

Description

The A1117 is designed to provide 1A for requiring high efficiency applications. The A1117 series of positive fixed voltage and adjustable version, which can provide an output voltage from 1.25V to 13.8V with only two external resistors. The A1117 offers current limiting and thermal protection to assure the stability of chip and power system. And the on chip trimming technique to guarantee output voltage accuracy within ±1%.

The A1117 is available in SOT-223 and TO-252 package.

Features

- Output Current of 1A Maximum
- Three-Terminal Adjustable or Fixed Outputs
- Maximum Input Voltage: 18V
- Fast Transient Response
- Current Limit, Safe Operating and Thermal Shutdown Protection
- Line Regulation: 0.2%
- Load Regulation: 0.4%
- Environment Temperature: -50°C~+140°C
- Available in SOT-223 and TO-252 Package Packages

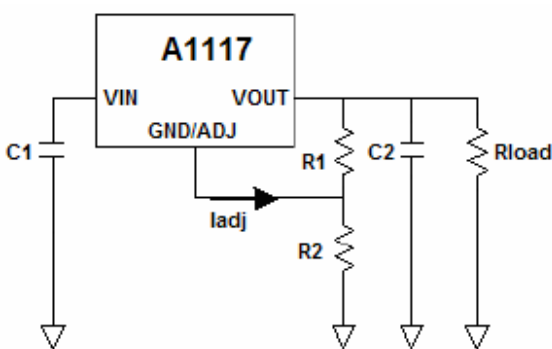
Ordering Information

N	SOT-223	PN: A1117N
D	TO-252	PN: A1117D
Note:	AiT provides all lead free parts AiT provides T/R in SOT-223 package Tape & Reel is available: A1117DR	

Application

- High Efficiency Linear Regulators
- Post Regulator for Switching DC/DC Converter
- Power Management for M/B and Graphic Card
- 2.85V Model for SCSI-2 Active Termination
- Battery Charger
- LCD Monitor and LCD TV
- DVD Decode Board
- ADSL Modem

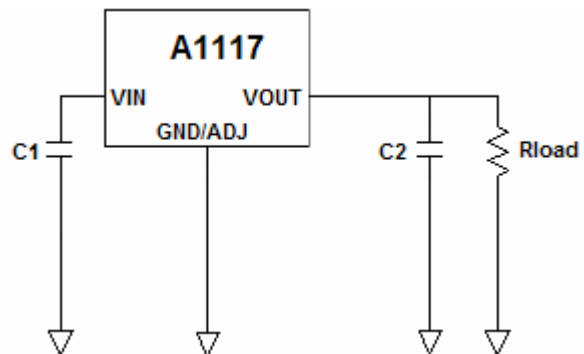
Typical Application



A1117 adjustable output voltage

$$V_{OUT} = 1.25V(1 + R2/R1)$$

The A1117 adjustable regulator provide 1.25V reference voltage. Any output voltage between 1.25V~13.8V can be available by choosing two external resistors.



A1117 fixed output

Absolute Maximum Ratings

Maximum Input Voltage	18V
Operating Junction Temperature (T_J)	150 °C
Environment Temperature (T_A)	140 °C
Storage Temperature Range (T_s)	-65 °C to 150 °C
Lead Temperature (soldering, 10 seconds)	260 °C

Note: Exceeding these rating could cause damage to the device, all voltages are with respect to Ground.

Currents are positive into, negative out of the specified terminal.

