ADJUSTABLE PRECISION SHUNT REGULATOR

FEATURES

- **Low Voltage Operation (2.5V)**
- **Adjustable Output Voltage V_0 =V_{REF} to 18V**
- **Wide Operating Current Range 0.4mA to 100mA**
- **Low Dynamic Output Impedance 0.5Ω max.**
- **ESD Rating is 5.5KV(Per MIL-STD-883D).**
- **Halogen Free Product**

APPLICATIONS

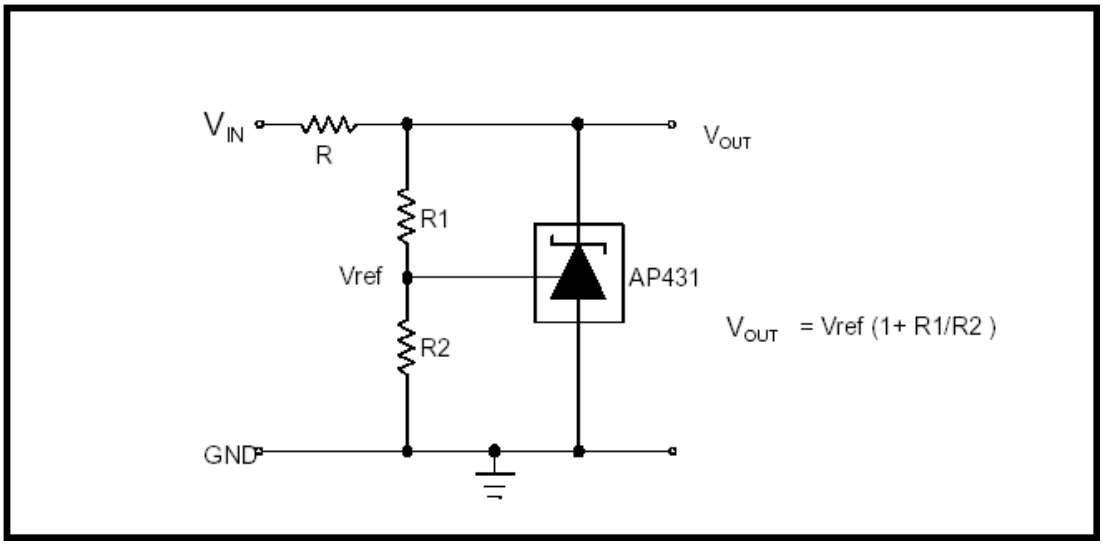
- **Linear Regulators**
- **Adjustable Supplies**
- **Switching Power Supplies**
- **Battery Operated Computers**
- **Instrumentation**
- **Computer Disk Drives**

DESCRIPTIOON

The AP431 is a low voltage three terminal adjustable shunt regulator with a guaranteed thermal stability over applicable temperature ranges. The output voltage can be set to any value between V_{REF} (approximately 2.5 V) to 18V with two external resistors (see application circuit). This device has a typical output impedance of 0.2 Ω . Active output circuitry provides a very sharp turn on characteristic, making this device excel lent replacement for Zener diodes in many applications.

The AP431 is characterized for operation from 0°C to 105°C, and four package options (SOT-23, SOT-89, SO-8 and TO-92) allow the designer the opportunity to select the proper package for their application.

TYPICAL APPLICATION

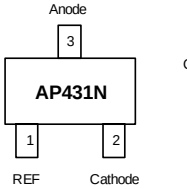


ORDERING / PACKAGE INFORMATION

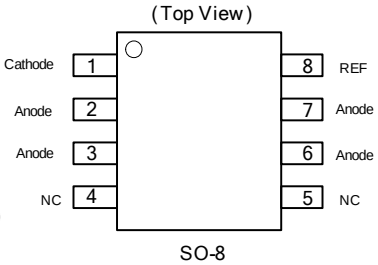
AP431X

Package Type

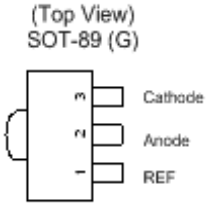
N : SOT-23
T : TO-92
G : SOT-89
M : SO-8

