

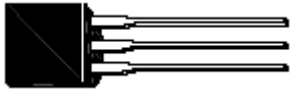
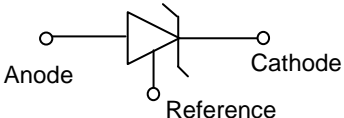
1、Description

The 431 series are three-terminal adjustable regulators with guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between V_{ref} (approximately 2.495 volts) and 36 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 in many applications.

2、Features

- Programmable output voltage.
- Temperature coefficient is 50 ppm/°C typical.
- Temperature compensated for operation over.
- Full temperature range.
- Low output noise voltage.
- Fast turn on response.

3、Pinning information

| PIN | Description | Simplified outline | Symbol |
|-----|-----------------|--|---|
| 1 | Reference (R) |  TO-92 |  |
| 2 | Anode (A) | | |
| 3 | Cathode(K) | | |

4、Classifications

| Rank | A | B | C |
|-----------|-----------------|-----------------|-------------------|
| V_{REF} | $2.495 \pm 2\%$ | $2.495 \pm 1\%$ | $2.495 \pm 0.5\%$ |

5、Absolute Maximum Rating

(Operating temperature ranges applies unless otherwise specified)

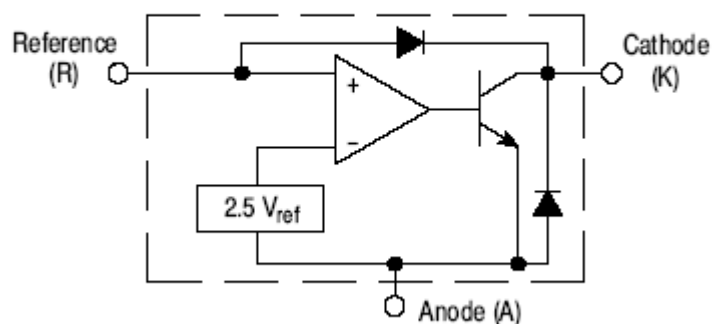
| Symbol | Characteristics | Value | | Unit |
|-----------|----------------------------------|-------------|----|------|
| V_{KA} | Cathode voltage | 37 | 20 | V |
| I_K | Cathode Current Range(continous) | -100 ~ +150 | | mA |
| R_{REF} | Reference Input Current Range | 0.05 ~ +10 | | mA |
| P_D | Power Dissipation | 770 | | mW |
| T_{opr} | Operating Temperature Range | 0 ~ +70 | | °C |
| T_{stg} | Storage Temperature Range | -65 ~ +150 | | °C |

6、Electrical Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNIT |
|--------------------------------|---|---|-------|-------|-------|---------------|
| V_{REF} | Reference Input Voltage A B C | $V_{KA} = V_{REF}; I_K = 10\text{mA}$ | 2.445 | 2.495 | 2.545 | V |
| | | | 2.470 | 2.495 | 2.520 | |
| | | | 2.483 | 2.495 | 2.507 | |
| $V_{REF(dev)}$ | Deviation of Reference Input Voltage Over-Temperature | $V_{KA} = V_{REF}; I_K = 10\text{mA}$ $T_{min} \leq T_a \leq T_{max}$ | - | 4 | 17 | mV |
| $\Delta V_{REF}/\Delta V_{KA}$ | Ratio of change in Reference Input Voltage to the change in Cathode Voltage | $I_K = 10\text{mA}$ $\Delta V_{KA} = 10\text{V} - V_{REF}$ | - | -1.4 | -2.7 | mV |
| | | $I_K = 10\text{mA}$ $\Delta V_{KA} = 36\text{V} - 10\text{V}$ | - | -1.0 | -2.0 | V |
| I_{REF} | Reference Input Current | $I_K = 10\text{mA}, R_1 = 10\text{K}\Omega,$ $R_2 = \infty$ | - | 2 | 4 | μA |
| $I_{REF(dev)}$ | Deviation of Reference Input Current Over full Temperature Range | $I_K = 10\text{mA}, R_1 = 10\text{K}\Omega,$ $R_2 = \infty; T_a = \text{Full Range}$ | - | 0.4 | 1.2 | μA |
| $I_{K(min)}$ | Minimum Cathode Current for Regulation | $V_{KA} = V_{REF}$ | - | 0.4 | 1.0 | mA |
| $I_{K(off)}$ | Off –state Cathode Current | $V_{KA} = 36\text{V}; V_{REF} = 0$ | - | 0.1 | 1.0 | μA |
| Z_{KA} | Dynamic impedance | $V_{KA} = V_{REF}; f \leq 1.0\text{KHz}$ $I_K = 1 \text{ to } 100\text{mA}$ | - | 0.2 | 0.5 | Ω |

