LM1117IMP-xx/NOPB

800mA Bipolar Linear Regulator

General Description

LM1117IMP-xx/NOPB is a seres of low dropout three-terminal regulators wiih a dropout of 1.3V at 800mA load current.LM1117IMP-xx/NOPB fatures a very low standby current 2mA compared to 5mA of competitor.

Other than a fixed version, Vout= 1.2V,1.8V, 2.5V,2.85V,3.3V,and 5V,LM1117IMP-xx/NOPB has an adjustable version,which can provide an output voltage from 1.25 to 12V with only two external resistors.

LM1117IMP-xx/NOPB 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%.

LM1117IMP-xx/NOPB is available in SOT-223 power package.

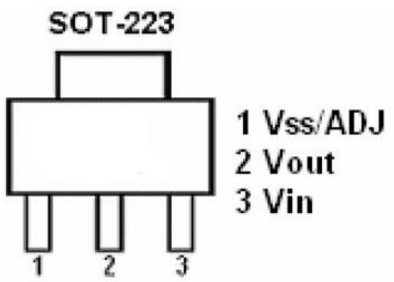
Features

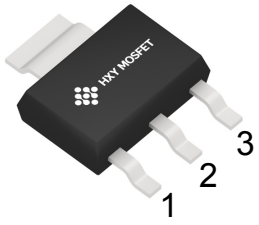
- Maximum output current is 0.8A
- Range of operation input voltage:Max 15V
- Line regulation;0.03%/V(typ.)
- Standby current:2mA(typ.)
- Load regulation:0.2%/A(typ.)
- Environment Temperature:-20°C~85°C

Application

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

Pin Configuration And Descriptions





Order Information

Orderable Device	Package	Output Voltage	Packing Option
LM1117IMP-xx/NOPB	SOT-223	1.2V,1.8V,2.5V,2.85V, 3.3V,5.0V,adj	2500/Reel

xx:From 1.2-5.0,ADJ

Absolute Maximum Ratings

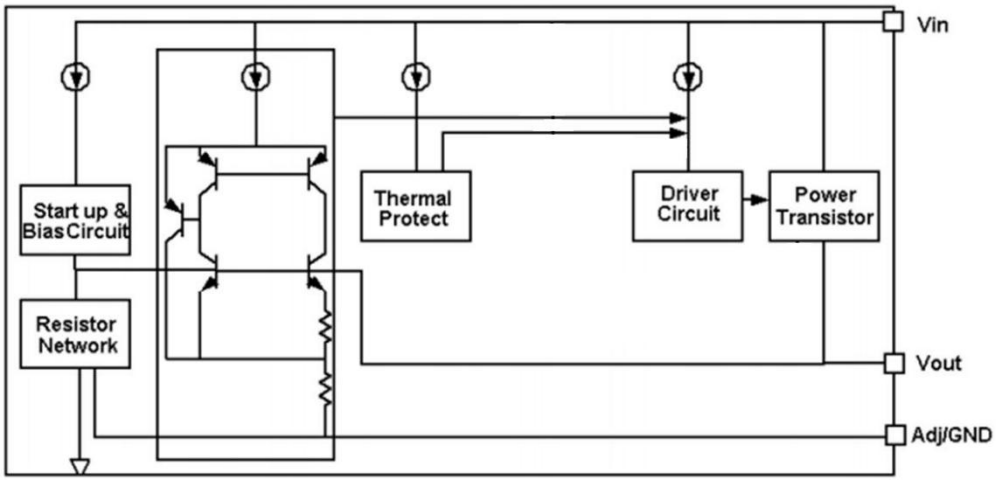
Description	Symbol	Value Range	Unit
MAX Input Voltage	V_{IN}	18	V
Max Operating Junction Temperature	T_j	150	°C
Storage Temperature	T_S	-55～+150	°C
Recommended operating junction temperature	T_j	-20~125	°C

Note:Stresses greater than those listed under "Absolute Maximum Ratingsmay" cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditionsis" not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Heat Dissipation

Description	Symbol	Package	Value Range	Unit
Thermal resistance	θ_{JA}	SOT-223	20	°C/W

