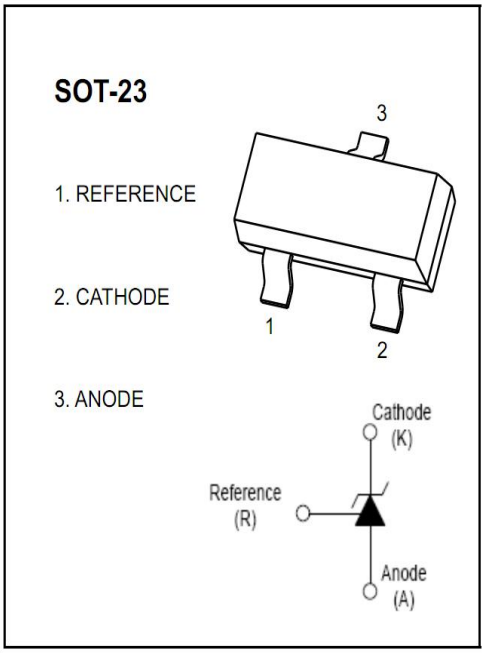
Adjustable Accurate Reference Source

DEVICE DESCRIPSION:

The TL431 0.5% 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.



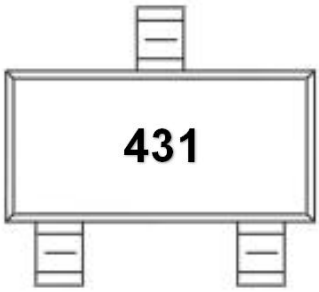
FEATURES:

- 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/℃

APPLICATION:

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

MARKING:



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

Parameter	Symbol	Value	Unit
Cathode Voltage	VKA	37	V
Cathode Current Range (Continuous)	IKA	-100~+150	mA
Reference Input Current Range	Iref	0.05~+150	mA
Power Dissipation	PD	300	mW
Thermal Resistance from Junction to Ambient	RθJA	417	℃/W
Operating Junction Temperature	Tj	150	℃
Operating Ambient Temperature Range	Topr	-25~+85	℃
Storage temperature Range	Tstg	-65~+150	℃

ELECTRICAL CHARACTERISTICS (Ta=25℃ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Reference input voltage (Fig.1)	Vref	VKA=VREF, IKA=10mA	2.475	2.5	2.525	V
Deviation of reference input voltag over temperature (note) (Fig.1)	△Vref /△T	VKA =VREF, IKA =10mA TMIN≤Ta≤TMAX		4.5	17	mV
Ratio of change in reference input voltage to the change in cathode voltage (Fig.2)	△Vref /△VKA	IKA=10mA, △VKA=10V~VRE		-1.0	-2.7	mV/V
		IKA=10mA, △VKA=36V~10V		-0.5	-2.0	mV/V
Reference input current (Fig.2)	Iref	IKA=10mA, R1=10kΩ R2=∞		1.5	4	μA
Deviation Of reference input curre over full temperature range (Fig.2)	△Iref /△T	IKA=10mA, R1=10kΩ R2=∞ TA=-25 to 85℃		0.4	1.2	μA
Minimum cathode current for regulation (Fig.1)	IKA(min)	VKA=VREF, IKA=10mA		0.45	1.0	mA
Off-state cathode Current (Fig.3)	IKA(OFF)	VKA=36V,VREF=0		0.05	1.0	μA
Dynamic impedance	ZKA	VKA=VREF, IKA=1 to100mA f≤1.0kHz		0.15	0.5	Ω

Note: TMIN=-25℃ ,TMAX=+85℃

CLASSIFICATION of Vref

Rank	0.50%	1%
Range	2.487-2.513	2.475-2.525

Figure 1. Test Circuit for VKA = Vref

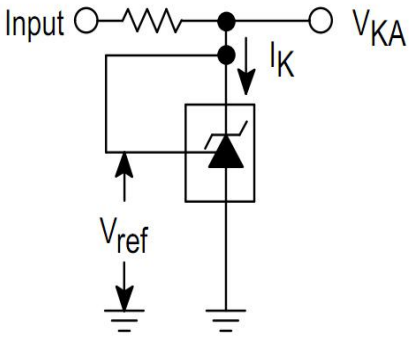
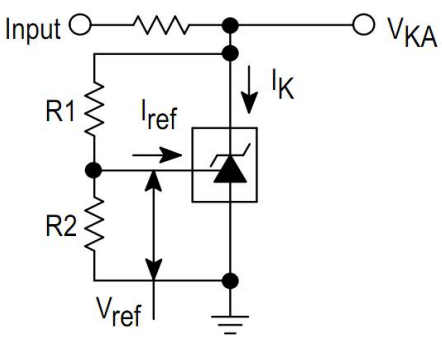
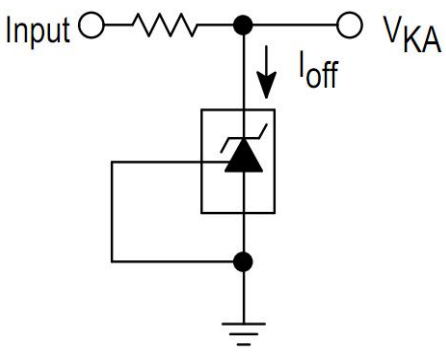


