AHK432

PowerManager™

Adjustable Low Voltage Shunt Regulator

General Description

The AHK432 is a low voltage adjustable shunt reference with thermal stability guaranteed over the full industrial temperature range. This three-terminal regulator has an output voltage range that extends from V_{REF} (1.24V) to 20V, giving designers outstanding flexibility in the development of power supplies and instrumentation. With a low operating current of 60µA, the AHK432 is well suited for battery-powered portable electronic applications. It also has a sharp turn-on characteristic and a dynamic resistance of only 50mΩ, making it an excellent replacement for zener diodes in low tempco designs.

The AHK432 is available in the Pb-free, surface-mount 3- or 5-pin SOT23, as well as the through hole TO-92. Three voltage tolerance options are offered in each package: ±0.5%, ±1%, and ±2%.

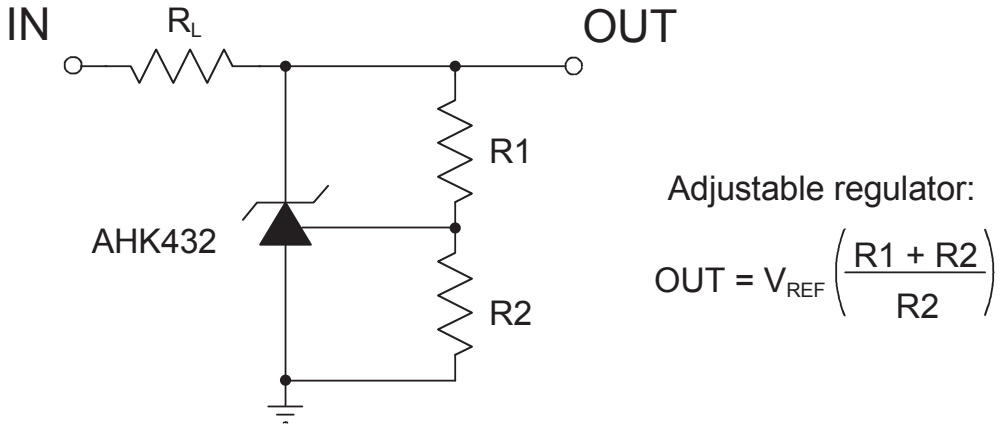
Features

- Wide Output Voltage Range (1.24V to 20V)
- Operating Current From 60µA to 100mA
- Low Dynamic Output Resistance of 50mΩ
- ±0.5% Trimmed Voltage Reference
- 10mV (Typical) V_{REF} Deviation, From -40°C to +105°C
- Surface Mount 3- or 5-Pin SOT23 or Through-Hole 3-Pin TO-92 Package

Applications

- Adjustable and Programmable Supplies
- Global Voltage Reference for Multiple Power Supplies
- Instrumentation
- Isolated Feedback in Switching Power Supplies
- Linear Regulators (External Reference)
- Medical Electronics (see Endnote, page 10)
- Notebook Computers

Typical Application

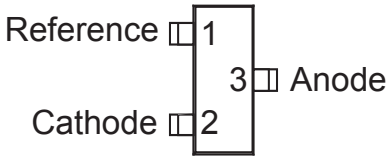


Pin Descriptions

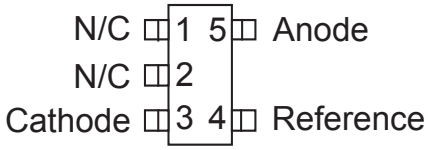
Pin			Description
SOT23-3	SOT23-5	TO-92	
1	4	1	Reference.
2	3	3	Cathode.
3	5	2	Anode.
N/A	1, 2	N/A	Not internally connected.

Pin Configuration

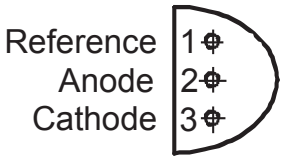
SOT23-3
(Top View)



SOT23-5
(Top View)



TO-92
(Top View)



Absolute Maximum Ratings[1]

T_A = 25°C, unless otherwise noted.

