



Description

The SP1117A is a low dropout three-terminal regulator with a dropout of 1.2V at 1A output current.

The SP1117A has been optimized for low voltage where transient response and minimum input voltage are critical. It provides current limit and thermal shutdown. Its circuit includes a trimmed bandgap reference to assure output voltage accuracy to be within 1%. On-chip thermal shutdown provides protection against a combination of high current and ambient temperature. The SP1117A is available in 1.8V, 2.5V and 3.3V versions. The fixed versions integrate the adjust resistors. It is also available in an adjustable version which can set the output voltage with two external resistors.

The SP1117A is available in the industry-standard SOT-223 power package.

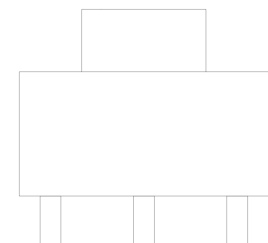
Features

- Low Dropout Voltage: 1.2V at 1A Output Current
- Output Noise from 10Hz to 10KHz: 0.003%
- PSRR at IOUT=300mA and f=120Hz: 70dB
- Output Voltage Accuracy: 1%
- On-chip Thermal Shutdown
- Maximum Quiescent Current: IQMAX=6mA
- Operation Junction Temperature: -40 to 125 °C
- OCP,OVP,OTP

Applications

- USB Device
- Add-on Card
- DVD Player
- PC Motherboard

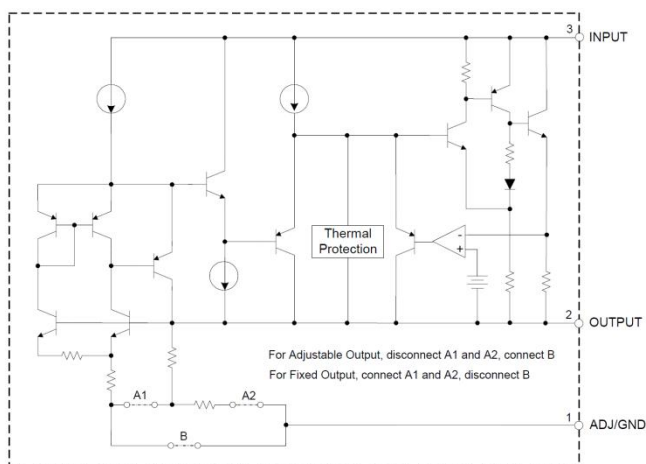
Pin Assignment



GND/ADJ VOUT VIN

SOT-223

Simplified Block Diagram





Order Information

SP1117AV①②

Designator	Description
①	Output Voltage 18=1.8V AD=Adj
②	Package: TC:SOT-223

Marking

Package	Temperature Range	Part Number	Marking ID	Packing Type
SOT-223	-40 to 125 °C	SP1117AV18TC	1718	Tape & Reel
		SP1117AV25TC	1725	Tape & Reel
		SP1117AV33TC	1733	Tape & Reel
		SP1117AVADTC	17AD	Tape & Reel

Absolute Maximum Ratings(Note)

Symbol	Items		Value	Unit
V_{IN}	Input Voltage		~18	V
I_{OUT}	Output Current		1000	mA
P_{DMAX}	Power Dissipation		OTP limited	W
$R_{\theta JA}$	Thermal Resistance	SOT-223	20	°C/W
T_J	Junction Temperature		150	°C
T_{STG}	Storage Temperature		-65 to 150	°C
T_{SOLDER}	Package Lead Soldering Temperature (10s)		260	°C

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

Recommended Operating Range

Symbol	Items	Value	Unit
V_{IN}	Supply Voltage	12	V
T_{OPT}	Operating Temperature	-40 to +85	°C



Electrical Characteristics($T_A=25^{\circ}\text{C}$, unless otherwise noted)

SP1117AV18 Electrical Characteristics

Operating Conditions: $V_{IN}=3.8\text{V}$, $I_{OUT}=10\text{mA}$, $T_J=25^{\circ}\text{C}$, unless otherwise specified. ($P \leq$ maximum power dissipation).

Limits appearing in Boldface type apply over the entire junction temperature range for operation, -20°C to 85°C .

