

TL431 DATASHEET

Specification Revision History:

Version	Date	Description
V1.0	2019/12	New
V1.1	2021/01	Modify Ordering Information
V1.2	2025/02	Modify Ordering Information
V1.3	2025/03	Add application precautions and overall typesetting.
V1.4	2026/05	Add Simplified outline

FEATURES

- Equivalent Full Range Temperature Coefficient 50PPM/°C
- Temperature Compensated For Operation Over Full Rate Operating Temperature Range
- Adjustable Output Voltage
- Fast Turn-on Response
- Sink Current Capability 1mA to 100mA
- Low(0.27ΩTyp.)Dynamic Output Impedance
- Low Output Noise

DESCRIPTION

The 431 is three-terminal adjustable shunt regulator with specified thermal stability. The output voltage may be set to any value between VREF(Approx.2.495V)and 36Vwith two external resistors. This device has a typical output impedance of 0.2Ω. Active output circuitry provides a very sharp tum-on characteristic, making this device excellent replacement for zener diodes in many application

THE APPEARANCE OF THE PRODUCT

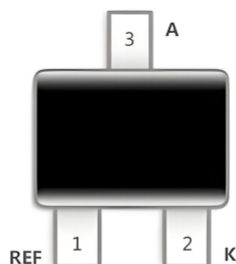


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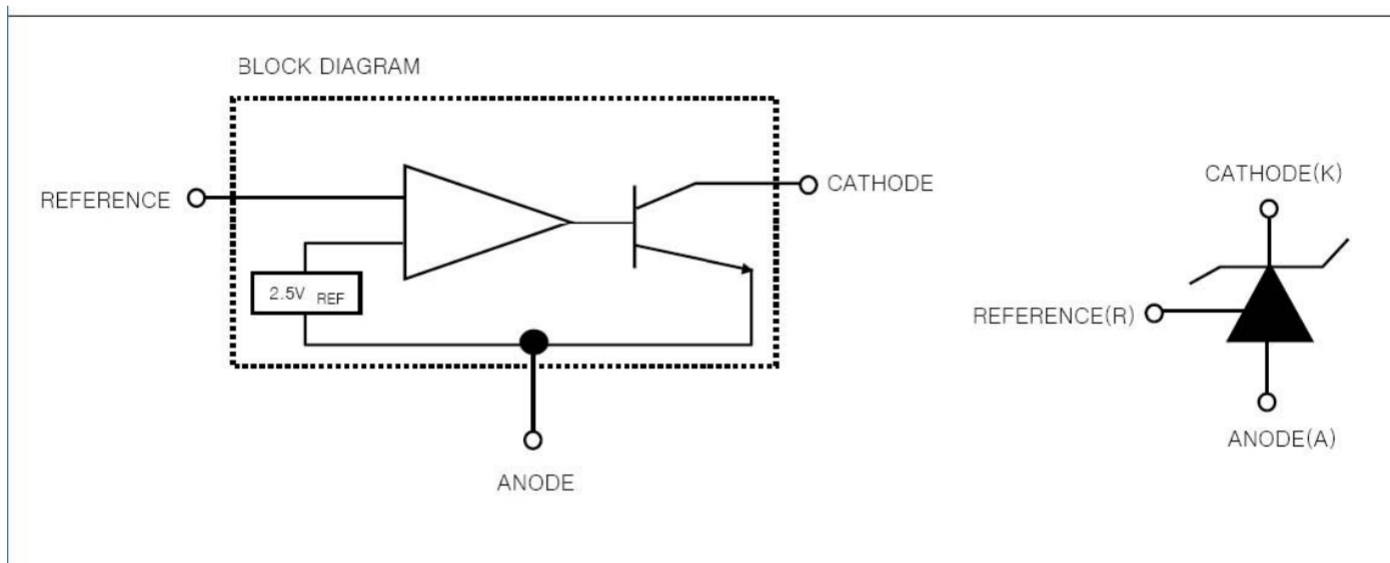
ORDERING INFORMATION

Product Model	Package Type	Marking	Packing	Packing Qty
TL431AR	SOT-23	431	REEL	3000PCS/REEL

SIMPLIFIED OUTLINE



FUNCTION BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

(Full Operating Ambient Temperature Range Applies Unless Otherwise Noted)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Cathode Voltage	V_{KA}	40	V
Continuous Cathode Current Range	I_{KA}	-100~+150	mA
Reference Input Current Range	I_{REF}	0.05~10	mA
Junction Temperature	T_J	150	°C
Operating Temperature	T_{ORR}	-20~85	°C
Storage Temperature	T_{STG}	-65~150	°C
Total Power Dissipation	P_D	700	mW

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}	$V_{KA}=V_{REF}, I_g=10\text{mA}$	2.483	2.495	2.507	V
Deviation of Reference Input Voltage Over Full Temperature Range	$V_{REF(\text{dev})}$	$T_{\text{min}} \leq T_a \leq T_{\text{max}}$		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	$I_{REF(\text{dev})}$	$R_1=10\text{K}\Omega, R_2=\infty$		0.4	1.2	μA
Minimum Cathode Current for Regulation	$I_{K(\text{min})}$			0.25	0.5	mA
Off-State Cathode Current	$I_{K(\text{OFF})}$	$V_{KA}=40\text{V}, V_{REF}=0$		0.17	0.9	μA
Dynamic Impedance	Z_{KA}	$I_K=10\text{mA to }100\text{mA}, f \leq 1.0\text{KHz}$		0.27	0.5	Ω

