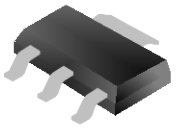
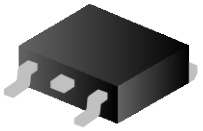
1A LDO VOLTAGE REGULATOR

DESCRIPTION

The SA1117C is a positive low voltage dropout regulator; voltage dropout is only 1.2V at 1A.
SA1117C provides two versions: fixed and adjustable versions. VOUT 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 SA1117C offers some key features include thermal shutdown and current limiting. It is suitable for all electronic products.



SOT-223-3L



TO-252-2L

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 1A output current
* Current Limiting
* Thermal Shutdown
* Temperature Range: -40°C to 125°C

APPLICATIONS

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

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

SA1117C □ – □ □ □

Device

Package
H: SOT-223-3L
D: TO-252-2L

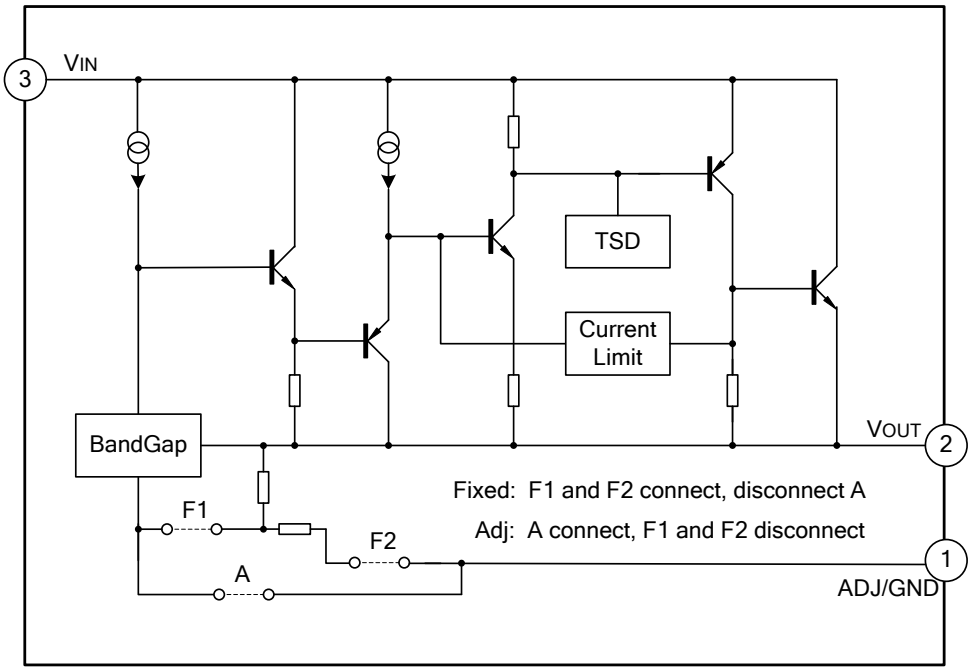
TR: Tape & Reel
Blank: Tube

G: Halogen free
Blank: Pb free

ADJ: Adjustable output
1.2: Fixed output 1.2V
1.5: Fixed output 1.5V
1.8: Fixed output 1.8V
2.5: Fixed output 2.5V
3.3: Fixed output 3.3V
5.0: Fixed output 5.0V

