ACE432N

Precision adjustable shunt voltage reference

Description

The ACE432N is low-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 VREF (1.24V) and 20V 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 ACE432N excellent replacements for low-voltage Zener diodes in many applications, including onboard regulation and adjustable power supplies.

Features

- Low-Voltage Operation --- Down to 1.24V
- Adjustable Output Voltage, Vo=Vref to 20V
- Low Operational Cathode Current --- 80uA (Typ)
- 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

Parameter	Symbol	Max	Unit
Cathode Voltage	V_Z	20	V
Continuous Cathode Current	I_Z	100	mA
Reference Current	I_{REF}	3	mA
Thermal resistance junction to ambient SOT-23-5 SOT-23-3	θ_{JA}	206 206	$^oC/W$
Operating junction temperature	T_J	-40 to 150	^oC
Storage temperature range	T_{STG}	-65 to 150	^oC

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.

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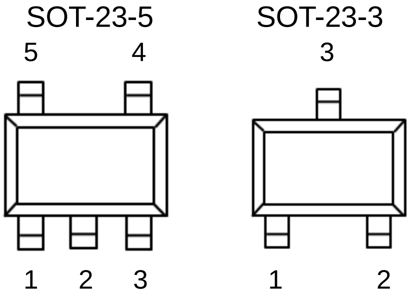
Packaging Type



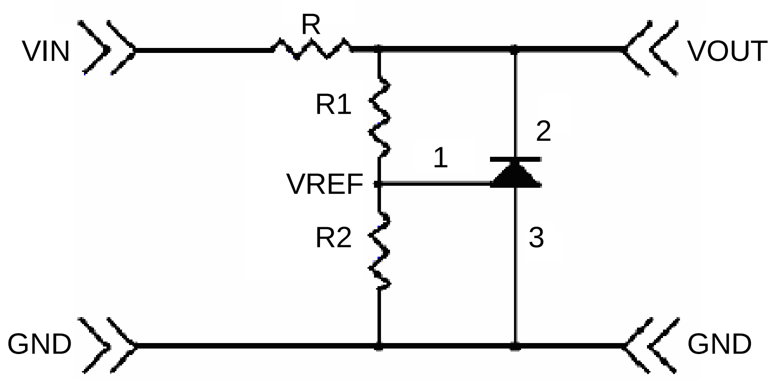
SOT-23-5	SOT-23-3	Description
3	2	Cathode
5	3	Anode
4	1	Ref
1.2		NC

Ordering information

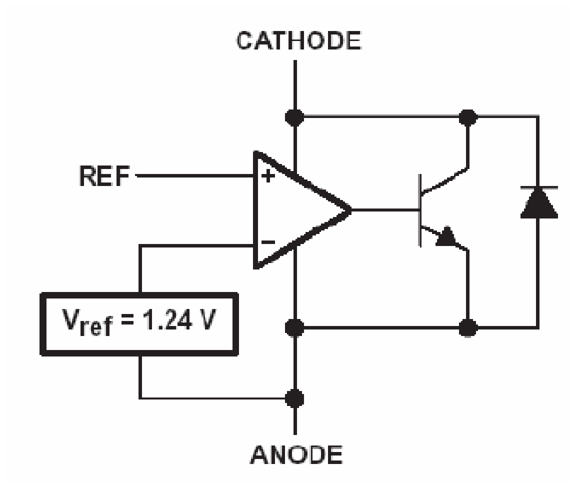
ACE432N X XX + H

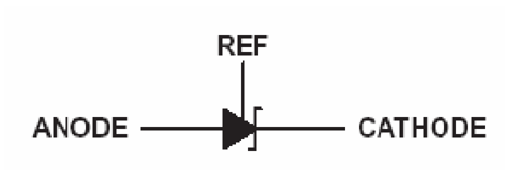
- H: Halogen - free
- +: Pb - free
- XX: BN : SOT-23-5; BM : SOT-23-3
- X: Reference Voltage accuracy : A : 0.5%; B : 1%

