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FAIRCHILD SEMICONDUCTOR®

March 2011

# FXLP34
# Single Bit Uni-Directional Translator

## Features

- 1.0V to 3.6V $V_{CC}$ Supply Voltage
- Converts Any Voltage (1.0V to 3.6V) to (1.0V to 3.6V)
- 4.6V Tolerant Inputs and Outputs
- $t_{PD}$:
  - 4ns Typical for 3.0V to 3.6V $V_{CC}$
- Power-Off High Impedance Inputs and Outputs
- Static Drive ($I_{OH}/I_{OL}$):
  - ±2.6mA at 3.00V $V_{CC}$
- Uses Proprietary Quiet Series™ Noise / EMI Reduction Circuitry
- Ultra-Small Micropak™ Leadless Packages
- Ultra-Low Dynamic Power

## Description

The FXLP34 is a single translator with two separate supply voltages: $V_{CC1}$ for input translation voltages and $V_{CC}$ for output translation voltages. The FXLP34 is part of Fairchild's Ultra Low Power (ULP) series of products. This device operates with VCC values from 1.0V to 3.6V, and is intended for use in portable applications that require ultra low power consumption.

The internal circuit is composed of a minimum of buffer stages, to enable ultra low dynamic power.

The FXLP34 is uniquely designed for optimized power and speed, and is fabricated with an advanced CMOS technology to achieve high-speed operation while maintaining low CMOS power dissipation.

## Ordering Information

| Part Number | Top Mark | Package | Packing Method |
|---|---|---|---|
| FXLP34P5X | X34 | 5-Lead SC70, EIAJ SC-88a, 1.25mm Wide | 3000 Units on Tape & Reel |
| FXLP34L6X | X3 | 6-Lead MicroPak™, 1.00mm Wide | 5000 Units on Tape & Reel |
| FXLP34FHX | X3 | 6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch | 5000 Units on Tape & Reel |

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## Pin Configuration

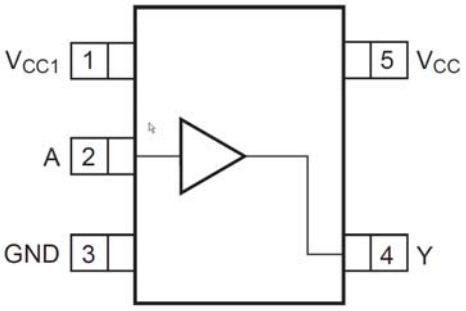


**Figure 1. SC70 (Top View)**

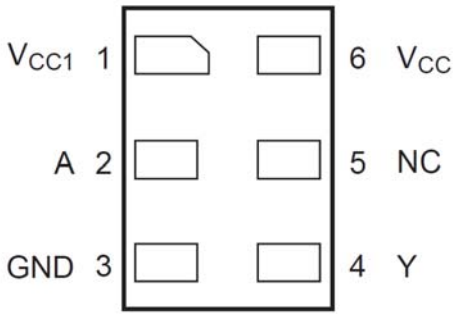


**Figure 2. MicroPak™ (Top Through View)**

## Pin Definitions

| Pin # SC70 | Pin # MicroPak™ | Name | Description |
|---|---|---|---|
| 1 | 1 | $V_{CC1}$ | Input Translation Voltage |
| 2 | 2 | A | Input |
| 3 | 3 | GND | Ground |
| 4 | 4 | Y | Output |
| | 5 | NC | No Connect |
| 5 | 6 | $V_{CC}$ | Output Translation Voltage |

## Truth Table

| Inputs | Outputs |
|---|---|
| **A** | **Y** |
| L | L |
| H | H |

H = Logic Level HIGH

L = Logic Level Low

## 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 | | Min. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{CC}$, $V_{CC1}$ | Supply Voltage | | -0.5 | +4.6 | V |
| $V_{IN}$ | DC Input Voltage | | -0.5 | +4.6 | V |
| $V_{OUT}$ | DC Output Voltage | HIGH or LOW State(1) | -0.5 | $V_{CC}$ +0.5V | V |
| | | $V_{CC}$=0V | -0.5 | +4.6 | |
| $I_{IK}$ | DC Input Diode Current | $V_{IN}$ < 0 | | -50 | mA |
| $I_{OK}$ | DC Output Diode Current | $V_{OUT}$ < 0V | | -50 | mA |
| | | $V_{OUT}$ > $V_{CC}$ | | +50 | |
| $I_{OH}/I_{OL}$ | DC Output Source/Sink Current | | | ±50 | mA |
| $I_{CC}$ or $I_{GND}$ | DC $V_{CC}$ or Ground Current per Supply Pin | | | ±100 | mA |
| $T_{STG}$ | Storage Temperature Range | | -65 | 150 | °C |
| $P_D$ | Power Dissipation at +85°C | SC70-6 | | 180 | mW |
| | | MicroPak™-6 | | 130 | |
| | | MicroPak2™-6 | | 120 | |
| ESD | Human Body Model, JEDEC:JESD22-A114 | | | 4000 | V |
| | Charge Device Model, JEDEC:JESD22-C101 | | | 2000 | |

