ACE432N

Low Voltage Adjustable Precision Shunt Regulators

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 SP432 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

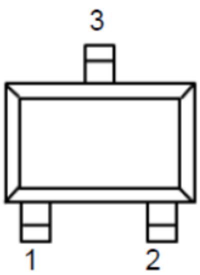
Absolute Maximum Ratings T_A=25℃ Unless otherwise specified

Parameter	Symbol		Value	Unit
Cathode Voltage	V_Z		20	V
Continuous Cathode Current	I_Z		100	mA
Reference Current	I_{REF}		3	mA
Power Dissipation ,TA=25℃	P_D		0.95	W
Operation Junction Temperature Range	T_J		-40 ~ 150	℃
Storage Temperature Range	T_{STG}		-65 ~ 150	℃
Lead Temperature Range (Soldering 10sec.)	T_{SOL}		260	℃
Thermal Resistance	θ_{JA}	SOT-23-3	206	℃/W
		SOT-23-5	206	
	θ_{JC}	SOT-23-3	88	
		SOT-23-5	88	

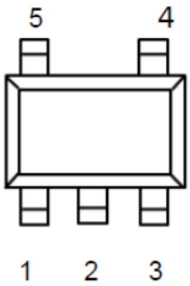
The IC has a protection circuit against static electricity. Do not apply high static electricity or high voltage that exceeds the performance of the protection circuit to the IC.

Packaging Type

SOT-23-3



SOT-23-5



Pin Description

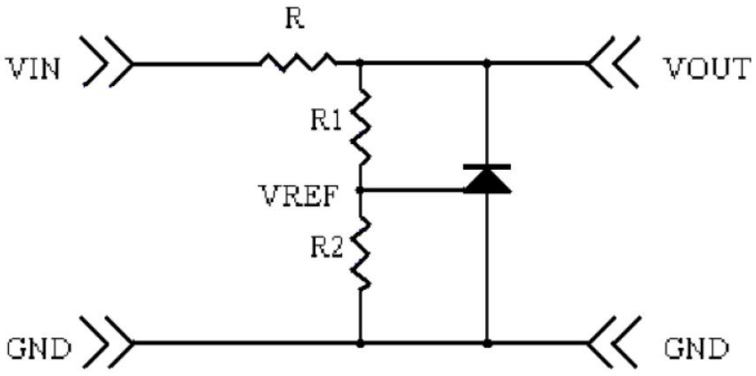
SOT-23-3	SOT-23-5	Symbol	Description
1	4	R	REF
2	3	C	CATHODE
3	5	A	ANODE
	1,2	NC	NC

Ordering information

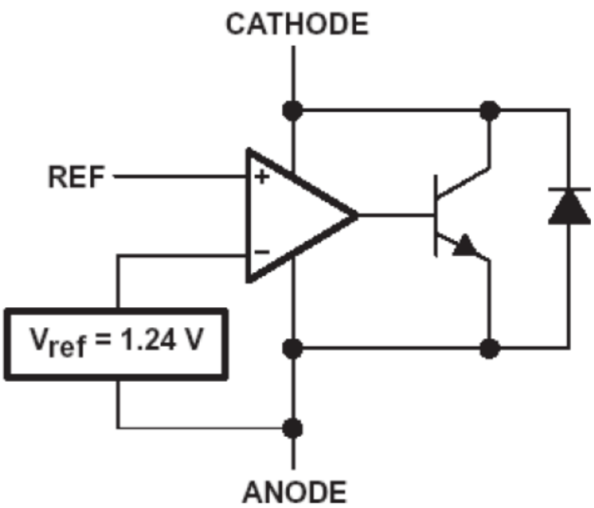
ACE432N X XX + H

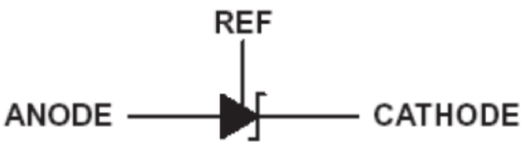
- Halogen - free
- Pb - free
- BM: SOT-23-3
  BN: SOT-23-5
- Reference Voltage accuracy:
  A: 0.5%
  B: 1%

