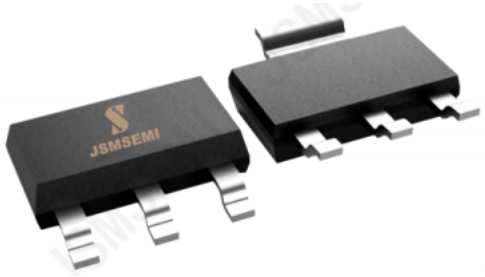
General Description

AMS1117 is a series of low dropout three-terminal regulators with a dropout of 1.3V at 0.8A load current. AMS1117 features a very low standby current 2mA compared to 5mA of competitor.

Other than a fixed version, Vout = 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, and 5V, AMS1117 has an adjustable version, which can provide an output voltage from 1.25 to 12V with only two external resistors.

AMS1117 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%.

AMS1117 is available in SOT223 package.



Features

- Maximum output current is 0.8A
- Range of operation input voltage: Max 15V
- Line regulation: 0.1%/V (typ.)
- Standby current: 2mA (typ.)
- Load regulation: 0.3%/A (typ.)
- Environment Temperature: -40℃~125℃

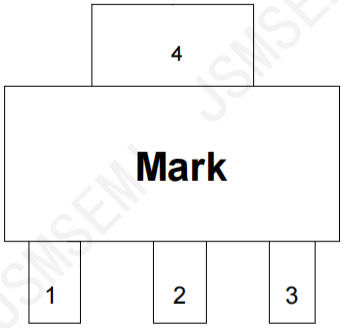
Applications

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

Ordering Information

Order number	Package	Marking	Operation Temperature Range	MSL Grade	Ship,Quantity	Green
AMS1117-1.2V	SOT-223-3	1117C12	-40 to 125 C	3	T&R,2500	Rohs
AMS1117-1.5V	SOT-223-3	1117C15	-40 to 125 C	3	T&R,2500	Rohs
AMS1117-1.8V	SOT-223-3	1117C18	-40 to 125 C	3	T&R,2500	Rohs
AMS1117-2.5V	SOT-223-3	1117C25	-40 to 125 C	3	T&R,2500	Rohs
AMS1117-3.3V	SOT-223-3	1117 33e	-40 to 125 C	3	T&R,2500	Rohs
AMS1117-5.0V	SOT-223-3	AMS1117 T50 F	-40 to 125 C	3	T&R,2500	Rohs
AMS1117-ADJ	SOT-223-3	1117 ADJ e	-40 to 125 C	3	T&R,2500	Rohs

Pin Configuration



(Top View)

PIN NO.	PIN NAME	FUNCTION
1	VSS/ADJ	VSS/ADJ pin
2	VOUT	Output voltage pin
3	VIN	Input voltage pin
4	VOUT	Output voltage pin

