

# HD74HC356

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

REJ03D0614-0200  
(Previous ADE-205-493)  
Rev.2.00  
Jan 31, 2006

### Description

This data selectors/multiplexers contain 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 HD74HC356 is composed of 8 edge-triggered flip-flops, clocked by a low to high transition on pin 9, clock. Both true (Y) and complementary (W) 3-state outputs are available.

### Features

- High Speed Operation:  $t_{pd}$  (Clock to W, Y) = 27 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 15 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2$  to 6 V
- Low Input Current: 1  $\mu$ A max
- Low Quiescent Supply Current:  $I_{CC}$  (static) = 4  $\mu$ A max ( $T_a = 25^\circ\text{C}$ )
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HC356FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HC356RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

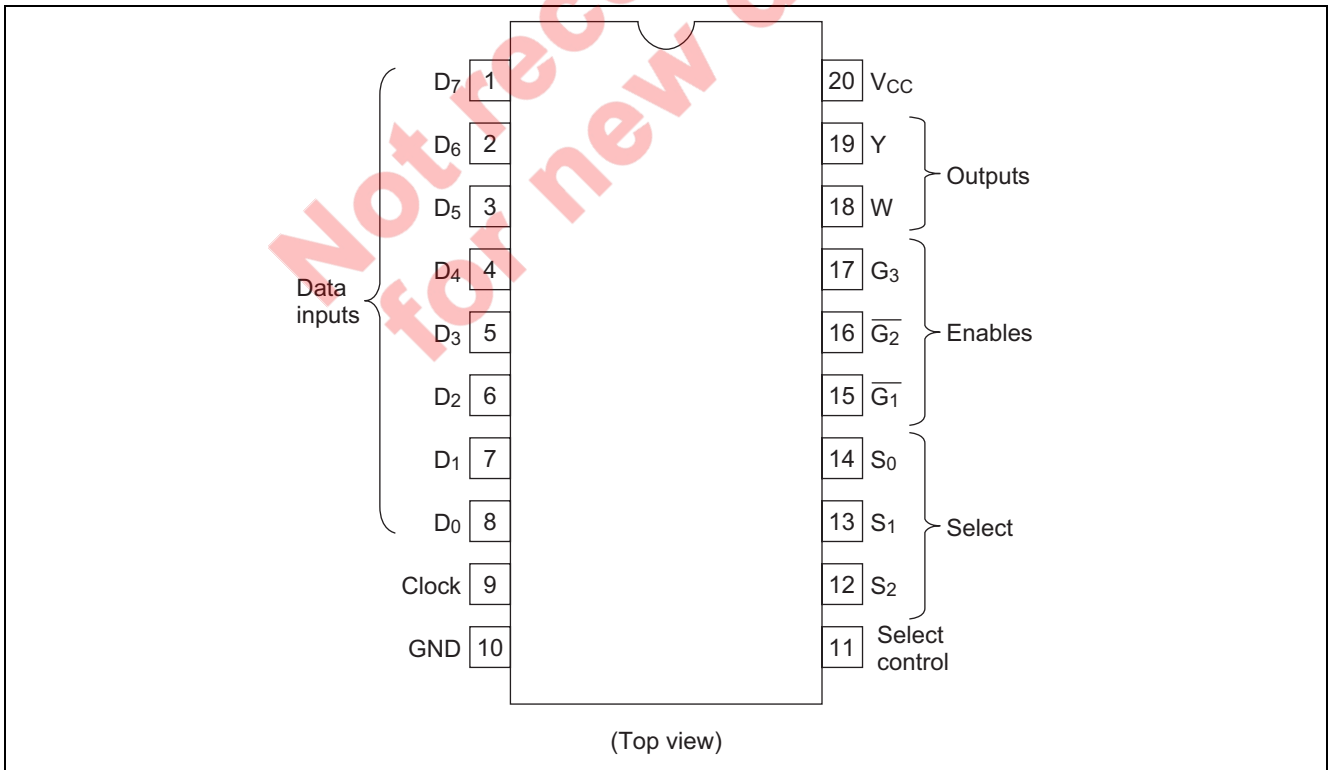
Note: Please consult the sales office for the above package availability.