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		1.782	1.8	1.818	V
		$10\text{mA} \leq I_{OUT} \leq 1\text{A}$, $3.8\text{V} \leq V_{IN} \leq 10\text{V}$	1.764	1.8	1.836	
Line Regulation	V_{RLINE}	$1.5\text{V} \leq V_{IN} - V_{OUT} \leq 10\text{V}$		0.5	6	mV
					10	
Load Regulation	V_{RLOAD}	$10\text{mA} \leq I_{OUT} \leq 1\text{A}$		2	10	mV
					25	
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1.0\text{A}$		1.2	1.3	V
Current Limit	I_{LIMIT}		1.1			A
Quiescent Current	I_Q	$I_{OUT}=0$		4	6	mA
Ripple Rejection	PSRR	$f=120\text{Hz}$, $C_{OUT}=22\mu\text{F}$ $(V_{IN}-V_{OUT})=3\text{V}$, $I_{OUT}=300\text{mA}$		70		dB
Temperature Stability				0.5		%
RMS Output Noise (% of V_{OUT})		$T_A=25^{\circ}\text{C}$, $10\text{Hz} \leq f \leq 10\text{KHz}$		0.003		%
Thermal Shutdown		Junction Temperature		160		$^{\circ}\text{C}$
Thermal Shutdown Hysteresis				16		$^{\circ}\text{C}$

SP1117AV25 Electrical Characteristics

Operating Conditions: $V_{IN}=4.5\text{V}$, $I_{OUT}=10\text{mA}$, $T_J=25^{\circ}\text{C}$, unless otherwise specified. ($P \leq$ maximum power dissipation).

Limits appearing in Boldface type apply over the entire junction temperature range for operation, -20°C to 85°C .

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		2.475	2.5	2.525	V
		$10\text{mA} \leq I_{OUT} \leq 1\text{A}$, $4.5\text{V} \leq V_{IN} \leq 10\text{V}$	2.455	2.5	2.545	
Line Regulation	V_{RLINE}	$1.5\text{V} \leq V_{IN} - V_{OUT} \leq 10\text{V}$		0.5	6	mV
					10	
Load Regulation	V_{RLOAD}	$10\text{mA} \leq I_{OUT} \leq 1\text{A}$		2	10	mV
					25	
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1.0\text{A}$		1.2	1.3	V
Current Limit	I_{LIMIT}		1.1			A
Quiescent Current	I_Q	$I_{OUT}=0$		4	6	mA
Ripple Rejection	PSRR	$f=120\text{Hz}$, $C_{OUT}=22\mu\text{F}$ $(V_{IN}-V_{OUT})=3\text{V}$, $I_{OUT}=300\text{mA}$		70		dB
Temperature Stability				0.5		%
RMS Output Noise (% of V_{OUT})		$T_A=25^{\circ}\text{C}$, $10\text{Hz} \leq f \leq 10\text{KHz}$		0.003		%
Thermal Shutdown		Junction Temperature		160		$^{\circ}\text{C}$
Thermal Shutdown Hysteresis				16		$^{\circ}\text{C}$



SP1113AV33 Electrical Characteristics

Operating Conditions: $V_{IN}=5.3V$, $I_{OUT}=10mA$, $T_J=25^{\circ}C$, unless otherwise specified. ($P \leq$ maximum power dissipation).

Limits appearing in Boldface type apply over the entire junction temperature range for operation, $-20^{\circ}C$ to $85^{\circ}C$.

Parameter	Symbol	Conditio	Min	Typ	Max	Unit
Output Voltage	V_{OUT}		3.267	3.3	3.333	V
		$10mA \leq I_{OUT} \leq 1A$, $5.3V \leq V_{IN} \leq 10V$	3.235	3.3	3.365	
Line Regulation	V_{RLINE}	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.5	6	mV
					10	
Load Regulation	V_{RLOAD}	$10mA \leq I_{OUT} \leq 1A$		2	10	mV
					25	
Dropout Voltage	V_{DROP}	$\Delta V_{OUT}=1\%$, $I_{OUT}=1.0A$		1.2	1.3	V
Current Limit	I_{LIMIT}		1.1			A
Quiescent Current	I_Q	$I_{OUT}=0$		4	6	mA
Ripple Rejection	PSRR	$f=120Hz$, $C_{OUT}=22\mu F$ $(V_{IN}-V_{OUT})=3V$, $I_{OUT}=300mA$		70		dB
Temperature Stability				0.5		%
RMS Output Noise (% of V_{OUT})		$T_A=25^{\circ}C$, $10Hz \leq f \leq 10KHz$		0.003		%
Thermal Shutdown		Junction Temperature		160		$^{\circ}C$
Thermal Shutdown Hysteresis				16		$^{\circ}C$

