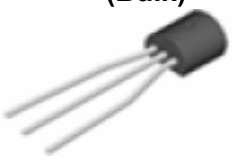
Adjustable Precision Shunt Regulator

General Description

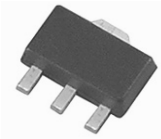
- LA431A and LA431B are three terminal Adjustable PrecisionShunt Regulators, With guaranteed thermal stability over a full operation temperature range.
- The output Voltage of these ICs can be set to any value between V_{REF} (Typical 2.50V) and the corresponding maximum cathode voltage with two external resistors.
- These devices feature the sharp turn-on characteristics,low temperature coefficient and low output impedance, making them ideal substitute for Zener Diode in many applications such as switching power supplly, charger and other adjustable regulators.

- LA431 precision reference Voltage tolerance is offered in 2 grades:0.8% for LA431A and 0.4% for LA431B
- Both LA431A and LA431B are available in TO-92 (Bulk), TO-92 (Ammo),SOT-89, SOT-23 and SOT-23-5 packages.

TO-92 (Bulk)



TO-92 (Ammo)



SOT-89

SOT-23

SOT-23-5

.Features

- Programmable Precise Output Voltage:2.50V to 18V
- High Stability under Capacitive Load
- Wide Operation Temperature Range:-40°C to 125°C
- Low Temperature Deviation:4.5mV (Typical)
- Low Equivalent Full-range Temperature Coefficient :20ppm/°C (Typical)
- Sink Current Capacity:1mA to100mA
- Low Dynamic Output Rresitance:0.20Ω (Typical)
- Low Output Noise
- RoHS Compliance and Halogen Free

RoHS Compliant

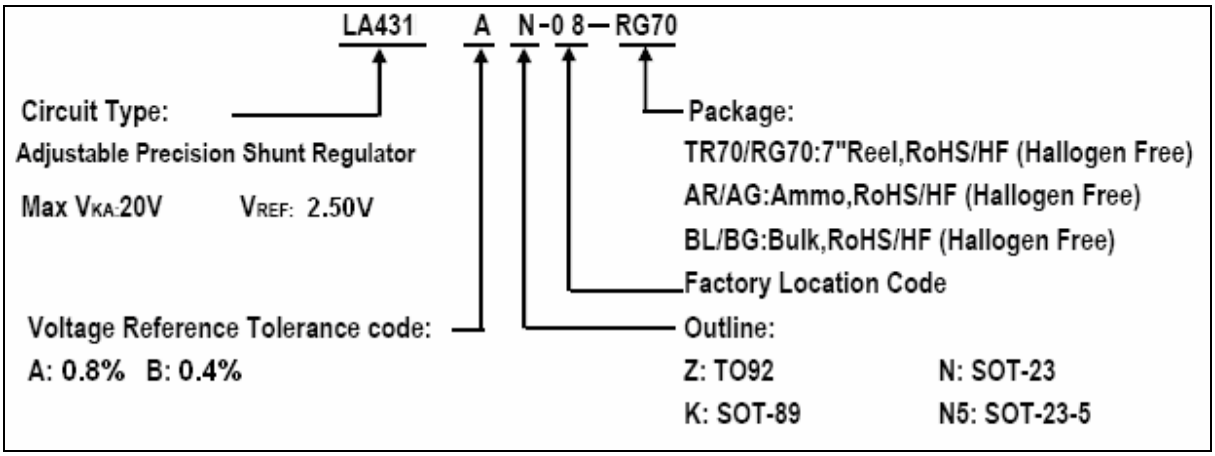
HALOGEN FREE

Applications

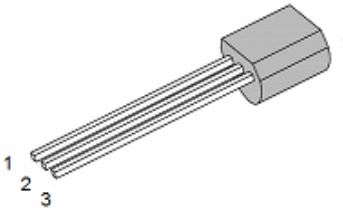
- Switching Power Supply
- Charger
- Voltage Adapter
- Graphic Card
- Precision Voltage Reference

LA431A LA431B

Ordering Information

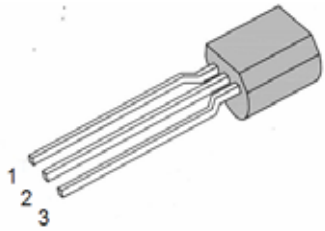


Pin Configuration



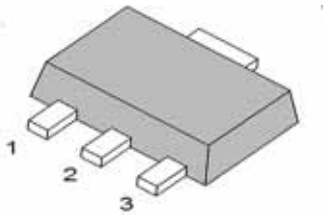
1: REF 2: ANODE 3: CATHODE

TO-92(Bulk)



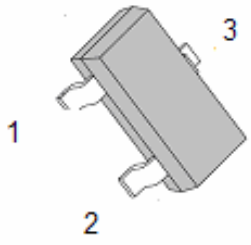
1: REF 2: ANODE 3: CATHODE

TO-92(Ammo)



