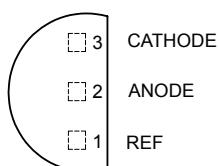


# LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR

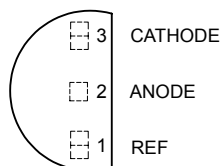
AZ432

## Pin Configuration

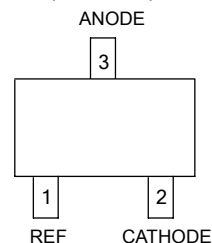
Z Package  
(TO-92(Bulk Packing))



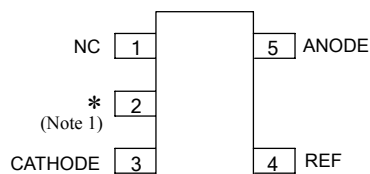
Z Package  
(TO-92(Ammo Packing))



N Package  
(SOT-23)



K Package  
(SOT-23-5)



Note 1: \* Pin 2 is attached to substrate and must be connected to ANODE or open

R Package  
(SOT-89)

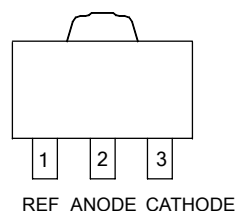


Figure 2. Pin Configuration of AZ432 (Top View)

## Functional Block Diagram

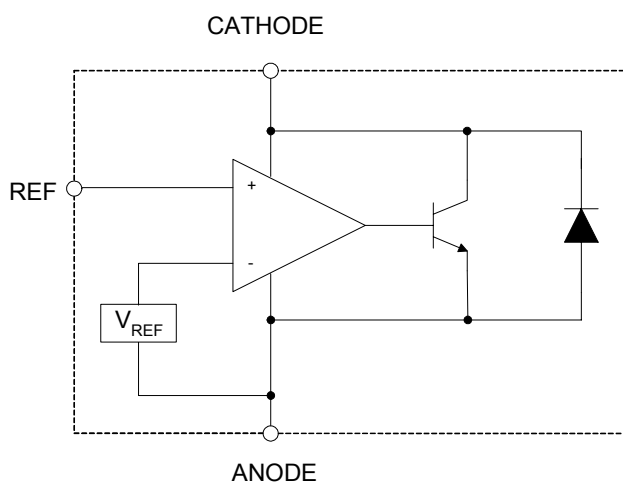
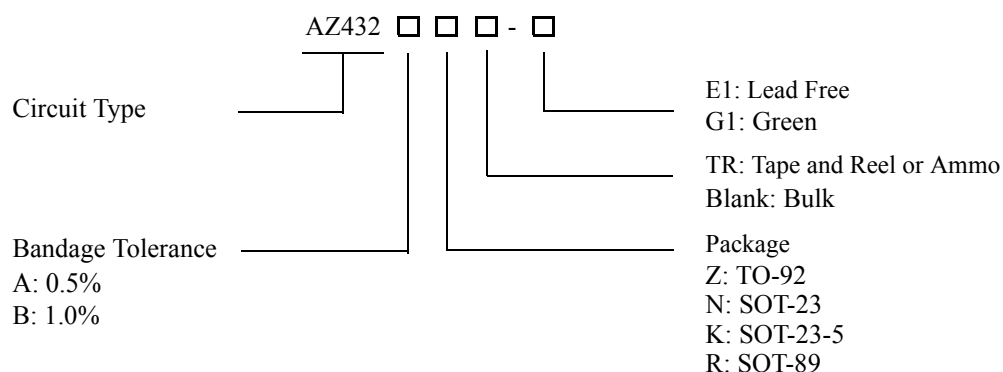


Figure 3. Functional Block Diagram of AZ432

**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR****AZ432****Ordering Information**

| Package  | Temperature Range | Voltage Tolerance | Part Number  |              | Marking ID |            | Packing Type |
|----------|-------------------|-------------------|--------------|--------------|------------|------------|--------------|
|          |                   |                   | Lead Free    | Green        | Lead Free  | Green      |              |
| TO-92    | -40 to 125°C      | 0.5%              | AZ432AZ-E1   | AZ432AZ-G1   | AZ432AZ-E1 | AZ432AZ-G1 | Bulk         |
|          |                   | 0.5%              | AZ432AZTR-E1 | AZ432AZTR-G1 | AZ432AZ-E1 | AZ432AZ-G1 | Ammo         |
|          |                   | 1.0%              | AZ432BZ-E1   | AZ432BZ-G1   | AZ432BZ-E1 | AZ432BZ-G1 | Bulk         |
|          |                   | 1.0%              | AZ432BZTR-E1 | AZ432BZTR-G1 | AZ432BZ-E1 | AZ432BZ-G1 | Ammo         |
| SOT-23   | -40 to 125°C      | 0.5%              | AZ432ANTR-E1 | AZ432ANTR-G1 | EA8        | GA8        | Tape & Reel  |
|          |                   | 1.0%              | AZ432BNTR-E1 | AZ432BNTR-G1 | EA9        | GA9        | Tape & Reel  |
| SOT-23-5 | -40 to 125°C      | 0.5%              | AZ432AKTR-E1 | AZ432AKTR-G1 | E7A        | G7A        | Tape & Reel  |
|          |                   | 1.0%              | AZ432BKTR-E1 | AZ432BKTR-G1 | E8A        | G8A        | Tape & Reel  |
| SOT-89   | -40 to 125°C      | 0.5%              | AZ432ARTR-E1 | AZ432ARTR-G1 | E42A       | G42A       | Tape & Reel  |
|          |                   | 1.0%              | AZ432BRTR-E1 | AZ432BRTR-G1 | E42B       | G42B       | Tape & Reel  |

