19-1130; Rev 1; 7/05

MAXIM

50ppm/°C, SOT23, 3-Terminal, 1.2V Voltage Reference

General Description

The MAX6520 is the lowest-power 1.2V, precision, three-terminal voltage reference offered in a SOT23-3 package. Ideal for 3V battery-powered equipment where power conservation is critical, the MAX6520 is a low-power alternative to existing two-terminal shunt references. Unlike two-terminal references that throw away battery current and require an external series resistor, the MAX6520 has a 70µA maximum supply current (typically only 50µA) that is independent of the input voltage. This feature translates to maximum efficiency at all battery voltages.

The MAX6520 operates from a supply voltage as low as 2.4V, and initial accuracy is ±1% for the SOT23 package. **Output voltage temperature coefficient is typically only 25ppm/°C, and is guaranteed to be less than 50ppm/°C in the SOT23 package.**

Applications

Battery-Powered Systems

Portable and Hand-Held Equipment

Data-Acquisition Systems

Instrumentation and Process Control

Features

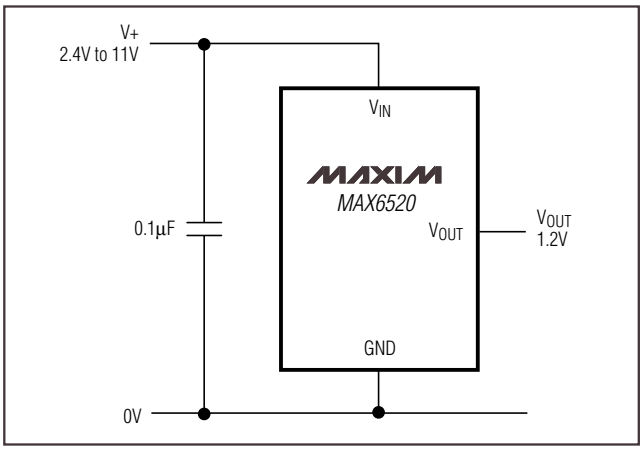
- **3-Pin SOT23 Package**
- **50ppm/°C max Tempco**
- **Supply Current Independent of Input Voltage Over Temperature**
- **50µA Supply Current**
- **2.4V to 11V Input Voltage Range**
- **±1% Initial Accuracy**

Ordering Information

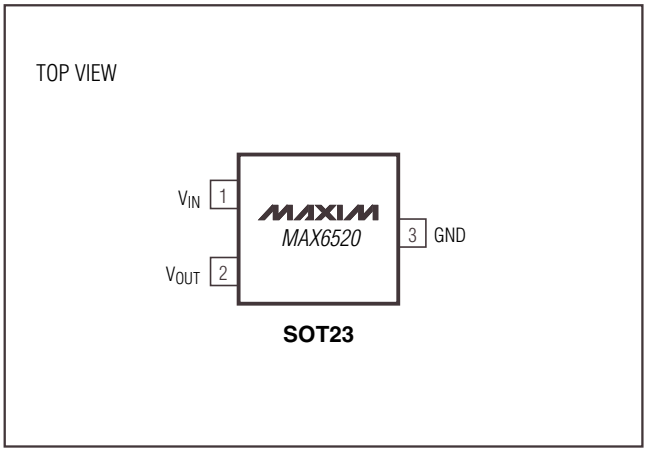
PART	TEMP RANGE	PIN-PACKAGE	TOP MARK
MAX6520EUR-T	-40°C to +85°C	3 SOT23-3	EFAA

**Contact factory for availability.*

Typical Operating Circuit



Pin Configuration



50ppm/°C, SOT23, 3-Terminal, 1.2V Voltage Reference

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{IN}) .....-0.3V to +12V
V_{OUT} .....-0.3V to (V_{IN} + 0.3V)
Output Short-Circuit Duration .....Continuous to Either Supply
Continuous Power Dissipation (T_A = +70°C)
SOT23 (derate 4mW/°C above +70°C) 320mW

Operating Temperature Range .....-40°C to +85°C
Storage Temperature Range .....-65°C to +160°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.

