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CS1009

2.5 Volt Reference

The CS1009 is a precision trimmed 2.5 V ±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 ±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 Ω 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

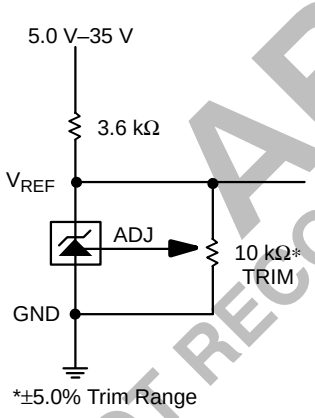

Figure 1. Application Diagram

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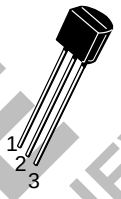
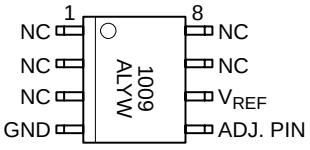
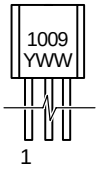
SO–8
D SUFFIX
CASE 751



TO–92
Z SUFFIX
CASE 29

PIN CONNECTIONS AND MARKING DIAGRAM





Pin 1. ADJ. PIN
2. V_{REF}
3. GND

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

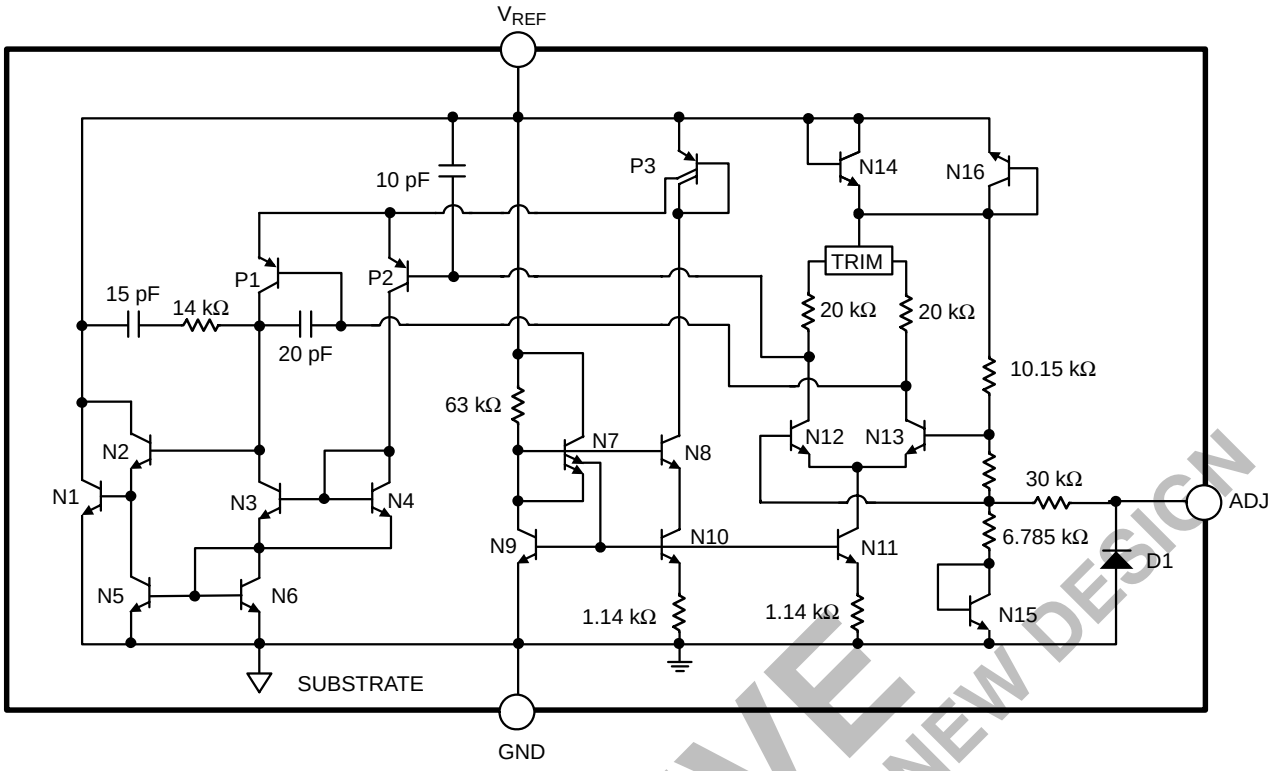


Figure 2. Block Diagram

MAXIMUM RATINGS*

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_A = 25°C unless otherwise specified.)

Characteristic	Test Conditions	Min	Typ	Max	Unit
Reverse Breakdown Voltage	I_R = 1.0 mA	2.492	2.500	2.508	V
Reverse Breakdown Voltage	0°C ≤ T_A ≤ 105°C	2.492	2.500	2.508	V
Reverse Breakdown Voltage	–40°C ≤ T_A ≤ °C	2.480	2.500	2.508	V
Reverse Breakdown Voltage Change with Current	400 μA ≤ I_R ≤ 10 mA †	– –	2.6 3.0	10 12	mV mV
Reverse Dynamic Impedance	I_R = 1.0 mA †	– –	0.2 0.4	1.0 1.4	Ω Ω
Temperature Stability Avgerage Temperature Coefficient	0°C ≤ T_A ≤ 70°C, Note 3 0°C ≤ T_A ≤ 70°C, Note 3	– –	– –	– –	mV ppm/°C
Long Term Stabilty	T_A = 25°C ±0.1 C, I_R = 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