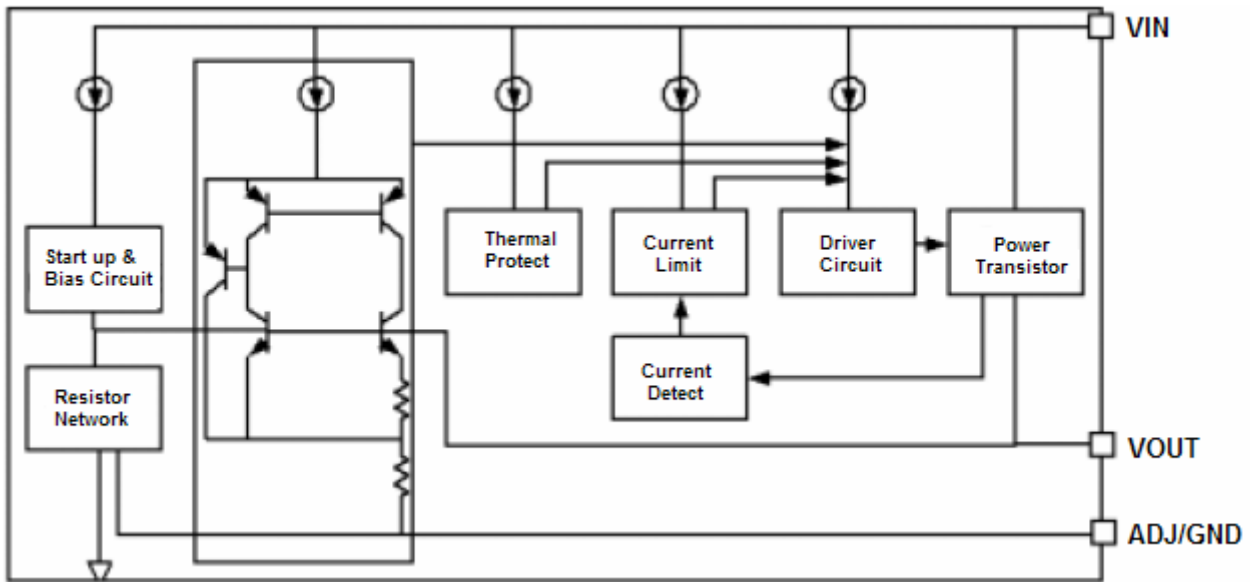
Electrical Characteristics

$V_{IN} = V_{OUT} + 2V$, $I_O = 10mA$, and $T_J = 25^\circ C$, unless otherwise specified.

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit			
Reference Voltage	A1117	V_{REF}	$I_O = 10mA$, $V_{IN} - V_{OUT} = 2V$	1.238	1.25	1.262	V			
			$10mA \leq I_O \leq 1A$, $1.5V \leq V_{IN} - V_{OUT} \leq 12V$	1.225	1.25	1.275				
Output Voltage	A1117-1.8	V_{OUT}	$I_O = 10mA$, $V_{IN} = 3.8V$	1.782	1.8	1.818	V			
			$10mA \leq I_O \leq 1A$, $3.2V \leq V_{IN} \leq 12V$	1.764	1.8	1.836				
	A1117-2.5		$I_O = 10mA$, $V_{IN} = 4.5V$	2.475	2.5	2.525				
			$10mA \leq I_O \leq 1A$, $3.9V \leq V_{IN} \leq 12V$	2.45	2.5	2.55				
	A1117-2.85		$I_O = 10mA$, $V_{IN} = 4.85V$	2.822	2.85	2.878				
			$10mA \leq I_O \leq 1A$, $4.25V \leq V_{IN} \leq 12V$	2.793	2.85	2.907				
	A1117-3.3		$I_O = 10mA$, $V_{IN} = 5.0V$	3.267	3.3	3.333				
			$10mA \leq I_O \leq 1A$, $4.75V \leq V_{IN} \leq 12V$	3.234	3.3	3.366				
	A1117-5.0		$I_O = 10mA$, $V_{IN} = 7.0V$	4.95	5	5.05				
			$10mA \leq I_O \leq 1A$, $6.5V \leq V_{IN} \leq 12V$	4.9	5	5.1				
	Line Regulation		A1117-adj	ΔV_{OI}	$I_O = 10mA$ $1.5V \leq V_{IN} - V_{OUT} \leq 13.775V$			0.035	0.2	%
			A1117-X.X		$I_O = 10mA$, $V_{OUT} + 1.5V \leq V_{IN} \leq 15V$			9	12	mV
Load Regulation	A1117-adj	ΔV_{OL}	$10mA \leq I_O \leq 1A$, $V_{IN} - V_{OUT} = 3V$		0.2	0.4	%			
	A1117-X.X		$10mA \leq I_O \leq 1A$, $V_{IN} = V_{OUT} + 1.5V$		3	10	mV			
Dropout Voltage		ΔV	$I_O = 100mA$		1.11	1.2	V			
			$I_O = 500mA$		1.18	1.25				
			$I_O = 1A$		1.26	1.3				
Minimum Load Current (Note1)		A1117	$V_{IN} \leq 12V$		5	10	mA			
Quiescent Current	I_q	A1117-X.X	$V_{IN} - V_{OUT} = 1.25V$		4	8	mA			
Current Limit		I_{CL}	$V_{IN} - V_{OUT} = 2V$	1.25	1.4	1.6	A			
Adjust Pin Current		A1117-X.X			55	120	mA			
Temperature Stability						0.5	%			
Thermal Resistor	θ_{JC}	SOT-223			20		$^\circ C/W$			
		TO-252			10					

