

MV431

Adjustable Precision Shunt Regulator

Description

The MV431 is a 3-terminal adjustable shunt regulator with guaranteed temperature stability over the entire temperature range of operation. The output voltage may be set at any level greater than 2.5V (V_{REF}) up to 36V merely by selecting two external resistors that act as a voltage divided network. Due to the sharp turn-on characteristics this device is an excellent replacement for many zener diode applications.

Features

- Average temperature coefficient 20 ppm/°C
- Temperature compensated for operation over the full temperature range
- Programmable output voltage
- Fast turn-on response low output noise

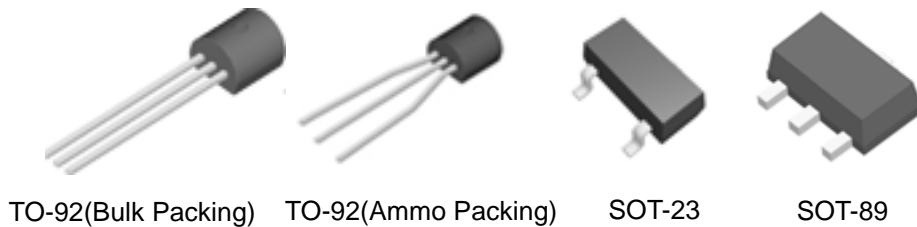
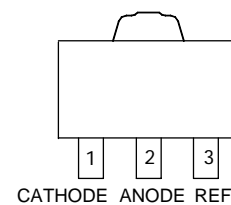
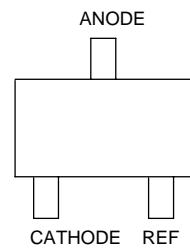
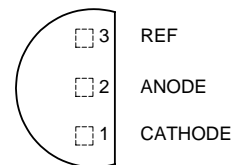


Figure 1. Package Types of MV431



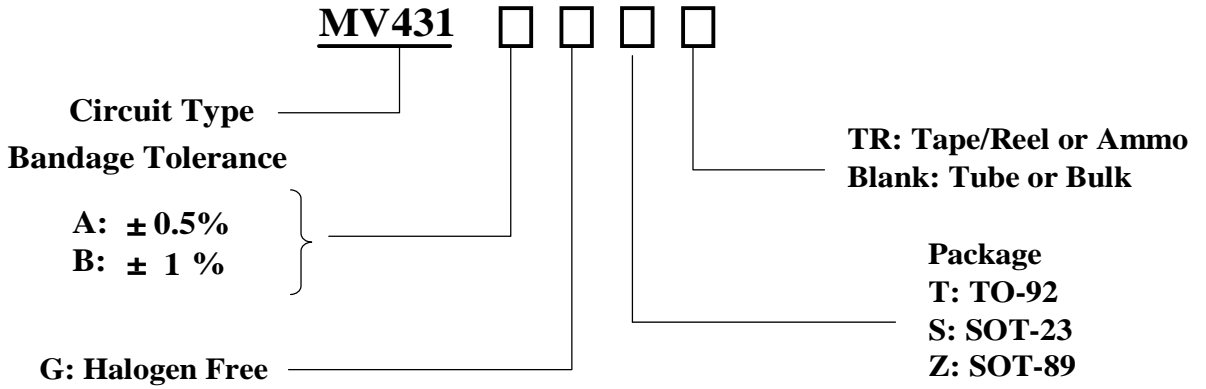
CBC Microelectronics
<http://www.cbcv.net>

Pin Configuration



MV431

Order Information



Package	Part Number	Marking ID	Package Type
TO-92	MV431AGT	MV431A	Bulk
	MV431AGTTR	MV431A	Ammo
	MV431BGT	MV431B	Bulk
	MV431BGTTR	MV431B	Ammo
SOT-23	MV431AGSTR	V31A	Tape & Reel
	MV431BGSTR	V31B	Tape & Reel
SOT-89	MV431AGZTR	VA31	Tape & Reel
	MV431BGZTR	VB31	Tape & Reel