**Note:**

1. $I_O$ Absolute Maximum Rating 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 |
|---|---|---|---|---|---|
| $V_{CC}$, $V_{CC1}$ | Supply Voltage | | 1.0 | 3.6 | V |
| $V_{IN}$ | Input Voltage | | 0 | 3.6 | V |
| $V_{OUT}$ | Output Voltage | HIGH or LOW State | 0 | $V_{CC}$ | V |
| | | $V_{CC}$=0V | 0 | 3.6 | |
| $I_{OH}/I_{OL}$ | Output Current in $I_{OH}/I_{OL}$ | $V_{CC}$=3.0 to 3.6V | | ±2.6 | mA |
| | | $V_{CC}$=2.3 to 2.7V | | ±2.1 | |
| | | $V_{CC}$=1.65 to 1.95V | | ±1.5 | |
| | | $V_{CC}$=1.40 to 1.60V | | ±1.0 | |
| | | $V_{CC}$=1.10 to 1.30V | | ±0.5 | |
| | | $V_{CC}$=1.0V | | ±20 | µA |
| $T_A$ | Operating Temperature, Free Air | | -40 | +85 | °C |
| $\theta_{JA}$ | Thermal Resistance | SC70-6 | | 425 | °C/W |
| | | MicroPak™-6 | | 500 | |
| | | MicroPak2™-6 | | 560 | |

**Note:**

2. Unused inputs must be held HIGH or LOW. They may not float.

## Electrical Characteristics

| Symbol | Parameter | Condition | $V_{CC}$ (V) | $V_{CC1}$ (V) | $T_A$=+25°C | | $T_A$=-40 to +85°C | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Min. | Max. | Min. | Max. | |
| $V_{IH}$ | HIGH Level Input ($V_{CC1}$) | | 1.0 to 3.6 | 1.0 | 0.65 x $V_{CCI}$ | | 0.65 x $V_{CCI}$ | | V |
| | | | | 1.10≤$V_{CC1}$≤1.30 | 0.65 x $V_{CCI}$ | | 0.65 x $V_{CCI}$ | | |
| | | | | 1.40≤$V_{CC1}$≤1.60 | 0.65 x $V_{CCI}$ | | 0.65 x $V_{CCI}$ | | |
| | | | | 1.65≤$V_{CC1}$≤1.95 | 0.65 x $V_{CCI}$ | | 0.65 x $V_{CCI}$ | | |
| | | | | 2.30≤$V_{CC1}$≤2.70 | 1.6 | | 1.6 | | |
| | | | | 3.00≤$V_{CC1}$≤3.60 | 2.1 | | 2.1 | | |
| $V_{IL}$ | LOW Level Input | | 1.0 to 3.6 | 1.0 | | 0.35 x $V_{CCI}$ | | 0.35 x $V_{CCI}$ | V |
| | | | | 1.10≤$V_{CC1}$≤1.30 | | 0.35 x $V_{CCI}$ | | 0.35 x $V_{CCI}$ | |
| | | | | 1.40≤$V_{CC1}$≤1.60 | | 0.35 x $V_{CCI}$ | | 0.35 x $V_{CCI}$ | |
| | | | | 1.65≤$V_{CC1}$≤1.95 | | 0.35 x $V_{CCI}$ | | 0.35 x $V_{CCI}$ | |
| | | | | 2.30≤$V_{CC1}$≤2.70 | | 0.7 | | 0.7 | |
| | | | | 3.00≤$V_{CC1}$≤3.60 | | 0.9 | | 0.9 | |
| $V_{OH}$ | HIGH Level Output ($V_{CC}$) | $I_{OH}$=-20µA | 1.0 | 1.0 to 3.6 | $V_{CC}$-0.1 | | $V_{CC}$-0.1 | | V |
| | | | 1.10≤$V_{CC1}$≤1.30 | | $V_{CC}$-0.1 | | $V_{CC}$-0.1 | | |
| | | | 1.40≤$V_{CC1}$≤1.60 | | $V_{CC}$-0.1 | | $V_{CC}$-0.1 | | |
| | | | 1.65≤$V_{CC1}$≤1.95 | | $V_{CC}$-0.1 | | $V_{CC}$-0.1 | | |
| | | | 2.30≤$V_{CC1}$≤2.70 | | $V_{CC}$-0.1 | | $V_{CC}$-0.1 | | |
| | | | 3.00≤$V_{CC1}$≤3.60 | | $V_{CC}$-0.1 | | $V_{CC}$-0.1 | | |
| | | $I_{OH}$=-0.5mA | 1.10≤$V_{CC1}$≤1.30 | 1.0 to 3.6 | 0.75 x $V_{CC}$ | | 0.70 x $V_{CC}$ | | |
| | | $I_{OH}$=-1.0mA | 1.40≤$V_{CC1}$≤1.60 | | 1.07 | | 0.99 | | |
| | | $I_{OH}$=-1.5mA | 1.65≤$V_{CC1}$≤1.95 | | 1.24 | | 1.22 | | |
| | | $I_{OH}$=-2.1mA | 2.30≤$V_{CC1}$≤2.70 | | 1.95 | | 1.87 | | |
| | | $I_{OH}$=-2.6mA | 3.00≤$V_{CC1}$≤3.60 | | 2.61 | | 2.55 | | |
| $V_{OL}$ | LOW Level Output | $I_{OL}$=20µA | 1.0 | 1.0 to 3.6 | | 0.1 | | 0.1 | V |
| | | | 1.10≤$V_{CC1}$≤1.30 | | | 0.1 | | 0.1 | |
| | | | 1.40≤$V_{CC1}$≤1.60 | | | 0.1 | | 0.1 | |
| | | | 1.65≤$V_{CC1}$≤1.95 | | | 0.1 | | 0.1 | |
| | | | 2.30≤$V_{CC1}$≤2.70 | | | 0.1 | | 0.1 | |
| | | $I_{OL}$=0.5mA | 1.10≤$V_{CC1}$≤1.30 | 1.0 to 3.6 | | 0.30 x $V_{CC}$ | | 0.30 x $V_{CC}$ | |
| | | $I_{OL}$=1.0mA | 1.40≤$V_{CC1}$≤1.60 | | | 0.31 | | 0.37 | |
| | | $I_{OL}$=1.5mA | 1.65≤$V_{CC1}$ ≤ 1.95 | | | 0.31 | | 0.35 | |
| | | $I_{OL}$=2.1mA | 2.30≤$V_{CC1}$≤2.70 | | | 0.31 | | 0.33 | |
| | | $I_{OL}$=2.6mA | 3.00≤$V_{CC1}$≤3.60 | | | 0.31 | | 0.33 | |
| $I_{IN}$ | Input Leakage Current | 0 ≤ $V_{IN}$ ≤ 3.60 | | 1.0 to 3.6 | | ±0.1 | | ±1.0 | µA |
| $I_{OFF}$ | Power Off Leakage Current | 0 ≤ ($V_{IN}$, $V_O$) ≤ 3.60 | 0 | 0 | | 1.0 | | 5.0 | µA |
| $I_{CC}$ | Quiescent Supply Current | $V_{IN}$=$V_{CC}$ or GND | 1.0 to 3.6 | 1.0 to 3.6 | | 0.9 | | 5.0 | µA |

