

MMTL431 Adjustable Reference Source

DEVICE DESCRIPTION

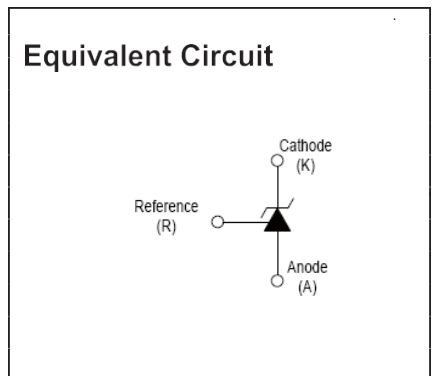
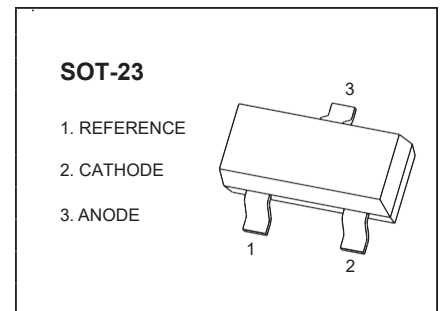
The MMTL431 is a three-terminal adjustable shunt regulator offering excellent temperature stability . This device has a typical dynamic output impedance of 0.2Ω. The device can be used as a replacement for zener diodes in many applications.

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 ppm/°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} | 36 | 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 | °C/W |
| Operating Temperature | T_{opr} | -25~+85 | °C |
| Junction Temperature | T_J | 150 | °C |
| Storage Temperature Range | T_{STG} | -65~+150 | °C |

CLASSIFICATION of V_{ref}

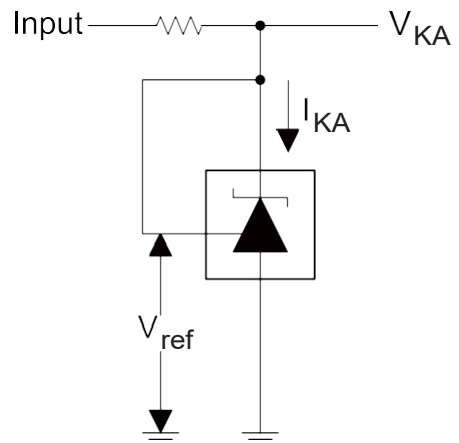
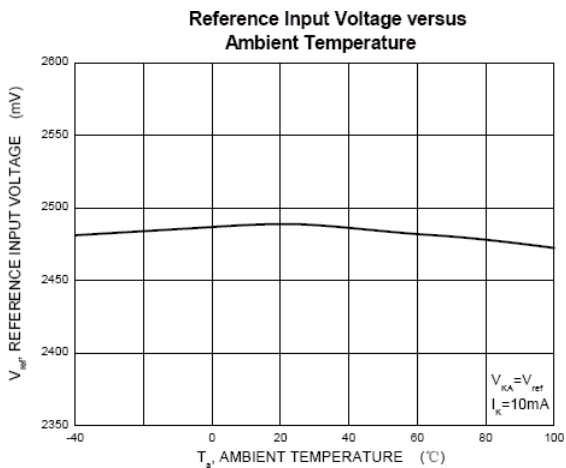
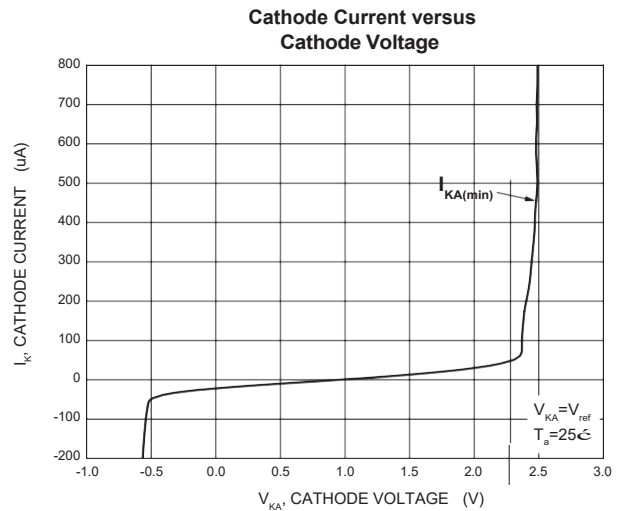
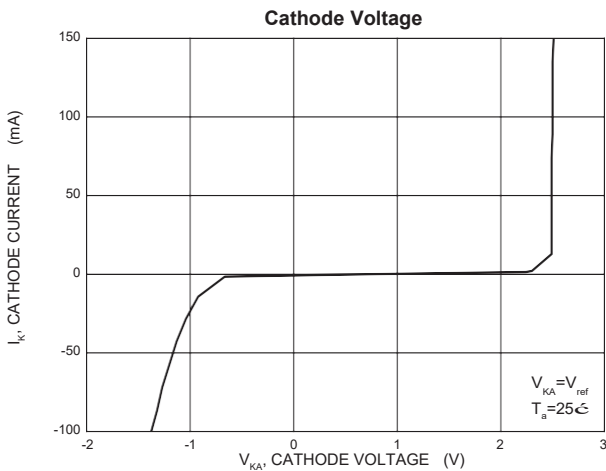
| Rank | 0.5% | 1% |
|---------|-------------|-------------|
| Range | 2.487-2.513 | 2.475-2.525 |
| MARKING | 431 | |