Part No.	Package	Marking	Material	Packing Type
SA1117CH-ADJTR	SOT-223-3L	SA1117CH-ADJ	Pb free	Tape & Reel
SA1117CH-ADJGTR		SA1117CH-ADJG	Halogen free	Tape & Reel
SA1117CH-1.2TR		SA1117CH-1.2	Pb free	Tape & Reel
SA1117CH-1.2GTR		SA1117CH-1.2G	Halogen free	Tape & Reel
SA1117CH-1.5TR		SA1117CH-1.5	Pb free	Tape & Reel
SA1117CH-1.5GTR		SA1117CH-1.5G	Halogen free	Tape & Reel
SA1117CH-1.8TR		SA1117CH-1.8	Pb free	Tape & Reel
SA1117CH-1.8GTR		SA1117CH-1.8G	Halogen free	Tape & Reel
SA1117CH-2.5TR		SA1117CH-2.5	Pb free	Tape & Reel
SA1117CH-2.5GTR		SA1117CH-2.5G	Halogen free	Tape & Reel
SA1117CH-3.3TR		SA1117CH-3.3	Pb free	Tape & Reel
SA1117CH-3.3GTR		SA1117CH-3.3G	Halogen free	Tape & Reel
SA1117CH-5.0TR		SA1117CH-5.0	Pb free	Tape & Reel
SA1117CH-5.0GTR		SA1117CH-5.0G	Halogen free	Tape & Reel
SA1117CD-ADJ	TO-252-2L	SA1117CD-ADJ	Pb free	Tube
SA1117CD-ADJTR		SA1117CD-ADJ	Pb free	Tape & Reel
SA1117CD-1.2		SA1117CD-1.2	Pb free	Tube
SA1117CD-1.2 TR		SA1117CD-1.2	Pb free	Tape & Reel
SA1117CD-1.5		SA1117CD-1.5	Pb free	Tube
SA1117CD-1.5TR		SA1117CD-1.5	Pb free	Tape & Reel
SA1117CD-1.8		SA1117CD-1.8	Pb free	Tube
SA1117CD-1.8TR		SA1117CD-1.8	Pb free	Tape & Reel
SA1117CD-2.5		SA1117CD-2.5	Pb free	Tube
SA1117CD-2.5TR		SA1117CD-2.5	Pb free	Tape & Reel
SA1117CD-3.3		SA1117CD-3.3	Pb free	Tube
SA1117CD-3.3TR		SA1117CD-3.3	Pb free	Tape & Reel
SA1117CD-5.0		SA1117CD-5.0	Pb free	Tube
SA1117CD-5.0TR		SA1117CD-5.0	Pb free	Tape & Reel

BLOCK DIAGRAM



ABOSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	V_{IN}	15	V
Lead Temperature (Soldering, 5 seconds)	T_{Lead}	260	°C
Operating Junction Temperature Range	T_J	150	°C
Storage Temperature Range	T_{stg}	-65 ~ +150	V
Power Dissipation	P_D	Internally Limited (Note1)	mW
ESD Tolerance (Minimum)	ESD	2000	V

Note1: The maximum allowable power dissipation is a function of maximum operating junction temperature, $T_{J(max)}$, the junction to ambient thermal resistance, θ_{JA}, and the ambient temperature T_{amb}. The maximum allowable power dissipation at any ambient temperature is given: $P_{D(max)} = (T_{J(max)} - T_{amb})/\theta_{JA}$, 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_{JA} of some packages may be different, The value of θ_{JA} depends on mounting technique.

RECOMMENDED OPERATING CONDITIONS

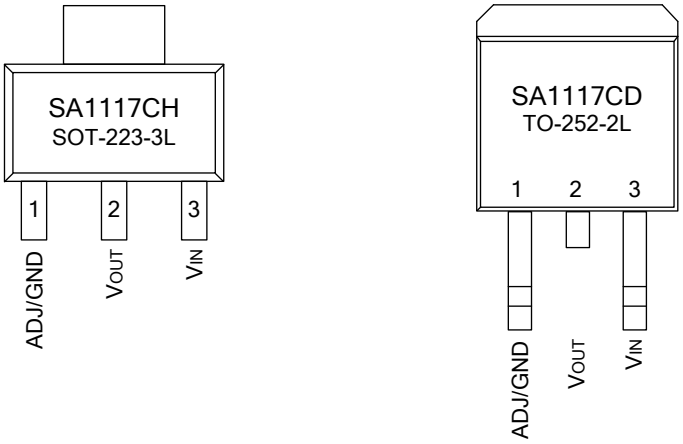
Characteristics	Symbol	Ratings	Unit
Input voltage	V_{IN}	12	V
Operating Junction Temperature Range	T_J	-40 ~ +125	°C