Symbol	Description	Value	Units
V_Z	Cathode Voltage	20	V
I_Z	Continuous Cathode Current	100	mA
I_{REF}	Reference Current	3	mA
T_J	Operating Junction Temperature Range	-40 to 150	°C
T_{LEAD}	Maximum Soldering Temperature (at Leads)	260	°C

Thermal Characteristics

Symbol	Description		Value	Units
Θ_{JA}	Maximum Thermal Resistance	TO-92	160	°C/W
		SOT23-3, SOT23-5	410	
P_D	Maximum Power Dissipation	TO-92	780	mW
		SOT23-3, SOT23-5	300	

1. Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. Functional operation at conditions other than the operating conditions specified is not implied. Only one Absolute Maximum Rating should be applied at any one time.

Electrical Characteristics

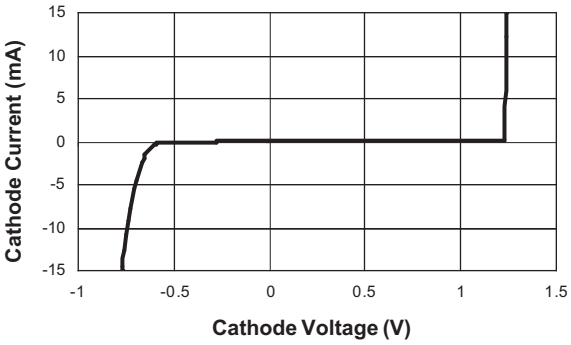
T_A = 25°C, unless otherwise noted.

Symbol	Description	Conditions		AHK432 0.5%			AHK432 1.0%			AHK432 2.0%			Units
				Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{REF}	Reference Voltage	$V_Z = V_{REF}$, I_Z = 10mA (test circuit 1)	T_A = 25°C	1.234	1.240	1.246	1.228	1.240	1.252	1.215	1.240	1.265	
			T_A = -40 to +105°C	1.222		1.258	1.215		1.265	1.200		1.280	
V_{DEV}	V_{REF} Temperature Deviation	T_A = -40°C to +105°C, V_Z = V_{REF}, I_Z = 10mA (test circuit 1)			10	25		10	25		10	25	mV
$\Delta V_{REF}/\Delta V_Z$	Ratio of Change in V_{REF} to Change in Cathode Voltage	I_Z = 10mA, ΔV_Z = 16V to V_{REF} (test circuit 2)			-1.0	-2.7		-1.0	-2.7		-1.0	-2.7	mV/V
I_{REF}	Reference Input Current	R1 = 10kΩ, R2 = ∞, I_Z = 10mA (test circuit 2)			0.15	0.5		0.15	0.5		0.15	0.5	µA
$I_{REF(DEV)}$	I_{REF} Temperature Deviation	T_A = -40°C to +105°C, R1 = 10kΩ, R2 = ∞, I_Z = 10mA (test circuit 2)			0.1	0.4		0.1	0.4		0.1	0.4	µA
$I_{Z(OFF)}$	Off State Cathode Current	V_{REF} = 0V (test circuit 3)	V_Z = 6V		0.04	0.1		0.04	0.1		0.04	0.1	µA
			V_Z = 16V		0.04	0.5		0.04	0.5		0.04	0.5	
R_Z	Dynamic Output Impedance	f <1kHz, V_Z = V_{REF}, I_Z = 100µA to 100mA (test circuit 1)			0.05	0.2		0.05	0.2		0.05	0.2	Ω
$I_{Z(MIN)}$	Minimum Operating Current	V_Z = V_{REF} (test circuit 1)			60	80		60	80		60	80	µA

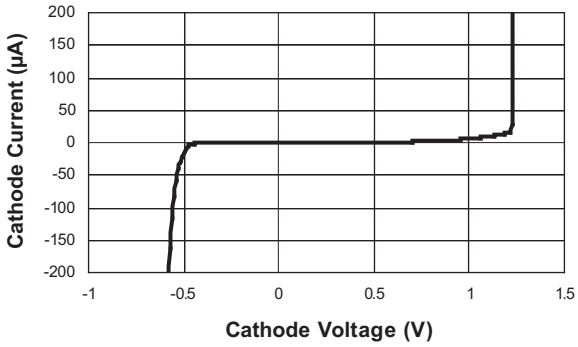
Typical Characteristics

Unless otherwise noted, T_A = 25°C, I_Z = 10mA.

