

# HD74HC147

## 10-to-4-line Priority Encoder

REJ03D0572-0200  
 (Previous ADE-205-446)  
 Rev.2.00  
 Oct 11, 2005

### Description

The HD74HC147 features priority encoding of the inputs to ensure that only the highest order data line is encoded. Nine input lines are encoded to a four line BCD output. The implied decimal zero condition requires no input condition as zero is encoded when all nine data lines are at a high logic level. All data inputs and outputs are active at the low logic level.

### Features

- High Speed Operation:  $t_{pd} = 14.5$  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)
HD74HC147P	DILP-16 pin	PRDP0016AE-B (DP-16FV)	P	—
HD74HC147FPEL	SOP-16 pin (JEITA)	PRSP0016DH-B (FP-16DAV)	FP	EL (2,000 pcs/reel)

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

### Function Table

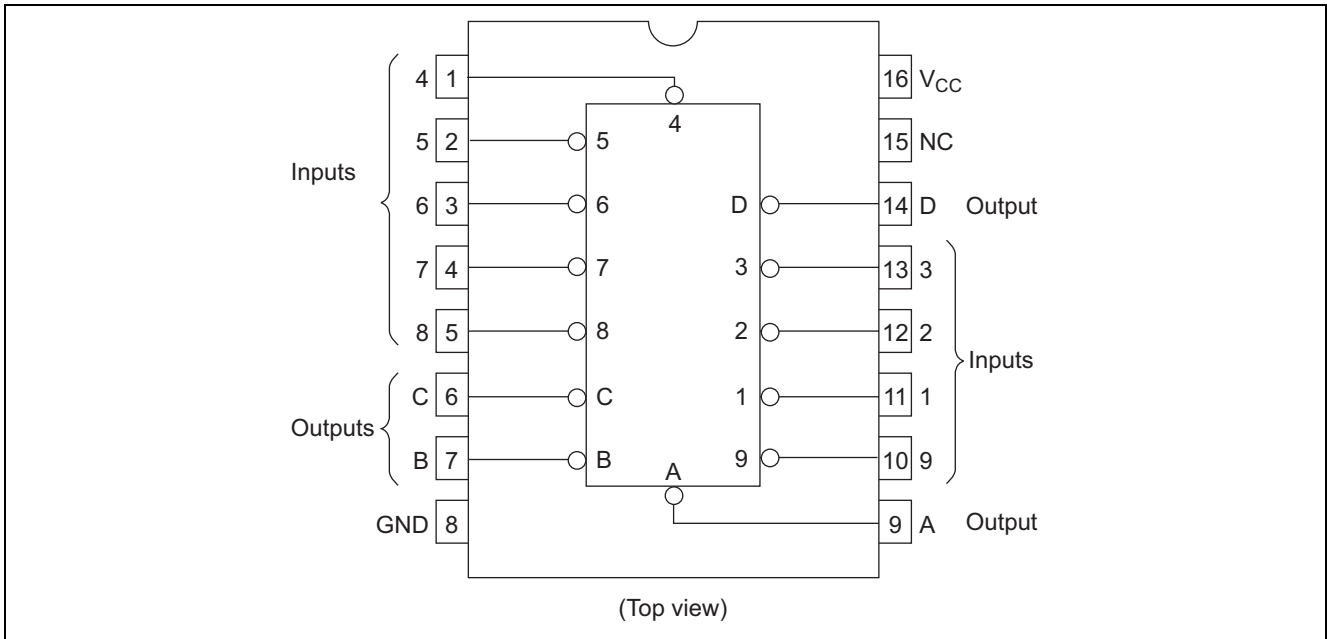
Inputs									Outputs			
1	2	3	4	5	6	7	8	9	D	C	B	A
H	H	H	H	H	H	H	H	H	H	H	H	H
X	X	X	X	X	X	X	X	L	L	H	H	L
X	X	X	X	X	X	X	L	H	L	H	H	H
X	X	X	X	X	X	L	H	H	H	L	L	L
X	X	X	X	X	L	H	H	H	H	L	L	H
X	X	X	X	L	H	H	H	H	H	L	H	L
X	X	X	L	H	H	H	H	H	H	L	H	H
X	X	L	H	H	H	H	H	H	H	H	L	L
X	L	H	H	H	H	H	H	H	H	H	L	H
L	H	H	H	H	H	H	H	H	H	H	H	L

