ACE431N

High Voltage Adjustable Precision Shunt Regulators

Description

The ACE431N is high-voltage three-terminal adjustable voltage references, with specified thermal stability over applicable industrial and commercial temperature ranges. Output voltage can be set to any value between V_{REF} (2.5V) and 36V with two external resistors. These devices have a typical output impedance of 0.25Ω. Active output circuitry provides a very sharp turn-on characteristic, making the ACE431N excellent replacements for low-voltage Zener diodes in many applications, including onboard regulation and adjustable power supplies.

Features

- Low Output Noise
- Adjustable Output Voltage, V_O = Vref to 36 V
- Low Operational Cathode Current
- 0.25Ω Typical Output Impedance

Application

- Battery Power Equipment
- Linear Regulators
- Switch Power Supply
- Cellular Phone
- Digital Cameras
- Computer Disk Drivers
- Instrumentation

Absolute Maximum Ratings

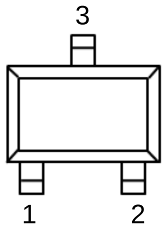
(T_A=25 °C Unless otherwise specified)

Parameter	Symbol	Max	Unit
Cathode Voltage	V_Z	37	V
Continuous Cathode Current	I_Z	150	mA
Reference Current	I_{REF}	10	mA
Operating junction temperature	T_J	-40 to 150	°C
Storage temperature range	T_{STG}	-65 to 150	°C
Lead Temperature Range (Soldering 10sec.)	T_{SOL}	260	°C
Thermal Resistance-Junction to Ambient (SOT-89-3)	θ_{JA}	85	°C /W
Thermal Resistance-Junction to Case (SOT-89-3)	θ_{JC}	45	°C /W
Thermal Resistance-Junction to Ambient (SOT-23-3)	θ_{JA}	250	°C /W
Thermal Resistance-Junction to Case (SOT-23-3)	θ_{JC}	120	°C /W

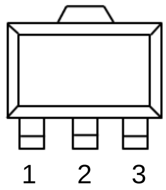
The IC has a protection circuit against static electricity. Do not apply high static electricity or high voltage that exceeds the performance of the protection circuit to the IC.

Packaging Type

SOT-23-3/SOT-23-3(A)



SOT-89-3



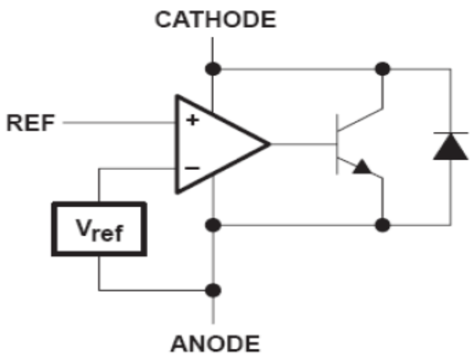
SOT-23-3	SOT-23-3(A)	STO-89-3	Description
2	1	3	Cathode
3	3	2	Anode
1	2	1	Ref

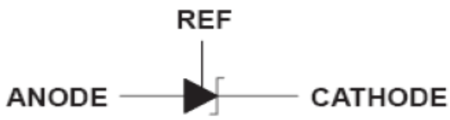
Ordering information

ACE431N X XX + H

- Halogen - free
- Pb - free
- BM : SOT-23-3
  BMA:SOT-23-3(A)
  AM : SOT-89-3
- Reference Voltage accuracy :
  A : 0.5%
  B : 1.0%

Block Diagram





Electrical Characteristics

(T_A=25 °C Unless otherwise specified)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	V_Z=V_{REF}, I_Z=10mA	2.482	2.495	2.508	V
		V_Z=V_{REF}, I_Z=1mA	2.482	2.495	2.508	
V_{REF} Temp Deviation	V_{DEV}	V_Z=V_{REF}, I_Z=10mA T_A=-40℃~80℃		10	25	mV
		V_Z=V_{REF}, I_Z=10mA T_A=-40℃~125℃		20	35	
Ratio of change in V_{REF} to change in cathode voltage	$\Delta V_{REF}/\Delta V_Z$	I_Z=10mA ΔV_Z=36V to V_{REF}		-1.4	-2.7	mV/V
Reference Input current	I_{REF}	I_Z =10mA, R1=10KΩ, R2=∞		2	4	μA
IREF Temp Deviation	$I_{REF(DEV)}$	I_Z=10mA, T_A=-40℃~80℃ R1=10KΩ, R2=∞		0.8	2.5	μA
Off-state cathode current	$I_{Z(OFF)}$	V_{REF}=0 V_Z=36V		0.1	0.5	μA
Dynamic output impedance	R_Z	I_Z=1mA~100mA V_Z=V_{REF}, f≦1KHz		0.25	0.5	Ω
Minimum Operation Current	$I_{Z(MIN)}$	V_Z=V_{REF}		0.4	0.7	mA

