

1A LDO VOLTAGE REGULATOR

DESCRIPTION

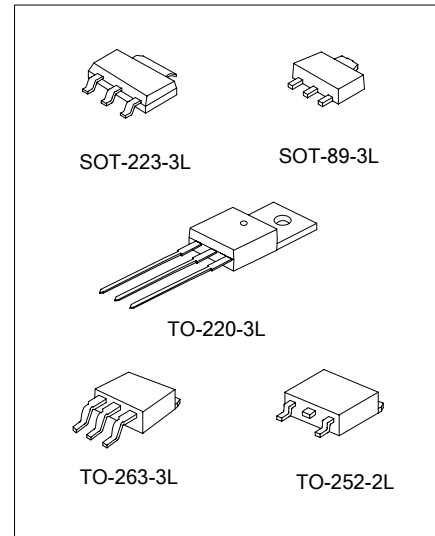
The SA1117 is a positive low voltage dropout regulator, voltage dropyout is only 1.2V at 1A.

SA1117 has two versions: the fixed version and the adjustable version. VOUT has a tolerance of less than 1% for fixed versions 1.5V, 1.8V, 2.5V, 2.85V, 3.0V, 3.3V, 5.0V and adjustable version or 2% output accuracy for fixed version 1.2V.

The SA1117 integrates overheating protection and current limit circuits. It is an suitable for all electronic products.

FEATURES

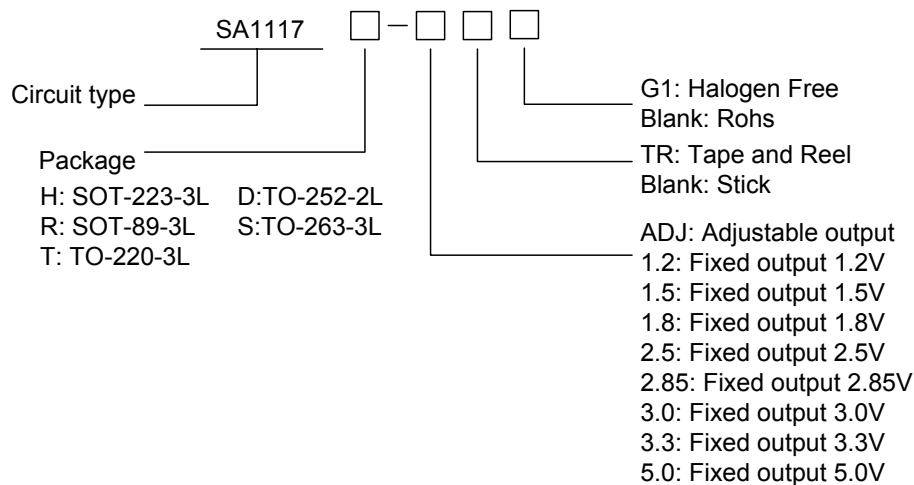
- * 1% accuracy for fixed output VOUT while the voltage is 1.5V, 1.8V, 2.5V, 2.85V, 3.0V, 3.3V, 5.0V and the adjustable output VOUT
- * 2% output accuracy for fixed version 1.2V
- * Low Dropout Voltage: 1.2V at 1A output current
- * Current Limiting
- * Thermal Shutdown
- * Temperature Range: -40°C to 125°C



