19-2606; Rev 3; 11/06

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).

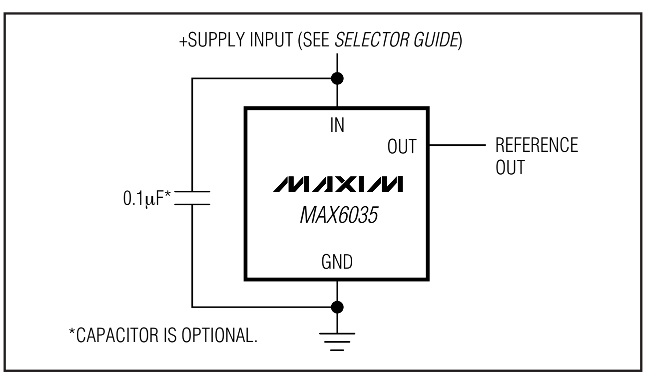
The MAX6035 typically draws only 73µA of supply current and can source 10mA or sink 2mA of load current. Unlike conventional shunt-mode (two-terminal) references that waste supply current and require an external resistor, this device offers a supply current that is virtually independent of the supply 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**
- ♦ **95µA (max) Quiescent Supply Current**
- ♦ **10mA Source Current, 2mA Sink Current**
- ♦ **No Output Capacitor Required**
- ♦ **Stable with Capacitive Loads up to 5µF**

Ordering Information

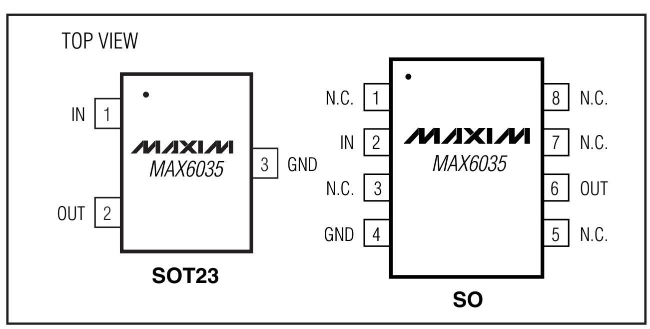
PART	TEMP RANGE	PIN-PACKAGE	TOP MARK
MAX6035AAUR25-T	-40°C to +125°C	3 SOT23-3	FZMW
MAX6035BAUR25-T	-40°C to +125°C	3 SOT23-3	FZMX
MAX6035ESA25	-40°C to +85°C	8 SO	—
MAX6035AAUR30-T	-40°C to +125°C	3 SOT23-3	FZMY
MAX6035BAUR30-T	-40°C to +125°C	3 SOT23-3	FZMZ
MAX6035AAUR50-T	-40°C to +125°C	3 SOT23-3	FZNA
MAX6035BAUR50-T	-40°C to +125°C	3 SOT23-3	FZNB

Note: *The 3-pin SOT23 package code is U3-1. The 8-pin SO package code is S8-2.*

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
MAX6035ESA25	40	0.20	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 Configurations



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
8-Pin SO (derate 5.9mW/°C above +70°C)..............470.6mW

Operating Temperature Range:
MAX6035ESA ....-40°C to +85°C
MAX6035_AUR ....-40°C to +125°C
Storage Temperature Range ....-65°C to +150°C
Junction Temperature ....+150°C
Lead Temperature (soldering, 10s) ....+300°C

Note 1: Continuous power dissipation should also be observed.

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 and MAX6035ESA25 (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	MAX6035AAUR, MAX6035ESA (0.2%)	2.4950	2.5000	2.5050	V
			MAX6035BAUR	2.4875	2.5000	2.5125	
Output Voltage Temperature Coefficient (Notes 3 and 6)	TCV_{OUT}	T_A = 0°C to +70°C	MAX6035AAUR			20	ppm/°C
			MAX6035BAUR			50	
		T_A = -40°C to +85°C	MAX6035AAUR			25	
			MAX6035ESA			40	
			MAX6035BAUR			65	
		T_A = -40°C to +125°C	MAX6035AAUR			30	
			MAX6035BAUR			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 = T_{MIN} to T_{MAX}			20	
Load Regulation (Note 4)	$\Delta V_{OUT}/\Delta I_{OUT}$	T_A = +25°C, MAX6035_AUR	Sourcing: 0 ≤ I_{OUT} ≤ 10mA		25	70	µV/mA
			Sinking: -2mA ≤ I_{OUT} ≤ 0		45	180	
		T_A = T_{MIN} to T_{MAX}, MAX6035_AUR	Sourcing: 0 ≤ I_{OUT} ≤ 10mA			85	
			Sinking: -2mA ≤ I_{OUT} ≤ 0			225	
		T_A = +25°C, MAX6035ESA	Sourcing: 0 ≤ I_{OUT} ≤ 10mA		105	175	
			Sinking: -2mA ≤ I_{OUT} ≤ 0		205	375	
		T_A = T_{MIN} to T_{MAX}, MAX6035ESA	Sourcing: 0 ≤ I_{OUT} ≤ 10mA			350	
			Sinking: -2mA ≤ I_{OUT} ≤ 0			500	
OUT Short-Circuit Current	I_{SC}	Short to GND			27		mA
		Short to IN			-4		

ELECTRICAL CHARACTERISTICS—MAX6035_AUR25 and MAX6035ESA25 (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
Dropout Voltage (Note 7)	V_{IN} - V_{OUT}	I_{OUT} = 10µA				1.9	V
		I_{OUT} = 10mA				2.25	
Thermal Hysteresis (Note 5)	ΔV_{OUT}/cycle				135		ppm
Long-Term Stability	ΔV_{OUT}/time	1000hr at +25°C			110		ppm/ 1000hr
DYNAMIC CHARACTERISTICS							
Output Noise Voltage	e_n	f = 0.1Hz to 10Hz			21		μV_{P-P}
		f = 10Hz to 1kHz			20		μV_{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)	ΔV_{OUT}/cycle				135		ppm
Long-Term Stability	ΔV_{OUT}/time	1000hr at +25°C			120		ppm/ 1000hr
DYNAMIC CHARACTERISTICS							
Output Noise Voltage	e_n	f = 0.1Hz to 10Hz			25		μV_{P-P}
		f = 10Hz to 1kHz			25		μV_{RMS}
Ripple Rejection	ΔV_{OUT}/ ΔV_{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)	ΔV_{OUT}/cycle				135		ppm
Long-Term Stability	ΔV_{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 ΔV_{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.