ELECTRICAL CHARACTERISTICS(Tamb=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_{REF}	SA1117C-ADJ, I_{OUT}=10mA, V_{IN}-V_{OUT}=2V, T_J=25°C 10mA ≤I_{OUT}≤1A, 1.4V≤V_{IN}-V_{OUT}≤10V	1.231 **1.225**	1.250 1.250	1.268 **1.275**	V
Output Voltage	V_{OUT}	SA1117C-1.2, I_{OUT}=10mA, V_{IN}=3.2V ,T_J=25°C 10mA≤I_{OUT}≤1A, 3.0V≤V_{IN}≤10V	1.176 **1.152**	1.2 1.2	1.224 **1.248**	V
		SA1117C-1.5, I_{OUT}=10mA, V_{IN}=3.5V ,T_J=25°C 10mA≤I_{OUT}≤1A, 3.0V≤V_{IN}≤10V	1.477 **1.470**	1.500 1.500	1.522 **1.530**	V
		SA1117C-1.8, I_{OUT}=10mA, V_{IN}=3.8V, T_J=25°C , 0≤I_{OUT}≤1A, 3.2V≤V_{IN}≤10V	1.773 **1.746**	1.800 1.800	1.827 **1.854**	V
		SA1117C-2.5, I_{OUT}=10mA, V_{IN}=4.5V,T_J=25°C , 0≤I_{OUT}≤1A, 3.9V≤V_{IN} ≤10V	2.462 **2.450**	2.500 2.500	2.538 **2.550**	V
		SA1117C-3.3, I_{OUT}=10mA, V_{IN}=5V,T_J=25°C , 0≤I_{OUT}≤1A, 4.75V≤V_{IN}≤10V	3.250 **3.235**	3.300 3.300	3.349 **3.365**	V
Output Voltage		SA1117C-5.0, I_{OUT}=10mA, V_{IN}=7V, T_J=25°C , 0≤ I_{OUT}≤1A, 6.5V≤V_{IN}≤12V	4.925 **4.900**	5.000 5.000	5.075 **5.10**	V
Output Voltage Temperature Stability	TS_{OUT}		--	0.3	--	%
Line Regulation	R_{line}	V_{INMIN} ≤V_{IN}≤ 12V, V_{OUT}=Fixed/Adj, I_{OUT}=10mA	--	6	15	mV
Load Regulation	R_{load}	10mA≤I_{OUT}≤1A, V_{OUT}=Fixed/Adj	--	6	**18**	mV
Dropout Voltage	V_{drop}	I_{OUT}=100mA I_{OUT}=500mA I_{OUT}=1A	-- -- --	1.00 1.05 1.20	**1.20** **1.25** **1.30**	V
Quiescent Current	I_q	4.25V≤V_{IN}≤ 6.5V	--	5	**10**	mA
Ripple Rejection	P_{SRR}	f_{RIPPLE}=120Hz, (V_{IN}-V_{OUT})=3V, V_{RIPPLE}=1V_{PP}	**50**	60	--	dB
Adjust pin Current	I_{adj}		--	60	**120**	μA
Adjust pin Current Change		0≤ I_{OUT}≤800mA, 1.4V ≤V_{IN}-V_{OUT}≤10V	--	0.2	**5**	μA
Thermal shutdown	TSD		--	150	--	°C
Current limitting	I_{limit}		1.4	1.6	1.8	A
Temperature Stabiliy			--	0.5	--	%
Long Term Stability		T_A=125°C, 1000Hrs	--	0. 3	--	%

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
RMS Output Noise		% of V_{OUT}, 10Hz≤f≤10kHz	--	0.005	--	%
Thermal Resistor Coefficient (No Heat-Sink)	θJA	SOT-223-3L	--	120	--	°C/W
		TO-252-2L	--	100	--	

PIN CONFIGURATION



PIN DESCRIPTION

Pin No.	Pin name	I/O	Functions
1	GND/ADJ	--/O	Ground/ADJ
2	VOUT	O	Output voltage
3	VIN	I	Input supply voltage

FUNCTION DESCRIPTION

The SA1117C is a LDO regulator, it's pass transistor is made up of a single NPN transistor being driven by a PNP. The dropout voltage is defined as: $V_{DROP} = V_{BE} + V_{SAT}$.

