MB431U

Adjustable Precision Shunt Regulator

CBC Microelectronics
http://www.cbcv.net

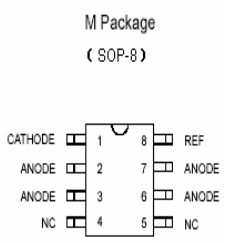
Description

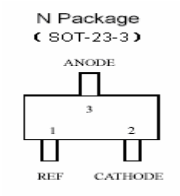
The MB431U is a 3-terminal adjustable shunt regulator with guaranteed temperature stability over the entire temperature range of operation. The output voltage may be set at any level greater than 2.5V (VREF) up to 18V merely by selecting two external resistors that act as a voltage divided network. Due to the sharp turn-on characteristics this device is an excellent replacement for many zener diode applications

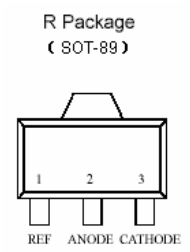
Features

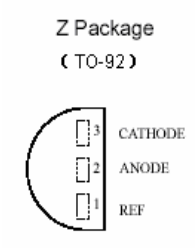
- Average temperature coefficient 50 ppm/°C
- Temperature compensated for operation over the full temperature range
- Programmable output voltage
- Fast turn-on response low output noise

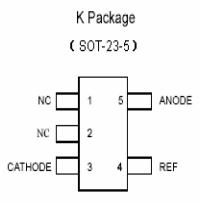
Pin Configuration

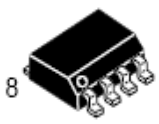






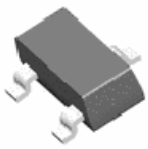






SOP8

SOT-89



SOT-23-3

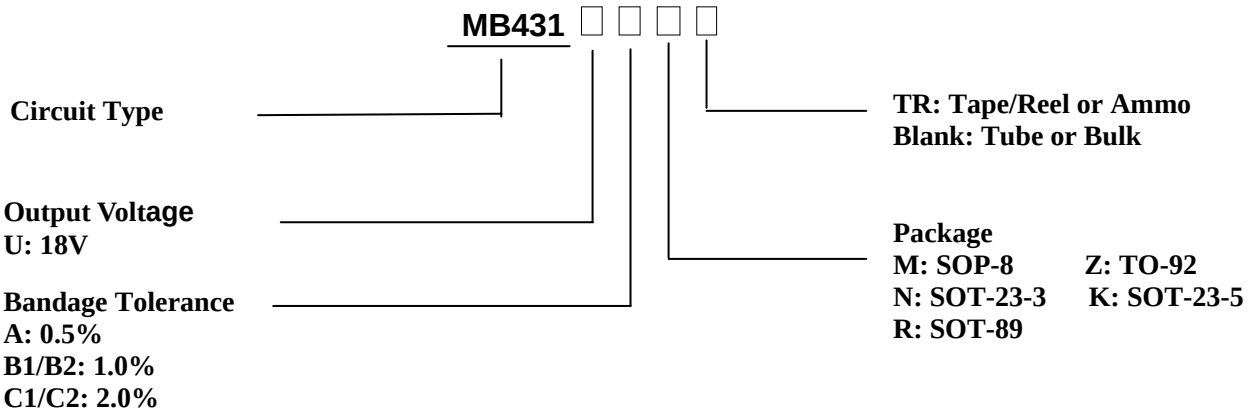
SOT-23-5

TO-92

Figure 1: Package Types of MB431U

