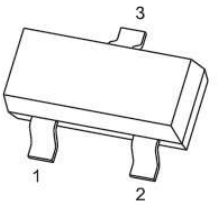
PROGRAMMABLE PRECISION REFERENCES

DEVICE DESCRIPTION

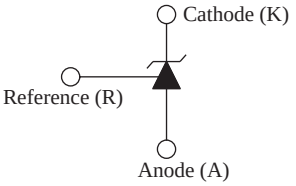
The TL431 is a three-terminal adjustable shunt regulator offering excellent temperature stability. This device has a typical dynamic output impedance of 0.2Ω. The device can be used as a replacement for zener diodes in many applications.

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/℃



1 REFERENCE
2 CATHODE
3 ANODE



APPLICATION

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

MECHANICAL DATA

- SOT-23 Small Outline Plastic Package.
- Epoxy UL: 94V-0.
- Mounting Position: Any.

MARKING: 431

MAXIMUM RATINGS & THERMAL CHARACTERISTICS

(Ratings at 25℃ ambient temperature unless otherwise specified.)

Parameters	Symbol	Value	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
Junction Temperature	T_j	150	℃
Operating Temperature	Topr	-25-+85	℃
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	417	℃/W

ELECTRICAL CHARACTERISTICS

(Ratings at 25℃ ambient temperature unless otherwise specified.)

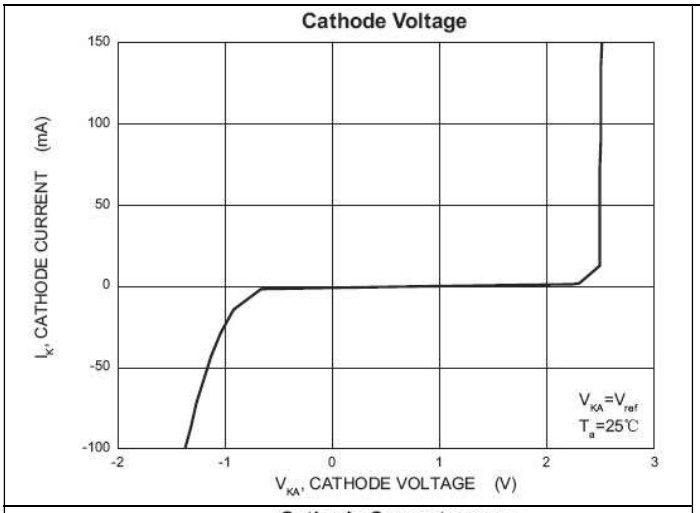
Parameter	Symbols	Test Condition		Limits Min	Limits Typ	Limits Max	Unit
Reference input Voltage	V_{ref}	V_{KA}= V_{REF} V, I_{KA}=10mA		2.475	2.5	2.525	V
Deviation of reference input voltage over temperature(note	$\triangle V_{ref}/\triangle T$	V_{KA}= V_{REF}, I_{KA}=10mA $T_{MIN} \le Ta \le T_{MAX}$			4.5	17	mV
Ratio of change in reference Input voltage to the change in cathode voltage	$\triangle V_{ref}/\triangle V_{KA}$	I_{KA}=10mA	$\triangle V_{KA=10V\sim}V_{REF}$		-1.0	-2.7	mV/v
			$\triangle V_{KA=36V\sim}10V$		-0.5	-2.0	mV/v
Reference input current	I_{ref}	I_{KA}=10mA, R1=10KΩ, R2=∞			1.5	4	uA
Deviation of reference input current over full temperature	$\triangle I_{ref}/\triangle T$	I_{KA}=10mA, R1=10KΩ, R2=∞ TA=-25 to 85℃			0.4	1.2	uA
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}=36V, V_{REF}=0			0.05	1.0	uA
Dynamic impedance	Z_{KA}	VKA=VREF, IKA=1 to 100mA, f≤1.0kHz			0.15	0.5	Ω

