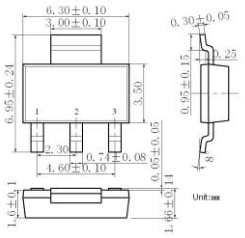
SOT-223 LOW DROPOUT LINEAR REGULATOR

A1117 Series Features

- Low Dropout Voltage: 1.15V at 1A Output Current
- Trimmed Current Limit
- On-chip Thermal Shutdown
- Three-terminal Adjustable or Fixed 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V
- Operation Junction Temperature: -40 to 125°C



1. ADJ/GND
2. OUTPUT
3. INPUT

Applications

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-video Player
- NIC/Switch
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment

Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage		20	V
T_J	Maximum Junction Temperature		150	°C
T_S	Storage Temperature	-65	150	°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)		300	°C
ESD	ESD (Machine Model)		600	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may 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 Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage		15	V
T_J	Operating Junction Temperature Range	-40	125	°C

Functional Block Diagram

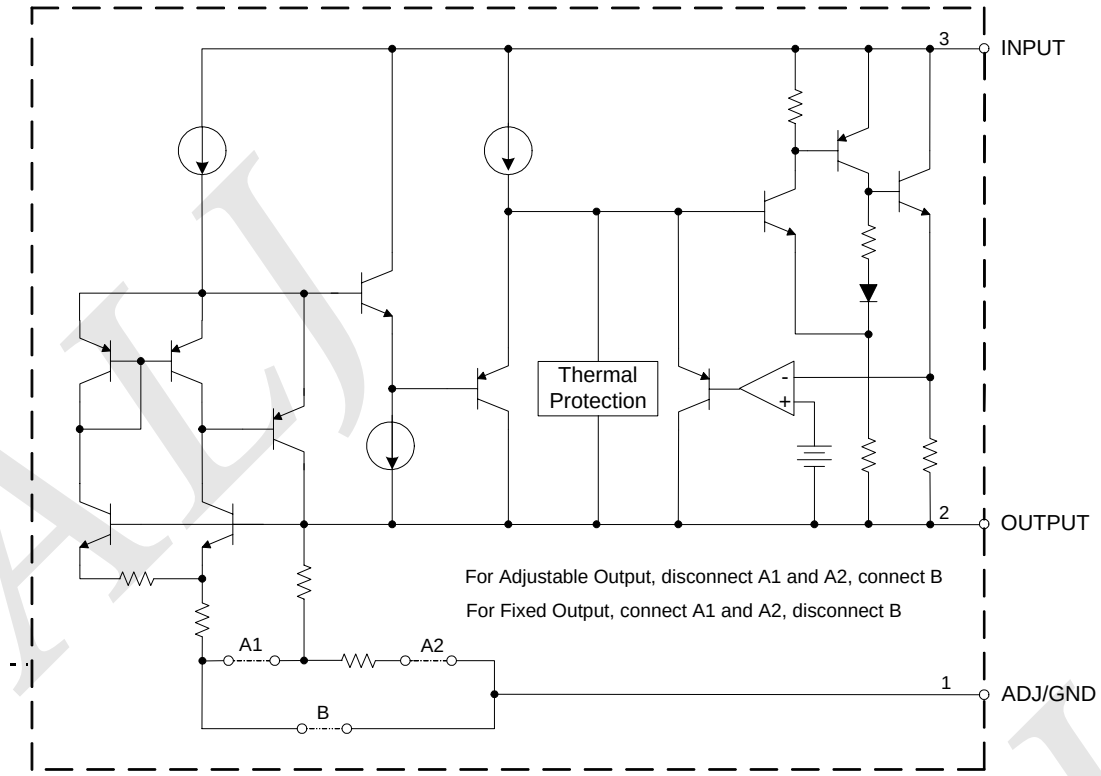


Figure 1. Functional Block Diagram of AMS1117

A1117-ADJ Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{REF}	Reference Voltage	I_{OUT} = 10mA, V_{IN}-V_{OUT} = 2V 10mA≤ I_{OUT} ≤ 1A, 1.4V≤ V_{IN}-V_{OUT} ≤ 8V, P≤ Maximum Power Dissipation	1.238 1.225	1.250 1.250	1.262 1.270	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		0.035	0.2	%
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤ 1A		0.2	0.4	%
	Dropout Voltage	ΔV_{REF} = 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{REF} = 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{REF} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Adjust Pin Current			60	120	μA
	Adjust Pin Current Change	1.4V≤ V_{IN}-V_{OUT} ≤ 10V, 10mA ≤ I_{OUT} ≤ 1A		0.2	5	μA
	Minimum Load Current (ADJ)	1.5V≤ V_{IN}-V_{OUT} ≤ 10V (ADJ only)		1.7	5	mA
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	60	75		dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
$R_{\theta JC}$	Thermal Resistance, Junction to Case			15		°C/W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient			100		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