Functional Block Diagram

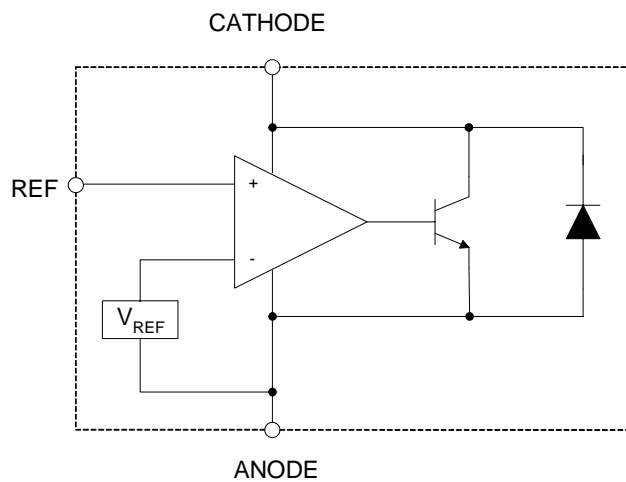


Figure 2. Functional Block Diagram of MV431

MV431

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Cathode Voltage	V_{KA}	40	V
Cathode Current Range (Continuous)	I_{KA}	-100 to 150	mA
Reference Input Current Range	I_{REF}	10	mA
Power Dissipation	P_D	T,Z Package: 750	mW
		S Package: 350	
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C
Package Thermal Impedance	θ_{JA}	TO-92: 150	°C/W
		SOT-23-3: 90	
		SOT-89: 100	

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	T_A	-40	+125	°C

MV431

Electrical Characteristics

Operating Conditions: TA= 25 °C unless otherwise specified.

Parameter	Test Circuit	Symbol	Conditions	MV431			Unit	
				Min	Typ	Max		
Reference Voltage	3	V_{REF}	$V_{KA}=V_{REF}$ $I_{KA}=10mA$	A	2.488	2.500	2.512	V
				B	2.475	2.500	2.525	V
Deviation of Reference Voltage Over-Temperature	3	ΔV_{REF}	-40 to +85°C		4.5	10	mV	
			-40 to +125°C		4.5	16		
Ratio of Change in Reference Voltage to the Change in Cathode Voltage	4	$\Delta V_{REF}/\Delta V_{KA}$	$I_{KA}=10mA$ $\Delta V_{KA}=10V$ to V_{REF}		-1.0	-2.7	mV/V	
			$I_{KA}=10mA$ $\Delta V_{KA}=36V$ to $10V$		-0.5	-2.0		
Reference Current	4	I_{REF}	$I_{KA}=10mA$ $R1=10K\Omega, R2=\infty$		0.7	4	μA	
Deviation of Reference Current Over Full Temperature Range	4	ΔI_{REF}	$I_{KA}=10mA$ $R1=10K\Omega, R2=\infty$ $T_A=-40$ to $+125^\circ C$		0.4	1.2	μA	
Minimum Cathode Current for Regulation	3	$I_{KA(min)}$	$V_{KA}=V_{REF}$		0.4	1.0	mA	
Off-State Cathode Current	5	$I_{KA(off)}$	$V_{KA}=36V, V_{REF}=0$		0.05	1.0	μA	
Dynamic Impedance	3	Z_{KA}	$V_{KA}=V_{REF}$ $I_{KA}=1$ to $100mA$ $F\leq 1.0KHz$		0.15	0.5	ohm	