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR****AZ432****Absolute Maximum Ratings (Note 2)**

| Parameter                          | Symbol    | Value        |     | Unit |
|------------------------------------|-----------|--------------|-----|------|
| Cathode Voltage                    | $V_{KA}$  | 20           |     | V    |
| Cathode Current Range (Continuous) | $I_{KA}$  | -100 to 100  |     | mA   |
| Reference Input Current Range      | $I_{REF}$ | 10           |     | mA   |
| Power Dissipation                  | $P_D$     | Z, R Package | 770 | mW   |
|                                    |           | N, K Package | 370 |      |
| Junction Temperature               | $T_J$     | 150          |     | °C   |
| Storage Temperature Range          | $T_{STG}$ | -65 to 150   |     | °C   |

Note 2: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

**Recommended Operation Ratings**

| Parameter                           | Symbol   | Min       | Max | Unit |
|-------------------------------------|----------|-----------|-----|------|
| Cathode Voltage                     | $V_{KA}$ | $V_{REF}$ | 18  | V    |
| Cathode Current                     | $I_{KA}$ | 0.1       | 100 | mA   |
| Operating Ambient Temperature Range |          | -40       | 125 | °C   |



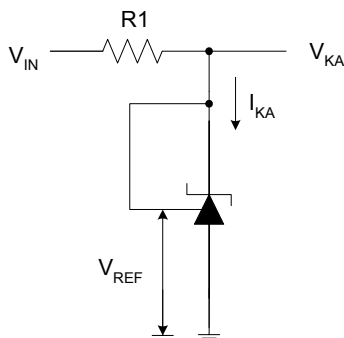
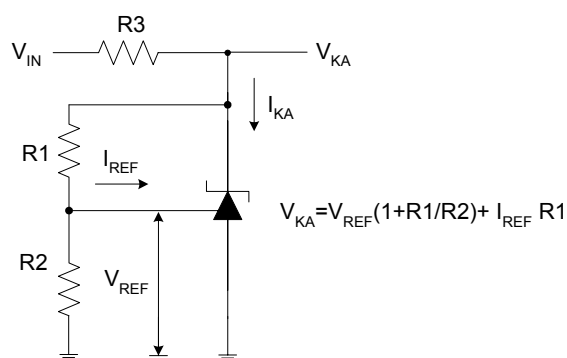
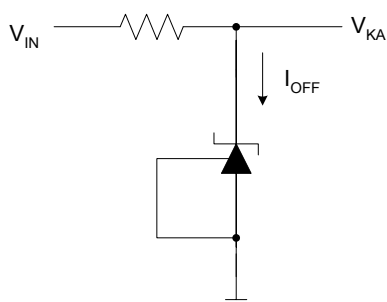
**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR**

**AZ432**

**Electrical Characteristics**

(Typical and limits apply for  $T_A=25^{\circ}\text{C}$ , unless otherwise noted.)

| Parameter                                                     | Test Circuit | Symbol                                 | Conditions                                                                                       | Min                          | Typ    | Max   | Unit                 |
|---------------------------------------------------------------|--------------|----------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------|--------|-------|----------------------|
| Reference Voltage                                             | 0.5%         | 4                                      | $V_{KA}=V_{REF}$ , $I_{KA}=10\text{mA}$                                                          | 1.244                        | 1.250  | 1.256 | V                    |
|                                                               | 1.0%         |                                        |                                                                                                  | 1.238                        | 1.250  | 1.262 |                      |
| Deviation of Reference Voltage Over Full Temperature Range    | 4            | $\Delta V_{REF}$                       | $V_{KA}=V_{REF}$ , $I_{KA}=10\text{mA}$                                                          | 0 to $70^{\circ}\text{C}$    | 2      | 10    | mV                   |
|                                                               |              |                                        |                                                                                                  | -40 to $85^{\circ}\text{C}$  | 3      | 10    |                      |
|                                                               |              |                                        |                                                                                                  | -40 to $125^{\circ}\text{C}$ | 4      | 15    |                      |
| Ratio of Change in $V_{REF}$ to the Change in Cathode Voltage | 5            | $\frac{\Delta V_{REF}}{\Delta V_{KA}}$ | $I_{KA}=10\text{mA}$ ,<br>$\Delta V_{KA}$ : $V_{REF}$ to 16V                                     |                              | -0.5   | -1.5  | mV/V                 |
| Reference Input Current                                       | 5            | $I_{REF}$                              | $I_{KA}=10\text{mA}$ , $R1=10\text{K}\Omega$ , $R2=\infty$                                       |                              | 0.15   | 0.4   | $\mu\text{A}$        |
| Deviation of Reference Current Over Full Temperature Range    | 5            | $\Delta I_{REF}$                       | $I_{KA}=10\text{mA}$ , $R1=10\text{K}\Omega$ , $R2=\infty$<br>$T_A=-40$ to $125^{\circ}\text{C}$ |                              | 0.1    | 0.4   | $\mu\text{A}$        |
| Minimum Cathode Current for Regulation                        | 4            | $I_{KA}$ (MIN)                         | $V_{KA}=V_{REF}$                                                                                 |                              | 55     | 80    | $\mu\text{A}$        |
| Off-state Cathode Current                                     | 6            | $I_{KA}$ (OFF)                         | $V_{REF}=0$ , $V_{KA}=18\text{V}$                                                                |                              | 0.04   | 0.10  | $\mu\text{A}$        |
|                                                               |              |                                        | $V_{KA}=6\text{V}$ , $V_{REF}=0$                                                                 |                              | 0.01   | 0.05  |                      |
| Dynamic Impedance                                             | 4            | $Z_{KA}$                               | $V_{KA}=V_{REF}$ , $I_{KA}=1$ to $100\text{mA}$<br>$f \leq 1.0\text{kHz}$                        |                              | 0.05   | 0.15  | $\Omega$             |
| Thermal Resistance (Junction to Case)                         |              | $\theta_{JC}$                          | SOT-23                                                                                           |                              | 84.84  |       | $^{\circ}\text{C/W}$ |
|                                                               |              |                                        | SOT-23-5                                                                                         |                              | 84.84  |       |                      |
|                                                               |              |                                        | TO-92                                                                                            |                              | 140.80 |       |                      |
|                                                               |              |                                        | SOT-89                                                                                           |                              | 88.00  |       |                      |

