Low Voltage Adjustable Precision Shunt Regulator

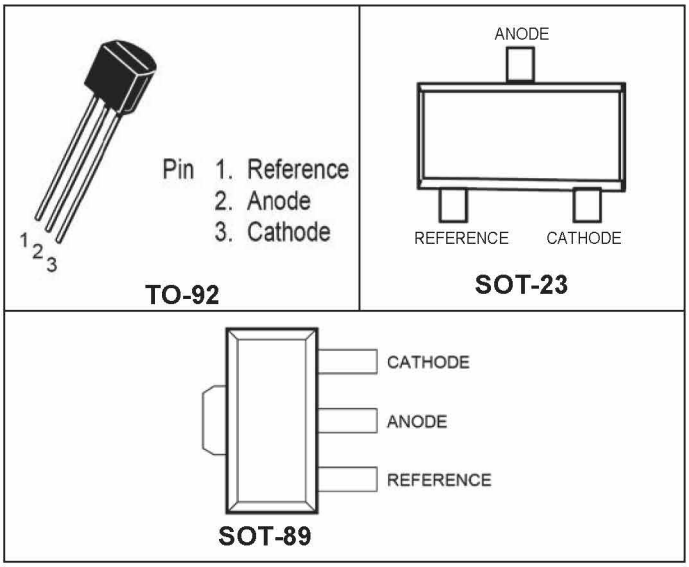
Features

- Precise Reference Voltage to 1.24V
- Guaranteed 2%, 1% , 0.5% Reference Voltage Tolerance
- Sink Current Capability, 80μA to100mA
- Quick Turn-on
- Adjustable Output Voltage, V_o=V_{REF} to 15V
- 0.2 Ω Typical Output Impedance
- TO-92, SOT-23, SOT-89 packages.

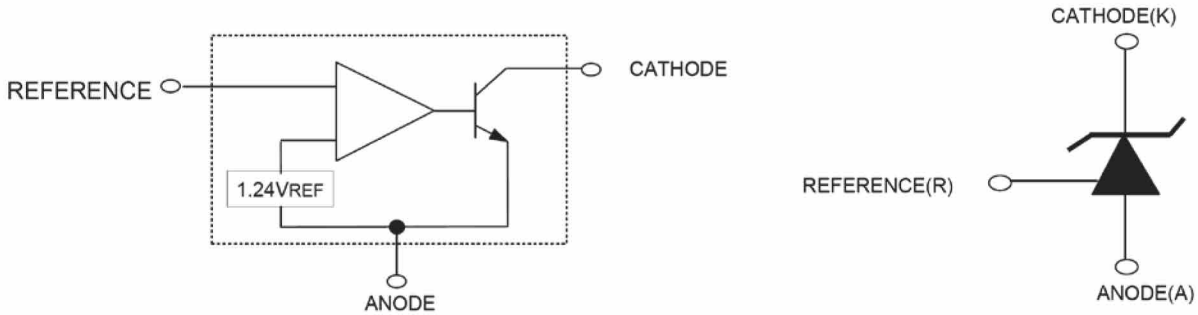
Applications

- Linear Regulator
- Adjustable Supplies
- Switching Power Supplies
- Battery Charger
- Instrumentation
- Computer Disk Drives

PIN CONNECTIONS



Block Diagram



Ordering Information

Part Number	Package	Packing	Temperature(TA)	Package Qty	Tolerance
TK432BIDBZR	SOT-23-3	Reel	-40°C ~ 85°C	3000	±0.5%
TK432BIPK	SOT-89-3	Reel	-40°C ~ 85°C	3000	±0.5%
TK432BILP	TO-92-3	Tube	-40°C ~ 85°C	1000	±0.5%
TK432AIDBZR	SOT-23-3	Reel	-40°C ~ 85°C	3000	±1%
TK432AIPK	SOT-89-3	Reel	-40°C ~ 85°C	3000	±1%
TK432AILP	TO-92-3	Tube	-40°C ~ 85°C	1000	±1%
TK432IDBZR	SOT-23-3	Reel	-40°C ~ 85°C	3000	±2%
TK432IPK	SOT-89-3	Reel	-40°C ~ 85°C	3000	±2%
TK432ILP	TO-92-3	Tube	-40°C ~ 85°C	1000	±2%

Absolute Maximum Ratings

Symbol	Parameter	Symbol	Rating	Unit
V_{KA}	Cathode voltage	V_{KA}	18	V
I_K	Continuous cathode current range	I_K	100	mA
I_{REF}	Reference current range	I_{REF}	3	mA
Tj	Operating Junction Temperature Range	Tj	- 40 to 150	°C

Pad #	Description
1	REF
2	ANODE
3	CATHODE

* Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device.