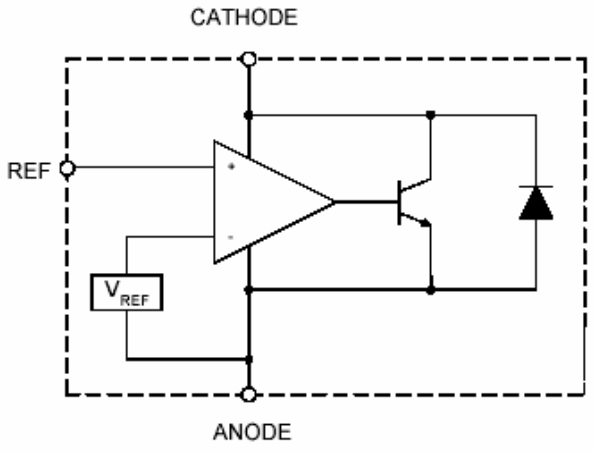
MB431U

Order Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
TO-92	-20℃～85℃	MB431UAZ	MB431UA	
SOT-23-3		MB431UANTR	MB431UA	Tape and Reel
SOT-23-5		MB431UAKTR	MB431UA	Tape and Reel
SOP-8		MB431UAM	MB431UA	Tube
SOT-89		MB431UARTR	MB431UA	Tape and Reel

Functional Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Cathode Voltage	VKA	18	V
Cathode Current Range (Continuous)	IKA	-100 to150	mA
Reference Input Current Range	IREF	10	mA
Power Dissipation	PD	M,Z,R Package: 750	mW
		N,K Package: 350	
Junction Temperature	TJ	150	°C
Storage Temperature Range	TSTG	-40 to +150	°C
Package Thermal Impedance	θJA	M Package: 150	°C/W
		Z Package: 150	°C/W

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Cathode Voltage	VKA	VREF	16	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		MB431U			Unit
					Min	Typ	Max	
Reference Voltage	4	VREF	VKA=VREF IKA=10mA	A	2.488	2.500	2.512	V
				B1	2.475		2.488	V
				B2	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=18V 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=18V, 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