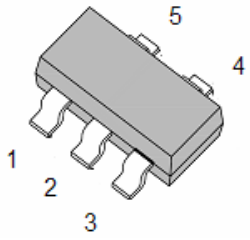
1: REF 2: ANODE 3: CATHODE

SOT-89



1: REF 2: CATHODE 3: ANODE

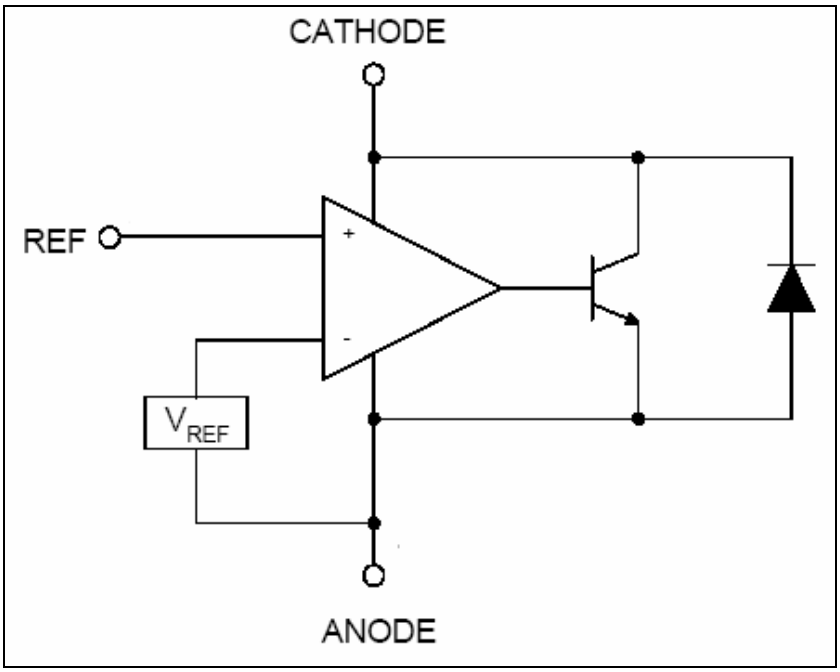
SOT-23



1:NC 2:NC 3: CATHODE 4: REF 5: ANODE

SOT-23-5

Functional Block Diagram



Marking information

Outline	Temperatue Range	VREF Tolerance	Part Number		Marking Code		Packing Type
			RoHS	Halogen Free	RoHS	Halogen Free	
TO-92	-40 to 125°C	0.8%	LA431AZ-08-AR	LA431AZ-08-AG	AZ431BZ-BE1	AZ431BZ-BG1	Ammo
			LA431AZ-08-BL	LA431AZ-08-BG			Bulk
		0.4%	LA431BZ-08-AR	LA431BZ-08-AG	AZ431AZ-BE1	AZ431AZ-BG1	Ammo
			LA431BZ-08-BL	LA431BZ-08-BG			Bulk
SOT-89	-40 to 125°C	0.8%	LA431AK-08-TR70	LA431AK-08-RG70	E43D	G43D	Tape & Reel
		0.4%	LA431BK-08-TR70	LA431BK-08-RG70	E43C	G43C	
SOT-23	-40 to 125°C	0.8%	LA431AN-08-TR70	LA431AN-08-RG70	EA5	GA5	Tape & Reel
		0.4%	LA431BN-08-TR70	LA431BN-08-RG70	EA4	GA4	
SOT-23 -5	-40 to 125°C	0.8%	LA431AN5-08-TR70	LA431AN5-08-RG70	E4B	G4B	Tape & Reel
		0.4%	LA431BN5-08-TR70	LA431BN5-08-RG70	E4A	G4A	

Absolute Maximum Ratings (Note1)

Symbol	Description		Ratings	Unit
V_{KA}	Cathode Voltage		20	V
I_{KA}	Continuous Cathode Current		-100 to 150	mA
I_{REF}	Reference Input Current		10	mA
P_D	Power Dissipation	Z:TO-92	770	mW
		K: SOT-89		
		N:SOT-23	370	
		N5:SOT-23-5		
T_J	Junction Temperature		150	° C
T_{STG}	Storage Temperature Range		-65 to 150	° C
ESD(Human body model)	ESD		2000	V

Recommend Operating Ratings(Note1)

Symbol	Description	Ratings		Unit
		Min	Max	
V_{KA}	Cathode Voltage	V_{REF}	18	V
I_{KA}	Continuous Cathode Current	1.0	100	mA
T_A	Operating Ambient Temperatrue	-40	125	° C

Note1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.Recommend Opertaing ratings indicate conditions for which the devices is functional,but do not guarantee specific specifation limits. For guarantee specifation and test conditions,see the Electrical Charctristics, the guarantee specifation apply only for the test conditions listed.Some performance characteristics may degrade when the device is not operated under the listed test conditions.

Electrical Characteristics (T_A=25°C, unless otherwise specified)

Symbol	Description		Min.	Typ.	Max.	Unit	Test Circuit	Test Conditions	
V_{REF}	Reference Voltage	0.4%	2.490	2.500	2.510	V	Fig.1	$V_{KA}=V_{REF}$,I_{KA}=10mA	
		0.8%	2.480	2.500	2.520	V			
ΔV_{REF}	Deviation of Reference Voltage Over Full Temperature Range		-	4.5	8	mV	Fig.1	0°C to 70°C	$V_{KA}=V_{REF}$ I_{KA}=10mA
			-	4.5	10			-40°C to 85°C	
			-	4.5	16			-40°C to125°C	
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Ratio of change in Reference Voltage to the change in Cathode Voltage		-	-1.0	-2.7	mV/ V	Fig.2	ΔV_{KA}= V_{REF} to 10V	I_{KA}=10mA
				-0.5	-2.0			ΔV_{KA}= 10V to 18V	
I_{REF}	Reference Current		-	0.7	4.0	uA	Fig.2	I_{KA}=10mA,R1=10KΩ,R2=∞	

ΔI_{REF}	Deviation of Reference Current Over Full Temperature Range	-	0.4	1.2	uA	Fig.2	I_{KA}=10mA, R1=10KΩ,R2=∞ T_A =-40°C to125°C
$I_{KA(Min)}$	Minimum Cathode Current for Regulation	-	0.4	1.0	mA	Fig.1	$V_{KA}=V_{REF}$
$I_{KA(Off)}$	Off-state Cathode Current	-	0.05	1.0	uA	Fig.3	V_{KA}=18V, V_{REF}=0V
Z_{KA}	Dynamic Impedance	-	0.2	0.5	Ω	Fig.1	$V_{KA}=V_{REF}$, I_{KA}=1mA to 100mA,f≤1.0KHz
θ_{JC}	Thermal Resisitance	-	107.04		° C/W	-	Z:TO-92
		-	111.03			-	K: SOT-89
		-	177.65			-	N:SOT-23
		-	177.65			-	N5:SOT-23-5

Parameter Test Circuit

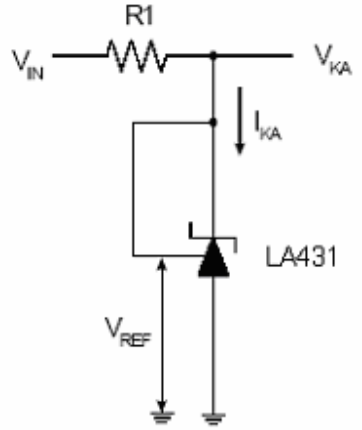


Fig.1 Test Circuit for $V_{KA}=V_{REF}$

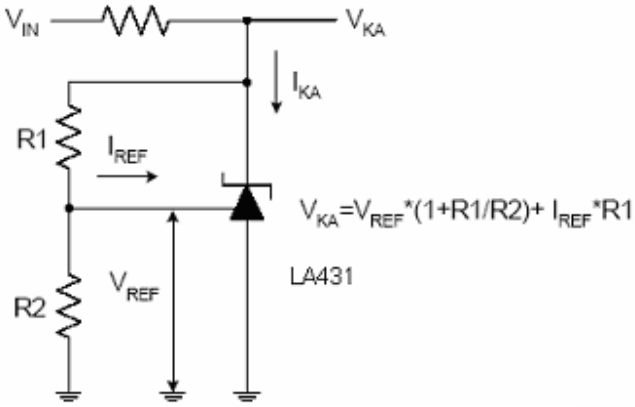


Fig.2 Test Circuit for $V_{KA}>V_{REF}$

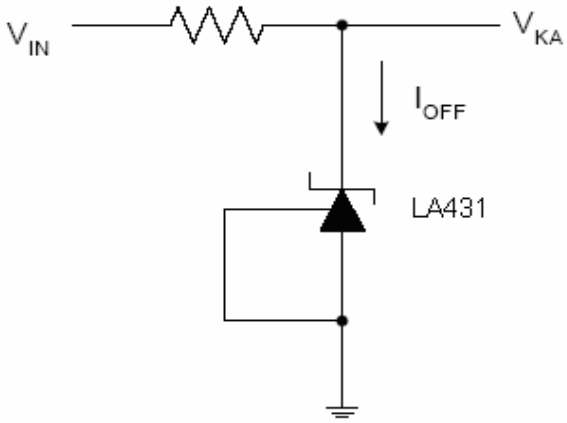


Fig.3 Test Circuit for I_{KA}(Off)

