

TL431

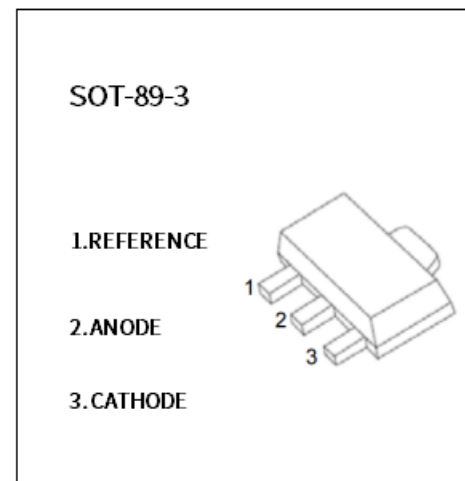
DATASHEET

Specification Revision History:

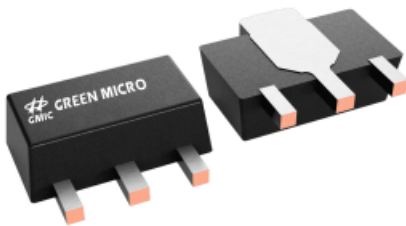
Version	Date	Description
V1.0	2021/06	New
V1.1	2022/02	Modify Ordering Information
V1.2	2024/02	Modify Ordering Information
V1.3	2025/05	Add application precautions and overall typesetting.

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
- The typical value of the equivalent temperature factor in the whole temperature scope is 50 ppm/ °C
- The effective temperature compensation in the working range of full temperature
- Low output noise voltage
- Fast on -state response



The appearance of the product



SOT-89-3

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
TL431FR	SOT-89-3	431	REEL	1000PCS/REEL

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

Parameter	Symbol	Value	Unit
Cathode Voltage	V_{KA}	37	V
Cathode Current Range (Continuous)	I_{KA}	-100~+150	mA
Reference Input Current Range	I_{ref}	0.05~+10	mA
Power Dissipation	P_D	500	mW
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	250	°C/W
Operating Ambient Temperature Range	T_{opr}	-25~+85	°C
Storage temperature Range	T_{stg}	-65~+150	°C
Operating Junction Temperature	T_j	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	$\Delta V_{ref}/\Delta V_{KA}$	$I_{KA}=10\text{mA}, \Delta V_{KA}=10\text{V} \sim V_{REF}$		-1.0	-2.7	mV/V
		$I_{KA}=10\text{mA}, \Delta V_{KA}=36\text{V} \sim 10\text{V}$		-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	$\Delta I_{ref}/\Delta T$	$I_{KA}=10\text{mA}, R_1=10\text{k}\Omega, R_2=\infty, T_a=-25 \text{ to } 85^{\circ}\text{C}$		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}	$V_{KA}=V_{REF}, I_{KA}=1 \text{ to } 100\text{mA}, f \leq 1.0\text{kHz}$		0.15	0.5	Ω

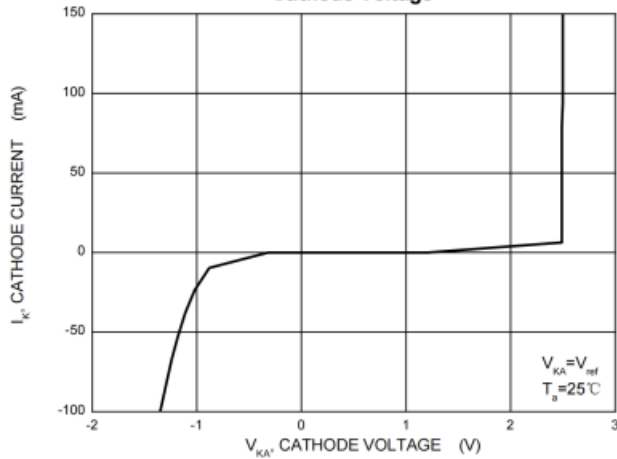
Note: $T_{MIN}=-25^{\circ}\text{C}$, $T_{MAX}=+85^{\circ}\text{C}$

CLASSIFICATION of V_{ref}

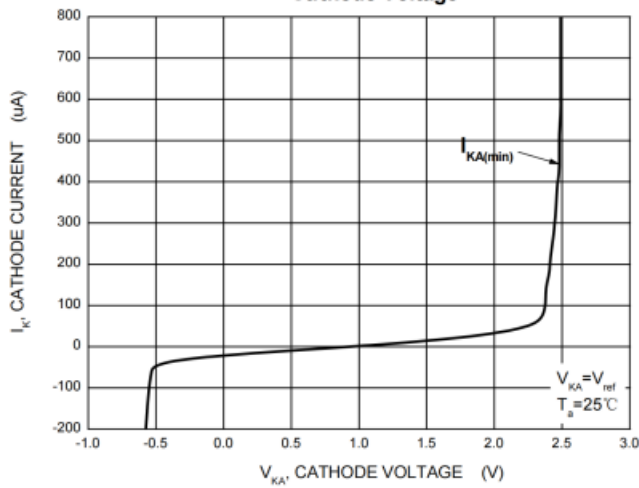
Rank	0.5%	1%
Range	2.487-2.513	2.475-2.525