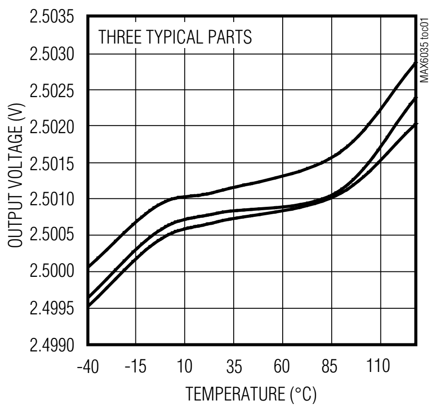
High-Supply-Voltage, Precision Voltage Reference in SOT23

MAX6035

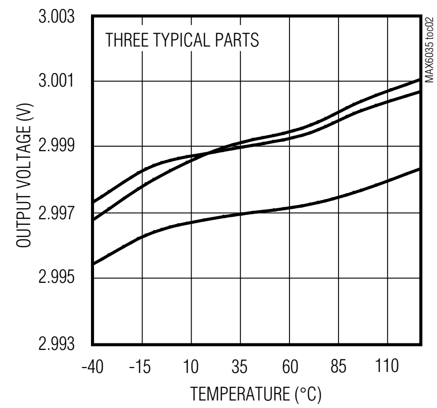
Typical Operating Characteristics

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

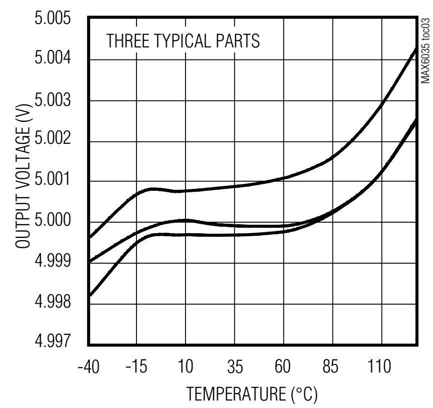
MAX6035AAUR25
OUTPUT VOLTAGE TEMPERATURE DRIFT



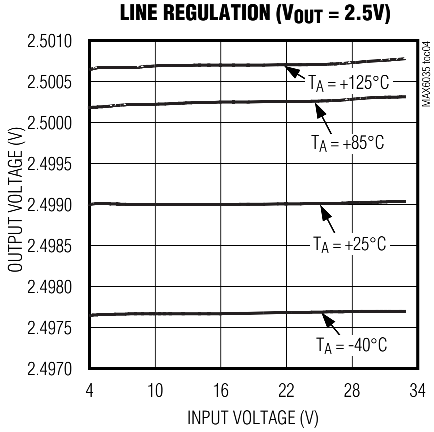
MAX6035AAUR30
OUTPUT VOLTAGE TEMPERATURE DRIFT



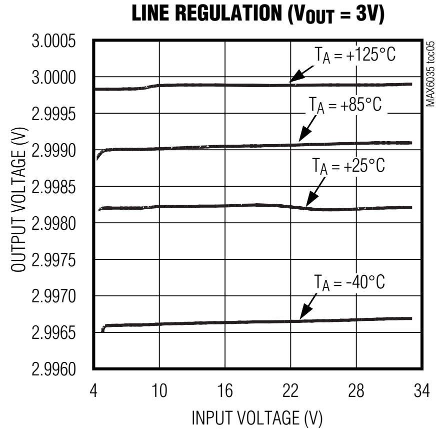
MAX6035AAUR50
OUTPUT VOLTAGE TEMPERATURE DRIFT



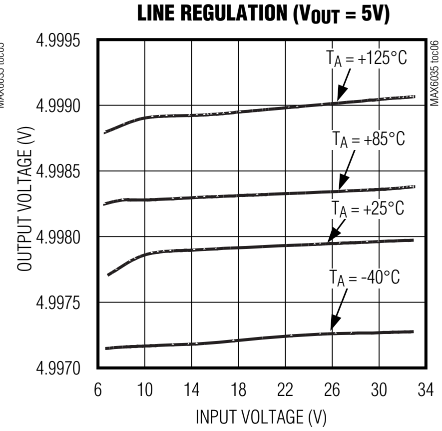
MAX6035
LINE REGULATION (V_{OUT} = 2.5V)



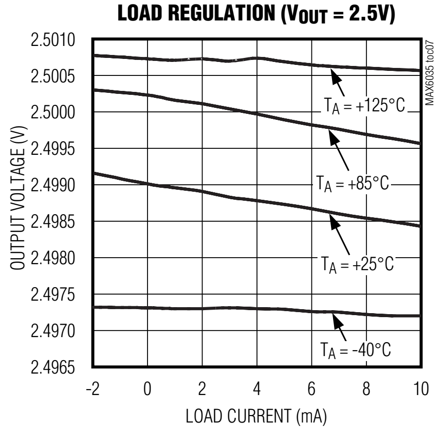
MAX6035
LINE REGULATION (V_{OUT} = 3V)



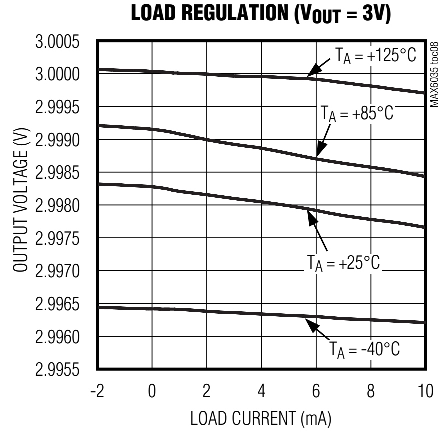
MAX6035
LINE REGULATION (V_{OUT} = 5V)



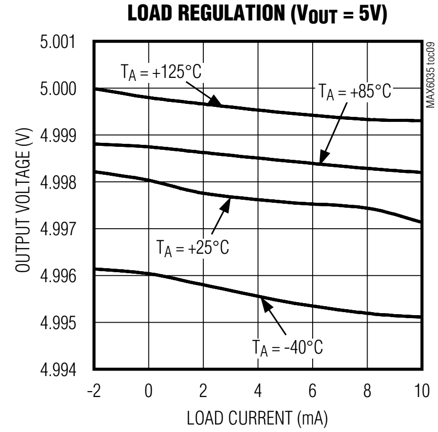
MAX6035
LOAD REGULATION (V_{OUT} = 2.5V)