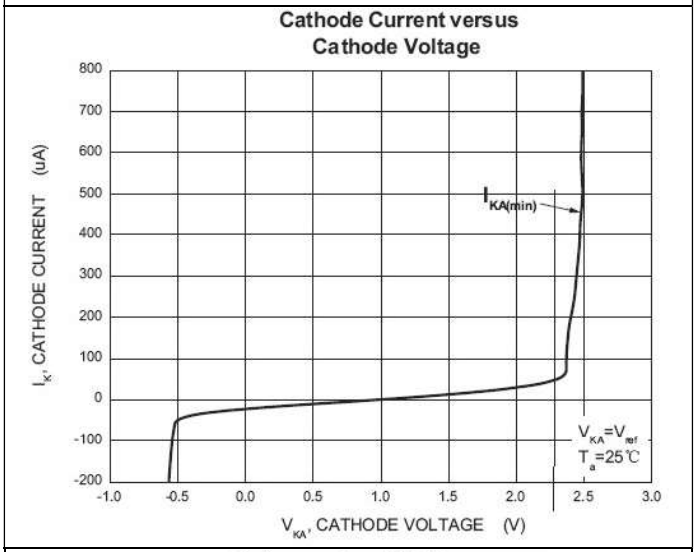
Note: TMIN=-25℃, TMAX=+85℃.

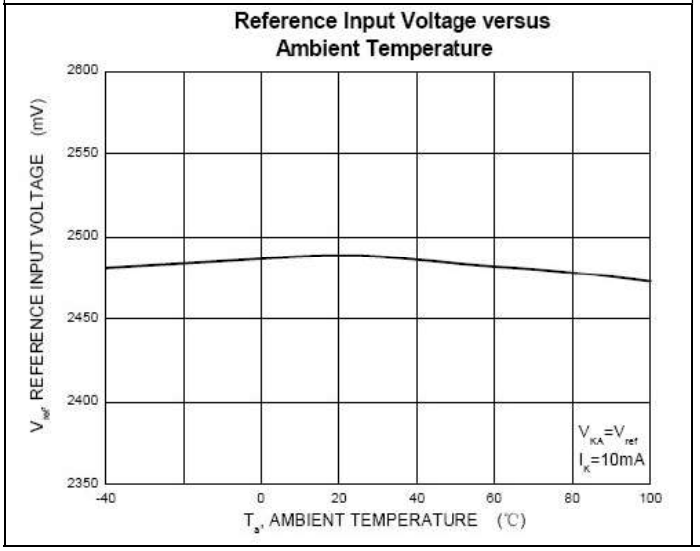
CLASSIFICATION of Vref

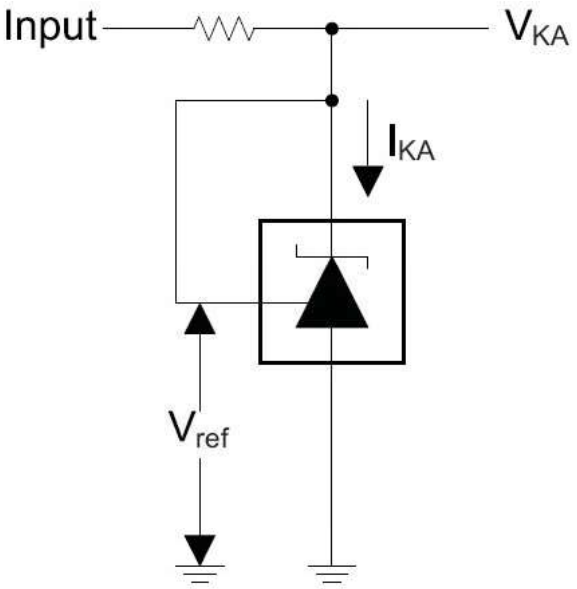
Rank	0.5%	1%
Rank	2.487-2.513	2.475-2.525

