19-1847; Rev 2; 12/06

# 1µA, 2Mbps, Low-Voltage Level Translators in SC70 and µDFN



## General Description

The MAX3370/MAX3371 logic-level translators are ideal for applications interfacing low-voltage devices to other logic levels. Externally applied voltages set the logic levels of the MAX3370/MAX3371. The devices accept $V_{CC}$ from +2.5V to +5.5V and $V_L$ from +1.6V to +5.5V, allowing data transfer between low-voltage ASICs and higher voltage devices. The MAX3371 features a shutdown mode that reduces supply current to < 1µA and puts the I/O pins in a high-impedance state.

The MAX3370/MAX3371 are bidirectional level shifters, allowing data transfer from the $V_{CC}$ side to the $V_L$ side and from the $V_L$ side to the $V_{CC}$ side. Both devices operate at speeds up to 2Mbps with an active driver and up to 500kbps with an open-drain driver.

The MAX3370/MAX3371 are available in space-saving µDFN (1mm x 1.5mm) and SC70 packages.

## Applications

Cell Phone Cradles

Cell Phone Hands-Free Kits

Portable POS Systems

Portable Communication Devices

Smart Card Readers

SPI™, MICROWIRE™, and I²C Level Translation

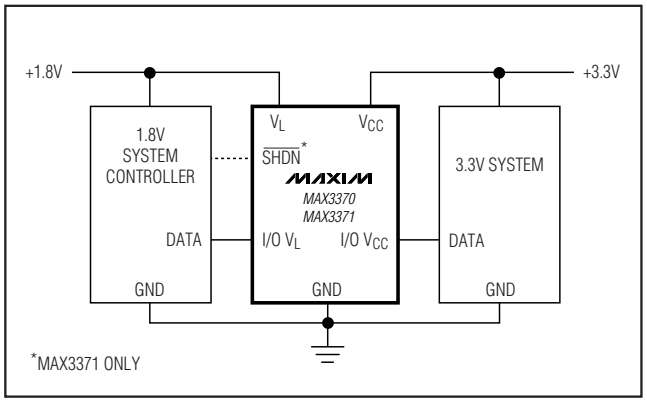
Low-Voltage ASIC Level Translation

RS-232-Compatible Translation

*SPI is a trademark of Motorola, Inc.*

*MICROWIRE is a trademark of National Semiconductor Corp.*

## Typical Operating Circuit




†*MAX3370/MAX3371 covered by U.S. Patent number 5,894,240.*

## Features

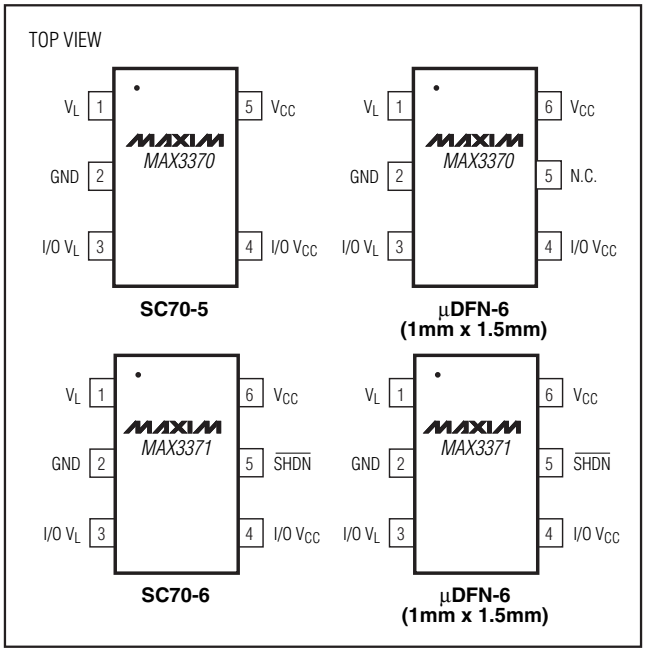
- ♦ **Allow Bidirectional Level Translation**
- ♦ **Miniature µDFN (1mm x 1.5mm) and SC70 Packages**
- ♦ **Operational Down to 1.6V**
- ♦ **Low Quiescent Current (< 100µA)**
- ♦ **Ultra-Low (< 1µA) Shutdown Supply Current (MAX3371)**
- ♦ **Three-State Outputs in Shutdown (MAX3371)**
- ♦ **2Mbps (10pF Load) Push-Pull Driving**
- ♦ **1Mbps (50pF Load) Push-Pull Driving**
- ♦ **500kbps (30pF Load) Open-Drain Driving**

## Ordering Information

| PART* | PIN-PACKAGE | $\overline{SHDN}$ | TOP MARK | PKG CODE |
|---|---|---|---|---|
| **MAX3370**ELT-T | 6 µDFN-6 | NO | KX | L611-1 |
| MAX3370EXK-T | 5 SC70-5 | NO | ABV | X5-1 |
| **MAX3371**ELT-T | 6 µDFN-6 | YES | KY | L611-1 |
| MAX3371EXK-T | 6 SC70-6 | YES | AAO | X6S-1 |

**All devices are specified over the -40°C to +85°C operating temperature range.*

## Pin Configurations



# 1µA, 2Mbps, Low-Voltage Level Translators in SC70 and µDFN

## ABSOLUTE MAXIMUM RATINGS

$V_{CC}$ to GND .....-0.3V to +7V
$\overline{SHDN}$ to GND .....-0.3V to ($V_L$ + 0.3V)
I/O $V_L$ to GND.....-0.3V to ($V_L$ + 0.3V)
$V_L$, I/O $V_{CC}$ to GND .....-0.3V to ($V_{CC}$ + 0.3V)
Short-Circuit Duration: I/O $V_L$, I/O $V_{CC}$ to GND.....Continuous

