

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# HD74HC137

## 3-to-8-line Decoder/Demultiplexer with Address Latch

REJ03D0569-0200  
 (Previous ADE-205-443)  
 Rev.2.00  
 Oct 11, 2005

### Description

The HD74HC137 implements a three-to-eight line decoder with latches on the three address inputs. When  $\overline{GL}$  goes from low to high, the address present at the select inputs (A, B and C) is stored in the latches. As long as  $\overline{GL}$  remains high no address changes will be recognized. Output enable controls,  $G_1$  and  $\overline{G}_2$ , control the state of the outputs independently of the select or latch-enable inputs.

All of the outputs are high unless  $G_1$  is high and  $\overline{G}_2$  is low. The HD74HC137 is ideally suited for the implementation of glitchfree decoders in stored-address applications in bus oriented systems.

### Features

- High Speed Operation:  $t_{pd}$  (A, B, C to Y) = 16.5 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 2$  V 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)
HD74HC137P	DILP-16 pin	PRDP0016AE-B (DP-16FV)	P	—
HD74HC137FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)
HD74HC137RPEL	SOP-16 pin (JEDEC)	PRSP0016DG-A (FP-16DNV)	RP	EL (2,500 pcs/reel)

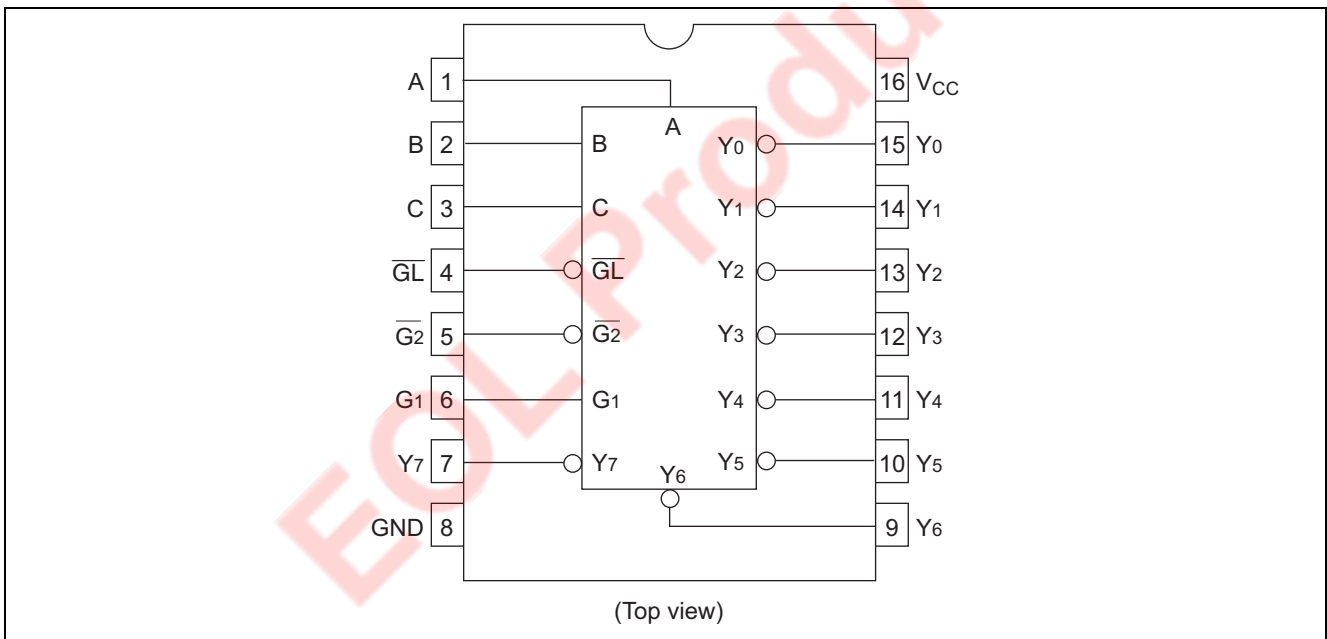
Note: Please consult the sales office for the above package availability.