TYPICAL CHARACTERISTICS



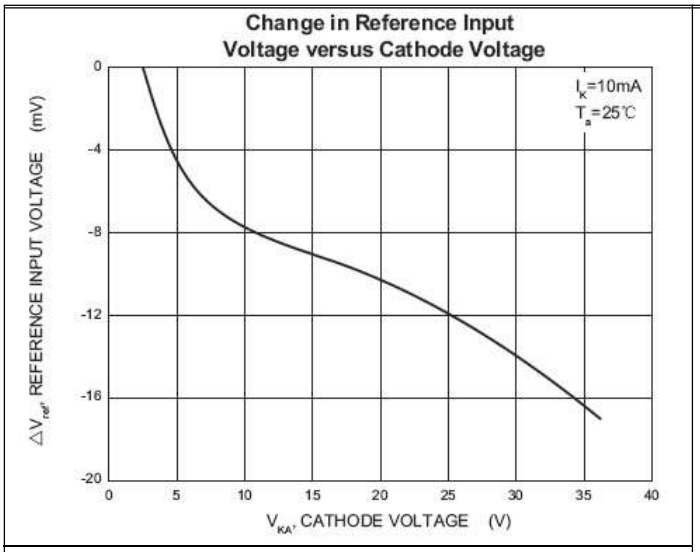


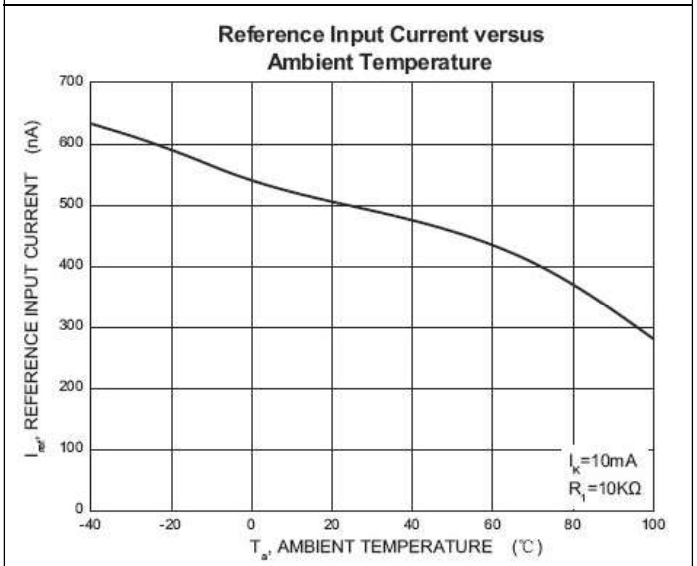


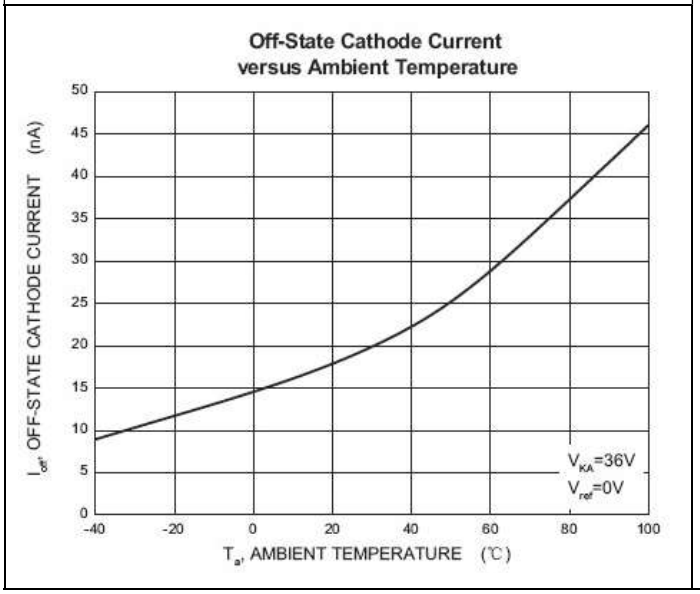


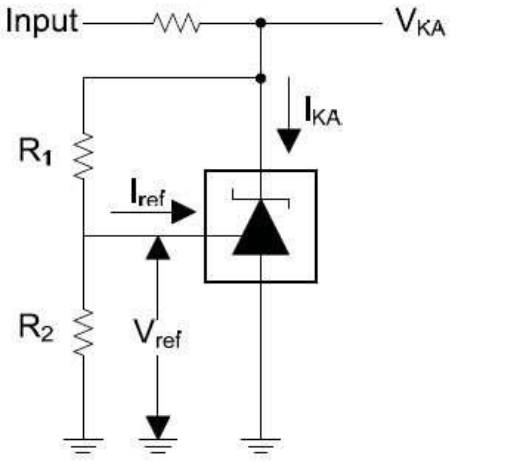
Test Circuit for $V_{KA}=V_{ref}$

TYPICAL CHARACTERISTICS(Con.)

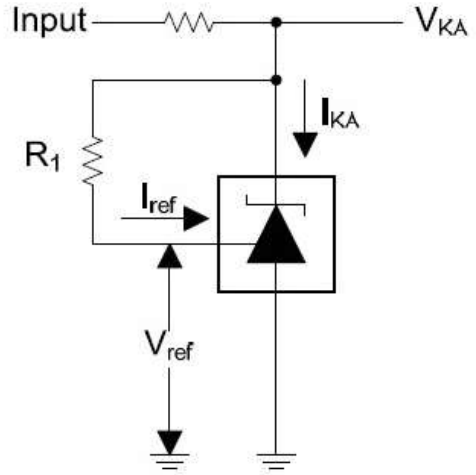




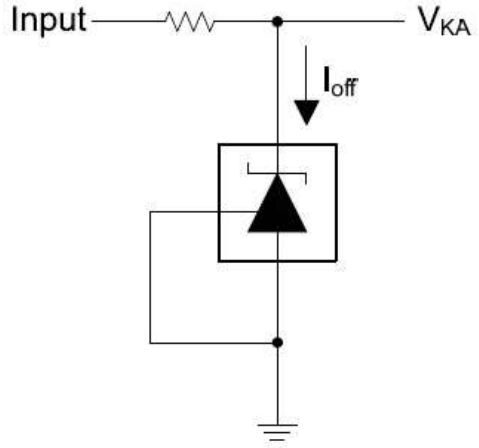




Test Circuit for $V_{KA}=V_{ref}(1+R1/R2)+R1*I_{ref}$