Typical Application Circuit



Block Diagram





Electrical Characteristics T_A=25℃ , Unless otherwise specified

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

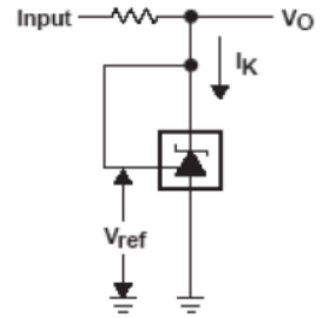


Figure 1. Test Circuit for $V_{KA}=V_{REF}$
$V_O=V_{KA}=V_{REF}$

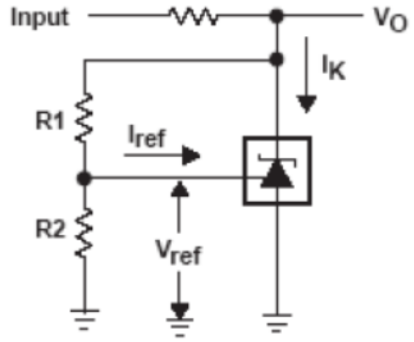


Figure 2. Test Circuit for $V_{KA}>V_{REF}$,
$V_O=V_{KA}=V_{REF}*1(1+R1/R2)+I_{REF}*R1$

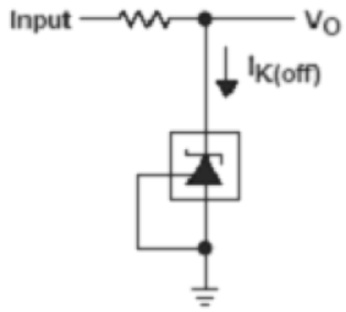


Figure 3. Test Circuit for $I_{K(OFF)}$

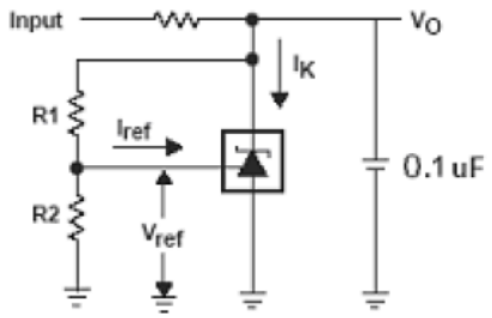


Figure 4. Test Circuit for $V_{KA}>V_{REF}$,
$V_O=V_{KA}=V_{REF}*1(1+R1/R2)+I_{REF}*R1$

