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FXL4245

Low-Voltage, Dual-Supply, 8-Bit, Signal Translator with Configurable Voltage Supplies, Signal Levels, and 3-State Outputs

Features

- Bi-Directional Interface between Two Levels from 1.1 V to 3.6 V
- Fully Configurable, Inputs Track V_{CC} Level
- Non-Preferential Power-up; Either V_{CC} May Be Powered-up First
- Outputs Remain in 3-State until Active V_{CC} Level is Reached
- Outputs Switch to 3-State if Either V_{CC} is at GND
- Power-Off Protection
- Control Inputs (T/\bar{R} , \overline{OE}) Levels are Referenced To V_{CCA} Voltage
- Packaged in 24-Pin MLP
- ESD Protection Exceeds:
 - 4 kV Human Body Model (per JESD22-A114 & Mil Std 883e 3015.7)
 - 8 kV Human Body Model I/O to GND (per JESD22-A114 & Mil Std 883e 3015.7)
 - 1 kV Charge Device Model (per ESD STM 5.3)
 - 200 V Machine Model (per JESD22-A115 & ESD STM5.2)

Description

The FXL4245 is a configurable dual-voltage-supply translator designed for bi-directional voltage translation of signals between two voltage levels. The device allows translation between voltages as high as 3.6 V to as low as 1.1 V. The A port tracks the V_{CCA} level and the B port tracks the V_{CCB} level. Both ports are designed to accept supply voltage levels from 1.1 V to 3.6 V. This allows for bi-directional voltage translation over a variety of voltage levels: 1.2 V, 1.5 V, 1.8 V, 2.5 V, and 3.3 V.

The device remains in 3-state until both V_{CC} s reach active levels, allowing either V_{CC} to be powered-up first. The device also contains power-down control circuits that place the device in 3-state if either V_{CC} is removed.

The Transmit/Receive (T/\bar{R}) input determines the direction of data flow through the device. The \overline{OE} input, when HIGH, disables both the A and B ports by placing them in a 3-state condition. The FXL4245 is designed with the control pins (T/\bar{R} and \overline{OE}) supplied by V_{CCA} .

Ordering Information

| Part Number | Package | Packing Method |
|-------------|--|----------------|
| FXL4245MPX | 24-Pin Molded Leadless Package (MLP), JEDEC MO-220, 3.5 x 4.5 mm | Tape and Reel |

Pin Configuration

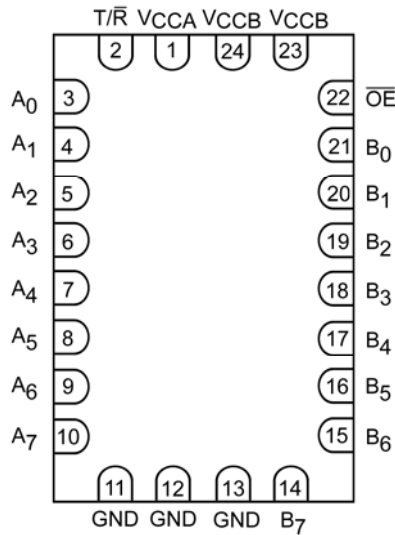


Figure 1. Pin Configuration (Top Through View)

Pin Definitions

| Pin # | Name | Description |
|--------------------------------|---|----------------------------------|
| 1 | V _{CCA} | Side-A Power Supply |
| 2 | $\overline{T/R}$ | Transmit / Receive Input |
| 3, 4, 5, 6, 7, 8, 9, 10 | A ₀ , A ₁ , A ₂ , A ₃ , A ₄ , A ₅ , A ₆ , A ₇ | Side-A Inputs or 3-State Outputs |
| 11, 12, 13 | GND | Ground |
| 14, 15, 16, 17, 18, 19, 20, 21 | B ₇ , B ₆ , B ₅ , B ₄ , B ₃ , B ₂ , B ₁ , B ₀ | Side-B Inputs or 3-State Outputs |
| 22 | \overline{OE} | Output Enable Input |
| 23, 24 | V _{CCB} | Side-B Power Supply |
| DAP | No Connect | No Connect |

Truth Table

| Inputs | | Description |
|--------------------|--------------------|---------------------|
| \overline{OE} | $\overline{T/R}$ | |
| LOW Voltage Level | LOW Voltage Level | Bus B Data to Bus A |
| LOW Voltage Level | HIGH Voltage Level | Bus A Data to Bus B |
| HIGH Voltage Level | Don't Care | 3-State |

