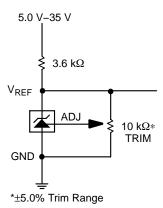
2.5 Volt Reference

The NCV1009 is a precision trimmed $2.5~V~\pm5.0~mV$ 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
- NCV Prefix, for Automotive and Other Applications Requiring Site and Change Control
- Pb-Free Packages are Available



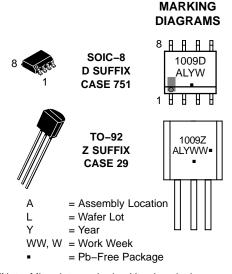
If the external trim resistor is not used, the "ADJ. PIN" should be left floating. The 10k trim potentiometer does not effect the temperature coefficient of the device.

Figure 1. Application Diagram



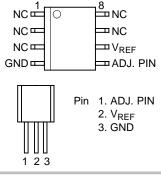
ON Semiconductor®

http://onsemi.com



(Note: Microdot may be in either location)

PIN CONNECTIONS



ORDERING INFORMATION

Device	Package	Shipping
NCV1009D	SOIC-8	95 Units/Rail
NCV1009DR2	SOIC-8	2500 Tape & Reel
NCV1009DR2G	SOIC-8 (Pb-Free)	2500 Tape & Reel
NCV1009Z	TO-92	2000 Units/Rail
NCV1009ZG	TO-92 (Pb-Free)	2000 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

NCV1009

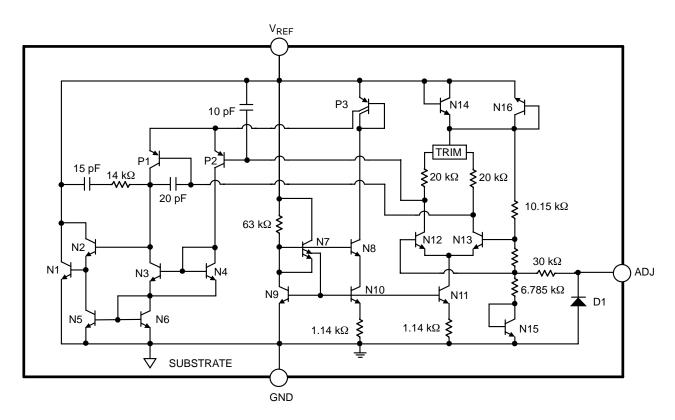


Figure 2. Block Diagram

NCV1009

MAXIMUM RATINGS*

R	ating	Value	Unit
Reverse Current		20	mA
Forward		10	mA
Package Thermal Resistance, SOIC–8: Junction–to–Case, $R_{\theta JC}$ Junction–to–Ambient, $R_{\theta JA}$ Package Thermal Resistance, TO–92: Junction–to–Case, $R_{\theta JC}$ Junction–to–Ambient, $R_{\theta JA}$		45 165 – 170	°C/W °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

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.
*The maximum package power dissipation must be observed.

- 1. 10 second maximum
- 2. 60 second maximum above 183°C.
- 3. -5° C / $+0^{\circ}$ C allowable conditions.

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

Characteristic	Test Conditions		Min	Тур	Max	Unit
Reverse Breakdown Voltage	I _R = 1.0 mA		2.492	2.500	2.508	V
Reverse Breakdown Voltage	$-40^{\circ}\text{C} \le \text{T}_{\text{A}} \le 125^{\circ}\text{C}$		2.480	2.500	2.508	V
Reverse Breakdown Voltage Change with Current	400 μA ≤ I _R ≤ 10 mA	(Note 4)	- -	2.6 3.0	5.0 6.0	mV mV
Reverse Dynamic Impedance	I _R = 1.0 mA	(Note 4)	- -	0.2 0.4	1.0 1.4	Ω Ω
Temperature Stability Average Temperature Coefficient	$0^{\circ}C \le T_A \le 70^{\circ}C$, (Note 5) $0^{\circ}C \le T_A \le 70^{\circ}C$, (Note 5)		- -	1.8 15	- -	mV ppm/°C
Long Term Stabilty	$T_A = 25^{\circ}C \pm 0.1 \text{ C}, I_R = 1.0 \text{ mA}$		_	20	_	ppm/kHr

- 4. Denotes the specifications which apply over full operating temperature range.
- 5. Average temperature coefficient is defined as the total voltage change divided by the specified temperature range.

