查询MAX6035AAUR25供应商

19-2606; Rev 1; 5/03

MAXIM

# High-Supply-Voltage, Precision Voltage Reference in SOT23

MAX6035

## General Description

The MAX6035 is a high-voltage, precision micropower voltage reference. This three-terminal device is available with output voltage options of 2.5V, 3.0V, and 5.0V. It is an excellent upgrade for industry-standard devices such as the REF02 and REF43. The MAX6035 offers 14x lower power than the REF02 and 5x lower power than the REF43, as well as a reduced package size from an 8-pin SO to a 3-pin SOT23. The MAX6035 features a proprietary temperature coefficient curvature-correction circuit and laser-trimmed, thin-film resistors that result in a very low temperature coefficient of 25ppm/°C (max) and an initial accuracy of ±0.2% (max).

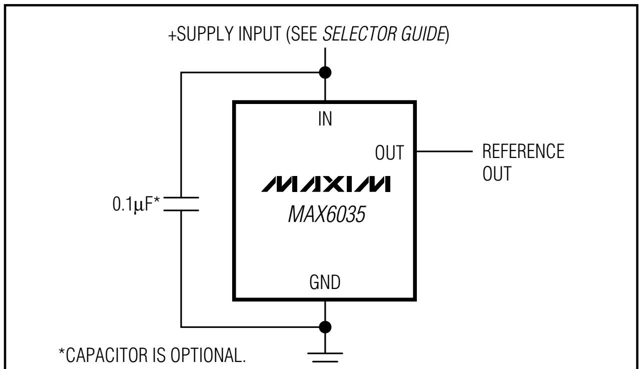
The MAX6035 typically draws only 73µA of supply current and can source 10mA or sink 2mA of load current. Unlike conventional shunt-mode (two-terminal) references that waste supply current and require an external resistor, this device offers a supply current that is virtually independent of the supply voltage and does not require an external resistor. Additionally, this internally compensated device does not require an external compensation capacitor, but is also stable with capacitive loads up to 5µF. Eliminating the external compensation capacitor saves valuable board area in space-critical applications. The supply independent, ultra-low supply current makes this device ideal for battery-operated, high-performance systems.

The MAX6035 is available in a 3-pin SOT23 package and is specified for operation from -40°C to +125°C.

## Applications

- 4mA to 20mA Industrial Control Loops
- Li+ Battery Chargers
- 12-Bit A/D and D/A Converters
- Digital Multimeters
- Portable Data-Acquisition Systems
- Low-Power Test Equipment

## Typical Operating Circuit




## Features

- ♦ Wide Supply Voltage Range: Up to 33V
- ♦ 25ppm/°C (max) Temperature Coefficient (-40°C to +85°C)
- ♦ ±0.2% (max) Initial Accuracy
- ♦ Small 3-Pin SOT23 Package
- ♦ 95µA (max) Quiescent Supply Current
- ♦ 10mA Source Current, 2mA Sink Current
- ♦ No Output Capacitor Required
- ♦ Stable with Capacitive Loads up to 5µF
- ♦ Output Voltages: 2.5V, 3.0V, 5.0V

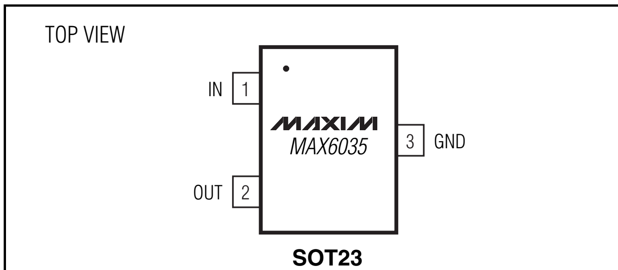
## Ordering Information

| PART | TEMP RANGE | PIN-PACKAGE | TOP MARK |
|---|---|---|---|
| MAX6035AAUR25-T | -40°C to +125°C | 3 SOT23-3 | FZMW |
| MAX6035BAUR25-T | -40°C to +125°C | 3 SOT23-3 | FZMX |
| MAX6035AAUR30-T | -40°C to +125°C | 3 SOT23-3 | FZMY |
| MAX6035BAUR30-T | -40°C to +125°C | 3 SOT23-3 | FZMZ |
| MAX6035AAUR50-T | -40°C to +125°C | 3 SOT23-3 | FZNA |
| MAX6035BAUR50-T | -40°C to +125°C | 3 SOT23-3 | FZNB |

## Selector Guide

| PART | MAXIMUM TEMPCO (ppm/°C) (-40°C to +85°C) | MAXIMUM INITIAL ACCURACY (%) | OUTPUT VOLTAGE (V) |
|---|---|---|---|
| MAX6035AAUR25 | 25 | 0.20 | 2.5 |
| MAX6035BAUR25 | 65 | 0.50 | 2.5 |
| MAX6035AAUR30 | 25 | 0.20 | 3.0 |
| MAX6035BAUR30 | 65 | 0.50 | 3.0 |
| MAX6035AAUR50 | 25 | 0.20 | 5.0 |
| MAX6035BAUR50 | 65 | 0.50 | 5.0 |

## Pin Configuration






For pricing, delivery, and ordering information, please contact Maxim/Dallas Direct! at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

## ABSOLUTE MAXIMUM RATINGS

(Voltages referenced to GND)
IN ........................................................................-0.3V to +36V
OUT ..........................................................-0.3V to ($V_{IN}$ + 0.3V)
OUT Short-Circuit Duration to GND or IN (Note 1).....Continuous
Current into Any Pin.........................................................±20mA
Continuous Power Dissipation
  3-Pin SOT23 (derate 4.0mW/°C above +70°C)...........320mW

**Note 1:** Continuous power dissipation should also be observed.

Operating Temperature Range .........................-40°C to +125°C
Storage Temperature Range ............................-65°C to +150°C
Junction Temperature.....................................................+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—MAX6035_AUR25 (2.5V)

($V_{IN}$ = 5V, $I_{OUT}$ = 0, $T_A$ = $T_{MIN}$ to $T_{MAX}$, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $T_A$ = +25°C | MAX6035A (0.2%) | 2.4950 | 2.5000 | 2.5050 | V |
| | | | MAX6035B (0.5%) | 2.4875 | 2.5000 | 2.5125 | |
| Output Voltage Temperature Coefficient (Note 3) | $TCV_{OUT}$ | $T_A$ = 0°C to +70°C | MAX6035A | | | 20 | ppm/°C |
| | | | MAX6035B | | | 50 | |
| | | $T_A$ = -40°C to +85°C | MAX6035A | | | 25 | |
| | | | MAX6035B | | | 65 | |
| | | $T_A$ = -40°C to +125°C | MAX6035A | | | 30 | |
| | | | MAX6035B | | | 75 | |
| Line Regulation (Note 4) | $\Delta V_{OUT}/\Delta V_{IN}$ | ($V_{OUT}$ + 2V) ≤ $V_{IN}$ ≤ 33V | $T_A$ = +25°C | | 4 | 15 | µV/V |
| | | | $T_A$ = -40°C to +125°C | | | 20 | |
| Load Regulation (Note 4) | $\Delta V_{OUT}/\Delta I_{OUT}$ | $T_A$ = +25°C | Sourcing: 0 ≤ $I_{OUT}$ ≤ 10mA | | 25 | 70 | µV/mA |
| | | | Sinking: -2mA ≤ $I_{OUT}$ ≤ 0 | | 45 | 180 | |
| | | $T_A$ = -40°C to +125°C | Sourcing: 0 ≤ $I_{OUT}$ ≤ 10mA | | | 85 | |
| | | | Sinking: -2mA ≤ $I_{OUT}$ ≤ 0 | | | 225 | |
| OUT Short-Circuit Current | $I_{SC}$ | Short to GND | | | 27 | | mA |
| | | Short to IN | | | -4 | | |
| Dropout Voltage (Note 7) | $V_{IN}$ - $V_{OUT}$ | $I_{OUT}$ = 10µA | | | | 1.9 | V |
| | | $I_{OUT}$ = 10mA | | | | 2.25 | |