Typical Characteristics Curves

Fig.4 V_{REF}-T_A

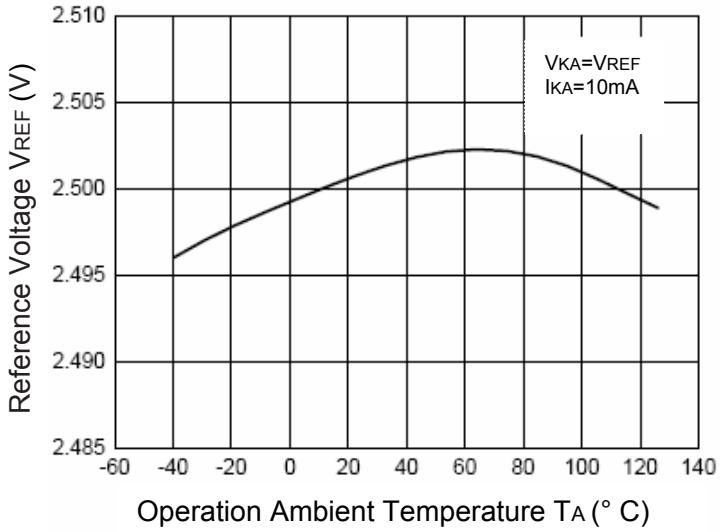


Fig.5 I_{REF}-T_A

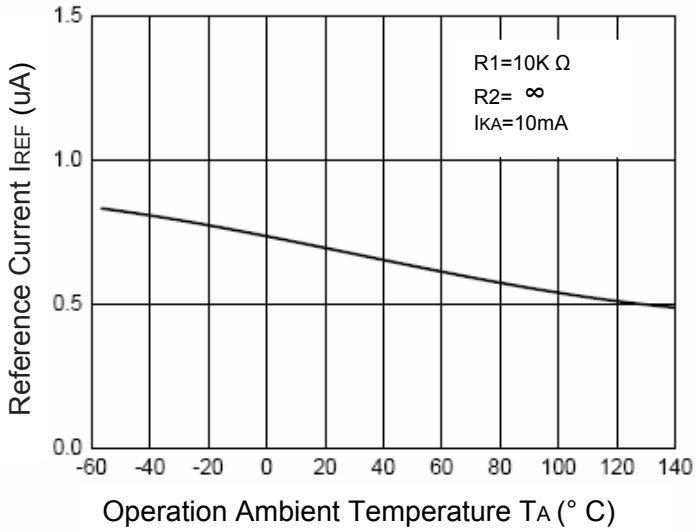


Fig.6 I_{KA}-V_{KA}

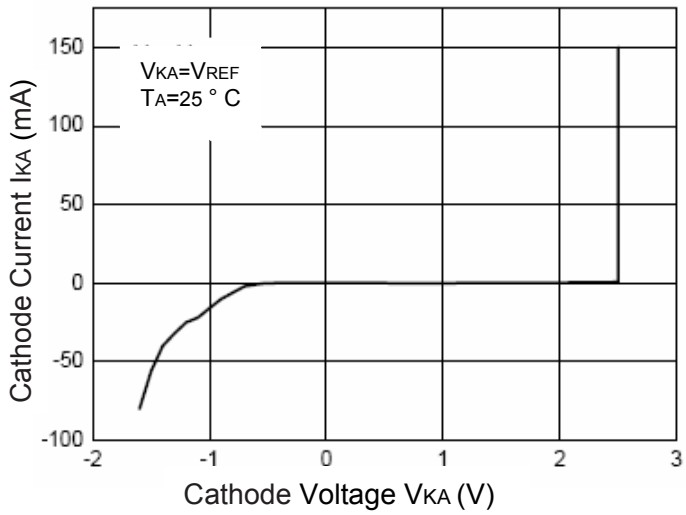


Fig.7 I_{KA}-V_{KA}

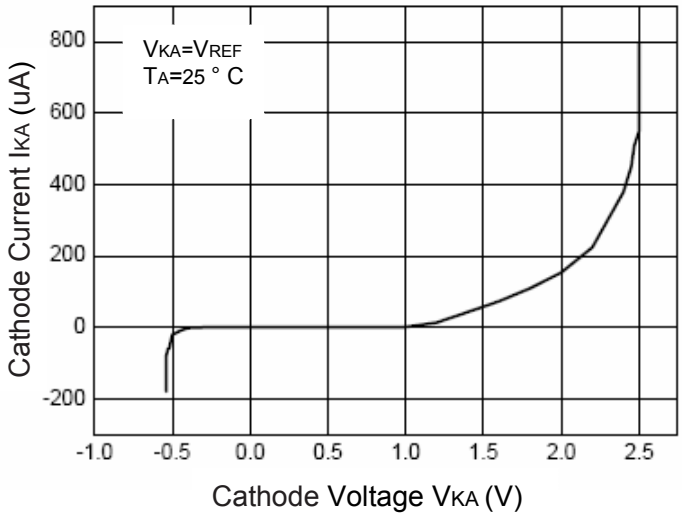


Fig.8 $I_{KA(Off)}$-T_A