NOTE:

1. The maximum package power dissipation is:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

2. $R_{\theta JA}$ on a 100 x 100 mm PCB Cu thickness 1 oz; T_A = 25°C

A1117-1.2V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 3.2V 10mA ≤ I_{OUT} ≤ 1A, 3.0V≤ V_{IN}≤ 10V	1.176 1.152	1.2 1.2	1.224 1.248	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	60	75		dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
$R_{\theta JC}$	Thermal Resistance, Junction to Case			15		°C/W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient			100		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

NOTE:

1. The maximum package power dissipation is:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

2. $R_{\theta JA}$ on a 100 x 100 mm PCB Cu thickness 1 oz; T_A = 25°C

A1117-1.5V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 3.5V 10mA ≤ I_{OUT} ≤ 1A, 3.0V≤ V_{IN}≤ 10V	1.485 1.470	1.5 1.5	1.515 1.530	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA≤ I_{OUT} ≤1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	60	75		dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
$R_{\theta JC}$	Thermal Resistance, Junction to Case			15		°C/W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient			100		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

NOTE:

1. The maximum package power dissipation is:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

2. $R_{\theta JA}$ on a 100 x 100 mm PCB Cu thickness 1 oz; T_A = 25°C

A1117-1.8V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 3.8V 10mA ≤ I_{OUT} ≤ 1A, 3.2V ≤ V_{IN} ≤ 10V	1.782 1.746	1.8 1.8	1.818 1.854	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V ≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA ≤ I_{OUT} ≤ 1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	60	75		dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
$R_{\theta JC}$	Thermal Resistance, Junction to Case			15		°C/W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient			100		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

NOTE:

1. The maximum package power dissipation is:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

2. $R_{\theta JA}$ on a 100 x 100 mm PCB Cu thickness 1 oz; T_A = 25°C

A1117-2.5V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 4.5V 10mA ≤ I_{OUT} ≤ 1A, 3.9V ≤ V_{IN} ≤ 10V	2.475 2.450	2.5 2.5	2.525 2.550	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V ≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA ≤ I_{OUT} ≤ 1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	60	75		dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
$R_{\theta JC}$	Thermal Resistance, Junction to Case			15		°C/W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient			100		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

NOTE:

1. The maximum package power dissipation is:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

2. $R_{\theta JA}$ on a 100 x 100 mm PCB Cu thickness 1 oz; T_A = 25°C

A1117-3.3V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 5.0V 10mA ≤ I_{OUT} ≤ 1A, 4.75V ≤ V_{IN} ≤ 10V	3.267 3.235	3.3 3.3	3.333 3.365	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V ≤ V_{IN}-V_{OUT} ≤ 10V		1	6	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA ≤ I_{OUT} ≤ 1A		1	10	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	60	75		dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
$R_{\theta JC}$	Thermal Resistance, Junction to Case			15		°C/W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient			100		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

NOTE:

1. The maximum package power dissipation is:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

2. $R_{\theta JA}$ on a 100 x 100 mm PCB Cu thickness 1 oz; T_A = 25°C

A1117-5.0V Electrical Characteristics

Operating Conditions: $V_{IN} \leq 10V$, $T_J = 25^oC$, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_{OUT} = 10mA, V_{IN} = 7.0V 10mA ≤ I_{OUT} ≤ 1A, 6.5V ≤ V_{IN} ≤ 12V	4.950 4.900	5.0 5.0	5.050 5.100	V
ΔV_{OUT}	Line Regulation	I_{OUT} = 10mA, 1.5V ≤ V_{IN}-V_{OUT} ≤ 10V		1	10	mV
ΔV_{OUT}	Load Regulation	V_{IN} -V_{OUT} = 2V, 10mA ≤ I_{OUT} ≤ 1A		1	15	mV
	Dropout Voltage	ΔV_{OUT}= 1%, I_{OUT} = 0.1A		1.00	1.1	V
		ΔV_{OUT}= 1%, I_{OUT} = 0.5A		1.08	1.18	V
		ΔV_{OUT} = 1%, I_{OUT} = 1.0A		1.15	1.25	V
I_{LIMIT}	Current Limit	V_{IN}-V_{OUT} = 2V	1.25	1.35		A
	Quiescent Current	V_{IN}=V_{OUT} +1.25V		5	10	mA
	Ripple Rejection	f =120Hz, C_{OUT} =22μF Tantalum, V_{IN}-V_{OUT} = 3V, I_{OUT} =1A	60	75		dB
	Temperature Stability			0.5		%
	Long -Term Stability	T_A=125°C, 1000hrs		0.3		%
	RMS Output Noise (% of V_{OUT})	T_A=25°C, 10Hz ≤ f ≤ 10kHz		0.003		%
$R_{\theta JC}$	Thermal Resistance, Junction to Case			15		°C/W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient			100		°C/W
	Thermal Shutdown	Junction Temperature		150		°C
	Thermal Shutdown Hysteresis			25		°C

NOTE:

1. The maximum package power dissipation is:

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}}$$

2. $R_{\theta JA}$ on a 100 x 100 mm PCB Cu thickness 1 oz; T_A = 25°C

Typical Performance Characteristics

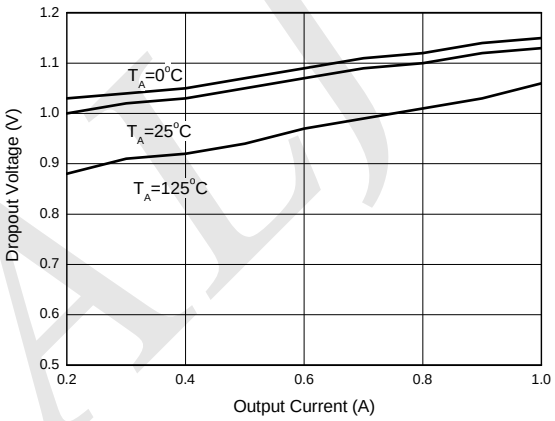


Figure 2` Dropout Voltage vs. Output Current

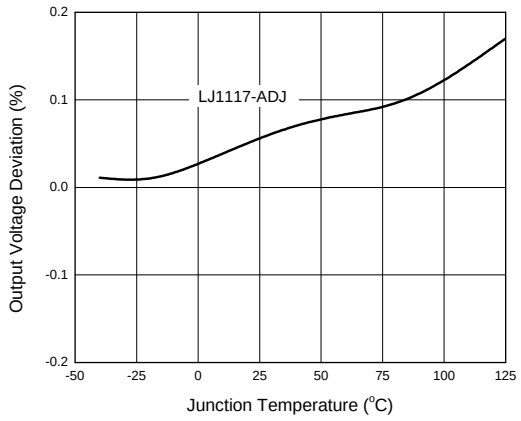


Figure 3. Load Regulation vs. Junction Temperature

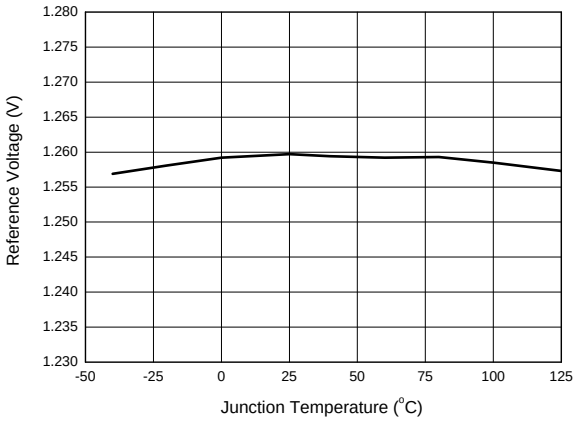


Figure 4. Reference Voltage vs. Junction Temperature

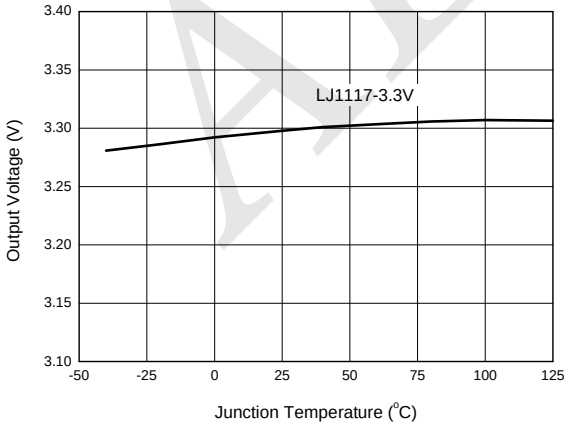


Figure 5. Output Voltage vs. Junction Temperature

Typical Performance Characteristics (Continued)