## ELECTRICAL CHARACTERISTICS—MAX6035_AUR25 (2.5V) (continued)

($V_{IN}$ = 5V, $I_{OUT}$ = 0, $T_A$ = $T_{MIN}$ to $T_{MAX}$, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|
| Thermal Hysteresis (Note 5) | $\Delta V_{OUT}$/cycle | | | | 135 | | ppm |
| Long-Term Stability | $\Delta V_{OUT}$/time | 1000hr at +25°C | | | 110 | | ppm/ 1000hr |
| **DYNAMIC CHARACTERISTICS** | | | | | | | |
| Output Noise Voltage | $e_n$ | f = 0.1Hz to 10Hz | | | 21 | | $\mu V_{P-P}$ |
| | | f = 10Hz to 1kHz | | | 20 | | $\mu V_{RMS}$ |
| Ripple Rejection | $\Delta V_{OUT}/\Delta V_{IN}$ | $V_{IN}$ = 5V ±100mV, f = 120Hz | | | 86 | | dB |
| Turn-On Settling Time | $t_R$ | To $V_{OUT}$ = 0.1% of final value | $C_{OUT}$ = 50pF | | 35 | | µs |
| | | | $C_{OUT}$ = 1µF | | 240 | | |
| Capacitive-Load Stability (Note 6) | $C_{OUT}$ | | | 0 | | 5 | µF |
| **INPUT CHARACTERISTICS** | | | | | | | |
| Supply Voltage Range | $V_{IN}$ | Inferred from line regulation and dropout voltage | | 4.4 | | 33 | V |
| Quiescent Supply Current | $I_{IN}$ | | | | 73 | 95 | µA |
| Change in Supply Current | $\Delta I_{IN}/\Delta V_{IN}$ | 4.4V ≤ $V_{IN}$ ≤ 33V | | | 0.4 | 0.7 | µA/V |

## ELECTRICAL CHARACTERISTICS—MAX6035_AUR30 (3.0V)

($V_{IN}$ = 5V, $I_{OUT}$ = 0, $T_A$ = $T_{MIN}$ to $T_{MAX}$, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $T_A$ = +25°C | MAX6035A (0.2%) | 2.9940 | 3.0000 | 3.0060 | V |
| | | | MAX6035B (0.5%) | 2.9850 | 3.0000 | 3.0150 | |
| Output Voltage Temperature Coefficient (Note 3) | $TCV_{OUT}$ | $T_A$ = 0°C to +70°C | MAX6035A | | | 20 | ppm/°C |
| | | | MAX6035B | | | 50 | |
| | | $T_A$ = -40°C to +85°C | MAX6035A | | | 25 | |
| | | | MAX6035B | | | 65 | |
| | | $T_A$ = -40°C to +125°C | MAX6035A | | | 30 | |
| | | | MAX6035B | | | 75 | |
| Line Regulation (Note 4) | $\Delta V_{OUT}/\Delta V_{IN}$ | ($V_{OUT}$ + 1.75V) ≤ $V_{IN}$ ≤ 33V | $T_A$ = +25°C | | 4.5 | 15 | µV/V |
| | | | $T_A$ = 0°C to +125°C | | | 24 | |
| | | ($V_{OUT}$ + 2V) ≤ $V_{IN}$ ≤ 33V | $T_A$ = -40°C to +125°C | | | 24 | |
| Load Regulation (Note 4) | $\Delta V_{OUT}/\Delta I_{OUT}$ | $T_A$ = +25°C | Sourcing: 0 ≤ $I_{OUT}$ ≤ 10mA | | 30 | 81 | µV/mA |
| | | | Sinking: -2mA ≤ $I_{OUT}$ ≤ 0mA | | 54 | 170 | |
| | | $T_A$ = -40°C to +125°C | Sourcing: 0 ≤ $I_{OUT}$ ≤ 10mA | | | 96 | |
| | | | Sinking: -2mA ≤ $I_{OUT}$ ≤ 0mA | | | 230 | |

## ELECTRICAL CHARACTERISTICS—MAX6035_AUR30 (3.0V) (continued)

($V_{IN}$ = 5V, $I_{OUT}$ = 0, $T_A$ = $T_{MIN}$ to $T_{MAX}$, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|
| OUT Short-Circuit Current | $I_{SC}$ | Short to GND | | | 27 | | mA |
| | | Short to IN | | | -4 | | |
| Dropout Voltage (Note 7) | $V_{IN}$ - $V_{OUT}$ | $T_A$ = 0°C to +125°C | $I_{OUT}$ = 10µA | | | 1.75 | V |
| | | $T_A$ = -40°C to +125°C | $I_{OUT}$ = 10µA | | | 1.9 | |
| | | | $I_{OUT}$ = 10mA | | | 2.25 | |
| Thermal Hysteresis (Note 5) | $\Delta V_{OUT}$/cycle | | | | 135 | | ppm |
| Long-Term Stability | $\Delta V_{OUT}$/time | 1000hr at +25°C | | | 120 | | ppm/ 1000hr |
| **DYNAMIC CHARACTERISTICS** | | | | | | | |
| Output Noise Voltage | $e_n$ | f = 0.1Hz to 10Hz | | | 25 | | $\mu V_{P-P}$ |
| | | f = 10Hz to 1kHz | | | 25 | | $\mu V_{RMS}$ |
| Ripple Rejection | $\Delta V_{OUT}$/ $\Delta V_{IN}$ | $V_{IN}$ = 5V ±100mV, f = 120Hz | | | 80 | | dB |
| Turn-On Settling Time | $t_R$ | $V_{OUT}$ = 0.1% of final value | $C_{OUT}$ = 50pF | | 40 | | µs |
| | | | $C_{OUT}$ = 1µF | | 250 | | |
| Capacitive-Load Stability (Note 6) | $C_{OUT}$ | | | 0 | | 5 | µF |
| **INPUT CHARACTERISTICS** | | | | | | | |
| Supply Voltage Range | $V_{IN}$ | $T_A$ = 0°C to +125°C, inferred from line regulation and dropout voltage | | 4.75 | | 33 | V |
| | | $T_A$ = -40°C to +125°C, inferred from line regulation and dropout voltage | | 4.9 | | 33 | |
| Quiescent Current Supply | $I_{IN}$ | | | | 73 | 95 | µA |
| Change in Supply Current | $\Delta I_{IN}/\Delta V_{IN}$ | 4.9V ≤ $V_{IN}$ ≤ 33V | | | 0.4 | 0.7 | µA/V |

## ELECTRICAL CHARACTERISTICS—MAX6035_AUR50 (5.0V)

($V_{IN}$ = 5V, $I_{OUT}$ = 0, $T_A$ = $T_{MIN}$ to $T_{MAX}$, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $T_A$ = +25°C | MAX6035A (0.2%) | 4.9900 | 5.0000 | 5.0100 | V |
| | | | MAX6035B (0.5%) | 4.9750 | 5.0000 | 5.0250 | |
| Output Voltage Temperature Coefficient (Note 3) | $TCV_{OUT}$ | $T_A$ = 0°C to +70°C | MAX6035A | | | 20 | ppm/°C |
| | | | MAX6035B | | | 50 | |
| | | $T_A$ = -40°C to +85°C | MAX6035A | | | 25 | |
| | | | MAX6035B | | | 65 | |
| | | $T_A$ = -40°C to +125°C | MAX6035A | | | 30 | |
| | | | MAX6035B | | | 75 | |
| Line Regulation (Note 4) | $\Delta V_{OUT}/\Delta V_{IN}$ | ($V_{OUT}$ + 2V) ≤ $V_{OUT}$ ≤ 33V | $T_A$ = +25°C | | 7.5 | 25 | µV/V |
| | | | $T_A$ = -40°C to +125°C | | 8 | 40 | |