Typical Application Circuit



Block Diagram





Electrical Characteristics

Parameter		Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Reference Voltage	0.5%	V_{REF}	$V_Z=V_{REF}$, I_Z=10mA	T_A=25℃	1.234	1.24	1.246	V
				T_A=-40℃~80℃	1.222		1.258	
	1.0%			T_A=25℃	1.228	1.24	1.252	
				T_A=-40℃~80℃	1.215		1.265	
V_{REF} Temp Deviation		V_{DEV}	$V_Z=V_{REF}$, I_Z=10mA T_A=-40℃~80℃			10	25	mV
Ratio of change in V_{REF} to change in cathode voltage		$\Delta V_{REF}/\Delta V_Z$	I_Z=10mA ΔV_Z=16V to V_{REF}			-1.0	-2.7	mV/V
Reference Input current		I_{REF}	I_Z =10mA, R1=10KΩ, R2=∞			0.15	0.5	μA
IREF Temp Deviation		$I_{REF(DEV)}$	I_Z=10mA, T_A=-40℃~80℃ R1=10KΩ, R2=∞			0.1	0.4	μA
Off-state cathode current		$I_{Z(OFF)}$	V_{REF}=0	V_Z=6V		0.5	1.0	μA
				V_Z=12V				
Dynamic output impedance		R_Z	I_Z=1mA~100mA $V_Z=V_{REF}$, f≦1KHz			0.25	0.4	Ω
Minimum Operation Current		$I_{Z(MIN)}$	$V_Z=V_{REF}$			30	80	μA