Continuous Power Dissipation ($T_A$ = +70°C)
SC70 (derate 3.1mW/°C above +70°C) .....245mW
6-Pin µDFN (derate 2.1mW/°C above +70°C) .....168mW
Operating Temperature Range .....-40°C to +85°C
Storage Temperature Range .....-65°C to +150°C
Lead Temperature (soldering, 10s) .....+300°C

*Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

## ELECTRICAL CHARACTERISTICS

($V_{CC}$ = +2.5V to +5.5V, $V_L$ = +1.6V to +5.5V (Note 1), GND = 0; I/O $V_L$, I/O $V_{CC}$ unconnected; $T_A$ = -40°C to +85°C, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **POWER SUPPLIES** | | | | | | |
| $V_L$ Supply Range | $V_L$ | (Note 1) | 1.6 | | 5.5 | V |
| $V_{CC}$ Supply Range | $V_{CC}$ | | 2.5 | | 5.5 | V |
| Supply Current from $V_{CC}$ | $I_{QVCC}$ | | | 70 | 100 | µA |
| Supply Current from $V_L$ | $I_{QVL}$ | | | 5 | 100 | µA |
| $V_{CC}$ Shutdown Supply Current | | $\overline{SHDN}$ = GND, $T_A$ = +25°C, MAX3371 | | 0.03 | 1 | µA |
| $V_L$ Shutdown Supply Current | | $\overline{SHDN}$ = GND, $T_A$ = +25°C, MAX3371 | | 0.03 | 1 | µA |
| Three-State Output Leakage Current | | I/O $V_L$, I/O $V_{CC}$; $\overline{SHDN}$ = GND, $T_A$ = +25°C, MAX3371 | | 0.02 | 1 | µA |
| **LOGIC LEVEL THRESHOLDS** | | | | | | |
| I/O $V_L$ Input-Voltage High Threshold | $V_{IHL}$ | | | | $V_L$ - 0.2 | V |
| I/O $V_L$ Input-Voltage Low Threshold | $V_{ILL}$ | | 0.15 | | | V |
| I/O $V_{CC}$ Input-Voltage High Threshold | $V_{IHC}$ | | | | $V_{CC}$ - 0.4 | V |
| I/O $V_{CC}$ Input-Voltage Low Threshold | $V_{ILC}$ | | 0.2 | | | V |
| I/O $V_L$ Output-Voltage High | $V_{OHL}$ | I/O $V_L$ sink current = 20µA, I/O $V_{CC}$ ≥ $V_{CC}$ - 0.4V (Note 3) | 2/3 × $V_L$ | | | V |
| I/O $V_L$ Output-Voltage Low | $V_{OLL}$ | I/O $V_L$ sink current = 1mA, I/O $V_{CC}$ ≤ 0.2V (Note 3) | | | 0.4 | V |
| I/O $V_{CC}$ Output-Voltage High | $V_{OHC}$ | I/O $V_{CC}$ source current = 20µA, I/O $V_L$ ≥ $V_L$ - 0.2V (Note 3) | 2/3 × $V_{CC}$ | | | V |
| I/O $V_{CC}$ Output-Voltage Low | $V_{OLC}$ | I/O $V_{CC}$ sink current = 1mA, I/O $V_L$ ≤ 0.15V (Note 3) | | | 0.4 | V |
| $\overline{SHDN}$ Input-Voltage High | $V_{IH-SHDN}$ | | 2/3 × $V_L$ | | | V |
| $\overline{SHDN}$ Input-Voltage Low | $V_{IL-SHDN}$ | $V_L$ ≥ +1.8V | | | 0.4 | V |
| | | $V_L$ ≥ +1.6V | | | 0.2 | |

## ELECTRICAL CHARACTERISTICS (continued)

($V_{CC}$ = +2.5V to +5.5V, $V_L$ = +1.6V to +5.5V (Note 1), GND = 0; I/O $V_L$, I/O $V_{CC}$ unconnected; $T_A$ = -40°C to +85°C, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **TIMING CHARACTERISTICS** ($R_{LOAD}$ = 1MΩ, $V_{CC}$ = +2.5V, $V_L$ = +1.6V, I/O test signal rail-to-rail, unless otherwise noted, Figure 1) (Note 3) | | | | | | |
| I/O $V_{CC}$ Rise Time (Note 4) | $t_{RVCC}$ | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 5) | | | 100 | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | | 200 | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | | 400 | |
| I/O $V_{CC}$ Fall Time (Note 4) | $t_{FVCC}$ | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 5) | | | 50 | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | | 200 | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | | 400 | |
| I/O $V_L$ Rise Time (Note 4) | $t_{RVL}$ | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 5) | | | 100 | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | | 200 | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | | 400 | |
| I/O $V_L$ Fall Time (Note 4) | $t_{FVL}$ | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 5) | | | 50 | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | | 200 | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | | 400 | |
| HIGH-to-LOW Transition Propagation Delay (Driving I/O $V_L$) | $t_{PD-VCC-HL}$ | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 5) | | | 50 | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | | 200 | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | | 400 | |
| LOW-to-HIGH Transition Propagation Delay (Driving I/O $V_L$) | $t_{PD-VCC-LH}$ | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 5) | | | 200 | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | | 400 | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | | 800 | |
| HIGH-to-LOW Transition Propagation Delay (Driving I/O $V_{CC}$) | $t_{PD-VL-HL}$ | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 5) | | | 50 | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | | 200 | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | | 400 | |
| LOW-to-HIGH Transition Propagation Delay (Driving I/O $V_{CC}$) | $t_{PD-VL-LH}$ | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 5) | | | 200 | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | | 400 | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | | 800 | |
| HIGH-to-LOW Transition Propagation Delay Device-to-Device Skew (Driving I/O $V_L$) | | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 3) | | 2 | | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | 4 | | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | 5 | | |

