

## 29F52 • 29F53 8-Bit Registered Transceiver

### General Description

The 29F52 and 29F53 are 8-bit registered transceivers. Two 8-bit back to back registers store data flowing in both directions between two bidirectional buses. Separate clock, clock enable and 3-STATE output enable signals are provided for each register. The  $A_0$ – $A_7$  output pins are guaranteed to sink 24 mA while the  $B_0$ – $B_7$  output pins are designed for 64 mA.

The 29F53 is an inverting option of the 29F52. Both transceivers are AMD Am2952/2953 functional equivalents.

### Features

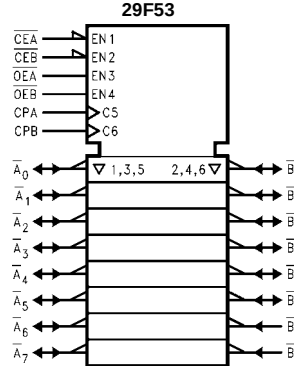
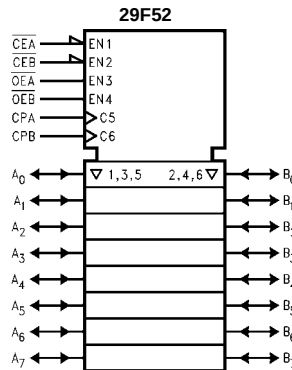
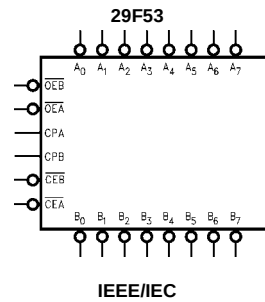
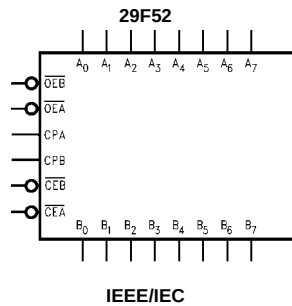
- 8-bit registered transceivers
- Separate clock, clock enable and 3-STATE output enable provided for each register
- AMD Am2952/2953 functional equivalents
- Both inverting and non-inverting options available
- 24-Pin slimline package

### Ordering Code:

| Order Number | Package Number | Package Description                                                       |
|--------------|----------------|---------------------------------------------------------------------------|
| 29F52SC      | M24B           | 24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| 29F52SPC     | N24C           | 24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide     |
| 29F53SPC     | N24C           | 24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide     |

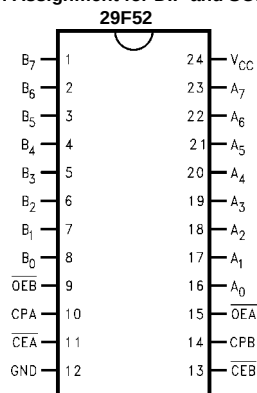
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

### Logic Symbols

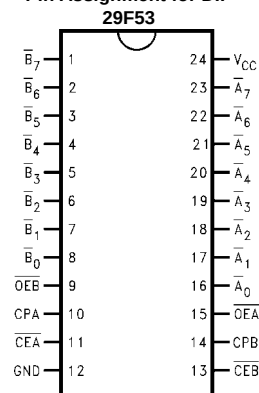


## Connection Diagrams

Pin Assignment for DIP and SOIC



Pin Assignment for DIP



## Unit Loading/Fan Out

| Pin Names                      | Description                                      | U.L.<br>HIGH/LOW           | Input I <sub>IH</sub> /I <sub>IL</sub><br>Output I <sub>OH</sub> /I <sub>OL</sub> |
|--------------------------------|--------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------|
| A <sub>0</sub> –A <sub>7</sub> | A-Register Inputs/<br>B-Register 3-STATE Outputs | 3.5/1.083                  | 70 μA/0.65 mA                                                                     |
| B <sub>0</sub> –B <sub>7</sub> | B Register Inputs/<br>A-Register 3-STATE Outputs | 150/40 (33.3)<br>3.5/1.083 | –3 mA/24 mA (20 mA)<br>70 μA/0.65 mA                                              |
| OE                             | Output Enable A-Register                         | 600/106.6 (80)             | –12 mA/64 mA (48 mA)                                                              |
| CPA                            | A-Register Clock                                 | 1.0/1.0                    | 20 μA/–0.6 mA                                                                     |
| CEA                            | A-Register Clock Enable                          | 1.0/1.0                    | 20 μA/–0.6 mA                                                                     |
| OE                             | Output Enable B-Register                         | 1.0/1.0                    | 20 μA/–0.6 mA                                                                     |
| CPB                            | B-Register Clock                                 | 1.0/1.0                    | 20 μA/–0.6 mA                                                                     |
| CEB                            | B-Register Clock Enable                          | 1.0/1.0                    | 20 μA/–0.6 mA                                                                     |