Application Circuit

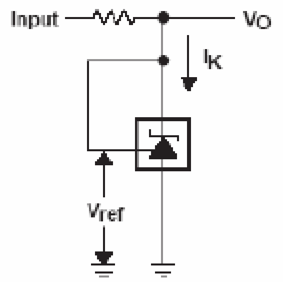


Figure 1. Test Circuit for $V_{KA}=V_{REF}$

$V_O=V_{KA}=V_{REF}$

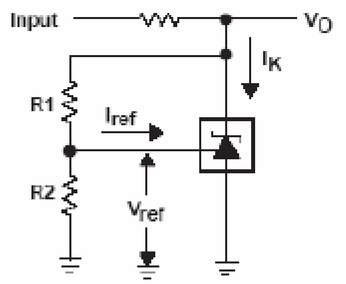


Figure 2. Test Circuit for $V_{KA}>V_{REF}$,

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

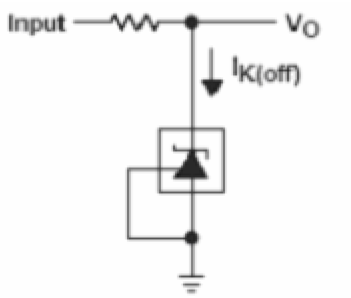


Figure 3. Test Circuit for $I_{K(OFF)}$

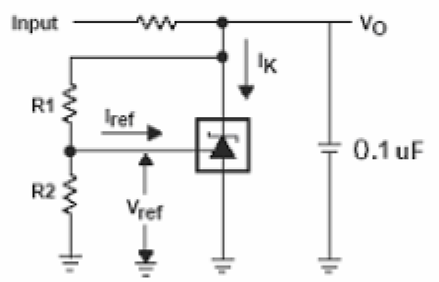


Figure 4. Test Circuit for $V_{KA}>V_{REF}$,

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

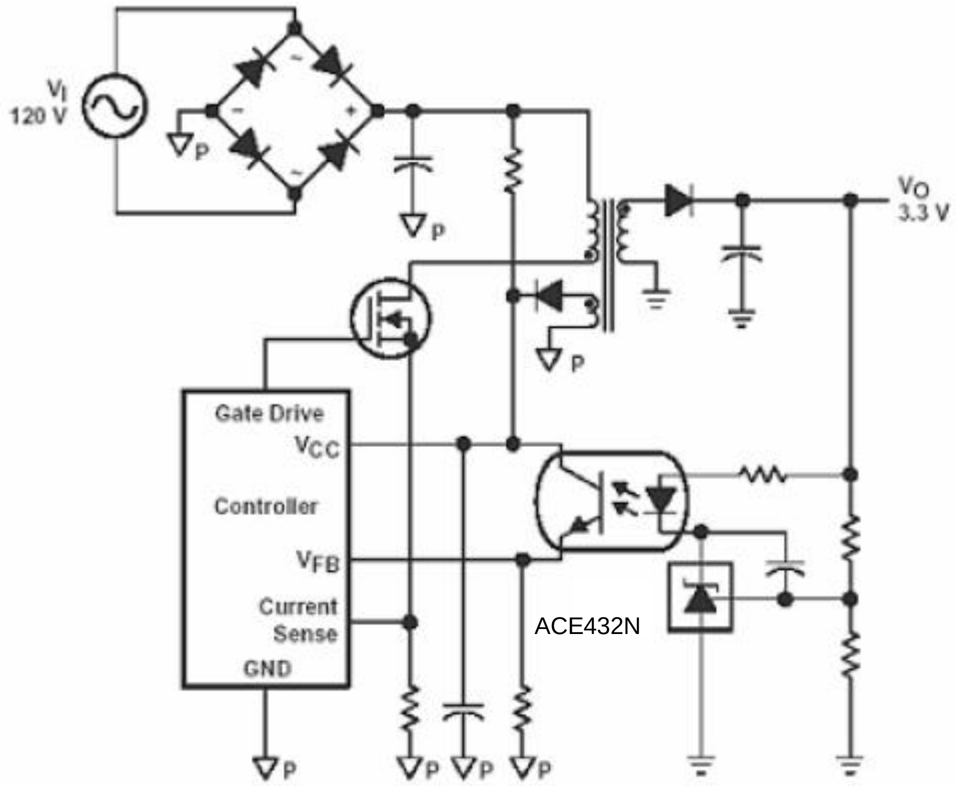
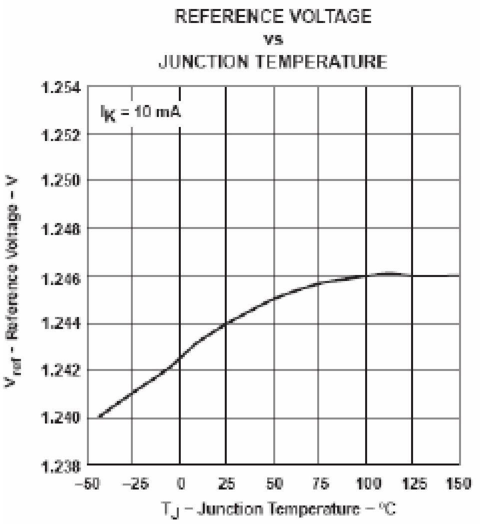
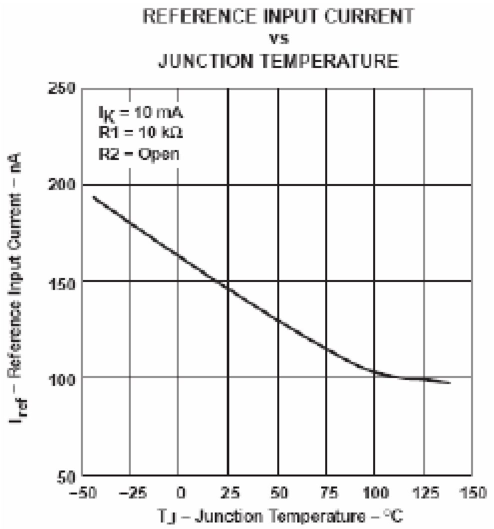


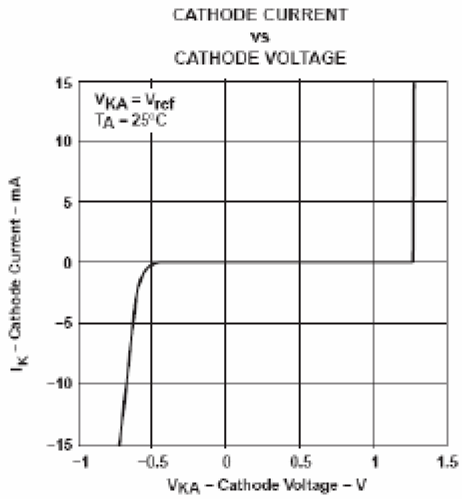
Figure 5. Flyback with isolation using ACE432N as voltage reference and error amplifier

