AT432

Low Voltage Adjustable Shunt Regulator

Immense Advance Tech.

FEATURES

- Low voltage operation (down to 1.24V)
- Wide operating current range 80μA to 100mA
- 0.2Ω Typical output impedance
- Voltage reference tolerance 1% for B series and 0.5% for A series
- Pin-to-Pin replacement for TLV431 and SC431L
- Available in SOT-23, SOT-25(SOT-23-5),SOT-89 and TO-92 packages

APPLICATION

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

DESCRIPTION

The AT432 is a three terminal adjustable shunt regulator with thermal stability guaranteed over temperature. The output voltage can be adjusted to any value from 1.24V (V_{REF}) to 18V with two external resistors. The AT432 has a typical dynamic output impedance of 0.2Ω. Active output circuitry provides a very sharp turn on characteristic, making the AT432 an excellent replacement for zener diodes. When combined with an optocoupler, the AT432 can be used as an error amplifier.

The AT432 shunt regulator is available with two voltage tolerances (0.5% and 1.0%) and three package options (SOT-23, SOT-89, SOT-25(SOT-23-5) and TO-92). This allows the designer the opportunity to select the optimum combination of cost and performance for their application.

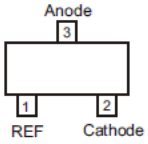
ORDER INFORMATION

AT 432A- KD R

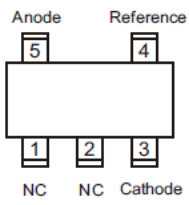
- AT: IAT
- 432: Circuit Type
- A: Voltage Tolerance
  - A: 0.5%
  - B: 1.0%
- KD: Package
  - KD: SOT-23
  - KE: SOT-25(SOT-23-5)
  - KG: SOT-89
  - TD: TO-92
- R: Shipping
  - R: Tape & Reel
  - T: Tube

PIN CONFIGURATIONS (TOP VIEW)

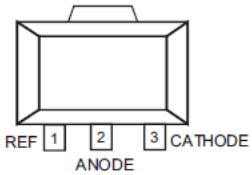
SOT-23



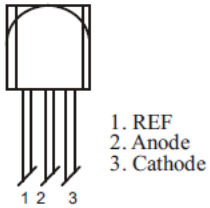
SOT-25(SOT-23-5)



SOT - 89



TO- 92



ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Max Value	Unit
Cathode Voltage (Note 1)		V_{KA}	18	V
Continuous cathode current		I_K	100	mA
Reference input current range		I_{ref}	3	mA
Power Dissipation	SOT-23	P_D	0.23	W
	SOT-25(SOT-23-5)		0.39	
	SOT-89		1.10	
	TO-92		0.71	
Operating Temperature Range		T_J	-40 to 150	℃
Lead temperature (soldering) 10 seconds		T_{LEAD}	260	℃

These are stress ratings only. Functional operation of the device at these or any conditions beyond the "recommended operating conditions" is not implied. Exposure to absolute maximum rated conditions may affect device reliability.

Note 1: Voltage values are with respect to the anode except as noted.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Mix Mum	Max Mum	Unit
Cathode Voltage	V_{KA}	V_{ref}	16	V
Cathode Current	I_K	80μA	100	mA

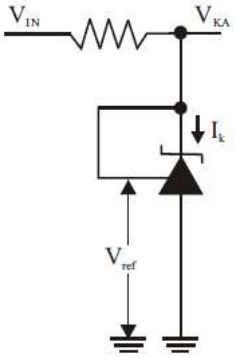
ELECTRICAL CHARACTERISTICS

Electrical characteristic at 25℃ free-air temperat ure(unless otherwise noted)

