Description

The SE5117 is an efficient linear voltage regulator. It has extra low dropout voltage. At light loads the typical dropout voltage is 5.5mV, and at full load the typical dropout voltage is 650mV. The output voltage accuracy is better than 2%.

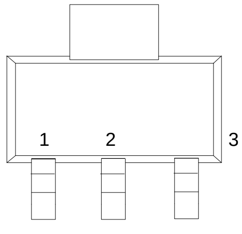
The SE5117 has low ground current, so it can help prolong battery life. The SE5117 is specially designed for hand-held, battery-powered devices.

Features

- Typical 90mV dropout voltage at 150mA.
- Guaranteed 1A output over the full operating temperature range.
- 650mV typical dropout voltage at full load.
- Extremely tight load and line regulation.
- Low temperature coefficient.
- Current and thermal limiting.
- No-load stability.
- Standard SOT-223 package.

Pin Configuration

Front View



Application

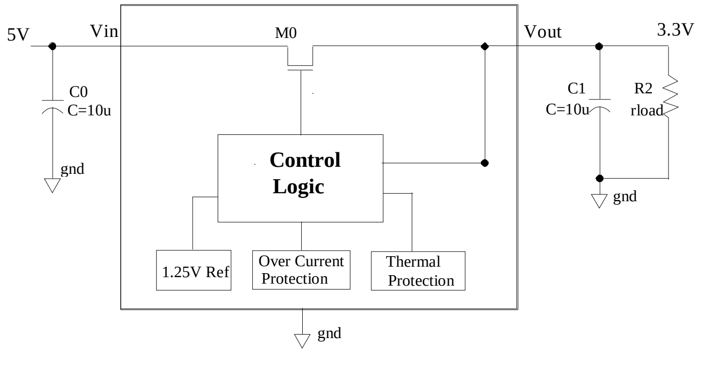
- Active SCSI terminators.
- Post regulators for switching supplies.
- Battery chargers.
- High-efficiency linear power supplies.
- Computer motherboard, display, graphic card
- DC/DC converter, such as 3.3V to 2.8V or 3.3V to 2.5V.

Ordering Information

SE5117 _ _ _

- PIN (1=>3): 1. G: OUT/GND/IN
- Package Type: 1. S: SOT-
- Output Voltage: 1. A: V_{OUT} = 3.3V
  2. B: V_{OUT} = 2.8V
  3. C: V_{OUT} = 2.5V
  4. D: V_{OUT} = 1.8V
  5. E: V_{OUT} = 1.5V
  6. F: V_{OUT} = 3.0V

Application Diagram



Absolute Maximum Rating

Parameter	Symbol	Value	Unit
Supply Input Voltage	V_{IN}	-0.7 to +7	V
Power Dissipation	P_D	Internally Limited[3]	--
Junction Temperature	T_J	0 to +125	°C
Lead Temperature (soldering, 5 sec.)	T_{LEAD}	260	°C
Storage Temperature	T_{STG}	-10 to +150	°C

Operating Ratings[2]

Parameter	Symbol	Value	Unit
Supply Input Voltage	V_{IN}	+2.5 to +6	V
Junction Temperature	T_J	0 to +125	°C
Package Thermal Resistance	θ_{JA}	135 (SOT-223)	°C/W

Note 1: Exceeding the absolute maximum rating may damage the device.

Note 2: The device is not guaranteed to function outside its operating rating.

Note 3: The maximum allowable power dissipation at any T_A (ambient temperature) is calculated using: $P_{D(max)} = (T_{J(max)} - T_A)/\theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown. See the "Thermal Considerations" section for details.

Note 4: Output voltage temperature coefficient is the worst-case voltage change divided by the total temperature range.

Note 5: Regulation is measured at constant junction temperature using low duty cycle pulse testing. Parts are tested for load regulation in the load range from 100µA to 1A. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

Note 6: Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value measured at 1V differential.

Electrical Characteristics

$V_{IN} = V_{OUT} + 1.0V$ ($V_{IN,MIN} = 3V$); $C_{OUT} = 4.7\mu F$, $I_{OUT} = 100\mu A$; $T_J = 25°C$, unless otherwise specified.

Symbol	Parameter		Conditions	Min	Typ	Max	Units
V_{OUT}	Output Voltage Accuracy		$10mA \le I_{OUT} \le 1A$, $T_A=25°C$, SE5117-1.5, $3.0V \le V_{IN} \le 5.5V$ SE5117-1.8, $3.0V \le V_{IN} \le 5.5V$ SE5117-2.5, $3.5V \le V_{IN} \le 5.5V$ SE5117-2.8, $3.8V \le V_{IN} \le 5.5V$ SE5117-3.0, $4.0V \le V_{IN} \le 5.5V$ SE5117-3.3, $4.3V \le V_{IN} \le 5.5V$	1.470 1.764 2.450 2.744 2.940 3.234	1.5 1.8 2.5 2.8 3.0 3.3	1.530 1.836 2.550 2.856 3.060 3.366	V V V V V
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient		Note 4	--	40		--
$\Delta V_{OUT}/V_{OUT}$	Line Regulation		$V_{IN} = V_{OUT} + 1V$ to 5.5V	--	0.3	--	%
$\Delta V_{OUT}/V_{OUT}$	Load Regulation(5)		I_{OUT} =10mA to 1A(5)	--	0.5	--	%
$V_{IN} - V_{OUT}$	Dropout Voltage(6)	$V_{OUT}<2V$	I_{OUT} =10mA	--	9	--	mV
			I_{OUT} =500mA	--	530	--	
			I_{OUT} =1A	--	1050	--	
		$V_{OUT}>2V$	I_{OUT} =10mA	--	5.5	--	mV
			I_{OUT} =150mA	--	90	--	
			I_{OUT} =500mA	--	300	--	
$T_{PROTECTION}$	Thermal Protection		Temperature	--	150	--	°C
			Protection Hysterisys	--	30	--	°C
PSRR	Ripple Rejection		f =120Hz	--	75	--	dB
I_{GROUND}	Ground Current		I_{OUT}=10mA	--	1	--	mA