MV431

Test Circuits

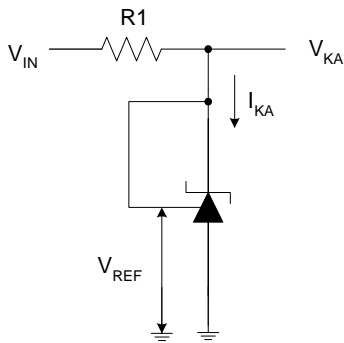


Figure 3 .Test Circuit 3 for $V_{KA} > V_{REF}$

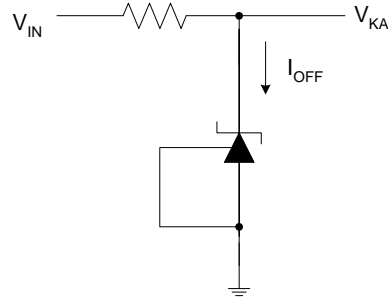


Figure 4 .Test Circuit 4 for I_{off}

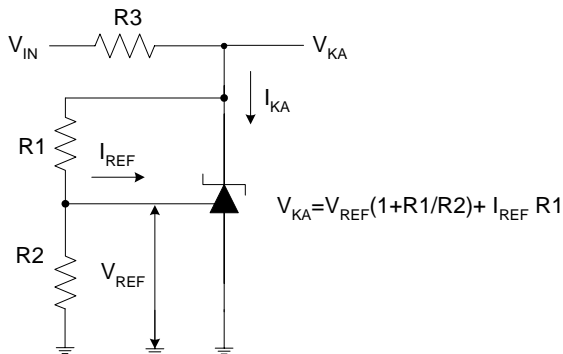


Figure 5 .Test Circuit 5 for $V_{KA} > V_{REF}$

Typical Performance Characteristics

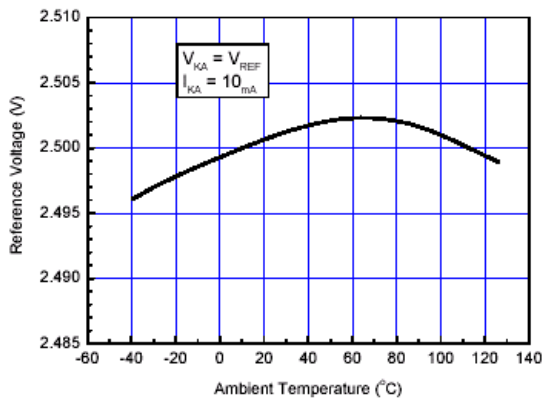


Figure 6. V_{REF} vs. Ambient Temperature