Application Circuit

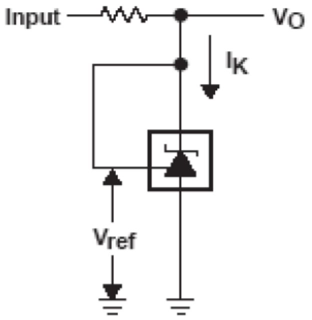


Figure 1. Test Circuit for $V_{KA} = V_{ref}$,
$V_O = V_{KA} = V_{ref}$

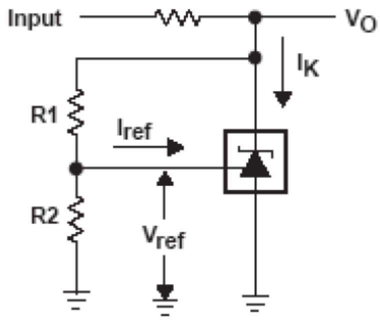


Figure 2. Test Circuit for $V_{KA} > V_{ref}$,
$V_O = V_{KA} = V_{ref} \times (1 + R1/R2) + I_{ref} \times R1$

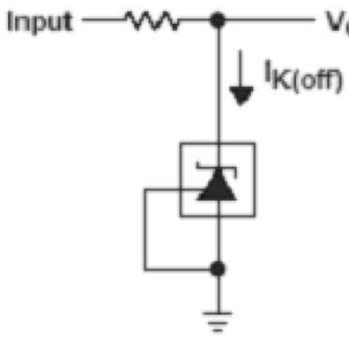


Figure 3. Test Circuit for $I_{K(off)}$

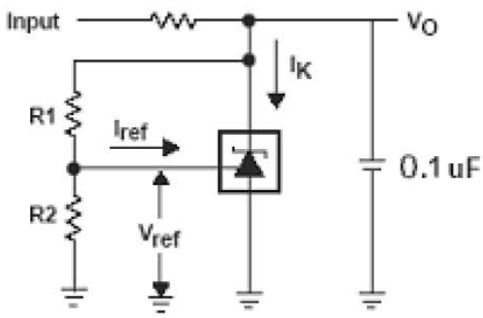
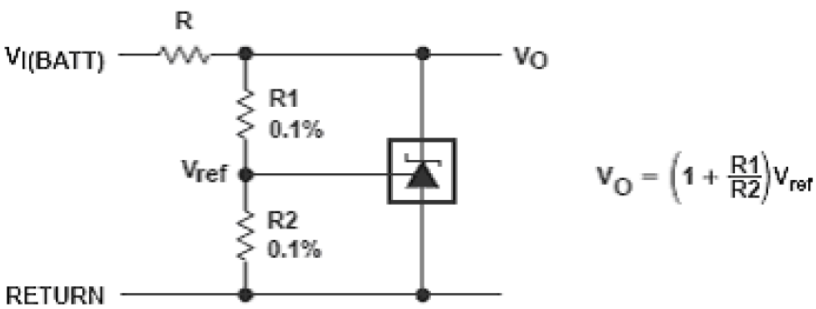
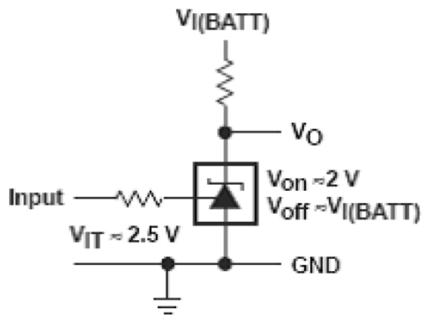


