Low Voltage（1.25V）Adjustable Precision Shunt Regulator

General Description

The ME432 series ICs are three-terminal adjustable shunt regulators with guaranteed thermal stability over a full operation range. These ICs feature sharp turn-on characteristics, low temperature coefficient and low output impedance, which make them ideal substitutes for Zener diodes in applications such as switching power supply, charger and other adjustable regulators.

The ME432 voltage type is 18V. The output voltage can be set to any value between V_{REF} (1.25V) and the corresponding maximum cathode voltage.

The ME432 precision reference is offered in two band gap tolerance: 0.5% and 1.0%.

Features

●Programmable Precise Output Voltage from 1.25V to 18V

●Very Accurate Reference Voltage: 1.25V±0.5%

●High Stability under Capacitive Load

●Low Temperature Deviation: Typical 4mV

● Low Equivalent Full-range Temperature Coefficient with 30PPM/℃ Typical

●Low Dynamic Output Resistance: Typical 0.05Ω

● Sink Current Capacity from 70μA to 100 mA

● Low Output Noise

Typical Application

● Charger

●Voltage Adapter

●Switching Power Supply

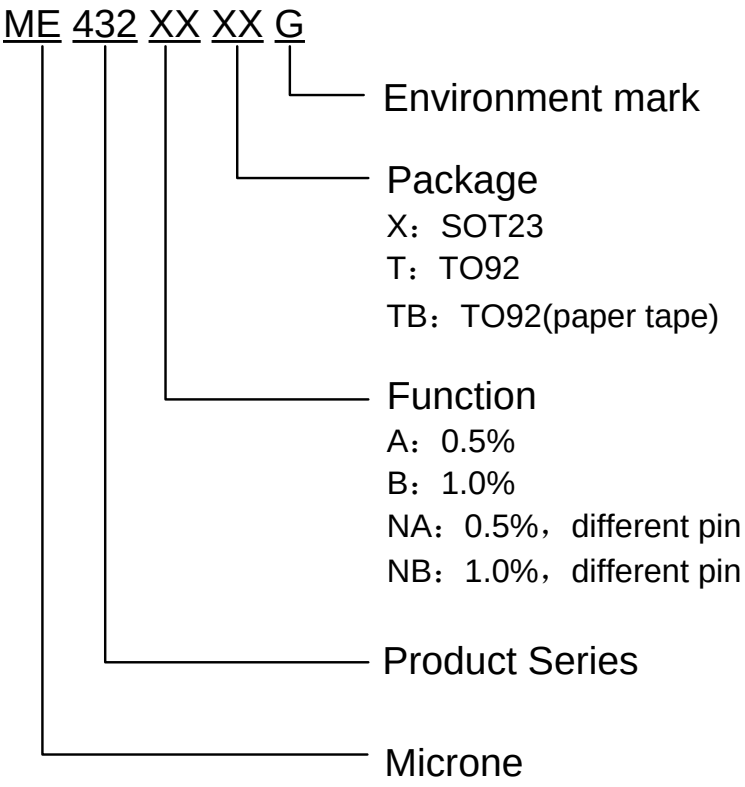
●Graphic Card

●Precision Voltage Reference

Package

● 3-pin SOT23、TO92

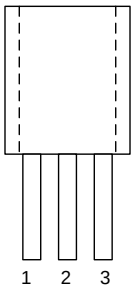
Selection Guide



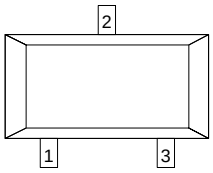
product series	product description
ME432AXG	V_{REF}=1.25V±0.5%； Package：SOT23
ME432BXG	V_{REF} =1.25V±1.0%； Package：SOT23
ME432ATG	V_{REF} =1.25V±0.5%； Package：TO92
ME432BTG	V_{REF} =1.25V±1.0%； Package：TO92
ME432ATBG	V_{REF} =1.25V±0.5%； Package：TO92；paper tape
ME432BTBG	V_{REF} =1.25V±1.0%； Package：TO92； paper tape
ME432NAXG	V_{REF} =1.25V±0.5%； Package：SOT23； Different pin
ME432NBXG	V_{REF} =1.25V±1.0%； Package：SOT23； Different pin

