



# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## General Description

The MAX4400–MAX4403 low-cost, general-purpose op amps offer Rail-to-Rail® outputs, draw only 320µA of quiescent current, and operate from a single +2.5V to +5.5V supply. For additional power conservation, the MAX4401 offers a low-power shutdown mode that reduces supply current to 1µA (max) and puts the amplifier's output in a high-impedance state. These devices deliver ±1.4mA of output current and are unity-gain stable with a 1MHz gain-bandwidth product driving capacitive loads up to 400pF. The MAX4400–MAX4403 are specified to +125°C, making them suitable for use in a variety of harsh environments, such as automotive applications.

The MAX4400 single amplifier is available in ultra-small 5-pin SC70 and space-saving 5-pin SOT23 packages. The single MAX4401 includes the shutdown feature and is available in a 6-pin SC70. The MAX4402 is a dual amplifier available in 8-pin SOT23 and SO packages. The MAX4403 quad amplifier is packaged in a 14-pin TSSOP or SO.

## Applications

Single-Supply, Zero-Crossing Detectors  
Instruments and Terminals  
Portable Communications  
Electronic Ignition Modules  
Infrared Receivers  
Sensor Signal Detection

## Selector Guide

| PART    | NO. OF AMPLIFIERS PER PACKAGE | SHUTDOWN MODE |
|---------|-------------------------------|---------------|
| MAX4400 | 1                             | No            |
| MAX4401 | 1                             | Yes           |
| MAX4402 | 2                             | No            |
| MAX4403 | 4                             | No            |

Rail-to-Rail is a registered trademark of Nippon Motorola, Ltd.

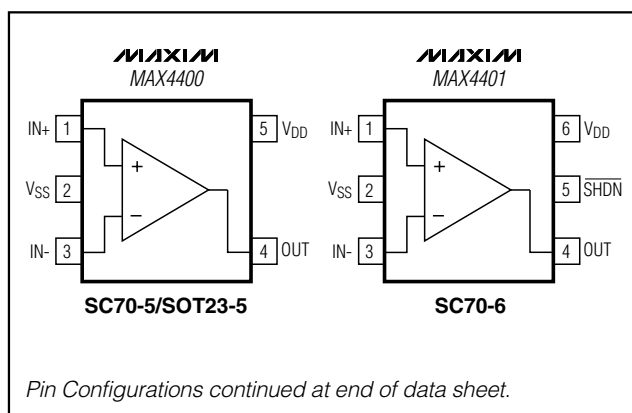
## Features

- ◆ Single +2.5V to +5.5V Supply Voltage Range
- ◆ 320µA Quiescent Current per Amplifier
- ◆ 1µA (max) Shutdown Mode (MAX4401)
- ◆ Available in Space-Saving Packages
  - 5-Pin SC70 (MAX4400)
  - 6-Pin SC70 (MAX4401)
  - 8-Pin SOT23 (MAX4402)
- ◆ 110dB A<sub>VO</sub>L with 2kΩ Load
- ◆ 0.015% THD with 2kΩ Load
- ◆ Rail-to-Rail Output Voltage Swing
- ◆ 1.4mA of Sink and Source Load Current
- ◆ Unity-Gain Stable up to C<sub>LOAD</sub> = 400pF
- ◆ Ground-Sensing Inputs

## Ordering Information

| PART         | TEMP RANGE      | PIN-PACKAGE | TOP MARK |
|--------------|-----------------|-------------|----------|
| MAX4400AXK-T | -40°C to +125°C | 5 SC70-5    | AAG      |
| MAX4400AUK-T | -40°C to +125°C | 5 SOT23-5   | ADNP     |
| MAX4401AXT-T | -40°C to +125°C | 6 SC70-6    | AAB      |
| MAX4402AKA-T | -40°C to +125°C | 8 SOT23-8   | AADI     |
| MAX4402AUA   | -40°C to +125°C | 8 µMAX      | —        |
| MAX4402ASA   | -40°C to +125°C | 8 SO        | —        |
| MAX4403AUD   | -40°C to +125°C | 14 TSSOP    | —        |
| MAX4403ASD   | -40°C to +125°C | 14 SO       | —        |

## Pin Configurations



# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## ABSOLUTE MAXIMUM RATINGS

Power-Supply Voltage ( $V_{DD}$  to  $V_{SS}$ ) ..... -0.3V to +6V  
 All Other Pins ..... ( $V_{SS} - 0.3V$ ) to ( $V_{DD} + 0.3V$ )  
 Output Short-Circuit Duration  
   OUT Shorted to  $V_{SS}$  or  $V_{DD}$  ..... Continuous  
 Continuous Power Dissipation ( $T_A = +70^\circ\text{C}$ )  
   5-Pin SC70 (derate 2.5mW/ $^\circ\text{C}$  above  $+70^\circ\text{C}$ ) ..... 200mW  
   5-Pin SOT23 (derate 7.1mW/ $^\circ\text{C}$  above  $+70^\circ\text{C}$ ) ..... 571mW  
   6-Pin SC70 (derate 2.27mW/ $^\circ\text{C}$  above  $+70^\circ\text{C}$ ) ..... 181mW

8-Pin SOT23 (derate 7.52mW/ $^\circ\text{C}$  above  $+70^\circ\text{C}$ ) ..... 602mW  
 8-Pin  $\mu\text{MAX}$  (derate 4.5mW/ $^\circ\text{C}$  above  $+70^\circ\text{C}$ ) ..... 362mW  
 8-Pin SO (derate 5.88mW/ $^\circ\text{C}$  above  $+70^\circ\text{C}$ ) ..... 471mW  
 14-Pin TSSOP (derate 8.33mW/ $^\circ\text{C}$  above  $+70^\circ\text{C}$ ) ..... 667mW  
 14-Pin SO (derate 8.33mW/ $^\circ\text{C}$  above  $+70^\circ\text{C}$ ) ..... 667mW  
 Operating Temperature Range .....  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$   
 Storage Temperature Range .....  $-65^\circ\text{C}$  to  $+150^\circ\text{C}$   
 Lead Temperature (soldering, 10s) .....  $+300^\circ\text{C}$

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

( $V_{DD} = +5V$ ,  $V_{SS} = 0$ ,  $V_{CM} = 0$ ,  $V_{OUT} = V_{DD}/2$ ,  $R_L = \infty$  connected to  $V_{DD}/2$ ,  $\overline{\text{SHDN}} = V_{DD}$  (MAX4401 only),  $T_A = +25^\circ\text{C}$ , unless otherwise noted.)

