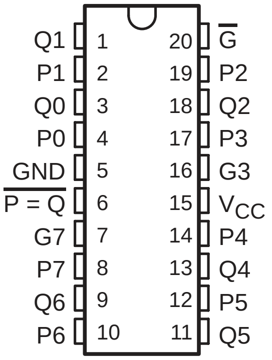
54ACT11520, 74ACT11520
8-BIT IDENTITY COMPARATORS

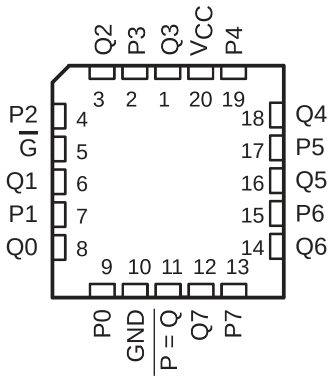
SCAS009B − D2957, JULY 1987 − REVISED APRIL 1993

- **Compares Two 8-Bit Words**
- **Inputs Are TTL-Voltage Compatible**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Center-Pin V_{CC} and GND Configurations Minimize High-Speed Switching Noise**
- ***EPIC*™ (Enhanced-Performance Implanted CMOS) 1-μm Process**
- **500-mA Typical Latch-Up Immunity at 125°C**
- **The Device Has the Equivalent of 20-kΩ Pullup Resistors on Q Inputs**
- **Package Options Include Plastic Small- Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**

54ACT11520 . . . J PACKAGE
74ACT11520 . . . DW OR N PACKAGE
(TOP VIEW)



54ACT11520 . . . FK PACKAGE
(TOP VIEW)



description

These identity comparators perform comparisons on two 8-bit binary or BCD words. Features include 20-kΩ pullup termination resistors on the Q inputs for analog or switch data and a $\overline{P = Q}$ totem-pole output.

The 54ACT11520 is characterized for operation over the full military temperature range of − 55°C to 125°C. The 74ACT11520 is characterized for operation from − 40°C to 85°C.

FUNCTION TABLE

INPUTS		**OUTPUT**
DATA P, Q	**ENABLE $\overline{G}$**	**$\overline{P = Q}$**
P = Q	L	L
P > Q	L	H
P < Q	L	H
X	H	H

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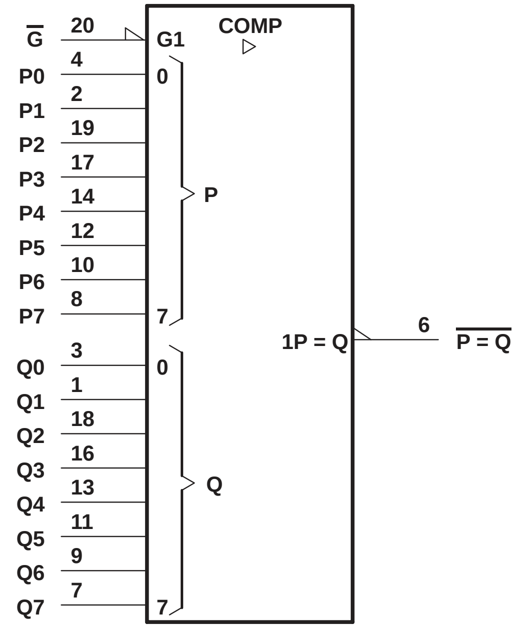
logic symbol†



