



ZHEJIANG UNI-NE Technology CO., LTD

浙江宇力微新能源科技有限公司



HT431AN Data Sheet

V 1.2

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ADJUSTABLE PRECISION SHUNT REGULATORS

Description

The HT431AN is a three-terminal adjustable shunt regulator with guaranteed thermal stability over a full operation range. It features sharp turn-on characteristics, low temperature coefficient and low output impedance, which make it ideal substitute for Zener diode in applications such as switching power supply, charger and other adjustable regulators.

The output voltage of HT431AN can be set to any value between $V_{REF}(2.5V)$ and the corresponding maximum cathode voltage (36V).

The HT431AN precision reference is offered in two voltage tolerance: 0.4%.

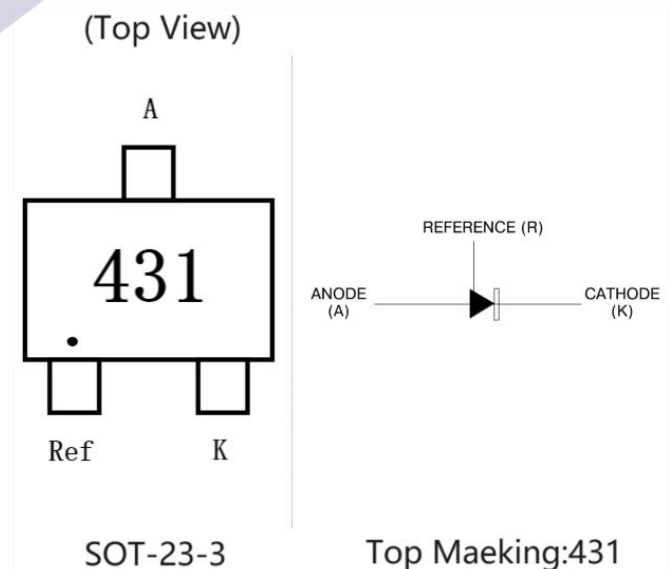
Features

- Programmable Precise Output Voltage from 2.5V to 36V
- High Stability under Capacitive Load
- Low Temperature Deviation: 4.5mV Typical
- Low Equivalent Full-range Temperature
- Coefficient with 20PPM/°C Typical
- Sink Current Capacity from 1mA to 100mA
- Low Output Noise
- Wide Operating Range of -40 to +125°C
- Lead-Free Packages: SOT-23-3
- Totally Lead-Free & Fully RoHS Compliant