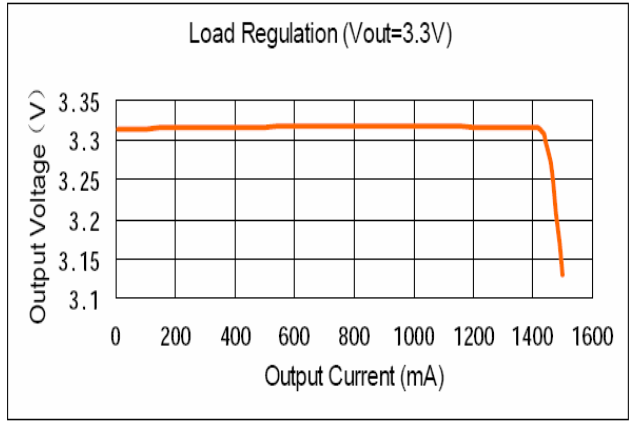
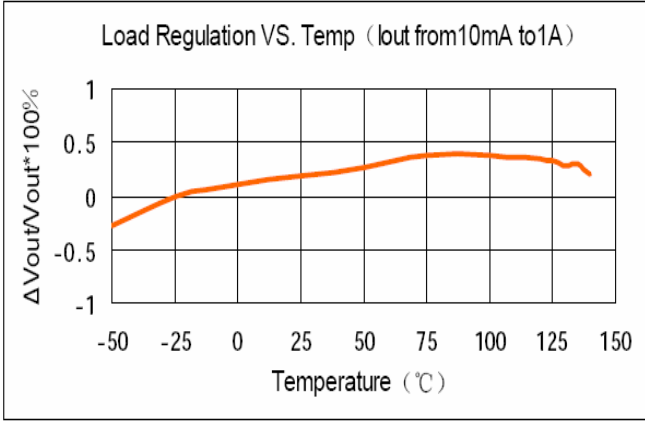
Note1: For the adjustable device, the minimum load current is the minimum current required to maintain regulation. Normally the current in the resistor divider used to set the output voltage is selected to meet the minimum load current requirement.

