

General Description

The AS431I is a three-terminal adjustable shunt regulator with guaranteed thermal stability over a full operation range. It features sharp turn-on characteristics, low temperature coefficient and low output impedance, which make it ideal substitute for Zener diode in applications such as switching power supply, charger and other adjustable regulators.

The output voltage of AS431I can be set to any value between V_{REF} (2.5V) and the corresponding maximum cathode voltage (36V).

The AS431I is offered in two grade initial voltage tolerance at 25°C, 0.5%, and 1%.

This IC is available in 3 packages: TO-92 (bulk or ammo packing), SOT-23 and SOT-89.

Features

- Programmable Precise Output Voltage from 2.5V to 36V
- High Stability Under Capacitive Load
- Low Minimum Cathode Current for Regulation: 10 μ A (Typ.), 50 μ A (Max.)
- Low Temperature Deviation: 4.5mV Typical
- Sink Current Capacity from 50 μ A to 100mA
- Low Output Noise
- Wide Operating Range: -40°C to 125°C

Applications

- Charger
- Voltage Adapter
- Switching Power Supply
- Graphic Card
- Precision Voltage Reference

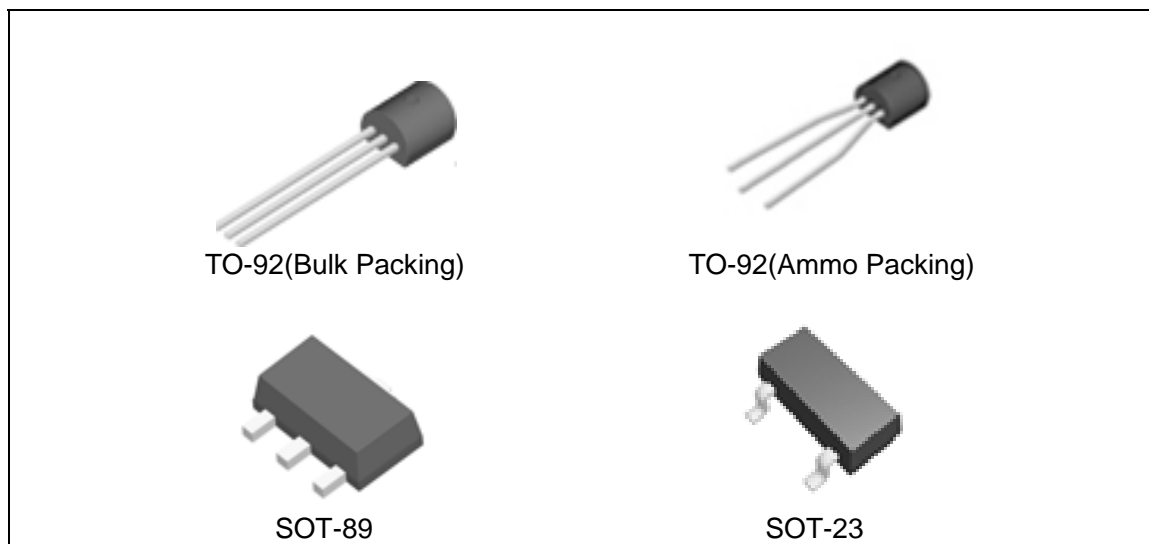
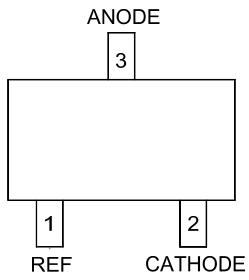


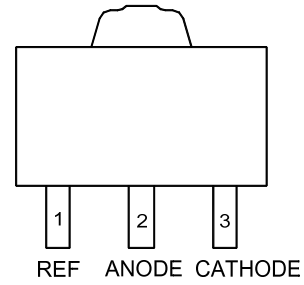
Figure 1. Package Type of AS431I

Pin Configuration

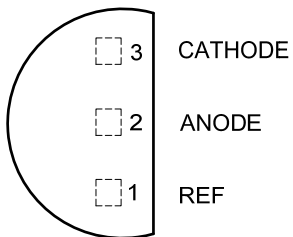
N Package
(SOT-23)



R Package
(SOT-89)



Z Package
(TO-92 (Bulk Packing))



Z Package
(TO-92 (Ammo Packing))

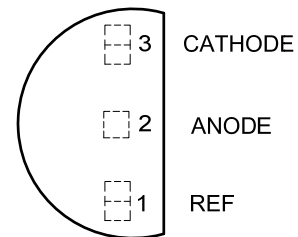


Figure 2. Pin Configuration of AS431I (Top View)

