

## 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

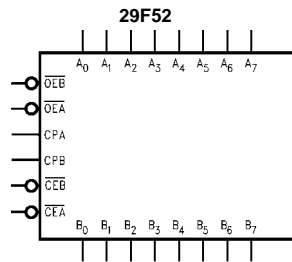
- 8-bit registered transceivers
- Separate clock, clock enable and 3-STATE output enable provided for each register
- AMD Am2952/2953 functional equivalents
- Both inverting and non-inverting options available
- 24-Pin slimline package

### Ordering Code:

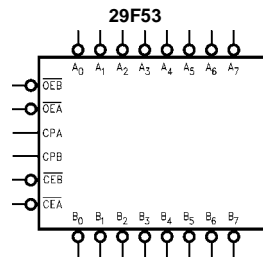
| Order Number | Package Number | Package Description   |
|--------------|----------------|---|
| 29F52SC      | M24B           | 24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| 29F52SPC     | N24C           | 24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-100, 0.300 Wide     |
| 29F53SPC     | N24C           | 24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-100, 0.300 Wide     |

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

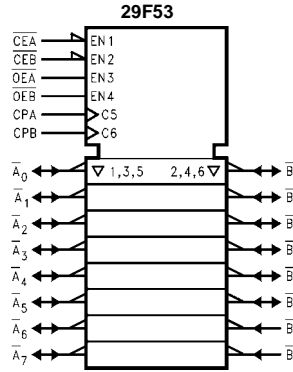
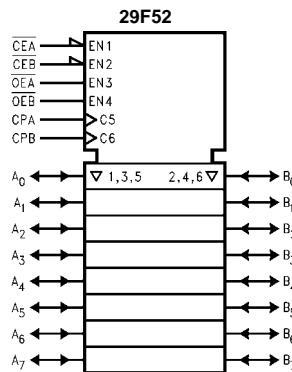
### Logic Symbols



IEEE/IEC

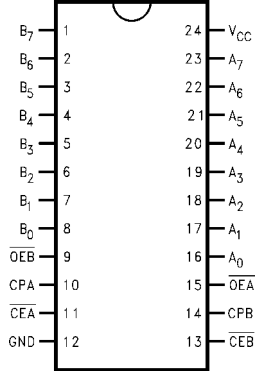


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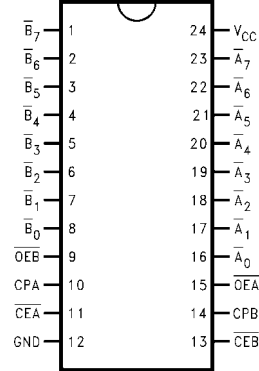


## Connection Diagrams

Pin Assignment for DIP and SOIC  
29F52



Pin Assignment for DIP  
29F53



## Unit Loading/Fan Out

| Pin Names                      | Description                                      | U.L.<br>HIGH/LOW | Input $I_H/I_L$<br>Output $I_{OH}/I_{OL}$ |
|--------------------------------|--|------------------|---|
| A <sub>0</sub> -A <sub>7</sub> | A-Register Inputs/<br>B-Register 3-STATE Outputs | 3.5/1.083        | 70 $\mu$ A/0.65 mA                        |
| B <sub>0</sub> -B <sub>7</sub> | B Register Inputs/<br>A-Register 3-STATE Outputs | 150/40 (33.3)    | -3 mA/24 mA (20 mA)                       |
| $\overline{OEA}$               | Output Enable A-Register                         | 3.5/1.083        | 70 $\mu$ A/0.65 mA                        |
| CPA                            | A-Register Clock                                 | 600/106.6 (80)   | -12 mA/64 mA (48 mA)                      |
| $\overline{CEA}$               | A-Register Clock Enable                          | 1.0/1.0          | 20 $\mu$ A/-0.6 mA                        |
| $\overline{OEB}$               | Output Enable B-Register                         | 1.0/1.0          | 20 $\mu$ A/-0.6 mA                        |
| CPB                            | B-Register Clock                                 | 1.0/1.0          | 20 $\mu$ A/-0.6 mA                        |
| $\overline{CEB}$               | B-Register Clock Enable                          | 1.0/1.0          | 20 $\mu$ A/-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     |                 |

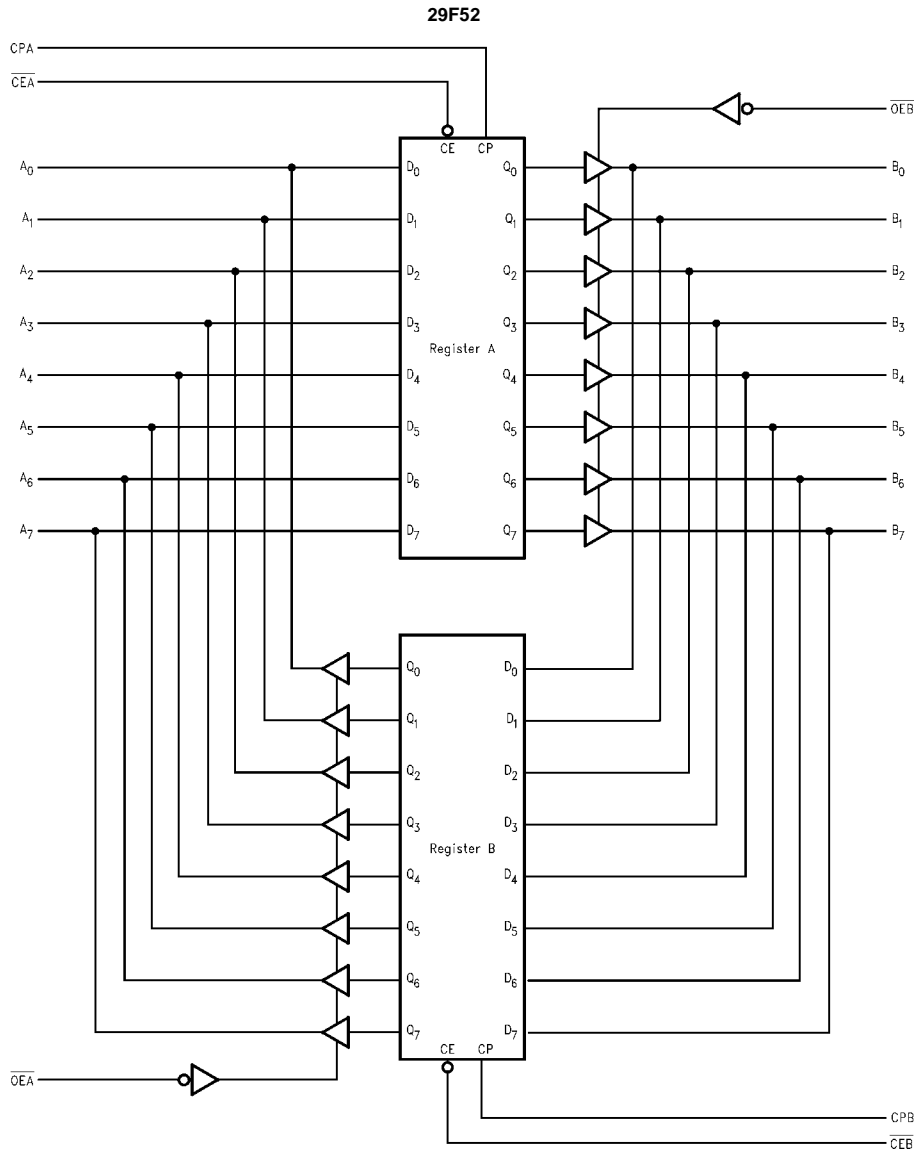
H = HIGH Voltage Level  
 L = LOW Voltage Level  
 X = Immaterial  
 Z = HIGH Impedance  
 N = LOW-to-HIGH Transition  
 NC = No Change

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

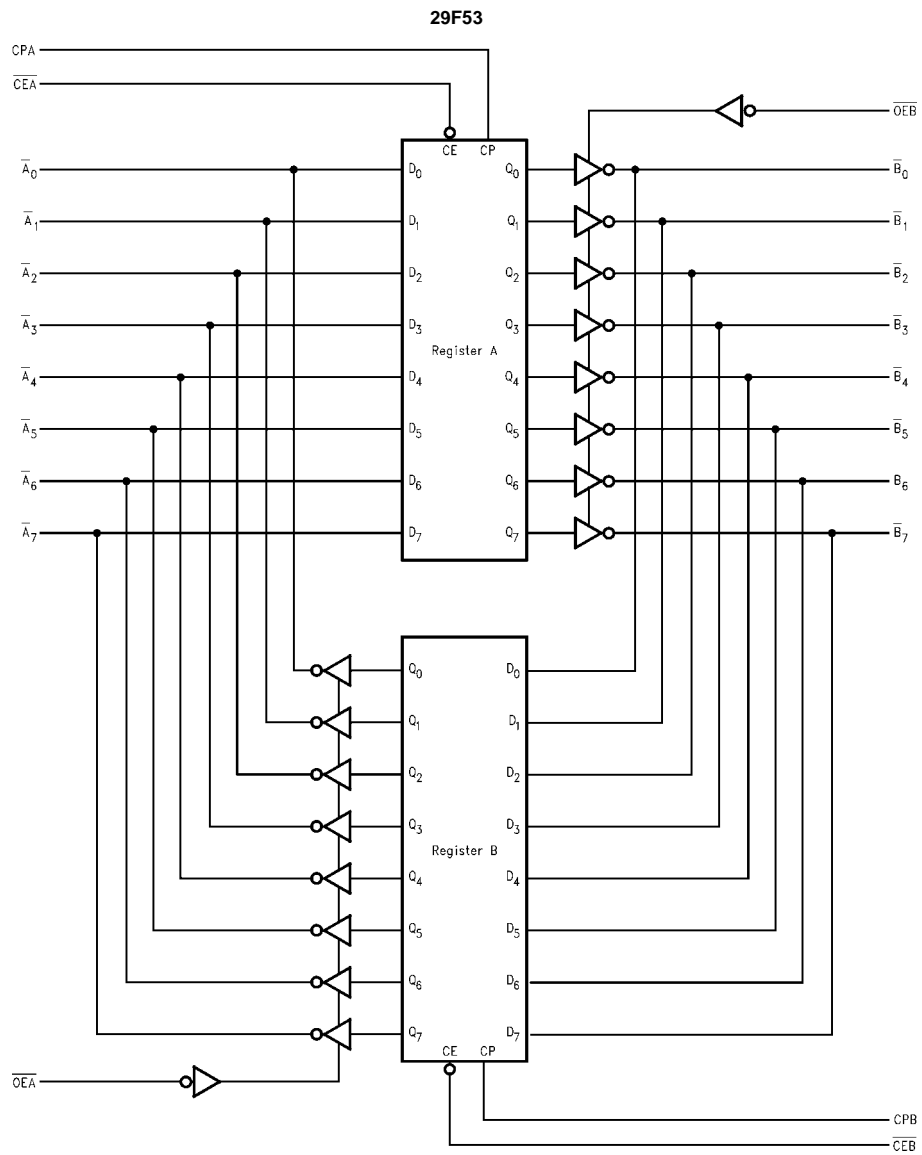
| Inputs |    |    | Internal<br>Q | Function  |
|--------|----|----|---------------|-----------|
| D      | CP | CE |               |           |
| X      | X  | H  | NC            | Hold Data |
| L      | N  | L  | L             | Load Data |
| H      | N  | L  | H             |           |

