

1A Bipolar Linear Regulator

SSP1117

General Description

SSP1117 is a series of low dropout three-terminal regulators with a dropout of 1.3V at 1A load current. SSP1117 features a very low standby current 2mA compared to 5mA of competitor. Other than a fixed version, $V_{out}=1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.3V$ and 5V, SSP1117 has an adjustable version, which can provide an output voltage from 1.25 to 12V with only two external resistors.

SSP1117 offers thermal shut down function, to assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within 2%. Other output voltage accuracy can be customized on demand, such as 1%. SSP1117 is available in SOT-223, TO-252 power package.



TO-252



SOT223

Features

- Maximum output current is 1.0A
- Range of operation input voltage: Max 20V
- Line regulation: 0.03%/V (typ.)
- Standby current: 2mA (typ.)
- Load regulation: 0.2%/A (typ.)
- Environment Temperature: -20°C~85°C
- SOT-223, TO-252 power package

Applications

- Power Management for Computer Mother Board, Graphic Card
- LCD Monitor and LCD TV
- DVD Decode Board
- ADSL Modem
- Post Regulators For Switching Supplies

Order information

| Product model | Package | Manner of packing | Minimum packing quantity |
|-------------------|---------|-------------------|--------------------------|
| SSP1117-XX-SOT223 | SOT223 | Reel | 2500 |
| SSP1117-XX-TO-252 | TO-252 | Reel | 2500 |

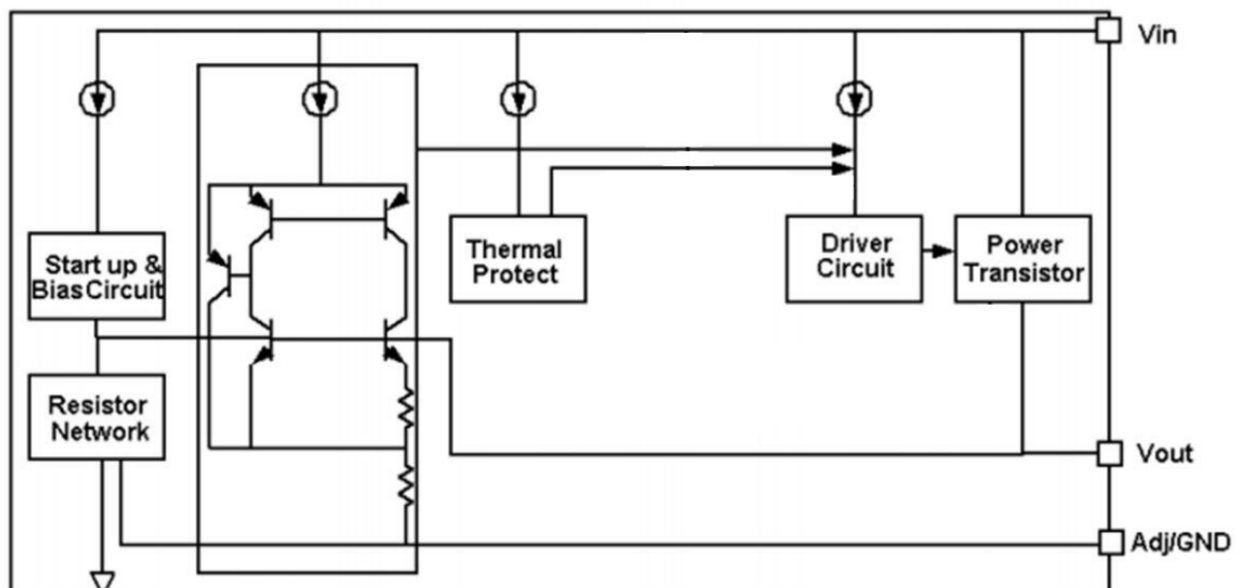
Selection Table

| Marking | Part No. | Output Voltage | Package |
|-----------------|----------|----------------|-------------------|
| 1117 XX YYWW | XX=12 | 1.2V | SOT-223 TO-252 |
| | XX=15 | 1.5V | |
| | XX=18 | 1.8V | |
| | XX=28 | 2.85V | |
| | XX=25 | 2.5V | |
| | XX=33 | 3.3V | |
| | XX=50 | 5.0V | |
| | XX=ADJ | Adj | |

