MB431A

Adjustable Precision Shunt Regulator

CBC Microelectronics
http://www.cbcv.net

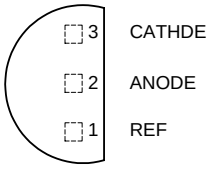
Description

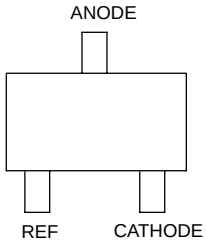
The MB431A is a 3-terminal adjustable shunt regulator with guaranteed temperature stability over the entire temperature range of operation. The output voltage may be set at any level greater than 2.5V (V_{REF}) up to 40V merely by selecting two external resistors that act as a voltage divided network. Due to the sharp turn-on characteristics this device is an excellent replacement for many zener diode applications.

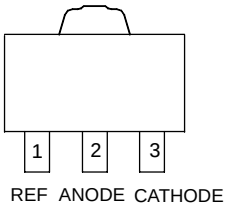
Features

- 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
- Wide Operating Range of -40 to 125 ℃
- Wide Programmable Precise Output Voltage from 2.5V to 36V

Pin Configuration







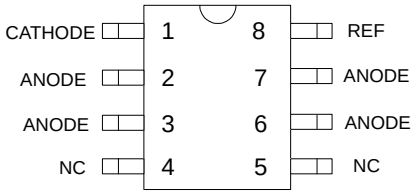
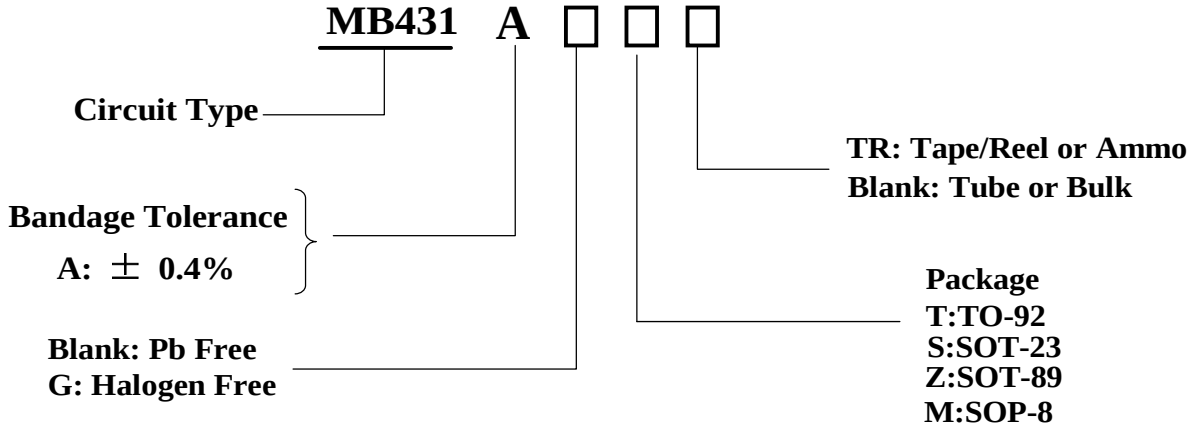


Figure 1. Package Types of MB431A

MB431A

Order Information



Package	Part Number		Marking ID		Packing Type
	Pb-free	Halogen-Free	Pb-free	Halogen-Free	
TO-92	MB431AT	MB431AGT	MB431A	MB431AG	Bulk
TO-92	MB431ATTR	MB431AGTTR	MB431A	MB431AG	Ammo
SOT-23	MB431ASTR	MB431AGSTR	31A	31AG	Tape & Reel
SOT-89	MB431AZTR	MB431AGZTR	A31	A31G	Tape & Reel
SOP-8	MB431AMTR	MB431AGMTR	MB431M	MB431GM	Tape & Reel

