

8-bit magnitude comparator

74HC/HCT688

FEATURES

- Compare two 8-bit words
- Output capability: standard
- I_{CC} category: MSI

GENERAL DESCRIPTION

The 74HC/HCT688 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT688 are 8-bit magnitude comparators. They perform comparison of two 8-bit binary or BCD words.

The output provides $\overline{P = Q}$.

QUICK REFERENCE DATA

GND = 0 V; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $t_r = t_f = 6\text{ ns}$

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t_{PHL}/t_{PLH}	propagation delay P_n, Q_n to $\overline{P = Q}$ E to $\overline{P = Q}$	$C_L = 15\text{ pF}$; $V_{CC} = 5\text{ V}$	17 8	17 12	ns ns
C_I	input capacitance		3.5	3.5	pF
C_{PD}	power dissipation capacitance per package	notes 1 and 2	30	30	pF

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) \quad \text{where:}$$

f_i = input frequency in MHz

f_o = output frequency in MHz

$\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs

C_L = output load capacitance in pF

V_{CC} = supply voltage in V

2. For HC the condition is $V_I = \text{GND}$ to V_{CC}
For HCT the condition is $V_I = \text{GND}$ to $V_{CC} - 1.5\text{ V}$

ORDERING INFORMATION

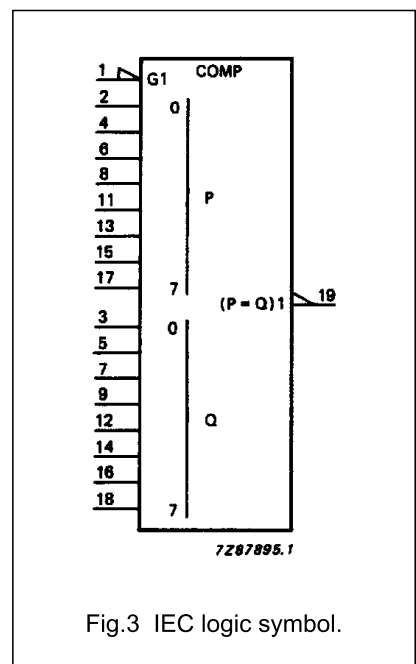
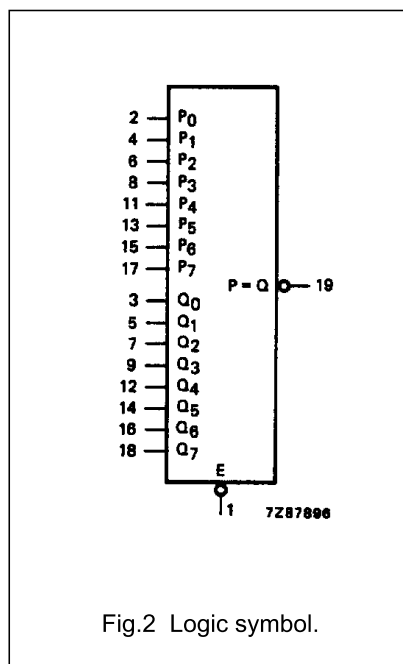
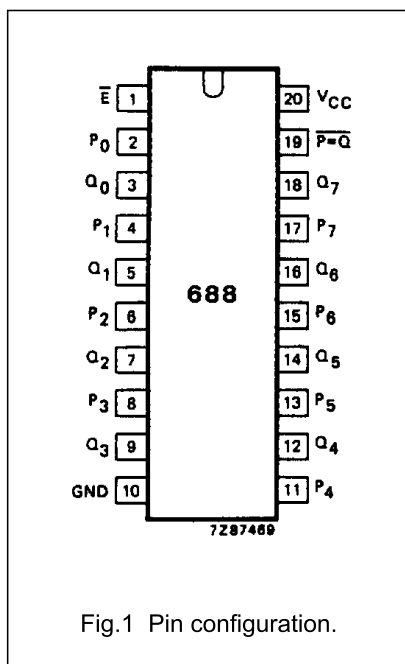
See "74HC/HCT/HCU/HCMOS Logic Package Information".

