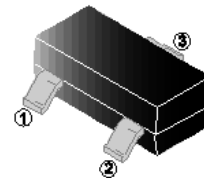


RoHS Compliant Product  
A suffix of "-C" specifies halogen or lead -free

### DESCRIPTION

The TL431A-C is a three-terminal adjustable shunt regulator offering excellent temperature stability. This device has a typical dynamic output impedance of  $0.2\Omega$ . The device can be used as a replacement for zener diodes in many applications.

**SOT-23**



1. Reference
2. Cathode
3. Anode

### FEATURES

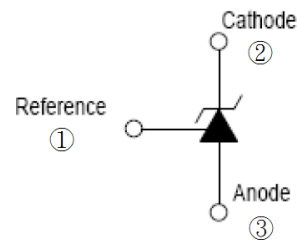
- The Output Voltage can be Adjusted to 36V
- Low Dynamic Output Impedance, Its Typical Value is  $0.2\Omega$
- Trapping Current Capability is 1~100mA
- Low Output Noise Voltage
- Fast On-State Response
- The Effective Temperature Compensation in the Working Range of Full Temperature
- The Typical Value of the Equivalent Temperature Factor in the Whole Temperature Scope is 50 ppm/°C

### APPLICATIONS

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

### MARKING

431
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### CLASSIFICATION OF $V_{ref}$

Rank	<b>0.5%</b>
Range	2.487-2.513

### PACKAGE INFORMATION

Package	MPQ	Leader Size
SOT-23	3K	7 inch

### ORDER INFORMATION

Part Number	Type
TL431A-C	Lead (Pb)-free and Halogen-free

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

Parameter	Symbol	Ratings	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-Ambient	$R_{\theta JA}$	417	°C/W
Operating Temperature	$T_{opr}$	-25~85	°C
Operating Junction and Storage Temperature	$T_J, T_{STG}$	150, -65~150	°C

