

XH431

Descriptions

The XH431/XH431C 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 output voltage of these ICs can be set to any value between V_{REF} (2.5V) and the maximum cathode voltage (36V).

The XH431/XH431C precision reference is offered in two voltage tolerance: 0.4% and 0.8%.

These ICs are available in SOT-23 package.

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
- Low Dynamic Output Resistance: 0.15Ω Typical
- Sink Current Capacity from 1mA to 100mA
- Low Output Noise
- Wide Operating Range of -40 to +125°C
- Lead-Free Packages: SOT-23
- Totally Lead-Free; RoHS Compliant
- Totally Lead-Free & Fully RoHS Compliant

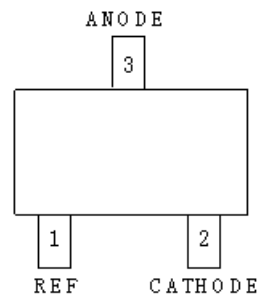
Applications

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

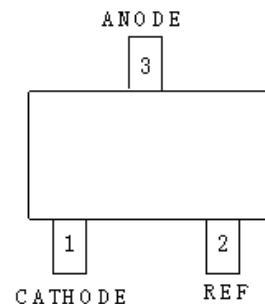
Pin Assignments

Top View

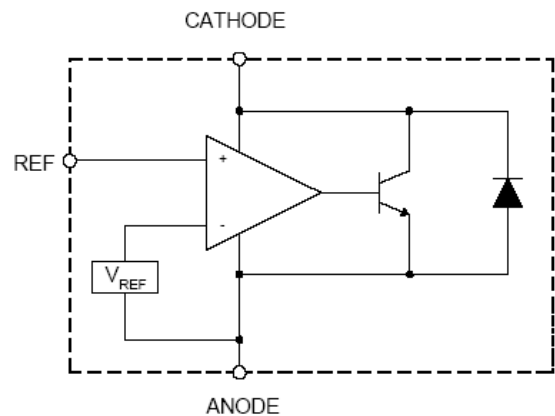
SOT-23 (N)



SOT-23(N1)



Functional Block Diagram



Absolute Maximum Ratings

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
P _D	Power Dissipation	370	mW
T _J	Junction Temperature	+150	°C
T _{STG}	Storage Temperature Range	-65 to +150	°C
ESD	ESD (Human Body Model)	2000	V
	ESD (Charged Device Model)	2000	V

Note : 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.

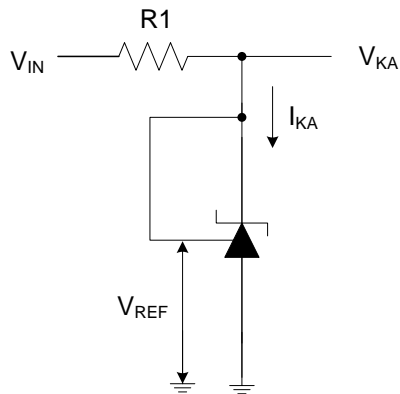
Recommended Operating Conditions

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

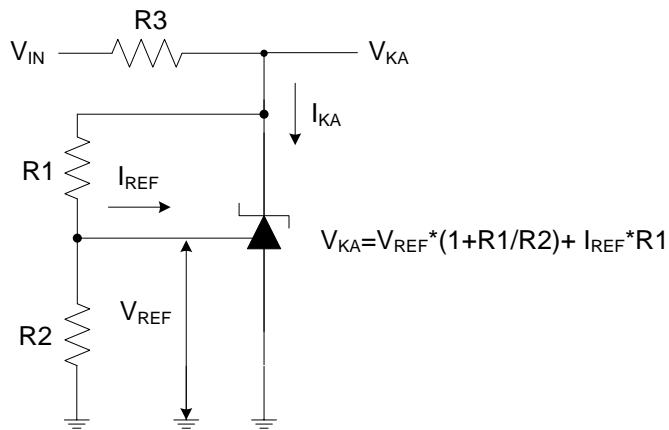
Electrical Characteristics (@T_A=+25°C, unless otherwise specified.)