Application Hints

Like any Low dropout regulator, SE5117 requires external capacitors to ensure stability. The external capacitors must be carefully selected to ensure the performances.

Input Capacitor:

An Input Capacitor of at least 10uF is required. Ceramic or Tantalum can be used. The value can be increased without upper limit.

Output Capacitor:

An Output Capacitor is required for look stability. It must be located no more than 1cm away from the V_{OUT} pin, and connected directly between V_{OUT} and GND pins. The minimum value is 10uF but once again its value can be increased without limit.

Thermal Consideration

It is important that the thermal limit of the package should not be exceeded. The SE5117 has built-in thermal protection. When the thermal limit is exceeded, the IC will enter protection, and the V_{OUT} will be reset to zero. The power dissipation for a given application can be calculated as follows:

The Power Dissipation (P_D) is

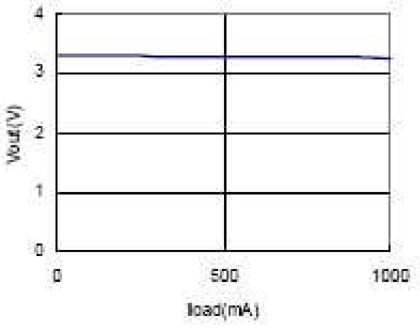
$P_D = I_{OUT} * [V_{IN} – V_{OUT}]$

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 ambient temperature, and θ_{JA} is around 135°C/W for SE5117. SE5117 is designed to enter thermal protection at 150°C. For example, if T_A is 25°C then the max P_D is limited to about 1W. In other words, if $I_{OUT(MAX)}$ = 1A, then $[V_{IN} – V_{OUT}]$ can not exceed 1V.

Typical Performance Characteristics

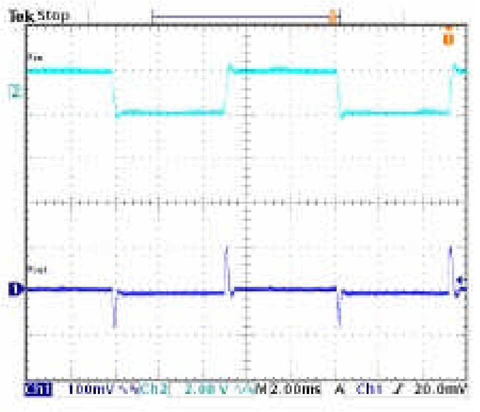
(V_{IN}=5V, V_{OUT}=3.3V, C_{IN}=1uF; C_{OUT}=10uF, T_A=25°C, unless otherwise noted.)

Vout VS load

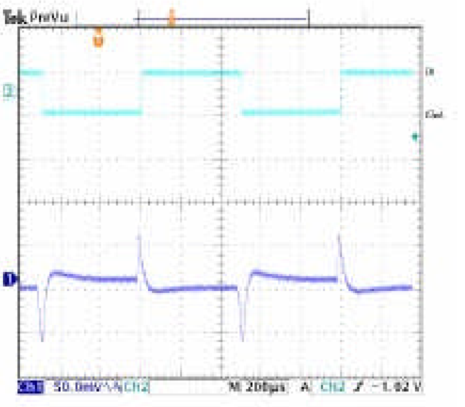


Over-Current Protection

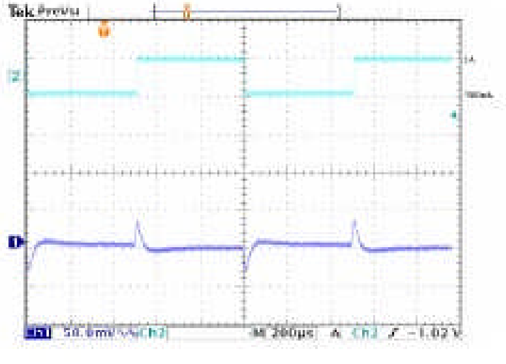
Line Transient



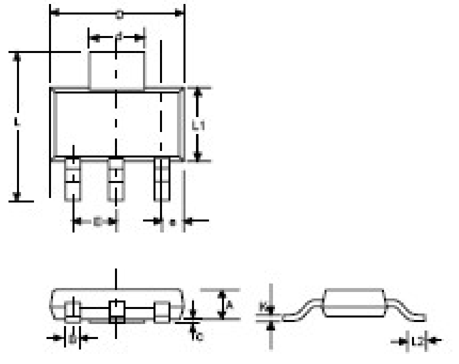
Load Transient



Load Transient



OUTLINE DRAWING SOT-223



DIMENSIONS				
DIM^N	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