LOW VOLTAGE (1.25V) ADJUSTABLE PRECISION SHUNT REGULATOR AZ432

General Description

The AZ432 series ICs are low voltage three-terminal adjustable regulators with guaranteed thermal stability over a full operation range. These ICs feature sharp turn-on characteristics, low temperature coefficient and low output impedance, which make them ideal substitutes for Zener diodes in applications such as switching power supply, charger, motherboard and other adjustable regulators.

The output voltage can be set to any value between 1.25V and 18V with two external resistors.

The AZ432 precision reference is offered in two voltage tolerance: 0.5% and 1.0%.

These ICs are available in 4 packages: TO-92 (bulk or ammo packing), SOT-23, SOT-23-5 and SOT-89.

Features

- Wide Programmable Precise Output Voltage from 1.25V to 18V
- High Stability under Capacitive Load
- Low Temperature Deviation: 3mV Typical
- Low Equivalent Full-Range Temperature Coefficient: 20PPM/^{o}C Typical
- Low Dynamic Output Resistance: 0.05Ω Typical
- High Sink Current Capacity from 0.1mA to 100 mA
- Low Output Noise
- Wide Operating Range of -40 to 125^{o}C

Applications

- Graphic Card
- PC Motherboard
- Voltage Adapter
- Switching Power Supply
- Charger

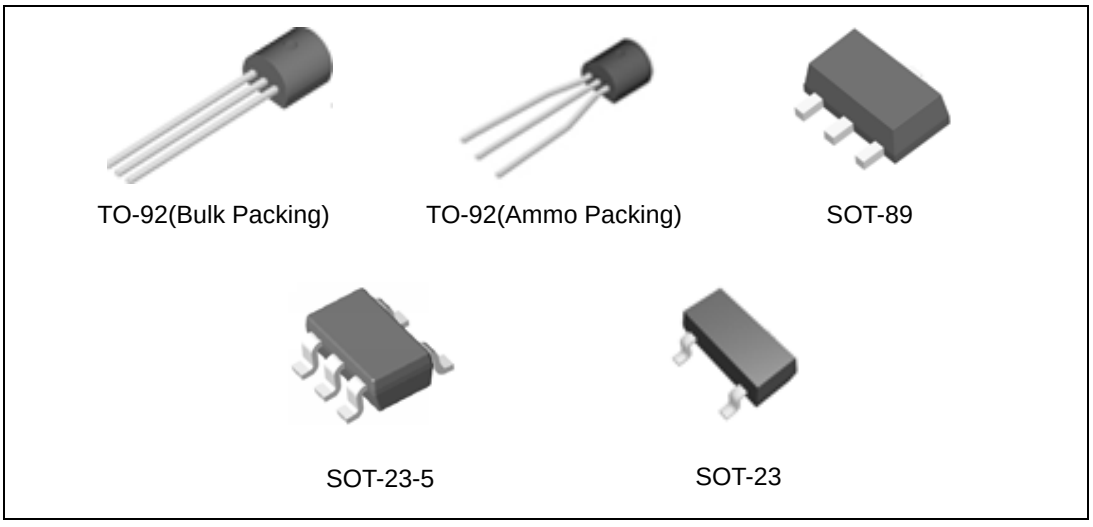


Figure 1. Package Types of AZ432

Pin Configuration

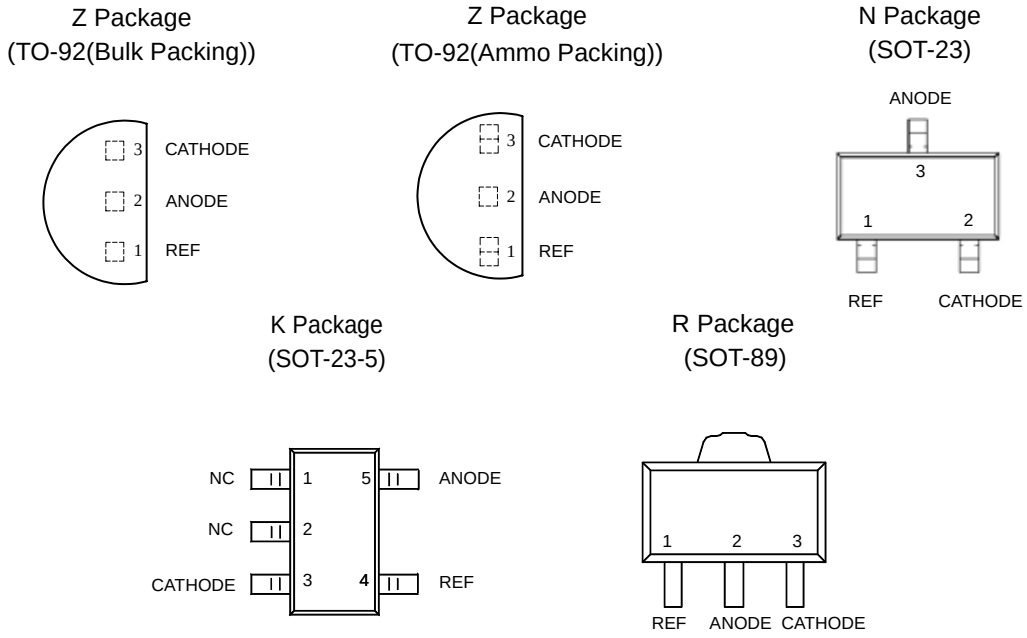


Figure 2. Pin Configuration of AZ432 (Top View)