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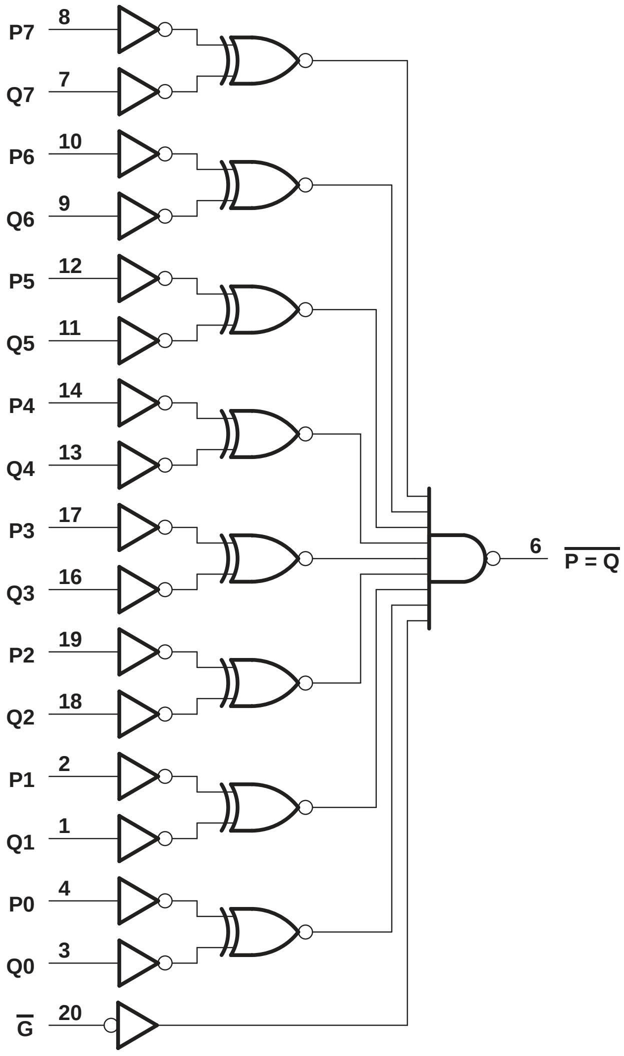
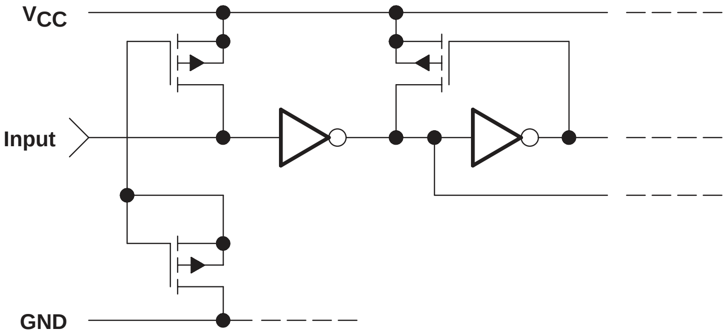
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



Pin numbers shown are for the DW, J, and N packages.

schematic of Q inputs



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage range, V_{CC}	−0.5 V to 7 V
Input voltage range, V_I (see Note 1)	−0.5 V to V_{CC} + 0.5 V
Output voltage range, V_O (see Note 1)	−0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	± 50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 50 mA
Continuous current through V_{CC} or GND	±100 mA
Storage temperature range	−65°C to 150°C

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

recommended operating conditions

		54ACT11520			74ACT11520			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
V_I	Input voltage	0		V_{CC}	0		V_{CC}	V
V_O	Output voltage	0		V_{CC}	0		V_{CC}	V
I_{OH}	High-level output current			−24			−24	mA
I_{OL}	Low-level output current			24			24	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0		10	0		10	ns/V
T_A	Operating free-air temperature	−55		125	−55		85	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C MIN	T_A = 25°C TYP	T_A = 25°C MAX	54ACT11520 MIN	54ACT11520 MAX	74ACT11520 MIN	74ACT11520 MAX	UNIT
V_{OH}	I_{OH} = − 50 µA	4.5 V	4.4			4.4		4.4		V
		5.5 V	5.4			5.4		5.4		
	I_{OH} = − 24 mA	4.5 V	3.94			3.7		3.8		
		5.5 V	4.94			4.7		4.8		
	I_{OH} = − 50 mA†	5.5 V				3.85				
	I_{OH} = − 75 mA†	5.5 V						3.85		
V_{OL}	I_{OL} = 50 µA	4.5 V			0.1		0.1		0.1	V
		5.5 V			0.1		0.1		0.1	
	I_{OL} = 24 mA	4.5 V			0.36		0.5		0.44	
		5.5 V			0.36		0.5		0.44	
	I_{OL} = 50 mA†	5.5 V					1.65			
	I_{OL} = 75 mA†	5.5 V							1.65	
I_{IH}	$V_I = V_{CC}$, Q inputs only	5.5 V			10		10		10	µA
I_{IL}	V_I = GND, Q inputs only	5.5 V		− 0.3	− 0.6		− 1		− 1	µA
I_I	$V_I = V_{CC}$ or GND, P and $\overline{G}$ inputs only	5.5 V			± 0.1		± 1		± 1	µA
I_{CC}	Q inputs at GND, Other inputs $V_I = V_{CC}$ or GND	5.5 V		2.3	4.8		8		8	µA
	Q inputs at open, Other inputs $V_I = V_{CC}$ or GND	5.5 V			8		160		80	µA
ΔI_{CC}‡	Q inputs open, One input at 3.4 V and other inputs at V_{CC} or GND, P and $\overline{G}$ inputs only	5.5 V			0.9		1		1	mA
C_i	$V_I = V_{CC}$ or GND	5 V		3.5						pF