The SA1117C 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 SA1117C requires an output capacitor for device stability. Its value of 22μF 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

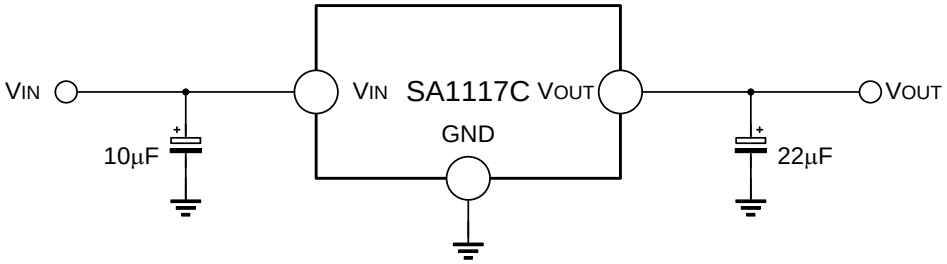


Figure 1. Typical Fixed Output Voltage

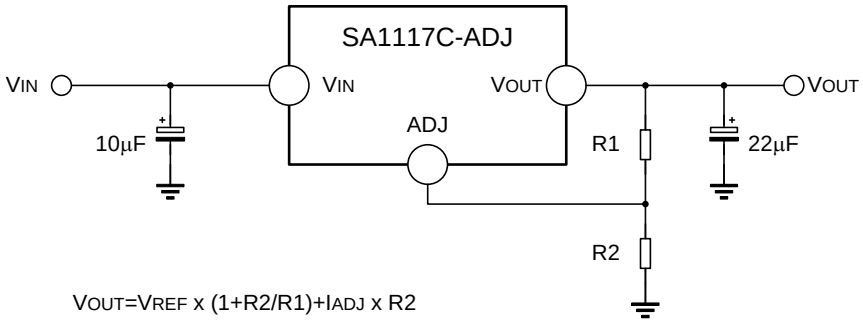
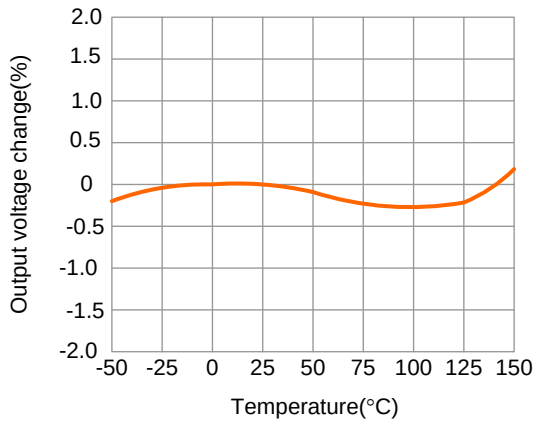


Figure 2. Typical Adjustable Output Voltage

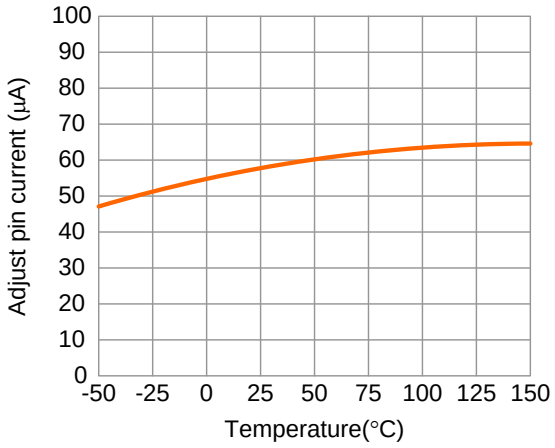
Note: The circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