## ELECTRICAL CHARACTERISTICS—MAX6035_AUR50 (5.0V) (continued)

($V_{IN}$ = 5V, $I_{OUT}$ = 0, $T_A$ = $T_{MIN}$ to $T_{MAX}$, unless otherwise noted. Typical values are at $T_A$ = +25°C.) (Note 2)

| PARAMETER | SYMBOL | CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|
| Load Regulation (Note 4) | $\Delta V_{OUT}/\Delta I_{OUT}$ | $T_A$ = +25°C | Sourcing: 0 ≤ $I_{OUT}$ ≤ 10mA | | 50 | 135 | µV/mA |
| | | | Sinking: -2mA ≤ $I_{OUT}$ ≤ 0mA | | 90 | 215 | |
| | | $T_A$ = -40°C to +125°C | Sourcing: 0 ≤ $I_{OUT}$ ≤ 10mA | | | 160 | |
| | | | Sinking: -2mA ≤ $I_{OUT}$ ≤ 0mA | | | 300 | |
| OUT Short-Circuit Current | $I_{SC}$ | Shorted to GND | | | 27 | | mA |
| | | Shorted to IN | | | -4 | | |
| Dropout Voltage (Note 7) | $V_{IN}$ - $V_{OUT}$ | $I_{OUT}$ = 10µA | | | | 1.9 | V |
| | | $I_{OUT}$ = 10mA | | | | 2.25 | |
| Thermal Hysteresis (Note 5) | $\Delta V_{OUT}$/cycle | | | | 135 | | ppm |
| Long-Term Stability | $\Delta V_{OUT}$/time | 1000hr at +25°C | | | 160 | | ppm/1000hr |
| **DYNAMIC CHARACTERISTICS** | | | | | | | |
| Output Noise Voltage | $e_n$ | f = 0.1Hz to 10Hz | | | 68 | | $µV_{P-P}$ |
| | | f = 10Hz to 1kHz | | | 48 | | $µV_{RMS}$ |
| Ripple Rejection | $\Delta V_{OUT}/\Delta V_{IN}$ | $V_{IN}$ = 15V ±100mV, f = 120Hz | | | 72 | | dB |
| Turn-On Settling Time | $t_R$ | To $V_{OUT}$ = 0.1% of final value | $C_{OUT}$ = 50pF | | 140 | | µs |
| | | | $C_{OUT}$ = 1µF | | 300 | | |
| Capacitive-Load Stability (Note 6) | $C_{OUT}$ | | | 0 | | 5 | µF |
| **INPUT CHARACTERISTICS** | | | | | | | |
| Supply Voltage Range | $V_{IN}$ | Inferred by line regulation and dropout voltage | | 6.9 | | 33 | V |
| Quiescent Current Supply | $I_{IN}$ | | | | 80 | 100 | µA |
| Change in Supply Current | $\Delta I_{IN}/\Delta V_{IN}$ | 6.9V ≤ $V_{IN}$ ≤ 33V | | | 0.4 | 0.7 | µA/V |

**Note 2:** All devices are 100% production tested at $T_A$ = +25°C and are guaranteed by design for $T_A$ = $T_{MIN}$ to $T_{MAX}$, as specified.

**Note 3:** Temperature Coefficient is measured by the “box” method, i.e., the maximum $\Delta V_{OUT}$ is divided by the maximum ΔT.

**Note 4:** Line and load regulation are measured with pulses and do not include output voltage fluctuation due to die-temperature changes.

**Note 5:** Thermal Hysteresis is defined as the change in the output voltage at $T_A$ = +25°C before and after cycling the device from $T_{MAX}$ to $T_{MIN}$.

**Note 6:** Guaranteed by design.

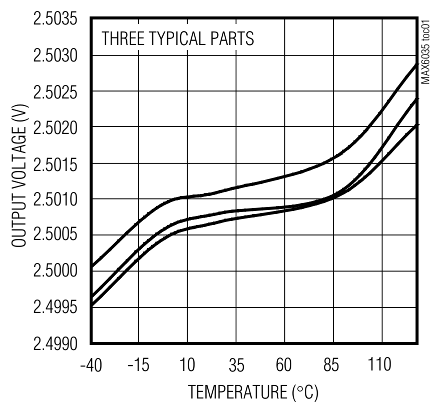
**Note 7:** Although the source current is guaranteed to be 10mA, exercise caution to ensure that the package’s absolute power dissipation rating is not exceeded.

# High-Supply-Voltage, Precision Voltage Reference in SOT23

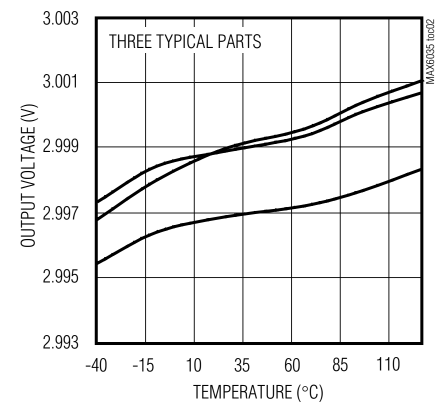
## Typical Operating Characteristics

($V_{IN}$ = 5V for MAX6035AAUR25/MAX6035AAUR30, $V_{IN}$ = 15V for MAX6035AAUR50, $I_{OUT}$ = 0, $T_A$ = +25°C, unless otherwise noted.)

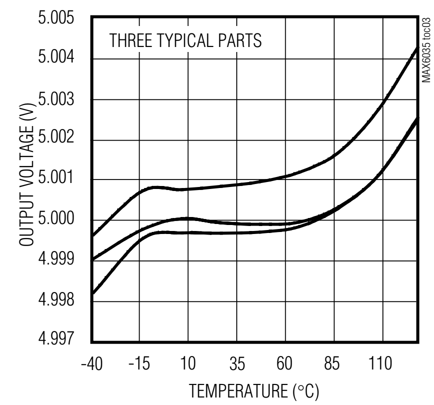
**MAX6035AAUR25**
**OUTPUT VOLTAGE TEMPERATURE DRIFT**



