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AMS1117B

Features

- Maximum output current is 1A
- 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℃~85℃

Applications

- Power Management for Computer Mother Board, Graphic Card
- LCD Monitor and LCD TV

- DVD Decode Board
- ADSL Modem
- Post Regulators For Switching Supplies

GENERAL DESCRIPTION

AMS1117B is a series of low dropout three-terminal regulators with a dropout o f 1.3V at 1A load current. AMS1117B features a very low standby current 2mA compared to 5mA of competitor.

Other than a fixed version, Vout = 1.2V, 1.8V, 2.5V, 1.5V，3.3V, and 5V, AMS1117B has an adjustable version, which can provide an output voltage from 1.25 to 12V with only

two external resistors.

AMS1117B offers thermal shut down and current limit functions, 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%. AMS1117B is available in SOT-223, TO-252 power package.

TYPICAL APPLICATION
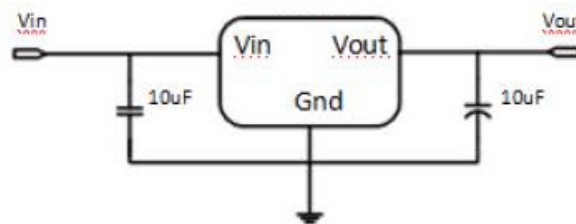
Application circuit of AMS1117B fixed version

TYPICAL ELECTRICAL CHARACTERISTIC
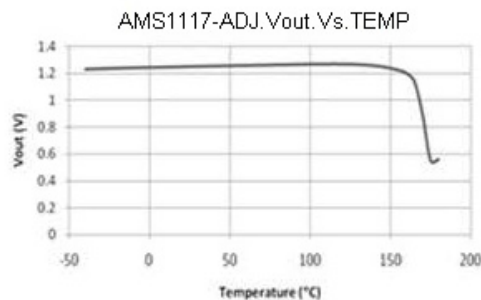
Selection Table

Marking	Part No.	Output Voltage	Package
AMS1117 XX HMYYWWT	XX=12	1.2V	SOT-223 TO-252
	XX=18	1.8V	
	XX=15	1.5V	
	XX=25	2.5V	
	XX=33	3.3V	
	XX=50	5.0V	
	XX=AD	Adj	

ORDERING INFORMATION

| Marking	Designator	Description
AMS1117 XX HMYYWWT	AMS	Product code
	XX	Output Voltage(1.2~12.0V)
	HMYYWWT	DATE CODE

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

Parameters	Description
Temperature & Rohs	C:-40~85℃ ,Pb Free Rohs Std.
Package type	L:SOT-223
	O:TO-252
Packing type:	TR: Tape & Reel (Standard)
Voltage accuracy	1%(Customized)

