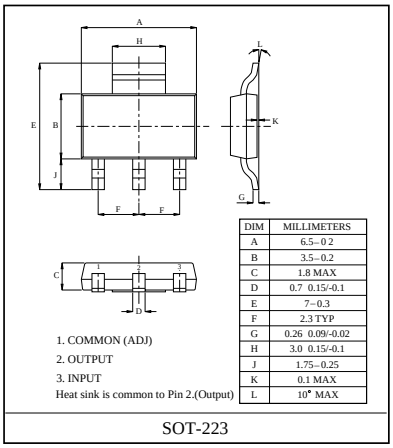
LOW DROP FIXED AND ADJUSTABLE POSITIVE VOLTAGE REGULATOR



DIM	MILLIMETERS
A	6.5~0.2
B	3.5~0.2
C	1.8 MAX
D	0.7 0.15/-0.1
E	7~0.3
F	2.3 TYP
G	0.26 0.09/-0.02
H	3.0 0.15/-0.1
J	1.75~0.25
K	0.1 MAX
L	10° MAX

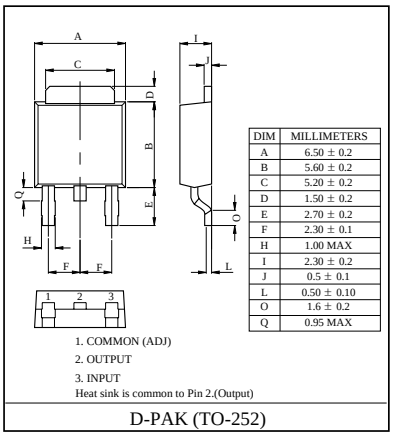
SOT-223

Features

- Maximum output current is 1.0A
- Range of operation input voltage: Max 15V
- Line regulation: 3mV (typ.)
- Standby current: 4mA (typ.)
- Load regulation: 7mV (typ.)
- EnvironmentTemperature: -20℃~85℃

Applications

- Power Managementf or Computer Mother Board, GraphicCard
- LCD Monitor and LCD TV
- DVD DecodeBoard
- ADSL Modem
- Post Regulators For Switching Supplies

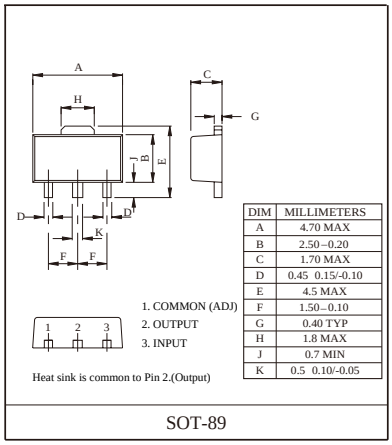


DIM	MILLIMETERS
A	6.50 ± 0.2
B	5.60 ± 0.2
C	5.20 ± 0.2
D	1.50 ± 0.2
E	2.70 ± 0.2
F	2.30 ± 0.1
H	1.00 MAX
I	2.30 ± 0.2
J	0.5 ± 0.1
L	0.50 ± 0.10
O	1.6 ± 0.2
Q	0.95 MAX

D-PAK (TO-252)

General Description

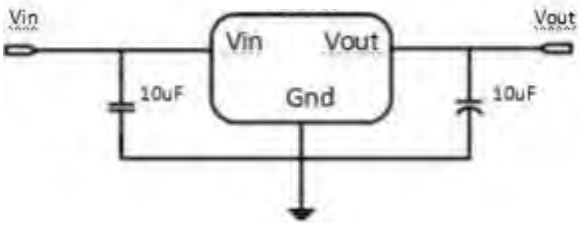
1117 is a series of low dropout three-terminal regulators with a dropout of 1.3 V at 1 Aload current. 1117 features a very low standby current 4mA compared to 8mA of competitor. Other than a fixed version, Vout = 1.2 V, 1.5 V, 1.8V, 2.5 V, 2.85V, 3.3V, and 5V, 1117 has an adjustable version, which can provide an output voltage from 1.25 to 12V with only two external resistors. 1117 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%.
1117 is available in SOT-223, TO-252, SOT-89 power package.