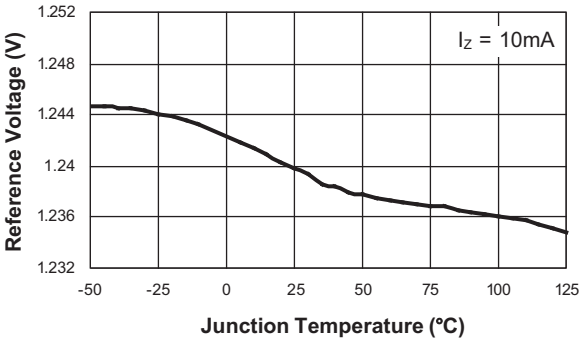
Cathode Current vs. Cathode Voltage



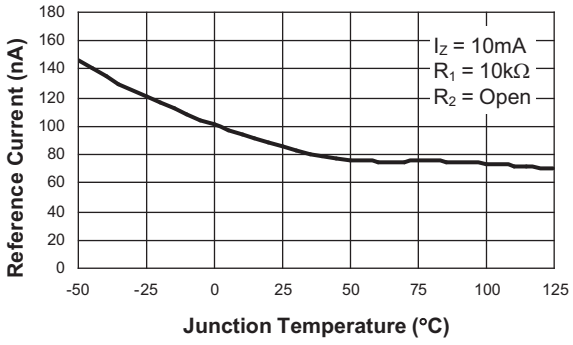
Cathode Current vs. Cathode Voltage



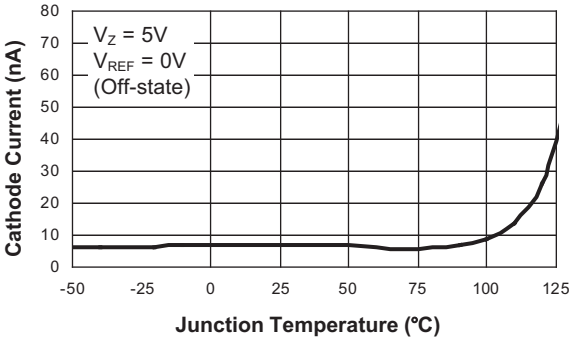
Reference Voltage vs. Temperature



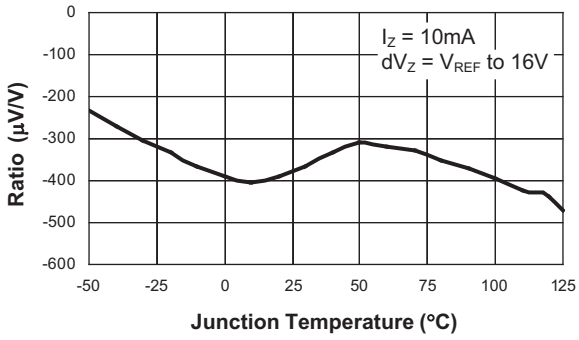
Reference Current vs. Temperature



Cathode Current vs. Temperature



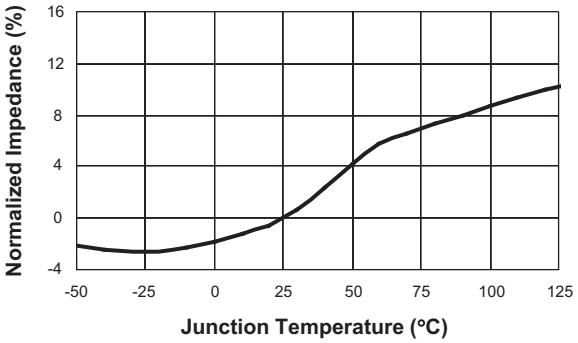
Ratio of ΔV_{REF} / ΔV_Z vs. Temperature



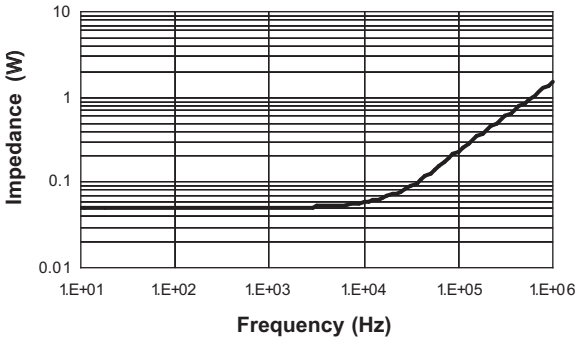
Typical Characteristics

Unless otherwise noted, T_A = 25°C, I_Z = 10mA.