Functional Block Diagram

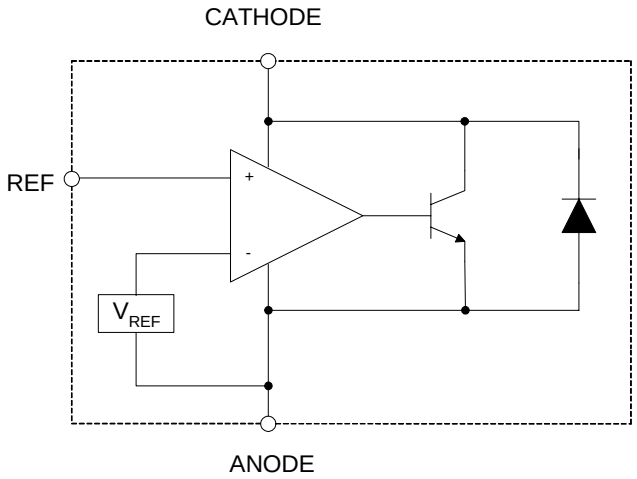


Figure 2. Functional Block Diagram of MB431A

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	
		M Package:600	
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	
		SOP-8 : 150	
ESD (Human Body Model)		3000	V
ESD (Machine Model)		400	V

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

MB431A

Electrical Characteristics

Operating Conditions: TA= 25℃ unless otherwise specified.

Parameter	Test Circuit	Symbol	Conditions		MB431			Unit
					Min	Typ	Max	
Reference Voltage	3	V_{REF}	$V_{KA}=V_{REF}$ I_{KA}=10mA	MB431A	2.490	2.500	2.510	V
Deviation of Reference Voltage Over-Temperature	3	ΔV_{REF}	0 to 70°C			5	12	mV
			-20 to +85°C			5	15	
Ratio of Change in Reference Voltage to the Change in Cathode Voltage	4	$\Delta V_{REF}/\Delta V_{KA}$	I_{KA}=10mA ΔV_{KA}=10V to V_{REF}			-1.2	-2.7	mV/V
			I_{KA}=10mA ΔV_{KA}=36V to 10V			-0.8	-2.2	
Reference Current	4	I_{REF}	I_{KA}=10mA R1=10k Ω, R2=∞			0.8	4	μA
Deviation of Reference Current Over Full Temperature Range	4	ΔI_{REF}	I_{KA}=10mA R1=10k Ω, R2=∞ T_A=-20 to +85°C			0.03	0.3	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			0.1	1.0	μA
Dynamic Impedance	3	Z_{KA}	$V_{KA}=V_{REF}$ I_{KA}=1 to 100mA f ≤1.0KHz			0.2	0.5	ohm

