# 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.

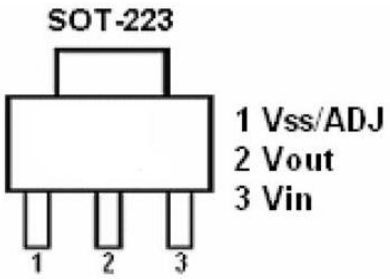
## Features

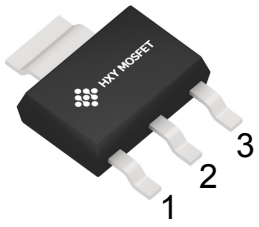
- Maximum output current is 0.8A
- Range of operation input voltage:Max 15V
- Line regulation;0.03%/V(typ.)
- Standby current:2mA(typ.)
- Load regulation:0.2%/A(typ.)
- Environment Temperature:-20°C~85°C

## 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

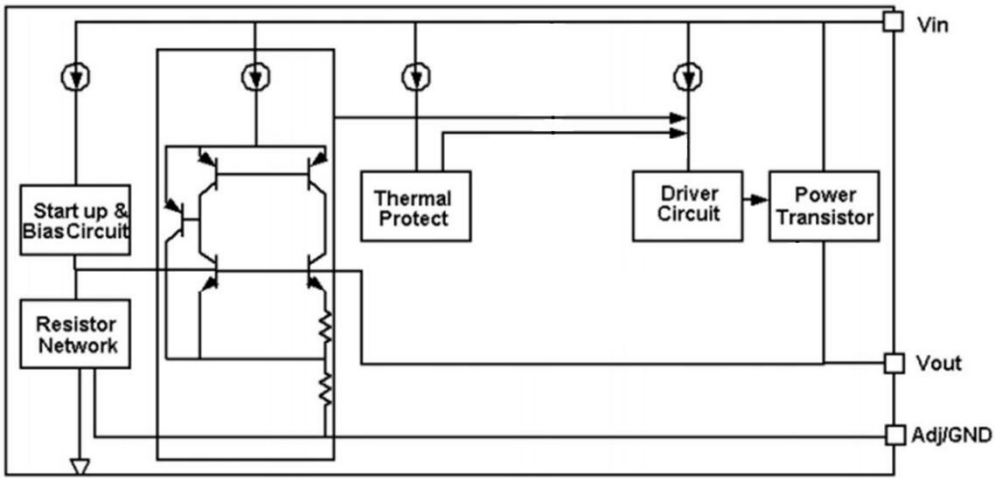
| Description | Symbol | Value Range | Unit |
|---|---|---|---|
| MAX Input Voltage | $V_{IN}$ | 18 | V |
| Max Operating Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature | $T_S$ | -55～+150 | °C |
| Recommended operating junction temperature | $T_j$ | -20~125 | °C |

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 | $\theta_{JA}$ | 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<br>10mA≤Iout≤800mA,Vin=3.25V | 1.225 | 1.25 | 1.275 | V |
| Vout | Output voltage | LM1117IMP-1.2/NOPB<br>0≤Iout≤800mA,Vin=3.2V | 1.176 | 1.2 | 1.224 | V |
| | | LM1117IMP-1.8/NOPB<br>0≤Iout≤800mA,Vin=3.8V | 1.764 | 1.8 | 1.836 | V |
| | | LM1117IMP-2.5/NOPB<br>0≤Iout≤800mA,Vin=4.5V | 2.45 | 2.5 | 2.55 | V |
| | | LM1117IMP-2.85/NOPB<br>0≤Iout≤800mA,Vin=4.85V | 2.793 | 2.85 | 2.907 | V |
| | | LM1117IMP-3.3/NOPB<br>0≤Iout≤800mA,Vin=5.3V | 3.234 | 3.3 | 3.366 | V |
| | | LM1117IMP-5.0/NOPB<br>0≤Iout≤800mA,Vin=7.0V | 4.9 | 5 | 5.1 | V |
| △Vout | Line regulation | LM1117IMP-1.2/NOPB<br>Iout=10mA,2.7V≤Vin≤10V | | 0.03 | 0.2 | %/V |
| | | LM1117IMP-ADJ/NOPB<br>Iout=10mA,2.75V≤Vin≤12V | | 0.03 | 0.2 | %/V |
| | | LM1117IMP-1.8/NOPB<br>Iout=10mA, 3.3V≤Vin≤12V | | 0.03 | 0.2 | %/V |
| | | LM1117IMP-2.5/NOPB<br>Iout=10mA,4.0V≤Vin≤12V | | 0.03 | 0.2 | %/V |
| | | LM1117IMP-2.85/NOPB<br>Iout=10mA,4.35V≤Vin≤12V | | 0.03 | 0.2 | %/V |
| | | LM1117IMP-3.3/NOPB<br>Iout=10mA,4.8V≤Vin≤12V | | 0.03 | 0.2 | %/V |
| | | LM1117IMP-5.0/NOPB<br>Iout=10mA,6.5V≤Vin≤12V | | 0.03 | 0.2 | %/V |
| △Vout | Load regulation | LM1117IMP-1.2/NOPB<br>Vin=2.7V,10mA≤Iout≤800mA | | 2 | 8 | mV |
| | | LM1117IMP-ADJ/NOPB<br>Vin=2.75V,10mA≤Iout≤800mA | | 2 | 8 | mV |
| | | TLM1117IMP-1.8/NOPB<br>Vin=3.3V,10mA≤Iout≤800mA | | 3 | 12 | mV |
| | | LM1117IMP-2.5/NOPB<br>Vin=4.0V,10mA≤Iout≤800mA | | 4 | 16 | mV |
| | | LM1117IMP-2.85/NOPB<br>Vin=4.35V,10mA≤Iout≤800mA | | 5 | 20 | mV |
| | | LM1117IMP-3.3/NOPB<br>Vin=4.8V,10mA≤Iout≤800mA | | 6 | 24 | mV |
| | | LM1117IMP-5.0/NOPB<br>Vin=6.5,10mA≤Iout≤800mA | | 9 | 36 | mV |