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## AC Electrical Characteristics

| Symbol | Parameter | Condition | $V_{CC1}$ (V) | $T_A$=+25°C | | | $T_A$=-40 to +85°C | | Unit | Figure |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | Min. | Max. | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.0 | $C_L$=10pF, $R_L$=1MΩ | 1.0 | | 26.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 15.0 | 25.0 | 38.1 | 12.0 | 43.3 | | |
| | | | 1.40 to 1.60 | 14.0 | 24.0 | 36.7 | 11.0 | 42.0 | | |
| | | | 1.65 to 1.95 | 13.0 | 23.0 | 36.0 | 10.0 | 41.4 | | |
| | | | 2.30 to 2.70 | 12.0 | 22.0 | 35.5 | 9.0 | 40.9 | | |
| | | | 3.00 to 3.60 | 11.0 | 21.0 | 35.5 | 8.0 | 40.6 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.2 | $C_L$=10pF, $R_L$=1MΩ | 1.0 | | 18.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 8.0 | 15.0 | 23.2 | 6.0 | 41.0 | | |
| | | | 1.40 to 1.60 | 7.5 | 14.0 | 21.7 | 5.5 | 39.1 | | |
| | | | 1.65 to 1.95 | 7.0 | 13.0 | 20.9 | 5.0 | 32.3 | | |
| | | | 2.30 to 2.70 | 6.5 | 12.0 | 20.4 | 4.5 | 29.6 | | |
| | | | 3.00 to 3.60 | 6.0 | 12.0 | 20.2 | 4.0 | 29.4 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.5 | $C_L$=10pF, $R_L$=1MΩ | 1.0 | | 14.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 5.0 | 11.0 | 16.3 | 4.0 | 20.6 | | |
| | | | 1.40 to 1.60 | 4.8 | 10.0 | 14.8 | 3.5 | 19.3 | | |
| | | | 1.65 to 1.95 | 4.5 | 9.0 | 14.1 | 3.0 | 18.7 | | |
| | | | 2.30 to 2.70 | 4.0 | 8.0 | 13.5 | 2.5 | 18.0 | | |
| | | | 3.00 to 3.60 | 3.5 | 8.0 | 13.3 | 2.0 | 17.8 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.8 | $C_L$=10pF, $R_L$=1MΩ | 1.0 | | 13.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 4.0 | 9.0 | 13.5 | 3.0 | 17.5 | | |
| | | | 1.40 to 1.60 | 3.5 | 8.0 | 12.0 | 2.5 | 16.3 | | |
| | | | 1.65 to 1.95 | 3.0 | 7.0 | 11.3 | 2.0 | 15.6 | | |
| | | | 2.30 to 2.70 | 2.5 | 6.0 | 10.7 | 1.5 | 15.0 | | |
| | | | 3.00 to 3.60 | 2.5 | 6.0 | 10.5 | 1.0 | 14.7 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=2.5 | $C_L$=10pF, $R_L$=1MΩ | 1.0 | | 12.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 3.0 | 7.0 | 10.9 | 2.5 | 14.3 | | |
| | | | 1.40 to 1.60 | 2.5 | 6.0 | 9.4 | 2.0 | 13.1 | | |
| | | | 1.65 to 1.95 | 2.0 | 5.0 | 8.6 | 1.5 | 11.4 | | |
| | | | 2.30 to 2.70 | 1.5 | 4.0 | 8.0 | 1.0 | 10.8 | | |
| | | | 3.00 to 3.60 | 1.5 | 4.0 | 7.8 | 1.0 | 10.5 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=3.3 | $C_L$=10pF, $R_L$=1MΩ | 1.0 | | 11.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 3.0 | 6.0 | 10.1 | 2.0 | 13.8 | | |
| | | | 1.40 to 1.60 | 2.5 | 5.0 | 8.2 | 1.5 | 10.5 | | |
| | | | 1.65 to 1.95 | 2.0 | 4.0 | 7.4 | 1.0 | 9.9 | | |
| | | | 2.30 to 2.70 | 1.0 | 3.0 | 6.8 | 1.0 | 9.2 | | |
| | | | 3.00 to 3.60 | 1.0 | 3.0 | 6.6 | 1.0 | 9.0 | | |