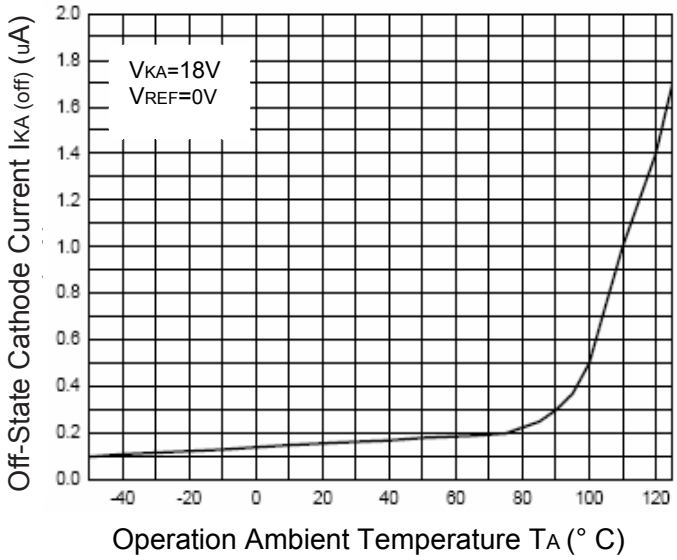


Fig.9 $\frac{\Delta V_{REF}}{\Delta V_{KA}}$ -T_A

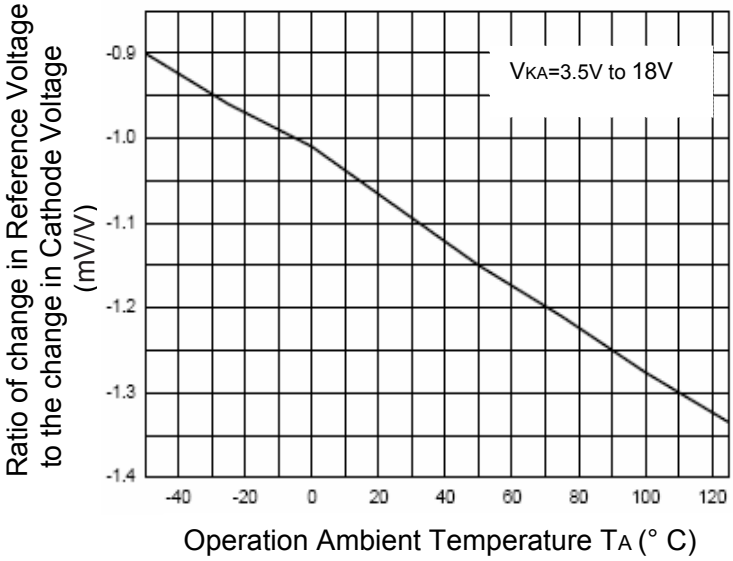
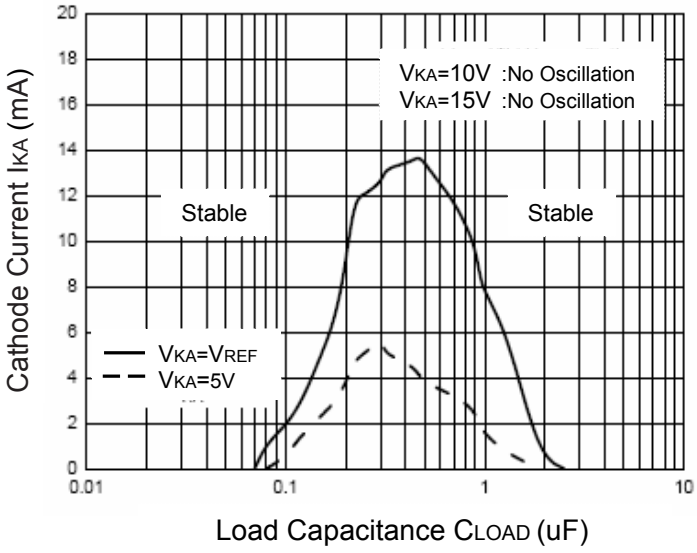


Fig.10 I_{KA}-C_{LOAD}



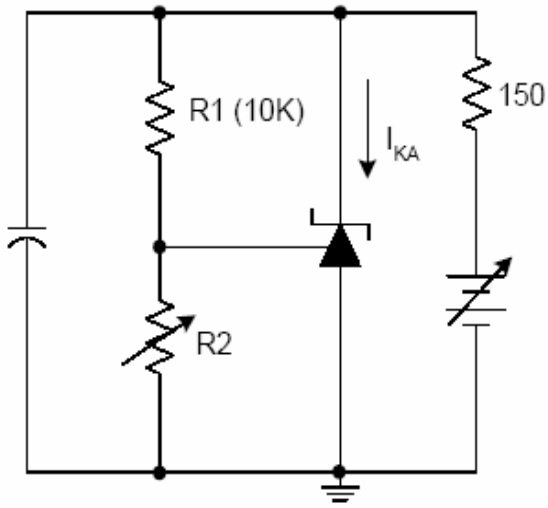
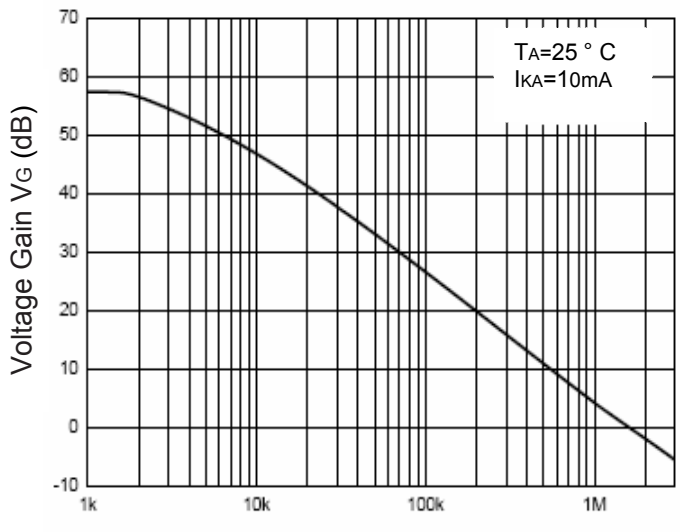


