

T-45-17



54F/74F521 8-Bit Identity Comparator

General Description

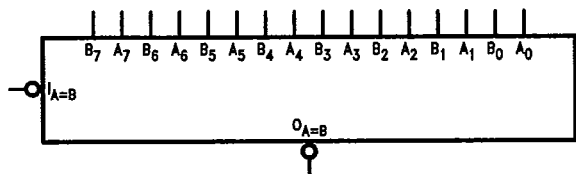
The 'F521 is an expandable 8-bit comparator. It compares two words of up to eight bits each and provides a LOW output when the two words match bit for bit. The expansion input $\bar{I}_{A=B}$ also serves as an active LOW enable input.

Features

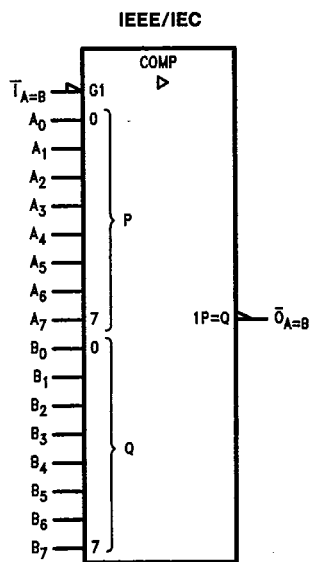
- Compares two 8-bit words in 6.5 ns typ
- Expandable to any word length
- 20-pin package

Ordering Code: See Section 5

Logic Symbols



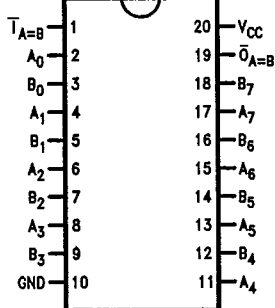
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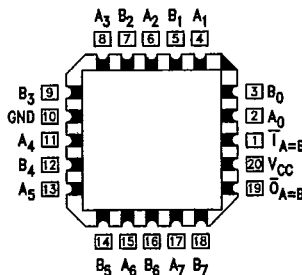
Connection Diagrams

Pin Assignment for DIP, SOIC and Flatpak



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Pin Assignment for LCC and PCC



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Unit Loading/Fan Out: See Section 2 for U.L. definitions

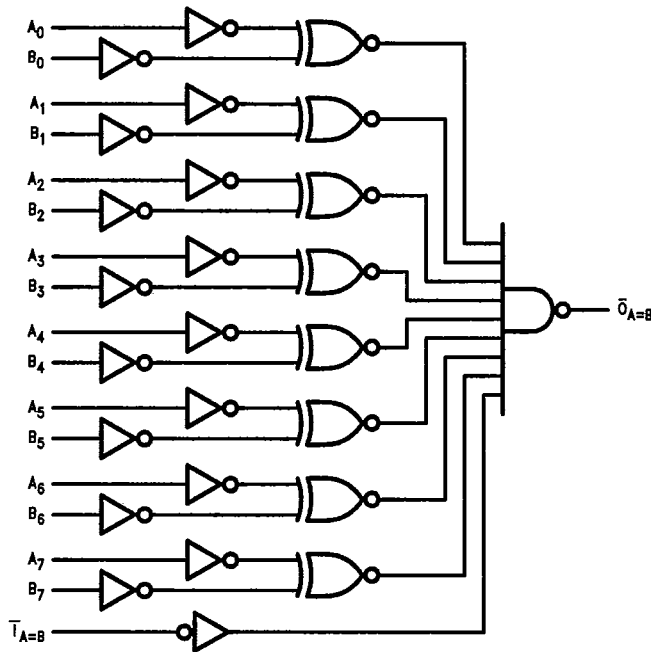
Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
A ₀ -A ₇	Word A Inputs	1.0/1.0	20 μ A / -0.6 mA
B ₀ -B ₇	Word B Inputs	1.0/1.0	20 μ A / -0.6 mA
$\bar{I}_{A=B}$	Expansion or Enable Input (Active LOW)	1.0/1.0	20 μ A / -0.6 mA
$\bar{O}_{A=B}$	Identity Output (Active LOW)	50/33.3	-1 mA / 20 mA

Truth Table

Inputs		Output
$\bar{I}_{A=B}$	A, B	$\bar{O}_{A=B}$
L	A = B*	L
L	A \neq B	H
H	A = B*	H
H	A \neq B	H

H = HIGH Voltage Level
 L = LOW Voltage Level
 *A₀ = B₀, A₁ = B₁, A₂ = B₂, etc.

