

May 1995

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

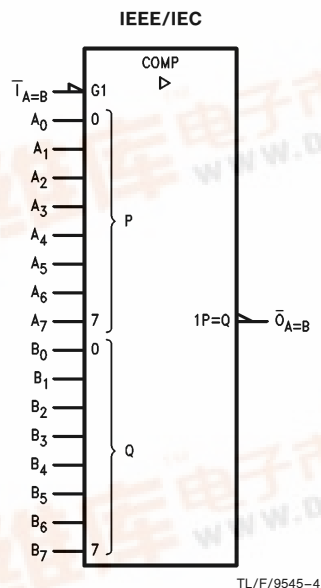
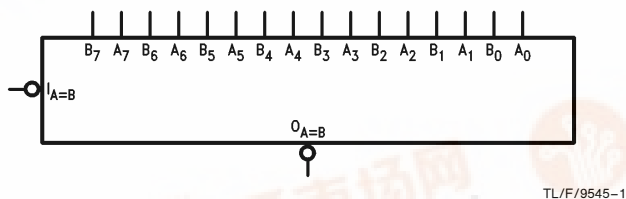
- Compares two 8-bit words in 6.5 ns typ
- Expandable to any word length
- 20-pin package

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



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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 μA/ –0.6 mA
B ₀ –B ₇	Word B Inputs	1.0/1.0	20 μA/ –0.6 mA
$\overline{I}_A=B$	Expansion or Enable Input (Active LOW)	1.0/1.0	20 μA/ –0.6 mA
$\overline{O}_A=B$	Identity Output (Active LOW)	50/33.3	–1 mA/20 mA

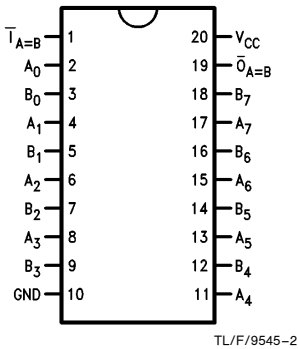
Truth Table

Inputs		Output
$\overline{I}_A=B$	A, B	$\overline{O}_A=B$
L	A = B*	L
L	A ≠ B	H
H	A = B*	H
H	A ≠ B	H

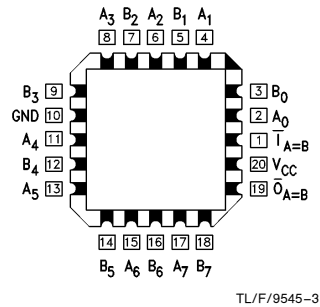
H = HIGH Voltage Level
L = LOW Voltage Level
*A₀ = B₀, A₁ = B₁, A₂ = B₂, etc.

Connection Diagrams

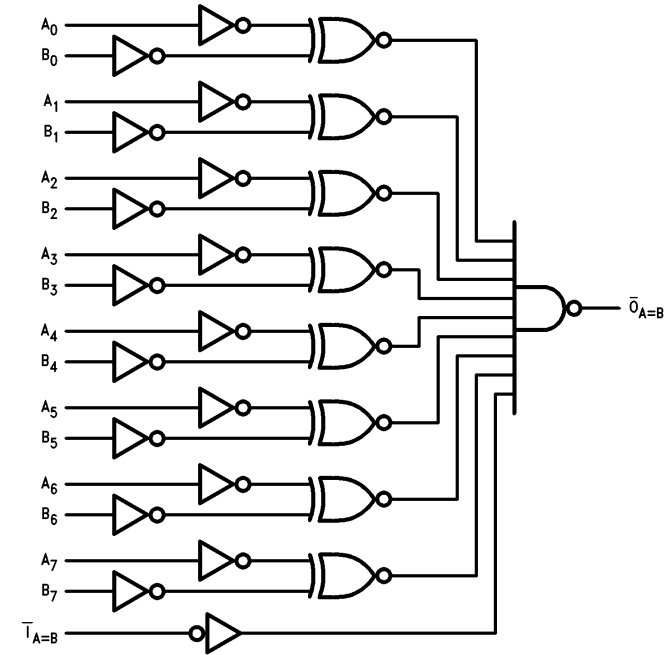
Pin Assignment for DIP, SOIC, SSOP and Flatpak