7、Functional Block Diagram

Representative Block Diagram



8、Test circuits

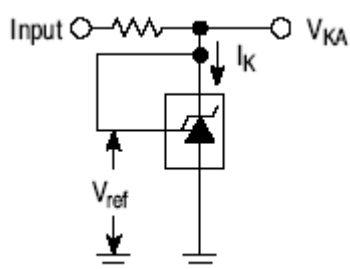


Figure1. Test Circuit for $V_{KA} = V_{REF}$

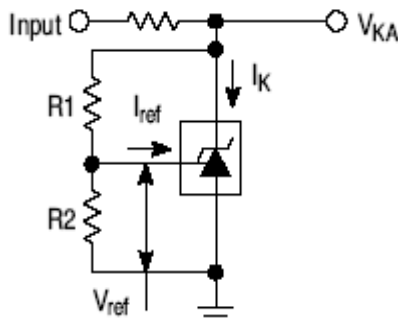


Figure2. Test Circuit for $V_{KA} > V_{REF}$

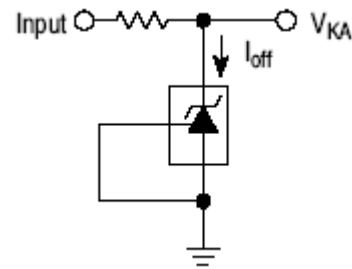


Figure3. Test Circuit for I_{off}

9. Characteristics Curve

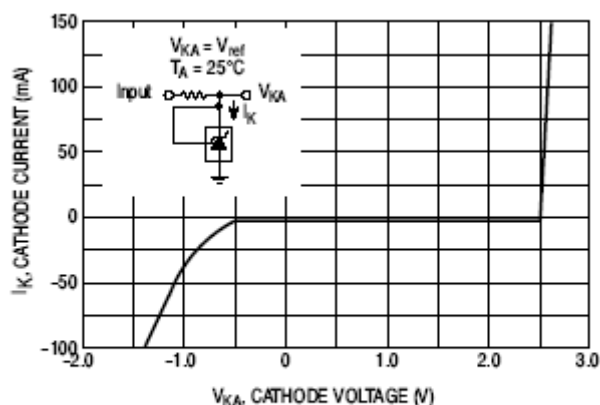


Figure 4. Cathode Current versus Cathode Voltage

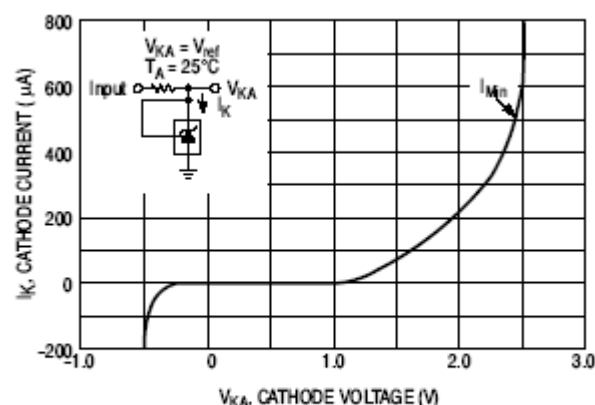


Figure 5. Cathode Current versus Cathode Voltage

