



# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## General Description

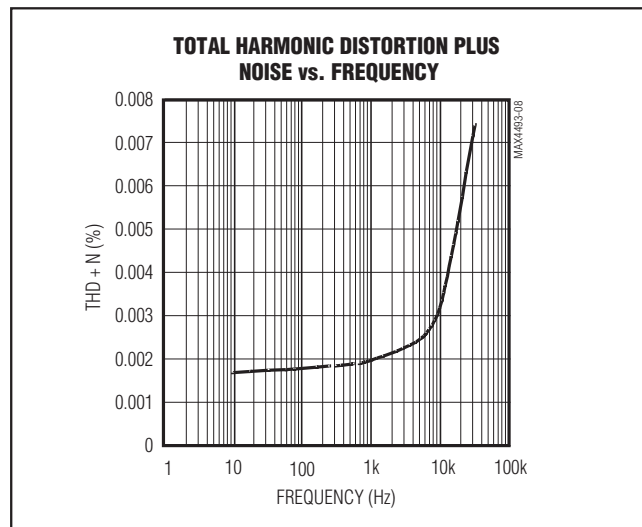
The MAX4493/MAX4494/MAX4495 single/dual/quad general-purpose operational amplifiers are designed for use in systems powered with dual supplies from  $\pm 2.25\text{V}$  to  $\pm 5.5\text{V}$  or with a single supply of  $+4.5\text{V}$  to  $+11\text{V}$ . These op amps provide a unity-gain bandwidth of  $5\text{MHz}$  with only  $770\mu\text{A}$  of quiescent current per amplifier. The wide input common-mode range extends from  $200\text{mV}$  beyond the negative rail to within  $1.5\text{V}$  of the positive supply rail while the output swings within  $10\text{mV}$  ( $R_L = 100\text{k}\Omega$ ) of either rail.

These amplifiers have excellent ( $110\text{dB}$ ) open-loop gain with very low THD+N of  $0.002\%$  ( $f = 1\text{kHz}$ ). The single MAX4493 is available in a tiny 5-pin SC70 package and the dual MAX4494 is available in the space-saving 8-pin SOT23. The quad MAX4495 is available in both 14-pin TSSOP and 14-pin SO packages. All products are rated at the automotive temperature range of  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$ .

## Applications

Battery-Powered Systems  
DAC Output Amplifiers  
Industrial Control Systems  
Voltage Reference Generators  
Signal Conditioning

## Typical Operating Characteristic



Typical Operating Circuit appears at end of data sheet.

## Features

- ◆  $770\mu\text{A}$  Supply Current per Amplifier
- ◆ Operates from Dual  $\pm 2.25\text{V}$  to  $\pm 5.5\text{V}$  Supplies
- ◆  $5\text{MHz}$  Gain-Bandwidth Product
- ◆ Rail-to-Rail Output Swing
- ◆ Input Voltage Range Extends  $200\text{mV}$  Below the Negative Rail
- ◆  $110\text{dB}$  Open-Loop Gain ( $R_L = 100\text{k}\Omega$ )
- ◆ Low THD+N of  $0.002\%$  ( $f = 1\text{kHz}$ )
- ◆ No Phase Reversal for Overdriven Inputs
- ◆ Unity-Gain Stable
- ◆ Available in Space-Saving Packages
  - 5-Pin SC70 (MAX4493)
  - 8-Pin SOT23 (MAX4494)
  - 14-Pin TSSOP (MAX4495)

## Ordering Information

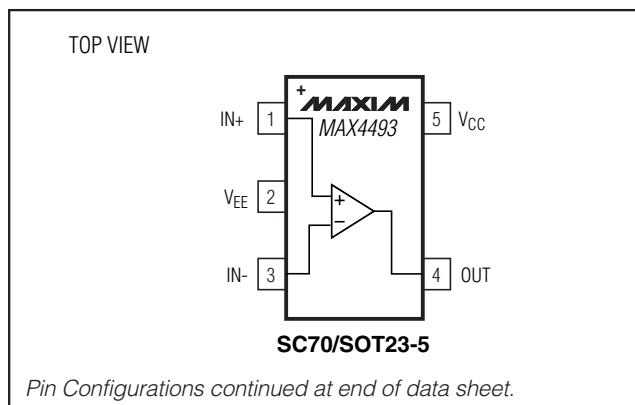
| PART           | TEMP RANGE                                  | PIN-PACKAGE       | TOP MARK |
|----------------|---------------------------------------------|-------------------|----------|
| MAX4493AXK+T   | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 5 SC70            | ABR      |
| MAX4493AXK/V+T | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 5 SC70            | +AUE     |
| MAX4493AUK+T   | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 5 SOT23           | ADPG     |
| MAX4494AKA+T   | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 8 SOT23           | AAEM     |
| MAX4494AKA/V+T | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 8 SOT23           | +AEQP    |
| MAX4494AUA+    | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 8 $\mu\text{MAX}$ | —        |
| MAX4494ASA+    | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 8 SO              | —        |
| MAX4495AUD+    | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 14 TSSOP          | —        |
| MAX4495ASD+    | $-40^\circ\text{C}$ to $+125^\circ\text{C}$ | 14 SO             | —        |

+ Denotes a lead(Pb)-free/RoHS-compliant package.

/V denotes an automotive qualified part.

T = Tape and reel.

## Pin Configurations



# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## ABSOLUTE MAXIMUM RATINGS

Supply Voltage ( $V_{CC}$  to  $V_{EE}$ ).....+12V  
 Voltage from Any Pin to Ground or  
 Any Other Pin .....( $V_{EE} - 0.3V$ ) to ( $V_{CC} + 0.3V$ )  
 Output Short-Circuit Duration to  
 $V_{CC}$ ,  $V_{EE}$ , or Ground .....Continuous  
 Continuous Power Dissipation ( $T_A = +70^\circ C$ )  
 5-Pin SC70 (derate 3.1mW/ $^\circ C$  above  $+70^\circ C$ ).....247mW  
 5-Pin SOT23 (derate 7.1mW/ $^\circ C$  above  $+70^\circ C$ ).....571mW

8-Pin SOT23 (derate 9.1mW/ $^\circ C$  above  $+70^\circ C$ ).....727mW  
 8-Pin  $\mu MAX^\circ$  (derate 4.5mW/ $^\circ C$  above  $+70^\circ C$ ) .....362mW  
 8-Pin SO (derate 5.9mW/ $^\circ C$  above  $+70^\circ C$ ).....471mW  
 14-Pin TSSOP (derate 9.1mW/ $^\circ C$  above  $+70^\circ C$ ) .....727mW  
 14-Pin SO (derate 8.3mW/ $^\circ C$  above  $+70^\circ C$ ).....667mW  
 Operating Temperature Range .....-40 $^\circ C$  to +125 $^\circ C$   
 Storage Temperature Range .....-65 $^\circ C$  to +150 $^\circ C$   
 Lead Temperature (soldering, 10s) .....+300 $^\circ C$

$\mu MAX$  is a registered trademark of Maxim Integrated products, Inc.

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.

