5.889	5.166	5.702	5.559	5.889	ns
	10mA	GCLK	$t_{co}$	3.013	3.013	4.263	4.624	5.092	4.971	5.179	4.624	5.092	4.971	5.179	ns
		GCLK PLL	$t_{co}$	3.340	3.340	4.747	5.153	5.689	5.546	5.864	5.153	5.689	5.546	5.864	ns
	12mA	GCLK	$t_{co}$	3.013	3.013	4.263	4.624	5.092	4.971	5.179	4.624	5.092	4.971	5.179	ns
		GCLK PLL	$t_{co}$	3.340	3.340	4.747	5.153	5.689	5.546	5.863	5.153	5.689	5.546	5.863	ns

**Table 1-53.** EP3SL70 Column Pins Output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.020	3.020	4.262	4.621	5.087	4.966	5.174	4.621	5.087	4.966	5.174	ns	
		GCLK PLL	$t_{co}$	3.346	3.346	4.746	5.150	5.684	5.541	5.866	5.150	5.684	5.541	5.866	ns	
	16mA	GCLK	$t_{co}$	3.022	3.022	4.269	4.630	5.099	4.978	5.186	4.630	5.099	4.978	5.186	ns	
		GCLK PLL	$t_{co}$	3.349	3.349	4.754	5.159	5.696	5.553	5.889	5.159	5.696	5.553	5.889	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.042	3.042	4.297	4.659	5.129	5.008	5.216	4.659	5.129	5.008	5.216	ns	
		GCLK PLL	$t_{co}$	3.370	3.370	4.781	5.189	5.726	5.583	5.908	5.189	5.726	5.583	5.908	ns	
	6mA	GCLK	$t_{co}$	3.030	3.030	4.287	4.650	5.120	4.999	5.207	4.650	5.120	4.999	5.207	ns	
		GCLK PLL	$t_{co}$	3.356	3.356	4.771	5.179	5.717	5.574	5.894	5.179	5.717	5.574	5.894	ns	
	8mA	GCLK	$t_{co}$	3.018	3.018	4.273	4.636	5.106	4.985	5.193	4.636	5.106	4.985	5.193	ns	
		GCLK PLL	$t_{co}$	3.345	3.345	4.757	5.165	5.703	5.560	5.879	5.165	5.703	5.560	5.879	ns	
	10mA	GCLK	$t_{co}$	3.017	3.017	4.275	4.639	5.110	4.989	5.197	4.639	5.110	4.989	5.197	ns	
		GCLK PLL	$t_{co}$	3.344	3.344	4.760	5.168	5.707	5.564	5.876	5.168	5.707	5.564	5.876	ns	
	12mA	GCLK	$t_{co}$	3.014	3.014	4.270	4.633	5.104	4.983	5.191	4.633	5.104	4.983	5.191	ns	
		GCLK PLL	$t_{co}$	3.341	3.341	4.755	5.163	5.701	5.558	5.870	5.163	5.701	5.558	5.870	ns	
	SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.016	3.016	4.260	4.620	5.087	4.966	5.174	4.620	5.087	4.966	5.174	ns
			GCLK PLL	$t_{co}$	3.343	3.343	4.744	5.149	5.684	5.541	5.867	5.149	5.684	5.541	5.867	ns
16mA		GCLK	$t_{co}$	3.019	3.019	4.267	4.628	5.098	4.977	5.185	4.628	5.098	4.977	5.185	ns	
		GCLK PLL	$t_{co}$	3.346	3.346	4.751	5.158	5.695	5.552	5.891	5.158	5.695	5.552	5.891	ns	

**Table 1-53.** EP3SL70 Column Pins Output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.026	3.026	4.261	4.619	5.085	4.964	5.172	4.619	5.085	4.964	5.172	ns
		GCLK PLL	$t_{co}$	3.353	3.353	4.746	5.149	5.682	5.539	5.868	5.149	5.682	5.539	5.868	ns
	6mA	GCLK	$t_{co}$	3.020	3.020	4.260	4.619	5.084	4.963	5.171	4.619	5.084	4.963	5.171	ns
		GCLK PLL	$t_{co}$	3.346	3.346	4.744	5.147	5.681	5.538	5.873	5.147	5.681	5.538	5.873	ns
	8mA	GCLK	$t_{co}$	3.012	3.012	4.252	4.611	5.077	4.956	5.164	4.611	5.077	4.956	5.164	ns
		GCLK PLL	$t_{co}$	3.338	3.338	4.736	5.140	5.674	5.531	5.855	5.140	5.674	5.531	5.855	ns
	10mA	GCLK	$t_{co}$	3.014	3.014	4.255	4.614	5.081	4.960	5.168	4.614	5.081	4.960	5.168	ns
		GCLK PLL	$t_{co}$	3.341	3.341	4.739	5.143	5.678	5.535	5.858	5.143	5.678	5.535	5.858	ns
	12mA	GCLK	$t_{co}$	3.011	3.011	4.257	4.617	5.085	4.964	5.172	4.617	5.085	4.964	5.172	ns
		GCLK PLL	$t_{co}$	3.338	3.338	4.742	5.147	5.682	5.539	5.865	5.147	5.682	5.539	5.865	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.019	3.019	4.256	4.615	5.081	4.960	5.168	4.615	5.081	4.960	5.168	ns
		GCLK PLL	$t_{co}$	3.346	3.346	4.741	5.144	5.678	5.535	5.869	5.144	5.678	5.535	5.869	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.031	3.031	4.269	4.629	5.096	4.975	5.183	4.629	5.096	4.975	5.183	ns
		GCLK PLL	$t_{co}$	3.358	3.358	4.754	5.159	5.693	5.550	5.881	5.159	5.693	5.550	5.881	ns
	6mA	GCLK	$t_{co}$	3.027	3.027	4.272	4.632	5.099	4.978	5.186	4.632	5.099	4.978	5.186	ns
		GCLK PLL	$t_{co}$	3.354	3.354	4.755	5.160	5.696	5.553	5.878	5.160	5.696	5.553	5.878	ns
	8mA	GCLK	$t_{co}$	3.023	3.023	4.267	4.627	5.094	4.973	5.181	4.627	5.094	4.973	5.181	ns
		GCLK PLL	$t_{co}$	3.350	3.350	4.751	5.156	5.691	5.548	5.873	5.156	5.691	5.548	5.873	ns
	10mA	GCLK	$t_{co}$	3.016	3.016	4.260	4.620	5.087	4.966	5.174	4.620	5.087	4.966	5.174	ns
		GCLK PLL	$t_{co}$	3.343	3.343	4.744	5.149	5.684	5.541	5.867	5.149	5.684	5.541	5.867	ns
	12mA	GCLK	$t_{co}$	3.016	3.016	4.266	4.627	5.097	4.976	5.184	4.627	5.097	4.976	5.184	ns
		GCLK PLL	$t_{co}$	3.344	3.344	4.751	5.157	5.694	5.551	5.870	5.157	5.694	5.551	5.870	ns
1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.014	3.014	4.247	4.605	5.071	4.950	5.158	4.605	5.071	4.950	5.158	ns
		GCLK PLL	$t_{co}$	3.342	3.342	4.732	5.135	5.668	5.525	5.855	5.135	5.668	5.525	5.855	ns

**Table 1-53.** EP3SL70 Column Pins Output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.035	3.035	4.284	4.647	5.117	4.996	5.204	4.647	5.117	4.996	5.204	ns
		GCLK PLL	$t_{co}$	3.361	3.361	4.768	5.176	5.714	5.571	5.900	5.176	5.714	5.571	5.900	ns
	6mA	GCLK	$t_{co}$	3.026	3.026	4.275	4.638	5.108	4.987	5.195	4.638	5.108	4.987	5.195	ns
		GCLK PLL	$t_{co}$	3.353	3.353	4.759	5.167	5.705	5.562	5.888	5.167	5.705	5.562	5.888	ns
	8mA	GCLK	$t_{co}$	3.026	3.026	4.282	4.646	5.117	4.996	5.204	4.646	5.117	4.996	5.204	ns
		GCLK PLL	$t_{co}$	3.354	3.354	4.767	5.175	5.714	5.571	5.891	5.175	5.714	5.571	5.891	ns
	10mA	GCLK	$t_{co}$	3.016	3.016	4.269	4.632	5.103	4.982	5.190	4.632	5.103	4.982	5.190	ns
		GCLK PLL	$t_{co}$	3.343	3.343	4.754	5.162	5.700	5.557	5.885	5.162	5.700	5.557	5.885	ns
	12mA	GCLK	$t_{co}$	3.016	3.016	4.270	4.633	5.104	4.983	5.191	4.633	5.104	4.983	5.191	ns
		GCLK PLL	$t_{co}$	3.343	3.343	4.754	5.162	5.701	5.558	5.877	5.162	5.701	5.558	5.877	ns
1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.037	3.037	4.286	4.648	5.117	4.996	5.204	4.648	5.117	4.996	5.204	ns
		GCLK PLL	$t_{co}$	3.364	3.364	4.770	5.177	5.714	5.571	5.914	5.177	5.714	5.571	5.914	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.140	3.140	4.331	4.684	5.142	5.021	5.229	4.684	5.142	5.021	5.229	ns
		GCLK PLL	$t_{co}$	3.467	3.467	4.815	5.211	5.739	5.596	5.945	5.211	5.739	5.596	5.945	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.140	3.140	4.331	4.684	5.142	5.021	5.229	4.684	5.142	5.021	5.229	ns
		GCLK PLL	$t_{co}$	3.467	3.467	4.815	5.211	5.739	5.596	5.945	5.211	5.739	5.596	5.945	ns

Table 1-54 lists the EP3SL70 row pins output timing parameters for single-ended I/O standards.

**Table 1-54.** EP3SL70 Row Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.182	3.424	4.767	5.163	5.668	5.532	5.739	5.293	5.802	5.667	5.813	ns
		GCLK PLL	$t_{co}$	1.474	1.669	2.054	2.135	2.377	2.393	2.266	2.251	2.501	2.515	2.258	ns
	8mA	GCLK	$t_{co}$	3.089	3.319	4.637	5.025	5.524	5.388	5.595	5.152	5.653	5.518	5.664	ns
		GCLK PLL	$t_{co}$	1.408	1.598	1.944	2.023	2.233	2.249	2.152	2.138	2.352	2.366	2.142	ns
	12mA	GCLK	$t_{co}$	2.990	3.213	4.518	4.902	5.396	5.260	5.467	5.025	5.521	5.386	5.532	ns
		GCLK PLL	$t_{co}$	1.329	1.509	1.838	1.923	2.119	2.138	2.056	2.039	2.235	2.252	2.043	ns
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.192	3.428	4.775	5.168	5.673	5.537	5.744	5.299	5.807	5.672	5.818	ns
		GCLK PLL	$t_{co}$	1.476	1.676	2.058	2.140	2.382	2.398	2.275	2.259	2.506	2.520	2.270	ns
	8mA	GCLK	$t_{co}$	2.994	3.219	4.524	4.908	5.402	5.266	5.473	5.031	5.528	5.393	5.539	ns
		GCLK PLL	$t_{co}$	1.333	1.513	1.849	1.938	2.129	2.148	2.066	2.051	2.244	2.261	2.052	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.136	3.370	4.719	5.116	5.625	5.489	5.696	5.250	5.760	5.625	5.771	ns
		GCLK PLL	$t_{co}$	1.435	1.630	2.021	2.103	2.334	2.350	2.232	2.219	2.459	2.473	2.224	ns
	8mA	GCLK	$t_{co}$	3.011	3.243	4.566	4.957	5.461	5.325	5.532	5.088	5.596	5.460	5.606	ns
		GCLK PLL	$t_{co}$	1.334	1.518	1.884	1.961	2.170	2.186	2.087	2.077	2.295	2.308	2.078	ns
	12mA	GCLK	$t_{co}$	2.972	3.192	4.484	4.874	5.373	5.237	5.444	5.002	5.503	5.367	5.513	ns
		GCLK PLL	$t_{co}$	1.297	1.480	1.824	1.896	2.082	2.099	2.017	2.009	2.202	2.215	2.005	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.050	3.289	4.613	5.009	5.514	5.378	5.585	5.142	5.649	5.513	5.659	ns
		GCLK PLL	$t_{co}$	1.356	1.542	1.919	1.996	2.223	2.239	2.123	2.111	2.348	2.361	2.114	ns
	8mA	GCLK	$t_{co}$	2.950	3.170	4.449	4.835	5.334	5.198	5.405	4.962	5.463	5.327	5.473	ns
		GCLK PLL	$t_{co}$	1.284	1.464	1.796	1.867	2.052	2.071	1.989	1.979	2.169	2.185	1.976	ns
2.5 V	4mA	GCLK	$t_{co}$	3.162	3.406	4.851	5.270	5.797	5.661	5.868	5.410	5.939	5.803	5.949	ns
		GCLK PLL	$t_{co}$	1.461	1.667	2.129	2.229	2.506	2.522	2.377	2.351	2.638	2.651	2.376	ns
	8mA	GCLK	$t_{co}$	3.052	3.307	4.696	5.107	5.627	5.491	5.698	5.243	5.765	5.629	5.775	ns
		GCLK PLL	$t_{co}$	1.376	1.564	2.005	2.094	2.336	2.352	2.235	2.214	2.464	2.477	2.231	ns
	12mA	GCLK	$t_{co}$	3.006	3.231	4.585	4.988	5.501	5.365	5.572	5.120	5.635	5.499	5.645	ns
		GCLK PLL	$t_{co}$	1.319	1.520	1.921	2.008	2.210	2.226	2.144	2.125	2.334	2.347	2.137	ns



**Table 1-54.** EP3SL70 Row Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.8 V	2mA	GCLK	$t_{co}$	3.350	3.691	5.275	5.573	6.134	5.998	6.210	5.723	6.286	6.151	6.297	ns
		GCLK PLL	$t_{co}$	1.728	1.915	2.562	2.717	2.981	2.999	2.946	2.881	3.150	3.167	2.958	ns
	4mA	GCLK	$t_{co}$	3.177	3.489	4.948	5.247	5.774	5.638	5.850	5.397	5.925	5.789	5.935	ns
		GCLK PLL	$t_{co}$	1.503	1.713	2.235	2.349	2.576	2.594	2.541	2.516	2.744	2.760	2.551	ns
	6mA	GCLK	$t_{co}$	3.102	3.387	4.795	5.142	5.673	5.537	5.749	5.283	5.819	5.684	5.830	ns
		GCLK PLL	$t_{co}$	1.438	1.611	2.082	2.199	2.417	2.435	2.382	2.348	2.571	2.588	2.379	ns
	8mA	GCLK	$t_{co}$	3.084	3.313	4.718	5.089	5.608	5.472	5.684	5.227	5.747	5.612	5.758	ns
		GCLK PLL	$t_{co}$	1.378	1.557	2.005	2.106	2.321	2.339	2.286	2.253	2.477	2.494	2.285	ns
1.5 V	2mA	GCLK	$t_{co}$	3.292	3.609	5.185	5.500	6.071	5.935	6.147	5.644	6.221	6.086	6.232	ns
		GCLK PLL	$t_{co}$	1.639	1.833	2.472	2.631	2.909	2.927	2.874	2.788	3.074	3.091	2.882	ns
	4mA	GCLK	$t_{co}$	3.100	3.352	4.780	5.142	5.677	5.541	5.753	5.280	5.820	5.685	5.831	ns
		GCLK PLL	$t_{co}$	1.397	1.576	2.067	2.194	2.418	2.436	2.383	2.342	2.570	2.587	2.378	ns
	6mA	GCLK	$t_{co}$	3.073	3.304	4.707	5.081	5.608	5.472	5.684	5.220	5.747	5.612	5.758	ns
		GCLK PLL	$t_{co}$	1.370	1.548	1.994	2.098	2.312	2.330	2.277	2.244	2.465	2.482	2.273	ns
	8mA	GCLK	$t_{co}$	3.054	3.295	4.685	5.057	5.589	5.453	5.665	5.196	5.728	5.593	5.739	ns
		GCLK PLL	$t_{co}$	1.361	1.537	1.972	2.080	2.293	2.311	2.258	2.226	2.443	2.460	2.251	ns
1.2 V	2mA	GCLK	$t_{co}$	3.222	3.534	5.095	5.432	6.010	5.874	6.086	5.576	6.152	6.017	6.163	ns
		GCLK PLL	$t_{co}$	1.582	1.758	2.382	2.545	2.834	2.852	2.799	2.700	2.990	3.007	2.798	ns
	4mA	GCLK	$t_{co}$	3.105	3.345	4.802	5.170	5.725	5.589	5.801	5.309	5.864	5.729	5.875	ns
		GCLK PLL	$t_{co}$	1.402	1.578	2.089	2.222	2.459	2.477	2.424	2.367	2.612	2.629	2.420	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	2.991	3.217	4.563	4.960	5.469	5.333	5.540	5.087	5.597	5.462	5.608	ns
		GCLK PLL	$t_{co}$	1.323	1.508	1.914	1.999	2.197	2.216	2.134	2.112	2.315	2.332	2.123	ns
	12mA	GCLK	$t_{co}$	2.979	3.205	4.555	4.952	5.461	5.325	5.532	5.079	5.590	5.455	5.601	ns
		GCLK PLL	$t_{co}$	1.318	1.504	1.911	1.997	2.195	2.214	2.132	2.111	2.314	2.331	2.122	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	2.963	3.187	4.530	4.927	5.434	5.298	5.505	5.053	5.563	5.428	5.574	ns
		GCLK PLL	$t_{co}$	1.309	1.493	1.896	1.981	2.178	2.197	2.115	2.094	2.296	2.313	2.104	ns

**Table 1-54.** EP3SL70 Row Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.033	3.269	4.613	4.993	5.503	5.367	5.579	5.126	5.638	5.503	5.649	ns
		GCLK PLL	$t_{co}$	1.339	1.501	1.909	1.997	2.194	2.212	2.159	2.134	2.340	2.357	2.148	ns
	6mA	GCLK	$t_{co}$	3.028	3.255	4.610	4.992	5.502	5.366	5.578	5.124	5.636	5.501	5.647	ns
		GCLK PLL	$t_{co}$	1.324	1.496	1.907	1.996	2.192	2.210	2.157	2.132	2.338	2.355	2.146	ns
	8mA	GCLK	$t_{co}$	3.017	3.243	4.593	4.982	5.492	5.356	5.568	5.115	5.627	5.492	5.638	ns
		GCLK PLL	$t_{co}$	1.313	1.485	1.897	1.986	2.175	2.193	2.140	2.115	2.322	2.339	2.130	ns
	10mA	GCLK	$t_{co}$	3.006	3.220	4.577	4.969	5.479	5.343	5.555	5.103	5.615	5.480	5.626	ns
		GCLK PLL	$t_{co}$	1.290	1.474	1.884	1.973	2.160	2.178	2.125	2.100	2.307	2.324	2.115	ns
	12mA	GCLK	$t_{co}$	3.006	3.219	4.576	4.969	5.479	5.343	5.555	5.102	5.615	5.480	5.626	ns
		GCLK PLL	$t_{co}$	1.290	1.473	1.884	1.973	2.159	2.177	2.124	2.099	2.306	2.323	2.114	ns
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.014	3.228	4.574	4.966	5.474	5.338	5.550	5.098	5.609	5.474	5.620	ns
		GCLK PLL	$t_{co}$	1.299	1.480	1.883	1.970	2.153	2.171	2.118	2.094	2.299	2.316	2.107	ns
	16mA	GCLK	$t_{co}$	3.015	3.223	4.573	4.974	5.484	5.348	5.560	5.107	5.620	5.485	5.631	ns
		GCLK PLL	$t_{co}$	1.299	1.483	1.889	1.978	2.155	2.173	2.120	2.096	2.303	2.320	2.111	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.036	3.265	4.624	5.004	5.516	5.380	5.592	5.136	5.650	5.515	5.661	ns
		GCLK PLL	$t_{co}$	1.335	1.504	1.918	2.008	2.211	2.229	2.176	2.147	2.356	2.373	2.164	ns
	6mA	GCLK	$t_{co}$	3.022	3.243	4.606	4.994	5.506	5.370	5.582	5.127	5.641	5.506	5.652	ns
		GCLK PLL	$t_{co}$	1.312	1.490	1.907	1.998	2.194	2.212	2.159	2.131	2.340	2.357	2.148	ns
	8mA	GCLK	$t_{co}$	3.011	3.226	4.589	4.981	5.493	5.357	5.569	5.114	5.628	5.493	5.639	ns
		GCLK PLL	$t_{co}$	1.295	1.478	1.894	1.985	2.176	2.194	2.141	2.113	2.323	2.340	2.131	ns

**Table 1-54.** EP3SL70 Row Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.021	3.241	4.580	4.964	5.472	5.336	5.548	5.097	5.606	5.471	5.617	ns
		GCLK PLL	$t_{co}$	1.314	1.486	1.882	1.968	2.156	2.174	2.121	2.098	2.302	2.319	2.110	ns
	6mA	GCLK	$t_{co}$	3.014	3.229	4.571	4.963	5.471	5.335	5.547	5.096	5.606	5.471	5.617	ns
		GCLK PLL	$t_{co}$	1.302	1.480	1.880	1.967	2.148	2.166	2.113	2.090	2.295	2.312	2.103	ns
	8mA	GCLK	$t_{co}$	3.005	3.217	4.563	4.956	5.464	5.328	5.540	5.089	5.599	5.464	5.610	ns
		GCLK PLL	$t_{co}$	1.289	1.472	1.873	1.960	2.140	2.158	2.105	2.082	2.287	2.304	2.095	ns
	10mA	GCLK	$t_{co}$	3.008	3.219	4.565	4.959	5.468	5.332	5.544	5.092	5.602	5.467	5.613	ns
		GCLK PLL	$t_{co}$	1.292	1.474	1.876	1.963	2.143	2.161	2.108	2.085	2.290	2.307	2.098	ns
12mA	GCLK	$t_{co}$	3.004	3.214	4.563	4.962	5.471	5.335	5.547	5.095	5.607	5.472	5.618	ns	
	GCLK PLL	$t_{co}$	1.288	1.471	1.878	1.966	2.143	2.161	2.108	2.085	2.291	2.308	2.099	ns	
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.012	3.218	4.558	4.959	5.467	5.331	5.543	5.091	5.601	5.466	5.612	ns
		GCLK PLL	$t_{co}$	1.296	1.479	1.876	1.963	2.134	2.152	2.099	2.078	2.280	2.297	2.088	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.027	3.248	4.591	4.974	5.483	5.347	5.559	5.106	5.617	5.482	5.628	ns
		GCLK PLL	$t_{co}$	1.321	1.492	1.891	1.978	2.171	2.189	2.136	2.110	2.316	2.333	2.124	ns
	6mA	GCLK	$t_{co}$	3.021	3.238	4.587	4.976	5.485	5.349	5.561	5.108	5.620	5.485	5.631	ns
		GCLK PLL	$t_{co}$	1.309	1.487	1.892	1.980	2.167	2.185	2.132	2.107	2.313	2.330	2.121	ns
	8mA	GCLK	$t_{co}$	3.017	3.233	4.581	4.971	5.480	5.344	5.556	5.103	5.614	5.479	5.625	ns
		GCLK PLL	$t_{co}$	1.305	1.483	1.887	1.975	2.161	2.179	2.126	2.101	2.307	2.324	2.115	ns
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.029	3.247	4.602	4.990	5.502	5.366	5.578	5.122	5.636	5.501	5.647	ns
		GCLK PLL	$t_{co}$	1.320	1.494	1.904	1.994	2.189	2.207	2.154	2.124	2.333	2.350	2.141	ns
	6mA	GCLK	$t_{co}$	3.020	3.235	4.591	4.981	5.493	5.357	5.569	5.113	5.627	5.492	5.638	ns
		GCLK PLL	$t_{co}$	1.308	1.486	1.895	1.985	2.177	2.195	2.142	2.113	2.322	2.339	2.130	ns
	8mA	GCLK	$t_{co}$	3.019	3.233	4.595	4.989	5.502	5.366	5.578	5.122	5.637	5.502	5.648	ns
		GCLK PLL	$t_{co}$	1.305	1.486	1.902	1.993	2.183	2.201	2.148	2.119	2.329	2.346	2.137	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.076	3.300	4.588	4.978	5.480	5.342	5.550	5.105	5.610	5.474	5.621	ns
		GCLK PLL	$t_{co}$	1.429	1.614	1.966	2.045	2.237	2.256	2.174	2.160	2.357	2.374	2.165	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.076	3.300	4.588	4.978	5.480	5.342	5.550	5.105	5.610	5.474	5.621	ns
		GCLK PLL	$t_{co}$	1.429	1.614	1.966	2.045	2.237	2.256	2.174	2.160	2.357	2.374	2.165	ns

Table 1-55 through Table 1-60 list the maximum I/O timing parameters for EP3SL70 devices for differential I/O standards.

Table 1-55 lists the EP3SL70 column pins input timing parameters for differential I/O standards.

**Table 1-55.** EP3SL70 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.697	-0.717	-1.072	-1.182	-1.294	-1.237	-1.524	-1.183	-1.296	-1.242	-1.562	ns
		$t_h$	0.814	0.849	1.257	1.389	1.522	1.454	1.740	1.398	1.532	1.469	1.777	ns
	GCLK PLL	$t_{su}$	1.143	1.159	1.821	2.053	2.279	2.166	2.172	2.063	2.288	2.173	2.219	ns
		$t_h$	-0.892	-0.893	-1.424	-1.606	-1.781	-1.696	-1.696	-1.608	-1.782	-1.694	-1.742	ns
MINI-LVDS	GCLK	$t_{su}$	-0.697	-0.717	-1.072	-1.182	-1.294	-1.237	-1.524	-1.183	-1.296	-1.242	-1.562	ns
		$t_h$	0.814	0.849	1.257	1.389	1.522	1.454	1.740	1.398	1.532	1.469	1.777	ns
	GCLK PLL	$t_{su}$	1.143	1.159	1.821	2.053	2.279	2.166	2.172	2.063	2.288	2.173	2.219	ns
		$t_h$	-0.892	-0.893	-1.424	-1.606	-1.781	-1.696	-1.696	-1.608	-1.782	-1.694	-1.742	ns
RSDS	GCLK	$t_{su}$	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		$t_h$	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	$t_{su}$	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		$t_h$	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		$t_h$	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	$t_{su}$	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		$t_h$	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.717	-0.740	-1.091	-1.204	-1.329	-1.272	-1.559	-1.205	-1.329	-1.275	-1.595	ns
		$t_h$	0.834	0.872	1.277	1.411	1.557	1.489	1.775	1.420	1.565	1.502	1.810	ns
	GCLK PLL	$t_{su}$	1.123	1.136	1.802	2.031	2.244	2.131	2.137	2.041	2.255	2.140	2.186	ns
		$t_h$	-0.872	-0.870	-1.404	-1.584	-1.746	-1.661	-1.661	-1.586	-1.749	-1.661	-1.709	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.717	-0.740	-1.091	-1.204	-1.329	-1.272	-1.559	-1.205	-1.329	-1.275	-1.595	ns
		$t_h$	0.834	0.872	1.277	1.411	1.557	1.489	1.775	1.420	1.565	1.502	1.810	ns
	GCLK PLL	$t_{su}$	1.123	1.136	1.802	2.031	2.244	2.131	2.137	2.041	2.255	2.140	2.186	ns
		$t_h$	-0.872	-0.870	-1.404	-1.584	-1.746	-1.661	-1.661	-1.586	-1.749	-1.661	-1.709	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		$t_h$	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	$t_{su}$	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		$t_h$	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		$t_h$	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	$t_{su}$	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		$t_h$	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns

**Table 1-55.** EP3SL70 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.717	-0.740	-1.091	-1.204	-1.329	-1.272	-1.559	-1.205	-1.329	-1.275	-1.595	ns
		$t_h$	0.834	0.872	1.277	1.411	1.557	1.489	1.775	1.420	1.565	1.502	1.810	ns
	GCLK PLL	$t_{su}$	1.123	1.136	1.802	2.031	2.244	2.131	2.137	2.041	2.255	2.140	2.186	ns
		$t_h$	-0.872	-0.870	-1.404	-1.584	-1.746	-1.661	-1.661	-1.586	-1.749	-1.661	-1.709	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.717	-0.740	-1.091	-1.204	-1.329	-1.272	-1.559	-1.205	-1.329	-1.275	-1.595	ns
		$t_h$	0.834	0.872	1.277	1.411	1.557	1.489	1.775	1.420	1.565	1.502	1.810	ns
	GCLK PLL	$t_{su}$	1.123	1.136	1.802	2.031	2.244	2.131	2.137	2.041	2.255	2.140	2.186	ns
		$t_h$	-0.872	-0.870	-1.404	-1.584	-1.746	-1.661	-1.661	-1.586	-1.749	-1.661	-1.709	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.724	-0.746	-1.103	-1.209	-1.329	-1.274	-1.558	-1.209	-1.324	-1.273	-1.591	ns
		$t_h$	0.841	0.878	1.290	1.419	1.560	1.492	1.779	1.427	1.565	1.501	1.811	ns
	GCLK PLL	$t_{su}$	1.116	1.130	1.790	2.026	2.244	2.129	2.138	2.037	2.260	2.142	2.190	ns
		$t_h$	-0.865	-0.864	-1.391	-1.576	-1.743	-1.658	-1.657	-1.579	-1.749	-1.662	-1.708	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.724	-0.746	-1.103	-1.209	-1.329	-1.274	-1.558	-1.209	-1.324	-1.273	-1.591	ns
		$t_h$	0.841	0.878	1.290	1.419	1.560	1.492	1.779	1.427	1.565	1.501	1.811	ns
	GCLK PLL	$t_{su}$	1.116	1.130	1.790	2.026	2.244	2.129	2.138	2.037	2.260	2.142	2.190	ns
		$t_h$	-0.865	-0.864	-1.391	-1.576	-1.743	-1.658	-1.657	-1.579	-1.749	-1.662	-1.708	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.697	-0.717	-1.072	-1.182	-1.294	-1.237	-1.524	-1.183	-1.296	-1.242	-1.562	ns
		$t_h$	0.814	0.849	1.257	1.389	1.522	1.454	1.740	1.398	1.532	1.469	1.777	ns
	GCLK PLL	$t_{su}$	1.143	1.159	1.821	2.053	2.279	2.166	2.172	2.063	2.288	2.173	2.219	ns
		$t_h$	-0.892	-0.893	-1.424	-1.606	-1.781	-1.696	-1.696	-1.608	-1.782	-1.694	-1.742	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.697	-0.717	-1.072	-1.182	-1.294	-1.237	-1.524	-1.183	-1.296	-1.242	-1.562	ns
		$t_h$	0.814	0.849	1.257	1.389	1.522	1.454	1.740	1.398	1.532	1.469	1.777	ns
	GCLK PLL	$t_{su}$	1.143	1.159	1.821	2.053	2.279	2.166	2.172	2.063	2.288	2.173	2.219	ns
		$t_h$	-0.892	-0.893	-1.424	-1.606	-1.781	-1.696	-1.696	-1.608	-1.782	-1.694	-1.742	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.705	-0.729	-1.082	-1.193	-1.310	-1.253	-1.540	-1.194	-1.311	-1.257	-1.577	ns
		$t_h$	0.822	0.861	1.267	1.400	1.538	1.470	1.756	1.409	1.547	1.484	1.792	ns
	GCLK PLL	$t_{su}$	1.135	1.147	1.811	2.042	2.263	2.150	2.156	2.052	2.273	2.158	2.204	ns
		$t_h$	-0.884	-0.881	-1.414	-1.595	-1.765	-1.680	-1.680	-1.597	-1.767	-1.679	-1.727	ns

Table 1-56 lists the EP3SL70 row pins input timing parameters for differential I/O standards.

**Table 1-56.** EP3SL70 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.919	-0.939	-0.988	-0.952	-1.089	-1.040	-1.316	-0.916	-1.048	-1.000	-1.349	ns
		$t_h$	1.042	1.077	1.209	1.205	1.369	1.306	1.580	1.182	1.339	1.280	1.613	ns
	GCLK PLL	$t_{su}$	0.882	0.896	1.863	2.243	2.446	2.322	2.342	2.291	2.500	2.376	2.393	ns
		$t_h$	-0.625	-0.625	-1.430	-1.749	-1.896	-1.802	-1.817	-1.783	-1.936	-1.843	-1.865	ns
MINI-LVDS	GCLK	$t_{su}$	-0.919	-0.939	-0.988	-0.952	-1.089	-1.040	-1.316	-0.916	-1.048	-1.000	-1.349	ns
		$t_h$	1.042	1.077	1.209	1.205	1.369	1.306	1.580	1.182	1.339	1.280	1.613	ns
	GCLK PLL	$t_{su}$	0.882	0.896	1.863	2.243	2.446	2.322	2.342	2.291	2.500	2.376	2.393	ns
		$t_h$	-0.625	-0.625	-1.430	-1.749	-1.896	-1.802	-1.817	-1.783	-1.936	-1.843	-1.865	ns
RSDS	GCLK	$t_{su}$	-0.919	-0.939	-0.988	-0.952	-1.089	-1.040	-1.316	-0.916	-1.048	-1.000	-1.349	ns
		$t_h$	1.042	1.077	1.209	1.205	1.369	1.306	1.580	1.182	1.339	1.280	1.613	ns
	GCLK PLL	$t_{su}$	0.882	0.896	1.863	2.243	2.446	2.322	2.342	2.291	2.500	2.376	2.393	ns
		$t_h$	-0.625	-0.625	-1.430	-1.749	-1.896	-1.802	-1.817	-1.783	-1.936	-1.843	-1.865	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.734	-0.764	-1.085	-1.186	-1.286	-1.234	-1.505	-1.193	-1.291	-1.242	-1.543	ns
		$t_h$	0.850	0.893	1.274	1.394	1.516	1.451	1.720	1.410	1.531	1.470	1.758	ns
	GCLK PLL	$t_{su}$	1.077	1.081	1.776	2.019	2.257	2.138	2.163	2.024	2.263	2.144	2.209	ns
		$t_h$	-0.827	-0.819	-1.375	-1.570	-1.756	-1.667	-1.687	-1.565	-1.751	-1.663	-1.730	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.734	-0.764	-1.085	-1.186	-1.286	-1.234	-1.505	-1.193	-1.291	-1.242	-1.543	ns
		$t_h$	0.850	0.893	1.274	1.394	1.516	1.451	1.720	1.410	1.531	1.470	1.758	ns
	GCLK PLL	$t_{su}$	1.077	1.081	1.776	2.019	2.257	2.138	2.163	2.024	2.263	2.144	2.209	ns
		$t_h$	-0.827	-0.819	-1.375	-1.570	-1.756	-1.667	-1.687	-1.565	-1.751	-1.663	-1.730	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.743	-0.776	-1.094	-1.196	-1.302	-1.250	-1.521	-1.202	-1.307	-1.258	-1.559	ns
		$t_h$	0.859	0.905	1.283	1.404	1.532	1.467	1.736	1.419	1.547	1.486	1.774	ns
	GCLK PLL	$t_{su}$	1.068	1.069	1.767	2.009	2.241	2.122	2.147	2.015	2.247	2.128	2.193	ns
		$t_h$	-0.818	-0.807	-1.366	-1.560	-1.740	-1.651	-1.671	-1.556	-1.735	-1.647	-1.714	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.743	-0.776	-1.094	-1.196	-1.302	-1.250	-1.521	-1.202	-1.307	-1.258	-1.559	ns
		$t_h$	0.859	0.905	1.283	1.404	1.532	1.467	1.736	1.419	1.547	1.486	1.774	ns
	GCLK PLL	$t_{su}$	1.068	1.069	1.767	2.009	2.241	2.122	2.147	2.015	2.247	2.128	2.193	ns
		$t_h$	-0.818	-0.807	-1.366	-1.560	-1.740	-1.651	-1.671	-1.556	-1.735	-1.647	-1.714	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.757	-0.788	-1.107	-1.206	-1.320	-1.268	-1.539	-1.213	-1.324	-1.275	-1.576	ns
		$t_h$	0.873	0.917	1.295	1.414	1.550	1.485	1.754	1.430	1.564	1.503	1.791	ns
	GCLK PLL	$t_{su}$	1.054	1.057	1.754	1.999	2.223	2.104	2.129	2.004	2.230	2.111	2.176	ns
		$t_h$	-0.804	-0.795	-1.354	-1.550	-1.722	-1.633	-1.653	-1.545	-1.718	-1.630	-1.697	ns

**Table 1-56.** EP3SL70 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.757	-0.788	-1.107	-1.206	-1.320	-1.268	-1.539	-1.213	-1.324	-1.275	-1.576	ns
		$t_h$	0.873	0.917	1.295	1.414	1.550	1.485	1.754	1.430	1.564	1.503	1.791	ns
	GCLK PLL	$t_{su}$	1.054	1.057	1.754	1.999	2.223	2.104	2.129	2.004	2.230	2.111	2.176	ns
		$t_h$	-0.804	-0.795	-1.354	-1.550	-1.722	-1.633	-1.653	-1.545	-1.718	-1.630	-1.697	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.743	-0.776	-1.094	-1.196	-1.302	-1.250	-1.521	-1.202	-1.307	-1.258	-1.559	ns
		$t_h$	0.859	0.905	1.283	1.404	1.532	1.467	1.736	1.419	1.547	1.486	1.774	ns
	GCLK PLL	$t_{su}$	1.068	1.069	1.767	2.009	2.241	2.122	2.147	2.015	2.247	2.128	2.193	ns
		$t_h$	-0.818	-0.807	-1.366	-1.560	-1.740	-1.651	-1.671	-1.556	-1.735	-1.647	-1.714	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.743	-0.776	-1.094	-1.196	-1.302	-1.250	-1.521	-1.202	-1.307	-1.258	-1.559	ns
		$t_h$	0.859	0.905	1.283	1.404	1.532	1.467	1.736	1.419	1.547	1.486	1.774	ns
	GCLK PLL	$t_{su}$	1.068	1.069	1.767	2.009	2.241	2.122	2.147	2.015	2.247	2.128	2.193	ns
		$t_h$	-0.818	-0.807	-1.366	-1.560	-1.740	-1.651	-1.671	-1.556	-1.735	-1.647	-1.714	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.757	-0.788	-1.107	-1.206	-1.320	-1.268	-1.539	-1.213	-1.324	-1.275	-1.576	ns
		$t_h$	0.873	0.917	1.295	1.414	1.550	1.485	1.754	1.430	1.564	1.503	1.791	ns
	GCLK PLL	$t_{su}$	1.054	1.057	1.754	1.999	2.223	2.104	2.129	2.004	2.230	2.111	2.176	ns
		$t_h$	-0.804	-0.795	-1.354	-1.550	-1.722	-1.633	-1.653	-1.545	-1.718	-1.630	-1.697	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.757	-0.788	-1.107	-1.206	-1.320	-1.268	-1.539	-1.213	-1.324	-1.275	-1.576	ns
		$t_h$	0.873	0.917	1.295	1.414	1.550	1.485	1.754	1.430	1.564	1.503	1.791	ns
	GCLK PLL	$t_{su}$	1.054	1.057	1.754	1.999	2.223	2.104	2.129	2.004	2.230	2.111	2.176	ns
		$t_h$	-0.804	-0.795	-1.354	-1.550	-1.722	-1.633	-1.653	-1.545	-1.718	-1.630	-1.697	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.756	-0.787	-1.112	-1.212	-1.321	-1.270	-1.540	-1.214	-1.320	-1.273	-1.573	ns
		$t_h$	0.872	0.916	1.300	1.422	1.554	1.489	1.759	1.434	1.563	1.502	1.792	ns
	GCLK PLL	$t_{su}$	1.045	1.048	1.739	1.983	2.212	2.092	2.118	1.993	2.224	2.103	2.169	ns
		$t_h$	-0.795	-0.786	-1.339	-1.532	-1.708	-1.619	-1.638	-1.531	-1.709	-1.621	-1.686	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.756	-0.787	-1.112	-1.212	-1.321	-1.270	-1.540	-1.214	-1.320	-1.273	-1.573	ns
		$t_h$	0.872	0.916	1.300	1.422	1.554	1.489	1.759	1.434	1.563	1.502	1.792	ns
	GCLK PLL	$t_{su}$	1.045	1.048	1.739	1.983	2.212	2.092	2.118	1.993	2.224	2.103	2.169	ns
		$t_h$	-0.795	-0.786	-1.339	-1.532	-1.708	-1.619	-1.638	-1.531	-1.709	-1.621	-1.686	ns

Table 1-57 lists the EP3SL70 column pins output timing parameters for differential I/O standards.

**Table 1-57.** EP3SL70 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=0.9V$	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=0.9V$		
LVDS_E_1R	—	GCLK	$t_{co}$	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	$t_{co}$	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
LVDS_E_3R	—	GCLK	$t_{co}$	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	$t_{co}$	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	$t_{co}$	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.056	3.279	4.646	5.054	5.571	5.431	5.649	5.181	5.698	5.560	5.717	ns	
		GCLK PLL	$t_{co}$	3.046	3.269	4.636	5.043	5.561	5.421	5.639	5.170	5.688	5.550	5.707	ns	
RSDS_E_1R	—	GCLK	$t_{co}$	3.046	3.269	4.639	5.047	5.565	5.425	5.643	5.175	5.693	5.555	5.712	ns	
		GCLK PLL	$t_{co}$	3.039	3.263	4.632	5.041	5.559	5.419	5.637	5.168	5.687	5.549	5.706	ns	
RSDS_E_3R	—	GCLK	$t_{co}$	3.038	3.261	4.629	5.038	5.556	5.416	5.634	5.165	5.683	5.545	5.702	ns	
		GCLK PLL	$t_{co}$	3.060	3.283	4.650	5.058	5.575	5.435	5.653	5.185	5.703	5.565	5.722	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.050	3.272	4.629	5.035	5.550	5.410	5.628	5.161	5.676	5.538	5.695	ns	
		GCLK PLL	$t_{co}$	3.045	3.268	4.629	5.035	5.551	5.411	5.629	5.162	5.678	5.540	5.697	ns	
	6mA	GCLK	$t_{co}$	3.043	3.266	4.628	5.034	5.549	5.409	5.627	5.161	5.677	5.539	5.696	ns	
		GCLK PLL	$t_{co}$	3.035	3.257	4.618	5.024	5.540	5.400	5.618	5.151	5.667	5.529	5.686	ns	
	8mA	GCLK	$t_{co}$	3.036	3.259	4.624	5.031	5.548	5.408	5.626	5.159	5.676	5.538	5.695	ns	
		GCLK PLL	$t_{co}$	3.035	3.256	4.607	5.012	5.526	5.386	5.604	5.138	5.652	5.514	5.671	ns	
	10mA	GCLK	$t_{co}$	3.047	3.269	4.625	5.030	5.544	5.404	5.622	5.157	5.671	5.533	5.690	ns	
		GCLK PLL	$t_{co}$	3.043	3.266	4.626	5.032	5.548	5.408	5.626	5.159	5.675	5.537	5.694	ns	
	12mA	GCLK	$t_{co}$	3.033	3.255	4.615	5.021	5.536	5.396	5.614	5.148	5.663	5.525	5.682	ns	
		GCLK PLL	$t_{co}$	3.031	3.253	4.613	5.018	5.534	5.394	5.612	5.146	5.661	5.523	5.680	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.031	3.254	4.616	5.023	5.539	5.399	5.617	5.150	5.667	5.529	5.686	ns
			GCLK PLL	$t_{co}$	3.035	3.257	4.613	5.018	5.533	5.393	5.611	5.145	5.660	5.522	5.679	ns



**Table 1-57.** EP3SL70 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 0.9 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 0.9 V		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.061	3.286	4.658	5.066	5.583	5.443	5.661	5.193	5.710	5.572	5.729	ns	
		GCLK PLL	t <sub>co</sub>	3.047	3.272	4.646	5.055	5.573	5.433	5.651	5.183	5.701	5.563	5.720	ns	
	6mA	GCLK	t <sub>co</sub>	3.035	3.259	4.629	5.037	5.555	5.415	5.633	5.165	5.683	5.545	5.702	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.259	4.632	5.041	5.559	5.419	5.637	5.169	5.688	5.550	5.707	ns	
	8mA	GCLK	t <sub>co</sub>	3.031	3.255	4.625	5.033	5.552	5.412	5.630	5.162	5.680	5.542	5.699	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.257	4.618	5.024	5.540	5.400	5.618	5.151	5.667	5.529	5.686	ns	
	10mA	GCLK	t <sub>co</sub>	3.036	3.259	4.626	5.034	5.551	5.411	5.629	5.161	5.679	5.541	5.698	ns	
		GCLK PLL	t <sub>co</sub>	3.064	3.289	4.657	5.064	5.581	5.441	5.659	5.192	5.708	5.570	5.727	ns	
	12mA	GCLK	t <sub>co</sub>	3.053	3.277	4.645	5.052	5.569	5.429	5.647	5.180	5.696	5.558	5.715	ns	
		GCLK PLL	t <sub>co</sub>	3.048	3.273	4.645	5.053	5.570	5.430	5.648	5.181	5.698	5.560	5.717	ns	
	DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.034	3.258	4.627	5.034	5.551	5.411	5.629	5.162	5.680	5.542	5.699	ns
			GCLK PLL	t <sub>co</sub>	3.032	3.256	4.625	5.032	5.549	5.409	5.627	5.160	5.677	5.539	5.696	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.036	3.258	4.617	5.022	5.537	5.397	5.615	5.149	5.664	5.526	5.683	ns	
		GCLK PLL	t <sub>co</sub>	3.036	3.259	4.625	5.032	5.549	5.409	5.627	5.160	5.677	5.539	5.696	ns	
	6mA	GCLK	t <sub>co</sub>	3.052	3.276	4.641	5.047	5.563	5.423	5.641	5.175	5.690	5.552	5.709	ns	
		GCLK PLL	t <sub>co</sub>	3.052	3.276	4.641	5.047	5.563	5.423	5.641	5.175	5.690	5.552	5.709	ns	
	8mA	GCLK	t <sub>co</sub>	3.042	3.266	4.631	5.037	5.553	5.413	5.631	5.165	5.681	5.543	5.700	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.258	4.617	5.022	5.537	5.397	5.615	5.149	5.664	5.526	5.683	ns	
	10mA	GCLK	t <sub>co</sub>	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	t <sub>co</sub>	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
	12mA	GCLK	t <sub>co</sub>	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns	
		GCLK PLL	t <sub>co</sub>	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.029	3.246	4.575	4.976	5.487	5.347	5.565	5.101	5.612	5.474	5.631	ns
			GCLK PLL	t <sub>co</sub>	3.025	3.249	4.622	5.031	5.549	5.409	5.627	5.160	5.678	5.540	5.697	ns

**Table 1-57.** EP3SL70 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial				V <sub>cc1</sub> =1.1V	V <sub>cc1</sub> =1.1V			V <sub>cc1</sub> =1.1V	V <sub>cc1</sub> =1.1V		V <sub>cc1</sub> =0.9V
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.056	3.279	4.646	5.054	5.571	5.431	5.649	5.181	5.698	5.560	5.717	ns	
		GCLK PLL	t <sub>co</sub>	3.046	3.269	4.636	5.043	5.561	5.421	5.639	5.170	5.688	5.550	5.707	ns	
	6mA	GCLK	t <sub>co</sub>	3.046	3.269	4.639	5.047	5.565	5.425	5.643	5.175	5.693	5.555	5.712	ns	
		GCLK PLL	t <sub>co</sub>	3.039	3.263	4.632	5.041	5.559	5.419	5.637	5.168	5.687	5.549	5.706	ns	
	8mA	GCLK	t <sub>co</sub>	3.038	3.261	4.629	5.038	5.556	5.416	5.634	5.165	5.683	5.545	5.702	ns	
		GCLK PLL	t <sub>co</sub>	3.060	3.283	4.650	5.058	5.575	5.435	5.653	5.185	5.703	5.565	5.722	ns	
	10mA	GCLK	t <sub>co</sub>	3.050	3.272	4.629	5.035	5.550	5.410	5.628	5.161	5.676	5.538	5.695	ns	
		GCLK PLL	t <sub>co</sub>	3.045	3.268	4.629	5.035	5.551	5.411	5.629	5.162	5.678	5.540	5.697	ns	
	12mA	GCLK	t <sub>co</sub>	3.043	3.266	4.628	5.034	5.549	5.409	5.627	5.161	5.677	5.539	5.696	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.257	4.618	5.024	5.540	5.400	5.618	5.151	5.667	5.529	5.686	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.036	3.259	4.624	5.031	5.548	5.408	5.626	5.159	5.676	5.538	5.695	ns
			GCLK PLL	t <sub>co</sub>	3.035	3.256	4.607	5.012	5.526	5.386	5.604	5.138	5.652	5.514	5.671	ns
16mA		GCLK	t <sub>co</sub>	3.047	3.269	4.625	5.030	5.544	5.404	5.622	5.157	5.671	5.533	5.690	ns	
		GCLK PLL	t <sub>co</sub>	3.043	3.266	4.626	5.032	5.548	5.408	5.626	5.159	5.675	5.537	5.694	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.033	3.255	4.615	5.021	5.536	5.396	5.614	5.148	5.663	5.525	5.682	ns	
		GCLK PLL	t <sub>co</sub>	3.031	3.253	4.613	5.018	5.534	5.394	5.612	5.146	5.661	5.523	5.680	ns	
	6mA	GCLK	t <sub>co</sub>	3.031	3.254	4.616	5.023	5.539	5.399	5.617	5.150	5.667	5.529	5.686	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.257	4.613	5.018	5.533	5.393	5.611	5.145	5.660	5.522	5.679	ns	
	8mA	GCLK	t <sub>co</sub>	3.061	3.286	4.658	5.066	5.583	5.443	5.661	5.193	5.710	5.572	5.729	ns	
		GCLK PLL	t <sub>co</sub>	3.047	3.272	4.646	5.055	5.573	5.433	5.651	5.183	5.701	5.563	5.720	ns	
	10mA	GCLK	t <sub>co</sub>	3.035	3.259	4.629	5.037	5.555	5.415	5.633	5.165	5.683	5.545	5.702	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.259	4.632	5.041	5.559	5.419	5.637	5.169	5.688	5.550	5.707	ns	
	12mA	GCLK	t <sub>co</sub>	3.031	3.255	4.625	5.033	5.552	5.412	5.630	5.162	5.680	5.542	5.699	ns	
		GCLK PLL	t <sub>co</sub>	3.035	3.257	4.618	5.024	5.540	5.400	5.618	5.151	5.667	5.529	5.686	ns	
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.036	3.259	4.626	5.034	5.551	5.411	5.629	5.161	5.679	5.541	5.698	ns	
		GCLK PLL	t <sub>co</sub>	3.064	3.289	4.657	5.064	5.581	5.441	5.659	5.192	5.708	5.570	5.727	ns	
	16mA	GCLK	t <sub>co</sub>	3.053	3.277	4.645	5.052	5.569	5.429	5.647	5.180	5.696	5.558	5.715	ns	
		GCLK PLL	t <sub>co</sub>	3.048	3.273	4.645	5.053	5.570	5.430	5.648	5.181	5.698	5.560	5.717	ns	

**Table 1-57.** EP3SL70 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.034	3.258	4.627	5.034	5.551	5.411	5.629	5.162	5.680	5.542	5.699	ns
		GCLK PLL	$t_{co}$	3.032	3.256	4.625	5.032	5.549	5.409	5.627	5.160	5.677	5.539	5.696	ns
	10mA	GCLK	$t_{co}$	3.036	3.258	4.617	5.022	5.537	5.397	5.615	5.149	5.664	5.526	5.683	ns
		GCLK PLL	$t_{co}$	3.036	3.259	4.625	5.032	5.549	5.409	5.627	5.160	5.677	5.539	5.696	ns
	12mA	GCLK	$t_{co}$	3.052	3.276	4.641	5.047	5.563	5.423	5.641	5.175	5.690	5.552	5.709	ns
		GCLK PLL	$t_{co}$	3.052	3.276	4.641	5.047	5.563	5.423	5.641	5.175	5.690	5.552	5.709	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.042	3.266	4.631	5.037	5.553	5.413	5.631	5.165	5.681	5.543	5.700	ns
		GCLK PLL	$t_{co}$	3.035	3.258	4.617	5.022	5.537	5.397	5.615	5.149	5.664	5.526	5.683	ns

Table 1-58 lists the EP3SL70 row pins output timing parameters for differential I/O standards.

**Table 1-58.** EP3SL70 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
LVDS	—	GCLK	$t_{CO}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
		GCLK PLL	$t_{CO}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
LVDS_E_1R	—	GCLK	$t_{CO}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
		GCLK PLL	$t_{CO}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
LVDS_E_3R	—	GCLK	$t_{CO}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
		GCLK PLL	$t_{CO}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
MINI-LVDS	—	GCLK	$t_{CO}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
		GCLK PLL	$t_{CO}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
MINI-LVDS_E_1R	—	GCLK	$t_{CO}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
		GCLK PLL	$t_{CO}$	3.098	3.331	4.730	5.145	5.672	5.528	5.727	5.280	5.809	5.665	5.794	ns
MINI-LVDS_E_3R	—	GCLK	$t_{CO}$	3.084	3.317	4.717	5.132	5.659	5.515	5.714	5.266	5.796	5.652	5.781	ns
		GCLK PLL	$t_{CO}$	3.080	3.313	4.715	5.132	5.660	5.516	5.715	5.266	5.798	5.654	5.783	ns
RSDS	—	GCLK	$t_{CO}$	3.096	3.328	4.716	5.129	5.654	5.510	5.709	5.263	5.791	5.647	5.776	ns
		GCLK PLL	$t_{CO}$	3.085	3.318	4.712	5.125	5.651	5.507	5.706	5.260	5.788	5.644	5.773	ns
RSDS_E_1R	—	GCLK	$t_{CO}$	3.082	3.315	4.710	5.123	5.649	5.505	5.704	5.258	5.787	5.643	5.772	ns
		GCLK PLL	$t_{CO}$	3.093	3.325	4.711	5.124	5.648	5.504	5.703	5.257	5.785	5.641	5.770	ns
RSDS_E_3R	—	GCLK	$t_{CO}$	3.083	3.316	4.709	5.122	5.647	5.503	5.702	5.257	5.785	5.641	5.770	ns
		GCLK PLL	$t_{CO}$	3.069	3.302	4.694	5.107	5.633	5.489	5.688	5.242	5.770	5.626	5.755	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{CO}$	3.066	3.298	4.690	5.103	5.629	5.485	5.684	5.238	5.766	5.622	5.751	ns
		GCLK PLL	$t_{CO}$	3.063	3.296	4.691	5.106	5.632	5.488	5.687	5.241	5.770	5.626	5.755	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	6mA	GCLK	$t_{CO}$	3.064	3.296	4.681	5.094	5.619	5.475	5.674	5.228	5.756	5.612	5.741	ns
		GCLK PLL	$t_{CO}$	3.113	3.349	4.752	5.167	5.695	5.551	5.750	5.302	5.832	5.688	5.817	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	8mA	GCLK	$t_{CO}$	3.089	3.325	4.734	5.150	5.678	5.534	5.733	5.285	5.817	5.673	5.802	ns
		GCLK PLL	$t_{CO}$	3.071	3.306	4.712	5.128	5.656	5.512	5.711	5.263	5.795	5.651	5.780	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{CO}$	3.117	3.352	4.752	5.167	5.694	5.550	5.749	5.302	5.832	5.688	5.817	ns
		GCLK PLL	$t_{CO}$	3.102	3.337	4.738	5.152	5.679	5.535	5.734	5.287	5.817	5.673	5.802	ns

**Table 1-58.** EP3SL70 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	6mA	GCLK	$t_{co}$	3.091	3.326	4.733	5.149	5.676	5.532	5.731	5.284	5.815	5.671	5.800	ns
		GCLK PLL	$t_{co}$	3.071	3.306	4.710	5.125	5.653	5.509	5.708	5.261	5.791	5.647	5.776	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	8mA	GCLK	$t_{co}$	3.068	3.302	4.706	5.122	5.649	5.505	5.704	5.257	5.788	5.644	5.773	ns
		GCLK PLL	$t_{co}$	3.073	3.306	4.697	5.110	5.635	5.491	5.690	5.244	5.772	5.628	5.757	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.066	3.299	4.696	5.111	5.638	5.494	5.693	5.247	5.777	5.633	5.762	ns
		GCLK PLL	$t_{co}$	3.094	3.328	4.724	5.138	5.664	5.520	5.719	5.273	5.802	5.658	5.787	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	6mA	GCLK	$t_{co}$	3.076	3.311	4.709	5.123	5.649	5.505	5.704	5.258	5.787	5.643	5.772	ns
		GCLK PLL	$t_{co}$	3.062	3.295	4.686	5.099	5.624	5.480	5.679	5.234	5.762	5.618	5.747	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	8mA	GCLK	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
		GCLK PLL	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	10mA	GCLK	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
		GCLK PLL	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	12mA	GCLK	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
		GCLK PLL	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	2.668	2.842	3.979	4.346	4.821	4.685	4.892	4.453	4.930	4.795	4.940	ns
		GCLK PLL	$t_{co}$	3.062	3.288	4.646	5.055	5.575	5.431	5.630	5.186	5.709	5.565	5.694	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.044	3.278	4.684	5.101	5.629	5.485	5.684	5.237	5.770	5.626	5.755	ns
		GCLK PLL	$t_{co}$	3.098	3.331	4.730	5.145	5.672	5.528	5.727	5.280	5.809	5.665	5.794	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	6mA	GCLK	$t_{co}$	3.084	3.317	4.717	5.132	5.659	5.515	5.714	5.266	5.796	5.652	5.781	ns
		GCLK PLL	$t_{co}$	3.080	3.313	4.715	5.132	5.660	5.516	5.715	5.266	5.798	5.654	5.783	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.096	3.328	4.716	5.129	5.654	5.510	5.709	5.263	5.791	5.647	5.776	ns
		GCLK PLL	$t_{co}$	3.085	3.318	4.712	5.125	5.651	5.507	5.706	5.260	5.788	5.644	5.773	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.082	3.315	4.710	5.123	5.649	5.505	5.704	5.258	5.787	5.643	5.772	ns
		GCLK PLL	$t_{co}$	3.093	3.325	4.711	5.124	5.648	5.504	5.703	5.257	5.785	5.641	5.770	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	6mA	GCLK	$t_{co}$	3.083	3.316	4.709	5.122	5.647	5.503	5.702	5.257	5.785	5.641	5.770	ns
		GCLK PLL	$t_{co}$	3.069	3.302	4.694	5.107	5.633	5.489	5.688	5.242	5.770	5.626	5.755	ns

**Table 1-58.** EP3SL70 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	
DIFFERENTIAL 1.8-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.066	3.298	4.690	5.103	5.629	5.485	5.684	5.238	5.766	5.622	5.751	ns
		GCLK PLL	$t_{co}$	3.063	3.296	4.691	5.106	5.632	5.488	5.687	5.241	5.770	5.626	5.755	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	10mA	GCLK	$t_{co}$	3.064	3.296	4.681	5.094	5.619	5.475	5.674	5.228	5.756	5.612	5.741	ns
		GCLK PLL	$t_{co}$	3.113	3.349	4.752	5.167	5.695	5.551	5.750	5.302	5.832	5.688	5.817	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	12mA	GCLK	$t_{co}$	3.089	3.325	4.734	5.150	5.678	5.534	5.733	5.285	5.817	5.673	5.802	ns
		GCLK PLL	$t_{co}$	3.071	3.306	4.712	5.128	5.656	5.512	5.711	5.263	5.795	5.651	5.780	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.117	3.352	4.752	5.167	5.694	5.550	5.749	5.302	5.832	5.688	5.817	ns
		GCLK PLL	$t_{co}$	3.102	3.337	4.738	5.152	5.679	5.535	5.734	5.287	5.817	5.673	5.802	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.091	3.326	4.733	5.149	5.676	5.532	5.731	5.284	5.815	5.671	5.800	ns
		GCLK PLL	$t_{co}$	3.071	3.306	4.710	5.125	5.653	5.509	5.708	5.261	5.791	5.647	5.776	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.068	3.302	4.706	5.122	5.649	5.505	5.704	5.257	5.788	5.644	5.773	ns
		GCLK PLL	$t_{co}$	3.073	3.306	4.697	5.110	5.635	5.491	5.690	5.244	5.772	5.628	5.757	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	12mA	GCLK	$t_{co}$	3.066	3.299	4.696	5.111	5.638	5.494	5.693	5.247	5.777	5.633	5.762	ns
		GCLK PLL	$t_{co}$	3.094	3.328	4.724	5.138	5.664	5.520	5.719	5.273	5.802	5.658	5.787	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.076	3.311	4.709	5.123	5.649	5.505	5.704	5.258	5.787	5.643	5.772	ns
		GCLK PLL	$t_{co}$	3.062	3.295	4.686	5.099	5.624	5.480	5.679	5.234	5.762	5.618	5.747	ns

Table 1-59 and Table 1-60 list the EP3SL70 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-59 lists the EP3SL70 column pin delay adders when using the regional clock.

**Table 1-59.** EP3SL70 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
RCLK input adder	0.158	0.168	0.225	0.241	0.257	0.247	0.313	0.244	0.258	0.252	0.315	ns
RCLK PLL input adder	-0.014	-0.012	-0.007	-0.003	-0.002	-0.005	0.191	-0.003	-0.003	-0.004	0.191	ns
RCLK output adder	-0.114	-0.116	-0.137	-0.139	-0.141	-0.137	-0.215	-0.132	-0.133	-0.136	-0.215	ns
RCLK PLL output adder	1.642	1.675	2.599	2.912	3.223	3.071	3.22	2.931	3.238	3.083	3.338	ns

Table 1-60 lists the EP3SL70 row pin delay adders when using the regional clock.

**Table 1-60.** EP3SL70 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.111	0.123	0.177	0.192	0.207	0.198	0.263	0.194	0.212	0.201	0.266	ns
RCLK PLL input adder	0.099	0.105	0.156	0.175	0.195	0.185	0.263	0.177	0.195	0.188	0.263	ns
RCLK output adder	-0.113	-0.127	-0.183	-0.198	-0.213	-0.205	-0.272	-0.202	-0.216	-0.21	-0.273	ns
RCLK PLL output adder	-0.107	-0.112	-0.164	-0.185	-0.202	-0.193	-0.258	-0.184	-0.204	-0.197	-0.257	ns

### EP3SL110 I/O Timing Parameters

Table 1-61 through Table 1-65 list the maximum I/O timing parameters for EP3SL110 devices for single-ended I/O standards.

Table 1-61 lists the EP3SL110 column pins input timing parameters for single-ended I/O standards.

**Table 1-61.** EP3SL110 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-0.917	-0.917	-1.333	-1.452	-1.682	-1.627	-1.980	-1.452	-1.682	-1.627	-1.980	ns
		t <sub>h</sub>	1.053	1.053	1.524	1.667	1.918	1.850	2.205	1.667	1.918	1.850	2.205	ns
	GCLK PLL	t <sub>su</sub>	-1.234	-1.176	-1.704	-1.940	-2.210	-2.135	-2.470	-1.940	-2.210	-2.135	-2.470	ns
		t <sub>h</sub>	1.512	1.460	2.116	2.394	2.710	2.610	2.971	2.394	2.710	2.610	2.971	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.917	-0.917	-1.333	-1.452	-1.682	-1.627	-1.980	-1.452	-1.682	-1.627	-1.980	ns
		t <sub>h</sub>	1.053	1.053	1.524	1.667	1.918	1.850	2.205	1.667	1.918	1.850	2.205	ns
	GCLK PLL	t <sub>su</sub>	-1.234	-1.176	-1.704	-1.940	-2.210	-2.135	-2.470	-1.940	-2.210	-2.135	-2.470	ns
		t <sub>h</sub>	1.512	1.460	2.116	2.394	2.710	2.610	2.971	2.394	2.710	2.610	2.971	ns
3.0-V LVTTL	GCLK	t <sub>su</sub>	-0.928	-0.928	-1.332	-1.454	-1.681	-1.626	-1.979	-1.454	-1.681	-1.626	-1.979	ns
		t <sub>h</sub>	1.064	1.064	1.523	1.669	1.917	1.849	2.204	1.669	1.917	1.849	2.204	ns
	GCLK PLL	t <sub>su</sub>	-1.245	-1.187	-1.703	-1.942	-2.209	-2.134	-2.469	-1.942	-2.209	-2.134	-2.469	ns
		t <sub>h</sub>	1.523	1.471	2.115	2.396	2.709	2.609	2.970	2.396	2.709	2.609	2.970	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.928	-0.928	-1.332	-1.454	-1.681	-1.626	-1.979	-1.454	-1.681	-1.626	-1.979	ns
		t <sub>h</sub>	1.064	1.064	1.523	1.669	1.917	1.849	2.204	1.669	1.917	1.849	2.204	ns
	GCLK PLL	t <sub>su</sub>	-1.245	-1.187	-1.703	-1.942	-2.209	-2.134	-2.469	-1.942	-2.209	-2.134	-2.469	ns
		t <sub>h</sub>	1.523	1.471	2.115	2.396	2.709	2.609	2.970	2.396	2.709	2.609	2.970	ns
2.5 V	GCLK	t <sub>su</sub>	-0.923	-0.923	-1.341	-1.466	-1.700	-1.645	-1.998	-1.466	-1.700	-1.645	-1.998	ns
		t <sub>h</sub>	1.059	1.059	1.532	1.681	1.936	1.868	2.223	1.681	1.936	1.868	2.223	ns
	GCLK PLL	t <sub>su</sub>	-1.240	-1.182	-1.712	-1.954	-2.228	-2.153	-2.488	-1.954	-2.228	-2.153	-2.488	ns
		t <sub>h</sub>	1.518	1.466	2.124	2.408	2.728	2.628	2.989	2.408	2.728	2.628	2.989	ns

**Table 1-61.** EP3SL110 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	
1.8 V	GCLK	$t_{su}$	-0.943	-0.943	-1.381	-1.502	-1.698	-1.643	-1.996	-1.502	-1.698	-1.643	-1.996	ns
		$t_h$	1.081	1.081	1.572	1.717	1.934	1.866	2.221	1.717	1.934	1.866	2.221	ns
	GCLK PLL	$t_{su}$	-1.262	-1.202	-1.752	-1.990	-2.226	-2.151	-2.486	-1.990	-2.226	-2.151	-2.486	ns
		$t_h$	1.542	1.488	2.164	2.444	2.726	2.626	2.987	2.444	2.726	2.626	2.987	ns
1.5 V	GCLK	$t_{su}$	-0.933	-0.933	-1.358	-1.470	-1.628	-1.573	-1.926	-1.470	-1.628	-1.573	-1.926	ns
		$t_h$	1.071	1.071	1.549	1.685	1.864	1.796	2.151	1.685	1.864	1.796	2.151	ns
	GCLK PLL	$t_{su}$	-1.252	-1.192	-1.729	-1.958	-2.156	-2.081	-2.416	-1.958	-2.156	-2.081	-2.416	ns
		$t_h$	1.532	1.478	2.141	2.412	2.656	2.556	2.917	2.412	2.656	2.556	2.917	ns
1.2 V	GCLK	$t_{su}$	-0.881	-0.881	-1.281	-1.371	-1.472	-1.417	-1.770	-1.371	-1.472	-1.417	-1.770	ns
		$t_h$	1.019	1.019	1.472	1.586	1.708	1.640	1.995	1.586	1.708	1.640	1.995	ns
	GCLK PLL	$t_{su}$	-1.200	-1.140	-1.652	-1.859	-2.000	-1.925	-2.260	-1.859	-2.000	-1.925	-2.260	ns
		$t_h$	1.480	1.426	2.064	2.313	2.500	2.400	2.761	2.313	2.500	2.400	2.761	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.852	-0.852	-1.253	-1.355	-1.474	-1.419	-1.772	-1.355	-1.474	-1.419	-1.772	ns
		$t_h$	0.990	0.990	1.444	1.570	1.710	1.642	1.997	1.570	1.710	1.642	1.997	ns
	GCLK PLL	$t_{su}$	-1.171	-1.111	-1.624	-1.843	-2.002	-1.927	-2.262	-1.843	-2.002	-1.927	-2.262	ns
		$t_h$	1.451	1.397	2.036	2.297	2.502	2.402	2.763	2.297	2.502	2.402	2.763	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.852	-0.852	-1.253	-1.355	-1.474	-1.419	-1.772	-1.355	-1.474	-1.419	-1.772	ns
		$t_h$	0.990	0.990	1.444	1.570	1.710	1.642	1.997	1.570	1.710	1.642	1.997	ns
	GCLK PLL	$t_{su}$	-1.171	-1.111	-1.624	-1.843	-2.002	-1.927	-2.262	-1.843	-2.002	-1.927	-2.262	ns
		$t_h$	1.451	1.397	2.036	2.297	2.502	2.402	2.763	2.297	2.502	2.402	2.763	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.846	-0.846	-1.241	-1.350	-1.474	-1.417	-1.773	-1.350	-1.474	-1.417	-1.773	ns
		$t_h$	0.984	0.984	1.431	1.562	1.707	1.639	1.993	1.562	1.707	1.639	1.993	ns
	GCLK PLL	$t_{su}$	-1.165	-1.105	-1.612	-1.835	-1.999	-1.922	-2.263	-1.835	-1.999	-1.922	-2.263	ns
		$t_h$	1.445	1.391	2.023	2.286	2.496	2.396	2.759	2.286	2.496	2.396	2.759	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.846	-0.846	-1.241	-1.350	-1.474	-1.417	-1.773	-1.350	-1.474	-1.417	-1.773	ns
		$t_h$	0.984	0.984	1.431	1.562	1.707	1.639	1.993	1.562	1.707	1.639	1.993	ns
	GCLK PLL	$t_{su}$	-1.165	-1.105	-1.612	-1.835	-1.999	-1.922	-2.263	-1.835	-1.999	-1.922	-2.263	ns
		$t_h$	1.445	1.391	2.023	2.286	2.496	2.396	2.759	2.286	2.496	2.396	2.759	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.835	-0.835	-1.232	-1.339	-1.455	-1.398	-1.754	-1.339	-1.455	-1.398	-1.754	ns
		$t_h$	0.973	0.973	1.421	1.551	1.688	1.620	1.974	1.551	1.688	1.620	1.974	ns
	GCLK PLL	$t_{su}$	-1.154	-1.094	-1.603	-1.824	-1.980	-1.903	-2.244	-1.824	-1.980	-1.903	-2.244	ns
		$t_h$	1.434	1.380	2.013	2.275	2.477	2.377	2.740	2.275	2.477	2.377	2.740	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.835	-0.835	-1.232	-1.339	-1.455	-1.398	-1.754	-1.339	-1.455	-1.398	-1.754	ns
		$t_h$	0.973	0.973	1.421	1.551	1.688	1.620	1.974	1.551	1.688	1.620	1.974	ns
	GCLK PLL	$t_{su}$	-1.154	-1.094	-1.603	-1.824	-1.980	-1.903	-2.244	-1.824	-1.980	-1.903	-2.244	ns
		$t_h$	1.434	1.380	2.013	2.275	2.477	2.377	2.740	2.275	2.477	2.377	2.740	ns



**Table 1-61.** EP3SL110 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.846	-0.846	-1.241	-1.350	-1.474	-1.417	-1.773	-1.350	-1.474	-1.417	-1.773	ns
		$t_h$	0.984	0.984	1.431	1.562	1.707	1.639	1.993	1.562	1.707	1.639	1.993	ns
	GCLK PLL	$t_{su}$	-1.165	-1.105	-1.612	-1.835	-1.999	-1.922	-2.263	-1.835	-1.999	-1.922	-2.263	ns
		$t_h$	1.445	1.391	2.023	2.286	2.496	2.396	2.759	2.286	2.496	2.396	2.759	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.846	-0.846	-1.241	-1.350	-1.474	-1.417	-1.773	-1.350	-1.474	-1.417	-1.773	ns
		$t_h$	0.984	0.984	1.431	1.562	1.707	1.639	1.993	1.562	1.707	1.639	1.993	ns
	GCLK PLL	$t_{su}$	-1.165	-1.105	-1.612	-1.835	-1.999	-1.922	-2.263	-1.835	-1.999	-1.922	-2.263	ns
		$t_h$	1.445	1.391	2.023	2.286	2.496	2.396	2.759	2.286	2.496	2.396	2.759	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.835	-0.835	-1.232	-1.339	-1.455	-1.398	-1.754	-1.339	-1.455	-1.398	-1.754	ns
		$t_h$	0.973	0.973	1.421	1.551	1.688	1.620	1.974	1.551	1.688	1.620	1.974	ns
	GCLK PLL	$t_{su}$	-1.154	-1.094	-1.603	-1.824	-1.980	-1.903	-2.244	-1.824	-1.980	-1.903	-2.244	ns
		$t_h$	1.434	1.380	2.013	2.275	2.477	2.377	2.740	2.275	2.477	2.377	2.740	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.835	-0.835	-1.232	-1.339	-1.455	-1.398	-1.754	-1.339	-1.455	-1.398	-1.754	ns
		$t_h$	0.973	0.973	1.421	1.551	1.688	1.620	1.974	1.551	1.688	1.620	1.974	ns
	GCLK PLL	$t_{su}$	-1.154	-1.094	-1.603	-1.824	-1.980	-1.903	-2.244	-1.824	-1.980	-1.903	-2.244	ns
		$t_h$	1.434	1.380	2.013	2.275	2.477	2.377	2.740	2.275	2.477	2.377	2.740	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.823	-0.823	-1.222	-1.328	-1.439	-1.382	-1.738	-1.328	-1.439	-1.382	-1.738	ns
		$t_h$	0.961	0.961	1.411	1.540	1.672	1.604	1.958	1.540	1.672	1.604	1.958	ns
	GCLK PLL	$t_{su}$	-1.142	-1.082	-1.593	-1.813	-1.964	-1.887	-2.228	-1.813	-1.964	-1.887	-2.228	ns
		$t_h$	1.422	1.368	2.003	2.264	2.461	2.361	2.724	2.264	2.461	2.361	2.724	ns
3.0-V PCI	GCLK	$t_{su}$	-0.823	-0.823	-1.222	-1.328	-1.439	-1.382	-1.738	-1.328	-1.439	-1.382	-1.738	ns
		$t_h$	0.961	0.961	1.411	1.540	1.672	1.604	1.958	1.540	1.672	1.604	1.958	ns
	GCLK PLL	$t_{su}$	-1.142	-1.082	-1.593	-1.813	-1.964	-1.887	-2.228	-1.813	-1.964	-1.887	-2.228	ns
		$t_h$	1.422	1.368	2.003	2.264	2.461	2.361	2.724	2.264	2.461	2.361	2.724	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.928	-0.928	-1.332	-1.454	-1.681	-1.626	-1.979	-1.454	-1.681	-1.626	-1.979	ns
		$t_h$	1.064	1.064	1.523	1.669	1.917	1.849	2.204	1.669	1.917	1.849	2.204	ns
	GCLK PLL	$t_{su}$	-1.245	-1.187	-1.703	-1.942	-2.209	-2.134	-2.469	-1.942	-2.209	-2.134	-2.469	ns
		$t_h$	1.523	1.471	2.115	2.396	2.709	2.609	2.970	2.396	2.709	2.609	2.970	ns

Table 1-62 lists the EP3SL110 row pins input timing parameters for single-ended I/O standards.

**Table 1-62.** EP3SL110 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.3-V LVTTL	GCLK	$t_{su}$	-0.910	-0.883	-1.252	-1.441	-1.559	-1.604	-1.843	-1.465	-1.551	-1.605	-1.881	ns
		$t_h$	1.025	1.015	1.440	1.648	1.792	1.822	2.066	1.682	1.794	1.831	2.104	ns
	GCLK PLL	$t_{su}$	0.992	1.013	1.646	1.862	1.976	1.860	1.804	1.870	1.998	1.880	1.856	ns
		$t_h$	-0.741	-0.746	-1.246	-1.412	-1.475	-1.388	-1.322	-1.411	-1.486	-1.398	-1.371	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.910	-0.883	-1.252	-1.441	-1.559	-1.604	-1.843	-1.465	-1.551	-1.605	-1.881	ns
		$t_h$	1.025	1.015	1.440	1.648	1.792	1.822	2.066	1.682	1.794	1.831	2.104	ns
	GCLK PLL	$t_{su}$	0.992	1.013	1.646	1.862	1.976	1.860	1.804	1.870	1.998	1.880	1.856	ns
		$t_h$	-0.741	-0.746	-1.246	-1.412	-1.475	-1.388	-1.322	-1.411	-1.486	-1.398	-1.371	ns
3.0-V LVTTL	GCLK	$t_{su}$	-0.916	-0.894	-1.249	-1.442	-1.562	-1.607	-1.846	-1.464	-1.556	-1.610	-1.886	ns
		$t_h$	1.031	1.026	1.437	1.649	1.795	1.825	2.069	1.681	1.799	1.836	2.109	ns
	GCLK PLL	$t_{su}$	0.986	1.002	1.649	1.861	1.973	1.857	1.801	1.871	1.993	1.875	1.851	ns
		$t_h$	-0.735	-0.735	-1.249	-1.411	-1.472	-1.385	-1.319	-1.412	-1.481	-1.393	-1.366	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.916	-0.894	-1.249	-1.442	-1.562	-1.607	-1.846	-1.464	-1.556	-1.610	-1.886	ns
		$t_h$	1.031	1.026	1.437	1.649	1.795	1.825	2.069	1.681	1.799	1.836	2.109	ns
	GCLK PLL	$t_{su}$	0.986	1.002	1.649	1.861	1.973	1.857	1.801	1.871	1.993	1.875	1.851	ns
		$t_h$	-0.735	-0.735	-1.249	-1.411	-1.472	-1.385	-1.319	-1.412	-1.481	-1.393	-1.366	ns
2.5 V	GCLK	$t_{su}$	-0.904	-0.887	-1.258	-1.455	-1.577	-1.622	-1.861	-1.473	-1.566	-1.620	-1.896	ns
		$t_h$	1.019	1.019	1.446	1.662	1.810	1.840	2.084	1.690	1.809	1.846	2.119	ns
	GCLK PLL	$t_{su}$	0.998	1.009	1.640	1.848	1.958	1.842	1.786	1.862	1.983	1.865	1.841	ns
		$t_h$	-0.747	-0.742	-1.240	-1.398	-1.457	-1.370	-1.304	-1.403	-1.471	-1.383	-1.356	ns
1.8 V	GCLK	$t_{su}$	-0.873	-0.918	-1.298	-1.402	-1.575	-1.530	-1.859	-1.402	-1.567	-1.526	-1.897	ns
		$t_h$	0.990	1.051	1.486	1.612	1.808	1.751	2.082	1.622	1.810	1.756	2.120	ns
	GCLK PLL	$t_{su}$	0.968	0.977	1.600	1.815	1.960	1.844	1.788	1.829	1.982	1.864	1.840	ns
		$t_h$	-0.716	-0.709	-1.200	-1.365	-1.459	-1.372	-1.306	-1.370	-1.470	-1.382	-1.355	ns
1.5 V	GCLK	$t_{su}$	-0.863	-0.907	-1.274	-1.370	-1.507	-1.462	-1.791	-1.371	-1.502	-1.461	-1.832	ns
		$t_h$	0.980	1.040	1.462	1.580	1.740	1.683	2.014	1.591	1.745	1.691	2.055	ns
	GCLK PLL	$t_{su}$	0.978	0.988	1.624	1.847	2.028	1.912	1.856	1.860	2.047	1.929	1.905	ns
		$t_h$	-0.726	-0.720	-1.224	-1.397	-1.527	-1.440	-1.374	-1.401	-1.535	-1.447	-1.420	ns
1.2 V	GCLK	$t_{su}$	-0.803	-0.854	-1.195	-1.269	-1.348	-1.303	-1.632	-1.275	-1.347	-1.306	-1.677	ns
		$t_h$	0.920	0.987	1.383	1.479	1.581	1.524	1.855	1.495	1.590	1.536	1.900	ns
	GCLK PLL	$t_{su}$	1.038	1.041	1.703	1.948	2.187	2.071	2.015	1.956	2.202	2.084	2.060	ns
		$t_h$	-0.786	-0.773	-1.303	-1.498	-1.686	-1.599	-1.533	-1.497	-1.690	-1.602	-1.575	ns

**Table 1-62.** EP3SL110 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.847	-0.828	-1.172	-1.346	-1.357	-1.402	-1.641	-1.361	-1.349	-1.403	-1.679	ns
		$t_h$	0.963	0.961	1.360	1.553	1.590	1.620	1.864	1.578	1.592	1.629	1.902	ns
	GCLK PLL	$t_{su}$	1.055	1.067	1.726	1.957	2.178	2.062	2.006	1.974	2.200	2.082	2.058	ns
		$t_h$	-0.803	-0.799	-1.326	-1.507	-1.677	-1.590	-1.524	-1.515	-1.688	-1.600	-1.573	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.847	-0.828	-1.172	-1.346	-1.357	-1.402	-1.641	-1.361	-1.349	-1.403	-1.679	ns
		$t_h$	0.963	0.961	1.360	1.553	1.590	1.620	1.864	1.578	1.592	1.629	1.902	ns
	GCLK PLL	$t_{su}$	1.055	1.067	1.726	1.957	2.178	2.062	2.006	1.974	2.200	2.082	2.058	ns
		$t_h$	-0.803	-0.799	-1.326	-1.507	-1.677	-1.590	-1.524	-1.515	-1.688	-1.600	-1.573	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.777	-0.819	-1.157	-1.244	-1.346	-1.300	-1.630	-1.246	-1.343	-1.300	-1.672	ns
		$t_h$	0.894	0.952	1.345	1.452	1.576	1.519	1.849	1.463	1.583	1.529	1.891	ns
	GCLK PLL	$t_{su}$	1.064	1.076	1.741	1.975	2.192	2.077	2.019	1.988	2.209	2.092	2.067	ns
		$t_h$	-0.812	-0.808	-1.341	-1.527	-1.693	-1.606	-1.541	-1.531	-1.700	-1.611	-1.586	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.777	-0.819	-1.157	-1.244	-1.346	-1.300	-1.630	-1.246	-1.343	-1.300	-1.672	ns
		$t_h$	0.894	0.952	1.345	1.452	1.576	1.519	1.849	1.463	1.583	1.529	1.891	ns
	GCLK PLL	$t_{su}$	1.064	1.076	1.741	1.975	2.192	2.077	2.019	1.988	2.209	2.092	2.067	ns
		$t_h$	-0.812	-0.808	-1.341	-1.527	-1.693	-1.606	-1.541	-1.531	-1.700	-1.611	-1.586	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.763	-0.807	-1.144	-1.234	-1.328	-1.282	-1.612	-1.235	-1.326	-1.283	-1.655	ns
		$t_h$	0.880	0.940	1.333	1.442	1.558	1.501	1.831	1.452	1.566	1.512	1.874	ns
	GCLK PLL	$t_{su}$	1.078	1.088	1.756	1.985	2.210	2.095	2.037	1.999	2.226	2.109	2.084	ns
		$t_h$	-0.826	-0.820	-1.355	-1.537	-1.711	-1.624	-1.559	-1.542	-1.717	-1.628	-1.603	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.777	-0.819	-1.157	-1.244	-1.346	-1.300	-1.630	-1.246	-1.343	-1.300	-1.672	ns
		$t_h$	0.894	0.952	1.345	1.452	1.576	1.519	1.849	1.463	1.583	1.529	1.891	ns
	GCLK PLL	$t_{su}$	1.064	1.076	1.741	1.975	2.192	2.077	2.019	1.988	2.209	2.092	2.067	ns
		$t_h$	-0.812	-0.808	-1.341	-1.527	-1.693	-1.606	-1.541	-1.531	-1.700	-1.611	-1.586	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.777	-0.819	-1.157	-1.244	-1.346	-1.300	-1.630	-1.246	-1.343	-1.300	-1.672	ns
		$t_h$	0.894	0.952	1.345	1.452	1.576	1.519	1.849	1.463	1.583	1.529	1.891	ns
	GCLK PLL	$t_{su}$	1.064	1.076	1.741	1.975	2.192	2.077	2.019	1.988	2.209	2.092	2.067	ns
		$t_h$	-0.812	-0.808	-1.341	-1.527	-1.693	-1.606	-1.541	-1.531	-1.700	-1.611	-1.586	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.763	-0.807	-1.144	-1.234	-1.328	-1.282	-1.612	-1.235	-1.326	-1.283	-1.655	ns
		$t_h$	0.880	0.940	1.333	1.442	1.558	1.501	1.831	1.452	1.566	1.512	1.874	ns
	GCLK PLL	$t_{su}$	1.078	1.088	1.756	1.985	2.210	2.095	2.037	1.999	2.226	2.109	2.084	ns
		$t_h$	-0.826	-0.820	-1.355	-1.537	-1.711	-1.624	-1.559	-1.542	-1.717	-1.628	-1.603	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.763	-0.807	-1.144	-1.234	-1.328	-1.282	-1.612	-1.235	-1.326	-1.283	-1.655	ns
		$t_h$	0.880	0.940	1.333	1.442	1.558	1.501	1.831	1.452	1.566	1.512	1.874	ns
	GCLK PLL	$t_{su}$	1.078	1.088	1.756	1.985	2.210	2.095	2.037	1.999	2.226	2.109	2.084	ns
		$t_h$	-0.826	-0.820	-1.355	-1.537	-1.711	-1.624	-1.559	-1.542	-1.717	-1.628	-1.603	ns

**Table 1-62.** EP3SL110 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.754	-0.795	-1.135	-1.224	-1.312	-1.266	-1.596	-1.226	-1.310	-1.267	-1.639	ns
		$t_h$	0.871	0.928	1.324	1.432	1.542	1.485	1.815	1.443	1.550	1.496	1.858	ns
	GCLK PLL	$t_{su}$	1.087	1.100	1.765	1.995	2.226	2.111	2.053	2.008	2.242	2.125	2.100	ns
		$t_h$	-0.835	-0.832	-1.364	-1.547	-1.727	-1.640	-1.575	-1.551	-1.733	-1.644	-1.619	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.754	-0.795	-1.135	-1.224	-1.312	-1.266	-1.596	-1.226	-1.310	-1.267	-1.639	ns
		$t_h$	0.871	0.928	1.324	1.432	1.542	1.485	1.815	1.443	1.550	1.496	1.858	ns
	GCLK PLL	$t_{su}$	1.087	1.100	1.765	1.995	2.226	2.111	2.053	2.008	2.242	2.125	2.100	ns
		$t_h$	-0.835	-0.832	-1.364	-1.547	-1.727	-1.640	-1.575	-1.551	-1.733	-1.644	-1.619	ns
3.0-V PCI	GCLK	$t_{su}$	-0.916	-0.894	-1.249	-1.442	-1.562	-1.607	-1.846	-1.464	-1.556	-1.610	-1.886	ns
		$t_h$	1.031	1.026	1.437	1.649	1.795	1.825	2.069	1.681	1.799	1.836	2.109	ns
	GCLK PLL	$t_{su}$	0.986	1.002	1.649	1.861	1.973	1.857	1.801	1.871	1.993	1.875	1.851	ns
		$t_h$	-0.735	-0.735	-1.249	-1.411	-1.472	-1.385	-1.319	-1.412	-1.481	-1.393	-1.366	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.916	-0.894	-1.249	-1.442	-1.562	-1.607	-1.846	-1.464	-1.556	-1.610	-1.886	ns
		$t_h$	1.031	1.026	1.437	1.649	1.795	1.825	2.069	1.681	1.799	1.836	2.109	ns
	GCLK PLL	$t_{su}$	0.986	1.002	1.649	1.861	1.973	1.857	1.801	1.871	1.993	1.875	1.851	ns
		$t_h$	-0.735	-0.735	-1.249	-1.411	-1.472	-1.385	-1.319	-1.412	-1.481	-1.393	-1.366	ns

Table 1-63 lists the EP3SL110 column pins output timing parameters for single-ended I/O standards.

**Table 1-63.** EP3SL110 Column Pins Output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.439	3.439	4.768	5.145	5.638	5.507	5.801	5.145	5.638	5.507	5.801	ns
		GCLK PLL	$t_{co}$	3.829	3.829	5.344	5.778	6.326	6.168	6.550	5.778	6.326	6.168	6.550	ns
	8mA	GCLK	$t_{co}$	3.372	3.372	4.659	5.034	5.525	5.394	5.688	5.034	5.525	5.394	5.688	ns
		GCLK PLL	$t_{co}$	3.762	3.762	5.235	5.667	6.213	6.055	6.437	5.667	6.213	6.055	6.437	ns
	12mA	GCLK	$t_{co}$	3.286	3.286	4.556	4.936	5.433	5.302	5.596	4.936	5.433	5.302	5.596	ns
		GCLK PLL	$t_{co}$	3.676	3.676	5.131	5.568	6.121	5.963	6.345	5.568	6.121	5.963	6.345	ns
	16mA	GCLK	$t_{co}$	3.279	3.279	4.539	4.908	5.392	5.261	5.555	4.908	5.392	5.261	5.555	ns
		GCLK PLL	$t_{co}$	3.669	3.669	5.114	5.540	6.080	5.922	6.304	5.540	6.080	5.922	6.304	ns

**Table 1-63.** EP3SL110 Column Pins Output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.445	3.445	4.773	5.150	5.645	5.514	5.808	5.150	5.645	5.514	5.808	ns
		GCLK PLL	$t_{co}$	3.835	3.835	5.348	5.783	6.333	6.175	6.557	5.783	6.333	6.175	6.557	ns
	8mA	GCLK	$t_{co}$	3.290	3.290	4.566	4.953	5.444	5.313	5.607	4.953	5.444	5.313	5.607	ns
		GCLK PLL	$t_{co}$	3.680	3.680	5.141	5.585	6.132	5.974	6.356	5.585	6.132	5.974	6.356	ns
	12mA	GCLK	$t_{co}$	3.297	3.297	4.560	4.932	5.418	5.287	5.581	4.932	5.418	5.287	5.581	ns
		GCLK PLL	$t_{co}$	3.687	3.687	5.135	5.564	6.106	5.948	6.330	5.564	6.106	5.948	6.330	ns
	16mA	GCLK	$t_{co}$	3.281	3.281	4.537	4.906	5.389	5.258	5.552	4.906	5.389	5.258	5.552	ns
		GCLK PLL	$t_{co}$	3.671	3.671	5.113	5.539	6.077	5.919	6.301	5.539	6.077	5.919	6.301	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.403	3.403	4.735	5.114	5.605	5.474	5.768	5.114	5.605	5.474	5.768	ns
		GCLK PLL	$t_{co}$	3.793	3.793	5.311	5.746	6.293	6.135	6.517	5.746	6.293	6.135	6.517	ns
	8mA	GCLK	$t_{co}$	3.292	3.292	4.605	4.980	5.467	5.337	5.629	4.980	5.467	5.337	5.629	ns
		GCLK PLL	$t_{co}$	3.682	3.682	5.181	5.612	6.156	5.999	6.379	5.612	6.156	5.999	6.379	ns
	12mA	GCLK	$t_{co}$	3.256	3.256	4.542	4.911	5.393	5.263	5.556	4.911	5.393	5.263	5.556	ns
		GCLK PLL	$t_{co}$	3.646	3.646	5.118	5.543	6.082	5.925	6.305	5.543	6.082	5.925	6.305	ns
	16mA	GCLK	$t_{co}$	3.238	3.238	4.513	4.883	5.365	5.234	5.528	4.883	5.365	5.234	5.528	ns
		GCLK PLL	$t_{co}$	3.628	3.628	5.089	5.515	6.053	5.895	6.277	5.515	6.053	5.895	6.277	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.317	3.317	4.639	5.013	5.502	5.372	5.664	5.013	5.502	5.372	5.664	ns
		GCLK PLL	$t_{co}$	3.707	3.707	5.215	5.646	6.191	6.034	6.414	5.646	6.191	6.034	6.414	ns
	8mA	GCLK	$t_{co}$	3.238	3.238	4.516	4.884	5.367	5.237	5.529	4.884	5.367	5.237	5.529	ns
		GCLK PLL	$t_{co}$	3.628	3.628	5.091	5.517	6.056	5.899	6.279	5.517	6.056	5.899	6.279	ns
	12mA	GCLK	$t_{co}$	3.233	3.233	4.508	4.877	5.359	5.228	5.522	4.877	5.359	5.228	5.522	ns
		GCLK PLL	$t_{co}$	3.623	3.623	5.084	5.510	6.047	5.889	6.271	5.510	6.047	5.889	6.271	ns
	16mA	GCLK	$t_{co}$	3.224	3.224	4.494	4.862	5.344	5.213	5.507	4.862	5.344	5.213	5.507	ns
		GCLK PLL	$t_{co}$	3.614	3.614	5.070	5.495	6.032	5.874	6.256	5.495	6.032	5.874	6.256	ns

**Table 1-63.** EP3SL110 Column Pins Output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
2.5 V	4mA	GCLK	$t_{co}$	3.439	3.439	4.846	5.240	5.749	5.619	5.912	5.240	5.749	5.619	5.912	ns
		GCLK PLL	$t_{co}$	3.829	3.829	5.422	5.873	6.438	6.281	6.661	5.873	6.438	6.281	6.661	ns
	8mA	GCLK	$t_{co}$	3.339	3.339	4.727	5.114	5.617	5.487	5.779	5.114	5.617	5.487	5.779	ns
		GCLK PLL	$t_{co}$	3.729	3.729	5.303	5.747	6.306	6.149	6.529	5.747	6.306	6.149	6.529	ns
	12mA	GCLK	$t_{co}$	3.295	3.295	4.640	5.024	5.522	5.391	5.685	5.024	5.522	5.391	5.685	ns
		GCLK PLL	$t_{co}$	3.685	3.685	5.216	5.656	6.210	6.052	6.434	5.656	6.210	6.052	6.434	ns
	16mA	GCLK	$t_{co}$	3.257	3.257	4.601	4.981	5.479	5.348	5.642	4.981	5.479	5.348	5.642	ns
		GCLK PLL	$t_{co}$	3.647	3.647	5.177	5.614	6.167	6.009	6.391	5.614	6.167	6.009	6.391	ns
1.8 V	2mA	GCLK	$t_{co}$	3.630	3.630	5.168	5.600	6.154	6.023	6.317	5.600	6.154	6.023	6.317	ns
		GCLK PLL	$t_{co}$	4.020	4.020	5.743	6.233	6.842	6.684	7.066	6.233	6.842	6.684	7.066	ns
	4mA	GCLK	$t_{co}$	3.449	3.449	4.889	5.291	5.806	5.676	5.968	5.291	5.806	5.676	5.968	ns
		GCLK PLL	$t_{co}$	3.839	3.839	5.464	5.924	6.495	6.338	6.718	5.924	6.495	6.338	6.718	ns
	6mA	GCLK	$t_{co}$	3.367	3.367	4.782	5.176	5.696	5.565	5.859	5.176	5.696	5.565	5.859	ns
		GCLK PLL	$t_{co}$	3.757	3.757	5.357	5.809	6.384	6.226	6.608	5.809	6.384	6.226	6.608	ns
	8mA	GCLK	$t_{co}$	3.347	3.347	4.723	5.123	5.630	5.499	5.793	5.123	5.630	5.499	5.793	ns
		GCLK PLL	$t_{co}$	3.737	3.737	5.299	5.755	6.318	6.160	6.542	5.755	6.318	6.160	6.542	ns
	10mA	GCLK	$t_{co}$	3.284	3.284	4.662	5.048	5.549	5.418	5.712	5.048	5.549	5.418	5.712	ns
		GCLK PLL	$t_{co}$	3.674	3.674	5.238	5.680	6.237	6.079	6.461	5.680	6.237	6.079	6.461	ns
	12mA	GCLK	$t_{co}$	3.266	3.266	4.642	5.026	5.526	5.395	5.689	5.026	5.526	5.395	5.689	ns
		GCLK PLL	$t_{co}$	3.656	3.656	5.217	5.659	6.214	6.056	6.438	5.659	6.214	6.056	6.438	ns

**Table 1-63.** EP3SL110 Column Pins Output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
1.5 V	2mA	GCLK	$t_{co}$	3.576	3.576	5.096	5.533	6.092	5.961	6.255	5.533	6.092	5.961	6.255	ns
		GCLK PLL	$t_{co}$	3.966	3.966	5.672	6.165	6.780	6.622	7.004	6.165	6.780	6.622	7.004	ns
	4mA	GCLK	$t_{co}$	3.364	3.364	4.777	5.176	5.700	5.569	5.863	5.176	5.700	5.569	5.863	ns
		GCLK PLL	$t_{co}$	3.754	3.754	5.353	5.809	6.388	6.230	6.612	5.809	6.388	6.230	6.612	ns
	6mA	GCLK	$t_{co}$	3.339	3.339	4.710	5.116	5.633	5.502	5.796	5.116	5.633	5.502	5.796	ns
		GCLK PLL	$t_{co}$	3.729	3.729	5.286	5.749	6.321	6.163	6.545	5.749	6.321	6.163	6.545	ns
	8mA	GCLK	$t_{co}$	3.328	3.328	4.693	5.091	5.613	5.482	5.776	5.091	5.613	5.482	5.776	ns
		GCLK PLL	$t_{co}$	3.718	3.718	5.269	5.724	6.301	6.143	6.525	5.724	6.301	6.143	6.525	ns
	10mA	GCLK	$t_{co}$	3.273	3.273	4.655	5.041	5.543	5.412	5.706	5.041	5.543	5.412	5.706	ns
		GCLK PLL	$t_{co}$	3.663	3.663	5.231	5.673	6.231	6.073	6.455	5.673	6.231	6.073	6.455	ns
	12mA	GCLK	$t_{co}$	3.268	3.268	4.639	5.029	5.532	5.401	5.695	5.029	5.532	5.401	5.695	ns
		GCLK PLL	$t_{co}$	3.658	3.658	5.214	5.662	6.220	6.062	6.444	5.662	6.220	6.062	6.444	ns
1.2 V	2mA	GCLK	$t_{co}$	3.492	3.492	5.022	5.468	6.036	5.905	6.199	5.468	6.036	5.905	6.199	ns
		GCLK PLL	$t_{co}$	3.882	3.882	5.598	6.101	6.724	6.566	6.948	6.101	6.724	6.566	6.948	ns
	4mA	GCLK	$t_{co}$	3.369	3.369	4.797	5.207	5.750	5.619	5.913	5.207	5.750	5.619	5.913	ns
		GCLK PLL	$t_{co}$	3.759	3.759	5.372	5.839	6.438	6.280	6.662	5.839	6.438	6.280	6.662	ns
	6mA	GCLK	$t_{co}$	3.331	3.331	4.704	5.117	5.637	5.506	5.800	5.117	5.637	5.506	5.800	ns
		GCLK PLL	$t_{co}$	3.721	3.721	5.280	5.750	6.325	6.167	6.549	5.750	6.325	6.167	6.549	ns
	8mA	GCLK	$t_{co}$	3.284	3.284	4.676	5.068	5.581	5.450	5.744	5.068	5.581	5.450	5.744	ns
		GCLK PLL	$t_{co}$	3.674	3.674	5.252	5.701	6.269	6.111	6.493	5.701	6.269	6.111	6.493	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.284	3.284	4.633	5.016	5.512	5.381	5.675	5.016	5.512	5.381	5.675	ns
		GCLK PLL	$t_{co}$	3.674	3.674	5.209	5.648	6.200	6.042	6.424	5.648	6.200	6.042	6.424	ns
	10mA	GCLK	$t_{co}$	3.281	3.281	4.630	5.012	5.508	5.377	5.671	5.012	5.508	5.377	5.671	ns
		GCLK PLL	$t_{co}$	3.671	3.671	5.206	5.645	6.196	6.038	6.420	5.645	6.196	6.038	6.420	ns
	12mA	GCLK	$t_{co}$	3.279	3.279	4.630	5.013	5.509	5.378	5.672	5.013	5.509	5.378	5.672	ns
		GCLK PLL	$t_{co}$	3.669	3.669	5.206	5.646	6.197	6.039	6.421	5.646	6.197	6.039	6.421	ns

**Table 1-63.** EP3SL110 Column Pins Output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.270	3.270	4.616	4.998	5.494	5.363	5.657	4.998	5.494	5.363	5.657	ns
		GCLK PLL	$t_{co}$	3.660	3.660	5.191	5.630	6.182	6.024	6.406	5.630	6.182	6.024	6.406	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.291	3.291	4.645	5.030	5.528	5.397	5.691	5.030	5.528	5.397	5.691	ns
		GCLK PLL	$t_{co}$	3.681	3.681	5.221	5.662	6.216	6.058	6.440	5.662	6.216	6.058	6.440	ns
	6mA	GCLK	$t_{co}$	3.287	3.287	4.643	5.028	5.526	5.395	5.689	5.028	5.526	5.395	5.689	ns
		GCLK PLL	$t_{co}$	3.677	3.677	5.219	5.660	6.214	6.056	6.438	5.660	6.214	6.056	6.438	ns
	8mA	GCLK	$t_{co}$	3.276	3.276	4.633	5.018	5.517	5.386	5.680	5.018	5.517	5.386	5.680	ns
		GCLK PLL	$t_{co}$	3.666	3.666	5.209	5.651	6.205	6.047	6.429	5.651	6.205	6.047	6.429	ns
	10mA	GCLK	$t_{co}$	3.265	3.265	4.621	5.005	5.504	5.373	5.667	5.005	5.504	5.373	5.667	ns
		GCLK PLL	$t_{co}$	3.655	3.655	5.196	5.638	6.192	6.034	6.416	5.638	6.192	6.034	6.416	ns
	12mA	GCLK	$t_{co}$	3.265	3.265	4.620	5.005	5.504	5.373	5.667	5.005	5.504	5.373	5.667	ns
		GCLK PLL	$t_{co}$	3.655	3.655	5.196	5.638	6.192	6.034	6.416	5.638	6.192	6.034	6.416	ns
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.271	3.271	4.619	5.002	5.499	5.368	5.662	5.002	5.499	5.368	5.662	ns
		GCLK PLL	$t_{co}$	3.661	3.661	5.195	5.635	6.187	6.029	6.411	5.635	6.187	6.029	6.411	ns
	16mA	GCLK	$t_{co}$	3.274	3.274	4.627	5.012	5.511	5.380	5.674	5.012	5.511	5.380	5.674	ns
		GCLK PLL	$t_{co}$	3.664	3.664	5.203	5.644	6.199	6.041	6.423	5.644	6.199	6.041	6.423	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.295	3.295	4.655	5.041	5.541	5.410	5.704	5.041	5.541	5.410	5.704	ns
		GCLK PLL	$t_{co}$	3.685	3.685	5.230	5.674	6.229	6.071	6.453	5.674	6.229	6.071	6.453	ns
	6mA	GCLK	$t_{co}$	3.281	3.281	4.644	5.031	5.532	5.401	5.695	5.031	5.532	5.401	5.695	ns
		GCLK PLL	$t_{co}$	3.671	3.671	5.220	5.664	6.220	6.062	6.444	5.664	6.220	6.062	6.444	ns
	8mA	GCLK	$t_{co}$	3.270	3.270	4.631	5.017	5.518	5.387	5.681	5.017	5.518	5.387	5.681	ns
		GCLK PLL	$t_{co}$	3.660	3.660	5.206	5.650	6.206	6.048	6.430	5.650	6.206	6.048	6.430	ns
	10mA	GCLK	$t_{co}$	3.269	3.269	4.634	5.021	5.522	5.391	5.685	5.021	5.522	5.391	5.685	ns
		GCLK PLL	$t_{co}$	3.659	3.659	5.209	5.653	6.210	6.052	6.434	5.653	6.210	6.052	6.434	ns
	12mA	GCLK	$t_{co}$	3.266	3.266	4.628	5.015	5.516	5.385	5.679	5.015	5.516	5.385	5.679	ns
		GCLK PLL	$t_{co}$	3.656	3.656	5.204	5.648	6.204	6.046	6.428	5.648	6.204	6.046	6.428	ns



**Table 1-63.** EP3SL110 Column Pins Output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	
SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.268	3.268	4.617	5.001	5.499	5.368	5.662	5.001	5.499	5.368	5.662	ns
		GCLK PLL	$t_{co}$	3.658	3.658	5.193	5.634	6.187	6.029	6.411	5.634	6.187	6.029	6.411	ns
	16mA	GCLK	$t_{co}$	3.271	3.271	4.624	5.010	5.510	5.379	5.673	5.010	5.510	5.379	5.673	ns
		GCLK PLL	$t_{co}$	3.661	3.661	5.200	5.643	6.198	6.040	6.422	5.643	6.198	6.040	6.422	ns
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.278	3.278	4.619	5.001	5.497	5.366	5.660	5.001	5.497	5.366	5.660	ns
		GCLK PLL	$t_{co}$	3.668	3.668	5.195	5.634	6.185	6.027	6.409	5.634	6.185	6.027	6.409	ns
	6mA	GCLK	$t_{co}$	3.271	3.271	4.617	5.000	5.496	5.365	5.659	5.000	5.496	5.365	5.659	ns
		GCLK PLL	$t_{co}$	3.661	3.661	5.193	5.632	6.184	6.026	6.408	5.632	6.184	6.026	6.408	ns
	8mA	GCLK	$t_{co}$	3.263	3.263	4.610	4.992	5.489	5.358	5.652	4.992	5.489	5.358	5.652	ns
		GCLK PLL	$t_{co}$	3.653	3.653	5.185	5.625	6.177	6.019	6.401	5.625	6.177	6.019	6.401	ns
	10mA	GCLK	$t_{co}$	3.266	3.266	4.613	4.996	5.493	5.362	5.656	4.996	5.493	5.362	5.656	ns
		GCLK PLL	$t_{co}$	3.656	3.656	5.188	5.628	6.181	6.023	6.405	5.628	6.181	6.023	6.405	ns
	12mA	GCLK	$t_{co}$	3.263	3.263	4.615	4.999	5.497	5.366	5.660	4.999	5.497	5.366	5.660	ns
		GCLK PLL	$t_{co}$	3.653	3.653	5.191	5.632	6.185	6.027	6.409	5.632	6.185	6.027	6.409	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.271	3.271	4.614	4.997	5.493	5.362	5.656	4.997	5.493	5.362	5.656	ns
		GCLK PLL	$t_{co}$	3.661	3.661	5.190	5.629	6.181	6.023	6.405	5.629	6.181	6.023	6.405	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.283	3.283	4.628	5.011	5.508	5.377	5.671	5.011	5.508	5.377	5.671	ns
		GCLK PLL	$t_{co}$	3.673	3.673	5.203	5.644	6.196	6.038	6.420	5.644	6.196	6.038	6.420	ns
	6mA	GCLK	$t_{co}$	3.279	3.279	4.629	5.013	5.511	5.380	5.674	5.013	5.511	5.380	5.674	ns
		GCLK PLL	$t_{co}$	3.669	3.669	5.204	5.645	6.199	6.041	6.423	5.645	6.199	6.041	6.423	ns
	8mA	GCLK	$t_{co}$	3.275	3.275	4.624	5.008	5.506	5.375	5.669	5.008	5.506	5.375	5.669	ns
		GCLK PLL	$t_{co}$	3.665	3.665	5.200	5.641	6.194	6.036	6.418	5.641	6.194	6.036	6.418	ns
	10mA	GCLK	$t_{co}$	3.268	3.268	4.617	5.001	5.499	5.368	5.662	5.001	5.499	5.368	5.662	ns
		GCLK PLL	$t_{co}$	3.658	3.658	5.193	5.634	6.187	6.029	6.411	5.634	6.187	6.029	6.411	ns
12mA	GCLK	$t_{co}$	3.269	3.269	4.624	5.009	5.509	5.378	5.672	5.009	5.509	5.378	5.672	ns	
	GCLK PLL	$t_{co}$	3.659	3.659	5.200	5.642	6.197	6.039	6.421	5.642	6.197	6.039	6.421	ns	

**Table 1-63.** EP3SL110 Column Pins Output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.267	3.267	4.605	4.987	5.483	5.352	5.646	4.987	5.483	5.352	5.646	ns
		GCLK PLL	$t_{co}$	3.657	3.657	5.181	5.620	6.171	6.013	6.395	5.620	6.171	6.013	6.395	ns
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.286	3.286	4.642	5.028	5.529	5.398	5.692	5.028	5.529	5.398	5.692	ns
		GCLK PLL	$t_{co}$	3.676	3.676	5.217	5.661	6.217	6.059	6.441	5.661	6.217	6.059	6.441	ns
	6mA	GCLK	$t_{co}$	3.278	3.278	4.633	5.019	5.520	5.389	5.683	5.019	5.520	5.389	5.683	ns
		GCLK PLL	$t_{co}$	3.668	3.668	5.208	5.652	6.208	6.050	6.432	5.652	6.208	6.050	6.432	ns
	8mA	GCLK	$t_{co}$	3.279	3.279	4.640	5.028	5.529	5.398	5.692	5.028	5.529	5.398	5.692	ns
		GCLK PLL	$t_{co}$	3.669	3.669	5.216	5.660	6.217	6.059	6.441	5.660	6.217	6.059	6.441	ns
	10mA	GCLK	$t_{co}$	3.268	3.268	4.627	5.014	5.515	5.384	5.678	5.014	5.515	5.384	5.678	ns
		GCLK PLL	$t_{co}$	3.658	3.658	5.203	5.647	6.203	6.045	6.427	5.647	6.203	6.045	6.427	ns
	12mA	GCLK	$t_{co}$	3.268	3.268	4.627	5.014	5.516	5.385	5.679	5.014	5.516	5.385	5.679	ns
		GCLK PLL	$t_{co}$	3.658	3.658	5.203	5.647	6.204	6.046	6.428	5.647	6.204	6.046	6.428	ns
1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.289	3.289	4.643	5.029	5.529	5.398	5.692	5.029	5.529	5.398	5.692	ns
		GCLK PLL	$t_{co}$	3.679	3.679	5.219	5.662	6.217	6.059	6.441	5.662	6.217	6.059	6.441	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.392	3.392	4.688	5.063	5.554	5.423	5.717	5.063	5.554	5.423	5.717	ns
		GCLK PLL	$t_{co}$	3.782	3.782	5.264	5.696	6.242	6.084	6.466	5.696	6.242	6.084	6.466	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.392	3.392	4.688	5.063	5.554	5.423	5.717	5.063	5.554	5.423	5.717	ns
		GCLK PLL	$t_{co}$	3.782	3.782	5.264	5.696	6.242	6.084	6.466	5.696	6.242	6.084	6.466	ns

Table 1-64 lists the EP3SL110 row pins output timing parameters for single-ended I/O standards.