Absolute Maximum Ratings

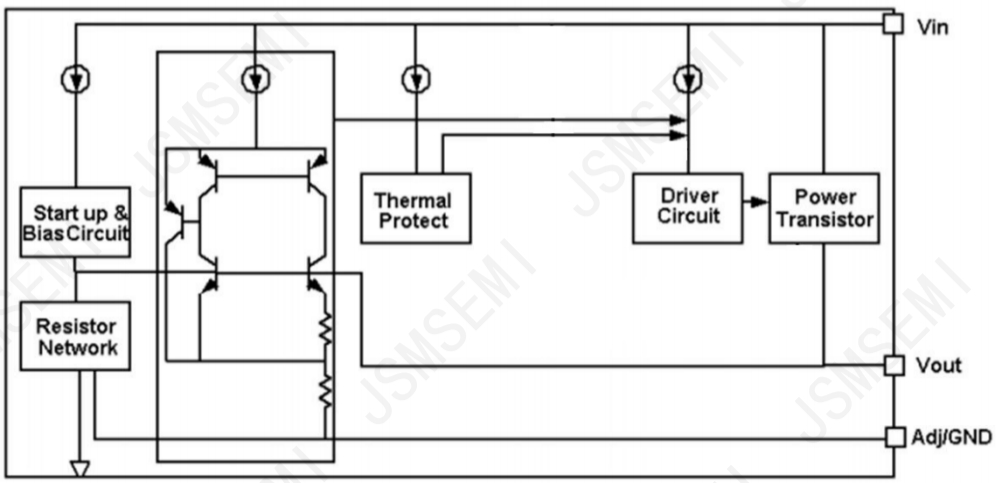
Max Input Voltage ····· ··18V

Storage Temperature(Ts) ····· ··-40℃~150℃

Lead Temperature & Time ····· ··260℃ 10S

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

Block Diagram



Electrical Characteristics

T_A=25℃, unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vref	Reference voltage	AMS1117-Adj 10mA≤Iout≤0.8A , Vin=3.25V	1.225	1.25	1.275	V
Vout	Output voltage	AMS1117-1.2V 0≤Iout≤0.8A , Vin=2.5V	1.176	1.2	1.224	V
		AMS1117-1.5V 0≤Iout≤0.8A , Vin=2.8V	1.47	1.5	1.53	V
		AMS1117-1.8V 0≤Iout≤0.8A , Vin=3.1V	1.764	1.8	1.836	V
		AMS1117-2.5V 0≤Iout≤0.8A , Vin=3.8V	2.45	2.5	2.55	V
		AMS1117-3.3V 0≤Iout≤0.8A , Vin=4.6V	3.234	3.3	3.366	V
		AMS1117-5.0V 0≤Iout≤0.8A , Vin=6.3V	4.9	5	5.1	V
△Vout	Line regulation	AMS1117-1.2V Iout=10mA, 2.7V≤Vin≤10V	--	4	19	mV
		AMS1117-1.5V Iout=10mA, 3.0V≤Vin≤10V	--	5	26	mV
		AMS1117-ADJ Iout=10mA, 2.75V≤Vin≤12V	--	5	24	mV
		AMS1117-1.8V Iout=10mA, 3.3V≤Vin≤12V	--	5	32	mV
		AMS1117-2.5V Iout=10mA, 4.0V≤Vin≤12V	--	8	41	mV
		AMS1117-3.3V Iout=10mA, 4.8V≤Vin≤12V	--	9	49	mV
		AMS1117-5.0V Iout=10mA, 6.5V≤Vin≤12V	--	10	56	mV
		AMS1117-1.2V Vin =2.5V, 10mA≤Iout≤0.8A	--	2	24	mV
		AMS1117-1.5V Vin =2.8V, 10mA≤Iout≤0.8A	--	2	30	mV
		AMS1117-1.8V	--	3	36	mV

△Vout	Load regulation	Vin =3.1V, 10mA≤Iout≤0.8A				
		AMS1117-2.5V Vin =3.8V, 10mA≤Iout≤0.8A	--	4	50	mV
		AMS1117-3.3 Vin =4.6V, 10mA≤Iout≤0.8A	--	6	66	mV
		AMS1117-5.0 Vin =6.3V, 10mA≤Iout≤0.8A	--	9	80	mV
		AMS1117-ADJ Vin =2.55V, 10mA≤Iout≤0.8A	--	2	40	mV
Vdrop	Dropout voltage	Iout =100mA	--	1.05	1.1	V
		Iout=0.8A	--	1.3	1.55	V
Imin	Minimum load current	AMS1117-ADJ	--	2	10	mA
Iq	Quiescent Current	AMS1117-1.2V, Vin=10V	--	2	5	mA
		AMS1117-1.5V, Vin=10V	--	2	5	mA
		AMS1117-1.8V, Vin=12V	--	2	5	mA
		AMS1117-2.5V, Vin=12V	--	2	5	mA
		AMS1117-2.85V, Vin=12V	--	2	5	mA
		AMS1117-3.3V, Vin=12V	--	2	5	mA
		AMS1117-5.0V, Vin=12V	--	2	5	mA
IAdj	Adjust pin current	AMS1117-ADJ Vin=5V,10mA≤Iout≤0.8A	--	55	120	uA
Ichange	Iadj change	AMS1117-ADJ Vin=5V,10mA≤Iout≤0.8A	--	0.2	10	uA
△V/△T	Temperature coefficien		--	±100		ppm

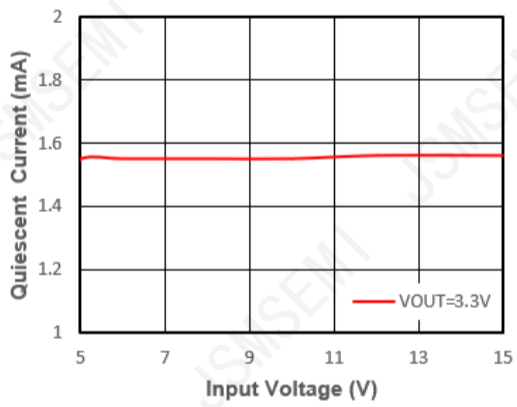
Note1: All test are conducted under ambient temperature 25° C and within a short period of time 20ms

Note2: Load current smaller than minimum load current of AMS1117-ADJ will lead to unstable or oscillation output.