Symbol	Parameter		Test Circuit	Conditions	Min	Typ	Max	Unit	
V _{REF}	Reference Voltage	0.4%	4	V _{KA} =V _{REF} , I _{KA} =10mA	2.490	2.5	2.510	V	
		0.8%			2.480	2.5	2.520		
ΔV _{REF}	Deviation of Reference Voltage Over Full Temperature Range		4	V _{KA} =V _{REF} , I _{KA} =10mA	0 to +70°C	-	4.5	8	mV
					-40 to +85°C	-	4.5	10	
					-40 to +125°C	-	4.5	16	
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Ratio of Change in Reference Voltage to the Change in Cathode Voltage		5	I _{KA} =10mA	ΔV _{KA} =10V to V _{REF}	-	-1.0	-2.7	mV/V
					ΔV _{KA} =36V to 10V	-	-0.5	-2.0	
I _{REF}	Reference Current		5	I _{KA} =10mA, R1=10kΩ, R2=∞	-	0.7	4	μA	
ΔI _{REF}	Deviation of Reference Current Over Full Temperature Range		5	I _{KA} =10mA, R1=10kΩ, R2=∞, T _A =-40 to +125°C	-	0.4	1.2	μA	
I _{KA} (Min)	Minimum Cathode Current for Regulation		4	V _{KA} =V _{REF}	-	0.4	1.0	mA	
I _{KA} (Off)	Off-state Cathode Current		6	V _{KA} =36V, V _{REF} =0	-	0.05	1.0	μA	
Z _{KA}	Dynamic Impedance		4	V _{KA} =V _{REF} , I _{KA} =1 to 100mA, f≤1.0kHz	-	0.15	0.5	Ω	
θ _{JC}	Thermal Resistance		-	SOT-23	-	135	-	°C/W	