NOTE: If you need other voltage and package, please contact our sales staff。

PIN Configuration



TO92

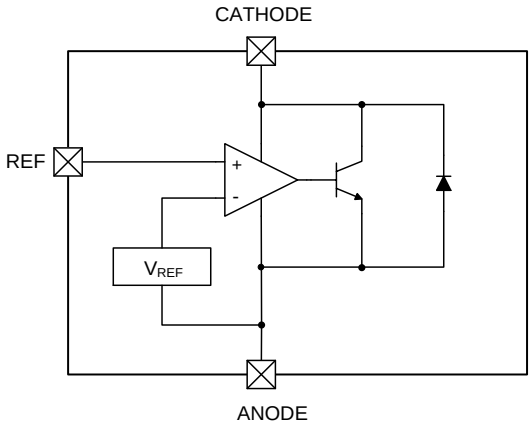


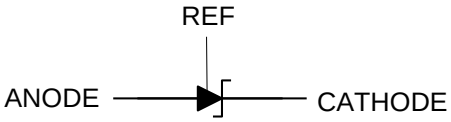
SOT23

Pin Assignment

Pin Number		Symbol	Functions
ME432	ME432N		
1	3	REF	reference
2	2	A	anode
3	1	K	cathode

Block Diagram and symbol





Absolute Maximum Ratings

Parameter	Symbal	Rating	Unit
Cathode voltage	V_{KA}	20	V
Cathode current range (continuous)	I_{KA}	-100 ~ +100	mA
Reference input current range	I_{REF}	10	mA
Power Dissipation	P_D	TO-92 Package: 770	mW
		SOT23 Package:300	
Junction temperature	T_J	-40~+150	℃
Storage Temperature range	T_{STG}	-55~+150	℃
Package thermal impedance	θ_{JA}	TO92 package:150	℃/W
		SOT23 package:350	

Note: Use this IC within the stated maximum ratings. Operation beyond these limits may cause degrading or permanent damage to the device.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Cathode Voltage	V_{KA}	V_{REF}	18	V
Cathode Current	I_{KA}	0.1	100	mA
Operating Ambient Temperature Range		-40	85	℃

Electrical Characteristics (T_A=25℃, unless otherwise noted)

Parameter		Symbol	Conditions		Min	Typ.	Max	Unit	Test circuit
Reference voltage	0.5%	V_{REF}	$V_{KA}=V_{REF}$, I_{KA}=10mA		1.244	1.250	1.256	V	Fig.1
	1.0%				1.238	1.250	1.262		
Deviation of reference voltage over-temperature		ΔV_{REF}	$V_{KA}=V_{REF}$, I_{KA}=10mA	0 ~ 70℃	-	4	12	mV	Fig.1
				-40 ~ 85℃	-	5	12		
Dynamic impedance		$\lvert Z_{KA} \rvert$	$V_{KA}=V_{REF}$, I_{KA}=1 to 100mA, f≤1.0KHz		-	0.05	0.15	Ω	Fig.1
Minimum cathode current for regulation		I_{KA} (MIN)	$V_{KA}=V_{REF}$		-	70	80	uA	Fig.1
Ratio of change in reference voltage to the change in cathode voltage		$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	I_{KA}=10mA	ΔV_{KA} =16V to V_{REF}	-	-1	-2.0	mV/V	Fig.2
Reference current		I_{REF}	I_{KA}=10mA, R1=10KΩ, R2=∝		-	0.15	0.4	μA	Fig.2
Deviation of reference over full temperature range		ΔI_{REF}	I_{KA}=10mA, R1=10KΩ, R2=∝, T_A=40 ~ 150℃		-	0.1	0.4	μA	Fig.2
Off-state cathode current		I_{KA} (OFF)	V_{KA}=18V, V_{REF}=0		-	0.01	0.05	μA	Fig.3

Note: The dynamic impedance is defined as: $\lvert Z_{KA} \rvert = \triangle V_{KA} / \triangle I_{KA}$

