

## 800 mA LDO VOLTAGE REGULATOR

### DESCRIPTION

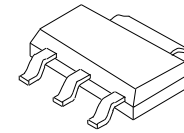
The SA1117B is a positive low voltage dropout regulator; voltage dropout is only 1.2V at 800mA.

SA1117B provides two versions: fixed and adjustable versions. V<sub>OUT</sub> has a tolerance of less than 1.5% for fixed versions 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable version or 2% output accuracy for fixed version 1.2V.

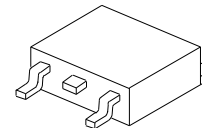
The SA1117B offers some key features include thermal shutdown and current limiting. It is suitable for all electronic products.

### FEATURES

- \* 1.5% output accuracy for fixed versions 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable version
- \* 2% output accuracy for fixed version 1.2V
- \* Low Dropout Voltage: 1.2V at 800mA output current
- \* Current Limiting
- \* Thermal Shutdown
- \* Temperature Range: -40°C to 125°C



SOT-223-3L



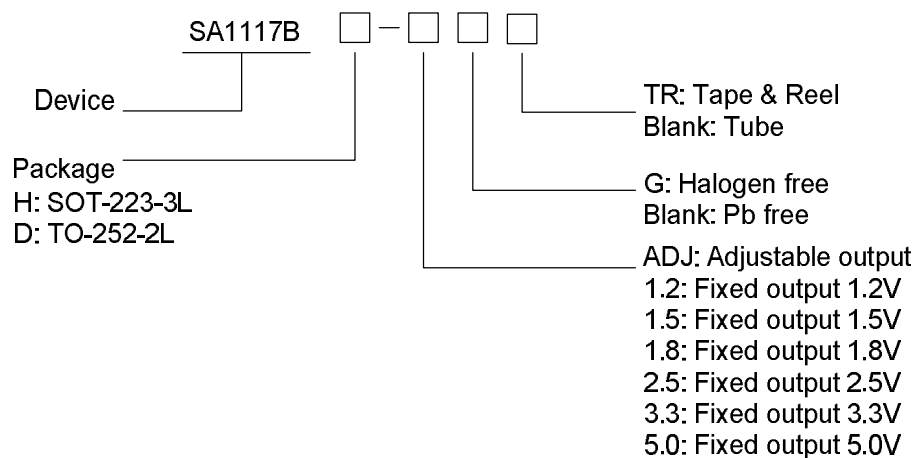
TO-252-2L

### APPLICATIONS

- \* Laptop, Palmtop, and Notebook Computers
- \* Battery Charger
- \* SCSI-II Active Terminator
- \* Cellular Phone
- \* Cordless Telephones
- \* Battery Powered Systems
- \* Portable Instrumentation
- \* SMPS Post-Regulator

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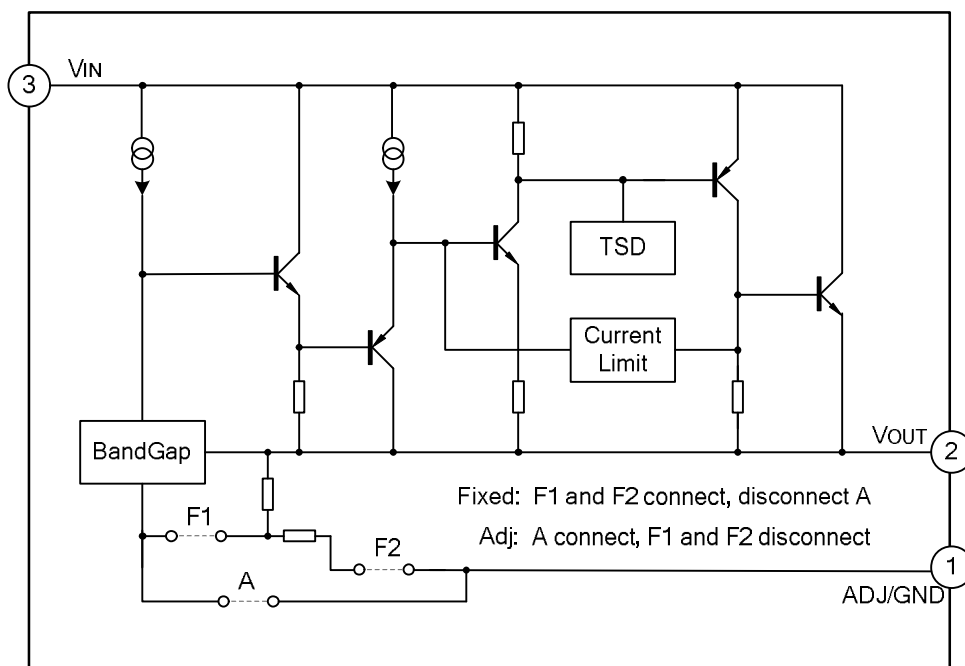
### ORDERING INFORMATION (Temperature range: -40°C ~125°C)



