

# HD74HC354

## 8-to-1-line Data Selector/Multiplexer/Register (with 3-state outputs)

REJ03D0613-0200  
 (Previous ADE-205-492)  
 Rev.2.00  
 Jan 31, 2006

### Description

This data selectors/multiplexers contains full on-chip binary decoding to select one of eight data sources. The data select address is stored in transparent latches that are enabled by a low level address on pin 11, Select Control. Data on the 8 input lines is stored in a parallel input/output register which in the HD74HC354 is composed of 8 transparent latches enabled by a low level on pin 9, Data Control. Both true (Y) and complementary (W) 3-state outputs are available.

### Features

- High Speed Operation:  $t_{pd}(\overline{DC} \text{ to } W, Y) = 23 \text{ ns typ } (C_L = 50 \text{ pF})$
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2 \text{ to } 6 \text{ V}$
- Low Input Current:  $1 \mu\text{A max}$
- Low Quiescent Supply Current:  $I_{CC}(\text{static}) = 4 \mu\text{A max } (T_a = 25^\circ\text{C})$
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HC354P	DILP-20 pin	PRDP0020AC-B (DP-20NEV)	P	—
HD74HC354FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HC354RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

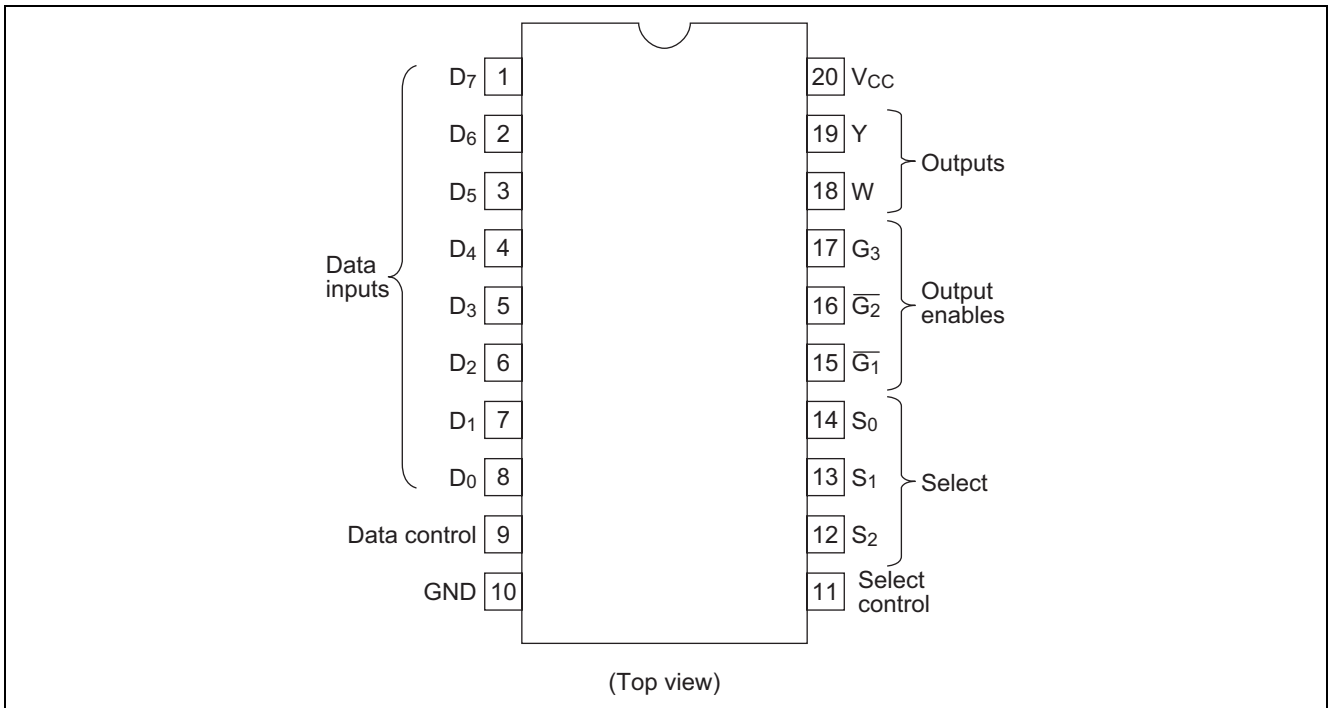
Note: Please consult the sales office for the above package availability.

