

# CS-1009

## 2.5 Volt Reference

### Description

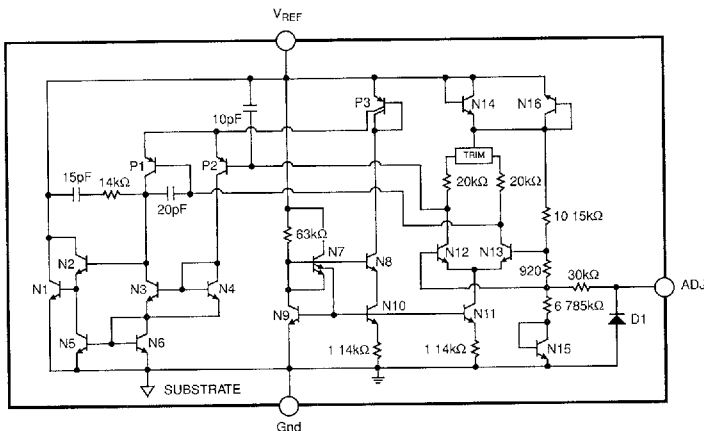
The CS-1009 is a precision trimmed 2.500V  $\pm 5\text{mV}$  shunt regulator diode. The low dynamic impedance and wide operating current range enhances its versatility. The tight reference tolerance is achieved by on-chip trimming which minimizes voltage tolerance and temperature drift.

A third terminal allows the reference voltage to be adjusted  $\pm 5\%$  to calibrate out system errors. In many applications, the CS-1009CZ can be used as a pin-to-pin replacement of the LT1009CZ and the LM136Z-2.5 with the external trim network eliminated.

### Absolute Maximum Ratings

|                                             |                |
|---------------------------------------------|----------------|
| Reverse Current .....                       | 20mA           |
| Forward .....                               | 10mA           |
| Operating Temperature Range                 |                |
| Commercial .....                            | 0°C to 70°C    |
| Extended .....                              | -40°C to 105°C |
| Storage Temperature Range .....             | -65°C to 150°C |
| Lead Temperature (Soldering, 10 sec.) ..... | 300°C          |

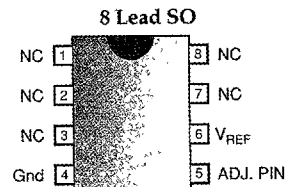
### Block Diagram



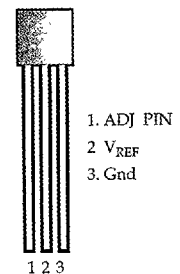
### Features

- ☐ 0.2% initial tolerance max.
- ☐ Guaranteed temperature stability
- ☐ Maximum 0.6Ω 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

### Package Options



### TO-92



**CSC**™ **CHERRY**   
**SEMICONDUCTOR**

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email info@cherry-semi.com

Electrical Characteristics:  $T_A = 25^\circ\text{C}$  unless otherwise specified

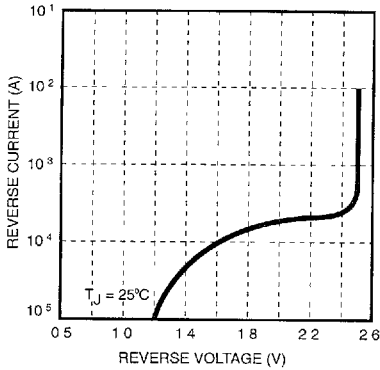
| PARAMETER                             | TEST CONDITIONS                                               | CS-1009 C |       |       | CS-1009 X |       |       | UNITS       |
|---------------------------------------|---------------------------------------------------------------|-----------|-------|-------|-----------|-------|-------|-------------|
|                                       |                                                               | MIN       | TYP   | MAX   | MIN       | TYP   | MAX   |             |
| Reverse Breakdown Voltage             | $I_R = 1\text{mA}$                                            | 2.495     | 2.500 | 2.505 | 2.492     | 2.500 | 2.508 | V           |
| Reverse Breakdown Voltage             | $0^\circ\text{C} \leq T_A \leq 105^\circ\text{C}$             |           |       |       | 2.492     | 2.500 | 2.508 | V           |
| Reverse Breakdown Voltage             | $-40^\circ\text{C} \leq T_A \leq 0^\circ\text{C}$             |           |       |       | 2.480     | 2.500 | 2.508 | V           |
| Reverse Breakdown Change with Current | $400\mu\text{A} \leq I_R \leq 10\text{mA}$                    | •         | 2.6   | 10    |           | 2.6   | 10    | mV          |
|                                       |                                                               |           | 3     | 12    |           | 3     | 12    | mV          |
| Reverse Dynamic Impedance             | $I_R = 1\text{mA}$                                            | •         | 0.2   | 1.0   |           | 0.2   | 1.0   | $\Omega$    |
|                                       |                                                               |           | 0.4   | 1.4   |           | 0.4   | 1.4   | $\Omega$    |
| Temperature Stability                 | $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ (Note 1)     |           | 1.8   | 4.0   |           |       |       | mV          |
| Avg. Temp. Coefficient                | $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ (Note 1)     |           | 15    | 25    |           |       |       | ppm/<br>°C  |
| Long Term Stability                   | $T_A = 25^\circ\text{C} \pm 0.1\text{C}$ , $I_R = 1\text{mA}$ |           | 20    |       |           | 20    |       | ppm/<br>kHr |

