



LT1009 Series 2.5V Reference

FEATURES

- Maximum Initial Tolerance: 0.2%
- *Guaranteed* Temperature Stability
- Maximum 0.6Ω Dynamic Impedance
- Wide Operating Current Range
- Directly Interchangeable with LM136 for Improved Performance
- No Adjustments Needed for Minimum Temperature Coefficient

APPLICATIONS

- Reference for 5V Systems
- 8-Bit A/D and D/A Reference
- Digital Voltmeters
- Current Loop Measurement and Control Systems
- Power Supply Monitor

DESCRIPTION

The LT[®]1009 is a precision trimmed 2.5V shunt regulator diode featuring a maximum initial tolerance of only ±5mV. The low dynamic impedance and wide operating current range enhances its versatility. The 0.2% reference tolerance is achieved by on-chip trimming which not only minimizes the initial voltage tolerance but also minimizes the temperature drift.

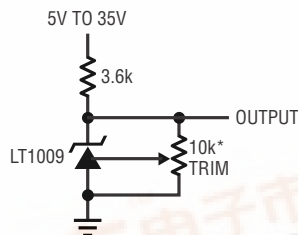
Even though no adjustments are needed with the LT1009, a third terminal allows the reference voltage to be adjusted ±5% to calibrate out system errors. In many applications, the LT1009 can be used as a pin-to-pin replacement of the LM136 and the external trim network eliminated.

For a lower drift 2.5V reference, see the LT1019 data sheet.

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TYPICAL APPLICATION

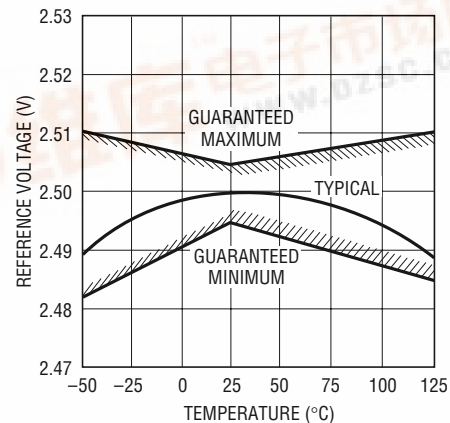
2.5V Reference



*DOES NOT AFFECT TEMPERATURE COEFFICIENT. ±5% TRIM RANGE

1009 TA01

Output Voltage



1009 TA02

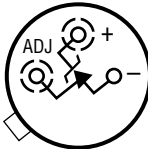
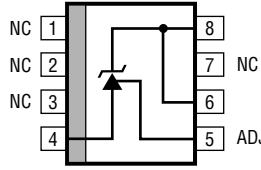
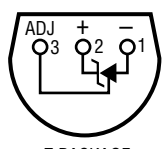


LT1009 Series

ABSOLUTE MAXIMUM RATINGS (Note 1)

Reverse Current	20mA	Operating Temperature Range	
Forward Current	10mA	LT1009/LT1009C	0°C to 70°C
Storage Temperature Range	-65°C to 150°C	LT1009I	-40°C to 85°C
Lead Temperature (Soldering, 10 sec)	300°C	LT1009M	-55°C to 125°C

PACKAGE/ORDER INFORMATION

<p>BOTTOM VIEW</p>  <p>H PACKAGE 3-LEAD TO-46 METAL CAN</p> <p>$T_{JMAX} = 150^{\circ}C, \theta_{JA} = 440^{\circ}C/W, \theta_{JC} = 80^{\circ}C/W$</p>	<p>TOP VIEW</p>  <p>S8 PACKAGE 8-LEAD PLASTIC SO</p> <p>$T_{JMAX} = 150^{\circ}C, \theta_{JA} = 190^{\circ}C/W$</p>	<p>BOTTOM VIEW</p>  <p>Z PACKAGE 3-LEAD PLASTIC TO-92</p> <p>$T_{JMAX} = 100^{\circ}C, \theta_{JA} = 160^{\circ}C/W$</p>
ORDER PART NUMBER	ORDER PART NUMBER	ORDER PART NUMBER
LT1009MH LT1009CH	LT1009S8 LT1009IS8	LT1009CZ LT1009IZ
	S8 PART MARKING	
	1009 1009I	

AVAILABLE OPTIONS

TEMPERATURE	ACCURACY (%)	TEMPERATURE COEFFICIENT (ppm/°C)	PACKAGE STYLE		
			TO-46 (H)	SO-8 (S8)	TO-92 (Z)
0°C to 70°C	0.20	25	LT1009CH	LT1009S8	LT1009CZ
	0.40	25			
-40°C to 85°C	0.20	25		LT1009IS8	LT1009IZ
	0.40	35			
-55°C to 125°C	0.20	35	LT1009MH		

ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the full operating temperature range, otherwise specifications are $T_A = 25^\circ\text{C}$. For MIL-STD components, please refer to LTC883C data sheet for test listing and parameters.

