

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

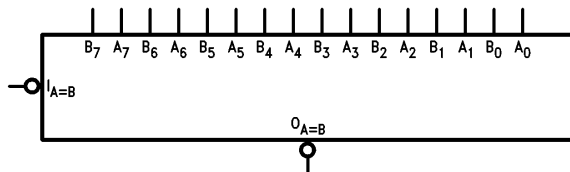
- Compares two 8-bit words in 6.5 ns typ
- Expandable to any word length
- 20-pin package

Commercial	Military	Package Number	Package Description
74F521PC		N20A	20-Lead (0.300" Wide) Molded Dual-In-Line
	54F521DM (Note 2)	J20A	20-Lead Ceramic Dual-In-Line
74F521SC (Note 1)		M20B	20-Lead (0.300" Wide) Molded Small Outline, JEDEC
74F521SJ (Note 1)		M20D	20-Lead (0.300" Wide) Molded Small Outline, EIAJ
74F521MSA (Note 1)		MSA20	20-Lead Molded Shrink Small Outline, EIAJ type II

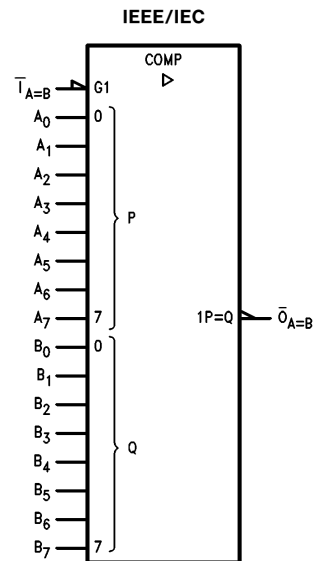
Note 1: Devices also available in 13" reel. Use suffix = SCX, SJX and MSAX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMOB.

Logic Symbols



TL/F/9545-1



TL/F/9545-4

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Unit Loading/Fan Out

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

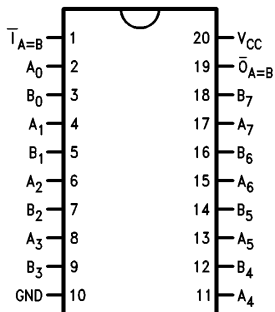
Truth Table

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.

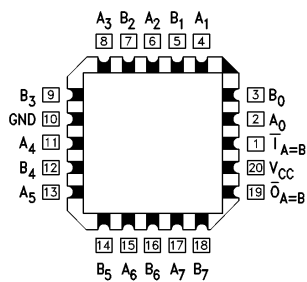
Connection Diagrams

Pin Assignment for DIP, SOIC, SSOP and Flatpak



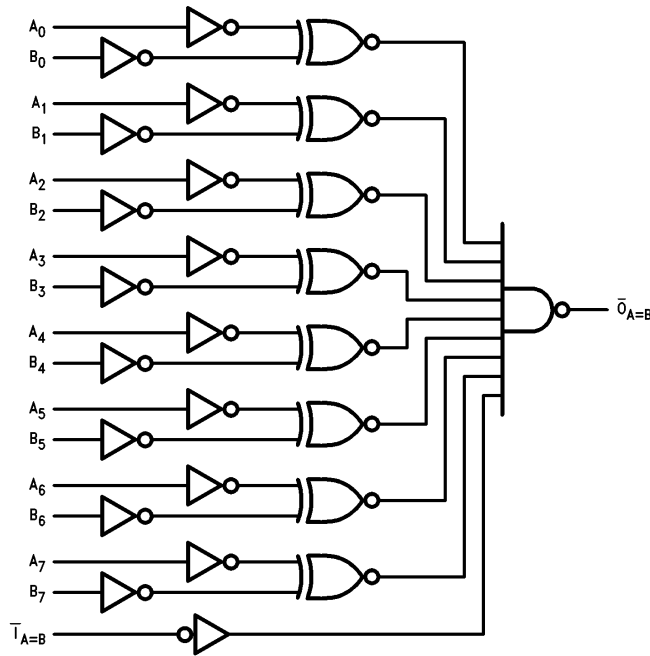
TL/F/9545-2

Pin Assignment for LCC



TL/F/9545-3

Logic Diagram



TL/F/9545-5

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

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please 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
Plastic	-55°C to +150°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