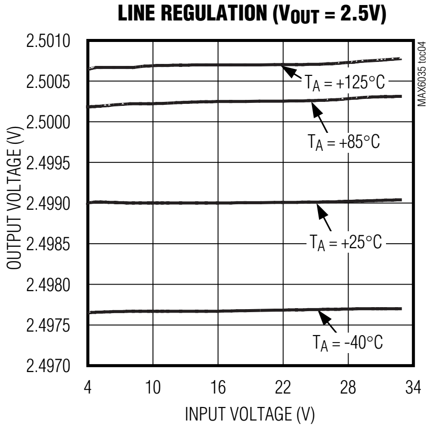

**MAX6035AAUR30**
**OUTPUT VOLTAGE TEMPERATURE DRIFT**



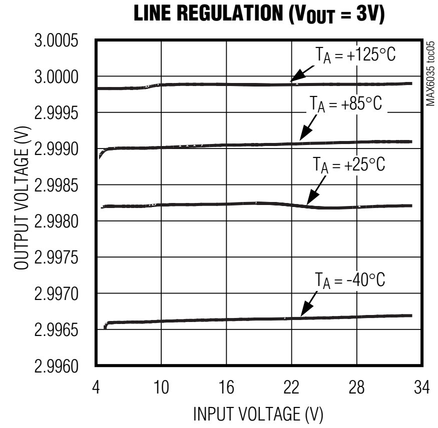

**MAX6035AAUR50**
**OUTPUT VOLTAGE TEMPERATURE DRIFT**



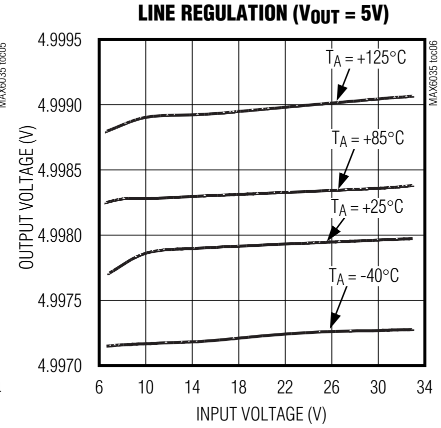

**MAX6035**
**LINE REGULATION ($V_{OUT}$ = 2.5V)**



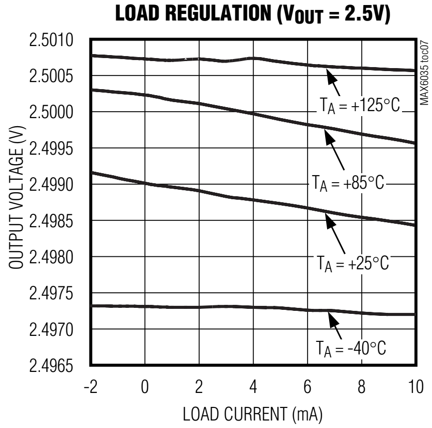

**MAX6035**
**LINE REGULATION ($V_{OUT}$ = 3V)**



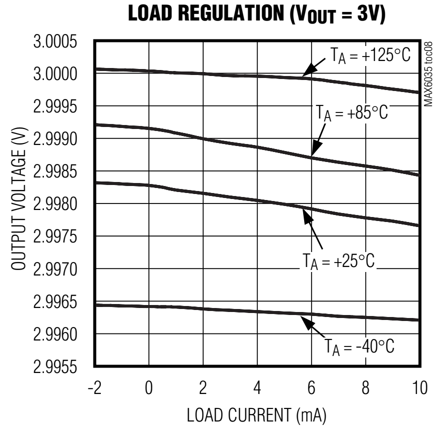

**MAX6035**
**LINE REGULATION ($V_{OUT}$ = 5V)**



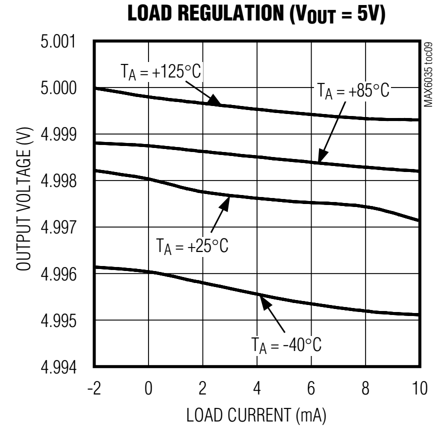

**MAX6035**
**LOAD REGULATION ($V_{OUT}$ = 2.5V)**




**MAX6035**
**LOAD REGULATION ($V_{OUT}$ = 3V)**



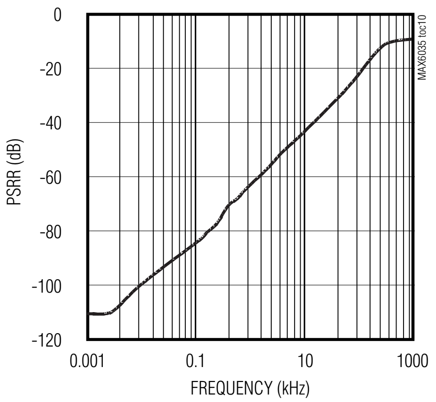

**MAX6035**
**LOAD REGULATION ($V_{OUT}$ = 5V)**



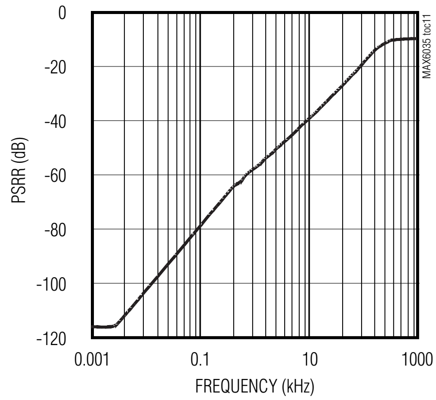
## Typical Operating Characteristics (continued)

($V_{IN}$ = 5V for MAX6035AAUR25/MAX6035AAUR30, $V_{IN}$ = 15V for MAX6035AAUR50, $I_{OUT}$ = 0, $T_A$ = +25°C, unless otherwise noted.)

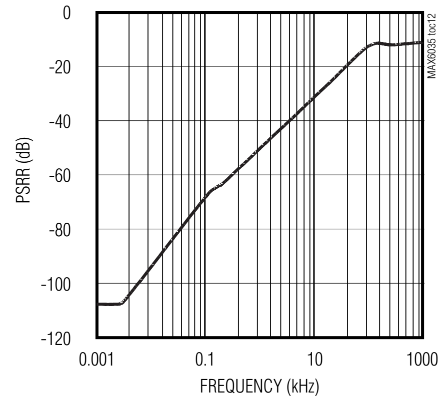
**MAX6035 POWER-SUPPLY REJECTION RATIO vs. FREQUENCY ($V_{OUT}$ = 2.5V)**



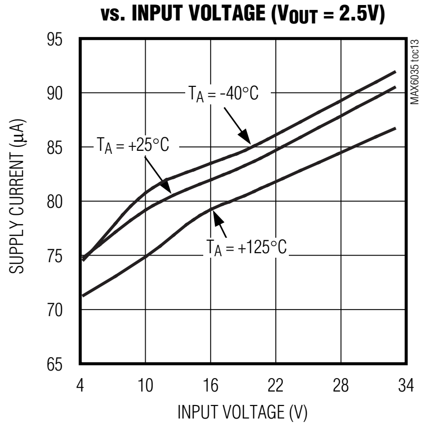

**MAX6035 POWER-SUPPLY REJECTION RATIO vs. FREQUENCY ($V_{OUT}$ = 3V)**



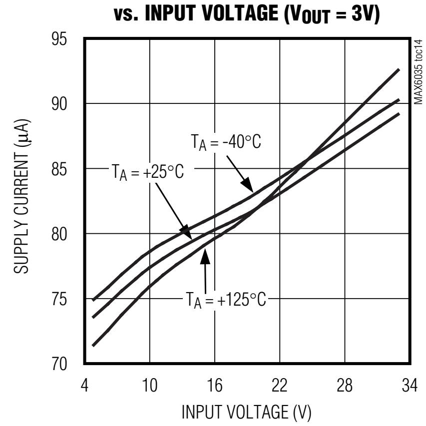

**MAX6035 POWER-SUPPLY REJECTION RATIO vs. FREQUENCY ($V_{OUT}$ = 5V)**



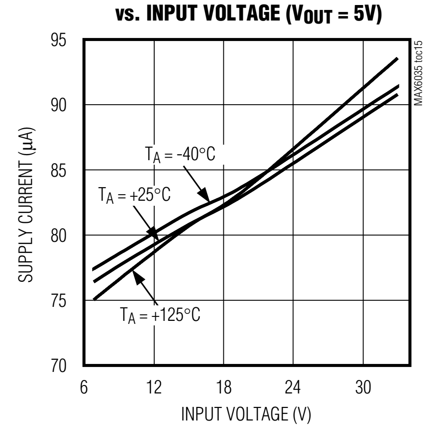

**MAX6035 SUPPLY CURRENT vs. INPUT VOLTAGE ($V_{OUT}$ = 2.5V)**



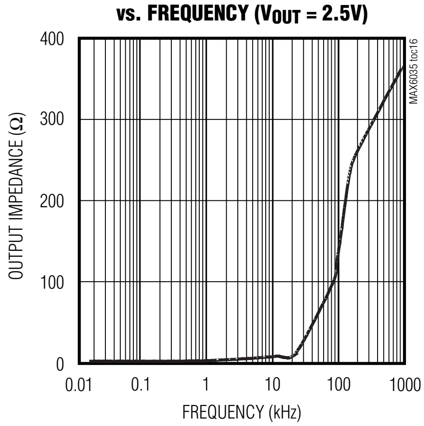

**MAX6035 SUPPLY CURRENT vs. INPUT VOLTAGE ($V_{OUT}$ = 3V)**



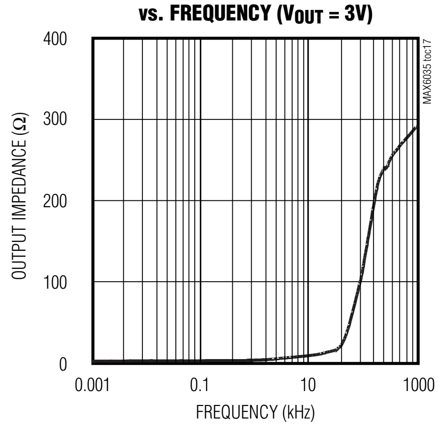

**MAX6035 SUPPLY CURRENT vs. INPUT VOLTAGE ($V_{OUT}$ = 5V)**



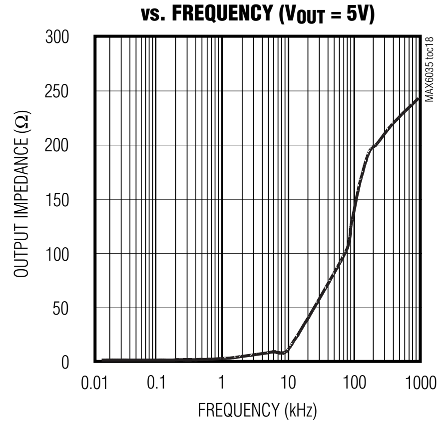

**MAX6035 OUTPUT IMPEDANCE vs. FREQUENCY ($V_{OUT}$ = 2.5V)**




**MAX6035 OUTPUT IMPEDANCE vs. FREQUENCY ($V_{OUT}$ = 3V)**




**MAX6035 OUTPUT IMPEDANCE vs. FREQUENCY ($V_{OUT}$ = 5V)**

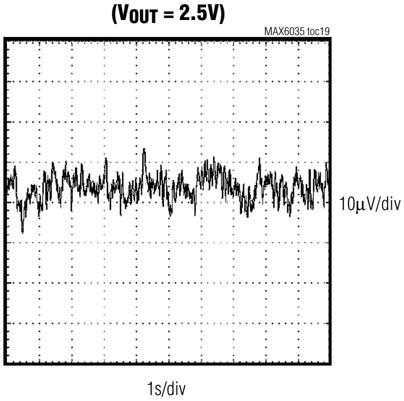


# High-Supply-Voltage, Precision Voltage Reference in SOT23

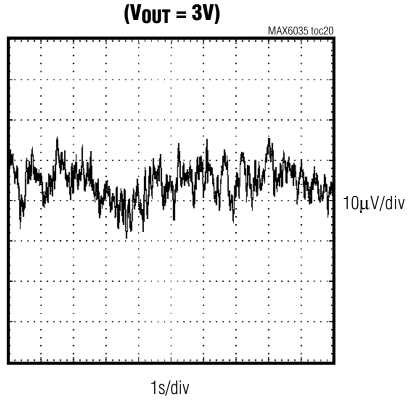
## Typical Operating Characteristics (continued)

($V_{IN}$ = 5V for MAX6035AAUR25/MAX6035AAUR30, $V_{IN}$ = 15V for MAX6035AAUR50, $I_{OUT}$ = 0, $T_A$ = +25°C, unless otherwise noted.)