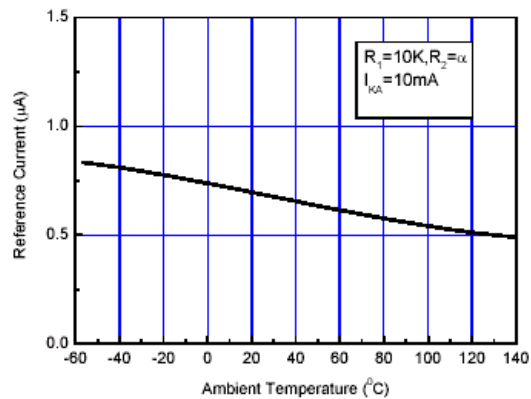


Figure 7. I_{REF} vs. Ambient Temperature

MV431

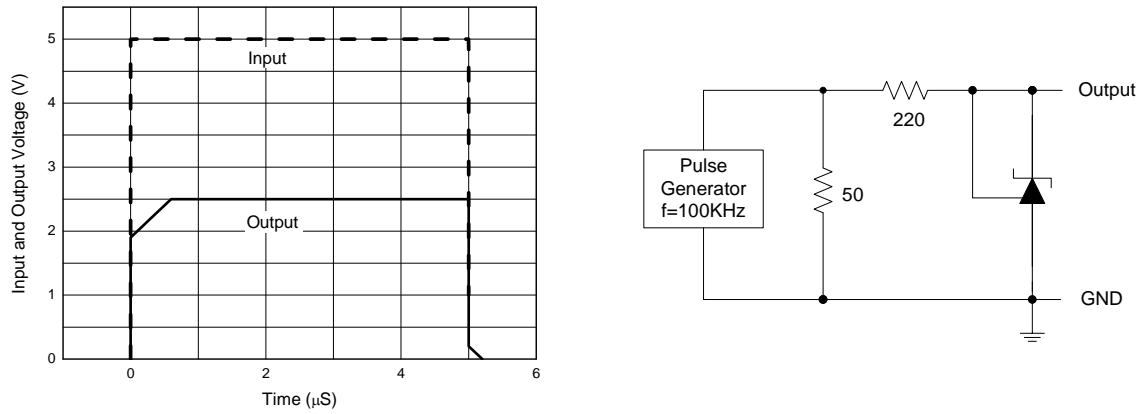


Figure 8. Pulse Response of Input and Output Voltage

Typical Applications

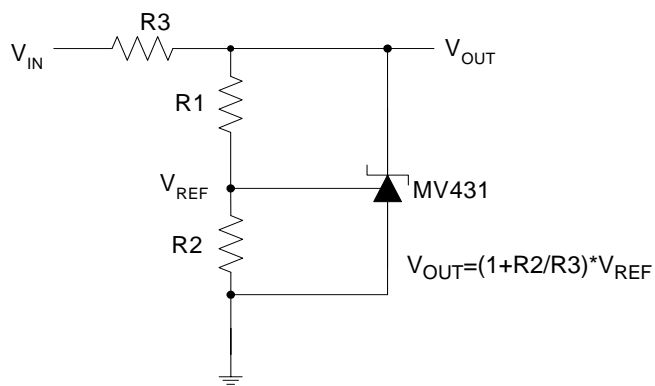


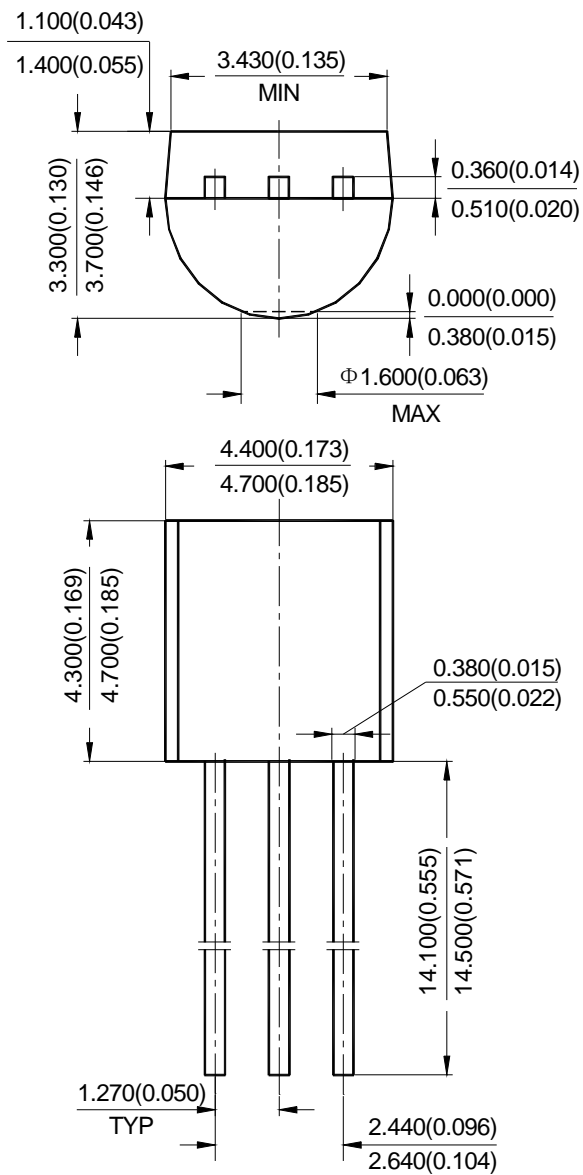
Figure 9. Shunt Regulator

MV431

Mechanical Dimensions

TO-92(Bulk Packing)