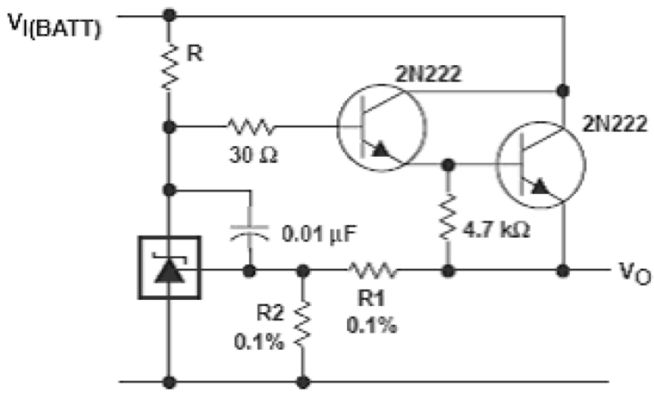
Figure 4. Test Circuit for $V_{KA} > V_{ref}$,
$V_O = V_{KA} = V_{ref} \times (1 + R1/R2) + I_{ref} \times R1$



Shunt Regulator

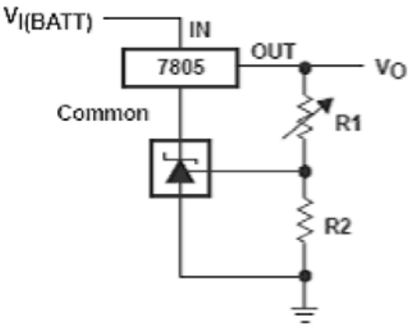


Single-Supply Comparator With Temperature-Compensated Threshold



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

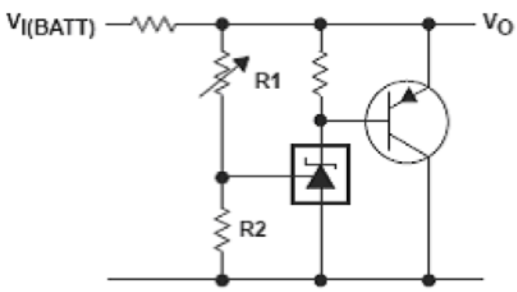
Precision High-Current Series Regulator



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

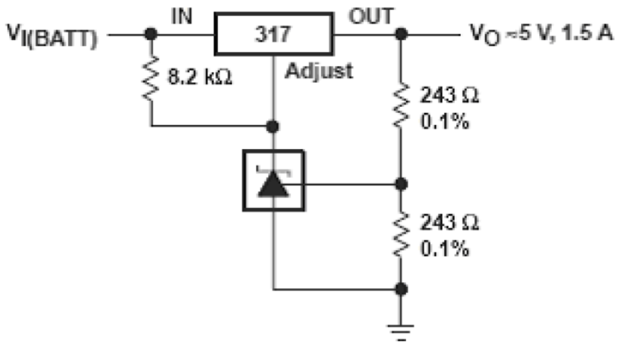
$$\text{Minimum } V_O = V_{ref} + 5\text{ V}$$