SP1117AVAD Electrical Characteristics

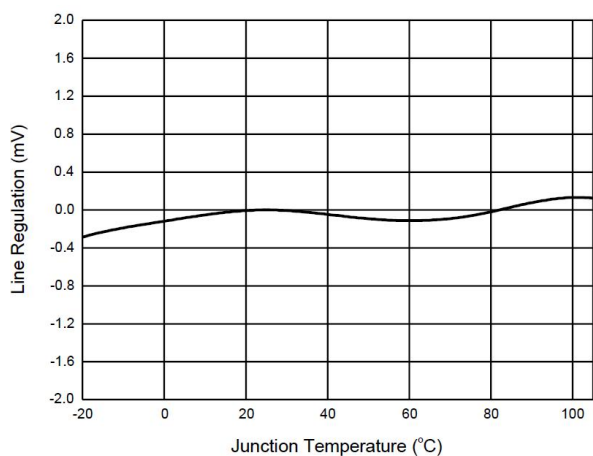
Operating Conditions: $V_{IN}=V_{OUT}+2V$, $I_{OUT}=10mA$, $T_J=25^{\circ}C$, unless otherwise specified. ($P \leq$ maximum power dissipation).

Limits appearing in Boldface type apply over the entire junction temperature range for operation, $-20^{\circ}C$ to $85^{\circ}C$.

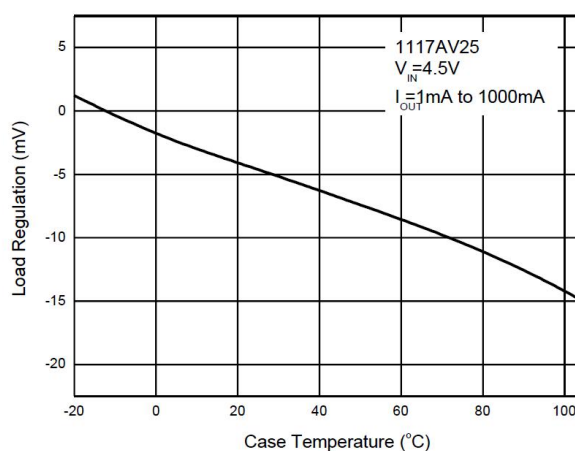
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reference Voltage	V_{REF}		1.238	1.250	1.262	V
		$10mA \leq I_{OUT} \leq 1A$, $1.5V \leq V_{IN} - V_{OUT} \leq 10V$	1.225	1.250	1.270	
Line Regulation	V_{RLINE}	$1.5V \leq V_{IN} - V_{OUT} \leq 10V$		0.001	0.1	%
					0.2	
Load Regulation	V_{RLOAD}	$10mA \leq I_{OUT} \leq 1A$		0.1	0.4	%
					0.5	
Dropout Voltage	V_{DROP}	$\Delta V_{REF}=1\%$, $I_{OUT}=1.0A$		1.2	1.3	V
Current Limit	I_{LIMIT}		1.1			A
Adjust Pin Current				60	120	A
Adjust Pin Current Change		$1.5V \leq (V_{IN} - V_{OUT}) \leq 10V$, $10mA \leq I_{OUT} \leq 1A$		0.2	5	A
Minimum Load Current		$1.5V \leq (V_{IN} - V_{OUT}) \leq 10V$		1.7	5	mA
Ripple Rejection	PSRR	$f=120Hz$, $C_{OUT}=22\mu F$ $(V_{IN}-V_{OUT})=3V$, $I_{OUT}=300mA$		70		dB
Temperature Stability				0.5		%
RMS Output Noise (% of		$T_A=25^{\circ}C$, $10Hz \leq f \leq 10KHz$		0.003		%
Thermal Shutdown		Junction Temperature		160		$^{\circ}C$
Thermal Shutdown				16		$^{\circ}C$



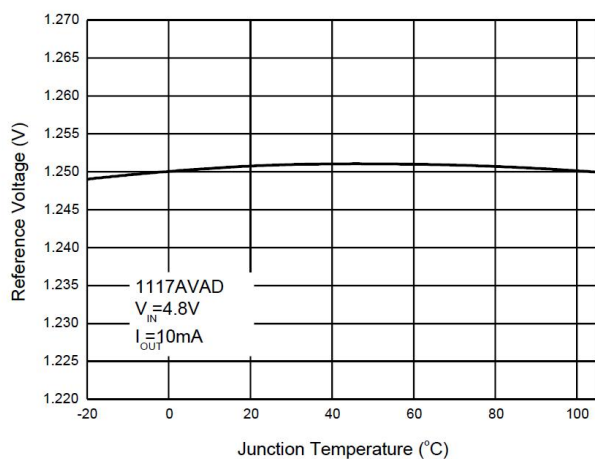
Typical Performance Characteristics($T_A=25^{\circ}\text{C}$, unless otherwise noted.)