| PARAMETER                              | SYMBOL           | CONDITIONS                                                                                        |                    | MIN                 | TYP         | MAX                 | UNITS            |
|----------------------------------------|------------------|---------------------------------------------------------------------------------------------------|--------------------|---------------------|-------------|---------------------|------------------|
| Supply Voltage Range                   | $V_{DD}$         | Inferred from PSRR test                                                                           |                    | 2.5                 |             | 5.5                 | V                |
| Supply Current per Amplifier           | $I_{DD}$         | $V_{DD} = 2.5V$                                                                                   |                    |                     | 320         |                     | $\mu\text{A}$    |
|                                        |                  | $V_{DD} = 5.0V$                                                                                   |                    |                     | 410         | 700                 |                  |
| Supply Current in Shutdown             | $I_{SHDN}$       | $\overline{\text{SHDN}} = V_{SS}$ (Note 1)                                                        |                    |                     | 0.00002     | 1                   | $\mu\text{A}$    |
| Input Offset Voltage                   | $V_{OS}$         | MAX4400/MAX4401                                                                                   |                    |                     | $\pm 0.8$   | $\pm 4.5$           | mV               |
|                                        |                  | MAX4402/MAX4403                                                                                   |                    |                     | $\pm 1.0$   | $\pm 5.5$           |                  |
| Input Bias Current                     | $I_B$            | (Note 2)                                                                                          |                    |                     | $\pm 0.1$   | $\pm 100$           | pA               |
| Input Offset Current                   | $I_{OS}$         | (Note 2)                                                                                          |                    |                     | $\pm 0.1$   | $\pm 100$           | pA               |
| Input Resistance                       | $R_{IN}$         | Differential or common mode                                                                       |                    |                     | 1000        |                     | G $\Omega$       |
| Input Common-Mode Voltage Range        | $V_{CM}$         | Inferred from CMRR test                                                                           |                    | $V_{SS}$            |             | $V_{DD} - 1.4$      | V                |
| Common-Mode Rejection Ratio            | CMRR             | $V_{SS} \leq V_{CM} \leq V_{DD} - 1.4V$                                                           |                    | 68                  | 84          |                     | dB               |
| Power-Supply Rejection Ratio           | PSRR             | $2.5V \leq V_{DD} \leq 5.5V$                                                                      |                    | 78                  | 100         |                     | dB               |
| Large-Signal Voltage Gain              | $A_{VOL}$        | $V_{SS} + 0.3V \leq V_{OUT} \leq V_{DD} - 0.3V$                                                   | $R_L = 100k\Omega$ |                     | 120         |                     | dB               |
|                                        |                  |                                                                                                   | $R_L = 2k\Omega$   | 90                  | 110         |                     |                  |
| Output Voltage High                    | $V_{OH}$         | Specified as $ V_{DD} - V_{OHL} $                                                                 | $R_L = 100k\Omega$ |                     | 3           |                     | mV               |
|                                        |                  |                                                                                                   | $R_L = 2k\Omega$   |                     | 55          | 200                 |                  |
| Output Voltage Low                     | $V_{OL}$         | Specified as $ V_{SS} - V_{OLL} $                                                                 | $R_L = 100k\Omega$ |                     | 2           |                     | mV               |
|                                        |                  |                                                                                                   | $R_L = 2k\Omega$   |                     | 30          | 75                  |                  |
| Output Short-Circuit Current           |                  | Sourcing                                                                                          |                    |                     | 12          |                     | mA               |
|                                        |                  | Sinking                                                                                           |                    |                     | 30          |                     |                  |
| Shutdown Mode Output Leakage           | $I_{OUTSHDN}$    | Device in shutdown mode, $\overline{\text{SHDN}} = V_{SS}$ , $V_{SS} < V_{OUT} < V_{CC}$ (Note 1) |                    |                     |             | $\pm 1.0$           | $\mu\text{A}$    |
| $\overline{\text{SHDN}}$ Logic Low     | $V_{IL}$         | (Note 1)                                                                                          |                    |                     |             | $0.3 \times V_{DD}$ | V                |
| $\overline{\text{SHDN}}$ Logic High    | $V_{IH}$         | (Note 1)                                                                                          |                    | $0.7 \times V_{DD}$ |             |                     | V                |
| $\overline{\text{SHDN}}$ Input Current | $I_{IL}, I_{IH}$ | $\overline{\text{SHDN}} = V_{DD}$ or $V_{SS}$ (Note 1)                                            |                    |                     | $\pm 0.001$ | $\pm 500$           | nA               |
| Gain-Bandwidth Product                 | GBW              |                                                                                                   |                    |                     | 800         |                     | kHz              |
| Phase Margin                           | $\phi_M$         |                                                                                                   |                    |                     | 70          |                     | degrees          |
| Gain Margin                            |                  |                                                                                                   |                    |                     | 20          |                     | dB               |
| Slew Rate                              | SR               |                                                                                                   |                    |                     | 1           |                     | V/ $\mu\text{s}$ |

# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## ELECTRICAL CHARACTERISTICS (continued)

( $V_{DD} = +5V$ ,  $V_{SS} = 0$ ,  $V_{CM} = 0$ ,  $V_{OUT} = V_{DD}/2$ ,  $R_L = \infty$  connected to  $V_{DD}/2$ ,  $\overline{SHDN} = V_{DD}$  (MAX4401 only),  $T_A = +25^\circ C$ , unless otherwise noted.)

| PARAMETER                   | SYMBOL     | CONDITIONS                                         | MIN                | TYP   | MAX | UNITS          |
|-----------------------------|------------|----------------------------------------------------|--------------------|-------|-----|----------------|
| Input Voltage Noise Density | $e_n$      | $f = 10kHz$                                        |                    | 36    |     | $nV/\sqrt{Hz}$ |
| Input Current Noise Density | $i_n$      | $f = 10kHz$                                        |                    | 1     |     | $fA/\sqrt{Hz}$ |
| Capacitive-Load Stability   | $C_{LOAD}$ | $A_V = +1V/V$                                      |                    | 400   |     | pF             |
| Shutdown Delay Time         | $t_{SHDN}$ | (Note 1)                                           |                    | 0.4   |     | $\mu s$        |
| Enable Delay Time           | $t_{EN}$   | (Note 1)                                           |                    | 6     |     | $\mu s$        |
| Power-On Time               | $t_{ON}$   |                                                    |                    | 5     |     | $\mu s$        |
| Input Capacitance           | $C_{IN}$   |                                                    |                    | 2.5   |     | pF             |
| Total Harmonic Distortion   | THD        | $f = 10kHz$ , $V_{OUT} = 2V_{p-p}$ , $A_V = +1V/V$ | $R_L = 100k\Omega$ | 0.009 |     | %              |
|                             |            |                                                    | $R_L = 2k\Omega$   | 0.015 |     |                |
| Settling Time to 0.1%       | $t_s$      | $V_{OUT} = 2V$ step                                |                    | 7     |     | $\mu s$        |

## ELECTRICAL CHARACTERISTICS

( $V_{DD} = +5V$ ,  $V_{SS} = 0$ ,  $V_{CM} = 0$ ,  $V_{OUT} = V_{DD}/2$ ,  $R_L = \infty$  connected to  $V_{DD}/2$ ,  $T_A = -40^\circ C$  to  $+125^\circ C$ , unless otherwise noted.) (Note 3)

