

TC74HCT688AP, TC74HCT688AF

8 – BIT EQUALITY COMPARATOR

The TC74HCT688A is a high speed CMOS 8 –BIT EQUALITY COMPARATOR fabricated with silicon gate C²MOS technology.

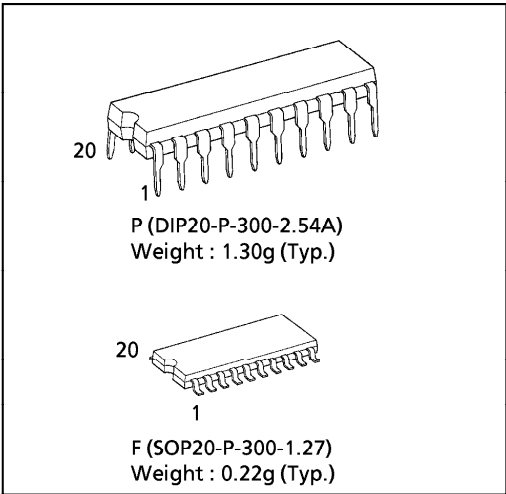
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

The TC74HCT688A compares two 8-bit binary or BCD words applied inputs P0~P7, and inputs Q0~Q7, and indicates whether or not they are equal.

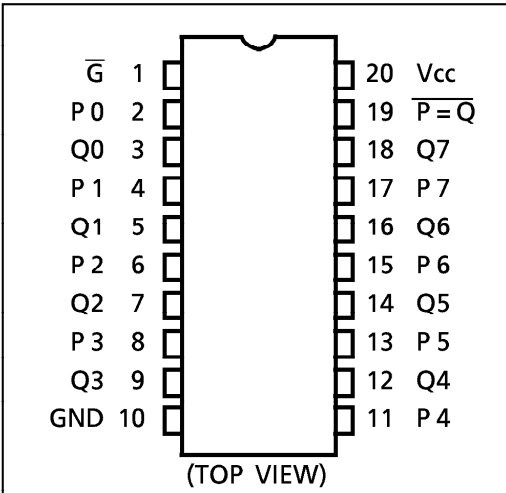
A signal active low enable is provided to facilitate cascading of several package to compare of words greater than 8 bits. All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

- High Speed..... $t_{pd} = 17ns(typ.)$ at $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 4\mu A(Max.)$ at $T_a = 25^{\circ}C$
- Compatible with TTL outputs..... $V_{IH} = 2.0V (Min.)$
 $V_{IL} = 0.8V(Max.)$
- Output Drive Capability..... 10 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = |I_{OL}| = 4mA (Min.)$
- Balanced Propagation Delays..... $t_{pLH} \cong t_{pHL}$
- Pin and Function Compatible with 74LS688