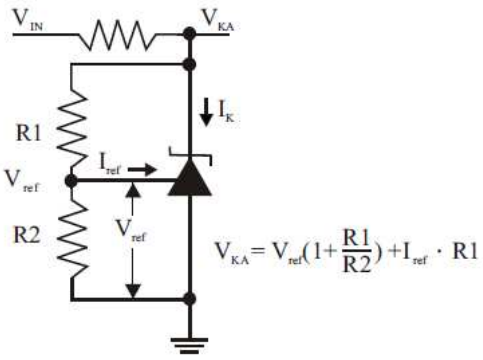
Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit	Test Circuit
Reference Input Voltage	V_{ref}	0.5%1.0%	$V_{KA}=V_{ref}, I_K=10mA$	1.234 1.228	1.240	1.246 1.252	V	1
V_{ref} temp deviation	V_{dev}	$V_{KA}=V_{ref}, I_K=10mA$ T_A=full range(Note 2)		—	10	25	mV	1
Ratio of change in V_{ref} to change in V_{KA}	$\frac{\triangle V_{ref}}{\triangle V_{KA}}$	$I_K=10mA, \triangle V_{KA}=18V$ to V_{ref}		-2.7	-1.0	—	mV/V	2
Reference input current	I_{ref}	$I_K=10mA, R1=10K\Omega, R2=\infty$		—	0.25	0.5	μA	2
Deviation of reference input current over full temperature range	$I_{ref(dev)}$	$I_K=10mA, R1=10K\Omega, R2=\infty$ T_A=full range(Note 2)		—	0.05	0.3	μA	2
Minimum operating current	$I_{K(min)}$	$V_{KA}=V_{ref}$		—	60	80	μA	1
Off-state cathode current	$I_{K(off)}$	V_{KA}=18 V,V_{ref}=0V		—	0.04	0.5	μA	3
Dynamic impedance	$\lvert Z_{KA} \rvert$	$V_{KA}=V_{ref}, I_K$=1mA to 100mA f≤1kHz		—	0.2	0.4	Ω	1

Note 2: Full temperature range is -40℃ to 105℃ for AT 432 .

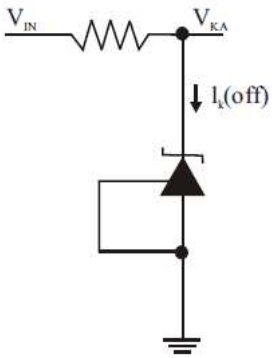
TYPICAL CIRCUITS



$V_{KA} = V_{ref}$
Test Circuit 1

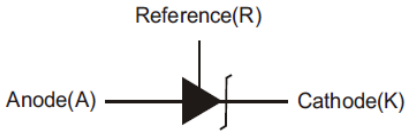


$V_{KA} > V_{ref}$
Test Circuit 2

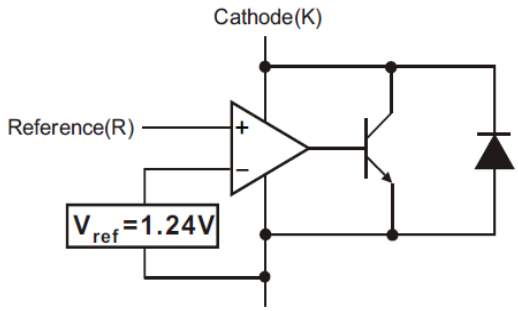


Off-State
Test Circuit 3

LOGIC SYMBOL



BLOCK DIAGRAM(POSITIVE LOGIC)