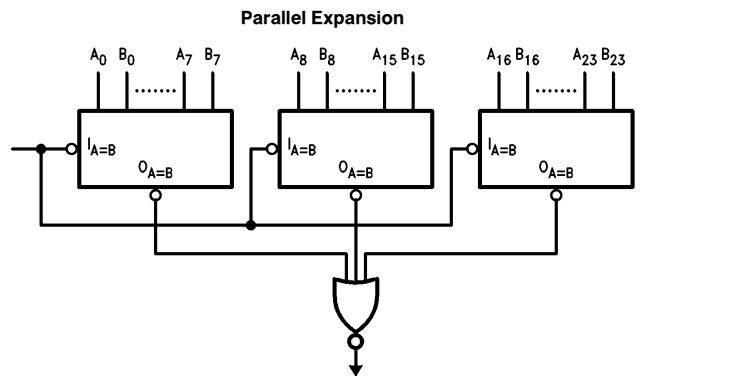
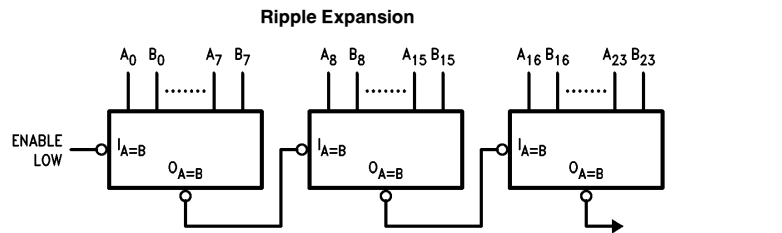
DC Electrical Characteristics

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 I _{OH} = -1 mA I _{OH} = -1 mA
		74F 10% V _{CC}	2.5				
		74F 5% V _{CC}	2.7				
V _{OL}	Output LOW Voltage	54F 10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA I _{OL} = 20 mA
		74F 10% V _{CC}		0.5			
I _{IH}	Input HIGH Current	54F		20.0	μA	Max	V _{IN} = 2.7V
		74F		5.0			
I _{BVI}	Input HIGH Current Breakdown Test	54F		100	μA	Max	V _{IN} = 7.0V
		74F		7.0			
I _{CEX}	Output HIGH Leakage Current	54F		250	μA	Max	V _{OUT} = V _{CC}
		74F		50			
V _{ID}	Input Leakage Test	74F	4.75		V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current	74F		3.75	μA	0.0	V _{IOD} = 150 mV All Other Pins Grounded
I _{IL}	Input LOW Current			-0.6	mA	Max	V _{IN} = 0.5V
I _{OS}	Output Short-Circuit Current			-60	mA	Max	V _{OUT} = 0V
I _{CCH}	Power Supply Current		21	32	mA	Max	V _O = HIGH

AC Electrical Characteristics

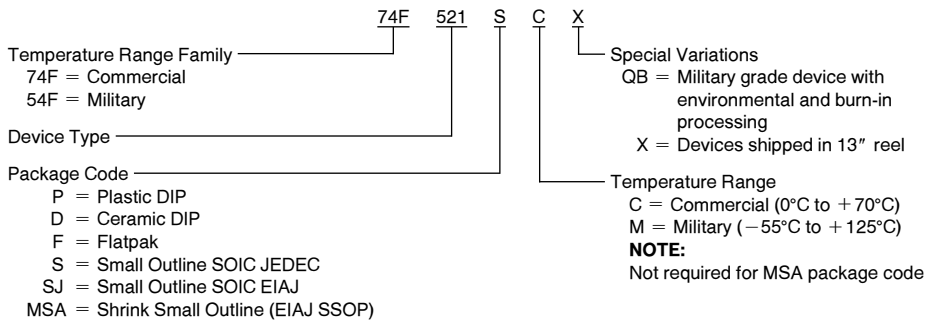
Symbol	Parameter	74F			54F		74F		Units
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$			$T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{ pF}$		$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{ pF}$		
		Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}	Propagation Delay A_n or B_n to $\overline{O}_{A=B}$	3.0	7.0	10.0	3.0	14.0	3.0	11.0	ns
t_{PHL}		4.5	7.0	10.0	4.0	15.0	4.0	11.0	
t_{PLH}	Propagation Delay $\overline{I}_{A=B}$ to $\overline{O}_{A=B}$	3.0	5.0	6.5	3.0	8.5	3.0	7.5	ns
t_{PHL}		3.5	6.5	9.0	3.5	13.5	3.5	10.0	