Pin Assignment for LCC



Logic Diagram



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

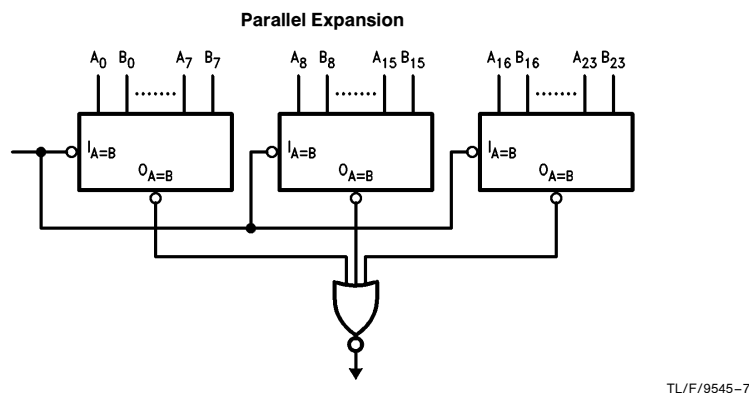
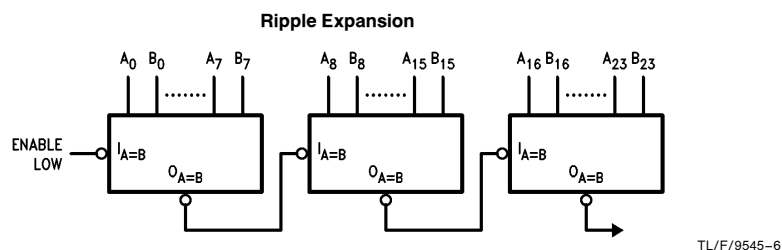
DC Electrical Characteristics

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} 74F 10% V _{CC} 74F 5% V _{CC}	2.5 2.5 2.7		V	Min	I _{OH} = −1 mA I _{OH} = −1 mA I _{OH} = −1 mA
V _{OL}	Output LOW Voltage	54F 10% V _{CC} 74F 10% V _{CC}		0.5 0.5	V	Min	I _{OL} = 20 mA I _{OL} = 20 mA
I _{IH}	Input HIGH Current	54F 74F		20.0 5.0	μA	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test	54F 74F		100 7.0	μA	Max	V _{IN} = 7.0V
I _{CEX}	Output HIGH Leakage Current	54F 74F		250 50	μA	Max	V _{OUT} = V _{CC}
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	−150	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	3.0	7.0	10.0	3.0	14.0	3.0	11.0	ns
t_{PHL}	A_n or B_n to $\overline{O}_{A=B}$	4.5	7.0	10.0	4.0	15.0	4.0	11.0	
t_{PLH}	Propagation Delay	3.0	5.0	6.5	3.0	8.5	3.0	7.5	ns
t_{PHL}	$\overline{I}_{A=B}$ to $\overline{O}_{A=B}$	3.5	6.5	9.0	3.5	13.5	3.5	10.0	