**Function Table**

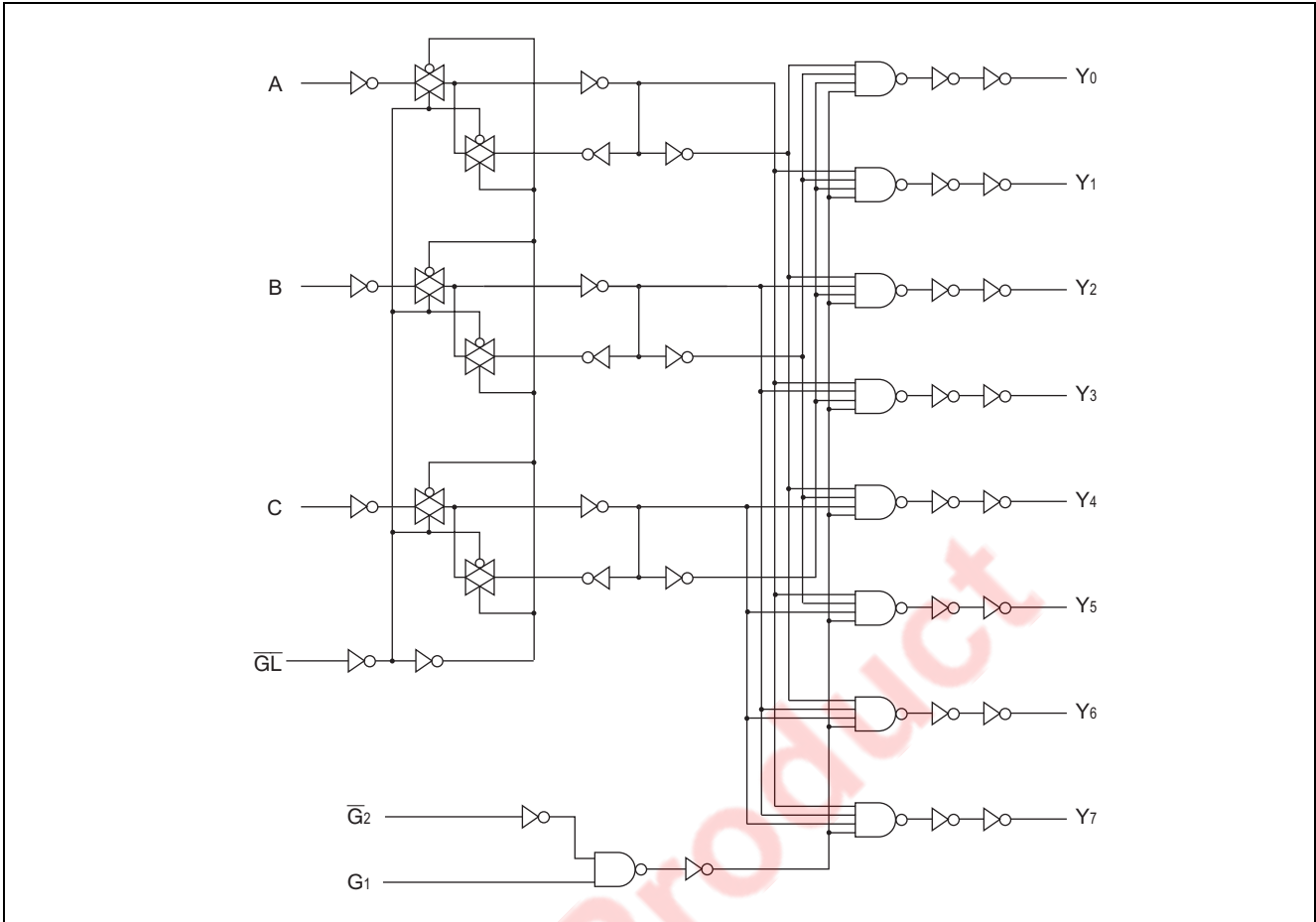
Inputs						Outputs							
Enable			Select										
$\overline{G_L}$	$G_1$	$\overline{G_2}$	C	B	A	$Y_0$	$Y_1$	$Y_2$	$Y_3$	$Y_4$	$Y_5$	$Y_6$	$Y_7$
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	L	X	X	X	X	H	H	H	H	H	H	H	H
L	H	L	L	L	L	L	H	H	H	H	H	H	H
L	H	L	L	L	H	H	L	H	H	H	H	H	H
L	H	L	L	H	L	H	H	L	H	H	H	H	H
L	H	L	L	H	H	H	H	H	L	H	H	H	H
L	H	L	H	L	L	H	H	H	H	L	H	H	H
L	H	L	H	L	H	H	H	H	H	H	L	H	H
L	H	L	H	H	L	H	H	H	H	H	H	L	H
L	H	L	H	H	H	H	H	H	H	H	H	H	L
H	H	L	X	X	X	Output Corresponding to stored address L; all Others. H							