**Table 1-64.** EP3SL110 Row Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.182	3.481	4.833	5.216	5.678	5.579	5.814	5.256	5.802	5.703	5.896	ns
		GCLK PLL	t <sub>co</sub>	1.457	1.650	2.051	2.136	2.329	2.349	2.337	2.239	2.435	2.454	2.331	ns
	8mA	GCLK	t <sub>co</sub>	3.116	3.376	4.703	5.078	5.533	5.434	5.669	5.143	5.653	5.554	5.747	ns
		GCLK PLL	t <sub>co</sub>	1.364	1.545	1.921	1.998	2.184	2.204	2.192	2.098	2.286	2.305	2.182	ns
	12mA	GCLK	t <sub>co</sub>	3.037	3.270	4.584	4.955	5.405	5.306	5.541	5.044	5.521	5.422	5.615	ns
		GCLK PLL	t <sub>co</sub>	1.265	1.439	1.802	1.875	2.056	2.076	2.064	1.971	2.154	2.173	2.050	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.184	3.485	4.841	5.221	5.682	5.583	5.818	5.264	5.806	5.707	5.900	ns
		GCLK PLL	t <sub>co</sub>	1.467	1.654	2.059	2.141	2.333	2.353	2.341	2.245	2.439	2.458	2.335	ns
	8mA	GCLK	t <sub>co</sub>	3.041	3.276	4.590	4.961	5.411	5.312	5.548	5.056	5.528	5.429	5.622	ns
		GCLK PLL	t <sub>co</sub>	1.269	1.445	1.808	1.881	2.062	2.082	2.070	1.977	2.161	2.180	2.057	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.143	3.427	4.785	5.169	5.634	5.535	5.770	5.224	5.760	5.661	5.854	ns
		GCLK PLL	t <sub>co</sub>	1.411	1.596	2.003	2.089	2.285	2.305	2.293	2.196	2.393	2.412	2.289	ns
	8mA	GCLK	t <sub>co</sub>	3.042	3.300	4.632	5.010	5.470	5.371	5.606	5.082	5.596	5.496	5.689	ns
		GCLK PLL	t <sub>co</sub>	1.286	1.469	1.850	1.930	2.121	2.141	2.129	2.034	2.229	2.247	2.124	ns
	12mA	GCLK	t <sub>co</sub>	3.005	3.249	4.550	4.927	5.382	5.283	5.518	5.014	5.503	5.403	5.596	ns
		GCLK PLL	t <sub>co</sub>	1.247	1.418	1.768	1.847	2.033	2.053	2.041	1.948	2.136	2.154	2.031	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.064	3.346	4.679	5.062	5.524	5.425	5.660	5.115	5.649	5.549	5.742	ns
		GCLK PLL	t <sub>co</sub>	1.325	1.515	1.897	1.982	2.175	2.195	2.183	2.088	2.282	2.300	2.177	ns
	8mA	GCLK	t <sub>co</sub>	2.992	3.227	4.515	4.888	5.343	5.244	5.479	4.984	5.463	5.363	5.556	ns
		GCLK PLL	t <sub>co</sub>	1.225	1.396	1.733	1.808	1.994	2.014	2.002	1.908	2.096	2.114	1.991	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.169	3.463	4.917	5.323	5.806	5.707	5.942	5.356	5.939	5.839	6.032	ns
		GCLK PLL	t <sub>co</sub>	1.437	1.632	2.135	2.243	2.457	2.477	2.465	2.356	2.572	2.590	2.467	ns
	8mA	GCLK	t <sub>co</sub>	3.084	3.365	4.762	5.160	5.636	5.537	5.772	5.219	5.765	5.665	5.858	ns
		GCLK PLL	t <sub>co</sub>	1.327	1.534	1.980	2.080	2.287	2.307	2.295	2.189	2.398	2.416	2.293	ns
	12mA	GCLK	t <sub>co</sub>	3.027	3.288	4.651	5.041	5.510	5.411	5.646	5.130	5.635	5.535	5.728	ns
		GCLK PLL	t <sub>co</sub>	1.281	1.457	1.869	1.961	2.161	2.181	2.169	2.066	2.268	2.286	2.163	ns

**Table 1-64.** EP3SL110 Row Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
1.8 V	2mA	GCLK	$t_{co}$	3.438	3.706	5.298	5.747	6.303	6.177	6.439	5.888	6.445	6.318	6.538	ns
		GCLK PLL	$t_{co}$	1.670	1.879	2.521	2.672	2.932	2.952	2.937	2.793	3.056	3.075	2.949	ns
	4mA	GCLK	$t_{co}$	3.213	3.504	4.971	5.378	5.898	5.772	6.034	5.523	6.039	5.911	6.131	ns
		GCLK PLL	$t_{co}$	1.445	1.677	2.194	2.303	2.527	2.547	2.532	2.428	2.650	2.668	2.542	ns
	6mA	GCLK	$t_{co}$	3.148	3.402	4.818	5.228	5.739	5.613	5.875	5.355	5.866	5.739	5.959	ns
		GCLK PLL	$t_{co}$	1.380	1.575	2.041	2.153	2.368	2.388	2.373	2.260	2.477	2.496	2.370	ns
	8mA	GCLK	$t_{co}$	3.088	3.328	4.741	5.134	5.642	5.516	5.778	5.260	5.772	5.645	5.865	ns
		GCLK PLL	$t_{co}$	1.320	1.501	1.964	2.059	2.271	2.291	2.276	2.165	2.383	2.402	2.276	ns
1.5 V	2mA	GCLK	$t_{co}$	3.349	3.624	5.208	5.660	6.231	6.105	6.367	5.795	6.369	6.242	6.462	ns
		GCLK PLL	$t_{co}$	1.581	1.797	2.431	2.585	2.860	2.880	2.865	2.700	2.980	2.999	2.873	ns
	4mA	GCLK	$t_{co}$	3.107	3.366	4.803	5.223	5.740	5.614	5.876	5.349	5.865	5.738	5.958	ns
		GCLK PLL	$t_{co}$	1.339	1.539	2.026	2.148	2.369	2.389	2.374	2.254	2.476	2.495	2.369	ns
	6mA	GCLK	$t_{co}$	3.080	3.319	4.730	5.127	5.634	5.508	5.770	5.251	5.760	5.633	5.853	ns
		GCLK PLL	$t_{co}$	1.312	1.492	1.953	2.052	2.263	2.283	2.268	2.156	2.371	2.390	2.264	ns
	8mA	GCLK	$t_{co}$	3.071	3.310	4.708	5.109	5.615	5.489	5.751	5.233	5.738	5.611	5.831	ns
		GCLK PLL	$t_{co}$	1.303	1.483	1.931	2.034	2.244	2.264	2.249	2.138	2.349	2.368	2.242	ns
1.2 V	2mA	GCLK	$t_{co}$	3.292	3.549	5.118	5.574	6.156	6.030	6.292	5.707	6.285	6.158	6.378	ns
		GCLK PLL	$t_{co}$	1.524	1.722	2.341	2.499	2.785	2.805	2.790	2.612	2.896	2.915	2.789	ns
	4mA	GCLK	$t_{co}$	3.112	3.360	4.825	5.251	5.781	5.655	5.917	5.374	5.907	5.780	6.000	ns
		GCLK PLL	$t_{co}$	1.344	1.533	2.048	2.176	2.410	2.430	2.415	2.279	2.518	2.537	2.411	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.031	3.274	4.629	5.013	5.478	5.379	5.616	5.117	5.597	5.498	5.692	ns
		GCLK PLL	$t_{co}$	1.266	1.443	1.847	1.933	2.129	2.149	2.137	2.033	2.230	2.249	2.126	ns
	12mA	GCLK	$t_{co}$	3.026	3.262	4.621	5.005	5.476	5.371	5.614	5.116	5.596	5.491	5.691	ns
		GCLK PLL	$t_{co}$	1.254	1.431	1.839	1.925	2.121	2.141	2.129	2.025	2.223	2.242	2.119	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.017	3.244	4.596	4.980	5.459	5.344	5.597	5.099	5.578	5.464	5.673	ns
		GCLK PLL	$t_{co}$	1.238	1.413	1.814	1.900	2.094	2.114	2.102	1.999	2.196	2.215	2.092	ns

**Table 1-64.** EP3SL110 Row Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$		
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.049	3.284	4.636	5.022	5.516	5.390	5.652	5.141	5.635	5.508	5.728	ns	
		GCLK PLL	$t_{co}$	1.281	1.457	1.859	1.947	2.145	2.165	2.150	2.046	2.246	2.265	2.139	ns	
	6mA	GCLK	$t_{co}$	3.034	3.270	4.633	5.020	5.514	5.388	5.650	5.139	5.633	5.506	5.726	ns	
		GCLK PLL	$t_{co}$	1.266	1.443	1.856	1.945	2.143	2.163	2.148	2.044	2.244	2.263	2.137	ns	
	8mA	GCLK	$t_{co}$	3.023	3.258	4.616	5.003	5.497	5.371	5.633	5.122	5.617	5.490	5.710	ns	
		GCLK PLL	$t_{co}$	1.255	1.431	1.839	1.928	2.126	2.146	2.131	2.027	2.228	2.247	2.121	ns	
	10mA	GCLK	$t_{co}$	2.999	3.235	4.600	4.987	5.482	5.356	5.618	5.107	5.602	5.475	5.695	ns	
		GCLK PLL	$t_{co}$	1.231	1.408	1.823	1.912	2.111	2.131	2.116	2.012	2.213	2.232	2.106	ns	
	12mA	GCLK	$t_{co}$	2.999	3.234	4.599	4.986	5.481	5.355	5.617	5.106	5.601	5.474	5.694	ns	
		GCLK PLL	$t_{co}$	1.231	1.407	1.822	1.911	2.110	2.130	2.116	2.011	2.212	2.231	2.106	ns	
	SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.009	3.243	4.597	4.982	5.475	5.349	5.611	5.101	5.594	5.467	5.687	ns
			GCLK PLL	$t_{co}$	1.241	1.416	1.820	1.907	2.104	2.124	2.111	2.006	2.205	2.224	2.100	ns
16mA		GCLK	$t_{co}$	3.004	3.238	4.596	4.983	5.477	5.351	5.613	5.103	5.598	5.471	5.691	ns	
		GCLK PLL	$t_{co}$	1.235	1.411	1.819	1.908	2.106	2.126	2.121	2.008	2.209	2.228	2.111	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.045	3.280	4.647	5.036	5.533	5.407	5.669	5.154	5.651	5.524	5.744	ns	
		GCLK PLL	$t_{co}$	1.277	1.453	1.870	1.961	2.162	2.182	2.167	2.059	2.262	2.281	2.155	ns	
	6mA	GCLK	$t_{co}$	3.022	3.258	4.629	5.019	5.516	5.390	5.652	5.138	5.635	5.508	5.728	ns	
		GCLK PLL	$t_{co}$	1.254	1.431	1.852	1.944	2.145	2.165	2.150	2.043	2.246	2.265	2.139	ns	
	8mA	GCLK	$t_{co}$	3.005	3.241	4.612	5.001	5.498	5.372	5.634	5.120	5.618	5.491	5.711	ns	
		GCLK PLL	$t_{co}$	1.237	1.414	1.835	1.926	2.127	2.147	2.132	2.025	2.229	2.248	2.122	ns	

**Table 1-64.** EP3SL110 Row Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.024	3.256	4.603	4.987	5.478	5.352	5.614	5.105	5.597	5.470	5.690	ns
		GCLK PLL	$t_{co}$	1.256	1.429	1.826	1.912	2.107	2.127	2.112	2.010	2.208	2.227	2.101	ns
	6mA	GCLK	$t_{co}$	3.012	3.244	4.594	4.979	5.470	5.344	5.606	5.097	5.590	5.463	5.683	ns
		GCLK PLL	$t_{co}$	1.244	1.417	1.817	1.904	2.099	2.119	2.108	2.002	2.201	2.220	2.097	ns
	8mA	GCLK	$t_{co}$	2.999	3.232	4.585	4.970	5.462	5.336	5.598	5.089	5.582	5.455	5.675	ns
		GCLK PLL	$t_{co}$	1.231	1.405	1.808	1.895	2.091	2.111	2.101	1.994	2.193	2.212	2.090	ns
	10mA	GCLK	$t_{co}$	3.001	3.234	4.588	4.973	5.465	5.339	5.601	5.092	5.585	5.458	5.678	ns
		GCLK PLL	$t_{co}$	1.233	1.407	1.811	1.898	2.094	2.114	2.105	1.997	2.196	2.215	2.093	ns
12mA	GCLK	$t_{co}$	2.994	3.229	4.586	4.972	5.465	5.339	5.601	5.092	5.586	5.459	5.679	ns	
	GCLK PLL	$t_{co}$	1.226	1.402	1.809	1.897	2.094	2.114	2.108	1.997	2.197	2.216	2.098	ns	
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.001	3.234	4.581	4.964	5.457	5.330	5.595	5.083	5.575	5.448	5.670	ns
		GCLK PLL	$t_{co}$	1.232	1.406	1.804	1.889	2.085	2.105	2.104	1.988	2.186	2.205	2.092	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.031	3.263	4.614	5.000	5.493	5.367	5.629	5.117	5.611	5.484	5.704	ns
		GCLK PLL	$t_{co}$	1.263	1.436	1.837	1.925	2.122	2.142	2.127	2.022	2.222	2.241	2.115	ns
	6mA	GCLK	$t_{co}$	3.019	3.253	4.610	4.996	5.489	5.363	5.625	5.114	5.608	5.481	5.701	ns
		GCLK PLL	$t_{co}$	1.251	1.426	1.833	1.921	2.118	2.138	2.123	2.019	2.219	2.238	2.112	ns
	8mA	GCLK	$t_{co}$	3.015	3.248	4.604	4.990	5.483	5.357	5.619	5.108	5.602	5.475	5.695	ns
		GCLK PLL	$t_{co}$	1.247	1.421	1.827	1.915	2.112	2.132	2.117	2.013	2.213	2.232	2.106	ns
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.030	3.262	4.625	5.014	5.511	5.385	5.647	5.131	5.628	5.501	5.721	ns
		GCLK PLL	$t_{co}$	1.262	1.435	1.848	1.939	2.140	2.160	2.145	2.036	2.239	2.258	2.132	ns
	6mA	GCLK	$t_{co}$	3.018	3.250	4.614	5.002	5.499	5.373	5.635	5.120	5.617	5.490	5.710	ns
		GCLK PLL	$t_{co}$	1.250	1.423	1.837	1.927	2.128	2.148	2.133	2.025	2.228	2.247	2.121	ns
	8mA	GCLK	$t_{co}$	3.014	3.248	4.618	5.007	5.505	5.379	5.641	5.126	5.624	5.497	5.717	ns
		GCLK PLL	$t_{co}$	1.246	1.421	1.841	1.932	2.134	2.154	2.139	2.031	2.235	2.254	2.128	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.137	3.357	4.654	5.031	5.518	5.390	5.656	5.165	5.639	5.511	5.734	ns
		GCLK PLL	$t_{co}$	1.351	1.526	1.872	1.951	2.138	2.158	2.146	2.051	2.242	2.261	2.138	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.137	3.357	4.654	5.031	5.518	5.390	5.656	5.165	5.639	5.511	5.734	ns
		GCLK PLL	$t_{co}$	1.351	1.526	1.872	1.951	2.138	2.158	2.146	2.051	2.242	2.261	2.138	ns

Table 1-65 through Table 1-70 list the maximum I/O timing parameters for EP3SL110 devices for differential I/O standards.

Table 1-65 lists the EP3SL110 column pins input timing parameters for differential I/O standards.

**Table 1-65.** EP3SL110 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		$t_h$	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	$t_{su}$	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		$t_h$	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
MINI-LVDS	GCLK	$t_{su}$	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		$t_h$	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	$t_{su}$	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		$t_h$	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
RSDS	GCLK	$t_{su}$	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		$t_h$	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	$t_{su}$	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		$t_h$	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.794	-0.829	-1.228	-1.334	-1.445	-1.387	-1.743	-1.333	-1.443	-1.391	-1.786	ns
		$t_h$	0.913	0.967	1.416	1.546	1.677	1.610	1.964	1.554	1.684	1.621	2.007	ns
	GCLK PLL	$t_{su}$	1.151	1.178	1.808	2.031	2.245	2.139	2.048	2.049	2.266	2.155	2.095	ns
		$t_h$	-0.898	-0.904	-1.405	-1.576	-1.742	-1.661	-1.565	-1.587	-1.753	-1.668	-1.609	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.794	-0.829	-1.228	-1.334	-1.445	-1.387	-1.743	-1.333	-1.443	-1.391	-1.786	ns
		$t_h$	0.913	0.967	1.416	1.546	1.677	1.610	1.964	1.554	1.684	1.621	2.007	ns
	GCLK PLL	$t_{su}$	1.151	1.178	1.808	2.031	2.245	2.139	2.048	2.049	2.266	2.155	2.095	ns
		$t_h$	-0.898	-0.904	-1.405	-1.576	-1.742	-1.661	-1.565	-1.587	-1.753	-1.668	-1.609	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_h$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{su}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_h$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_h$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{su}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_h$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_h$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{su}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_h$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns

**Table 1–65.** EP3SL110 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=0.9\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_h$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{su}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_h$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_h$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{su}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_h$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_h$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{su}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_h$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_h$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{su}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_h$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_h$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{su}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_h$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.821	-0.858	-1.259	-1.361	-1.480	-1.424	-1.777	-1.359	-1.471	-1.422	-1.815	ns
		$t_h$	0.940	0.996	1.449	1.576	1.715	1.648	2.003	1.583	1.717	1.653	2.041	ns
	GCLK PLL	$t_{su}$	1.124	1.149	1.777	2.004	2.210	2.102	2.014	2.023	2.238	2.124	2.066	ns
		$t_h$	-0.871	-0.875	-1.372	-1.546	-1.704	-1.623	-1.526	-1.558	-1.720	-1.636	-1.575	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.821	-0.858	-1.259	-1.361	-1.480	-1.424	-1.777	-1.359	-1.471	-1.422	-1.815	ns
		$t_h$	0.940	0.996	1.449	1.576	1.715	1.648	2.003	1.583	1.717	1.653	2.041	ns
	GCLK PLL	$t_{su}$	1.124	1.149	1.777	2.004	2.210	2.102	2.014	2.023	2.238	2.124	2.066	ns
		$t_h$	-0.871	-0.875	-1.372	-1.546	-1.704	-1.623	-1.526	-1.558	-1.720	-1.636	-1.575	ns

Table 1–66 lists the EP3SL110 parameters for differential I/O standards.

**Table 1–66.** EP3SL110 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=0.9\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=1.1\text{ V}$	$V_{CCL}=0.9\text{ V}$	
LVDS	GCLK	$t_{su}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{su}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns



**Table 1-66.** EP3SL110 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
MINI-LVDS	GCLK	$t_{su}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{su}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
RSDS	GCLK	$t_{su}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{su}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.724	-0.765	-1.113	-1.210	-1.304	-1.254	-1.583	-1.211	-1.303	-1.255	-1.626	ns
		$t_h$	0.841	0.898	1.302	1.420	1.535	1.474	1.802	1.429	1.543	1.483	1.846	ns
	GCLK PLL	$t_{su}$	1.154	1.172	1.862	2.100	2.338	2.219	2.155	2.117	2.360	2.238	2.203	ns
		$t_h$	-0.900	-0.902	-1.458	-1.649	-1.837	-1.746	-1.674	-1.657	-1.847	-1.753	-1.718	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.724	-0.765	-1.113	-1.210	-1.304	-1.254	-1.583	-1.211	-1.303	-1.255	-1.626	ns
		$t_h$	0.841	0.898	1.302	1.420	1.535	1.474	1.802	1.429	1.543	1.483	1.846	ns
	GCLK PLL	$t_{su}$	1.154	1.172	1.862	2.100	2.338	2.219	2.155	2.117	2.360	2.238	2.203	ns
		$t_h$	-0.900	-0.902	-1.458	-1.649	-1.837	-1.746	-1.674	-1.657	-1.847	-1.753	-1.718	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns

**Table 1-66.** EP3SL110 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.756	-0.798	-1.145	-1.241	-1.345	-1.296	-1.623	-1.238	-1.337	-1.291	-1.661	ns
		$t_h$	0.873	0.931	1.336	1.454	1.579	1.518	1.847	1.459	1.582	1.521	1.886	ns
	GCLK PLL	$t_{su}$	1.122	1.139	1.825	2.064	2.293	2.173	2.110	2.086	2.321	2.197	2.163	ns
		$t_h$	-0.868	-0.869	-1.422	-1.611	-1.789	-1.698	-1.625	-1.623	-1.805	-1.711	-1.674	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.756	-0.798	-1.145	-1.241	-1.345	-1.296	-1.623	-1.238	-1.337	-1.291	-1.661	ns
		$t_h$	0.873	0.931	1.336	1.454	1.579	1.518	1.847	1.459	1.582	1.521	1.886	ns
	GCLK PLL	$t_{su}$	1.122	1.139	1.825	2.064	2.293	2.173	2.110	2.086	2.321	2.197	2.163	ns
		$t_h$	-0.868	-0.869	-1.422	-1.611	-1.789	-1.698	-1.625	-1.623	-1.805	-1.711	-1.674	ns

Table 1-67 lists the EP3SL110 column pins output timing parameters for differential I/O standards.

**Table 1-67.** EP3SL110 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS_E_1R	—	GCLK	$t_{co}$	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns
		GCLK PLL	$t_{co}$	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns
		GCLK PLL	$t_{co}$	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns

**Table 1-67.** EP3SL110 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
RSDS_E_1R	—	GCLK	$t_{co}$	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns	
		GCLK PLL	$t_{co}$	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns	
RSDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns	
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.127	3.363	4.758	5.157	5.670	5.531	5.815	5.280	5.792	5.656	5.889	ns	
		GCLK PLL	$t_{co}$	1.335	1.513	1.956	2.056	2.272	2.283	2.310	2.161	2.379	2.389	2.297	ns	
	6mA	GCLK	$t_{co}$	3.117	3.353	4.748	5.146	5.660	5.521	5.805	5.269	5.782	5.646	5.879	ns	
		GCLK PLL	$t_{co}$	1.325	1.503	1.946	2.045	2.262	2.273	2.300	2.150	2.369	2.379	2.287	ns	
	8mA	GCLK	$t_{co}$	3.117	3.353	4.751	5.150	5.664	5.525	5.809	5.274	5.787	5.651	5.884	ns	
		GCLK PLL	$t_{co}$	1.325	1.503	1.949	2.049	2.266	2.277	2.304	2.155	2.374	2.384	2.292	ns	
	10mA	GCLK	$t_{co}$	3.110	3.347	4.744	5.144	5.658	5.519	5.803	5.267	5.781	5.645	5.878	ns	
		GCLK PLL	$t_{co}$	1.318	1.497	1.942	2.043	2.260	2.271	2.298	2.148	2.368	2.378	2.286	ns	
	12mA	GCLK	$t_{co}$	3.109	3.345	4.741	5.141	5.655	5.516	5.800	5.264	5.777	5.641	5.874	ns	
		GCLK PLL	$t_{co}$	1.317	1.495	1.939	2.040	2.257	2.268	2.295	2.145	2.364	2.374	2.282	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.131	3.367	4.762	5.161	5.674	5.535	5.819	5.284	5.797	5.661	5.894	ns
			GCLK PLL	$t_{co}$	1.339	1.517	1.960	2.060	2.276	2.287	2.314	2.165	2.384	2.394	2.302	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.121	3.356	4.741	5.138	5.649	5.510	5.794	5.260	5.770	5.634	5.867	ns	
		GCLK PLL	$t_{co}$	1.329	1.506	1.939	2.037	2.251	2.262	2.289	2.141	2.357	2.367	2.275	ns	
	6mA	GCLK	$t_{co}$	3.116	3.352	4.741	5.138	5.650	5.511	5.795	5.261	5.772	5.636	5.869	ns	
		GCLK PLL	$t_{co}$	1.324	1.502	1.939	2.037	2.252	2.263	2.290	2.142	2.359	2.369	2.277	ns	
	8mA	GCLK	$t_{co}$	3.114	3.350	4.740	5.137	5.648	5.509	5.793	5.260	5.771	5.635	5.868	ns	
		GCLK PLL	$t_{co}$	1.322	1.500	1.938	2.036	2.250	2.261	2.288	2.141	2.358	2.368	2.276	ns	
	10mA	GCLK	$t_{co}$	3.106	3.341	4.730	5.127	5.639	5.500	5.784	5.250	5.761	5.625	5.858	ns	
		GCLK PLL	$t_{co}$	1.314	1.491	1.928	2.026	2.241	2.252	2.279	2.131	2.348	2.358	2.266	ns	
12mA	GCLK	$t_{co}$	3.107	3.343	4.736	5.134	5.647	5.508	5.792	5.258	5.770	5.634	5.867	ns		
	GCLK PLL	$t_{co}$	1.315	1.493	1.934	2.033	2.249	2.260	2.287	2.139	2.357	2.367	2.275	ns		
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.106	3.340	4.719	5.115	5.625	5.486	5.770	5.237	5.746	5.610	5.843	ns	
		GCLK PLL	$t_{co}$	1.314	1.490	1.917	2.014	2.227	2.238	2.265	2.118	2.333	2.343	2.251	ns	

**Table 1-67.** EP3SL110 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.118	3.353	4.737	5.133	5.643	5.504	5.788	5.256	5.765	5.629	5.862	ns
		GCLK PLL	$t_{co}$	1.326	1.503	1.935	2.032	2.245	2.256	2.283	2.137	2.352	2.362	2.270	ns
	6mA	GCLK	$t_{co}$	3.114	3.350	4.738	5.135	5.647	5.508	5.792	5.258	5.769	5.633	5.866	ns
		GCLK PLL	$t_{co}$	1.322	1.500	1.936	2.034	2.249	2.260	2.287	2.139	2.356	2.366	2.274	ns
	8mA	GCLK	$t_{co}$	3.104	3.339	4.727	5.124	5.635	5.496	5.780	5.247	5.757	5.621	5.854	ns
		GCLK PLL	$t_{co}$	1.312	1.489	1.925	2.023	2.237	2.248	2.275	2.128	2.344	2.354	2.262	ns
	10mA	GCLK	$t_{co}$	3.102	3.337	4.725	5.121	5.633	5.494	5.778	5.245	5.755	5.619	5.852	ns
		GCLK PLL	$t_{co}$	1.310	1.487	1.923	2.020	2.235	2.246	2.273	2.126	2.342	2.352	2.260	ns
12mA	GCLK	$t_{co}$	3.102	3.338	4.728	5.126	5.638	5.499	5.783	5.249	5.761	5.625	5.858	ns	
	GCLK PLL	$t_{co}$	1.310	1.488	1.926	2.025	2.240	2.251	2.278	2.130	2.348	2.358	2.266	ns	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.106	3.341	4.725	5.121	5.632	5.493	5.777	5.244	5.754	5.618	5.851	ns
		GCLK PLL	$t_{co}$	1.314	1.491	1.923	2.020	2.234	2.245	2.272	2.125	2.341	2.351	2.259	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.132	3.370	4.770	5.169	5.682	5.543	5.827	5.292	5.804	5.668	5.901	ns
		GCLK PLL	$t_{co}$	1.340	1.520	1.968	2.068	2.284	2.295	2.322	2.173	2.391	2.401	2.309	ns
	6mA	GCLK	$t_{co}$	3.118	3.356	4.758	5.158	5.672	5.533	5.817	5.282	5.795	5.659	5.892	ns
		GCLK PLL	$t_{co}$	1.326	1.506	1.956	2.057	2.274	2.285	2.312	2.163	2.382	2.392	2.300	ns
	8mA	GCLK	$t_{co}$	3.106	3.343	4.741	5.140	5.654	5.515	5.799	5.264	5.777	5.641	5.874	ns
		GCLK PLL	$t_{co}$	1.314	1.493	1.939	2.039	2.256	2.267	2.294	2.145	2.364	2.374	2.282	ns
	10mA	GCLK	$t_{co}$	3.106	3.343	4.744	5.144	5.658	5.519	5.803	5.268	5.782	5.646	5.879	ns
		GCLK PLL	$t_{co}$	1.314	1.493	1.942	2.043	2.260	2.271	2.298	2.149	2.369	2.379	2.287	ns
12mA	GCLK	$t_{co}$	3.102	3.339	4.737	5.136	5.651	5.512	5.796	5.261	5.774	5.638	5.871	ns	
	GCLK PLL	$t_{co}$	1.310	1.489	1.935	2.035	2.253	2.264	2.291	2.142	2.361	2.371	2.279	ns	
DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.106	3.341	4.730	5.127	5.639	5.500	5.784	5.250	5.761	5.625	5.858	ns
		GCLK PLL	$t_{co}$	1.314	1.491	1.928	2.026	2.241	2.252	2.279	2.131	2.348	2.358	2.266	ns
	16mA	GCLK	$t_{co}$	3.107	3.343	4.738	5.137	5.650	5.511	5.795	5.260	5.773	5.637	5.870	ns
		GCLK PLL	$t_{co}$	1.315	1.493	1.936	2.036	2.252	2.263	2.290	2.141	2.360	2.370	2.278	ns

**Table 1-67.** EP3SL110 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.135	3.373	4.769	5.167	5.680	5.541	5.825	5.291	5.802	5.666	5.899	ns
		GCLK PLL	$t_{co}$	1.343	1.523	1.967	2.066	2.282	2.293	2.320	2.172	2.389	2.399	2.307	ns
	6mA	GCLK	$t_{co}$	3.124	3.361	4.757	5.155	5.668	5.529	5.813	5.279	5.790	5.654	5.887	ns
		GCLK PLL	$t_{co}$	1.332	1.511	1.955	2.054	2.270	2.281	2.308	2.160	2.377	2.387	2.295	ns
	8mA	GCLK	$t_{co}$	3.119	3.357	4.757	5.156	5.669	5.530	5.814	5.280	5.792	5.656	5.889	ns
		GCLK PLL	$t_{co}$	1.327	1.507	1.955	2.055	2.271	2.282	2.309	2.161	2.379	2.389	2.297	ns
	10mA	GCLK	$t_{co}$	3.105	3.342	4.739	5.137	5.650	5.511	5.795	5.261	5.774	5.638	5.871	ns
		GCLK PLL	$t_{co}$	1.313	1.492	1.937	2.036	2.252	2.263	2.290	2.142	2.361	2.371	2.279	ns
12mA	GCLK	$t_{co}$	3.103	3.340	4.737	5.135	5.648	5.509	5.793	5.259	5.771	5.635	5.868	ns	
	GCLK PLL	$t_{co}$	1.311	1.490	1.935	2.034	2.250	2.261	2.288	2.140	2.358	2.368	2.276	ns	
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.107	3.342	4.729	5.125	5.636	5.497	5.781	5.248	5.758	5.622	5.855	ns
		GCLK PLL	$t_{co}$	1.315	1.492	1.927	2.024	2.238	2.249	2.276	2.129	2.345	2.355	2.263	ns
	16mA	GCLK	$t_{co}$	3.107	3.343	4.737	5.135	5.648	5.509	5.793	5.259	5.771	5.635	5.868	ns
		GCLK PLL	$t_{co}$	1.315	1.493	1.935	2.034	2.250	2.261	2.288	2.140	2.358	2.368	2.276	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.123	3.360	4.753	5.150	5.662	5.523	5.807	5.274	5.784	5.648	5.881	ns
		GCLK PLL	$t_{co}$	1.331	1.510	1.951	2.049	2.264	2.275	2.302	2.155	2.371	2.381	2.289	ns
	10mA	GCLK	$t_{co}$	3.123	3.360	4.753	5.150	5.662	5.523	5.807	5.274	5.784	5.648	5.881	ns
		GCLK PLL	$t_{co}$	1.331	1.510	1.951	2.049	2.264	2.275	2.302	2.155	2.371	2.381	2.289	ns
	12mA	GCLK	$t_{co}$	3.113	3.350	4.743	5.140	5.652	5.513	5.797	5.264	5.775	5.639	5.872	ns
		GCLK PLL	$t_{co}$	1.321	1.500	1.941	2.039	2.254	2.265	2.292	2.145	2.362	2.372	2.280	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.106	3.342	4.729	5.125	5.636	5.497	5.781	5.248	5.758	5.622	5.855	ns
		GCLK PLL	$t_{co}$	1.314	1.492	1.927	2.024	2.238	2.249	2.276	2.129	2.345	2.355	2.263	ns

Table 1-68 lists the EP3SL110 row pins output timing parameters for differential I/O standards.

**Table 1-68.** EP3SL110 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
		GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459	ns
LVDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
		GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
		GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283	ns
MINI-LVDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
		GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
		GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
		GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283	ns
RSDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
		GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
		GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
		GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.132	3.375	4.783	5.187	5.698	5.562	5.817	5.313	5.826	5.689	5.892	ns
		GCLK PLL	$t_{co}$	1.352	1.536	1.993	2.096	2.309	2.322	2.325	2.204	2.420	2.430	2.312	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	6mA	GCLK	$t_{co}$	3.118	3.361	4.770	5.174	5.685	5.549	5.804	5.299	5.813	5.676	5.879	ns
		GCLK PLL	$t_{co}$	1.338	1.522	1.980	2.083	2.296	2.309	2.312	2.190	2.407	2.417	2.299	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	8mA	GCLK	$t_{co}$	3.114	3.357	4.768	5.174	5.686	5.550	5.805	5.299	5.815	5.678	5.881	ns
		GCLK PLL	$t_{co}$	1.334	1.518	1.978	2.083	2.297	2.310	2.313	2.190	2.409	2.419	2.301	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.130	3.372	4.769	5.171	5.680	5.544	5.799	5.296	5.808	5.671	5.874	ns
		GCLK PLL	$t_{co}$	1.350	1.533	1.979	2.080	2.291	2.304	2.307	2.187	2.402	2.412	2.294	ns

**Table 1-68.** EP3SL110 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	6mA	GCLK	$t_{co}$	3.119	3.362	4.765	5.167	5.677	5.541	5.796	5.293	5.805	5.668	5.871	ns
		GCLK PLL	$t_{co}$	1.339	1.523	1.975	2.076	2.288	2.301	2.304	2.184	2.399	2.409	2.291	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	8mA	GCLK	$t_{co}$	3.116	3.359	4.763	5.165	5.675	5.539	5.794	5.291	5.804	5.667	5.870	ns
		GCLK PLL	$t_{co}$	1.336	1.520	1.973	2.074	2.286	2.299	2.302	2.182	2.398	2.408	2.290	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.127	3.369	4.764	5.166	5.674	5.538	5.793	5.291	5.802	5.665	5.868	ns
		GCLK PLL	$t_{co}$	1.347	1.530	1.974	2.075	2.285	2.298	2.301	2.182	2.396	2.406	2.288	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	6mA	GCLK	$t_{co}$	3.117	3.360	4.762	5.164	5.673	5.537	5.792	5.290	5.802	5.665	5.868	ns
		GCLK PLL	$t_{co}$	1.337	1.521	1.972	2.073	2.284	2.297	2.300	2.181	2.396	2.406	2.288	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	8mA	GCLK	$t_{co}$	3.103	3.346	4.747	5.149	5.659	5.523	5.778	5.275	5.787	5.650	5.853	ns
		GCLK PLL	$t_{co}$	1.323	1.507	1.957	2.058	2.270	2.283	2.286	2.166	2.381	2.391	2.273	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	10mA	GCLK	$t_{co}$	3.100	3.342	4.743	5.145	5.655	5.519	5.774	5.271	5.783	5.646	5.849	ns
		GCLK PLL	$t_{co}$	1.320	1.503	1.953	2.054	2.266	2.279	2.282	2.162	2.377	2.387	2.269	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	12mA	GCLK	$t_{co}$	3.097	3.340	4.744	5.148	5.658	5.522	5.777	5.274	5.787	5.650	5.853	ns
		GCLK PLL	$t_{co}$	1.317	1.501	1.954	2.057	2.269	2.282	2.285	2.165	2.381	2.391	2.273	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.098	3.340	4.734	5.136	5.645	5.509	5.764	5.261	5.773	5.636	5.839	ns
		GCLK PLL	$t_{co}$	1.318	1.501	1.944	2.045	2.256	2.269	2.272	2.152	2.367	2.377	2.259	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.147	3.393	4.805	5.209	5.721	5.585	5.840	5.335	5.849	5.712	5.915	ns
		GCLK PLL	$t_{co}$	1.367	1.554	2.015	2.118	2.332	2.345	2.348	2.226	2.443	2.453	2.335	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	6mA	GCLK	$t_{co}$	3.123	3.369	4.787	5.192	5.704	5.568	5.823	5.318	5.834	5.697	5.900	ns
		GCLK PLL	$t_{co}$	1.343	1.530	1.997	2.101	2.315	2.328	2.331	2.209	2.428	2.438	2.320	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.106	3.350	4.765	5.170	5.682	5.546	5.801	5.296	5.812	5.675	5.878	ns
		GCLK PLL	$t_{co}$	1.326	1.511	1.975	2.079	2.293	2.306	2.309	2.187	2.406	2.416	2.298	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.151	3.396	4.805	5.209	5.720	5.584	5.839	5.335	5.849	5.712	5.915	ns
		GCLK PLL	$t_{co}$	1.371	1.557	2.015	2.118	2.331	2.344	2.347	2.226	2.443	2.453	2.335	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	6mA	GCLK	$t_{co}$	3.136	3.381	4.791	5.194	5.705	5.569	5.824	5.320	5.834	5.697	5.900	ns
		GCLK PLL	$t_{co}$	1.356	1.542	2.001	2.103	2.316	2.329	2.332	2.211	2.428	2.438	2.320	ns



**Table 1-68.** EP3SL110 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
DIFFERENTIAL 1.8-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.125	3.370	4.786	5.191	5.702	5.566	5.821	5.317	5.832	5.695	5.898	ns
		GCLK PLL	$t_{co}$	1.345	1.531	1.996	2.100	2.313	2.326	2.329	2.208	2.426	2.436	2.318	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	10mA	GCLK	$t_{co}$	3.105	3.350	4.763	5.167	5.679	5.543	5.798	5.294	5.808	5.671	5.874	ns
		GCLK PLL	$t_{co}$	1.325	1.511	1.973	2.076	2.290	2.303	2.306	2.185	2.402	2.412	2.294	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	12mA	GCLK	$t_{co}$	3.102	3.346	4.759	5.164	5.675	5.539	5.794	5.290	5.805	5.668	5.871	ns
		GCLK PLL	$t_{co}$	1.322	1.507	1.969	2.073	2.286	2.299	2.302	2.181	2.399	2.409	2.291	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.107	3.350	4.750	5.152	5.661	5.525	5.780	5.277	5.789	5.652	5.855	ns
		GCLK PLL	$t_{co}$	1.327	1.511	1.960	2.061	2.272	2.285	2.288	2.168	2.383	2.393	2.275	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.100	3.343	4.749	5.153	5.664	5.528	5.783	5.280	5.794	5.657	5.860	ns
		GCLK PLL	$t_{co}$	1.320	1.504	1.959	2.062	2.275	2.288	2.291	2.171	2.388	2.398	2.280	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.138	3.382	4.787	5.190	5.700	5.564	5.819	5.316	5.829	5.692	5.895	ns
		GCLK PLL	$t_{co}$	1.358	1.543	1.997	2.099	2.311	2.324	2.327	2.207	2.423	2.433	2.315	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	12mA	GCLK	$t_{co}$	3.120	3.365	4.772	5.175	5.685	5.549	5.804	5.301	5.814	5.677	5.880	ns
		GCLK PLL	$t_{co}$	1.340	1.526	1.982	2.084	2.296	2.309	2.312	2.192	2.408	2.418	2.300	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.106	3.349	4.749	5.151	5.660	5.524	5.779	5.277	5.789	5.652	5.855	ns
		GCLK PLL	$t_{co}$	1.326	1.510	1.959	2.060	2.271	2.284	2.287	2.168	2.383	2.393	2.275	ns

Table 1-69 and Table 1-70 list the EP3SL110 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-69 lists the EP3SL110 column pin delay adders when using the regional clock.

**Table 1-69.** EP3SL110 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
RCLK input adder	0.186	0.171	0.245	0.255	0.268	0.261	0.393	0.248	0.277	0.267	0.364	ns
RCLK PLL input adder	2.391	2.371	3.577	4.036	4.418	4.225	4.574	4.044	4.442	4.246	4.635	ns
RCLK output adder	-0.374	-0.162	-0.226	-0.233	-0.244	-0.239	-0.367	-0.111	-0.123	-0.116	-0.296	ns
RCLK PLL output adder	-2.001	-1.786	-2.669	-2.844	-2.996	-2.879	-2.722	-2.699	-3.067	-2.798	-2.773	ns



Table 1-70 lists the EP3SL110 row pin delay adders when using the regional clock.

**Table 1-70.** EP3SL110 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
RCLK input adder	0.086	0.109	0.158	0.16	0.161	0.159	0.281	0.137	0.153	0.153	0.285	ns
RCLK PLL input adder	0.075	0.075	0.117	0.123	0.129	0.125	0.222	0.113	0.118	0.114	0.226	ns
RCLK output adder	-0.072	-0.097	-0.137	-0.135	-0.116	-0.134	-0.24	-0.11	-0.104	-0.124	-0.244	ns
RCLK PLL output adder	-0.063	-0.065	-0.097	-0.1	-0.104	-0.101	-0.198	-0.088	-0.09	-0.088	-0.201	ns

### EP3SL150 I/O Timing Parameters

Table 1-71 through Table 1-74 list the maximum I/O timing parameters for EP3SL150 devices for single-ended I/O standards.

Table 1-71 lists the EP3SL150 column pins input timing parameters for single-ended I/O standards.

**Table 1-71.** EP3SL150 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTL	GCLK	$t_{su}$	-0.986	-0.964	-1.402	-1.558	-1.797	-1.778	-2.106	-1.558	-1.797	-1.778	-2.106	ns
		$t_h$	1.119	1.093	1.584	1.767	2.027	1.996	2.327	1.767	2.027	1.996	2.327	ns
	GCLK PLL	$t_{su}$	-1.278	-1.221	-1.771	-1.984	-2.197	-2.123	-2.542	-1.984	-2.197	-2.123	-2.542	ns
		$t_h$	1.556	1.499	2.175	2.439	2.697	2.598	3.034	2.439	2.697	2.598	3.034	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.986	-0.964	-1.402	-1.558	-1.797	-1.778	-2.106	-1.558	-1.797	-1.778	-2.106	ns
		$t_h$	1.119	1.093	1.584	1.767	2.027	1.996	2.327	1.767	2.027	1.996	2.327	ns
	GCLK PLL	$t_{su}$	-1.278	-1.221	-1.771	-1.984	-2.197	-2.123	-2.542	-1.984	-2.197	-2.123	-2.542	ns
		$t_h$	1.556	1.499	2.175	2.439	2.697	2.598	3.034	2.439	2.697	2.598	3.034	ns
3.0-V LVTTL	GCLK	$t_{su}$	-0.997	-0.975	-1.401	-1.560	-1.796	-1.777	-2.105	-1.560	-1.796	-1.777	-2.105	ns
		$t_h$	1.130	1.104	1.583	1.769	2.026	1.995	2.326	1.769	2.026	1.995	2.326	ns
	GCLK PLL	$t_{su}$	-1.289	-1.232	-1.770	-1.986	-2.196	-2.122	-2.541	-1.986	-2.196	-2.122	-2.541	ns
		$t_h$	1.567	1.510	2.174	2.441	2.696	2.597	3.033	2.441	2.696	2.597	3.033	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.997	-0.975	-1.401	-1.560	-1.796	-1.777	-2.105	-1.560	-1.796	-1.777	-2.105	ns
		$t_h$	1.130	1.104	1.583	1.769	2.026	1.995	2.326	1.769	2.026	1.995	2.326	ns
	GCLK PLL	$t_{su}$	-1.289	-1.232	-1.770	-1.986	-2.196	-2.122	-2.541	-1.986	-2.196	-2.122	-2.541	ns
		$t_h$	1.567	1.510	2.174	2.441	2.696	2.597	3.033	2.441	2.696	2.597	3.033	ns
2.5 V	GCLK	$t_{su}$	-0.992	-0.970	-1.410	-1.572	-1.815	-1.796	-2.124	-1.572	-1.815	-1.796	-2.124	ns
		$t_h$	1.125	1.099	1.592	1.781	2.045	2.014	2.345	1.781	2.045	2.014	2.345	ns
	GCLK PLL	$t_{su}$	-1.284	-1.227	-1.779	-1.998	-2.215	-2.141	-2.560	-1.998	-2.215	-2.141	-2.560	ns
		$t_h$	1.562	1.505	2.183	2.453	2.715	2.616	3.052	2.453	2.715	2.616	3.052	ns

Table 1-71. EP3SL150 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.8 V	GCLK	$t_{su}$	-1.014	-0.992	-1.450	-1.608	-1.813	-1.794	-2.122	-1.608	-1.813	-1.794	-2.122	ns
		$t_h$	1.149	1.123	1.632	1.817	2.043	2.012	2.343	1.817	2.043	2.012	2.343	ns
	GCLK PLL	$t_{su}$	-1.306	-1.249	-1.819	-2.034	-2.213	-2.139	-2.558	-2.034	-2.213	-2.139	-2.558	ns
		$t_h$	1.586	1.529	2.223	2.489	2.713	2.614	3.050	2.489	2.713	2.614	3.050	ns
1.5 V	GCLK	$t_{su}$	-1.004	-0.982	-1.427	-1.576	-1.743	-1.724	-2.052	-1.576	-1.743	-1.724	-2.052	ns
		$t_h$	1.139	1.113	1.609	1.785	1.973	1.942	2.273	1.785	1.973	1.942	2.273	ns
	GCLK PLL	$t_{su}$	-1.296	-1.239	-1.796	-2.002	-2.143	-2.069	-2.488	-2.002	-2.143	-2.069	-2.488	ns
		$t_h$	1.576	1.519	2.200	2.457	2.643	2.544	2.980	2.457	2.643	2.544	2.980	ns
1.2 V	GCLK	$t_{su}$	-0.952	-0.930	-1.350	-1.477	-1.587	-1.568	-1.896	-1.477	-1.587	-1.568	-1.896	ns
		$t_h$	1.087	1.061	1.532	1.686	1.817	1.786	2.117	1.686	1.817	1.786	2.117	ns
	GCLK PLL	$t_{su}$	-1.244	-1.187	-1.719	-1.903	-1.987	-1.913	-2.332	-1.903	-1.987	-1.913	-2.332	ns
		$t_h$	1.524	1.467	2.123	2.358	2.487	2.388	2.824	2.358	2.487	2.388	2.824	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.923	-0.901	-1.322	-1.461	-1.589	-1.570	-1.898	-1.461	-1.589	-1.570	-1.898	ns
		$t_h$	1.058	1.032	1.504	1.670	1.819	1.788	2.119	1.670	1.819	1.788	2.119	ns
	GCLK PLL	$t_{su}$	-1.215	-1.158	-1.691	-1.887	-1.989	-1.915	-2.334	-1.887	-1.989	-1.915	-2.334	ns
		$t_h$	1.495	1.438	2.095	2.342	2.489	2.390	2.826	2.342	2.489	2.390	2.826	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.923	-0.901	-1.322	-1.461	-1.589	-1.570	-1.898	-1.461	-1.589	-1.570	-1.898	ns
		$t_h$	1.058	1.032	1.504	1.670	1.819	1.788	2.119	1.670	1.819	1.788	2.119	ns
	GCLK PLL	$t_{su}$	-1.215	-1.158	-1.691	-1.887	-1.989	-1.915	-2.334	-1.887	-1.989	-1.915	-2.334	ns
		$t_h$	1.495	1.438	2.095	2.342	2.489	2.390	2.826	2.342	2.489	2.390	2.826	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.917	-0.895	-1.309	-1.453	-1.586	-1.565	-1.896	-1.453	-1.586	-1.565	-1.896	ns
		$t_h$	1.052	1.026	1.491	1.659	1.813	1.782	2.112	1.659	1.813	1.782	2.112	ns
	GCLK PLL	$t_{su}$	-1.209	-1.152	-1.678	-1.879	-1.986	-1.910	-2.332	-1.879	-1.986	-1.910	-2.332	ns
		$t_h$	1.489	1.432	2.082	2.331	2.483	2.384	2.819	2.331	2.483	2.384	2.819	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.917	-0.895	-1.309	-1.453	-1.586	-1.565	-1.896	-1.453	-1.586	-1.565	-1.896	ns
		$t_h$	1.052	1.026	1.491	1.659	1.813	1.782	2.112	1.659	1.813	1.782	2.112	ns
	GCLK PLL	$t_{su}$	-1.209	-1.152	-1.678	-1.879	-1.986	-1.910	-2.332	-1.879	-1.986	-1.910	-2.332	ns
		$t_h$	1.489	1.432	2.082	2.331	2.483	2.384	2.819	2.331	2.483	2.384	2.819	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.906	-0.884	-1.298	-1.442	-1.567	-1.546	-1.877	-1.442	-1.567	-1.546	-1.877	ns
		$t_h$	1.041	1.015	1.479	1.648	1.794	1.763	2.093	1.648	1.794	1.763	2.093	ns
	GCLK PLL	$t_{su}$	-1.198	-1.141	-1.667	-1.868	-1.967	-1.891	-2.313	-1.868	-1.967	-1.891	-2.313	ns
		$t_h$	1.478	1.421	2.070	2.320	2.464	2.365	2.800	2.320	2.464	2.365	2.800	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.906	-0.884	-1.298	-1.442	-1.567	-1.546	-1.877	-1.442	-1.567	-1.546	-1.877	ns
		$t_h$	1.041	1.015	1.479	1.648	1.794	1.763	2.093	1.648	1.794	1.763	2.093	ns
	GCLK PLL	$t_{su}$	-1.198	-1.141	-1.667	-1.868	-1.967	-1.891	-2.313	-1.868	-1.967	-1.891	-2.313	ns
		$t_h$	1.478	1.421	2.070	2.320	2.464	2.365	2.800	2.320	2.464	2.365	2.800	ns

**Table 1-71.** EP3SL150 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.917	-0.895	-1.309	-1.453	-1.586	-1.565	-1.896	-1.453	-1.586	-1.565	-1.896	ns
		$t_h$	1.052	1.026	1.491	1.659	1.813	1.782	2.112	1.659	1.813	1.782	2.112	ns
	GCLK PLL	$t_{su}$	-1.209	-1.152	-1.678	-1.879	-1.986	-1.910	-2.332	-1.879	-1.986	-1.910	-2.332	ns
		$t_h$	1.489	1.432	2.082	2.331	2.483	2.384	2.819	2.331	2.483	2.384	2.819	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.917	-0.895	-1.309	-1.453	-1.586	-1.565	-1.896	-1.453	-1.586	-1.565	-1.896	ns
		$t_h$	1.052	1.026	1.491	1.659	1.813	1.782	2.112	1.659	1.813	1.782	2.112	ns
	GCLK PLL	$t_{su}$	-1.209	-1.152	-1.678	-1.879	-1.986	-1.910	-2.332	-1.879	-1.986	-1.910	-2.332	ns
		$t_h$	1.489	1.432	2.082	2.331	2.483	2.384	2.819	2.331	2.483	2.384	2.819	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.906	-0.884	-1.298	-1.442	-1.567	-1.546	-1.877	-1.442	-1.567	-1.546	-1.877	ns
		$t_h$	1.041	1.015	1.479	1.648	1.794	1.763	2.093	1.648	1.794	1.763	2.093	ns
	GCLK PLL	$t_{su}$	-1.198	-1.141	-1.667	-1.868	-1.967	-1.891	-2.313	-1.868	-1.967	-1.891	-2.313	ns
		$t_h$	1.478	1.421	2.070	2.320	2.464	2.365	2.800	2.320	2.464	2.365	2.800	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.906	-0.884	-1.298	-1.442	-1.567	-1.546	-1.877	-1.442	-1.567	-1.546	-1.877	ns
		$t_h$	1.041	1.015	1.479	1.648	1.794	1.763	2.093	1.648	1.794	1.763	2.093	ns
	GCLK PLL	$t_{su}$	-1.198	-1.141	-1.667	-1.868	-1.967	-1.891	-2.313	-1.868	-1.967	-1.891	-2.313	ns
		$t_h$	1.478	1.421	2.070	2.320	2.464	2.365	2.800	2.320	2.464	2.365	2.800	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.894	-0.872	-1.288	-1.431	-1.551	-1.530	-1.861	-1.431	-1.551	-1.530	-1.861	ns
		$t_h$	1.029	1.003	1.469	1.637	1.778	1.747	2.077	1.637	1.778	1.747	2.077	ns
	GCLK PLL	$t_{su}$	-1.186	-1.129	-1.657	-1.857	-1.951	-1.875	-2.297	-1.857	-1.951	-1.875	-2.297	ns
		$t_h$	1.466	1.409	2.060	2.309	2.448	2.349	2.784	2.309	2.448	2.349	2.784	ns
3.0-V PCI	GCLK	$t_{su}$	-0.894	-0.872	-1.288	-1.431	-1.551	-1.530	-1.861	-1.431	-1.551	-1.530	-1.861	ns
		$t_h$	1.029	1.003	1.469	1.637	1.778	1.747	2.077	1.637	1.778	1.747	2.077	ns
	GCLK PLL	$t_{su}$	-1.186	-1.129	-1.657	-1.857	-1.951	-1.875	-2.297	-1.857	-1.951	-1.875	-2.297	ns
		$t_h$	1.466	1.409	2.060	2.309	2.448	2.349	2.784	2.309	2.448	2.349	2.784	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.997	-0.975	-1.401	-1.560	-1.796	-1.777	-2.105	-1.560	-1.796	-1.777	-2.105	ns
		$t_h$	1.130	1.104	1.583	1.769	2.026	1.995	2.326	1.769	2.026	1.995	2.326	ns
	GCLK PLL	$t_{su}$	-1.289	-1.232	-1.770	-1.986	-2.196	-2.122	-2.541	-1.986	-2.196	-2.122	-2.541	ns
		$t_h$	1.567	1.510	2.174	2.441	2.696	2.597	3.033	2.441	2.696	2.597	3.033	ns

Table 1-72 lists the EP3SL150 row pins input timing parameters for single-ended I/O standards.

**Table 1-72.** EP3SL150 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	
3.3-V LVTTL	GCLK	$t_{su}$	-0.925	-0.964	-1.360	-1.470	-1.682	-1.633	-1.954	-1.480	-1.679	-1.634	-1.993	ns
		$t_h$	1.040	1.094	1.544	1.677	1.910	1.851	2.173	1.698	1.917	1.860	2.212	ns
	GCLK PLL	$t_{su}$	0.988	1.009	1.642	1.858	1.971	1.855	1.796	1.865	1.993	1.875	1.848	ns
		$t_h$	-0.737	-0.741	-1.241	-1.407	-1.471	-1.383	-1.314	-1.407	-1.482	-1.393	-1.363	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.925	-0.964	-1.360	-1.470	-1.682	-1.633	-1.954	-1.480	-1.679	-1.634	-1.993	ns
		$t_h$	1.040	1.094	1.544	1.677	1.910	1.851	2.173	1.698	1.917	1.860	2.212	ns
	GCLK PLL	$t_{su}$	0.988	1.009	1.642	1.858	1.971	1.855	1.796	1.865	1.993	1.875	1.848	ns
		$t_h$	-0.737	-0.741	-1.241	-1.407	-1.471	-1.383	-1.314	-1.407	-1.482	-1.393	-1.363	ns
3.0-V LVTTL	GCLK	$t_{su}$	-0.931	-0.975	-1.357	-1.471	-1.685	-1.636	-1.957	-1.479	-1.684	-1.639	-1.998	ns
		$t_h$	1.046	1.105	1.541	1.678	1.913	1.854	2.176	1.697	1.922	1.865	2.217	ns
	GCLK PLL	$t_{su}$	0.982	0.998	1.645	1.857	1.968	1.852	1.793	1.866	1.988	1.870	1.843	ns
		$t_h$	-0.731	-0.730	-1.244	-1.406	-1.468	-1.380	-1.311	-1.408	-1.477	-1.388	-1.358	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.931	-0.975	-1.357	-1.471	-1.685	-1.636	-1.957	-1.479	-1.684	-1.639	-1.998	ns
		$t_h$	1.046	1.105	1.541	1.678	1.913	1.854	2.176	1.697	1.922	1.865	2.217	ns
	GCLK PLL	$t_{su}$	0.982	0.998	1.645	1.857	1.968	1.852	1.793	1.866	1.988	1.870	1.843	ns
		$t_h$	-0.731	-0.730	-1.244	-1.406	-1.468	-1.380	-1.311	-1.408	-1.477	-1.388	-1.358	ns
2.5 V	GCLK	$t_{su}$	-0.919	-0.968	-1.366	-1.484	-1.700	-1.651	-1.972	-1.488	-1.694	-1.649	-2.008	ns
		$t_h$	1.034	1.098	1.550	1.691	1.928	1.869	2.191	1.706	1.932	1.875	2.227	ns
	GCLK PLL	$t_{su}$	0.994	1.005	1.636	1.844	1.953	1.837	1.778	1.857	1.978	1.860	1.833	ns
		$t_h$	-0.743	-0.737	-1.235	-1.393	-1.453	-1.365	-1.296	-1.399	-1.467	-1.378	-1.348	ns
1.8 V	GCLK	$t_{su}$	-0.949	-1.000	-1.406	-1.530	-1.590	-1.662	-1.875	-1.521	-1.582	-1.663	-1.913	ns
		$t_h$	1.065	1.131	1.590	1.738	1.824	1.880	2.098	1.739	1.826	1.889	2.137	ns
	GCLK PLL	$t_{su}$	0.964	0.966	1.589	1.806	1.955	1.835	1.780	1.824	1.977	1.854	1.832	ns
		$t_h$	-0.712	-0.698	-1.190	-1.356	-1.455	-1.362	-1.298	-1.366	-1.466	-1.372	-1.347	ns
1.5 V	GCLK	$t_{su}$	-0.939	-0.989	-1.382	-1.498	-1.522	-1.594	-1.807	-1.490	-1.517	-1.598	-1.848	ns
		$t_h$	1.055	1.120	1.566	1.706	1.756	1.812	2.030	1.708	1.761	1.824	2.072	ns
	GCLK PLL	$t_{su}$	0.974	0.977	1.613	1.838	2.023	1.903	1.848	1.855	2.042	1.919	1.897	ns
		$t_h$	-0.722	-0.709	-1.214	-1.388	-1.523	-1.430	-1.366	-1.397	-1.531	-1.437	-1.412	ns
1.2 V	GCLK	$t_{su}$	-0.879	-0.936	-1.303	-1.397	-1.363	-1.435	-1.648	-1.394	-1.362	-1.443	-1.693	ns
		$t_h$	0.995	1.067	1.487	1.605	1.597	1.653	1.871	1.612	1.606	1.669	1.917	ns
	GCLK PLL	$t_{su}$	1.034	1.030	1.692	1.939	2.182	2.062	2.007	1.951	2.197	2.074	2.052	ns
		$t_h$	-0.782	-0.762	-1.293	-1.489	-1.682	-1.589	-1.525	-1.493	-1.686	-1.592	-1.567	ns

**Table 1-72.** EP3SL150 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.862	-0.910	-1.280	-1.375	-1.480	-1.431	-1.752	-1.376	-1.477	-1.432	-1.791	ns
		$t_h$	0.978	1.041	1.464	1.582	1.708	1.649	1.971	1.594	1.715	1.658	2.010	ns
	GCLK PLL	$t_{su}$	1.051	1.063	1.722	1.953	2.173	2.057	1.998	1.969	2.195	2.077	2.050	ns
		$t_h$	-0.799	-0.794	-1.321	-1.502	-1.673	-1.585	-1.516	-1.511	-1.684	-1.595	-1.565	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.862	-0.910	-1.280	-1.375	-1.480	-1.431	-1.752	-1.376	-1.477	-1.432	-1.791	ns
		$t_h$	0.978	1.041	1.464	1.582	1.708	1.649	1.971	1.594	1.715	1.658	2.010	ns
	GCLK PLL	$t_{su}$	1.051	1.063	1.722	1.953	2.173	2.057	1.998	1.969	2.195	2.077	2.050	ns
		$t_h$	-0.799	-0.794	-1.321	-1.502	-1.673	-1.585	-1.516	-1.511	-1.684	-1.595	-1.565	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.853	-0.901	-1.265	-1.370	-1.361	-1.429	-1.646	-1.362	-1.358	-1.435	-1.688	ns
		$t_h$	0.969	1.032	1.449	1.576	1.592	1.646	1.865	1.578	1.599	1.660	1.908	ns
	GCLK PLL	$t_{su}$	1.060	1.065	1.730	1.966	2.187	2.068	2.011	1.983	2.204	2.082	2.059	ns
		$t_h$	-0.808	-0.797	-1.331	-1.518	-1.689	-1.596	-1.533	-1.527	-1.696	-1.601	-1.578	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.853	-0.901	-1.265	-1.370	-1.361	-1.429	-1.646	-1.362	-1.358	-1.435	-1.688	ns
		$t_h$	0.969	1.032	1.449	1.576	1.592	1.646	1.865	1.578	1.599	1.660	1.908	ns
	GCLK PLL	$t_{su}$	1.060	1.065	1.730	1.966	2.187	2.068	2.011	1.983	2.204	2.082	2.059	ns
		$t_h$	-0.808	-0.797	-1.331	-1.518	-1.689	-1.596	-1.533	-1.527	-1.696	-1.601	-1.578	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.839	-0.889	-1.250	-1.360	-1.343	-1.411	-1.628	-1.351	-1.341	-1.418	-1.671	ns
		$t_h$	0.955	1.020	1.435	1.566	1.574	1.628	1.847	1.567	1.582	1.643	1.891	ns
	GCLK PLL	$t_{su}$	1.074	1.077	1.745	1.976	2.205	2.086	2.029	1.994	2.221	2.099	2.076	ns
		$t_h$	-0.822	-0.809	-1.345	-1.528	-1.707	-1.614	-1.551	-1.538	-1.713	-1.618	-1.595	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.853	-0.901	-1.265	-1.370	-1.361	-1.429	-1.646	-1.362	-1.358	-1.435	-1.688	ns
		$t_h$	0.969	1.032	1.449	1.576	1.592	1.646	1.865	1.578	1.599	1.660	1.908	ns
	GCLK PLL	$t_{su}$	1.060	1.065	1.730	1.966	2.187	2.068	2.011	1.983	2.204	2.082	2.059	ns
		$t_h$	-0.808	-0.797	-1.331	-1.518	-1.689	-1.596	-1.533	-1.527	-1.696	-1.601	-1.578	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.853	-0.901	-1.265	-1.370	-1.361	-1.429	-1.646	-1.362	-1.358	-1.435	-1.688	ns
		$t_h$	0.969	1.032	1.449	1.576	1.592	1.646	1.865	1.578	1.599	1.660	1.908	ns
	GCLK PLL	$t_{su}$	1.060	1.065	1.730	1.966	2.187	2.068	2.011	1.983	2.204	2.082	2.059	ns
		$t_h$	-0.808	-0.797	-1.331	-1.518	-1.689	-1.596	-1.533	-1.527	-1.696	-1.601	-1.578	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.839	-0.889	-1.250	-1.360	-1.343	-1.411	-1.628	-1.351	-1.341	-1.418	-1.671	ns
		$t_h$	0.955	1.020	1.435	1.566	1.574	1.628	1.847	1.567	1.582	1.643	1.891	ns
	GCLK PLL	$t_{su}$	1.074	1.077	1.745	1.976	2.205	2.086	2.029	1.994	2.221	2.099	2.076	ns
		$t_h$	-0.822	-0.809	-1.345	-1.528	-1.707	-1.614	-1.551	-1.538	-1.713	-1.618	-1.595	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.839	-0.889	-1.250	-1.360	-1.343	-1.411	-1.628	-1.351	-1.341	-1.418	-1.671	ns
		$t_h$	0.955	1.020	1.435	1.566	1.574	1.628	1.847	1.567	1.582	1.643	1.891	ns
	GCLK PLL	$t_{su}$	1.074	1.077	1.745	1.976	2.205	2.086	2.029	1.994	2.221	2.099	2.076	ns
		$t_h$	-0.822	-0.809	-1.345	-1.528	-1.707	-1.614	-1.551	-1.538	-1.713	-1.618	-1.595	ns

**Table 1-72.** EP3SL150 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.830	-0.877	-1.241	-1.350	-1.327	-1.395	-1.612	-1.342	-1.325	-1.402	-1.655	ns
		$t_h$	0.946	1.008	1.426	1.556	1.558	1.612	1.831	1.558	1.566	1.627	1.875	ns
	GCLK PLL	$t_{su}$	1.083	1.089	1.754	1.986	2.221	2.102	2.045	2.003	2.237	2.115	2.092	ns
		$t_h$	-0.831	-0.821	-1.354	-1.538	-1.723	-1.630	-1.567	-1.547	-1.729	-1.634	-1.611	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.830	-0.877	-1.241	-1.350	-1.327	-1.395	-1.612	-1.342	-1.325	-1.402	-1.655	ns
		$t_h$	0.946	1.008	1.426	1.556	1.558	1.612	1.831	1.558	1.566	1.627	1.875	ns
	GCLK PLL	$t_{su}$	1.083	1.089	1.754	1.986	2.221	2.102	2.045	2.003	2.237	2.115	2.092	ns
		$t_h$	-0.831	-0.821	-1.354	-1.538	-1.723	-1.630	-1.567	-1.547	-1.729	-1.634	-1.611	ns
3.0-V PCI	GCLK	$t_{su}$	-0.931	-0.975	-1.357	-1.471	-1.685	-1.636	-1.957	-1.479	-1.684	-1.639	-1.998	ns
		$t_h$	1.046	1.105	1.541	1.678	1.913	1.854	2.176	1.697	1.922	1.865	2.217	ns
	GCLK PLL	$t_{su}$	0.982	0.998	1.645	1.857	1.968	1.852	1.793	1.866	1.988	1.870	1.843	ns
		$t_h$	-0.731	-0.730	-1.244	-1.406	-1.468	-1.380	-1.311	-1.408	-1.477	-1.388	-1.358	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.931	-0.975	-1.357	-1.471	-1.685	-1.636	-1.957	-1.479	-1.684	-1.639	-1.998	ns
		$t_h$	1.046	1.105	1.541	1.678	1.913	1.854	2.176	1.697	1.922	1.865	2.217	ns
	GCLK PLL	$t_{su}$	0.982	0.998	1.645	1.857	1.968	1.852	1.793	1.866	1.988	1.870	1.843	ns
		$t_h$	-0.731	-0.730	-1.244	-1.406	-1.468	-1.380	-1.311	-1.408	-1.477	-1.388	-1.358	ns

Table 1-73 lists the EP3SL150 column pins output timing parameters for single-ended I/O standards.

**Table 1-73.** EP3SL150 Column Pins Output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.422	3.439	4.768	5.127	5.625	5.473	5.808	5.127	5.625	5.473	5.808	ns
		GCLK PLL	$t_{co}$	3.898	3.841	5.355	5.880	6.341	6.161	6.543	5.880	6.341	6.161	6.543	ns
	8mA	GCLK	$t_{co}$	3.355	3.372	4.659	5.016	5.512	5.360	5.695	5.016	5.512	5.360	5.695	ns
		GCLK PLL	$t_{co}$	3.781	3.774	5.246	5.718	6.228	6.048	6.430	5.718	6.228	6.048	6.430	ns
	12mA	GCLK	$t_{co}$	3.269	3.286	4.555	4.918	5.420	5.268	5.603	4.918	5.420	5.268	5.603	ns
		GCLK PLL	$t_{co}$	3.692	3.688	5.142	5.583	6.136	5.956	6.338	5.583	6.136	5.956	6.338	ns
	16mA	GCLK	$t_{co}$	3.262	3.279	4.538	4.890	5.379	5.227	5.562	4.890	5.379	5.227	5.562	ns
		GCLK PLL	$t_{co}$	3.685	3.681	5.125	5.555	6.095	5.915	6.297	5.555	6.095	5.915	6.297	ns

**Table 1-73.** EP3SL150 Column Pins Output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.428	3.445	4.772	5.132	5.632	5.480	5.815	5.132	5.632	5.480	5.815	ns
		GCLK PLL	$t_{co}$	3.901	3.847	5.359	5.892	6.348	6.168	6.550	5.892	6.348	6.168	6.550	ns
	8mA	GCLK	$t_{co}$	3.273	3.290	4.565	4.935	5.431	5.279	5.614	4.935	5.431	5.279	5.614	ns
		GCLK PLL	$t_{co}$	3.701	3.692	5.152	5.600	6.147	5.967	6.349	5.600	6.147	5.967	6.349	ns
	12mA	GCLK	$t_{co}$	3.280	3.297	4.559	4.914	5.405	5.253	5.588	4.914	5.405	5.253	5.588	ns
		GCLK PLL	$t_{co}$	3.703	3.699	5.146	5.579	6.121	5.941	6.323	5.579	6.121	5.941	6.323	ns
	16mA	GCLK	$t_{co}$	3.264	3.281	4.537	4.888	5.376	5.224	5.559	4.888	5.376	5.224	5.559	ns
		GCLK PLL	$t_{co}$	3.687	3.683	5.124	5.553	6.092	5.912	6.294	5.553	6.092	5.912	6.294	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.386	3.403	4.735	5.096	5.592	5.440	5.775	5.096	5.592	5.440	5.775	ns
		GCLK PLL	$t_{co}$	3.843	3.805	5.322	5.831	6.308	6.128	6.510	5.831	6.308	6.128	6.510	ns
	8mA	GCLK	$t_{co}$	3.275	3.292	4.605	4.962	5.455	5.303	5.637	4.962	5.455	5.303	5.637	ns
		GCLK PLL	$t_{co}$	3.713	3.694	5.192	5.659	6.170	5.991	6.371	5.659	6.170	5.991	6.371	ns
	12mA	GCLK	$t_{co}$	3.239	3.256	4.542	4.893	5.381	5.229	5.563	4.893	5.381	5.229	5.563	ns
		GCLK PLL	$t_{co}$	3.662	3.658	5.129	5.560	6.096	5.917	6.298	5.560	6.096	5.917	6.298	ns
	16mA	GCLK	$t_{co}$	3.221	3.238	4.513	4.865	5.352	5.200	5.535	4.865	5.352	5.200	5.535	ns
		GCLK PLL	$t_{co}$	3.644	3.640	5.100	5.530	6.070	5.888	6.270	5.530	6.070	5.888	6.270	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.300	3.317	4.639	4.995	5.490	5.338	5.672	4.995	5.490	5.338	5.672	ns
		GCLK PLL	$t_{co}$	3.751	3.719	5.226	5.712	6.205	6.026	6.406	5.712	6.205	6.026	6.406	ns
	8mA	GCLK	$t_{co}$	3.221	3.238	4.515	4.866	5.355	5.203	5.537	4.866	5.355	5.203	5.537	ns
		GCLK PLL	$t_{co}$	3.644	3.640	5.102	5.531	6.083	5.891	6.271	5.531	6.083	5.891	6.271	ns
	12mA	GCLK	$t_{co}$	3.216	3.233	4.508	4.859	5.346	5.194	5.529	4.859	5.346	5.194	5.529	ns
		GCLK PLL	$t_{co}$	3.639	3.635	5.095	5.524	6.062	5.882	6.264	5.524	6.062	5.882	6.264	ns
	16mA	GCLK	$t_{co}$	3.207	3.224	4.494	4.844	5.331	5.179	5.514	4.844	5.331	5.179	5.514	ns
		GCLK PLL	$t_{co}$	3.630	3.626	5.081	5.509	6.057	5.867	6.249	5.509	6.057	5.867	6.249	ns

**Table 1-73.** EP3SL150 Column Pins Output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	
2.5 V	4mA	GCLK	$t_{co}$	3.422	3.439	4.846	5.222	5.737	5.585	5.919	5.222	5.737	5.585	5.919	ns
		GCLK PLL	$t_{co}$	3.898	3.841	5.433	5.991	6.452	6.273	6.654	5.991	6.452	6.273	6.654	ns
	8mA	GCLK	$t_{co}$	3.322	3.339	4.727	5.096	5.605	5.453	5.787	5.096	5.605	5.453	5.787	ns
		GCLK PLL	$t_{co}$	3.773	3.741	5.314	5.807	6.320	6.141	6.521	5.807	6.320	6.141	6.521	ns
	12mA	GCLK	$t_{co}$	3.278	3.295	4.640	5.006	5.509	5.357	5.692	5.006	5.509	5.357	5.692	ns
		GCLK PLL	$t_{co}$	3.701	3.697	5.227	5.671	6.225	6.045	6.427	5.671	6.225	6.045	6.427	ns
	16mA	GCLK	$t_{co}$	3.240	3.257	4.601	4.963	5.466	5.314	5.649	4.963	5.466	5.314	5.649	ns
		GCLK PLL	$t_{co}$	3.663	3.659	5.188	5.628	6.182	6.002	6.384	5.628	6.182	6.002	6.384	ns
1.8 V	2mA	GCLK	$t_{co}$	3.613	3.630	5.167	5.582	6.141	5.989	6.324	5.582	6.141	5.989	6.324	ns
		GCLK PLL	$t_{co}$	4.161	4.032	5.754	6.474	6.857	6.677	7.059	6.474	6.857	6.677	7.059	ns
	4mA	GCLK	$t_{co}$	3.432	3.449	4.888	5.273	5.794	5.642	5.976	5.273	5.794	5.642	5.976	ns
		GCLK PLL	$t_{co}$	3.920	3.851	5.475	6.068	6.509	6.330	6.710	6.068	6.509	6.330	6.710	ns
	6mA	GCLK	$t_{co}$	3.350	3.367	4.781	5.158	5.683	5.531	5.866	5.158	5.683	5.531	5.866	ns
		GCLK PLL	$t_{co}$	3.802	3.769	5.368	5.878	6.399	6.219	6.601	5.878	6.399	6.219	6.601	ns
	8mA	GCLK	$t_{co}$	3.330	3.347	4.723	5.105	5.617	5.465	5.800	5.105	5.617	5.465	5.800	ns
		GCLK PLL	$t_{co}$	3.753	3.749	5.310	5.780	6.333	6.153	6.535	5.780	6.333	6.153	6.535	ns
	10mA	GCLK	$t_{co}$	3.267	3.284	4.662	5.030	5.536	5.384	5.719	5.030	5.536	5.384	5.719	ns
		GCLK PLL	$t_{co}$	3.690	3.686	5.249	5.695	6.252	6.072	6.454	5.695	6.252	6.072	6.454	ns
	12mA	GCLK	$t_{co}$	3.249	3.266	4.641	5.008	5.513	5.361	5.696	5.008	5.513	5.361	5.696	ns
		GCLK PLL	$t_{co}$	3.672	3.668	5.228	5.673	6.229	6.049	6.431	5.673	6.229	6.049	6.431	ns



**Table 1-73.** EP3SL150 Column Pins Output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.5 V	2mA	GCLK	$t_{co}$	3.559	3.576	5.096	5.515	6.079	5.927	6.262	5.515	6.079	5.927	6.262	ns
		GCLK PLL	$t_{co}$	4.069	3.978	5.683	6.384	6.795	6.615	6.997	6.384	6.795	6.615	6.997	ns
	4mA	GCLK	$t_{co}$	3.347	3.364	4.777	5.158	5.687	5.535	5.870	5.158	5.687	5.535	5.870	ns
		GCLK PLL	$t_{co}$	3.786	3.766	5.364	5.871	6.403	6.223	6.605	5.871	6.403	6.223	6.605	ns
	6mA	GCLK	$t_{co}$	3.322	3.339	4.710	5.098	5.620	5.468	5.803	5.098	5.620	5.468	5.803	ns
		GCLK PLL	$t_{co}$	3.745	3.741	5.297	5.763	6.336	6.156	6.538	5.763	6.336	6.156	6.538	ns
	8mA	GCLK	$t_{co}$	3.311	3.328	4.693	5.073	5.600	5.448	5.783	5.073	5.600	5.448	5.783	ns
		GCLK PLL	$t_{co}$	3.734	3.730	5.280	5.742	6.316	6.136	6.518	5.742	6.316	6.136	6.518	ns
	10mA	GCLK	$t_{co}$	3.256	3.273	4.655	5.023	5.530	5.378	5.713	5.023	5.530	5.378	5.713	ns
		GCLK PLL	$t_{co}$	3.679	3.675	5.242	5.688	6.246	6.066	6.448	5.688	6.246	6.066	6.448	ns
	12mA	GCLK	$t_{co}$	3.251	3.268	4.638	5.011	5.519	5.367	5.702	5.011	5.519	5.367	5.702	ns
		GCLK PLL	$t_{co}$	3.674	3.670	5.225	5.676	6.235	6.055	6.437	5.676	6.235	6.055	6.437	ns
1.2 V	2mA	GCLK	$t_{co}$	3.475	3.492	5.022	5.450	6.023	5.871	6.206	5.450	6.023	5.871	6.206	ns
		GCLK PLL	$t_{co}$	3.959	3.894	5.609	6.283	6.739	6.559	6.941	6.283	6.739	6.559	6.941	ns
	4mA	GCLK	$t_{co}$	3.352	3.369	4.796	5.189	5.737	5.585	5.920	5.189	5.737	5.585	5.920	ns
		GCLK PLL	$t_{co}$	3.786	3.771	5.383	5.902	6.453	6.273	6.655	5.902	6.453	6.273	6.655	ns
	6mA	GCLK	$t_{co}$	3.314	3.331	4.704	5.099	5.624	5.472	5.807	5.099	5.624	5.472	5.807	ns
		GCLK PLL	$t_{co}$	3.737	3.733	5.291	5.764	6.340	6.160	6.542	5.764	6.340	6.160	6.542	ns
	8mA	GCLK	$t_{co}$	3.267	3.284	4.676	5.050	5.568	5.416	5.751	5.050	5.568	5.416	5.751	ns
		GCLK PLL	$t_{co}$	3.690	3.686	5.263	5.715	6.284	6.104	6.486	5.715	6.284	6.104	6.486	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.267	3.284	4.633	4.998	5.499	5.347	5.682	4.998	5.499	5.347	5.682	ns
		GCLK PLL	$t_{co}$	3.690	3.686	5.220	5.663	6.215	6.035	6.417	5.663	6.215	6.035	6.417	ns
	10mA	GCLK	$t_{co}$	3.264	3.281	4.630	4.994	5.495	5.343	5.678	4.994	5.495	5.343	5.678	ns
		GCLK PLL	$t_{co}$	3.687	3.683	5.217	5.659	6.211	6.031	6.413	5.659	6.211	6.031	6.413	ns
	12mA	GCLK	$t_{co}$	3.262	3.279	4.630	4.995	5.496	5.344	5.679	4.995	5.496	5.344	5.679	ns
		GCLK PLL	$t_{co}$	3.685	3.681	5.217	5.660	6.212	6.032	6.414	5.660	6.212	6.032	6.414	ns

**Table 1-73.** EP3SL150 Column Pins Output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.253	3.270	4.615	4.980	5.481	5.329	5.664	4.980	5.481	5.329	5.664	ns	
		GCLK PLL	$t_{co}$	3.676	3.672	5.202	5.645	6.197	6.017	6.399	5.645	6.197	6.017	6.399	ns	
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.274	3.291	4.645	5.012	5.515	5.363	5.698	5.012	5.515	5.363	5.698	ns	
		GCLK PLL	$t_{co}$	3.697	3.693	5.232	5.677	6.231	6.051	6.433	5.677	6.231	6.051	6.433	ns	
	6mA	GCLK	$t_{co}$	3.270	3.287	4.643	5.010	5.513	5.361	5.696	5.010	5.513	5.361	5.696	ns	
		GCLK PLL	$t_{co}$	3.693	3.689	5.230	5.675	6.229	6.049	6.431	5.675	6.229	6.049	6.431	ns	
	8mA	GCLK	$t_{co}$	3.259	3.276	4.633	5.000	5.504	5.352	5.687	5.000	5.504	5.352	5.687	ns	
		GCLK PLL	$t_{co}$	3.682	3.678	5.220	5.665	6.220	6.040	6.422	5.665	6.220	6.040	6.422	ns	
	10mA	GCLK	$t_{co}$	3.248	3.265	4.620	4.987	5.491	5.339	5.674	4.987	5.491	5.339	5.674	ns	
		GCLK PLL	$t_{co}$	3.671	3.667	5.207	5.652	6.207	6.027	6.409	5.652	6.207	6.027	6.409	ns	
	12mA	GCLK	$t_{co}$	3.248	3.265	4.620	4.987	5.491	5.339	5.674	4.987	5.491	5.339	5.674	ns	
		GCLK PLL	$t_{co}$	3.671	3.667	5.207	5.652	6.207	6.027	6.409	5.652	6.207	6.027	6.409	ns	
	SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.254	3.271	4.619	4.984	5.486	5.334	5.669	4.984	5.486	5.334	5.669	ns
			GCLK PLL	$t_{co}$	3.677	3.673	5.206	5.649	6.202	6.022	6.404	5.649	6.202	6.022	6.404	ns
16mA		GCLK	$t_{co}$	3.257	3.274	4.627	4.994	5.498	5.346	5.681	4.994	5.498	5.346	5.681	ns	
		GCLK PLL	$t_{co}$	3.680	3.676	5.214	5.659	6.214	6.034	6.416	5.659	6.214	6.034	6.416	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.278	3.295	4.654	5.023	5.528	5.376	5.711	5.023	5.528	5.376	5.711	ns	
		GCLK PLL	$t_{co}$	3.701	3.697	5.241	5.688	6.244	6.064	6.446	5.688	6.244	6.064	6.446	ns	
	6mA	GCLK	$t_{co}$	3.264	3.281	4.644	5.013	5.519	5.367	5.702	5.013	5.519	5.367	5.702	ns	
		GCLK PLL	$t_{co}$	3.687	3.683	5.231	5.678	6.235	6.055	6.437	5.678	6.235	6.055	6.437	ns	
	8mA	GCLK	$t_{co}$	3.253	3.270	4.630	4.999	5.505	5.353	5.688	4.999	5.505	5.353	5.688	ns	
		GCLK PLL	$t_{co}$	3.676	3.672	5.217	5.664	6.221	6.041	6.423	5.664	6.221	6.041	6.423	ns	
	10mA	GCLK	$t_{co}$	3.252	3.269	4.633	5.003	5.509	5.357	5.692	5.003	5.509	5.357	5.692	ns	
		GCLK PLL	$t_{co}$	3.675	3.671	5.220	5.668	6.225	6.045	6.427	5.668	6.225	6.045	6.427	ns	
	12mA	GCLK	$t_{co}$	3.249	3.266	4.628	4.997	5.503	5.351	5.686	4.997	5.503	5.351	5.686	ns	
		GCLK PLL	$t_{co}$	3.672	3.668	5.215	5.662	6.219	6.039	6.421	5.662	6.219	6.039	6.421	ns	

**Table 1-73.** EP3SL150 Column Pins Output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.251	3.268	4.617	4.983	5.486	5.334	5.669	4.983	5.486	5.334	5.669	ns	
		GCLK PLL	$t_{co}$	3.674	3.670	5.204	5.648	6.202	6.022	6.404	5.648	6.202	6.022	6.404	ns	
	16mA	GCLK	$t_{co}$	3.254	3.271	4.624	4.992	5.497	5.345	5.680	4.992	5.497	5.345	5.680	ns	
		GCLK PLL	$t_{co}$	3.677	3.673	5.211	5.657	6.213	6.033	6.415	5.657	6.213	6.033	6.415	ns	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.261	3.278	4.619	4.983	5.484	5.332	5.667	4.983	5.484	5.332	5.667	ns	
		GCLK PLL	$t_{co}$	3.684	3.680	5.206	5.648	6.200	6.020	6.402	5.648	6.200	6.020	6.402	ns	
	6mA	GCLK	$t_{co}$	3.254	3.271	4.617	4.982	5.483	5.331	5.666	4.982	5.483	5.331	5.666	ns	
		GCLK PLL	$t_{co}$	3.677	3.673	5.204	5.647	6.199	6.019	6.401	5.647	6.199	6.019	6.401	ns	
	8mA	GCLK	$t_{co}$	3.246	3.263	4.609	4.974	5.476	5.324	5.659	4.974	5.476	5.324	5.659	ns	
		GCLK PLL	$t_{co}$	3.669	3.665	5.196	5.639	6.192	6.012	6.394	5.639	6.192	6.012	6.394	ns	
	10mA	GCLK	$t_{co}$	3.249	3.266	4.612	4.978	5.480	5.328	5.663	4.978	5.480	5.328	5.663	ns	
		GCLK PLL	$t_{co}$	3.672	3.668	5.199	5.643	6.196	6.016	6.398	5.643	6.196	6.016	6.398	ns	
	12mA	GCLK	$t_{co}$	3.246	3.263	4.615	4.981	5.484	5.332	5.667	4.981	5.484	5.332	5.667	ns	
		GCLK PLL	$t_{co}$	3.669	3.665	5.202	5.646	6.200	6.020	6.402	5.646	6.200	6.020	6.402	ns	
	1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.254	3.271	4.614	4.979	5.480	5.328	5.663	4.979	5.480	5.328	5.663	ns
			GCLK PLL	$t_{co}$	3.677	3.673	5.201	5.644	6.196	6.016	6.398	5.644	6.196	6.016	6.398	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.266	3.283	4.627	4.993	5.495	5.343	5.678	4.993	5.495	5.343	5.678	ns	
		GCLK PLL	$t_{co}$	3.689	3.685	5.214	5.658	6.211	6.031	6.413	5.658	6.211	6.031	6.413	ns	
	6mA	GCLK	$t_{co}$	3.262	3.279	4.628	4.995	5.498	5.346	5.681	4.995	5.498	5.346	5.681	ns	
		GCLK PLL	$t_{co}$	3.685	3.681	5.215	5.660	6.214	6.034	6.416	5.660	6.214	6.034	6.416	ns	
	8mA	GCLK	$t_{co}$	3.258	3.275	4.624	4.990	5.493	5.341	5.676	4.990	5.493	5.341	5.676	ns	
		GCLK PLL	$t_{co}$	3.681	3.677	5.211	5.655	6.209	6.029	6.411	5.655	6.209	6.029	6.411	ns	
	10mA	GCLK	$t_{co}$	3.251	3.268	4.617	4.983	5.486	5.334	5.669	4.983	5.486	5.334	5.669	ns	
		GCLK PLL	$t_{co}$	3.674	3.670	5.204	5.648	6.202	6.022	6.404	5.648	6.202	6.022	6.404	ns	
	12mA	GCLK	$t_{co}$	3.252	3.269	4.624	4.991	5.496	5.344	5.679	4.991	5.496	5.344	5.679	ns	
		GCLK PLL	$t_{co}$	3.675	3.671	5.211	5.656	6.212	6.032	6.414	5.656	6.212	6.032	6.414	ns	

**Table 1-73.** EP3SL150 Column Pins Output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$		
1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.250	3.267	4.605	4.969	5.470	5.318	5.653	4.969	5.470	5.318	5.653	ns	
		GCLK PLL	$t_{co}$	3.673	3.669	5.192	5.634	6.186	6.006	6.388	5.634	6.186	6.006	6.388	ns	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.269	3.286	4.641	5.010	5.516	5.364	5.699	5.010	5.516	5.364	5.699	ns	
		GCLK PLL	$t_{co}$	3.692	3.688	5.228	5.675	6.232	6.052	6.434	5.675	6.232	6.052	6.434	ns	
	6mA	GCLK	$t_{co}$	3.261	3.278	4.632	5.001	5.507	5.355	5.690	5.001	5.507	5.355	5.690	ns	
		GCLK PLL	$t_{co}$	3.684	3.680	5.219	5.666	6.223	6.043	6.425	5.666	6.223	6.043	6.425	ns	
	8mA	GCLK	$t_{co}$	3.262	3.279	4.640	5.010	5.516	5.364	5.699	5.010	5.516	5.364	5.699	ns	
		GCLK PLL	$t_{co}$	3.685	3.681	5.227	5.675	6.232	6.052	6.434	5.675	6.232	6.052	6.434	ns	
	10mA	GCLK	$t_{co}$	3.251	3.268	4.627	4.996	5.502	5.350	5.685	4.996	5.502	5.350	5.685	ns	
		GCLK PLL	$t_{co}$	3.674	3.670	5.214	5.661	6.218	6.038	6.420	5.661	6.218	6.038	6.420	ns	
	12mA	GCLK	$t_{co}$	3.251	3.268	4.627	4.996	5.503	5.351	5.686	4.996	5.503	5.351	5.686	ns	
		GCLK PLL	$t_{co}$	3.674	3.670	5.214	5.661	6.219	6.039	6.421	5.661	6.219	6.039	6.421	ns	
	1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.272	3.289	4.643	5.011	5.516	5.364	5.699	5.011	5.516	5.364	5.699	ns
			GCLK PLL	$t_{co}$	3.695	3.691	5.230	5.676	6.233	6.052	6.434	5.676	6.233	6.052	6.434	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.375	3.392	4.688	5.045	5.541	5.389	5.724	5.045	5.541	5.389	5.724	ns	
		GCLK PLL	$t_{co}$	3.798	3.794	5.275	5.710	6.264	6.077	6.459	5.710	6.264	6.077	6.459	ns	
3.0-V PCI-X	—	GCLK	$t_{co}$	3.375	3.392	4.688	5.045	5.541	5.389	5.724	5.045	5.541	5.389	5.724	ns	
		GCLK PLL	$t_{co}$	3.798	3.794	5.275	5.710	6.264	6.077	6.459	5.710	6.264	6.077	6.459	ns	

Table 1-74 lists the EP3SL150 row pins output timing parameters for single-ended I/O standards.

**Table 1-74.** EP3SL150 Row Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.214	3.466	4.819	5.204	5.693	5.566	5.831	5.325	5.817	5.689	5.913	ns
		GCLK PLL	$t_{co}$	1.420	1.606	1.985	2.065	2.256	2.277	2.285	2.167	2.360	2.380	2.277	ns
	8mA	GCLK	$t_{co}$	3.121	3.361	4.689	5.066	5.548	5.421	5.686	5.184	5.668	5.540	5.764	ns
		GCLK PLL	$t_{co}$	1.354	1.535	1.875	1.954	2.142	2.163	2.171	2.054	2.245	2.265	2.162	ns
	12mA	GCLK	$t_{co}$	3.042	3.271	4.570	4.943	5.420	5.293	5.558	5.057	5.536	5.408	5.632	ns
		GCLK PLL	$t_{co}$	1.275	1.446	1.769	1.854	2.046	2.067	2.075	1.955	2.145	2.165	2.062	ns
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.224	3.470	4.827	5.209	5.697	5.570	5.835	5.331	5.821	5.693	5.917	ns
		GCLK PLL	$t_{co}$	1.422	1.613	1.989	2.071	2.265	2.286	2.294	2.175	2.372	2.392	2.289	ns
	8mA	GCLK	$t_{co}$	3.046	3.275	4.576	4.949	5.427	5.301	5.564	5.063	5.543	5.417	5.639	ns
		GCLK PLL	$t_{co}$	1.279	1.450	1.780	1.869	2.056	2.077	2.085	1.967	2.154	2.174	2.071	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.168	3.412	4.771	5.157	5.649	5.522	5.787	5.282	5.775	5.647	5.871	ns
		GCLK PLL	$t_{co}$	1.381	1.567	1.952	2.034	2.222	2.243	2.251	2.135	2.326	2.346	2.243	ns
	8mA	GCLK	$t_{co}$	3.047	3.285	4.618	4.998	5.485	5.358	5.623	5.120	5.611	5.482	5.706	ns
		GCLK PLL	$t_{co}$	1.280	1.455	1.815	1.892	2.077	2.098	2.106	1.993	2.181	2.200	2.097	ns
	12mA	GCLK	$t_{co}$	3.010	3.242	4.536	4.915	5.397	5.270	5.535	5.034	5.518	5.389	5.613	ns
		GCLK PLL	$t_{co}$	1.243	1.417	1.755	1.827	2.007	2.028	2.036	1.925	2.107	2.127	2.024	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.082	3.331	4.665	5.050	5.539	5.412	5.677	5.174	5.664	5.535	5.759	ns
		GCLK PLL	$t_{co}$	1.302	1.479	1.850	1.927	2.113	2.134	2.142	2.026	2.217	2.236	2.133	ns
	8mA	GCLK	$t_{co}$	2.997	3.226	4.502	4.876	5.358	5.231	5.496	4.994	5.478	5.349	5.573	ns
		GCLK PLL	$t_{co}$	1.230	1.401	1.727	1.798	1.979	2.000	2.008	1.895	2.079	2.098	1.995	ns
2.5 V	4mA	GCLK	$t_{co}$	3.194	3.448	4.903	5.311	5.821	5.694	5.959	5.442	5.954	5.825	6.049	ns
		GCLK PLL	$t_{co}$	1.407	1.604	2.060	2.160	2.367	2.388	2.396	2.267	2.478	2.498	2.395	ns
	8mA	GCLK	$t_{co}$	3.089	3.350	4.748	5.148	5.651	5.524	5.789	5.275	5.780	5.651	5.875	ns
		GCLK PLL	$t_{co}$	1.322	1.501	1.936	2.025	2.225	2.246	2.254	2.130	2.334	2.353	2.250	ns
	12mA	GCLK	$t_{co}$	3.038	3.282	4.637	5.029	5.525	5.398	5.663	5.152	5.650	5.521	5.745	ns
		GCLK PLL	$t_{co}$	1.265	1.457	1.852	1.939	2.134	2.155	2.163	2.041	2.239	2.259	2.156	ns

**Table 1-74.** EP3SL150 Row Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.8 V	2mA	GCLK	$t_{co}$	3.431	3.699	5.291	5.740	6.296	6.169	6.434	5.882	6.438	6.310	6.534	ns
		GCLK PLL	$t_{co}$	1.655	1.850	2.491	2.527	2.770	2.796	2.799	2.776	2.888	2.913	2.805	ns
	4mA	GCLK	$t_{co}$	3.206	3.497	4.964	5.371	5.891	5.764	6.029	5.517	6.032	5.903	6.127	ns
		GCLK PLL	$t_{co}$	1.430	1.648	2.164	2.201	2.410	2.436	2.439	2.411	2.527	2.551	2.443	ns
	6mA	GCLK	$t_{co}$	3.141	3.395	4.811	5.221	5.732	5.605	5.870	5.349	5.859	5.731	5.955	ns
		GCLK PLL	$t_{co}$	1.365	1.546	2.011	2.096	2.310	2.336	2.339	2.243	2.421	2.446	2.338	ns
	8mA	GCLK	$t_{co}$	3.081	3.321	4.734	5.127	5.635	5.508	5.773	5.254	5.765	5.637	5.861	ns
		GCLK PLL	$t_{co}$	1.327	1.508	1.937	2.043	2.244	2.270	2.273	2.148	2.349	2.374	2.266	ns
1.5 V	2mA	GCLK	$t_{co}$	3.342	3.617	5.201	5.653	6.224	6.097	6.362	5.789	6.362	6.234	6.458	ns
		GCLK PLL	$t_{co}$	1.566	1.768	2.401	2.454	2.707	2.733	2.736	2.683	2.823	2.848	2.740	ns
	4mA	GCLK	$t_{co}$	3.100	3.359	4.796	5.216	5.733	5.606	5.871	5.343	5.858	5.730	5.954	ns
		GCLK PLL	$t_{co}$	1.343	1.525	1.996	2.096	2.313	2.339	2.342	2.237	2.422	2.447	2.339	ns
	6mA	GCLK	$t_{co}$	3.073	3.312	4.723	5.120	5.627	5.502	5.765	5.245	5.753	5.625	5.849	ns
		GCLK PLL	$t_{co}$	1.316	1.499	1.923	2.035	2.244	2.270	2.273	2.139	2.349	2.374	2.266	ns
	8mA	GCLK	$t_{co}$	3.064	3.303	4.701	5.102	5.608	5.483	5.746	5.227	5.731	5.606	5.827	ns
		GCLK PLL	$t_{co}$	1.297	1.488	1.905	2.010	2.225	2.251	2.254	2.121	2.330	2.355	2.247	ns
1.2 V	2mA	GCLK	$t_{co}$	3.285	3.542	5.111	5.567	6.149	6.022	6.287	5.701	6.278	6.150	6.374	ns
		GCLK PLL	$t_{co}$	1.509	1.693	2.311	2.386	2.646	2.672	2.675	2.595	2.754	2.779	2.671	ns
	4mA	GCLK	$t_{co}$	3.105	3.353	4.818	5.244	5.774	5.647	5.912	5.368	5.900	5.772	5.996	ns
		GCLK PLL	$t_{co}$	1.348	1.529	2.018	2.124	2.361	2.387	2.390	2.262	2.466	2.491	2.383	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.036	3.270	4.620	5.004	5.495	5.369	5.631	5.123	5.614	5.488	5.708	ns
		GCLK PLL	$t_{co}$	1.269	1.445	1.845	1.930	2.124	2.145	2.153	2.028	2.225	2.245	2.142	ns
	12mA	GCLK	$t_{co}$	3.031	3.266	4.617	5.002	5.493	5.367	5.628	5.122	5.613	5.487	5.706	ns
		GCLK PLL	$t_{co}$	1.264	1.441	1.842	1.928	2.122	2.143	2.151	2.027	2.224	2.244	2.141	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.022	3.255	4.602	4.986	5.476	5.350	5.611	5.105	5.595	5.469	5.688	ns
		GCLK PLL	$t_{co}$	1.255	1.430	1.827	1.912	2.105	2.126	2.134	2.010	2.206	2.226	2.123	ns

**Table 1-74.** EP3SL150 Row Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.042	3.277	4.629	5.031	5.512	5.397	5.647	5.135	5.631	5.516	5.724	ns
		GCLK PLL	$t_{co}$	1.276	1.452	1.856	1.947	2.139	2.165	2.168	2.041	2.240	2.265	2.157	ns
	6mA	GCLK	$t_{co}$	3.027	3.263	4.626	5.030	5.511	5.396	5.646	5.133	5.629	5.514	5.722	ns
		GCLK PLL	$t_{co}$	1.271	1.447	1.854	1.946	2.138	2.164	2.167	2.039	2.238	2.263	2.155	ns
	8mA	GCLK	$t_{co}$	3.016	3.251	4.609	5.020	5.501	5.386	5.636	5.116	5.620	5.505	5.713	ns
		GCLK PLL	$t_{co}$	1.260	1.436	1.844	1.936	2.128	2.154	2.157	2.030	2.229	2.254	2.146	ns
	10mA	GCLK	$t_{co}$	2.992	3.228	4.593	5.007	5.488	5.373	5.623	5.101	5.608	5.493	5.701	ns
		GCLK PLL	$t_{co}$	1.249	1.425	1.831	1.923	2.115	2.141	2.144	2.018	2.217	2.242	2.134	ns
	12mA	GCLK	$t_{co}$	2.992	3.227	4.592	5.007	5.488	5.373	5.623	5.100	5.608	5.493	5.701	ns
		GCLK PLL	$t_{co}$	1.249	1.424	1.831	1.923	2.115	2.141	2.144	2.017	2.217	2.242	2.134	ns
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.002	3.236	4.590	5.004	5.483	5.368	5.618	5.095	5.602	5.487	5.695	ns
		GCLK PLL	$t_{co}$	1.257	1.431	1.830	1.920	2.110	2.136	2.139	2.013	2.211	2.236	2.128	ns
	16mA	GCLK	$t_{co}$	2.996	3.231	4.589	5.012	5.493	5.378	5.628	5.097	5.613	5.498	5.706	ns
		GCLK PLL	$t_{co}$	1.258	1.434	1.836	1.928	2.120	2.146	2.149	2.022	2.222	2.247	2.139	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.038	3.273	4.640	5.042	5.526	5.410	5.664	5.148	5.644	5.528	5.740	ns
		GCLK PLL	$t_{co}$	1.279	1.455	1.865	1.958	2.152	2.178	2.181	2.051	2.252	2.277	2.169	ns
	6mA	GCLK	$t_{co}$	3.015	3.251	4.622	5.032	5.515	5.400	5.650	5.132	5.634	5.519	5.727	ns
		GCLK PLL	$t_{co}$	1.265	1.441	1.854	1.948	2.142	2.168	2.171	2.042	2.243	2.268	2.160	ns
	8mA	GCLK	$t_{co}$	2.998	3.234	4.605	5.019	5.502	5.387	5.637	5.114	5.621	5.506	5.714	ns
		GCLK PLL	$t_{co}$	1.254	1.429	1.841	1.935	2.129	2.155	2.158	2.029	2.230	2.255	2.147	ns

**Table 1-74.** EP3SL150 Row Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.017	3.249	4.596	5.002	5.481	5.366	5.616	5.099	5.599	5.484	5.692	ns
		GCLK PLL	$t_{co}$	1.264	1.437	1.829	1.918	2.108	2.134	2.137	2.012	2.208	2.233	2.125	ns
	6mA	GCLK	$t_{co}$	3.005	3.237	4.587	5.001	5.480	5.365	5.615	5.091	5.599	5.484	5.692	ns
		GCLK PLL	$t_{co}$	1.257	1.431	1.827	1.917	2.107	2.133	2.136	2.011	2.208	2.233	2.125	ns
	8mA	GCLK	$t_{co}$	2.992	3.225	4.578	4.994	5.473	5.358	5.608	5.083	5.592	5.477	5.685	ns
		GCLK PLL	$t_{co}$	1.248	1.423	1.820	1.910	2.100	2.126	2.129	2.004	2.201	2.226	2.118	ns
	10mA	GCLK	$t_{co}$	2.994	3.227	4.581	4.997	5.477	5.362	5.612	5.086	5.595	5.480	5.688	ns
		GCLK PLL	$t_{co}$	1.251	1.425	1.823	1.913	2.104	2.130	2.133	2.007	2.204	2.229	2.121	ns
12mA	GCLK	$t_{co}$	2.987	3.222	4.579	5.000	5.480	5.365	5.615	5.086	5.600	5.485	5.693	ns	
	GCLK PLL	$t_{co}$	1.247	1.422	1.825	1.916	2.107	2.133	2.136	2.010	2.209	2.234	2.126	ns	
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	2.993	3.226	4.574	4.997	5.476	5.361	5.611	5.077	5.594	5.479	5.687	ns
		GCLK PLL	$t_{co}$	1.255	1.430	1.823	1.913	2.103	2.129	2.132	2.006	2.203	2.228	2.120	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.024	3.256	4.607	5.012	5.492	5.377	5.627	5.111	5.610	5.495	5.703	ns
		GCLK PLL	$t_{co}$	1.270	1.443	1.838	1.928	2.119	2.145	2.148	2.021	2.219	2.244	2.136	ns
	6mA	GCLK	$t_{co}$	3.012	3.246	4.603	5.014	5.494	5.379	5.629	5.108	5.613	5.498	5.706	ns
		GCLK PLL	$t_{co}$	1.264	1.438	1.839	1.930	2.121	2.147	2.150	2.023	2.222	2.247	2.139	ns
	8mA	GCLK	$t_{co}$	3.008	3.241	4.597	5.009	5.489	5.374	5.624	5.102	5.607	5.492	5.700	ns
		GCLK PLL	$t_{co}$	1.260	1.434	1.834	1.925	2.116	2.142	2.145	2.018	2.216	2.241	2.133	ns
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.023	3.255	4.618	5.028	5.511	5.396	5.646	5.125	5.629	5.514	5.722	ns
		GCLK PLL	$t_{co}$	1.272	1.445	1.851	1.944	2.138	2.164	2.167	2.037	2.238	2.263	2.155	ns
	6mA	GCLK	$t_{co}$	3.011	3.243	4.607	5.019	5.502	5.387	5.637	5.114	5.620	5.505	5.713	ns
		GCLK PLL	$t_{co}$	1.263	1.437	1.842	1.935	2.129	2.155	2.158	2.028	2.229	2.254	2.146	ns
	8mA	GCLK	$t_{co}$	3.007	3.241	4.611	5.027	5.511	5.396	5.646	5.120	5.630	5.515	5.723	ns
		GCLK PLL	$t_{co}$	1.262	1.437	1.849	1.943	2.138	2.164	2.167	2.037	2.239	2.264	2.156	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.142	3.376	4.672	5.050	5.535	5.409	5.670	5.171	5.656	5.530	5.749	ns
		GCLK PLL	$t_{co}$	1.375	1.551	1.897	1.976	2.164	2.185	2.193	2.076	2.267	2.287	2.184	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.142	3.376	4.672	5.050	5.535	5.409	5.670	5.171	5.656	5.530	5.749	ns
		GCLK PLL	$t_{co}$	1.375	1.551	1.897	1.976	2.164	2.185	2.193	2.076	2.267	2.287	2.184	ns



Table 1-75 through Table 1-75 list the maximum I/O timing parameters for EP3SL150 devices for differential I/O standards.

Table 1-75 lists the EP3SL150 column pins input timing parameters for differential I/O standards.

**Table 1-75.** EP3SL150 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		$t_h$	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	$t_{su}$	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		$t_h$	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
MINI-LVDS	GCLK	$t_{su}$	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		$t_h$	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	$t_{su}$	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		$t_h$	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
RSDS	GCLK	$t_{su}$	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		$t_h$	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	$t_{su}$	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		$t_h$	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.794	-0.829	-1.228	-1.334	-1.445	-1.387	-1.743	-1.333	-1.443	-1.391	-1.786	ns
		$t_h$	0.913	0.967	1.416	1.546	1.677	1.610	1.964	1.554	1.684	1.621	2.007	ns
	GCLK PLL	$t_{su}$	1.151	1.178	1.808	2.031	2.245	2.139	2.048	2.049	2.266	2.155	2.095	ns
		$t_h$	-0.898	-0.904	-1.405	-1.576	-1.742	-1.661	-1.565	-1.587	-1.753	-1.668	-1.609	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.794	-0.829	-1.228	-1.334	-1.445	-1.387	-1.743	-1.333	-1.443	-1.391	-1.786	ns
		$t_h$	0.913	0.967	1.416	1.546	1.677	1.610	1.964	1.554	1.684	1.621	2.007	ns
	GCLK PLL	$t_{su}$	1.151	1.178	1.808	2.031	2.245	2.139	2.048	2.049	2.266	2.155	2.095	ns
		$t_h$	-0.898	-0.904	-1.405	-1.576	-1.742	-1.661	-1.565	-1.587	-1.753	-1.668	-1.609	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_h$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{su}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_h$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_h$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{su}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_h$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_h$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{su}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_h$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns

**Table 1-75.** EP3SL150 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_h$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{su}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_h$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_h$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{su}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_h$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_h$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{su}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_h$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_h$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{su}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_h$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_h$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{su}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_h$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.821	-0.858	-1.259	-1.361	-1.480	-1.424	-1.777	-1.359	-1.471	-1.422	-1.815	ns
		$t_h$	0.940	0.996	1.449	1.576	1.715	1.648	2.003	1.583	1.717	1.653	2.041	ns
	GCLK PLL	$t_{su}$	1.124	1.149	1.777	2.004	2.210	2.102	2.014	2.023	2.238	2.124	2.066	ns
		$t_h$	-0.871	-0.875	-1.372	-1.546	-1.704	-1.623	-1.526	-1.558	-1.720	-1.636	-1.575	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.821	-0.858	-1.259	-1.361	-1.480	-1.424	-1.777	-1.359	-1.471	-1.422	-1.815	ns
		$t_h$	0.940	0.996	1.449	1.576	1.715	1.648	2.003	1.583	1.717	1.653	2.041	ns
	GCLK PLL	$t_{su}$	1.124	1.149	1.777	2.004	2.210	2.102	2.014	2.023	2.238	2.124	2.066	ns
		$t_h$	-0.871	-0.875	-1.372	-1.546	-1.704	-1.623	-1.526	-1.558	-1.720	-1.636	-1.575	ns

Table 1-76 lists the EP3SL150 row pins input timing parameters for differential I/O standards.

**Table 1-76.** EP3SL150 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
LVDS	GCLK	$t_{su}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{su}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
MINI-LVDS	GCLK	$t_{su}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{su}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
RSDS	GCLK	$t_{su}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{su}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.724	-0.765	-1.113	-1.210	-1.304	-1.254	-1.583	-1.211	-1.303	-1.255	-1.626	ns
		$t_h$	0.841	0.898	1.302	1.420	1.535	1.474	1.802	1.429	1.543	1.483	1.846	ns
	GCLK PLL	$t_{su}$	1.154	1.172	1.862	2.100	2.338	2.219	2.155	2.117	2.360	2.238	2.203	ns
		$t_h$	-0.900	-0.902	-1.458	-1.649	-1.837	-1.746	-1.674	-1.657	-1.847	-1.753	-1.718	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.724	-0.765	-1.113	-1.210	-1.304	-1.254	-1.583	-1.211	-1.303	-1.255	-1.626	ns
		$t_h$	0.841	0.898	1.302	1.420	1.535	1.474	1.802	1.429	1.543	1.483	1.846	ns
	GCLK PLL	$t_{su}$	1.154	1.172	1.862	2.100	2.338	2.219	2.155	2.117	2.360	2.238	2.203	ns
		$t_h$	-0.900	-0.902	-1.458	-1.649	-1.837	-1.746	-1.674	-1.657	-1.847	-1.753	-1.718	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns

**Table 1-76.** EP3SL150 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.756	-0.798	-1.145	-1.241	-1.345	-1.296	-1.623	-1.238	-1.337	-1.291	-1.661	ns
		$t_h$	0.873	0.931	1.336	1.454	1.579	1.518	1.847	1.459	1.582	1.521	1.886	ns
	GCLK PLL	$t_{su}$	1.122	1.139	1.825	2.064	2.293	2.173	2.110	2.086	2.321	2.197	2.163	ns
		$t_h$	-0.868	-0.869	-1.422	-1.611	-1.789	-1.698	-1.625	-1.623	-1.805	-1.711	-1.674	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.756	-0.798	-1.145	-1.241	-1.345	-1.296	-1.623	-1.238	-1.337	-1.291	-1.661	ns
		$t_h$	0.873	0.931	1.336	1.454	1.579	1.518	1.847	1.459	1.582	1.521	1.886	ns
	GCLK PLL	$t_{su}$	1.122	1.139	1.825	2.064	2.293	2.173	2.110	2.086	2.321	2.197	2.163	ns
		$t_h$	-0.868	-0.869	-1.422	-1.611	-1.789	-1.698	-1.625	-1.623	-1.805	-1.711	-1.674	ns

Table 1-77 lists the EP3SL150 column pins output timing parameters for differential I/O standards.