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## AC Electrical Characteristics (Continued)

| Symbol | Parameter | Condition | $V_{CC1}$ (V) | $T_A$=+25°C | | | $T_A$=-40 to +85°C | | Unit | Figure |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | Min. | Max. | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.0 | $C_L$=15pF, $R_L$=1MΩ | 1.0 | | 28.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 16.0 | 27.0 | 43.0 | 12.0 | 44.8 | | |
| | | | 1.40 to 1.60 | 15.0 | 26.0 | 41.6 | 11.0 | 43.6 | | |
| | | | 1.65 to 1.95 | 14.0 | 25.0 | 40.9 | 10.0 | 47.9 | | |
| | | | 2.30 to 2.70 | 13.0 | 24.0 | 40.5 | 9.0 | 47.5 | | |
| | | | 3.00 to 3.60 | 12.0 | 23.0 | 40.4 | 8.0 | 41.4 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.2 | $C_L$=15pF, $R_L$=1MΩ | 1.0 | | 19.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 9.0 | 16.0 | 24.6 | 8.0 | 43.1 | | |
| | | | 1.40 to 1.60 | 8.5 | 15.0 | 23.1 | 7.5 | 42.2 | | |
| | | | 1.65 to 1.95 | 8.0 | 14.0 | 22.4 | 7.0 | 31.4 | | |
| | | | 2.30 to 2.70 | 7.5 | 13.0 | 21.8 | 6.5 | 30.7 | | |
| | | | 3.00 to 3.60 | 7.0 | 13.0 | 21.6 | 6.0 | 30.5 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.5 | $C_L$=15pF, $R_L$=1MΩ | 1.0 | | 15.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 6.0 | 12.0 | 17.2 | 5.5 | 21.5 | | |
| | | | 1.40 to 1.60 | 5.8 | 11.0 | 15.7 | 5.0 | 20.3 | | |
| | | | 1.65 to 1.95 | 5.5 | 10.0 | 14.9 | 4.5 | 19.6 | | |
| | | | 2.30 to 2.70 | 5.0 | 9.0 | 14.3 | 4.0 | 18.9 | | |
| | | | 3.00 to 3.60 | 4.5 | .0 | 14.2 | 3.5 | 18.7 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.8 | $C_L$=15pF, $R_L$=1MΩ | 1.0 | | 14.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 5.0 | 8.0 | 14.2 | 5.5 | 18.2 | | |
| | | | 1.40 to 1.60 | 4.5 | 7.0 | 12.7 | 4.0 | 17.0 | | |
| | | | 1.65 to 1.95 | 4.0 | 6.0 | 11.9 | 3.5 | 16.3 | | |
| | | | 2.30 to 2.70 | 3.5 | 5.0 | 11.3 | 3.0 | 15.7 | | |
| | | | 3.00 to 3.60 | 3.5 | 5.0 | 11.2 | 2.5 | 14.4 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=2.5 | $C_L$=15pF, $R_L$=1MΩ | 1.0 | | 12.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 4.0 | 7.0 | 11.3 | 3.5 | 14.9 | | |
| | | | 1.40 to 1.60 | 3.5 | 6.0 | 9.8 | 3.0 | 13.6 | | |
| | | | 1.65 to 1.95 | 3.0 | 5.0 | 9.1 | 2.5 | 12.0 | | |
| | | | 2.30 to 2.70 | 2.5 | 4.0 | 8.5 | 2.0 | 11.3 | | |
| | | | 3.00 to 3.60 | 2.5 | 4.0 | 8.3 | 2.0 | 11.1 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=3.3 | $C_L$=15pF, $R_L$=1MΩ | 1.0 | | 11.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 3.0 | 6.0 | 10.5 | 2.0 | 14.2 | | |
| | | | 1.40 to 1.60 | 2.5 | 5.0 | 8.6 | 1.5 | 11.0 | | |
| | | | 1.65 to 1.95 | 2.0 | 4.0 | 7.8 | 1.0 | 10.3 | | |
| | | | 2.30 to 2.70 | 1.5 | 3.0 | 7.2 | 1.0 | 9.7 | | |
| | | | 3.00 to 3.60 | 1.5 | 3.0 | 7.0 | 1.0 | 9.4 | | |