APPLICATIONS

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

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

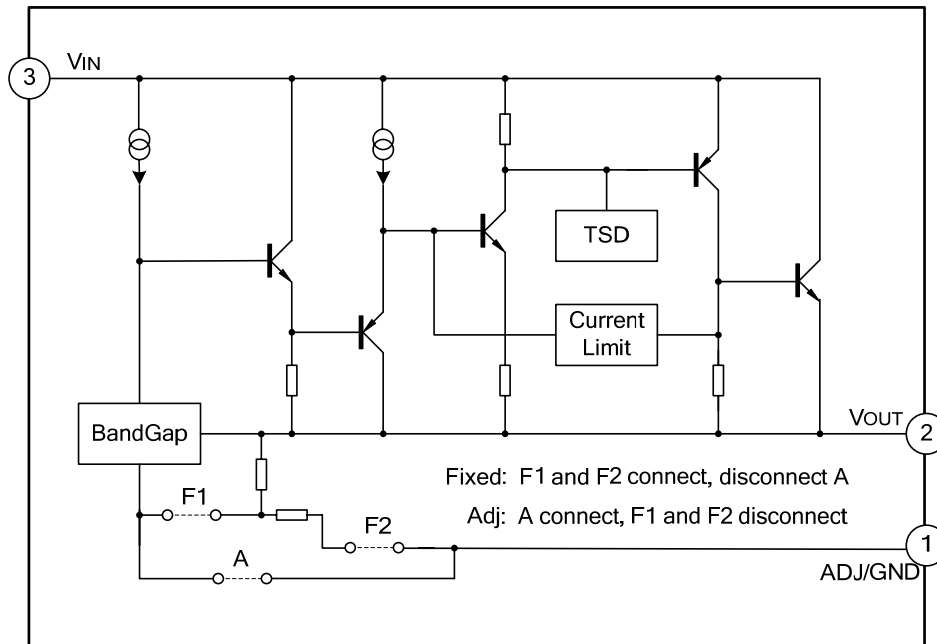


Part No.	Package	Marking	Packing Type
SA1117H-ADJTR	SOT-223-3L	SA1117H-ADJ	Tape & Reel
SA1117H-1.2TR		SA1117H-1.2	Tape & Reel
SA1117H-1.5TR		SA1117H-1.5	Tape & Reel
SA1117H-1.8TR		SA1117H-1.8	Tape & Reel
SA1117H-2.5TR		SA1117H-2.5	Tape & Reel
SA1117H-2.85TR		SA1117H-2.85	Tape & Reel
SA1117H-3.0TR		SA1117H-3.0	Tape & Reel
SA1117H-3.3TR		SA1117H-3.3	Tape & Reel
SA1117H-5.0TR		SA1117H-5.0	Tape & Reel
SA1117R-ADJ TR	SOT-89-3L	SAJR	Tape & Reel
SA1117R-1.2TR		S12R	Tape & Reel
SA1117R-1.5TR		S15R	Tape & Reel
SA1117R-1.8TR		S18R	Tape & Reel
SA1117R-2.5TR		S25R	Tape & Reel
SA1117R-2.85TR		S28R	Tape & Reel
SA1117R-3.0TR		S30R	Tape & Reel
SA1117R-3.3TR		S33R	Tape & Reel
SA1117R-5.0TR		S50R	Tape & Reel
SA1117T-ADJ	TO-220-3L	SA1117T-ADJ	Stick
SA1117T-1.2		SA1117T-1.2	Stick
SA1117T-1.5		SA1117T-1.5	Stick
SA1117T-1.8		SA1117T-1.8	Stick
SA1117T-2.5		SA1117T-2.5	Stick
SA1117T-2.85		SA1117T-2.85	Stick
SA1117T-3.0		SA1117T-3.0	Stick
SA1117T-3.3		SA1117T-3.3	Stick
SA1117T-5.0		SA1117T-5.0	Stick
SA1117D-ADJ	TO-252-2L	SA1117D-ADJ	Stick
SA1117D-ADJTR		SA1117D-ADJ	Tape & Reel
SA1117D-1.2		SA1117D-1.2	Stick
SA1117D-1.2TR		SA1117D-1.2	Tape & Reel
SA1117D-1.5		SA1117D-1.5	Stick
SA1117D-1.5TR		SA1117D-1.5	Tape & Reel
SA1117D-1.8		SA1117D-1.8	Stick
SA1117D-1.8TR		SA1117D-1.8	Tape & Reel
SA1117D-2.5		SA1117D-2.5	Stick
SA1117D-2.5TR		SA1117D-2.5	Tape & Reel
SA1117D-2.85		SA1117D-2.85	Stick
SA1117D-2.85TR		SA1117D-2.85	Tape & Reel
SA1117D-3.0		SA1117D-3.0	Stick
SA1117D-3.0TR		SA1117D-3.0	Tape & Reel
SA1117D-3.3		SA1117D-3.3	Stick
SA1117D-3.3TR	SA1117D-3.3	Tape & Reel	

Part No.	Package	Marking	Packing Type	
SA1117D-5.0	TO-252-2L	SA1117D-5.0	Stick	
SA1117D-5.0TR		SA1117D-5.0	Tape & Reel	
SA1117S-ADJ	TO-263-3L	SA1117S-ADJ	Stick	
SA1117S-ADJTR		SA1117S-ADJ	Tape & Reel	
SA1117S-1.2		SA1117S-1.2	Stick	
SA1117S-1.2TR		SA1117S-1.2	Tape & Reel	
SA1117S-1.5		SA1117S-1.5	Stick	
SA1117S-1.5TR		SA1117S-1.5	Tape & Reel	
SA1117S-1.8		SA1117S-1.8	Stick	
SA1117S-1.8TR		SA1117S-1.8	Tape & Reel	
SA1117S-2.5		SA1117S-2.5	Stick	
SA1117S-2.5TR		SA1117S-2.5	Tape & Reel	
SA1117S-2.85		SA1117S-2.85	Stick	
SA1117S-2.85TR		SA1117S-2.85	Tape & Reel	
SA1117S-3.0		SA1117S-3.0	Stick	
SA1117S-3.0TR		SA1117S-3.0	Tape & Reel	
SA1117S-3.3		SA1117S-3.3	Stick	
SA1117S-3.3TR		SA1117S-3.3	Tape & Reel	
SA1117S-5.0		SA1117S-5.0	Stick	
SA1117S-5.0TR		SA1117S-5.0	Tape & Reel	
SA1117H-ADJTRG1		SOT-223-3L	1117H-ADJG	Tape & Reel
SA1117H-1.2TRG1			1117H-1.2G	Tape & Reel
SA1117H-1.5TRG1	1117H-1.5G		Tape & Reel	
SA1117H-1.8TRG1	1117H-1.8G		Tape & Reel	
SA1117H-2.5TRG1	1117H-2.5G		Tape & Reel	
SA1117H-2.85TRG1	1117H-2.85G		Tape & Reel	
SA1117H-3.0TRG1	1117H-3.0G		Tape & Reel	
SA1117H-3.3TRG1	1117H-3.3G		Tape & Reel	
SA1117H-5.0TRG1	1117H-5.0G		Tape & Reel	
SA1117R-ADJ TRG1	SOT-89-3L	RAJG	Tape & Reel	
SA1117R-1.2TRG1		R12G	Tape & Reel	
SA1117R-1.5TRG1		R15G	Tape & Reel	
SA1117R-1.8TRG1		R18G	Tape & Reel	
SA1117R-2.5TRG1		R25G	Tape & Reel	
SA1117R-2.85TRG1		R28G	Tape & Reel	
SA1117R-3.0TRG1		R30G	Tape & Reel	
SA1117R-3.3TRG1		R33G	Tape & Reel	
SA1117R-5.0TRG1		R50G	Tape & Reel	
SA1117T-ADJG1	TO-220-3L	1117T-ADJG	Stick	
SA1117T-1.2G1		1117T-1.2G	Stick	
SA1117T-1.5G1		1117T-1.5G	Stick	
SA1117T-1.8G1		1117T-1.8G	Stick	