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



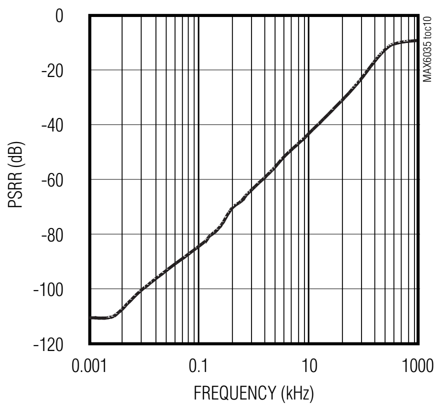
MAX6035
LOAD REGULATION (V_{OUT} = 5V)



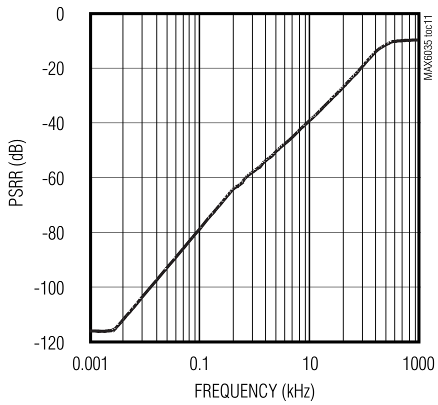
Typical Operating Characteristics (continued)

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

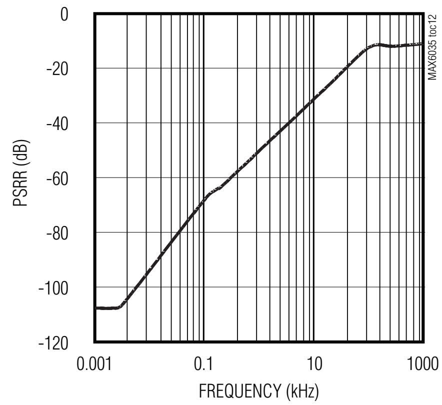
MAX6035
POWER-SUPPLY REJECTION RATIO
vs. FREQUENCY (V_{OUT} = 2.5V)



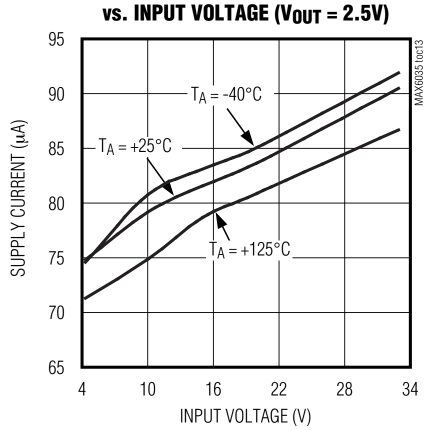
MAX6035
POWER-SUPPLY REJECTION RATIO
vs. FREQUENCY (V_{OUT} = 3V)



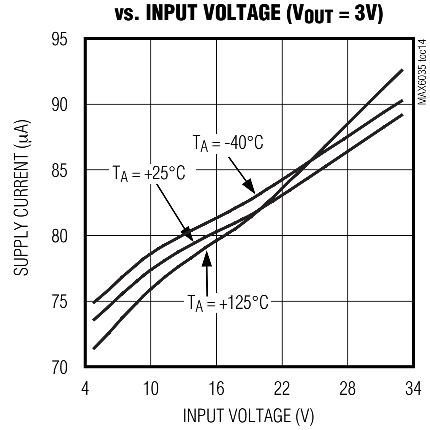
MAX6035
POWER-SUPPLY REJECTION RATIO
vs. FREQUENCY (V_{OUT} = 5V)



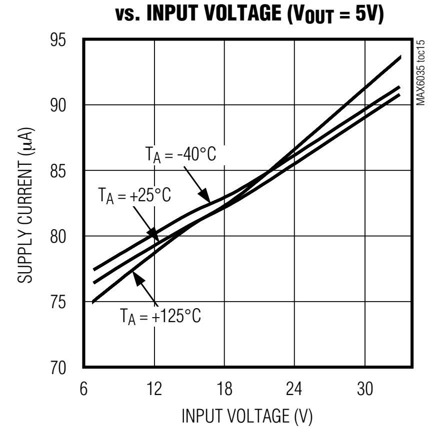
MAX6035
SUPPLY CURRENT
vs. INPUT VOLTAGE (V_{OUT} = 2.5V)



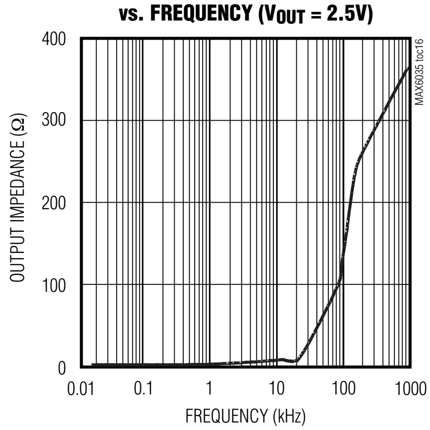
MAX6035
SUPPLY CURRENT
vs. INPUT VOLTAGE (V_{OUT} = 3V)



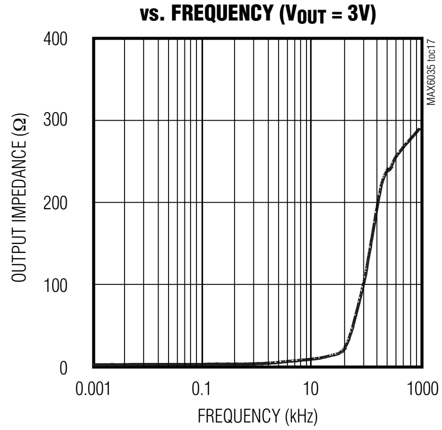
MAX6035
SUPPLY CURRENT
vs. INPUT VOLTAGE (V_{OUT} = 5V)



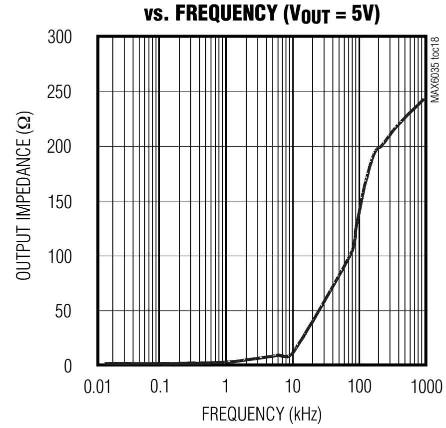
MAX6035
OUTPUT IMPEDANCE
vs. FREQUENCY (V_{OUT} = 2.5V)