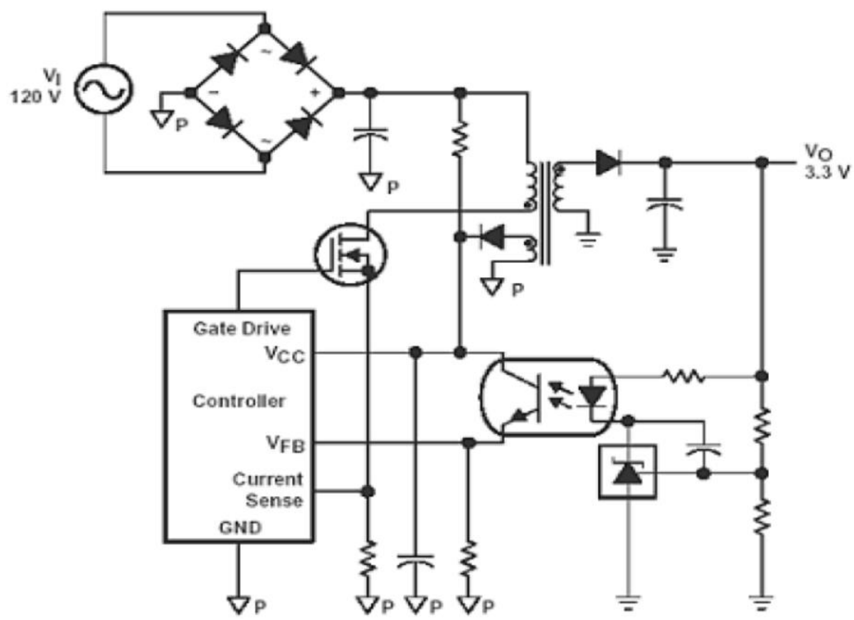
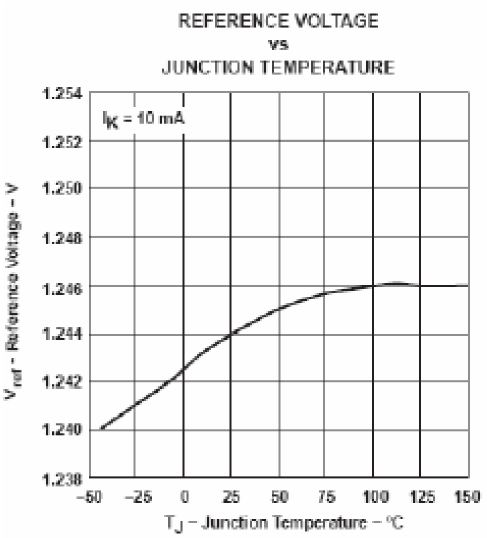
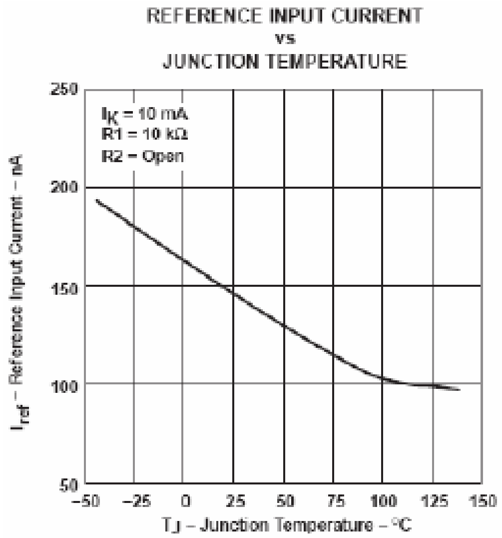


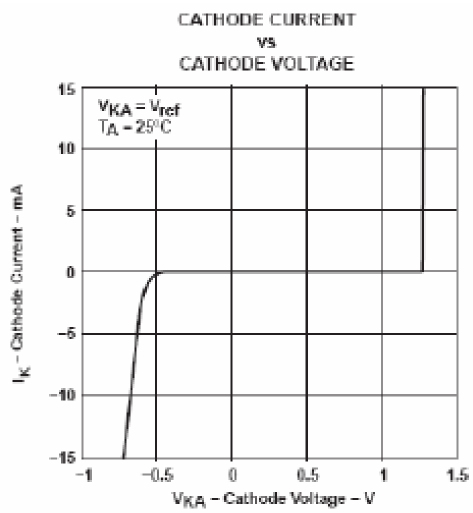
Figure 5. Flyback with isolation using ACE432N as voltage reference and error amplifier

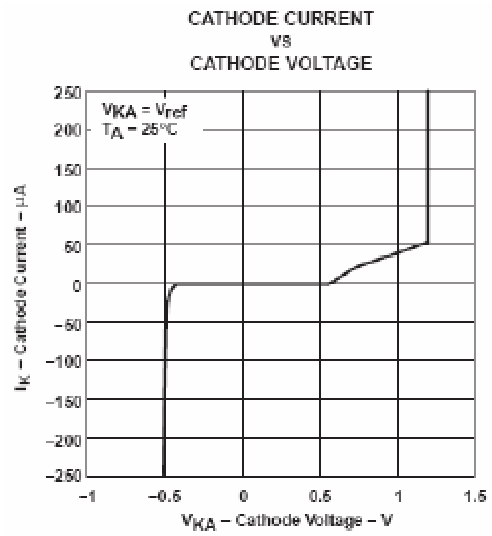
* To improve the stability of output voltage, Figure 4, a 0.1uF capacitor is recommended between cathode to anode.

