ADJUSTABLE PRECISION SHUNT REGULATOR

❖ GENERAL DESCRIPTION

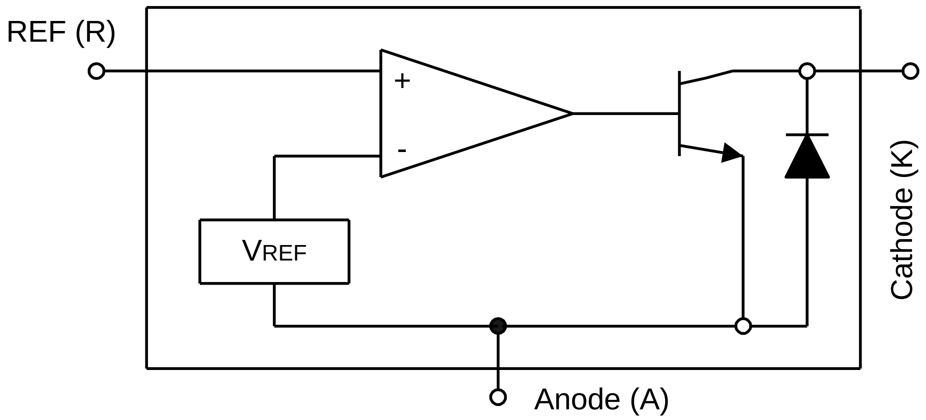
The AX432 is a low voltage three terminal adjustable shunt regulator with a guaranteed thermal stability over applicable temperature ranges. The output voltage can be set to any value between 1.24V (VREF) to 20V with two external resistors (see application circuit). The high precise Reference voltage tolerance is ±1% by AX432. This device has a typical output impedance of 0.2Ω. Active output circuitry provides a very sharp turn on characteristic, making this device excel lent replacement for Zener diodes in many applications.

The AX432 is characterized for operation from -20°C to 85°C. The AX432 is available in a low profile SOT-23-3L package.

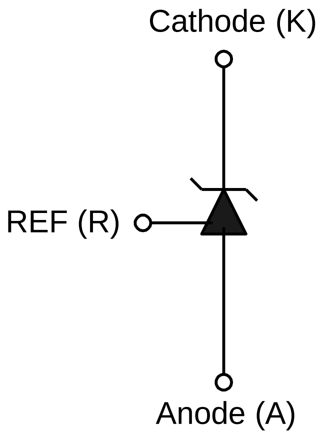
❖ FEATURES

- Precision reference voltage 1.24V±1%
- Adjustable output voltage is VREF to 20V
- Sink current capability is 150mA
- Low dynamic output impedance is 0.2Ω (typ.)
- Minimum Cathode current for regulation is 0.2mA (typ.)
- 3-pin, SOT-23 Pb-Free package

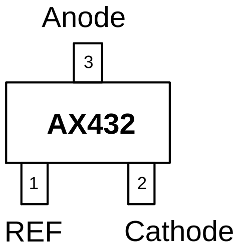
❖ BLOCK DIAGRAM



❖ SYMBOL



❖ PIN ASSIGNMET



SOT-23-3L
(Top View)

❖ ORDER/MARKING INFORMATION

Order Information	Top Marking
AX432 X X Package Type: R: SOT-23-3L Packing: Blank : Bag, A : Taping	**R 3 Y W X** X → ID code: internal W → WW: 01~26(A~Z) 27~52(a~z) Y → Year: A=2010 1=2011 R 3 → AX432

❖ ABSOLUTE MAXIMUM RATINGS (at T_A=25°C)

Characteristics	Symbol	Rating	Unit
Cathode Voltage	V_{KA}	20	V
Continuous Cathode Current	I_{KA}	200	mA
Reference Input Current	I_{REF}	10	mA
Operating Temperature	T_{OP}	-20~85	°C
Junction Temperature	T_J	-40~125	°C
Storage Temperature	T_{STG}	-40~150	°C
Thermal Resistance from Junction to case	θ_{JC}	180	°C/W
Thermal Resistance from Junction to ambient	θ_{JA}	250	°C/W
Power Dissipation[PD=(T_J-T_A) / θ_{JA}]	PD	0.4	W

Note : θ_{JA} is measured with the PCB copper area of approximately 1 in^2(Multi-layer).

