Rev	Date	Remark
00	2007/1/18	Original
01	2009/3/25	Update for CHARACTERIZATION CURVES

Precision Adjustable Shunt Voltage Reference

SMD431

FEATURES

- Initial voltage reference accuracy of 0.5% and 1.0% available.
- Programmable output voltage.
- Sink current capability from 1mA to 100mA
- Typical output dynamic impedance less than 200mΩ

DESCRIPTION

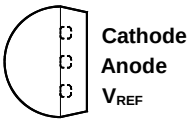
The SMD431 is a 3-terminal adjustable shunt regulator with guaranteed temperature stability over the entire temperature range of operation. The output voltage may be set at any level greater than 2.5V (VREF) up to 36V by selecting two external resistors that act as a voltage divided network.

Due to the sharp turn-on characteristics this device is an excellent replacement for many zener diode applications.

APPLICATIONS

- Precision shut regulators
- High current shunt regulator
- Power supplier voltage reference
- PWM down converter with reference
- Voltage monitor

PACKAGE/ORDER INFORMATION



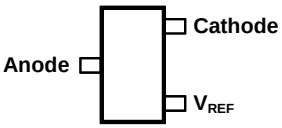
3-Pin Plastic TO 92
(Top View)

Order Part Number

SMD431ALP(TB)* – 0.5%

SMD431BLP(TB)* – 1.0%

* TO92 package is available in taping and box, include TB for specification



3-Pin Plastic SOT 23
Surface Mount
(Top View)

SMD431AECT – 0.5%

SMD431BECT – 1.0%

ABSOLUTE MAXIMUM RATINGS (Note 1)

Cathode Voltage	37	V
Cathode Current Range (continuous)	-100 to 150	mA
Reference Input Current Range	0.05 to 10	mA
Maximum junction operating temperature, T_J	150	°C
Operational ambient temperature	-25 to +85	°C
Storage Temperature Range	-65°C to 150°C	°C

Note 1: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

POWER DISSIPATION TABLE

Package	θ_{JA} (^{o}C/W)	Derating factor (mW/^{o}C) $T_A \geq 25\,^{o}$C	$T_A \leq 25\,^{o}$C Power rating(mW)	T_A=70 ^{o}C Power rating(mW)	T_A= 85 ^{o}C Power rating (mW)
TO 92	156	6.41	801	513	417
SOT 23	285	3.5	438	280	228

θ_{JA}: Thermal Resistance - Junction to Ambient, D_F : Derating factor, Po: Power consumption.

Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$, and $Po = D_F \times (T_J - T_A)$

The θ_{JA} numbers are guidelines for the thermal performance of the device/PC-board system.

All of the above assume no ambient airflow.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units
Cathode Current	I_K	1		100	mA
Cathode Voltage	V_{KA}	0		36	V
Junction temperature	T_J			125	^oC

PARAMETER MEASUREMENT INFORMATION

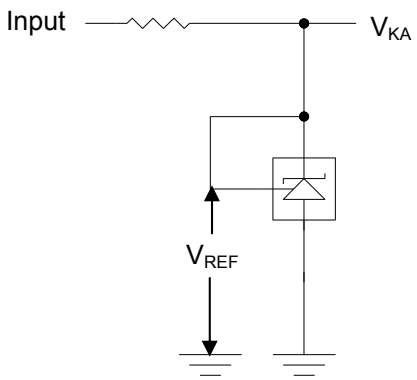


Figure 1. Test Circuit for $V_{KA} = V_{REF}$

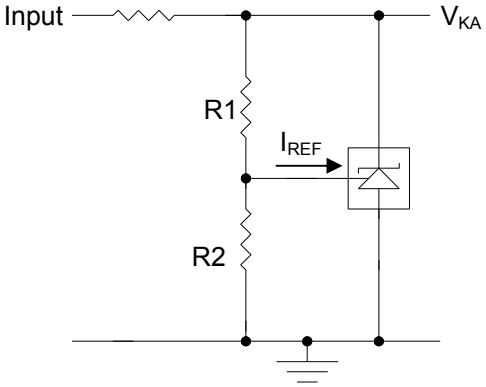


Figure 2. Test Circuit for $V_{KA} > V_{REF}$

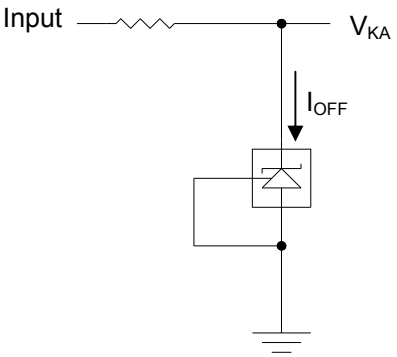


Figure 3. Test Circuit for I_{OFF}

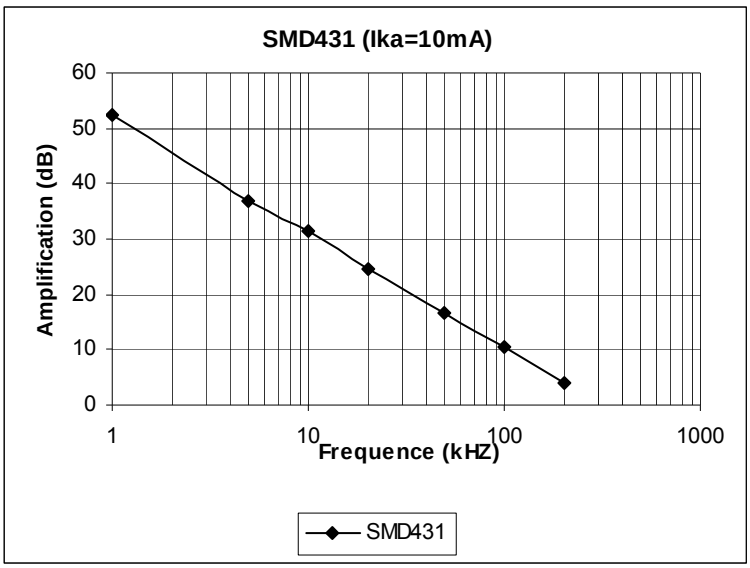
ELECTRICAL CHARACTERISTICS Unless otherwise specified, T_A = 25°C.

