

# HD74HCT688

## 8-bit Magnitude Comparator

REJ03D0673-0200  
 (Previous ADE-205-563)  
 Rev.2.00  
 Mar 30, 2006

### Description

The HD74HCT688 compares bit for bit two 8-bit words and indicates whether or not they are equal. The  $\overline{P=Q}$  output indicates equality when it is low.

A single active low enable is provided to facilitate cascading of several packages and enable comparison of words greater than 8-bits.

This device is useful in memory block decoding applications, where memory block enable signals must be generated from computer address information.

### Features

- LSTTL Output Logic Level Compatibility as well as CMOS Output Compatibility
- High Speed Operation:  $t_{pd}$  (Data to  $\overline{P=Q}$ ) = 18 ns typ ( $C_L = 50$  pF)
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage:  $V_{CC} = 4.5$  to  $5.5$  V
- Low Input Current:  $1 \mu\text{A}$  max
- Low Quiescent Supply Current:  $I_{CC}$  (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)
HD74HCT688P	DILP-20 pin (JEDEC)	PRDP0020AC-B (DP-20NEV)	P	—
HD74HCT688FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HCT688RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

### Function Table

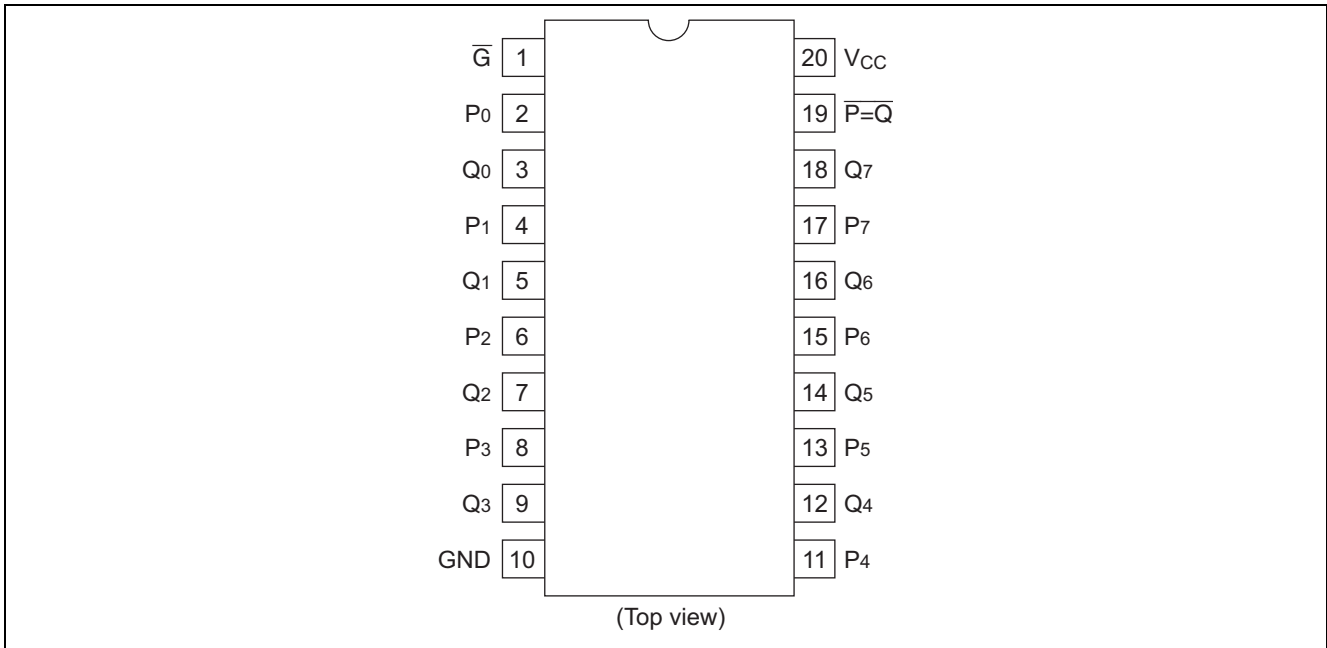
Input		Output $\overline{P=Q}$
Data P, Q	Enable $\overline{G}$	
P=Q	L	L
P>Q	L	H
P<Q	L	H
X	H	H