TYPICAL PERFORMANCE CHARACTERISTICS

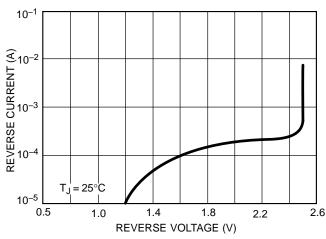


Figure 3. Reverse Current vs. Reverse Voltage

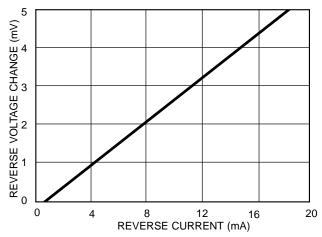


Figure 4. Change in Reverse Voltage vs. Reverse Current

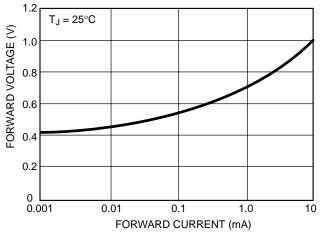


Figure 5. Forward Voltage vs. Forward Current

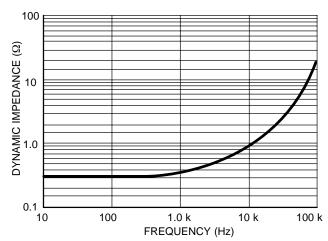


Figure 6. Dynamic Impedance vs. Frequency

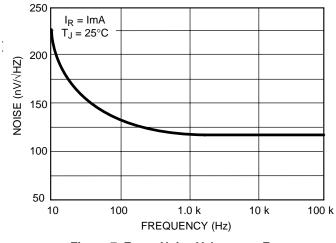


Figure 7. Zener Noise Voltage vs. Frequency

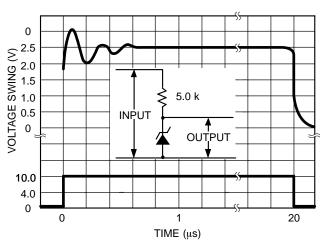
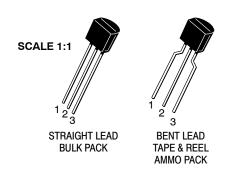


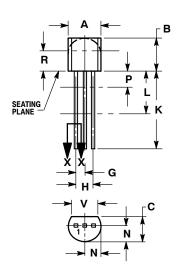
Figure 8. Response Time





TO-92 (TO-226) CASE 29-11 **ISSUE AM**

DATE 09 MAR 2007

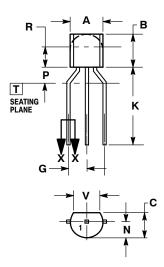


STRAIGHT LEAD **BULK PACK**



- 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.

	INC	HES	MILLIN	IETERS
DIM	MIN	MAX	MIN	MAX
Α	0.175	0.205	4.45	5.20
В	0.170	0.210	4.32	5.33
С	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
Н	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	
٧	0.135		3.43	



BENT LEAD TAPE & REEL AMMO PACK



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
 4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	MILLIMETERS				
DIM	MIN MAX				
Α	4.45	5.20			
В	4.32	5.33			
С	3.18	4.19			
D	0.40	0.54			
G	2.40	2.80			
J	0.39	0.50			
K	12.70				
N	2.04	2.66			
P	1.50	4.00			
R	2.93				
V	3.43				