Block Diagram



DC Characteristics (unless otherwise noted T_A= 25°C)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vref	Reference voltage	LM1117IMP-ADJ/NOPB 10mA≤Iout≤800mA,Vin=3.25V	1.225	1.25	1.275	V
Vout	Output voltage	LM1117IMP-1.2/NOPB 0≤Iout≤800mA,Vin=3.2V	1.176	1.2	1.224	V
		LM1117IMP-1.8/NOPB 0≤Iout≤800mA,Vin=3.8V	1.764	1.8	1.836	V
		LM1117IMP-2.5/NOPB 0≤Iout≤800mA,Vin=4.5V	2.45	2.5	2.55	V
		LM1117IMP-2.85/NOPB 0≤Iout≤800mA,Vin=4.85V	2.793	2.85	2.907	V
		LM1117IMP-3.3/NOPB 0≤Iout≤800mA,Vin=5.3V	3.234	3.3	3.366	V
		LM1117IMP-5.0/NOPB 0≤Iout≤800mA,Vin=7.0V	4.9	5	5.1	V
△Vout	Line regulation	LM1117IMP-1.2/NOPB Iout=10mA,2.7V≤Vin≤10V		0.03	0.2	%/V
		LM1117IMP-ADJ/NOPB Iout=10mA,2.75V≤Vin≤12V		0.03	0.2	%/V
		LM1117IMP-1.8/NOPB Iout=10mA, 3.3V≤Vin≤12V		0.03	0.2	%/V
		LM1117IMP-2.5/NOPB Iout=10mA,4.0V≤Vin≤12V		0.03	0.2	%/V
		LM1117IMP-2.85/NOPB Iout=10mA,4.35V≤Vin≤12V		0.03	0.2	%/V
		LM1117IMP-3.3/NOPB Iout=10mA,4.8V≤Vin≤12V		0.03	0.2	%/V
		LM1117IMP-5.0/NOPB Iout=10mA,6.5V≤Vin≤12V		0.03	0.2	%/V
△Vout	Load regulation	LM1117IMP-1.2/NOPB Vin=2.7V,10mA≤Iout≤800mA		2	8	mV
		LM1117IMP-ADJ/NOPB Vin=2.75V,10mA≤Iout≤800mA		2	8	mV
		TLM1117IMP-1.8/NOPB Vin=3.3V,10mA≤Iout≤800mA		3	12	mV
		LM1117IMP-2.5/NOPB Vin=4.0V,10mA≤Iout≤800mA		4	16	mV
		LM1117IMP-2.85/NOPB Vin=4.35V,10mA≤Iout≤800mA		5	20	mV
		LM1117IMP-3.3/NOPB Vin=4.8V,10mA≤Iout≤800mA		6	24	mV
		LM1117IMP-5.0/NOPB Vin=6.5,10mA≤Iout≤800mA		9	36	mV

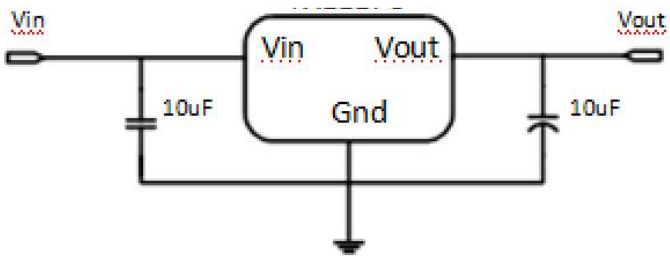
Vdrop	Dropout voltage	Iout =100mA		1.2	1.3	V
		Iout=800mA		1.3	1.5	V
Imin	Minimum load current	LM1117IMP-ADJ/NOPB		2	10	mA
Iq	Quiescent Current	LM1117IMP-1.2/NOPB,Vin=10V		2	5	mA
		LM1117IMP-1.8/NOPB,Vin=12V		2	5	mA
		LM1117IMP-2.5/NOPB,Vin=12V		2	5	mA
		LM1117IMP-2.85/NOPB,Vin=12V		2	5	mA
		LM1117IMP-3.3/NOPB,Vin=12V		2	5	mA
		LM1117IMP-5.0/NOPB,Vin=12V		2	5	mA
IAdj	Adjust pin current	LM1117IMP-ADJ/NOPB Vin=5V,10mA≤Iout≤800mA		55	120	uA
Ichange	Iadj change	LM1117IMP-ADJ/NOPB Vin=5V,10mA≤Iout≤800mA		0.2	10	uA
OTP	Thermal Shutdown	Junction Temperature		+200		℃
	Thermal Shutdown Hysteresis	Junction Temperature		+30		℃
ΔV/ΔT	Temperature coefficien			±100		ppm
θ_{JC}	Thermal resistance	SOT-223		20		℃/W