Part No.	Package	Marking	Material	Packing Type
SA1117BH-ADJTR	SOT-223-3L	SA1117BH-ADJ	Pb free	Tape & Reel
SA1117BH-1.2TR		SA1117BH-1.2	Pb free	Tape & Reel
SA1117BH-1.5TR		SA1117BH-1.5	Pb free	Tape & Reel
SA1117BH-1.8TR		SA1117BH-1.8	Pb free	Tape & Reel
SA1117BH-2.5TR		SA1117BH-2.5	Pb free	Tape & Reel
SA1117BH-3.3TR		SA1117BH-3.3	Pb free	Tape & Reel
SA1117BH-5.0TR		SA1117BH-5.0	Pb free	Tape & Reel
SA1117BD-ADJ	TO-252-2L	SA1117BD-ADJ	Pb free	Tube
SA1117BD-ADJTR		SA1117BD-ADJ	Pb free	Tape & Reel
SA1117BD-1.2		SA1117BD-1.2	Pb free	Tube
SA1117BD-1.2 TR		SA1117BD-1.2	Pb free	Tape & Reel
SA1117BD-1.5		SA1117BD-1.5	Pb free	Tube
SA1117BD-1.5TR		SA1117BD-1.5	Pb free	Tape & Reel
SA1117BD-1.8		SA1117BD-1.8	Pb free	Tube
SA1117BD-1.8TR		SA1117BD-1.8	Pb free	Tape & Reel
SA1117BD-2.5		SA1117BD-2.5	Pb free	Tube
SA1117BD-2.5TR		SA1117BD-2.5	Pb free	Tape & Reel
SA1117BD-3.3		SA1117BD-3.3	Pb free	Tube
SA1117BD-3.3TR		SA1117BD-3.3	Pb free	Tape & Reel
SA1117BD-5.0		SA1117BD-5.0	Pb free	Tube
SA1117BD-5.0TR		SA1117BD-5.0	Pb free	Tape & Reel

**BLOCK DIAGRAM**

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**ABOSOLUTE MAXIMUM RATINGS**

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	V <sub>IN</sub>	20	V
Lead Temperature (Soldering, 5 seconds)	T <sub>Lead</sub>	260	°C
Operating Junction Temperature Range	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>stg</sub>	-65 ~ +150	V
Power Dissipation	P <sub>D</sub>	Internally Limited (Note1)	mW
ESD Tolerance (Minimum)	ESD	2000	V

Note1: The maximum allowable power dissipation is a function of maximum operating junction temperature, T<sub>J</sub> (max), the junction to ambient thermal resistance, θ<sub>JA</sub>, and the ambient temperature T<sub>amb</sub>. The maximum allowable power dissipation at any ambient temperature is given: P<sub>D</sub> (max) = (T<sub>J</sub> (max) - T<sub>amb</sub>)/θ<sub>JA</sub>, exceeding the maximum allowable power limit will result in excessive die temperature; thus, the regulator will go into thermal shutdown. The junction to ambient thermal resistance, θ<sub>JA</sub> of some packages may be different, The value of θ<sub>JA</sub> depends on mounting technique.