Figure 2. Test Circuit for VKA >Vref

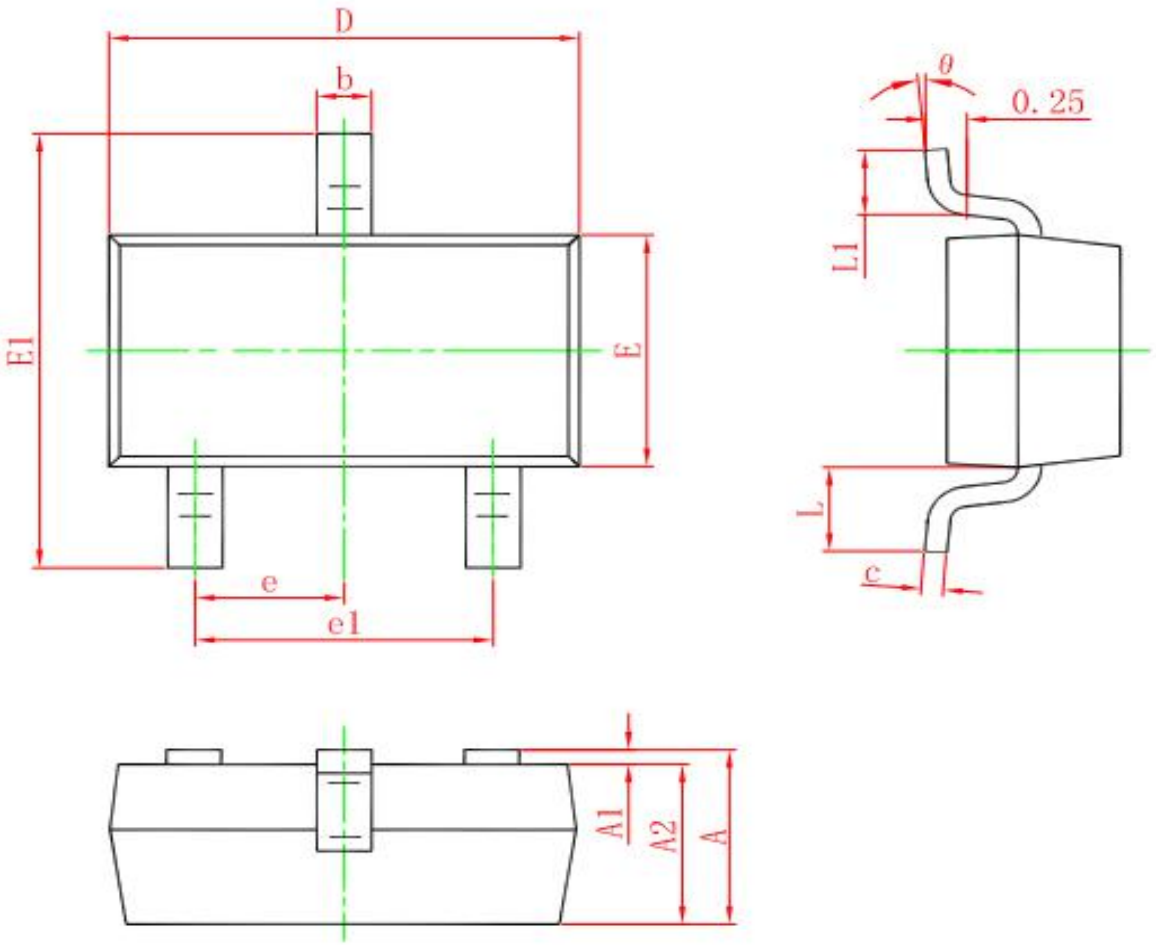


$$V_{KA} = V_{ref}\left(1 + \frac{R1}{R2}\right) + I_{ref} \bullet R1$$

Figure 3. Test Circuit for Ioff



SOT-23 PACKAGE OUTLINE DIMENSIONS



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	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°