NCV1009

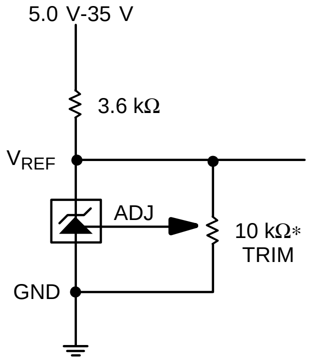
2.5 Volt Reference

The NCV1009 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 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
- NCV Prefix, for Automotive and Other Applications Requiring Site and Change Control



*±5.0% Trim Range

If the external trim resistor is not used, the “ADJ. PIN” should be left floating. The 10k trim potentiometer does not effect the temperature coefficient of the device.

Figure 1. Application Diagram

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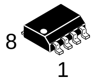
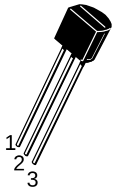
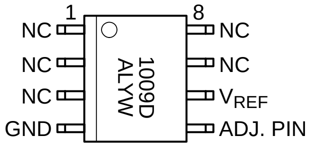


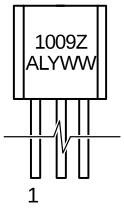
SO-8
D SUFFIX
CASE 751



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

April, 2003 - Rev. 4

Publication Order Number:
NCV1009/D

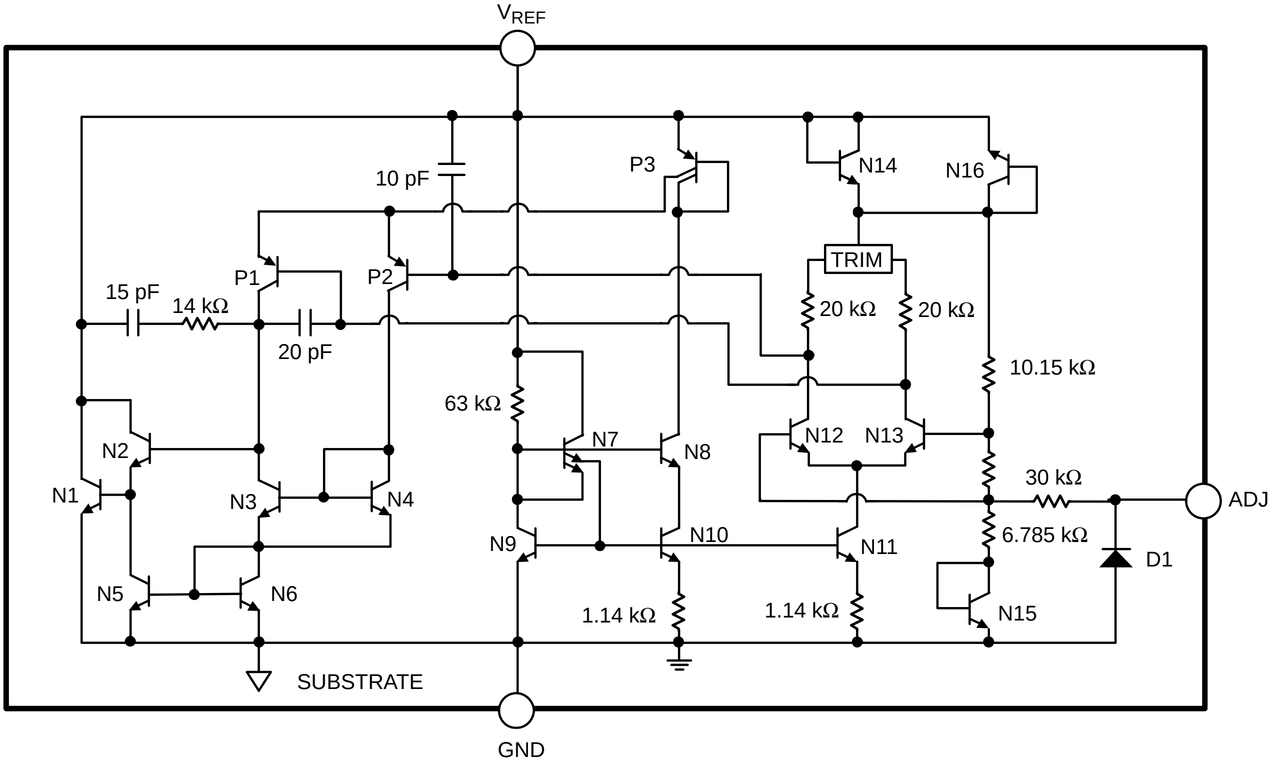


Figure 2. Block Diagram

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	 °C/W °C/W
Package Thermal Resistance, TO-92: Junction-to-Case, $R_{\theta JC}$ Junction-to-Ambient, $R_{\theta JA}$		 - 170	 °C/W °C/W
Operating Temperature Range		-40 to +125	°C
Storage Temperature Range		-65 to +150	°C
Lead Temperature Soldering:	Wave Solder (through hole styles only) (Note 1) Reflow: (SMD styles only) (Notes 2, 3)	260 peak 240 peak	°C °C

1. 10 second maximum
2. 60 second maximum above 183°C.
3. -5 °C / +0°C allowable conditions.

*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 ≤ 125°C	2.492	2.500	2.508	V
Reverse Breakdown Voltage	-40 °C ≤ T_A ≤ 0°C	2.480	2.500	2.508	V
Reverse Breakdown Voltage Change with Current	400 µA ≤ I_R ≤ 10 mA †	- -	2.6 3.0	5.0 6.0	mV mV
Reverse Dynamic Impedance	I_R = 1.0 mA †	- -	0.2 0.4	1.0 1.4	Ω Ω
Temperature Stability Average Temperature Coefficient	0°C ≤ T_A ≤ 70°C, Note 4 0°C ≤ T_A ≤ 70°C, Note 4	- -	1.8 15	- -	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.