**Electrical Characteristics (Continued)**

Figure 4. Test Circuit 4 for  $V_{KA} = V_{REF}$ 

Figure 5. Test Circuit 5 for  $V_{KA} > V_{REF}$ 

Figure 6. Test Circuit 6 for  $I_{OFF}$

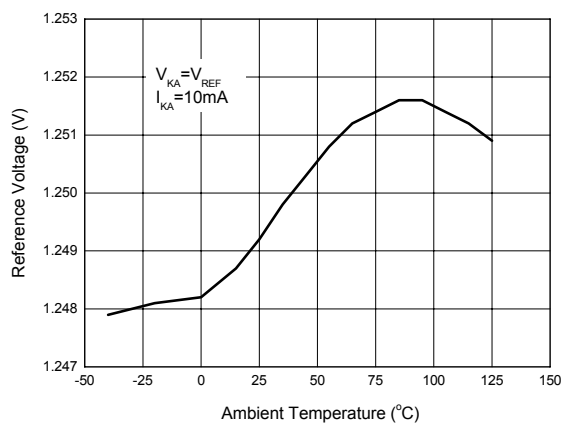
**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR****AZ432****Typical Performance Characteristics**

Figure 7. Reference Voltage vs. Ambient Temperature

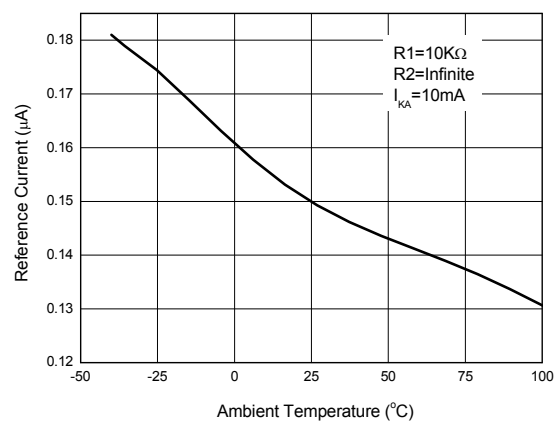


Figure 8. Reference Current vs. Ambient Temperature

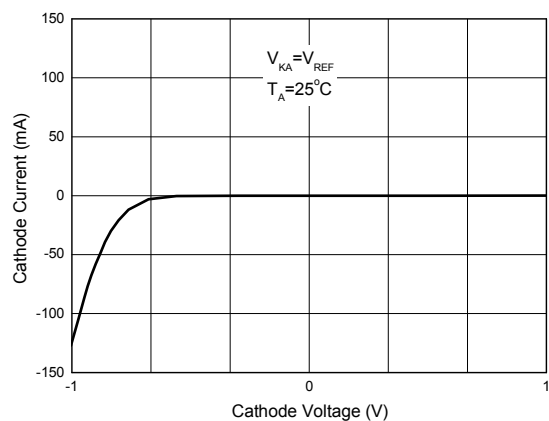