TYPICAL APPLICATION CIRCUITS

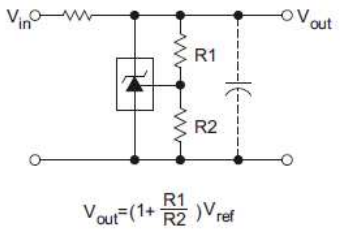


Figure 1. Shunt Regulator

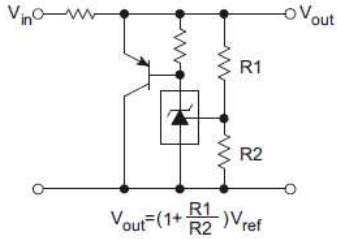


Figure 2. High Current Shunt Regulator

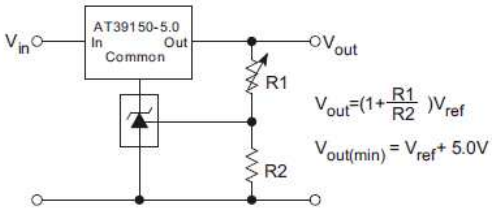


Figure 3. Output Control for a Three Terminal Fixed Regulator

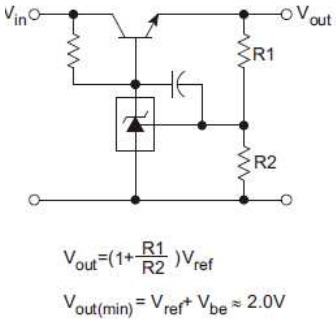


Figure 4. Series Pass Regulator

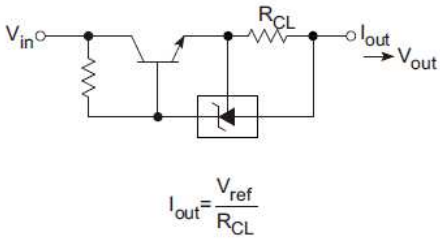


Figure 5. Constant Current Source

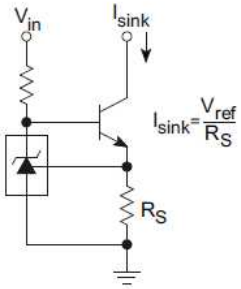


Figure 6. Constant Current Sink