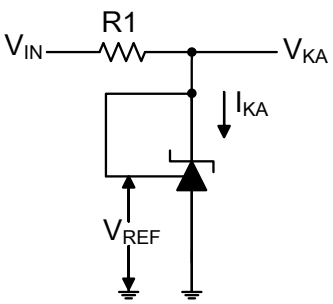


Fig.1: V_{KA}= V_{REF}

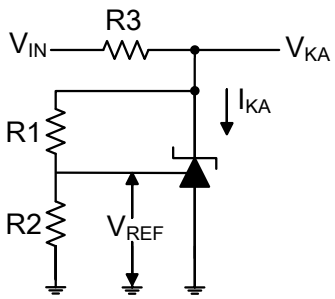


Fig.2: V_{KA}> V_{REF}

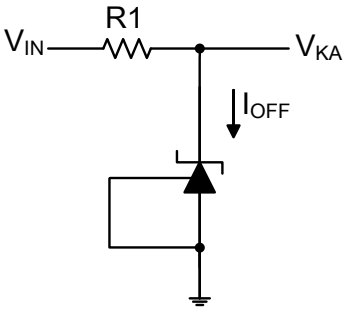
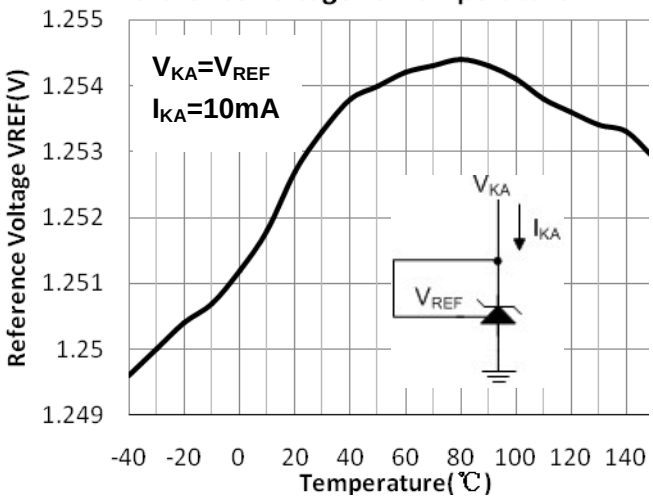


Fig.3: I_{OFF}

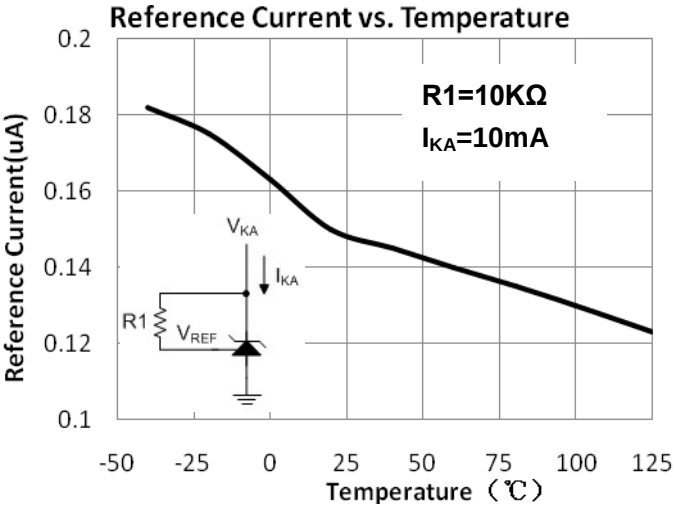
$$V_{KA} = V_{REF}(1 + R1/R2) + I_{REF}R1$$

