

### Description

ACE1117 series of high performance low dropout voltage regulators are designed for applications that require efficient conversion and fast transient response.

In addition, ACE1117 is designed to be stable under conditions where  $C_{in}$  and  $C_{out}$  are not present. However, it is recommended to include  $C_{in}$  and  $C_{out}$  in the system design as this will speed up the transient response and increase the PSRR rating.

### Features

- Low Dropout Performance.
- Low Quiescent Current: 3mA (Typ.)
- Guaranteed 1A Output Current.
- Wide input Supply Voltage Range.
- Stable operation without  $C_{in}$  and  $C_{out}$ .
- Over-temperature and Over-current Protection
- Fixed or Adjustable Output Voltage.
- Rugged 2KV ESD withstand capability.
- Available in SOT-223 and TO-252 Packages.
- RoHS Compliant and 100% Lead (Pb)-Free

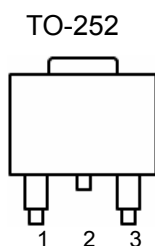
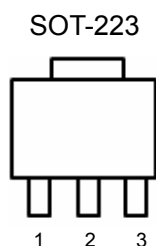
### Application

- Active SCSI Terminators
- High Efficiency Linear Regulators
- 5V to 3.3V Linear Regulators
- Motherboard Clock Supplies

### Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Input voltage	$V_{IN}$	9	V
Junction temperature	$T_J$	-40 to 130	$^{\circ}C$
Thermal Resistance Junction to Ambient	$\theta_{JA}$	60	$^{\circ}C/W$
Storage temperature	$T_S$	- 40 to 150	$^{\circ}C$

### Packaging Type

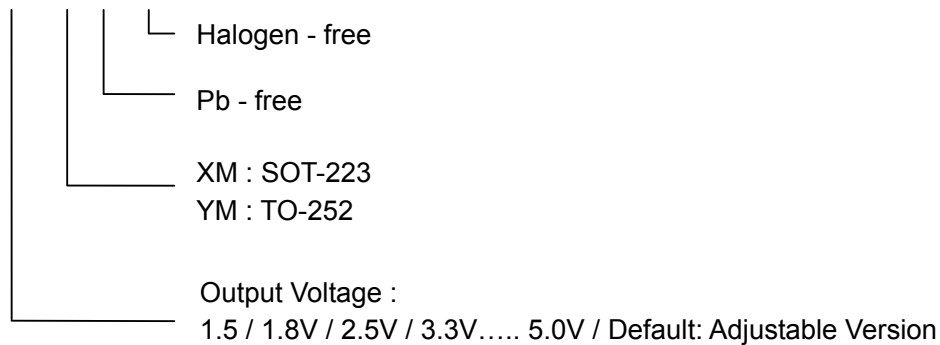


Pin	Symbol
1	ADJ/GND
2	$V_{out}$
3	$V_{in}$

### Ordering information

#### Selection Guide

ACE1117 XX XX + H



### Electrical Characteristics

$V_{IN,MAX} \leq 8V$ ,  $V_{IN,MAX} - V_{OUT} = 1.5V$ ,  $I_{OUT} = 10mA$ ,  $C_{IN} = 10\mu F$ ,  $C_{OUT} = 22\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise specified.