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol | Parameter | Conditions | Min. | Max. | Unit |
|-----------------|--|---|-------------------|------|------|
| V_{CCA} | Supply Voltage | | -0.5 | 4.6 | V |
| V_{CCB} | | | -0.5 | 4.6 | |
| V_I | DC Input Voltage | I/O Port A | -0.5 | 4.6 | V |
| | | I/O Port B | -0.5 | 4.6 | |
| | | Control Inputs ($\overline{T/R}$, \overline{OE}) | -0.5 | 4.6 | |
| V_O | Output Voltage ⁽¹⁾ | Output 3-State | -0.5 | 4.6 | V |
| | | Output Active (A_n) | -0.5 to V_{CCA} | 0.5 | |
| | | Output Active (B_n) | -0.5 to V_{CCB} | 0.5 | |
| I_{IK} | DC Input Diode Current | $V_I < 0$ V | | -50 | mA |
| I_{OK} | DC Output Diode Current | $V_O < 0$ V | | -50 | mA |
| | | $V_O > V_{CC}$ | | 50 | |
| I_{OH}/I_{OL} | DC Output Source/Sink Current | | | ±50 | mA |
| I_{CC} | DC V_{CC} or Ground Current per Supply Pin | | | ±100 | mA |
| T_{STG} | Storage Temperature Range | | -65 | +150 | °C |
| ESD | Electrostatic Discharge Capability | Human Body Model, JESD22-A114, Mil Std 883e 3015.7 | | 4 | kV |
| | | | I/O to GND | 8 | |
| | | Charged Device Model, JESD22-C101, STM 5.3 | | | 1 |
| | | Machine Model, JESD22-A115, STM 5.2 | | | 200 |

Note:

1. I/O absolute maximum ratings must be observed.

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

| Symbol | Parameter | Conditions | Min. | Max. | Unit | |
|---------------------|---------------------------------|---|------------------|-----------|------|----|
| V_{CC} | Power Supply | Operating V_{CCA} or V_{CCB} | 1.1 | 3.6 | V | |
| V_I | Input Voltage | Port A | 0 | 3.6 | V | |
| | | Port B | 0 | 3.6 | | |
| | | Control Inputs ($\overline{T/R}$, \overline{OE}) | 0 | V_{CCA} | | |
| I_{OH}/I_{OL} | Output Current | V_{CC0} | 3.0 V to 3.6 V | | ±24 | mA |
| | | | 2.3 V to 2.7 V | | ±18 | |
| | | | 1.65 V to 1.95 V | | ±6 | |
| | | | 1.40 V to 1.65 V | | ±2 | |
| | | | 1.1 V to 1.4 V | | ±0.5 | |
| T_A | Operating Temperature, Free Air | | -40 | +85 | °C | |
| $\Delta V/\Delta t$ | Minimum Input Edge Rate | $V_{CCA/B} = 1.1$ V to 3.6 V | | 10 | ns/V | |

Note:

2. All unused inputs must be held at V_{CCI} or GND.

Electrical Characteristics

| Symbol | Parameter | Conditions | V _{CCI} (V) | V _{CC0} (V) | Min. | Max. | Units |
|-----------------|----------------------------------|---|----------------------|----------------------|-------------------------|-------------------------|-------|
| V _{IH} | HIGH Level Input ⁽³⁾ | Data Inputs A _n , B _n | 2.70 to 3.60 | 1.1 to 3.6 | 2.0 | | V |
| | | | 2.30 to 2.70 | | 1.6 | | |
| | | | 1.65 to 2.30 | | 0.65 x V _{CCI} | | |
| | | | 1.40 to 1.65 | | 0.65 x V _{CCI} | | |
| | | | 1.10 to 1.40 | | 0.9 x V _{CCI} | | |
| | | Control Pins \overline{OE} , T/ \overline{R} (Referenced to V _{CCA}) | 2.70 to 3.6 | 1.1 to 3.6 | 2.0 | | |
| | | | 2.30 to 2.70 | | 1.6 | | |
| | | | 1.65 to 2.30 | | 0.65 x V _{CCA} | | |
| | | | 1.40 to 1.65 | | 0.65 x V _{CCA} | | |
| | | | 1.10 to 1.40 | | 0.9 x V _{CCA} | | |
| V _{IL} | LOW Level Input ⁽³⁾ | Data Inputs A _n , B _n | 2.70 to 3.60 | 1.1 to 3.6 | | 0.8 | V |
| | | | 2.30 to 2.70 | | | 0.7 | |
| | | | 1.65 to 2.30 | | | 0.35 x V _{CCI} | |
| | | | 1.40 to 1.65 | | | 0.35 x V _{CCI} | |
| | | | 1.10 to 1.40 | | | 0.10 x V _{CCI} | |
| | | Control Pins \overline{OE} , T/ \overline{R} (Referenced to V _{CCA}) | 2.70 to 3.60 | 1.1 to 3.6 | | 0.8 | |
| | | | 2.30 to 2.70 | | | 0.7 | |
| | | | 1.65 to 2.30 | | | 0.35 x V _{CCI} | |
| | | | 1.40 to 1.65 | | | 0.35 x V _{CCI} | |
| | | | 1.10 to 1.40 | | | 0.10 x V _{CCI} | |
| V _{OH} | HIGH Level Output ⁽⁴⁾ | I _{OH} = -100 μ A | 1.1 to 3.6 | 1.1 to 3.6 | V _{CC0} - 0.2 | | V |
| | | I _{OH} = -12 mA | 2.7 | 2.7 | 2.2 | | |
| | | I _{OH} = -18 mA | 3.0 | 3.0 | 2.4 | | |
| | | I _{OH} = -24 mA | 3.0 | 3.0 | 2.2 | | |
| | | I _{OH} = -6 mA | 2.3 | 2.3 | 2.0 | | |
| | | I _{OH} = -12 mA | 2.3 | 2.3 | 1.8 | | |
| | | I _{OH} = -18 mA | 2.3 | 2.3 | 1.7 | | |
| | | I _{OH} = -6 mA | 1.65 | 1.65 | 1.25 | | |
| | | I _{OH} = -2 mA | 1.4 | 1.4 | 1.05 | | |
| | | I _{OH} = -0.5 mA | 1.1 | 1.1 | 0.75 x V _{CC0} | | |
| V _{OL} | LOW Level Output ⁽⁴⁾ | I _{OL} = 100 μ A | 1.1 to 3.6 | 1.1 to 3.6 | | 0.2 | V |
| | | I _{OL} = 12 mA | 2.7 | 2.7 | | 0.4 | |
| | | I _{OL} = 18 mA | 3.0 | 3.0 | | 0.4 | |
| | | I _{OL} = 24 mA | 3.0 | 3.0 | | 0.55 | |
| | | I _{OL} = 12 mA | 2.3 | 2.3 | | 0.4 | |
| | | I _{OL} = 18 mA | 2.3 | 2.3 | | 0.6 | |
| | | I _{OL} = 6 mA | 1.65 | 1.65 | | 0.3 | |
| | | I _{OL} = 2 mA | 1.4 | 1.4 | | 0.35 | |
| | | I _{OL} = 0.5mA | 1.1 | 1.1 | | 0.3 x V _{CC0} | |

Continued on the following page...

Electrical Characteristics

| Symbol | Parameter | Conditions | V _{CCI} (V) | V _{CCO} (V) | Min. | Max. | Units |
|---------------------|---|---|----------------------|----------------------|------|------|-------|
| I _L | Input Leakage Current, Control Pins | V _i =V _{CCA} or GND | 1.1 to 3.6 | 3.6 | | ±1.0 | μA |
| I _{OFF} | Power Off Leakage Current | A _n , V _i or V _O =0 V to 3.6 V | 0 | 3.6 | | ±10 | μA |
| | | B _n , V _i or V _O =0 V to 3.6 V | 3.6 | 0 | | ±10 | |
| I _{OZ} | 3-State Output Leakage (0 ≤ V _O ≤ 3.6 V, V _i =V _{IH} or V _{IL}) | A _n , B _n , /OE=V _{IH} | 3.6 | 3.6 | | ±10 | μA |
| | | B _n , /OE= Don't Care ⁽⁵⁾ | 0 | 3.6 | | ±10 | |
| | | A _n , /OE= Don't Care ⁽⁵⁾ | 3.6 | 0 | | ±10 | |
| I _{CCA/B} | Quiescent Supply Current ⁽⁶⁾ | V _i =V _{CCI} or GND; I _O =0 | 1.1 to 3.6 | 1.1 to 3.6 | | 20 | μA |
| I _{CCZ} | | | 1.1 to 3.6 | 1.1 to 3.6 | | 20 | |
| I _{CCA} | | V _i =V _{CCA} or GND; I _O =0 | 0 | 1.1 to 3.6 | | -10 | |
| | | | 1.1 to 3.6 | 0 | | 10 | |
| I _{CCB} | | V _i =V _{CCB} or GND; I _O =0 | 1.1 to 3.6 | 0 | | -10 | |
| | | | 0 | 1.1 to 3.6 | | 10 | |
| ΔI _{CCA/B} | Increase in I _{CC} per Input; Other Inputs at V _{CC} or GND | V _{IH} =3.0 | 3.6 | 3.6 | | 500 | μA |