## DC ELECTRICAL CHARACTERISTICS

( $V_{CC} = +5V$ ,  $V_{EE} = -5V$ ,  $R_L = 100k\Omega$  to ground,  $T_A = -40^\circ C$  to  $+125^\circ C$ . Typical values are at  $T_A = +25^\circ C$ , unless otherwise noted.)  
 (Note 1)

| PARAMETER                              | SYMBOL     | CONDITIONS                                                             | MIN             | TYP | MAX             | UNITS            |
|----------------------------------------|------------|------------------------------------------------------------------------|-----------------|-----|-----------------|------------------|
| Operating Supply Voltage Range         | $V_S$      | Guaranteed by PSRR test                                                | $\pm 2.25$      |     | $\pm 5.5$       | V                |
| Quiescent Supply Current per Amplifier | $I_S$      |                                                                        |                 | 770 | 1100            | $\mu A$          |
| Input Offset Voltage                   | $V_{OS}$   | $T_A = +25^\circ C$                                                    |                 | 0.3 | 5               | mV               |
|                                        |            | $T_A = T_{MIN}$ to $T_{MAX}$                                           |                 |     | 10              |                  |
| Input Offset Voltage Drift             | $TCV_{OS}$ |                                                                        |                 | 3   |                 | $\mu V/^\circ C$ |
| Input Offset Voltage Channel Matching  |            | MAX4494 and MAX4495                                                    |                 | 1   |                 | mV               |
| Input Bias Current                     | $I_B$      |                                                                        |                 | 0.2 | 1               | $\mu A$          |
| Input Offset Current                   | $I_{OS}$   |                                                                        |                 | 5   | 300             | nA               |
| Input Resistance                       | $R_{IN}$   | Differential mode ( $-1V \leq V_{IN} \leq +1V$ )                       |                 | 250 |                 | $k\Omega$        |
|                                        |            | Common mode ( $V_{EE} - 0.2V \leq V_{CM} \leq V_{CC} - 1.5V$ )         |                 | 110 |                 | $M\Omega$        |
| Common-Mode Input Voltage Range        | $V_{CM}$   | Guaranteed by CMRR test                                                | $V_{EE} - 0.2V$ |     | $V_{CC} - 1.5V$ | V                |
| Common-Mode Rejection Ratio            | CMRR       | $V_{EE} - 0.2V \leq V_{CM} \leq V_{CC} - 1.5V$                         | 65              | 90  |                 | dB               |
| Power-Supply Rejection Ratio           | PSRR       | $V_S = \pm 2.25V$ to $\pm 5.5V$                                        | 65              | 80  |                 | dB               |
| Large-Signal Voltage Gain              | $A_{VOL}$  | $R_L = 100k\Omega$ , $V_{EE} + 0.25V \leq V_{OUT} \leq V_{CC} - 0.25V$ | 85              | 110 |                 | dB               |
|                                        |            | $R_L = 1k\Omega$ , $V_{EE} + 0.5V \leq V_{OUT} \leq V_{CC} - 0.5V$     | 65              | 90  |                 |                  |
| Output Voltage Swing                   | $V_{OUT}$  | $R_L = 100k\Omega$ , $V_{CC} - V_{OH}$ and $V_{OL} - V_{EE}$           |                 | 10  | 150             | mV               |
|                                        |            | $R_L = 1k\Omega$ , $V_{CC} - V_{OH}$ and $V_{OL} - V_{EE}$             |                 | 200 | 450             |                  |
| Output Short-Circuit Current           | $I_{SC}$   | Sourcing or sinking                                                    |                 | 15  |                 | mA               |

**Note 1:** All devices are 100% production tested at  $T_A = +25^\circ C$ . Limits over the operating temperature range are guaranteed by design and not production tested.

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MAX4493/MAX4494/MAX4495

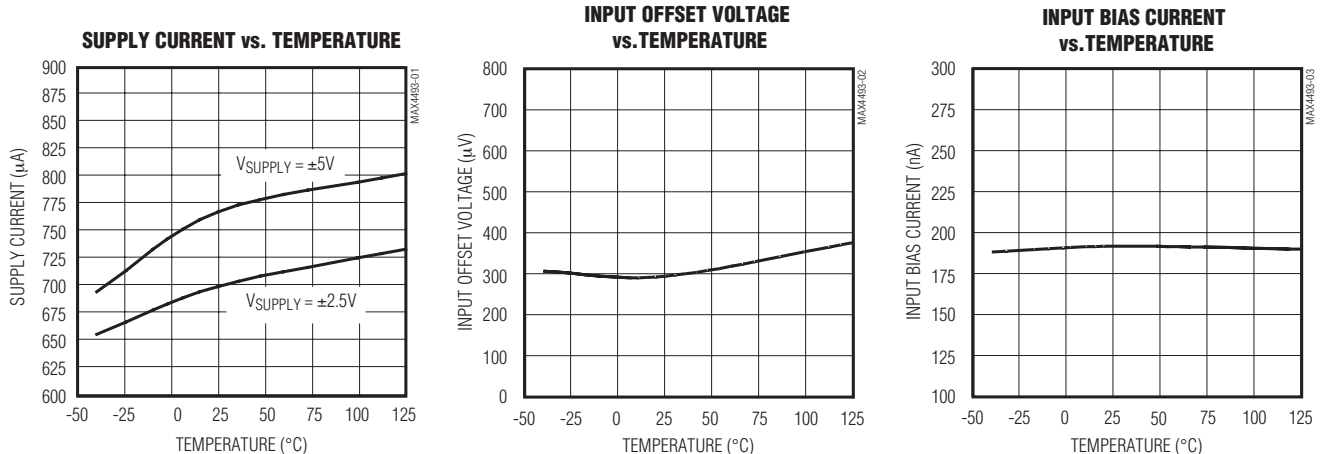
## AC ELECTRICAL CHARACTERISTICS

( $V_{CC} = +5V$ ,  $V_{EE} = -5V$ ,  $R_L = 100k\Omega$  to ground,  $C_L = 15pF$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

| PARAMETER                            | SYMBOL   | CONDITIONS                                       | MIN | TYP   | MAX | UNITS           |
|--------------------------------------|----------|--------------------------------------------------|-----|-------|-----|-----------------|
| Gain-Bandwidth Product               | GBWP     |                                                  |     | 5     |     | MHz             |
| Full-Power Bandwidth                 | FPBW     | $V_{OUT} = 5Vp-p$                                |     | 190   |     | kHz             |
| Slew Rate                            | SR       | $V_{OUT} = 5Vp-p$                                |     | 3     |     | V/ $\mu s$      |
| Phase Margin                         |          |                                                  |     | 75    |     | degrees         |
| Gain Margin                          |          |                                                  |     | 15    |     | dB              |
| Total Harmonic Distortion Plus Noise | THD+N    | $f = 1kHz$ , $V_{OUT} = 5Vp-p$ , $A_V = +1V/V$   |     | 0.002 |     | %               |
| Settling Time to 0.01%               | $t_s$    | $A_V = +1V/V$ , $V_{OUT} = 5V$ step              |     | 4     |     | $\mu s$         |
| Input Capacitance                    | $C_{IN}$ |                                                  |     | 2     |     | pF              |
| Input Noise Voltage Density          | $e_{IN}$ | $f = 1kHz$                                       |     | 8     |     | nV/ $\sqrt{Hz}$ |
| Input Noise Current Density          | $i_{IN}$ | $f = 1kHz$                                       |     | 0.2   |     | pA/ $\sqrt{Hz}$ |
| All-Hostile Crosstalk                |          | $f = 1kHz$ , MAX4494 and MAX4495                 |     | -100  |     | dB              |
| Capacitive-Load Stability            |          | $A_V = +1V/V$ , no sustained oscillations        |     | 300   |     | pF              |
| Power-Up Time                        | $t_{ON}$ | $V_{OUT} = 1V$ , $1\mu s$ power supply rise-time |     | 3     |     | $\mu s$         |

