

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

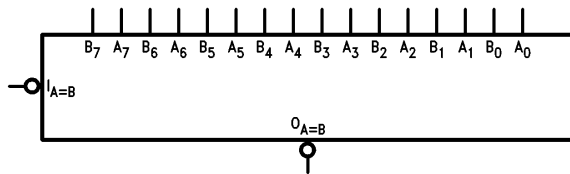
- Compares two 8-bit words in 6.5 ns typ
- Expandable to any word length
- 20-pin package

| 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 |

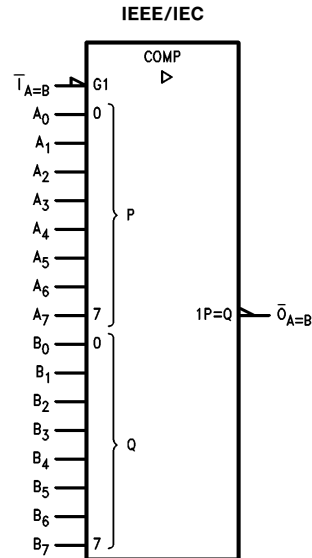
Note 1: Devices also available in 13" reel. Use suffix = SCX, SJX and MSAX.

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 |

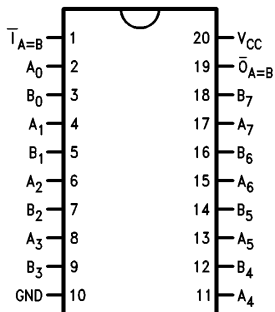
Truth Table

| 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.