# 1µA, 2Mbps, Low-Voltage Level Translators in SC70 and µDFN

## ELECTRICAL CHARACTERISTICS (continued)

($V_{CC}$ = +2.5V to +5.5V, $V_L$ = +1.6V to +5.5V (Note 1), GND = 0; I/O $V_L$, I/O $V_{CC}$ unconnected; $T_A$ = -40°C to +85°C, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| LOW-to-HIGH Transition Propagation Delay Device-to-Device Skew (Driving I/O $V_L$) | | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 3) | | 5 | | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | 8 | | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | 80 | | |
| HIGH-to-LOW Transition Propagation Delay Device-to-Device Skew (Driving I/O $V_{CC}$) | | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 3) | | 2 | | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | 4 | | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | 5 | | |
| LOW-to-HIGH Transition Propagation Delay Device-to-Device Skew (Driving I/O $V_{CC}$) | | $C_{LOAD}$ = 10pF, data rate = 2Mbps (Note 3) | | 7 | | ns |
| | | $C_{LOAD}$ = 50pF, data rate = 1Mbps | | 8 | | |
| | | $C_{LOAD}$ = 30pF, data rate = 500kbps, open-drain drive | | 50 | | |
| Maximum Data Rate | | $C_{LOAD}$ = 10pF (Note 5) | 2 | 3 | | Mbps |
| | | $C_{LOAD}$ = 50pF | 1 | 2 | | |
| | | $C_{LOAD}$ = 30pF, open-drain drive | 0.5 | 1 | | |

**Note 1:** $V_L$ must always be less than or equal to $V_{CC}$.
**Note 2:** All units are 100% production tested at $T_A$ = +25°C. Limits over the operating temperature range are guaranteed by design and not production tested.
**Note 3:** Tested only at worst case: $V_{CC}$ = +2.5V, $V_L$ = +1.6V.
**Note 4:** 10% to 90%.
**Note 5:** Guaranteed by correlation to $C_{LOAD}$ = 50pF.