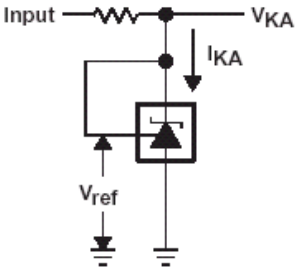


Figure 4. Test Circuit 4 for VKA=VREF

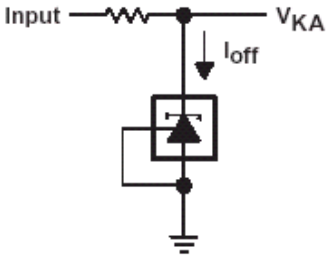


Figure 5. Test Circuit 5 for IOFF

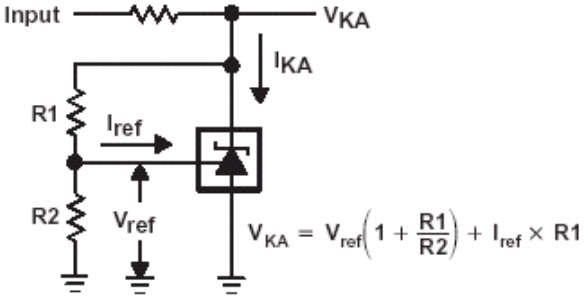


Figure 6. Test Circuit 6 for VKA >VREF

Typical Performance Characteristics

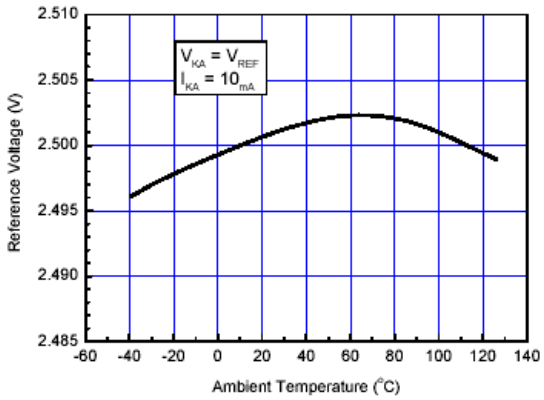


