

NCV1009

2.5 Volt Reference

The NCV1009 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 NCV1009Z 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
- Extended Operating Temperature Range for Use in Automotive Applications

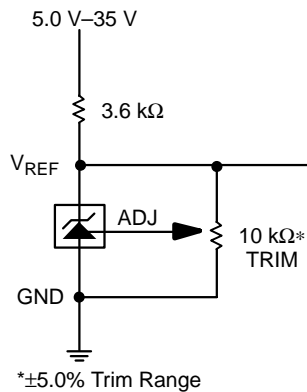


Figure 1. Application Diagram

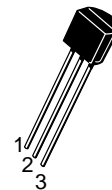


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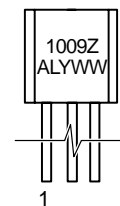
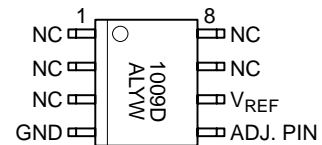


**SO-8
D SUFFIX
CASE 751**



**TO-92
Z SUFFIX
CASE 29**

PIN CONNECTIONS AND MARKING DIAGRAM



Pin 1. ADJ. PIN
2. VREF
3. GND

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

ORDERING INFORMATION

Device	Package	Shipping
NCV1009D	SO-8	95 Units/Rail
NCV1009DR2	SO-8	2500 Tape & Reel
NCV1009Z	TO-92	2000 Units
NCV1009ZRP	TO-92	2000 Tape & Reel

MAXIMUM RATINGS*

Rating	Value	Unit
Reverse Current	20	mA
Forward	10	mA
Package Thermal Resistance, SO-8: Junction-to-Case, $R_{\theta JC}$ Junction-to-Ambient, $R_{\theta JA}$	45 165	$^{\circ}C/W$ $^{\circ}C/W$
Package Thermal Resistance, TO-92: Junction-to-Case, $R_{\theta JC}$ Junction-to-Ambient, $R_{\theta JA}$	- 170	$^{\circ}C/W$ $^{\circ}C/W$
Operating Temperature Range	-40 to +125	$^{\circ}C$
Storage Temperature Range	-65 to +150	$^{\circ}C$
Lead Temperature Soldering:	Wave Solder (through hole styles only) (Note 1) Reflow: (SMD styles only) (Note 2)	260 peak 230 peak $^{\circ}C$ $^{\circ}C$

1. 10 second maximum
2. 60 second maximum above 183 $^{\circ}C$.

*The maximum package power dissipation must be observed.

ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}C$ unless otherwise specified.)

Characteristic	Test Conditions	Min	Typ	Max	Unit
Reverse Breakdown Voltage	$I_R = 1.0 \text{ mA}$	2.492	2.500	2.508	V
Reverse Breakdown Voltage	$0^{\circ}C \leq T_A \leq 125^{\circ}C$	2.492	2.500	2.508	V
Reverse Breakdown Voltage	$-40^{\circ}C \leq T_A \leq 0^{\circ}C$	2.480	2.500	2.508	V
Reverse Breakdown Voltage Change with Current	$400 \mu A \leq I_R \leq 10 \text{ mA}$	-	2.6 3.0	10 12	mV mV
Reverse Dynamic Impedance	$I_R = 1.0 \text{ mA}$	-	0.2 0.4	1.0 1.4	Ω Ω
Temperature Stability Average Temperature Coefficient	$0^{\circ}C \leq T_A \leq 70^{\circ}C$, Note 3 $0^{\circ}C \leq T_A \leq 70^{\circ}C$, Note 3	-	-	-	mV ppm/ $^{\circ}C$
Long Term Stability	$T_A = 25^{\circ}C \pm 0.1 \text{ C}$, $I_R = 1.0 \text{ mA}$	-	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

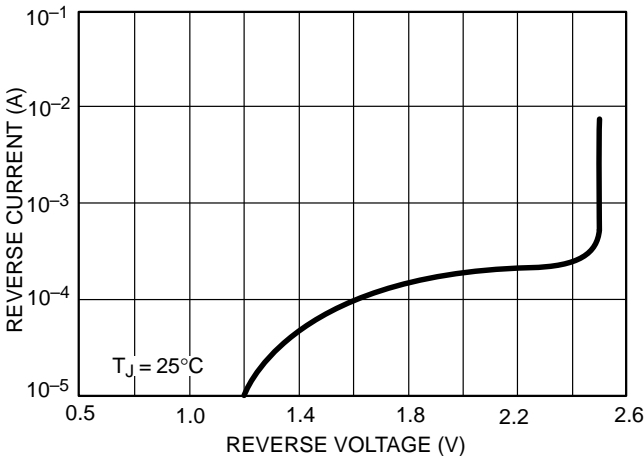


Figure 3. Reverse Current vs. Reverse Voltage

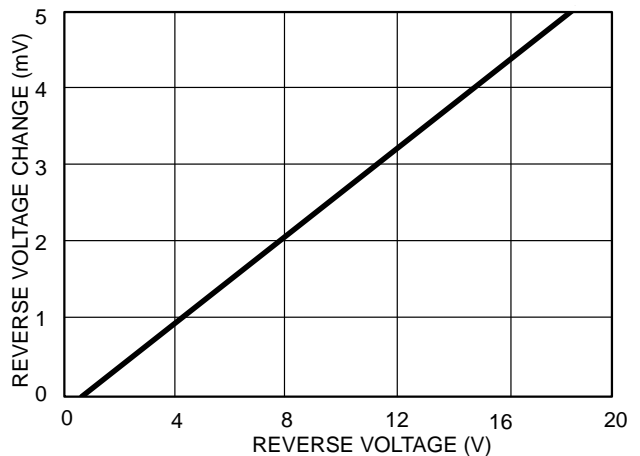


Figure 4. Change in Reverse Voltage vs. Reverse Current

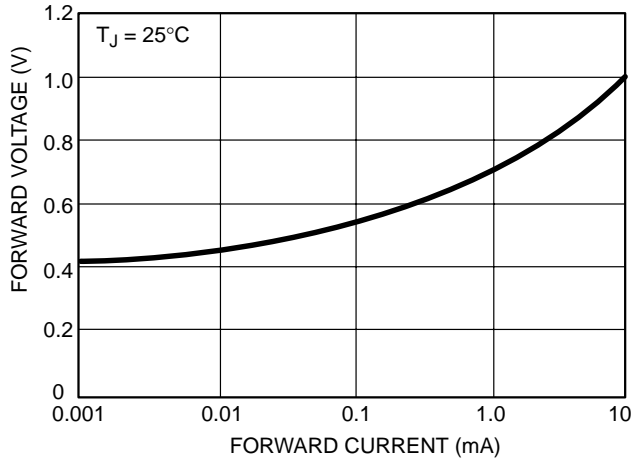


Figure 5. Forward Voltage vs. Forward Current

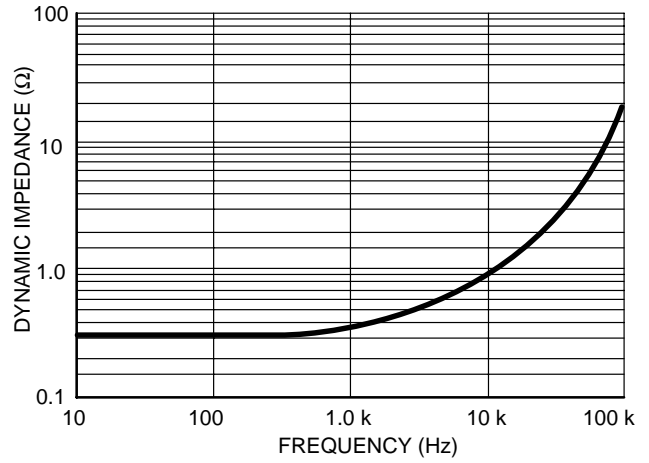


Figure 6. Dynamic Impedance vs. Frequency

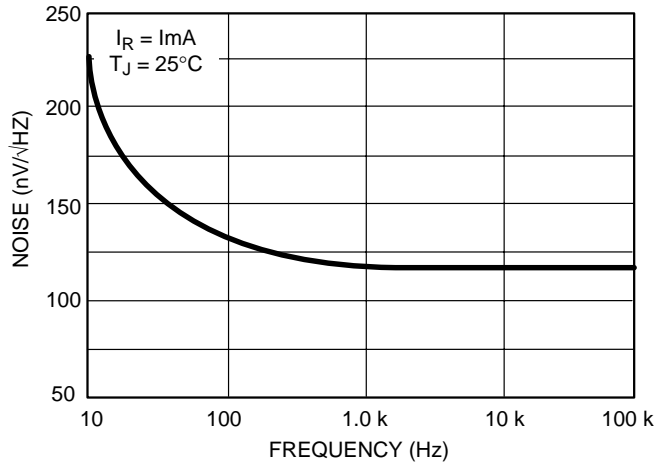


Figure 7. Zener Noise Voltage vs. Frequency

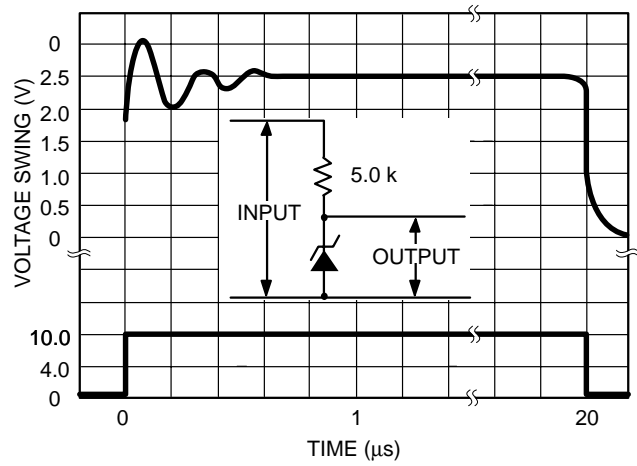


Figure 8. Response Time