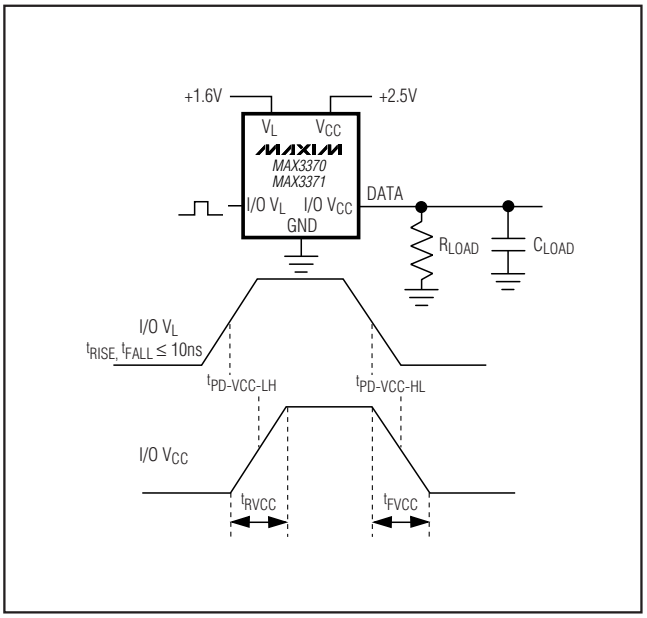



*Figure 1a. Rail-to-Rail Driving I/O $V_L$*

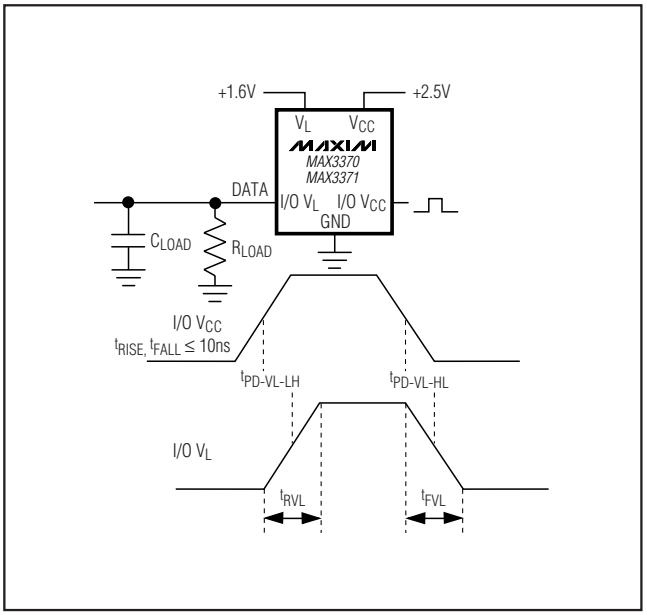



*Figure 1b. Rail-to-Rail Driving I/O $V_{CC}$*

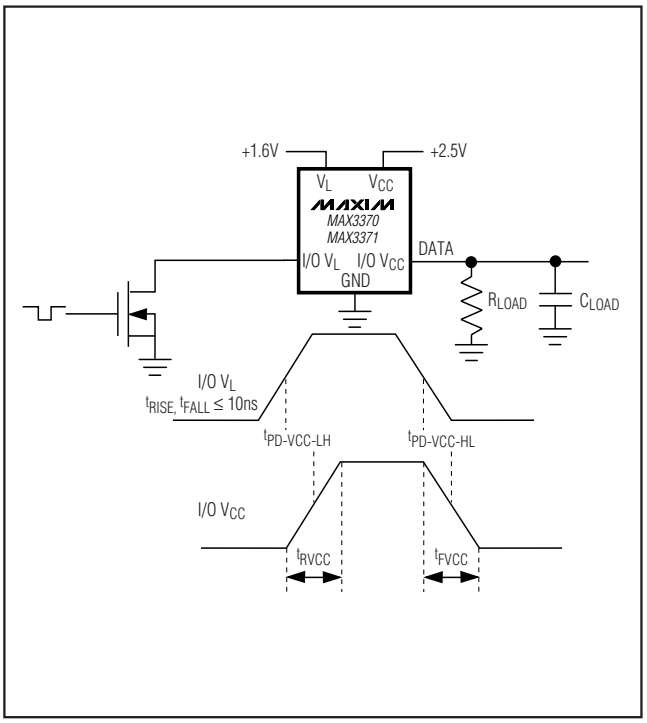



*Figure 1c. Open-Drain Driving I/O $V_L$*

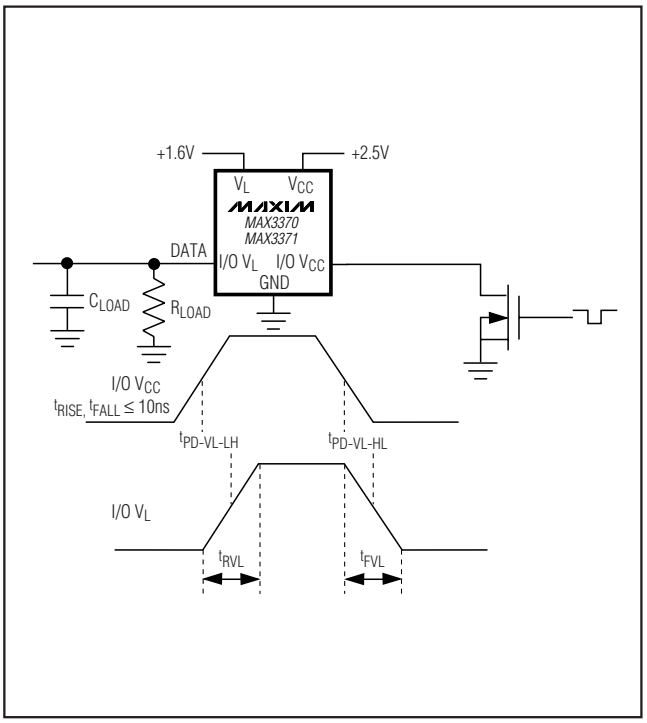


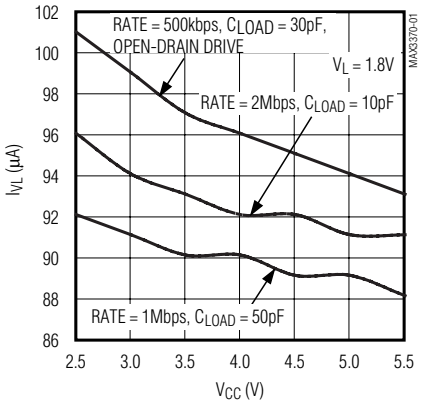

*Figure 1d. Open-Drain Driving I/O $V_{CC}$*

# 1µA, 2Mbps, Low-Voltage Level Translators in SC70 and µDFN

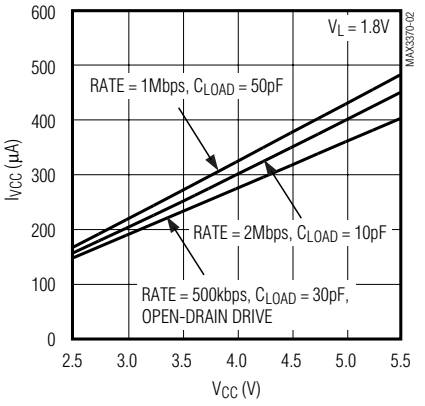
## Typical Operating Characteristics

(Driving I/O $V_L$ rail-to-rail, $R_L$ = 1MΩ, $T_A$ = +25°C, unless otherwise noted.)

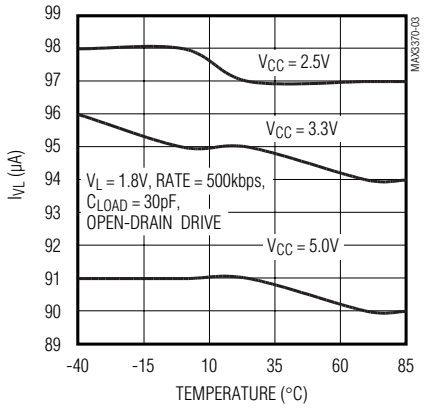
**$V_L$ SUPPLY CURRENT vs. POWER-SUPPLY VOLTAGE**