Part No.	Package	Marking	Packing Type	
SA1117T-2.5G1	TO-220-3L	1117T-2.5G	Stick	
SA1117T-2.85G1		1117T-2.85G	Stick	
SA1117T-3.0G1		1117T-3.0G	Stick	
SA1117T-3.3G1		1117T-3.3G	Stick	
SA1117T-5.0G1		1117T-5.0G	Stick	
SA1117D-ADJG1	TO-252-2L	1117D-ADJG	Stick	
SA1117D-ADJTRG1		1117D-ADJG	Tape & Reel	
SA1117D-1.2G1		1117D-1.2G	Stick	
SA1117D-1.2TRG1		1117D-1.2G	Tape & Reel	
SA1117D-1.5G1		1117D-1.5G	Stick	
SA1117D-1.5TRG1		1117D-1.5G	Tape & Reel	
SA1117D-1.8G1		1117D-1.8G	Stick	
SA1117D-1.8TRG1		1117D-1.8G	Tape & Reel	
SA1117D-2.5G1		1117D-2.5G	Stick	
SA1117D-2.5TRG1		1117D-2.5G	Tape & Reel	
SA1117D-2.85G1		1117D-2.85G	Stick	
SA1117D-2.85TRG1		1117D-2.85G	Tape & Reel	
SA1117D-3.0G1		1117D-3.0G	Stick	
SA1117D-3.0TRG1		1117D-3.0G	Tape & Reel	
SA1117D-3.3G1		1117D-3.3G	Stick	
SA1117D-3.3TRG1		1117D-3.3G	Tape & Reel	
SA1117D-5.0G1		1117D-5.0G	Stick	
SA1117D-5.0TRG1		1117D-5.0G	Tape & Reel	
SA1117S-ADJG1		TO-263-3L	1117S-ADJG	Stick
SA1117S-ADJTRG1			1117S-ADJG	Tape & Reel
SA1117S-1.2G1	1117S-1.2G		Stick	
SA1117S-1.2TRG1	1117S-1.2G		Tape & Reel	
SA1117S-1.5G1	1117S-1.5G		Stick	
SA1117S-1.5TRG1	1117S-1.5G		Tape & Reel	
SA1117S-1.8G1	1117S-1.8G		Stick	
SA1117S-1.8TRG1	1117S-1.8G		Tape & Reel	
SA1117S-2.5G1	1117S-2.5G		Stick	
SA1117S-2.5TRG1	1117S-2.5G		Tape & Reel	
SA1117S-2.85G1	1117S-2.85G		Stick	
SA1117S-2.85TRG1	1117S-2.85G		Tape & Reel	
SA1117S-3.0G1	1117S-3.0G		Stick	
SA1117S-3.0TRG1	1117S-3.0G		Tape & Reel	
SA1117S-3.3G1	1117S-3.3G		Stick	
SA1117S-3.3TRG1	1117S-3.3G		Tape & Reel	
SA1117S-5.0G1	1117S-5.0G		Stick	
SA1117S-5.0TRG1	1117S-5.0G	Tape & Reel		

BLOCK DIAGRAM



ABOSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Ratings	Unit
Input Supply Voltage	V _{IN}	20	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	°C
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})/θ_{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 different packages may be different, and the he value of θ_{JA} depends on mounting technique.