Applications

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

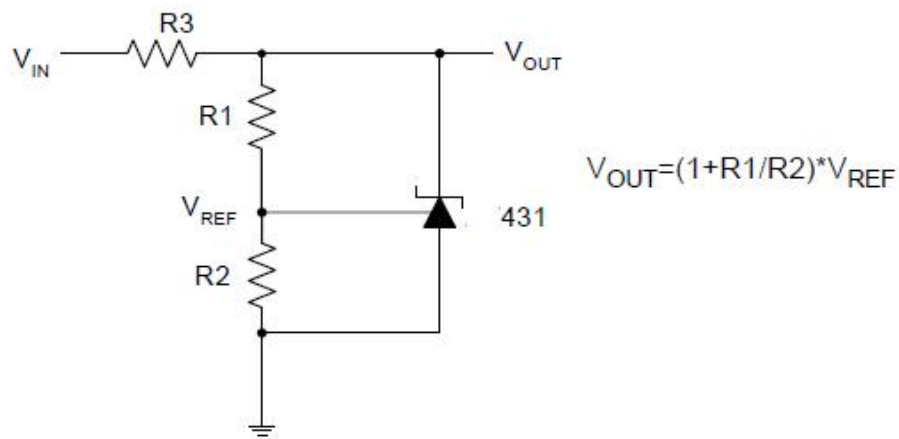
Pin Configuration



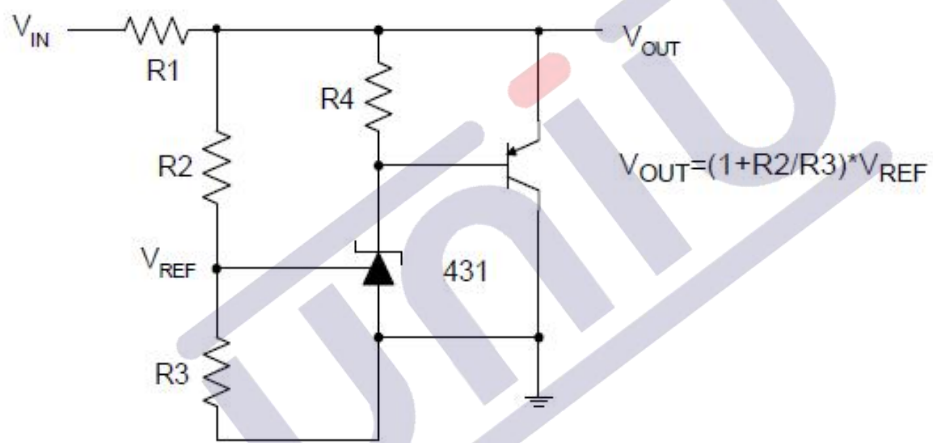
Ordering Information

Part Number	Description
HT431AN	SOT-23-3, halogen free, 3000Pcs/Reel

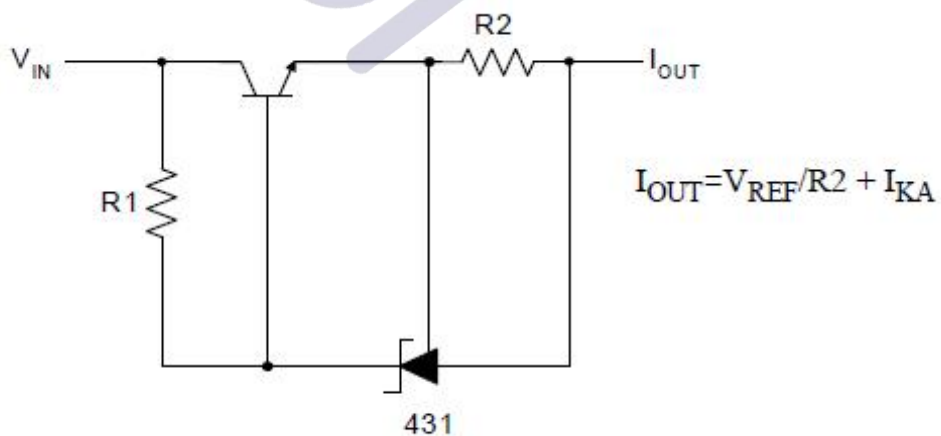
Typical Applications Circuit



Shunt Regulator

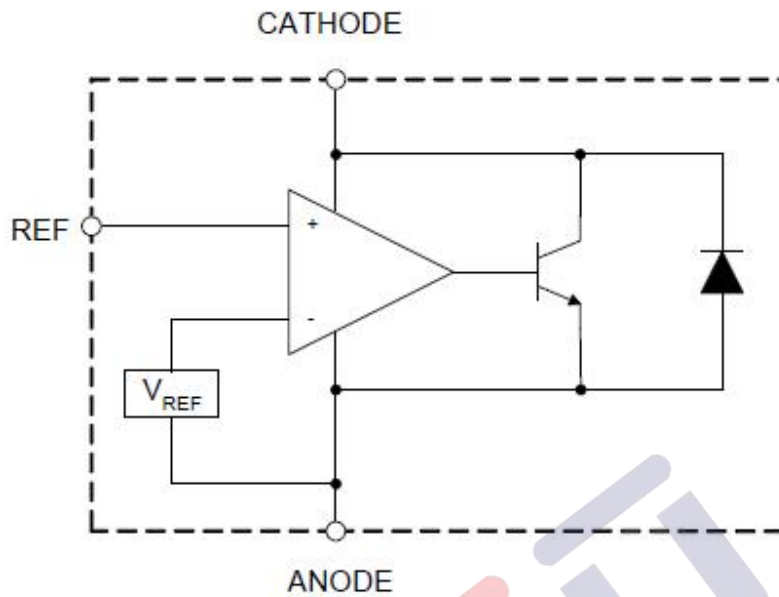


High Current Shunt Regulator



Current Source or Current Limit

Functional Block Diagram



Absolute Maximum Ratings (Note 5)

Symbol	Parameter	Rating	Unit
V_{KA}	Cathode Voltage	40	V
I_{KA}	Cathode Current Range (Continuous)	-100 to 150	mA
I_{REF}	Reference Input Current Range	10	mA
T_J	Junction Temperature	+150	°C
T_{STG}	Storage Temperature Range	-65 to +150	°C
ESD	ESD (Human Body Model)	3000	V