Unit: mm(inch)

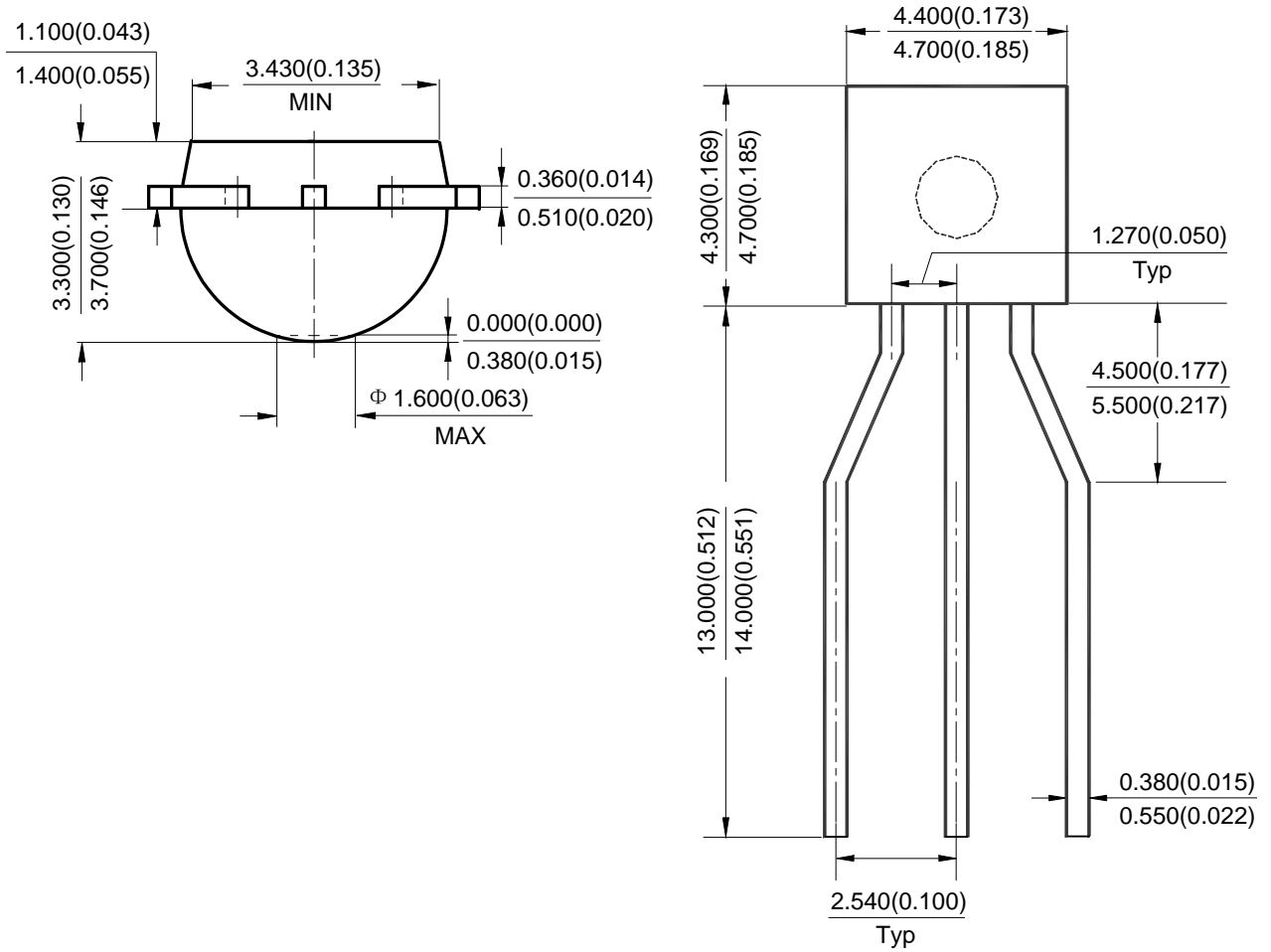


MV431

Mechanical Dimensions (Cont'd)