Function Table

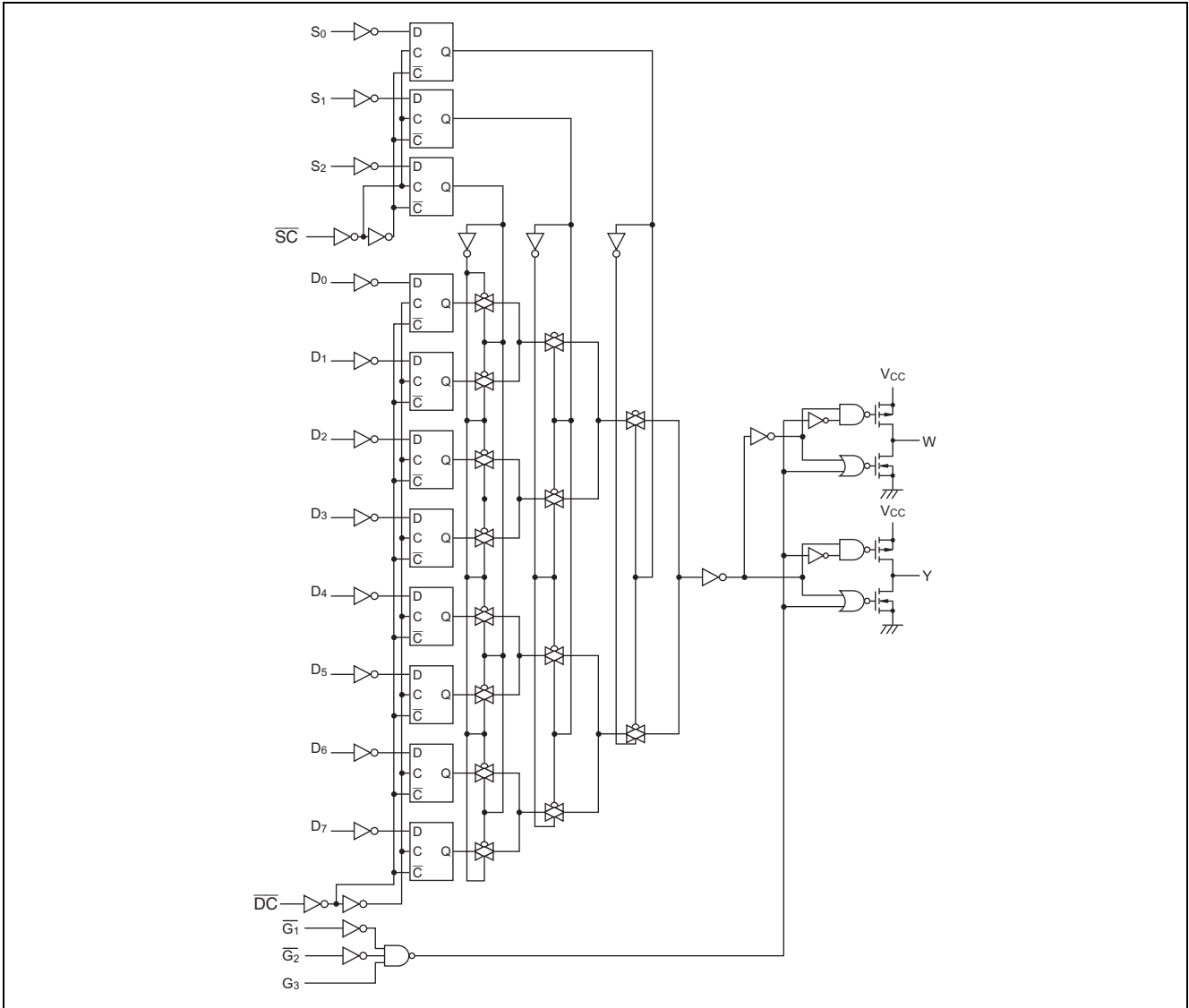
Select			Inputs				Outputs	
S <sub>1</sub>	S <sub>2</sub>	S <sub>0</sub>	Data Control	Output Enable			W	Y
			$\overline{DC}$	$\overline{G1}$	$\overline{G2}$	G3		
X	X	X	X	H	X	X	Z	Z
X	X	X	X	X	H	X	Z	Z
X	X	X	X	X	X	L	Z	Z
L	L	L	L	L	L	H	$\overline{D0}$	D0
L	L	L	H	L	L	H	$\overline{D0n}$	D0n
L	L	H	L	L	L	H	$\overline{D1}$	D1
L	L	H	H	L	L	H	$\overline{D1n}$	D1n
L	H	L	L	L	L	H	$\overline{D2}$	D2
L	H	L	H	L	L	H	$\overline{D2n}$	D2n
L	H	H	L	L	L	H	$\overline{D3}$	D3
L	H	H	H	L	L	H	$\overline{D3n}$	D3n
H	L	L	L	L	L	H	$\overline{D4}$	D4
H	L	L	H	L	L	H	$\overline{D4n}$	D4n
H	L	H	L	L	L	H	$\overline{D5}$	D5
H	L	H	H	L	L	H	$\overline{D5n}$	D5n
H	H	L	L	L	L	H	$\overline{D6}$	D6
H	H	L	H	L	L	H	$\overline{D6n}$	D6n
H	H	H	L	L	L	H	$\overline{D7}$	D7
H	H	H	H	L	L	H	$\overline{D7n}$	D7n

