TC74ACT520P/F/FW 8-BIT EQUALITY COMPARATOR WITH PULL-UP RESISTOR
TC74ACT521P/F/FW 8-BIT EQUALITY COMPARATOR

The TC74ACT520 and TC74ACT521 are advanced high speed CMOS 8-BIT DIGITAL COMPARATOR fabricated with silicon gate and double-layer metal wiring C^2MOS technology.

They achieve the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.

These devices 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.

They compare 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.

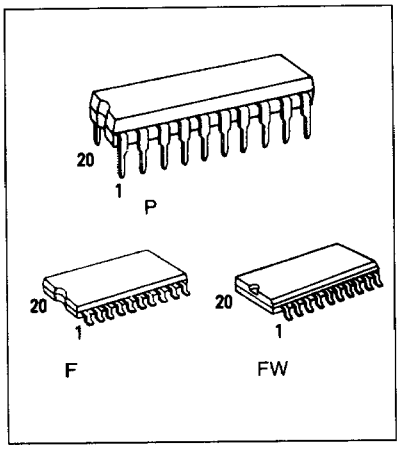
The TC74AC520 is equipped with pull-up resistors (20k Ω typ.) to inputs $Q_0 \sim Q_7$ and features pull-up resistors on the Q inputs for switch data.

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

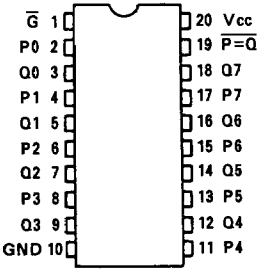
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

FEATURES:

- High Speed ..... t_{pd}=6.4ns(typ.) at V_{CC}=5V
- Low Power Dissipation ..... I_{CC}=8μA(Max.) at Ta=25℃*
- Compatible with TTL outputs..... V_{IL} =0.8V (Max.)
  V_{IH} =2.0V (Min.)
- Symmetrical Output Impedance ··· $|I_{OH}|=I_{OL}$=24mA(Min.)
  Capability of driving 50Ω transmission lines.
- Balanced Propagation Delays ..... $t_{pLH} \fallingdotseq t_{pHL}$
- Pin and Function Compatible with 74F521
- * .....for ACT520 only



PIN ASSIGNMENT



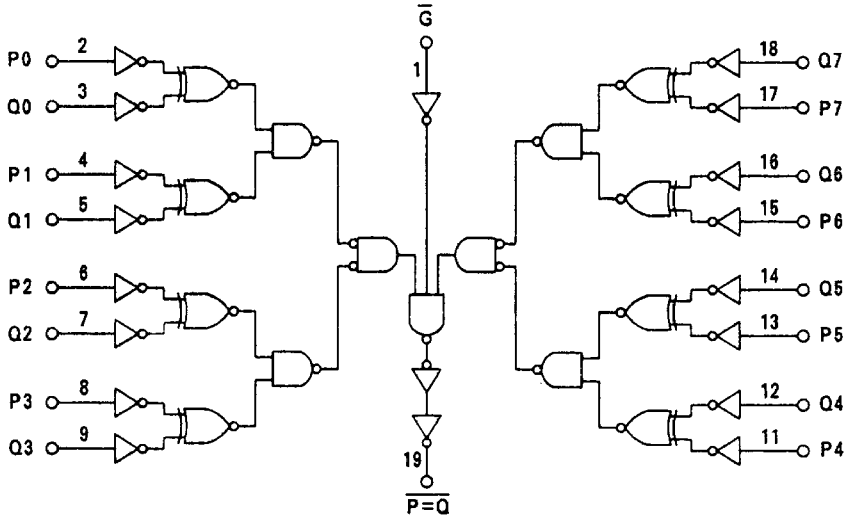
(TOP VIEW)

TRUTH TABLE

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

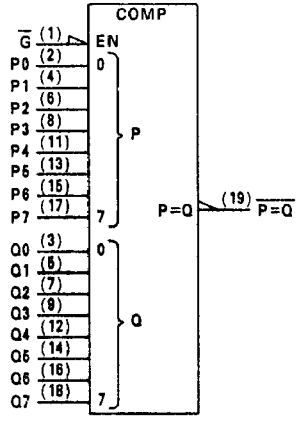
X : Don't care

SYSTEM DIAGRAM



Note : AC520 is equipped with pull−up resistor (20kΩ typ.) to inputs Q_0~Q_7.