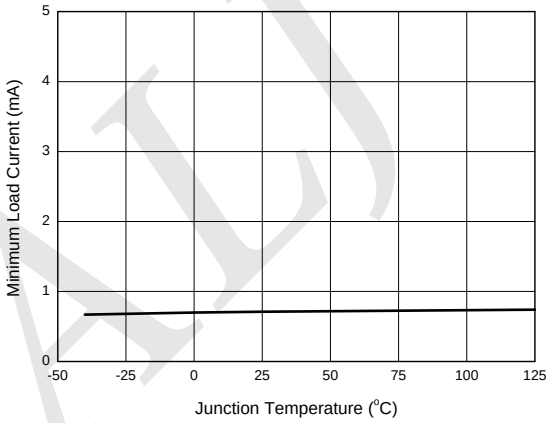


Figure 6. Minimum Load Current vs. Junction Temperature

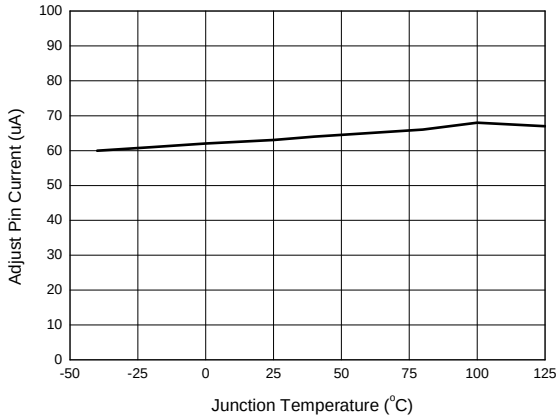


Figure 7. Adjust Pin Current vs. Temperature

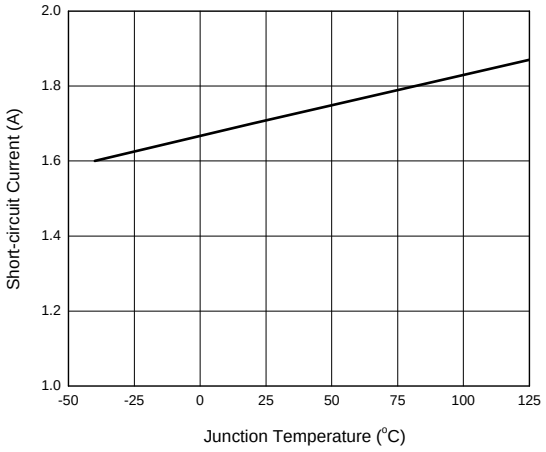


Figure 8. Short-Circuit Curr ent vs. Junction Temperature

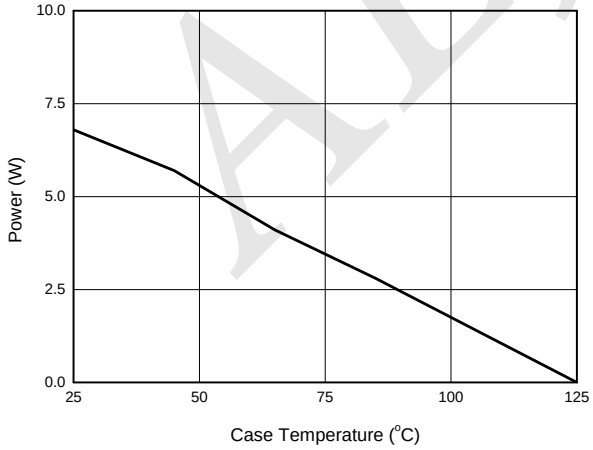


Figure 9. Maximum Power Dissipation

Typical Performance Characteristics (Continued)

