Signetics

74AC/ACT11521

8-Bit Identity Comparator

Product Specification

ACL Products

FEATURES

- **Compares two 8-bit words**
- **Output capability: ±24 mA**
- **Inputs are TTL-voltage compatible**
- **CMOS (AC) and TTL (ACT) voltage level inputs**
- **50Ω incident wave switching**
- **Center-pin V_{CC} and ground configuration to minimize high-speed switching noise**
- **I_{CC} category: MSI**

DESCRIPTION

The 74AC/ACT11521 high-performance CMOS devices combine very high speed and high output drive comparable to the most advanced TTL families.

The 74AC/ACT11521 identity comparators perform comparisons on two 8-bit binary or BCD words and provides a Low output when the two words match bit for bit.

The 74AC/ACT11521 identity comparators also feature a provision for $\overline{P=Q}$ totem-pole outputs.

GENERAL INFORMATION

SYMBOL	PARAMETER	CONDITIONS T_A = 25°C; GND = 0V; V_{CC} = 5.0V	TYPICAL		UNIT
			AC	ACT	
t_{PLH}/t_{PHL}	Propagation delay P_n or Q_n to $\overline{P=Q}$	C_L = 50pF	7.8	8.5	ns
C_{PD}	Power dissipation capacitance[1]	f = 1MHz; C_L = 50pF	42	40	pF
C_{IN}	Input capacitance	V_I = 0V or V_{CC}	3.5	3.5	pF
I_{LATCH}	Latch-up current	Per Jedec JC40.2 Standard 17	500	500	mA

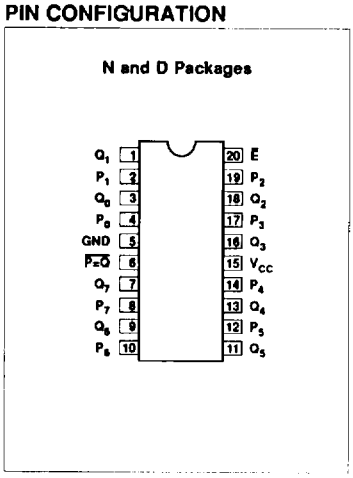
Note:

1. C_{PD} is used to determine the dynamic power dissipation (P_D in µW):
   $P_D = C_{PD} \times V_{CC}^2 \times f_I + \Sigma (C_L \times V_{CC}^2 \times f_O)$ where:
   f_I = input frequency in MHz, C_L = output load capacitance in pF,
   f_O = output frequency in MHz, V_{CC} = supply voltage in V,
   $\Sigma (C_L \times V_{CC}^2 \times f_O)$ = sum of outputs

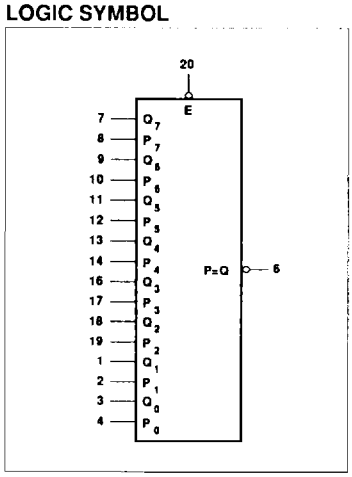
ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE
20-pin plastic DIP (300mil-wide)	-40°C to +85°C	74AC11521N 74ACT11521N
20-pin plastic SO (300mil-wide)	-40°C to +85°C	74AC11521D 74ACT11521D