The • denotes the specifications which apply over full operating temperature range

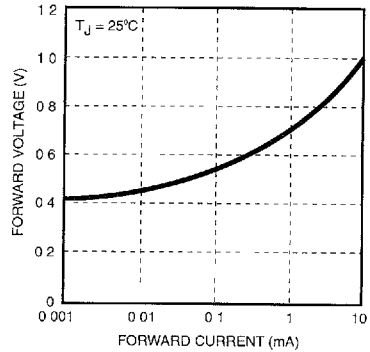
Note 1 Average temperature coefficient is defined as the total voltage change divided by the specified temperature range

Typical Performance Characteristics

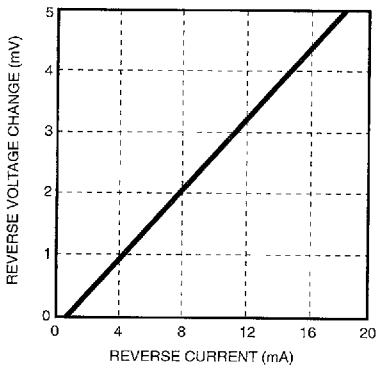
Reverse Current vs. Reverse Voltage



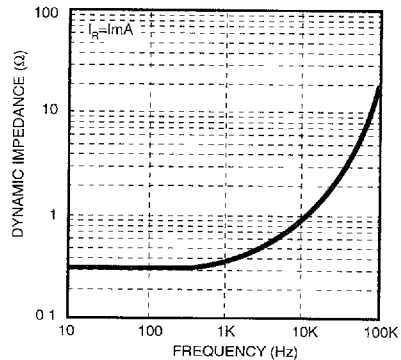
Forward Voltage vs. Forward Current



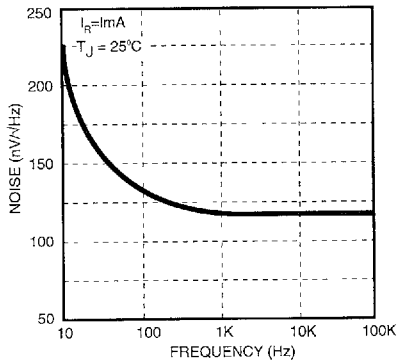
Change in Reverse Voltage vs. Reverse Current