Typical Performance Characteristics

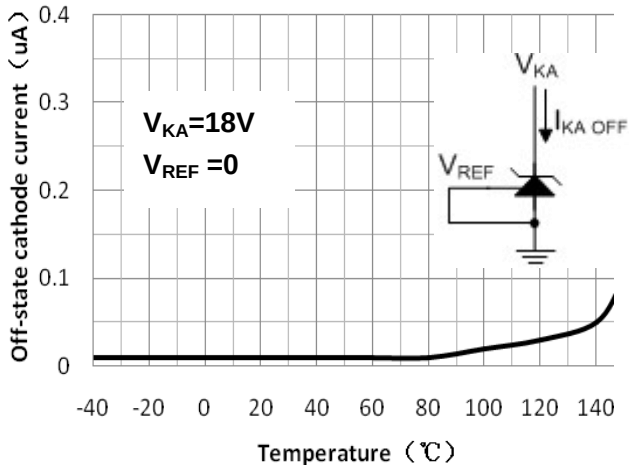
Reference voltage vs. Temperature



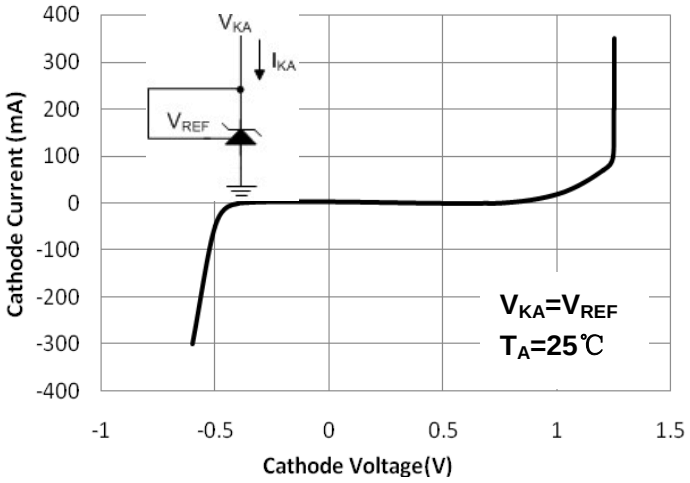
Reference Current vs. Temperature



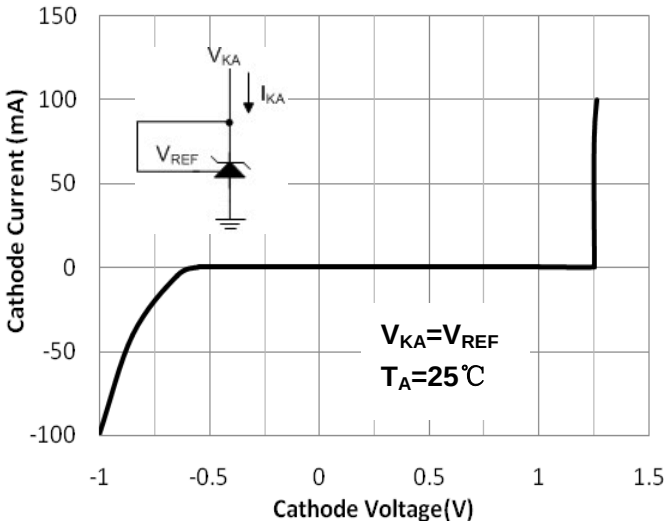
Off-state cathode current vs Temperature



