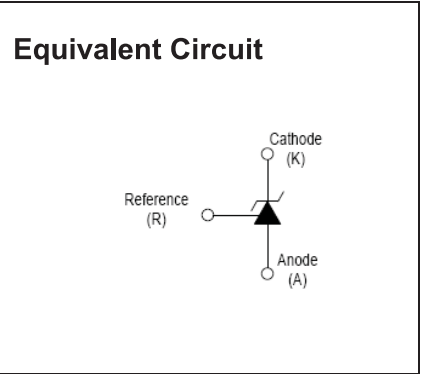


Adjustable Accurate Reference Source

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

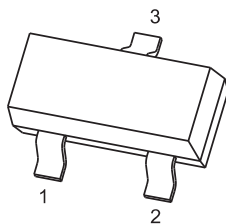


APPLICATION

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

PIN CONNENCTIONS and MARKING

TL431



SOT -23

- 1.REFERENCE
- 2.CATHODE
- 3. ANODE

ORDERING INFORMATION

Part Number	MARKING ⁽¹⁾	Package	Packing Method	Pack Quantity
TL431	431	SOT-23	Reel	3000pcs/Reel

Notes: (1). Solid dot= Green molding compound device, if none, the normal device.
(2). XXX=Code

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

Parameter	Symbol	Value			Unit
		SOT-23	SOT-89	TO-92	
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	500	770	mW
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	417	250	162	°C/W
Operating Junction Temperature	T_J	-40~+125			°C
Storage Temperature Range	T_{STG}	-65~+150			°C

ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Reference input voltage	V_{ref}	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$	2.475	2.5	2.525	V
Deviation of reference Input voltage over temperature (note)	$\Delta V_{ref}/\Delta T$	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$ $T_{MIN}\leq T_a\leq T_{MAX}$		4.5	17	mV
Ratio of change in reference Input voltage to the change in cathode voltage	$\Delta V_{ref}/\Delta V_{KA}$	$I_{KA}=10\text{mA}$		-1.0	-2.7	mV/V
				-0.5	-2.0	mV/V
Reference input current	I_{ref}	$I_{KA}=10\text{mA}, R_1=10\text{k}\Omega$ $R_2=\infty$		1.5	4	μA
Deviation of reference input current over full temperature range	$\Delta I_{ref}/\Delta T$	$I_{KA}=10\text{mA}, R_1=10\text{k}\Omega$ $R_2=\infty$ $T_A=-25$ 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	$I_{KA(OFF)}$	$V_{KA}=36\text{V}, V_{REF}=0$		0.05	1.0	μA
Dynamic impedance	Z_{KA}	$V_{KA}=V_{REF}, I_{KA}=1$ to 100mA $f\leq 1.0\text{kHz}$		0.15	0.5	Ω