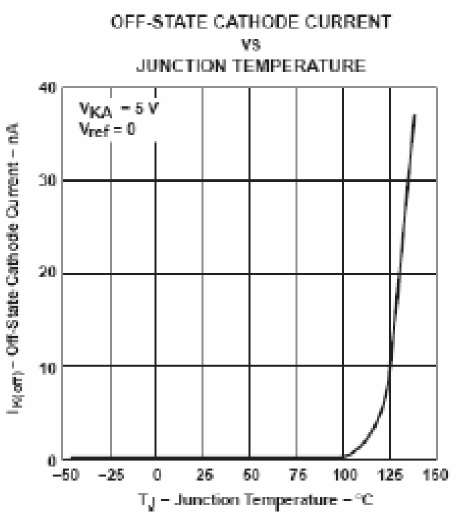
Performance characteristics

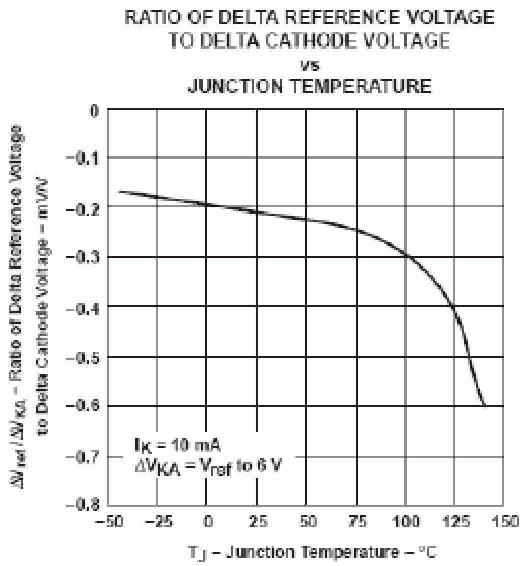


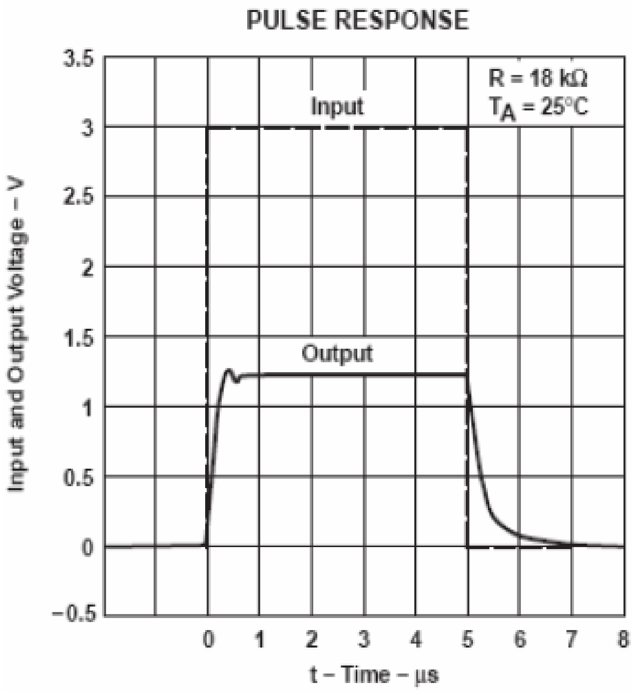


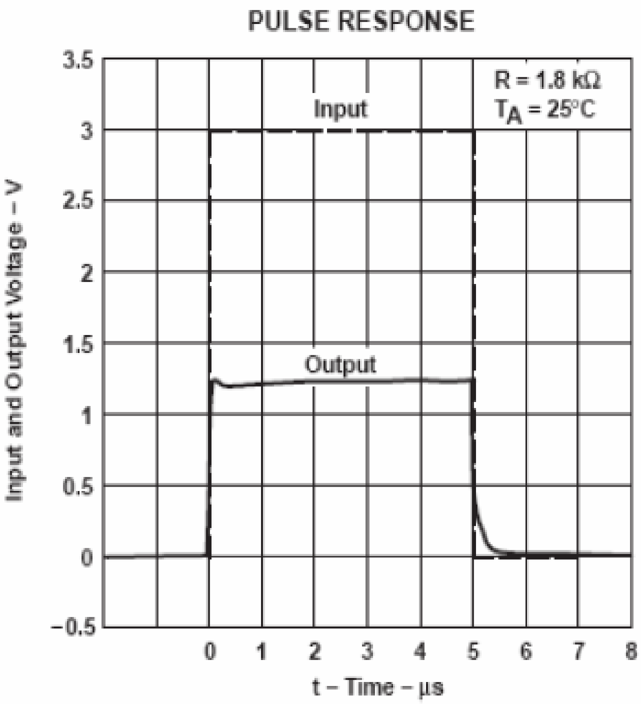


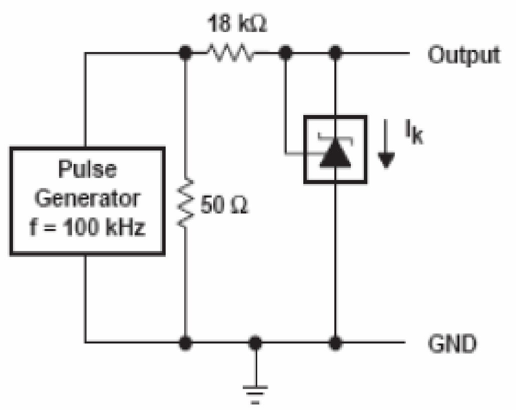




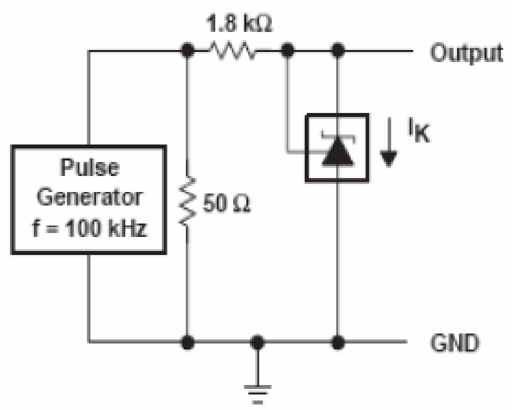






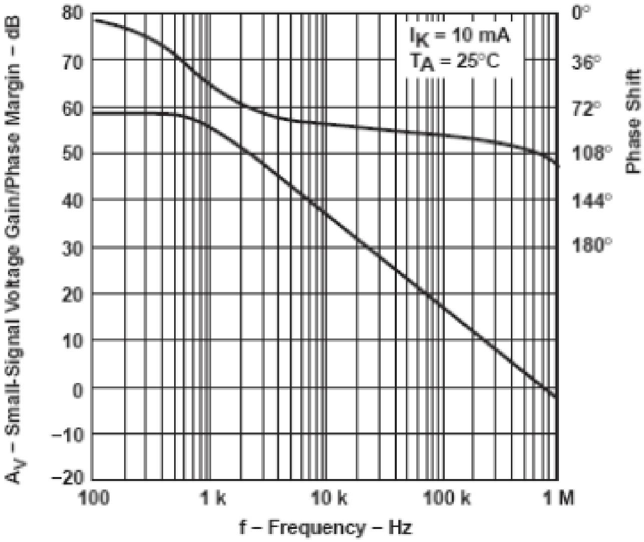


TEST CIRCUIT FOR PULSE RESPONSE

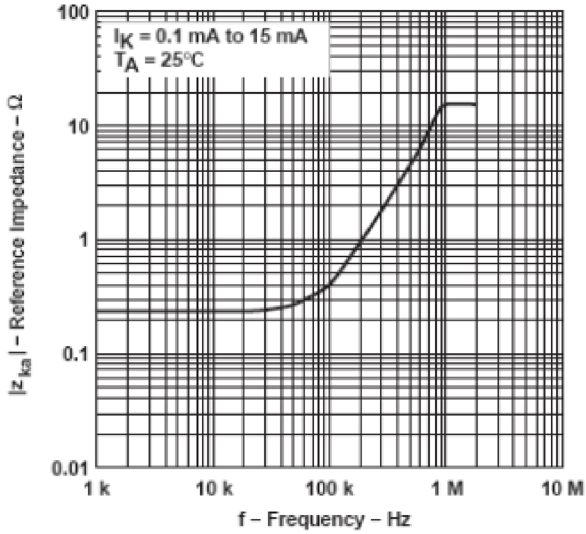


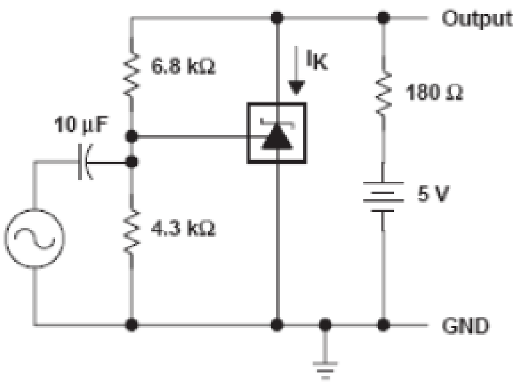