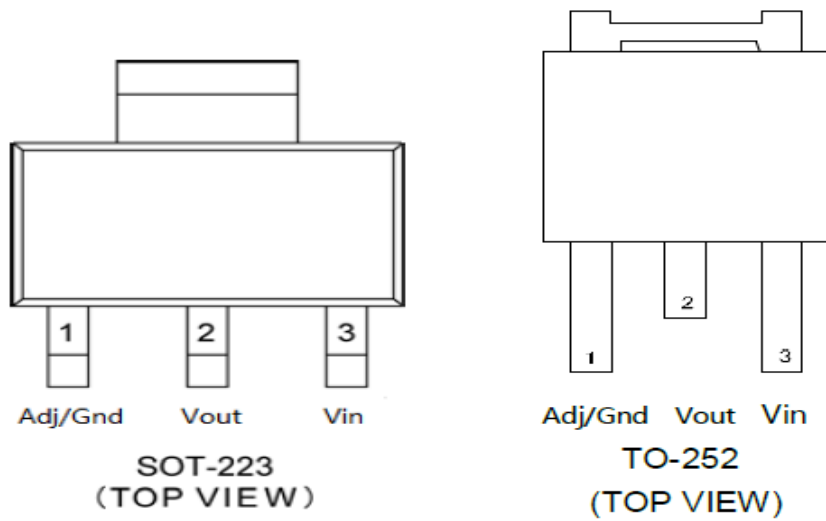
| Marking | Designator | Description |
|----------------|------------|---------------------------|
| 1117 XXYYWW | 1117 | Product code |
| | XX | Output Voltage(1.2~12.0V) |
| | YYWW | DATE CODE |

Note: "XX" stands for output voltages. Other voltages can be specially customized

Block Diagram



Pin Configuration



Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Units |
|---|---------------|-----------|-------|
| Max Input Voltage | V_{IN} | 20 | V |
| Max Operating Junction Temperature(T_j) | θ_{Tj} | 150 | °C |
| Ambient Temperature(T_a) | T_{opr} | -40~+85 | °C |
| Storage Temperature(T_s) | T_{stg} | -40~+150 | °C |
| Lead Temperature & Time | TSOLD, R | 260°C 10S | |

Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

Thermal Information

| Parameter | Package | Rating | Unit |
|----------------------------|---------|--------|------|
| Package thermal resistance | SOT-223 | 20 | °C/W |
| | TO-252 | 12.5 | °C/W |

Detailed Description

SSP1117 is a series of low dropout voltage, three terminal regulators. Its 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. It is composed of some modules including start-up circuit, bias circuit, bandgap, thermal shutdown, power transistors and its driver circuit and so on.

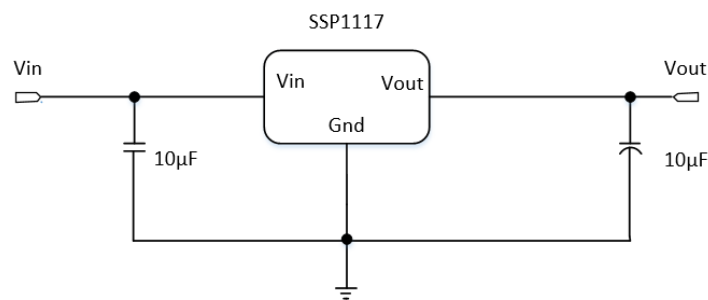
The thermal shut down modules can assure chip and its application system working safety when the junction temperature is larger than 140°C.