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TO-92 (TO-226) CASE 29-11

ISSUE AM

DATE 09 MAR 2007

STYLE 1: PIN 1. 2. 3.	EMITTER BASE COLLECTOR	STYLE 2: PIN 1. 2. 3.	BASE EMITTER COLLECTOR	STYLE 3: PIN 1. 2. 3.	ANODE ANODE CATHODE	STYLE 4: PIN 1. 2. 3.	CATHODE CATHODE ANODE	STYLE 5: PIN 1. 2. 3.	DRAIN
2.	GATE SOURCE & SUBSTRATE DRAIN	STYLE 7: PIN 1. 2. 3.	SOURCE DRAIN GATE	STYLE 8: PIN 1. 2. 3.	DRAIN GATE SOURCE & SUBSTRATE	PIN 1.	BASE 1		CATHODE
2.	ANODE CATHODE & ANODE CATHODE	STYLE 12: PIN 1. 2. 3.	MAIN TERMINAL 1 GATE MAIN TERMINAL 2	PIN 1.	ANODE 1	PIN 1.	EMITTER COLLECTOR BASE	PIN 1. 2.	
2.	ANODE GATE	PIN 1. 2.	COLLECTOR BASE	PIN 1. 2.	ANODE CATHODE	PIN 1. 2.	GATE	2.	NOT CONNECTED
2.	COLLECTOR	PIN 1. 2.	SOURCE GATE DRAIN	STYLE 23: PIN 1. 2. 3.	GATE SOURCE DRAIN	STYLE 24: PIN 1. 2. 3.	EMITTER COLLECTOR/ANODE CATHODE	STYLE 25: PIN 1. 2. 3.	MT 1 GATE
	V _{CC}	PIN 1. 2.	MT	STYLE 28: PIN 1. 2.	CATHODE ANODE GATE	STYLE 29: PIN 1. 2.		PIN 1. 2.	DRAIN
	GATE	PIN 1. 2.		STYLE 33: PIN 1. 2. 3.	RETURN	2.			

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ISSUE	REVISION	DATE
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SOIC-8 NB CASE 751-07 **ISSUE AK**

DATE 16 FEB 2011



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER
- ANSI Y14.5M, 1982.
 CONTROLLING DIMENSION: MILLIMETER.
- DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE
- 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.
- 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

	MILLIN	IETERS	INC	HES
DIM	MIN	MAX	MIN	MAX
Α	4.80	5.00	0.189	0.197
В	3.80	4.00	0.150	0.157
С	1.35	1.75	0.053	0.069
D	0.33	0.33 0.51 0.013		0.020
G	1.27	7 BSC	0.050 BSC	
Н	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
М	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

SOLDERING FOOTPRINT*



^{*}For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code = Assembly Location = Wafer Lot = Year = Work Week W

= Pb-Free Package

XXXXXX XXXXXX AYWW AYWW Ŧ \mathbb{H} Discrete **Discrete** (Pb-Free)

XXXXXX = Specific Device Code = Assembly Location Α = Year ww = Work Week = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

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SOIC-8 NB CASE 751-07 ISSUE AK

