

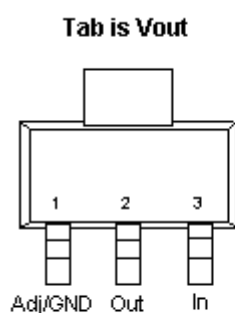


Description

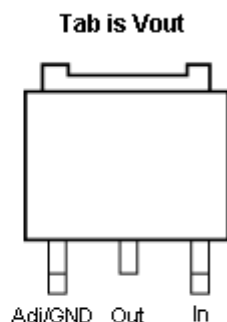
The SE8117 series of high performance low dropout voltage regulators are designed for applications that require efficient conversion and fast transient response.

In addition, SE8117 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. SE8117 is characterized under Junction Temperature from -40°C to $+125^{\circ}\text{C}$.

Pin Configuration



Top View
SOT223



Top View
TO-252

Features

- Low Dropout Performance.
- Low Quiescent Current: 2.7mA (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.
- Available in SOT-223 and TO252 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.

Ordering Information

Device	Marking Information	Package	V_{OUT}
SE8117TXXLF	SE8117TXXLF	SOT-223 TO-252 (Lead-free)	Fixed output voltages; XX denotes voltage options (1.5V, 1.8V, 2.5V, 3.3V and 5.0V).
SE8117TALF	SE8117TALF		Adjustable output voltage.

Absolute Maximum Rating

Symbol	Parameter	Maximum	Units
V_{IN}	Input Supply Voltage	9	V
θ_{JA}	Thermal Resistance Junction to Ambient (SOT-223)	120	$^{\circ}\text{C}/\text{W}$
T_J	Operating Junction Temperature Range	-40 to 125	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to 150	$^{\circ}\text{C}$
T_{LEAD}	Lead Temperature (Soldering 10 Sec)	260	$^{\circ}\text{C}$



Electrical Characteristic

$V_{IN,MAX} \leq 9V$, $V_{IN,MIN} - V_{OUT} = 2V$, $I_{OUT} = 10mA$, $C_{IN} = 10\mu F$, $C_{OUT} = 22\mu F$, $T_A = 25^\circ C$, unless otherwise specified.

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V_O	Output Voltage	SE8117T-15	1.470	1.5	1.530	V
		SE8117T-18	1.764	1.8	1.836	
		SE8117T-25	2.450	2.5	2.550	
		SE8117T-33	3.234	3.3	3.366	
		SE8117T-50	4.900	5.0	5.100	
V_{REF}	Reference Voltage (Adj. Voltage Version)	$(V_{IN} - V_{OUT}) = 1.5V$ $I_{OUT} = 10mA$	(-2%)	1.250	(+2%)	V
V_{SR}	Line Regulation	$V_{OUT} + 1.5V < V_{IN} < 9V$ $I_{OUT} = 10mA$	--	0.3	--	%/V
V_{LR}	Load Regulation ⁽¹⁾	$(V_{IN} - V_{OUT}) = 2.0V$ $10mA \leq I_{OUT} \leq 1A$	--	0.0001	--	%/mA
I_Q	Quiescent Current	Fixed Output Version	--	2.7	5	mA
I_{ADJ} (I_{GND})	Adjust Pin Current (GND Current)		--	50	120	μA
ΔI_{ADJ}	Adjust Pin Current Change	$V_{OUT} + 1.5V < V_{IN} < 9V$	--	0.2	5	μA
V_D	Dropout Voltage ⁽¹⁾⁽²⁾	$I_{OUT} = 1A$	--	1.38	1.49	V
I_O	Minimum Load Current		--	0.4	5	mA
I_{CL}	Current Limit ⁽¹⁾		1	1.35	--	A
T_C	Temperature Coefficient		--	30	--	ppm/ $^\circ C$ /V
OTP	Thermal Protection	$V_{IN}=9V$, $I_{OUT}=10mA$	--	175	--	$^\circ C$
V_N	RMS Output Noise	$T_A = 25^\circ C$, $10Hz \leq f \leq 10kHz$	--	0.003	--	% V_O
R_A	Ripple Rejection Ratio	$f = 120Hz$, $C_{OUT} = 22\mu F$ (Tantalum), $(V_{IN} - V_{OUT}) = 3V$, $I_{OUT} = 10mA$	--	60	--	dB