Applications

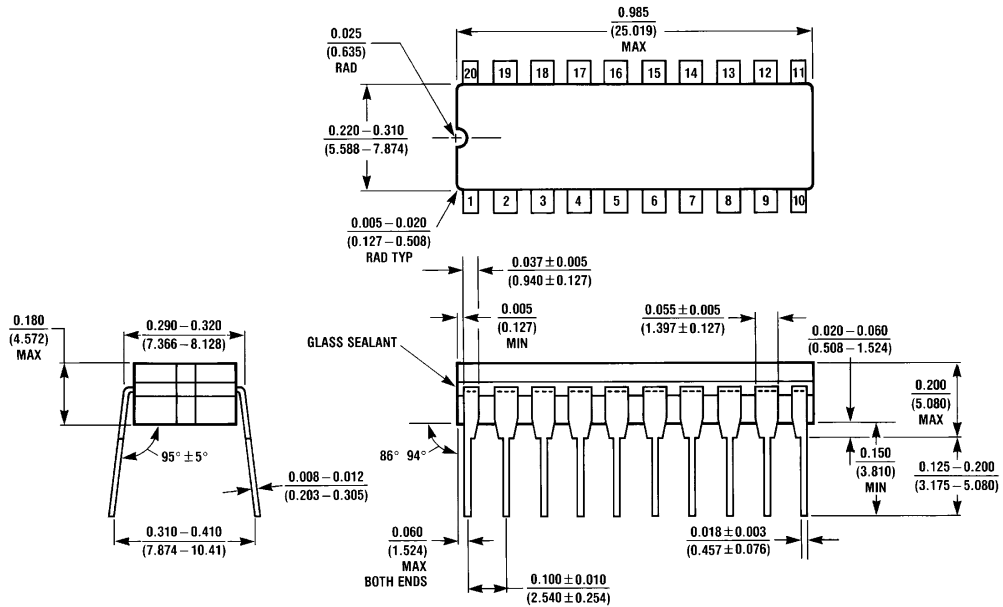


Ordering Information

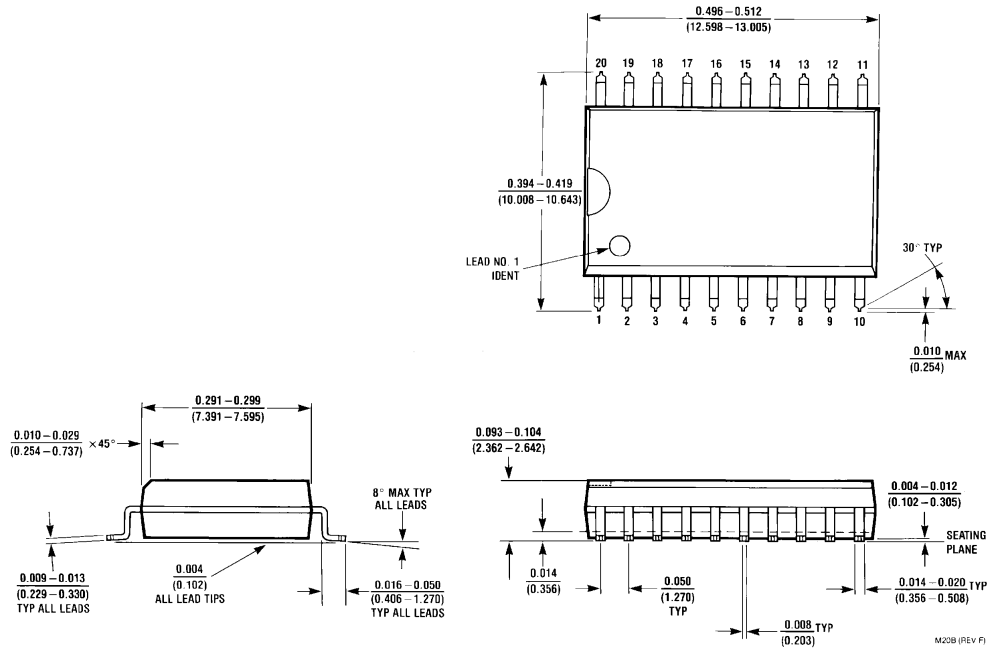
The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



Physical Dimensions inches (millimeters)