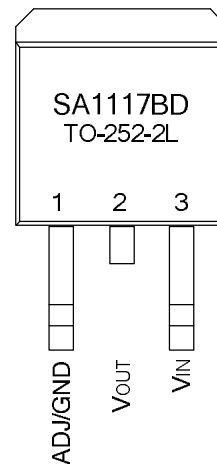
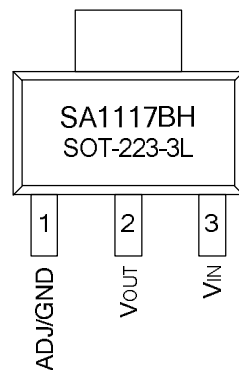
**RECOMMENDED OPERATING CONDITIONS**

Characteristics	Symbol	Ratings	Unit
Input voltage	V <sub>IN</sub>	15	V
Operating Junction Temperature Range	T <sub>J</sub>	-40 ~ +125	°C

**ELECTRICAL CHARACTERISTICS**(T<sub>amb</sub>=25°C, unless otherwise specified. Limits appearing in **Boldface** type apply over the entire junction temperature range for operation, -40°C to 125°C. )

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V <sub>REF</sub>	SA1117B-ADJ, I <sub>OUT</sub> =10mA, V <sub>IN</sub> -V <sub>OUT</sub> =2V, T <sub>J</sub> =25°C 10mA ≤ I <sub>OUT</sub> ≤ 1A, 1.4V ≤ V <sub>IN</sub> -V <sub>OUT</sub> ≤ 10V	1.231 <b>1.225</b>	1.250 1.250	1.268 <b>1.275</b>	V
Output Voltage	V <sub>OUT</sub>	SA1117B-1.2, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =3.2V, T <sub>J</sub> =25°C 10mA ≤ I <sub>OUT</sub> ≤ 1A, 3.0V ≤ V <sub>IN</sub> ≤ 10V	1.176 <b>1.152</b>	1.2 1.2	1.224 <b>1.248</b>	V
		SA1117B-1.5, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =3.5V, T <sub>J</sub> =25°C 10mA ≤ I <sub>OUT</sub> ≤ 1A, 3.0V ≤ V <sub>IN</sub> ≤ 10V	1.477 <b>1.470</b>	1.500 1.500	1.522 <b>1.530</b>	V
		SA1117B-1.8, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =3.8V, T <sub>J</sub> =25°C, 0 ≤ I <sub>OUT</sub> ≤ 1A, 3.2V ≤ V <sub>IN</sub> ≤ 10V	1.773 <b>1.746</b>	1.800 1.800	1.827 <b>1.854</b>	V
		SA1117B -2.5, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =4.5V, T <sub>J</sub> =25°C, 0 ≤ I <sub>OUT</sub> ≤ 1A, 3.9V ≤ V <sub>IN</sub> ≤ 10V	2.462 <b>2.450</b>	2.500 2.500	2.538 <b>2.550</b>	V
		SA1117B-3.3, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =5V, T <sub>J</sub> =25°C, 0 ≤ I <sub>OUT</sub> ≤ 1A, 4.75V ≤ V <sub>IN</sub> ≤ 10V	3.250 <b>3.235</b>	3.300 3.300	3.349 <b>3.365</b>	V

