1A Bipolar Linear Regulator

General Description

The ET1117 series are the low dropout three-terminal regulators with fixed output and ADJ output.

The ET1117 series features dropout of 1.3V at 1A load current and very low standby current 2mA.

ET1117 series offers thermal shut down function to assure the stability of chip and power system.

The ET1117 series are available in the SOT-223 package.

Features

- Maximum Output Current is 1.2A (TYP)
- Range of Operation Input Voltage up to 15V (MAX)
- Line Regulation is 0.03%/V (TYP)
- Standby Current is 2mA (TYP)
- Low Dropout Voltage is 1.3V(TYP)@1A
- Environment Temperature Range is -40°C~85°C
- Package is SOT-223 for Good Heat Dissipation

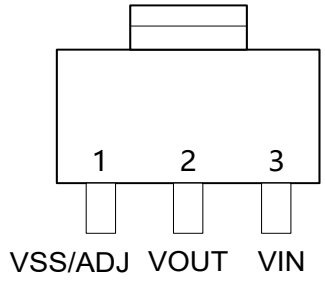
Applications

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

Device Information

Part No.	VOUT Type	Package
ET1117	ADJ Output	SOT-223
ET1117V18	1.8V Fixed Output	SOT-223
ET1117V33	3.3V Fixed Output	SOT-223
ET1117V50	5.0V Fixed Output	SOT-223

Pin Configuration

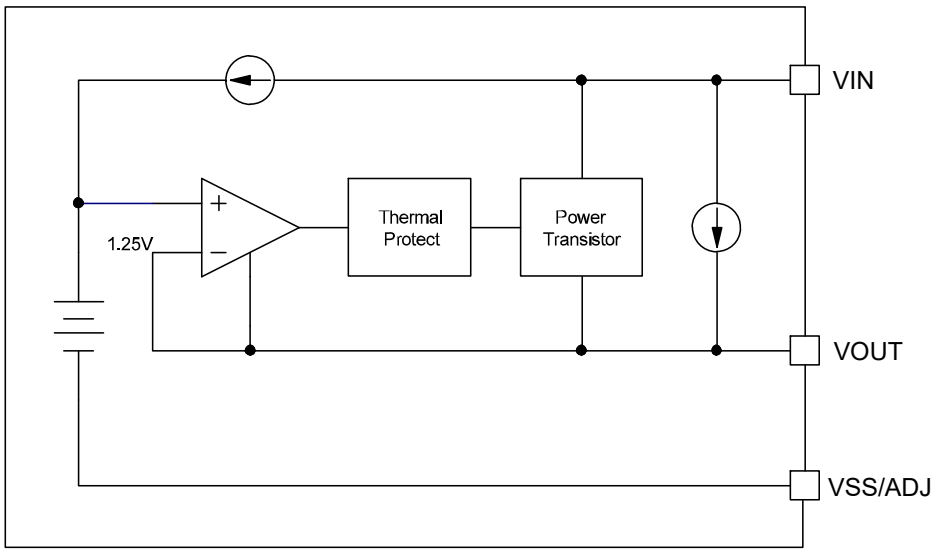


TOP VIEW

Pin Function

Pin No.	Symbol	Pin Description
1	VSS /ADJ	Ground Pin(Fixed Type) /ADJ Pin (ADJ Type)
2	VOUT	Output Pin
3	VIN	Input Pin

Block Diagram



Functional Description

ET1117 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, band gap, thermal shutdown, power transistors and its driver circuit and so on.

The thermal shutdown modules can assure chip and its application system working safety when the junction temperature is larger than 125°C.

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 ET1117 is very large.

ET1117 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 ET1117 could allow on itself is less than 1W. And furthermore, ET1117 will work at junction temperature higher than 125° C under such condition and no lifetime is guaranteed.

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	-0.3~18	V
I_{OUT}	Output Current	1.2	A
T_{JMAX}	Operating Junction Temperature	150	ºC
T_{STG}	Storage Temperature	-40~150	ºC
P_D	Power Dissipation (Standard Land Pattern)	1.25	W

Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

Recommended Work Conditions

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	Max 15	V
I_{OUT}	Output Current	Max 1.0	A
T_J	Operating Junction Temperature	-40 ~ 125	ºC
T_A	Ambient Temperature	-40 ~ 85	ºC

Electrical Characteristics

T_A=25ºC, unless otherwise noted.

ET1117V18

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	0≤ I_{OUT} ≤1A , V_{IN}=3.8V	1.755	1.8	1.854	V
V_{OUT}	Output Voltage	3.8V≤ V_{IN} ≤12V , I_{OUT}=10mA	1.764	1.8	1.836	V
$\triangle V_{OUT}/V_{IN}$	Line Regulation	I_{OUT}=10mA, 3.8V≤ V_{IN} ≤12V		0.03	0.2	%/V
$\triangle V_{OUT}/I_{OUT}$	Load Regulation	V_{IN} =3.3V, 10mA≤ I_{OUT} ≤1A		6	24	mV
V_{DIF}	Dropout Voltage	I_{OUT} =100mA		1.15	1.3	V
		I_{OUT} =500mA		1.20	1.4	V
		I_{OUT} =800mA		1.25	1.45	V
		I_{OUT} =1A		1.3	1.5	V
I_Q	Quiescent Current	V_{IN}=12V		2	5	mA
I_{LIMIT}	Max Limit Current	V_{IN} – V_{OUT} = 5V	1.2	1.4		A
PSRR	Ripple Rejection	V_{IN} – V_{OUT} = 3V, V_{RIPPLE} = 1V_{PP}, F= 120Hz		65		dB
ΔV/ΔT	Temperature Coefficient	-40 ºC ~125 ºC		±100		ppm

Electrical Characteristics

T_A=25ºC, unless otherwise noted.

ET1117V33

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	0≤ I_{OUT} ≤1A , V_{IN}=5.3V	3.234	3.3	3.366	V
V_{OUT}	Output Voltage	5.3V≤ V_{IN} ≤12V , I_{OUT}=10mA	3.234	3.3	3.366	V
$\triangle V_{OUT}/V_{IN}$	Line Regulation	I_{OUT}=10mA, 5.3V≤ V_{IN} ≤12V		0.03	0.2	%/V
$\triangle V_{OUT}/I_{OUT}$	Load Regulation	V_{IN} =4.8V, 10mA≤ I_{OUT} ≤1A		6	24	mV
V_{DIF}	Dropout Voltage	I_{OUT} =100mA		1.15	1.3	V
		I_{OUT} =500mA		1.20	1.4	V
		I_{OUT} =800mA		1.25	1.45	V
		I_{OUT} =1A		1.3	1.5	V
I_Q	Quiescent Current	V_{IN}=12V		2	5	mA
I_{LIMIT}	Max Limit Current	V_{IN} – V_{OUT} = 5V	1.2	1.4		A
PSRR	Ripple Rejection	V_{IN} – V_{OUT} = 3V, V_{RIPPLE} = 1V_{PP}, F= 120Hz		65		dB
ΔV/ΔT	Temperature Coefficient	-40 ºC ~125 ºC		±100		ppm

Electrical Characteristics

T_A=25ºC, unless otherwise noted.

ET1117V50

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	0≤ I_{OUT} ≤1A , V_{IN}=7.0V	4.90	5.0	5.10	V
V_{OUT}	Output Voltage	7.0V≤ V_{IN} ≤12V , I_{OUT}=10mA	4.90	5.0	5.10	V
$\triangle V_{OUT}/V_{IN}$	Line Regulation	I_{OUT}=10mA, 7.0V≤ V_{IN} ≤12V		0.03	0.2	%/V
$\triangle V_{OUT}/I_{OUT}$	Load Regulation	V_{IN} =6.5V, 10mA≤ I_{OUT} ≤1A		6	24	mV
V_{DIF}	Dropout Voltage	I_{OUT} =100mA		1.15	1.3	V
		I_{OUT} =500mA		1.20	1.4	V
		I_{OUT} =800mA		1.25	1.45	V
		I_{OUT} =1A		1.3	1.5	V
I_Q	Quiescent Current	V_{IN}=12V		2	5	mA
I_{LIMIT}	Max Limit Current	V_{IN} – V_{OUT} = 5V	1.2	1.4		A
PSRR	Ripple rejection	V_{IN} – V_{OUT} = 3V, V_{RIPPLE} = 1V_{PP}, F= 120Hz		65		dB
ΔV/ΔT	Temperature Coefficient	- 40 ºC ~125 ºC		±100		ppm

Electrical Characteristics

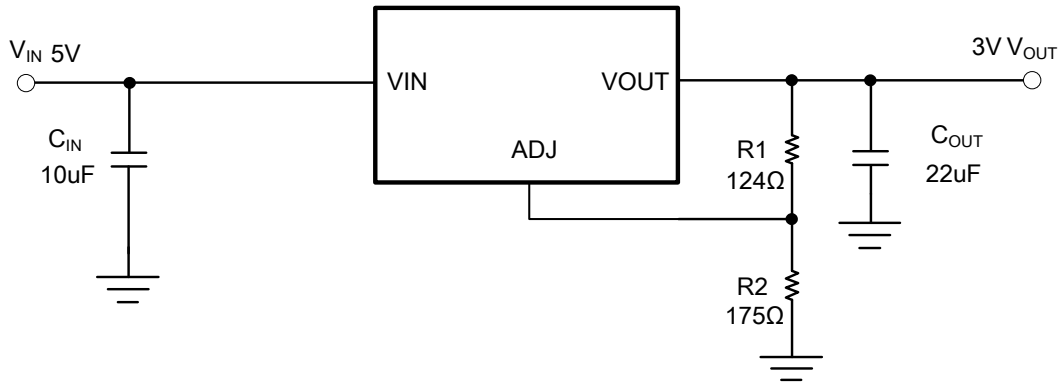
T_A=25ºC, unless otherwise noted.

ET1117

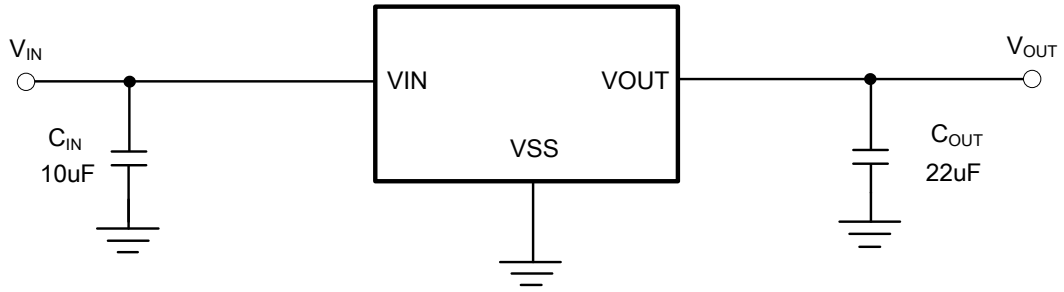
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	Reference Voltage	V_{IN} -V_{OUT}=2V to 10V, 10mA≤I_{OUT}≤1A	1.225	1.25	1.275	V
△V_{OUT}/V_{IN}	Line Regulation	I_{OUT}=10mA, V_{IN} -V_{OUT}=2V to 10V,		0.03	0.2	%/V
△V_{OUT}/I_{OUT}	Load Regulation	V_{IN} -V_{OUT}=1.5V , 10mA≤ I_{OUT} ≤1A		6	24	mV
V_{DIF}	Dropout Voltage	I_{OUT} =100mA		1.15	1.3	V
		I_{OUT} =500mA		1.20	1.4	V
		I_{OUT} =800mA		1.25	1.45	V
		I_{OUT} =1A		1.3	1.5	V
I_{MIN}	Min Load Current (1)	V_{IN}=12V		2	5	mA
I_{LIMIT}	Max Limit Current	V_{IN} – V_{OUT} = 5V	1.2	1.4		A
I_{ADJ}	Adjust pin current	V_{IN}=5V, 10mA≤ I_{OUT} ≤1A		55	120	uA
I_{CHANGE}	I_{ADJ} change	V_{IN}=5V, 10mA≤ I_{OUT} ≤1A		0.2	10	uA
PSRR	Ripple rejection	V_{IN} – V_{OUT} = 3V, V_{RIPPLE} = 1V_{PP}, F= 120Hz		65		dB
ΔV/ΔT	Temperature Coefficient	-40 ºC ~125 ºC		±100		ppm