Notes:

3. V_{CCI} = the V_{CC} associated with the data input under test.
4. V_{CCO} = the V_{CC} associated with the output under test.
5. Don't care = any valid logic level.
6. Reflects current per supply, V_{CCA} or V_{CCB}.

AC Electrical Characteristics

$V_{CCA}=3.0\text{ V to }3.6\text{ V}$

| Symbol | Parameter | $T_A = -40\text{ to }+85^\circ\text{C}$ | | | | | | | | | | Units |
|--------------------|--------------------------|---|------|--|------|--|------|--|------|--|------|-------|
| | | $V_{CCB}=3.0\text{ V to }3.6\text{ V}$ | | $V_{CCB}=2.3\text{ V to }2.7\text{ V}$ | | $V_{CCB}=1.65\text{ V to }1.95\text{ V}$ | | $V_{CCB}=1.4\text{ V to }1.6\text{ V}$ | | $V_{CCB}=1.1\text{ V to }1.3\text{ V}$ | | |
| | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| t_{PLH}, t_{PHL} | Propagation Delay A to B | 0.2 | 3.5 | 0.3 | 3.9 | 0.5 | 5.4 | 0.6 | 6.8 | 1.4 | 22.0 | ns |
| | Propagation Delay B to A | 0.2 | 3.5 | 0.2 | 3.8 | 0.3 | 4.0 | 0.5 | 4.3 | 0.8 | 13.0 | |
| t_{PZH}, t_{PZL} | Output Enable /OE to B | 0.5 | 4.0 | 0.7 | 4.4 | 1.0 | 5.9 | 1.0 | 6.4 | 1.5 | 17.0 | ns |
| | Output Enable /OE to A | 0.5 | 4.0 | 0.5 | 4.0 | 0.5 | 4.0 | 0.5 | 4.0 | 0.5 | 4.0 | |
| t_{PHZ}, t_{PLZ} | Output Disable /OE to B | 0.2 | 3.8 | 0.2 | 4.0 | 0.7 | 4.8 | 1.5 | 6.2 | 2.0 | 17.0 | ns |
| | Output Disable /OE to A | 0.2 | 3.7 | 0.2 | 3.7 | 0.2 | 3.7 | 0.2 | 3.7 | 0.2 | 3.7 | |

$V_{CCA}=2.3\text{ V to }2.7\text{ V}$

| Symbol | Parameter | $T_A = -40\text{ to }+85^\circ\text{C}$ | | | | | | | | | | Units |
|--------------------|--------------------------|---|------|--|------|--|------|--|------|--|------|-------|
| | | $V_{CCB}=3.0\text{ V to }3.6\text{ V}$ | | $V_{CCB}=2.3\text{ V to }2.7\text{ V}$ | | $V_{CCB}=1.65\text{ V to }1.95\text{ V}$ | | $V_{CCB}=1.4\text{ V to }1.6\text{ V}$ | | $V_{CCB}=1.1\text{ V to }1.3\text{ V}$ | | |
| | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| t_{PLH}, t_{PHL} | Propagation Delay A to B | 0.2 | 3.8 | 0.4 | 4.2 | 0.5 | 5.6 | 0.8 | 6.9 | 1.4 | 22.0 | ns |
| | Propagation Delay B to A | 0.3 | 3.9 | 0.4 | 4.2 | 0.5 | 4.5 | 0.5 | 4.8 | 1.0 | 7.0 | |
| t_{PZH}, t_{PZL} | Output Enable /OE to B | 0.6 | 4.2 | 0.8 | 4.6 | 1.0 | 6.0 | 1.0 | 6.8 | 1.5 | 17.0 | ns |
| | Output Enable /OE to A | 0.6 | 4.5 | 0.6 | 4.5 | 0.6 | 4.5 | 0.6 | 4.5 | 0.6 | 4.5 | |
| t_{PHZ}, t_{PLZ} | Output Disable /OE to B | 0.2 | 4.1 | 0.2 | 4.3 | 0.7 | 4.8 | 1.5 | 6.7 | 2.0 | 17.0 | ns |
| | Output Disable /OE to A | 0.2 | 4.0 | 0.2 | 4.0 | 0.2 | 4.0 | 0.2 | 4.0 | 0.2 | 4.0 | |