## Typical Operating Characteristics

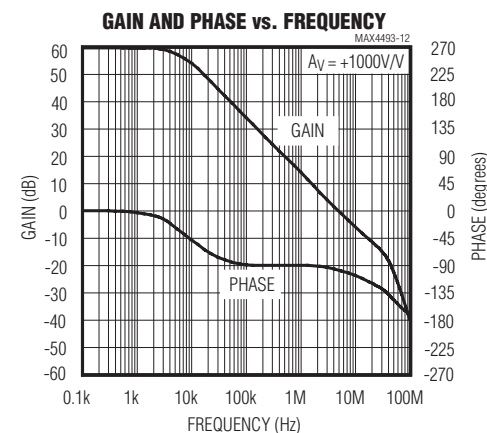
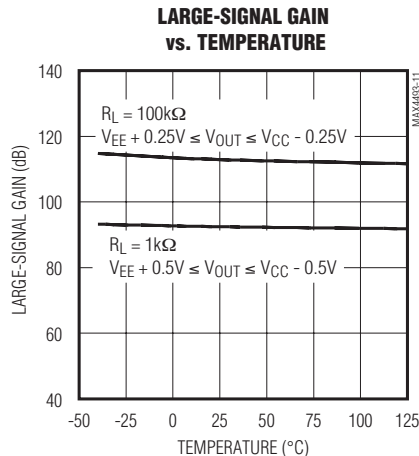
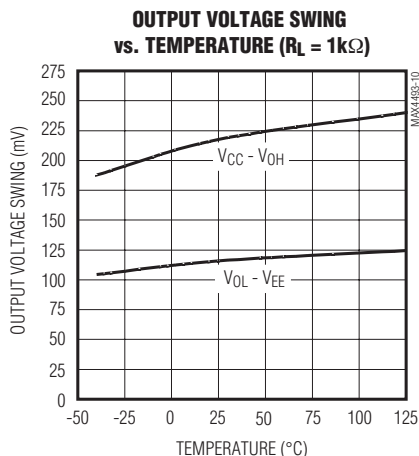
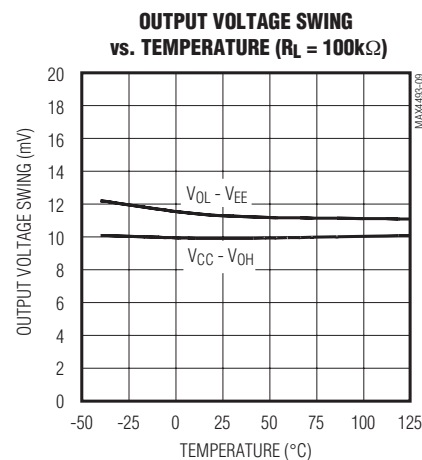
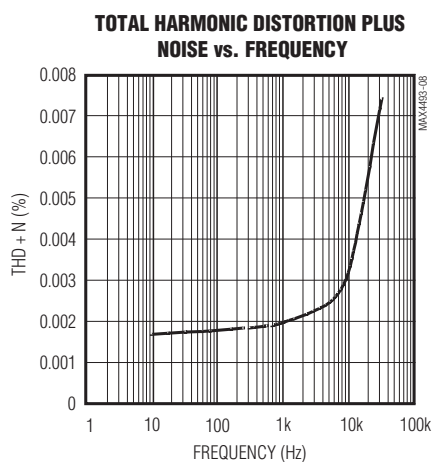
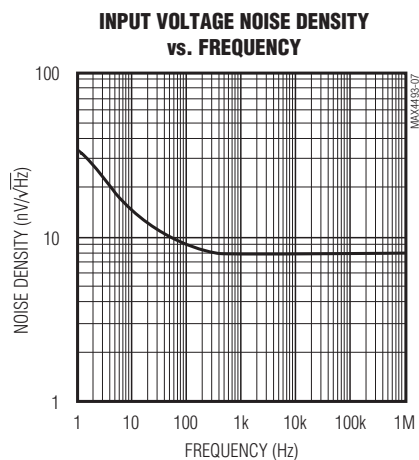
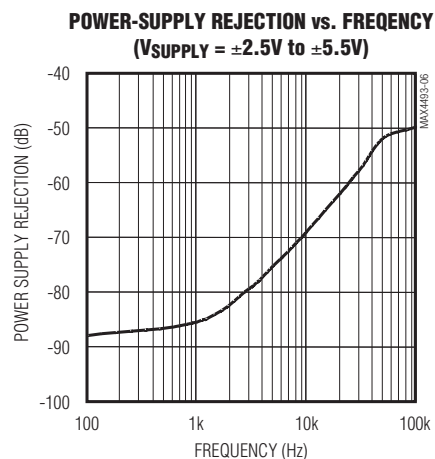
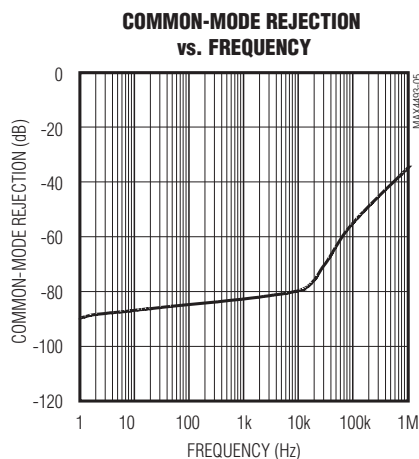
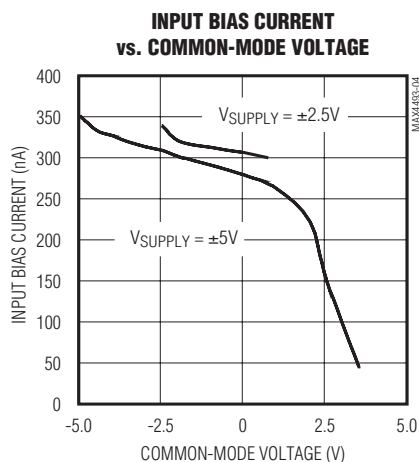
( $V_{CC} = +5V$ ,  $V_{EE} = -5V$ ,  $V_{CM} = 0V$ ,  $R_L = 100k\Omega$  to ground,  $C_L = 15pF$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)



# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## Typical Operating Characteristics (continued)

( $V_{CC} = +5V$ ,  $V_{EE} = -5V$ ,  $V_{CM} = 0V$ ,  $R_L = 100k\Omega$  to ground,  $C_L = 15pF$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

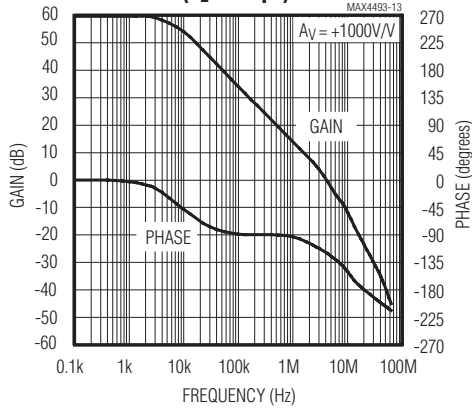


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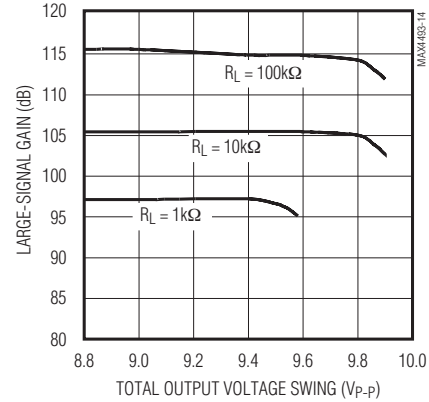
## Typical Operating Characteristics (continued)

( $V_{CC} = +5V$ ,  $V_{EE} = -5V$ ,  $V_{CM} = 0V$ ,  $R_L = 100k\Omega$  to ground,  $C_L = 15pF$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

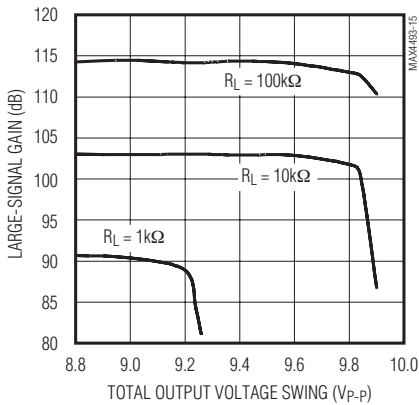
**GAIN AND PHASE vs. FREQUENCY**  
( $C_L = 300pF$ )



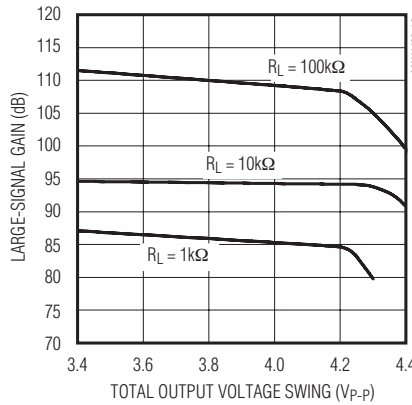
**LARGE-SIGNAL GAIN vs. OUTPUT VOLTAGE SWING**  
( $R_L$  TO  $V_{CC}$ ,  $V_{CC} = +5V$ ,  $V_{EE} = -5V$ )



