

Description

The ACE432 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 1.24V) to 8V with two external resistors.

The device has a typical output impedance of 0.30Ω. Active output circuitry provides a very sharp turn on characteristic, making this device excellent replacement for Zener diodes in many applications.

The ACE432 is characterized for operation from 0°C to 105°C, and two package options (SOT-23-3 and TO-92) allow the designer the opportunity to select the proper package for their applications.

Features

- Low voltage operation (1.24V)
- Adjustable output voltage $V_D = V_{REF}$ to 8V
- Wide operating current range 60μA to 100mA
- Low dynamic output impedance 0.30Ω (Typ.)
- Trimmed bandgap design up ±0.5%
- ESD rating is 2.5KV (Per MIL-STD-883D)

Application

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

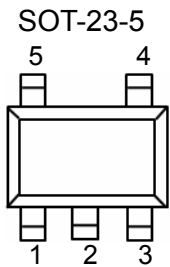
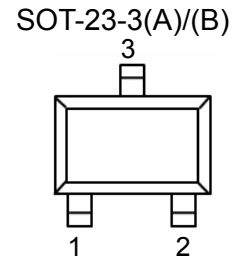
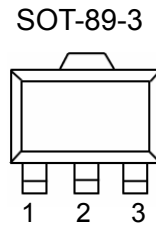
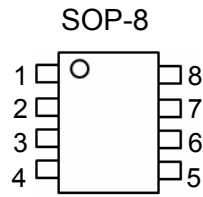
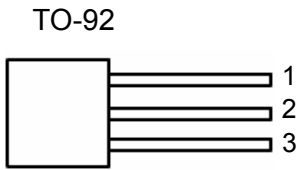
Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Cathode to Anode Voltage ^(Note 2)	V_{KA}	8	V
Continuous Cathode Current	I_{KA}	150	mA
Reference Input Current	I_{REF}	3	mA
Thermal resistance junction to ambient TO-92 SOP-8 SOT-89-3 SOT-23-3 SOT-23-5	θ_{JA}	220 150 120 230 230	°C/W
Operating junction temperature	T_J	150	°C
Storage temperature range	T_{STG}	- 45 to 150	°C
Lead temperature (soldering) 10sec	T_{LEAD}	260	°C

Note 1: Exceeding these rating could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

Note 2: Voltage values are with respect to the anode terminal unless otherwise noted.

Packaging Type

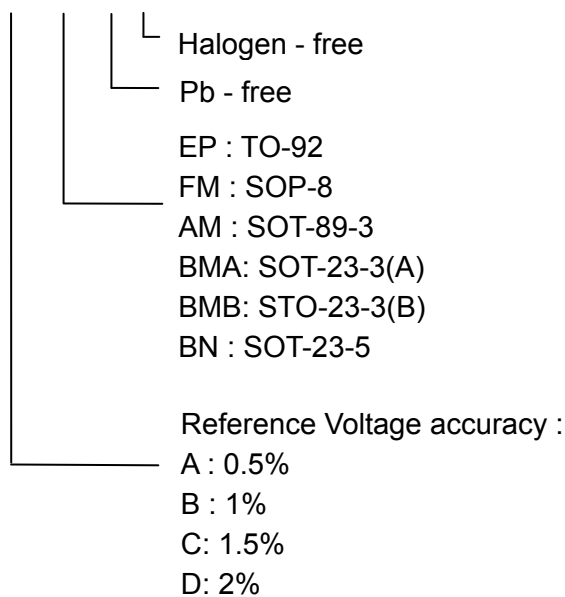


Pin	TO-92	SOP-8	SOT-89-3	SOT-23-3(A)	SOT-23-3(B)	SOT-23-5
Cathode	1	1	3	2	1	3
Anode	2	2.3.6.7	2	3	3	5
Ref	3	8	1	1	2	4
NC		4.5				1.2

Ordering information

Selection Guide

ACE432 XX XXX + H



Power Dissipation Table

Package	θ_{JA} ($^{\circ}\text{C}/\text{W}$)	Df(mW/ $^{\circ}\text{C}$) $T_A \geq 25^{\circ}\text{C}$	$T_A \leq 25^{\circ}\text{C}$ Power rating(mW)	$T_A = 50^{\circ}\text{C}$ Power rating(mW)	$T_A = 75^{\circ}\text{C}$ Power rating (mW)
EP	220	6.41	568	455	341
BM	230	3.50	543	435	326

Note:

1. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into Thermal shutdown.