Figure 9. Cathode Current vs. Cathode Voltage

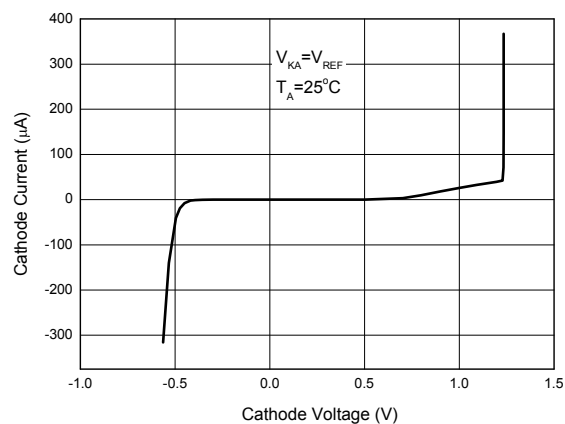


Figure 10. Cathode Current vs. Cathode Voltage

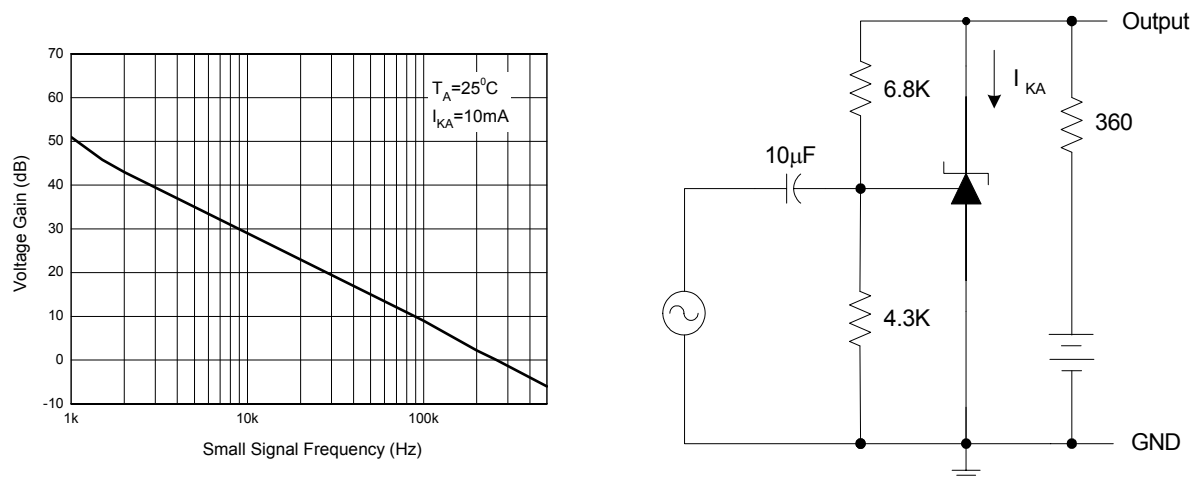
**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR****AZ432****Typical Performance Characteristics (Continued)**

Figure 11. Small Signal Voltage Gain vs. Frequency

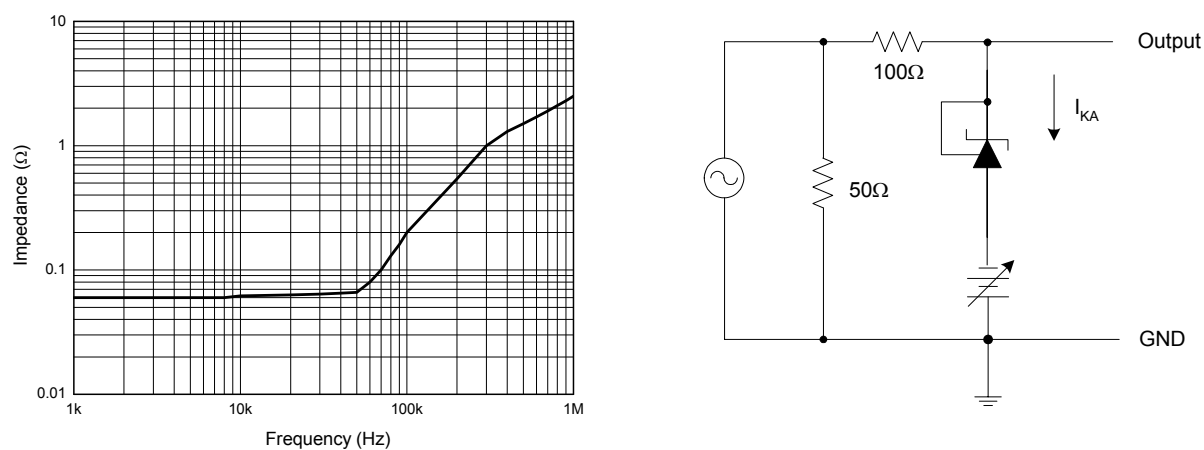


Figure 12. Dynamic Impedance vs. Frequency

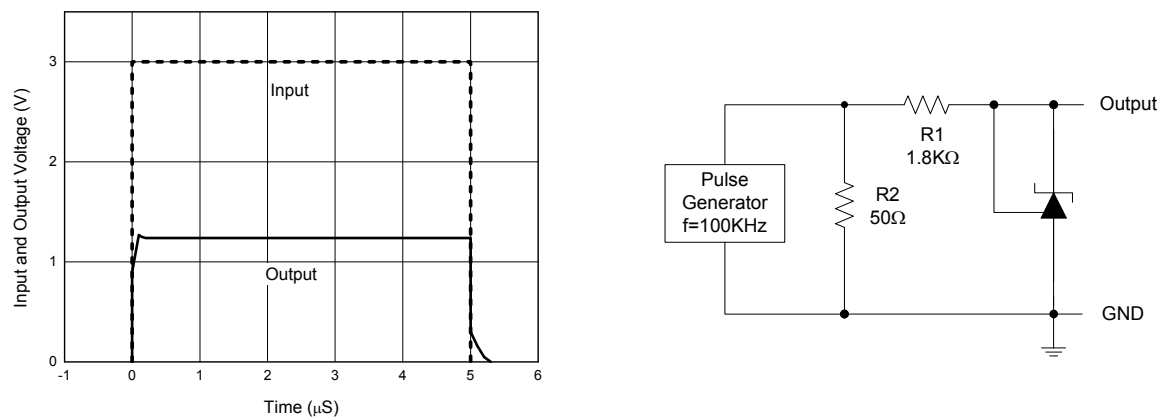
**Typical Performance Characteristics (Continued)**