Note5: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

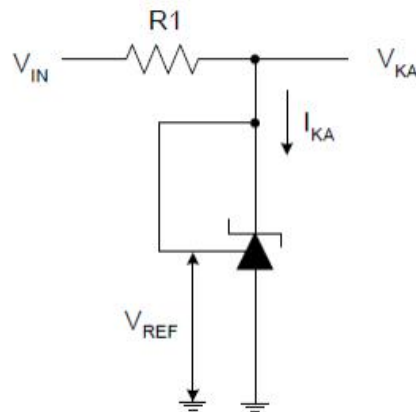
Recommended Operating Conditions

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

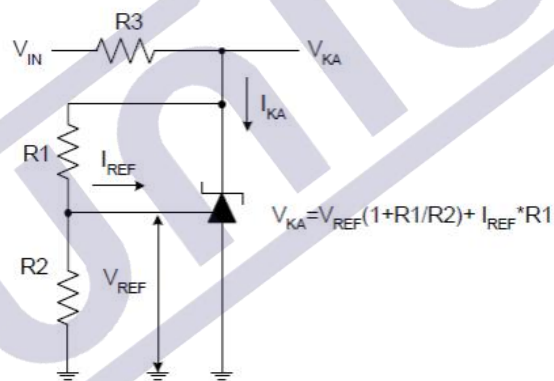
Electrical Characteristics (@TA = +25°C, unless otherwise specified.)

Symbol	Test Circuit	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	4	Reference Voltage	$\pm 0.4\%$ $V_{KA}=V_{REF}, I_{KA}=10mA$	2.490	2.500	2.510	V
ΔV_{REF}	4	Deviation of Reference Voltage Over Full Temperature Range	$V_{KA} = V_{REF}$ $I_{KA} = 10mA$	0 to +70°C -40 to +85°C -40 to +125°C	— 4.5 4.5	8 10 16	mV
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	5	Ratio of Change in Reference Voltage to the Change in Cathode Voltage	$I_{KA} = 10mA$	$\Delta V_{KA} = 10V$ to V_{REF} $\Delta V_{KA} = 36V$ to $10V$	— -1.0 -0.5	-2.7 -2.0	mV/V
I_{REF}	5	Reference Current	$I_{KA}=10mA, R1=10K\Omega, R2=\infty$	—	0.8	4	μA
ΔI_{REF}	5	Deviation of Reference Current Over Full Temperature Range	$I_{KA}=10mA, R1=10K\Omega$ $R2=\infty, T_A=-40$ to $+125^\circ C$	—	0.4	1.1	μA
I_{KA} (Min)	4	Minimum Cathode Current for Regulation	$V_{KA} = V_{REF}$	—	0.4	1.0	mA
I_{KA} (Off)	6	Off-state Cathode Current	$V_{KA} = 36V, V_{REF} = 0$	—	0.05	1.0	μA
Z_{KA}	4	Dynamic Impedance	$V_{KA}=V_{REF}, I_{KA} = 1$ to $100mA,$ $f \leq 1.0KHz$	—	0.15	0.5	Ω
θ_{JC}	—	Thermal Resistance	SOT-23-3	—	130	—	$^\circ C/W$