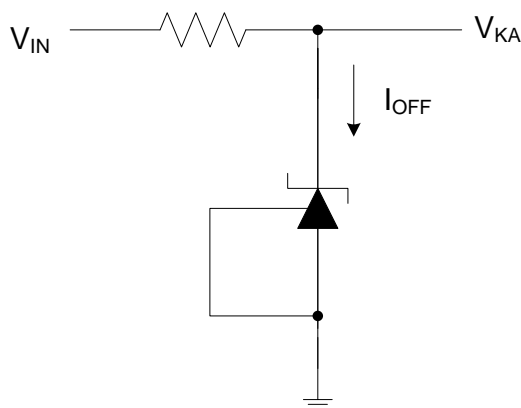
Electrical Characteristics



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

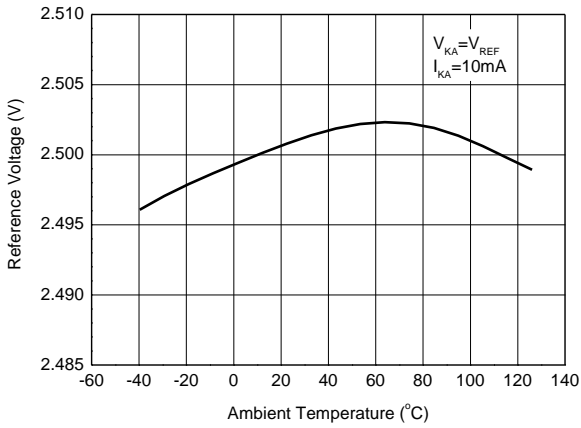


Test Circuit 5 for $V_{KA}>V_{REF}$

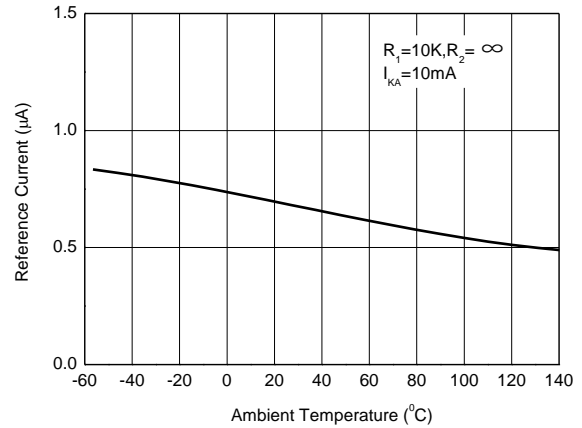


Test Circuit 6 for I_{OFF}

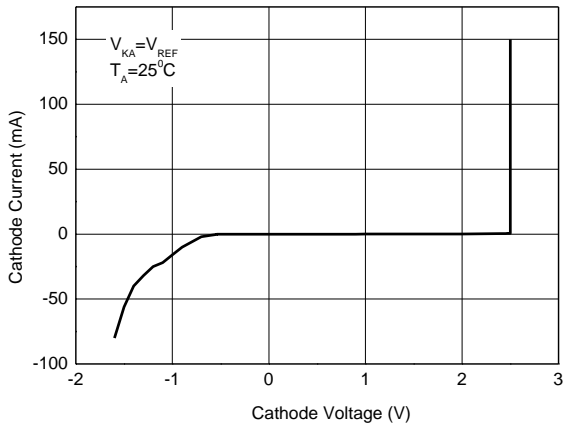
Reference Voltage vs. Ambient Temperature



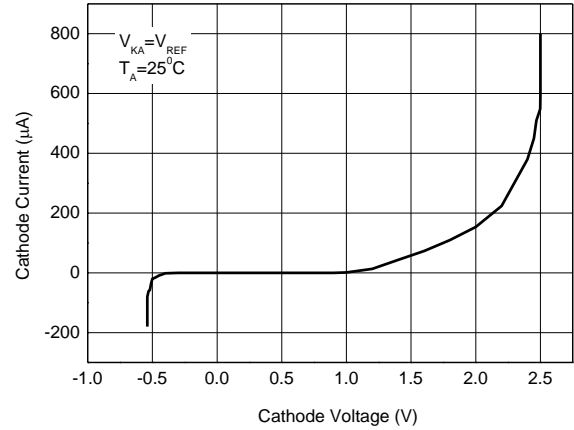
Reference Current vs. Ambient Temperature