Function Table

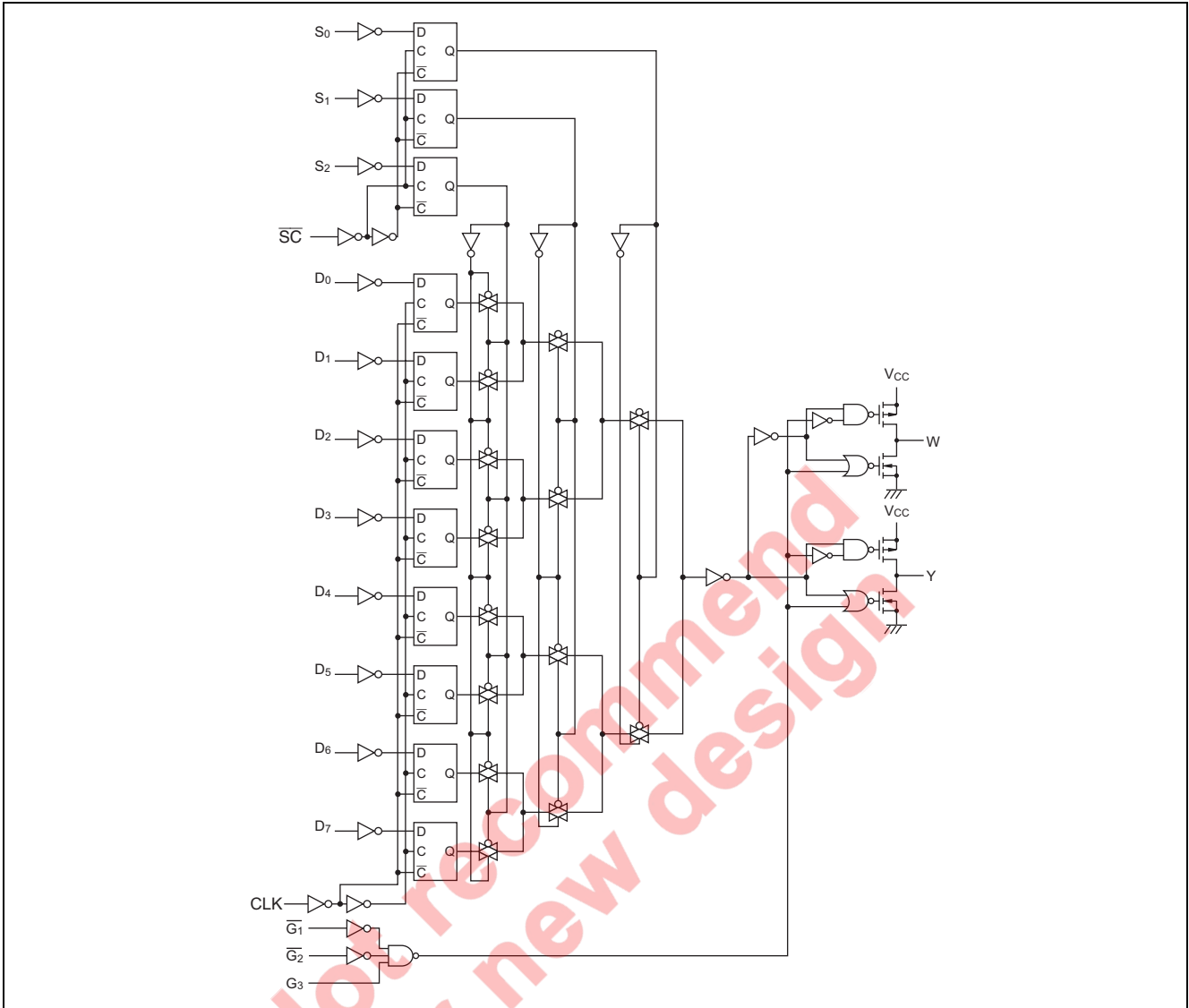
Select			Inputs				Outputs	
S <sub>1</sub>	S <sub>2</sub>	S <sub>0</sub>	Clock	$\overline{G}_1$	$\overline{G}_2$	G <sub>3</sub>	W	Y
X	X	X	X	H	X	X	Z	Z
X	X	X	X	X	H	X	Z	Z
X	X	X	X	X	X	L	Z	Z
L	L	L	$\int$	L	L	H	$\overline{D}_0$	D <sub>0</sub>
L	L	L	H or L	L	L	H	$\overline{D}_{0n}$	D <sub>0n</sub>
L	L	H	$\int$	L	L	H	$\overline{D}_1$	D <sub>1</sub>
L	L	H	H or L	L	L	H	$\overline{D}_{1n}$	D <sub>1n</sub>
L	H	L	$\int$	L	L	H	$\overline{D}_2$	D <sub>2</sub>
L	H	L	H or L	L	L	H	$\overline{D}_{2n}$	D <sub>2n</sub>
L	H	H	$\int$	L	L	H	$\overline{D}_3$	D <sub>3</sub>
L	H	H	H or L	L	L	H	$\overline{D}_{3n}$	D <sub>3n</sub>
H	L	L	$\int$	L	L	H	$\overline{D}_4$	D <sub>4</sub>
H	L	L	H or L	L	L	H	$\overline{D}_{4n}$	D <sub>4n</sub>
H	L	H	$\int$	L	L	H	$\overline{D}_5$	D <sub>5</sub>
H	L	H	H or L	L	L	H	$\overline{D}_{5n}$	D <sub>5n</sub>
H	H	L	$\int$	L	L	H	$\overline{D}_6$	D <sub>6</sub>
H	H	L	H or L	L	L	H	$\overline{D}_{6n}$	D <sub>6n</sub>
H	H	H	$\int$	L	L	H	$\overline{D}_7$	D <sub>7</sub>
H	H	H	H or L	L	L	H	$\overline{D}_{7n}$	D <sub>7n</sub>