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



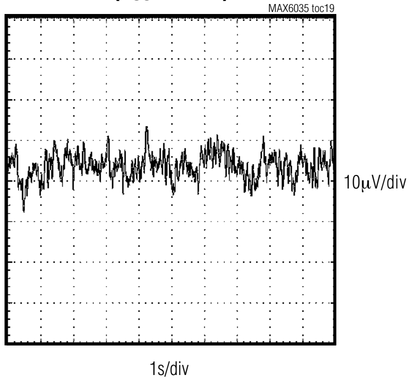
MAX6035
OUTPUT IMPEDANCE
vs. FREQUENCY (V_{OUT} = 5V)



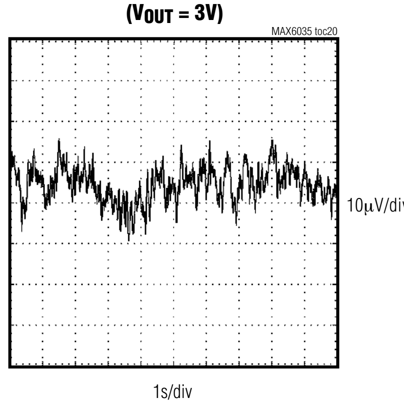
Typical Operating Characteristics (continued)

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

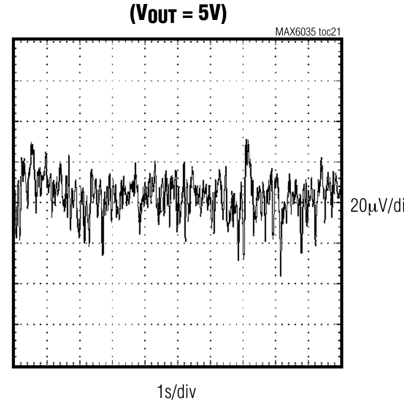
MAX6035
0.1Hz to 10Hz OUTPUT NOISE
(V_{OUT} = 2.5V)



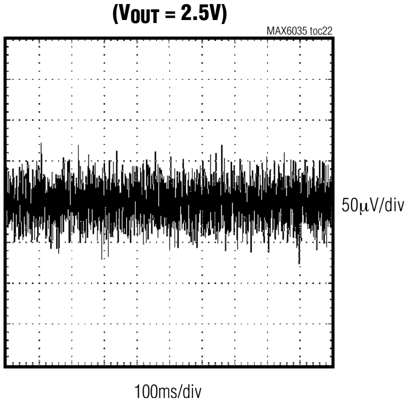
MAX6035
0.1Hz to 10Hz OUTPUT NOISE
(V_{OUT} = 3V)



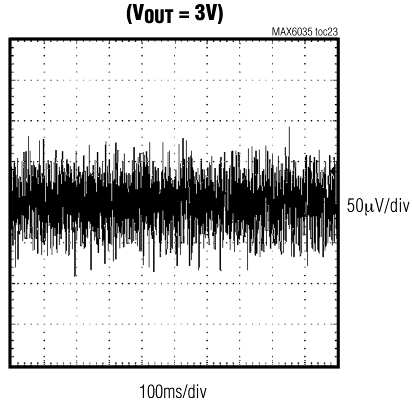
MAX6035
0.1Hz to 10Hz OUTPUT NOISE
(V_{OUT} = 5V)



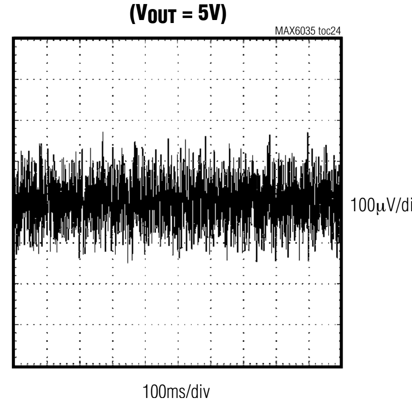
MAX6035
10Hz to 1kHz OUTPUT NOISE
(V_{OUT} = 2.5V)



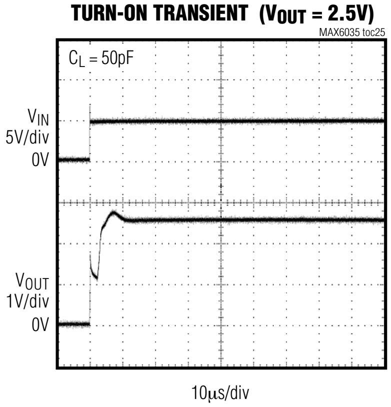
MAX6035
10Hz to 1kHz OUTPUT NOISE
(V_{OUT} = 3V)



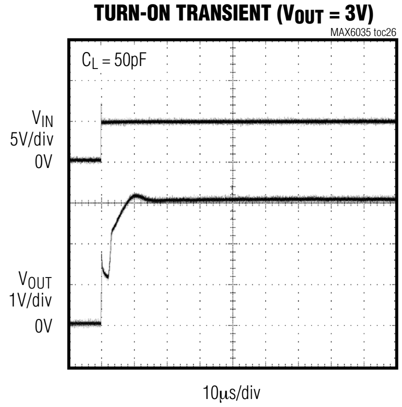
MAX6035
10Hz to 1kHz OUTPUT NOISE
(V_{OUT} = 5V)



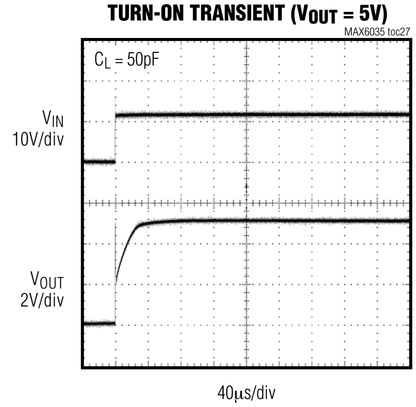
MAX6035
TURN-ON TRANSIENT (V_{OUT} = 2.5V)



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



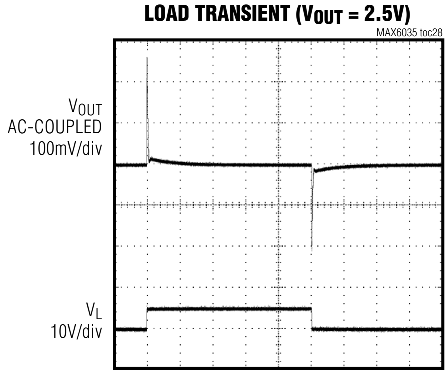
MAX6035
TURN-ON TRANSIENT (V_{OUT} = 5V)



Typical Operating Characteristics (continued)

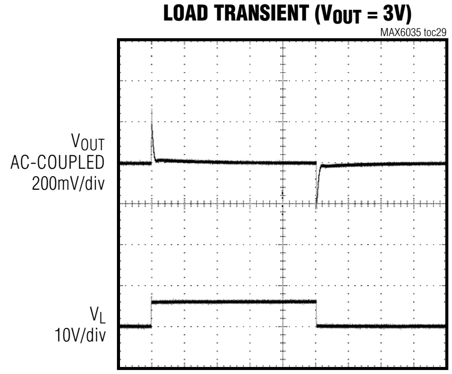
(V_{IN} = 5V for MAX6035AAUR25/MAX6035AAUR30, V_{IN} = 15V for MAX6035AAUR50, I_{OUT} = 0, T_A = +25°C, unless otherwise noted.)