Typical Characteristics

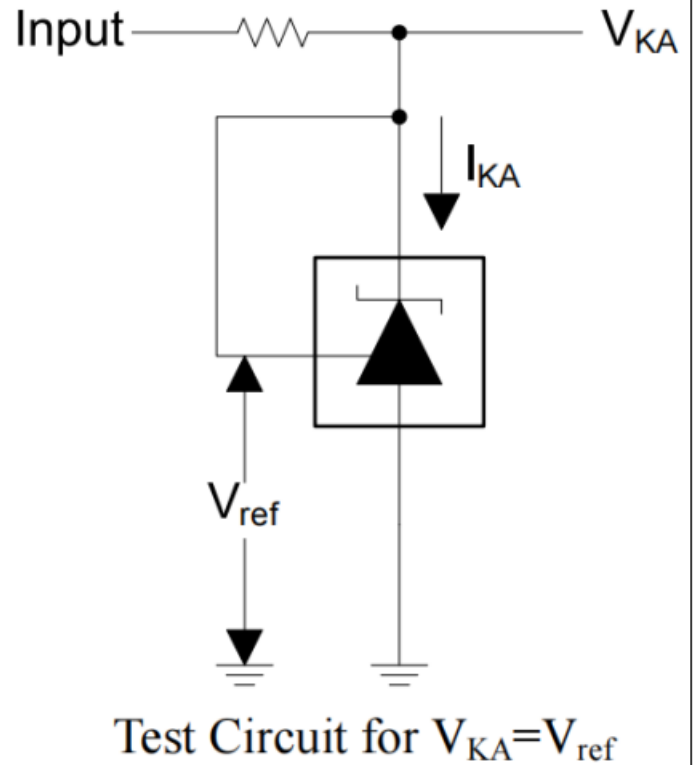
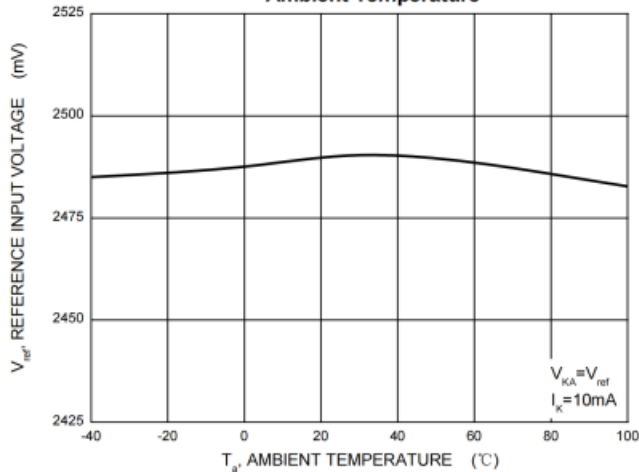
Cathode Current versus Cathode Voltage