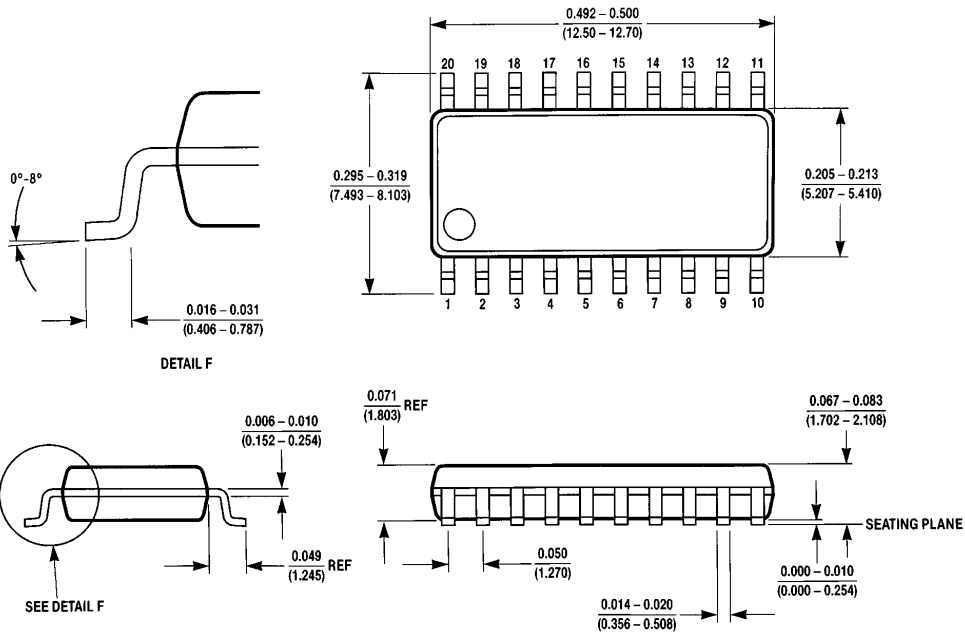


20-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J20A

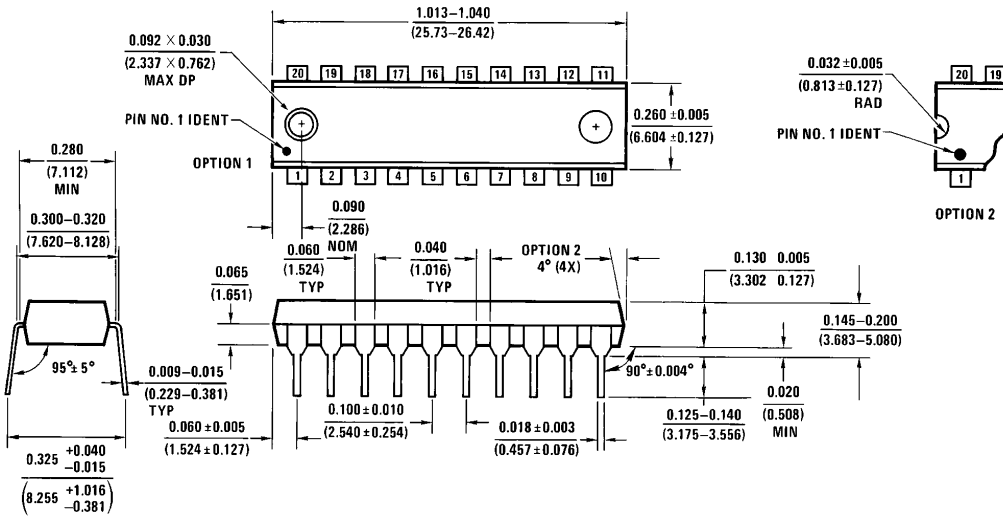


20-Lead (0.300" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M20B

Physical Dimensions inches (millimeters) (Continued)

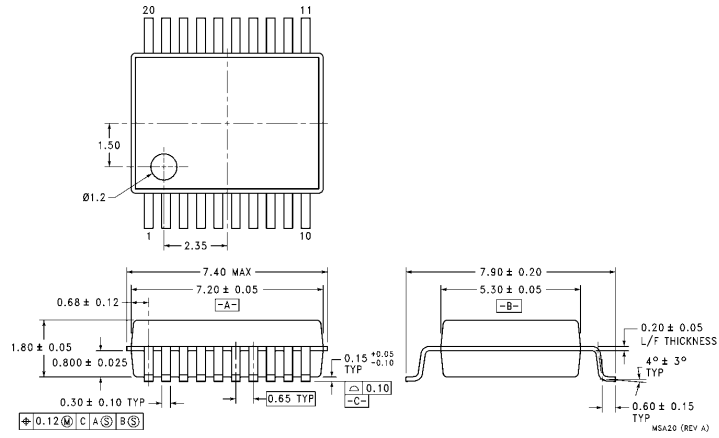


20-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M20D



20-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
NS Package Number N20A

Physical Dimensions inches (millimeters) (Continued)



**20-Lead (0.300" Wide) Molded Shrink Outline Package, EIAJ, Type II (MSA)
NS Package Number MSA20**

Physical Dimensions inches (millimeters) (Continued)



**20-Lead Ceramic Flatpak (F)
NS Package Number W20A**

W20A (REV E)

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