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

‡ This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

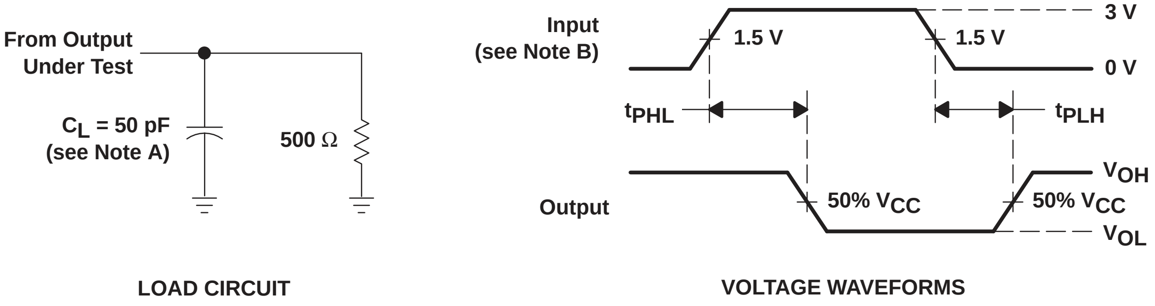
switching characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C MIN	T_A = 25°C TYP	T_A = 25°C MAX	54ACT11520 MIN	54ACT11520 MAX	74ACT11520 MIN	74ACT11520 MAX	UNIT
t_{PLH}	P or Q	$\overline{P = Q}$	1.5	8.6	12.7	1.5	15.4	1.5	14.3	ns
t_{PHL}			1.5	8	12.4	1.5	14.8	1.5	13.9	
t_{PLH}	$\overline{G}$	$\overline{P = Q}$	1.5	6.4	8.5	1.5	10.2	1.5	9.5	ns
t_{PHL}			1.5	5.8	9	1.5	10.4	1.5	9.8	

operating characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance	C_L = 50 pF, f = 1 MHz	40	pF

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig capacitance.
B. Input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 ns.
C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS

Q INPUT CURRENT
vs
INPUT VOLTAGE

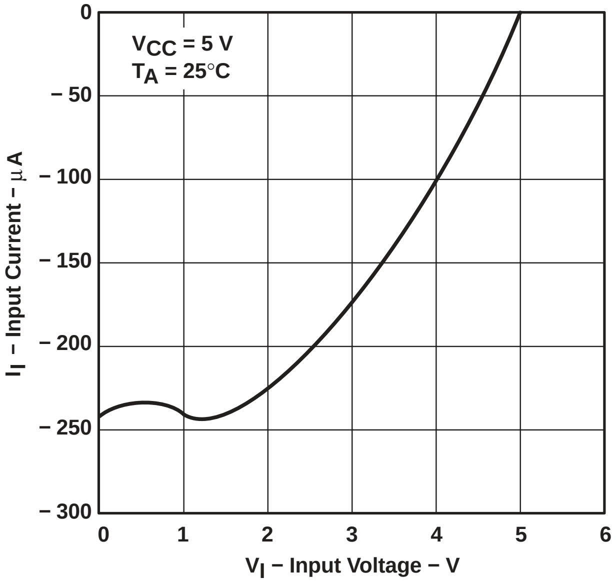


Figure 2

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