1A Low Dropout Linear Regulator

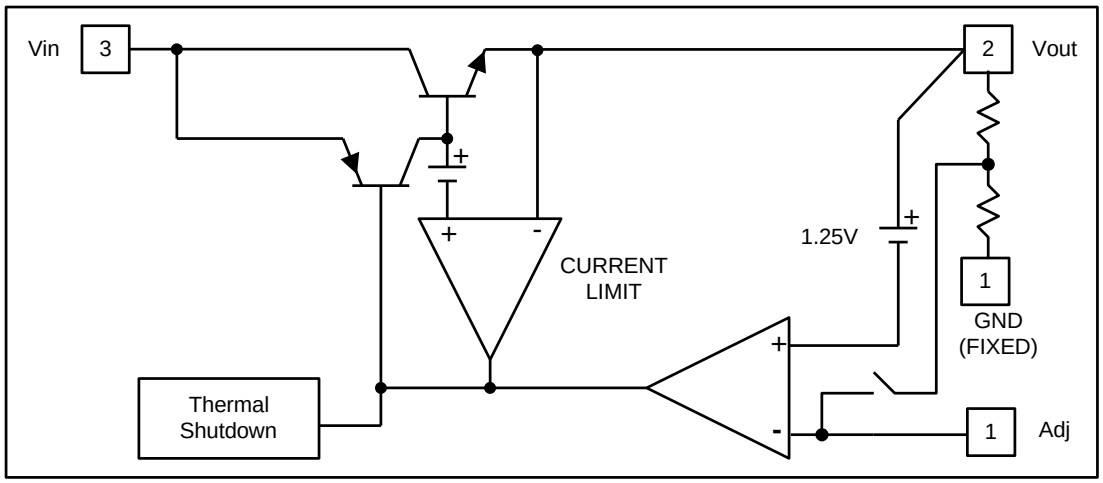
❖ GENERAL DESCRIPTION

AX1117 is a low dropout positive adjustable or fixed-mode regulator with minimum of 1A output current capability. The product is specifically designed to provide well-regulated supply for low voltage IC applications such as high-speed bus termination and low current 3.3V logic supply. AX1117 is also well suited for other applications such as VGA cards. AX1117 is guaranteed to have lower than 1.4V dropout at full load current making it ideal to provide well-regulated outputs of 1.25 to 5.0 with 6.4V to 12V input supply.

❖ FEATURES

- 1.4V maximum dropout at full load current
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- 3-Terminal Adjustable or Fixed 1.5V, 1.8V, 2.5V, 3.3V, 5.0V
- Packages: SOT223, TO252

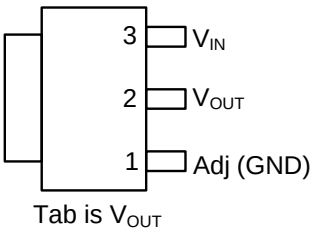
❖ BLOCK DIAGRAM



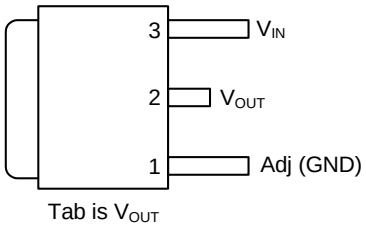
❖ PIN ASSIGNMENT

The packages of AX1117 are SOT223 and TO252; the pin assignment is given by:

SOT223
(Top View)



TO252
(Top View)



Name	Description
Adj (GND)	A resistor divider from this pin to the V_{OUT} pin and ground sets the output voltage. (Ground only for Fixed-Mode)
V_{OUT}	The output of the regulator. A minimum of 10uF capacitor (0.15Ω ≤ ESR ≤ 20Ω) must be connected from this pin to ground to insure stability.
V_{IN}	The input pin of regulator. Typically a large storage capacitor (0.15Ω ≤ ESR ≤ 20Ω) is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.4V higher than V_{OUT} in order for the device to regulate properly.