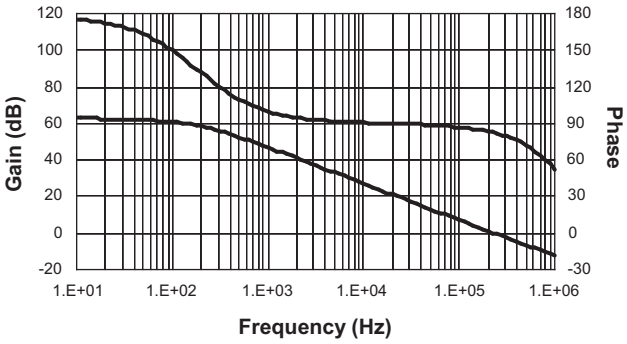
Cathode Impedance vs. Temperature

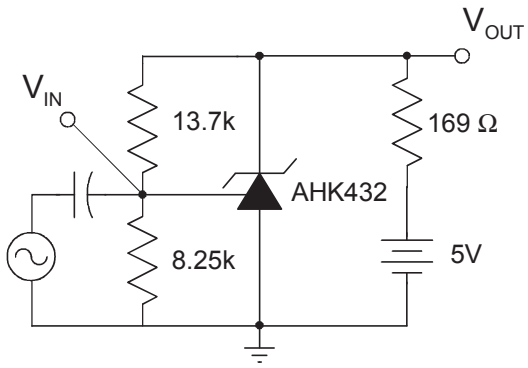


Impedance vs. Frequency



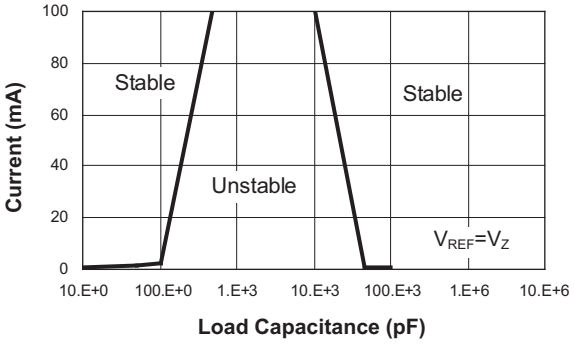
Gain and Phase vs. Frequency

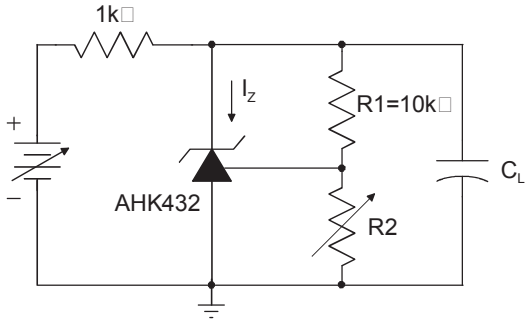




Test Circuit for Voltage Gain and Phase

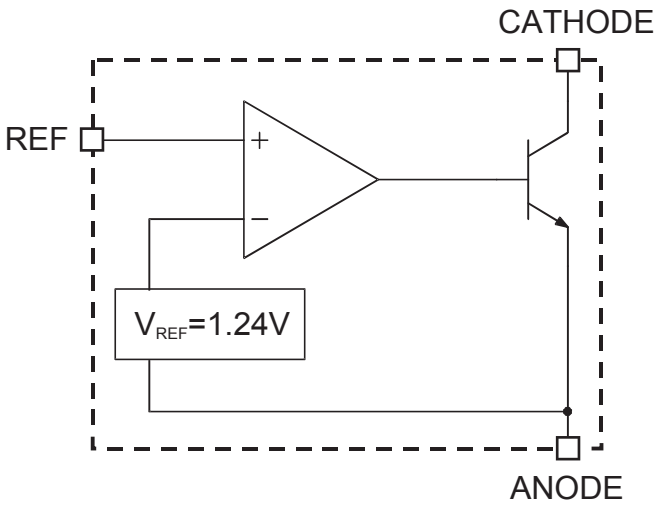
Stability Boundary



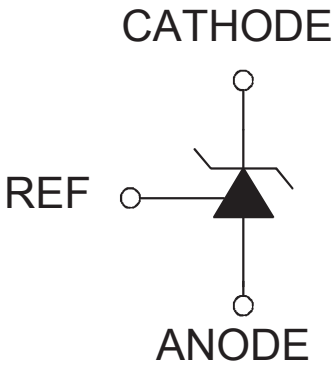


Test Circuit for Stability

Functional Block Diagram

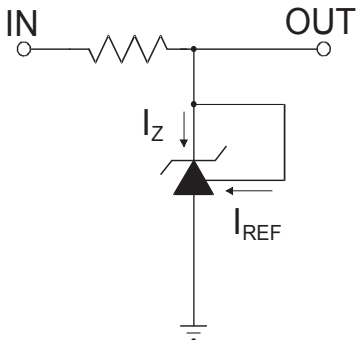


Symbol Diagram

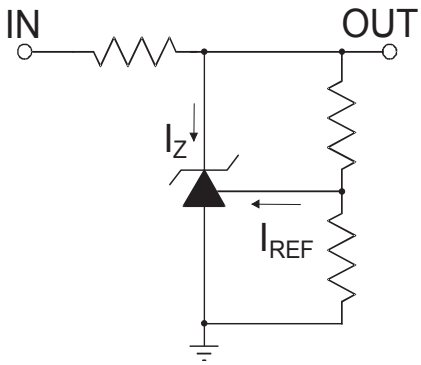


Test Circuits

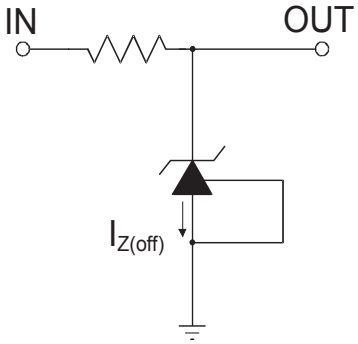
Test Circuit 1



Test Circuit 2



Test Circuit 3



Ordering Information1

