FAIRCHILD SEMICONDUCTOR™

April 1988
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# 74F521
# 8-Bit Identity Comparator

## General Description

The 74F521 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 $\overline{I}_{A=B}$ also serves as an active LOW enable input.

## Features

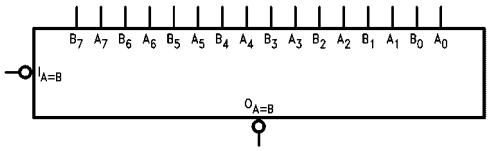
- Compares two 8-bit words in 6.5 ns typ
- Expandable to any word length
- 20-pin package

## Ordering Code:

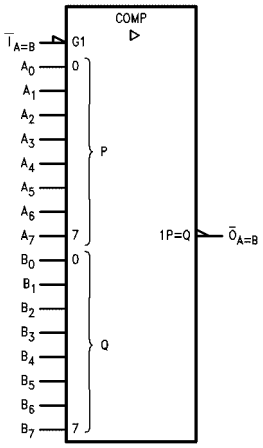
| Order Number | Package Number | Package Description |
|---|---|---|
| 74F521SC | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| 74F521SJ | M20D | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| 74F521MSA | MSA20 | 20-Lead Shrink Small Outline Package (SSOP), EIAJ TYPE II, 5.3mm Wide |
| 74F521PC | N20A | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

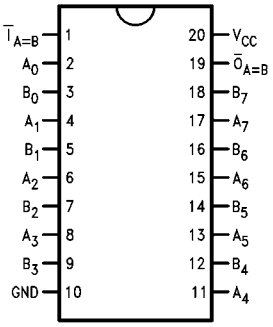
## Logic Symbols




**IEEE/IEC**




## Connection Diagram



## Unit Loading/Fan Out

| Pin Names | Description | 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 |

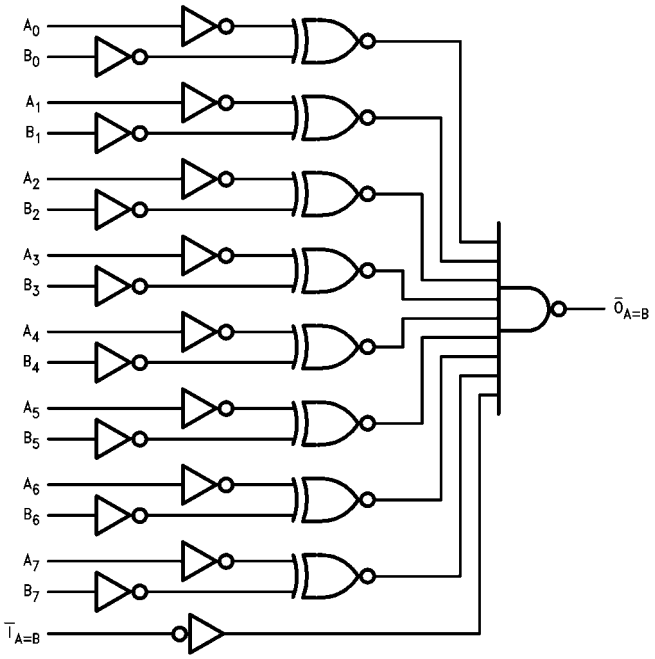
## Truth Table

| Inputs | | Output |
|---|---|---|
| $\overline{I}_{A=B}$ | A, B | $\overline{O}_{A=B}$ |
| L | A = B (Note 1) | L |
| L | A ≠ B | H |
| H | A = B (Note 1) | H |
| H | A ≠ B | H |

H = HIGH Voltage Level
L = LOW Voltage Level

**Note 1:** $A_0 = B_0$, $A_1 = B_1$, $A_2 = B_2$, etc.

## 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 2)

| | |
|---|---|
| Storage Temperature | −65°C to +150°C |
| Ambient Temperature under Bias | −55°C to +125°C |
| Junction Temperature under Bias | −55°C to +150°C |
| $V_{CC}$ Pin Potential to Ground Pin | −0.5V to +7.0V |
| Input Voltage (Note 3) | −0.5V to +7.0V |
| Input Current (Note 3) | −30 mA to +5.0 mA |
| Voltage Applied to Output | |
| in HIGH State (with $V_{CC}$ = 0V) | |
| Standard Output | −0.5V to $V_{CC}$ |
| 3-STATE Output | −0.5V to +5.5V |
| Current Applied to Output | |
| in LOW State (Max) | twice the rated $I_{OL}$ (mA) |

## Recommended Operating Conditions

| | |
|---|---|
| Free Air Ambient Temperature | 0°C to +70°C |
| Supply Voltage | +4.5V to +5.5V |

**Note 2:** 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 3:** Either voltage limit or current limit is sufficient to protect inputs.