DC ELECTRICAL CHARACTERISTICS

(V_{IN} = 2.4V, I_{LOAD} = 0mA, T_A = +25°C, unless otherwise noted.)

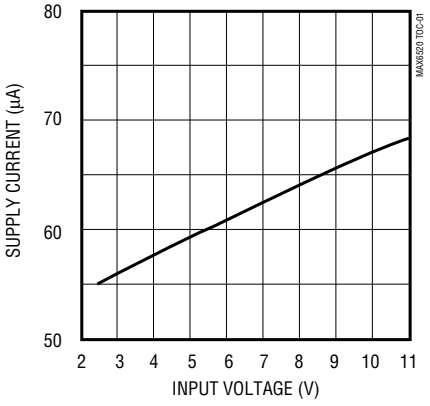
PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	MAX6520EUR	T_A = +25°C	1.188	1.200	1.212	V
			$T_A = T_{MIN}$ to T_{MAX}	1.176		1.224	V
Output Voltage Temperature Coefficient	TCV_{OUT}	MAX6520EUR, $T_A = T_{MIN}$ to T_{MAX}			25	50	ppm/°C
Output Voltage Noise	e_n	0.1Hz to 10Hz			10		µVp-p
		10Hz to 10kHz			400		
Line Regulation	V_{OUT}/V_{IN}	V_{IN} = 2.4V to 11V, $T_A = T_{MIN}$ to T_{MAX} (Note 1)			2	30	µV/V
Load Regulation	V_{OUT}/I_{OUT}	I_{LOAD} = -50µA to 400µA (Note 1)			0.1	1	µV/µA
Quiescent Supply Current	I_Q	T_A = +25°C			50	58	µA
		$T_A = T_{MIN}$ to T_{MAX} (Note 1)				70	
Change in Supply Current vs. Input Voltage	I_Q/V_{IN}	V_{IN} = 2.4V to 11V			1.5	5	µA/V
Short-Circuit Output Current	I_{SC}	V_{OUT} shorted to GND			4.3		mA
		V_{OUT} shorted to V_{IN}			400		µA

Note 1: Production testing done at T_A = +25°C, over temperature limits guaranteed by parametric correlation data.

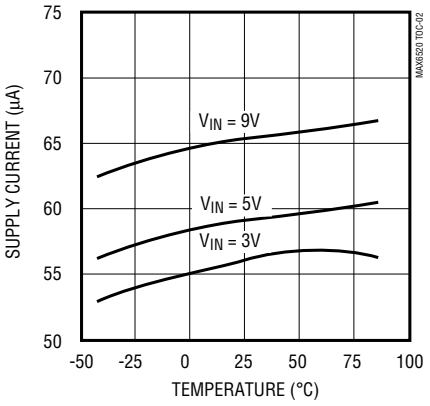
Typical Operating Characteristics

(V_{IN} = 3V, I_{LOAD} = 0mA, T_A = +25°C, unless otherwise noted.)