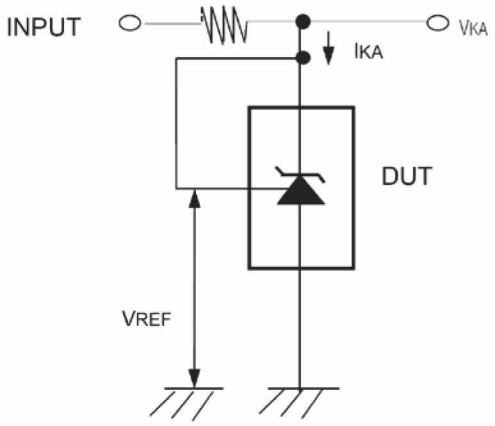
Electrical Characteristics Ta= 25°C (unless otherwise noted)

Symbol	Parameter	Test Conditions	TK432			Unit
			Min	Typ	Max	
V_{RFF}	Reference voltage	$V_{KA}=V_{REF}$, I_K=10mA (Fig. 1) T_A =25°C TK432 (2%) TK432-A (1%) TK432-C (0.5%)	 1.216 1.228 1.234	 1.240 1.240 1.240	 1.264 1.252 1.246	V
V_{DEV}	V_{REF} Temp Deviation	T_A=full range (see Note1) $V_{KA}=V_{REF}$, I_K=10mA (Fig. 1)		10	25	mV
$\Delta V_{REF}/\Delta V_{KA}$	Ratio of Change in V_{REF} to Change in Cathode Voltage	I_K=10mA, V_{KA}=15V to V_{REF} (Fig. 2)		-1	-2.7	mV / V
I_{REF}	Reference Input Current	I_K=10mA, R_1 =10kΩ R_2=∞ (Fig.2)		0.5	1.0	μA
$I_{REF(DEV)}$	I_{REF} Temp Deviation	T_K=full range (see Note 1), R_1 =10kΩ, R_2=∞, I_K=10mA (Fig. 2)		0.05	0.3	μA
Ik(off)	Off-state cathode current	V_{REF}=0 V,(Fig.3) V_k=15V		0.04	0.5	μA
Zka	Dynamic Output Impedance	$V_{ka}=V_{ref}$, I_k=1mA to 100mA F ≤1kHz (Fig. 1)		0.2	0.4	Ω
$I_{K(MIN)}$	Minimum Operating Current	$V_{KA}=V_{REF}$(Fig. 1)		60	80	μA

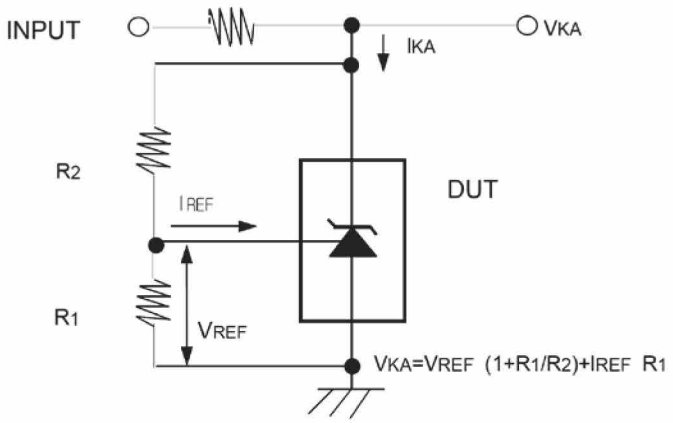
Notes: 1. Full temperature range is -40°C to 105°C for TK432