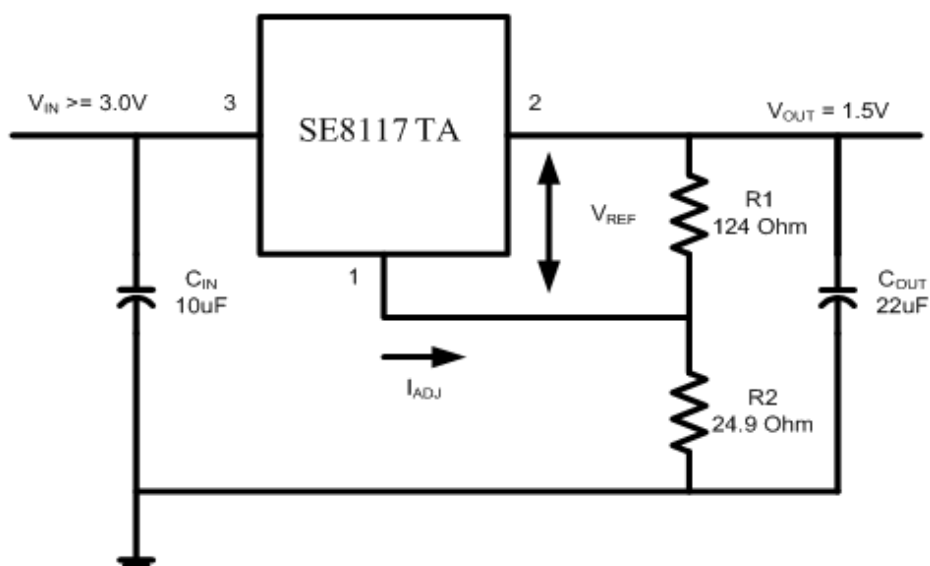
Notes:

1. Low duty cycle pulse testing with which T_J remains unchanged.
2. The dropout voltage is the input/output differential at which the circuit ceases to regulate against further reduction in input voltage. It is measured when the output voltage has dropped 98% from the nominal value obtained at $V_{IN} = V_{OUT} + 2V$.



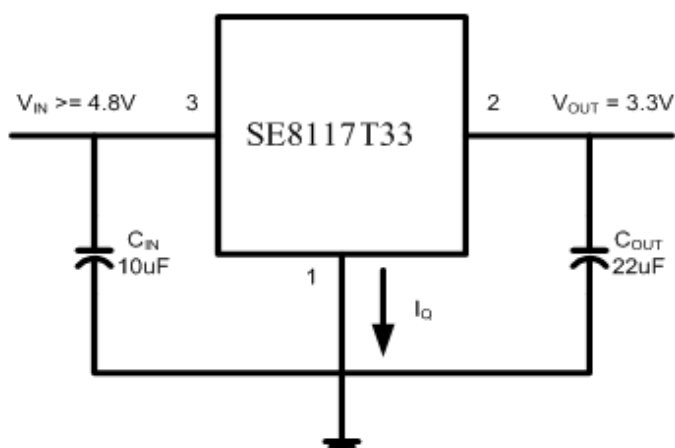
Typical Application

Adjustable Voltage Regulator



$$V_{OUT} = V_{REF} \left(1 + \frac{R_2}{R_1} \right) + I_{ADJ} R_2$$

Fixed Voltage Regulator





Application Hints

The typical Linear regulator would require external capacitors to ensure stability. However, SE8117 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 μ F is recommended. Ceramic or Tantalum can be used. The value can be increased without upper limit.