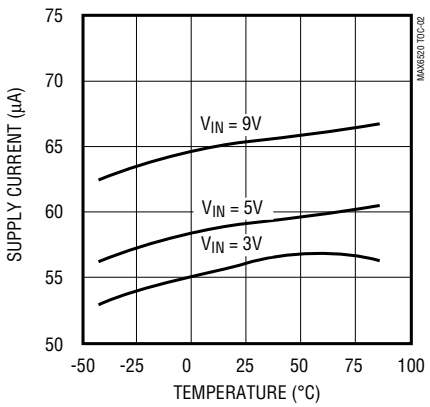
SUPPLY CURRENT vs. INPUT VOLTAGE



SUPPLY CURRENT vs. TEMPERATURE



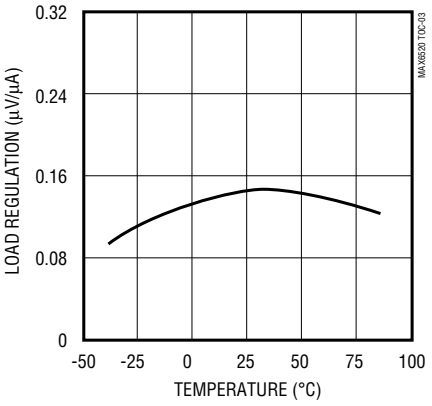
SUPPLY CURRENT vs. TEMPERATURE



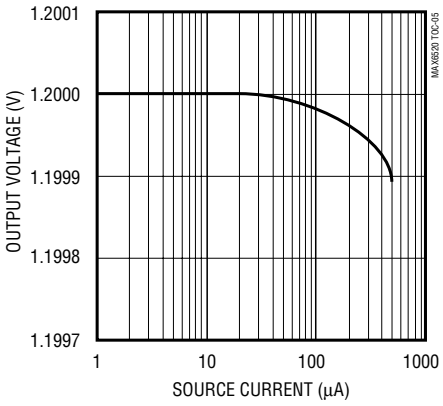
Typical Operating Characteristics (continued)

(V_{IN} = 3V, I_{LOAD} = 0mA, T_A = +25°C, unless otherwise noted.)

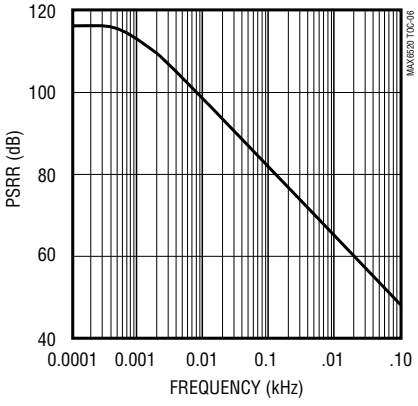
LOAD REGULATION vs. TEMPERATURE



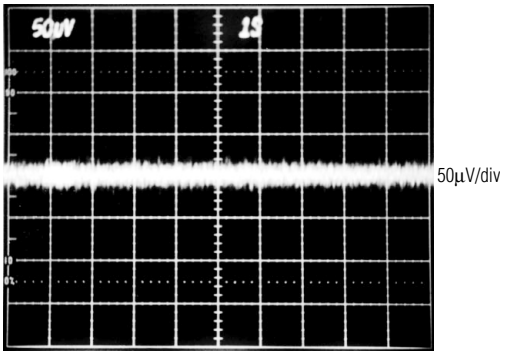
OUTPUT VOLTAGE vs. SOURCE CURRENT



POWER-SUPPLY REJECTION RATIO vs. FREQUENCY

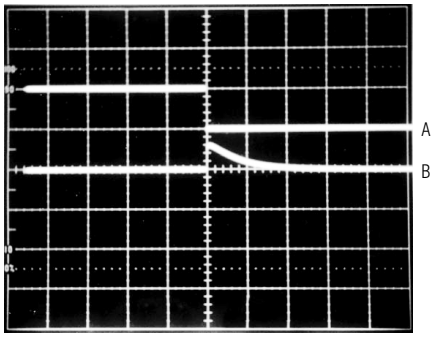


0.1Hz TO 100Hz NOISE



1µs/div

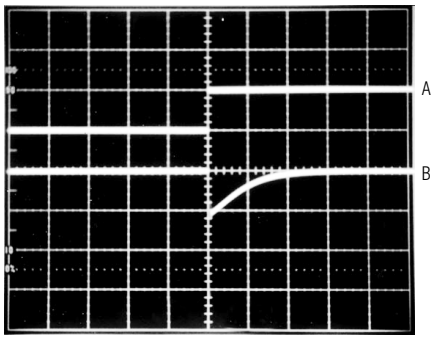
LOAD-TRANSIENT RESPONSE



10µs/div

A = OUTPUT CURRENT, 50µA/div, I_{LOAD} = 0µA TO -50µA
B = OUTPUT VOLTAGE, 100mV/div

