



NANJING INTERNATIONAL GROUP CO.,LTD.

SOT-23 Encapsulate Adjustable Reference Source

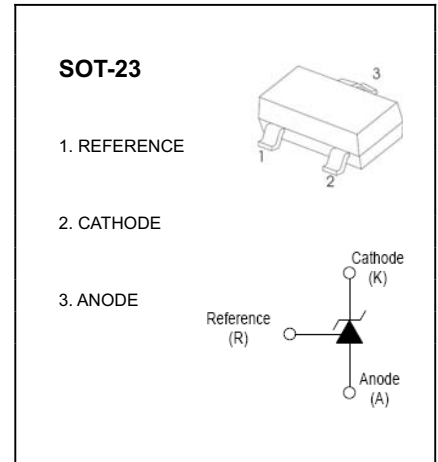
TL431 Adjustable Accurate Reference Source

DEVICE DESCRIPTION

The TL431 is a three-terminal adjustable shunt regulator offering excellent temperature stability. This device has a typical dynamic output impedance of 0.2Ω . The device can be used as a replacement for zener diodes in many applications.

FEATURES

- The output voltage can be adjusted to 36V
- Low dynamic output impedance, its typical value is 0.2Ω
- Trapping current capability is 1 to 100mA
- Low output noise voltage
- Fast on-state response
- The effective temperature compensation in the working range of full temperature
- The typical value of the equivalent temperature factor in the whole temperature scope is $50 \text{ ppm}/^\circ\text{C}$



APPLICATION

- Shunt Regulator
- High-Current Shunt Regulator
- Precision Current Limiter

ABSOLUTE MAXIMUM RATINGS (Operating temperature range applies unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-----------|---------------------------|
| Cathode Voltage | V_{KA} | 37 | V |
| Cathode Current Range (Continuous) | I_{KA} | -100~+150 | mA |
| Reference Input Current Range | I_{ref} | 0.05~+10 | mA |
| Power Dissipation | P_D | 300 | mW |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Operating Junction Temperature | T_j | 150 | $^\circ\text{C}$ |
| Operating Ambient Temperature Range | T_{opr} | -65~+150 | $^\circ\text{C}$ |
| Storage temperature Range | T_{stg} | -65~+150 | $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS (T_a=25°C unless otherwise specified)

| Parameter | Symbol | Test conditions | Min | Typ | Max | Unit |
|---|-------------------------------------|---|---|------|-------|------|
| Reference input voltage (Fig.1) | V _{ref} | V _{KA} =V _{REF} , I _{KA} =10mA | 2.450 | 2.5 | 2.550 | V |
| Deviation of reference input voltage over temperature (note) (Fig.1) | ΔV _{ref} /ΔT | V _{KA} =V _{REF} , I _{KA} =10mA T _{min} ≤T _a ≤T _{max} | | 4.5 | 17 | mV |
| Ratio of change in reference input voltage to the change in cathode voltage (Fig.2) | ΔV _{ref} /ΔV _{KA} | I _{KA} =10mA | ΔV _{KA} =10V~V _{REF} | -1.0 | -2.7 | mV/V |
| | | | ΔV _{KA} =36V~ 10V | -0.5 | -2.0 | mV/V |
| Reference input current (Fig.2) | I _{ref} | I _{KA} = 10mA, R ₁ =10kΩ R ₂ =∞ | | 1.5 | 4 | μA |
| Deviation Of reference input current over full temperature range (Fig.2) | ΔI _{ref} /ΔT | I _{KA} =10mA, R ₁ =10kΩ R ₂ =∞ T _a =full Temperature | | 0.4 | 1.2 | μA |
| Minimum cathode current for regulation (Fig.1) | I _{KA(min)} | V _{KA} =V _{REF} | | 0.45 | 1.0 | mA |
| Off-state cathode Current (Fig.3) | I _{KA(OFF)} | V _{KA} =36V, V _{REF} =0 | | 0.05 | 1.0 | μA |
| Dynamic impedance | Z _{KA} | V _{KA} =V _{REF} , I _{KA} =1 to 100mA f≤1.0kHz | | 0.15 | 0.5 | Ω |

