UP1117B

1A Bipolar Linear Regulator

■ DESCRIPTION

The UP1117B series is a set of low dropout three-terminal with a dropout of 1.3V at 1A load current UP1117B features a very low standby current 2mA compared to 5mA of competitor.

Other than a fixed version, V_{OUT}=1.2V, 1.8V, 2.5V, 2.85V, 3.3V and 5V, UP1117B has an adjustable version, which can provide an output voltage from 1.25V to 12V whit only two external resistors.

UP1117B offers thermal shutdown 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.

UP1117B is available in SOT223,TO252 package

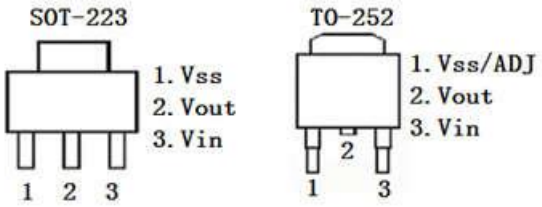
■ FEATURE

- ***Maximum output current is 1.4A***
- ***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℃~85℃***
- ***Output voltage accuracy : tolerance 2%***
- ***SOT223, TO-252 power packages***

■ APPLICATIONS

- Power Management for Computer Mother
- LCD Monitor and LCD TV
- ADSL Modem

■ PIN CONFIGURATION



■ PART NUMBER INFORMATION

UP1117B XX A	XX=Output Voltage, blank is ADJ A=Package Code S: SOT223 Y: TO252

■ ORDERING INFROMATION

Part Number	Output Voltage	Package	Marking
UP1117B-50-S	5.0	SOT223	2500EA / T&R
UP1117B-50-Y	5.0	TO252	2500EA / T&R

■ ABSOLUTE MAXIMUM RATINGS (T_A = 25℃ Unless otherwise noted)

Symbol	Parameter	Typical	Unit
$V_{IN(MAX)}$	Supply Voltage	18	V
T_J	Operation Junction Temperature	150	℃
T_{STG}	Storage Temperature Range	-40~+150	℃
T_P	Operation Temperature	-40~+80	℃

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress rating only and functional device operation is not implied

■ THERMAL DATA

Symbol	Parameter	Package	Max	Unit
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	SOT223	20	℃/W
		TO252	12.5	℃/W

■ ELECTRICAL CHARACTERISTICS(T_A=25℃ Unless otherwise noted)

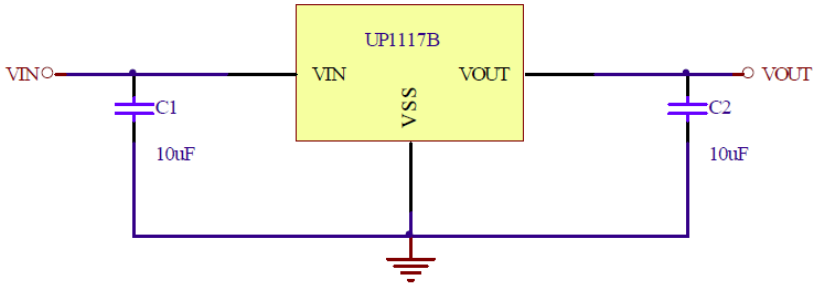
Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{IN}	Input Voltage				15	V
Vref	Refer Voltage	V_{IN}=3.25, I_{OUT}=100mA	1.25	1.25	1.275	V
V_{OUT}	Output Voltage	V_{IN}=V_{OUT}+2V, I_{OUT}=100mA	V_{OUT}*0.98		V_{OUT}*1.02	V
I_{OUT}	Output Current	V_{IN}=V_{OUT}+2V	1			A
ΔV_{OUT}	Load Regulation	V_{IN}=V_{OUT}+1.5V, 10mA≤I_{OUT}≤1A		8	24	mV
V_{DIF1}	Dropout Voltage	I_{OUT}=100mA,ΔV_{OUT}=5%		1.15	1.3	V
V_{DIF2}	Dropout Voltage	I_{OUT}=1A,ΔV_{OUT}=5%		1.3	1.5	V
I_{SS}	Quiescent Current	No Load, V_{IN}=12V		2.0	5.0	mA
$\Delta V_{OUT}/\Delta V_{IN}$*$V_{OUT}$	Line Regulation	V_{OUT}+1.5V≤V_{IN}≤12V, I_{OUT}=10mA		0.03	0.2	%V

Note: Dropout voltage is defined as the input voltage minus the output voltage that produces a 5% change in the output voltage from the value at V_{IN}=V_{OUT}+2V with a fixed load

■ *Typical Application*

UP1117B has an adjustable version and six fixed versions

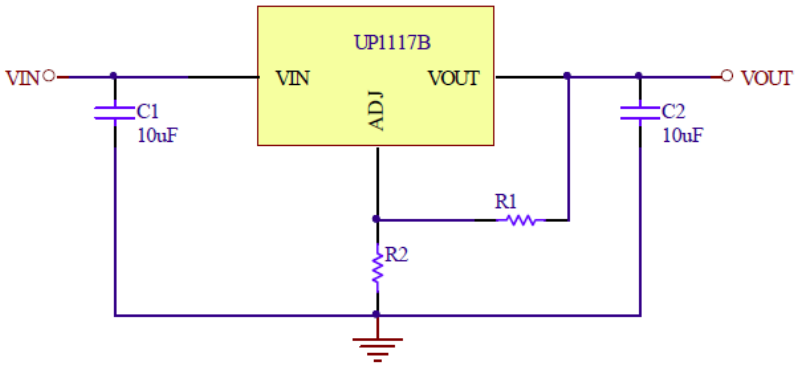
Fixed Output Voltage Version



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



The output voltage of adjustable version follows the equation: VOUT=1.25(1+R2/R1)+IAdjXR2. We can ignore IAdj because IAdj (about 50uA) is much less the current of R1 (about 2~10mA).

To meet the minimum load current (>10mA) requirement, R1 is recommended to be 125ohm or lower.

UP1117B-ADJ can keep itself stable at load current about 2mA, R1 is not allowed to be higher than 625ohm

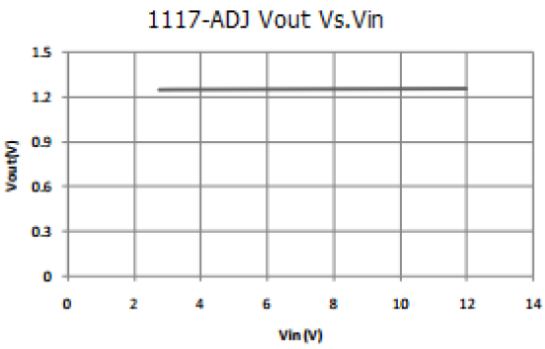
Using a bypass capacitor (CADJ) between the ADJ pin and ground can improve ripple rejection. This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of CADJ should be less than R1 to prevent ripple from being amplified. As R1 is normally in the range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

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 UP1117B is very large. UP1117B series uses SOT223 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, 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 120C/W, then the power dissipation of UP1117B could allow on itself is less than 1W. And furthermore, UP1117B will work at junction temperature higher than 125℃ under such condition and no lifetime is guaranteed.

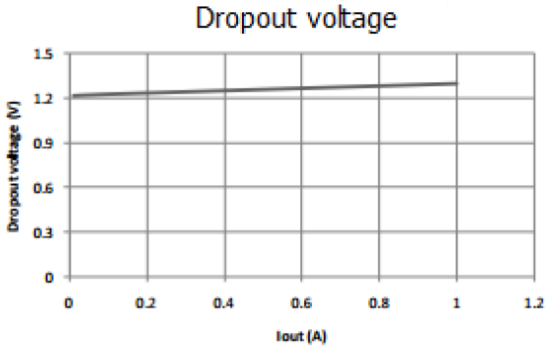
■ TYPICAL PERFORMANCE CHARACTERISTICS

Test Condition : T_J=25℃, unless otherwise noted

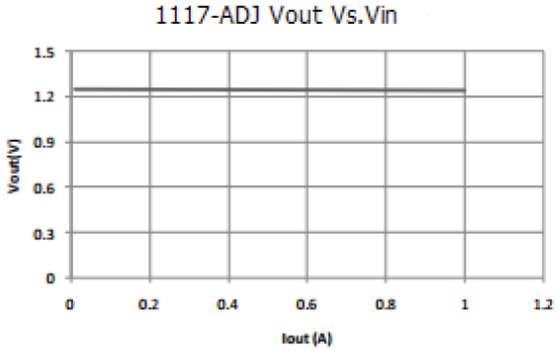
Line regulation



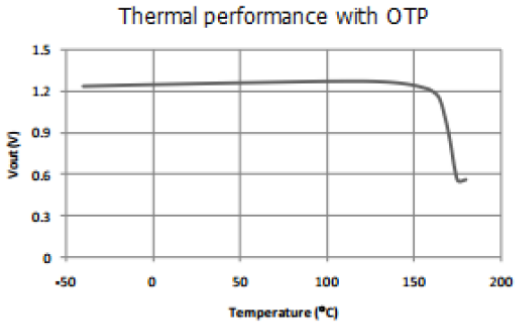
Dropout voltage



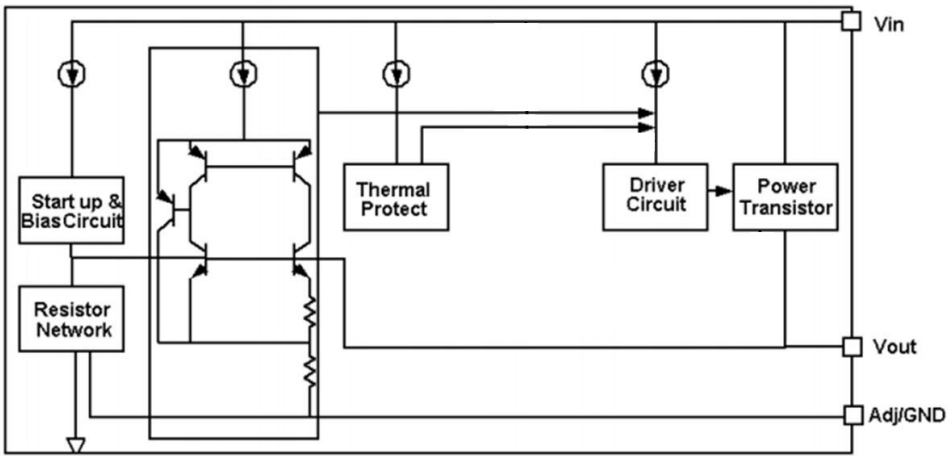
Load regulation



Thermal performance with OTP

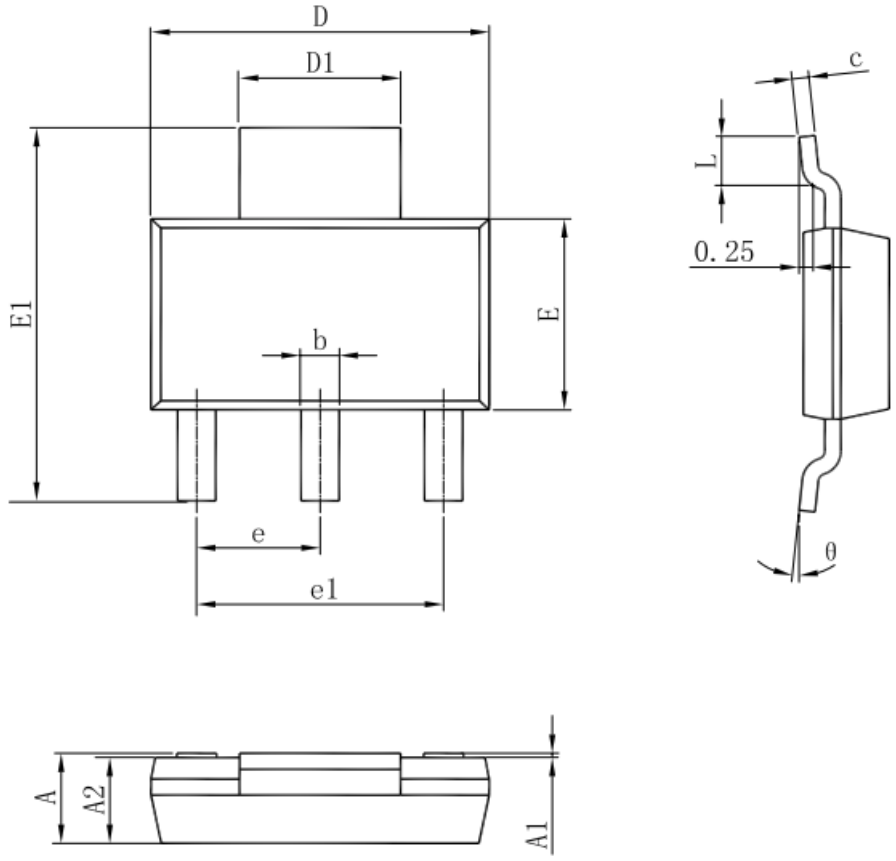


■ BLOCK DIAGRAM



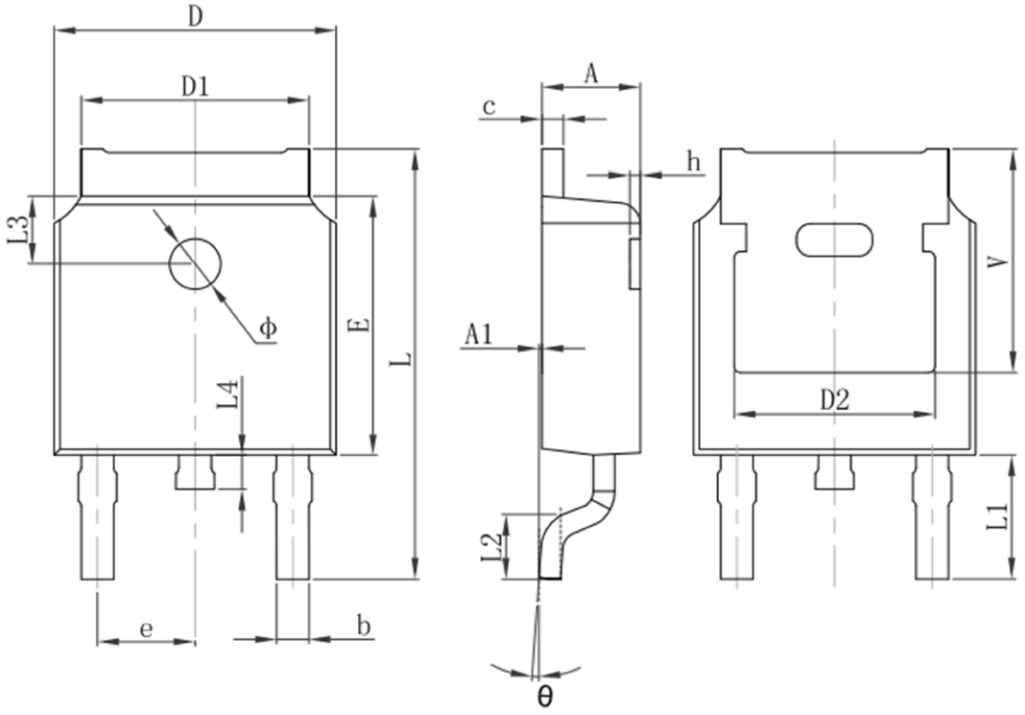
■ PACKAGE INFORMATION

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

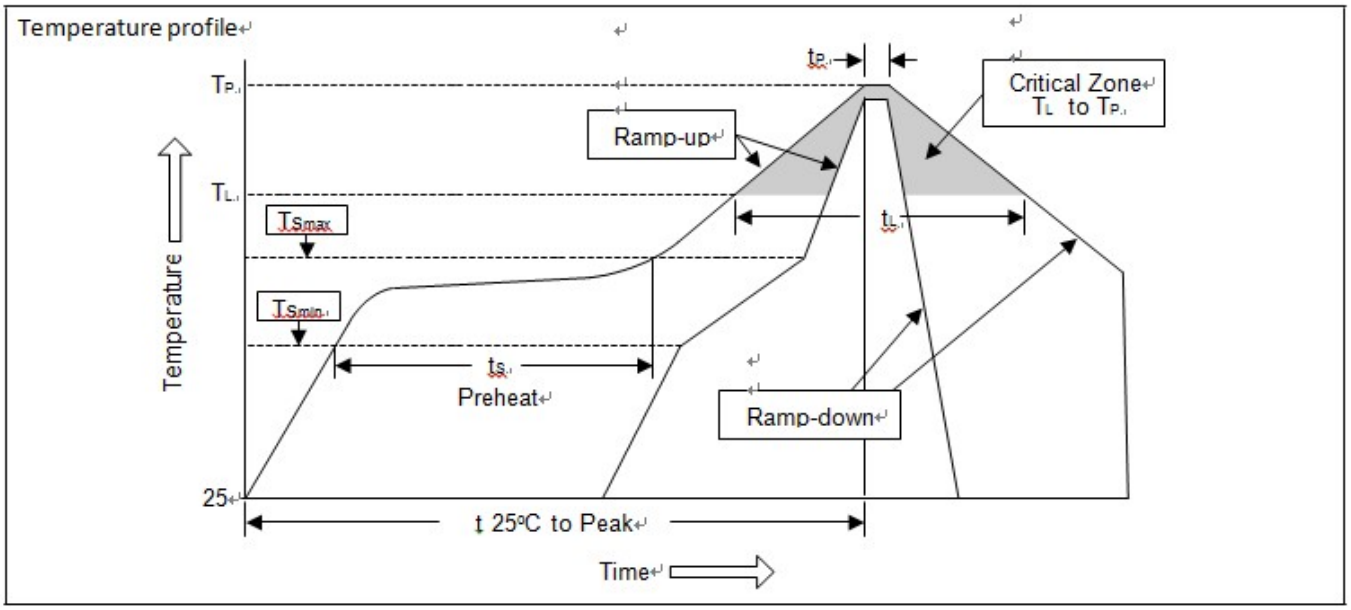


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	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.	

■ SOLDERING METHODS FOR UNIVERCHIP

Storage environment Temperature=10℃~35℃ Humidity=65%±15%

Reflow soldering of surface mount device



Profile Feature	Sn-Pb Eutectic Assembly	Pb free Assembly
Average ramp-up rate (T_L to T_P)	<3℃/sec	<3℃/sec
Preheat -Temperature Min (Ts_{min}) -Temperature Max (Ts_{max}) -Time (min to max) (ts)	 100℃ 150℃ 60~120 sec	 150℃ 200℃ 60~180 sec
Tsmax to T_L -Ramp-up Rate	<3℃/sec	<3℃/sec
Time maintained above -Temperature (T_L) -Time (t_L)	 183℃ 60~150 sec	 217℃ 60~150 sec
Peak Temperature (T_P)	240℃+0/-5℃	260℃+0/-5℃
Time within 5℃ of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down Rate	<6℃/sec	<6℃/sec
Time 25℃ to Peak Temperature	<6 minutes	<6 minutes

Flow (wave) soldering (solder dipping)

Product	Peak Temperature	Dipping Time
Pb device	245℃±5℃	5sec±1sec
Pb-Free device	260℃+0/-5℃	5sec±1sec

This integrated circuit can be damaged by ESD UniverChip Corporation recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedure can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.