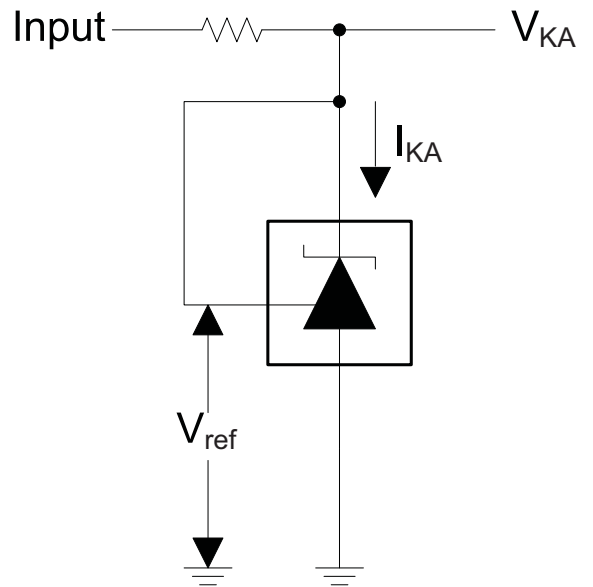
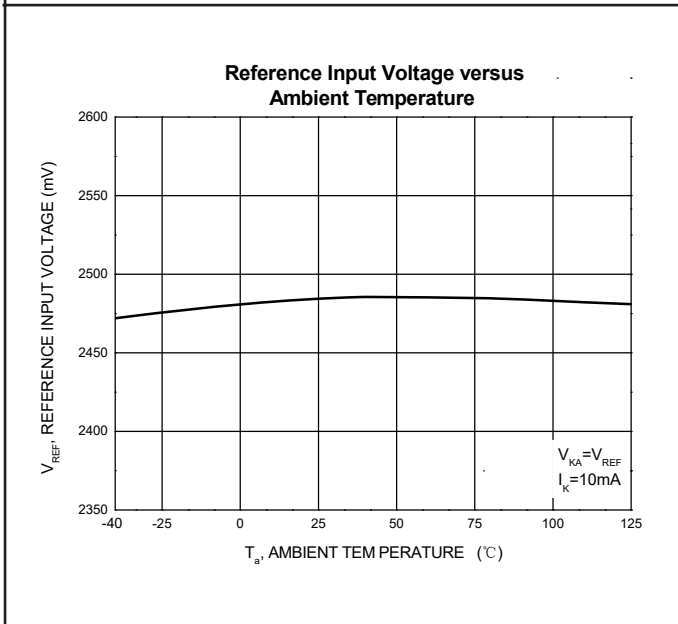
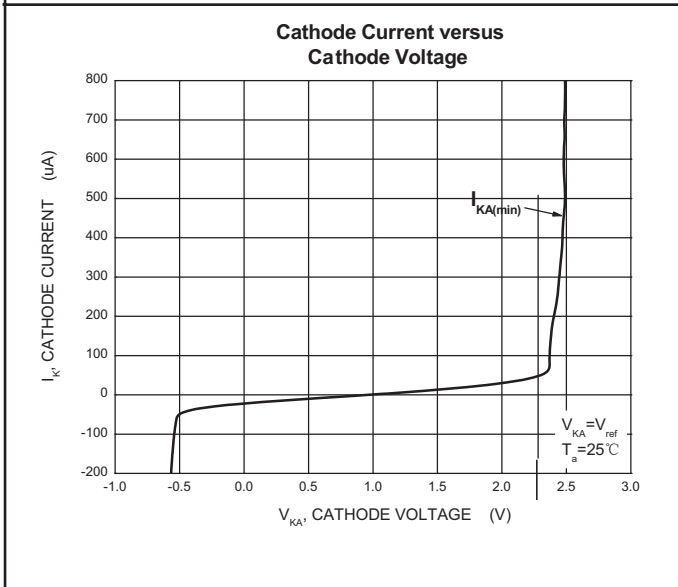
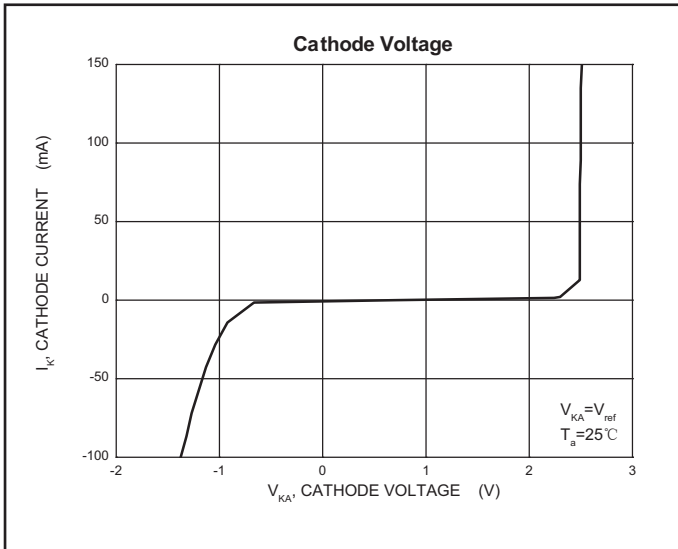
Note: $T_{MIN}=-25^\circ\text{C}$, $T_{MAX}=+85^\circ\text{C}$