TEST CIRCUITS

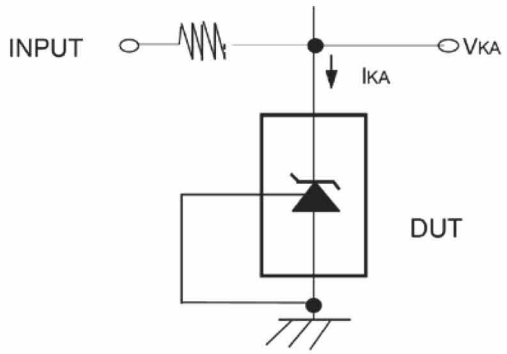
Flg. 1 Test Circuit for $V_{KA}=V_{REF}$



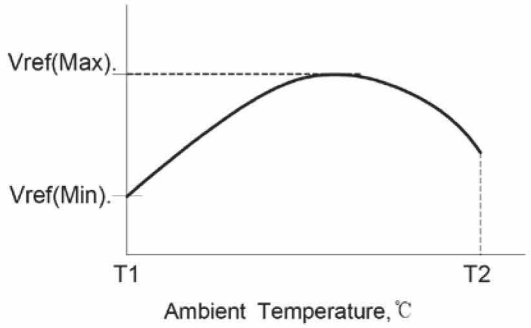
Flg. 2 Test Circuit for $V_{KA} \geq V_{REF}$



Flg. 3 Test Circuit for IKA(off)



Note1] The deviation parameter △Vref is defined as the differences between the maximum and minimum values obtained over the full operating ambient temperature range that applies.



△Vref =Vref(Max.) -Vref(Min)

Ta= T2-T1

The average temperature coefficient of the Reference input voltage, αVref. is defined as:

$$\alpha Vref.= \frac{ppm}{℃} = \frac{(\frac{\triangle Vref}{Vref\ @25℃}) \times 10^6}{\triangle Ta} = \frac{\triangle Vref \times 10^6}{\triangle Ta(\ Vref\ @25℃)}$$

αVref. is can be positive or negative depending on whether Vref.Min. or Vref.Max. occurs at the lower ambient temperature.

Note2] The dynamic impedance Z_{ka} is defined as:

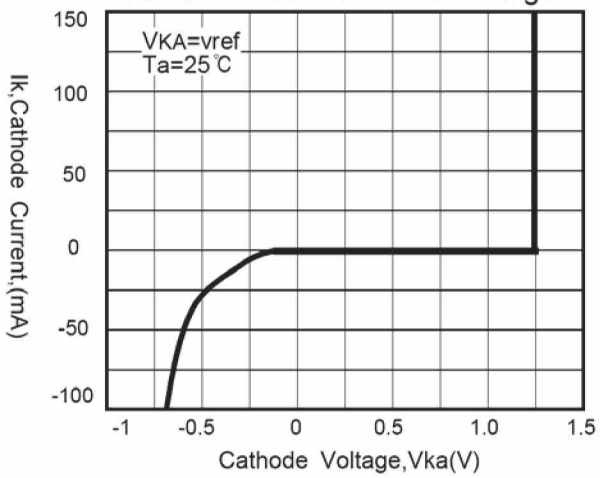
$$|Z_{ka}| = \frac{\triangle VKA}{\triangle IK}$$

When the device is programmed with two external resistors, R1 an R2,(Refer to Fig.2) the total dynamic impedance of the circuit is defined as :

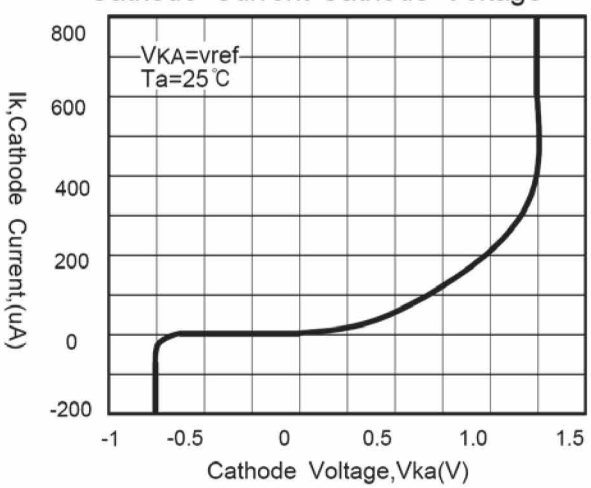
$$|Z_{ka}'| = |Z_{ka}| (1+ \frac{R1}{R2})$$