❖ ORDER/MARKING INFORMATION

Order Information

AX 1117 X XX X

- 1117 — Low Dropout Regulator
- X (Package): E : SOT223-3L; D : TO252-3L
- XX (Vout): Blank : ADJ; 15 : 1.5V; 18 : 1.8V; 25 : 2.5V; 33 : 3.3V; 50 : 5.0V
- X (Packing): Blank : Tube; A : Taping

Top Marking (SOT223-3L)

ADJ

Logo ← AX 1117 → Part number
YWWX → ID code: internal
WW: 01~52
Year: A= 2010
1= 2011

FIX

Output Voltage ←
AX1117-15: 1.5V
AX1117-18: 1.8V
AX1117-25: 2.5V
AX1117-33: 3.3V
AX1117-50: 5.0V

AX 1117-VV → ID code: internal
YWWX
WW: 01~52
Year: A= 2010
1= 2011

Top Marking (TO252-3L)

ADJ

Logo ← AX 1117 → Part number
YYWWX → ID code: internal
WW: 01~52
Year: 10=2010
11=2011

FIX

Output Voltage ←
AX1117-15: 1.5V
AX1117-18: 1.8V
AX1117-25: 2.5V
AX1117-33: 3.3V
AX1117-50: 5.0V

AX 1117-VV → ID code: internal
YYWWX
WW: 01~52
Year: 10=2010
11=2011

❖ ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Rating	Unit
DC Supply Voltage		V_{IN}	-0.3 to 12	V
Operating Junction Temperature Range		T_{OP}	0 to +125	°C
Maximum junction Temperature		T_{MJ}	150	°C
Power Dissipation(No heat sink ;No air flow)	SOT-223	P_D	850	mW
T_A=25°C, T_J=125°C, PD=(T_J-T_A) / θ_{JA}	TO-252		1050	
(multi-layer PCB cupper area 10mm*10mm)	SOT-223		1333	mW
T_A=25°C, T_J=125°C, PD=(T_J-T_A) / θ_{JA}	TO-252		1818	
Storage Temperature		T_{ST}	-65 to +150	°C

❖ ELECTRICAL CHARACTERISTICS

(T_A=25°C, Under Operating Conditions)

Characteristics	Conditions		Min	Typ	Max	Units
Operation Input Voltage			2.75	-	12	V
Reference Voltage	AX1117-ADJ	T_J=25°C,(V_{IN-OUT})=1.5V, I_{OUT}=10mA	1.225	1.250	1.275	V
Output Voltage	AX1117-1.5	I_{OUT}=10mA,T_J=25°C, 3V≦V_{IN}≦12V	1.470	1.500	1.530	V
	AX1117-1.8	I_{OUT}=10mA,T_J=25°C, 3.3V≦V_{IN}≦12V	1.764	1.800	1.836	V
	AX1117-2.5	I_{OUT}=10mA,T_J=25°C,4V≦V_{IN}≦12V	2.450	2.500	2.550	V
	AX1117-3.3	I_{OUT} = 10mA, T_J = 25°C, 4.8V≦V_{IN}≦12V	3.235	3.300	3.365	V
	AX1117-5.0	I_{OUT}=10mA,T_J=25°C,6.5V≦V_{IN}≦12V	4.900	5.000	5.100	V
Line Regulation (Note 1,2)	AX1117-XXX	V_{IN}= V_{OUT}+1.5V ~7V, I_{OUT} =10mA,T_J=25°C		0.1	0.3	%
		V_{IN}= V_{OUT}+1.5V ~12V, I_{OUT} =10mA,T_J=25°C		0.1	0.5	%
Load Regulation (Note 1,2)	AX1117-ADJ	V_{IN}=3V,Vadj=0,10mA<I_{OUT}<1A,T_J=25°C			1	%
	AX1117-1.5	V_{IN}= 3V, 10mA<Io<1A, T_J=25°C		12	15	mV
	AX1117-1.8	V_{IN}= 3.3V, 10mA<Io<1A, T_J=25°C		15	18	mV
	AX1117-2.5	V_{IN}= 4V, 10mA<Io<1A, T_J=25°C		20	25	mV
	AX1117-3.3	V_{IN} = 5V, 10mA≦I_{OUT}≦1A, T_J=25°C		26	33	mV
	AX1117-5.0	V_{IN}=6.5V, 10mA≦I_{OUT}≦1A, T_J=25°C		40	50	mV
Dropout Voltage(V_{IN}-V_{OUT})	AX1117-XXX	I_{OUT} = 1A ,ΔV_{OUT}=1%V_{OUT}		1.3	1.4	V
Current Limit	AX1117-XXX	(V_{IN}-V_{OUT}) = 3V	1. 1			A
Minimum Load Current	AX1117-XXX	0°C≦Tj≦125°C		5	10	mA
Ripple Rejection	F=120Hz,C_{OUT}=25uF Tantalum					
	AX1117-XXX	V_{IN}=V_{OUT}+3V		60	70	dB

❖ ELECTRICAL CHARACTERISTICS (CONTINUED)

Temperature Stability	I_{OUT} =10mA		0.5		%
θ_{JA} Thermal Resistance Junction-to-Ambient(No heat sink ;No air flow)	SOT-223 TO-252		117 92		°C/W
θ_{JA} Thermal Resistance Junction-to-Ambient (Note 4)	SOT-223 TO-252		75 55		°C/W
θ_{JC} Thermal Resistance Junction-to-Case	SOT-223 TO-252		15 10		°C/W

Note1: See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead = 1/18" from the package.