## Output Control

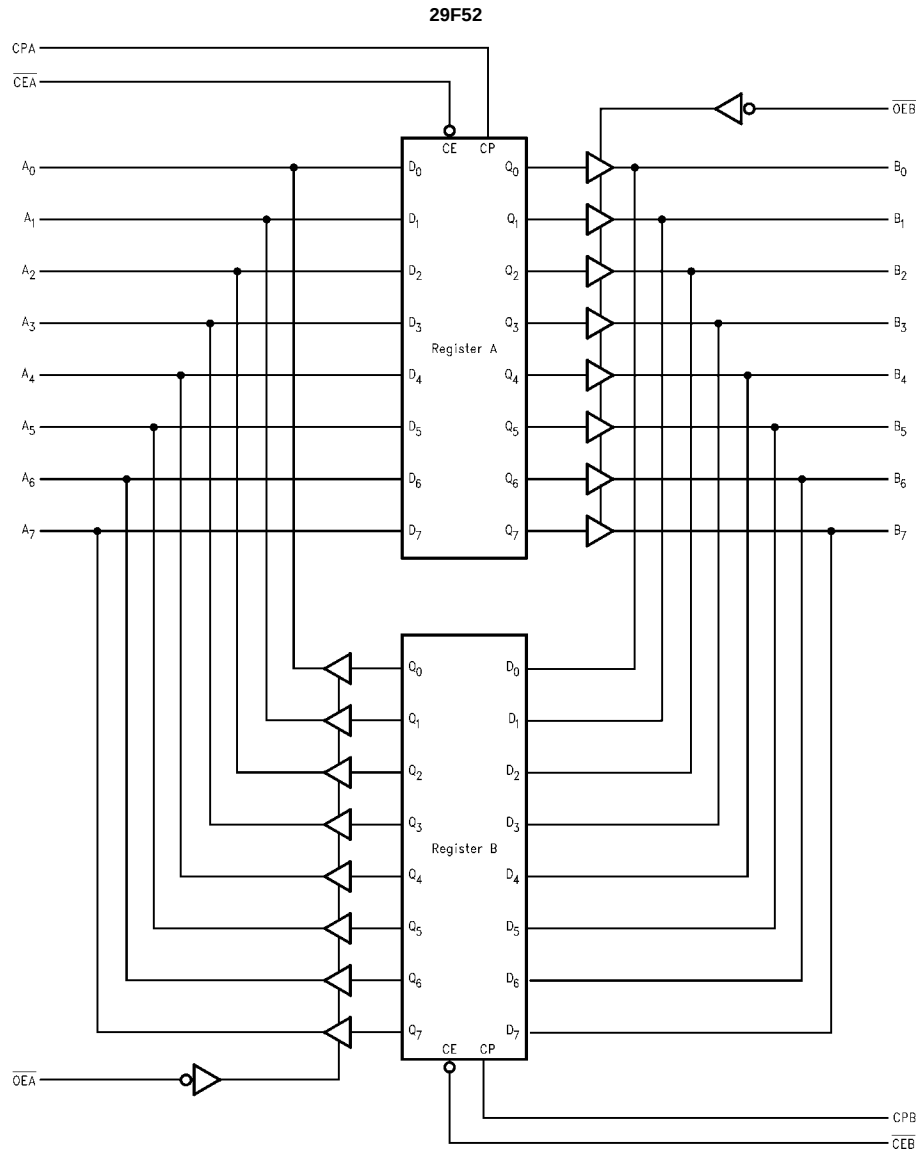
| OE | Internal<br>Q | Y-Output |       | Function        |
|----|---------------|----------|-------|-----------------|
|    |               | 29F52    | 29F53 |                 |
| H  | X             | Z        | Z     | Disable Outputs |
| L  | L             | L        | H     | Enable Outputs  |
| L  | H             | H        | L     |                 |