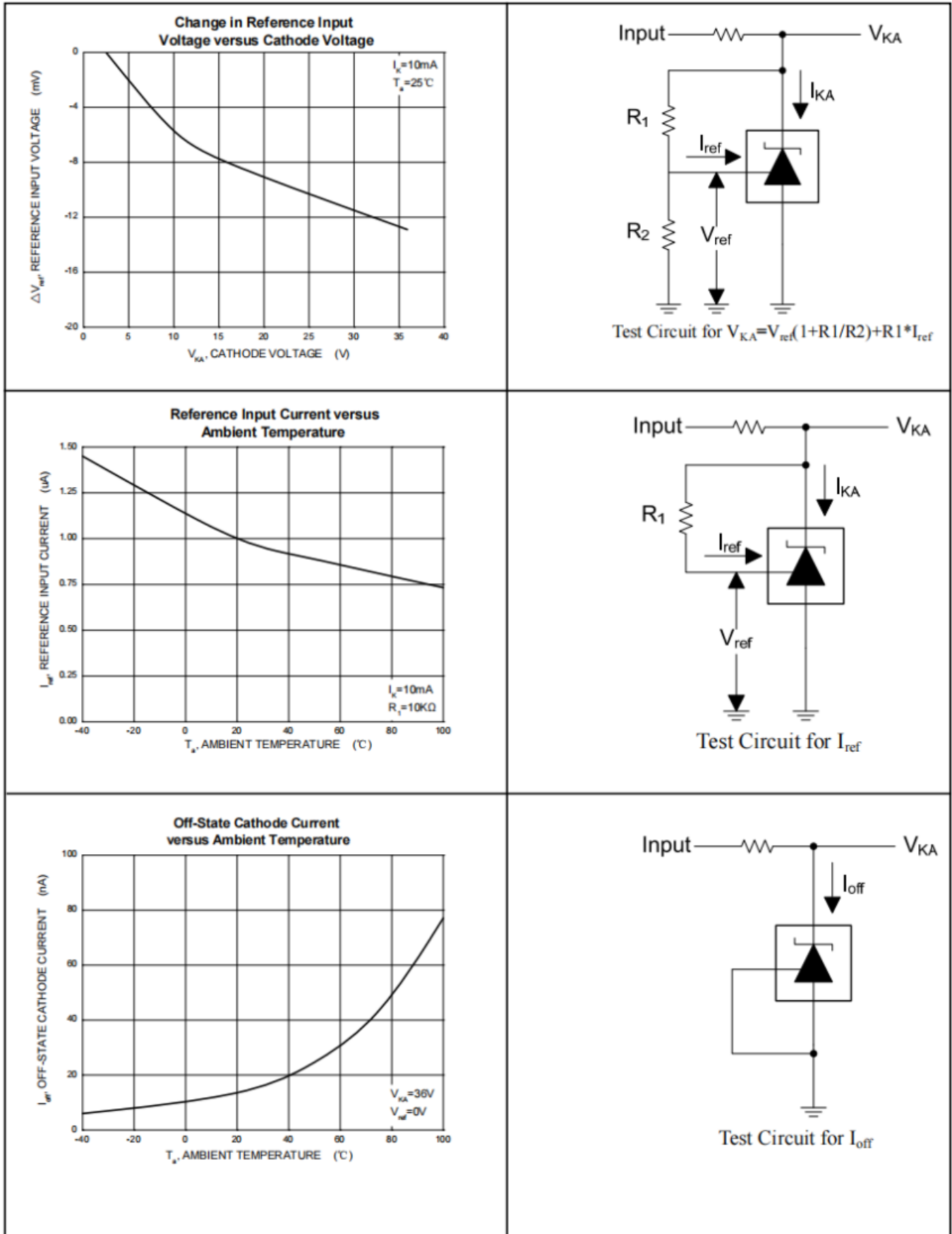
Cathode Current versus Cathode Voltage



Reference Input Voltage versus Ambient Temperature



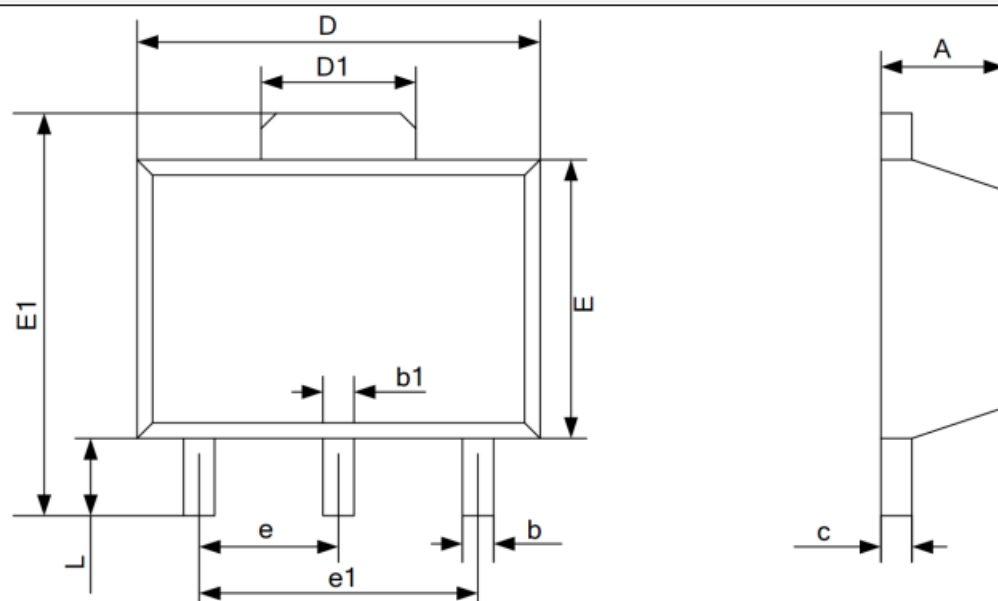
Typical Characteristics



Outline Dimensions

SOT-89-3

Unit : mm



SYMBOL	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 TYP		0.061 TYP	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047

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