DIM	MILLIMETERS
A	4.70 MAX
B	2.50~0.20
C	1.70 MAX
D	0.45 0.15/-0.10
E	4.5 MAX
F	1.50~0.10
G	0.40 TYP
H	1.8 MAX
J	0.7 MIN
K	0.5 0.10/-0.05

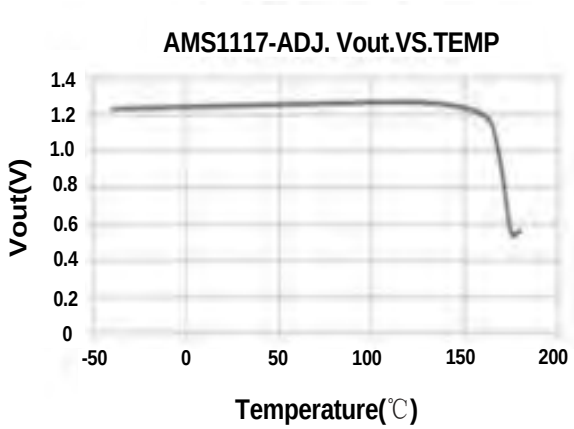
SOT-89

Typical Application



Application circuit of 1117 fixed version

Typical Electrical Characteristic



Selection Table

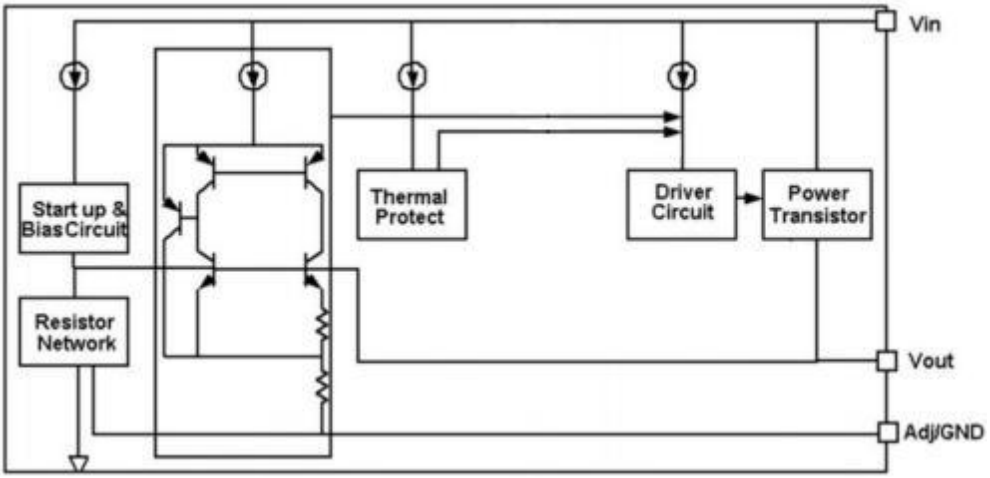
Marking	Part No	Output Voltage	Package
AMS1117 XX CCCCC	XX=12	1 2V	SOT-223 TO-252 SOT-89
	XX=15	1.5V	
	XX=18	1.8V	
	XX=28	2.85V	
	XX=25	2.5V	
	XX=33	3.3V	
	XX=50	5.0V	
	XX=AD	Adj	

Ordering Information

Marking	Designator	Description
AMS1117 XX CCCCC	AMS1117	Product code
	XX	Output Voltage(1.2~12.0V)
	CCCCC	Chip CODE

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

Block Diagram



Pin Configuration

SOT-223 (Top View)

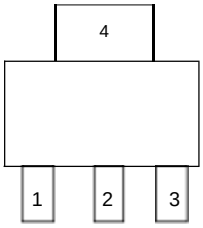


Table1:1117 series (SOT-223)

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

TO-252 (Top View)

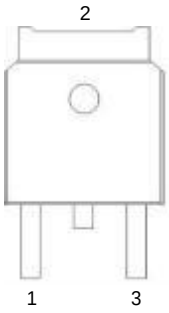


Table2: 1117 series (TO-252)

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

SOT-89 (Top View)

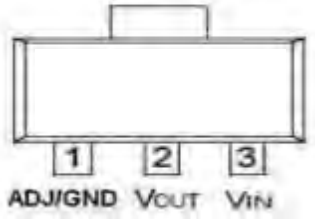


Table3: 1117 series (SOT-89)

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

Absolute Maximum Ratings

Max Input Voltage 15V
Max Operating Junction Temperature(Tj) ..... 150℃
Ambient Temperature(Ta) ..... -40 ℃~ 85℃
Storage Temperature(Ts) ..... -60 ℃~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 15V
Recommended operating junction temperature(Tj) ..... -40~125℃