H : high level

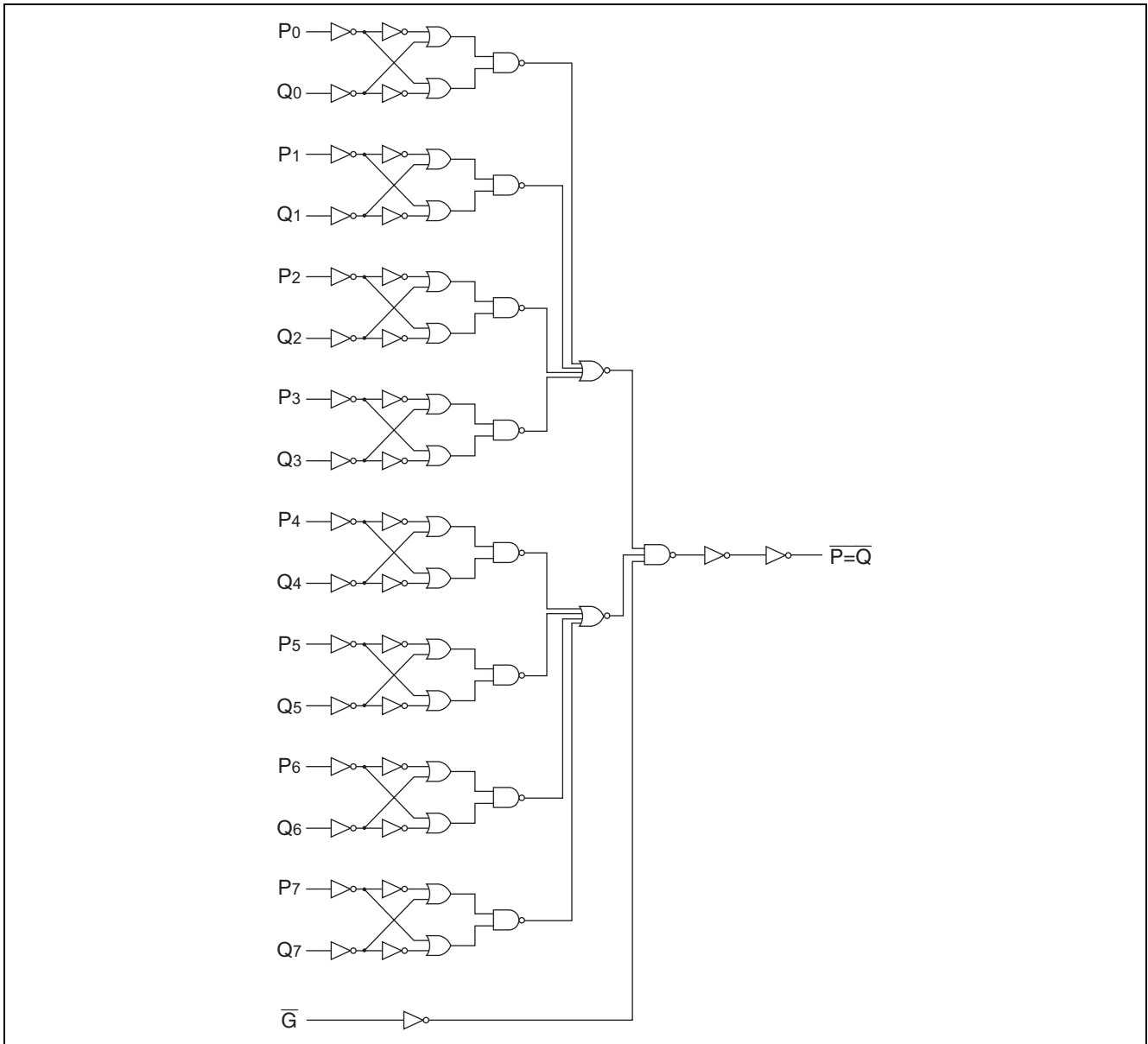
L : low level

X : irrelevant

### 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	$I_{OUT}$	$\pm 25$	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 <sub>CC</sub>	4.5 to 5.5	V	
Input / Output voltage	V <sub>IN</sub> , V <sub>OUT</sub>	0 to V <sub>CC</sub>	V	
Operating temperature	T <sub>a</sub>	-40 to 85	°C	
Input rise / fall time <sup>*1</sup>	t <sub>r</sub> , t <sub>f</sub>	0 to 500	ns	V <sub>CC</sub> = 4.5 V

Notes: 1. This item guarantees maximum limit when one input switches.  
 Waveform: Refer to test circuit of switching characteristics.

### Electrical Characteristics

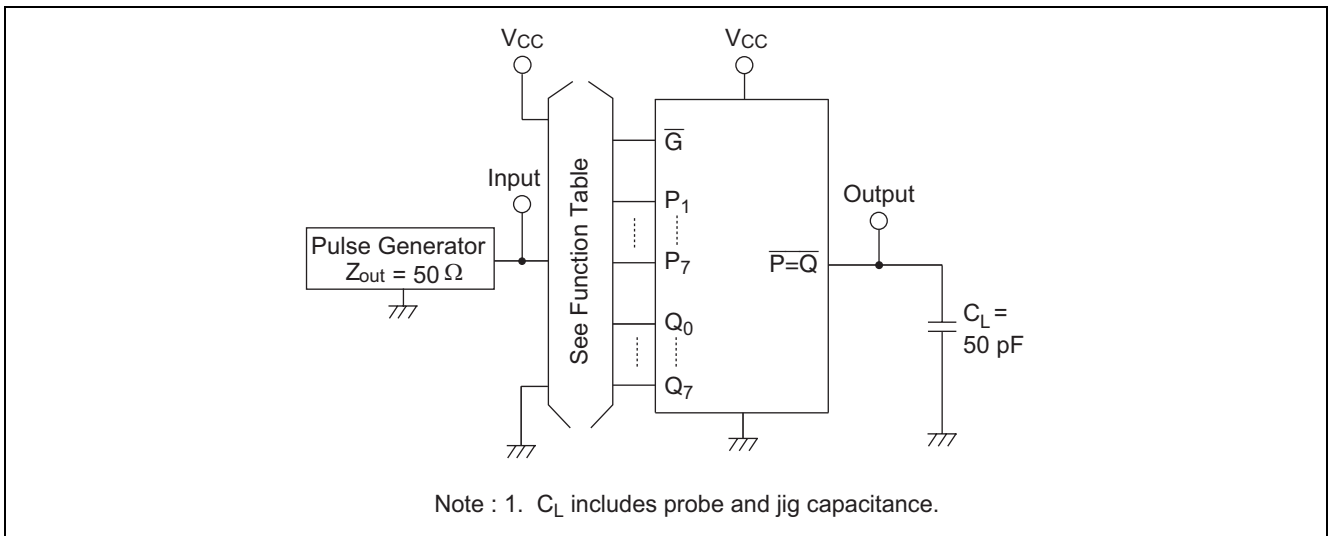
Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	V <sub>IH</sub>	4.5 to 5.5	2.0	—	—	2.0	—	V		
	V <sub>IL</sub>	4.5 to 5.5	—	—	0.8	—	0.8			
Output voltage	V <sub>OH</sub>	4.5	4.4	—	—	4.4	—	V	V <sub>in</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20 μA
		4.5	4.18	—	—	4.13	—			I <sub>OH</sub> = -4 mA
	V <sub>OL</sub>	4.5	—	—	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	—	—	0.26	—	0.33			I <sub>OL</sub> = 4 mA
Input current	I <sub>in</sub>	5.5	—	—	±0.1	—	±1.0	μA	V <sub>in</sub> = V <sub>CC</sub> or GND	
Quiescent current	I <sub>CC</sub>	5.5	—	—	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)