Fig.11 V_G-f



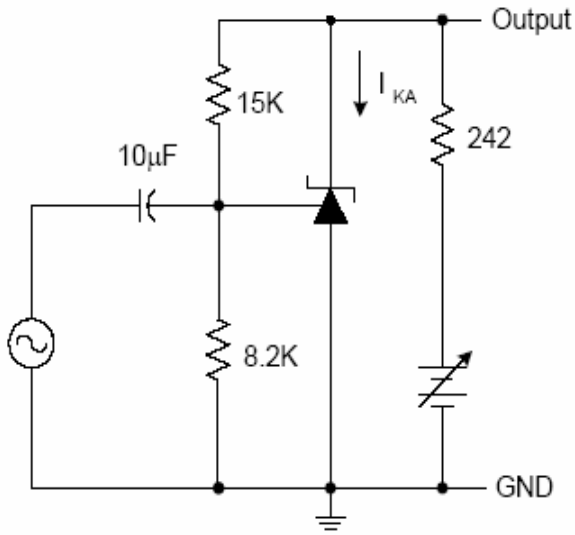
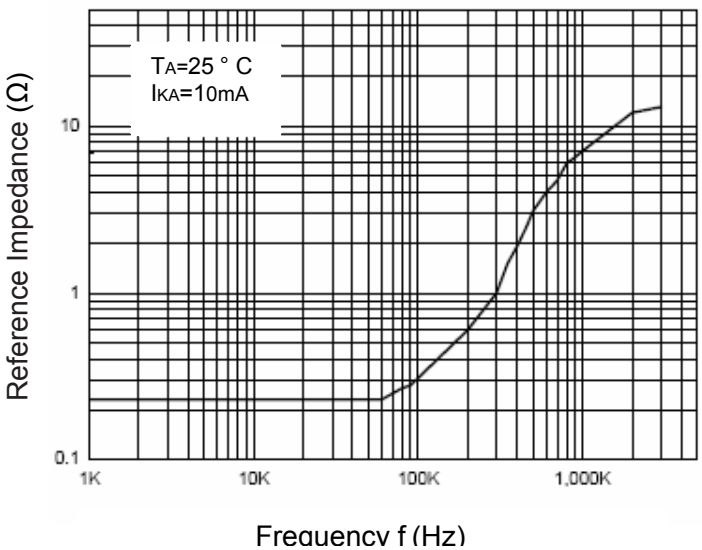


Fig.12 Z_{KA}-f



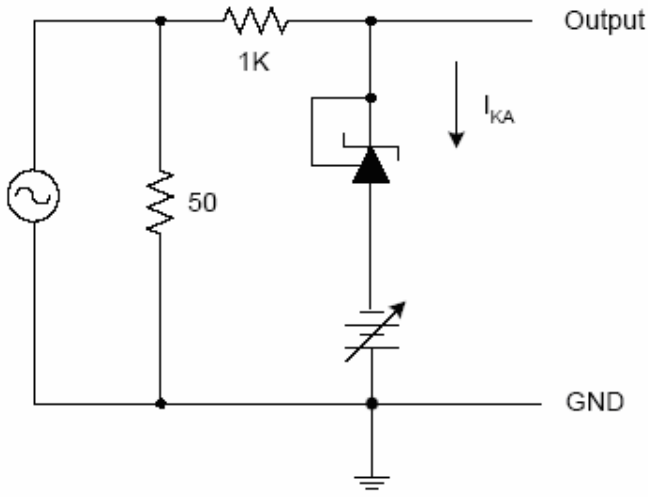
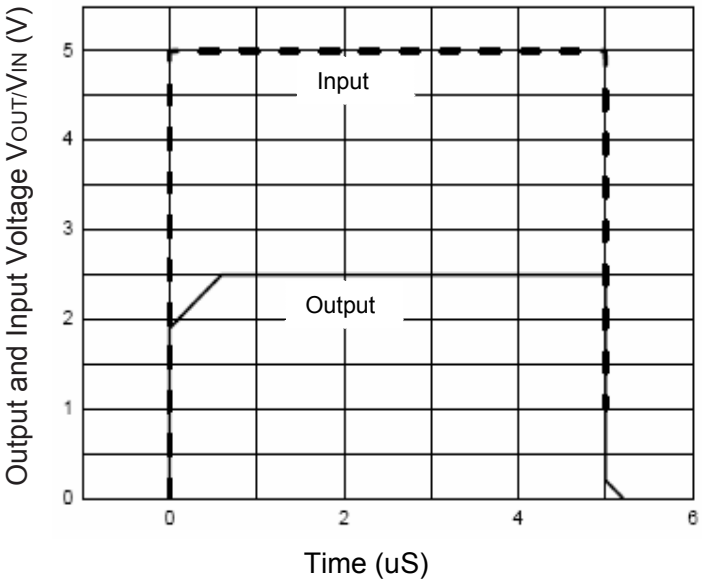
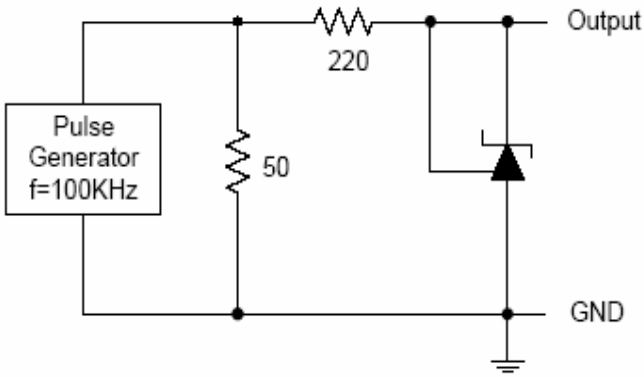