Parameter	Symbol	Test Conditions	Min	Typ	Mum	Unit
Output Voltage <sup>(1)</sup>	$V_O$	ACE1117-15	1.470	1.5	1.530	V
		ACE1117-18	1.764	1.8	1.836	
		ACE1117-25	2.450	2.5	2.550	
		ACE1117-33	3.234	3.3	3.366	
		ACE1117-50	4.900	5.0	5.100	
Reference Voltage <sup>(1)</sup> (ADJ. Voltage Version)	$V_{REF}$	$(V_{IN} - V_{OUT}) = 1.5V$ $I_{OUT} = 10mA$	(-2%)	1.250	(+2%)	V
Line Regulation <sup>(1)</sup>	$V_{SR}$	$V_{OUT} + 1.5V < V_{IN} < 8V$ $I_{OUT} = 10mA$		0.3		%
Load Regulation <sup>(1)</sup>	$V_{LR}$	$(V_{IN} - V_{OUT}) = 1.5V$ $10mA \leq I_{OUT} \leq 1A$		0.5		%
Quiescent Current <sup>(2)</sup>	$I_Q$	Fixed Output Version		3		mA
Adjust Pin Current	$I_{ADJ}$			65		uA
Adjust Pin Current Change	$\Delta I_{ADJ}$	$V_{OUT} + 1.5V < V_{IN} < 8V$ $10mA \leq I_{OUT} \leq 1A$		14		uA
Dropout Voltage <sup>(3)</sup>	$V_D$	$I_{OUT} = 1A$		1.3		V
Minimum Load Current	$I_O$			0.4		mA
Current Limit	$I_{CL}$			1.8		A
Temperature Coefficient	$T_C$			0.07		%/°C
Thermal Protection	OTP			175		°C
RMS Output Noise	$V_N$	$T_A = 25^\circ C$ , $10Hz \leq f \leq 100kHz$		0.003		% $V_O$
Ripple Rejection Ratio	$R_A$	$f = 120Hz$ , $C_{OUT} = 22\mu F$ (Tantalum), $(V_{IN} - V_{OUT}) = 3V$ , $I_{OUT} = 10mA$		55		dB

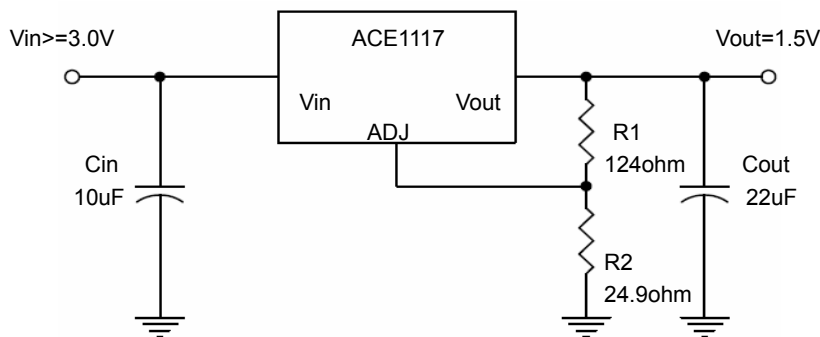
Note1: Low duty cycle pulse testing with which  $T_J$  remains unchanged.

2: The  $I_Q$  of ACE1117-1.5 is 1.2mA (Typ.)

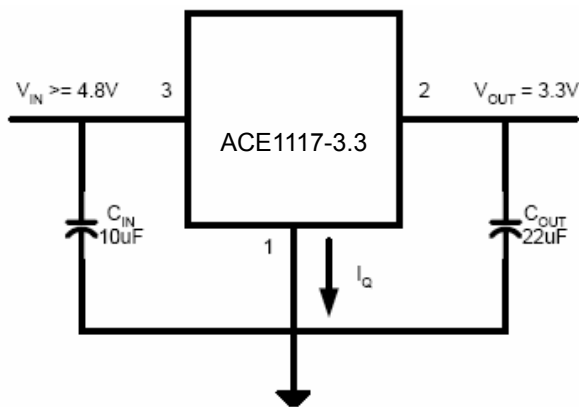
3: The dropout voltage is the input/output differential at which the circuit ceases to regulate against further reduction in input

### Typical Application

#### Adjustable Voltage Regulator



$$V_{OUT} = V_{REF} * (1 + R2/R1) + I_{ADJ} * R2$$



#### Fixed Voltage Regulator

### Application Hints

The typical Linear regulator would require external capacitors to ensure stability. However, ACE1117 is designed in such a way that these external capacitor can be omitted if the PCB layout is tight and system noise is not very high. For better transient and PSRR performance, the Input and Output capacitors are still recommended.

### Input Capacitor

An input capacitor of 10 $\mu$ F is recommended. Ceramic or Tantalum can be used. The value can be increased without upper limit.