H : High level  
 L : Low level  
 X : Irrelevant

**Pin Arrangement**



Logic Diagram



Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply voltage range	$V_{CC}$	-0.5 to +7.0	V
Input voltage	$V_{IN}$	-0.5 to $V_{CC} + 0.5$	V
Output voltage	$V_{OUT}$	-0.5 to $V_{CC} + 0.5$	V
Output current	$I_{OUT}$	$\pm 25$	mA
DC current drain per $V_{CC}$ , GND	$I_{CC}$ , $I_{GND}$	$\pm 50$	mA
DC input diode current	$I_{IK}$	$\pm 20$	mA
DC output diode current	$I_{OK}$	$\pm 20$	mA
Power dissipation per package	$P_T$	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*1	$t_r, t_f$	0 to 1000	ns	$V_{CC} = 2.0\text{ V}$
		0 to 500		$V_{CC} = 4.5\text{ V}$
		0 to 400		$V_{CC} = 6.0\text{ V}$

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

Waveform: Refer to test circuit of switching characteristics.

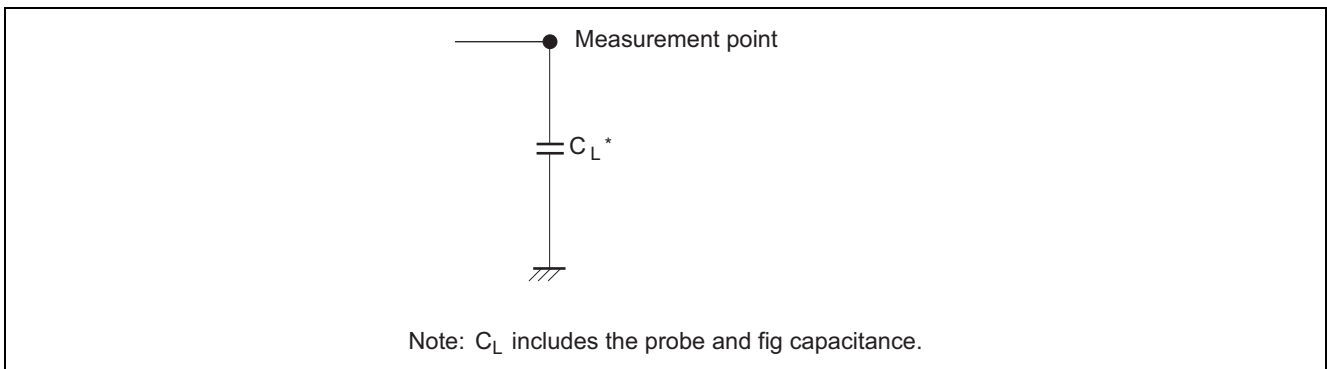
## Electrical Characteristics

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	—			$I_{OH} = -4\ \text{mA}$
		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	$V_{in} = V_{IH}$ 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			$I_{OL} = 5.2\ \text{mA}$
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** ( $C_L = 50\text{ pF}$ , Input  $t_r = t_f = 6\text{ ns}$ )

