S B U -D
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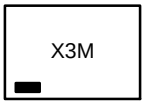
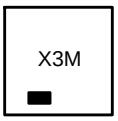
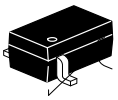
# FXLP34

SIP6 1.45X1.0
CASE 127EB

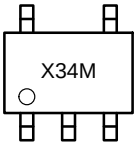



UDFN6
1.0X1.0, 0.35P
CASE 517DP



SC−88A (SC−70
5 Lead), 1.25x2
CASE 419AC−01




MARKING DIAGRAM

X3, X34 = Device Code
M = Assembly Operation Month

## 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 **onsemi**'s Ultra Low Power (ULP) series of products. This device operates with VCC values from 1.0 V to 3.6 V, 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.

## Features

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

## ORDERING INFORMATION

See detailed ordering and shipping information on page 9 of this data sheet.

## ABSOLUTE MAXIMUM RATINGS

| 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 (Note 1) | −0.5 | $V_{CC}$ + 0.5 V | V |
| | | $V_{CC}$ = 0 V | −0.5 | +4.6 | |
| $I_{IK}$ | DC Input Diode Current | $V_{IN}$ < 0 | − | −50 | mA |
| $I_{OK}$ | DC Output Diode Current | $V_{OUT}$ < 0 V | − | −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 | |

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. $I_O$ Absolute Maximum Rating must be observed.

## RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$, $V_{CC1}$ | Supply Voltage | | 1.0 | 3.6 | V |

## ELECTRICAL CHARACTERISTIICS

| 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 ($V_{CC1}$) | | 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 ($V_{CC}$) | $I_{OH}$ = −20 μA | 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 | − | |
| | | $I_{OH}$ = −0.5 mA | 1.10 ≤ $V_{CC1}$ ≤ 1.30 | 1.0 to 3.6 | 0.75 x $V_{CC}$ | − | 0.70 x $V_{CC}$ | − | |
| | | $I_{OH}$ = −1.0 mA | 1.40 ≤ $V_{CC1}$ ≤ 1.60 | | 1.07 | − | 0.99 | − | |
| | | $I_{OH}$ = −1.5 mA | 1.65 ≤ $V_{CC1}$ ≤ 1.95 | | 1.24 | − | 1.22 | − | |
| | | $I_{OH}$ = −2.1 mA | 2.30 ≤ $V_{CC1}$ ≤ 2.70 | | 1.95 | − | 1.87 | − | |
| | | $I_{OH}$ = −2.6 mA | 3.00 ≤ $V_{CC1}$ ≤ 3.60 | | 2.61 | − | 2.55 | − | |
| $V_{OL}$ | LOW Level Output ($V_{CC}$) | $I_{OL}$ = 20 μA | 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 | |
| | | $I_{OL}$ = 0.5 mA | 1.10 ≤ $V_{CC1}$ ≤ 1.30 | 1.0 to 3.6 | − | 0.30 x $V_{CC}$ | − | 0.30 x $V_{CC}$ | |
| | | $I_{OL}$ = 1.0 mA | 1.40 ≤ $V_{CC1}$ ≤ 1.60 | | − | 0.31 | − | 0.37 | |
| | | $I_{OL}$ = 1.5 mA | 1.65 ≤ $V_{CC1}$ ≤ 1.95 | | − | 0.31 | − | 0.35 | |
| | | $I_{OL}$ = 2.1 mA | 2.30 ≤ $V_{CC1}$ ≤ 2.70 | | − | 0.31 | − | 0.33 | |
| | | $I_{OL}$ = 2.6 mA | 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 |
| $I_{CC}$ | | | | | | | | | |

**AC ELECTRICAL CHARACTERISTIICS** (continued)

| Symbol | Parameter | Condition | $V_{CC}$ (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 | $C_L$ = 15 pF, $R_L$ = 1 MΩ | 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 | $C_L$ = 15 pF, $R_L$ = 1 MΩ | 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 | $C_L$ = 15 pF, $R_L$ = 1 MΩ | 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 | 5.51 | | | | | | |

**AC ELECTRICAL CHARACTERISTIICS** (continued)

| Symbol | Parameter | Condition | $V_{CC}$ (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 | | | | | | | | | |