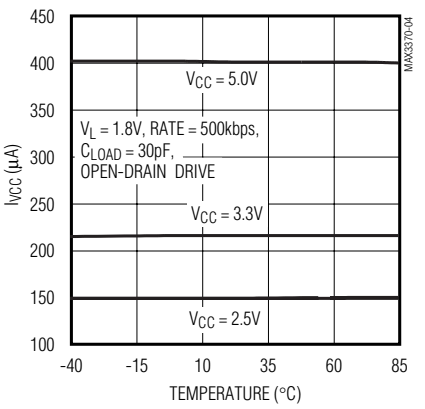

**$V_{CC}$ SUPPLY CURRENT vs. POWER-SUPPLY VOLTAGE**



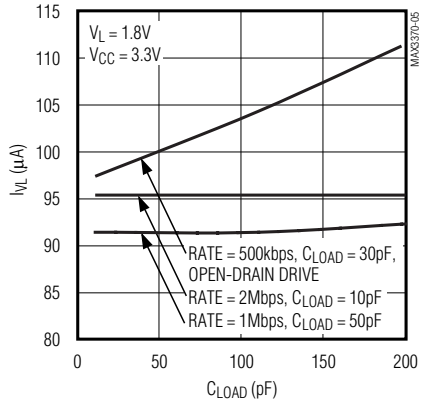

**$V_L$ SUPPLY CURRENT vs. TEMPERATURE**



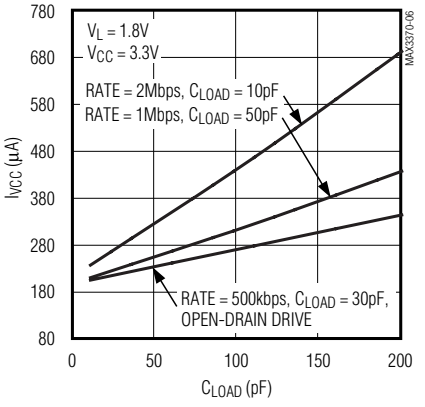

**$V_{CC}$ SUPPLY CURRENT vs. TEMPERATURE**




**$V_L$ SUPPLY CURRENT vs. LOAD CAPACITANCE**



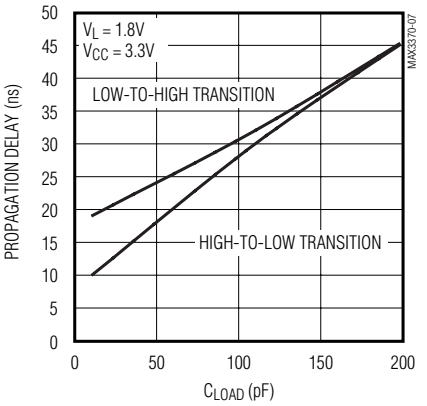

**$V_{CC}$ SUPPLY CURRENT vs. LOAD CAPACITANCE**



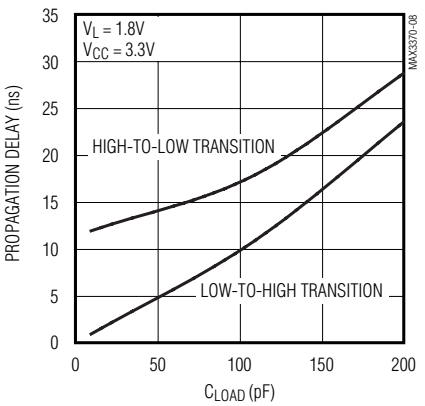
## Typical Operating Characteristics (continued)

(Driving I/O $V_L$ rail-to-rail, $R_L$ = 1MΩ, $T_A$ = +25°C, unless otherwise noted.)

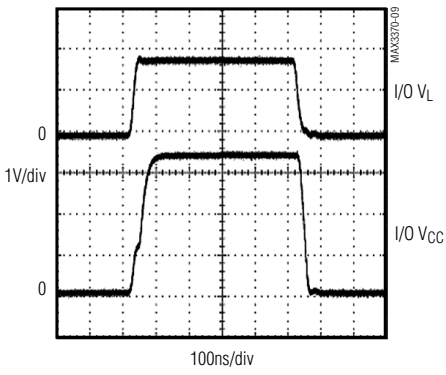
**PROPAGATION DELAY vs. LOAD CAPACITANCE (DRIVING I/O $V_L$)**