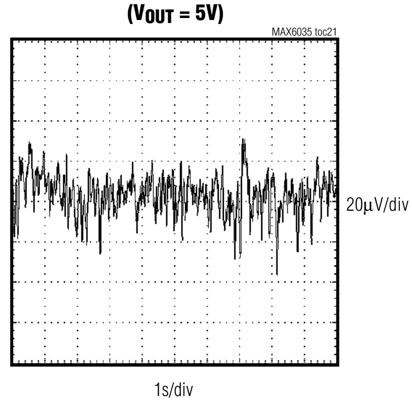
**MAX6035**
**0.1Hz to 10Hz OUTPUT NOISE**
**($V_{OUT}$ = 2.5V)**



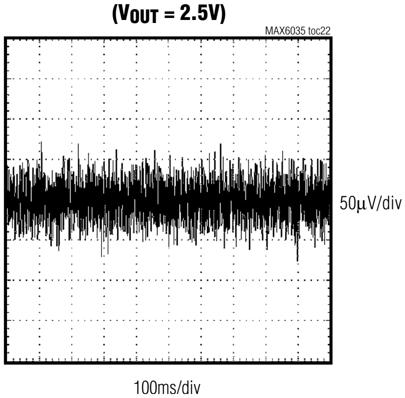

**MAX6035**
**0.1Hz to 10Hz OUTPUT NOISE**
**($V_{OUT}$ = 3V)**



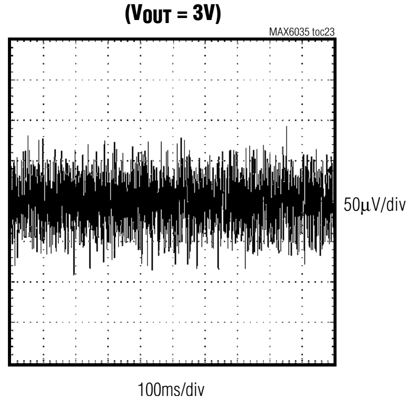

**MAX6035**
**0.1Hz to 10Hz OUTPUT NOISE**
**($V_{OUT}$ = 5V)**



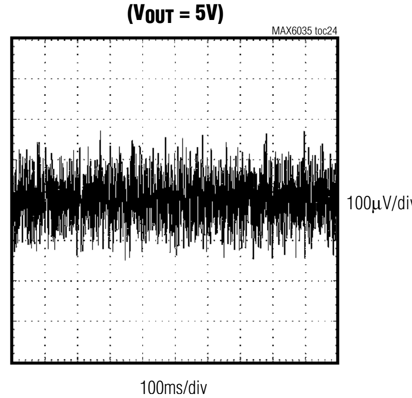

**MAX6035**
**10Hz to 1kHz OUTPUT NOISE**
**($V_{OUT}$ = 2.5V)**



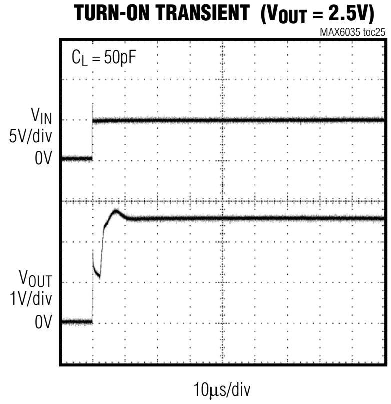

**MAX6035**
**10Hz to 1kHz OUTPUT NOISE**
**($V_{OUT}$ = 3V)**



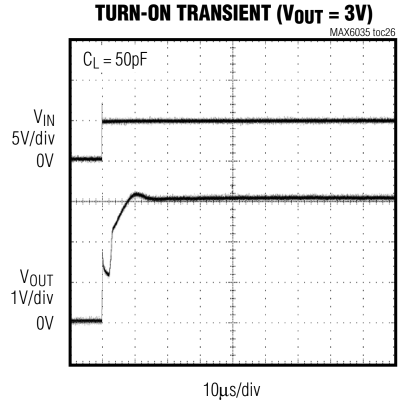

**MAX6035**
**10Hz to 1kHz OUTPUT NOISE**
**($V_{OUT}$ = 5V)**



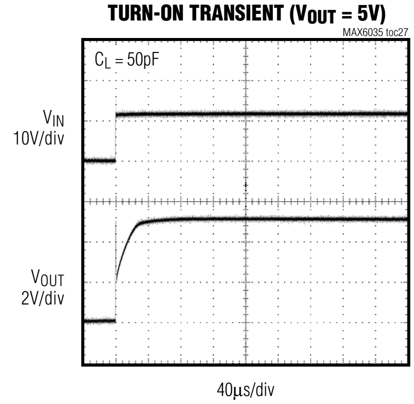

**MAX6035**
**TURN-ON TRANSIENT ($V_{OUT}$ = 2.5V)**




**MAX6035**
**TURN-ON TRANSIENT ($V_{OUT}$ = 3V)**




**MAX6035**
**TURN-ON TRANSIENT ($V_{OUT}$ = 5V)**

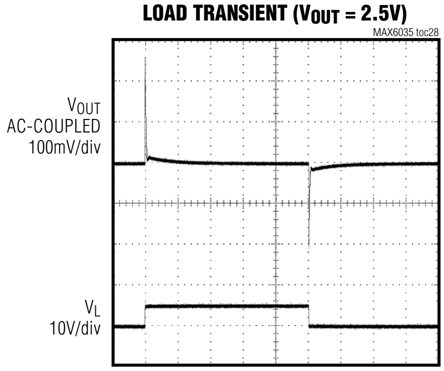


## Typical Operating Characteristics (continued)

($V_{IN}$ = 5V for MAX6035AAUR25/MAX6035AAUR30, $V_{IN}$ = 15V for MAX6035AAUR50, $I_{OUT}$ = 0, $T_A$ = +25°C, unless otherwise noted.)

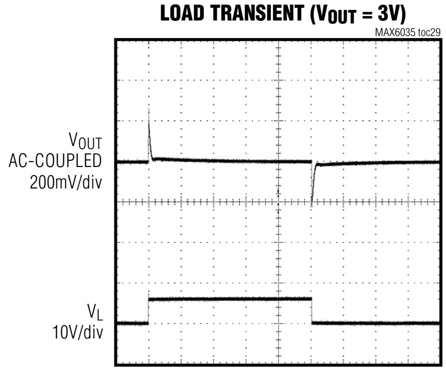


**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 2.5V)**



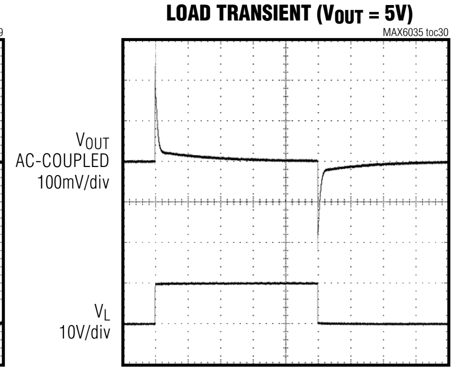

40µs/div
($I_{OUT}$ = ±250µA, $C_L$ = 0, $R_L$ = 10kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 3V)**



