MB431

Adjustable Precision Shunt Regulator

CBC Microelectronics
http://www.cbcv.net

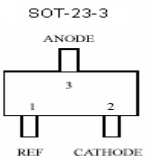
Description

The MB431 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 (VREF) 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 50 ppm/°C
- Temperature compensated for operation over the full temperature range
- Programmable output voltage
- Fast turn-on response low output noise

Pin Configuration



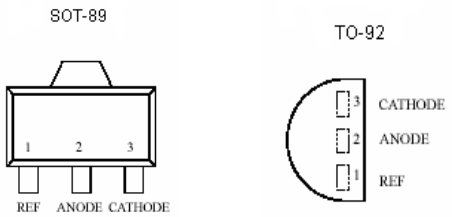
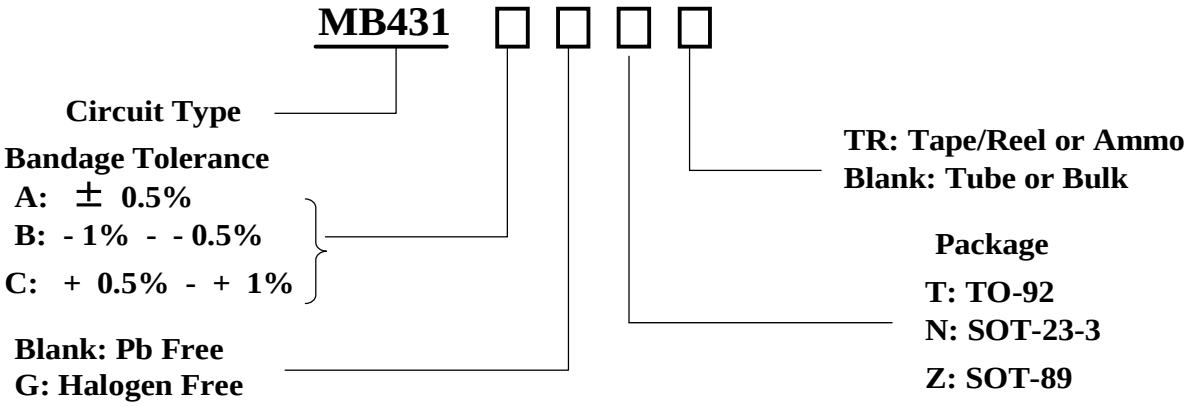


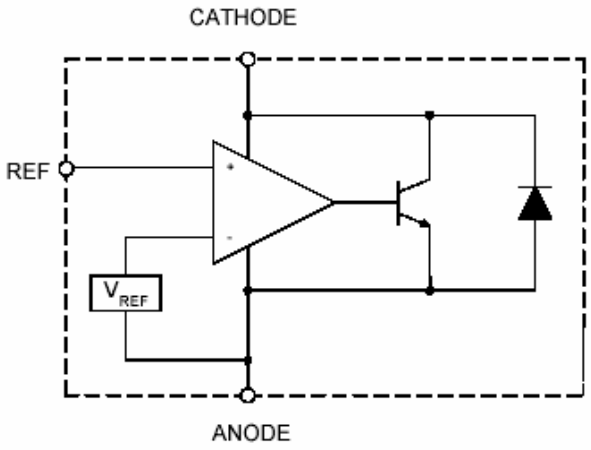
Figure 1: Package Types of MB431

Order Information



Package	Part Number		Marking ID		Packing Type
	Pb free	Halogen free	pb free	Halogen-Free	
TO-92	MB431AT	MB431AGT	431AT	431AGT	Bulk
	MB431ATTR	MB431AGTTR	431AT	431AGT	Ammo
	MB431BT	MB431BGT	431BT	431BGT	Bulk
	MB431BTTR	MB431BGTTR	431BT	431BGT	Ammo
	MB431CT	MB431CGT	431CT	431CGT	Bulk
	MB431CTTR	MB431CGTTR	431CT	431CGT	Ammo
SOT-23-3	MB431ASTR	MB431AGSTR	431AS	431AGS	Tape & Reel
	MB431BSTR	MB431BGSTR	431BS	431BGS	Tape & Reel
	MB431CSTR	MB431CGSTR	431CS	431CGS	Tape & Reel
SOT-89	MB431AZTR	MB431AGZTR	431AZ	431AGZ	Tape & Reel
	MB431BZTR	MB431BGZTR	431BZ	431BGZ	Tape & Reel
	MB431CZTR	MB431CGZTR	431CZ	431CGZ	Tape & Reel

Functional Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Cathode Voltage	VKA	36	V
Cathode Current Range (Continuous)	IKA	-100 to150	mA
Reference Input Current Range	IREF	10	mA
Power Dissipation	PD	T,Z Package: 750	mW
		S Package: 350	
Junction Temperature	TJ	150	°C
Storage Temperature Range	TSTG	-40 to +150	°C
Package Thermal Impedance	θJA		°C/W
		T Package: 150	°C/W

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Cathode Voltage	VKA	VREF	32	V
Cathode Current	IKA	1.0	100	mA
Operating Ambient Temperature Range	TA	-40	+125	°C

Electrical Characteristics

Operating Conditions: VCC = +15V, VEE = - 15V, TA= 25℃ unless otherwise specified.