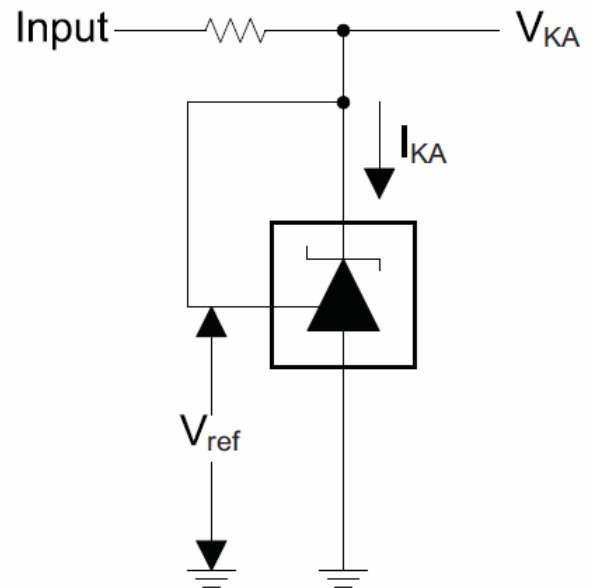
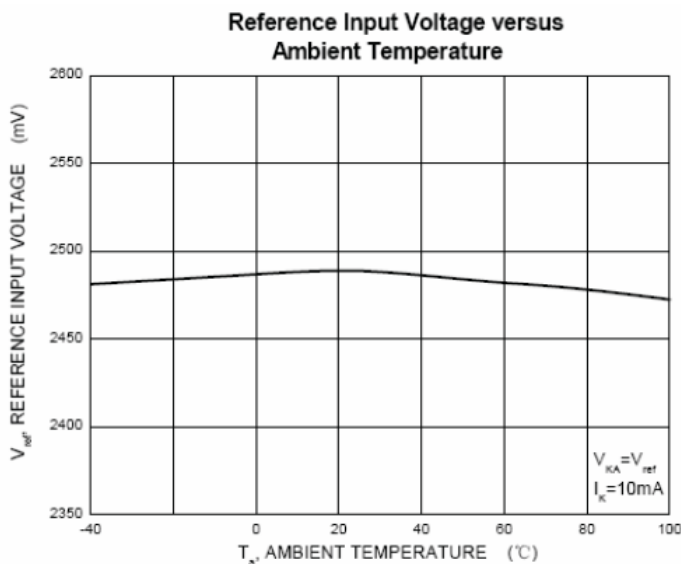
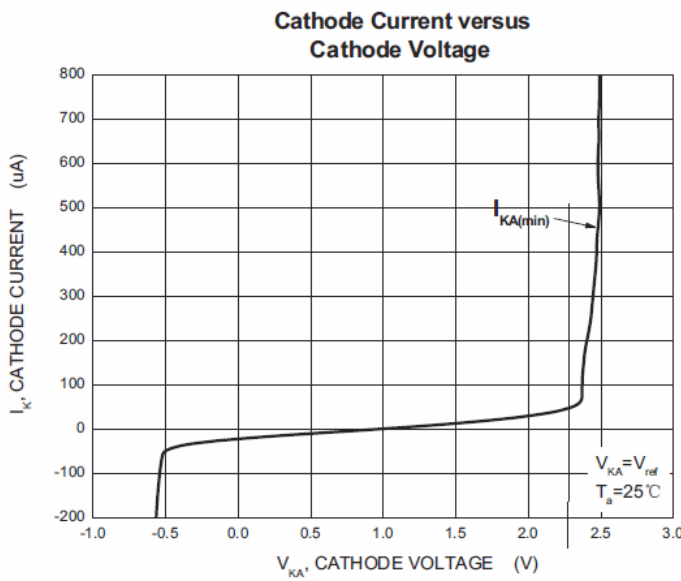
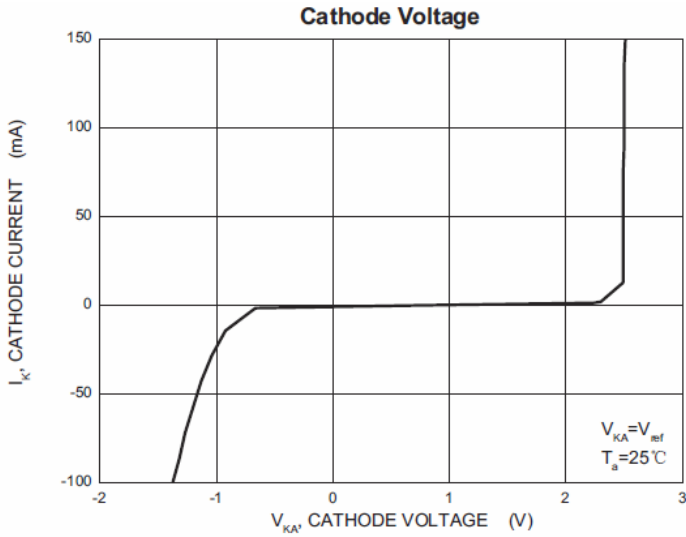
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Reference Input Voltage	$V_{\text{ref}}$	2.487	2.5	2.513	V	$V_{\text{KA}}=V_{\text{ref}}, I_{\text{KA}}=10\text{mA}$
Deviation of Reference Input Voltage Over Temperature <sup>1</sup>	$\Delta V_{\text{ref}} / \Delta T$	-	4.5	17	mV	$V_{\text{KA}}=V_{\text{ref}}, I_{\text{KA}}=10\text{mA}$ $T_{\text{Min}} \leq T_A \leq T_{\text{Max}}$
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\Delta V_{\text{ref}} / \Delta V_{\text{KA}}$	-	-1	-2.7	mV/V	$I_{\text{KA}}=10\text{mA}$ $\Delta V_{\text{KA}}=10\text{V} \sim V_{\text{ref}}$
		-	-0.5	-2		$\Delta V_{\text{KA}}=10\text{V} \sim 36\text{V}$
Reference Input Current	$I_{\text{ref}}$	-	1.5	4	$\mu\text{A}$	$I_{\text{KA}}=10\text{mA}, R_1=10\text{k}\Omega, R_2=\infty$
Deviation of Reference Input Current Over Full Temperature Range	$\Delta I_{\text{ref}} / \Delta T$	-	0.4	1.2	$\mu\text{A}$	$I_{\text{KA}}=10\text{mA}, R_1=10\text{k}\Omega, R_2=\infty$ $T_A = -25 \sim 85^\circ\text{C}$
Minimum Cathode Current for Regulation	$I_{\text{KA}(\text{min})}$	-	0.45	1	mA	$V_{\text{KA}}=V_{\text{ref}}$
Off-State Cathode Current	$I_{\text{KA}(\text{OFF})}$	-	0.05	1	$\mu\text{A}$	$V_{\text{KA}}=36\text{V}, V_{\text{ref}}=0$
Dynamic Impedance	$Z_{\text{KA}}$	-	0.15	0.5	$\Omega$	$V_{\text{KA}}=V_{\text{ref}}, I_{\text{KA}}=1 \sim 100\text{mA},$ $f \leq 1\text{kHz}$