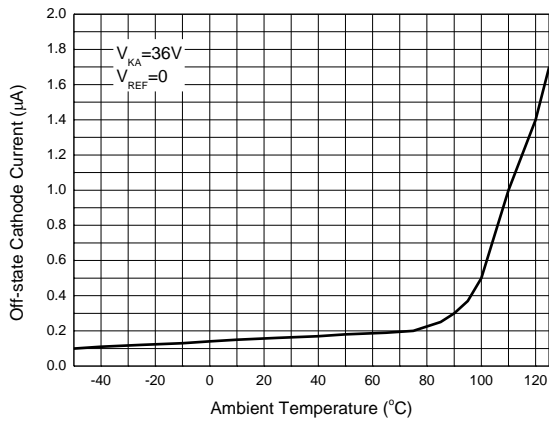
Cathode Current vs. Cathode Voltage



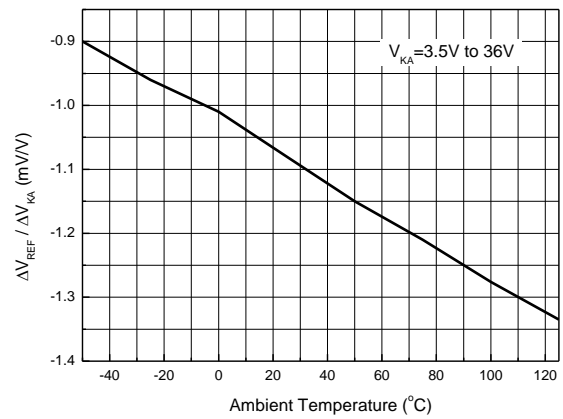
Cathode Current vs. Cathode Voltage



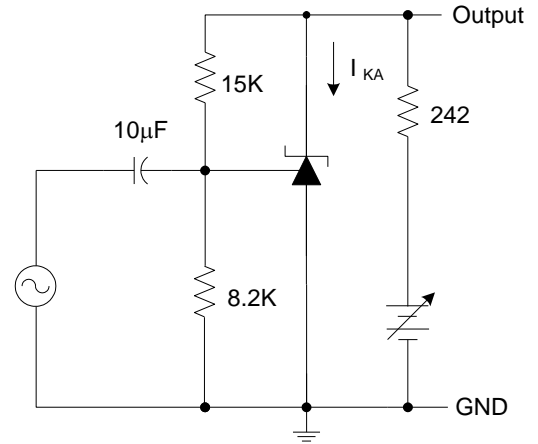
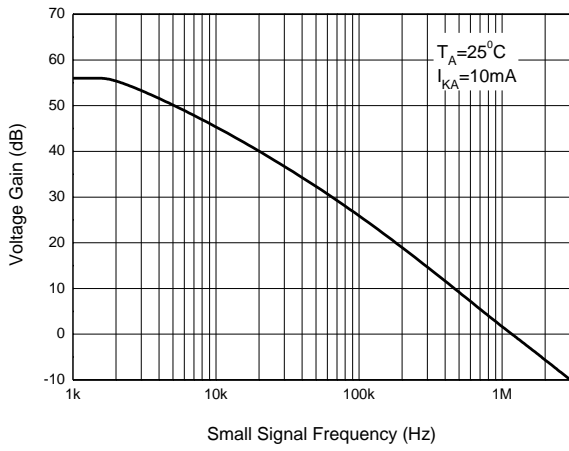
Off-state Cathode Current vs. Ambient Temperature



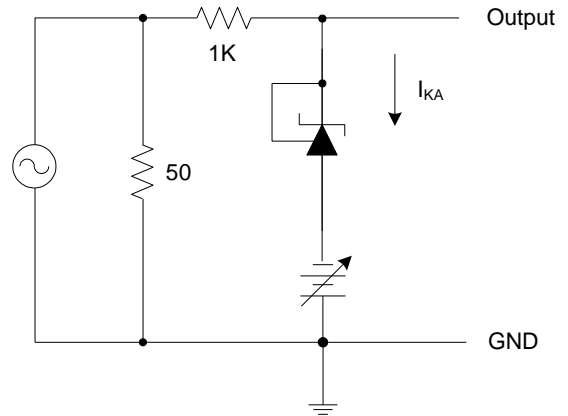
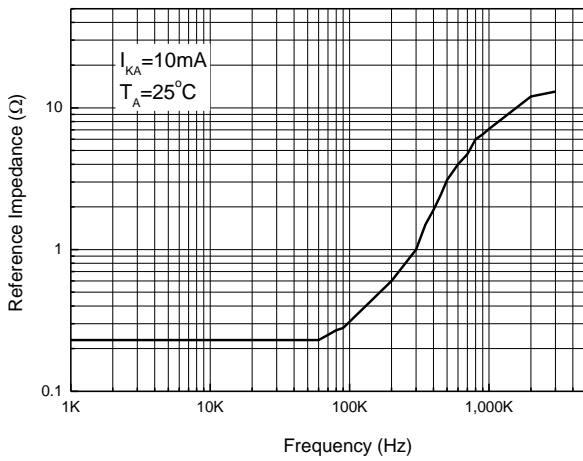
Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage



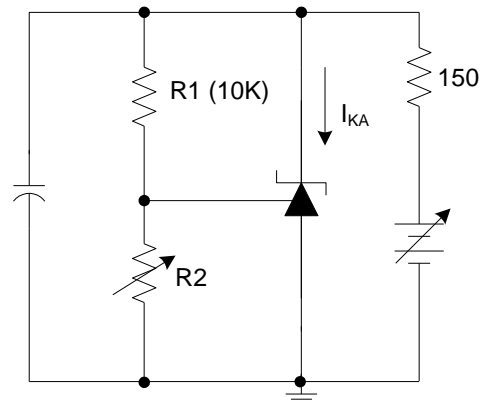
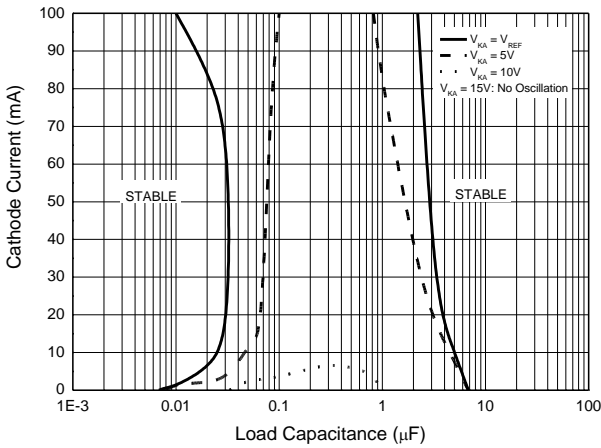
Small Signal Voltage Gain vs. Frequency



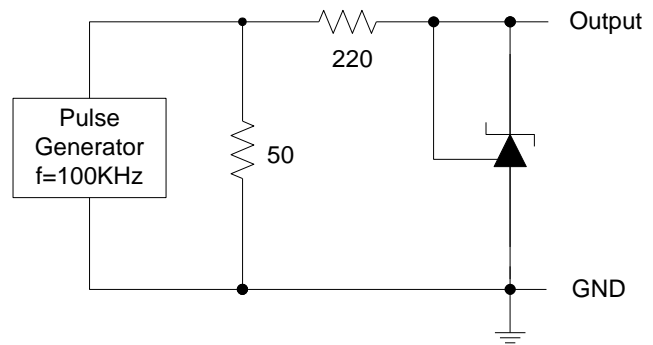
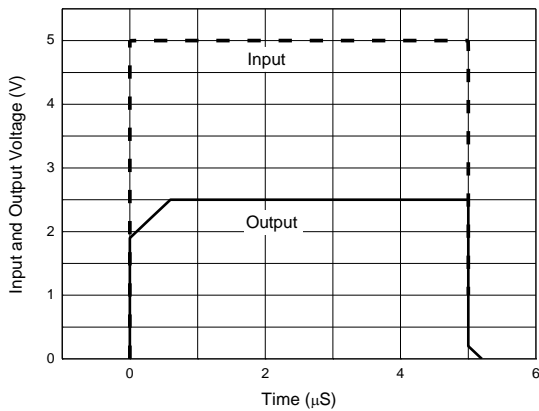
Reference Impedance vs. Frequency



Stability Boundary Conditions vs. Load Capacitance



Pulse Response of Input and Output Voltage

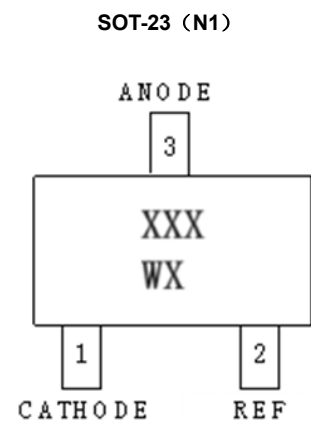
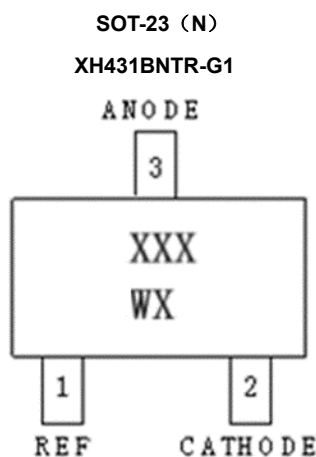
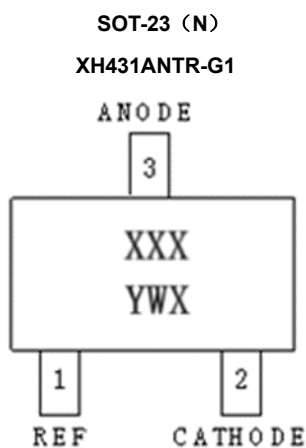