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PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1	\overline{E}	enable input (active LOW)
2, 4, 6, 8, 11, 13, 15, 17	P_0 to P_7	word inputs
3, 5, 7, 9, 12, 14, 16, 18	Q_0 to Q_7	word inputs
10	GND	ground (0 V)
19	$\overline{P = Q}$	equal to output
20	V_{CC}	positive supply voltage



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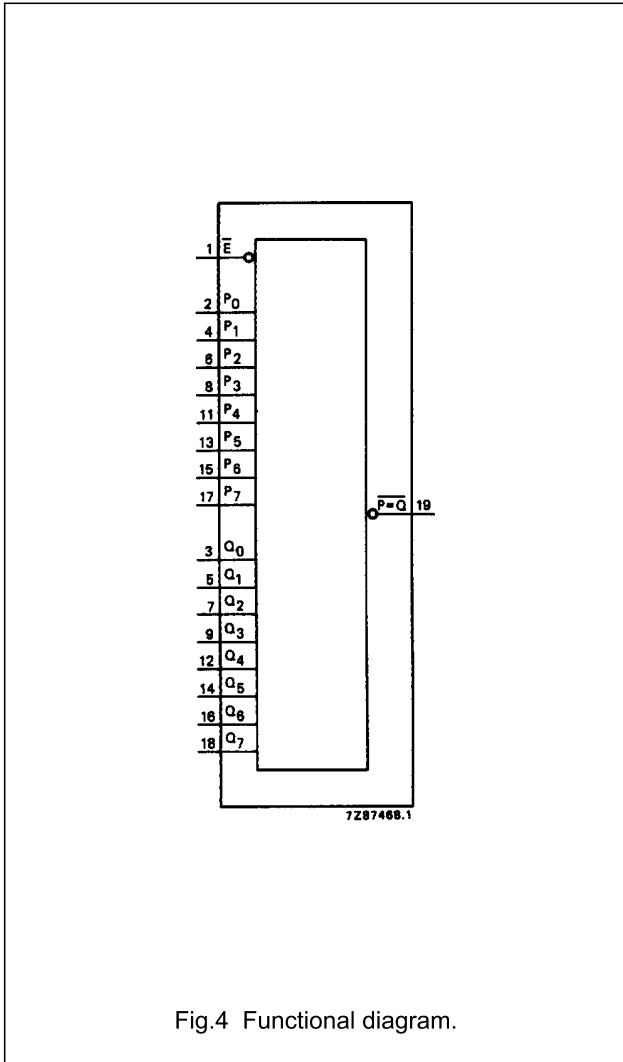


Fig.4 Functional diagram.

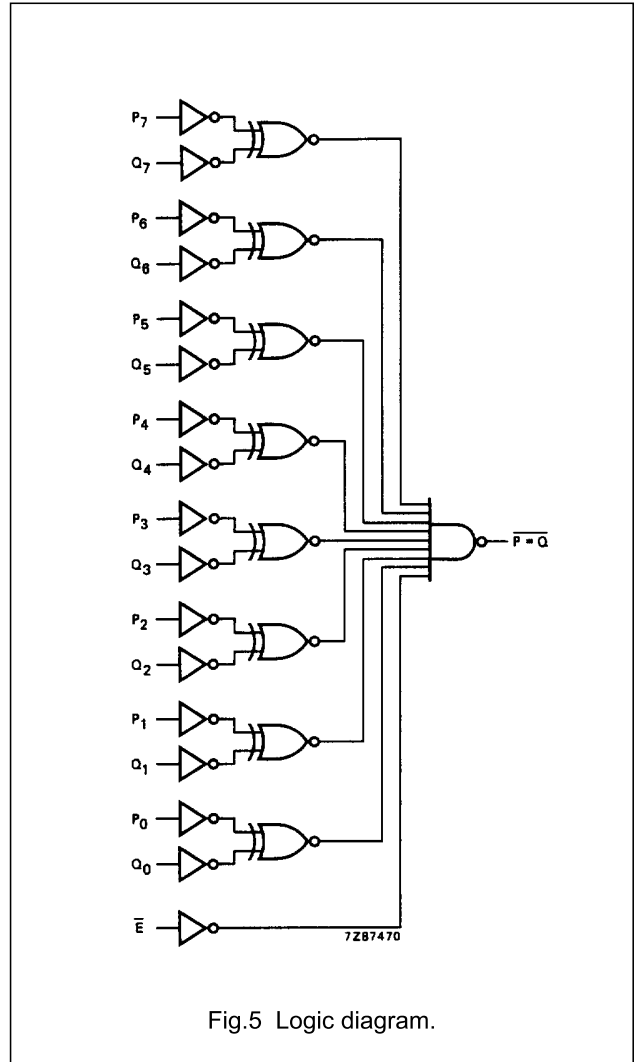


Fig.5 Logic diagram.