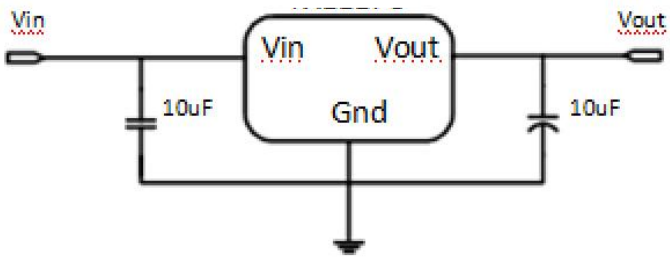
| | | | | | | |
|---|---|---|---|---|---|---|
| Vdrop | Dropout voltage | Iout =100mA | | 1.2 | 1.3 | V |
| | | Iout=800mA | | 1.3 | 1.5 | V |
| Imin | Minimum load current | LM1117IMP-ADJ/NOPB | | 2 | 10 | mA |
| Iq | Quiescent Current | LM1117IMP-1.2/NOPB,Vin=10V | | 2 | 5 | mA |
| | | LM1117IMP-1.8/NOPB,Vin=12V | | 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 |
| $\theta_{JC}$ | 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.

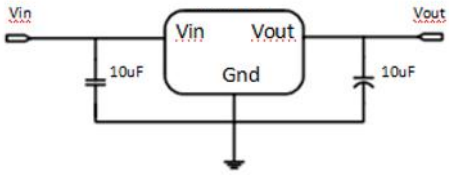
The thermal shut down modules can a ssure chip and its application system working safety when the junction temperature is larger than 140°C.

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)

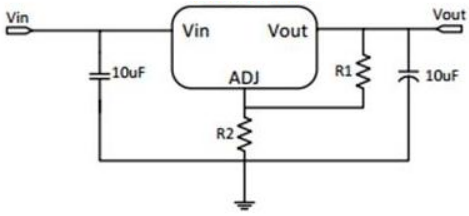
### Fixed Output Voltage Version




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.

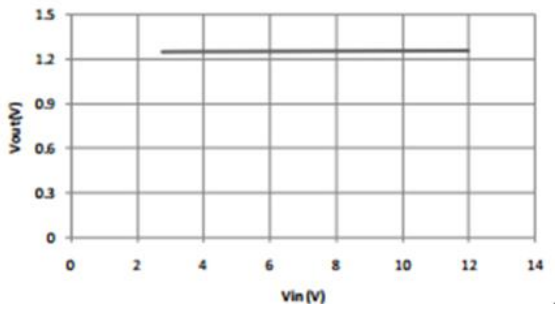
2) Using a bypass capacitor ($C_{ADJ}$) between the ADJ pin and ground can improve ripple rejection. This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of $C_{ADJ}$ should be less than R1 to prevent ripple from being amplified. As R1 is normally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

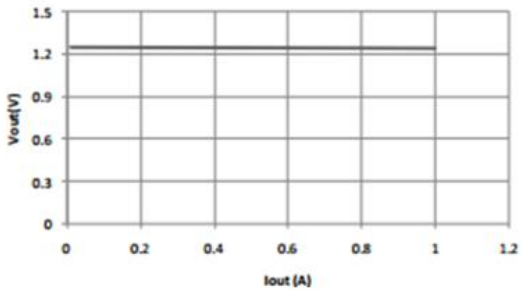
We have to take heat dissipation into great consideration when output current or differential voltage of input and output voltage is large. Because in such cases, the power dissipation consumed by LM1117IMP-xx/NOPB is very large. LM1117IMP-xx/NOPB series uses SOT-223 package type and its thermal resistance 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