RECOMMENDED OPERATING CONDITIONS

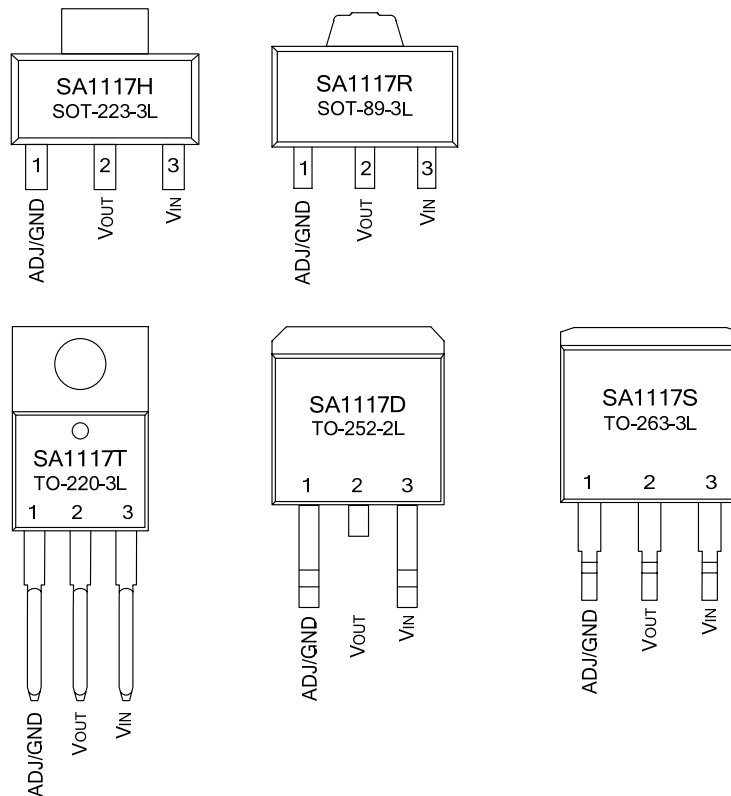
Characteristics	Symbol	Ratings	Unit
Input Voltage	V _{IN}	15	V
Operating Junction Temperature Range	T _J	-40 ~ +125	°C

ELECTRICAL CHARACTERISTICS ($T_{amb}=25^{\circ}\text{C}$, 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	VREF	SA1117-ADJ, $I_{OUT}=10\text{mA}$, $V_{IN}-V_{OUT}=2\text{V}$, $T_J=25^{\circ}\text{C}$ $10\text{mA}\leq I_{OUT}\leq 1\text{A}$, $1.4\text{V}\leq V_{IN}-V_{OUT}\leq 10\text{V}$	1.238 1.225	1.250 1.250	1.262 1.270	V
Output Voltage	VOUT	SA1117-1.2, $I_{OUT}=10\text{mA}$, $V_{IN}=3.2\text{V}$, $T_J=25^{\circ}\text{C}$ $10\text{mA}\leq I_{OUT}\leq 1\text{A}$, $3.0\text{V}\leq V_{IN}\leq 10\text{V}$	1.176 1.152	1.2 1.2	1.224 1.248	V
		SA1117-1.5, $I_{OUT}=10\text{mA}$, $V_{IN}=3.5\text{V}$, $T_J=25^{\circ}\text{C}$ $10\text{mA}\leq I_{OUT}\leq 1\text{A}$, $3.0\text{V}\leq V_{IN}\leq 10\text{V}$	1.485 1.470	1.500 1.500	1.515 1.530	V
		SA1117-1.8, $I_{OUT}=10\text{mA}$, $V_{IN}=3.8\text{V}$, $T_J=25^{\circ}\text{C}$, $0\leq I_{OUT}\leq 1\text{A}$, $3.2\text{V}\leq V_{IN}\leq 10\text{V}$	1.782 1.764	1.800 1.800	1.818 1.836	V
		SA1117-2.5, $I_{OUT}=10\text{mA}$, $V_{IN}=4.5\text{V}$, $T_J=25^{\circ}\text{C}$, $0\leq I_{OUT}\leq 1\text{A}$, $3.9\text{V}\leq V_{IN}\leq 10\text{V}$	2.475 2.450	2.500 2.500	2.525 2.550	V
		SA1117-2.85, $I_{OUT}=10\text{mA}$, $V_{IN}=4.85\text{V}$, $T_J=25^{\circ}\text{C}$, $0\leq I_{OUT}\leq 1\text{A}$, $4.25\text{V}\leq V_{IN}\leq 10\text{V}$ $0\leq I_{OUT}\leq 500\text{mA}$, $V_{IN}=4.10\text{V}$	2.820 2.790 2.790	2.850 2.850 2.850	2.880 2.910 2.910	V
		SA1117-3.0, $I_{OUT}=10\text{mA}$, $V_{IN}=4.5\text{V}$, $T_J=25^{\circ}\text{C}$, $0\leq I_{OUT}\leq 1\text{A}$, $4.4\text{V}\leq V_{IN}\leq 10\text{V}$	2.970 2.940	3.000 3.000	3.030 3.060	V
Output Voltage	VOUT	SA1117-3.3, $I_{OUT}=10\text{mA}$, $V_{IN}=5\text{V}$, $T_J=25^{\circ}\text{C}$, $0\leq I_{OUT}\leq 1\text{A}$, $4.75\text{V}\leq V_{IN}\leq 10\text{V}$	3.267 3.235	3.300 3.300	3.333 3.365	V
		SA1117-5.0, $I_{OUT}=10\text{mA}$, $V_{IN}=7\text{V}$, $T_J=25^{\circ}\text{C}$, $0\leq I_{OUT}\leq 1\text{A}$, $6.5\text{V}\leq V_{IN}\leq 12\text{V}$	4.950 4.900	5.000 5.000	5.05 5.10	V
				0.3		%
Output Voltage Temperature Stability	TSOUT					
Line Regulation	Rline	$V_{INMIN}\leq V_{IN}\leq 12\text{V}$, $V_{OUT}=\text{Fixed/Adj}$, $I_{OUT}=10\text{mA}$		3	7	mV
Load Regulation	Rload	$10\text{mA}\leq I_{OUT}\leq 1\text{A}$, $V_{OUT}=\text{Fixed/Adj}$		6	12	mV
Dropout Voltage	Vdrop	$I_{OUT}=100\text{mA}$		1.00	1.20	V
		$I_{OUT}=500\text{mA}$		1.05	1.25	
		$I_{OUT}=1\text{A}$		1.10	1.30	
Quiescent Current	Iq	$4.25\text{V}\leq V_{IN}\leq 6.5\text{V}$		5	10	mA
Ripple Rejection	PSRR	f _{RIPPLE} =120Hz, $(V_{IN}-V_{OUT})=3\text{V}$, V _{RIPPLE} =1V _{PP}	60	75		dB
Adjust pin Current	Iadj			60	120	μA

