# LOW POWER, BAND-GAP VOLTAGE REFERENCES

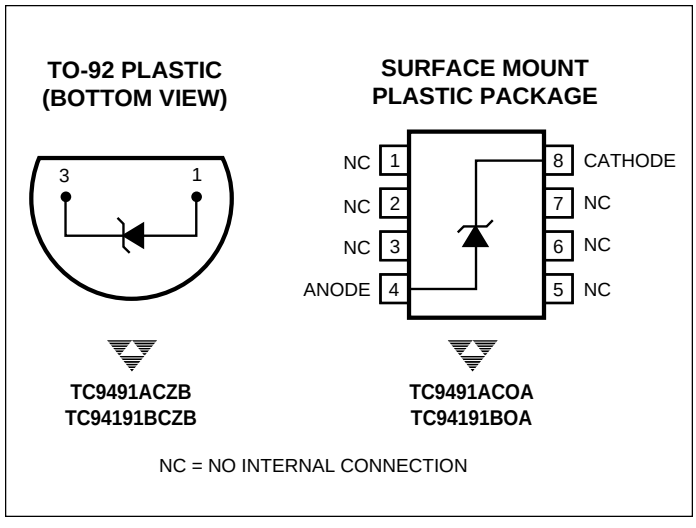
## FEATURES

- **Temperature Coefficient ..... 50ppm/°C**
- **Wide Operating Current Range ..... 15μA to 20mA**
- **Dynamic Impedance ..... 0.6Ω**
- **Output Tolerance ..... 1% or 2%**
- **Output Voltage Option .....1.220V**
- **TO-92 Plastic Package**
- **8-Pin Plastic Small Outline (SO) Package**

## APPLICATIONS

- **ADC and DAC Reference**
- **Current Source Generation**
- **Threshold Detectors**
- **Power Supplies**
- **Multi-meters**

### PIN CONFIGURATIONS




## GENERAL DESCRIPTION

The TC9491 (1.220V output) bipolar, two-terminal, band-gap voltage references offer precision performance without premium price. These devices do not require thin-film resistors, greatly lowering manufacturing complexity and cost.

A 50ppm/°C output temperature coefficient and a 15μA to 20mA operating current range make these devices attractive for multimeter, data acquisition converter, and telecommunication voltage references.

## ORDERING INFORMATION

| Part No. | Package | Temperature Range | Temp.Co. |
|---|---|---|---|
| TC9491ACOA | 8-Pin SOIC | 0°C to +70°C | 50 ppm°C |
| TC9491BCOA | 8-Pin SOIC | 0°C to +70°C | 100 ppm°C |
| TC9491ACZM | TO-92 | 0°C to +70°C | 50 ppm°C |
| TC9491BCZM | TO-92 | 0°C to +70°C | 100 ppm°C |

# TC9491A
# TC9491B

## ABSOLUTE MAXIMUM RATINGS*

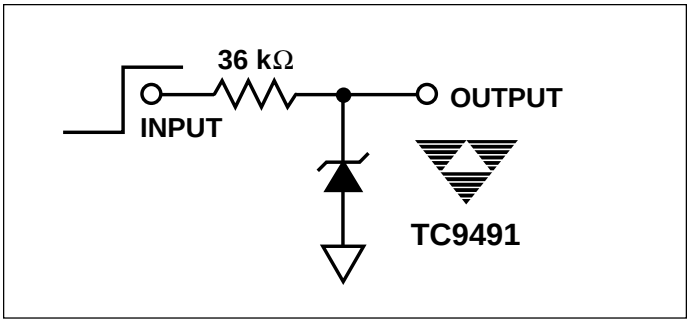
Forward Current ..... +10mA
Reverse Current ..... +30mA
Storage Temperature Range ..... – 65°C to +150°C
Operating Temperature Range
    TO-92 Package ..... 0°C to +70°C
    COA Surface Mount Package ..... 0°C to +70°C
Lead Temperature (Soldering, 10 sec)
    TO-92 Package ..... +300°C
    COA Surface Mount Package ..... +300°C
Power Dissipation
    Limited by Forward/Reverse Current

*Functional operation above the absolute maximum stress ratings is not implied.