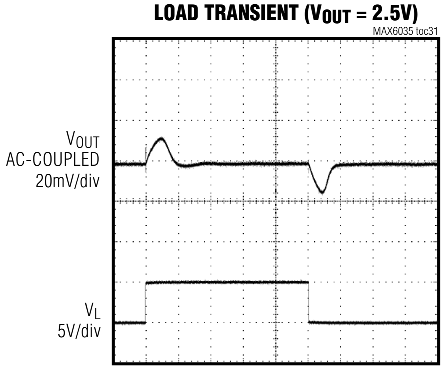

20µs/div
($I_{OUT}$ = ±250µA, $C_L$ = 0, $R_L$ = 12kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 5V)**



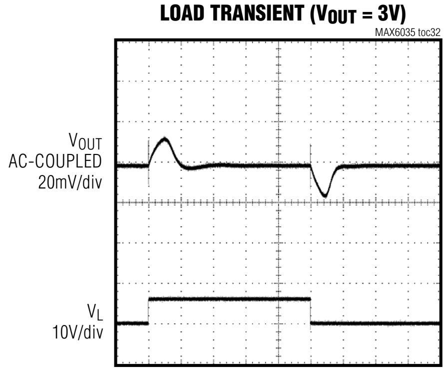

20µs/div
($I_{OUT}$ = ±250µA, $C_L$ = 0, $R_L$ = 20kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 2.5V)**



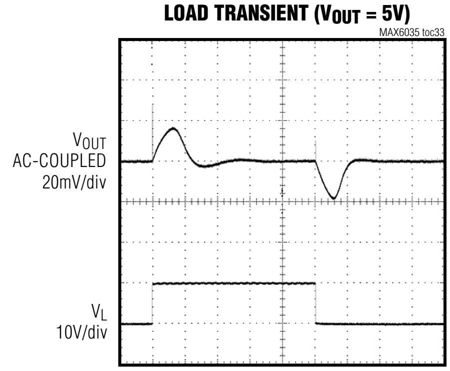

100µs/div
($I_{OUT}$ = ±250µA, $C_L$ = 1µF, $R_L$ = 10kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 3V)**



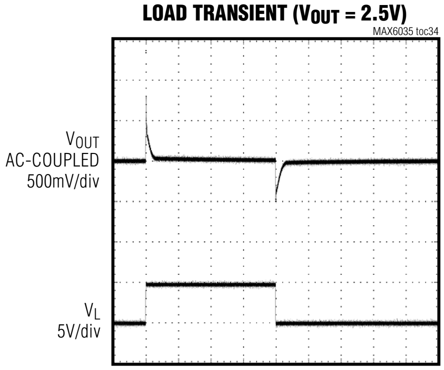

100µs/div
($I_{OUT}$ = ±250µA, $C_L$ = 1µF, $R_L$ = 12kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 5V)**



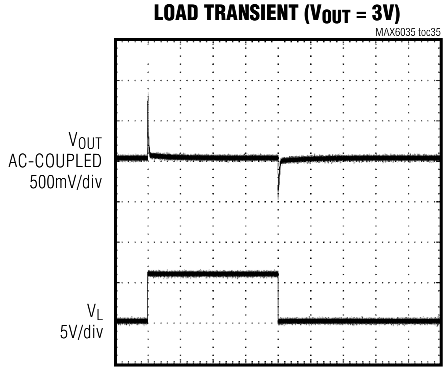

100µs/div
($I_{OUT}$ = ±250µA, $C_L$ = 1µF, $R_L$ = 20kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 2.5V)**



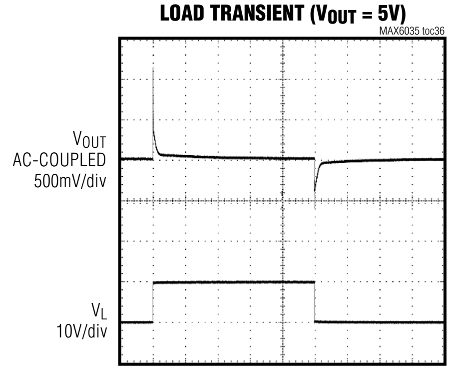

10µs/div
($I_{OUT}$ = ±2mA, $C_L$ = 0, $R_L$ = 1.25kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 3V)**




40µs/div
($I_{OUT}$ = ±2mA, $C_L$ = 0, $R_L$ = 1.5kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 5V)**



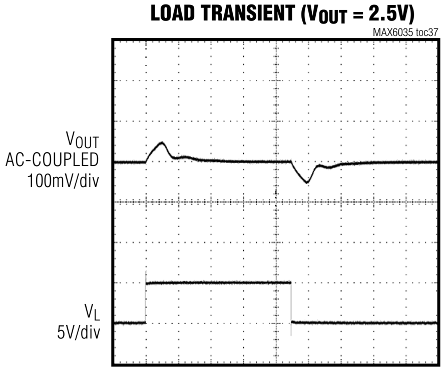

20µs/div
($I_{OUT}$ = ±2mA, $C_L$ = 0, $R_L$ = 2.5kΩ) (Figure 1)

# High-Supply-Voltage, Precision Voltage Reference in SOT23

## Typical Operating Characteristics (continued)

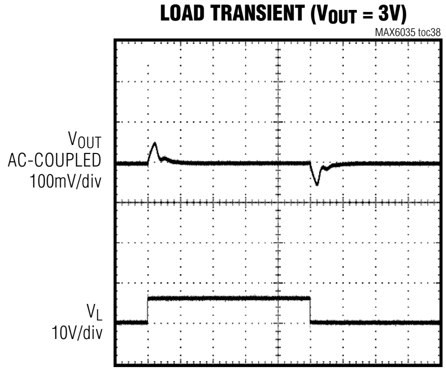
($V_{IN}$ = 5V for MAX6035AAUR25/MAX6035AAUR30, $V_{IN}$ = 15V for MAX6035AAUR50, $I_{OUT}$ = 0, $T_A$ = +25°C, unless otherwise noted.)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 2.5V)**



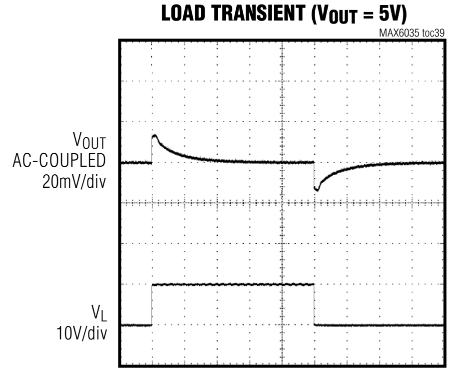

40µs/div
($I_{OUT}$ = ±2mA, $C_L$ = 1µF, $R_L$ = 1.25kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 3V)**



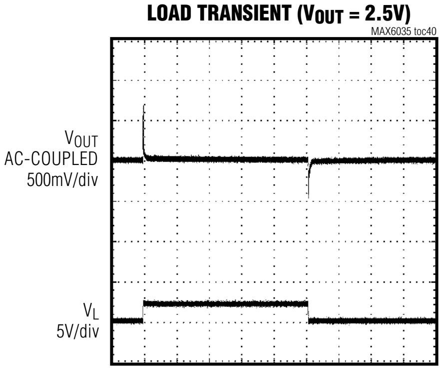

100µs/div
($I_{OUT}$ = ±2mA, $C_L$ = 1µF, $R_L$ = 1.5kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 5V)**



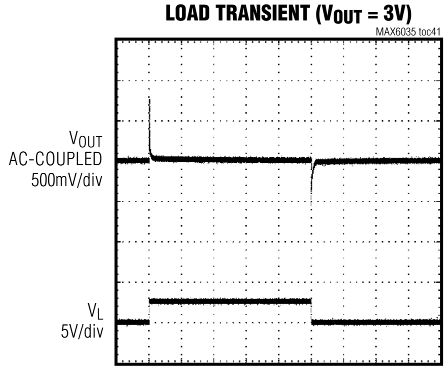

200µs/div
($I_{OUT}$ = ±2mA, $C_L$ = 1µF, $R_L$ = 2.5kΩ) (Figure 1)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 2.5V)**



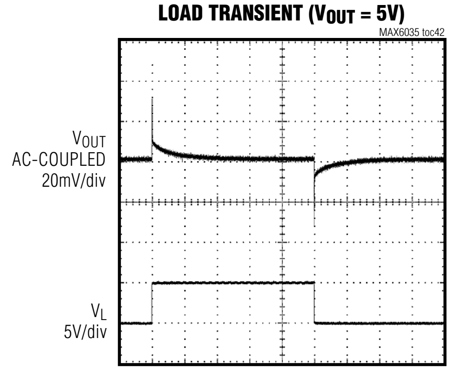

20µs/div
($I_{OUT}$ = 0 to 10mA, $C_L$ = 0, $R_L$ = 250Ω) (Figure 2)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 3V)**