❖ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Reference Voltage	V_{REF}	V_{KA}=V_{REF}, I_{KA}=10mA (Fig.1)	1.227	1.24	1.252	V
Deviation of Reference Input Voltage over full temperature range	$V_{REF(DEV)}$	V_{KA} = V_{REF}, I_{KA} = 10mA, T_A= -20~85°C (Fig.1)	-	6	20	mV
Reference Input Current	I_{REF}	R1=10KΩ, R2=∞, I_{KA}=10mA (Fig.2)	-	1.5	3.5	uA
Deviation of Reference Input Current over Temperature	$I_{REF(DEV)}$	R1=10KΩ, R2=∞, I_{KA}=10mA T_A= -20~85°C (Fig.2)	-	0.4	1.2	uA
Ratio of the Change in Reference Voltage to the Change in Cathode Voltage	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	I_{KA}=10mA (Fig.2); V_{KA}=20V~V_{REF}	-	-1.4	-2.0	mV/V
Minimum Cathode Current for Regulation	$I_{KA(min)}$	V_{KA}=V_{REF} (Fig.1)	-	0.15	0.3	mA
Off-state Cathode Current	$I_{KA(OFF)}$	V_{KA}=20V, V_{REF}=0V (Fig.3)	-	0.1	1	uA
Dynamic Output Impedance	$\lvert Z_{KA} \rvert$	V_{KA}=V_{REF} Frequency ≤ 1KHz (Fig.1)	-	0.2	0.5	Ω

❖ APPLICATION CIRCUIT

Fig1: V_{KA}=V_{REF}

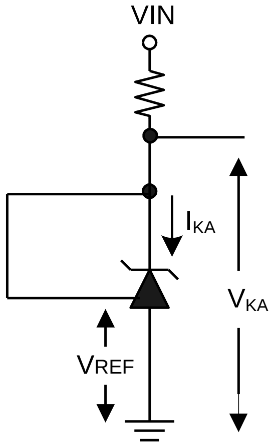
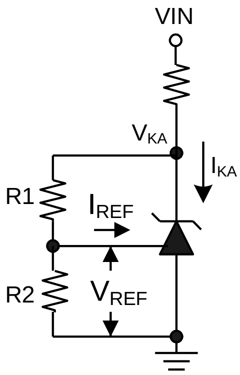
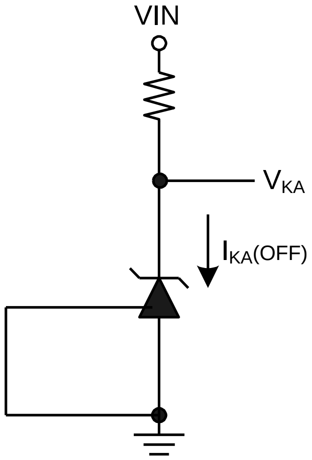