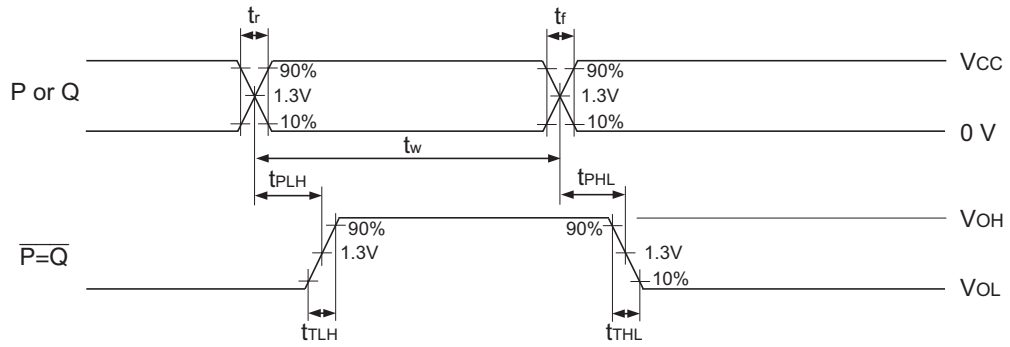
Item	Symbol	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Propagation delay time	t <sub>PLH</sub>	4.5	—	17	42	—	53	ns	Por Q to output	
	t <sub>PHL</sub>	4.5	—	19	42	—	53			
	t <sub>PLH</sub>	4.5	—	9	24	—	30	ns	Enable to output	
	t <sub>PHL</sub>	4.5	—	12	24	—	30			
Output rise/fall time	t <sub>TLH</sub> t <sub>THL</sub>	4.5	—	5	15	—	19	ns		
Input capacitance	C <sub>in</sub>	—	—	5	10	—	10	pF		