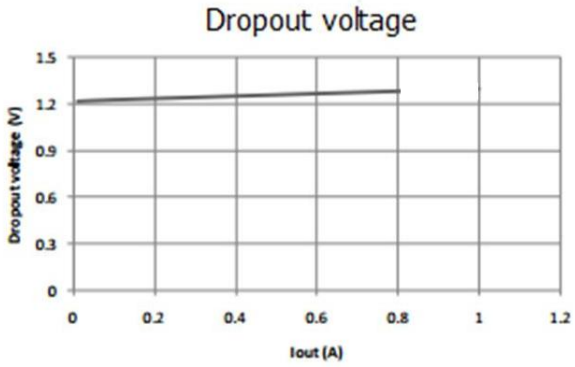
**Line regulation**



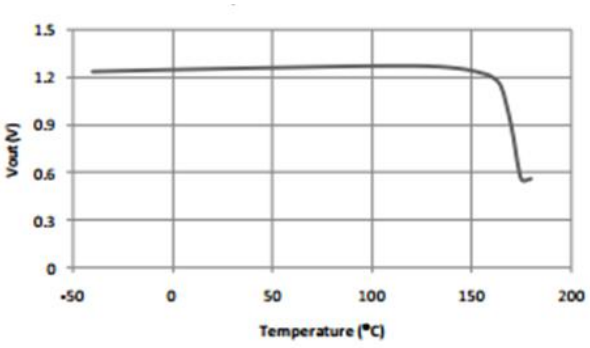

**Load regulation**




**Dropout voltage**

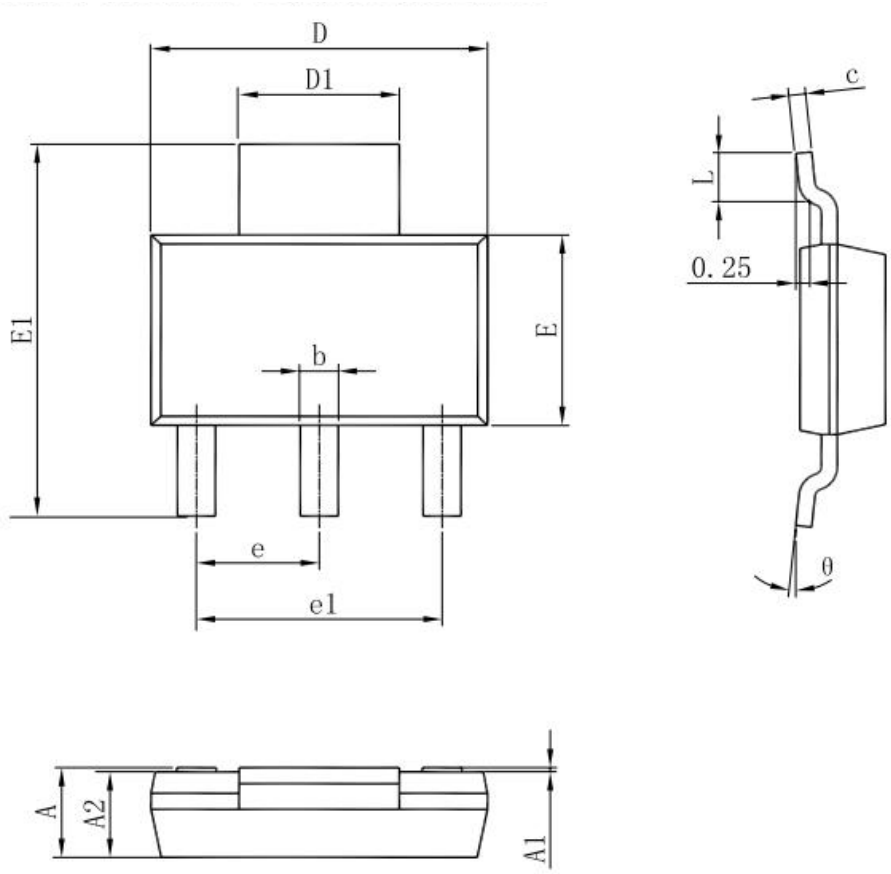



**Thermal performance with OTP**



## 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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## HXY MOSFET:

PJSD24CW_R1 AZ4007-01H BV05C-H HESD36VD3B HESDSLC3V3D3B HLY323BC1524L HSEN2411D3 HAZ4007-01H HSD15C.TCT HSG3D15B3.3MA LM393DR-HXY PESDNC2XD5VBF PESDNC2XD5VBL TPSMB100CA-VR AQ15C-01FTG HACPDQC5V0-HF TPSMB28A-VR HSEN3611D3 HSTS521050B331 PJEC5V0M1FN2 HCEZ36V,L3F HRCLAMP3371ZCTFT AZ4836-01L ESD5LM5.0C-HXY ESD5L5.0C-HXY HPTVSUC3D5VB PESDLC2FD3V3BH RLSD32A121V 60N06 PESDSC2FD5VU