H : High level

L : Low level

X : Irrelevant

## Pin Arrangement



## 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	$^{\circ}C$	
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		$V_{CC} = 6.0 V$

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

Waveform: Refer to test circuit of switching characteristics.

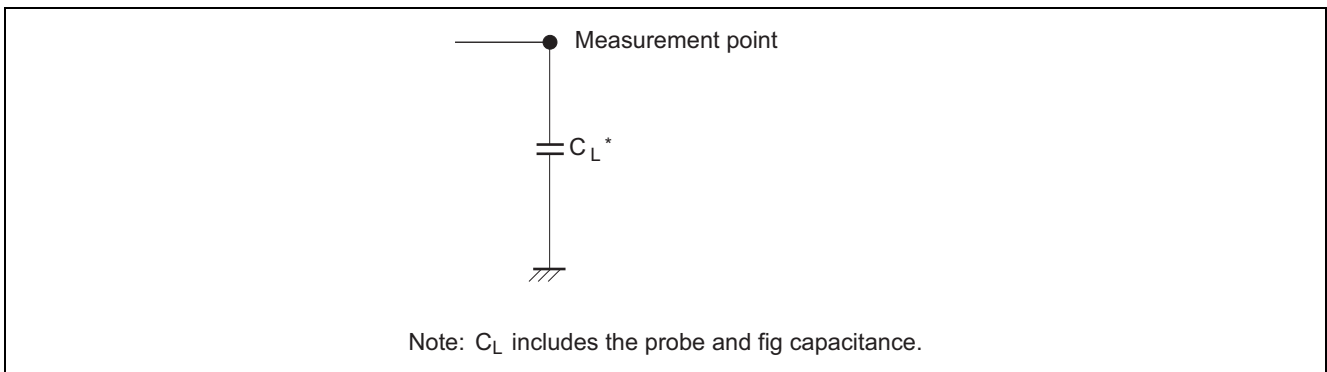
**Electrical Characteristics**

Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V <sub>IH</sub>	2.0	1.5	—	—	1.5	—	V		
		4.5	3.15	—	—	3.15	—			
		6.0	4.2	—	—	4.2	—			
	V <sub>IL</sub>	2.0	—	—	0.5	—	0.5	V		
		4.5	—	—	1.35	—	1.35			
		6.0	—	—	1.8	—	1.8			
Output voltage	V <sub>OH</sub>	2.0	1.9	2.0	—	1.9	—	V	V <sub>in</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA
		4.5	4.4	4.5	—	4.4	—			I <sub>OH</sub> = -4 mA
		6.0	5.9	6.0	—	5.9	—			I <sub>OH</sub> = -5.2 mA
		4.5	4.18	—	—	4.13	—			
		6.0	5.68	—	—	5.63	—			
		6.0	5.68	—	—	5.63	—			
	V <sub>OL</sub>	2.0	—	0.0	0.1	—	0.1	V	V <sub>in</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA
		4.5	—	0.0	0.1	—	0.1			
		6.0	—	0.0	0.1	—	0.1			
		4.5	—	—	0.26	—	0.33			I <sub>OL</sub> = 4 mA
		6.0	—	—	0.26	—	0.33			I <sub>OL</sub> = 5.2 mA
		6.0	—	—	0.26	—	0.33			
Input current	I <sub>in</sub>	6.0	—	—	±0.1	—	±1.0	μA	V <sub>in</sub> = V <sub>CC</sub> or GND	
Quiescent supply current	I <sub>CC</sub>	6.0	—	—	4.0	—	40	μA	V <sub>in</sub> = V <sub>CC</sub> or GND, I <sub>out</sub> = 0 μA	