Ordering Information

Package	Temperature Range	Condition	Part Number	Marking ID	Packing
			Green	Green	
SOT-23 (N)	-40 to +125°C	0.4%	XH431ANTR-G1	N1A	3000/Tape & Reel
		0.8%	XH431BNTR-G1	N1B	3000/Tape & Reel
SOT-23 (N1)		0.4%	XH431CANTR-G1	NpA	3000/Tape & Reel
		0.8%	XH431CBNTR-G1	NpB	3000/Tape & Reel

Marking Information

Top View



XXX: Marking ID (See Ordering Information)

YWX Y: Year

W: Weekly

X: Internal Code

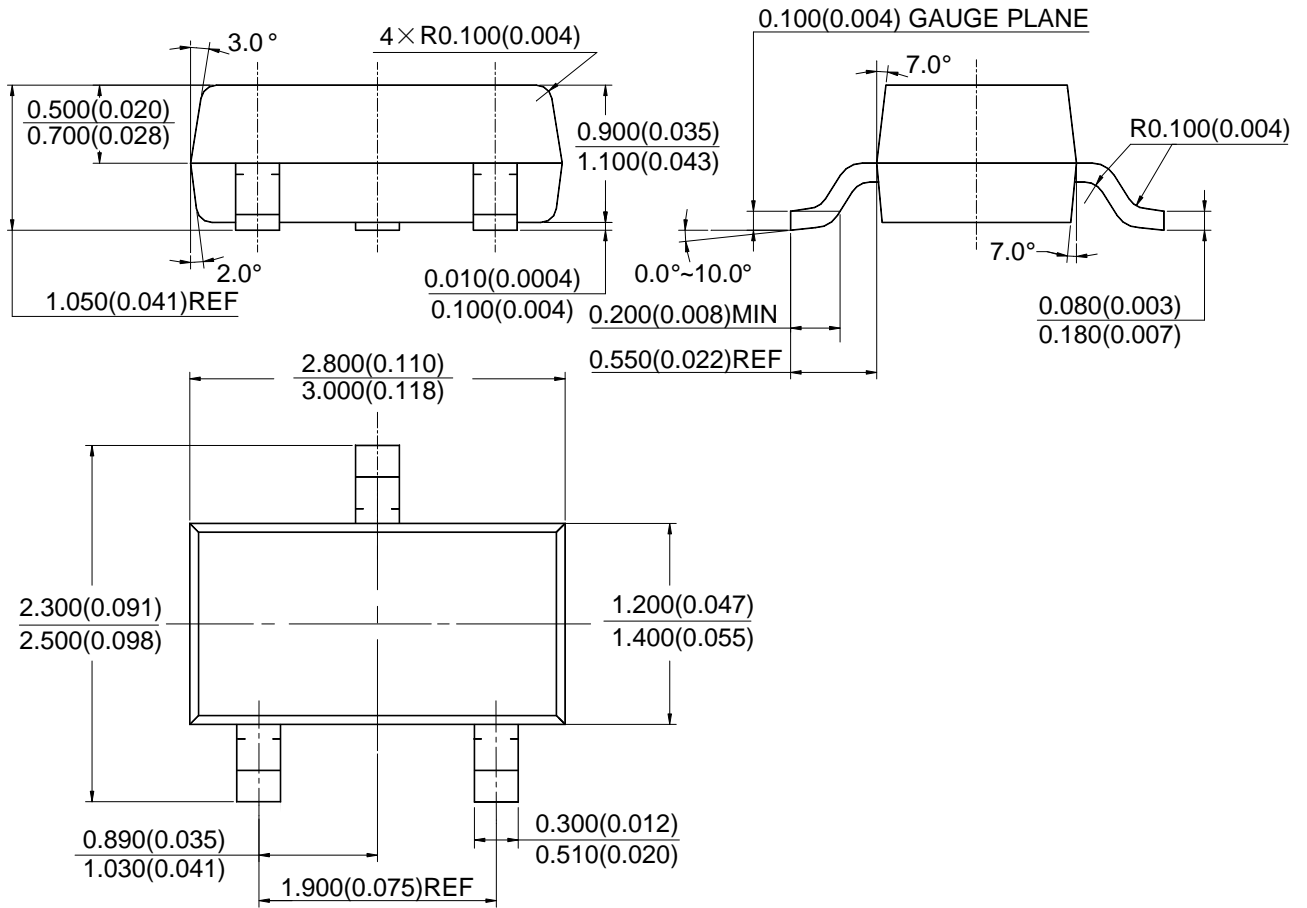
XXX: Marking ID (See Ordering Information)

