

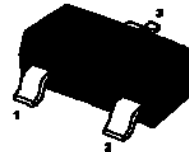


MMTL431 Programmable Precision Reference

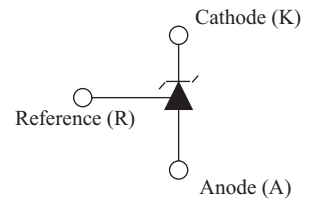
Features:

- 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 $V_{KA} = V_{ref}$

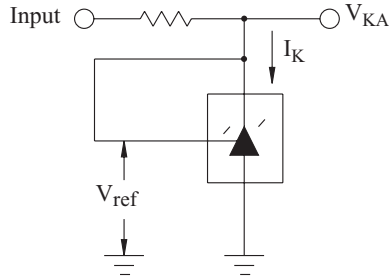
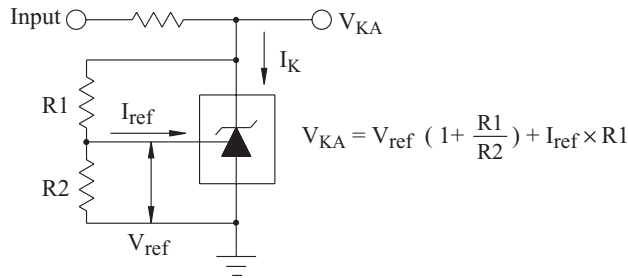


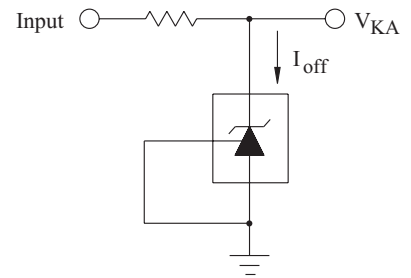
FIGURE 2-TEST CIRCUIT FOR $V_{KA} > V_{ref}$



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 $25\text{ }^\circ\text{C} = 2.495V$, $\Delta T_a = 70\text{ }^\circ\text{C}$

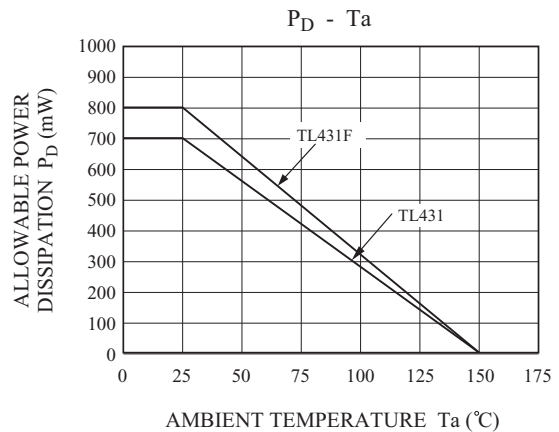
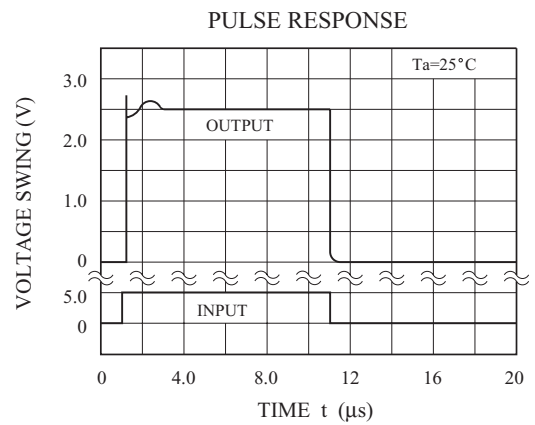
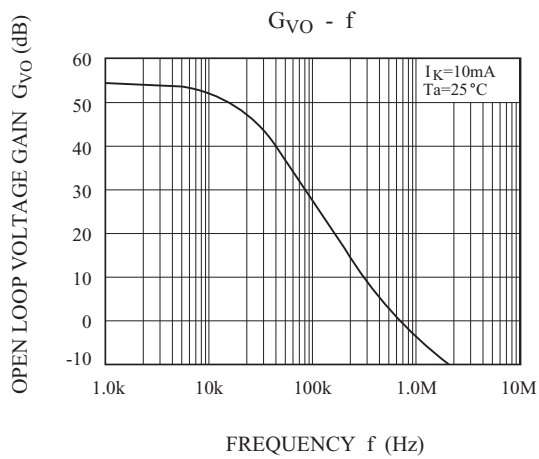
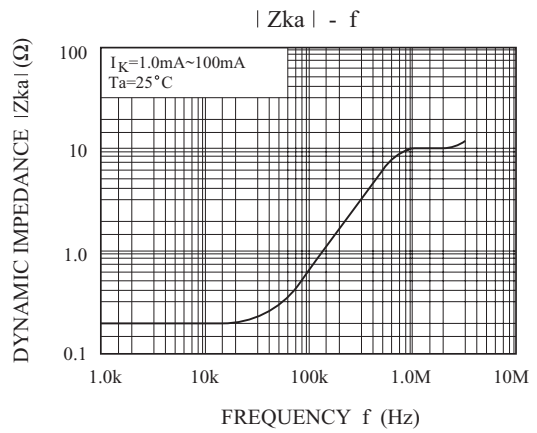
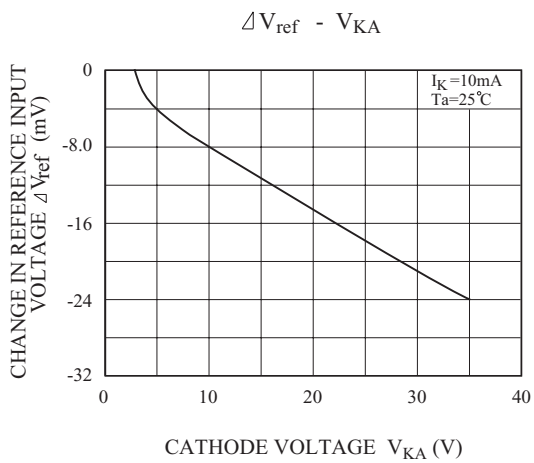
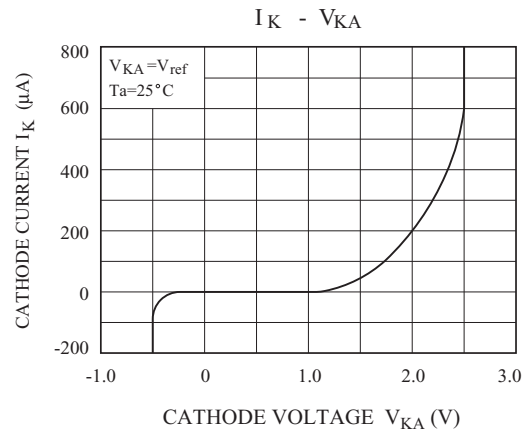
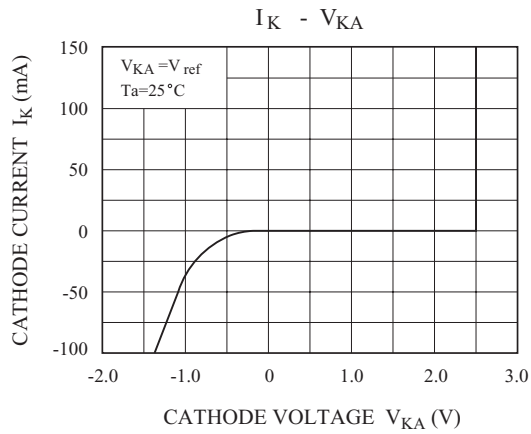
$$\alpha V_{ref} = \frac{0.008 \times 10^6}{70 \times (2.495)} = 45.8 \text{ ppm/ } ^\circ\text{C}$$