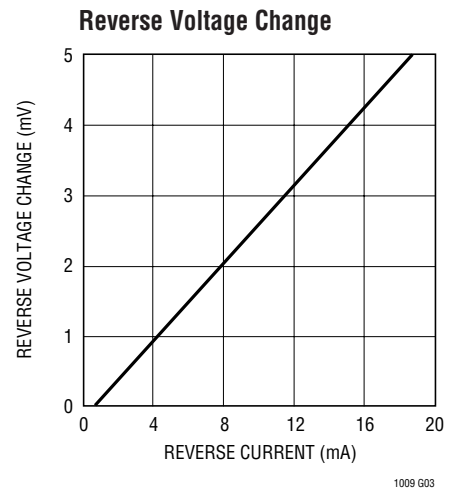
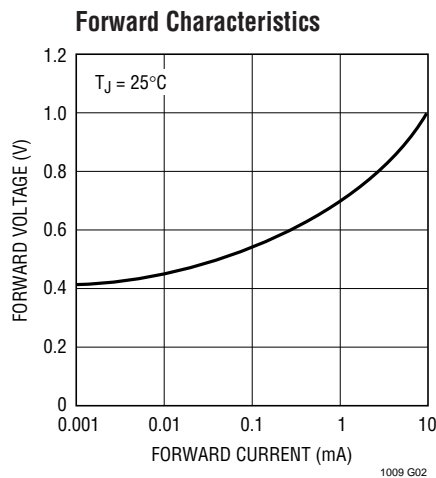
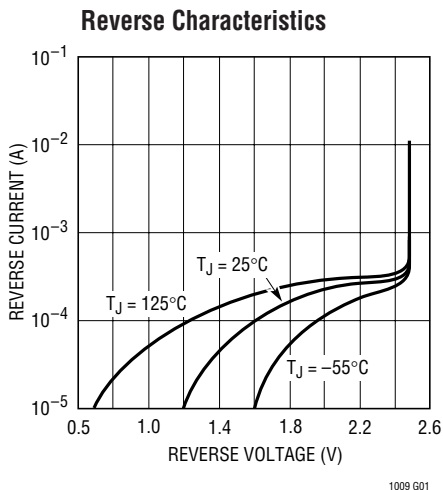
SYMBOL	PARAMETER	CONDITIONS	LT1009M			LT1009I			LT1009/LT1009C			UNITS
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_Z	Reverse Breakdown Voltage	$T_A = 25^\circ\text{C}$, $I_R = 1\text{mA}$, H, Z Pkg S Pkg	2.495	2.500	2.505	2.495	2.500	2.505	2.495	2.500	2.505	V V
$\frac{\Delta V_Z}{\Delta I_R}$	Reverse Breakdown Change with Current	$400\mu\text{A} \leq I_R \leq 10\text{mA}$	●	2.6	6	2.6	10	2.6	10	2.6	10	mV mV
r_Z	Reverse Dynamic Impedance	$I_R = 1\text{mA}$	●	0.2	0.6	0.2	1.0	0.2	1.0	0.2	1.0	Ω Ω
	Temperature Stability	$T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$	●		15		15		1.8	4		mV
$\frac{\Delta V_Z}{\Delta \text{Temp}}$	Average Temperature Coefficient (Notes 2, 3)	$0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ $-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$ $-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		15	25	15	25	35	15	25		ppm/ $^\circ\text{C}$ ppm/ $^\circ\text{C}$ ppm/ $^\circ\text{C}$
$\frac{\Delta V_Z}{\Delta \text{Time}}$	Long-Term Stability	$T_A = 25^\circ\text{C} \pm 0.1^\circ\text{C}$ $I_R = 1\text{mA}$		20		20		20	20			ppm/kHr