**Table 1-77.** EP3SL150 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
LVDS_E_1R	—	GCLK	$t_{co}$	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns	
		GCLK PLL	$t_{co}$	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns	
LVDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns	
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns	
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns	
		GCLK PLL	$t_{co}$	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns	
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns	
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns	
RSDS_E_1R	—	GCLK	$t_{co}$	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns	
		GCLK PLL	$t_{co}$	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns	
RSDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns	
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.127	3.363	4.758	5.157	5.670	5.531	5.815	5.280	5.792	5.656	5.889	ns	
		GCLK PLL	$t_{co}$	1.335	1.513	1.956	2.056	2.272	2.283	2.310	2.161	2.379	2.389	2.297	ns	
	6mA	GCLK	$t_{co}$	3.117	3.353	4.748	5.146	5.660	5.521	5.805	5.269	5.782	5.646	5.879	ns	
		GCLK PLL	$t_{co}$	1.325	1.503	1.946	2.045	2.262	2.273	2.300	2.150	2.369	2.379	2.287	ns	
	8mA	GCLK	$t_{co}$	3.117	3.353	4.751	5.150	5.664	5.525	5.809	5.274	5.787	5.651	5.884	ns	
		GCLK PLL	$t_{co}$	1.325	1.503	1.949	2.049	2.266	2.277	2.304	2.155	2.374	2.384	2.292	ns	
	10mA	GCLK	$t_{co}$	3.110	3.347	4.744	5.144	5.658	5.519	5.803	5.267	5.781	5.645	5.878	ns	
		GCLK PLL	$t_{co}$	1.318	1.497	1.942	2.043	2.260	2.271	2.298	2.148	2.368	2.378	2.286	ns	
	12mA	GCLK	$t_{co}$	3.109	3.345	4.741	5.141	5.655	5.516	5.800	5.264	5.777	5.641	5.874	ns	
		GCLK PLL	$t_{co}$	1.317	1.495	1.939	2.040	2.257	2.268	2.295	2.145	2.364	2.374	2.282	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.131	3.367	4.762	5.161	5.674	5.535	5.819	5.284	5.797	5.661	5.894	ns
			GCLK PLL	$t_{co}$	1.339	1.517	1.960	2.060	2.276	2.287	2.314	2.165	2.384	2.394	2.302	ns

**Table 1-77.** EP3SL150 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.121	3.356	4.741	5.138	5.649	5.510	5.794	5.260	5.770	5.634	5.867	ns	
		GCLK PLL	$t_{co}$	1.329	1.506	1.939	2.037	2.251	2.262	2.289	2.141	2.357	2.367	2.275	ns	
	6mA	GCLK	$t_{co}$	3.116	3.352	4.741	5.138	5.650	5.511	5.795	5.261	5.772	5.636	5.869	ns	
		GCLK PLL	$t_{co}$	1.324	1.502	1.939	2.037	2.252	2.263	2.290	2.142	2.359	2.369	2.277	ns	
	8mA	GCLK	$t_{co}$	3.114	3.350	4.740	5.137	5.648	5.509	5.793	5.260	5.771	5.635	5.868	ns	
		GCLK PLL	$t_{co}$	1.322	1.500	1.938	2.036	2.250	2.261	2.288	2.141	2.358	2.368	2.276	ns	
	10mA	GCLK	$t_{co}$	3.106	3.341	4.730	5.127	5.639	5.500	5.784	5.250	5.761	5.625	5.858	ns	
		GCLK PLL	$t_{co}$	1.314	1.491	1.928	2.026	2.241	2.252	2.279	2.131	2.348	2.358	2.266	ns	
	12mA	GCLK	$t_{co}$	3.107	3.343	4.736	5.134	5.647	5.508	5.792	5.258	5.770	5.634	5.867	ns	
		GCLK PLL	$t_{co}$	1.315	1.493	1.934	2.033	2.249	2.260	2.287	2.139	2.357	2.367	2.275	ns	
	DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.106	3.340	4.719	5.115	5.625	5.486	5.770	5.237	5.746	5.610	5.843	ns
			GCLK PLL	$t_{co}$	1.314	1.490	1.917	2.014	2.227	2.238	2.265	2.118	2.333	2.343	2.251	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.118	3.353	4.737	5.133	5.643	5.504	5.788	5.256	5.765	5.629	5.862	ns	
		GCLK PLL	$t_{co}$	1.326	1.503	1.935	2.032	2.245	2.256	2.283	2.137	2.352	2.362	2.270	ns	
	6mA	GCLK	$t_{co}$	3.114	3.350	4.738	5.135	5.647	5.508	5.792	5.258	5.769	5.633	5.866	ns	
		GCLK PLL	$t_{co}$	1.322	1.500	1.936	2.034	2.249	2.260	2.287	2.139	2.356	2.366	2.274	ns	
	8mA	GCLK	$t_{co}$	3.104	3.339	4.727	5.124	5.635	5.496	5.780	5.247	5.757	5.621	5.854	ns	
		GCLK PLL	$t_{co}$	1.312	1.489	1.925	2.023	2.237	2.248	2.275	2.128	2.344	2.354	2.262	ns	
	10mA	GCLK	$t_{co}$	3.102	3.337	4.725	5.121	5.633	5.494	5.778	5.245	5.755	5.619	5.852	ns	
		GCLK PLL	$t_{co}$	1.310	1.487	1.923	2.020	2.235	2.246	2.273	2.126	2.342	2.352	2.260	ns	
	12mA	GCLK	$t_{co}$	3.102	3.338	4.728	5.126	5.638	5.499	5.783	5.249	5.761	5.625	5.858	ns	
		GCLK PLL	$t_{co}$	1.310	1.488	1.926	2.025	2.240	2.251	2.278	2.130	2.348	2.358	2.266	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.106	3.341	4.725	5.121	5.632	5.493	5.777	5.244	5.754	5.618	5.851	ns
			GCLK PLL	$t_{co}$	1.314	1.491	1.923	2.020	2.234	2.245	2.272	2.125	2.341	2.351	2.259	ns

**Table 1-77.** EP3SL150 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.132	3.370	4.770	5.169	5.682	5.543	5.827	5.292	5.804	5.668	5.901	ns	
		GCLK PLL	$t_{co}$	1.340	1.520	1.968	2.068	2.284	2.295	2.322	2.173	2.391	2.401	2.309	ns	
	6mA	GCLK	$t_{co}$	3.118	3.356	4.758	5.158	5.672	5.533	5.817	5.282	5.795	5.659	5.892	ns	
		GCLK PLL	$t_{co}$	1.326	1.506	1.956	2.057	2.274	2.285	2.312	2.163	2.382	2.392	2.300	ns	
	8mA	GCLK	$t_{co}$	3.106	3.343	4.741	5.140	5.654	5.515	5.799	5.264	5.777	5.641	5.874	ns	
		GCLK PLL	$t_{co}$	1.314	1.493	1.939	2.039	2.256	2.267	2.294	2.145	2.364	2.374	2.282	ns	
	10mA	GCLK	$t_{co}$	3.106	3.343	4.744	5.144	5.658	5.519	5.803	5.268	5.782	5.646	5.879	ns	
		GCLK PLL	$t_{co}$	1.314	1.493	1.942	2.043	2.260	2.271	2.298	2.149	2.369	2.379	2.287	ns	
	12mA	GCLK	$t_{co}$	3.102	3.339	4.737	5.136	5.651	5.512	5.796	5.261	5.774	5.638	5.871	ns	
		GCLK PLL	$t_{co}$	1.310	1.489	1.935	2.035	2.253	2.264	2.291	2.142	2.361	2.371	2.279	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.106	3.341	4.730	5.127	5.639	5.500	5.784	5.250	5.761	5.625	5.858	ns
			GCLK PLL	$t_{co}$	1.314	1.491	1.928	2.026	2.241	2.252	2.279	2.131	2.348	2.358	2.266	ns
16mA		GCLK	$t_{co}$	3.107	3.343	4.738	5.137	5.650	5.511	5.795	5.260	5.773	5.637	5.870	ns	
		GCLK PLL	$t_{co}$	1.315	1.493	1.936	2.036	2.252	2.263	2.290	2.141	2.360	2.370	2.278	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.135	3.373	4.769	5.167	5.680	5.541	5.825	5.291	5.802	5.666	5.899	ns	
		GCLK PLL	$t_{co}$	1.343	1.523	1.967	2.066	2.282	2.293	2.320	2.172	2.389	2.399	2.307	ns	
	6mA	GCLK	$t_{co}$	3.124	3.361	4.757	5.155	5.668	5.529	5.813	5.279	5.790	5.654	5.887	ns	
		GCLK PLL	$t_{co}$	1.332	1.511	1.955	2.054	2.270	2.281	2.308	2.160	2.377	2.387	2.295	ns	
	8mA	GCLK	$t_{co}$	3.119	3.357	4.757	5.156	5.669	5.530	5.814	5.280	5.792	5.656	5.889	ns	
		GCLK PLL	$t_{co}$	1.327	1.507	1.955	2.055	2.271	2.282	2.309	2.161	2.379	2.389	2.297	ns	
	10mA	GCLK	$t_{co}$	3.105	3.342	4.739	5.137	5.650	5.511	5.795	5.261	5.774	5.638	5.871	ns	
		GCLK PLL	$t_{co}$	1.313	1.492	1.937	2.036	2.252	2.263	2.290	2.142	2.361	2.371	2.279	ns	
	12mA	GCLK	$t_{co}$	3.103	3.340	4.737	5.135	5.648	5.509	5.793	5.259	5.771	5.635	5.868	ns	
		GCLK PLL	$t_{co}$	1.311	1.490	1.935	2.034	2.250	2.261	2.288	2.140	2.358	2.368	2.276	ns	
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.107	3.342	4.729	5.125	5.636	5.497	5.781	5.248	5.758	5.622	5.855	ns	
		GCLK PLL	$t_{co}$	1.315	1.492	1.927	2.024	2.238	2.249	2.276	2.129	2.345	2.355	2.263	ns	
	16mA	GCLK	$t_{co}$	3.107	3.343	4.737	5.135	5.648	5.509	5.793	5.259	5.771	5.635	5.868	ns	
		GCLK PLL	$t_{co}$	1.315	1.493	1.935	2.034	2.250	2.261	2.288	2.140	2.358	2.368	2.276	ns	

**Table 1-77.** EP3SL150 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.123	3.360	4.753	5.150	5.662	5.523	5.807	5.274	5.784	5.648	5.881	ns
		GCLK PLL	$t_{co}$	1.331	1.510	1.951	2.049	2.264	2.275	2.302	2.155	2.371	2.381	2.289	ns
	10mA	GCLK	$t_{co}$	3.123	3.360	4.753	5.150	5.662	5.523	5.807	5.274	5.784	5.648	5.881	ns
		GCLK PLL	$t_{co}$	1.331	1.510	1.951	2.049	2.264	2.275	2.302	2.155	2.371	2.381	2.289	ns
	12mA	GCLK	$t_{co}$	3.113	3.350	4.743	5.140	5.652	5.513	5.797	5.264	5.775	5.639	5.872	ns
		GCLK PLL	$t_{co}$	1.321	1.500	1.941	2.039	2.254	2.265	2.292	2.145	2.362	2.372	2.280	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.106	3.342	4.729	5.125	5.636	5.497	5.781	5.248	5.758	5.622	5.855	ns
		GCLK PLL	$t_{co}$	1.314	1.492	1.927	2.024	2.238	2.249	2.276	2.129	2.345	2.355	2.263	ns



Table 1-78 lists the EP3SL150 row pins output timing parameters for differential I/O standards.

**Table 1-78.** EP3SL150 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
LVDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
		GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459	ns
LVDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
		GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
		GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283	ns
MINI-LVDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
		GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
		GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
		GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283	ns
RSDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
		GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
		GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
		GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.132	3.375	4.783	5.187	5.698	5.562	5.817	5.313	5.826	5.689	5.892	ns
		GCLK PLL	$t_{co}$	1.352	1.536	1.993	2.096	2.309	2.322	2.325	2.204	2.420	2.430	2.312	ns
	6mA	GCLK	$t_{co}$	3.118	3.361	4.770	5.174	5.685	5.549	5.804	5.299	5.813	5.676	5.879	ns
		GCLK PLL	$t_{co}$	1.338	1.522	1.980	2.083	2.296	2.309	2.312	2.190	2.407	2.417	2.299	ns
	8mA	GCLK	$t_{co}$	3.114	3.357	4.768	5.174	5.686	5.550	5.805	5.299	5.815	5.678	5.881	ns
		GCLK PLL	$t_{co}$	1.334	1.518	1.978	2.083	2.297	2.310	2.313	2.190	2.409	2.419	2.301	ns

**Table 1-78.** EP3SL150 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.130	3.372	4.769	5.171	5.680	5.544	5.799	5.296	5.808	5.671	5.874	ns
		GCLK PLL	$t_{co}$	1.350	1.533	1.979	2.080	2.291	2.304	2.307	2.187	2.402	2.412	2.294	ns
	6mA	GCLK	$t_{co}$	3.119	3.362	4.765	5.167	5.677	5.541	5.796	5.293	5.805	5.668	5.871	ns
		GCLK PLL	$t_{co}$	1.339	1.523	1.975	2.076	2.288	2.301	2.304	2.184	2.399	2.409	2.291	ns
	8mA	GCLK	$t_{co}$	3.116	3.359	4.763	5.165	5.675	5.539	5.794	5.291	5.804	5.667	5.870	ns
		GCLK PLL	$t_{co}$	1.336	1.520	1.973	2.074	2.286	2.299	2.302	2.182	2.398	2.408	2.290	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.127	3.369	4.764	5.166	5.674	5.538	5.793	5.291	5.802	5.665	5.868	ns
		GCLK PLL	$t_{co}$	1.347	1.530	1.974	2.075	2.285	2.298	2.301	2.182	2.396	2.406	2.288	ns
	6mA	GCLK	$t_{co}$	3.117	3.360	4.762	5.164	5.673	5.537	5.792	5.290	5.802	5.665	5.868	ns
		GCLK PLL	$t_{co}$	1.337	1.521	1.972	2.073	2.284	2.297	2.300	2.181	2.396	2.406	2.288	ns
	8mA	GCLK	$t_{co}$	3.103	3.346	4.747	5.149	5.659	5.523	5.778	5.275	5.787	5.650	5.853	ns
		GCLK PLL	$t_{co}$	1.323	1.507	1.957	2.058	2.270	2.283	2.286	2.166	2.381	2.391	2.273	ns
	10mA	GCLK	$t_{co}$	3.100	3.342	4.743	5.145	5.655	5.519	5.774	5.271	5.783	5.646	5.849	ns
		GCLK PLL	$t_{co}$	1.320	1.503	1.953	2.054	2.266	2.279	2.282	2.162	2.377	2.387	2.269	ns
	12mA	GCLK	$t_{co}$	3.097	3.340	4.744	5.148	5.658	5.522	5.777	5.274	5.787	5.650	5.853	ns
		GCLK PLL	$t_{co}$	1.317	1.501	1.954	2.057	2.269	2.282	2.285	2.165	2.381	2.391	2.273	ns
	16mA	GCLK	$t_{co}$	3.098	3.340	4.734	5.136	5.645	5.509	5.764	5.261	5.773	5.636	5.839	ns
		GCLK PLL	$t_{co}$	1.318	1.501	1.944	2.045	2.256	2.269	2.272	2.152	2.367	2.377	2.259	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.147	3.393	4.805	5.209	5.721	5.585	5.840	5.335	5.849	5.712	5.915	ns
		GCLK PLL	$t_{co}$	1.367	1.554	2.015	2.118	2.332	2.345	2.348	2.226	2.443	2.453	2.335	ns
	6mA	GCLK	$t_{co}$	3.123	3.369	4.787	5.192	5.704	5.568	5.823	5.318	5.834	5.697	5.900	ns
		GCLK PLL	$t_{co}$	1.343	1.530	1.997	2.101	2.315	2.328	2.331	2.209	2.428	2.438	2.320	ns
	8mA	GCLK	$t_{co}$	3.106	3.350	4.765	5.170	5.682	5.546	5.801	5.296	5.812	5.675	5.878	ns
		GCLK PLL	$t_{co}$	1.326	1.511	1.975	2.079	2.293	2.306	2.309	2.187	2.406	2.416	2.298	ns

**Table 1-78.** EP3SL150 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.151	3.396	4.805	5.209	5.720	5.584	5.839	5.335	5.849	5.712	5.915	ns	
		GCLK PLL	$t_{co}$	1.371	1.557	2.015	2.118	2.331	2.344	2.347	2.226	2.443	2.453	2.335	ns	
	6mA	GCLK	$t_{co}$	3.136	3.381	4.791	5.194	5.705	5.569	5.824	5.320	5.834	5.697	5.900	ns	
		GCLK PLL	$t_{co}$	1.356	1.542	2.001	2.103	2.316	2.329	2.332	2.211	2.428	2.438	2.320	ns	
	8mA	GCLK	$t_{co}$	3.125	3.370	4.786	5.191	5.702	5.566	5.821	5.317	5.832	5.695	5.898	ns	
		GCLK PLL	$t_{co}$	1.345	1.531	1.996	2.100	2.313	2.326	2.329	2.208	2.426	2.436	2.318	ns	
	10mA	GCLK	$t_{co}$	3.105	3.350	4.763	5.167	5.679	5.543	5.798	5.294	5.808	5.671	5.874	ns	
		GCLK PLL	$t_{co}$	1.325	1.511	1.973	2.076	2.290	2.303	2.306	2.185	2.402	2.412	2.294	ns	
	12mA	GCLK	$t_{co}$	3.102	3.346	4.759	5.164	5.675	5.539	5.794	5.290	5.805	5.668	5.871	ns	
		GCLK PLL	$t_{co}$	1.322	1.507	1.969	2.073	2.286	2.299	2.302	2.181	2.399	2.409	2.291	ns	
	8mA	GCLK	$t_{co}$	3.107	3.350	4.750	5.152	5.661	5.525	5.780	5.277	5.789	5.652	5.855	ns	
		GCLK PLL	$t_{co}$	1.327	1.511	1.960	2.061	2.272	2.285	2.288	2.168	2.383	2.393	2.275	ns	
	16mA	GCLK	$t_{co}$	3.100	3.343	4.749	5.153	5.664	5.528	5.783	5.280	5.794	5.657	5.860	ns	
		GCLK PLL	$t_{co}$	1.320	1.504	1.959	2.062	2.275	2.288	2.291	2.171	2.388	2.398	2.280	ns	
	DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.138	3.382	4.787	5.190	5.700	5.564	5.819	5.316	5.829	5.692	5.895	ns
			GCLK PLL	$t_{co}$	1.358	1.543	1.997	2.099	2.311	2.324	2.327	2.207	2.423	2.433	2.315	ns
12mA		GCLK	$t_{co}$	3.120	3.365	4.772	5.175	5.685	5.549	5.804	5.301	5.814	5.677	5.880	ns	
		GCLK PLL	$t_{co}$	1.340	1.526	1.982	2.084	2.296	2.309	2.312	2.192	2.408	2.418	2.300	ns	
16mA		GCLK	$t_{co}$	3.106	3.349	4.749	5.151	5.660	5.524	5.779	5.277	5.789	5.652	5.855	ns	
		GCLK PLL	$t_{co}$	1.326	1.510	1.959	2.060	2.271	2.284	2.287	2.168	2.383	2.393	2.275	ns	

Table 1-79 and Table 1-80 list the EP3SL150 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-79 lists the EP3SL150 column pin delay adders when using the regional clock.

**Table 1-79.** EP3SL150 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.198	0.152	0.22	0.258	0.27	0.262	0.393	0.244	0.271	0.261	0.495	ns
RCLK PLL input adder	2.453	2.426	3.654	4.098	4.422	4.224	4.664	4.106	4.447	4.101	4.707	ns
RCLK output adder	-0.374	-0.152	-0.216	-0.232	-0.248	-0.227	-0.367	-0.11	-0.127	-0.106	-0.303	ns
RCLK PLL output adder	-2.017	-1.798	-2.68	-2.859	-3.011	-2.872	-2.715	-2.714	-3.082	-2.791	-2.766	ns

Table 1-80 lists the EP3SL150 row pin delay adders when using the regional clock.

**Table 1-80.** EP3SL150 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.107	0.115	0.164	0.165	0.167	0.165	0.285	0.158	0.159	0.158	0.29	ns
RCLK PLL input adder	0.074	0.075	0.116	0.123	0.129	0.126	0.218	0.114	0.118	0.114	0.223	ns
RCLK output adder	-0.093	-0.103	-0.137	-0.136	-0.133	-0.134	-0.257	-0.125	-0.121	-0.122	-0.261	ns
RCLK PLL output adder	-0.063	-0.065	-0.097	-0.102	-0.103	-0.102	-0.198	-0.088	-0.089	-0.088	-0.202	ns

### EP3SL200 I/O Timing Parameters

Table 1-81 through Table 1-84 list the maximum I/O timing parameters for EP3SL200 devices for single-ended I/O standards.

Table 1-81 lists the EP3SL200 column pins input timing parameters for single-ended I/O standards.

**Table 1-81.** EP3SL200 Column Pins Input Timing Parameters (Part 1 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-1.137	-1.173	-1.810	-1.775	-2.002	-1.934	-2.482	-1.775	-2.002	-1.934	-2.482	ns
		t <sub>h</sub>	1.285	1.319	2.032	2.008	2.259	2.177	2.724	2.008	2.259	2.177	2.724	ns
	GCLK PLL	t <sub>su</sub>	-1.465	-1.465	-2.238	-2.271	-2.558	-2.477	-2.997	-2.271	-2.558	-2.477	-2.997	ns
		t <sub>h</sub>	1.778	1.778	2.727	2.776	3.113	3.000	3.543	2.776	3.113	3.000	3.543	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.137	-1.173	-1.810	-1.775	-2.002	-1.934	-2.482	-1.775	-2.002	-1.934	-2.482	ns
		t <sub>h</sub>	1.285	1.319	2.032	2.008	2.259	2.177	2.724	2.008	2.259	2.177	2.724	ns
	GCLK PLL	t <sub>su</sub>	-1.465	-1.465	-2.238	-2.271	-2.558	-2.477	-2.997	-2.271	-2.558	-2.477	-2.997	ns
		t <sub>h</sub>	1.778	1.778	2.727	2.776	3.113	3.000	3.543	2.776	3.113	3.000	3.543	ns

**Table 1-81.** EP3SL200 Column Pins Input Timing Parameters (Part 2 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V LVTTTL	GCLK	$t_{su}$	-1.148	-1.184	-1.809	-1.777	-2.001	-1.933	-2.481	-1.777	-2.001	-1.933	-2.481	ns
		$t_h$	1.296	1.330	2.031	2.010	2.258	2.176	2.723	2.010	2.258	2.176	2.723	ns
	GCLK PLL	$t_{su}$	-1.476	-1.476	-2.237	-2.273	-2.557	-2.476	-2.996	-2.273	-2.557	-2.476	-2.996	ns
		$t_h$	1.789	1.789	2.726	2.778	3.112	2.999	3.542	2.778	3.112	2.999	3.542	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-1.148	-1.184	-1.809	-1.777	-2.001	-1.933	-2.481	-1.777	-2.001	-1.933	-2.481	ns
		$t_h$	1.296	1.330	2.031	2.010	2.258	2.176	2.723	2.010	2.258	2.176	2.723	ns
	GCLK PLL	$t_{su}$	-1.476	-1.476	-2.237	-2.273	-2.557	-2.476	-2.996	-2.273	-2.557	-2.476	-2.996	ns
		$t_h$	1.789	1.789	2.726	2.778	3.112	2.999	3.542	2.778	3.112	2.999	3.542	ns
2.5 V	GCLK	$t_{su}$	-1.143	-1.179	-1.818	-1.789	-2.020	-1.952	-2.500	-1.789	-2.020	-1.952	-2.500	ns
		$t_h$	1.291	1.325	2.040	2.022	2.277	2.195	2.742	2.022	2.277	2.195	2.742	ns
	GCLK PLL	$t_{su}$	-1.471	-1.471	-2.246	-2.285	-2.576	-2.495	-3.015	-2.285	-2.576	-2.495	-3.015	ns
		$t_h$	1.784	1.784	2.735	2.790	3.131	3.018	3.561	2.790	3.131	3.018	3.561	ns
1.8 V	GCLK	$t_{su}$	-1.163	-1.201	-1.858	-1.825	-2.018	-1.950	-2.498	-1.825	-2.018	-1.950	-2.498	ns
		$t_h$	1.313	1.349	2.080	2.058	2.275	2.193	2.740	2.058	2.275	2.193	2.740	ns
	GCLK PLL	$t_{su}$	-1.493	-1.493	-2.286	-2.321	-2.574	-2.493	-3.013	-2.321	-2.574	-2.493	-3.013	ns
		$t_h$	1.808	1.808	2.775	2.826	3.129	3.016	3.559	2.826	3.129	3.016	3.559	ns
1.5 V	GCLK	$t_{su}$	-1.153	-1.191	-1.835	-1.793	-1.948	-1.880	-2.428	-1.793	-1.948	-1.880	-2.428	ns
		$t_h$	1.303	1.339	2.057	2.026	2.205	2.123	2.670	2.026	2.205	2.123	2.670	ns
	GCLK PLL	$t_{su}$	-1.483	-1.483	-2.263	-2.289	-2.504	-2.423	-2.943	-2.289	-2.504	-2.423	-2.943	ns
		$t_h$	1.798	1.798	2.752	2.794	3.059	2.946	3.489	2.794	3.059	2.946	3.489	ns
1.2 V	GCLK	$t_{su}$	-1.101	-1.139	-1.758	-1.694	-1.792	-1.724	-2.272	-1.694	-1.792	-1.724	-2.272	ns
		$t_h$	1.251	1.287	1.980	1.927	2.049	1.967	2.514	1.927	2.049	1.967	2.514	ns
	GCLK PLL	$t_{su}$	-1.431	-1.431	-2.186	-2.190	-2.348	-2.267	-2.787	-2.190	-2.348	-2.267	-2.787	ns
		$t_h$	1.746	1.746	2.675	2.695	2.903	2.790	3.333	2.695	2.903	2.790	3.333	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-1.072	-1.110	-1.730	-1.678	-1.794	-1.726	-2.274	-1.678	-1.794	-1.726	-2.274	ns
		$t_h$	1.222	1.258	1.952	1.911	2.051	1.969	2.516	1.911	2.051	1.969	2.516	ns
	GCLK PLL	$t_{su}$	-1.402	-1.402	-2.158	-2.174	-2.350	-2.269	-2.789	-2.174	-2.350	-2.269	-2.789	ns
		$t_h$	1.717	1.717	2.647	2.679	2.905	2.792	3.335	2.679	2.905	2.792	3.335	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-1.072	-1.110	-1.730	-1.678	-1.794	-1.726	-2.274	-1.678	-1.794	-1.726	-2.274	ns
		$t_h$	1.222	1.258	1.952	1.911	2.051	1.969	2.516	1.911	2.051	1.969	2.516	ns
	GCLK PLL	$t_{su}$	-1.402	-1.402	-2.158	-2.174	-2.350	-2.269	-2.789	-2.174	-2.350	-2.269	-2.789	ns
		$t_h$	1.717	1.717	2.647	2.679	2.905	2.792	3.335	2.679	2.905	2.792	3.335	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-1.066	-1.104	-1.717	-1.673	-1.794	-1.724	-2.272	-1.673	-1.794	-1.724	-2.272	ns
		$t_h$	1.216	1.252	1.939	1.903	2.048	1.966	2.509	1.903	2.048	1.966	2.509	ns
	GCLK PLL	$t_{su}$	-1.396	-1.396	-2.145	-2.166	-2.347	-2.264	-2.787	-2.166	-2.347	-2.264	-2.787	ns
		$t_h$	1.711	1.711	2.634	2.668	2.899	2.786	3.328	2.668	2.899	2.786	3.328	ns

Table 1-81. EP3SL200 Column Pins Input Timing Parameters (Part 3 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
SSTL-18 CLASS II	GCLK	$t_{su}$	-1.066	-1.104	-1.717	-1.673	-1.794	-1.724	-2.272	-1.673	-1.794	-1.724	-2.272	ns
		$t_h$	1.216	1.252	1.939	1.903	2.048	1.966	2.509	1.903	2.048	1.966	2.509	ns
	GCLK PLL	$t_{su}$	-1.396	-1.396	-2.145	-2.166	-2.347	-2.264	-2.787	-2.166	-2.347	-2.264	-2.787	ns
		$t_h$	1.711	1.711	2.634	2.668	2.899	2.786	3.328	2.668	2.899	2.786	3.328	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-1.055	-1.093	-1.706	-1.662	-1.775	-1.705	-2.253	-1.662	-1.775	-1.705	-2.253	ns
		$t_h$	1.205	1.241	1.927	1.892	2.029	1.947	2.490	1.892	2.029	1.947	2.490	ns
	GCLK PLL	$t_{su}$	-1.385	-1.385	-2.134	-2.155	-2.328	-2.245	-2.768	-2.155	-2.328	-2.245	-2.768	ns
		$t_h$	1.700	1.700	2.622	2.657	2.880	2.767	3.309	2.657	2.880	2.767	3.309	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.055	-1.093	-1.706	-1.662	-1.775	-1.705	-2.253	-1.662	-1.775	-1.705	-2.253	ns
		$t_h$	1.205	1.241	1.927	1.892	2.029	1.947	2.490	1.892	2.029	1.947	2.490	ns
	GCLK PLL	$t_{su}$	-1.385	-1.385	-2.134	-2.155	-2.328	-2.245	-2.768	-2.155	-2.328	-2.245	-2.768	ns
		$t_h$	1.700	1.700	2.622	2.657	2.880	2.767	3.309	2.657	2.880	2.767	3.309	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.066	-1.104	-1.717	-1.673	-1.794	-1.724	-2.272	-1.673	-1.794	-1.724	-2.272	ns
		$t_h$	1.216	1.252	1.939	1.903	2.048	1.966	2.509	1.903	2.048	1.966	2.509	ns
	GCLK PLL	$t_{su}$	-1.396	-1.396	-2.145	-2.166	-2.347	-2.264	-2.787	-2.166	-2.347	-2.264	-2.787	ns
		$t_h$	1.711	1.711	2.634	2.668	2.899	2.786	3.328	2.668	2.899	2.786	3.328	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.066	-1.104	-1.717	-1.673	-1.794	-1.724	-2.272	-1.673	-1.794	-1.724	-2.272	ns
		$t_h$	1.216	1.252	1.939	1.903	2.048	1.966	2.509	1.903	2.048	1.966	2.509	ns
	GCLK PLL	$t_{su}$	-1.396	-1.396	-2.145	-2.166	-2.347	-2.264	-2.787	-2.166	-2.347	-2.264	-2.787	ns
		$t_h$	1.711	1.711	2.634	2.668	2.899	2.786	3.328	2.668	2.899	2.786	3.328	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.055	-1.093	-1.706	-1.662	-1.775	-1.705	-2.253	-1.662	-1.775	-1.705	-2.253	ns
		$t_h$	1.205	1.241	1.927	1.892	2.029	1.947	2.490	1.892	2.029	1.947	2.490	ns
	GCLK PLL	$t_{su}$	-1.385	-1.385	-2.134	-2.155	-2.328	-2.245	-2.768	-2.155	-2.328	-2.245	-2.768	ns
		$t_h$	1.700	1.700	2.622	2.657	2.880	2.767	3.309	2.657	2.880	2.767	3.309	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.055	-1.093	-1.706	-1.662	-1.775	-1.705	-2.253	-1.662	-1.775	-1.705	-2.253	ns
		$t_h$	1.205	1.241	1.927	1.892	2.029	1.947	2.490	1.892	2.029	1.947	2.490	ns
	GCLK PLL	$t_{su}$	-1.385	-1.385	-2.134	-2.155	-2.328	-2.245	-2.768	-2.155	-2.328	-2.245	-2.768	ns
		$t_h$	1.700	1.700	2.622	2.657	2.880	2.767	3.309	2.657	2.880	2.767	3.309	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.043	-1.081	-1.696	-1.651	-1.759	-1.689	-2.237	-1.651	-1.759	-1.689	-2.237	ns
		$t_h$	1.193	1.229	1.917	1.881	2.013	1.931	2.474	1.881	2.013	1.931	2.474	ns
	GCLK PLL	$t_{su}$	-1.373	-1.373	-2.124	-2.144	-2.312	-2.229	-2.752	-2.144	-2.312	-2.229	-2.752	ns
		$t_h$	1.688	1.688	2.612	2.646	2.864	2.751	3.293	2.646	2.864	2.751	3.293	ns
3.0-V PCI	GCLK	$t_{su}$	-1.043	-1.081	-1.696	-1.651	-1.759	-1.689	-2.237	-1.651	-1.759	-1.689	-2.237	ns
		$t_h$	1.193	1.229	1.917	1.881	2.013	1.931	2.474	1.881	2.013	1.931	2.474	ns
	GCLK PLL	$t_{su}$	-1.373	-1.373	-2.124	-2.144	-2.312	-2.229	-2.752	-2.144	-2.312	-2.229	-2.752	ns
		$t_h$	1.688	1.688	2.612	2.646	2.864	2.751	3.293	2.646	2.864	2.751	3.293	ns

**Table 1-81.** EP3SL200 Column Pins Input Timing Parameters (Part 4 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V PCI-X	GCLK	$t_{su}$	-1.148	-1.184	-1.809	-1.777	-2.001	-1.933	-2.481	-1.777	-2.001	-1.933	-2.481	ns
		$t_h$	1.296	1.330	2.031	2.010	2.258	2.176	2.723	2.010	2.258	2.176	2.723	ns
	GCLK PLL	$t_{su}$	-1.476	-1.476	-2.237	-2.273	-2.557	-2.476	-2.996	-2.273	-2.557	-2.476	-2.996	ns
		$t_h$	1.789	1.789	2.726	2.778	3.112	2.999	3.542	2.778	3.112	2.999	3.542	ns

Table 1-82 lists the EP3SL200 row pins input timing parameters for single-ended I/O standards.

**Table 1-82.** EP3SL200 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.3-V LVTTL	GCLK	$t_{su}$	-1.298	-1.321	-1.972	-1.978	-2.368	-2.291	-2.712	-2.132	-2.388	-2.291	-2.712	ns
		$t_h$	1.432	1.473	1.671	1.862	1.969	1.850	1.775	1.751	1.869	1.850	1.775	ns
	GCLK PLL	$t_{su}$	0.915	0.938	2.210	2.223	2.633	2.541	2.966	2.384	2.665	2.541	2.966	ns
		$t_h$	-0.638	-0.643	-1.972	-1.978	-2.368	-2.291	-2.712	-2.132	-2.388	-2.291	-2.712	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-1.298	-1.321	-1.972	-1.978	-2.368	-2.291	-2.712	-2.132	-2.388	-2.291	-2.712	ns
		$t_h$	1.432	1.473	1.671	1.862	1.969	1.850	1.775	1.751	1.869	1.850	1.775	ns
	GCLK PLL	$t_{su}$	0.915	0.938	2.210	2.223	2.633	2.541	2.966	2.384	2.665	2.541	2.966	ns
		$t_h$	-0.638	-0.643	-1.969	-1.979	-2.371	-2.294	-2.715	-2.131	-2.393	-2.294	-2.715	ns
3.0-V LVTTL	GCLK	$t_{su}$	-1.304	-1.332	2.207	2.224	2.636	2.544	2.969	2.383	2.670	2.544	2.969	ns
		$t_h$	1.438	1.484	-1.969	-1.979	-2.371	-2.294	-2.715	-2.131	-2.393	-2.294	-2.715	ns
	GCLK PLL	$t_{su}$	0.909	0.927	1.674	1.861	1.966	1.847	1.772	1.752	1.864	1.847	1.772	ns
		$t_h$	-0.632	-0.632	2.207	2.224	2.636	2.544	2.969	2.383	2.670	2.544	2.969	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-1.304	-1.332	2.216	2.237	2.651	2.559	2.984	2.392	2.680	2.559	2.984	ns
		$t_h$	1.438	1.484	-1.978	-1.992	-2.386	-2.309	-2.730	-2.140	-2.403	-2.309	-2.730	ns
	GCLK PLL	$t_{su}$	0.909	0.927	1.665	1.848	1.951	1.832	1.757	1.743	1.854	1.832	1.757	ns
		$t_h$	-0.632	-0.632	2.216	2.237	2.651	2.559	2.984	2.392	2.680	2.559	2.984	ns
2.5 V	GCLK	$t_{su}$	-1.292	-1.325	1.625	1.722	1.945	1.834	1.742	1.710	1.853	1.834	1.742	ns
		$t_h$	1.426	1.477	2.254	2.297	2.649	2.557	2.982	2.425	2.681	2.557	2.982	ns
	GCLK PLL	$t_{su}$	0.921	0.934	-2.017	-2.051	-2.384	-2.307	-2.728	-2.173	-2.404	-2.307	-2.728	ns
		$t_h$	-0.644	-0.639	1.625	1.722	1.945	1.834	1.742	1.710	1.853	1.834	1.742	ns
1.8 V	GCLK	$t_{su}$	-1.322	-1.354	1.649	1.754	2.013	1.902	1.810	1.741	1.918	1.902	1.810	ns
		$t_h$	0.891	0.902	2.230	2.265	2.581	2.489	2.914	2.394	2.616	2.489	2.914	ns
	GCLK PLL	$t_{su}$	1.457	1.507	-1.993	-2.019	-2.316	-2.239	-2.660	-2.142	-2.339	-2.239	-2.660	ns
		$t_h$	-1.312	-1.343	1.728	1.855	2.172	2.061	1.969	1.837	2.073	2.061	1.969	ns

**Table 1-82.** EP3SL200 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.5 V	GCLK	$t_{su}$	0.901	0.913	2.151	2.164	2.422	2.330	2.755	2.298	2.461	2.330	2.755	ns
		$t_h$	1.447	1.496	-1.914	-1.918	-2.157	-2.080	-2.501	-2.046	-2.184	-2.080	-2.501	ns
	GCLK PLL	$t_{su}$	-1.252	-1.290	1.751	1.957	2.171	2.052	1.977	1.855	2.071	2.052	1.977	ns
		$t_h$	0.961	0.966	2.130	2.128	2.431	2.339	2.764	2.280	2.463	2.339	2.764	ns
1.2 V	GCLK	$t_{su}$	1.387	1.443	-1.876	-1.893	-2.152	-2.074	-2.497	-2.014	-2.177	-2.074	-2.497	ns
		$t_h$	-1.235	-1.266	1.766	-1.893	-2.152	-2.074	-2.497	-2.014	-2.177	-2.074	-2.497	ns
	GCLK PLL	$t_{su}$	0.978	0.992	2.113	2.137	2.415	2.323	2.747	2.264	2.451	2.323	2.747	ns
		$t_h$	1.370	1.419	-1.876	1.882	2.174	2.064	1.973	1.869	2.080	2.064	1.973	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-1.235	-1.266	1.766	1.882	2.174	2.064	1.973	1.869	2.080	2.064	1.973	ns
		$t_h$	0.978	0.992	2.113	-1.387	-1.620	-1.542	-1.441	-1.361	-1.518	-1.542	-1.441	ns
	GCLK PLL	$t_{su}$	1.370	1.419	-1.876	-1.893	-2.152	-2.074	-2.497	-2.014	-2.177	-2.074	-2.497	ns
		$t_h$	-1.226	-1.255	1.766	2.137	2.415	2.323	2.747	2.264	2.451	2.323	2.747	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	0.987	1.001	2.113	1.882	2.174	2.064	1.973	1.869	2.080	2.064	1.973	ns
		$t_h$	1.361	1.408	-1.876	-1.387	-1.620	-1.542	-1.441	-1.361	-1.518	-1.542	-1.441	ns
	GCLK PLL	$t_{su}$	-1.226	-1.255	-1.302	-1.883	-2.134	-2.056	-2.479	-2.003	-2.160	-2.056	-2.479	ns
		$t_h$	0.987	1.001	-1.863	2.127	2.397	2.305	2.729	2.253	2.434	2.305	2.729	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	1.361	1.408	2.101	1.892	2.192	2.082	1.991	1.880	2.097	2.082	1.991	ns
		$t_h$	-1.212	-1.243	1.766	1.892	2.192	2.082	1.991	1.880	2.097	2.082	1.991	ns
	GCLK PLL	$t_{su}$	1.001	1.013	2.113	-1.397	-1.638	-1.560	-1.459	-1.372	-1.535	-1.560	-1.459	ns
		$t_h$	1.347	1.396	-1.876	-1.883	-2.134	-2.056	-2.479	-2.003	-2.160	-2.056	-2.479	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-1.226	-1.255	1.766	-1.387	-1.620	-1.542	-1.441	-1.361	-1.518	-1.542	-1.441	ns
		$t_h$	0.987	1.001	2.113	-1.893	-2.152	-2.074	-2.497	-2.014	-2.177	-2.074	-2.497	ns
	GCLK PLL	$t_{su}$	1.361	1.408	-1.876	2.137	2.415	2.323	2.747	2.264	2.451	2.323	2.747	ns
		$t_h$	-1.226	-1.255	-1.302	1.882	2.174	2.064	1.973	1.869	2.080	2.064	1.973	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	0.987	1.001	-1.863	-1.387	-1.620	-1.542	-1.441	-1.361	-1.518	-1.542	-1.441	ns
		$t_h$	1.361	1.408	2.101	-1.893	-2.152	-2.074	-2.497	-2.014	-2.177	-2.074	-2.497	ns
	GCLK PLL	$t_{su}$	-1.212	-1.243	1.781	2.137	2.415	2.323	2.747	2.264	2.451	2.323	2.747	ns
		$t_h$	1.001	1.013	-1.302	1.882	2.174	2.064	1.973	1.869	2.080	2.064	1.973	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	1.347	1.396	-1.863	-1.387	-1.620	-1.542	-1.441	-1.361	-1.518	-1.542	-1.441	ns
		$t_h$	-1.212	-1.243	-1.311	1.892	2.192	2.082	1.991	1.880	2.097	2.082	1.991	ns
	GCLK PLL	$t_{su}$	1.001	1.013	-1.854	-1.397	-1.638	-1.560	-1.459	-1.372	-1.535	-1.560	-1.459	ns
		$t_h$	1.347	1.396	2.092	-1.883	-2.134	-2.056	-2.479	-2.003	-2.160	-2.056	-2.479	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.203	-1.231	1.790	2.127	2.397	2.305	2.729	2.253	2.434	2.305	2.729	ns
		$t_h$	1.010	1.025	-1.311	1.892	2.192	2.082	1.991	1.880	2.097	2.082	1.991	ns
	GCLK PLL	$t_{su}$	1.338	1.384	-1.854	-1.397	-1.638	-1.560	-1.459	-1.372	-1.535	-1.560	-1.459	ns
		$t_h$	-1.203	-1.231	-1.311	1.902	2.208	2.098	2.007	1.889	2.113	2.098	2.007	ns



**Table 1-82.** EP3SL200 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.5-V HSTL CLASS I	GCLK	$t_{su}$	1.010	1.025	-1.969	-1.407	-1.654	-1.576	-1.475	-1.381	-1.551	-1.576	-1.475	ns
		$t_h$	1.338	1.384	1.674	-1.873	-2.118	-2.040	-2.463	-1.994	-2.144	-2.040	-2.463	ns
	GCLK PLL	$t_{su}$	-1.304	-1.332	2.207	2.117	2.381	2.289	2.713	2.244	2.418	2.289	2.713	ns
		$t_h$	1.438	1.484	-1.969	1.902	2.208	2.098	2.007	1.889	2.113	2.098	2.007	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	0.909	0.927	1.674	-1.407	-1.654	-1.576	-1.475	-1.381	-1.551	-1.576	-1.475	ns
		$t_h$	-0.632	-0.632	2.207	-1.873	-2.118	-2.040	-2.463	-1.994	-2.144	-2.040	-2.463	ns
	GCLK PLL	$t_{su}$	-1.304	-1.332	2.207	2.117	2.381	2.289	2.713	2.244	2.418	2.289	2.713	ns
		$t_h$	1.438	1.484	2.207	1.902	2.208	2.098	2.007	1.889	2.113	2.098	2.007	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	0.909	0.927	2.207	-1.407	-1.654	-1.576	-1.475	-1.381	-1.551	-1.576	-1.475	ns
		$t_h$	-0.632	-0.632	2.207	-1.873	-2.118	-2.040	-2.463	-1.994	-2.144	-2.040	-2.463	ns
	GCLK PLL	$t_{su}$	-1.298	-1.321	-1.972	-1.978	-2.368	-2.291	-2.712	-2.132	-2.388	-2.291	-2.712	ns
		$t_h$	1.432	1.473	1.671	1.862	1.969	1.850	1.775	1.751	1.869	1.850	1.775	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	0.915	0.938	2.210	2.223	2.633	2.541	2.966	2.384	2.665	2.541	2.966	ns
		$t_h$	-0.638	-0.643	-1.972	-1.978	-2.368	-2.291	-2.712	-2.132	-2.388	-2.291	-2.712	ns
	GCLK PLL	$t_{su}$	-1.298	-1.321	-1.972	-1.978	-2.368	-2.291	-2.712	-2.132	-2.388	-2.291	-2.712	ns
		$t_h$	1.432	1.473	1.671	1.862	1.969	1.850	1.775	1.751	1.869	1.850	1.775	ns
3.0-V PCI	GCLK	$t_{su}$	0.915	0.938	2.210	2.223	2.633	2.541	2.966	2.384	2.665	2.541	2.966	ns
		$t_h$	-0.638	-0.643	-1.969	-1.979	-2.371	-2.294	-2.715	-2.131	-2.393	-2.294	-2.715	ns
	GCLK PLL	$t_{su}$	-1.304	-1.332	2.207	2.224	2.636	2.544	2.969	2.383	2.670	2.544	2.969	ns
		$t_h$	1.438	1.484	-1.969	-1.979	-2.371	-2.294	-2.715	-2.131	-2.393	-2.294	-2.715	ns
3.0-V PCI-X	GCLK	$t_{su}$	0.909	0.927	1.674	1.861	1.966	1.847	1.772	1.752	1.864	1.847	1.772	ns
		$t_h$	-0.632	-0.632	2.207	2.224	2.636	2.544	2.969	2.383	2.670	2.544	2.969	ns
	GCLK PLL	$t_{su}$	-1.304	-1.332	2.216	2.237	2.651	2.559	2.984	2.392	2.680	2.559	2.984	ns
		$t_h$	1.438	1.484	-1.978	-1.992	-2.386	-2.309	-2.730	-2.140	-2.403	-2.309	-2.730	ns

Table 1-83 lists the EP3SL200 column pins output timing parameters for single-ended I/O standards.

**Table 1-83.** EP3SL200 Column Pins Output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.3-V LVTTL	4mA	GCLK	$t_{co}$	3.677	3.677	5.302	5.492	5.997	5.854	6.259	5.492	5.997	5.854	6.259	ns
		GCLK PLL	$t_{co}$	4.076	4.076	5.937	6.132	6.701	6.529	7.016	6.132	6.701	6.529	7.016	ns
	8mA	GCLK	$t_{co}$	3.610	3.610	5.193	5.381	5.884	5.741	6.146	5.381	5.884	5.741	6.146	ns
		GCLK PLL	$t_{co}$	4.009	4.009	5.828	6.021	6.588	6.416	6.903	6.021	6.588	6.416	6.903	ns
	12mA	GCLK	$t_{co}$	3.524	3.524	5.089	5.282	5.792	5.649	6.054	5.282	5.792	5.649	6.054	ns
		GCLK PLL	$t_{co}$	3.923	3.923	5.724	5.922	6.496	6.324	6.811	5.922	6.496	6.324	6.811	ns
16mA	GCLK	$t_{co}$	3.517	3.517	5.072	5.254	5.751	5.608	6.013	5.254	5.751	5.608	6.013	ns	
	GCLK PLL	$t_{co}$	3.916	3.916	5.707	5.894	6.455	6.283	6.770	5.894	6.455	6.283	6.770	ns	
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.683	3.683	5.306	5.497	6.004	5.861	6.266	5.497	6.004	5.861	6.266	ns
		GCLK PLL	$t_{co}$	4.082	4.082	5.941	6.137	6.708	6.536	7.023	6.137	6.708	6.536	7.023	ns
	8mA	GCLK	$t_{co}$	3.528	3.528	5.099	5.299	5.803	5.660	6.065	5.299	5.803	5.660	6.065	ns
		GCLK PLL	$t_{co}$	3.927	3.927	5.734	5.939	6.507	6.335	6.822	5.939	6.507	6.335	6.822	ns
	12mA	GCLK	$t_{co}$	3.535	3.535	5.093	5.278	5.777	5.634	6.039	5.278	5.777	5.634	6.039	ns
		GCLK PLL	$t_{co}$	3.934	3.934	5.728	5.918	6.481	6.309	6.796	5.918	6.481	6.309	6.796	ns
16mA	GCLK	$t_{co}$	3.519	3.519	5.071	5.253	5.748	5.605	6.010	5.253	5.748	5.605	6.010	ns	
	GCLK PLL	$t_{co}$	3.918	3.918	5.706	5.893	6.452	6.280	6.767	5.893	6.452	6.280	6.767	ns	
3.0-V LVTTL	4mA	GCLK	$t_{co}$	3.641	3.641	5.269	5.460	5.964	5.821	6.226	5.460	5.964	5.821	6.226	ns
		GCLK PLL	$t_{co}$	4.040	4.040	5.904	6.100	6.668	6.496	6.983	6.100	6.668	6.496	6.983	ns
	8mA	GCLK	$t_{co}$	3.530	3.530	5.139	5.326	5.826	5.684	6.088	5.326	5.826	5.684	6.088	ns
		GCLK PLL	$t_{co}$	3.929	3.929	5.774	5.966	6.531	6.360	6.845	5.966	6.531	6.360	6.845	ns
	12mA	GCLK	$t_{co}$	3.494	3.494	5.076	5.257	5.752	5.610	6.014	5.257	5.752	5.610	6.014	ns
		GCLK PLL	$t_{co}$	3.893	3.893	5.711	5.897	6.457	6.286	6.771	5.897	6.457	6.286	6.771	ns
16mA	GCLK	$t_{co}$	3.476	3.476	5.047	5.229	5.724	5.581	5.986	5.229	5.724	5.581	5.986	ns	
	GCLK PLL	$t_{co}$	3.875	3.875	5.682	5.869	6.428	6.256	6.743	5.869	6.428	6.256	6.743	ns	

**Table 1-83.** EP3SL200 Column Pins Output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V LVC MOS	4mA	GCLK	$t_{co}$	3.555	3.555	5.173	5.360	5.861	5.719	6.123	5.360	5.861	5.719	6.123	ns
		GCLK PLL	$t_{co}$	3.954	3.954	5.808	6.000	6.566	6.395	6.880	6.000	6.566	6.395	6.880	ns
	8mA	GCLK	$t_{co}$	3.476	3.476	5.049	5.231	5.726	5.584	5.988	5.231	5.726	5.584	5.988	ns
		GCLK PLL	$t_{co}$	3.875	3.875	5.684	5.871	6.431	6.260	6.745	5.871	6.431	6.260	6.745	ns
	12mA	GCLK	$t_{co}$	3.471	3.471	5.042	5.224	5.718	5.575	5.980	5.224	5.718	5.575	5.980	ns
		GCLK PLL	$t_{co}$	3.870	3.870	5.677	5.864	6.422	6.250	6.737	5.864	6.422	6.250	6.737	ns
	16mA	GCLK	$t_{co}$	3.462	3.462	5.028	5.209	5.703	5.560	5.965	5.209	5.703	5.560	5.965	ns
		GCLK PLL	$t_{co}$	3.861	3.861	5.663	5.849	6.407	6.235	6.722	5.849	6.407	6.235	6.722	ns
2.5 V	4mA	GCLK	$t_{co}$	3.677	3.677	5.380	5.587	6.108	5.966	6.370	5.587	6.108	5.966	6.370	ns
		GCLK PLL	$t_{co}$	4.076	4.076	6.015	6.227	6.813	6.642	7.127	6.227	6.813	6.642	7.127	ns
	8mA	GCLK	$t_{co}$	3.577	3.577	5.261	5.461	5.976	5.834	6.238	5.461	5.976	5.834	6.238	ns
		GCLK PLL	$t_{co}$	3.976	3.976	5.896	6.101	6.681	6.510	6.995	6.101	6.681	6.510	6.995	ns
	12mA	GCLK	$t_{co}$	3.533	3.533	5.174	5.370	5.881	5.738	6.143	5.370	5.881	5.738	6.143	ns
		GCLK PLL	$t_{co}$	3.932	3.932	5.809	6.010	6.585	6.413	6.900	6.010	6.585	6.413	6.900	ns
	16mA	GCLK	$t_{co}$	3.495	3.495	5.135	5.328	5.838	5.695	6.100	5.328	5.838	5.695	6.100	ns
		GCLK PLL	$t_{co}$	3.894	3.894	5.770	5.968	6.542	6.370	6.857	5.968	6.542	6.370	6.857	ns

**Table 1-83.** EP3SL200 Column Pins Output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.8 V	2mA	GCLK	$t_{co}$	3.868	3.868	5.701	5.947	6.513	6.370	6.775	5.947	6.513	6.370	6.775	ns
		GCLK PLL	$t_{co}$	4.267	4.267	6.336	6.587	7.217	7.045	7.532	6.587	7.217	7.045	7.532	ns
	4mA	GCLK	$t_{co}$	3.687	3.687	5.422	5.638	6.165	6.023	6.427	5.638	6.165	6.023	6.427	ns
		GCLK PLL	$t_{co}$	4.086	4.086	6.057	6.278	6.870	6.699	7.184	6.278	6.870	6.699	7.184	ns
	6mA	GCLK	$t_{co}$	3.605	3.605	5.315	5.523	6.055	5.912	6.317	5.523	6.055	5.912	6.317	ns
		GCLK PLL	$t_{co}$	4.004	4.004	5.950	6.163	6.759	6.587	7.074	6.163	6.759	6.587	7.074	ns
	8mA	GCLK	$t_{co}$	3.585	3.585	5.257	5.469	5.989	5.846	6.251	5.469	5.989	5.846	6.251	ns
		GCLK PLL	$t_{co}$	3.984	3.984	5.892	6.109	6.693	6.521	7.008	6.109	6.693	6.521	7.008	ns
	10mA	GCLK	$t_{co}$	3.522	3.522	5.196	5.394	5.908	5.765	6.170	5.394	5.908	5.765	6.170	ns
		GCLK PLL	$t_{co}$	3.921	3.921	5.831	6.034	6.612	6.440	6.927	6.034	6.612	6.440	6.927	ns
	12mA	GCLK	$t_{co}$	3.504	3.504	5.175	5.373	5.885	5.742	6.147	5.373	5.885	5.742	6.147	ns
		GCLK PLL	$t_{co}$	3.903	3.903	5.810	6.013	6.589	6.417	6.904	6.013	6.589	6.417	6.904	ns
1.5 V	2mA	GCLK	$t_{co}$	3.814	3.814	5.630	5.879	6.451	6.308	6.713	5.879	6.451	6.308	6.713	ns
		GCLK PLL	$t_{co}$	4.213	4.213	6.265	6.519	7.155	6.983	7.470	6.519	7.155	6.983	7.470	ns
	4mA	GCLK	$t_{co}$	3.602	3.602	5.311	5.523	6.059	5.916	6.321	5.523	6.059	5.916	6.321	ns
		GCLK PLL	$t_{co}$	4.001	4.001	5.946	6.163	6.763	6.591	7.078	6.163	6.763	6.591	7.078	ns
	6mA	GCLK	$t_{co}$	3.577	3.577	5.244	5.463	5.992	5.849	6.254	5.463	5.992	5.849	6.254	ns
		GCLK PLL	$t_{co}$	3.976	3.976	5.879	6.103	6.696	6.524	7.011	6.103	6.696	6.524	7.011	ns
	8mA	GCLK	$t_{co}$	3.566	3.566	5.227	5.438	5.972	5.829	6.234	5.438	5.972	5.829	6.234	ns
		GCLK PLL	$t_{co}$	3.965	3.965	5.862	6.078	6.676	6.504	6.991	6.078	6.676	6.504	6.991	ns
	10mA	GCLK	$t_{co}$	3.511	3.511	5.189	5.387	5.902	5.759	6.164	5.387	5.902	5.759	6.164	ns
		GCLK PLL	$t_{co}$	3.910	3.910	5.824	6.027	6.606	6.434	6.921	6.027	6.606	6.434	6.921	ns
	12mA	GCLK	$t_{co}$	3.506	3.506	5.172	5.376	5.891	5.748	6.153	5.376	5.891	5.748	6.153	ns
		GCLK PLL	$t_{co}$	3.905	3.905	5.807	6.016	6.595	6.423	6.910	6.016	6.595	6.423	6.910	ns

**Table 1-83.** EP3SL200 Column Pins Output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.2 V	2mA	GCLK	$t_{co}$	3.730	3.730	5.556	5.815	6.395	6.252	6.657	5.815	6.395	6.252	6.657	ns
		GCLK PLL	$t_{co}$	4.129	4.129	6.191	6.455	7.099	6.927	7.414	6.455	7.099	6.927	7.414	ns
	4mA	GCLK	$t_{co}$	3.607	3.607	5.330	5.553	6.109	5.966	6.371	5.553	6.109	5.966	6.371	ns
		GCLK PLL	$t_{co}$	4.006	4.006	5.965	6.193	6.813	6.641	7.128	6.193	6.813	6.641	7.128	ns
	6mA	GCLK	$t_{co}$	3.569	3.569	5.238	5.464	5.996	5.853	6.258	5.464	5.996	5.853	6.258	ns
		GCLK PLL	$t_{co}$	3.968	3.968	5.873	6.104	6.700	6.528	7.015	6.104	6.700	6.528	7.015	ns
	8mA	GCLK	$t_{co}$	3.522	3.522	5.210	5.415	5.940	5.797	6.202	5.415	5.940	5.797	6.202	ns
		GCLK PLL	$t_{co}$	3.921	3.921	5.845	6.055	6.644	6.472	6.959	6.055	6.644	6.472	6.959	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.522	3.522	5.167	5.362	5.871	5.728	6.133	5.362	5.871	5.728	6.133	ns
		GCLK PLL	$t_{co}$	3.921	3.921	5.802	6.002	6.575	6.403	6.890	6.002	6.575	6.403	6.890	ns
	10mA	GCLK	$t_{co}$	3.519	3.519	5.164	5.359	5.867	5.724	6.129	5.359	5.867	5.724	6.129	ns
		GCLK PLL	$t_{co}$	3.918	3.918	5.799	5.999	6.571	6.399	6.886	5.999	6.571	6.399	6.886	ns
	12mA	GCLK	$t_{co}$	3.517	3.517	5.164	5.360	5.868	5.725	6.130	5.360	5.868	5.725	6.130	ns
		GCLK PLL	$t_{co}$	3.916	3.916	5.799	6.000	6.572	6.400	6.887	6.000	6.572	6.400	6.887	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.508	3.508	5.149	5.344	5.853	5.710	6.115	5.344	5.853	5.710	6.115	ns
		GCLK PLL	$t_{co}$	3.907	3.907	5.784	5.984	6.557	6.385	6.872	5.984	6.557	6.385	6.872	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.529	3.529	5.179	5.376	5.887	5.744	6.149	5.376	5.887	5.744	6.149	ns
		GCLK PLL	$t_{co}$	3.928	3.928	5.814	6.016	6.591	6.419	6.906	6.016	6.591	6.419	6.906	ns
	6mA	GCLK	$t_{co}$	3.525	3.525	5.177	5.374	5.885	5.742	6.147	5.374	5.885	5.742	6.147	ns
		GCLK PLL	$t_{co}$	3.924	3.924	5.812	6.014	6.589	6.417	6.904	6.014	6.589	6.417	6.904	ns
	8mA	GCLK	$t_{co}$	3.514	3.514	5.167	5.365	5.876	5.733	6.138	5.365	5.876	5.733	6.138	ns
		GCLK PLL	$t_{co}$	3.913	3.913	5.802	6.005	6.580	6.408	6.895	6.005	6.580	6.408	6.895	ns
	10mA	GCLK	$t_{co}$	3.503	3.503	5.154	5.352	5.863	5.720	6.125	5.352	5.863	5.720	6.125	ns
		GCLK PLL	$t_{co}$	3.902	3.902	5.789	5.992	6.567	6.395	6.882	5.992	6.567	6.395	6.882	ns
	12mA	GCLK	$t_{co}$	3.503	3.503	5.154	5.352	5.863	5.720	6.125	5.352	5.863	5.720	6.125	ns
		GCLK PLL	$t_{co}$	3.902	3.902	5.789	5.992	6.567	6.395	6.882	5.992	6.567	6.395	6.882	ns

**Table 1-83.** EP3SL200 Column Pins Output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.509	3.509	5.153	5.349	5.858	5.715	6.120	5.349	5.858	5.715	6.120	ns	
		GCLK PLL	$t_{co}$	3.908	3.908	5.788	5.989	6.562	6.390	6.877	5.989	6.562	6.390	6.877	ns	
	16mA	GCLK	$t_{co}$	3.512	3.512	5.161	5.358	5.870	5.727	6.132	5.358	5.870	5.727	6.132	ns	
		GCLK PLL	$t_{co}$	3.911	3.911	5.796	5.998	6.574	6.402	6.889	5.998	6.574	6.402	6.889	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.533	3.533	5.188	5.388	5.900	5.757	6.162	5.388	5.900	5.757	6.162	ns	
		GCLK PLL	$t_{co}$	3.932	3.932	5.823	6.028	6.604	6.432	6.919	6.028	6.604	6.432	6.919	ns	
	6mA	GCLK	$t_{co}$	3.519	3.519	5.178	5.378	5.891	5.748	6.153	5.378	5.891	5.748	6.153	ns	
		GCLK PLL	$t_{co}$	3.918	3.918	5.813	6.018	6.595	6.423	6.910	6.018	6.595	6.423	6.910	ns	
	8mA	GCLK	$t_{co}$	3.508	3.508	5.164	5.364	5.877	5.734	6.139	5.364	5.877	5.734	6.139	ns	
		GCLK PLL	$t_{co}$	3.907	3.907	5.799	6.004	6.581	6.409	6.896	6.004	6.581	6.409	6.896	ns	
	10mA	GCLK	$t_{co}$	3.507	3.507	5.167	5.367	5.881	5.738	6.143	5.367	5.881	5.738	6.143	ns	
		GCLK PLL	$t_{co}$	3.906	3.906	5.802	6.007	6.585	6.413	6.900	6.007	6.585	6.413	6.900	ns	
	12mA	GCLK	$t_{co}$	3.504	3.504	5.162	5.362	5.875	5.732	6.137	5.362	5.875	5.732	6.137	ns	
		GCLK PLL	$t_{co}$	3.903	3.903	5.797	6.002	6.579	6.407	6.894	6.002	6.579	6.407	6.894	ns	
	SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.506	3.506	5.151	5.348	5.858	5.715	6.120	5.348	5.858	5.715	6.120	ns
			GCLK PLL	$t_{co}$	3.905	3.905	5.786	5.988	6.562	6.390	6.877	5.988	6.562	6.390	6.877	ns
16mA		GCLK	$t_{co}$	3.509	3.509	5.158	5.357	5.869	5.726	6.131	5.357	5.869	5.726	6.131	ns	
		GCLK PLL	$t_{co}$	3.908	3.908	5.793	5.997	6.573	6.401	6.888	5.997	6.573	6.401	6.888	ns	

**Table 1-83.** EP3SL200 Column Pins Output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.516	3.516	5.153	5.348	5.856	5.713	6.118	5.348	5.856	5.713	6.118	ns
		GCLK PLL	$t_{co}$	3.915	3.915	5.788	5.988	6.560	6.388	6.875	5.988	6.560	6.388	6.875	ns
	6mA	GCLK	$t_{co}$	3.509	3.509	5.151	5.346	5.855	5.712	6.117	5.346	5.855	5.712	6.117	ns
		GCLK PLL	$t_{co}$	3.908	3.908	5.786	5.986	6.559	6.387	6.874	5.986	6.559	6.387	6.874	ns
	8mA	GCLK	$t_{co}$	3.501	3.501	5.143	5.339	5.848	5.705	6.110	5.339	5.848	5.705	6.110	ns
		GCLK PLL	$t_{co}$	3.900	3.900	5.778	5.979	6.552	6.380	6.867	5.979	6.552	6.380	6.867	ns
	10mA	GCLK	$t_{co}$	3.504	3.504	5.146	5.342	5.852	5.709	6.114	5.342	5.852	5.709	6.114	ns
		GCLK PLL	$t_{co}$	3.903	3.903	5.781	5.982	6.556	6.384	6.871	5.982	6.556	6.384	6.871	ns
12mA	GCLK	$t_{co}$	3.501	3.501	5.149	5.346	5.856	5.713	6.118	5.346	5.856	5.713	6.118	ns	
	GCLK PLL	$t_{co}$	3.900	3.900	5.784	5.986	6.560	6.388	6.875	5.986	6.560	6.388	6.875	ns	
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.509	3.509	5.148	5.343	5.852	5.709	6.114	5.343	5.852	5.709	6.114	ns
		GCLK PLL	$t_{co}$	3.908	3.908	5.783	5.983	6.556	6.384	6.871	5.983	6.556	6.384	6.871	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.521	3.521	5.161	5.358	5.867	5.724	6.129	5.358	5.867	5.724	6.129	ns
		GCLK PLL	$t_{co}$	3.920	3.920	5.796	5.998	6.571	6.399	6.886	5.998	6.571	6.399	6.886	ns
	6mA	GCLK	$t_{co}$	3.517	3.517	5.162	5.359	5.870	5.727	6.132	5.359	5.870	5.727	6.132	ns
		GCLK PLL	$t_{co}$	3.916	3.916	5.797	5.999	6.574	6.402	6.889	5.999	6.574	6.402	6.889	ns
	8mA	GCLK	$t_{co}$	3.513	3.513	5.158	5.355	5.865	5.722	6.127	5.355	5.865	5.722	6.127	ns
		GCLK PLL	$t_{co}$	3.912	3.912	5.793	5.995	6.569	6.397	6.884	5.995	6.569	6.397	6.884	ns
	10mA	GCLK	$t_{co}$	3.506	3.506	5.151	5.348	5.858	5.715	6.120	5.348	5.858	5.715	6.120	ns
		GCLK PLL	$t_{co}$	3.905	3.905	5.786	5.988	6.562	6.390	6.877	5.988	6.562	6.390	6.877	ns
12mA	GCLK	$t_{co}$	3.507	3.507	5.158	5.356	5.868	5.725	6.130	5.356	5.868	5.725	6.130	ns	
	GCLK PLL	$t_{co}$	3.906	3.906	5.793	5.996	6.572	6.400	6.887	5.996	6.572	6.400	6.887	ns	
1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.505	3.505	5.139	5.334	5.842	5.699	6.104	5.334	5.842	5.699	6.104	ns
		GCLK PLL	$t_{co}$	3.904	3.904	5.774	5.974	6.546	6.374	6.861	5.974	6.546	6.374	6.861	ns

**Table 1-83.** EP3SL200 Column Pins Output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.524	3.524	5.175	5.375	5.888	5.745	6.150	5.375	5.888	5.745	6.150	ns
		GCLK PLL	$t_{co}$	3.923	3.923	5.810	6.015	6.592	6.420	6.907	6.015	6.592	6.420	6.907	ns
	6mA	GCLK	$t_{co}$	3.516	3.516	5.166	5.366	5.879	5.736	6.141	5.366	5.879	5.736	6.141	ns
		GCLK PLL	$t_{co}$	3.915	3.915	5.801	6.006	6.583	6.411	6.898	6.006	6.583	6.411	6.898	ns
	8mA	GCLK	$t_{co}$	3.517	3.517	5.174	5.374	5.888	5.745	6.150	5.374	5.888	5.745	6.150	ns
		GCLK PLL	$t_{co}$	3.916	3.916	5.809	6.014	6.592	6.420	6.907	6.014	6.592	6.420	6.907	ns
	10mA	GCLK	$t_{co}$	3.506	3.506	5.161	5.361	5.874	5.731	6.136	5.361	5.874	5.731	6.136	ns
		GCLK PLL	$t_{co}$	3.905	3.905	5.796	6.001	6.578	6.406	6.893	6.001	6.578	6.406	6.893	ns
12mA	GCLK	$t_{co}$	3.506	3.506	5.161	5.361	5.875	5.732	6.137	5.361	5.875	5.732	6.137	ns	
	GCLK PLL	$t_{co}$	3.905	3.905	5.796	6.001	6.579	6.407	6.894	6.001	6.579	6.407	6.894	ns	
1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.527	3.527	5.177	5.376	5.888	5.745	6.150	5.376	5.888	5.745	6.150	ns
		GCLK PLL	$t_{co}$	3.926	3.926	5.812	6.016	6.592	6.420	6.907	6.016	6.592	6.420	6.907	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.630	3.630	5.222	5.410	5.913	5.770	6.175	5.410	5.913	5.770	6.175	ns
		GCLK PLL	$t_{co}$	4.029	4.029	5.857	6.050	6.617	6.445	6.932	6.050	6.617	6.445	6.932	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.630	3.630	5.222	5.410	5.913	5.770	6.175	5.410	5.913	5.770	6.175	ns
		GCLK PLL	$t_{co}$	4.029	4.029	5.857	6.050	6.617	6.445	6.932	6.050	6.617	6.445	6.932	ns



Table 1-84 lists the EP3SL200 row pins output timing parameters for single-ended I/O standards.

**Table 1-84.** EP3SL200 Row Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.639	3.902	5.663	5.916	6.397	6.238	6.709	6.053	6.634	6.238	6.709	ns
		GCLK PLL	t <sub>co</sub>	1.551	1.768	2.210	2.317	2.505	2.518	2.444	2.409	2.649	2.518	2.444	ns
	8mA	GCLK	t <sub>co</sub>	3.548	3.813	5.533	5.778	6.283	6.124	6.565	5.912	6.485	6.124	6.565	ns
		GCLK PLL	t <sub>co</sub>	1.468	1.663	2.080	2.179	2.361	2.374	2.300	2.268	2.500	2.374	2.300	ns
	12mA	GCLK	t <sub>co</sub>	3.469	3.724	5.414	5.655	6.187	6.028	6.437	5.785	6.353	6.028	6.437	ns
		GCLK PLL	t <sub>co</sub>	1.389	1.560	1.961	2.056	2.233	2.246	2.172	2.147	2.368	2.246	2.172	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.649	3.906	5.671	5.921	6.406	6.247	6.714	6.059	6.639	6.247	6.714	ns
		GCLK PLL	t <sub>co</sub>	1.561	1.772	2.218	2.322	2.510	2.523	2.449	2.415	2.654	2.523	2.449	ns
	8mA	GCLK	t <sub>co</sub>	3.473	3.728	5.420	5.661	6.197	6.038	6.443	5.794	6.360	6.038	6.443	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.564	1.967	2.062	2.239	2.252	2.178	2.159	2.375	2.252	2.178	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.593	3.848	5.615	5.869	6.363	6.204	6.666	6.010	6.592	6.204	6.666	ns
		GCLK PLL	t <sub>co</sub>	1.505	1.714	2.162	2.270	2.462	2.475	2.401	2.366	2.607	2.475	2.401	ns
	8mA	GCLK	t <sub>co</sub>	3.474	3.733	5.463	5.710	6.218	6.059	6.502	5.848	6.428	6.059	6.502	ns
		GCLK PLL	t <sub>co</sub>	1.394	1.587	2.010	2.111	2.298	2.311	2.237	2.204	2.443	2.311	2.237	ns
	12mA	GCLK	t <sub>co</sub>	3.437	3.695	5.395	5.627	6.148	5.989	6.414	5.762	6.335	5.989	6.414	ns
		GCLK PLL	t <sub>co</sub>	1.357	1.536	1.928	2.028	2.210	2.223	2.149	2.118	2.350	2.223	2.149	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.507	3.767	5.510	5.762	6.254	6.095	6.555	5.902	6.481	6.095	6.555	ns
		GCLK PLL	t <sub>co</sub>	1.419	1.633	2.057	2.163	2.351	2.364	2.290	2.258	2.496	2.364	2.290	ns
	8mA	GCLK	t <sub>co</sub>	3.424	3.679	5.368	5.588	6.120	5.961	6.375	5.722	6.295	5.961	6.375	ns
		GCLK PLL	t <sub>co</sub>	1.344	1.515	1.893	1.989	2.171	2.184	2.110	2.087	2.310	2.184	2.110	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.619	3.884	5.748	6.023	6.508	6.349	6.838	6.170	6.771	6.349	6.838	ns
		GCLK PLL	t <sub>co</sub>	1.531	1.750	2.295	2.424	2.634	2.647	2.573	2.526	2.786	2.647	2.573	ns
	8mA	GCLK	t <sub>co</sub>	3.516	3.785	5.593	5.860	6.366	6.207	6.668	6.003	6.597	6.207	6.668	ns
		GCLK PLL	t <sub>co</sub>	1.436	1.651	2.140	2.261	2.464	2.477	2.403	2.359	2.612	2.477	2.403	ns
	12mA	GCLK	t <sub>co</sub>	3.463	3.735	5.492	5.741	6.275	6.116	6.542	5.880	6.467	6.116	6.542	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.575	2.029	2.142	2.338	2.351	2.277	2.236	2.482	2.351	2.277	ns

**Table 1-84.** EP3SL200 Row Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
1.8 V	2mA	GCLK	$t_{co}$	3.863	4.170	6.174	6.451	7.093	6.933	7.278	6.617	7.250	6.933	7.278	ns
		GCLK PLL	$t_{co}$	1.795	2.018	2.703	2.852	3.121	3.130	3.066	2.995	3.095	3.130	3.066	ns
	4mA	GCLK	$t_{co}$	3.638	3.968	5.848	6.083	6.688	6.528	6.873	6.252	6.844	6.528	6.873	ns
		GCLK PLL	$t_{co}$	1.570	1.816	2.377	2.484	2.716	2.725	2.661	2.630	2.734	2.725	2.661	ns
	6mA	GCLK	$t_{co}$	3.573	3.866	5.694	5.933	6.529	6.369	6.714	6.084	6.671	6.369	6.714	ns
		GCLK PLL	$t_{co}$	1.505	1.714	2.223	2.334	2.557	2.566	2.502	2.462	2.628	2.566	2.502	ns
	8mA	GCLK	$t_{co}$	3.521	3.792	5.617	5.840	6.433	6.273	6.618	5.989	6.577	6.273	6.618	ns
		GCLK PLL	$t_{co}$	1.445	1.640	2.146	2.241	2.461	2.470	2.406	2.367	2.556	2.470	2.406	ns
1.5 V	2mA	GCLK	$t_{co}$	3.774	4.088	6.084	6.365	7.021	6.861	7.206	6.524	7.174	6.861	7.206	ns
		GCLK PLL	$t_{co}$	1.706	1.936	2.613	2.766	3.049	3.058	2.994	2.902	3.030	3.058	2.994	ns
	4mA	GCLK	$t_{co}$	3.537	3.831	5.679	5.928	6.530	6.370	6.715	6.078	6.670	6.370	6.715	ns
		GCLK PLL	$t_{co}$	1.464	1.679	2.208	2.329	2.558	2.567	2.503	2.456	2.629	2.567	2.503	ns
	6mA	GCLK	$t_{co}$	3.510	3.783	5.606	5.832	6.424	6.264	6.609	5.980	6.565	6.264	6.609	ns
		GCLK PLL	$t_{co}$	1.437	1.631	2.135	2.233	2.452	2.461	2.397	2.358	2.556	2.461	2.397	ns
	8mA	GCLK	$t_{co}$	3.496	3.774	5.584	5.814	6.405	6.245	6.590	5.962	6.543	6.245	6.590	ns
		GCLK PLL	$t_{co}$	1.428	1.622	2.113	2.215	2.433	2.442	2.378	2.340	2.537	2.442	2.378	ns
1.2 V	2mA	GCLK	$t_{co}$	3.717	4.013	5.994	6.279	6.946	6.786	7.131	6.436	7.090	6.786	7.131	ns
		GCLK PLL	$t_{co}$	1.649	1.861	2.523	2.680	2.974	2.983	2.919	2.814	2.961	2.983	2.919	ns
	4mA	GCLK	$t_{co}$	3.542	3.824	5.701	5.956	6.571	6.411	6.756	6.103	6.712	6.411	6.756	ns
		GCLK PLL	$t_{co}$	1.469	1.672	2.230	2.357	2.599	2.608	2.544	2.481	2.673	2.608	2.544	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.463	3.723	5.485	5.713	6.265	6.106	6.510	5.855	6.429	6.106	6.510	ns
		GCLK PLL	$t_{co}$	1.383	1.561	2.006	2.114	2.306	2.319	2.245	2.220	2.444	2.319	2.245	ns
	12mA	GCLK	$t_{co}$	3.458	3.719	5.482	5.705	6.263	6.104	6.502	5.854	6.422	6.104	6.502	ns
		GCLK PLL	$t_{co}$	1.378	1.555	1.999	2.106	2.298	2.311	2.237	2.219	2.437	2.311	2.237	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.449	3.708	5.467	5.680	6.246	6.087	6.475	5.837	6.395	6.087	6.475	ns
		GCLK PLL	$t_{co}$	1.369	1.544	1.984	2.081	2.271	2.284	2.210	2.202	2.413	2.284	2.210	ns

**Table 1-84.** EP3SL200 Row Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.474	3.748	5.512	5.727	6.306	6.146	6.491	5.870	6.440	6.146	6.491	ns
		GCLK PLL	$t_{co}$	1.406	1.596	2.041	2.128	2.334	2.343	2.279	2.248	2.447	2.343	2.279	ns
	6mA	GCLK	$t_{co}$	3.465	3.734	5.509	5.725	6.304	6.144	6.489	5.868	6.438	6.144	6.489	ns
		GCLK PLL	$t_{co}$	1.391	1.582	2.038	2.126	2.332	2.341	2.277	2.246	2.445	2.341	2.277	ns
	8mA	GCLK	$t_{co}$	3.454	3.722	5.492	5.708	6.287	6.127	6.472	5.857	6.422	6.127	6.472	ns
		GCLK PLL	$t_{co}$	1.380	1.570	2.021	2.109	2.315	2.324	2.260	2.229	2.436	2.324	2.260	ns
	10mA	GCLK	$t_{co}$	3.443	3.699	5.476	5.692	6.272	6.112	6.457	5.845	6.407	6.112	6.457	ns
		GCLK PLL	$t_{co}$	1.363	1.547	2.005	2.093	2.300	2.309	2.245	2.214	2.424	2.309	2.245	ns
	12mA	GCLK	$t_{co}$	3.443	3.698	5.475	5.691	6.271	6.111	6.456	5.844	6.406	6.111	6.456	ns
		GCLK PLL	$t_{co}$	1.363	1.546	2.004	2.092	2.299	2.308	2.244	2.213	2.424	2.308	2.244	ns
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.451	3.707	5.473	5.687	6.265	6.105	6.450	5.840	6.399	6.105	6.450	ns
		GCLK PLL	$t_{co}$	1.371	1.555	2.002	2.088	2.293	2.302	2.238	2.208	2.418	2.302	2.238	ns
	16mA	GCLK	$t_{co}$	3.452	3.702	5.472	5.688	6.267	6.107	6.458	5.849	6.408	6.107	6.458	ns
		GCLK PLL	$t_{co}$	1.372	1.550	2.001	2.093	2.295	2.304	2.240	2.214	2.429	2.304	2.240	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.473	3.744	5.523	5.741	6.323	6.163	6.508	5.883	6.456	6.163	6.508	ns
		GCLK PLL	$t_{co}$	1.402	1.592	2.052	2.142	2.351	2.360	2.296	2.261	2.459	2.360	2.296	ns
	6mA	GCLK	$t_{co}$	3.459	3.722	5.505	5.724	6.306	6.146	6.491	5.869	6.440	6.146	6.491	ns
		GCLK PLL	$t_{co}$	1.379	1.570	2.034	2.125	2.334	2.343	2.279	2.245	2.450	2.343	2.279	ns
	8mA	GCLK	$t_{co}$	3.448	3.705	5.488	5.706	6.288	6.128	6.473	5.856	6.423	6.128	6.473	ns
		GCLK PLL	$t_{co}$	1.368	1.553	2.017	2.107	2.316	2.325	2.261	2.227	2.437	2.325	2.261	ns

**Table 1-84.** EP3SL200 Row Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.458	3.720	5.479	5.692	6.268	6.108	6.453	5.839	6.402	6.108	6.453	ns
		GCLK PLL	$t_{co}$	1.381	1.568	2.008	2.093	2.296	2.305	2.241	2.212	2.415	2.305	2.241	ns
	6mA	GCLK	$t_{co}$	3.451	3.708	5.470	5.684	6.260	6.100	6.445	5.838	6.395	6.100	6.445	ns
		GCLK PLL	$t_{co}$	1.371	1.556	1.999	2.085	2.288	2.297	2.233	2.204	2.415	2.297	2.233	ns
	8mA	GCLK	$t_{co}$	3.442	3.696	5.462	5.675	6.252	6.092	6.438	5.831	6.387	6.092	6.438	ns
		GCLK PLL	$t_{co}$	1.362	1.544	1.991	2.076	2.280	2.289	2.225	2.196	2.408	2.289	2.225	ns
	10mA	GCLK	$t_{co}$	3.445	3.698	5.464	5.678	6.255	6.095	6.442	5.834	6.390	6.095	6.442	ns
		GCLK PLL	$t_{co}$	1.365	1.546	1.993	2.079	2.283	2.292	2.228	2.199	2.411	2.292	2.228	ns
12mA	GCLK	$t_{co}$	3.441	3.693	5.462	5.677	6.255	6.095	6.445	5.837	6.395	6.095	6.445	ns	
	GCLK PLL	$t_{co}$	1.361	1.541	1.991	2.081	2.283	2.292	2.228	2.202	2.416	2.292	2.228	ns	
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.449	3.697	5.457	5.669	6.246	6.086	6.441	5.833	6.389	6.086	6.441	ns
		GCLK PLL	$t_{co}$	1.369	1.545	1.986	2.078	2.274	2.283	2.219	2.198	2.410	2.283	2.219	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.464	3.727	5.490	5.705	6.283	6.123	6.468	5.848	6.416	6.123	6.468	ns
		GCLK PLL	$t_{co}$	1.388	1.575	2.019	2.106	2.311	2.320	2.256	2.224	2.426	2.320	2.256	ns
	6mA	GCLK	$t_{co}$	3.458	3.717	5.486	5.701	6.279	6.119	6.464	5.850	6.413	6.119	6.464	ns
		GCLK PLL	$t_{co}$	1.378	1.565	2.015	2.102	2.307	2.316	2.252	2.221	2.429	2.316	2.252	ns
	8mA	GCLK	$t_{co}$	3.454	3.712	5.480	5.695	6.273	6.113	6.458	5.845	6.407	6.113	6.458	ns
		GCLK PLL	$t_{co}$	1.374	1.560	2.009	2.096	2.301	2.310	2.246	2.215	2.423	2.310	2.246	ns
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.466	3.726	5.501	5.719	6.301	6.141	6.486	5.864	6.433	6.141	6.486	ns
		GCLK PLL	$t_{co}$	1.387	1.574	2.030	2.120	2.329	2.338	2.274	2.238	2.445	2.338	2.274	ns
	6mA	GCLK	$t_{co}$	3.457	3.714	5.490	5.707	6.289	6.129	6.474	5.855	6.422	6.129	6.474	ns
		GCLK PLL	$t_{co}$	1.377	1.562	2.019	2.108	2.317	2.326	2.262	2.227	2.436	2.326	2.262	ns
	8mA	GCLK	$t_{co}$	3.456	3.712	5.494	5.712	6.295	6.135	6.480	5.864	6.429	6.135	6.480	ns
		GCLK PLL	$t_{co}$	1.376	1.560	2.023	2.113	2.323	2.332	2.268	2.233	2.446	2.332	2.268	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.569	3.829	5.537	5.731	6.305	6.146	6.519	5.903	6.453	6.146	6.519	ns
		GCLK PLL	$t_{co}$	1.489	1.665	2.054	2.132	2.315	2.328	2.267	2.268	2.474	2.328	2.267	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.569	3.829	5.537	5.731	6.305	6.146	6.519	5.903	6.453	6.146	6.519	ns
		GCLK PLL	$t_{co}$	1.489	1.665	2.054	2.132	2.315	2.328	2.267	2.268	2.474	2.328	2.267	ns

Table 1-85 through Table 1-88 list the maximum I/O timing parameters for EP3SL200 devices for differential I/O standards.

Table 1-85 lists the EP3SL200 column pins input timing parameters for differential I/O standards.

**Table 1-85.** EP3SL200 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-1.153	-1.221	-1.879	-1.911	-2.067	-1.987	-2.459	-1.928	-2.084	-1.987	-2.459	ns
		$t_h$	1.289	1.376	2.114	2.150	2.330	2.237	2.711	2.177	2.355	2.237	2.711	ns
	GCLK PLL	$t_{su}$	1.103	1.122	1.882	1.986	2.207	2.099	2.096	1.998	2.217	2.099	2.096	ns
		$t_h$	-0.824	-0.821	-1.403	-1.493	-1.659	-1.580	-1.562	-1.493	-1.659	-1.580	-1.562	ns
MINI-LVDS	GCLK	$t_{su}$	-1.153	-1.221	-1.879	-1.911	-2.067	-1.987	-2.459	-1.928	-2.084	-1.987	-2.459	ns
		$t_h$	1.289	1.376	2.114	2.150	2.330	2.237	2.711	2.177	2.355	2.237	2.711	ns
	GCLK PLL	$t_{su}$	1.103	1.122	1.882	1.986	2.207	2.099	2.096	1.998	2.217	2.099	2.096	ns
		$t_h$	-0.824	-0.821	-1.403	-1.493	-1.659	-1.580	-1.562	-1.493	-1.659	-1.580	-1.562	ns
RSDS	GCLK	$t_{su}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_h$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{su}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_h$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_h$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{su}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_h$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.173	-1.244	-1.898	-1.933	-2.102	-2.022	-2.494	-1.950	-2.117	-2.022	-2.494	ns
		$t_h$	1.309	1.399	2.133	2.172	2.365	2.272	2.746	2.199	2.388	2.272	2.746	ns
	GCLK PLL	$t_{su}$	1.083	1.099	1.863	1.964	2.172	2.064	2.061	1.976	2.184	2.064	2.061	ns
		$t_h$	-0.804	-0.798	-1.384	-1.471	-1.624	-1.545	-1.527	-1.471	-1.626	-1.545	-1.527	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.173	-1.244	-1.898	-1.933	-2.102	-2.022	-2.494	-1.950	-2.117	-2.022	-2.494	ns
		$t_h$	1.309	1.399	2.133	2.172	2.365	2.272	2.746	2.199	2.388	2.272	2.746	ns
	GCLK PLL	$t_{su}$	1.083	1.099	1.863	1.964	2.172	2.064	2.061	1.976	2.184	2.064	2.061	ns
		$t_h$	-0.804	-0.798	-1.384	-1.471	-1.624	-1.545	-1.527	-1.471	-1.626	-1.545	-1.527	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_h$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{su}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_h$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_h$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{su}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_h$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns

**Table 1-85.** EP3SL200 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.173	-1.244	-1.898	-1.933	-2.102	-2.022	-2.494	-1.950	-2.117	-2.022	-2.494	ns
		$t_h$	1.309	1.399	2.133	2.172	2.365	2.272	2.746	2.199	2.388	2.272	2.746	ns
	GCLK PLL	$t_{su}$	1.083	1.099	1.863	1.964	2.172	2.064	2.061	1.976	2.184	2.064	2.061	ns
		$t_h$	-0.804	-0.798	-1.384	-1.471	-1.624	-1.545	-1.527	-1.471	-1.626	-1.545	-1.527	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.173	-1.244	-1.898	-1.933	-2.102	-2.022	-2.494	-1.950	-2.117	-2.022	-2.494	ns
		$t_h$	1.309	1.399	2.133	2.172	2.365	2.272	2.746	2.199	2.388	2.272	2.746	ns
	GCLK PLL	$t_{su}$	1.083	1.099	1.863	1.964	2.172	2.064	2.061	1.976	2.184	2.064	2.061	ns
		$t_h$	-0.804	-0.798	-1.384	-1.471	-1.624	-1.545	-1.527	-1.471	-1.626	-1.545	-1.527	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.180	-1.250	-1.910	-1.938	-2.102	-2.024	-2.493	-1.954	-2.112	-2.024	-2.493	ns
		$t_h$	1.316	1.405	2.146	2.180	2.368	2.275	2.750	2.206	2.388	2.275	2.750	ns
	GCLK PLL	$t_{su}$	1.076	1.093	1.851	1.959	2.172	2.062	2.062	1.972	2.189	2.062	2.062	ns
		$t_h$	-0.797	-0.792	-1.371	-1.463	-1.621	-1.542	-1.523	-1.464	-1.626	-1.542	-1.523	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.180	-1.250	-1.910	-1.938	-2.102	-2.024	-2.493	-1.954	-2.112	-2.024	-2.493	ns
		$t_h$	1.316	1.405	2.146	2.180	2.368	2.275	2.750	2.206	2.388	2.275	2.750	ns
	GCLK PLL	$t_{su}$	1.076	1.093	1.851	1.959	2.172	2.062	2.062	1.972	2.189	2.062	2.062	ns
		$t_h$	-0.797	-0.792	-1.371	-1.463	-1.621	-1.542	-1.523	-1.464	-1.626	-1.542	-1.523	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.153	-1.221	-1.879	-1.911	-2.067	-1.987	-2.459	-1.928	-2.084	-1.987	-2.459	ns
		$t_h$	1.289	1.376	2.114	2.150	2.330	2.237	2.711	2.177	2.355	2.237	2.711	ns
	GCLK PLL	$t_{su}$	1.103	1.122	1.882	1.986	2.207	2.099	2.096	1.998	2.217	2.099	2.096	ns
		$t_h$	-0.824	-0.821	-1.403	-1.493	-1.659	-1.580	-1.562	-1.493	-1.659	-1.580	-1.562	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.153	-1.221	-1.879	-1.911	-2.067	-1.987	-2.459	-1.928	-2.084	-1.987	-2.459	ns
		$t_h$	1.289	1.376	2.114	2.150	2.330	2.237	2.711	2.177	2.355	2.237	2.711	ns
	GCLK PLL	$t_{su}$	1.103	1.122	1.882	1.986	2.207	2.099	2.096	1.998	2.217	2.099	2.096	ns
		$t_h$	-0.824	-0.821	-1.403	-1.493	-1.659	-1.580	-1.562	-1.493	-1.659	-1.580	-1.562	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_h$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{su}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_h$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns

Table 1-86 lists the EP3SL200 row pins input timing parameters for differential I/O standards.

**Table 1-86.** EP3SL200 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
LVDS	GCLK	$t_{su}$	-1.332	-1.401	-1.719	-1.648	-1.841	-1.769	-2.221	-1.630	-1.815	-1.769	-2.221	ns
		$t_h$	1.476	1.563	1.994	1.939	2.157	2.071	2.526	1.934	2.145	2.071	2.526	ns
	GCLK PLL	$t_{su}$	0.869	0.886	1.991	2.205	2.405	2.282	2.297	2.252	2.458	2.282	2.297	ns
		$t_h$	-0.581	-0.578	-1.475	-1.662	-1.803	-1.711	-1.711	-1.692	-1.839	-1.711	-1.711	ns
MINI-LVDS	GCLK	$t_{su}$	-1.332	-1.401	-1.719	-1.648	-1.841	-1.769	-2.221	-1.630	-1.815	-1.769	-2.221	ns
		$t_h$	1.476	1.563	1.994	1.939	2.157	2.071	2.526	1.934	2.145	2.071	2.526	ns
	GCLK PLL	$t_{su}$	0.869	0.886	1.991	2.205	2.405	2.282	2.297	2.252	2.458	2.282	2.297	ns
		$t_h$	-0.581	-0.578	-1.475	-1.662	-1.803	-1.711	-1.711	-1.692	-1.839	-1.711	-1.711	ns
RSDS	GCLK	$t_{su}$	-1.332	-1.401	-1.719	-1.648	-1.841	-1.769	-2.221	-1.630	-1.815	-1.769	-2.221	ns
		$t_h$	1.476	1.563	1.994	1.939	2.157	2.071	2.526	1.934	2.145	2.071	2.526	ns
	GCLK PLL	$t_{su}$	0.869	0.886	1.991	2.205	2.405	2.282	2.297	2.252	2.458	2.282	2.297	ns
		$t_h$	-0.581	-0.578	-1.475	-1.662	-1.803	-1.711	-1.711	-1.692	-1.839	-1.711	-1.711	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.137	-1.216	-1.849	-1.877	-2.030	-1.953	-2.400	-1.901	-2.052	-1.953	-2.400	ns
		$t_h$	1.274	1.369	2.088	2.122	2.297	2.206	2.656	2.156	2.330	2.206	2.656	ns
	GCLK PLL	$t_{su}$	1.064	1.071	1.866	1.981	2.216	2.098	2.118	1.985	2.221	2.098	2.118	ns
		$t_h$	-0.783	-0.772	-1.384	-1.483	-1.663	-1.576	-1.581	-1.474	-1.654	-1.576	-1.581	ns
	GCLK	$t_{su}$	-1.137	-1.216	-1.849	-1.877	-2.030	-1.953	-2.400	-1.901	-2.052	-1.953	-2.400	ns
		$t_h$	1.274	1.369	2.088	2.122	2.297	2.206	2.656	2.156	2.330	2.206	2.656	ns
	GCLK PLL	$t_{su}$	1.064	1.071	1.866	1.981	2.216	2.098	2.118	1.985	2.221	2.098	2.118	ns
		$t_h$	-0.783	-0.772	-1.384	-1.483	-1.663	-1.576	-1.581	-1.474	-1.654	-1.576	-1.581	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.146	-1.228	-1.858	-1.887	-2.046	-1.969	-2.416	-1.910	-2.068	-1.969	-2.416	ns
		$t_h$	1.283	1.381	2.097	2.132	2.313	2.222	2.672	2.165	2.346	2.222	2.672	ns
	GCLK PLL	$t_{su}$	1.055	1.059	1.857	1.971	2.200	2.082	2.102	1.976	2.205	2.082	2.102	ns
		$t_h$	-0.774	-0.760	-1.375	-1.473	-1.647	-1.560	-1.565	-1.465	-1.638	-1.560	-1.565	ns
	GCLK	$t_{su}$	-1.146	-1.228	-1.858	-1.887	-2.046	-1.969	-2.416	-1.910	-2.068	-1.969	-2.416	ns
		$t_h$	1.283	1.381	2.097	2.132	2.313	2.222	2.672	2.165	2.346	2.222	2.672	ns
	GCLK PLL	$t_{su}$	1.055	1.059	1.857	1.971	2.200	2.082	2.102	1.976	2.205	2.082	2.102	ns
		$t_h$	-0.774	-0.760	-1.375	-1.473	-1.647	-1.560	-1.565	-1.465	-1.638	-1.560	-1.565	ns

Table 1-86. EP3SL200 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.160	-1.240	-1.867	-1.897	-2.064	-1.987	-2.434	-1.921	-2.085	-1.987	-2.434	ns
		$t_h$	1.297	1.393	2.106	2.142	2.331	2.240	2.690	2.176	2.363	2.240	2.690	ns
	GCLK PLL	$t_{su}$	1.041	1.047	1.844	1.961	2.182	2.064	2.084	1.965	2.188	2.064	2.084	ns
		$t_h$	-0.760	-0.748	-1.363	-1.463	-1.629	-1.542	-1.547	-1.454	-1.621	-1.542	-1.547	ns
	GCLK	$t_{su}$	-1.160	-1.240	-1.867	-1.897	-2.064	-1.987	-2.434	-1.921	-2.085	-1.987	-2.434	ns
		$t_h$	1.297	1.393	2.106	2.142	2.331	2.240	2.690	2.176	2.363	2.240	2.690	ns
GCLK PLL	$t_{su}$	1.041	1.047	1.844	1.961	2.182	2.064	2.084	1.965	2.188	2.064	2.084	ns	
	$t_h$	-0.760	-0.748	-1.363	-1.463	-1.629	-1.542	-1.547	-1.454	-1.621	-1.542	-1.547	ns	
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.146	-1.228	-1.858	-1.887	-2.046	-1.969	-2.416	-1.910	-2.068	-1.969	-2.416	ns
		$t_h$	1.283	1.381	2.097	2.132	2.313	2.222	2.672	2.165	2.346	2.222	2.672	ns
	GCLK PLL	$t_{su}$	1.055	1.059	1.857	1.971	2.200	2.082	2.102	1.976	2.205	2.082	2.102	ns
		$t_h$	-0.774	-0.760	-1.375	-1.473	-1.647	-1.560	-1.565	-1.465	-1.638	-1.560	-1.565	ns
	GCLK	$t_{su}$	-1.146	-1.228	-1.858	-1.887	-2.046	-1.969	-2.416	-1.910	-2.068	-1.969	-2.416	ns
		$t_h$	1.283	1.381	2.097	2.132	2.313	2.222	2.672	2.165	2.346	2.222	2.672	ns
GCLK PLL	$t_{su}$	1.055	1.059	1.857	1.971	2.200	2.082	2.102	1.976	2.205	2.082	2.102	ns	
	$t_h$	-0.774	-0.760	-1.375	-1.473	-1.647	-1.560	-1.565	-1.465	-1.638	-1.560	-1.565	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.160	-1.240	-1.867	-1.897	-2.064	-1.987	-2.434	-1.921	-2.085	-1.987	-2.434	ns
		$t_h$	1.297	1.393	2.106	2.142	2.331	2.240	2.690	2.176	2.363	2.240	2.690	ns
	GCLK PLL	$t_{su}$	1.041	1.047	1.844	1.961	2.182	2.064	2.084	1.965	2.188	2.064	2.084	ns
		$t_h$	-0.760	-0.748	-1.363	-1.463	-1.629	-1.542	-1.547	-1.454	-1.621	-1.542	-1.547	ns
	GCLK	$t_{su}$	-1.160	-1.240	-1.867	-1.897	-2.064	-1.987	-2.434	-1.921	-2.085	-1.987	-2.434	ns
		$t_h$	1.297	1.393	2.106	2.142	2.331	2.240	2.690	2.176	2.363	2.240	2.690	ns
GCLK PLL	$t_{su}$	1.041	1.047	1.844	1.961	2.182	2.064	2.084	1.965	2.188	2.064	2.084	ns	
	$t_h$	-0.760	-0.748	-1.363	-1.463	-1.629	-1.542	-1.547	-1.454	-1.621	-1.542	-1.547	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.169	-1.249	-1.881	-1.908	-2.071	-1.995	-2.440	-1.928	-2.086	-1.995	-2.440	ns
		$t_h$	1.306	1.402	2.121	2.156	2.341	2.250	2.701	2.186	2.369	2.250	2.701	ns
	GCLK PLL	$t_{su}$	1.032	1.038	1.829	1.945	2.171	2.052	2.073	1.954	2.182	2.052	2.073	ns
		$t_h$	-0.751	-0.739	-1.348	-1.445	-1.615	-1.528	-1.532	-1.440	-1.612	-1.528	-1.532	ns
	GCLK	$t_{su}$	-1.169	-1.249	-1.881	-1.908	-2.071	-1.995	-2.440	-1.928	-2.086	-1.995	-2.440	ns
		$t_h$	1.306	1.402	2.121	2.156	2.341	2.250	2.701	2.186	2.369	2.250	2.701	ns
GCLK PLL	$t_{su}$	1.032	1.038	1.829	1.945	2.171	2.052	2.073	1.954	2.182	2.052	2.073	ns	
	$t_h$	-0.751	-0.739	-1.348	-1.445	-1.615	-1.528	-1.532	-1.440	-1.612	-1.528	-1.532	ns	



Table 1-87 lists the EP3SL200 column pins output timing parameters for differential I/O standards.

**Table 1-87.** EP3SL200 Column Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$		
LVDS_E_1R	—	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns	
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns	
LVDS_E_3R	—	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns	
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns	
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns	
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns	
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.506	3.783	5.577	5.790	6.354	6.190	6.597	5.934	6.497	6.190	6.597	ns	
		GCLK PLL	$t_{co}$	3.496	3.773	5.567	5.779	6.344	6.180	6.587	5.923	6.487	6.180	6.587	ns	
RSDS_E_1R	—	GCLK	$t_{co}$	3.496	3.773	5.570	5.783	6.348	6.184	6.591	5.928	6.492	6.184	6.591	ns	
		GCLK PLL	$t_{co}$	3.489	3.767	5.563	5.777	6.342	6.178	6.585	5.921	6.486	6.178	6.585	ns	
RSDS_E_3R	—	GCLK	$t_{co}$	3.488	3.765	5.560	5.774	6.339	6.175	6.582	5.918	6.482	6.175	6.582	ns	
		GCLK PLL	$t_{co}$	3.510	3.787	5.581	5.794	6.358	6.194	6.601	5.938	6.502	6.194	6.601	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.500	3.776	5.560	5.771	6.333	6.169	6.576	5.914	6.475	6.169	6.576	ns	
		GCLK PLL	$t_{co}$	3.495	3.772	5.560	5.771	6.334	6.170	6.577	5.915	6.477	6.170	6.577	ns	
	6mA	GCLK	$t_{co}$	3.493	3.770	5.559	5.770	6.332	6.168	6.575	5.914	6.476	6.168	6.575	ns	
		GCLK PLL	$t_{co}$	3.485	3.761	5.549	5.760	6.323	6.159	6.566	5.904	6.466	6.159	6.566	ns	
	8mA	GCLK	$t_{co}$	3.486	3.763	5.555	5.767	6.331	6.167	6.574	5.912	6.475	6.167	6.574	ns	
		GCLK PLL	$t_{co}$	3.485	3.760	5.538	5.748	6.309	6.145	6.552	5.891	6.451	6.145	6.552	ns	
	10mA	GCLK	$t_{co}$	3.497	3.773	5.556	5.766	6.327	6.163	6.570	5.910	6.470	6.163	6.570	ns	
		GCLK PLL	$t_{co}$	3.493	3.770	5.557	5.768	6.331	6.167	6.574	5.912	6.474	6.167	6.574	ns	
	12mA	GCLK	$t_{co}$	3.483	3.759	5.546	5.757	6.319	6.155	6.562	5.901	6.462	6.155	6.562	ns	
		GCLK PLL	$t_{co}$	3.481	3.757	5.544	5.754	6.317	6.153	6.560	5.899	6.460	6.153	6.560	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.481	3.758	5.547	5.759	6.322	6.158	6.565	5.903	6.466	6.158	6.565	ns
			GCLK PLL	$t_{co}$	3.485	3.761	5.544	5.754	6.316	6.152	6.559	5.898	6.459	6.152	6.559	ns

**Table 1-87.** EP3SL200 Column Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.511	3.790	5.589	5.802	6.366	6.202	6.609	5.946	6.509	6.202	6.609	ns
		GCLK PLL	$t_{co}$	3.497	3.776	5.577	5.791	6.356	6.192	6.599	5.936	6.500	6.192	6.599	ns
	6mA	GCLK	$t_{co}$	3.485	3.763	5.560	5.773	6.338	6.174	6.581	5.918	6.482	6.174	6.581	ns
		GCLK PLL	$t_{co}$	3.485	3.763	5.563	5.777	6.342	6.178	6.585	5.922	6.487	6.178	6.585	ns
	8mA	GCLK	$t_{co}$	3.481	3.759	5.556	5.769	6.335	6.171	6.578	5.915	6.479	6.171	6.578	ns
		GCLK PLL	$t_{co}$	3.485	3.761	5.549	5.760	6.323	6.159	6.566	5.904	6.466	6.159	6.566	ns
	10mA	GCLK	$t_{co}$	3.486	3.763	5.557	5.770	6.334	6.170	6.577	5.914	6.478	6.170	6.577	ns
		GCLK PLL	$t_{co}$	3.514	3.793	5.588	5.800	6.364	6.200	6.607	5.945	6.507	6.200	6.607	ns
12mA	GCLK	$t_{co}$	3.503	3.781	5.576	5.788	6.352	6.188	6.595	5.933	6.495	6.188	6.595	ns	
	GCLK PLL	$t_{co}$	3.498	3.777	5.576	5.789	6.353	6.189	6.596	5.934	6.497	6.189	6.596	ns	
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.484	3.762	5.558	5.770	6.334	6.170	6.577	5.915	6.479	6.170	6.577	ns
		GCLK PLL	$t_{co}$	3.482	3.760	5.556	5.768	6.332	6.168	6.575	5.913	6.476	6.168	6.575	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.486	3.762	5.548	5.758	6.320	6.156	6.563	5.902	6.463	6.156	6.563	ns
		GCLK PLL	$t_{co}$	3.486	3.763	5.556	5.768	6.332	6.168	6.575	5.913	6.476	6.168	6.575	ns
	6mA	GCLK	$t_{co}$	3.502	3.780	5.572	5.783	6.346	6.182	6.589	5.928	6.489	6.182	6.589	ns
		GCLK PLL	$t_{co}$	3.502	3.780	5.572	5.783	6.346	6.182	6.589	5.928	6.489	6.182	6.589	ns
	8mA	GCLK	$t_{co}$	3.492	3.770	5.562	5.773	6.336	6.172	6.579	5.918	6.480	6.172	6.579	ns
		GCLK PLL	$t_{co}$	3.485	3.762	5.548	5.758	6.320	6.156	6.563	5.902	6.463	6.156	6.563	ns
	10mA	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns
12mA	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns	
	GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns

**Table 1-87.** EP3SL200 Column Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.506	3.783	5.577	5.790	6.354	6.190	6.597	5.934	6.497	6.190	6.597	ns
		GCLK PLL	$t_{co}$	3.496	3.773	5.567	5.779	6.344	6.180	6.587	5.923	6.487	6.180	6.587	ns
	6mA	GCLK	$t_{co}$	3.496	3.773	5.570	5.783	6.348	6.184	6.591	5.928	6.492	6.184	6.591	ns
		GCLK PLL	$t_{co}$	3.489	3.767	5.563	5.777	6.342	6.178	6.585	5.921	6.486	6.178	6.585	ns
	8mA	GCLK	$t_{co}$	3.488	3.765	5.560	5.774	6.339	6.175	6.582	5.918	6.482	6.175	6.582	ns
		GCLK PLL	$t_{co}$	3.510	3.787	5.581	5.794	6.358	6.194	6.601	5.938	6.502	6.194	6.601	ns
	10mA	GCLK	$t_{co}$	3.500	3.776	5.560	5.771	6.333	6.169	6.576	5.914	6.475	6.169	6.576	ns
		GCLK PLL	$t_{co}$	3.495	3.772	5.560	5.771	6.334	6.170	6.577	5.915	6.477	6.170	6.577	ns
12mA	GCLK	$t_{co}$	3.493	3.770	5.559	5.770	6.332	6.168	6.575	5.914	6.476	6.168	6.575	ns	
	GCLK PLL	$t_{co}$	3.485	3.761	5.549	5.760	6.323	6.159	6.566	5.904	6.466	6.159	6.566	ns	
DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.486	3.763	5.555	5.767	6.331	6.167	6.574	5.912	6.475	6.167	6.574	ns
		GCLK PLL	$t_{co}$	3.485	3.760	5.538	5.748	6.309	6.145	6.552	5.891	6.451	6.145	6.552	ns
	16mA	GCLK	$t_{co}$	3.497	3.773	5.556	5.766	6.327	6.163	6.570	5.910	6.470	6.163	6.570	ns
		GCLK PLL	$t_{co}$	3.493	3.770	5.557	5.768	6.331	6.167	6.574	5.912	6.474	6.167	6.574	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.483	3.759	5.546	5.757	6.319	6.155	6.562	5.901	6.462	6.155	6.562	ns
		GCLK PLL	$t_{co}$	3.481	3.757	5.544	5.754	6.317	6.153	6.560	5.899	6.460	6.153	6.560	ns
	6mA	GCLK	$t_{co}$	3.481	3.758	5.547	5.759	6.322	6.158	6.565	5.903	6.466	6.158	6.565	ns
		GCLK PLL	$t_{co}$	3.485	3.761	5.544	5.754	6.316	6.152	6.559	5.898	6.459	6.152	6.559	ns
	8mA	GCLK	$t_{co}$	3.511	3.790	5.589	5.802	6.366	6.202	6.609	5.946	6.509	6.202	6.609	ns
		GCLK PLL	$t_{co}$	3.497	3.776	5.577	5.791	6.356	6.192	6.599	5.936	6.500	6.192	6.599	ns
	10mA	GCLK	$t_{co}$	3.485	3.763	5.560	5.773	6.338	6.174	6.581	5.918	6.482	6.174	6.581	ns
		GCLK PLL	$t_{co}$	3.485	3.763	5.563	5.777	6.342	6.178	6.585	5.922	6.487	6.178	6.585	ns
12mA	GCLK	$t_{co}$	3.481	3.759	5.556	5.769	6.335	6.171	6.578	5.915	6.479	6.171	6.578	ns	
	GCLK PLL	$t_{co}$	3.485	3.761	5.549	5.760	6.323	6.159	6.566	5.904	6.466	6.159	6.566	ns	
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.486	3.763	5.557	5.770	6.334	6.170	6.577	5.914	6.478	6.170	6.577	ns
		GCLK PLL	$t_{co}$	3.514	3.793	5.588	5.800	6.364	6.200	6.607	5.945	6.507	6.200	6.607	ns
	16mA	GCLK	$t_{co}$	3.503	3.781	5.576	5.788	6.352	6.188	6.595	5.933	6.495	6.188	6.595	ns
		GCLK PLL	$t_{co}$	3.498	3.777	5.576	5.789	6.353	6.189	6.596	5.934	6.497	6.189	6.596	ns

**Table 1-87.** EP3SL200 Column Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.484	3.762	5.558	5.770	6.334	6.170	6.577	5.915	6.479	6.170	6.577	ns
		GCLK PLL	$t_{co}$	3.482	3.760	5.556	5.768	6.332	6.168	6.575	5.913	6.476	6.168	6.575	ns
	10mA	GCLK	$t_{co}$	3.486	3.762	5.548	5.758	6.320	6.156	6.563	5.902	6.463	6.156	6.563	ns
		GCLK PLL	$t_{co}$	3.486	3.763	5.556	5.768	6.332	6.168	6.575	5.913	6.476	6.168	6.575	ns
	12mA	GCLK	$t_{co}$	3.502	3.780	5.572	5.783	6.346	6.182	6.589	5.928	6.489	6.182	6.589	ns
		GCLK PLL	$t_{co}$	3.502	3.780	5.572	5.783	6.346	6.182	6.589	5.928	6.489	6.182	6.589	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.492	3.770	5.562	5.773	6.336	6.172	6.579	5.918	6.480	6.172	6.579	ns
		GCLK PLL	$t_{co}$	3.485	3.762	5.548	5.758	6.320	6.156	6.563	5.902	6.463	6.156	6.563	ns

Table 1-88 lists the EP3SL200 row pins output timing parameters for differential I/O standards.

**Table 1-88.** EP3SL200 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
LVDS	—	GCLK	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
		GCLK PLL	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
LVDS_E_1R	—	GCLK	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
		GCLK PLL	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
		GCLK PLL	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
MINI-LVDS	—	GCLK	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
		GCLK PLL	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
		GCLK PLL	$t_{co}$	3.562	3.845	5.678	5.894	6.468	6.301	6.680	6.046	6.621	6.301	6.680	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.548	3.831	5.665	5.881	6.455	6.288	6.667	6.032	6.608	6.288	6.667	ns
		GCLK PLL	$t_{co}$	3.544	3.827	5.663	5.881	6.456	6.289	6.668	6.032	6.610	6.289	6.668	ns
RSDS	—	GCLK	$t_{co}$	3.560	3.842	5.664	5.878	6.450	6.283	6.662	6.029	6.603	6.283	6.662	ns
		GCLK PLL	$t_{co}$	3.549	3.832	5.660	5.874	6.447	6.280	6.659	6.026	6.600	6.280	6.659	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.546	3.829	5.658	5.872	6.445	6.278	6.657	6.024	6.599	6.278	6.657	ns
		GCLK PLL	$t_{co}$	3.557	3.839	5.659	5.873	6.444	6.277	6.656	6.023	6.597	6.277	6.656	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.547	3.830	5.657	5.871	6.443	6.276	6.655	6.023	6.597	6.276	6.655	ns
		GCLK PLL	$t_{co}$	3.533	3.816	5.642	5.856	6.429	6.262	6.641	6.008	6.582	6.262	6.641	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.530	3.812	5.638	5.852	6.425	6.258	6.637	6.004	6.578	6.258	6.637	ns
		GCLK PLL	$t_{co}$	3.527	3.810	5.639	5.855	6.428	6.261	6.640	6.007	6.582	6.261	6.640	ns
	6mA	GCLK	$t_{co}$	3.528	3.810	5.629	5.843	6.415	6.248	6.627	5.994	6.568	6.248	6.627	ns
		GCLK PLL	$t_{co}$	3.577	3.863	5.700	5.916	6.491	6.324	6.703	6.068	6.644	6.324	6.703	ns
8mA	GCLK	$t_{co}$	3.553	3.839	5.682	5.899	6.474	6.307	6.686	6.051	6.629	6.307	6.686	ns	
	GCLK PLL	$t_{co}$	3.535	3.820	5.660	5.877	6.452	6.285	6.664	6.029	6.607	6.285	6.664	ns	

**Table 1-88.** EP3SL200 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.581	3.866	5.700	5.916	6.490	6.323	6.702	6.068	6.644	6.323	6.702	ns
		GCLK PLL	$t_{co}$	3.566	3.851	5.686	5.901	6.475	6.308	6.687	6.053	6.629	6.308	6.687	ns
	6mA	GCLK	$t_{co}$	3.555	3.840	5.681	5.898	6.472	6.305	6.684	6.050	6.627	6.305	6.684	ns
		GCLK PLL	$t_{co}$	3.535	3.820	5.658	5.874	6.449	6.282	6.661	6.027	6.603	6.282	6.661	ns
	8mA	GCLK	$t_{co}$	3.532	3.816	5.654	5.871	6.445	6.278	6.657	6.023	6.600	6.278	6.657	ns
		GCLK PLL	$t_{co}$	3.537	3.820	5.645	5.859	6.431	6.264	6.643	6.010	6.584	6.264	6.643	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.530	3.813	5.644	5.860	6.434	6.267	6.646	6.013	6.589	6.267	6.646	ns
		GCLK PLL	$t_{co}$	3.568	3.852	5.682	5.897	6.470	6.303	6.682	6.049	6.624	6.303	6.682	ns
	6mA	GCLK	$t_{co}$	3.550	3.835	5.667	5.882	6.455	6.288	6.667	6.034	6.609	6.288	6.667	ns
		GCLK PLL	$t_{co}$	3.536	3.819	5.644	5.858	6.430	6.263	6.642	6.010	6.584	6.263	6.642	ns
	8mA	GCLK	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
		GCLK PLL	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
	10mA	GCLK	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
		GCLK PLL	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
	12mA	GCLK	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
		GCLK PLL	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
	16mA	GCLK	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
		GCLK PLL	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
		GCLK PLL	$t_{co}$	3.562	3.845	5.678	5.894	6.468	6.301	6.680	6.046	6.621	6.301	6.680	ns
	6mA	GCLK	$t_{co}$	3.548	3.831	5.665	5.881	6.455	6.288	6.667	6.032	6.608	6.288	6.667	ns
		GCLK PLL	$t_{co}$	3.544	3.827	5.663	5.881	6.456	6.289	6.668	6.032	6.610	6.289	6.668	ns
	8mA	GCLK	$t_{co}$	3.560	3.842	5.664	5.878	6.450	6.283	6.662	6.029	6.603	6.283	6.662	ns
		GCLK PLL	$t_{co}$	3.549	3.832	5.660	5.874	6.447	6.280	6.659	6.026	6.600	6.280	6.659	ns

**Table 1-88.** EP3SL200 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.546	3.829	5.658	5.872	6.445	6.278	6.657	6.024	6.599	6.278	6.657	ns	
		GCLK PLL	$t_{co}$	3.557	3.839	5.659	5.873	6.444	6.277	6.656	6.023	6.597	6.277	6.656	ns	
	6mA	GCLK	$t_{co}$	3.547	3.830	5.657	5.871	6.443	6.276	6.655	6.023	6.597	6.276	6.655	ns	
		GCLK PLL	$t_{co}$	3.533	3.816	5.642	5.856	6.429	6.262	6.641	6.008	6.582	6.262	6.641	ns	
	8mA	GCLK	$t_{co}$	3.530	3.812	5.638	5.852	6.425	6.258	6.637	6.004	6.578	6.258	6.637	ns	
		GCLK PLL	$t_{co}$	3.527	3.810	5.639	5.855	6.428	6.261	6.640	6.007	6.582	6.261	6.640	ns	
	10mA	GCLK	$t_{co}$	3.528	3.810	5.629	5.843	6.415	6.248	6.627	5.994	6.568	6.248	6.627	ns	
		GCLK PLL	$t_{co}$	3.577	3.863	5.700	5.916	6.491	6.324	6.703	6.068	6.644	6.324	6.703	ns	
	12mA	GCLK	$t_{co}$	3.553	3.839	5.682	5.899	6.474	6.307	6.686	6.051	6.629	6.307	6.686	ns	
		GCLK PLL	$t_{co}$	3.535	3.820	5.660	5.877	6.452	6.285	6.664	6.029	6.607	6.285	6.664	ns	
	8mA	GCLK	$t_{co}$	3.581	3.866	5.700	5.916	6.490	6.323	6.702	6.068	6.644	6.323	6.702	ns	
		GCLK PLL	$t_{co}$	3.566	3.851	5.686	5.901	6.475	6.308	6.687	6.053	6.629	6.308	6.687	ns	
	16mA	GCLK	$t_{co}$	3.555	3.840	5.681	5.898	6.472	6.305	6.684	6.050	6.627	6.305	6.684	ns	
		GCLK PLL	$t_{co}$	3.535	3.820	5.658	5.874	6.449	6.282	6.661	6.027	6.603	6.282	6.661	ns	
	DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.532	3.816	5.654	5.871	6.445	6.278	6.657	6.023	6.600	6.278	6.657	ns
			GCLK PLL	$t_{co}$	3.537	3.820	5.645	5.859	6.431	6.264	6.643	6.010	6.584	6.264	6.643	ns
12mA		GCLK	$t_{co}$	3.530	3.813	5.644	5.860	6.434	6.267	6.646	6.013	6.589	6.267	6.646	ns	
		GCLK PLL	$t_{co}$	3.568	3.852	5.682	5.897	6.470	6.303	6.682	6.049	6.624	6.303	6.682	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.550	3.835	5.667	5.882	6.455	6.288	6.667	6.034	6.609	6.288	6.667	ns	
		GCLK PLL	$t_{co}$	3.536	3.819	5.644	5.858	6.430	6.263	6.642	6.010	6.584	6.263	6.642	ns	

Table 1-89 and Table 1-90 list the EP3SL200 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-89 lists the EP3SL200 column pin delay adders when using the regional clock.

**Table 1-89.** EP3SL200 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.204	0.235	0.378	0.378	0.403	0.392	0.509	0.387	0.411	0.392	0.509	ns
RCLK PLL input adder	0.036	0.046	0.078	0.078	-0.047	-0.038	-0.036	0.085	-0.046	-0.038	-0.036	ns
RCLK output adder	-0.211	-0.234	-0.332	-0.328	-0.34	-0.334	-0.464	-0.327	-0.339	-0.334	-0.464	ns
RCLK PLL output adder	1.904	1.965	3.193	3.323	3.688	3.496	3.804	3.351	3.716	3.496	3.804	ns

Table 1-90 lists the EP3SL200 row pin delay adders when using the regional clock.

**Table 1-90.** EP3SL200 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.272	0.301	0.446	0.424	0.473	0.46	0.547	0.454	0.481	0.46	0.547	ns
RCLK PLL input adder	0.14	0.149	0.226	0.216	0.235	0.226	0.306	0.232	0.254	0.226	0.306	ns
RCLK output adder	-0.278	-0.306	-0.418	-0.434	-0.486	-0.472	-0.592	-0.464	-0.493	-0.472	-0.592	ns
RCLK PLL output adder	-0.15	-0.15	-0.227	-0.233	-0.254	-0.243	-0.322	-0.243	-0.258	-0.243	-0.322	ns

### EP3SL340 I/O Timing Parameters

Table 1-91 through Table 1-94 list the maximum I/O timing parameters for EP3SL340 devices for single-ended I/O standards.

Table 1-91 lists the EP3SL340 column pins input timing parameters for single-ended I/O standards.

**Table 1-91.** EP3SL340 Column Pins Input Timing Parameters (Part 1 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-1.345	-1.335	-2.017	-2.061	-2.330	-2.245	-2.542	-2.061	-2.330	-2.245	-2.542	ns
		t <sub>h</sub>	1.486	1.476	2.232	2.284	2.574	2.476	2.783	2.284	2.574	2.476	2.783	ns
	GCLK PLL	t <sub>su</sub>	-1.691	-1.691	-2.554	-2.585	-2.890	-2.799	-3.373	-2.585	-2.890	-2.799	-3.373	ns
		t <sub>h</sub>	1.996	1.996	3.031	3.081	3.434	3.313	3.912	3.081	3.434	3.313	3.912	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.345	-1.335	-2.017	-2.061	-2.330	-2.245	-2.542	-2.061	-2.330	-2.245	-2.542	ns
		t <sub>h</sub>	1.486	1.476	2.232	2.284	2.574	2.476	2.783	2.284	2.574	2.476	2.783	ns
	GCLK PLL	t <sub>su</sub>	-1.691	-1.691	-2.554	-2.585	-2.890	-2.799	-3.373	-2.585	-2.890	-2.799	-3.373	ns
		t <sub>h</sub>	1.996	1.996	3.031	3.081	3.434	3.313	3.912	3.081	3.434	3.313	3.912	ns



**Table 1-91.** EP3SL340 Column Pins Input Timing Parameters (Part 2 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V LVTTL	GCLK	$t_{su}$	-1.356	-1.346	-2.016	-2.063	-2.329	-2.244	-2.541	-2.063	-2.329	-2.244	-2.541	ns
		$t_h$	1.497	1.487	2.231	2.286	2.573	2.475	2.782	2.286	2.573	2.475	2.782	ns
	GCLK PLL	$t_{su}$	-1.702	-1.702	-2.553	-2.587	-2.889	-2.798	-3.372	-2.587	-2.889	-2.798	-3.372	ns
		$t_h$	2.007	2.007	3.030	3.083	3.433	3.312	3.911	3.083	3.433	3.312	3.911	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-1.356	-1.346	-2.016	-2.063	-2.329	-2.244	-2.541	-2.063	-2.329	-2.244	-2.541	ns
		$t_h$	1.497	1.487	2.231	2.286	2.573	2.475	2.782	2.286	2.573	2.475	2.782	ns
	GCLK PLL	$t_{su}$	-1.702	-1.702	-2.553	-2.587	-2.889	-2.798	-3.372	-2.587	-2.889	-2.798	-3.372	ns
		$t_h$	2.007	2.007	3.030	3.083	3.433	3.312	3.911	3.083	3.433	3.312	3.911	ns
2.5 V	GCLK	$t_{su}$	-1.351	-1.341	-2.025	-2.075	-2.348	-2.263	-2.560	-2.075	-2.348	-2.263	-2.560	ns
		$t_h$	1.492	1.482	2.240	2.298	2.592	2.494	2.801	2.298	2.592	2.494	2.801	ns
	GCLK PLL	$t_{su}$	-1.697	-1.697	-2.562	-2.599	-2.908	-2.817	-3.391	-2.599	-2.908	-2.817	-3.391	ns
		$t_h$	2.002	2.002	3.039	3.095	3.452	3.331	3.930	3.095	3.452	3.331	3.930	ns
1.8 V	GCLK	$t_{su}$	-1.373	-1.363	-2.065	-2.111	-2.346	-2.261	-2.558	-2.111	-2.346	-2.261	-2.558	ns
		$t_h$	1.516	1.506	2.280	2.334	2.590	2.492	2.799	2.334	2.590	2.492	2.799	ns
	GCLK PLL	$t_{su}$	-1.719	-1.719	-2.602	-2.635	-2.906	-2.815	-3.389	-2.635	-2.906	-2.815	-3.389	ns
		$t_h$	2.026	2.026	3.079	3.131	3.450	3.329	3.928	3.131	3.450	3.329	3.928	ns
1.5 V	GCLK	$t_{su}$	-1.363	-1.353	-2.042	-2.079	-2.276	-2.191	-2.488	-2.079	-2.276	-2.191	-2.488	ns
		$t_h$	1.506	1.496	2.257	2.302	2.520	2.422	2.729	2.302	2.520	2.422	2.729	ns
	GCLK PLL	$t_{su}$	-1.709	-1.709	-2.579	-2.603	-2.836	-2.745	-3.319	-2.603	-2.836	-2.745	-3.319	ns
		$t_h$	2.016	2.016	3.056	3.099	3.380	3.259	3.858	3.099	3.380	3.259	3.858	ns
1.2 V	GCLK	$t_{su}$	-1.311	-1.301	-1.965	-1.980	-2.120	-2.035	-2.332	-1.980	-2.120	-2.035	-2.332	ns
		$t_h$	1.454	1.444	2.180	2.203	2.364	2.266	2.573	2.203	2.364	2.266	2.573	ns
	GCLK PLL	$t_{su}$	-1.657	-1.657	-2.502	-2.504	-2.680	-2.589	-3.163	-2.504	-2.680	-2.589	-3.163	ns
		$t_h$	1.964	1.964	2.979	3.000	3.224	3.103	3.702	3.000	3.224	3.103	3.702	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-1.282	-1.272	-1.937	-1.964	-2.122	-2.037	-2.334	-1.964	-2.122	-2.037	-2.334	ns
		$t_h$	1.425	1.415	2.152	2.187	2.366	2.268	2.575	2.187	2.366	2.268	2.575	ns
	GCLK PLL	$t_{su}$	-1.628	-1.628	-2.474	-2.488	-2.682	-2.591	-3.165	-2.488	-2.682	-2.591	-3.165	ns
		$t_h$	1.935	1.935	2.951	2.984	3.226	3.105	3.704	2.984	3.226	3.105	3.704	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-1.282	-1.272	-1.937	-1.964	-2.122	-2.037	-2.334	-1.964	-2.122	-2.037	-2.334	ns
		$t_h$	1.425	1.415	2.152	2.187	2.366	2.268	2.575	2.187	2.366	2.268	2.575	ns
	GCLK PLL	$t_{su}$	-1.628	-1.628	-2.474	-2.488	-2.682	-2.591	-3.165	-2.488	-2.682	-2.591	-3.165	ns
		$t_h$	1.935	1.935	2.951	2.984	3.226	3.105	3.704	2.984	3.226	3.105	3.704	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-1.276	-1.266	-1.924	-1.956	-2.119	-2.032	-2.335	-1.956	-2.119	-2.032	-2.335	ns
		$t_h$	1.419	1.409	2.139	2.176	2.360	2.262	2.571	2.176	2.360	2.262	2.571	ns
	GCLK PLL	$t_{su}$	-1.622	-1.622	-2.461	-2.480	-2.679	-2.586	-3.163	-2.480	-2.679	-2.586	-3.163	ns
		$t_h$	1.929	1.929	2.938	2.973	3.220	3.099	3.697	2.973	3.220	3.099	3.697	ns

**Table 1-91.** EP3SL340 Column Pins Input Timing Parameters (Part 3 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
SSTL-18 CLASS II	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns
3.0-V PCI	GCLK	$t_{su}$	-1.397	-1.354	-2.096	-2.121	-2.299	-2.366	-2.766	-2.321	-2.476	-2.366	-2.766	ns
		$t_h$	1.530	1.508	2.327	2.361	2.563	2.611	3.023	2.566	2.745	2.611	3.023	ns
	GCLK PLL	$t_{su}$	0.785	0.779	1.380	1.479	1.654	1.670	1.679	1.480	1.660	1.670	1.679	ns
		$t_h$	-0.510	-0.485	-0.912	-0.992	-1.113	-1.156	-1.144	-0.982	-1.107	-1.156	-1.144	ns

**Table 1-91.** EP3SL340 Column Pins Input Timing Parameters (Part 4 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V PCI-X	GCLK	$t_{su}$	-1.356	-1.346	-2.016	-2.063	-2.329	-2.244	-2.541	-2.063	-2.329	-2.244	-2.541	ns
		$t_h$	1.497	1.487	2.231	2.286	2.573	2.475	2.782	2.286	2.573	2.475	2.782	ns
	GCLK PLL	$t_{su}$	-1.702	-1.702	-2.553	-2.587	-2.889	-2.798	-3.372	-2.587	-2.889	-2.798	-3.372	ns
		$t_h$	2.007	2.007	3.030	3.083	3.433	3.312	3.911	3.083	3.433	3.312	3.911	ns

Table 1-92 lists the EP3SL340 row pins input timing parameters for single-ended I/O standards.

**Table 1-92.** EP3SL340 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.3-V LVTTTL	GCLK	$t_{su}$	-1.239	-1.296	-1.925	-1.956	-2.199	-2.135	-2.587	-1.973	-2.204	-2.142	-2.522	ns
		$t_h$	1.362	1.435	2.137	2.177	2.442	2.366	2.822	2.205	2.456	2.382	2.763	ns
	GCLK PLL	$t_{su}$	0.879	0.945	1.670	1.687	1.786	1.680	1.689	1.689	1.807	1.695	1.746	ns
		$t_h$	-0.615	-0.660	-1.216	-1.217	-1.263	-1.188	-1.178	-1.208	-1.273	-1.193	-1.231	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-1.239	-1.296	-1.925	-1.956	-2.199	-2.135	-2.587	-1.973	-2.204	-2.142	-2.522	ns
		$t_h$	1.362	1.435	2.137	2.177	2.442	2.366	2.822	2.205	2.456	2.382	2.763	ns
	GCLK PLL	$t_{su}$	0.879	0.945	1.670	1.687	1.786	1.680	1.689	1.689	1.807	1.695	1.746	ns
		$t_h$	-0.615	-0.660	-1.216	-1.217	-1.263	-1.188	-1.178	-1.208	-1.273	-1.193	-1.231	ns
3.0-V LVTTTL	GCLK	$t_{su}$	-1.245	-1.307	-1.922	-1.957	-2.202	-2.138	-2.590	-1.972	-2.209	-2.147	-2.527	ns
		$t_h$	1.368	1.446	2.134	2.178	2.445	2.369	2.825	2.204	2.461	2.387	2.768	ns
	GCLK PLL	$t_{su}$	0.873	0.934	1.673	1.686	1.783	1.677	1.686	1.690	1.802	1.690	1.741	ns
		$t_h$	-0.609	-0.649	-1.219	-1.216	-1.260	-1.185	-1.175	-1.209	-1.268	-1.188	-1.226	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-1.245	-1.307	-1.922	-1.957	-2.202	-2.138	-2.590	-1.972	-2.209	-2.147	-2.527	ns
		$t_h$	1.368	1.446	2.134	2.178	2.445	2.369	2.825	2.204	2.461	2.387	2.768	ns
	GCLK PLL	$t_{su}$	0.873	0.934	1.673	1.686	1.783	1.677	1.686	1.690	1.802	1.690	1.741	ns
		$t_h$	-0.609	-0.649	-1.219	-1.216	-1.260	-1.185	-1.175	-1.209	-1.268	-1.188	-1.226	ns
2.5 V	GCLK	$t_{su}$	-1.233	-1.300	-1.931	-1.970	-2.217	-2.153	-2.605	-1.981	-2.219	-2.157	-2.537	ns
		$t_h$	1.356	1.439	2.143	2.191	2.460	2.384	2.840	2.213	2.471	2.397	2.778	ns
	GCLK PLL	$t_{su}$	0.885	0.941	1.664	1.673	1.768	1.662	1.671	1.681	1.792	1.680	1.731	ns
		$t_h$	-0.621	-0.656	-1.210	-1.203	-1.245	-1.170	-1.160	-1.200	-1.258	-1.178	-1.216	ns
1.8 V	GCLK	$t_{su}$	-1.251	-1.343	-1.980	-1.995	-2.204	-2.138	-2.582	-2.003	-2.208	-2.153	-2.621	ns
		$t_h$	1.377	1.482	2.193	2.216	2.447	2.369	2.817	2.234	2.461	2.393	2.859	ns
	GCLK PLL	$t_{su}$	0.827	0.910	1.624	1.634	1.857	1.742	1.565	1.620	1.886	1.762	1.619	ns
		$t_h$	-0.562	-0.624	-1.170	-1.164	-1.330	-1.246	-1.060	-1.140	-1.347	-1.255	-1.107	ns

Table 1-92. EP3SL340 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	
1.5 V	GCLK	$t_{su}$	-1.241	-1.332	-1.956	-1.963	-2.136	-2.070	-2.514	-1.972	-2.143	-2.088	-2.556	ns
		$t_h$	1.367	1.471	2.169	2.184	2.379	2.301	2.749	2.203	2.396	2.328	2.794	ns
	GCLK PLL	$t_{su}$	0.837	0.921	1.648	1.666	1.925	1.810	1.633	1.651	1.951	1.827	1.684	ns
		$t_h$	-0.572	-0.635	-1.194	-1.196	-1.398	-1.314	-1.128	-1.171	-1.412	-1.320	-1.172	ns
1.2 V	GCLK	$t_{su}$	-1.181	-1.279	-1.877	-1.862	-1.977	-1.911	-2.355	-1.876	-1.988	-1.933	-2.401	ns
		$t_h$	1.307	1.418	2.090	2.083	2.220	2.142	2.590	2.107	2.241	2.173	2.639	ns
	GCLK PLL	$t_{su}$	0.897	0.974	1.727	1.767	2.084	1.969	1.792	1.747	2.106	1.982	1.839	ns
		$t_h$	-0.632	-0.688	-1.273	-1.297	-1.557	-1.473	-1.287	-1.267	-1.567	-1.475	-1.327	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-1.176	-1.242	-1.845	-1.861	-1.997	-1.933	-2.385	-1.869	-2.002	-1.940	-2.320	ns
		$t_h$	1.300	1.382	2.057	2.082	2.240	2.164	2.620	2.101	2.254	2.180	2.561	ns
	GCLK PLL	$t_{su}$	0.942	1.000	1.750	1.782	1.988	1.882	1.891	1.793	2.009	1.897	1.948	ns
		$t_h$	-0.677	-0.714	-1.296	-1.312	-1.465	-1.390	-1.380	-1.312	-1.475	-1.395	-1.433	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-1.176	-1.242	-1.845	-1.861	-1.997	-1.933	-2.385	-1.869	-2.002	-1.940	-2.320	ns
		$t_h$	1.300	1.382	2.057	2.082	2.240	2.164	2.620	2.101	2.254	2.180	2.561	ns
	GCLK PLL	$t_{su}$	0.942	1.000	1.750	1.782	1.988	1.882	1.891	1.793	2.009	1.897	1.948	ns
		$t_h$	-0.677	-0.714	-1.296	-1.312	-1.465	-1.390	-1.380	-1.312	-1.475	-1.395	-1.433	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-1.155	-1.244	-1.839	-1.835	-1.972	-1.905	-2.351	-1.844	-1.981	-1.925	-2.394	ns
		$t_h$	1.281	1.383	2.052	2.054	2.213	2.135	2.582	2.073	2.231	2.164	2.628	ns
	GCLK PLL	$t_{su}$	0.923	1.009	1.765	1.794	2.086	1.972	1.796	1.779	2.110	1.988	1.846	ns
		$t_h$	-0.658	-0.723	-1.311	-1.326	-1.562	-1.478	-1.295	-1.301	-1.574	-1.482	-1.338	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-1.155	-1.244	-1.839	-1.835	-1.972	-1.905	-2.351	-1.844	-1.981	-1.925	-2.394	ns
		$t_h$	1.281	1.383	2.052	2.054	2.213	2.135	2.582	2.073	2.231	2.164	2.628	ns
	GCLK PLL	$t_{su}$	0.923	1.009	1.765	1.794	2.086	1.972	1.796	1.779	2.110	1.988	1.846	ns
		$t_h$	-0.658	-0.723	-1.311	-1.326	-1.562	-1.478	-1.295	-1.301	-1.574	-1.482	-1.338	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-1.141	-1.232	-1.824	-1.825	-1.954	-1.887	-2.333	-1.833	-1.964	-1.908	-2.377	ns
		$t_h$	1.267	1.371	2.038	2.044	2.195	2.117	2.564	2.062	2.214	2.147	2.611	ns
	GCLK PLL	$t_{su}$	0.937	1.021	1.778	1.804	2.104	1.990	1.814	1.790	2.127	2.005	1.863	ns
		$t_h$	-0.672	-0.735	-1.323	-1.336	-1.580	-1.496	-1.313	-1.312	-1.591	-1.499	-1.355	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.155	-1.244	-1.839	-1.835	-1.972	-1.905	-2.351	-1.844	-1.981	-1.925	-2.394	ns
		$t_h$	1.281	1.383	2.052	2.054	2.213	2.135	2.582	2.073	2.231	2.164	2.628	ns
	GCLK PLL	$t_{su}$	0.923	1.009	1.765	1.794	2.086	1.972	1.796	1.779	2.110	1.988	1.846	ns
		$t_h$	-0.658	-0.723	-1.311	-1.326	-1.562	-1.478	-1.295	-1.301	-1.574	-1.482	-1.338	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.155	-1.244	-1.839	-1.835	-1.972	-1.905	-2.351	-1.844	-1.981	-1.925	-2.394	ns
		$t_h$	1.281	1.383	2.052	2.054	2.213	2.135	2.582	2.073	2.231	2.164	2.628	ns
	GCLK PLL	$t_{su}$	0.923	1.009	1.765	1.794	2.086	1.972	1.796	1.779	2.110	1.988	1.846	ns
		$t_h$	-0.658	-0.723	-1.311	-1.326	-1.562	-1.478	-1.295	-1.301	-1.574	-1.482	-1.338	ns

**Table 1-92.** EP3SL340 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.141	-1.232	-1.824	-1.825	-1.954	-1.887	-2.333	-1.833	-1.964	-1.908	-2.377	ns
		$t_h$	1.267	1.371	2.038	2.044	2.195	2.117	2.564	2.062	2.214	2.147	2.611	ns
	GCLK PLL	$t_{su}$	0.937	1.021	1.778	1.804	2.104	1.990	1.814	1.790	2.127	2.005	1.863	ns
		$t_h$	-0.672	-0.735	-1.323	-1.336	-1.580	-1.496	-1.313	-1.312	-1.591	-1.499	-1.355	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.141	-1.232	-1.824	-1.825	-1.954	-1.887	-2.333	-1.833	-1.964	-1.908	-2.377	ns
		$t_h$	1.267	1.371	2.038	2.044	2.195	2.117	2.564	2.062	2.214	2.147	2.611	ns
	GCLK PLL	$t_{su}$	0.937	1.021	1.778	1.804	2.104	1.990	1.814	1.790	2.127	2.005	1.863	ns
		$t_h$	-0.672	-0.735	-1.323	-1.336	-1.580	-1.496	-1.313	-1.312	-1.591	-1.499	-1.355	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.132	-1.220	-1.815	-1.815	-1.938	-1.871	-2.317	-1.824	-1.948	-1.892	-2.361	ns
		$t_h$	1.258	1.359	2.029	2.034	2.179	2.101	2.548	2.053	2.198	2.131	2.595	ns
	GCLK PLL	$t_{su}$	0.946	1.033	1.787	1.814	2.120	2.006	1.830	1.799	2.143	2.021	1.879	ns
		$t_h$	-0.681	-0.747	-1.332	-1.346	-1.596	-1.512	-1.329	-1.321	-1.607	-1.515	-1.371	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.132	-1.220	-1.815	-1.815	-1.938	-1.871	-2.317	-1.824	-1.948	-1.892	-2.361	ns
		$t_h$	1.258	1.359	2.029	2.034	2.179	2.101	2.548	2.053	2.198	2.131	2.595	ns
	GCLK PLL	$t_{su}$	0.946	1.033	1.787	1.814	2.120	2.006	1.830	1.799	2.143	2.021	1.879	ns
		$t_h$	-0.681	-0.747	-1.332	-1.346	-1.596	-1.512	-1.329	-1.321	-1.607	-1.515	-1.371	ns
3.0-V PCI	GCLK	$t_{su}$	-1.245	-1.307	-1.922	-1.957	-2.202	-2.138	-2.590	-1.972	-2.209	-2.147	-2.527	ns
		$t_h$	1.368	1.446	2.134	2.178	2.445	2.369	2.825	2.204	2.461	2.387	2.768	ns
	GCLK PLL	$t_{su}$	0.873	0.934	1.673	1.686	1.783	1.677	1.686	1.690	1.802	1.690	1.741	ns
		$t_h$	-0.609	-0.649	-1.219	-1.216	-1.260	-1.185	-1.175	-1.209	-1.268	-1.188	-1.226	ns
3.0-V PCI-X	GCLK	$t_{su}$	-1.245	-1.307	-1.922	-1.957	-2.202	-2.138	-2.590	-1.972	-2.209	-2.147	-2.527	ns
		$t_h$	1.368	1.446	2.134	2.178	2.445	2.369	2.825	2.204	2.461	2.387	2.768	ns
	GCLK PLL	$t_{su}$	0.873	0.934	1.673	1.686	1.783	1.677	1.686	1.690	1.802	1.690	1.741	ns
		$t_h$	-0.609	-0.649	-1.219	-1.216	-1.260	-1.185	-1.175	-1.209	-1.268	-1.188	-1.226	ns

Table 1-93 lists the EP3SL340 column pins output timing parameters for single-ended I/O standards.

**Table 1-93.** EP3SL340 Column Pins Output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.3-V LVTTL	4mA	GCLK	$t_{co}$	3.705	3.705	5.372	5.559	6.083	5.935	6.364	5.559	6.083	5.935	6.364	ns
		GCLK PLL	$t_{co}$	4.269	4.269	6.214	6.409	6.992	6.812	7.355	6.409	6.992	6.812	7.355	ns
	8mA	GCLK	$t_{co}$	3.638	3.638	5.263	5.448	5.970	5.822	6.251	5.448	5.970	5.822	6.251	ns
		GCLK PLL	$t_{co}$	4.202	4.202	6.105	6.298	6.879	6.699	7.242	6.298	6.879	6.699	7.242	ns
	12mA	GCLK	$t_{co}$	3.552	3.552	5.160	5.350	5.878	5.730	6.159	5.350	5.878	5.730	6.159	ns
		GCLK PLL	$t_{co}$	4.116	4.116	6.001	6.200	6.789	6.609	7.152	6.200	6.789	6.609	7.152	ns
	16mA	GCLK	$t_{co}$	3.545	3.545	5.143	5.322	5.837	5.689	6.118	5.322	5.837	5.689	6.118	ns
		GCLK PLL	$t_{co}$	4.110	4.110	5.985	6.172	6.747	6.567	7.110	6.172	6.747	6.567	7.110	ns
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.711	3.711	5.377	5.564	6.090	5.942	6.371	5.564	6.090	5.942	6.371	ns
		GCLK PLL	$t_{co}$	4.275	4.275	6.218	6.414	7.000	6.820	7.363	6.414	7.000	6.820	7.363	ns
	8mA	GCLK	$t_{co}$	3.556	3.556	5.170	5.367	5.889	5.741	6.170	5.367	5.889	5.741	6.170	ns
		GCLK PLL	$t_{co}$	4.120	4.120	6.012	6.217	6.799	6.619	7.162	6.217	6.799	6.619	7.162	ns
	12mA	GCLK	$t_{co}$	3.563	3.563	5.164	5.346	5.863	5.715	6.144	5.346	5.863	5.715	6.144	ns
		GCLK PLL	$t_{co}$	4.127	4.127	6.006	6.196	6.775	6.595	7.138	6.196	6.775	6.595	7.138	ns
	16mA	GCLK	$t_{co}$	3.547	3.547	5.141	5.320	5.834	5.686	6.115	5.320	5.834	5.686	6.115	ns
		GCLK PLL	$t_{co}$	4.111	4.111	5.983	6.171	6.746	6.566	7.109	6.171	6.746	6.566	7.109	ns
3.0-V LVTTL	4mA	GCLK	$t_{co}$	3.669	3.669	5.339	5.528	6.050	5.902	6.331	5.528	6.050	5.902	6.331	ns
		GCLK PLL	$t_{co}$	4.232	4.232	6.181	6.377	6.983	6.803	7.346	6.377	6.983	6.803	7.346	ns
	8mA	GCLK	$t_{co}$	3.558	3.558	5.209	5.394	5.912	5.765	6.193	5.394	5.912	5.765	6.193	ns
		GCLK PLL	$t_{co}$	4.125	4.125	6.053	6.246	6.867	6.688	7.229	6.246	6.867	6.688	7.229	ns
	12mA	GCLK	$t_{co}$	3.522	3.522	5.146	5.325	5.838	5.691	6.119	5.325	5.838	5.691	6.119	ns
		GCLK PLL	$t_{co}$	4.087	4.087	5.987	6.174	6.803	6.624	7.165	6.174	6.803	6.624	7.165	ns
	16mA	GCLK	$t_{co}$	3.504	3.504	5.117	5.297	5.810	5.662	6.091	5.297	5.810	5.662	6.091	ns
		GCLK PLL	$t_{co}$	4.068	4.068	5.959	6.147	6.780	6.601	7.142	6.147	6.780	6.601	7.142	ns

**Table 1-93.** EP3SL340 Column Pins Output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V LVC MOS	4mA	GCLK	$t_{co}$	3.583	3.583	5.243	5.427	5.947	5.800	6.228	5.427	5.947	5.800	6.228	ns
		GCLK PLL	$t_{co}$	4.149	4.149	6.087	6.279	6.903	6.724	7.265	6.279	6.903	6.724	7.265	ns
	8mA	GCLK	$t_{co}$	3.504	3.504	5.120	5.298	5.812	5.665	6.093	5.298	5.812	5.665	6.093	ns
		GCLK PLL	$t_{co}$	4.070	4.070	5.963	6.149	6.793	6.614	7.155	6.149	6.793	6.614	7.155	ns
	12mA	GCLK	$t_{co}$	3.499	3.499	5.112	5.291	5.804	5.656	6.085	5.291	5.804	5.656	6.085	ns
		GCLK PLL	$t_{co}$	4.063	4.063	5.955	6.142	6.761	6.581	7.124	6.142	6.761	6.581	7.124	ns
	16mA	GCLK	$t_{co}$	3.490	3.490	5.098	5.276	5.789	5.641	6.070	5.276	5.789	5.641	6.070	ns
		GCLK PLL	$t_{co}$	4.054	4.054	5.940	6.126	6.767	6.588	7.129	6.126	6.767	6.588	7.129	ns
2.5 V	4mA	GCLK	$t_{co}$	3.705	3.705	5.450	5.654	6.194	6.047	6.475	5.654	6.194	6.047	6.475	ns
		GCLK PLL	$t_{co}$	4.269	4.269	6.293	6.504	7.111	6.932	7.473	6.504	7.111	6.932	7.473	ns
	8mA	GCLK	$t_{co}$	3.605	3.605	5.331	5.528	6.062	5.915	6.343	5.528	6.062	5.915	6.343	ns
		GCLK PLL	$t_{co}$	4.172	4.172	6.174	6.379	6.987	6.808	7.349	6.379	6.987	6.808	7.349	ns
	12mA	GCLK	$t_{co}$	3.561	3.561	5.244	5.438	5.967	5.819	6.248	5.438	5.967	5.819	6.248	ns
		GCLK PLL	$t_{co}$	4.127	4.127	6.087	6.288	6.909	6.730	7.271	6.288	6.909	6.730	7.271	ns
	16mA	GCLK	$t_{co}$	3.523	3.523	5.205	5.395	5.924	5.776	6.205	5.395	5.924	5.776	6.205	ns
		GCLK PLL	$t_{co}$	4.088	4.088	6.048	6.246	6.852	6.673	7.214	6.246	6.852	6.673	7.214	ns

**Table 1-93.** EP3SL340 Column Pins Output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.8 V	2mA	GCLK	$t_{co}$	3.896	3.896	5.772	6.014	6.599	6.451	6.880	6.014	6.599	6.451	6.880	ns
		GCLK PLL	$t_{co}$	4.460	4.460	6.613	6.863	7.507	7.327	7.870	6.863	7.507	7.327	7.870	ns
	4mA	GCLK	$t_{co}$	3.715	3.715	5.493	5.705	6.251	6.104	6.532	5.705	6.251	6.104	6.532	ns
		GCLK PLL	$t_{co}$	4.282	4.282	6.336	6.556	7.177	6.998	7.539	6.556	7.177	6.998	7.539	ns
	6mA	GCLK	$t_{co}$	3.633	3.633	5.386	5.590	6.141	5.993	6.422	5.590	6.141	5.993	6.422	ns
		GCLK PLL	$t_{co}$	4.197	4.197	6.227	6.440	7.064	6.884	7.427	6.440	7.064	6.884	7.427	ns
	8mA	GCLK	$t_{co}$	3.613	3.613	5.327	5.537	6.075	5.927	6.356	5.537	6.075	5.927	6.356	ns
		GCLK PLL	$t_{co}$	4.177	4.177	6.169	6.386	6.987	6.807	7.350	6.386	6.987	6.807	7.350	ns
	10mA	GCLK	$t_{co}$	3.550	3.550	5.266	5.462	5.994	5.846	6.275	5.462	5.994	5.846	6.275	ns
		GCLK PLL	$t_{co}$	4.114	4.114	6.109	6.312	6.918	6.738	7.281	6.312	6.918	6.738	7.281	ns
	12mA	GCLK	$t_{co}$	3.532	3.532	5.246	5.440	5.971	5.823	6.252	5.440	5.971	5.823	6.252	ns
		GCLK PLL	$t_{co}$	4.097	4.097	6.088	6.291	6.885	6.705	7.248	6.291	6.885	6.705	7.248	ns
1.5 V	2mA	GCLK	$t_{co}$	3.842	3.842	5.700	5.947	6.537	6.389	6.818	5.947	6.537	6.389	6.818	ns
		GCLK PLL	$t_{co}$	4.406	4.406	6.542	6.796	7.452	7.272	7.815	6.796	7.452	7.272	7.815	ns
	4mA	GCLK	$t_{co}$	3.630	3.630	5.381	5.590	6.145	5.997	6.426	5.590	6.145	5.997	6.426	ns
		GCLK PLL	$t_{co}$	4.194	4.194	6.223	6.439	7.066	6.886	7.429	6.439	7.066	6.886	7.429	ns
	6mA	GCLK	$t_{co}$	3.605	3.605	5.314	5.530	6.078	5.930	6.359	5.530	6.078	5.930	6.359	ns
		GCLK PLL	$t_{co}$	4.170	4.170	6.156	6.381	6.989	6.809	7.352	6.381	6.989	6.809	7.352	ns
	8mA	GCLK	$t_{co}$	3.594	3.594	5.297	5.505	6.058	5.910	6.339	5.505	6.058	5.910	6.339	ns
		GCLK PLL	$t_{co}$	4.158	4.158	6.140	6.356	6.972	6.792	7.335	6.356	6.972	6.792	7.335	ns
	10mA	GCLK	$t_{co}$	3.539	3.539	5.259	5.455	5.988	5.840	6.269	5.455	5.988	5.840	6.269	ns
		GCLK PLL	$t_{co}$	4.103	4.103	6.101	6.305	6.909	6.729	7.272	6.305	6.909	6.729	7.272	ns
	12mA	GCLK	$t_{co}$	3.534	3.534	5.243	5.443	5.977	5.829	6.258	5.443	5.977	5.829	6.258	ns
		GCLK PLL	$t_{co}$	4.097	4.097	6.084	6.292	6.888	6.708	7.251	6.292	6.888	6.708	7.251	ns



**Table 1-93.** EP3SL340 Column Pins Output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 1.1\text{ V}$	$V_{CCL} = 0.9\text{ V}$	
1.2 V	2mA	GCLK	$t_{co}$	3.758	3.758	5.626	5.882	6.481	6.333	6.762	5.882	6.481	6.333	6.762	ns
		GCLK PLL	$t_{co}$	4.322	4.322	6.468	6.731	7.392	7.212	7.755	6.731	7.392	7.212	7.755	ns
	4mA	GCLK	$t_{co}$	3.635	3.635	5.401	5.621	6.195	6.047	6.476	5.621	6.195	6.047	6.476	ns
		GCLK PLL	$t_{co}$	4.200	4.200	6.243	6.471	7.107	6.927	7.470	6.471	7.107	6.927	7.470	ns
	6mA	GCLK	$t_{co}$	3.597	3.597	5.308	5.531	6.082	5.934	6.363	5.531	6.082	5.934	6.363	ns
		GCLK PLL	$t_{co}$	4.162	4.162	6.150	6.381	6.993	6.813	7.356	6.381	6.993	6.813	7.356	ns
	8mA	GCLK	$t_{co}$	3.550	3.550	5.280	5.482	6.026	5.878	6.307	5.482	6.026	5.878	6.307	ns
		GCLK PLL	$t_{co}$	4.113	4.113	6.121	6.331	6.946	6.766	7.309	6.331	6.946	6.766	7.309	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.550	3.550	5.237	5.430	5.957	5.809	6.238	5.430	5.957	5.809	6.238	ns
		GCLK PLL	$t_{co}$	4.114	4.114	6.078	6.278	6.903	6.723	7.266	6.278	6.903	6.723	7.266	ns
	10mA	GCLK	$t_{co}$	3.547	3.547	5.234	5.426	5.953	5.805	6.234	5.426	5.953	5.805	6.234	ns
		GCLK PLL	$t_{co}$	4.111	4.111	6.075	6.274	6.899	6.720	7.261	6.274	6.899	6.720	7.261	ns
	12mA	GCLK	$t_{co}$	3.545	3.545	5.234	5.427	5.954	5.806	6.235	5.427	5.954	5.806	6.235	ns
		GCLK PLL	$t_{co}$	4.110	4.110	6.075	6.275	6.899	6.719	7.262	6.275	6.899	6.719	7.262	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.536	3.536	5.220	5.412	5.939	5.791	6.220	5.412	5.939	5.791	6.220	ns
		GCLK PLL	$t_{co}$	4.101	4.101	6.062	6.261	6.883	6.703	7.246	6.261	6.883	6.703	7.246	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.557	3.557	5.249	5.444	5.973	5.825	6.254	5.444	5.973	5.825	6.254	ns
		GCLK PLL	$t_{co}$	4.121	4.121	6.090	6.292	6.923	6.744	7.285	6.292	6.923	6.744	7.285	ns
	6mA	GCLK	$t_{co}$	3.553	3.553	5.247	5.442	5.971	5.823	6.252	5.442	5.971	5.823	6.252	ns
		GCLK PLL	$t_{co}$	4.117	4.117	6.088	6.290	6.920	6.740	7.283	6.290	6.920	6.740	7.283	ns
	8mA	GCLK	$t_{co}$	3.542	3.542	5.237	5.432	5.962	5.814	6.243	5.432	5.962	5.814	6.243	ns
		GCLK PLL	$t_{co}$	4.107	4.107	6.079	6.281	6.919	6.740	7.281	6.281	6.919	6.740	7.281	ns
	10mA	GCLK	$t_{co}$	3.531	3.531	5.225	5.419	5.949	5.801	6.230	5.419	5.949	5.801	6.230	ns
		GCLK PLL	$t_{co}$	4.095	4.095	6.066	6.268	6.894	6.715	7.256	6.268	6.894	6.715	7.256	ns
	12mA	GCLK	$t_{co}$	3.531	3.531	5.224	5.419	5.949	5.801	6.230	5.419	5.949	5.801	6.230	ns
		GCLK PLL	$t_{co}$	4.095	4.095	6.066	6.268	6.892	6.712	7.255	6.268	6.892	6.712	7.255	ns

**Table 1-93.** EP3SL340 Column Pins Output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.537	3.537	5.223	5.416	5.944	5.796	6.225	5.416	5.944	5.796	6.225	ns	
		GCLK PLL	$t_{co}$	4.102	4.102	6.065	6.265	6.895	6.715	7.258	6.265	6.895	6.715	7.258	ns	
	16mA	GCLK	$t_{co}$	3.540	3.540	5.231	5.426	5.956	5.808	6.237	5.426	5.956	5.808	6.237	ns	
		GCLK PLL	$t_{co}$	4.104	4.104	6.072	6.274	6.918	6.738	7.281	6.274	6.918	6.738	7.281	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.561	3.561	5.259	5.455	5.986	5.838	6.267	5.455	5.986	5.838	6.267	ns	
		GCLK PLL	$t_{co}$	4.124	4.124	6.100	6.303	6.937	6.757	7.300	6.303	6.937	6.757	7.300	ns	
	6mA	GCLK	$t_{co}$	3.547	3.547	5.248	5.445	5.977	5.829	6.258	5.445	5.977	5.829	6.258	ns	
		GCLK PLL	$t_{co}$	4.112	4.112	6.090	6.294	6.923	6.743	7.286	6.294	6.923	6.743	7.286	ns	
	8mA	GCLK	$t_{co}$	3.536	3.536	5.235	5.431	5.963	5.815	6.244	5.431	5.963	5.815	6.244	ns	
		GCLK PLL	$t_{co}$	4.100	4.100	6.076	6.280	6.908	6.728	7.271	6.280	6.908	6.728	7.271	ns	
	10mA	GCLK	$t_{co}$	3.535	3.535	5.238	5.435	5.967	5.819	6.248	5.435	5.967	5.819	6.248	ns	
		GCLK PLL	$t_{co}$	4.099	4.099	6.078	6.283	6.905	6.726	7.268	6.283	6.905	6.726	7.268	ns	
	12mA	GCLK	$t_{co}$	3.532	3.532	5.232	5.429	5.961	5.813	6.242	5.429	5.961	5.813	6.242	ns	
		GCLK PLL	$t_{co}$	4.096	4.096	6.073	6.277	6.899	6.719	7.262	6.277	6.899	6.719	7.262	ns	
	SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.534	3.534	5.221	5.415	5.944	5.796	6.225	5.415	5.944	5.796	6.225	ns
			GCLK PLL	$t_{co}$	4.098	4.098	6.063	6.264	6.896	6.716	7.259	6.264	6.896	6.716	7.259	ns
16mA		GCLK	$t_{co}$	3.537	3.537	5.228	5.424	5.955	5.807	6.236	5.424	5.955	5.807	6.236	ns	
		GCLK PLL	$t_{co}$	4.101	4.101	6.070	6.272	6.920	6.740	7.283	6.272	6.920	6.740	7.283	ns	

**Table 1-93.** EP3SL340 Column Pins Output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$		
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.544	3.544	5.223	5.415	5.942	5.794	6.223	5.415	5.942	5.794	6.223	ns	
		GCLK PLL	$t_{co}$	4.108	4.108	6.064	6.263	6.897	6.717	7.260	6.263	6.897	6.717	7.260	ns	
	6mA	GCLK	$t_{co}$	3.537	3.537	5.221	5.414	5.941	5.793	6.222	5.414	5.941	5.793	6.222	ns	
		GCLK PLL	$t_{co}$	4.102	4.102	6.063	6.263	6.903	6.724	7.265	6.263	6.903	6.724	7.265	ns	
	8mA	GCLK	$t_{co}$	3.529	3.529	5.214	5.406	5.934	5.786	6.215	5.406	5.934	5.786	6.215	ns	
		GCLK PLL	$t_{co}$	4.094	4.094	6.055	6.255	6.885	6.706	7.247	6.255	6.885	6.706	7.247	ns	
	10mA	GCLK	$t_{co}$	3.532	3.532	5.217	5.410	5.938	5.790	6.219	5.410	5.938	5.790	6.219	ns	
		GCLK PLL	$t_{co}$	4.096	4.096	6.058	6.258	6.887	6.707	7.250	6.258	6.887	6.707	7.250	ns	
	12mA	GCLK	$t_{co}$	3.529	3.529	5.219	5.413	5.942	5.794	6.223	5.413	5.942	5.794	6.223	ns	
		GCLK PLL	$t_{co}$	4.093	4.093	6.060	6.261	6.895	6.716	7.257	6.261	6.895	6.716	7.257	ns	
	1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.537	3.537	5.218	5.411	5.938	5.790	6.219	5.411	5.938	5.790	6.219	ns
			GCLK PLL	$t_{co}$	4.101	4.101	6.059	6.259	6.898	6.718	7.261	6.259	6.898	6.718	7.261	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.549	3.549	5.232	5.425	5.953	5.805	6.234	5.425	5.953	5.805	6.234	ns	
		GCLK PLL	$t_{co}$	4.113	4.113	6.072	6.273	6.910	6.730	7.273	6.273	6.910	6.730	7.273	ns	
	6mA	GCLK	$t_{co}$	3.545	3.545	5.233	5.427	5.956	5.808	6.237	5.427	5.956	5.808	6.237	ns	
		GCLK PLL	$t_{co}$	4.109	4.109	6.075	6.276	6.907	6.727	7.270	6.276	6.907	6.727	7.270	ns	
	8mA	GCLK	$t_{co}$	3.541	3.541	5.228	5.422	5.951	5.803	6.232	5.422	5.951	5.803	6.232	ns	
		GCLK PLL	$t_{co}$	4.105	4.105	6.070	6.271	6.902	6.722	7.265	6.271	6.902	6.722	7.265	ns	
	10mA	GCLK	$t_{co}$	3.534	3.534	5.221	5.415	5.944	5.796	6.225	5.415	5.944	5.796	6.225	ns	
		GCLK PLL	$t_{co}$	4.098	4.098	6.063	6.264	6.896	6.716	7.259	6.264	6.896	6.716	7.259	ns	
	12mA	GCLK	$t_{co}$	3.535	3.535	5.228	5.423	5.954	5.806	6.235	5.423	5.954	5.806	6.235	ns	
		GCLK PLL	$t_{co}$	4.098	4.098	6.069	6.271	6.900	6.721	7.262	6.271	6.900	6.721	7.262	ns	
	1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.533	3.533	5.209	5.401	5.928	5.780	6.209	5.401	5.928	5.780	6.209	ns
			GCLK PLL	$t_{co}$	4.096	4.096	6.050	6.249	6.884	6.704	7.247	6.249	6.884	6.704	7.247	ns

**Table 1-93.** EP3SL340 Column Pins Output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.552	3.552	5.246	5.442	5.974	5.826	6.255	5.442	5.974	5.826	6.255	ns	
		GCLK PLL	$t_{co}$	4.117	4.117	6.087	6.291	6.929	6.749	7.292	6.291	6.929	6.749	7.292	ns	
	6mA	GCLK	$t_{co}$	3.544	3.544	5.237	5.433	5.965	5.817	6.246	5.433	5.965	5.817	6.246	ns	
		GCLK PLL	$t_{co}$	4.108	4.108	6.078	6.282	6.917	6.737	7.280	6.282	6.917	6.737	7.280	ns	
	8mA	GCLK	$t_{co}$	3.545	3.545	5.244	5.442	5.974	5.826	6.255	5.442	5.974	5.826	6.255	ns	
		GCLK PLL	$t_{co}$	4.108	4.108	6.085	6.290	6.920	6.740	7.283	6.290	6.920	6.740	7.283	ns	
	10mA	GCLK	$t_{co}$	3.534	3.534	5.231	5.428	5.960	5.812	6.241	5.428	5.960	5.812	6.241	ns	
		GCLK PLL	$t_{co}$	4.098	4.098	6.072	6.276	6.915	6.736	7.277	6.276	6.915	6.736	7.277	ns	
	12mA	GCLK	$t_{co}$	3.534	3.534	5.231	5.428	5.961	5.813	6.242	5.428	5.961	5.813	6.242	ns	
		GCLK PLL	$t_{co}$	4.098	4.098	6.073	6.277	6.906	6.727	7.269	6.277	6.906	6.727	7.269	ns	
	1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.555	3.555	5.247	5.443	5.974	5.826	6.255	5.443	5.974	5.826	6.255	ns
			GCLK PLL	$t_{co}$	4.119	4.119	6.089	6.292	6.943	6.763	7.306	6.292	6.943	6.763	7.306	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.658	3.658	5.292	5.477	5.999	5.851	6.280	5.477	5.999	5.851	6.280	ns	
		GCLK PLL	$t_{co}$	4.222	4.222	6.134	6.328	6.974	6.794	7.337	6.328	6.974	6.794	7.337	ns	
3.0-V PCI-X	—	GCLK	$t_{co}$	3.658	3.658	5.292	5.477	5.999	5.851	6.280	5.477	5.999	5.851	6.280	ns	
		GCLK PLL	$t_{co}$	4.222	4.222	6.134	6.328	6.974	6.794	7.337	6.328	6.974	6.794	7.337	ns	

Table 1-94 lists the EP3SL340 row pins output timing parameters for single-ended I/O standards.

**Table 1-94.** EP3SL340 Row Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.479	3.781	5.469	5.657	6.238	6.095	6.481	5.741	6.370	6.120	6.565	ns
		GCLK PLL	t <sub>co</sub>	1.562	1.782	2.243	2.285	2.559	2.570	2.578	2.386	2.666	2.671	2.594	ns
	8mA	GCLK	t <sub>co</sub>	3.413	3.681	5.339	5.519	6.093	5.950	6.336	5.628	6.221	6.005	6.416	ns
		GCLK PLL	t <sub>co</sub>	1.496	1.677	2.113	2.174	2.414	2.425	2.433	2.273	2.517	2.522	2.445	ns
	12mA	GCLK	t <sub>co</sub>	3.334	3.592	5.220	5.398	5.965	5.822	6.208	5.529	6.089	5.905	6.284	ns
		GCLK PLL	t <sub>co</sub>	1.417	1.575	1.994	2.074	2.286	2.297	2.305	2.174	2.385	2.390	2.313	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.481	3.785	5.477	5.662	6.242	6.099	6.485	5.749	6.374	6.132	6.569	ns
		GCLK PLL	t <sub>co</sub>	1.564	1.786	2.251	2.291	2.563	2.574	2.582	2.394	2.670	2.675	2.598	ns
	8mA	GCLK	t <sub>co</sub>	3.338	3.596	5.226	5.413	5.971	5.828	6.214	5.541	6.096	5.914	6.291	ns
		GCLK PLL	t <sub>co</sub>	1.421	1.579	2.000	2.089	2.292	2.303	2.311	2.186	2.392	2.397	2.320	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.440	3.727	5.421	5.610	6.194	6.051	6.437	5.709	6.328	6.086	6.523	ns
		GCLK PLL	t <sub>co</sub>	1.523	1.728	2.195	2.254	2.515	2.526	2.534	2.354	2.624	2.629	2.552	ns
	8mA	GCLK	t <sub>co</sub>	3.339	3.601	5.269	5.451	6.030	5.887	6.273	5.567	6.164	5.940	6.358	ns
		GCLK PLL	t <sub>co</sub>	1.422	1.601	2.043	2.112	2.351	2.362	2.370	2.212	2.460	2.464	2.387	ns
	12mA	GCLK	t <sub>co</sub>	3.302	3.563	5.188	5.371	5.942	5.799	6.185	5.499	6.071	5.867	6.265	ns
		GCLK PLL	t <sub>co</sub>	1.385	1.550	1.961	2.047	2.263	2.274	2.282	2.144	2.367	2.371	2.294	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.361	3.646	5.316	5.503	6.084	5.941	6.327	5.600	6.217	5.976	6.411	ns
		GCLK PLL	t <sub>co</sub>	1.444	1.647	2.090	2.147	2.405	2.416	2.424	2.245	2.513	2.517	2.440	ns
	8mA	GCLK	t <sub>co</sub>	3.289	3.547	5.161	5.342	5.903	5.760	6.146	5.469	6.031	5.838	6.225	ns
		GCLK PLL	t <sub>co</sub>	1.372	1.530	1.926	2.018	2.224	2.235	2.243	2.114	2.327	2.331	2.254	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.466	3.763	5.554	5.764	6.366	6.223	6.609	5.841	6.507	6.238	6.701	ns
		GCLK PLL	t <sub>co</sub>	1.549	1.764	2.328	2.380	2.687	2.698	2.706	2.486	2.803	2.807	2.730	ns
	8mA	GCLK	t <sub>co</sub>	3.381	3.665	5.399	5.601	6.196	6.053	6.439	5.704	6.333	6.093	6.527	ns
		GCLK PLL	t <sub>co</sub>	1.464	1.666	2.173	2.245	2.517	2.528	2.536	2.349	2.629	2.633	2.556	ns
	12mA	GCLK	t <sub>co</sub>	3.324	3.603	5.288	5.483	6.070	5.927	6.313	5.615	6.203	5.999	6.397	ns
		GCLK PLL	t <sub>co</sub>	1.407	1.589	2.062	2.159	2.391	2.402	2.410	2.260	2.499	2.503	2.426	ns

**Table 1-94.** EP3SL340 Row Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	
1.8 V	2mA	GCLK	$t_{co}$	3.692	3.942	5.817	6.193	6.841	6.698	7.084	6.248	6.991	6.682	7.186	ns
		GCLK PLL	$t_{co}$	1.785	1.925	2.574	2.860	3.162	3.173	3.192	2.985	3.287	3.292	3.203	ns
	4mA	GCLK	$t_{co}$	3.519	3.756	5.527	5.824	6.436	6.293	6.679	5.922	6.585	6.320	6.779	ns
		GCLK PLL	$t_{co}$	1.562	1.739	2.284	2.491	2.757	2.768	2.787	2.620	2.881	2.885	2.796	ns
	6mA	GCLK	$t_{co}$	3.444	3.674	5.427	5.674	6.277	6.134	6.520	5.808	6.412	6.215	6.607	ns
		GCLK PLL	$t_{co}$	1.495	1.657	2.184	2.341	2.598	2.609	2.628	2.452	2.708	2.713	2.624	ns
	8mA	GCLK	$t_{co}$	3.426	3.654	5.370	5.595	6.180	6.037	6.423	5.752	6.318	6.143	6.513	ns
		GCLK PLL	$t_{co}$	1.469	1.637	2.127	2.259	2.501	2.512	2.531	2.361	2.614	2.619	2.530	ns
1.5 V	2mA	GCLK	$t_{co}$	3.634	3.885	5.745	6.106	6.769	6.626	7.012	6.169	6.915	6.617	7.110	ns
		GCLK PLL	$t_{co}$	1.696	1.868	2.502	2.773	3.090	3.101	3.120	2.892	3.211	3.216	3.127	ns
	4mA	GCLK	$t_{co}$	3.442	3.671	5.423	5.669	6.278	6.135	6.521	5.805	6.411	6.216	6.606	ns
		GCLK PLL	$t_{co}$	1.485	1.654	2.180	2.336	2.599	2.610	2.629	2.446	2.707	2.712	2.623	ns
	6mA	GCLK	$t_{co}$	3.415	3.645	5.355	5.587	6.172	6.029	6.415	5.745	6.306	6.143	6.501	ns
		GCLK PLL	$t_{co}$	1.458	1.628	2.112	2.251	2.493	2.504	2.523	2.354	2.602	2.607	2.518	ns
	8mA	GCLK	$t_{co}$	3.396	3.634	5.338	5.562	6.153	6.010	6.396	5.721	6.284	6.124	6.479	ns
		GCLK PLL	$t_{co}$	1.439	1.617	2.095	2.226	2.474	2.485	2.504	2.330	2.580	2.585	2.496	ns
1.2 V	2mA	GCLK	$t_{co}$	3.564	3.798	5.666	6.020	6.694	6.551	6.937	6.100	6.831	6.548	7.026	ns
		GCLK PLL	$t_{co}$	1.639	1.781	2.423	2.687	3.015	3.026	3.045	2.804	3.127	3.132	3.043	ns
	4mA	GCLK	$t_{co}$	3.447	3.675	5.440	5.697	6.319	6.176	6.562	5.834	6.453	6.260	6.648	ns
		GCLK PLL	$t_{co}$	1.490	1.658	2.197	2.364	2.640	2.651	2.670	2.471	2.749	2.754	2.665	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.328	3.591	5.278	5.474	6.038	5.895	6.281	5.602	6.165	5.985	6.360	ns
		GCLK PLL	$t_{co}$	1.411	1.575	2.039	2.150	2.359	2.370	2.378	2.247	2.461	2.466	2.389	ns
	12mA	GCLK	$t_{co}$	3.323	3.587	5.275	5.472	6.030	5.887	6.273	5.601	6.158	5.984	6.353	ns
		GCLK PLL	$t_{co}$	1.406	1.570	2.032	2.148	2.351	2.362	2.370	2.246	2.454	2.459	2.382	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.314	3.576	5.260	5.456	6.003	5.860	6.246	5.584	6.131	5.966	6.326	ns
		GCLK PLL	$t_{co}$	1.397	1.559	2.017	2.132	2.324	2.335	2.343	2.229	2.427	2.432	2.355	ns

**Table 1-94.** EP3SL340 Row Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.375	3.598	5.289	5.499	6.054	5.911	6.297	5.651	6.181	6.034	6.376	ns
		GCLK PLL	$t_{co}$	1.418	1.581	2.046	2.163	2.375	2.386	2.405	2.260	2.477	2.482	2.393	ns
	6mA	GCLK	$t_{co}$	3.370	3.593	5.287	5.498	6.052	5.909	6.295	5.649	6.179	6.032	6.374	ns
		GCLK PLL	$t_{co}$	1.413	1.576	2.044	2.162	2.373	2.384	2.403	2.258	2.475	2.480	2.391	ns
	8mA	GCLK	$t_{co}$	3.359	3.582	5.277	5.488	6.035	5.895	6.278	5.640	6.163	6.023	6.358	ns
		GCLK PLL	$t_{co}$	1.402	1.565	2.034	2.152	2.356	2.367	2.386	2.249	2.459	2.464	2.375	ns
	10mA	GCLK	$t_{co}$	3.348	3.571	5.264	5.475	6.020	5.882	6.263	5.628	6.148	6.011	6.343	ns
		GCLK PLL	$t_{co}$	1.391	1.554	2.021	2.139	2.341	2.352	2.371	2.237	2.444	2.449	2.360	ns
	12mA	GCLK	$t_{co}$	3.348	3.570	5.264	5.475	6.019	5.882	6.262	5.627	6.147	6.011	6.342	ns
		GCLK PLL	$t_{co}$	1.391	1.553	2.021	2.139	2.340	2.351	2.370	2.236	2.443	2.448	2.359	ns
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.356	3.577	5.263	5.472	6.013	5.877	6.256	5.623	6.140	6.005	6.335	ns
		GCLK PLL	$t_{co}$	1.399	1.560	2.020	2.136	2.334	2.345	2.364	2.232	2.436	2.441	2.352	ns
	16mA	GCLK	$t_{co}$	3.357	3.580	5.269	5.480	6.015	5.887	6.258	5.632	6.144	6.016	6.339	ns
		GCLK PLL	$t_{co}$	1.400	1.563	2.026	2.144	2.336	2.347	2.366	2.241	2.440	2.445	2.356	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.378	3.601	5.298	5.510	6.071	5.928	6.314	5.661	6.197	6.046	6.392	ns
		GCLK PLL	$t_{co}$	1.421	1.584	2.055	2.174	2.392	2.403	2.422	2.270	2.493	2.498	2.409	ns
	6mA	GCLK	$t_{co}$	3.364	3.587	5.287	5.500	6.054	5.911	6.297	5.652	6.181	6.037	6.376	ns
		GCLK PLL	$t_{co}$	1.407	1.570	2.044	2.164	2.375	2.386	2.405	2.261	2.477	2.482	2.393	ns
	8mA	GCLK	$t_{co}$	3.353	3.575	5.274	5.487	6.036	5.896	6.279	5.639	6.164	6.024	6.359	ns
		GCLK PLL	$t_{co}$	1.396	1.558	2.031	2.151	2.357	2.368	2.387	2.248	2.460	2.465	2.376	ns

**Table 1-94.** EP3SL340 Row Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{cc1}=1.1V$	$V_{cc1}=1.1V$	$V_{cc1}=1.1V$	$V_{cc1}=1.1V$	$V_{cc1}=0.9V$	$V_{cc1}=1.1V$	$V_{cc1}=1.1V$	$V_{cc1}=1.1V$	$V_{cc1}=0.9V$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.363	3.583	5.262	5.470	6.016	5.875	6.259	5.622	6.143	6.002	6.338	ns
		GCLK PLL	$t_{co}$	1.406	1.566	2.019	2.134	2.337	2.348	2.367	2.231	2.439	2.444	2.355	ns
	6mA	GCLK	$t_{co}$	3.356	3.577	5.260	5.469	6.008	5.874	6.251	5.621	6.136	6.002	6.331	ns
		GCLK PLL	$t_{co}$	1.399	1.560	2.017	2.133	2.329	2.340	2.359	2.230	2.432	2.437	2.348	ns
	8mA	GCLK	$t_{co}$	3.347	3.569	5.253	5.462	6.000	5.867	6.243	5.614	6.128	5.995	6.323	ns
		GCLK PLL	$t_{co}$	1.390	1.552	2.010	2.126	2.321	2.332	2.351	2.223	2.424	2.429	2.340	ns
	10mA	GCLK	$t_{co}$	3.350	3.571	5.256	5.465	6.003	5.871	6.246	5.617	6.131	5.998	6.326	ns
		GCLK PLL	$t_{co}$	1.393	1.554	2.013	2.129	2.324	2.335	2.354	2.226	2.427	2.432	2.343	ns
	12mA	GCLK	$t_{co}$	3.346	3.568	5.258	5.468	6.003	5.874	6.246	5.620	6.132	6.003	6.327	ns
		GCLK PLL	$t_{co}$	1.389	1.551	2.015	2.132	2.324	2.335	2.354	2.229	2.428	2.433	2.344	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.354	3.576	5.256	5.465	5.994	5.870	6.237	5.616	6.121	5.997	6.316	ns
		GCLK PLL	$t_{co}$	1.397	1.559	2.013	2.129	2.315	2.326	2.345	2.225	2.417	2.422	2.333	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.369	3.589	5.271	5.480	6.031	5.888	6.274	5.631	6.157	6.013	6.352	ns
		GCLK PLL	$t_{co}$	1.412	1.572	2.028	2.144	2.352	2.363	2.382	2.240	2.453	2.458	2.369	ns
	6mA	GCLK	$t_{co}$	3.363	3.584	5.272	5.482	6.027	5.888	6.270	5.633	6.154	6.016	6.349	ns
		GCLK PLL	$t_{co}$	1.406	1.567	2.029	2.146	2.348	2.359	2.378	2.242	2.450	2.455	2.366	ns
	8mA	GCLK	$t_{co}$	3.359	3.580	5.267	5.477	6.021	5.883	6.264	5.628	6.148	6.010	6.343	ns
		GCLK PLL	$t_{co}$	1.402	1.563	2.024	2.141	2.342	2.353	2.372	2.237	2.444	2.449	2.360	ns
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.371	3.591	5.284	5.496	6.049	5.906	6.292	5.647	6.174	6.032	6.369	ns
		GCLK PLL	$t_{co}$	1.414	1.574	2.041	2.160	2.370	2.381	2.400	2.256	2.470	2.475	2.386	ns
	6mA	GCLK	$t_{co}$	3.362	3.583	5.275	5.487	6.037	5.896	6.280	5.638	6.163	6.023	6.358	ns
		GCLK PLL	$t_{co}$	1.405	1.566	2.032	2.151	2.358	2.369	2.388	2.247	2.459	2.464	2.375	ns
	8mA	GCLK	$t_{co}$	3.361	3.583	5.282	5.495	6.043	5.905	6.286	5.647	6.170	6.033	6.365	ns
		GCLK PLL	$t_{co}$	1.404	1.566	2.039	2.159	2.364	2.375	2.394	2.256	2.466	2.471	2.382	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.434	3.697	5.330	5.520	6.047	5.904	6.299	5.650	6.177	6.027	6.372	ns
		GCLK PLL	$t_{co}$	1.517	1.680	2.087	2.196	2.378	2.386	2.387	2.295	2.482	2.493	2.401	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.434	3.697	5.330	5.520	6.047	5.904	6.299	5.650	6.177	6.027	6.372	ns
		GCLK PLL	$t_{co}$	1.517	1.680	2.087	2.196	2.378	2.386	2.387	2.295	2.482	2.493	2.401	ns



Table 1-95 through Table 1-98 list the maximum I/O timing parameters for EP3SL340 devices for differential I/O standards.

Table 1-95 lists the EP3SL340 column pins input timing parameters for differential I/O standards.

**Table 1-95.** EP3SL340 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-1.278	-1.335	-1.674	-1.607	-1.788	-1.721	-2.204	-1.580	-2.013	-1.689	-2.242	ns
		$t_h$	1.414	1.489	1.926	1.873	2.080	2.002	2.485	1.857	2.327	1.981	2.527	ns
	GCLK PLL	$t_{su}$	0.857	0.885	1.872	2.050	2.211	2.107	1.975	2.104	2.409	2.165	2.031	ns
		$t_h$	-0.582	-0.589	-1.382	-1.537	-1.640	-1.565	-1.423	-1.579	-1.804	-1.612	-1.474	ns
MINI-LVDS	GCLK	$t_{su}$	-1.278	-1.335	-1.674	-1.607	-1.788	-1.721	-2.204	-1.580	-2.013	-1.689	-2.242	ns
		$t_h$	1.414	1.489	1.926	1.873	2.080	2.002	2.485	1.857	2.327	1.981	2.527	ns
	GCLK PLL	$t_{su}$	0.857	0.885	1.872	2.050	2.211	2.107	1.975	2.104	2.409	2.165	2.031	ns
		$t_h$	-0.582	-0.589	-1.382	-1.537	-1.640	-1.565	-1.423	-1.579	-1.804	-1.612	-1.474	ns
RSDS	GCLK	$t_{su}$	-1.278	-1.335	-1.674	-1.607	-1.788	-1.721	-2.204	-1.580	-2.013	-1.689	-2.242	ns
		$t_h$	1.414	1.489	1.926	1.873	2.080	2.002	2.485	1.857	2.327	1.981	2.527	ns
	GCLK PLL	$t_{su}$	0.857	0.885	1.872	2.050	2.211	2.107	1.975	2.104	2.409	2.165	2.031	ns
		$t_h$	-0.582	-0.589	-1.382	-1.537	-1.640	-1.565	-1.423	-1.579	-1.804	-1.612	-1.474	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.094	-1.158	-1.787	-1.806	-1.947	-1.875	-2.353	-1.815	-1.953	-1.887	-2.396	ns
		$t_h$	1.223	1.304	2.006	2.032	2.193	2.110	2.589	2.050	2.208	2.131	2.636	ns
	GCLK PLL	$t_{su}$	1.041	1.062	1.759	1.851	2.052	1.953	1.826	1.869	2.073	1.967	1.877	ns
		$t_h$	-0.773	-0.774	-1.302	-1.378	-1.527	-1.457	-1.319	-1.386	-1.537	-1.462	-1.365	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.094	-1.158	-1.787	-1.806	-1.947	-1.875	-2.353	-1.815	-1.953	-1.887	-2.396	ns
		$t_h$	1.223	1.304	2.006	2.032	2.193	2.110	2.589	2.050	2.208	2.131	2.636	ns
	GCLK PLL	$t_{su}$	1.041	1.062	1.759	1.851	2.052	1.953	1.826	1.869	2.073	1.967	1.877	ns
		$t_h$	-0.773	-0.774	-1.302	-1.378	-1.527	-1.457	-1.319	-1.386	-1.537	-1.462	-1.365	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.102	-1.170	-1.797	-1.817	-1.963	-1.891	-2.369	-1.826	-1.968	-1.902	-2.411	ns
		$t_h$	1.231	1.316	2.016	2.043	2.209	2.126	2.605	2.061	2.223	2.146	2.651	ns
	GCLK PLL	$t_{su}$	1.033	1.050	1.749	1.840	2.036	1.937	1.810	1.858	2.058	1.952	1.862	ns
		$t_h$	-0.765	-0.762	-1.292	-1.367	-1.511	-1.441	-1.303	-1.375	-1.522	-1.447	-1.350	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.102	-1.170	-1.797	-1.817	-1.963	-1.891	-2.369	-1.826	-1.968	-1.902	-2.411	ns
		$t_h$	1.231	1.316	2.016	2.043	2.209	2.126	2.605	2.061	2.223	2.146	2.651	ns
	GCLK PLL	$t_{su}$	1.033	1.050	1.749	1.840	2.036	1.937	1.810	1.858	2.058	1.952	1.862	ns
		$t_h$	-0.765	-0.762	-1.292	-1.367	-1.511	-1.441	-1.303	-1.375	-1.522	-1.447	-1.350	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.114	-1.181	-1.806	-1.828	-1.982	-1.910	-2.388	-1.837	-1.986	-1.920	-2.429	ns
		$t_h$	1.243	1.327	2.025	2.054	2.228	2.145	2.624	2.072	2.241	2.164	2.669	ns
	GCLK PLL	$t_{su}$	1.021	1.039	1.740	1.829	2.017	1.918	1.791	1.847	2.040	1.934	1.844	ns
		$t_h$	-0.753	-0.751	-1.283	-1.356	-1.492	-1.422	-1.284	-1.364	-1.504	-1.429	-1.332	ns

**Table 1-95.** EP3SL340 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.114	-1.181	-1.806	-1.828	-1.982	-1.910	-2.388	-1.837	-1.986	-1.920	-2.429	ns
		$t_h$	1.243	1.327	2.025	2.054	2.228	2.145	2.624	2.072	2.241	2.164	2.669	ns
	GCLK PLL	$t_{su}$	1.021	1.039	1.740	1.829	2.017	1.918	1.791	1.847	2.040	1.934	1.844	ns
		$t_h$	-0.753	-0.751	-1.283	-1.356	-1.492	-1.422	-1.284	-1.364	-1.504	-1.429	-1.332	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.102	-1.170	-1.797	-1.817	-1.963	-1.891	-2.369	-1.826	-1.968	-1.902	-2.411	ns
		$t_h$	1.231	1.316	2.016	2.043	2.209	2.126	2.605	2.061	2.223	2.146	2.651	ns
	GCLK PLL	$t_{su}$	1.033	1.050	1.749	1.840	2.036	1.937	1.810	1.858	2.058	1.952	1.862	ns
		$t_h$	-0.765	-0.762	-1.292	-1.367	-1.511	-1.441	-1.303	-1.375	-1.522	-1.447	-1.350	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.102	-1.170	-1.797	-1.817	-1.963	-1.891	-2.369	-1.826	-1.968	-1.902	-2.411	ns
		$t_h$	1.231	1.316	2.016	2.043	2.209	2.126	2.605	2.061	2.223	2.146	2.651	ns
	GCLK PLL	$t_{su}$	1.033	1.050	1.749	1.840	2.036	1.937	1.810	1.858	2.058	1.952	1.862	ns
		$t_h$	-0.765	-0.762	-1.292	-1.367	-1.511	-1.441	-1.303	-1.375	-1.522	-1.447	-1.350	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.114	-1.181	-1.806	-1.828	-1.982	-1.910	-2.388	-1.837	-1.986	-1.920	-2.429	ns
		$t_h$	1.243	1.327	2.025	2.054	2.228	2.145	2.624	2.072	2.241	2.164	2.669	ns
	GCLK PLL	$t_{su}$	1.021	1.039	1.740	1.829	2.017	1.918	1.791	1.847	2.040	1.934	1.844	ns
		$t_h$	-0.753	-0.751	-1.283	-1.356	-1.492	-1.422	-1.284	-1.364	-1.504	-1.429	-1.332	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.114	-1.181	-1.806	-1.828	-1.982	-1.910	-2.388	-1.837	-1.986	-1.920	-2.429	ns
		$t_h$	1.243	1.327	2.025	2.054	2.228	2.145	2.624	2.072	2.241	2.164	2.669	ns
	GCLK PLL	$t_{su}$	1.021	1.039	1.740	1.829	2.017	1.918	1.791	1.847	2.040	1.934	1.844	ns
		$t_h$	-0.753	-0.751	-1.283	-1.356	-1.492	-1.422	-1.284	-1.364	-1.504	-1.429	-1.332	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.121	-1.187	-1.818	-1.833	-1.982	-1.912	-2.387	-1.841	-1.981	-1.918	-2.425	ns
		$t_h$	1.250	1.333	2.038	2.062	2.231	2.148	2.628	2.079	2.241	2.163	2.670	ns
	GCLK PLL	$t_{su}$	1.014	1.033	1.728	1.824	2.017	1.916	1.792	1.843	2.045	1.936	1.848	ns
		$t_h$	-0.746	-0.745	-1.270	-1.348	-1.489	-1.419	-1.280	-1.357	-1.504	-1.430	-1.331	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.121	-1.187	-1.818	-1.833	-1.982	-1.912	-2.387	-1.841	-1.981	-1.918	-2.425	ns
		$t_h$	1.250	1.333	2.038	2.062	2.231	2.148	2.628	2.079	2.241	2.163	2.670	ns
	GCLK PLL	$t_{su}$	1.014	1.033	1.728	1.824	2.017	1.916	1.792	1.843	2.045	1.936	1.848	ns
		$t_h$	-0.746	-0.745	-1.270	-1.348	-1.489	-1.419	-1.280	-1.357	-1.504	-1.430	-1.331	ns

Table 1-96 lists the EP3SL340 row pins input timing parameters for differential I/O standards.

**Table 1-96.** EP3SL340 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
LVDS	GCLK	t <sub>su</sub>	-1.246	-1.308	-1.577	-1.488	-1.656	-1.595	-2.046	-1.456	-1.615	-1.558	-2.087	ns
		t <sub>h</sub>	1.380	1.458	1.832	1.758	1.950	1.878	2.332	1.738	1.920	1.853	2.374	ns
	GCLK PLL	t <sub>su</sub>	0.822	0.846	1.911	2.121	2.309	2.193	2.091	2.181	2.377	2.260	2.149	ns
		t <sub>h</sub>	-0.548	-0.552	-1.422	-1.604	-1.736	-1.650	-1.536	-1.651	-1.790	-1.702	-1.588	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-1.246	-1.308	-1.577	-1.488	-1.656	-1.595	-2.046	-1.456	-1.615	-1.558	-2.087	ns
		t <sub>h</sub>	1.380	1.458	1.832	1.758	1.950	1.878	2.332	1.738	1.920	1.853	2.374	ns
	GCLK PLL	t <sub>su</sub>	0.822	0.846	1.911	2.121	2.309	2.193	2.091	2.181	2.377	2.260	2.149	ns
		t <sub>h</sub>	-0.548	-0.552	-1.422	-1.604	-1.736	-1.650	-1.536	-1.651	-1.790	-1.702	-1.588	ns
RSDS	GCLK	t <sub>su</sub>	-1.246	-1.308	-1.577	-1.488	-1.656	-1.595	-2.046	-1.456	-1.615	-1.558	-2.087	ns
		t <sub>h</sub>	1.380	1.458	1.832	1.758	1.950	1.878	2.332	1.738	1.920	1.853	2.374	ns
	GCLK PLL	t <sub>su</sub>	0.822	0.846	1.911	2.121	2.309	2.193	2.091	2.181	2.377	2.260	2.149	ns
		t <sub>h</sub>	-0.548	-0.552	-1.422	-1.604	-1.736	-1.650	-1.536	-1.651	-1.790	-1.702	-1.588	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.051	-1.123	-1.707	-1.717	-1.845	-1.779	-2.225	-1.727	-1.852	-1.790	-2.271	ns
		t <sub>h</sub>	1.178	1.264	1.926	1.941	2.090	2.013	2.462	1.960	2.105	2.033	2.509	ns
	GCLK PLL	t <sub>su</sub>	1.007	1.021	1.776	1.887	2.110	1.999	1.902	1.904	2.130	2.018	1.955	ns
		t <sub>h</sub>	-0.740	-0.736	-1.321	-1.415	-1.586	-1.505	-1.396	-1.423	-1.595	-1.512	-1.443	ns
	GCLK	t <sub>su</sub>	-1.051	-1.123	-1.707	-1.717	-1.845	-1.779	-2.225	-1.727	-1.852	-1.790	-2.271	ns
		t <sub>h</sub>	1.178	1.264	1.926	1.941	2.090	2.013	2.462	1.960	2.105	2.033	2.509	ns
	GCLK PLL	t <sub>su</sub>	1.007	1.021	1.776	1.887	2.110	1.999	1.902	1.904	2.130	2.018	1.955	ns
		t <sub>h</sub>	-0.740	-0.736	-1.321	-1.415	-1.586	-1.505	-1.396	-1.423	-1.595	-1.512	-1.443	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.060	-1.135	-1.716	-1.727	-1.861	-1.795	-2.241	-1.736	-1.868	-1.806	-2.287	ns
		t <sub>h</sub>	1.187	1.276	1.935	1.951	2.106	2.029	2.478	1.969	2.121	2.049	2.525	ns
	GCLK PLL	t <sub>su</sub>	0.998	1.009	1.767	1.877	2.094	1.983	1.886	1.895	2.114	2.002	1.939	ns
		t <sub>h</sub>	-0.731	-0.724	-1.312	-1.405	-1.570	-1.489	-1.380	-1.414	-1.579	-1.496	-1.427	ns
	GCLK	t <sub>su</sub>	-1.060	-1.135	-1.716	-1.727	-1.861	-1.795	-2.241	-1.736	-1.868	-1.806	-2.287	ns
		t <sub>h</sub>	1.187	1.276	1.935	1.951	2.106	2.029	2.478	1.969	2.121	2.049	2.525	ns
	GCLK PLL	t <sub>su</sub>	0.998	1.009	1.767	1.877	2.094	1.983	1.886	1.895	2.114	2.002	1.939	ns
		t <sub>h</sub>	-0.731	-0.724	-1.312	-1.405	-1.570	-1.489	-1.380	-1.414	-1.579	-1.496	-1.427	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.074	-1.147	-1.725	-1.737	-1.879	-1.813	-2.259	-1.747	-1.885	-1.823	-2.304	ns
		t <sub>h</sub>	1.201	1.288	1.944	1.961	2.124	2.047	2.496	1.980	2.138	2.066	2.542	ns
	GCLK PLL	t <sub>su</sub>	0.984	0.997	1.754	1.867	2.076	1.965	1.868	1.884	2.097	1.985	1.922	ns
		t <sub>h</sub>	-0.717	-0.712	-1.300	-1.395	-1.552	-1.471	-1.362	-1.403	-1.562	-1.479	-1.410	ns

**Table 1-96.** EP3SL340 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.074	-1.147	-1.725	-1.737	-1.879	-1.813	-2.259	-1.747	-1.885	-1.823	-2.304	ns
		$t_h$	1.201	1.288	1.944	1.961	2.124	2.047	2.496	1.980	2.138	2.066	2.542	ns
	GCLK PLL	$t_{su}$	0.984	0.997	1.754	1.867	2.076	1.965	1.868	1.884	2.097	1.985	1.922	ns
		$t_h$	-0.717	-0.712	-1.300	-1.395	-1.552	-1.471	-1.362	-1.403	-1.562	-1.479	-1.410	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.060	-1.135	-1.716	-1.727	-1.861	-1.795	-2.241	-1.736	-1.868	-1.806	-2.287	ns
		$t_h$	1.187	1.276	1.935	1.951	2.106	2.029	2.478	1.969	2.121	2.049	2.525	ns
	GCLK PLL	$t_{su}$	0.998	1.009	1.767	1.877	2.094	1.983	1.886	1.895	2.114	2.002	1.939	ns
		$t_h$	-0.731	-0.724	-1.312	-1.405	-1.570	-1.489	-1.380	-1.414	-1.579	-1.496	-1.427	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.060	-1.135	-1.716	-1.727	-1.861	-1.795	-2.241	-1.736	-1.868	-1.806	-2.287	ns
		$t_h$	1.187	1.276	1.935	1.951	2.106	2.029	2.478	1.969	2.121	2.049	2.525	ns
	GCLK PLL	$t_{su}$	0.998	1.009	1.767	1.877	2.094	1.983	1.886	1.895	2.114	2.002	1.939	ns
		$t_h$	-0.731	-0.724	-1.312	-1.405	-1.570	-1.489	-1.380	-1.414	-1.579	-1.496	-1.427	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.074	-1.147	-1.725	-1.737	-1.879	-1.813	-2.259	-1.747	-1.885	-1.823	-2.304	ns
		$t_h$	1.201	1.288	1.944	1.961	2.124	2.047	2.496	1.980	2.138	2.066	2.542	ns
	GCLK PLL	$t_{su}$	0.984	0.997	1.754	1.867	2.076	1.965	1.868	1.884	2.097	1.985	1.922	ns
		$t_h$	-0.717	-0.712	-1.300	-1.395	-1.552	-1.471	-1.362	-1.403	-1.562	-1.479	-1.410	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.074	-1.147	-1.725	-1.737	-1.879	-1.813	-2.259	-1.747	-1.885	-1.823	-2.304	ns
		$t_h$	1.201	1.288	1.944	1.961	2.124	2.047	2.496	1.980	2.138	2.066	2.542	ns
	GCLK PLL	$t_{su}$	0.984	0.997	1.754	1.867	2.076	1.965	1.868	1.884	2.097	1.985	1.922	ns
		$t_h$	-0.717	-0.712	-1.300	-1.395	-1.552	-1.471	-1.362	-1.403	-1.562	-1.479	-1.410	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.083	-1.156	-1.739	-1.748	-1.886	-1.821	-2.265	-1.754	-1.886	-1.826	-2.306	ns
		$t_h$	1.210	1.297	1.959	1.975	2.134	2.057	2.507	1.990	2.144	2.071	2.549	ns
	GCLK PLL	$t_{su}$	0.985	0.998	1.749	1.861	2.075	1.963	1.867	1.883	2.101	1.987	1.925	ns
		$t_h$	-0.718	-0.713	-1.295	-1.387	-1.548	-1.467	-1.357	-1.399	-1.563	-1.480	-1.409	ns
	GCLK	$t_{su}$	-1.083	-1.156	-1.739	-1.748	-1.886	-1.821	-2.265	-1.754	-1.886	-1.826	-2.306	ns
		$t_h$	1.210	1.297	1.959	1.975	2.134	2.057	2.507	1.990	2.144	2.071	2.549	ns
	GCLK PLL	$t_{su}$	0.985	0.998	1.749	1.861	2.075	1.963	1.867	1.883	2.101	1.987	1.925	ns
		$t_h$	-0.718	-0.713	-1.295	-1.387	-1.548	-1.467	-1.357	-1.399	-1.563	-1.480	-1.409	ns

Table 1-97 lists the EP3SL340 column pins output timing parameters for differential I/O standards.

**Table 1-97.** EP3SL340 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V		
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.438	3.700	5.415	5.607	6.143	5.991	6.399	5.739	6.274	6.122	6.475	ns	
		GCLK PLL	t <sub>co</sub>	1.427	1.606	2.089	2.181	2.406	2.407	2.475	2.287	2.511	2.514	2.459	ns	
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.434	3.703	5.462	5.662	6.205	6.053	6.461	5.798	6.340	6.188	6.541	ns	
		GCLK PLL	t <sub>co</sub>	1.423	1.609	2.136	2.236	2.468	2.469	2.537	2.346	2.577	2.580	2.525	ns	
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.438	3.700	5.415	5.607	6.143	5.991	6.399	5.739	6.274	6.122	6.475	ns	
		GCLK PLL	t <sub>co</sub>	1.427	1.606	2.089	2.181	2.406	2.407	2.475	2.287	2.511	2.514	2.459	ns	
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.434	3.703	5.462	5.662	6.205	6.053	6.461	5.798	6.340	6.188	6.541	ns	
		GCLK PLL	t <sub>co</sub>	1.423	1.609	2.136	2.236	2.468	2.469	2.537	2.346	2.577	2.580	2.525	ns	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.438	3.700	5.415	5.607	6.143	5.991	6.399	5.739	6.274	6.122	6.475	ns	
		GCLK PLL	t <sub>co</sub>	1.427	1.606	2.089	2.181	2.406	2.407	2.475	2.287	2.511	2.514	2.459	ns	
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.434	3.703	5.462	5.662	6.205	6.053	6.461	5.798	6.340	6.188	6.541	ns	
		GCLK PLL	t <sub>co</sub>	1.423	1.609	2.136	2.236	2.468	2.469	2.537	2.346	2.577	2.580	2.525	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.465	3.733	5.486	5.685	6.227	6.075	6.483	5.819	6.360	6.208	6.561	ns	
		GCLK PLL	t <sub>co</sub>	1.454	1.639	2.160	2.259	2.490	2.491	2.559	2.367	2.597	2.600	2.545	ns	
	6mA	GCLK	t <sub>co</sub>	3.455	3.723	5.476	5.674	6.217	6.065	6.473	5.808	6.350	6.198	6.551	ns	
		GCLK PLL	t <sub>co</sub>	1.444	1.629	2.150	2.248	2.480	2.481	2.549	2.356	2.587	2.590	2.535	ns	
	8mA	GCLK	t <sub>co</sub>	3.455	3.723	5.479	5.678	6.221	6.069	6.477	5.813	6.355	6.203	6.556	ns	
		GCLK PLL	t <sub>co</sub>	1.444	1.629	2.153	2.252	2.484	2.485	2.553	2.361	2.592	2.595	2.540	ns	
	10mA	GCLK	t <sub>co</sub>	3.448	3.717	5.472	5.672	6.215	6.063	6.471	5.806	6.349	6.197	6.550	ns	
		GCLK PLL	t <sub>co</sub>	1.437	1.623	2.146	2.246	2.478	2.479	2.547	2.354	2.586	2.589	2.534	ns	
	12mA	GCLK	t <sub>co</sub>	3.447	3.715	5.469	5.669	6.212	6.060	6.468	5.803	6.345	6.193	6.546	ns	
		GCLK PLL	t <sub>co</sub>	1.436	1.621	2.143	2.243	2.475	2.476	2.544	2.351	2.582	2.585	2.530	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.469	3.737	5.490	5.689	6.231	6.079	6.487	5.823	6.365	6.213	6.566	ns
			GCLK PLL	t <sub>co</sub>	1.458	1.643	2.164	2.263	2.494	2.495	2.563	2.371	2.602	2.605	2.550	ns

**Table 1-97.** EP3SL340 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.459	3.726	5.469	5.666	6.206	6.054	6.462	5.799	6.338	6.186	6.539	ns
		GCLK PLL	$t_{co}$	1.448	1.632	2.143	2.240	2.469	2.470	2.538	2.347	2.575	2.578	2.523	ns
	6mA	GCLK	$t_{co}$	3.454	3.722	5.469	5.666	6.207	6.055	6.463	5.800	6.340	6.188	6.541	ns
		GCLK PLL	$t_{co}$	1.443	1.628	2.143	2.240	2.470	2.471	2.539	2.348	2.577	2.580	2.525	ns
	8mA	GCLK	$t_{co}$	3.452	3.720	5.468	5.665	6.205	6.053	6.461	5.799	6.339	6.187	6.540	ns
		GCLK PLL	$t_{co}$	1.441	1.626	2.142	2.239	2.468	2.469	2.537	2.347	2.576	2.579	2.524	ns
	10mA	GCLK	$t_{co}$	3.444	3.711	5.458	5.655	6.196	6.044	6.452	5.789	6.329	6.177	6.530	ns
		GCLK PLL	$t_{co}$	1.433	1.617	2.132	2.229	2.459	2.460	2.528	2.337	2.566	2.569	2.514	ns
12mA	GCLK	$t_{co}$	3.445	3.713	5.464	5.662	6.204	6.052	6.460	5.797	6.338	6.186	6.539	ns	
	GCLK PLL	$t_{co}$	1.434	1.619	2.138	2.236	2.467	2.468	2.536	2.345	2.575	2.578	2.523	ns	
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.444	3.710	5.447	5.643	6.182	6.030	6.438	5.776	6.314	6.162	6.515	ns
		GCLK PLL	$t_{co}$	1.433	1.616	2.121	2.217	2.445	2.446	2.514	2.324	2.551	2.554	2.499	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.456	3.723	5.465	5.661	6.200	6.048	6.456	5.795	6.333	6.181	6.534	ns
		GCLK PLL	$t_{co}$	1.445	1.629	2.139	2.235	2.463	2.464	2.532	2.343	2.570	2.573	2.518	ns
	6mA	GCLK	$t_{co}$	3.452	3.720	5.466	5.663	6.204	6.052	6.460	5.797	6.337	6.185	6.538	ns
		GCLK PLL	$t_{co}$	1.441	1.626	2.140	2.237	2.467	2.468	2.536	2.345	2.574	2.577	2.522	ns
	8mA	GCLK	$t_{co}$	3.442	3.709	5.455	5.652	6.192	6.040	6.448	5.786	6.325	6.173	6.526	ns
		GCLK PLL	$t_{co}$	1.431	1.615	2.129	2.226	2.455	2.456	2.524	2.334	2.562	2.565	2.510	ns
	10mA	GCLK	$t_{co}$	3.440	3.707	5.453	5.649	6.190	6.038	6.446	5.784	6.323	6.171	6.524	ns
		GCLK PLL	$t_{co}$	1.429	1.613	2.127	2.223	2.453	2.454	2.522	2.332	2.560	2.563	2.508	ns
12mA	GCLK	$t_{co}$	3.440	3.708	5.456	5.654	6.195	6.043	6.451	5.788	6.329	6.177	6.530	ns	
	GCLK PLL	$t_{co}$	1.429	1.614	2.130	2.228	2.458	2.459	2.527	2.336	2.566	2.569	2.514	ns	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.444	3.711	5.453	5.649	6.189	6.037	6.445	5.783	6.322	6.170	6.523	ns
		GCLK PLL	$t_{co}$	1.433	1.617	2.127	2.223	2.452	2.453	2.521	2.331	2.559	2.562	2.507	ns

**Table 1-97.** EP3SL340 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.470	3.740	5.498	5.697	6.239	6.087	6.495	5.831	6.372	6.220	6.573	ns
		GCLK PLL	t <sub>co</sub>	1.459	1.646	2.172	2.271	2.502	2.503	2.571	2.379	2.609	2.612	2.557	ns
	6mA	GCLK	t <sub>co</sub>	3.456	3.726	5.486	5.686	6.229	6.077	6.485	5.821	6.363	6.211	6.564	ns
		GCLK PLL	t <sub>co</sub>	1.445	1.632	2.160	2.260	2.492	2.493	2.561	2.369	2.600	2.603	2.548	ns
	8mA	GCLK	t <sub>co</sub>	3.444	3.713	5.469	5.668	6.211	6.059	6.467	5.803	6.345	6.193	6.546	ns
		GCLK PLL	t <sub>co</sub>	1.433	1.619	2.143	2.242	2.474	2.475	2.543	2.351	2.582	2.585	2.530	ns
	10mA	GCLK	t <sub>co</sub>	3.444	3.713	5.472	5.672	6.215	6.063	6.471	5.807	6.350	6.198	6.551	ns
		GCLK PLL	t <sub>co</sub>	1.433	1.619	2.146	2.246	2.478	2.479	2.547	2.355	2.587	2.590	2.535	ns
12mA	GCLK	t <sub>co</sub>	3.440	3.709	5.465	5.664	6.208	6.056	6.464	5.800	6.342	6.190	6.543	ns	
	GCLK PLL	t <sub>co</sub>	1.429	1.615	2.139	2.238	2.471	2.472	2.540	2.348	2.579	2.582	2.527	ns	
DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.444	3.711	5.458	5.655	6.196	6.044	6.452	5.789	6.329	6.177	6.530	ns
		GCLK PLL	t <sub>co</sub>	1.433	1.617	2.132	2.229	2.459	2.460	2.528	2.337	2.566	2.569	2.514	ns
	16mA	GCLK	t <sub>co</sub>	3.445	3.713	5.466	5.665	6.207	6.055	6.463	5.799	6.341	6.189	6.542	ns
		GCLK PLL	t <sub>co</sub>	1.434	1.619	2.140	2.239	2.470	2.471	2.539	2.347	2.578	2.581	2.526	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.473	3.743	5.497	5.695	6.237	6.085	6.493	5.830	6.370	6.218	6.571	ns
		GCLK PLL	t <sub>co</sub>	1.462	1.649	2.171	2.269	2.500	2.501	2.569	2.378	2.607	2.610	2.555	ns
	6mA	GCLK	t <sub>co</sub>	3.462	3.731	5.485	5.683	6.225	6.073	6.481	5.818	6.358	6.206	6.559	ns
		GCLK PLL	t <sub>co</sub>	1.451	1.637	2.159	2.257	2.488	2.489	2.557	2.366	2.595	2.598	2.543	ns
	8mA	GCLK	t <sub>co</sub>	3.457	3.727	5.485	5.684	6.226	6.074	6.482	5.819	6.360	6.208	6.561	ns
		GCLK PLL	t <sub>co</sub>	1.446	1.633	2.159	2.258	2.489	2.490	2.558	2.367	2.597	2.600	2.545	ns
	10mA	GCLK	t <sub>co</sub>	3.443	3.712	5.467	5.665	6.207	6.055	6.463	5.800	6.342	6.190	6.543	ns
		GCLK PLL	t <sub>co</sub>	1.432	1.618	2.141	2.239	2.470	2.471	2.539	2.348	2.579	2.582	2.527	ns
12mA	GCLK	t <sub>co</sub>	3.441	3.710	5.465	5.663	6.205	6.053	6.461	5.798	6.339	6.187	6.540	ns	
	GCLK PLL	t <sub>co</sub>	1.430	1.616	2.139	2.237	2.468	2.469	2.537	2.346	2.576	2.579	2.524	ns	
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.445	3.712	5.457	5.653	6.193	6.041	6.449	5.787	6.326	6.174	6.527	ns
		GCLK PLL	t <sub>co</sub>	1.434	1.618	2.131	2.227	2.456	2.457	2.525	2.335	2.563	2.566	2.511	ns
	16mA	GCLK	t <sub>co</sub>	3.445	3.713	5.465	5.663	6.205	6.053	6.461	5.798	6.339	6.187	6.540	ns
		GCLK PLL	t <sub>co</sub>	1.434	1.619	2.139	2.237	2.468	2.469	2.537	2.346	2.576	2.579	2.524	ns

**Table 1-97.** EP3SL340 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.461	3.730	5.481	5.678	6.219	6.067	6.475	5.813	6.352	6.200	6.553	ns
		GCLK PLL	$t_{co}$	1.450	1.636	2.155	2.252	2.482	2.483	2.551	2.361	2.589	2.592	2.537	ns
	10mA	GCLK	$t_{co}$	3.461	3.730	5.481	5.678	6.219	6.067	6.475	5.813	6.352	6.200	6.553	ns
		GCLK PLL	$t_{co}$	1.450	1.636	2.155	2.252	2.482	2.483	2.551	2.361	2.589	2.592	2.537	ns
	12mA	GCLK	$t_{co}$	3.451	3.720	5.471	5.668	6.209	6.057	6.465	5.803	6.343	6.191	6.544	ns
		GCLK PLL	$t_{co}$	1.440	1.626	2.145	2.242	2.472	2.473	2.541	2.351	2.580	2.583	2.528	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.444	3.712	5.457	5.653	6.193	6.041	6.449	5.787	6.326	6.174	6.527	ns
		GCLK PLL	$t_{co}$	1.433	1.618	2.131	2.227	2.456	2.457	2.525	2.335	2.563	2.566	2.511	ns



Table 1-98 lists the EP3SL340 row pins output timing parameters for differential I/O standards.

**Table 1-98.** EP3SL340 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
LVDS	—	GCLK	$t_{co}$	3.022	3.234	4.714	4.872	5.362	5.217	5.602	4.981	5.467	5.326	5.662	ns
		GCLK PLL	$t_{co}$	1.063	1.193	1.445	1.501	1.678	1.690	1.735	1.583	1.761	1.772	1.704	ns
LVDS_E_1R	—	GCLK	$t_{co}$	3.414	3.678	5.396	5.588	6.125	5.972	6.349	5.722	6.255	6.105	6.425	ns
		GCLK PLL	$t_{co}$	1.455	1.637	2.127	2.217	2.441	2.445	2.482	2.324	2.549	2.551	2.467	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.396	3.668	5.434	5.634	6.179	6.026	6.403	5.773	6.316	6.166	6.486	ns
		GCLK PLL	$t_{co}$	1.437	1.627	2.165	2.263	2.495	2.499	2.536	2.375	2.610	2.612	2.528	ns
MINI-LVDS	—	GCLK	$t_{co}$	3.022	3.234	4.714	4.872	5.362	5.217	5.602	4.981	5.467	5.326	5.662	ns
		GCLK PLL	$t_{co}$	1.063	1.193	1.445	1.501	1.678	1.690	1.735	1.583	1.761	1.772	1.704	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.414	3.678	5.396	5.588	6.125	5.972	6.349	5.722	6.255	6.105	6.425	ns
		GCLK PLL	$t_{co}$	1.455	1.637	2.127	2.217	2.441	2.445	2.482	2.324	2.549	2.551	2.467	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.396	3.668	5.434	5.634	6.179	6.026	6.403	5.773	6.316	6.166	6.486	ns
		GCLK PLL	$t_{co}$	1.437	1.627	2.165	2.263	2.495	2.499	2.536	2.375	2.610	2.612	2.528	ns
RSDS	—	GCLK	$t_{co}$	3.022	3.234	4.714	4.872	5.362	5.217	5.602	4.981	5.467	5.326	5.662	ns
		GCLK PLL	$t_{co}$	1.063	1.193	1.445	1.501	1.678	1.690	1.735	1.583	1.761	1.772	1.704	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.414	3.678	5.396	5.588	6.125	5.972	6.349	5.722	6.255	6.105	6.425	ns
		GCLK PLL	$t_{co}$	1.455	1.637	2.127	2.217	2.441	2.445	2.482	2.324	2.549	2.551	2.467	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.396	3.668	5.434	5.634	6.179	6.026	6.403	5.773	6.316	6.166	6.486	ns
		GCLK PLL	$t_{co}$	1.437	1.627	2.165	2.263	2.495	2.499	2.536	2.375	2.610	2.612	2.528	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.440	3.711	5.470	5.668	6.212	6.059	6.436	5.806	6.345	6.195	6.515	ns
		GCLK PLL	$t_{co}$	1.491	1.680	2.211	2.307	2.538	2.542	2.579	2.418	2.649	2.651	2.567	ns
	6mA	GCLK	$t_{co}$	3.426	3.697	5.457	5.655	6.199	6.046	6.423	5.792	6.332	6.182	6.502	ns
		GCLK PLL	$t_{co}$	1.477	1.666	2.198	2.294	2.525	2.529	2.566	2.404	2.636	2.638	2.554	ns
	8mA	GCLK	$t_{co}$	3.422	3.693	5.455	5.655	6.200	6.047	6.424	5.792	6.334	6.184	6.504	ns
		GCLK PLL	$t_{co}$	1.473	1.662	2.196	2.294	2.526	2.530	2.567	2.404	2.638	2.640	2.556	ns

**Table 1-98.** EP3SL340 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.438	3.708	5.456	5.652	6.194	6.041	6.418	5.789	6.327	6.177	6.497	ns
		GCLK PLL	$t_{co}$	1.489	1.677	2.197	2.291	2.520	2.524	2.561	2.401	2.631	2.633	2.549	ns
	6mA	GCLK	$t_{co}$	3.427	3.698	5.452	5.648	6.191	6.038	6.415	5.786	6.324	6.174	6.494	ns
		GCLK PLL	$t_{co}$	1.478	1.667	2.193	2.287	2.517	2.521	2.558	2.398	2.628	2.630	2.546	ns
	8mA	GCLK	$t_{co}$	3.424	3.695	5.450	5.646	6.189	6.036	6.413	5.784	6.323	6.173	6.493	ns
		GCLK PLL	$t_{co}$	1.475	1.664	2.191	2.285	2.515	2.519	2.556	2.396	2.627	2.629	2.545	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.435	3.705	5.451	5.647	6.188	6.035	6.412	5.784	6.321	6.171	6.491	ns
		GCLK PLL	$t_{co}$	1.486	1.674	2.192	2.286	2.514	2.518	2.555	2.396	2.625	2.627	2.543	ns
	6mA	GCLK	$t_{co}$	3.425	3.696	5.449	5.645	6.187	6.034	6.411	5.783	6.321	6.171	6.491	ns
		GCLK PLL	$t_{co}$	1.476	1.665	2.190	2.284	2.513	2.517	2.554	2.395	2.625	2.627	2.543	ns
	8mA	GCLK	$t_{co}$	3.411	3.682	5.434	5.630	6.173	6.020	6.397	5.768	6.306	6.156	6.476	ns
		GCLK PLL	$t_{co}$	1.462	1.651	2.175	2.269	2.499	2.503	2.540	2.380	2.610	2.612	2.528	ns
	10mA	GCLK	$t_{co}$	3.408	3.678	5.430	5.626	6.169	6.016	6.393	5.764	6.302	6.152	6.472	ns
		GCLK PLL	$t_{co}$	1.459	1.647	2.171	2.265	2.495	2.499	2.536	2.376	2.606	2.608	2.524	ns
	12mA	GCLK	$t_{co}$	3.405	3.676	5.431	5.629	6.172	6.019	6.396	5.767	6.306	6.156	6.476	ns
		GCLK PLL	$t_{co}$	1.456	1.645	2.172	2.268	2.498	2.502	2.539	2.379	2.610	2.612	2.528	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.406	3.676	5.421	5.617	6.159	6.006	6.383	5.754	6.292	6.142	6.462	ns
		GCLK PLL	$t_{co}$	1.457	1.645	2.162	2.256	2.485	2.489	2.526	2.366	2.596	2.598	2.514	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.455	3.729	5.492	5.690	6.235	6.082	6.459	5.828	6.368	6.218	6.538	ns
		GCLK PLL	$t_{co}$	1.506	1.698	2.233	2.329	2.561	2.565	2.602	2.440	2.672	2.674	2.590	ns
	6mA	GCLK	$t_{co}$	3.431	3.705	5.474	5.673	6.218	6.065	6.442	5.811	6.353	6.203	6.523	ns
		GCLK PLL	$t_{co}$	1.482	1.674	2.215	2.312	2.544	2.548	2.585	2.423	2.657	2.659	2.575	ns
	8mA	GCLK	$t_{co}$	3.414	3.686	5.452	5.651	6.196	6.043	6.420	5.789	6.331	6.181	6.501	ns
		GCLK PLL	$t_{co}$	1.465	1.655	2.193	2.290	2.522	2.526	2.563	2.401	2.635	2.637	2.553	ns

**Table 1-98.** EP3SL340 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.459	3.732	5.492	5.690	6.234	6.081	6.458	5.828	6.368	6.218	6.538	ns	
		GCLK PLL	$t_{co}$	1.510	1.701	2.233	2.329	2.560	2.564	2.601	2.440	2.672	2.674	2.590	ns	
	6mA	GCLK	$t_{co}$	3.444	3.717	5.478	5.675	6.219	6.066	6.443	5.813	6.353	6.203	6.523	ns	
		GCLK PLL	$t_{co}$	1.495	1.686	2.219	2.314	2.545	2.549	2.586	2.425	2.657	2.659	2.575	ns	
	8mA	GCLK	$t_{co}$	3.433	3.706	5.473	5.672	6.216	6.063	6.440	5.810	6.351	6.201	6.521	ns	
		GCLK PLL	$t_{co}$	1.484	1.675	2.214	2.311	2.542	2.546	2.583	2.422	2.655	2.657	2.573	ns	
	10mA	GCLK	$t_{co}$	3.413	3.686	5.450	5.648	6.193	6.040	6.417	5.787	6.327	6.177	6.497	ns	
		GCLK PLL	$t_{co}$	1.464	1.655	2.191	2.287	2.519	2.523	2.560	2.399	2.631	2.633	2.549	ns	
	12mA	GCLK	$t_{co}$	3.410	3.682	5.446	5.645	6.189	6.036	6.413	5.783	6.324	6.174	6.494	ns	
		GCLK PLL	$t_{co}$	1.461	1.651	2.187	2.284	2.515	2.519	2.556	2.395	2.628	2.630	2.546	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.415	3.686	5.437	5.633	6.175	6.022	6.399	5.770	6.308	6.158	6.478	ns
			GCLK PLL	$t_{co}$	1.466	1.655	2.178	2.272	2.501	2.505	2.542	2.382	2.612	2.614	2.530	ns
16mA		GCLK	$t_{co}$	3.408	3.679	5.436	5.634	6.178	6.025	6.402	5.773	6.313	6.163	6.483	ns	
		GCLK PLL	$t_{co}$	1.459	1.648	2.177	2.273	2.504	2.508	2.545	2.385	2.617	2.619	2.535	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.446	3.718	5.474	5.671	6.214	6.061	6.438	5.809	6.348	6.198	6.518	ns	
		GCLK PLL	$t_{co}$	1.487	1.677	2.205	2.300	2.530	2.534	2.571	2.411	2.642	2.644	2.560	ns	
	12mA	GCLK	$t_{co}$	3.428	3.701	5.459	5.656	6.199	6.046	6.423	5.794	6.333	6.183	6.503	ns	
		GCLK PLL	$t_{co}$	1.469	1.660	2.190	2.285	2.515	2.519	2.556	2.396	2.627	2.629	2.545	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.414	3.685	5.436	5.632	6.174	6.021	6.398	5.770	6.308	6.158	6.478	ns	
		GCLK PLL	$t_{co}$	1.455	1.644	2.167	2.261	2.490	2.494	2.531	2.372	2.602	2.604	2.520	ns	

Table 1-99 and Table 1-100 list the EP3SL340 regional (RCLK) clock adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-99 lists the EP3SL340 column pin delay adders when using the regional clock.

**Table 1-99.** EP3SL340 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.318	0.171	0.255	0.247	0.257	0.244	0.369	0.37	0.253	0.232	0.336	ns
RCLK PLL input adder	2.716	2.739	4.379	4.508	4.926	4.717	5.376	4.508	4.94	4.89	5.434	ns
RCLK output adder	-0.341	-0.107	-0.18	-0.169	-0.171	-0.167	-0.362	-0.03	-0.043	-0.034	-0.287	ns
RCLK PLL output adder	-2.36	-2.128	-3.344	-3.384	-3.571	-3.487	-3.545	-3.246	-3.636	-3.357	-3.544	ns

Table 1-100 lists the EP3SL340 row pin delay adders when using the regional clock.

**Table 1-100.** EP3SL340 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.075	0.079	0.133	0.124	0.125	0.124	0.307	0.117	0.116	0.117	0.31	ns
RCLK PLL input adder	0.157	0.151	0.262	0.274	0.306	0.288	0.464	0.268	0.291	0.278	0.46	ns
RCLK output adder	-0.052	-0.066	-0.107	-0.098	-0.127	-0.129	-0.282	-0.082	-0.118	-0.085	-0.285	ns
RCLK PLL output adder	-0.157	-0.139	-0.232	-0.248	-0.272	-0.259	-0.422	-0.252	-0.256	-0.244	-0.444	ns

### EP3SE50 I/O Timing Parameters

Table 1-101 through Table 1-104 list the maximum I/O timing parameters for EP3SE50 devices for single-ended I/O standards.

Table 1-101 lists the EP3SE50 column pins input timing parameters for single-ended I/O standards.