Fig2: V_{KA}>V_{REF}



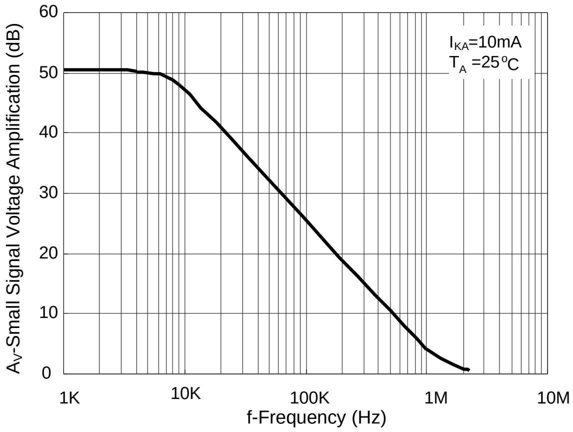
$VKA=V_{REF}(1+R1/R2)+I_{REF}*R1$

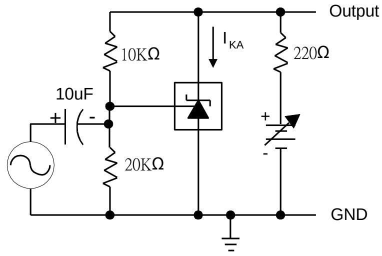
Fig3: Off state current



❖ TYPICAL CHARACTERISTICS

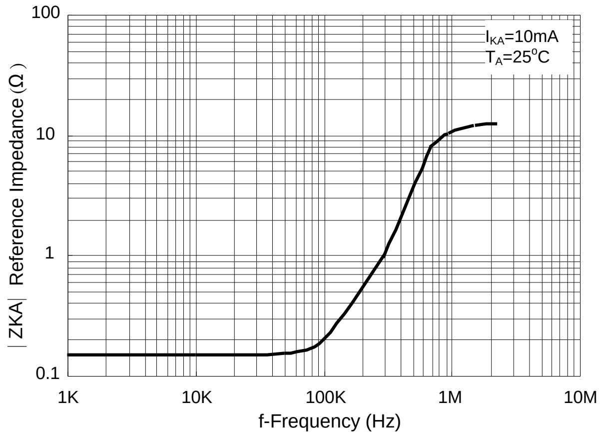
(1) Small Signal Voltage Amplification Vs Frequency

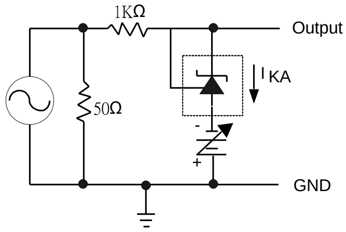




TEST CIRCUIT FOR VOLTAGE AMPLIFICATION

(2) Reference Impedance VS Frequency

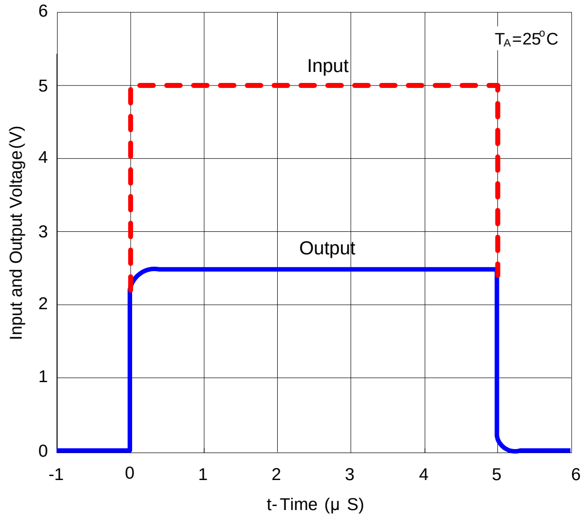


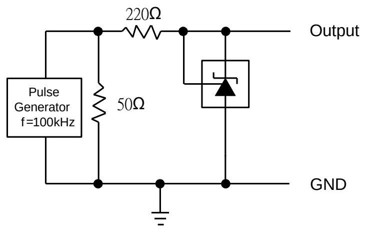


TEST CIRCUIT FOR REFERENCE IMPEDANCE

❖ TYPICAL CHARACTERISTICS (CONTINUED)