Block Diagram

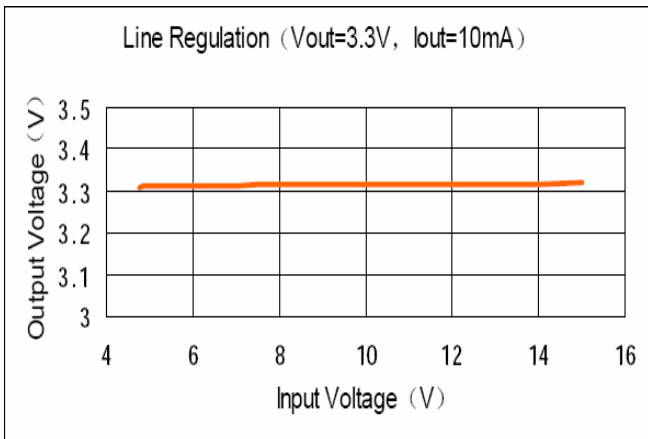


Typical Characteristics

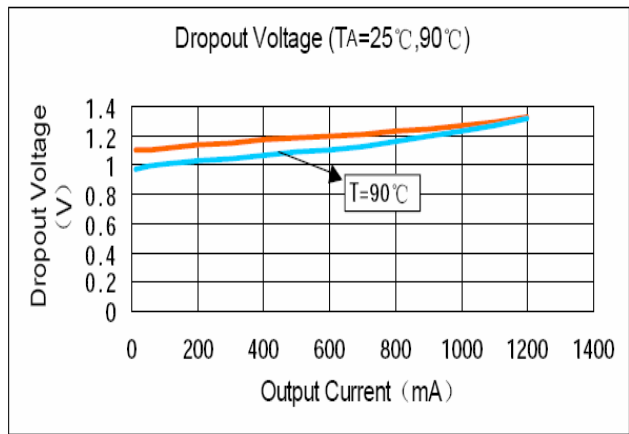
1. Load Regulation



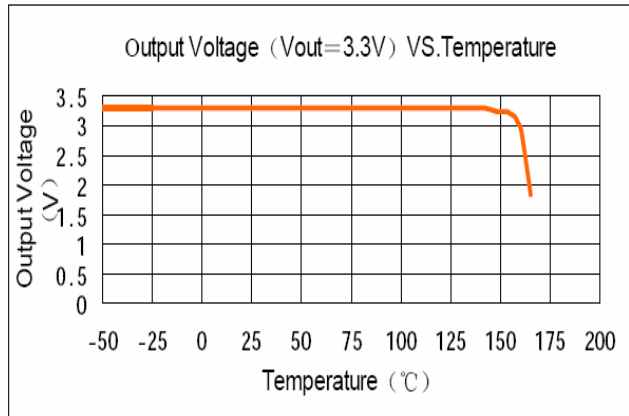
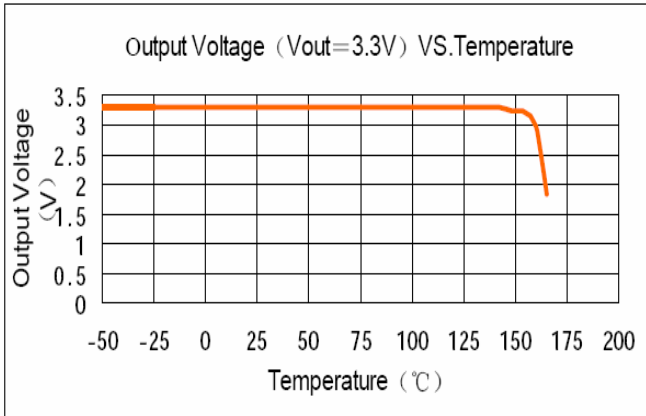
2. Line Regulation