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
Adjust pin Current Change		$0 \leq I_{OUT} \leq 1A, 1.4V \leq V_{IN} - V_{OUT} \leq 10V$		0.2	5	μA
Temperature Stability				0.5		%
Long Term Stability		$T_{amb} = 125^{\circ}C, 1000Hrs$		0.3		%
RMS Output Noise		% of $V_{OUT}, 10Hz \leq f \leq 10kHz$		0.003		%
Thermal Resistance (No Heat-sink)	θ_{JA}	SOT-223-3L		120		$^{\circ}C/W$
		TO-252-2L		100		
		TO-263-3L		60		
		SOT-89-3L		165		
		TO-220-3L		60		

PIN CONFIGURATION



PIN DESCRIPTION

Pin No.	Pin name	I/O	Functions
1	GND/ADJ	--/O	Ground/ADJ
2	V _{OUT}	O	Output voltage
3	V _{IN}	I	Input supply voltage

FUNCTION DESCRIPTION

The SA1117 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 SA1117 has two versions: the fixed output version and the adjustable output version. Output voltages can be 1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.0V, 3.3V, and 5.0V. On-chip thermal shut-down circuit provides protection against overload and overheating that would create excessive junction temperature.

The adjustable output version requires a 22 μF or bigger tantalum capacitor at output for SA1117 stability. The capacitor for fixed output version can be smaller and should be determined base on actual application. Generally, the stability of linear regulator stability decreases with output currents increase.

TYPICAL APPLICATION CIRCUIT

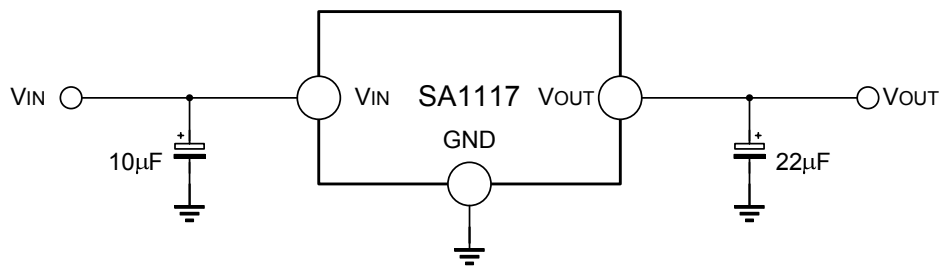


Figure 1. Typical Fixed Output Voltage

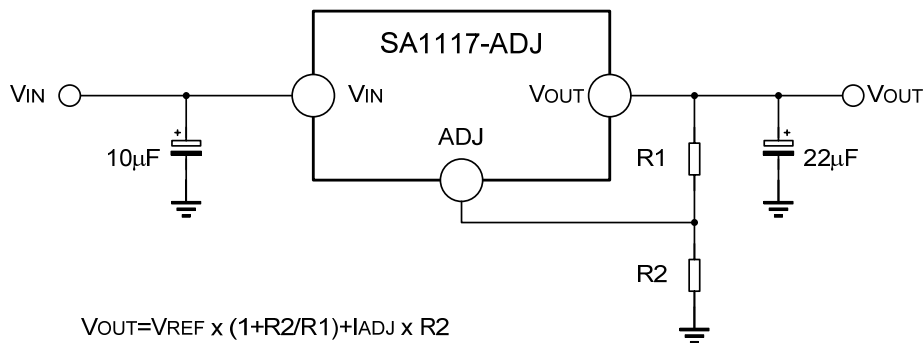
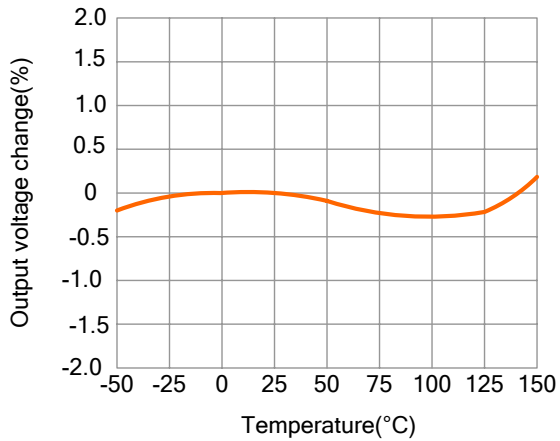