Figure 13. Pulse Response of Input and Output Voltage

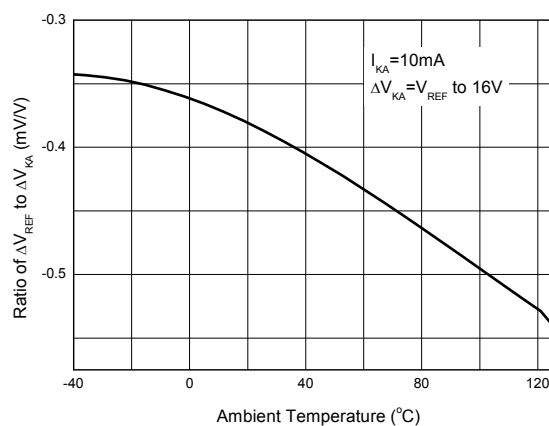


Figure 14. Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage vs. Ambient Temperature

## Typical Applications

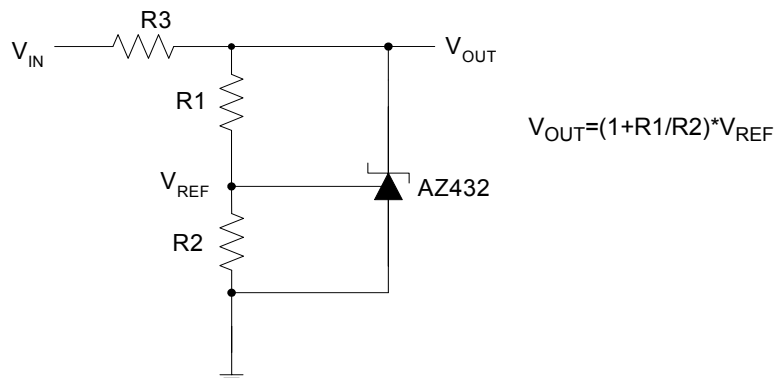