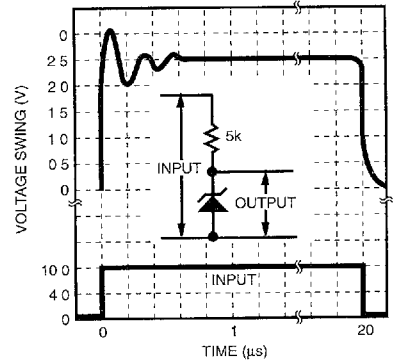
Dynamic Impedance vs. Frequency



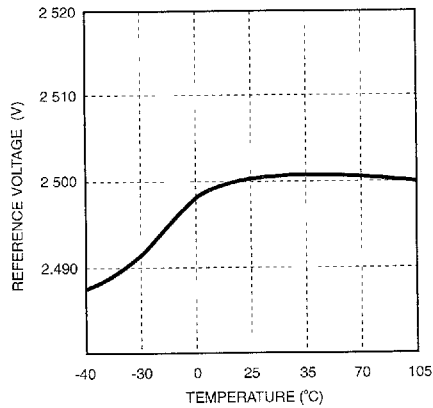
Zener Noise Voltage vs. Frequency



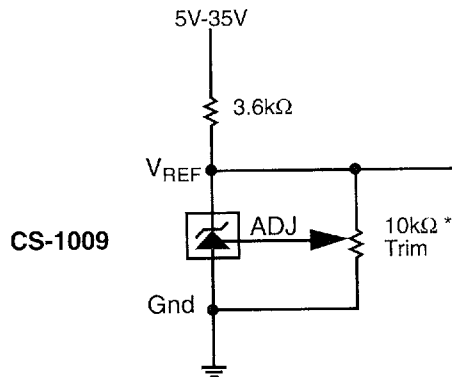
Response Time



Reference Voltage vs. Temperature



Application Diagram



\*  $\pm 5\%$  Trim Range

## Package Specification

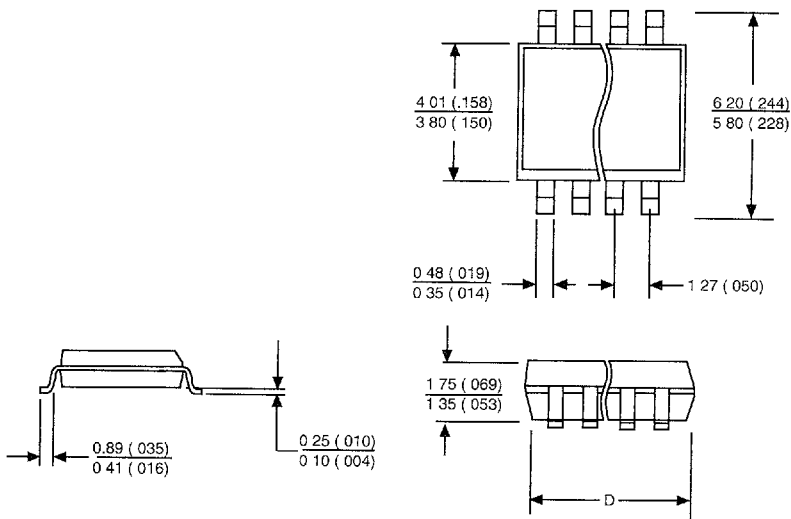
## PACKAGE DIMENSIONS IN mm (INCHES)

| Lead Count | D      |      |         |      |
|------------|--------|------|---------|------|
|            | Metric |      | English |      |
|            | Max    | Min  | Max     | Min  |
| 8          | 5.00   | 4.80 | .197    | .188 |

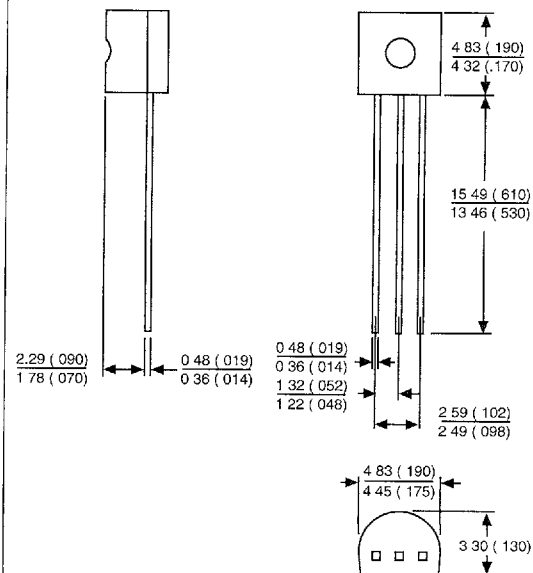
## PACKAGE THERMAL DATA

| Thermal Data   |     | 8L<br>SO | TO-92 |                      |
|----------------|-----|----------|-------|----------------------|
| $R\theta_{JC}$ | typ | 45       | —     | $^{\circ}\text{C/W}$ |
| $R\theta_{JA}$ | typ | 165      | 170   | $^{\circ}\text{C/W}$ |

## SO-Narrow



## TO-92



## Ordering Information

| Part Number | 0°C to 70°C | -40°C to 105°C | Description |
|-------------|-------------|----------------|-------------|
| CS-1009CD8  | •           |                | SO 8        |
| CS-1009CZ   | •           |                | TO-92       |
| CS-1009XD8  |             | •              | SO 8        |
| CS-1009XZ   |             | •              | TO-92       |