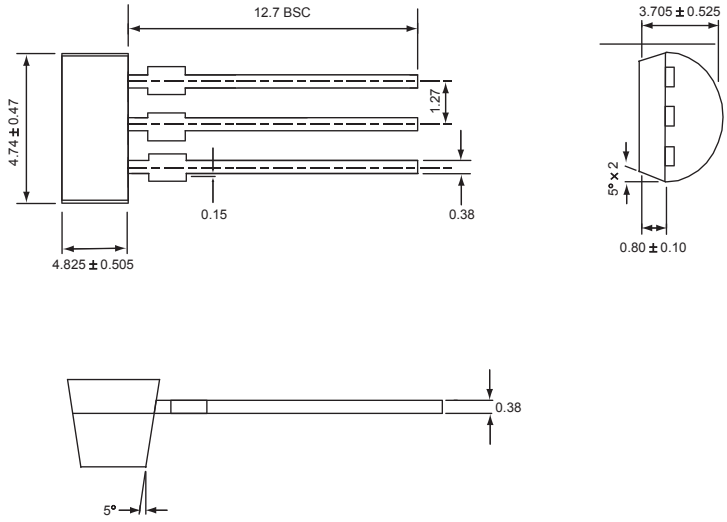
Package	Bulk or Tape and Reel	Tolerance		
		0.5%	1.0%	2.0%
SOT23-3	Bulk	N/A	N/A	N/A
SOT23-5		N/A	N/A	N/A
TO92		**AHK432ILY-.5-B1**	**AHK432ILY-1-B1**	**AHK432ILY-2-B1**
SOT23-3	Tape and Reel	**AHK432IGY-.5-T1**	**AHK432IGY-1-T1**	N/A
SOT23-5		**AHK432IGV-.5-T1**	**AHK432IGV-1-T1**	N/A
TO-92	Ammo	**AHK432ILY-.5-A1**	**AHK432ILY-1-A1**	N/A

Pb-free

All AnalogicTech products are offered in Pb-free packaging. The term "Pb-free" means semiconductor products that are in compliance with current RoHS standards, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. For more information, please visit our website at http://www.analogictech.com/aboutus/quality.php.

