To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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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 kΩ pullup termination resistors on the Q inputs for analog or switch data.

Type	$\overline{P=Q}$	$\overline{P>Q}$	Output Enable	20 kΩ 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 µA max
- Low Quiescent Supply Current: I_{CC} (static) = 4 µA max (Ta = 25°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

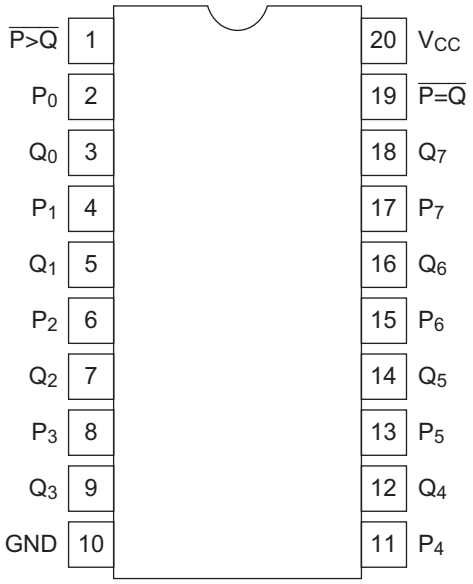
Input Data	Outputs	
P, Q	$\overline{P=Q}$	$\overline{P>Q}$
P = Q	L	H
P > Q	H	L
P < Q	H	H

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

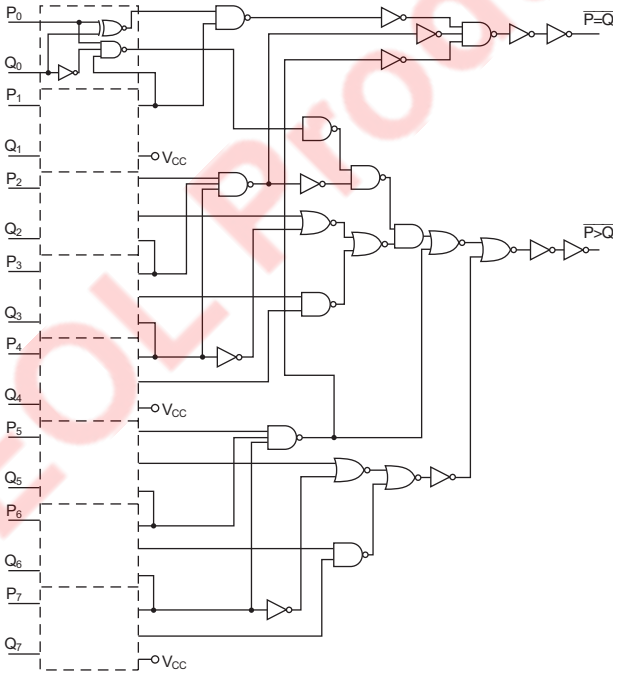
L : low level

Pin Arrangement



(Top view)

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	Tstg	–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	Ta	–40 to 85	°C	
Input rise / fall time[*1]	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.

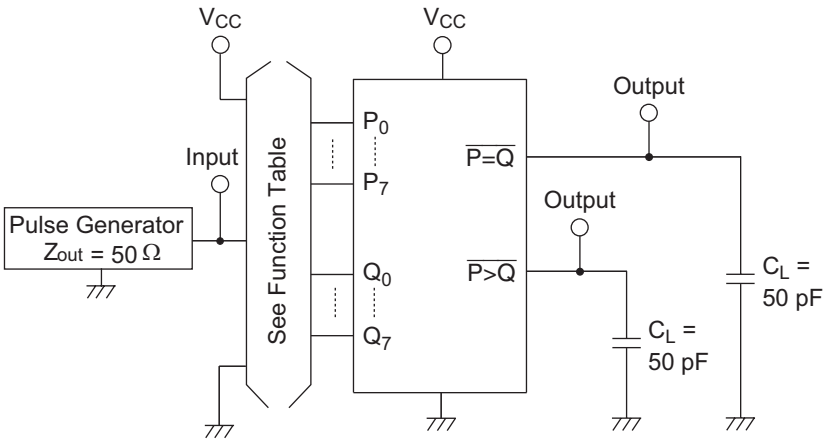
Electrical Characteristics

Item	Symbol	V_{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)	Iin	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, Iout = 0 µA	
Input current (HD682)	Iin	6.0	—	—	±0.1	—	±1.0	µA	Vin = V_{CC}	
			—	—	–0.6	—	–0.7	mA	Iin = GND	
Quiescent supply current (HC682)	I_{CC}	6.0	—	—	4.8	—	5.6	mA	Qn = GND, other inputs = V_{CC} or GND Iout = 0 µA	
			—	—	4.0	—	40	µA	Qn = VCC, other inputs = V_{CC} or GND Iout = 0 µA	