Notes: 1. H; High level, L; Low level, X; Irrelevant, Z; High impedance

Pin Arrangement



Logic Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage range	$V_{CC}$	-0.5 to 7.0	V
Input / Output voltage	$V_{IN}, V_{OUT}$	-0.5 to $V_{CC} + 0.5$	V
Input / Output diode current	$I_{IK}, I_{OK}$	$\pm 20$	mA
Output current	$I_O$	$\pm 35$	mA
$V_{CC}$ , GND current	$I_{CC}$ or $I_{GND}$	$\pm 75$	mA
Power dissipation	$P_T$	500	mW
Storage temperature	$T_{stg}$	-65 to +150	$^{\circ}C$

Note: The absolute maximum ratings are values, which must not individually be exceeded, and furthermore, no two of which may be realized at the same time.

## Recommended Operating Conditions

Item	Symbol	Ratings	Unit	Conditions
Supply voltage	$V_{CC}$	2 to 6	V	
Input / Output voltage	$V_{IN}, V_{OUT}$	0 to $V_{CC}$	V	
Operating temperature	$T_a$	-40 to 85	°C	
Input rise / fall time <sup>*1</sup>	$t_r, t_f$	0 to 1000	ns	$V_{CC} = 2.0\text{ V}$
		0 to 500		$V_{CC} = 4.5\text{ V}$
		0 to 400		$V_{CC} = 6.0\text{ V}$

Notes: 1. This item guarantees maximum limit when one input switches.

Waveform: Refer to test circuit of switching characteristics.

## Electrical Characteristics

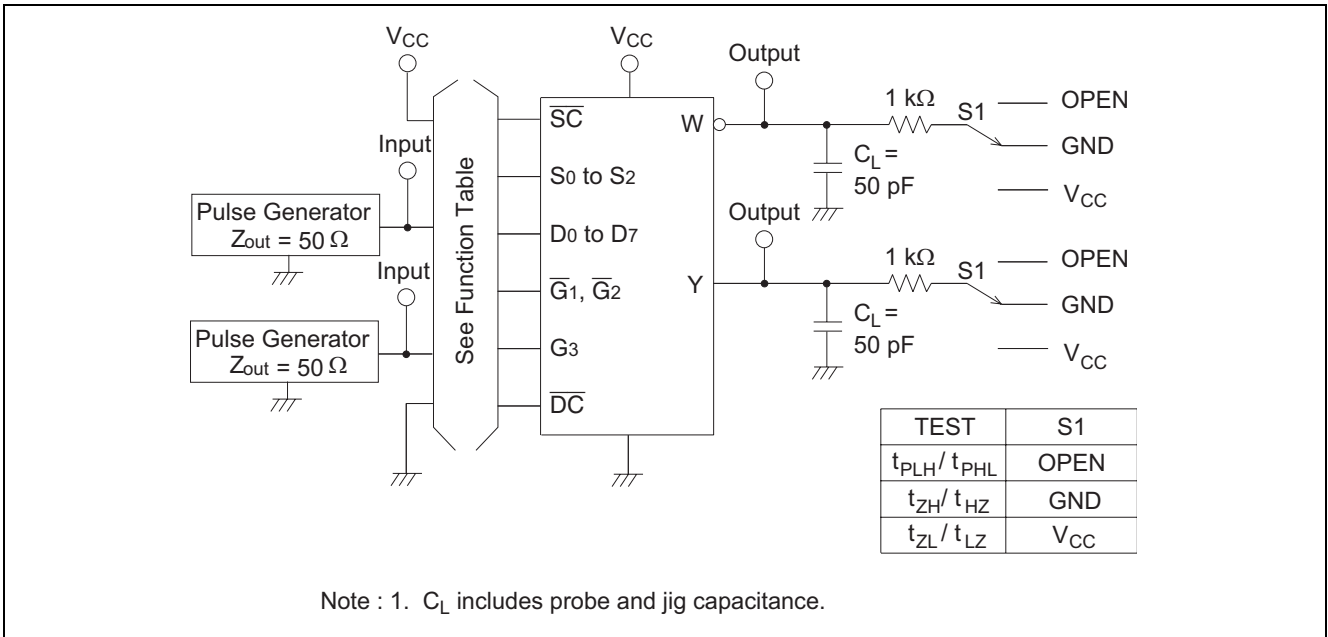
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40\text{ to }+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	$V_{IH}$	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	$V_{IL}$	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	$V_{OH}$	2.0	1.9	2.0	—	1.9	—	V	$V_{in} = V_{IH}\text{ or }V_{IL}$	$I_{OH} = -20\ \mu\text{A}$
		4.5	4.4	4.5	—	4.4	—			$I_{OH} = -6\ \text{mA}$
		6.0	5.9	6.0	—	5.9	—			$I_{OH} = -7.8\ \text{mA}$
		4.5	4.18	—	—	4.13	—			
		6.0	5.68	—	—	5.63	—			
	$V_{OL}$	2.0	—	0.0	0.1	—	0.1	V	$V_{in} = V_{IH}\text{ or }V_{IL}$	$I_{OL} = 20\ \mu\text{A}$
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	—	0.26	—	0.33			$I_{OH} = 6\ \text{mA}$
		6.0	—	—	0.26	—	0.33			$I_{OH} = 7.8\ \text{mA}$
Off-state output current	$I_{OZ}$	6.0	—	—	$\pm 0.5$	—	$\pm 5.0$	$\mu\text{A}$	$V_{in} = V_{IH}\text{ or }V_{IL}$ , $V_{out} = V_{CC}\text{ or GND}$	
Input current	$I_{in}$	6.0	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu\text{A}$	$V_{in} = V_{CC}\text{ or GND}$	
Quiescent supply current	$I_{CC}$	6.0	—	—	4.0	—	40	$\mu\text{A}$	$V_{in} = V_{CC}\text{ or GND}$ , $I_{out} = 0\ \mu\text{A}$	