TO-92(Ammo Packing)

Unit: mm(inch)

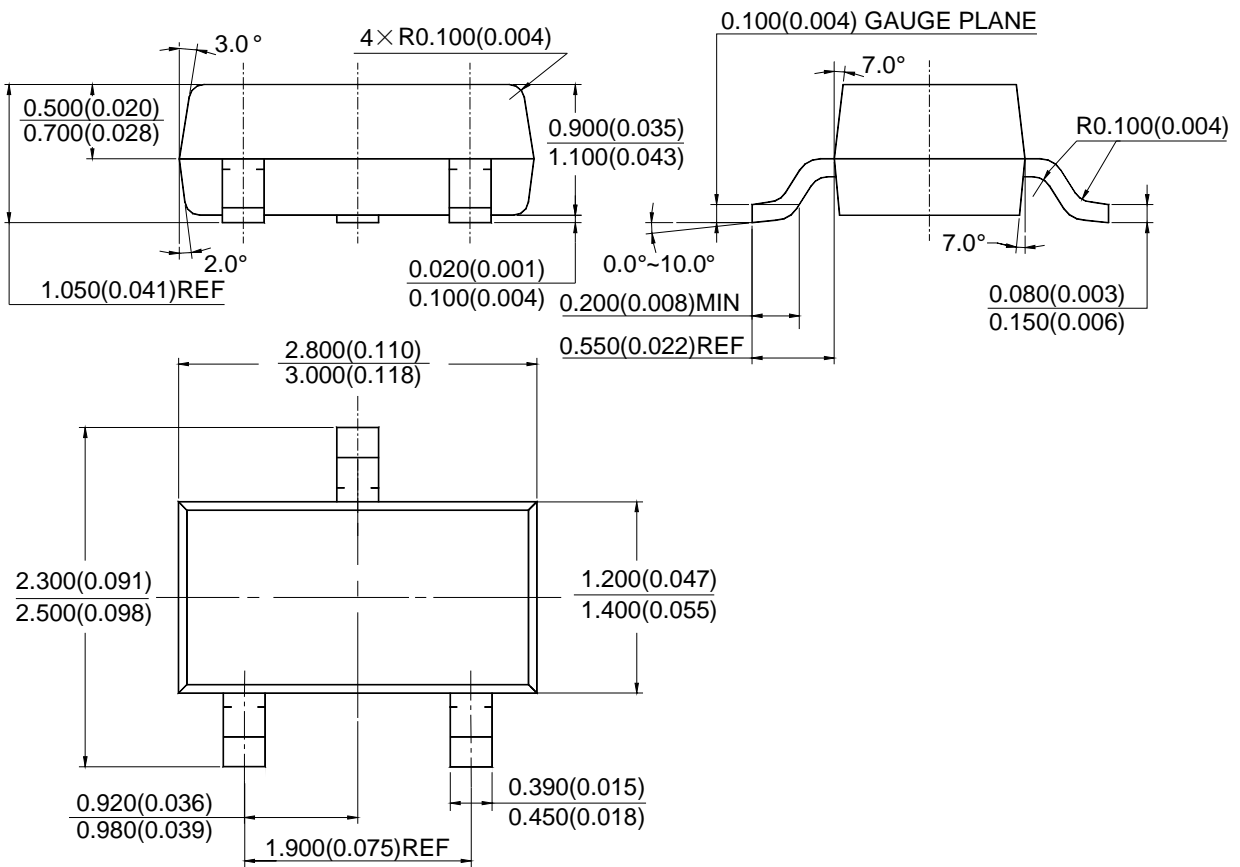


MV431

Mechanical Dimensions (Cont'd)

SOT-23

Unit: mm(inch)