## ELECTRICAL CHARACTERISTICS: $T_A$ = +25°C, unless otherwise specified.

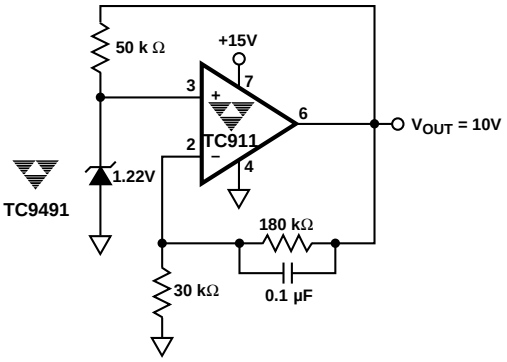
| Symbol | Parameter | Test Conditions | TC9491A | | | TC9491B | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| $V_{(BR)R}$ | Reverse Breakdown Voltage | $I_R \leq 20mA$ | 1.200 | 1.22 | 1.250 | 1.200 | 1.220 | 1.250 | V |
| | $T_A$ = 0°C to +70°C | | 1.180 | — | 1.290 | 1.219 | — | 1.260 | |
| $I_{RMIN}$ | Minimum Operating Current | | | | | | | | µA |
| | $T_A$ = +25°C | | — | 8.0 | 15 | — | 8.0 | 15 | |
| | $T_A$ = 0°C to +70°C | | — | — | 20 | — | — | 20 | |
| $\Delta V_{(BR)R}$ | Reverse Breakdown Voltage Change with Current | | | | | | | | |
| | $I_{Rmin} = I_R$ = 1.0mA, $T_A$ = +25°C | | — | — | 1.0 | — | — | 1.0 | |
| | $T_A$ = 0°C to +70°C | | — | — | 1.5 | — | — | 1.5 | mV |
| | 1.0mA = $I_R$ = 20mA, $T_A$ = +25°C | | — | — | 10 | — | — | 20 | |
| | $T_A$ = 0°C to +70°C | | — | — | 20 | — | — | 25 | |
| Z | Reverse Dynamic Impedance | $I_R$ = 100µA | — | 0.6 | — | — | 0.6 | — | Ω |
| $\Delta V_{(BR)}/\Delta T$ | Average Temperature Coefficient | 10µA = $I_R$ = 20mA | — | — | 50 | — | — | 100 | ppm/°C |
| S | Long Term Stability | $I_R$ = 100µA, $T_A$ = +25°C ±0.1°C | — | 20 | — | — | 20 | — | ppm/kHR |

