

### FEATURES

- $\pm 5$  mV ( $\pm 0.2\%$ ) Max. Initial Tolerance (A grade)
- Wide Operating Current Range
- Low Voltage Reference 2.5V
- Max.  $0.6\Omega$  Dynamic Impedance (A grade)
- Low Temperature Coefficient

### APPLICATIONS

- Power Supplies
- Instrumentation
- 8 Bit A/D, D/A Reference
- Current Loop Measurement and Control Systems
- Reference for 5V Systems

### GENERAL DESCRIPTION

The AMS1009 is a precision band-gap voltage reference diode. This voltage reference features a very low dynamic impedance and good temperature coefficient, operating over a wide current range of  $400\mu\text{A}$  to  $10\text{mA}$ . On-chip trimming is used to provide tight tolerance and minimize temperature drift. A third terminal allows the reference voltage to be adjusted to  $\pm 5\%$  to calibrate out system errors.

The AMS1009 is used as a precision 2.5V low voltage reference for digital voltmeters, power supplies or op amp circuitry, and the 2.5V make it easy to obtain a stable reference from 5V logic supplies.

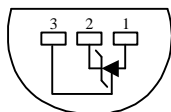
The AMS1009 is available in TO-92 and SO-8 packages operating over a  $0^\circ\text{C}$  to  $70^\circ\text{C}$  temperature range.

### ORDERING INFORMATION:

| TOL.              | PACKAGE TYPE |             | OPERATING TEMPERATURE RANGE |
|-------------------|--------------|-------------|-----------------------------|
|                   | TO-92        | 8 LEAD SOIC |                             |
| $\pm 5\text{mV}$  | AMS1009AN    | AMS1009AS   | 0 to $70^\circ\text{C}$     |
| $\pm 10\text{mV}$ | AMS1009BN    | AMS1009BS   | 0 to $70^\circ\text{C}$     |

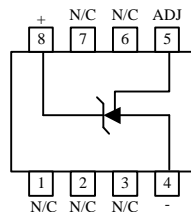
### PIN CONNECTIONS

**TO-92**  
Plastic Package (N)



**Bottom View**

**8L SOIC**  
SO Package (S)



**Top View**

## ABSOLUTE MAXIMUM RATINGS (Note 1)

|                             |                 |                                    |       |
|-----------------------------|-----------------|------------------------------------|-------|
| Reverse Current             | 20mA            | Soldering information              |       |
| Forward Current             | 10mA            | TO-92 package: 10 sec.             | 260°C |
| Operating Temperature Range | 0°C to 70°C     | SOIC package: Vapor phase (60 sec) | 215°C |
| Storage temperature         | -55°C to +150°C | Infrared (15 sec.)                 | 220°C |

## ELECTRICAL CHARACTERISTICS

Electrical Characteristics at  $I_R = 1 \text{ mA}$ , and  $T_A = +25^\circ\text{C}$  unless otherwise specified.

| Parameter                                     | Conditions  | AMS1009A |                   |                   | AMS1009B |                   |                   | Units    |
|---|---|----------|-------------------|-------------------|----------|-------------------|-------------------|----------|
|   |   | Min      | Typ               | Max               | Min      | Typ               | Max               |          |
| Reverse Breakdown Voltage                     |   | 2.495    | 2.500             | 2.505             | 2.490    | 2.500             | 2.510             | V        |
| Reverse Dynamic Impedance                     |   |          | 0.2<br><b>0.4</b> | 0.6<br><b>1.4</b> |          | 0.2<br><b>0.4</b> | 1.0<br><b>1.4</b> | $\Omega$ |
| Reverse Breakdown Voltage Change with current | $400\mu\text{A} \leq I_R \leq 10\text{mA}$                            |          | 2.6<br><b>3</b>   | 10<br><b>12</b>   |          | 2.6<br><b>3</b>   | 10<br><b>12</b>   | mV       |
| Temperature Stability                         | $T_{\text{MIN}} \leq T_A \leq T_{\text{MAX}}$                         |          | 1.8               | 4                 |          | 1.8               | 4                 | mV       |
| Average Temperature Coeff.                    | $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$                      |          | 15                | 25                |          | 15                | 25                | ppm/°C   |
| Long Term Stability (Note 4)                  | $T_A = 25^\circ\text{C} \pm 1^\circ\text{C}$<br>$T = 1000 \text{ Hr}$ |          | 20                |                   |          | 20                |                   | ppm      |