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

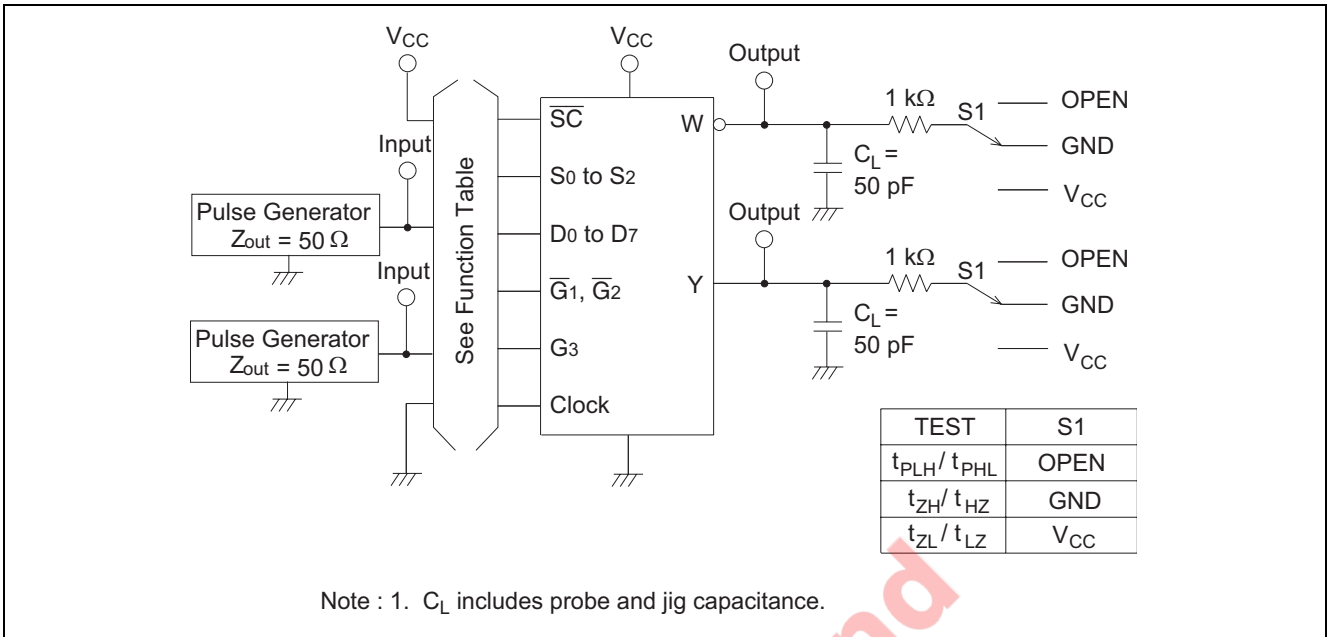
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40\text{ to }+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	$V_{IH}$	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	$V_{IL}$	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	$V_{OH}$	2.0	1.9	2.0	—	1.9	—	V	$V_{in} = V_{IH}$ 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	$V_{in} = V_{IH}$ 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	—	—	$\pm 0.5$	—	$\pm 5.0$	$\mu\text{A}$	$V_{in} = V_{IH}$ or $V_{IL}$ , $V_{out} = V_{CC}$ or GND	
Input current	$I_{in}$	6.0	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu\text{A}$	$V_{in} = V_{CC}$ or GND	
Quiescent supply current	$I_{CC}$	6.0	—	—	4.0	—	40	$\mu\text{A}$	$V_{in} = V_{CC}$ or GND, $I_{out} = 0\ \mu\text{A}$	