CLASSIFICATION cZVref

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

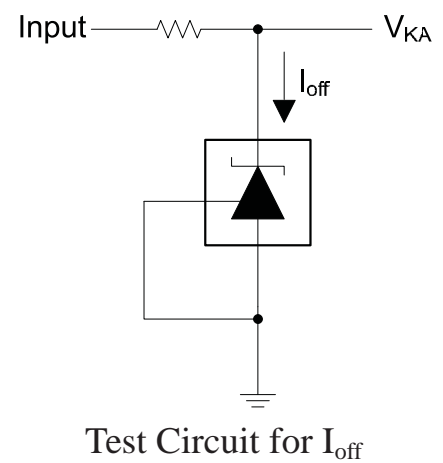
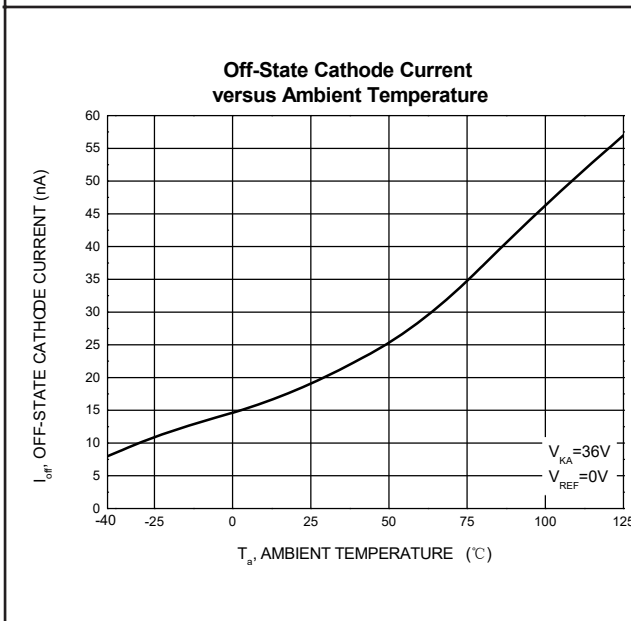
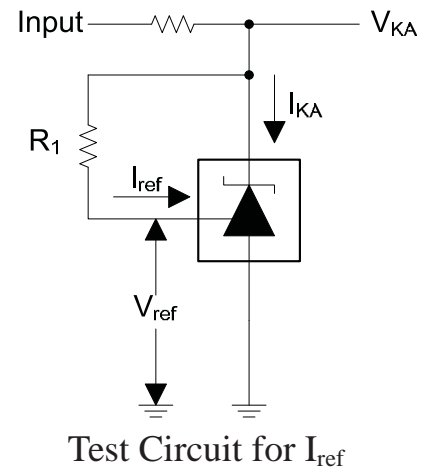
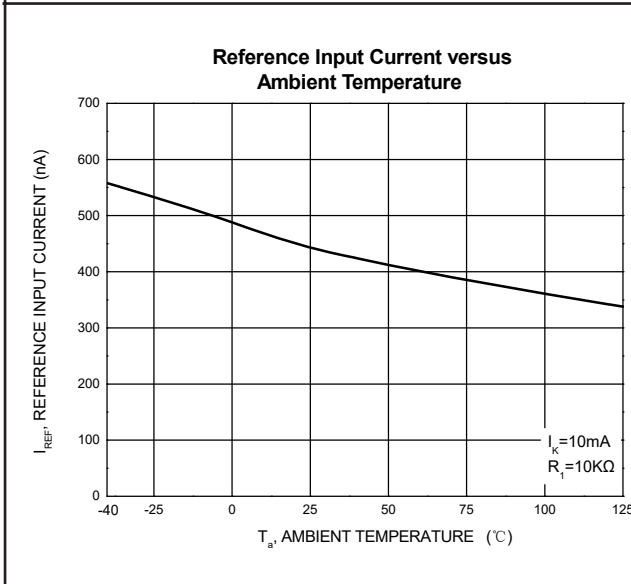
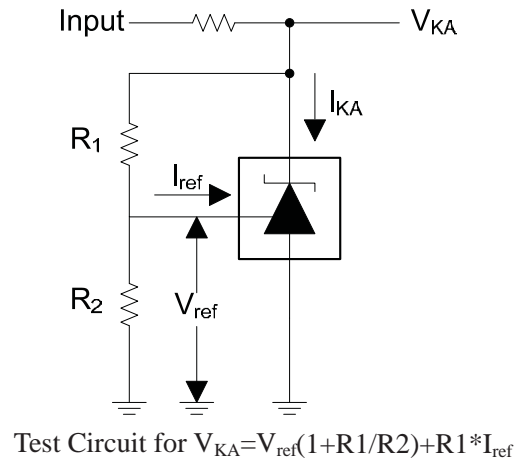
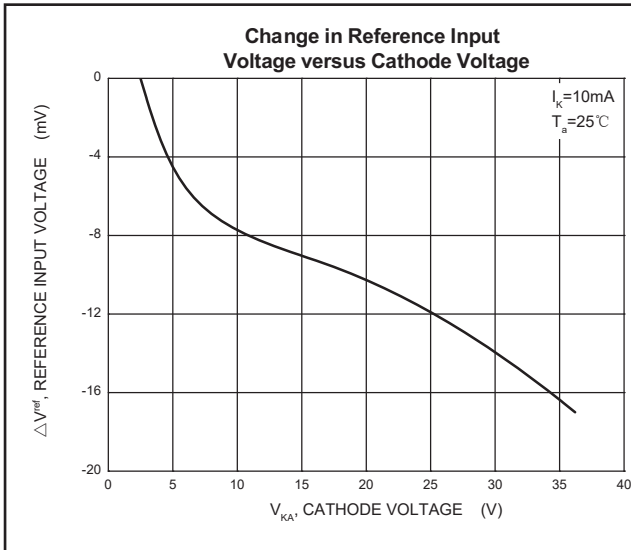
NOTE: It is strongly recommended to connect a capacitor (value more than 0.1 μF) at the output pin to smooth the output. The capacitor should be placed as close as possible to the output pin, with the shortest path to GND.