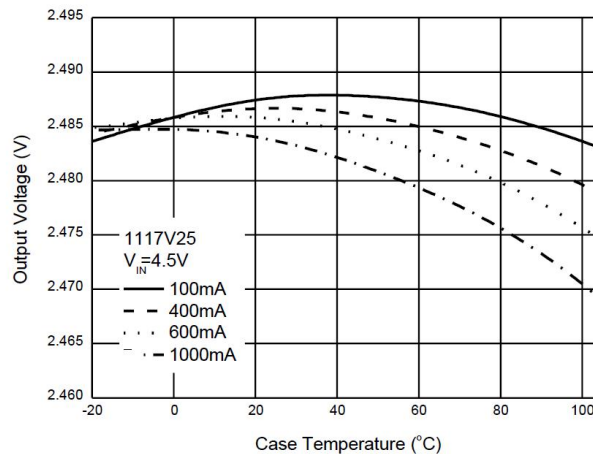
Line Regulation vs. Junction Temperature



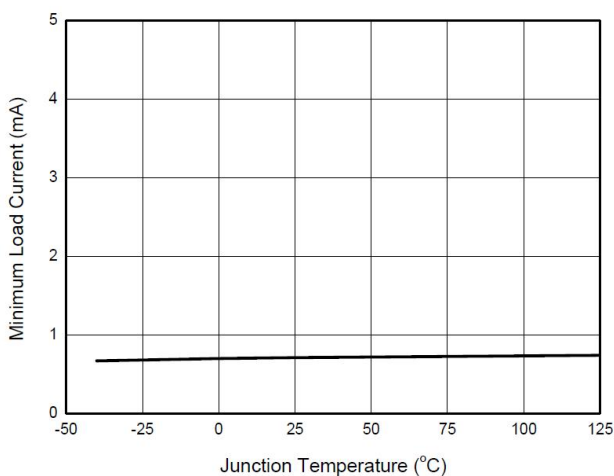
Load Regulation vs. Case Temperature



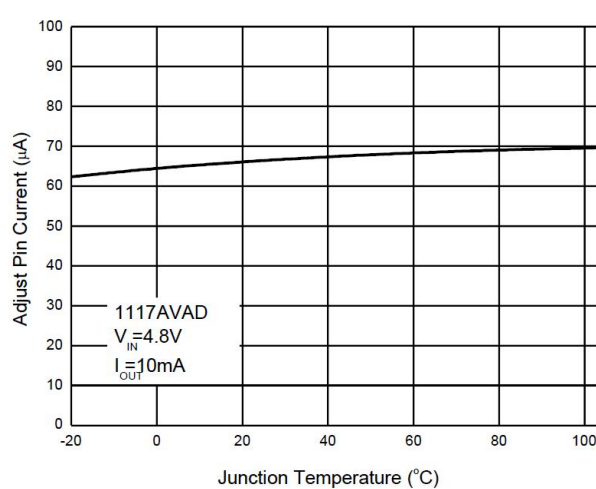
Reference Voltage vs. Junction Temperature