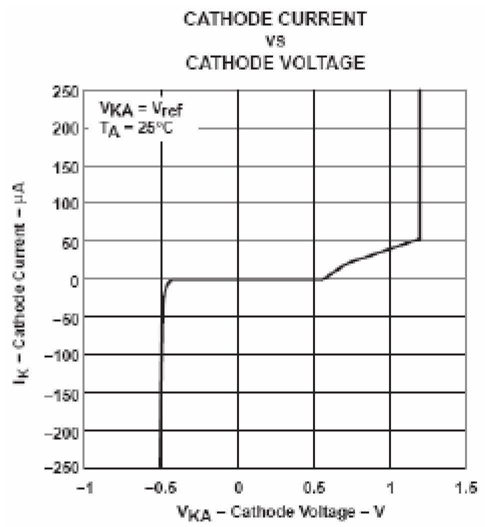
* To improve the stability of output voltage, Figure 4, a 0.1uF capacitor is recommended between cathode to anode.

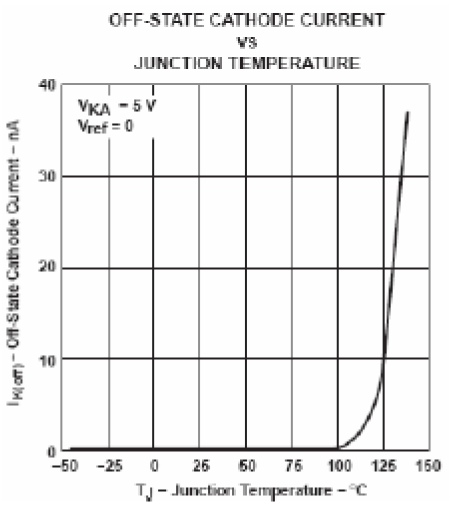
Performance characteristics

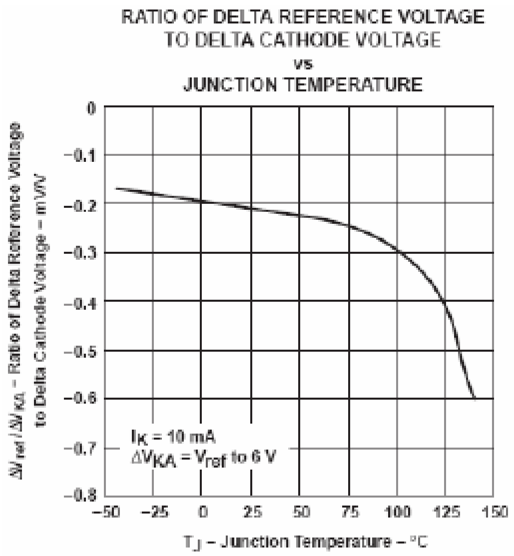