Functional Block Diagram

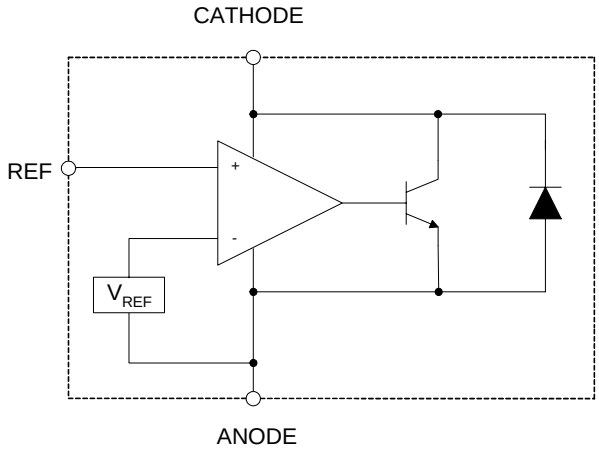
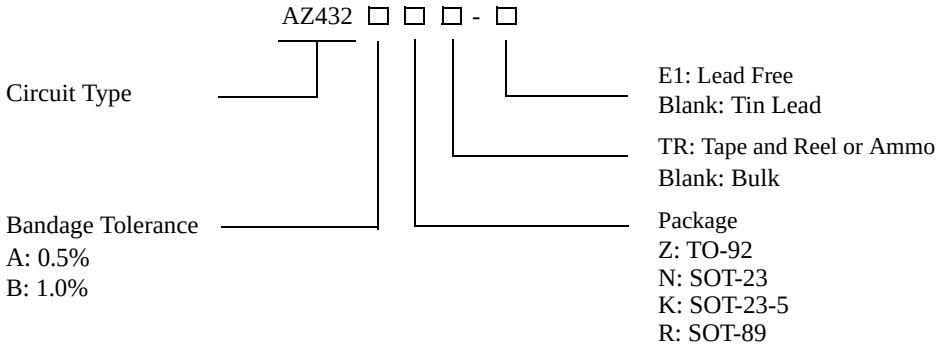


Figure 3. Functional Block Diagram of AZ432

Ordering Information



Package	Tempera-ture Range	Voltage Tolerance	Part Number		Marking ID		Packing Type
			Tin Lead	Lead Free	Tin Lead	Lead Free	
TO-92	-40 to 125°C	0.5%	AZ432AZ	AZ432AZ-E1	AZ432AZ	AZ432AZ-E1	Bulk
		0.5%	AZ432AZTR	AZ432AZTR-E1	AZ432AZ	AZ432AZ-E1	Ammo
		1.0%	AZ432BZ	AZ432BZ-E1	AZ432BZ	AZ432BZ-E1	Bulk
		1.0%	AZ432BZTR	AZ432BZTR-E1	AZ432BZ	AZ432BZ-E1	Ammo
SOT-23	-40 to 125°C	0.5%		AZ432ANTR-E1		EA8	Tape & Reel
		1.0%		AZ432BNTR-E1		EA9	Tape & Reel
SOT-23-5	-40 to 125°C	0.5%	AZ432AKTR	AZ432AKTR-E1	K43	E7A	Tape & Reel
		1.0%	AZ432BKTR	AZ432BKTR-E1	K44	E8A	Tape & Reel
SOT-89	-40 to 125°C	0.5%	AZ432ARTR	AZ432ARTR-E1	R42A	E42A	Tape & Reel
		1.0%	AZ432BRTR	AZ432BRTR-E1	R42B	E42B	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value		Unit
Cathode Voltage	V_{KA}	20		V
Cathode Current Range (Continuous)	I_{KA}	-100 to 100		mA
Reference Input Current Range	I_{REF}	10		mA
Power Dissipation	P_D	Z, R Package	770	mW
		N, K Package	370	
Junction Temperature	T_J	150		°C
Storage Temperature Range	T_{STG}	-65 to 150		°C

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operation Ratings

Parameter	Symbol	Min	Max	Unit
Cathode Voltage	V_{KA}	V_{REF}	18	V
Cathode Current	I_{KA}	0.1	100	mA
Operating Ambient Temperature Range		-40	125	°C

Electrical Characteristics

(Typical and limits apply for T_A=25°C, unless otherwise noted.)

Parameter		Test Circuit	Symbol	Conditions		Min	Typ	Max	Unit
Reference Voltage	0.5%	4	V_{REF}	$V_{KA}=V_{REF}$, I_{KA}=10mA		1.244	1.250	1.256	V
	1.0%					1.238	1.250	1.262	
Deviation of Reference Voltage Over Full Temperature Range		4	ΔV_{REF}	$V_{KA}=V_{REF}$ I_{KA}=10mA	0 to 70°C		2	10	mV
					-40 to 85°C		3	10	
					-40 to 125°C		4	15	
Ratio of Change in V_{REF} to the Change in Cathode Voltage		5	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	I_{KA}=10mA, ΔV_{KA}: V_{REF} to 16V			-0.5	-1.5	mV/V
Reference Input Current		5	I_{REF}	I_{KA}=10mA, R1=10KΩ, R2=∞			0.15	0.4	μA
Deviation of Reference Current Over Full Temperature Range		5	ΔI_{REF}	I_{KA}=10mA, R1=10KΩ, R2=∞ T_A=-40 to 125°C			0.1	0.4	μA
Minimum Cathode Current for Regulation		4	I_{KA} (MIN)	$V_{KA}=V_{REF}$			55	80	μA
Off-state Cathode Current		6	I_{KA} (OFF)	V_{REF}=0, V_{KA}=18V			0.04	0.10	μA
				V_{KA}=6V, V_{REF}=0			0.01	0.05	
Dynamic Impedance		4	Z_{KA}	$V_{KA}=V_{REF}$, I_{KA}=1 to 100mA f≤1.0kHz			0.05	0.15	Ω