FUNCTION TABLE

INPUTS		OUTPUT
DATA P _n , Q _n	ENABLE E-bar	P = Q-bar
P = Q	L	L
X	H	H
P > Q	L	H
P < Q	L	H

Notes

- H = HIGH voltage level
L = LOW voltage level
X = don't care

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DC CHARACTERISTICS FOR 74HC

For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

Output capability: standard

I_{CC} category: MSI

AC CHARACTERISTICS FOR 74HC

GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

SYMBOL	PARAMETER	T _{amb} (°C)						UNIT	TEST CONDITIONS		
		74HC							V _{CC} (V)	WAVEFORMS	
		+25			-40 to +85		-40 to +125				
		min.	typ.	max.	min.	max.	min.				max.
t _{PHL} / t _{PLH}	propagation delay P _n , Q _n to $\overline{P} = \overline{Q}$		55 20 16	170 34 29		215 43 37		255 51 43	ns	2.0 4.5 6.0	Fig.6
t _{PHL} / t _{PLH}	propagation delay \overline{E} to $\overline{P} = \overline{Q}$		28 10 8	120 24 20		150 30 26		180 36 31	ns	2.0 4.5 6.0	Fig.7
t _{THL} / t _{TLH}	output transition time		19 7 6	75 15 13		95 19 16		110 22 19	ns	2.0 4.5 6.0	Figs 6 and 7

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DC CHARACTERISTICS FOR 74HCT

For the DC characteristics see "*74HC/HCT/HCU/HCMOS Logic Family Specifications*".

Output capability: standard

I_{CC} category: MSI

Note to HCT types

The value of additional quiescent supply current (ΔI_{CC}) for a unit load of 1 is given in the family specifications. To determine ΔI_{CC} per input, multiply this value by the unit load coefficient shown in the table below.

INPUT	UNIT LOAD COEFFICIENT
P _n	0.35
Q _n	0.35
\overline{E}	0.70

AC CHARACTERISTICS FOR 74HCT

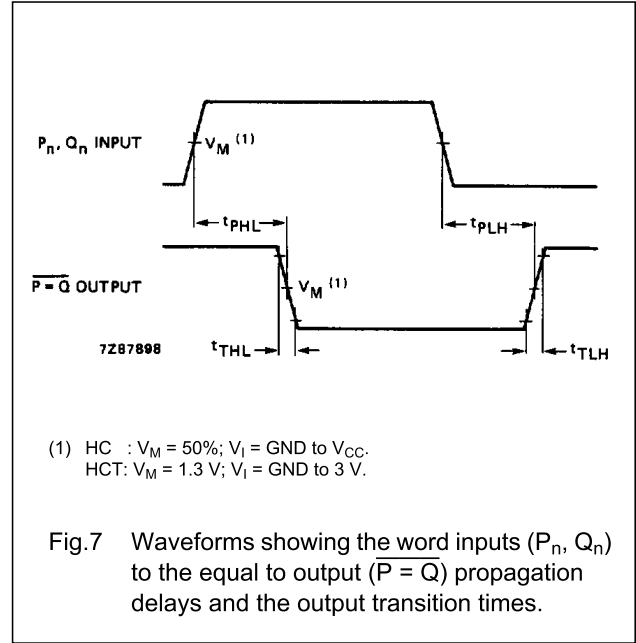
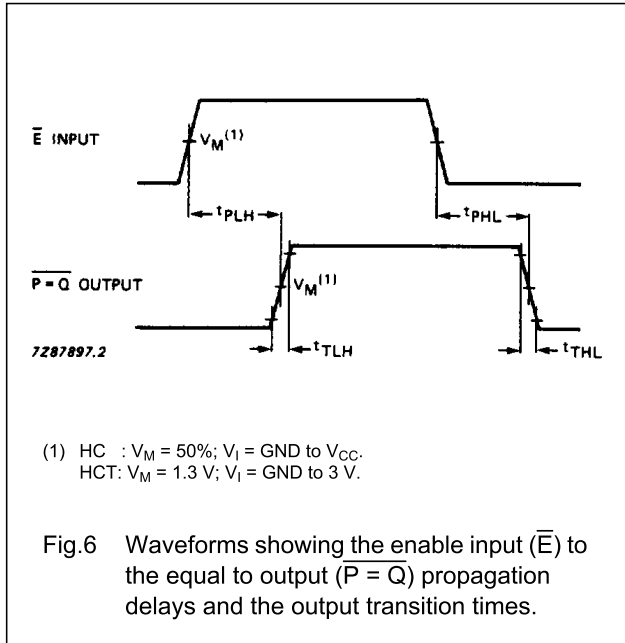
GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