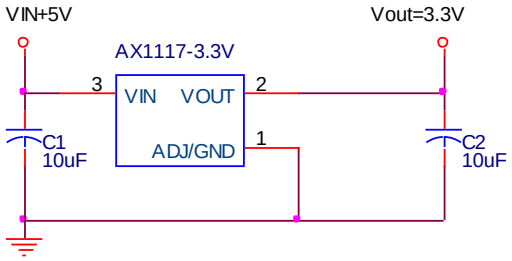
Note2: Line and load regulation are guaranteed up to the maximum power dissipation of 15W. Power dissipation is determined by the difference between input and output differential and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range.

Note3: Quiescent current is defined as the minimum output current required in maintaining regulation. At 12V input/output differential the device is guaranteed to regulate if the output current is greater than 10mA.

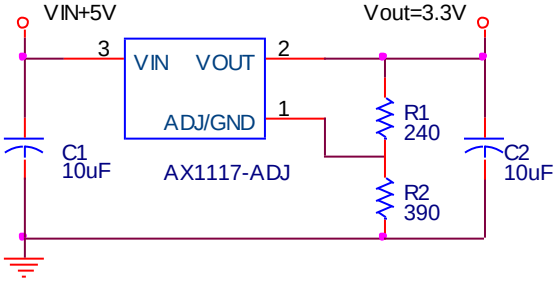
Note4: Output is connected to the multi-layer PCB cupper area 10mm*10mm separately. If you need large PD or lower Tc and Tj, please connect to the large cupper area >>10mm*10mm.