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 LM1117IMP-ADJ/NOPB will lead to unstable or oscillation output.

Application Circuit

Basic Circuits



Application circuit of LM1117IMP-xx/NOPB fixed version

Function Description

LM1117IMP-xx/NOPB 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 drive circuit and so on.

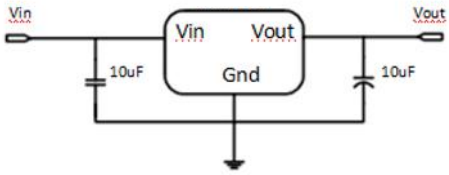
The thermal shut down modules can a ssure chip and its application system working safety when the junction temperature is larger than 140°C.

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

LM1117IMP-xx/NOPB has an adjustable version and six fixed versions(1.2V,1.8V,2.5V,2.85V,3.3V and 5V)

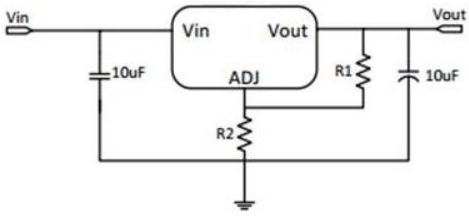
Fixed Output Voltage Version



Application circuit of LM1117IMP-xx/NOPB 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 LM1117IMP-ADJ/NOPB

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 LM1117IMP-ADJ/NOPB can keep itself stable at load current about 2mA, R1 is not allowed to be higher than 625ohm.

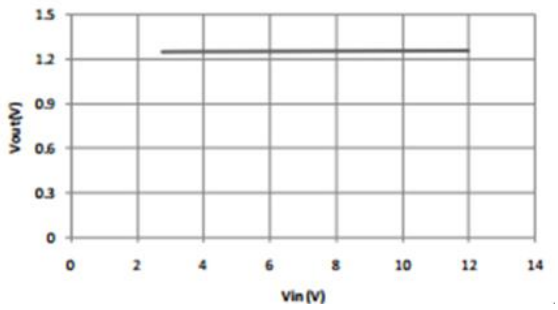
2) Using a bypass capacitor (C_{ADJ}) between the ADJ pin and ground can improve ripple rejection. This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of C_{ADJ} should be less than R1 to prevent ripple from being amplified. As R1 is normally in 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

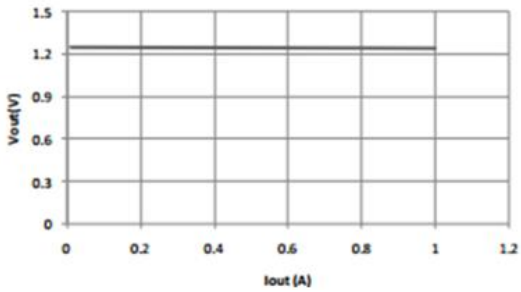
We have to take heat dissipation into great consideration when output current or differential voltage of input and output voltage is large. Because in such cases, the power dissipation consumed by LM1117IMP-xx/NOPB is very large. LM1117IMP-xx/NOPB series uses SOT-223 package type and its thermal resistance 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 LM1117IMP-xx/NOPB could allow on itself is less than 1W. And furthermore, LM1117IMP-xx/NOPB will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.