### 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

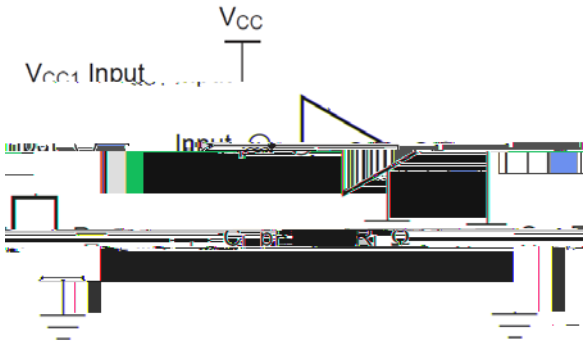



**Figure 3. AC Test Circuit**

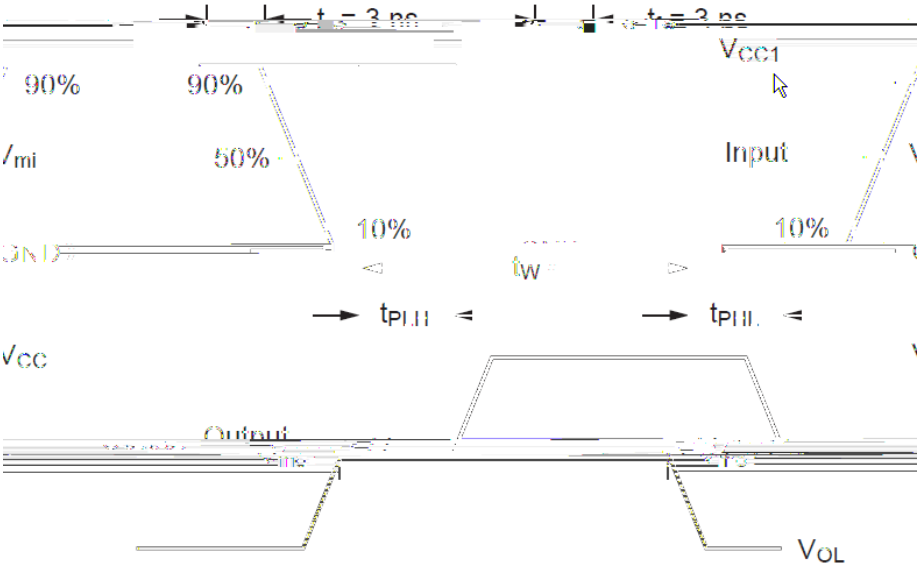



**Figure 4. Waveform for Inverting and Non-Inverting Functions**

**Table 1. AC LOAD TABLE**

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

## ORDERING INFORMATION

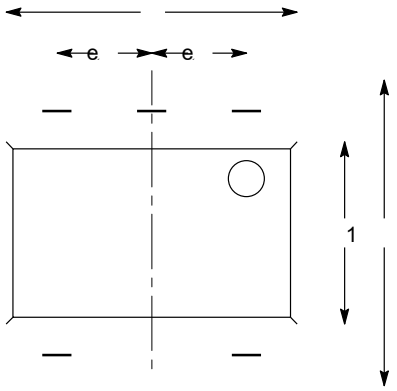
| Part Number | Top Mark | Package Type | Shipping† |
|---|---|---|---|
| FXLP34P5X | X34 | 5−Lead SC70, EIAJ SC−88a, 1.25 mm Wide (Pb−Free) | 3000 / Tape & Reel |
| FXLP34L6X | X3 | SIP6, 6−Lead MicroPak, 1.00 mm Wide (Pb−Free) | 5000 / Tape & Reel |
| FXLP34FHX | X3 | UDFN6, 6−Lead, MicroPak2, 1x1 mm Body, .35 mm Pitch (Pb−Free) | 5000 / Tape & Reel |

†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.

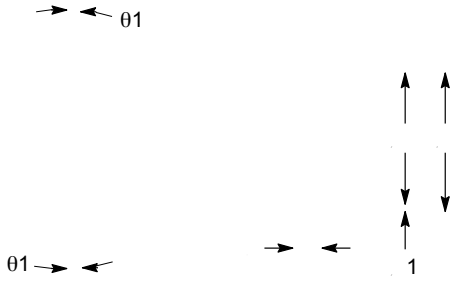
**SIP6 1.45X1.0**

2. DI ˆ/

**SC 88A (SC 70 5 Lead), 1.25x2**




**TOP VIEW**




**SIDE VIEW**


**END VIEW**

**Notes:**

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**UDFN6 1.0X1.0, 0.35P**
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