

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

## FXL4245

### General Description

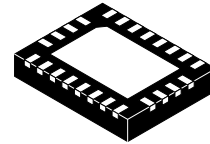
The FXL4245 is a configurable dual-voltage-supply translator designed for bi-directional voltage translation of signals between two voltage levels. The device allows translation between voltages as high as 3.6 V to as low as 1.1 V. The A port tracks the  $V_{CCA}$  level and the B port tracks the  $V_{CCB}$  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  $V_{CCA}$ .

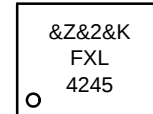
### Features

- 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)
- This Device is Pb-Free, Halide Free and is RoHS Compliant



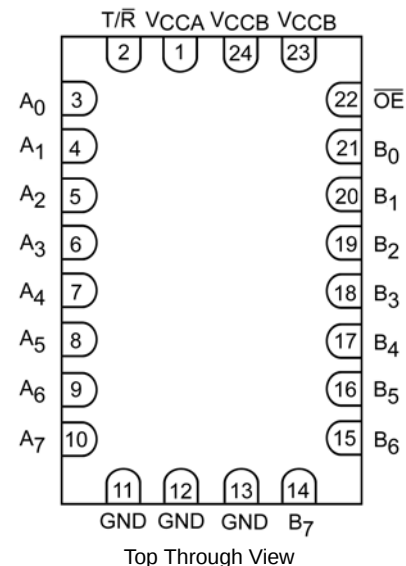
WQFN24 4.5x3.5, 0.5P  
CASE 510CE

### MARKING DIAGRAM



FXL4245 = Specific Device Code  
 &Z = Assembly Plant Code  
 &2 = 2-Digit Date Code  
 &K = 2-Digits Lot Run Traceability Code

### PIN CONFIGURATION



### ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

# FXL4245

## PIN DESCRIPTIONS

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

## TRUTH TABLE

| Inputs             |                    | Description         |
|--------------------|--------------------|---------------------|
| OE                 | 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

| Symbol                           | Parameter                                           | Conditions                                         | Min                      | Max  | Unit |
|----------------------------------|-----------------------------------------------------|----------------------------------------------------|--------------------------|------|------|
| V <sub>CCA</sub>                 | Supply Voltage                                      |                                                    | -0.5                     | 4.6  | V    |
| V <sub>CCB</sub>                 |                                                     |                                                    | -0.5                     | 4.6  |      |
| V <sub>I</sub>                   | DC Input Voltage                                    | I/O Port A                                         | -0.5                     | 4.6  | V    |
|                                  |                                                     | I/O Port B                                         | -0.5                     | 4.6  |      |
|                                  |                                                     | Control Inputs (T/R, OE)                           | -0.5                     | 4.6  |      |
| V <sub>O</sub>                   | Output Voltage (Note 1)                             | Output 3-State                                     | -0.5                     | 4.6  | V    |
|                                  |                                                     | Output Active (A <sub>n</sub> )                    | -0.5 to V <sub>CCA</sub> | 0.5  |      |
|                                  |                                                     | Output Active (B <sub>n</sub> )                    | -0.5 to V <sub>CCB</sub> | 0.5  |      |
| I <sub>IK</sub>                  | DC Input Diode Current                              | V <sub>I</sub> < 0 V                               | -                        | -50  | mA   |
| I <sub>OK</sub>                  | DC Output Diode Current                             | V <sub>O</sub> < 0 V                               | -                        | -50  | mA   |
|                                  |                                                     | V <sub>O</sub> > V <sub>CC</sub>                   | -                        | 50   |      |
| I <sub>OH</sub> /I <sub>OL</sub> | DC Output Source/Sink Current                       |                                                    | -                        | ±50  | mA   |
| I <sub>CC</sub>                  | DC V <sub>CC</sub> or Ground Current per Supply Pin |                                                    | -                        | ±100 | mA   |
| T <sub>STG</sub>                 | 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  | V    |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. I<sub>O</sub> Absolute Maximum Rating must be observed.