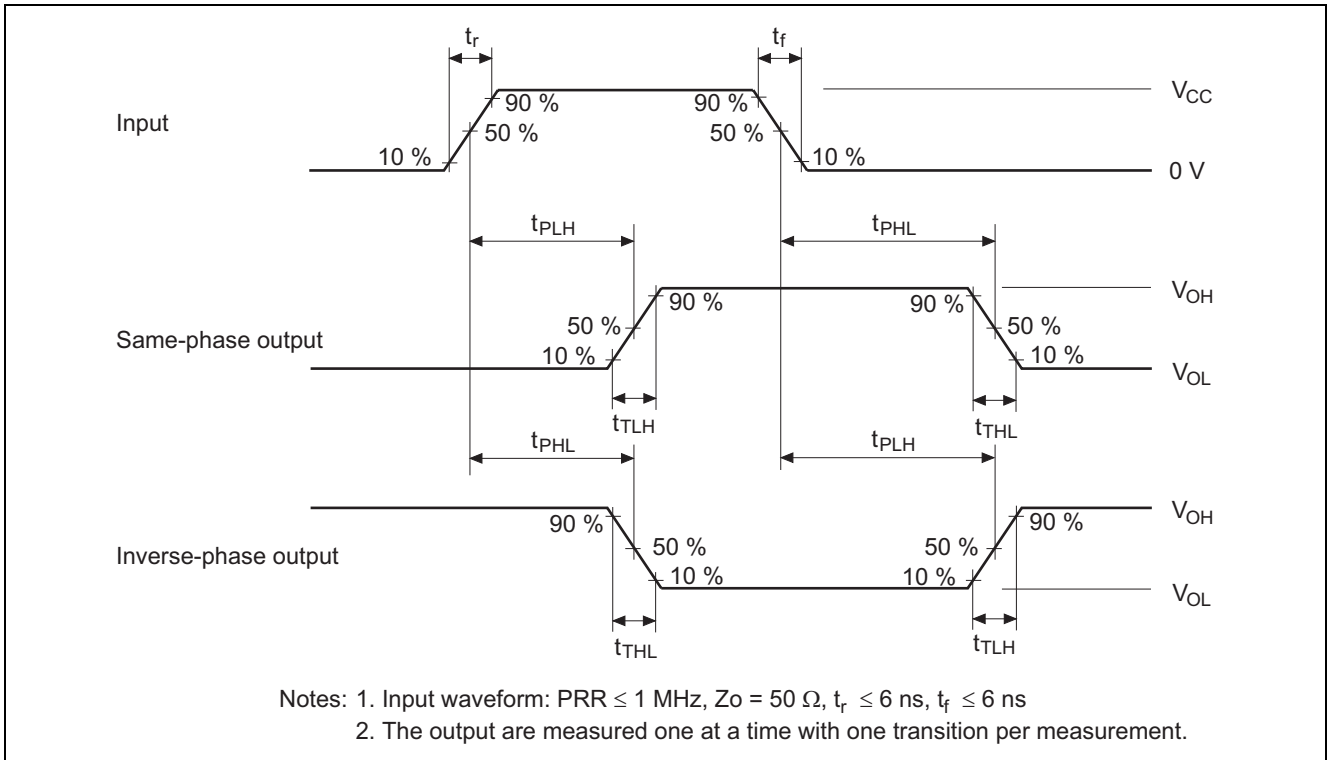
**Switching Characteristics (C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6 ns)**