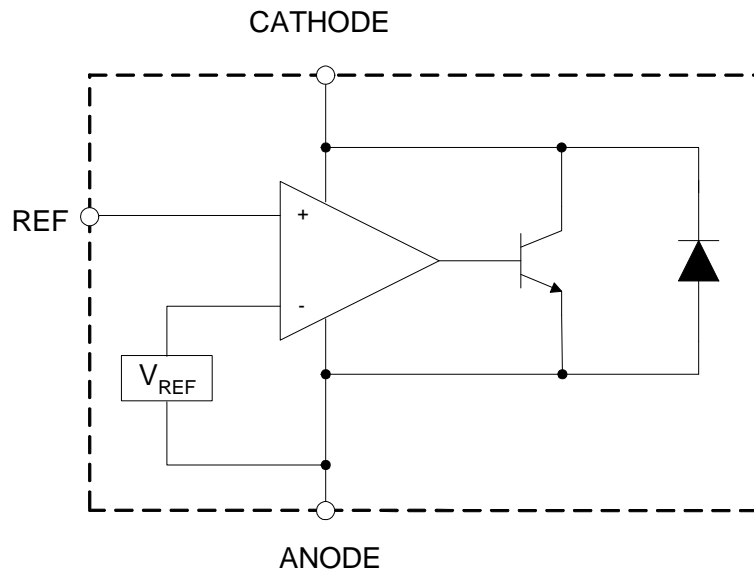
Functional Block Diagram

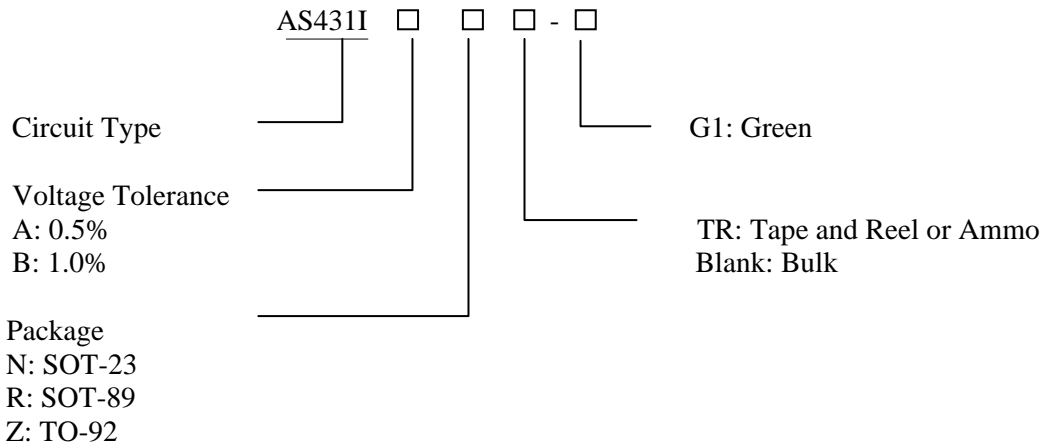
Figure 3. Functional Block Diagram of AS431I



LOW CATHODE CURRENT ADJUSTABLE PRECISION SHUNT REGULATOR

AS431I

Ordering Information



Package	Temperature Range	Voltage Tolerance	Part Number	Marking ID	Packing Type
SOT-23	-40 to 125°C	0.5%	AS431IANTR-G1	GB9	Tape & Reel
		1.0%	AS431IBNTR-G1	GC9	Tape & Reel
TO-92	-40 to 125°C	0.5%	AS431IAZ-G1	AS431IAZ-G1	Bulk
		0.5%	AS431IAZTR-G1	AS431IAZ-G1	Ammo
		1.0%	AS431IBZ-G1	AS431IBZ-G1	Bulk
		1.0%	AS431IBZTR-G1	AS431IBZ-G1	Ammo
SOT-89	-40 to 125°C	0.5%	AS431IARTR-G1	G43J	Tape & Reel
		1.0%	AS431IBRTR-G1	G43K	Tape & Reel

BCD Semiconductor's products, as designated with "G1" suffix in the part number, are RoHS compliant and Green.

**LOW CATHODE CURRENT ADJUSTABLE PRECISION SHUNT REGULATOR****AS431I****Absolute Maximum Ratings (Note 1)**

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	TO-92	770	mW
		SOT-89	770	
		SOT-23	370	
Junction Temperature	T_J	150		°C
Storage Temperature Range	T_{STG}	-65 to 150		°C
ESD (Human Body Model)	ESD	2000		V

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 Operating Conditions

Parameter	Symbol	Min	Max	Unit
Cathode Voltage	V_{KA}	V_{REF}	36	V
Cathode Current	I_{KA}	0.05	100	mA
Operating Ambient Temperature Range	T_A	-40	125	°C



LOW CATHODE CURRENT ADJUSTABLE PRECISION SHUNT REGULATOR

AS431I

Electrical Characteristics

Operating Conditions: $T_A=25^{\circ}\text{C}$, unless otherwise specified.

Parameter	Test Circuit	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	0.5%	4	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$	2.487	2.500	2.512	V
	1.0%			2.475	2.500	2.525	
Deviation of Reference Voltage Over Full Temperature Range	4	ΔV_{REF}	$V_{KA}=V_{REF}, I_{KA}=10\text{mA}$	0 to 70°C	4.5	8	mV
				-40 to 85°C	4.5	10	
				-40 to 125°C	4.5	16	
Ratio of Change in Reference Voltage to the Change in Cathode Voltage	5	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$I_{KA}=10\text{mA}$	$\Delta V_{KA}=10\text{V to } V_{REF}$	-1.0	-2.7	mV/V
				$\Delta V_{KA}=36\text{V to } 10\text{V}$	-0.5	-2.0	
Reference Current	5	I_{REF}	$I_{KA}=10\text{mA}, R1=10\text{k}\Omega, R2=\infty$		0.035	0.5	μA
Deviation of Reference Current Over Full Temperature Range	5	ΔI_{REF}	$I_{KA}=10\text{mA}, R1=10\text{k}\Omega, R2=\infty, T_A=-40$ to 125°C		0.03	0.3	μA
Minimum Cathode Current for Regulation	4	$I_{KA}(\text{Min})$	$V_{KA}=V_{REF}$		10	50	μA
Off-state Cathode Current	6	$I_{KA}(\text{Off})$	$V_{KA}=36\text{V}, V_{REF}=0$		0.05	1.0	μA
Dynamic Impedance	4	Z_{KA}	$V_{KA}=V_{REF}, I_{KA}=1$ to $100\text{mA}, f \leq 1.0\text{kHz}$		0.15	0.5	Ω
Thermal Resistance		θ_{JC}	TO-92		68		$^{\circ}\text{C/W}$
			SOT-89		29		
			SOT-23		113		