Parameter		Test Conditions	Min	Typ	Max	Units
Reference Voltage	SMD431A	$V_{KA} = V_{REF}$, I_{KA} = 10mA	2.487	2.500	2.513	V
	SMD431B		2.475	2.500	2.525	V
Reference drift over temperature		I_K = 10mA, $V_{KA} = V_{REF}$, 0°C ≤ T_A ≤ 70°C		4.5	17	mV
Voltage Ratio, Reference to Cathode (note 2)		I_K = 10mA, V_{KA} = 2.5V to 36V		-1.4	-2.7	mV/V
Reference Input Current (I_{REF})		I_K = 10mA, V_{KA} = 2.5V to 36V		1.5	4.0	µA
Minimum Cathode Current		$V_{KA} = V_{REF}$		0.45	1.0	mA
Off-State Cathode Current (I_{OFF})		V_{KA} = 36V, V_{REF} = 0V		0.05	1.0	µA
Dynamic Impedance (note 3)		$V_{KA} = V_{REF}$, I_K = 1mA to 100mA, f ≤ 1kHz		0.15	0.5	Ω

Note 2: Ratio of change in reference input voltage to the change in cathode voltage ($\Delta V_{REF} / \Delta V_{KA}$)

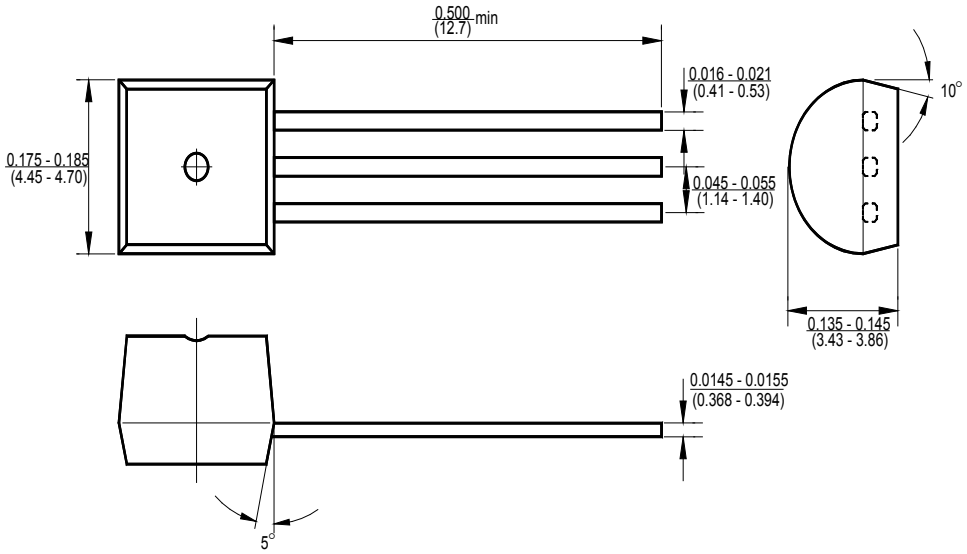
Note 3: These parameters, although guaranteed, are not 100% tested in production prior to shipment.

CHARACTERIZATION CURVES

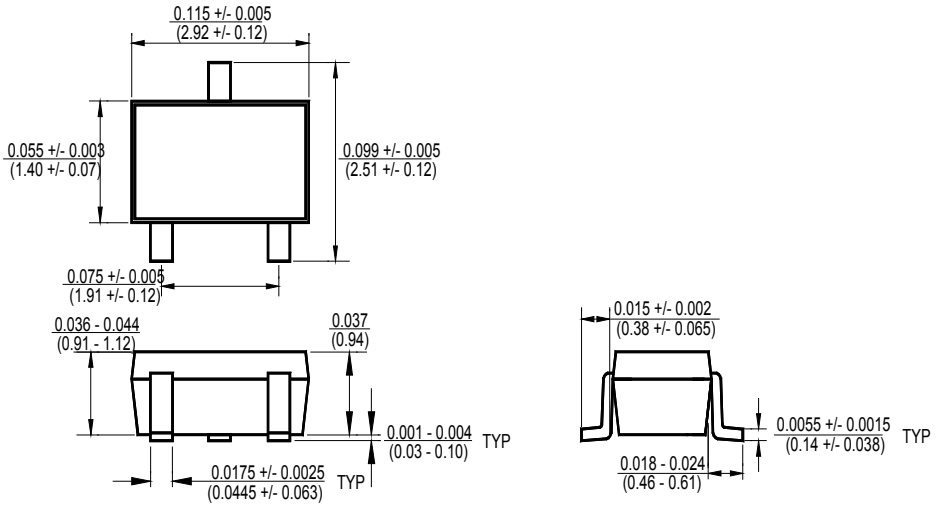


PACKAGE DESCRIPTION Dimensions in inches (millimeters) unless otherwise specified

TO92



SOT23



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