

# HD74HC251

## 1 of 8 Data Selectors/Multiplexers (with 3-state outputs)

REJ03D0599-0200  
 (Previous ADE-205-476)  
 Rev.2.00  
 Jan 31, 2006

### Description

This multiplexer features both true (Y) and complement (W) outputs as well as a strobe input. The strobe must be at a low logic level to enable this device. When the strobe input is high, both outputs are in the high impedance state. When enabled, address information on the data select inputs determine which data input is routed to the Y and W outputs.

### Features

- High Speed Operation:  $t_{pd}$  (A, B, C to Y) = 20 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 10 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)
HD74HC251P	DILP-16 pin	PRDP0016AE-B (DP-16FV)	P	—
HD74HC251FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)
HD74HC251RPEL	SOP-16 pin (JEDEC)	PRSP0016DG-A (FP-16DNV)	RP	EL (2,500 pcs/reel)

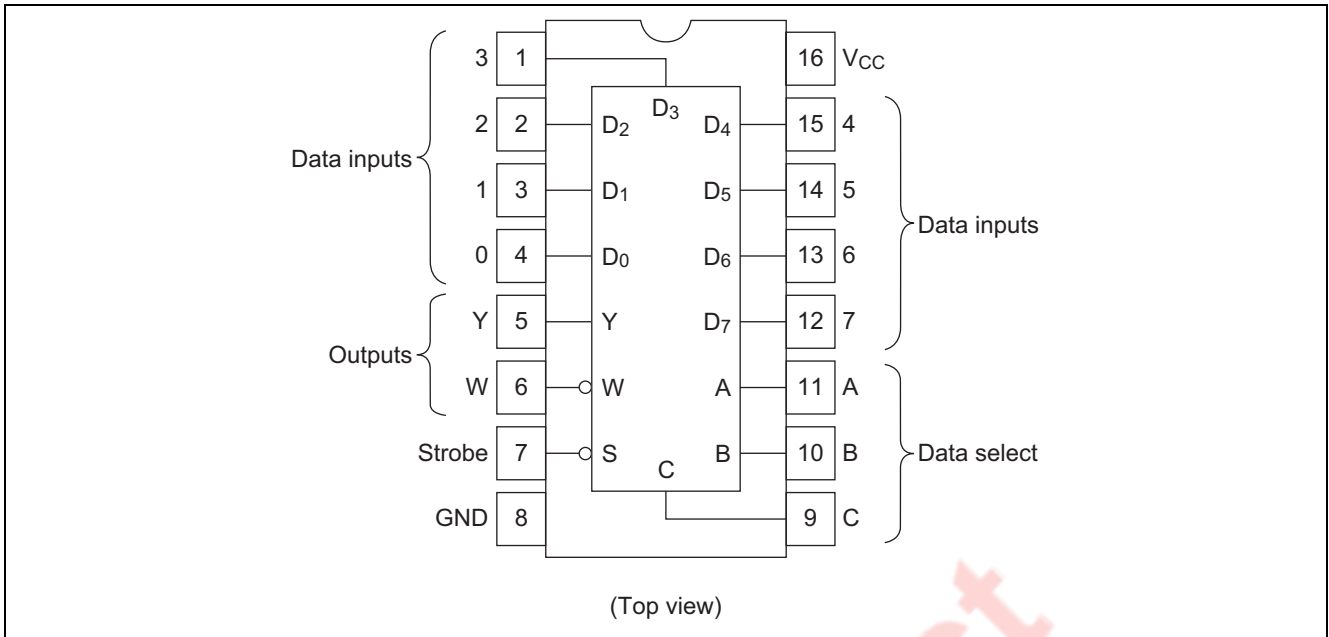
Note: Please consult the sales office for the above package availability.