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

| Parameter | Symbol | Test conditions | Min | Typ | Max | Unit |
|---|----------------------------------|---|------------------------------------|------|-------|------|
| Reference input voltage | V _{ref} | V _{KA} =V _{REF} , I _{KA} =10mA | 2.475 | 2.5 | 2.525 | V |
| Deviation of reference Input voltage over temperature (note) | $\Sigma V_{ref} / \Sigma T$ | 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 | $\Sigma V_{ref} / \Sigma V_{KA}$ | I _{KA} = 10mA | $\Sigma V_{KA} = 10V \sim V_{REF}$ | -1.0 | -2.7 | mV/V |
| | | | $\Sigma V_{KA} = 36V \sim 10V$ | -0.5 | -2.0 | mV/V |
| Reference input current | I _{ref} | I _{KA} = 10mA, R ₁ = 10kΩ R ₂ = ∞ | | 1.5 | 4 | μA |
| Deviation of reference input current over full temperature range | $\Sigma I_{ref} / \Sigma T$ | I _{KA} = 10mA, R ₁ = 10kΩ R ₂ = ∞ T _A = -25 to 85 °C | | 0.4 | 1.2 | μA |
| Minimum cathode current for regulation | I _{KA(min)} | V _{KA} = V _{REF} | | 0.45 | 1.0 | mA |
| Off-state cathode current | 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} = -25 °C, T_{MAX} = +85 °C

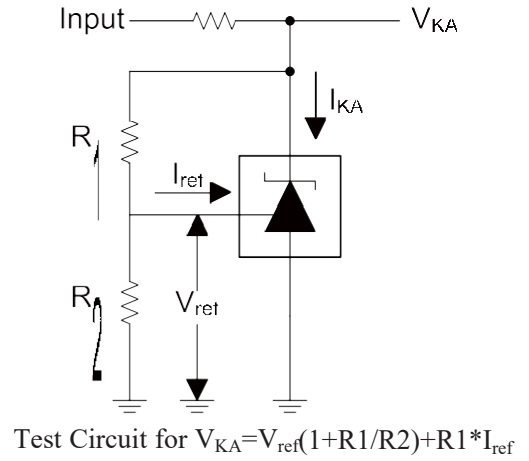
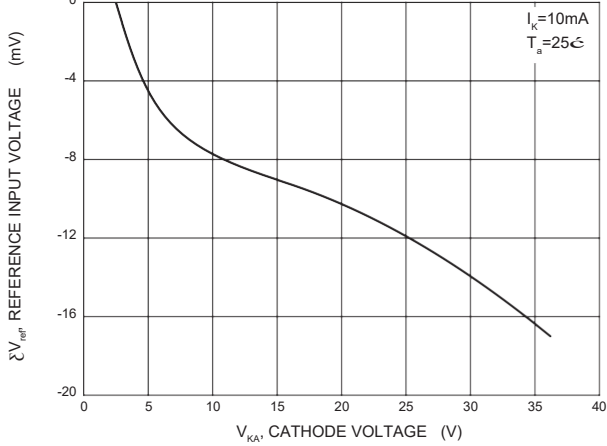
Typical Characteristics



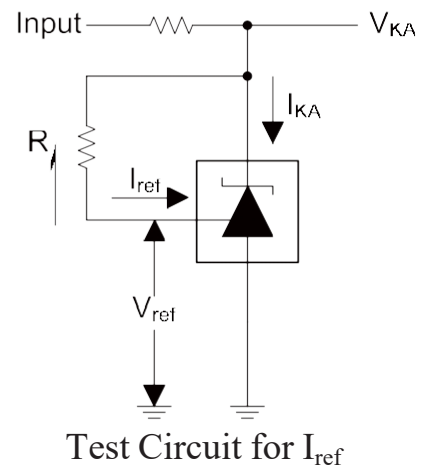
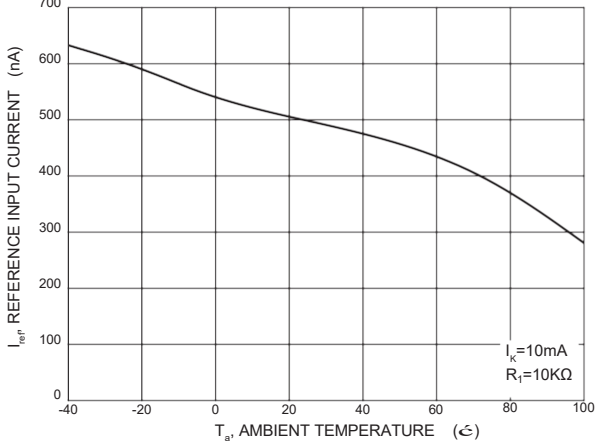
Test Circuit for V_{KA} = V_{ref}