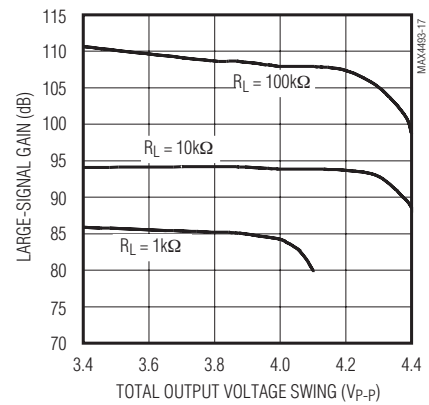
**LARGE-SIGNAL GAIN vs. OUTPUT VOLTAGE SWING**  
( $R_L$  TO  $V_{EE}$ ,  $V_{CC} = +5V$ ,  $V_{EE} = -5V$ )



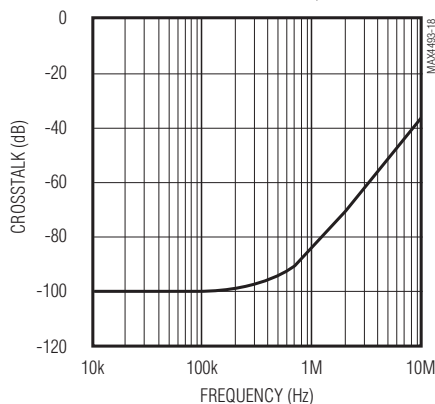
**LARGE-SIGNAL GAIN vs. OUTPUT VOLTAGE SWING**  
( $R_L$  TO  $V_{CC}$ ,  $V_{CC} = +2.25V$ ,  $V_{EE} = -2.25V$ )



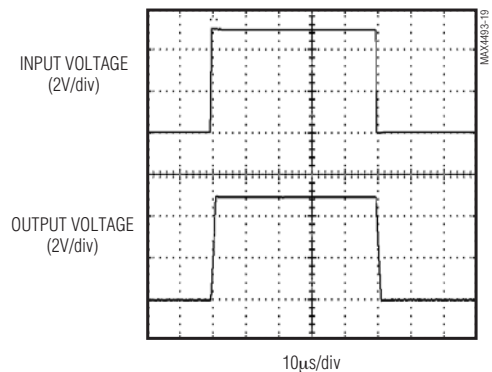
**LARGE-SIGNAL GAIN vs. OUTPUT VOLTAGE SWING**  
( $R_L$  TO  $V_{EE}$ ,  $V_{CC} = +2.25V$ ,  $V_{EE} = -2.25V$ )



**MAX4494/MAX4495**  
**CROSSTALK vs. FREQUENCY**



**LARGE-SIGNAL TRANSIENT RESPONSE**

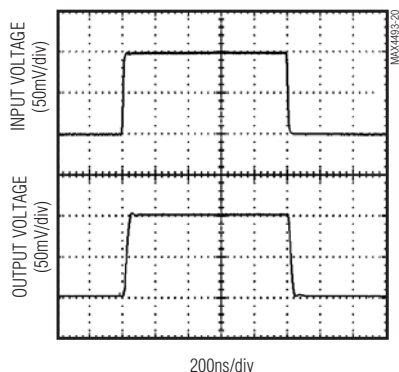


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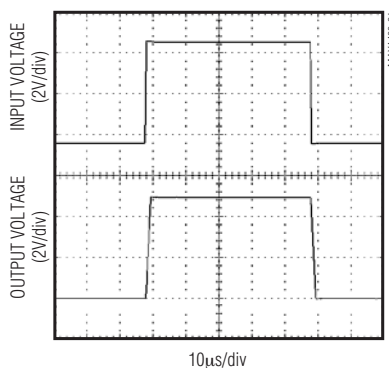
## Typical Operating Characteristics (continued)

( $V_{CC} = +5V$ ,  $V_{EE} = -5V$ ,  $V_{CM} = 0V$ ,  $R_L = 100k\Omega$  to ground,  $C_L = 15pF$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

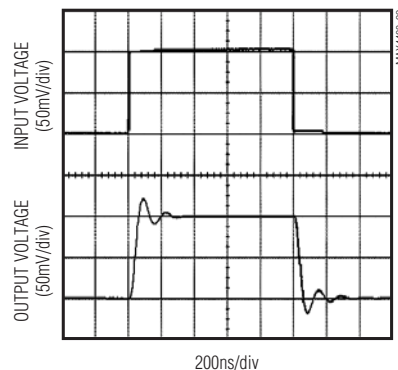
**SMALL-SIGNAL TRANSIENT RESPONSE**



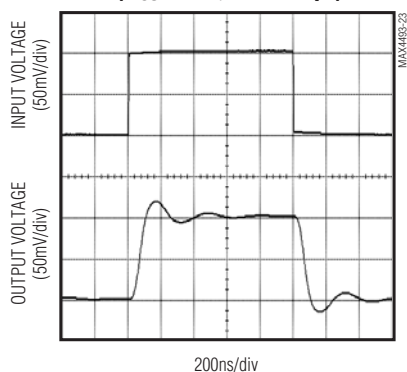
**LARGE-SIGNAL CAPACITIVE-LOAD STABILITY**  
( $C_L = 1200pF$ )



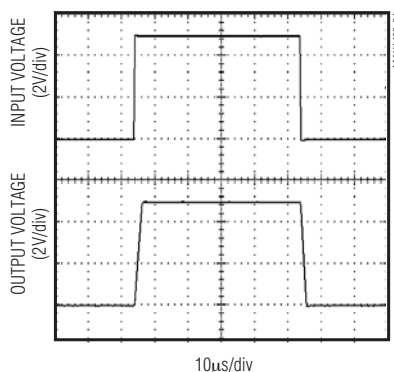
**SMALL-SIGNAL CAPACITIVE-LOAD STABILITY**  
( $C_L = 300pF$ )



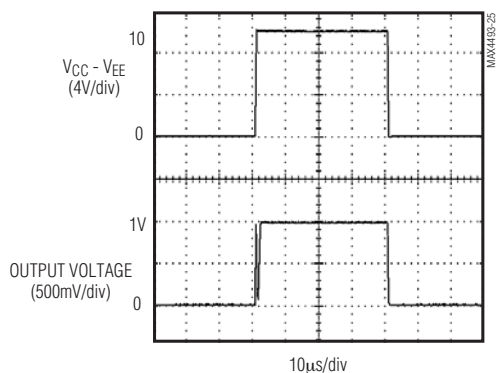
**SMALL-SIGNAL TRANSIENT RESPONSE**  
( $R_{ISO} = 15\Omega$ ,  $C_L = 1000pF$ )



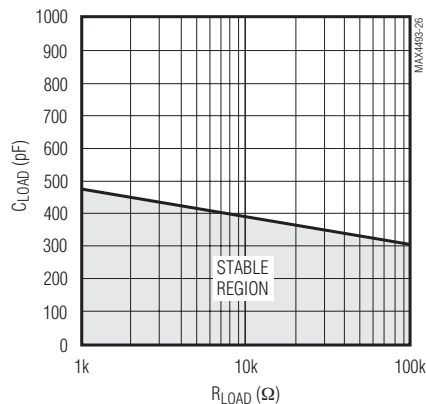
**LARGE-SIGNAL TRANSIENT RESPONSE**  
( $R_{ISO} = 15\Omega$ ,  $C_L = 0.01\mu F$ )



**POWER-UP TIME ( $V_{IN} = +1V$ )**



**STABILITY vs. CAPACITIVE AND RESISTIVE LOADS**



# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

MAX4493/MAX4494/MAX4495

## Pin Description

| PIN     |         |         | NAME | FUNCTION                     |
|---------|---------|---------|------|------------------------------|
| MAX4493 | MAX4494 | MAX4495 |      |                              |
| —       | 1       | 1       | OUTA | Channel A Output             |
| —       | 2       | 2       | INA- | Channel A Inverting Input    |
| —       | 3       | 3       | INA+ | Channel A Noninverting Input |
| —       | 7       | 7       | OUTB | Channel B Output             |
| —       | 6       | 6       | INB- | Channel B Inverting Input    |
| —       | 5       | 5       | INB+ | Channel B Noninverting Input |
| —       | —       | 8       | OUTC | Channel C Output             |
| —       | —       | 9       | INC- | Channel C Inverting Input    |
| —       | —       | 10      | INC+ | Channel C Noninverting Input |
| —       | —       | 14      | OUTD | Channel D Output             |
| —       | —       | 13      | IND- | Channel D Inverting Input    |
| —       | —       | 12      | IND+ | Channel D Noninverting Input |
| 4       | —       | —       | OUT  | Output                       |
| 1       | —       | —       | IN+  | Noninverting Input           |
| 3       | —       | —       | IN-  | Inverting Input              |
| 5       | 8       | 4       | VCC  | Positive Supply              |
| 2       | 4       | 11      | VEE  | Negative Supply              |

## Applications Information

### Rail-to-Rail Output Stage

The MAX4493/MAX4494/MAX4495 output stage can drive up to 1k $\Omega$  and still swing within 200mV of the rails.