### Test Circuit

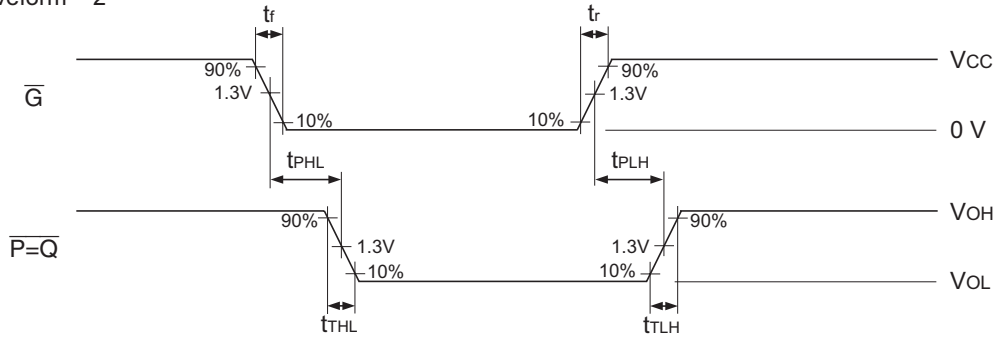


Waveforms

• Waveform – 1

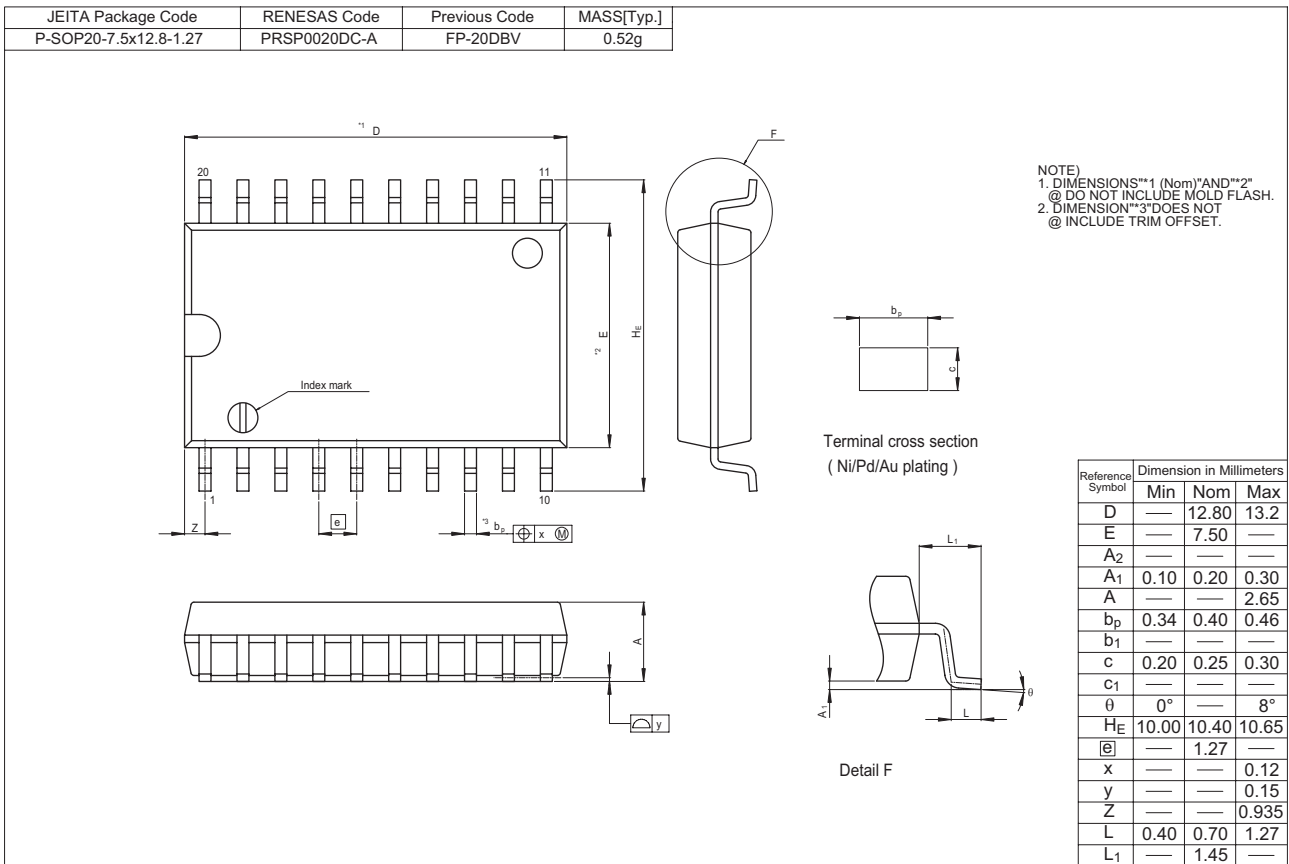
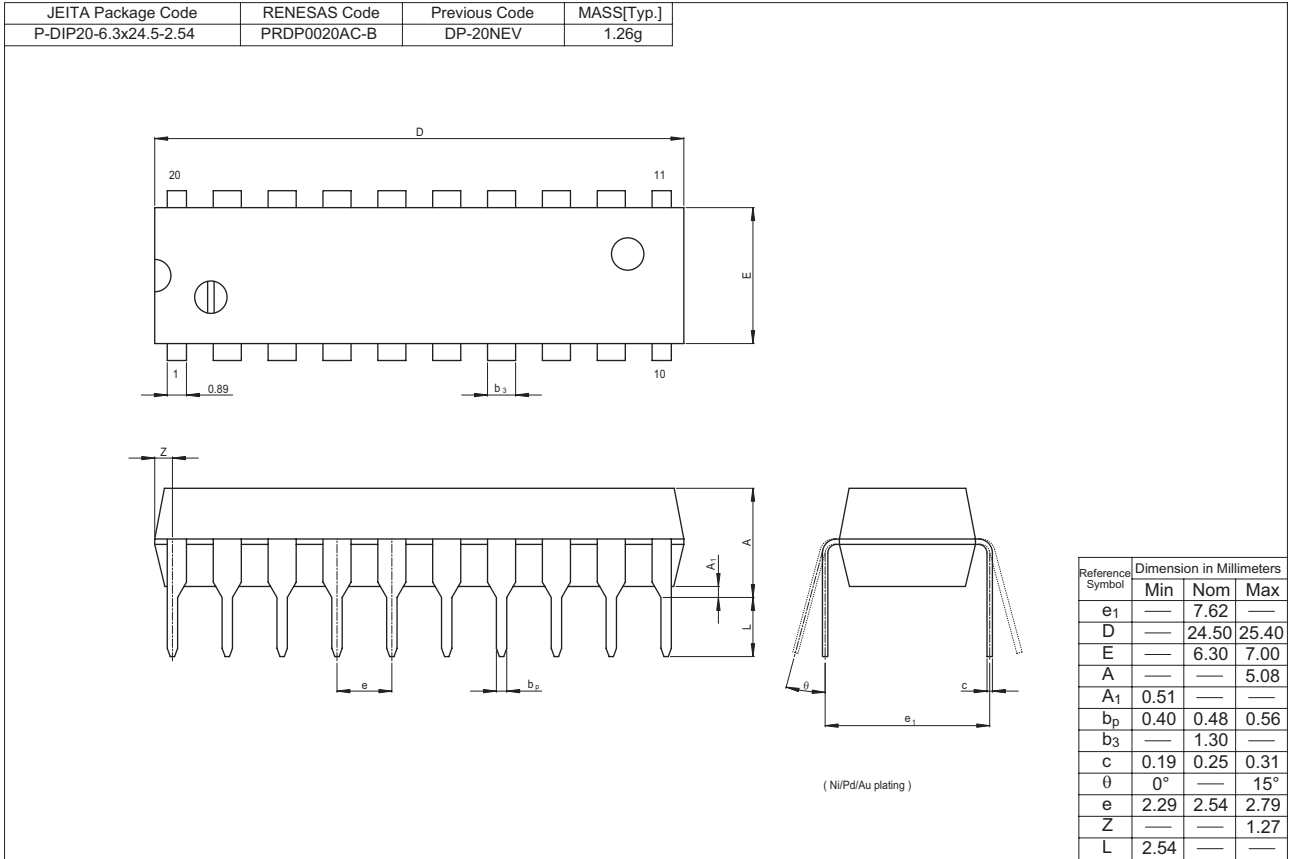


