

HD74HC682, HD74HC684

8-bit Magnitude Comparator

REJ03D0642-0200
(Previous ADE-205-528)
Rev.2.00
Mar 30, 2006

Description

These magnitude comparators perform comparisons of two eight-bit binary or BCD words. All types provide $\overline{P=Q}$ outputs and provide $\overline{P>Q}$ outputs. The HD74HC682 features 20 k Ω pullup termination resistors on the Q inputs for analog or switch data.

Type	$\overline{P=Q}$	$\overline{P>Q}$	Output Enable	20 k Ω Pullup
HD74HC682	Yes	Yes	No	Yes
HD74HC684	Yes	Yes	No	No

Features

- High Speed Operation
- High Output Current: Fanout of 10 LSTTL Loads
- Wide Operating Voltage: $V_{CC} = 2$ to 6 V
- Low Input Current: 1 μ A max
- Low Quiescent Supply Current: I_{CC} (static) = 4 μ A max ($T_a = 25^\circ\text{C}$)
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74HC682P HD74HC684P	DILP-20 pin	PRDP0020AC-B (DP-20NEV)	P	—
HD74HC682RPEL HD74HC684RPEL	SOP-20 pin (JEDEC)	PRSP0020DC-A (FP-20DBV)	RP	EL (1,000 pcs/reel)

Function Table

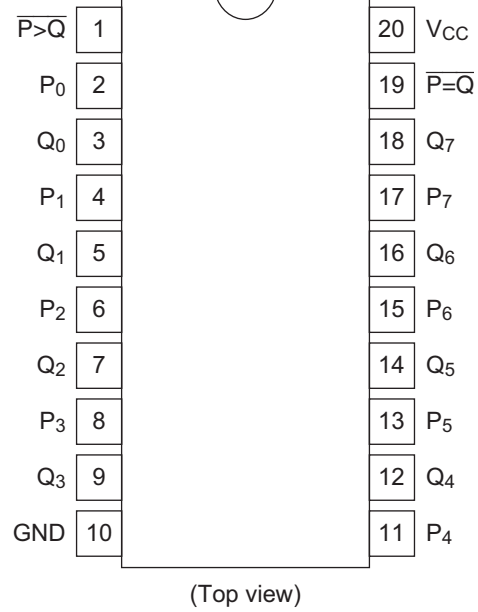
Input Data	Outputs	
P, Q	$\overline{P=Q}$	$\overline{P>Q}$
$P = Q$	L	H
$P > Q$	H	L
$P < Q$	H	H

Note: 1. The $\overline{P<Q}$ function can be generated by applying the $\overline{P=Q}$ and $\overline{P>Q}$ Outputs to a 2-input NAND gate.

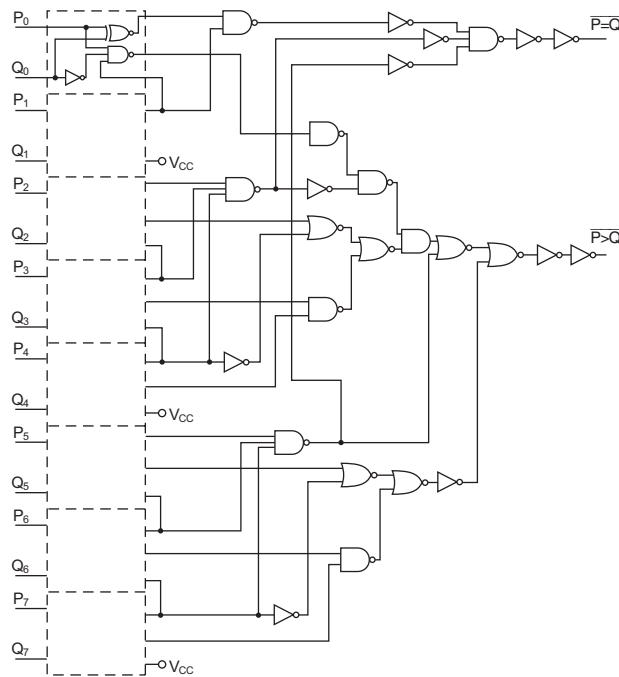
H : high level

L : low level

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}	± 20	mA
Output current	I_{OUT}	± 25	mA
V_{CC} , GND current	I_{CC} or I_{GND}	± 50	mA
Power dissipation	P_T	500	mW
Storage temperature	T_{stg}	-65 to +150	°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.