Output Capacitor

An output capacitor of 22 μ F is recommended for better transient and PSRR performance. It should be placed no more than 1 cm away from the V_{OUT} pin, and connected directly between V_{OUT} 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 SE8117 has built-in thermal protection. When the thermal limit is exceeded, the IC will enter protection, and V_{OUT} will be pulled to ground. The power dissipation for a given application can be calculated as following:

The power dissipation (P_D) is

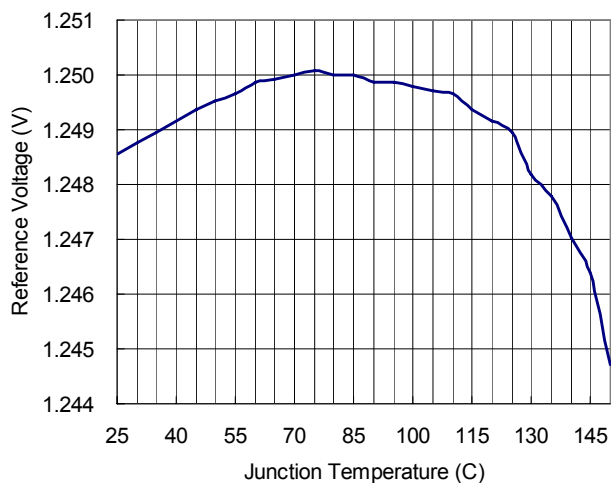
$$P_D = I_{OUT} * [V_{IN} - V_{OUT}]$$

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 Θ_{JA} is around 120°C/W for SE8117. SE8117 is designed to enter thermal protection at 125°C. For example, if T_A is 25°C then the maximum P_D is limited to about 0.83W. In other words, if $I_{OUT(MAX)} = 500\text{mA}$, then $[V_{IN} - V_{OUT}]$ can not exceed 1.66V. (Ref. SOT223 without heat sink.)

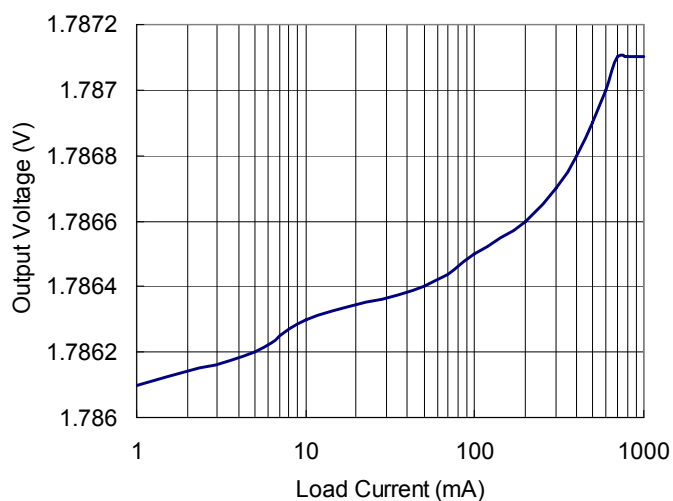


Typical Performance Characteristics

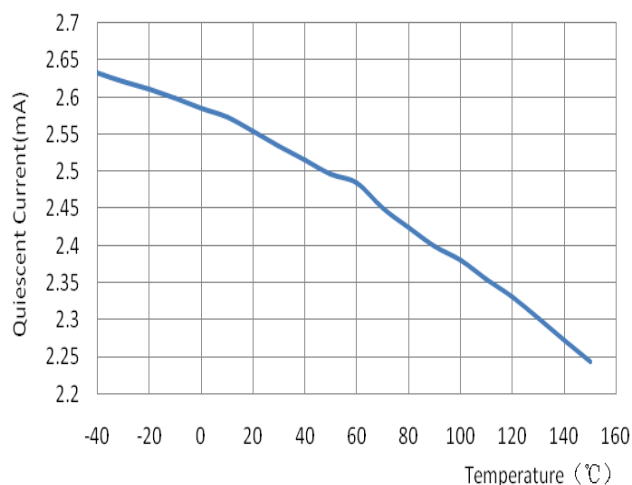
Reference Voltage vs Junction Temperature