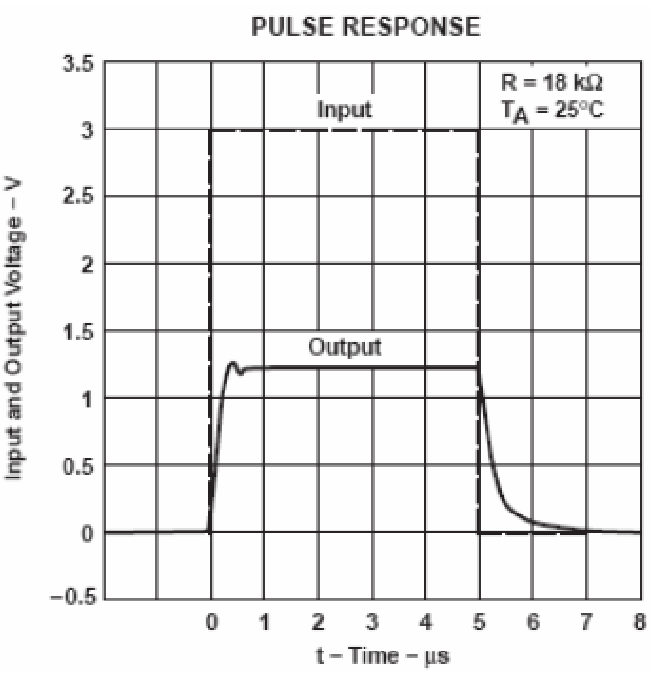


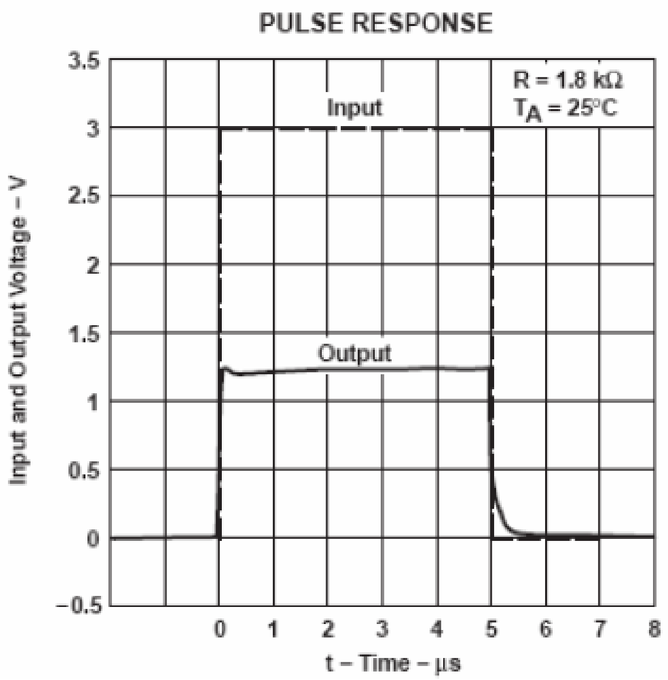


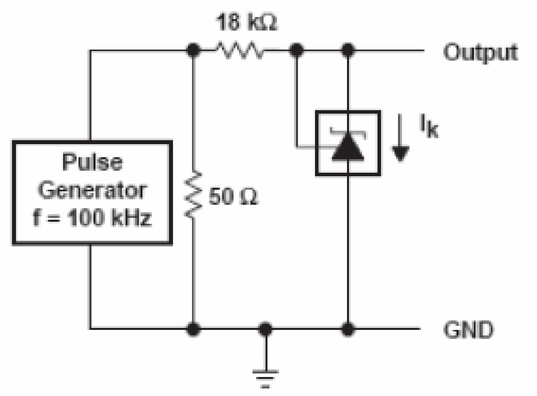




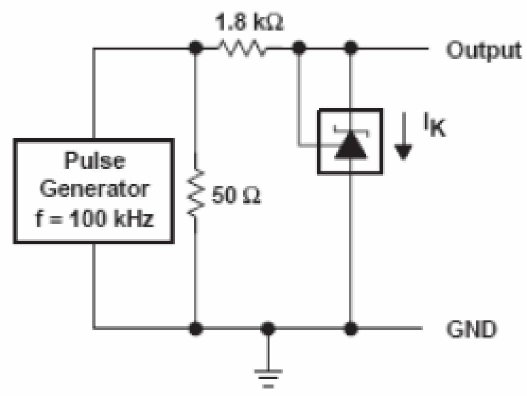
Performance Characteristics





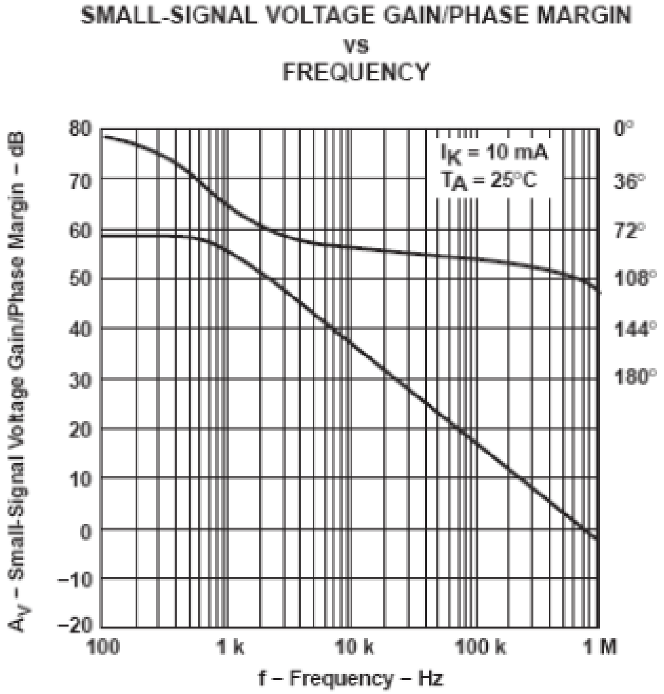


