

## 2.5 Volt Reference

The CS1009 is a precision trimmed 2.5 V  $\pm 5.0$  mV shunt regulator diode. The low dynamic impedance and wide operating current range enhances its versatility. The tight reference tolerance is achieved by on-chip trimming which minimizes voltage tolerance and temperature drift.

A third terminal allows the reference voltage to be adjusted  $\pm 5.0\%$  to calibrate out system errors. In many applications, the CS1009GZ can be used as a pin-to-pin replacement of the LT1009CZ and the LM136Z-2.5 with the external trim network eliminated.

### Features

- 0.2% Initial Tolerance Max.
- Guaranteed Temperature Stability
- Maximum 0.6  $\Omega$  Dynamic Impedance
- Wide Operating Current Range
- Directly Interchangeable with LT1009 and LM136 for Improved Performance
- No Adjustments Needed for Minimum Temperature Coefficient
- Meets Mil Std 883C ESD Requirements

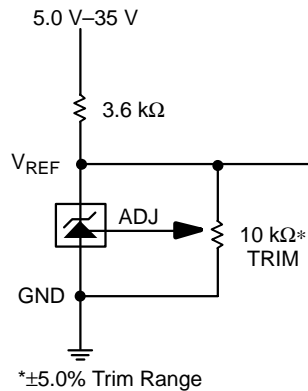


Figure 1. Application Diagram

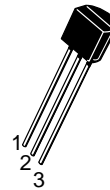


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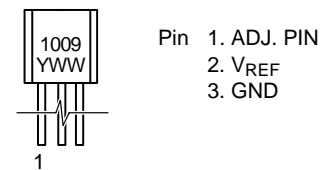
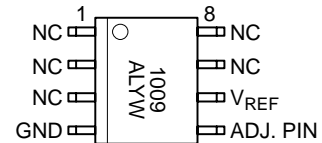


SO-8  
D SUFFIX  
CASE 751



TO-92  
Z SUFFIX  
CASE 29

### PIN CONNECTIONS AND MARKING DIAGRAM



A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
CS1009GD8	SO-8	95 Units/Rail
CS1009GDR8	SO-8	2500 Tape & Reel
CS1009GZ3	TO-92	2000 Units
CS1009GZR3	TO-92	2000 Tape & Reel

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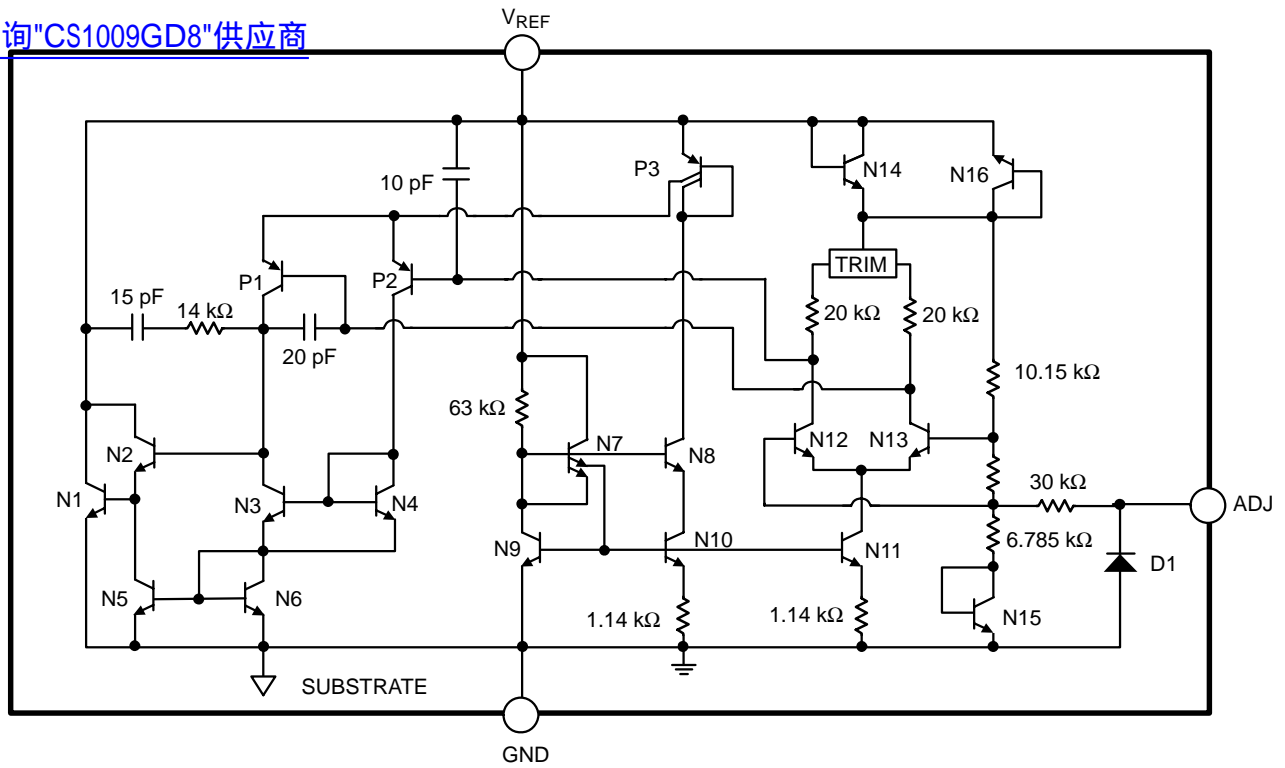


