

# 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

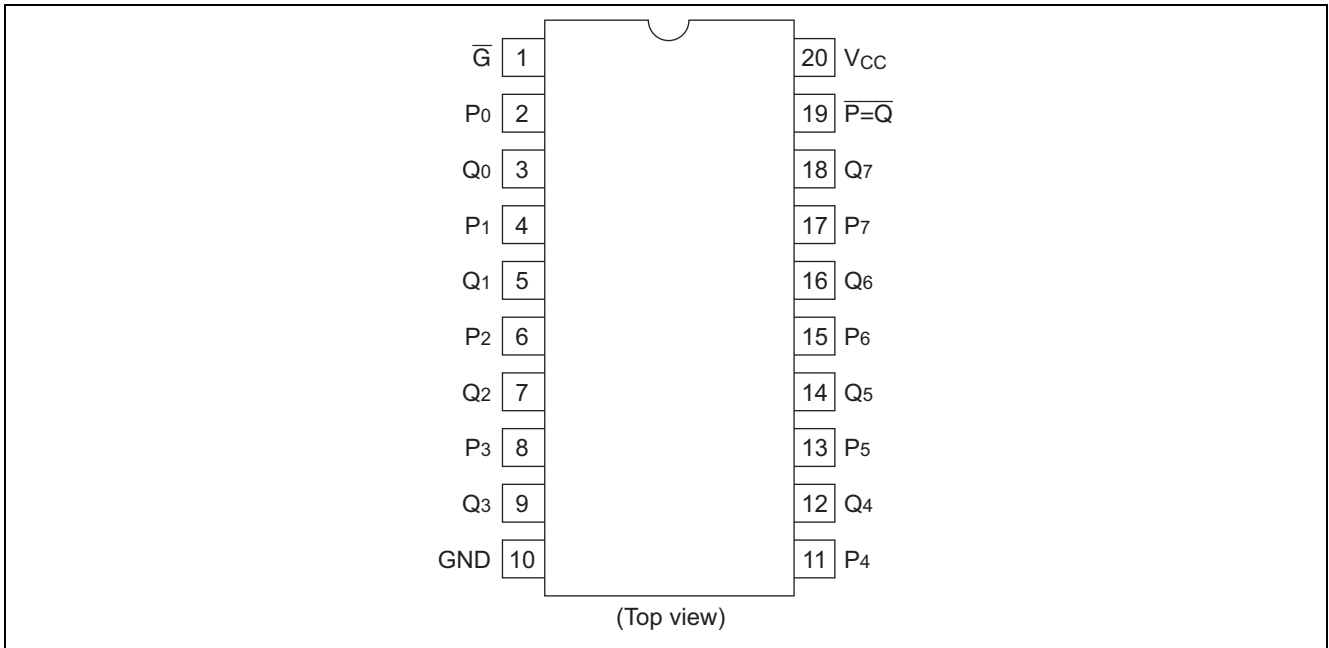
Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HCT688P	DILP-20 pin (JEDEC)	PRDP0020AC-B (DP-20NEV)	P	—
HD74HCT688FPEL	SOP-20 pin (JEITA)	PRSP0020DD-B (FP-20DAV)	FP	EL (2,000 pcs/reel)
HD74HCT688RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