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

Typical Application

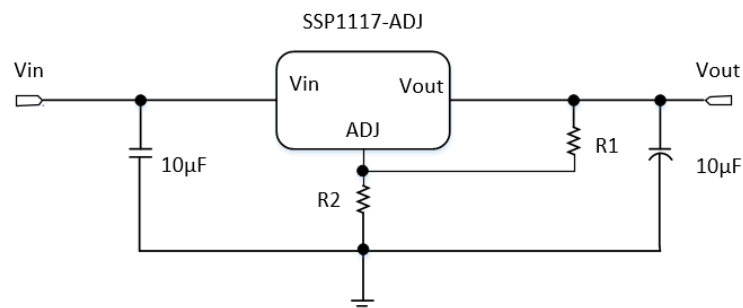
SSP1117 has an adjustable version and six fixed versions (1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.3V and 5V)

Fixed Output Voltage Version



- 1) Recommend using 10uF tan capacitor as bypass capacitor (C1) for all application circuit.
- 2) Recommend using 10uF tan capacitor to assure circuit stability.

Adjustable Output Voltage Version



Application Circuit of SSP1117-ADJ

The output voltage of adjustable version follows the equation:

$$V_{out} = 1.25 \times (1 + R2/R1) + I_{Adj} \times R2.$$

I_{adj} because I_{adj} (about 50uA) is much less than the current of R1 (about 2~10mA).

1) . As SSP1117-ADJ can keep itself stable at load current about 2mA, R1 is not allowed to be higher than 625ohm.

2) Using a bypass capacitor (CADJ) between the ADJ pin and ground can improve ripple rejection. This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of CADJ should be less than R1 to prevent ripple from being amplified. As R1 is normally in the range of 100Ω~500Ω, the value of CADJ should satisfy this equation:

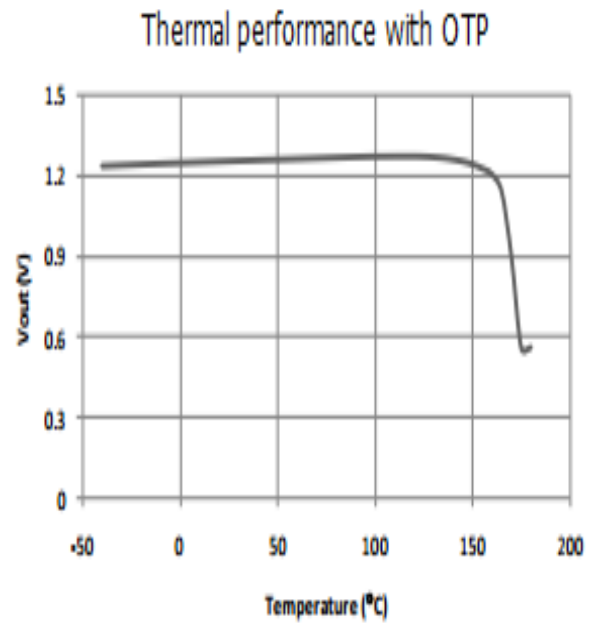
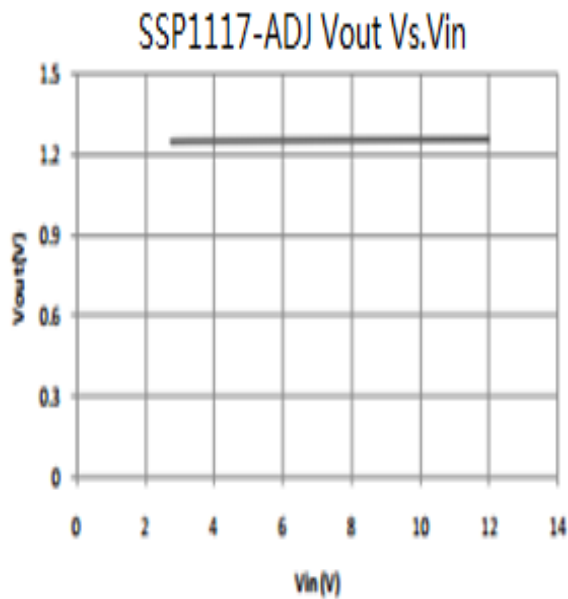
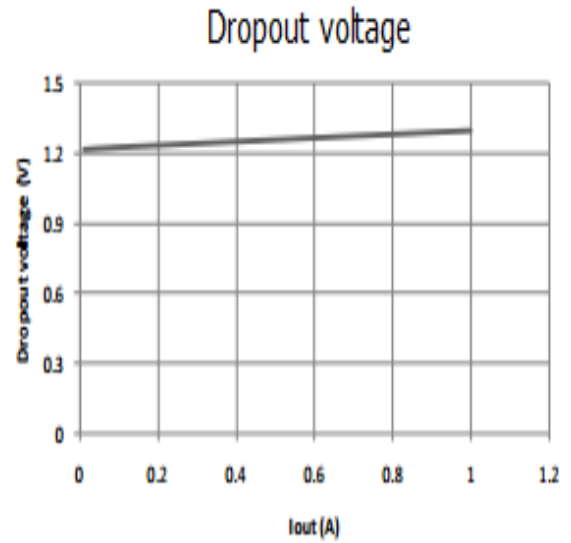
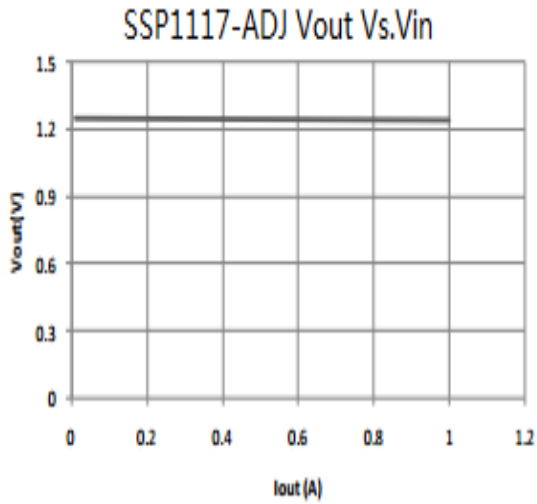
$$C_{adj} > \frac{1}{2\pi f_{ripple} R1}$$