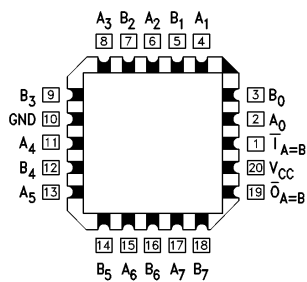
Connection Diagrams

Pin Assignment for DIP, SOIC, SSOP and Flatpak



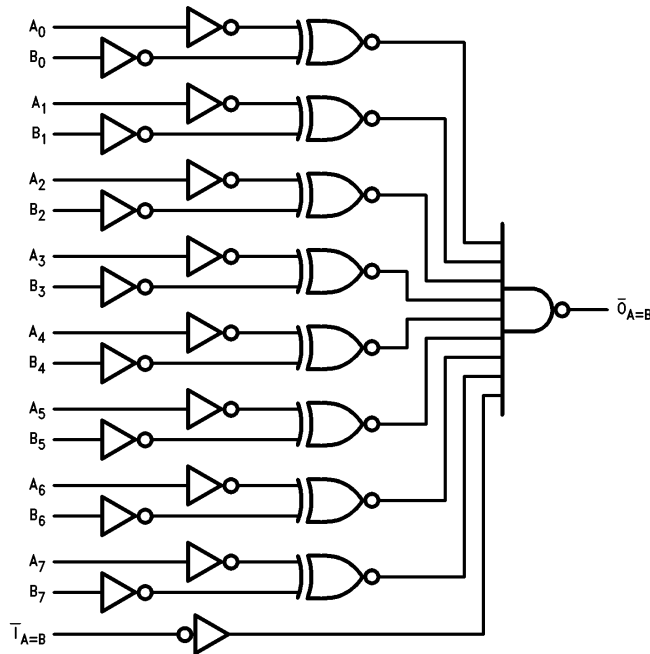
TL/F/9545-2

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 |

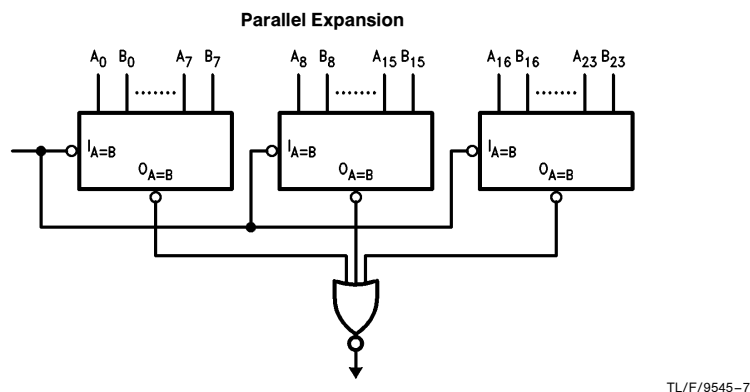
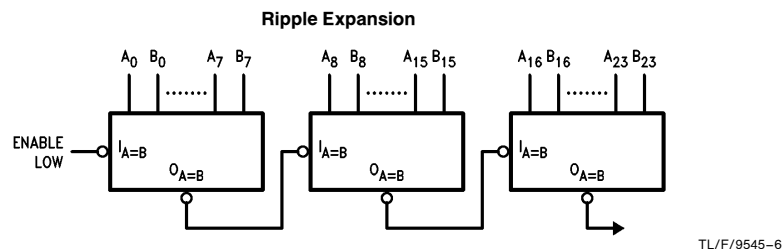
DC Electrical Characteristics

| 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

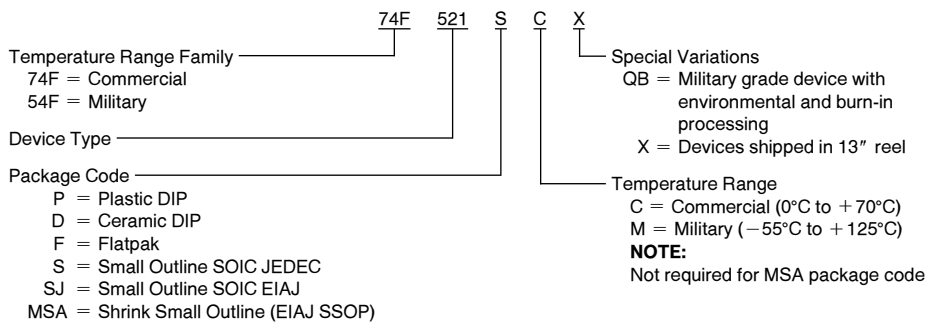
| Symbol | Parameter | 74F | | | 54F | | 74F | | Units |
|-----------|---|--|-----|------|--|------|--|------|-------|
| | | $T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$ | | | $T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{ pF}$ | | $T_A, V_{CC} = \text{Com}$ $C_L = 50\text{ pF}$ | | |
| | | 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