Typical Characteristics

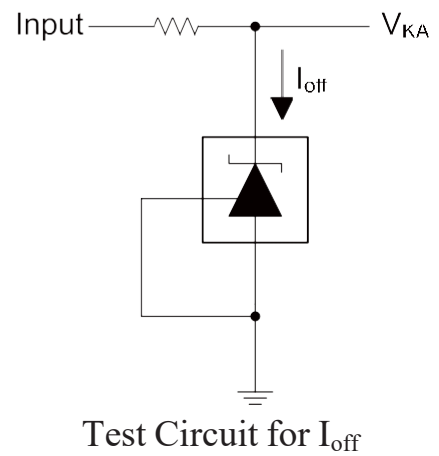
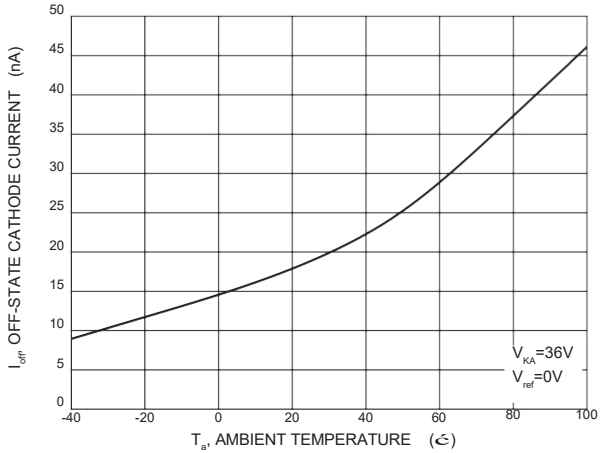
Change in Reference Input Voltage versus Cathode Voltage



Reference Input Current versus Ambient Temperature



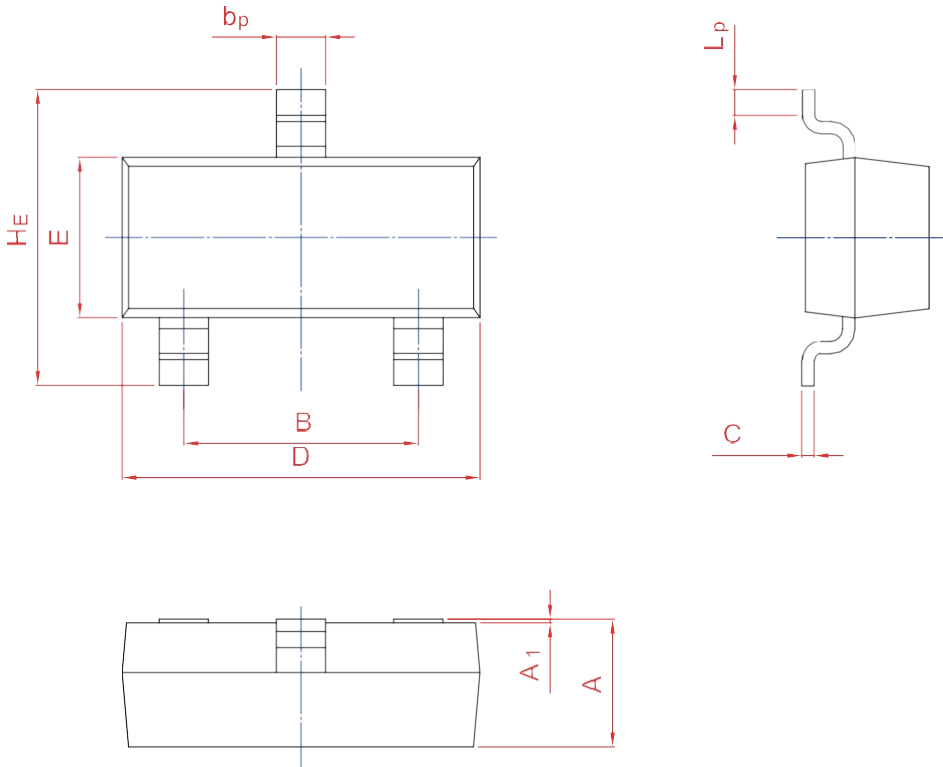
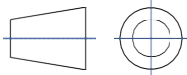
Off-State Cathode Current versus Ambient Temperature



PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT-23



| UNIT | A | B | b _p | C | D | E | HE | A ₁ | L _p |
|------|------|------|----------------|------|------|------|------|----------------|----------------|
| mm | 1.40 | 2.04 | 0.50 | 0.19 | 3.10 | 1.65 | 3.00 | 0.100 | 0.50 |
| | 0.95 | 1.78 | 0.35 | 0.08 | 2.70 | 1.20 | 2.20 | 0.013 | 0.20 |