| PARAMETER                       | SYMBOL           | CONDITIONS                                                                                 | MIN                                   | TYP                 | MAX            | UNITS            |
|---------------------------------|------------------|--------------------------------------------------------------------------------------------|---------------------------------------|---------------------|----------------|------------------|
| Supply Voltage Range            | $V_{DD}$         | Inferred from PSRR test                                                                    | 2.5                                   |                     | 5.5            | V                |
| Supply Current per Amplifier    | $I_{DD}$         |                                                                                            |                                       |                     | 800            | $\mu A$          |
| Input Offset Voltage            | $V_{OS}$         | MAX4400/MAX4401                                                                            |                                       |                     | $\pm 6.5$      | mV               |
|                                 |                  | MAX4402/MAX4403                                                                            |                                       |                     | $\pm 8.0$      |                  |
| Input Offset Voltage Drift      | $TC_{VOS}$       |                                                                                            |                                       | $\pm 1$             |                | $\mu V/^\circ C$ |
| Input Bias Current              | $I_B$            | (Note 2)                                                                                   |                                       |                     | $\pm 100$      | pA               |
| Input Offset Current            | $I_{OS}$         | (Note 2)                                                                                   |                                       |                     | $\pm 100$      | pA               |
| Input Common-Mode Voltage Range | $V_{CM}$         | Inferred from CMRR test                                                                    | $V_{SS}$                              |                     | $V_{DD} - 1.5$ | V                |
| Common-Mode Rejection Ratio     | CMRR             | $V_{SS} \leq V_{CM} \leq V_{DD} - 1.5V$                                                    | 65                                    |                     |                | dB               |
|                                 |                  | $V_{SS} \leq V_{CM} \leq V_{DD} - 1.0V$ $T_A = -20^\circ C$ to $+125^\circ C$              | 50                                    |                     |                |                  |
| Power-Supply Rejection Ratio    | PSRR             | $2.5V \leq V_{CC} \leq 5.5V$                                                               | 74                                    |                     |                | dB               |
| Shutdown Mode Output Leakage    | $I_{OUTSHDN}$    | Device in shutdown mode, $\overline{SHDN} = V_{SS}$ , $V_{SS} < V_{OUT} < V_{DD}$ (Note 1) | $T_A = -40^\circ C$ to $+85^\circ C$  |                     | $\pm 1.0$      | $\mu A$          |
|                                 |                  |                                                                                            | $T_A = +85^\circ C$ to $+125^\circ C$ |                     | $\pm 5.0$      |                  |
| $\overline{SHDN}$ Logic Low     | $V_{IL}$         | (Note 1)                                                                                   |                                       | $0.3 \times V_{DD}$ |                | V                |
| $\overline{SHDN}$ Logic High    | $V_{IH}$         | (Note 1)                                                                                   | $0.7 \times V_{DD}$                   |                     |                | V                |
| $\overline{SHDN}$ Input Current | $I_{IL}, I_{IH}$ | $\overline{SHDN} = V_{DD}$ or $V_{SS}$ (Notes 1, 2)                                        |                                       |                     | $\pm 1000$     | nA               |
| Large-Signal Voltage Gain       | $A_{VOL}$        | $V_{SS} + 0.3V \leq V_{OUT} \leq V_{DD} - 0.3V$ , $R_L = 2k\Omega$                         | 85                                    |                     |                | dB               |
| Output Voltage High             | $V_{OH}$         | Specified as $I_{VDD} - V_{OHL}$ , $R_L = 2k\Omega$                                        |                                       |                     | 250            | mV               |
| Output Voltage Low              | $V_{OL}$         | Specified as $I_{VSS} - V_{OLL}$ , $R_L = 2k\Omega$                                        |                                       |                     | 100            | mV               |

**Note 1:** Shutdown mode is only available in the 6-pin SC70 single op amp (MAX4401).

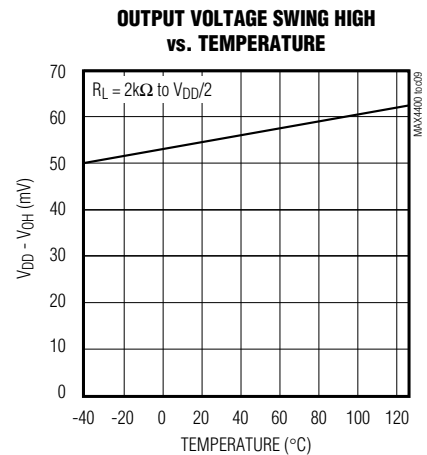
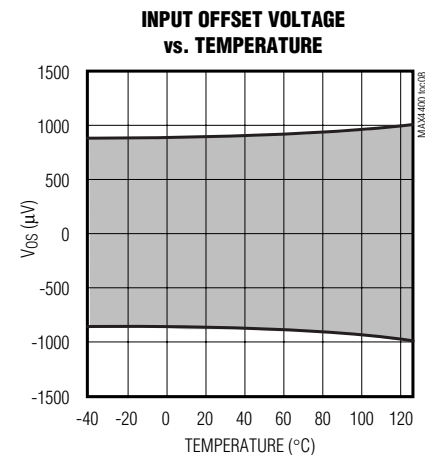
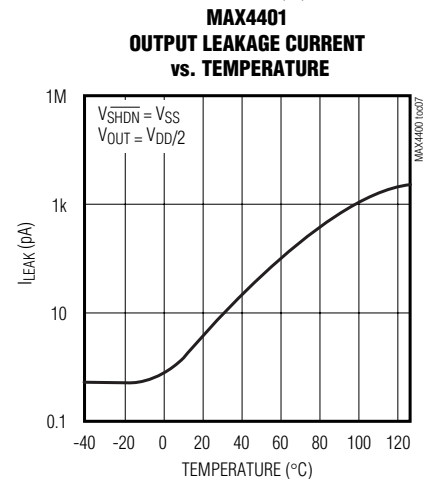
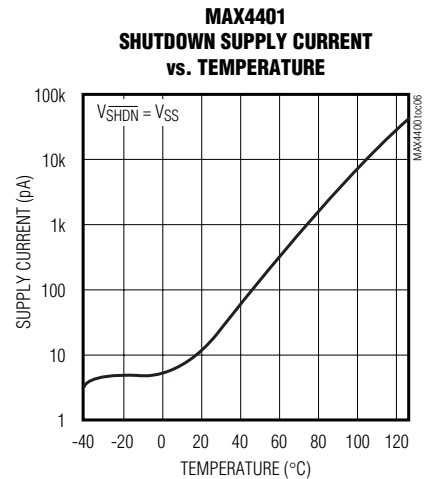
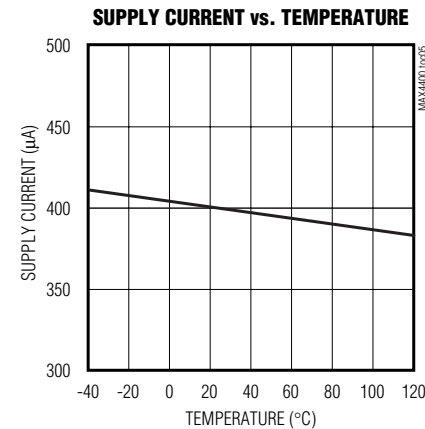
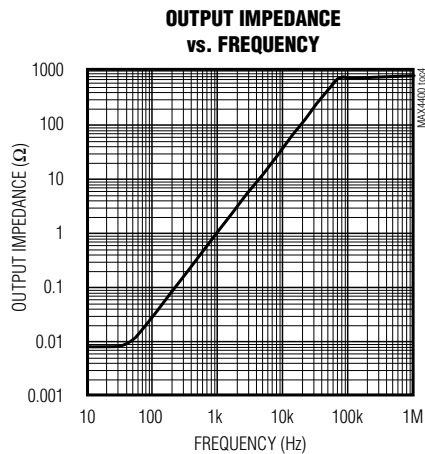
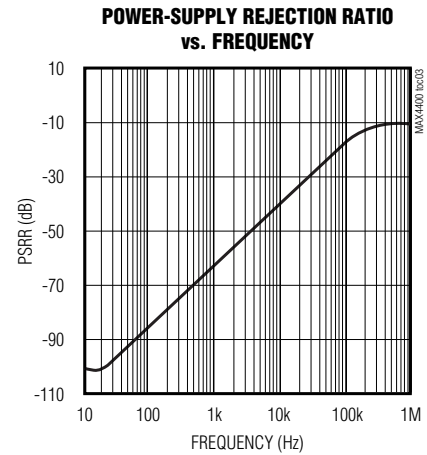
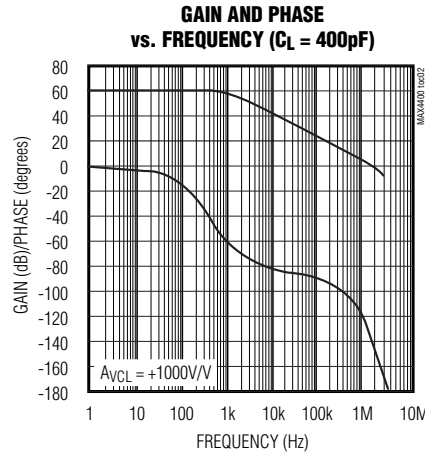
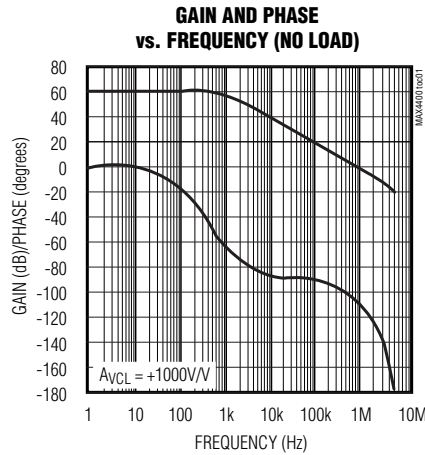
**Note 2:** Guaranteed by design.