Output Control of a Three-Terminal Fixed Regulator

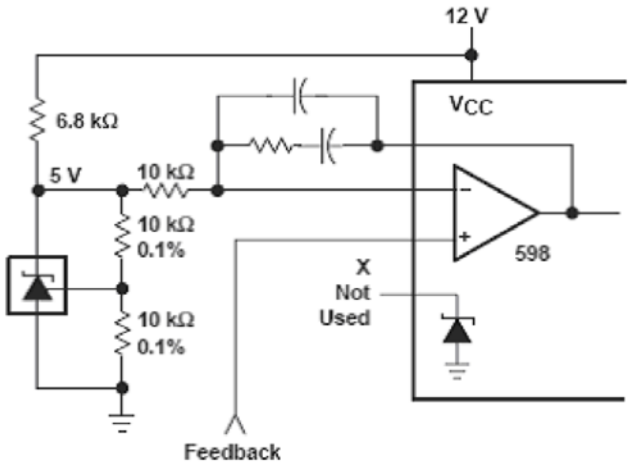


$$V_O = \left(1 + \frac{R1}{R2}\right)V_{ref}$$

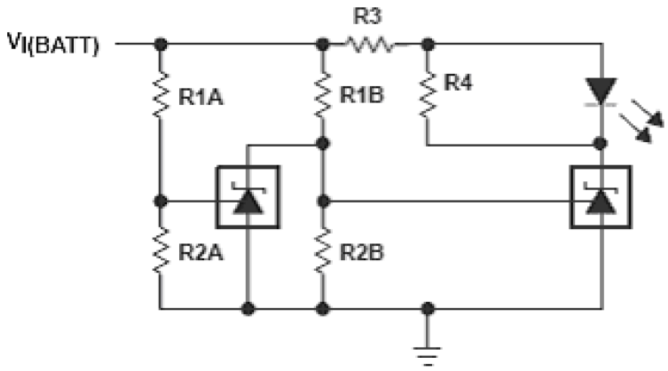
High-Current Shunt Regulator



Precision 5-V 1.5-A Regulator



PWM Converter With Reference

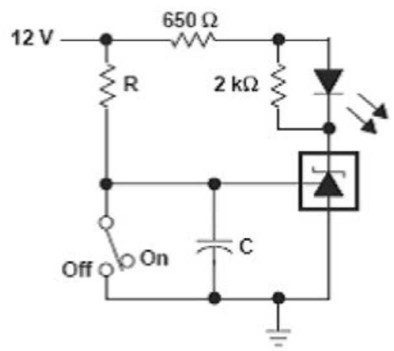


$$\text{Low Limit} = \left(1 + \frac{R1B}{R2B}\right)V_{ref}$$

$$\text{High Limit} = \left(1 + \frac{R1A}{R2A}\right)V_{ref}$$

LED on When Low Limit < $V_{I(BATT)}$ < High Limit

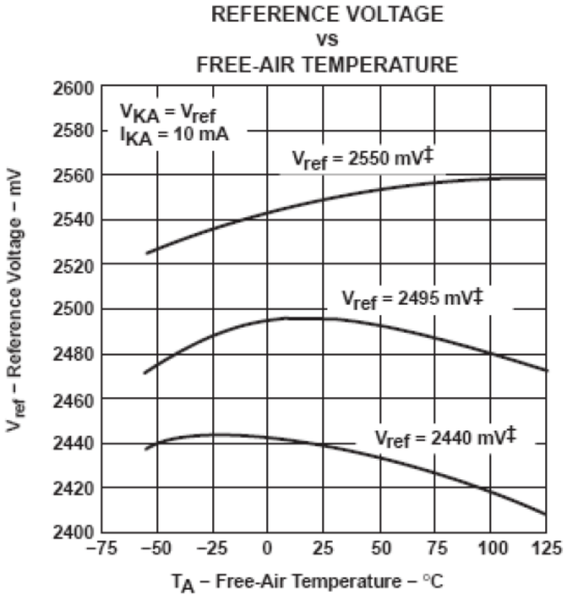
Voltage Monitor

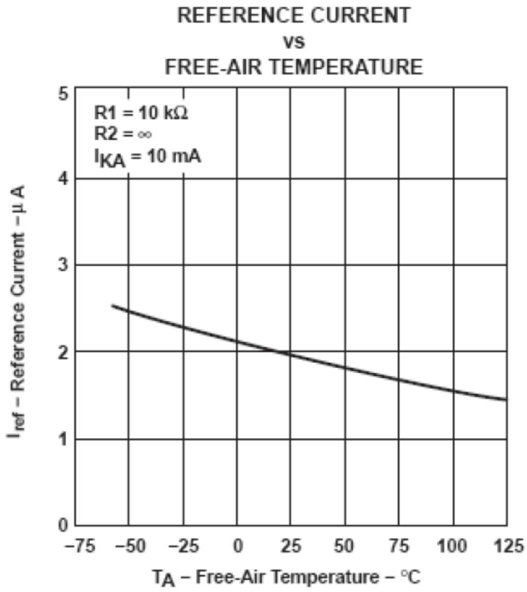


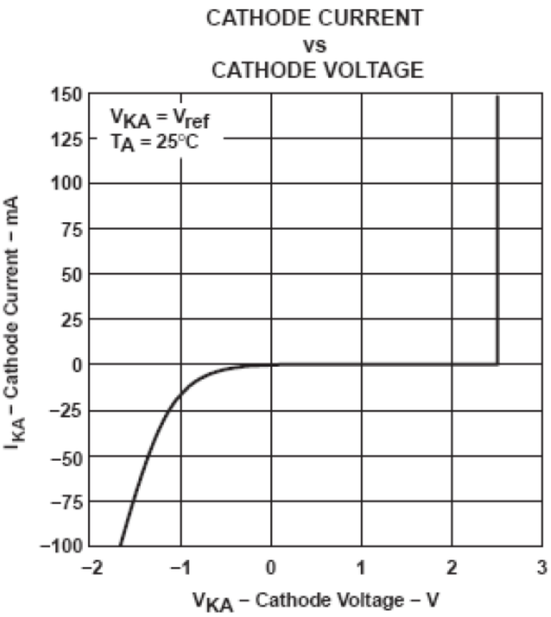
$$\text{Delay} = R \times C \times l_n\left(\frac{12\text{ V}}{12\text{ V} - V_{ref}}\right)$$