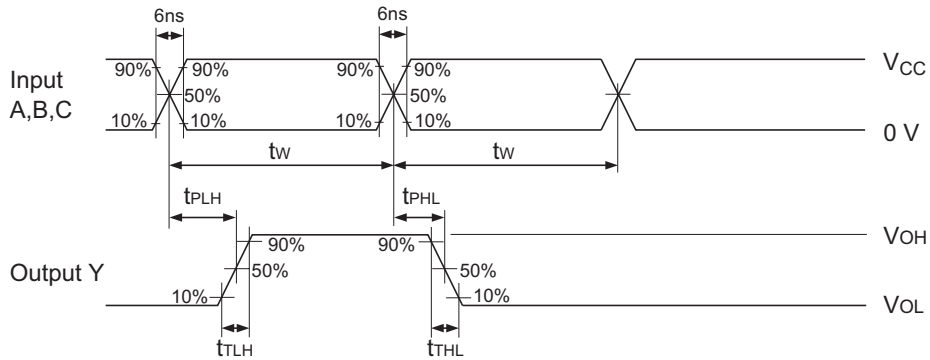
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ\text{C}$			$T_a = -40\text{ to }+85^\circ\text{C}$		Unit	Test Conditions				
			Min	Typ	Max	Min	Max						
Propagation delay time	$t_{PLH}$	2.0	—	—	170	—	215	ns	A, B or C to Y				
		4.5	—	16	34	—	43						
		6.0	—	—	29	—	37						
	$t_{PHL}$	2.0	—	—	240	—	305			ns	$\overline{G}_2$ to Y		
		4.5	—	17	48	—	60						
		6.0	—	—	41	—	51						
	$t_{PLH}$	2.0	—	—	130	—	165					ns	$G_1$ to Y
		4.5	—	13	26	—	33						
		6.0	—	—	22	—	28						
	$t_{PHL}$	2.0	—	—	195	—	245	ns	$\overline{G}_L$ to Y				
		4.5	—	14	39	—	49						
		6.0	—	—	33	—	42						
	$t_{PLH}$	2.0	—	—	150	—	190			ns			
		4.5	—	14	30	—	38						
		6.0	—	—	26	—	33						
	$t_{PHI}$	2.0	—	—	195	—	245					ns	
		4.5	—	14	39	—	49						
		6.0	—	—	33	—	42						
	$t_{PLH}$	2.0	—	—	175	—	220	ns					
		4.5	—	17	35	—	44						
		6.0	—	—	30	—	37						
	$t_{PHL}$	2.0	—	—	250	—	315			ns			
		4.5	—	18	50	—	63						
		6.0	—	—	43	—	54						
Pulse width	$t_w$	2.0	80	—	—	100	—					ns	
		4.5	16	7	—	20	—						
		6.0	14	—	—	17	—						
Setup time	$t_{su}$	2.0	100	—	—	125	—	ns	A, B, C inputs				
		4.5	20	3	—	25	—						
		6.0	17	—	—	21	—						
Hold time	$t_h$	2.0	50	—	—	65	—	ns	A, B, C inputs				
		4.5	10	-3	—	13	—						
		6.0	9	—	—	11	—						
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**



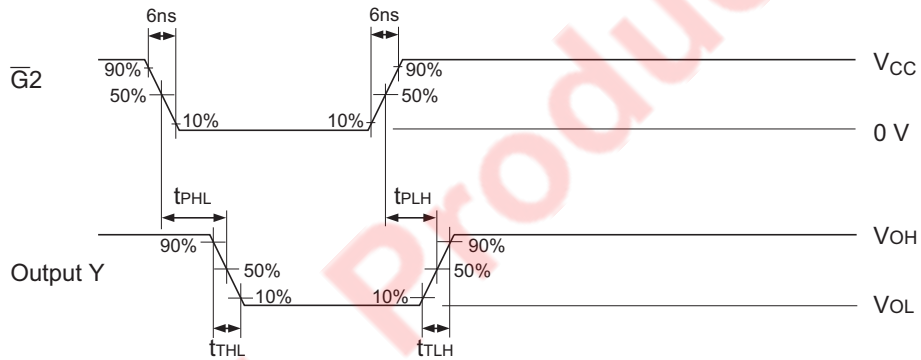
Waveforms

• Waveform – 1



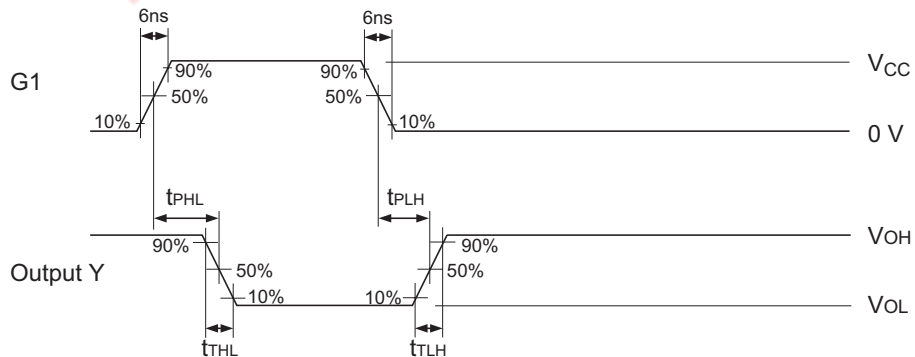
Notes: 1. Input waveform:  $PRR \leq 1\text{ MHz}$ ,  $Z_o = 50\ \Omega$ ,  $t_r \leq 6\text{ ns}$ ,  $t_f \leq 6\text{ ns}$   
 2. The output are measured one at a time with one transition per measurement.