Figure 7. VREF vs. Ambient Temperature

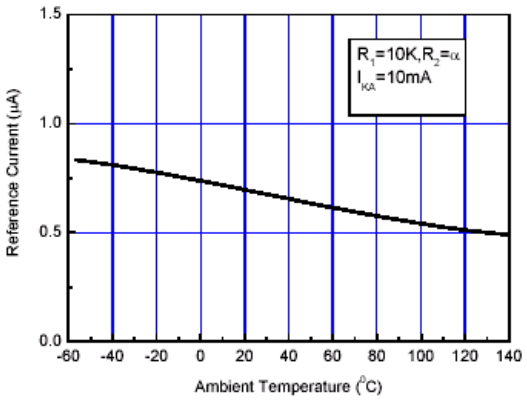


Figure 8. IREF vs. Ambient Temperature

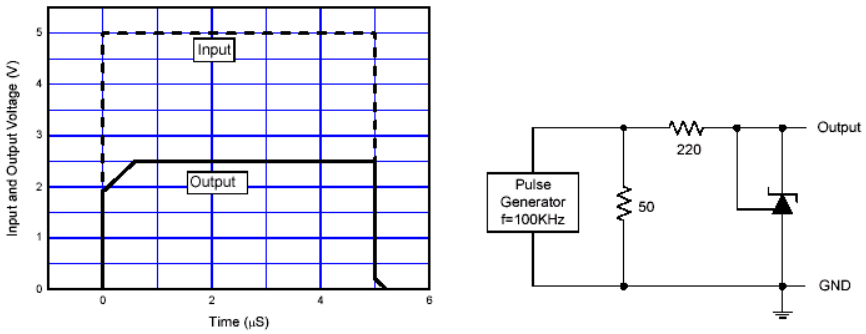


Figure 9. Pulse Response of Input and Output Voltage

Typical Applications

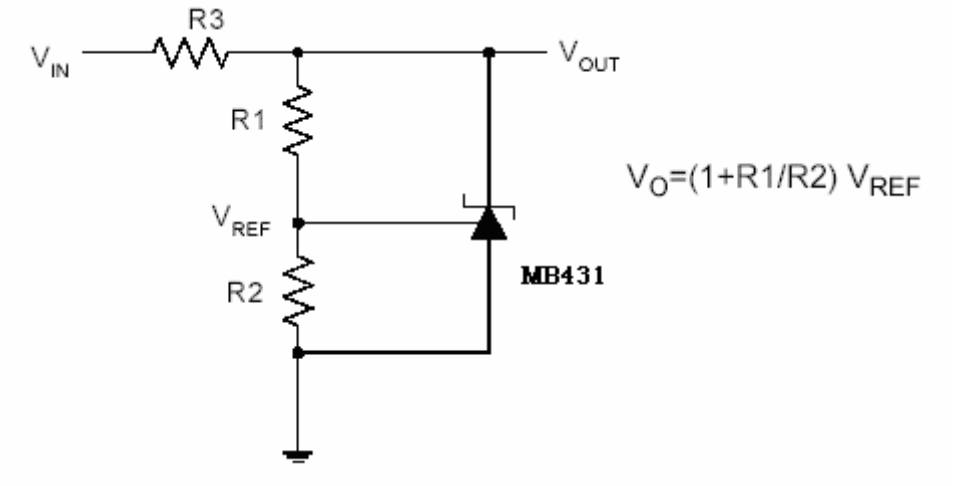
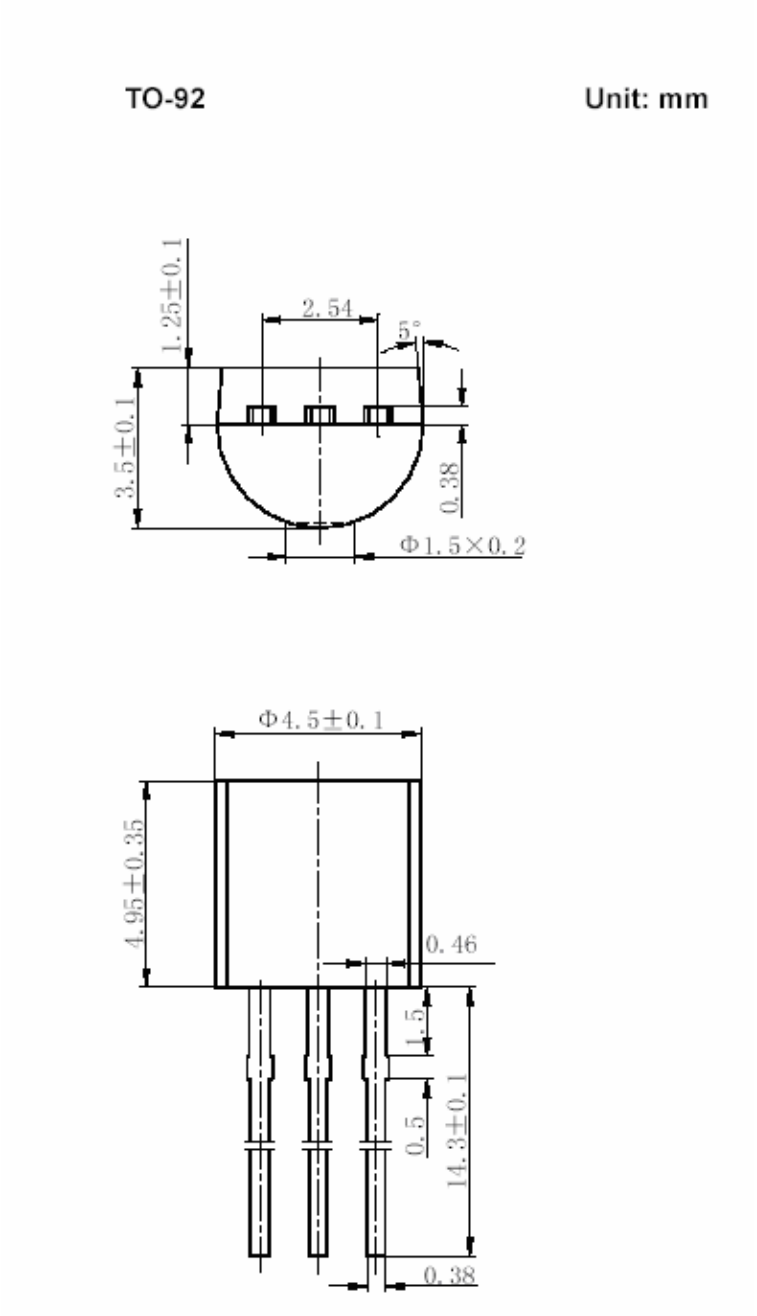


