

## Adjustable Precision Shunt Regulator

### General Description

The ME431 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.

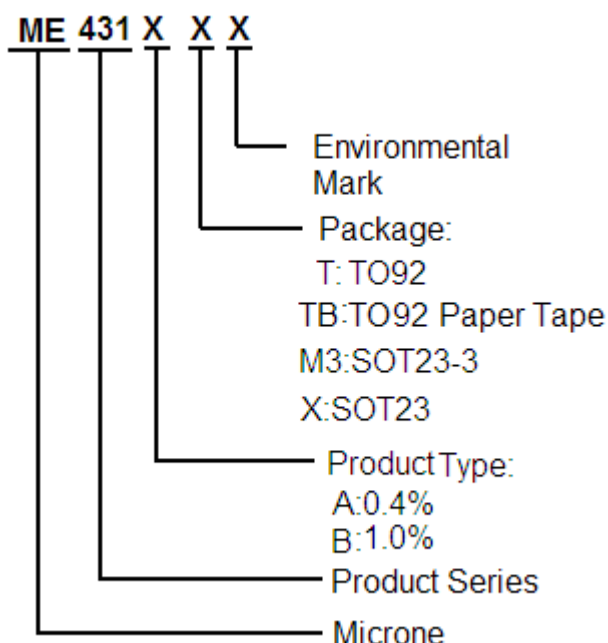
The ME431 voltage type is 40V. The output voltage can be set to any value between  $V_{REF}$  (2.5V) and the corresponding maximum cathode voltage.

The ME431 precision reference is offered in two band gap tolerance: 0.4% and 1.0%.

### Features

- Programmable Precise Output Voltage from 2.5V to 36V
- Very Accurate Reference Voltage: Typical 0.15%
- High Stability under Capacitive Load
- Low Temperature Deviation: Typical 4.5mV
- Low Equivalent Full-range Temperature Coefficient with 20PPM/°C Typical
- Low Dynamic Output Resistance: Typical 0.2Ω
- Sink Current Capacity from 1mA to 100 mA
- Low Output Noise
- Wide Operating Range of -40 to 150°C
- TO-92, SOT23-3, SOT23 package

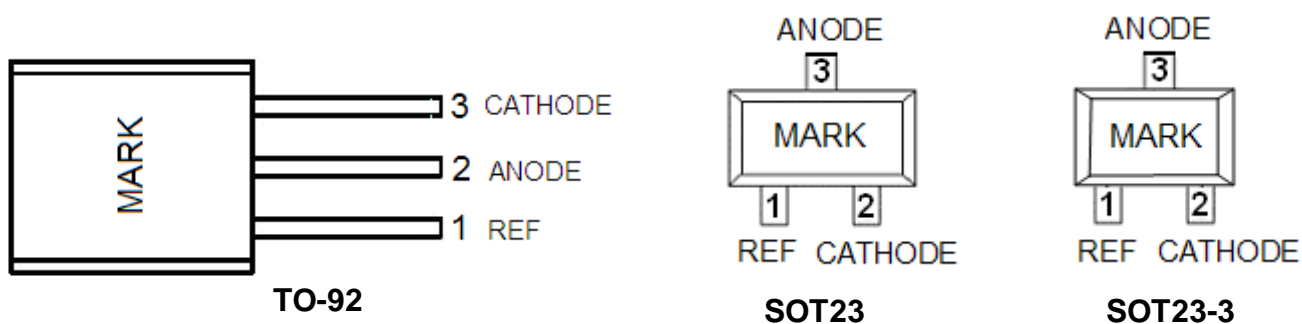
### Selection Guide



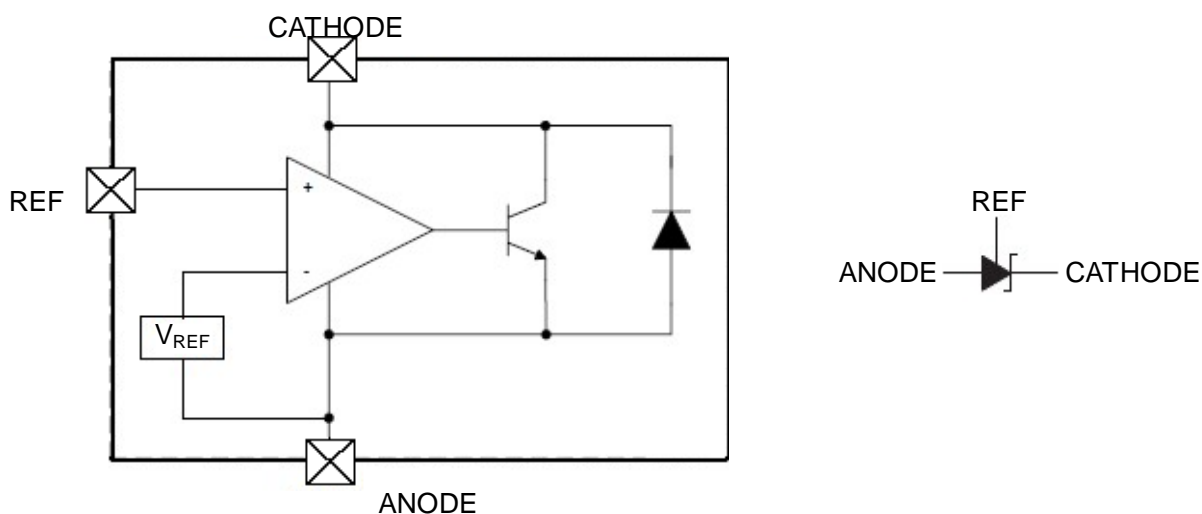
### Typical Application

- Charger
- Voltage Adapter
- Switching Power Supply
- Graphic Card
- Precision Voltage Reference