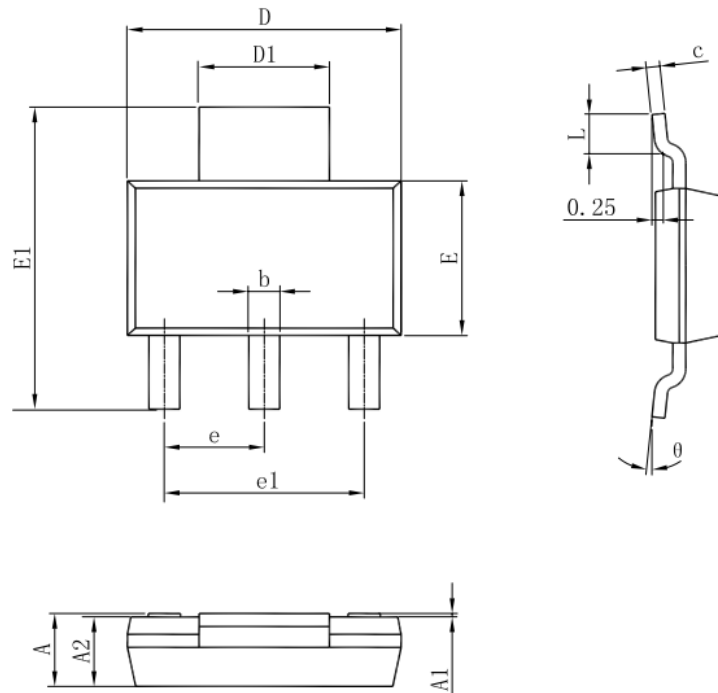
Thermal Considerations

We have to take heat dissipation into great consideration when output current or differential voltage of input and output voltage is large. Because in such cases, the power dissipation consumed by SSP1117 is very large. SSP1117 series uses SOT-223 package type and its thermal resistance is about 20°C/W. And the copper area of application board can affect the total thermal resistance. If copper area is 5cm*5cm (two sides), the resistance is about 30°C/W. So the total thermal resistance is about 20°C/W + 30°C/W. We can decrease total thermal resistance by increasing copper area in application board. When there is no good heat dissipation copper are in PCB, the total thermal resistance will be as high as 120°C/W, then the power dissipation of SSP1117 could allow on itself is less than 1W. And furthermore, SSP1117 will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.