• Waveform – 2



Notes: 1. Input waveform:  $PRR \leq 1\text{ MHz}$ ,  $Z_o = 50\ \Omega$ ,  $t_r \leq 6\text{ ns}$ ,  $t_f \leq 6\text{ ns}$   
 2. The output are measured one at a time with one transition per measurement.

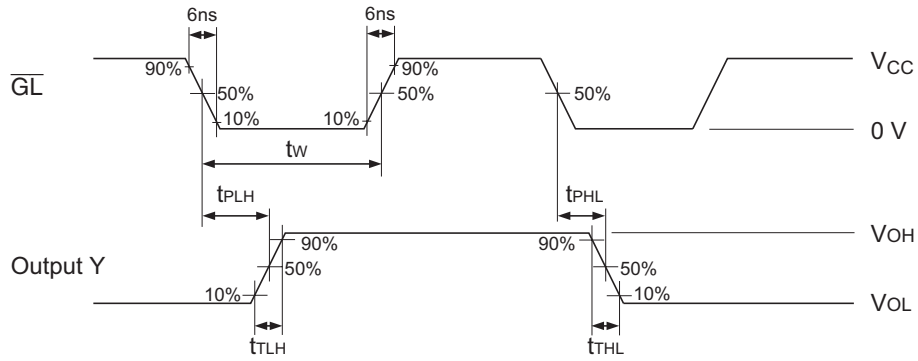
• Waveform – 3



Notes: 1. Input waveform:  $PRR \leq 1\text{ MHz}$ ,  $Z_o = 50\ \Omega$ ,  $t_r \leq 6\text{ ns}$ ,  $t_f \leq 6\text{ ns}$   
 2. The output are measured one at a time with one transition per measurement.