TYPICAL CHARACTERISTICS CURVES

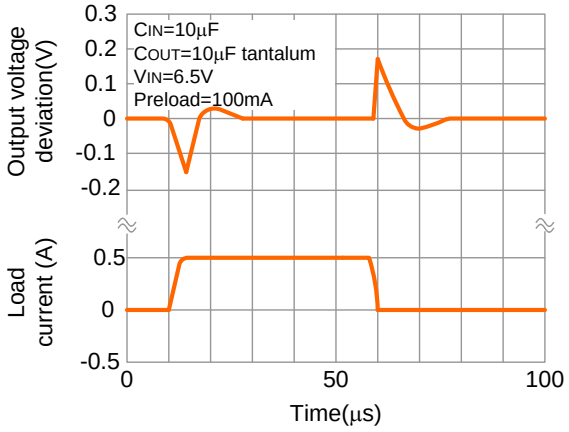
Temperature Stability



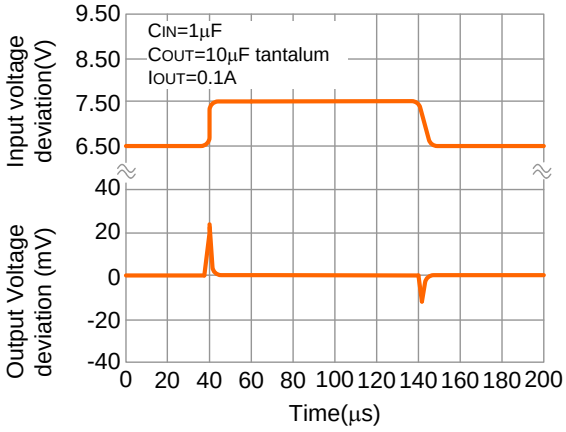
Adjust Pin Current



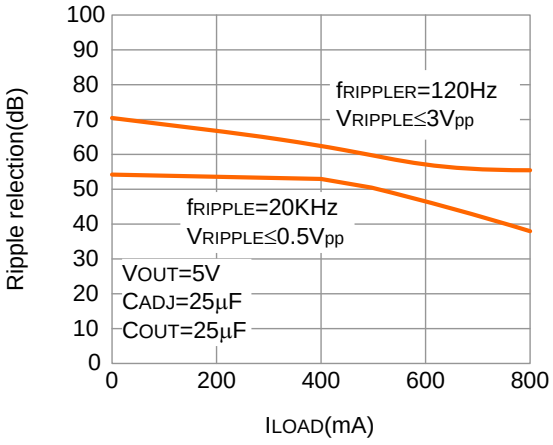
V_{OUT}=5 V Load Transient Response



V_{OUT}=5 V Line Transient Response

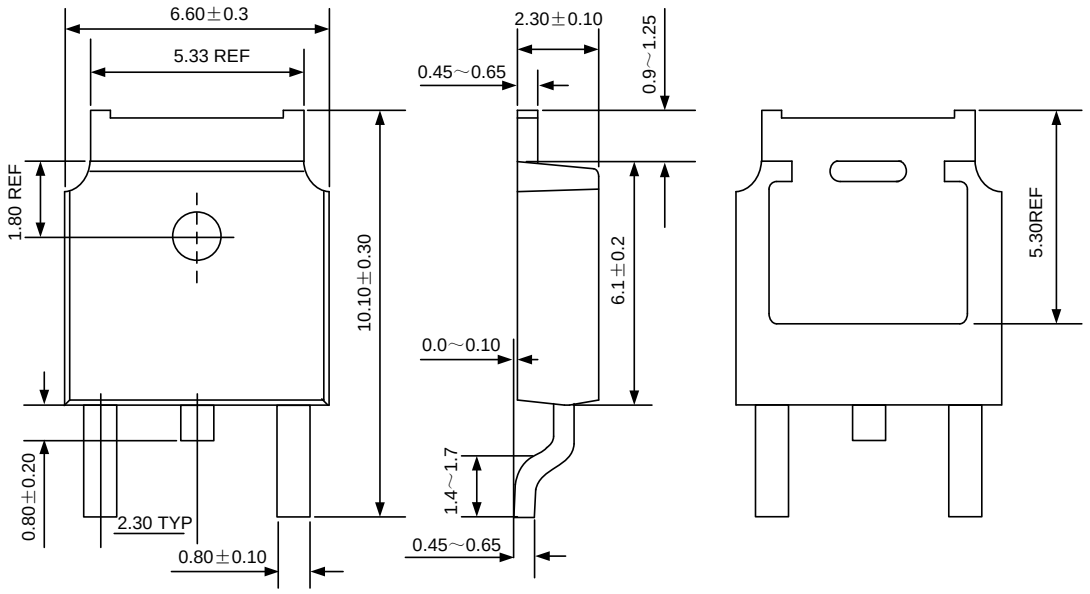


Ripple Rejection VS Current

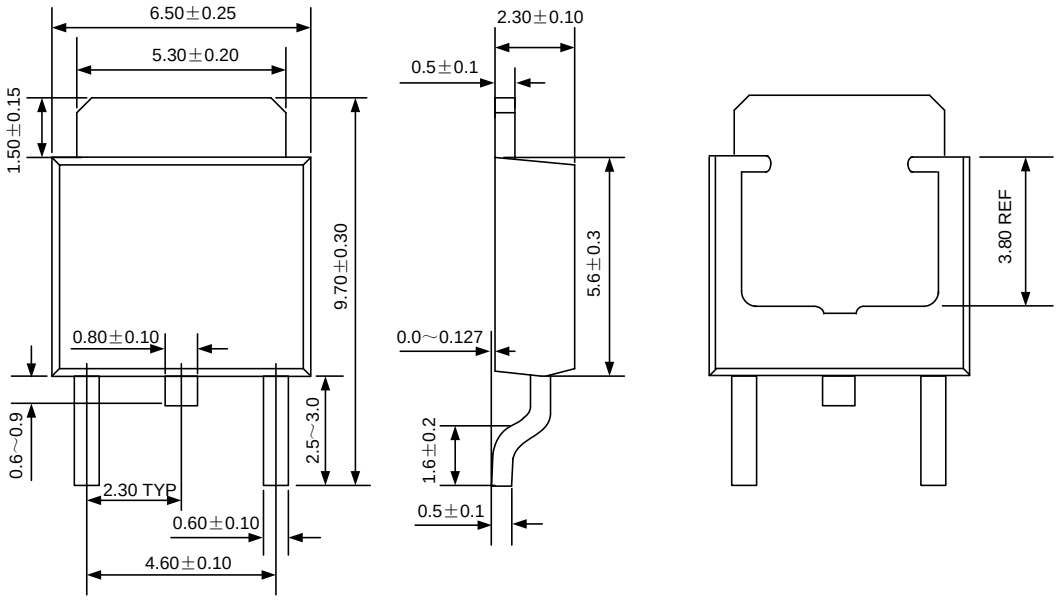