### Function Table

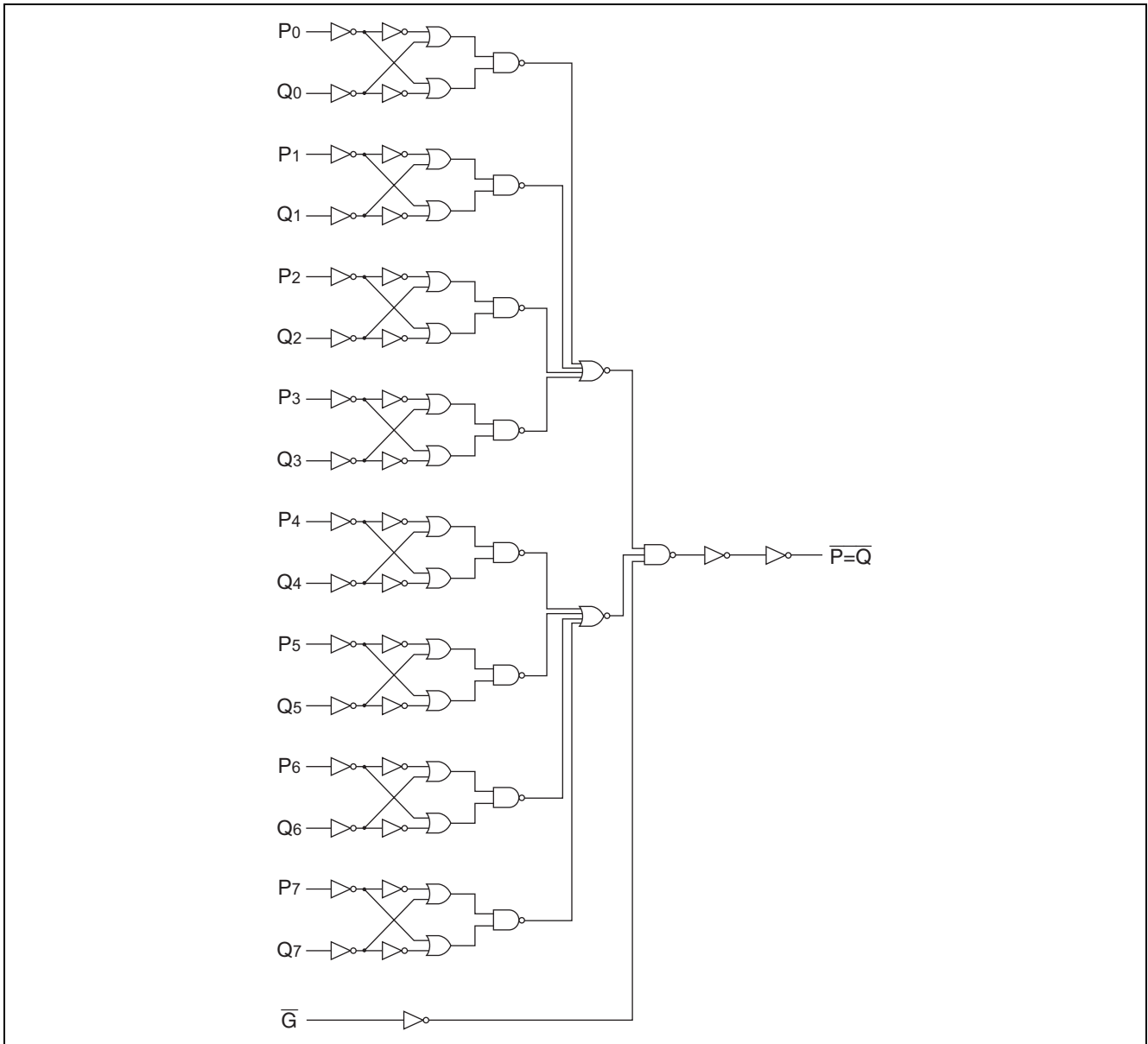
Input		Output $\overline{P=Q}$
Data P, Q	Enable $\overline{G}$	
P=Q	L	L
P>Q	L	H
P<Q	L	H
X	H	H

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	$V_{CC}$	4.5 to 5.5	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 500	ns	$V_{CC} = 4.5 V$