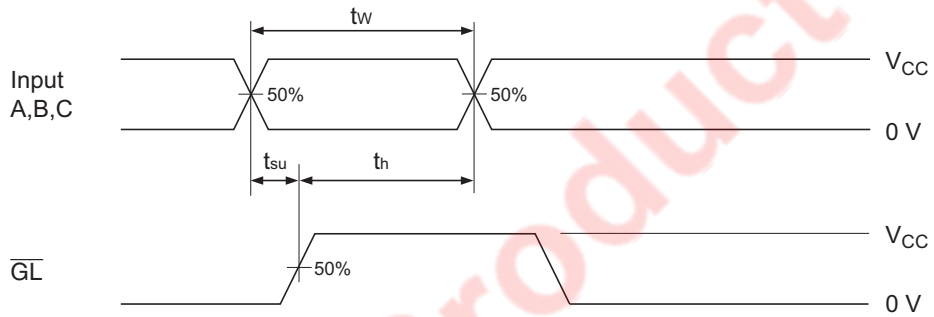


• Waveform – 4



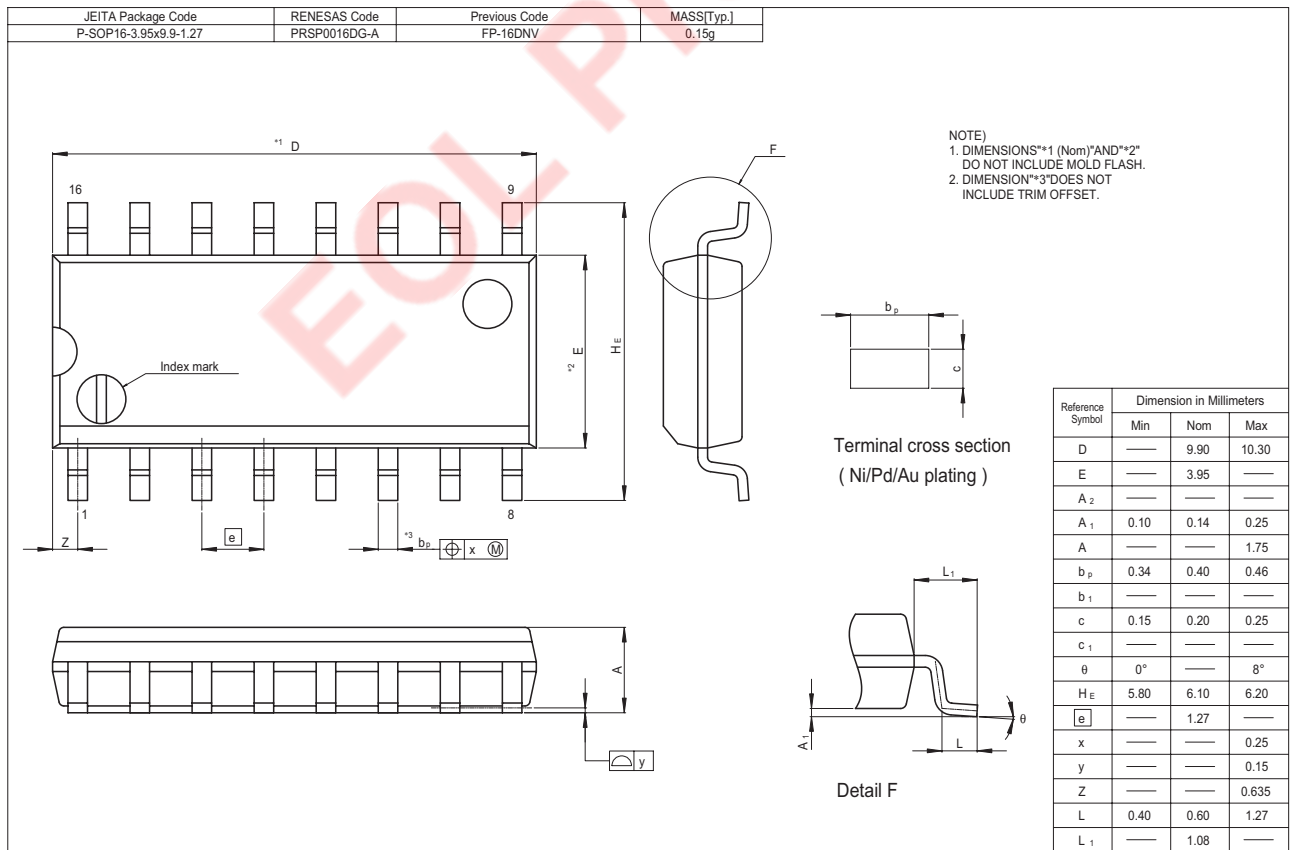
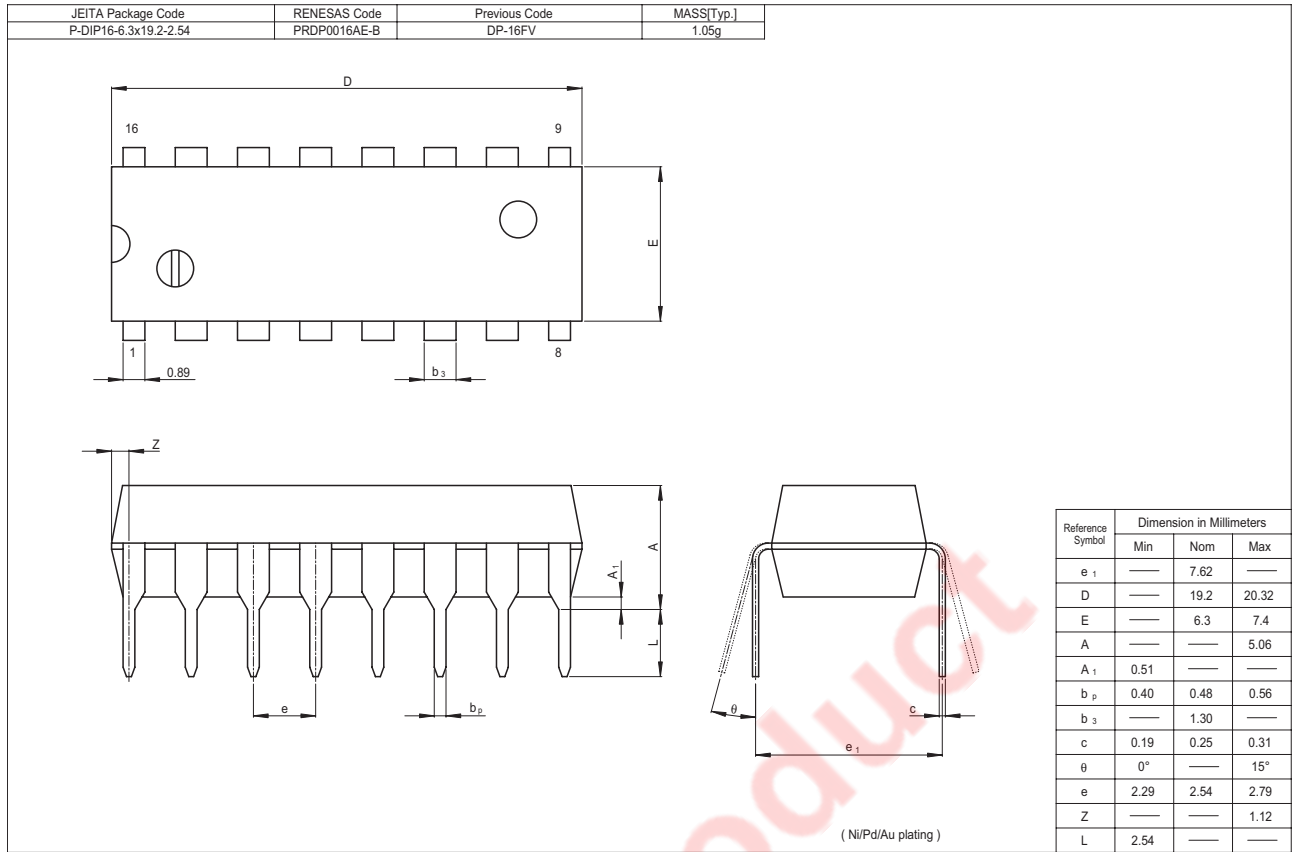
- Notes: 1. Input waveform: PRR  $\leq$  1 MHz,  $Z_o = 50 \Omega$ ,  $t_r \leq 6$  ns,  $t_f \leq 6$  ns  
 2. The output are measured one at a time with one transition per measurement.