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

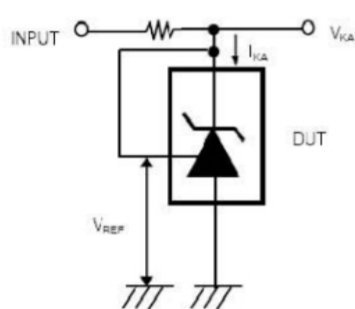


Fig. 2 Test Circuit for $V_{KA} \geq V_{REF}$

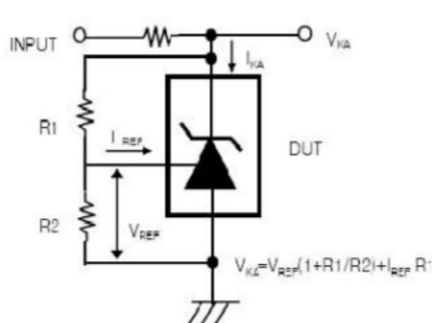
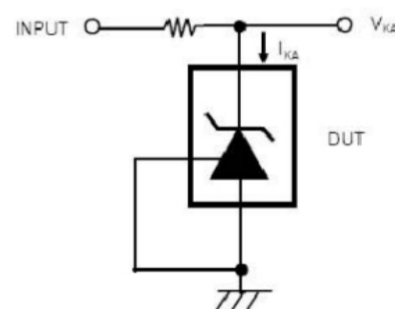
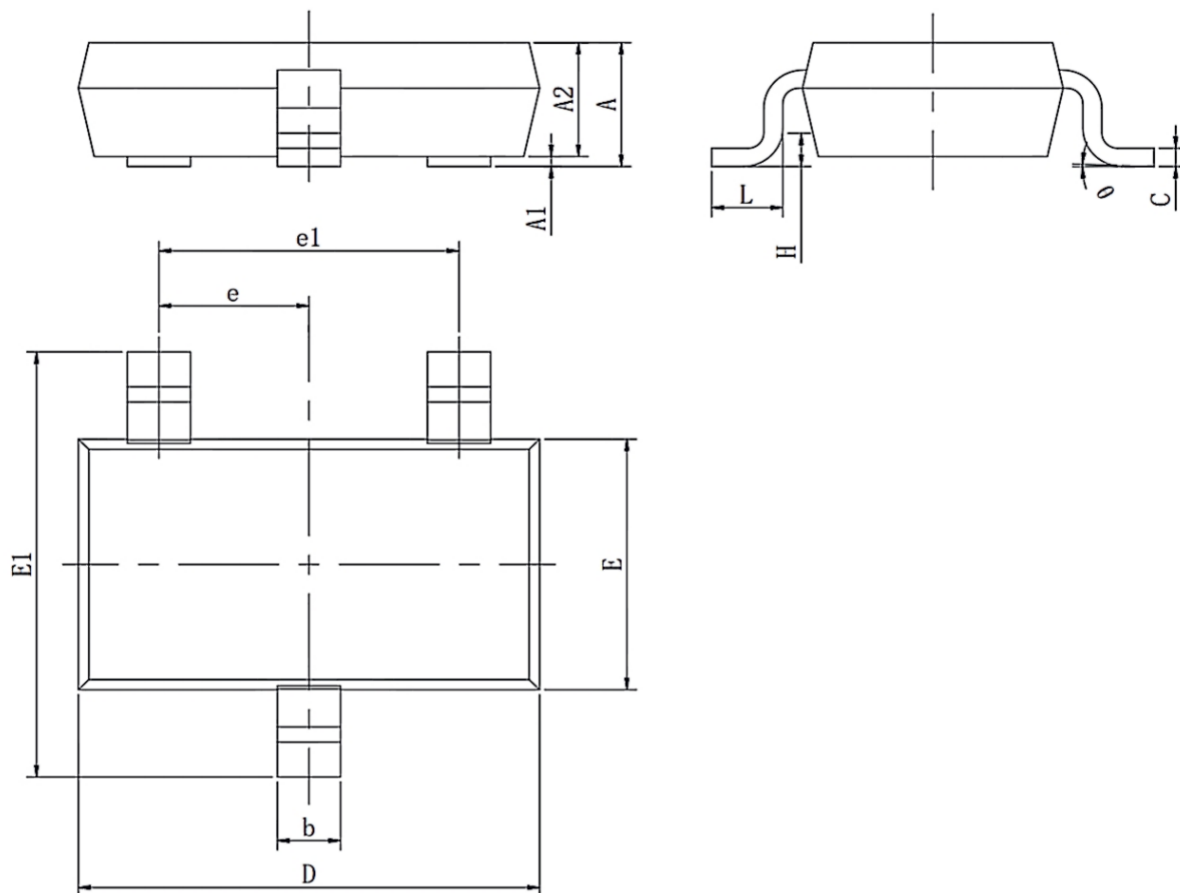


Fig. 3 Test Circuit for $I_{KA}(\text{off})$



OUTLINE DIMENSIONS

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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	0.200	0.003	0.008
D	2.800	3.020	0.110	0.119
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.95 (BSC)		0.037(BSC)	
e1	1.90 (BSC)		0.075(BSC)	
L	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

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