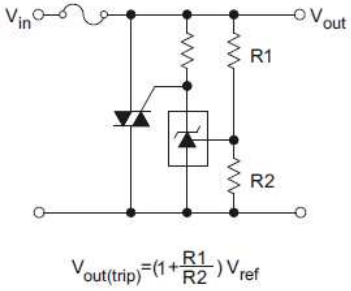


Figure 7. TRIAC Crowbar

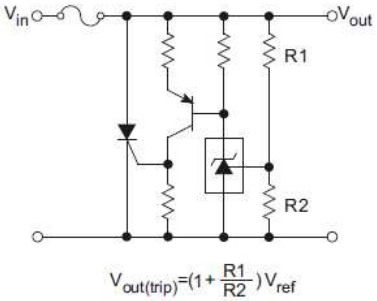


Figure 8. SRC Crowbar

TYPICAL OPERATING CHARACTERISTICS

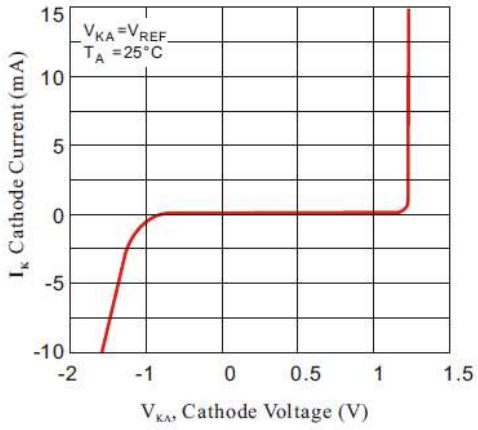


Figure 1. Cathode Current vs. Cathode Voltage

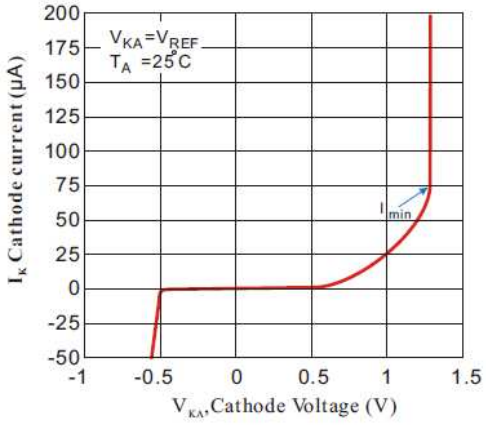


Figure 2. Cathode Current vs. Cathode Voltage

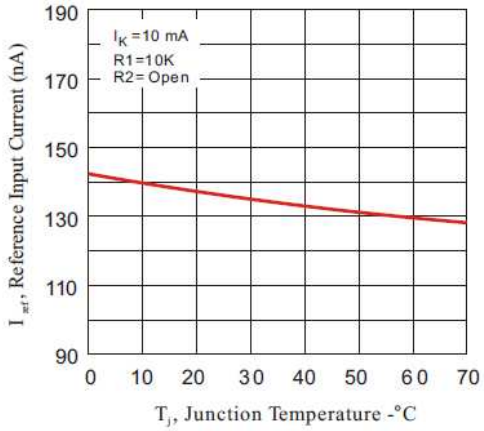


Figure 3. Ref. Input Current vs. Junction Temperature

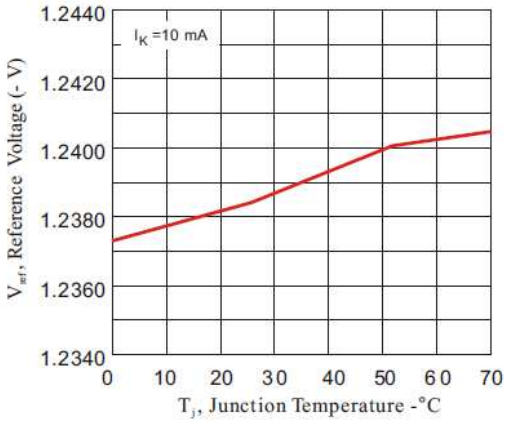


Figure 4. Ref. Voltage vs. Junction Temperature