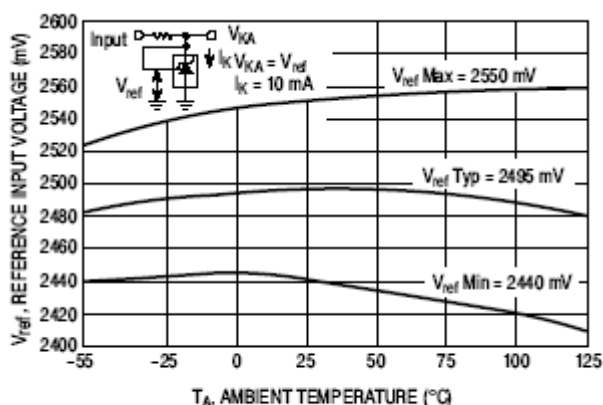


Figure 6. Reference Input Voltage versus Ambient Temperature

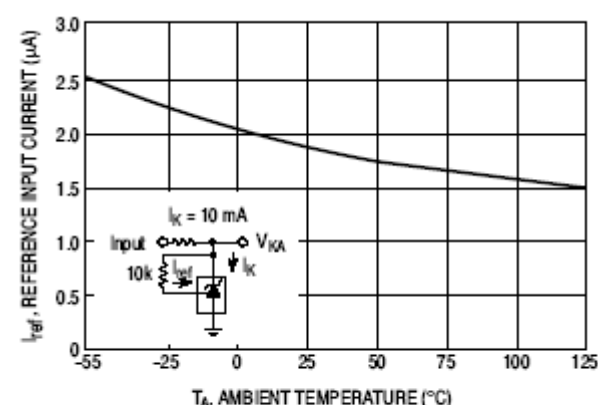


Figure 7. Reference Input Current versus Ambient Temperature

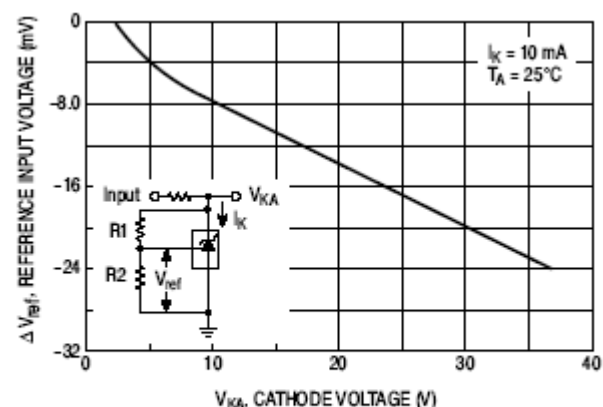


Figure 8. Change in Reference Input Voltage versus Cathode Voltage

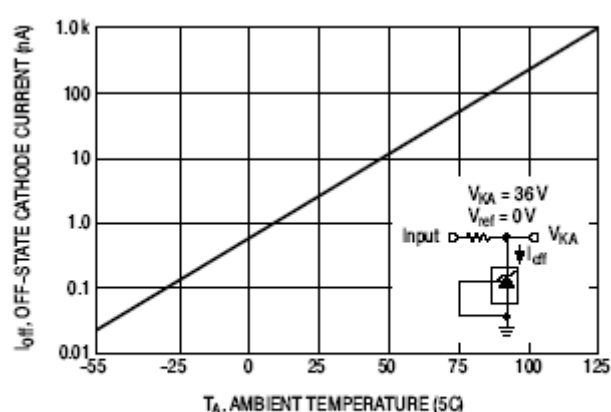
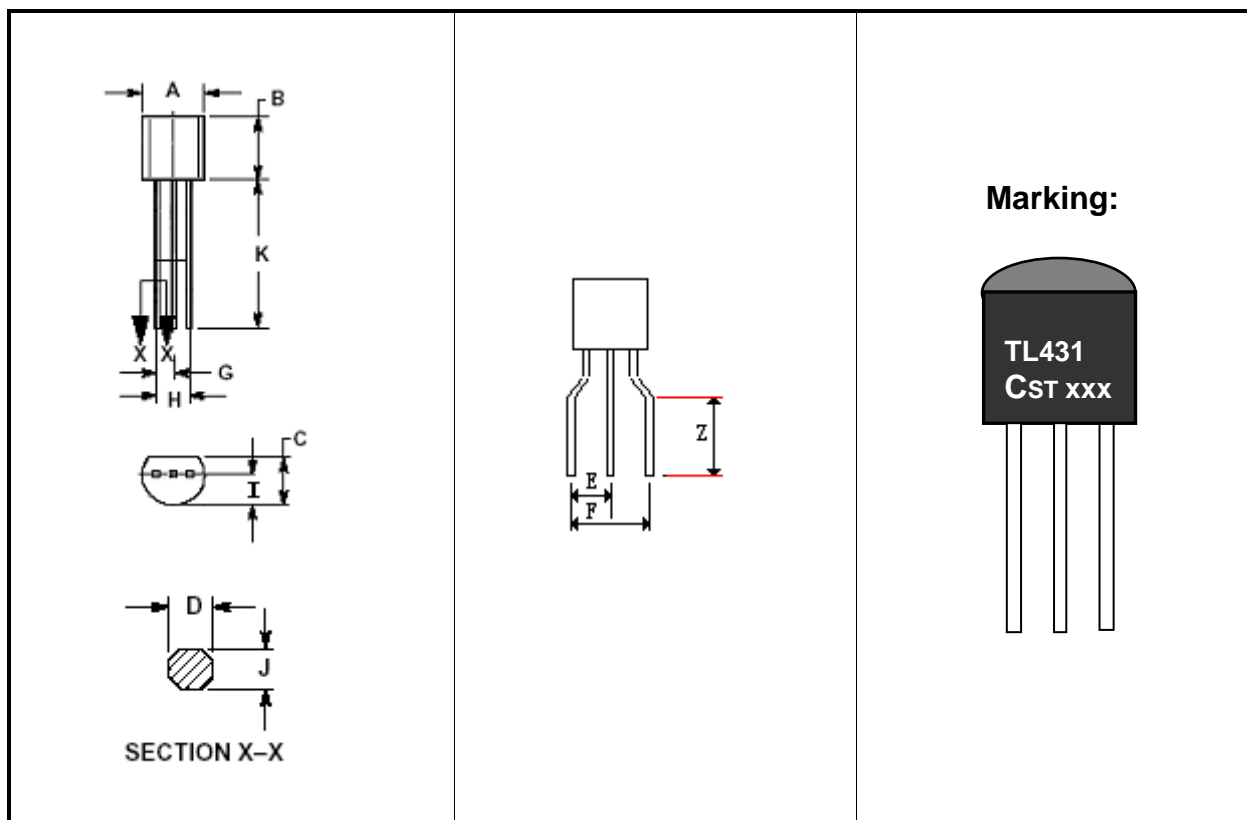


Figure 9. Off-State Cathode Current versus Ambient Temperature

10、Package outline(TO-92)



| DIM | Inches | | | Milimeters | | |
|-----|--------|------|-------|------------|------|------|
| | Min | Type | Max | Min | Type | Max |
| A | 0.175 | - | 0.205 | 4.45 | - | 5.20 |
| B | 0.170 | - | 0.210 | 4.32 | - | 5.33 |
| C | 0.134 | - | 0.142 | 3.40 | - | 3.60 |
| K | 0.500 | - | - | 12.70 | - | - |
| G | 0.045 | - | 0.055 | 1.14 | - | 1.39 |
| H | 0.095 | - | 0.105 | 2.41 | - | 2.67 |
| I | 0.080 | - | 0.105 | 2.04 | - | 2.66 |
| D | 0.016 | - | 0.021 | 0.41 | - | 0.53 |
| J | 0.012 | - | 0.018 | 0.30 | - | 0.45 |
| E | 0.08 | - | 0.112 | 2.15 | - | 2.85 |
| F | 0.179 | - | 0.215 | 4.55 | - | 5.45 |
| Z | 0.118 | - | - | 3.00 | - | - |