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

TYPICAL PERFORMANCE CHARACTERISTICS

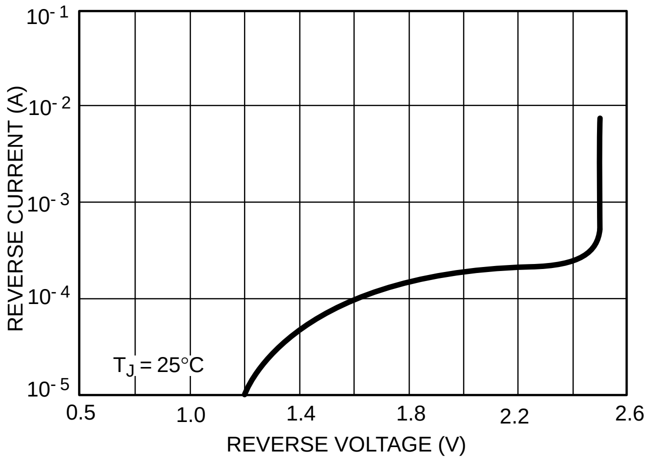


Figure 3. Reverse Current vs. Reverse Voltage

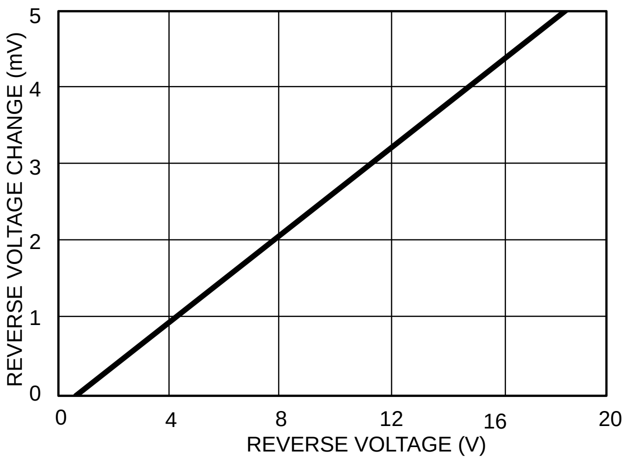


Figure 4. Change in Reverse Voltage vs. Reverse Current

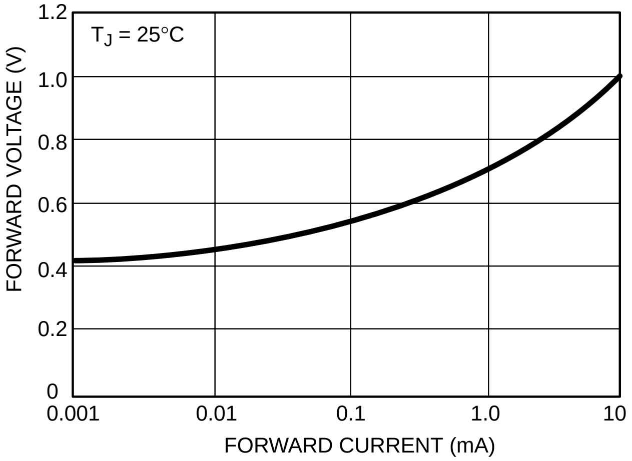


Figure 5. Forward Voltage vs. Forward Current