## Switching Characteristics

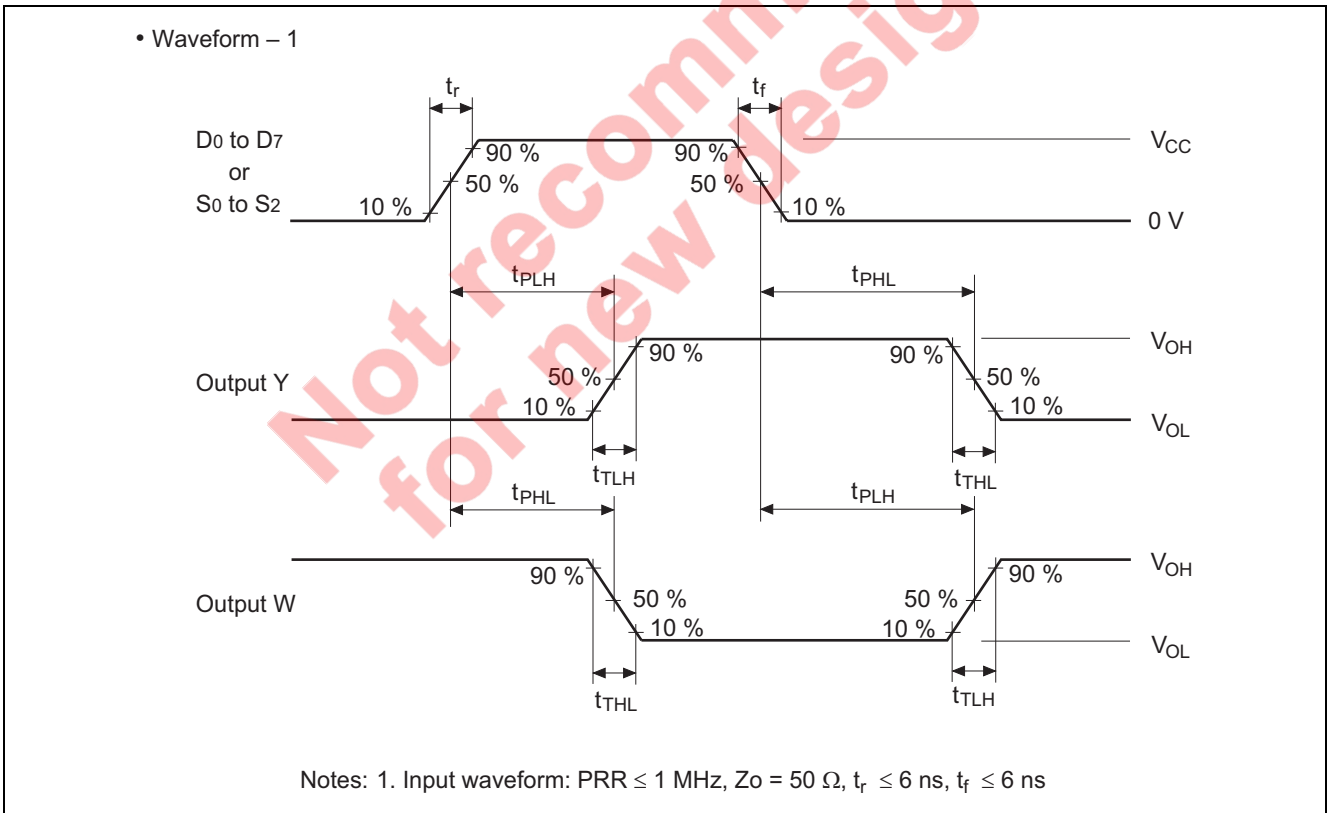
(C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6 ns)