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V <sub>OUT</sub>	SA1117B-5.0, I <sub>OUT</sub> =10mA, V <sub>IN</sub> =7V, T <sub>J</sub> =25°C, 0 ≤ I <sub>OUT</sub> ≤ 1A, 6.5V ≤ V <sub>IN</sub> ≤ 12V	4.925 <b>4.900</b>	5.000 5.000	5.075 <b>5.10</b>	V
Output Voltage Temperature Stability	T <sub>SOUT</sub>			0.3		%
Line Regulation	R <sub>line</sub>	V <sub>INMIN</sub> ≤ V <sub>IN</sub> ≤ 12V, V <sub>OUT</sub> =Fixed/Adj, I <sub>OUT</sub> =10mA		3	7	mV
Load Regulation	R <sub>load</sub>	10mA ≤ I <sub>OUT</sub> ≤ 800mA, V <sub>OUT</sub> =Fixed/Adj		6	<b>12</b>	mV
Dropout Voltage	V <sub>drop</sub>	I <sub>OUT</sub> =100mA I <sub>OUT</sub> =500mA I <sub>OUT</sub> =800mA		1.00 1.05 1.20	<b>1.20</b> <b>1.25</b> <b>1.30</b>	V
Quiescent Current	I <sub>q</sub>	4.25V ≤ V <sub>IN</sub> ≤ 6.5V		5	<b>10</b>	mA
Ripple Rejection	PSRR	f <sub>RIPPLE</sub> =120Hz, (V <sub>IN</sub> -V <sub>OUT</sub> )=3V, V <sub>RIPPLE</sub> =1V <sub>PP</sub>	<b>60</b>	75		dB
Adjust pin Current	I <sub>adj</sub>			60	<b>120</b>	μA
Adjust pin Current Change		0 ≤ I <sub>OUT</sub> ≤ 800mA, 1.4V ≤ V <sub>IN</sub> -V <sub>OUT</sub> ≤ 10V		0.2	<b>5</b>	μA
Thermal shutdown	TSD			150		°C
Current limiting	I <sub>limit</sub>		0.9	1.1	1.2	A
Temperature Stability				0.5		%
Long Term Stability		T <sub>AMB</sub> =125°C, 1000Hrs		0.3		%
RMS Output Noise		% of V <sub>OUT</sub> , 10Hz ≤ f ≤ 10kHz		0.003		%

**PIN CONFIGURATION**

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**PIN DESCRIPTION**

Pin No.	Pin name	I/O	Functions
1	GND/ADJ	--/O	Ground/ADJ
2	V <sub>OUT</sub>	O	Output voltage
3	V <sub>IN</sub>	I	Input supply voltage

## FUNCTION DESCRIPTION

The SA1117B is a LDO regulator, its pass transistor is made up of a single NPN transistor being driven by a PNP. The dropout voltage is defined as:  $V_{DROD} = V_{BE} + V_{SAT}$ .

The SA1117B series of fixed and adjustable regulators are easy to use. Output voltages are 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V. On-chip thermal shut down provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The SA1117B requires an output capacitor for device stability. Its value of 22 $\mu$ F tantalum covers all cases of bypassing the adjustment terminal. Without bypassing the adjustment terminal smaller capacitors can be used with equally good results which depend upon the application circuit. In general, linear regulator stability decreases with higher output currents.