SYMBOL	PARAMETER	T _{amb} (°C)						UNIT	TEST CONDITIONS		
		74HCT							V _{CC} (V)	WAVEFORMS	
		+25			-40 to +85		-40 to +125				
		min.	typ.	max.	min.	max.	min.				max.
t _{PHL} / t _{PLH}	propagation delay P _n , Q _n to $\overline{P} = \overline{Q}$		20	34		43		51	ns	4.5	Fig.6
t _{PHL} / t _{PLH}	propagation delay \overline{E} to $\overline{P} = \overline{Q}$		18	24		30		36	ns	4.5	Fig.7
t _{THL} / t _{TLH}	output transition time		7	15		19		22	ns	4.5	Figs 6 and 7

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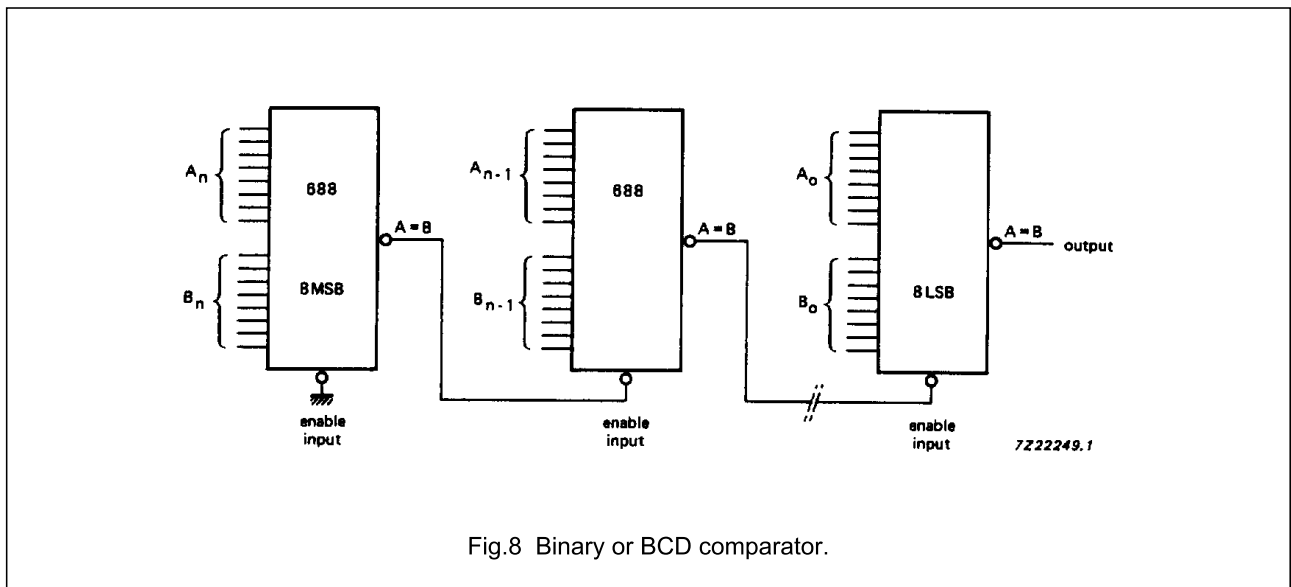
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AC WAVEFORMS



APPLICATION INFORMATION

Two or more "688" 8-bit magnitude comparators may be cascaded to compare binary or BCD numbers of more than 8 bits. An example is shown in Fig.8.



PACKAGE OUTLINES

See "74HC/HCT/HCU/HCMOS Logic Package Outlines".