TYPICAL PERFORMANCE CHARACTERISTICS

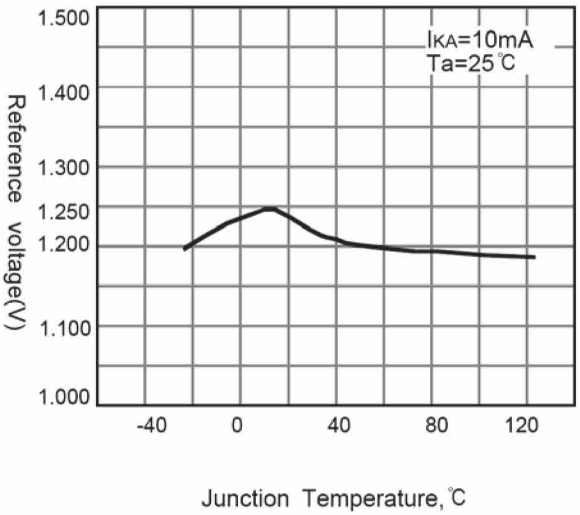
Cathode Current-Cathode Voltage



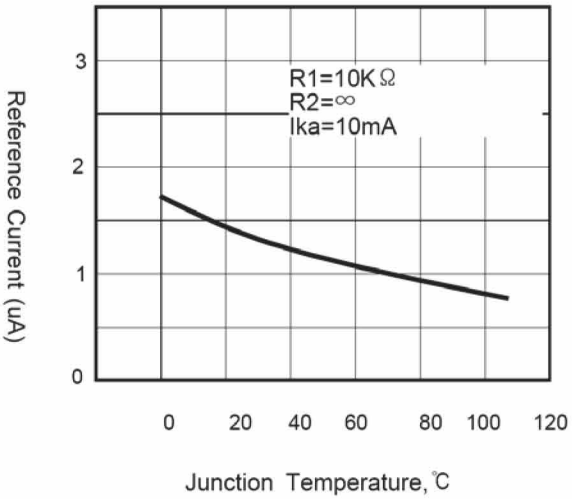
Cathode Current-Cathode Voltage