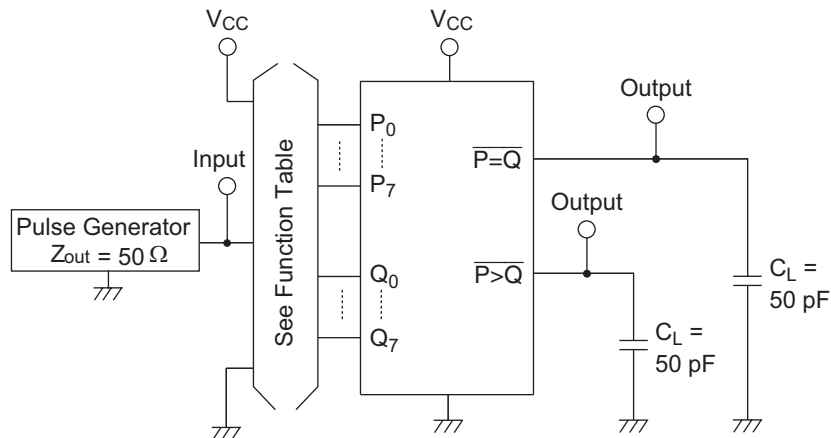
Electrical Characteristics

Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°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	Vin = V _{IH} or V _{IL} I _{OH} = -20 µA
		4.5	4.4	4.5	—	4.4	—		
		6.0	5.9	6.0	—	5.9	—		
		4.5	4.18	—	—	4.13	—		I _{OH} = -4 mA
		6.0	5.68	—	—	5.63	—		I _{OH} = -5.2 mA
	V _{OL}	2.0	—	0.0	0.1	—	0.1	V	Vin = V _{IH} or V _{IL} I _{OL} = 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 _{OL} = 4 mA
		6.0	—	—	0.26	—	0.33		I _{OL} = 5.2 mA
Input current (HC684)	I _{in}	6.0	—	—	±0.1	—	±1.0	µA	Vin = V _{CC} or GND
Quiescent supply current (HC684)	I _{CC}	6.0	—	—	4.0	—	40	µA	Vin = V _{CC} or GND, I _{out} = 0 µA
Input current (HD682)	I _{in}	6.0	—	—	±0.1	—	±1.0	µA	Vin = V _{CC}
			—	—	-0.6	—	-0.7	mA	I _{in} = GND
Quiescent supply current (HC682)	I _{CC}	6.0	—	—	4.8	—	5.6	mA	Qn = GND, other inputs = V _{CC} or GND I _{out} = 0 µA
			—	—	4.0	—	40	µA	Qn = V _{CC} , other inputs = V _{CC} or GND I _{out} = 0 µA

Switching Characteristics (C_L = 50 pF, Input t_r = t_f = 6 ns)

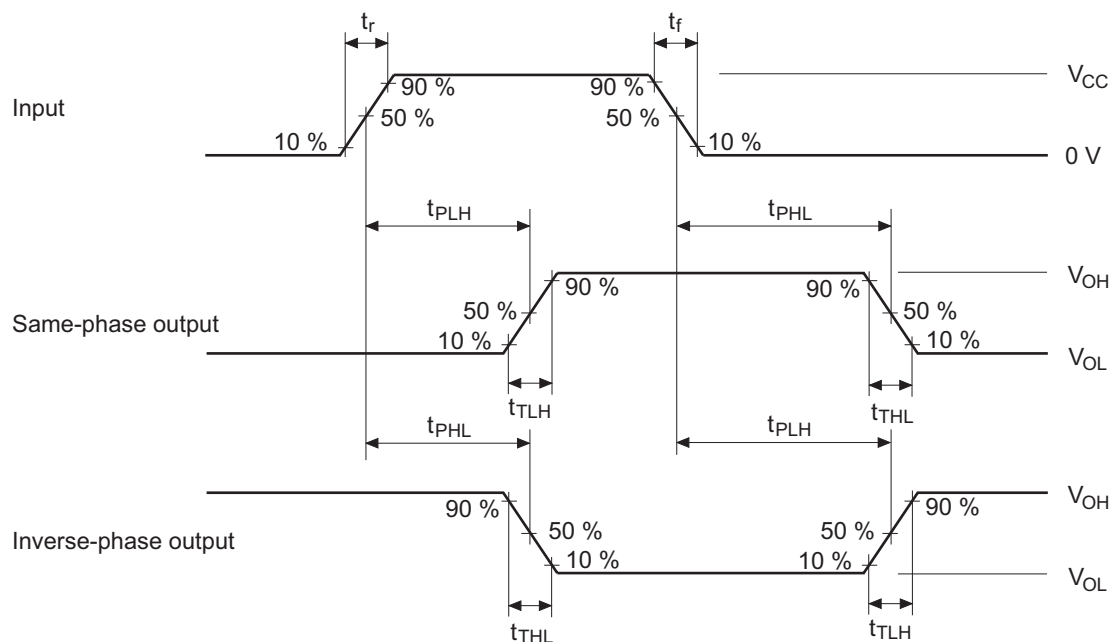
Item	Symbol	V _{CC} (V)	Ta = 25°C			Ta = -40 to +85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Propagation delay time	t _{PLH}	2.0	—	—	175	—	220	ns	P or Q to P=Q
		4.5	—	—	35	—	44		
		6.0	—	—	30	—	37		
	t _{PHL}	2.0	—	—	200	—	250	ns	P or Q to P>Q
		4.5	—	—	40	—	50		
		6.0	—	—	34	—	43		
Output rise/fall time	t _{TLH}	2.0	—	—	60	—	75	ns	
		4.5	—	—	12	—	15		
		6.0	—	—	10	—	13		
Input capacitance	C _{in}	—	—	5	10	—	10	pF	

