

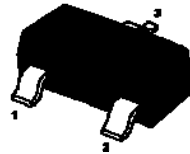


MMTL431 Programmable Precision Reference

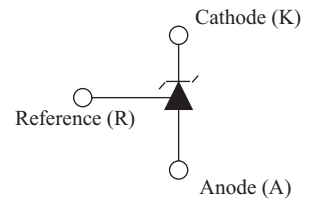
Features:

- Programmable output Voltage to 36 V
- Low dynamic output impedance
- Sink current capability of 1 to 100 mA
- Low output noise voltage
- Fast turn on response

Marking : 431



1. Reference 2. Cathode 3. Anode



SOT-23

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$, unless otherwise noted.)

| Parameter | Symbol | Value | Unit |
|------------------------------------|-----------|----------------|------------------|
| Cathode Voltage | V_{KA} | 37 | V |
| Cathode Current Range (Continuous) | I_{KA} | - 100 to + 150 | mA |
| Reference Input Current Range | I_{REF} | - 0.05 to + 10 | mA |
| Power Dissipation | P_D | 350 | mW |
| Operating Temperature Range | T_{opr} | - 25 to + 85 | $^\circ\text{C}$ |
| Junction Temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | - 65 to + 150 | $^\circ\text{C}$ |

Recommended Operating Conditions

| Parameter | Symbol | Min. | Max. | Unit |
|-----------------|----------|-----------|------|------|
| Cathode Voltage | V_{KA} | V_{REF} | 36 | V |
| Cathode Current | I_{KA} | 1 | 100 | mA |

Characteristics at $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|--------------------------------|-------|------|-------|---------------|
| Reference Input Voltage at $V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$ | V_{REF} | 2.487 | 2.50 | 2.513 | V |
| Reference Input Voltage at $V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$ | V_{REF} | 2.475 | 2.50 | 2.525 | V |
| Reference Input Voltage at $V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$ | V_{REF} | 2.44 | 2.50 | 2.55 | V |
| Deviation of Reference Input Voltage Over Temperature at $V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$, $-25^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$ | $\Delta V_{REF}/\Delta T$ | - | 4.5 | 17 | mV |
| Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage at $I_{KA} = 10\text{ mA}$ | $\Delta V_{REF}/\Delta V_{KA}$ | - | -1.0 | -2.7 | mV/V |
| Reference Input Current at $I_{KA} = 10\text{ mA}$, $R_1 = 10\text{ K}\Omega$, $R_2 = \infty$ | I_{REF} | - | 1.5 | 4 | μA |
| Deviation of Reference Input Current Over Full Temperature at $I_{KA} = 10\text{ mA}$, $R_1 = 10\text{ K}\Omega$, $R_2 = \infty$, $-25^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$ | $\Delta I_{REF}/\Delta T$ | - | 0.4 | 1.2 | μA |
| Minimum Cathode Current for Regulation at $V_{KA} = V_{REF}$ | $I_{KA(min)}$ | - | 0.45 | 1 | mA |
| Off-Stage Cathode Current at $V_{KA} = 36\text{ V}$, $V_{REF} = 0$ | $I_{KA(OFF)}$ | - | 0.05 | 1 | μA |
| Dynamic Impedance at $V_{KA} = V_{REF}$, $I_{KA} = 1\text{ to }100\text{ mA}$, $f \leq 1\text{ KHz}$ | Z_{KA} | - | 0.15 | 0.5 | Ω |



FIGURE 1-TEST CIRCUIT FOR $V_{KA} = V_{ref}$

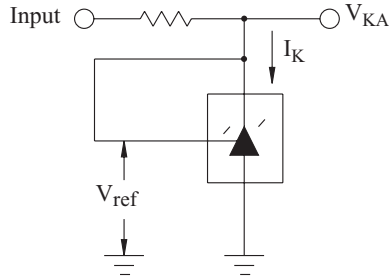
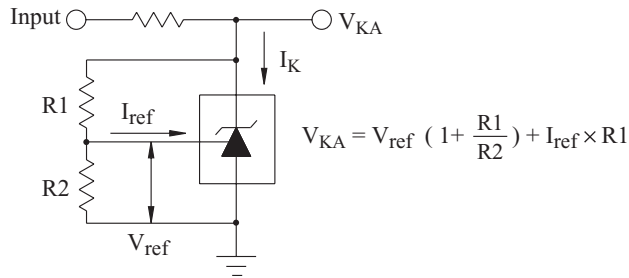


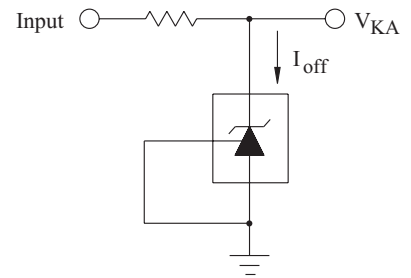
FIGURE 2-TEST CIRCUIT FOR $V_{KA} > V_{ref}$



Note 1:

The deviation parameter ΔV_{ref} is defined as the differences between the maximum and minimum values obtained over the full operating ambient temperature range that applies.

FIGURE 3-TEST CIRCUIT FOR I_{off}



Example : $\Delta V_{ref} = 8.0mV$ and slope is positive,
 V_{ref} at $25\text{ }^\circ\text{C} = 2.495V$, $\Delta T_a = 70\text{ }^\circ\text{C}$