PIN ASSIGNMENT



TRUTH TABLE

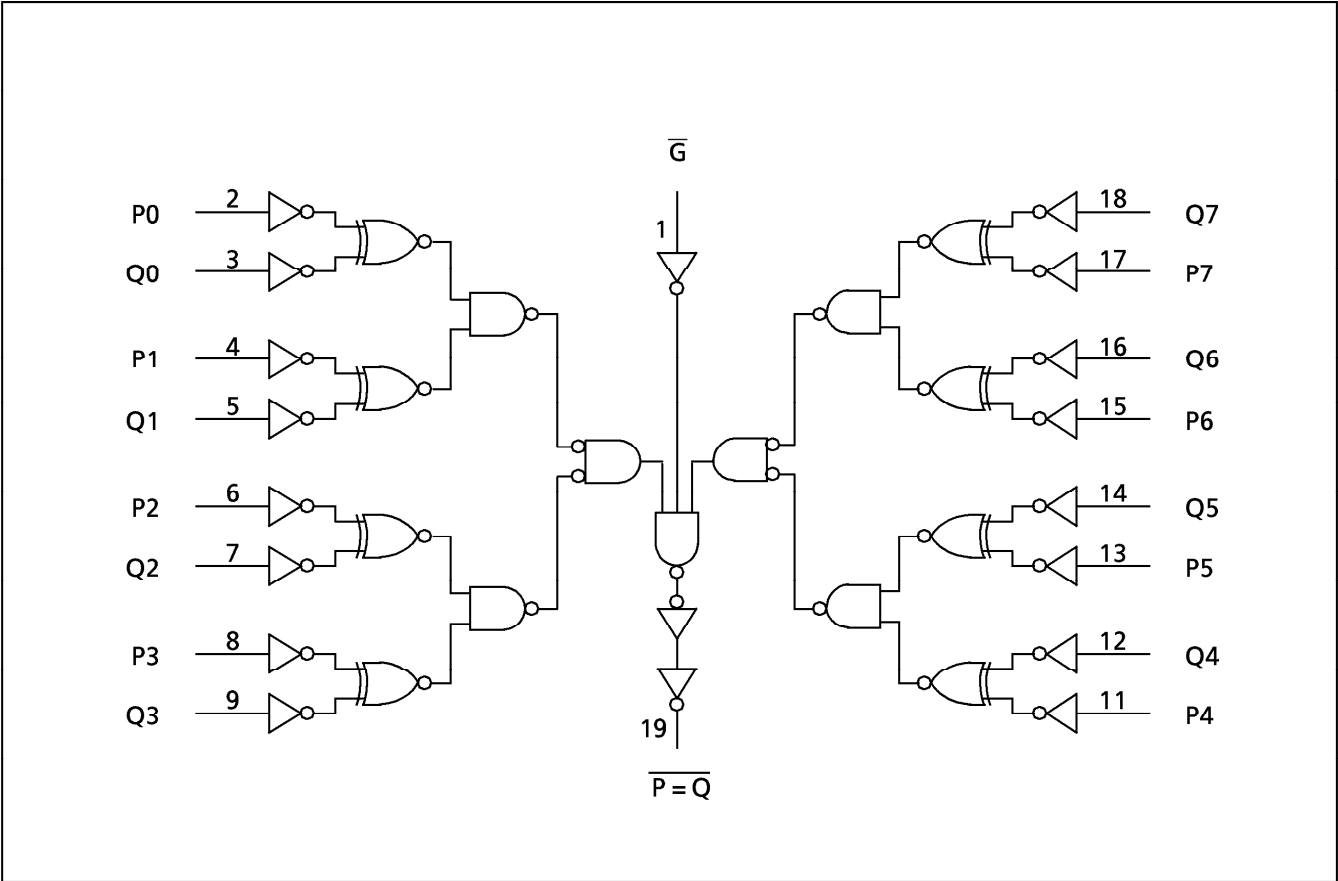
INPUTS		OUTPUT
P, Q	$\overline{G}$	$\overline{P=Q}$
P = Q	L	L
P $\neq$ Q	L	H
X	H	H