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## AC Electrical Characteristics (Continued)

| Symbol | Parameter | Condition | $V_{CC1}$ (V) | $T_A$=+25°C | | | $T_A$=-40 to +85°C | | Unit | Figure |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | Min. | Max. | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.0 | $C_L$=30pF, $R_L$=1MΩ | 1.0 | | 34.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 19.0 | 32.0 | 48.6 | 15.0 | 55.5 | | |
| | | | 1.40 to 1.60 | 18.0 | 31.0 | 47.1 | 14.0 | 52.3 | | |
| | | | 1.65 to 1.95 | 17.0 | 30.0 | 46.4 | 13.0 | 50.6 | | |
| | | | 2.30 to 2.70 | 16.0 | 29.0 | 45.9 | 12.0 | 49.2 | | |
| | | | 3.00 to 3.60 | 15.0 | 28.0 | 45.8 | 10.0 | 49.1 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.2 | $C_L$=30pF, $R_L$=1MΩ | 1.0 | | 22.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 11.0 | 19.0 | 29.0 | 10.0 | 46.5 | | |
| | | | 1.40 to 1.60 | 10.0 | 18.0 | 27.5 | 9.0 | 42.6 | | |
| | | | 1.65 to 1.95 | 9.0 | 17.0 | 26.7 | 8.0 | 36.7 | | |
| | | | 2.30 to 2.70 | 8.5 | 16.0 | 26.1 | 7.0 | 36.0 | | |
| | | | 3.00 to 3.60 | 8.0 | 16.0 | 26.0 | 6.0 | 35.9 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.5 | $C_L$=30pF, $R_L$=1MΩ | 1.0 | | 16.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 6.0 | 13.0 | 19.8 | 5.5 | 25.3 | | |
| | | | 1.40 to 1.60 | 5.8 | 12.0 | 18.3 | 5.0 | 23.0 | | |
| | | | 1.65 to 1.95 | 5.5 | 11.0 | 17.6 | 4.5 | 22.4 | | |
| | | | 2.30 to 2.70 | 5.0 | 10.0 | 17.0 | 4.0 | 21.7 | | |
| | | | 3.00 to 3.60 | 4.5 | 9.0 | 16.8 | 3.5 | 21.5 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=1.8 | $C_L$=30pF, $R_L$=1MΩ | 1.0 | | 15.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 5.0 | 11.0 | 16.2 | 5.5 | 20.4 | | |
| | | | 1.40 to 1.60 | 4.5 | 10.0 | 14.7 | 4.0 | 19.2 | | |
| | | | 1.65 to 1.95 | 4.0 | 9.0 | 13.9 | 3.5 | 18.5 | | |
| | | | 2.30 to 2.70 | 3.5 | 8.0 | 13.3 | 3.0 | 17.9 | | |
| | | | 3.00 to 3.60 | 3.5 | 8.0 | 13.1 | 2.5 | 17.6 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=2.5 | $C_L$=30pF, $R_L$=1MΩ | 1.0 | | 13.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 4.0 | 8.0 | 12.7 | 3.5 | 15.9 | | |
| | | | 1.40 to 1.60 | 3.5 | 7.0 | 11.2 | 3.0 | 14.3 | | |
| | | | 1.65 to 1.95 | 3.0 | 6.0 | 10.5 | 2.5 | 13.6 | | |
| | | | 2.30 to 2.70 | 2.5 | 5.0 | 9.9 | 2.0 | 12.8 | | |
| | | | 3.00 to 3.60 | 2.5 | 5.0 | 9.7 | 2.0 | 12.5 | | |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay Output Translation $V_{CC}$(V)=3.3 | $C_L$=30pF, $R_L$=1MΩ | 1.0 | | 12.0 | | | | ns | Figure 3, Figure 4 |
| | | | 1.10 to 1.30 | 3.0 | 8.0 | 11.7 | 2.0 | 15.0 | | |
| | | | 1.40 to 1.60 | 2.5 | 7.0 | 9.8 | 1.5 | 12.2 | | |
| | | | 1.65 to 1.95 | 2.0 | 6.0 | 8.9 | 1.0 | 11.5 | | |
| | | | 2.30 to 2.70 | 1.5 | 5.0 | 8.3 | 1.0 | 10.7 | | |
| | | | 3.00 to 3.60 | 1.5 | 5.0 | 8.1 | 1.0 | 10.4 | | |