STABILITY BOUNDARY CONDITIONS

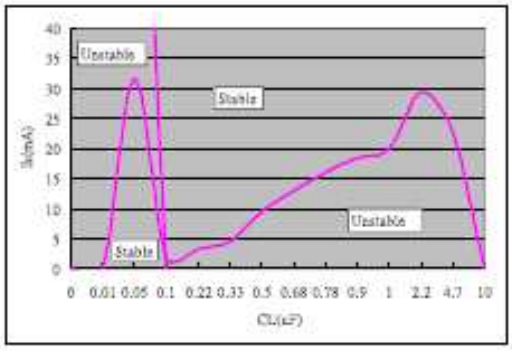


Figure 5. CL=Ceramic Capacitor

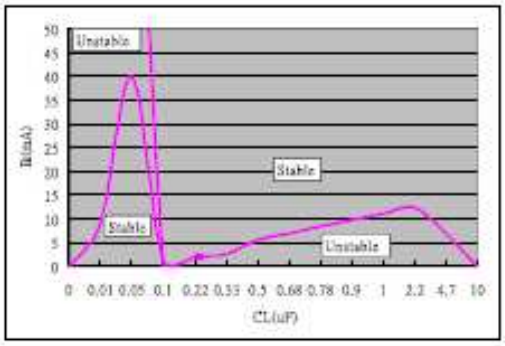


Figure 6. CL=Ceramic Capacitor

TYPICAL APPLICATION CIRCUIT

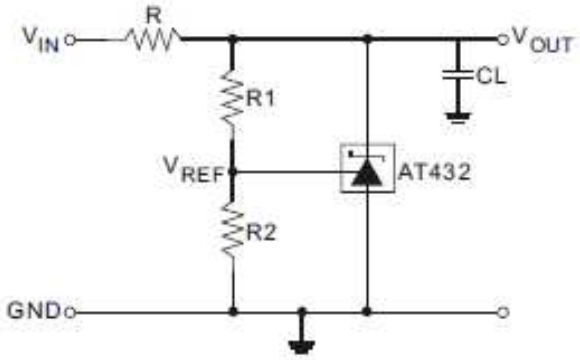


Figure	Vka (V)	R1 (kΩ)	R2 (kΩ)
5	V_{ref}	0	∞
6	1.8	4K	10K

Table1 , Test Condition For Test Circuit

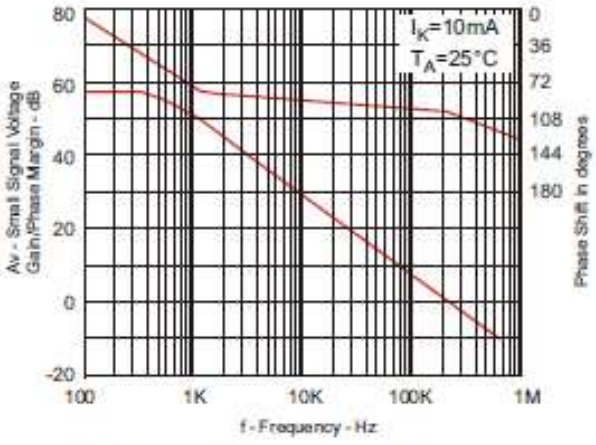


Figure 7. Small Signal Voltage Gain/ Phase Margin vs. Frequency

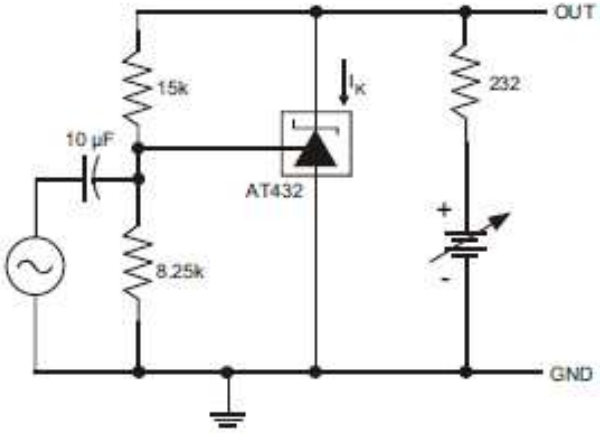
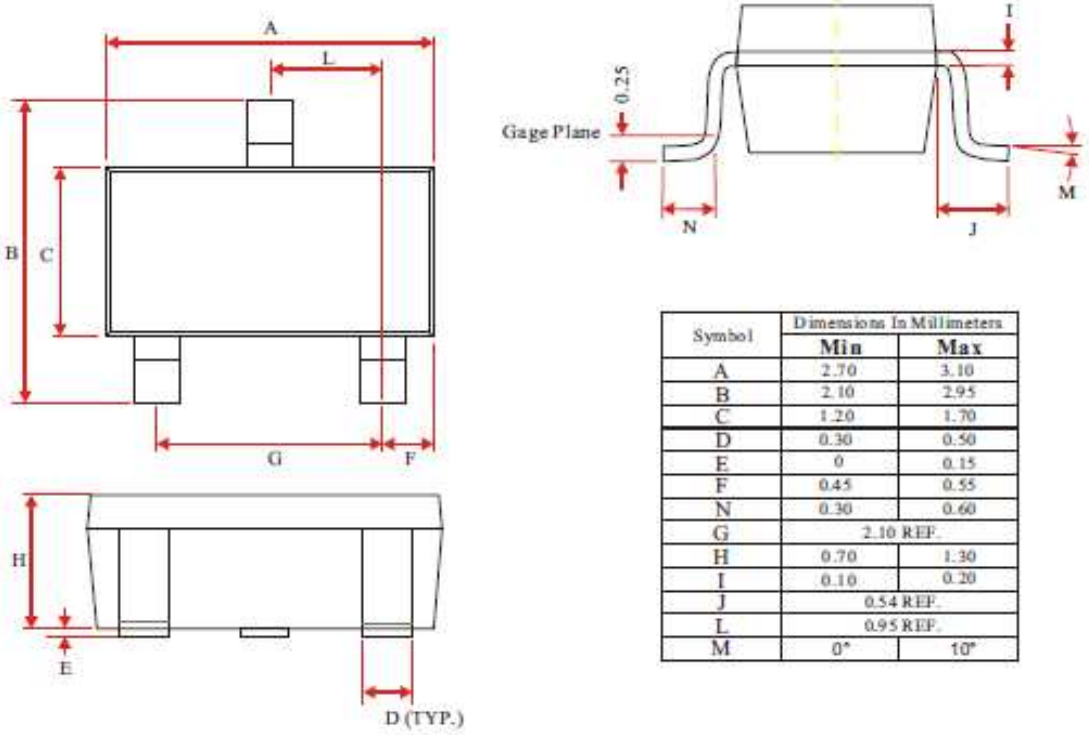