Electrical Characteristics (Continued)

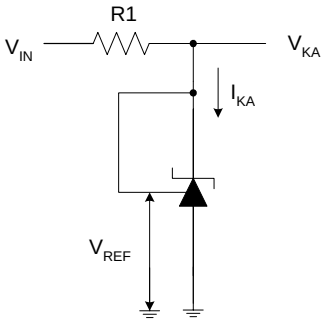


Figure 4. Test Circuit 4 for $V_{KA}=V_{REF}$

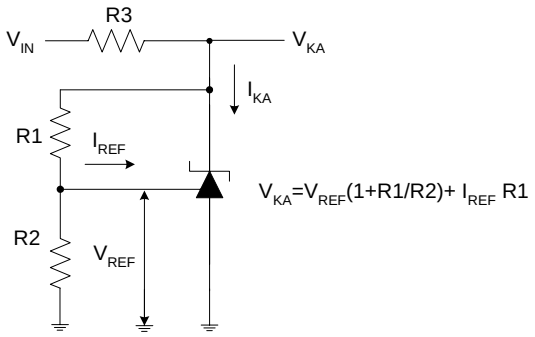


Figure 5. Test Circuit 5 for $V_{KA}>V_{REF}$

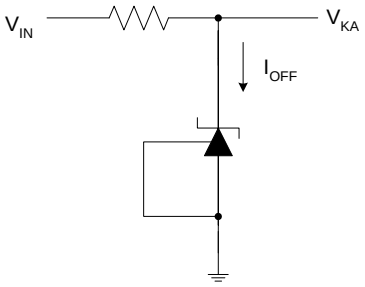


Figure 6. Test Circuit 6 for I_{OFF}

Typical Performance Characteristics

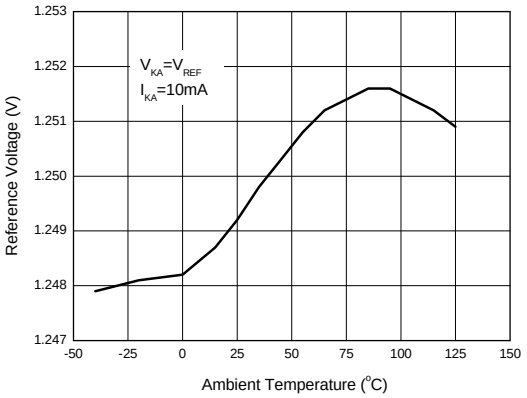


Figure 7. Reference Voltage vs. Ambient Temperature

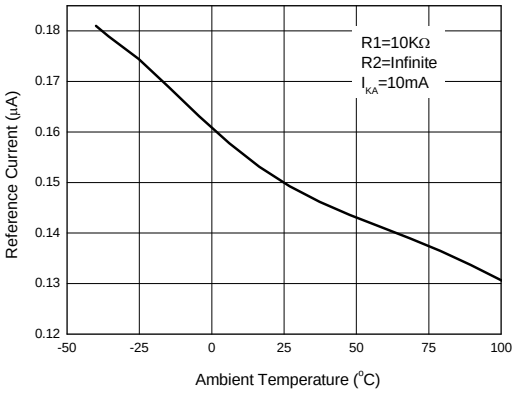


Figure 8. Reference Current vs. Ambient Temperature

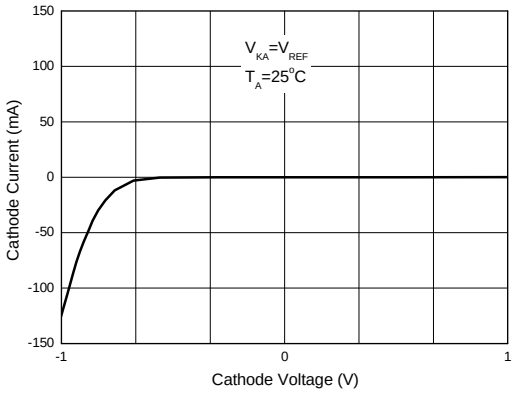


Figure 9. Cathode Current vs. Cathode Voltage

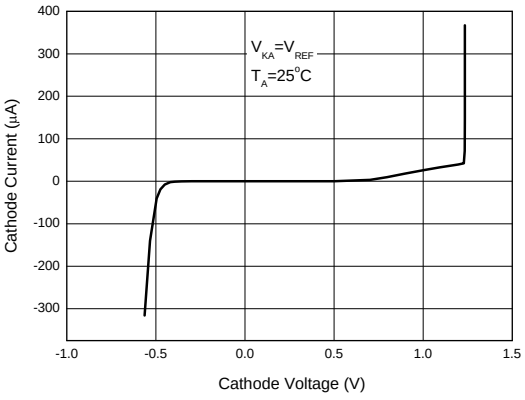


Figure 10. Cathode Current vs. Cathode Voltage

Typical Performance Characteristics (Continued)