### Output Capacitor

An output capacitor of 22uF is recommended for better transient and PSRR performance. It should be placed no more than 1 cm away from the V<sub>OUT</sub> pin, and connected directly between V<sub>OUT</sub> and GND pins. The value may be increased without upper limit.

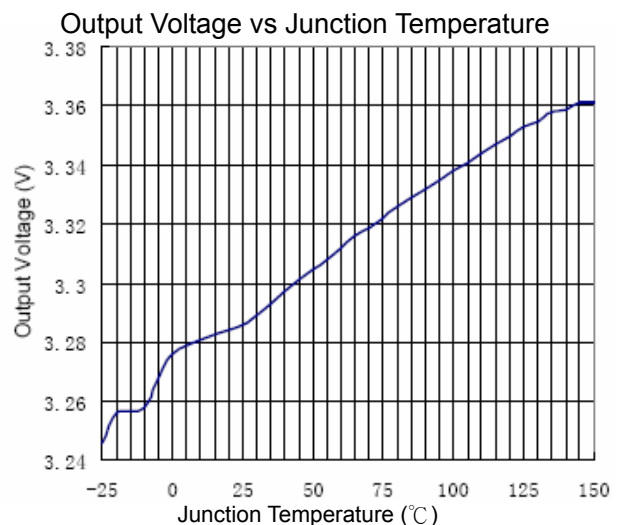
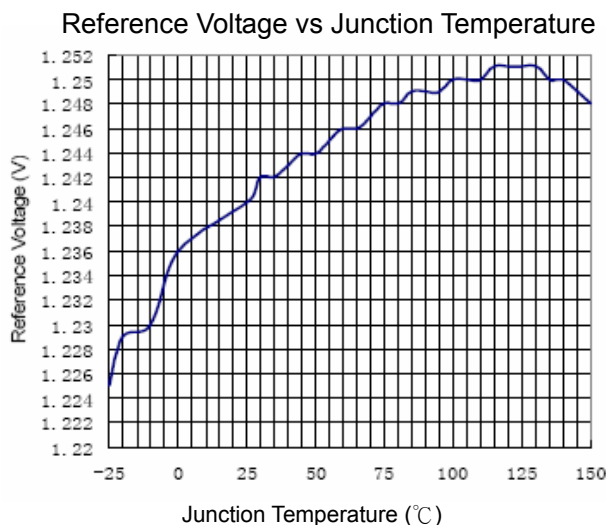
### Thermal Considerations

