

Low Voltage Adjustable Precision Shunt Regulator

DESCRIPTION

The TL432 are three-terminal adjustable shunt regulators with guaranteed thermal stability over applicable extended commercial temperature ranges. The output voltage may be set to any value between V_{REF} 1.24V and 20 volts with two external resistors. These devices have a typical dynamic output impedance of 0.2Ω. Active output circuitry provides a very sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications.

FEATURES

- ◆ Voltage Reference Accuracy of 1%, 0.5%
- ◆ Low-Voltage Operation
- ◆ Adjustable Output Voltage from V_{REF} to 20V
- ◆ Low output noise voltage
- ◆ Fast turn on response

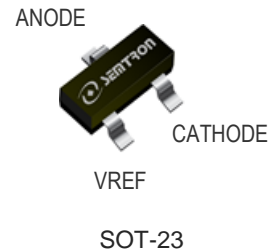
APPLICATIONS

- ◆ Battery Power Equipment
- ◆ Switch Power Supply

PART NUMBER INFORMATION

TL 432 X SN - TR G
 a b c d e f

a : Product Type Name.
 b : Product Serial number.
 c : Accuracy Code. A : 0.5% B : 1%
 c : Package code SN:SOT-23
 d : Handling code TR:Tape&Reel
 e : Green produce code G:RoHS Compliant



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ Unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|-----------|---|---------|------------------|
| P_D | Power Dissipation | 280 | mW |
| V_{KA} | Cathode Voltage | 20 | V |
| I_{KA} | Continuous Cathode Current | 100 | mA |
| I_{REF} | Reference Current Range | 3 | mA |
| T_J | Operation Junction Temperature | -40/150 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55/150 | $^\circ\text{C}$ |
| T_{SOL} | Lead Temperature Range (Soldering 10sec.) | 260 | $^\circ\text{C}$ |

Note: The power dissipation values are based on the condition that temperature T_J and ambient temperature T_A difference is 100°C . Stresses beyond those listed under "absolute maximum rating" may cause permanent damage to the device.

These are stress rating only, and function operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

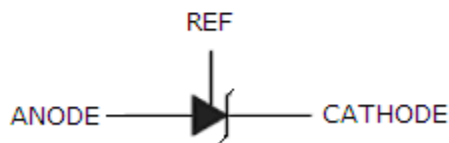
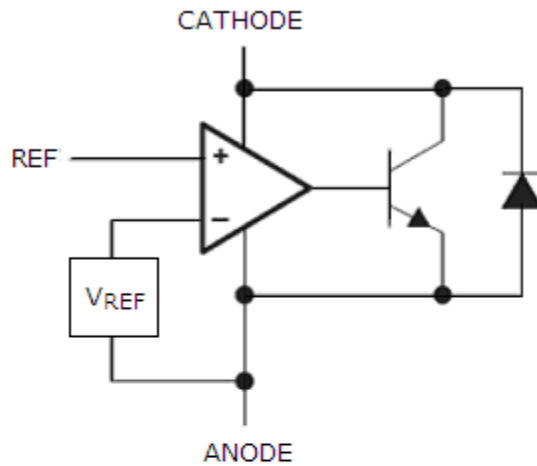
THERMAL RESISTANCE

| Symbol | Parameter | Typ | Max | Units |
|-----------------|--|--------------|-----|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient ^{AC} | Steady-State | 200 | $^\circ\text{C/W}$ |

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise noted)