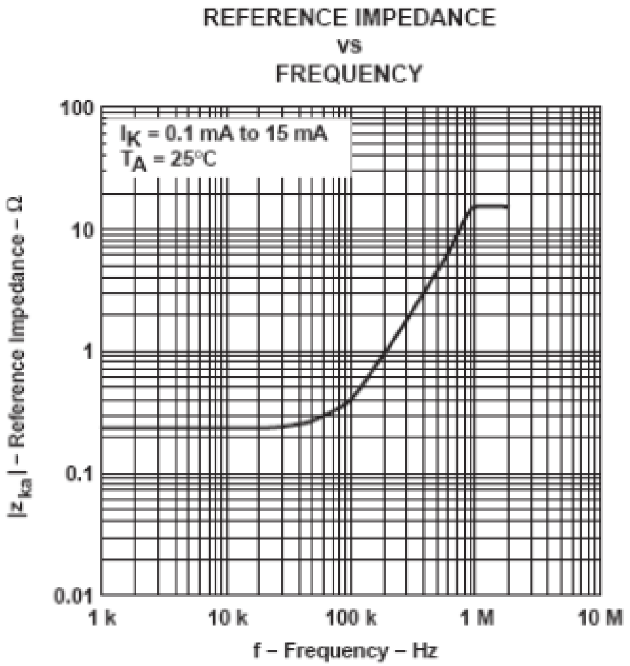
TEST CIRCUIT FOR PULSE RESPONSE

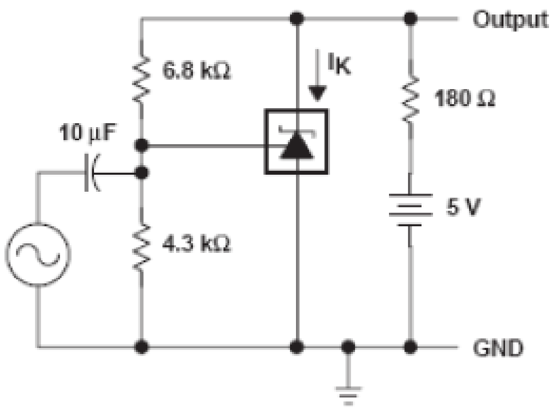


TEST CIRCUIT FOR PULSE RESPONSE

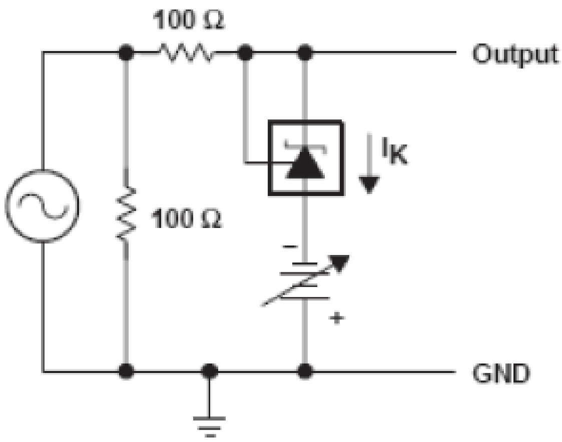
Performance Characteristics





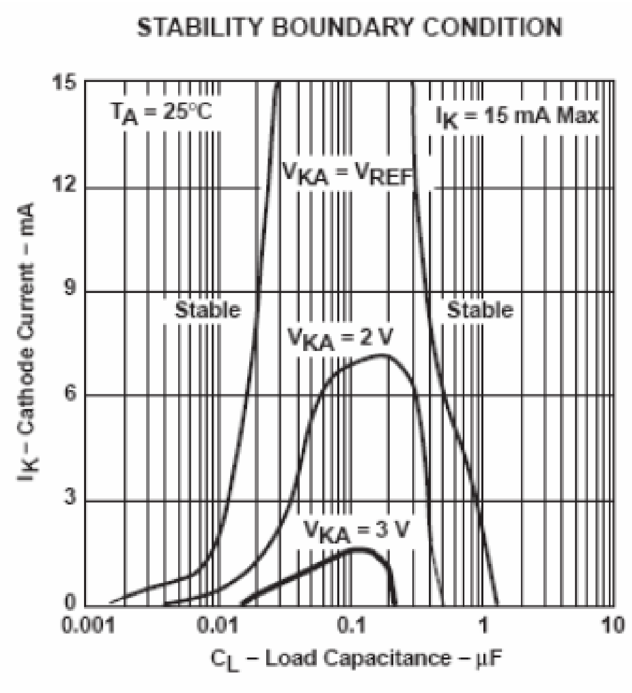