WX W: Weekly

X: Internal Code

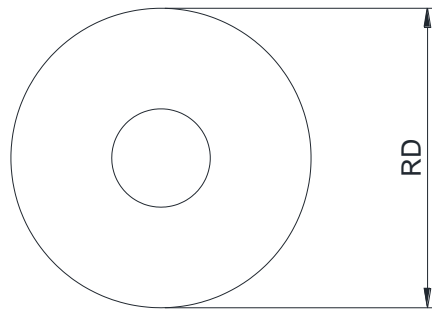
Package Outline Dimensions

Package Type: SOT-23

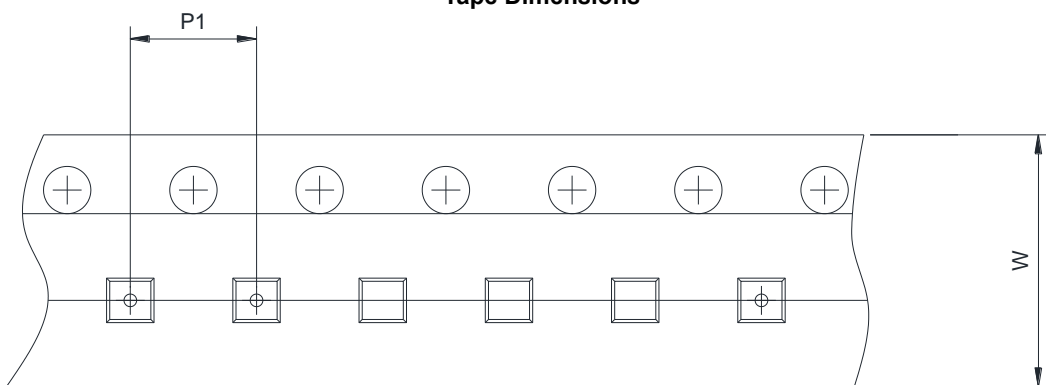


Tape and Reel Information

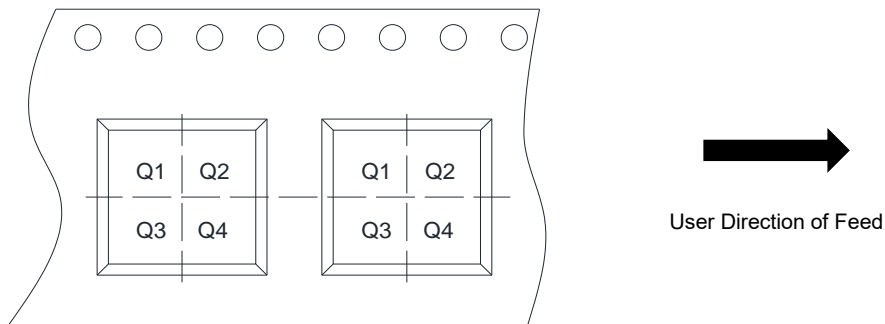
Reel Dimensions



Tape Dimensions



Quadrant Assignments for Pin1 Orientation in Tape



Project		SOT-23
RD	Reel Dimension	7inch
W	Overall Width of the Carrier Tape	8mm
P1	Pitch between Successive Cavity Centers	4mm
Pin1	Pin1 Quadrant	Q3