## Switching Characteristics

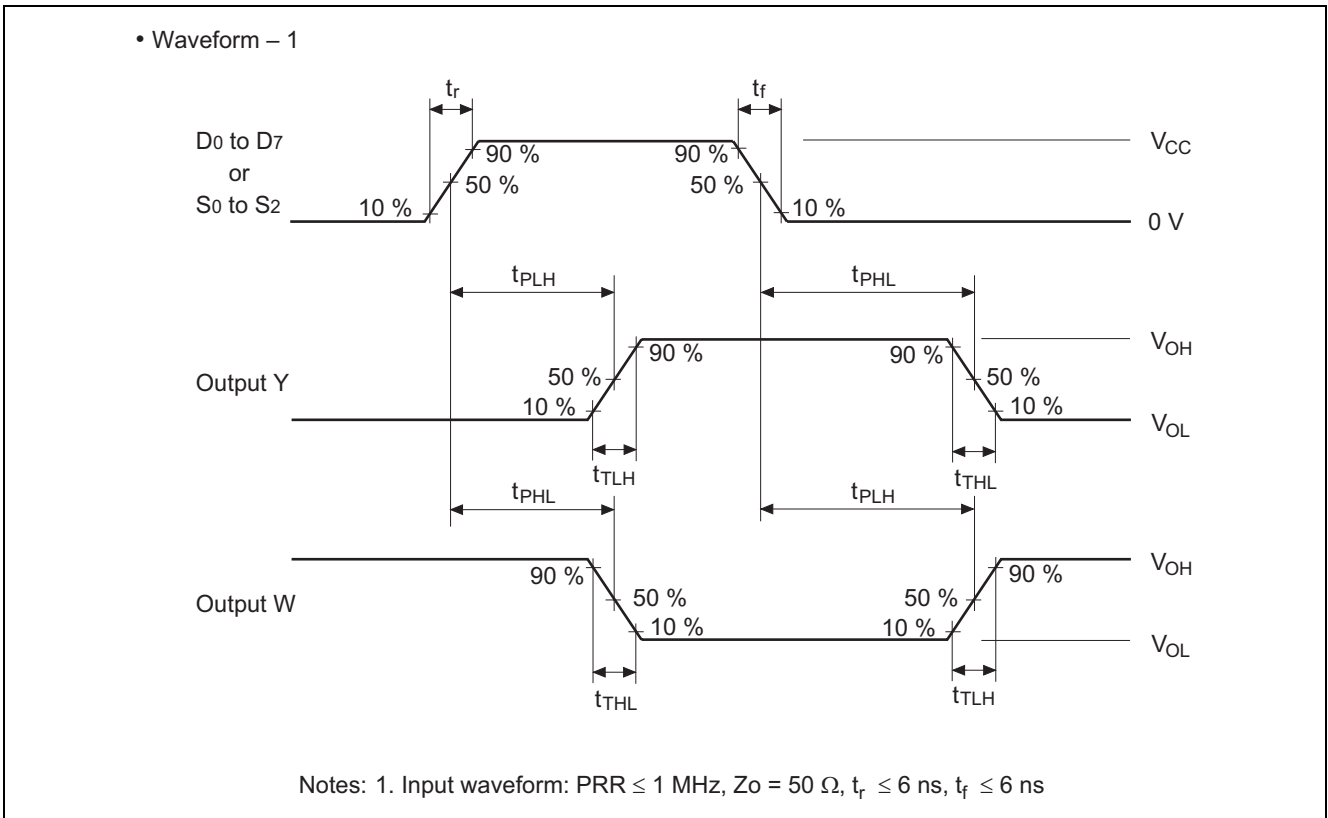
(C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6 ns)