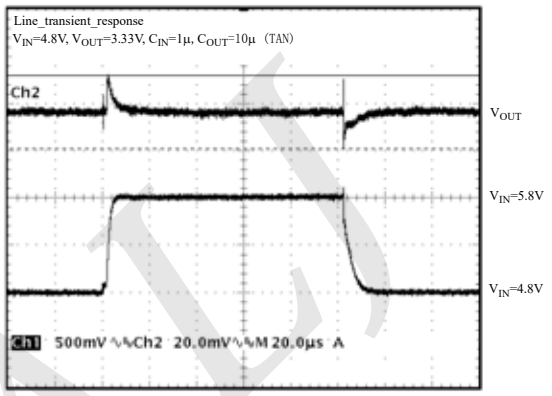


Figure 10. Line Transient Response

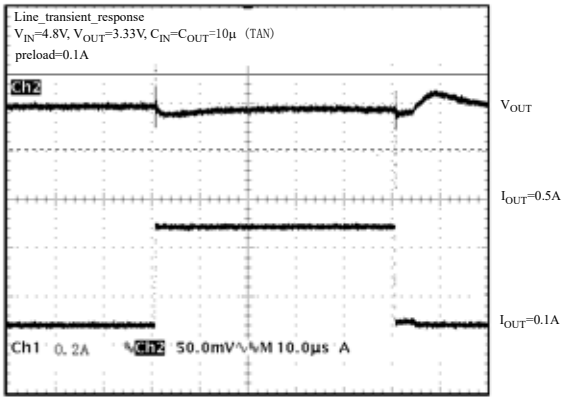


Figure 11. Load Transient Response

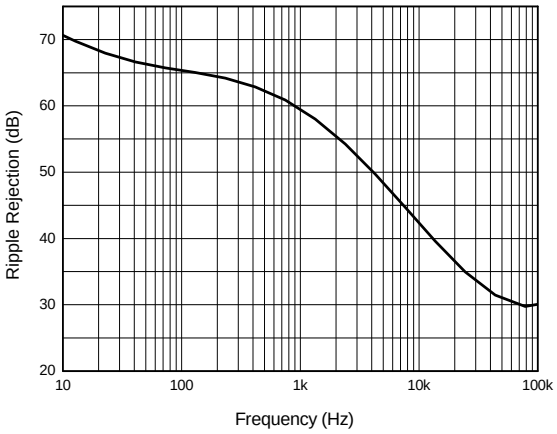


Figure 12. Ripple Rejection vs. Frequency

Typical Applications

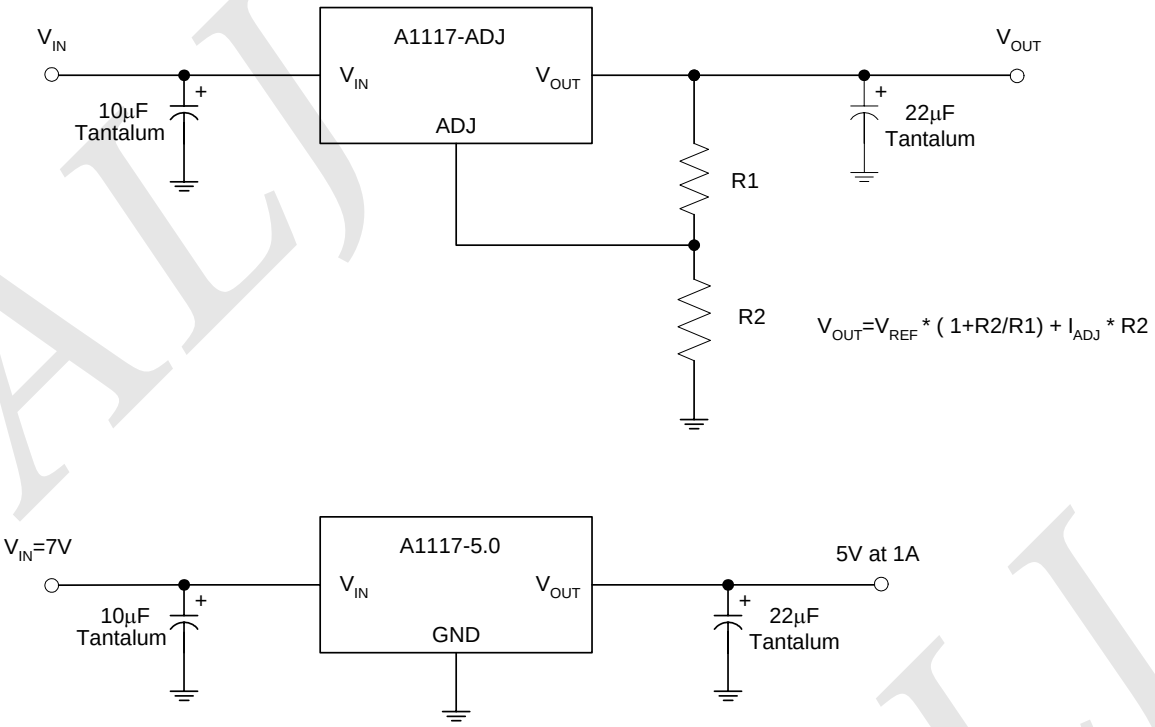
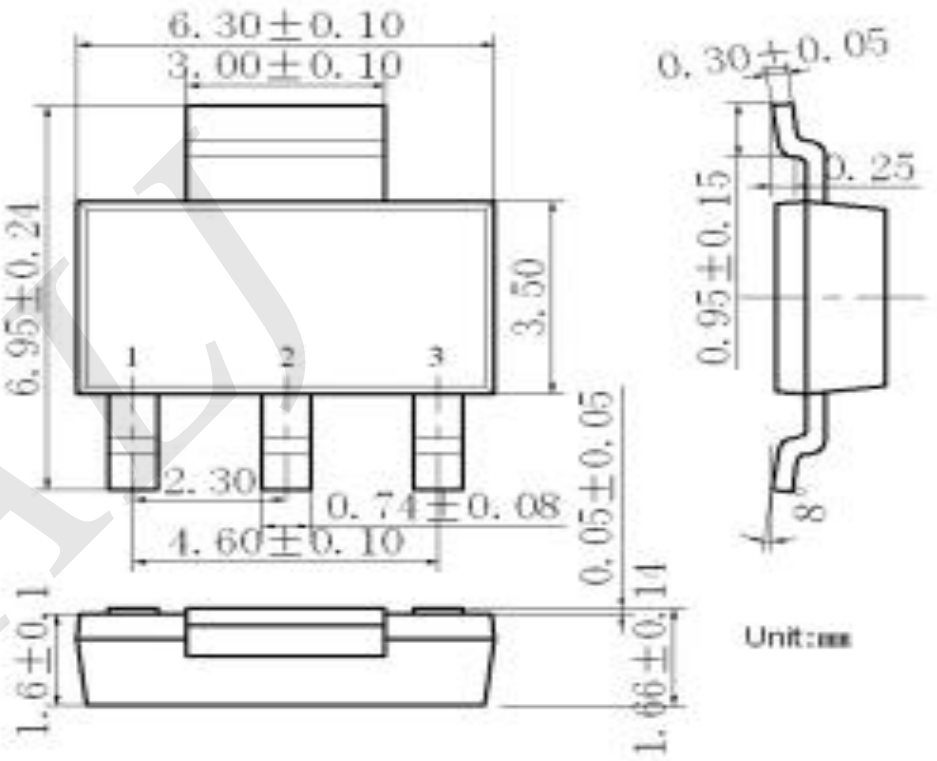
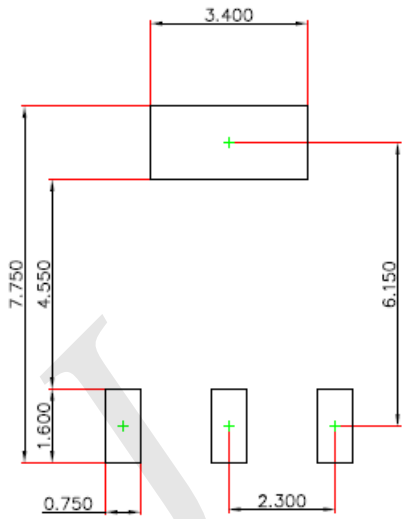


Figure 13. Typical Applications of AMS1117

SOT-223 Package Outline Dimensions

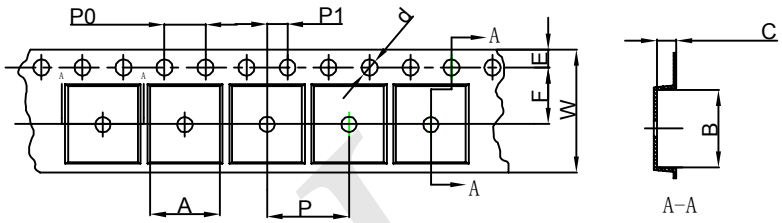


SOT-223 Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.050mm.
3.The pad layout is for reference purposes only.

