

# ADJUSTABLE PRECISION SHUNT REGULATORS

## Description

The YJ431 is a three-terminal adjustable shunt regulator with guaranteed thermal stability over a full operation range. It features sharp turn-on characteristics, low temperature coefficient and low output impedance, which make it ideal substitute for Zener diode in applications such as switching power supply, charger and other adjustable regulators.

The output voltage of YJ431 can be set to any value between  $V_{REF}$  (2.5V) and the corresponding maximum cathode voltage (40V).

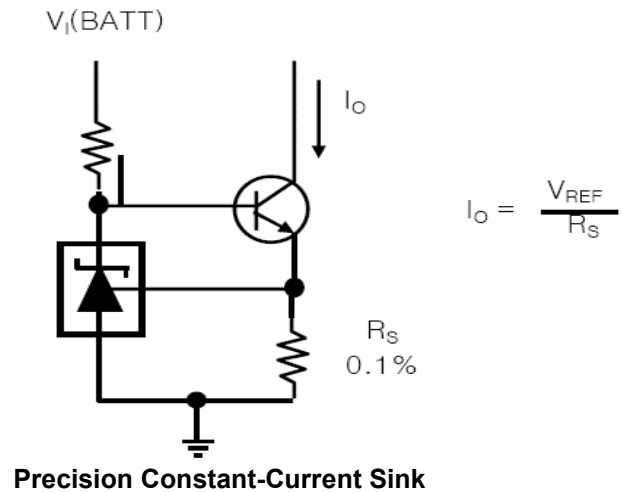
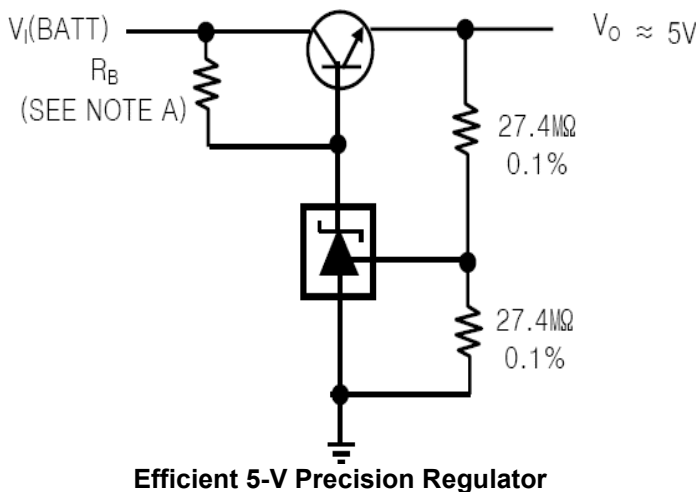
## Features

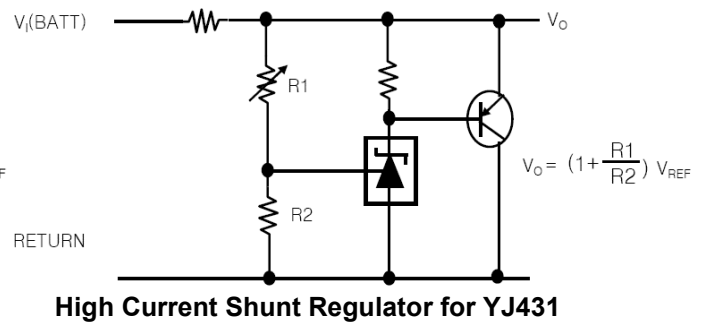
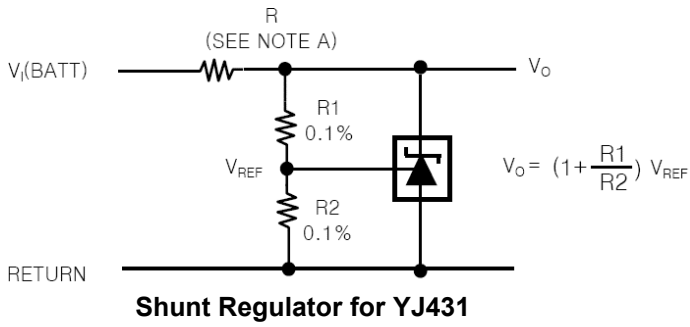
- Reference Voltage Tolerance is  $\pm 0.5\%$  and  $\pm 1\%$ .
- Programmable Precise Output Voltage to 40V.
- High Stability under Capacitive Load.
- Sink Current Capacity from 0.1mA to 100mA.
- Temperature Compensated for Operation over Full Rated.
- Operating Temperature Range.
- Low Output Noise Voltage.
- Fast turn on response.

