Product Preview

Low-Voltage 1:20 Differential ECL/PECL Clock Driver

MC100EP221

LOW–VOLTAGE 1:20 DIFFERENTIAL ECL/PECL CLOCK DRIVER

The MC100EP221 is a low skew 1–to–20 differential driver, designed with clock distribution in mind. It accepts two clock sources into an input multiplexer. The input signals can be either differential or single–ended if the V_{BB} output is used. The selected signal is fanned out to 20 identical differential outputs.

- 150ps Part–to–Part Skew
- 50ps Output–to–Output Skew
- Differential Design
- V_{BB} Output
- Voltage and Temperature Compensated Outputs
- Low Voltage V_{EE} Range of –2.375 to –3.8V
- 75kΩ Input Pulldown Resistors

FA SUFFIX
52–LEAD TQFP PACKAGE
CASE 848D–03

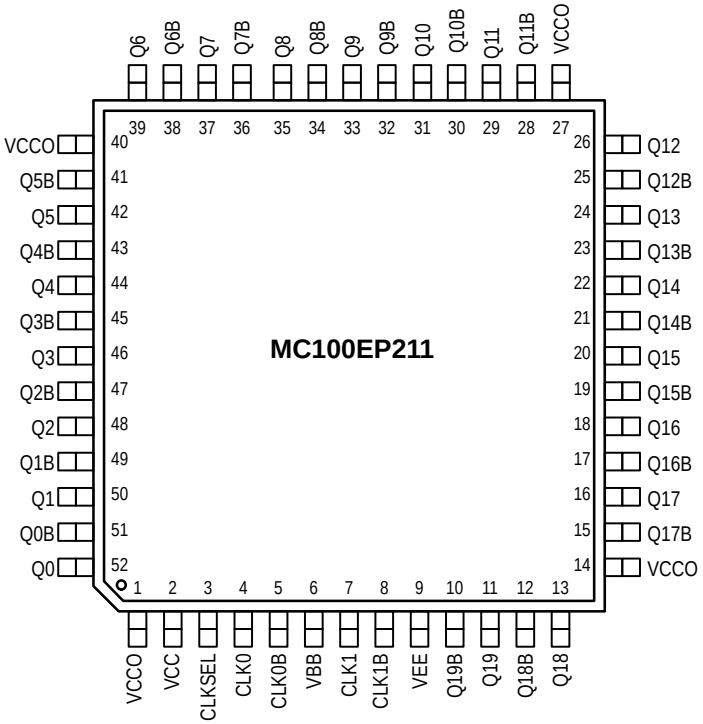
The EP221 is specifically designed, modeled and produced with low skew as the key goal. Optimal design and layout serve to minimize gate–to–gate skew within a device, and empirical modeling is used to determine process control limits that ensure consistent t_{pd} distributions from lot to lot. The net result is a dependable, guaranteed low skew device.

To ensure that the tight skew specification is met it is necessary that both sides of the differential output are terminated into 50Ω, even if only one side is being used. In most applications, all ten differential pairs will be used and therefore terminated. In the case where fewer than ten pairs are used, it is necessary to terminate at least the output pairs on the same package side as the pair(s) being used on that side, in order to maintain minimum skew. Failure to do this will result in small degradations of propagation delay (on the order of 10–20ps) of the output(s) being used which, while not being catastrophic to most designs, will mean a loss of skew margin.

The MC100EP221, as with most other ECL devices, can be operated from a positive V_{CC} supply in PECL mode. This allows the EP221 to be used for high performance clock distribution in +3.3V or +2.5V systems. Designers can take advantage of the EP221's performance to distribute low skew clocks across the backplane. In a PECL environment, series or Thevenin line terminations are typically used as they require no additional power supplies. For more information on using PECL, designers should refer to Motorola Application Note AN1406/D.

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

Pinout: 52–Lead TQFP
(Top View)



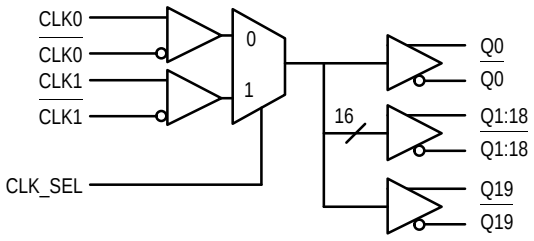
PIN NAMES

Pins	Function
CLKn, $\overline{\text{CLKn}}$	Differential Input Pairs
Q0:19, $\overline{\text{Q0:19}}$	Differential Outputs
CLK_SEL	Active Clock Select Input
VBB	V_{BB} Output