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	—	—	255	—	320	ns	Clock to output
		4.5	—	27	51	—	64		
		6.0	—	—	43	—	54		
	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	—	25	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	—	25	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	—	17	33	—	41		
		6.0	—	—	28	—	35		
Setup time	t <sub>su</sub>	2.0	50	—	—	65	—	ns	D <sub>0</sub> to D <sub>7</sub> to Clock S <sub>0</sub> to 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> to D <sub>7</sub> to Clock S <sub>0</sub> to S <sub>7</sub> to Select control
		4.5	5	1	—	5	—		
		6.0	5	—	—	5	—		
Pulse width	t <sub>w</sub>	2.0	80	—	—	100	—	ns	
		4.5	16	5	—	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	

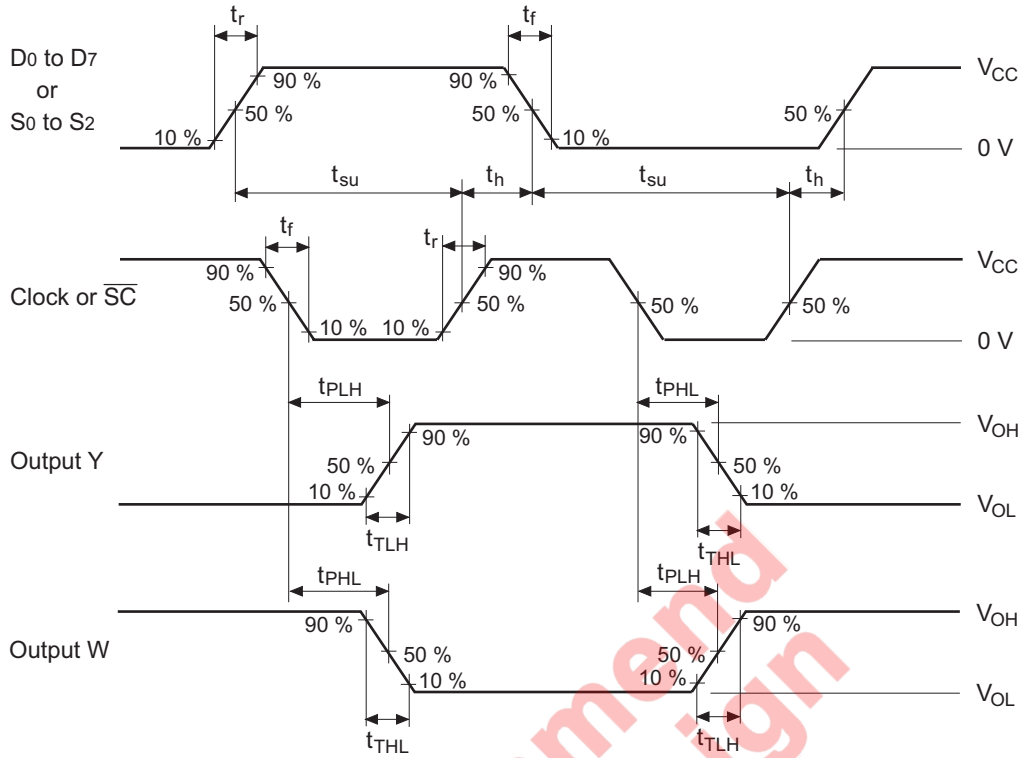
Test Circuit



Waveforms

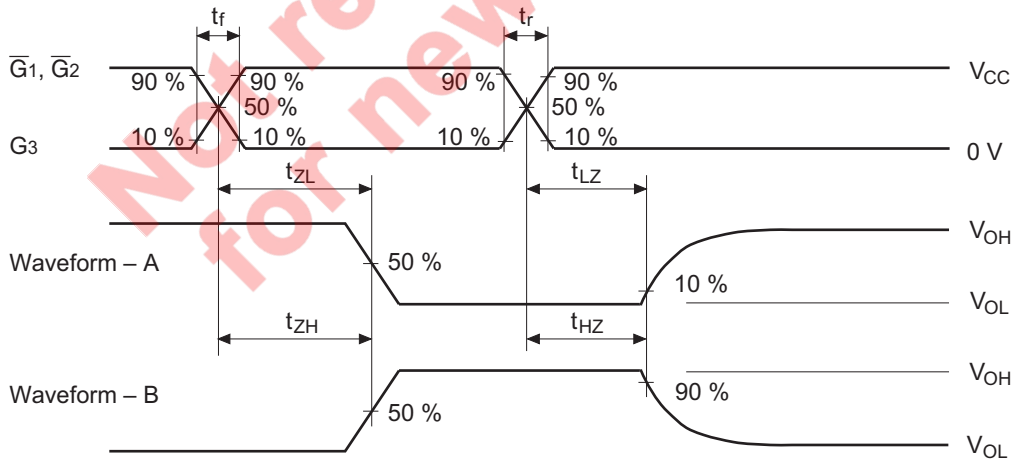


• Waveform – 2