Electrical Characteristics (Continued)

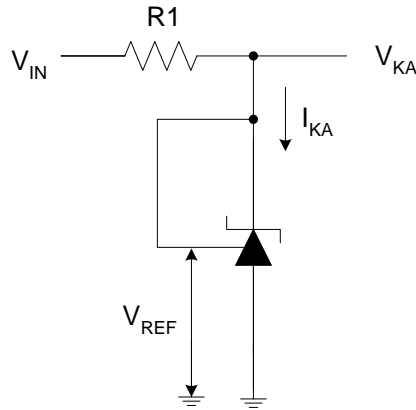


Figure 4. Test Circuit 4 for $V_{KA} = V_{REF}$

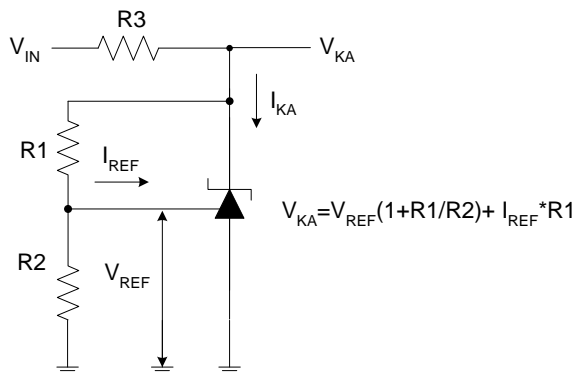


Figure 5. Test Circuit 5 for $V_{KA} > V_{REF}$

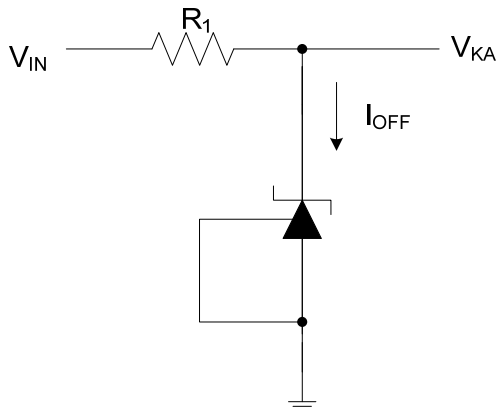


Figure 6. Test Circuit 6 for I_{OFF}

Typical Performance Characteristics

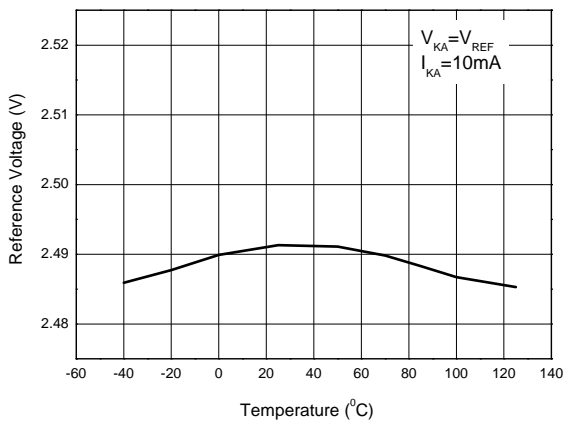


Figure 7. Reference Voltage vs. Ambient Temperature

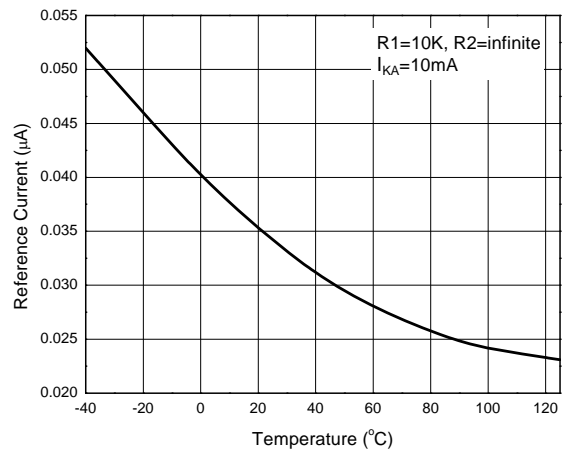


Figure 8. Reference Current vs. Ambient Temperature

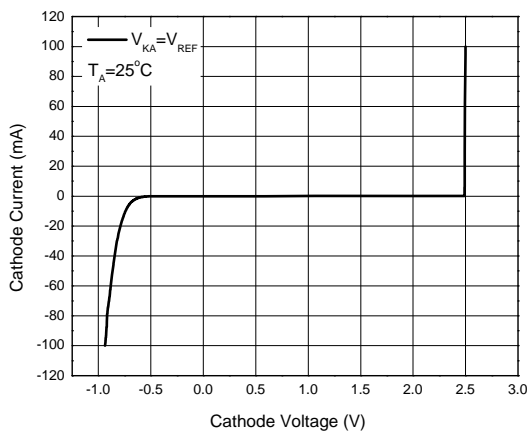