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Immaterial  
 Z = HIGH Impedance  
 N = LOW-to-HIGH Transition  
 NC = No Change

## Register Function Table (Applies to A or B Register)

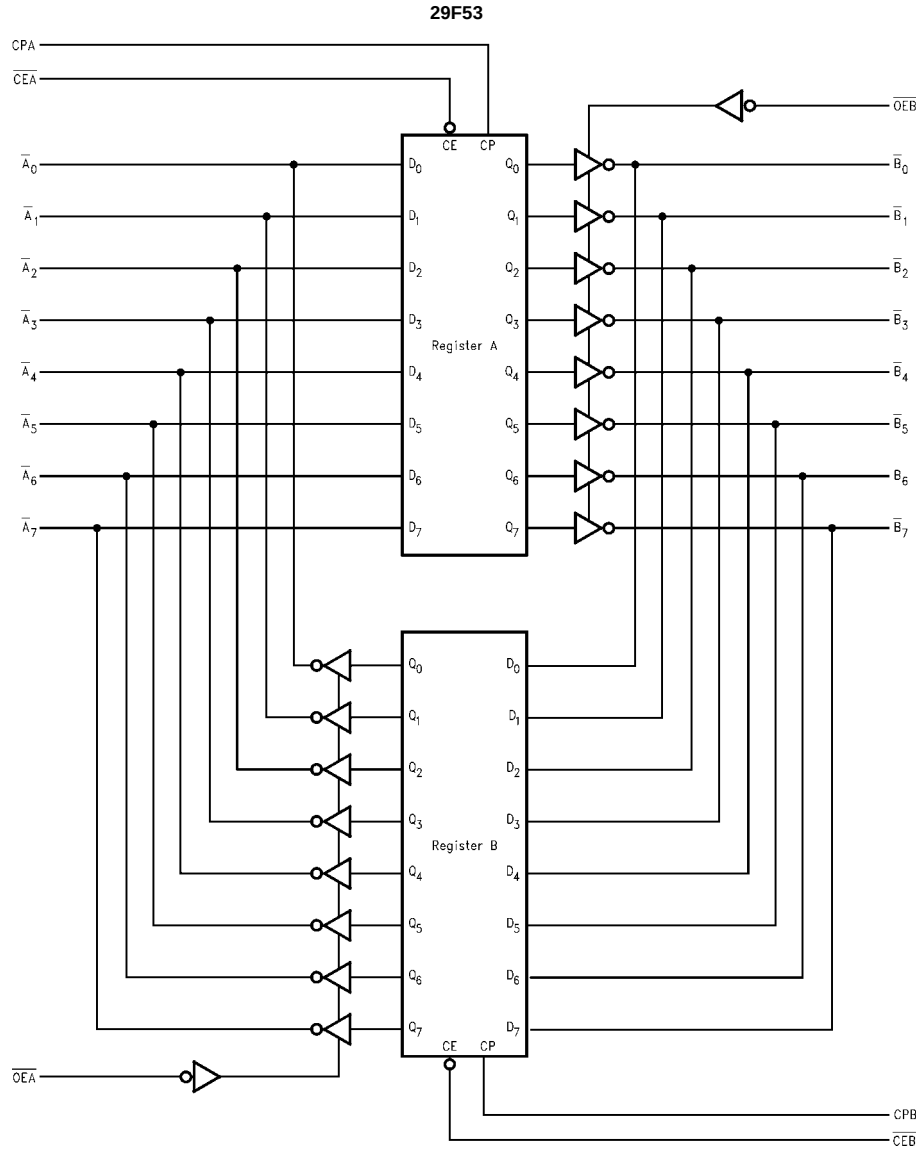
| Inputs |    |    | Internal<br>Q | Function  |
|--------|----|----|---------------|-----------|
| D      | CP | CE |               |           |
| X      | X  | H  | NC            | Hold Data |
| L      | N  | L  | L             | Load Data |
| H      | N  | L  | H             |           |

## Block Diagrams



29F52 • 29F53

# **Block Diagrams** (Continued) **Block Diagrams (continued)**



**Absolute Maximum Ratings**(Note 1)

|                                             |                   |
|---------------------------------------------|-------------------|
| 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 <sub>CC</sub> 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<sub>CC</sub> = 0V)Standard Output –0.5V to V<sub>CC</sub>