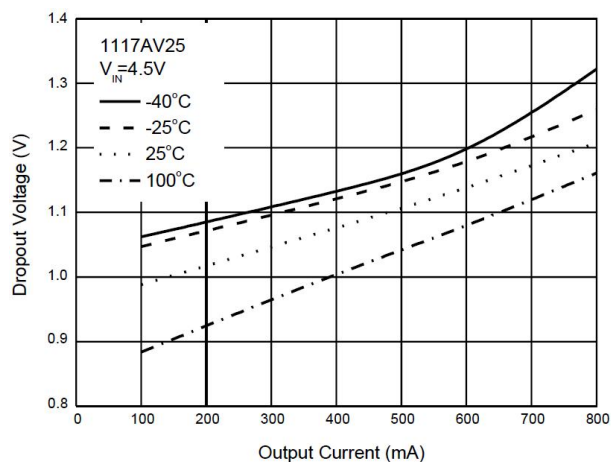
Output Voltage vs. Case Temperature



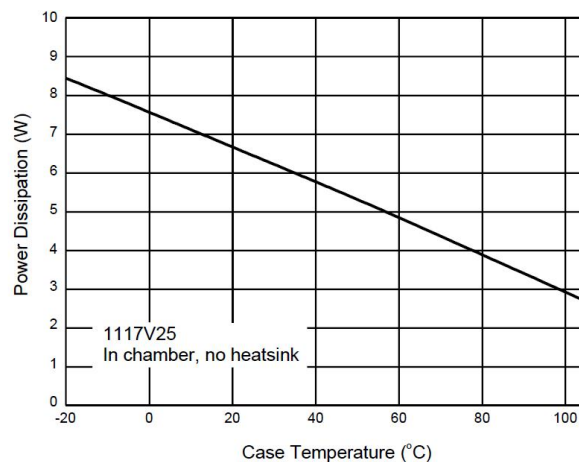
Minimum Load Current vs. Junction Temperature



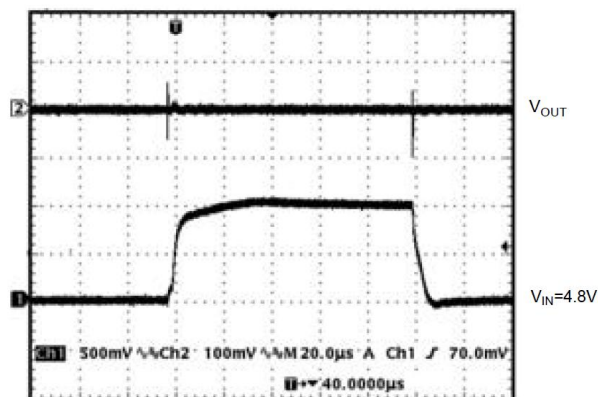
Adjust Pin Current vs. Junction Temperature



