

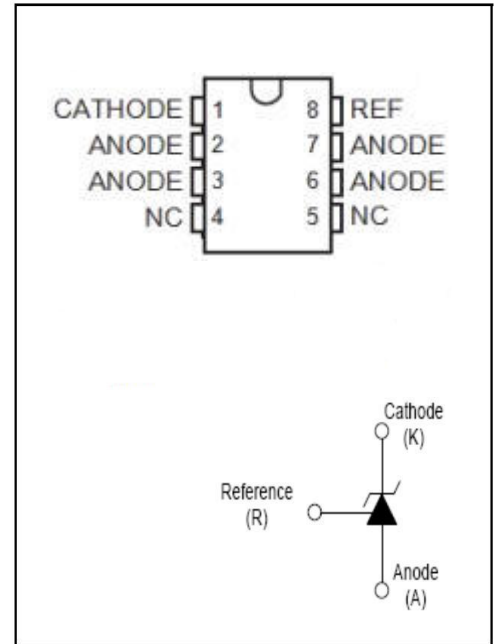
Adjustable Accurate Reference Source

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.

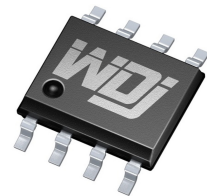
FEATURES:

- #. The output voltage can be adjusted to 40V
- #. 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/°C



APPLICATION:

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



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

Parameter	Symbol	Value	Unit
Cathode Voltage	VKA	42	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	°C/W
Operating Junction Temperature	Tj	150	°C
Operating Ambient Temperature Range	Topr	-25~+85	°C
Storage temperature Range	Tstg	-65~+150	°C

ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Reference input voltage (Fig.1)	Vref	VKA=VREF, IKA=10mA	2.483	2.495	2.507	V
Deviation of reference input voltage over temperature (note) (Fig.1)	$\Delta V_{ref} / \Delta T$	VKA =VREF, IKA =10mA TMIN≤Ta≤TMAX		3.0	17	mV
Ratio of change in reference input voltage to the change in cathode voltage (Fig.2)	$\Delta V_{ref} / \Delta V_{KA}$	IKA=10mA	Δ VKA=10V~VRE	-1.4	-2.7	mV/V
			Δ VKA=36V~10V	-0.8	-2.0	mV/V
Reference input current (Fig.2)	Iref	IKA=10mA, R1=10kΩ R2=∞		1.8	4	μA
Deviation Of reference input current over full temperature range (Fig.2)	$\Delta I_{ref} / \Delta T$	IKA=10mA, R1=10kΩ R2=∞ TA=-25 to 85°C		0.4	1.2	μA
Minimum cathode current for regulation (Fig.1)	IKA(min)	VKA=VREF, IKA=10mA			0.5	mA
Off-state cathode Current (Fig.3)	IKA(OFF)	VKA=36V, VREF=0		0.17	1.0	μA
Dynamic impedance	ZKA	VKA=VREF, IKA=1 to100mA f≤1.0kHz		0.27	0.5	Ω

Note: TMIN=-25°C ,TMAX=+85°C

CLASSIFICATION of Vref

Rank	0.40%
Range	2.483-2.507

Figure 1. Test Circuit for VKA = Vref

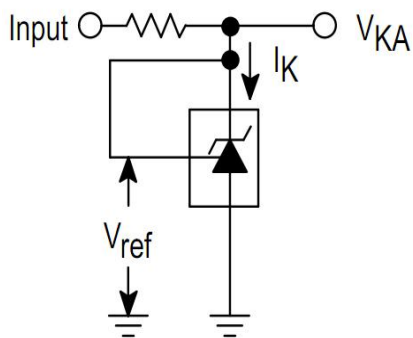
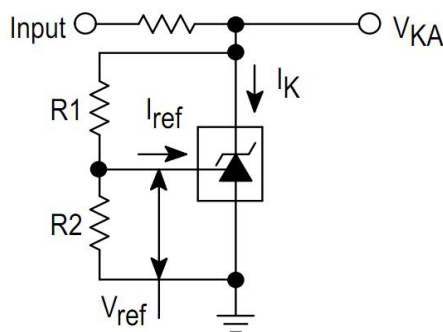
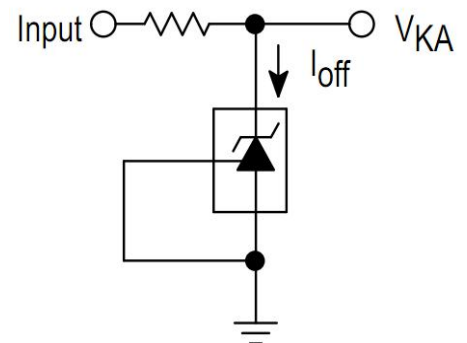


Figure 2. Test Circuit for VKA > Vref

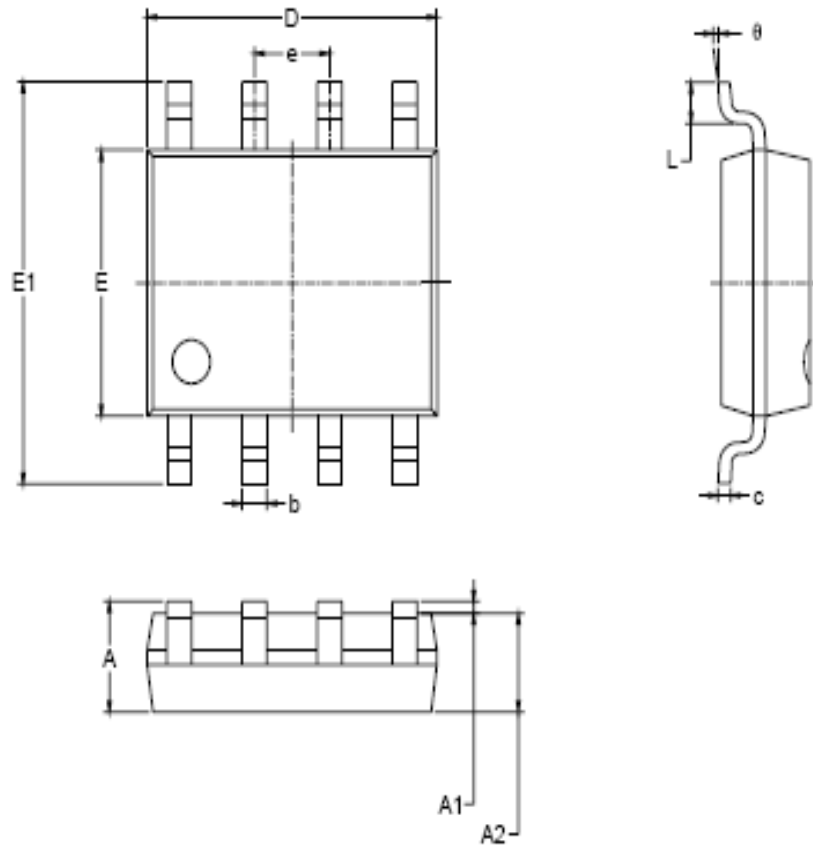


$$V_{KA} = V_{ref} \left(1 + \frac{R1}{R2} \right) + I_{ref} \cdot R1$$

Figure 3. Test Circuit for Ioff



SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.560	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.008	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°