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Propagation delay time	t <sub>PLH</sub> t <sub>PHL</sub>	2.0	—	—	235	—	295	ns	D <sub>0</sub> – D <sub>7</sub> to output
		4.5	—	23	47	—	59		
		6.0	—	—	40	—	50		
	t <sub>PLH</sub> t <sub>PHL</sub>	2.0	—	—	270	—	340	ns	Data control to output
		4.5	—	26	54	—	68		
		6.0	—	—	46	—	58		
	t <sub>PLH</sub> t <sub>PHL</sub>	2.0	—	—	285	—	355	ns	S <sub>0</sub> – S <sub>2</sub> to output
		4.5	—	26	57	—	71		
		6.0	—	—	48	—	60		
	t <sub>PLH</sub> t <sub>PHL</sub>	2.0	—	—	300	—	375	ns	Select control to output
		4.5	—	26	60	—	75		
		6.0	—	—	51	—	64		
Output enable time	t <sub>ZH</sub> t <sub>ZL</sub>	2.0	—	—	150	—	190	ns	
		4.5	—	12	30	—	38		
		6.0	—	—	26	—	33		
Output disable time	t <sub>LZ</sub> t <sub>HZ</sub>	2.0	—	—	165	—	205	ns	
		4.5	—	15	33	—	41		
		6.0	—	—	28	—	35		
Setup time	t <sub>su</sub>	2.0	50	—	—	65	—	ns	D <sub>0</sub> – D <sub>7</sub> to Data control, S <sub>0</sub> – S <sub>7</sub> to Select control
		4.5	10	2	—	13	—		
		6.0	10	—	—	13	—		
Hold time	t <sub>h</sub>	2.0	5	—	—	5	—	ns	D <sub>0</sub> – D <sub>7</sub> to Data control, S <sub>0</sub> – S <sub>7</sub> to Select control
		4.5	5	0	—	5	—		
		6.0	5	—	—	5	—		
Pulse width	t <sub>w</sub>	2.0	80	—	—	100	—	ns	Select control or Data control
		4.5	16	4	—	20	—		
		6.0	14	—	—	17	—		
Output rise/fall time	t <sub>TLH</sub> t <sub>THL</sub>	2.0	—	—	60	—	75	ns	
		4.5	—	4	12	—	15		
		6.0	—	—	10	—	13		
Input capacitance	C <sub>in</sub>	—	—	5	10	—	10	pF	