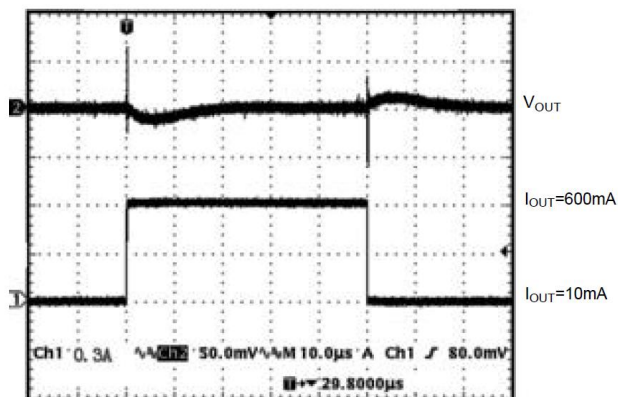
Dropout Voltage vs. Output Current



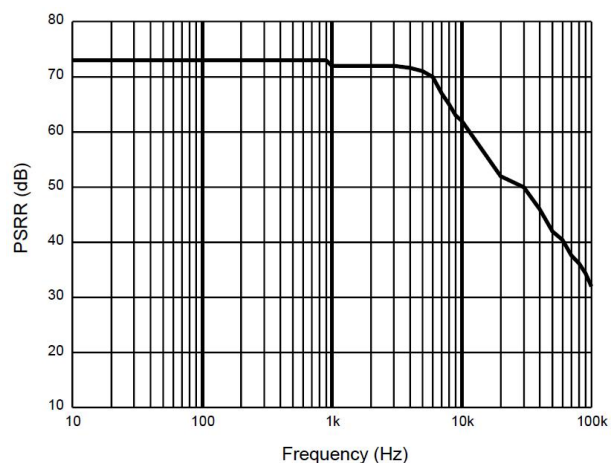
Power Dissipation vs. Case Temperature



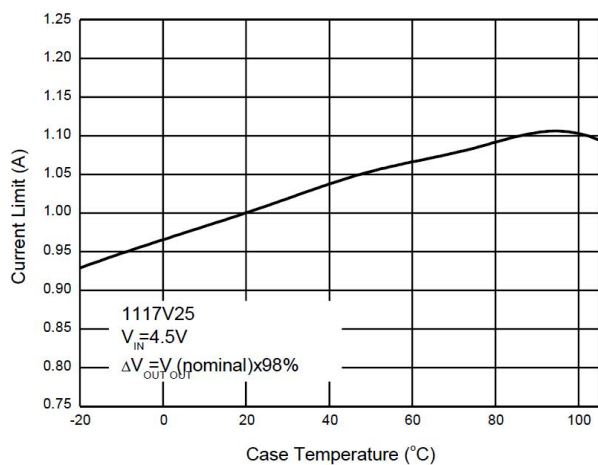
Line Transient Response



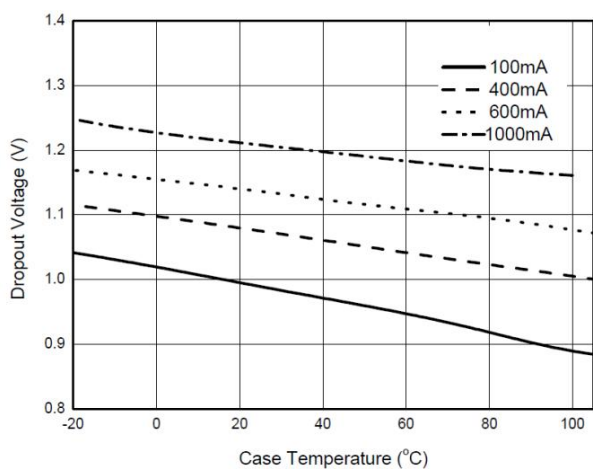
Load Transient Response



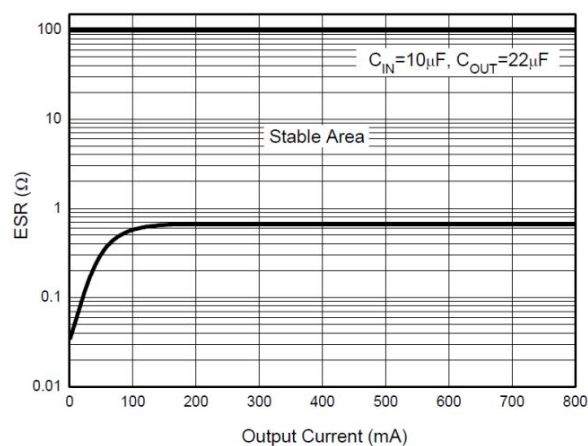
PSRR vs. Frequency



Current Limit vs. Case Temperature

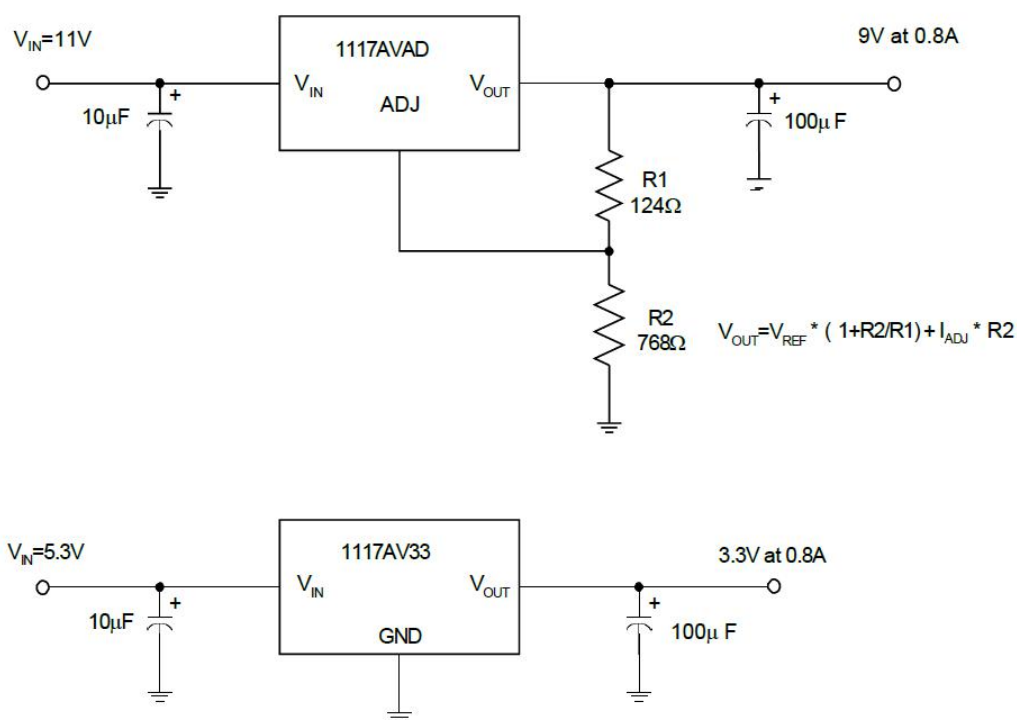