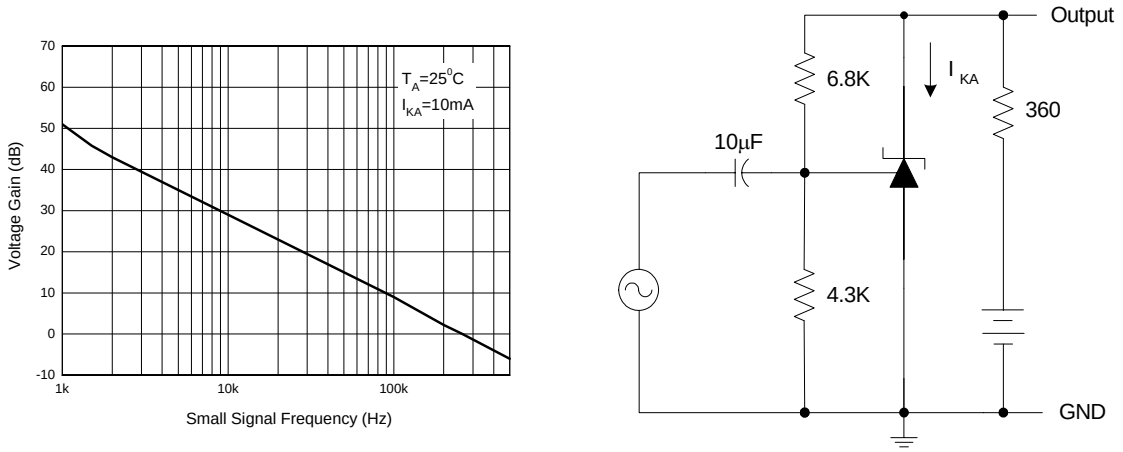


Figure 11. Small Signal Voltage Gain vs. Frequency

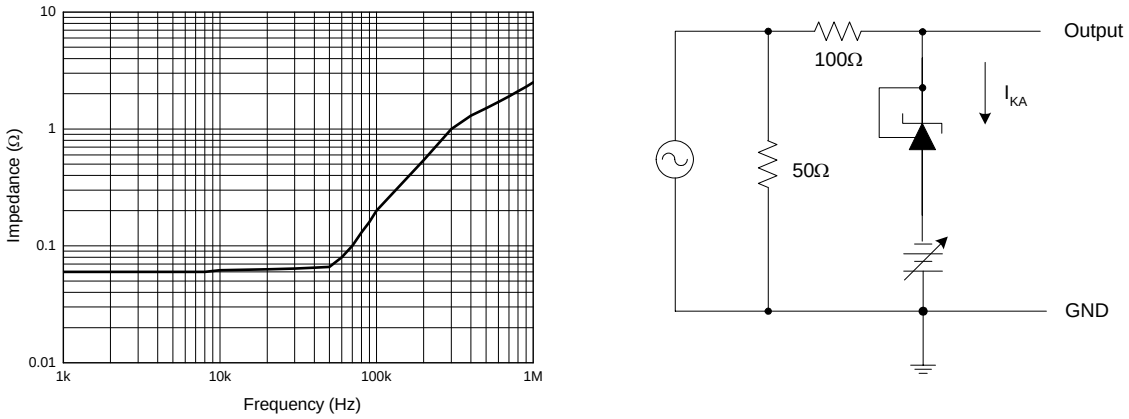


Figure 12. Dynamic Impedance vs. Frequency

Typical Performance Characteristics (Continued)

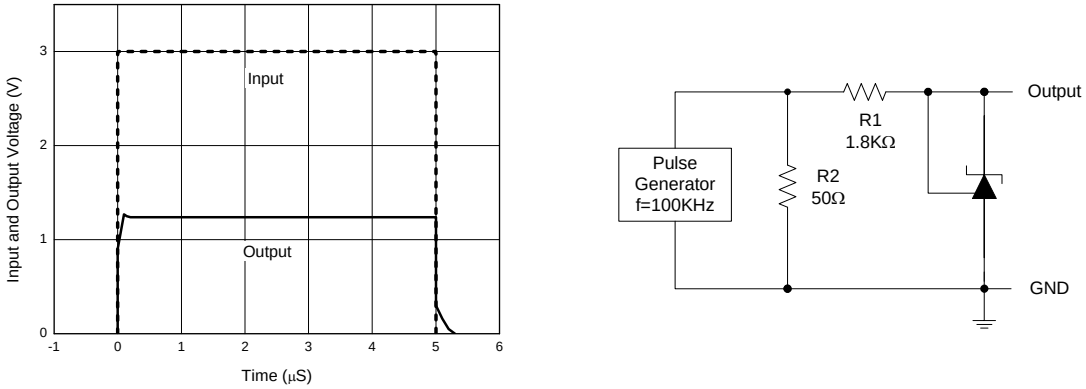


Figure 13. Pulse Response of Input and Output Voltage

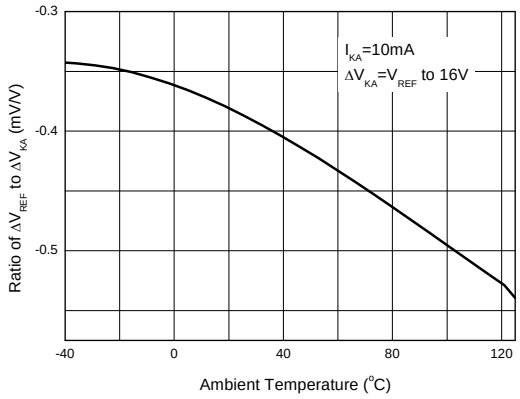


Figure 14. Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage vs. Ambient Temperature