Test Circuits

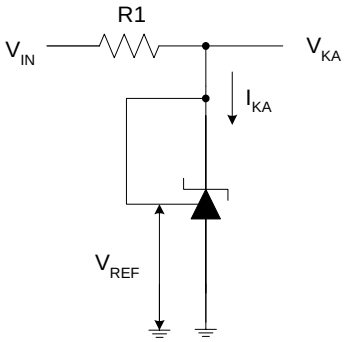


Figure 3 .Test Circuit 3 for $V_{KA} = V_{REF}$

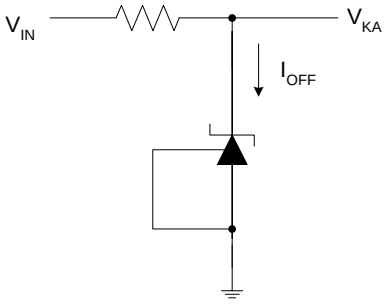


Figure 4 .Test Circuit 4 for I_{off}

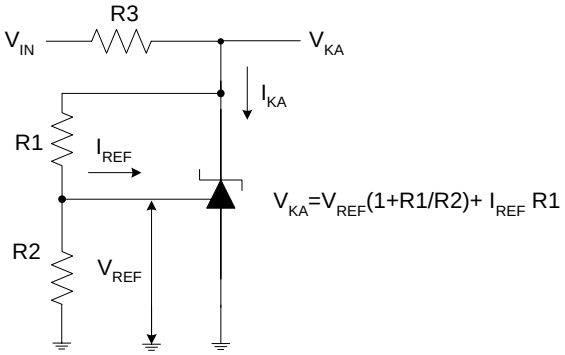


Figure 5 .Test Circuit 5 for $V_{KA} > V_{REF}$

Typical Performance Characteristics

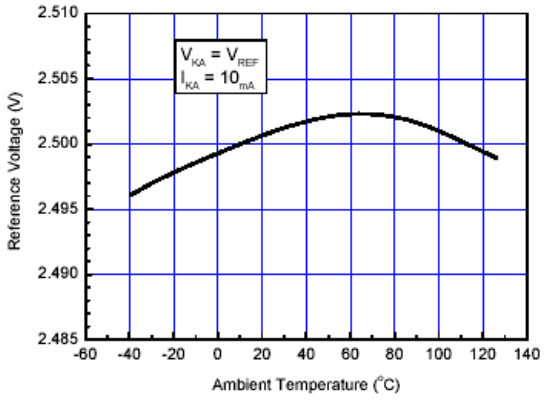