SOT-223 Embossed Carrier Tape

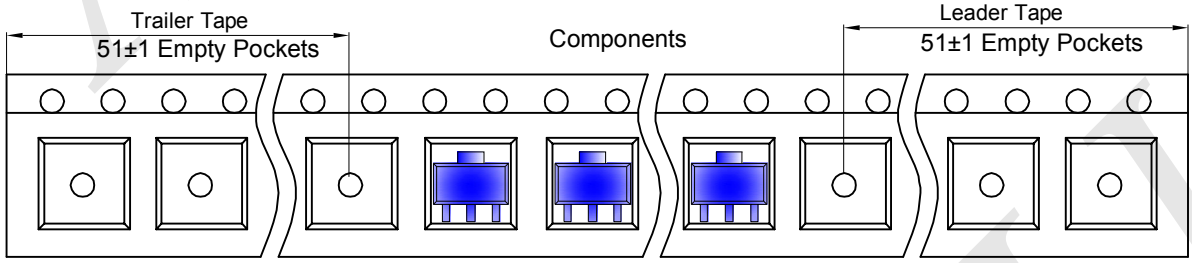


Packaging Description:

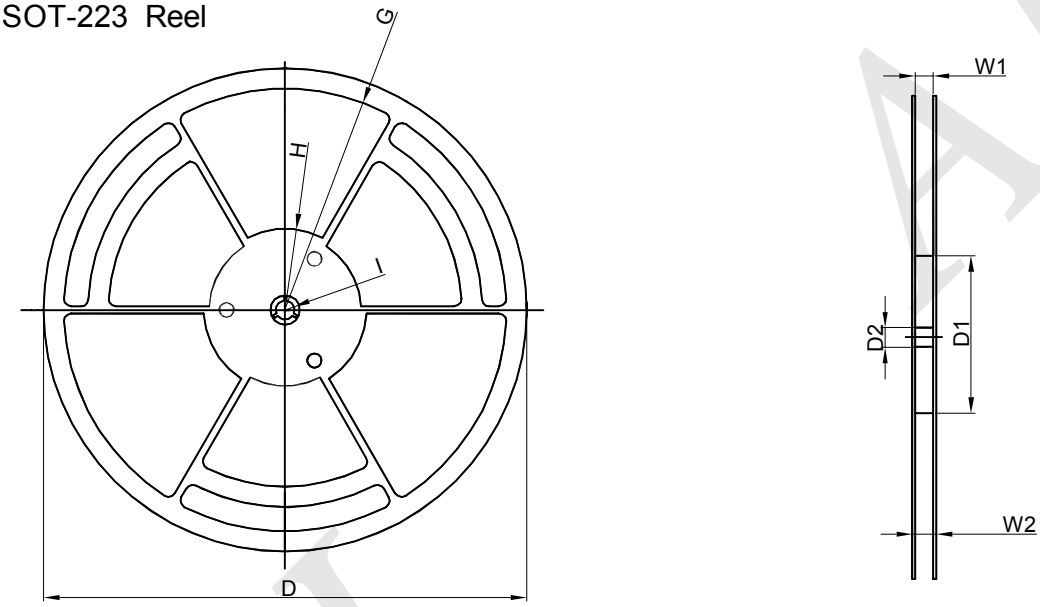
SOT-223 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 33.0cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-223	6.765	7.335	1.88	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOT-223 Tape Leader and Trailer



SOT-223 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
13"Dia	Ø330.00	100.00	13.00	R151.00	R56.00	R6.50	12.40	17.60

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
2,500 pcs	13 inch	2,500 pcs	336×336×48	20,000 pcs	445×355×365	

Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	Temperature Min ($T_{s(min)}$)	150°C
	Temperature Max ($T_{s(max)}$)	200°C
	Time (min to max) (ts)	60 – 190 secs
Average ramp up rate (Liquidus Temp) (T_L) to peak		5°C/second max
$T_{S(max)}$ to T_L——Ramp-up Rate		5°C/second max
Reflow	Temperature (T_L) (Liquidus)	217°C
	Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		260+0/-5 °C
Time within actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		280°C