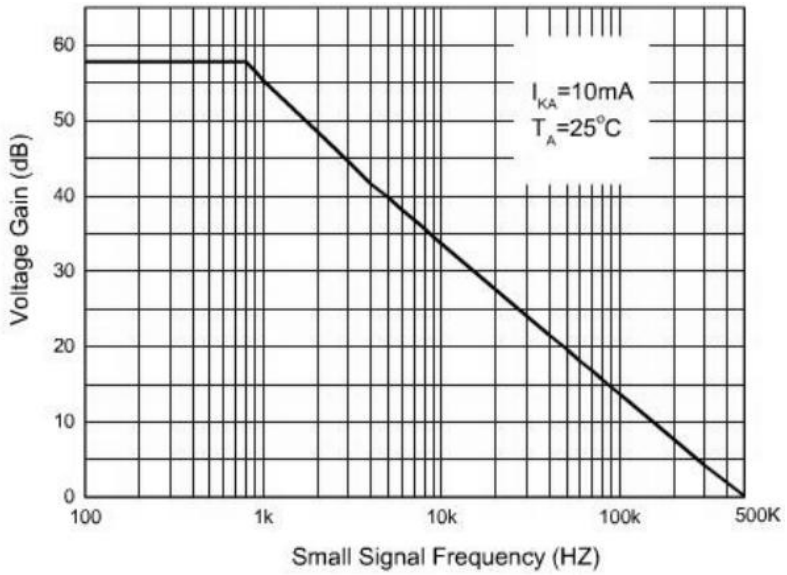
Cathode Current vs. Cathode Voltage

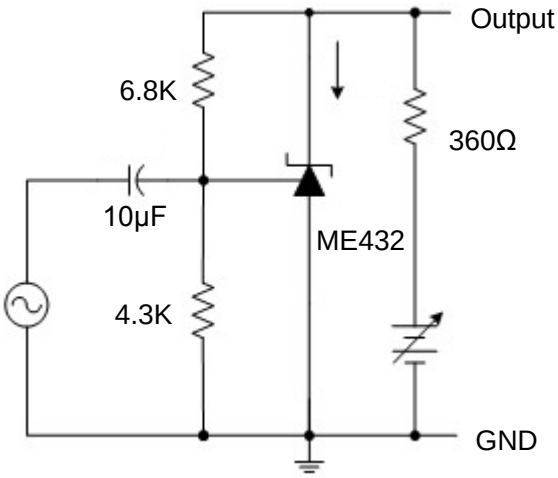


Cathode Current vs. Cathode Voltage

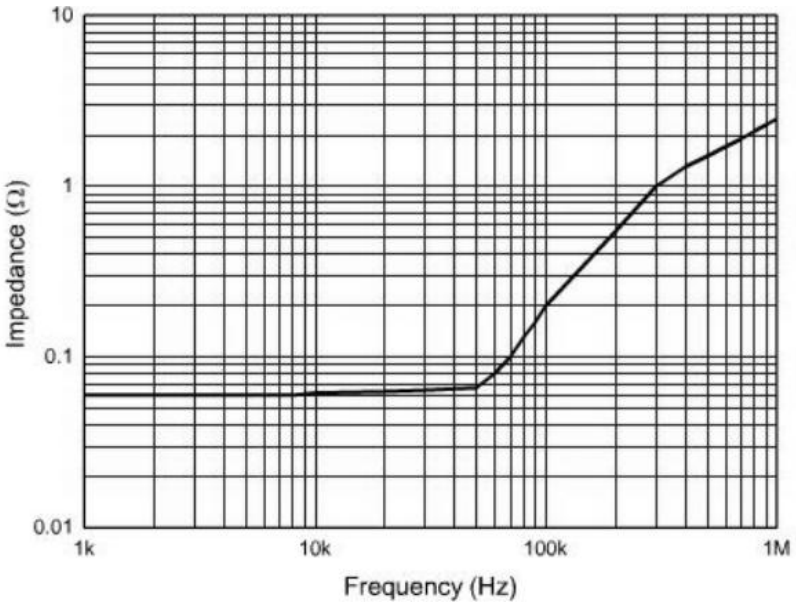


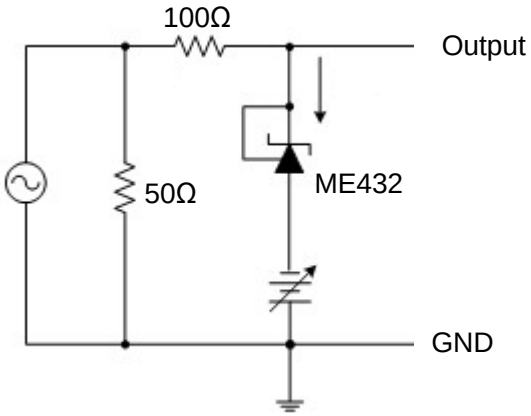
Small Signal Voltage Gain vs. Frequency