## Applications

- Charger
- Voltage Adapter
- Switching Power Supply
- Graphic Card
- Precision Voltage Reference
- Adjustable Power Supply
- Switching Power Supply

## Typical Application

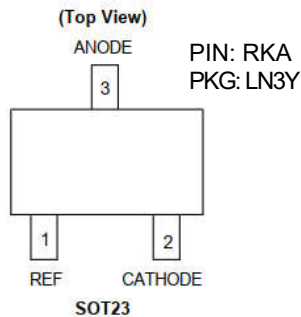




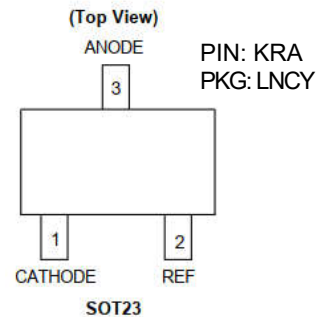
## ■ Package and Ordering Information

| Model | Part Number | Package Description | Temperature Range | Voltage Tolerance | Ordering Number | Marking Information | Packing Option      |
|-------|-------------|---------------------|-------------------|-------------------|-----------------|---------------------|---------------------|
| YJ431 | YJ431       | SOT-23              | -40°C ~ 125°C     | ±0.5%             | YJ431LN3Y       | 431XXX              | Tape & Reel<br>3000 |
|       |             | SOT-23              | -40°C ~ 125°C     |                   | YJ431LNCY       | 4C1XXX              | Tape & Reel<br>3000 |
|       | YJ431A      | SOT-23              | -40°C ~ 125°C     | ±1%               | YJ431ALN3Y      | 43AXXX              | Tape & Reel<br>3000 |
|       |             | SOT-23              | -40°C ~ 125°C     |                   | YJ431ALNCY      | 4CAXXX              | Tape & Reel<br>3000 |

## ■ Pin Configuration and Top Mark

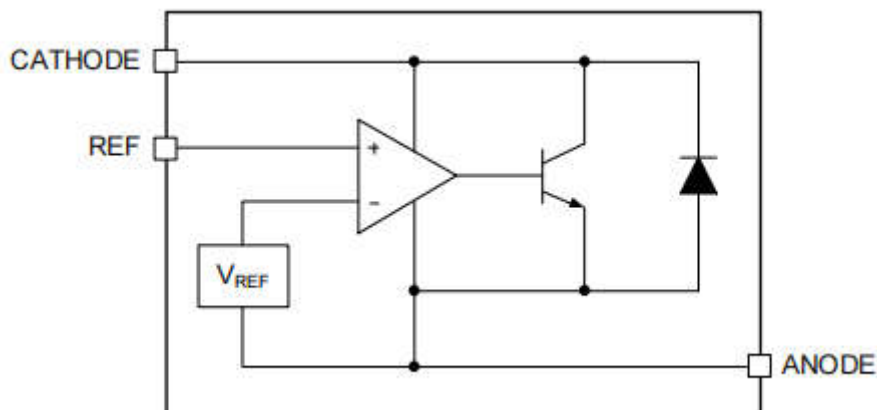


REF(R) CATHODE(K) ANODE (A)



CATHODE(K) REF(R) ANODE (A)

## ■ Functional Block Diagram





■ **Absolute Maximum Ratings (Operating temperature range applies unless otherwise noted)**

| Parameter                                   |        | Symbol        | Ratings      | Unit |
|---|--------|---------------|--------------|------|
| Cathode Voltage                             |        | $V_{KA}$      | 40           | V    |
| Cathode Current Range (Continuous)          |        | $I_K$         | -100 to 150  | mA   |
| Reference Input Current Range               |        | $I_{REF}$     | -0.05 to +10 | mA   |
| Thermal Resistance from Junction to Ambient | SOT-23 | $\theta_{JA}$ | 333          | °C/W |
| Power Dissipation at 25°C                   |        | $P_D$         | 0.3          | W    |
| Junction Temperature Range                  |        | $T_J$         | -40 to +150  | °C   |
| Storage Temperature Range                   |        | $T_{stg}$     | -65 to +150  | °C   |

Notes:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.
2. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
3. This condition is only determined from design. It can't be 100% tested in mass production.