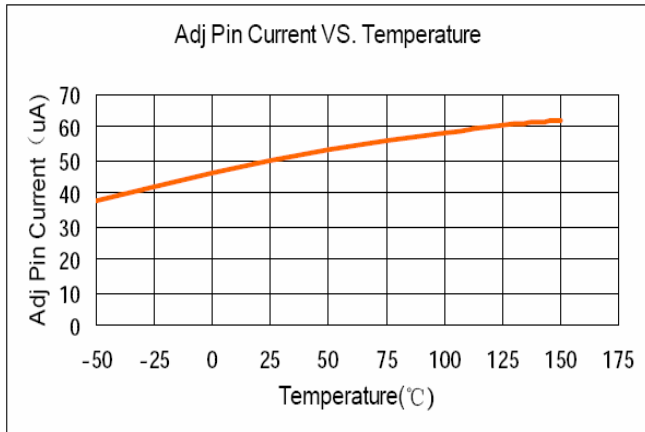
3. Dropout Voltage



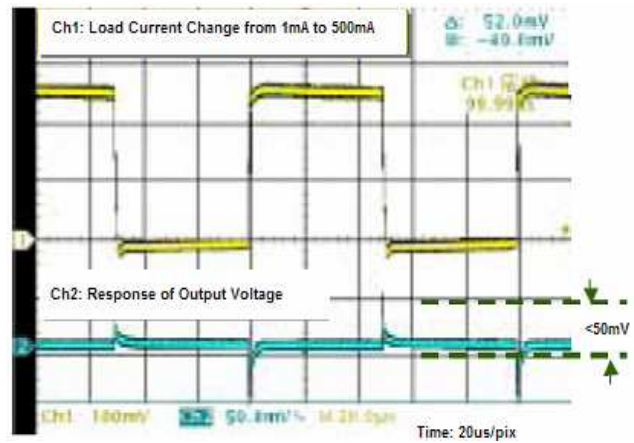
4. Temperature Stability



5. A1117 ADJ Pin Current vs. Temperature



6. Load Transient Response



Detailed Information

The A1117 is a series of low dropout voltage, three terminal regulators. The A1117's application circuit is very simple: the fixed version only needs two capacitors and the adjustable version only needs two resistors and two capacitors to work. The A1117 is composed of some modules including start-up circuit, bias circuit, bandgap, thermal shutdown, current limit, power transistors and A1117's driver circuit etc.

Thermal Shutdown

The thermal shutdown and current limit modules can assure chip and its application system working safety when the junction temperature is larger than 140°C or output current is larger than 1.4A.

Bandgap Module

The bandgap module provides stable reference voltage, whose temperature coefficient is compensated by careful design considerations. The temperature coefficient is under 100ppm/°C. And the accuracy of output voltage is guaranteed by trimming technique.

Adjustable Output Version

A1117 has adjustable & fixed output version, Fig 1. is typical adjustable output version application.

The A1117 adjustable version provides 1.25V reference voltage. Any output voltage between 1.25V~13.8V can be available by choosing two external resistors (R1 & R2, connection method is showed in Fig 1.)

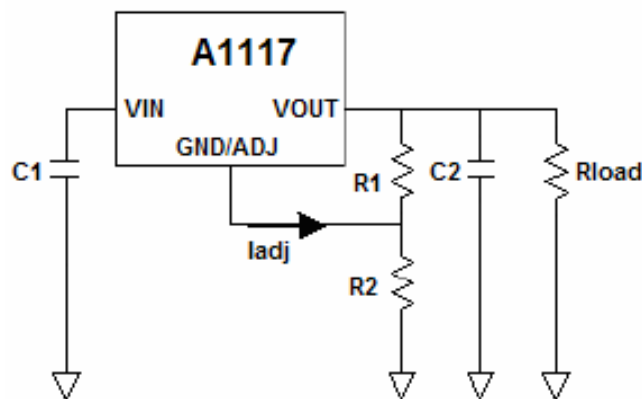


Fig1. A1117 adjustable output version

The output voltage of adjustable version satisfies this followed equation: $V_{OUT} = V_{REF} * (1 + R2/R1) + I_{ADJ} * R2$.

We can ignore I_{ADJ} because I_{ADJ} (about 50uA) is much less than the current of R1 (about 4mA).

The value of R1 should be in the range of 200Ω~350Ω to assure chip working normally without any load. To assure the electrical performance, the output current should be larger than 5mA. If R1 is too large, the minimum output current should be larger than 4mA. The best working condition is to assure that the output current exceeds 10mA.

Fixed Output Version

The A1117 typical circuit of fixed output version showed in Fig 2.