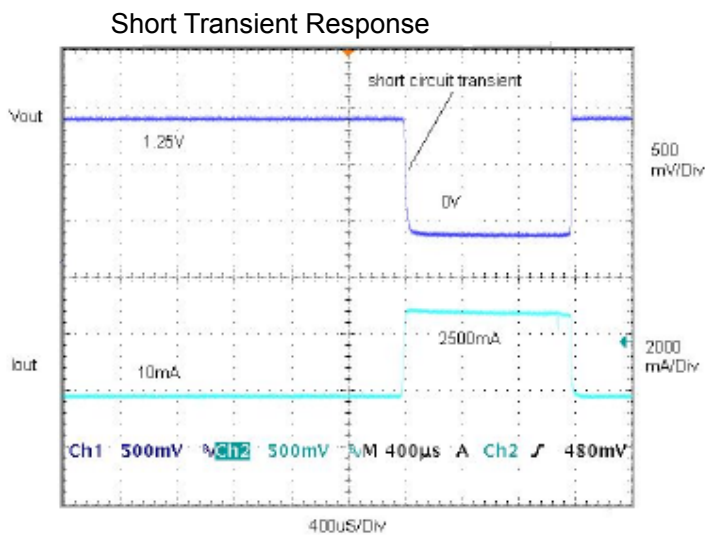
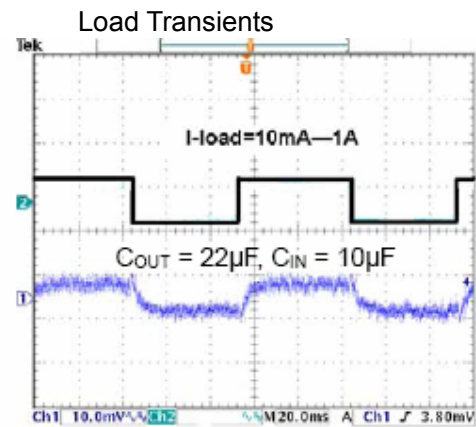
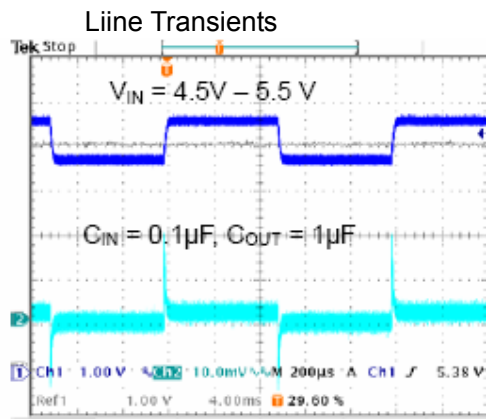
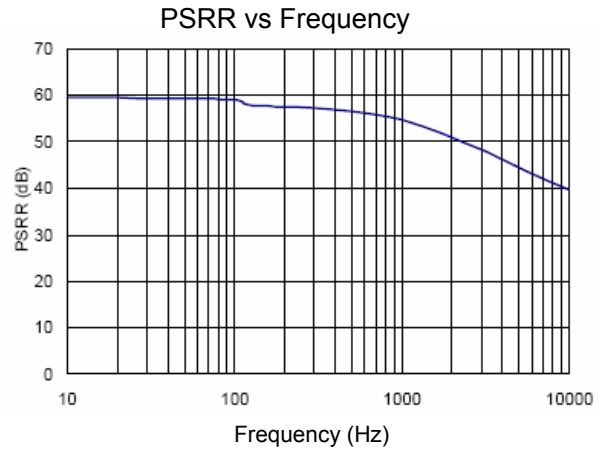
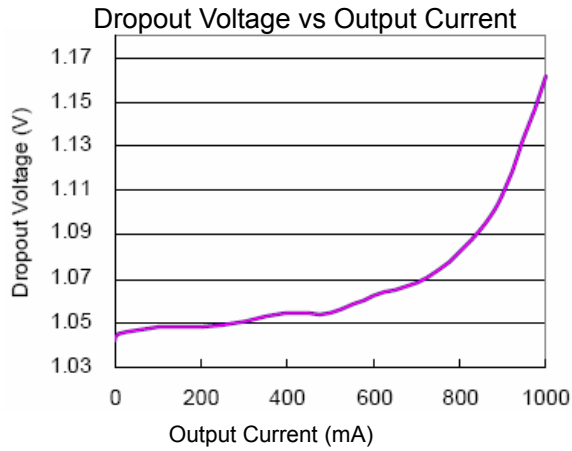
It is important that the thermal limit of the package is not exceeded. The ACE1117 has built-in thermal protection. When the thermal limit is exceeded, the IC will enter protection, and V<sub>OUT</sub> will be pulled to ground. The power dissipation for a given application can be calculated as following:

$$P_D = I_{OUT} * [V_{IN} - V_{OUT}]$$

The thermal limit of the package is then limited to  $P_{D(MAX)} = [T_J - T_A] / \Theta_{JA}$  where  $T_J$  is the junction temperature,  $T_A$  is the ambient temperature, and  $\Theta_{JA}$  is around 180°C/W for ACE1117. ACE1117 is designed to enter thermal protection at 175°C. For example, if  $T_A$  is 25°C then the maximum PD is limited to about 0.83W. In other words, if  $I_{OUT(MAX)} = 500mA$ , then  $[V_{IN} - V_{OUT}]$  can not exceed 1.66V. (Ref. SOT-223 without heat sink.)