Block Diagram

PIN CONFIGURATION

SOT-223

1 Vss/ADJ
2 Vout
3 Vin

1   2   3

TO-252

1 Vss/ADJ
2 Vout
3 Vin

1   2   3
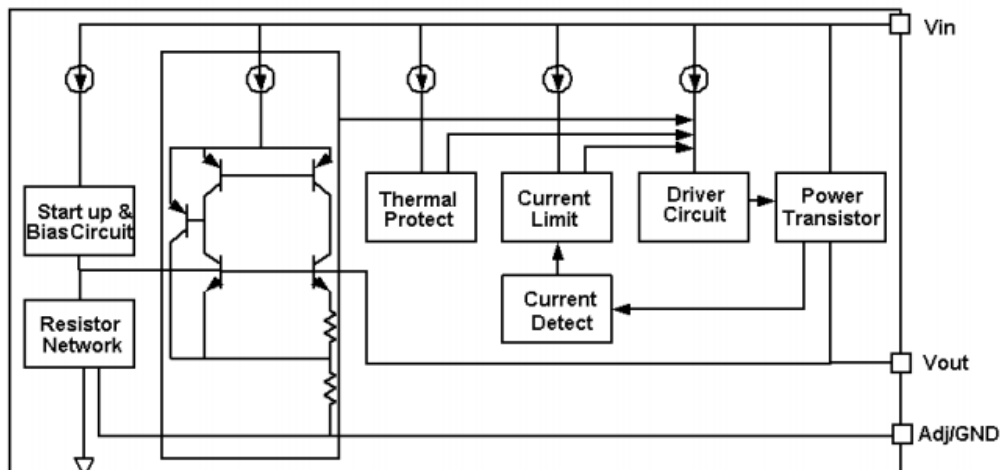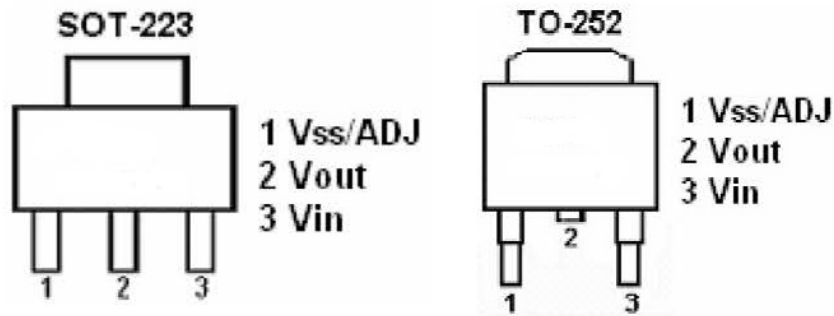
Absolute Maximum Ratings

Max Input Voltage --- --------------- ----- -20V Max

Operating Junction Temperature(Tj) --- --------------- ----- -150℃ Ambient

Temperature(Ta) --- --------------- ----- -40℃~ 85℃

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.

RECOMMENDED WORK CONDITIONS

Recommended maximum input voltage --- --------   20V

Recommended operating junction temperature(Tj) --- --------   -20~125℃

Thermal Information

Parameter	Package	Rating	Unit
Package thermal resistance	SOT-223	20	℃/w
	TO-252	12.5	℃/w

Electrical Characteristics

T_A=25℃，unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vref	Reference voltage	AMS1117B-Adj 10mA≤Iout≤1A , Vin=3.25V	1.225	1.25	1.275	V
Vout	Output voltage	AMS1117B-1.2V 0≤Iout≤1A , Vin=3.2V	1.176	1.2	1.224	V
		AMS1117B-1.8V 0≤Iout≤1A , Vin=3.8V	1.764	1.8	1.836	V
		AMS1117B-2.5V 0≤Iout≤1A , Vin=4.5V	2.45	2.5	2.55	V
		AMS1117B-1.5V 0≤Iout≤1A , Vin=3.5V	1.47	1.5	1.53	V
		AMS1117B-3.3V 0≤Iout≤1A , Vin=5.3V	3.234	3.3	3.366	V
		AMS1117B-5.0V 0≤Iout≤1A , Vin=7.0V	4.9	5	5.1	V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
△Vout	Line regulation	AMS1117B-1.2V Iout=10mA, 2.7V≤Vin≤10V		0.03	0.2	%/V
		AMS1117B-ADJ Iout=10mA, 2.75V≤Vin≤12V		0.03	0.2	%/V
		AMS1117B-1.8V Iout=10mA, 3.3V≤Vin≤12V		0.03	0.2	%/V
		AMS1117B-2.5V Iout=10mA, 4.0V≤Vin≤12V		0.03	0.2	%/V
		AMS1117B-1.5V Iout=10mA, 3.0V≤Vin≤12V		0.03	0.2	%/V
		AMS1117B-3.3V Iout=10mA, 4.8V≤Vin≤12V		0.03	0.2	%/V
		AMS1117B-5.0V Iout=10mA, 6.5V≤Vin≤12V		0.03	0.2	%/V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		AMS1117B-1.2V Vin =2.7V, 10mA≤Iout≤1A		2	8	mV
		AMS1117B-ADJ Vin =2.75V, 10mA≤Iout≤1A		2	8	mV
		AMS1117B-1.8V Vin =3.3V, 10mA≤Iout≤1A		3	12	mV