TEST CIRCUIT FOR VOLTAGE GAIN AND PHASE MARGIN

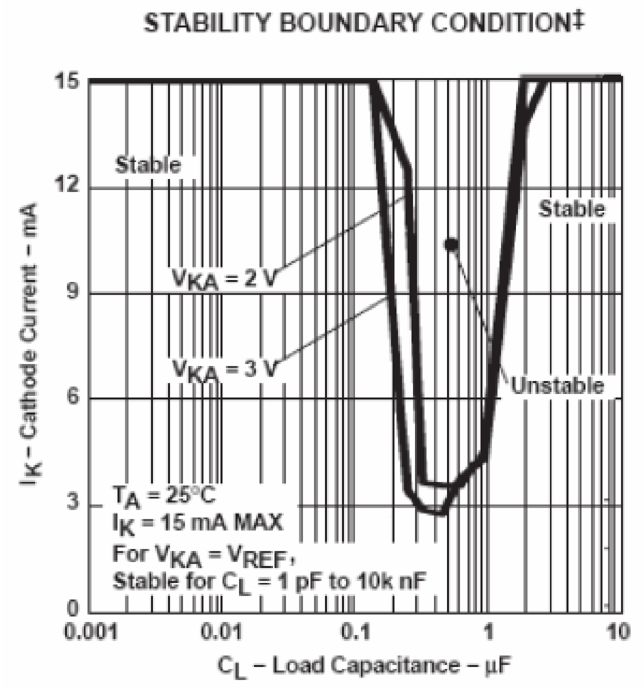


TEST CIRCUIT FOR REFERENCE IMPEDANCE

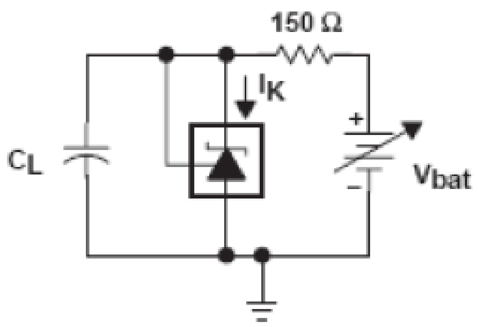
Performance Characteristics



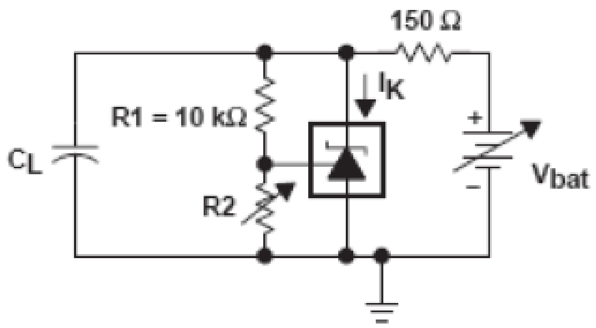
(For 1.0%)



(For 0.5%)