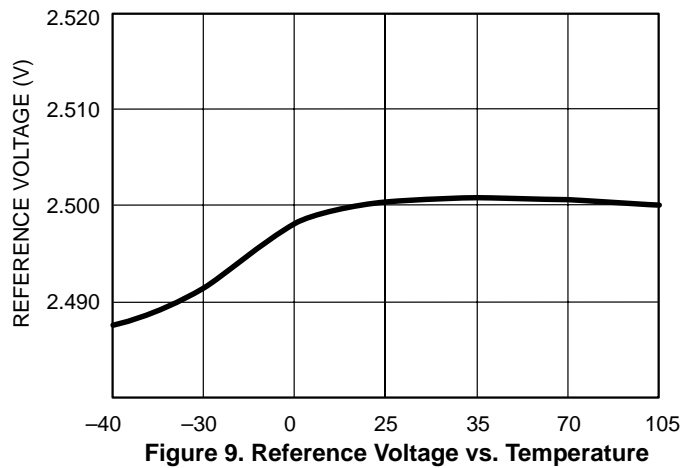
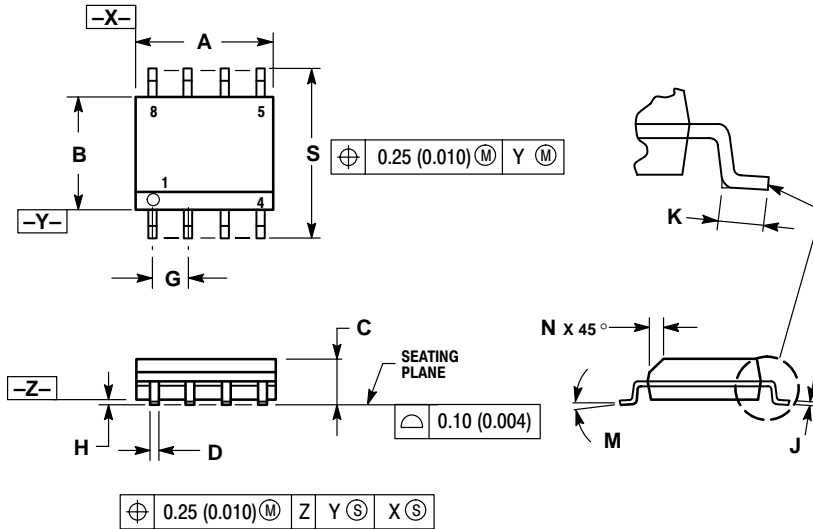


Figure 9. Reference Voltage vs. Temperature

NCV1009

PACKAGE DIMENSIONS

SO-8 D SUFFIX CASE 751-07 ISSUE W

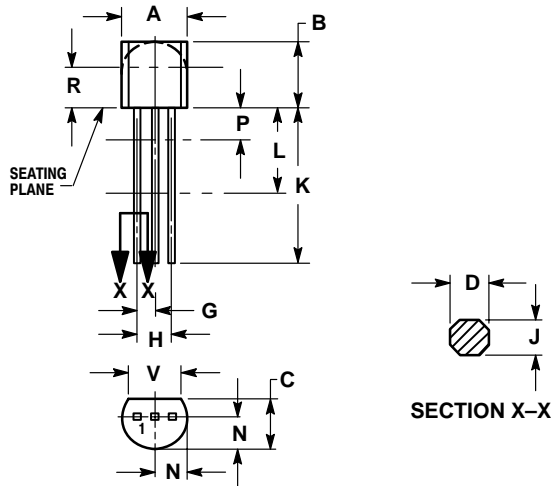


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

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 $^\circ$	8 $^\circ$	0 $^\circ$	8 $^\circ$
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	---

Notes

Notes

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