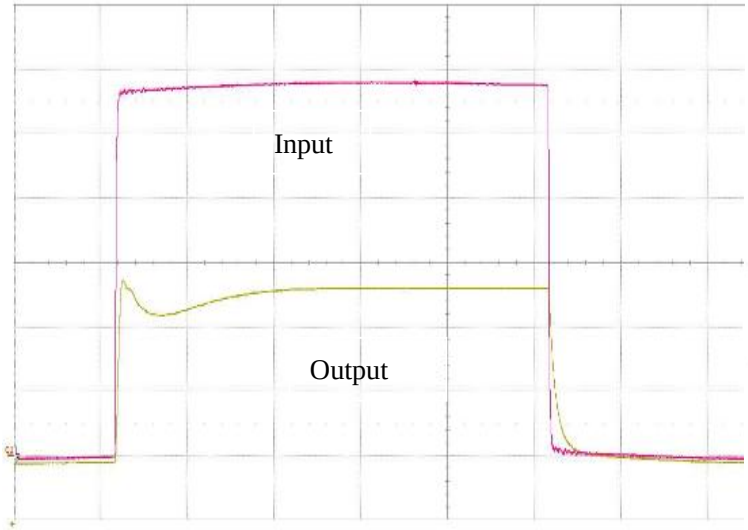


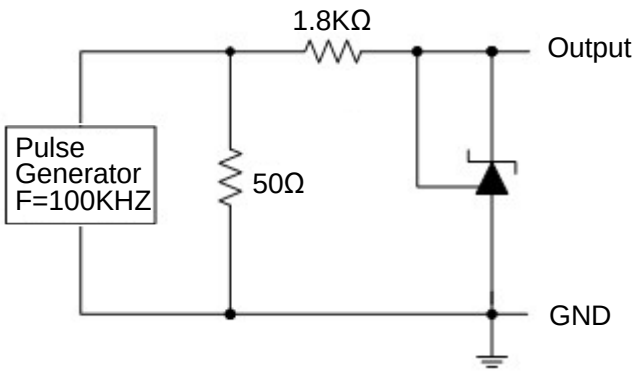
Dynamic Impedance vs. Frequency



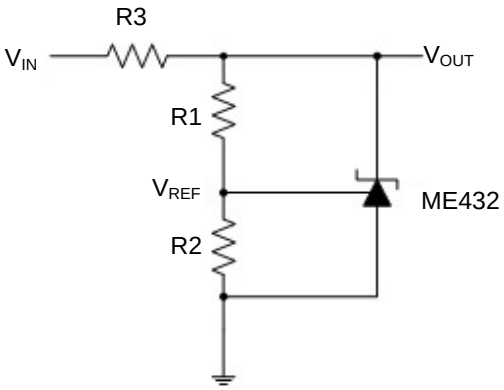


Pulse Response of Input and Output Voltage



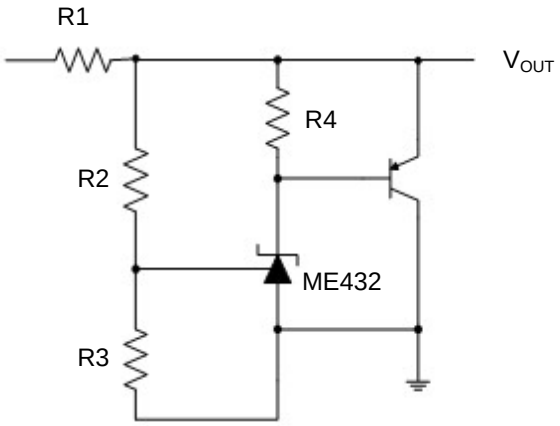


Typical Application