RECOMMENDED OPERATING CONDITIONS

| Symbol                           | Parameter                       | Conditions                                     |                  | Min | Max              | Unit |
|----------------------------------|---------------------------------|------------------------------------------------|------------------|-----|------------------|------|
| V <sub>CC</sub>                  | Power Supply                    | Operating V <sub>CCA</sub> or V <sub>CCB</sub> |                  | 1.1 | 3.6              | V    |
| V <sub>I</sub>                   | Input Voltage                   | Port A                                         |                  | 0   | 3.6              | V    |
|                                  |                                 | Port B                                         |                  | 0   | 3.6              |      |
|                                  |                                 | Control Inputs (T/R, $\overline{OE}$ )         |                  | 0   | V <sub>CCA</sub> |      |
| I <sub>OH</sub> /I <sub>OL</sub> | Output Current                  | V <sub>CC0</sub>                               | 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 <sub>A</sub>                   | Operating Temperature, Free Air |                                                |                  | –40 | +85              | °C   |
| ΔV/Δt                            | Minimum Input Edge Rate         | V <sub>CCA/B</sub> = 1.1 V to 3.6 V            |                  | –   | 10               | ns/V |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

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                   | Unit |
|----------|---------------------------|----------------------------------------------------------------------|---------------|---------------|-----------------------|-----------------------|------|
| $V_{IH}$ | HIGH Level Input (Note 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  |               | $0.65 \times V_{CCI}$ | –                     |      |
|          |                           |                                                                      | 1.40 to 1.65  |               | $0.65 \times V_{CCI}$ | –                     |      |
|          |                           |                                                                      | 1.10 to 1.40  |               | $0.9 \times V_{CCI}$  | –                     |      |
|          |                           | Control Pins $\bar{OE}$ , $T/\bar{R}$<br>(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  |               | $0.65 \times V_{CCA}$ | –                     |      |
|          |                           |                                                                      | 1.40 to 1.65  |               | $0.65 \times V_{CCA}$ | –                     |      |
|          |                           |                                                                      | 1.10 to 1.40  |               | $0.9 \times V_{CCA}$  | –                     |      |
| $V_{IL}$ | LOW Level Input (Note 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  |               | –                     | $0.35 \times V_{CCI}$ |      |
|          |                           |                                                                      | 1.40 to 1.65  |               | –                     | $0.35 \times V_{CCI}$ |      |
|          |                           |                                                                      | 1.10 to 1.40  |               | –                     | $0.10 \times V_{CCI}$ |      |
|          |                           | Control Pins $/\bar{OE}$ , $T/\bar{R}$<br>(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  |               | –                     | $0.35 \times V_{CCI}$ |      |
|          |                           |                                                                      | 1.40 to 1.65  |               | –                     | $0.35 \times V_{CCI}$ |      |
|          |                           |                                                                      | 1.10 to 1.40  |               | –                     | $0.10 \times V_{CCI}$ |      |

ELECTRICAL CHARACTERISTICS (continued)