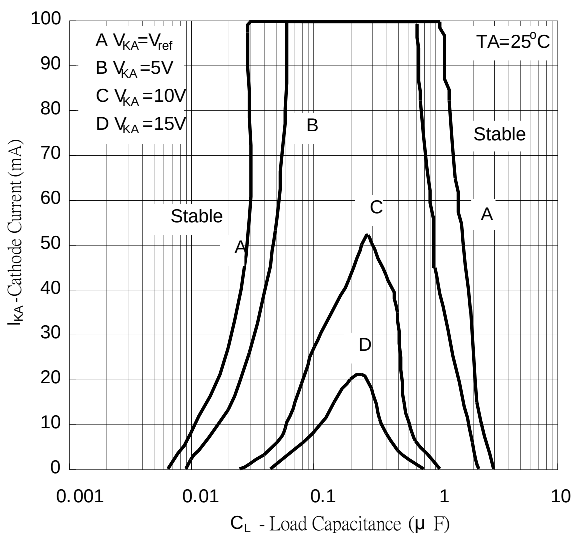
(3) Pulse Response

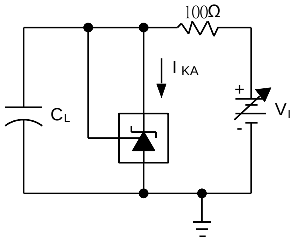




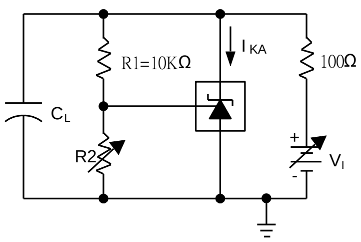
TEST CIRCUIT FOR PULSE RESPONSE

(4) Stability boundary conditions





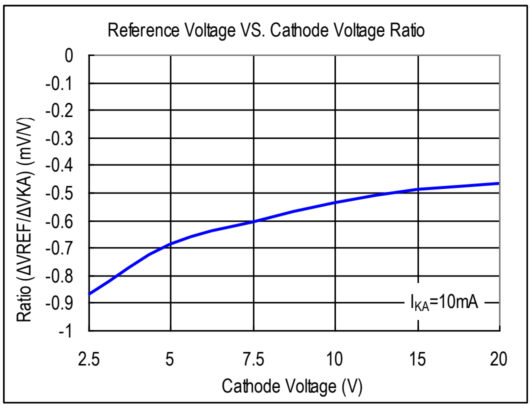
TEST CIRCUIT FOR CURVE A

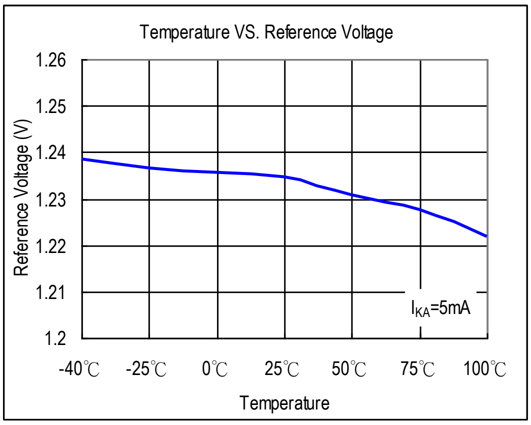


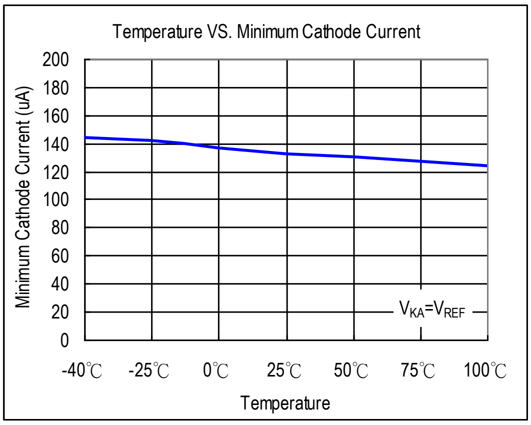
TEST CIRCUIT FOR CURVE B , C , AND D

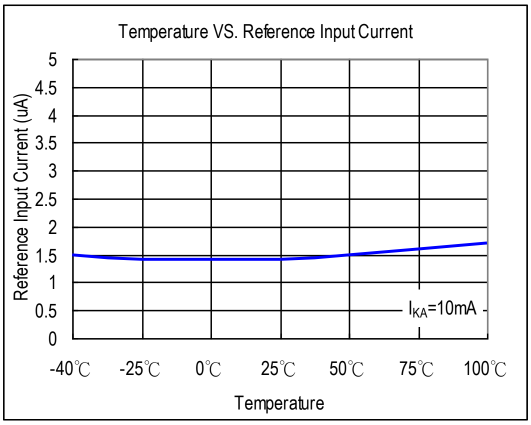
The areas under the curves represent conditions that may cause the device to oscillate For curves B,C, and D, R2 and V_I were adjusted to establish the initial V_{KA} and I_{KA} conditions with C_L=0 . V_{BATT} and C_L were then adjusted to determine the ranges of stability.