Note:

1.  $T_{\text{MIN}} = -25^\circ\text{C}, T_{\text{MAX}} = 85^\circ\text{C}.$

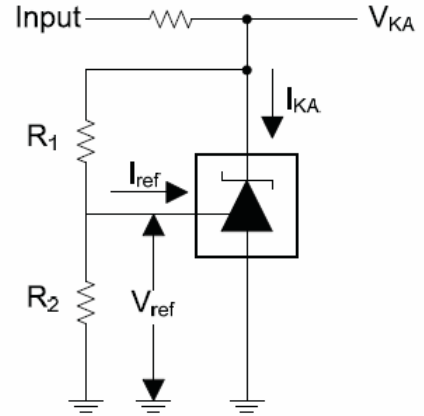
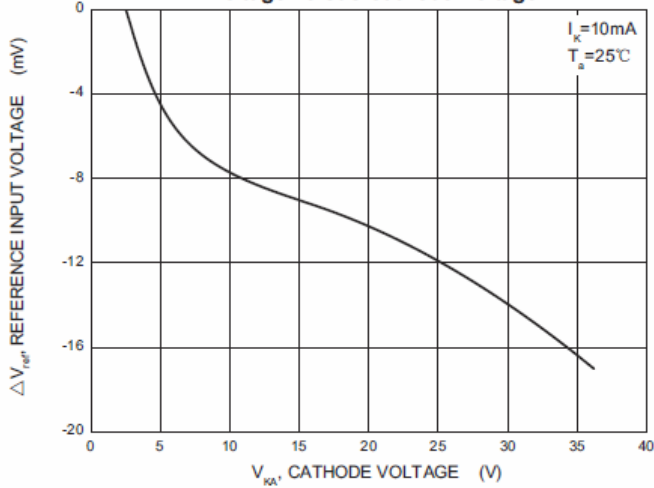
**CHARACTERISTIC CURVE**



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

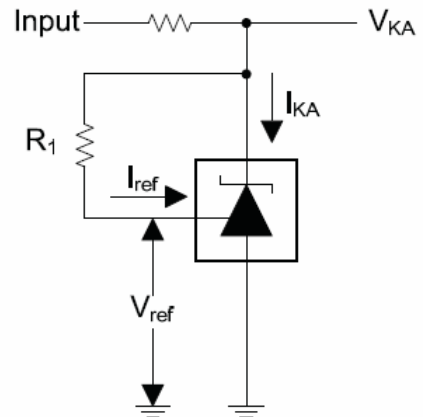
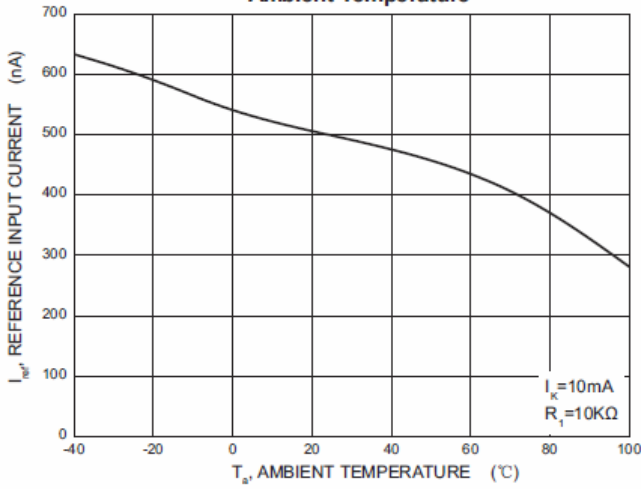
**CHARACTERISTIC CURVE**

