

TL431

DATASHEET

Specification Revision History:

Version	Date	Description
V1.0	2019/03	New
V1.1	2021/04	Modify Ordering Information
V1.2	2025/02	Modify Ordering Information
V1.3	2025/03	Add application precautions and overall typesetting.

DESCRIPTION

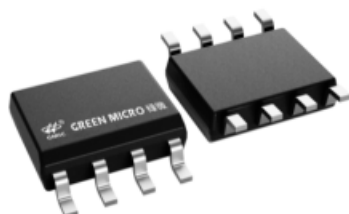
The 431 is a three-terminal adjustable regulator series with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between V_{ref} (approximately 2.5 volts) and 40 volts with two external resistors. These devices have a typical dynamic output impedance of 0.2Ω . Active output circuitry provides a very sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications.

The 431 is characterized for operation from -0°C to $+70^{\circ}\text{C}$.

FEATURE

- Programmable Output Voltage to 40V
- Low Dynamic Output Impedance 0.27Ω (Typ)
- Sink Current Capability of 0.1mA to 100mA
- Equivalent Full-Range Temperature Coefficient of 50ppm/ $^{\circ}\text{C}$
- Temperature Compensated for Operation over Full Rated Operating Temperature Range
- Low Output Noise Voltage
- Fast Turn on Respons
- TO-92, SOP-8, SOT-89 or SOT-23-3 packages

The appearance of the product

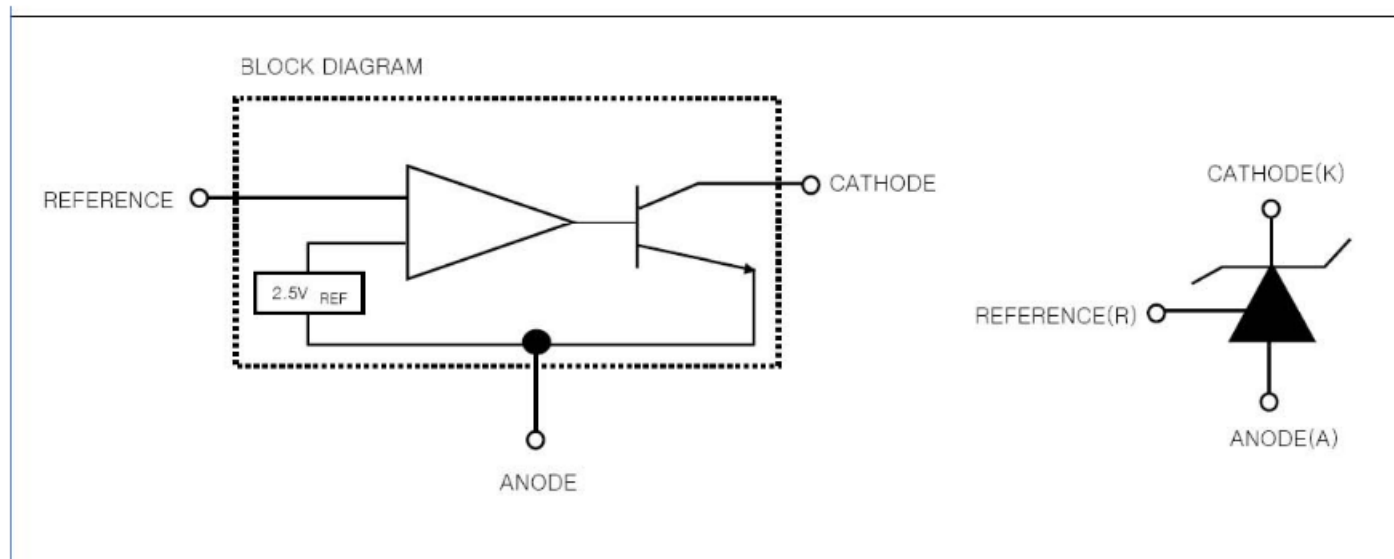


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Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
TL431ACDR	SOP-8	TL431 294	REEL	2500PCS/REEL
TL431	SOP-8	TL431 26M	REEL	2500PCS/REEL

FUNCTIONAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS_(Ta=25°C)