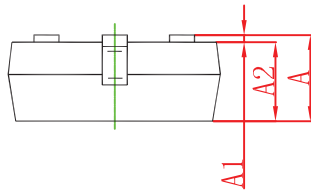
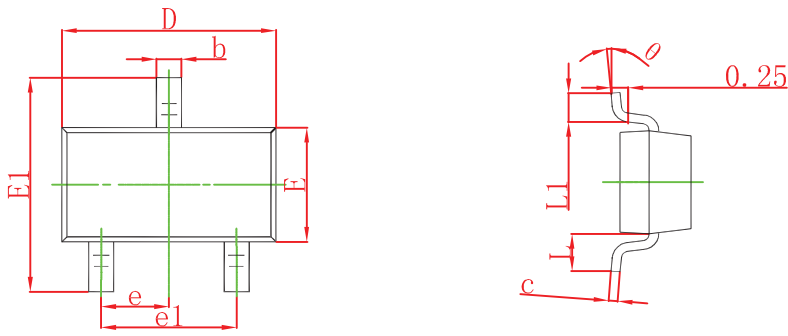
Typical Characteristics



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

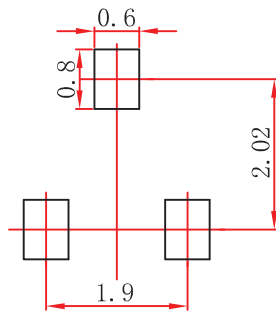
Typical Characteristics





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
v	0°	8°	0°	8°

SOT-23 Suggested Pad Layout



- Note:
1. Controlling dimension: in millimeters.
 2. General tolerance: $\pm 0.05\text{mm}$.
 3. The pad layout is for reference purposes only.