## Capacitance

| Symbol | Parameter | Conditions | $V_{CC}$ / $V_{CC1}$ (V) | $T_A$=+25°C | Units |
|---|---|---|---|---|---|
| | | | | Typical | |
| $C_{IN}$ | Input Capacitance | | | 2 | pF |
| $C_{I/O}$ | Input/Output Capacitance | | | 4 | pF |
| $C_{PD}$ | Power Dissipation Capacitance | $V_I$=0V or $V_{CC1}$, f=10MHz, $V_{CC}$ / $V_{CC1}$=3.6V | 1.0 to 3.60 | 8 | pF |

## Translator Power-up Sequence Recommendations

To ensure that the system does not experience unnecessary $I_{CC}$ current draw, bus contention, or oscillations during power-up; adhere to the following guidelines. This device is designed with the output pin(s) supplied by $V_{CC}$ and the input pin(s) supplied by $V_{CC1}$. The first recommendation is to begin by powering up the input side of the device with $V_{CC1}$. The Input pin(s) should be ramped with or ahead of $V_{CC1}$ or held LOW. This guards against bus contentions and oscillations as all inputs and the input $V_{CC1}$ are powered at the same time. The output $V_{CC}$ can then be powered to the target voltage level to which the device will translate. The output pin(s) then translate to logic levels dictated by the output $V_{CC}$ levels.

Upon completion of these steps, the device can be configured for the desired operation. Following these steps helps prevent possible damage to the translator device as well as other system components.

## AC Loadings and Waveforms

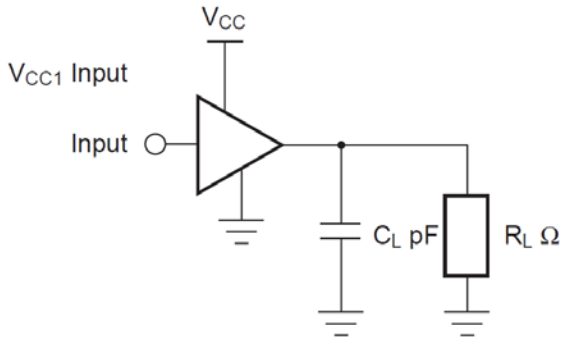


**Figure 3. AC Test Circuit**

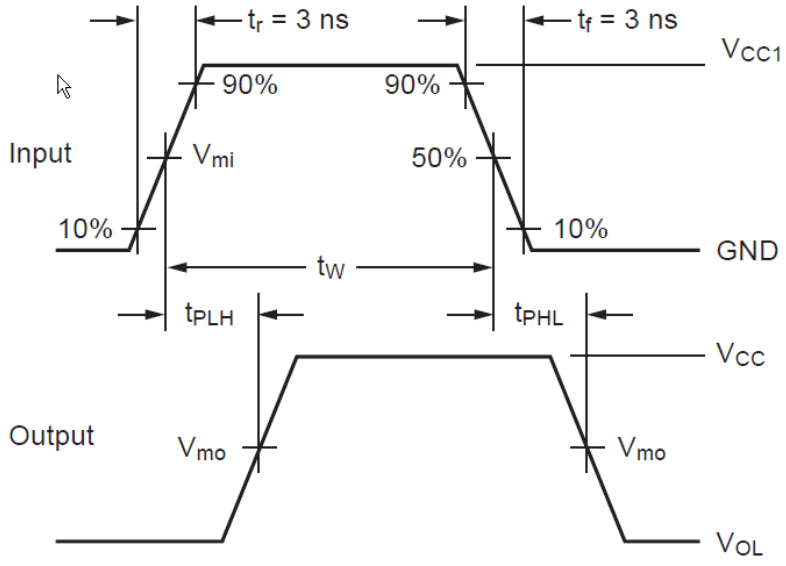


**Figure 4. Waveform for Inverting and Non-Inverting Functions**

**Table 1. AC Load Table**

| Symbol | $V_{CC}$ | | | | | |
|---|---|---|---|---|---|---|
| | 3.3V ±0.3V | 2.5V ±0.2V | 1.8V ±0.15V | 1.5V ±0.10V | 1.2V ±0.10V | 1.0V |
| $V_{mi}$ | 1.5V | $V_{CC1}/2$ | $V_{CC1}/2$ | $V_{CC1}/2$ | $V_{CC1}/2$ | $V_{CC1}/2$ |
| $V_{mo}$ | 1.5V | $V_{CC}/2$ | $V_{CC}/2$ | $V_{CC}/2$ | $V_CC/2$ | $V_{CC}/2$ |