### RESPONSE TIME TEST CIRCUIT

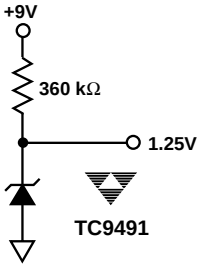


## TYPICAL APPLICATIONS

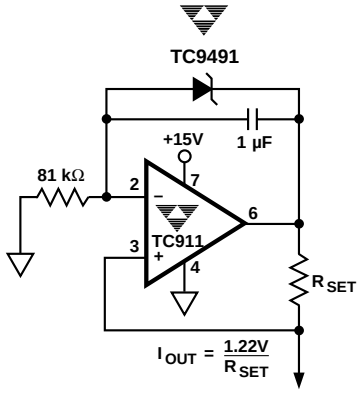
**10V Reference**




**Battery Powered 1.25V Reference**

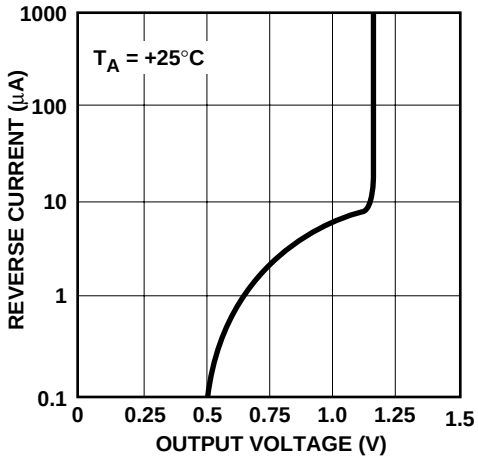



**Precision Current Source**

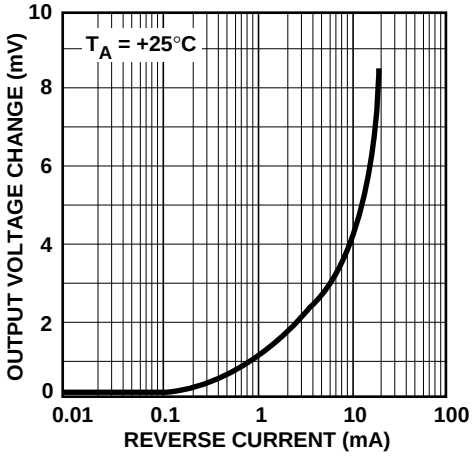



## TYPICAL CHARACTERISTICS

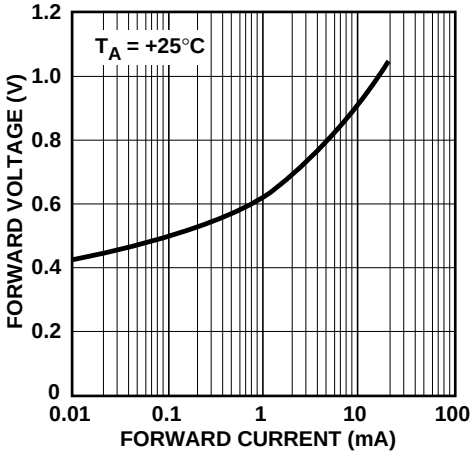
**Output Voltage vs. Reverse Current**



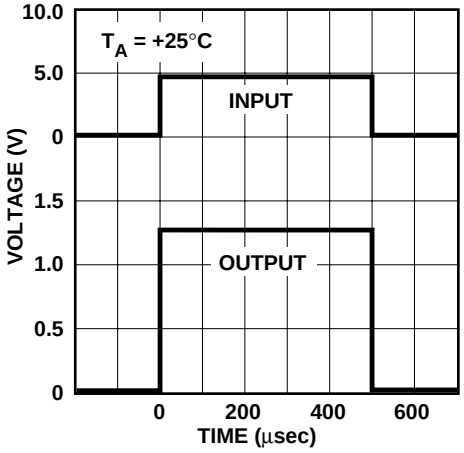

**Output Voltage Change vs. Reverse Current**




**Forward Voltage vs. Forward Current**



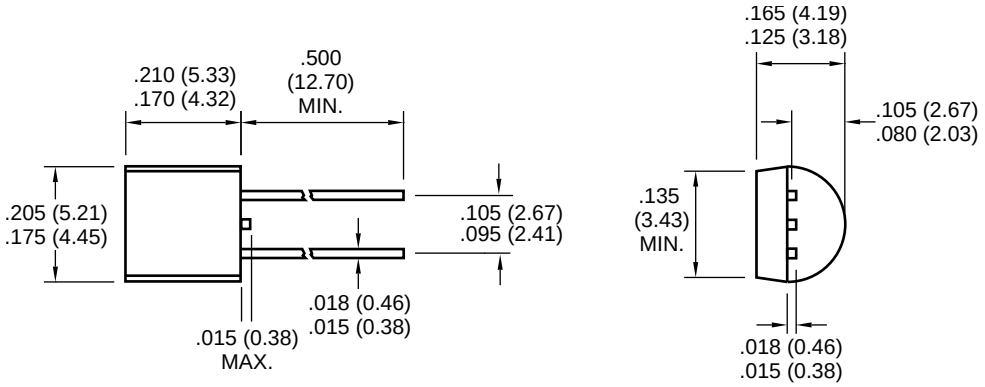

**Response Time**



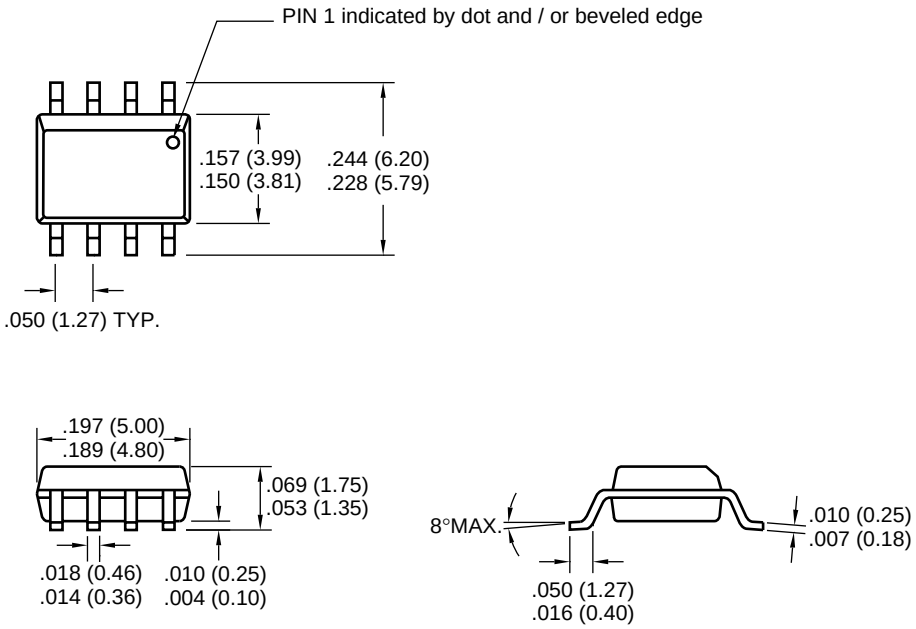
# TC9491A
# TC9491B

## PACKAGE DIMENSIONS

### TO-92-2




### 8-Pin SOIC




Dimensions: inches (mm)

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Printed in the U.S.A.