## TYPICAL APPLICATION CIRCUIT

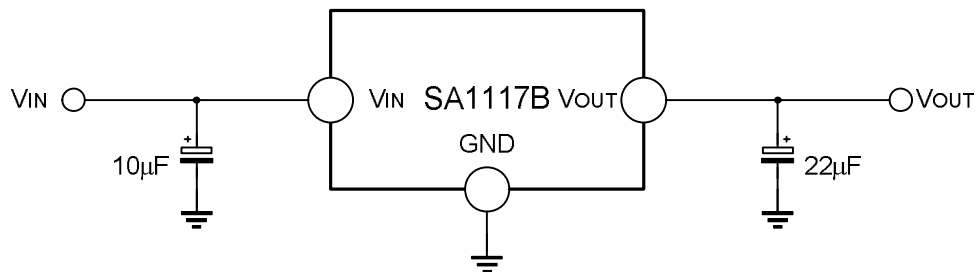


Figure 1. Typical Fixed Output Voltage

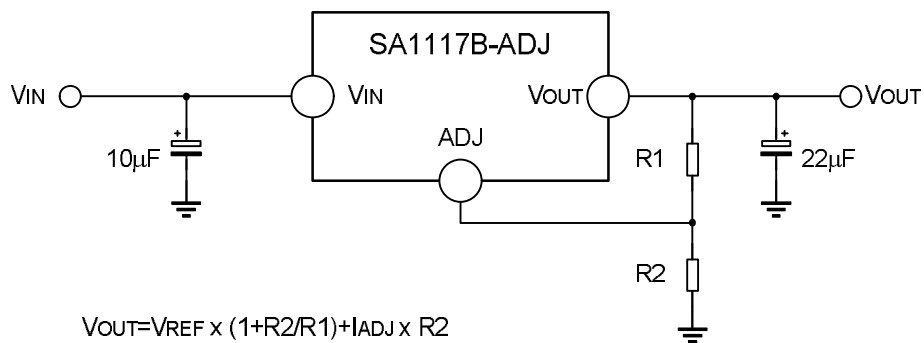
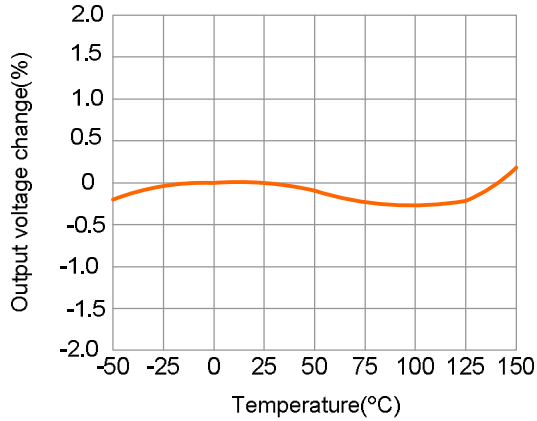


Figure 2. Typical Adjustable Output Voltage

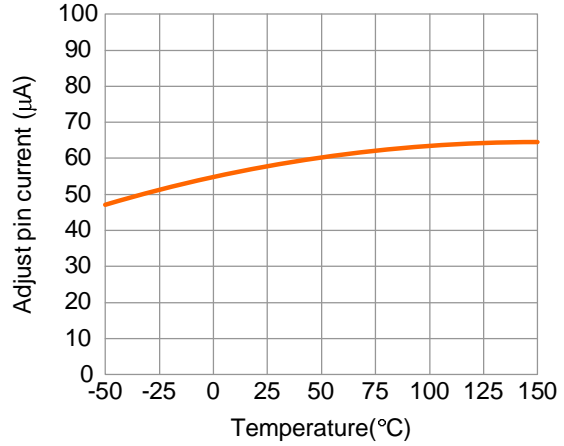
Note: The circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