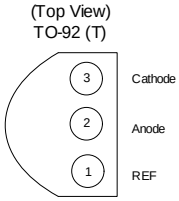


SOT-23 (N type)
(Top View)



SO-8





ABSOLUTE MAXIMUM RATINGS

Cathode Voltage (V_{KA}) ---------- 18V

Continuous Cathode Current (I_{KA}) ---------- 150mA

Reference Input Current (I_{REF}) ---------- 10mA

Power Dissipation (P_D) ----------

SOT-23 -------- 0.3W

SOT-89 -------- 0.625W

SO-8 ---------- 1.25W

TO-92 ---------- 0.64W

Storage Temperature Range (T_{ST}) ---------- -65 to +150°C

Junction Temperature (T_J) ---------- +125°C

Thermal Resistance from Junction to ambient (Rth_{ja})

SOT-23 -------- 336°C/W

SOT-89 -------- 160°C/W

SO-8 ---------- 80°C/W

TO-92 ---------- 156°C/W

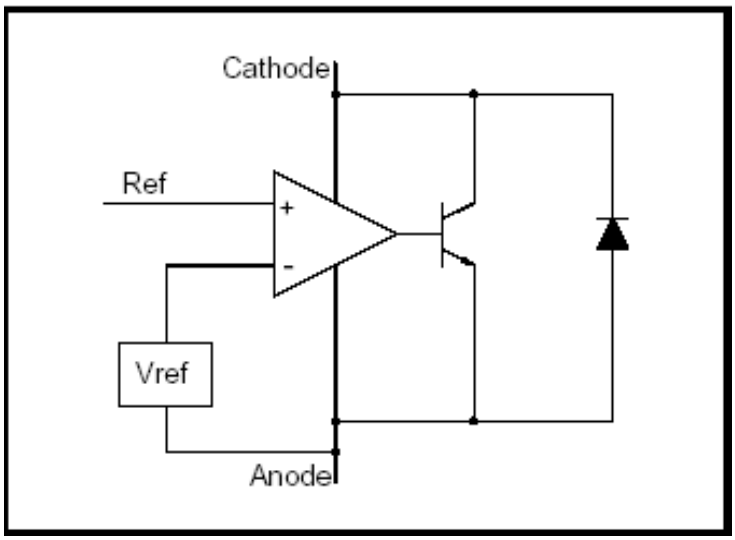
Lead Temperature (Soldering) 10 seconds (T_{LEAD}) 260°C

ELECTRICAL SPECIFICATIONS

(T_A =25°C, unless otherwise specified)

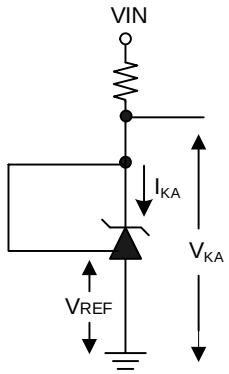
Parameter	SYM	TEST CONDITION	MIN	TYP	MAX	UNITS
Reference Voltage (Test circuit 1)	V_{REF}	V_{KA} = V_{REF}, I_{KA} = 10mA	2.47	2.495	2.52	V
Deviation of Reference Input Voltage over full temperature range (Test circuit 1)	$V_{REF(DEV)}$	V_{KA} = V_{REF}, I_{KA} = 10mA, T_A = Full Range		4	25	mV
Reference Input Current (Test circuit 2)	I_{REF}	R1 = 10KΩ, R2 = ∞, I_{KA}= 10mA	-	2	4	uA
Deviation of Reference current over full temperature range (Test circuit 2)	$I_{REF(DEV)}$	R1 = 10KΩ, R2 = ∞, I_{KA} = 10mA T_A = Full Range	-	0.4	1.2	uA
Ratio of change in reference voltage to the change in cathode voltage (Test circuit 2)	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	I_{KA} = 10mA, δV_{KA}=10V -V_{REF}	-	-1.4	-2.7	mV/V
Minimum Cathode Current for Regulation (Test circuit 1)	$I_{KA(min)}$	V_{KA} = V_{REF}	-	0.4	1	mA
Off-state Cathode Current (Test circuit 3)	$I_{KA(OFF)}$	V_{KA} = 18V, V_{REF} = 0V	-	0.1	1	uA
Dynamic Impedance (Test circuit 1)	$\lvert Z_{KA} \rvert$	V_{KA} = V_{REF}, I_{KA} = 1mA ~ 100mA Frequency ≤ 1KHz	-	0.2	0.5	Ω