## PIN Configuration



## Block Diagram and symbol



## Absolute Maximum Ratings

PARAMETER	SYMBOL	RATING	UNIT
Cathode voltage	$V_{KA}$	40	V
Cathode current range (continuous)	$I_{KA}$	-100 to +130	mA
Reference input current range	$I_{REF}$	10	mA
Power Dissipation	$P_D$	TO-92 Package: 770	mW
		SOT23-3 Package: 370	
		SOT23 Package: 300	
Junction temperature	$T_J$	160	$^{\circ}C$
Storage Temperature range	$T_{STG}$	-65~+150	$^{\circ}C$
Package thermal impedance	$\theta_{JA}$	TO-92 package: 150	$^{\circ}C/W$
		SOT23-3 package: 330	
		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.

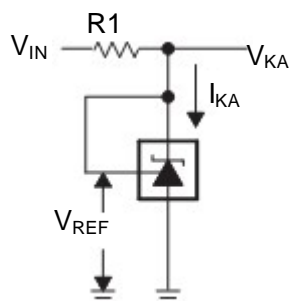
## Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Cathode Voltage	$V_{KA}$	$V_{REF}$	36	V
Cathode Current	$I_{KA}$	1.0	100	mA
Operating Ambient Temperature Range		-40	125	°C

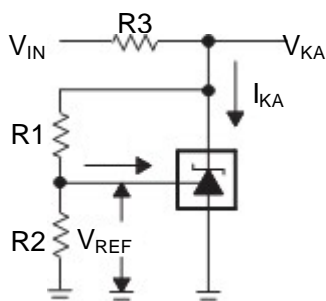
## Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit	Test circuit	
Reference voltage	$V_{REF}$	$V_{KA}=V_{REF}, I_{KA}=10mA$	2.490	2.50	2.510	V	Fig.1	
			2.475	2.50	2.525			
Deviation of reference voltage over-temperature	$\Delta V_{REF}$	$V_{KA}=V_{REF}, I_{KA}=10mA$	0 to 70°C	-	3	10	mV	Fig.1
			-40 to 150°C	-	3	15		
Dynamic impedance	$ Z_{KA} $	$V_{KA}=V_{REF}, I_{KA}=1$ to 100mA, $f \leq 1.0KHz$	-	0.15	0.5	$\Omega$	Fig.1	
Minimum cathode current for regulation	$I_{KA} (MIN)$	$V_{KA}=V_{REF}$	-	0.4	1.0	mA	Fig.1	
Ratio of change in reference voltage to the change in cathode voltage	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$I_{KA}=10mA$	$\Delta V_{KA} = 10V$ to $V_{REF}$	-	-0.8	-2.5	mV/V	Fig.2
			$\Delta V_{KA} = 36V$ to 10V	-	-0.6	-1.5		
Reference current	$I_{REF}$	$I_{KA}=10mA, R1=10K\Omega, R2=\infty$		0.7	3	$\mu A$	Fig.2	
Deviation of reference over full temperature range	$\Delta I_{REF}$	$I_{KA}=10mA, R1=10K\Omega, R2=\infty, T_A=40$ to 150°C		0.1	1.2	$\mu A$	Fig.2	
Off-state cathode current	$I_{KA} (OFF)$	$V_{KA}=36V, V_{REF}=0$		0.03	0.3	$\mu A$	Fig.3	

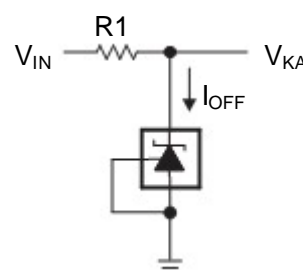
**Note:**The dynamic impedance is defined as:  $|Z_{KA}| = \Delta V_{KA} / \Delta I_{KA}$