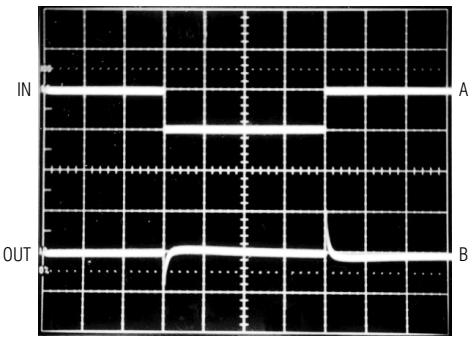
LOAD-TRANSIENT RESPONSE



10µs/div

A = OUTPUT CURRENT, 500µA/div, I_{LOAD} = 0µA TO 500µA
B = OUTPUT VOLTAGE, 100mV/div

LINE-TRANSIENT RESPONSE



5µs/div

A = INPUT VOLTAGE, 100mV/div, V_{IN} = 3V ± 50mV
B = OUTPUT VOLTAGE, 10mV/div

50ppm/°C, SOT23, 3-Terminal, 1.2V Voltage Reference

Pin Description

PIN	NAME	FUNCTION
1	V_{IN}	Input Voltage
2	V_{OUT}	Reference Output
3	GND	Ground

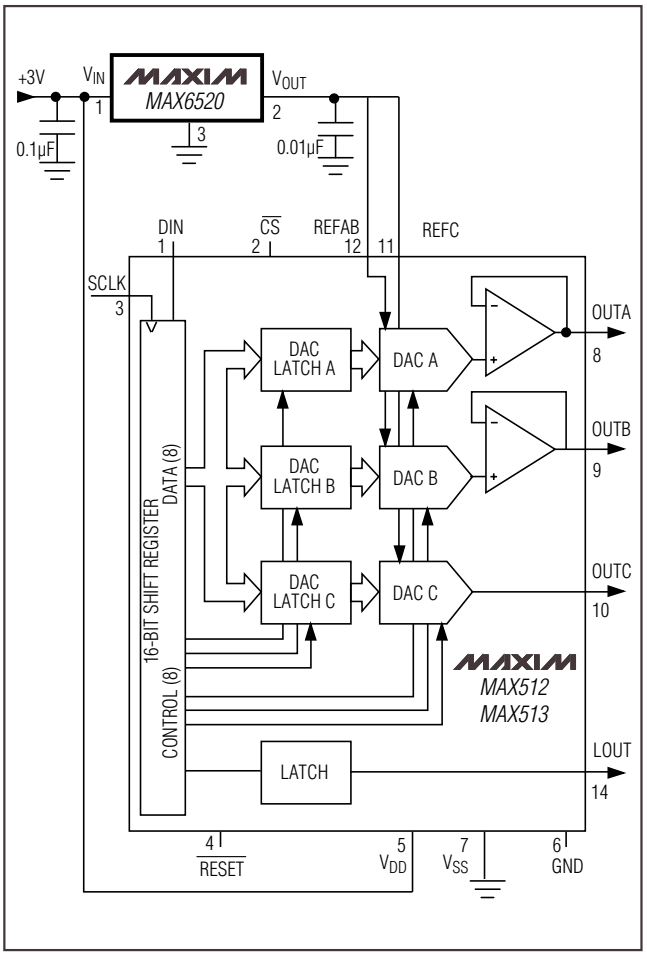


Figure 1. 3V, Triple, 8-Bit Serial DAC

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 pin as possible. Where transient performance is less important, no capacitor is necessary.

Output Bypass

The MAX6520 performs well without an output decoupling capacitor. If your application requires an output charge reservoir (e.g., to decouple the reference from the input of a DAC), then make sure that the total output capacitive load does not exceed 10nF.