### Function Table

Inputs				Outputs	
Select			Strobe	Y	W
C	B	A	S		
X	X	X	H	Z	Z
L	L	L	L	$D_0$	$\overline{D}_0$
L	L	H	L	$D_1$	$\overline{D}_1$
L	H	L	L	$D_2$	$\overline{D}_2$
L	H	H	L	$D_3$	$\overline{D}_3$
H	L	L	L	$D_4$	$\overline{D}_4$
H	L	H	L	$D_5$	$\overline{D}_5$
H	H	L	L	$D_6$	$\overline{D}_6$
H	H	H	L	$D_7$	$\overline{D}_7$

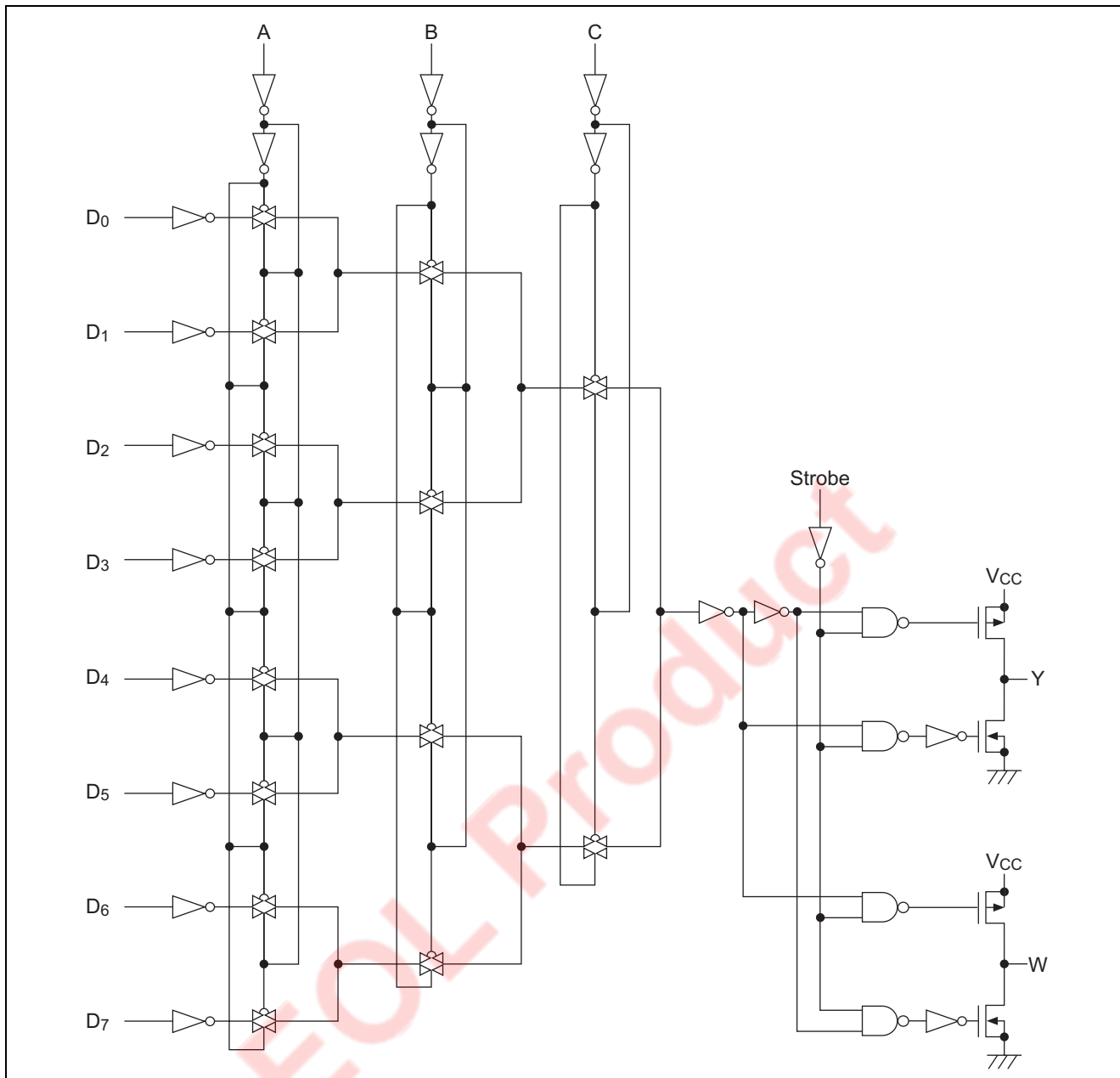
- Notes: 1. H: high level, L: low level, X: irrelevant  
 2. Z; high impedance (off-state)  
 3.  $D_0$  through  $D_7$ ; the level of the respective D input.