Figure 6. VREF vs. Ambient Temperature

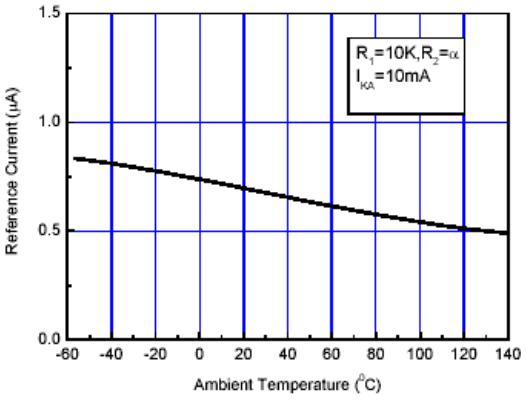


Figure 7. IREF vs. Ambient Temperature

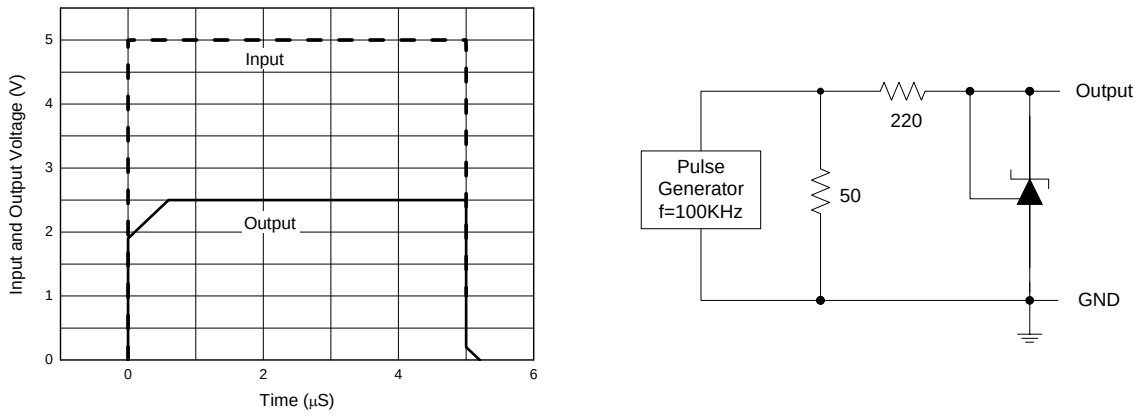


Figure 8. Pulse Response of Input and Output Voltage

Typical Applications

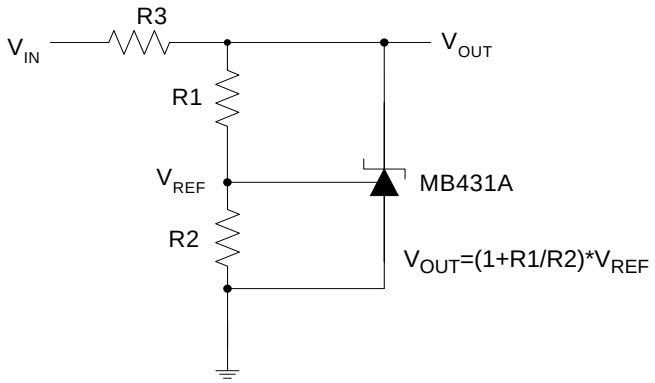
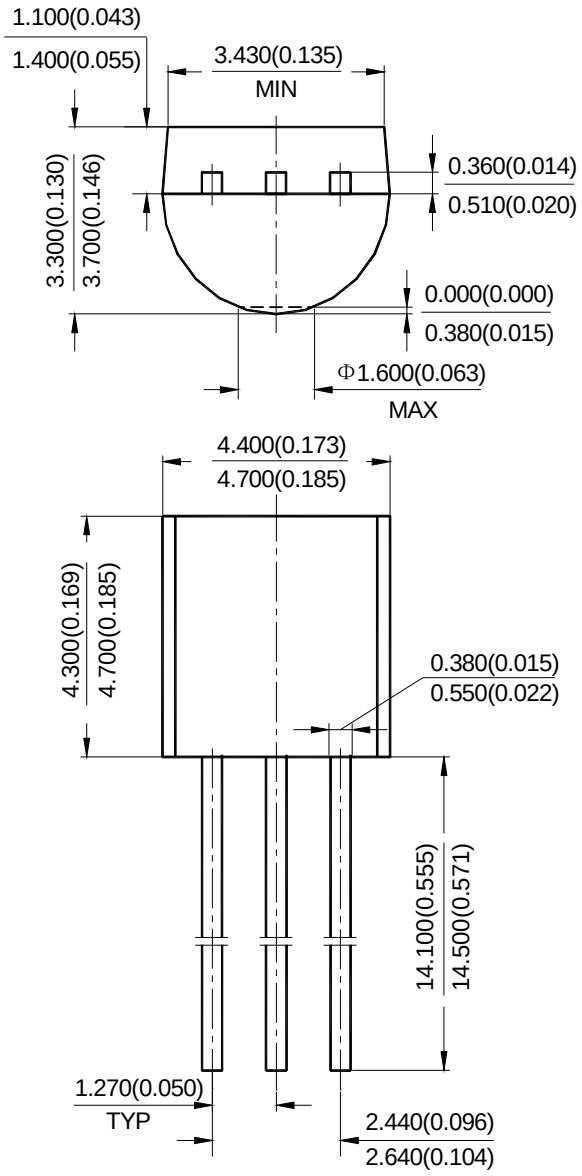