△Vout	Load regulation	AMS1117B-2.5V Vin =4.0V, 10mA≤Iout≤1A		4	16	mV
		AMS1117B-1.5V Vin =3.0V, 10mA≤Iout≤1A		2.5	10	mV
		AMS1117B-3.3 Vin =4.8V, 10mA≤Iout≤1A		6	24	mV
		AMS1117B-5.0 Vin =6.5V, 10mA≤Iout≤1A		9	36	mV
Vdrop	Dropout voltage	Iout =100mA		1.23	1.3	V
		Iout=1A		1.3	1.5	V
Ilimit	Current limit	Vin-Vout=2V;Tj =25℃	1.1	1.2		A
Imin	Minimum load current	AMS1117B-ADJ		2	10	mA
Iq	Quiescent Current	AMS1117B-1.2V,Vin=10V		2	5	mA
		AMS1117B-1.8V,Vin=12V		2	5	mA
		AMS1117B-2.5V,Vin=12V		2	5	mA
		AMS1117B-1.5V,Vin=12V		2	5	mA
		AMS1117B-3.3V,Vin=12V		2	5	mA
		AMS1117B-5.0V,Vin=12V		2	5	mA
IAdj	Adjust pin current	AMS1117B-ADJ Vin=5V,10mA≤Iout≤1A		55	120	uA
Ichange	Iadj change	AMS1117B-ADJ Vin=5V,10mA≤Iout≤1A		0.2	10	uA
△V/△T	Temperature coefficien			±100		ppm
θJC	Thermal resistance	SOT-223		20		℃/W
		TO-252		10		

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 AMS1117B-ADJ will lead to unstable or oscillation output.

DETAILED DESCRIPTION

AMS1117B 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, current limit, 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℃.

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

TYPICAL APPLICATION

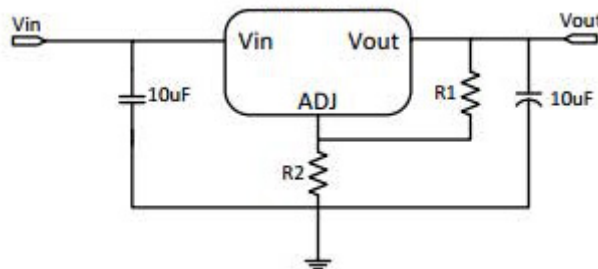AMS1117B has an adjustable version and six fixed versions (1.2V, 1.8V, 2.5V, 1.5V , 3.3V and 5V)

Fixed Output Voltage Version
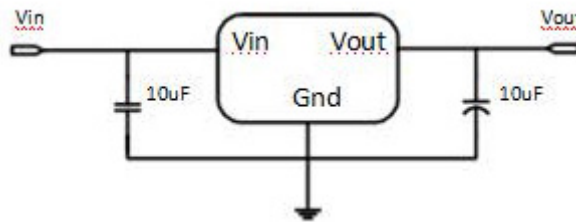
Application circuit of AMS1117B fixed
version

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 AMS1117B-
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

AMS1117B-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 100Ù~500Ù, 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 d ifferential voltage of input and output voltage is large. Because in such cases, the power dissipation consumed by AMS1117B is very large. AMS1117B series uses SOT-223 package type and its thermal resistance is about 20℃/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℃/W. So the total thermal resistance is about 20℃/W + 30℃/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℃/W, then the power dissipation of AMS1117B could allow on itself is less than 1W. And furthermore, AMS1117B will work at junction temperature higher than 125℃ under such condition and no lifetime is guaranteed.
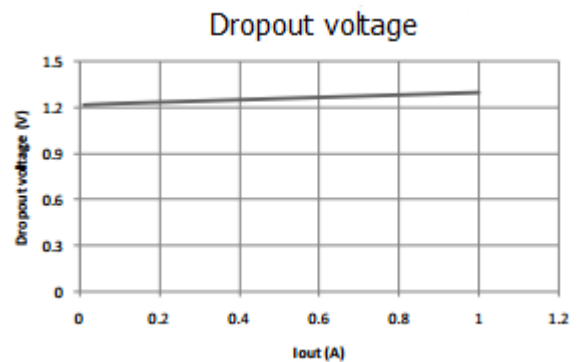
TYPICAL PERFORMANCE CHARACTERISTICS

T$_A$=25℃，unless otherwise noted.