Figure 9. Shunt Regulator

MB431U

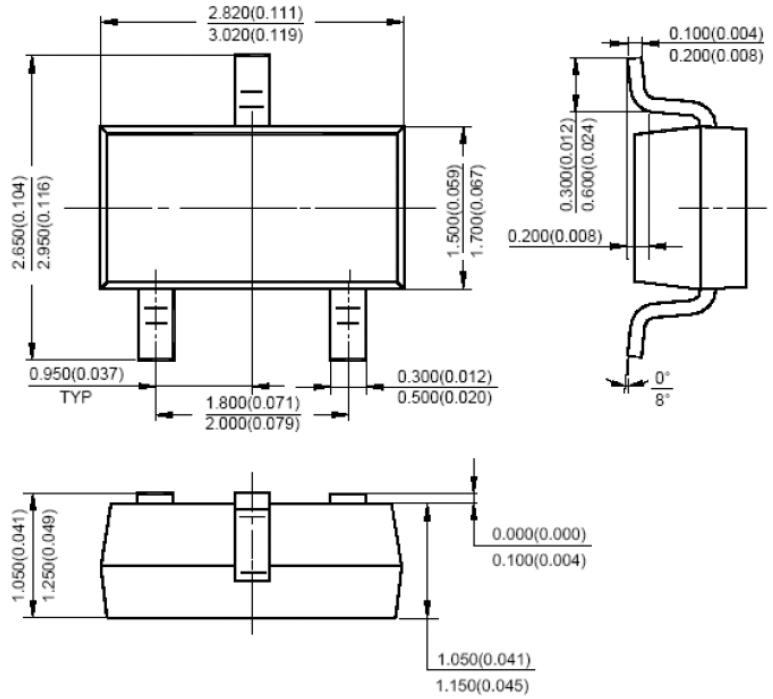
Mechanical Dimensions

TO-92 Unit: mm



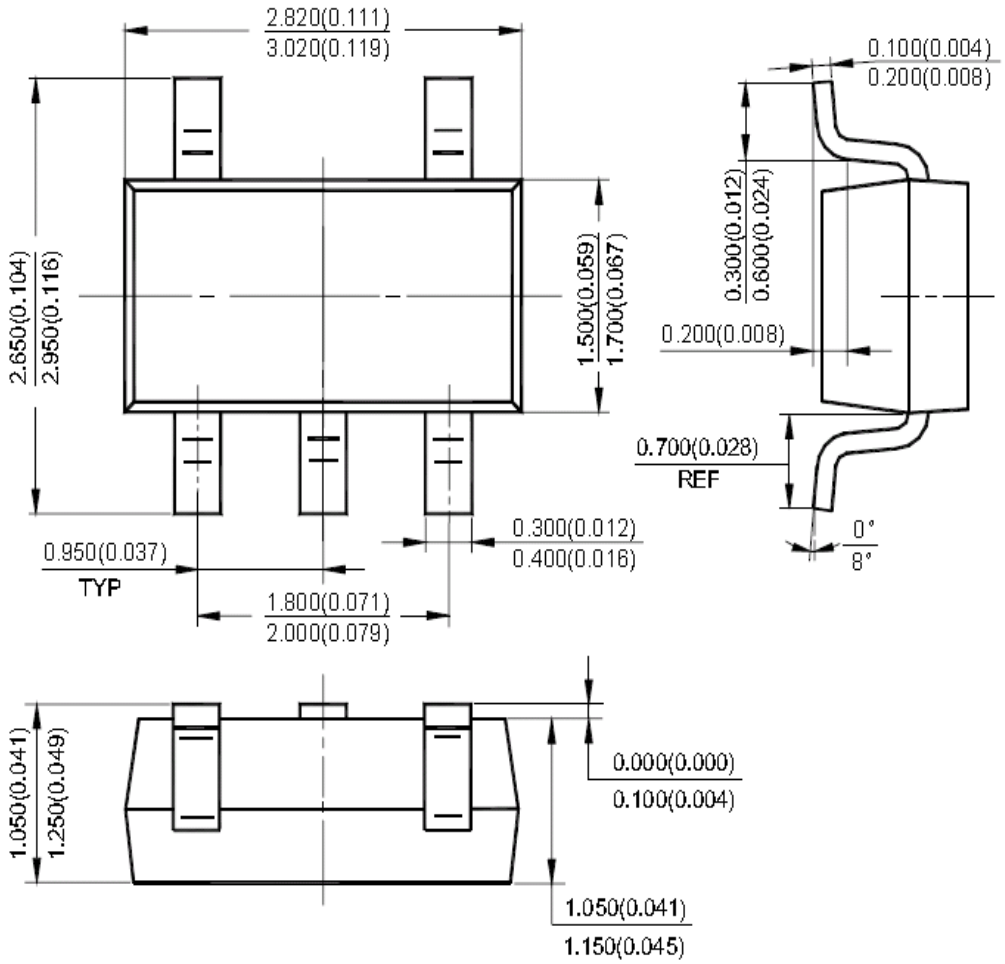
Mechanical Dimensions (Cont'd)