### Capacitive-Load Stability

Driving large capacitive loads can cause instability in many op amps. The MAX4493/MAX4494/MAX4495 are

stable with capacitive loads up to 300pF. The Capacitive-Load Stability graph in the *Typical Operating Characteristics* gives the stable operation region for capacitive versus resistive load. Stability with higher capacitive loads can be improved by adding an isolation resistor in series with the op-amp output, as shown in Figure 1. This resistor improves the circuit's phase margin by isolating the load capacitor from the amplifier's output. As seen in the *Typical Operating Characteristics*, driving capacitive loads with an isolation resistor exhibits some overshoot, but no oscillation.

### Full-Power Bandwidth

The FPBW is given by:

$$\text{FPBW(Hz)} = \frac{\text{SR}}{\pi [V_{\text{OUTp-p(max)}}]}$$

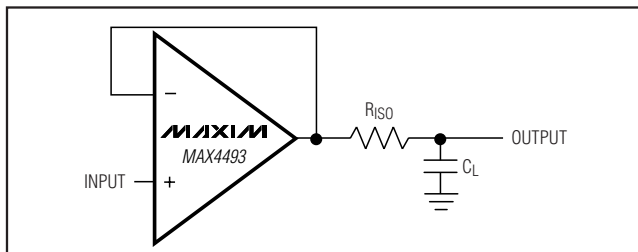


Figure 1. Capacitive Load Driving Circuit

# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

where the slew rate (SR) is  $3\text{V}/\mu\text{s}$ . Figure 2 shows the full-power bandwidth as a function of the peak-to-peak AC output voltage.

## Power-Up Conditions

The MAX4493/MAX4494/MAX4495 typically settle within  $3\mu\text{s}$  after power-up. See Power-Up Time in *Typical Operating Characteristics*.

## Power Supplies and Layout

The MAX4493/MAX4494/MAX4495 operate with dual supplies from  $\pm 2.25\text{V}$  to  $\pm 5.5\text{V}$ . Bypass both  $V_{CC}$  and  $V_{EE}$  with their own  $0.1\mu\text{F}$  capacitor to ground.

Good layout technique helps 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.

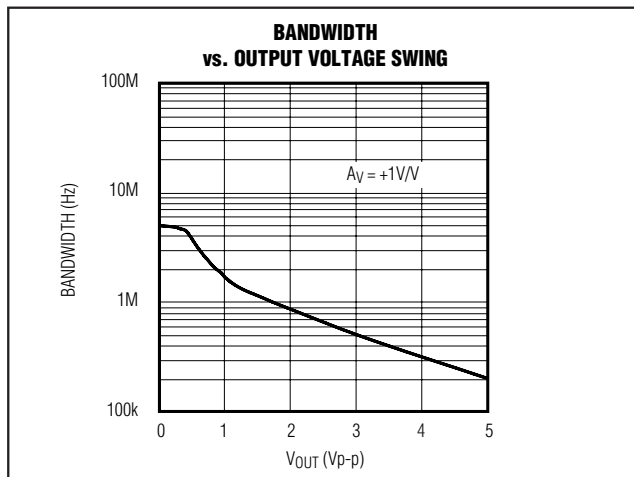
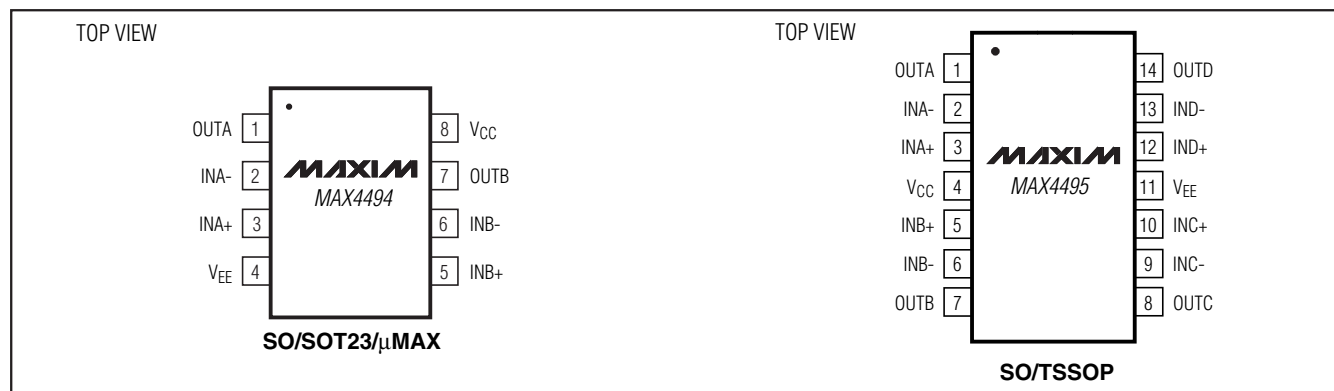
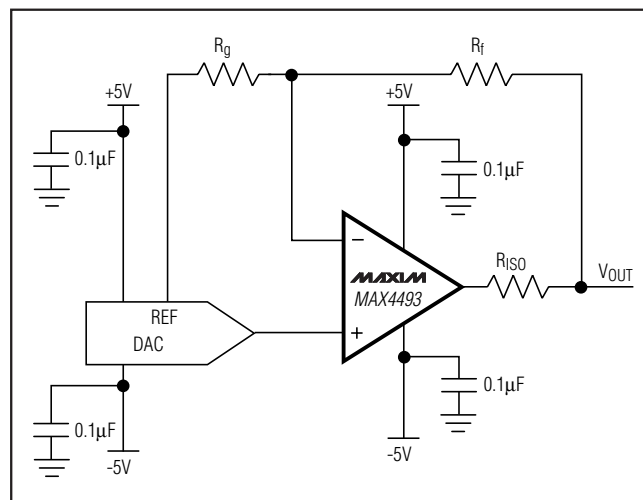


Figure 2. Bandwidth vs. Peak-to-Peak AC Voltage Plot

## Pin Configurations (continued)



## Typical Operating Circuit



## Chip Information

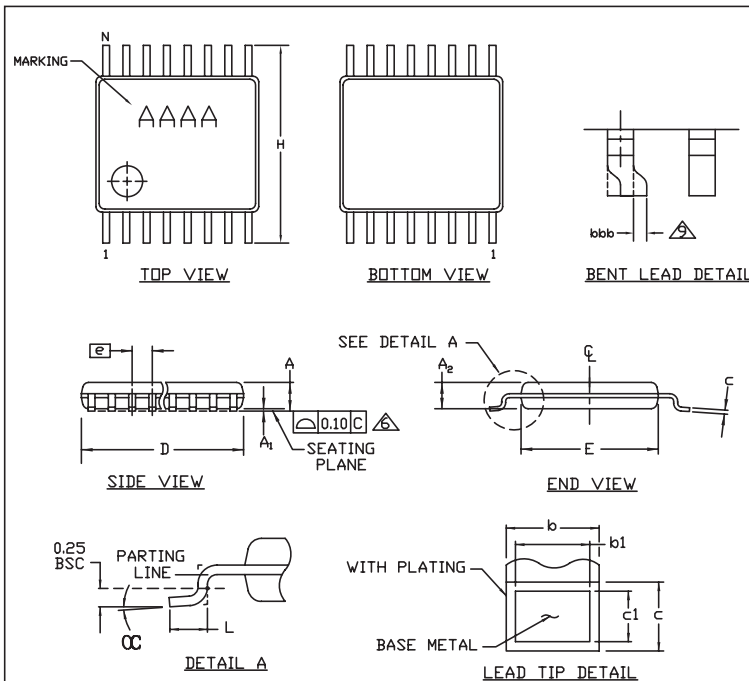
PROCESS: Bipolar

# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## Package Information

For the latest package outline information and land patterns, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

| PACKAGE TYPE | PACKAGE CODE | DOCUMENT NO.            |
|--------------|--------------|-------------------------|
| 14 TSSOP     | U14-1        | <a href="#">21-0066</a> |
| 5 SOT23      | U5-1         | <a href="#">21-0057</a> |
| 5 SC70       | X5-1         | <a href="#">21-0076</a> |
| 8 SO         | S8-2         | <a href="#">21-0041</a> |
| 8 SOT23      | K8-5         | <a href="#">21-0078</a> |
| 8 $\mu$ MAX  | U8-1         | <a href="#">21-0036</a> |
| 14 SO        | S14-1        | <a href="#">21-0041</a> |