Thermal Information

Parameter	Package	Rating	Unit
Package thermal resistance	SOT-223	20	℃/W
	TO-252	12.5	℃/W
	SOT-89	20	℃/W

Electrical Characteristics

T_A=25℃, unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vref	Reference voltage	1117-Adj 10mA≤Iout≤1A , Vin=3.25V	1.225	1.25	1.275	V
Vout	Output voltage	1117-1.2V 0≤Iout≤1A , Vin=3.2V	1.176	1.2	1.224	V
		1117-1.5V 0≤Iout≤1A , Vin=3.5V	1.47	1.5	1.53	V
		1117-1.8V 0≤Iout≤1A , Vin=3.8V	1.764	1.8	1.836	V
		1117-2.5V 0≤Iout≤1A , Vin=4.5V	2.45	2.5	2.55	V
		1117-2.85V 0≤Iout≤1A , Vin=4.85V	2.793	2.85	2.907	V
		1117-3.3V 0≤Iout≤1A , Vin=5.3V	3.234	3.3	3.366	V
		1117-5.0V 0≤Iout≤1A , Vin=7.0V	4.9	5	5.1	V

Electrical Characteristics(Con.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
△Vout	Line regulation	1117-1.2V Iout=10mA, 2.7V≤Vin≤10V		2.0	7.0	mV
		1117-1.5V Iout=10mA, 3.0V≤Vin≤10V		2.0	7.0	mV
		1117-ADJ Iout=10mA, 2.75V≤Vin≤12V		0.1	0.2	%
		1117-1.8V Iout=10mA, 3.3V≤Vin≤12V		2.0	7.0	mV
		1117-2.5V Iout=10mA, 4.0V≤Vin≤12V		2.0	7.0	mV
		1117-2.85V Iout=10mA, 4.35V≤Vin≤12V		2.0	7.0	mV
		1117-3.3V Iout=10mA, 4.8V≤Vin≤12V		3.0	7.0	mV
		1117-5.0V Iout=10mA, 6.5V≤Vin≤12V		4.0	10.0	mV
△Vout	Load regulation	1117-1.2V Vin =2.7V, 10mA≤Iout≤1A		3	12	mV
		1117-1.5V Vin =3.0V, 10mA≤Iout≤1A		3	15	mV
		1117-ADJ Vin =2.75V, 10mA≤Iout≤1A		3	13	mV
		1117-1.8V Vin =3.3V, 10mA≤Iout≤1A		4	18	mV
		1117-2.5V Vin =4.0V, 10mA≤Iout≤1A		5	25	mV
		1117-2.85V Vin =4.35V, 10mA≤Iout≤1A		6	29	mV
		1117-3.3 Vin =4.8V, 10mA≤Iout≤1A		7	33	mV
		1117-5.0 Vin =6.5V, 10mA≤Iout≤1A		10	50	mV
Vdrop	Dropout voltage	Iout =100mA		1.15	1.3	V
		Iout=1A		1.3	1.5	V
Imin	Minimum load current	1117-ADJ		2	10	mA
Iq	Quiescent Current	1117-1.2V,Vin=10V		4	8	mA
		1117-1.5V,Vin=10V		4	8	mA

Electrical Characteristics(Con.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Iq	Quiescent Current	1117-1.8V,Vin=12V		4	8	mA
		1117-2.5V,Vin=12V		4	8	mA
		1117-2.85V,Vin=12V		4	8	mA
		1117-3.3V,Vin=12V		4	8	mA
		1117-5.0V,Vin=12V		4	8	mA
IAdj	Adjust pin current	1117-ADJ Vin=5V, 10mA≤Iout≤1A		55	120	uA
Ichange	Iadj change	1117-ADJ Vin=5V, 10mA≤Iout≤1A		0.2	10	uA
ΔV/ ΔT	Temperature coefficient			±100		ppm
θ_{JC}	Thermal resistance	SOT-223/SOT-89		20		℃/W
		TO-252		10		
V_N	Operating Input Voltage	I_O = 5mA			15	V
I_{SC}	Short Circuit Current Limit	V_{IN}=V_{OUT}+1.5V	1000	1200	2000	mA
V_{NO}	Output Noise Voltage	B = 10Hz to 10kHz, T_J = 25℃		100		uV
R · R	Ripple Rejection	I_{OUT}=1A, f=120Hz, Vripple=1Vp-p V_{IN}=V_{OUT}+5V	60	72		dB
TCV_O	Temperature Stability			0.5		%

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

Note2: Load current smaller than minimum load current of 1117-ADJ will lead to unstable or oscillation output.