DATE 16 FEB 2011

STYLE 1: PIN 1. EMITTER 2. COLLECTOR 3. COLLECTOR 4. EMITTER 5. EMITTER 6. BASE 7. BASE 8. EMITTER	STYLE 2: PIN 1. COLLECTOR, DIE, #1 2. COLLECTOR, #1 3. COLLECTOR, #2 4. COLLECTOR, #2 5. BASE, #2 6. EMITTER, #2 7. BASE, #1 8. EMITTER, #1	STYLE 3: PIN 1. DRAIN, DIE #1 2. DRAIN, #1 3. DRAIN, #2 4. DRAIN, #2 5. GATE, #2 6. SOURCE, #2 7. GATE, #1 8. SOURCE, #1	STYLE 4: PIN 1. ANODE 2. ANODE 3. ANODE 4. ANODE 5. ANODE 6. ANODE 7. ANODE 8. COMMON CATHODE
STYLE 5: PIN 1. DRAIN 2. DRAIN 3. DRAIN 4. DRAIN 5. GATE 6. GATE 7. SOURCE 8. SOURCE	STYLE 6: PIN 1. SOURCE 2. DRAIN 3. DRAIN 4. SOURCE 5. SOURCE 6. GATE 7. GATE 8. SOURCE	STYLE 7: PIN 1. INPUT 2. EXTERNAL BYPASS 3. THIRD STAGE SOURCE 4. GROUND 5. DRAIN 6. GATE 3 7. SECOND STAGE Vd 8. FIRST STAGE Vd	STYLE 8: PIN 1. COLLECTOR, DIE #1 2. BASE. #1
STYLE 9: PIN 1. EMITTER, COMMON 2. COLLECTOR, DIE #1 3. COLLECTOR, DIE #2 4. EMITTER, COMMON 5. EMITTER, COMMON 6. BASE, DIE #2 7. BASE, DIE #1 8. EMITTER, COMMON	STYLE 10: PIN 1. GROUND 2. BIAS 1 3. OUTPUT 4. GROUND 5. GROUND 6. BIAS 2 7. INPUT 8. GROUND	STYLE 11: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. DRAIN 2 7. DRAIN 1 8. DRAIN 1	STYLE 12: PIN 1. SOURCE 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN
STYLE 13: PIN 1. N.C. 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN	STYLE 14: PIN 1. N-SOURCE 2. N-GATE 3. P-SOURCE 4. P-GATE 5. P-DRAIN 6. P-DRAIN 7. N-DRAIN 8. N-DRAIN	STYLE 15: PIN 1. ANODE 1 2. ANODE 1 3. ANODE 1 4. ANODE 1 5. CATHODE, COMMON 6. CATHODE, COMMON 7. CATHODE, COMMON 8. CATHODE, COMMON	STYLE 16: PIN 1. EMITTER, DIE #1 2. BASE, DIE #1 3. EMITTER, DIE #2 4. BASE, DIE #2 5. COLLECTOR, DIE #2 7. COLLECTOR, DIE #2 8. COLLECTOR, DIE #1 8. COLLECTOR, DIE #1
STYLE 17: PIN 1. VCC 2. V2OUT 3. V1OUT 4. TXE 5. RXE 6. VEE 7. GND 8. ACC	STYLE 18: PIN 1. ANODE 2. ANODE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. CATHODE 8. CATHODE	STYLE 19: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. MIRROR 2 7. DRAIN 1 8. MIRROR 1	STYLE 20: PIN 1. SOURCE (N) 2. GATE (N) 3. SOURCE (P) 4. GATE (P) 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN
STYLE 21: PIN 1. CATHODE 1 2. CATHODE 2 3. CATHODE 3 4. CATHODE 4 5. CATHODE 5 6. COMMON ANODE 7. COMMON ANODE 8. CATHODE 6	STYLE 22: PIN 1. I/O LINE 1 2. COMMON CATHODE/VCC 3. COMMON CATHODE/VCC 4. I/O LINE 3 5. COMMON ANODE/GND 6. I/O LINE 4 7. I/O LINE 5 8. COMMON ANODE/GND	STYLE 23: PIN 1. LINE 1 IN 2. COMMON ANODE/GND 3. COMMON ANODE/GND 4. LINE 2 IN 5. LINE 2 OUT 6. COMMON ANODE/GND 7. COMMON ANODE/GND 8. LINE 1 OUT	STYLE 24: PIN 1. BASE 2. EMITTER 3. COLLECTOR/ANODE 4. COLLECTOR/ANODE 5. CATHODE 6. CATHODE 7. COLLECTOR/ANODE 8. COLLECTOR/ANODE
STYLE 25: PIN 1. VIN 2. N/C 3. REXT 4. GND 5. IOUT 6. IOUT 7. IOUT 8. IOUT	STYLE 26: PIN 1. GND 2. dv/dt 3. ENABLE 4. ILIMIT 5. SOURCE 6. SOURCE 7. SOURCE 8. VCC	STYLE 27: PIN 1. ILIMIT 2. OVLO 3. UVLO 4. INPUT+ 5. SOURCE 6. SOURCE 7. SOURCE 8. DRAIN	STYLE 28: PIN 1. SW TO GND 2. DASIC OFF 3. DASIC SW_DET 4. GND 5. V_MON 6. VBULK 7. VBULK 8. VIN
STYLE 29: PIN 1. BASE, DIE #1 2. EMITTER, #1 3. BASE, #2 4. EMITTER, #2 5. COLLECTOR, #2 6. COLLECTOR, #2 7. COLLECTOR, #1 8. COLLECTOR, #1	STYLE 30: PIN 1. DRAIN 1 2. DRAIN 1 3. GATE 2 4. SOURCE 2 5. SOURCE 1/DRAIN 2 6. SOURCE 1/DRAIN 2 7. SOURCE 1/DRAIN 2 8. GATE 1		

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