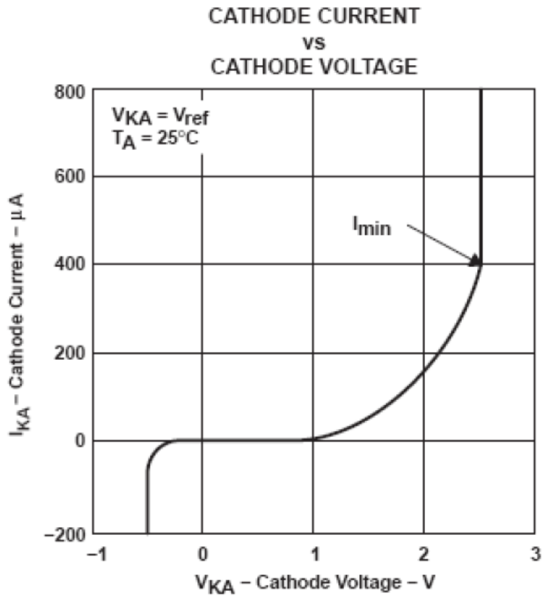
Delay Timer

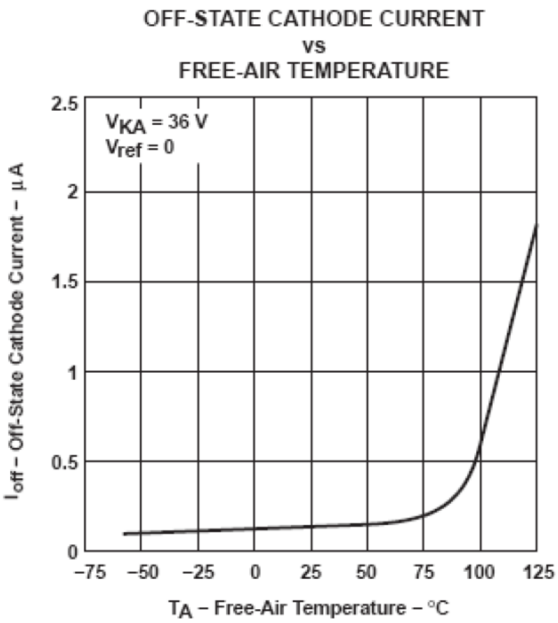
Performance Characteristics

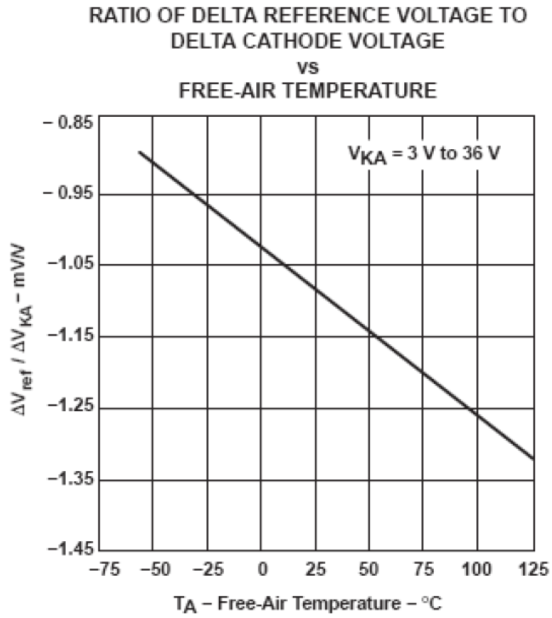


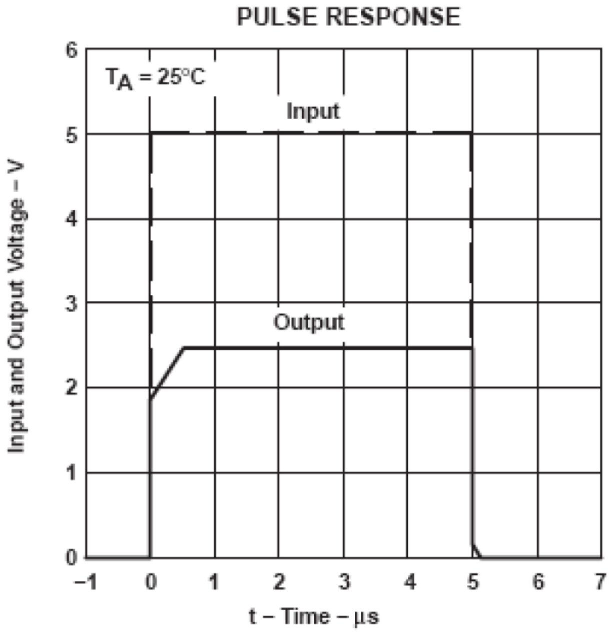


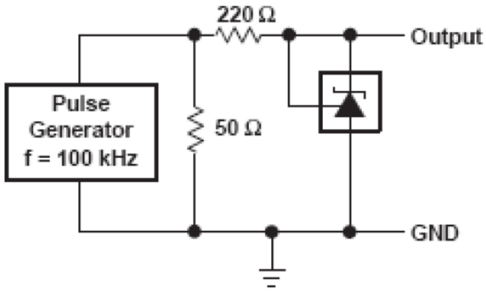




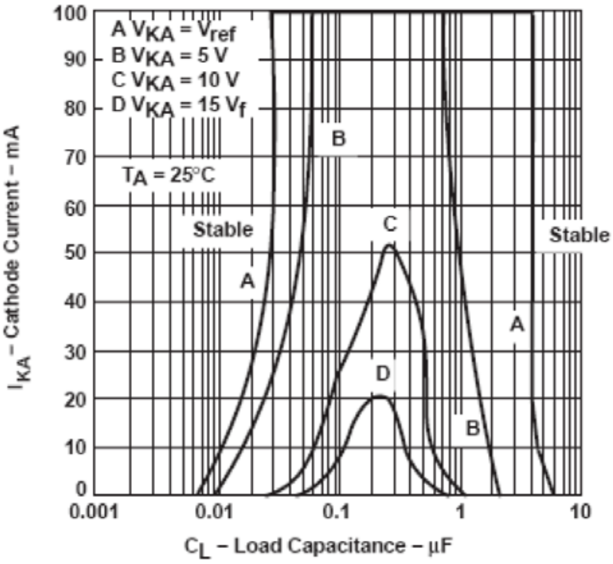


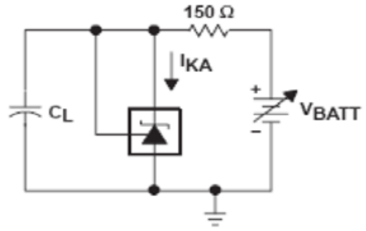