Figure 15. Shunt Regulator

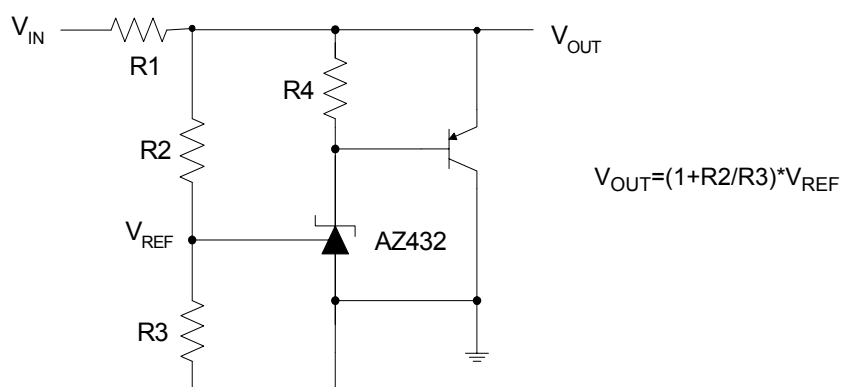


Figure 16. High Current Shunt Regulator

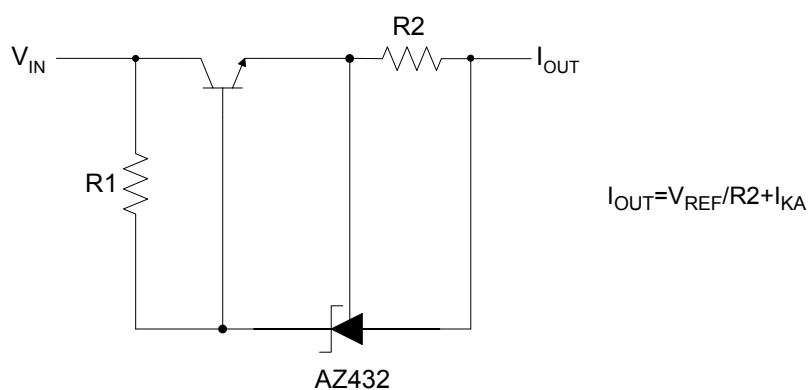


Figure 17. Current Source or Current Limit

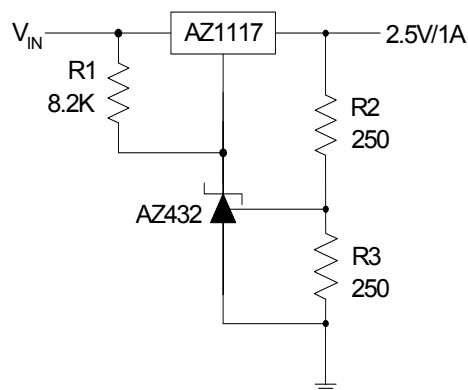