Pin Arrangement



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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	$I_O$	$\pm 25$	mA
$V_{CC}, GND$ current	$I_{CC}$ or $I_{GND}$	$\pm 50$	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	$V_{CC} = 2.0$ V
		0 to 500		$V_{CC} = 4.5$ V
		0 to 400		$V_{CC} = 6.0$ V

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

Waveform: Refer to test circuit of switching characteristics.

## Electrical Characteristics

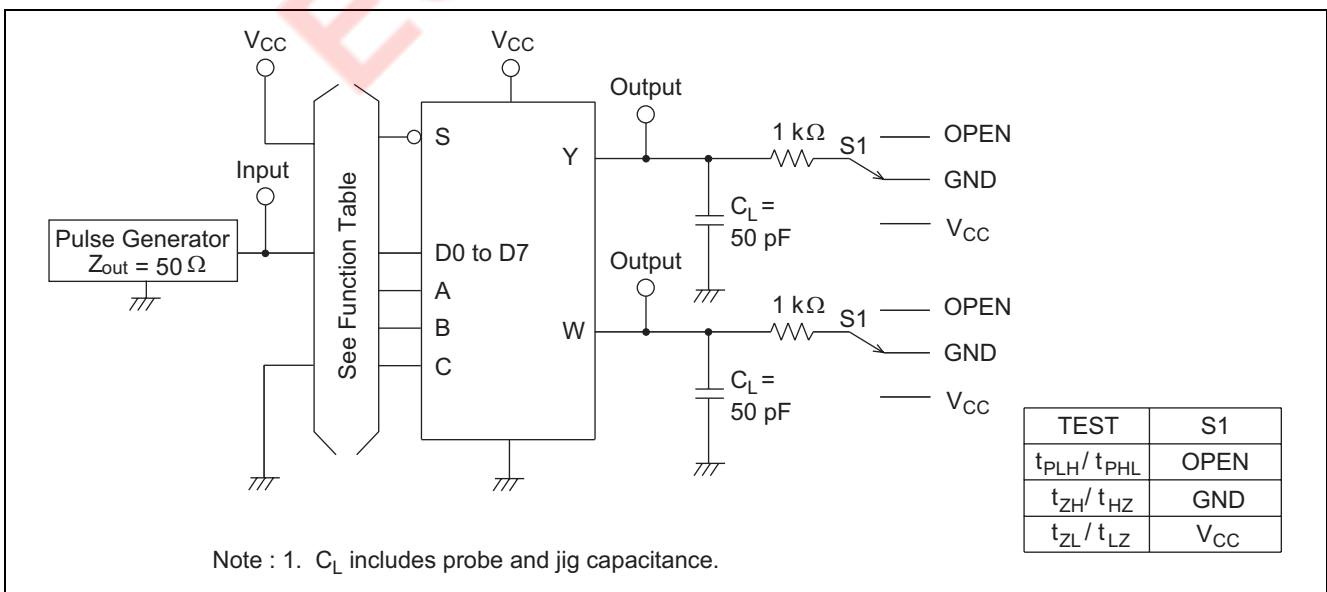
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } +85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	$V_{IH}$	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	$V_{IL}$	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	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	—			$I_{OH} = -4 \text{ mA}$
		6.0	5.9	6.0	—	5.9	—			$I_{OH} = -5.2 \text{ mA}$
		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			$I_{OL} = 4 \text{ mA}$
		6.0	—	—	0.26	—	0.33			$I_{OL} = 5.2 \text{ mA}$
Off-state output current	$I_{OZ}$	6.0	—	—	$\pm 0.5$	—	$\pm 5.0$	$\mu\text{A}$	$V_{in} = V_{IH} \text{ or } V_{IL}$ , $V_{out} = V_{CC} \text{ or } \text{GND}$	
Input current	$I_{in}$	6.0	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu\text{A}$	$V_{in} = V_{CC} \text{ or } \text{GND}$	
Quiescent supply current	$I_{CC}$	6.0	—	—	4.0	—	40	$\mu\text{A}$	$V_{in} = V_{CC} \text{ or } \text{GND}$ , $I_{out} = 0 \mu\text{A}$	