| Symbol | Parameter | Condition | | Min | Typ | Max | Unit |
|-----------------------------|--|---|---|----------------|------|----------------|---------------|
| V_{REF} | Reference Input Voltage ($I_K=10\text{mA}, V_K=V_{REF}$) | TL432A (0.5%) | $T_A=-25^\circ\text{C}$ $T_A=-40^\circ\text{C}\sim+80^\circ\text{C}$ | 1.234 1.222 | 1.24 | 1.246 1.258 | V |
| V_{REF} | Reference Input Voltage ($I_K=10\text{mA}, V_K=V_{REF}$) | TL432B (1%) | $T_A=-25^\circ\text{C}$ $T_A=-40^\circ\text{C}\sim+80^\circ\text{C}$ | 1.228 1.215 | 1.24 | 1.252 1.265 | V |
| V_{DEV} | Deviation of Reference Input Voltage Over-Temperature | $T_A=-40^\circ\text{C}\sim105^\circ\text{C}$ $V_K=V_{REF}, I_K=10\text{mA}$ | | | 10 | 25 | mV |
| $\Delta V_{REF}/\Delta V_K$ | Ratio Of Change In V_{REF} To Change In Cathode Voltage | $I_K=10\text{mA}, \Delta V_K=16\text{V}\sim V_{REF}$ | | | -1 | -2.7 | mV/V |
| I_{REF} | Reference Input Current | $I_K=10\text{mA}, R_1=10\text{K}\Omega, R_2=\infty$ | | | 0.25 | 0.5 | μA |
| $I_{REF(DEV)}$ | Deviation of Reference Input Current Over Full Temperature Range | $T_A=-40^\circ\text{C}\sim105^\circ\text{C}$ $R_1=10\text{K}\Omega, R_2=\infty, I_K=10\text{mA}$ | | | 0.05 | 0.3 | μA |
| $I_{K(OFF)}$ | Off-State Cathode Current | $V_{REF}=0\text{V}, V_K=18\text{V}$ | | | 0.5 | 1.0 | μA |
| $I_{K(MIN)}$ | Minimum Operating Current | $V_K=V_{REF}$ | | | 50 | 80 | μA |
| Z_K | Dynamic Output Impedance | $F \leq 1\text{kHz}, V_K=V_{REF}$ $I_K=1\text{mA}\sim100\text{mA}$ | | | 0.2 | 0.4 | Ω |

BLOCK DIAGRAM



APPLICATION CIRCUIT

Fig 1. $V_K = V_{REF}$

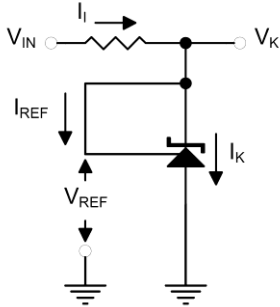
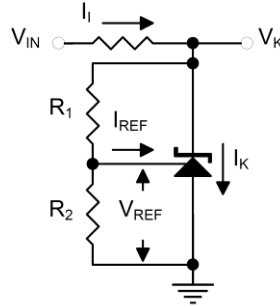
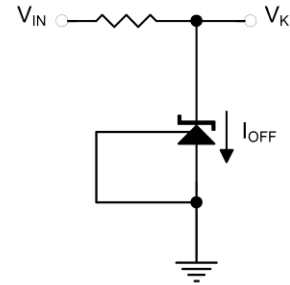


