

74F640 • 74F645

Octal Bus Transceiver with 3-STATE Outputs

General Description

These devices are octal bus transceivers designed for asynchronous two-way data flow between the A and B busses. Both busses are capable of sinking 64 mA, have 3-STATE outputs, and a common output enable pin. The direction of data flow is determined by the transmit/receive (T/R) input. The 74F645 is a high speed/low power version of the 74F245. The 74F640 is an inverting option of the 74F645.

Features

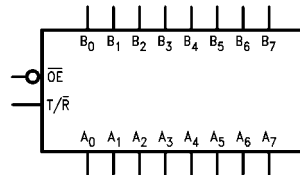
- Designed for asynchronous two-way data flow between busses
- Outputs sink 64 mA
- Transmit/receive (T/R) input controls the direction of data flow
- 74F645 is a lower power, faster version of the 74F245
- 74F640 is an inverting option of the 74F645

Ordering Code:

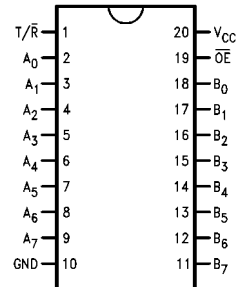
| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| 74F640SC | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| 74F640PC | N20A | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |
| 74F645PC | N20A | 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 Symbol



Connection Diagram



Unit Loading/Fan Out

| Pin Names | Description | U.L. HIGH/LOW | Input I_{IH}/I_{IL} Output I_{OH}/I_{OL} |
|------------------|-------------------------------------|------------------|---|
| \overline{OE} | Output Enable Input (Active LOW) | 1.0/1.0 | 20 μ A/-0.6 mA |
| T/\overline{R} | Transmit/Receive Input | 1.0/1.0 | 20 μ A/-0.6 mA |
| A_0 - A_7 | Side A Inputs or 3-STATE Outputs | 3.5/0.667 | 70 μ A/-0.4 mA |
| B_0 - B_7 | Side B Inputs or 3-STATE Outputs | 600/106.6 | -12 mA/64 mA |
| | | 3.5/0.667 | 70 μ A/-0.4 mA |
| | | 600/106.6 | -12 mA/64 mA |

Functional Description

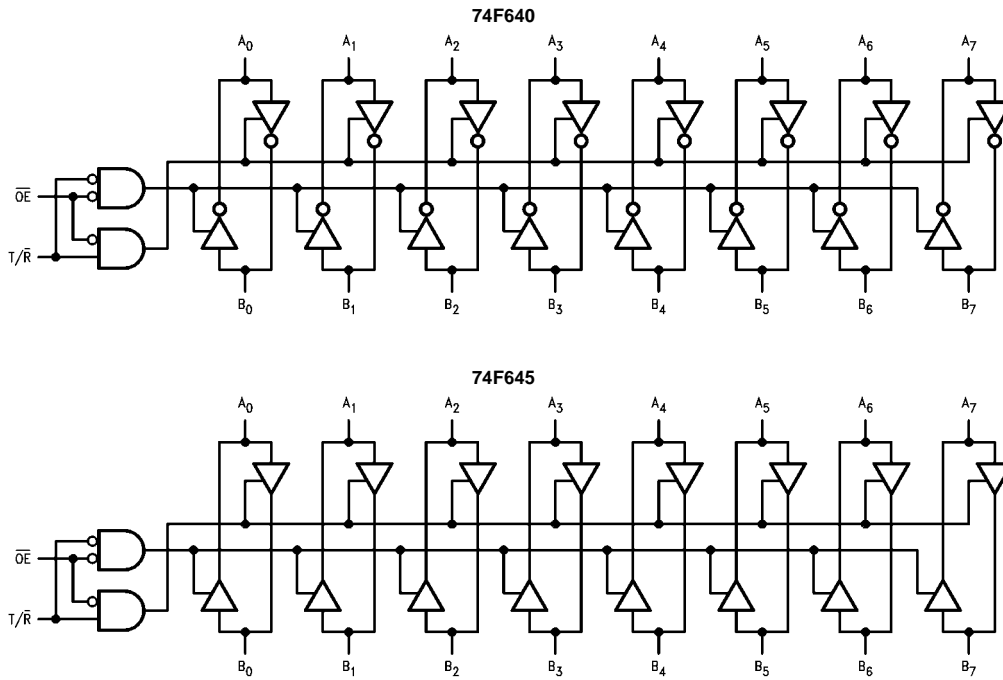
The output enable (\overline{OE}) is active LOW. If the device is disabled (\overline{OE} HIGH), the outputs are in the high impedance state. The transmit/receive input (T/\overline{R}) controls whether data is transmitted from the A bus to the B bus or from the B bus to the A bus. When T/\overline{R} is LOW, B data is sent to the A bus. If T/\overline{R} is HIGH, A data is sent to the B bus.

Function Table

| Inputs | | Outputs | |
|-----------------|------------------|----------------------------------|---------------------|
| \overline{OE} | T/\overline{R} | 74F640 | 74F645 |
| L | L | Bus \overline{B} data to Bus A | Bus B data to Bus A |
| L | H | Bus \overline{A} data to Bus B | Bus A data to Bus B |
| H | X | Z | Z |

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Z = High Impedance State

Logic Diagram



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 _{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} |
| 3-STATE Output | -0.5V to +5.5V |
| Current Applied to Output in LOW State (Max) | twice the rated I _{OL} (mA) |
| ESD Last Passing Voltage (Min) | 4000V |

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.

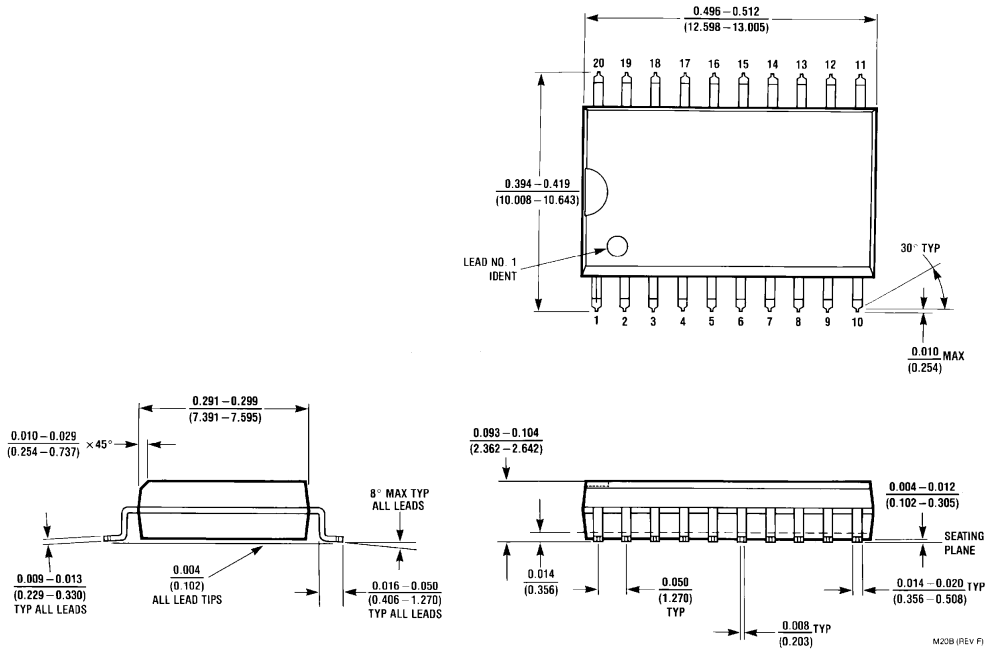
DC Electrical Characteristics

| Symbol | Parameter | Min | Typ | Max | Units | V _{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 (Non I/O Pins) |
| V _{OH} | Output HIGH Voltage 10% V _{CC} | 2.0 | | | V | Min | I _{OH} = -15 mA (A _n , B _n) |
| V _{OL} | Output LOW Voltage 10% V _{CC} | | | 0.55 | V | Min | I _{OL} = 64 mA (A _n , B _n) |
| I _{IH} | Input HIGH Current | | | 5.0 | μA | Max | V _{IN} = 2.7V (Non I/O Pins) |
| I _{BVI} | Input HIGH Current Breakdown Test | | | 7.0 | μA | Max | V _{IN} = 7.0V (Non I/O Pins) |
| I _{BVIT} | Input HIGH Current Breakdown (I/O) | | | 0.5 | mA | Max | V _{IN} = 5.5V (A _n , B _n) |
| 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 (Non I/O Pins) |
| I _{IH} + I _{OZH} | Output Leakage Current | | | 70 | μA | Max | V _{OUT} = 2.7V (A _n , B _n) |
| I _{IL} + I _{OZL} | Output Leakage Current | | | -650 | μA | Max | V _{OUT} = 0.5V (A _n , B _n) |
| I _{OS} | Output Short-Circuit Current | -100 | | -225 | mA | Max | V _{OUT} = 0V |
| I _{ZZ} | Bus Drainage Test | | | 500 | μA | 0.0V | V _{OUT} = 5.25 |
| I _{CCH} | Power Supply Current (74F640) | | | 80 | mA | Max | V _O = HIGH, V _{IN} = 0.2V |
| I _{CCL} | Power Supply Current (74F640) | | | 80 | mA | Max | V _O = LOW |
| I _{CCZ} | Power Supply Current (74F640) | | | 96 | mA | Max | V _O = HIGH Z |
| I _{CCH} | Power Supply Current (74F645) | | | 65 | mA | Max | V _O = HIGH |
| I _{CCL} | Power Supply Current (74F645) | | | 80 | mA | Max | V _O = LOW, V _{IN} = 0.2V |
| I _{CCZ} | Power Supply Current (74F645) | | | 90 | mA | Max | V _O = HIGH Z |

