8-Bit Equality Comparator

The TC74HCT688A is a high speed CMOS 8-BIT EQUALITY COMPARATOR fabricated with silicon gate C^2MOS technology.

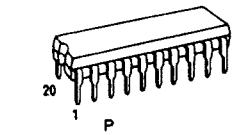
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

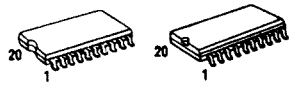
This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

The TC75HCT688A compares two 8-bit binary or BCD words applied inputs $P_0 \sim P_7$, and inputs $Q_0 \sim Q_7$, and indicates whether or not they are equal.

A signal active low enable is provided to facilitate cascading of several packages to compare of words greater than 8 bits.

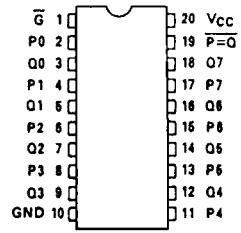
All inputs are equipped with protection circuits against static discharge or transient excess voltage.





Features

- High Speed: t_{pd} = 17ns(Typ.) at V_{CC} = 5V
- Low Power Dissipation: I_{CC} = 4μA(Max.) at Ta = 25°C
- Compatible with TTL outputs: V_{IH} = 2V(Min.)
  V_{IL} = 0.8V(Max.)
- Output Drive Capability: 10 LSTTL Loads
- Symmetrical Output Impedance: $|I_{OH}| = I_{OL}$ = 4mA(Min.)
- Balanced Propagation Delays: $t_{pLH} = t_{pHL}$
- Pin and Function Compatible with 74LS688



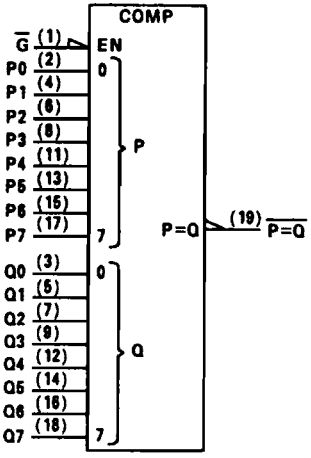
(TOP VIEW)

Pin Assignment

Truth Table

Inputs		Output
P, Q	G̅	P=Q̅
P = Q	L	L
P≠Q	L	H
X	H	H

X: "Don't Care



IEC Logic Symbol

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage Range	V_{CC}	-0.5 ~ 7	V

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
DC Input Voltage	V_{IN}	-0.5 ~ V_{CC} + 0.5	V
DC Output Voltage	V_{OUT}	-0.5 ~ V_{CC} + 0.5	V
Input Diode Current	I_{IK}	±20	mA
Output Diode Current	I_{OK}	±20	mA
DC Output Current	I_{OUT}	±25	mA
DC V_{CC}/Ground Current	I_{CC}	±50	mA
Power Dissipation	P_D	500(DIP)*/180(SOIC)	mW
Storage Temperature	T_{stg}	-65 ~ 150	°C
Lead Temperature 10sec	T_L	300	°C

*500mW in the range of Ta = -40°C ~ 65°C. From Ta = 65°C to 85°C a derating factor of -10mW/°C shall be applied until 300mW.

Recommended Operating Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	4.5 ~ 5.5	V
Input Voltage	V_{IN}	0 ~ V_{CC}	V
Output Voltage	V_{OUT}	0 ~ V_{CC}	V
Operating Temperature	T_{opr}	-40 ~ 85	°C
Input Rise and Fall Time	t_r, t_f	0 ~ 500	ns

DC Electrical Characteristics

Parameter	Symbol	Test Condition			Ta = 25°C			Ta = -40 ~ 85°C		Unit
				V_{CC}	Min.	Typ.	Max.	Min.	Max.	
High-Level Input Voltage	V_{IH}	–		4.5 ∫ 5.5	2.0	–	–	2.0	–	V
Low-Level Input Voltage	V_{IL}	–		4.5 ∫ 5.5	–	–	0.8	–	0.8	V
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -20μA	4.5	4.4	4.5	–	4.4	–	V
			I_{OH} = -4 mA	4.5	4.18	4.31	–	4.13	–	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20μA	4.5	–	0.0	0.1	–	0.1	V
			I_{OL} = 4 mA	4.5	–	0.17	0.26	–	0.33	
Input Leakage Current	I_{IN}	V_{IN} = V_{CC} or GND		5.5	–	–	±0.1	–	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		5.5	–	–	1.0	–	10.0	μA
	ΔI_{CC}	Per input: V_{IN} = 0.5V or 2.4V Other input: V_{CC} or GND		5.5	–	–	2.0	–	2.9	mA