Figure 2. Block Diagram

# MAXIMUM RATINGS\*

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Rating	Value	Unit
Reverse Current	20	mA
Forward	10	mA
Operating Temperature Range	-40 to 105	°C
Storage Temperature Range	-65 to +150	°C
Lead Temperature Soldering:	Wave Solder (through hole styles only) (Note 1) Reflow: (SMD styles only) (Note 2)	260 peak 230 peak °C °C

1. 10 second maximum
2. 60 second maximum above 183°C.

\*The maximum package power dissipation must be observed.

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise specified.)

Characteristic	Test Conditions	Min	Typ	Max	Unit
Reverse Breakdown Voltage	I <sub>R</sub> = 1.0 mA	2.492	2.500	2.508	V
Reverse Breakdown Voltage	0°C ≤ T <sub>A</sub> ≤ 105°C	2.492	2.500	2.508	V
Reverse Breakdown Voltage	-40°C ≤ T <sub>A</sub> ≤ °C	2.480	2.500	2.508	V
Reverse Breakdown Voltage Change with Current	400 μA ≤ I <sub>R</sub> ≤ 10 mA	—	2.6 3.0	10 12	mV mV
Reverse Dynamic Impedance	I <sub>R</sub> = 1.0 mA	—	0.2 0.4	1.0 1.4	Ω Ω
Temperature Stability Average Temperature Coefficient	0°C ≤ T <sub>A</sub> ≤ 70°C, Note 3 0°C ≤ T <sub>A</sub> ≤ 70°C, Note 3	—	—	—	mV ppm/°C
Long Term Stability	T <sub>A</sub> = 25°C ±0.1 C, I <sub>R</sub> = 1.0 mA	—	20	—	ppm/kHr

† Denotes the specifications which apply over full operating temperature range.