## DC Electrical Characteristics

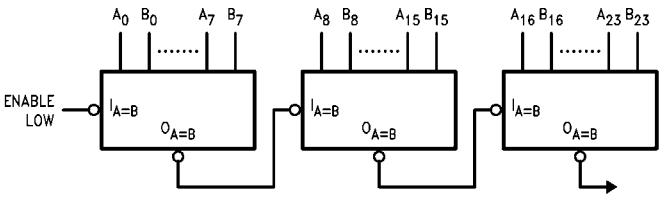
| Symbol | Parameter | Min | Typ | Max | Units | $V_{CC}$ | Conditions |
|---|---|---|---|---|---|---|---|
| $V_{IH}$ | Input HIGH Voltage | 2.0 | | | V | | Recognized as a HIGH Signal |
| $V_{IL}$ | Input LOW Voltage | | | 0.8 | V | | Recognized as a LOW Signal |
| $V_{CD}$ | Input Clamp Diode Voltage | | | −1.2 | V | Min | $I_{IN}$ = −18 mA |
| $V_{OH}$ | Output HIGH 10% $V_{CC}$ | 2.5 | | | V | Min | $I_{OH}$ = −1 mA |
| | Voltage 5% $V_{CC}$ | 2.7 | | | | | $I_{OH}$ = −1 mA |
| $V_{OL}$ | Output LOW 10% $V_{CC}$ Voltage | | | 0.5 | V | Min | $I_{OL}$ = 20 mA |
| $I_{IH}$ | Input HIGH Current | | | 5.0 | µA | Max | $V_{IN}$ = 2.7V |
| $I_{BVI}$ | Input HIGH Current Breakdown Test | | | 7.0 | µA | Max | $V_{IN}$ = 7.0V |
| $I_{CEX}$ | Output HIGH Leakage Current | | | 50 | µA | Max | $V_{OUT}$ = $V_{CC}$ |
| $V_{ID}$ | Input Leakage Test | 4.75 | | | V | 0.0 | $I_{ID}$ = 1.9 µA All Other Pins Grounded |
| $I_{OD}$ | Output Leakage Circuit Current | | | 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

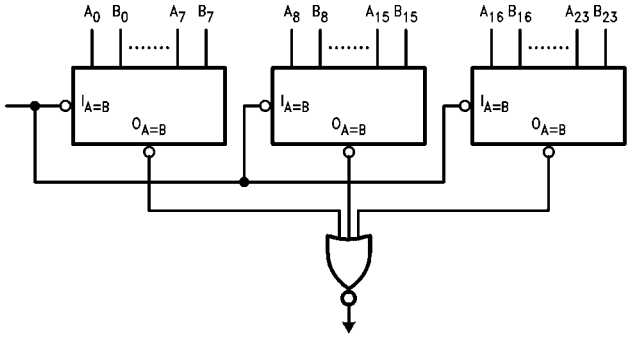
| Symbol | Parameter | $T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF | | | $T_A = -55°C$ to $+125°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF | | $T_A = 0°C$ to $+70°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF | | Units |
|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Max | Min | Max | |
| $t_{PLH}$ | 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

