

Adjustable Accurate Reference Source

The TL431 is a three-terminal adjustable regulator series with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between V_{ref} (approximately 2.5 volts) and 40 volts with two external resistors. These devices have a typical dynamic output impedance of 0.28Ω . Active output circuitry provides a very sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications. The IL431S is characterized for operation from $(-40$ to $+125^{\circ}\text{C})$.

FEATURES

- Programmable Output Voltage to 40V
- Low Dynamic Output Impedance 0.28Ω (Typ)
- Sink Current Capability of $100\mu\text{A}$ to 100 mA
- Equivalent Full-Range Temperature Coefficient of $(50\text{ ppm}/^{\circ}\text{C})^*$
- Temperature Compensated for Operation over Full Rated Operating Temperature Range
- Low Output Noise Voltage
ESD 2000 V
- Fast Turn on Respons

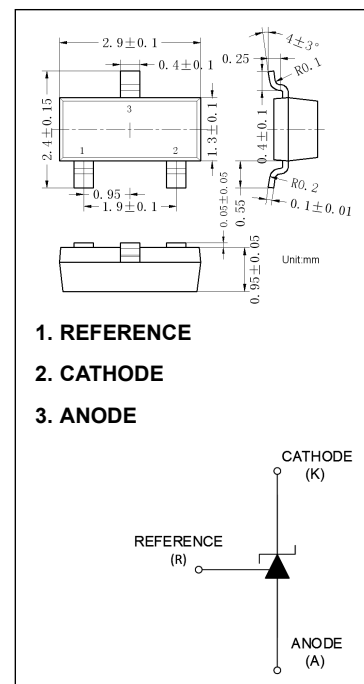
Applications

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

ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

Symbol	Characteristic	Value	Unit
V_{KA}	Cathode Voltage	40	V
I_K	Cathode Current Range (Continuous)	-100 ~ 150	mA
I_{REF}	Reference Input Current Range	-0.05 ~ +10	mA
P_D	Power Dissipation at 25°C : TO – 92 Package ($R_{\theta JA} = 178^{\circ}\text{C/W}$)	0.7	W
	SOT – 23 – 3 Package ($R_{\theta JA} = 625^{\circ}\text{C/W}$)	0.2	W
T_J	Junction Temperature Range	-40 ~ 125	$^{\circ}\text{C}$
T_A	Operating Temperature Range	(-40 ~ 125)	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range	-65 ~ +150	$^{\circ}\text{C}$



RECOMMENDED OPERATING CONDITIONS

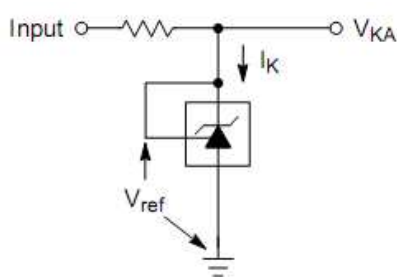
Symbol	Characteristic	Test Condition	Min	Typ	Max	Unit
V_{KA}	Cathode Voltage		V_{REF}		40	V
I_K	Cathode Current		0.1		100	mA

ELECTRICAL CHARACTERISTICS

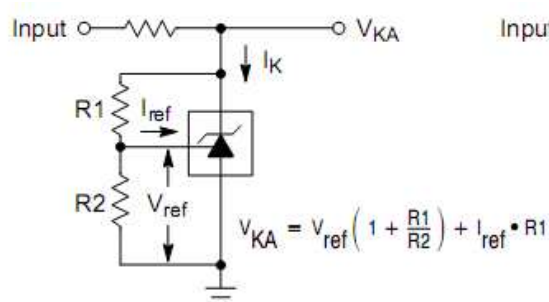
($T_A = 25^\circ\text{C}$, $V_{KA} = V_{REF}$, $I_K = 10\text{mA}$ unless otherwise specified)

Symbol	Characteristic	Test Condition	Min	Typ	Max	Unit
V_{REF}	Reference Input Voltage	$V_{KA} = V_{REF}$, $I_K = 10\text{mA}$	2.483	2.495	2.507	V
$V_{REF(dev)}$	Deviation of Reference Input Voltage Over Full Temperature Range	$T_{min} \leq T_A \leq T_{max}$			17	mV
$-V_{REF}/\Delta V_{KA}$	Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\Delta V_{KA} = 10\text{V} - V_{REF}$ $\Delta V_{KA} = 36\text{V} - 10\text{V}$	-0.4 -0.4	0.32 0.16	2.7 2.0	mV/V
I_{REF}	Reference Input Current	$R_1 = 10\text{K}\Omega$, $R_2 = \infty$		0.22	4	μA
$I_{REF(dev)}$	Deviation of Reference Input Current Over Full Temperature Range	$R_1 = 10\text{K}\Omega$, $R_2 = \infty$		0.05	0.4	μA
$I_{K(min)}$	Minimum Cathode Current for Regulation			0.05	0.1	mA
$I_{K(off)}$	Off-State Cathode Current	$V_{KA} = 40\text{V}$, $V_{REF} = 0$		0.056	0.5	μA
Z_{KA}	Dynamic Impedance	$I_K = 1\text{mA}$ to 100mA , $f \leq 1.0\text{KHz}$		0.28	0.5	Ω

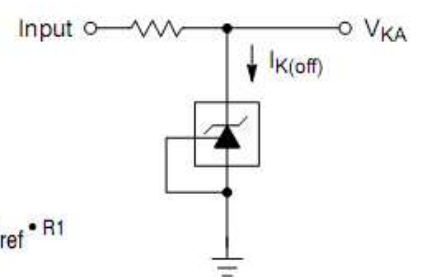
TEST CIRCUITS



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



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



Test Circuit
for $I_{K(off)}$

Typical Electrical Characteristics