**Fig.1:** for  $V_{KA} = V_{REF}$



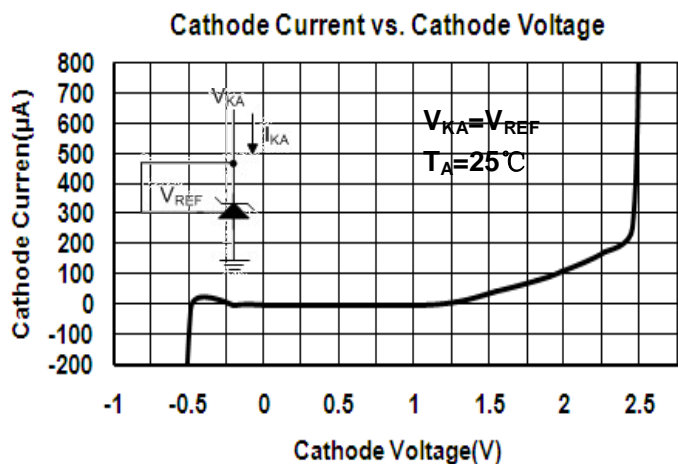
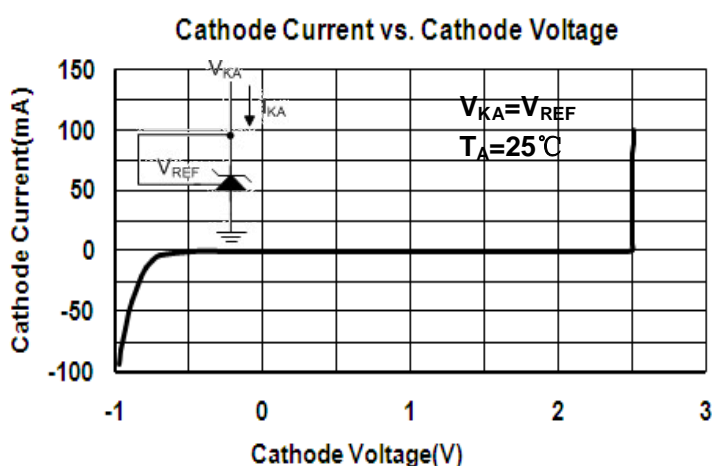
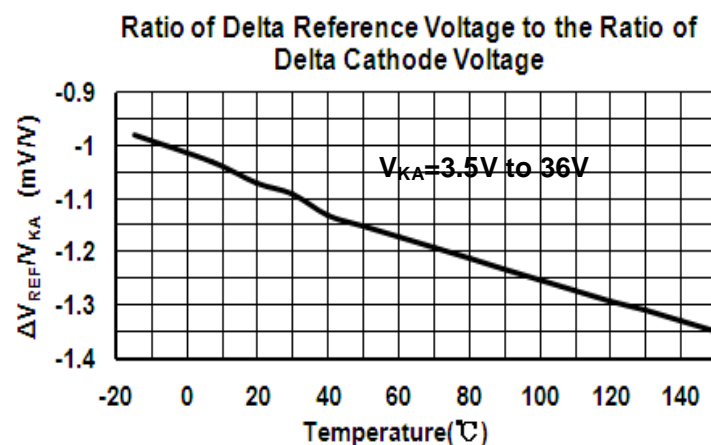
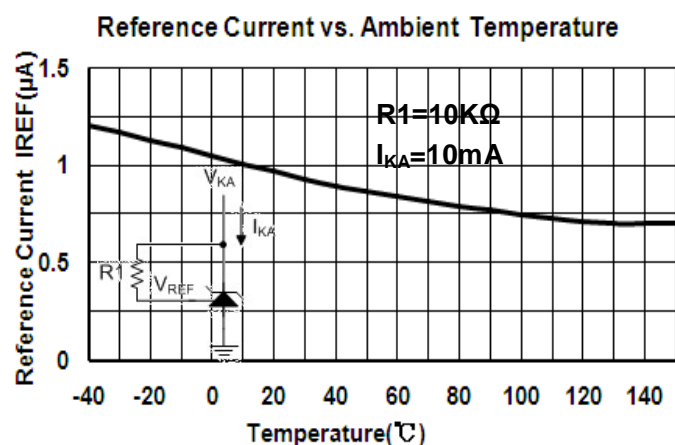
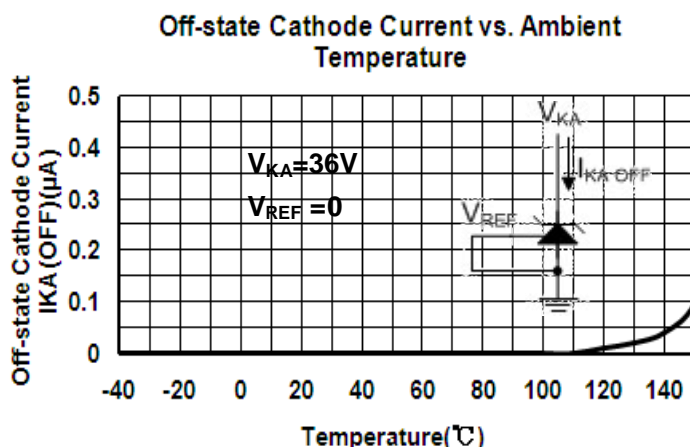
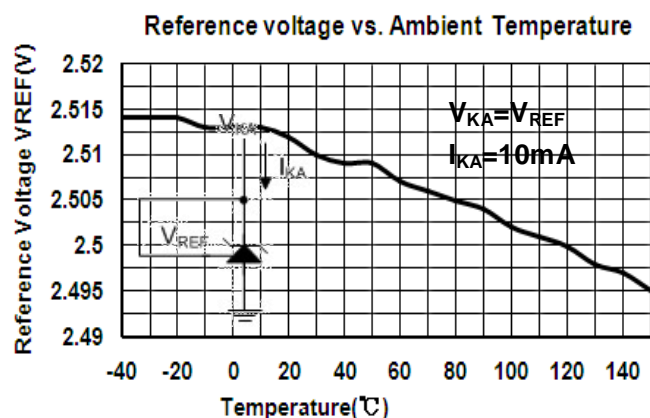
**Fig.2:** for  $V_{KA} > V_{REF}$