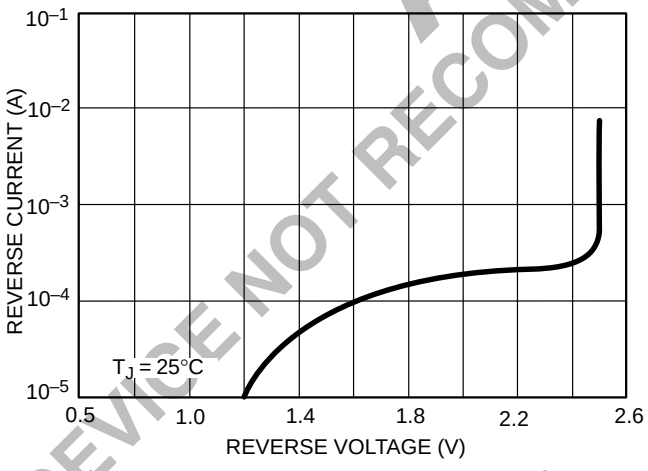


Figure 3. Reverse Current vs. Reverse Voltage

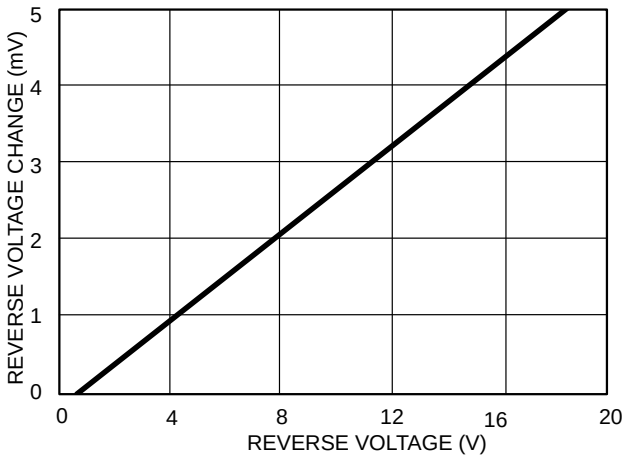


Figure 4. Change in Reverse Voltage vs. Reverse Current

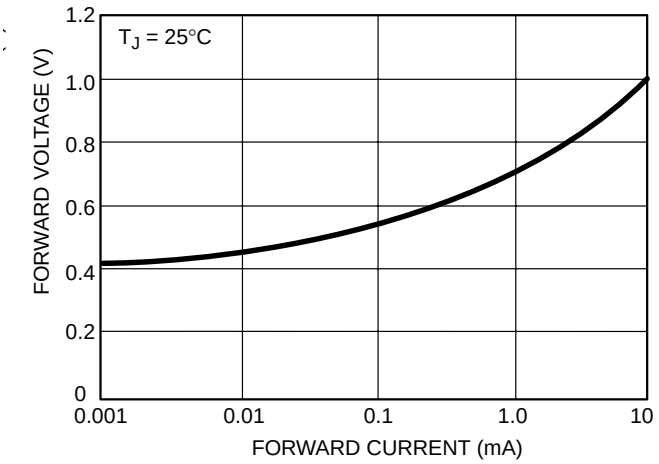


Figure 5. Forward Voltage vs. Forward Current

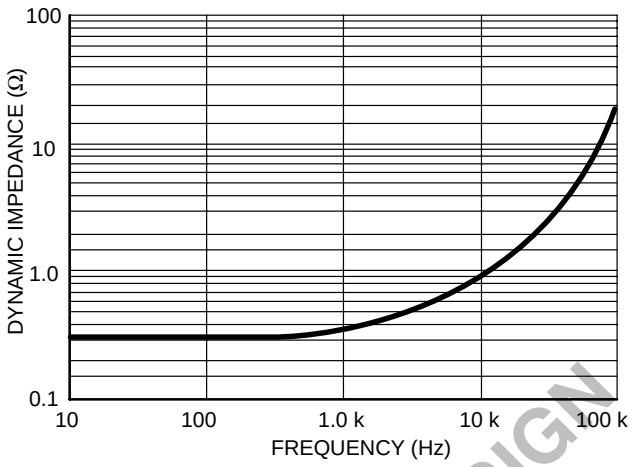


Figure 6. Dynamic Impedance vs. Frequency