3-STATE Output –0.5V to +5.5V

Current Applied to Output

in LOW State (Max) twice the rated I<sub>OL</sub> (mA)**Recommended Operating Conditions**

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

**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.

**DC Electrical Characteristics**

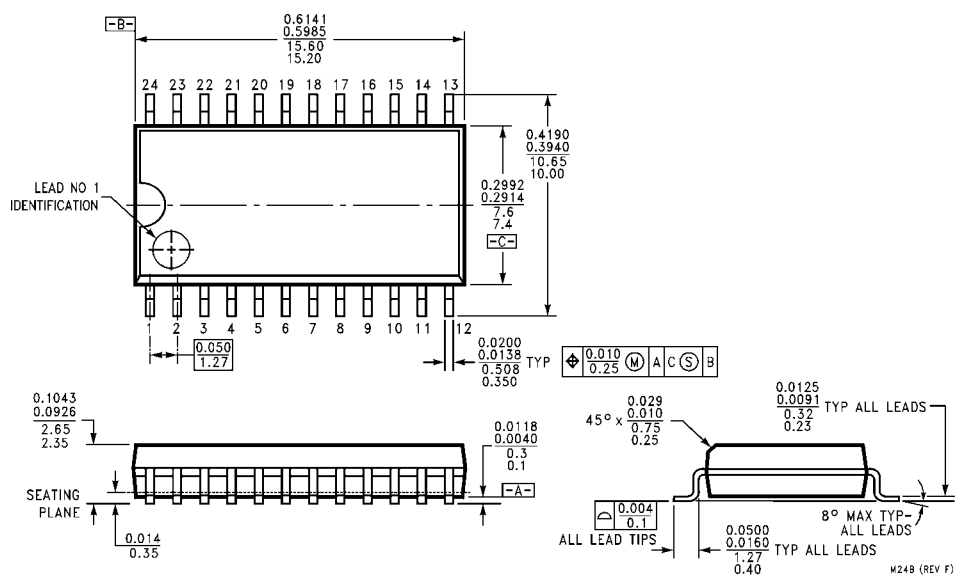
| Symbol                             | Parameter                               | Min                                                                                                           | Typ                             | Max          | Units | V <sub>CC</sub> | Conditions                                                                                                                                                                                                                                                       |
|------------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------|--------------|-------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| V <sub>IH</sub>                    | Input HIGH Voltage                      | 2.0                                                                                                           |                                 |              | V     |                 | Recognized as a HIGH Signal                                                                                                                                                                                                                                      |
| V <sub>IL</sub>                    | Input LOW Voltage                       |                                                                                                               |                                 | 0.8          | V     |                 | Recognized as a LOW Signal                                                                                                                                                                                                                                       |
| V <sub>CD</sub>                    | Input Clamp Diode Voltage               |                                                                                                               |                                 | –1.2         | V     | Min             | I <sub>IN</sub> = –18 mA (Non I/O Pins)                                                                                                                                                                                                                          |
| V <sub>OH</sub>                    | Output HIGH Voltage                     | 10% V <sub>CC</sub><br>10% V <sub>CC</sub><br>10% V <sub>CC</sub><br>5% V <sub>CC</sub><br>5% V <sub>CC</sub> | 2.5<br>2.4<br>2.0<br>2.7<br>2.7 |              | V     | Min             | I <sub>OH</sub> = –1 mA (A <sub>n</sub> )<br>I <sub>OH</sub> = –3 mA (A <sub>n</sub> , B <sub>n</sub> )<br>I <sub>OH</sub> = –15 mA (B <sub>n</sub> )<br>I <sub>OH</sub> = –1 mA (A <sub>n</sub> )<br>I <sub>OH</sub> = –3 mA (A <sub>n</sub> , B <sub>n</sub> ) |
| V <sub>OL</sub>                    | Output LOW Voltage                      | 10% V <sub>CC</sub><br>10% V <sub>CC</sub>                                                                    |                                 | 0.5<br>0.55  | V     | Min             | I <sub>OL</sub> = 24 mA (A <sub>n</sub> )<br>I <sub>OL</sub> = 64 mA (B <sub>n</sub> )                                                                                                                                                                           |
| I <sub>IH</sub>                    | Input HIGH Current                      |                                                                                                               |                                 | 20           | μA    | Max             | V <sub>IN</sub> = 2.7V (Non-I/O Pins)                                                                                                                                                                                                                            |
| I <sub>BVI</sub>                   | Input HIGH Current Breakdown Test       |                                                                                                               |                                 | 100          | μA    | Max             | V <sub>IN</sub> = 7.0V (Non-I/O Pins)                                                                                                                                                                                                                            |
| I <sub>BVIT</sub>                  | Input HIGH Current Breakdown Test (I/O) |                                                                                                               |                                 | 1.0          | mA    | Max             | V <sub>IN</sub> = 5.5V (A <sub>n</sub> , B <sub>n</sub> )                                                                                                                                                                                                        |
| I <sub>IL</sub>                    | Input LOW Current                       |                                                                                                               |                                 | –0.6         | mA    | Max             | V <sub>IN</sub> = 0.5V (Non-I/O Pins)                                                                                                                                                                                                                            |
| I <sub>IH</sub> + I <sub>OZH</sub> | Output Leakage Current                  |                                                                                                               |                                 | 70           | μA    | Max             | V <sub>OUT</sub> = 2.7V (A <sub>n</sub> , B <sub>n</sub> )                                                                                                                                                                                                       |
| I <sub>IL</sub> + I <sub>OZL</sub> | Output Leakage Current                  |                                                                                                               |                                 | –650         | μA    | Max             | V <sub>OUT</sub> = 0.5V (A <sub>n</sub> , B <sub>n</sub> )                                                                                                                                                                                                       |
| I <sub>OS</sub>                    | Output Short-Circuit Current            | –60<br>–100                                                                                                   |                                 | –150<br>–225 | mA    | Max             | V <sub>OUT</sub> = 0V (A <sub>n</sub> )<br>V <sub>OUT</sub> = 0V (B <sub>n</sub> )                                                                                                                                                                               |
| I <sub>CEX</sub>                   | Output HIGH Leakage Current             |                                                                                                               |                                 | 250          | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub> (A <sub>n</sub> , B <sub>n</sub> )                                                                                                                                                                                            |
| I <sub>ZZ</sub>                    | Bus Drainage Test                       |                                                                                                               |                                 | 500          | μA    | 0.0V            | V <sub>OUT</sub> = 5.25V (A <sub>n</sub> , B <sub>n</sub> )                                                                                                                                                                                                      |
| I <sub>CCH</sub>                   | Power Supply Current                    |                                                                                                               | 130                             | 190          | mA    | Max             | V <sub>O</sub> = HIGH                                                                                                                                                                                                                                            |
| I <sub>CCL</sub>                   | Power Supply Current                    |                                                                                                               |                                 | 190          | mA    | Max             | V <sub>O</sub> = LOW                                                                                                                                                                                                                                             |
| I <sub>CCZ</sub>                   | Power Supply Current                    |                                                                                                               |                                 | 190          | mA    | Max             | V <sub>O</sub> = HIGH Z                                                                                                                                                                                                                                          |