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



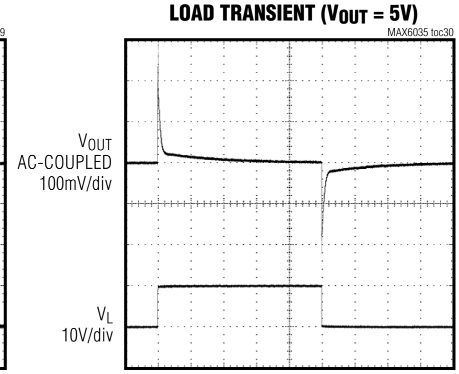
40µs/div
(I_{OUT} = ±250µA, C_L = 0, R_L = 10kΩ) (Figure 1)

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



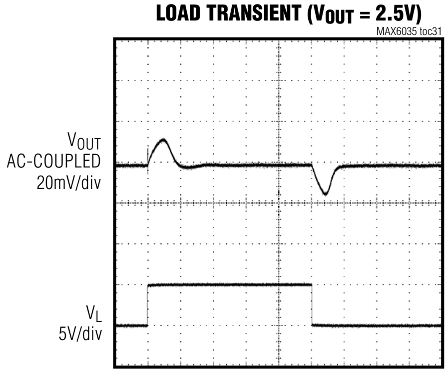
20µs/div
(I_{OUT} = ±250µA, C_L = 0, R_L = 12kΩ) (Figure 1)

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



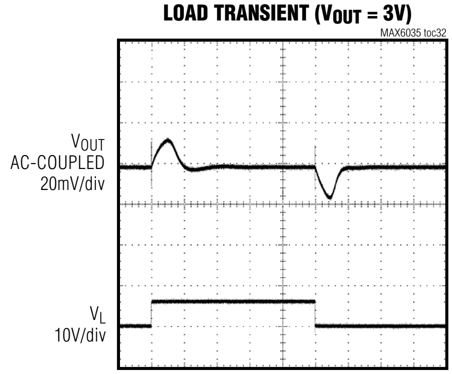
20µs/div
(I_{OUT} = ±250µA, C_L = 0, R_L = 20kΩ) (Figure 1)

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



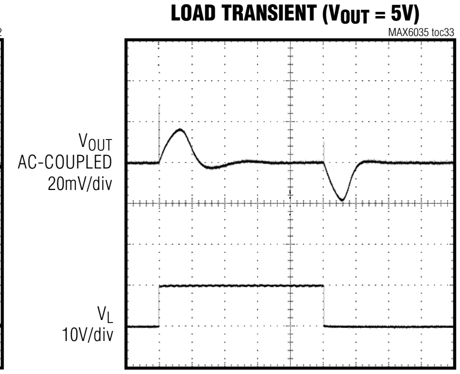
100µs/div
(I_{OUT} = ±250µA, C_L = 1µF, R_L = 10kΩ) (Figure 1)

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



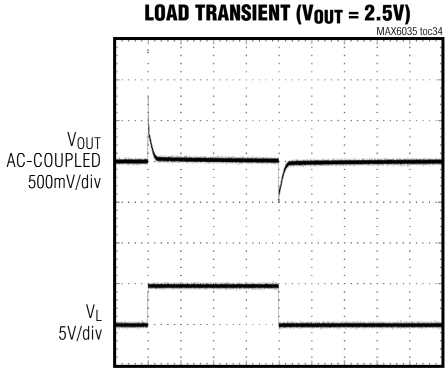
100µs/div
(I_{OUT} = ±250µA, C_L = 1µF, R_L = 12kΩ) (Figure 1)

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



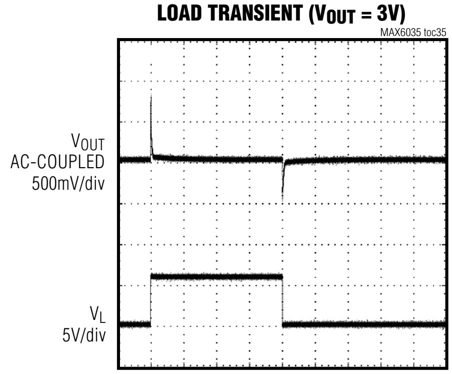
100µs/div
(I_{OUT} = ±250µA, C_L = 1µF, R_L = 20kΩ) (Figure 1)

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



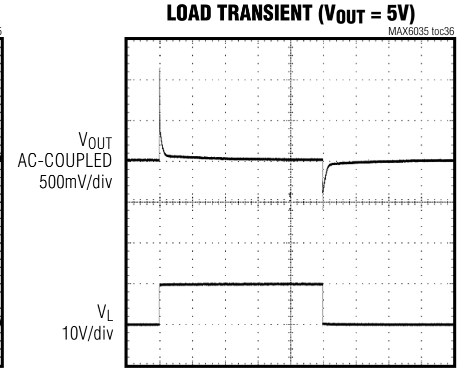
10µs/div
(I_{OUT} = ±2mA, C_L = 0, R_L = 1.25kΩ) (Figure 1)

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)



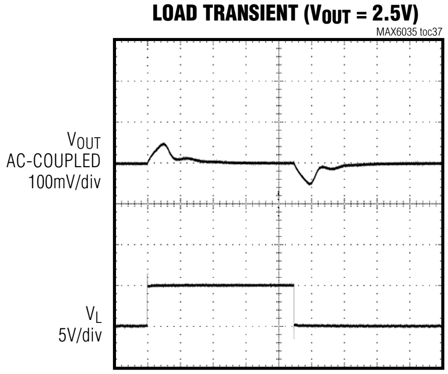
20µs/div
(I_{OUT} = ±2mA, C_L = 0, R_L = 2.5kΩ) (Figure 1)