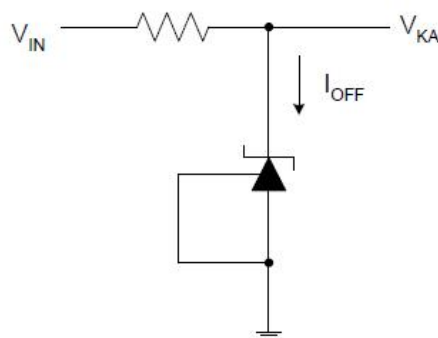
Electrical Characteristics



Test Circuit 4 for $V_{KA} = V_{REF}$



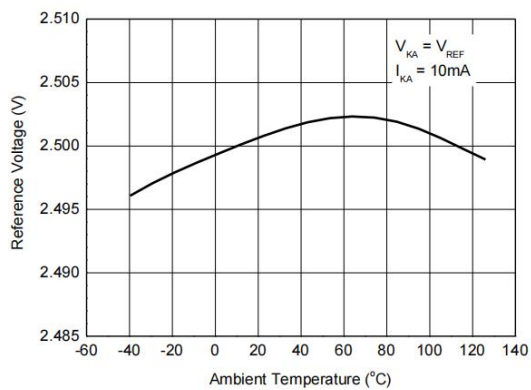
Test Circuit 5 for $V_{KA} > V_{REF}$



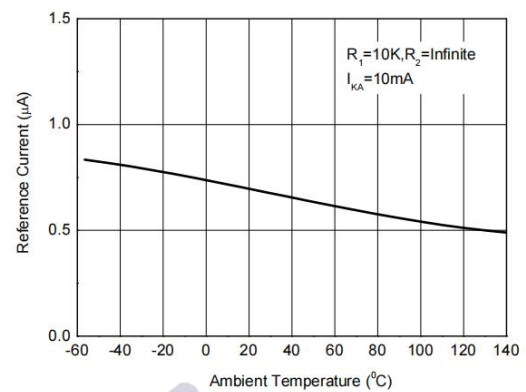
Test Circuit 6 for I_{OFF}

Performance Characteristics

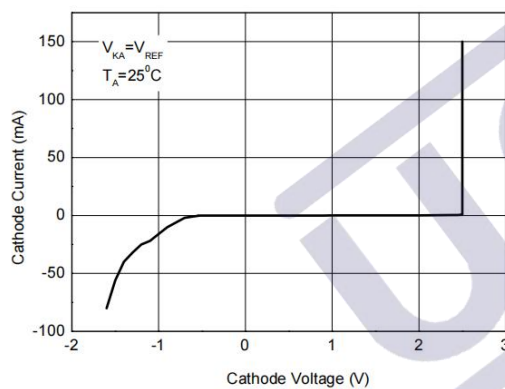
Reference Voltage vs. Ambient Temperature



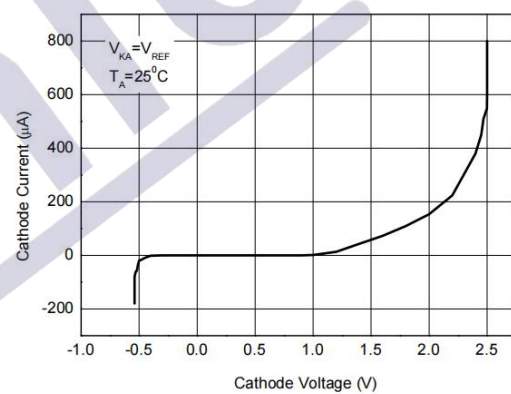
Reference Current vs. Ambient Temperature