**Table 1-101.** EP3SE50 Column Pins Input Timing Parameters (Part 1 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-0.743	-0.742	-1.063	-1.165	-1.374	-1.329	-1.605	-1.165	-1.374	-1.329	-1.605	ns
		t <sub>h</sub>	0.870	0.869	1.241	1.366	1.595	1.538	1.815	1.366	1.595	1.538	1.815	ns
	GCLK PLL	t <sub>su</sub>	-1.037	-1.037	-1.466	-1.593	-1.830	-1.772	-2.038	-1.593	-1.830	-1.772	-2.038	ns
		t <sub>h</sub>	1.290	1.290	1.836	2.009	2.292	2.207	2.484	2.009	2.292	2.207	2.484	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.743	-0.742	-1.063	-1.165	-1.374	-1.329	-1.605	-1.165	-1.374	-1.329	-1.605	ns
		t <sub>h</sub>	0.870	0.869	1.241	1.366	1.595	1.538	1.815	1.366	1.595	1.538	1.815	ns
	GCLK PLL	t <sub>su</sub>	-1.037	-1.037	-1.466	-1.593	-1.830	-1.772	-2.038	-1.593	-1.830	-1.772	-2.038	ns
		t <sub>h</sub>	1.290	1.290	1.836	2.009	2.292	2.207	2.484	2.009	2.292	2.207	2.484	ns

**Table 1-101.** EP3SE50 Column Pins Input Timing Parameters (Part 2 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.0-V LVTTL	GCLK	$t_{su}$	-0.754	-0.753	-1.062	-1.167	-1.373	-1.328	-1.604	-1.167	-1.373	-1.328	-1.604	ns
		$t_h$	0.881	0.880	1.240	1.368	1.594	1.537	1.814	1.368	1.594	1.537	1.814	ns
	GCLK PLL	$t_{su}$	-1.048	-1.048	-1.465	-1.595	-1.829	-1.771	-2.037	-1.595	-1.829	-1.771	-2.037	ns
		$t_h$	1.301	1.301	1.835	2.011	2.291	2.206	2.483	2.011	2.291	2.206	2.483	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.754	-0.753	-1.062	-1.167	-1.373	-1.328	-1.604	-1.167	-1.373	-1.328	-1.604	ns
		$t_h$	0.881	0.880	1.240	1.368	1.594	1.537	1.814	1.368	1.594	1.537	1.814	ns
	GCLK PLL	$t_{su}$	-1.048	-1.048	-1.465	-1.595	-1.829	-1.771	-2.037	-1.595	-1.829	-1.771	-2.037	ns
		$t_h$	1.301	1.301	1.835	2.011	2.291	2.206	2.483	2.011	2.291	2.206	2.483	ns
2.5 V	GCLK	$t_{su}$	-0.749	-0.748	-1.071	-1.179	-1.392	-1.347	-1.623	-1.179	-1.392	-1.347	-1.623	ns
		$t_h$	0.876	0.875	1.249	1.380	1.613	1.556	1.833	1.380	1.613	1.556	1.833	ns
	GCLK PLL	$t_{su}$	-1.043	-1.043	-1.474	-1.607	-1.848	-1.790	-2.056	-1.607	-1.848	-1.790	-2.056	ns
		$t_h$	1.296	1.296	1.844	2.023	2.310	2.225	2.502	2.023	2.310	2.225	2.502	ns
1.8 V	GCLK	$t_{su}$	-0.769	-0.768	-1.111	-1.215	-1.390	-1.345	-1.621	-1.215	-1.390	-1.345	-1.621	ns
		$t_h$	0.898	0.897	1.289	1.416	1.611	1.554	1.831	1.416	1.611	1.554	1.831	ns
	GCLK PLL	$t_{su}$	-1.065	-1.065	-1.514	-1.643	-1.846	-1.788	-2.054	-1.643	-1.846	-1.788	-2.054	ns
		$t_h$	1.320	1.320	1.884	2.059	2.308	2.223	2.500	2.059	2.308	2.223	2.500	ns
1.5 V	GCLK	$t_{su}$	-0.759	-0.758	-1.088	-1.183	-1.320	-1.275	-1.551	-1.183	-1.320	-1.275	-1.551	ns
		$t_h$	0.888	0.887	1.266	1.384	1.541	1.484	1.761	1.384	1.541	1.484	1.761	ns
	GCLK PLL	$t_{su}$	-1.055	-1.055	-1.491	-1.611	-1.776	-1.718	-1.984	-1.611	-1.776	-1.718	-1.984	ns
		$t_h$	1.310	1.310	1.861	2.027	2.238	2.153	2.430	2.027	2.238	2.153	2.430	ns
1.2 V	GCLK	$t_{su}$	-0.707	-0.706	-1.011	-1.084	-1.164	-1.119	-1.395	-1.084	-1.164	-1.119	-1.395	ns
		$t_h$	0.836	0.835	1.189	1.285	1.385	1.328	1.605	1.285	1.385	1.328	1.605	ns
	GCLK PLL	$t_{su}$	-1.003	-1.003	-1.414	-1.512	-1.620	-1.562	-1.828	-1.512	-1.620	-1.562	-1.828	ns
		$t_h$	1.258	1.258	1.784	1.928	2.082	1.997	2.274	1.928	2.082	1.997	2.274	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.678	-0.677	-0.983	-1.068	-1.166	-1.121	-1.397	-1.068	-1.166	-1.121	-1.397	ns
		$t_h$	0.807	0.806	1.161	1.269	1.387	1.330	1.607	1.269	1.387	1.330	1.607	ns
	GCLK PLL	$t_{su}$	-0.974	-0.974	-1.386	-1.496	-1.622	-1.564	-1.830	-1.496	-1.622	-1.564	-1.830	ns
		$t_h$	1.229	1.229	1.756	1.912	2.084	1.999	2.276	1.912	2.084	1.999	2.276	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.678	-0.677	-0.983	-1.068	-1.166	-1.121	-1.397	-1.068	-1.166	-1.121	-1.397	ns
		$t_h$	0.807	0.806	1.161	1.269	1.387	1.330	1.607	1.269	1.387	1.330	1.607	ns
	GCLK PLL	$t_{su}$	-0.974	-0.974	-1.386	-1.496	-1.622	-1.564	-1.830	-1.496	-1.622	-1.564	-1.830	ns
		$t_h$	1.229	1.229	1.756	1.912	2.084	1.999	2.276	1.912	2.084	1.999	2.276	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.672	-0.671	-0.971	-1.063	-1.166	-1.119	-1.398	-1.063	-1.166	-1.119	-1.398	ns
		$t_h$	0.801	0.800	1.148	1.261	1.384	1.327	1.603	1.261	1.384	1.327	1.603	ns
	GCLK PLL	$t_{su}$	-0.968	-0.968	-1.373	-1.488	-1.619	-1.559	-1.828	-1.488	-1.619	-1.559	-1.828	ns
		$t_h$	1.223	1.223	1.743	1.901	2.078	1.993	2.269	1.901	2.078	1.993	2.269	ns

**Table 1-101.** EP3SE50 Column Pins Input Timing Parameters (Part 3 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.672	-0.671	-0.971	-1.063	-1.166	-1.119	-1.398	-1.063	-1.166	-1.119	-1.398	ns
		$t_h$	0.801	0.800	1.148	1.261	1.384	1.327	1.603	1.261	1.384	1.327	1.603	ns
	GCLK PLL	$t_{su}$	-0.968	-0.968	-1.373	-1.488	-1.619	-1.559	-1.828	-1.488	-1.619	-1.559	-1.828	ns
		$t_h$	1.223	1.223	1.743	1.901	2.078	1.993	2.269	1.901	2.078	1.993	2.269	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.661	-0.660	-0.962	-1.052	-1.147	-1.100	-1.379	-1.052	-1.147	-1.100	-1.379	ns
		$t_h$	0.790	0.789	1.138	1.250	1.365	1.308	1.584	1.250	1.365	1.308	1.584	ns
	GCLK PLL	$t_{su}$	-0.957	-0.957	-1.362	-1.477	-1.600	-1.540	-1.809	-1.477	-1.600	-1.540	-1.809	ns
		$t_h$	1.212	1.212	1.731	1.890	2.059	1.974	2.250	1.890	2.059	1.974	2.250	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.661	-0.660	-0.962	-1.052	-1.147	-1.100	-1.379	-1.052	-1.147	-1.100	-1.379	ns
		$t_h$	0.790	0.789	1.138	1.250	1.365	1.308	1.584	1.250	1.365	1.308	1.584	ns
	GCLK PLL	$t_{su}$	-0.957	-0.957	-1.362	-1.477	-1.600	-1.540	-1.809	-1.477	-1.600	-1.540	-1.809	ns
		$t_h$	1.212	1.212	1.731	1.890	2.059	1.974	2.250	1.890	2.059	1.974	2.250	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.672	-0.671	-0.971	-1.063	-1.166	-1.119	-1.398	-1.063	-1.166	-1.119	-1.398	ns
		$t_h$	0.801	0.800	1.148	1.261	1.384	1.327	1.603	1.261	1.384	1.327	1.603	ns
	GCLK PLL	$t_{su}$	-0.968	-0.968	-1.373	-1.488	-1.619	-1.559	-1.828	-1.488	-1.619	-1.559	-1.828	ns
		$t_h$	1.223	1.223	1.743	1.901	2.078	1.993	2.269	1.901	2.078	1.993	2.269	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.672	-0.671	-0.971	-1.063	-1.166	-1.119	-1.398	-1.063	-1.166	-1.119	-1.398	ns
		$t_h$	0.801	0.800	1.148	1.261	1.384	1.327	1.603	1.261	1.384	1.327	1.603	ns
	GCLK PLL	$t_{su}$	-0.968	-0.968	-1.373	-1.488	-1.619	-1.559	-1.828	-1.488	-1.619	-1.559	-1.828	ns
		$t_h$	1.223	1.223	1.743	1.901	2.078	1.993	2.269	1.901	2.078	1.993	2.269	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.661	-0.660	-0.962	-1.052	-1.147	-1.100	-1.379	-1.052	-1.147	-1.100	-1.379	ns
		$t_h$	0.790	0.789	1.138	1.250	1.365	1.308	1.584	1.250	1.365	1.308	1.584	ns
	GCLK PLL	$t_{su}$	-0.957	-0.957	-1.362	-1.477	-1.600	-1.540	-1.809	-1.477	-1.600	-1.540	-1.809	ns
		$t_h$	1.212	1.212	1.731	1.890	2.059	1.974	2.250	1.890	2.059	1.974	2.250	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.661	-0.660	-0.962	-1.052	-1.147	-1.100	-1.379	-1.052	-1.147	-1.100	-1.379	ns
		$t_h$	0.790	0.789	1.138	1.250	1.365	1.308	1.584	1.250	1.365	1.308	1.584	ns
	GCLK PLL	$t_{su}$	-0.957	-0.957	-1.362	-1.477	-1.600	-1.540	-1.809	-1.477	-1.600	-1.540	-1.809	ns
		$t_h$	1.212	1.212	1.731	1.890	2.059	1.974	2.250	1.890	2.059	1.974	2.250	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.649	-0.648	-0.952	-1.041	-1.131	-1.084	-1.363	-1.041	-1.131	-1.084	-1.363	ns
		$t_h$	0.778	0.777	1.128	1.239	1.349	1.292	1.568	1.239	1.349	1.292	1.568	ns
	GCLK PLL	$t_{su}$	-0.945	-0.945	-1.352	-1.466	-1.584	-1.524	-1.793	-1.466	-1.584	-1.524	-1.793	ns
		$t_h$	1.200	1.200	1.721	1.879	2.043	1.958	2.234	1.879	2.043	1.958	2.234	ns
3.0-V PCI	GCLK	$t_{su}$	-0.649	-0.648	-0.952	-1.041	-1.131	-1.084	-1.363	-1.041	-1.131	-1.084	-1.363	ns
		$t_h$	0.778	0.777	1.128	1.239	1.349	1.292	1.568	1.239	1.349	1.292	1.568	ns
	GCLK PLL	$t_{su}$	-0.945	-0.945	-1.352	-1.466	-1.584	-1.524	-1.793	-1.466	-1.584	-1.524	-1.793	ns
		$t_h$	1.200	1.200	1.721	1.879	2.043	1.958	2.234	1.879	2.043	1.958	2.234	ns

**Table 1-101.** EP3SE50 Column Pins Input Timing Parameters (Part 4 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.0-V   PCI-X	GCLK	$t_{su}$	-0.754	-0.753	-1.062	-1.167	-1.373	-1.328	-1.604	-1.167	-1.373	-1.328	-1.604	ns
		$t_h$	0.881	0.880	1.240	1.368	1.594	1.537	1.814	1.368	1.594	1.537	1.814	ns
	GCLK PLL	$t_{su}$	-1.048	-1.048	-1.465	-1.595	-1.829	-1.771	-2.037	-1.595	-1.829	-1.771	-2.037	ns
		$t_h$	1.301	1.301	1.835	2.011	2.291	2.206	2.483	2.011	2.291	2.206	2.483	ns

Table 1-102 lists the EP3SE50 row pins input timing parameters for single-ended I/O standards.

**Table 1-102.** EP3SE50 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.3-V LVTTL	GCLK	$t_{su}$	-0.896	-0.926	-1.311	-1.433	-1.658	-1.605	-1.896	-1.451	-1.663	-1.612	-1.927	ns
		$t_h$	1.009	1.052	1.597	1.816	1.931	1.813	1.843	1.809	1.936	1.818	1.895	ns
	GCLK PLL	$t_{su}$	0.952	0.960	1.494	1.640	1.888	1.819	2.111	1.667	1.903	1.836	2.144	ns
		$t_h$	-0.703	-0.700	-1.311	-1.433	-1.658	-1.605	-1.896	-1.451	-1.663	-1.612	-1.927	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.896	-0.926	-1.311	-1.433	-1.658	-1.605	-1.896	-1.451	-1.663	-1.612	-1.927	ns
		$t_h$	1.009	1.052	1.597	1.816	1.931	1.813	1.843	1.809	1.936	1.818	1.895	ns
	GCLK PLL	$t_{su}$	0.952	0.960	1.494	1.640	1.888	1.819	2.111	1.667	1.903	1.836	2.144	ns
		$t_h$	-0.703	-0.700	-1.308	-1.434	-1.661	-1.608	-1.899	-1.450	-1.668	-1.617	-1.932	ns
3.0-V LVTTL	GCLK	$t_{su}$	-0.902	-0.937	1.491	1.641	1.891	1.822	2.114	1.666	1.908	1.841	2.149	ns
		$t_h$	1.015	1.063	-1.308	-1.434	-1.661	-1.608	-1.899	-1.450	-1.668	-1.617	-1.932	ns
	GCLK PLL	$t_{su}$	0.946	0.949	1.600	1.815	1.928	1.810	1.840	1.810	1.931	1.813	1.890	ns
		$t_h$	-0.697	-0.689	1.491	1.641	1.891	1.822	2.114	1.666	1.908	1.841	2.149	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.902	-0.937	1.500	1.654	1.906	1.837	2.129	1.675	1.918	1.851	2.159	ns
		$t_h$	1.015	1.063	-1.317	-1.447	-1.676	-1.623	-1.914	-1.459	-1.678	-1.627	-1.942	ns
	GCLK PLL	$t_{su}$	0.946	0.949	1.591	1.802	1.913	1.795	1.825	1.801	1.921	1.803	1.880	ns
		$t_h$	-0.697	-0.689	1.500	1.654	1.906	1.837	2.129	1.675	1.918	1.851	2.159	ns
2.5 V	GCLK	$t_{su}$	-0.890	-0.930	1.510	1.730	1.876	1.758	1.788	1.729	1.881	1.762	1.840	ns
		$t_h$	1.003	1.056	1.458	1.596	1.807	1.742	2.015	1.614	1.817	1.754	2.048	ns
	GCLK PLL	$t_{su}$	0.958	0.956	-1.272	-1.388	-1.573	-1.523	-1.797	-1.395	-1.573	-1.526	-1.829	ns
		$t_h$	-0.709	-0.696	1.510	1.730	1.876	1.758	1.788	1.729	1.881	1.762	1.840	ns
1.8 V	GCLK	$t_{su}$	-0.869	-0.907	1.534	1.762	1.944	1.826	1.856	1.760	1.946	1.827	1.905	ns
		$t_h$	0.890	0.886	1.434	1.564	1.739	1.674	1.947	1.583	1.752	1.689	1.983	ns
	GCLK PLL	$t_{su}$	0.986	1.035	-1.248	-1.356	-1.505	-1.455	-1.729	-1.364	-1.508	-1.461	-1.764	ns
		$t_h$	-0.859	-0.896	1.613	1.863	2.103	1.985	2.015	1.856	2.101	1.982	2.060	ns

**Table 1-102.** EP3SE50 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
1.5 V	GCLK	$t_{su}$	0.900	0.897	1.355	1.463	1.580	1.515	1.788	1.487	1.597	1.534	1.828	ns
		$t_h$	0.976	1.024	-1.169	-1.255	-1.346	-1.296	-1.570	-1.268	-1.353	-1.306	-1.609	ns
	GCLK PLL	$t_{su}$	-0.799	-0.843	1.677	1.911	2.133	2.015	2.045	1.913	2.138	2.020	2.097	ns
		$t_h$	0.960	0.950	1.414	1.545	1.686	1.617	1.909	1.563	1.701	1.634	1.942	ns
1.2 V	GCLK	$t_{su}$	0.916	0.971	-1.131	-1.230	-1.344	-1.293	-1.568	-1.239	-1.349	-1.300	-1.604	ns
		$t_h$	-0.833	-0.872	1.651	-1.230	-1.344	-1.293	-1.568	-1.239	-1.349	-1.300	-1.604	ns
	GCLK PLL	$t_{su}$	1.015	1.014	1.317	1.436	1.575	1.510	1.782	1.455	1.590	1.527	1.819	ns
		$t_h$	0.947	0.999	-1.131	1.890	2.108	1.991	2.019	1.888	2.108	1.990	2.067	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.833	-0.872	1.651	1.890	2.108	1.991	2.019	1.888	2.108	1.990	2.067	ns
		$t_h$	1.015	1.014	1.317	-1.442	-1.607	-1.521	-1.544	-1.432	-1.599	-1.511	-1.589	ns
	GCLK PLL	$t_{su}$	0.947	0.999	-1.131	-1.230	-1.344	-1.293	-1.568	-1.239	-1.349	-1.300	-1.604	ns
		$t_h$	-0.773	-0.808	1.651	1.436	1.575	1.510	1.782	1.455	1.590	1.527	1.819	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	0.986	0.985	1.317	1.890	2.108	1.991	2.019	1.888	2.108	1.990	2.067	ns
		$t_h$	0.890	0.936	-1.131	-1.442	-1.607	-1.521	-1.544	-1.432	-1.599	-1.511	-1.589	ns
	GCLK PLL	$t_{su}$	-0.773	-0.808	-1.267	-1.220	-1.326	-1.275	-1.550	-1.228	-1.332	-1.283	-1.587	ns
		$t_h$	0.986	0.985	-1.118	1.426	1.557	1.492	1.764	1.444	1.573	1.510	1.802	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	0.890	0.936	1.305	1.900	2.126	2.009	2.037	1.899	2.125	2.007	2.084	ns
		$t_h$	-0.759	-0.796	1.651	1.900	2.126	2.009	2.037	1.899	2.125	2.007	2.084	ns
	GCLK PLL	$t_{su}$	1.000	0.997	1.317	-1.452	-1.625	-1.539	-1.562	-1.443	-1.616	-1.528	-1.606	ns
		$t_h$	0.876	0.924	-1.131	-1.220	-1.326	-1.275	-1.550	-1.228	-1.332	-1.283	-1.587	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.773	-0.808	1.651	-1.442	-1.607	-1.521	-1.544	-1.432	-1.599	-1.511	-1.589	ns
		$t_h$	0.986	0.985	1.317	-1.230	-1.344	-1.293	-1.568	-1.239	-1.349	-1.300	-1.604	ns
	GCLK PLL	$t_{su}$	0.890	0.936	-1.131	1.436	1.575	1.510	1.782	1.455	1.590	1.527	1.819	ns
		$t_h$	-0.773	-0.808	-1.267	1.890	2.108	1.991	2.019	1.888	2.108	1.990	2.067	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	0.986	0.985	-1.118	-1.442	-1.607	-1.521	-1.544	-1.432	-1.599	-1.511	-1.589	ns
		$t_h$	0.890	0.936	1.305	-1.230	-1.344	-1.293	-1.568	-1.239	-1.349	-1.300	-1.604	ns
	GCLK PLL	$t_{su}$	-0.759	-0.796	1.666	1.436	1.575	1.510	1.782	1.455	1.590	1.527	1.819	ns
		$t_h$	1.000	0.997	-1.267	1.890	2.108	1.991	2.019	1.888	2.108	1.990	2.067	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	0.876	0.924	-1.118	-1.442	-1.607	-1.521	-1.544	-1.432	-1.599	-1.511	-1.589	ns
		$t_h$	-0.759	-0.796	-1.276	1.900	2.126	2.009	2.037	1.899	2.125	2.007	2.084	ns
	GCLK PLL	$t_{su}$	1.000	0.997	-1.109	-1.452	-1.625	-1.539	-1.562	-1.443	-1.616	-1.528	-1.606	ns
		$t_h$	0.876	0.924	1.296	-1.220	-1.326	-1.275	-1.550	-1.228	-1.332	-1.283	-1.587	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.750	-0.784	1.675	1.426	1.557	1.492	1.764	1.444	1.573	1.510	1.802	ns
		$t_h$	1.009	1.009	-1.276	1.900	2.126	2.009	2.037	1.899	2.125	2.007	2.084	ns
	GCLK PLL	$t_{su}$	0.867	0.912	-1.109	-1.452	-1.625	-1.539	-1.562	-1.443	-1.616	-1.528	-1.606	ns
		$t_h$	-0.750	-0.784	-1.276	1.910	2.142	2.025	2.053	1.908	2.141	2.023	2.100	ns



**Table 1-102.** EP3SE50 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
1.5-V HSTL CLASS I	GCLK	$t_{su}$	1.009	1.009	-1.308	-1.462	-1.641	-1.555	-1.578	-1.452	-1.632	-1.544	-1.622	ns
		$t_h$	0.867	0.912	1.600	-1.210	-1.310	-1.259	-1.534	-1.219	-1.316	-1.267	-1.571	ns
	GCLK PLL	$t_{su}$	-0.902	-0.937	1.491	1.416	1.541	1.476	1.748	1.435	1.557	1.494	1.786	ns
		$t_h$	1.015	1.063	-1.308	1.910	2.142	2.025	2.053	1.908	2.141	2.023	2.100	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	0.946	0.949	1.600	-1.462	-1.641	-1.555	-1.578	-1.452	-1.632	-1.544	-1.622	ns
		$t_h$	-0.697	-0.689	1.491	-1.210	-1.310	-1.259	-1.534	-1.219	-1.316	-1.267	-1.571	ns
	GCLK PLL	$t_{su}$	-0.902	-0.937	1.491	1.416	1.541	1.476	1.748	1.435	1.557	1.494	1.786	ns
		$t_h$	1.015	1.063	1.491	1.910	2.142	2.025	2.053	1.908	2.141	2.023	2.100	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	0.946	0.949	1.491	-1.462	-1.641	-1.555	-1.578	-1.452	-1.632	-1.544	-1.622	ns
		$t_h$	-0.697	-0.689	1.491	-1.210	-1.310	-1.259	-1.534	-1.219	-1.316	-1.267	-1.571	ns
	GCLK PLL	$t_{su}$	-0.896	-0.926	-1.311	-1.433	-1.658	-1.605	-1.896	-1.451	-1.663	-1.612	-1.927	ns
		$t_h$	1.009	1.052	1.597	1.816	1.931	1.813	1.843	1.809	1.936	1.818	1.895	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	0.952	0.960	1.494	1.640	1.888	1.819	2.111	1.667	1.903	1.836	2.144	ns
		$t_h$	-0.703	-0.700	-1.311	-1.433	-1.658	-1.605	-1.896	-1.451	-1.663	-1.612	-1.927	ns
	GCLK PLL	$t_{su}$	-0.896	-0.926	-1.311	-1.433	-1.658	-1.605	-1.896	-1.451	-1.663	-1.612	-1.927	ns
		$t_h$	1.009	1.052	1.597	1.816	1.931	1.813	1.843	1.809	1.936	1.818	1.895	ns
3.0-V PCI	GCLK	$t_{su}$	0.952	0.960	1.494	1.640	1.888	1.819	2.111	1.667	1.903	1.836	2.144	ns
		$t_h$	-0.703	-0.700	-1.308	-1.434	-1.661	-1.608	-1.899	-1.450	-1.668	-1.617	-1.932	ns
	GCLK PLL	$t_{su}$	-0.902	-0.937	1.491	1.641	1.891	1.822	2.114	1.666	1.908	1.841	2.149	ns
		$t_h$	1.015	1.063	-1.308	-1.434	-1.661	-1.608	-1.899	-1.450	-1.668	-1.617	-1.932	ns
3.0-V PCI-X	GCLK	$t_{su}$	0.946	0.949	1.600	1.815	1.928	1.810	1.840	1.810	1.931	1.813	1.890	ns
		$t_h$	-0.697	-0.689	1.491	1.641	1.891	1.822	2.114	1.666	1.908	1.841	2.149	ns
	GCLK PLL	$t_{su}$	-0.902	-0.937	1.500	1.654	1.906	1.837	2.129	1.675	1.918	1.851	2.159	ns
		$t_h$	1.015	1.063	-1.317	-1.447	-1.676	-1.623	-1.914	-1.459	-1.678	-1.627	-1.942	ns

Table 1-103 lists the EP3SE50 column pins output timing parameters for single-ended I/O standards.

**Table 1-103.** EP3SE50 Column Pins Output Timing Parameters (Part 1 of 6)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$		$V_{CC1}=0.9V$
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.293	3.293	4.559	4.925	5.402	5.282	5.365	4.925	5.402	5.282	5.365	ns	
		GCLK PLL	$t_{co}$	3.550	3.524	4.903	5.329	5.819	5.674	5.973	5.329	5.819	5.674	5.973	ns	
	8mA	GCLK	$t_{co}$	3.176	3.176	4.405	4.763	5.232	5.112	5.252	4.763	5.232	5.112	5.252	ns	
		GCLK PLL	$t_{co}$	3.483	3.457	4.794	5.218	5.706	5.561	5.860	5.218	5.706	5.561	5.860	ns	
	12mA	GCLK	$t_{co}$	3.081	3.081	4.268	4.620	5.080	4.960	5.162	4.620	5.080	4.960	5.162	ns	
		GCLK PLL	$t_{co}$	3.397	3.371	4.691	5.120	5.614	5.469	5.768	5.120	5.614	5.469	5.768	ns	
	16mA	GCLK	$t_{co}$	3.041	3.051	4.243	4.596	5.055	4.935	5.120	4.596	5.055	4.935	5.120	ns	
		GCLK PLL	$t_{co}$	3.390	3.364	4.674	5.092	5.573	5.428	5.727	5.092	5.573	5.428	5.727	ns	
	3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.296	3.296	4.563	4.937	5.416	5.296	5.373	4.937	5.416	5.296	5.373	ns
			GCLK PLL	$t_{co}$	3.556	3.530	4.908	5.334	5.826	5.681	5.980	5.334	5.826	5.681	5.980	ns
		8mA	GCLK	$t_{co}$	3.096	3.096	4.273	4.625	5.086	4.966	5.172	4.625	5.086	4.966	5.172	ns
			GCLK PLL	$t_{co}$	3.401	3.375	4.701	5.137	5.625	5.480	5.779	5.137	5.625	5.480	5.779	ns
12mA		GCLK	$t_{co}$	3.059	3.069	4.236	4.594	5.055	4.935	5.148	4.594	5.055	4.935	5.148	ns	
		GCLK PLL	$t_{co}$	3.408	3.382	4.695	5.116	5.599	5.454	5.753	5.116	5.599	5.454	5.753	ns	
16mA		GCLK	$t_{co}$	3.043	3.053	4.212	4.553	5.025	4.904	5.119	4.553	5.025	4.904	5.119	ns	
		GCLK PLL	$t_{co}$	3.392	3.366	4.672	5.090	5.570	5.425	5.724	5.090	5.570	5.425	5.724	ns	
3.0-V LVTTTL		4mA	GCLK	$t_{co}$	3.238	3.238	4.508	4.876	5.367	5.247	5.356	4.876	5.367	5.247	5.356	ns
			GCLK PLL	$t_{co}$	3.514	3.488	4.870	5.298	5.786	5.641	5.940	5.298	5.786	5.641	5.940	ns
		8mA	GCLK	$t_{co}$	3.108	3.108	4.339	4.704	5.205	5.086	5.239	4.704	5.205	5.086	5.239	ns
			GCLK PLL	$t_{co}$	3.403	3.377	4.740	5.164	5.648	5.504	5.801	5.164	5.648	5.504	5.801	ns
	12mA	GCLK	$t_{co}$	3.033	3.033	4.250	4.605	5.103	4.984	5.175	4.605	5.103	4.984	5.175	ns	
		GCLK PLL	$t_{co}$	3.367	3.341	4.677	5.095	5.574	5.430	5.728	5.095	5.574	5.430	5.728	ns	
	16mA	GCLK	$t_{co}$	3.000	3.010	4.188	4.536	5.053	4.934	5.152	4.536	5.053	4.934	5.152	ns	
		GCLK PLL	$t_{co}$	3.349	3.323	4.648	5.067	5.546	5.401	5.700	5.067	5.546	5.401	5.700	ns	

**Table 1-103.** EP3SE50 Column Pins Output Timing Parameters (Part 2 of 6)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.146	3.146	4.397	4.757	5.259	5.140	5.275	4.757	5.259	5.140	5.275	ns	
		GCLK PLL	$t_{co}$	3.428	3.402	4.774	5.197	5.683	5.539	5.836	5.197	5.683	5.539	5.836	ns	
	8mA	GCLK	$t_{co}$	3.009	3.010	4.202	4.558	5.077	4.958	5.165	4.558	5.077	4.958	5.165	ns	
		GCLK PLL	$t_{co}$	3.349	3.323	4.651	5.068	5.548	5.404	5.701	5.068	5.548	5.404	5.701	ns	
	12mA	GCLK	$t_{co}$	2.995	3.005	4.183	4.524	5.009	4.889	5.134	4.524	5.009	4.889	5.134	ns	
		GCLK PLL	$t_{co}$	3.344	3.318	4.643	5.061	5.540	5.395	5.694	5.061	5.540	5.395	5.694	ns	
	16mA	GCLK	$t_{co}$	2.986	2.996	4.169	4.509	5.007	4.888	5.139	4.509	5.007	4.888	5.139	ns	
		GCLK PLL	$t_{co}$	3.335	3.309	4.629	5.046	5.525	5.380	5.679	5.046	5.525	5.380	5.679	ns	
	2.5 V	4mA	GCLK	$t_{co}$	3.293	3.293	4.651	5.036	5.541	5.422	5.483	5.036	5.541	5.422	5.483	ns
			GCLK PLL	$t_{co}$	3.550	3.524	4.981	5.424	5.930	5.786	6.084	5.424	5.930	5.786	6.084	ns
		8mA	GCLK	$t_{co}$	3.168	3.168	4.478	4.852	5.344	5.225	5.359	4.852	5.344	5.225	5.359	ns
			GCLK PLL	$t_{co}$	3.450	3.424	4.862	5.298	5.798	5.654	5.951	5.298	5.798	5.654	5.951	ns
12mA		GCLK	$t_{co}$	3.068	3.068	4.349	4.716	5.204	5.085	5.281	4.716	5.204	5.085	5.281	ns	
		GCLK PLL	$t_{co}$	3.406	3.380	4.775	5.208	5.703	5.558	5.857	5.208	5.703	5.558	5.857	ns	
16mA		GCLK	$t_{co}$	3.041	3.041	4.280	4.649	5.154	5.035	5.224	4.649	5.154	5.035	5.224	ns	
		GCLK PLL	$t_{co}$	3.368	3.342	4.736	5.165	5.660	5.515	5.814	5.165	5.660	5.515	5.814	ns	
1.8 V		2mA	GCLK	$t_{co}$	3.556	3.556	5.088	5.519	6.078	5.958	5.880	5.519	6.078	5.958	5.880	ns
			GCLK PLL	$t_{co}$	3.741	3.715	5.303	5.784	6.335	6.190	6.489	5.784	6.335	6.190	6.489	ns
		4mA	GCLK	$t_{co}$	3.315	3.315	4.728	5.113	5.617	5.498	5.549	5.113	5.617	5.498	5.549	ns
			GCLK PLL	$t_{co}$	3.560	3.534	5.024	5.475	5.987	5.843	6.140	5.475	5.987	5.843	6.140	ns
	6mA	GCLK	$t_{co}$	3.197	3.197	4.538	4.923	5.443	5.323	5.437	4.923	5.443	5.323	5.437	ns	
		GCLK PLL	$t_{co}$	3.478	3.452	4.917	5.360	5.877	5.732	6.031	5.360	5.877	5.732	6.031	ns	
	8mA	GCLK	$t_{co}$	3.143	3.143	4.438	4.825	5.331	5.211	5.360	4.825	5.331	5.211	5.360	ns	
		GCLK PLL	$t_{co}$	3.458	3.432	4.858	5.307	5.811	5.666	5.965	5.307	5.811	5.666	5.965	ns	
	10mA	GCLK	$t_{co}$	3.075	3.075	4.342	4.727	5.217	5.097	5.291	4.727	5.217	5.097	5.291	ns	
		GCLK PLL	$t_{co}$	3.395	3.369	4.797	5.232	5.730	5.585	5.884	5.232	5.730	5.585	5.884	ns	
	12mA	GCLK	$t_{co}$	3.051	3.051	4.317	4.680	5.179	5.059	5.258	4.680	5.179	5.059	5.258	ns	
		GCLK PLL	$t_{co}$	3.377	3.351	4.777	5.210	5.707	5.562	5.861	5.210	5.707	5.562	5.861	ns	

**Table 1–103.** EP3SE50 Column Pins Output Timing Parameters (Part 3 of 6)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.5 V	2mA	GCLK	$t_{co}$	3.464	3.464	4.981	5.429	5.995	5.875	5.825	5.429	5.995	5.875	5.825	ns
		GCLK PLL	$t_{co}$	3.687	3.661	5.231	5.717	6.273	6.128	6.427	5.717	6.273	6.128	6.427	ns
	4mA	GCLK	$t_{co}$	3.181	3.181	4.527	4.916	5.439	5.319	5.439	4.916	5.439	5.319	5.439	ns
		GCLK PLL	$t_{co}$	3.475	3.449	4.912	5.360	5.881	5.736	6.035	5.360	5.881	5.736	6.035	ns
	6mA	GCLK	$t_{co}$	3.103	3.111	4.427	4.808	5.322	5.202	5.362	4.808	5.322	5.202	5.362	ns
		GCLK PLL	$t_{co}$	3.450	3.424	4.845	5.300	5.814	5.669	5.968	5.300	5.814	5.669	5.968	ns
	8mA	GCLK	$t_{co}$	3.093	3.100	4.409	4.787	5.290	5.170	5.345	4.787	5.290	5.170	5.345	ns
		GCLK PLL	$t_{co}$	3.439	3.413	4.828	5.275	5.794	5.649	5.948	5.275	5.794	5.649	5.948	ns
	10mA	GCLK	$t_{co}$	3.063	3.063	4.330	4.709	5.208	5.088	5.282	4.709	5.208	5.088	5.282	ns
		GCLK PLL	$t_{co}$	3.384	3.358	4.790	5.225	5.724	5.579	5.878	5.225	5.724	5.579	5.878	ns
	12mA	GCLK	$t_{co}$	3.030	3.040	4.314	4.676	5.168	5.047	5.261	4.676	5.168	5.047	5.261	ns
		GCLK PLL	$t_{co}$	3.379	3.353	4.774	5.213	5.713	5.568	5.867	5.213	5.713	5.568	5.867	ns
1.2 V	2mA	GCLK	$t_{co}$	3.354	3.354	4.868	5.328	5.915	5.795	5.765	5.328	5.915	5.795	5.765	ns
		GCLK PLL	$t_{co}$	3.603	3.577	5.157	5.652	6.217	6.072	6.371	5.652	6.217	6.072	6.371	ns
	4mA	GCLK	$t_{co}$	3.181	3.181	4.546	4.947	5.486	5.366	5.480	4.947	5.486	5.366	5.480	ns
		GCLK PLL	$t_{co}$	3.480	3.454	4.932	5.391	5.931	5.786	6.085	5.391	5.931	5.786	6.085	ns
	6mA	GCLK	$t_{co}$	3.094	3.103	4.419	4.806	5.331	5.211	5.366	4.806	5.331	5.211	5.366	ns
		GCLK PLL	$t_{co}$	3.442	3.416	4.839	5.301	5.818	5.673	5.972	5.301	5.818	5.673	5.972	ns
	8mA	GCLK	$t_{co}$	3.070	3.070	4.351	4.746	5.240	5.120	5.319	4.746	5.240	5.120	5.319	ns
		GCLK PLL	$t_{co}$	3.395	3.369	4.811	5.252	5.762	5.617	5.916	5.252	5.762	5.617	5.916	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.058	3.058	4.312	4.677	5.188	5.068	5.276	4.677	5.188	5.068	5.276	ns
		GCLK PLL	$t_{co}$	3.395	3.369	4.768	5.200	5.693	5.548	5.847	5.200	5.693	5.548	5.847	ns
	10mA	GCLK	$t_{co}$	3.055	3.055	4.305	4.670	5.193	5.074	5.271	4.670	5.193	5.074	5.271	ns
		GCLK PLL	$t_{co}$	3.392	3.366	4.765	5.196	5.689	5.544	5.843	5.196	5.689	5.544	5.843	ns
	12mA	GCLK	$t_{co}$	3.043	3.051	4.305	4.666	5.174	5.054	5.272	4.666	5.174	5.054	5.272	ns
		GCLK PLL	$t_{co}$	3.390	3.364	4.765	5.197	5.690	5.545	5.844	5.197	5.690	5.545	5.844	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.032	3.042	4.291	4.644	5.140	5.020	5.256	4.644	5.140	5.020	5.256	ns
		GCLK PLL	$t_{co}$	3.381	3.355	4.751	5.182	5.675	5.530	5.829	5.182	5.675	5.530	5.829	ns

**Table 1-103.** EP3SE50 Column Pins Output Timing Parameters (Part 4 of 6)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.074	3.074	4.324	4.692	5.215	5.096	5.295	4.692	5.215	5.096	5.295	ns	
		GCLK PLL	$t_{co}$	3.402	3.376	4.780	5.214	5.709	5.564	5.863	5.214	5.709	5.564	5.863	ns	
	6mA	GCLK	$t_{co}$	3.057	3.059	4.321	4.689	5.205	5.085	5.293	4.689	5.205	5.085	5.293	ns	
		GCLK PLL	$t_{co}$	3.398	3.372	4.778	5.212	5.707	5.562	5.861	5.212	5.707	5.562	5.861	ns	
	8mA	GCLK	$t_{co}$	3.045	3.048	4.308	4.669	5.197	5.078	5.291	4.669	5.197	5.078	5.291	ns	
		GCLK PLL	$t_{co}$	3.387	3.361	4.768	5.202	5.698	5.553	5.852	5.202	5.698	5.553	5.852	ns	
	10mA	GCLK	$t_{co}$	3.027	3.037	4.296	4.652	5.159	5.039	5.266	4.652	5.159	5.039	5.266	ns	
		GCLK PLL	$t_{co}$	3.376	3.350	4.756	5.189	5.685	5.540	5.839	5.189	5.685	5.540	5.839	ns	
	12mA	GCLK	$t_{co}$	3.027	3.037	4.295	4.652	5.159	5.039	5.265	4.652	5.159	5.039	5.265	ns	
		GCLK PLL	$t_{co}$	3.376	3.350	4.755	5.189	5.685	5.540	5.839	5.189	5.685	5.540	5.839	ns	
	SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.033	3.043	4.294	4.649	5.159	5.039	5.268	4.649	5.159	5.039	5.268	ns
			GCLK PLL	$t_{co}$	3.382	3.356	4.754	5.186	5.680	5.535	5.834	5.186	5.680	5.535	5.834	ns
16mA		GCLK	$t_{co}$	3.036	3.046	4.302	4.658	5.164	5.044	5.291	4.658	5.164	5.044	5.291	ns	
		GCLK PLL	$t_{co}$	3.385	3.359	4.762	5.196	5.692	5.547	5.846	5.196	5.692	5.547	5.846	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.068	3.068	4.338	4.709	5.230	5.110	5.310	4.709	5.230	5.110	5.310	ns	
		GCLK PLL	$t_{co}$	3.406	3.380	4.790	5.225	5.722	5.577	5.876	5.225	5.722	5.577	5.876	ns	
	6mA	GCLK	$t_{co}$	3.043	3.053	4.319	4.688	5.204	5.084	5.296	4.688	5.204	5.084	5.296	ns	
		GCLK PLL	$t_{co}$	3.392	3.366	4.779	5.215	5.713	5.568	5.867	5.215	5.713	5.568	5.867	ns	
	8mA	GCLK	$t_{co}$	3.032	3.042	4.306	4.667	5.180	5.060	5.281	4.667	5.180	5.060	5.281	ns	
		GCLK PLL	$t_{co}$	3.381	3.355	4.766	5.201	5.699	5.554	5.853	5.201	5.699	5.554	5.853	ns	
	10mA	GCLK	$t_{co}$	3.031	3.041	4.309	4.667	5.169	5.049	5.278	4.667	5.169	5.049	5.278	ns	
		GCLK PLL	$t_{co}$	3.380	3.354	4.769	5.205	5.703	5.558	5.857	5.205	5.703	5.558	5.857	ns	
	12mA	GCLK	$t_{co}$	3.028	3.038	4.303	4.662	5.159	5.039	5.272	4.662	5.159	5.039	5.272	ns	
		GCLK PLL	$t_{co}$	3.377	3.351	4.763	5.199	5.697	5.552	5.851	5.199	5.697	5.552	5.851	ns	
	SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.030	3.040	4.292	4.648	5.159	5.039	5.269	4.648	5.159	5.039	5.269	ns
			GCLK PLL	$t_{co}$	3.379	3.353	4.752	5.185	5.680	5.535	5.834	5.185	5.680	5.535	5.834	ns
16mA		GCLK	$t_{co}$	3.033	3.043	4.299	4.657	5.165	5.045	5.293	4.657	5.165	5.045	5.293	ns	
		GCLK PLL	$t_{co}$	3.382	3.356	4.759	5.194	5.691	5.546	5.845	5.194	5.691	5.546	5.845	ns	

**Table 1-103.** EP3SE50 Column Pins Output Timing Parameters (Part 5 of 6)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.042	3.050	4.294	4.654	5.173	5.053	5.270	4.654	5.173	5.053	5.270	ns
		GCLK PLL	$t_{co}$	3.389	3.363	4.754	5.185	5.678	5.533	5.832	5.185	5.678	5.533	5.832	ns
	6mA	GCLK	$t_{co}$	3.033	3.043	4.292	4.646	5.169	5.050	5.275	4.646	5.169	5.050	5.275	ns
		GCLK PLL	$t_{co}$	3.382	3.356	4.752	5.184	5.677	5.532	5.831	5.184	5.677	5.532	5.831	ns
	8mA	GCLK	$t_{co}$	3.025	3.035	4.285	4.639	5.142	5.023	5.257	4.639	5.142	5.023	5.257	ns
		GCLK PLL	$t_{co}$	3.374	3.348	4.745	5.176	5.670	5.525	5.824	5.176	5.670	5.525	5.824	ns
	10mA	GCLK	$t_{co}$	3.028	3.038	4.288	4.642	5.145	5.025	5.260	4.642	5.145	5.025	5.260	ns
		GCLK PLL	$t_{co}$	3.377	3.351	4.748	5.180	5.674	5.529	5.828	5.180	5.674	5.529	5.828	ns
	12mA	GCLK	$t_{co}$	3.025	3.035	4.290	4.646	5.144	5.025	5.267	4.646	5.144	5.025	5.267	ns
		GCLK PLL	$t_{co}$	3.374	3.348	4.750	5.183	5.678	5.533	5.832	5.183	5.678	5.533	5.832	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.033	3.043	4.289	4.643	5.141	5.021	5.271	4.643	5.141	5.021	5.271	ns
		GCLK PLL	$t_{co}$	3.382	3.356	4.749	5.181	5.674	5.529	5.828	5.181	5.674	5.529	5.828	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.048	3.055	4.303	4.667	5.189	5.069	5.283	4.667	5.189	5.069	5.283	ns
		GCLK PLL	$t_{co}$	3.394	3.368	4.763	5.195	5.689	5.544	5.843	5.195	5.689	5.544	5.843	ns
	6mA	GCLK	$t_{co}$	3.041	3.051	4.304	4.662	5.178	5.058	5.280	4.662	5.178	5.058	5.280	ns
		GCLK PLL	$t_{co}$	3.390	3.364	4.764	5.197	5.692	5.547	5.846	5.197	5.692	5.547	5.846	ns
	8mA	GCLK	$t_{co}$	3.037	3.047	4.299	4.655	5.172	5.052	5.275	4.655	5.172	5.052	5.275	ns
		GCLK PLL	$t_{co}$	3.386	3.360	4.759	5.192	5.687	5.542	5.841	5.192	5.687	5.542	5.841	ns
	10mA	GCLK	$t_{co}$	3.030	3.040	4.292	4.648	5.159	5.039	5.269	4.648	5.159	5.039	5.269	ns
		GCLK PLL	$t_{co}$	3.379	3.353	4.752	5.185	5.680	5.535	5.834	5.185	5.680	5.535	5.834	ns
	12mA	GCLK	$t_{co}$	3.031	3.041	4.299	4.656	5.155	5.035	5.272	4.656	5.155	5.035	5.272	ns
		GCLK PLL	$t_{co}$	3.380	3.354	4.759	5.193	5.690	5.545	5.844	5.193	5.690	5.545	5.844	ns
1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.029	3.039	4.280	4.634	5.134	5.014	5.257	4.634	5.134	5.014	5.257	ns
		GCLK PLL	$t_{co}$	3.378	3.352	4.740	5.171	5.664	5.519	5.818	5.171	5.664	5.519	5.818	ns

**Table 1-103.** EP3SE50 Column Pins Output Timing Parameters (Part 6 of 6)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.048	3.058	4.317	4.683	5.208	5.088	5.302	4.683	5.208	5.088	5.302	ns
		GCLK PLL	$t_{co}$	3.397	3.371	4.777	5.212	5.710	5.565	5.864	5.212	5.710	5.565	5.864	ns
	6mA	GCLK	$t_{co}$	3.040	3.050	4.308	4.668	5.191	5.071	5.290	4.668	5.191	5.071	5.290	ns
		GCLK PLL	$t_{co}$	3.389	3.363	4.768	5.203	5.701	5.556	5.855	5.203	5.701	5.556	5.855	ns
	8mA	GCLK	$t_{co}$	3.041	3.051	4.315	4.674	5.187	5.067	5.293	4.674	5.187	5.067	5.293	ns
		GCLK PLL	$t_{co}$	3.390	3.364	4.775	5.212	5.710	5.565	5.864	5.212	5.710	5.565	5.864	ns
	10mA	GCLK	$t_{co}$	3.030	3.040	4.302	4.661	5.164	5.044	5.287	4.661	5.164	5.044	5.287	ns
		GCLK PLL	$t_{co}$	3.379	3.353	4.762	5.198	5.696	5.551	5.850	5.198	5.696	5.551	5.850	ns
	12mA	GCLK	$t_{co}$	3.030	3.040	4.302	4.661	5.165	5.045	5.279	4.661	5.165	5.045	5.279	ns
		GCLK PLL	$t_{co}$	3.379	3.353	4.762	5.198	5.697	5.552	5.851	5.198	5.697	5.552	5.851	ns
1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.061	3.061	4.318	4.685	5.243	5.123	5.316	4.685	5.243	5.123	5.316	ns
		GCLK PLL	$t_{co}$	3.400	3.374	4.778	5.213	5.710	5.565	5.864	5.213	5.710	5.565	5.864	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.154	3.164	4.363	4.710	5.218	5.098	5.347	4.710	5.218	5.098	5.347	ns
		GCLK PLL	$t_{co}$	3.503	3.477	4.823	5.247	5.735	5.590	5.889	5.247	5.735	5.590	5.889	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.154	3.164	4.363	4.710	5.218	5.098	5.347	4.710	5.218	5.098	5.347	ns
		GCLK PLL	$t_{co}$	3.503	3.477	4.823	5.247	5.735	5.590	5.889	5.247	5.735	5.590	5.889	ns

Table 1-104 lists the EP3SE50 row pins output timing parameters for single-ended I/O standards.

**Table 1-104.** EP3SE50 Row Pins Output Timing Parameters (Part 1 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.3-V LVTTL	4mA	GCLK	$t_{co}$	3.161	3.395	4.722	5.117	5.622	5.486	5.755	5.247	5.754	5.618	5.832	ns
		GCLK PLL	$t_{co}$	1.488	1.692	2.101	2.185	2.381	2.400	2.349	2.304	2.505	2.523	2.344	ns
	8mA	GCLK	$t_{co}$	3.095	3.324	4.612	5.005	5.508	5.372	5.611	5.134	5.638	5.502	5.683	ns
		GCLK PLL	$t_{co}$	1.395	1.587	1.971	2.047	2.237	2.256	2.205	2.163	2.356	2.374	2.195	ns
	12mA	GCLK	$t_{co}$	3.016	3.235	4.506	4.905	5.412	5.276	5.483	5.035	5.539	5.403	5.551	ns
		GCLK PLL	$t_{co}$	1.314	1.493	1.852	1.924	2.109	2.128	2.077	2.036	2.224	2.242	2.063	ns

**Table 1–104.** EP3SE50 Row Pins Output Timing Parameters (Part 2 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.163	3.402	4.726	5.122	5.631	5.495	5.760	5.255	5.766	5.630	5.837	ns
		GCLK PLL	$t_{co}$	1.498	1.696	2.109	2.190	2.386	2.405	2.354	2.310	2.510	2.528	2.349	ns
	8mA	GCLK	$t_{co}$	3.020	3.239	4.517	4.920	5.422	5.286	5.489	5.047	5.548	5.412	5.558	ns
		GCLK PLL	$t_{co}$	1.318	1.497	1.858	1.930	2.115	2.134	2.083	2.042	2.231	2.249	2.070	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.122	3.356	4.689	5.085	5.588	5.452	5.712	5.215	5.720	5.584	5.790	ns
		GCLK PLL	$t_{co}$	1.442	1.638	2.053	2.138	2.338	2.357	2.306	2.261	2.463	2.481	2.302	ns
	8mA	GCLK	$t_{co}$	3.021	3.244	4.552	4.943	5.443	5.307	5.548	5.073	5.575	5.438	5.625	ns
		GCLK PLL	$t_{co}$	1.319	1.511	1.900	1.979	2.174	2.193	2.142	2.099	2.299	2.316	2.137	ns
	12mA	GCLK	$t_{co}$	2.984	3.206	4.492	4.878	5.373	5.237	5.460	5.005	5.501	5.365	5.532	ns
		GCLK PLL	$t_{co}$	1.282	1.464	1.818	1.896	2.086	2.105	2.054	2.013	2.206	2.223	2.044	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.043	3.268	4.587	4.978	5.479	5.343	5.601	5.107	5.611	5.474	5.678	ns
		GCLK PLL	$t_{co}$	1.356	1.557	1.947	2.031	2.227	2.246	2.195	2.153	2.352	2.369	2.190	ns
	8mA	GCLK	$t_{co}$	2.971	3.190	4.464	4.849	5.345	5.209	5.421	4.975	5.473	5.336	5.492	ns
		GCLK PLL	$t_{co}$	1.269	1.448	1.783	1.857	2.047	2.066	2.015	1.973	2.166	2.183	2.004	ns
2.5 V	4mA	GCLK	$t_{co}$	3.148	3.393	4.797	5.211	5.733	5.597	5.884	5.347	5.872	5.736	5.968	ns
		GCLK PLL	$t_{co}$	1.468	1.674	2.185	2.292	2.510	2.529	2.478	2.421	2.642	2.659	2.480	ns
	8mA	GCLK	$t_{co}$	3.063	3.290	4.673	5.076	5.591	5.455	5.714	5.210	5.728	5.591	5.794	ns
		GCLK PLL	$t_{co}$	1.361	1.575	2.030	2.129	2.340	2.359	2.308	2.254	2.468	2.485	2.306	ns
	12mA	GCLK	$t_{co}$	3.006	3.246	4.589	4.990	5.500	5.364	5.588	5.121	5.633	5.497	5.664	ns
		GCLK PLL	$t_{co}$	1.312	1.504	1.919	2.010	2.214	2.233	2.182	2.131	2.338	2.355	2.176	ns
1.8 V	2mA	GCLK	$t_{co}$	3.405	3.663	5.253	5.717	6.292	6.156	6.368	5.867	6.444	6.308	6.461	ns
		GCLK PLL	$t_{co}$	1.650	1.863	2.459	2.597	2.849	2.868	2.787	2.729	2.984	3.002	2.793	ns
	4mA	GCLK	$t_{co}$	3.180	3.461	4.926	5.349	5.887	5.751	5.963	5.502	6.038	5.901	6.054	ns
		GCLK PLL	$t_{co}$	1.477	1.677	2.168	2.271	2.489	2.508	2.427	2.403	2.623	2.640	2.431	ns
	6mA	GCLK	$t_{co}$	3.115	3.359	4.773	5.199	5.728	5.592	5.804	5.334	5.865	5.729	5.882	ns
		GCLK PLL	$t_{co}$	1.402	1.595	2.069	2.166	2.388	2.407	2.326	2.289	2.517	2.535	2.326	ns
	8mA	GCLK	$t_{co}$	3.055	3.285	4.696	5.106	5.632	5.496	5.708	5.239	5.771	5.635	5.788	ns
		GCLK PLL	$t_{co}$	1.384	1.575	2.012	2.113	2.323	2.342	2.261	2.233	2.445	2.463	2.254	ns



**Table 1-104.** EP3SE50 Row Pins Output Timing Parameters (Part 3 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.5 V	2mA	GCLK	$t_{co}$	3.316	3.581	5.163	5.631	6.220	6.084	6.296	5.774	6.368	6.232	6.385	ns
		GCLK PLL	$t_{co}$	1.592	1.806	2.387	2.524	2.786	2.805	2.724	2.650	2.919	2.937	2.728	ns
	4mA	GCLK	$t_{co}$	3.074	3.324	4.758	5.194	5.729	5.593	5.805	5.328	5.864	5.728	5.881	ns
		GCLK PLL	$t_{co}$	1.400	1.592	2.065	2.166	2.392	2.411	2.330	2.286	2.518	2.536	2.327	ns
	6mA	GCLK	$t_{co}$	3.047	3.276	4.685	5.098	5.623	5.487	5.699	5.230	5.759	5.623	5.776	ns
		GCLK PLL	$t_{co}$	1.373	1.566	1.996	2.105	2.323	2.342	2.261	2.226	2.445	2.463	2.254	ns
	8mA	GCLK	$t_{co}$	3.038	3.267	4.663	5.080	5.604	5.468	5.680	5.212	5.737	5.601	5.754	ns
		GCLK PLL	$t_{co}$	1.354	1.555	1.980	2.081	2.304	2.323	2.242	2.202	2.426	2.444	2.235	ns
1.2 V	2mA	GCLK	$t_{co}$	3.259	3.506	5.073	5.545	6.145	6.009	6.221	5.686	6.284	6.148	6.301	ns
		GCLK PLL	$t_{co}$	1.522	1.719	2.308	2.456	2.725	2.744	2.663	2.582	2.850	2.868	2.659	ns
	4mA	GCLK	$t_{co}$	3.079	3.317	4.780	5.222	5.770	5.634	5.846	5.353	5.906	5.770	5.923	ns
		GCLK PLL	$t_{co}$	1.405	1.596	2.082	2.194	2.440	2.459	2.378	2.315	2.562	2.580	2.371	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.010	3.234	4.582	4.981	5.490	5.354	5.556	5.108	5.619	5.483	5.627	ns
		GCLK PLL	$t_{co}$	1.308	1.492	1.899	1.984	2.183	2.202	2.150	2.100	2.301	2.318	2.139	ns
	12mA	GCLK	$t_{co}$	3.005	3.230	4.579	4.979	5.488	5.352	5.548	5.107	5.618	5.482	5.620	ns
		GCLK PLL	$t_{co}$	1.303	1.488	1.896	1.982	2.181	2.200	2.142	2.099	2.300	2.317	2.132	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	2.996	3.219	4.564	4.963	5.471	5.335	5.521	5.090	5.600	5.464	5.593	ns
		GCLK PLL	$t_{co}$	1.294	1.477	1.881	1.966	2.164	2.183	2.115	2.082	2.282	2.299	2.105	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.016	3.241	4.591	4.993	5.505	5.369	5.581	5.120	5.634	5.498	5.651	ns
		GCLK PLL	$t_{co}$	1.333	1.519	1.931	2.017	2.218	2.237	2.156	2.132	2.336	2.354	2.145	ns
	6mA	GCLK	$t_{co}$	3.001	3.227	4.588	4.991	5.503	5.367	5.579	5.118	5.632	5.496	5.649	ns
		GCLK PLL	$t_{co}$	1.328	1.514	1.929	2.016	2.217	2.236	2.155	2.130	2.334	2.352	2.143	ns
	8mA	GCLK	$t_{co}$	2.990	3.215	4.571	4.974	5.486	5.350	5.562	5.101	5.616	5.480	5.633	ns
		GCLK PLL	$t_{co}$	1.317	1.503	1.919	2.006	2.207	2.226	2.145	2.121	2.325	2.343	2.134	ns
	10mA	GCLK	$t_{co}$	2.966	3.192	4.555	4.958	5.471	5.335	5.547	5.086	5.601	5.465	5.618	ns
		GCLK PLL	$t_{co}$	1.306	1.492	1.906	1.993	2.194	2.213	2.132	2.109	2.313	2.331	2.122	ns
	12mA	GCLK	$t_{co}$	2.966	3.191	4.554	4.957	5.470	5.334	5.546	5.085	5.600	5.464	5.617	ns
		GCLK PLL	$t_{co}$	1.306	1.491	1.906	1.993	2.194	2.213	2.132	2.108	2.313	2.331	2.122	ns

**Table 1–104.** EP3SE50 Row Pins Output Timing Parameters (Part 4 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	2.976	3.200	4.552	4.953	5.464	5.328	5.540	5.080	5.593	5.457	5.610	ns
		GCLK PLL	$t_{co}$	1.314	1.498	1.905	1.990	2.189	2.208	2.127	2.104	2.307	2.325	2.116	ns
	16mA	GCLK	$t_{co}$	2.975	3.198	4.551	4.954	5.466	5.330	5.542	5.082	5.597	5.461	5.614	ns
		GCLK PLL	$t_{co}$	1.315	1.501	1.911	1.998	2.199	2.218	2.137	2.113	2.318	2.336	2.127	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.012	3.237	4.602	5.007	5.522	5.386	5.598	5.133	5.650	5.514	5.667	ns
		GCLK PLL	$t_{co}$	1.336	1.522	1.940	2.028	2.231	2.250	2.169	2.142	2.348	2.366	2.157	ns
	6mA	GCLK	$t_{co}$	2.989	3.215	4.584	4.990	5.505	5.369	5.581	5.117	5.634	5.498	5.651	ns
		GCLK PLL	$t_{co}$	1.322	1.508	1.929	2.018	2.221	2.240	2.159	2.133	2.339	2.357	2.148	ns
	8mA	GCLK	$t_{co}$	2.972	3.198	4.567	4.972	5.487	5.351	5.563	5.099	5.617	5.481	5.634	ns
		GCLK PLL	$t_{co}$	1.311	1.496	1.916	2.005	2.208	2.227	2.146	2.120	2.326	2.344	2.135	ns
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	2.991	3.213	4.558	4.958	5.467	5.331	5.543	5.084	5.596	5.460	5.613	ns
		GCLK PLL	$t_{co}$	1.321	1.504	1.904	1.988	2.187	2.206	2.125	2.103	2.304	2.322	2.113	ns
	6mA	GCLK	$t_{co}$	2.979	3.201	4.549	4.950	5.459	5.323	5.535	5.076	5.589	5.453	5.606	ns
		GCLK PLL	$t_{co}$	1.314	1.498	1.902	1.987	2.186	2.205	2.124	2.102	2.304	2.322	2.113	ns
	8mA	GCLK	$t_{co}$	2.966	3.189	4.541	4.941	5.451	5.315	5.527	5.068	5.581	5.445	5.598	ns
		GCLK PLL	$t_{co}$	1.305	1.490	1.895	1.980	2.179	2.198	2.117	2.095	2.297	2.315	2.106	ns
	10mA	GCLK	$t_{co}$	2.968	3.191	4.543	4.944	5.454	5.318	5.530	5.071	5.584	5.448	5.601	ns
		GCLK PLL	$t_{co}$	1.308	1.492	1.898	1.983	2.183	2.202	2.121	2.098	2.300	2.318	2.109	ns
	12mA	GCLK	$t_{co}$	2.964	3.186	4.541	4.943	5.454	5.318	5.530	5.071	5.585	5.449	5.602	ns
		GCLK PLL	$t_{co}$	1.304	1.489	1.900	1.986	2.186	2.205	2.124	2.101	2.305	2.323	2.114	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	2.972	3.194	4.536	4.935	5.445	5.309	5.521	5.062	5.574	5.438	5.591	ns
		GCLK PLL	$t_{co}$	1.312	1.497	1.898	1.983	2.182	2.201	2.120	2.097	2.299	2.317	2.108	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	2.998	3.220	4.569	4.971	5.482	5.346	5.558	5.096	5.610	5.474	5.627	ns
		GCLK PLL	$t_{co}$	1.327	1.510	1.913	1.998	2.198	2.217	2.136	2.112	2.315	2.333	2.124	ns
	6mA	GCLK	$t_{co}$	2.986	3.210	4.565	4.967	5.478	5.342	5.554	5.093	5.607	5.471	5.624	ns
		GCLK PLL	$t_{co}$	1.321	1.505	1.914	2.000	2.200	2.219	2.138	2.114	2.318	2.336	2.127	ns
	8mA	GCLK	$t_{co}$	2.982	3.205	4.559	4.961	5.472	5.336	5.548	5.087	5.601	5.465	5.618	ns
		GCLK PLL	$t_{co}$	1.317	1.501	1.909	1.995	2.195	2.214	2.133	2.109	2.312	2.330	2.121	ns

**Table 1-104.** EP3SE50 Row Pins Output Timing Parameters (Part 5 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	2.997	3.219	4.580	4.985	5.500	5.364	5.576	5.110	5.627	5.491	5.644	ns
		GCLK PLL	$t_{co}$	1.329	1.512	1.926	2.014	2.217	2.236	2.155	2.128	2.334	2.352	2.143	ns
	6mA	GCLK	$t_{co}$	2.985	3.207	4.569	4.973	5.488	5.352	5.564	5.099	5.616	5.480	5.633	ns
		GCLK PLL	$t_{co}$	1.320	1.504	1.917	2.005	2.208	2.227	2.146	2.119	2.325	2.343	2.134	ns
	8mA	GCLK	$t_{co}$	2.982	3.205	4.573	4.978	5.494	5.358	5.570	5.105	5.623	5.487	5.640	ns
		GCLK PLL	$t_{co}$	1.319	1.504	1.924	2.013	2.217	2.236	2.155	2.128	2.335	2.353	2.144	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.116	3.340	4.634	5.027	5.530	5.394	5.578	5.156	5.661	5.525	5.651	ns
		GCLK PLL	$t_{co}$	1.414	1.598	1.951	2.030	2.223	2.242	2.160	2.148	2.343	2.360	2.151	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.116	3.340	4.634	5.027	5.530	5.394	5.578	5.156	5.661	5.525	5.651	ns
		GCLK PLL	$t_{co}$	1.414	1.598	1.951	2.030	2.223	2.242	2.160	2.148	2.343	2.360	2.151	ns

Table 1-115 through Table 1-108 list the maximum I/O timing parameters for EP3SE50 devices for differential I/O standards.

Table 1-105 lists the EP3SE50 column pins input timing parameters for differential I/O standards.

**Table 1-105.** EP3SE50 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 1.1 V$	$V_{CC1} = 0.9 V$	
LVDS	GCLK	$t_{su}$	-0.730	-0.751	-1.114	-1.228	-1.341	-1.284	-1.581	-1.230	-1.344	-1.290	-1.617	ns
		$t_h$	0.848	0.884	1.299	1.436	1.571	1.501	1.798	1.446	1.583	1.516	1.835	ns
	GCLK PLL	$t_{su}$	1.120	1.138	1.796	2.027	2.253	2.141	2.145	2.036	2.262	2.145	2.193	ns
		$t_h$	-0.867	-0.870	-1.397	-1.578	-1.752	-1.669	-1.666	-1.580	-1.754	-1.665	-1.710	ns
MINI-LVDS	GCLK	$t_{su}$	-0.730	-0.751	-1.114	-1.228	-1.341	-1.284	-1.581	-1.230	-1.344	-1.290	-1.617	ns
		$t_h$	0.848	0.884	1.299	1.436	1.571	1.501	1.798	1.446	1.583	1.516	1.835	ns
	GCLK PLL	$t_{su}$	1.120	1.138	1.796	2.027	2.253	2.141	2.145	2.036	2.262	2.145	2.193	ns
		$t_h$	-0.867	-0.870	-1.397	-1.578	-1.752	-1.669	-1.666	-1.580	-1.754	-1.665	-1.710	ns
RSDS	GCLK	$t_{su}$	-0.738	-0.763	-1.124	-1.239	-1.357	-1.300	-1.597	-1.241	-1.359	-1.305	-1.632	ns
		$t_h$	0.856	0.896	1.309	1.447	1.587	1.517	1.814	1.457	1.598	1.531	1.850	ns
	GCLK PLL	$t_{su}$	1.112	1.126	1.786	2.016	2.237	2.125	2.129	2.025	2.247	2.130	2.178	ns
		$t_h$	-0.859	-0.858	-1.387	-1.567	-1.736	-1.653	-1.650	-1.569	-1.739	-1.650	-1.695	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.738	-0.763	-1.124	-1.239	-1.357	-1.300	-1.597	-1.241	-1.359	-1.305	-1.632	ns
		$t_h$	0.856	0.896	1.309	1.447	1.587	1.517	1.814	1.457	1.598	1.531	1.850	ns
	GCLK PLL	$t_{su}$	1.112	1.126	1.786	2.016	2.237	2.125	2.129	2.025	2.247	2.130	2.178	ns
		$t_h$	-0.859	-0.858	-1.387	-1.567	-1.736	-1.653	-1.650	-1.569	-1.739	-1.650	-1.695	ns

**Table 1-105.** EP3SE50 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.750	-0.774	-1.133	-1.250	-1.376	-1.319	-1.616	-1.252	-1.377	-1.323	-1.650	ns
		$t_h$	0.868	0.907	1.319	1.458	1.606	1.536	1.833	1.468	1.616	1.549	1.868	ns
	GCLK PLL	$t_{su}$	1.100	1.115	1.777	2.005	2.218	2.106	2.110	2.014	2.229	2.112	2.160	ns
		$t_h$	-0.847	-0.847	-1.377	-1.556	-1.717	-1.634	-1.631	-1.558	-1.721	-1.632	-1.677	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.750	-0.774	-1.133	-1.250	-1.376	-1.319	-1.616	-1.252	-1.377	-1.323	-1.650	ns
		$t_h$	0.868	0.907	1.319	1.458	1.606	1.536	1.833	1.468	1.616	1.549	1.868	ns
	GCLK PLL	$t_{su}$	1.100	1.115	1.777	2.005	2.218	2.106	2.110	2.014	2.229	2.112	2.160	ns
		$t_h$	-0.847	-0.847	-1.377	-1.556	-1.717	-1.634	-1.631	-1.558	-1.721	-1.632	-1.677	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.738	-0.763	-1.124	-1.239	-1.357	-1.300	-1.597	-1.241	-1.359	-1.305	-1.632	ns
		$t_h$	0.856	0.896	1.309	1.447	1.587	1.517	1.814	1.457	1.598	1.531	1.850	ns
	GCLK PLL	$t_{su}$	1.112	1.126	1.786	2.016	2.237	2.125	2.129	2.025	2.247	2.130	2.178	ns
		$t_h$	-0.859	-0.858	-1.387	-1.567	-1.736	-1.653	-1.650	-1.569	-1.739	-1.650	-1.695	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.738	-0.763	-1.124	-1.239	-1.357	-1.300	-1.597	-1.241	-1.359	-1.305	-1.632	ns
		$t_h$	0.856	0.896	1.309	1.447	1.587	1.517	1.814	1.457	1.598	1.531	1.850	ns
	GCLK PLL	$t_{su}$	1.112	1.126	1.786	2.016	2.237	2.125	2.129	2.025	2.247	2.130	2.178	ns
		$t_h$	-0.859	-0.858	-1.387	-1.567	-1.736	-1.653	-1.650	-1.569	-1.739	-1.650	-1.695	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.750	-0.774	-1.133	-1.250	-1.376	-1.319	-1.616	-1.252	-1.377	-1.323	-1.650	ns
		$t_h$	0.868	0.907	1.319	1.458	1.606	1.536	1.833	1.468	1.616	1.549	1.868	ns
	GCLK PLL	$t_{su}$	1.100	1.115	1.777	2.005	2.218	2.106	2.110	2.014	2.229	2.112	2.160	ns
		$t_h$	-0.847	-0.847	-1.377	-1.556	-1.717	-1.634	-1.631	-1.558	-1.721	-1.632	-1.677	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.750	-0.774	-1.133	-1.250	-1.376	-1.319	-1.616	-1.252	-1.377	-1.323	-1.650	ns
		$t_h$	0.868	0.907	1.319	1.458	1.606	1.536	1.833	1.468	1.616	1.549	1.868	ns
	GCLK PLL	$t_{su}$	1.100	1.115	1.777	2.005	2.218	2.106	2.110	2.014	2.229	2.112	2.160	ns
		$t_h$	-0.847	-0.847	-1.377	-1.556	-1.717	-1.634	-1.631	-1.558	-1.721	-1.632	-1.677	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.757	-0.780	-1.145	-1.255	-1.376	-1.321	-1.615	-1.256	-1.372	-1.321	-1.646	ns
		$t_h$	0.875	0.913	1.332	1.466	1.609	1.539	1.837	1.475	1.616	1.548	1.869	ns
	GCLK PLL	$t_{su}$	1.093	1.109	1.765	2.000	2.218	2.104	2.111	2.010	2.234	2.114	2.164	ns
		$t_h$	-0.840	-0.841	-1.364	-1.548	-1.714	-1.631	-1.627	-1.551	-1.721	-1.633	-1.676	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.757	-0.780	-1.145	-1.255	-1.376	-1.321	-1.615	-1.256	-1.372	-1.321	-1.646	ns
		$t_h$	0.875	0.913	1.332	1.466	1.609	1.539	1.837	1.475	1.616	1.548	1.869	ns
	GCLK PLL	$t_{su}$	1.093	1.109	1.765	2.000	2.218	2.104	2.111	2.010	2.234	2.114	2.164	ns
		$t_h$	-0.840	-0.841	-1.364	-1.548	-1.714	-1.631	-1.627	-1.551	-1.721	-1.633	-1.676	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.730	-0.751	-1.114	-1.228	-1.341	-1.284	-1.581	-1.230	-1.344	-1.290	-1.617	ns
		$t_h$	0.848	0.884	1.299	1.436	1.571	1.501	1.798	1.446	1.583	1.516	1.835	ns
	GCLK PLL	$t_{su}$	1.120	1.138	1.796	2.027	2.253	2.141	2.145	2.036	2.262	2.145	2.193	ns
		$t_h$	-0.867	-0.870	-1.397	-1.578	-1.752	-1.669	-1.666	-1.580	-1.754	-1.665	-1.710	ns

**Table 1-105.** EP3SE50 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.730	-0.751	-1.114	-1.228	-1.341	-1.284	-1.581	-1.230	-1.344	-1.290	-1.617	ns
		$t_h$	0.848	0.884	1.299	1.436	1.571	1.501	1.798	1.446	1.583	1.516	1.835	ns
	GCLK PLL	$t_{su}$	1.120	1.138	1.796	2.027	2.253	2.141	2.145	2.036	2.262	2.145	2.193	ns
		$t_h$	-0.867	-0.870	-1.397	-1.578	-1.752	-1.669	-1.666	-1.580	-1.754	-1.665	-1.710	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.738	-0.763	-1.124	-1.239	-1.357	-1.300	-1.597	-1.241	-1.359	-1.305	-1.632	ns
		$t_h$	0.856	0.896	1.309	1.447	1.587	1.517	1.814	1.457	1.598	1.531	1.850	ns
	GCLK PLL	$t_{su}$	1.112	1.126	1.786	2.016	2.237	2.125	2.129	2.025	2.247	2.130	2.178	ns
		$t_h$	-0.859	-0.858	-1.387	-1.567	-1.736	-1.653	-1.650	-1.569	-1.739	-1.650	-1.695	ns

Table 1-106 lists the EP3SE50 row pins input timing parameters for differential I/O standards.

**Table 1-106.** EP3SE50 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.925	-0.948	-1.004	-0.967	-1.102	-1.057	-1.337	-0.933	-1.060	-1.017	-1.369	ns
		$t_h$	1.048	1.086	1.223	1.219	1.381	1.322	1.601	1.199	1.353	1.296	1.634	ns
	GCLK PLL	$t_{su}$	0.886	0.901	1.866	2.244	2.450	2.324	2.344	2.289	2.502	2.376	2.396	ns
		$t_h$	-0.626	-0.628	-1.432	-1.750	-1.897	-1.803	-1.817	-1.782	-1.937	-1.842	-1.867	ns
MINI-LVDS	GCLK	$t_{su}$	-0.925	-0.948	-1.004	-0.967	-1.102	-1.057	-1.337	-0.933	-1.060	-1.017	-1.369	ns
		$t_h$	1.048	1.086	1.223	1.219	1.381	1.322	1.601	1.199	1.353	1.296	1.634	ns
	GCLK PLL	$t_{su}$	0.886	0.901	1.866	2.244	2.450	2.324	2.344	2.289	2.502	2.376	2.396	ns
		$t_h$	-0.626	-0.628	-1.432	-1.750	-1.897	-1.803	-1.817	-1.782	-1.937	-1.842	-1.867	ns
RSDS	GCLK	$t_{su}$	-0.925	-0.948	-1.004	-0.967	-1.102	-1.057	-1.337	-0.933	-1.060	-1.017	-1.369	ns
		$t_h$	1.048	1.086	1.223	1.219	1.381	1.322	1.601	1.199	1.353	1.296	1.634	ns
	GCLK PLL	$t_{su}$	0.886	0.901	1.866	2.244	2.450	2.324	2.344	2.289	2.502	2.376	2.396	ns
		$t_h$	-0.626	-0.628	-1.432	-1.750	-1.897	-1.803	-1.817	-1.782	-1.937	-1.842	-1.867	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.740	-0.773	-1.101	-1.201	-1.301	-1.251	-1.526	-1.210	-1.307	-1.259	-1.563	ns
		$t_h$	0.856	0.902	1.288	1.408	1.531	1.467	1.741	1.427	1.548	1.486	1.779	ns
	GCLK PLL	$t_{su}$	1.081	1.086	1.779	2.020	2.261	2.140	2.165	2.022	2.265	2.144	2.212	ns
		$t_h$	-0.828	-0.822	-1.377	-1.571	-1.757	-1.668	-1.687	-1.564	-1.752	-1.662	-1.732	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.740	-0.773	-1.101	-1.201	-1.301	-1.251	-1.526	-1.210	-1.307	-1.259	-1.563	ns
		$t_h$	0.856	0.902	1.288	1.408	1.531	1.467	1.741	1.427	1.548	1.486	1.779	ns
	GCLK PLL	$t_{su}$	1.081	1.086	1.779	2.020	2.261	2.140	2.165	2.022	2.265	2.144	2.212	ns
		$t_h$	-0.828	-0.822	-1.377	-1.571	-1.757	-1.668	-1.687	-1.564	-1.752	-1.662	-1.732	ns

**Table 1-106.** EP3SE50 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.749	-0.785	-1.110	-1.211	-1.317	-1.267	-1.542	-1.219	-1.323	-1.275	-1.579	ns
		$t_h$	0.865	0.914	1.297	1.418	1.547	1.483	1.757	1.436	1.564	1.502	1.795	ns
	GCLK PLL	$t_{su}$	1.072	1.074	1.770	2.010	2.245	2.124	2.149	2.013	2.249	2.128	2.196	ns
		$t_h$	-0.819	-0.810	-1.368	-1.561	-1.741	-1.652	-1.671	-1.555	-1.736	-1.646	-1.716	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.749	-0.785	-1.110	-1.211	-1.317	-1.267	-1.542	-1.219	-1.323	-1.275	-1.579	ns
		$t_h$	0.865	0.914	1.297	1.418	1.547	1.483	1.757	1.436	1.564	1.502	1.795	ns
	GCLK PLL	$t_{su}$	1.072	1.074	1.770	2.010	2.245	2.124	2.149	2.013	2.249	2.128	2.196	ns
		$t_h$	-0.819	-0.810	-1.368	-1.561	-1.741	-1.652	-1.671	-1.555	-1.736	-1.646	-1.716	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.763	-0.797	-1.123	-1.221	-1.335	-1.285	-1.560	-1.230	-1.340	-1.292	-1.596	ns
		$t_h$	0.879	0.926	1.309	1.428	1.565	1.501	1.775	1.447	1.581	1.519	1.812	ns
	GCLK PLL	$t_{su}$	1.058	1.062	1.757	2.000	2.227	2.106	2.131	2.002	2.232	2.111	2.179	ns
		$t_h$	-0.805	-0.798	-1.356	-1.551	-1.723	-1.634	-1.653	-1.544	-1.719	-1.629	-1.699	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.763	-0.797	-1.123	-1.221	-1.335	-1.285	-1.560	-1.230	-1.340	-1.292	-1.596	ns
		$t_h$	0.879	0.926	1.309	1.428	1.565	1.501	1.775	1.447	1.581	1.519	1.812	ns
	GCLK PLL	$t_{su}$	1.058	1.062	1.757	2.000	2.227	2.106	2.131	2.002	2.232	2.111	2.179	ns
		$t_h$	-0.805	-0.798	-1.356	-1.551	-1.723	-1.634	-1.653	-1.544	-1.719	-1.629	-1.699	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.749	-0.785	-1.110	-1.211	-1.317	-1.267	-1.542	-1.219	-1.323	-1.275	-1.579	ns
		$t_h$	0.865	0.914	1.297	1.418	1.547	1.483	1.757	1.436	1.564	1.502	1.795	ns
	GCLK PLL	$t_{su}$	1.072	1.074	1.770	2.010	2.245	2.124	2.149	2.013	2.249	2.128	2.196	ns
		$t_h$	-0.819	-0.810	-1.368	-1.561	-1.741	-1.652	-1.671	-1.555	-1.736	-1.646	-1.716	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.749	-0.785	-1.110	-1.211	-1.317	-1.267	-1.542	-1.219	-1.323	-1.275	-1.579	ns
		$t_h$	0.865	0.914	1.297	1.418	1.547	1.483	1.757	1.436	1.564	1.502	1.795	ns
	GCLK PLL	$t_{su}$	1.072	1.074	1.770	2.010	2.245	2.124	2.149	2.013	2.249	2.128	2.196	ns
		$t_h$	-0.819	-0.810	-1.368	-1.561	-1.741	-1.652	-1.671	-1.555	-1.736	-1.646	-1.716	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.763	-0.797	-1.123	-1.221	-1.335	-1.285	-1.560	-1.230	-1.340	-1.292	-1.596	ns
		$t_h$	0.879	0.926	1.309	1.428	1.565	1.501	1.775	1.447	1.581	1.519	1.812	ns
	GCLK PLL	$t_{su}$	1.058	1.062	1.757	2.000	2.227	2.106	2.131	2.002	2.232	2.111	2.179	ns
		$t_h$	-0.805	-0.798	-1.356	-1.551	-1.723	-1.634	-1.653	-1.544	-1.719	-1.629	-1.699	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.763	-0.797	-1.123	-1.221	-1.335	-1.285	-1.560	-1.230	-1.340	-1.292	-1.596	ns
		$t_h$	0.879	0.926	1.309	1.428	1.565	1.501	1.775	1.447	1.581	1.519	1.812	ns
	GCLK PLL	$t_{su}$	1.058	1.062	1.757	2.000	2.227	2.106	2.131	2.002	2.232	2.111	2.179	ns
		$t_h$	-0.805	-0.798	-1.356	-1.551	-1.723	-1.634	-1.653	-1.544	-1.719	-1.629	-1.699	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.762	-0.796	-1.128	-1.227	-1.336	-1.287	-1.561	-1.231	-1.336	-1.290	-1.593	ns
		$t_h$	0.878	0.925	1.314	1.436	1.569	1.505	1.780	1.451	1.580	1.518	1.813	ns
	GCLK PLL	$t_{su}$	1.049	1.053	1.742	1.984	2.216	2.094	2.120	1.991	2.226	2.103	2.172	ns
		$t_h$	-0.796	-0.789	-1.341	-1.533	-1.709	-1.620	-1.638	-1.530	-1.710	-1.620	-1.688	ns

**Table 1-106.** EP3SE50 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.762	-0.796	-1.128	-1.227	-1.336	-1.287	-1.561	-1.231	-1.336	-1.290	-1.593	ns
		$t_h$	0.878	0.925	1.314	1.436	1.569	1.505	1.780	1.451	1.580	1.518	1.813	ns
	GCLK PLL	$t_{su}$	1.049	1.053	1.742	1.984	2.216	2.094	2.120	1.991	2.226	2.103	2.172	ns
		$t_h$	-0.796	-0.789	-1.341	-1.533	-1.709	-1.620	-1.638	-1.530	-1.710	-1.620	-1.688	ns

Table 1-107 lists the EP3SE50 column pins output timing parameters for differential I/O standards.

**Table 1-107.** EP3SE50 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
LVDS_E_1R	—	GCLK	$t_{co}$	3.058	3.277	4.610	5.014	5.527	5.385	5.614	5.140	5.654	5.514	5.680	ns
		GCLK PLL	$t_{co}$	3.054	3.280	4.657	5.069	5.589	5.447	5.676	5.199	5.720	5.580	5.746	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.058	3.277	4.610	5.014	5.527	5.385	5.614	5.140	5.654	5.514	5.680	ns
		GCLK PLL	$t_{co}$	3.054	3.280	4.657	5.069	5.589	5.447	5.676	5.199	5.720	5.580	5.746	ns
MINI- LVDS_E_1R	—	GCLK	$t_{co}$	3.058	3.277	4.610	5.014	5.527	5.385	5.614	5.140	5.654	5.514	5.680	ns
		GCLK PLL	$t_{co}$	3.054	3.280	4.657	5.069	5.589	5.447	5.676	5.199	5.720	5.580	5.746	ns
MINI- LVDS_E_3R	—	GCLK	$t_{co}$	3.085	3.310	4.681	5.092	5.611	5.469	5.698	5.220	5.740	5.600	5.766	ns
		GCLK PLL	$t_{co}$	3.075	3.300	4.671	5.081	5.601	5.459	5.688	5.209	5.730	5.590	5.756	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.075	3.300	4.674	5.085	5.605	5.463	5.692	5.214	5.735	5.595	5.761	ns
		GCLK PLL	$t_{co}$	3.068	3.294	4.667	5.079	5.599	5.457	5.686	5.207	5.729	5.589	5.755	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.067	3.292	4.664	5.076	5.596	5.454	5.683	5.204	5.725	5.585	5.751	ns
		GCLK PLL	$t_{co}$	3.089	3.314	4.685	5.096	5.615	5.473	5.702	5.224	5.745	5.605	5.771	ns

**Table 1-107.** EP3SE50 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.079	3.303	4.664	5.073	5.590	5.448	5.677	5.200	5.718	5.578	5.744	ns
		GCLK PLL	$t_{co}$	3.074	3.299	4.664	5.073	5.591	5.449	5.678	5.201	5.720	5.580	5.746	ns
	6mA	GCLK	$t_{co}$	3.072	3.297	4.663	5.072	5.589	5.447	5.676	5.200	5.719	5.579	5.745	ns
		GCLK PLL	$t_{co}$	3.064	3.288	4.653	5.062	5.580	5.438	5.667	5.190	5.709	5.569	5.735	ns
	8mA	GCLK	$t_{co}$	3.065	3.290	4.659	5.069	5.588	5.446	5.675	5.198	5.718	5.578	5.744	ns
		GCLK PLL	$t_{co}$	3.064	3.287	4.642	5.050	5.566	5.424	5.653	5.177	5.694	5.554	5.720	ns
	10mA	GCLK	$t_{co}$	3.076	3.300	4.660	5.068	5.584	5.442	5.671	5.196	5.713	5.573	5.739	ns
		GCLK PLL	$t_{co}$	3.072	3.297	4.661	5.070	5.588	5.446	5.675	5.198	5.717	5.577	5.743	ns
	12mA	GCLK	$t_{co}$	3.062	3.286	4.650	5.059	5.576	5.434	5.663	5.187	5.705	5.565	5.731	ns
		GCLK PLL	$t_{co}$	3.060	3.284	4.648	5.056	5.574	5.432	5.661	5.185	5.703	5.563	5.729	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.060	3.285	4.651	5.061	5.579	5.437	5.666	5.189	5.709	5.569	5.735	ns
		GCLK PLL	$t_{co}$	3.064	3.288	4.648	5.056	5.573	5.431	5.660	5.184	5.702	5.562	5.728	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.090	3.317	4.693	5.104	5.623	5.481	5.710	5.232	5.752	5.612	5.778	ns
		GCLK PLL	$t_{co}$	3.076	3.303	4.681	5.093	5.613	5.471	5.700	5.222	5.743	5.603	5.769	ns
	6mA	GCLK	$t_{co}$	3.064	3.290	4.664	5.075	5.595	5.453	5.682	5.204	5.725	5.585	5.751	ns
		GCLK PLL	$t_{co}$	3.064	3.290	4.667	5.079	5.599	5.457	5.686	5.208	5.730	5.590	5.756	ns
	8mA	GCLK	$t_{co}$	3.060	3.286	4.660	5.071	5.592	5.450	5.679	5.201	5.722	5.582	5.748	ns
		GCLK PLL	$t_{co}$	3.064	3.288	4.653	5.062	5.580	5.438	5.667	5.190	5.709	5.569	5.735	ns
	10mA	GCLK	$t_{co}$	3.065	3.290	4.661	5.072	5.591	5.449	5.678	5.200	5.721	5.581	5.747	ns
		GCLK PLL	$t_{co}$	3.093	3.320	4.692	5.102	5.621	5.479	5.708	5.231	5.750	5.610	5.776	ns
	12mA	GCLK	$t_{co}$	3.082	3.308	4.680	5.090	5.609	5.467	5.696	5.219	5.738	5.598	5.764	ns
		GCLK PLL	$t_{co}$	3.077	3.304	4.680	5.091	5.610	5.468	5.697	5.220	5.740	5.600	5.766	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.063	3.289	4.662	5.072	5.591	5.449	5.678	5.201	5.722	5.582	5.748	ns
		GCLK PLL	$t_{co}$	3.061	3.287	4.660	5.070	5.589	5.447	5.676	5.199	5.719	5.579	5.745	ns



**Table 1-107.** EP3SE50 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V		
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.065	3.289	4.652	5.060	5.577	5.435	5.664	5.188	5.706	5.566	5.732	ns	
		GCLK PLL	t <sub>co</sub>	3.065	3.290	4.660	5.070	5.589	5.447	5.676	5.199	5.719	5.579	5.745	ns	
	6mA	GCLK	t <sub>co</sub>	3.081	3.307	4.676	5.085	5.603	5.461	5.690	5.214	5.732	5.592	5.758	ns	
		GCLK PLL	t <sub>co</sub>	3.081	3.307	4.676	5.085	5.603	5.461	5.690	5.214	5.732	5.592	5.758	ns	
	8mA	GCLK	t <sub>co</sub>	3.071	3.297	4.666	5.075	5.593	5.451	5.680	5.204	5.723	5.583	5.749	ns	
		GCLK PLL	t <sub>co</sub>	3.064	3.289	4.652	5.060	5.577	5.435	5.664	5.188	5.706	5.566	5.732	ns	
	10mA	GCLK	t <sub>co</sub>	3.058	3.277	4.610	5.014	5.527	5.385	5.614	5.140	5.654	5.514	5.680	ns	
		GCLK PLL	t <sub>co</sub>	3.054	3.280	4.657	5.069	5.589	5.447	5.676	5.199	5.720	5.580	5.746	ns	
	12mA	GCLK	t <sub>co</sub>	3.058	3.277	4.610	5.014	5.527	5.385	5.614	5.140	5.654	5.514	5.680	ns	
		GCLK PLL	t <sub>co</sub>	3.054	3.280	4.657	5.069	5.589	5.447	5.676	5.199	5.720	5.580	5.746	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.058	3.277	4.610	5.014	5.527	5.385	5.614	5.140	5.654	5.514	5.680	ns
			GCLK PLL	t <sub>co</sub>	3.054	3.280	4.657	5.069	5.589	5.447	5.676	5.199	5.720	5.580	5.746	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.085	3.310	4.681	5.092	5.611	5.469	5.698	5.220	5.740	5.600	5.766	ns	
		GCLK PLL	t <sub>co</sub>	3.075	3.300	4.671	5.081	5.601	5.459	5.688	5.209	5.730	5.590	5.756	ns	
	6mA	GCLK	t <sub>co</sub>	3.075	3.300	4.674	5.085	5.605	5.463	5.692	5.214	5.735	5.595	5.761	ns	
		GCLK PLL	t <sub>co</sub>	3.068	3.294	4.667	5.079	5.599	5.457	5.686	5.207	5.729	5.589	5.755	ns	
	8mA	GCLK	t <sub>co</sub>	3.067	3.292	4.664	5.076	5.596	5.454	5.683	5.204	5.725	5.585	5.751	ns	
		GCLK PLL	t <sub>co</sub>	3.089	3.314	4.685	5.096	5.615	5.473	5.702	5.224	5.745	5.605	5.771	ns	
	10mA	GCLK	t <sub>co</sub>	3.079	3.303	4.664	5.073	5.590	5.448	5.677	5.200	5.718	5.578	5.744	ns	
		GCLK PLL	t <sub>co</sub>	3.074	3.299	4.664	5.073	5.591	5.449	5.678	5.201	5.720	5.580	5.746	ns	
	12mA	GCLK	t <sub>co</sub>	3.072	3.297	4.663	5.072	5.589	5.447	5.676	5.200	5.719	5.579	5.745	ns	
		GCLK PLL	t <sub>co</sub>	3.064	3.288	4.653	5.062	5.580	5.438	5.667	5.190	5.709	5.569	5.735	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.065	3.290	4.659	5.069	5.588	5.446	5.675	5.198	5.718	5.578	5.744	ns
			GCLK PLL	t <sub>co</sub>	3.064	3.287	4.642	5.050	5.566	5.424	5.653	5.177	5.694	5.554	5.720	ns
16mA		GCLK	t <sub>co</sub>	3.076	3.300	4.660	5.068	5.584	5.442	5.671	5.196	5.713	5.573	5.739	ns	
		GCLK PLL	t <sub>co</sub>	3.072	3.297	4.661	5.070	5.588	5.446	5.675	5.198	5.717	5.577	5.743	ns	

**Table 1-107.** EP3SE50 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.062	3.286	4.650	5.059	5.576	5.434	5.663	5.187	5.705	5.565	5.731	ns
		GCLK PLL	$t_{co}$	3.060	3.284	4.648	5.056	5.574	5.432	5.661	5.185	5.703	5.563	5.729	ns
	6mA	GCLK	$t_{co}$	3.060	3.285	4.651	5.061	5.579	5.437	5.666	5.189	5.709	5.569	5.735	ns
		GCLK PLL	$t_{co}$	3.064	3.288	4.648	5.056	5.573	5.431	5.660	5.184	5.702	5.562	5.728	ns
	8mA	GCLK	$t_{co}$	3.090	3.317	4.693	5.104	5.623	5.481	5.710	5.232	5.752	5.612	5.778	ns
		GCLK PLL	$t_{co}$	3.076	3.303	4.681	5.093	5.613	5.471	5.700	5.222	5.743	5.603	5.769	ns
	10mA	GCLK	$t_{co}$	3.064	3.290	4.664	5.075	5.595	5.453	5.682	5.204	5.725	5.585	5.751	ns
		GCLK PLL	$t_{co}$	3.064	3.290	4.667	5.079	5.599	5.457	5.686	5.208	5.730	5.590	5.756	ns
12mA	GCLK	$t_{co}$	3.060	3.286	4.660	5.071	5.592	5.450	5.679	5.201	5.722	5.582	5.748	ns	
	GCLK PLL	$t_{co}$	3.064	3.288	4.653	5.062	5.580	5.438	5.667	5.190	5.709	5.569	5.735	ns	
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.065	3.290	4.661	5.072	5.591	5.449	5.678	5.200	5.721	5.581	5.747	ns
		GCLK PLL	$t_{co}$	3.093	3.320	4.692	5.102	5.621	5.479	5.708	5.231	5.750	5.610	5.776	ns
	16mA	GCLK	$t_{co}$	3.082	3.308	4.680	5.090	5.609	5.467	5.696	5.219	5.738	5.598	5.764	ns
		GCLK PLL	$t_{co}$	3.077	3.304	4.680	5.091	5.610	5.468	5.697	5.220	5.740	5.600	5.766	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.063	3.289	4.662	5.072	5.591	5.449	5.678	5.201	5.722	5.582	5.748	ns
		GCLK PLL	$t_{co}$	3.061	3.287	4.660	5.070	5.589	5.447	5.676	5.199	5.719	5.579	5.745	ns
	10mA	GCLK	$t_{co}$	3.065	3.289	4.652	5.060	5.577	5.435	5.664	5.188	5.706	5.566	5.732	ns
		GCLK PLL	$t_{co}$	3.065	3.290	4.660	5.070	5.589	5.447	5.676	5.199	5.719	5.579	5.745	ns
	12mA	GCLK	$t_{co}$	3.081	3.307	4.676	5.085	5.603	5.461	5.690	5.214	5.732	5.592	5.758	ns
		GCLK PLL	$t_{co}$	3.081	3.307	4.676	5.085	5.603	5.461	5.690	5.214	5.732	5.592	5.758	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.071	3.297	4.666	5.075	5.593	5.451	5.680	5.204	5.723	5.583	5.749	ns
		GCLK PLL	$t_{co}$	3.064	3.289	4.652	5.060	5.577	5.435	5.664	5.188	5.706	5.566	5.732	ns

Table 1-108 lists the EP3SE50 row pins output timing parameters for differential I/O standards.

**Table 1-108.** EP3SE50 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
LVDS	—	GCLK	t <sub>co</sub>	2.674	2.849	3.990	4.359	4.834	4.699	4.910	4.467	4.945	4.809	4.961	ns
		GCLK PLL	t <sub>co</sub>	3.068	3.295	4.657	5.068	5.588	5.445	5.648	5.200	5.724	5.579	5.715	ns
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.050	3.285	4.695	5.114	5.642	5.499	5.702	5.251	5.785	5.640	5.776	ns
		GCLK PLL	t <sub>co</sub>	2.674	2.849	3.990	4.359	4.834	4.699	4.910	4.467	4.945	4.809	4.961	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.068	3.295	4.657	5.068	5.588	5.445	5.648	5.200	5.724	5.579	5.715	ns
		GCLK PLL	t <sub>co</sub>	3.050	3.285	4.695	5.114	5.642	5.499	5.702	5.251	5.785	5.640	5.776	ns
MINI-LVDS	—	GCLK	t <sub>co</sub>	2.674	2.849	3.990	4.359	4.834	4.699	4.910	4.467	4.945	4.809	4.961	ns
		GCLK PLL	t <sub>co</sub>	3.068	3.295	4.657	5.068	5.588	5.445	5.648	5.200	5.724	5.579	5.715	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.050	3.285	4.695	5.114	5.642	5.499	5.702	5.251	5.785	5.640	5.776	ns
		GCLK PLL	t <sub>co</sub>	3.104	3.338	4.741	5.158	5.685	5.542	5.745	5.294	5.824	5.679	5.815	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.090	3.324	4.728	5.145	5.672	5.529	5.732	5.280	5.811	5.666	5.802	ns
		GCLK PLL	t <sub>co</sub>	3.086	3.320	4.726	5.145	5.673	5.530	5.733	5.280	5.813	5.668	5.804	ns
RSDS	—	GCLK	t <sub>co</sub>	3.102	3.335	4.727	5.142	5.667	5.524	5.727	5.277	5.806	5.661	5.797	ns
		GCLK PLL	t <sub>co</sub>	3.091	3.325	4.723	5.138	5.664	5.521	5.724	5.274	5.803	5.658	5.794	ns
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.088	3.322	4.721	5.136	5.662	5.519	5.722	5.272	5.802	5.657	5.793	ns
		GCLK PLL	t <sub>co</sub>	3.099	3.332	4.722	5.137	5.661	5.518	5.721	5.271	5.800	5.655	5.791	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.089	3.323	4.720	5.135	5.660	5.517	5.720	5.271	5.800	5.655	5.791	ns
		GCLK PLL	t <sub>co</sub>	3.075	3.309	4.705	5.120	5.646	5.503	5.706	5.256	5.785	5.640	5.776	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.072	3.305	4.701	5.116	5.642	5.499	5.702	5.252	5.781	5.636	5.772	ns
		GCLK PLL	t <sub>co</sub>	3.069	3.303	4.702	5.119	5.645	5.502	5.705	5.255	5.785	5.640	5.776	ns
	6mA	GCLK	t <sub>co</sub>	3.070	3.303	4.692	5.107	5.632	5.489	5.692	5.242	5.771	5.626	5.762	ns
		GCLK PLL	t <sub>co</sub>	3.119	3.356	4.763	5.180	5.708	5.565	5.768	5.316	5.847	5.702	5.838	ns
	8mA	GCLK	t <sub>co</sub>	3.095	3.332	4.745	5.163	5.691	5.548	5.751	5.299	5.832	5.687	5.823	ns
		GCLK PLL	t <sub>co</sub>	3.077	3.313	4.723	5.141	5.669	5.526	5.729	5.277	5.810	5.665	5.801	ns

**Table 1-108.** EP3SE50 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.123	3.359	4.763	5.180	5.707	5.564	5.767	5.316	5.847	5.702	5.838	ns	
		GCLK PLL	$t_{co}$	3.108	3.344	4.749	5.165	5.692	5.549	5.752	5.301	5.832	5.687	5.823	ns	
	6mA	GCLK	$t_{co}$	3.097	3.333	4.744	5.162	5.689	5.546	5.749	5.298	5.830	5.685	5.821	ns	
		GCLK PLL	$t_{co}$	3.077	3.313	4.721	5.138	5.666	5.523	5.726	5.275	5.806	5.661	5.797	ns	
	8mA	GCLK	$t_{co}$	3.074	3.309	4.717	5.135	5.662	5.519	5.722	5.271	5.803	5.658	5.794	ns	
		GCLK PLL	$t_{co}$	3.079	3.313	4.708	5.123	5.648	5.505	5.708	5.258	5.787	5.642	5.778	ns	
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.072	3.306	4.707	5.124	5.651	5.508	5.711	5.261	5.792	5.647	5.783	ns	
		GCLK PLL	$t_{co}$	3.100	3.335	4.735	5.151	5.677	5.534	5.737	5.287	5.817	5.672	5.808	ns	
	6mA	GCLK	$t_{co}$	3.082	3.318	4.720	5.136	5.662	5.519	5.722	5.272	5.802	5.657	5.793	ns	
		GCLK PLL	$t_{co}$	3.068	3.302	4.697	5.112	5.637	5.494	5.697	5.248	5.777	5.632	5.768	ns	
	8mA	GCLK	$t_{co}$	2.674	2.849	3.990	4.359	4.834	4.699	4.910	4.467	4.945	4.809	4.961	ns	
		GCLK PLL	$t_{co}$	3.068	3.295	4.657	5.068	5.588	5.445	5.648	5.200	5.724	5.579	5.715	ns	
	10mA	GCLK	$t_{co}$	3.050	3.285	4.695	5.114	5.642	5.499	5.702	5.251	5.785	5.640	5.776	ns	
		GCLK PLL	$t_{co}$	2.674	2.849	3.990	4.359	4.834	4.699	4.910	4.467	4.945	4.809	4.961	ns	
	12mA	GCLK	$t_{co}$	3.068	3.295	4.657	5.068	5.588	5.445	5.648	5.200	5.724	5.579	5.715	ns	
		GCLK PLL	$t_{co}$	3.050	3.285	4.695	5.114	5.642	5.499	5.702	5.251	5.785	5.640	5.776	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	2.674	2.849	3.990	4.359	4.834	4.699	4.910	4.467	4.945	4.809	4.961	ns
			GCLK PLL	$t_{co}$	3.068	3.295	4.657	5.068	5.588	5.445	5.648	5.200	5.724	5.579	5.715	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.050	3.285	4.695	5.114	5.642	5.499	5.702	5.251	5.785	5.640	5.776	ns	
		GCLK PLL	$t_{co}$	3.104	3.338	4.741	5.158	5.685	5.542	5.745	5.294	5.824	5.679	5.815	ns	
	6mA	GCLK	$t_{co}$	3.090	3.324	4.728	5.145	5.672	5.529	5.732	5.280	5.811	5.666	5.802	ns	
		GCLK PLL	$t_{co}$	3.086	3.320	4.726	5.145	5.673	5.530	5.733	5.280	5.813	5.668	5.804	ns	
	8mA	GCLK	$t_{co}$	3.102	3.335	4.727	5.142	5.667	5.524	5.727	5.277	5.806	5.661	5.797	ns	
		GCLK PLL	$t_{co}$	3.091	3.325	4.723	5.138	5.664	5.521	5.724	5.274	5.803	5.658	5.794	ns	

**Table 1-108.** EP3SE50 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.088	3.322	4.721	5.136	5.662	5.519	5.722	5.272	5.802	5.657	5.793	ns	
		GCLK PLL	$t_{co}$	3.099	3.332	4.722	5.137	5.661	5.518	5.721	5.271	5.800	5.655	5.791	ns	
	6mA	GCLK	$t_{co}$	3.089	3.323	4.720	5.135	5.660	5.517	5.720	5.271	5.800	5.655	5.791	ns	
		GCLK PLL	$t_{co}$	3.075	3.309	4.705	5.120	5.646	5.503	5.706	5.256	5.785	5.640	5.776	ns	
	8mA	GCLK	$t_{co}$	3.072	3.305	4.701	5.116	5.642	5.499	5.702	5.252	5.781	5.636	5.772	ns	
		GCLK PLL	$t_{co}$	3.069	3.303	4.702	5.119	5.645	5.502	5.705	5.255	5.785	5.640	5.776	ns	
	10mA	GCLK	$t_{co}$	3.070	3.303	4.692	5.107	5.632	5.489	5.692	5.242	5.771	5.626	5.762	ns	
		GCLK PLL	$t_{co}$	3.119	3.356	4.763	5.180	5.708	5.565	5.768	5.316	5.847	5.702	5.838	ns	
	12mA	GCLK	$t_{co}$	3.095	3.332	4.745	5.163	5.691	5.548	5.751	5.299	5.832	5.687	5.823	ns	
		GCLK PLL	$t_{co}$	3.077	3.313	4.723	5.141	5.669	5.526	5.729	5.277	5.810	5.665	5.801	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.123	3.359	4.763	5.180	5.707	5.564	5.767	5.316	5.847	5.702	5.838	ns
			GCLK PLL	$t_{co}$	3.108	3.344	4.749	5.165	5.692	5.549	5.752	5.301	5.832	5.687	5.823	ns
16mA		GCLK	$t_{co}$	3.097	3.333	4.744	5.162	5.689	5.546	5.749	5.298	5.830	5.685	5.821	ns	
		GCLK PLL	$t_{co}$	3.077	3.313	4.721	5.138	5.666	5.523	5.726	5.275	5.806	5.661	5.797	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.074	3.309	4.717	5.135	5.662	5.519	5.722	5.271	5.803	5.658	5.794	ns	
		GCLK PLL	$t_{co}$	3.079	3.313	4.708	5.123	5.648	5.505	5.708	5.258	5.787	5.642	5.778	ns	
	12mA	GCLK	$t_{co}$	3.072	3.306	4.707	5.124	5.651	5.508	5.711	5.261	5.792	5.647	5.783	ns	
		GCLK PLL	$t_{co}$	3.100	3.335	4.735	5.151	5.677	5.534	5.737	5.287	5.817	5.672	5.808	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.082	3.318	4.720	5.136	5.662	5.519	5.722	5.272	5.802	5.657	5.793	ns	
		GCLK PLL	$t_{co}$	3.068	3.302	4.697	5.112	5.637	5.494	5.697	5.248	5.777	5.632	5.768	ns	

Table 1-109 and Table 1-110 list the EP3SE50 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-109 lists the EP3SE50 column pin delay adders when using the regional clock in Stratix III devices.

**Table 1-109.** EP3SE50 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	
RCLK input adder	0.152	0.164	0.22	0.237	0.25	0.244	0.31	0.24	0.254	0.246	0.312	ns
RCLK PLL input adder	-0.001	-0.001	-0.003	-0.004	-0.004	-0.004	-0.006	-0.003	-0.004	-0.004	-0.006	ns
RCLK output adder	-0.116	-0.119	-0.134	-0.136	-0.17	-0.171	-0.249	-0.131	-0.13	-0.13	-0.216	ns
RCLK PLL output adder	1.647	1.684	2.61	2.926	3.238	3.084	3.298	2.943	3.254	3.098	3.374	ns

Table 1-110 lists the EP3SE50 row pin delay adders when using the regional clock in Stratix III devices.

**Table 1-110.** EP3SE50 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	
RCLK input adder	0.113	0.125	0.182	0.197	0.212	0.205	0.274	0.201	0.215	0.21	0.275	ns
RCLK PLL input adder	0.13	0.14	0.213	0.241	0.267	0.255	0.385	0.244	0.27	0.256	0.386	ns
RCLK output adder	-0.116	-0.129	-0.186	-0.202	-0.218	-0.209	-0.28	-0.206	-0.221	-0.214	-0.283	ns
RCLK PLL output adder	-0.137	-0.143	-0.193	-0.214	-0.236	-0.225	-0.295	-0.215	-0.237	-0.226	-0.297	ns

### EP3SE80 I/O Timing Parameters

Table 1-111 through Table 1-114 list the maximum I/O timing parameters for EP3SE80 devices for single-ended I/O standards.

Table 1-111 lists the EP3SE80 column pins input timing parameters for single-ended I/O standards.

**Table 1-111.** EP3SE80 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-1.054	-1.054	-1.505	-1.636	-1.872	-1.819	-2.173	-1.636	-1.872	-1.819	-2.173	ns
		t <sub>h</sub>	1.195	1.195	1.704	1.861	2.117	2.050	2.409	1.861	2.117	2.050	2.409	ns
	GCLK PLL	t <sub>su</sub>	-1.307	-1.307	-1.870	-2.028	-2.321	-2.214	-2.661	-2.028	-2.321	-2.214	-2.661	ns
		t <sub>h</sub>	1.605	1.605	2.302	2.513	2.858	2.721	3.186	2.513	2.858	2.721	3.186	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.054	-1.054	-1.505	-1.636	-1.872	-1.819	-2.173	-1.636	-1.872	-1.819	-2.173	ns
		t <sub>h</sub>	1.195	1.195	1.704	1.861	2.117	2.050	2.409	1.861	2.117	2.050	2.409	ns
	GCLK PLL	t <sub>su</sub>	-1.307	-1.307	-1.870	-2.028	-2.321	-2.214	-2.661	-2.028	-2.321	-2.214	-2.661	ns
		t <sub>h</sub>	1.605	1.605	2.302	2.513	2.858	2.721	3.186	2.513	2.858	2.721	3.186	ns
3.0-V LVTTL	GCLK	t <sub>su</sub>	-1.065	-1.065	-1.504	-1.638	-1.871	-1.818	-2.172	-1.638	-1.871	-1.818	-2.172	ns
		t <sub>h</sub>	1.206	1.206	1.703	1.863	2.116	2.049	2.408	1.863	2.116	2.049	2.408	ns
	GCLK PLL	t <sub>su</sub>	-1.318	-1.318	-1.869	-2.030	-2.320	-2.213	-2.660	-2.030	-2.320	-2.213	-2.660	ns
		t <sub>h</sub>	1.616	1.616	2.301	2.515	2.857	2.720	3.185	2.515	2.857	2.720	3.185	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.065	-1.065	-1.504	-1.638	-1.871	-1.818	-2.172	-1.638	-1.871	-1.818	-2.172	ns
		t <sub>h</sub>	1.206	1.206	1.703	1.863	2.116	2.049	2.408	1.863	2.116	2.049	2.408	ns
	GCLK PLL	t <sub>su</sub>	-1.318	-1.318	-1.869	-2.030	-2.320	-2.213	-2.660	-2.030	-2.320	-2.213	-2.660	ns
		t <sub>h</sub>	1.616	1.616	2.301	2.515	2.857	2.720	3.185	2.515	2.857	2.720	3.185	ns
2.5 V	GCLK	t <sub>su</sub>	-1.060	-1.060	-1.513	-1.650	-1.890	-1.837	-2.191	-1.650	-1.890	-1.837	-2.191	ns
		t <sub>h</sub>	1.201	1.201	1.712	1.875	2.135	2.068	2.427	1.875	2.135	2.068	2.427	ns
	GCLK PLL	t <sub>su</sub>	-1.313	-1.313	-1.878	-2.042	-2.339	-2.232	-2.679	-2.042	-2.339	-2.232	-2.679	ns
		t <sub>h</sub>	1.611	1.611	2.310	2.527	2.876	2.739	3.204	2.527	2.876	2.739	3.204	ns
1.8 V	GCLK	t <sub>su</sub>	-1.082	-1.082	-1.553	-1.686	-1.888	-1.835	-2.189	-1.686	-1.888	-1.835	-2.189	ns
		t <sub>h</sub>	1.225	1.225	1.752	1.911	2.133	2.066	2.425	1.911	2.133	2.066	2.425	ns
	GCLK PLL	t <sub>su</sub>	-1.335	-1.335	-1.918	-2.078	-2.337	-2.230	-2.677	-2.078	-2.337	-2.230	-2.677	ns
		t <sub>h</sub>	1.635	1.635	2.350	2.563	2.874	2.737	3.202	2.563	2.874	2.737	3.202	ns
1.5 V	GCLK	t <sub>su</sub>	-1.072	-1.072	-1.530	-1.654	-1.818	-1.765	-2.119	-1.654	-1.818	-1.765	-2.119	ns
		t <sub>h</sub>	1.215	1.215	1.729	1.879	2.063	1.996	2.355	1.879	2.063	1.996	2.355	ns
	GCLK PLL	t <sub>su</sub>	-1.325	-1.325	-1.895	-2.046	-2.267	-2.160	-2.607	-2.046	-2.267	-2.160	-2.607	ns
		t <sub>h</sub>	1.625	1.625	2.327	2.531	2.804	2.667	3.132	2.531	2.804	2.667	3.132	ns
1.2 V	GCLK	t <sub>su</sub>	-1.020	-1.020	-1.453	-1.555	-1.662	-1.609	-1.963	-1.555	-1.662	-1.609	-1.963	ns
		t <sub>h</sub>	1.163	1.163	1.652	1.780	1.907	1.840	2.199	1.780	1.907	1.840	2.199	ns
	GCLK PLL	t <sub>su</sub>	-1.273	-1.273	-1.818	-1.947	-2.111	-2.004	-2.451	-1.947	-2.111	-2.004	-2.451	ns
		t <sub>h</sub>	1.573	1.573	2.250	2.432	2.648	2.511	2.976	2.432	2.648	2.511	2.976	ns

Table 1-111. EP3SE80 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.991	-0.991	-1.425	-1.539	-1.664	-1.611	-1.965	-1.539	-1.664	-1.611	-1.965	ns
		$t_h$	1.134	1.134	1.624	1.764	1.909	1.842	2.201	1.764	1.909	1.842	2.201	ns
	GCLK PLL	$t_{su}$	-1.244	-1.244	-1.790	-1.931	-2.113	-2.006	-2.453	-1.931	-2.113	-2.006	-2.453	ns
		$t_h$	1.544	1.544	2.222	2.416	2.650	2.513	2.978	2.416	2.650	2.513	2.978	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.991	-0.991	-1.425	-1.539	-1.664	-1.611	-1.965	-1.539	-1.664	-1.611	-1.965	ns
		$t_h$	1.134	1.134	1.624	1.764	1.909	1.842	2.201	1.764	1.909	1.842	2.201	ns
	GCLK PLL	$t_{su}$	-1.244	-1.244	-1.790	-1.931	-2.113	-2.006	-2.453	-1.931	-2.113	-2.006	-2.453	ns
		$t_h$	1.544	1.544	2.222	2.416	2.650	2.513	2.978	2.416	2.650	2.513	2.978	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.985	-0.985	-1.412	-1.531	-1.661	-1.606	-1.963	-1.531	-1.661	-1.606	-1.963	ns
		$t_h$	1.128	1.128	1.611	1.753	1.903	1.836	2.194	1.753	1.903	1.836	2.194	ns
	GCLK PLL	$t_{su}$	-1.238	-1.238	-1.777	-1.923	-2.110	-2.001	-2.451	-1.923	-2.110	-2.001	-2.451	ns
		$t_h$	1.538	1.538	2.209	2.405	2.644	2.507	2.971	2.405	2.644	2.507	2.971	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.985	-0.985	-1.412	-1.531	-1.661	-1.606	-1.963	-1.531	-1.661	-1.606	-1.963	ns
		$t_h$	1.128	1.128	1.611	1.753	1.903	1.836	2.194	1.753	1.903	1.836	2.194	ns
	GCLK PLL	$t_{su}$	-1.238	-1.238	-1.777	-1.923	-2.110	-2.001	-2.451	-1.923	-2.110	-2.001	-2.451	ns
		$t_h$	1.538	1.538	2.209	2.405	2.644	2.507	2.971	2.405	2.644	2.507	2.971	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.974	-0.974	-1.401	-1.520	-1.642	-1.587	-1.944	-1.520	-1.642	-1.587	-1.944	ns
		$t_h$	1.117	1.117	1.599	1.742	1.884	1.817	2.175	1.742	1.884	1.817	2.175	ns
	GCLK PLL	$t_{su}$	-1.227	-1.227	-1.766	-1.912	-2.091	-1.982	-2.432	-1.912	-2.091	-1.982	-2.432	ns
		$t_h$	1.527	1.527	2.197	2.394	2.625	2.488	2.952	2.394	2.625	2.488	2.952	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.974	-0.974	-1.401	-1.520	-1.642	-1.587	-1.944	-1.520	-1.642	-1.587	-1.944	ns
		$t_h$	1.117	1.117	1.599	1.742	1.884	1.817	2.175	1.742	1.884	1.817	2.175	ns
	GCLK PLL	$t_{su}$	-1.227	-1.227	-1.766	-1.912	-2.091	-1.982	-2.432	-1.912	-2.091	-1.982	-2.432	ns
		$t_h$	1.527	1.527	2.197	2.394	2.625	2.488	2.952	2.394	2.625	2.488	2.952	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.985	-0.985	-1.412	-1.531	-1.661	-1.606	-1.963	-1.531	-1.661	-1.606	-1.963	ns
		$t_h$	1.128	1.128	1.611	1.753	1.903	1.836	2.194	1.753	1.903	1.836	2.194	ns
	GCLK PLL	$t_{su}$	-1.238	-1.238	-1.777	-1.923	-2.110	-2.001	-2.451	-1.923	-2.110	-2.001	-2.451	ns
		$t_h$	1.538	1.538	2.209	2.405	2.644	2.507	2.971	2.405	2.644	2.507	2.971	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.985	-0.985	-1.412	-1.531	-1.661	-1.606	-1.963	-1.531	-1.661	-1.606	-1.963	ns
		$t_h$	1.128	1.128	1.611	1.753	1.903	1.836	2.194	1.753	1.903	1.836	2.194	ns
	GCLK PLL	$t_{su}$	-1.238	-1.238	-1.777	-1.923	-2.110	-2.001	-2.451	-1.923	-2.110	-2.001	-2.451	ns
		$t_h$	1.538	1.538	2.209	2.405	2.644	2.507	2.971	2.405	2.644	2.507	2.971	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.974	-0.974	-1.401	-1.520	-1.642	-1.587	-1.944	-1.520	-1.642	-1.587	-1.944	ns
		$t_h$	1.117	1.117	1.599	1.742	1.884	1.817	2.175	1.742	1.884	1.817	2.175	ns
	GCLK PLL	$t_{su}$	-1.227	-1.227	-1.766	-1.912	-2.091	-1.982	-2.432	-1.912	-2.091	-1.982	-2.432	ns
		$t_h$	1.527	1.527	2.197	2.394	2.625	2.488	2.952	2.394	2.625	2.488	2.952	ns



**Table 1–111.** EP3SE80 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.974	-0.974	-1.401	-1.520	-1.642	-1.587	-1.944	-1.520	-1.642	-1.587	-1.944	ns
		$t_h$	1.117	1.117	1.599	1.742	1.884	1.817	2.175	1.742	1.884	1.817	2.175	ns
	GCLK PLL	$t_{su}$	-1.227	-1.227	-1.766	-1.912	-2.091	-1.982	-2.432	-1.912	-2.091	-1.982	-2.432	ns
		$t_h$	1.527	1.527	2.197	2.394	2.625	2.488	2.952	2.394	2.625	2.488	2.952	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.962	-0.962	-1.391	-1.509	-1.626	-1.571	-1.928	-1.509	-1.626	-1.571	-1.928	ns
		$t_h$	1.105	1.105	1.589	1.731	1.868	1.801	2.159	1.731	1.868	1.801	2.159	ns
	GCLK PLL	$t_{su}$	-1.215	-1.215	-1.756	-1.901	-2.075	-1.966	-2.416	-1.901	-2.075	-1.966	-2.416	ns
		$t_h$	1.515	1.515	2.187	2.383	2.609	2.472	2.936	2.383	2.609	2.472	2.936	ns
3.0-V PCI	GCLK	$t_{su}$	-0.962	-0.962	-1.391	-1.509	-1.626	-1.571	-1.928	-1.509	-1.626	-1.571	-1.928	ns
		$t_h$	1.105	1.105	1.589	1.731	1.868	1.801	2.159	1.731	1.868	1.801	2.159	ns
	GCLK PLL	$t_{su}$	-1.215	-1.215	-1.756	-1.901	-2.075	-1.966	-2.416	-1.901	-2.075	-1.966	-2.416	ns
		$t_h$	1.515	1.515	2.187	2.383	2.609	2.472	2.936	2.383	2.609	2.472	2.936	ns
3.0-V PCI-X	GCLK	$t_{su}$	-1.065	-1.065	-1.504	-1.638	-1.871	-1.818	-2.172	-1.638	-1.871	-1.818	-2.172	ns
		$t_h$	1.206	1.206	1.703	1.863	2.116	2.049	2.408	1.863	2.116	2.049	2.408	ns
	GCLK PLL	$t_{su}$	-1.318	-1.318	-1.869	-2.030	-2.320	-2.213	-2.660	-2.030	-2.320	-2.213	-2.660	ns
		$t_h$	1.616	1.616	2.301	2.515	2.857	2.720	3.185	2.515	2.857	2.720	3.185	ns

Table 1–112 lists the EP3SE80 row pins input timing parameters for single-ended I/O standards.