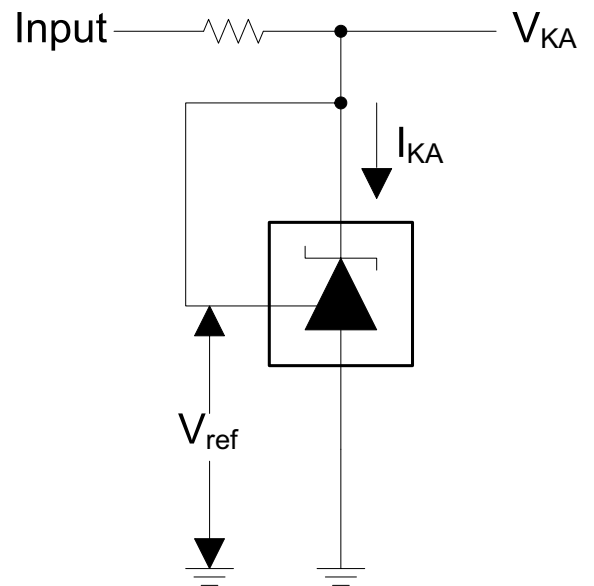
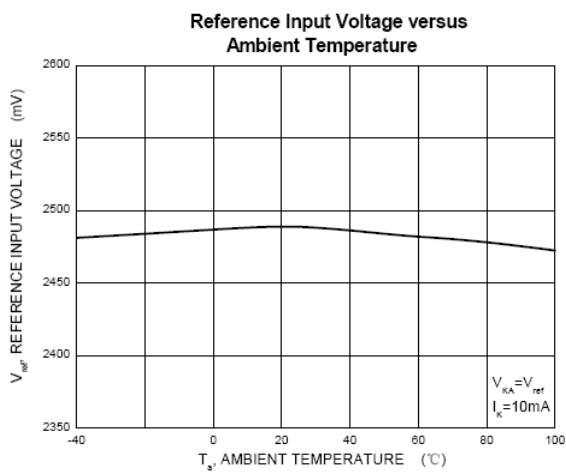
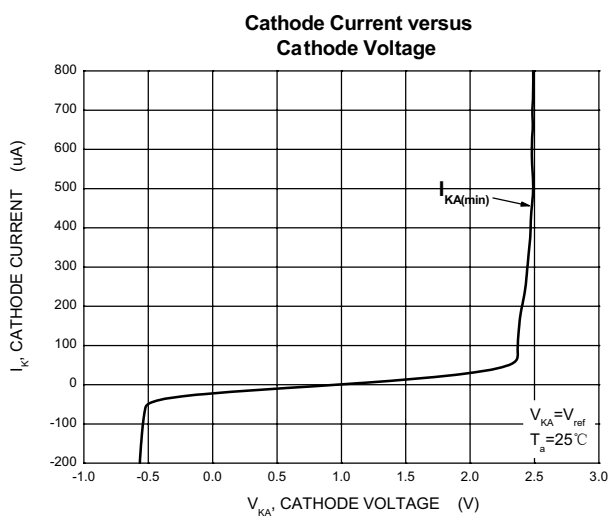
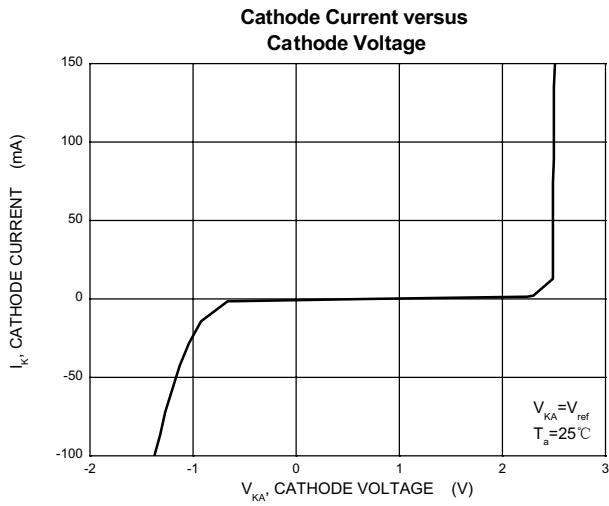
note: T_{MIN}=0°C , T_{MAX}=+70°C

CLASSIFICATION of V_{ref}

| Rank | 0.5% | 1% |
|-------|-------------|-------------|
| Range | 2.487-2.513 | 2.475-2.525 |

Typical Characteristics

TL431



Test Circuit for $V_{KA} = V_{ref}$