**Note 3:** Specifications are 100% tested at  $T_A = +25^\circ C$  (exceptions noted). All temperature limits are guaranteed by design.

# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## Typical Operating Characteristics

( $V_{DD} = +5V$ ,  $V_{SS} = 0$ ,  $V_{CM} = V_{DD}/2$ ,  $V_{SHDN} = 5V$ ,  $R_L = \infty$  connected to  $V_{DD}/2$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

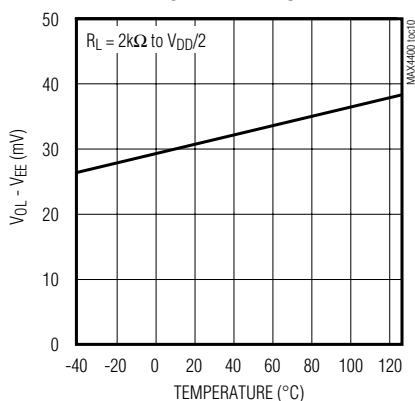


# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

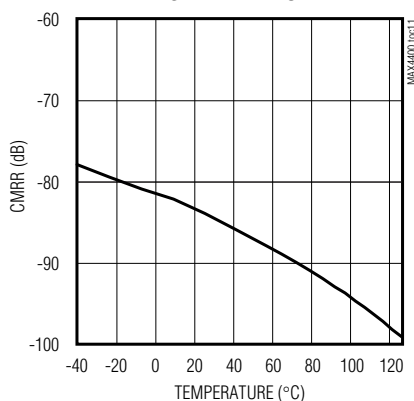
## Typical Operating Characteristics (continued)

( $V_{DD} = +5V$ ,  $V_{SS} = 0$ ,  $V_{CM} = V_{DD}/2$ ,  $V_{SHDN} = 5V$ ,  $R_L = \infty$  connected to  $V_{DD}/2$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

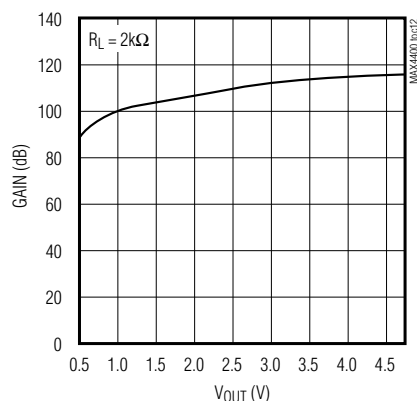
**OUTPUT VOLTAGE SWING LOW vs. TEMPERATURE**



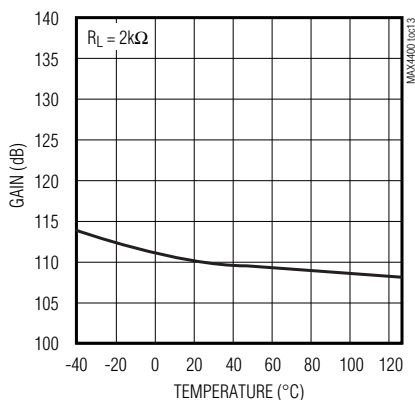
**COMMON-MODE REJECTION RATIO vs. TEMPERATURE**



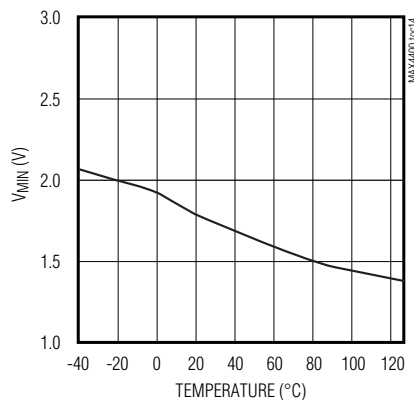
**LARGE-SIGNAL GAIN vs. OUTPUT VOLTAGE**



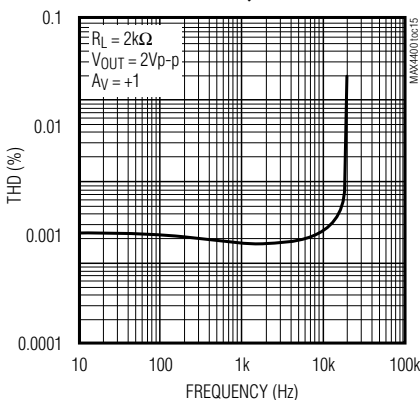
**LARGE-SIGNAL GAIN vs. TEMPERATURE**



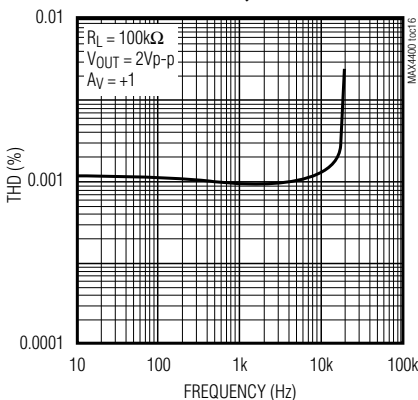
**MINIMUM OPERATING VOLTAGE vs. TEMPERATURE**



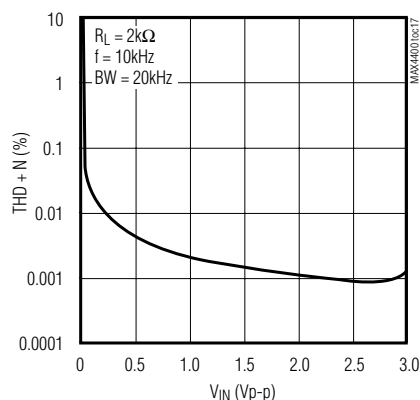
**TOTAL HARMONIC DISTORTION vs. FREQUENCY**