• Waveform – 5



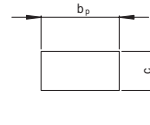
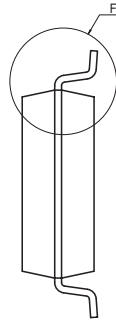
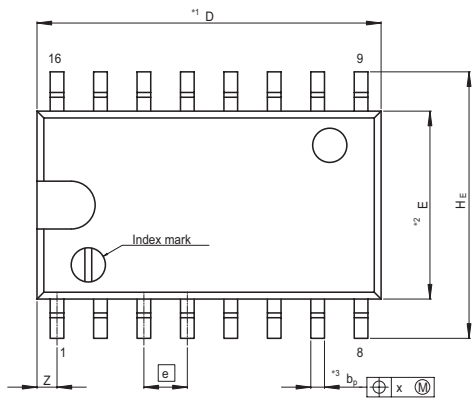
- Notes: 1. Input waveform: PRR  $\leq$  1 MHz,  $Z_o = 50 \Omega$ ,  $t_r \leq 6$  ns,  $t_f \leq 6$  ns  
 2. The output are measured one at a time with one transition per measurement.

Package Dimensions

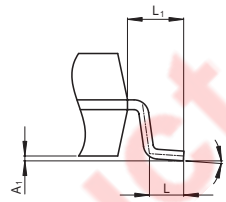
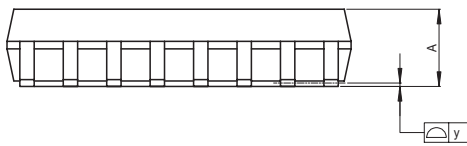


# HD74HC137

JEITA Package Code P-SOP16-5.5x10.06-1.27	RENESAS Code PRSP0016DH-B	Previous Code FP-16DAV	MASS[Typ.] 0.24g
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Terminal cross section  
( Ni/Pd/Au plating )



Detail F

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

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	10.06	10.5
E	—	5.50	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.00	0.10	0.20
A	—	—	2.20
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>	7.50	7.80	8.00
e	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.80
L	0.50	0.70	0.90
L <sub>1</sub>	—	1.15	—

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