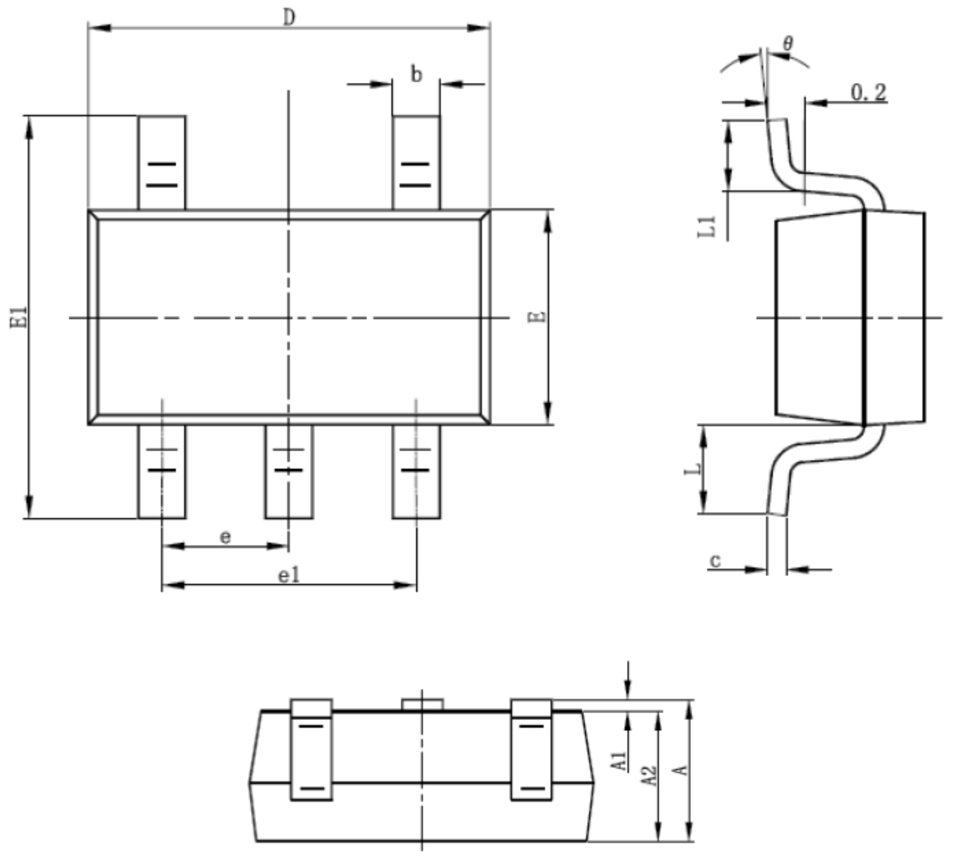
TEST CIRCUIT FOR $V_{KA} = V_{REF}$



TEST CIRCUIT FOR V_{KA} = 2 V, 3 V

Packing Information

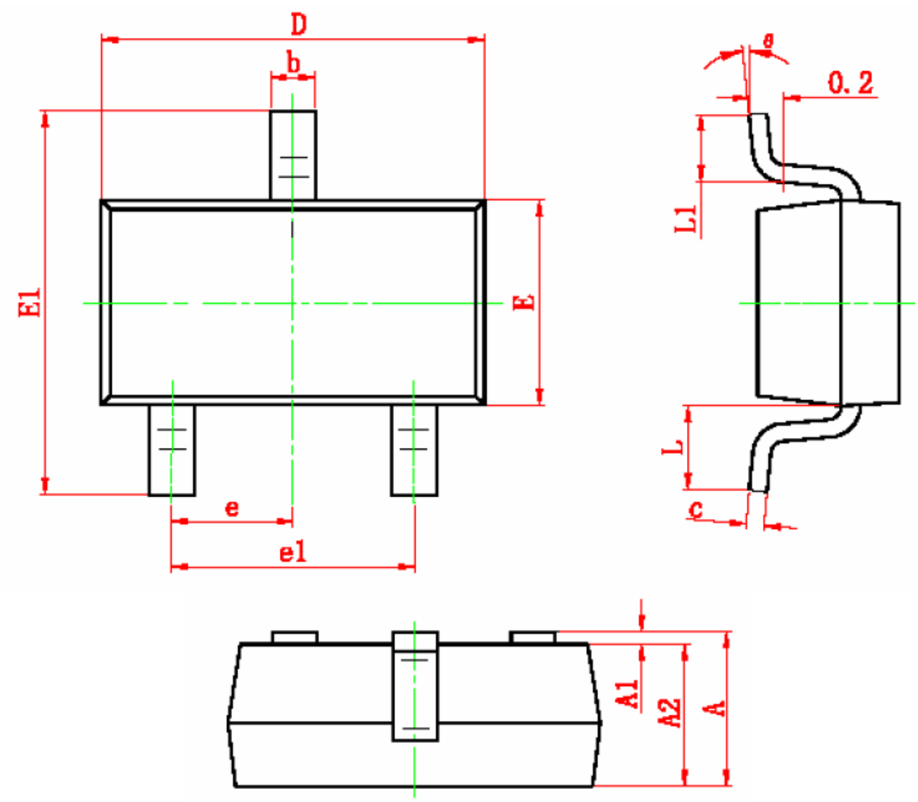
SOT-23-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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°

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 Electronics 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.

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