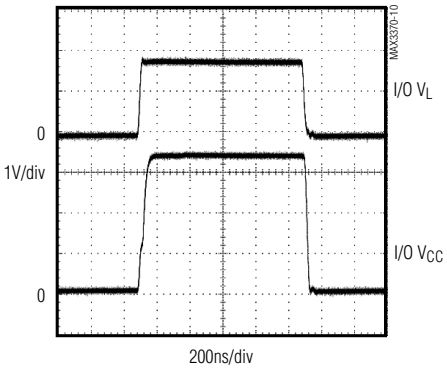

**PROPAGATION DELAY vs. LOAD CAPACITANCE (DRIVING I/O $V_{CC}$)**



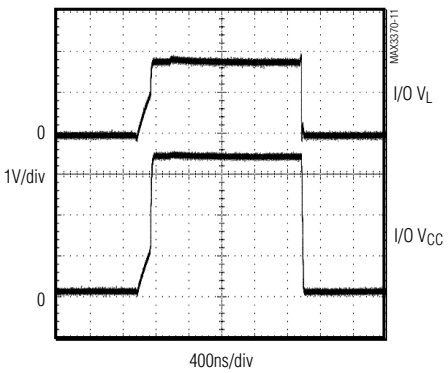

**RAIL-TO-RAIL DRIVING (RATE = 2Mbps, $C_{LOAD}$ = 10pF, $V_{CC}$ = 3.3V, $V_L$ = 1.8V)**



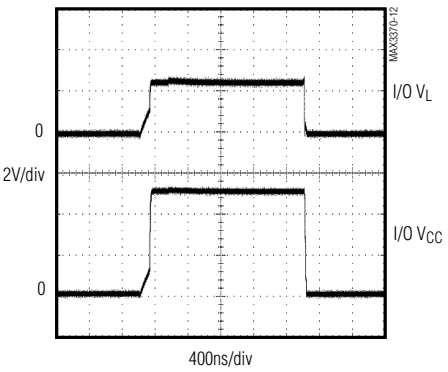

**RAIL-TO-RAIL DRIVING (RATE = 1Mbps, $C_{LOAD}$ = 50pF, $V_{CC}$ = 3.3V, $V_L$ = 1.8V)**



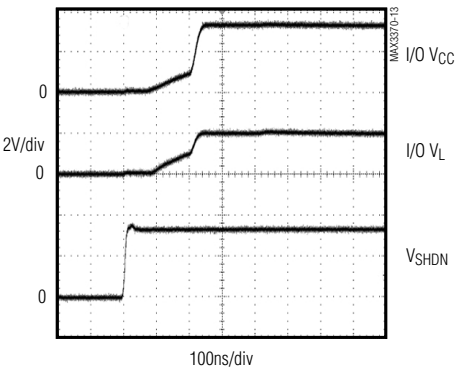

**OPEN-DRAIN DRIVING (RATE = 500kbps, $C_{LOAD}$ = 30pF, $V_{CC}$ = 3.3V, $V_L$ = 1.8V)**




**OPEN-DRAIN DRIVING (RATE = 500kbps, $C_{LOAD}$ = 30pF, $V_{CC}$ = 5V, $V_L$ = 2.5V)**




**MAX3371 EXITING SHUTDOWN**



# 1µA, 2Mbps, Low-Voltage Level Translators in SC70 and µDFN

## Pin Description

| PIN | | | NAME | FUNCTION |
|---|---|---|---|---|
| MAX3370 | | MAX3371 (SC70-6 AND µDFN-6) | | |
| (SC70-5) | (µDFN-6) | | | |
| 1 | 1 | 1 | $V_L$ | Logic Supply Voltage |
| 2 | 2 | 2 | GND | Ground |
| 3 | 3 | 3 | I/O $V_L$ | Input/Output Referred to $V_L$ |
| 4 | 4 | 4 | I/O $V_{CC}$ | Input/Output Referred to $V_{CC}$ |
| 5 | 6 | 6 | $V_{CC}$ | Power-Supply Voltage |
| — | — | 5 | $\overline{SHDN}$ | Shutdown. A high turns on the device. A low shuts down the device. I/O $V_{CC}$ and I/O $V_L$ are high impedance in shutdown. |
| — | 5 | — | N.C. | No Connection |

## Detailed Description

The MAX3370/MAX3371 provide the necessary level translation to allow data transfer in a multivoltage system. These devices transmit data between an I/O pin referenced to $V_{CC}$ and an I/O pin referenced to $V_L$. The $V_{CC}$ supply voltage range is from +2.5V to +5.5V, and the $V_L$ supply voltage range is between +1.6V and +5.5V. The MAX3371 features a shutdown mode in which I/O $V_{CC}$ and I/O $V_L$ are placed in a high-impedance state and supply current drops to 1µA.

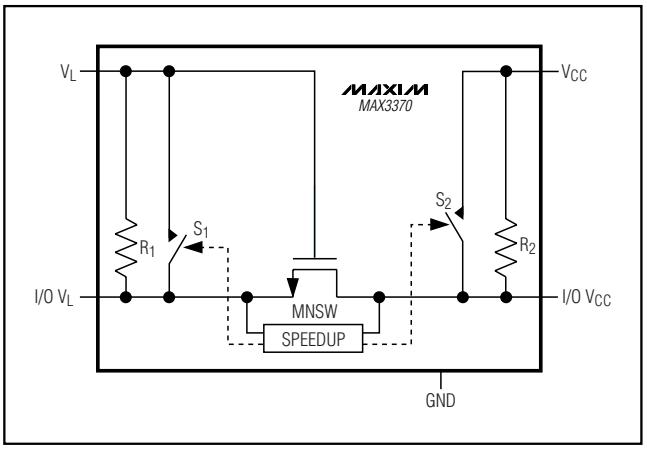
The MAX3370/MAX3371 are bidirectional level shifters allowing data transfer from the $V_{CC}$ side to the $V_L$ side, and from the $V_L$ side to the $V_{CC}$ side. Both devices operate at speeds up to 2Mbps with an active driver and up to 500kbps with an open-drain driver.

### Level Translation

The MAX3370/MAX3371 provide bidirectional level translation between I/O pins referred to $V_{CC}$ and $V_L$. I/O $V_{CC}$ and I/O $V_L$ are internally pulled up to their respective power-supply rails through 10kΩ resistors. $V_{CC}$ must be between +2.5V and +5.5V, and $V_L$ must be between +1.6V and +5.5V. For proper operation, $V_L$ can not exceed $V_{CC}$.

The MAX3370/MAX3371 can operate at data rates up to 2Mbps when driven by an active (push-pull) driver with a 10pF load, 1Mbps when driven by an active driver with a 50pF load, or 500kbps when driven by an open-drain driver with a 30pF load. The internal pullups allow these devices to be driven by open-drain drivers.

## Functional Diagram




### MAX3371 Shutdown Mode

The MAX3371 enters a low-power shutdown mode when $\overline{SHDN}$ is driven low. Connect $\overline{SHDN}$ to $V_L$ or drive high for normal operation. Activating shutdown mode disconnects the internal 10kΩ pullup resistors on I/O $V_{CC}$ and I/O $V_L$. As a result, the supply current decreases to < 1µA, and the I/O lines are high impedance. The high impedance I/O lines in shutdown allow use in a multidrop network. When in shutdown, I/O $V_L$ can be driven to $V_L$ and I/O $V_{CC}$ can be driven to $V_{CC}$.

### Speed-Up

The speed-up circuit is a one-shot generator that helps the rise time of the output waveform in the low-to-high transition. When triggered, switches $S_1$ and $S_2$ turn on for 320ns to pull up I/O $V_L$ and I/O $V_{CC}$. This greatly reduces the rise time and propagation delay for the low-to-high transition as well as improves the duty cycle (closer to 50% for an ideal square-wave input). See the scope plots in the *Typical Operating Characteristics* for the speed-up circuitry in operation.

## Applications Information

### Power-Supply Decoupling

To reduce ripple and the chance of transmitting incorrect data, decouple $V_{CC}$ and $V_L$ to ground with a 0.1µF capacitor as close to the device as possible.

### I²C Level Translation

The MAX3370/MAX3371 are ideal for level translation between a low-voltage ASIC and an I²C device. The devices' bidirectional natures allow their use in the data line of I²C communications. A typical application is interfacing a low-voltage microprocessor to a 3V or 5V D/A converter, such as the MAX517.

The I/O lines on the MAX3370/MAX3371 are bidirectional, can be level-shifted up to +5.5V, and contain internal 10kΩ pullup resistors to allow open-drain driving (see the *Typical Operating Circuit*).