Applications

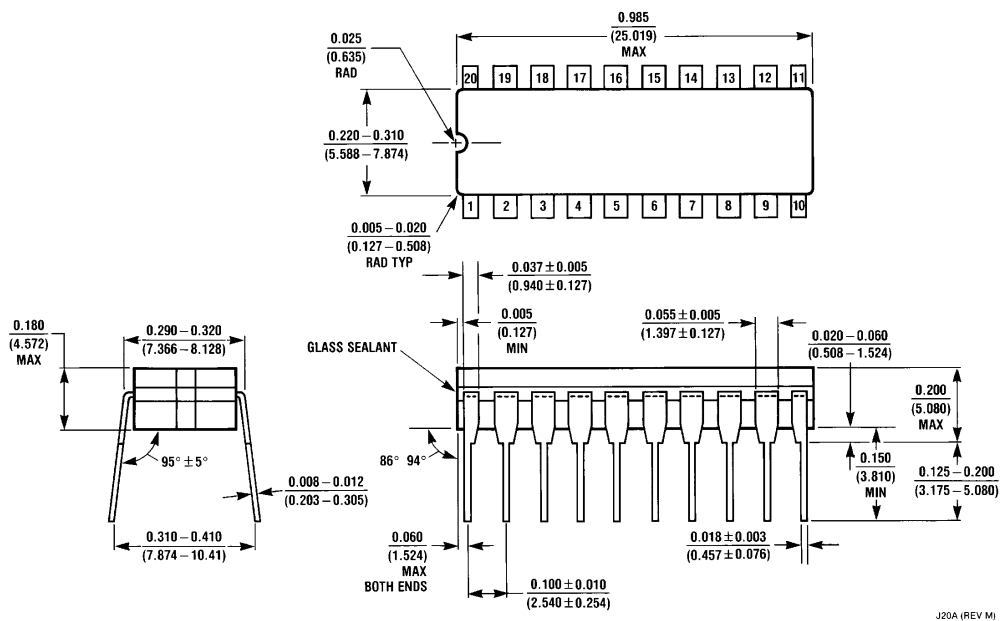


Ordering Information

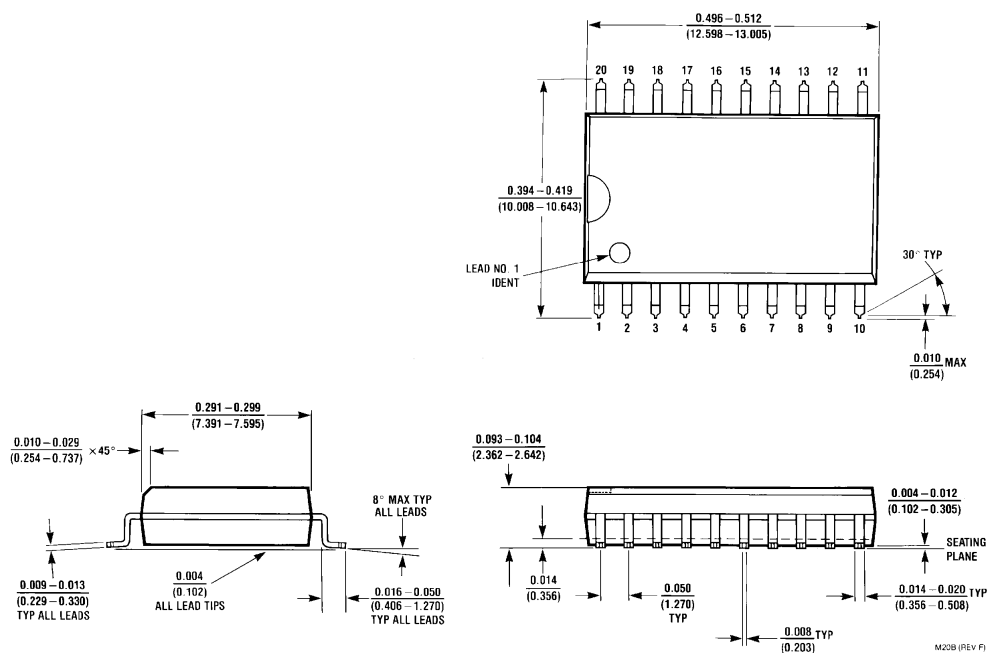
The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:

Temperature Range Family	74F	521	S	C	X	Special Variations
74F = Commercial						QB = Military grade device with environmental and burn-in processing
54F = Military						X = Devices shipped in 13" reel
Device Type						Temperature Range
P = Plastic DIP						C = Commercial (0°C to +70°C)
D = Ceramic DIP						M = Military (-55°C to +125°C)
F = Flatpak						NOTE:
S = Small Outline SOIC JEDEC						Not required for MSA package code
SJ = Small Outline SOIC EIAJ						
MSA = Shrink Small Outline (EIAJ SSOP)						

Physical Dimensions inches (millimeters)