# Block Diagrams

29F52•29F53



Block Diagrams (continued)



**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<br>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<br>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  | $T_A = +25^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{ pF}$ |     |     | $T_A = -55^\circ\text{C to } +125^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{ pF}$ |     | $T_A = 0^\circ\text{C to } +70^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$<br>$C_L = 50\text{ pF}$ |      | Units |
|-----------|--|--|-----|-----|---|-----|--|------|-------|
|           |  | Min  | Typ | Max | Min   | Max | Min  | Max  |       |
| $t_{PLH}$ | Propagation Delay  | 3.0  | 5.5 | 7.5 |   |     | 2.5  | 8.5  | ns    |
| $t_{PHL}$ | CPA or CPB to $A_n$ or $B_n$   | 4.0  | 7.0 | 9.0 |   |     | 3.5  | 10.0 |       |
| $t_{PZH}$ | Output Enable Time   | 2.5  | 5.5 | 7.5 |   |     | 2.0  | 8.5  | ns    |
| $t_{PZL}$ | $\overline{\text{OEA}}$ or $\overline{\text{OEB}}$ to $A_n$ or $B_n$ | 3.5  | 7.0 | 9.5 |   |     | 3.0  | 10.5 |       |
| $t_{PHZ}$ | Output Disable Time  | 2.5  | 6.5 | 9.0 |   |     | 2.0  | 10.0 | ns    |
| $t_{PLZ}$ | $\overline{\text{OEA}}$ or $\overline{\text{OEB}}$ to $A_n$ or $B_n$ | 2.5  | 5.5 | 7.5 |   |     | 2.0  | 8.5  |       |

### AC Operating Requirements

| Symbol   | Parameter  | $T_A = +25^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$ |     | $T_A = -55^\circ\text{C to } +125^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$ |     | $T_A = 0^\circ\text{C to } +70^\circ\text{C}$<br>$V_{CC} = +5.0\text{V}$ |     | Units |
|----------|--|--|-----|---|-----|--|-----|-------|
|          |  | Min  | Max | Min   | Max | Min  | Max |       |
| $t_S(H)$ | Setup Time, HIGH or LOW  | 4.0  |     |   |     | 4.5  |     | ns    |
| $t_S(L)$ | $A_n$ or $B_n$ to CPA or CPB                                     | 4.0  |     |   |     | 4.5  |     |       |
| $t_H(H)$ | Hold Time, HIGH or LOW   | 2.0  |     |   |     | 2.5  |     | ns    |
| $t_H(L)$ | $A_n$ or $B_n$ to CPA or CPB                                     | 2.0  |     |   |     | 2.5  |     |       |
| $t_S(H)$ | Setup Time, HIGH or LOW  | 1.0  |     |   |     | 1.5  |     | ns    |
| $t_S(L)$ | $\overline{\text{CEA}}$ or $\overline{\text{CEB}}$ to CPA or CPB | 4.0  |     |   |     | 4.5  |     |       |
| $t_H(H)$ | Hold Time, HIGH or LOW   | 2.0  |     |   |     | 2.5  |     | ns    |
| $t_H(L)$ | $\overline{\text{CEA}}$ or $\overline{\text{CEB}}$ to CPA or CPB | 2.0  |     |   |     | 2.5  |     |       |
| $t_W(H)$ | Pulse Width, HIGH or LOW   | 3.0  |     |   |     | 3.5  |     | ns    |
| $t_W(L)$ | CPA or CPB   | 3.0  |     |   |     | 3.5  |     |       |