Switching Characteristics

( $C_L = 50\text{ pF}$ , Input  $t_r = t_f = 6\text{ ns}$ )

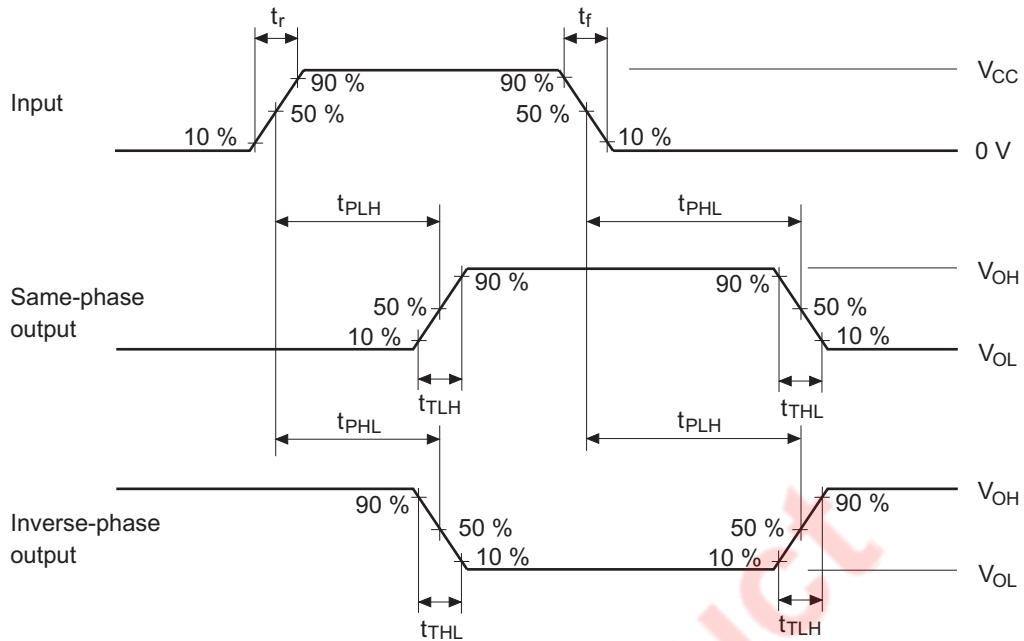
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40\text{ to }+85^\circ\text{C}$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Propagation delay time	$t_{PLH}$ $t_{PHL}$	2.0	—	—	205	—	255	ns	A, B or C to Y	
		4.5	—	20	41	—	51			
		6.0	—	—	35	—	43			
	$t_{PLH}$ $t_{PHL}$	2.0	—	—	205	—	255	ns	A, B or C to W	
		4.5	—	20	41	—	51			
		6.0	—	—	35	—	43			
	$t_{PLH}$ $t_{PHL}$	2.0	—	—	195	—	245	ns	Data to Y	
		4.5	—	17	39	—	49			
		6.0	—	—	33	—	42			
	$t_{PLH}$ $t_{PHL}$	2.0	—	—	185	—	230	ns	Data to W	
		4.5	—	17	37	—	46			
		6.0	—	—	31	—	39			
Output enable time	$t_{ZH}$ $t_{ZL}$	2.0	—	—	150	—	190	ns	strobe to W	$R_L = 1\text{ k}\Omega$
		4.5	—	11	30	—	38			
		6.0	—	—	26	—	33			
	$t_{ZH}$ $t_{ZL}$	2.0	—	—	145	—	180	ns	strobe to Y	$R_L = 1\text{ k}\Omega$
		4.5	—	11	29	—	36			
		6.0	—	—	25	—	31			
Output disable time	$t_{HZ}$ $t_{LZ}$	2.0	—	—	220	—	275	ns	strobe to W	$R_L = 1\text{ k}\Omega$
		4.5	—	12	44	—	55			
		6.0	—	—	37	—	47			
	$t_{HZ}$ $t_{LZ}$	2.0	—	—	195	—	245	ns	strobe to Y	$R_L = 1\text{ k}\Omega$
		4.5	—	12	39	—	49			
		6.0	—	—	33	—	42			
Output rise/fall time	$t_{TLH}$ $t_{THL}$	2.0	—	—	75	—	90	ns		
		4.5	—	5	15	—	19			
		6.0	—	—	13	—	16			
Input capacitance	$C_{in}$	—	—	5	10	—	10	pF		