Figure 9. Shunt Regulator

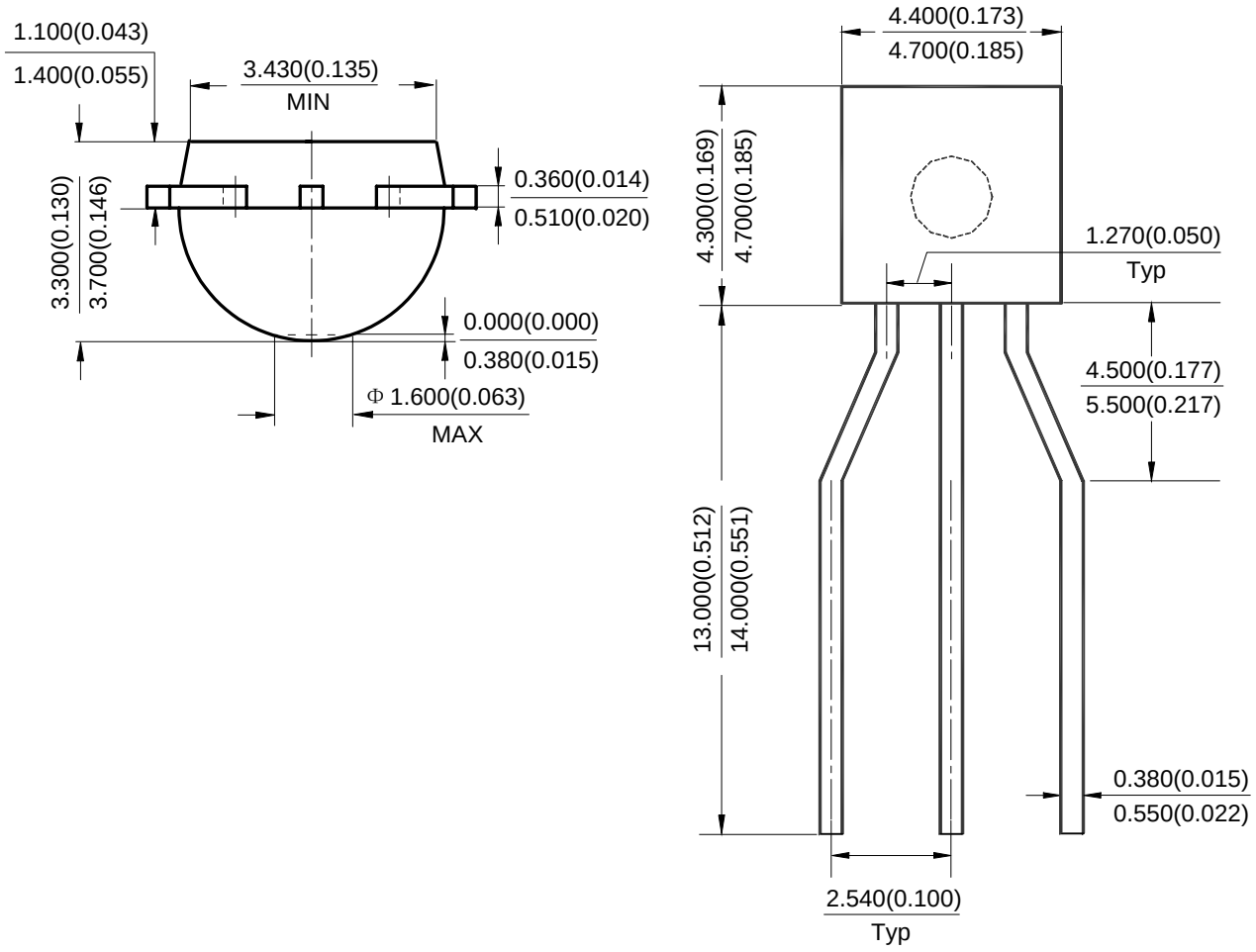
Mechanical Dimensions

TO-92(Bulk Packing) **Unit: mm(inch)**



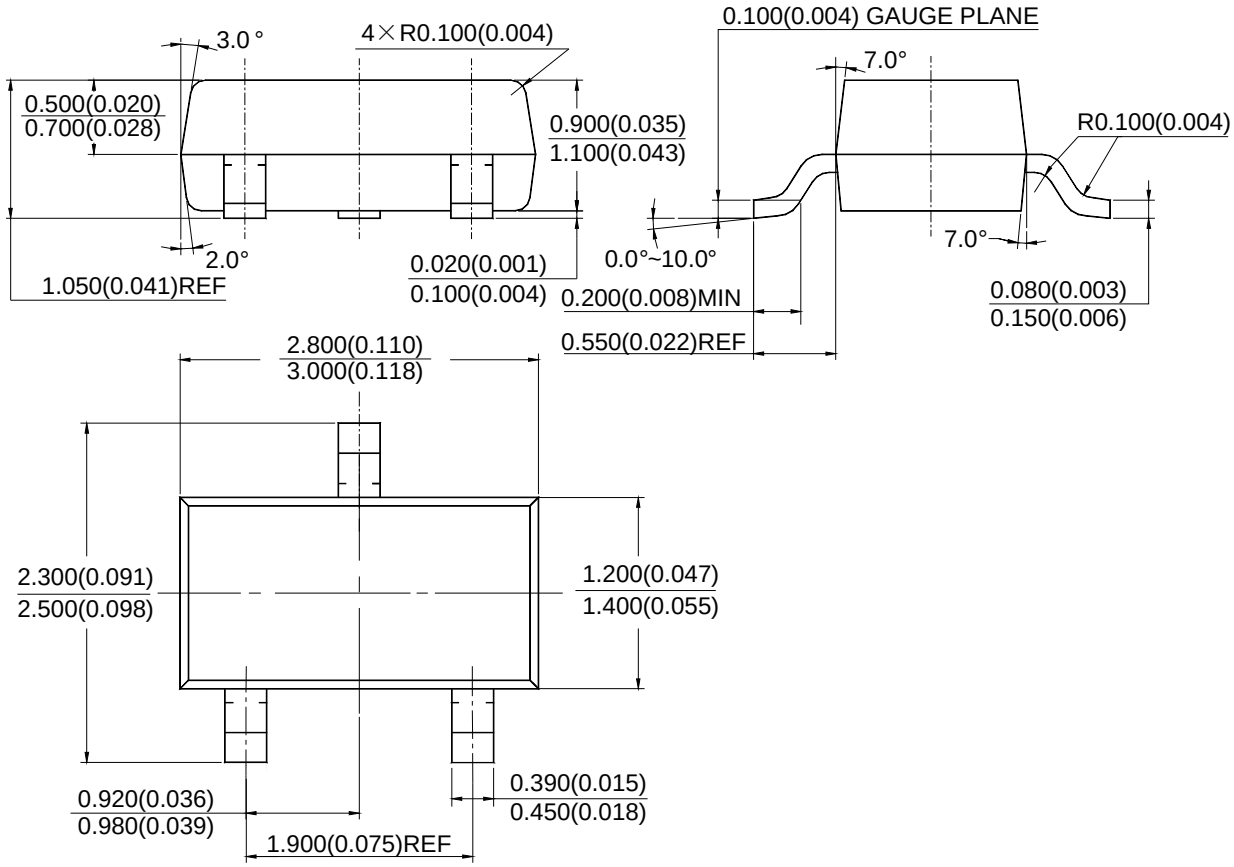
Mechanical Dimensions (Cont'd)