**Table 1–112.** EP3SE80 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.3-V LVTTTL	GCLK	$t_{su}$	-0.922	-0.964	-1.369	-1.481	-1.595	-1.647	-1.890	-1.492	-1.697	-1.649	-1.929	ns
		$t_h$	1.045	1.103	1.566	1.703	1.842	1.878	2.128	1.725	1.950	1.890	2.168	ns
	GCLK PLL	$t_{su}$	1.087	1.110	1.770	2.000	1.985	2.004	1.799	2.012	2.003	2.024	1.850	ns
		$t_h$	-0.825	-0.830	-1.353	-1.532	-1.470	-1.513	-1.300	-1.533	-1.477	-1.523	-1.349	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.922	-0.964	-1.369	-1.481	-1.595	-1.647	-1.890	-1.492	-1.697	-1.649	-1.929	ns
		$t_h$	1.045	1.103	1.566	1.703	1.842	1.878	2.128	1.725	1.950	1.890	2.168	ns
	GCLK PLL	$t_{su}$	1.087	1.110	1.770	2.000	1.985	2.004	1.799	2.012	2.003	2.024	1.850	ns
		$t_h$	-0.825	-0.830	-1.353	-1.532	-1.470	-1.513	-1.300	-1.533	-1.477	-1.523	-1.349	ns
3.0-V LVTTTL	GCLK	$t_{su}$	-0.928	-0.975	-1.366	-1.482	-1.598	-1.650	-1.893	-1.491	-1.702	-1.654	-1.934	ns
		$t_h$	1.051	1.114	1.563	1.704	1.845	1.881	2.131	1.724	1.955	1.895	2.173	ns
	GCLK PLL	$t_{su}$	1.081	1.099	1.773	1.999	1.982	2.001	1.796	2.013	1.998	2.019	1.845	ns
		$t_h$	-0.819	-0.819	-1.356	-1.531	-1.467	-1.510	-1.297	-1.534	-1.472	-1.518	-1.344	ns

**Table 1-112.** EP3SE80 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
3.0-V LVCMOS	GCLK	$t_{su}$	-0.928	-0.975	-1.366	-1.482	-1.598	-1.650	-1.893	-1.491	-1.702	-1.654	-1.934	ns
		$t_h$	1.051	1.114	1.563	1.704	1.845	1.881	2.131	1.724	1.955	1.895	2.173	ns
	GCLK PLL	$t_{su}$	1.081	1.099	1.773	1.999	1.982	2.001	1.796	2.013	1.998	2.019	1.845	ns
		$t_h$	-0.819	-0.819	-1.356	-1.531	-1.467	-1.510	-1.297	-1.534	-1.472	-1.518	-1.344	ns
2.5 V	GCLK	$t_{su}$	-0.916	-0.968	-1.375	-1.495	-1.613	-1.665	-1.908	-1.500	-1.712	-1.664	-1.944	ns
		$t_h$	1.039	1.107	1.572	1.717	1.860	1.896	2.146	1.733	1.965	1.905	2.183	ns
	GCLK PLL	$t_{su}$	1.093	1.106	1.764	1.986	1.967	1.986	1.781	2.004	1.988	2.009	1.835	ns
		$t_h$	-0.831	-0.826	-1.347	-1.518	-1.452	-1.495	-1.282	-1.525	-1.462	-1.508	-1.334	ns
1.8 V	GCLK	$t_{su}$	-0.973	-1.027	-1.441	-1.555	-1.741	-1.689	-1.906	-1.560	-1.739	-1.691	-1.945	ns
		$t_h$	1.097	1.167	1.638	1.777	1.984	1.920	2.144	1.792	1.992	1.931	2.184	ns
	GCLK PLL	$t_{su}$	0.974	0.984	1.606	1.824	1.969	1.854	1.783	1.837	1.987	1.870	1.834	ns
		$t_h$	-0.714	-0.705	-1.192	-1.359	-1.454	-1.366	-1.284	-1.362	-1.461	-1.373	-1.333	ns
1.5 V	GCLK	$t_{su}$	-0.963	-1.016	-1.417	-1.523	-1.673	-1.621	-1.838	-1.529	-1.674	-1.626	-1.880	ns
		$t_h$	1.087	1.156	1.614	1.745	1.916	1.852	2.076	1.761	1.927	1.866	2.119	ns
	GCLK PLL	$t_{su}$	0.984	0.995	1.630	1.856	2.037	1.922	1.851	1.868	2.052	1.935	1.899	ns
		$t_h$	-0.724	-0.716	-1.216	-1.391	-1.522	-1.434	-1.352	-1.393	-1.526	-1.438	-1.398	ns
1.2 V	GCLK	$t_{su}$	-0.903	-0.963	-1.338	-1.422	-1.514	-1.462	-1.679	-1.433	-1.519	-1.471	-1.725	ns
		$t_h$	1.027	1.103	1.535	1.644	1.757	1.693	1.917	1.665	1.772	1.711	1.964	ns
	GCLK PLL	$t_{su}$	1.044	1.048	1.709	1.957	2.196	2.081	2.010	1.964	2.207	2.090	2.054	ns
		$t_h$	-0.784	-0.769	-1.295	-1.492	-1.681	-1.593	-1.511	-1.489	-1.681	-1.593	-1.553	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.859	-0.910	-1.289	-1.386	-1.393	-1.445	-1.688	-1.388	-1.495	-1.447	-1.727	ns
		$t_h$	0.983	1.050	1.486	1.608	1.640	1.676	1.926	1.621	1.748	1.688	1.966	ns
	GCLK PLL	$t_{su}$	1.151	1.165	1.850	2.095	2.187	2.206	2.001	2.116	2.205	2.226	2.052	ns
		$t_h$	-0.888	-0.884	-1.433	-1.627	-1.672	-1.715	-1.502	-1.637	-1.679	-1.725	-1.551	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.859	-0.910	-1.289	-1.386	-1.393	-1.445	-1.688	-1.388	-1.495	-1.447	-1.727	ns
		$t_h$	0.983	1.050	1.486	1.608	1.640	1.676	1.926	1.621	1.748	1.688	1.966	ns
	GCLK PLL	$t_{su}$	1.151	1.165	1.850	2.095	2.187	2.206	2.001	2.116	2.205	2.226	2.052	ns
		$t_h$	-0.888	-0.884	-1.433	-1.627	-1.672	-1.715	-1.502	-1.637	-1.679	-1.725	-1.551	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.877	-0.928	-1.300	-1.395	-1.509	-1.456	-1.677	-1.401	-1.512	-1.463	-1.720	ns
		$t_h$	1.001	1.068	1.497	1.615	1.750	1.686	1.911	1.631	1.762	1.702	1.955	ns
	GCLK PLL	$t_{su}$	1.070	1.083	1.747	1.984	2.201	2.087	2.014	1.996	2.214	2.098	2.061	ns
		$t_h$	-0.810	-0.804	-1.333	-1.521	-1.688	-1.600	-1.519	-1.523	-1.691	-1.602	-1.564	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.877	-0.928	-1.300	-1.395	-1.509	-1.456	-1.677	-1.401	-1.512	-1.463	-1.720	ns
		$t_h$	1.001	1.068	1.497	1.615	1.750	1.686	1.911	1.631	1.762	1.702	1.955	ns
	GCLK PLL	$t_{su}$	1.070	1.083	1.747	1.984	2.201	2.087	2.014	1.996	2.214	2.098	2.061	ns
		$t_h$	-0.810	-0.804	-1.333	-1.521	-1.688	-1.600	-1.519	-1.523	-1.691	-1.602	-1.564	ns

**Table 1-112.** EP3SE80 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.863	-0.916	-1.285	-1.385	-1.491	-1.438	-1.659	-1.390	-1.495	-1.446	-1.703	ns
		t <sub>h</sub>	0.987	1.056	1.483	1.605	1.732	1.668	1.893	1.620	1.745	1.685	1.938	ns
	GCLK PLL	t <sub>su</sub>	1.084	1.095	1.762	1.994	2.219	2.105	2.032	2.007	2.231	2.115	2.078	ns
		t <sub>h</sub>	-0.824	-0.816	-1.347	-1.531	-1.706	-1.618	-1.537	-1.534	-1.708	-1.619	-1.581	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.877	-0.928	-1.300	-1.395	-1.509	-1.456	-1.677	-1.401	-1.512	-1.463	-1.720	ns
		t <sub>h</sub>	1.001	1.068	1.497	1.615	1.750	1.686	1.911	1.631	1.762	1.702	1.955	ns
	GCLK PLL	t <sub>su</sub>	1.070	1.083	1.747	1.984	2.201	2.087	2.014	1.996	2.214	2.098	2.061	ns
		t <sub>h</sub>	-0.810	-0.804	-1.333	-1.521	-1.688	-1.600	-1.519	-1.523	-1.691	-1.602	-1.564	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.877	-0.928	-1.300	-1.395	-1.509	-1.456	-1.677	-1.401	-1.512	-1.463	-1.720	ns
		t <sub>h</sub>	1.001	1.068	1.497	1.615	1.750	1.686	1.911	1.631	1.762	1.702	1.955	ns
	GCLK PLL	t <sub>su</sub>	1.070	1.083	1.747	1.984	2.201	2.087	2.014	1.996	2.214	2.098	2.061	ns
		t <sub>h</sub>	-0.810	-0.804	-1.333	-1.521	-1.688	-1.600	-1.519	-1.523	-1.691	-1.602	-1.564	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.863	-0.916	-1.285	-1.385	-1.491	-1.438	-1.659	-1.390	-1.495	-1.446	-1.703	ns
		t <sub>h</sub>	0.987	1.056	1.483	1.605	1.732	1.668	1.893	1.620	1.745	1.685	1.938	ns
	GCLK PLL	t <sub>su</sub>	1.084	1.095	1.762	1.994	2.219	2.105	2.032	2.007	2.231	2.115	2.078	ns
		t <sub>h</sub>	-0.824	-0.816	-1.347	-1.531	-1.706	-1.618	-1.537	-1.534	-1.708	-1.619	-1.581	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.863	-0.916	-1.285	-1.385	-1.491	-1.438	-1.659	-1.390	-1.495	-1.446	-1.703	ns
		t <sub>h</sub>	0.987	1.056	1.483	1.605	1.732	1.668	1.893	1.620	1.745	1.685	1.938	ns
	GCLK PLL	t <sub>su</sub>	1.084	1.095	1.762	1.994	2.219	2.105	2.032	2.007	2.231	2.115	2.078	ns
		t <sub>h</sub>	-0.824	-0.816	-1.347	-1.531	-1.706	-1.618	-1.537	-1.534	-1.708	-1.619	-1.581	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.854	-0.904	-1.276	-1.375	-1.475	-1.422	-1.643	-1.381	-1.479	-1.430	-1.687	ns
		t <sub>h</sub>	0.978	1.044	1.474	1.595	1.716	1.652	1.877	1.611	1.729	1.669	1.922	ns
	GCLK PLL	t <sub>su</sub>	1.093	1.107	1.771	2.004	2.235	2.121	2.048	2.016	2.247	2.131	2.094	ns
		t <sub>h</sub>	-0.833	-0.828	-1.356	-1.541	-1.722	-1.634	-1.553	-1.543	-1.724	-1.635	-1.597	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.854	-0.904	-1.276	-1.375	-1.475	-1.422	-1.643	-1.381	-1.479	-1.430	-1.687	ns
		t <sub>h</sub>	0.978	1.044	1.474	1.595	1.716	1.652	1.877	1.611	1.729	1.669	1.922	ns
	GCLK PLL	t <sub>su</sub>	1.093	1.107	1.771	2.004	2.235	2.121	2.048	2.016	2.247	2.131	2.094	ns
		t <sub>h</sub>	-0.833	-0.828	-1.356	-1.541	-1.722	-1.634	-1.553	-1.543	-1.724	-1.635	-1.597	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.928	-0.975	-1.366	-1.482	-1.598	-1.650	-1.893	-1.491	-1.702	-1.654	-1.934	ns
		t <sub>h</sub>	1.051	1.114	1.563	1.704	1.845	1.881	2.131	1.724	1.955	1.895	2.173	ns
	GCLK PLL	t <sub>su</sub>	1.081	1.099	1.773	1.999	1.982	2.001	1.796	2.013	1.998	2.019	1.845	ns
		t <sub>h</sub>	-0.819	-0.819	-1.356	-1.531	-1.467	-1.510	-1.297	-1.534	-1.472	-1.518	-1.344	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.928	-0.975	-1.366	-1.482	-1.598	-1.650	-1.893	-1.491	-1.702	-1.654	-1.934	ns
		t <sub>h</sub>	1.051	1.114	1.563	1.704	1.845	1.881	2.131	1.724	1.955	1.895	2.173	ns
	GCLK PLL	t <sub>su</sub>	1.081	1.099	1.773	1.999	1.982	2.001	1.796	2.013	1.998	2.019	1.845	ns
		t <sub>h</sub>	-0.819	-0.819	-1.356	-1.531	-1.467	-1.510	-1.297	-1.534	-1.472	-1.518	-1.344	ns

Table 1–113 lists the EP3SE80 column pins output timing parameters for single-ended I/O standards.

**Table 1–113.** EP3SE80 Column Pins Output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=0.9V$	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=1.1V$	$V_{ccl}=0.9V$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.559	3.559	4.935	5.323	5.638	5.693	5.865	5.323	5.638	5.693	5.865	ns
		GCLK PLL	$t_{co}$	3.859	3.865	5.394	5.826	6.396	6.210	6.631	5.826	6.396	6.210	6.631	ns
	8mA	GCLK	$t_{co}$	3.442	3.442	4.781	5.161	5.525	5.523	5.752	5.161	5.525	5.523	5.752	ns
		GCLK PLL	$t_{co}$	3.792	3.798	5.285	5.715	6.283	6.097	6.518	5.715	6.283	6.097	6.518	ns
	12mA	GCLK	$t_{co}$	3.347	3.347	4.644	5.018	5.433	5.371	5.660	5.018	5.433	5.371	5.660	ns
		GCLK PLL	$t_{co}$	3.706	3.712	5.181	5.616	6.191	6.005	6.426	5.616	6.191	6.005	6.426	ns
	16mA	GCLK	$t_{co}$	3.302	3.302	4.619	4.994	5.392	5.346	5.619	4.994	5.392	5.346	5.619	ns
		GCLK PLL	$t_{co}$	3.699	3.705	5.164	5.588	6.150	5.964	6.385	5.588	6.150	5.964	6.385	ns
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.562	3.562	4.939	5.335	5.645	5.707	5.872	5.335	5.645	5.707	5.872	ns
		GCLK PLL	$t_{co}$	3.865	3.871	5.398	5.831	6.403	6.217	6.638	5.831	6.403	6.217	6.638	ns
	8mA	GCLK	$t_{co}$	3.362	3.362	4.649	5.023	5.444	5.377	5.671	5.023	5.444	5.377	5.671	ns
		GCLK PLL	$t_{co}$	3.710	3.716	5.191	5.633	6.202	6.016	6.437	5.633	6.202	6.016	6.437	ns
	12mA	GCLK	$t_{co}$	3.305	3.305	4.612	4.992	5.418	5.346	5.645	4.992	5.418	5.346	5.645	ns
		GCLK PLL	$t_{co}$	3.717	3.723	5.185	5.612	6.176	5.990	6.411	5.612	6.176	5.990	6.411	ns
	16mA	GCLK	$t_{co}$	3.285	3.285	4.558	4.934	5.389	5.289	5.616	4.934	5.389	5.289	5.616	ns
		GCLK PLL	$t_{co}$	3.701	3.707	5.163	5.587	6.147	5.961	6.382	5.587	6.147	5.961	6.382	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.504	3.504	4.884	5.274	5.605	5.658	5.832	5.274	5.605	5.658	5.832	ns
		GCLK PLL	$t_{co}$	3.823	3.829	5.361	5.794	6.363	6.177	6.598	5.794	6.363	6.177	6.598	ns
	8mA	GCLK	$t_{co}$	3.374	3.374	4.715	5.102	5.468	5.497	5.693	5.102	5.468	5.497	5.693	ns
		GCLK PLL	$t_{co}$	3.712	3.718	5.231	5.660	6.225	6.041	6.459	5.660	6.225	6.041	6.459	ns
	12mA	GCLK	$t_{co}$	3.299	3.299	4.626	5.003	5.394	5.395	5.620	5.003	5.394	5.395	5.620	ns
		GCLK PLL	$t_{co}$	3.676	3.682	5.168	5.591	6.151	5.967	6.386	5.591	6.151	5.967	6.386	ns
	16mA	GCLK	$t_{co}$	3.262	3.262	4.561	4.934	5.365	5.345	5.592	4.934	5.365	5.345	5.592	ns
		GCLK PLL	$t_{co}$	3.658	3.664	5.139	5.563	6.123	5.937	6.358	5.563	6.123	5.937	6.358	ns

**Table 1-113.** EP3SE80 Column Pins Output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 0.9 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 1.1 V	V <sub>CC1</sub> = 0.9 V	
3.0-V LVC MOS	4mA	GCLK	t <sub>co</sub>	3.412	3.412	4.773	5.155	5.503	5.551	5.728	5.155	5.503	5.551	5.728	ns
		GCLK PLL	t <sub>co</sub>	3.737	3.743	5.265	5.694	6.260	6.076	6.494	5.694	6.260	6.076	6.494	ns
	8mA	GCLK	t <sub>co</sub>	3.275	3.275	4.578	4.956	5.368	5.369	5.593	4.956	5.368	5.369	5.593	ns
		GCLK PLL	t <sub>co</sub>	3.658	3.664	5.141	5.565	6.125	5.941	6.359	5.565	6.125	5.941	6.359	ns
	12mA	GCLK	t <sub>co</sub>	3.245	3.245	4.532	4.904	5.359	5.300	5.586	4.904	5.359	5.300	5.586	ns
		GCLK PLL	t <sub>co</sub>	3.653	3.659	5.134	5.558	6.117	5.931	6.352	5.558	6.117	5.931	6.352	ns
	16mA	GCLK	t <sub>co</sub>	3.223	3.224	4.510	4.883	5.344	5.299	5.571	4.883	5.344	5.299	5.571	ns
		GCLK PLL	t <sub>co</sub>	3.644	3.650	5.120	5.543	6.102	5.916	6.337	5.543	6.102	5.916	6.337	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.559	3.559	5.027	5.434	5.750	5.833	5.976	5.434	5.750	5.833	5.976	ns
		GCLK PLL	t <sub>co</sub>	3.859	3.865	5.472	5.921	6.507	6.323	6.742	5.921	6.507	6.323	6.742	ns
	8mA	GCLK	t <sub>co</sub>	3.434	3.434	4.854	5.250	5.618	5.636	5.843	5.250	5.618	5.636	5.843	ns
		GCLK PLL	t <sub>co</sub>	3.759	3.765	5.353	5.795	6.375	6.191	6.609	5.795	6.375	6.191	6.609	ns
	12mA	GCLK	t <sub>co</sub>	3.334	3.334	4.725	5.114	5.522	5.496	5.749	5.114	5.522	5.496	5.749	ns
		GCLK PLL	t <sub>co</sub>	3.715	3.721	5.266	5.704	6.280	6.094	6.515	5.704	6.280	6.094	6.515	ns
	16mA	GCLK	t <sub>co</sub>	3.307	3.307	4.656	5.047	5.479	5.446	5.706	5.047	5.479	5.446	5.706	ns
		GCLK PLL	t <sub>co</sub>	3.677	3.683	5.227	5.662	6.237	6.051	6.472	5.662	6.237	6.051	6.472	ns

**Table 1-113.** EP3SE80 Column Pins Output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.8 V	2mA	GCLK	$t_{co}$	3.822	3.822	5.464	5.917	6.154	6.369	6.381	5.917	6.154	6.369	6.381	ns
		GCLK PLL	$t_{co}$	4.050	4.056	5.793	6.281	6.912	6.726	7.147	6.281	6.912	6.726	7.147	ns
	4mA	GCLK	$t_{co}$	3.581	3.581	5.104	5.511	5.807	5.909	6.032	5.511	5.807	5.909	6.032	ns
		GCLK PLL	$t_{co}$	3.869	3.875	5.514	5.972	6.564	6.380	6.798	5.972	6.564	6.380	6.798	ns
	6mA	GCLK	$t_{co}$	3.463	3.463	4.914	5.321	5.696	5.734	5.923	5.321	5.696	5.734	5.923	ns
		GCLK PLL	$t_{co}$	3.787	3.793	5.407	5.857	6.454	6.268	6.689	5.857	6.454	6.268	6.689	ns
	8mA	GCLK	$t_{co}$	3.409	3.409	4.814	5.223	5.630	5.622	5.857	5.223	5.630	5.622	5.857	ns
		GCLK PLL	$t_{co}$	3.767	3.773	5.349	5.803	6.388	6.202	6.623	5.803	6.388	6.202	6.623	ns
	10mA	GCLK	$t_{co}$	3.341	3.341	4.718	5.125	5.549	5.508	5.776	5.125	5.549	5.508	5.776	ns
		GCLK PLL	$t_{co}$	3.704	3.710	5.288	5.728	6.307	6.121	6.542	5.728	6.307	6.121	6.542	ns
	12mA	GCLK	$t_{co}$	3.317	3.317	4.685	5.078	5.526	5.470	5.753	5.078	5.526	5.470	5.753	ns
		GCLK PLL	$t_{co}$	3.686	3.692	5.267	5.707	6.284	6.098	6.519	5.707	6.284	6.098	6.519	ns
1.5 V	2mA	GCLK	$t_{co}$	3.730	3.730	5.357	5.827	6.092	6.286	6.319	5.827	6.092	6.286	6.319	ns
		GCLK PLL	$t_{co}$	3.996	4.002	5.722	6.213	6.850	6.664	7.085	6.213	6.850	6.664	7.085	ns
	4mA	GCLK	$t_{co}$	3.447	3.447	4.903	5.314	5.700	5.730	5.927	5.314	5.700	5.730	5.927	ns
		GCLK PLL	$t_{co}$	3.784	3.790	5.403	5.857	6.458	6.272	6.693	5.857	6.458	6.272	6.693	ns
	6mA	GCLK	$t_{co}$	3.369	3.369	4.803	5.206	5.633	5.613	5.860	5.206	5.633	5.613	5.860	ns
		GCLK PLL	$t_{co}$	3.759	3.765	5.336	5.797	6.391	6.205	6.626	5.797	6.391	6.205	6.626	ns
	8mA	GCLK	$t_{co}$	3.359	3.359	4.785	5.185	5.613	5.581	5.840	5.185	5.613	5.581	5.840	ns
		GCLK PLL	$t_{co}$	3.748	3.754	5.319	5.772	6.371	6.185	6.606	5.772	6.371	6.185	6.606	ns
	10mA	GCLK	$t_{co}$	3.329	3.329	4.701	5.107	5.543	5.499	5.770	5.107	5.543	5.499	5.770	ns
		GCLK PLL	$t_{co}$	3.693	3.699	5.281	5.721	6.301	6.115	6.536	5.721	6.301	6.115	6.536	ns
	12mA	GCLK	$t_{co}$	3.280	3.280	4.679	5.072	5.532	5.457	5.759	5.072	5.532	5.457	5.759	ns
		GCLK PLL	$t_{co}$	3.688	3.694	5.264	5.710	6.290	6.104	6.525	5.710	6.290	6.104	6.525	ns

**Table 1-113.** EP3SE80 Column Pins Output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.2 V	2mA	GCLK	$t_{co}$	3.620	3.620	5.244	5.726	6.036	6.206	6.263	5.726	6.036	6.206	6.263	ns
		GCLK PLL	$t_{co}$	3.912	3.918	5.648	6.149	6.794	6.608	7.029	6.149	6.794	6.608	7.029	ns
	4mA	GCLK	$t_{co}$	3.447	3.447	4.922	5.345	5.750	5.777	5.977	5.345	5.750	5.777	5.977	ns
		GCLK PLL	$t_{co}$	3.789	3.795	5.422	5.887	6.508	6.322	6.743	5.887	6.508	6.322	6.743	ns
	6mA	GCLK	$t_{co}$	3.360	3.360	4.795	5.204	5.637	5.622	5.864	5.204	5.637	5.622	5.864	ns
		GCLK PLL	$t_{co}$	3.751	3.757	5.330	5.798	6.395	6.209	6.630	5.798	6.395	6.209	6.630	ns
	8mA	GCLK	$t_{co}$	3.336	3.336	4.726	5.144	5.581	5.531	5.808	5.144	5.581	5.531	5.808	ns
		GCLK PLL	$t_{co}$	3.704	3.710	5.302	5.749	6.339	6.153	6.574	5.749	6.339	6.153	6.574	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.324	3.324	4.688	5.075	5.512	5.479	5.739	5.075	5.512	5.479	5.739	ns
		GCLK PLL	$t_{co}$	3.704	3.710	5.259	5.696	6.270	6.084	6.505	5.696	6.270	6.084	6.505	ns
	10mA	GCLK	$t_{co}$	3.321	3.321	4.681	5.068	5.508	5.485	5.735	5.068	5.508	5.485	5.735	ns
		GCLK PLL	$t_{co}$	3.701	3.707	5.256	5.693	6.266	6.080	6.501	5.693	6.266	6.080	6.501	ns
	12mA	GCLK	$t_{co}$	3.309	3.309	4.677	5.064	5.509	5.465	5.736	5.064	5.509	5.465	5.736	ns
		GCLK PLL	$t_{co}$	3.699	3.705	5.256	5.694	6.267	6.081	6.502	5.694	6.267	6.081	6.502	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.286	3.286	4.647	5.033	5.494	5.431	5.721	5.033	5.494	5.431	5.721	ns
		GCLK PLL	$t_{co}$	3.690	3.696	5.241	5.678	6.252	6.066	6.487	5.678	6.252	6.066	6.487	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.340	3.340	4.700	5.090	5.528	5.507	5.755	5.090	5.528	5.507	5.755	ns
		GCLK PLL	$t_{co}$	3.711	3.717	5.271	5.710	6.286	6.100	6.521	5.710	6.286	6.100	6.521	ns
	6mA	GCLK	$t_{co}$	3.323	3.323	4.697	5.087	5.526	5.496	5.753	5.087	5.526	5.496	5.753	ns
		GCLK PLL	$t_{co}$	3.707	3.713	5.269	5.708	6.284	6.098	6.519	5.708	6.284	6.098	6.519	ns
	8mA	GCLK	$t_{co}$	3.311	3.311	4.677	5.067	5.517	5.489	5.744	5.067	5.517	5.489	5.744	ns
		GCLK PLL	$t_{co}$	3.696	3.702	5.259	5.699	6.275	6.089	6.510	5.699	6.275	6.089	6.510	ns
	10mA	GCLK	$t_{co}$	3.282	3.282	4.659	5.049	5.504	5.450	5.731	5.049	5.504	5.450	5.731	ns
		GCLK PLL	$t_{co}$	3.685	3.691	5.246	5.686	6.262	6.076	6.497	5.686	6.262	6.076	6.497	ns
12mA	GCLK	$t_{co}$	3.281	3.281	4.659	5.049	5.504	5.450	5.731	5.049	5.504	5.450	5.731	ns	
	GCLK PLL	$t_{co}$	3.685	3.691	5.246	5.686	6.262	6.076	6.497	5.686	6.262	6.076	6.497	ns	

**Table 1-113.** EP3SE80 Column Pins Output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.290	3.290	4.656	5.044	5.499	5.450	5.726	5.044	5.499	5.450	5.726	ns	
		GCLK PLL	$t_{co}$	3.691	3.697	5.245	5.683	6.257	6.071	6.492	5.683	6.257	6.071	6.492	ns	
	16mA	GCLK	$t_{co}$	3.279	3.279	4.649	5.039	5.511	5.455	5.738	5.039	5.511	5.455	5.738	ns	
		GCLK PLL	$t_{co}$	3.694	3.700	5.253	5.692	6.269	6.083	6.504	5.692	6.269	6.083	6.504	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.334	3.334	4.714	5.107	5.541	5.521	5.768	5.107	5.541	5.521	5.768	ns	
		GCLK PLL	$t_{co}$	3.715	3.721	5.280	5.722	6.299	6.113	6.534	5.722	6.299	6.113	6.534	ns	
	6mA	GCLK	$t_{co}$	3.309	3.309	4.693	5.086	5.532	5.495	5.759	5.086	5.532	5.495	5.759	ns	
		GCLK PLL	$t_{co}$	3.701	3.707	5.270	5.712	6.290	6.104	6.525	5.712	6.290	6.104	6.525	ns	
	8mA	GCLK	$t_{co}$	3.289	3.289	4.672	5.065	5.518	5.471	5.745	5.065	5.518	5.471	5.745	ns	
		GCLK PLL	$t_{co}$	3.690	3.696	5.256	5.698	6.276	6.090	6.511	5.698	6.276	6.090	6.511	ns	
	10mA	GCLK	$t_{co}$	3.280	3.280	4.666	5.059	5.522	5.460	5.749	5.059	5.522	5.460	5.749	ns	
		GCLK PLL	$t_{co}$	3.689	3.695	5.259	5.701	6.280	6.094	6.515	5.701	6.280	6.094	6.515	ns	
	12mA	GCLK	$t_{co}$	3.275	3.275	4.659	5.051	5.516	5.450	5.743	5.051	5.516	5.450	5.743	ns	
		GCLK PLL	$t_{co}$	3.686	3.692	5.254	5.696	6.274	6.088	6.509	5.696	6.274	6.088	6.509	ns	
	SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.284	3.284	4.652	5.042	5.499	5.450	5.726	5.042	5.499	5.450	5.726	ns
			GCLK PLL	$t_{co}$	3.688	3.694	5.243	5.682	6.257	6.071	6.492	5.682	6.257	6.071	6.492	ns
16mA		GCLK	$t_{co}$	3.274	3.274	4.646	5.036	5.510	5.456	5.737	5.036	5.510	5.456	5.737	ns	
		GCLK PLL	$t_{co}$	3.691	3.697	5.250	5.691	6.268	6.082	6.503	5.691	6.268	6.082	6.503	ns	



**Table 1-113.** EP3SE80 Column Pins Output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =0.9V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.308	3.308	4.665	5.052	5.497	5.464	5.724	5.052	5.497	5.464	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.698	3.704	5.245	5.682	6.255	6.069	6.490	5.682	6.255	6.069	6.490	ns
	6mA	GCLK	t <sub>co</sub>	3.294	3.294	4.652	5.040	5.496	5.461	5.723	5.040	5.496	5.461	5.723	ns
		GCLK PLL	t <sub>co</sub>	3.691	3.697	5.243	5.680	6.254	6.068	6.489	5.680	6.254	6.068	6.489	ns
	8mA	GCLK	t <sub>co</sub>	3.278	3.278	4.642	5.029	5.489	5.434	5.716	5.029	5.489	5.434	5.716	ns
		GCLK PLL	t <sub>co</sub>	3.683	3.689	5.235	5.673	6.247	6.061	6.482	5.673	6.247	6.061	6.482	ns
	10mA	GCLK	t <sub>co</sub>	3.279	3.279	4.644	5.032	5.493	5.436	5.720	5.032	5.493	5.436	5.720	ns
		GCLK PLL	t <sub>co</sub>	3.686	3.692	5.238	5.676	6.251	6.065	6.486	5.676	6.251	6.065	6.486	ns
	12mA	GCLK	t <sub>co</sub>	3.271	3.271	4.640	5.028	5.497	5.436	5.724	5.028	5.497	5.436	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.683	3.689	5.241	5.680	6.255	6.069	6.490	5.680	6.255	6.069	6.490	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.274	3.274	4.631	5.018	5.493	5.432	5.720	5.018	5.493	5.432	5.720	ns
		GCLK PLL	t <sub>co</sub>	3.691	3.697	5.240	5.677	6.251	6.065	6.486	5.677	6.251	6.065	6.486	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.314	3.314	4.676	5.065	5.508	5.480	5.735	5.065	5.508	5.480	5.735	ns
		GCLK PLL	t <sub>co</sub>	3.703	3.709	5.253	5.692	6.266	6.080	6.501	5.692	6.266	6.080	6.501	ns
	6mA	GCLK	t <sub>co</sub>	3.302	3.302	4.670	5.060	5.511	5.469	5.738	5.060	5.511	5.469	5.738	ns
		GCLK PLL	t <sub>co</sub>	3.699	3.705	5.254	5.693	6.269	6.083	6.504	5.693	6.269	6.083	6.504	ns
	8mA	GCLK	t <sub>co</sub>	3.296	3.296	4.664	5.053	5.506	5.463	5.733	5.053	5.506	5.463	5.733	ns
		GCLK PLL	t <sub>co</sub>	3.695	3.701	5.250	5.689	6.264	6.078	6.499	5.689	6.264	6.078	6.499	ns
	10mA	GCLK	t <sub>co</sub>	3.284	3.284	4.652	5.042	5.499	5.450	5.726	5.042	5.499	5.450	5.726	ns
		GCLK PLL	t <sub>co</sub>	3.688	3.694	5.243	5.682	6.257	6.071	6.492	5.682	6.257	6.071	6.492	ns
	12mA	GCLK	t <sub>co</sub>	3.279	3.279	4.653	5.043	5.509	5.446	5.736	5.043	5.509	5.446	5.736	ns
		GCLK PLL	t <sub>co</sub>	3.689	3.695	5.250	5.690	6.267	6.081	6.502	5.690	6.267	6.081	6.502	ns
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.275	3.275	4.629	5.015	5.483	5.425	5.710	5.015	5.483	5.425	5.710	ns
		GCLK PLL	t <sub>co</sub>	3.687	3.693	5.231	5.668	6.241	6.055	6.476	5.668	6.241	6.055	6.476	ns

**Table 1–113.** EP3SE80 Column Pins Output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.312	3.312	4.688	5.081	5.529	5.499	5.756	5.081	5.529	5.499	5.756	ns	
		GCLK PLL	$t_{co}$	3.706	3.712	5.267	5.709	6.287	6.101	6.522	5.709	6.287	6.101	6.522	ns	
	6mA	GCLK	$t_{co}$	3.298	3.298	4.674	5.066	5.520	5.482	5.747	5.066	5.520	5.482	5.747	ns	
		GCLK PLL	$t_{co}$	3.698	3.704	5.258	5.700	6.278	6.092	6.513	5.700	6.278	6.092	6.513	ns	
	8mA	GCLK	$t_{co}$	3.292	3.292	4.675	5.068	5.529	5.478	5.756	5.068	5.529	5.478	5.756	ns	
		GCLK PLL	$t_{co}$	3.699	3.705	5.266	5.708	6.287	6.101	6.522	5.708	6.287	6.101	6.522	ns	
	10mA	GCLK	$t_{co}$	3.277	3.277	4.657	5.049	5.515	5.455	5.742	5.049	5.515	5.455	5.742	ns	
		GCLK PLL	$t_{co}$	3.688	3.694	5.253	5.695	6.273	6.087	6.508	5.695	6.273	6.087	6.508	ns	
	12mA	GCLK	$t_{co}$	3.277	3.277	4.657	5.049	5.516	5.456	5.743	5.049	5.516	5.456	5.743	ns	
		GCLK PLL	$t_{co}$	3.688	3.694	5.253	5.695	6.274	6.088	6.509	5.695	6.274	6.088	6.509	ns	
	1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.327	3.327	4.692	5.083	5.529	5.534	5.756	5.083	5.529	5.534	5.756	ns
			GCLK PLL	$t_{co}$	3.709	3.715	5.269	5.710	6.287	6.101	6.522	5.710	6.287	6.101	6.522	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.395	3.395	4.701	5.080	5.554	5.509	5.781	5.080	5.554	5.509	5.781	ns	
		GCLK PLL	$t_{co}$	3.812	3.818	5.314	5.744	6.312	6.126	6.547	5.744	6.312	6.126	6.547	ns	
3.0-V PCI-X	—	GCLK	$t_{co}$	3.395	3.395	4.701	5.080	5.554	5.509	5.781	5.080	5.554	5.509	5.781	ns	
		GCLK PLL	$t_{co}$	3.812	3.818	5.314	5.744	6.312	6.126	6.547	5.744	6.312	6.126	6.547	ns	

Table 1–114 lists the EP3SE80 row pins output timing parameters for single-ended I/O standards.

**Table 1–114.** EP3SE80 Row Pins Output Timing Parameters (Part 1 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.238	3.493	4.856	5.245	5.757	5.609	5.907	5.368	5.891	5.735	5.990	ns
		GCLK PLL	$t_{co}$	1.439	1.634	2.039	2.121	2.343	2.334	2.309	2.226	2.430	2.441	2.301	ns
	8mA	GCLK	$t_{co}$	3.156	3.399	4.726	5.107	5.612	5.464	5.762	5.227	5.742	5.586	5.841	ns
		GCLK PLL	$t_{co}$	1.346	1.529	1.909	1.983	2.198	2.189	2.195	2.085	2.281	2.292	2.186	ns
	12mA	GCLK	$t_{co}$	3.077	3.310	4.607	4.984	5.484	5.348	5.634	5.107	5.610	5.468	5.709	ns
		GCLK PLL	$t_{co}$	1.247	1.423	1.790	1.860	2.070	2.061	2.099	1.958	2.149	2.160	2.086	ns

**Table 1-114.** EP3SE80 Row Pins Output Timing Parameters (Part 2 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.248	3.497	4.864	5.250	5.761	5.613	5.911	5.374	5.895	5.739	5.994	ns
		GCLK PLL	$t_{co}$	1.449	1.638	2.047	2.126	2.347	2.338	2.318	2.232	2.434	2.445	2.313	ns
	8mA	GCLK	$t_{co}$	3.081	3.314	4.613	4.999	5.490	5.358	5.640	5.119	5.617	5.477	5.716	ns
		GCLK PLL	$t_{co}$	1.251	1.429	1.796	1.866	2.076	2.067	2.109	1.964	2.156	2.167	2.095	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.192	3.439	4.808	5.198	5.713	5.565	5.863	5.325	5.849	5.693	5.948	ns
		GCLK PLL	$t_{co}$	1.393	1.580	1.991	2.074	2.299	2.290	2.275	2.183	2.388	2.399	2.267	ns
	8mA	GCLK	$t_{co}$	3.082	3.319	4.655	5.039	5.549	5.401	5.699	5.163	5.685	5.528	5.783	ns
		GCLK PLL	$t_{co}$	1.268	1.453	1.838	1.915	2.135	2.126	2.130	2.021	2.224	2.234	2.121	ns
	12mA	GCLK	$t_{co}$	3.045	3.281	4.582	4.957	5.461	5.313	5.611	5.077	5.592	5.435	5.690	ns
		GCLK PLL	$t_{co}$	1.229	1.402	1.756	1.832	2.047	2.038	2.060	1.935	2.131	2.141	2.048	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.106	3.358	4.702	5.091	5.603	5.455	5.753	5.217	5.738	5.581	5.836	ns
		GCLK PLL	$t_{co}$	1.307	1.499	1.885	1.967	2.189	2.180	2.166	2.075	2.277	2.287	2.157	ns
	8mA	GCLK	$t_{co}$	3.032	3.265	4.554	4.928	5.422	5.281	5.572	5.047	5.552	5.401	5.650	ns
		GCLK PLL	$t_{co}$	1.207	1.380	1.721	1.793	2.008	1.999	2.032	1.895	2.091	2.101	2.019	ns
2.5 V	4mA	GCLK	$t_{co}$	3.218	3.475	4.940	5.352	5.885	5.737	6.035	5.485	6.028	5.871	6.126	ns
		GCLK PLL	$t_{co}$	1.419	1.616	2.123	2.228	2.471	2.462	2.420	2.343	2.567	2.577	2.419	ns
	8mA	GCLK	$t_{co}$	3.124	3.377	4.785	5.189	5.715	5.567	5.865	5.318	5.854	5.697	5.952	ns
		GCLK PLL	$t_{co}$	1.309	1.518	1.968	2.065	2.301	2.292	2.278	2.176	2.393	2.403	2.274	ns
	12mA	GCLK	$t_{co}$	3.067	3.321	4.679	5.070	5.589	5.441	5.739	5.195	5.724	5.567	5.822	ns
		GCLK PLL	$t_{co}$	1.263	1.441	1.857	1.946	2.175	2.166	2.187	2.053	2.263	2.273	2.180	ns
1.8 V	2mA	GCLK	$t_{co}$	3.451	3.722	5.326	5.781	6.360	6.212	6.510	5.922	6.504	6.356	6.611	ns
		GCLK PLL	$t_{co}$	1.652	1.862	2.507	2.657	2.761	2.937	2.944	2.780	2.883	3.062	2.957	ns
	4mA	GCLK	$t_{co}$	3.229	3.520	4.999	5.412	5.955	5.807	6.105	5.557	6.098	5.949	6.204	ns
		GCLK PLL	$t_{co}$	1.427	1.660	2.180	2.288	2.401	2.532	2.539	2.415	2.522	2.655	2.550	ns
	6mA	GCLK	$t_{co}$	3.161	3.418	4.846	5.262	5.796	5.648	5.946	5.389	5.925	5.777	6.032	ns
		GCLK PLL	$t_{co}$	1.362	1.558	2.027	2.138	2.301	2.373	2.380	2.247	2.416	2.483	2.378	ns
	8mA	GCLK	$t_{co}$	3.136	3.379	4.770	5.176	5.699	5.552	5.849	5.300	5.831	5.683	5.938	ns
		GCLK PLL	$t_{co}$	1.315	1.497	1.950	2.044	2.235	2.276	2.297	2.152	2.344	2.389	2.290	ns

**Table 1-114.** EP3SE80 Row Pins Output Timing Parameters (Part 3 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.5 V	2mA	GCLK	$t_{co}$	3.362	3.640	5.236	5.694	6.288	6.140	6.438	5.829	6.428	6.280	6.535	ns
		GCLK PLL	$t_{co}$	1.563	1.780	2.417	2.570	2.698	2.865	2.872	2.687	2.818	2.986	2.881	ns
	4mA	GCLK	$t_{co}$	3.152	3.396	4.831	5.257	5.797	5.649	5.947	5.383	5.924	5.776	6.031	ns
		GCLK PLL	$t_{co}$	1.331	1.522	2.012	2.133	2.304	2.374	2.381	2.241	2.417	2.482	2.377	ns
	6mA	GCLK	$t_{co}$	3.125	3.370	4.758	5.168	5.691	5.552	5.841	5.293	5.819	5.677	5.926	ns
		GCLK PLL	$t_{co}$	1.304	1.488	1.939	2.037	2.235	2.268	2.297	2.143	2.344	2.377	2.290	ns
	8mA	GCLK	$t_{co}$	3.106	3.359	4.738	5.143	5.672	5.533	5.822	5.269	5.797	5.658	5.904	ns
		GCLK PLL	$t_{co}$	1.285	1.477	1.917	2.019	2.216	2.249	2.278	2.125	2.325	2.355	2.271	ns
1.2 V	2mA	GCLK	$t_{co}$	3.305	3.565	5.146	5.608	6.213	6.065	6.363	5.741	6.344	6.196	6.451	ns
		GCLK PLL	$t_{co}$	1.506	1.705	2.327	2.484	2.637	2.790	2.797	2.599	2.749	2.902	2.797	ns
	4mA	GCLK	$t_{co}$	3.157	3.400	4.853	5.285	5.838	5.690	5.988	5.408	5.966	5.818	6.073	ns
		GCLK PLL	$t_{co}$	1.336	1.518	2.034	2.161	2.352	2.415	2.422	2.266	2.461	2.524	2.419	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.071	3.309	4.672	5.060	5.557	5.426	5.707	5.180	5.686	5.548	5.785	ns
		GCLK PLL	$t_{co}$	1.248	1.427	1.835	1.918	2.143	2.134	2.177	2.020	2.225	2.236	2.166	ns
	12mA	GCLK	$t_{co}$	3.066	3.305	4.669	5.058	5.549	5.424	5.699	5.179	5.679	5.547	5.778	ns
		GCLK PLL	$t_{co}$	1.236	1.415	1.827	1.910	2.135	2.126	2.175	2.012	2.218	2.229	2.165	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.057	3.294	4.654	5.042	5.522	5.407	5.672	5.162	5.652	5.529	5.751	ns
		GCLK PLL	$t_{co}$	1.220	1.397	1.802	1.885	2.108	2.099	2.158	1.986	2.191	2.202	2.147	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.085	3.323	4.689	5.080	5.578	5.447	5.724	5.199	5.698	5.568	5.802	ns
		GCLK PLL	$t_{co}$	1.264	1.441	1.849	1.934	2.130	2.151	2.192	2.035	2.235	2.254	2.181	ns
	6mA	GCLK	$t_{co}$	3.080	3.318	4.687	5.079	5.577	5.446	5.723	5.197	5.696	5.566	5.800	ns
		GCLK PLL	$t_{co}$	1.259	1.436	1.847	1.933	2.129	2.150	2.191	2.033	2.233	2.252	2.179	ns
	8mA	GCLK	$t_{co}$	3.069	3.307	4.677	5.069	5.567	5.436	5.713	5.188	5.687	5.557	5.791	ns
		GCLK PLL	$t_{co}$	1.248	1.425	1.837	1.923	2.119	2.140	2.181	2.024	2.224	2.243	2.170	ns
	10mA	GCLK	$t_{co}$	3.058	3.296	4.664	5.056	5.554	5.423	5.700	5.176	5.675	5.545	5.779	ns
		GCLK PLL	$t_{co}$	1.237	1.414	1.824	1.910	2.106	2.127	2.168	2.012	2.212	2.231	2.158	ns
12mA	GCLK	$t_{co}$	3.058	3.295	4.664	5.056	5.554	5.423	5.700	5.175	5.675	5.545	5.779	ns	
	GCLK PLL	$t_{co}$	1.237	1.413	1.824	1.910	2.106	2.127	2.168	2.011	2.212	2.231	2.158	ns	

**Table 1-114.** EP3SE80 Row Pins Output Timing Parameters (Part 4 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.066	3.302	4.663	5.053	5.549	5.418	5.695	5.171	5.669	5.539	5.773	ns
		GCLK PLL	$t_{co}$	1.245	1.420	1.823	1.907	2.101	2.122	2.163	2.007	2.206	2.225	2.152	ns
	16mA	GCLK	$t_{co}$	3.067	3.305	4.669	5.061	5.559	5.428	5.705	5.180	5.680	5.550	5.784	ns
		GCLK PLL	$t_{co}$	1.246	1.423	1.829	1.915	2.111	2.132	2.173	2.016	2.217	2.236	2.163	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.088	3.326	4.698	5.091	5.591	5.460	5.740	5.209	5.710	5.580	5.817	ns
		GCLK PLL	$t_{co}$	1.267	1.444	1.858	1.946	2.143	2.167	2.205	2.046	2.247	2.268	2.193	ns
	6mA	GCLK	$t_{co}$	3.074	3.312	4.687	5.081	5.581	5.450	5.727	5.200	5.701	5.571	5.805	ns
		GCLK PLL	$t_{co}$	1.253	1.430	1.847	1.935	2.133	2.154	2.195	2.036	2.238	2.257	2.184	ns
	8mA	GCLK	$t_{co}$	3.063	3.300	4.674	5.068	5.568	5.437	5.714	5.187	5.688	5.558	5.792	ns
		GCLK PLL	$t_{co}$	1.242	1.418	1.834	1.922	2.120	2.141	2.182	2.023	2.225	2.244	2.171	ns
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.073	3.308	4.662	5.051	5.547	5.416	5.693	5.170	5.666	5.536	5.770	ns
		GCLK PLL	$t_{co}$	1.252	1.426	1.822	1.905	2.099	2.120	2.161	2.006	2.203	2.222	2.149	ns
	6mA	GCLK	$t_{co}$	3.066	3.302	4.660	5.050	5.546	5.415	5.692	5.169	5.666	5.536	5.770	ns
		GCLK PLL	$t_{co}$	1.245	1.420	1.820	1.904	2.098	2.119	2.160	2.005	2.203	2.222	2.149	ns
	8mA	GCLK	$t_{co}$	3.057	3.294	4.653	5.043	5.539	5.408	5.685	5.162	5.659	5.529	5.763	ns
		GCLK PLL	$t_{co}$	1.236	1.412	1.813	1.897	2.091	2.112	2.153	1.998	2.196	2.215	2.142	ns
	10mA	GCLK	$t_{co}$	3.060	3.296	4.656	5.046	5.543	5.412	5.689	5.165	5.662	5.532	5.766	ns
		GCLK PLL	$t_{co}$	1.239	1.414	1.816	1.900	2.095	2.116	2.157	2.001	2.199	2.218	2.145	ns
	12mA	GCLK	$t_{co}$	3.056	3.293	4.658	5.049	5.546	5.415	5.692	5.168	5.667	5.537	5.771	ns
		GCLK PLL	$t_{co}$	1.235	1.411	1.818	1.903	2.098	2.119	2.160	2.004	2.204	2.223	2.150	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.064	3.301	4.656	5.046	5.542	5.411	5.688	5.164	5.661	5.531	5.765	ns
		GCLK PLL	$t_{co}$	1.243	1.419	1.816	1.900	2.094	2.115	2.156	2.000	2.198	2.217	2.144	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.079	3.314	4.671	5.061	5.558	5.427	5.704	5.179	5.677	5.547	5.781	ns
		GCLK PLL	$t_{co}$	1.258	1.432	1.831	1.915	2.110	2.131	2.172	2.015	2.214	2.233	2.160	ns
	6mA	GCLK	$t_{co}$	3.073	3.309	4.672	5.063	5.560	5.429	5.706	5.181	5.680	5.550	5.784	ns
		GCLK PLL	$t_{co}$	1.252	1.427	1.832	1.917	2.112	2.133	2.174	2.017	2.217	2.236	2.163	ns
	8mA	GCLK	$t_{co}$	3.069	3.305	4.667	5.058	5.555	5.424	5.701	5.176	5.674	5.544	5.778	ns
		GCLK PLL	$t_{co}$	1.248	1.423	1.827	1.912	2.107	2.128	2.169	2.012	2.211	2.230	2.157	ns

**Table 1–114.** EP3SE80 Row Pins Output Timing Parameters (Part 5 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.081	3.316	4.684	5.077	5.577	5.446	5.723	5.195	5.696	5.566	5.800	ns
		GCLK PLL	$t_{co}$	1.260	1.434	1.844	1.931	2.129	2.150	2.191	2.031	2.233	2.252	2.179	ns
	6mA	GCLK	$t_{co}$	3.072	3.308	4.675	5.068	5.568	5.437	5.714	5.186	5.687	5.557	5.791	ns
		GCLK PLL	$t_{co}$	1.251	1.426	1.835	1.922	2.120	2.141	2.182	2.022	2.224	2.243	2.170	ns
	8mA	GCLK	$t_{co}$	3.071	3.308	4.682	5.076	5.577	5.446	5.723	5.195	5.697	5.567	5.801	ns
		GCLK PLL	$t_{co}$	1.250	1.426	1.842	1.930	2.129	2.150	2.191	2.031	2.234	2.253	2.180	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.177	3.415	4.724	5.106	5.581	5.466	5.731	5.228	5.698	5.590	5.810	ns
		GCLK PLL	$t_{co}$	1.333	1.510	1.860	1.936	2.152	2.143	2.217	2.038	2.252	2.248	2.208	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.177	3.415	4.724	5.106	5.581	5.466	5.731	5.228	5.698	5.590	5.810	ns
		GCLK PLL	$t_{co}$	1.333	1.510	1.860	1.936	2.152	2.143	2.217	2.038	2.252	2.248	2.208	ns

Table 1–115 through Table 1–118 list the maximum I/O timing parameters for EP3SE80 devices for differential I/O standards.

Table 1–115 lists the EP3SE80 column pins input timing parameters for differential I/O standards.

**Table 1–115.** EP3SE80 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
LVDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
MINI-LVDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
RSDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.813	-0.852	-1.258	-1.368	-1.483	-1.423	-1.794	-1.368	-1.482	-1.428	-1.837	ns
		$t_h$	0.942	0.999	1.460	1.595	1.731	1.659	2.031	1.604	1.739	1.674	2.075	ns
	GCLK PLL	$t_{su}$	1.144	1.171	1.802	2.025	2.242	2.134	2.045	2.042	2.260	2.147	2.091	ns
		$t_h$	-0.882	-0.886	-1.383	-1.555	-1.721	-1.641	-1.544	-1.563	-1.729	-1.645	-1.588	ns

Table 1-115. EP3SE80 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.813	-0.852	-1.258	-1.368	-1.483	-1.423	-1.794	-1.368	-1.482	-1.428	-1.837	ns
		t <sub>h</sub>	0.942	0.999	1.460	1.595	1.731	1.659	2.031	1.604	1.739	1.674	2.075	ns
	GCLK PLL	t <sub>su</sub>	1.144	1.171	1.802	2.025	2.242	2.134	2.045	2.042	2.260	2.147	2.091	ns
		t <sub>h</sub>	-0.882	-0.886	-1.383	-1.555	-1.721	-1.641	-1.544	-1.563	-1.729	-1.645	-1.588	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		t <sub>h</sub>	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		t <sub>h</sub>	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		t <sub>h</sub>	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		t <sub>h</sub>	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		t <sub>h</sub>	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	t <sub>su</sub>	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		t <sub>h</sub>	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		t <sub>h</sub>	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	t <sub>su</sub>	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		t <sub>h</sub>	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		t <sub>h</sub>	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		t <sub>h</sub>	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		t <sub>h</sub>	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		t <sub>h</sub>	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		t <sub>h</sub>	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	t <sub>su</sub>	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		t <sub>h</sub>	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		t <sub>h</sub>	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	t <sub>su</sub>	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		t <sub>h</sub>	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns

**Table 1–115.** EP3SE80 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.840	-0.881	-1.289	-1.395	-1.518	-1.460	-1.828	-1.394	-1.510	-1.459	-1.866	ns
		$t_h$	0.969	1.028	1.493	1.625	1.769	1.697	2.070	1.633	1.772	1.706	2.109	ns
	GCLK PLL	$t_{su}$	1.117	1.142	1.771	1.998	2.207	2.097	2.011	2.016	2.232	2.116	2.062	ns
		$t_h$	-0.855	-0.857	-1.350	-1.525	-1.683	-1.603	-1.505	-1.534	-1.696	-1.613	-1.554	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.840	-0.881	-1.289	-1.395	-1.518	-1.460	-1.828	-1.394	-1.510	-1.459	-1.866	ns
		$t_h$	0.969	1.028	1.493	1.625	1.769	1.697	2.070	1.633	1.772	1.706	2.109	ns
	GCLK PLL	$t_{su}$	1.117	1.142	1.771	1.998	2.207	2.097	2.011	2.016	2.232	2.116	2.062	ns
		$t_h$	-0.855	-0.857	-1.350	-1.525	-1.683	-1.603	-1.505	-1.534	-1.696	-1.613	-1.554	ns

Table 1–116 lists the EP3SE80 row pins input timing parameters for differential I/O standards.

**Table 1–116.** EP3SE80 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		$t_h$	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	$t_{su}$	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		$t_h$	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
MINI-LVDS	GCLK	$t_{su}$	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		$t_h$	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	$t_{su}$	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		$t_h$	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
RSDS	GCLK	$t_{su}$	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		$t_h$	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	$t_{su}$	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		$t_h$	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.749	-0.794	-1.145	-1.244	-1.343	-1.291	-1.633	-1.246	-1.344	-1.293	-1.677	ns
		$t_h$	0.875	0.936	1.345	1.468	1.587	1.524	1.867	1.479	1.597	1.535	1.912	ns
	GCLK PLL	$t_{su}$	1.156	1.174	1.864	2.104	2.344	2.224	2.163	2.120	2.362	2.240	2.210	ns
		$t_h$	-0.893	-0.894	-1.447	-1.639	-1.828	-1.736	-1.666	-1.644	-1.834	-1.741	-1.709	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.749	-0.794	-1.145	-1.244	-1.343	-1.291	-1.633	-1.246	-1.344	-1.293	-1.677	ns
		$t_h$	0.875	0.936	1.345	1.468	1.587	1.524	1.867	1.479	1.597	1.535	1.912	ns
	GCLK PLL	$t_{su}$	1.156	1.174	1.864	2.104	2.344	2.224	2.163	2.120	2.362	2.240	2.210	ns
		$t_h$	-0.893	-0.894	-1.447	-1.639	-1.828	-1.736	-1.666	-1.644	-1.834	-1.741	-1.709	ns



**Table 1-116.** EP3SE80 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.781	-0.827	-1.178	-1.275	-1.384	-1.333	-1.673	-1.273	-1.378	-1.329	-1.712	ns
		$t_h$	0.907	0.969	1.379	1.502	1.631	1.568	1.912	1.509	1.636	1.573	1.952	ns
	GCLK PLL	$t_{su}$	1.124	1.141	1.827	2.068	2.299	2.178	2.118	2.089	2.323	2.199	2.170	ns
		$t_h$	-0.861	-0.861	-1.411	-1.601	-1.780	-1.688	-1.617	-1.610	-1.792	-1.699	-1.665	ns

**Table 1-116.** EP3SE80 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.781	-0.827	-1.178	-1.275	-1.384	-1.333	-1.673	-1.273	-1.378	-1.329	-1.712	ns
		$t_h$	0.907	0.969	1.379	1.502	1.631	1.568	1.912	1.509	1.636	1.573	1.952	ns
	GCLK PLL	$t_{su}$	1.124	1.141	1.827	2.068	2.299	2.178	2.118	2.089	2.323	2.199	2.170	ns
		$t_h$	-0.861	-0.861	-1.411	-1.601	-1.780	-1.688	-1.617	-1.610	-1.792	-1.699	-1.665	ns

Table 1-117 lists the EP3SE80 column pins output timing parameters for differential I/O standards.

**Table 1-117.** EP3SE80 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
LVDS_E_1R	—	GCLK	$t_{co}$	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	$t_{co}$	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	$t_{co}$	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns
MINI- LVDS_E_1R	—	GCLK	$t_{co}$	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	$t_{co}$	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
MINI- LVDS_E_3R	—	GCLK	$t_{co}$	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	$t_{co}$	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	$t_{co}$	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	$t_{co}$	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns

**Table 1-117.** EP3SE80 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.179	3.420	4.828	5.233	5.750	5.610	5.910	5.358	5.875	5.736	5.985	ns
		GCLK PLL	t <sub>co</sub>	1.355	1.535	1.984	2.084	2.298	2.309	2.335	2.190	2.407	2.417	2.323	ns
	6mA	GCLK	t <sub>co</sub>	3.169	3.410	4.818	5.222	5.740	5.600	5.900	5.347	5.865	5.726	5.975	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.525	1.974	2.073	2.288	2.299	2.325	2.179	2.397	2.407	2.313	ns
	8mA	GCLK	t <sub>co</sub>	3.169	3.410	4.821	5.226	5.744	5.604	5.904	5.352	5.870	5.731	5.980	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.525	1.977	2.077	2.292	2.303	2.329	2.184	2.402	2.412	2.318	ns
	10mA	GCLK	t <sub>co</sub>	3.162	3.404	4.814	5.220	5.738	5.598	5.898	5.345	5.864	5.725	5.974	ns
		GCLK PLL	t <sub>co</sub>	1.338	1.519	1.970	2.071	2.286	2.297	2.323	2.177	2.396	2.406	2.312	ns
	12mA	GCLK	t <sub>co</sub>	3.161	3.402	4.811	5.217	5.735	5.595	5.895	5.342	5.860	5.721	5.970	ns
		GCLK PLL	t <sub>co</sub>	1.337	1.517	1.967	2.068	2.283	2.294	2.320	2.174	2.392	2.402	2.308	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.183	3.424	4.832	5.237	5.754	5.614	5.914	5.362	5.880	5.741	5.990	ns
		GCLK PLL	t <sub>co</sub>	1.359	1.539	1.988	2.088	2.302	2.313	2.339	2.194	2.412	2.422	2.328	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.173	3.413	4.811	5.214	5.729	5.589	5.889	5.338	5.853	5.714	5.963	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.528	1.967	2.065	2.277	2.288	2.314	2.170	2.385	2.395	2.301	ns
	6mA	GCLK	t <sub>co</sub>	3.168	3.409	4.811	5.214	5.730	5.590	5.890	5.339	5.855	5.716	5.965	ns
		GCLK PLL	t <sub>co</sub>	1.344	1.524	1.967	2.065	2.278	2.289	2.315	2.171	2.387	2.397	2.303	ns
	8mA	GCLK	t <sub>co</sub>	3.166	3.407	4.810	5.213	5.728	5.588	5.888	5.338	5.854	5.715	5.964	ns
		GCLK PLL	t <sub>co</sub>	1.342	1.522	1.966	2.064	2.276	2.287	2.313	2.170	2.386	2.396	2.302	ns
	10mA	GCLK	t <sub>co</sub>	3.158	3.398	4.800	5.203	5.719	5.579	5.879	5.328	5.844	5.705	5.954	ns
		GCLK PLL	t <sub>co</sub>	1.334	1.513	1.956	2.054	2.267	2.278	2.304	2.160	2.376	2.386	2.292	ns
	12mA	GCLK	t <sub>co</sub>	3.159	3.400	4.806	5.210	5.727	5.587	5.887	5.336	5.853	5.714	5.963	ns
		GCLK PLL	t <sub>co</sub>	1.335	1.515	1.962	2.061	2.275	2.286	2.312	2.168	2.385	2.395	2.301	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.158	3.397	4.789	5.191	5.705	5.565	5.865	5.315	5.829	5.690	5.939	ns
		GCLK PLL	t <sub>co</sub>	1.334	1.512	1.945	2.042	2.253	2.264	2.290	2.147	2.361	2.371	2.277	ns

**Table 1-117.** EP3SE80 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{CO}$	3.170	3.410	4.807	5.209	5.723	5.583	5.883	5.334	5.848	5.709	5.958	ns
		GCLK PLL	$t_{CO}$	1.346	1.525	1.963	2.060	2.271	2.282	2.308	2.166	2.380	2.390	2.296	ns
	6mA	GCLK	$t_{CO}$	3.166	3.407	4.808	5.211	5.727	5.587	5.887	5.336	5.852	5.713	5.962	ns
		GCLK PLL	$t_{CO}$	1.342	1.522	1.964	2.062	2.275	2.286	2.312	2.168	2.384	2.394	2.300	ns
	8mA	GCLK	$t_{CO}$	3.156	3.396	4.797	5.200	5.715	5.575	5.875	5.325	5.840	5.701	5.950	ns
		GCLK PLL	$t_{CO}$	1.332	1.511	1.953	2.051	2.263	2.274	2.300	2.157	2.372	2.382	2.288	ns
	10mA	GCLK	$t_{CO}$	3.154	3.394	4.795	5.197	5.713	5.573	5.873	5.323	5.838	5.699	5.948	ns
		GCLK PLL	$t_{CO}$	1.330	1.509	1.951	2.048	2.261	2.272	2.298	2.155	2.370	2.380	2.286	ns
	12mA	GCLK	$t_{CO}$	3.154	3.395	4.798	5.202	5.718	5.578	5.878	5.327	5.844	5.705	5.954	ns
		GCLK PLL	$t_{CO}$	1.330	1.510	1.954	2.053	2.266	2.277	2.303	2.159	2.376	2.386	2.292	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{CO}$	3.158	3.398	4.795	5.197	5.712	5.572	5.872	5.322	5.837	5.698	5.947	ns
		GCLK PLL	$t_{CO}$	1.334	1.513	1.951	2.048	2.260	2.271	2.297	2.154	2.369	2.379	2.285	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{CO}$	3.184	3.427	4.840	5.245	5.762	5.622	5.922	5.370	5.887	5.748	5.997	ns
		GCLK PLL	$t_{CO}$	1.360	1.542	1.996	2.096	2.310	2.321	2.347	2.202	2.419	2.429	2.335	ns
	6mA	GCLK	$t_{CO}$	3.170	3.413	4.828	5.234	5.752	5.612	5.912	5.360	5.878	5.739	5.988	ns
		GCLK PLL	$t_{CO}$	1.346	1.528	1.984	2.085	2.300	2.311	2.337	2.192	2.410	2.420	2.326	ns
	8mA	GCLK	$t_{CO}$	3.158	3.400	4.811	5.216	5.734	5.594	5.894	5.342	5.860	5.721	5.970	ns
		GCLK PLL	$t_{CO}$	1.334	1.515	1.967	2.067	2.282	2.293	2.319	2.174	2.392	2.402	2.308	ns
	10mA	GCLK	$t_{CO}$	3.158	3.400	4.814	5.220	5.738	5.598	5.898	5.346	5.865	5.726	5.975	ns
		GCLK PLL	$t_{CO}$	1.334	1.515	1.970	2.071	2.286	2.297	2.323	2.178	2.397	2.407	2.313	ns
	12mA	GCLK	$t_{CO}$	3.154	3.396	4.807	5.212	5.731	5.591	5.891	5.339	5.857	5.718	5.967	ns
		GCLK PLL	$t_{CO}$	1.330	1.511	1.963	2.063	2.279	2.290	2.316	2.171	2.389	2.399	2.305	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	$t_{CO}$	3.158	3.398	4.800	5.203	5.719	5.579	5.879	5.328	5.844	5.705	5.954	ns
		GCLK PLL	$t_{CO}$	1.334	1.513	1.956	2.054	2.267	2.278	2.304	2.160	2.376	2.386	2.292	ns
	16mA	GCLK	$t_{CO}$	3.159	3.400	4.808	5.213	5.730	5.590	5.890	5.338	5.856	5.717	5.966	ns
		GCLK PLL	$t_{CO}$	1.335	1.515	1.964	2.064	2.278	2.289	2.315	2.170	2.388	2.398	2.304	ns

**Table 1-117.** EP3SE80 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.187	3.430	4.839	5.243	5.760	5.620	5.920	5.369	5.885	5.746	5.995	ns
		GCLK PLL	$t_{co}$	1.363	1.545	1.995	2.094	2.308	2.319	2.345	2.201	2.417	2.427	2.333	ns
	6mA	GCLK	$t_{co}$	3.176	3.418	4.827	5.231	5.748	5.608	5.908	5.357	5.873	5.734	5.983	ns
		GCLK PLL	$t_{co}$	1.352	1.533	1.983	2.082	2.296	2.307	2.333	2.189	2.405	2.415	2.321	ns
	8mA	GCLK	$t_{co}$	3.171	3.414	4.827	5.232	5.749	5.609	5.909	5.358	5.875	5.736	5.985	ns
		GCLK PLL	$t_{co}$	1.347	1.529	1.983	2.083	2.297	2.308	2.334	2.190	2.407	2.417	2.323	ns
	10mA	GCLK	$t_{co}$	3.157	3.399	4.809	5.213	5.730	5.590	5.890	5.339	5.857	5.718	5.967	ns
		GCLK PLL	$t_{co}$	1.333	1.514	1.965	2.064	2.278	2.289	2.315	2.171	2.389	2.399	2.305	ns
	12mA	GCLK	$t_{co}$	3.155	3.397	4.807	5.211	5.728	5.588	5.888	5.337	5.854	5.715	5.964	ns
		GCLK PLL	$t_{co}$	1.331	1.512	1.963	2.062	2.276	2.287	2.313	2.169	2.386	2.396	2.302	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.159	3.399	4.799	5.201	5.716	5.576	5.876	5.326	5.841	5.702	5.951	ns
		GCLK PLL	$t_{co}$	1.335	1.514	1.955	2.052	2.264	2.275	2.301	2.158	2.373	2.383	2.289	ns
	16mA	GCLK	$t_{co}$	3.159	3.400	4.807	5.211	5.728	5.588	5.888	5.337	5.854	5.715	5.964	ns
		GCLK PLL	$t_{co}$	1.335	1.515	1.963	2.062	2.276	2.287	2.313	2.169	2.386	2.396	2.302	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.175	3.417	4.823	5.226	5.742	5.602	5.902	5.352	5.867	5.728	5.977	ns
		GCLK PLL	$t_{co}$	1.351	1.532	1.979	2.077	2.290	2.301	2.327	2.184	2.399	2.409	2.315	ns
	10mA	GCLK	$t_{co}$	3.175	3.417	4.823	5.226	5.742	5.602	5.902	5.352	5.867	5.728	5.977	ns
		GCLK PLL	$t_{co}$	1.351	1.532	1.979	2.077	2.290	2.301	2.327	2.184	2.399	2.409	2.315	ns
	12mA	GCLK	$t_{co}$	3.165	3.407	4.813	5.216	5.732	5.592	5.892	5.342	5.858	5.719	5.968	ns
		GCLK PLL	$t_{co}$	1.341	1.522	1.969	2.067	2.280	2.291	2.317	2.174	2.390	2.400	2.306	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.158	3.399	4.799	5.201	5.716	5.576	5.876	5.326	5.841	5.702	5.951	ns
		GCLK PLL	$t_{co}$	1.334	1.514	1.955	2.052	2.264	2.275	2.301	2.158	2.373	2.383	2.289	ns

Table 1-118 lists the EP3SE80 row pins output timing parameters for differential I/O standards.

**Table 1-118.** EP3SE80 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	—	GCLK	$t_{CO}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{CO}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
LVDS_E_1R	—	GCLK	$t_{CO}$	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	$t_{CO}$	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
LVDS_E_3R	—	GCLK	$t_{CO}$	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	$t_{CO}$	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
MINI-LVDS	—	GCLK	$t_{CO}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{CO}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
MINI-LVDS_E_1R	—	GCLK	$t_{CO}$	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	$t_{CO}$	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
MINI-LVDS_E_3R	—	GCLK	$t_{CO}$	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	$t_{CO}$	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
RSDS	—	GCLK	$t_{CO}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{CO}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
RSDS_E_1R	—	GCLK	$t_{CO}$	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	$t_{CO}$	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
RSDS_E_3R	—	GCLK	$t_{CO}$	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	$t_{CO}$	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{CO}$	3.162	3.409	4.828	5.236	5.751	5.613	5.884	5.365	5.880	5.742	5.961	ns
		GCLK PLL	$t_{CO}$	1.359	1.544	2.004	2.106	2.318	2.332	2.330	2.217	2.433	2.442	2.319	ns
	6mA	GCLK	$t_{CO}$	3.148	3.395	4.815	5.223	5.738	5.600	5.871	5.351	5.867	5.729	5.948	ns
		GCLK PLL	$t_{CO}$	1.345	1.530	1.991	2.093	2.305	2.319	2.317	2.203	2.420	2.429	2.306	ns
	8mA	GCLK	$t_{CO}$	3.144	3.391	4.813	5.223	5.739	5.601	5.872	5.351	5.869	5.731	5.950	ns
		GCLK PLL	$t_{CO}$	1.341	1.526	1.989	2.093	2.306	2.320	2.318	2.203	2.422	2.431	2.308	ns

**Table 1-118.** EP3SE80 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.160	3.406	4.814	5.220	5.733	5.595	5.866	5.348	5.862	5.724	5.943	ns	
		GCLK PLL	$t_{co}$	1.357	1.541	1.990	2.090	2.300	2.314	2.312	2.200	2.415	2.424	2.301	ns	
	6mA	GCLK	$t_{co}$	3.149	3.396	4.810	5.216	5.730	5.592	5.863	5.345	5.859	5.721	5.940	ns	
		GCLK PLL	$t_{co}$	1.346	1.531	1.986	2.086	2.297	2.311	2.309	2.197	2.412	2.421	2.298	ns	
	8mA	GCLK	$t_{co}$	3.146	3.393	4.808	5.214	5.728	5.590	5.861	5.343	5.858	5.720	5.939	ns	
		GCLK PLL	$t_{co}$	1.343	1.528	1.984	2.084	2.295	2.309	2.307	2.195	2.411	2.420	2.297	ns	
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.157	3.403	4.809	5.215	5.727	5.589	5.860	5.343	5.856	5.718	5.937	ns	
		GCLK PLL	$t_{co}$	1.354	1.538	1.985	2.085	2.294	2.308	2.306	2.195	2.409	2.418	2.295	ns	
	6mA	GCLK	$t_{co}$	3.147	3.394	4.807	5.213	5.726	5.588	5.859	5.342	5.856	5.718	5.937	ns	
		GCLK PLL	$t_{co}$	1.344	1.529	1.983	2.083	2.293	2.307	2.305	2.194	2.409	2.418	2.295	ns	
	8mA	GCLK	$t_{co}$	3.133	3.380	4.792	5.198	5.712	5.574	5.845	5.327	5.841	5.703	5.922	ns	
		GCLK PLL	$t_{co}$	1.330	1.515	1.968	2.068	2.279	2.293	2.291	2.179	2.394	2.403	2.280	ns	
	10mA	GCLK	$t_{co}$	3.130	3.376	4.788	5.194	5.708	5.570	5.841	5.323	5.837	5.699	5.918	ns	
		GCLK PLL	$t_{co}$	1.327	1.511	1.964	2.064	2.275	2.289	2.287	2.175	2.390	2.399	2.276	ns	
	12mA	GCLK	$t_{co}$	3.127	3.374	4.789	5.197	5.711	5.573	5.844	5.326	5.841	5.703	5.922	ns	
		GCLK PLL	$t_{co}$	1.324	1.509	1.965	2.067	2.278	2.292	2.290	2.178	2.394	2.403	2.280	ns	
	16mA	GCLK	$t_{co}$	3.128	3.374	4.779	5.185	5.698	5.560	5.831	5.313	5.827	5.689	5.908	ns	
		GCLK PLL	$t_{co}$	1.325	1.509	1.955	2.055	2.265	2.279	2.277	2.165	2.380	2.389	2.266	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.177	3.427	4.850	5.258	5.774	5.636	5.907	5.387	5.903	5.765	5.984	ns
			GCLK PLL	$t_{co}$	1.374	1.562	2.026	2.128	2.341	2.355	2.353	2.239	2.456	2.465	2.342	ns
6mA		GCLK	$t_{co}$	3.153	3.403	4.832	5.241	5.757	5.619	5.890	5.370	5.888	5.750	5.969	ns	
		GCLK PLL	$t_{co}$	1.350	1.538	2.008	2.111	2.324	2.338	2.336	2.222	2.441	2.450	2.327	ns	
8mA		GCLK	$t_{co}$	3.136	3.384	4.810	5.219	5.735	5.597	5.868	5.348	5.866	5.728	5.947	ns	
		GCLK PLL	$t_{co}$	1.333	1.519	1.986	2.089	2.302	2.316	2.314	2.200	2.419	2.428	2.305	ns	

**Table 1-118.** EP3SE80 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.181	3.430	4.850	5.258	5.773	5.635	5.906	5.387	5.903	5.765	5.984	ns	
		GCLK PLL	$t_{co}$	1.378	1.565	2.026	2.128	2.340	2.354	2.352	2.239	2.456	2.465	2.342	ns	
	6mA	GCLK	$t_{co}$	3.166	3.415	4.836	5.243	5.758	5.620	5.891	5.372	5.888	5.750	5.969	ns	
		GCLK PLL	$t_{co}$	1.363	1.550	2.012	2.113	2.325	2.339	2.337	2.224	2.441	2.450	2.327	ns	
	8mA	GCLK	$t_{co}$	3.155	3.404	4.831	5.240	5.755	5.617	5.888	5.369	5.886	5.748	5.967	ns	
		GCLK PLL	$t_{co}$	1.352	1.539	2.007	2.110	2.322	2.336	2.334	2.221	2.439	2.448	2.325	ns	
	10mA	GCLK	$t_{co}$	3.135	3.384	4.808	5.216	5.732	5.594	5.865	5.346	5.862	5.724	5.943	ns	
		GCLK PLL	$t_{co}$	1.332	1.519	1.984	2.086	2.299	2.313	2.311	2.198	2.415	2.424	2.301	ns	
	12mA	GCLK	$t_{co}$	3.132	3.380	4.804	5.213	5.728	5.590	5.861	5.342	5.859	5.721	5.940	ns	
		GCLK PLL	$t_{co}$	1.329	1.515	1.980	2.083	2.295	2.309	2.307	2.194	2.412	2.421	2.298	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.137	3.384	4.795	5.201	5.714	5.576	5.847	5.329	5.843	5.705	5.924	ns
			GCLK PLL	$t_{co}$	1.334	1.519	1.971	2.071	2.281	2.295	2.293	2.181	2.396	2.405	2.282	ns
16mA		GCLK	$t_{co}$	3.130	3.377	4.794	5.202	5.717	5.579	5.850	5.332	5.848	5.710	5.929	ns	
		GCLK PLL	$t_{co}$	1.327	1.512	1.970	2.072	2.284	2.298	2.296	2.184	2.401	2.410	2.287	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.168	3.416	4.832	5.239	5.753	5.615	5.886	5.368	5.883	5.745	5.964	ns	
		GCLK PLL	$t_{co}$	1.365	1.551	2.008	2.109	2.320	2.334	2.332	2.220	2.436	2.445	2.322	ns	
	12mA	GCLK	$t_{co}$	3.150	3.399	4.817	5.224	5.738	5.600	5.871	5.353	5.868	5.730	5.949	ns	
		GCLK PLL	$t_{co}$	1.347	1.534	1.993	2.094	2.305	2.319	2.317	2.205	2.421	2.430	2.307	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.136	3.383	4.794	5.200	5.713	5.575	5.846	5.329	5.843	5.705	5.924	ns	
		GCLK PLL	$t_{co}$	1.333	1.518	1.970	2.070	2.280	2.294	2.292	2.181	2.396	2.405	2.282	ns	



Table 1-119 and Table 1-120 list the EP3SE80 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-119 lists the EP3SE80 column pin delay adders when using the regional clock.

**Table 1-119.** EP3SE80 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.251	0.187	0.308	0.239	0.389	0.103	0.176	0.199	0.102	0.099	0.172	ns
RCLK PLL input adder	1.895	1.982	2.923	3.16	3.601	4.28	4.913	3.261	4.491	4.295	4.833	ns
RCLK output adder	-0.069	0.253	0.551	0.865	0.693	-0.059	-0.119	1.06	0.135	0.066	-0.046	ns
RCLK PLL output adder	-1.545	-1.367	-1.715	-1.587	-1.976	-3.145	-3.116	-1.541	-3.343	-3.027	-3.123	ns

Table 1-120 lists the EP3SE80 row pin delay adders when using the regional clock.

**Table 1-120.** EP3SE80 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.014	0.014	0.018	0.005	-0.022	0.0	0.052	-0.004	-0.014	-0.008	0.056	ns
RCLK PLL input adder	0.116	0.122	0.192	0.206	0.231	0.217	0.367	0.198	0.223	0.21	0.371	ns
RCLK output adder	0.004	0.003	0.029	0.042	0.056	0.039	-0.021	0.047	0.061	0.049	-0.025	ns
RCLK PLL output adder	-0.089	-0.089	-0.145	-0.161	-0.197	-0.169	-0.332	-0.151	-0.186	-0.157	-0.333	ns

### EP3SE110 I/O Timing Parameters

Table 1-121 through Table 1-124 list the maximum I/O timing parameters for EP3SE110 for single-ended I/O standards.

Table 1-121 lists the EP3SE110 column pins input timing parameters for single-ended I/O standards.

**Table 1-121.** EP3SE110 Column Pins Input Timing Parameters (Part 1 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-1.030	-1.006	-1.454	-1.613	-1.847	-1.786	-2.148	-1.613	-1.847	-1.786	-2.148	ns
		t <sub>h</sub>	1.172	1.144	1.648	1.838	2.093	2.017	2.385	1.838	2.093	2.017	2.385	ns
	GCLK PLL	t <sub>su</sub>	-1.297	-1.267	-1.831	-2.023	-2.261	-2.187	-2.655	-2.023	-2.261	-2.187	-2.655	ns
		t <sub>h</sub>	1.600	1.565	2.262	2.514	2.793	2.689	3.180	2.514	2.793	2.689	3.180	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.030	-1.006	-1.454	-1.613	-1.847	-1.786	-2.148	-1.613	-1.847	-1.786	-2.148	ns
		t <sub>h</sub>	1.172	1.144	1.648	1.838	2.093	2.017	2.385	1.838	2.093	2.017	2.385	ns
	GCLK PLL	t <sub>su</sub>	-1.297	-1.267	-1.831	-2.023	-2.261	-2.187	-2.655	-2.023	-2.261	-2.187	-2.655	ns
		t <sub>h</sub>	1.600	1.565	2.262	2.514	2.793	2.689	3.180	2.514	2.793	2.689	3.180	ns

**Table 1-121.** EP3SE110 Column Pins Input Timing Parameters (Part 2 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.0-V LVTTL	GCLK	$t_{su}$	-1.041	-1.017	-1.453	-1.615	-1.846	-1.785	-2.147	-1.615	-1.846	-1.785	-2.147	ns
		$t_h$	1.183	1.155	1.647	1.840	2.092	2.016	2.384	1.840	2.092	2.016	2.384	ns
	GCLK PLL	$t_{su}$	-1.308	-1.278	-1.830	-2.025	-2.260	-2.186	-2.654	-2.025	-2.260	-2.186	-2.654	ns
		$t_h$	1.611	1.576	2.261	2.516	2.792	2.688	3.179	2.516	2.792	2.688	3.179	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-1.041	-1.017	-1.453	-1.615	-1.846	-1.785	-2.147	-1.615	-1.846	-1.785	-2.147	ns
		$t_h$	1.183	1.155	1.647	1.840	2.092	2.016	2.384	1.840	2.092	2.016	2.384	ns
	GCLK PLL	$t_{su}$	-1.308	-1.278	-1.830	-2.025	-2.260	-2.186	-2.654	-2.025	-2.260	-2.186	-2.654	ns
		$t_h$	1.611	1.576	2.261	2.516	2.792	2.688	3.179	2.516	2.792	2.688	3.179	ns
2.5 V	GCLK	$t_{su}$	-1.036	-1.012	-1.462	-1.627	-1.865	-1.804	-2.166	-1.627	-1.865	-1.804	-2.166	ns
		$t_h$	1.178	1.150	1.656	1.852	2.111	2.035	2.403	1.852	2.111	2.035	2.403	ns
	GCLK PLL	$t_{su}$	-1.303	-1.273	-1.839	-2.037	-2.279	-2.205	-2.673	-2.037	-2.279	-2.205	-2.673	ns
		$t_h$	1.606	1.571	2.270	2.528	2.811	2.707	3.198	2.528	2.811	2.707	3.198	ns
1.8 V	GCLK	$t_{su}$	-1.058	-1.034	-1.502	-1.663	-1.863	-1.802	-2.164	-1.663	-1.863	-1.802	-2.164	ns
		$t_h$	1.202	1.174	1.696	1.888	2.109	2.033	2.401	1.888	2.109	2.033	2.401	ns
	GCLK PLL	$t_{su}$	-1.325	-1.295	-1.879	-2.073	-2.277	-2.203	-2.671	-2.073	-2.277	-2.203	-2.671	ns
		$t_h$	1.630	1.595	2.310	2.564	2.809	2.705	3.196	2.564	2.809	2.705	3.196	ns
1.5 V	GCLK	$t_{su}$	-1.048	-1.024	-1.479	-1.631	-1.793	-1.732	-2.094	-1.631	-1.793	-1.732	-2.094	ns
		$t_h$	1.192	1.164	1.673	1.856	2.039	1.963	2.331	1.856	2.039	1.963	2.331	ns
	GCLK PLL	$t_{su}$	-1.315	-1.285	-1.856	-2.041	-2.207	-2.133	-2.601	-2.041	-2.207	-2.133	-2.601	ns
		$t_h$	1.620	1.585	2.287	2.532	2.739	2.635	3.126	2.532	2.739	2.635	3.126	ns
1.2 V	GCLK	$t_{su}$	-0.996	-0.972	-1.402	-1.532	-1.637	-1.576	-1.938	-1.532	-1.637	-1.576	-1.938	ns
		$t_h$	1.140	1.112	1.596	1.757	1.883	1.807	2.175	1.757	1.883	1.807	2.175	ns
	GCLK PLL	$t_{su}$	-1.263	-1.233	-1.779	-1.942	-2.051	-1.977	-2.445	-1.942	-2.051	-1.977	-2.445	ns
		$t_h$	1.568	1.533	2.210	2.433	2.583	2.479	2.970	2.433	2.583	2.479	2.970	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.967	-0.943	-1.374	-1.516	-1.639	-1.578	-1.940	-1.516	-1.639	-1.578	-1.940	ns
		$t_h$	1.111	1.083	1.568	1.741	1.885	1.809	2.177	1.741	1.885	1.809	2.177	ns
	GCLK PLL	$t_{su}$	-1.234	-1.204	-1.751	-1.926	-2.053	-1.979	-2.447	-1.926	-2.053	-1.979	-2.447	ns
		$t_h$	1.539	1.504	2.182	2.417	2.585	2.481	2.972	2.417	2.585	2.481	2.972	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.967	-0.943	-1.374	-1.516	-1.639	-1.578	-1.940	-1.516	-1.639	-1.578	-1.940	ns
		$t_h$	1.111	1.083	1.568	1.741	1.885	1.809	2.177	1.741	1.885	1.809	2.177	ns
	GCLK PLL	$t_{su}$	-1.234	-1.204	-1.751	-1.926	-2.053	-1.979	-2.447	-1.926	-2.053	-1.979	-2.447	ns
		$t_h$	1.539	1.504	2.182	2.417	2.585	2.481	2.972	2.417	2.585	2.481	2.972	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.961	-0.937	-1.361	-1.508	-1.636	-1.573	-1.938	-1.508	-1.636	-1.573	-1.938	ns
		$t_h$	1.105	1.077	1.555	1.730	1.879	1.803	2.170	1.730	1.879	1.803	2.170	ns
	GCLK PLL	$t_{su}$	-1.228	-1.198	-1.738	-1.918	-2.050	-1.974	-2.445	-1.918	-2.050	-1.974	-2.445	ns
		$t_h$	1.533	1.498	2.169	2.406	2.579	2.475	2.965	2.406	2.579	2.475	2.965	ns

**Table 1-121.** EP3SE110 Column Pins Input Timing Parameters (Part 3 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.961	-0.937	-1.361	-1.508	-1.636	-1.573	-1.938	-1.508	-1.636	-1.573	-1.938	ns
		$t_h$	1.105	1.077	1.555	1.730	1.879	1.803	2.170	1.730	1.879	1.803	2.170	ns
	GCLK PLL	$t_{su}$	-1.228	-1.198	-1.738	-1.918	-2.050	-1.974	-2.445	-1.918	-2.050	-1.974	-2.445	ns
		$t_h$	1.533	1.498	2.169	2.406	2.579	2.475	2.965	2.406	2.579	2.475	2.965	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.950	-0.926	-1.350	-1.497	-1.617	-1.554	-1.919	-1.497	-1.617	-1.554	-1.919	ns
		$t_h$	1.094	1.066	1.543	1.719	1.860	1.784	2.151	1.719	1.860	1.784	2.151	ns
	GCLK PLL	$t_{su}$	-1.217	-1.187	-1.727	-1.907	-2.031	-1.955	-2.426	-1.907	-2.031	-1.955	-2.426	ns
		$t_h$	1.522	1.487	2.157	2.395	2.560	2.456	2.946	2.395	2.560	2.456	2.946	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.950	-0.926	-1.350	-1.497	-1.617	-1.554	-1.919	-1.497	-1.617	-1.554	-1.919	ns
		$t_h$	1.094	1.066	1.543	1.719	1.860	1.784	2.151	1.719	1.860	1.784	2.151	ns
	GCLK PLL	$t_{su}$	-1.217	-1.187	-1.727	-1.907	-2.031	-1.955	-2.426	-1.907	-2.031	-1.955	-2.426	ns
		$t_h$	1.522	1.487	2.157	2.395	2.560	2.456	2.946	2.395	2.560	2.456	2.946	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.961	-0.937	-1.361	-1.508	-1.636	-1.573	-1.938	-1.508	-1.636	-1.573	-1.938	ns
		$t_h$	1.105	1.077	1.555	1.730	1.879	1.803	2.170	1.730	1.879	1.803	2.170	ns
	GCLK PLL	$t_{su}$	-1.228	-1.198	-1.738	-1.918	-2.050	-1.974	-2.445	-1.918	-2.050	-1.974	-2.445	ns
		$t_h$	1.533	1.498	2.169	2.406	2.579	2.475	2.965	2.406	2.579	2.475	2.965	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.961	-0.937	-1.361	-1.508	-1.636	-1.573	-1.938	-1.508	-1.636	-1.573	-1.938	ns
		$t_h$	1.105	1.077	1.555	1.730	1.879	1.803	2.170	1.730	1.879	1.803	2.170	ns
	GCLK PLL	$t_{su}$	-1.228	-1.198	-1.738	-1.918	-2.050	-1.974	-2.445	-1.918	-2.050	-1.974	-2.445	ns
		$t_h$	1.533	1.498	2.169	2.406	2.579	2.475	2.965	2.406	2.579	2.475	2.965	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.950	-0.926	-1.350	-1.497	-1.617	-1.554	-1.919	-1.497	-1.617	-1.554	-1.919	ns
		$t_h$	1.094	1.066	1.543	1.719	1.860	1.784	2.151	1.719	1.860	1.784	2.151	ns
	GCLK PLL	$t_{su}$	-1.217	-1.187	-1.727	-1.907	-2.031	-1.955	-2.426	-1.907	-2.031	-1.955	-2.426	ns
		$t_h$	1.522	1.487	2.157	2.395	2.560	2.456	2.946	2.395	2.560	2.456	2.946	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.950	-0.926	-1.350	-1.497	-1.617	-1.554	-1.919	-1.497	-1.617	-1.554	-1.919	ns
		$t_h$	1.094	1.066	1.543	1.719	1.860	1.784	2.151	1.719	1.860	1.784	2.151	ns
	GCLK PLL	$t_{su}$	-1.217	-1.187	-1.727	-1.907	-2.031	-1.955	-2.426	-1.907	-2.031	-1.955	-2.426	ns
		$t_h$	1.522	1.487	2.157	2.395	2.560	2.456	2.946	2.395	2.560	2.456	2.946	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.938	-0.914	-1.340	-1.486	-1.601	-1.538	-1.903	-1.486	-1.601	-1.538	-1.903	ns
		$t_h$	1.082	1.054	1.533	1.708	1.844	1.768	2.135	1.708	1.844	1.768	2.135	ns
	GCLK PLL	$t_{su}$	-1.205	-1.175	-1.717	-1.896	-2.015	-1.939	-2.410	-1.896	-2.015	-1.939	-2.410	ns
		$t_h$	1.510	1.475	2.147	2.384	2.544	2.440	2.930	2.384	2.544	2.440	2.930	ns
3.0-V PCI	GCLK	$t_{su}$	-0.938	-0.914	-1.340	-1.486	-1.601	-1.538	-1.903	-1.486	-1.601	-1.538	-1.903	ns
		$t_h$	1.082	1.054	1.533	1.708	1.844	1.768	2.135	1.708	1.844	1.768	2.135	ns
	GCLK PLL	$t_{su}$	-1.205	-1.175	-1.717	-1.896	-2.015	-1.939	-2.410	-1.896	-2.015	-1.939	-2.410	ns
		$t_h$	1.510	1.475	2.147	2.384	2.544	2.440	2.930	2.384	2.544	2.440	2.930	ns

**Table 1-121.** EP3SE110 Column Pins Input Timing Parameters (Part 4 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.0-V PCI-X	GCLK	$t_{su}$	-1.041	-1.017	-1.453	-1.615	-1.846	-1.785	-2.147	-1.615	-1.846	-1.785	-2.147	ns
		$t_h$	1.183	1.155	1.647	1.840	2.092	2.016	2.384	1.840	2.092	2.016	2.384	ns
	GCLK PLL	$t_{su}$	-1.308	-1.278	-1.830	-2.025	-2.260	-2.186	-2.654	-2.025	-2.260	-2.186	-2.654	ns
		$t_h$	1.611	1.576	2.261	2.516	2.792	2.688	3.179	2.516	2.792	2.688	3.179	ns

Table 1-122 lists the EP3SE110 row pins input timing parameters for single-ended I/O standards.

**Table 1-122.** EP3SE110 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.3-V LVTTTL	GCLK	$t_{su}$	-0.917	-0.960	-1.364	-1.476	-1.736	-1.642	-2.026	-1.488	-1.737	-1.683	-2.064	ns
		$t_h$	1.041	1.099	1.561	1.698	1.978	1.873	2.261	1.720	1.989	1.922	2.300	ns
	GCLK PLL	$t_{su}$	1.022	1.000	1.632	1.851	1.964	1.893	1.808	1.901	1.982	1.864	1.859	ns
		$t_h$	-0.762	-0.722	-1.218	-1.386	-1.449	-1.406	-1.309	-1.426	-1.456	-1.368	-1.357	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.917	-0.960	-1.364	-1.476	-1.736	-1.642	-2.026	-1.488	-1.737	-1.683	-2.064	ns
		$t_h$	1.041	1.099	1.561	1.698	1.978	1.873	2.261	1.720	1.989	1.922	2.300	ns
	GCLK PLL	$t_{su}$	1.022	1.000	1.632	1.851	1.964	1.893	1.808	1.901	1.982	1.864	1.859	ns
		$t_h$	-0.762	-0.722	-1.218	-1.386	-1.449	-1.406	-1.309	-1.426	-1.456	-1.368	-1.357	ns
3.0-V LVTTTL	GCLK	$t_{su}$	-0.923	-0.971	-1.361	-1.477	-1.739	-1.645	-2.029	-1.487	-1.742	-1.688	-2.069	ns
		$t_h$	1.047	1.110	1.558	1.699	1.981	1.876	2.264	1.719	1.994	1.927	2.305	ns
	GCLK PLL	$t_{su}$	1.016	0.989	1.635	1.850	1.961	1.890	1.805	1.902	1.977	1.859	1.854	ns
		$t_h$	-0.756	-0.711	-1.221	-1.385	-1.446	-1.403	-1.306	-1.427	-1.451	-1.363	-1.352	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.923	-0.971	-1.361	-1.477	-1.739	-1.645	-2.029	-1.487	-1.742	-1.688	-2.069	ns
		$t_h$	1.047	1.110	1.558	1.699	1.981	1.876	2.264	1.719	1.994	1.927	2.305	ns
	GCLK PLL	$t_{su}$	1.016	0.989	1.635	1.850	1.961	1.890	1.805	1.902	1.977	1.859	1.854	ns
		$t_h$	-0.756	-0.711	-1.221	-1.385	-1.446	-1.403	-1.306	-1.427	-1.451	-1.363	-1.352	ns
2.5 V	GCLK	$t_{su}$	-0.911	-0.964	-1.370	-1.490	-1.754	-1.660	-2.044	-1.496	-1.752	-1.698	-2.079	ns
		$t_h$	1.035	1.103	1.567	1.712	1.996	1.891	2.279	1.728	2.004	1.937	2.315	ns
	GCLK PLL	$t_{su}$	1.028	0.996	1.626	1.837	1.946	1.875	1.790	1.893	1.967	1.849	1.844	ns
		$t_h$	-0.768	-0.718	-1.212	-1.372	-1.431	-1.388	-1.291	-1.418	-1.441	-1.353	-1.342	ns
1.8 V	GCLK	$t_{su}$	-0.987	-1.042	-1.456	-1.570	-1.756	-1.705	-2.042	-1.576	-1.754	-1.707	-2.080	ns
		$t_h$	1.112	1.182	1.653	1.793	1.999	1.936	2.277	1.808	2.007	1.948	2.316	ns
	GCLK PLL	$t_{su}$	1.040	1.054	1.703	1.929	1.948	1.963	1.900	1.946	1.966	1.848	1.952	ns
		$t_h$	-0.777	-0.773	-1.286	-1.461	-1.433	-1.472	-1.399	-1.468	-1.440	-1.352	-1.447	ns

**Table 1-122.** EP3SE110 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.5 V	GCLK	$t_{su}$	-0.977	-1.031	-1.432	-1.538	-1.688	-1.637	-1.974	-1.545	-1.689	-1.642	-2.015	ns
		$t_h$	1.102	1.171	1.629	1.761	1.931	1.868	2.209	1.777	1.942	1.883	2.251	ns
	GCLK PLL	$t_{su}$	1.050	1.065	1.727	1.961	2.016	2.031	1.968	1.977	2.031	1.913	2.017	ns
		$t_h$	-0.787	-0.784	-1.310	-1.493	-1.501	-1.540	-1.467	-1.499	-1.505	-1.417	-1.512	ns
1.2 V	GCLK	$t_{su}$	-0.917	-0.978	-1.353	-1.437	-1.529	-1.478	-1.815	-1.449	-1.534	-1.487	-1.860	ns
		$t_h$	1.042	1.118	1.550	1.660	1.772	1.709	2.050	1.681	1.787	1.728	2.096	ns
	GCLK PLL	$t_{su}$	1.110	1.118	1.806	2.062	2.175	2.190	2.127	2.073	2.186	2.068	2.172	ns
		$t_h$	-0.847	-0.837	-1.389	-1.594	-1.660	-1.699	-1.626	-1.595	-1.660	-1.572	-1.667	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.854	-0.906	-1.284	-1.381	-1.534	-1.440	-1.824	-1.384	-1.535	-1.481	-1.862	ns
		$t_h$	0.979	1.046	1.481	1.603	1.776	1.671	2.059	1.616	1.787	1.720	2.098	ns
	GCLK PLL	$t_{su}$	1.085	1.054	1.712	1.946	2.166	2.095	2.010	2.005	2.184	2.066	2.061	ns
		$t_h$	-0.824	-0.775	-1.298	-1.481	-1.651	-1.608	-1.511	-1.530	-1.658	-1.570	-1.559	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.854	-0.906	-1.284	-1.381	-1.534	-1.440	-1.824	-1.384	-1.535	-1.481	-1.862	ns
		$t_h$	0.979	1.046	1.481	1.603	1.776	1.671	2.059	1.616	1.787	1.720	2.098	ns
	GCLK PLL	$t_{su}$	1.085	1.054	1.712	1.946	2.166	2.095	2.010	2.005	2.184	2.066	2.061	ns
		$t_h$	-0.824	-0.775	-1.298	-1.481	-1.651	-1.608	-1.511	-1.530	-1.658	-1.570	-1.559	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.891	-0.943	-1.315	-1.410	-1.524	-1.472	-1.811	-1.417	-1.530	-1.479	-1.853	ns
		$t_h$	1.016	1.083	1.512	1.631	1.765	1.702	2.042	1.647	1.778	1.719	2.085	ns
	GCLK PLL	$t_{su}$	1.136	1.153	1.844	2.087	2.180	2.193	2.129	2.102	2.193	2.076	2.177	ns
		$t_h$	-0.873	-0.872	-1.427	-1.621	-1.667	-1.704	-1.632	-1.627	-1.670	-1.581	-1.676	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.891	-0.943	-1.315	-1.410	-1.524	-1.472	-1.811	-1.417	-1.530	-1.479	-1.853	ns
		$t_h$	1.016	1.083	1.512	1.631	1.765	1.702	2.042	1.647	1.778	1.719	2.085	ns
	GCLK PLL	$t_{su}$	1.136	1.153	1.844	2.087	2.180	2.193	2.129	2.102	2.193	2.076	2.177	ns
		$t_h$	-0.873	-0.872	-1.427	-1.621	-1.667	-1.704	-1.632	-1.627	-1.670	-1.581	-1.676	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.877	-0.931	-1.300	-1.400	-1.506	-1.454	-1.793	-1.406	-1.513	-1.462	-1.836	ns
		$t_h$	1.002	1.071	1.498	1.621	1.747	1.684	2.024	1.636	1.761	1.702	2.068	ns
	GCLK PLL	$t_{su}$	1.150	1.165	1.857	2.097	2.198	2.211	2.147	2.113	2.210	2.093	2.194	ns
		$t_h$	-0.887	-0.884	-1.439	-1.631	-1.685	-1.722	-1.650	-1.638	-1.687	-1.598	-1.693	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.891	-0.943	-1.315	-1.410	-1.524	-1.472	-1.811	-1.417	-1.530	-1.479	-1.853	ns
		$t_h$	1.016	1.083	1.512	1.631	1.765	1.702	2.042	1.647	1.778	1.719	2.085	ns
	GCLK PLL	$t_{su}$	1.136	1.153	1.844	2.087	2.180	2.193	2.129	2.102	2.193	2.076	2.177	ns
		$t_h$	-0.873	-0.872	-1.427	-1.621	-1.667	-1.704	-1.632	-1.627	-1.670	-1.581	-1.676	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.891	-0.943	-1.315	-1.410	-1.524	-1.472	-1.811	-1.417	-1.530	-1.479	-1.853	ns
		$t_h$	1.016	1.083	1.512	1.631	1.765	1.702	2.042	1.647	1.778	1.719	2.085	ns
	GCLK PLL	$t_{su}$	1.136	1.153	1.844	2.087	2.180	2.193	2.129	2.102	2.193	2.076	2.177	ns
		$t_h$	-0.873	-0.872	-1.427	-1.621	-1.667	-1.704	-1.632	-1.627	-1.670	-1.581	-1.676	ns

**Table 1-122.** EP3SE110 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.877	-0.931	-1.300	-1.400	-1.506	-1.454	-1.793	-1.406	-1.513	-1.462	-1.836	ns
		$t_h$	1.002	1.071	1.498	1.621	1.747	1.684	2.024	1.636	1.761	1.702	2.068	ns
	GCLK PLL	$t_{su}$	1.150	1.165	1.857	2.097	2.198	2.211	2.147	2.113	2.210	2.093	2.194	ns
		$t_h$	-0.887	-0.884	-1.439	-1.631	-1.685	-1.722	-1.650	-1.638	-1.687	-1.598	-1.693	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.877	-0.931	-1.300	-1.400	-1.506	-1.454	-1.793	-1.406	-1.513	-1.462	-1.836	ns
		$t_h$	1.002	1.071	1.498	1.621	1.747	1.684	2.024	1.636	1.761	1.702	2.068	ns
	GCLK PLL	$t_{su}$	1.150	1.165	1.857	2.097	2.198	2.211	2.147	2.113	2.210	2.093	2.194	ns
		$t_h$	-0.887	-0.884	-1.439	-1.631	-1.685	-1.722	-1.650	-1.638	-1.687	-1.598	-1.693	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.868	-0.919	-1.291	-1.390	-1.490	-1.438	-1.777	-1.397	-1.497	-1.446	-1.820	ns
		$t_h$	0.993	1.059	1.489	1.611	1.731	1.668	2.008	1.627	1.745	1.686	2.052	ns
	GCLK PLL	$t_{su}$	1.159	1.177	1.866	2.107	2.214	2.227	2.163	2.122	2.226	2.109	2.210	ns
		$t_h$	-0.896	-0.896	-1.448	-1.641	-1.701	-1.738	-1.666	-1.647	-1.703	-1.614	-1.709	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.868	-0.919	-1.291	-1.390	-1.490	-1.438	-1.777	-1.397	-1.497	-1.446	-1.820	ns
		$t_h$	0.993	1.059	1.489	1.611	1.731	1.668	2.008	1.627	1.745	1.686	2.052	ns
	GCLK PLL	$t_{su}$	1.159	1.177	1.866	2.107	2.214	2.227	2.163	2.122	2.226	2.109	2.210	ns
		$t_h$	-0.896	-0.896	-1.448	-1.641	-1.701	-1.738	-1.666	-1.647	-1.703	-1.614	-1.709	ns
3.0-V PCI	GCLK	$t_{su}$	-0.923	-0.971	-1.361	-1.477	-1.739	-1.645	-2.029	-1.487	-1.742	-1.688	-2.069	ns
		$t_h$	1.047	1.110	1.558	1.699	1.981	1.876	2.264	1.719	1.994	1.927	2.305	ns
	GCLK PLL	$t_{su}$	1.016	0.989	1.635	1.850	1.961	1.890	1.805	1.902	1.977	1.859	1.854	ns
		$t_h$	-0.756	-0.711	-1.221	-1.385	-1.446	-1.403	-1.306	-1.427	-1.451	-1.363	-1.352	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.923	-0.971	-1.361	-1.477	-1.739	-1.645	-2.029	-1.487	-1.742	-1.688	-2.069	ns
		$t_h$	1.047	1.110	1.558	1.699	1.981	1.876	2.264	1.719	1.994	1.927	2.305	ns
	GCLK PLL	$t_{su}$	1.016	0.989	1.635	1.850	1.961	1.890	1.805	1.902	1.977	1.859	1.854	ns
		$t_h$	-0.756	-0.711	-1.221	-1.385	-1.446	-1.403	-1.306	-1.427	-1.451	-1.363	-1.352	ns

Table 1-123 lists the EP3SE110 column pins output timing parameters for single-ended I/O standards.