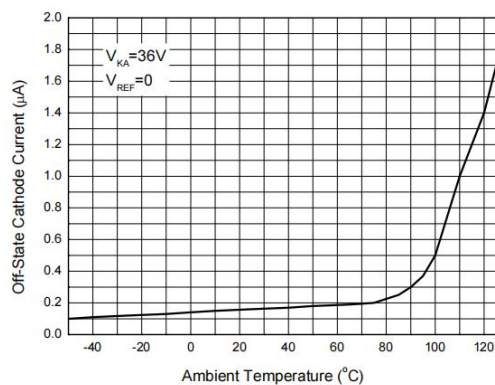
Cathode Current vs. Cathode Voltage



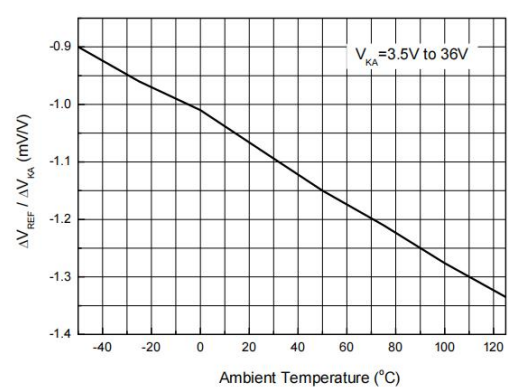
Cathode Current vs. Cathode Voltage



Off-State Cathode Current vs. Ambient Temperature

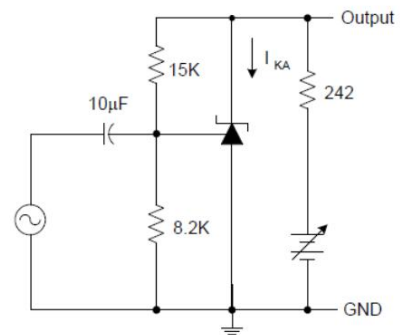
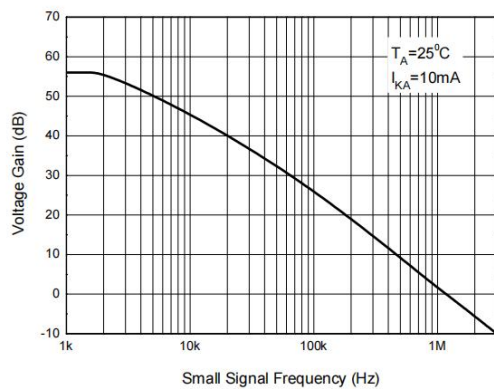


Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage

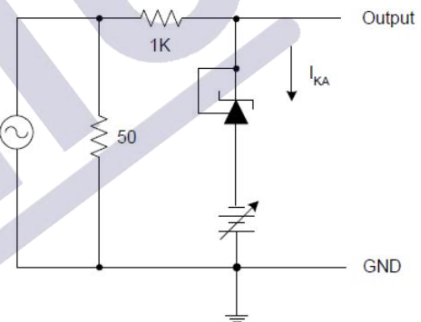
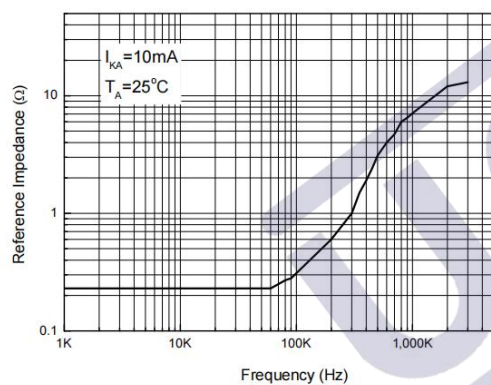


Performance Characteristics (Cont.)

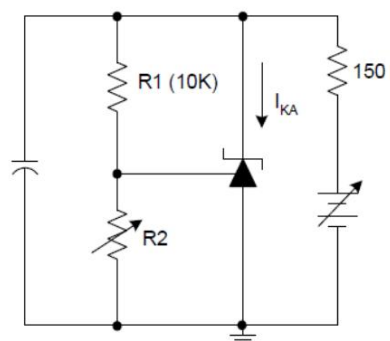
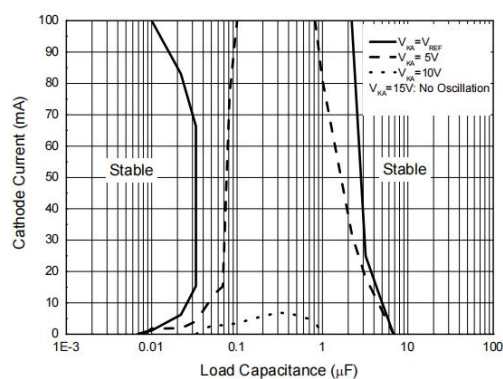
Small Signal Voltage Gain vs. Frequency



Reference Impedance vs. Frequency

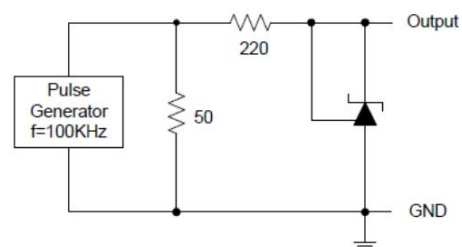
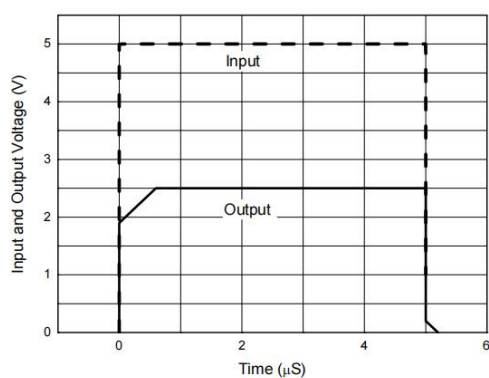