■ **Recommended Operating Ratings**

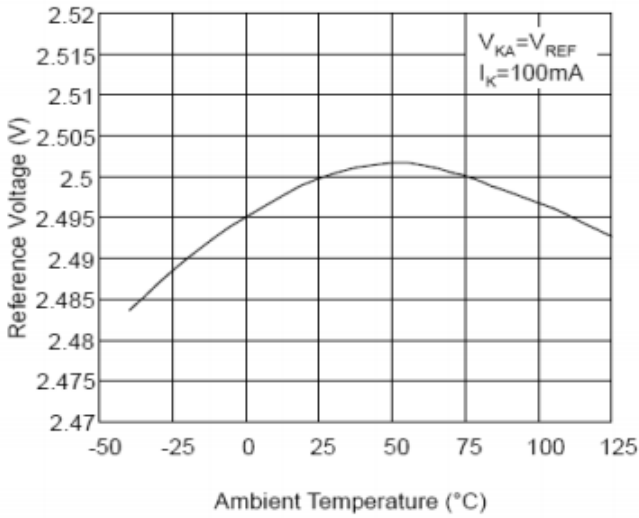
| Parameter       | Symbol   | Ratings   |     | Unit |
|-----------------|----------|-----------|-----|------|
|                 |          | Min       | Max |      |
| Cathode Voltage | $V_{KA}$ | $V_{REF}$ | 40  | V    |
| Cathode Current | $I_K$    | 0.5       | 100 | mA   |

■ **Electrical Characteristics ( $T_A=25^\circ\text{C}$ ,  $V_{KA}=V_{REF}$ ,  $I_K=10\text{mA}$  unless otherwise noted)**

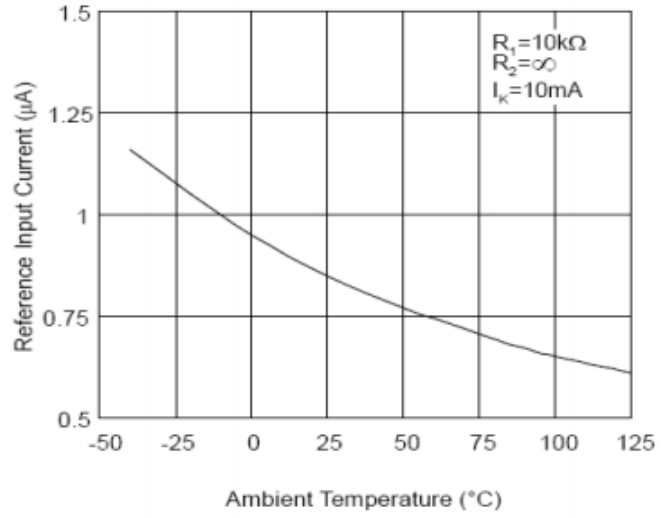
| Parameter   | Symbol                         | Conditions  | Min            | Typ          | Max            | Units         |
|---|--------------------------------|---|----------------|--------------|----------------|---------------|
| Reference Input Voltage   | $V_{REF}$                      | $V_{KA}=V_{REF}$ , $I_K=10\text{mA}$  | 2.483<br>2.470 | 2.495        | 2.507<br>2.520 | V             |
| Deviation of Reference Input Voltage Over Full Temperature Range            | $V_{REF(dev)}$                 | $T_{min} \leq T_A \leq T_{max}$   |                | 3            | 17             | mV            |
| Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage | $\Delta V_{REF}/\Delta V_{KA}$ | $\Delta V_{KA}=10\text{V}-V_{REF}$<br>$\Delta V_{KA}=36\text{V}-10\text{V}$ |                | -0.5<br>-0.4 | -2.7<br>-2.0   | mV/V          |
| Reference Input Current   | $I_{REF}$                      | $R_1=10\text{K}\Omega$ , $R_2=\infty$                                       |                | 1.8          | 4              | $\mu\text{A}$ |
| Deviation of Reference Input Current Over Full Temperature Range            | $I_{REF(dev)}$                 | $R_1=10\text{K}\Omega$ , $R_2=\infty$                                       |                | 0.4          | 1.2            | $\mu\text{A}$ |
| Minimum Cathode Current for Regulation                                      | $I_{K(min)}$                   | -   |                | 0.25         | 0.5            | mA            |
| Off-State Cathode Current   | $I_{K(off)}$                   | $V_{KA}=40\text{V}$ , $V_{REF}=0$   |                | 0.17         | 0.9            | $\mu\text{A}$ |
| Dynamic Impedance   | $Z_{KA}$                       | $I_K=1\text{mA}$ to $100\text{mA}$ ,<br>$f \leq 1.0\text{KHz}$              |                | 0.15         | 0.5            | $\Omega$      |