Note1: Load current smaller than minimum load current of ET1117 will lead to unstable or oscillation output.

Application Circuits



ADJ Type Application Circuit (5V to 3V reference circuit)

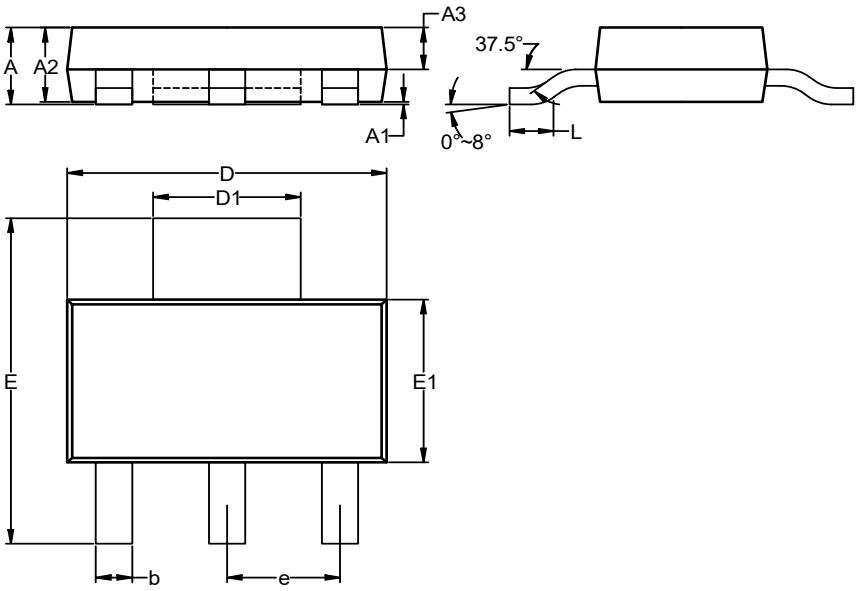


Fixed Type Application Circuit

Note*: For ET1117 (ADJ Type): $V_{OUT} = V_{REF}(1+R2/R1) + I_{ADJ} \times R2$

Package Dimension

SOT-223



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.5	1.65	1.8
A1	0.03	0.06	0.09
A2	1.45	1.60	1.75
A3	0.8	0.9	1
b	0.69	-	0.78
D	6.3	6.5	6.7
D1	3.00REF		
e	2.30BSC		
E	6.8	7	7.2
E1	3.4	3.5	3.6
L	0.9	-	-

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2017-12-26	Original version	Shibo	Shibo	Zhujl
1.1	2019-01-25	Revise package size	Wuy	Wuy	Liujy
1.2	2022-11-11	Update Typeset	Shib	Shib	Liujy
1.3	2022-12-07	Update Block	Wuhan	Shib	Liujy
1.4	2023-5-9	Load Regulation changed V_{IN} -V_{OUT}=1.5V	Shibo	Shibo	