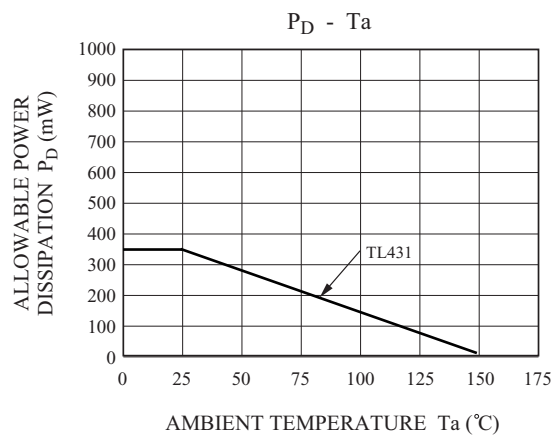
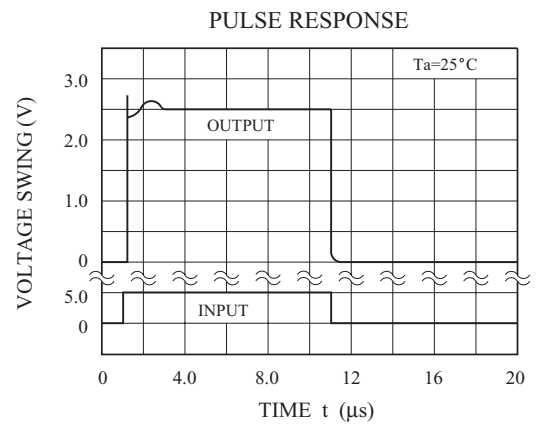
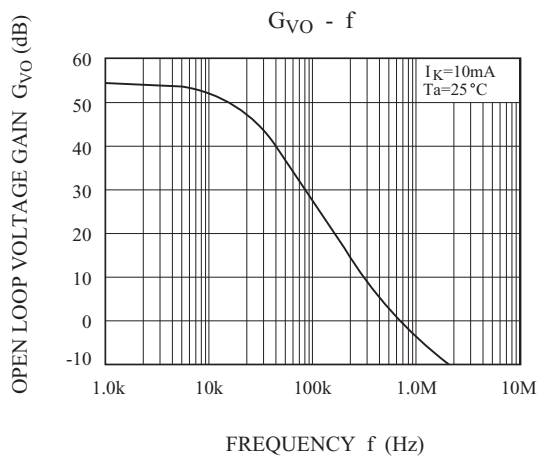
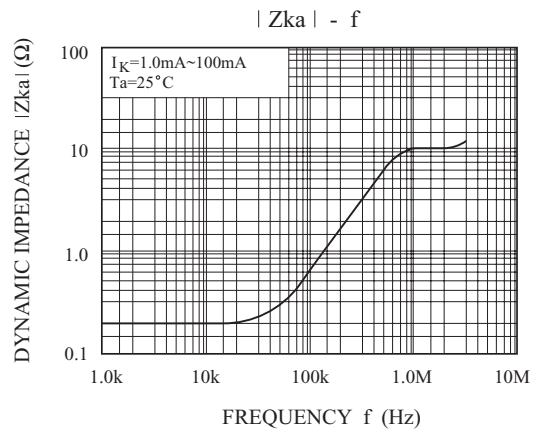
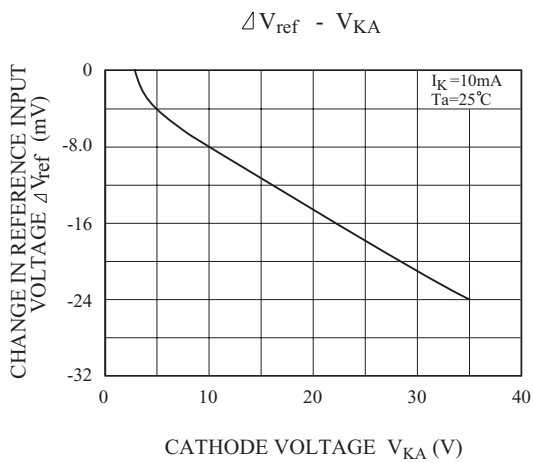
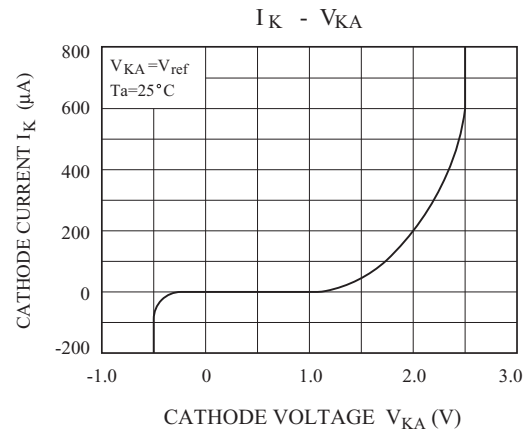
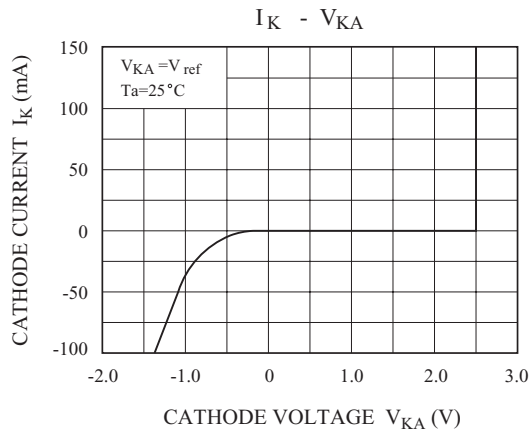
$$\alpha V_{ref} = \frac{0.008 \times 10^6}{70 \times (2.495)} = 45.8 \text{ ppm/ } ^\circ\text{C}$$