20µs/div
($I_{OUT}$ = 0 to 10mA, $C_L$ = 0, $R_L$ = 300Ω) (Figure 2)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 5V)**

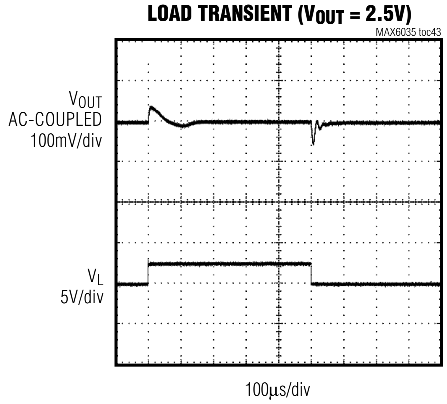



200µs/div
($I_{OUT}$ = 0 to 10mA, $C_L$ = 0, $R_L$ = 500Ω) (Figure 2)

## Typical Operating Characteristics (continued)

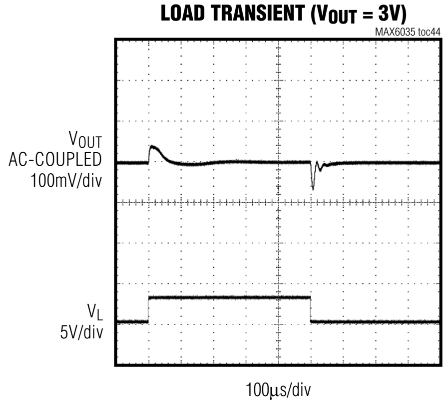
($V_{IN}$ = 5V for MAX6035AAUR25/MAX6035AAUR30, $V_{IN}$ = 15V for MAX6035AAUR50, $I_{OUT}$ = 0, $T_A$ = +25°C, unless otherwise noted.)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 2.5V)**



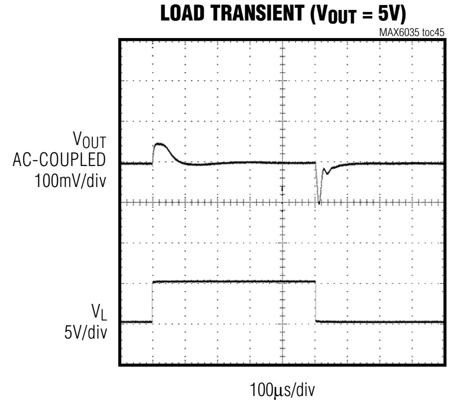

($I_{OUT}$ = 0 to 10mA, $C_L$ = 1µF, $R_L$ = 250Ω) (Figure 2)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 3V)**



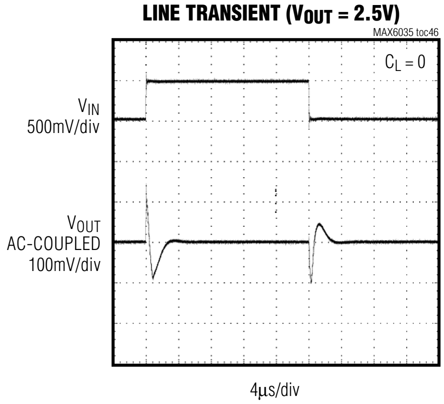

($I_{OUT}$ = 0 to 10mA, $C_L$ = 1µF, $R_L$ = 300Ω) (Figure 2)

**MAX6035**
**LOAD TRANSIENT ($V_{OUT}$ = 5V)**

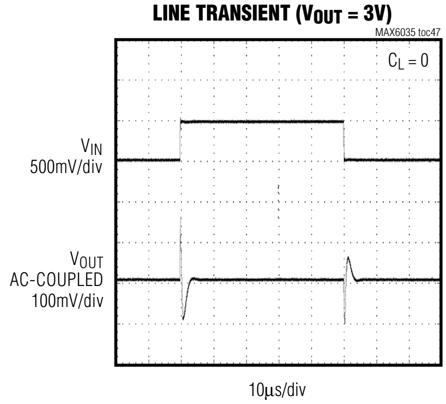



($I_{OUT}$ = 0 to 10mA, $C_L$ = 1µF, $R_L$ = 500Ω) (Figure 2)

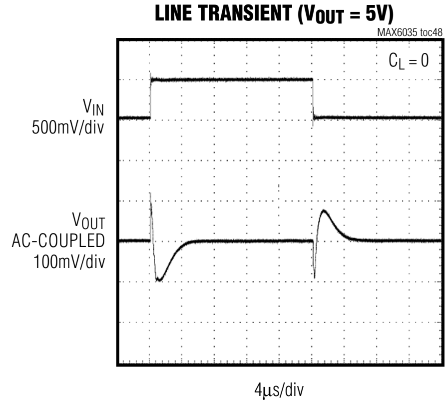
**MAX6035**
**LINE TRANSIENT ($V_{OUT}$ = 2.5V)**




**MAX6035**
**LINE TRANSIENT ($V_{OUT}$ = 3V)**




**MAX6035**
**LINE TRANSIENT ($V_{OUT}$ = 5V)**



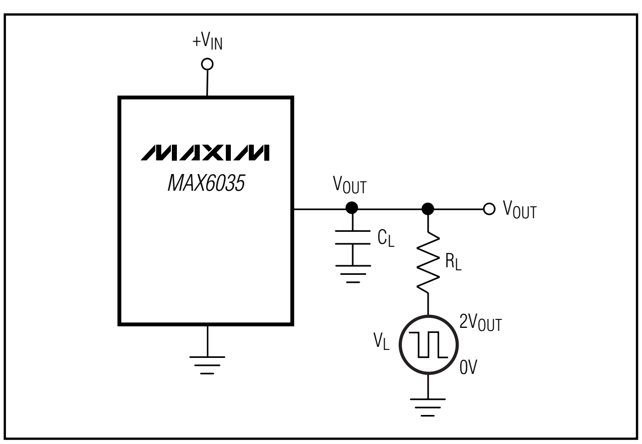




*Figure 1. Load-Transient Test Circuit*

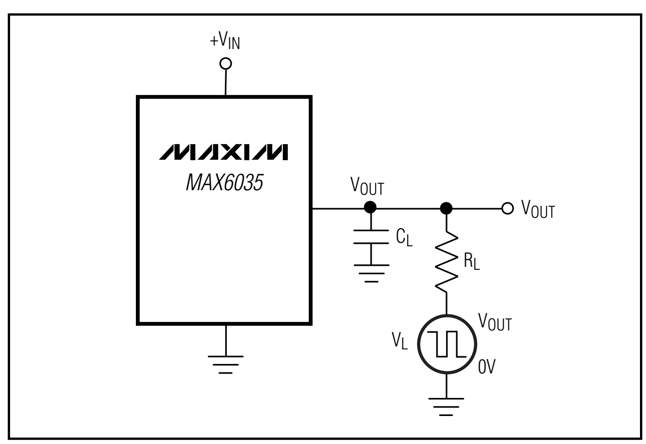



*Figure 2. Load-Transient Test Circuit*

# High-Supply-Voltage, Precision Voltage Reference in SOT23

## Pin Description

| PIN | NAME | FUNCTION |
|---|---|---|
| 1 | IN | Input Voltage |
| 2 | OUT | Reference Output |
| 3 | GND | Ground |

## Applications Information

### Input Bypassing

For the best line-transient performance, decouple the input with a 0.1µF ceramic capacitor as shown in the *Typical Operating Circuit*. Locate the capacitor as close to the device as possible. Where transient performance is less important, no capacitor is necessary.

### Output/Load Capacitance

Devices in the MAX6035 family do not require any output capacitance for frequency stability. In applications where the load or the supply can experience step changes, an output capacitor of at least 0.1µF reduces the amount of overshoot (undershoot) and improves the circuit's transient response. Many applications do not require an external capacitor, and the MAX6035 family can offer a significant advantage in these applications when board space is critical.

### Supply Current

The quiescent supply current of the MAX6035 series-mode family is typically 73µA and is virtually independent of the supply voltage, with only a 0.7µA/V (max) variation with supply voltage. In contrast, the quiescent current of a shunt-mode reference is a function of the input voltage due to a series resistor connected to the power supply. Additionally, shunt-mode references have to be biased at the maximum expected load current, even if the load current is not present at the time. In the MAX6035 family, the load current is drawn from the input voltage only when required, so supply current is not wasted and efficiency is maximized at all input voltages. This improved efficiency reduces power dissipation and extends battery life.