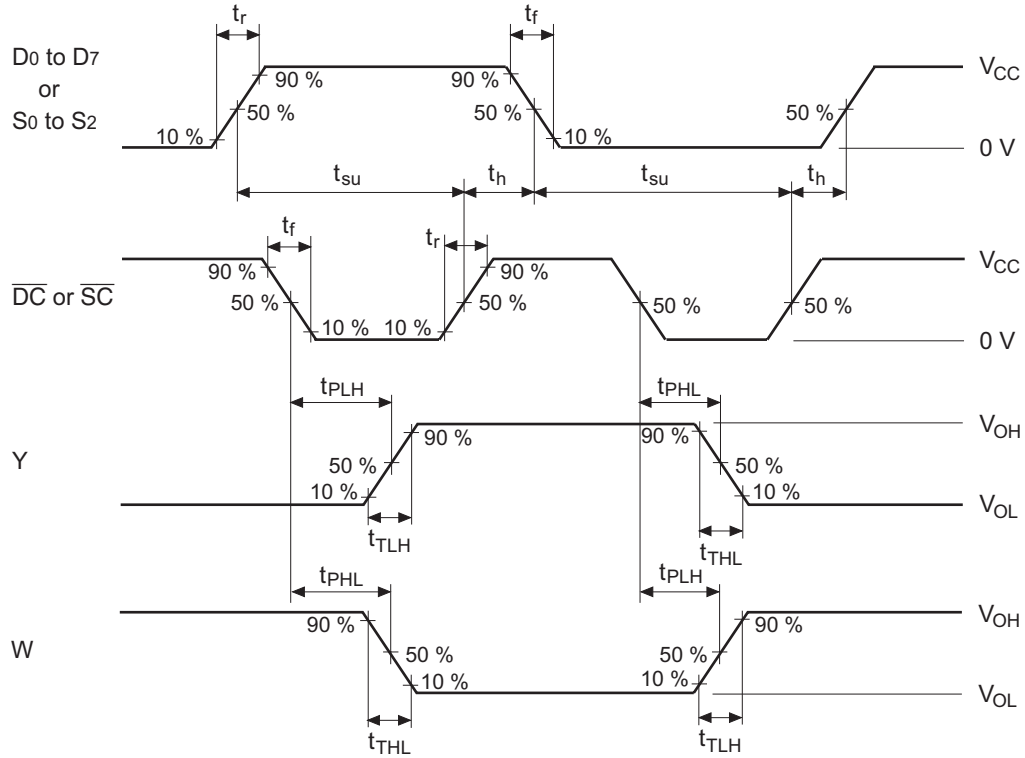
Test Circuit



Waveforms

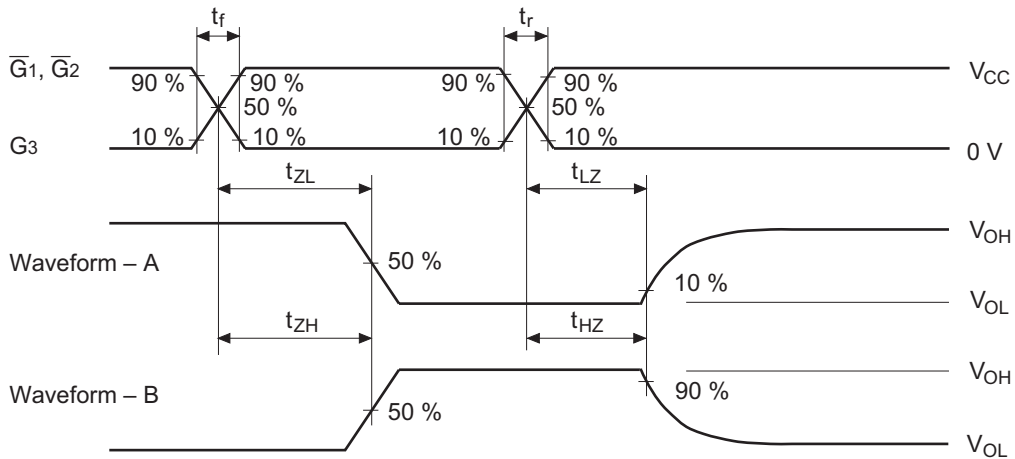


• Waveform – 2



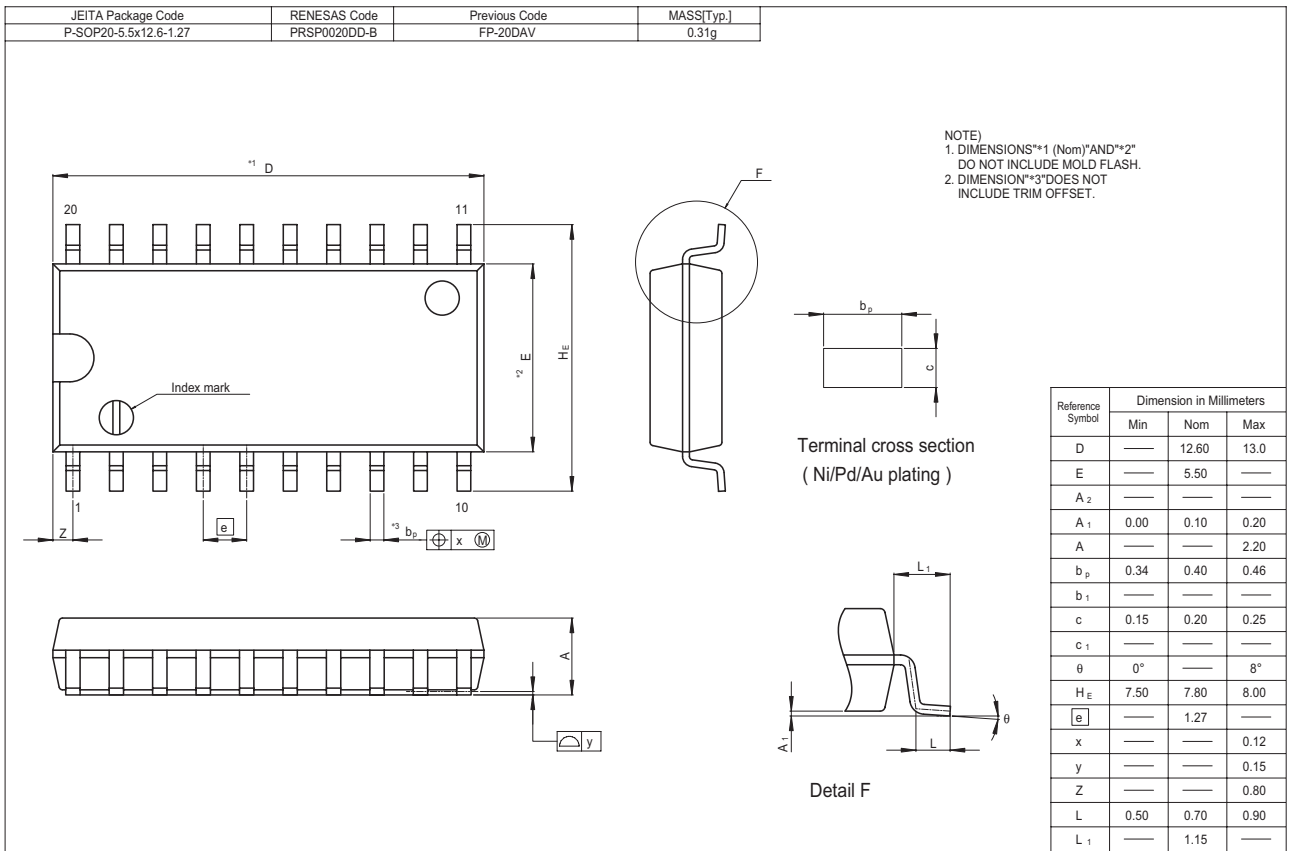