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



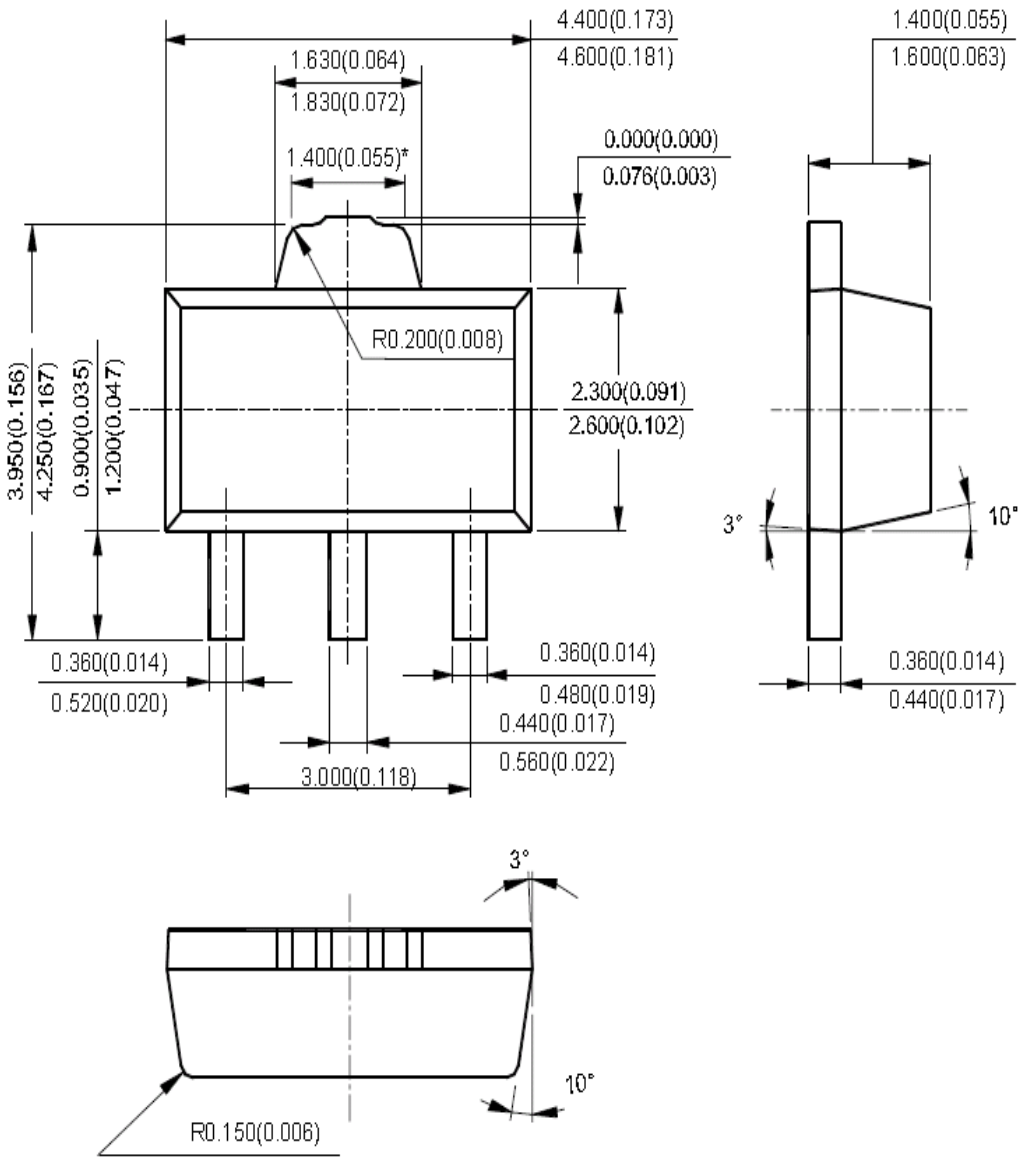
Mechanical Dimensions (Cont'd)

SOT-23-5 **Unit: mm(inch)**



Mechanical Dimensions (Cont'd)

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



Mechanical Dimensions (Cont'd)

SOIC-8 Unit: mm(inch)