**Typical Application (Continued)**


Figure18. Precision 2.5V/1A Regulator

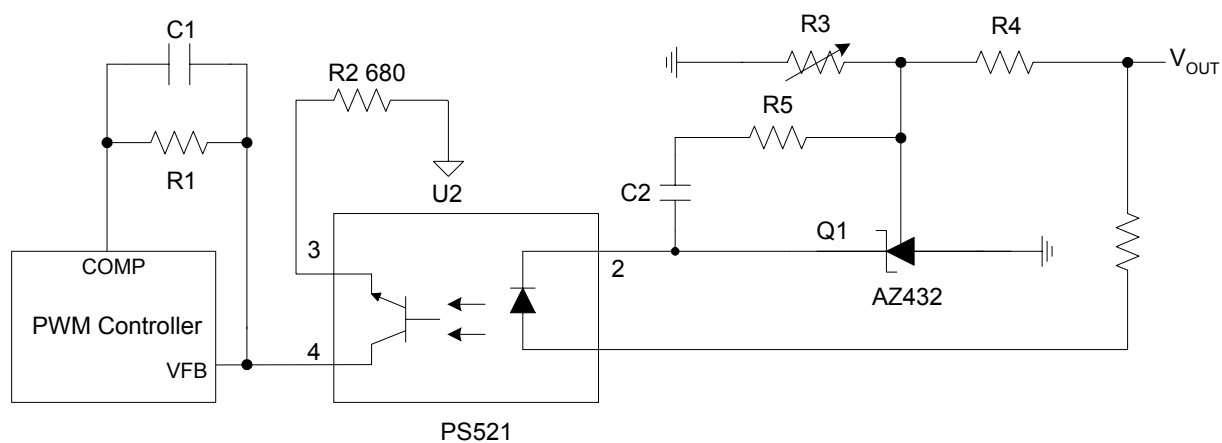
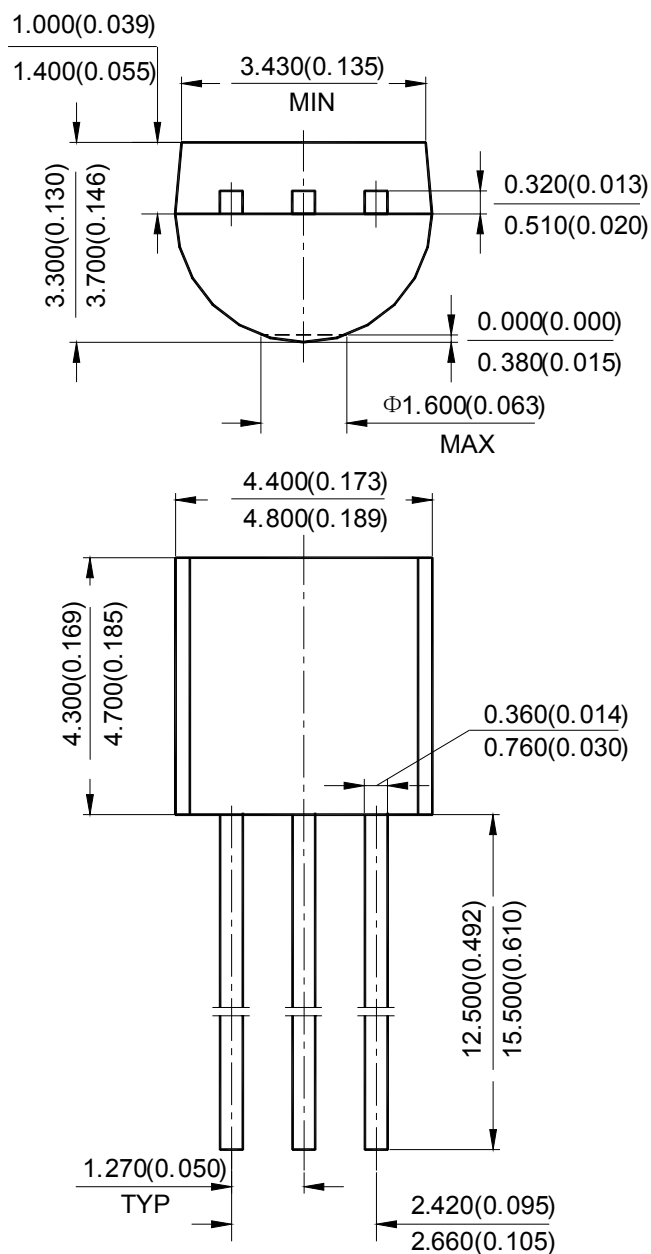
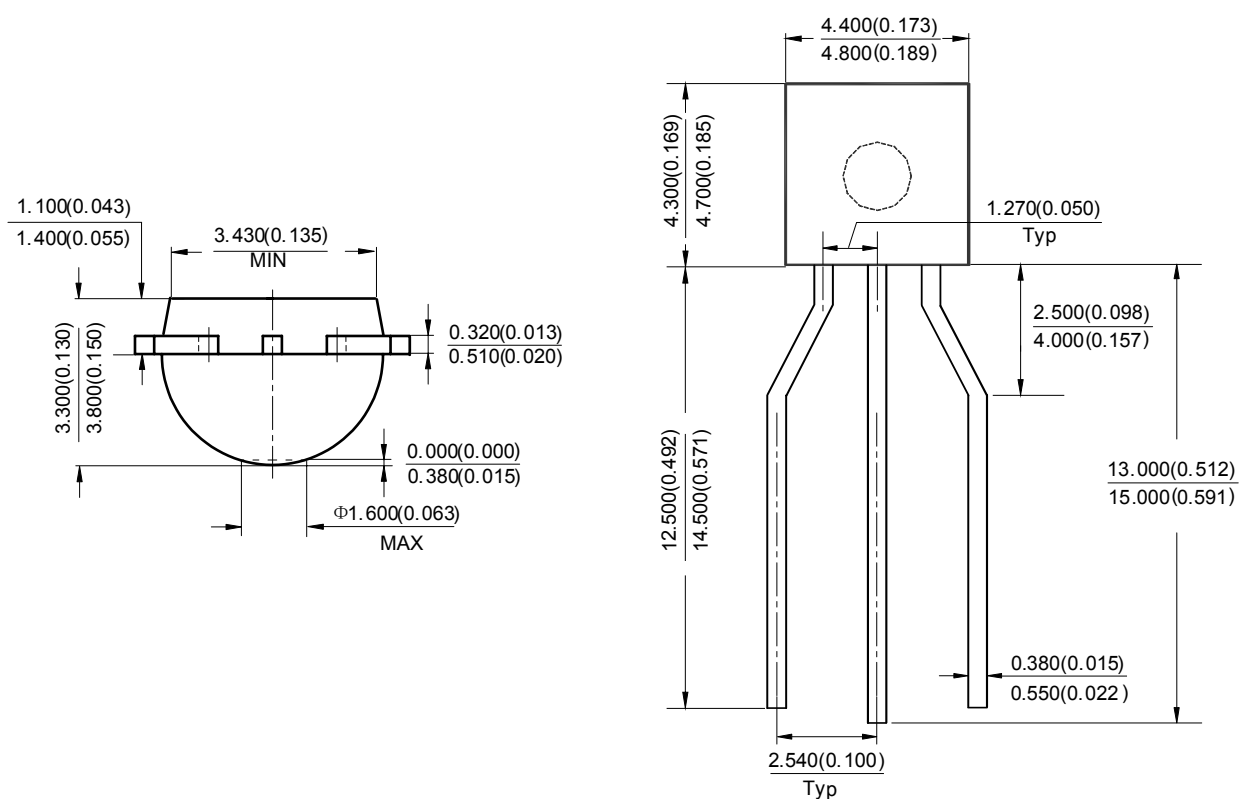
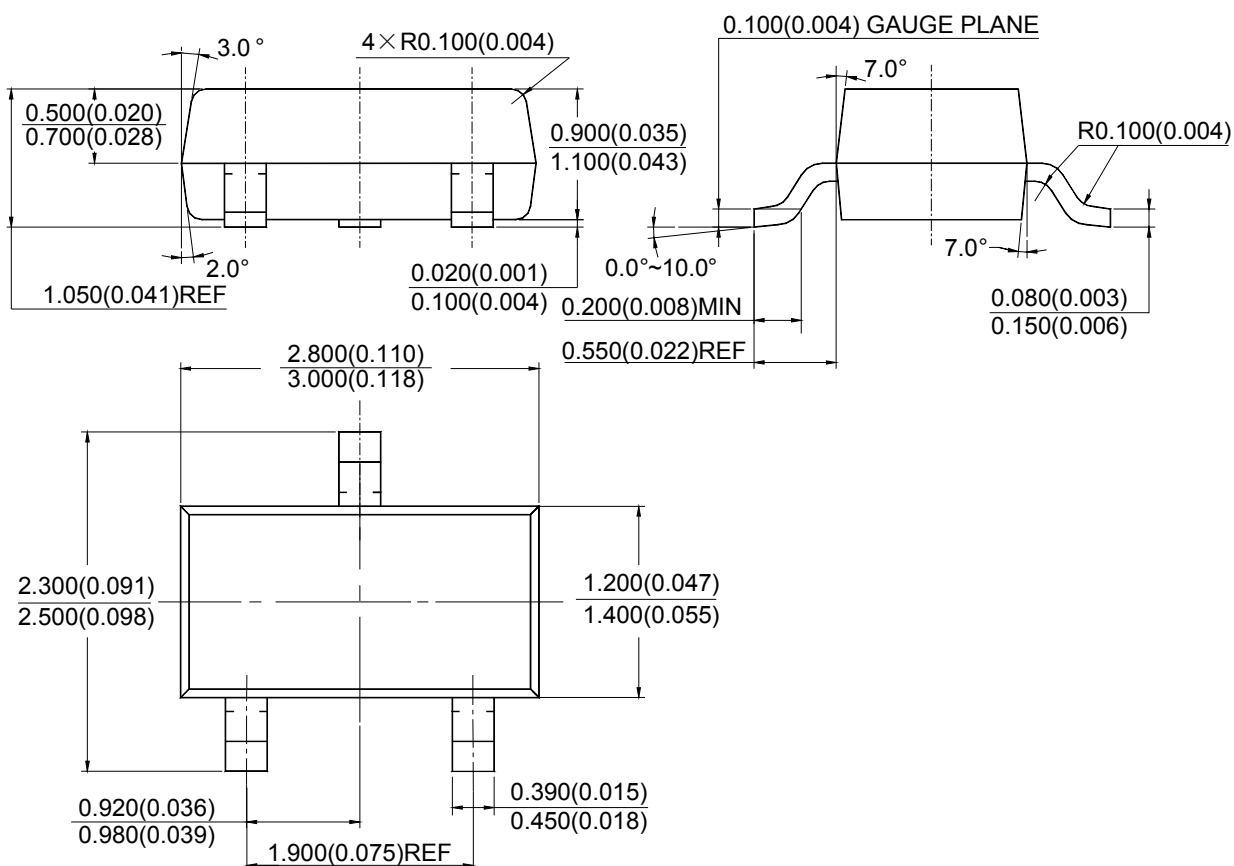
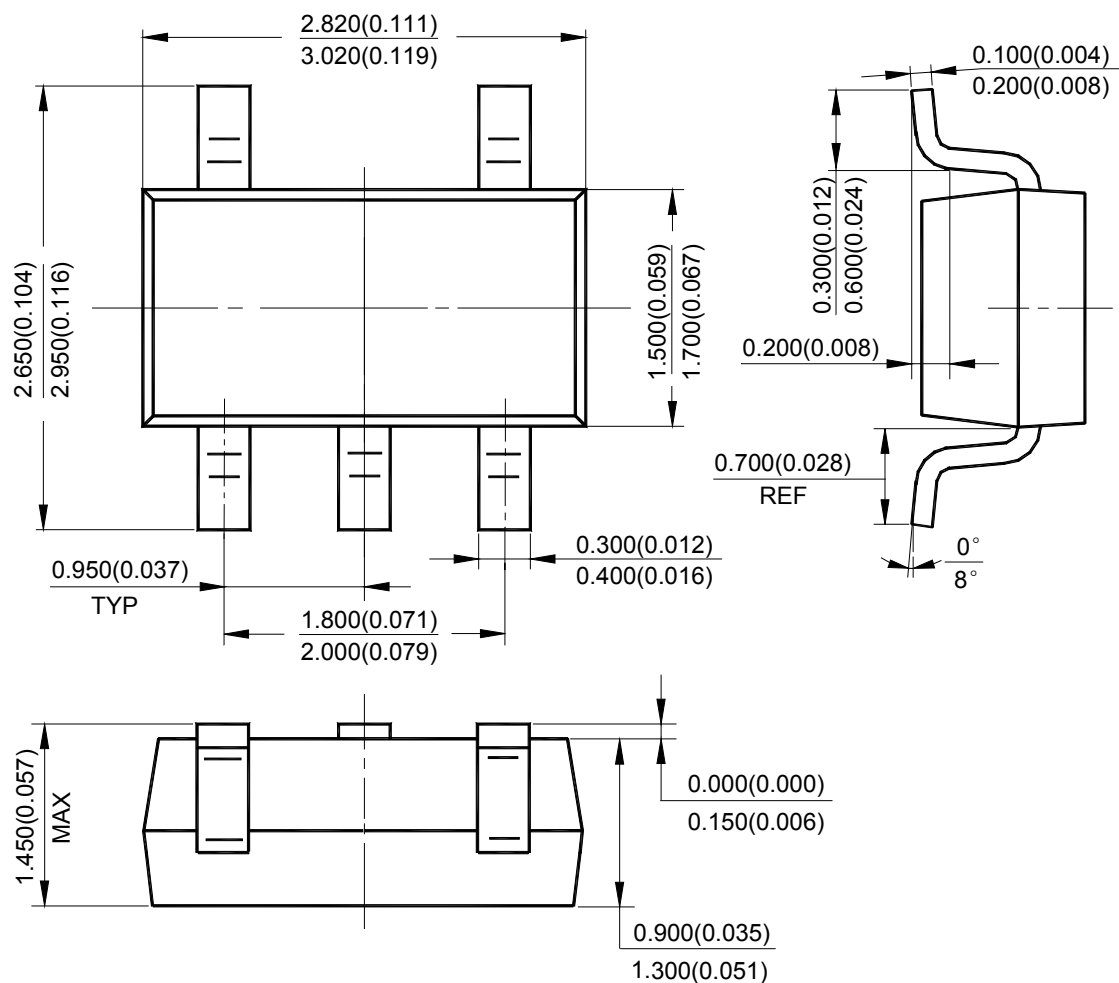