Typical Characteristics

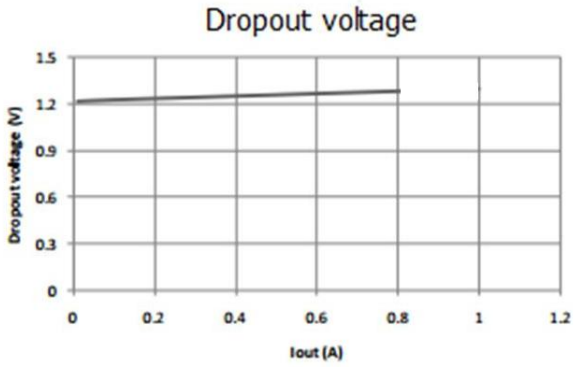
Line regulation



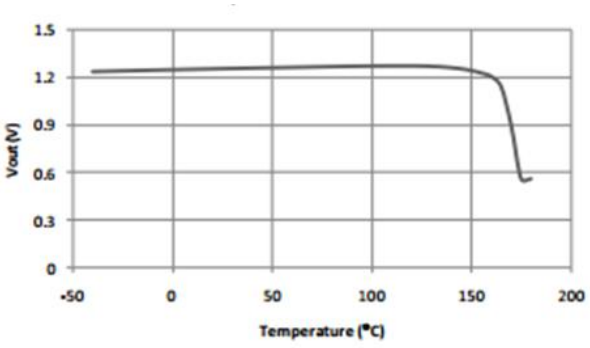
Load regulation



Dropout voltage

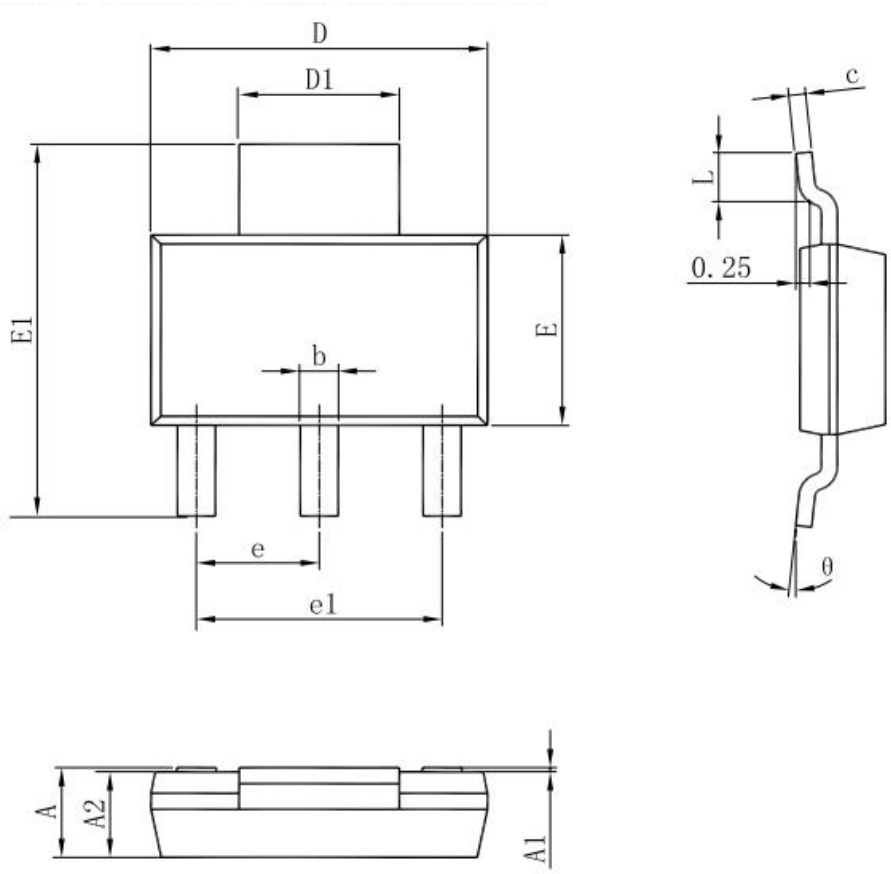


Thermal performance with OTP



Package Outline Dimensions

SOT-223



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°

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