Test Circuit

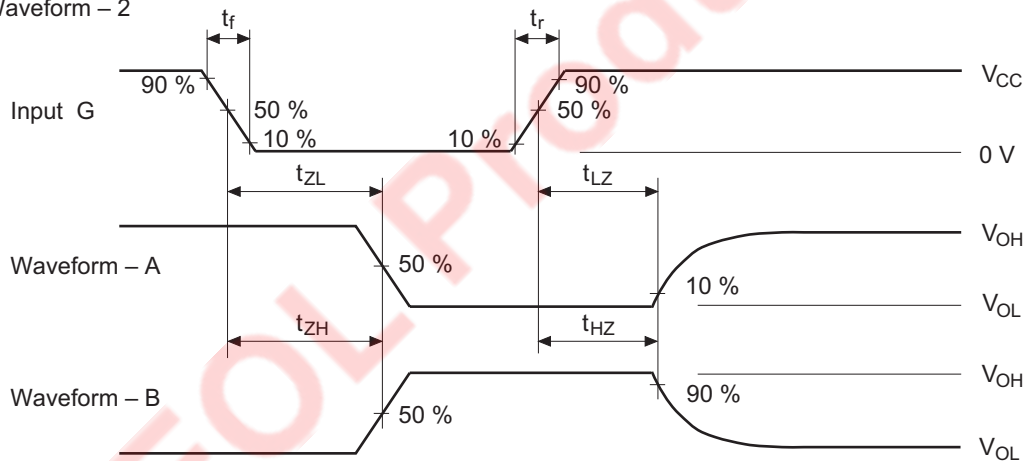


Waveforms

• Waveform – 1