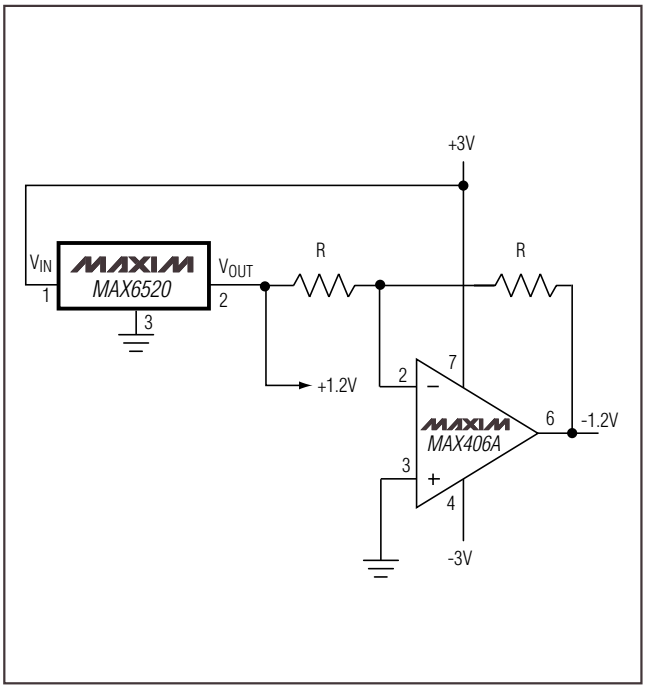
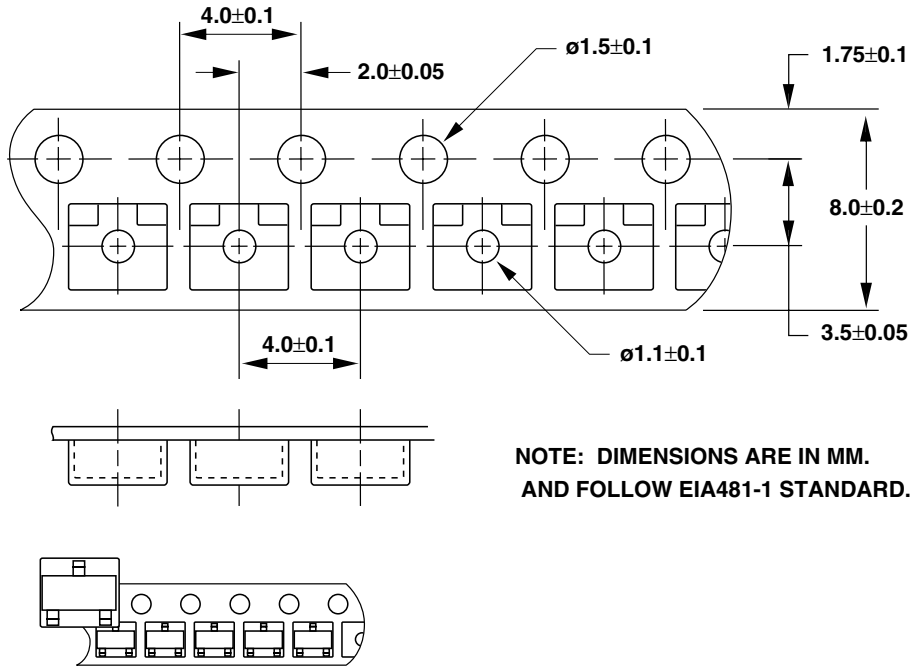