Logic Diagram



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Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

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Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	-55°C to +175°C
V _{CC} Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V _{CC} = 0V)	
Standard Output	-0.5V to V _{CC}
TRI-STATE® Output	-0.5V to +5.5V

Current Applied to Output in LOW State (Max) twice the rated I_{OL} (mA)

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	-55°C to +125°C
Commercial	0°C to +70°C
Supply Voltage	
Military	+4.5V to +5.5V
Commercial	+4.5V to +5.5V

DC Electrical Characteristics

Symbol	Parameter	54F/74F			Units	V _{CC}	Conditions
		Min	Typ	Max			
V _{IH}	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V _{IL}	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage			-1.2	V	Min	I _{IN} = -18 mA
V _{OH}	Output HIGH Voltage	54F 10% V _{CC}	2.5		V	Min	I _{OH} = -1 mA
		74F 10% V _{CC}	2.5				I _{OH} = -1 mA
		74F 5% V _{CC}	2.7				I _{OH} = -1 mA
V _{OL}	Output LOW Voltage	54F 10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA
		74F 10% V _{CC}		0.5			I _{OL} = 20 mA
I _{IH}	Input HIGH Current			20	μA	Max	V _{IN} = 2.7V
I _{BV1}	Input HIGH Current Breakdown Test			100	μA	Max	V _{IN} = 7.0V
I _{IL}	Input LOW Current			-0.6	mA	Max	V _{IN} = 0.5V
I _{OS}	Output Short-Circuit Current	-60		-150	mA	Max	V _{OUT} = 0V
I _{CEX}	Output HIGH Leakage Current			250	μA	Max	V _{OUT} = V _{CC}
I _{CCH}	Power Supply Current		21	32	mA	Max	V _O = HIGH

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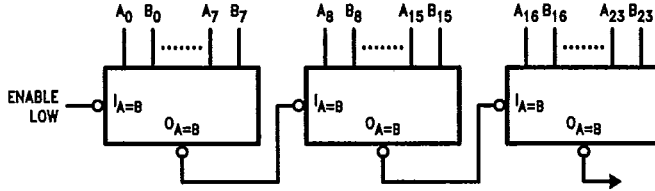
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AC Electrical Characteristics: See Section 2 for Waveforms and Load Configurations

Symbol	Parameter	74F			54F		74F		Units	Fig No
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{pF}$			$T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{pF}$		$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{pF}$			
		Min	Typ	Max	Min	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation Delay A_n or B_n to $\overline{O}_{A=B}$	3.0 4.5	7.0 7.0	10.0 10.0	3.0 4.0	14.0 15.0	3.0 4.0	11.0 11.0	ns	2-3
t_{PLH} t_{PHL}	Propagation Delay $\overline{I}_{A=B}$ to $\overline{O}_{A=B}$	3.0 3.5	5.0 6.5	6.5 9.0	3.0 3.5	8.5 13.5	3.0 3.5	7.5 10.0	ns	2-3

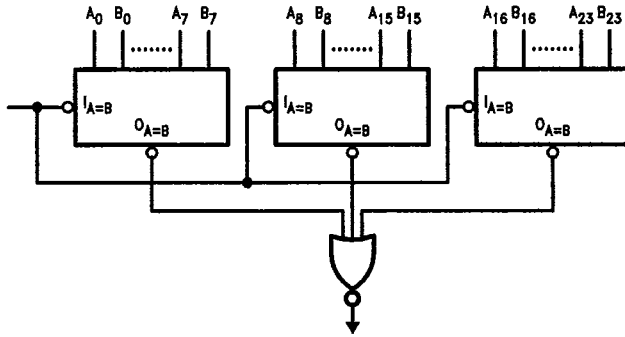
Applications

Ripple Expansion



TL/F/9545-6

Parallel Expansion



TL/F/9545-7