Typical Applications

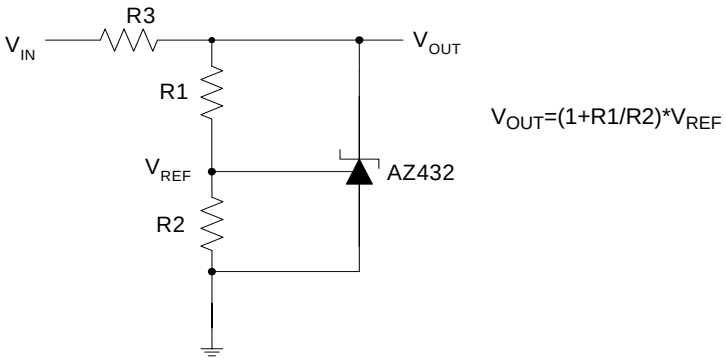


Figure 15. Shunt Regulator

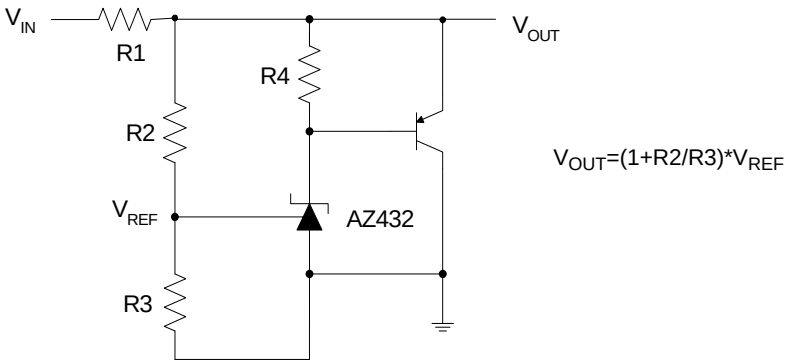


Figure 16. High Current Shunt Regulator

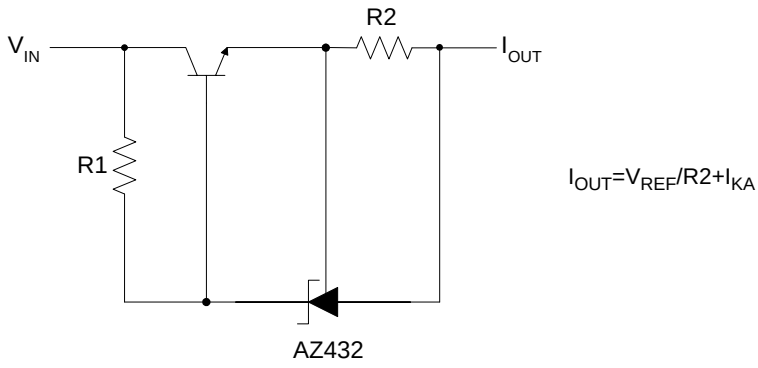


Figure17. Current Source or Current Limit

Typical Application (Continued)

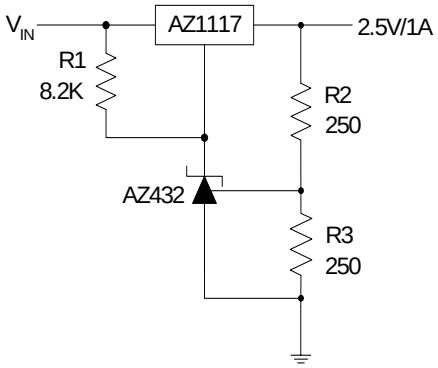


Figure18. Precision 2.5V/1A Regulator

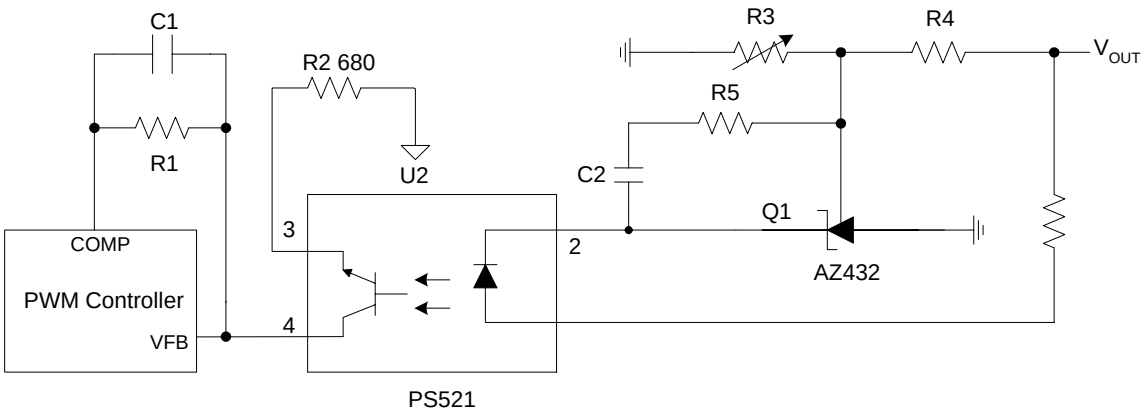
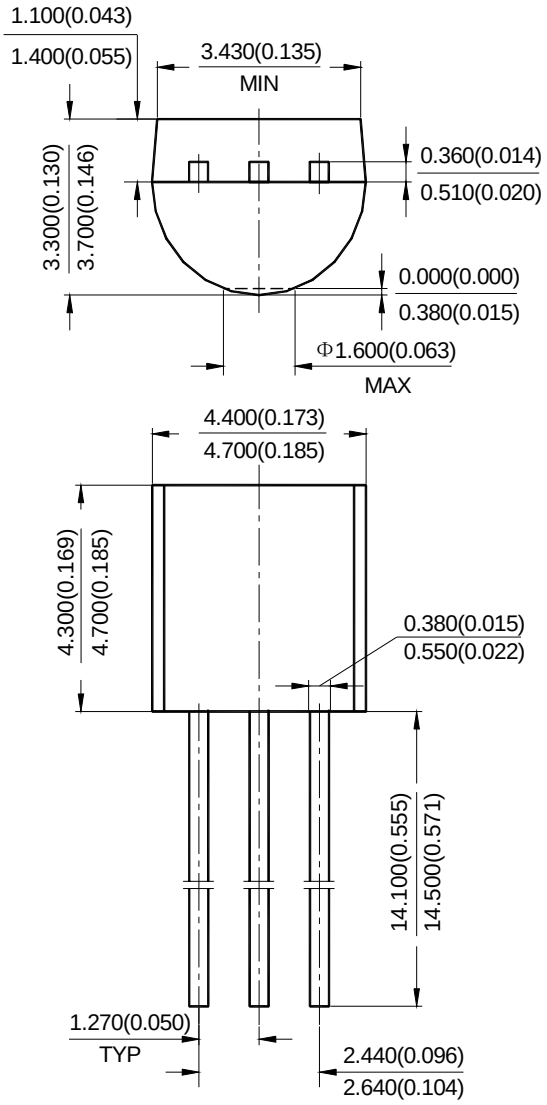