## Physical Dimensions

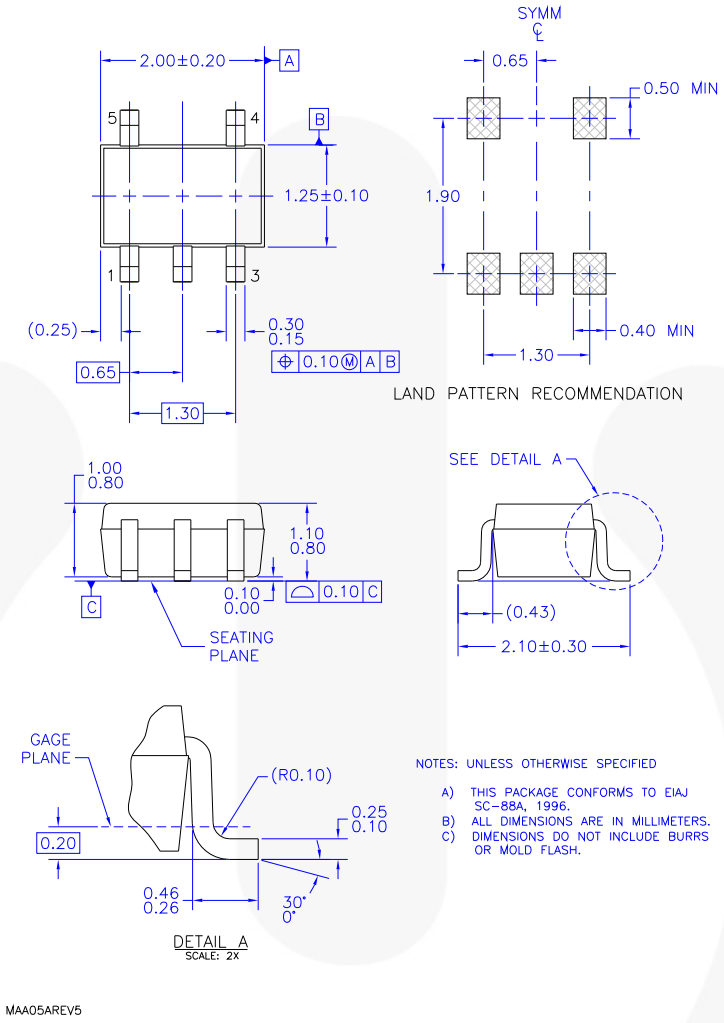


**Figure 5. 5-Lead, SC70, EIAJ SC-88a, 1.25mm Wide**

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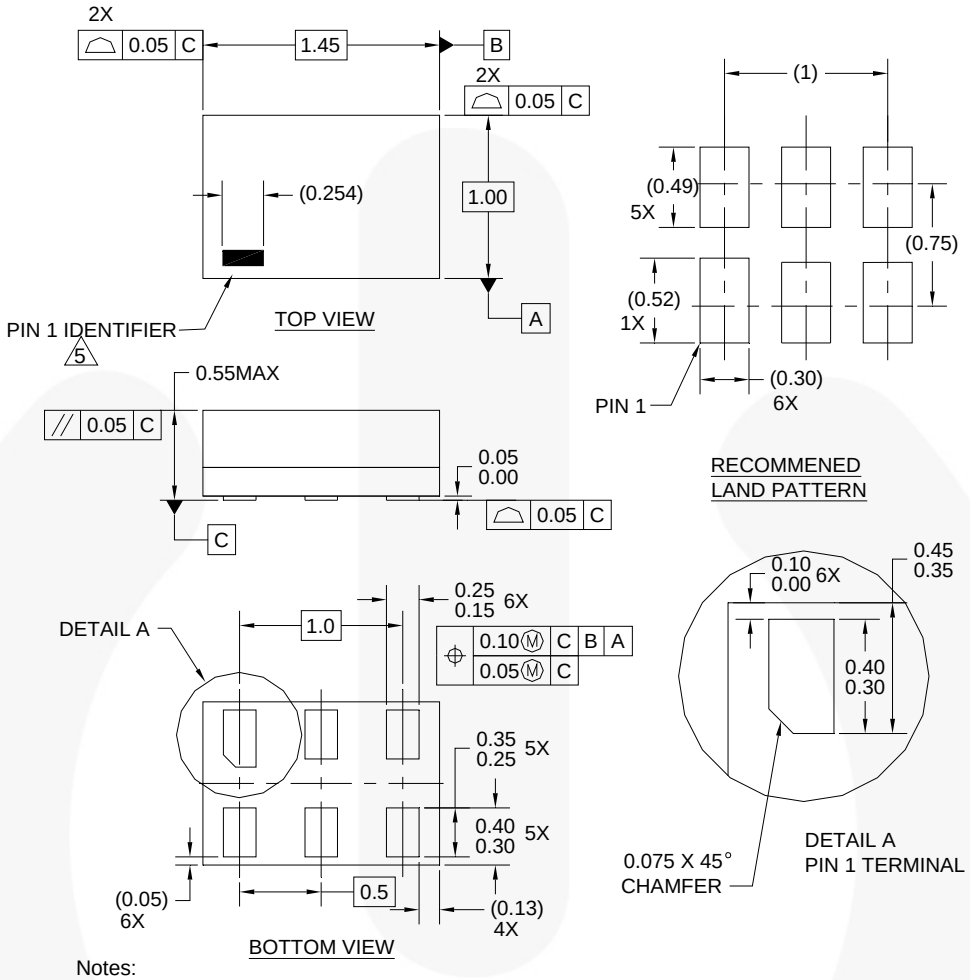
| Package Designator | Tape Section | Cavity Number | Cavity Status | Cover Type Status |
|---|---|---|---|---|
| P5X | Leader (Start End) | 125 (Typical) | Empty | Sealed |
| | Carrier | 3000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (Typical) | Empty | Sealed |

## Physical Dimensions




Notes:

1. CONFORMS TO JEDEC STANDARD M0-252 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994
4. FILENAME AND REVISION: MAC06AREV4
5. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.