## AC Electrical Characteristics

| Symbol           | Parameter                                      | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     |     | T <sub>A</sub> = -55°C to +125°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |      | Units |
|------------------|------------------------------------------------|-----------------------------------------------------------------------------|-----|-----|---------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------|------|-------|
|                  |                                                | Min                                                                         | Typ | Max | Min                                                                                   | Max | Min                                                                                | Max  |       |
| t <sub>PLH</sub> | Propagation Delay                              | 3.0                                                                         | 5.5 | 7.5 |                                                                                       |     | 2.5                                                                                | 8.5  | ns    |
| t <sub>PHL</sub> | CPA or CPB to A <sub>n</sub> or B <sub>n</sub> | 4.0                                                                         | 7.0 | 9.0 |                                                                                       |     | 3.5                                                                                | 10.0 |       |
| t <sub>PZH</sub> | Output Enable Time                             | 2.5                                                                         | 5.5 | 7.5 |                                                                                       |     | 2.0                                                                                | 8.5  | ns    |
| t <sub>PZL</sub> | OEA or OEB to A <sub>n</sub> or B <sub>n</sub> | 3.5                                                                         | 7.0 | 9.5 |                                                                                       |     | 3.0                                                                                | 10.5 |       |
| t <sub>PHZ</sub> | Output Disable Time                            | 2.5                                                                         | 6.5 | 9.0 |                                                                                       |     | 2.0                                                                                | 10.0 | ns    |
| t <sub>PLZ</sub> | OEA or OEB to A <sub>n</sub> or B <sub>n</sub> | 2.5                                                                         | 5.5 | 7.5 |                                                                                       |     | 2.0                                                                                | 8.5  |       |