2. T_J : Junction Temperature Calculation $T_J = T_A + (P_D \times \theta_{JA})$

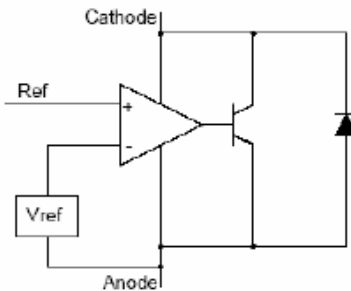
The θ_{JA} numbers are guidelines for the thermal performance of the device/PC-board system. All of the above assume no Ambient airflow.

3. θ_{JA} : Thermal Resistance-Junction to Ambient, Df: Derating factor, P_o : Power consumption

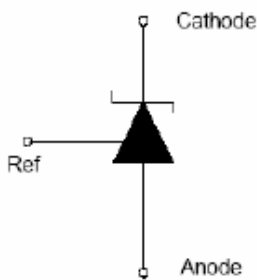
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	$V_{KA} = V_{REF}$, $I_{KA} = 10\text{mA}$ Test Circuit #1	1.234	1.240	1.246	V
			1.228	1.240	1.252	
			1.211	1.240	1.259	
			1.215	1.240	1.265	
Deviation of reference voltage over full temperature range	$V_{I(DEV)}$	$V_{KA} = V_{REF}$, $I_{KA} = 10\text{mA}$ $T_A = 0^{\circ}\text{C}$ to 105°C Test Circuit #1		10	25	mV
Ratio of change in reference voltage to the change in cathode voltage	$\Delta V_{REF}/\Delta V_{KA}$	$I_{KA} = 10\text{mA}$ $\Delta V_{KA} = 8\text{V}$ to V_{REF} Test Circuit #2		-1.0	-2.7	mV/V
Reference current	I_{REF}	$I_{KA} = 10\text{mA}$, $R1 = 10\text{K}\Omega$, $R2 = \infty$ Test Circuit #2		0.15	2	μA
Deviation of Reference current over full temperature range	$I_{I(DEV)}$	$I_{KA} = 10\text{mA}$, $T_A = 0^{\circ}\text{C}$ to 105°C $R1 = 10\text{K}\Omega$, $R2 = \infty$ Test Circuit #2		0.10	0.50	μA
Minimum cathode current for regulation	I_{MIN}	$V_{KA} = V_{REF}$ Test Circuit #1		60	100	μA
Off-state cathode current	I_{OFF}	$V_{KA} = 8\text{V}$, $V_{REF} = 0$ Test Circuit #3		0.04	0.8	μA
Dynamic impedance	$ Z_{KA} $	$I_{KA} = 100\mu\text{A} - 80\text{mA}$ $V_{KA} = V_{REF}$, $f \leq 1\text{KHz}$ Test Circuit #1		0.3	1.0	Ω

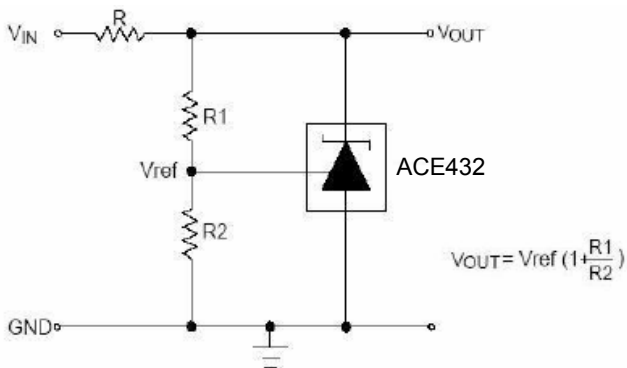
Block Diagram



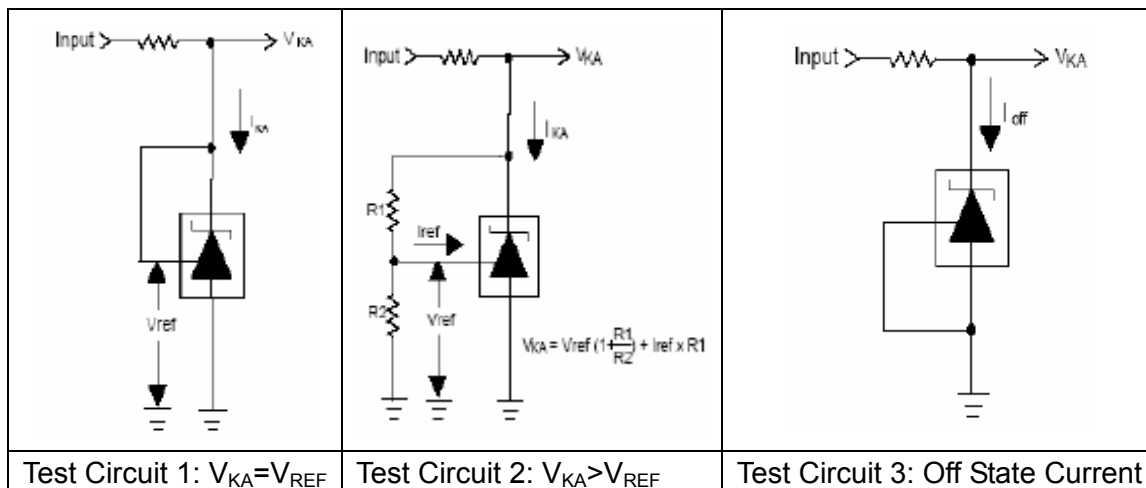
Symbol Diagram



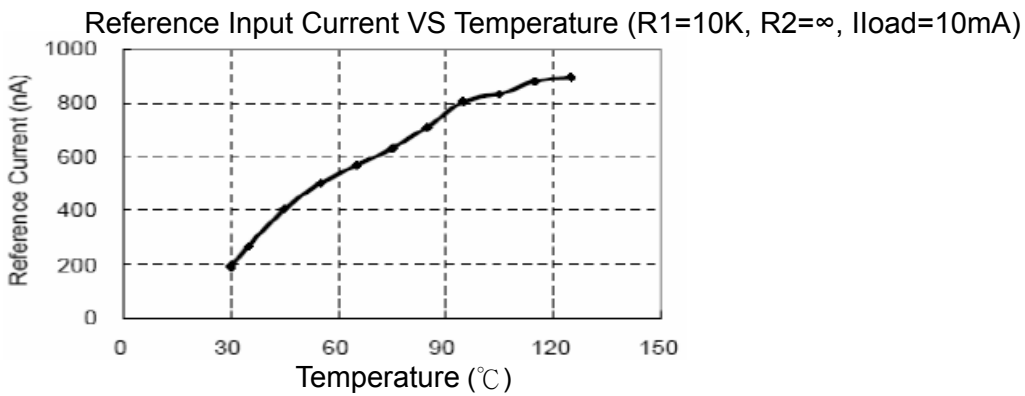
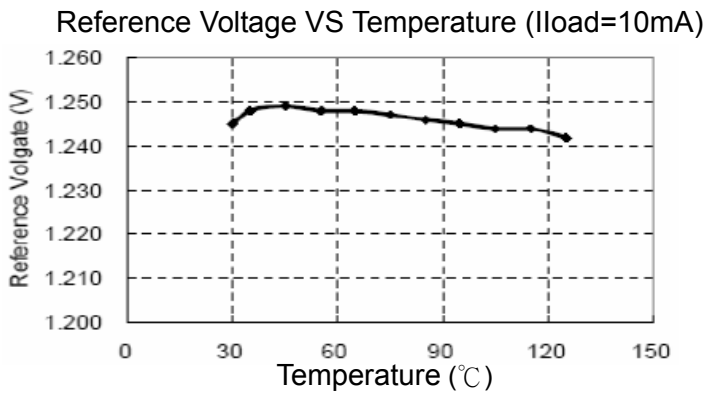
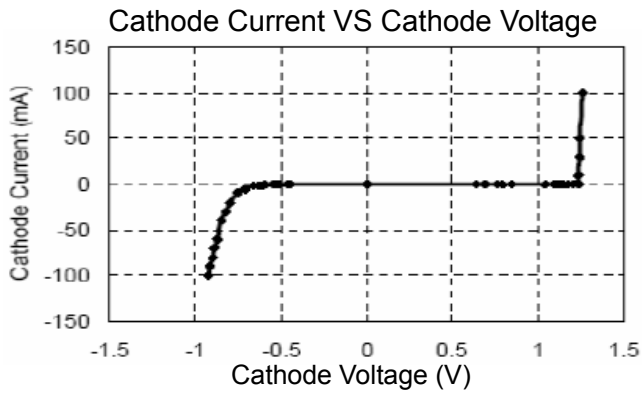
Typical Applications



Test Circuits

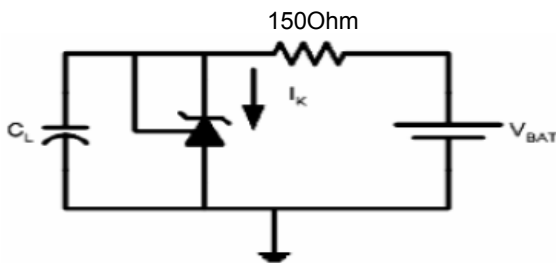
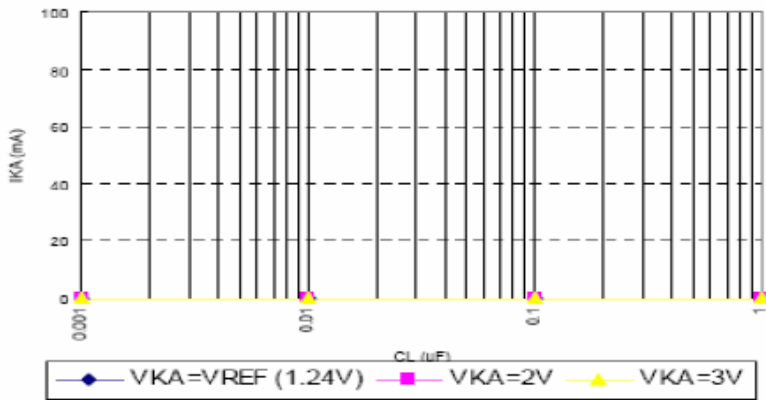


Typical Performance Characteristics

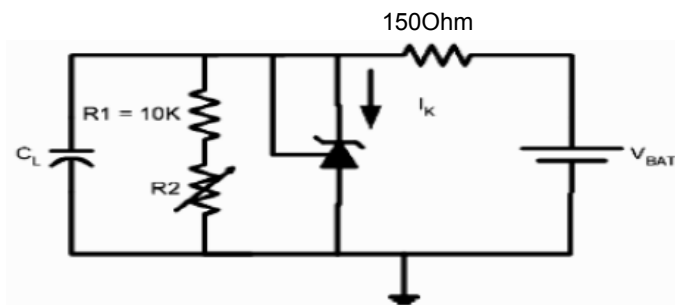


Typical Performance Characteristics

Stability Boundary Condition



Test Circuit for $V_{KA} = V_{REF}$

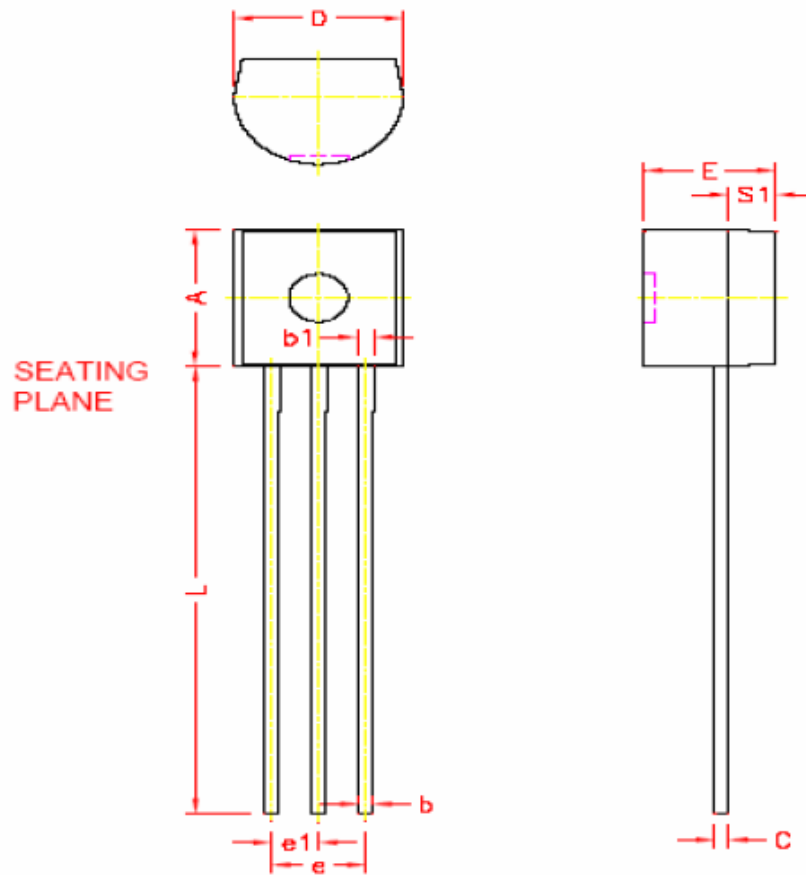


Test Circuit for $V_{KA} = 2\text{V}, 3\text{V}$

The areas under the curves represent conditions that may cause the device to oscillate. For $V_{KA} = 2\text{V}$ and 3V curves, R_2 and V_{BAT} were adjusted to establish the initial V_{KA} and 1K conditions with $C_L = 0$. V_{BAT} and C_L then were adjusted to determine the ranges of stability. As the graph suggested, ACE432 is unconditional stable with I_K from 0 to 100 mA and with C_L from 0.001 μF to 1 μF .

Packing Information

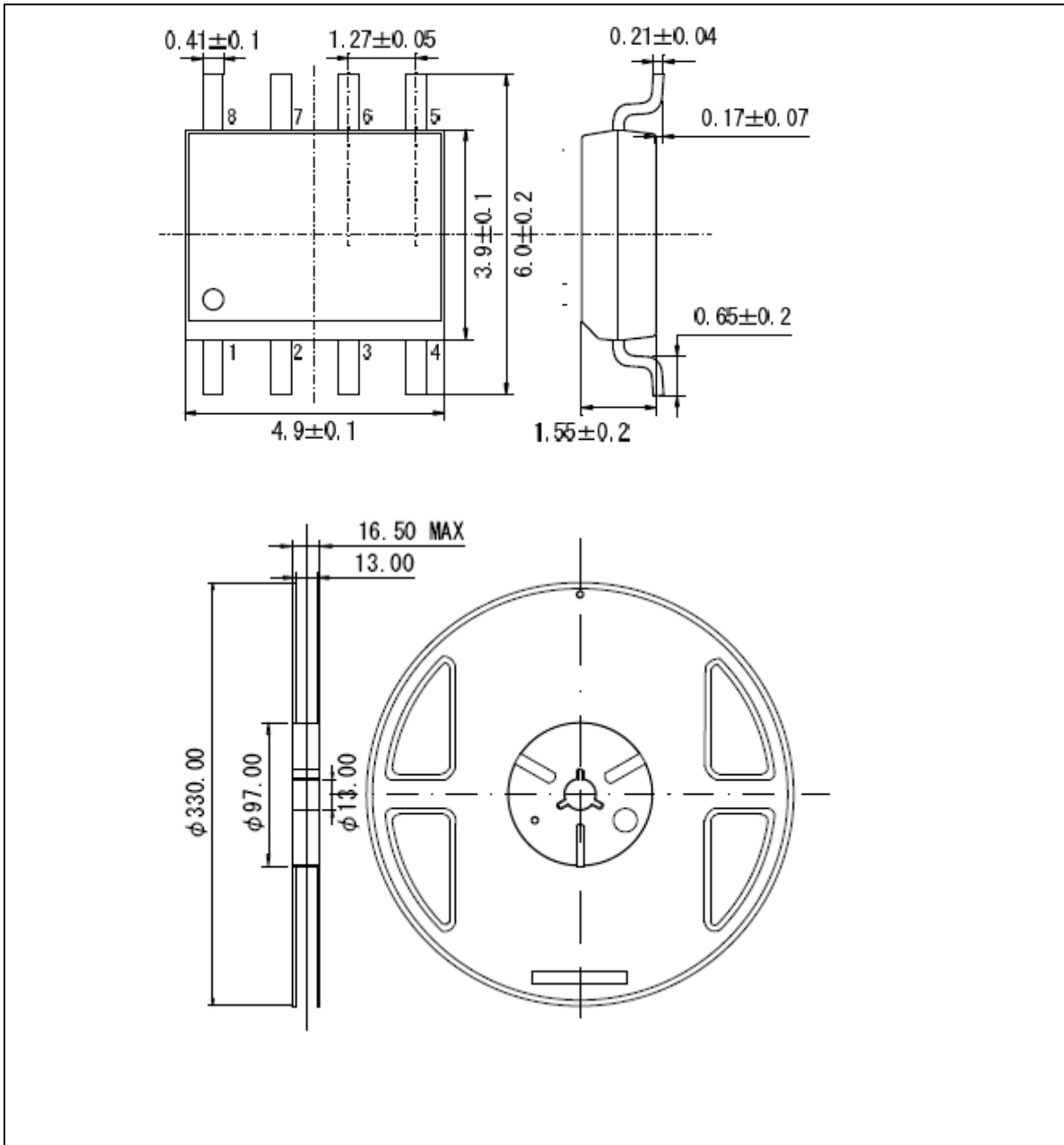
TO-92



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.45	4.70	D	4.44	4.7
S1	1.02	—	E	3.30	3.81
b	0.36	0.51	L	12.70	—
b1	0.36	0.76	e1	1.15	1.39
C	0.36	0.51	e	2.42	2.66

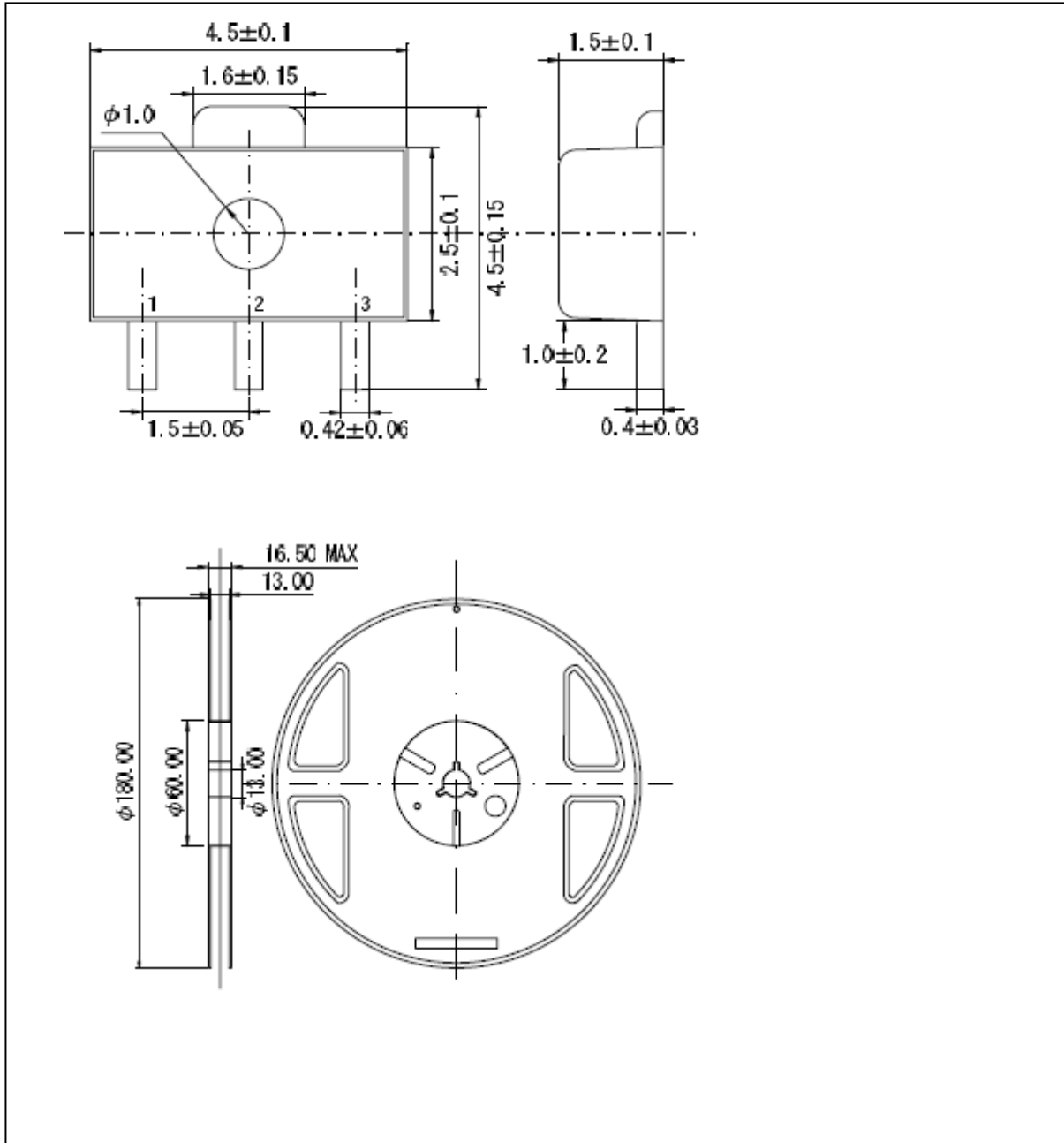
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SOP-8



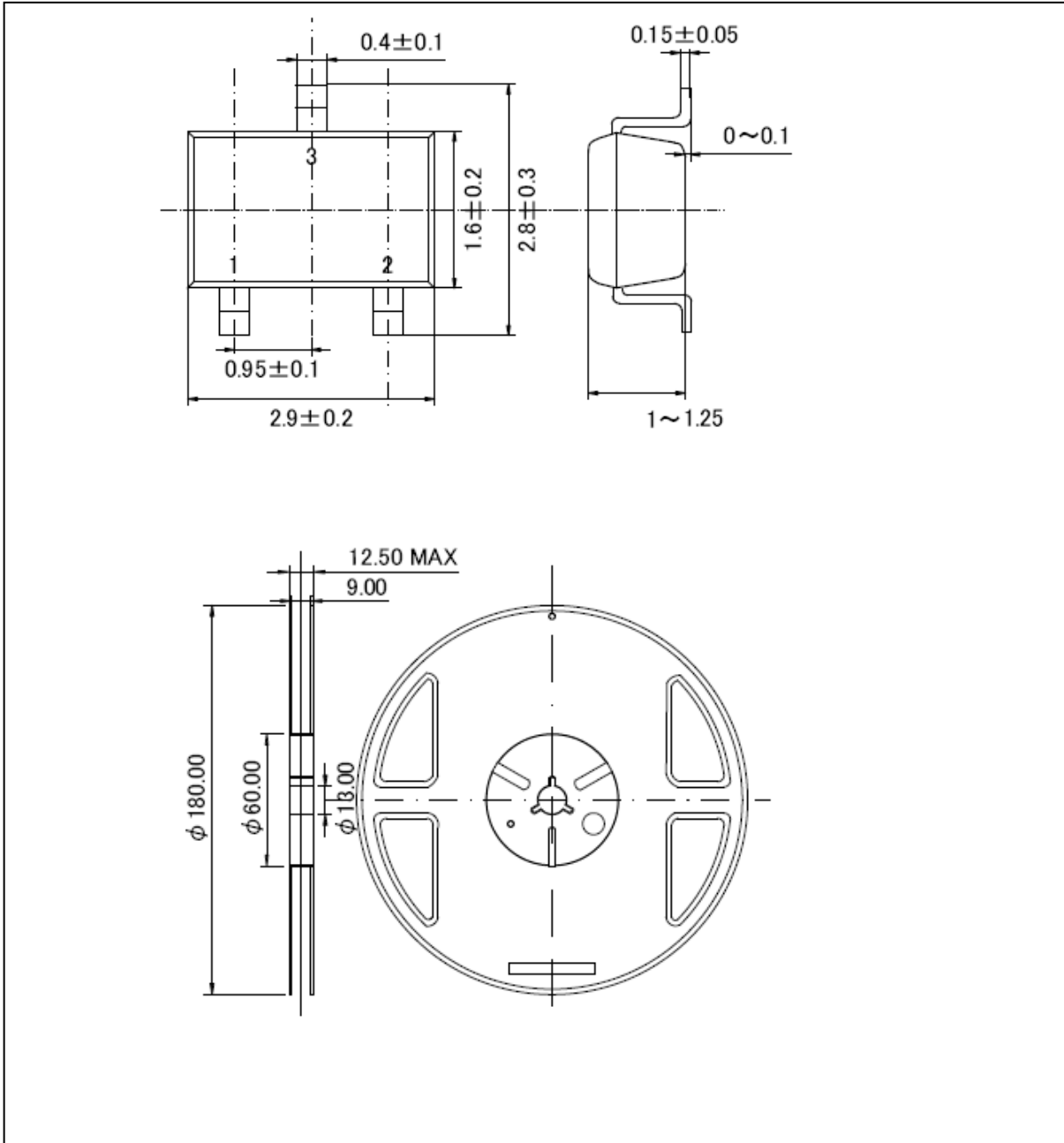
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SOT-89-3