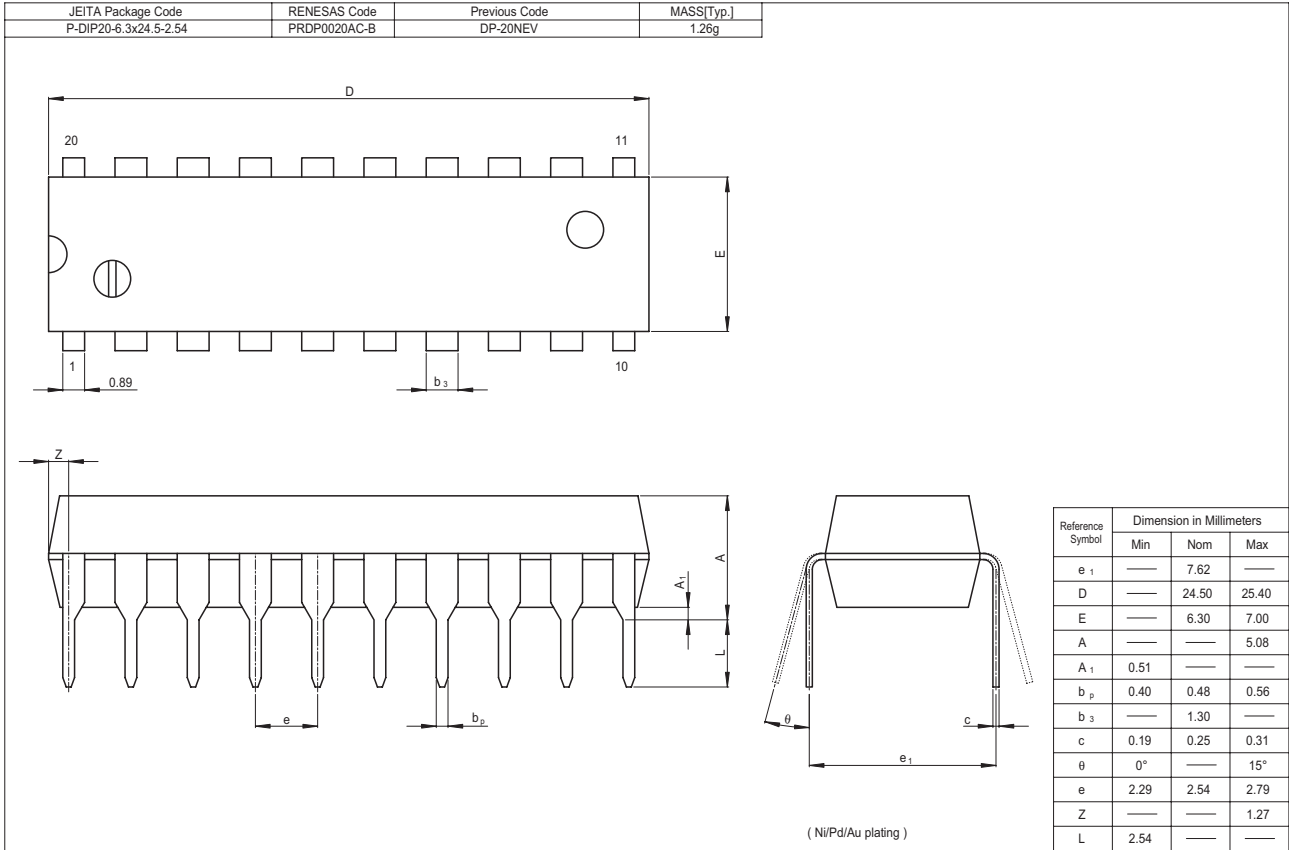
Notes: 1. Input waveform:  $PRR \leq 1\text{ MHz}$ ,  $Z_o = 50\ \Omega$ ,  $t_r \leq 6\text{ ns}$ ,  $t_f \leq 6\text{ ns}$