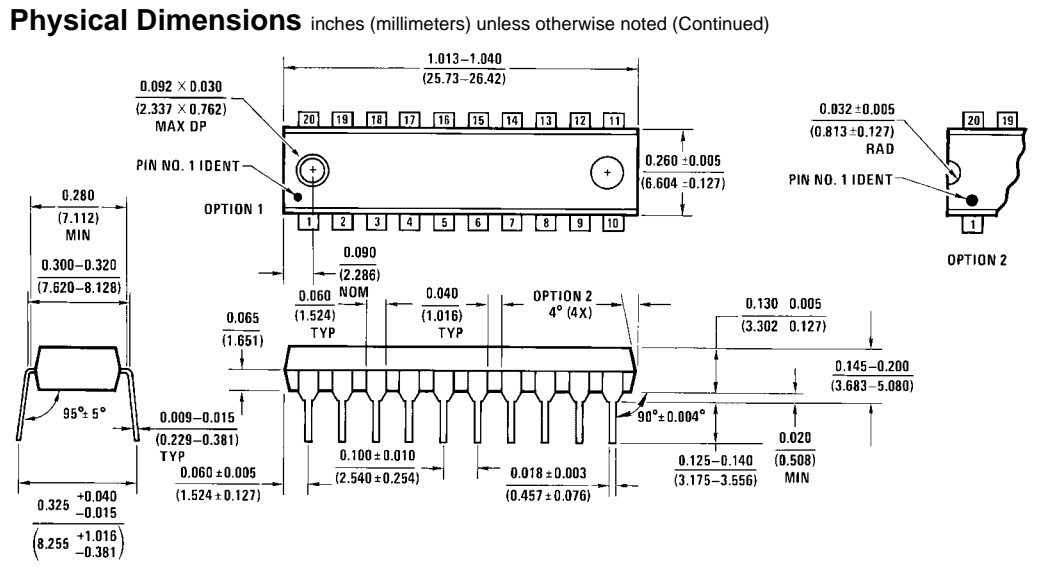
| AC Electrical Characteristics 74F640 | | | | | | | |
|--------------------------------------|----------------------|---|-----|-----|--|-----|-------|
| Symbol | Parameter | T _A = +25°C V _{CC} = +5.0V C _L = 50 pF | | | T _A = 0°C to +70°C V _{CC} = +5.0V C _L = 50 pF | | Units |
| | | Min | Typ | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 2.5 | | 7.5 | 2.0 | 8.0 | ns |
| t _{PHL} | A Input to B Output | 2.0 | | 7.0 | 2.0 | 7.0 | |
| t _{PLH} | Propagation Delay | 2.5 | | 7.5 | 2.0 | 8.0 | ns |
| t _{PHL} | B Input to A Output | 2.0 | | 7.0 | 2.0 | 7.0 | |
| t _{PZH} | Enable Time | 2.5 | | 7.5 | 2.0 | 9.0 | ns |
| t _{PZL} | OE Input to A Output | 2.5 | | 8.0 | 2.0 | 8.5 | |
| t _{PHZ} | Disable Time | 1.5 | | 7.0 | 1.0 | 7.5 | ns |
| t _{PLZ} | OE Input to A Output | 1.5 | | 6.0 | 1.5 | 6.0 | |
| t _{PZH} | Enable Time | 2.5 | | 7.5 | 2.0 | 9.0 | ns |
| t _{PZL} | OE Input to B Output | 2.5 | | 8.0 | 2.0 | 8.5 | |
| t _{PHZ} | Disable Time | 1.5 | | 7.0 | 1.0 | 7.5 | ns |
| t _{PLZ} | OE Input to B Output | 1.5 | | 6.0 | 1.5 | 6.0 | |

| AC Electrical Characteristics 74F645 | | | | | | | |
|--------------------------------------|----------------------|---|-----|-----|--|-----|-------|
| Symbol | Parameter | T _A = +25°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 | |
| t _{PLH} | Propagation Delay | 1.5 | | 6.0 | 1.5 | 7.0 | ns |
| t _{PHL} | A Input to B Output | 2.0 | | 7.0 | 2.0 | 7.5 | |
| t _{PLH} | Propagation Delay | 1.5 | | 6.0 | 1.5 | 7.0 | ns |
| t _{PHL} | B Input to A Output | 2.0 | | 7.0 | 2.0 | 7.5 | |
| t _{PZH} | Enable Time | 2.5 | | 8.0 | 2.0 | 9.0 | ns |
| t _{PZL} | OE Input to A Output | 2.5 | | 8.5 | 2.0 | 8.5 | |
| t _{PHZ} | Disable Time | 1.5 | | 7.0 | 1.0 | 8.0 | ns |
| t _{PLZ} | OE Input to A Output | 1.0 | | 5.5 | 1.0 | 5.5 | |
| t _{PZH} | Enable Time | 2.5 | | 7.5 | 2.0 | 9.5 | ns |
| t _{PZL} | OE Input to B Output | 2.5 | | 8.5 | 2.5 | 9.0 | |
| t _{PHZ} | Disable Time | 1.5 | | 6.5 | 1.0 | 7.5 | ns |
| t _{PLZ} | OE Input to B Output | 1.0 | | 5.5 | 1.0 | 5.5 | |

Physical Dimensions inches (millimeters) unless otherwise noted



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



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

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