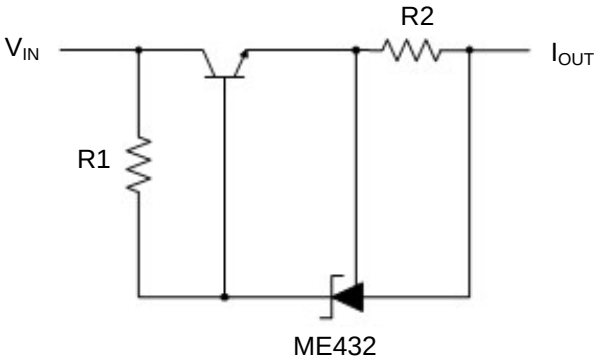
$V_O=(1+R1/R2)V_{REF}$

Fig.4: Shunt Regulator



$V_O=(1+R2/R3)V_{REF}$

Fig.5: High Current Shunt Regulator



$I_{OUT}=V_{REF}/R2+I_{KA}$

Fig.6: Current Source or Current Limit

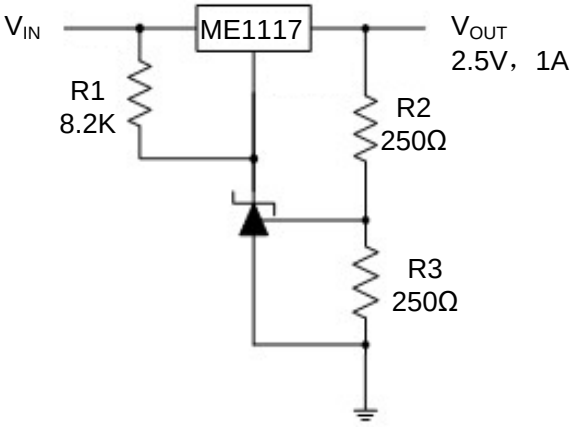
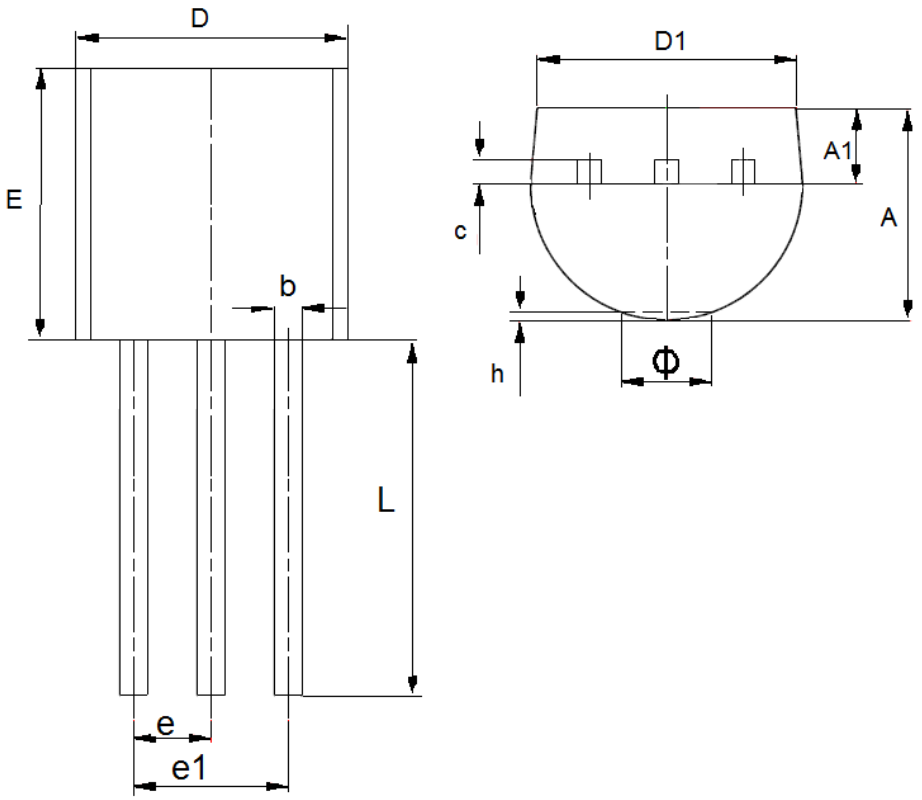