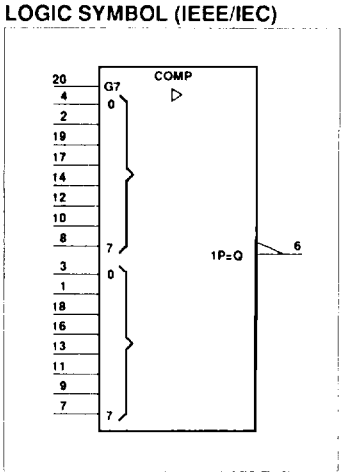
PIN CONFIGURATION



LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



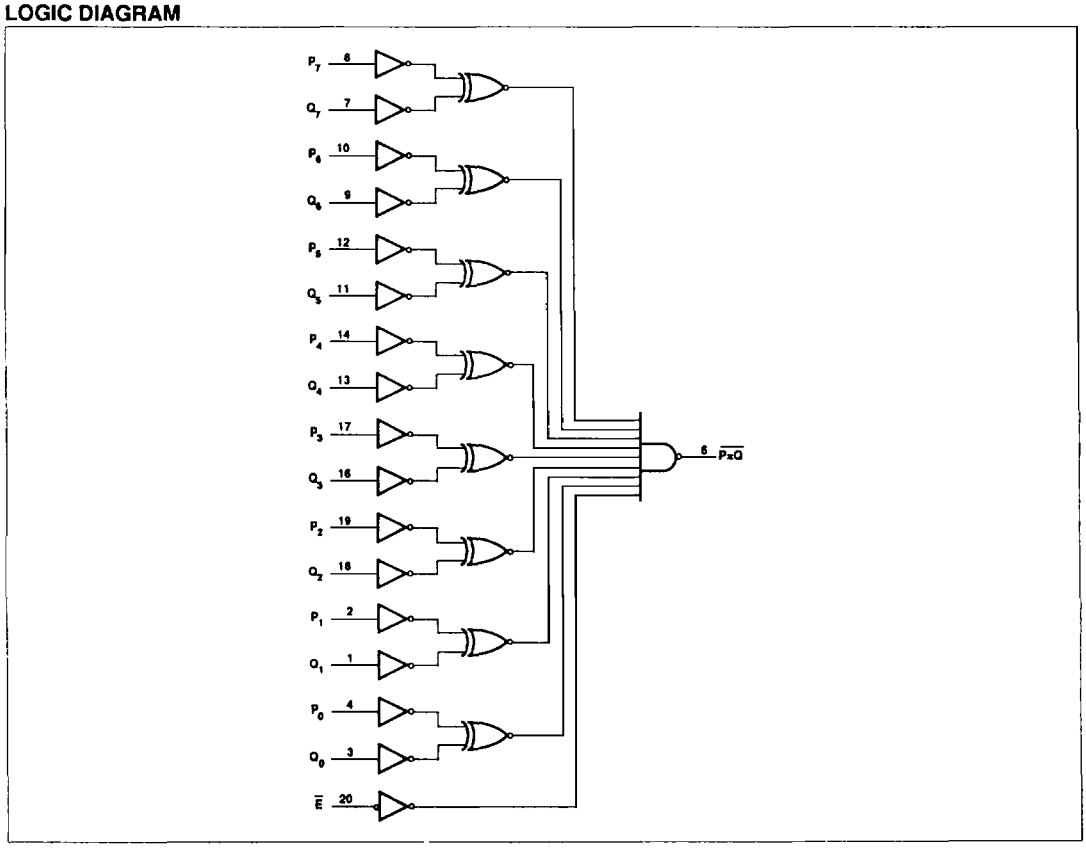
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
4, 2, 19, 17 14, 12, 10, 8	P_0 to P_7	Data inputs
3, 1, 18, 16 13, 11, 9, 7	Q_0 to Q_7	Data inputs
20	$\overline{E}$	Enable input (active Low)
6	$\overline{P=Q}$	Output
5	GND	Ground (0V)
15	V_{CC}	Positive supply voltage

FUNCTION TABLE

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

LOGIC DIAGRAM



RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	74AC11521			74ACT11521			UNIT
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	DC supply voltage	3.0[1]	5.0	5.5	4.5	5.0	5.5	V
V_I	Input voltage	0		V_{CC}	0		V_{CC}	V
V_O	Output voltage	0		V_{CC}	0		V_{CC}	V
$\Delta t/\Delta v$	Input transition rise or fall rate	0		10	0		10	ns/V
T_A	Operating free-air temperature	-40		+85	-40		+85	°C

NOTE:

1. No electrical or switching characteristics are specified at V_{CC} < 3V. Operation between 2V and 3V is not recommended, but within that range, a device output will maintain a previously established logic state.

ABSOLUTE MAXIMUM RATINGS[1]

SYMBOL	PARAMETER	TEST CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		-0.5 to +7.0	V
I_{IK} or V_I	DC input diode current[2]	$V_I < 0$	-20	mA
		$V_I > V_{CC}$	20	
	DC input voltage		-0.5 to V_{CC} +0.5	V
I_{OK} or V_O	DC output diode current[2]	$V_O < 0$	-50	mA
		$V_O > V_{CC}$	50	
	DC output voltage		-0.5 to V_{CC} +0.5	V
I_O	DC output source or sink current per output pin	V_O = 0 to V_{CC}	±50	mA
I_{CC} or I_{GND}	DC V_{CC} current		±100	mA
	DC ground current		±100	
T_{STG}	Storage temperature		-65 to 150	°C
P_{TOT}	Power dissipation per package Plastic DIP	Above 70°C:derate linearly by 8mW/K	500	mW
	Power dissipation per package Plastic surface mount (SO)	Above 70°C:derate linearly by 6mW/K	400	mW

NOTES:

1. Stresses beyond those listed 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.
2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS		V_{CC}	74AC11521				74ACT11521				UNIT
					T_A = +25°C		T_A = -40°C to +85°C		T_A = +25°C		T_A = -40°C to +85°C		
				V	Min	Max	Min	Max	Min	Max	Min	Max	
V_{IH}	High-level input voltage			3.0	2.10		2.10						V
				4.5	3.15		3.15		2.0		2.0		
				5.5	3.85		3.85		2.0		2.0		
V_{IL}	Low-level input voltage			3.0		0.90		0.90					V
				4.5		1.35		1.35		0.8		0.8	
				5.5		1.65		1.65		0.8		0.8	
V_{OH}	High-level output voltage	V_I = V_{IL} or V_{IH}	I_{OH} = -50μA	3.0	2.9		2.9						V
				4.5	4.4		4.4		4.4		4.4		
				5.5	5.4		5.4		5.4		5.4		
			I_{OH} = -4mA	3.0	2.58		2.48						
			I_{OH} = -24mA	4.5	3.94		3.8		3.94		3.8		
				5.5	4.94		4.8		4.94		4.8		
			I_{OH} = -75mA[1]	5.5			3.85				3.85		
V_{OL}	Low-level output voltage	V_I = V_{IL} or V_{IH}	I_{OL} = 50μA	3.0		0.1		0.1					V
				4.5		0.1		0.1		0.1		0.1	
				5.5		0.1		0.1		0.1		0.1	
			I_{OL} = 12mA	3.0		0.36		0.44					
			I_{OL} = 24mA	4.5		0.36		0.44		0.36		0.44	
				5.5		0.36		0.44		0.36		0.44	
			I_{OL} = 75mA[1]	5.5				1.65				1.65	
I_I	Input leakage current	V_I = V_{CC} or GND		5.5		±0.1		±1.0		±0.1		±1.0	μA
I_{CC}	Quiescent supply current	V_I = V_{CC} or GND, I_O = 0		5.5		8.0		80		8.0		80	μA
ΔI_{CC}	Supply current, TTL inputs High[2]	One input at 3.4V, other inputs at V_{CC} or GND		5.5						0.9		1.0	mA

NOTES:
1. Not more than one output should be tested at a time, and the duration of the test should not exceed 10ms.
2. This is the increase in supply current for each input that is at one of the specified TTL voltage levels rather than 0V or V_{CC}.

AC ELECTRICAL CHARACTERISTICS AT 3.3V ±0.3V

SYMBOL	PARAMETER	WAVEFORM	74AC11521					UNIT
			T_A = +25°C			T_A = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay P_n, Q_n to $\overline{P=Q}$	1	1.5 1.5	12.5 10.5	16.6 14.1	1.5 1.5	19.0 16.1	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{E}$ to $\overline{P=Q}$	1	1.5 1.5	7.1 6.4	9.8 8.8	1.5 1.5	10.8 10.1	ns

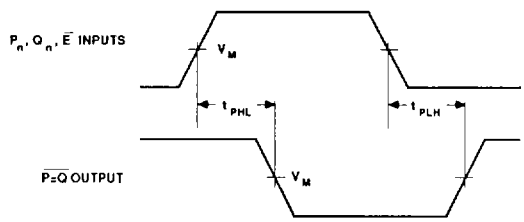
AC ELECTRICAL CHARACTERISTICS AT 5.0V ±0.5V

SYMBOL	PARAMETER	WAVEFORM	74AC11521					UNIT
			T_A = +25°C			T_A = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay P_n, Q_n to $\overline{P=Q}$	1	1.5 1.5	8.3 7.2	11.3 10.1	1.5 1.5	13.0 11.4	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{E}$ to $\overline{P=Q}$	1	1.5 1.5	5.1 4.8	7.1 7.1	1.5 1.5	7.9 8.1	ns

AC ELECTRICAL CHARACTERISTICS AT 5.0V ±0.5V

SYMBOL	PARAMETER	WAVEFORM	74ACT11521					UNIT
			T_A = +25°C			T_A = -40°C to +85°C		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay P_n, Q_n to $\overline{P=Q}$	1	1.5 1.5	8.8 8.2	13.0 12.0	1.5 1.5	14.7 13.6	ns
t_{PLH} t_{PHL}	Propagation delay $\overline{E}$ to $\overline{P=Q}$	1	1.5 1.5	6.7 6.8	9.3 8.8	1.5 1.5	10.5 9.7	ns

AC WAVEFORMS

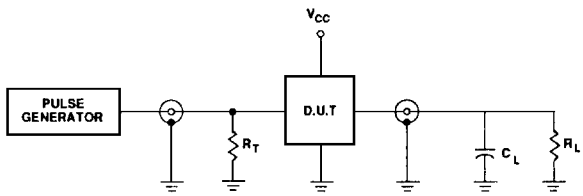


Waveform 1. Waveforms Showing the Inputs (P_n, Q_n, $\overline{E}$) to Output ($\overline{P=Q}$) Propagation Delays

WAVEFORM CONDITIONS

	INPUTS	OUTPUTS
AC	V_{IN} = GND to V_{CC}, V_M = 50% V_{CC}	V_{OUT} = V_{OL} to V_{OH}
ACT	V_{IN} = GND to 3.0V, V_M = 1.5V	V_M = 50% V_{CC}

TEST CIRCUIT



Test Circuit

DEFINITIONS

C_L = Load capacitance, 50pF; includes jig and probe capacitance

R_L = Load resistor, 500Ω

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators

Input pulses: PRR ≤ 10MHz

$t_r = t_f$ = 3ns