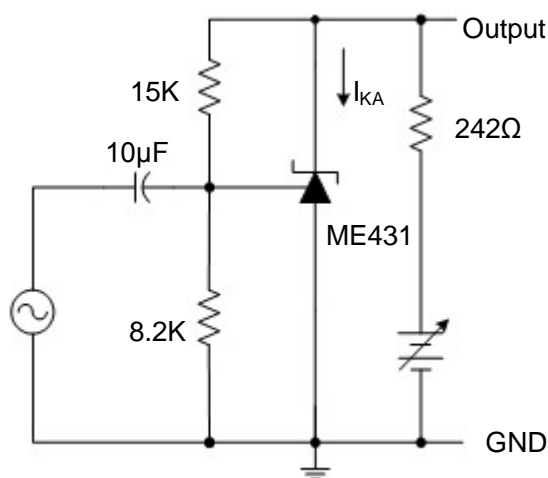
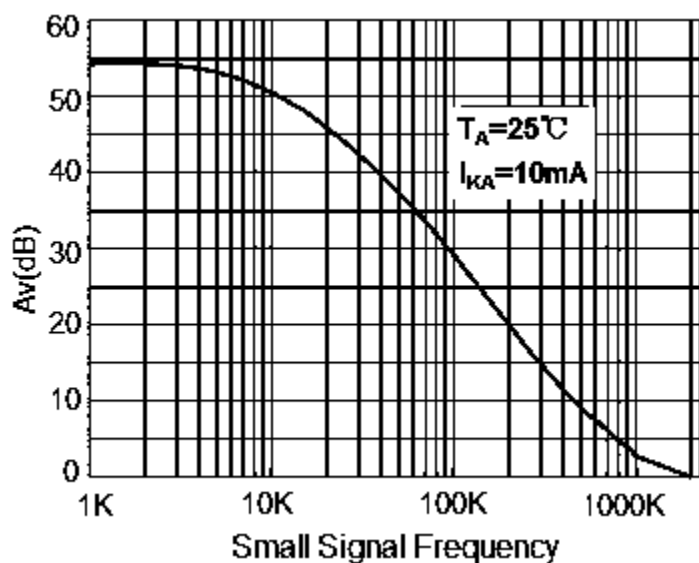
**Fig.3:** for  $I_{OFF}$

$$V_{KA} = V_{REF} (1 + R1 / R2) + I_{KA} R3$$

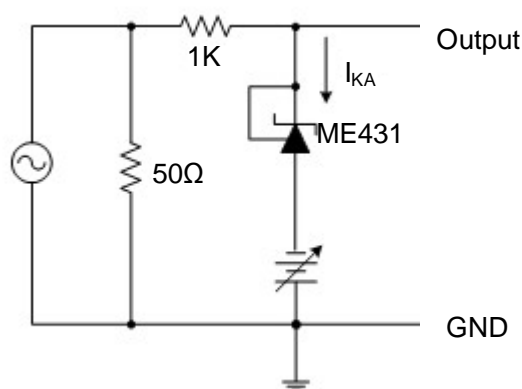
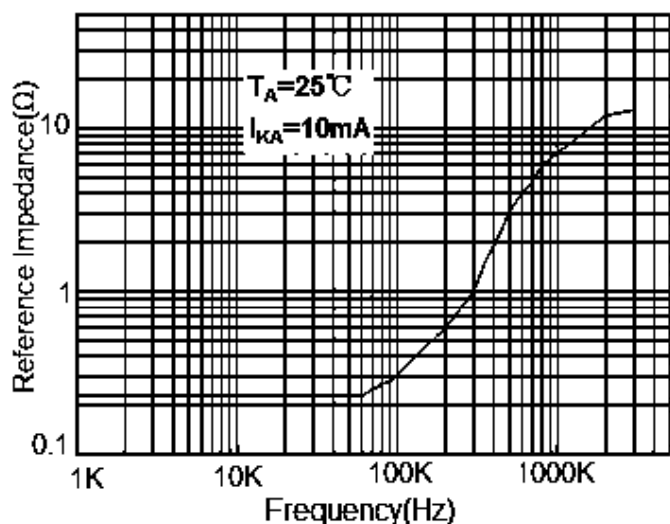
Typical Performance Characteristics