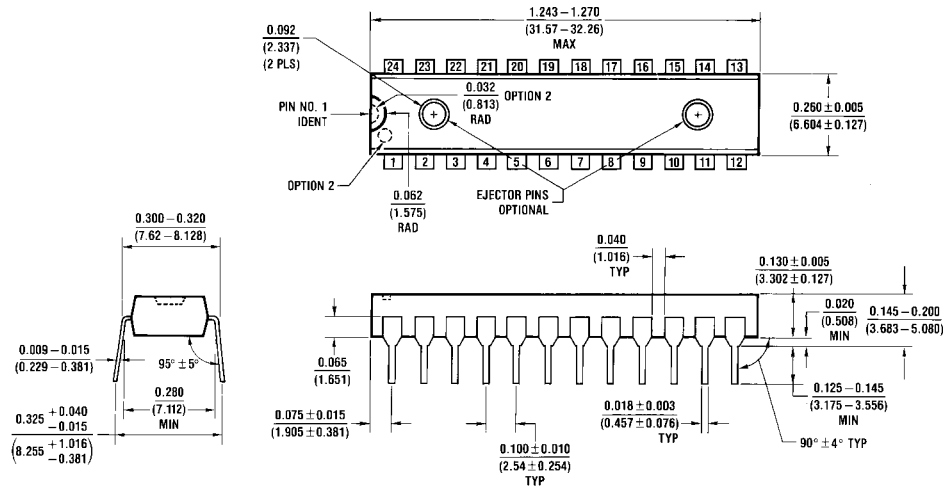
## AC Operating Requirements

| Symbol             | Parameter                                      | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V |     | T <sub>A</sub> = -55°C to +125°C<br>V <sub>CC</sub> = +5.0V |     | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = +5.0V |     | Units |
|--------------------|------------------------------------------------|---------------------------------------------------|-----|-------------------------------------------------------------|-----|----------------------------------------------------------|-----|-------|
|                    |                                                | Min                                               | Max | Min                                                         | Max | Min                                                      | Max |       |
| t <sub>S</sub> (H) | Setup Time, HIGH or LOW                        | 4.0                                               |     |                                                             |     | 4.5                                                      |     | ns    |
| t <sub>S</sub> (L) | A <sub>n</sub> or B <sub>n</sub> to CPA or CPB | 4.0                                               |     |                                                             |     | 4.5                                                      |     |       |
| t <sub>H</sub> (H) | Hold Time, HIGH or LOW                         | 2.0                                               |     |                                                             |     | 2.5                                                      |     | ns    |
| t <sub>H</sub> (L) | A <sub>n</sub> or B <sub>n</sub> to CPA or CPB | 2.0                                               |     |                                                             |     | 2.5                                                      |     |       |
| t <sub>S</sub> (H) | Setup Time, HIGH or LOW                        | 1.0                                               |     |                                                             |     | 1.5                                                      |     | ns    |
| t <sub>S</sub> (L) | CEA or CEB to CPA or CPB                       | 4.0                                               |     |                                                             |     | 4.5                                                      |     |       |
| t <sub>H</sub> (H) | Hold Time, HIGH or LOW                         | 2.0                                               |     |                                                             |     | 2.5                                                      |     | ns    |
| t <sub>H</sub> (L) | CEA or CEB to CPA or CPB                       | 2.0                                               |     |                                                             |     | 2.5                                                      |     |       |
| t <sub>W</sub> (H) | Pulse Width, HIGH or LOW                       | 3.0                                               |     |                                                             |     | 3.5                                                      |     | ns    |
| t <sub>W</sub> (L) | CPA or CPB                                     | 3.0                                               |     |                                                             |     | 3.5                                                      |     |       |



**24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide  
Package Number M24B**

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



24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide  
Package Number N24C

Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

## LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

[www.fairchildsemi.com](http://www.fairchildsemi.com)