Fig.13 Pulse Respond of Input and Output Voltage





Typical Application Circuit

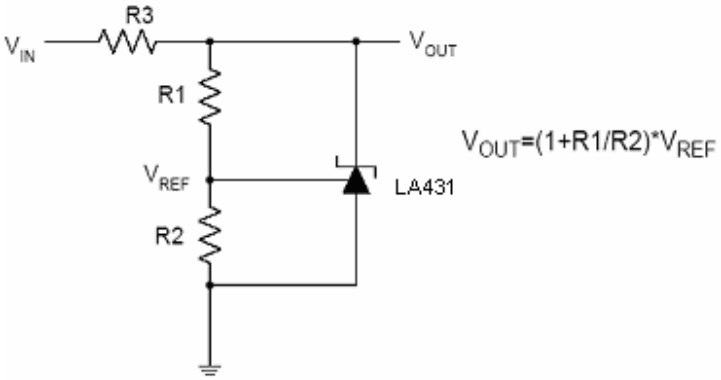


Fig.14 Shunt Regulator

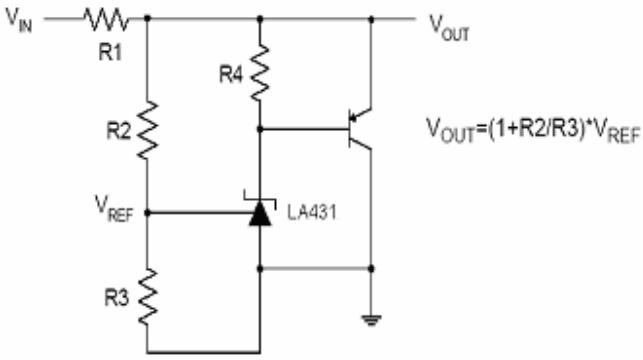


Fig.15 High Current Shunt Regulator

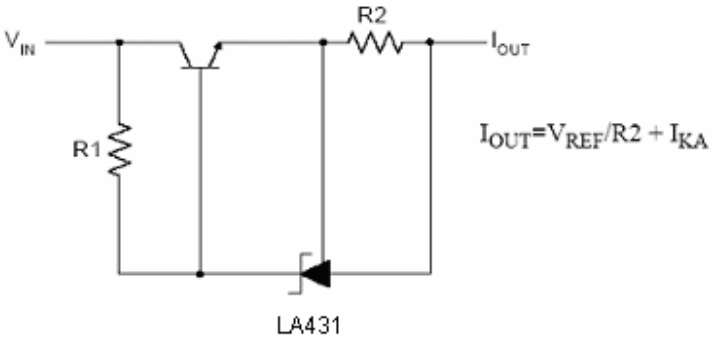


Fig.16 Current Source or Current Limit

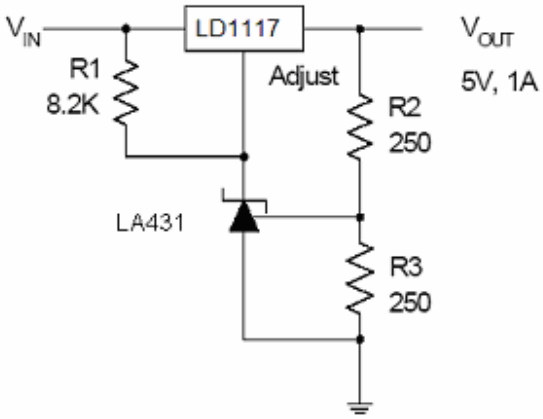


Fig.17 Precision 5V 1A Regulator

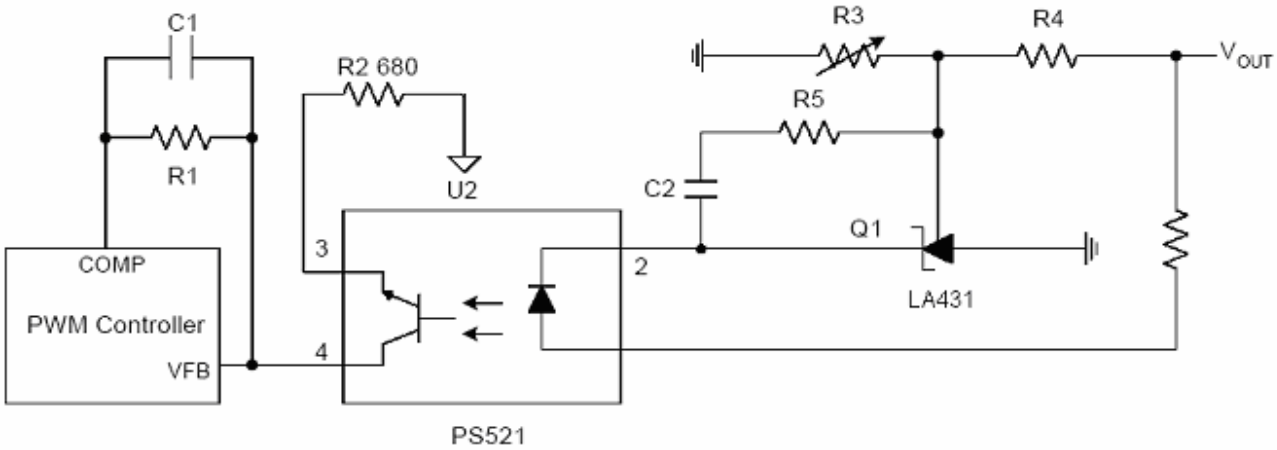
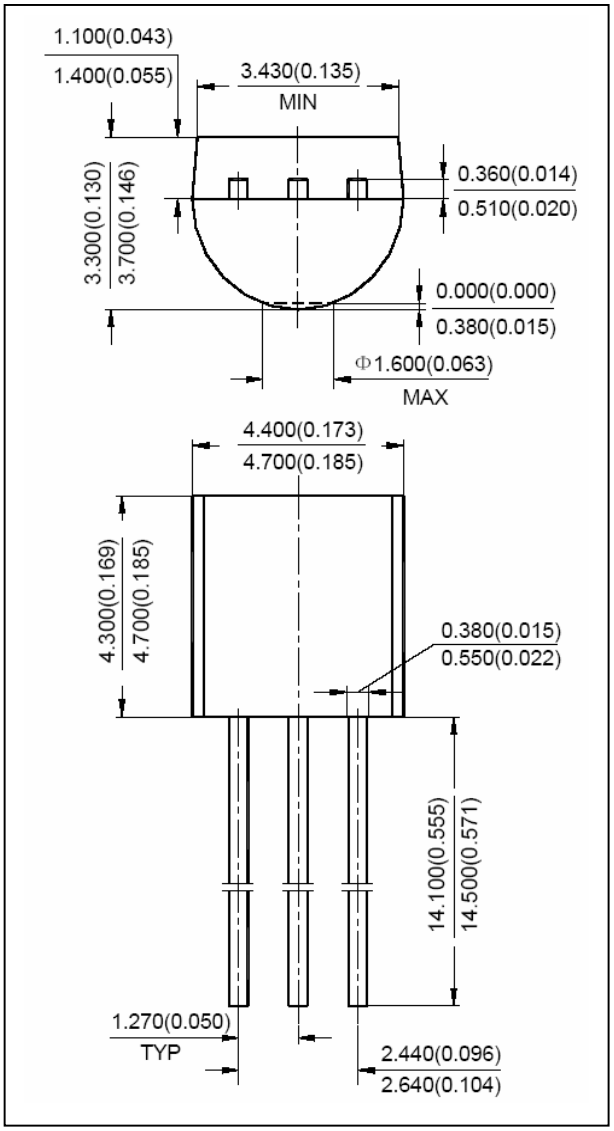
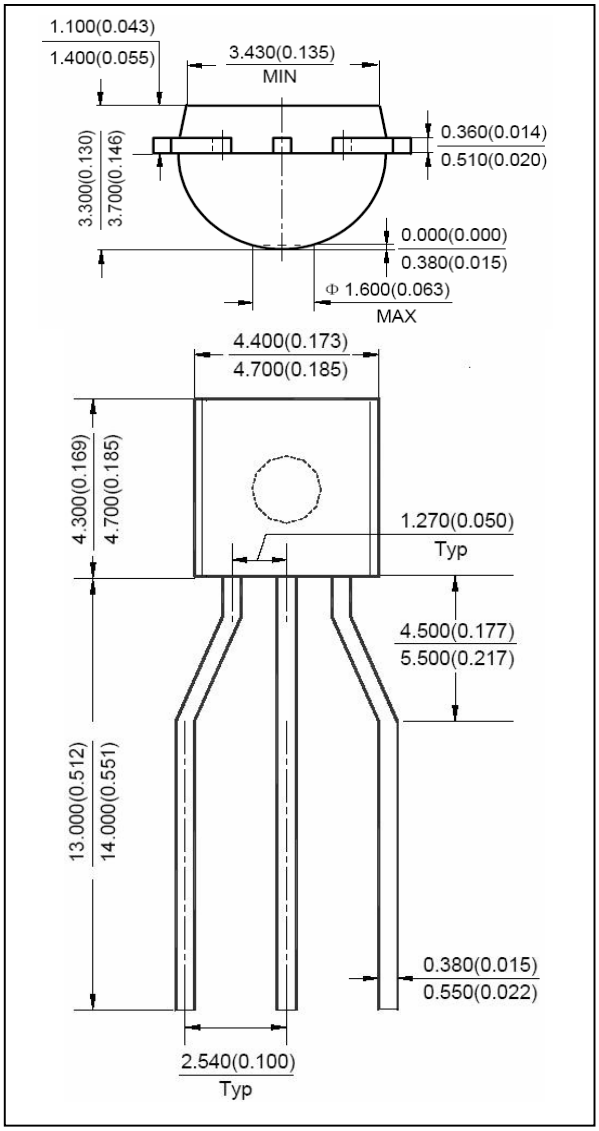