**Table 1-123.** EP3SE110 Column Pins Output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.489	3.489	4.830	5.213	5.686	5.551	5.863	5.213	5.686	5.551	5.863	ns
		GCLK PLL	t <sub>co</sub>	3.868	3.881	5.415	5.837	6.442	6.278	6.680	5.837	6.442	6.278	6.680	ns
	8mA	GCLK	t <sub>co</sub>	3.422	3.422	4.721	5.102	5.573	5.438	5.750	5.102	5.573	5.438	5.750	ns
		GCLK PLL	t <sub>co</sub>	3.801	3.814	5.306	5.726	6.329	6.165	6.567	5.726	6.329	6.165	6.567	ns
	12mA	GCLK	t <sub>co</sub>	3.336	3.336	4.617	5.003	5.481	5.346	5.658	5.003	5.481	5.346	5.658	ns
		GCLK PLL	t <sub>co</sub>	3.715	3.728	5.203	5.628	6.237	6.073	6.475	5.628	6.237	6.073	6.475	ns
	16mA	GCLK	t <sub>co</sub>	3.329	3.329	4.600	4.975	5.440	5.305	5.617	4.975	5.440	5.305	5.617	ns
		GCLK PLL	t <sub>co</sub>	3.709	3.721	5.186	5.600	6.196	6.032	6.434	5.600	6.196	6.032	6.434	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.495	3.495	4.834	5.218	5.693	5.558	5.870	5.218	5.693	5.558	5.870	ns
		GCLK PLL	t <sub>co</sub>	3.874	3.887	5.420	5.842	6.449	6.285	6.687	5.842	6.449	6.285	6.687	ns
	8mA	GCLK	t <sub>co</sub>	3.340	3.340	4.627	5.020	5.492	5.357	5.669	5.020	5.492	5.357	5.669	ns
		GCLK PLL	t <sub>co</sub>	3.719	3.732	5.213	5.645	6.248	6.084	6.486	5.645	6.248	6.084	6.486	ns
	12mA	GCLK	t <sub>co</sub>	3.347	3.347	4.621	4.999	5.466	5.331	5.643	4.999	5.466	5.331	5.643	ns
		GCLK PLL	t <sub>co</sub>	3.726	3.739	5.207	5.624	6.222	6.058	6.460	5.624	6.222	6.058	6.460	ns
	16mA	GCLK	t <sub>co</sub>	3.331	3.331	4.599	4.974	5.437	5.302	5.614	4.974	5.437	5.302	5.614	ns
		GCLK PLL	t <sub>co</sub>	3.710	3.723	5.184	5.599	6.193	6.029	6.431	5.599	6.193	6.029	6.431	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.453	3.453	4.797	5.181	5.653	5.518	5.830	5.181	5.653	5.518	5.830	ns
		GCLK PLL	t <sub>co</sub>	3.831	3.845	5.382	5.805	6.409	6.245	6.647	5.805	6.409	6.245	6.647	ns
	8mA	GCLK	t <sub>co</sub>	3.342	3.342	4.667	5.047	5.515	5.381	5.691	5.047	5.515	5.381	5.691	ns
		GCLK PLL	t <sub>co</sub>	3.724	3.734	5.252	5.674	6.272	6.109	6.509	5.674	6.272	6.109	6.509	ns
	12mA	GCLK	t <sub>co</sub>	3.306	3.306	4.604	4.978	5.441	5.307	5.618	4.978	5.441	5.307	5.618	ns
		GCLK PLL	t <sub>co</sub>	3.686	3.698	5.189	5.602	6.198	6.035	6.435	5.602	6.198	6.035	6.435	ns
	16mA	GCLK	t <sub>co</sub>	3.288	3.288	4.575	4.950	5.413	5.278	5.590	4.950	5.413	5.278	5.590	ns
		GCLK PLL	t <sub>co</sub>	3.667	3.680	5.160	5.575	6.169	6.005	6.407	5.575	6.169	6.005	6.407	ns

**Table 1-123.** EP3SE110 Column Pins Output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.367	3.367	4.701	5.081	5.550	5.416	5.726	5.081	5.550	5.416	5.726	ns
		GCLK PLL	$t_{co}$	3.748	3.759	5.286	5.707	6.307	6.144	6.544	5.707	6.307	6.144	6.544	ns
	8mA	GCLK	$t_{co}$	3.288	3.288	4.577	4.952	5.415	5.281	5.591	4.952	5.415	5.281	5.591	ns
		GCLK PLL	$t_{co}$	3.669	3.680	5.163	5.577	6.172	6.009	6.413	5.577	6.172	6.009	6.413	ns
	12mA	GCLK	$t_{co}$	3.283	3.283	4.570	4.945	5.407	5.272	5.584	4.945	5.407	5.272	5.584	ns
		GCLK PLL	$t_{co}$	3.662	3.675	5.155	5.570	6.163	5.999	6.401	5.570	6.163	5.999	6.401	ns
	16mA	GCLK	$t_{co}$	3.274	3.274	4.556	4.930	5.392	5.257	5.569	4.930	5.392	5.257	5.569	ns
		GCLK PLL	$t_{co}$	3.653	3.666	5.141	5.554	6.148	5.984	6.387	5.554	6.148	5.984	6.387	ns
2.5 V	4mA	GCLK	$t_{co}$	3.489	3.489	4.908	5.308	5.797	5.663	5.974	5.308	5.797	5.663	5.974	ns
		GCLK PLL	$t_{co}$	3.868	3.881	5.493	5.932	6.554	6.391	6.791	5.932	6.554	6.391	6.791	ns
	8mA	GCLK	$t_{co}$	3.389	3.389	4.789	5.182	5.665	5.531	5.841	5.182	5.665	5.531	5.841	ns
		GCLK PLL	$t_{co}$	3.771	3.781	5.374	5.807	6.422	6.259	6.659	5.807	6.422	6.259	6.659	ns
	12mA	GCLK	$t_{co}$	3.345	3.345	4.702	5.091	5.570	5.435	5.747	5.091	5.570	5.435	5.747	ns
		GCLK PLL	$t_{co}$	3.726	3.737	5.287	5.716	6.326	6.162	6.564	5.716	6.326	6.162	6.564	ns
	16mA	GCLK	$t_{co}$	3.307	3.307	4.663	5.049	5.527	5.392	5.704	5.049	5.527	5.392	5.704	ns
		GCLK PLL	$t_{co}$	3.687	3.699	5.248	5.674	6.283	6.119	6.521	5.674	6.283	6.119	6.521	ns



**Table 1-123.** EP3SE110 Column Pins Output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.8 V	2mA	GCLK	$t_{co}$	3.680	3.680	5.229	5.668	6.202	6.067	6.379	5.668	6.202	6.067	6.379	ns
		GCLK PLL	$t_{co}$	4.059	4.072	5.815	6.291	6.958	6.794	7.196	6.291	6.958	6.794	7.196	ns
	4mA	GCLK	$t_{co}$	3.499	3.499	4.950	5.359	5.854	5.720	6.030	5.359	5.854	5.720	6.030	ns
		GCLK PLL	$t_{co}$	3.881	3.891	5.536	5.984	6.611	6.448	6.848	5.984	6.611	6.448	6.848	ns
	6mA	GCLK	$t_{co}$	3.417	3.417	4.843	5.244	5.744	5.609	5.921	5.244	5.744	5.609	5.921	ns
		GCLK PLL	$t_{co}$	3.796	3.809	5.429	5.868	6.500	6.336	6.738	5.868	6.500	6.336	6.738	ns
	8mA	GCLK	$t_{co}$	3.397	3.397	4.785	5.190	5.678	5.543	5.855	5.190	5.678	5.543	5.855	ns
		GCLK PLL	$t_{co}$	3.776	3.789	5.370	5.814	6.434	6.270	6.672	5.814	6.434	6.270	6.672	ns
	10mA	GCLK	$t_{co}$	3.334	3.334	4.724	5.115	5.597	5.462	5.774	5.115	5.597	5.462	5.774	ns
		GCLK PLL	$t_{co}$	3.713	3.726	5.309	5.740	6.353	6.189	6.591	5.740	6.353	6.189	6.591	ns
	12mA	GCLK	$t_{co}$	3.316	3.316	4.703	5.094	5.574	5.439	5.751	5.094	5.574	5.439	5.751	ns
		GCLK PLL	$t_{co}$	3.696	3.708	5.289	5.719	6.330	6.166	6.568	5.719	6.330	6.166	6.568	ns
1.5 V	2mA	GCLK	$t_{co}$	3.626	3.626	5.158	5.600	6.140	6.005	6.317	5.600	6.140	6.005	6.317	ns
		GCLK PLL	$t_{co}$	4.005	4.018	5.743	6.224	6.896	6.732	7.134	6.224	6.896	6.732	7.134	ns
	4mA	GCLK	$t_{co}$	3.414	3.414	4.839	5.244	5.748	5.613	5.925	5.244	5.748	5.613	5.925	ns
		GCLK PLL	$t_{co}$	3.793	3.806	5.424	5.867	6.504	6.340	6.742	5.867	6.504	6.340	6.742	ns
	6mA	GCLK	$t_{co}$	3.389	3.389	4.772	5.184	5.681	5.546	5.858	5.184	5.681	5.546	5.858	ns
		GCLK PLL	$t_{co}$	3.769	3.781	5.357	5.809	6.437	6.273	6.675	5.809	6.437	6.273	6.675	ns
	8mA	GCLK	$t_{co}$	3.378	3.378	4.755	5.159	5.661	5.526	5.838	5.159	5.661	5.526	5.838	ns
		GCLK PLL	$t_{co}$	3.757	3.770	5.340	5.784	6.417	6.253	6.655	5.784	6.417	6.253	6.655	ns
	10mA	GCLK	$t_{co}$	3.323	3.323	4.717	5.108	5.591	5.456	5.768	5.108	5.591	5.456	5.768	ns
		GCLK PLL	$t_{co}$	3.702	3.715	5.302	5.733	6.347	6.183	6.585	5.733	6.347	6.183	6.585	ns
	12mA	GCLK	$t_{co}$	3.318	3.318	4.700	5.097	5.580	5.445	5.757	5.097	5.580	5.445	5.757	ns
		GCLK PLL	$t_{co}$	3.696	3.710	5.286	5.720	6.336	6.172	6.574	5.720	6.336	6.172	6.574	ns

**Table 1-123.** EP3SE110 Column Pins Output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.2 V	2mA	GCLK	$t_{co}$	3.542	3.542	5.084	5.536	6.084	5.949	6.261	5.536	6.084	5.949	6.261	ns
		GCLK PLL	$t_{co}$	3.921	3.934	5.669	6.159	6.840	6.676	7.078	6.159	6.840	6.676	7.078	ns
	4mA	GCLK	$t_{co}$	3.419	3.419	4.858	5.274	5.798	5.663	5.975	5.274	5.798	5.663	5.975	ns
		GCLK PLL	$t_{co}$	3.799	3.811	5.444	5.899	6.554	6.390	6.792	5.899	6.554	6.390	6.792	ns
	6mA	GCLK	$t_{co}$	3.381	3.381	4.766	5.185	5.685	5.550	5.862	5.185	5.685	5.550	5.862	ns
		GCLK PLL	$t_{co}$	3.761	3.773	5.351	5.809	6.441	6.277	6.679	5.809	6.441	6.277	6.679	ns
	8mA	GCLK	$t_{co}$	3.334	3.334	4.738	5.136	5.629	5.494	5.806	5.136	5.629	5.494	5.806	ns
		GCLK PLL	$t_{co}$	3.712	3.726	5.323	5.759	6.385	6.221	6.623	5.759	6.385	6.221	6.623	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.334	3.334	4.695	5.083	5.560	5.425	5.737	5.083	5.560	5.425	5.737	ns
		GCLK PLL	$t_{co}$	3.713	3.726	5.280	5.706	6.316	6.152	6.554	5.706	6.316	6.152	6.554	ns
	10mA	GCLK	$t_{co}$	3.331	3.331	4.692	5.080	5.556	5.421	5.733	5.080	5.556	5.421	5.733	ns
		GCLK PLL	$t_{co}$	3.710	3.723	5.277	5.702	6.312	6.148	6.550	5.702	6.312	6.148	6.550	ns
	12mA	GCLK	$t_{co}$	3.329	3.329	4.692	5.081	5.557	5.422	5.734	5.081	5.557	5.422	5.734	ns
		GCLK PLL	$t_{co}$	3.709	3.721	5.277	5.703	6.313	6.149	6.551	5.703	6.313	6.149	6.551	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.320	3.320	4.677	5.065	5.542	5.407	5.719	5.065	5.542	5.407	5.719	ns
		GCLK PLL	$t_{co}$	3.700	3.712	5.263	5.689	6.298	6.134	6.536	5.689	6.298	6.134	6.536	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.341	3.341	4.707	5.097	5.576	5.441	5.753	5.097	5.576	5.441	5.753	ns
		GCLK PLL	$t_{co}$	3.720	3.733	5.292	5.720	6.332	6.168	6.570	5.720	6.332	6.168	6.570	ns
	6mA	GCLK	$t_{co}$	3.337	3.337	4.705	5.095	5.574	5.439	5.751	5.095	5.574	5.439	5.751	ns
		GCLK PLL	$t_{co}$	3.716	3.729	5.290	5.718	6.330	6.166	6.568	5.718	6.330	6.166	6.568	ns
	8mA	GCLK	$t_{co}$	3.326	3.326	4.695	5.086	5.565	5.430	5.742	5.086	5.565	5.430	5.742	ns
		GCLK PLL	$t_{co}$	3.706	3.718	5.280	5.709	6.321	6.157	6.559	5.709	6.321	6.157	6.559	ns
	10mA	GCLK	$t_{co}$	3.315	3.315	4.682	5.073	5.552	5.417	5.729	5.073	5.552	5.417	5.729	ns
		GCLK PLL	$t_{co}$	3.694	3.707	5.268	5.696	6.308	6.144	6.546	5.696	6.308	6.144	6.546	ns
12mA	GCLK	$t_{co}$	3.315	3.315	4.682	5.073	5.552	5.417	5.729	5.073	5.552	5.417	5.729	ns	
	GCLK PLL	$t_{co}$	3.694	3.707	5.267	5.696	6.308	6.144	6.546	5.696	6.308	6.144	6.546	ns	

**Table 1-123.** EP3SE110 Column Pins Output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.321	3.321	4.681	5.070	5.547	5.412	5.724	5.070	5.547	5.412	5.724	ns
		GCLK PLL	$t_{co}$	3.701	3.713	5.266	5.693	6.303	6.139	6.541	5.693	6.303	6.139	6.541	ns
	16mA	GCLK	$t_{co}$	3.324	3.324	4.689	5.079	5.559	5.424	5.736	5.079	5.559	5.424	5.736	ns
		GCLK PLL	$t_{co}$	3.703	3.716	5.274	5.702	6.315	6.151	6.553	5.702	6.315	6.151	6.553	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.345	3.345	4.716	5.109	5.589	5.454	5.766	5.109	5.589	5.454	5.766	ns
		GCLK PLL	$t_{co}$	3.723	3.737	5.302	5.731	6.345	6.181	6.583	5.731	6.345	6.181	6.583	ns
	6mA	GCLK	$t_{co}$	3.331	3.331	4.706	5.099	5.580	5.445	5.757	5.099	5.580	5.445	5.757	ns
		GCLK PLL	$t_{co}$	3.711	3.723	5.291	5.722	6.336	6.172	6.574	5.722	6.336	6.172	6.574	ns
	8mA	GCLK	$t_{co}$	3.320	3.320	4.692	5.085	5.566	5.431	5.743	5.085	5.566	5.431	5.743	ns
		GCLK PLL	$t_{co}$	3.699	3.712	5.278	5.708	6.322	6.158	6.560	5.708	6.322	6.158	6.560	ns
	10mA	GCLK	$t_{co}$	3.319	3.319	4.695	5.088	5.570	5.435	5.747	5.088	5.570	5.435	5.747	ns
		GCLK PLL	$t_{co}$	3.698	3.711	5.281	5.711	6.326	6.162	6.564	5.711	6.326	6.162	6.564	ns
	12mA	GCLK	$t_{co}$	3.316	3.316	4.690	5.083	5.564	5.429	5.741	5.083	5.564	5.429	5.741	ns
		GCLK PLL	$t_{co}$	3.695	3.708	5.275	5.705	6.320	6.156	6.558	5.705	6.320	6.156	6.558	ns
SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.318	3.318	4.679	5.069	5.547	5.412	5.724	5.069	5.547	5.412	5.724	ns
		GCLK PLL	$t_{co}$	3.697	3.710	5.264	5.692	6.303	6.139	6.541	5.692	6.303	6.139	6.541	ns
	16mA	GCLK	$t_{co}$	3.321	3.321	4.686	5.078	5.558	5.423	5.735	5.078	5.558	5.423	5.735	ns
		GCLK PLL	$t_{co}$	3.700	3.713	5.271	5.700	6.314	6.150	6.552	5.700	6.314	6.150	6.552	ns

**Table 1-123.** EP3SE110 Column Pins Output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.328	3.328	4.681	5.069	5.545	5.410	5.722	5.069	5.545	5.410	5.722	ns
		GCLK PLL	$t_{co}$	3.707	3.720	5.266	5.691	6.301	6.137	6.539	5.691	6.301	6.137	6.539	ns
	6mA	GCLK	$t_{co}$	3.321	3.321	4.679	5.067	5.544	5.409	5.721	5.067	5.544	5.409	5.721	ns
		GCLK PLL	$t_{co}$	3.701	3.713	5.264	5.691	6.300	6.136	6.538	5.691	6.300	6.136	6.538	ns
	8mA	GCLK	$t_{co}$	3.313	3.313	4.671	5.060	5.537	5.402	5.714	5.060	5.537	5.402	5.714	ns
		GCLK PLL	$t_{co}$	3.693	3.705	5.257	5.683	6.293	6.129	6.531	5.683	6.293	6.129	6.531	ns
	10mA	GCLK	$t_{co}$	3.316	3.316	4.674	5.063	5.541	5.406	5.718	5.063	5.541	5.406	5.718	ns
		GCLK PLL	$t_{co}$	3.695	3.708	5.260	5.686	6.297	6.133	6.535	5.686	6.297	6.133	6.535	ns
	12mA	GCLK	$t_{co}$	3.313	3.313	4.677	5.067	5.545	5.410	5.722	5.067	5.545	5.410	5.722	ns
		GCLK PLL	$t_{co}$	3.692	3.705	5.262	5.689	6.301	6.137	6.539	5.689	6.301	6.137	6.539	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.321	3.321	4.676	5.064	5.541	5.406	5.718	5.064	5.541	5.406	5.718	ns
		GCLK PLL	$t_{co}$	3.700	3.713	5.261	5.687	6.297	6.133	6.535	5.687	6.297	6.133	6.535	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.333	3.333	4.689	5.079	5.556	5.421	5.733	5.079	5.556	5.421	5.733	ns
		GCLK PLL	$t_{co}$	3.712	3.725	5.275	5.701	6.312	6.148	6.550	5.701	6.312	6.148	6.550	ns
	6mA	GCLK	$t_{co}$	3.329	3.329	4.690	5.080	5.559	5.424	5.736	5.080	5.559	5.424	5.736	ns
		GCLK PLL	$t_{co}$	3.708	3.721	5.276	5.704	6.315	6.151	6.553	5.704	6.315	6.151	6.553	ns
	8mA	GCLK	$t_{co}$	3.325	3.325	4.686	5.076	5.554	5.419	5.731	5.076	5.554	5.419	5.731	ns
		GCLK PLL	$t_{co}$	3.704	3.717	5.271	5.699	6.310	6.146	6.548	5.699	6.310	6.146	6.548	ns
	10mA	GCLK	$t_{co}$	3.318	3.318	4.679	5.069	5.547	5.412	5.724	5.069	5.547	5.412	5.724	ns
		GCLK PLL	$t_{co}$	3.697	3.710	5.264	5.692	6.303	6.139	6.541	5.692	6.303	6.139	6.541	ns
	12mA	GCLK	$t_{co}$	3.319	3.319	4.686	5.077	5.557	5.422	5.734	5.077	5.557	5.422	5.734	ns
		GCLK PLL	$t_{co}$	3.697	3.711	5.271	5.699	6.313	6.149	6.551	5.699	6.313	6.149	6.551	ns
1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.317	3.317	4.667	5.055	5.531	5.396	5.708	5.055	5.531	5.396	5.708	ns
		GCLK PLL	$t_{co}$	3.695	3.709	5.252	5.677	6.287	6.123	6.525	5.677	6.287	6.123	6.525	ns

**Table 1-123.** EP3SE110 Column Pins Output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{CO}$	3.336	3.336	4.703	5.096	5.577	5.442	5.754	5.096	5.577	5.442	5.754	ns
		GCLK PLL	$t_{CO}$	3.716	3.728	5.289	5.719	6.333	6.169	6.571	5.719	6.333	6.169	6.571	ns
	6mA	GCLK	$t_{CO}$	3.328	3.328	4.694	5.087	5.568	5.433	5.745	5.087	5.568	5.433	5.745	ns
		GCLK PLL	$t_{CO}$	3.707	3.720	5.280	5.710	6.324	6.160	6.562	5.710	6.324	6.160	6.562	ns
	8mA	GCLK	$t_{CO}$	3.329	3.329	4.702	5.095	5.577	5.442	5.754	5.095	5.577	5.442	5.754	ns
		GCLK PLL	$t_{CO}$	3.707	3.721	5.287	5.718	6.333	6.169	6.571	5.718	6.333	6.169	6.571	ns
	10mA	GCLK	$t_{CO}$	3.318	3.318	4.689	5.082	5.563	5.428	5.740	5.082	5.563	5.428	5.740	ns
		GCLK PLL	$t_{CO}$	3.697	3.710	5.274	5.704	6.319	6.155	6.557	5.704	6.319	6.155	6.557	ns
	12mA	GCLK	$t_{CO}$	3.318	3.318	4.689	5.082	5.564	5.429	5.741	5.082	5.564	5.429	5.741	ns
		GCLK PLL	$t_{CO}$	3.697	3.710	5.274	5.705	6.320	6.156	6.558	5.705	6.320	6.156	6.558	ns
1.2-V HSTL CLASS II	16mA	GCLK	$t_{CO}$	3.339	3.339	4.705	5.097	5.577	5.442	5.754	5.097	5.577	5.442	5.754	ns
		GCLK PLL	$t_{CO}$	3.718	3.731	5.290	5.720	6.333	6.169	6.571	5.720	6.333	6.169	6.571	ns
3.0-V PCI	—	GCLK	$t_{CO}$	3.442	3.442	4.750	5.131	5.602	5.467	5.779	5.131	5.602	5.467	5.779	ns
		GCLK PLL	$t_{CO}$	3.821	3.834	5.335	5.756	6.358	6.194	6.596	5.756	6.358	6.194	6.596	ns
3.0-V PCI-X	—	GCLK	$t_{CO}$	3.442	3.442	4.750	5.131	5.602	5.467	5.779	5.131	5.602	5.467	5.779	ns
		GCLK PLL	$t_{CO}$	3.821	3.834	5.335	5.756	6.358	6.194	6.596	5.756	6.358	6.194	6.596	ns

Table 1-124 lists the EP3SE110 row pins output timing parameters for single-ended I/O standards.

**Table 1-124.** EP3SE110 Row Pins Output Timing Parameters (Part 1 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.3-V LVTTL	4mA	GCLK	$t_{CO}$	3.208	3.456	4.797	5.180	5.703	5.543	5.850	5.304	5.827	5.696	5.930	ns
		GCLK PLL	$t_{CO}$	1.452	1.625	2.008	2.086	2.326	2.346	2.347	2.239	2.435	2.455	2.342	ns
	8mA	GCLK	$t_{CO}$	3.142	3.385	4.687	5.069	5.589	5.429	5.736	5.191	5.712	5.581	5.815	ns
		GCLK PLL	$t_{CO}$	1.359	1.554	1.898	1.975	2.181	2.201	2.202	2.098	2.286	2.306	2.193	ns
	12mA	GCLK	$t_{CO}$	3.063	3.296	4.581	4.969	5.493	5.333	5.640	5.092	5.612	5.481	5.715	ns
		GCLK PLL	$t_{CO}$	1.260	1.465	1.792	1.875	2.053	2.073	2.074	1.971	2.154	2.174	2.061	ns

**Table 1–124.** EP3SE110 Row Pins Output Timing Parameters (Part 2 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.210	3.463	4.801	5.186	5.712	5.552	5.859	5.312	5.839	5.708	5.942	ns
		GCLK PLL	$t_{co}$	1.462	1.632	2.012	2.092	2.330	2.350	2.351	2.245	2.439	2.459	2.346	ns
	8mA	GCLK	$t_{co}$	3.067	3.300	4.592	4.984	5.503	5.343	5.650	5.104	5.621	5.490	5.724	ns
		GCLK PLL	$t_{co}$	1.264	1.469	1.803	1.890	2.059	2.079	2.080	1.977	2.161	2.181	2.068	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.169	3.417	4.764	5.149	5.669	5.509	5.816	5.272	5.793	5.662	5.896	ns
		GCLK PLL	$t_{co}$	1.406	1.586	1.975	2.055	2.282	2.302	2.303	2.196	2.393	2.413	2.300	ns
	8mA	GCLK	$t_{co}$	3.068	3.305	4.627	5.007	5.524	5.364	5.671	5.130	5.648	5.516	5.750	ns
		GCLK PLL	$t_{co}$	1.281	1.474	1.838	1.913	2.118	2.138	2.139	2.034	2.229	2.248	2.135	ns
	12mA	GCLK	$t_{co}$	3.031	3.267	4.567	4.942	5.454	5.294	5.601	5.062	5.574	5.443	5.677	ns
		GCLK PLL	$t_{co}$	1.242	1.436	1.778	1.848	2.030	2.050	2.051	1.948	2.136	2.155	2.042	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.090	3.329	4.662	5.042	5.560	5.400	5.707	5.163	5.684	5.552	5.786	ns
		GCLK PLL	$t_{co}$	1.320	1.498	1.873	1.948	2.172	2.192	2.193	2.088	2.282	2.301	2.188	ns
	8mA	GCLK	$t_{co}$	3.018	3.251	4.539	4.913	5.426	5.266	5.573	5.032	5.546	5.414	5.648	ns
		GCLK PLL	$t_{co}$	1.220	1.420	1.750	1.819	1.991	2.011	2.012	1.908	2.096	2.115	2.002	ns
2.5 V	4mA	GCLK	$t_{co}$	3.195	3.454	4.872	5.275	5.814	5.654	5.961	5.404	5.945	5.814	6.048	ns
		GCLK PLL	$t_{co}$	1.432	1.623	2.083	2.181	2.454	2.474	2.475	2.356	2.572	2.591	2.478	ns
	8mA	GCLK	$t_{co}$	3.110	3.351	4.748	5.140	5.672	5.512	5.819	5.267	5.801	5.669	5.903	ns
		GCLK PLL	$t_{co}$	1.322	1.520	1.959	2.046	2.284	2.304	2.305	2.189	2.398	2.417	2.304	ns
	12mA	GCLK	$t_{co}$	3.053	3.307	4.664	5.054	5.581	5.421	5.728	5.178	5.706	5.575	5.809	ns
		GCLK PLL	$t_{co}$	1.276	1.476	1.875	1.960	2.158	2.178	2.179	2.066	2.268	2.287	2.174	ns
1.8 V	2mA	GCLK	$t_{co}$	3.458	3.730	5.334	5.790	6.350	6.220	6.500	5.931	6.493	6.365	6.600	ns
		GCLK PLL	$t_{co}$	1.663	1.874	2.520	2.669	2.929	2.949	2.954	2.792	3.056	3.075	2.967	ns
	4mA	GCLK	$t_{co}$	3.233	3.528	5.007	5.421	5.945	5.815	6.095	5.566	6.087	5.958	6.193	ns
		GCLK PLL	$t_{co}$	1.438	1.672	2.193	2.300	2.524	2.544	2.549	2.427	2.650	2.668	2.560	ns
	6mA	GCLK	$t_{co}$	3.168	3.426	4.854	5.271	5.786	5.656	5.936	5.398	5.914	5.786	6.021	ns
		GCLK PLL	$t_{co}$	1.373	1.570	2.040	2.150	2.365	2.385	2.390	2.259	2.477	2.496	2.388	ns
	8mA	GCLK	$t_{co}$	3.108	3.352	4.777	5.177	5.691	5.559	5.839	5.303	5.820	5.692	5.927	ns
		GCLK PLL	$t_{co}$	1.313	1.496	1.963	2.056	2.268	2.288	2.293	2.164	2.383	2.402	2.294	ns

**Table 1-124.** EP3SE110 Row Pins Output Timing Parameters (Part 3 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =0.9V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =0.9V	
1.5 V	2mA	GCLK	t <sub>co</sub>	3.369	3.648	5.244	5.703	6.278	6.148	6.428	5.838	6.417	6.289	6.524	ns
		GCLK PLL	t <sub>co</sub>	1.574	1.792	2.430	2.582	2.857	2.877	2.882	2.699	2.980	2.999	2.891	ns
	4mA	GCLK	t <sub>co</sub>	3.127	3.390	4.839	5.266	5.787	5.657	5.937	5.392	5.913	5.785	6.020	ns
		GCLK PLL	t <sub>co</sub>	1.332	1.534	2.025	2.145	2.366	2.386	2.391	2.253	2.476	2.495	2.387	ns
	6mA	GCLK	t <sub>co</sub>	3.100	3.343	4.766	5.170	5.691	5.551	5.834	5.294	5.816	5.685	5.916	ns
		GCLK PLL	t <sub>co</sub>	1.305	1.487	1.952	2.049	2.260	2.280	2.285	2.155	2.371	2.390	2.282	ns
	8mA	GCLK	t <sub>co</sub>	3.091	3.334	4.744	5.152	5.672	5.532	5.815	5.276	5.797	5.666	5.897	ns
		GCLK PLL	t <sub>co</sub>	1.296	1.478	1.930	2.031	2.241	2.261	2.266	2.137	2.349	2.368	2.260	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.312	3.573	5.154	5.617	6.203	6.073	6.353	5.750	6.333	6.205	6.440	ns
		GCLK PLL	t <sub>co</sub>	1.517	1.717	2.340	2.496	2.782	2.802	2.807	2.611	2.896	2.915	2.807	ns
	4mA	GCLK	t <sub>co</sub>	3.132	3.384	4.861	5.294	5.828	5.698	5.978	5.417	5.955	5.827	6.062	ns
		GCLK PLL	t <sub>co</sub>	1.337	1.528	2.047	2.173	2.407	2.427	2.432	2.278	2.518	2.537	2.429	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.057	3.295	4.657	5.045	5.571	5.411	5.718	5.165	5.692	5.561	5.795	ns
		GCLK PLL	t <sub>co</sub>	1.261	1.464	1.868	1.951	2.126	2.146	2.147	2.033	2.230	2.250	2.137	ns
	12mA	GCLK	t <sub>co</sub>	3.052	3.291	4.654	5.043	5.569	5.409	5.716	5.164	5.691	5.560	5.794	ns
		GCLK PLL	t <sub>co</sub>	1.249	1.460	1.865	1.949	2.118	2.138	2.139	2.025	2.223	2.243	2.130	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.043	3.280	4.639	5.027	5.552	5.392	5.699	5.147	5.673	5.542	5.776	ns
		GCLK PLL	t <sub>co</sub>	1.234	1.449	1.850	1.933	2.097	2.111	2.112	1.999	2.202	2.221	2.103	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.069	3.308	4.672	5.065	5.586	5.433	5.729	5.184	5.707	5.576	5.807	ns
		GCLK PLL	t <sub>co</sub>	1.274	1.452	1.858	1.944	2.142	2.162	2.167	2.045	2.246	2.265	2.157	ns
	6mA	GCLK	t <sub>co</sub>	3.054	3.294	4.669	5.063	5.585	5.431	5.728	5.182	5.705	5.574	5.805	ns
		GCLK PLL	t <sub>co</sub>	1.259	1.438	1.855	1.942	2.140	2.160	2.165	2.043	2.244	2.263	2.155	ns
	8mA	GCLK	t <sub>co</sub>	3.043	3.282	4.652	5.046	5.575	5.414	5.718	5.165	5.696	5.565	5.796	ns
		GCLK PLL	t <sub>co</sub>	1.248	1.426	1.838	1.925	2.123	2.143	2.148	2.026	2.228	2.247	2.139	ns
	10mA	GCLK	t <sub>co</sub>	3.030	3.267	4.636	5.030	5.562	5.399	5.705	5.150	5.684	5.553	5.784	ns
		GCLK PLL	t <sub>co</sub>	1.228	1.404	1.822	1.909	2.108	2.128	2.133	2.011	2.213	2.232	2.124	ns
12mA	GCLK	t <sub>co</sub>	3.030	3.266	4.635	5.029	5.562	5.398	5.705	5.149	5.684	5.553	5.784	ns	
	GCLK PLL	t <sub>co</sub>	1.228	1.403	1.821	1.908	2.107	2.127	2.132	2.010	2.213	2.232	2.123	ns	

**Table 1–124.** EP3SE110 Row Pins Output Timing Parameters (Part 4 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.038	3.273	4.633	5.025	5.557	5.392	5.700	5.144	5.678	5.547	5.778	ns
		GCLK PLL	$t_{co}$	1.236	1.411	1.819	1.904	2.102	2.121	2.126	2.005	2.207	2.226	2.116	ns
	16mA	GCLK	$t_{co}$	3.039	3.276	4.639	5.031	5.567	5.400	5.710	5.150	5.689	5.558	5.789	ns
		GCLK PLL	$t_{co}$	1.237	1.413	1.818	1.905	2.112	2.123	2.128	2.007	2.218	2.237	2.120	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.065	3.304	4.683	5.079	5.599	5.450	5.742	5.197	5.719	5.588	5.819	ns
		GCLK PLL	$t_{co}$	1.270	1.448	1.869	1.958	2.159	2.179	2.184	2.058	2.262	2.281	2.173	ns
	6mA	GCLK	$t_{co}$	3.046	3.283	4.665	5.062	5.589	5.433	5.732	5.181	5.710	5.579	5.810	ns
		GCLK PLL	$t_{co}$	1.247	1.426	1.851	1.941	2.142	2.162	2.167	2.042	2.246	2.265	2.157	ns
	8mA	GCLK	$t_{co}$	3.035	3.271	4.648	5.044	5.576	5.415	5.719	5.163	5.697	5.566	5.797	ns
		GCLK PLL	$t_{co}$	1.233	1.409	1.834	1.923	2.124	2.144	2.149	2.024	2.229	2.248	2.140	ns
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.045	3.280	4.639	5.030	5.555	5.395	5.698	5.148	5.675	5.544	5.775	ns
		GCLK PLL	$t_{co}$	1.249	1.424	1.825	1.909	2.104	2.124	2.129	2.009	2.208	2.227	2.119	ns
	6mA	GCLK	$t_{co}$	3.038	3.273	4.630	5.022	5.554	5.387	5.697	5.140	5.675	5.544	5.775	ns
		GCLK PLL	$t_{co}$	1.237	1.412	1.816	1.901	2.099	2.116	2.121	2.001	2.204	2.223	2.112	ns
	8mA	GCLK	$t_{co}$	3.029	3.265	4.623	5.013	5.547	5.380	5.690	5.132	5.668	5.537	5.768	ns
		GCLK PLL	$t_{co}$	1.227	1.402	1.807	1.892	2.092	2.108	2.113	1.993	2.197	2.216	2.104	ns
	10mA	GCLK	$t_{co}$	3.032	3.267	4.626	5.016	5.551	5.384	5.694	5.135	5.671	5.540	5.771	ns
		GCLK PLL	$t_{co}$	1.230	1.404	1.810	1.895	2.096	2.111	2.116	1.996	2.200	2.219	2.107	ns
	12mA	GCLK	$t_{co}$	3.028	3.264	4.628	5.019	5.554	5.387	5.697	5.138	5.676	5.545	5.776	ns
		GCLK PLL	$t_{co}$	1.226	1.401	1.808	1.894	2.099	2.111	2.116	1.996	2.205	2.224	2.108	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.036	3.272	4.626	5.016	5.550	5.383	5.693	5.134	5.670	5.539	5.770	ns
		GCLK PLL	$t_{co}$	1.234	1.409	1.805	1.890	2.095	2.106	2.107	1.991	2.199	2.218	2.097	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.051	3.287	4.650	5.043	5.566	5.410	5.709	5.160	5.686	5.555	5.786	ns
		GCLK PLL	$t_{co}$	1.256	1.431	1.836	1.922	2.119	2.139	2.144	2.021	2.222	2.241	2.133	ns
	6mA	GCLK	$t_{co}$	3.045	3.280	4.646	5.039	5.568	5.406	5.711	5.157	5.689	5.558	5.789	ns
		GCLK PLL	$t_{co}$	1.244	1.421	1.832	1.918	2.115	2.135	2.140	2.018	2.219	2.238	2.130	ns
	8mA	GCLK	$t_{co}$	3.041	3.276	4.640	5.033	5.563	5.400	5.706	5.151	5.683	5.552	5.783	ns
		GCLK PLL	$t_{co}$	1.240	1.416	1.826	1.912	2.109	2.129	2.134	2.012	2.213	2.232	2.124	ns



**Table 1–124.** EP3SE110 Row Pins Output Timing Parameters (Part 5 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.053	3.287	4.661	5.057	5.585	5.428	5.728	5.174	5.705	5.574	5.805	ns
		GCLK PLL	$t_{co}$	1.255	1.430	1.847	1.936	2.137	2.157	2.162	2.035	2.239	2.258	2.150	ns
	6mA	GCLK	$t_{co}$	3.044	3.279	4.650	5.045	5.576	5.416	5.719	5.163	5.696	5.565	5.796	ns
		GCLK PLL	$t_{co}$	1.243	1.418	1.836	1.924	2.125	2.145	2.150	2.024	2.228	2.247	2.139	ns
	8mA	GCLK	$t_{co}$	3.043	3.279	4.654	5.050	5.585	5.422	5.728	5.169	5.706	5.575	5.806	ns
		GCLK PLL	$t_{co}$	1.241	1.416	1.840	1.929	2.131	2.151	2.156	2.030	2.235	2.254	2.146	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.163	3.401	4.709	5.091	5.611	5.451	5.758	5.213	5.734	5.603	5.837	ns
		GCLK PLL	$t_{co}$	1.354	1.570	1.920	1.997	2.156	2.167	2.156	2.061	2.263	2.282	2.149	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.163	3.401	4.709	5.091	5.611	5.451	5.758	5.213	5.734	5.603	5.837	ns
		GCLK PLL	$t_{co}$	1.354	1.570	1.920	1.997	2.156	2.167	2.156	2.061	2.263	2.282	2.149	ns

Table 1–125 through Table 1–128 list the maximum I/O timing parameters for EP3SE110 devices for differential I/O standards.

Table 1–125 lists the EP3SE110 column pins input timing parameters for differential I/O standards.

**Table 1–125.** EP3SE110 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
MINI-LVDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
RSDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.813	-0.852	-1.258	-1.368	-1.483	-1.423	-1.794	-1.368	-1.482	-1.428	-1.837	ns
		$t_h$	0.942	0.999	1.460	1.595	1.731	1.659	2.031	1.604	1.739	1.674	2.075	ns
	GCLK PLL	$t_{su}$	1.144	1.171	1.802	2.025	2.242	2.134	2.045	2.042	2.260	2.147	2.091	ns
		$t_h$	-0.882	-0.886	-1.383	-1.555	-1.721	-1.641	-1.544	-1.563	-1.729	-1.645	-1.588	ns

Table 1-125. EP3SE110 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{SU}$	-0.813	-0.852	-1.258	-1.368	-1.483	-1.423	-1.794	-1.368	-1.482	-1.428	-1.837	ns
		$t_H$	0.942	0.999	1.460	1.595	1.731	1.659	2.031	1.604	1.739	1.674	2.075	ns
	GCLK PLL	$t_{SU}$	1.144	1.171	1.802	2.025	2.242	2.134	2.045	2.042	2.260	2.147	2.091	ns
		$t_H$	-0.882	-0.886	-1.383	-1.555	-1.721	-1.641	-1.544	-1.563	-1.729	-1.645	-1.588	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{SU}$	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		$t_H$	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	$t_{SU}$	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		$t_H$	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{SU}$	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		$t_H$	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	$t_{SU}$	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		$t_H$	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{SU}$	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		$t_H$	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	$t_{SU}$	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		$t_H$	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{SU}$	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		$t_H$	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	$t_{SU}$	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		$t_H$	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{SU}$	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		$t_H$	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	$t_{SU}$	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		$t_H$	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{SU}$	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		$t_H$	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	$t_{SU}$	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		$t_H$	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{SU}$	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		$t_H$	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	$t_{SU}$	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		$t_H$	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{SU}$	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		$t_H$	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	$t_{SU}$	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		$t_H$	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns

**Table 1-125.** EP3SE110 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.840	-0.881	-1.289	-1.395	-1.518	-1.460	-1.828	-1.394	-1.510	-1.459	-1.866	ns
		$t_h$	0.969	1.028	1.493	1.625	1.769	1.697	2.070	1.633	1.772	1.706	2.109	ns
	GCLK PLL	$t_{su}$	1.117	1.142	1.771	1.998	2.207	2.097	2.011	2.016	2.232	2.116	2.062	ns
		$t_h$	-0.855	-0.857	-1.350	-1.525	-1.683	-1.603	-1.505	-1.534	-1.696	-1.613	-1.554	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.840	-0.881	-1.289	-1.395	-1.518	-1.460	-1.828	-1.394	-1.510	-1.459	-1.866	ns
		$t_h$	0.969	1.028	1.493	1.625	1.769	1.697	2.070	1.633	1.772	1.706	2.109	ns
	GCLK PLL	$t_{su}$	1.117	1.142	1.771	1.998	2.207	2.097	2.011	2.016	2.232	2.116	2.062	ns
		$t_h$	-0.855	-0.857	-1.350	-1.525	-1.683	-1.603	-1.505	-1.534	-1.696	-1.613	-1.554	ns

Table 1-126 lists the EP3SE110 row pins input timing parameters for differential I/O standards

**Table 1-126.** EP3SE110 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		$t_h$	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	$t_{su}$	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		$t_h$	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
MINI-LVDS	GCLK	$t_{su}$	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		$t_h$	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	$t_{su}$	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		$t_h$	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
RSDS	GCLK	$t_{su}$	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		$t_h$	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	$t_{su}$	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		$t_h$	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.749	-0.794	-1.145	-1.244	-1.343	-1.291	-1.633	-1.246	-1.344	-1.293	-1.677	ns
		$t_h$	0.875	0.936	1.345	1.468	1.587	1.524	1.867	1.479	1.597	1.535	1.912	ns
	GCLK PLL	$t_{su}$	1.156	1.174	1.864	2.104	2.344	2.224	2.163	2.120	2.362	2.240	2.210	ns
		$t_h$	-0.893	-0.894	-1.447	-1.639	-1.828	-1.736	-1.666	-1.644	-1.834	-1.741	-1.709	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.749	-0.794	-1.145	-1.244	-1.343	-1.291	-1.633	-1.246	-1.344	-1.293	-1.677	ns
		$t_h$	0.875	0.936	1.345	1.468	1.587	1.524	1.867	1.479	1.597	1.535	1.912	ns
	GCLK PLL	$t_{su}$	1.156	1.174	1.864	2.104	2.344	2.224	2.163	2.120	2.362	2.240	2.210	ns
		$t_h$	-0.893	-0.894	-1.447	-1.639	-1.828	-1.736	-1.666	-1.644	-1.834	-1.741	-1.709	ns

**Table 1-126.** EP3SE110 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.781	-0.827	-1.178	-1.275	-1.384	-1.333	-1.673	-1.273	-1.378	-1.329	-1.712	ns
		$t_h$	0.907	0.969	1.379	1.502	1.631	1.568	1.912	1.509	1.636	1.573	1.952	ns
	GCLK PLL	$t_{su}$	1.124	1.141	1.827	2.068	2.299	2.178	2.118	2.089	2.323	2.199	2.170	ns
		$t_h$	-0.861	-0.861	-1.411	-1.601	-1.780	-1.688	-1.617	-1.610	-1.792	-1.699	-1.665	ns

**Table 1-126.** EP3SE110 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.781	-0.827	-1.178	-1.275	-1.384	-1.333	-1.673	-1.273	-1.378	-1.329	-1.712	ns
		$t_h$	0.907	0.969	1.379	1.502	1.631	1.568	1.912	1.509	1.636	1.573	1.952	ns
	GCLK PLL	$t_{su}$	1.124	1.141	1.827	2.068	2.299	2.178	2.118	2.089	2.323	2.199	2.170	ns
		$t_h$	-0.861	-0.861	-1.411	-1.601	-1.780	-1.688	-1.617	-1.610	-1.792	-1.699	-1.665	ns

Table 1-127 lists the EP3SE110 column pins output timing parameters for differential I/O standards.

**Table 1-127.** EP3SE110 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
LVDS_E_1R	—	GCLK	$t_{co}$	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	$t_{co}$	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	$t_{co}$	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	$t_{co}$	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	$t_{co}$	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	$t_{co}$	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	$t_{co}$	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns

**Table 1-127.** EP3SE110 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.179	3.420	4.828	5.233	5.750	5.610	5.910	5.358	5.875	5.736	5.985	ns	
		GCLK PLL	$t_{co}$	1.355	1.535	1.984	2.084	2.298	2.309	2.335	2.190	2.407	2.417	2.323	ns	
	6mA	GCLK	$t_{co}$	3.169	3.410	4.818	5.222	5.740	5.600	5.900	5.347	5.865	5.726	5.975	ns	
		GCLK PLL	$t_{co}$	1.345	1.525	1.974	2.073	2.288	2.299	2.325	2.179	2.397	2.407	2.313	ns	
	8mA	GCLK	$t_{co}$	3.169	3.410	4.821	5.226	5.744	5.604	5.904	5.352	5.870	5.731	5.980	ns	
		GCLK PLL	$t_{co}$	1.345	1.525	1.977	2.077	2.292	2.303	2.329	2.184	2.402	2.412	2.318	ns	
	10mA	GCLK	$t_{co}$	3.162	3.404	4.814	5.220	5.738	5.598	5.898	5.345	5.864	5.725	5.974	ns	
		GCLK PLL	$t_{co}$	1.338	1.519	1.970	2.071	2.286	2.297	2.323	2.177	2.396	2.406	2.312	ns	
	12mA	GCLK	$t_{co}$	3.161	3.402	4.811	5.217	5.735	5.595	5.895	5.342	5.860	5.721	5.970	ns	
		GCLK PLL	$t_{co}$	1.337	1.517	1.967	2.068	2.283	2.294	2.320	2.174	2.392	2.402	2.308	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.183	3.424	4.832	5.237	5.754	5.614	5.914	5.362	5.880	5.741	5.990	ns
			GCLK PLL	$t_{co}$	1.359	1.539	1.988	2.088	2.302	2.313	2.339	2.194	2.412	2.422	2.328	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.173	3.413	4.811	5.214	5.729	5.589	5.889	5.338	5.853	5.714	5.963	ns	
		GCLK PLL	$t_{co}$	1.349	1.528	1.967	2.065	2.277	2.288	2.314	2.170	2.385	2.395	2.301	ns	
	6mA	GCLK	$t_{co}$	3.168	3.409	4.811	5.214	5.730	5.590	5.890	5.339	5.855	5.716	5.965	ns	
		GCLK PLL	$t_{co}$	1.344	1.524	1.967	2.065	2.278	2.289	2.315	2.171	2.387	2.397	2.303	ns	
	8mA	GCLK	$t_{co}$	3.166	3.407	4.810	5.213	5.728	5.588	5.888	5.338	5.854	5.715	5.964	ns	
		GCLK PLL	$t_{co}$	1.342	1.522	1.966	2.064	2.276	2.287	2.313	2.170	2.386	2.396	2.302	ns	
	10mA	GCLK	$t_{co}$	3.158	3.398	4.800	5.203	5.719	5.579	5.879	5.328	5.844	5.705	5.954	ns	
		GCLK PLL	$t_{co}$	1.334	1.513	1.956	2.054	2.267	2.278	2.304	2.160	2.376	2.386	2.292	ns	
	12mA	GCLK	$t_{co}$	3.159	3.400	4.806	5.210	5.727	5.587	5.887	5.336	5.853	5.714	5.963	ns	
		GCLK PLL	$t_{co}$	1.335	1.515	1.962	2.061	2.275	2.286	2.312	2.168	2.385	2.395	2.301	ns	
	DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.158	3.397	4.789	5.191	5.705	5.565	5.865	5.315	5.829	5.690	5.939	ns
			GCLK PLL	$t_{co}$	1.334	1.512	1.945	2.042	2.253	2.264	2.290	2.147	2.361	2.371	2.277	ns

**Table 1-127.** EP3SE110 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =0.9V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =0.9V		
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.170	3.410	4.807	5.209	5.723	5.583	5.883	5.334	5.848	5.709	5.958	ns	
		GCLK PLL	t <sub>co</sub>	1.346	1.525	1.963	2.060	2.271	2.282	2.308	2.166	2.380	2.390	2.296	ns	
	6mA	GCLK	t <sub>co</sub>	3.166	3.407	4.808	5.211	5.727	5.587	5.887	5.336	5.852	5.713	5.962	ns	
		GCLK PLL	t <sub>co</sub>	1.342	1.522	1.964	2.062	2.275	2.286	2.312	2.168	2.384	2.394	2.300	ns	
	8mA	GCLK	t <sub>co</sub>	3.156	3.396	4.797	5.200	5.715	5.575	5.875	5.325	5.840	5.701	5.950	ns	
		GCLK PLL	t <sub>co</sub>	1.332	1.511	1.953	2.051	2.263	2.274	2.300	2.157	2.372	2.382	2.288	ns	
	10mA	GCLK	t <sub>co</sub>	3.154	3.394	4.795	5.197	5.713	5.573	5.873	5.323	5.838	5.699	5.948	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.509	1.951	2.048	2.261	2.272	2.298	2.155	2.370	2.380	2.286	ns	
	12mA	GCLK	t <sub>co</sub>	3.154	3.395	4.798	5.202	5.718	5.578	5.878	5.327	5.844	5.705	5.954	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.510	1.954	2.053	2.266	2.277	2.303	2.159	2.376	2.386	2.292	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.158	3.398	4.795	5.197	5.712	5.572	5.872	5.322	5.837	5.698	5.947	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.513	1.951	2.048	2.260	2.271	2.297	2.154	2.369	2.379	2.285	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.184	3.427	4.840	5.245	5.762	5.622	5.922	5.370	5.887	5.748	5.997	ns	
		GCLK PLL	t <sub>co</sub>	1.360	1.542	1.996	2.096	2.310	2.321	2.347	2.202	2.419	2.429	2.335	ns	
	6mA	GCLK	t <sub>co</sub>	3.170	3.413	4.828	5.234	5.752	5.612	5.912	5.360	5.878	5.739	5.988	ns	
		GCLK PLL	t <sub>co</sub>	1.346	1.528	1.984	2.085	2.300	2.311	2.337	2.192	2.410	2.420	2.326	ns	
	8mA	GCLK	t <sub>co</sub>	3.158	3.400	4.811	5.216	5.734	5.594	5.894	5.342	5.860	5.721	5.970	ns	
		GCLK PLL	t <sub>co</sub>	1.334	1.515	1.967	2.067	2.282	2.293	2.319	2.174	2.392	2.402	2.308	ns	
	10mA	GCLK	t <sub>co</sub>	3.158	3.400	4.814	5.220	5.738	5.598	5.898	5.346	5.865	5.726	5.975	ns	
		GCLK PLL	t <sub>co</sub>	1.334	1.515	1.970	2.071	2.286	2.297	2.323	2.178	2.397	2.407	2.313	ns	
	12mA	GCLK	t <sub>co</sub>	3.154	3.396	4.807	5.212	5.731	5.591	5.891	5.339	5.857	5.718	5.967	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.511	1.963	2.063	2.279	2.290	2.316	2.171	2.389	2.399	2.305	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.158	3.398	4.800	5.203	5.719	5.579	5.879	5.328	5.844	5.705	5.954	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.513	1.956	2.054	2.267	2.278	2.304	2.160	2.376	2.386	2.292	ns
16mA		GCLK	t <sub>co</sub>	3.159	3.400	4.808	5.213	5.730	5.590	5.890	5.338	5.856	5.717	5.966	ns	
		GCLK PLL	t <sub>co</sub>	1.335	1.515	1.964	2.064	2.278	2.289	2.315	2.170	2.388	2.398	2.304	ns	

**Table 1-127.** EP3SE110 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.187	3.430	4.839	5.243	5.760	5.620	5.920	5.369	5.885	5.746	5.995	ns	
		GCLK PLL	$t_{co}$	1.363	1.545	1.995	2.094	2.308	2.319	2.345	2.201	2.417	2.427	2.333	ns	
	6mA	GCLK	$t_{co}$	3.176	3.418	4.827	5.231	5.748	5.608	5.908	5.357	5.873	5.734	5.983	ns	
		GCLK PLL	$t_{co}$	1.352	1.533	1.983	2.082	2.296	2.307	2.333	2.189	2.405	2.415	2.321	ns	
	8mA	GCLK	$t_{co}$	3.171	3.414	4.827	5.232	5.749	5.609	5.909	5.358	5.875	5.736	5.985	ns	
		GCLK PLL	$t_{co}$	1.347	1.529	1.983	2.083	2.297	2.308	2.334	2.190	2.407	2.417	2.323	ns	
	10mA	GCLK	$t_{co}$	3.157	3.399	4.809	5.213	5.730	5.590	5.890	5.339	5.857	5.718	5.967	ns	
		GCLK PLL	$t_{co}$	1.333	1.514	1.965	2.064	2.278	2.289	2.315	2.171	2.389	2.399	2.305	ns	
	12mA	GCLK	$t_{co}$	3.155	3.397	4.807	5.211	5.728	5.588	5.888	5.337	5.854	5.715	5.964	ns	
		GCLK PLL	$t_{co}$	1.331	1.512	1.963	2.062	2.276	2.287	2.313	2.169	2.386	2.396	2.302	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.159	3.399	4.799	5.201	5.716	5.576	5.876	5.326	5.841	5.702	5.951	ns
			GCLK PLL	$t_{co}$	1.335	1.514	1.955	2.052	2.264	2.275	2.301	2.158	2.373	2.383	2.289	ns
16mA		GCLK	$t_{co}$	3.159	3.400	4.807	5.211	5.728	5.588	5.888	5.337	5.854	5.715	5.964	ns	
		GCLK PLL	$t_{co}$	1.335	1.515	1.963	2.062	2.276	2.287	2.313	2.169	2.386	2.396	2.302	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.175	3.417	4.823	5.226	5.742	5.602	5.902	5.352	5.867	5.728	5.977	ns	
		GCLK PLL	$t_{co}$	1.351	1.532	1.979	2.077	2.290	2.301	2.327	2.184	2.399	2.409	2.315	ns	
	10mA	GCLK	$t_{co}$	3.175	3.417	4.823	5.226	5.742	5.602	5.902	5.352	5.867	5.728	5.977	ns	
		GCLK PLL	$t_{co}$	1.351	1.532	1.979	2.077	2.290	2.301	2.327	2.184	2.399	2.409	2.315	ns	
	12mA	GCLK	$t_{co}$	3.165	3.407	4.813	5.216	5.732	5.592	5.892	5.342	5.858	5.719	5.968	ns	
		GCLK PLL	$t_{co}$	1.341	1.522	1.969	2.067	2.280	2.291	2.317	2.174	2.390	2.400	2.306	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.158	3.399	4.799	5.201	5.716	5.576	5.876	5.326	5.841	5.702	5.951	ns	
		GCLK PLL	$t_{co}$	1.334	1.514	1.955	2.052	2.264	2.275	2.301	2.158	2.373	2.383	2.289	ns	



Table 1-128 lists the EP3SE110 row pins output timing parameters for differential I/O standards.

**Table 1-128.** EP3SE110 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	
LVDS	—	GCLK	t <sub>co</sub>	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	t <sub>co</sub>	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	t <sub>co</sub>	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	t <sub>co</sub>	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
MINI-LVDS	—	GCLK	t <sub>co</sub>	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	t <sub>co</sub>	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	t <sub>co</sub>	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	t <sub>co</sub>	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
RSDS	—	GCLK	t <sub>co</sub>	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	t <sub>co</sub>	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	t <sub>co</sub>	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	t <sub>co</sub>	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.162	3.409	4.828	5.236	5.751	5.613	5.884	5.365	5.880	5.742	5.961	ns
		GCLK PLL	t <sub>co</sub>	1.359	1.544	2.004	2.106	2.318	2.332	2.330	2.217	2.433	2.442	2.319	ns
	6mA	GCLK	t <sub>co</sub>	3.148	3.395	4.815	5.223	5.738	5.600	5.871	5.351	5.867	5.729	5.948	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.530	1.991	2.093	2.305	2.319	2.317	2.203	2.420	2.429	2.306	ns
	8mA	GCLK	t <sub>co</sub>	3.144	3.391	4.813	5.223	5.739	5.601	5.872	5.351	5.869	5.731	5.950	ns
		GCLK PLL	t <sub>co</sub>	1.341	1.526	1.989	2.093	2.306	2.320	2.318	2.203	2.422	2.431	2.308	ns

**Table 1-128.** EP3SE110 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.160	3.406	4.814	5.220	5.733	5.595	5.866	5.348	5.862	5.724	5.943	ns
		GCLK PLL	$t_{co}$	1.357	1.541	1.990	2.090	2.300	2.314	2.312	2.200	2.415	2.424	2.301	ns
	6mA	GCLK	$t_{co}$	3.149	3.396	4.810	5.216	5.730	5.592	5.863	5.345	5.859	5.721	5.940	ns
		GCLK PLL	$t_{co}$	1.346	1.531	1.986	2.086	2.297	2.311	2.309	2.197	2.412	2.421	2.298	ns
	8mA	GCLK	$t_{co}$	3.146	3.393	4.808	5.214	5.728	5.590	5.861	5.343	5.858	5.720	5.939	ns
		GCLK PLL	$t_{co}$	1.343	1.528	1.984	2.084	2.295	2.309	2.307	2.195	2.411	2.420	2.297	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.157	3.403	4.809	5.215	5.727	5.589	5.860	5.343	5.856	5.718	5.937	ns
		GCLK PLL	$t_{co}$	1.354	1.538	1.985	2.085	2.294	2.308	2.306	2.195	2.409	2.418	2.295	ns
	6mA	GCLK	$t_{co}$	3.147	3.394	4.807	5.213	5.726	5.588	5.859	5.342	5.856	5.718	5.937	ns
		GCLK PLL	$t_{co}$	1.344	1.529	1.983	2.083	2.293	2.307	2.305	2.194	2.409	2.418	2.295	ns
	8mA	GCLK	$t_{co}$	3.133	3.380	4.792	5.198	5.712	5.574	5.845	5.327	5.841	5.703	5.922	ns
		GCLK PLL	$t_{co}$	1.330	1.515	1.968	2.068	2.279	2.293	2.291	2.179	2.394	2.403	2.280	ns
	10mA	GCLK	$t_{co}$	3.130	3.376	4.788	5.194	5.708	5.570	5.841	5.323	5.837	5.699	5.918	ns
		GCLK PLL	$t_{co}$	1.327	1.511	1.964	2.064	2.275	2.289	2.287	2.175	2.390	2.399	2.276	ns
	12mA	GCLK	$t_{co}$	3.127	3.374	4.789	5.197	5.711	5.573	5.844	5.326	5.841	5.703	5.922	ns
		GCLK PLL	$t_{co}$	1.324	1.509	1.965	2.067	2.278	2.292	2.290	2.178	2.394	2.403	2.280	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.128	3.374	4.779	5.185	5.698	5.560	5.831	5.313	5.827	5.689	5.908	ns
		GCLK PLL	$t_{co}$	1.325	1.509	1.955	2.055	2.265	2.279	2.277	2.165	2.380	2.389	2.266	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.177	3.427	4.850	5.258	5.774	5.636	5.907	5.387	5.903	5.765	5.984	ns
		GCLK PLL	$t_{co}$	1.374	1.562	2.026	2.128	2.341	2.355	2.353	2.239	2.456	2.465	2.342	ns
	6mA	GCLK	$t_{co}$	3.153	3.403	4.832	5.241	5.757	5.619	5.890	5.370	5.888	5.750	5.969	ns
		GCLK PLL	$t_{co}$	1.350	1.538	2.008	2.111	2.324	2.338	2.336	2.222	2.441	2.450	2.327	ns
	8mA	GCLK	$t_{co}$	3.136	3.384	4.810	5.219	5.735	5.597	5.868	5.348	5.866	5.728	5.947	ns
		GCLK PLL	$t_{co}$	1.333	1.519	1.986	2.089	2.302	2.316	2.314	2.200	2.419	2.428	2.305	ns

**Table 1-128.** EP3SE110 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.181	3.430	4.850	5.258	5.773	5.635	5.906	5.387	5.903	5.765	5.984	ns	
		GCLK PLL	$t_{co}$	1.378	1.565	2.026	2.128	2.340	2.354	2.352	2.239	2.456	2.465	2.342	ns	
	6mA	GCLK	$t_{co}$	3.166	3.415	4.836	5.243	5.758	5.620	5.891	5.372	5.888	5.750	5.969	ns	
		GCLK PLL	$t_{co}$	1.363	1.550	2.012	2.113	2.325	2.339	2.337	2.224	2.441	2.450	2.327	ns	
	8mA	GCLK	$t_{co}$	3.155	3.404	4.831	5.240	5.755	5.617	5.888	5.369	5.886	5.748	5.967	ns	
		GCLK PLL	$t_{co}$	1.352	1.539	2.007	2.110	2.322	2.336	2.334	2.221	2.439	2.448	2.325	ns	
	10mA	GCLK	$t_{co}$	3.135	3.384	4.808	5.216	5.732	5.594	5.865	5.346	5.862	5.724	5.943	ns	
		GCLK PLL	$t_{co}$	1.332	1.519	1.984	2.086	2.299	2.313	2.311	2.198	2.415	2.424	2.301	ns	
	12mA	GCLK	$t_{co}$	3.132	3.380	4.804	5.213	5.728	5.590	5.861	5.342	5.859	5.721	5.940	ns	
		GCLK PLL	$t_{co}$	1.329	1.515	1.980	2.083	2.295	2.309	2.307	2.194	2.412	2.421	2.298	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.137	3.384	4.795	5.201	5.714	5.576	5.847	5.329	5.843	5.705	5.924	ns
			GCLK PLL	$t_{co}$	1.334	1.519	1.971	2.071	2.281	2.295	2.293	2.181	2.396	2.405	2.282	ns
16mA		GCLK	$t_{co}$	3.130	3.377	4.794	5.202	5.717	5.579	5.850	5.332	5.848	5.710	5.929	ns	
		GCLK PLL	$t_{co}$	1.327	1.512	1.970	2.072	2.284	2.298	2.296	2.184	2.401	2.410	2.287	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.168	3.416	4.832	5.239	5.753	5.615	5.886	5.368	5.883	5.745	5.964	ns	
		GCLK PLL	$t_{co}$	1.365	1.551	2.008	2.109	2.320	2.334	2.332	2.220	2.436	2.445	2.322	ns	
	12mA	GCLK	$t_{co}$	3.150	3.399	4.817	5.224	5.738	5.600	5.871	5.353	5.868	5.730	5.949	ns	
		GCLK PLL	$t_{co}$	1.347	1.534	1.993	2.094	2.305	2.319	2.317	2.205	2.421	2.430	2.307	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.136	3.383	4.794	5.200	5.713	5.575	5.846	5.329	5.843	5.705	5.924	ns	
		GCLK PLL	$t_{co}$	1.333	1.518	1.970	2.070	2.280	2.294	2.292	2.181	2.396	2.405	2.282	ns	

Table 1-129 and Table 1-130 list the EP3SE110 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-129 lists the EP3SE110 column pin delay adders when using the regional clock.

**Table 1-129.** EP3SE110 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.111	0.14	0.19	0.103	0.105	0.103	0.177	0.085	0.101	0.098	0.146	ns
RCLK PLL input adder	2.506	2.513	3.782	4.081	4.579	4.381	4.923	4.222	4.603	4.401	4.984	ns
RCLK output adder	-0.281	-0.062	-0.079	-0.074	-0.074	-0.072	-0.128	0.056	0.051	0.054	-0.055	ns
RCLK PLL output adder	-2.121	-1.833	-2.75	-2.908	-3.127	-3.057	-3.165	-2.959	-3.157	-2.903	-3.172	ns

Table 1-130 lists the EP3SE110 row pin delay adders when using the regional clock.

**Table 1-130.** EP3SE110 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	-0.003	-0.002	0.001	-0.012	-0.01	-0.017	0.078	-0.02	-0.02	-0.016	0.08	ns
RCLK PLL input adder	0.116	0.122	0.192	0.212	0.227	0.217	0.375	0.198	0.219	0.209	0.379	ns
RCLK output adder	0.02	0.019	0.027	0.041	0.044	0.048	-0.038	0.051	0.057	0.051	-0.04	ns
RCLK PLL output adder	-0.103	-0.105	-0.162	-0.179	-0.194	-0.185	-0.322	-0.167	-0.183	-0.175	-0.324	ns

### EP3SE260 I/O Timing Parameters

Table 1-131 through Table 1-135 list the maximum I/O timing parameters for EP3SE260 devices for single-ended I/O standards.

Table 1-131 lists the EP3SE260 column pins input timing parameters for single-ended I/O standards.

**Table 1-131.** EP3SE260 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-1.242	-1.186	-1.822	-1.915	-2.184	-2.050	-2.482	-1.915	-2.184	-2.050	-2.482	ns
		t <sub>h</sub>	1.388	1.332	2.045	2.146	2.437	2.285	2.724	2.146	2.437	2.285	2.724	ns
	GCLK PLL	t <sub>su</sub>	-1.417	-1.465	-2.238	-2.189	-2.558	-2.477	-3.038	-2.189	-2.558	-2.477	-3.038	ns
		t <sub>h</sub>	1.732	1.778	2.727	2.697	3.113	3.000	3.584	2.697	3.113	3.000	3.584	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.242	-1.186	-1.822	-1.915	-2.184	-2.050	-2.482	-1.915	-2.184	-2.050	-2.482	ns
		t <sub>h</sub>	1.388	1.332	2.045	2.146	2.437	2.285	2.724	2.146	2.437	2.285	2.724	ns
	GCLK PLL	t <sub>su</sub>	-1.417	-1.465	-2.238	-2.189	-2.558	-2.477	-3.038	-2.189	-2.558	-2.477	-3.038	ns
		t <sub>h</sub>	1.732	1.778	2.727	2.697	3.113	3.000	3.584	2.697	3.113	3.000	3.584	ns
3.0-V LVTTL	GCLK	t <sub>su</sub>	-1.253	-1.197	-1.821	-1.917	-2.183	-2.049	-2.481	-1.917	-2.183	-2.049	-2.481	ns
		t <sub>h</sub>	1.399	1.343	2.044	2.148	2.436	2.284	2.723	2.148	2.436	2.284	2.723	ns
	GCLK PLL	t <sub>su</sub>	-1.428	-1.476	-2.237	-2.191	-2.557	-2.476	-3.037	-2.191	-2.557	-2.476	-3.037	ns
		t <sub>h</sub>	1.743	1.789	2.726	2.699	3.112	2.999	3.583	2.699	3.112	2.999	3.583	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.253	-1.197	-1.821	-1.917	-2.183	-2.049	-2.481	-1.917	-2.183	-2.049	-2.481	ns
		t <sub>h</sub>	1.399	1.343	2.044	2.148	2.436	2.284	2.723	2.148	2.436	2.284	2.723	ns
	GCLK PLL	t <sub>su</sub>	-1.428	-1.476	-2.237	-2.191	-2.557	-2.476	-3.037	-2.191	-2.557	-2.476	-3.037	ns
		t <sub>h</sub>	1.743	1.789	2.726	2.699	3.112	2.999	3.583	2.699	3.112	2.999	3.583	ns
2.5 V	GCLK	t <sub>su</sub>	-1.248	-1.192	-1.830	-1.929	-2.202	-2.068	-2.500	-1.929	-2.202	-2.068	-2.500	ns
		t <sub>h</sub>	1.394	1.338	2.053	2.160	2.455	2.303	2.742	2.160	2.455	2.303	2.742	ns
	GCLK PLL	t <sub>su</sub>	-1.423	-1.471	-2.246	-2.203	-2.576	-2.495	-3.056	-2.203	-2.576	-2.495	-3.056	ns
		t <sub>h</sub>	1.738	1.784	2.735	2.711	3.131	3.018	3.602	2.711	3.131	3.018	3.602	ns
1.8 V	GCLK	t <sub>su</sub>	-1.270	-1.214	-1.870	-1.965	-2.200	-2.066	-2.498	-1.965	-2.200	-2.066	-2.498	ns
		t <sub>h</sub>	1.418	1.362	2.093	2.196	2.453	2.301	2.740	2.196	2.453	2.301	2.740	ns
	GCLK PLL	t <sub>su</sub>	-1.443	-1.493	-2.286	-2.239	-2.574	-2.493	-3.054	-2.239	-2.574	-2.493	-3.054	ns
		t <sub>h</sub>	1.760	1.808	2.775	2.747	3.129	3.016	3.600	2.747	3.129	3.016	3.600	ns
1.5 V	GCLK	t <sub>su</sub>	-1.260	-1.204	-1.847	-1.933	-2.130	-1.996	-2.428	-1.933	-2.130	-1.996	-2.428	ns
		t <sub>h</sub>	1.408	1.352	2.070	2.164	2.383	2.231	2.670	2.164	2.383	2.231	2.670	ns
	GCLK PLL	t <sub>su</sub>	-1.433	-1.483	-2.263	-2.207	-2.504	-2.423	-2.984	-2.207	-2.504	-2.423	-2.984	ns
		t <sub>h</sub>	1.750	1.798	2.752	2.715	3.059	2.946	3.530	2.715	3.059	2.946	3.530	ns
1.2 V	GCLK	t <sub>su</sub>	-1.208	-1.152	-1.770	-1.834	-1.974	-1.840	-2.272	-1.834	-1.974	-1.840	-2.272	ns
		t <sub>h</sub>	1.356	1.300	1.993	2.065	2.227	2.075	2.514	2.065	2.227	2.075	2.514	ns
	GCLK PLL	t <sub>su</sub>	-1.381	-1.431	-2.186	-2.108	-2.348	-2.267	-2.828	-2.108	-2.348	-2.267	-2.828	ns
		t <sub>h</sub>	1.698	1.746	2.675	2.616	2.903	2.790	3.374	2.616	2.903	2.790	3.374	ns

**Table 1-131.** EP3SE260 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
SSTL-2 CLASS I	GCLK	$t_{su}$	-1.179	-1.123	-1.742	-1.818	-1.976	-1.842	-2.274	-1.818	-1.976	-1.842	-2.274	ns
		$t_h$	1.327	1.271	1.965	2.049	2.229	2.077	2.516	2.049	2.229	2.077	2.516	ns
	GCLK PLL	$t_{su}$	-1.352	-1.402	-2.158	-2.092	-2.350	-2.269	-2.830	-2.092	-2.350	-2.269	-2.830	ns
		$t_h$	1.669	1.717	2.647	2.600	2.905	2.792	3.376	2.600	2.905	2.792	3.376	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-1.179	-1.123	-1.742	-1.818	-1.976	-1.842	-2.274	-1.818	-1.976	-1.842	-2.274	ns
		$t_h$	1.327	1.271	1.965	2.049	2.229	2.077	2.516	2.049	2.229	2.077	2.516	ns
	GCLK PLL	$t_{su}$	-1.352	-1.402	-2.158	-2.092	-2.350	-2.269	-2.830	-2.092	-2.350	-2.269	-2.830	ns
		$t_h$	1.669	1.717	2.647	2.600	2.905	2.792	3.376	2.600	2.905	2.792	3.376	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-1.173	-1.117	-1.729	-1.810	-1.973	-1.837	-2.272	-1.810	-1.973	-1.837	-2.272	ns
		$t_h$	1.321	1.265	1.952	2.038	2.223	2.071	2.509	2.038	2.223	2.071	2.509	ns
	GCLK PLL	$t_{su}$	-1.346	-1.396	-2.145	-2.087	-2.347	-2.264	-2.828	-2.087	-2.347	-2.264	-2.828	ns
		$t_h$	1.663	1.711	2.634	2.592	2.899	2.786	3.369	2.592	2.899	2.786	3.369	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-1.173	-1.117	-1.729	-1.810	-1.973	-1.837	-2.272	-1.810	-1.973	-1.837	-2.272	ns
		$t_h$	1.321	1.265	1.952	2.038	2.223	2.071	2.509	2.038	2.223	2.071	2.509	ns
	GCLK PLL	$t_{su}$	-1.346	-1.396	-2.145	-2.087	-2.347	-2.264	-2.828	-2.087	-2.347	-2.264	-2.828	ns
		$t_h$	1.663	1.711	2.634	2.592	2.899	2.786	3.369	2.592	2.899	2.786	3.369	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-1.162	-1.106	-1.718	-1.799	-1.954	-1.818	-2.253	-1.799	-1.954	-1.818	-2.253	ns
		$t_h$	1.310	1.254	1.940	2.027	2.204	2.052	2.490	2.027	2.204	2.052	2.490	ns
	GCLK PLL	$t_{su}$	-1.335	-1.385	-2.134	-2.076	-2.328	-2.245	-2.809	-2.076	-2.328	-2.245	-2.809	ns
		$t_h$	1.652	1.700	2.622	2.581	2.880	2.767	3.350	2.581	2.880	2.767	3.350	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.162	-1.106	-1.718	-1.799	-1.954	-1.818	-2.253	-1.799	-1.954	-1.818	-2.253	ns
		$t_h$	1.310	1.254	1.940	2.027	2.204	2.052	2.490	2.027	2.204	2.052	2.490	ns
	GCLK PLL	$t_{su}$	-1.335	-1.385	-2.134	-2.076	-2.328	-2.245	-2.809	-2.076	-2.328	-2.245	-2.809	ns
		$t_h$	1.652	1.700	2.622	2.581	2.880	2.767	3.350	2.581	2.880	2.767	3.350	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.173	-1.117	-1.729	-1.810	-1.973	-1.837	-2.272	-1.810	-1.973	-1.837	-2.272	ns
		$t_h$	1.321	1.265	1.952	2.038	2.223	2.071	2.509	2.038	2.223	2.071	2.509	ns
	GCLK PLL	$t_{su}$	-1.346	-1.396	-2.145	-2.087	-2.347	-2.264	-2.828	-2.087	-2.347	-2.264	-2.828	ns
		$t_h$	1.663	1.711	2.634	2.592	2.899	2.786	3.369	2.592	2.899	2.786	3.369	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.173	-1.117	-1.729	-1.810	-1.973	-1.837	-2.272	-1.810	-1.973	-1.837	-2.272	ns
		$t_h$	1.321	1.265	1.952	2.038	2.223	2.071	2.509	2.038	2.223	2.071	2.509	ns
	GCLK PLL	$t_{su}$	-1.346	-1.396	-2.145	-2.087	-2.347	-2.264	-2.828	-2.087	-2.347	-2.264	-2.828	ns
		$t_h$	1.663	1.711	2.634	2.592	2.899	2.786	3.369	2.592	2.899	2.786	3.369	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.162	-1.106	-1.718	-1.799	-1.954	-1.818	-2.253	-1.799	-1.954	-1.818	-2.253	ns
		$t_h$	1.310	1.254	1.940	2.027	2.204	2.052	2.490	2.027	2.204	2.052	2.490	ns
	GCLK PLL	$t_{su}$	-1.335	-1.385	-2.134	-2.076	-2.328	-2.245	-2.809	-2.076	-2.328	-2.245	-2.809	ns
		$t_h$	1.652	1.700	2.622	2.581	2.880	2.767	3.350	2.581	2.880	2.767	3.350	ns

**Table 1-131.** EP3SE260 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.162	-1.106	-1.718	-1.799	-1.954	-1.818	-2.253	-1.799	-1.954	-1.818	-2.253	ns
		$t_h$	1.310	1.254	1.940	2.027	2.204	2.052	2.490	2.027	2.204	2.052	2.490	ns
	GCLK PLL	$t_{su}$	-1.335	-1.385	-2.134	-2.076	-2.328	-2.245	-2.809	-2.076	-2.328	-2.245	-2.809	ns
		$t_h$	1.652	1.700	2.622	2.581	2.880	2.767	3.350	2.581	2.880	2.767	3.350	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.150	-1.094	-1.708	-1.788	-1.938	-1.802	-2.237	-1.788	-1.938	-1.802	-2.237	ns
		$t_h$	1.298	1.242	1.930	2.016	2.188	2.036	2.474	2.016	2.188	2.036	2.474	ns
	GCLK PLL	$t_{su}$	-1.323	-1.373	-2.124	-2.065	-2.312	-2.229	-2.793	-2.065	-2.312	-2.229	-2.793	ns
		$t_h$	1.640	1.688	2.612	2.570	2.864	2.751	3.334	2.570	2.864	2.751	3.334	ns
3.0-V PCI	GCLK	$t_{su}$	-1.150	-1.094	-1.708	-1.788	-1.938	-1.802	-2.237	-1.788	-1.938	-1.802	-2.237	ns
		$t_h$	1.298	1.242	1.930	2.016	2.188	2.036	2.474	2.016	2.188	2.036	2.474	ns
	GCLK PLL	$t_{su}$	-1.323	-1.373	-2.124	-2.065	-2.312	-2.229	-2.793	-2.065	-2.312	-2.229	-2.793	ns
		$t_h$	1.640	1.688	2.612	2.570	2.864	2.751	3.334	2.570	2.864	2.751	3.334	ns
3.0-V PCI-X	GCLK	$t_{su}$	-1.253	-1.197	-1.821	-1.917	-2.183	-2.049	-2.481	-1.917	-2.183	-2.049	-2.481	ns
		$t_h$	1.399	1.343	2.044	2.148	2.436	2.284	2.723	2.148	2.436	2.284	2.723	ns
	GCLK PLL	$t_{su}$	-1.428	-1.476	-2.237	-2.191	-2.557	-2.476	-3.037	-2.191	-2.557	-2.476	-3.037	ns
		$t_h$	1.743	1.789	2.726	2.699	3.112	2.999	3.583	2.699	3.112	2.999	3.583	ns

Table 1-132 lists the EP3SE260 row pins input timing parameters for single-ended I/O standards.

**Table 1-132.** EP3SE260 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
3.3-V LVTTTL	GCLK	$t_{su}$	-1.219	-1.374	-2.059	-1.988	-2.283	-2.177	-2.643	-2.003	-2.382	-2.177	-2.643	ns
		$t_h$	1.355	1.524	1.749	1.864	1.862	1.767	1.884	1.864	1.883	1.767	1.884	ns
	GCLK PLL	$t_{su}$	0.983	0.983	2.293	2.233	2.553	2.431	2.902	2.260	2.659	2.431	2.902	ns
		$t_h$	-0.704	-0.685	-2.059	-1.988	-2.283	-2.177	-2.643	-2.003	-2.382	-2.177	-2.643	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-1.219	-1.374	-2.059	-1.988	-2.283	-2.177	-2.643	-2.003	-2.382	-2.177	-2.643	ns
		$t_h$	1.355	1.524	1.749	1.864	1.862	1.767	1.884	1.864	1.883	1.767	1.884	ns
	GCLK PLL	$t_{su}$	0.983	0.983	2.293	2.233	2.553	2.431	2.902	2.260	2.659	2.431	2.902	ns
		$t_h$	-0.704	-0.685	-2.056	-1.989	-2.286	-2.180	-2.646	-2.002	-2.387	-2.180	-2.646	ns
3.0-V LVTTTL	GCLK	$t_{su}$	-1.225	-1.385	2.290	2.234	2.556	2.434	2.905	2.259	2.664	2.434	2.905	ns
		$t_h$	1.361	1.535	-2.056	-1.989	-2.286	-2.180	-2.646	-2.002	-2.387	-2.180	-2.646	ns
	GCLK PLL	$t_{su}$	0.977	0.972	1.752	1.863	1.859	1.764	1.881	1.865	1.878	1.764	1.881	ns
		$t_h$	-0.698	-0.674	2.290	2.234	2.556	2.434	2.905	2.259	2.664	2.434	2.905	ns

**Table 1-132.** EP3SE260 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
3.0-V LVCMOS	GCLK	$t_{su}$	-1.225	-1.385	2.299	2.247	2.571	2.449	2.920	2.268	2.674	2.449	2.920	ns
		$t_h$	1.361	1.535	-2.065	-2.002	-2.301	-2.195	-2.661	-2.011	-2.397	-2.195	-2.661	ns
	GCLK PLL	$t_{su}$	0.977	0.972	1.743	1.850	1.844	1.749	1.866	1.856	1.868	1.749	1.866	ns
		$t_h$	-0.698	-0.674	2.299	2.247	2.571	2.449	2.920	2.268	2.674	2.449	2.920	ns
2.5 V	GCLK	$t_{su}$	-1.213	-1.378	1.617	1.714	1.860	1.741	1.759	1.830	1.861	1.741	1.759	ns
		$t_h$	1.349	1.528	2.364	2.410	2.627	2.565	3.018	2.344	2.687	2.565	3.018	ns
	GCLK PLL	$t_{su}$	0.989	0.979	-2.130	-2.167	-2.360	-2.314	-2.765	-2.088	-2.409	-2.314	-2.765	ns
		$t_h$	-0.710	-0.681	1.617	1.714	1.860	1.741	1.759	1.830	1.861	1.741	1.759	ns
1.8 V	GCLK	$t_{su}$	-1.283	-1.435	1.641	1.746	1.928	1.809	1.827	1.861	1.926	1.809	1.827	ns
		$t_h$	0.968	0.896	2.340	2.378	2.559	2.497	2.950	2.313	2.622	2.497	2.950	ns
	GCLK PLL	$t_{su}$	1.421	1.586	-2.106	-2.135	-2.292	-2.246	-2.697	-2.057	-2.344	-2.246	-2.697	ns
		$t_h$	-1.273	-1.424	1.720	1.847	2.087	1.968	1.986	1.957	2.081	1.968	1.986	ns
1.5 V	GCLK	$t_{su}$	0.978	0.907	2.261	2.277	2.400	2.338	2.791	2.217	2.467	2.338	2.791	ns
		$t_h$	1.411	1.575	-2.027	-2.034	-2.133	-2.087	-2.538	-1.961	-2.189	-2.087	-2.538	ns
	GCLK PLL	$t_{su}$	-1.213	-1.371	1.829	1.959	2.064	1.969	2.086	1.968	2.085	1.969	2.086	ns
		$t_h$	1.038	0.960	2.213	2.138	2.351	2.229	2.700	2.156	2.457	2.229	2.700	ns
1.2 V	GCLK	$t_{su}$	1.351	1.522	-1.989	-2.007	-2.128	-2.081	-2.534	-1.932	-2.182	-2.081	-2.534	ns
		$t_h$	-1.155	-1.320	1.758	-2.007	-2.128	-2.081	-2.534	-1.932	-2.182	-2.081	-2.534	ns
	GCLK PLL	$t_{su}$	1.047	1.038	2.223	2.248	2.393	2.331	2.783	2.185	2.457	2.331	2.783	ns
		$t_h$	1.292	1.471	-1.989	1.874	2.092	1.974	1.990	1.986	2.088	1.974	1.990	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-1.155	-1.320	1.758	1.874	2.092	1.974	1.990	1.986	2.088	1.974	1.990	ns
		$t_h$	1.047	1.038	2.223	-1.378	-1.541	-1.455	-1.458	-1.477	-1.526	-1.455	-1.458	ns
	GCLK PLL	$t_{su}$	1.292	1.471	-1.989	-2.007	-2.128	-2.081	-2.534	-1.932	-2.182	-2.081	-2.534	ns
		$t_h$	-1.187	-1.336	1.758	2.248	2.393	2.331	2.783	2.185	2.457	2.331	2.783	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	1.064	0.995	2.223	1.874	2.092	1.974	1.990	1.986	2.088	1.974	1.990	ns
		$t_h$	1.325	1.487	-1.989	-1.378	-1.541	-1.455	-1.458	-1.477	-1.526	-1.455	-1.458	ns
	GCLK PLL	$t_{su}$	-1.187	-1.336	-1.294	-1.997	-2.110	-2.063	-2.516	-1.921	-2.165	-2.063	-2.516	ns
		$t_h$	1.064	0.995	-1.974	2.238	2.375	2.313	2.765	2.174	2.440	2.313	2.765	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	1.325	1.487	2.209	1.884	2.110	1.992	2.008	1.997	2.105	1.992	2.008	ns
		$t_h$	-1.173	-1.324	1.758	1.884	2.110	1.992	2.008	1.997	2.105	1.992	2.008	ns
	GCLK PLL	$t_{su}$	1.078	1.007	2.223	-1.388	-1.559	-1.473	-1.476	-1.488	-1.543	-1.473	-1.476	ns
		$t_h$	1.311	1.475	-1.989	-1.997	-2.110	-2.063	-2.516	-1.921	-2.165	-2.063	-2.516	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-1.187	-1.336	1.758	-1.378	-1.541	-1.455	-1.458	-1.477	-1.526	-1.455	-1.458	ns
		$t_h$	1.064	0.995	2.223	-2.007	-2.128	-2.081	-2.534	-1.932	-2.182	-2.081	-2.534	ns
	GCLK PLL	$t_{su}$	1.325	1.487	-1.989	2.248	2.393	2.331	2.783	2.185	2.457	2.331	2.783	ns
		$t_h$	-1.187	-1.336	-1.294	1.874	2.092	1.974	1.990	1.986	2.088	1.974	1.990	ns



**Table 1-132.** EP3SE260 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	
SSTL-15 CLASS I	GCLK	$t_{su}$	1.064	0.995	-1.974	-1.378	-1.541	-1.455	-1.458	-1.477	-1.526	-1.455	-1.458	ns
		$t_h$	1.325	1.487	2.209	-2.007	-2.128	-2.081	-2.534	-1.932	-2.182	-2.081	-2.534	ns
	GCLK PLL	$t_{su}$	-1.173	-1.324	1.773	2.248	2.393	2.331	2.783	2.185	2.457	2.331	2.783	ns
		$t_h$	1.078	1.007	-1.294	1.874	2.092	1.974	1.990	1.986	2.088	1.974	1.990	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	1.311	1.475	-1.974	-1.378	-1.541	-1.455	-1.458	-1.477	-1.526	-1.455	-1.458	ns
		$t_h$	-1.173	-1.324	-1.303	1.884	2.110	1.992	2.008	1.997	2.105	1.992	2.008	ns
	GCLK PLL	$t_{su}$	1.078	1.007	-1.965	-1.388	-1.559	-1.473	-1.476	-1.488	-1.543	-1.473	-1.476	ns
		$t_h$	1.311	1.475	2.200	-1.997	-2.110	-2.063	-2.516	-1.921	-2.165	-2.063	-2.516	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.164	-1.312	1.782	2.238	2.375	2.313	2.765	2.174	2.440	2.313	2.765	ns
		$t_h$	1.087	1.019	-1.303	1.884	2.110	1.992	2.008	1.997	2.105	1.992	2.008	ns
	GCLK PLL	$t_{su}$	1.302	1.463	-1.965	-1.388	-1.559	-1.473	-1.476	-1.488	-1.543	-1.473	-1.476	ns
		$t_h$	-1.164	-1.312	-1.303	1.894	2.126	2.008	2.024	2.006	2.121	2.008	2.024	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	1.087	1.019	-2.056	-1.398	-1.575	-1.489	-1.492	-1.497	-1.559	-1.489	-1.492	ns
		$t_h$	1.302	1.463	1.752	-1.987	-2.094	-2.047	-2.500	-1.912	-2.149	-2.047	-2.500	ns
	GCLK PLL	$t_{su}$	-1.225	-1.385	2.290	2.228	2.359	2.297	2.749	2.165	2.424	2.297	2.749	ns
		$t_h$	1.361	1.535	-2.056	1.894	2.126	2.008	2.024	2.006	2.121	2.008	2.024	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	0.977	0.972	1.752	-1.398	-1.575	-1.489	-1.492	-1.497	-1.559	-1.489	-1.492	ns
		$t_h$	-0.698	-0.674	2.290	-1.987	-2.094	-2.047	-2.500	-1.912	-2.149	-2.047	-2.500	ns
	GCLK PLL	$t_{su}$	-1.225	-1.385	2.290	2.228	2.359	2.297	2.749	2.165	2.424	2.297	2.749	ns
		$t_h$	1.361	1.535	2.290	1.894	2.126	2.008	2.024	2.006	2.121	2.008	2.024	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	0.977	0.972	2.290	-1.398	-1.575	-1.489	-1.492	-1.497	-1.559	-1.489	-1.492	ns
		$t_h$	-0.698	-0.674	2.290	-1.987	-2.094	-2.047	-2.500	-1.912	-2.149	-2.047	-2.500	ns
	GCLK PLL	$t_{su}$	-1.219	-1.374	-2.059	-1.988	-2.283	-2.177	-2.643	-2.003	-2.382	-2.177	-2.643	ns
		$t_h$	1.355	1.524	1.749	1.864	1.862	1.767	1.884	1.864	1.883	1.767	1.884	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	0.983	0.983	2.293	2.233	2.553	2.431	2.902	2.260	2.659	2.431	2.902	ns
		$t_h$	-0.704	-0.685	-2.059	-1.988	-2.283	-2.177	-2.643	-2.003	-2.382	-2.177	-2.643	ns
	GCLK PLL	$t_{su}$	-1.219	-1.374	-2.059	-1.988	-2.283	-2.177	-2.643	-2.003	-2.382	-2.177	-2.643	ns
		$t_h$	1.355	1.524	1.749	1.864	1.862	1.767	1.884	1.864	1.883	1.767	1.884	ns
3.0-V PCI	GCLK	$t_{su}$	0.983	0.983	2.293	2.233	2.553	2.431	2.902	2.260	2.659	2.431	2.902	ns
		$t_h$	-0.704	-0.685	-2.056	-1.989	-2.286	-2.180	-2.646	-2.002	-2.387	-2.180	-2.646	ns
	GCLK PLL	$t_{su}$	-1.225	-1.385	2.290	2.234	2.556	2.434	2.905	2.259	2.664	2.434	2.905	ns
		$t_h$	1.361	1.535	-2.056	-1.989	-2.286	-2.180	-2.646	-2.002	-2.387	-2.180	-2.646	ns
3.0-V PCI-X	GCLK	$t_{su}$	0.977	0.972	1.752	1.863	1.859	1.764	1.881	1.865	1.878	1.764	1.881	ns
		$t_h$	-0.698	-0.674	2.290	2.234	2.556	2.434	2.905	2.259	2.664	2.434	2.905	ns
	GCLK PLL	$t_{su}$	-1.225	-1.385	2.299	2.247	2.571	2.449	2.920	2.268	2.674	2.449	2.920	ns
		$t_h$	1.361	1.535	-2.065	-2.002	-2.301	-2.195	-2.661	-2.011	-2.397	-2.195	-2.661	ns

Table 1-133 lists the EP3SE260 column pins output timing parameters for single-ended I/O standards.

**Table 1-133.** EP3SE260 Column Pins Output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.644	3.677	5.302	5.460	6.139	5.837	6.259	5.460	6.139	5.837	6.259	ns
		GCLK PLL	$t_{co}$	4.087	4.076	5.937	6.144	6.701	6.529	7.188	6.144	6.701	6.529	7.188	ns
	8mA	GCLK	$t_{co}$	3.577	3.610	5.193	5.349	5.969	5.724	6.146	5.349	5.969	5.724	6.146	ns
		GCLK PLL	$t_{co}$	4.020	4.009	5.828	6.033	6.588	6.416	7.018	6.033	6.588	6.416	7.018	ns
	12mA	GCLK	$t_{co}$	3.491	3.524	5.089	5.250	5.817	5.632	6.054	5.250	5.817	5.632	6.054	ns
		GCLK PLL	$t_{co}$	3.934	3.923	5.724	5.934	6.496	6.324	6.866	5.934	6.496	6.324	6.866	ns
	16mA	GCLK	$t_{co}$	3.484	3.517	5.072	5.222	5.792	5.591	6.013	5.222	5.792	5.591	6.013	ns
		GCLK PLL	$t_{co}$	3.927	3.916	5.707	5.906	6.455	6.283	6.841	5.906	6.455	6.283	6.841	ns
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.650	3.683	5.306	5.465	6.153	5.844	6.266	5.465	6.153	5.844	6.266	ns
		GCLK PLL	$t_{co}$	4.093	4.082	5.941	6.149	6.708	6.536	7.202	6.149	6.708	6.536	7.202	ns
	8mA	GCLK	$t_{co}$	3.495	3.528	5.099	5.267	5.823	5.643	6.065	5.267	5.823	5.643	6.065	ns
		GCLK PLL	$t_{co}$	3.938	3.927	5.734	5.951	6.507	6.335	6.872	5.951	6.507	6.335	6.872	ns
	12mA	GCLK	$t_{co}$	3.502	3.535	5.093	5.246	5.792	5.617	6.039	5.246	5.792	5.617	6.039	ns
		GCLK PLL	$t_{co}$	3.945	3.934	5.728	5.930	6.481	6.309	6.841	5.930	6.481	6.309	6.841	ns
	16mA	GCLK	$t_{co}$	3.486	3.519	5.071	5.221	5.735	5.588	6.010	5.221	5.735	5.588	6.010	ns
		GCLK PLL	$t_{co}$	3.929	3.918	5.706	5.905	6.452	6.280	6.784	5.905	6.452	6.280	6.784	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.608	3.641	5.269	5.428	6.104	5.804	6.226	5.428	6.104	5.804	6.226	ns
		GCLK PLL	$t_{co}$	4.051	4.040	5.904	6.112	6.668	6.496	7.153	6.112	6.668	6.496	7.153	ns
	8mA	GCLK	$t_{co}$	3.497	3.530	5.139	5.294	5.942	5.668	6.088	5.294	5.942	5.668	6.088	ns
		GCLK PLL	$t_{co}$	3.940	3.929	5.774	5.978	6.531	6.360	6.990	5.978	6.531	6.360	6.990	ns
	12mA	GCLK	$t_{co}$	3.461	3.494	5.076	5.225	5.840	5.594	6.014	5.225	5.840	5.594	6.014	ns
		GCLK PLL	$t_{co}$	3.904	3.893	5.711	5.909	6.457	6.286	6.888	5.909	6.457	6.286	6.888	ns
	16mA	GCLK	$t_{co}$	3.443	3.476	5.047	5.197	5.790	5.564	5.986	5.197	5.790	5.564	5.986	ns
		GCLK PLL	$t_{co}$	3.886	3.875	5.682	5.881	6.428	6.256	6.838	5.881	6.428	6.256	6.838	ns

**Table 1-133.** EP3SE260 Column Pins Output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.522	3.555	5.173	5.328	5.996	5.703	6.123	5.328	5.996	5.703	6.123	ns
		GCLK PLL	$t_{co}$	3.965	3.954	5.808	6.012	6.566	6.395	7.044	6.012	6.566	6.395	7.044	ns
	8mA	GCLK	$t_{co}$	3.443	3.476	5.049	5.199	5.814	5.568	5.988	5.199	5.814	5.568	5.988	ns
		GCLK PLL	$t_{co}$	3.886	3.875	5.684	5.883	6.431	6.260	6.862	5.883	6.431	6.260	6.862	ns
	12mA	GCLK	$t_{co}$	3.438	3.471	5.042	5.192	5.746	5.558	5.980	5.192	5.746	5.558	5.980	ns
		GCLK PLL	$t_{co}$	3.881	3.870	5.677	5.876	6.422	6.250	6.795	5.876	6.422	6.250	6.795	ns
	16mA	GCLK	$t_{co}$	3.429	3.462	5.028	5.177	5.744	5.543	5.965	5.177	5.744	5.543	5.965	ns
		GCLK PLL	$t_{co}$	3.872	3.861	5.663	5.861	6.407	6.235	6.792	5.861	6.407	6.235	6.792	ns
2.5 V	4mA	GCLK	$t_{co}$	3.644	3.677	5.380	5.555	6.278	5.950	6.370	5.555	6.278	5.950	6.370	ns
		GCLK PLL	$t_{co}$	4.087	4.076	6.015	6.239	6.813	6.642	7.326	6.239	6.813	6.642	7.326	ns
	8mA	GCLK	$t_{co}$	3.544	3.577	5.261	5.429	6.081	5.818	6.238	5.429	6.081	5.818	6.238	ns
		GCLK PLL	$t_{co}$	3.987	3.976	5.896	6.113	6.681	6.510	7.129	6.113	6.681	6.510	7.129	ns
	12mA	GCLK	$t_{co}$	3.500	3.533	5.174	5.338	5.941	5.721	6.143	5.338	5.941	5.721	6.143	ns
		GCLK PLL	$t_{co}$	3.943	3.932	5.809	6.022	6.585	6.413	6.989	6.022	6.585	6.413	6.989	ns
	16mA	GCLK	$t_{co}$	3.462	3.495	5.135	5.296	5.891	5.678	6.100	5.296	5.891	5.678	6.100	ns
		GCLK PLL	$t_{co}$	3.905	3.894	5.770	5.980	6.542	6.370	6.939	5.980	6.542	6.370	6.939	ns

**Table 1-133.** EP3SE260 Column Pins Output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
1.8 V	2mA	GCLK	$t_{co}$	3.835	3.868	5.701	5.915	6.815	6.353	6.775	5.915	6.815	6.353	6.775	ns
		GCLK PLL	$t_{co}$	4.278	4.267	6.336	6.599	7.217	7.045	7.864	6.599	7.217	7.045	7.864	ns
	4mA	GCLK	$t_{co}$	3.654	3.687	5.422	5.606	6.354	6.007	6.427	5.606	6.354	6.007	6.427	ns
		GCLK PLL	$t_{co}$	4.097	4.086	6.057	6.290	6.870	6.699	7.402	6.290	6.870	6.699	7.402	ns
	6mA	GCLK	$t_{co}$	3.572	3.605	5.315	5.491	6.180	5.895	6.317	5.491	6.180	5.895	6.317	ns
		GCLK PLL	$t_{co}$	4.015	4.004	5.950	6.175	6.759	6.587	7.229	6.175	6.759	6.587	7.229	ns
	8mA	GCLK	$t_{co}$	3.552	3.585	5.257	5.437	6.068	5.829	6.251	5.437	6.068	5.829	6.251	ns
		GCLK PLL	$t_{co}$	3.995	3.984	5.892	6.121	6.693	6.521	7.117	6.121	6.693	6.521	7.117	ns
	10mA	GCLK	$t_{co}$	3.489	3.522	5.196	5.362	5.954	5.748	6.170	5.362	5.954	5.748	6.170	ns
		GCLK PLL	$t_{co}$	3.932	3.921	5.831	6.046	6.612	6.440	7.003	6.046	6.612	6.440	7.003	ns
	12mA	GCLK	$t_{co}$	3.471	3.504	5.175	5.341	5.916	5.725	6.147	5.341	5.916	5.725	6.147	ns
		GCLK PLL	$t_{co}$	3.914	3.903	5.810	6.025	6.589	6.417	6.965	6.025	6.589	6.417	6.965	ns
1.5 V	2mA	GCLK	$t_{co}$	3.781	3.814	5.630	5.847	6.732	6.291	6.713	5.847	6.732	6.291	6.713	ns
		GCLK PLL	$t_{co}$	4.224	4.213	6.265	6.531	7.155	6.983	7.781	6.531	7.155	6.983	7.781	ns
	4mA	GCLK	$t_{co}$	3.569	3.602	5.311	5.491	6.176	5.899	6.321	5.491	6.176	5.899	6.321	ns
		GCLK PLL	$t_{co}$	4.012	4.001	5.946	6.175	6.763	6.591	7.225	6.175	6.763	6.591	7.225	ns
	6mA	GCLK	$t_{co}$	3.544	3.577	5.244	5.431	6.059	5.832	6.254	5.431	6.059	5.832	6.254	ns
		GCLK PLL	$t_{co}$	3.987	3.976	5.879	6.115	6.696	6.524	7.108	6.115	6.696	6.524	7.108	ns
	8mA	GCLK	$t_{co}$	3.533	3.566	5.227	5.406	6.027	5.812	6.234	5.406	6.027	5.812	6.234	ns
		GCLK PLL	$t_{co}$	3.976	3.965	5.862	6.090	6.676	6.504	7.076	6.090	6.676	6.504	7.076	ns
	10mA	GCLK	$t_{co}$	3.478	3.511	5.189	5.355	5.945	5.742	6.164	5.355	5.945	5.742	6.164	ns
		GCLK PLL	$t_{co}$	3.921	3.910	5.824	6.039	6.606	6.434	6.994	6.039	6.606	6.434	6.994	ns
	12mA	GCLK	$t_{co}$	3.473	3.506	5.172	5.344	5.903	5.731	6.153	5.344	5.903	5.731	6.153	ns
		GCLK PLL	$t_{co}$	3.916	3.905	5.807	6.028	6.595	6.423	6.952	6.028	6.595	6.423	6.952	ns

**Table 1-133.** EP3SE260 Column Pins Output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.2 V	2mA	GCLK	$t_{co}$	3.697	3.730	5.556	5.783	6.652	6.235	6.657	5.783	6.652	6.235	6.657	ns
		GCLK PLL	$t_{co}$	4.140	4.129	6.191	6.467	7.099	6.927	7.701	6.467	7.099	6.927	7.701	ns
	4mA	GCLK	$t_{co}$	3.574	3.607	5.330	5.521	6.223	5.949	6.371	5.521	6.223	5.949	6.371	ns
		GCLK PLL	$t_{co}$	4.017	4.006	5.965	6.205	6.813	6.641	7.272	6.205	6.813	6.641	7.272	ns
	6mA	GCLK	$t_{co}$	3.536	3.569	5.238	5.432	6.068	5.836	6.258	5.432	6.068	5.836	6.258	ns
		GCLK PLL	$t_{co}$	3.979	3.968	5.873	6.116	6.700	6.528	7.117	6.116	6.700	6.528	7.117	ns
	8mA	GCLK	$t_{co}$	3.489	3.522	5.210	5.383	5.977	5.780	6.202	5.383	5.977	5.780	6.202	ns
		GCLK PLL	$t_{co}$	3.932	3.921	5.845	6.067	6.644	6.472	7.026	6.067	6.644	6.472	7.026	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.489	3.522	5.167	5.330	5.925	5.711	6.133	5.330	5.925	5.711	6.133	ns
		GCLK PLL	$t_{co}$	3.932	3.921	5.802	6.014	6.575	6.403	6.974	6.014	6.575	6.403	6.974	ns
	10mA	GCLK	$t_{co}$	3.486	3.519	5.164	5.327	5.930	5.707	6.129	5.327	5.930	5.707	6.129	ns
		GCLK PLL	$t_{co}$	3.929	3.918	5.799	6.011	6.571	6.399	6.978	6.011	6.571	6.399	6.978	ns
	12mA	GCLK	$t_{co}$	3.484	3.517	5.164	5.328	5.911	5.708	6.130	5.328	5.911	5.708	6.130	ns
		GCLK PLL	$t_{co}$	3.927	3.916	5.799	6.012	6.572	6.400	6.960	6.012	6.572	6.400	6.960	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.475	3.508	5.149	5.312	5.877	5.693	6.115	5.312	5.877	5.693	6.115	ns
		GCLK PLL	$t_{co}$	3.918	3.907	5.784	5.996	6.557	6.385	6.926	5.996	6.557	6.385	6.926	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.496	3.529	5.179	5.344	5.952	5.727	6.149	5.344	5.952	5.727	6.149	ns
		GCLK PLL	$t_{co}$	3.939	3.928	5.814	6.028	6.591	6.419	7.000	6.028	6.591	6.419	7.000	ns
	6mA	GCLK	$t_{co}$	3.492	3.525	5.177	5.342	5.942	5.725	6.147	5.342	5.942	5.725	6.147	ns
		GCLK PLL	$t_{co}$	3.935	3.924	5.812	6.026	6.589	6.417	6.991	6.026	6.589	6.417	6.991	ns
	8mA	GCLK	$t_{co}$	3.481	3.514	5.167	5.333	5.934	5.716	6.138	5.333	5.934	5.716	6.138	ns
		GCLK PLL	$t_{co}$	3.924	3.913	5.802	6.017	6.580	6.408	6.982	6.017	6.580	6.408	6.982	ns
	10mA	GCLK	$t_{co}$	3.470	3.503	5.154	5.320	5.896	5.703	6.125	5.320	5.896	5.703	6.125	ns
		GCLK PLL	$t_{co}$	3.913	3.902	5.789	6.004	6.567	6.395	6.945	6.004	6.567	6.395	6.945	ns
	12mA	GCLK	$t_{co}$	3.470	3.503	5.154	5.320	5.896	5.703	6.125	5.320	5.896	5.703	6.125	ns
		GCLK PLL	$t_{co}$	3.913	3.902	5.789	6.004	6.567	6.395	6.945	6.004	6.567	6.395	6.945	ns

**Table 1-133.** EP3SE260 Column Pins Output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.476	3.509	5.153	5.317	5.896	5.698	6.120	5.317	5.896	5.698	6.120	ns
		GCLK PLL	$t_{co}$	3.919	3.908	5.788	6.001	6.562	6.390	6.945	6.001	6.562	6.390	6.945	ns
	16mA	GCLK	$t_{co}$	3.479	3.512	5.161	5.326	5.901	5.710	6.132	5.326	5.901	5.710	6.132	ns
		GCLK PLL	$t_{co}$	3.922	3.911	5.796	6.010	6.574	6.402	6.950	6.010	6.574	6.402	6.950	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.500	3.533	5.188	5.356	5.967	5.740	6.162	5.356	5.967	5.740	6.162	ns
		GCLK PLL	$t_{co}$	3.943	3.932	5.823	6.040	6.604	6.432	7.016	6.040	6.604	6.432	7.016	ns
	6mA	GCLK	$t_{co}$	3.486	3.519	5.178	5.346	5.941	5.731	6.153	5.346	5.941	5.731	6.153	ns
		GCLK PLL	$t_{co}$	3.929	3.918	5.813	6.030	6.595	6.423	6.990	6.030	6.595	6.423	6.990	ns
	8mA	GCLK	$t_{co}$	3.475	3.508	5.164	5.332	5.917	5.717	6.139	5.332	5.917	5.717	6.139	ns
		GCLK PLL	$t_{co}$	3.918	3.907	5.799	6.016	6.581	6.409	6.966	6.016	6.581	6.409	6.966	ns
	10mA	GCLK	$t_{co}$	3.474	3.507	5.167	5.335	5.906	5.721	6.143	5.335	5.906	5.721	6.143	ns
		GCLK PLL	$t_{co}$	3.917	3.906	5.802	6.019	6.585	6.413	6.955	6.019	6.585	6.413	6.955	ns
	12mA	GCLK	$t_{co}$	3.471	3.504	5.162	5.330	5.896	5.715	6.137	5.330	5.896	5.715	6.137	ns
		GCLK PLL	$t_{co}$	3.914	3.903	5.797	6.014	6.579	6.407	6.945	6.014	6.579	6.407	6.945	ns
SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.473	3.506	5.151	5.316	5.896	5.698	6.120	5.316	5.896	5.698	6.120	ns
		GCLK PLL	$t_{co}$	3.916	3.905	5.786	6.000	6.562	6.390	6.945	6.000	6.562	6.390	6.945	ns
	16mA	GCLK	$t_{co}$	3.476	3.509	5.158	5.325	5.902	5.709	6.131	5.325	5.902	5.709	6.131	ns
		GCLK PLL	$t_{co}$	3.919	3.908	5.793	6.009	6.573	6.401	6.951	6.009	6.573	6.401	6.951	ns

**Table 1-133.** EP3SE260 Column Pins Output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$		
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.483	3.516	5.153	5.316	5.910	5.696	6.118	5.316	5.910	5.696	6.118	ns	
		GCLK PLL	$t_{co}$	3.926	3.915	5.788	6.000	6.560	6.388	6.959	6.000	6.560	6.388	6.959	ns	
	6mA	GCLK	$t_{co}$	3.476	3.509	5.151	5.314	5.906	5.695	6.117	5.314	5.906	5.695	6.117	ns	
		GCLK PLL	$t_{co}$	3.919	3.908	5.786	5.998	6.559	6.387	6.954	5.998	6.559	6.387	6.954	ns	
	8mA	GCLK	$t_{co}$	3.468	3.501	5.143	5.307	5.879	5.688	6.110	5.307	5.879	5.688	6.110	ns	
		GCLK PLL	$t_{co}$	3.911	3.900	5.778	5.991	6.552	6.380	6.928	5.991	6.552	6.380	6.928	ns	
	10mA	GCLK	$t_{co}$	3.471	3.504	5.146	5.310	5.882	5.692	6.114	5.310	5.882	5.692	6.114	ns	
		GCLK PLL	$t_{co}$	3.914	3.903	5.781	5.994	6.556	6.384	6.931	5.994	6.556	6.384	6.931	ns	
	12mA	GCLK	$t_{co}$	3.468	3.501	5.149	5.314	5.881	5.696	6.118	5.314	5.881	5.696	6.118	ns	
		GCLK PLL	$t_{co}$	3.911	3.900	5.784	5.998	6.560	6.388	6.929	5.998	6.560	6.388	6.929	ns	
	1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.476	3.509	5.148	5.311	5.878	5.692	6.114	5.311	5.878	5.692	6.114	ns
			GCLK PLL	$t_{co}$	3.919	3.908	5.783	5.995	6.556	6.384	6.927	5.995	6.556	6.384	6.927	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.488	3.521	5.161	5.326	5.926	5.707	6.129	5.326	5.926	5.707	6.129	ns	
		GCLK PLL	$t_{co}$	3.931	3.920	5.796	6.010	6.571	6.399	6.975	6.010	6.571	6.399	6.975	ns	
	6mA	GCLK	$t_{co}$	3.484	3.517	5.162	5.327	5.915	5.710	6.132	5.327	5.915	5.710	6.132	ns	
		GCLK PLL	$t_{co}$	3.927	3.916	5.797	6.011	6.574	6.402	6.964	6.011	6.574	6.402	6.964	ns	
	8mA	GCLK	$t_{co}$	3.480	3.513	5.158	5.323	5.909	5.705	6.127	5.323	5.909	5.705	6.127	ns	
		GCLK PLL	$t_{co}$	3.923	3.912	5.793	6.007	6.569	6.397	6.958	6.007	6.569	6.397	6.958	ns	
	10mA	GCLK	$t_{co}$	3.473	3.506	5.151	5.316	5.896	5.698	6.120	5.316	5.896	5.698	6.120	ns	
		GCLK PLL	$t_{co}$	3.916	3.905	5.786	6.000	6.562	6.390	6.945	6.000	6.562	6.390	6.945	ns	
	12mA	GCLK	$t_{co}$	3.474	3.507	5.158	5.324	5.892	5.708	6.130	5.324	5.892	5.708	6.130	ns	
		GCLK PLL	$t_{co}$	3.917	3.906	5.793	6.008	6.572	6.400	6.941	6.008	6.572	6.400	6.941	ns	
	1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.472	3.505	5.139	5.302	5.871	5.682	6.104	5.302	5.871	5.682	6.104	ns
			GCLK PLL	$t_{co}$	3.915	3.904	5.774	5.986	6.546	6.374	6.920	5.986	6.546	6.374	6.920	ns

**Table 1-133.** EP3SE260 Column Pins Output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.491	3.524	5.175	5.343	5.945	5.728	6.150	5.343	5.945	5.728	6.150	ns
		GCLK PLL	$t_{co}$	3.934	3.923	5.810	6.027	6.592	6.420	6.994	6.027	6.592	6.420	6.994	ns
	6mA	GCLK	$t_{co}$	3.483	3.516	5.166	5.334	5.928	5.719	6.141	5.334	5.928	5.719	6.141	ns
		GCLK PLL	$t_{co}$	3.926	3.915	5.801	6.018	6.583	6.411	6.977	6.018	6.583	6.411	6.977	ns
	8mA	GCLK	$t_{co}$	3.484	3.517	5.174	5.342	5.924	5.728	6.150	5.342	5.924	5.728	6.150	ns
		GCLK PLL	$t_{co}$	3.927	3.916	5.809	6.026	6.592	6.420	6.973	6.026	6.592	6.420	6.973	ns
	10mA	GCLK	$t_{co}$	3.473	3.506	5.161	5.329	5.901	5.714	6.136	5.329	5.901	5.714	6.136	ns
		GCLK PLL	$t_{co}$	3.916	3.905	5.796	6.013	6.578	6.406	6.950	6.013	6.578	6.406	6.950	ns
	12mA	GCLK	$t_{co}$	3.473	3.506	5.161	5.329	5.902	5.715	6.137	5.329	5.902	5.715	6.137	ns
		GCLK PLL	$t_{co}$	3.916	3.905	5.796	6.013	6.579	6.407	6.951	6.013	6.579	6.407	6.951	ns
1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.494	3.527	5.177	5.344	5.980	5.728	6.150	5.344	5.980	5.728	6.150	ns
		GCLK PLL	$t_{co}$	3.937	3.926	5.812	6.028	6.592	6.420	7.029	6.028	6.592	6.420	7.029	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.597	3.630	5.222	5.378	5.955	5.753	6.175	5.378	5.955	5.753	6.175	ns
		GCLK PLL	$t_{co}$	4.040	4.029	5.857	6.062	6.617	6.445	7.004	6.062	6.617	6.445	7.004	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.597	3.630	5.222	5.378	5.955	5.753	6.175	5.378	5.955	5.753	6.175	ns
		GCLK PLL	$t_{co}$	4.040	4.029	5.857	6.062	6.617	6.445	7.004	6.062	6.617	6.445	7.004	ns

Table 1-134 lists the EP3SE260 row pins output timing parameters for single-ended I/O standards.