$V_{CCA}=1.65\text{ V to }1.95\text{ V}$

| Symbol | Parameter | $T_A = -40\text{ to }+85^\circ\text{C}$ | | | | | | | | | | Units |
|--------------------|--------------------------|---|------|--|------|--|------|--|------|--|------|-------|
| | | $V_{CCB}=3.0\text{ V to }3.6\text{ V}$ | | $V_{CCB}=2.3\text{ V to }2.7\text{ V}$ | | $V_{CCB}=1.65\text{ V to }1.95\text{ V}$ | | $V_{CCB}=1.4\text{ V to }1.6\text{ V}$ | | $V_{CCB}=1.1\text{ V to }1.3\text{ V}$ | | |
| | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| t_{PLH}, t_{PHL} | Propagation Delay A to B | 0.3 | 4.0 | 0.5 | 4.5 | 0.8 | 5.7 | 0.9 | 7.1 | 1.5 | 22.0 | ns |
| | Propagation Delay B to A | 0.5 | 5.4 | 0.5 | 5.6 | 0.8 | 5.7 | 1.0 | 6.0 | 1.2 | 8.0 | |
| t_{PZH}, t_{PZL} | Output Enable /OE to B | 0.6 | 5.2 | 0.8 | 5.4 | 1.2 | 6.9 | 1.2 | 7.2 | 1.5 | 18.0 | ns |
| | Output Enable /OE to A | 1.0 | 6.7 | 1.0 | 6.7 | 1.0 | 6.7 | 1.0 | 6.7 | 1.0 | 6.7 | |
| t_{PHZ}, t_{PLZ} | Output Disable /OE to B | 0.2 | 5.1 | 0.2 | 5.2 | 0.8 | 5.2 | 1.5 | 7.0 | 2.0 | 17.0 | ns |
| | Output Disable /OE to A | 0.5 | 5.0 | 0.5 | 5.0 | 0.5 | 5.0 | 0.5 | 5.0 | 0.5 | 5.0 | |

AC Electrical Characteristics (Continued)

$V_{CCA}=1.4\text{ V to }1.6\text{ V}$

| Symbol | Parameter | $T_A = -40\text{ to }+85^\circ\text{C}$ | | | | | | | | | | Units |
|--------------------|--------------------------|---|------|--|------|--|------|--|------|--|------|-------|
| | | $V_{CCB}=3.0\text{ V to }3.6\text{ V}$ | | $V_{CCB}=2.3\text{ V to }2.7\text{ V}$ | | $V_{CCB}=1.65\text{ V to }1.95\text{ V}$ | | $V_{CCB}=1.4\text{ V to }1.6\text{ V}$ | | $V_{CCB}=1.1\text{ V to }1.3\text{ V}$ | | |
| | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| t_{PLH}, t_{PHL} | Propagation Delay A to B | 0.5 | 4.3 | 0.5 | 4.8 | 1.0 | 6.0 | 1.0 | 7.3 | 1.5 | 22.0 | ns |
| | Propagation Delay B to A | 0.6 | 6.8 | 0.8 | 6.9 | 0.9 | 7.1 | 1.0 | 7.3 | 1.3 | 9.5 | |
| t_{PZH}, t_{PZL} | Output Enable /OE to B | 1.1 | 7.5 | 1.1 | 7.6 | 1.3 | 7.7 | 1.4 | 7.9 | 2.0 | 20.0 | ns |
| | Output Enable /OE to A | 1.0 | 7.5 | 1.0 | 7.5 | 1.0 | 7.5 | 1.0 | 7.5 | 1.0 | 7.5 | |
| t_{PHZ}, t_{PLZ} | Output Disable /OE to B | 0.4 | 6.1 | 0.4 | 6.2 | 0.9 | 6.2 | 1.5 | 7.5 | 2.0 | 18.0 | ns |
| | Output Disable /OE to A | 1.0 | 6.0 | 1.0 | 6.0 | 1.0 | 6.0 | 1.0 | 6.0 | 1.0 | 6.0 | |