TO-92(Ammo Packing) **Unit: mm(inch)**



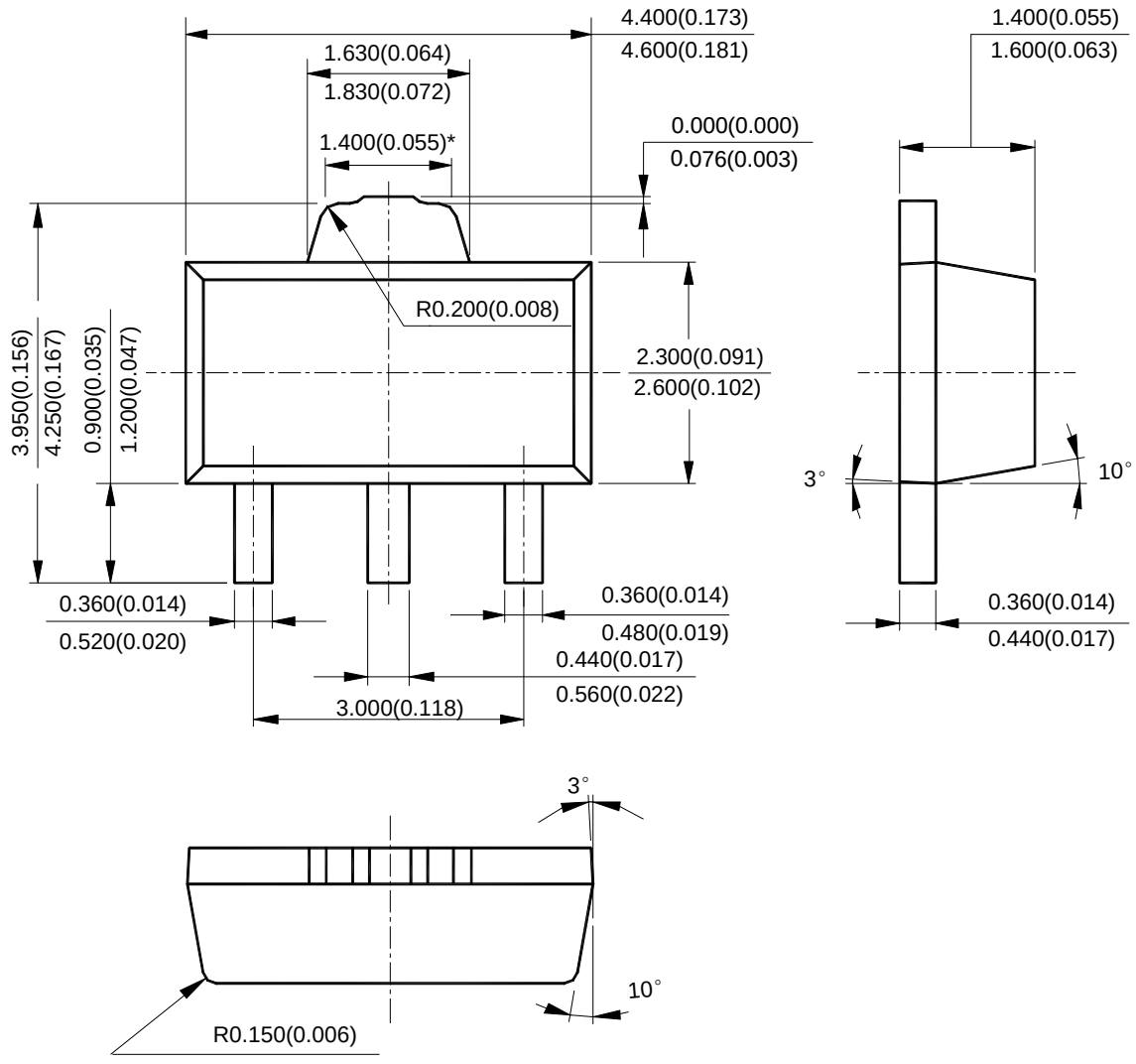
Mechanical Dimensions (Cont'd)