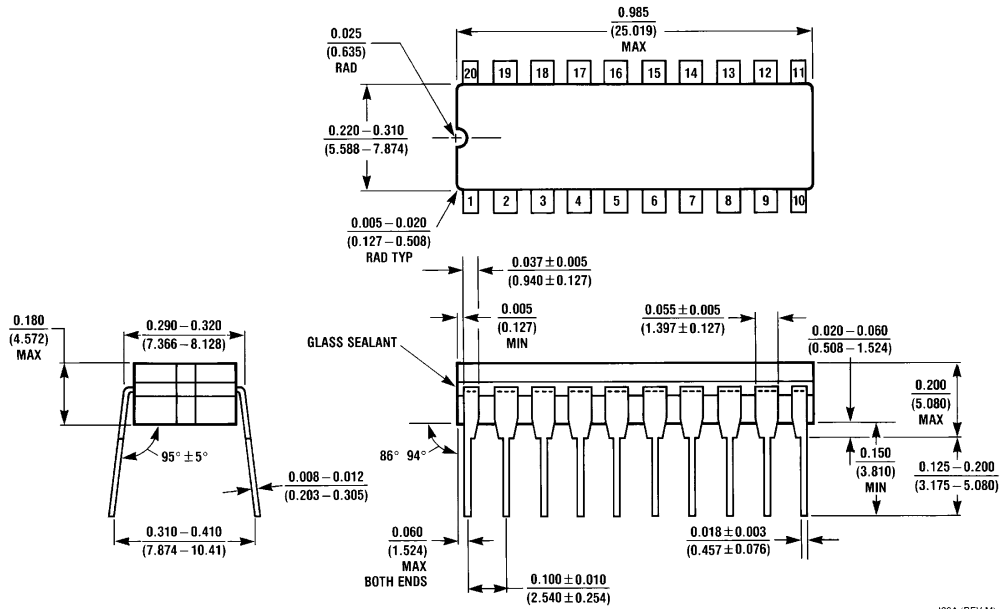


Ordering Information

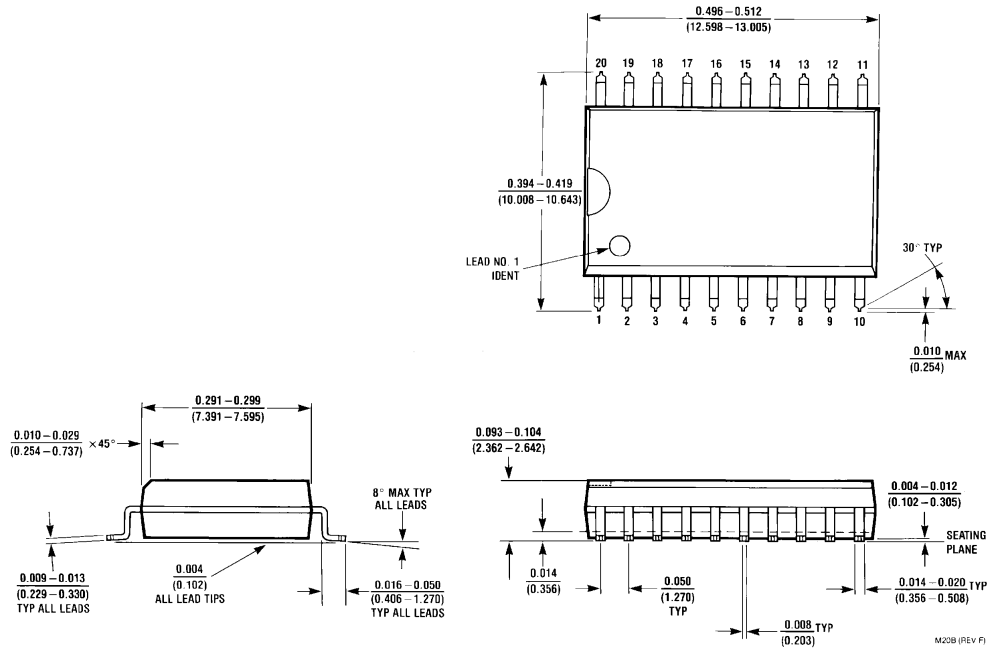
The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



Physical Dimensions inches (millimeters)