IEC LOGIC SYMBOL



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	−0.5 ~7.0	V
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}	±50	mA
DC Output Current	I_{OUT}	±50	mA
DC V_{CC}/Ground Current	I_{CC}	±100	mA
Power Dissipation	P_D	500(DIP)*/180(SOP)	mW
Storage Temperature	T_{stg}	−65 ~150	℃
Lead Temperature 10sec	T_L	300	℃

*500mW in the range of Ta= −40℃~ 65℃. From Ta=65℃ to 85℃ a derating factor of −10mW/℃ should be applied up to 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	℃
Input Rise and Fall Time	dt/dv	0 ~ 10	ns/v

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V_{CC}	Ta=25℃			Ta=−40~85℃		UNIT
					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}=−50μA	4.5	4.4	4.5	−	4.4	−	V
			I_{OH}=−24mA	4.5	3.94	−	−	3.80	−	
			I_{OH}=−75mA*1	5.5	−	−	−	3.85	−	
Low−Level Output Voltage	V_{OL}	V_{IN}= V_{IH} or V_{IL}	I_{OL}=50μA	4.5	−	0.0	0.1	−	0.1	V
			I_{OL}=24mA	4.5	−	−	0.36	−	0.44	
			I_{OL}=75mA*1	5.5	−	−	−	−	1.65	

*1 :This spec indicates the capability of driving 50Ω transmission lines.
One output should be tested at a time for a 10ms maximum duration.

DC ELECTRICAL CHARACTERISTICS

i) **ACT520**

PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	Ta=25℃			Ta=−40~85℃		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
Input Leakage Current	I_{IN}	P and $\overline{G}$ inputs only $V_{IN}=V_{CC}$ or GND	5.5	−	−	±0.1	−	±1.0	μA
High−Level Input Current	I_{IH}	Q inputs only $V_{IN}=V_{CC}$	5.5	−	−	10	−	10	μA
Low−Level Input Current	I_{IL}	Q inputs only V_{IN}=GND	5.5	−	−0.3	−0.6	−	−1.0	mA
Quiescent Supply Current	I_{CC}	Q inputs open P and $\overline{G}$ inputs, $V_{IN}=V_{CC}$ or GND	5.5	−	−	8.0	−	80.0	μA
		Q inputs, V_{IN}=GND P and $\overline{G}$ inputs, $V_{IN}=V_{CC}$ or GND	5.5	−		4.8	−	8.0	mA
	ΔI_{CC}	Q inputs open PER INPUT: V_{IN}=3.4V OTHER INPUT: V_{CC} or GND	5.5	−	−	1.35	−	1.5	mA

ii) **ACT521**

PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	Ta=25℃			Ta=−40~85℃		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
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	−	−	8.0	−	80.0	μA
	ΔI_{CC}	PER INPUT: V_{IN}=3.4V OTHER INPUT: V_{CC} or GND	5.5	−	−	1.35	−	1.5	mA

AC ELECTRICAL CHARACTERISTICS (C_L=50pF, R_L=500Ω, Input $t_r=t_f$=3ns)

PARAMETER	SYMBOL	TEST CONDITION	V_{CC}	Ta=25℃			Ta=−40~85℃		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time (Pn, Qn−$\overline{P=Q}$)	t_{pLH} t_{pHL}		5.0±0.5	−	7.1	11.4	−	13.0	ns
Propagation Delay Time ($\overline{G-P=Q}$)	t_{pLH} t_{pHL}		5.0±0.5	−	5.7	8.3	−	9.5	ns
Input Capacitance	C_{IN}			−	5	10	−	10	pF
Power Dissipation Capacitance	C_{PD}(1)			−	29	−	−	−	pF

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:

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