Figure 9. Cathode Current vs. Cathode Voltage

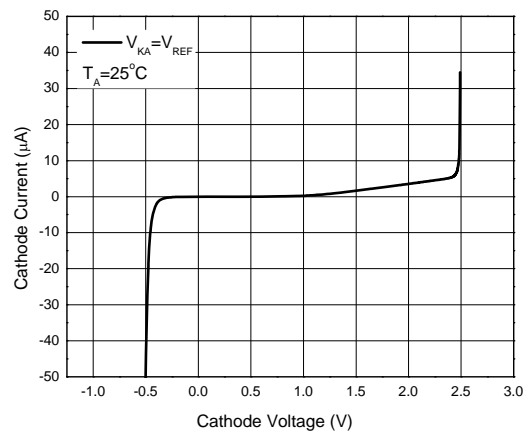


Figure 10. Cathode Current vs. Cathode Voltage

Typical Performance Characteristics (Continued)

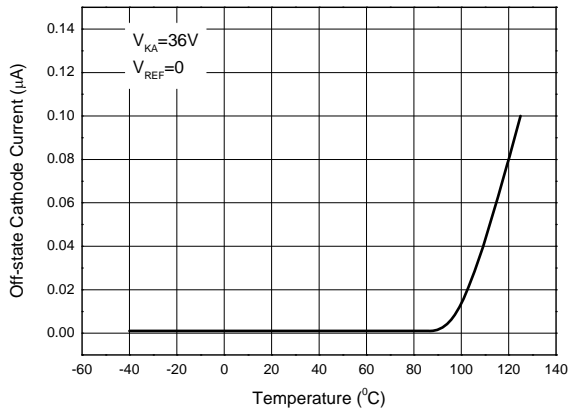


Figure 11. Off-state Cathode Current vs. Ambient Temperature

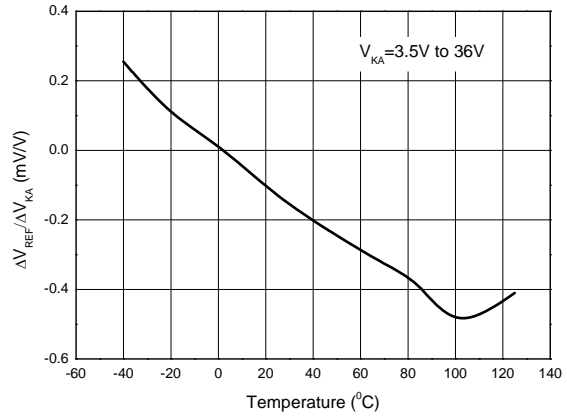


Figure 12. Ratio of Delta Reference Voltage to the Ratio of Delta Cathode Voltage

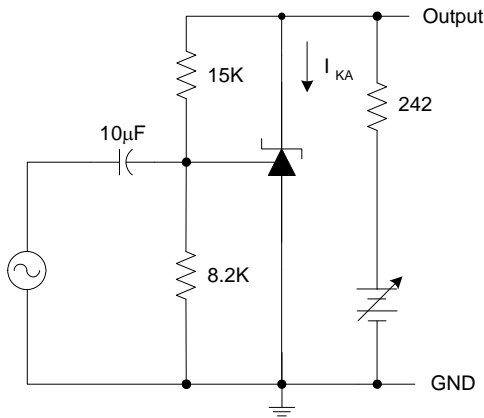
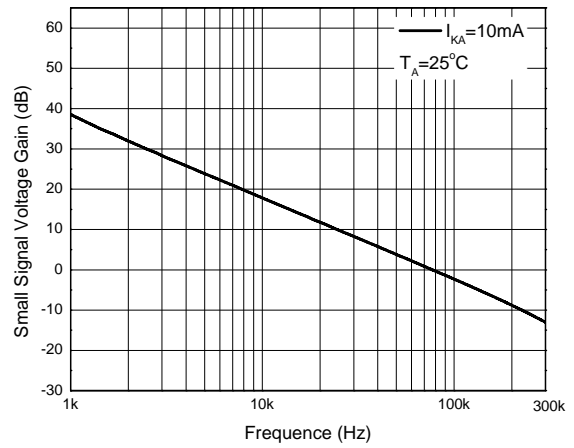


Figure 13. Small Signal Voltage Gain vs. Frequency



Typical Performance Characteristics (Continued)