• Waveform – 3



- Notes :
1. Input waveform :  $PRR \leq 1\text{ MHz}$ , duty cycle 50%,  $t_r \leq 6\text{ ns}$ ,  $t_f \leq 6\text{ ns}$
  2. Waveform– A is for an output with internal conditions such that the output is low except when disabled by the output control.
  3. Waveform– B is for an output with internal conditions such that the output is high except when disabled by the output control.
  4. The output are measured one at a time with one transition per measurement.

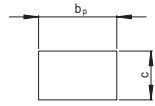
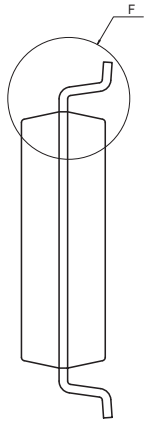
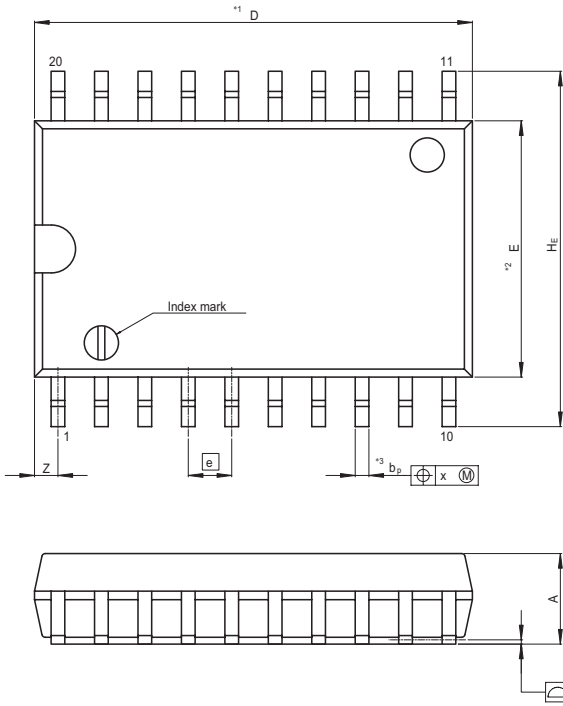
Package Dimensions



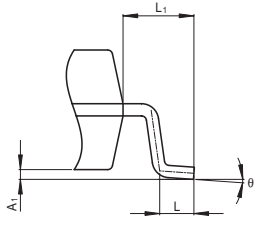


# HD74HC354

JEITA Package Code P-SOP20-7.5x12.8-1.27	RENESAS Code PRSP0020DC-A	Previous Code FP-20DBV	MASS[Typ.] 0.52g
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Terminal cross section  
( Ni/Pd/Au plating )



Detail F

NOTE)  
1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\*  
@ DO NOT INCLUDE MOLD FLASH.  
2. DIMENSION\*\*3\*DOES NOT  
@ INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	12.80	13.2
E	—	7.50	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.10	0.20	0.30
A	—	—	2.65
b <sub>p</sub>	0.34	0.40	0.46
b <sub>1</sub>	—	—	—
c	0.20	0.25	0.30
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	10.00	10.40	10.65
e	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.935
L	0.40	0.70	1.27
L <sub>1</sub>	—	1.45	—

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