**Table 1-134.** EP3SE260 Row Pins Output Timing Parameters (Part 1 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.648	3.902	5.663	5.865	6.484	6.256	6.709	6.063	6.530	6.256	6.709	ns
		GCLK PLL	$t_{co}$	1.582	1.785	2.228	2.322	2.505	2.489	2.454	2.441	2.632	2.489	2.454	ns
	8mA	GCLK	$t_{co}$	3.555	3.797	5.533	5.727	6.340	6.112	6.565	5.922	6.414	6.112	6.565	ns
		GCLK PLL	$t_{co}$	1.489	1.680	2.098	2.184	2.361	2.346	2.310	2.300	2.483	2.346	2.310	ns
	12mA	GCLK	$t_{co}$	3.456	3.707	5.414	5.604	6.212	5.995	6.446	5.795	6.315	5.995	6.446	ns
		GCLK PLL	$t_{co}$	1.390	1.574	1.979	2.061	2.233	2.250	2.182	2.173	2.354	2.250	2.182	ns



**Table 1-134.** EP3SE260 Row Pins Output Timing Parameters (Part 2 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.658	3.906	5.671	5.870	6.489	6.261	6.714	6.069	6.542	6.261	6.714	ns
		GCLK PLL	$t_{co}$	1.592	1.789	2.236	2.327	2.510	2.494	2.459	2.447	2.637	2.494	2.459	ns
	8mA	GCLK	$t_{co}$	3.460	3.711	5.420	5.616	6.218	6.005	6.456	5.801	6.324	6.005	6.456	ns
		GCLK PLL	$t_{co}$	1.394	1.580	1.985	2.067	2.239	2.260	2.188	2.179	2.363	2.260	2.188	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.602	3.848	5.615	5.818	6.441	6.213	6.666	6.020	6.496	6.213	6.666	ns
		GCLK PLL	$t_{co}$	1.536	1.731	2.180	2.275	2.462	2.446	2.411	2.398	2.590	2.446	2.411	ns
	8mA	GCLK	$t_{co}$	3.477	3.721	5.463	5.659	6.277	6.049	6.502	5.858	6.351	6.049	6.502	ns
		GCLK PLL	$t_{co}$	1.411	1.604	2.028	2.116	2.298	2.282	2.247	2.236	2.426	2.282	2.247	ns
	12mA	GCLK	$t_{co}$	3.438	3.678	5.381	5.576	6.189	5.961	6.414	5.772	6.277	5.961	6.414	ns
		GCLK PLL	$t_{co}$	1.372	1.553	1.946	2.033	2.210	2.211	2.159	2.150	2.333	2.211	2.159	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.516	3.767	5.510	5.711	6.330	6.102	6.555	5.912	6.387	6.102	6.555	ns
		GCLK PLL	$t_{co}$	1.450	1.650	2.075	2.168	2.351	2.335	2.300	2.290	2.479	2.335	2.300	ns
	8mA	GCLK	$t_{co}$	3.416	3.662	5.351	5.545	6.150	5.928	6.379	5.732	6.249	5.928	6.379	ns
		GCLK PLL	$t_{co}$	1.350	1.531	1.911	1.994	2.171	2.183	2.120	2.110	2.293	2.183	2.120	ns
2.5 V	4mA	GCLK	$t_{co}$	3.628	3.884	5.748	5.972	6.613	6.385	6.838	6.180	6.648	6.385	6.838	ns
		GCLK PLL	$t_{co}$	1.562	1.767	2.313	2.429	2.634	2.618	2.583	2.558	2.769	2.618	2.583	ns
	8mA	GCLK	$t_{co}$	3.518	3.785	5.593	5.809	6.443	6.215	6.668	6.013	6.504	6.215	6.668	ns
		GCLK PLL	$t_{co}$	1.452	1.668	2.158	2.266	2.464	2.448	2.413	2.391	2.595	2.448	2.413	ns
	12mA	GCLK	$t_{co}$	3.472	3.718	5.482	5.690	6.317	6.089	6.542	5.890	6.409	6.089	6.542	ns
		GCLK PLL	$t_{co}$	1.406	1.592	2.047	2.147	2.338	2.338	2.287	2.268	2.465	2.338	2.287	ns
1.8 V	2mA	GCLK	$t_{co}$	3.886	4.170	6.174	6.450	7.088	6.750	7.260	6.640	7.070	6.750	7.260	ns
		GCLK PLL	$t_{co}$	1.787	2.014	2.698	2.822	3.109	3.100	3.058	2.988	3.253	3.100	3.058	ns
	4mA	GCLK	$t_{co}$	3.661	3.968	5.848	6.082	6.683	6.390	6.855	6.275	6.709	6.390	6.855	ns
		GCLK PLL	$t_{co}$	1.562	1.812	2.372	2.454	2.704	2.695	2.653	2.623	2.847	2.695	2.653	ns
	6mA	GCLK	$t_{co}$	3.596	3.866	5.694	5.932	6.524	6.289	6.709	6.107	6.603	6.289	6.709	ns
		GCLK PLL	$t_{co}$	1.497	1.710	2.218	2.304	2.545	2.536	2.494	2.455	2.674	2.536	2.494	ns
	8mA	GCLK	$t_{co}$	3.536	3.792	5.617	5.839	6.428	6.224	6.644	6.012	6.531	6.224	6.644	ns
		GCLK PLL	$t_{co}$	1.437	1.649	2.141	2.227	2.449	2.440	2.398	2.360	2.580	2.440	2.398	ns

**Table 1-134.** EP3SE260 Row Pins Output Timing Parameters (Part 3 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
1.5 V	2mA	GCLK	$t_{co}$	3.797	4.088	6.084	6.364	7.016	6.687	7.188	6.547	7.005	6.687	7.188	ns
		GCLK PLL	$t_{co}$	1.698	1.932	2.608	2.736	3.037	3.028	2.986	2.895	3.177	3.028	2.986	ns
	4mA	GCLK	$t_{co}$	3.555	3.831	5.679	5.927	6.525	6.293	6.713	6.101	6.604	6.293	6.713	ns
		GCLK PLL	$t_{co}$	1.456	1.675	2.203	2.299	2.546	2.537	2.495	2.449	2.673	2.537	2.495	ns
	6mA	GCLK	$t_{co}$	3.528	3.783	5.606	5.831	6.419	6.224	6.644	6.003	6.531	6.224	6.644	ns
		GCLK PLL	$t_{co}$	1.429	1.640	2.130	2.219	2.440	2.431	2.389	2.351	2.568	2.431	2.389	ns
	8mA	GCLK	$t_{co}$	3.519	3.774	5.584	5.813	6.400	6.205	6.625	5.985	6.512	6.205	6.625	ns
		GCLK PLL	$t_{co}$	1.420	1.629	2.108	2.195	2.421	2.412	2.370	2.333	2.549	2.412	2.370	ns
1.2 V	2mA	GCLK	$t_{co}$	3.740	4.013	5.994	6.278	6.941	6.626	7.113	6.459	6.936	6.626	7.113	ns
		GCLK PLL	$t_{co}$	1.641	1.857	2.518	2.650	2.962	2.953	2.911	2.807	3.093	2.953	2.911	ns
	4mA	GCLK	$t_{co}$	3.560	3.824	5.701	5.955	6.566	6.341	6.761	6.126	6.648	6.341	6.761	ns
		GCLK PLL	$t_{co}$	1.461	1.670	2.225	2.327	2.587	2.578	2.536	2.474	2.715	2.578	2.536	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.457	3.706	5.468	5.677	6.285	6.073	6.524	5.857	6.395	6.073	6.524	ns
		GCLK PLL	$t_{co}$	1.391	1.578	2.024	2.119	2.306	2.328	2.255	2.235	2.434	2.328	2.255	ns
	12mA	GCLK	$t_{co}$	3.445	3.702	5.465	5.675	6.277	6.071	6.522	5.849	6.394	6.071	6.522	ns
		GCLK PLL	$t_{co}$	1.379	1.566	2.016	2.111	2.301	2.326	2.247	2.227	2.433	2.326	2.247	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	3.429	3.691	5.450	5.659	6.250	6.054	6.505	5.823	6.376	6.054	6.505	ns
		GCLK PLL	$t_{co}$	1.363	1.548	1.991	2.086	2.284	2.309	2.220	2.201	2.415	2.309	2.220	ns
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.497	3.748	5.512	5.726	6.301	6.119	6.539	5.893	6.422	6.119	6.539	ns
		GCLK PLL	$t_{co}$	1.398	1.593	2.041	2.131	2.324	2.313	2.271	2.241	2.459	2.313	2.271	ns
	6mA	GCLK	$t_{co}$	3.482	3.734	5.509	5.724	6.299	6.118	6.538	5.891	6.420	6.118	6.538	ns
		GCLK PLL	$t_{co}$	1.383	1.588	2.039	2.130	2.323	2.311	2.269	2.239	2.457	2.311	2.269	ns
	8mA	GCLK	$t_{co}$	3.471	3.722	5.492	5.707	6.282	6.108	6.528	5.874	6.411	6.108	6.528	ns
		GCLK PLL	$t_{co}$	1.372	1.577	2.029	2.120	2.313	2.294	2.252	2.222	2.448	2.294	2.252	ns
	10mA	GCLK	$t_{co}$	3.447	3.699	5.476	5.691	6.267	6.095	6.515	5.859	6.399	6.095	6.515	ns
		GCLK PLL	$t_{co}$	1.348	1.566	2.016	2.107	2.300	2.279	2.237	2.207	2.436	2.279	2.237	ns
	12mA	GCLK	$t_{co}$	3.447	3.698	5.475	5.690	6.266	6.095	6.515	5.858	6.399	6.095	6.515	ns
		GCLK PLL	$t_{co}$	1.348	1.565	2.016	2.107	2.300	2.278	2.236	2.206	2.436	2.278	2.236	ns

**Table 1-134.** EP3SE260 Row Pins Output Timing Parameters (Part 4 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 0.9\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	$V_{CC1} = 1.1\text{ V}$	
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.457	3.707	5.473	5.686	6.260	6.090	6.510	5.853	6.393	6.090	6.510	ns
		GCLK PLL	$t_{co}$	1.358	1.572	2.015	2.104	2.295	2.272	2.230	2.201	2.430	2.272	2.230	ns
	16mA	GCLK	$t_{co}$	3.451	3.702	5.472	5.687	6.262	6.100	6.520	5.855	6.404	6.100	6.520	ns
		GCLK PLL	$t_{co}$	1.352	1.575	2.021	2.112	2.305	2.274	2.233	2.203	2.441	2.274	2.233	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.493	3.744	5.523	5.740	6.318	6.132	6.552	5.906	6.434	6.132	6.552	ns
		GCLK PLL	$t_{co}$	1.394	1.596	2.050	2.142	2.339	2.330	2.288	2.254	2.471	2.330	2.288	ns
	6mA	GCLK	$t_{co}$	3.470	3.722	5.505	5.723	6.301	6.122	6.542	5.890	6.425	6.122	6.542	ns
		GCLK PLL	$t_{co}$	1.371	1.582	2.039	2.132	2.327	2.313	2.271	2.238	2.462	2.313	2.271	ns
	8mA	GCLK	$t_{co}$	3.453	3.705	5.488	5.705	6.283	6.109	6.529	5.872	6.412	6.109	6.529	ns
		GCLK PLL	$t_{co}$	1.354	1.570	2.026	2.119	2.314	2.295	2.253	2.220	2.449	2.295	2.253	ns
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.472	3.720	5.479	5.691	6.263	6.088	6.508	5.857	6.390	6.088	6.508	ns
		GCLK PLL	$t_{co}$	1.373	1.578	2.014	2.102	2.293	2.275	2.233	2.205	2.427	2.275	2.233	ns
	6mA	GCLK	$t_{co}$	3.460	3.708	5.470	5.683	6.255	6.087	6.507	5.849	6.390	6.087	6.507	ns
		GCLK PLL	$t_{co}$	1.361	1.572	2.012	2.101	2.292	2.267	2.225	2.197	2.427	2.267	2.225	ns
	8mA	GCLK	$t_{co}$	3.447	3.696	5.462	5.674	6.247	6.080	6.500	5.841	6.383	6.080	6.500	ns
		GCLK PLL	$t_{co}$	1.348	1.564	2.005	2.094	2.285	2.259	2.217	2.189	2.420	2.259	2.217	ns
	10mA	GCLK	$t_{co}$	3.449	3.698	5.464	5.677	6.250	6.084	6.504	5.844	6.386	6.084	6.504	ns
		GCLK PLL	$t_{co}$	1.350	1.566	2.008	2.097	2.289	2.262	2.220	2.192	2.423	2.262	2.220	ns
	12mA	GCLK	$t_{co}$	3.442	3.693	5.462	5.676	6.250	6.087	6.507	5.844	6.391	6.087	6.507	ns
		GCLK PLL	$t_{co}$	1.343	1.563	2.010	2.100	2.292	2.262	2.220	2.192	2.428	2.262	2.220	ns
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.448	3.697	5.457	5.668	6.241	6.083	6.503	5.835	6.385	6.083	6.503	ns
		GCLK PLL	$t_{co}$	1.349	1.571	2.008	2.097	2.288	2.253	2.216	2.183	2.422	2.253	2.216	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.479	3.727	5.490	5.704	6.278	6.099	6.519	5.869	6.401	6.099	6.519	ns
		GCLK PLL	$t_{co}$	1.380	1.584	2.023	2.112	2.304	2.290	2.248	2.217	2.438	2.290	2.248	ns
	6mA	GCLK	$t_{co}$	3.467	3.717	5.486	5.700	6.274	6.101	6.521	5.866	6.404	6.101	6.521	ns
		GCLK PLL	$t_{co}$	1.368	1.579	2.024	2.114	2.306	2.286	2.244	2.214	2.441	2.286	2.244	ns
	8mA	GCLK	$t_{co}$	3.463	3.712	5.480	5.694	6.268	6.096	6.516	5.860	6.398	6.096	6.516	ns
		GCLK PLL	$t_{co}$	1.364	1.575	2.019	2.109	2.301	2.280	2.238	2.208	2.435	2.280	2.238	ns

**Table 1–134.** EP3SE260 Row Pins Output Timing Parameters (Part 5 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{CO}$	3.478	3.726	5.501	5.718	6.296	6.118	6.538	5.883	6.420	6.118	6.538	ns
		GCLK PLL	$t_{CO}$	1.379	1.586	2.036	2.128	2.323	2.308	2.266	2.231	2.457	2.308	2.266	ns
	6mA	GCLK	$t_{CO}$	3.466	3.714	5.490	5.706	6.284	6.109	6.529	5.872	6.411	6.109	6.529	ns
		GCLK PLL	$t_{CO}$	1.367	1.578	2.027	2.119	2.314	2.296	2.254	2.220	2.448	2.296	2.254	ns
	8mA	GCLK	$t_{CO}$	3.463	3.712	5.494	5.711	6.290	6.118	6.538	5.878	6.421	6.118	6.538	ns
		GCLK PLL	$t_{CO}$	1.364	1.578	2.034	2.127	2.323	2.302	2.260	2.226	2.458	2.302	2.260	ns
3.0-V PCI	—	GCLK	$t_{CO}$	3.542	3.812	5.520	5.723	6.294	6.113	6.564	5.875	6.437	6.113	6.564	ns
		GCLK PLL	$t_{CO}$	1.476	1.661	2.049	2.137	2.343	2.368	2.264	2.253	2.476	2.368	2.264	ns
3.0-V PCI-X	—	GCLK	$t_{CO}$	3.542	3.812	5.520	5.723	6.294	6.113	6.564	5.875	6.437	6.113	6.564	ns
		GCLK PLL	$t_{CO}$	1.476	1.661	2.049	2.137	2.343	2.368	2.264	2.253	2.476	2.368	2.264	ns

Table 1–135 through Table 1–138 list the maximum I/O timing parameters for EP3SE260 devices for differential I/O standards.

Table 1–135 lists the EP3SE260 column pins input timing parameters for differential I/O standards.

**Table 1–135.** EP3SE260 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=1.1\text{ V}$	$V_{CC1}=0.9\text{ V}$	
LVDS	GCLK	$t_{SU}$	-1.153	-1.221	-1.879	-1.911	-2.067	-1.987	-2.459	-1.928	-2.084	-1.987	-2.459	ns
		$t_H$	1.289	1.376	2.114	2.150	2.330	2.237	2.711	2.177	2.355	2.237	2.711	ns
	GCLK PLL	$t_{SU}$	1.103	1.122	1.882	1.986	2.207	2.099	2.096	1.998	2.217	2.099	2.096	ns
		$t_H$	-0.824	-0.821	-1.403	-1.493	-1.659	-1.580	-1.562	-1.493	-1.659	-1.580	-1.562	ns
MINI-LVDS	GCLK	$t_{SU}$	-1.153	-1.221	-1.879	-1.911	-2.067	-1.987	-2.459	-1.928	-2.084	-1.987	-2.459	ns
		$t_H$	1.289	1.376	2.114	2.150	2.330	2.237	2.711	2.177	2.355	2.237	2.711	ns
	GCLK PLL	$t_{SU}$	1.103	1.122	1.882	1.986	2.207	2.099	2.096	1.998	2.217	2.099	2.096	ns
		$t_H$	-0.824	-0.821	-1.403	-1.493	-1.659	-1.580	-1.562	-1.493	-1.659	-1.580	-1.562	ns
RSDS	GCLK	$t_{SU}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_H$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{SU}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_H$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{SU}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_H$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{SU}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_H$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns

**Table 1-135.** EP3SE260 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.173	-1.244	-1.898	-1.933	-2.102	-2.022	-2.494	-1.950	-2.117	-2.022	-2.494	ns
		$t_h$	1.309	1.399	2.133	2.172	2.365	2.272	2.746	2.199	2.388	2.272	2.746	ns
	GCLK PLL	$t_{su}$	1.083	1.099	1.863	1.964	2.172	2.064	2.061	1.976	2.184	2.064	2.061	ns
		$t_h$	-0.804	-0.798	-1.384	-1.471	-1.624	-1.545	-1.527	-1.471	-1.626	-1.545	-1.527	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.173	-1.244	-1.898	-1.933	-2.102	-2.022	-2.494	-1.950	-2.117	-2.022	-2.494	ns
		$t_h$	1.309	1.399	2.133	2.172	2.365	2.272	2.746	2.199	2.388	2.272	2.746	ns
	GCLK PLL	$t_{su}$	1.083	1.099	1.863	1.964	2.172	2.064	2.061	1.976	2.184	2.064	2.061	ns
		$t_h$	-0.804	-0.798	-1.384	-1.471	-1.624	-1.545	-1.527	-1.471	-1.626	-1.545	-1.527	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_h$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{su}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_h$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_h$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{su}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_h$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.173	-1.244	-1.898	-1.933	-2.102	-2.022	-2.494	-1.950	-2.117	-2.022	-2.494	ns
		$t_h$	1.309	1.399	2.133	2.172	2.365	2.272	2.746	2.199	2.388	2.272	2.746	ns
	GCLK PLL	$t_{su}$	1.083	1.099	1.863	1.964	2.172	2.064	2.061	1.976	2.184	2.064	2.061	ns
		$t_h$	-0.804	-0.798	-1.384	-1.471	-1.624	-1.545	-1.527	-1.471	-1.626	-1.545	-1.527	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.173	-1.244	-1.898	-1.933	-2.102	-2.022	-2.494	-1.950	-2.117	-2.022	-2.494	ns
		$t_h$	1.309	1.399	2.133	2.172	2.365	2.272	2.746	2.199	2.388	2.272	2.746	ns
	GCLK PLL	$t_{su}$	1.083	1.099	1.863	1.964	2.172	2.064	2.061	1.976	2.184	2.064	2.061	ns
		$t_h$	-0.804	-0.798	-1.384	-1.471	-1.624	-1.545	-1.527	-1.471	-1.626	-1.545	-1.527	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.180	-1.250	-1.910	-1.938	-2.102	-2.024	-2.493	-1.954	-2.112	-2.024	-2.493	ns
		$t_h$	1.316	1.405	2.146	2.180	2.368	2.275	2.750	2.206	2.388	2.275	2.750	ns
	GCLK PLL	$t_{su}$	1.076	1.093	1.851	1.959	2.172	2.062	2.062	1.972	2.189	2.062	2.062	ns
		$t_h$	-0.797	-0.792	-1.371	-1.463	-1.621	-1.542	-1.523	-1.464	-1.626	-1.542	-1.523	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.180	-1.250	-1.910	-1.938	-2.102	-2.024	-2.493	-1.954	-2.112	-2.024	-2.493	ns
		$t_h$	1.316	1.405	2.146	2.180	2.368	2.275	2.750	2.206	2.388	2.275	2.750	ns
	GCLK PLL	$t_{su}$	1.076	1.093	1.851	1.959	2.172	2.062	2.062	1.972	2.189	2.062	2.062	ns
		$t_h$	-0.797	-0.792	-1.371	-1.463	-1.621	-1.542	-1.523	-1.464	-1.626	-1.542	-1.523	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.153	-1.221	-1.879	-1.911	-2.067	-1.987	-2.459	-1.928	-2.084	-1.987	-2.459	ns
		$t_h$	1.289	1.376	2.114	2.150	2.330	2.237	2.711	2.177	2.355	2.237	2.711	ns
	GCLK PLL	$t_{su}$	1.103	1.122	1.882	1.986	2.207	2.099	2.096	1.998	2.217	2.099	2.096	ns
		$t_h$	-0.824	-0.821	-1.403	-1.493	-1.659	-1.580	-1.562	-1.493	-1.659	-1.580	-1.562	ns

**Table 1-135.** EP3SE260 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.153	-1.221	-1.879	-1.911	-2.067	-1.987	-2.459	-1.928	-2.084	-1.987	-2.459	ns
		$t_h$	1.289	1.376	2.114	2.150	2.330	2.237	2.711	2.177	2.355	2.237	2.711	ns
	GCLK PLL	$t_{su}$	1.103	1.122	1.882	1.986	2.207	2.099	2.096	1.998	2.217	2.099	2.096	ns
		$t_h$	-0.824	-0.821	-1.403	-1.493	-1.659	-1.580	-1.562	-1.493	-1.659	-1.580	-1.562	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.161	-1.233	-1.889	-1.922	-2.083	-2.003	-2.475	-1.939	-2.099	-2.003	-2.475	ns
		$t_h$	1.297	1.388	2.124	2.161	2.346	2.253	2.727	2.188	2.370	2.253	2.727	ns
	GCLK PLL	$t_{su}$	1.095	1.110	1.872	1.975	2.191	2.083	2.080	1.987	2.202	2.083	2.080	ns
		$t_h$	-0.816	-0.809	-1.393	-1.482	-1.643	-1.564	-1.546	-1.482	-1.644	-1.564	-1.546	ns

Table 1-136 lists the EP3SE260 row pins input timing parameters for differential I/O standards.

**Table 1-136.** EP3SE260 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	GCLK	$t_{su}$	-1.332	-1.401	-1.719	-1.648	-1.841	-1.769	-2.221	-1.630	-1.815	-1.769	-2.221	ns
		$t_h$	1.476	1.563	1.994	1.939	2.157	2.071	2.526	1.934	2.145	2.071	2.526	ns
	GCLK PLL	$t_{su}$	0.869	0.886	1.991	2.205	2.405	2.282	2.297	2.252	2.458	2.282	2.297	ns
		$t_h$	-0.581	-0.578	-1.475	-1.662	-1.803	-1.711	-1.711	-1.692	-1.839	-1.711	-1.711	ns
MINI-LVDS	GCLK	$t_{su}$	-1.332	-1.401	-1.719	-1.648	-1.841	-1.769	-2.221	-1.630	-1.815	-1.769	-2.221	ns
		$t_h$	1.476	1.563	1.994	1.939	2.157	2.071	2.526	1.934	2.145	2.071	2.526	ns
	GCLK PLL	$t_{su}$	0.869	0.886	1.991	2.205	2.405	2.282	2.297	2.252	2.458	2.282	2.297	ns
		$t_h$	-0.581	-0.578	-1.475	-1.662	-1.803	-1.711	-1.711	-1.692	-1.839	-1.711	-1.711	ns
RSDS	GCLK	$t_{su}$	-1.332	-1.401	-1.719	-1.648	-1.841	-1.769	-2.221	-1.630	-1.815	-1.769	-2.221	ns
		$t_h$	1.476	1.563	1.994	1.939	2.157	2.071	2.526	1.934	2.145	2.071	2.526	ns
	GCLK PLL	$t_{su}$	0.869	0.886	1.991	2.205	2.405	2.282	2.297	2.252	2.458	2.282	2.297	ns
		$t_h$	-0.581	-0.578	-1.475	-1.662	-1.803	-1.711	-1.711	-1.692	-1.839	-1.711	-1.711	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.137	-1.216	-1.849	-1.877	-2.030	-1.953	-2.400	-1.901	-2.052	-1.953	-2.400	ns
		$t_h$	1.274	1.369	2.088	2.122	2.297	2.206	2.656	2.156	2.330	2.206	2.656	ns
	GCLK PLL	$t_{su}$	1.064	1.071	1.866	1.981	2.216	2.098	2.118	1.985	2.221	2.098	2.118	ns
		$t_h$	-0.783	-0.772	-1.384	-1.483	-1.663	-1.576	-1.581	-1.474	-1.654	-1.576	-1.581	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.137	-1.216	-1.849	-1.877	-2.030	-1.953	-2.400	-1.901	-2.052	-1.953	-2.400	ns
		$t_h$	1.274	1.369	2.088	2.122	2.297	2.206	2.656	2.156	2.330	2.206	2.656	ns
	GCLK PLL	$t_{su}$	1.064	1.071	1.866	1.981	2.216	2.098	2.118	1.985	2.221	2.098	2.118	ns
		$t_h$	-0.783	-0.772	-1.384	-1.483	-1.663	-1.576	-1.581	-1.474	-1.654	-1.576	-1.581	ns

**Table 1-136.** EP3SE260 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.146	-1.228	-1.858	-1.887	-2.046	-1.969	-2.416	-1.910	-2.068	-1.969	-2.416	ns
		$t_h$	1.283	1.381	2.097	2.132	2.313	2.222	2.672	2.165	2.346	2.222	2.672	ns
	GCLK PLL	$t_{su}$	1.055	1.059	1.857	1.971	2.200	2.082	2.102	1.976	2.205	2.082	2.102	ns
		$t_h$	-0.774	-0.760	-1.375	-1.473	-1.647	-1.560	-1.565	-1.465	-1.638	-1.560	-1.565	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.146	-1.228	-1.858	-1.887	-2.046	-1.969	-2.416	-1.910	-2.068	-1.969	-2.416	ns
		$t_h$	1.283	1.381	2.097	2.132	2.313	2.222	2.672	2.165	2.346	2.222	2.672	ns
	GCLK PLL	$t_{su}$	1.055	1.059	1.857	1.971	2.200	2.082	2.102	1.976	2.205	2.082	2.102	ns
		$t_h$	-0.774	-0.760	-1.375	-1.473	-1.647	-1.560	-1.565	-1.465	-1.638	-1.560	-1.565	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.160	-1.240	-1.867	-1.897	-2.064	-1.987	-2.434	-1.921	-2.085	-1.987	-2.434	ns
		$t_h$	1.297	1.393	2.106	2.142	2.331	2.240	2.690	2.176	2.363	2.240	2.690	ns
	GCLK PLL	$t_{su}$	1.041	1.047	1.844	1.961	2.182	2.064	2.084	1.965	2.188	2.064	2.084	ns
		$t_h$	-0.760	-0.748	-1.363	-1.463	-1.629	-1.542	-1.547	-1.454	-1.621	-1.542	-1.547	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.160	-1.240	-1.867	-1.897	-2.064	-1.987	-2.434	-1.921	-2.085	-1.987	-2.434	ns
		$t_h$	1.297	1.393	2.106	2.142	2.331	2.240	2.690	2.176	2.363	2.240	2.690	ns
	GCLK PLL	$t_{su}$	1.041	1.047	1.844	1.961	2.182	2.064	2.084	1.965	2.188	2.064	2.084	ns
		$t_h$	-0.760	-0.748	-1.363	-1.463	-1.629	-1.542	-1.547	-1.454	-1.621	-1.542	-1.547	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.146	-1.228	-1.858	-1.887	-2.046	-1.969	-2.416	-1.910	-2.068	-1.969	-2.416	ns
		$t_h$	1.283	1.381	2.097	2.132	2.313	2.222	2.672	2.165	2.346	2.222	2.672	ns
	GCLK PLL	$t_{su}$	1.055	1.059	1.857	1.971	2.200	2.082	2.102	1.976	2.205	2.082	2.102	ns
		$t_h$	-0.774	-0.760	-1.375	-1.473	-1.647	-1.560	-1.565	-1.465	-1.638	-1.560	-1.565	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.146	-1.228	-1.858	-1.887	-2.046	-1.969	-2.416	-1.910	-2.068	-1.969	-2.416	ns
		$t_h$	1.283	1.381	2.097	2.132	2.313	2.222	2.672	2.165	2.346	2.222	2.672	ns
	GCLK PLL	$t_{su}$	1.055	1.059	1.857	1.971	2.200	2.082	2.102	1.976	2.205	2.082	2.102	ns
		$t_h$	-0.774	-0.760	-1.375	-1.473	-1.647	-1.560	-1.565	-1.465	-1.638	-1.560	-1.565	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.160	-1.240	-1.867	-1.897	-2.064	-1.987	-2.434	-1.921	-2.085	-1.987	-2.434	ns
		$t_h$	1.297	1.393	2.106	2.142	2.331	2.240	2.690	2.176	2.363	2.240	2.690	ns
	GCLK PLL	$t_{su}$	1.041	1.047	1.844	1.961	2.182	2.064	2.084	1.965	2.188	2.064	2.084	ns
		$t_h$	-0.760	-0.748	-1.363	-1.463	-1.629	-1.542	-1.547	-1.454	-1.621	-1.542	-1.547	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.160	-1.240	-1.867	-1.897	-2.064	-1.987	-2.434	-1.921	-2.085	-1.987	-2.434	ns
		$t_h$	1.297	1.393	2.106	2.142	2.331	2.240	2.690	2.176	2.363	2.240	2.690	ns
	GCLK PLL	$t_{su}$	1.041	1.047	1.844	1.961	2.182	2.064	2.084	1.965	2.188	2.064	2.084	ns
		$t_h$	-0.760	-0.748	-1.363	-1.463	-1.629	-1.542	-1.547	-1.454	-1.621	-1.542	-1.547	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.169	-1.249	-1.881	-1.908	-2.071	-1.995	-2.440	-1.928	-2.086	-1.995	-2.440	ns
		$t_h$	1.306	1.402	2.121	2.156	2.341	2.250	2.701	2.186	2.369	2.250	2.701	ns
	GCLK PLL	$t_{su}$	1.032	1.038	1.829	1.945	2.171	2.052	2.073	1.954	2.182	2.052	2.073	ns
		$t_h$	-0.751	-0.739	-1.348	-1.445	-1.615	-1.528	-1.532	-1.440	-1.612	-1.528	-1.532	ns

**Table 1-136.** EP3SE260 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.169	-1.249	-1.881	-1.908	-2.071	-1.995	-2.440	-1.928	-2.086	-1.995	-2.440	ns
		$t_h$	1.306	1.402	2.121	2.156	2.341	2.250	2.701	2.186	2.369	2.250	2.701	ns
	GCLK PLL	$t_{su}$	1.032	1.038	1.829	1.945	2.171	2.052	2.073	1.954	2.182	2.052	2.073	ns
		$t_h$	-0.751	-0.739	-1.348	-1.445	-1.615	-1.528	-1.532	-1.440	-1.612	-1.528	-1.532	ns

Table 1-137 lists the EP3SE260 column pins output timing parameters for differential I/O standards.

**Table 1-137.** EP3SE260 Column Pins Output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
LVDS_E_1R	—	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns
MINI- LVDS_E_1R	—	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns
MINI- LVDS_E_3R	—	GCLK	$t_{co}$	3.506	3.783	5.577	5.790	6.354	6.190	6.597	5.934	6.497	6.190	6.597	ns
		GCLK PLL	$t_{co}$	3.496	3.773	5.567	5.779	6.344	6.180	6.587	5.923	6.487	6.180	6.587	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.496	3.773	5.570	5.783	6.348	6.184	6.591	5.928	6.492	6.184	6.591	ns
		GCLK PLL	$t_{co}$	3.489	3.767	5.563	5.777	6.342	6.178	6.585	5.921	6.486	6.178	6.585	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.488	3.765	5.560	5.774	6.339	6.175	6.582	5.918	6.482	6.175	6.582	ns
		GCLK PLL	$t_{co}$	3.510	3.787	5.581	5.794	6.358	6.194	6.601	5.938	6.502	6.194	6.601	ns



**Table 1-137.** EP3SE260 Column Pins Output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.500	3.776	5.560	5.771	6.333	6.169	6.576	5.914	6.475	6.169	6.576	ns
		GCLK PLL	$t_{co}$	3.495	3.772	5.560	5.771	6.334	6.170	6.577	5.915	6.477	6.170	6.577	ns
	6mA	GCLK	$t_{co}$	3.493	3.770	5.559	5.770	6.332	6.168	6.575	5.914	6.476	6.168	6.575	ns
		GCLK PLL	$t_{co}$	3.485	3.761	5.549	5.760	6.323	6.159	6.566	5.904	6.466	6.159	6.566	ns
	8mA	GCLK	$t_{co}$	3.486	3.763	5.555	5.767	6.331	6.167	6.574	5.912	6.475	6.167	6.574	ns
		GCLK PLL	$t_{co}$	3.485	3.760	5.538	5.748	6.309	6.145	6.552	5.891	6.451	6.145	6.552	ns
	10mA	GCLK	$t_{co}$	3.497	3.773	5.556	5.766	6.327	6.163	6.570	5.910	6.470	6.163	6.570	ns
		GCLK PLL	$t_{co}$	3.493	3.770	5.557	5.768	6.331	6.167	6.574	5.912	6.474	6.167	6.574	ns
	12mA	GCLK	$t_{co}$	3.483	3.759	5.546	5.757	6.319	6.155	6.562	5.901	6.462	6.155	6.562	ns
		GCLK PLL	$t_{co}$	3.481	3.757	5.544	5.754	6.317	6.153	6.560	5.899	6.460	6.153	6.560	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.481	3.758	5.547	5.759	6.322	6.158	6.565	5.903	6.466	6.158	6.565	ns
		GCLK PLL	$t_{co}$	3.485	3.761	5.544	5.754	6.316	6.152	6.559	5.898	6.459	6.152	6.559	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.511	3.790	5.589	5.802	6.366	6.202	6.609	5.946	6.509	6.202	6.609	ns
		GCLK PLL	$t_{co}$	3.497	3.776	5.577	5.791	6.356	6.192	6.599	5.936	6.500	6.192	6.599	ns
	6mA	GCLK	$t_{co}$	3.485	3.763	5.560	5.773	6.338	6.174	6.581	5.918	6.482	6.174	6.581	ns
		GCLK PLL	$t_{co}$	3.485	3.763	5.563	5.777	6.342	6.178	6.585	5.922	6.487	6.178	6.585	ns
	8mA	GCLK	$t_{co}$	3.481	3.759	5.556	5.769	6.335	6.171	6.578	5.915	6.479	6.171	6.578	ns
		GCLK PLL	$t_{co}$	3.485	3.761	5.549	5.760	6.323	6.159	6.566	5.904	6.466	6.159	6.566	ns
	10mA	GCLK	$t_{co}$	3.486	3.763	5.557	5.770	6.334	6.170	6.577	5.914	6.478	6.170	6.577	ns
		GCLK PLL	$t_{co}$	3.514	3.793	5.588	5.800	6.364	6.200	6.607	5.945	6.507	6.200	6.607	ns
	12mA	GCLK	$t_{co}$	3.503	3.781	5.576	5.788	6.352	6.188	6.595	5.933	6.495	6.188	6.595	ns
		GCLK PLL	$t_{co}$	3.498	3.777	5.576	5.789	6.353	6.189	6.596	5.934	6.497	6.189	6.596	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.484	3.762	5.558	5.770	6.334	6.170	6.577	5.915	6.479	6.170	6.577	ns
		GCLK PLL	$t_{co}$	3.482	3.760	5.556	5.768	6.332	6.168	6.575	5.913	6.476	6.168	6.575	ns

**Table 1-137.** EP3SE260 Column Pins Output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.486	3.762	5.548	5.758	6.320	6.156	6.563	5.902	6.463	6.156	6.563	ns
		GCLK PLL	$t_{co}$	3.486	3.763	5.556	5.768	6.332	6.168	6.575	5.913	6.476	6.168	6.575	ns
	6mA	GCLK	$t_{co}$	3.502	3.780	5.572	5.783	6.346	6.182	6.589	5.928	6.489	6.182	6.589	ns
		GCLK PLL	$t_{co}$	3.502	3.780	5.572	5.783	6.346	6.182	6.589	5.928	6.489	6.182	6.589	ns
	8mA	GCLK	$t_{co}$	3.492	3.770	5.562	5.773	6.336	6.172	6.579	5.918	6.480	6.172	6.579	ns
		GCLK PLL	$t_{co}$	3.485	3.762	5.548	5.758	6.320	6.156	6.563	5.902	6.463	6.156	6.563	ns
	10mA	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns
	12mA	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.479	3.750	5.506	5.712	6.270	6.106	6.513	5.854	6.411	6.106	6.513	ns
		GCLK PLL	$t_{co}$	3.475	3.753	5.553	5.767	6.332	6.168	6.575	5.913	6.477	6.168	6.575	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.506	3.783	5.577	5.790	6.354	6.190	6.597	5.934	6.497	6.190	6.597	ns
		GCLK PLL	$t_{co}$	3.496	3.773	5.567	5.779	6.344	6.180	6.587	5.923	6.487	6.180	6.587	ns
	6mA	GCLK	$t_{co}$	3.496	3.773	5.570	5.783	6.348	6.184	6.591	5.928	6.492	6.184	6.591	ns
		GCLK PLL	$t_{co}$	3.489	3.767	5.563	5.777	6.342	6.178	6.585	5.921	6.486	6.178	6.585	ns
	8mA	GCLK	$t_{co}$	3.488	3.765	5.560	5.774	6.339	6.175	6.582	5.918	6.482	6.175	6.582	ns
		GCLK PLL	$t_{co}$	3.510	3.787	5.581	5.794	6.358	6.194	6.601	5.938	6.502	6.194	6.601	ns
	10mA	GCLK	$t_{co}$	3.500	3.776	5.560	5.771	6.333	6.169	6.576	5.914	6.475	6.169	6.576	ns
		GCLK PLL	$t_{co}$	3.495	3.772	5.560	5.771	6.334	6.170	6.577	5.915	6.477	6.170	6.577	ns
	12mA	GCLK	$t_{co}$	3.493	3.770	5.559	5.770	6.332	6.168	6.575	5.914	6.476	6.168	6.575	ns
		GCLK PLL	$t_{co}$	3.485	3.761	5.549	5.760	6.323	6.159	6.566	5.904	6.466	6.159	6.566	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.486	3.763	5.555	5.767	6.331	6.167	6.574	5.912	6.475	6.167	6.574	ns
		GCLK PLL	$t_{co}$	3.485	3.760	5.538	5.748	6.309	6.145	6.552	5.891	6.451	6.145	6.552	ns
	16mA	GCLK	$t_{co}$	3.497	3.773	5.556	5.766	6.327	6.163	6.570	5.910	6.470	6.163	6.570	ns
		GCLK PLL	$t_{co}$	3.493	3.770	5.557	5.768	6.331	6.167	6.574	5.912	6.474	6.167	6.574	ns

**Table 1-137.** EP3SE260 Column Pins Output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.483	3.759	5.546	5.757	6.319	6.155	6.562	5.901	6.462	6.155	6.562	ns
		GCLK PLL	$t_{co}$	3.481	3.757	5.544	5.754	6.317	6.153	6.560	5.899	6.460	6.153	6.560	ns
	6mA	GCLK	$t_{co}$	3.481	3.758	5.547	5.759	6.322	6.158	6.565	5.903	6.466	6.158	6.565	ns
		GCLK PLL	$t_{co}$	3.485	3.761	5.544	5.754	6.316	6.152	6.559	5.898	6.459	6.152	6.559	ns
	8mA	GCLK	$t_{co}$	3.511	3.790	5.589	5.802	6.366	6.202	6.609	5.946	6.509	6.202	6.609	ns
		GCLK PLL	$t_{co}$	3.497	3.776	5.577	5.791	6.356	6.192	6.599	5.936	6.500	6.192	6.599	ns
	10mA	GCLK	$t_{co}$	3.485	3.763	5.560	5.773	6.338	6.174	6.581	5.918	6.482	6.174	6.581	ns
		GCLK PLL	$t_{co}$	3.485	3.763	5.563	5.777	6.342	6.178	6.585	5.922	6.487	6.178	6.585	ns
	12mA	GCLK	$t_{co}$	3.481	3.759	5.556	5.769	6.335	6.171	6.578	5.915	6.479	6.171	6.578	ns
		GCLK PLL	$t_{co}$	3.485	3.761	5.549	5.760	6.323	6.159	6.566	5.904	6.466	6.159	6.566	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.486	3.763	5.557	5.770	6.334	6.170	6.577	5.914	6.478	6.170	6.577	ns
		GCLK PLL	$t_{co}$	3.514	3.793	5.588	5.800	6.364	6.200	6.607	5.945	6.507	6.200	6.607	ns
	16mA	GCLK	$t_{co}$	3.503	3.781	5.576	5.788	6.352	6.188	6.595	5.933	6.495	6.188	6.595	ns
		GCLK PLL	$t_{co}$	3.498	3.777	5.576	5.789	6.353	6.189	6.596	5.934	6.497	6.189	6.596	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.484	3.762	5.558	5.770	6.334	6.170	6.577	5.915	6.479	6.170	6.577	ns
		GCLK PLL	$t_{co}$	3.482	3.760	5.556	5.768	6.332	6.168	6.575	5.913	6.476	6.168	6.575	ns
	10mA	GCLK	$t_{co}$	3.486	3.762	5.548	5.758	6.320	6.156	6.563	5.902	6.463	6.156	6.563	ns
		GCLK PLL	$t_{co}$	3.486	3.763	5.556	5.768	6.332	6.168	6.575	5.913	6.476	6.168	6.575	ns
	12mA	GCLK	$t_{co}$	3.502	3.780	5.572	5.783	6.346	6.182	6.589	5.928	6.489	6.182	6.589	ns
		GCLK PLL	$t_{co}$	3.502	3.780	5.572	5.783	6.346	6.182	6.589	5.928	6.489	6.182	6.589	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.492	3.770	5.562	5.773	6.336	6.172	6.579	5.918	6.480	6.172	6.579	ns
		GCLK PLL	$t_{co}$	3.485	3.762	5.548	5.758	6.320	6.156	6.563	5.902	6.463	6.156	6.563	ns

Table 1-138 lists the EP3SE260 row pins output timing parameters for differential I/O standards.

**Table 1-138.** EP3SE260 Row Pins Output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 1.1 V	V <sub>ccl</sub> = 0.9 V	
LVDS	—	GCLK	t <sub>co</sub>	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
		GCLK PLL	t <sub>co</sub>	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
		GCLK PLL	t <sub>co</sub>	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
		GCLK PLL	t <sub>co</sub>	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
MINI-LVDS	—	GCLK	t <sub>co</sub>	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
		GCLK PLL	t <sub>co</sub>	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
		GCLK PLL	t <sub>co</sub>	3.562	3.845	5.678	5.894	6.468	6.301	6.680	6.046	6.621	6.301	6.680	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.548	3.831	5.665	5.881	6.455	6.288	6.667	6.032	6.608	6.288	6.667	ns
		GCLK PLL	t <sub>co</sub>	3.544	3.827	5.663	5.881	6.456	6.289	6.668	6.032	6.610	6.289	6.668	ns
RSDS	—	GCLK	t <sub>co</sub>	3.560	3.842	5.664	5.878	6.450	6.283	6.662	6.029	6.603	6.283	6.662	ns
		GCLK PLL	t <sub>co</sub>	3.549	3.832	5.660	5.874	6.447	6.280	6.659	6.026	6.600	6.280	6.659	ns
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.546	3.829	5.658	5.872	6.445	6.278	6.657	6.024	6.599	6.278	6.657	ns
		GCLK PLL	t <sub>co</sub>	3.557	3.839	5.659	5.873	6.444	6.277	6.656	6.023	6.597	6.277	6.656	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.547	3.830	5.657	5.871	6.443	6.276	6.655	6.023	6.597	6.276	6.655	ns
		GCLK PLL	t <sub>co</sub>	3.533	3.816	5.642	5.856	6.429	6.262	6.641	6.008	6.582	6.262	6.641	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.530	3.812	5.638	5.852	6.425	6.258	6.637	6.004	6.578	6.258	6.637	ns
		GCLK PLL	t <sub>co</sub>	3.527	3.810	5.639	5.855	6.428	6.261	6.640	6.007	6.582	6.261	6.640	ns
	6mA	GCLK	t <sub>co</sub>	3.528	3.810	5.629	5.843	6.415	6.248	6.627	5.994	6.568	6.248	6.627	ns
		GCLK PLL	t <sub>co</sub>	3.577	3.863	5.700	5.916	6.491	6.324	6.703	6.068	6.644	6.324	6.703	ns
	8mA	GCLK	t <sub>co</sub>	3.553	3.839	5.682	5.899	6.474	6.307	6.686	6.051	6.629	6.307	6.686	ns
		GCLK PLL	t <sub>co</sub>	3.535	3.820	5.660	5.877	6.452	6.285	6.664	6.029	6.607	6.285	6.664	ns

**Table 1-138.** EP3SE260 Row Pins Output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.581	3.866	5.700	5.916	6.490	6.323	6.702	6.068	6.644	6.323	6.702	ns
		GCLK PLL	$t_{co}$	3.566	3.851	5.686	5.901	6.475	6.308	6.687	6.053	6.629	6.308	6.687	ns
	6mA	GCLK	$t_{co}$	3.555	3.840	5.681	5.898	6.472	6.305	6.684	6.050	6.627	6.305	6.684	ns
		GCLK PLL	$t_{co}$	3.535	3.820	5.658	5.874	6.449	6.282	6.661	6.027	6.603	6.282	6.661	ns
	8mA	GCLK	$t_{co}$	3.532	3.816	5.654	5.871	6.445	6.278	6.657	6.023	6.600	6.278	6.657	ns
		GCLK PLL	$t_{co}$	3.537	3.820	5.645	5.859	6.431	6.264	6.643	6.010	6.584	6.264	6.643	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.530	3.813	5.644	5.860	6.434	6.267	6.646	6.013	6.589	6.267	6.646	ns
		GCLK PLL	$t_{co}$	3.568	3.852	5.682	5.897	6.470	6.303	6.682	6.049	6.624	6.303	6.682	ns
	6mA	GCLK	$t_{co}$	3.550	3.835	5.667	5.882	6.455	6.288	6.667	6.034	6.609	6.288	6.667	ns
		GCLK PLL	$t_{co}$	3.536	3.819	5.644	5.858	6.430	6.263	6.642	6.010	6.584	6.263	6.642	ns
	8mA	GCLK	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
		GCLK PLL	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
	10mA	GCLK	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
		GCLK PLL	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
	12mA	GCLK	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
		GCLK PLL	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.152	3.376	4.936	5.115	5.637	5.478	5.865	5.239	5.762	5.478	5.865	ns
		GCLK PLL	$t_{co}$	3.536	3.812	5.604	5.814	6.381	6.214	6.593	5.962	6.531	6.214	6.593	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.518	3.802	5.642	5.860	6.435	6.268	6.647	6.013	6.592	6.268	6.647	ns
		GCLK PLL	$t_{co}$	3.562	3.845	5.678	5.894	6.468	6.301	6.680	6.046	6.621	6.301	6.680	ns
	6mA	GCLK	$t_{co}$	3.548	3.831	5.665	5.881	6.455	6.288	6.667	6.032	6.608	6.288	6.667	ns
		GCLK PLL	$t_{co}$	3.544	3.827	5.663	5.881	6.456	6.289	6.668	6.032	6.610	6.289	6.668	ns
	8mA	GCLK	$t_{co}$	3.560	3.842	5.664	5.878	6.450	6.283	6.662	6.029	6.603	6.283	6.662	ns
		GCLK PLL	$t_{co}$	3.549	3.832	5.660	5.874	6.447	6.280	6.659	6.026	6.600	6.280	6.659	ns

**Table 1–138.** EP3SE260 Row Pins Output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$		$V_{CC1}=0.9V$
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.546	3.829	5.658	5.872	6.445	6.278	6.657	6.024	6.599	6.278	6.657	ns	
		GCLK PLL	$t_{co}$	3.557	3.839	5.659	5.873	6.444	6.277	6.656	6.023	6.597	6.277	6.656	ns	
	6mA	GCLK	$t_{co}$	3.547	3.830	5.657	5.871	6.443	6.276	6.655	6.023	6.597	6.276	6.655	ns	
		GCLK PLL	$t_{co}$	3.533	3.816	5.642	5.856	6.429	6.262	6.641	6.008	6.582	6.262	6.641	ns	
	8mA	GCLK	$t_{co}$	3.530	3.812	5.638	5.852	6.425	6.258	6.637	6.004	6.578	6.258	6.637	ns	
		GCLK PLL	$t_{co}$	3.527	3.810	5.639	5.855	6.428	6.261	6.640	6.007	6.582	6.261	6.640	ns	
	10mA	GCLK	$t_{co}$	3.528	3.810	5.629	5.843	6.415	6.248	6.627	5.994	6.568	6.248	6.627	ns	
		GCLK PLL	$t_{co}$	3.577	3.863	5.700	5.916	6.491	6.324	6.703	6.068	6.644	6.324	6.703	ns	
	12mA	GCLK	$t_{co}$	3.553	3.839	5.682	5.899	6.474	6.307	6.686	6.051	6.629	6.307	6.686	ns	
		GCLK PLL	$t_{co}$	3.535	3.820	5.660	5.877	6.452	6.285	6.664	6.029	6.607	6.285	6.664	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.581	3.866	5.700	5.916	6.490	6.323	6.702	6.068	6.644	6.323	6.702	ns
			GCLK PLL	$t_{co}$	3.566	3.851	5.686	5.901	6.475	6.308	6.687	6.053	6.629	6.308	6.687	ns
16mA		GCLK	$t_{co}$	3.555	3.840	5.681	5.898	6.472	6.305	6.684	6.050	6.627	6.305	6.684	ns	
		GCLK PLL	$t_{co}$	3.535	3.820	5.658	5.874	6.449	6.282	6.661	6.027	6.603	6.282	6.661	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.532	3.816	5.654	5.871	6.445	6.278	6.657	6.023	6.600	6.278	6.657	ns	
		GCLK PLL	$t_{co}$	3.537	3.820	5.645	5.859	6.431	6.264	6.643	6.010	6.584	6.264	6.643	ns	
	12mA	GCLK	$t_{co}$	3.530	3.813	5.644	5.860	6.434	6.267	6.646	6.013	6.589	6.267	6.646	ns	
		GCLK PLL	$t_{co}$	3.568	3.852	5.682	5.897	6.470	6.303	6.682	6.049	6.624	6.303	6.682	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.550	3.835	5.667	5.882	6.455	6.288	6.667	6.034	6.609	6.288	6.667	ns	
		GCLK PLL	$t_{co}$	3.536	3.819	5.644	5.858	6.430	6.263	6.642	6.010	6.584	6.263	6.642	ns	

Table 1-139 and Table 1-140 list the EP3SE260 regional clock (RCLK) adder values that must be added to the GCLK values. Use these adder values to determine I/O timing when the I/O pin is driven using the regional clock. This applies to all I/O standards supported by Stratix III devices.

Table 1-139 lists the EP3SE260 column pin delay adders when using the regional clock.

**Table 1-139.** EP3SE260 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.233	0.311	0.488	0.489	0.45	0.439	0.515	0.416	0.458	0.439	0.515	ns
RCLK PLL input adder	-0.036	0.028	0.059	0.06	0.113	0.11	-0.005	-0.038	0.121	0.11	-0.005	ns
RCLK output adder	-0.204	-0.237	-0.334	-0.331	-0.413	-0.405	-0.44	-0.32	-0.371	-0.405	-0.44	ns
RCLK PLL output adder	1.899	1.965	3.193	3.323	3.677	3.512	3.802	3.346	3.705	3.512	3.802	ns

Table 1-140 lists the EP3SE260 row pin delay adders when using the regional clock in Stratix III devices.

**Table 1-140.** EP3SE260 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
RCLK input adder	0.244	0.293	0.438	0.412	0.471	0.427	0.577	0.421	0.452	0.427	0.577	ns
RCLK PLL input adder	0.124	0.134	0.21	0.215	0.234	0.228	0.297	0.217	0.239	0.228	0.297	ns
RCLK output adder	-0.256	-0.289	-0.418	-0.424	-0.484	-0.438	-0.591	-0.443	-0.464	-0.438	-0.591	ns
RCLK PLL output adder	-0.134	-0.147	-0.228	-0.233	-0.254	-0.261	-0.322	-0.236	-0.262	-0.261	-0.322	ns

## Dedicated Clock Pin Timing

Table 1-141 to Table 1-201 list clock pin timing for Stratix III devices when the clock is driven by the global clock, regional clock, periphery clock, and a PLL.

Table 1-141 lists the Stratix III clock timing parameters.

**Table 1-141.** Clock Timing Parameters for Stratix III Devices

Symbol	Parameter
$t_{CIN}$	Delay from the clock pad to the I/O input register
$t_{COUT}$	Delay from the clock pad to the I/O output register
$t_{PLLCIN}$	Delay from the PLL <i>inclk</i> pad to the I/O input register
$t_{PLLCOUT}$	Delay from the PLL <i>inclk</i> pad to the I/O output register

### EP3SL50 Clock Timing Parameters

Table 1-142 and Table 1-143 list the global clock timing parameters for EP3SL50 devices.

**Table 1-142.** EP3SL50 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.736	1.737	2.436	2.691	3.056	2.925	3.433	2.691	3.056	2.925	3.433	ns
$t_{COUT}$	1.736	1.737	2.436	2.691	3.056	2.925	3.433	2.691	3.056	2.925	3.433	ns
$t_{PLLCIN}$	-0.018	-0.026	-0.261	-0.312	-0.251	-0.230	-0.011	-0.312	0.161	-0.230	-0.011	ns
$t_{PLLCOUT}$	-0.018	-0.026	-0.261	-0.312	-0.251	-0.230	-0.011	-0.312	0.161	-0.230	-0.011	ns

**Table 1-143.** EP3SL50 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.732	1.843	2.527	2.758	3.099	2.997	3.227	2.811	3.146	3.055	3.260	ns
$t_{COUT}$	1.650	1.752	2.385	2.595	2.918	2.826	3.068	2.641	2.957	2.876	3.101	ns
$t_{PLLCIN}$	0.048	0.116	-0.142	-0.216	-0.181	-0.136	-0.188	-0.173	0.265	-0.087	-0.230	ns
$t_{PLLCOUT}$	-0.034	0.025	-0.284	-0.379	-0.362	-0.307	-0.347	-0.343	0.076	-0.266	-0.389	ns

Table 1-144 and Table 1-145 list the regional clock timing parameters for EP3SL50 devices.

**Table 1-144.** EP3SL50 Column Pin Regional Clock Timing Specifications (Part 1 of 2)

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.689	1.669	2.371	2.645	3.004	2.719	3.136	2.645	3.009	2.719	3.136	ns
$t_{COUT}$	1.689	1.669	2.371	2.645	3.004	2.719	3.136	2.645	3.009	2.719	3.136	ns



**Table 1-144.** EP3SL50 Column Pin Regional Clock Timing Specifications (Part 2 of 2)

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>PLLCIN</sub>	-0.019	-0.025	-0.264	-0.315	-0.256	-0.236	-0.017	-0.315	0.224	-0.236	-0.017	ns
t <sub>PLLCOUT</sub>	-0.019	-0.025	-0.264	-0.315	-0.256	-0.236	-0.017	-0.315	0.224	-0.236	-0.017	ns

**Table 1-145.** EP3SL50 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.636	1.729	2.356	2.567	2.894	2.800	2.964	2.622	2.941	2.853	2.997	ns
t <sub>COUT</sub>	1.554	1.638	2.214	2.404	2.713	2.629	2.805	2.452	2.752	2.674	2.838	ns
t <sub>PLLCIN</sub>	0.018	0.084	-0.178	-0.255	-0.222	-0.169	-0.226	-0.203	0.298	-0.123	-0.272	ns
t <sub>PLLCOUT</sub>	-0.064	-0.007	-0.320	-0.418	-0.403	-0.340	-0.385	-0.373	0.109	-0.302	-0.431	ns

Table 1-146 and Table 1-147 list the periphery clock timing parameters for EP3SL50 devices.

**Table 1-146.** EP3SL50 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.468	1.469	2.143	2.418	2.797	2.668	3.219	2.418	2.801	2.668	3.219	ns
t <sub>COUT</sub>	1.468	1.469	2.143	2.418	2.797	2.668	3.219	2.418	2.801	2.668	3.219	ns
t <sub>PLLCIN</sub>	-0.081	-0.081	-0.327	-0.383	-0.334	-0.310	-0.105	-0.383	0.273	-0.310	-0.105	ns
t <sub>PLLCOUT</sub>	-0.081	-0.081	-0.327	-0.383	-0.334	-0.310	-0.105	-0.383	0.273	-0.310	-0.105	ns

**Table 1-147.** EP3SL50 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.482	1.556	2.223	2.488	2.859	2.740	3.034	2.539	2.897	2.785	3.056	ns
t <sub>COUT</sub>	1.400	1.465	2.078	2.325	2.678	2.569	2.875	2.369	2.708	2.606	2.897	ns
t <sub>PLLCIN</sub>	-0.014	0.042	-0.222	-0.299	-0.278	-0.224	-0.295	-0.256	0.368	-0.177	-0.257	ns
t <sub>PLLCOUT</sub>	-0.096	-0.049	-0.364	-0.462	-0.459	-0.395	-0.454	-0.426	0.179	-0.356	-0.416	ns

**EP3SL70 Clock Timing Parameters**

Table 1-148 and Table 1-149 list the global clock timing specifications for EP3SL70 devices.

**Table 1-148.** EP3SL70 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.749	1.735	2.434	2.702	3.056	2.950	3.403	2.702	3.056	2.950	3.403	ns
$t_{COUT}$	1.749	1.735	2.434	2.702	3.056	2.950	3.403	2.702	3.056	2.950	3.403	ns
$t_{PLLCIN}$	-0.012	-0.021	-0.255	-0.306	-0.251	-0.203	-0.044	-0.306	0.161	-0.203	-0.044	ns
$t_{PLLCOUT}$	-0.012	-0.021	-0.255	-0.306	-0.251	-0.203	-0.044	-0.306	0.161	-0.203	-0.044	ns

**Table 1-149.** EP3SL70 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.732	1.840	2.524	2.758	3.083	2.986	3.227	2.811	3.157	3.042	3.260	ns
$t_{COUT}$	1.650	1.749	2.382	2.595	2.902	2.815	3.068	2.641	2.968	2.863	3.101	ns
$t_{PLLCIN}$	0.051	0.115	-0.144	-0.219	-0.193	-0.144	-0.188	-0.170	0.275	-0.097	-0.234	ns
$t_{PLLCOUT}$	-0.031	0.024	-0.286	-0.382	-0.374	-0.315	-0.347	-0.340	0.086	-0.276	-0.393	ns

Table 1-150 and Table 1-151 list the regional clock timing parameters for EP3SL70 devices.

**Table 1-150.** EP3SL70 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.689	1.689	2.388	2.649	3.004	2.723	3.132	2.649	3.014	2.723	3.132	ns
$t_{COUT}$	1.689	1.689	2.388	2.649	3.004	2.723	3.132	2.649	3.014	2.723	3.132	ns
$t_{PLLCIN}$	-0.011	-0.022	-0.261	-0.308	-0.256	-0.207	-0.054	-0.308	0.224	-0.207	-0.054	ns
$t_{PLLCOUT}$	-0.011	-0.022	-0.261	-0.308	-0.256	-0.207	-0.054	-0.308	0.224	-0.207	-0.054	ns

**Table 1-151.** EP3SL70 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.637	1.726	2.353	2.566	2.885	2.786	2.964	2.625	2.948	2.839	3.001	ns
$t_{COUT}$	1.555	1.635	2.211	2.403	2.704	2.615	2.805	2.455	2.759	2.660	2.842	ns
$t_{PLLCIN}$	0.018	0.085	-0.176	-0.252	-0.230	-0.180	-0.226	-0.203	0.307	-0.139	-0.272	ns
$t_{PLLCOUT}$	-0.064	-0.006	-0.318	-0.415	-0.411	-0.351	-0.385	-0.373	0.118	-0.318	-0.431	ns

Table 1-152 and Table 1-153 list the periphery clock timing parameters for EP3SL70 devices.

**Table 1-152.** EP3SL70 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.465	1.468	2.142	2.410	2.792	2.673	3.220	2.410	2.802	2.673	3.220	ns
t <sub>COUT</sub>	1.465	1.468	2.142	2.410	2.792	2.673	3.220	2.410	2.802	2.673	3.220	ns
t <sub>PLLCIN</sub>	-0.068	-0.083	-0.330	-0.370	-0.334	-0.288	-0.133	-0.370	0.273	-0.288	-0.133	ns
t <sub>PLLCOUT</sub>	-0.068	-0.083	-0.330	-0.370	-0.334	-0.288	-0.133	-0.370	0.273	-0.288	-0.133	ns

**Table 1-153.** EP3SL70 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.482	1.558	2.227	2.488	2.851	2.727	3.031	2.539	2.905	2.777	3.056	ns
t <sub>COUT</sub>	1.400	1.467	2.082	2.325	2.670	2.556	2.872	2.369	2.716	2.598	2.897	ns
t <sub>PLLCIN</sub>	-0.019	0.039	-0.225	-0.302	-0.291	-0.235	-0.295	-0.261	0.376	-0.188	-0.257	ns
t <sub>PLLCOUT</sub>	-0.101	-0.052	-0.367	-0.465	-0.472	-0.406	-0.454	-0.431	0.187	-0.367	-0.416	ns

### EP3SL110 Clock Timing Parameters

Table 1-154 and Table 1-155 list the global clock timing parameters for EP3SL110 devices.

**Table 1-154.** EP3SL110 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.909	1.907	2.674	2.936	3.285	3.182	3.700	2.936	3.285	3.182	3.700	ns
t <sub>COUT</sub>	1.909	1.907	2.674	2.936	3.285	3.182	3.700	2.936	3.285	3.182	3.700	ns
t <sub>PLLCIN</sub>	-0.048	-0.050	-0.274	-0.330	-0.290	-0.251	-0.032	-0.330	-0.290	-0.251	-0.032	ns
t <sub>PLLCOUT</sub>	-0.048	-0.050	-0.274	-0.330	-0.290	-0.251	-0.032	-0.330	-0.290	-0.251	-0.032	ns

**Table 1-155.** EP3SL110 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Unit
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.882	2.014	2.754	2.975	3.344	3.221	3.511	3.062	3.413	3.287	3.551	ns
t <sub>COUT</sub>	1.800	1.923	2.612	2.812	3.163	3.050	3.352	2.892	3.224	3.108	3.392	ns
t <sub>PLLCIN</sub>	-0.002	0.059	-0.202	-0.271	-0.231	-0.184	-0.212	-0.219	-0.184	-0.138	-0.260	ns
t <sub>PLLCOUT</sub>	-0.084	-0.032	-0.347	-0.434	-0.412	-0.355	-0.371	-0.389	-0.373	-0.317	-0.419	ns

Table 1-156 and Table 1-157 list the regional clock timing parameters for EP3SL110 devices.

**Table 1-156.** EP3SL110 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.689	1.687	2.360	2.600	2.924	2.836	3.241	2.600	2.924	2.836	3.241	ns
t <sub>COUT</sub>	1.689	1.687	2.360	2.600	2.924	2.836	3.241	2.600	2.924	2.836	3.241	ns
t <sub>PLLCIN</sub>	-0.036	-0.038	-0.262	-0.317	-0.278	-0.239	-0.020	-0.317	-0.278	-0.239	-0.020	ns
t <sub>PLLCOUT</sub>	-0.036	-0.038	-0.262	-0.317	-0.278	-0.239	-0.020	-0.317	-0.278	-0.239	-0.020	ns

**Table 1-157.** EP3SL110 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.684	1.792	2.440	2.644	2.985	2.879	3.044	2.720	3.044	2.938	3.083	ns
t <sub>COUT</sub>	1.602	1.701	2.298	2.481	2.804	2.708	2.885	2.550	2.855	2.759	2.924	ns
t <sub>PLLCIN</sub>	0.008	0.071	-0.189	-0.276	-0.218	-0.188	-0.214	-0.209	-0.174	-0.141	-0.263	ns
t <sub>PLLCOUT</sub>	-0.074	-0.020	-0.334	-0.439	-0.399	-0.359	-0.373	-0.379	-0.363	-0.320	-0.422	ns

Table 1-158 and Table 1-159 list the periphery clock timing parameters for EP3SL110 devices.

**Table 1-158.** EP3SL110 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.541	1.538	2.257	2.539	2.931	2.810	3.345	2.539	2.931	2.810	3.345	ns
t <sub>COUT</sub>	1.541	1.538	2.257	2.539	2.931	2.810	3.345	2.539	2.931	2.810	3.345	ns
t <sub>PLLCIN</sub>	-0.029	-0.031	-0.253	-0.310	-0.276	-0.222	-0.020	-0.310	-0.276	-0.222	-0.020	ns
t <sub>PLLCOUT</sub>	-0.029	-0.031	-0.253	-0.310	-0.276	-0.222	-0.020	-0.310	-0.276	-0.222	-0.020	ns

**Table 1-159.** EP3SL110 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.430	1.503	2.156	2.416	2.783	2.665	2.926	2.465	2.828	2.711	2.951	ns
t <sub>COUT</sub>	1.348	1.412	2.011	2.253	2.602	2.494	2.767	2.295	2.639	2.532	2.792	ns
t <sub>PLLCIN</sub>	0.015	0.072	-0.188	-0.267	-0.219	-0.180	-0.214	-0.206	-0.170	-0.133	-0.263	ns
t <sub>PLLCOUT</sub>	-0.067	-0.019	-0.333	-0.430	-0.400	-0.351	-0.373	-0.376	-0.359	-0.312	-0.422	ns

### EP3SL150 Clock Timing Parameters

Table 1-160 and Table 1-161 list the global clock timing parameters for EP3SL150 devices.

**Table 1-160.** EP3SL150 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Unit
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.898	1.926	2.692	2.920	3.294	3.170	3.719	2.920	3.294	3.170	3.719	ns
t <sub>COUT</sub>	1.898	1.926	2.692	2.920	3.294	3.170	3.719	2.920	3.294	3.170	3.719	ns
t <sub>PLLCIN</sub>	-0.054	-0.028	-0.252	-0.342	-0.296	-0.239	-0.018	-0.342	-0.296	-0.239	-0.018	ns
t <sub>PLLCOUT</sub>	-0.054	-0.028	-0.252	-0.342	-0.296	-0.239	-0.018	-0.342	-0.296	-0.239	-0.018	ns

**Table 1-161.** EP3SL150 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.868	2.010	2.750	2.982	3.347	3.224	3.506	3.048	3.400	3.293	3.549	ns
t <sub>COUT</sub>	1.786	1.919	2.608	2.819	3.166	3.053	3.347	2.878	3.211	3.114	3.390	ns
t <sub>PLLCIN</sub>	0.007	0.059	-0.202	-0.255	-0.231	-0.184	-0.214	-0.210	-0.173	-0.122	-0.249	ns
t <sub>PLLCOUT</sub>	-0.075	-0.032	-0.347	-0.418	-0.412	-0.355	-0.373	-0.380	-0.362	-0.301	-0.408	ns

Table 1-162 and Table 1-163 list the regional clock timing parameters for EP3SL150 devices.

**Table 1-162.** EP3SL150 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.683	1.701	2.375	2.595	2.936	2.833	3.255	2.595	2.936	2.833	3.255	ns
t <sub>COUT</sub>	1.683	1.701	2.375	2.595	2.936	2.833	3.255	2.595	2.936	2.833	3.255	ns
t <sub>PLLCIN</sub>	-0.043	-0.016	-0.240	-0.329	-0.284	-0.227	-0.005	-0.329	-0.284	-0.227	-0.005	ns
t <sub>PLLCOUT</sub>	-0.043	-0.016	-0.240	-0.329	-0.284	-0.227	-0.005	-0.329	-0.284	-0.227	-0.005	ns

**Table 1-163.** EP3SL150 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.683	1.793	2.441	2.659	2.987	2.875	3.042	2.719	3.047	2.951	3.096	ns
t <sub>COUT</sub>	1.601	1.702	2.299	2.496	2.806	2.704	2.883	2.549	2.858	2.772	2.937	ns
t <sub>PLLCIN</sub>	-0.007	0.068	-0.192	-0.269	-0.221	-0.188	-0.211	-0.226	-0.186	-0.135	-0.260	ns
t <sub>PLLCOUT</sub>	-0.089	-0.023	-0.337	-0.432	-0.402	-0.359	-0.370	-0.396	-0.375	-0.314	-0.419	ns

Table 1-164 and Table 1-165 list the periphery clock timing parameters for EP3SL150 devices.

**Table 1-164.** EP3SL150 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.537	1.550	2.268	2.535	2.929	2.812	3.354	2.535	2.929	2.812	3.354	ns
$t_{COUT}$	1.537	1.550	2.268	2.535	2.929	2.812	3.354	2.535	2.929	2.812	3.354	ns
$t_{PLLIN}$	-0.040	-0.012	-0.235	-0.326	-0.267	-0.234	0.002	-0.326	-0.267	-0.234	0.002	ns
$t_{PLLCOUT}$	-0.040	-0.012	-0.235	-0.326	-0.267	-0.234	0.002	-0.326	-0.267	-0.234	0.002	ns

**Table 1-165.** EP3SL150 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.438	1.505	2.159	2.429	2.783	2.657	2.934	2.475	2.838	2.725	2.972	ns
$t_{COUT}$	1.356	1.414	2.014	2.266	2.602	2.486	2.775	2.305	2.649	2.546	2.813	ns
$t_{PLLIN}$	0.002	0.076	-0.183	-0.266	-0.217	-0.185	-0.206	-0.220	-0.182	-0.132	-0.260	ns
$t_{PLLCOUT}$	-0.080	-0.015	-0.328	-0.429	-0.398	-0.356	-0.365	-0.390	-0.371	-0.311	-0.419	ns

### EP3SL200 Clock Timing Parameters

Table 1-166 and Table 1-167 list the global clock timing parameters for EP3SL200 devices.

**Table 1-166.** EP3SL200 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Unit
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.237	2.264	3.331	3.416	3.842	3.686	4.345	3.416	3.834	3.686	4.345	ns
$t_{COUT}$	2.237	2.264	3.331	3.416	3.842	3.686	4.345	3.416	3.834	3.686	4.345	ns
$t_{PLLIN}$	0.032	0.060	-0.177	-0.219	-0.137	-0.122	0.088	-0.219	0.287	-0.122	0.088	ns
$t_{PLLCOUT}$	0.032	0.060	-0.177	-0.219	-0.137	-0.122	0.088	-0.219	0.287	-0.122	0.088	ns

**Table 1-167.** EP3SL200 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.208	2.371	3.453	3.526	3.900	3.747	4.190	3.601	3.977	3.747	4.190	ns
$t_{COUT}$	2.126	2.280	3.301	3.366	3.719	3.576	4.031	3.433	3.788	3.576	4.031	ns
$t_{PLLIN}$	0.102	0.174	-0.085	-0.115	-0.076	-0.043	-0.063	-0.067	0.409	-0.043	-0.063	ns
$t_{PLLCOUT}$	0.020	0.083	-0.237	-0.278	-0.257	-0.214	-0.222	-0.237	0.220	-0.214	-0.222	ns

Table 1-168 and Table 1-169 list the regional clock timing parameters for EP3SL200.

**Table 1-168.** EP3SL200 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.006	2.035	3.020	3.113	3.494	3.213	3.743	3.113	3.531	3.213	3.743	ns
$t_{COUT}$	2.006	2.035	3.020	3.113	3.494	3.213	3.743	3.113	3.531	3.213	3.743	ns
$t_{PLLCIN}$	0.059	0.086	-0.150	-0.191	-0.109	-0.094	0.116	-0.191	0.291	-0.094	0.116	ns
$t_{PLLCOUT}$	0.059	0.086	-0.150	-0.191	-0.109	-0.094	0.116	-0.191	0.291	-0.094	0.116	ns

**Table 1-169.** EP3SL200 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.937	2.065	3.000	3.070	3.414	3.275	3.597	3.139	3.479	3.275	3.597	ns
$t_{COUT}$	1.855	1.974	2.848	2.910	3.233	3.104	3.438	2.971	3.290	3.104	3.438	ns
$t_{PLLCIN}$	0.126	0.197	-0.059	-0.091	-0.051	-0.036	-0.041	-0.043	0.410	-0.036	-0.041	ns
$t_{PLLCOUT}$	0.044	0.106	-0.211	-0.254	-0.232	-0.207	-0.200	-0.213	0.221	-0.207	-0.200	ns

Table 1-170 and Table 1-171 list the periphery clock timing parameters for EP3SL200 devices.

**Table 1-170.** EP3SL200 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.720	1.712	2.615	2.776	3.177	3.044	3.660	2.776	3.177	3.044	3.660	ns
$t_{COUT}$	1.720	1.712	2.615	2.776	3.177	3.044	3.660	2.776	3.177	3.044	3.660	ns
$t_{PLLCIN}$	0.037	0.064	-0.173	-0.213	-0.135	-0.118	0.090	-0.213	0.292	-0.118	0.090	ns
$t_{PLLCOUT}$	0.037	0.064	-0.173	-0.213	-0.135	-0.118	0.090	-0.213	0.292	-0.118	0.090	ns

**Table 1-171.** EP3SL200 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.501	1.575	2.380	2.518	2.892	2.761	3.077	2.567	2.938	2.761	3.077	ns
$t_{COUT}$	1.419	1.484	2.225	2.355	2.711	2.590	2.918	2.397	2.749	2.590	2.918	ns
$t_{PLLCIN}$	0.105	0.174	-0.081	-0.118	-0.077	-0.061	-0.063	-0.067	0.411	-0.061	-0.063	ns
$t_{PLLCOUT}$	0.023	0.083	-0.233	-0.281	-0.258	-0.232	-0.222	-0.237	0.222	-0.232	-0.222	ns

## EP3SL340 Clock Timing Parameters

Table 1-172 and Table 1-173 list the global clock timing parameters for EP3S340 devices.

**Table 1-172.** EP3SL340 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.357	2.331	3.440	3.566	3.938	3.807	4.482	3.566	3.938	3.807	4.482	ns
$t_{COUT}$	2.357	2.331	3.440	3.566	3.938	3.807	4.482	3.566	3.938	3.807	4.482	ns
$t_{PLLCIN}$	0.091	0.058	-0.165	-0.152	-0.140	-0.096	0.111	-0.152	-0.140	-0.096	0.111	ns
$t_{PLLCOUT}$	0.091	0.058	-0.165	-0.152	-0.140	-0.096	0.111	-0.152	-0.140	-0.096	0.111	ns

**Table 1-173.** EP3SL340 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.293	2.479	3.608	3.630	4.020	3.880	4.324	3.746	4.099	3.977	4.369	ns
$t_{COUT}$	2.211	2.388	3.456	3.470	3.839	3.709	4.165	3.578	3.910	3.798	4.210	ns
$t_{PLLCIN}$	0.121	0.210	-0.034	-0.098	-0.045	-0.001	-0.042	-0.031	0.005	0.051	-0.083	ns
$t_{PLLCOUT}$	0.039	0.119	-0.186	-0.261	-0.226	-0.172	-0.201	-0.201	-0.184	-0.128	-0.242	ns

Table 1-174 and Table 1-175 list the regional clock timing parameters for EP3SL340 devices.

**Table 1-174.** EP3SL340 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.031	2.013	2.958	3.073	3.435	3.308	3.803	3.073	3.435	3.308	3.803	ns
$t_{COUT}$	2.031	2.013	2.958	3.073	3.435	3.308	3.803	3.073	3.435	3.308	3.803	ns
$t_{PLLCIN}$	0.127	0.094	-0.128	-0.116	-0.104	-0.061	0.148	-0.116	-0.104	-0.061	0.148	ns
$t_{PLLCOUT}$	0.127	0.094	-0.128	-0.116	-0.104	-0.061	0.148	-0.116	-0.104	-0.061	0.148	ns

**Table 1-175.** EP3SL340 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.998	2.161	3.129	3.149	3.501	3.376	3.648	3.242	3.570	3.463	3.707	ns
$t_{COUT}$	1.916	2.070	2.977	2.989	3.320	3.205	3.492	3.074	3.381	3.284	3.551	ns
$t_{PLLCIN}$	0.157	0.248	0.006	-0.069	-0.009	0.017	-0.011	0.003	0.039	0.093	-0.057	ns
$t_{PLLCOUT}$	0.075	0.157	-0.146	-0.232	-0.190	-0.154	-0.170	-0.167	-0.150	-0.086	-0.216	ns



Table 1-176 and Table 1-177 list the periphery clock timing parameters for EP3SL340 devices.

**Table 1-176.** EP3SL340 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.778	1.760	2.687	2.847	3.240	3.099	3.718	2.847	3.240	3.099	3.718	ns
t <sub>COUT</sub>	1.778	1.760	2.687	2.847	3.240	3.099	3.718	2.847	3.240	3.099	3.718	ns
t <sub>PLLCIN</sub>	0.086	0.061	-0.164	-0.161	-0.140	-0.097	0.101	-0.161	-0.140	-0.097	0.101	ns
t <sub>PLLCOUT</sub>	0.086	0.061	-0.164	-0.161	-0.140	-0.097	0.101	-0.161	-0.140	-0.097	0.101	ns

**Table 1-177.** EP3SL340 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.524	1.616	2.435	2.567	2.958	2.823	3.141	2.605	3.002	2.861	3.165	ns
t <sub>COUT</sub>	1.442	1.525	2.280	2.404	2.777	2.652	2.982	2.435	2.813	2.682	3.006	ns
t <sub>PLLCIN</sub>	0.116	0.211	-0.039	-0.116	-0.055	-0.030	-0.051	-0.040	-0.006	0.050	-0.098	ns
t <sub>PLLCOUT</sub>	0.034	0.120	-0.191	-0.279	-0.236	-0.201	-0.210	-0.210	-0.195	-0.129	-0.257	ns

### EP3SE50 Clock Timing Parameters

Table 1-178 and Table 1-179 list the global clock timing parameters for EP3SE50 devices.

**Table 1-178.** EP3SE50 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.786	1.789	2.495	2.748	3.111	2.993	3.489	2.748	3.105	2.993	3.489	ns
t <sub>COUT</sub>	1.786	1.789	2.495	2.748	3.111	2.993	3.489	2.748	3.105	2.993	3.489	ns
t <sub>PLLCIN</sub>	0.023	0.027	-0.204	-0.268	-0.226	-0.180	0.025	-0.268	0.249	-0.180	0.025	ns
t <sub>PLLCOUT</sub>	0.083	0.103	-0.068	-0.131	-0.226	-0.010	0.025	-0.131	0.249	-0.010	0.025	ns

**Table 1-179.** EP3SE50 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.739	1.849	2.536	2.769	3.112	3.010	3.250	2.830	3.171	3.069	3.276	ns
t <sub>COUT</sub>	1.657	1.758	2.394	2.606	2.931	2.839	3.091	2.660	2.982	2.890	3.117	ns
t <sub>PLLCIN</sub>	0.044	0.117	-0.143	-0.220	-0.183	-0.135	-0.189	-0.171	0.345	-0.088	-0.242	ns
t <sub>PLLCOUT</sub>	-0.038	0.026	-0.285	-0.383	-0.364	-0.306	-0.348	-0.341	0.156	-0.267	-0.401	ns

Table 1-180 and Table 1-181 list the regional clock timing parameters for EP3SE50 devices.

**Table 1-180.** EP3SE50 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.711	1.721	2.429	2.679	3.053	2.767	3.191	2.679	3.053	2.767	3.191	ns
t <sub>COUT</sub>	1.711	1.721	2.429	2.679	3.053	2.767	3.191	2.679	3.053	2.767	3.191	ns
t <sub>PLLCIN</sub>	0.034	0.038	-0.193	-0.255	-0.212	-0.168	0.040	-0.255	0.263	-0.168	0.040	ns
t <sub>PLLCOUT</sub>	0.106	0.102	-0.074	-0.101	-0.212	-0.168	0.040	-0.101	0.263	-0.168	0.040	ns

**Table 1-181.** EP3SE50 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.640	1.732	2.361	2.580	2.905	2.810	2.977	2.636	2.960	2.868	3.003	ns
t <sub>COUT</sub>	1.558	1.641	2.219	2.417	2.724	2.639	2.818	2.466	2.771	2.689	2.844	ns
t <sub>PLLCIN</sub>	0.020	0.091	-0.168	-0.241	-0.208	-0.155	-0.210	-0.191	0.321	-0.108	-0.264	ns
t <sub>PLLCOUT</sub>	-0.062	0.000	-0.310	-0.404	-0.389	-0.326	-0.369	-0.361	0.132	-0.287	-0.423	ns

Table 1-182 and Table 1-183 list the periphery clock timing parameters for EP3SE50 devices.

**Table 1-182.** EP3SE50 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.472	1.481	2.155	2.417	2.825	2.681	3.247	2.417	2.819	2.681	3.247	ns
t <sub>COUT</sub>	1.472	1.481	2.155	2.417	2.825	2.681	3.247	2.417	2.819	2.681	3.247	ns
t <sub>PLLCIN</sub>	-0.047	-0.044	-0.288	-0.347	-0.302	-0.266	-0.079	-0.347	0.300	-0.266	-0.079	ns
t <sub>PLLCOUT</sub>	-0.047	-0.044	-0.288	-0.347	-0.302	-0.266	-0.079	-0.347	0.300	-0.266	-0.079	ns

**Table 1-183.** EP3SE50 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.467	1.543	2.208	2.472	2.843	2.729	3.012	2.521	2.891	2.771	3.028	ns
t <sub>COUT</sub>	1.385	1.452	2.063	2.309	2.662	2.558	2.853	2.351	2.702	2.592	2.869	ns
t <sub>PLLCIN</sub>	-0.021	0.036	-0.231	-0.307	-0.282	-0.230	-0.301	-0.262	0.372	-0.184	-0.361	ns
t <sub>PLLCOUT</sub>	-0.103	-0.055	-0.373	-0.470	-0.463	-0.401	-0.460	-0.432	0.183	-0.363	-0.520	ns

### EP3SE80 Clock Timing Parameters

Table 1-184 and Table 1-185 list the global clock timing parameters for EP3SE80 devices.

**Table 1-184.** EP3SE80 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	2.037	2.059	2.879	3.127	3.524	3.430	3.989	3.127	3.524	3.430	3.989	ns
t <sub>COUT</sub>	2.037	2.059	2.879	3.127	3.524	3.430	3.989	3.127	3.524	3.430	3.989	ns
t <sub>PLLCIN</sub>	-0.024	-0.007	-0.235	-0.315	-0.292	-0.199	-0.042	-0.315	-0.292	-0.199	-0.042	ns
t <sub>PLLCOUT</sub>	-0.024	-0.007	-0.235	-0.315	-0.292	-0.199	-0.042	-0.315	-0.292	-0.199	-0.042	ns

**Table 1-185.** EP3SE80 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.994	2.143	2.942	3.188	3.552	3.446	3.769	3.258	3.633	3.515	3.813	ns
t <sub>COUT</sub>	1.912	2.052	2.800	3.025	3.371	3.275	3.610	3.089	3.444	3.336	3.654	ns
t <sub>PLLCIN</sub>	0.020	0.086	-0.177	-0.249	-0.221	-0.171	-0.221	-0.199	-0.173	-0.121	-0.266	ns
t <sub>PLLCOUT</sub>	-0.062	-0.005	-0.319	-0.412	-0.402	-0.342	-0.380	-0.369	-0.362	-0.300	-0.425	ns

Table 1-186 and Table 1-187 list the regional clock timing parameters for EP3SE80 devices.

**Table 1-186.** EP3SE80 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.828	1.849	2.578	2.811	3.171	3.087	3.547	2.811	3.171	3.087	3.547	ns
t <sub>COUT</sub>	1.828	1.849	2.578	2.811	3.171	3.087	3.547	2.811	3.171	3.087	3.547	ns
t <sub>PLLCIN</sub>	-0.013	0.004	-0.224	-0.303	-0.280	-0.187	-0.030	-0.303	-0.280	-0.187	-0.030	ns
t <sub>PLLCOUT</sub>	-0.013	0.004	-0.224	-0.303	-0.280	-0.187	-0.030	-0.303	-0.280	-0.187	-0.030	ns

**Table 1-187.** EP3SE80 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.812	1.928	2.638	2.874	3.205	3.107	3.332	2.938	3.277	3.169	3.373	ns
t <sub>COUT</sub>	1.730	1.837	2.496	2.711	3.024	2.936	3.173	2.768	3.088	2.990	3.214	ns
t <sub>PLLCIN</sub>	0.010	0.087	-0.176	-0.259	-0.231	-0.167	-0.229	-0.210	-0.169	-0.118	-0.275	ns
t <sub>PLLCOUT</sub>	-0.072	-0.004	-0.318	-0.422	-0.412	-0.338	-0.388	-0.380	-0.358	-0.297	-0.434	ns

Table 1-188 and Table 1-189 list the periphery clock timing parameters for EP3SE80 devices.

**Table 1-188.** EP3SE80 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.564	1.585	2.309	2.566	2.962	2.838	3.377	2.566	2.962	2.838	3.377	ns
$t_{COUT}$	1.564	1.584	2.308	2.566	2.962	2.844	3.377	2.566	2.962	2.844	3.377	ns
$t_{PLLIN}$	-0.028	-0.006	-0.234	-0.327	-0.270	-0.193	-0.018	-0.327	-0.270	-0.193	-0.018	ns
$t_{PLLCOUT}$	-0.028	-0.006	-0.234	-0.327	-0.270	-0.193	-0.018	-0.327	-0.270	-0.193	-0.018	ns

**Table 1-189.** EP3SE80 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.441	1.503	2.156	2.429	2.776	2.665	2.934	2.477	2.828	2.711	2.959	ns
$t_{COUT}$	1.359	1.412	2.011	2.266	2.595	2.494	2.775	2.307	2.639	2.532	2.800	ns
$t_{PLLIN}$	0.004	0.077	-0.186	-0.268	-0.243	-0.177	-0.238	-0.219	-0.177	-0.128	-0.287	ns
$t_{PLLCOUT}$	-0.078	-0.014	-0.328	-0.431	-0.424	-0.348	-0.397	-0.389	-0.366	-0.307	-0.446	ns

### EP3SE110 Clock Timing Parameters

Table 1-190 and Table 1-191 list the global clock timing parameters for EP3SE110 devices.

**Table 1-190.** EP3SE110 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.046	2.046	2.868	3.144	3.524	3.429	3.989	3.144	3.524	3.429	3.989	ns
$t_{COUT}$	2.046	2.046	2.868	3.144	3.524	3.429	3.989	3.144	3.524	3.429	3.989	ns
$t_{PLLIN}$	-0.020	-0.034	-0.265	-0.311	-0.267	-0.198	-0.034	-0.311	-0.267	-0.198	-0.034	ns
$t_{PLLCOUT}$	-0.020	-0.034	-0.265	-0.311	-0.267	-0.198	-0.034	-0.311	-0.267	-0.198	-0.034	ns

**Table 1-191.** EP3SE110 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.985	2.130	2.928	3.183	3.546	3.437	3.772	3.250	3.615	3.507	3.815	ns
$t_{COUT}$	1.903	2.039	2.786	3.020	3.365	3.266	3.613	3.082	3.426	3.328	3.656	ns
$t_{PLLIN}$	0.012	0.084	-0.180	-0.253	-0.223	-0.173	-0.223	-0.207	-0.173	-0.123	-0.267	ns
$t_{PLLCOUT}$	-0.070	-0.007	-0.322	-0.416	-0.404	-0.344	-0.382	-0.377	-0.362	-0.302	-0.426	ns

Table 1-192 and Table 1-193 list the regional clock timing parameters for EP3SE110 devices.

**Table 1-192.** EP3SE110 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.828	1.849	2.578	2.811	3.155	3.082	3.560	2.811	3.155	3.082	3.560	ns
t <sub>COUT</sub>	1.828	1.849	2.578	2.811	3.155	3.082	3.560	2.811	3.155	3.082	3.560	ns
t <sub>PLLCIN</sub>	-0.008	-0.022	-0.254	-0.299	-0.255	-0.186	-0.021	-0.299	-0.255	-0.186	-0.021	ns
t <sub>PLLCOUT</sub>	-0.008	-0.022	-0.254	-0.299	-0.255	-0.186	-0.021	-0.299	-0.255	-0.186	-0.021	ns

**Table 1-193.** EP3SE110 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.798	1.924	2.631	2.860	3.204	3.101	3.332	2.920	3.268	3.163	3.373	ns
t <sub>COUT</sub>	1.716	1.833	2.489	2.697	3.023	2.930	3.173	2.750	3.079	2.984	3.214	ns
t <sub>PLLCIN</sub>	0.001	0.076	-0.188	-0.262	-0.231	-0.184	-0.229	-0.218	-0.180	-0.134	-0.277	ns
t <sub>PLLCOUT</sub>	-0.081	-0.015	-0.330	-0.425	-0.412	-0.355	-0.388	-0.388	-0.369	-0.313	-0.436	ns

Table 1-194 and Table 1-195 list the periphery clock timing parameters for EP3SE110 devices.

**Table 1-194.** EP3SE110 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.564	1.585	2.309	2.566	2.951	2.843	3.398	2.566	2.951	2.843	3.398	ns
t <sub>COUT</sub>	1.564	1.584	2.308	2.566	2.951	2.843	3.398	2.566	2.951	2.843	3.398	ns
t <sub>PLLCIN</sub>	-0.019	-0.019	-0.245	-0.310	-0.267	-0.194	-0.018	-0.310	-0.267	-0.194	-0.018	ns
t <sub>PLLCOUT</sub>	-0.019	-0.019	-0.245	-0.310	-0.267	-0.194	-0.018	-0.310	-0.267	-0.194	-0.018	ns

**Table 1-195.** EP3SE110 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 1.1 V	V <sub>CCL</sub> = 0.9 V	
t <sub>CIN</sub>	1.423	1.502	2.156	2.411	2.781	2.659	2.934	2.455	2.826	2.704	2.949	ns
t <sub>COUT</sub>	1.341	1.411	2.011	2.248	2.600	2.488	2.775	2.285	2.637	2.525	2.790	ns
t <sub>PLLCIN</sub>	0.001	0.069	-0.195	-0.271	-0.241	-0.188	-0.238	-0.222	-0.190	-0.139	-0.288	ns
t <sub>PLLCOUT</sub>	-0.081	-0.022	-0.337	-0.434	-0.422	-0.359	-0.397	-0.392	-0.379	-0.318	-0.447	ns

## EP3SE260 Clock Timing Parameters

Table 1-196 and Table 1-197 list the global clock timing parameters for EP3SE260 devices.

**Table 1-196.** EP3SE260 Column Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.237	2.237	3.302	3.416	3.837	3.683	4.331	3.416	3.837	3.683	4.331	ns
$t_{COUT}$	2.237	2.237	3.302	3.416	3.837	3.683	4.331	3.416	3.837	3.683	4.331	ns
$t_{PLLCIN}$	0.040	0.040	-0.199	-0.211	-0.135	-0.127	0.074	-0.211	0.296	-0.127	0.074	ns
$t_{PLLCOUT}$	0.040	0.040	-0.199	-0.211	-0.135	-0.127	0.074	-0.211	0.296	-0.127	0.074	ns

**Table 1-197.** EP3SE260 Row Pin Global Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	2.171	2.374	3.458	3.526	3.868	3.768	4.184	3.564	3.943	3.768	4.184	ns
$t_{COUT}$	2.089	2.283	3.306	3.366	3.687	3.597	4.025	3.396	3.754	3.597	4.025	ns
$t_{PLLCIN}$	0.091	0.172	-0.087	-0.116	-0.085	-0.031	-0.071	-0.077	0.399	-0.031	-0.071	ns
$t_{PLLCOUT}$	0.009	0.081	-0.239	-0.279	-0.266	-0.202	-0.230	-0.247	0.210	-0.202	-0.230	ns

Table 1-198 and Table 1-199 list the regional clock timing parameters for EP3SE260 devices.

**Table 1-198.** EP3SE260 Column Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.930	2.003	2.983	2.955	3.531	3.209	3.736	2.955	3.531	3.209	3.736	ns
$t_{COUT}$	1.930	2.003	2.983	2.955	3.531	3.209	3.736	2.955	3.531	3.209	3.736	ns
$t_{PLLCIN}$	0.061	0.066	-0.172	-0.191	-0.109	-0.091	0.102	-0.191	0.302	-0.091	0.102	ns
$t_{PLLCOUT}$	0.061	0.066	-0.172	-0.191	-0.109	-0.091	0.102	-0.191	0.302	-0.091	0.102	ns

**Table 1-199.** EP3SE260 Row Pin Regional Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.903	2.065	3.000	3.070	3.388	3.294	3.593	3.103	3.457	3.294	3.593	ns
$t_{COUT}$	1.821	1.974	2.848	2.910	3.207	3.123	3.434	2.935	3.268	3.123	3.434	ns
$t_{PLLCIN}$	0.088	0.199	-0.056	-0.091	-0.081	-0.009	-0.049	-0.078	0.379	-0.009	-0.049	ns
$t_{PLLCOUT}$	0.006	0.108	-0.208	-0.254	-0.262	-0.180	-0.208	-0.248	0.190	-0.180	-0.208	ns

Table 1-200 and Table 1-201 list the periphery clock timing parameters for EP3SE260 devices.

**Table 1-200.** EP3SE260 Column Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.709	1.716	2.620	2.765	3.177	3.039	3.668	2.765	3.177	3.039	3.668	ns
$t_{COUT}$	1.709	1.716	2.620	2.765	3.177	3.039	3.668	2.765	3.177	3.039	3.668	ns
$t_{PLLCIN}$	0.037	0.037	-0.202	-0.213	-0.140	-0.119	0.075	-0.213	0.293	-0.119	0.075	ns
$t_{PLLCOUT}$	0.037	0.037	-0.202	-0.213	-0.140	-0.119	0.075	-0.213	0.293	-0.119	0.075	ns

**Table 1-201.** EP3SE260 Row Pin Periphery Clock Timing Specifications

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
$t_{CIN}$	1.495	1.574	2.378	2.518	2.878	2.776	3.072	2.555	2.926	2.776	3.072	ns
$t_{COUT}$	1.413	1.483	2.223	2.355	2.697	2.605	2.913	2.385	2.737	2.605	2.913	ns
$t_{PLLCIN}$	0.065	0.172	-0.084	-0.118	-0.103	-0.033	-0.071	-0.103	0.384	-0.033	-0.071	ns
$t_{PLLCOUT}$	-0.017	0.081	-0.236	-0.281	-0.284	-0.204	-0.230	-0.273	0.195	-0.204	-0.230	ns

# Glossary

The following table lists the glossary for this chapter.

Table 1.

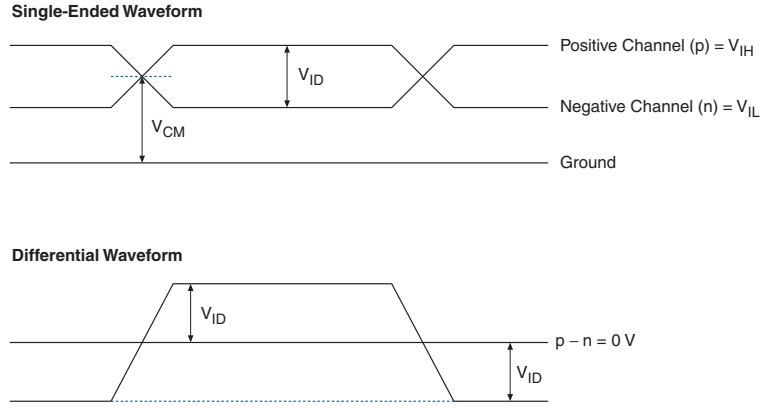
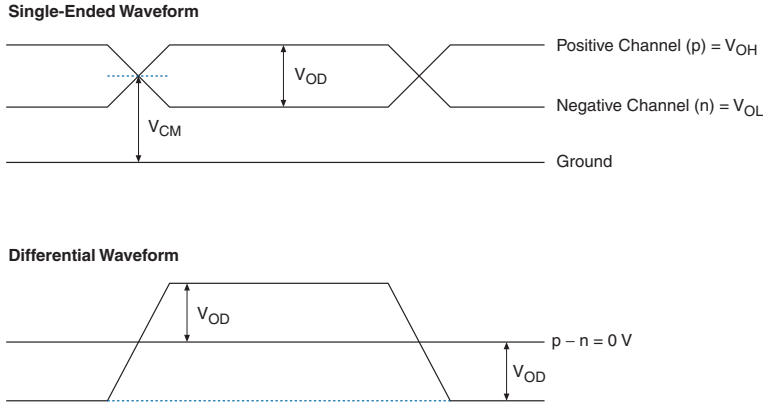
Glossary Table (Part 1 of 4)		
Letter	Subject	Definitions
A	—	—
B	—	—
C	—	—
D	Differential I/O Standards	<p>Receiver Input Waveforms</p>  <p>Transmitter Output Waveforms</p> 
E	—	—
F	$f_{\text{HSCLK}}$	High-Speed I/O Block: High-speed receiver/transmitter input and output clock frequency.
	$f_{\text{HSDR}}$	High-Speed I/O Block: Maximum/minimum LVDS data transfer rate ( $f_{\text{HSDR}} = 1/\text{TUI}$ ), non-DPA.
	$f_{\text{HSDRDPA}}$	High-Speed I/O Block: Maximum/minimum LVDS data transfer rate ( $f_{\text{HSDRDPA}} = 1/\text{TUI}$ ), DPA.
G	—	—
H	—	—
I	—	—



Table 1.

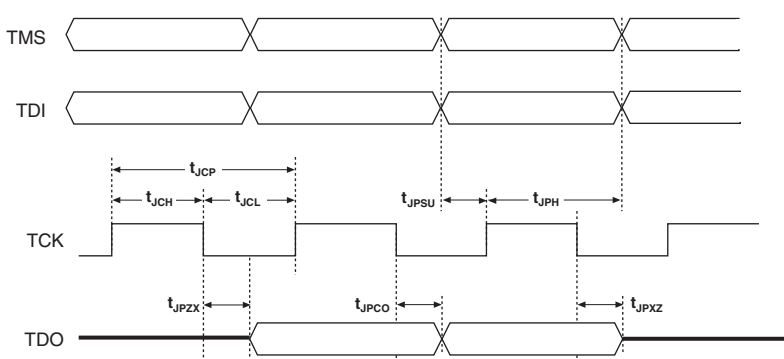
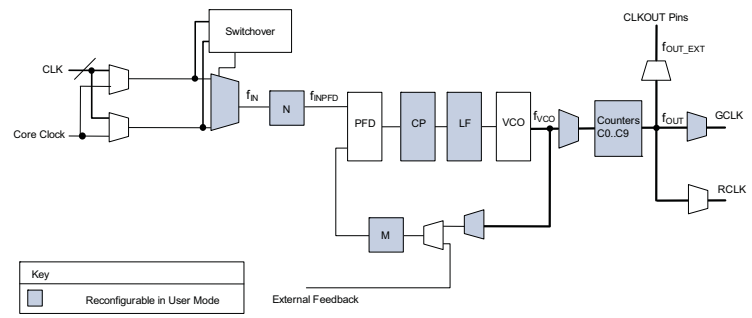
Glossary Table (Part 2 of 4)		
Letter	Subject	Definitions
J	J	High-Speed I/O Block: Deserialization factor (width of parallel data bus).
	JTAG Timing Specifications	<p>JTAG Timing Specifications are in the following figure:</p> 
K	—	—
L	—	—
M	—	—
N	—	—
O	—	—
P	PLL Specifications	<p>The block diagram shown in the following figure highlights the PLL Specification parameters: Diagram of PLL Specifications (1)</p>  <p><b>Note:</b> (1) CoreClock can only be fed by dedicated clock input pins or PLL outputs.</p>
		<p>Key</p> <p>Reconfigurable in User Mode</p>
Q	—	—
R	R <sub>L</sub>	Receiver differential input discrete resistor (external to Stratix III device).

Table 1.

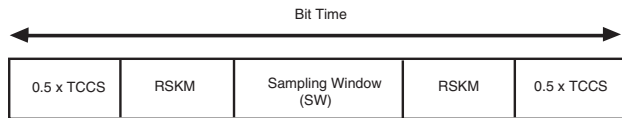
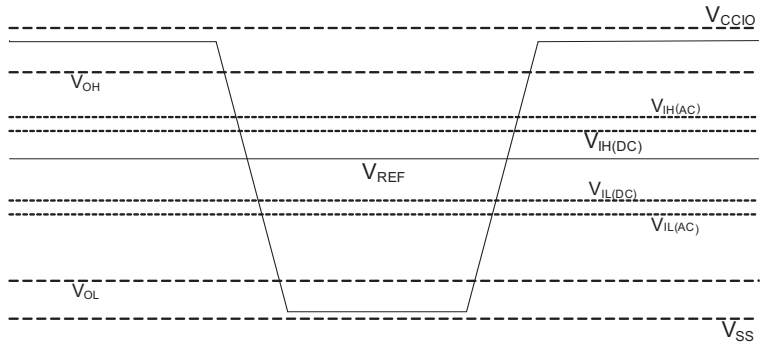
Glossary Table (Part 3 of 4)		
Letter	Subject	Definitions
S	SW (sampling window)	<p>The period of time during which the data must be valid in order to capture it correctly. The setup and hold times determine the ideal strobe position within the sampling window (the following figure):</p> <p>Timing Diagram</p> 
	Single-ended Voltage Referenced I/O Standard	<p>The JEDEC standard for SSTI and HSTL I/O standards defines both the AC and DC input signal values. The AC values indicate the voltage levels at which the receiver must meet its timing specifications. The DC values indicate the voltage levels at which the final logic state of the receiver is unambiguously defined. After the receiver input has crossed the AC value, the receiver changes to the new logic state.</p> <p>The new logic state is maintained as long as the input stays beyond the DC threshold. This approach is intended to provide predictable receiver timing in the presence of input waveform ringing (The following figure):</p> <p>Single-Ended Voltage Referenced I/O Standard</p> 
T	$t_C$	High-Speed receiver/transmitter input and output clock period.
	TCCS (channel-to-channel-skew)	The timing difference between the fastest and slowest output edges, including $t_{CO}$ variation and clock skew, across channels driven by the same PLL. The clock is included in the TCCS measurement (refer to the <i>Timing Diagram</i> figure under <b>S</b> in this table)
	$t_{DUTY}$	High-Speed I/O Block: Duty cycle on high-speed transmitter output clock. Timing Unit Interval (TUI) The timing budget allowed for skew, propagation delays, and data sampling window. (TUI = $1/(\text{Receiver Input Clock Frequency Multiplication Factor}) = t_C/w$ )
	$t_{FALL}$	Signal high-to-low transition time (80-20%)
	$t_{INCCJ}$	Cycle-to-cycle jitter tolerance on PLL clock input
	$t_{OUTPJ\_IO}$	Period jitter on general purpose I/O driven by a PLL
	$t_{OUTPJ\_DC}$	Period jitter on dedicated clock output driven by a PLL
	$t_{RISE}$	Signal low-to-high transition time (20-80%)
U	—	—

Table 1.

<b>Glossary Table (Part 4 of 4)</b>		
<b>Letter</b>	<b>Subject</b>	<b>Definitions</b>
<b>V</b>	$V_{CM(DC)}$	DC Common Mode Input Voltage.
	$V_{ICM}$	Input Common Mode Voltage: The common mode of the differential signal at the receiver.
	$V_{ID}$	Input Differential Voltage Swing: The difference in voltage between the positive and complementary conductors of a differential transmission at the receiver.
	$V_{DIF(AC)}$	AC Differential Input Voltage: Minimum AC input differential voltage required for switching.
	$V_{DIF(DC)}$	DC Differential Input Voltage: Minimum DC input differential voltage required for switching.
	$V_{IH}$	Voltage Input High: The minimum positive voltage applied to the input that is accepted by the device as a logic high.
	$V_{IH(AC)}$	High-level AC input voltage
	$V_{IH(DC)}$	High-level DC input voltage
	$V_{IL}$	Voltage Input Low: The maximum positive voltage applied to the input that is accepted by the device as a logic low.
	$V_{IL(AC)}$	Low-level AC input voltage
	$V_{IL(DC)}$	Low-level DC input voltage
	$V_{OCM}$	Output Common Mode Voltage: The common mode of the differential signal at the transmitter.
	$V_{OD}$	Output differential Voltage Swing: The difference in voltage between the positive and complementary conductors of a differential transmission at the transmitter.
<b>W</b>	<b>W</b>	High-Speed I/O Block: Clock Boost Factor
<b>X</b>	—	—
<b>Y</b>	—	—
<b>Z</b>	—	—

## Chapter Revision History

Table 1-202 lists the revision history for this chapter.

**Table 1-202.** Chapter Revision History (Part 1 of 2)

Date	Version	Changes Made
July 2010	2.3	Updated Table 1-11, Table 1-20, Table 1-25, and Table 1-33.
March 2010	2.2	<p>Updated for the Quartus II software version 9.1 SP2 release:</p> <ul style="list-style-type: none"> <li>■ Updated Table 1-7, Table 1-8, Table 1-11, Table 1-19, Table 1-23, Table 1-25, Table 1-28, Table 1-29, and Table 1-33.</li> <li>■ Updated the “Sinusoidal Maximum Allowed Overshoot/Undershoot Voltage” and “External Memory Interface Specifications” sections.</li> <li>■ Minor text edits.</li> </ul>
July 2009	2.1	Minor text edits.
May 2009	2.0	<ul style="list-style-type: none"> <li>■ Updated Table 1-1, Table 1-7, Table 1-9, Table 1-18, Table 1-21, Table 1-22, Table 1-23, Table 1-25, Table 1-26, Table 1-28, Table 1-29, Table 1-30, Table 1-33, Table 1-35, Table 1-41, Table 1-43, Table 1-51, Table 1-53, Table 1-61, Table 1-63, Table 1-71, Table 1-73, Table 1-81, Table 1-83, Table 1-91, Table 1-93, Table 1-101, Table 1-103, Table 1-111, Table 1-113, Table 1-121, Table 1-123, Table 1-131, and Table 1-133.</li> <li>■ Updated Equation 1-1.</li> </ul>
February 2009	1.9	<ul style="list-style-type: none"> <li>■ Updated “Programmable IOE Delay”, “PLL Specifications”, “DSP Block Specifications”, “TriMatrix Memory Block Specifications”, “External Memory Interface Specifications”, and “High-Speed I/O Specifications” sections.</li> <li>■ Updated all Timing Information Tables in “User I/O Pin Timing” and “Dedicated Clock Pin Timing” sections.</li> <li>■ Removed “Referenced Documents” and “Maximum Input and Output Toggle Rate” sections.</li> </ul>
October 2008	1.8	<ul style="list-style-type: none"> <li>■ Updated “Operating Conditions”.</li> <li>■ Added “Bus Hold Specifications”.</li> <li>■ Updated Table 1-3, Table 1-6, Table 1-7, Table 1-11, and Table 1-14.</li> <li>■ Updated Table 1-17 to Table 1-25.</li> <li>■ Updated Table 1-39 to Table 1-47.</li> <li>■ Updated Table 1-50 to Table 1-210.</li> <li>■ Added (Note 3) to Table 1-11.</li> <li>■ Added (Note 1) to Table 1-14.</li> <li>■ Added (Note 6) to Table 1-17.</li> <li>■ Added (Note 1) to Table 1-47.</li> <li>■ Added Table 1-26.</li> <li>■ Added Figure 1-2.</li> </ul>

**Table 1-202.** Chapter Revision History (Part 2 of 2)

Date	Version	Changes Made
July 2008	1.7	<ul style="list-style-type: none"> <li>■ Updated “Operating Conditions” introduction section.</li> <li>■ Updated Table 1-3, Table 1-7, Table 1-8, Table 1-19, Table 1-21, Table 1-22, Table 1-25, Table 1-26, Table 1-28, Table 1-29, Table 1-30, Table 1-31, Table 1-32, Table 1-33, Table 1-35, and Table 1-48.</li> <li>■ Updated “PLL Specifications” introduction section.</li> <li>■ Updated “I/O Timing Measurement Methodology” section.</li> <li>■ Updated Figure 1-5, Figure 1-6, and Figure 1-7.</li> </ul>
May 2008	1.6	<ul style="list-style-type: none"> <li>■ Updated all tables for timing section.</li> <li>■ Added “Internal Weak Pull-Up Resistor” section.</li> <li>■ Removed “Stratix III Temperature Sensing Diode Specifications” section.</li> <li>■ Added Figure 1-6 and Figure 1-7.</li> <li>■ Added derating factors Table 1-45 and Table 1-46.</li> </ul>
November 2007	1.5	<ul style="list-style-type: none"> <li>■ Updated Table 1-90 to Table 1-109.</li> <li>■ Updated Table 1-140 to Table 1-149.</li> <li>■ Updated Table 1-175 to Table 1-180.</li> <li>■ Updated Table 1-181 to Table 1-186.</li> <li>■ Updated Table 1-205 to Table 1-210.</li> </ul>
October 2007	1.4	<ul style="list-style-type: none"> <li>■ Updated I/O Timing</li> <li>■ Added new device packages for EP3SL50, EP3SL110, EP3SE80.</li> </ul>
May 2007	1.3	Added new contact information table to the About this Handbook section.
May 2007	1.2	Updated Table 1-44 through Table 1-205.
March 2007	1.1	Added I/O Timing section.
November 2006	1.0	Initial Release.