**Figure 6. 6-Lead, MicroPak™, 1.0mm Wide**

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| Package Designator | Tape Section | Cavity Number | Cavity Status | Cover Type Status |
|---|---|---|---|---|
| L6X | Leader (Start End) | 125 (Typical) | Empty | Sealed |
| | Carrier | 5000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (Typical) | Empty | Sealed |

## Physical Dimensions

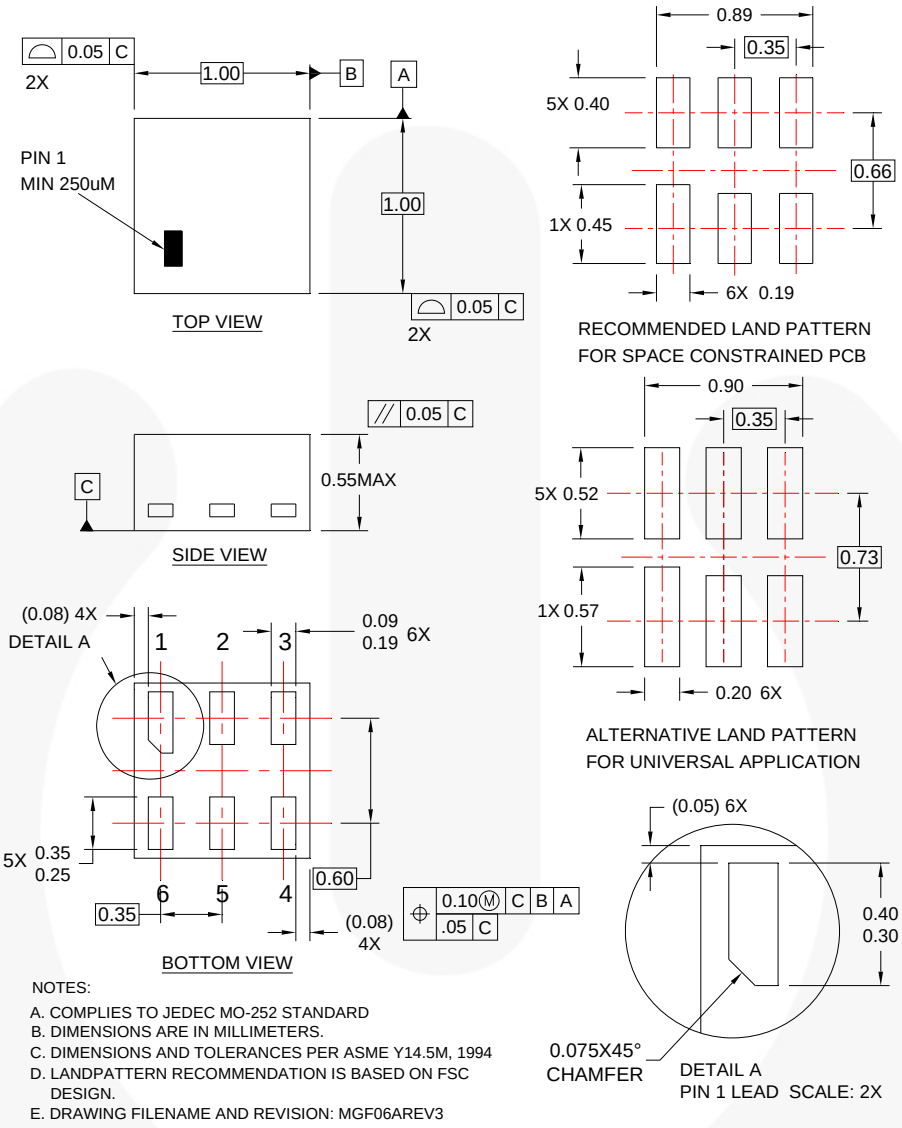


**Figure 7. 6-Lead, MicroPak2™, 1x1mm Body, .35mm Pitch**

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## Tape and Reel Specification

*Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications:*
*http://www.fairchildsemi.com/packaging/MicroPAK2_6L_tr.pdf.*

| Package Designator | Tape Section | Cavity Number | Cavity Status | Cover Type Status |
|---|---|---|---|---|
| FHX | Leader (Start End) | 125 (Typical) | Empty | Sealed |
| | Carrier | 5000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (Typical) | Empty | Sealed |

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