Figure 19. PWM Converter with Reference

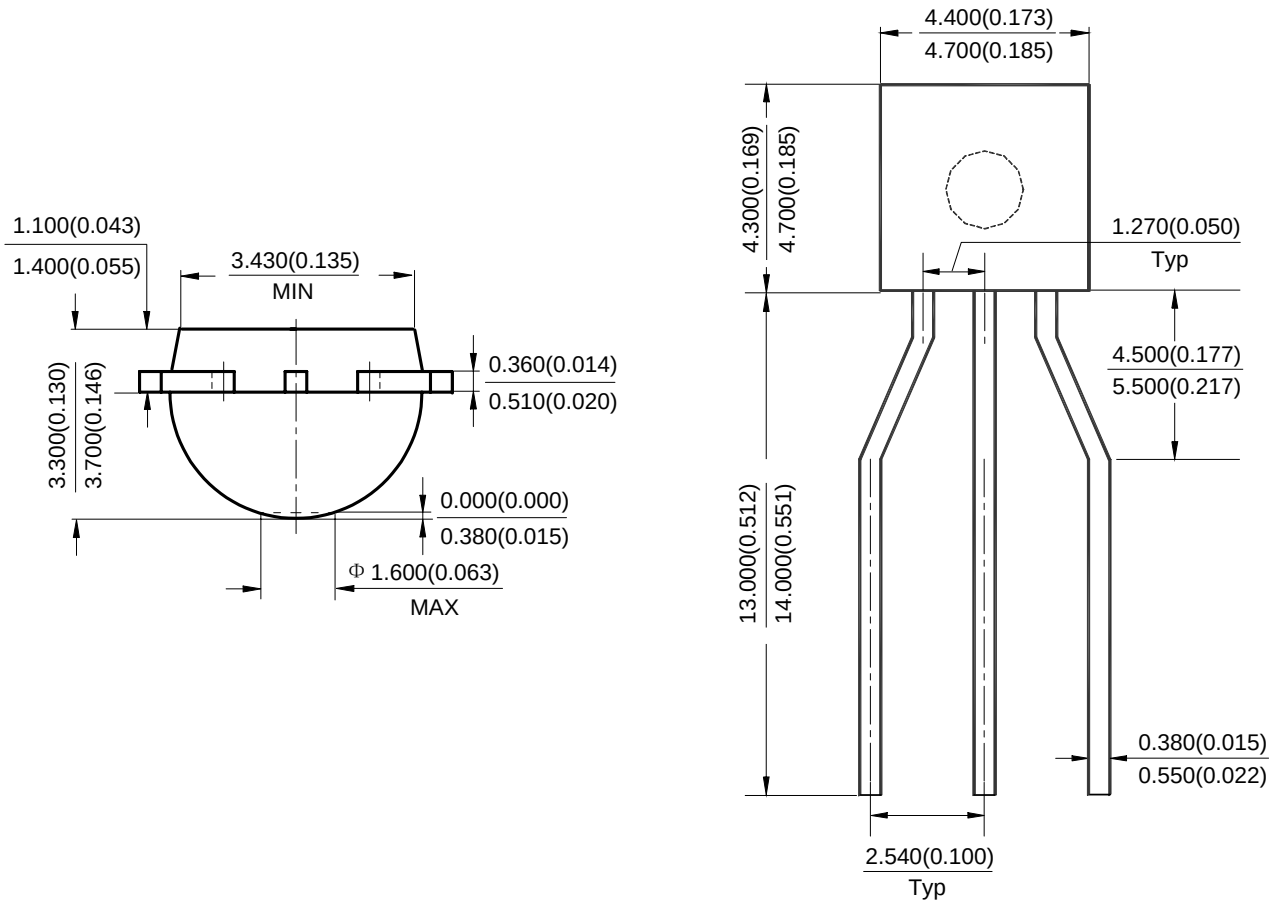
Mechanical Dimensions

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



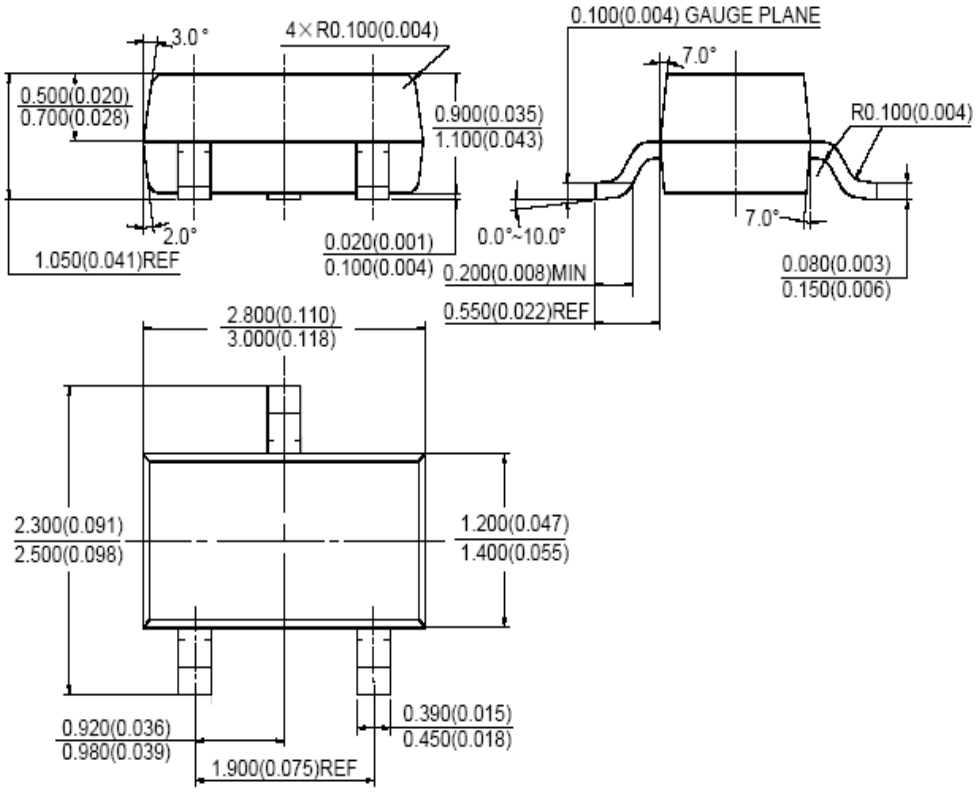