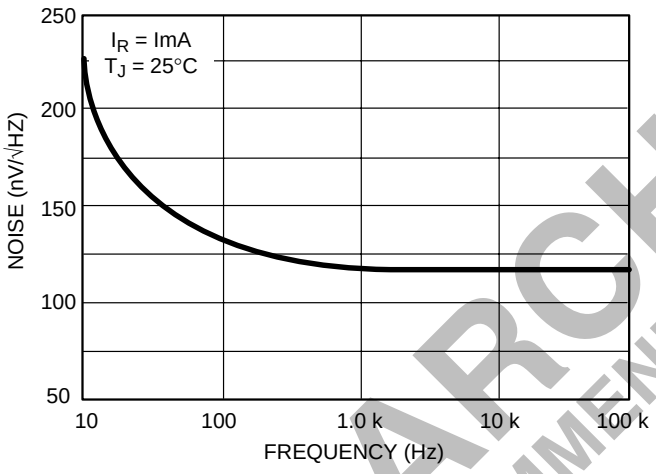


Figure 7. Zener Noise Voltage vs. Frequency

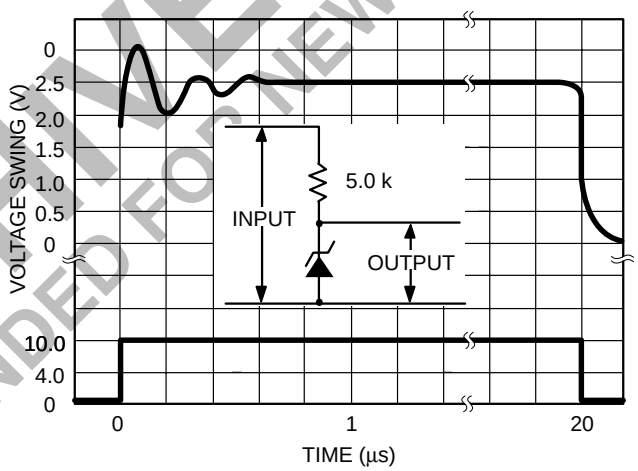


Figure 8. Response Time

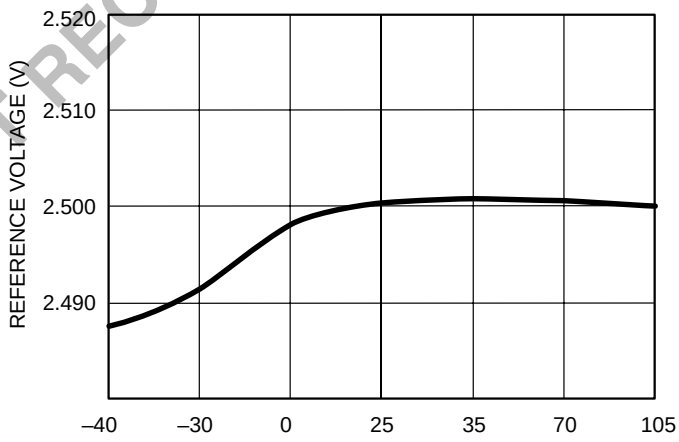
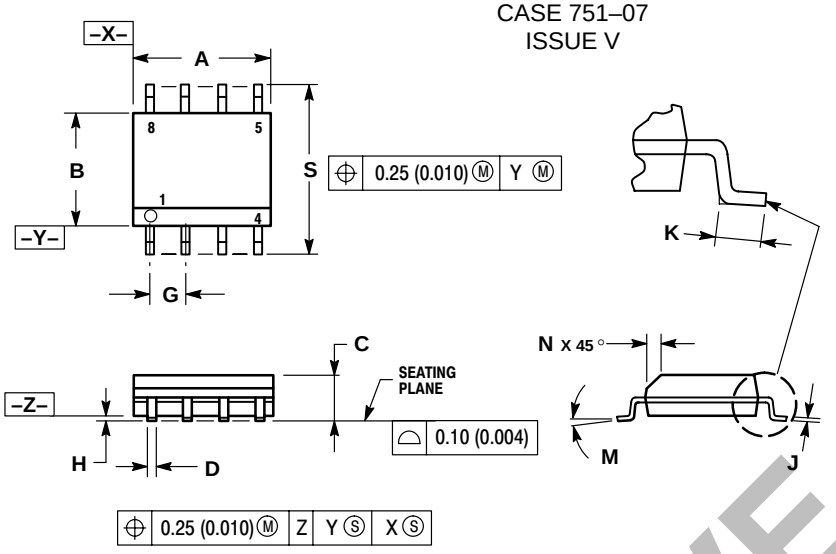


Figure 9. Reference Voltage vs. Temperature

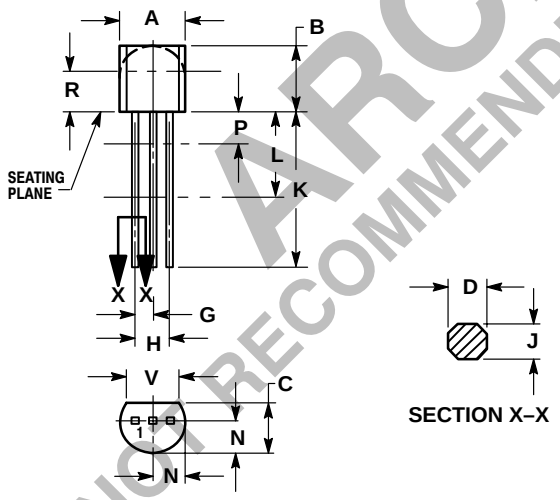
PACKAGE DIMENSIONS

SO–8
D SUFFIX
CASE 751–07
ISSUE V



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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 MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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
$R_{\Theta JC}$	Typical	45	–	°C/W
$R_{\Theta JA}$	Typical	165	170	°C/W

Notes

Notes

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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