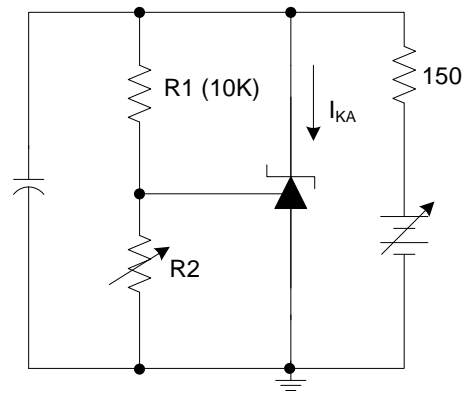
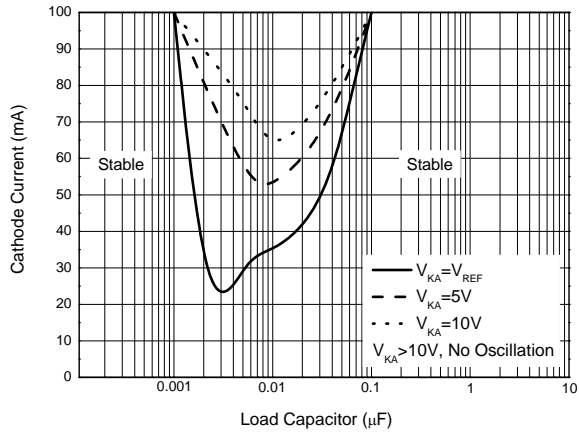


Figure 14. Stability Boundary Conditions vs. Load Capacitance

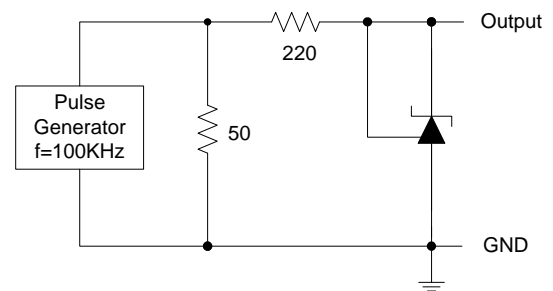
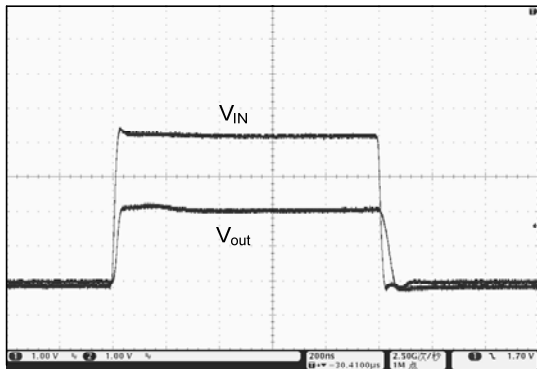


Figure 15. Pulse Response of Input and Output Voltage

Typical Application

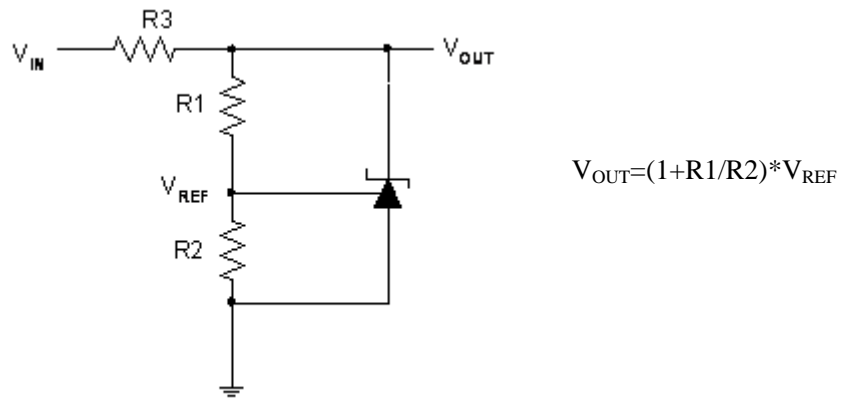


Figure 16. Shunt Regulator

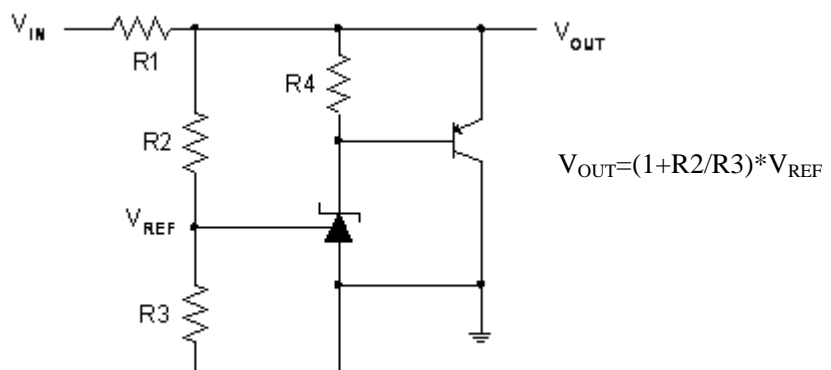


Figure 17. High Current Shunt Regulator

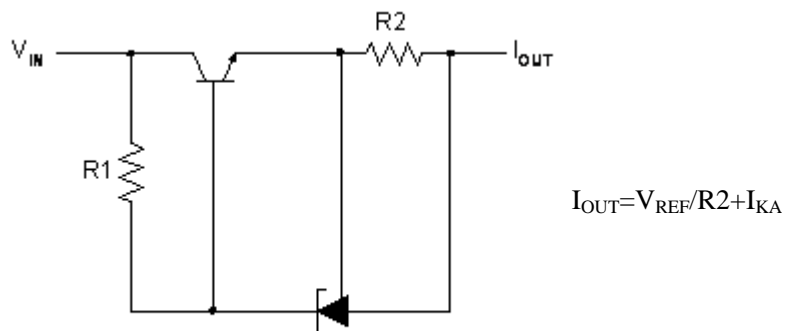


Figure 18. Current Source or Current Limit

Typical Application (Continued)