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

### Electrical Characteristics

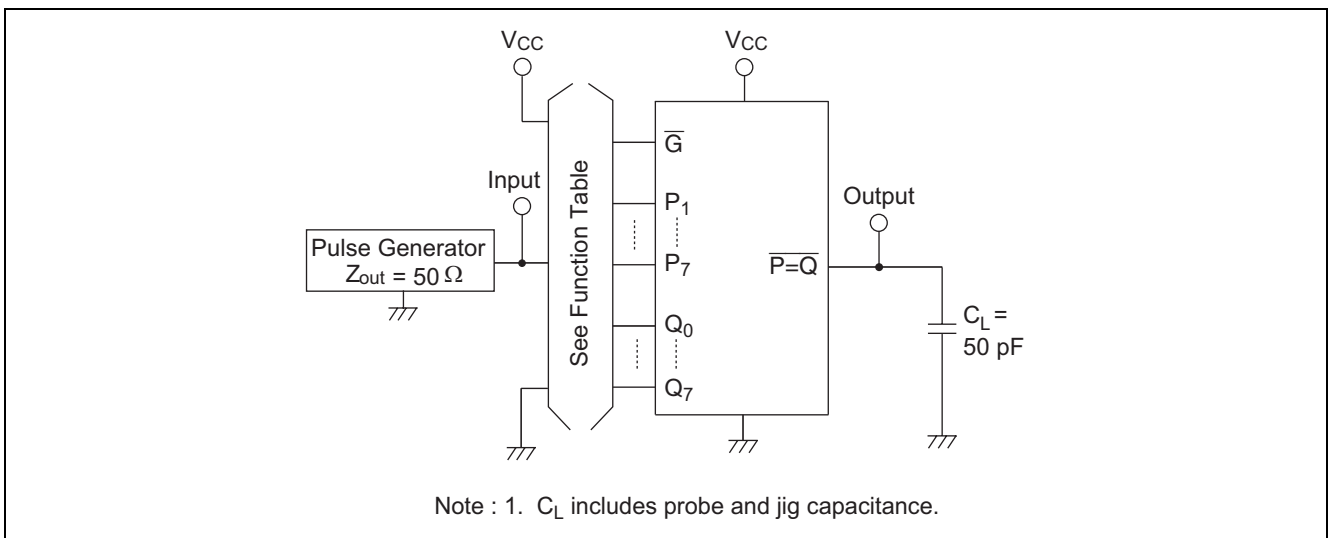
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ C$			$T_a = -40 \text{ to } +85^\circ C$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Input voltage	$V_{IH}$	4.5 to 5.5	2.0	—	—	2.0	—	V		
	$V_{IL}$	4.5 to 5.5	—	—	0.8	—	0.8	V		
Output voltage	$V_{OH}$	4.5	4.4	—	—	4.4	—	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20 \mu A$
		4.5	4.18	—	—	4.13	—	V		$I_{OH} = -4 \text{ mA}$
	$V_{OL}$	4.5	—	—	0.1	—	0.1	V	$V_{in} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20 \mu A$
		4.5	—	—	0.26	—	0.33	V		$I_{OL} = 4 \text{ mA}$
Input current	$I_{in}$	5.5	—	—	$\pm 0.1$	—	$\pm 1.0$	$\mu A$	$V_{in} = V_{CC} \text{ or } GND$	
Quiescent current	$I_{CC}$	5.5	—	—	4.0	—	40	$\mu A$	$V_{in} = V_{CC} \text{ or } GND, I_{out} = 0 \mu A$	