### Thermal Hysteresis

Thermal hysteresis is the change of output voltage at $T_A$ = +25°C before and after the device is cycled over its entire operating temperature range. The typical temperature hysteresis value is 135ppm.

### Turn-On Time

These devices typically turn on and settle to within 0.1% of their final value in 240µs. Increased output capacitance also increases turn-on time.

### Temperature Coefficient vs. Operating Temperature Range for a 1 LSB Maximum Error

In a data converter application, the reference voltage of the converter must stay within a certain limit to keep the error in the data converter smaller than the resolution limit through the operating temperature range. Figure 3 shows the maximum allowable reference-voltage temperature coefficient to keep the conversion error to less than 1LSB, as a function of the operating temperature range ($T_{MAX}$ - $T_{MIN}$) with the converter resolution as a parameter. The graph assumes the reference-voltage temperature coefficient as the only parameter affecting accuracy.

In reality, the absolute static accuracy of a data converter is dependent on the combination of many parameters such as integral nonlinearity, differential nonlinearity, offset error, gain error, as well as voltage reference changes.

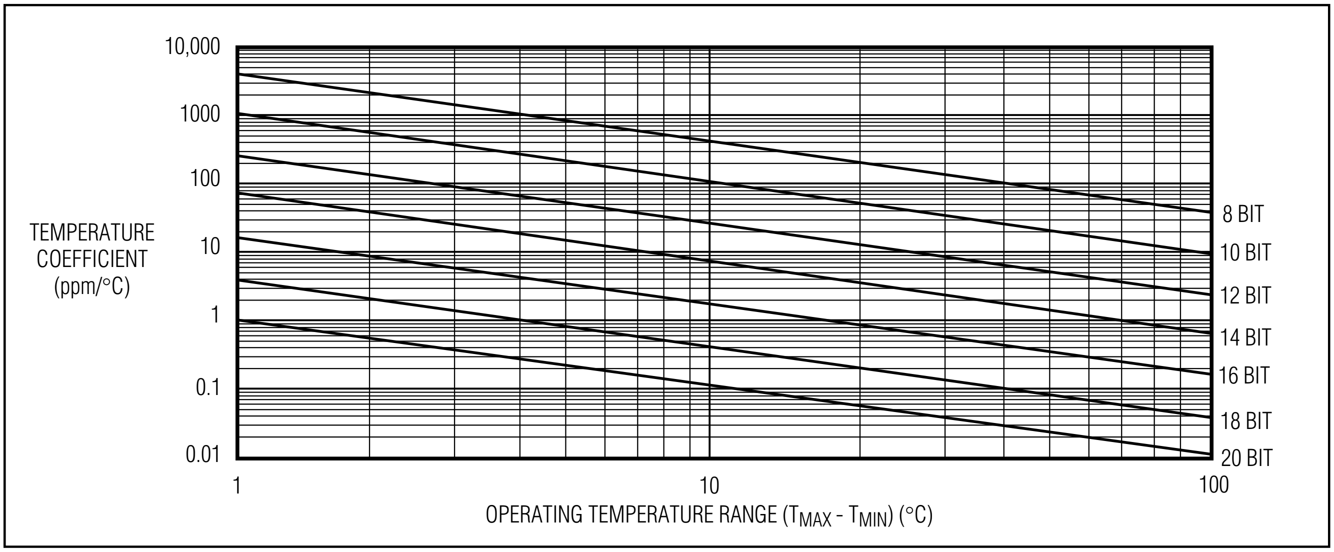



*Figure 3. Temperature Coefficient vs. Operating Temperature Range for a 1 LSB Maximum Error*

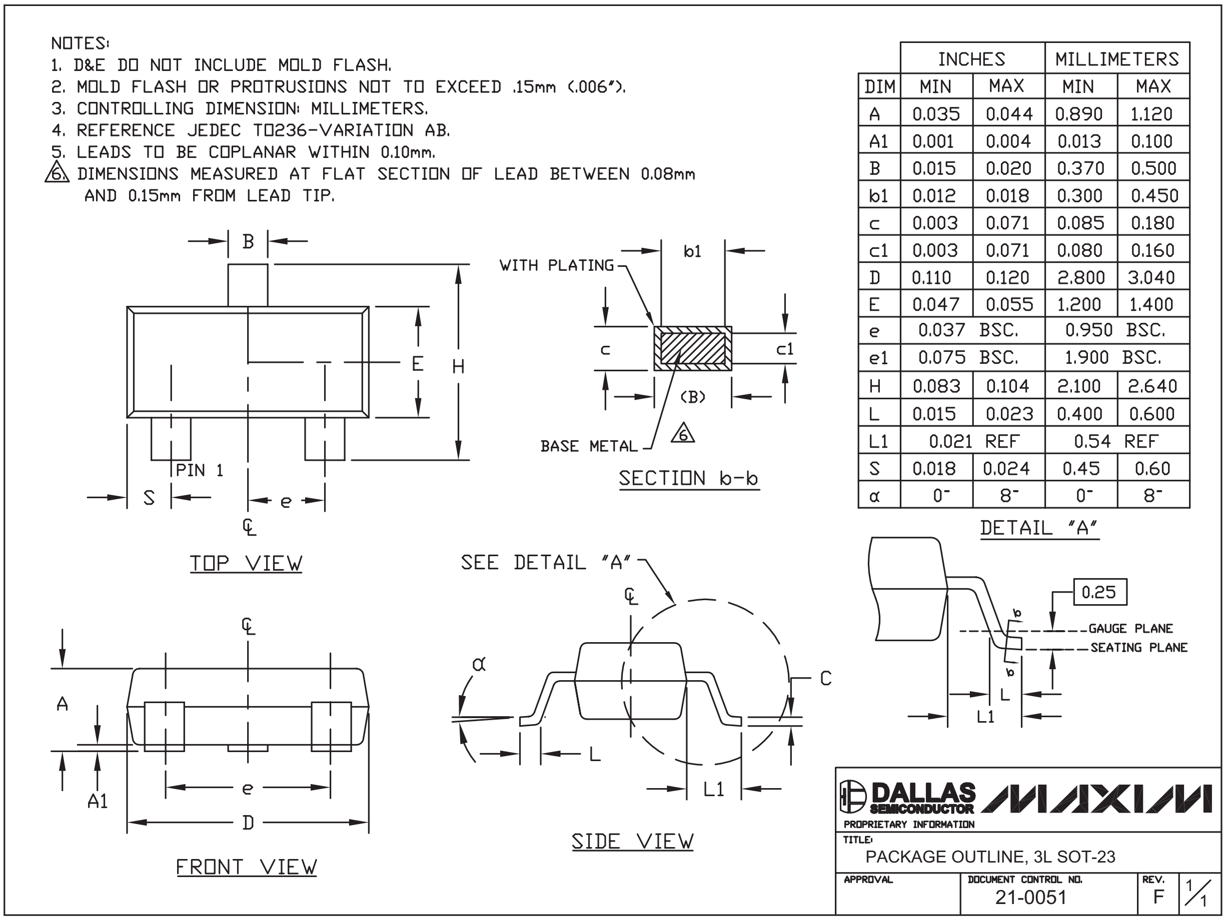
## Chip Information

TRANSISTOR COUNT: 84

PROCESS: BiCMOS

## 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**.)




| DIM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|
| A | 0.035 | 0.044 | 0.890 | 1.120 |
| A1 | 0.001 | 0.004 | 0.013 | 0.100 |
| B | 0.015 | 0.020 | 0.370 | 0.500 |
| b1 | 0.012 | 0.018 | 0.300 | 0.450 |
| c | 0.003 | 0.071 | 0.085 | 0.180 |
| c1 | 0.003 | 0.071 | 0.080 | 0.160 |
| D | 0.110 | 0.120 | 2.800 | 3.040 |
| E | 0.047 | 0.055 | 1.200 | 1.400 |
| e | 0.037 BSC. | | 0.950 BSC. | |
| e1 | 0.075 BSC. | | 1.900 BSC. | |
| H | 0.083 | 0.104 | 2.100 | 2.640 |
| L | 0.015 | 0.023 | 0.400 | 0.600 |
| L1 | 0.021 REF | | 0.54 REF | |
| S | 0.018 | 0.024 | 0.45 | 0.60 |
| α | 0° | 8° | 0° | 8° |

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