x: Don't care

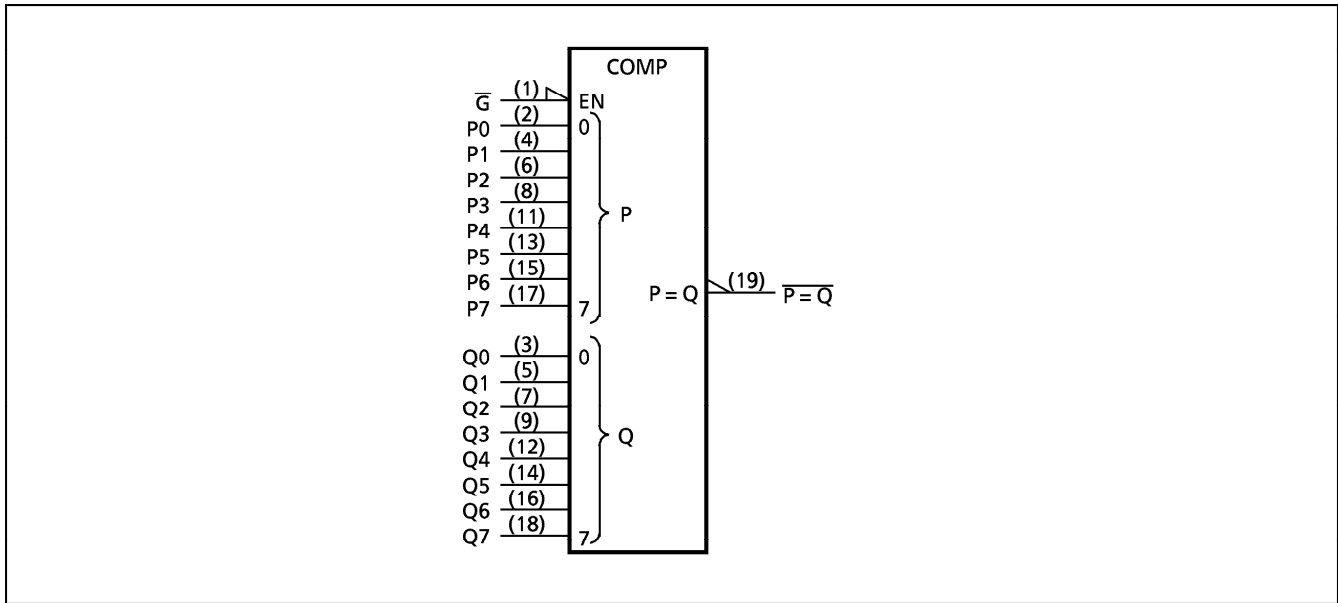
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SYSTEM DIAGRAM



IEC LOGIC SYMBOL



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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7.0$	V
DC Input Voltage	V_{IN}	$-0.5 \sim V_{CC} + 0.5$	V
DC Output Voltage	V_{OUT}	$-0.5 \sim V_{CC} + 0.5$	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 (SOP)	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	°C

*500mW in the range of $T_a = -40^\circ\text{C} \sim 65^\circ\text{C}$. From $T_a = 65^\circ\text{C}$ to 85°C a derating factor of $-10\text{mW}/^\circ\text{C}$ should be applied up to 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	$4.5 \sim 5.5$	V
Input Voltage	V_{IN}	$0 \sim V_{CC}$	V
Output Voltage	V_{OUT}	$0 \sim V_{CC}$	V
Operating Temperature	T_{opr}	$-40 \sim 85$	°C
Input Rise and Fall Time	t_r, t_f	$0 \sim 500$	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40 \sim 85^\circ\text{C}$		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
High - Level Input Voltage	V_{IH}		$4.5 \begin{smallmatrix} \text{ } \\ \text{ } \end{smallmatrix} 5.5$	2.0	—	—	2.0	—	V
Low - Level Input Voltage	V_{IL}		$4.5 \begin{smallmatrix} \text{ } \\ \text{ } \end{smallmatrix} 5.5$	—	—	0.8	—	0.8	V
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20 \mu\text{A}$	4.5	4.4	4.5	—	4.4	V
			$I_{OH} = -4 \text{ mA}$	4.5	4.18	4.31	—	4.13	
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20 \mu\text{A}$	4.5	—	0.0	0.1	—	V
			$I_{OL} = 4 \text{ mA}$	4.5	—	0.17	0.26	—	
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC} \text{ or GND}$	5.5	—	—	± 0.1	—	± 1.0	μA
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC} \text{ or GND}$	5.5	—	—	4.0	—	40.0	mA
	I_C	PER INPUT: $V_{IN} = 0.5\text{V or } 2.4\text{V}$ OTHER INPUT: $V_{CC} \text{ or GND}$	5.5	—	—	2.0	—	2.9	