Figure 2. Low-Power ±1.2V Reference

Chip Information

TRANSISTOR COUNT: 39

Tape-and-Reel Information

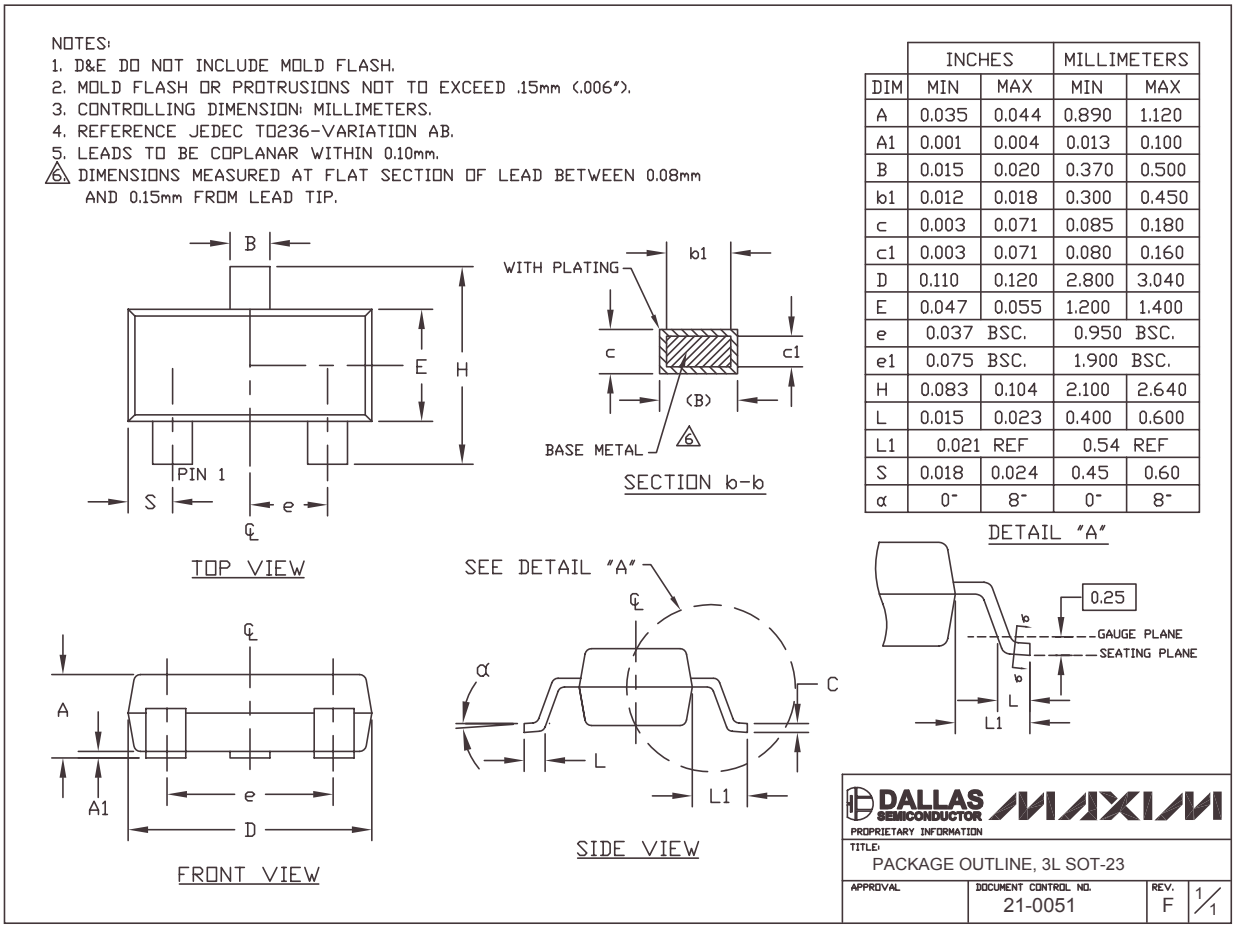


NOTE: DIMENSIONS ARE IN MM.
AND FOLLOW EIA481-1 STANDARD.

50ppm/°C, SOT23, 3-Terminal, 1.2V Voltage Reference

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**.)



	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	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°

DALLAS SEMICONDUCTOR MAXIM
PROPRIETARY INFORMATION
TITLE: PACKAGE OUTLINE, 3L SOT-23
APPROVAL | DOCUMENT CONTROL NO. 21-0051 | REV. F | 1/1