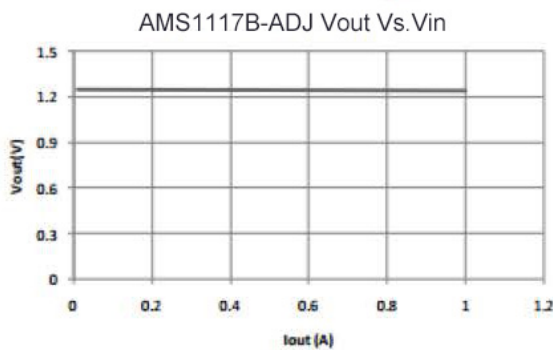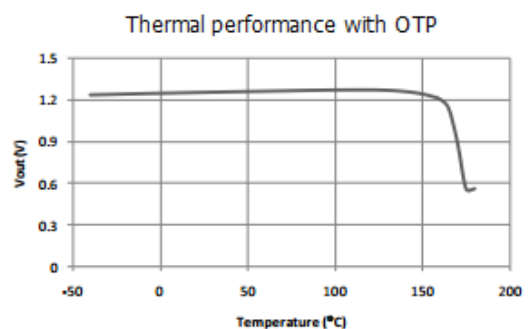**Line regulation**
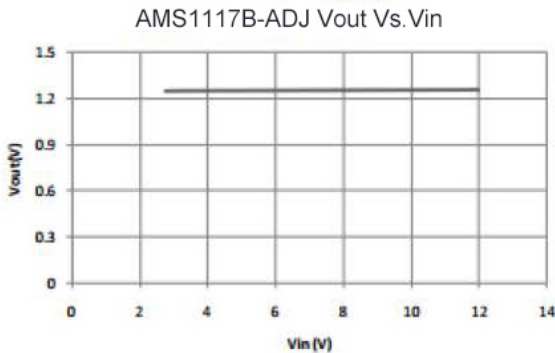
Dropout voltage

Load regulation

Thermal performance with OTP

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PACKAGE OUTLINE

SOT-223 PACKAGE OUTLINE DIMENSIONS
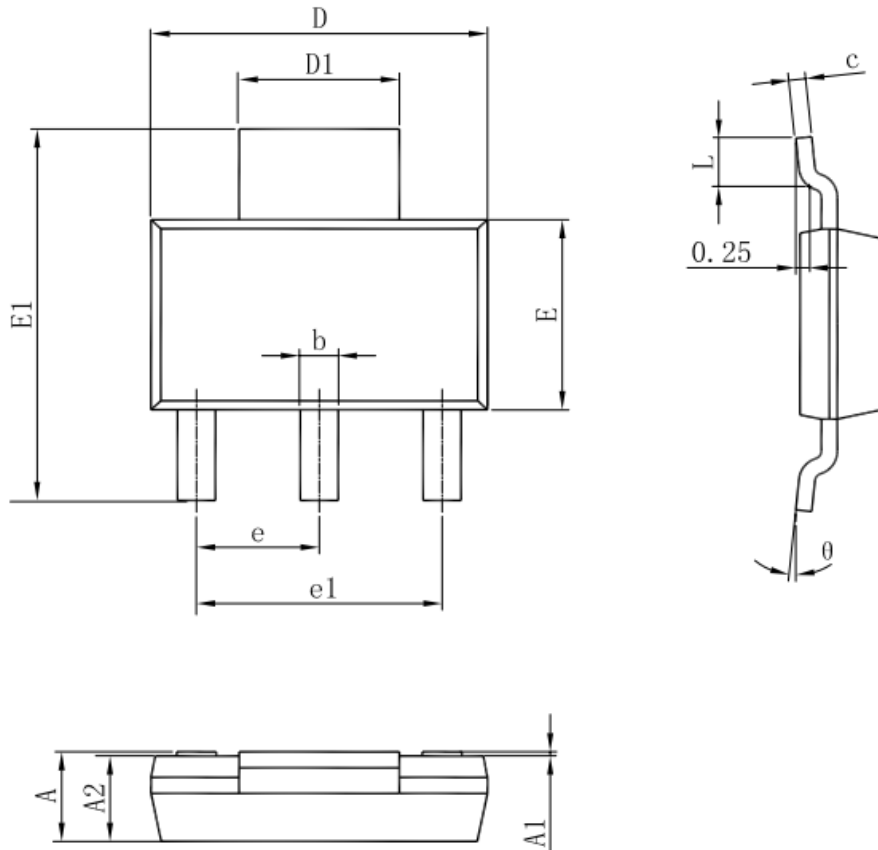
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	**Max**	**Min**	**Max**
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	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°