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

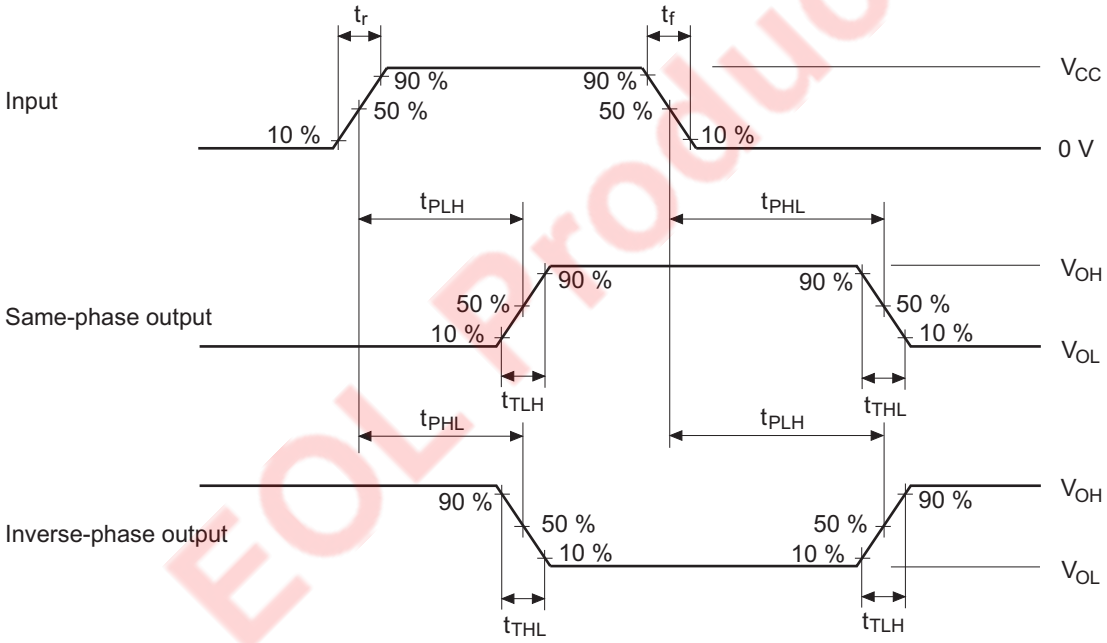
Item	Symbol	V_{CC} (V)	Ta = 25°C			Ta = –40 to +85°C		Unit	Test Conditions
			Min	Typ	Max	Min	Max		
Propagation delay time	t_{PLH} t_{PHL}	2.0	—	—	175	—	220	ns	P or Q to $\overline{P=Q}$
		4.5	—	—	35	—	44		
		6.0	—	—	30	—	37		
	t_{PLH} t_{PHL}	2.0	—	—	200	—	250	ns	P or Q to $\overline{P>Q}$
		4.5	—	—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

Test Circuit



Note : 1. C_L includes probe and jig capacitance.