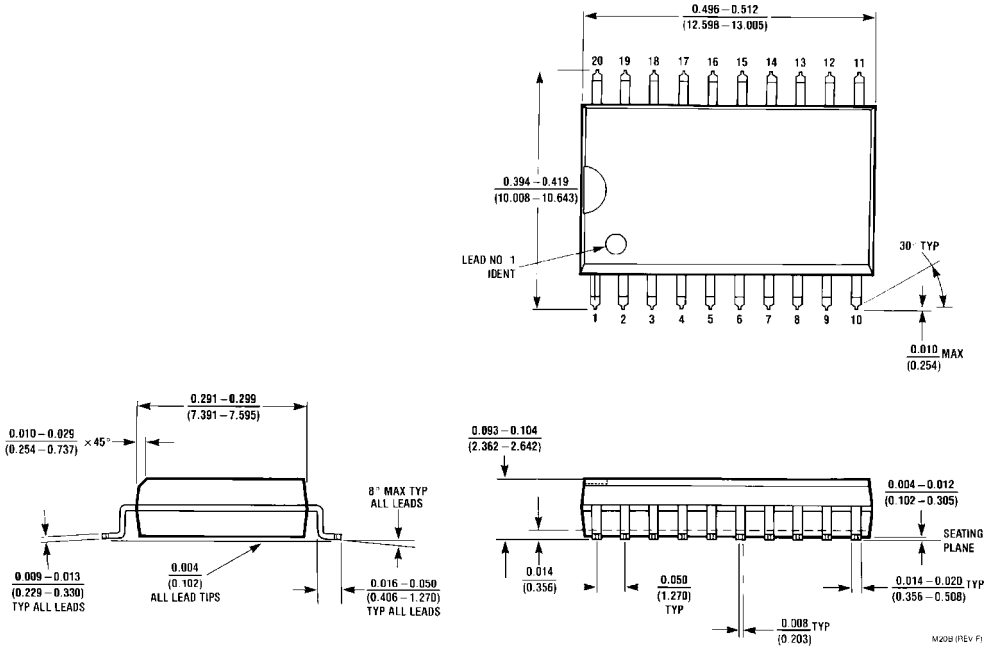
**Ripple Expansion**




**Parallel Expansion**

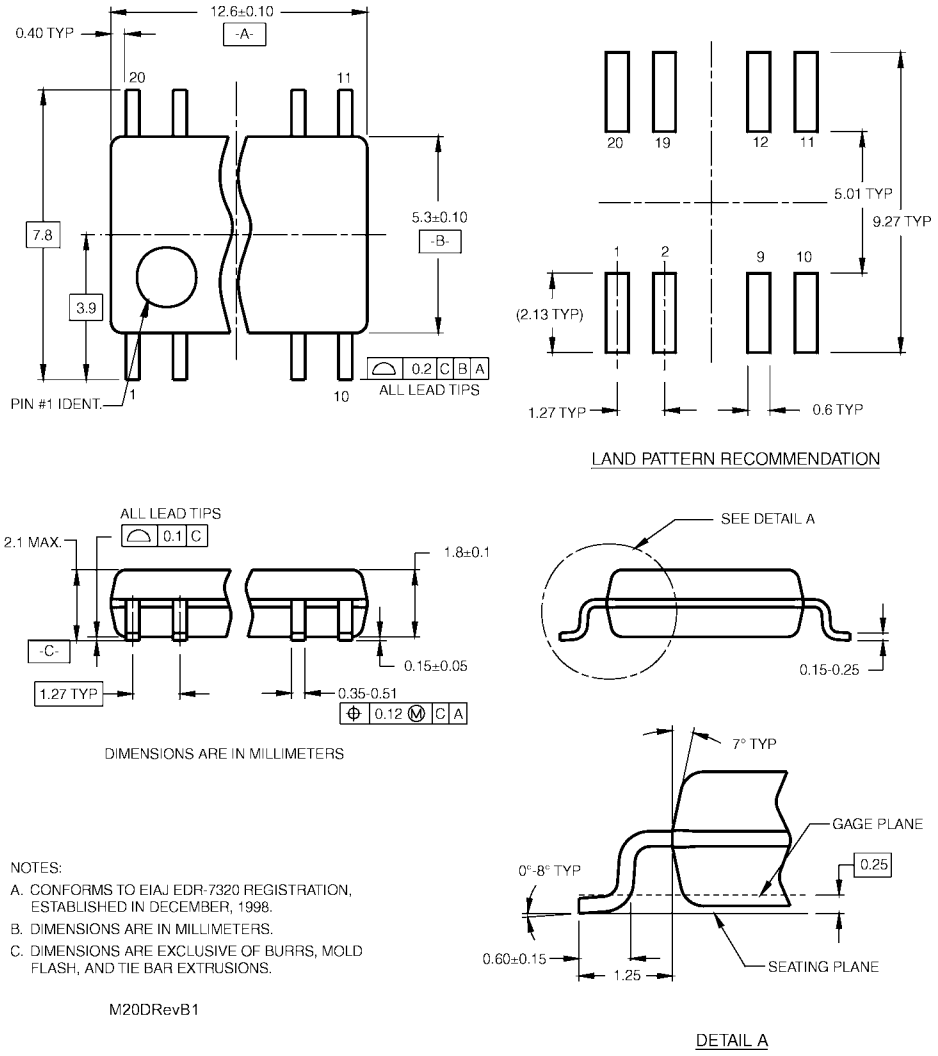


## Physical Dimensions inches (millimeters) unless otherwise noted




**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide**
**Package Number M20B**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)




NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.