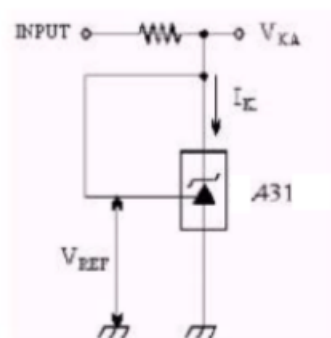
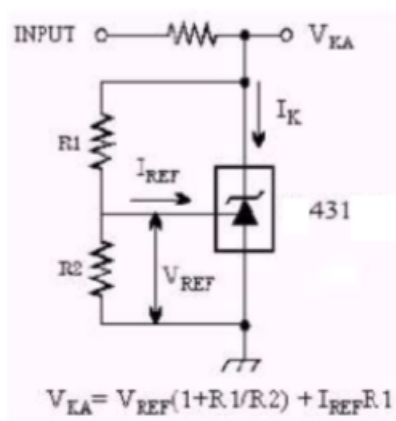
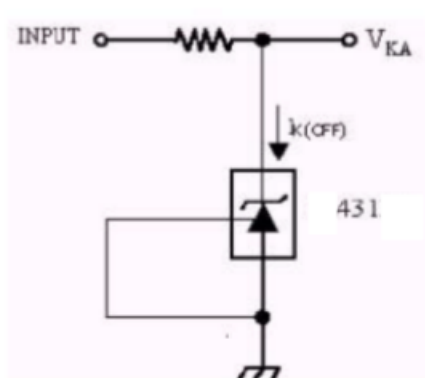
Characteristic	Symbol	Value	Unit
Cathode Voltage	V_{KA}	40	V
Cathode Current Range(Continuous)	I_K	-100~150	mA
Reference Input Current Range	I_{REF}	0.05~10	mA
Power Dissipation at 25°C:	P_D	0.7	W
TO-92 Package ($R_{\theta JA}=178^{\circ}\text{C/W}$)		0.2	W
SOT-23-3 Package ($R_{\theta JA}=625^{\circ}\text{C/W}$)			
Junction Temperature Range	T_J	0~150	°C
Operating Temperature Range	T_g	0~70	°C
Storage Temperature Range	T_{stg}	-65~+150	°C

RECOMMENDED OPERATING CONDITIONS

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Cathode Voltage	V_{KA}		V_{REF}		40	V
Cathode Current	I_K		0.5		100	mA

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

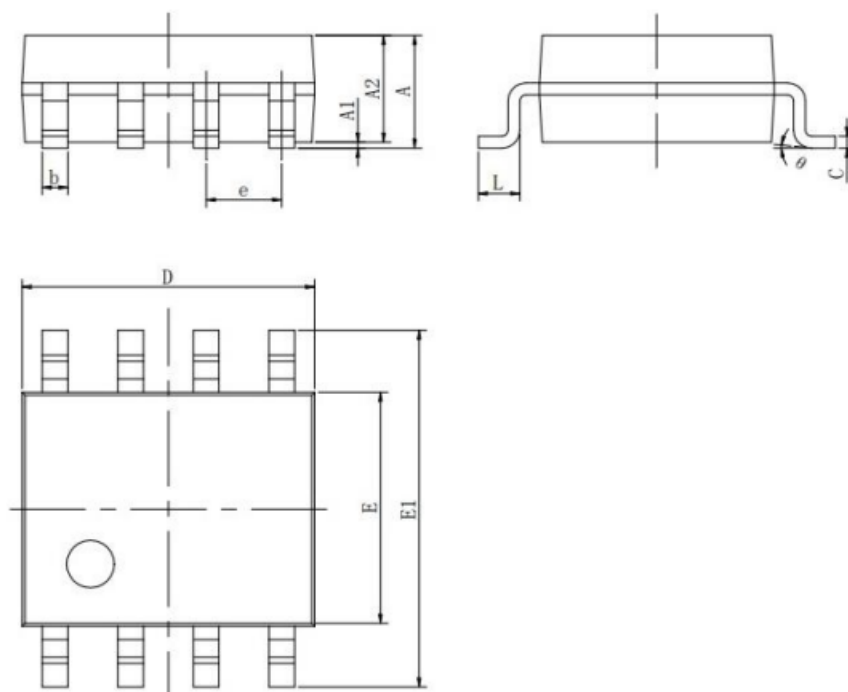
Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Reference Input Voltage	V_{REF}	$V_{KA}=V_{REF}$, $I_K=10\text{mA}$	2.483	2.495	2.507	V
Deviation of Reference Input Voltage Over Full Temperature Range	$V_{REF(dev)}$	$T_{min} \leq T_a \leq T_{max}$		3	17	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\Delta V_{REF} / \Delta V_{KA}$	$\Delta V_{KA}=10\text{V}-V_{REF}$ $\Delta V_{KA}=36\text{V}-10\text{V}$	-0.4 -0.4	0.0 0.0	2.7 2.0	mV/V
Reference Input Current	I_{REF}	$R_1=10\text{K}\Omega$, $R_2=\infty$		1.8	4	μA
Deviation of Reference Input Current Over Full Temperature Range	$I_{REF(dev)}$	$R_1=10\text{K}\Omega$, $R_2=\infty$		0.4	1.2	μA
Minimum Cathode Current for Regulation	$I_{K(min)}$			0.25	0.5	mA
Off-State Cathode Current	$I_{K(OFF)}$	$V_{KA}=40\text{V}$, $V_{REF}=0$		0.17	0.9	μA
Dynamic Impedance	Z_{KA}	$I_K=10\text{mA}$ to 100mA , $f \leq 1.0\text{KHz}$		0.27	0.5	Ω

TEST CIRCUITS
Fig.1. Test Circuit for $V_{KA} = V_{REF}$

Fig.2. Test Circuit for $V_{KA} \geq V_{REF}$

Fig.3. Test Circuit for I_{off}


Outline Dimensions

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Unit : mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.800	0.053	0.071
A1	0.050	0.250	0.004	0.010
A2	1.250	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
C	0.170	0.250	0.006	0.010
D	4.780	5.000	0.185	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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