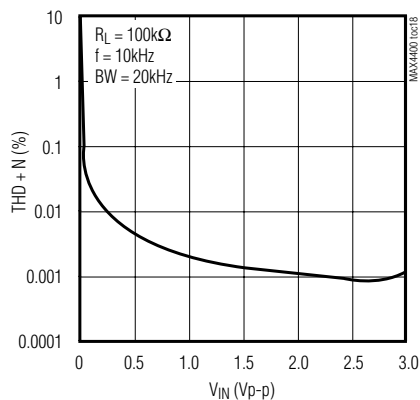
**TOTAL HARMONIC DISTORTION vs. FREQUENCY**



**TOTAL HARMONIC DISTORTION PLUS NOISE vs. INPUT AMPLITUDE**



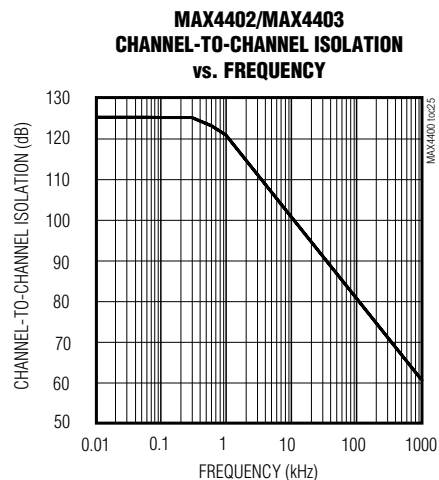
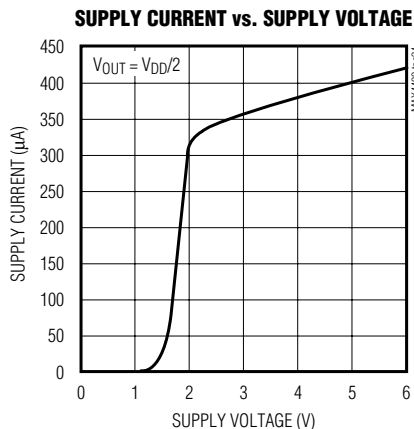
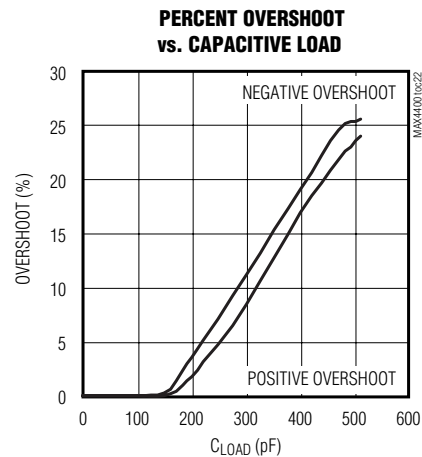
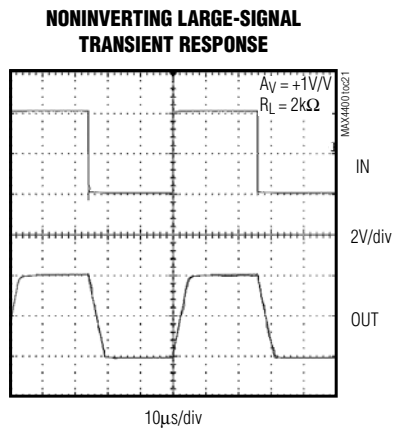
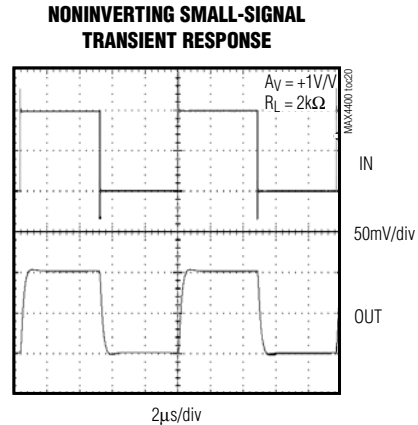
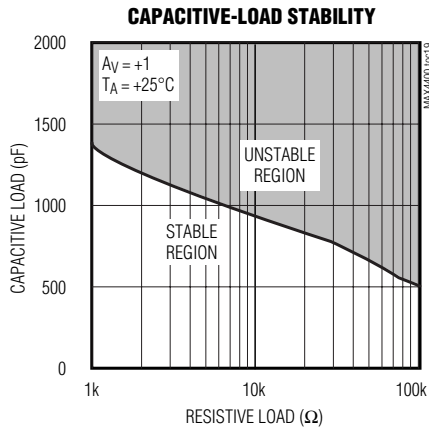
**TOTAL HARMONIC DISTORTION PLUS NOISE vs. INPUT AMPLITUDE**



# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## Typical Operating Characteristics (continued)

( $V_{DD} = +5V$ ,  $V_{SS} = 0$ ,  $V_{CM} = V_{DD}/2$ ,  $V_{SHDN} = 5V$ ,  $R_L = \infty$  connected to  $V_{DD}/2$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)



# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

MAX4400-MAX4403

## Pin Description

| PIN     |         |         |         | NAME                     | FUNCTION                                                                                           |
|---------|---------|---------|---------|--------------------------|----------------------------------------------------------------------------------------------------|
| MAX4400 | MAX4401 | MAX4402 | MAX4403 |                          |                                                                                                    |
| 1       | 1       | —       | —       | IN+                      | Noninverting Amplifier Input                                                                       |
| —       | —       | 3       | 3       | INA+                     | Noninverting Amplifier Input A                                                                     |
| —       | —       | 5       | 5       | INB+                     | Noninverting Amplifier Input B                                                                     |
| —       | —       | —       | 10      | INC+                     | Noninverting Amplifier Input C                                                                     |
| —       | —       | —       | 12      | IND+                     | Noninverting Amplifier Input D                                                                     |
| 2       | 2       | 4       | 11      | V <sub>SS</sub>          | Negative Supply. Connect to ground for single-supply operation                                     |
| 3       | 3       | —       | —       | IN-                      | Inverting Amplifier Input                                                                          |
| —       | —       | 2       | 2       | INA-                     | Inverting Amplifier Input A                                                                        |
| —       | —       | 6       | 6       | INB-                     | Inverting Amplifier Input B                                                                        |
| —       | —       | —       | 9       | INC-                     | Inverting Amplifier Input C                                                                        |
| —       | —       | —       | 13      | IND-                     | Inverting Amplifier Input D                                                                        |
| 4       | 4       | —       | —       | OUT                      | Amplifier Output                                                                                   |
| —       | —       | 1       | 1       | OUTA                     | Amplifier Output A                                                                                 |
| —       | —       | 7       | 7       | OUTB                     | Amplifier Output B                                                                                 |
| —       | —       | —       | 8       | OUTC                     | Amplifier Output C                                                                                 |
| —       | —       | —       | 14      | OUTD                     | Amplifier Output D                                                                                 |
| 5       | 6       | 8       | 4       | V <sub>DD</sub>          | Positive Supply                                                                                    |
| —       | 5       | —       | —       | $\overline{\text{SHDN}}$ | Active-Low Shutdown Input. Connect to V <sub>DD</sub> for normal operation. Do not leave floating. |

## Detailed Description

### Rail-to-Rail Output Stage

The MAX4400-MAX4403 can drive a 2k $\Omega$  load and still typically swing within 55mV of the supply rails. Figure 1 shows the output voltage swing of the MAX4400 configured with A<sub>v</sub> = +10V/V.