Stability Boundary Conditions vs. Load Capacitance



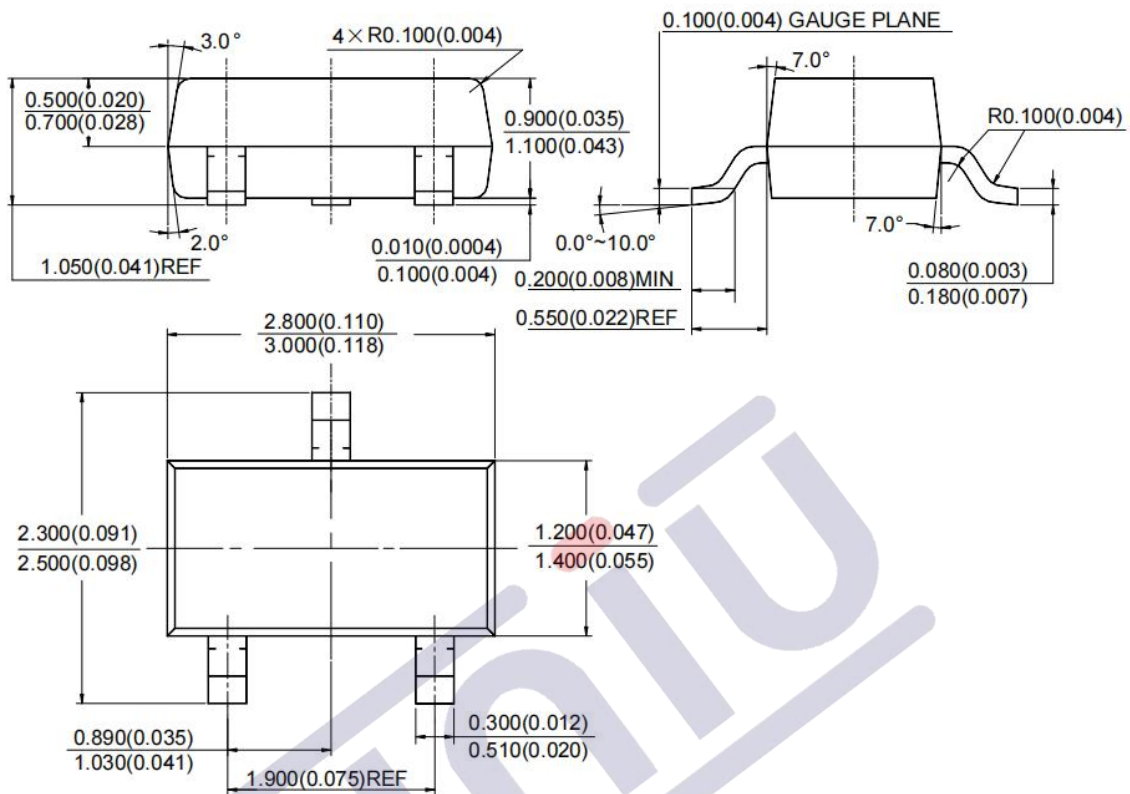
Performance Characteristics (Cont.)

Pulse Response of Input and Output Voltage



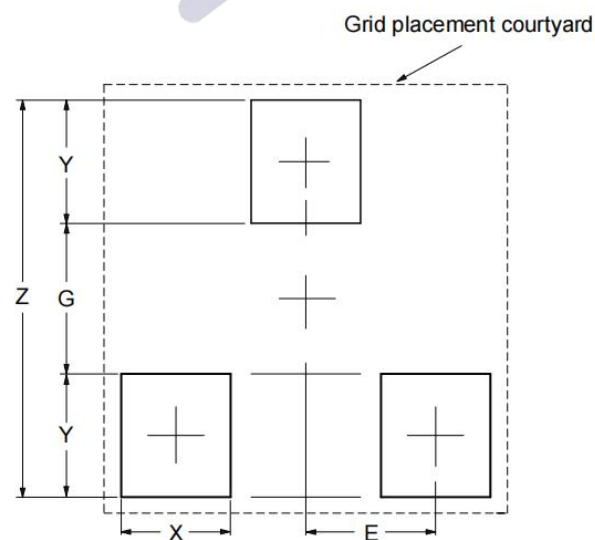
Package Outline Dimensions

(3) Package Type: SOT23-3



Suggested Pad Layout

Package Type: SOT23-3



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	2.900/0.114	1.100/0.043	0.800/0.031	0.900/0.035	0.950/0.037

1、版本记录

DATE	REV.	DESCRIPTION
2018/04/19	1.0	首次发布
2020/05/21	1.1	布局调整
2023/09/15	1.2	免责声明更新

2、免责声明

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