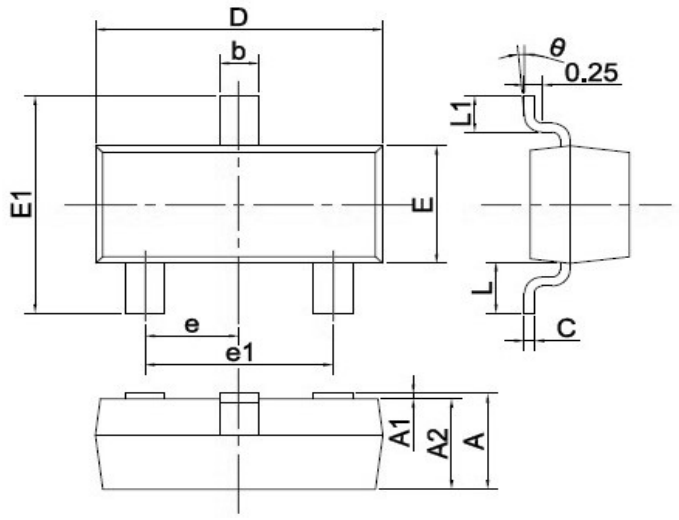


Test Circuit for I_{ref}



Test Circuit for I_{off}

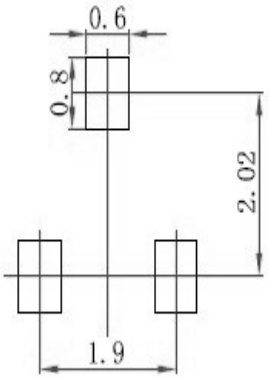
SOT-23 PACKAGE OUTLINE



SYMBOL	DIMENSIONS	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

Unit: mm

RECOMMENDED LAND DIMENSIONS FOR SOT-23



Note:
1.Controlling dimension:In millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.