Figure 2. Typical Adjustable Output Voltage

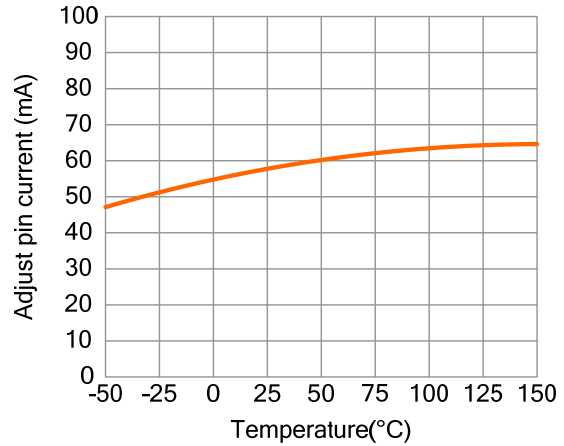
Note: The above circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

TYPICAL CHARACTERISTICS CURVES

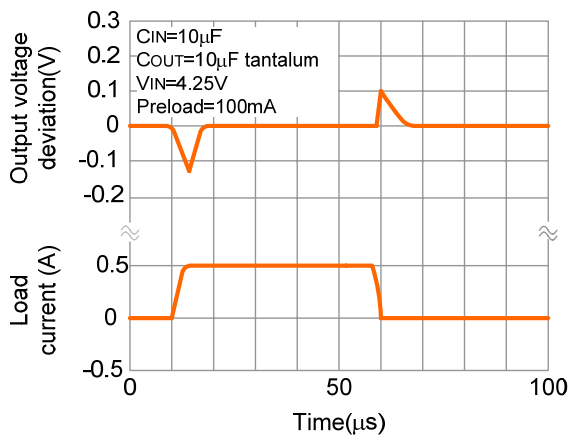
Temperature Stability



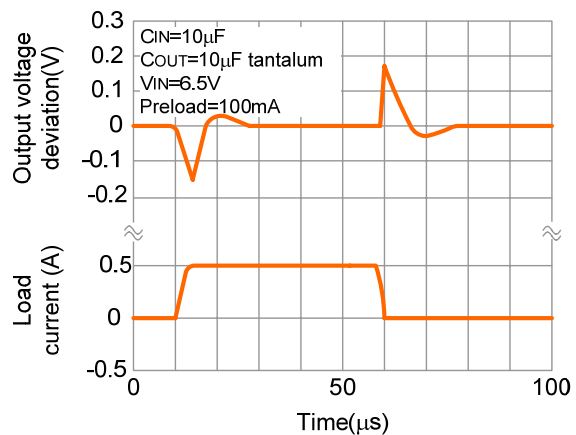
Adjust Pin Current



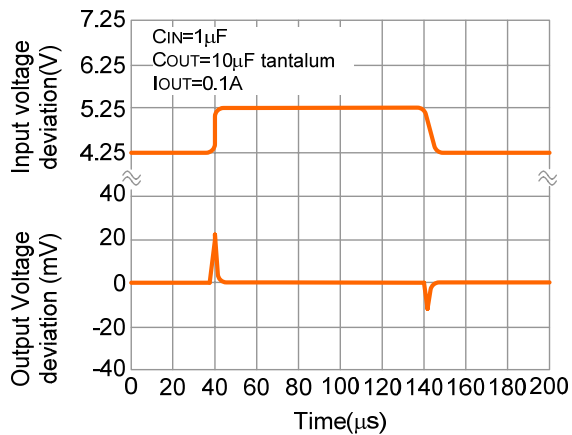
V_{OUT}=2.85 V Load Transient Response



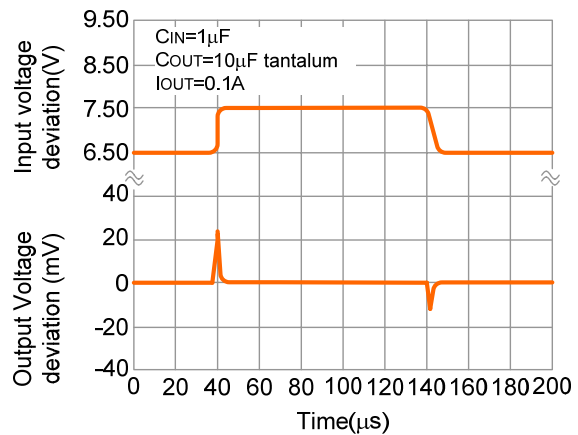
V_{OUT}=5 V Load Transient Response



V_{OUT}=2.85V Line Transient Response

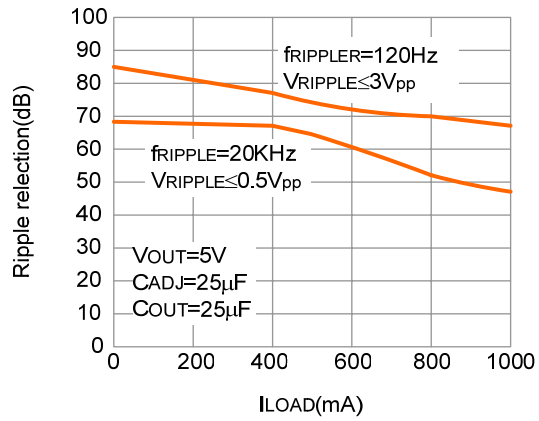


V_{OUT}=5 V Line Transient Response



TYPICAL CHARACTERISTICS CURVES (CONTINUED)