TEST CIRCUIT FOR PULSE RESPONSE

SMALL-SIGNAL VOLTAGE GAIN/PHASE MARGIN vs FREQUENCY

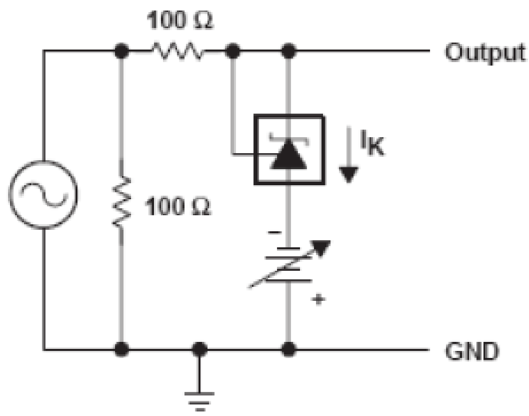


REFERENCE IMPEDANCE vs FREQUENCY

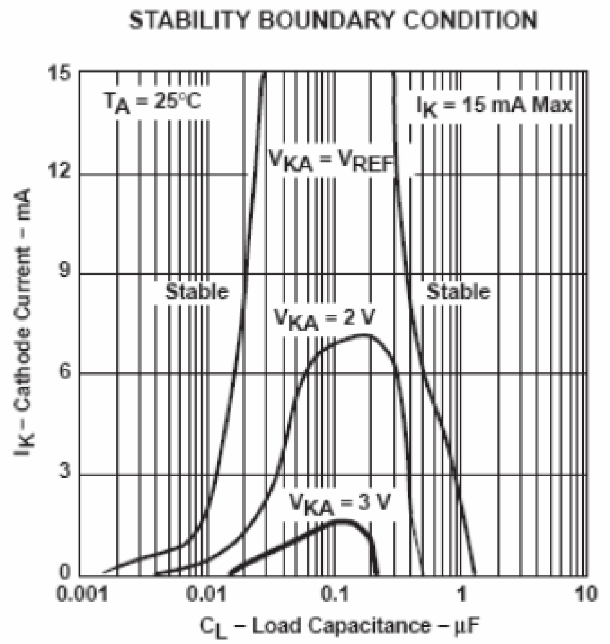