Fig 2. $V_K > V_{REF}$

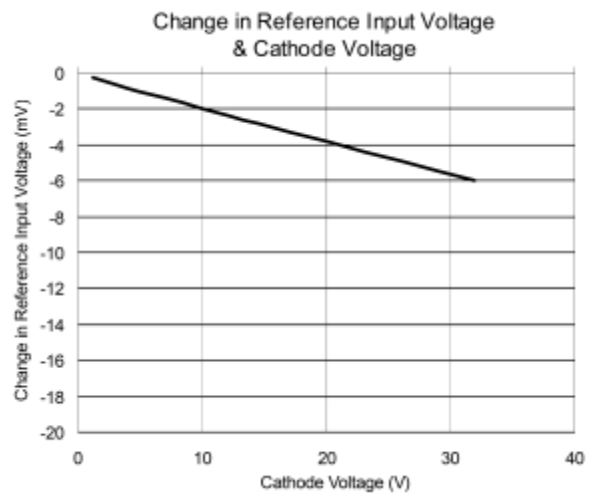
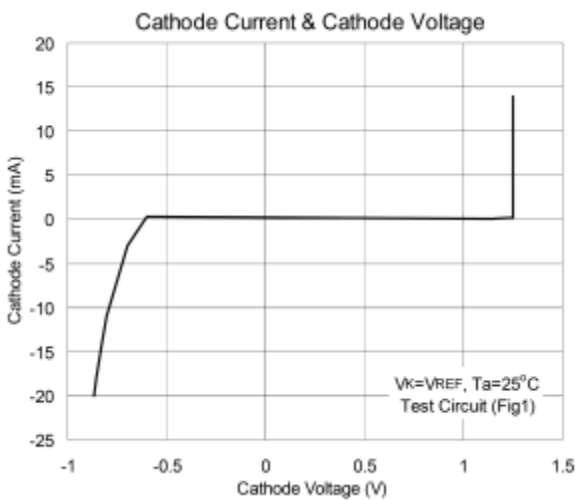
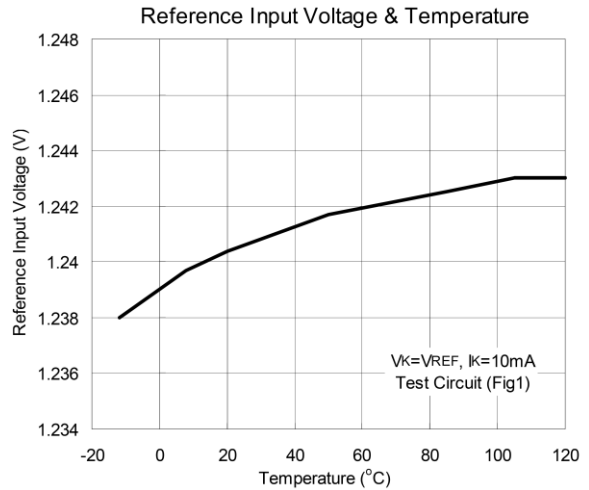
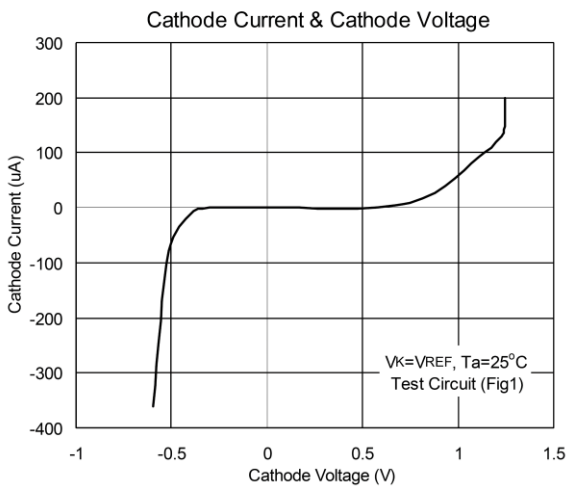


Note: $V_K = V_{REF}(1 + R_1/R_2) + I_{REF} \times R_1$

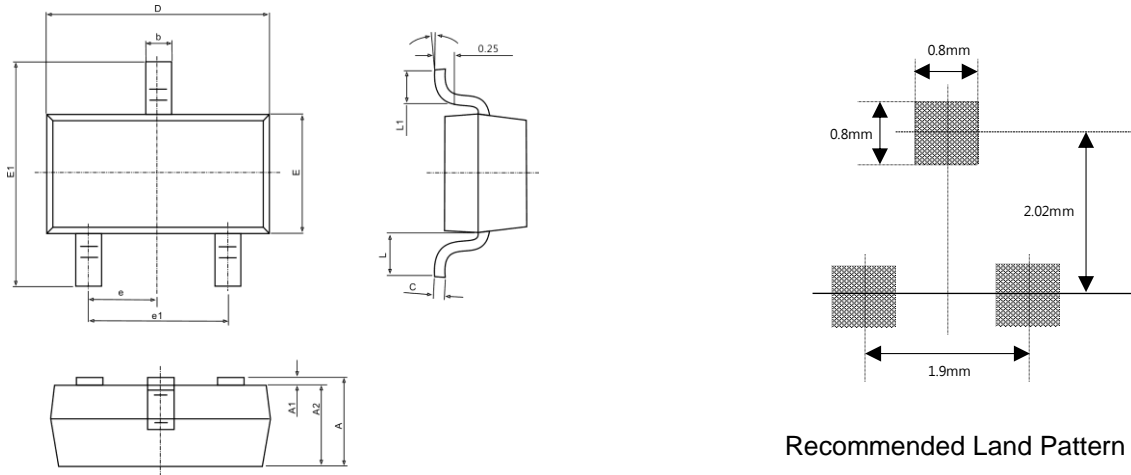
Fig 3. Off-State Current



TYPICAL CHARACTERISTICS



■ SOT-23 PACKAGE DIMENSIONS



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP. | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF. | | 0.022 REF. | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |