MB435

Adjustable Precision Shunt Regulator

CBC Microelectronics
http://www.cbcv.net

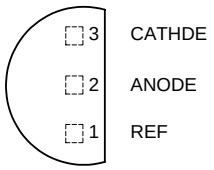
Description

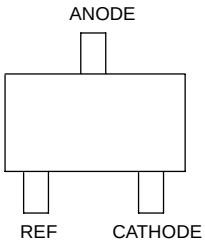
The MB435 is a 3-terminal adjustable shunt regulator with guaranteed temperature stability over the entire temperature range of operation. The output voltage may be set at any level greater than 2.5V (V_{REF}) up to 36V merely by selecting two external resistors that act as a voltage divided network. 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
- Wide Operating Range of -40 to 125
- Wide Programmable Precise Output Voltage from 2.5V to 36V

Pin Configuration

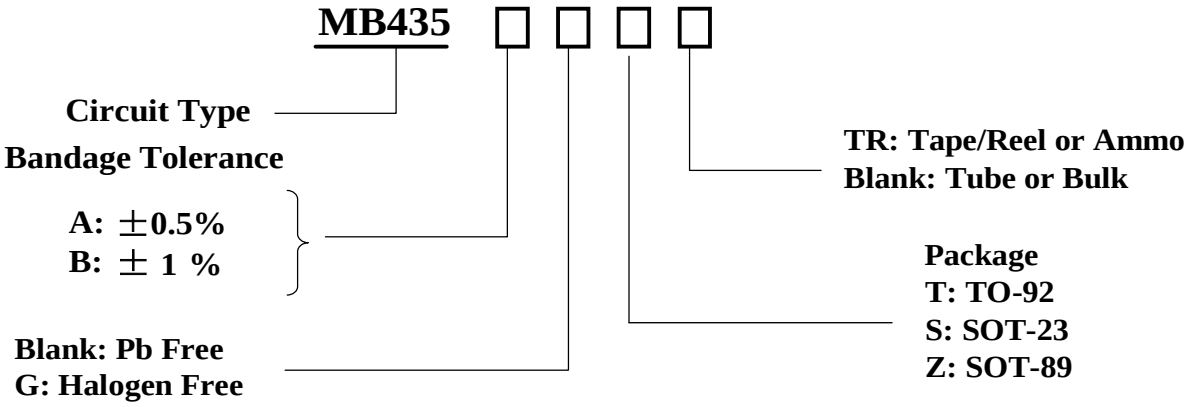




TO-92(Bulk Packing) TO-92(Ammo Packing) SOT-23 SOT-89

Figure 1. Package Types of MB435

Order Information



Package	Part Number		Marking ID		Packing Type
	Pb-free	Halogen-Free	Pb-free	Halogen-Free	
TO-92	MB435AT	MB435AGT	MB435A	MB435AG	Bulk
	MB435ATTR	MB435AGTTR	MB435A	MB435AG	Ammo
	MB435BT	MB435BGT	MB435B	MB435BG	Bulk
	MB435BTTR	MB435BGTTR	MB435B	MB435BG	Ammo
SOT-23	MB435ASTR	MB435AGSTR	35A	35AG	Tape & Reel
	MB435BSTR	MB435BGSTR	35B	35BG	Tape & Reel
SOT-89	MB435AZTR	MB435AGZTR	A35	A35G	Tape & Reel
	MB435BZTR	MB435BGZTR	B35	B35G	Tape & Reel

Functional Block Diagram

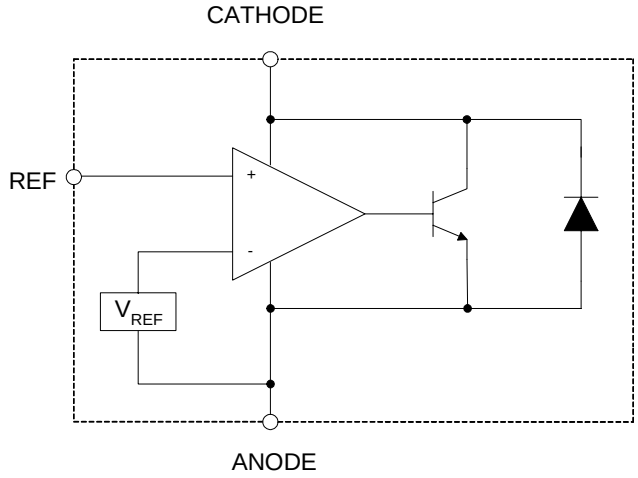


Figure 2. Functional Block Diagram of MB435

MB435

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Cathode Voltage	V_{KA}	40	V
Cathode Current Range (Continuous)	I_{KA}	-100 to100	mA
Reference Input Current Range	I_{REF}	10	mA
Power Dissipation	P_D	T,Z Package: 750	mW
		S Package: 350	
Junction Temp erature	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

Electrical Characteristics

Operating Conditions: TA= 25℃ unless otherwise specified.

Parameter	Test Circuit	Symbol	Conditions		MB435 Min	MB435 Typ	MB435 Max	Unit
Reference Voltage	3	V_{REF}	$V_{KA}=V_{REF}$ I_{KA}=10mA	A	2.488	2.500	2.512	V
				B	2.475		2.525	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	ΔV_{REF} /ΔV_{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=∞			0.035	0.5	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	$I_{KA(min)}$	$V_{KA}=V_{REF}$			10	50	μA
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 ≤1.0KHz			0.17	0.5	ohm

Test Circuits

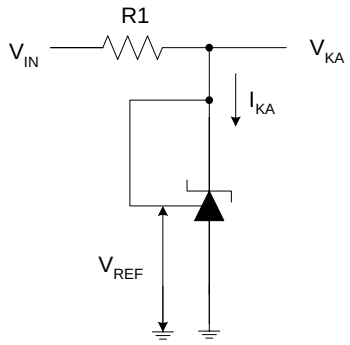


Figure 3 .Test Circuit 3 for $V_{KA} > V_{REF}$

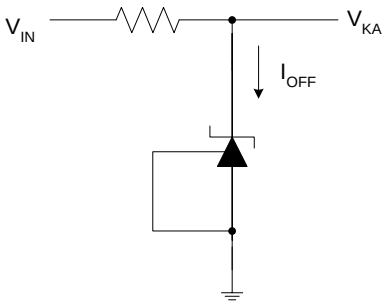


Figure 4 .Test Circuit 4 for I_{off}

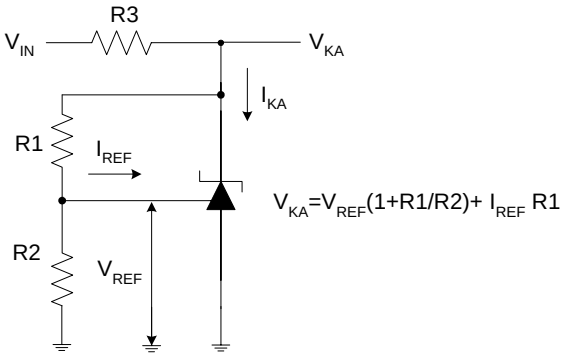


Figure 5 .Test Circuit 5 for $V_{KA} > V_{REF}$

Typical Performance Characteristics

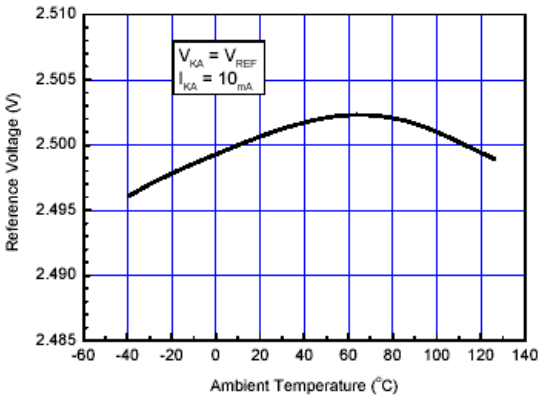


Figure 6. VREF vs. Ambient Temperature

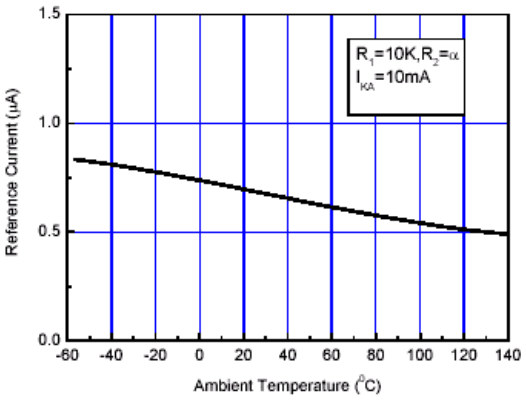


Figure 7. IREF vs. Ambient Temperature

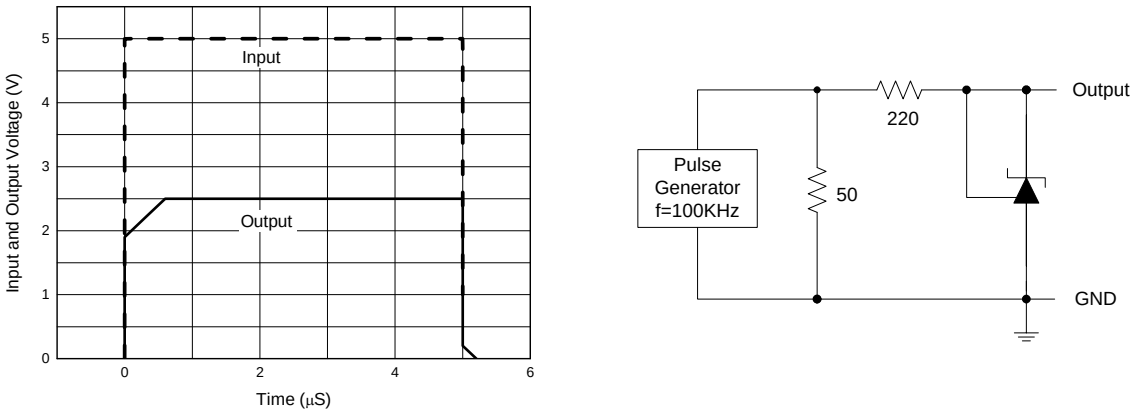


Figure 8. Pulse Response of Input and Output Voltage

Typical Applications

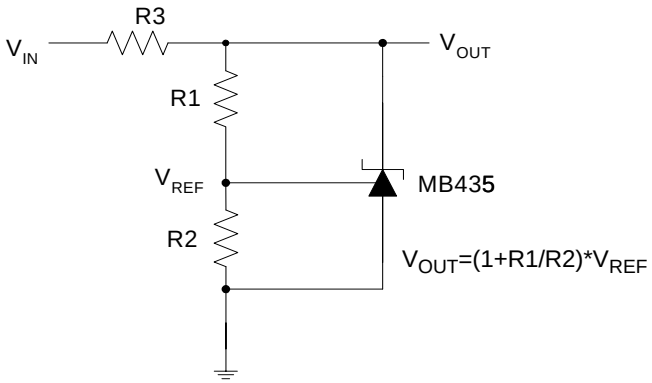
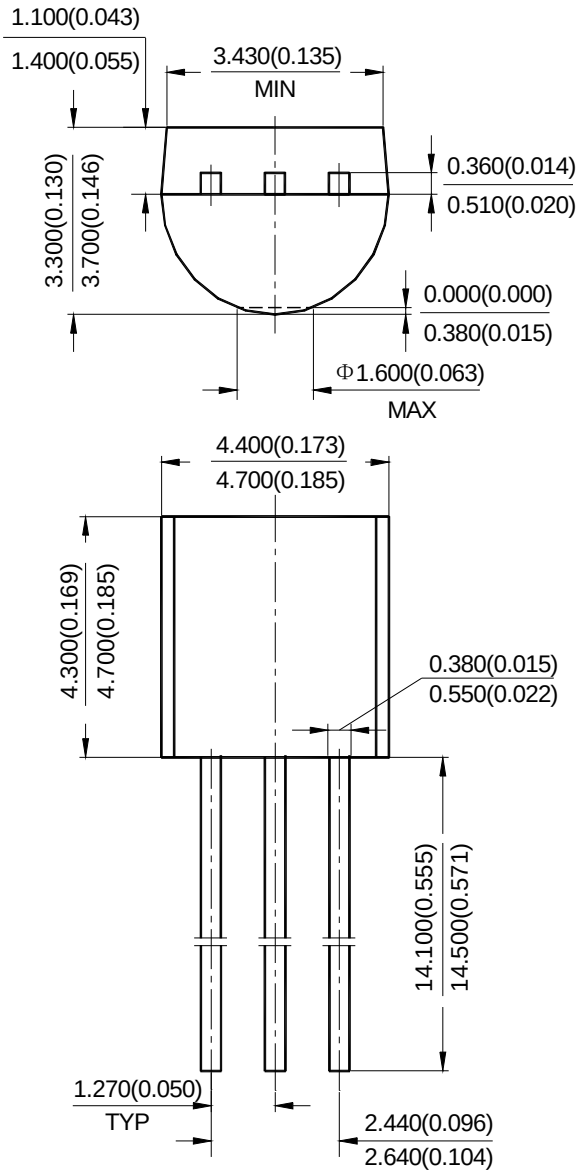


Figure 9. Shunt Regulator

MB435

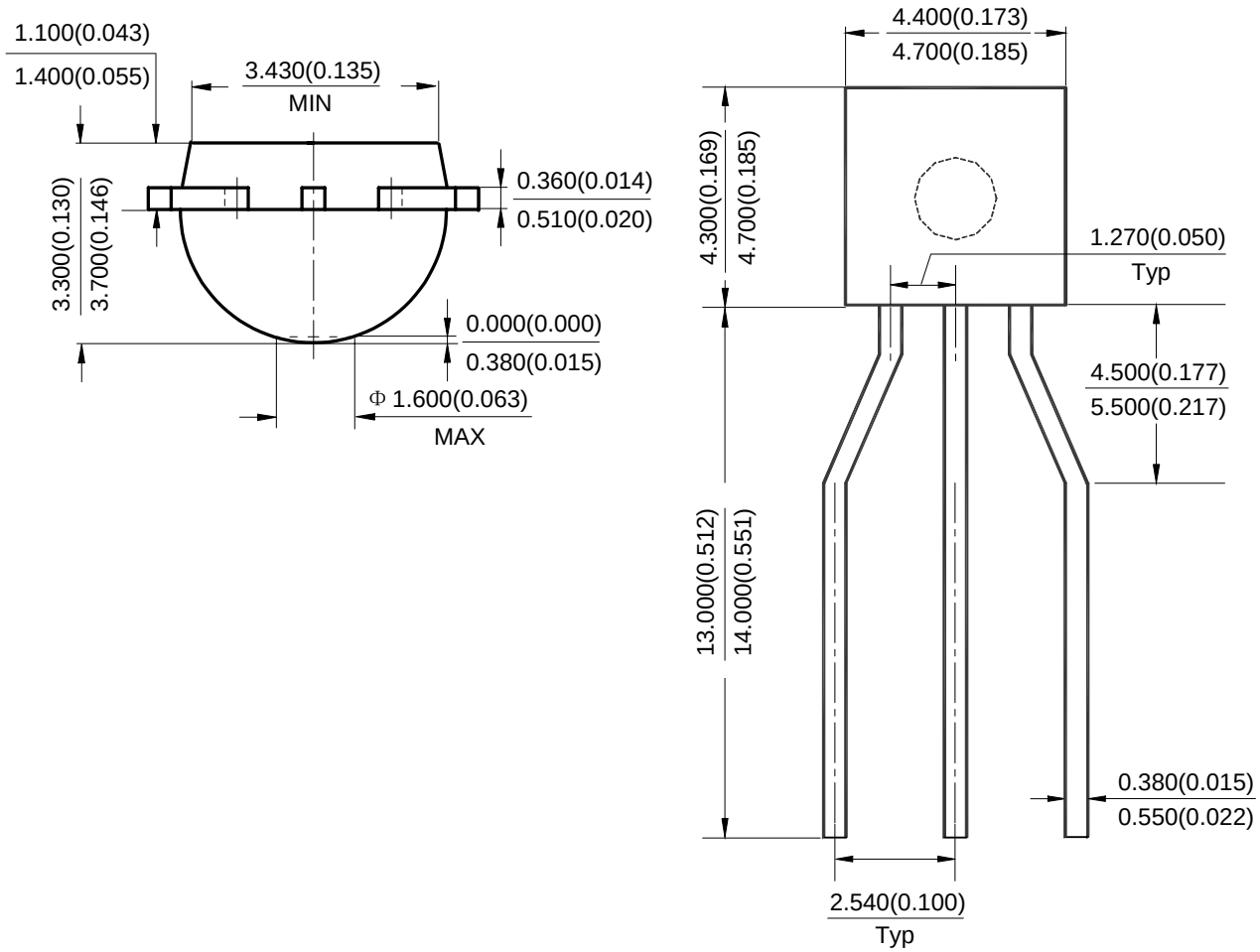
Mechanical Dimensions

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



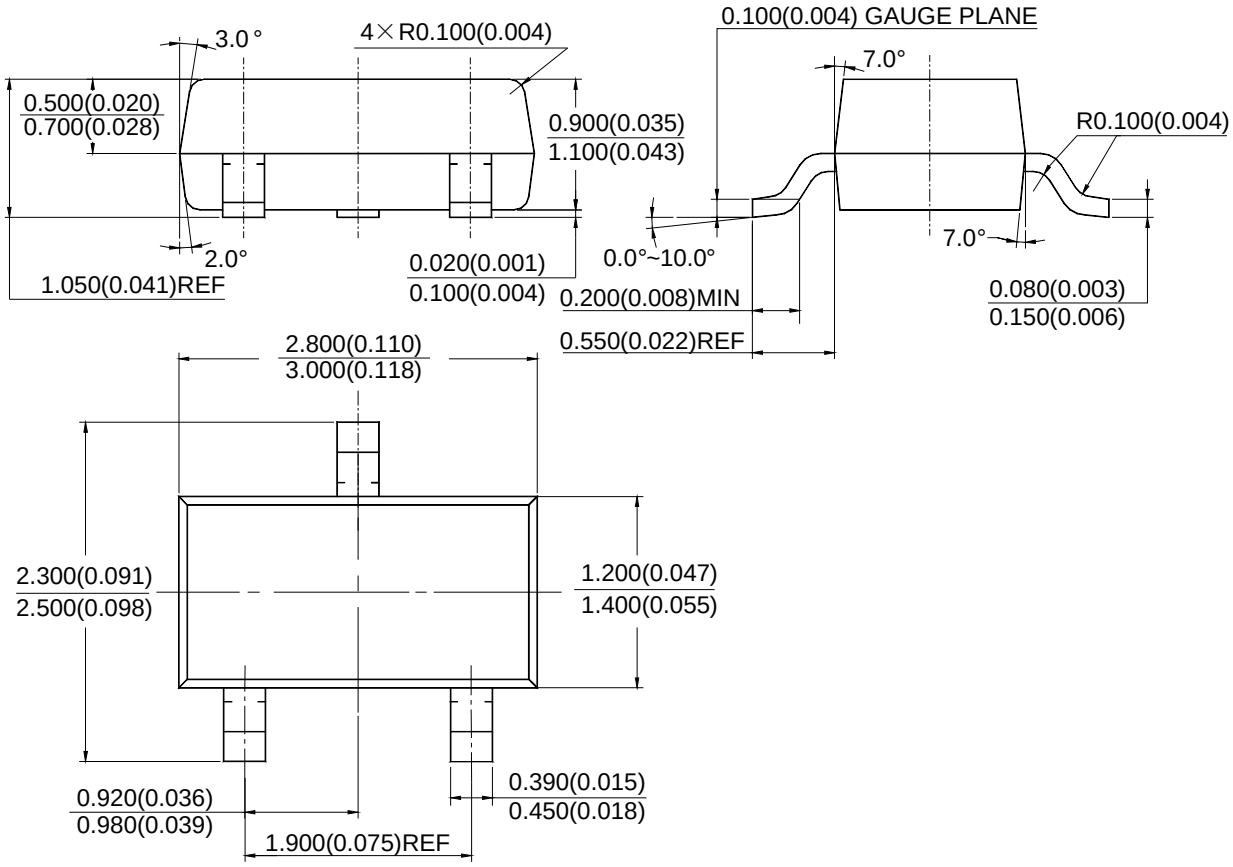
Mechanical Dimensions (Cont'd)

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



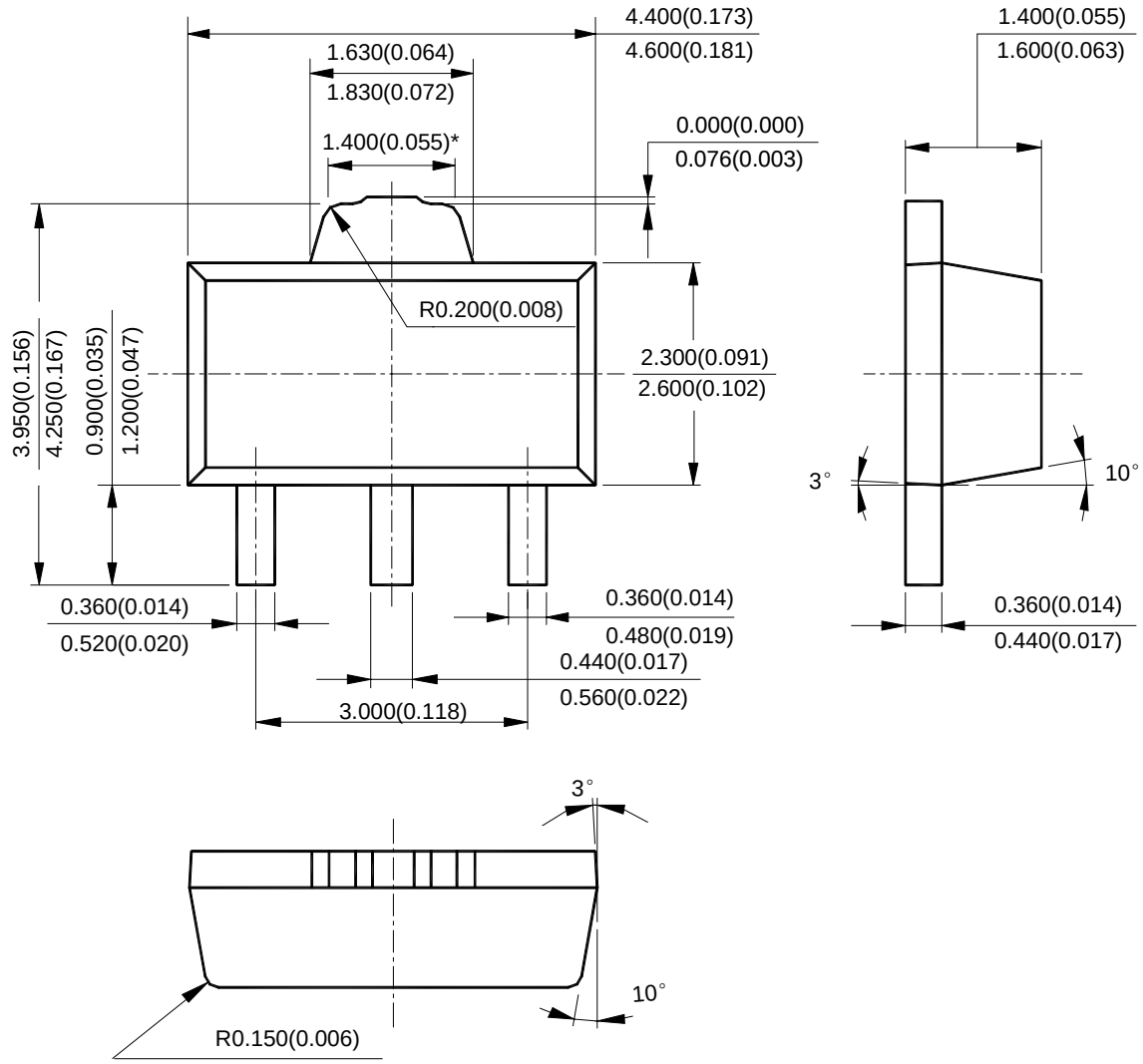
Mechanical Dimensions (Cont'd)

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



Mechanical Dimensions (Cont'd)

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



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