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

## TYPICAL PERFORMANCE CHARACTERISTICS

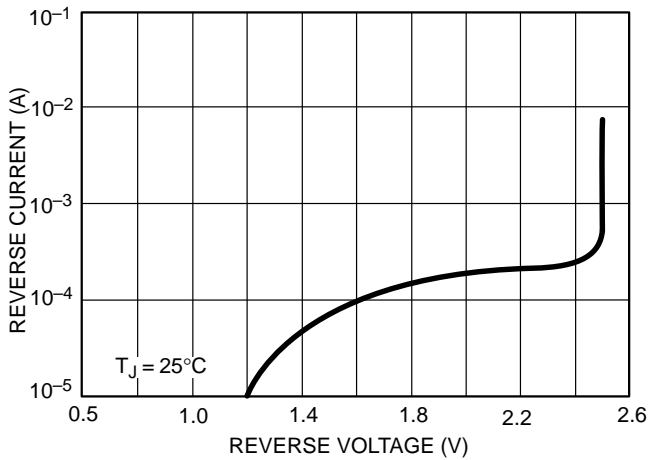


Figure 3. Reverse Current vs. Reverse Voltage

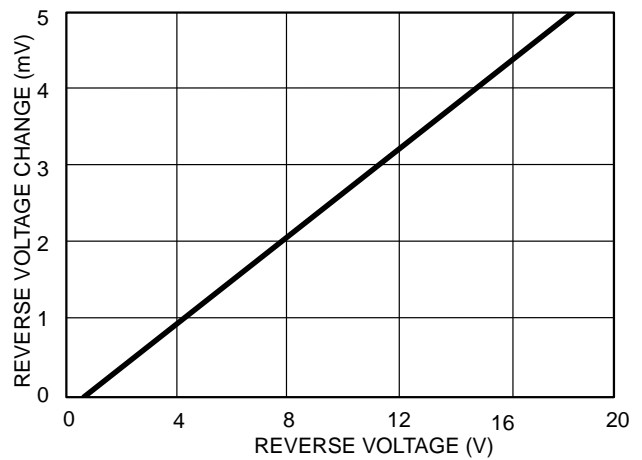


Figure 4. Change in Reverse Voltage vs. Reverse Current

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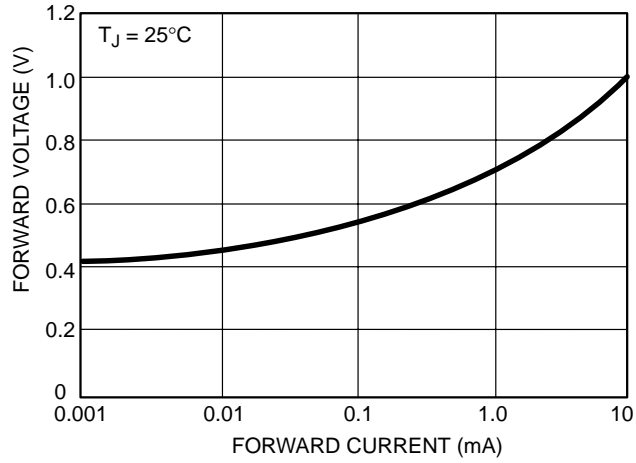