Test Circuit



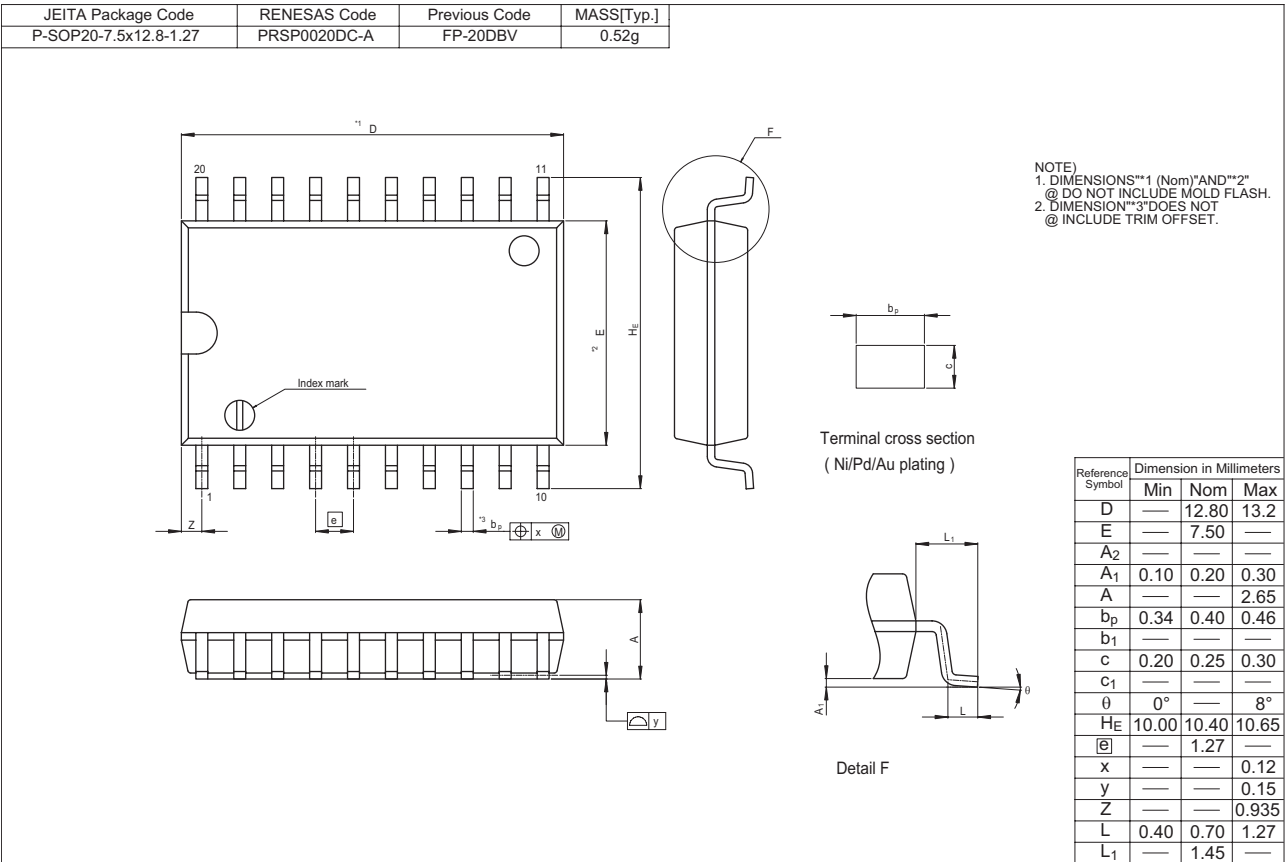
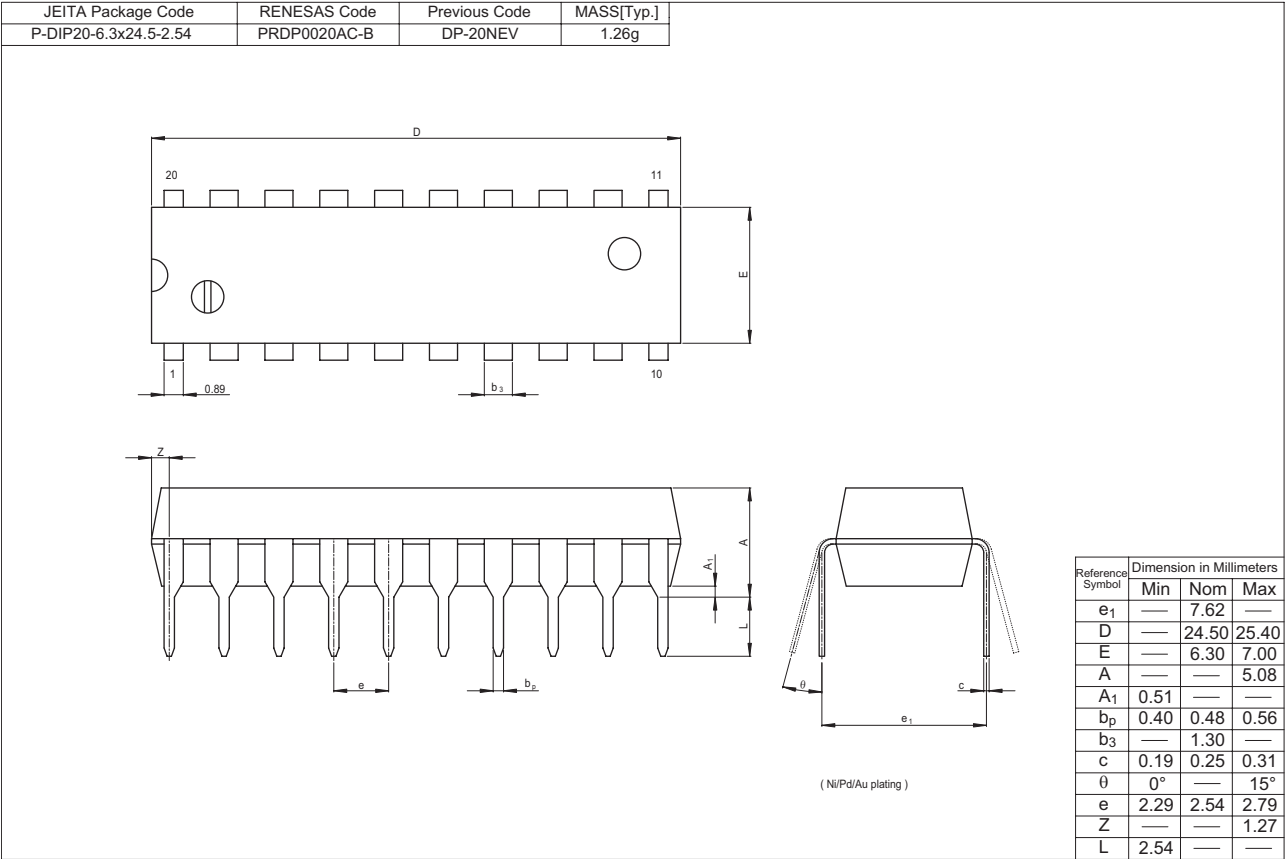
Note : 1. C_L includes probe and jig capacitance.

Waveforms



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.

Package Dimensions



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