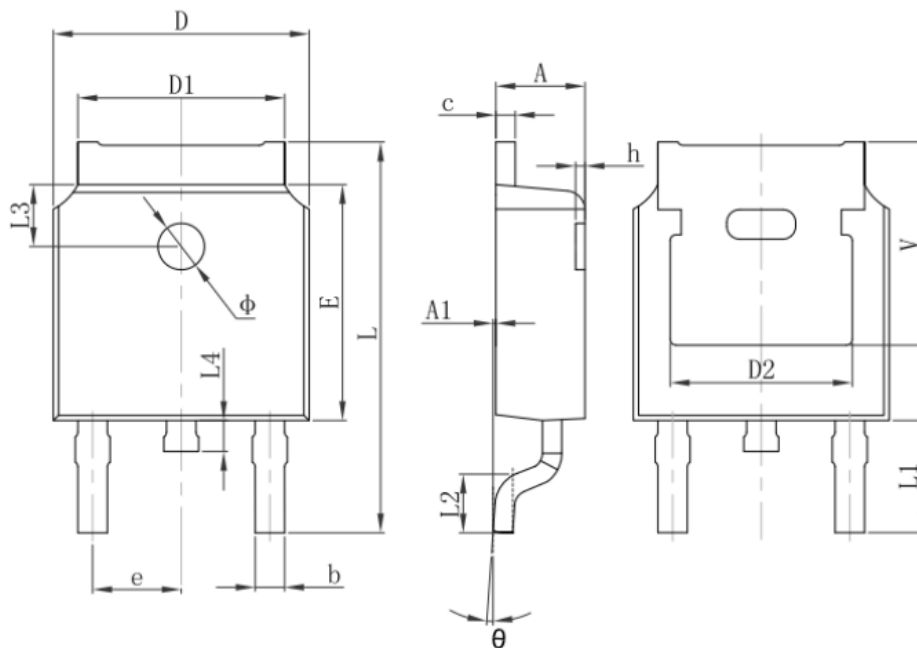
Typical Performance Characteristics

T_A=25°C, unless otherwise noted



Package Information (SOT223)


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.520 | 1.800 | 0.060 | 0.071 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.500 | 1.700 | 0.059 | 0.067 |
| b | 0.660 | 0.820 | 0.026 | 0.032 |
| c | 0.250 | 0.350 | 0.010 | 0.014 |
| D | 6.200 | 6.400 | 0.244 | 0.252 |
| D1 | 2.900 | 3.100 | 0.114 | 0.122 |
| E | 3.300 | 3.700 | 0.130 | 0.146 |
| E1 | 6.830 | 7.070 | 0.269 | 0.278 |
| e | 2.300 (BSC) | | 0.091 (BSC) | |
| e1 | 4.500 | 4.700 | 0.177 | 0.185 |
| L | 0.900 | 1.150 | 0.035 | 0.045 |
| θ | 0° | 10° | 0° | 10° |

Package Information (TO-252)


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.660 | 0.860 | 0.026 | 0.034 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830REF. | | 0.190REF. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.900REF. | | 0.114REF. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600REF. | | 0.063REF. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| Φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.350REF. | | 0.211REF. | |

Special Version

The company reserves the right of final interpretation of this specification.

Version Change Description

Versions: V1.6

Writer: HangLiu

Time: 2021.10.29

Amendant record:

1.Re-typesetting the manual and checking some data.