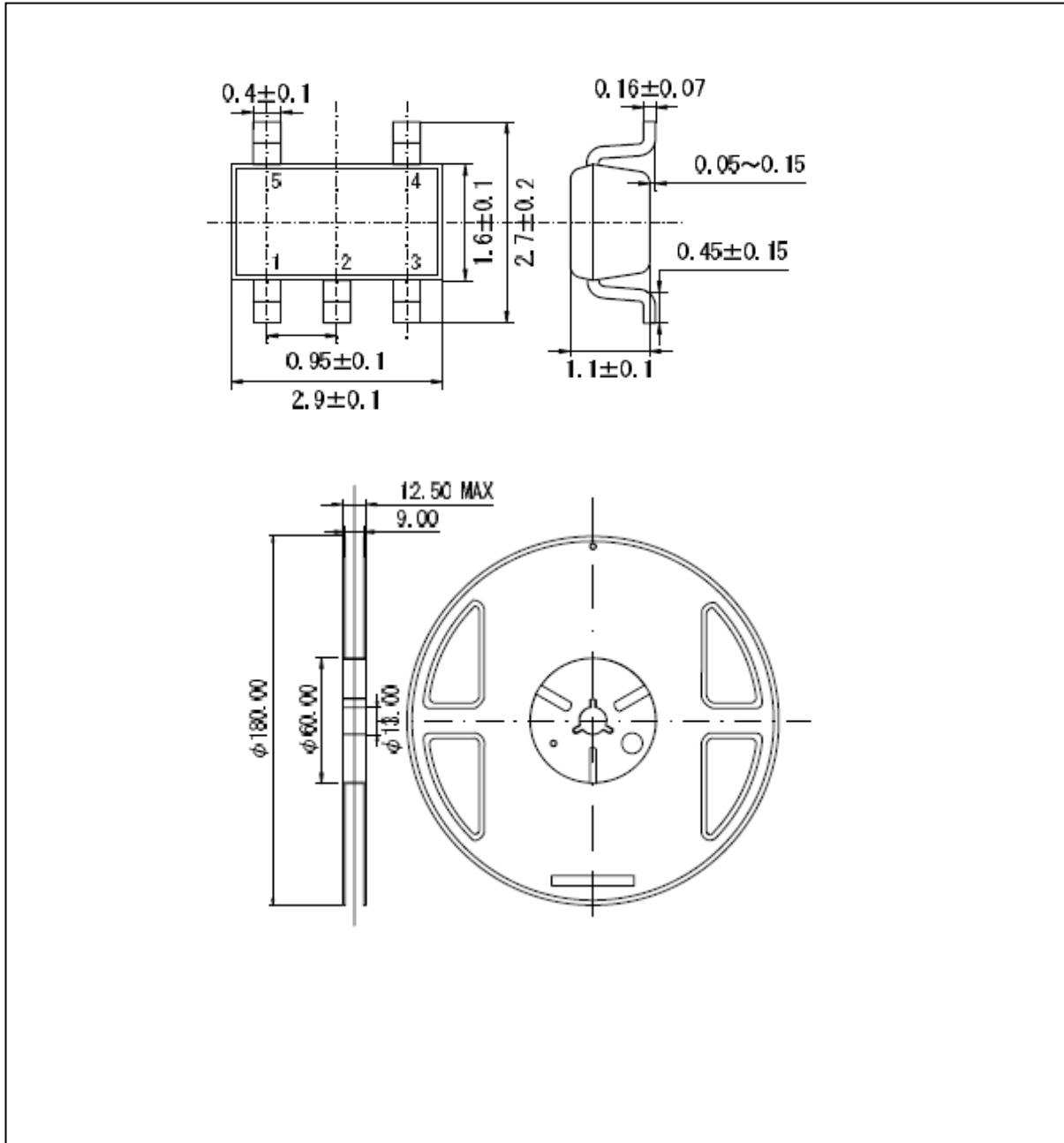
Packing Information

SOT-23-3



Packing Information

SOT-23-5



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 used 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 whose 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.