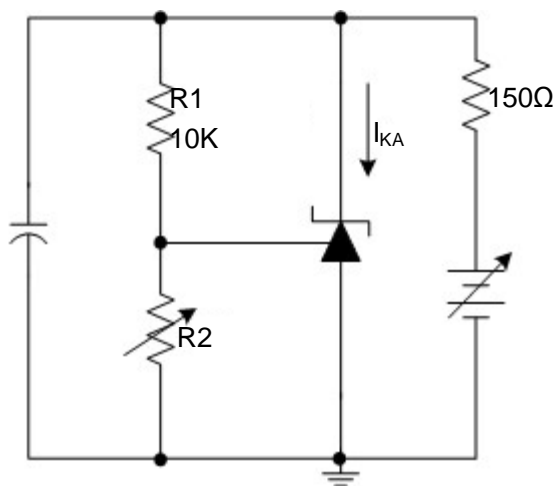
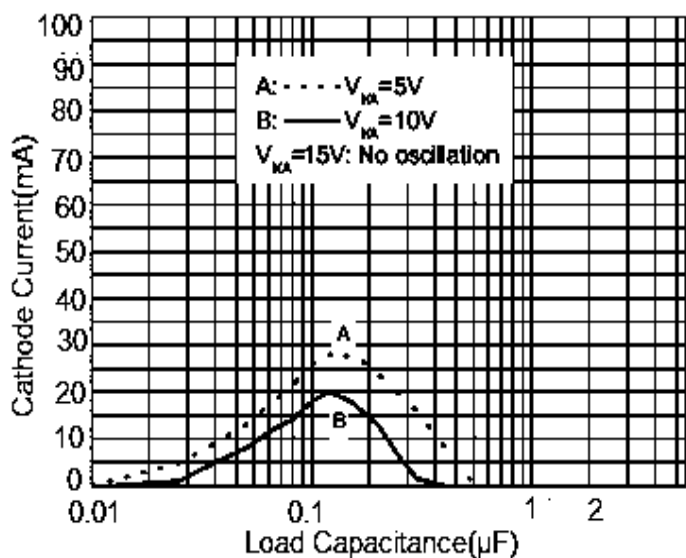
Small Signal Voltage Gain vs. Frequency



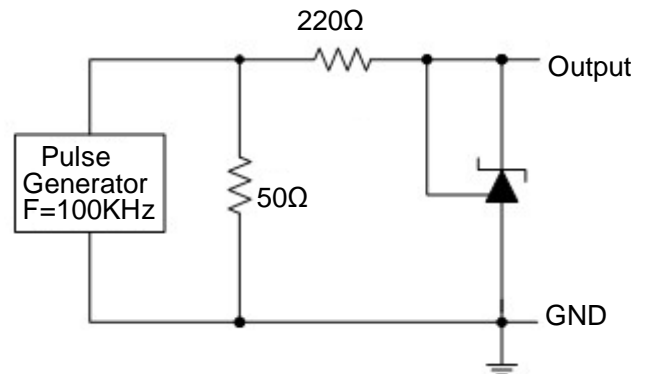
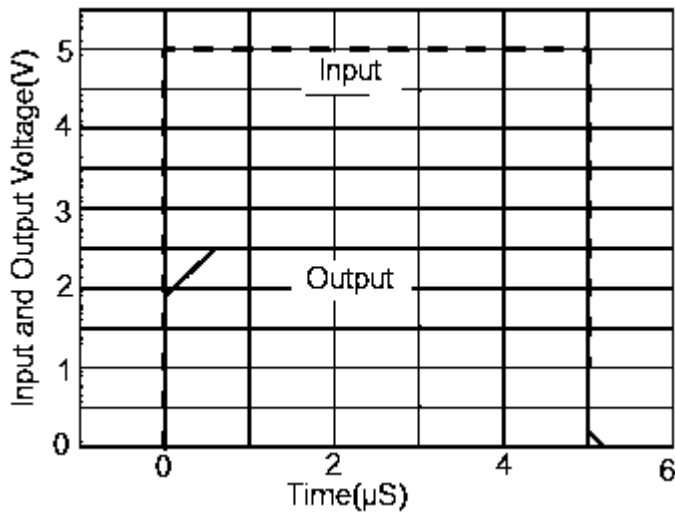
Reference Impedance vs. Frequency