AC Electrical Characteristics (C_L = 15pF, V_{CC} = 5V, Ta = 25°C)

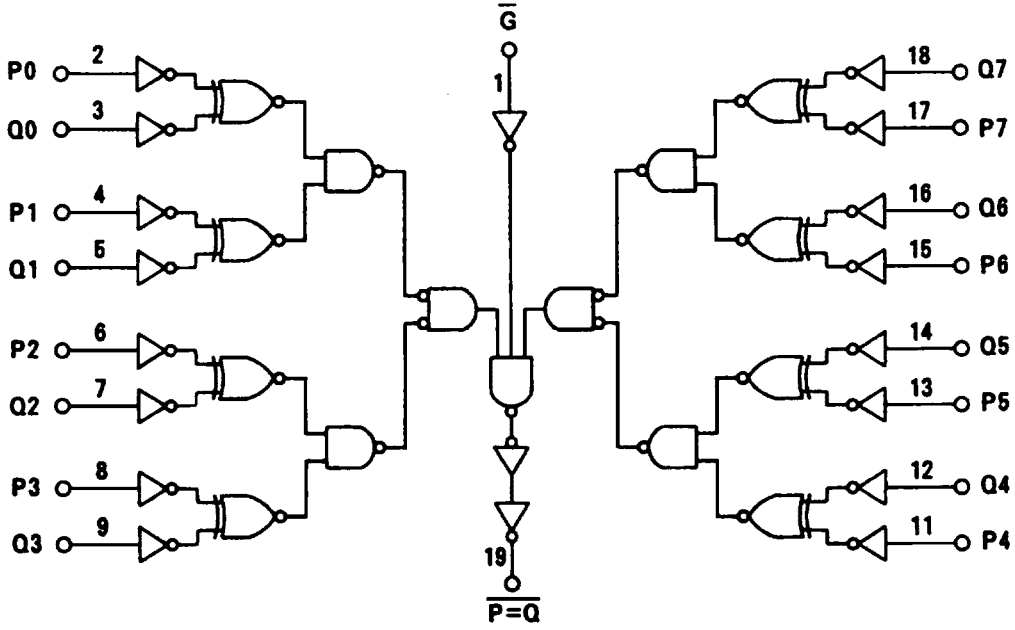
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Output Transition Time	t_{TLH} t_{THL}	–	–	6	12	ns
Propagation Delay Time (Pn, Qn-$\overline{P=Q}$)	t_{pLH} t_{pHL}	–	–	17	27	
Propagation Delay Time (G-$\overline{P=Q}$)	t_{pLH} t_{pHL}	–	–	12	19	

AC Electrical Characteristics (C_L = 50pF, Input $t_r = t_f$ = 6ns)

Parameter	Symbol	Test Condition		Ta = 25°C			Ta = -40 ~ 85°C		Unit
			V_{CC}	Min.	Typ.	Max.	Min.	Max.	
Output Transition Time	t_{TLH} t_{THL}	–	4.5 5.5	– –	8 7	15 13	– –	19 16	ns
Propagation Delay Time (Pn, Qn-$\overline{P=Q}$)	t_{pLH} t_{pHL}	–	4.5 5.5	– –	21 18	32 29	– –	40 36	
Propagation Delay Time (G-$\overline{P=Q}$)	t_{pLH} t_{pHL}	–	4.5 5.5	– –	15 13	23 21	– –	28 26	
Input Capacitance	C_{IN}	–		–	5	10	–	10	pF
Power Dissipation Capacitance	C_{PD}(1)	–		–	32	–	–	–	

Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation:

$I_{CC(opr)} = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}$



Logic Diagram