High-Supply-Voltage, Precision Voltage Reference in SOT23

Typical Operating Characteristics (continued)

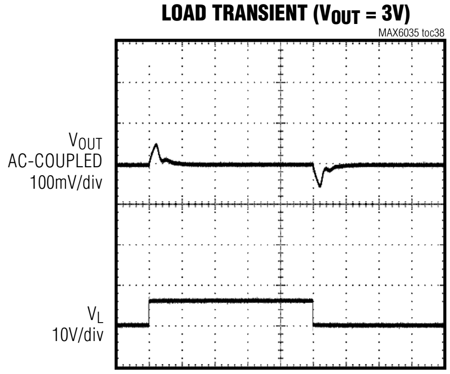
(V_{IN} = 5V for MAX6035AAUR25/MAX6035AAUR30, V_{IN} = 15V for MAX6035AAUR50, I_{OUT} = 0, T_A = +25°C, unless otherwise noted.)

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



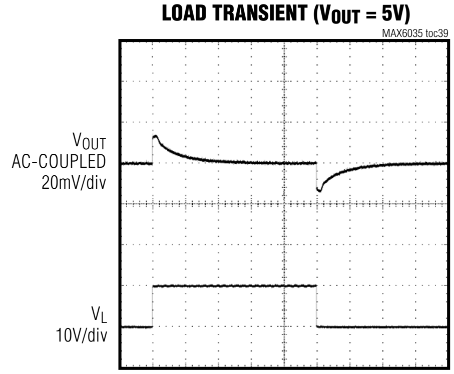
40µs/div
(I_{OUT} = ±2mA, C_L = 1µF, R_L = 1.25kΩ) (Figure 1)

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



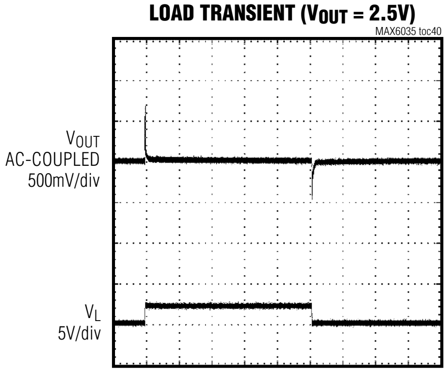
100µs/div
(I_{OUT} = ±2mA, C_L = 1µF, R_L = 1.5kΩ) (Figure 1)

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



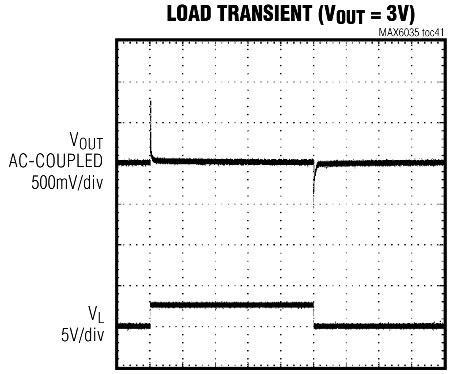
200µs/div
(I_{OUT} = ±2mA, C_L = 1µF, R_L = 2.5kΩ) (Figure 1)

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



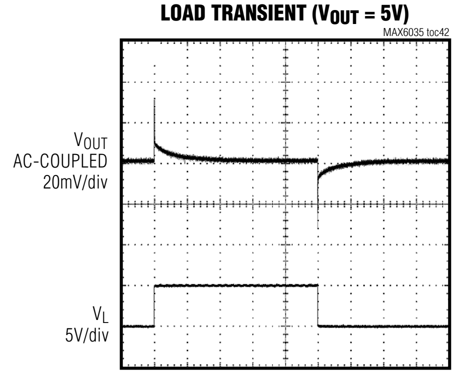
20µs/div
(I_{OUT} = 0 to 10mA, C_L = 0, R_L = 250Ω) (Figure 2)

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



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

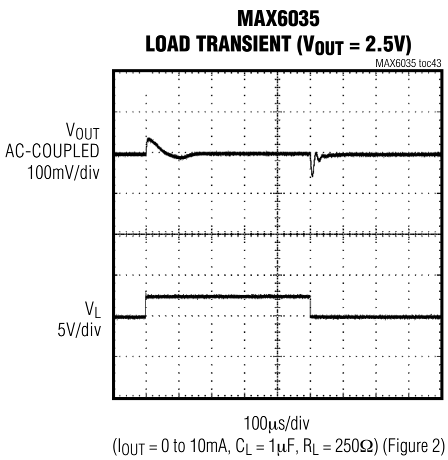
MAX6035
LOAD TRANSIENT (V_{OUT} = 5V)

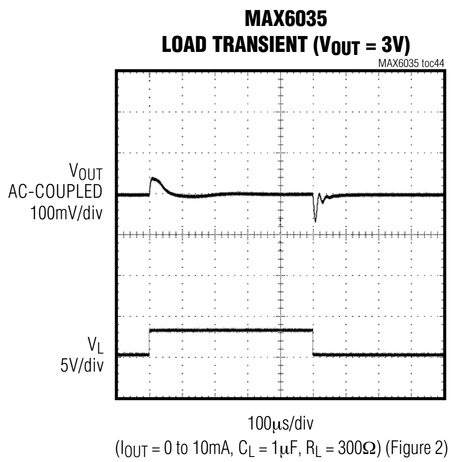


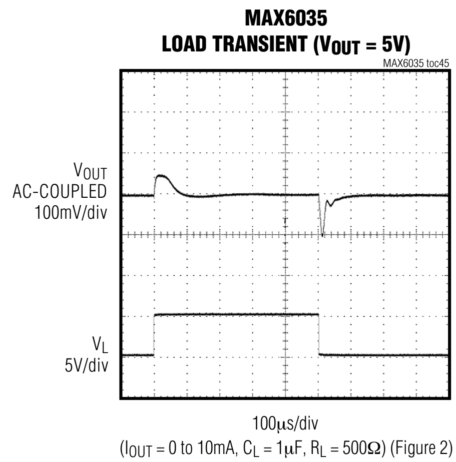
200µs/div
(I_{OUT} = 0 to 10mA, C_L = 0, R_L = 500Ω) (Figure 2)