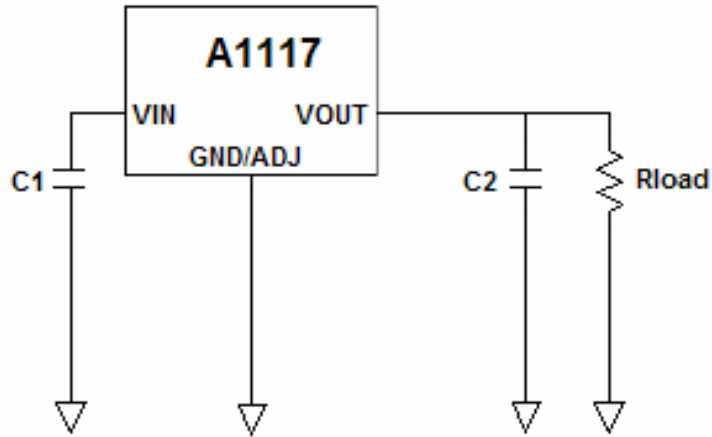


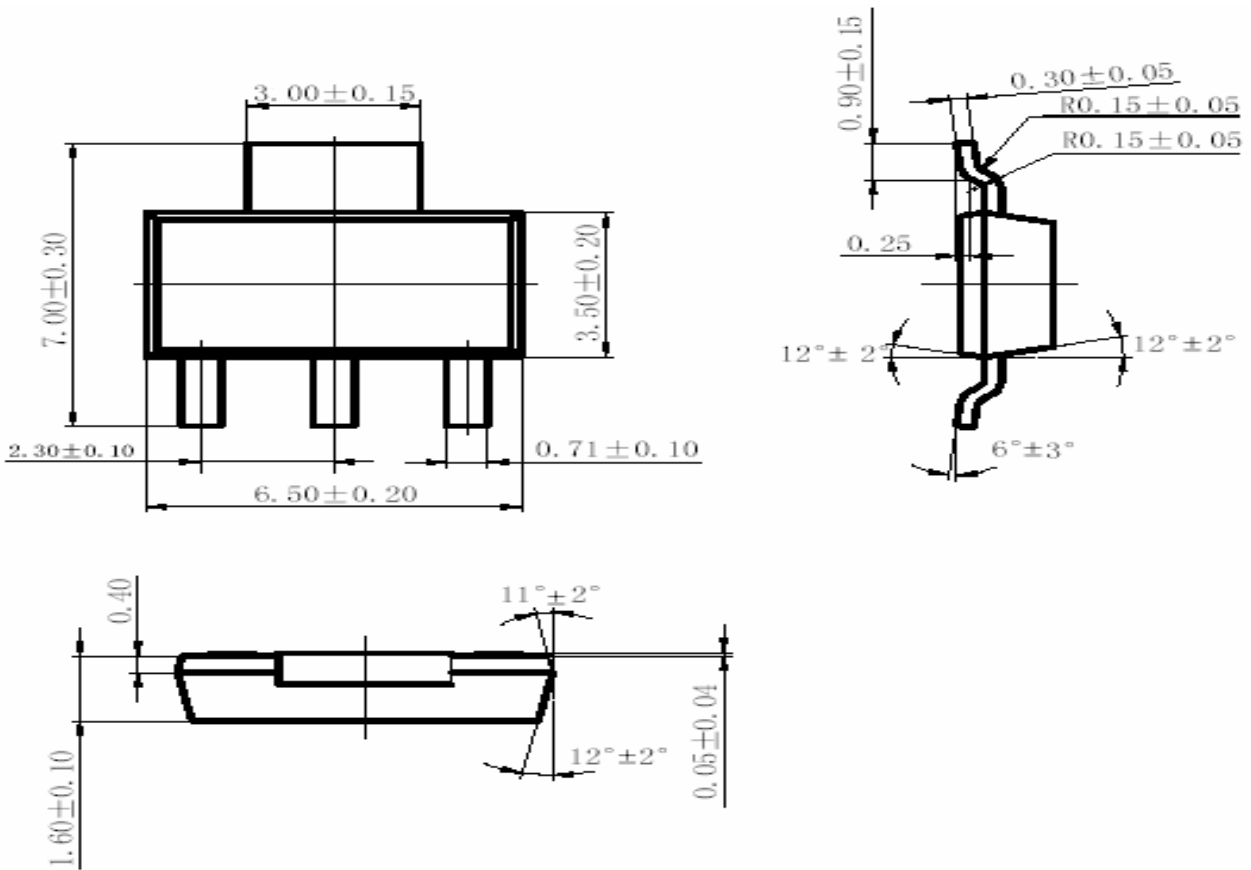
Fig 2. A1117 fixed output version

Thermal Consideration

Heat dissipation should be considered when output current or differential voltage of input and output voltage is large. In such case, the power dissipation consumed by A1117 is very large. The A1117 series uses SOT-223 package type and its thermal resistance is about $0^{\circ}\text{C}/\text{W}$. And the copper area of