### NOTES

- DIMENSIONS D AND E DO NOT INCLUDE FLASH
- MOLD FLASH OR PROTRUSIONS NOT TO EXCEED 0.15mm PER SIDE
- CONTROLLING DIMENSION: MILLIMETER
- MEETS JEDEC OUTLINE MO-153. SEE JEDEC VARIATIONS TABLE
- "N" REFERS TO NUMBER OF LEADS
- LEAD COPLANARITY 0.10 MM MAX.
- NUMBER OF LEADS SHOWN ARE FOR REFERENCE ONLY
- MARKING IS FOR PACKAGE ORIENTATION REFERENCE ONLY
- BENT LEAD 0.10 MM MAX.
- ALL DIMENSIONS APPLY TO BOTH LEADED (-) AND PBFREE (+) PKG. CODES.

-DRAWING NOT TO SCALE-

|                | COMMON DIMENSIONS |      |                |      |
|----------------|-------------------|------|----------------|------|
|                | MILLIMETERS       |      | INCHES         |      |
|                | MIN.              | MAX. | MIN.           | MAX. |
| A              | —                 | 1.10 | —              | .043 |
| A <sub>1</sub> | 0.05              | 0.15 | .002           | .006 |
| A <sub>2</sub> | 0.85              | 0.95 | .033           | .037 |
| b              | 0.19              | 0.30 | .007           | .012 |
| b <sub>1</sub> | 0.19              | 0.25 | .007           | .010 |
| c              | 0.09              | 0.20 | .004           | .008 |
| c <sub>1</sub> | 0.09              | 0.14 | .004           | .006 |
| D              | SEE VARIATIONS    |      | SEE VARIATIONS |      |
| E              | 4.30              | 4.50 | .169           | .177 |
| e              | 0.65              | BSC  | .026           | BSC  |
| H              | 6.25              | 6.55 | .246           | .258 |
| L              | 0.50              | 0.70 | .020           | .028 |
| N              | SEE VARIATIONS    |      | SEE VARIATIONS |      |
| α              | 0°                | 8°   | 0°             | 8°   |
| bbb            | 0.10 MAX          |      |                |      |

| JEDEC<br>MO-153 | N  | PKG.<br>CODES | VARIATIONS                |           |        |      |
|-----------------|----|---------------|---------------------------|-----------|--------|------|
|                 |    |               | MILLIMETERS               |           | INCHES |      |
| AB-1            | 14 | D             | U14-1;<br>U14-2           | 4.90 5.10 | .193   | .201 |
| AB              | 16 | D             | U16-1;<br>U16-2           | 4.90 5.10 | .193   | .201 |
| AC              | 20 | D             | U20-2;<br>U20M-2<br>U20-3 | 6.40 6.60 | .252   | .260 |
| AD              | 24 | D             | U24-1                     | 7.70 7.90 | .303   | .311 |
| AE              | 28 | D             | U28-1;<br>U28-2;<br>U28-3 | 9.60 9.80 | .378   | .386 |

# MAXIM

TITLE:  
PACKAGE OUTLINE,  
TSSOP 4.40mm BODY

|          |                                 |        |     |
|----------|---------------------------------|--------|-----|
| APPROVAL | DOCUMENT CONTROL NO.<br>21-0066 | REV. J | 1/1 |
|----------|---------------------------------|--------|-----|

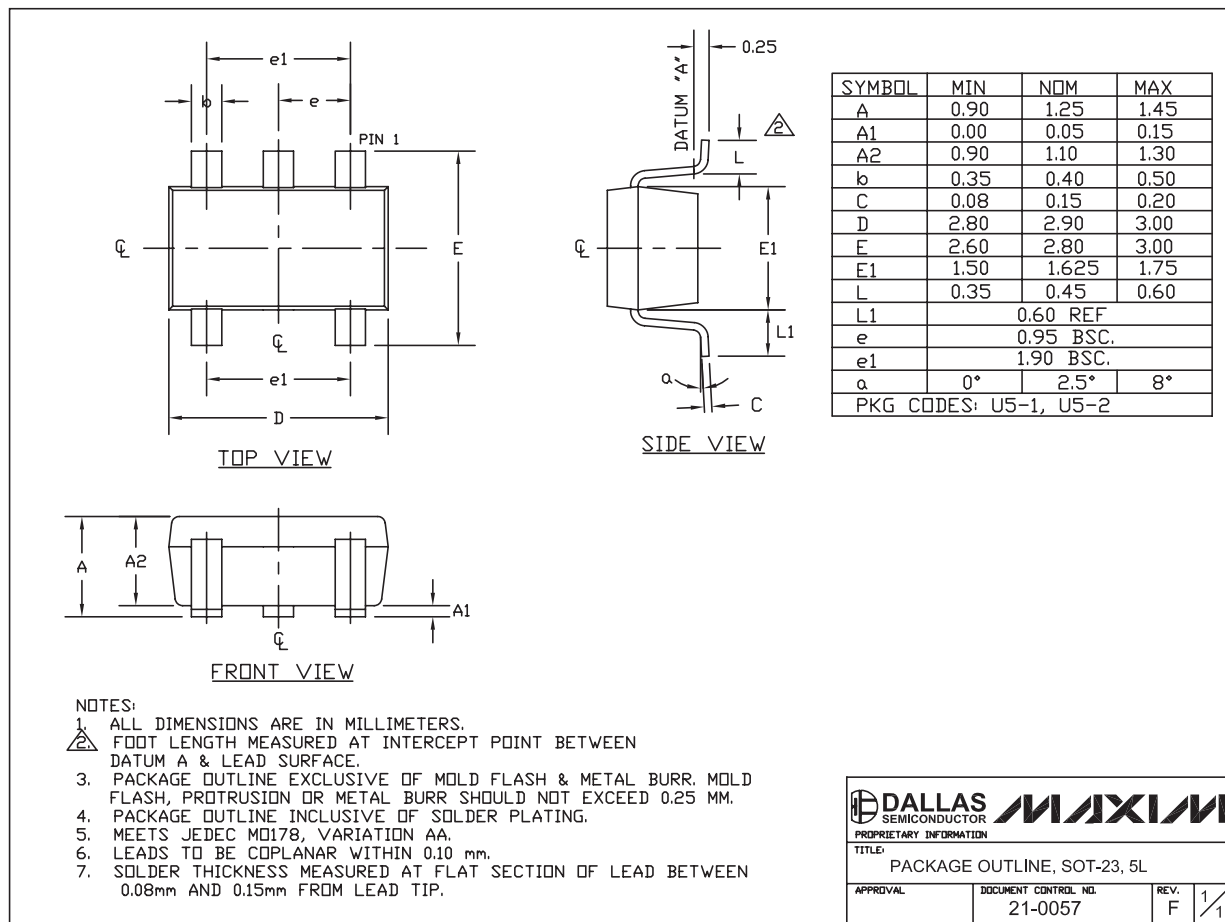
TSSOP4.40mm.EPS

MAX4493/MAX4494/MAX4495

# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## Package Information (continued)