❖ TYPICAL CHARACTERISTICS (CONTINUED)

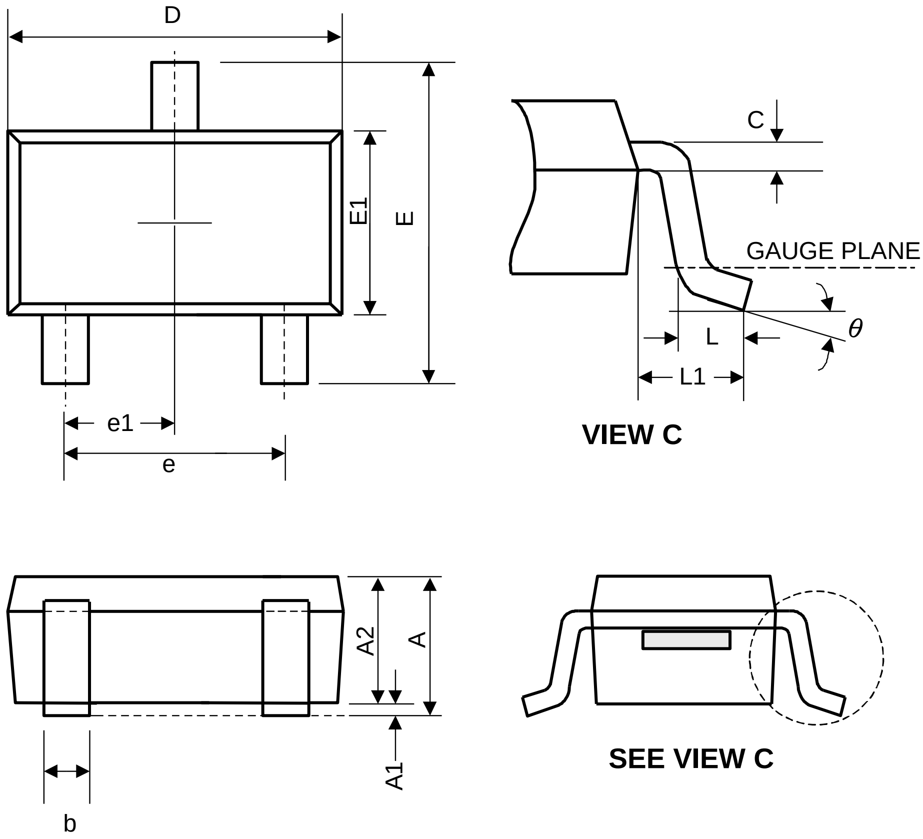








❖ PACKAGE OUTLINES



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.45	-	-	0.057
A1	0.00	0.08	0.15	-	-	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
b	0.30	0.40	0.50	0.012	0.016	0.020
C	0.08	0.15	0.22	0.003	0.006	0.009
D	2.70	2.90	3.10	0.106	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.40	1.60	1.80	0.055	0.063	0.071
L	0.30	0.45	0.60	0.012	0.018	0.024
L1	0.50	0.60	0.70	0.020	0.024	0.028
e	1.9 BSC			0.075 BSC		
e1	0.95 BSC			0.037 BSC		
θ	0^{o}	4^{o}	8^{o}	0^{o}	4^{o}	8^{o}

JEDEC outline: NA