Figure 8. Test Circuit - Small - Signal Gain and Phase

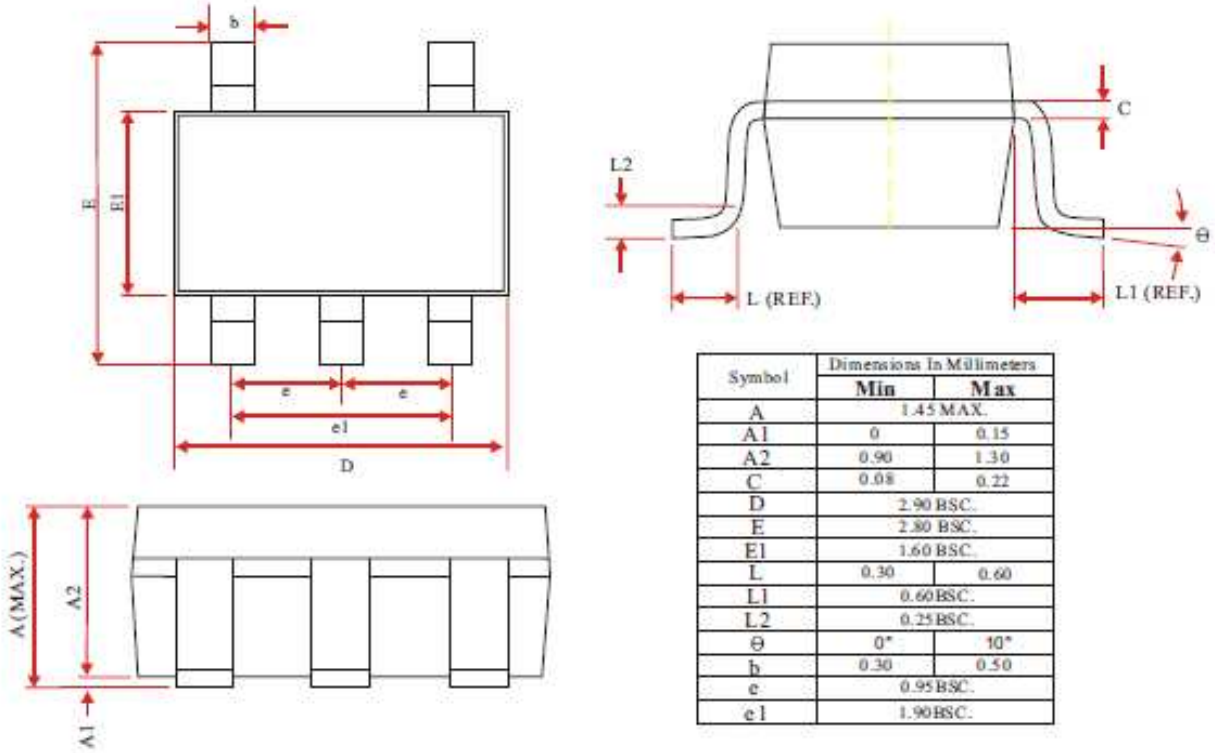
PACKAGE OUTLINE DIMENSIONS

SOT-23 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters	
	Min	Max
A	2.70	3.10
B	2.10	2.95
C	1.20	1.70
D	0.30	0.50
E	0	0.15
F	0.45	0.55
N	0.30	0.60
G	2.10 REF.	
H	0.70	1.30
I	0.10	0.20
J	0.54 REF.	
L	0.95 REF.	
M	0°	10°