Parameter	Test Circuit	1 Symbol	Conditions		MB431			Unit
					Min	Typ	Max	
Reference Voltage	4	VREF	VKA=VREF IKA=10mA	A	2.488	2.500	2.512	V
				B	2.475		2.488	V
				C	2.512		2.525	V
Deviation of Reference Voltage Over-Temperature	4	ΔVREF	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	5	ΔVREF ΔVKA	IKA=10mA ΔVKA=10V to VREF			-1.2	-2.7	mV/V
			IKA=10mA ΔVKA=36V to 10V			-0.8	-2.2	
Reference Current	5	IREF	IKA=10mA R1=10KΩ, R2=∞			0.8	4	μA
Deviation of Reference Current Over Full Temperature Range	5	ΔIREF	IKA=10mA R1=10KΩ, R2=∞ TA=-20 to +85°C			0.4	1.2	μA
Minimum Cathode Current for Regulation	4	IKA(min)	VKA=VREF			0.4	1.0	mA
Off-State Cathode Current	6	IKA(off)	VKA=36V, VREF=0			0.1	1.0	μA
Dynamic Impedance	4	ZKA	VKA=VREF IKA=1 to 100mA F≤1.0KHz			0.2	0.5	ohm

Test Circuits

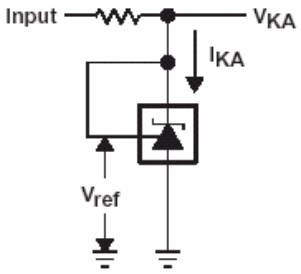


Figure 4. Test Circuit 4 for VKA=VREF

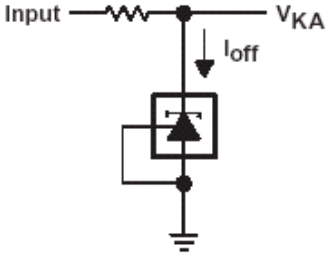


Figure 5. Test Circuit 5 for IOFF

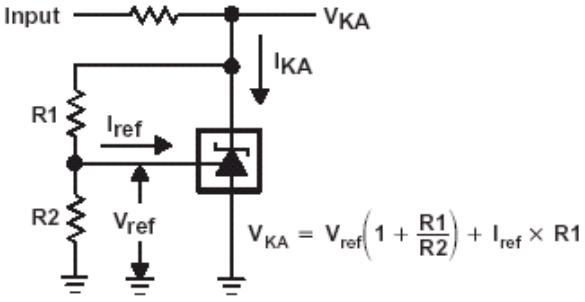


Figure 6. Test Circuit 6 for VKA >VREF

Typical Performance Characteristics

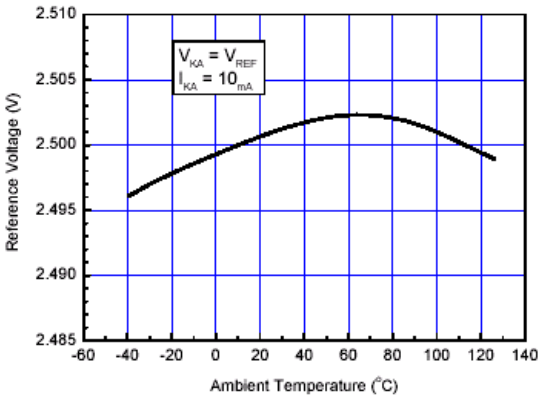


Figure 7. VREF vs. Ambient Temperature

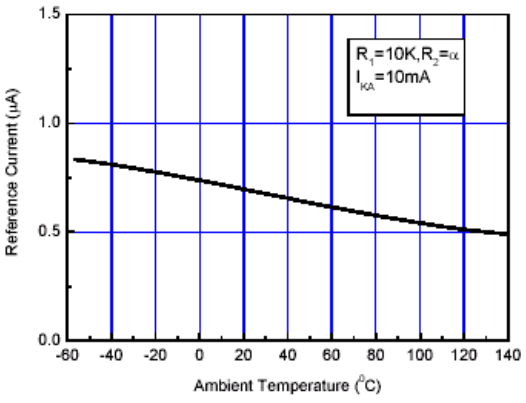


Figure 8. IREF vs. Ambient Temperature

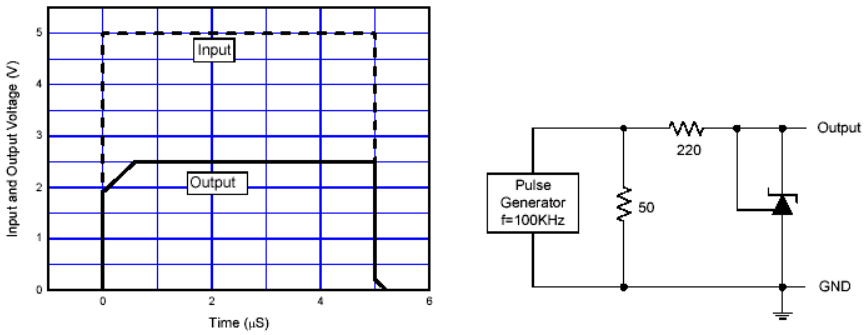


Figure 9. Pulse Response of Input and Output Voltage

Typical Applications

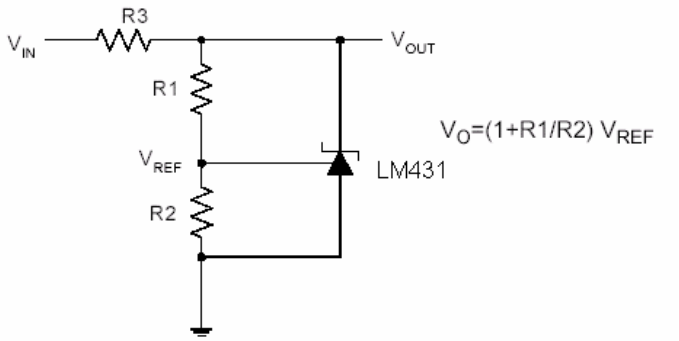
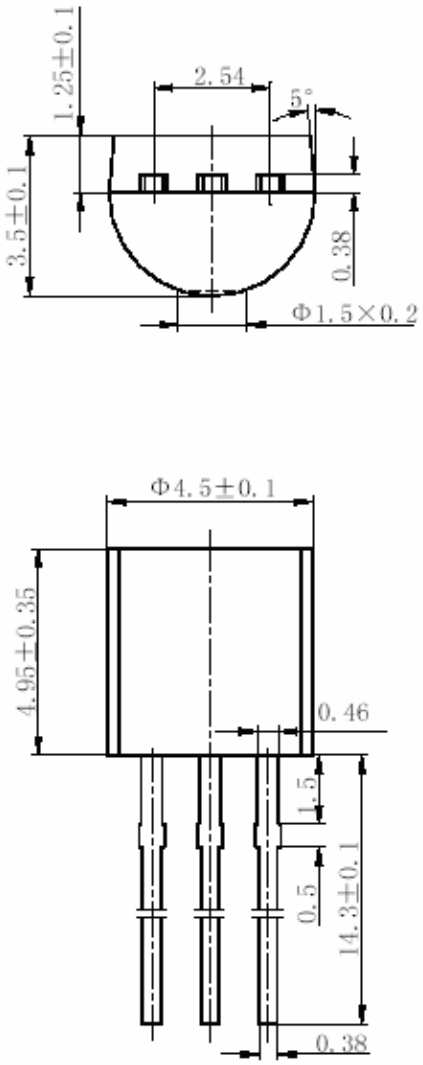