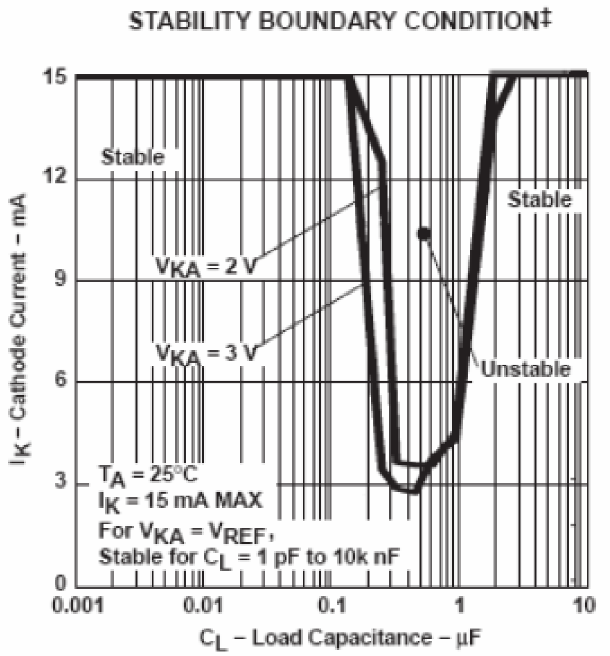
TEST CIRCUIT FOR VOLTAGE GAIN AND PHASE MARGIN



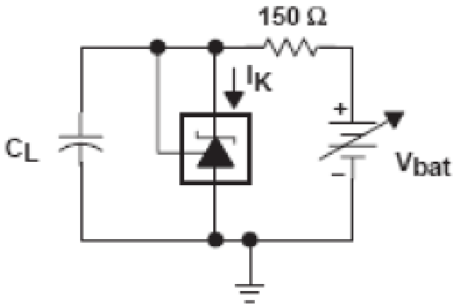
TEST CIRCUIT FOR REFERENCE IMPEDANCE



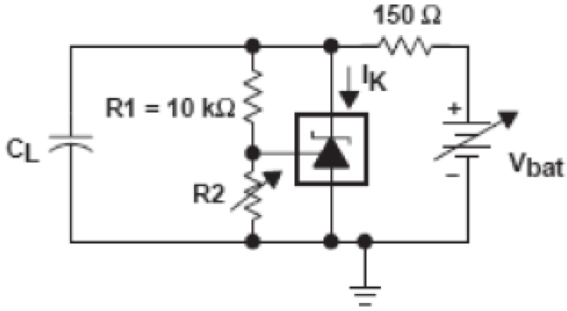
(For 1.0%)



(For 0.5%)