application board can affect the total thermal resistance. If copper area is $5\text{cm}\times 5\text{cm}$ (two sides), the resistance is about $30^{\circ}\text{C}/\text{W}$. So total thermal resistance is about $20^{\circ}\text{C}/\text{W}+30^{\circ}\text{C}/\text{W}$. It can be decreased total thermal resistance by increasing copper area in application board.

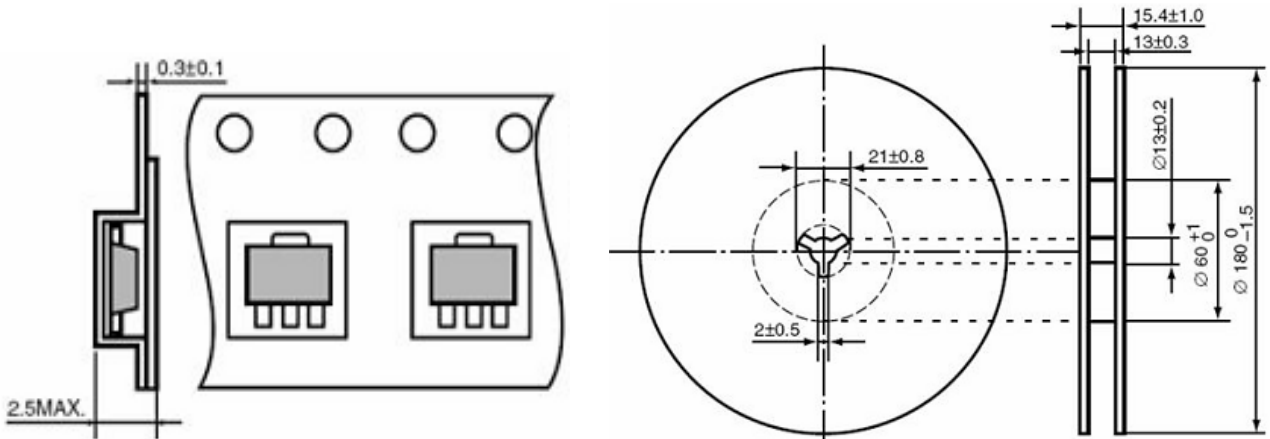
Packaging Information

Dimension in SOT-223 Package (Unit: mm)



