

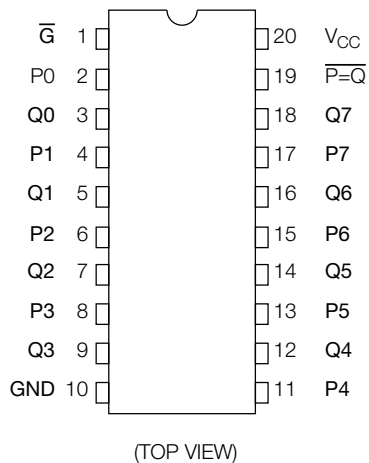
520: with Pull-up Resistor

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.

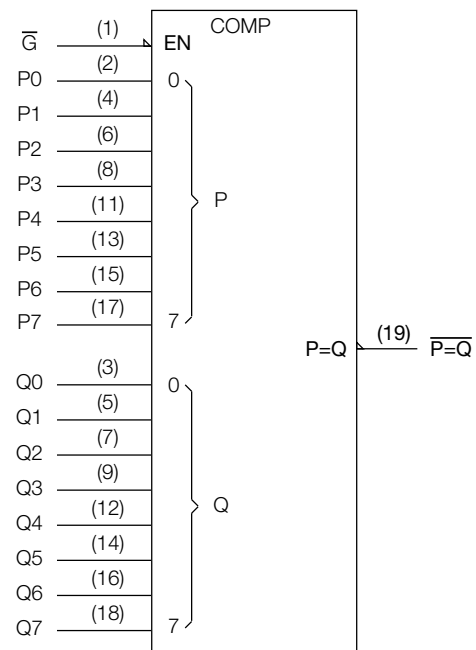
They compare two 8-bit binary or BCD words applied inputs P0~P7, and inputs Q0~Q7, and indicate whether or not they are equal.

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



The information contained here is subject to change without notice.

The information contained herein is presented only as guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others. These TOSHIBA products are intended for usage in general electronic equipments (office equipment, communication equipment, measuring equipment, domestic electrification, etc.) Please make sure that you consult with us before you use these TOSHIBA products in equipments which require high quality and/or reliability, and in equipments which could have major impact to the welfare of human life (atomic energy control, spaceship, traffic signal, combustion control, all types of safety devices, etc.). TOSHIBA cannot accept liability to any damage which may occur in case these TOSHIBA products were used in the mentioned equipments without prior consultation with TOSHIBA.

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

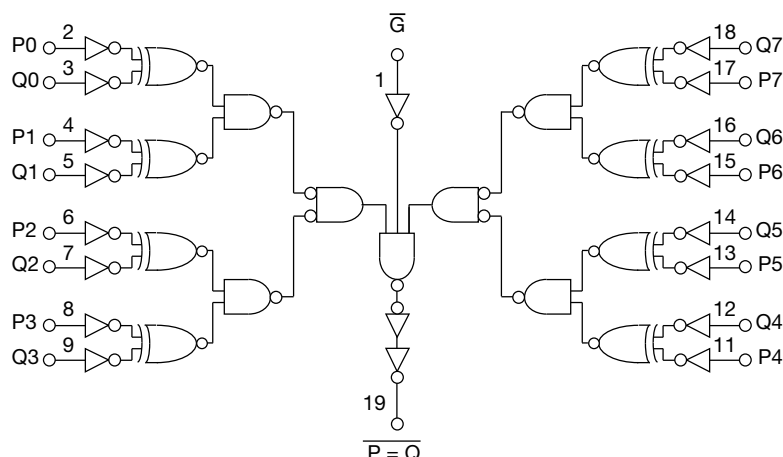
PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	2.0-5.5	V
Input Voltage	V_{IN}	0- V_{CC}	V
Output Voltage	V_{OUT}	0- V_{CC}	V
Operating Temperature	T_{opr}	-40~85	°C
Input Rise and Fall Time	dt/dv	0~100 ($V_{CC} = 3.3 \pm 0.3\text{V}$) 0~20 ($V_{CC} = 5 \pm 0.5\text{V}$)	ns/v

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	—			
			$I_{OH} = -4\text{mA}$	4.5	4.4	4.5	—	4.4	—			
				4.5	$I_{OH} = -24\text{mA}$	3.0	2.58	—	—		2.48	—
					$I_{OH} = -75\text{mA}^*$	5.5	—	—	—		3.85	—
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			
			4.5	$I_{OL} = 12\text{mA}$	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}.