520: with Pull-up Resistor

Features:

- **High Speed:** t_{pd} = 6.4ns (typ.) at V_{CC} = 5V
- **Low Power Dissipation:** I_{CC} = 8μA (max.) at Ta = 25°C*
- **High Noise Immunity:** $V_{NIH} = V_{NIL}$ = 28% V_{CC} (min.)
- **Symmetrical Output Impedance:** $|I_{OH}| = I_{OL}$ = 24mA (min.). Capability of driving 50Ω transmission lines.
- **Balanced Propagation Delays:** $t_{pLH} = t_{pHL}$
- **Wide Operating Voltage Range:** V_{CC} (opr) = 2V~5.5V
- **Pin and Function Compatible with 74F521**
- **Available in DIP, SOIC and SOP Packages**

* for AC521 only

The TC74AC520 and TC74AC521 are advanced high speed CMOS 8-BIT DIGITAL COMPARATORS 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.

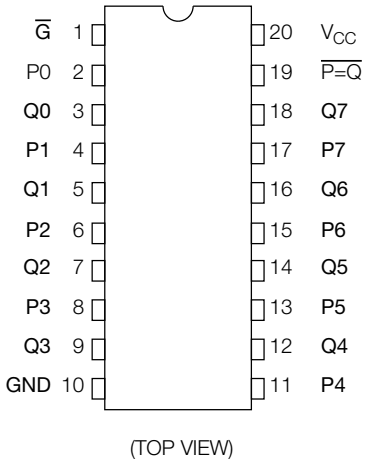
They compare two 8-bit binary or BCD words applied inputs P0~P7, and inputs Q0~Q7, and indicate whether or not they are equal.

The TC74AC520 is equipped with pull-up resistors (20Ω typ.) to inputs Q0~Q7 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 words greater than 8 bits.

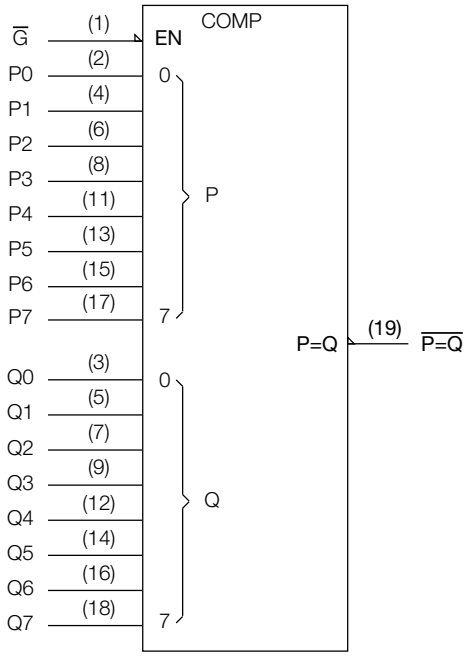
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

Pin Assignment



(TOP VIEW)

IEC Logic Symbol



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

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	°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 should be applied up to 300mW.

Recommended Operating Conditions

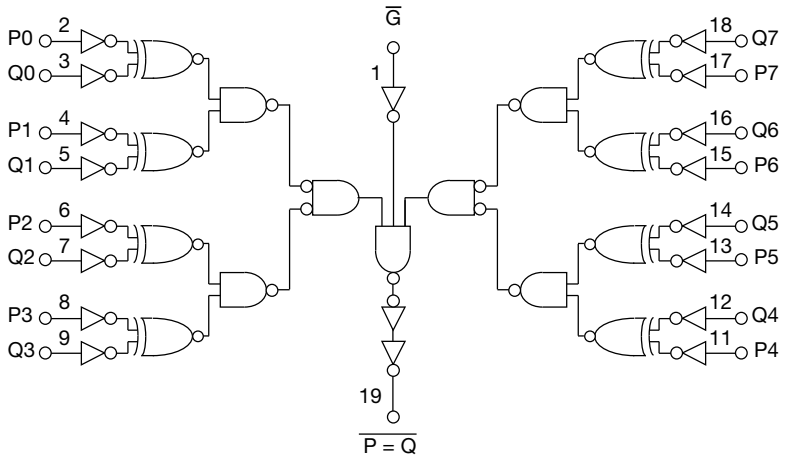
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0~5.5	V
Input Voltage	V_{IN}	0~V_{CC}	V
Output Voltage	V_{OUT}	0~V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C
Input Rise and Fall Time	dt/dv	0~100 (V_{CC} = 3.3±0.3V) 0~20 (V_{CC} = 5±0.5V)	ns/v

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}	—		2.0	1.50	—	—	1.50	—	V
				3.0	2.10	—	—	2.10	—	
				5.5	3.85	—	—	3.85	—	
Low-Level Input Voltage	V_{IL}	—		2.0	—	—	0.50	—	0.50	V
				3.0	—	—	0.90	—	0.90	
				5.5	—	—	1.65	—	1.65	
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -50μA	2.0	1.9	2.0	—	1.9	—	V
				3.0	2.9	3.0	—	2.9	—	
				4.5	4.4	4.5	—	4.4	—	
			I_{OH} = -4mA	3.0	2.58	—	—	2.48	—	
			I_{OH} = -24mA	4.5	3.94	—	—	3.80	—	
			I_{OH} = -75mA*	5.5	—	—	—	3.85	—	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50μA	2.0	—	0.0	0.1	—	0.1	V
				3.0	—	0.0	0.1	—	0.1	
				4.5	—	0.0	0.1	—	0.1	
			I_{OL} =12mA	3.0	—	—	0.36	—	0.44	
			I_{OL} = 24mA	4.5	—	—	0.36	—	0.44	
			I_{OL} = 75mA*	5.5	—	—	—	—	1.65	

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

System Diagram



Note: AC520 is equipped with pull-up resistors (20k Ωtyp.) to inputs Q_0 ~ Q_7.

DC Electrical Characteristics

i) AC520

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = -40~85°C		UNIT
			V_{CC}	Min.	Typ.	Max.	Min.	Max.	
Input Leakage Current	I_{IN}	P and $\overline{G}$ inputs only $V_{IN} = V_{CC}$ or GND	5.5	—	—	±1.0	—	±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

ii) AC521

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = -40~85°C		UNIT
			V_{CC}	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	

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

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C			Ta = -40~85°C		UNIT
			V_{CC}	Min.	Typ.	Max.	Min.	Max.	
Propagation Delay Time (Pn, Qn–$\overline{P}$=$\overline{Q}$)	t_{pLH}	—	3.0±0.3	—	10.5	17.5	1.0	20.0	ns
	t_{pHL}		5.0±0.5	—	7.2	11.0	1.0	12.5	
Propagation Delay Time ($\overline{G}$–$\overline{P}$=$\overline{Q}$)	t_{pLH}	—	3.0±0.3	—	7.2	11.5	1.0	13.0	
	t_{pHL}		5.0±0.5	—	4.8	7.0	1.0	8.0	
Input Capacitance	C_{IN}	—	—	—	5	10	—	10	pF
Power Dissipation Capacitance	C_{PD}[1]	—	—	—	34	—	—	—	

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