Tape Dimension

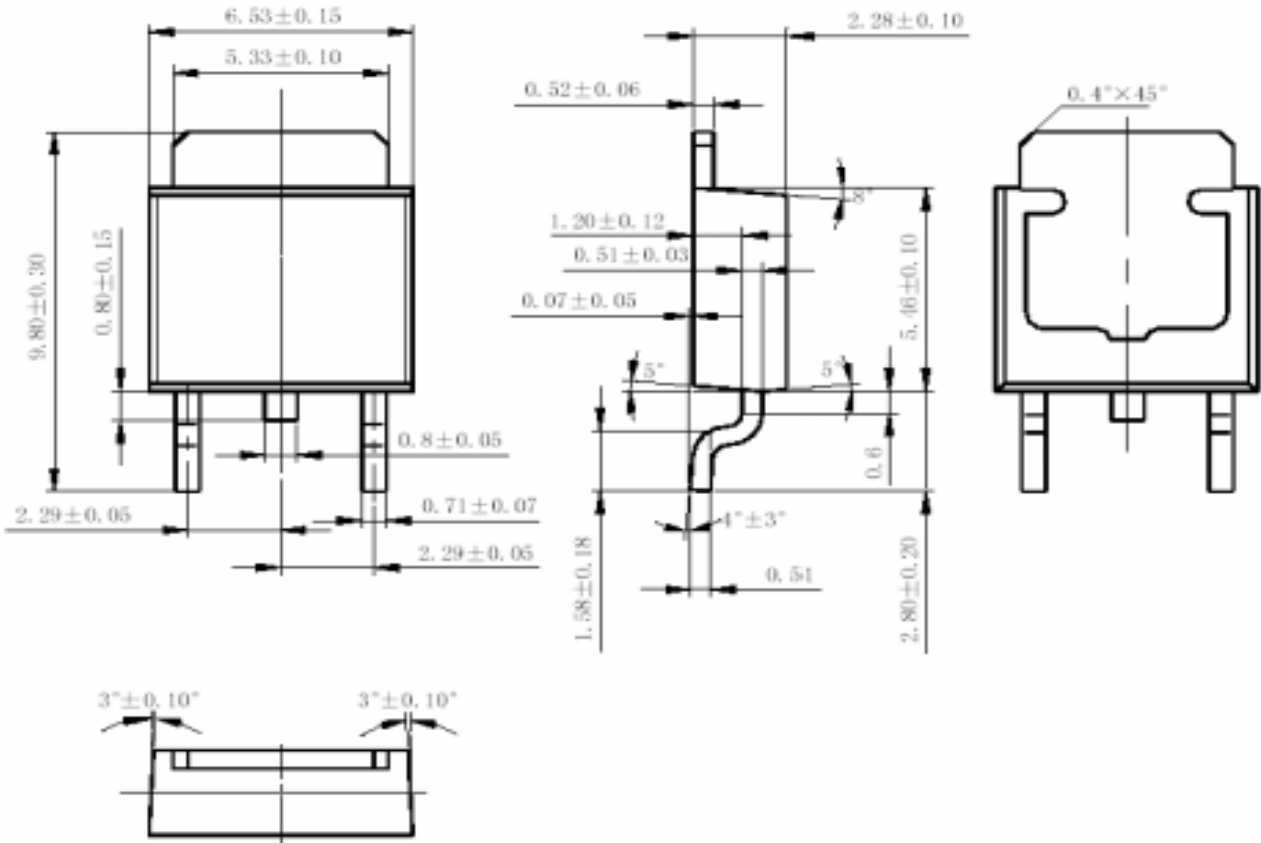
Reel Dimension



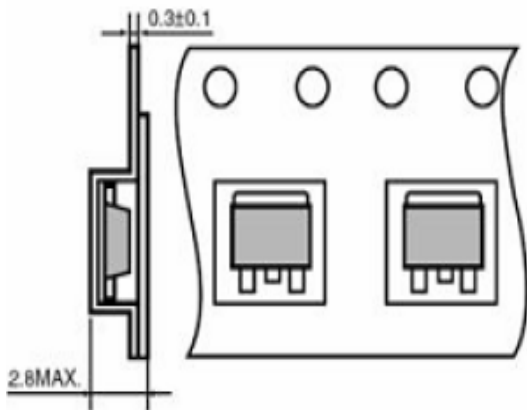
1A LOW-DROPOUT POSITIVE FIXED AND ADJUSTABLE VOLTAGE REGULATOR

A1117

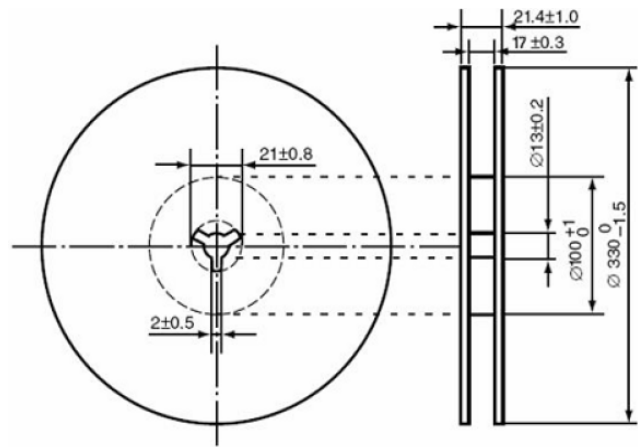
Dimension in TO-252 Package (Unit: mm)



Tape Dimension



Reel Dimension



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