

## 1A Bipolar Linear Regulator

### CYP1117

#### General Description

CYP1117 is a series of low dropout three-terminal regulators with a dropout of 1.3V at 1A load current. CYP1117 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, CYP1117 has an adjustable version, which can provide an output voltage from 1.25 to 12V with only two external resistors. CYP1117 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%. CYP1117 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.)
- SOT-223, TO-252 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
CYP1117-XX-SOT223	SOT223	Reel	2500
CYP1117-XX-TO-252	TO-252	Reel	2500

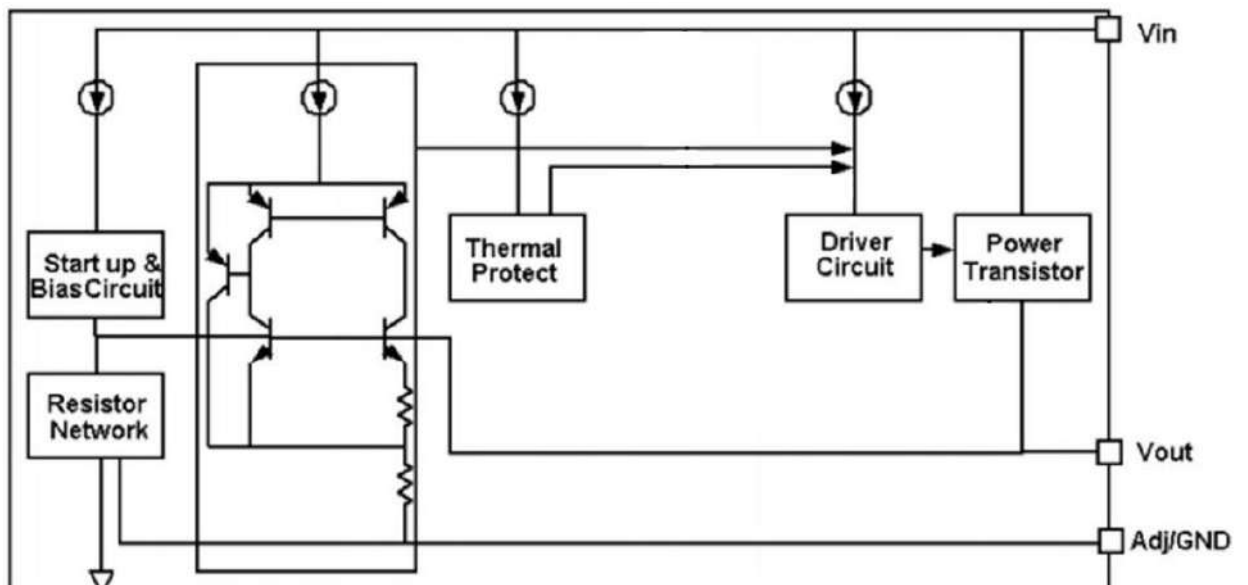
**Selection Table**

Marking	Part No.	Output Voltage	Package
1117 XXYYWW	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	

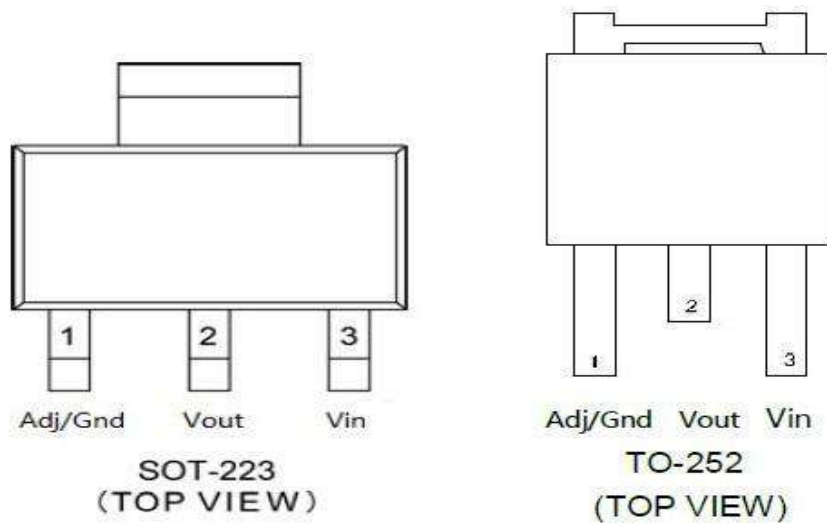
Marking	Designator	Description
1117 XXYYWW	1117	Product code
	XX	Output Voltage(1.2~12.0V)
	YYWW	DATE CODE