| Symbol              | Parameter                                                                                                       | Conditions                                                       | V <sub>CCI</sub> (V) | V <sub>CCO</sub> (V) | Min                     | Max                    | Unit |
|---------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------|----------------------|-------------------------|------------------------|------|
| V <sub>OH</sub>     | HIGH Level Output (Note 4)                                                                                      | I <sub>OH</sub> = -100 μA                                        | 1.1 to 3.6           | 1.1 to 3.6           | V <sub>CC0</sub> - 0.2  | -                      | V    |
|                     |                                                                                                                 | I <sub>OH</sub> = -12 mA                                         | 2.7                  | 2.7                  | 2.2                     | -                      |      |
|                     |                                                                                                                 | I <sub>OH</sub> = -18 mA                                         | 3.0                  | 3.0                  | 2.4                     | -                      |      |
|                     |                                                                                                                 | I <sub>OH</sub> = -24 mA                                         | 3.0                  | 3.0                  | 2.2                     | -                      |      |
|                     |                                                                                                                 | I <sub>OH</sub> = -6 mA                                          | 2.3                  | 2.3                  | 2.0                     | -                      |      |
|                     |                                                                                                                 | I <sub>OH</sub> = -12 mA                                         | 2.3                  | 2.3                  | 1.8                     | -                      |      |
|                     |                                                                                                                 | I <sub>OH</sub> = -18 mA                                         | 2.3                  | 2.3                  | 1.7                     | -                      |      |
|                     |                                                                                                                 | I <sub>OH</sub> = -6 mA                                          | 1.65                 | 1.65                 | 1.25                    | -                      |      |
|                     |                                                                                                                 | I <sub>OH</sub> = -2 mA                                          | 1.4                  | 1.4                  | 1.05                    | -                      |      |
|                     |                                                                                                                 | I <sub>OH</sub> = -0.5 mA                                        | 1.1                  | 1.1                  | 0.75 x V <sub>CC0</sub> | -                      |      |
| V <sub>OL</sub>     | LOW Level Output (Note 4)                                                                                       | I <sub>OL</sub> = 100 μA                                         | 1.1 to 3.6           | 1.1 to 3.6           | -                       | 0.2                    | V    |
|                     |                                                                                                                 | I <sub>OL</sub> = 12 mA                                          | 2.7                  | 2.7                  | -                       | 0.4                    |      |
|                     |                                                                                                                 | I <sub>OL</sub> = 18 mA                                          | 3.0                  | 3.0                  | -                       | 0.4                    |      |
|                     |                                                                                                                 | I <sub>OL</sub> = 24 mA                                          | 3.0                  | 3.0                  | -                       | 0.55                   |      |
|                     |                                                                                                                 | I <sub>OL</sub> = 12 mA                                          | 2.3                  | 2.3                  | -                       | 0.4                    |      |
|                     |                                                                                                                 | I <sub>OL</sub> = 18 mA                                          | 2.3                  | 2.3                  | -                       | 0.6                    |      |
|                     |                                                                                                                 | I <sub>OL</sub> = 6 mA                                           | 1.65                 | 1.65                 | -                       | 0.3                    |      |
|                     |                                                                                                                 | I <sub>OL</sub> = 2 mA                                           | 1.4                  | 1.4                  | -                       | 0.35                   |      |
|                     |                                                                                                                 | I <sub>OL</sub> = 0.5 mA                                         | 1.1                  | 1.1                  | -                       | 0.3 x V <sub>CC0</sub> |      |
| I <sub>L</sub>      | Input Leakage Current, Control Pins                                                                             | V <sub>I</sub> = V <sub>CCA</sub> or GND                         | 1.1 to 3.6           | 3.6                  | -                       | ±1.0                   | μA   |
| I <sub>OFF</sub>    | Power Off Leakage Current                                                                                       | A <sub>n</sub> , V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V | 0                    | 3.6                  | -                       | ±10                    | μA   |
|                     |                                                                                                                 | B <sub>n</sub> , V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V | 3.6                  | 0                    | -                       | ±10                    |      |
| I <sub>OZ</sub>     | 3-State Output Leakage<br>(0 ≤ V <sub>O</sub> ≤ 3.6 V,<br>V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ) | A <sub>n</sub> , B <sub>n</sub> , /OE = V <sub>IH</sub>          | 3.6                  | 3.6                  | -                       | ±10                    | μA   |
|                     |                                                                                                                 | B <sub>n</sub> , /OE = Don't Care (Note 5)                       | 0                    | 3.6                  | -                       | ±10                    |      |
|                     |                                                                                                                 | A <sub>n</sub> , /OE = Don't Care (Note 5)                       | 3.6                  | 0                    | -                       | ±10                    |      |
| I <sub>CCA/B</sub>  | Quiescent Supply Current<br>(Note 6)                                                                            | V <sub>I</sub> = V <sub>CCI</sub> or GND; I <sub>O</sub> = 0     | 1.1 to 3.6           | 1.1 to 3.6           | -                       | 20                     | μA   |
| I <sub>CCZ</sub>    |                                                                                                                 |                                                                  | 1.1 to 3.6           | 1.1 to 3.6           | -                       | 20                     |      |
| I <sub>CCA</sub>    |                                                                                                                 | V <sub>I</sub> = V <sub>CCA</sub> or GND; I <sub>O</sub> = 0     | 0                    | 1.1 to 3.6           | -                       | -10                    |      |
|                     |                                                                                                                 |                                                                  | 1.1 to 3.6           | 0                    | -                       | 10                     |      |
| I <sub>CCB</sub>    |                                                                                                                 | V <sub>I</sub> = V <sub>CCB</sub> or GND; I <sub>O</sub> = 0     | 1.1 to 3.6           | 0                    | -                       | -10                    |      |
|                     |                                                                                                                 |                                                                  | 0                    | 1.1 to 3.6           | -                       | 10                     |      |
| ΔI <sub>CCA/B</sub> | Increase in I <sub>CC</sub> per Input;<br>Other Inputs at V <sub>CC</sub> or GND                                | V <sub>IH</sub> = 3.0                                            | 3.6                  | 3.6                  | -                       | 500                    | μA   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. V<sub>CCI</sub> = the V<sub>CC</sub> associated with the data input under test.