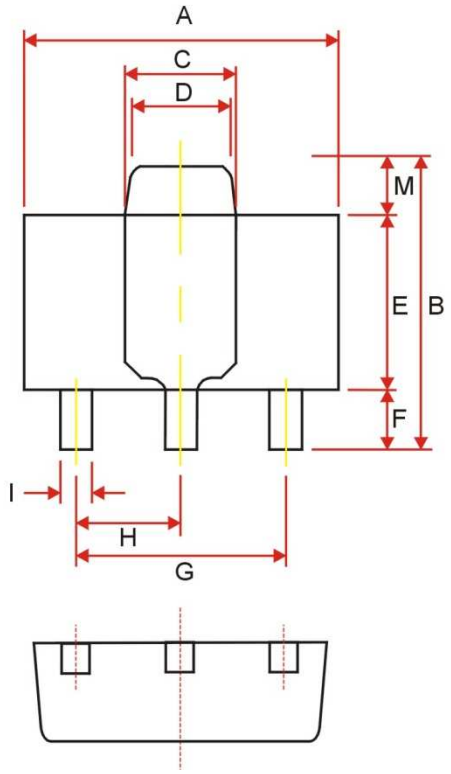
SOT-25 PACKAGE OUTLINE DIMENSIONS

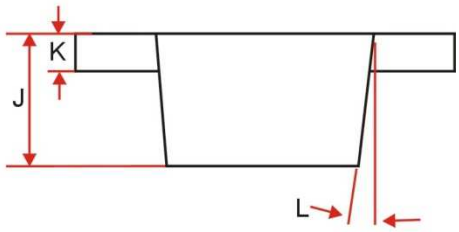


Symbol	Dimensions In Millimeters	
	Min	Max
A	1.45 MAX.	
A1	0	0.15
A2	0.90	1.30
C	0.08	0.22
D	2.90 BSC.	
E	2.80 BSC.	
E1	1.60 BSC.	
L	0.30	0.60
L1	0.60 BSC.	
L2	0.25 BSC.	
θ	0°	10°
b	0.30	0.50
e	0.95 BSC.	
e1	1.90 BSC.	

PACKAGE OUTLINE DIMENSIONS

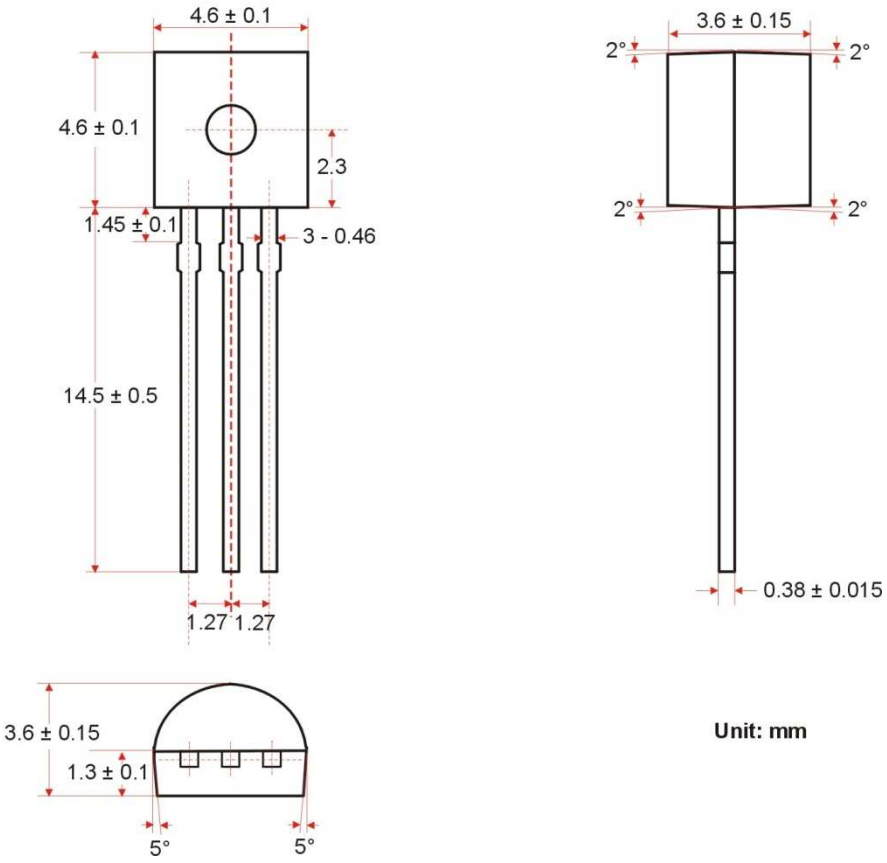
SOT-89 PACKAGE OUTLINE DIMENSIONS





REF.	Dimensions In Millimeters	
	Min	Max
A	4.40	4.60
B	3.94	4.25
C	1.50	1.70
D	1.30	1.50
E	2.29	2.60
F	0.89	1.20
G	3.00 REF.	
H	1.50 REF.	
I	0.40	0.56
J	1.40	1.60
K	0.35	0.44
L	5°TYP.	
M	0.70 REF.	

PACKAGE OUTLINE DIMENSIONS
TO-92 PACKAGE OUTLINE DIMENSIONS



Unit: mm

Note :

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Life Support Policy: IAT does not authorize any IAT product for use in life support devices and/or systems. Life support devices or systems are devices or systems which, (I) are intended for surgical implant into the body or (II) 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. Typical numbers are at 25℃ and represent the most likely norm.