Stability Boundary Conditions vs. Load Capacitance



Pulse Response of Input and Output Voltage



Typical Application

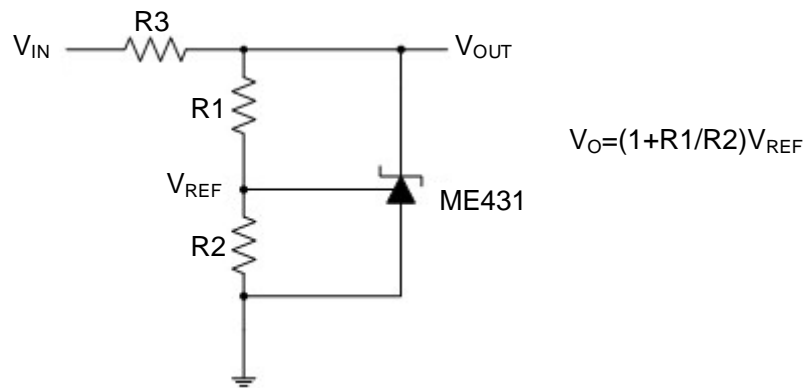


Fig.4: Shunt Regulator

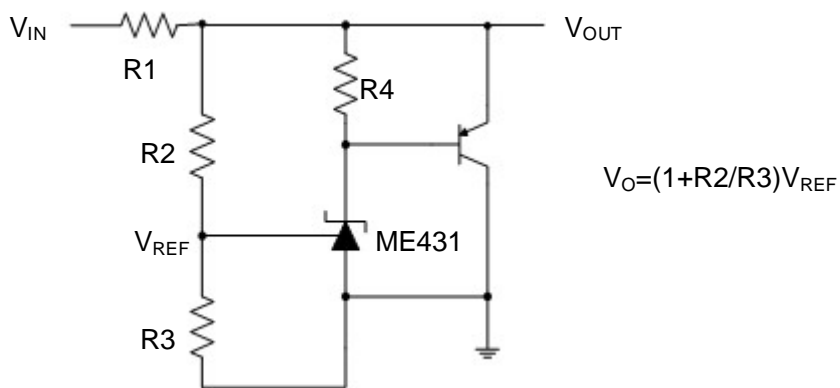


Fig.5: High Current Shunt Regulator

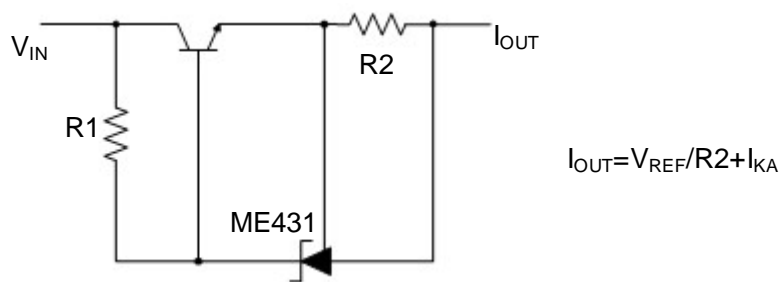


Fig.6: Current Source or Current Limit

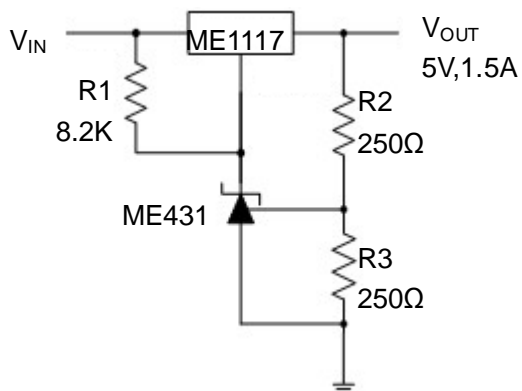
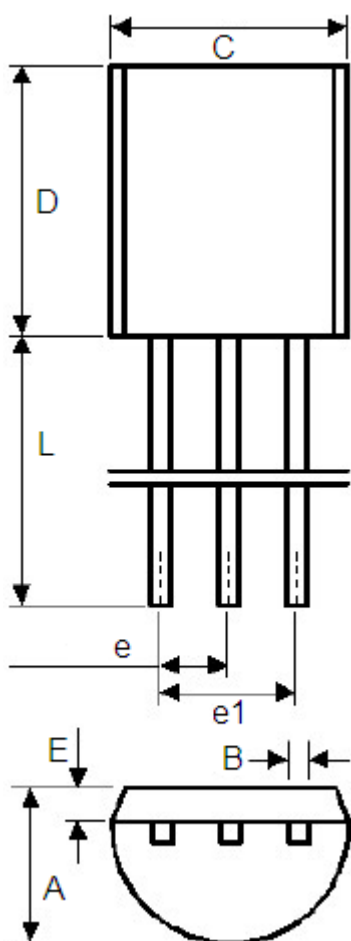