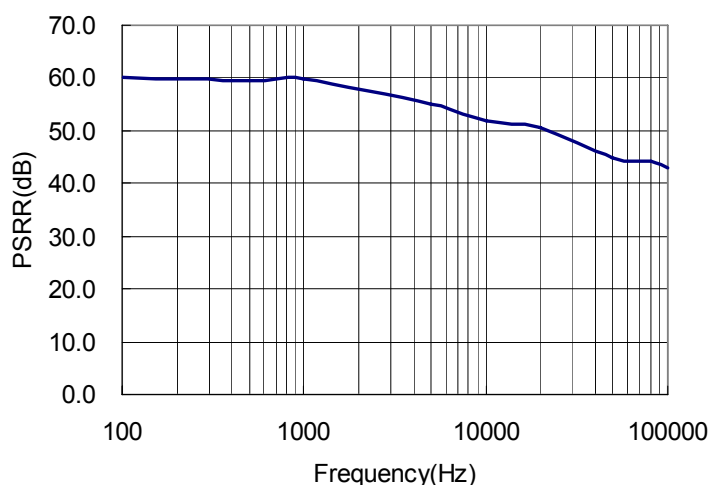
Output Voltage vs Load Current



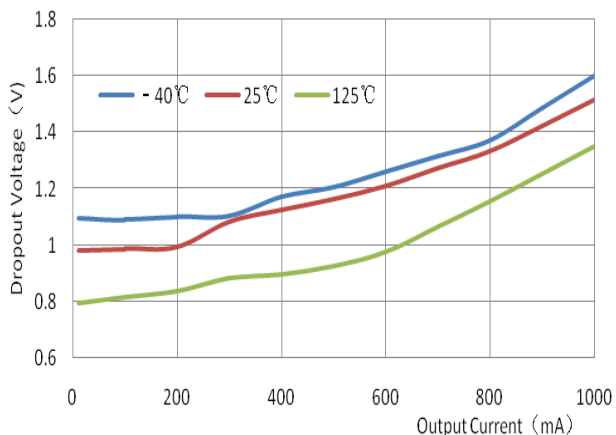
Quiescent Current vs Temperature



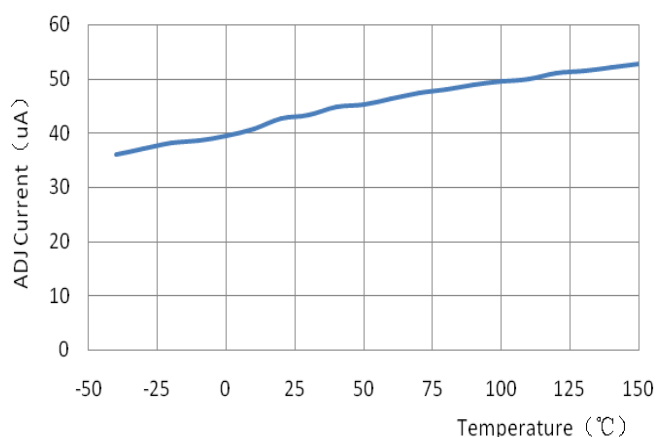
PSRR vs Frequency



Dropout Voltage VS Output Current



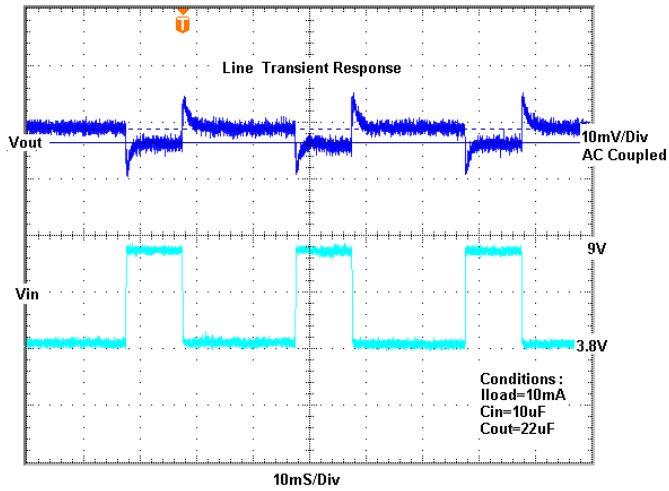
ADJ Current VS Temperature



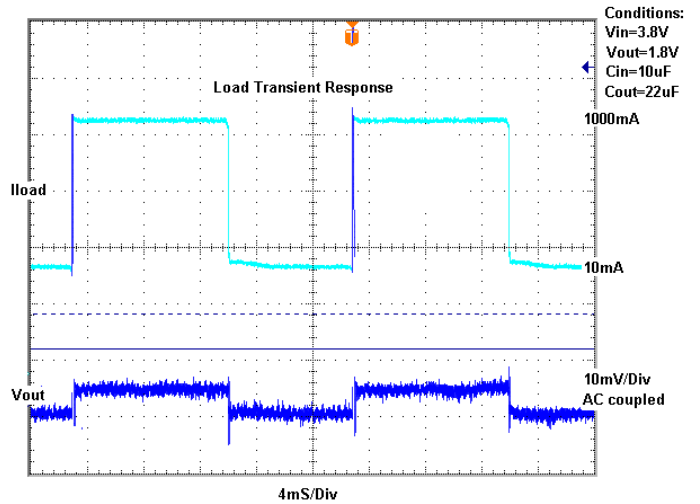