BLOCK DIAGRAM

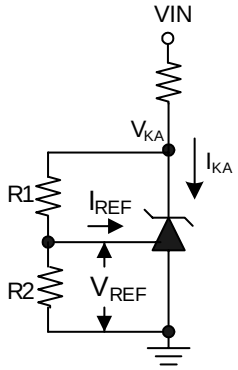


TEST CIRCUIT

(1): $V_{KA} = V_{REF}$

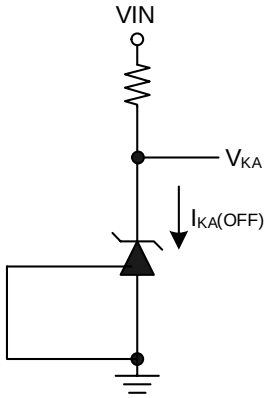


(2): $V_{KA} > V_{REF}$

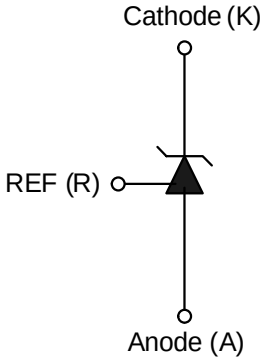


$V_{KA} = V_{REF} \times (1+R1/R2) + I_{REF} \times R1$

(3): Off state current

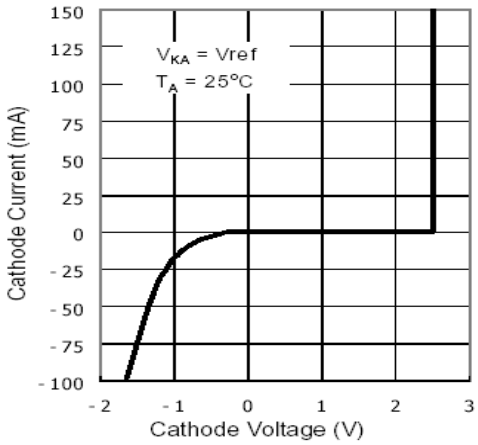


SYMBOL

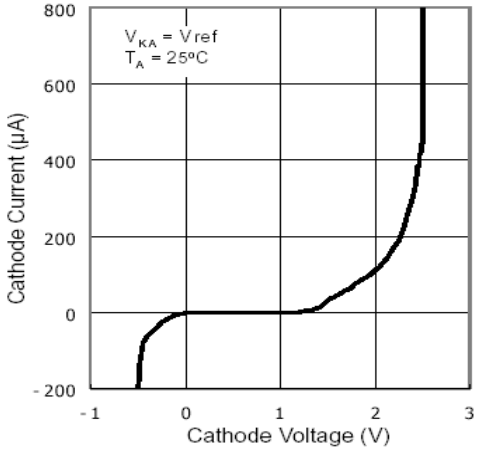


TYPICAL PERFORMANCE CHARACTERISTICS