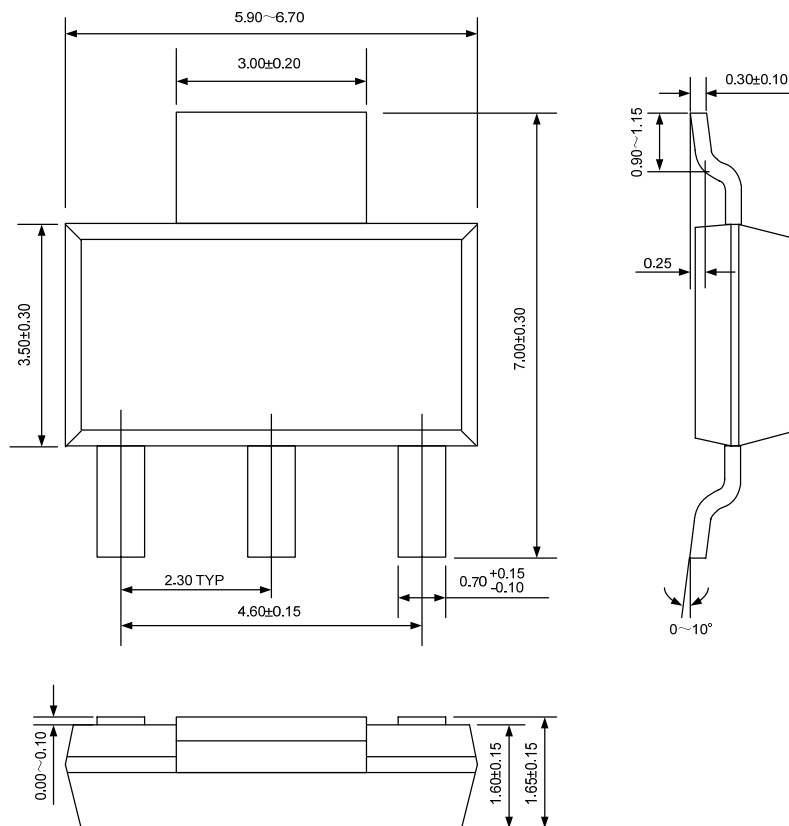
Ripple Rejection VS Current



PACKAGE OUTLINE

SOT-223-3L

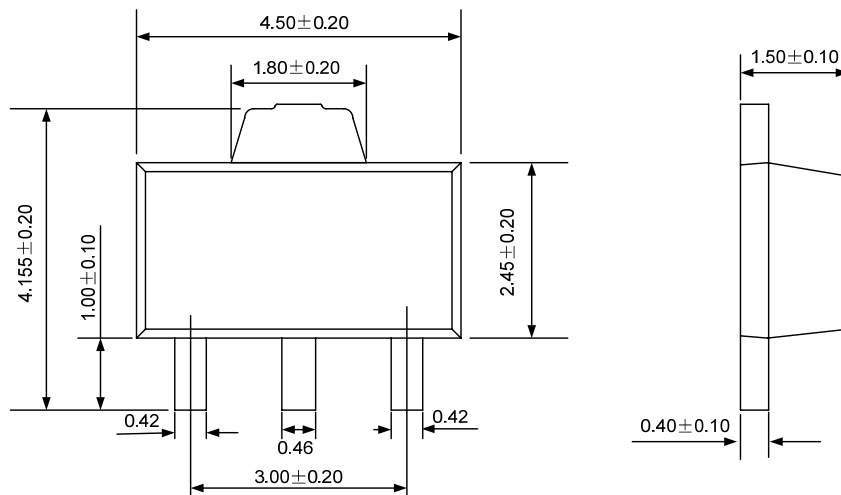
Unit: mm



PACKAGE OUTLINE

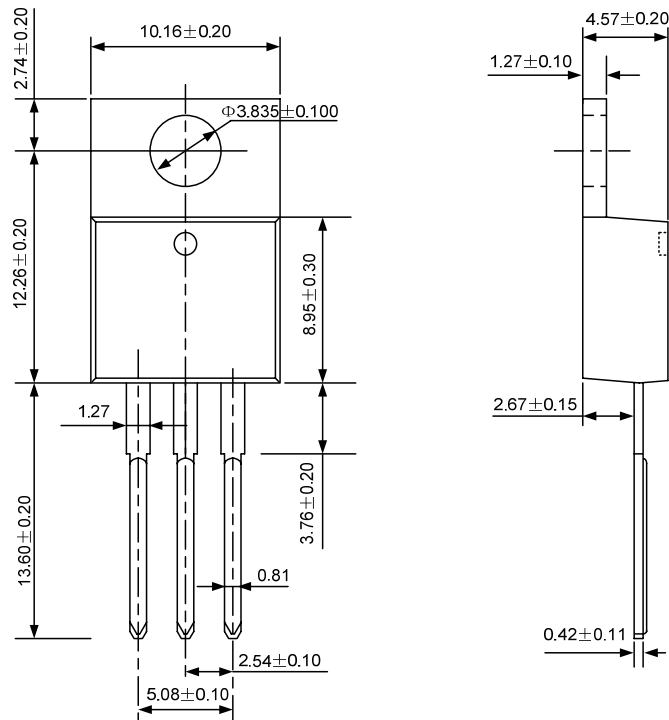
SOT-89-3L

Unit: mm



TO-220-3L

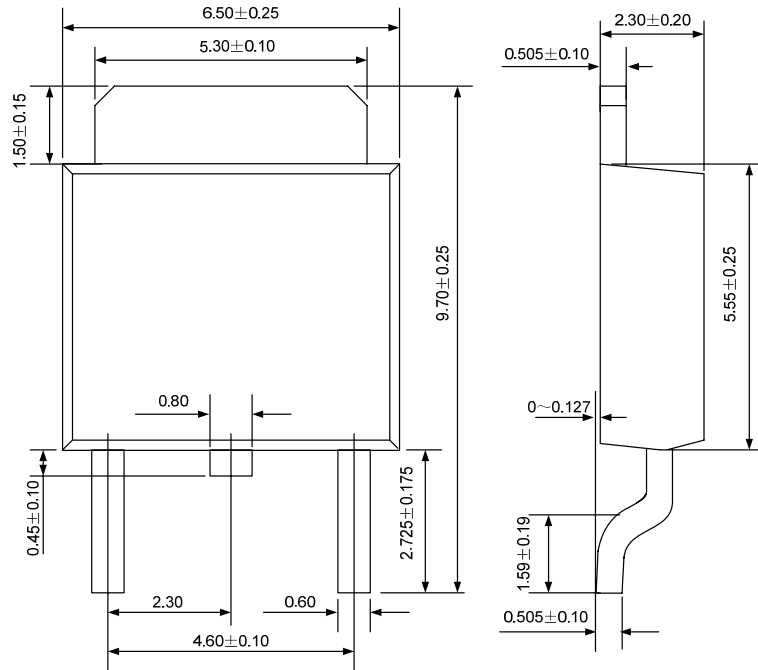
Unit: mm