Note 2: The dynamic impedance Z_{ka} is defined as:

$$|Z_{ka}| = \frac{\Delta V_{KA}}{\Delta I_K}$$

When the device is programmed with two external resistors, R1 and R2, (refer to Figure 2) the total dynamic impedance of the circuit is defined as:

$$|Z_{ka}| = |Z_{ka}| \left(1 + \frac{R1}{R2}\right)$$

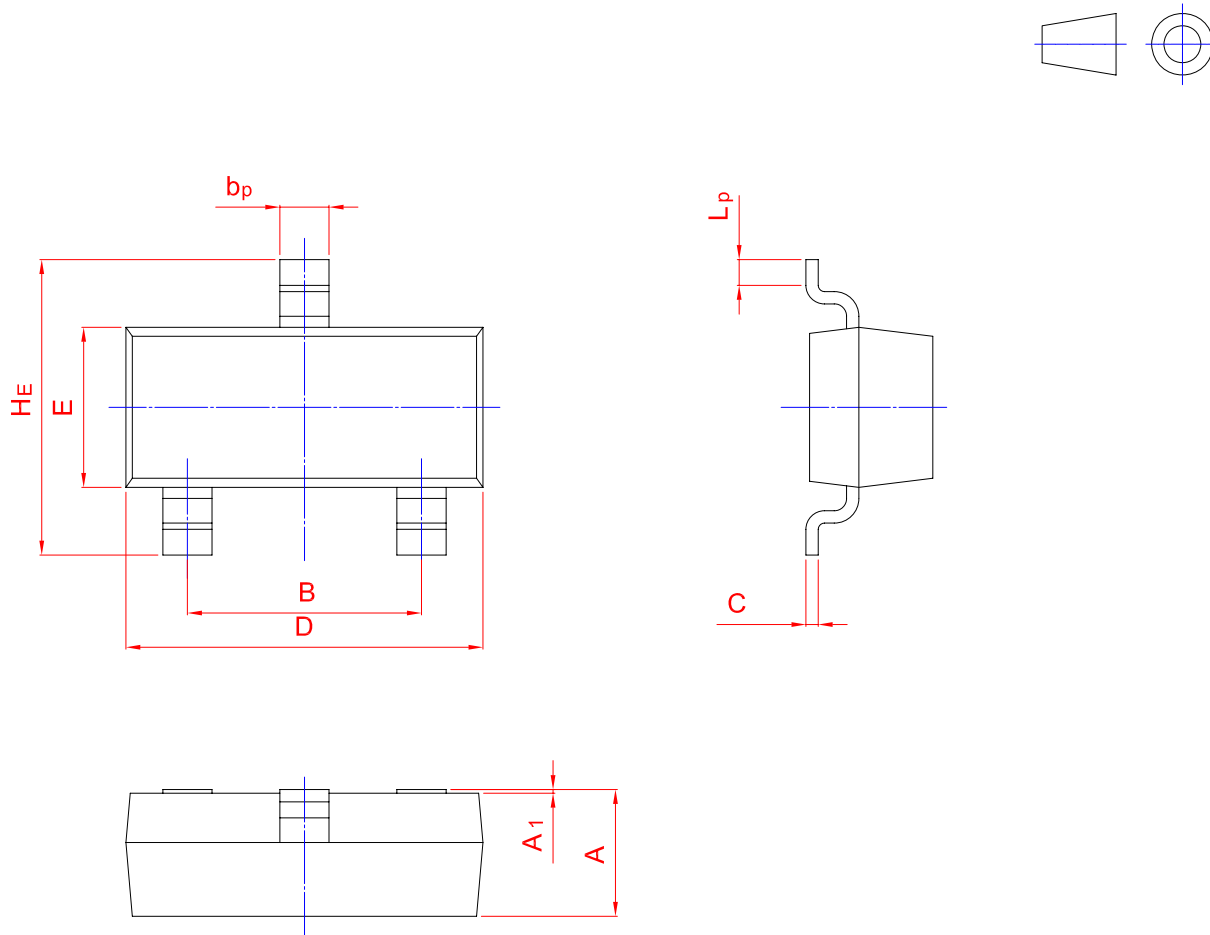




PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT-23



| UNIT | A | B | b_p | C | D | E | H_E | 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 |