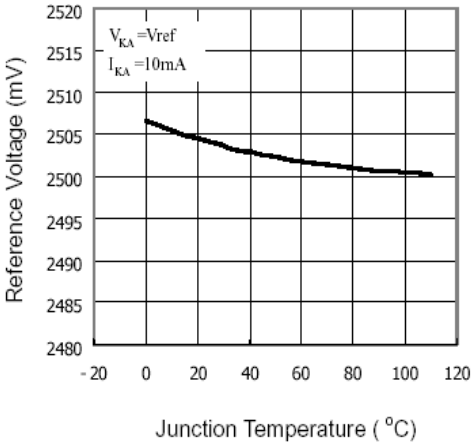
CATHODE CURRENT vs. CATHODE VOLTAGE



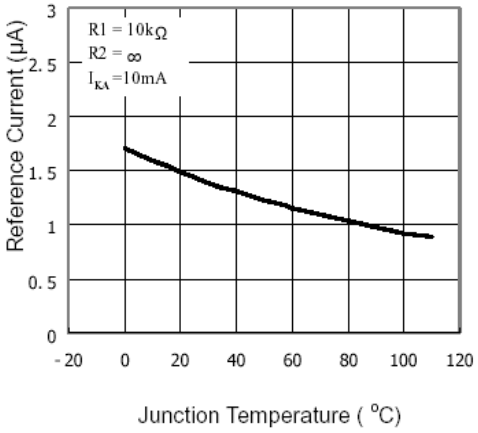
CATHODE CURRENT vs. CATHODE VOLTAGE



REFERENCE VOLTAGE vs. JUNCTION TEMPERATURE

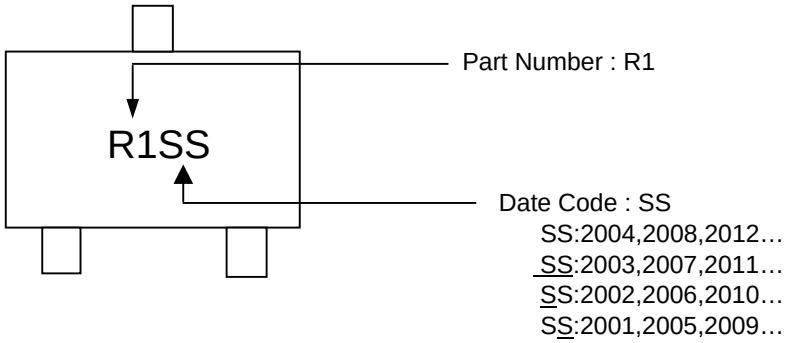


REFERENCE INPUT CURRENT vs. JUNCTION TEMPERATURE

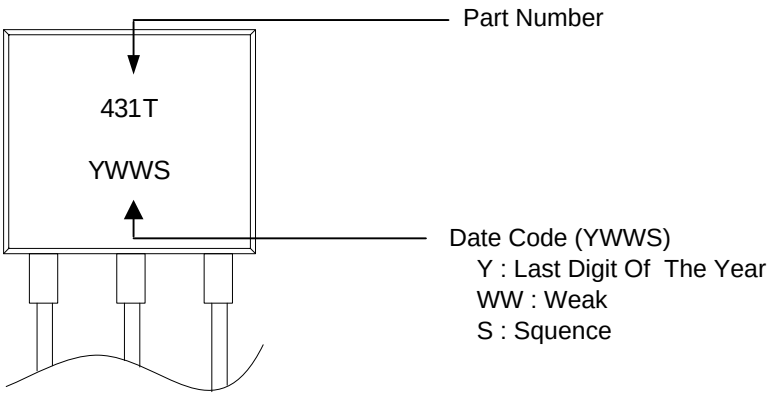


MARKING INFORMATION

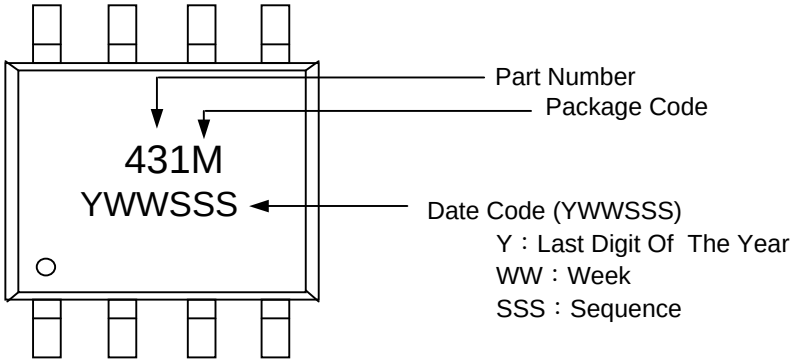
SOT-23



TO-92



SO-8



SOT-89