PACKAGE OUTLINE

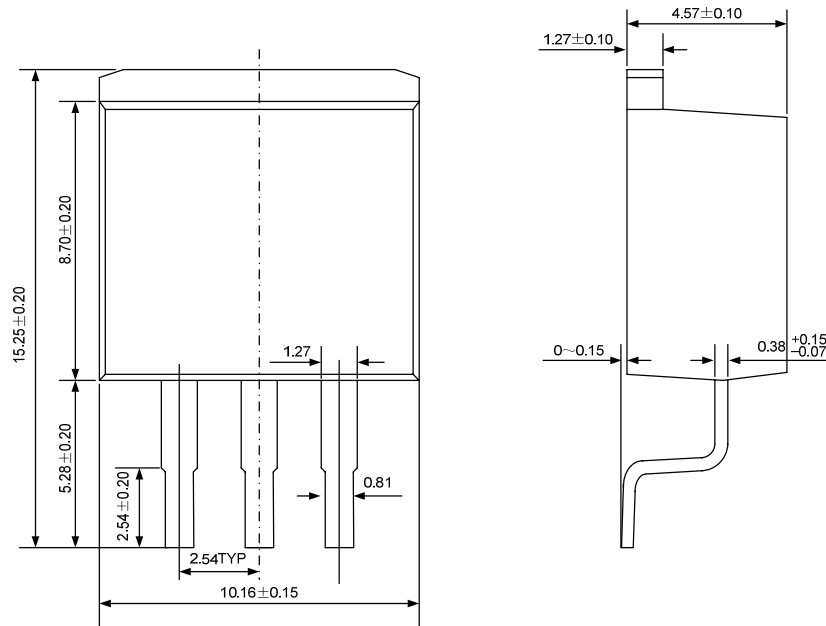
TO-252-2L

Unit: mm



TO-263-3L

Unit: mm



Note: Silan reserves the right to make changes without notice in this specification for the improvement of the design and performance.
Silan will supply the best possible product for customers