FUNCTION

CLK_SEL	Active Input
0	CLK0, $\overline{\text{CLK0}}$
1	CLK1, $\overline{\text{CLK1}}$

LOGIC SYMBOL



ECL DC CHARACTERISTICS

Symbol	Characteristic	–40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage	–1.025	–0.955	–0.880	–1.025	–0.955	–0.880	–1.025	–0.955	–0.880	–1.025	–0.955	–0.880	V
V_{OL}	Output LOW Voltage	–1.810	–1.705	–1.620	–1.810	–1.705	–1.620	–1.810	–1.705	–1.620	–1.810	–1.705	–1.620	V
V_{IH}	Input HIGH Voltage	–1.165		–0.880	–1.165		–0.880	–1.165		–0.880	–1.165		–0.880	V
V_{IL}	Input LOW Voltage	–1.810		–1.475	–1.810		–1.475	–1.810		–1.475	–1.810		–1.475	V
V_{BB}	Output Reference Voltage	–1.38		–1.26	–1.38		–1.26	–1.38		–1.26	–1.38		–1.26	V
V_{EE}	Power Supply Voltage	–2.375		–3.8	–2.375		–3.8	–2.375		–3.8	–2.375		–3.8	V
I_{IH}	Input HIGH Current			150			150			150			150	µA
I_{EE}	Power Supply Current													mA

PECL DC CHARACTERISTICS

Symbol	Characteristic	–40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage **(NO TAG)**	2.275	2.345	2.420	2.275	2.345	2.420	2.275	2.345	2.420	2.275	2.345	2.420	V
V_{OL}	Output LOW Voltage **(NO TAG)**	1.490	1.595	1.680	1.490	1.595	1.680	1.490	1.595	1.680	1.490	1.595	1.680	V
V_{IH}	Input HIGH Voltage **(NO TAG)**	2.135		2.420	2.135		2.420	2.135		2.420	2.135		2.420	V
V_{IL}	Input LOW Voltage **(NO TAG)**	1.490		1.825	1.490		1.825	1.490		1.825	1.490		1.825	V
V_{BB}	Output Reference Voltage (Note NO TAG)	1.92		2.04	1.92		2.04	1.92		2.04	1.92		2.04	V
V_{CC}	Power Supply Voltage	2.375		3.8	2.375		3.8	2.375		3.8	2.375		3.8	V
I_{IH}	Input HIGH Current			150			150			150			150	µA
I_{EE}	Power Supply Current													mA

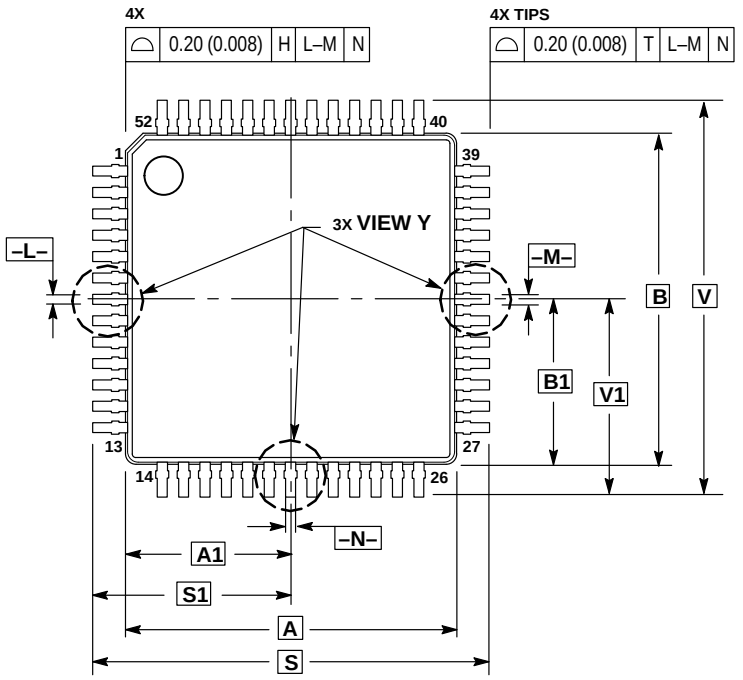
1. These values are for V_{CC} = 3.3V. Level Specifications will vary 1:1 with V_{CC}.