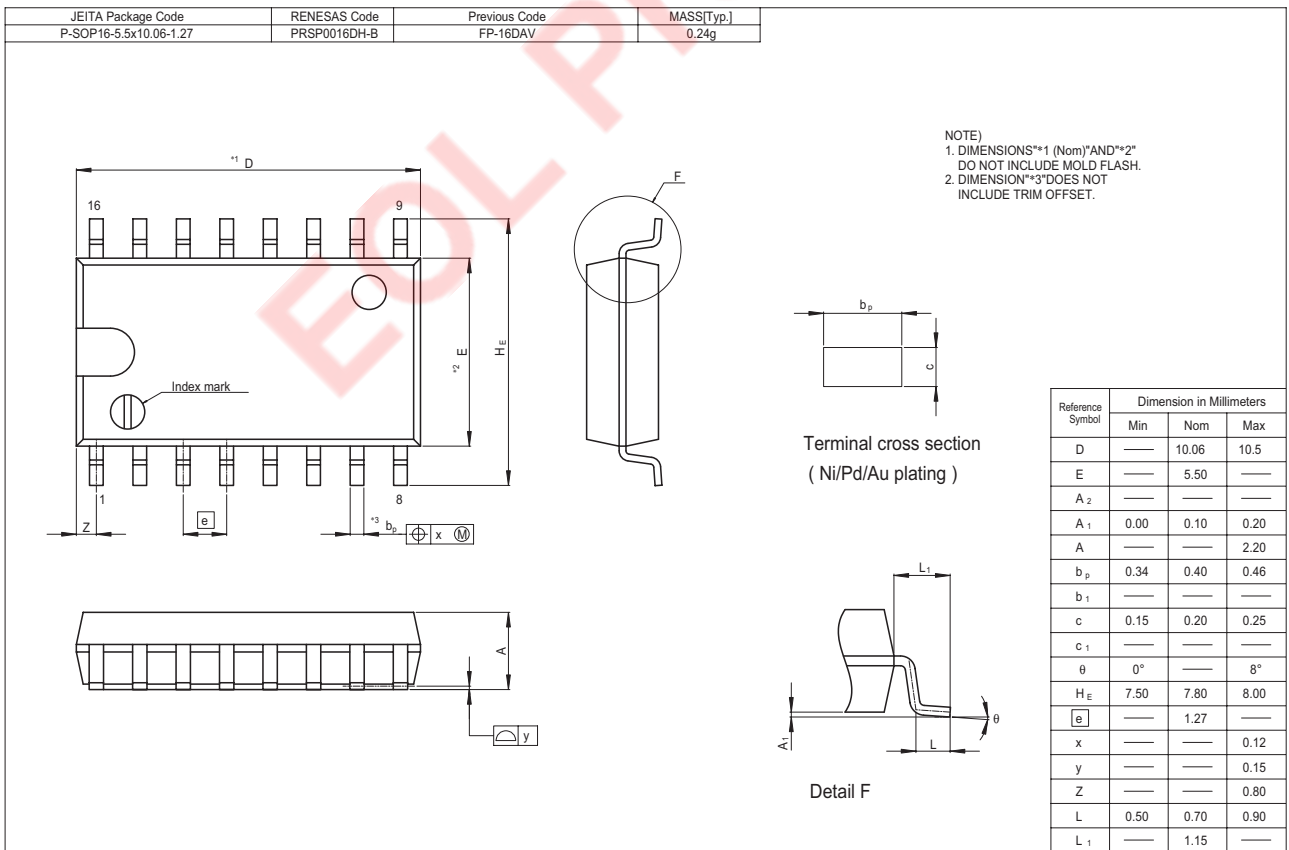
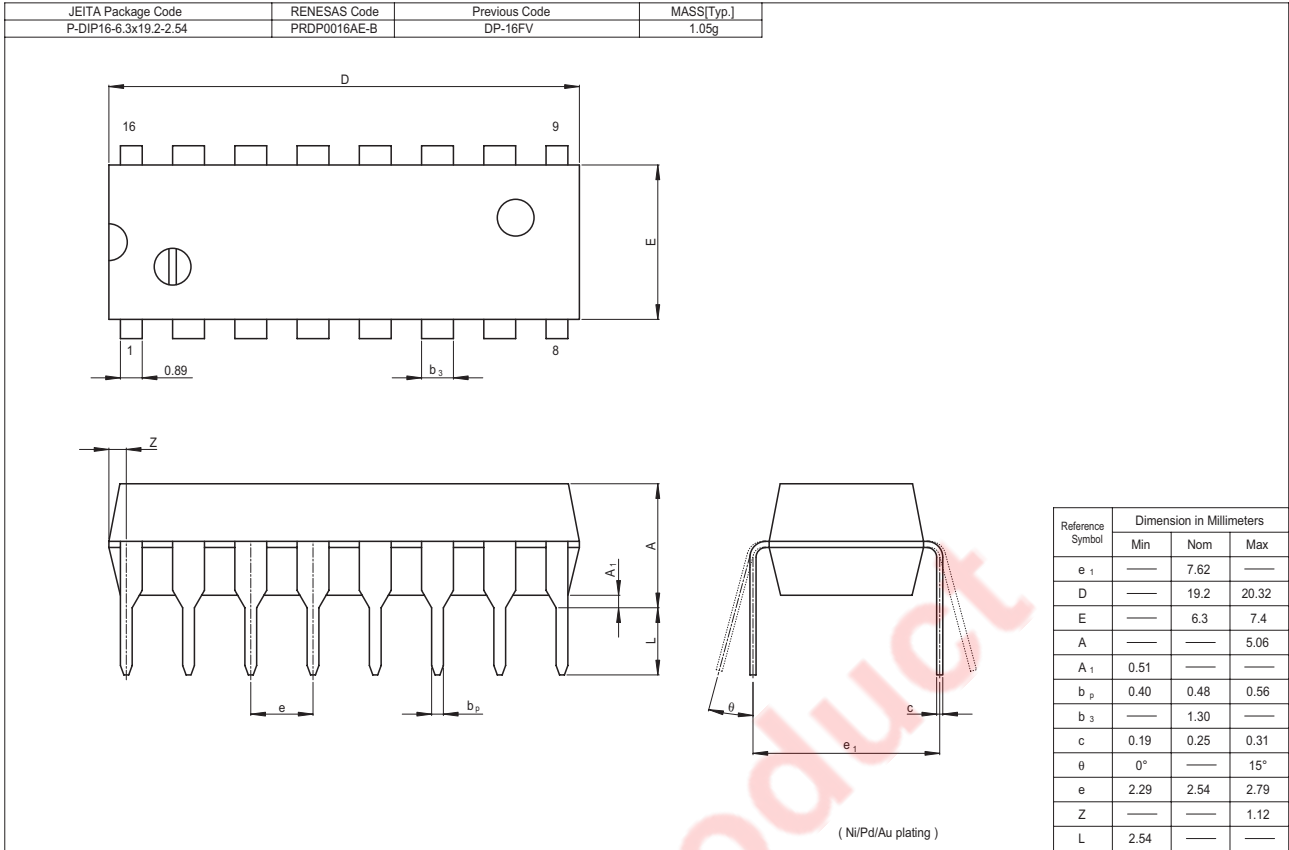