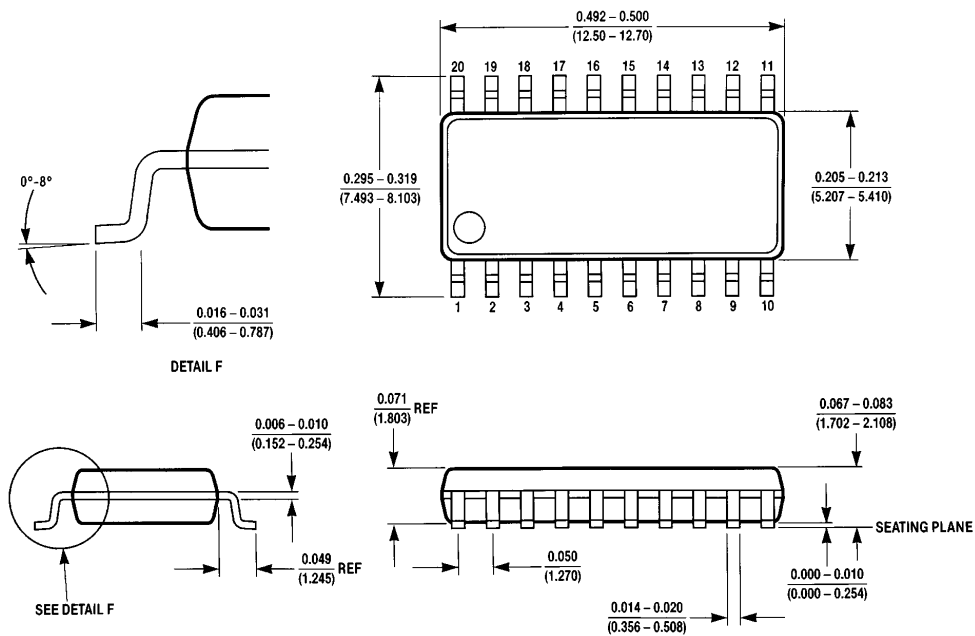


20-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J20A

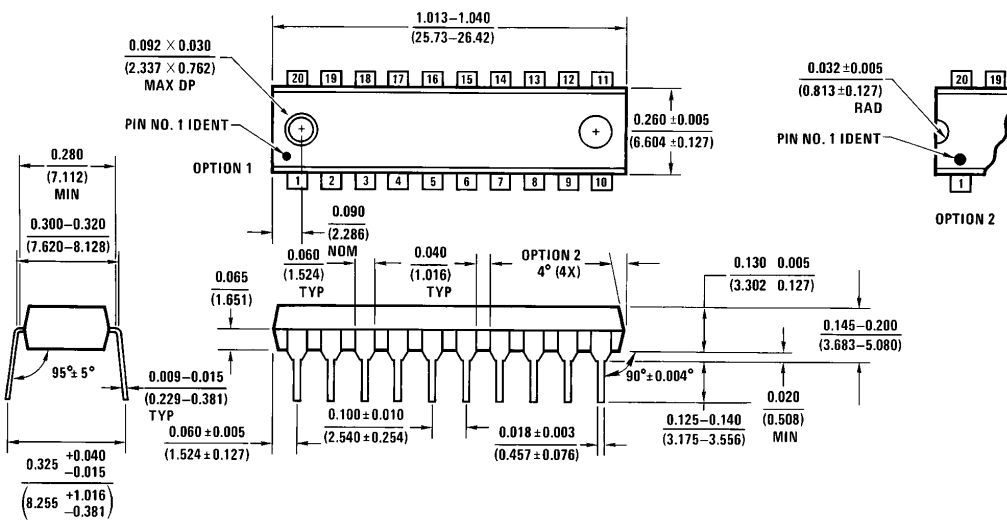


**20-Lead (0.300" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M20B**

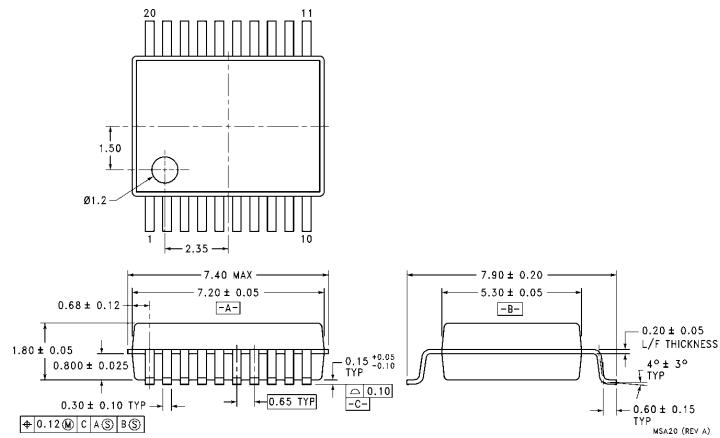
Physical Dimensions inches (millimeters) (Continued)



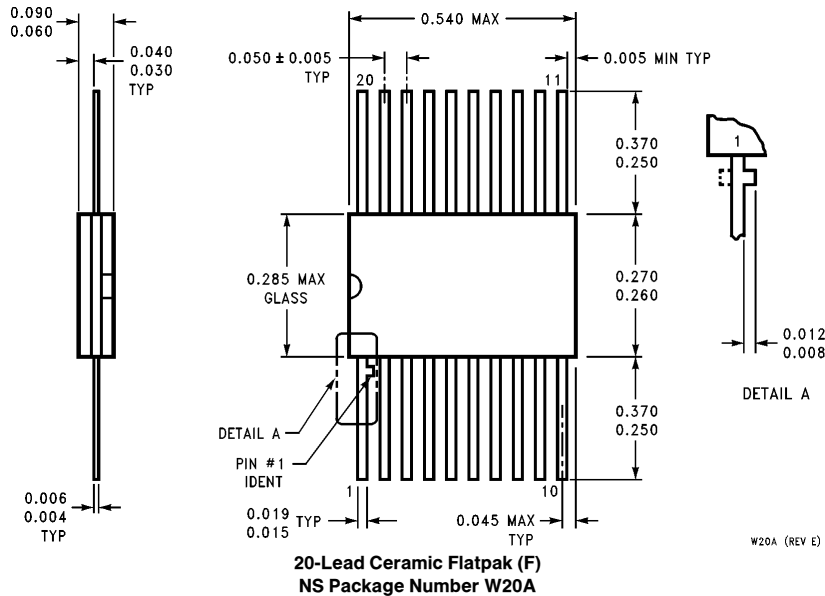
20-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M20D



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)**LIFE SUPPORT POLICY**

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