SOT-23 **Unit: mm(inch)**



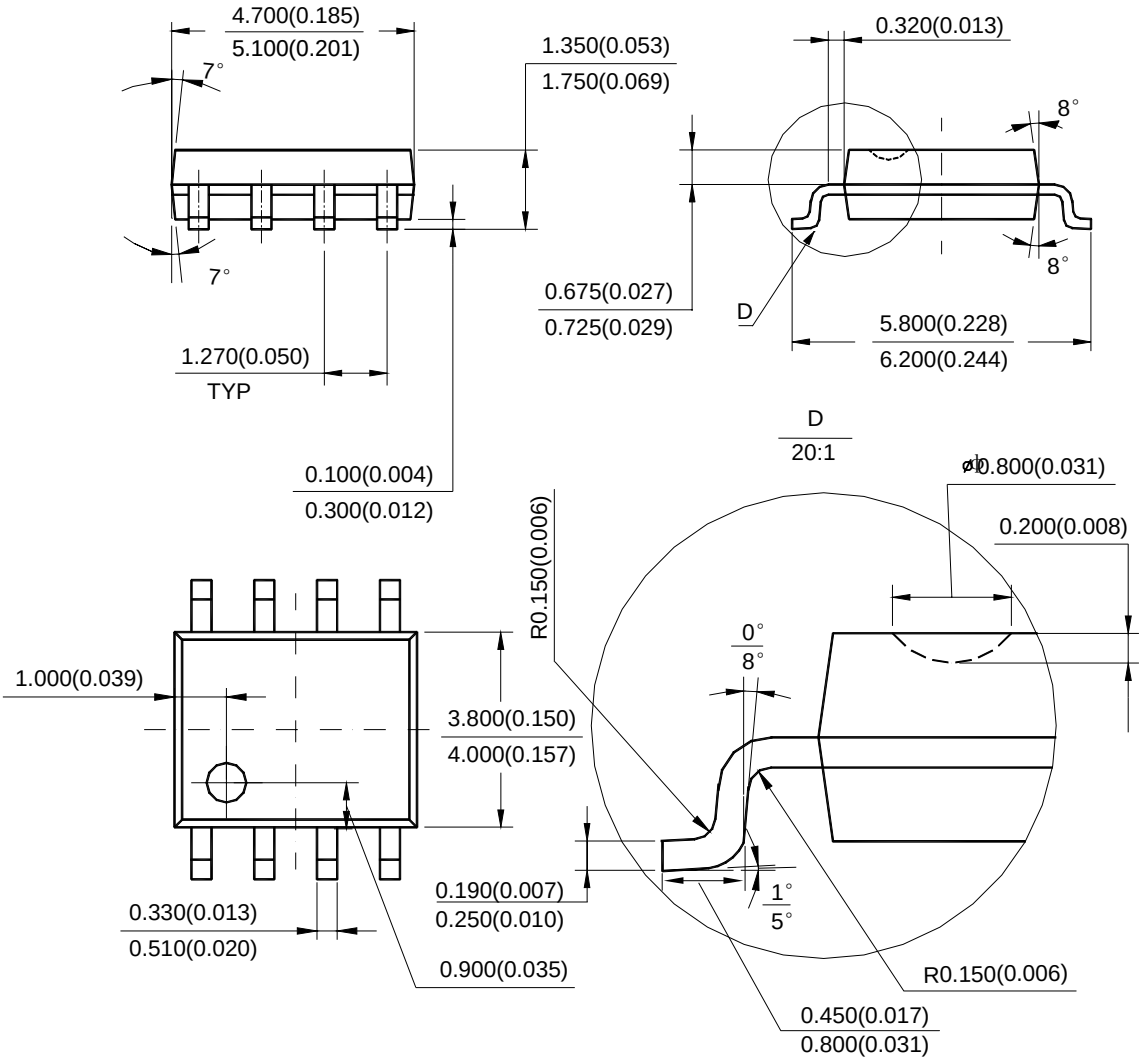
Mechanical Dimensions (Cont'd)

SOT-89 **Unit: mm(inch)**



Mechanical Dimensions (Cont'd)

SOP-8 **Unit: mm(inch)**



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