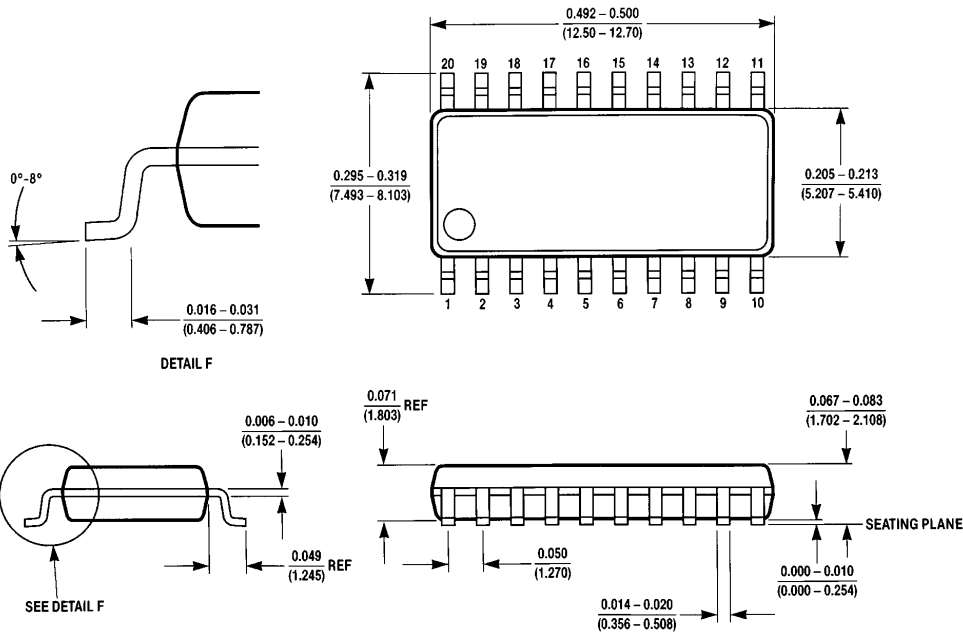


**20-Lead Ceramic Dual-In-Line Package (D)
 NS Package Number J20A**



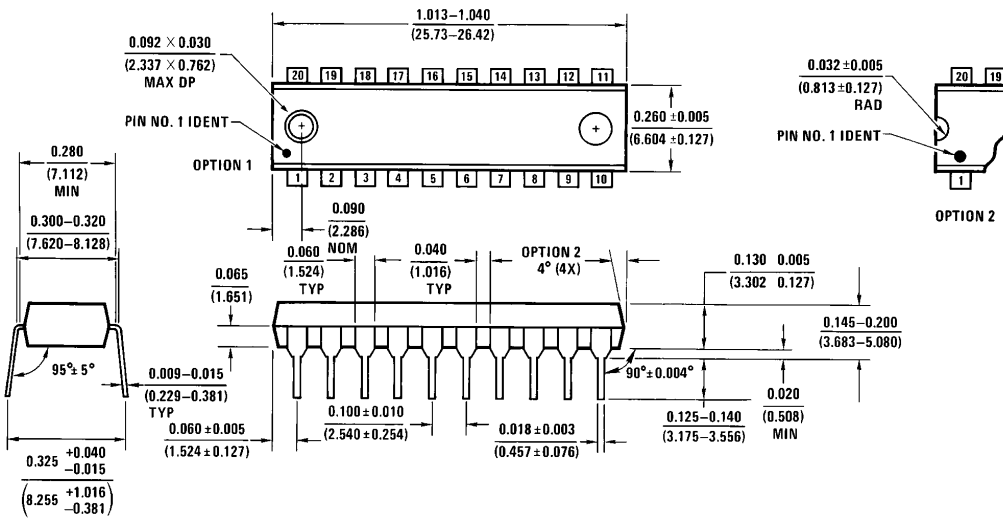
**20-Lead (0.300" Wide) Molded Small Outline Package, JEDEC (S)
 NS Package Number M20B**

Physical Dimensions inches (millimeters) (Continued)



M20D (REV A)

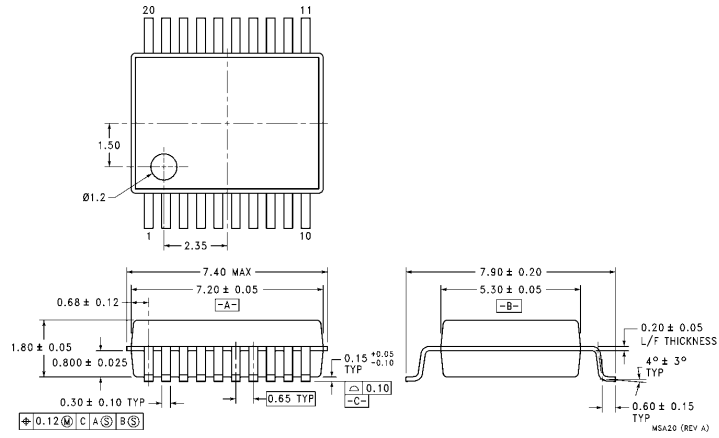
**20-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M20D**



N20A (REV G)

**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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