### Push-Pull vs. Open-Drain Driving

The MAX3370/MAX3371 I/O pins can be driven by a push-pull or open-drain device. When using a push-pull driver, the MAX3370/MAX3371 operate up to 2Mbps with a 10pF load or 1Mbps with a 50pF load. The internal pullup resistors on the I/O pins allow use with open-drain devices. The MAX3370/MAX3371 operate up to 500kbps with a 30pF load when driven by an open-drain device.

Data rates higher than those listed in the *Electrical Characteristics* table can be achieved. The maximum data rate is limited to 3Mbps by the speed-up circuitry.

### Unidirectional vs. Bidirectional Level Translator

The MAX3370/MAX3371 may also be used to translate unidirectional signals without signal inversion. The devices provide the smallest solution (SC70 package) for unidirectional level translation without inversion.

## Chip Information

TRANSISTOR COUNT: 75

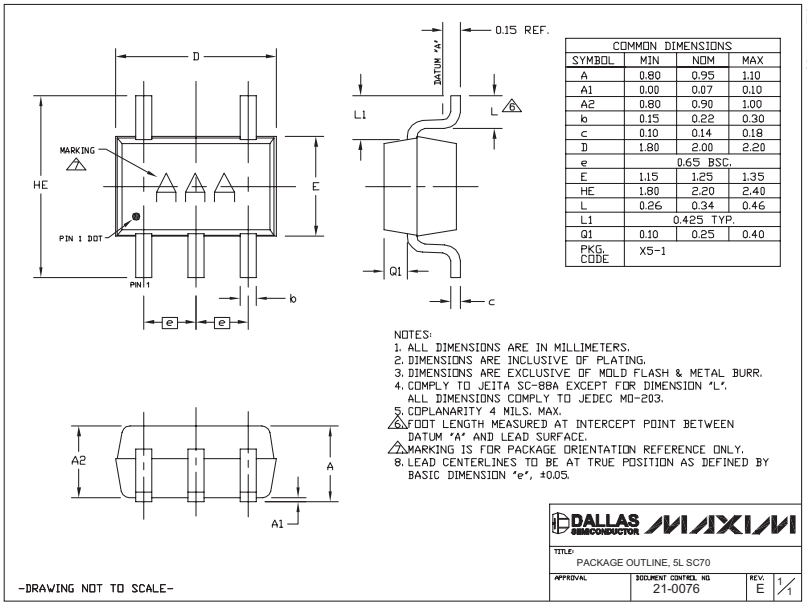
PROCESS: BiCMOS

# 1µA, 2Mbps, Low-Voltage Level Translators in SC70 and µDFN

## Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to **www.maxim-ic.com/packages**.)

SC70, 5L.EPS




| COMMON DIMENSIONS | | | |
|---|---|---|---|
| SYMBOL | MIN | NOM | MAX |
| A | 0.80 | 0.95 | 1.10 |
| A1 | 0.00 | 0.07 | 0.10 |
| A2 | 0.80 | 0.90 | 1.00 |
| b | 0.15 | 0.22 | 0.30 |
| c | 0.10 | 0.14 | 0.18 |
| D | 1.80 | 2.00 | 2.20 |
| e | 0.65 BSC. | | |
| E | 1.15 | 1.25 | 1.35 |
| HE | 1.80 | 2.20 | 2.40 |
| L | 0.26 | 0.34 | 0.46 |
| L1 | 0.425 TYP. | | |
| Q1 | 0.10 | 0.25 | 0.40 |
| PKG. CODE | X5-1 | | |

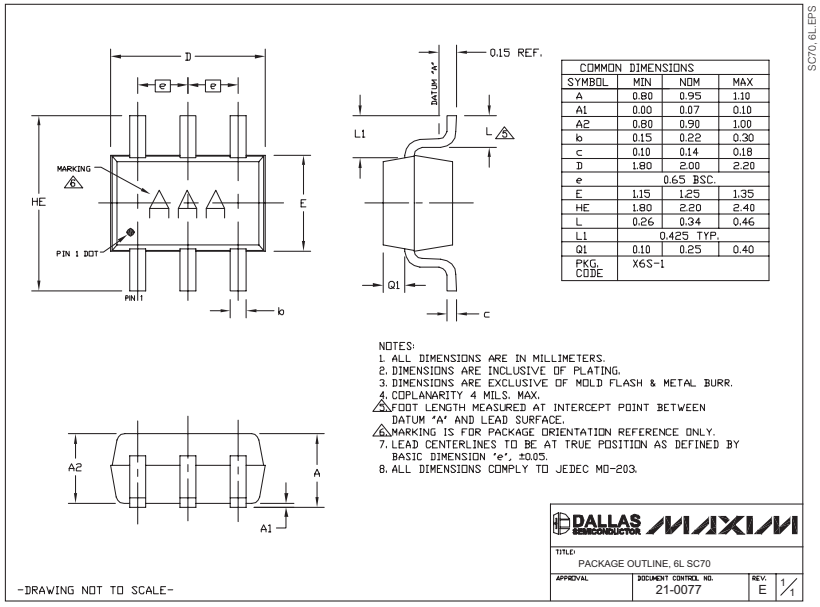
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONS ARE INCLUSIVE OF PLATING.
3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR.
4. COMPLY TO JEITA SC-88A EXCEPT FOR DIMENSION "L", ALL DIMENSIONS COMPLY TO JEDEC MO-203.
5. COPLANARITY 4 MILS. MAX.
6. FOOT LENGTH MEASURED AT INTERCEPT POINT BETWEEN DATUM "A" AND LEAD SURFACE.
4. MARKING IS FOR PACKAGE ORIENTATION REFERENCE ONLY.
8. LEAD CENTERLINES TO BE AT TRUE POSITION AS DEFINED BY BASIC DIMENSION "e", ±0.05.