### Driving Capacitive Loads

Driving a capacitive load can cause instability in many op amps, especially those with low quiescent current. The MAX4400-MAX4403 are unity-gain stable for a range of capacitive loads to above 400pF. Figure 2 shows the response of the MAX4400 with an excessive capacitive load. Adding a series resistor between the output and the load capacitor (Figure 3) improves the

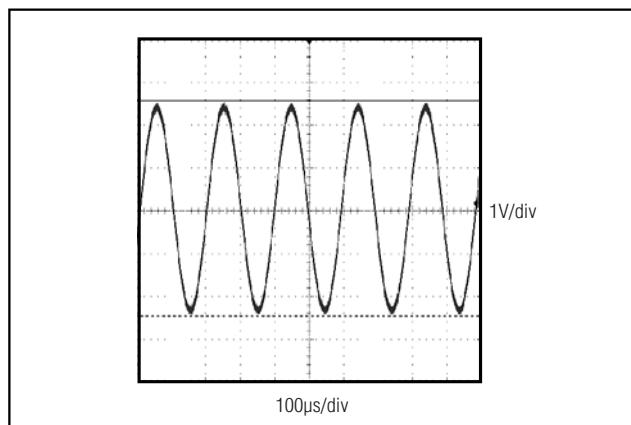


Figure 1. Rail-to-Rail Output Operation

# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

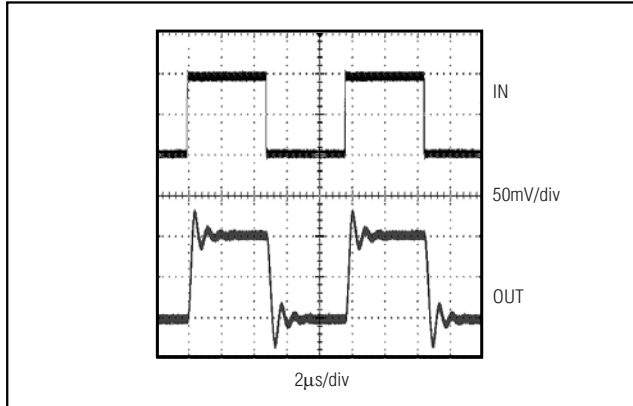


Figure 2. Small-Signal Transient Response with Excessive Capacitive Load

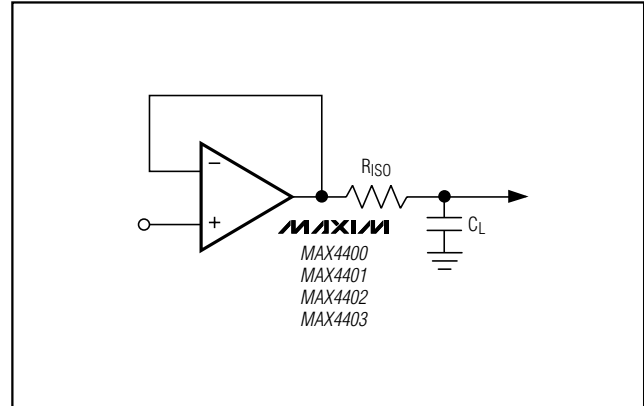


Figure 3. Capacitive-Load-Driving Circuit

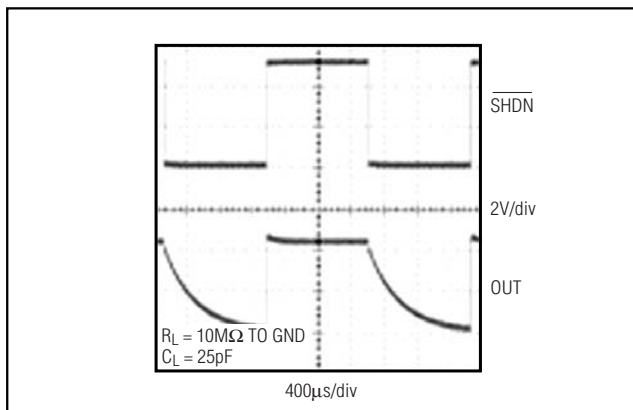


Figure 4. Shutdown Waveform

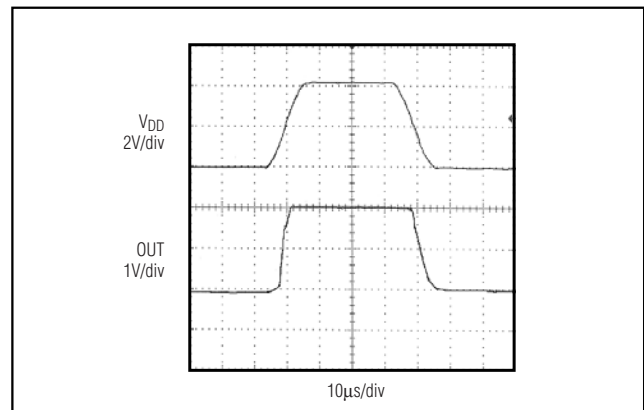


Figure 5. Power-Up/Power-Down Waveform

circuit's response by isolating the load capacitance from the op amp's output.

## Applications Information

### Shutdown Mode

The MAX4401 features a low-power shutdown mode. When  $\overline{\text{SHDN}}$  goes low, the supply current drops to 20pA (typ) and the output enters a high-impedance state. Pull  $\overline{\text{SHDN}}$  high to enable the amplifier. Do not leave  $\overline{\text{SHDN}}$  floating. Figure 4 shows the shutdown waveform.

### Power-Up

The MAX4400-MAX4403 outputs typically settle within 5μs after power-up. Figure 5 shows the output voltage on power-up and power-down.

## Power Supplies and Layout

The MAX4400-MAX4403 operate from a single +2.5V to +5.5V power supply. Bypass the power supply with a 0.1μF capacitor to ground.

Good layout techniques optimize performance by decreasing the amount of stray capacitance at the op amp's inputs and outputs. To decrease stray capacitance, minimize trace lengths by placing external components close to the op amp's pins.