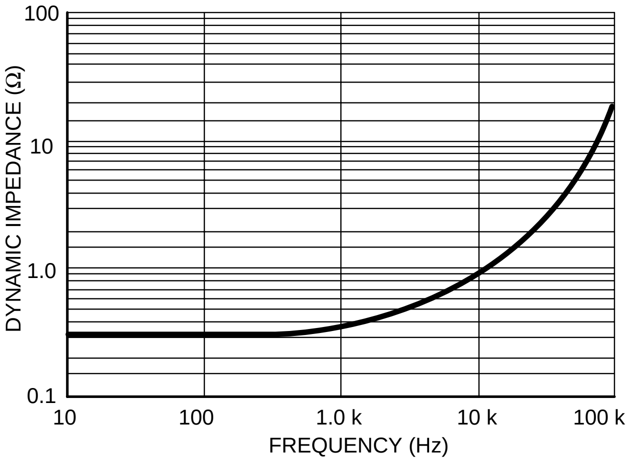


Figure 6. Dynamic Impedance vs. Frequency

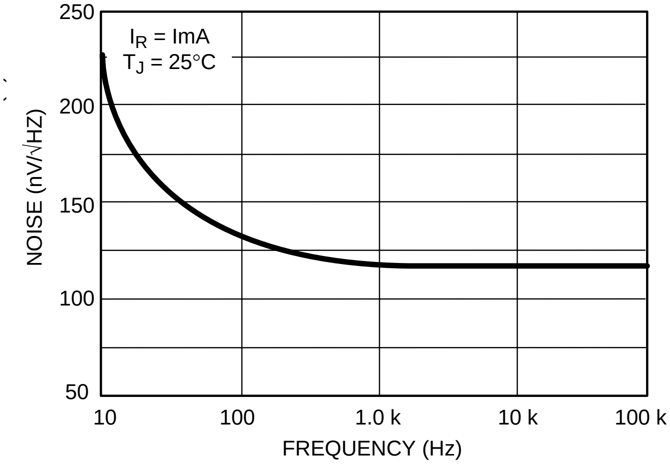


Figure 7. Zener Noise Voltage vs. Frequency

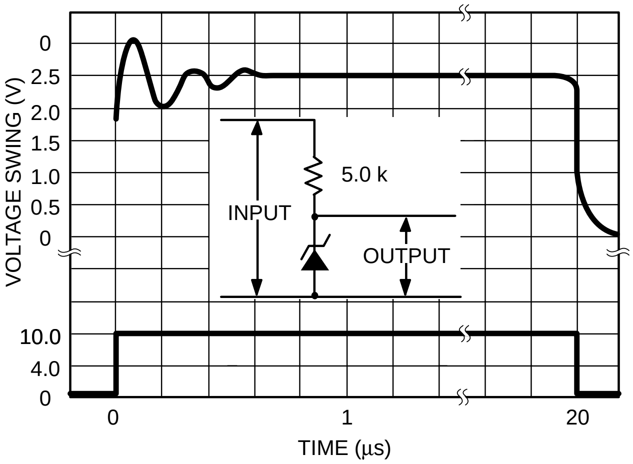


Figure 8. Response Time

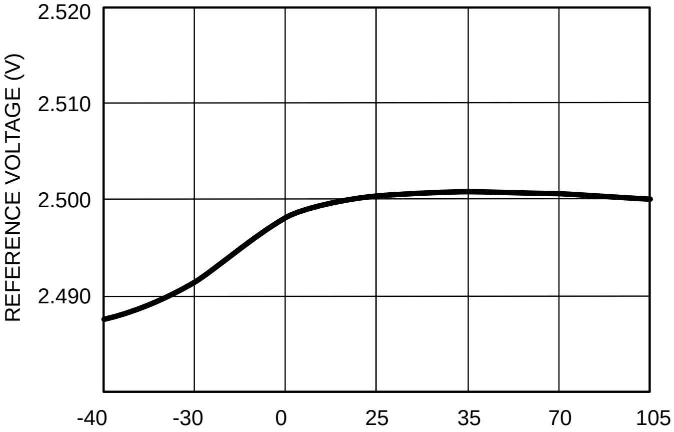
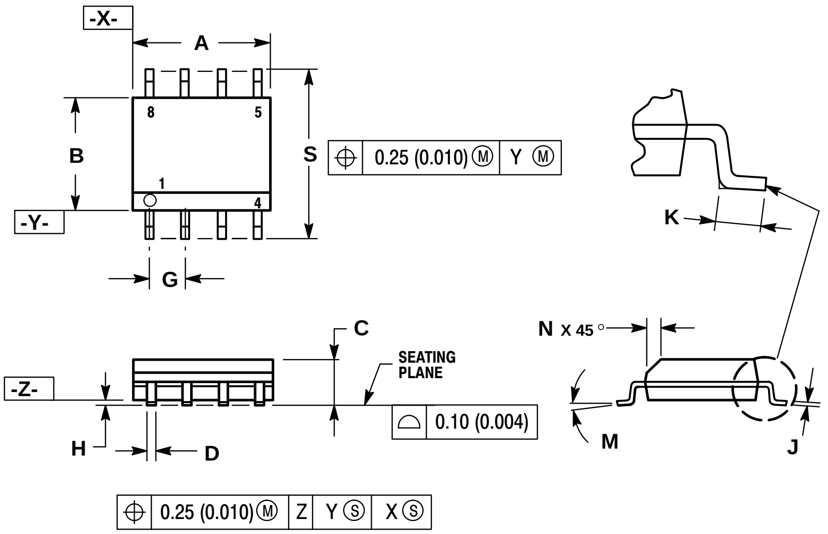


Figure 9. Reference Voltage vs. Temperature

PACKAGE DIMENSIONS

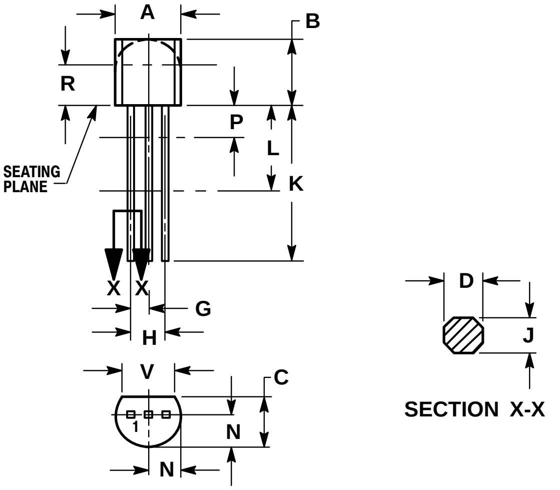
SO-8
D SUFFIX
CASE 751-07
ISSUE AA



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.
6. 751–01 THRU 751–06 ARE OBSOLETE. NEW STANDARD IS 751–07

	MILLIMETERS		INCHES	
DIM	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.

	INCHES		MILLIMETERS	
DIM	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

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