### Switching Characteristics

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

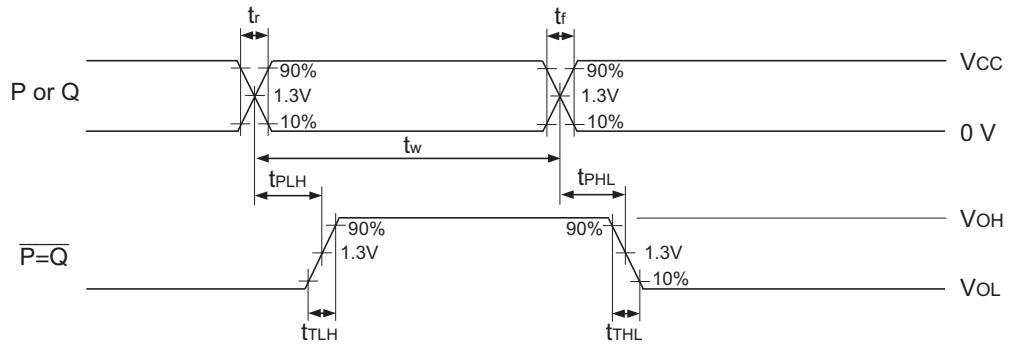
Item	Symbol	$V_{CC}$ (V)	$T_a = 25^\circ C$			$T_a = -40 \text{ to } +85^\circ C$		Unit	Test Conditions	
			Min	Typ	Max	Min	Max			
Propagation delay time	$t_{PLH}$	4.5	—	17	42	—	53	ns	Por Q to output	
	$t_{PHL}$	4.5	—	19	42	—	53	ns		
	$t_{PLH}$	4.5	—	9	24	—	30	ns	Enable to output	
	$t_{PHL}$	4.5	—	12	24	—	30	ns		
Output rise/fall time	$t_{TLH}$ $t_{THL}$	4.5	—	5	15	—	19	ns		
Input capacitance	$C_{in}$	—	—	5	10	—	10	pF		