4. V<sub>CCO</sub> = the V<sub>CC</sub> associated with the output under test.

5. Don't care = Any valid logic level.

6. Reflects current per supply, V<sub>CCA</sub> or V<sub>CCB</sub>.

AC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | T <sub>A</sub> = -40 °C to +85 °C    |     |                                      |     |                                        |     |                                      |     |                                      |     | Unit |
|--------|-----------|--------------------------------------|-----|--------------------------------------|-----|----------------------------------------|-----|--------------------------------------|-----|--------------------------------------|-----|------|
|        |           | V <sub>CCB</sub> =<br>3.0 V to 3.6 V |     | V <sub>CCB</sub> =<br>2.3 V to 2.7 V |     | V <sub>CCB</sub> =<br>1.65 V to 1.95 V |     | V <sub>CCB</sub> =<br>1.4 V to 1.6 V |     | V <sub>CCB</sub> =<br>1.1 V to 1.3 V |     |      |
|        |           | Typ                                  | Max | Typ                                  | Max | Typ                                    | Max | Typ                                  | Max | Typ                                  | Typ |      |

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

|                    |                          |     |     |     |     |     |     |     |     |     |      |    |
|--------------------|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----|
| $t_{PLH}, t_{PHL}$ | 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  |    |

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

|                    |                          |     |     |     |     |     |     |     |     |     |      |    |
|--------------------|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----|
| $t_{PLH}, t_{PHL}$ | 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  |    |

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

|                    |                          |     |     |     |     |     |     |     |     |     |      |    |
|--------------------|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----|
| $t_{PLH}, t_{PHL}$ | 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  |    |

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

|                    |                          |     |     |     |     |     |     |     |     |     |      |    |
|--------------------|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----|
| $t_{PLH}, t_{PHL}$ | 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  |    |

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

|                    |                          |     |      |     |      |     |      |     |      |     |      |    |
|--------------------|--------------------------|-----|------|-----|------|-----|------|-----|------|-----|------|----|
| $t_{PLH}, t_{PHL}$ | 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                                                                          | $T_A = +25\text{ }^{\circ}\text{C}$ | Unit |
|----------|-------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|------|
|          |                               |                                                                                     | Typical                             |      |
| $C_{IN}$ | Input Capacitance             | $V_{CCA} = V_{CCB} = 0\text{ V}, V_I = 0\text{ V}$ or $V_{CCA/B}$                   | 4                                   | pF   |
| $C_{IO}$ | 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   |



## 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 ( $T/\overline{R}$  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  $T/\overline{R}$  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  $V_{CC}$ .