$V_{CCA}=1.1\text{ V to }1.3\text{ V}$

| Symbol | Parameter | $T_A = -40\text{ to }+85^\circ\text{C}$ | | | | | | | | | | Units |
|--------------------|--------------------------|---|------|--|------|--|------|--|------|--|------|-------|
| | | $V_{CCB}=3.0\text{ V to }3.6\text{ V}$ | | $V_{CCB}=2.3\text{ V to }2.7\text{ V}$ | | $V_{CCB}=1.65\text{ V to }1.95\text{ V}$ | | $V_{CCB}=1.4\text{ V to }1.6\text{ V}$ | | $V_{CCB}=1.1\text{ V to }1.3\text{ V}$ | | |
| | | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | |
| t_{PLH}, t_{PHL} | Propagation Delay A to B | 0.8 | 13.0 | 1.0 | 7.0 | 1.2 | 8.0 | 1.3 | 9.5 | 2.0 | 24.0 | ns |
| | Propagation Delay B to A | 1.4 | 22.0 | 1.4 | 22.0 | 1.5 | 22.0 | 1.5 | 22.0 | 2.0 | 24.0 | |
| t_{PZH}, t_{PZL} | Output Enable /OE to B | 1.0 | 12.0 | 1.0 | 9.0 | 2.0 | 10.0 | 2.0 | 11.0 | 2.0 | 24.0 | ns |
| | Output Enable /OE to A | 2.0 | 22.0 | 2.0 | 22.0 | 2.0 | 22.0 | 2.0 | 22.0 | 2.0 | 22.0 | |
| t_{PHZ}, t_{PLZ} | Output Disable /OE to B | 1.0 | 15.0 | 0.7 | 7.0 | 1.0 | 8.0 | 2.0 | 10.0 | 2.0 | 20.0 | ns |
| | Output Disable /OE to A | 2.0 | 15.0 | 2.0 | 12.0 | 2.0 | 12.0 | 2.0 | 12.0 | 2.0 | 12.0 | |

Capacitance

| Symbol | Parameter | Conditions | $T_A=+25^\circ\text{C}$ | Units |
|-----------|-------------------------------|---|-------------------------|-------|
| | | | Typical | |
| C_{IN} | Input Capacitance | $V_{CCA}=V_{CCB}=0\text{ V}, V_I=0\text{ V or }V_{CCA/B}$ | 4 | pF |
| $C_{I/O}$ | Input/Output Capacitance | $V_{CCA}=V_{CCB}=3.3\text{ V}, V_I=0\text{ V or }V_{CCA/B}$ | 5 | pF |
| C_{PD} | Power Dissipation Capacitance | $V_{CCA}=V_{CCB}=3.3\text{ V}, V_I=0\text{ V or }V_{CC}, f=10\text{ MHz}$ | 20 | pF |

AC Loadings and Waveforms

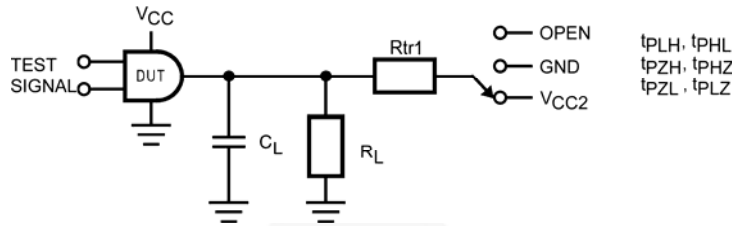
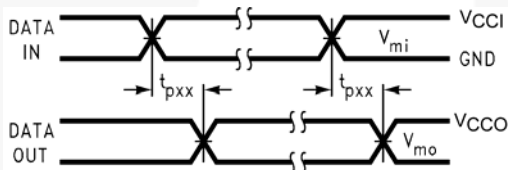