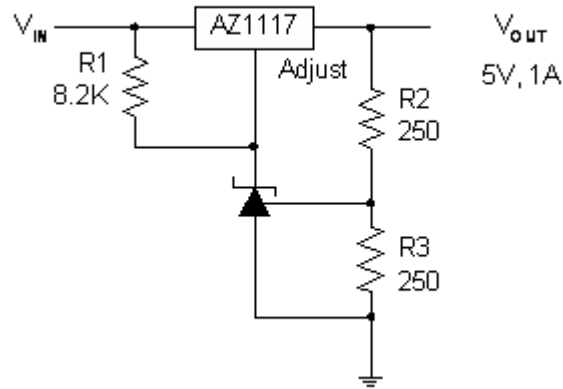


Figure 19. Precision 5V 1A Regulator

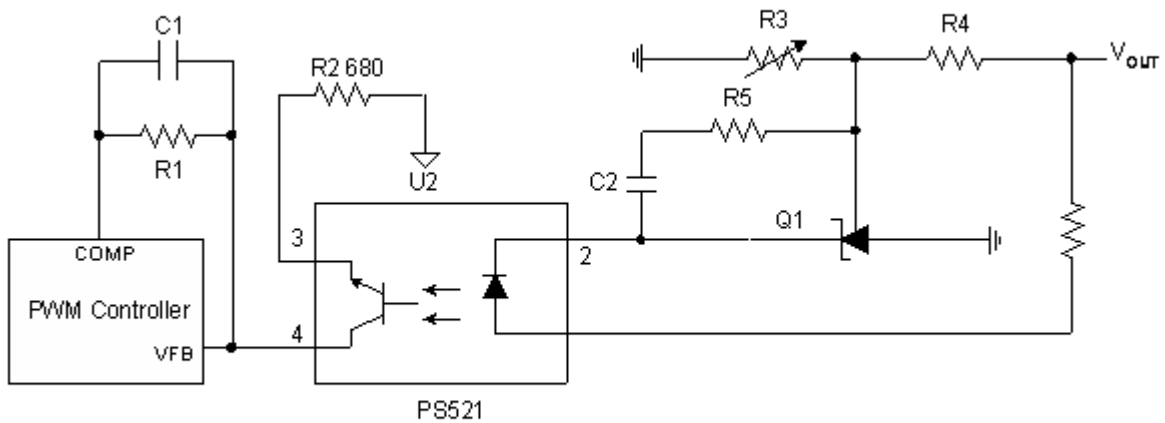
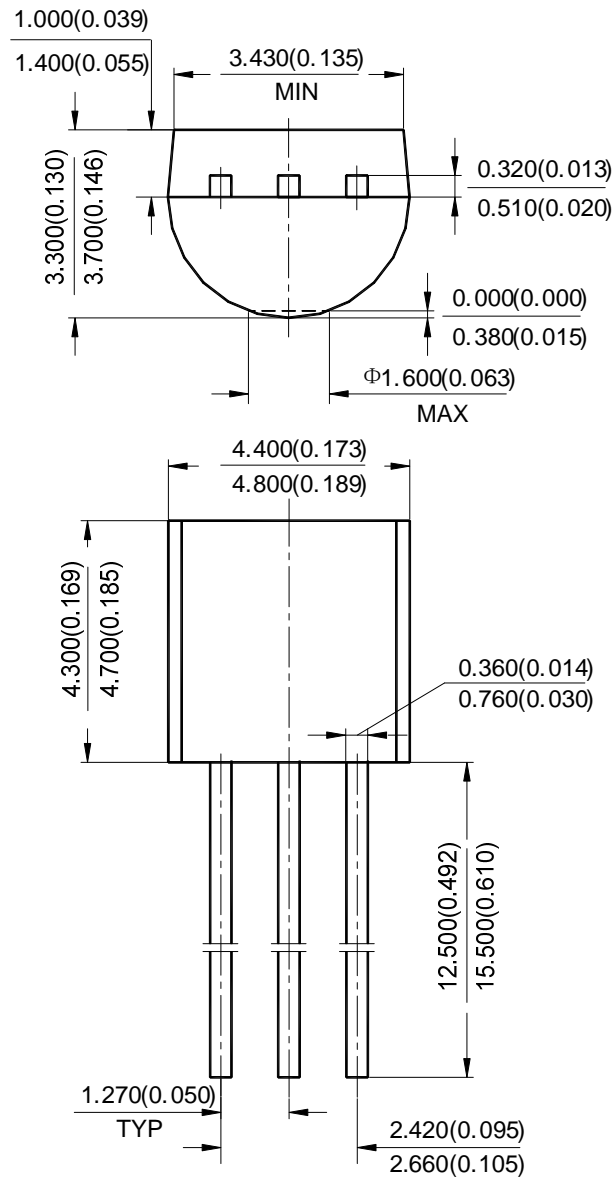