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>PHL</sub>	2.0	—	—	220	—	275	ns	Select to any Y (4 levels)	
		4.5	—	15	44	—	55			
		6.0	—	—	37	—	47			
	t <sub>PLH</sub>	2.0	—	—	220	—	275	ns		
		4.5	—	14	44	—	55			
		6.0	—	—	37	—	47			
Output rise/fall time	t <sub>TLH</sub> , t <sub>THL</sub>	2.0	—	—	75	—	95	ns		
		4.5	—	5	15	—	19			
		6.0	—	—	13	—	16			
Input capacitance	C <sub>in</sub>	—	—	5	10	—	10	pF		

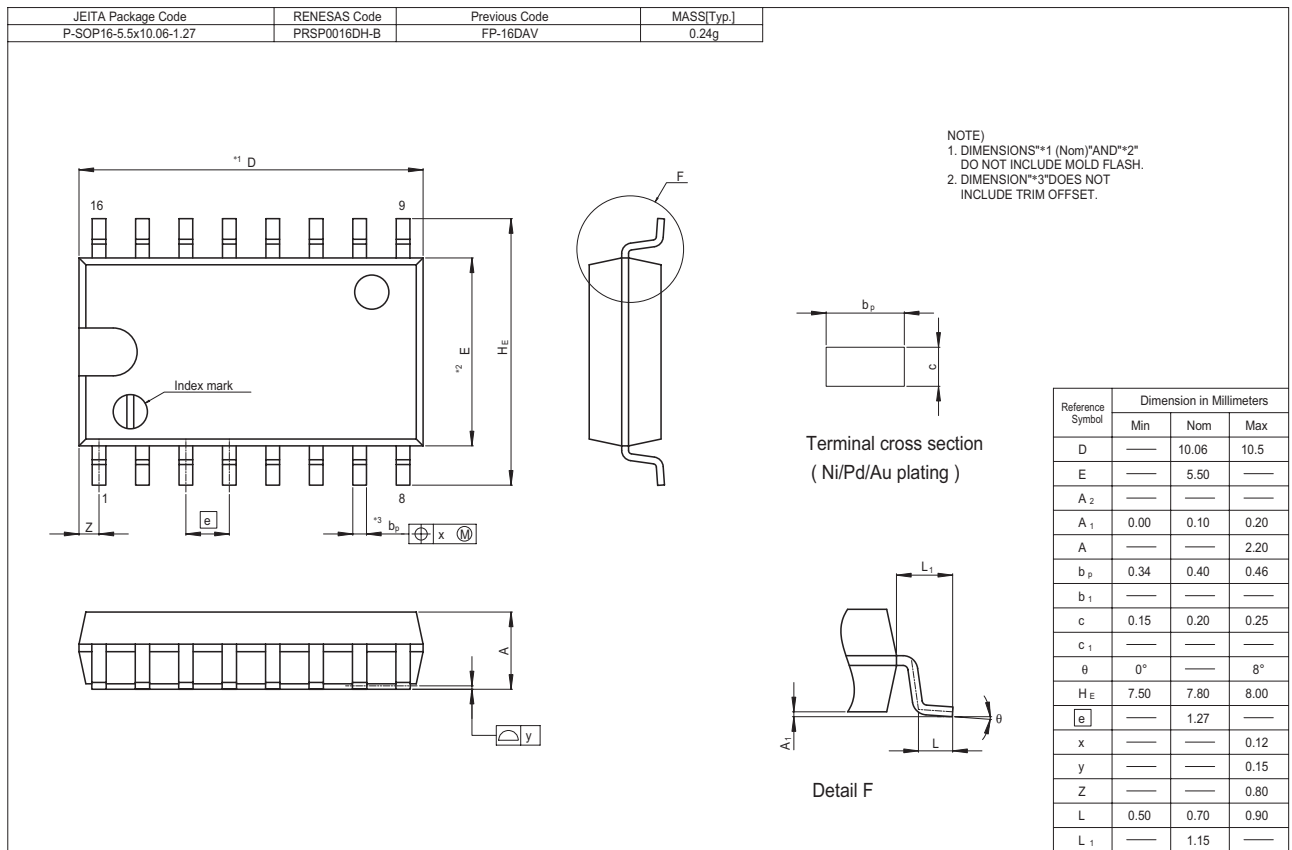
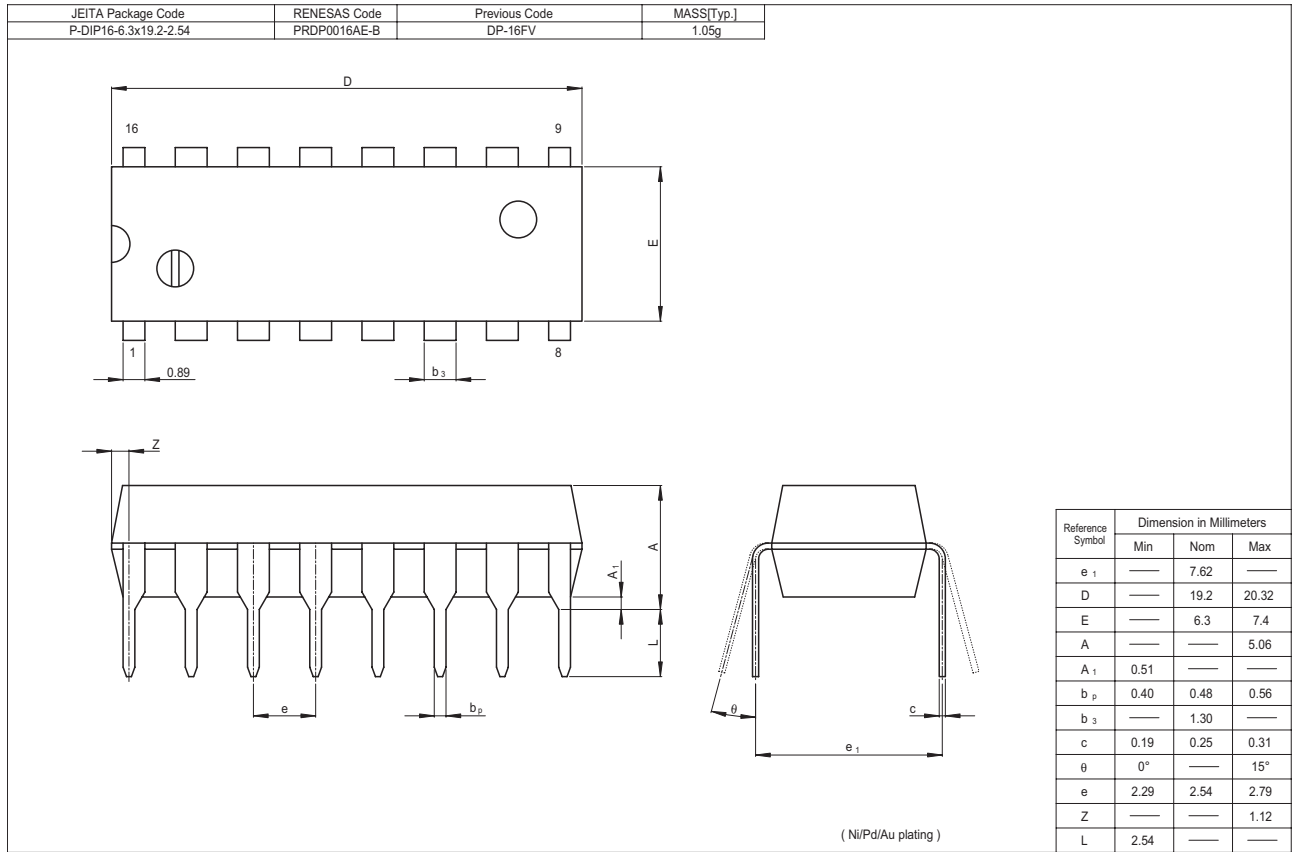
**Test Circuit**



Waveforms



Package Dimensions



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