**TYPICAL CHARACTERISTICS CURVES**

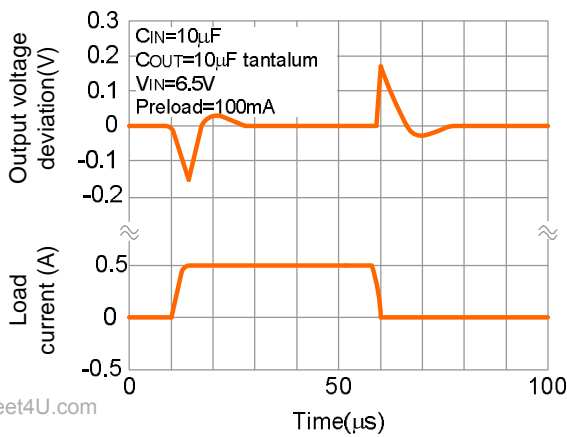
*Temperature Stability*



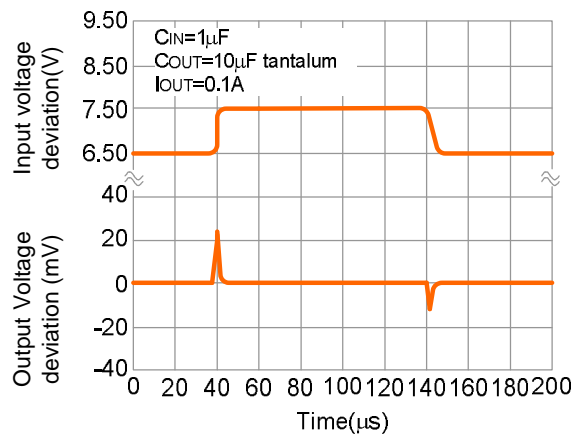
*Adjust Pin Current*



*V<sub>OUT</sub>=5 V Load Transient Response*

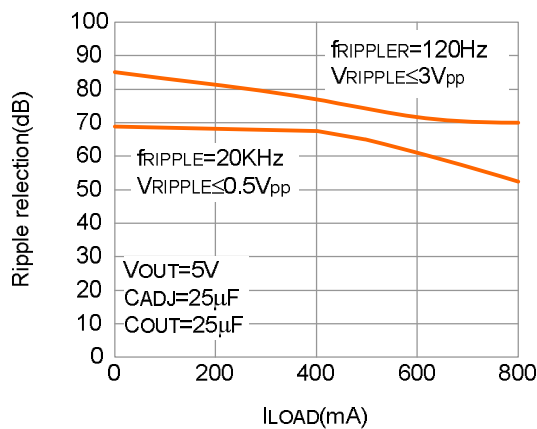


*V<sub>OUT</sub>=5 V Line Transient Response*



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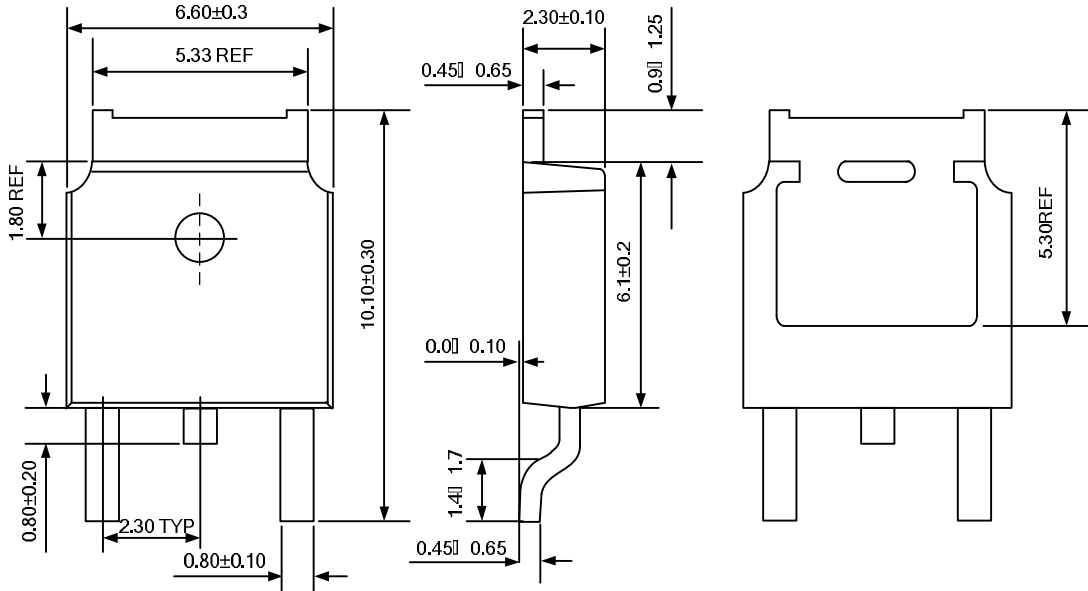
*Ripple Rejection VS Current*