• Waveform – 2



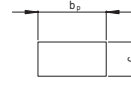
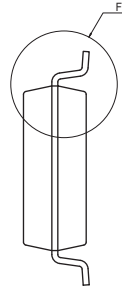
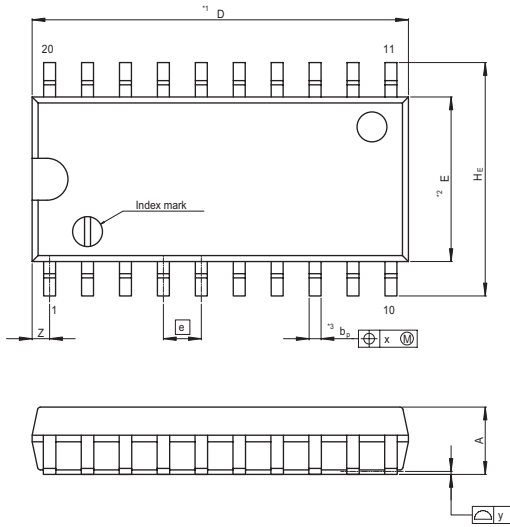
Notes : 1. Input waveform : PRR ≤ 1 MHz, duty cycle 50%, tr ≤ 6 ns, tf ≤ 6 ns

Package Dimensions

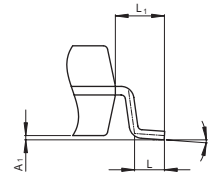


# HD74HCT688

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP20-5.5x12.6-1.27	PRSP0020DD-B	FP-20DAV	0.31g



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	—	12.60	13.0
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>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	7.50	7.80	8.00
Ⓜ	—	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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