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:

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

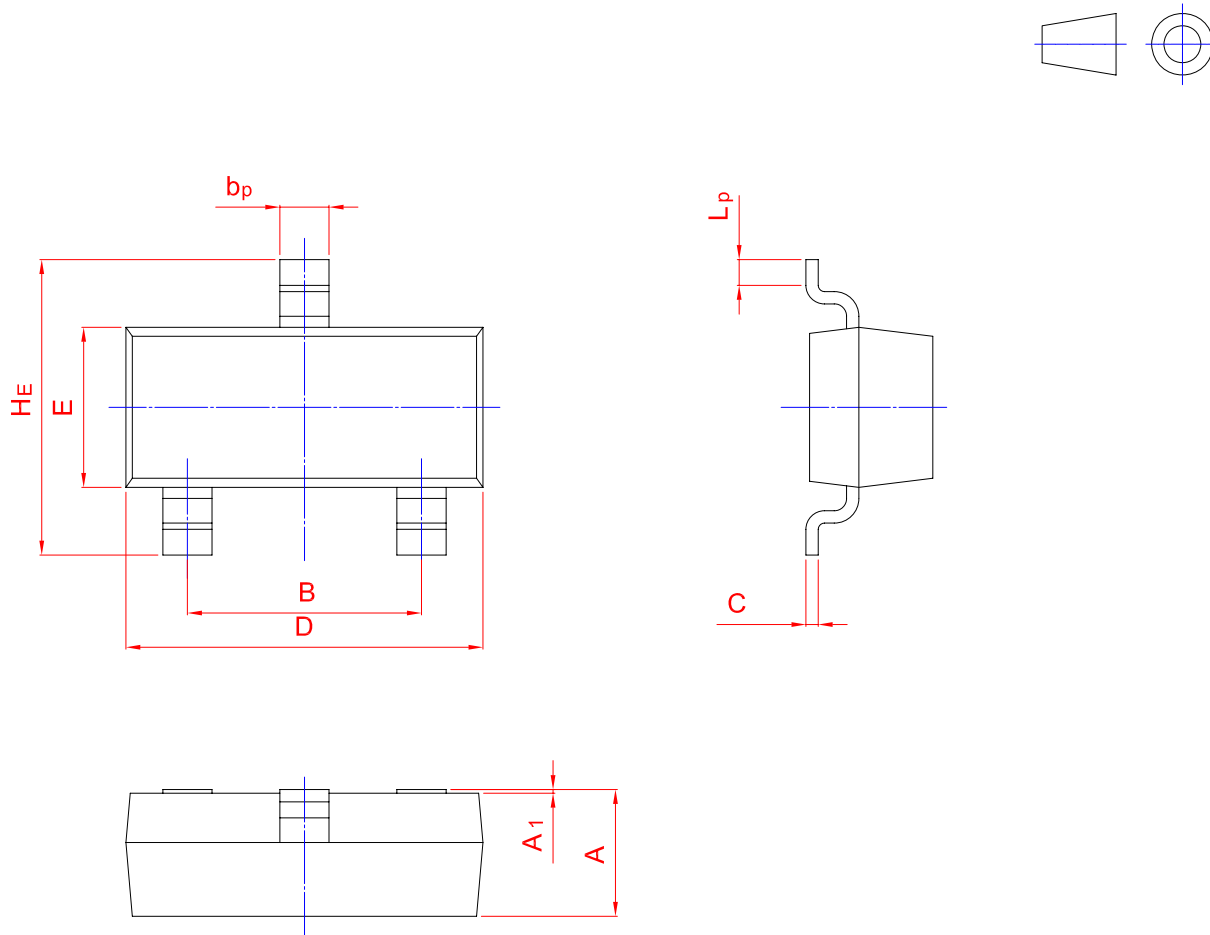




PACKAGE OUTLINE

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