Fig.18 PWM Converter With Reference

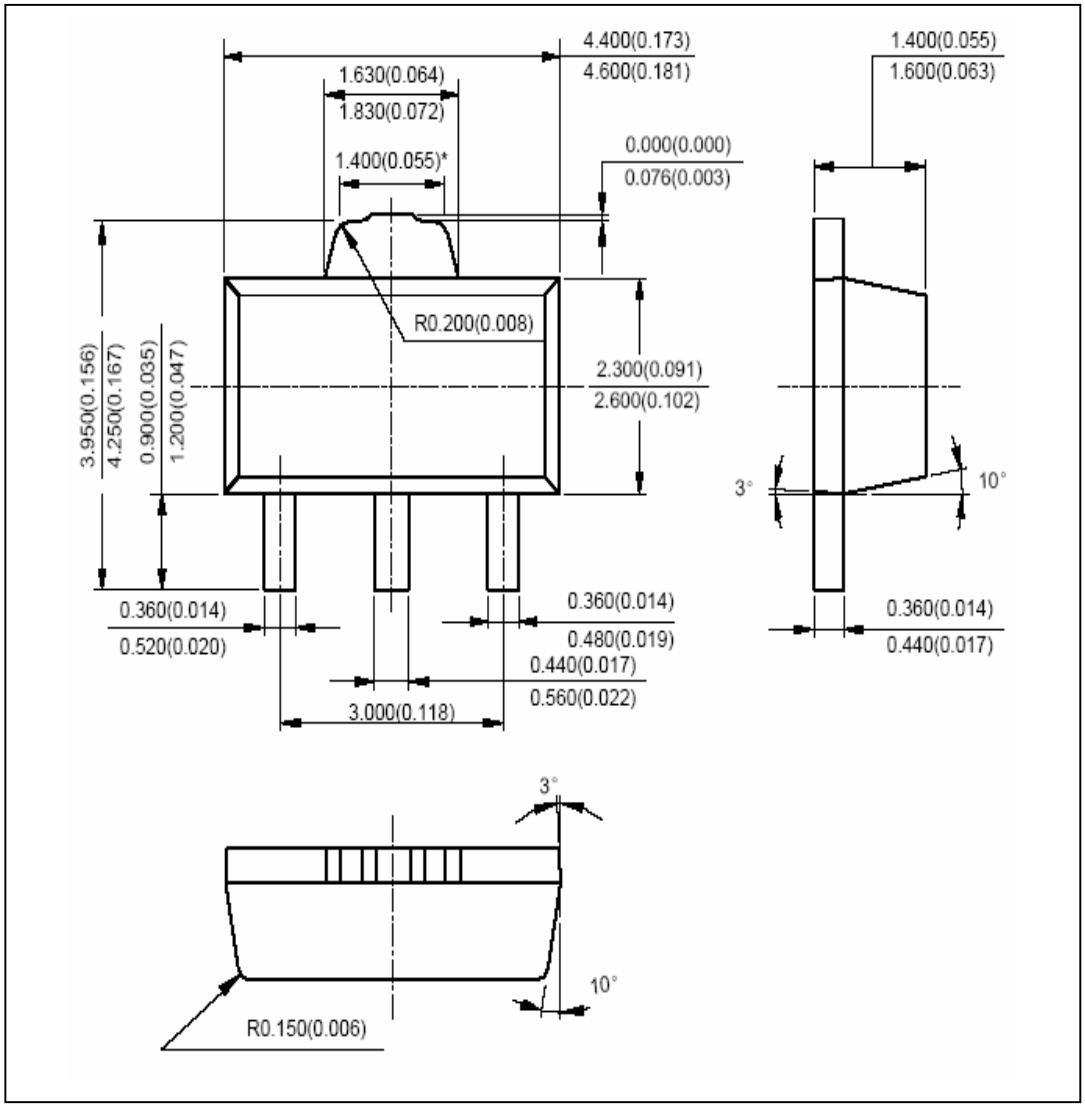
Dimensions in mm (inch)