PACKAGE OUTLINE

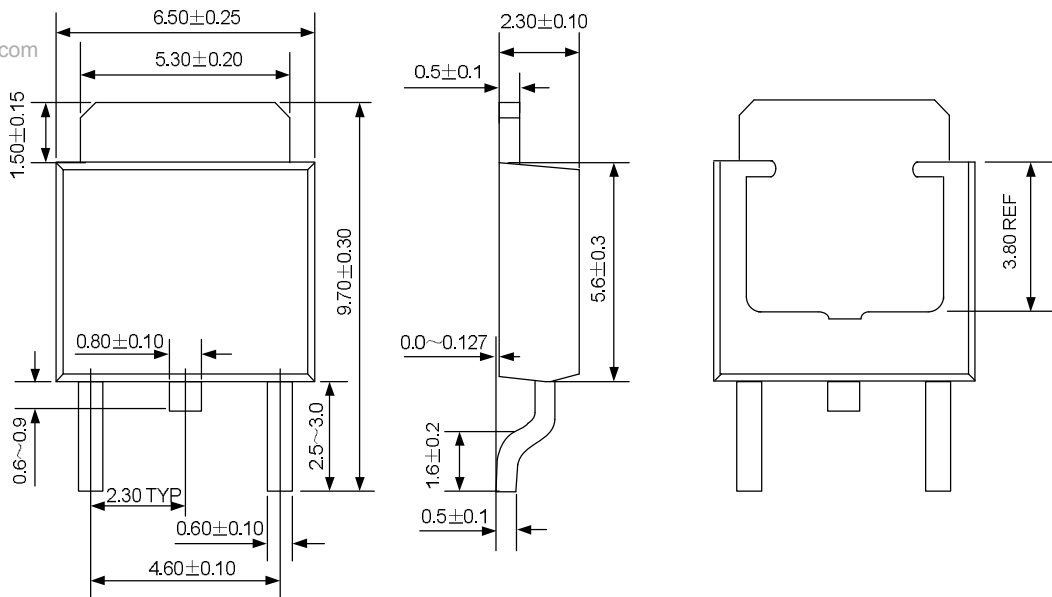
TO-252-2L

Unit: mm

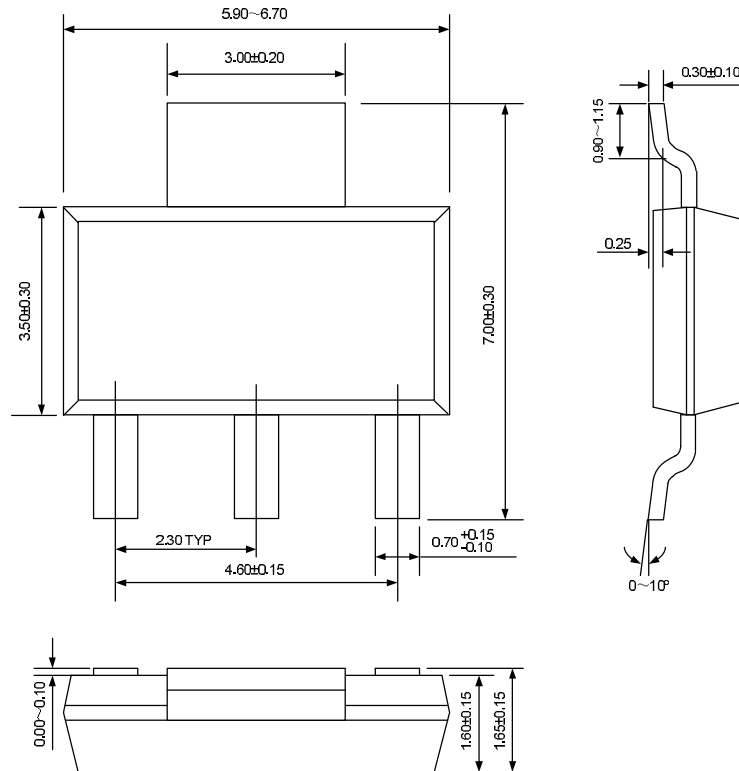


TO-252-2L

Unit: mm



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**PACKAGE OUTLINE****SOT-223-3L****Unit: mm**

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