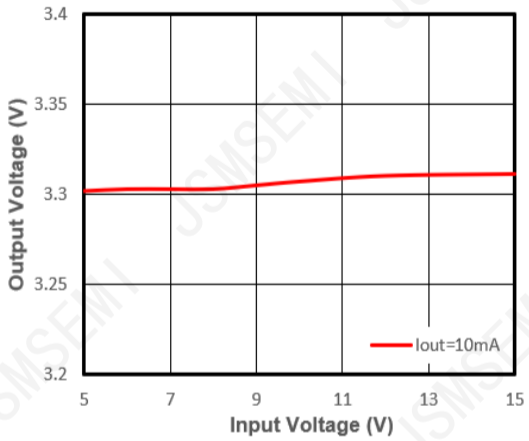
Typical Performance Characteristics

T_A=25℃, unless otherwise noted

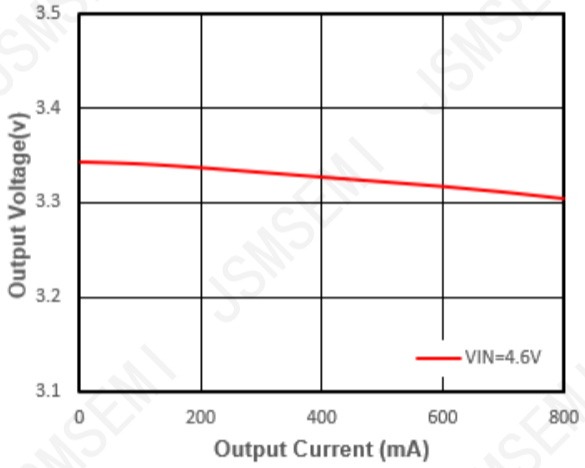
(1) Quiescent Current VS Input Voltage



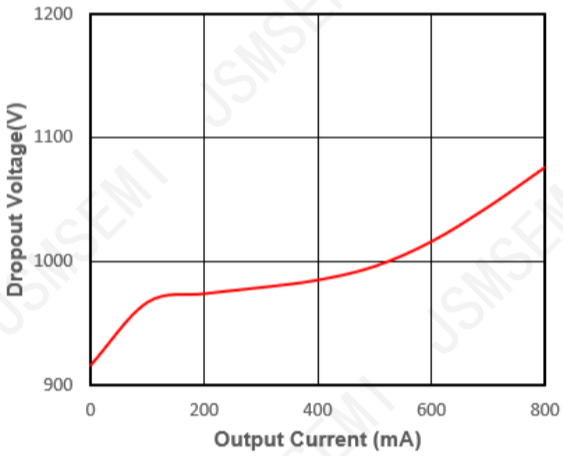
(2) Output Voltage VS Input Voltage



(3) Output Voltage VS Output Current



(4) Dropout Voltage VS Output Current



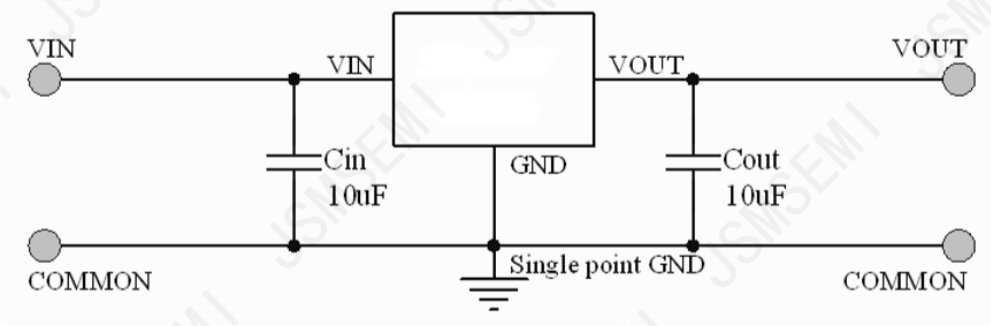
Detailed Description

AMS1117 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 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