TO-252-2L PACKAGE OUTLINE DIMENSIONS
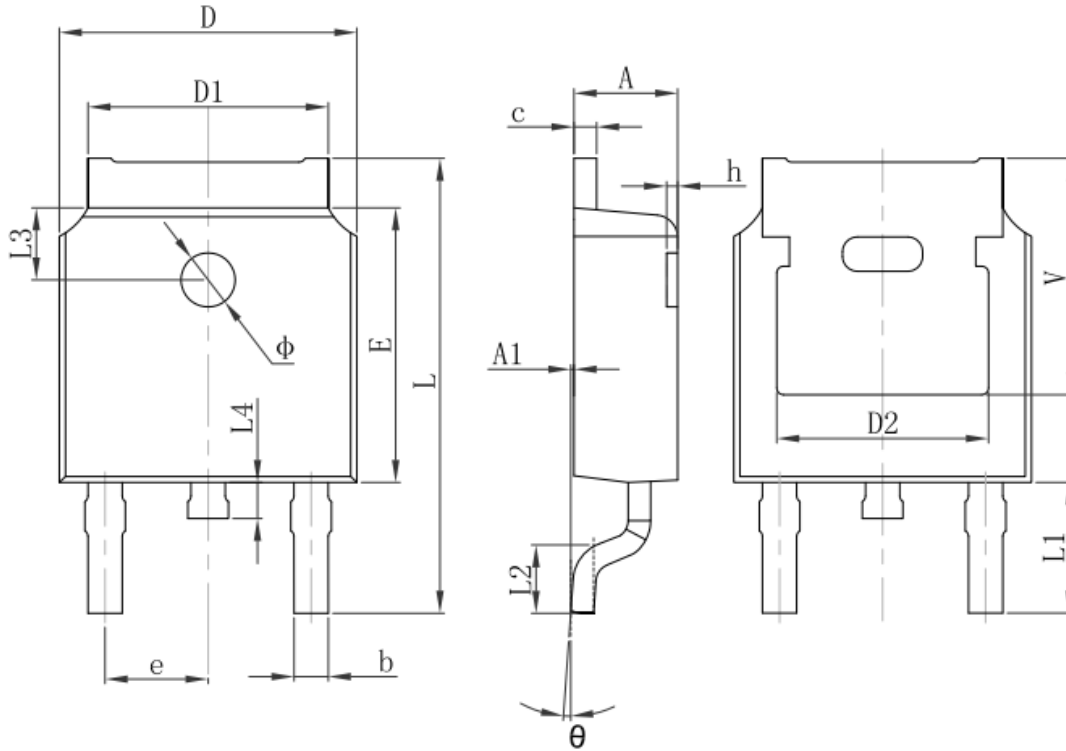
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
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	5.350 REF.		0.211 REF.	