AC ELECTRICAL CHARACTERISTICS ($C_L = 15\text{pF}$, $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$, Input $t_r = t_f = 6\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Transition Time	t_{TLH} t_{THL}		—	6	12	ns
Propagation Delay Time ($P_n, Q_n - \overline{P=Q}$)	t_{PLH} t_{PHL}		—	17	27	
Propagation Delay Time ($\overline{G} - \overline{P=Q}$)	t_{PLH} t_{PHL}		—	12	19	

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

PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C				Ta = −40–85°C		UNIT
			VCC (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	tTLH		4.5	—	8	15	—	19	ns
	tTHL		5.5	—	7	13	—	16	
Propagation Delay Time (Pn, Qn − P=Q)	tPLH		4.5	—	21	32	—	40	
	tPHL		5.5	—	18	29	—	36	
Propagation Delay Time (G − P=Q)	tPLH		4.5	—	15	23	—	29	
	tPHL		5.5	—	13	21	—	26	
Input Capacitance	CIN		—	5	10	—	10	pF	
Power Dissipation Capacitance	C _{PD} (1)		—	32	—	—	—		

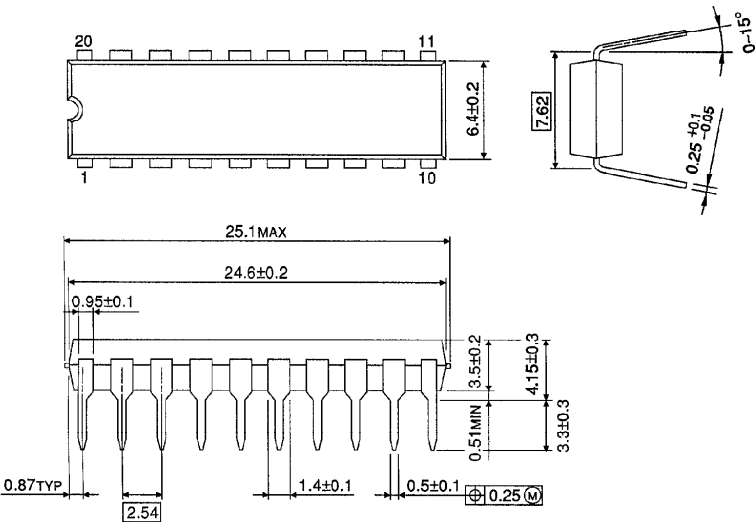
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

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

DIP 20PIN OUTLINE DRAWING (DIP20-P-300-2.54A)

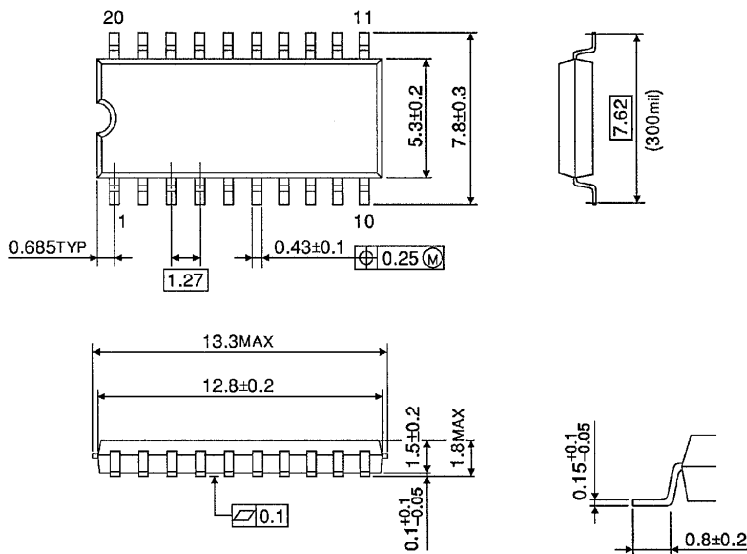
Unit in mm



Weight : 1.30g (Typ.)

SOP 20PIN (200mil BODY) OUTLINE DRAWING (SOP20-P-300-1.27)

Unit in mm



Weight : 0.22g (Typ.)