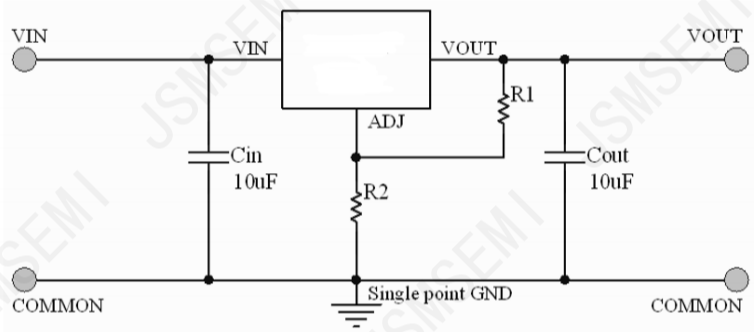
AMS1117 has an adjustable version and six fixed versions (1.2V, 1.5V,1.8V, 2.5V, 3.3V and 5V)**Fixed Output Voltage Version**



Application circuit of AMS1117 fixed 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 AMS1117-ADJ

The output voltage of adjustable version follows the equation: Vout=1.25×(1+R2/R1)+IAdj×R2. We can ignore IAdj because IAdj (about 50uA) is much less than the current of R1 (about 2~10mA).

1) To meet the minimum load current (>10mA) requirement, R1 is recommended to be 125ohm or lower. As AMS1117-ADJ can keep itself stable at load current about 2mA, R1 is not allowed to be higher than 625ohm.

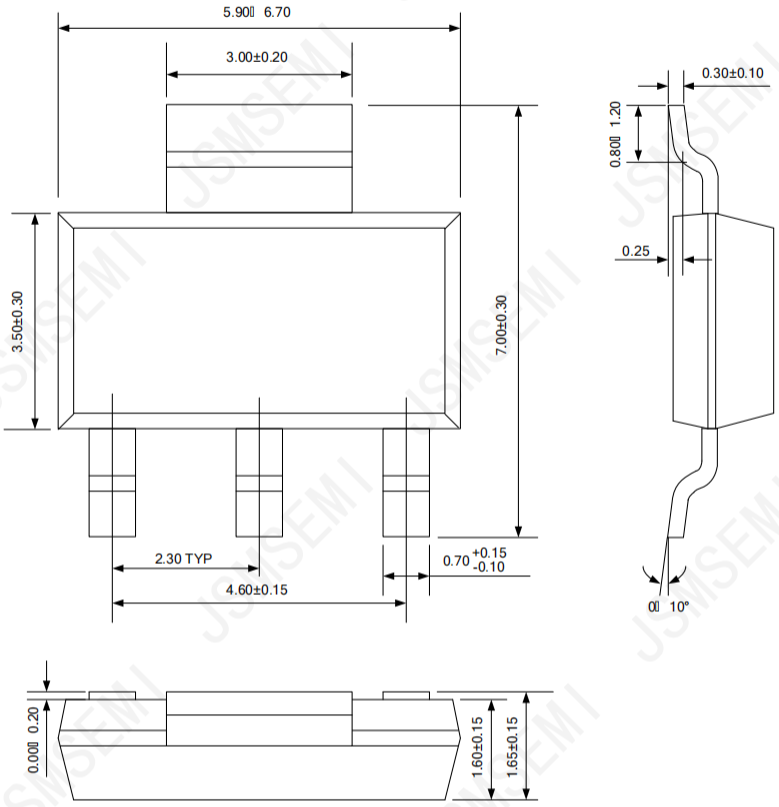
2) Using a bypass capacitor (C_{ADJ}) between the ADJ pin and ground can improve ripple rejection. This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of C_{ADJ} should be less than R1 to prevent ripple from being amplified. As R1 is normally in the range of 100Ω~500Ω, the value of C_{ADJ} should satisfy this equation: $1/(2\pi \times f_{ripple} \times C_{ADJ}) < R1$.

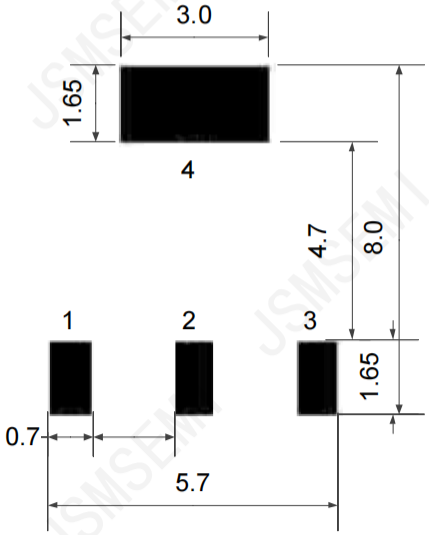
Thermal Considerations

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 AMS1117 is very large. AMS1117 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 AMS1117 could allow on itself is less than 1W. And furthermore, AMS1117 will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.

Package Information

SOT-223-3L





Revision History

Rev.	Change	Date
V2.0	Version upgrade	2/23/2023

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