Vref -Junction Temperature

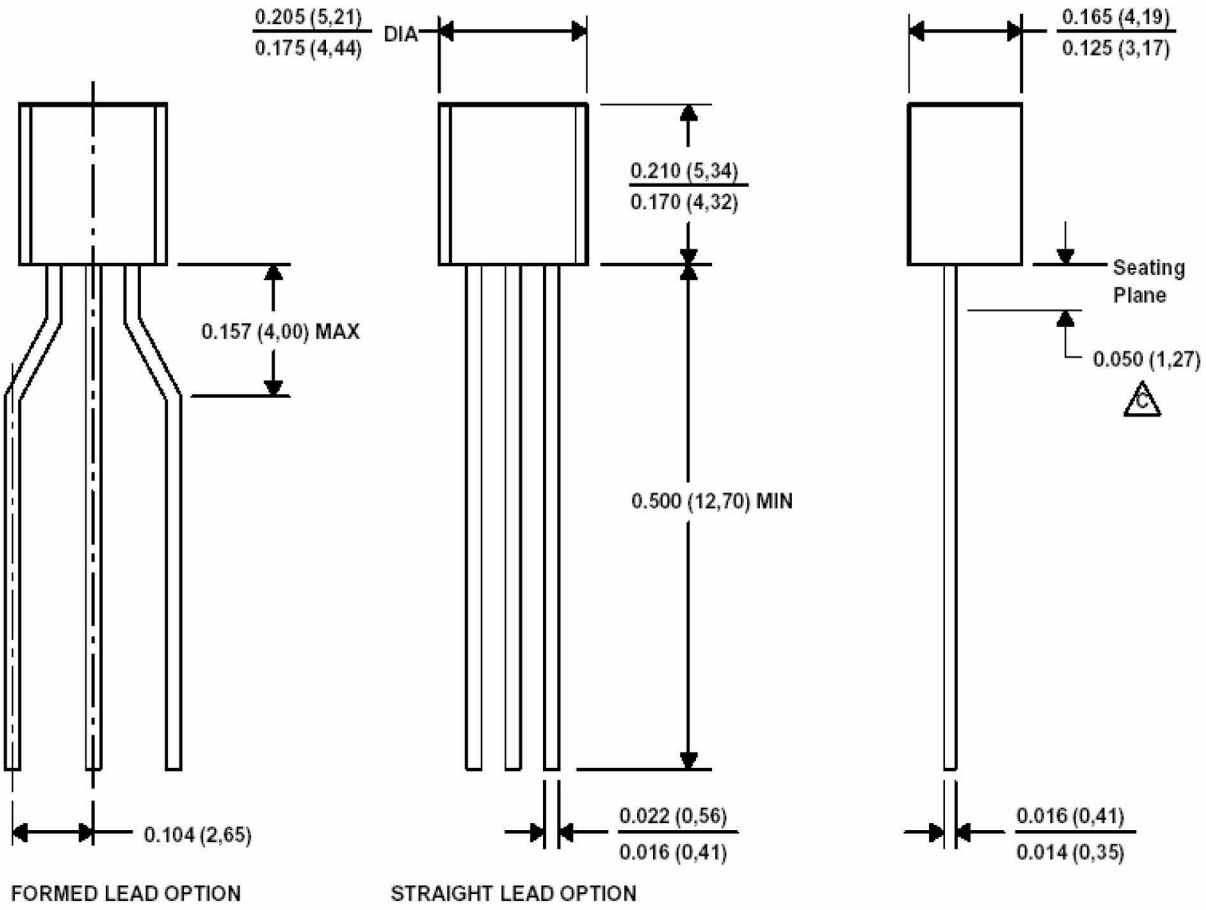


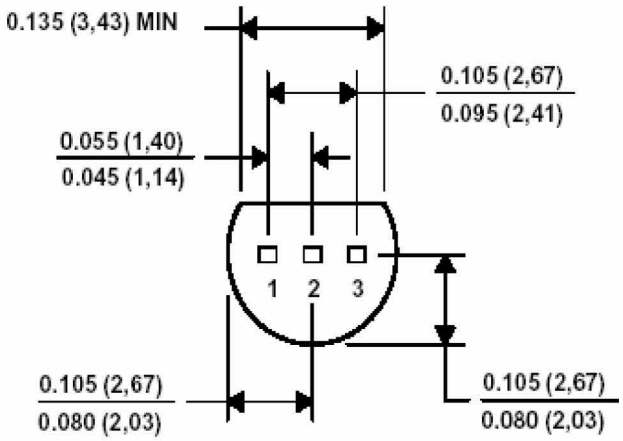
Reference Input Current - Junction Temperature