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( $T_j$ )	$\theta_{Tj}$	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

CYP1117 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.

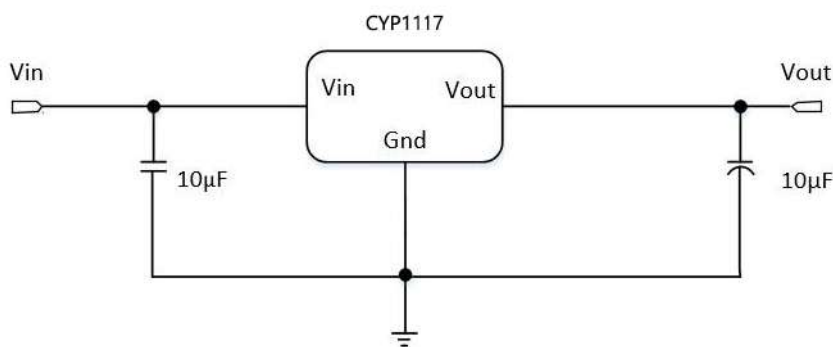
The thermal shut down modules can assure chip and its application system working safety when the junction temperature is larger than 140°C.

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

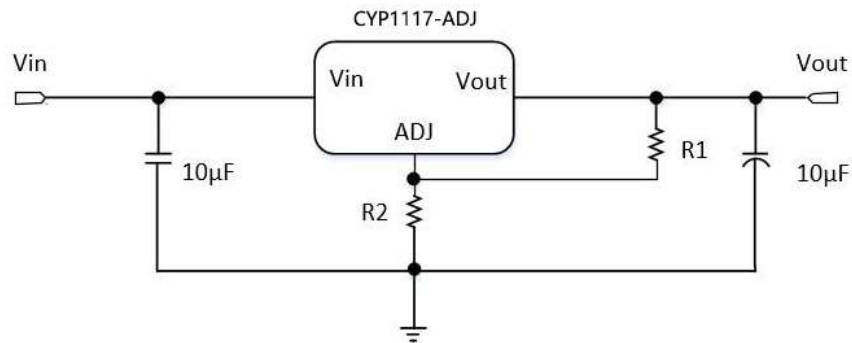
CYP1117 has an adjustable version and six fixed versions (1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.3V and 5V)

### 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 CYP1117-ADJ

The output voltage of adjustable version follows the equation:

$$V_{out} = 1.25 \times (1 + R_2/R_1) + I_{Adj} \times R_2.$$

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

1) As CYP1117-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,

$$C_{adj} > \frac{1}{2\pi \text{ripple} R_1}$$

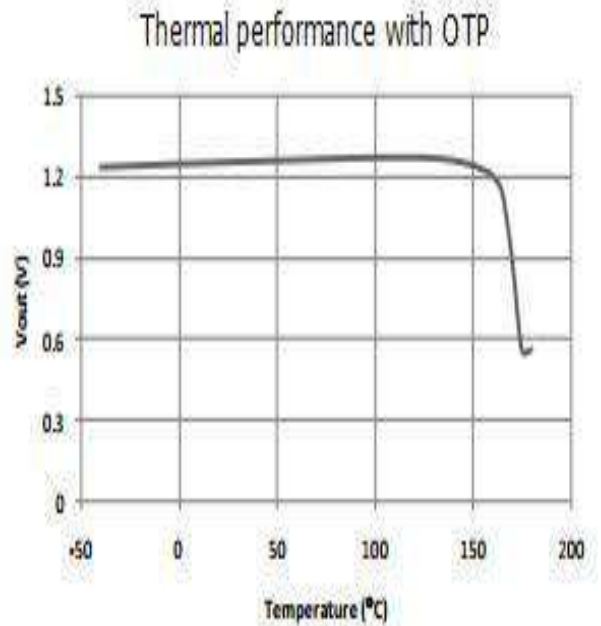
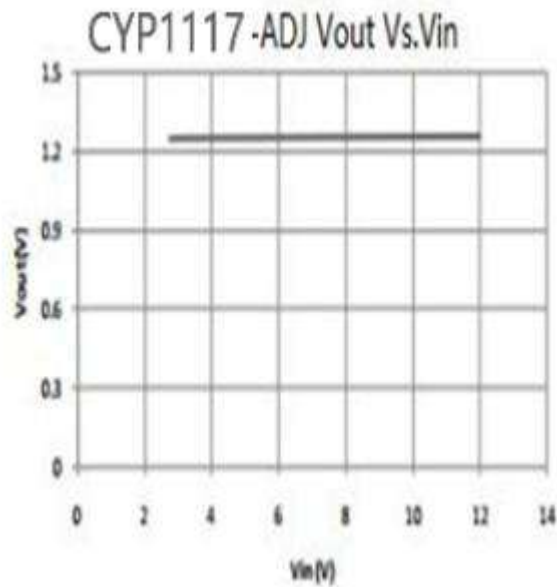
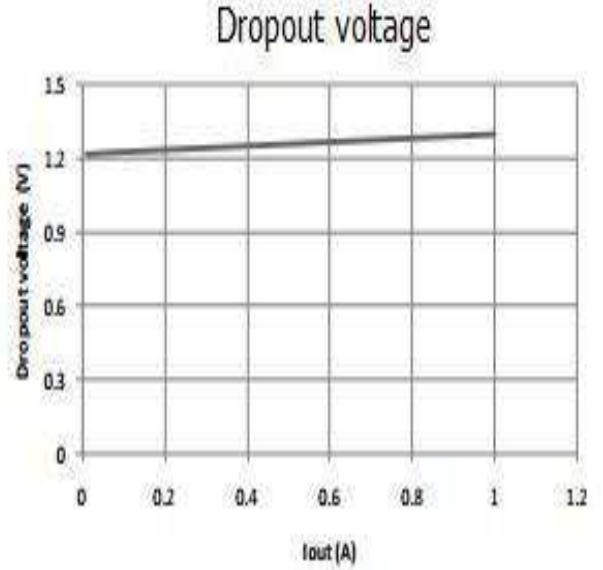
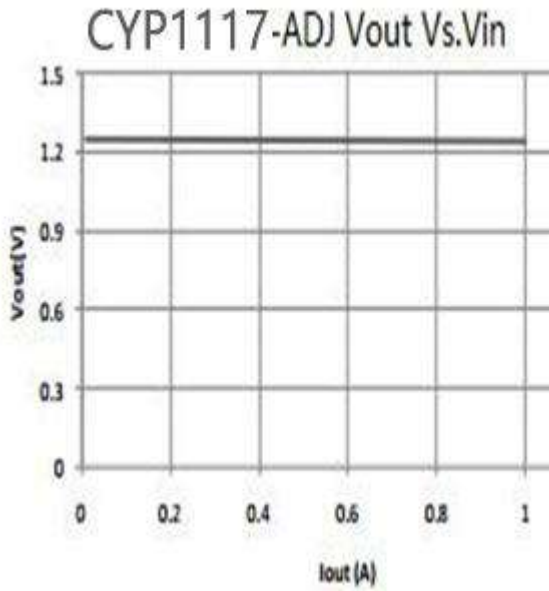
the value of CADJ should satisfy this equation:

## Thermal Considerations

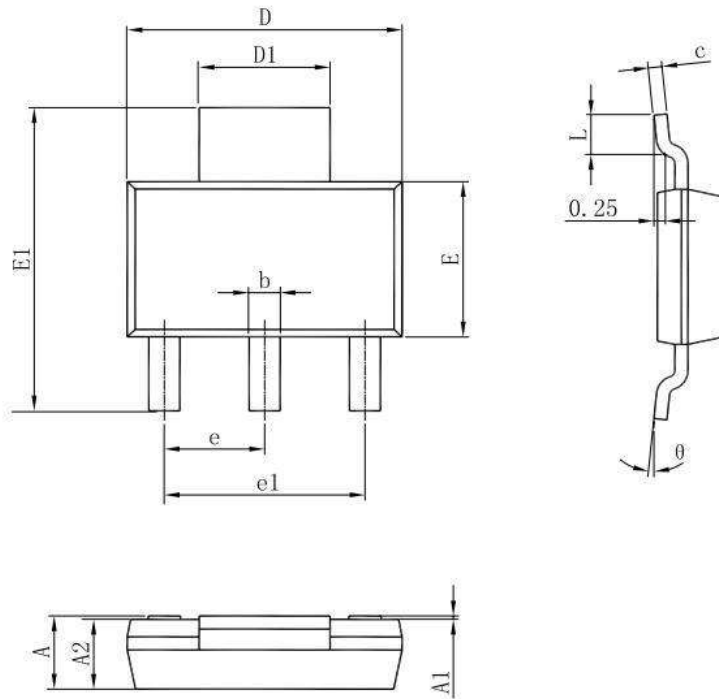
We have to take heat dissipation into great consideration when output current or differential voltage of input and output voltage is large. Because in such cases, the power dissipation consumed by CYP1117 is very large. CYP1117 series uses SOT-223 package type and its thermal resistance is about 20°C/W. 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 area in PCB, the total thermal resistance will be as high as 120°C/W, then the power dissipation of CYP1117 could allow on itself is less than 1W. And furthermore, CYP1117 will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.

## Typical Performance Characteristics

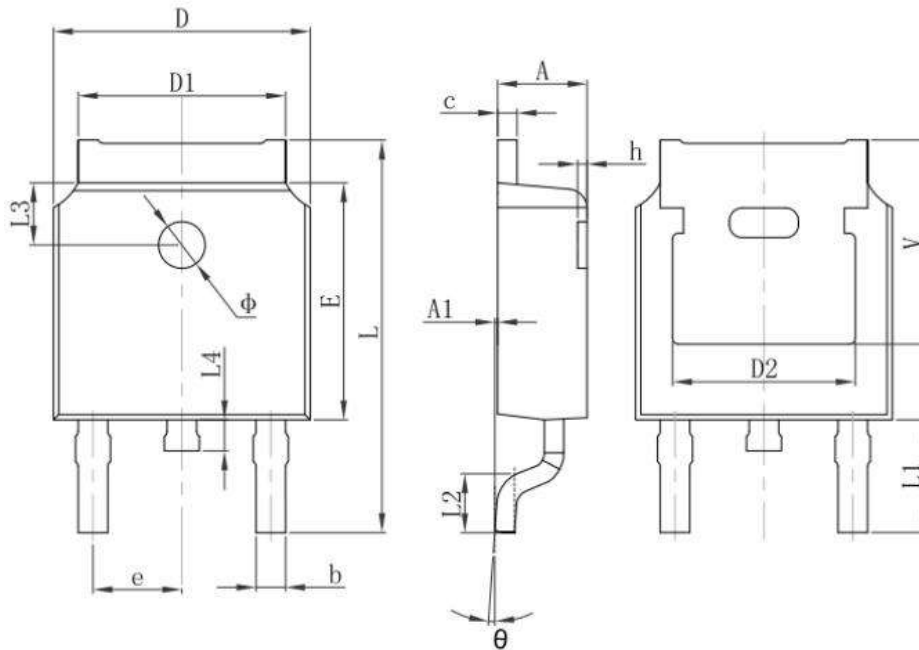
T<sub>A</sub>=25°C, unless otherwise noted



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
$\theta$	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

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Versions: V1.6      Writer: HangLiu      Time: 2021.10.29

### Amendant record:

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