Package Information

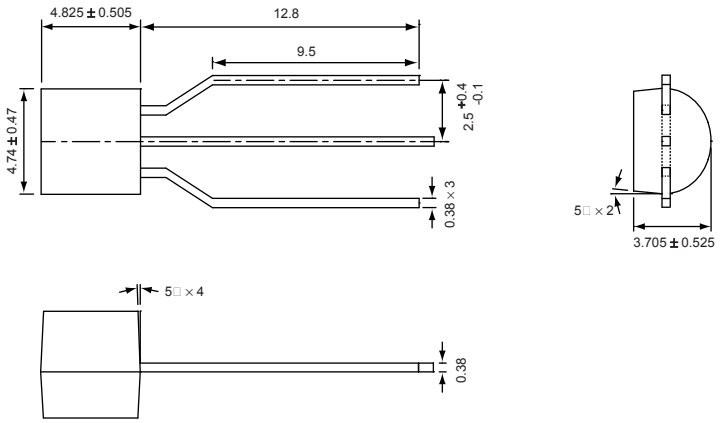
TO-92 (Bulk packing option)



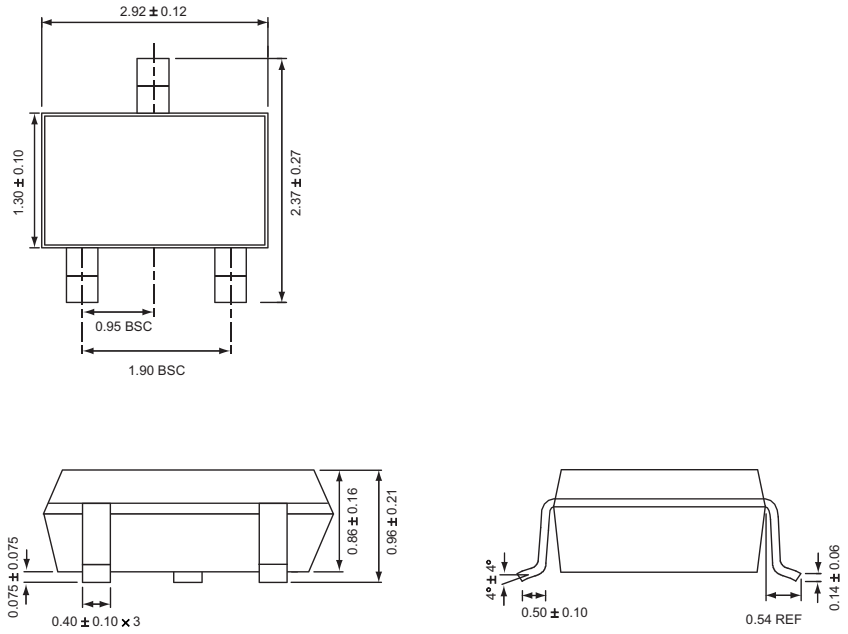
All dimensions in millimeters.

1. Sample stock is generally held on part numbers listed in **BOLD**.

TO-92 (Ammo packing option)

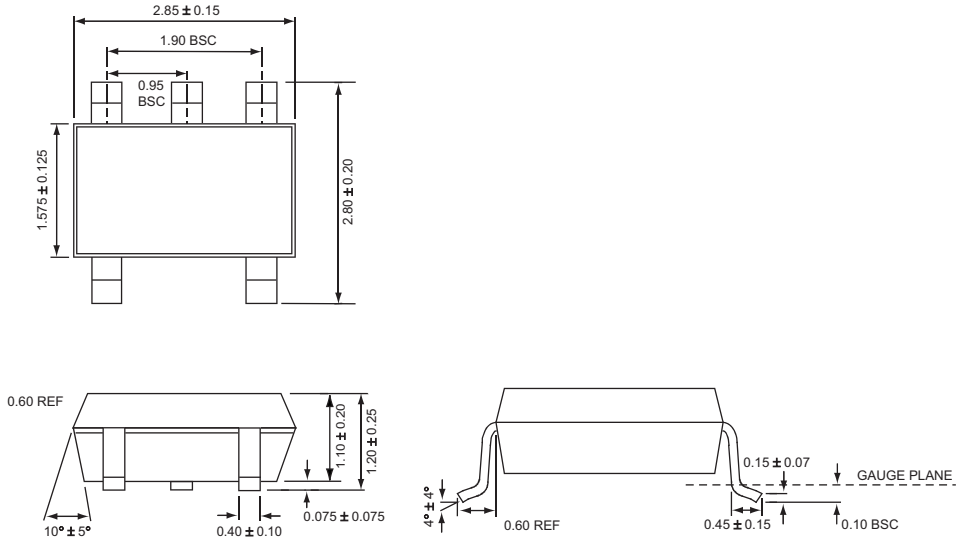


SOT23-3



All dimensions in millimeters.

SOT23-5



All dimensions in millimeters.

Endnote: Life Support Policy

AnalogicTech's PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF Advanced Analogic Technologies Inc. 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.

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