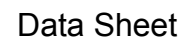
Figure 19. PWM Converter with Reference

**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR****AZ432****Mechanical Dimensions****TO-92(Bulk Packing)****Unit: mm(inch)**

**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR****AZ432****Mechanical Dimensions (Continued)****TO-92(Ammo Packing)****Unit: mm(inch)**

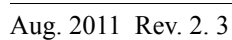
**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR****AZ432****Mechanical Dimensions (Continued)****SOT-23****Unit: mm(inch)**

**LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR****AZ432****Mechanical Dimensions (Continued)****SOT-23-5****Unit: mm(inch)**

**AZ432**

## SOT-89

**Unit: mm(inch)**



BCD Semiconductor Manufacturing Limited



## **BCD Semiconductor Manufacturing Limited**

<http://www.bcdsemi.com>

### **IMPORTANT NOTICE**

BCD Semiconductor Manufacturing Limited reserves the right to make changes without further notice to any products or specifications herein. BCD Semiconductor Manufacturing Limited does not assume any responsibility for use of any its products for any particular purpose, nor does BCD Semiconductor Manufacturing Limited assume any liability arising out of the application or use of any its products or circuits. BCD Semiconductor Manufacturing Limited does not convey any license under its patent rights or other rights nor the rights of others.

---

#### **MAIN SITE**

##### **- Headquarters**

##### **BCD Semiconductor Manufacturing Limited**

No. 1600, Zi Xing Road, Shanghai ZiZhu Science-based Industrial Park, 200241, China  
Tel: +86-21-24162266, Fax: +86-21-24162277

##### **- Wafer Fab**

##### **Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd.**

800 Yi Shan Road, Shanghai 200233, China  
Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

#### **REGIONAL SALES OFFICE**

##### **Shenzhen Office**

##### **Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd., Shenzhen Office**

Unit A Room 1203, Skyworth Bldg., Gaoxin Ave. I.S., Nanshan District, Shenzhen, China  
Tel: +86-755-8826 7951  
Fax: +86-755-8826 7865

##### **Taiwan Office**

##### **BCD Semiconductor (Taiwan) Company Limited**

4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei, Taiwan  
Tel: +886-2-2656 2808  
Fax: +886-2-2656 2806

##### **USA Office**

##### **BCD Semiconductor Corp.**

30920 Huntwood Ave. Hayward, CA 94544, USA  
Tel : +1-510-324-2988  
Fax: +1-510-324-2788