• Waveform – 2



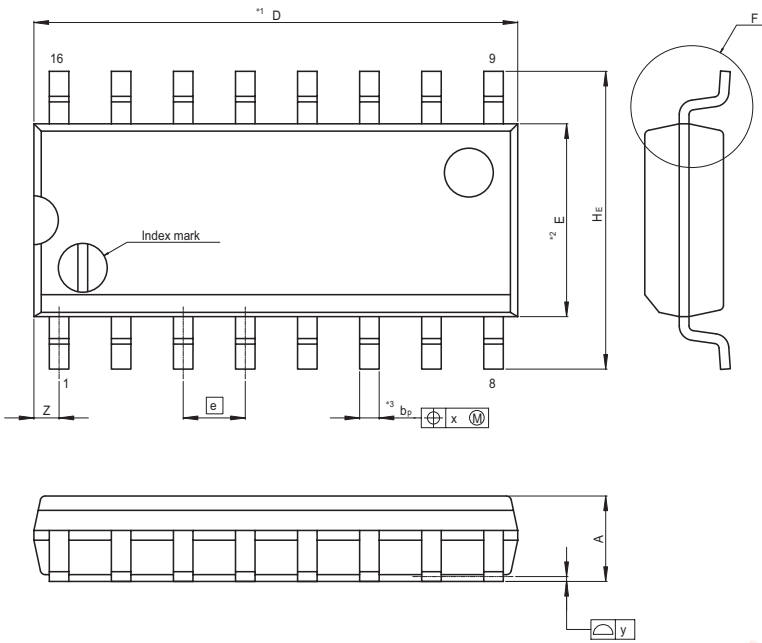
- Notes :
1. Input waveform : PRR  $\leq$  1 MHz, duty cycle 50%,  $t_r \leq$  6 ns,  $t_f \leq$  6 ns
  2. Waveform– A is for an output with internal conditions such that the output is low except when disabled by the output control.
  3. Waveform– B is for an output with internal conditions such that 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

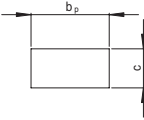


# HD74HC251

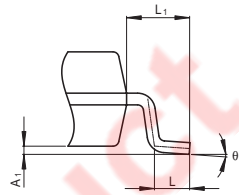
JEITA Package Code P-SOP16-3.95x9.9-1.27	RENESAS Code PRSP0016DG-A	Previous Code FP-16DNV	MASS[Typ.] 0.15g
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NOTE)  
1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\*  
DO NOT INCLUDE MOLD FLASH.  
2. DIMENSION\*\*3\*DOES NOT  
INCLUDE TRIM OFFSET.



Terminal cross section  
( Ni/Pd/Au plating )



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	9.90	10.30
E	—	3.95	—
A <sub>z</sub>	—	—	—
A <sub>1</sub>	0.10	0.14	0.25
A	—	—	1.75
b <sub>p</sub>	0.34	0.40	0.46
b <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
$\theta$	0°	—	8°
H <sub>E</sub>	5.80	6.10	6.20
e	—	1.27	—
x	—	—	0.25
y	—	—	0.15
Z	—	—	0.635
L	0.40	0.60	1.27
L <sub>1</sub>	—	1.08	—

EOL Product



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