**Change in Reference Input Voltage versus Cathode Voltage**



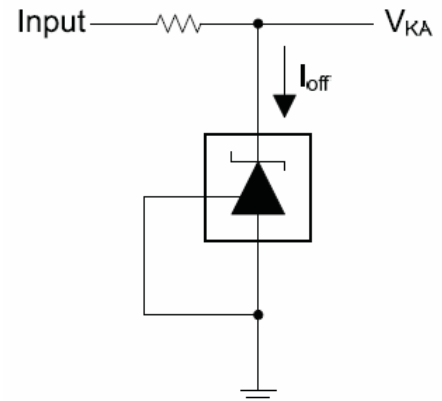
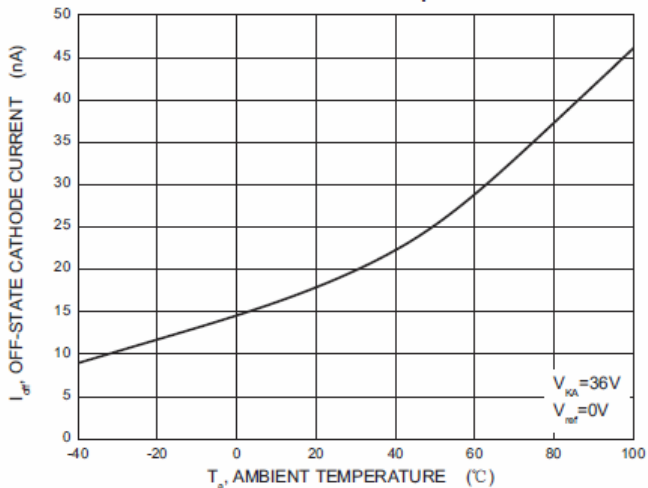
Test Circuit for  $V_{KA} = V_{ref}(1 + R1/R2) + R1 \cdot I_{ref}$

**Reference Input Current versus Ambient Temperature**



Test Circuit for I<sub>ref</sub>

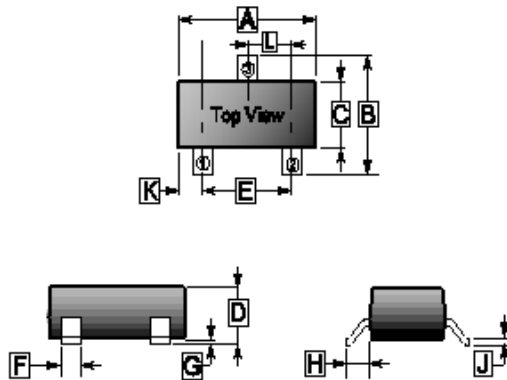
**Off-State Cathode Current versus Ambient Temperature**



Test Circuit for I<sub>off</sub>

**PACKAGE OUTLINE DIMENSIONS**

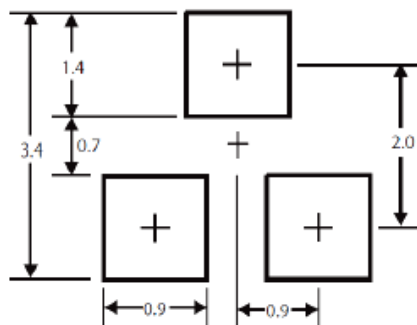
**SOT-23**



REF.	Millimeter	
	Min.	Max.
A	2.65	3.10
B	2.10	3.00
C	1.10	1.80
D	0.89	1.40
E	1.70	2.30
F	0.28	0.55
G	0	0.18
H	0.55 REF.	
J	0.05	0.26
K	0.60 REF.	
L	0.95 TYP.	

**MOUNTING PAD LAYOUT**

**SOT-23**



\*Dimensions in millimeters