For the latest package outline information and land patterns, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

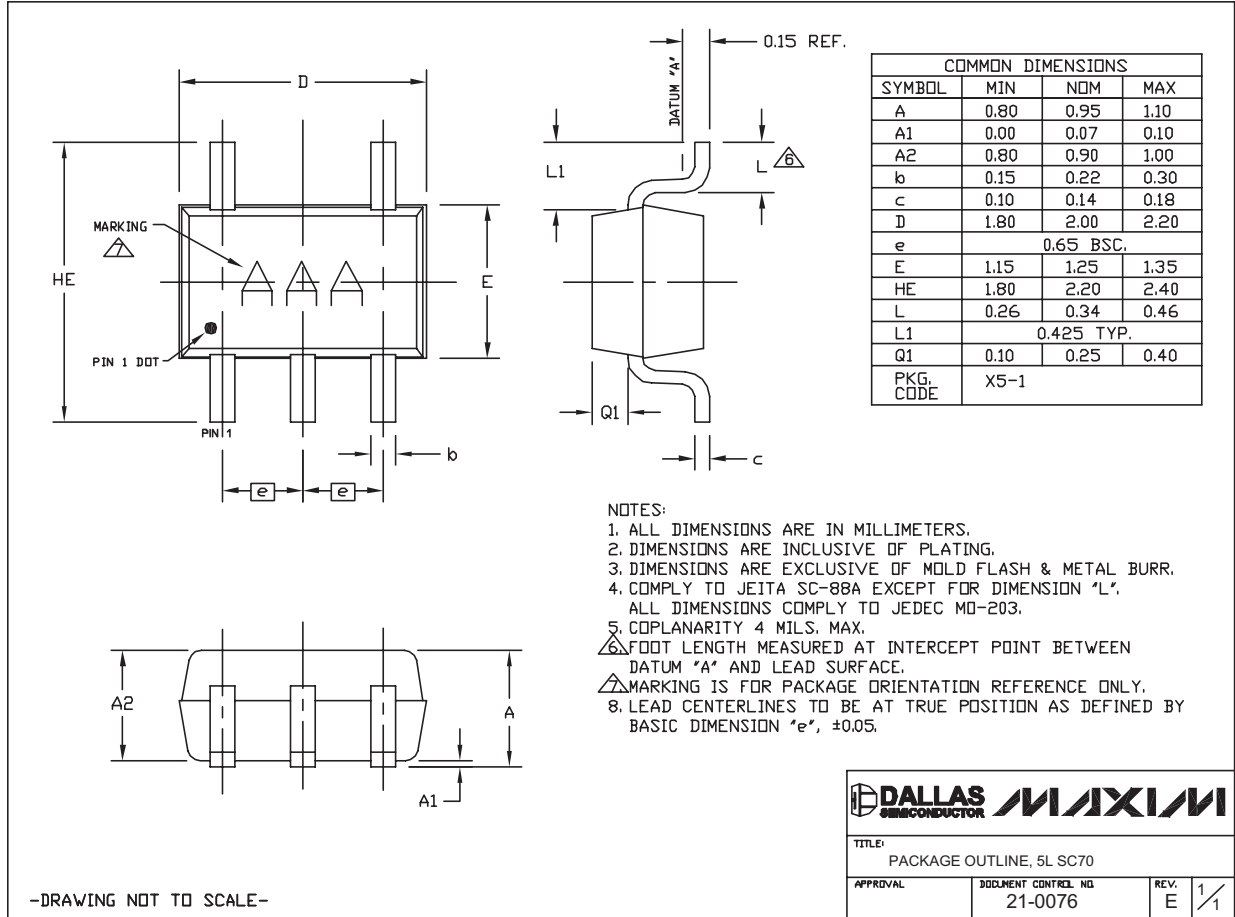


SOT-23 5L EPSS

# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## Package Information (continued)

For the latest package outline information and land patterns, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.



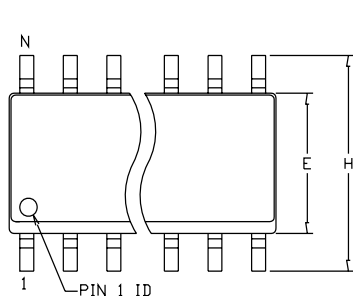
SC70, 5LEPS

MAX4493/MAX4494/MAX4495

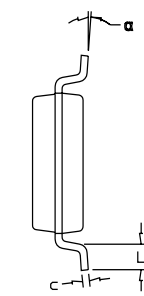
# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## Package Information (continued)

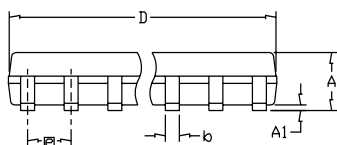
For the latest package outline information and land patterns, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.



TOP VIEW



END VIEW



SIDE VIEW

| COMMON DIMENSIONS |        |      |      |      |
|-------------------|--------|------|------|------|
| SYMBOL            | INCHES |      | MM   |      |
|                   | MIN.   | MAX. | MIN. | MAX. |
| A                 | .053   | .069 | 1.35 | 1.75 |
| A1                | .004   | .010 | 0.10 | 0.25 |
| b                 | .014   | .019 | 0.35 | 0.49 |
| c                 | .007   | .010 | 0.19 | 0.25 |
| E                 | .150   | .157 | 3.80 | 4.00 |
| e                 | .050   | BSC  | 1.27 | BSC  |
| H                 | .228   | .244 | 5.80 | 6.20 |
| L                 | .016   | .050 | 0.40 | 1.27 |
| α                 | 0°     | 8°   | 0°   | 8°   |

| VARIATION A |                                                               |      |           |
|-------------|---------------------------------------------------------------|------|-----------|
| SYMBOL      | INCHES                                                        |      | MM        |
|             | MIN.                                                          | MAX. | MIN. MAX. |
| D           | .189                                                          | .197 | 4.80 5.00 |
| N           | 8                                                             |      |           |
| MS012       | AA                                                            |      |           |
| PKG. CODE   | S8-2, S8-4, S8-5, S8-6F, S8-7F, S8-8F, S8-10F, S8-11F, S8-16F |      |           |

| VARIATION B |                                                            |      |           |
|-------------|------------------------------------------------------------|------|-----------|
| SYMBOL      | INCHES                                                     |      | MM        |
|             | MIN.                                                       | MAX. | MIN. MAX. |
| D           | .337                                                       | .344 | 8.55 8.75 |
| N           | 14                                                         |      |           |
| MS012       | AB                                                         |      |           |
| PKG. CODE   | S14-1, S14-4, S14-5, S14-6, S14M-4, S14M-5, S14M-6, S14M-7 |      |           |

| VARIATION C |                                                                            |      |            |
|-------------|----------------------------------------------------------------------------|------|------------|
| SYMBOL      | INCHES                                                                     |      | MM         |
|             | MIN.                                                                       | MAX. | MIN. MAX.  |
| D           | .386                                                                       | .394 | 9.80 10.00 |
| N           | 16                                                                         |      |            |
| MS012       | AC                                                                         |      |            |
| PKG. CODE   | S16-1, S16-3, S16-5, S16-6, S16-8, S16-7F, S16-9F, S16-10F; S16M-3, S16M-6 |      |            |

### NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. MATERIAL MUST COMPLY WITH BANNED AND RESTRICTED SUBSTANCES SPEC # 10-0131.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.15 MM (.006") PER SIDE.
4. LEADS TO BE COPLANAR WITHIN 0.10mm (.004").
5. MEETS JEDEC MS012
6. ALL DIMENSIONS APPLY TO BOTH LEADED (-) AND PbFREE (+) PKG. CODES.