### Test Circuit

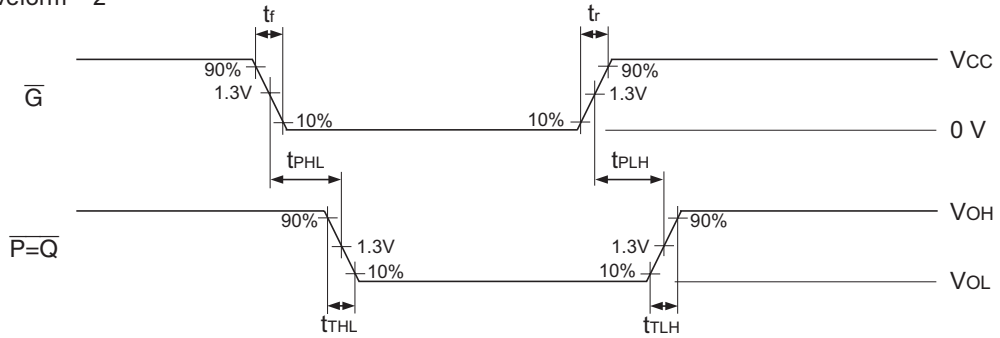


Waveforms

• Waveform – 1

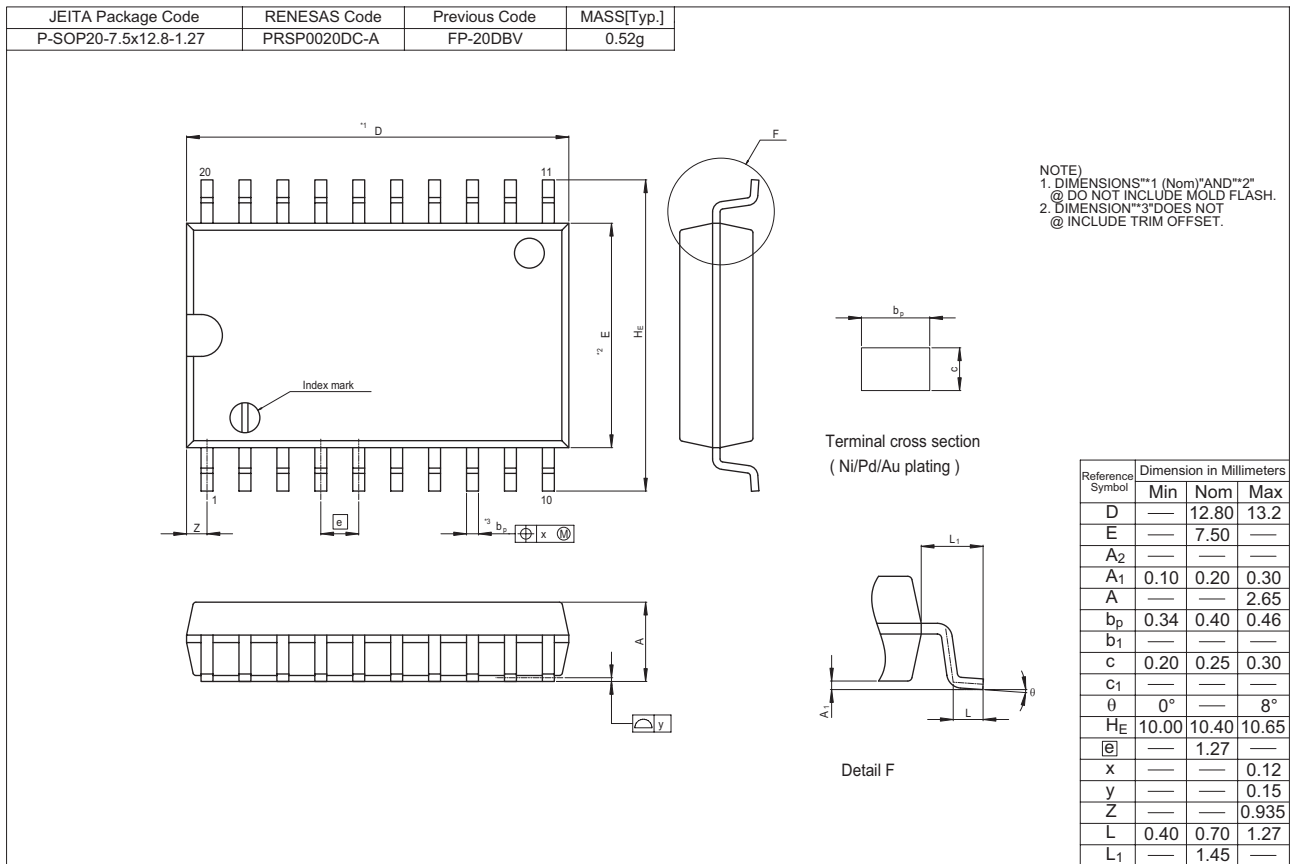
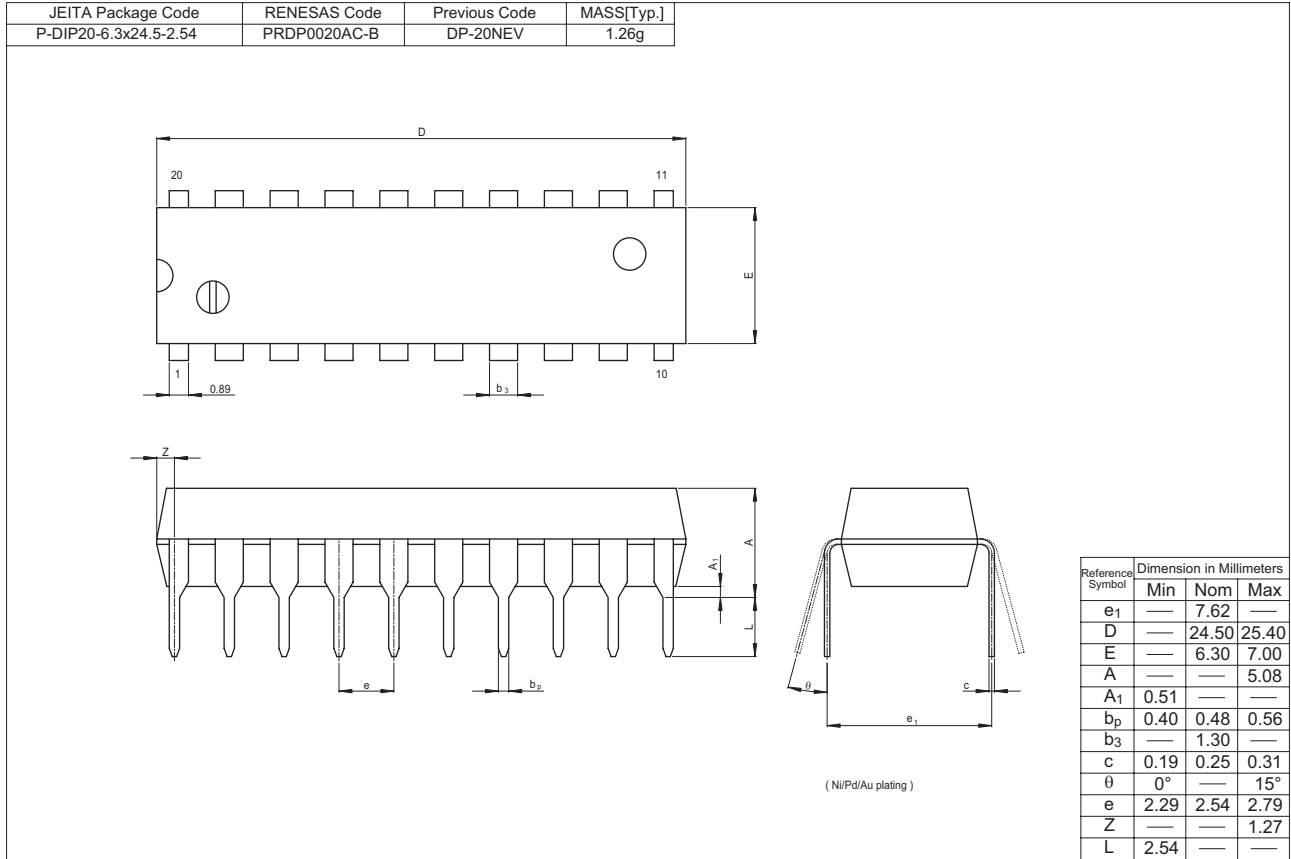