Figure 5. Forward Voltage vs. Forward Current

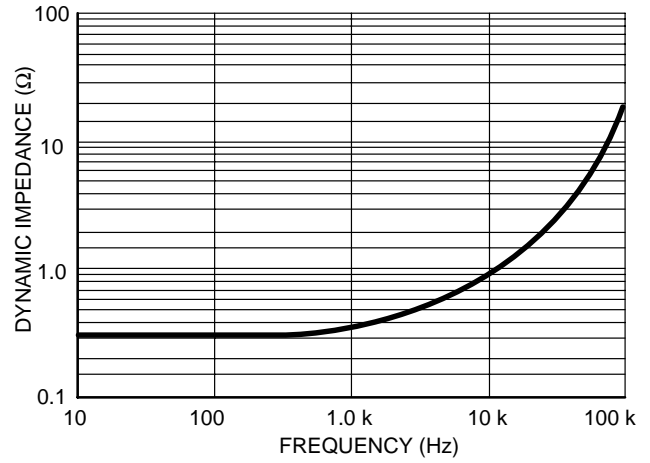


Figure 6. Dynamic Impedance vs. Frequency

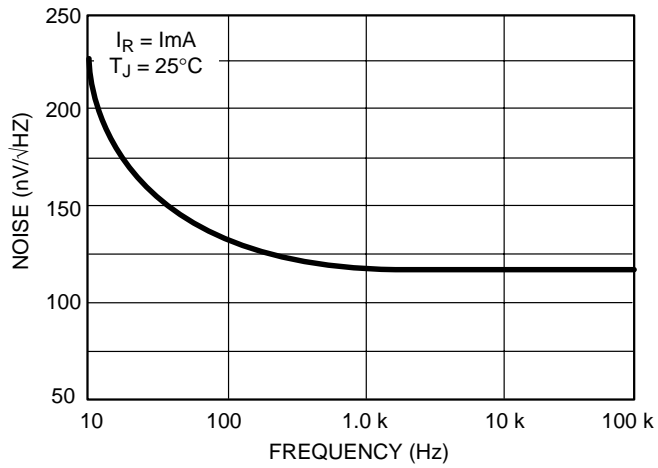


Figure 7. Zener Noise Voltage vs. Frequency

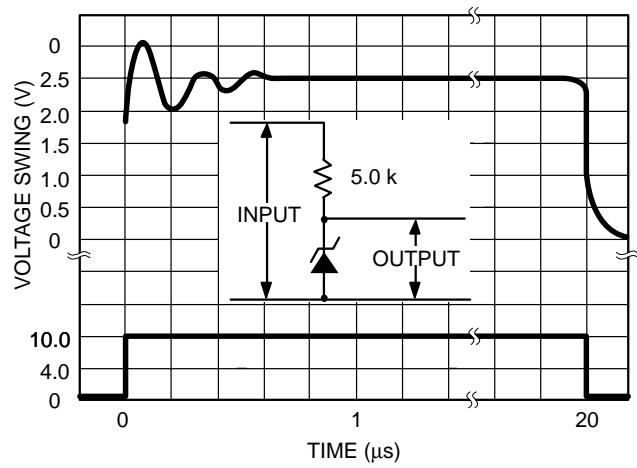


Figure 8. Response Time

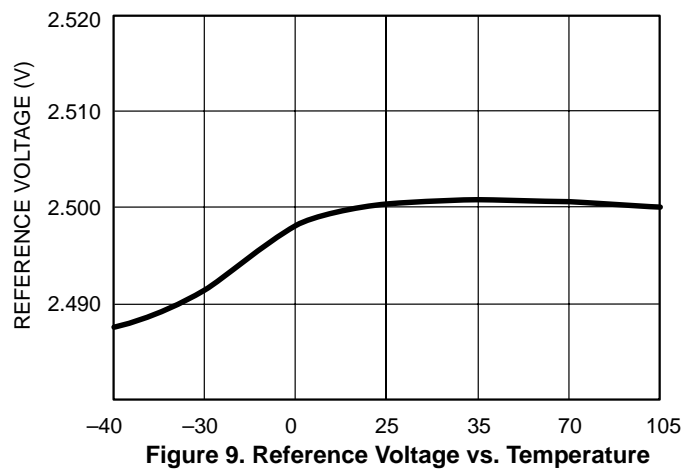


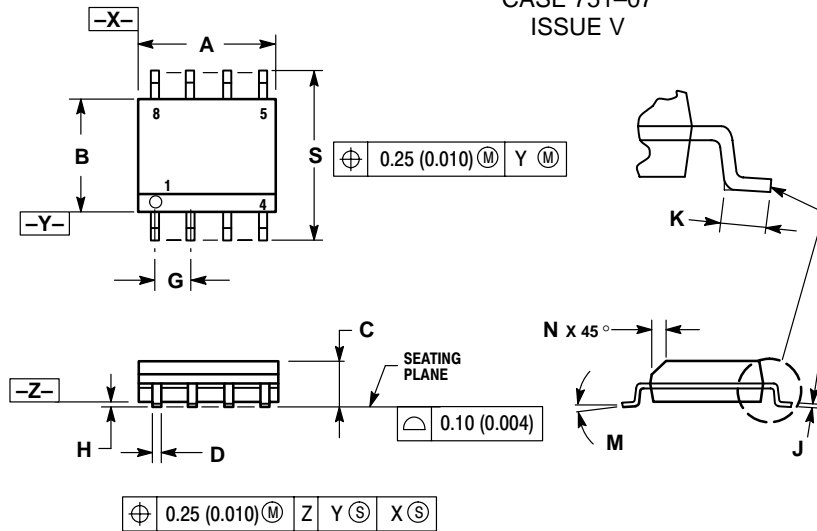
Figure 9. Reference Voltage vs. Temperature

# CS1009

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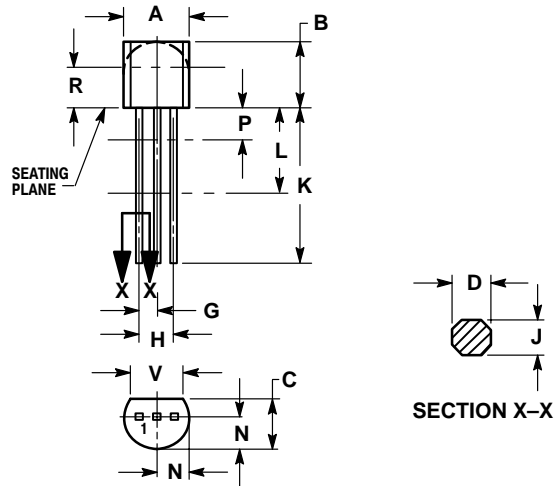
## PACKAGE DIMENSIONS

SO-8  
D SUFFIX  
CASE 751-07  
ISSUE V



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

TO-92  
Z SUFFIX  
CASE 29-11  
ISSUE AL



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
  4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---


## PACKAGE THERMAL DATA

Parameter		SO-8	TO-92	Unit
R <sub>θJC</sub>	Typical	45	—	°C/W
R <sub>θJA</sub>	Typical	165	170	°C/W

**Notes**  
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