**Note 1:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed.

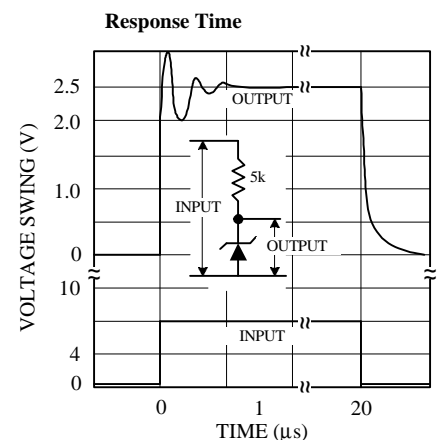
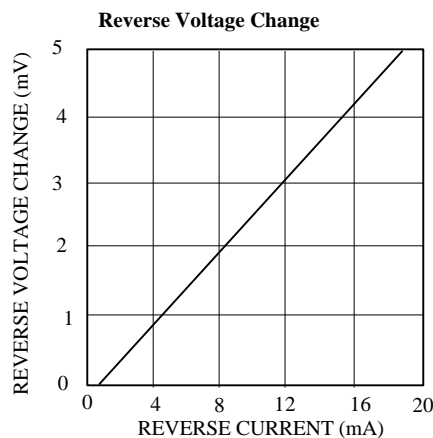
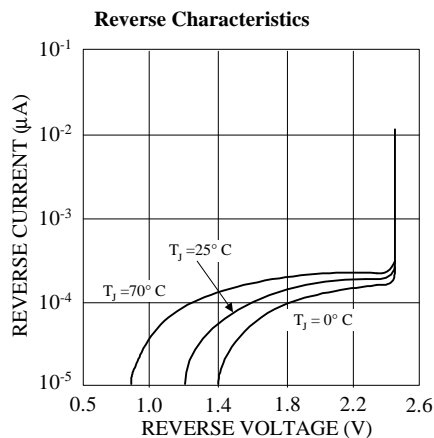
**Note 2:** For elevated temperature operation,  $T_j$  max is  $+125^\circ\text{C}$

| Thermal Resistance                  | TO-92                  | SO-8    |
|-------------------------------------|------------------------|---------|
| $\theta_{JA}$ (junction to ambient) | 170°C/W (0.125" leads) | 165°C/W |

**Note 3:** Parameters identified with **boldface type** apply at temperature extremes. All other numbers apply at  $T_A = T_j = 25^\circ\text{C}$ .

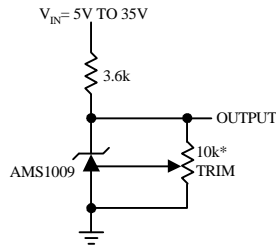
**Note 4:** The average temperature coefficient is defined as the maximum deviation of reference voltage at all measured temperatures between the operating  $T_{\text{MAX}}$  and  $T_{\text{MIN}}$ , divided by  $T_{\text{MAX}} - T_{\text{MIN}}$ . The measured temperatures are  $0^\circ\text{C}$ ,  $25^\circ\text{C}$  and  $70^\circ\text{C}$ .