Mechanical Dimensions (Continued)

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



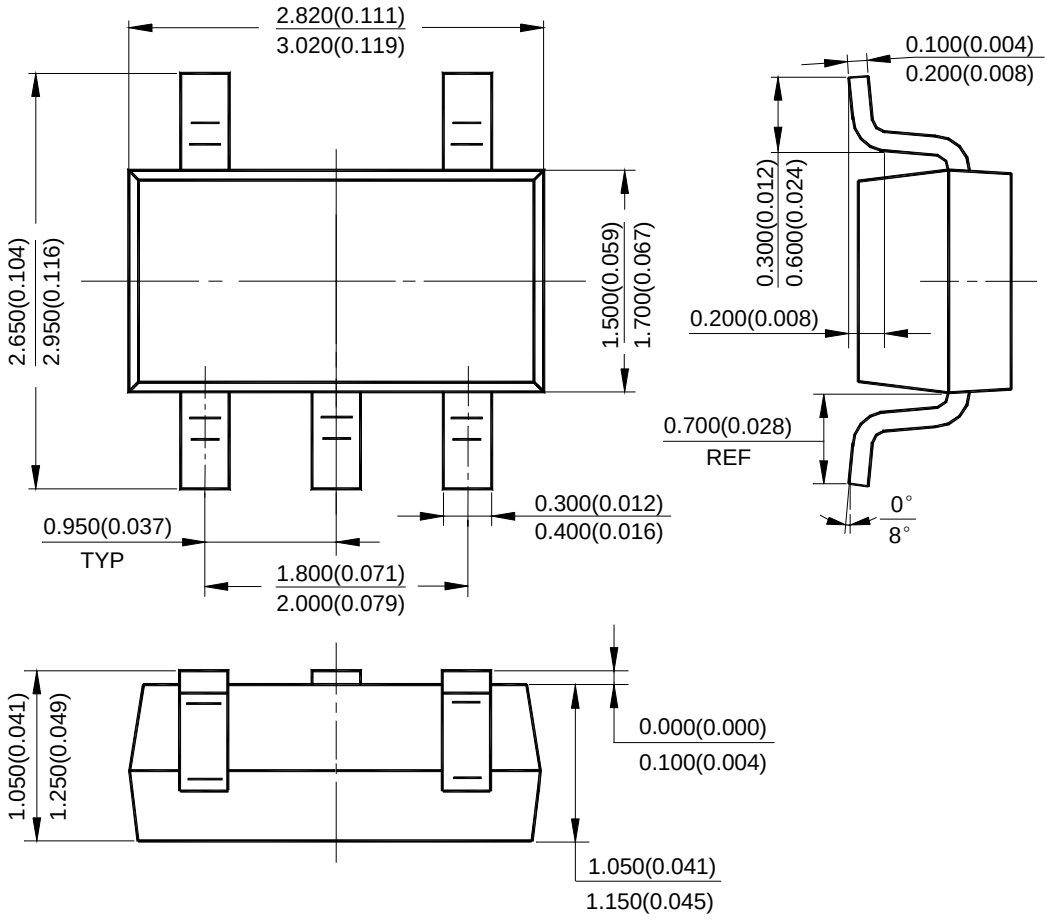
Mechanical Dimensions (Continued)