Figure 20. PWM Converter with Reference

Mechanical Dimensions

TO-92(Bulk Packing)

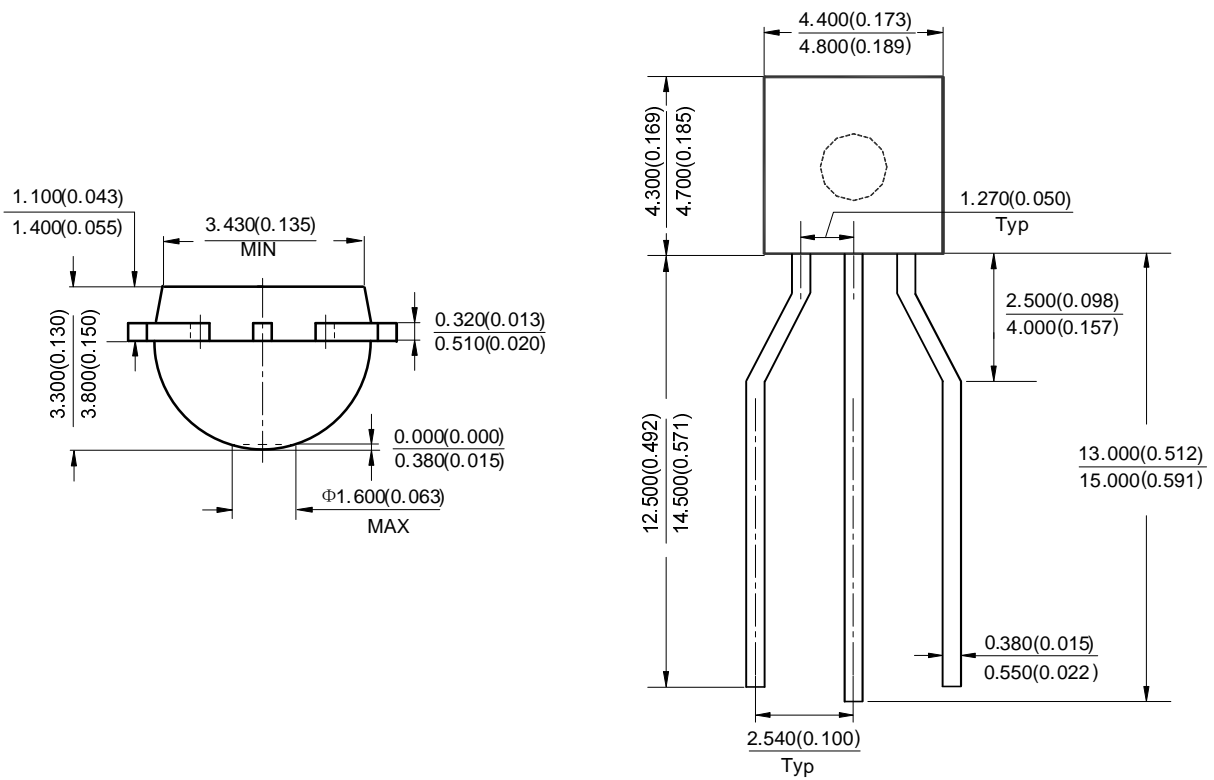
Unit: mm(inch)



Mechanical Dimensions (Continued)

TO-92(Ammo Packing)

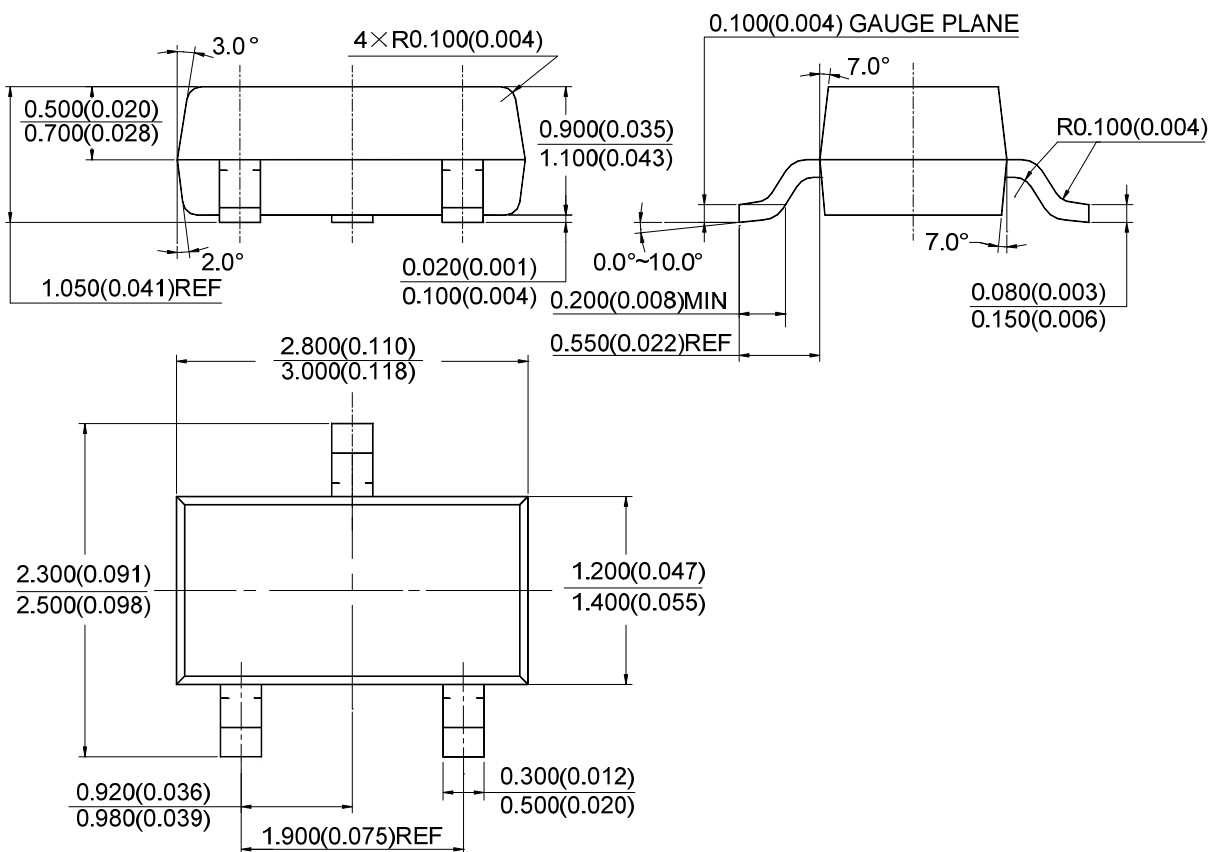
Unit: mm(inch)