## TYPICAL PERFORMANCE CHARACTERISTICS

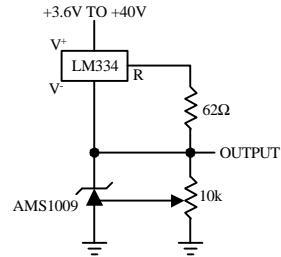


## TYPICAL APPLICATIONS

### 2.5V Reference

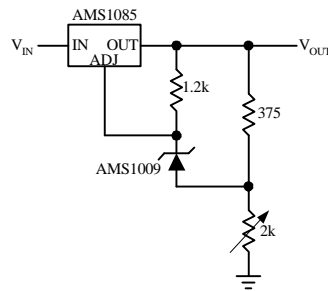


### Wide Supply Range, Adjustable Reference



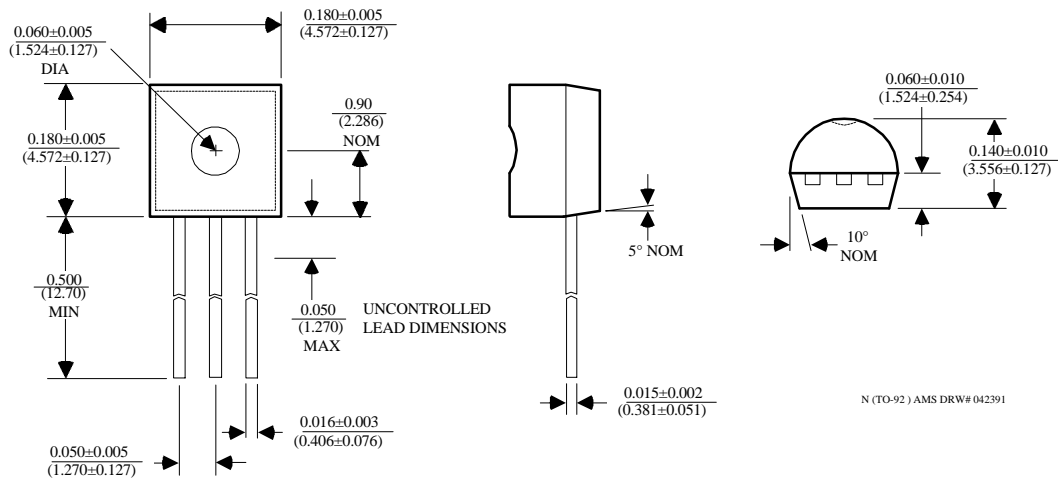
\*Does not affect Temperature Coefficient

### Low Temperature Coefficient Power Regulator



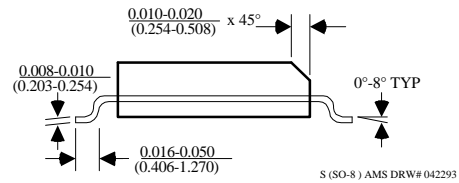
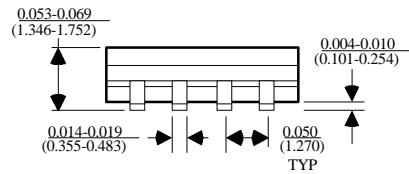
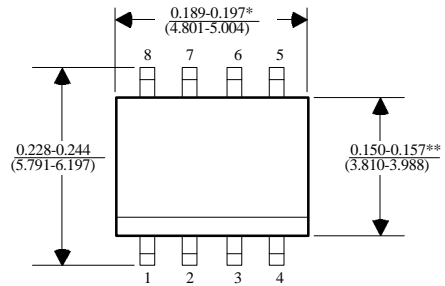
**PACKAGE DIMENSIONS** inches (millimeters) unless otherwise noted.

### 3 LEAD TO-92 PLASTIC PACKAGE (N)



PACKAGE DIMENSIONS inches (millimeters) unless otherwise noted (Continued).

## 8 LEAD SOIC PLASTIC PACKAGE (S)



\*DIMENSION DOES NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.006" (0.152mm) PER SIDE

\*\*DIMENSION DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010" (0.254mm) PER SIDE