PACKAGE OUTLINE

TO-252-2L Unit: mm

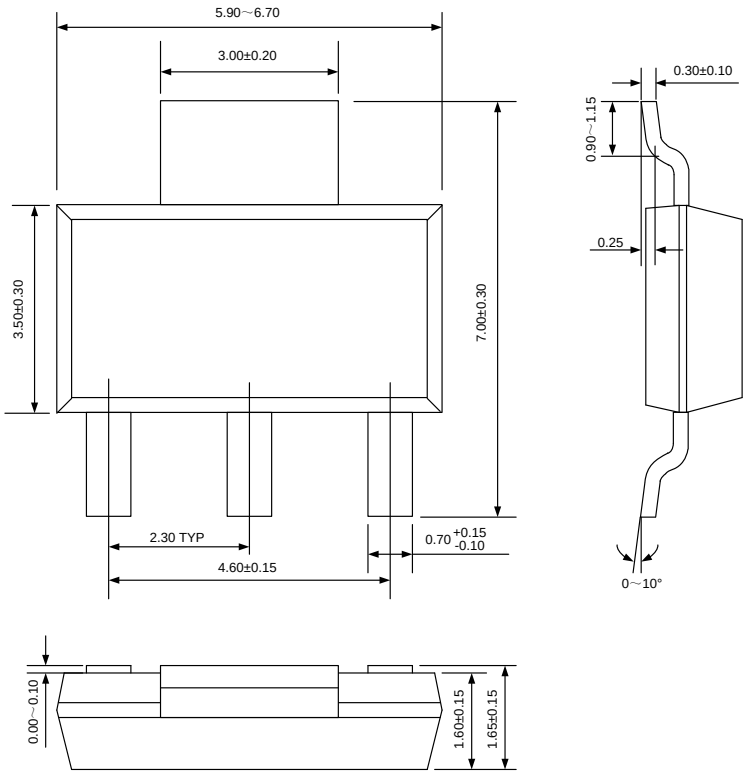


TO-252-2L Unit: mm



PACKAGE OUTLINE

SOT-223-3L Unit: mm



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ATTACHMENT

Revision History

Date	REV	Description	Page
2010.05.14	1.0	Original	
2010.11.11	1.1	Modify the template of datasheet	
2012.11.19	1.2	Add the halogen free information of SA1117CH	