Dropout Voltage vs. Case Temperature



ESR vs. Output Current

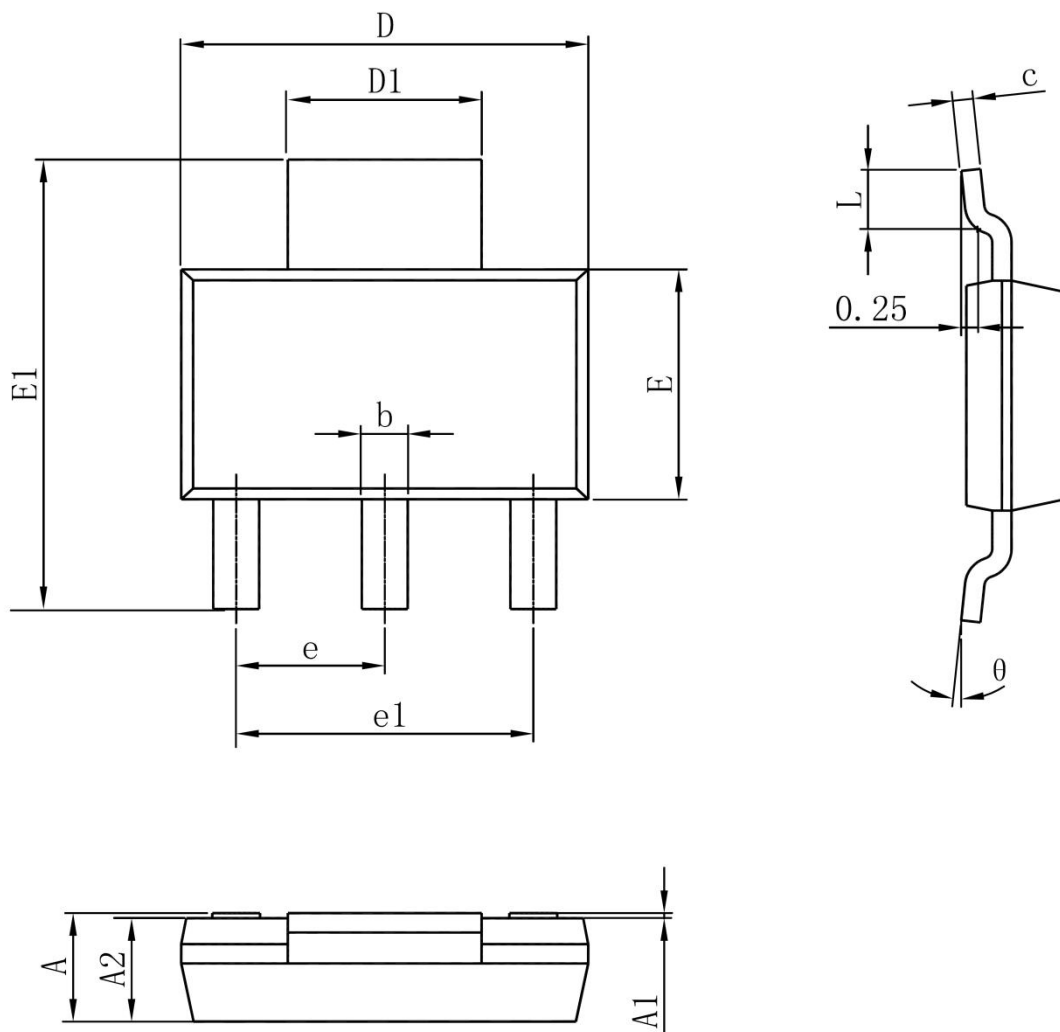
Typical Application



Typical Applications of SP1117A



SOT-223 Package Outline



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.520	1.800
A1	0.000	0.100
A2	1.500	1.700
b	0.660	0.820
c	0.250	0.350
D	6.200	6.400
D1	2.900	3.100
E	3.300	3.700
E1	6.830	7.070
e	2.300(BSC)	
e1	4.500	4.700
L	0.900	1.150
θ	0°	0°

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