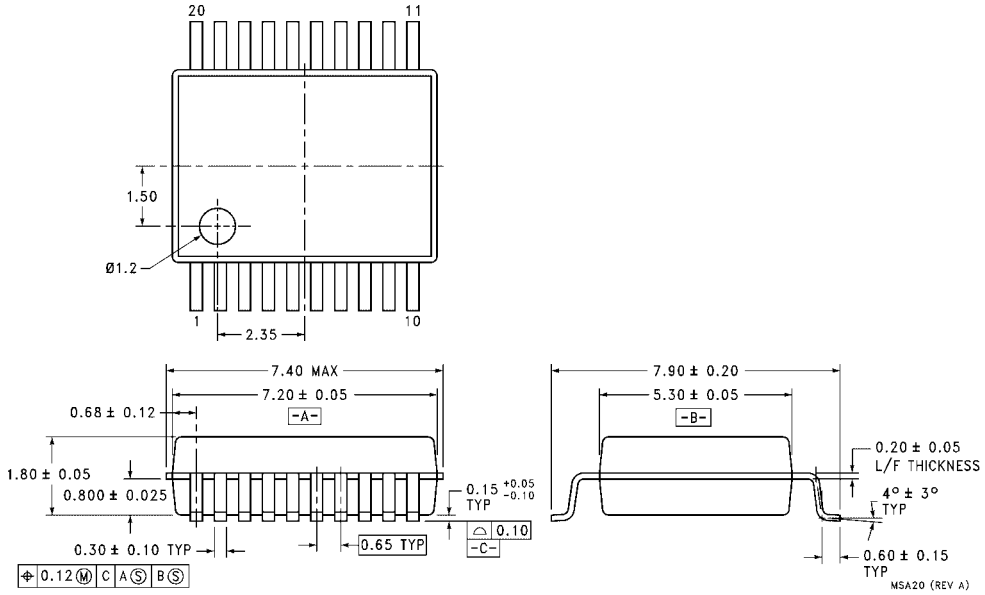
B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

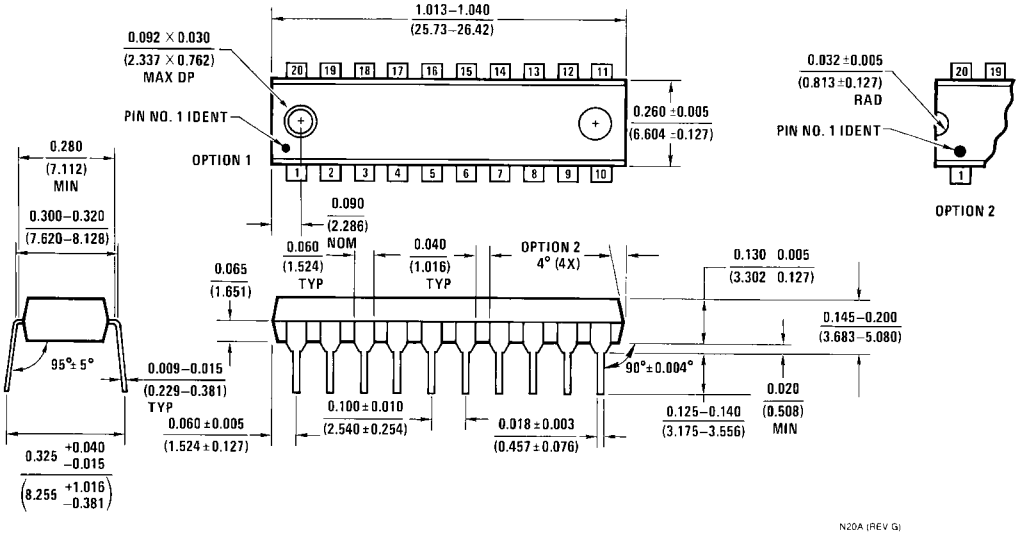
**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide**
**Package Number M20D**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)




**20-Lead Shrink Small Outline Package (SSOP), EIAJ TYPE II, 5.3mm Wide**
**Package Number MSA20**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)




**20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide**
**Package Number N20A**