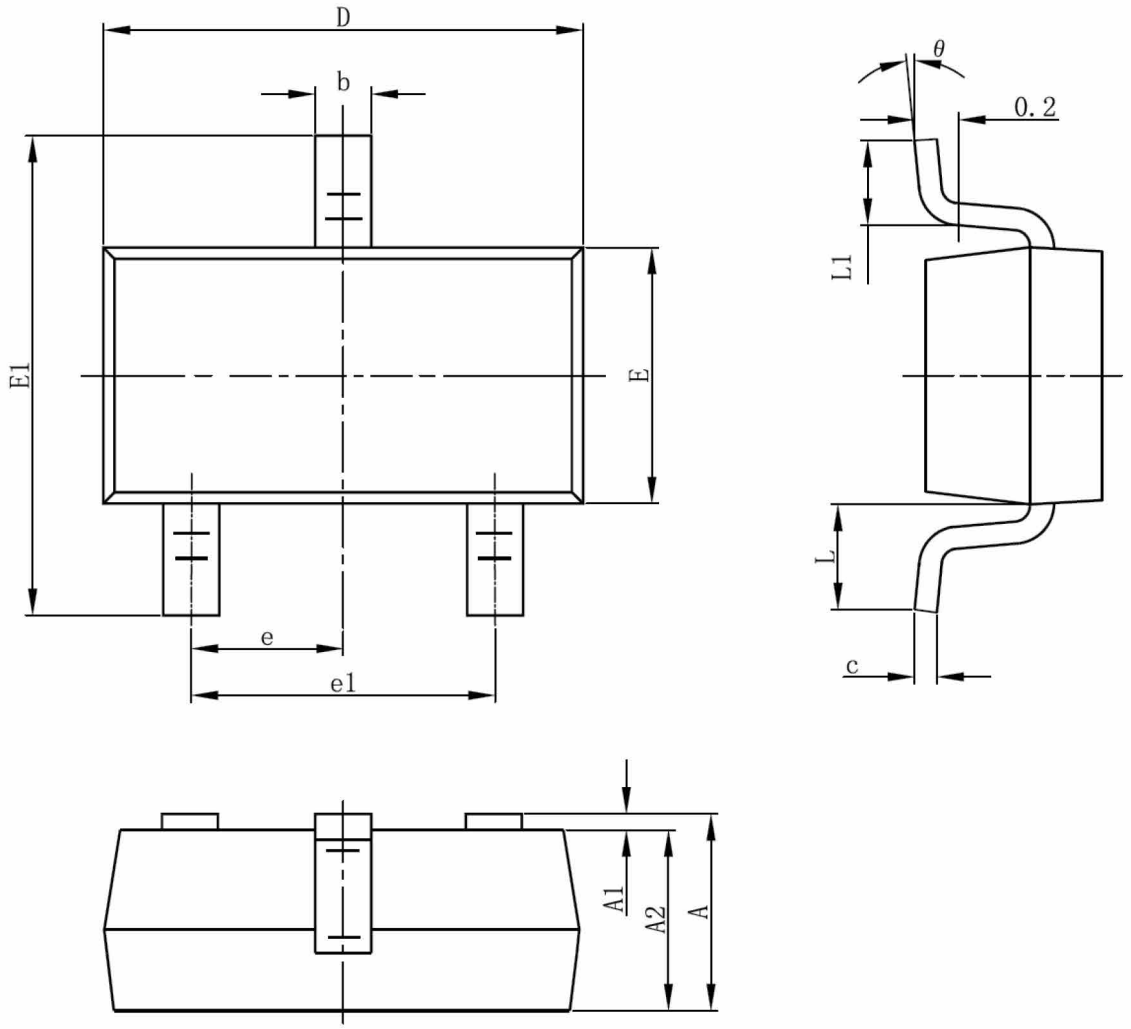
Package Dimensions

TO-92



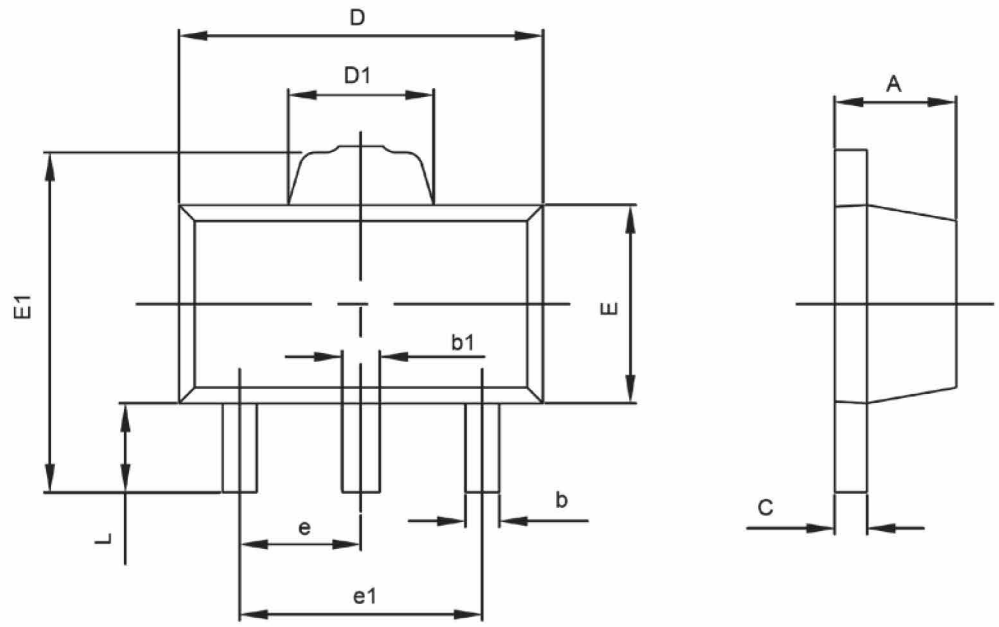


SOT-23-3L PACKAGE OUTLINE DIMENSIONS



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°

SOT-89-3L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.360	0.560	0.014	0.022
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.400	1.800	0.055	0.071
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500TYP		0.060TYP	
e1	2.900	3.100	0.114	0.122
L	0.900	1.100	0.035	0.043