■ Typical Characteristics

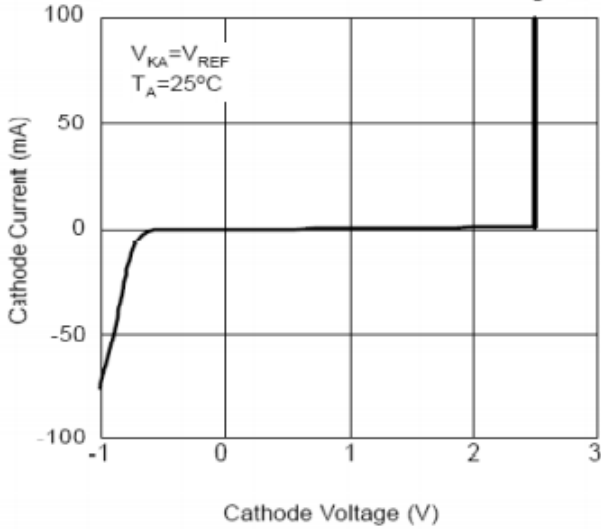
Reference Voltage vs. Ambient Temperature



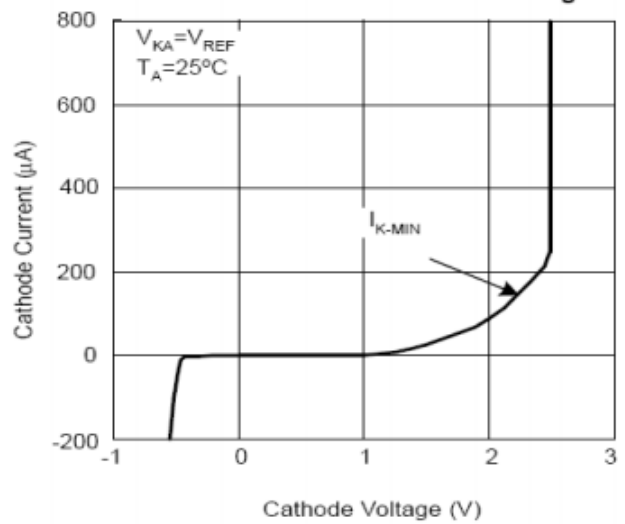
Reference Input Current vs. Ambient Temperature