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



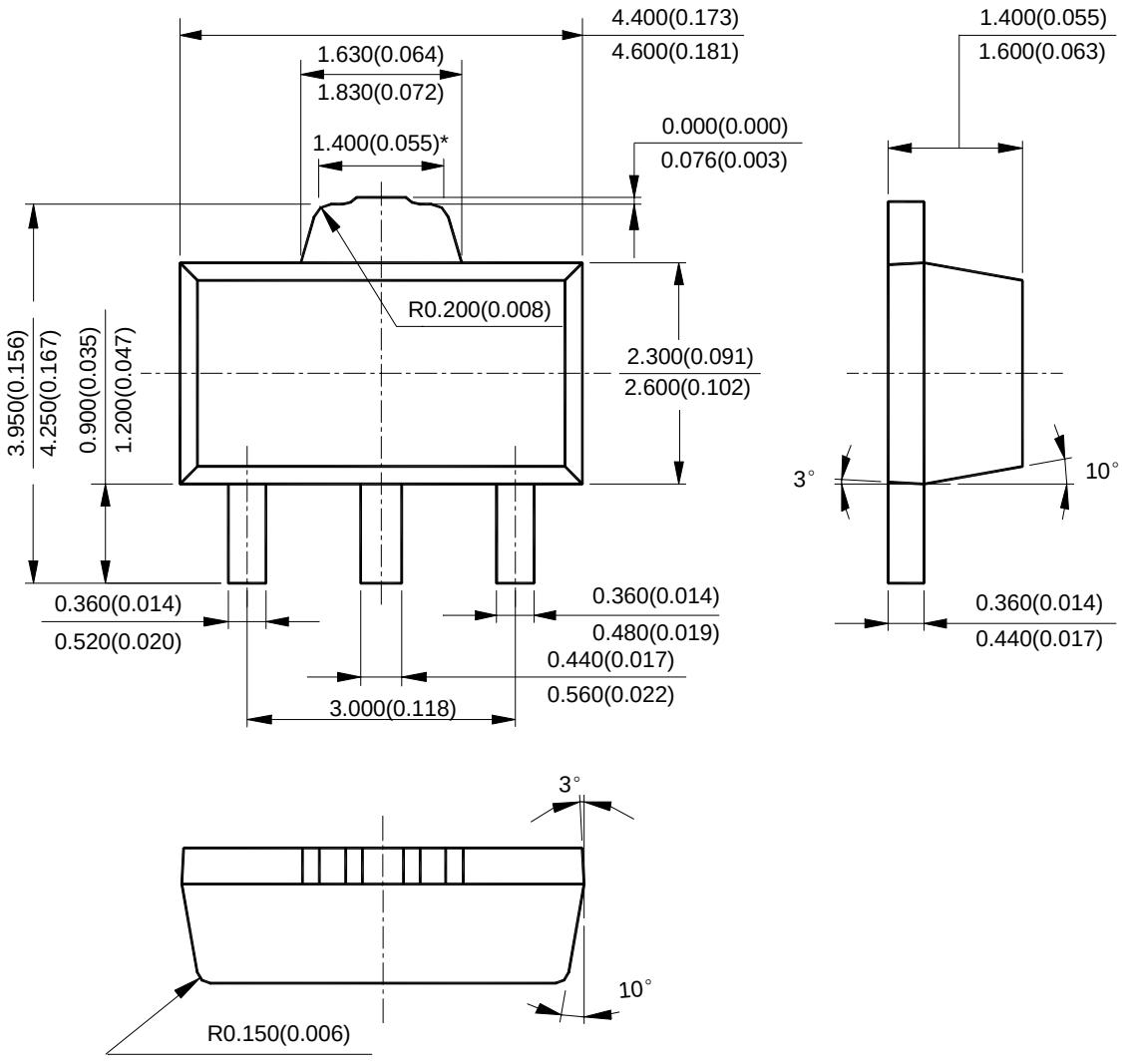
Mechanical Dimensions (Continued)

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



Mechanical Dimensions (Continued)

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



BCD Semiconductor Manufacturing Limited

http://www.bcdsemi.com

IMPORTANT NOTICE

BCD Semiconductor Manufacturing Limited reserves the right to make changes without further notice to any products or specifications herein. BCD Semiconductor Manufacturing Limited does not assume any responsibility for use of any its products for any particular purpose, nor does BCD Semiconductor Manufacturing Limited assume any liability arising out of the application or use of any its products or circuits. BCD Semiconductor Manufacturing Limited does not convey any license under its patent rights or other rights nor the rights of others.

MAIN SITE

- Headquarters
BCD Semiconductor Manufacturing Limited
No. 1600, Zi Xing Road, Shanghai ZiZhu Science-based Industrial Park, 200241, China
Tel: +86-21-24162266, Fax: +86-21-24162277

- Wafer Fab
Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd.
800 Yi Shan Road, Shanghai 200233, China
Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

REGIONAL SALES OFFICE

Shenzhen Office
Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd., Shenzhen Office
Room E, 5F, Noble Center, No.1006, 3rd Fuzhong Road, Futian District, Shenzhen, 518026, China
Tel: +86-755-8826 7951
Fax: +86-755-8826 7865

Taiwan Office
BCD Semiconductor (Taiwan) Company Limited
4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei, Taiwan
Tel: +886-2-2656 2808
Fax: +886-2-2656 2806

USA Office
BCD Semiconductor Corp.
30920 Huntwood Ave. Hayward, CA 94544, USA
Tel : +1-510-324-2988
Fax: +1-510-324-2788