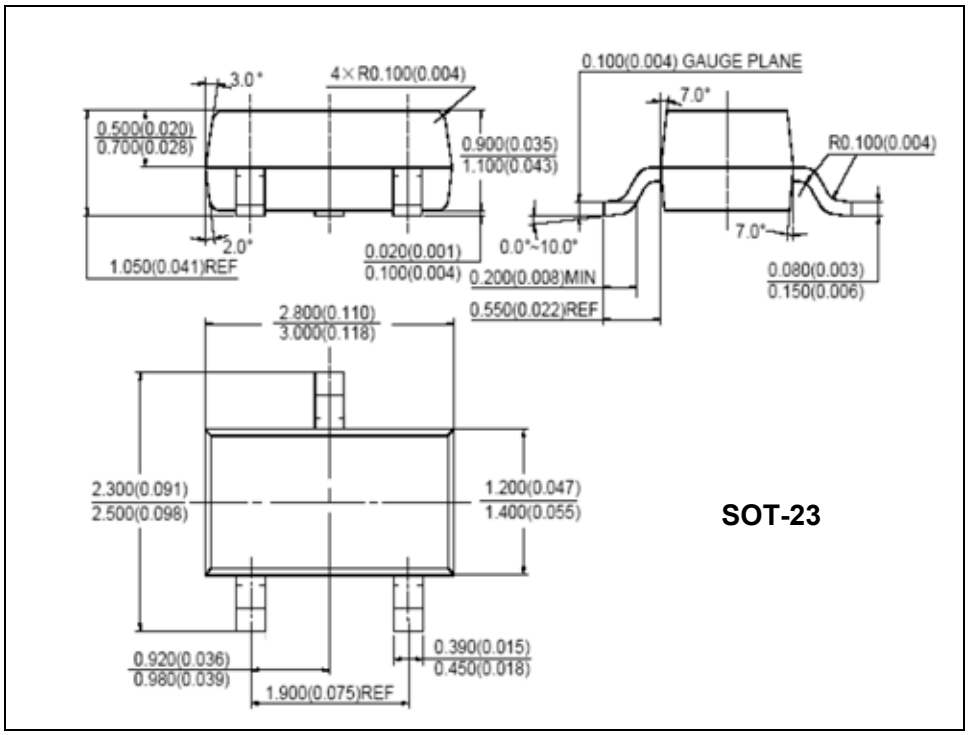
TO-92 Buck

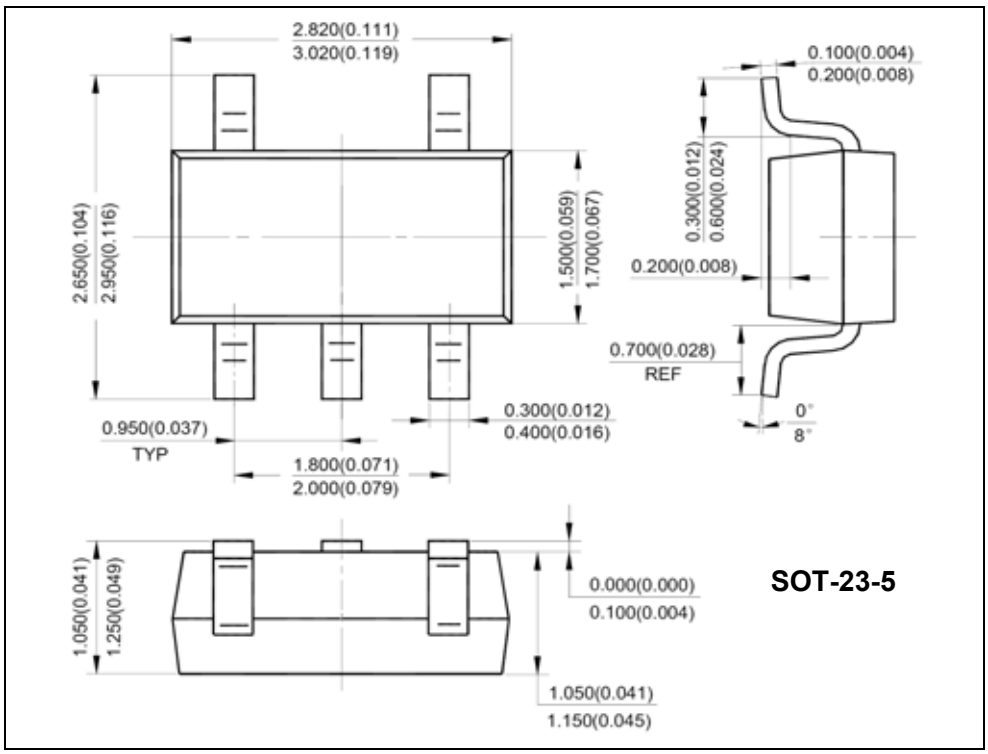


TO-92 Ammo


4.400(0.173)
4.600(0.181)
1.630(0.064)
1.830(0.072)
1.400(0.055)*
0.000(0.000)
0.076(0.003)
R0.200(0.008)
3.950(0.156)
4.250(0.167)
0.900(0.035)
1.200(0.047)
2.300(0.091)
2.600(0.102)
0.360(0.014)
0.520(0.020)
0.360(0.014)
0.480(0.019)
0.440(0.017)
0.560(0.022)
3.000(0.118)
1.400(0.055)
1.600(0.063)
3°
10°
0.360(0.014)
0.440(0.017)
3°
10°
R0.150(0.006)

SOT-89


3.0°
4×R0.100(0.004)
0.100(0.004) GAUGE PLANE
7.0°
0.500(0.020)
0.700(0.028)
0.900(0.035)
1.100(0.043)
R0.100(0.004)
2.0°
7.0°
1.050(0.041)REF
0.020(0.001)
0.100(0.004)
0.0°~10.0°
0.200(0.008)MIN
0.080(0.003)
0.150(0.006)
0.550(0.022)REF
2.800(0.110)
3.000(0.118)
2.300(0.091)
2.500(0.098)
1.200(0.047)
1.400(0.055)
SOT-23
0.920(0.036)
0.980(0.039)
0.390(0.015)
0.450(0.018)
1.900(0.075)REF


2.820(0.111)
3.020(0.119)
0.100(0.004)
0.200(0.008)
0.300(0.012)
0.600(0.024)
2.650(0.104)
2.950(0.116)
1.500(0.059)
1.700(0.067)
0.200(0.008)
0.700(0.028)
REF
0.950(0.037)
TYP
0.300(0.012)
0.400(0.016)
0°
8°
1.800(0.071)
2.000(0.079)
1.050(0.041)
1.250(0.049)
0.000(0.000)
0.100(0.004)
SOT-23-5
1.050(0.041)
1.150(0.045)

How to contact us:

US HEADQUARTERS

28040 WEST HARRISON PARKAWAY, VALENCIA, CA 91355-4162
Tel: (800) TAITRON (800) 824-8766 (661) 257-6060
Fax: (800) TAITFAX (800) 824-8329 (661) 257-6415
Email: taitron@taitroncomponents.com
Http://www.taitroncomponents.com

TAITRON COMPONENTS MEXICO, S.A .DE C.V.

BOULEVARD CENTRAL 5000 INTERIOR 5 PARQUE INDUSTRIAL ATITALAQUIA, HIDALGO C.P. 42970 MEXICO
Tel: +52-55-5560-1519
Fax: +52-55-5560-2190

TAITRON COMPONETS INCORPORATED E REPRESENTAÇÕES DO BRASIL LTDA

RUA DOMINGOS DE MORAIS, 2777, 2.ANDAR, SALA 24 SAÚDE - SÃO PAULO-SP 04035-001 BRAZIL
Tel: +55-11-5574-7949
Fax: +55-11-5572-0052

TAITRON COMPONETS INCORPORATED, SHANGHAI REPRESENTATIVE OFFICE

METROBANK PLAZA, 1160 WEST YAN' AN ROAD, SUITE 1503, SHANGHAI, 200052, CHINA
Tel: +86-21-5424-9942
Fax: +86-21-5424-9931