Figure 9. Shunt Regulator

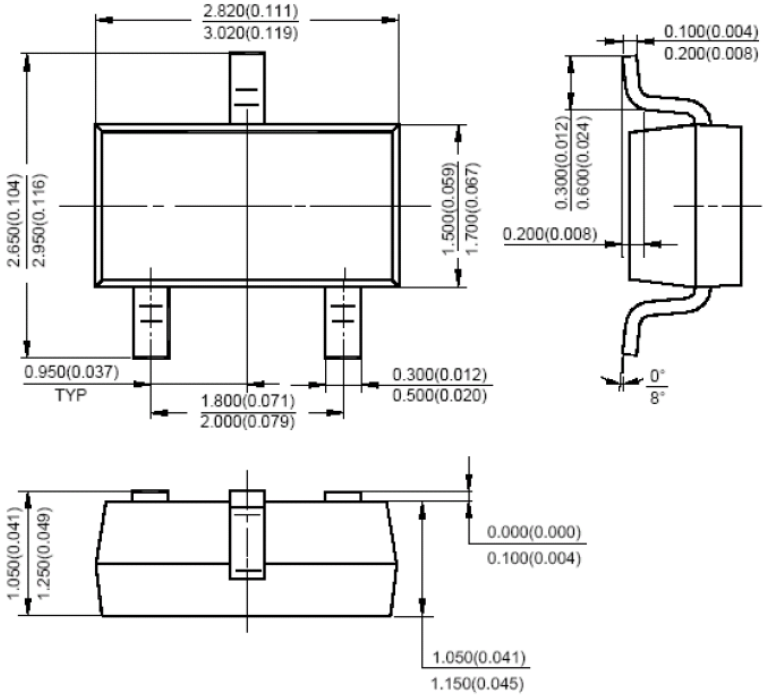
Mechanical Dimensions

TO-92 Unit: mm



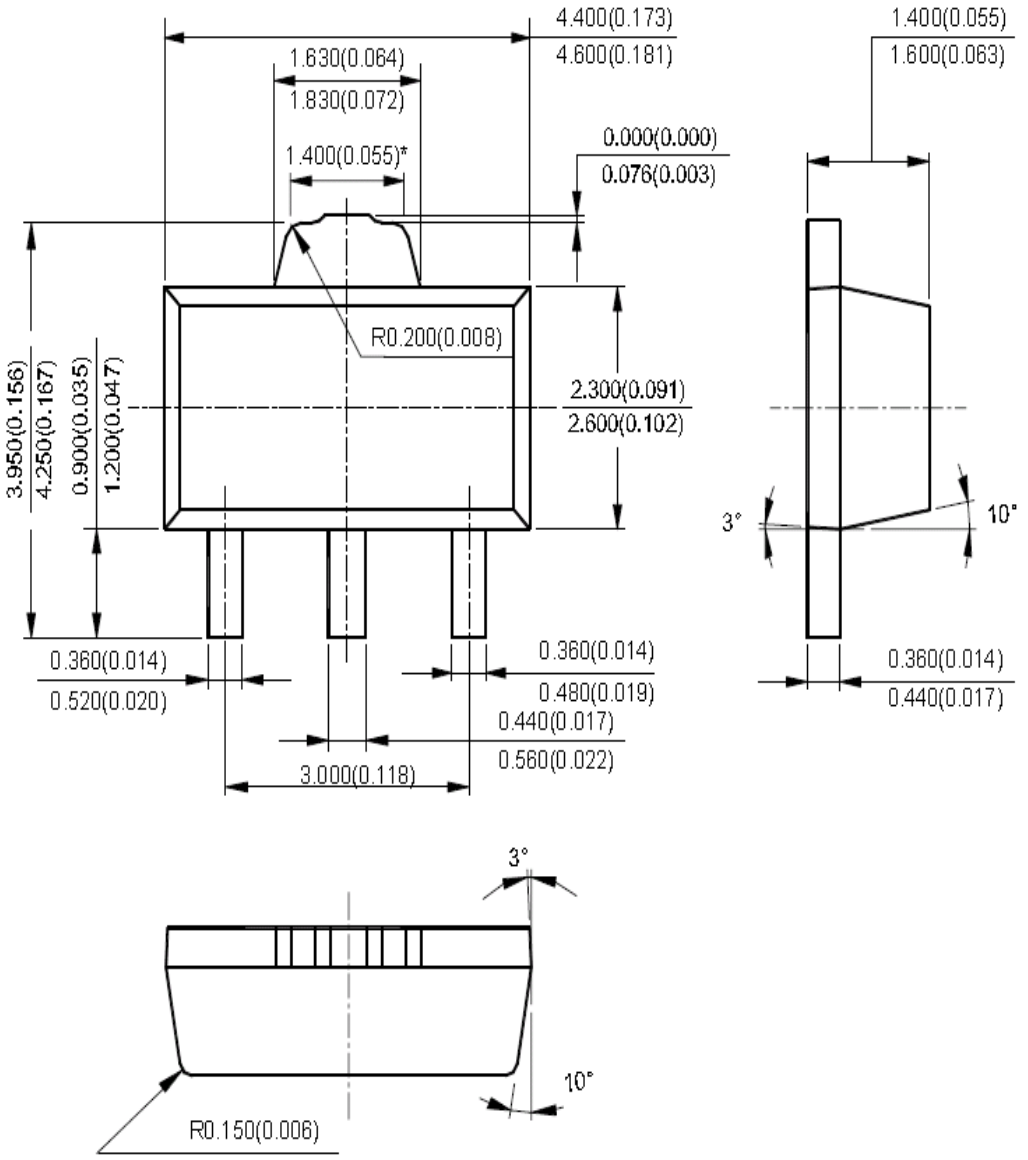
Mechanical Dimensions (Cont'd)

SOT-23-3 **Unit: mm(inch)**



Mechanical Dimensions (Cont'd)

SOT-89-3 **Unit: mm(inch)**



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