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

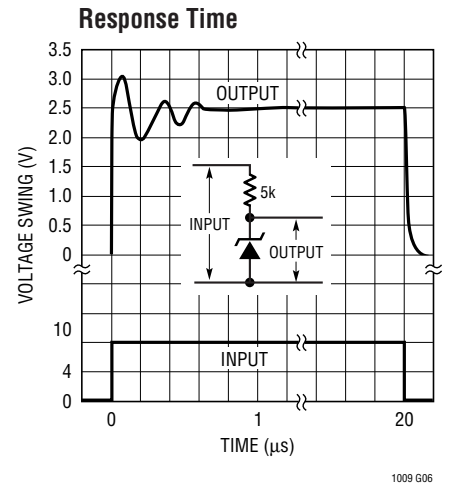
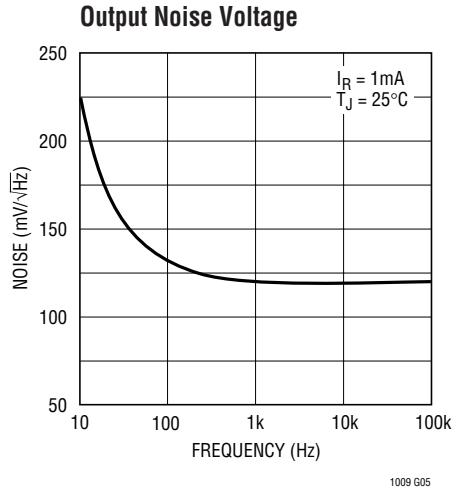
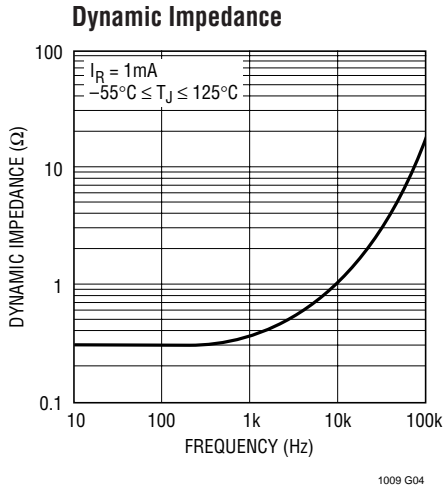
Note 2: Guaranteed by Design.

Note 3: Average temperature coefficient is defined as the total voltage change divided by the specified temperature change.

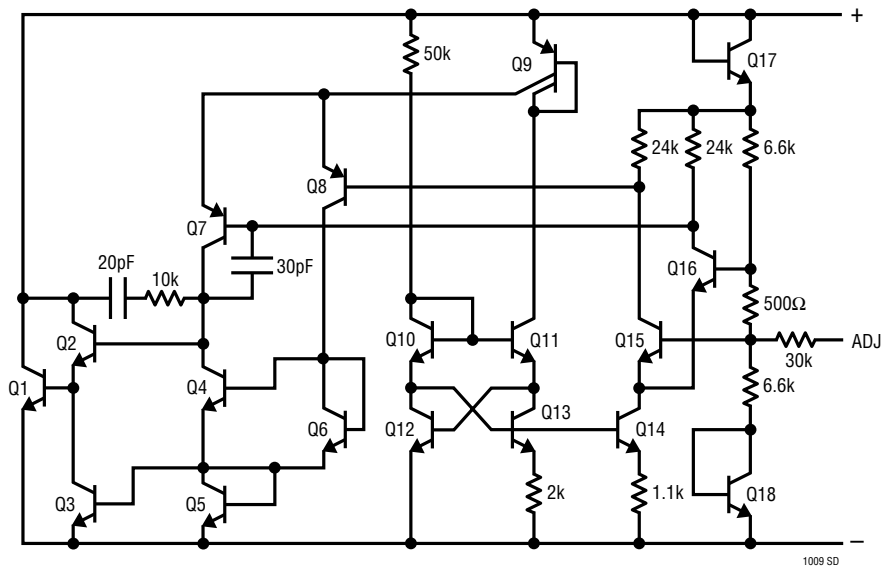
TYPICAL PERFORMANCE CHARACTERISTICS



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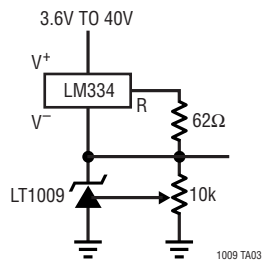