## Chip Information

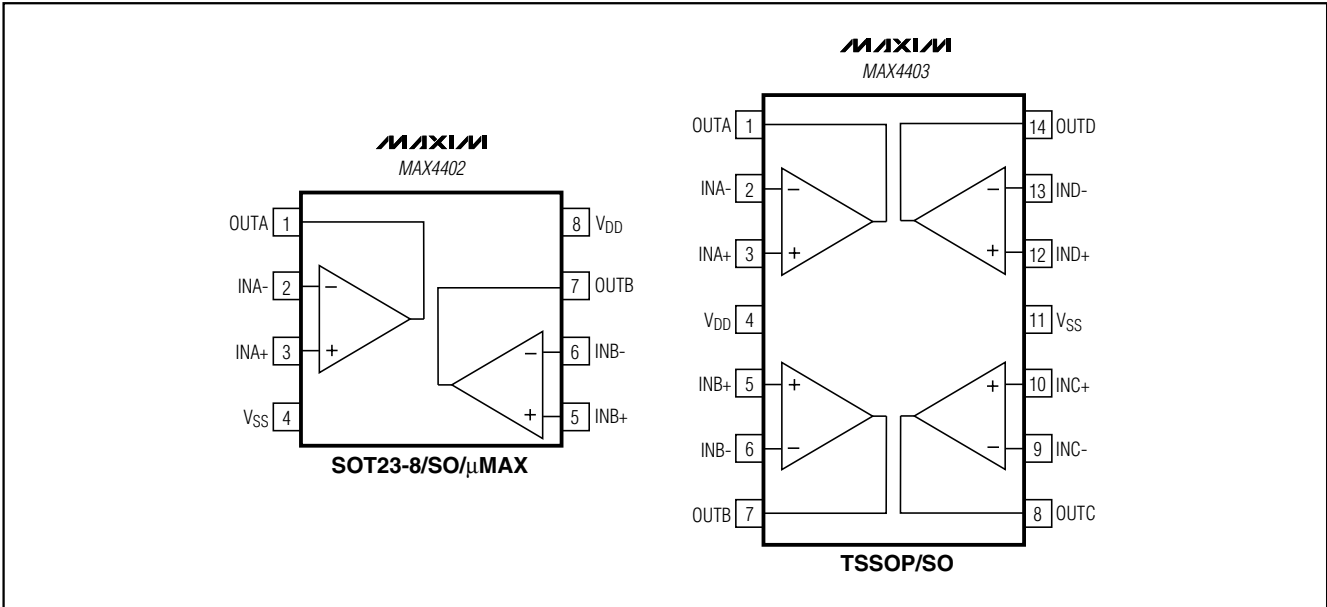
MAX4400/MAX4401 TRANSISTOR COUNT: 101  
MAX4402 TRANSISTOR COUNT: 202  
MAX4403 TRANSISTOR COUNT: 404



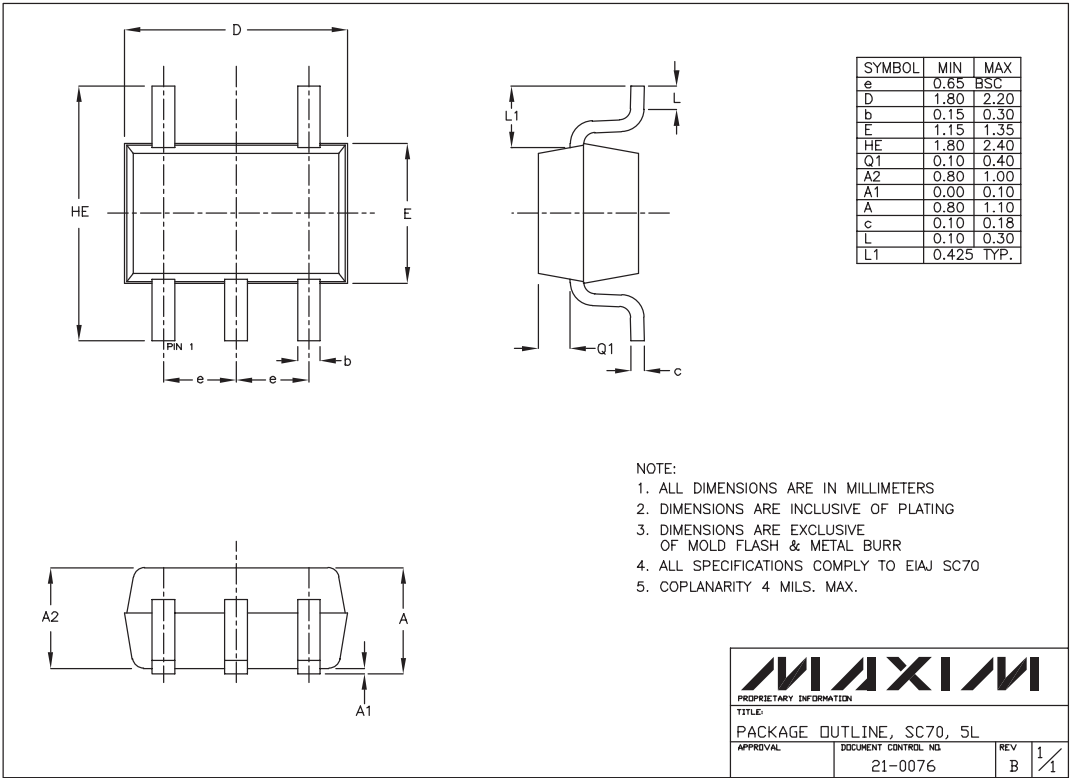
# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## Pin Configurations (continued)

MAX4400-MAX4403



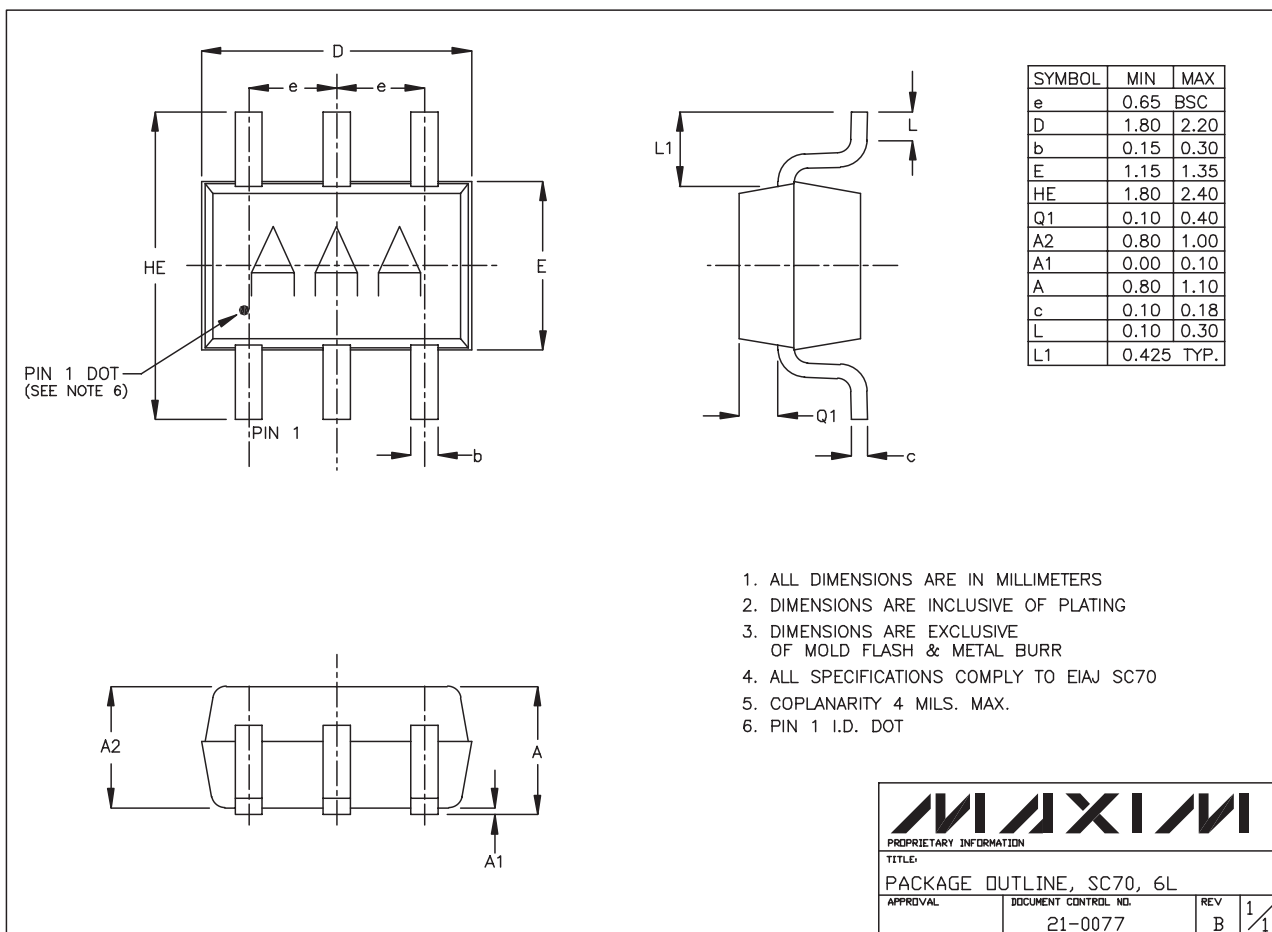
## Package Information



# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## Package Information (continued)