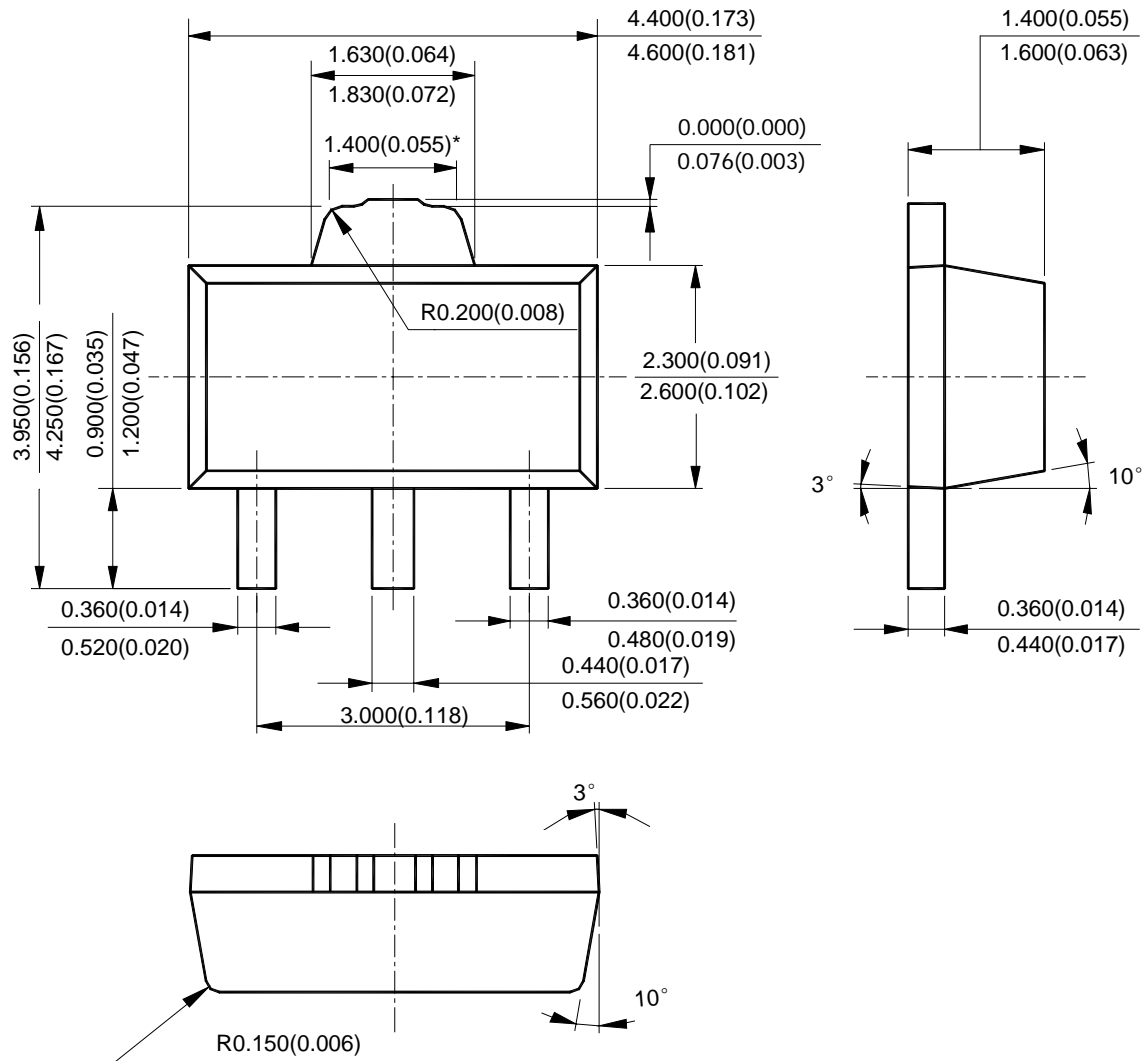


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Mechanical Dimensions (Cont'd)

SOT-89

Unit: mm(inch)



MV431

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