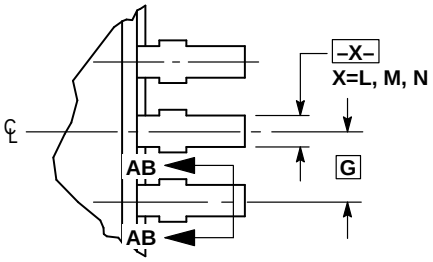
AC CHARACTERISTICS (V_{EE} = V_{EE} (min) to V_{EE} (max); V_{CC} = V_{CCO} = GND)

Symbol	Characteristic	–40°C			0°C			25°C			85°C			Unit	Condition
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
t_{PLH} t_{PHL}	Propagation Delay to Output IN (differential) IN (single–ended)								 500 500					ps	
t_{skew}	Within–Device Skew Part–to–Part Skew (Diff)		 50 150			 50 150			 50 150			 50 150		ps	
f_{max}	Maximum Input Frequency		1.5			1.5			1.5			1.5		GHz	
V_{PP}	Minimum Input Swing	500			500			500			500			mV	
V_{CMR}	Common Mode Range													V	
t_r/t_f	Output Rise/Fall Time		200			200			200			200		ps	20%–80%

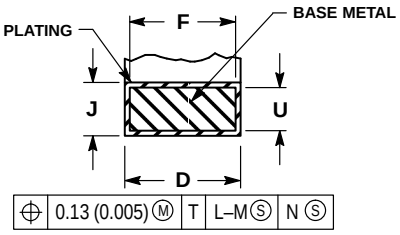
OUTLINE DIMENSIONS

FA SUFFIX
PLASTIC TQFP PACKAGE
CASE 848D–03
ISSUE C

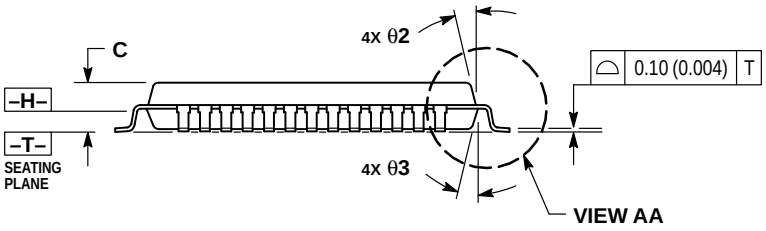


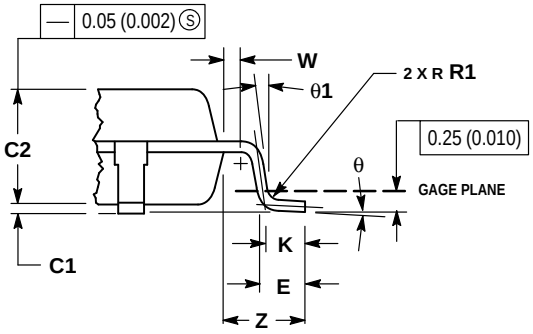


VIEW Y



SECTION AB–AB
ROTATED 90° CLOCKWISE





VIEW AA

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE –H– IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS –L–, –M– AND –N– TO BE DETERMINED AT DATUM PLANE –H–.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE –T–.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -H-.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED 0.46 (0.018). MINIMUM SPACE BETWEEN PROTRUSION AND ADJACENT LEAD OR PROTRUSION 0.07 (0.003).

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	10.00 BSC		0.394 BSC	
A1	5.00 BSC		0.197 BSC	
B	10.00 BSC		0.394 BSC	
B1	5.00 BSC		0.197 BSC	
C	—	1.70	—	0.067
C1	0.05	0.20	0.002	0.008
C2	1.30	1.50	0.051	0.059
D	0.20	0.40	0.008	0.016
E	0.45	0.75	0.018	0.030
F	0.22	0.35	0.009	0.014
G	0.65 BSC		0.026 BSC	
J	0.07	0.20	0.003	0.008
K	0.50 REF		0.020 REF	
R1	0.08	0.20	0.003	0.008
S	12.00 BSC		0.472 BSC	
S1	6.00 BSC		0.236 BSC	
U	0.09	0.16	0.004	0.006
V	12.00 BSC		0.472 BSC	
V1	6.00 BSC		0.236 BSC	
W	0.20 REF		0.008 REF	
Z	1.00 REF		0.039 REF	
θ	0°	7°	0°	7°
θ1	0°	—	0°	—
θ2	12° REF		12° REF	
θ3	5°	13°	5°	13°

How to reach us:

USA / EUROPE / Locations Not Listed: Motorola Literature Distribution; P.O. Box 5405; Denver, Colorado 80217. 303–675–2140 or 1–800–441–2447

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 602–244–6609

INTERNET: http://www.mot.com/sps/

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, 6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 81–3–3521–8315

ASIA / PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298