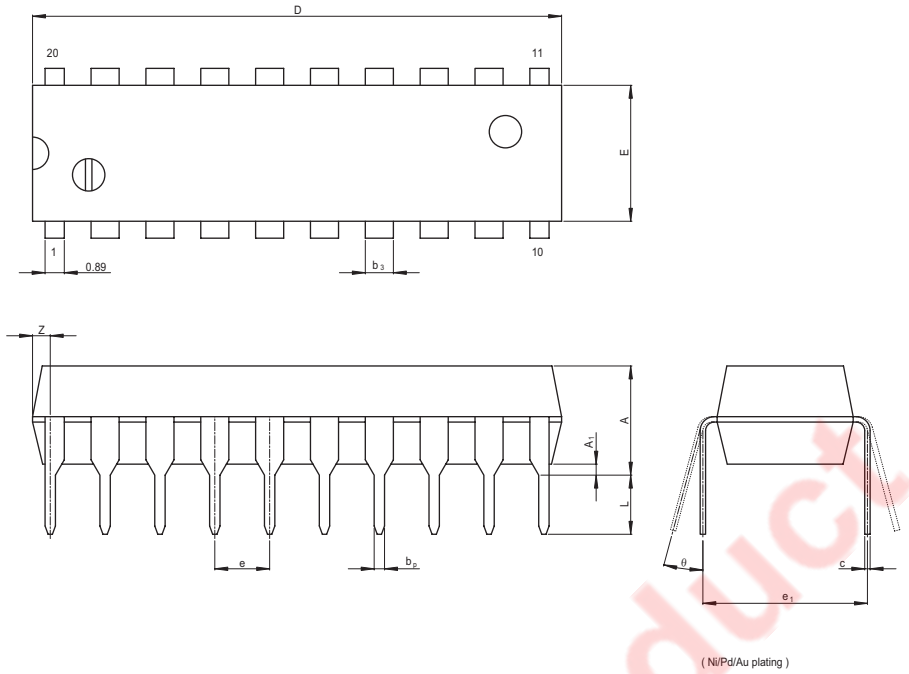
Waveforms



Notes: 1. Input waveform: PRR ≤ 1 MHz, Zo = 50 Ω, t_r ≤ 6 ns, t_f ≤ 6 ns
2. The output are measured one at a time with one transition per measurement.

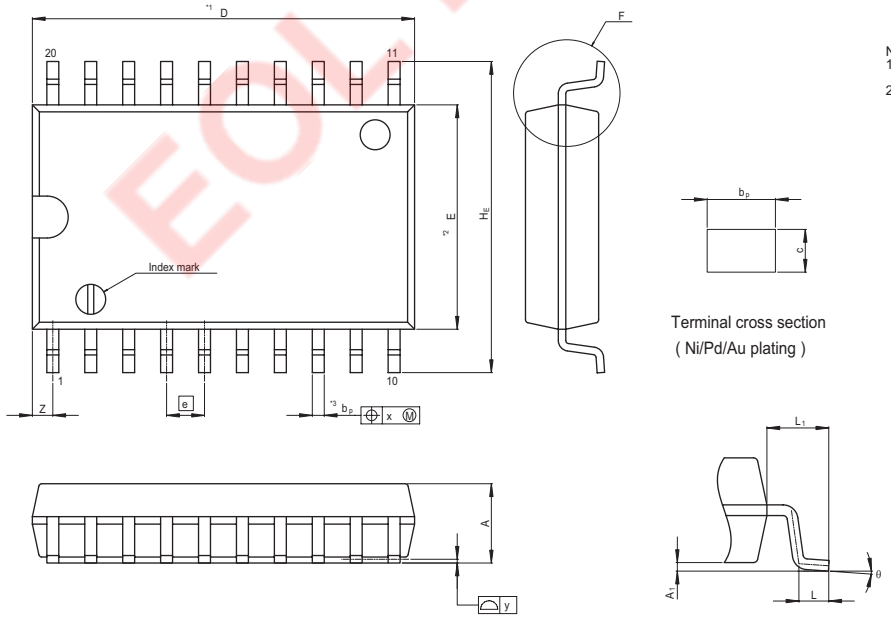
Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP20-6.3x24.5-2.54	PRDP0020AC-B	DP-20NEV	1.26g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e_1	—	7.62	—
D	—	24.50	25.40
E	—	6.30	7.00
A	—	—	5.08
A_1	0.51	—	—
b_p	0.40	0.48	0.56
b_3	—	1.30	—
c	0.19	0.25	0.31
θ	0°	—	15°
e	2.29	2.54	2.79
Z	—	—	1.27
L	2.54	—	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP20-7.5x12.8-1.27	PRSP0020DC-A	FP-20DBV	0.52g



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	—	12.80	13.2
E	—	7.50	—
A_2	—	—	—
A_1	0.10	0.20	0.30
A	—	—	2.65
b_p	0.34	0.40	0.46
b_1	—	—	—
c	0.20	0.25	0.30
c_1	—	—	—
θ	0°	—	8°
H_E	10.00	10.40	10.65
e	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.935
L	0.40	0.70	1.27
L_1	—	1.45	—

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