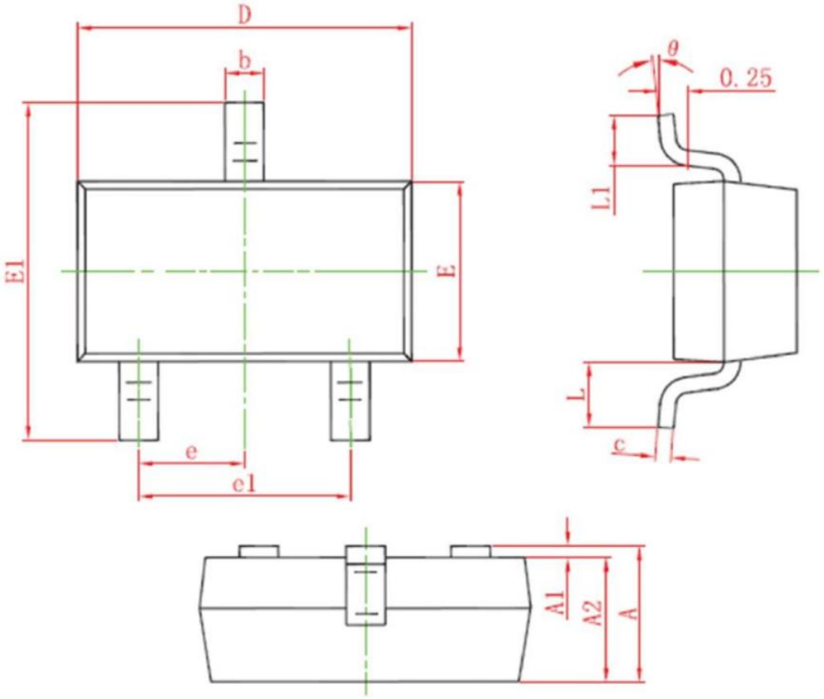
TEST CIRCUIT FOR $V_{KA} = V_{REF}$



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

Packing Information

SOT-23-3

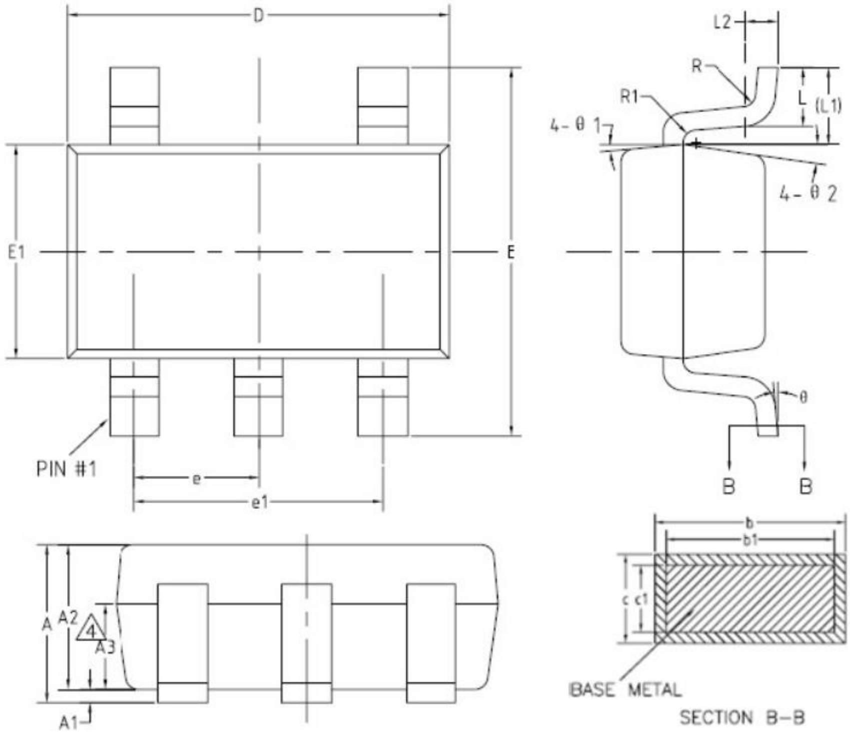


(mm)

SYMBOL	MIN	NOM	MAX
A	0.90	1.05	1.15
A1	0.00	--	0.10
A2	0.90	1.00	1.05
b	0.30	-	0.50
c	0.08	--	0.15
D	2.80	2.90	3.00
E	1.20	1.30	1.40
E1	2.25	2.40	2.55
e	0.95 TYP		
e1	1.80	1.90	2.00
L	0.55REF		
L1	0.20	0.35	0.50
θ	0°	--	8°

Packing Information

SOT-23-5



SYMBOL	MIN	NOM	MAX
A	1.05	--	1.30
A1	0.00	--	0.15
A2	0.90	1.10	1.30
A3	0.60	0.65	0.70
b	0.30	--	0.50
b1	0.35	--	0.45
c	0.10	--	0.20
c1	0.10	--	0.15
D	2.80	2.94	3.05
E	2.60	2.80	3.00
E1	1.50	1.62	1.75
e	0.85	0.95	1.05
e1	1.80	1.90	2.00
L	0.30	0.45	0.60
L1	0.59 REF		
L2	0.25BSC		
R	0.05	--	--
R1	0.05	--	0.25
θ	0°	--	8°
θ1	3°	5°	7°
θ2	6°	8°	12°

(mm)

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/