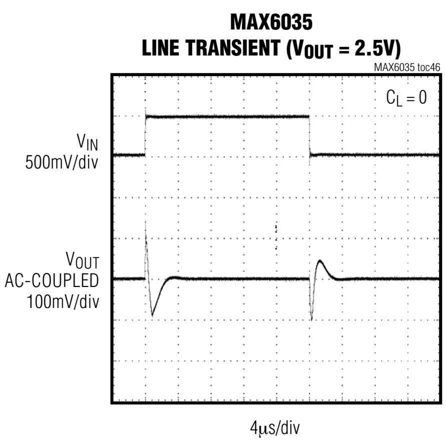
Typical Operating Characteristics (continued)

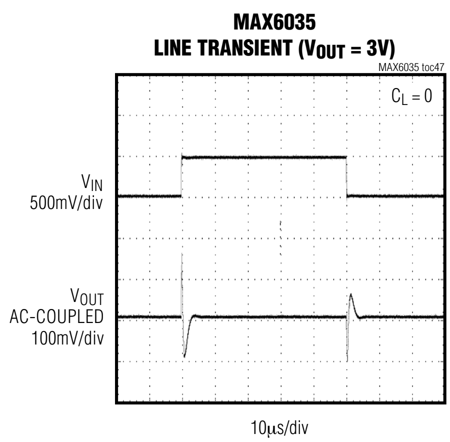
(V_{IN} = 5V for MAX6035AAUR25/MAX6035AAUR30, V_{IN} = 15V for MAX6035AAUR50, I_{OUT} = 0, T_A = +25°C, unless otherwise noted.)

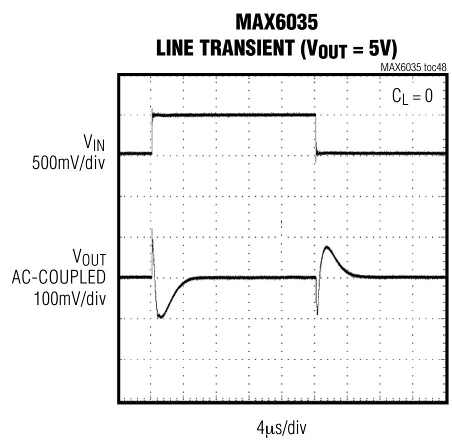












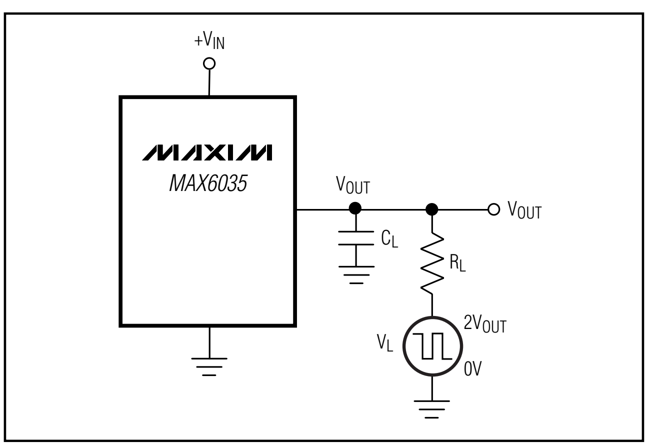


Figure 1. Load-Transient Test Circuit

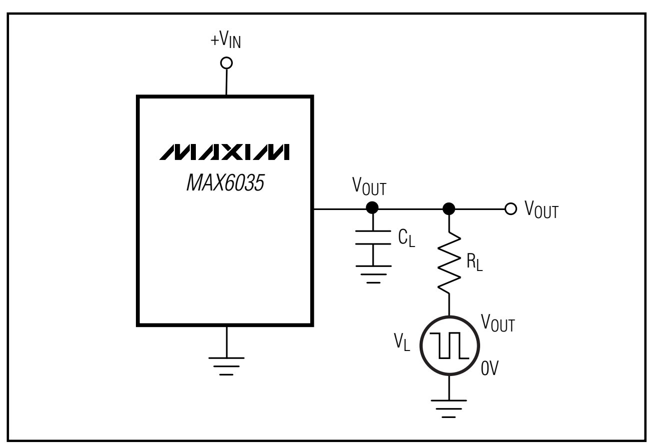


Figure 2. Load-Transient Test Circuit

Pin Description

PIN		NAME	FUNCTION
SOT23	SO		
1	2	IN	Input Voltage
2	6	OUT	Reference Output
3	4	GND	Ground
	1, 3, 5, 7, 8	N.C.	No Connection. Not internally connected.

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

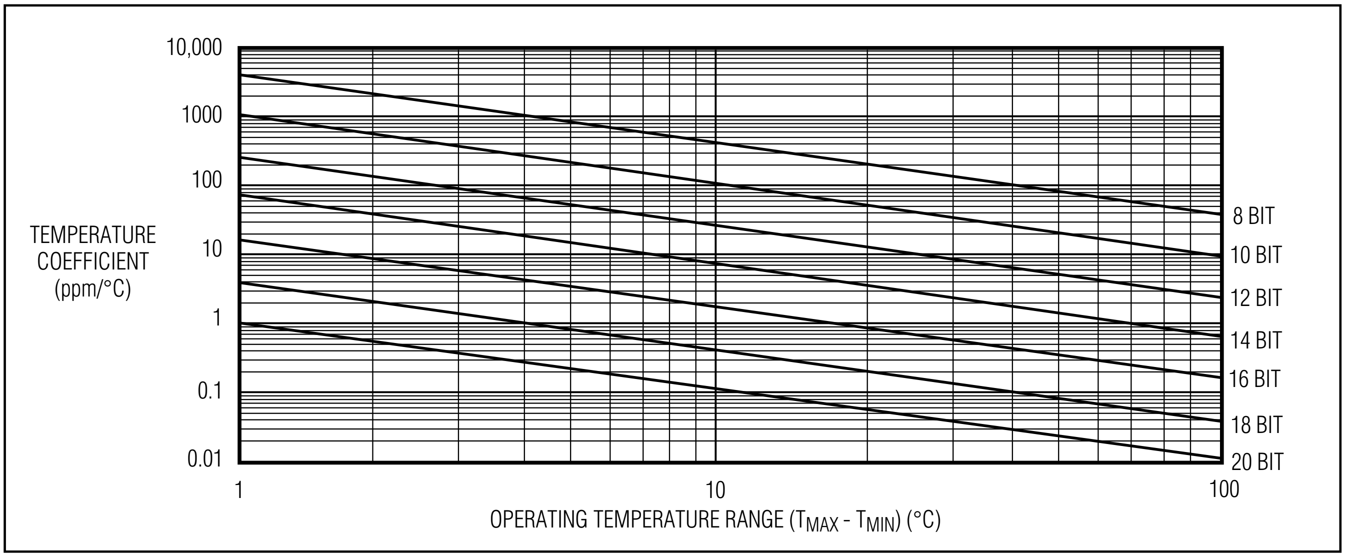


Figure 3. Temperature Coefficient vs. Operating Temperature Range for a 1 LSB Maximum Error