Figure 2. AC Test Circuit

| Test | Switch |
|--------------------|---|
| t_{PLH}, t_{PHL} | Open |
| t_{PLZ}, t_{PZL} | $V_{CC0} \cdot 2$ at $V_{CC0}=3.3 \pm 0.3 \text{ V}, 2.5 \text{ V} \pm 0.2 \text{ V}, 1.8 \text{ V} \pm 0.15 \text{ V}, 1.5 \text{ V} \pm 0.1 \text{ V}, 1.2 \text{ V} \pm 0.1 \text{ V}$ |
| t_{PHZ}, t_{PZH} | GND |

Table 1. AC Load Table

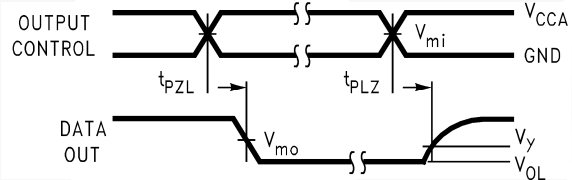
| V_{CC0} | C_L | R_L | R_{tr1} |
|------------------------------------|-------|----------------|----------------|
| $1.2 \text{ V} \pm 0.1 \text{ V}$ | 15 pF | 2 k Ω | 2 k Ω |
| $1.5 \text{ V} \pm 0.1 \text{ V}$ | 15 pF | 2 k Ω | 2 k Ω |
| $1.8 \text{ V} \pm 0.15 \text{ V}$ | 30 pF | 500 k Ω | 500 k Ω |
| $2.5 \text{ V} \pm 0.2 \text{ V}$ | 30 pF | 500 k Ω | 500 k Ω |
| $3.3 \text{ V} \pm 0.3 \text{ V}$ | 30 pF | 500 k Ω | 500 k Ω |



Note:

7. Input $t_R=t_F=2.0 \text{ ns}$, 10% to 90%

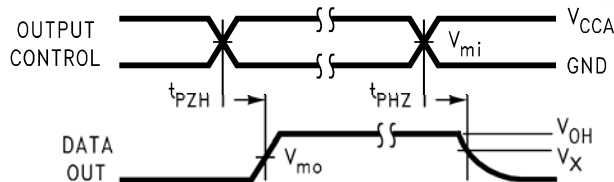
Figure 3. Waveform for Inverting and Non-Inverting Functions



Note:

8. Input $t_R=t_F=2.0 \text{ ns}$, 10% to 90%

Figure 4. 3-State Output Low Enable and Disable for Low Voltage Logic



Note:

9. Input $t_R=t_F=2.0 \text{ ns}$, 10% to 90%

Figure 5. 3-State Output High Enable and Disable for Low Voltage Logic

| Symbol | V_{CC} | | | | |
|----------|-----------------------------------|-----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|
| | $3.3 \text{ V} \pm 0.3 \text{ V}$ | $2.5 \text{ V} \pm 0.2 \text{ V}$ | $1.8 \text{ V} \pm 0.15 \text{ V}$ | $1.5 \text{ V} \pm 0.1 \text{ V}$ | $1.2 \text{ V} \pm 0.1 \text{ V}$ |
| V_{MI} | $V_{CC1}/2$ | $V_{CC1}/2$ | $V_{CC1}/2$ | $V_{CC1}/2$ | $V_{CC1}/2$ |
| V_{MO} | $V_{CC0}/2$ | $V_{CC0}/2$ | $V_{CC0}/2$ | $V_{CC0}/2$ | $V_{CC0}/2$ |
| V_X | $V_{OH} - 0.3 \text{ V}$ | $V_{OH} - 0.15 \text{ V}$ | $V_{OH} - 0.15 \text{ V}$ | $V_{OH} - 0.1 \text{ V}$ | $V_{OH} - 0.1 \text{ V}$ |
| V_Y | $V_{OL} + 0.3 \text{ V}$ | $V_{OL} + 0.15 \text{ V}$ | $V_{OL} + 0.15 \text{ V}$ | $V_{OL} + 0.1 \text{ V}$ | $V_{OL} + 0.1 \text{ V}$ |

Note:

10. For V_{MI} $V_{CC0}=V_{CCA}$ for control pins $T\bar{R}$ and $\bar{O}E$ or $V_{CCA}/2$.

Functional Description

Power-Up/Power-Down Sequencing

FXL translators offer an advantage in that either V_{CC} may be powered up first. This benefit derives from the chip design. When either V_{CC} is at 0 V, outputs are in a High-impedance state. The control inputs ($\overline{T/R}$ and \overline{OE}) are designed to track the V_{CCA} supply. A pull-up resistor tying \overline{OE} to V_{CCA} should be used to ensure that bus contention, excessive currents, or oscillations do not occur during power-up/power-down. The size of the pull-up resistor is based upon the current-sinking capability of the OE driver.

