

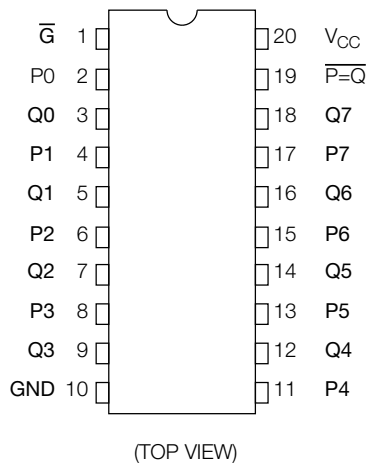
520: with Pull-up Resistor

Features:

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

* for AC521 only

Pin Assignment



Truth Table

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

X: Don't Care

The TC74AC520 and TC74AC521 are advanced high speed CMOS 8-BIT DIGITAL COMPARATORS fabricated with silicon gate and double-layer metal wiring C²MOS technology.

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

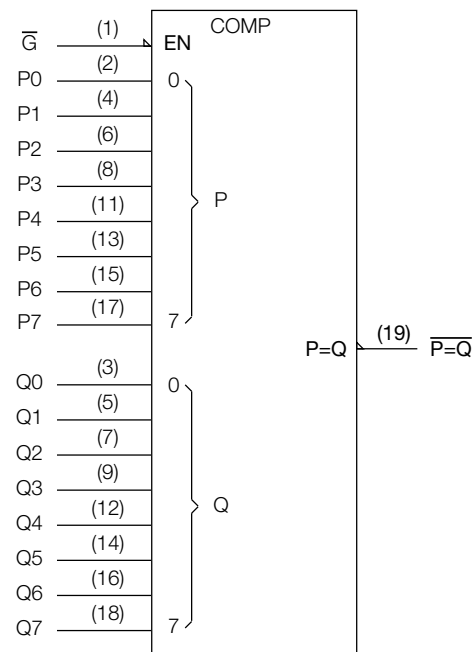
They compare two 8-bit binary or BCD words applied inputs P0~P7, and inputs Q0~Q7, and indicate whether or not they are equal.

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.

IEC Logic Symbol



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

Recommended Operating Conditions

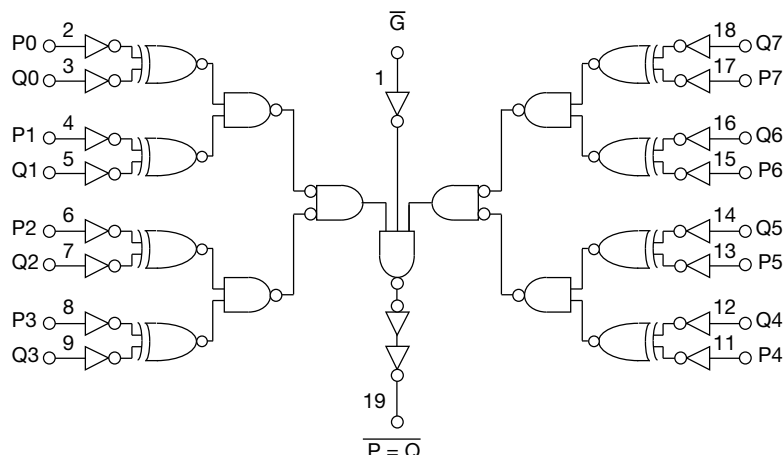
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0-5.5	V
Input Voltage	V_{IN}	0- V_{CC}	V
Output Voltage	V_{OUT}	0- V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C
Input Rise and Fall Time	dt/dv	0~100 ($V_{CC} = 3.3 \pm 0.3\text{V}$) 0~20 ($V_{CC} = 5 \pm 0.5\text{V}$)	ns/v

DC Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITION	$T_a = 25^{\circ}\text{C}$			$T_a = -40 \sim 85^{\circ}\text{C}$		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}	$I_{OH} = -50\mu\text{A}$	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	—		
				$I_{OH} = -4\text{mA}$	3.0	2.58	—	—	2.48		—
				$I_{OH} = -24\text{mA}$	4.5	3.94	—	—	3.80		—
Low-Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50\mu\text{A}$	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		
				$I_{OL} = 12\text{mA}$	3.0	—	—	0.36	—		0.44
				$I_{OL} = 24\text{mA}$	4.5	—	—	0.36	—		0.44
				$I_{OL} = 75\text{mA}^*$	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 Ω typ.) to inputs Q₀ ~ Q₇.

DC Electrical Characteristics

i) AC520

PARAMETER	SYMBOL	TEST CONDITION	V _{CC}	Ta = 25°C			Ta = -40~85°C		UNIT
				Min.	Typ.	Max.	Min.	Max.	
Input Leakage Current	I _{IN}	P and \bar{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 \bar{G} inputs, V _{IN} = V _{CC} or GND	5.5	—	—	8.0	—	80.0	μA
		Q inputs, V _{IN} = GND P and \bar{G} inputs, V _{IN} = V _{CC} or GND	5.5	—	—	4.8	—	8.0	mA

ii) AC521

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

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

PARAMETER	SYMBOL	TEST CONDITION	V _{CC}	Ta = 25°C			Ta = -40~85°C		UNIT
				Min.	Typ.	Max.	Min.	Max.	
Propagation Delay Time (Pn, Qn~P=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 (G~P=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} • V_{CC} • f_{IN} + I_{CC}.