SC70, 6L, EPS

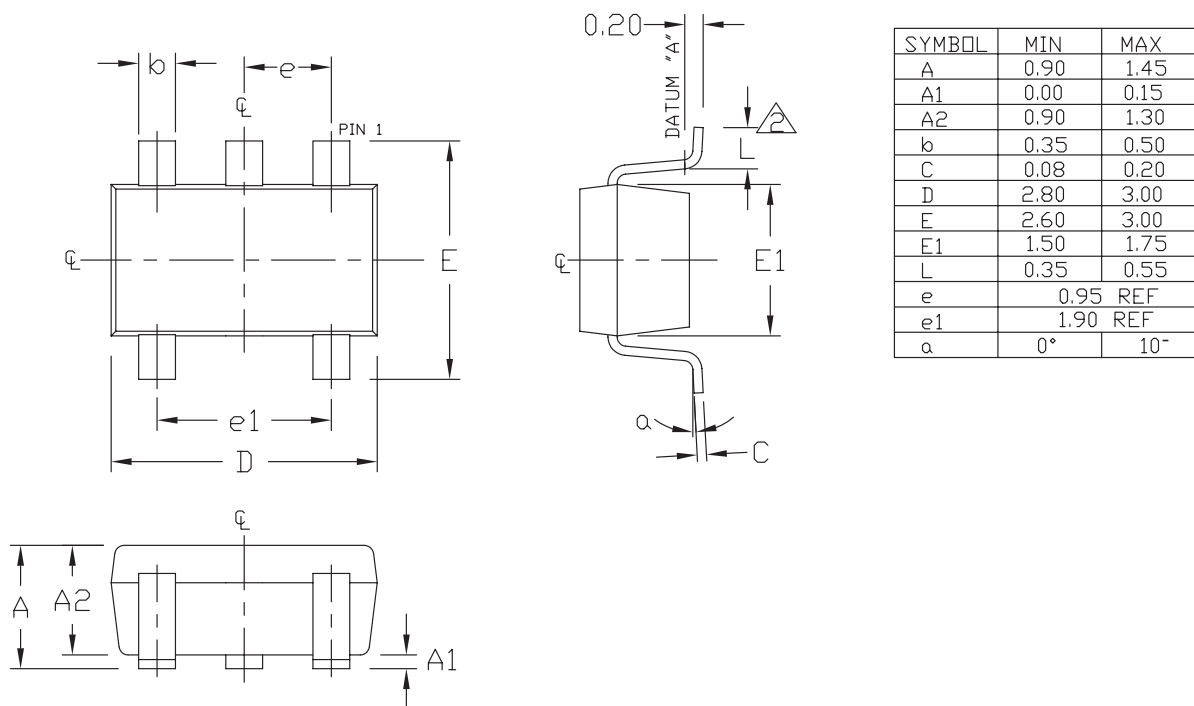


# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## Package Information (continued)

MAX4400-MAX4403

SOT-23



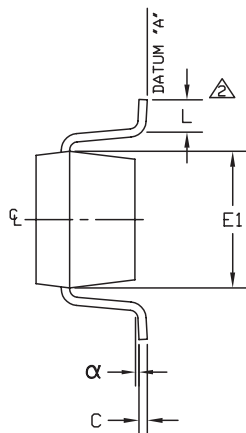
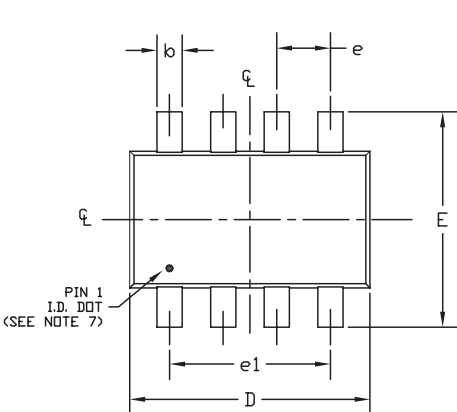
### NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOOT LENGTH MEASURED AT INTERCEPT POINT BETWEEN DATUM A & LEAD SURFACE.
3. PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH & METAL BURR.
4. PACKAGE OUTLINE INCLUSIVE OF SOLDER PLATING.
5. MEETS JEDEC MO178.

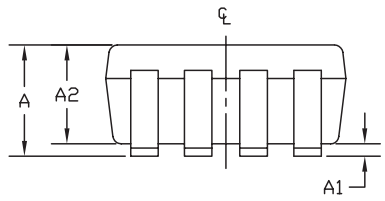
|                                                        |                      |     |     |
|--------------------------------------------------------|----------------------|-----|-----|
| <b>MAXIM</b><br><small>PROPRIETARY INFORMATION</small> |                      |     |     |
| TITLE: PACKAGE OUTLINE, SOT-23, 5L                     |                      |     |     |
| APPROVAL                                               | DOCUMENT CONTROL NO. | REV | 1/1 |
|                                                        | 21-0057              | C   |     |

# Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown

## Package Information (continued)



| SYMBOL | MIN      | MAX  |
|--------|----------|------|
| A      | 0.90     | 1.45 |
| A1     | 0.00     | 0.15 |
| A2     | 0.90     | 1.30 |
| b      | 0.28     | 0.45 |
| c      | 0.09     | 0.20 |
| D      | 2.80     | 3.00 |
| E      | 2.60     | 3.00 |
| E1     | 1.50     | 1.75 |
| L      | 0.10     | 0.60 |
| e      | 0.65 ref |      |
| e1     | 1.95 ref |      |
| α      | 0°       | 10°  |



- NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
  2. FOOT LENGTH MEASURED REFERENCE TO FLAT FOOT SURFACE PARALLEL TO DATUM "A".
  3. PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH & METAL BURR.
  4. PACKAGE OUTLINE INCLUSIVE OF SOLDER PLATING.
  5. EIAJ REF. NUMBER SC-74 (6 LEAD VERSION)
  6. COPLANARITY 4 MILS. MAX.
  7. PIN 1 I.D. DOT IS 0.3 MM Ø MIN. LOCATED ABOVE PIN 1.
  8. MEETS JEDEC MO178.

**MAXIM**  
PROPRIETARY INFORMATION

TITLE:  
PACKAGE OUTLINE, SOT-23, 8L

|          |                                 |          |     |
|----------|---------------------------------|----------|-----|
| APPROVAL | DOCUMENT CONTROL NO.<br>21-0078 | REV<br>C | 1/1 |
|----------|---------------------------------|----------|-----|

SOT23, 8LEPS

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