SCHEMATIC DIAGRAM

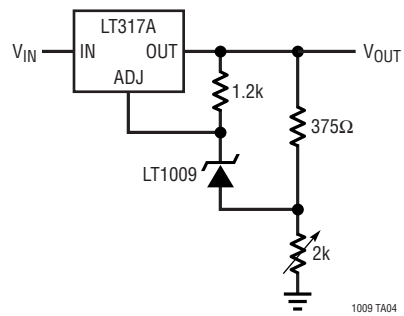


TYPICAL APPLICATIONS

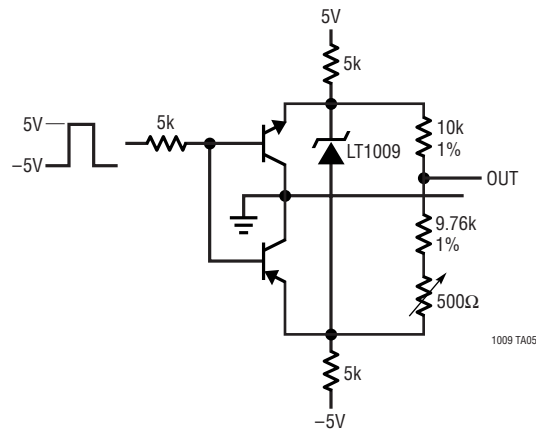
Wide Supply Range, Adjustable Reference



Low Temperature Coefficient Power Regulator

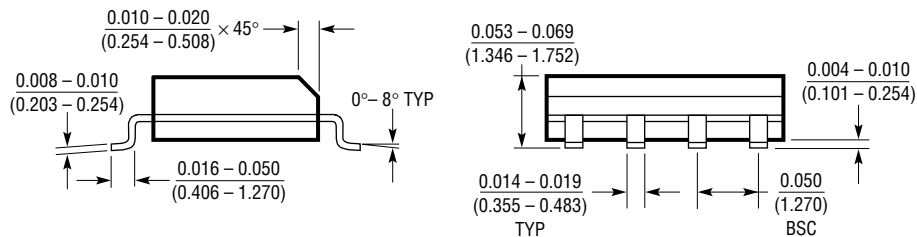
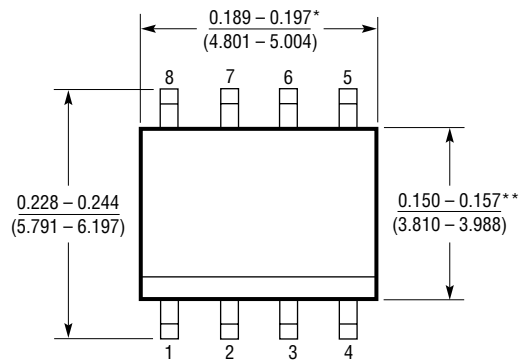


Switchable $\pm 1.25V$ Bipolar Reference



PACKAGE DESCRIPTION Dimensions in inches (millimeters) unless otherwise noted.

S8 Package
8-Lead Plastic Small Outline (Narrow 0.150)
 (LTC DWG # 05-08-1610)

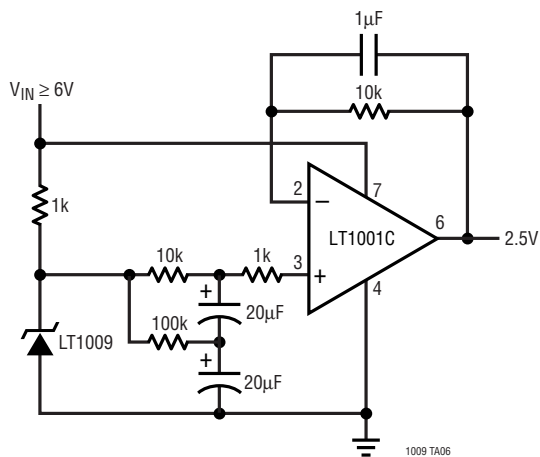


DIMENSION DOES NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.006 (0.152mm) PER SIDE

**DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010* (0.254mm) PER SIDE

TYPICAL APPLICATION

Low Noise 2.5V Buffered Reference



RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1019	Precision Series Reference	Bandgap, 0.05%, 5ppm/°C
LT1236	Precision Series Reference	5V and 10V Zener-Based 5ppm/°C, SO-8 Package
LTC [®] 1798	Micropower Low Dropout Series Reference	0.15% Max, 6.5μA Supply Current
LT1460	Micropower Precision Series Reference	Bandgap, 130μA Supply Current 10ppm/°C, Available in SOT-23
LT1634	Micropower Precision Shunt Voltage Reference	Bandgap 0.05%, 10ppm/°C, 10μA Supply Current
LT1461	Micropower Precision Series Reference	0.04% Max, 3ppm/°C Max, 35μA Supply Current