Typical Performance Characteristics

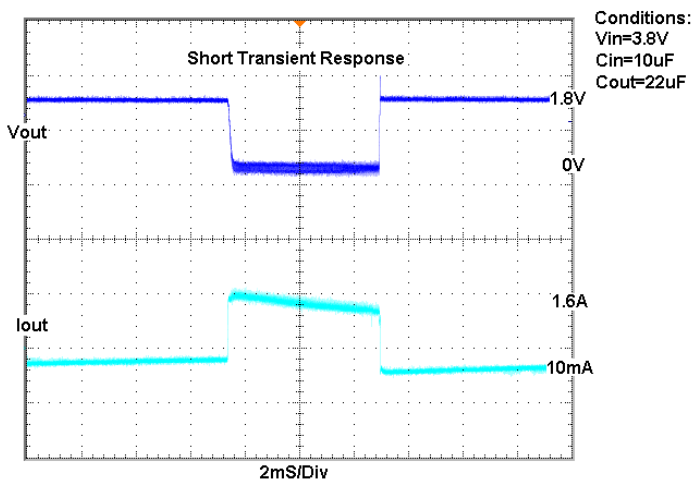
Line Transient Response



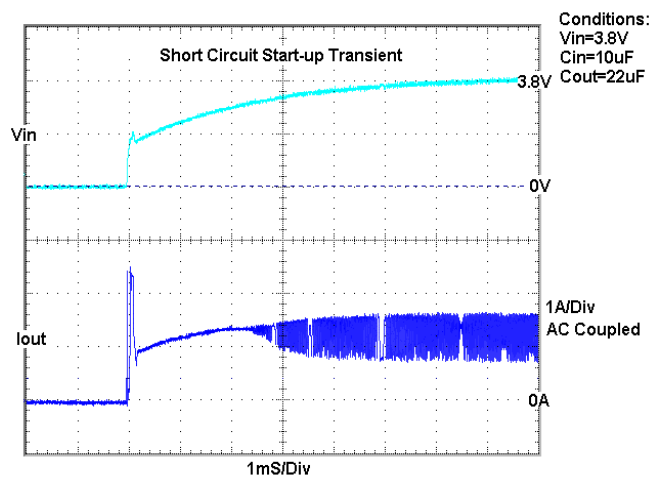
Load Transient Response



Short Transient Response

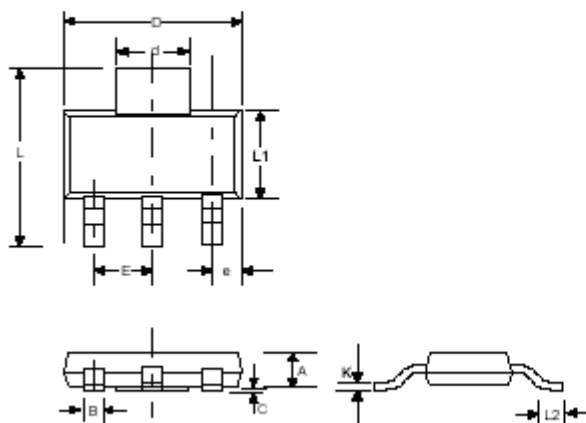


Short Circuit Start-up Transient



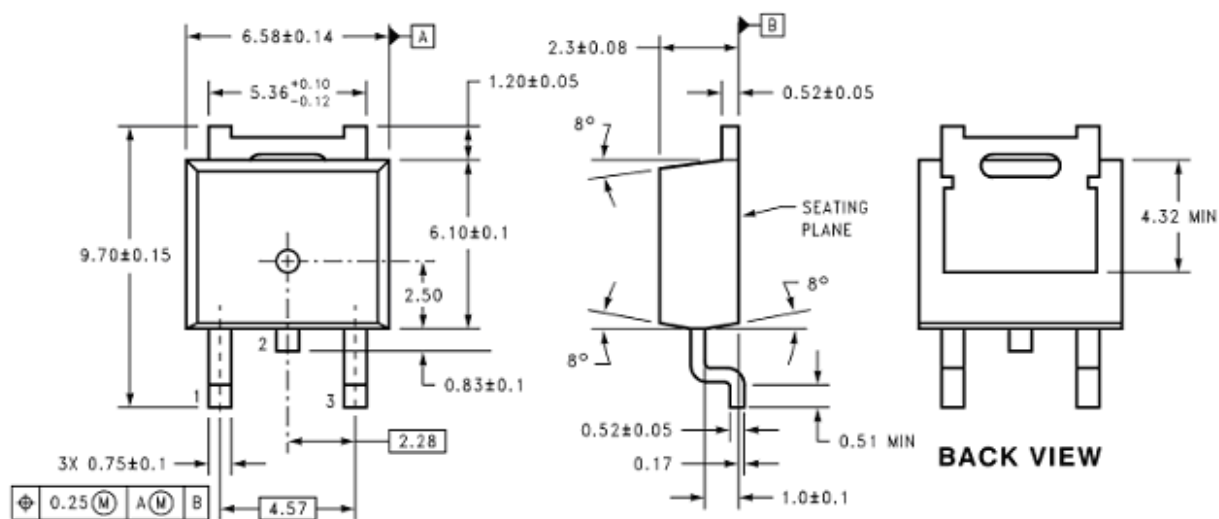


Outline Drawing for SOT-223



DIM ^N	DIMENSIONS			
	INCHES		MM	
	MIN	MAX	MIN	MAX
A	—	0.071	—	1.80
B	0.025	0.033	0.640	0.840
C	0.012	—	0.31	—
D	0.248	0.264	6.30	6.71
d	0.115	0.124	2.95	3.15
E	—	0.090	—	2.29
e	0.033	0.041	0.840	1.04
L	0.264	0.287	6.71	7.29
L1	0.130	0.148	3.30	3.71
L2	0.012	—	0.310	—
K	0.010	0.014	0.250	0.360

Outline Drawing for TO252



DIMENSIONS ARE IN MILLIMETERS

3-Lead TO-252 Package