Mechanical Dimensions (Continued)

SOT-23

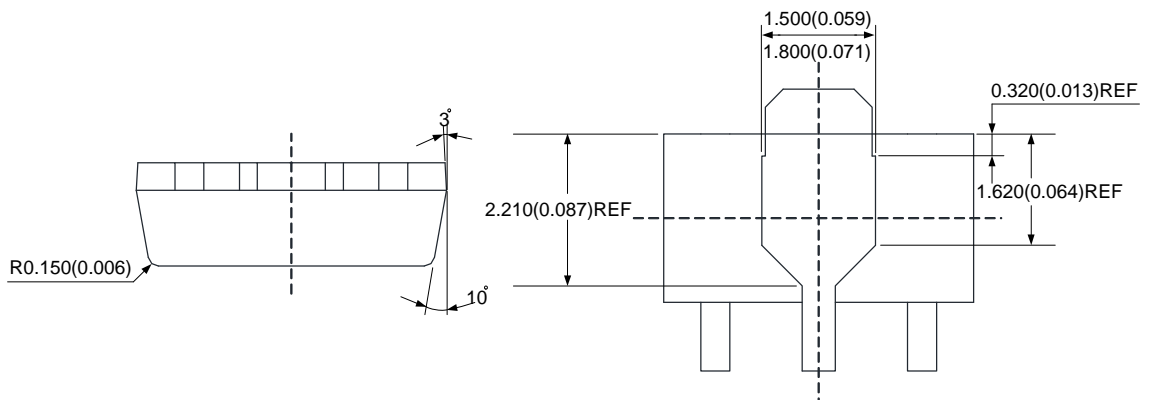
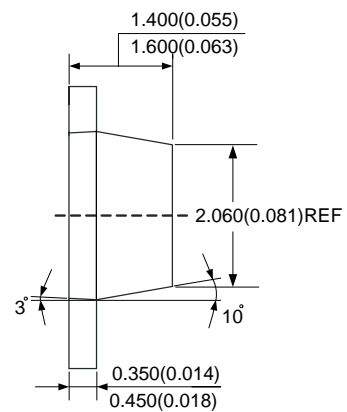
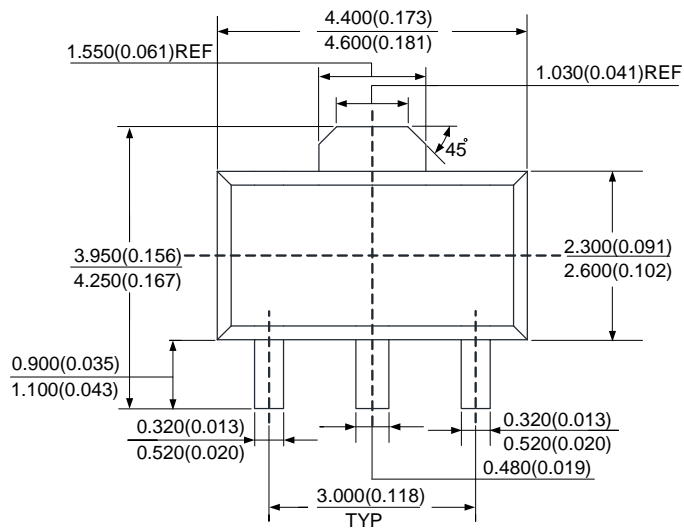
Unit: mm(inch)



Mechanical Dimensions (Continued)

SOT-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

Unit A Room 1203, Skyworth Bldg., Gaoxin Ave. 1.S., Nanshan District, Shenzhen, 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

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А