Detailed Description

1117 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.

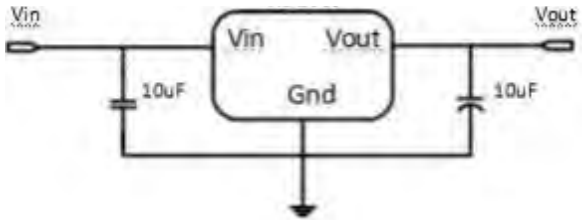
The thermal shut down modules can assure chip and its application system working safetywhen the junction temperature is larger than 140°C.

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

1117 has an adjustable version and sixfixed versions (1.2V, 1.5V,1.8V, 2.5V, 2.85V , 3.3V and 5V)

Fixed Output Voltage Version

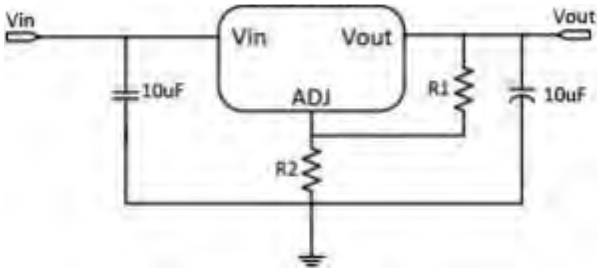


Application circuit of 1117 fixed version

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

1117-ADJ



Application Circuit of 1117-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

1117-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 satisfythis equation: $1/(2\pi \times f_{ripple} \times C_{ADJ}) < R1$.

Thermal Considerations

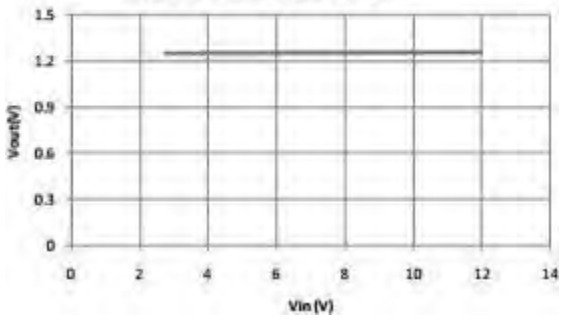
We have to take heat dissipation into great consideration when output current or differential voltage of input and output voltage is large. Because in such cases, the power dissipation consumed by 1117 is very large. 1117 series uses SOT-223 package type and its thermal resistance is about 20°C/W. And 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 byincreasing 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 1117 could allow on itself is less than 1W. And furthermore, 1117 will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.

Typical Performance Characteristics

T_A=25℃, unless otherwise noted.

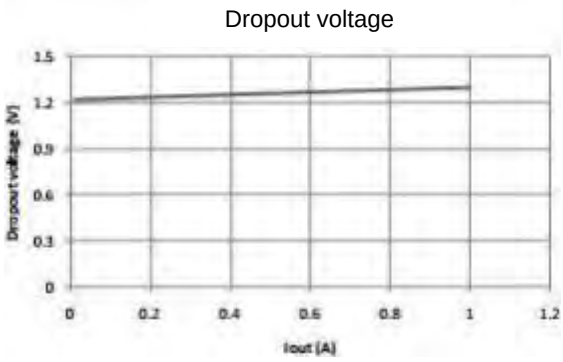
Line regulation

1117-ADJ Vout Vs. Vin



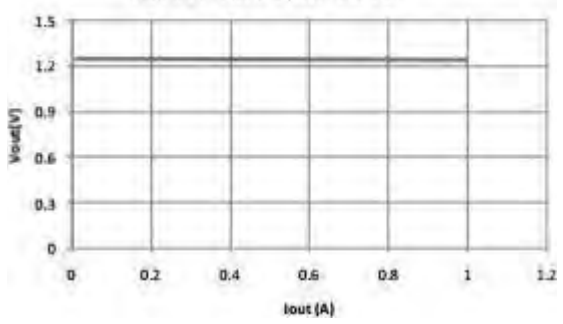
Dropout voltage

Dropout voltage



Load regulation

1117-ADJ Vout Vs. Iout



Thermal performance with OTP

Thermal performance with OTP