The recommended power-up sequence is:

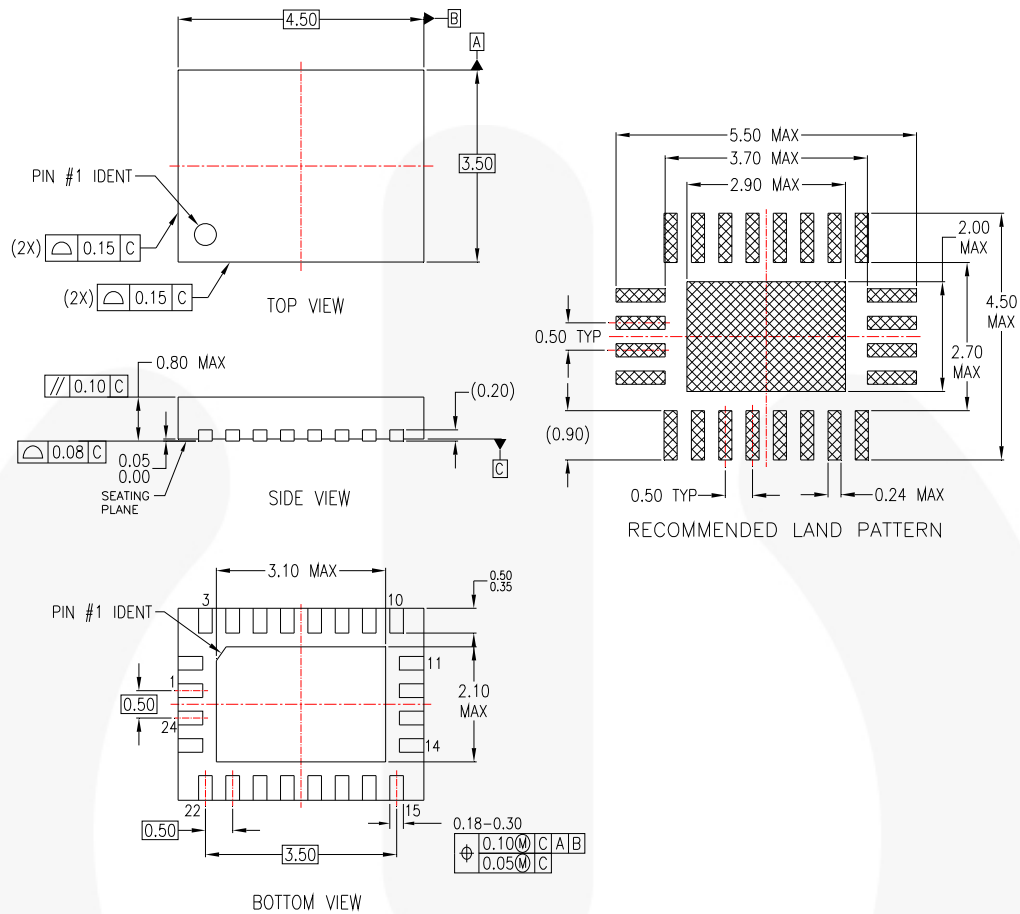
1. Apply power to either V_{CC} .
2. Apply power to the $\overline{T/R}$ input (logic HIGH for A-to-B operation; logic LOW for B-to-A operation) and to the respective data inputs (A port or B port). This may occur at the same time as step 1.
3. Apply power to the other V_{CC} .
4. Drive the \overline{OE} input LOW to enable the device.

The recommended power-down sequence is:

1. Drive \overline{OE} input HIGH to disable the device.
2. Remove power from either V_{CC} .
3. Remove power from the other V_{CC} .



Physical Dimensions



NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-220, VARIATION WFSD-2 FOR DIMENSIONS ONLY. PIN NUMBERING DOES NOT COMPLY.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

MLP24Brev4

Figure 6. 24-Pin Molded Leadless Package (MLP), JEDEC MO-220, 3.5 x 4.5 mm

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