-DRAWING NOT TO SCALE-

# MAXIM

TITLE:  
PACKAGE OUTLINE,  
8L, 14L, 16L SOIC .150 INCH

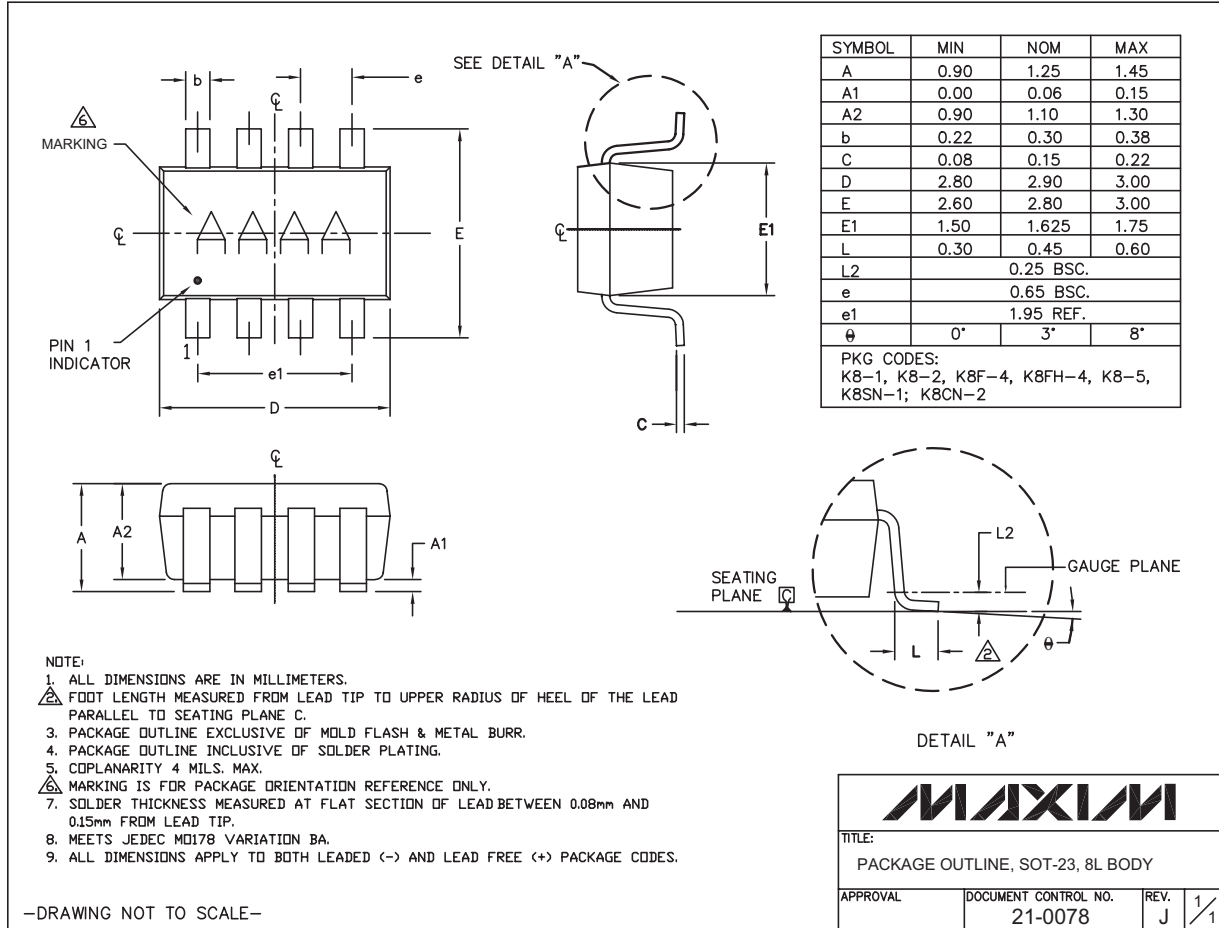
|          |                                 |        |     |
|----------|---------------------------------|--------|-----|
| APPROVAL | DOCUMENT CONTROL NO.<br>21-0041 | REV. C | 1/1 |
|----------|---------------------------------|--------|-----|

# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## Package Information (continued)

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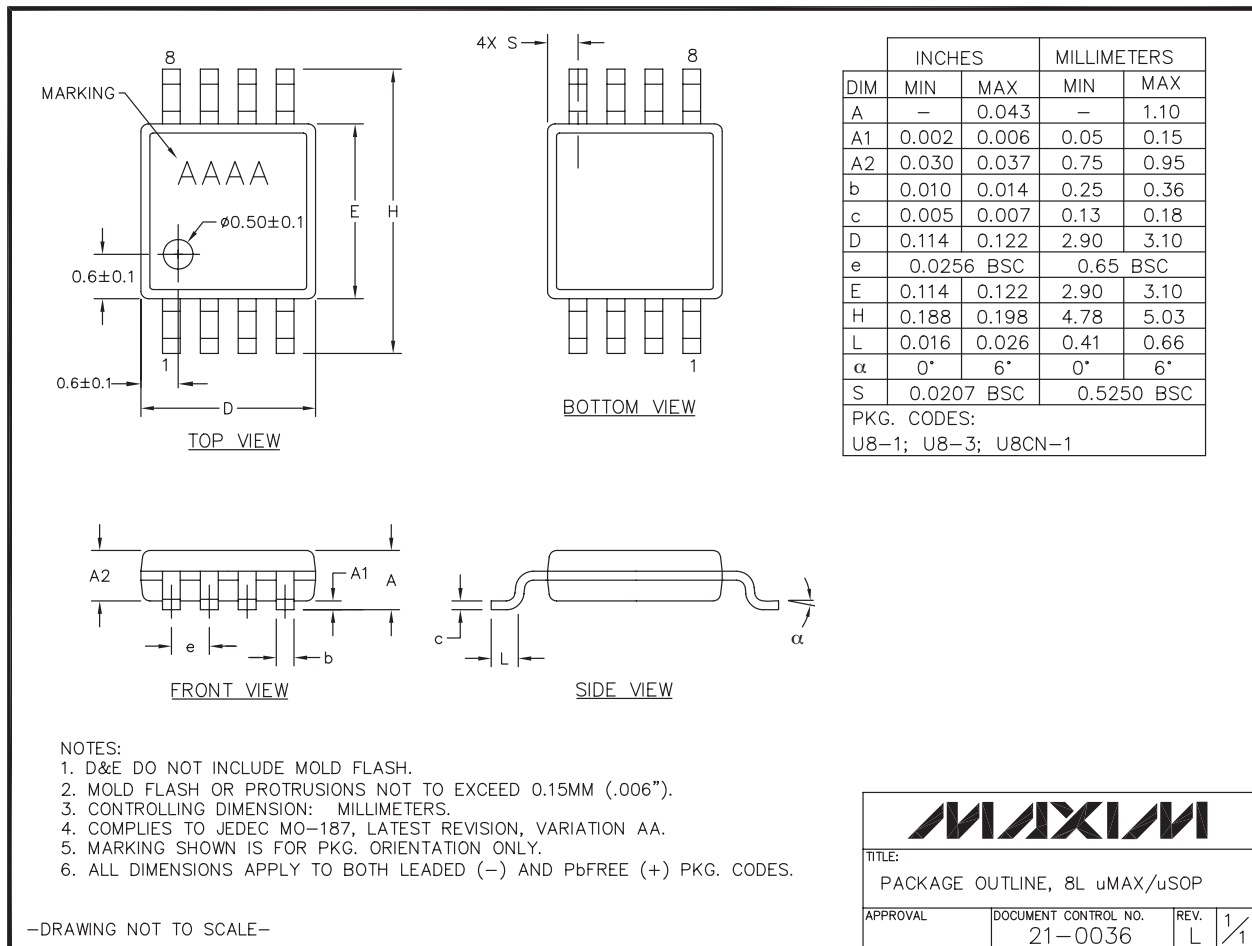
MAX4493/MAX4494/MAX4495



# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## Package Information (continued)

For the latest package outline information and land patterns, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages). Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.



# SC70, Low-Power, General-Purpose, Dual-Supply, Rail-to-Rail Op Amps

## Revision History

| REVISION<br>NUMBER | REVISION<br>DATE | DESCRIPTION                                                         | PAGES<br>CHANGED |
|--------------------|------------------|---------------------------------------------------------------------|------------------|
| 2                  | 10/08            | Updated first paragraph of the <i>General Description</i> section   | 1                |
| 3                  | 12/09            | Added lead-free and automotive parts to <i>Ordering Information</i> | 1                |

MAX4493/MAX4494/MAX4495

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

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