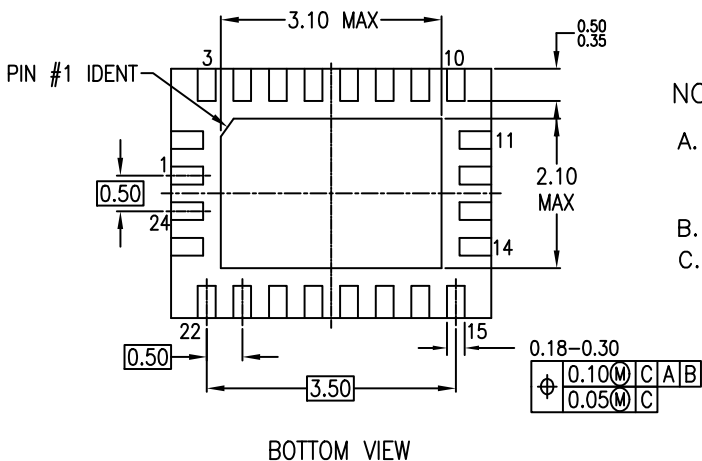
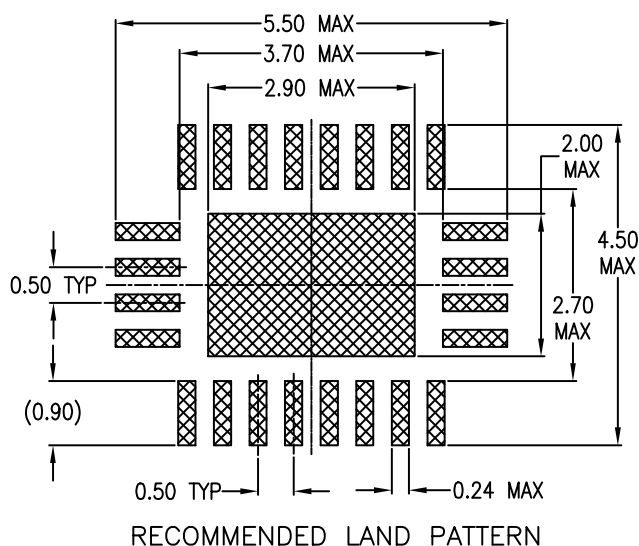
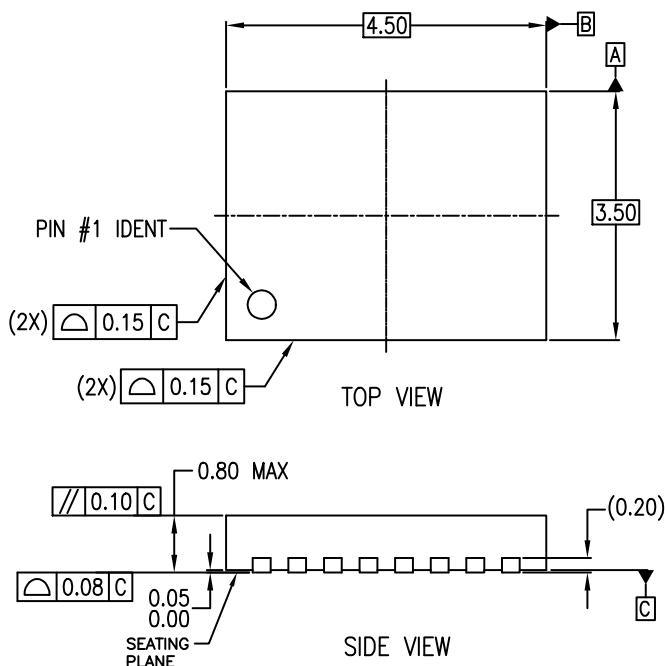
## ORDERING INFORMATION

| Order Number | Package Description                                                                     | Shipping <sup>†</sup> |
|--------------|-----------------------------------------------------------------------------------------|-----------------------|
| FXL4245MPX   | 24-Pin Molded Leadless Package (MLP), JEDEC MO-220, 3.5 x 4.5 mm (Pb-Free, Halide Free) | 3000 / Tape & Reel    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

WQFN24 4.5x3.5, 0.5P  
CASE 510CE  
ISSUE O

DATE 31 AUG 2016



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

|                         |                             |                                                                                                                                                                                     |
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| <b>DESCRIPTION:</b>     | <b>WQFN24 4.5X3.5, 0.5P</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                                  |

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