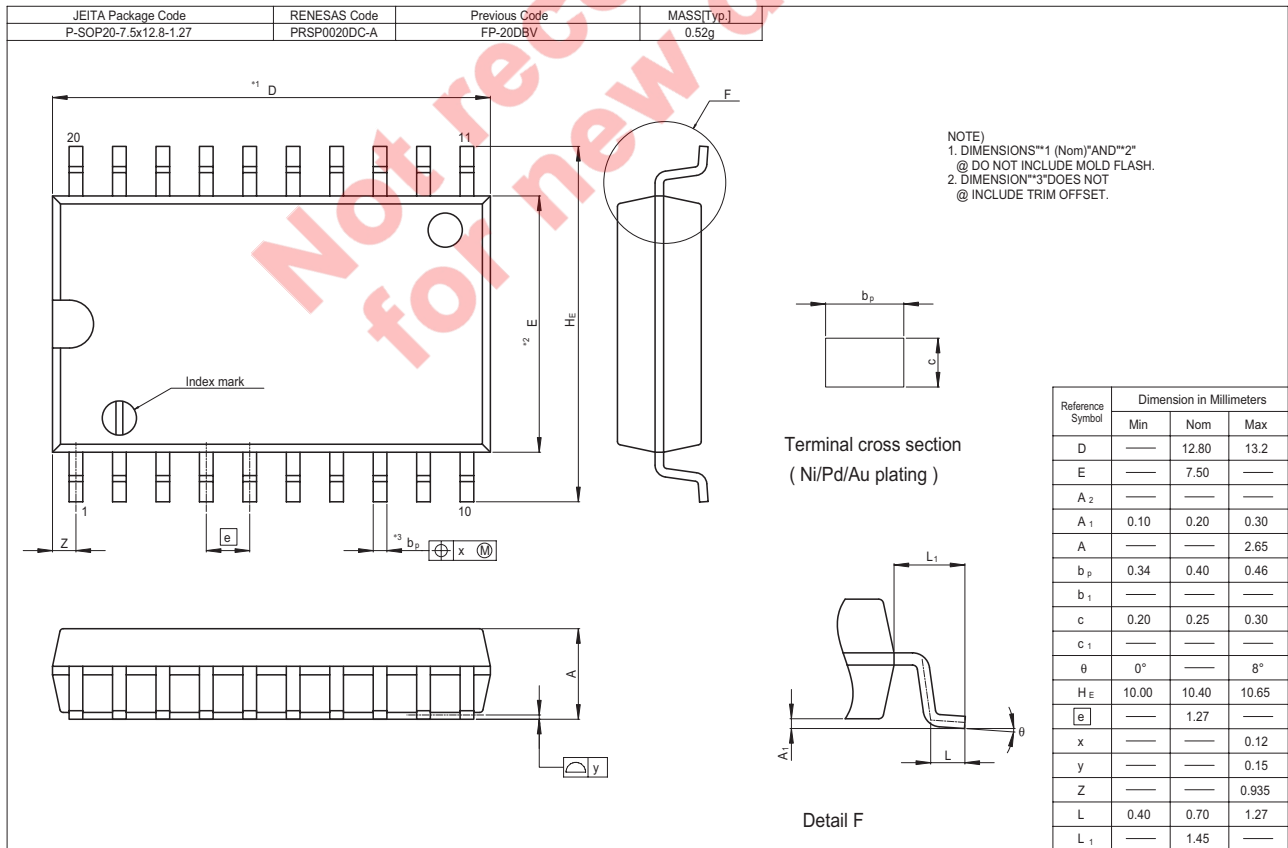
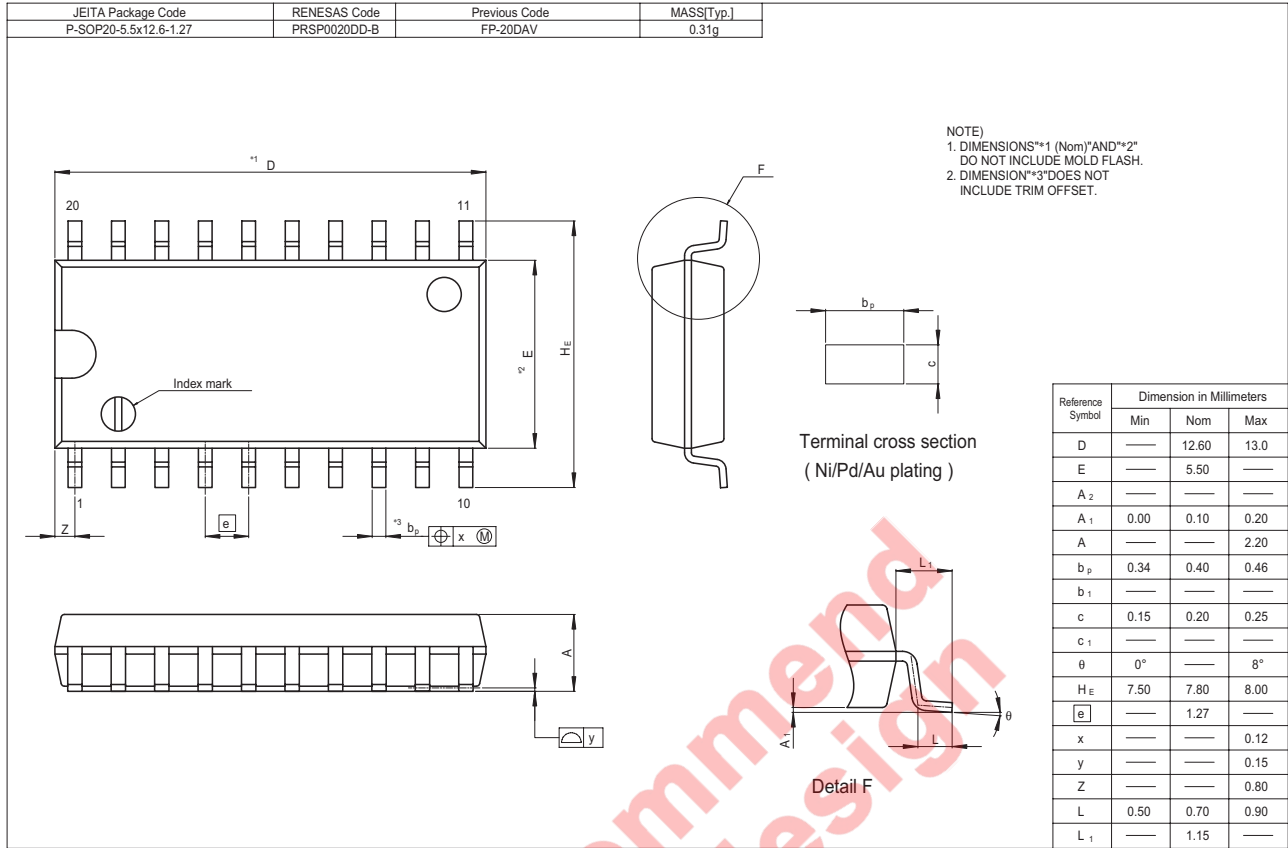
Notes: 1. Input waveform: PRR  $\leq$  1 MHz,  $Z_o = 50 \Omega$ ,  $t_r \leq 6$  ns,  $t_f \leq 6$  ns

• Waveform – 3



- Notes : 1. Input waveform : PRR  $\leq$  1 MHz, duty cycle 50%,  $t_r \leq 6$  ns,  $t_f \leq 6$  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





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