Fig.7: Precision 5V 1.5A Regulator

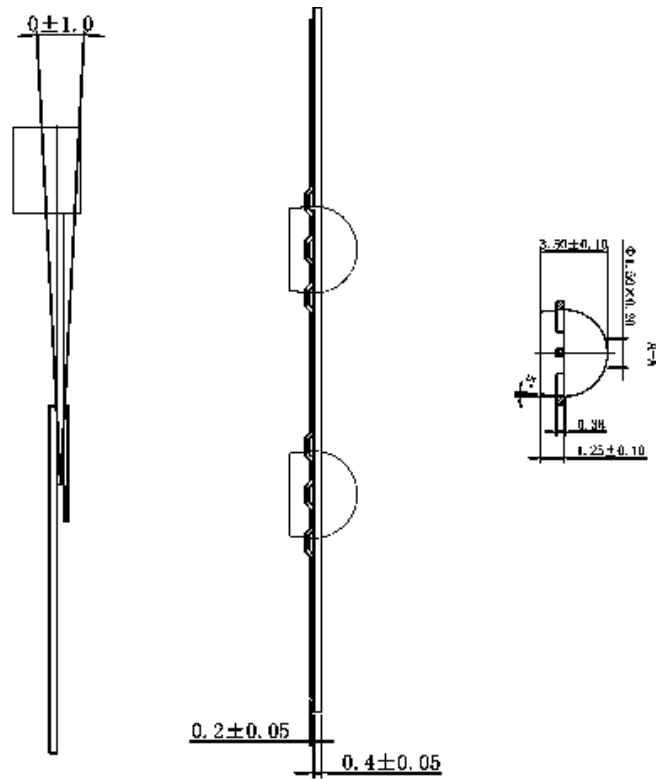
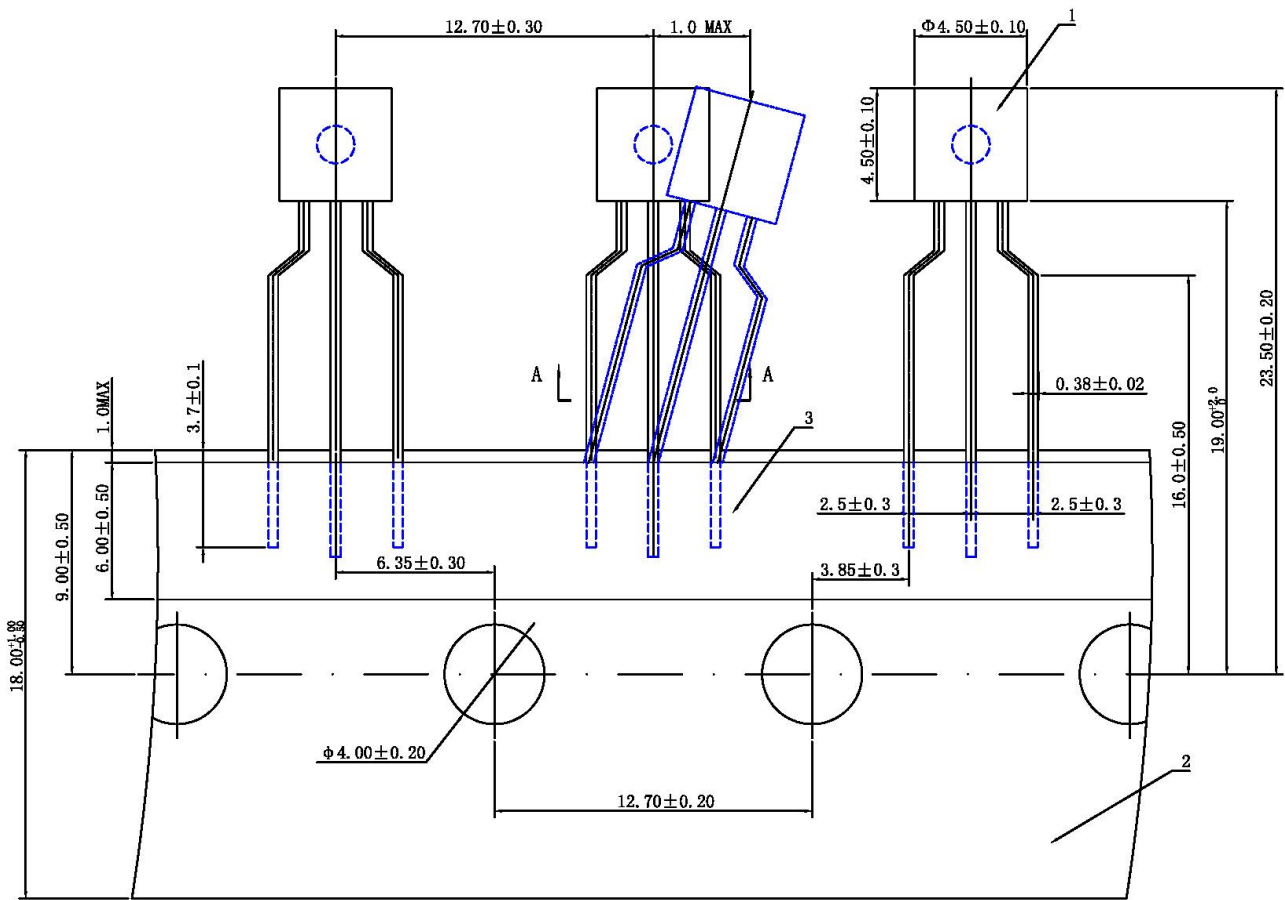
Packaging Type: TO-92



	Min	Max	Min	Max
A	3.4	3.8	0.13386	0.1496
B	0.3	0.5	0.0118	0.0197
C	4.4	4.8	0.1732	0.189
D	4.4	4.8	0.1732	0.189
E	0.9	1.5	0.0354	0.059
e	1.17	1.37	0.046	0.0539
e1	2.39	2.69	0.094	0.1059
L	12	16	0.4724	0.6299

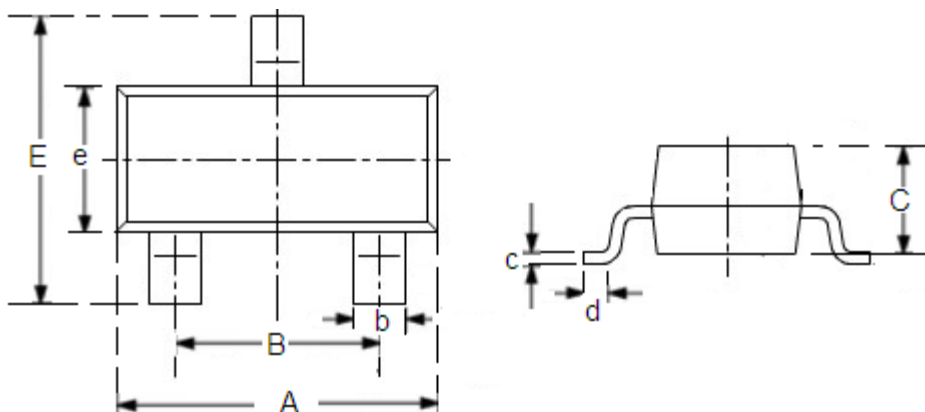


Packaging Type: TO-92 (Paper Tape)