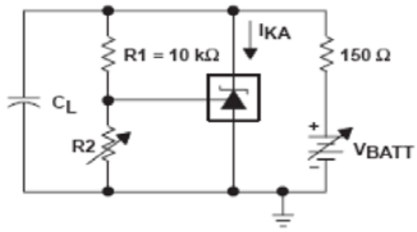


TEST CIRCUIT FOR PULSE RESPONSE



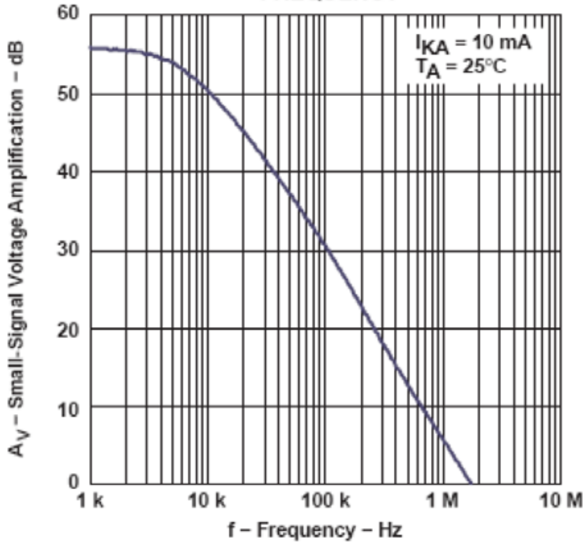


TEST CIRCUIT FOR CURVE A

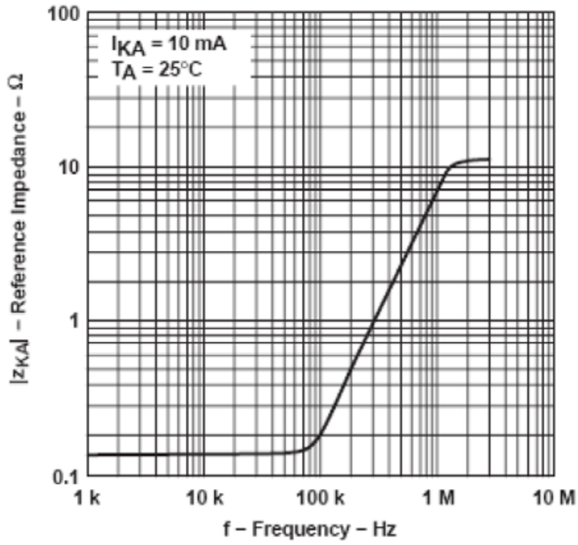


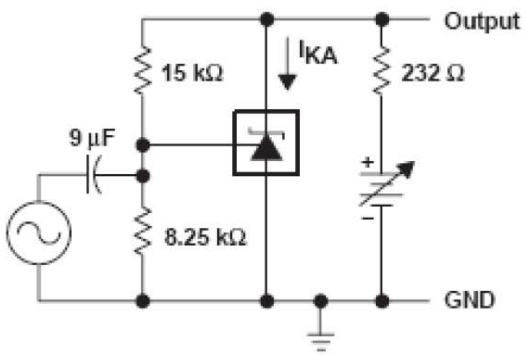
TEST CIRCUIT FOR CURVES B, C, AND D

SMALL-SIGNAL VOLTAGE AMPLIFICATION
vs
FREQUENCY

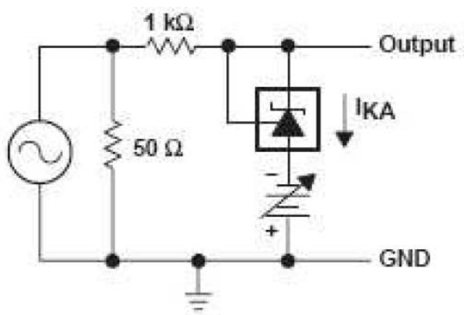