Fig.7: Precision 2.5V, 1A Regulator

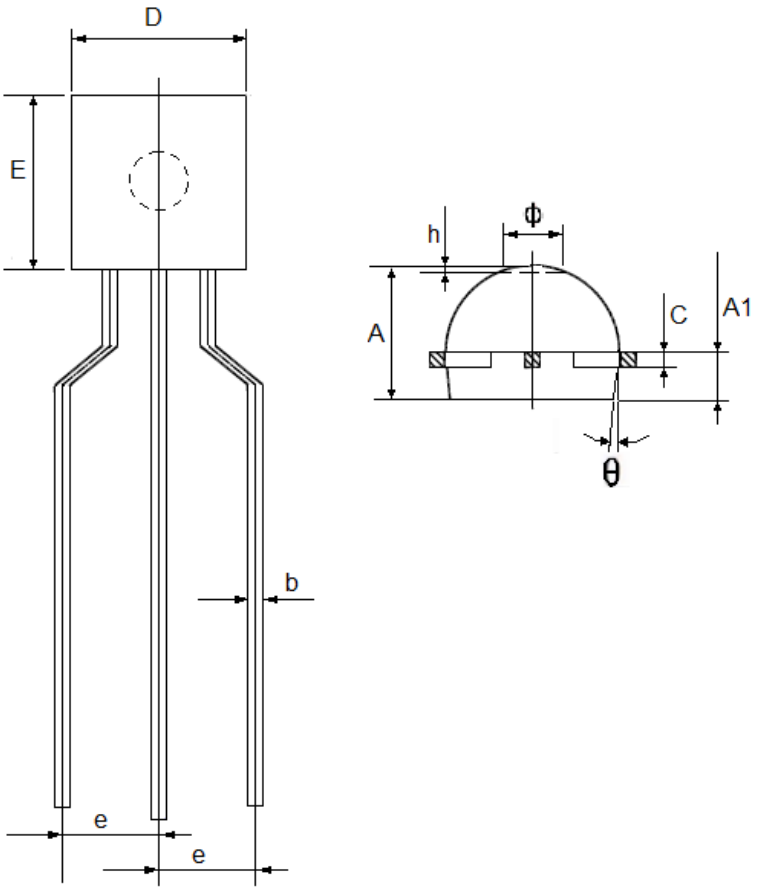
Packaging Information

- **Packaging Type: TO92**



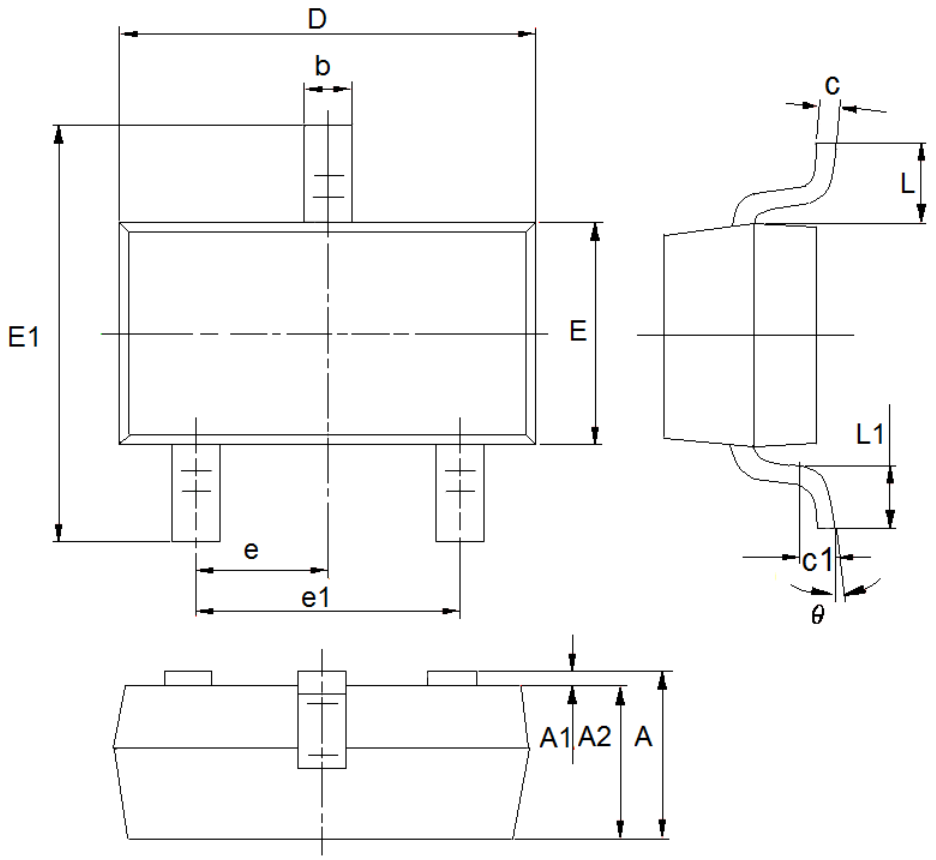
DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	3.3	3.7	0.1299	0.1457
A1	1.1	1.4	0.0433	0.0551
b	0.38	0.55	0.015	0.0217
c	0.36	0.51	0.0142	0.0201
D	4.3	4.7	0.1693	0.185
D1	3.43	—	0.135	—
E	4.3	4.7	0.1693	0.185
e	1.27TYP		0.05TYP	
e1	2.44	2.64	0.0961	0.1039
L	14.1	14.5	0.5551	0.5709
h	0	0.38	0	0.015
Φ	—	1.6	—	0.063

- **Packaging Type: TO-92 (Paper Tape)**



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	3.4	3.7	0.1339	0.1457
A1	1.15	1.4	0.0453	0.0551
b	0.36	0.5	0.0142	0.0197
c	0.38		0.0150	
D	4.4	4.7	0.1732	0.1850
E	4.4	4.7	0.1732	0.1850
e	2.2	2.8	0.0866	0.1102
Φ	1.5		0.0591	
θ	5°		5°	
h	0.2		0.0079	

- **Packaging Type: SOT23**



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.9	1.15	0.0354	0.0453
A1	0	0.14	0.0000	0.0055
A2	0.9	1.05	0.0354	0.0413
b	0.28	0.52	0.0110	0.0205
c	0.07	0.23	0.0028	0.0091
D	2.8	3.0	0.1102	0.1181
e1	1.8	2.0	0.0709	0.0787
E	1.2	1.4	0.0472	0.0551
E1	2.2	2.6	0.0866	0.1024
e	0.95(TYP)		0.0374(TYP)	
L	0.55(TYP)		0.0217(TYP)	
L1	0.25	0.55	0.0098	0.0217
θ	0	8°	0.0000	8°
c1	0.25(TYP)		0.0098(TYP)	

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