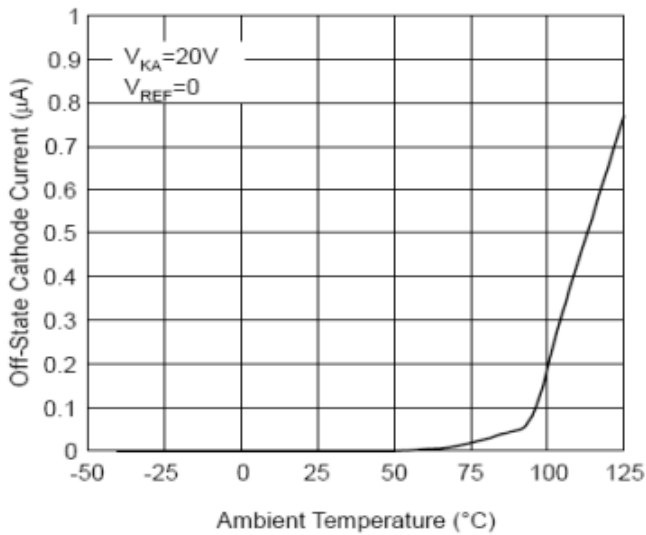
Cathode Current vs. Cathode Voltage



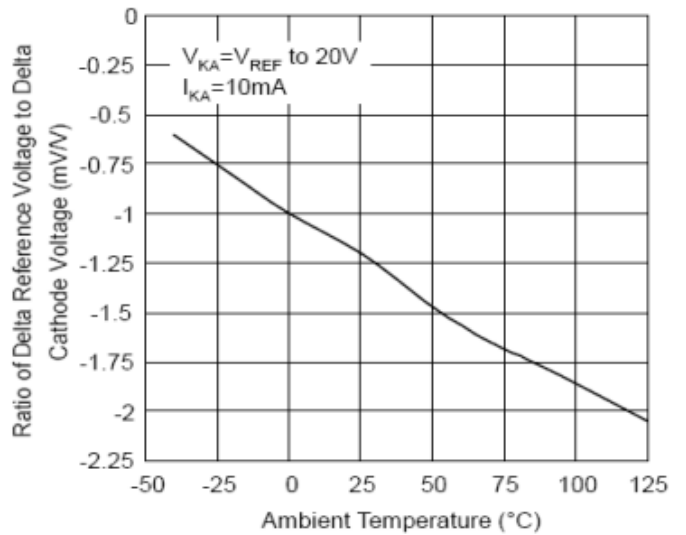
Cathode Current vs. Cathode Voltage



Off-State Cathode Current vs. Ambient Temperature

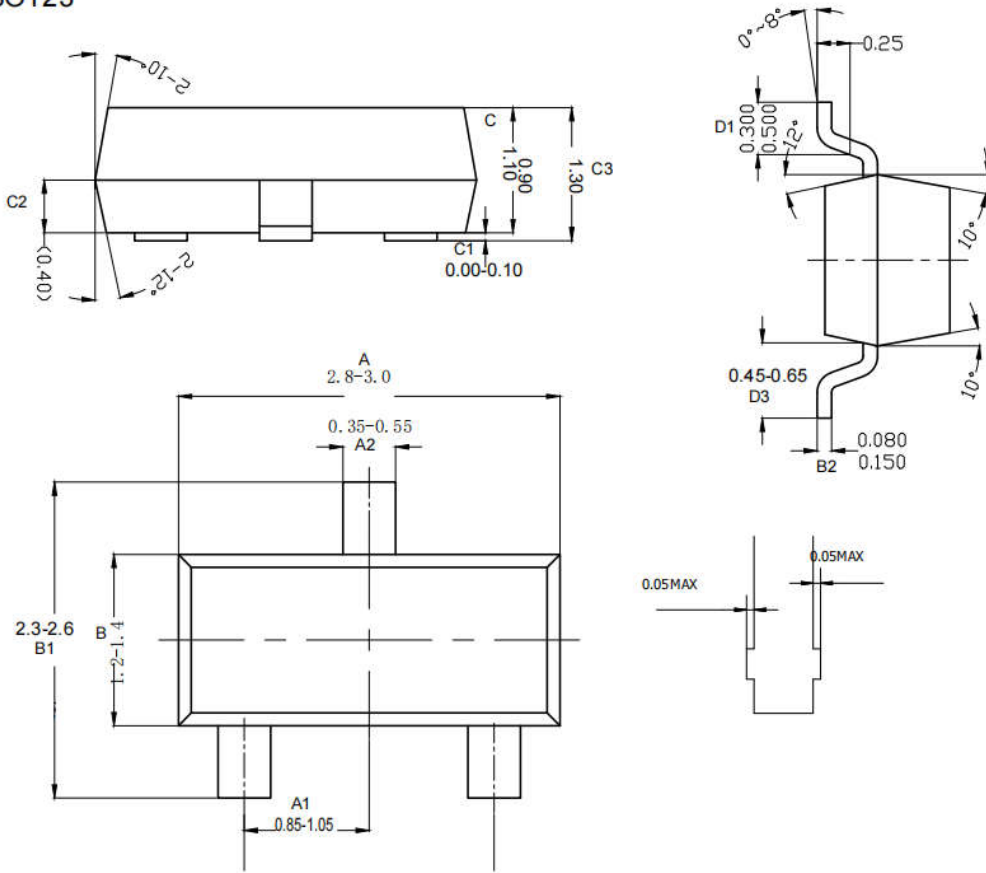


Ratio of Delta Reference Voltage to Delta Cathode Voltage vs. Ambient Temperature



## ■ Package Outline Drawing

SOT23



| COMMON DIMENSIONS        |         |       |      |
|--------------------------|---------|-------|------|
| UNITS MEASURE=MILLIMETER |         |       |      |
| SYMBOL                   | MIN     | MID   | MAX  |
| A                        | 2.80    | 2.90  | 3.0  |
| A1                       | 0.85    | 0.95  | 1.05 |
| A2                       | 0.35    | 0.45  | 0.55 |
| B                        | 1.20    | 1.3   | 1.4  |
| B1                       | 2.3     | 2.45  | 2.6  |
| B2                       | 0.08    | 0.115 | 0.15 |
| C                        | 0.90    | 1.0   | 1.10 |
| C1                       | 0.00    | 0.05  | 0.10 |
| C2                       | 0.35    | 0.4   | 0.45 |
| C3                       | 1.30MAX |       |      |
| D1                       | 0.3     | 0.4   | 0.5  |
| D2                       | 0.25TYP |       |      |
| D3                       | 0.45    | 0.55  | 0.65 |



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