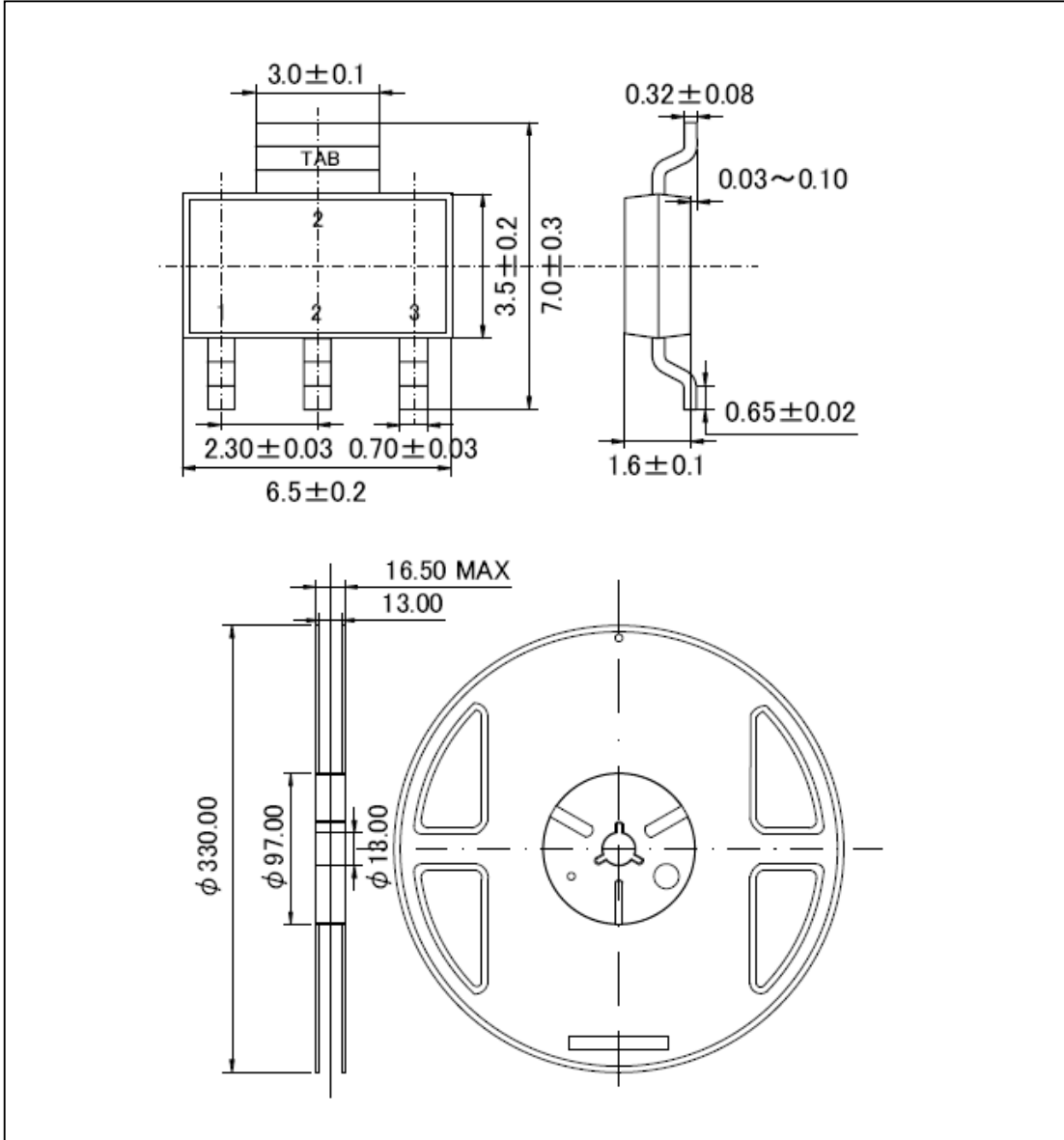
### Typical Performance Characteristic





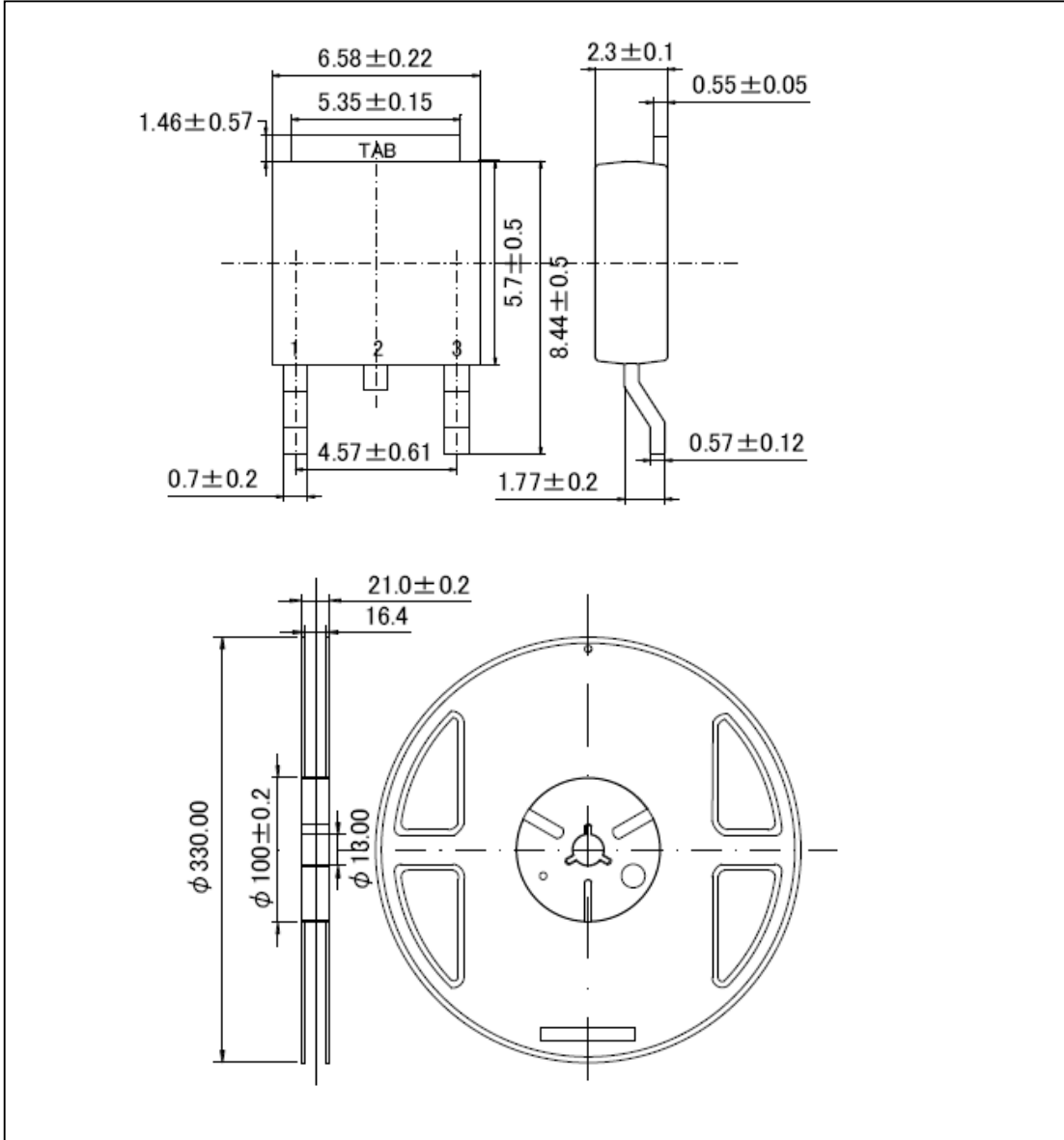
### Packing Information

#### SOT-223



### Packing Information

TO-252



#### Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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