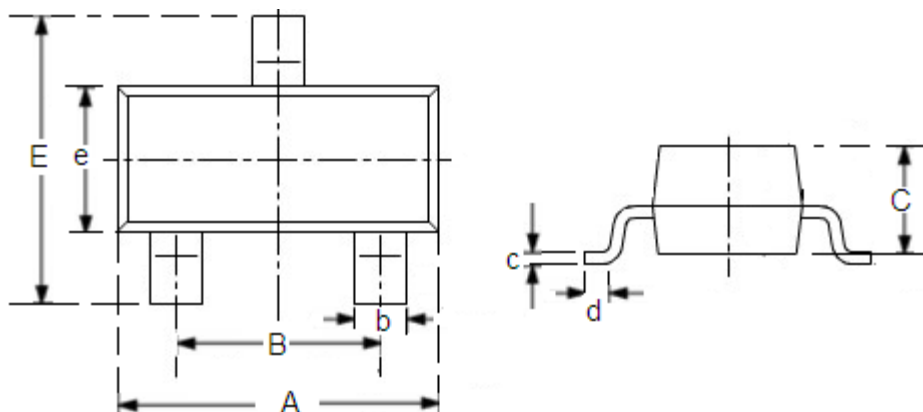
单位: mm

## Packaging Type: SOT23-3



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	2.7	3.1	0.1063	0.122
B	1.7	2.1	0.0669	0.0827
b	0.35	0.5	0.0138	0.0197
C	1.0	1.2	0.0394	0.0472
c	0.1	0.25	0.0039	0.0098
d	0.2	-	0.0079	-
E	2.6	3.0	0.1023	0.1181
e	1.5	1.8	0.059	0.0708

## Packaging Type: SOT23



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	2.7	3.1	0.1063	0.122
B	1.7	2.1	0.0669	0.0827
b	0.35	0.5	0.0138	0.0197
C	1.0	1.2	0.0394	0.0472
c	0.1	0.25	0.0039	0.0098
d	0.2	-	0.0079	-
E	2.1	2.64	0.0827	0.1039
e	1.2	1.4	0.0472	0.0551

- The information described herein is subject to change without notice.
- Nanjing Micro One Electronics Inc is not responsible for any problems caused by circuits or diagrams described herein whose related industrial properties, patents, or other rights belong to third parties. The application circuit examples explain typical applications of the products, and do not guarantee the success of any specific mass-production design.
- Use of the information described herein for other purposes and/or reproduction or copying without the express permission of Nanjing Micro One Electronics Inc is strictly prohibited.
- The products described herein cannot be used as part of any device or equipment affecting the human body, such as exercise equipment, medical equipment, security systems, gas equipment, or any apparatus installed in airplanes and other vehicles, without prior written permission of Nanjing Micro One Electronics Inc.
- Although Nanjing Micro One Electronics Inc exerts the greatest possible effort to ensure high quality and reliability, the failure or malfunction of semiconductor products may occur. The user of these products should therefore give thorough consideration to safety design, including redundancy, fire-prevention measures, and malfunction prevention, to prevent any accidents, fires, or community damage that may ensue.

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Voltage References](#) category:*

*Click to view products by [Micro One](#) manufacturer:*

Other Similar products are found below :

[622664A](#) [636116E](#) [748389C](#) [AS431ARTR-E1](#) [NCP431BCSNT1G](#) [NCP432BCSNT1G](#) [NCV431BSNT1G](#) [AP4313UKTR-G1](#)  
[TL1431AIYDT](#) [AZ431BR-ATRE1](#) [622668D](#) [NCP432BVSNT1G](#) [5962-8686103XC](#) [NCV431BVDMR2G](#) [AP4306BUKTR-G1](#)  
[SC431BVSNT1G](#) [MAX6023EBT30+T](#) [NCV431ASNT1G](#) [LM4040CEM3-5.0/V+T](#) [LT1460KCS3-3#TRM](#) [LT1460KCS3-3.3#TRM](#)  
[LT1019AIS8-2.5](#) [LT6660KCDC-10#TRMPBF](#) [LTC6652BHLS8-5#PBF](#) [LTC6652AHLS8-4.096#PBF](#) [LTC6655BHLS8-4.096#PBF](#)  
[LT6660HCDC-5#TRMPBF](#) [LM336Z-2.5#PBF](#) [LT1021BMH-10](#) [SC431ILPRAG](#) [TLVH431MIL3T](#) [MAX6023EBT21+T](#) [AP432AQG-7](#)  
[ADR4540CRZ](#) [LM4040B25QFTA](#) [TS3325AQPR](#) [REF102AU/2K5](#) [TL4050B25QDBZR](#) [TL4051C12QDCKR](#) [TL431ACZ](#) [KA431SLMF2TF](#)  
[KA431SMF2TF](#) [KA431SMFTF](#) [LM385BXZ/NOPB](#) [LM4040QCEM3-3.0/NOPB](#) [LM4041C12ILPR](#) [LM4050AEM3X-5.0/NOPB](#)  
[LM4050AIM3X-5.0/NOPB](#) [LM4120AIM5-2.5/NOP](#) [LM431SCCMFX](#)