Chip Information

TRANSISTOR COUNT: 84

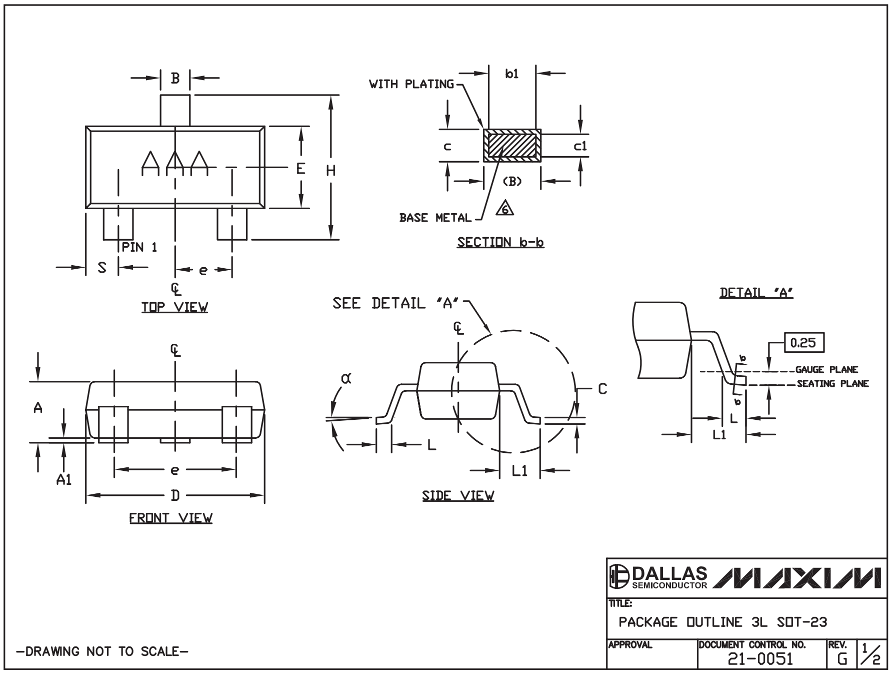
PROCESS: BiCMOS

High-Supply-Voltage, Precision Voltage Reference in SOT23

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**.)

SOT23 L.EPS



NOTES:
1. D&E DO NOT INCLUDE MOLD FLASH.
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006").
3. CONTROLLING DIMENSION: MILLIMETERS.
4. REFERENCE JEDEC TO236-VARIATION AB.
5. LEADS TO BE COPLANAR WITHIN 0.10mm.
6. DIMENSIONS MEASURED AT FLAT SECTION OF LEAD BETWEEN 0.08mm AND 0.15mm FROM LEAD TIP.
7. MARKING SHOWN IS FOR PACKAGE ORIENTATION REFERENCE ONLY.

	INCHES			MILLIMETERS		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.035	0.0394	0.044	0.890	1.000	1.120
A1	0.0004	0.0024	0.004	0.010	0.060	0.100
B	0.012	0.0165	0.020	0.300	0.420	0.500
b1	0.012		0.018	0.300		0.450
c	0.003	0.047	0.071	0.085	0.120	0.180
c1	0.003		0.071	0.080		0.160
D	0.110	0.115	0.120	2.800	2.920	3.040
E	0.047	0.0512	0.055	1.200	1.30	1.400
e	0.037 BSC.			0.950 BSC.		
e1	0.075 BSC.			1.900 BSC.		
H	0.083	0.0925	0.104	2.100	2.350	2.640
L	0.015	0.0205	0.023	0.400	0.520	0.600
L1	0.021 REF			0.54 REF		
S	0.018	0.0213	0.024	0.45	0.540	0.60
α	0°	2°	8°	0°	2	8°
PKG CODES: U3-1, U3-2						

DALLAS SEMICONDUCTOR MAXIM

TITLE: PACKAGE OUTLINE 3L SOT-23

APPROVAL	DOCUMENT CONTROL NO.	REV.	
	21-0051	G	1/2

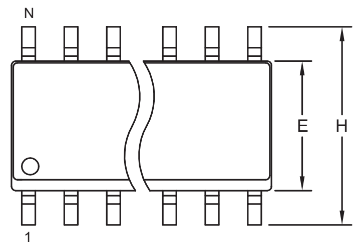
-DRAWING NOT TO SCALE-

Package Information (continued)

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

SOICN .EPS

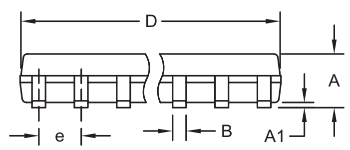
	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
B	0.014	0.019	0.35	0.49
C	0.007	0.010	0.19	0.25
e	0.050 BSC		1.27 BSC	
E	0.150	0.157	3.80	4.00
H	0.228	0.244	5.80	6.20
L	0.016	0.050	0.40	1.27



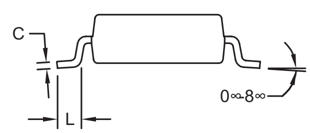
TOP VIEW

VARIATIONS:

	INCHES		MILLIMETERS			
DIM	MIN	MAX	MIN	MAX	N	MS012
D	0.189	0.197	4.80	5.00	8	AA
D	0.337	0.344	8.55	8.75	14	AB
D	0.386	0.394	9.80	10.00	16	AC



FRONT VIEW



SIDE VIEW

NOTES:
1. D&E DO NOT INCLUDE MOLD FLASH.
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED 0.15mm (.006").
3. LEADS TO BE COPLANAR WITHIN 0.10mm (.004").
4. CONTROLLING DIMENSION: MILLIMETERS.
5. MEETS JEDEC MS012.
6. N = NUMBER OF PINS.

DALLAS SEMICONDUCTOR MAXIM

PROPRIETARY INFORMATION

TITLE: PACKAGE OUTLINE, .150" SOIC

APPROVAL	DOCUMENT CONTROL NO.	REV.	
	21-0041	B	1/1

Revision History

Pages changed at Rev 2: 1, 2, 3, 12, 15
Pages changed at Rev 3: 1, 2, 15