DALLAS SEMICONDUCTOR MAXIM

TITLE: PACKAGE OUTLINE, 5L SC70

| APPROVAL | DOCUMENT CONTROL NO. | REV. | |
|---|---|---|---|
| | 21-0076 | E | 1/1 |

SC70, 6L.EPS




| COMMON DIMENSIONS | | | |
|---|---|---|---|
| SYMBOL | MIN | NOM | MAX |
| A | 0.80 | 0.95 | 1.10 |
| A1 | 0.00 | 0.07 | 0.10 |
| A2 | 0.80 | 0.90 | 1.00 |
| b | 0.15 | 0.22 | 0.30 |
| c | 0.10 | 0.14 | 0.18 |
| D | 1.80 | 2.00 | 2.20 |
| e | 0.65 BSC. | | |
| E | 1.15 | 1.25 | 1.35 |
| HE | 1.80 | 2.20 | 2.40 |
| L | 0.26 | 0.34 | 0.46 |
| L1 | 0.425 TYP. | | |
| Q1 | 0.10 | 0.25 | 0.40 |
| PKG. CODE | X6S-1 | | |

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONS ARE INCLUSIVE OF PLATING.
3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR.
4. COPLANARITY 4 MILS. MAX.
5. FOOT LENGTH MEASURED AT INTERCEPT POINT BETWEEN DATUM "A" AND LEAD SURFACE.
6. MARKING IS FOR PACKAGE ORIENTATION REFERENCE ONLY.
7. LEAD CENTERLINES TO BE AT TRUE POSITION AS DEFINED BY BASIC DIMENSION "e", ±0.05.
8. ALL DIMENSIONS COMPLY TO JEDEC MO-203.

DALLAS SEMICONDUCTOR MAXIM

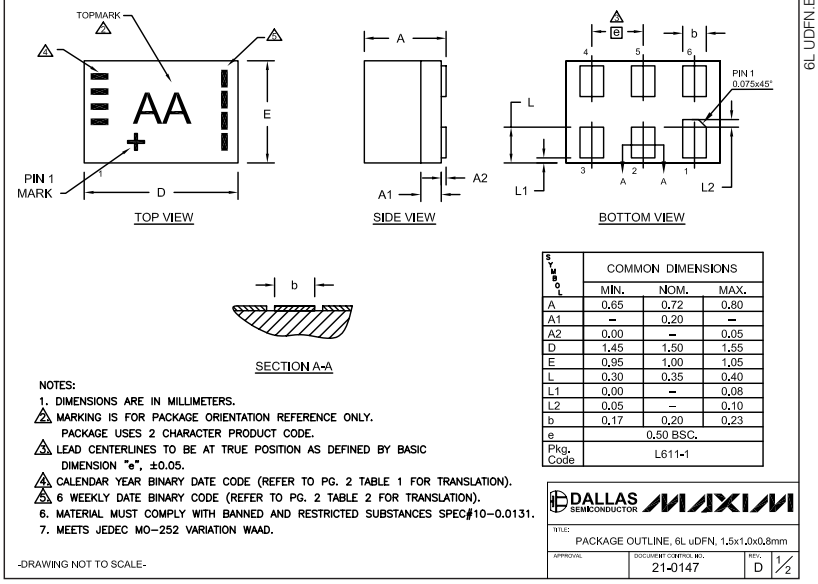
TITLE: PACKAGE OUTLINE, 6L SC70

| APPROVAL | DOCUMENT CONTROL NO. | REV. | |
|---|---|---|---|
| | 21-0077 | E | 1/1 |

## Package Information (continued)

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to **www.maxim-ic.com/packages**.)

6L UDFN.EPS




| SYMBOL | COMMON DIMENSIONS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.65 | 0.72 | 0.80 |
| A1 | – | 0.20 | – |
| A2 | 0.00 | – | 0.05 |
| D | 1.45 | 1.50 | 1.55 |
| E | 0.95 | 1.00 | 1.05 |
| L | 0.30 | 0.35 | 0.40 |
| L1 | 0.00 | – | 0.08 |
| L2 | 0.05 | – | 0.10 |
| b | 0.17 | 0.20 | 0.23 |
| e | 0.50 BSC. | | |
| Pkg. Code | L611-1 | | |

NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
2. MARKING IS FOR PACKAGE ORIENTATION REFERENCE ONLY. PACKAGE USES 2 CHARACTER PRODUCT CODE.
3. LEAD CENTERLINES TO BE AT TRUE POSITION AS DEFINED BY BASIC DIMENSION "e", ±0.05.
4. CALENDAR YEAR BINARY DATE CODE (REFER TO PG. 2 TABLE 1 FOR TRANSLATION).
5. 6 WEEKLY DATE BINARY CODE (REFER TO PG. 2 TABLE 2 FOR TRANSLATION).
6. MATERIAL MUST COMPLY WITH BANNED AND RESTRICTED SUBSTANCES SPEC#10-0.0131.
7. MEETS JEDEC MO-252 VARIATION WAAD.

-DRAWING NOT TO SCALE-

DALLAS SEMICONDUCTOR MAXIM

TITLE: PACKAGE OUTLINE, 6L uDFN, 1.5x1.0x0.8mm

APPROVAL | DOCUMENT CONTROL NO. 21-0147 | REV. D | 1/2

**TABLE 1** Translation Table for Calendar Year Code

| Calendar Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|

Legend: Marked with bar | Blank space - no bar required

**TABLE 2** Translation Table for Payweek Binary Coding

| Payweek | 06-11 | 12-17 | 18-23 | 24-29 | 30-35 | 36-41 | 42-47 | 48-51 | 52-05 |
|---|---|---|---|---|---|---|---|---|---|

Legend: Marked with bar | Blank space - no bar required

-DRAWING NOT TO SCALE-

DALLAS SEMICONDUCTOR MAXIM

TITLE: PACKAGE OUTLINE, 6L uDFN, 1.5x1.0x0.8mm

APPROVAL | DOCUMENT CONTROL NO. 21-0147 | REV. D | 2/2

## Revision History

Pages changed at Rev 2: 1–11

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