• Waveform – 2



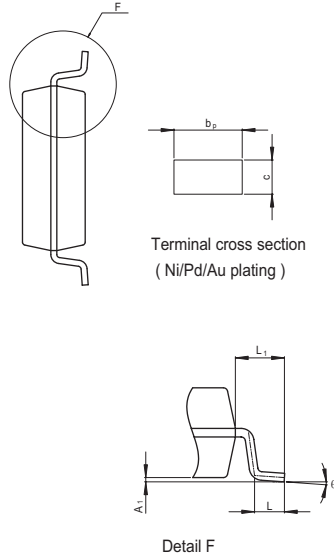
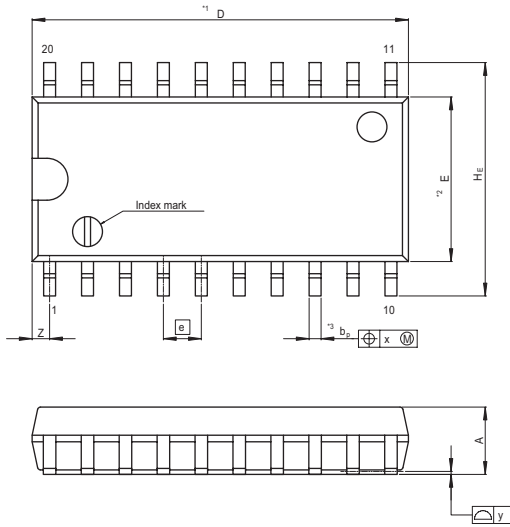
Notes : 1. Input waveform : PRR  $\leq$  1 MHz, duty cycle 50%,  $t_r \leq$  6 ns,  $t_f \leq$  6 ns

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



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
d <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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