REFERENCE IMPEDANCE
vs
FREQUENCY





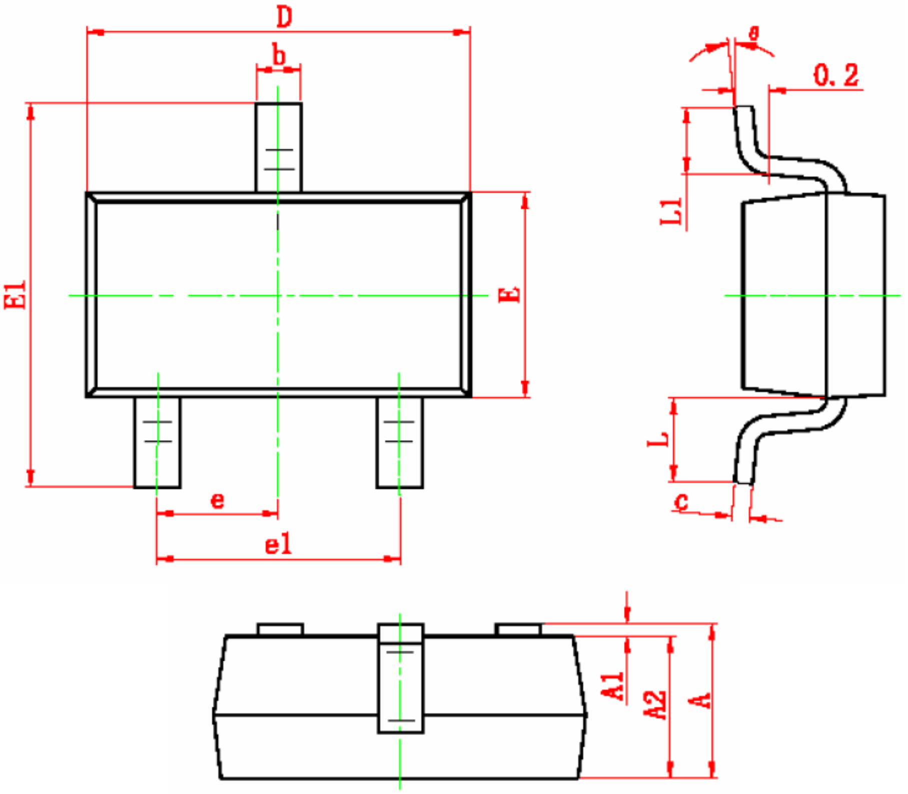
TEST CIRCUIT FOR VOLTAGE AMPLIFICATION



TEST CIRCUIT FOR REFERENCE IMPEDANCE

Packing Information

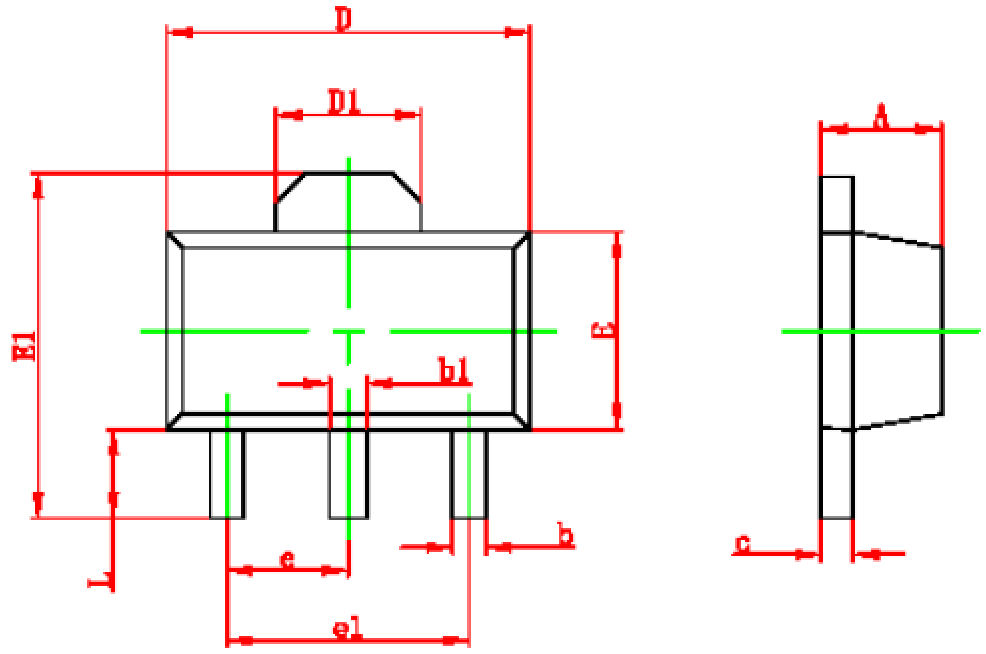
SOT-23-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.200	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.100	0.035	0.039
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°	6°

Packing Information

SOT-89-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Technology Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and shoes failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ACE Technology Co., LTD.
http://www.ace-ele.com/