❖ APPLICATION CIRCUIT

Fixed Output

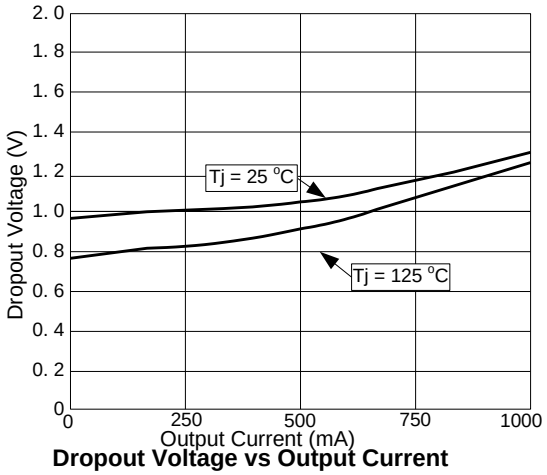


ADJ Output

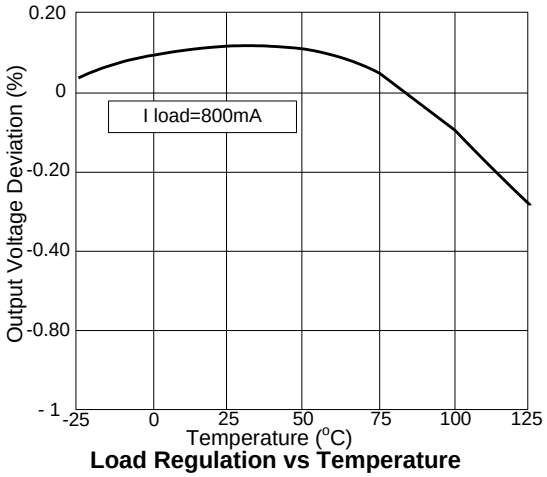


$$VOUT = VREF \times \left(1 + \frac{R2}{R1}\right)$$
$$VREF = 1.250V$$

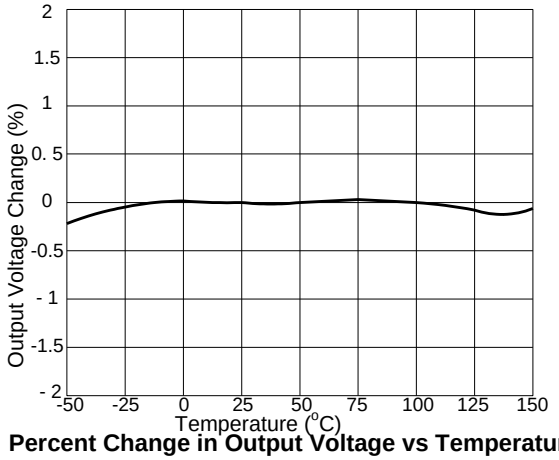
❖ TYPICAL CHARACTERISTICS



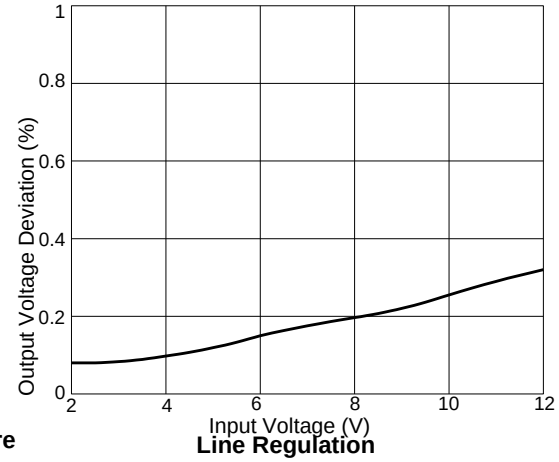
Dropout Voltage vs Output Current



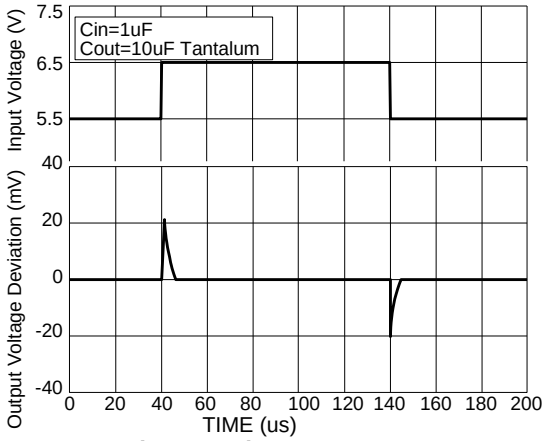
Load Regulation vs Temperature



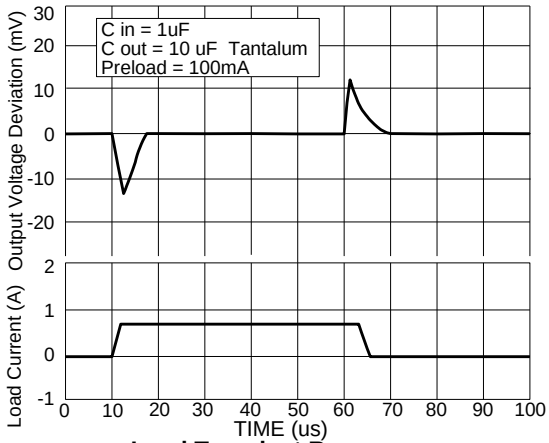
Percent Change in Output Voltage vs Temperature



Line Regulation



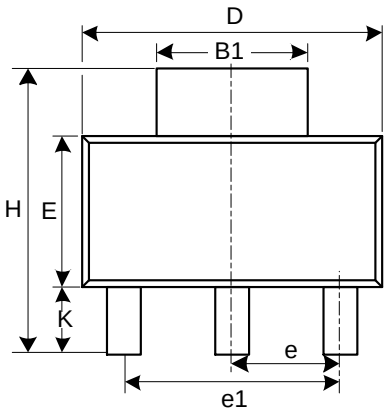
Line Transient Response

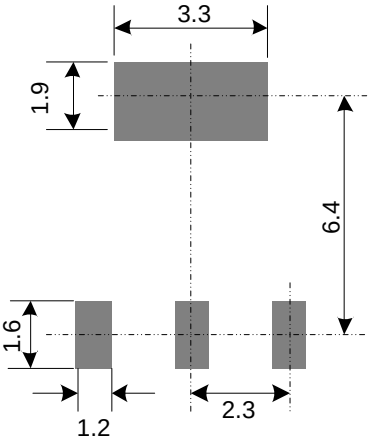


Load Transient Response

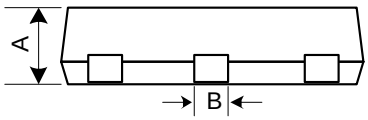
❖ PACKAGE OUTLINES

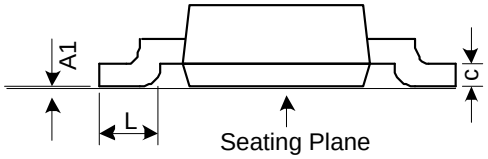
(1) SOT223-3L





Land Pattern Recommendation (Unit: mm)

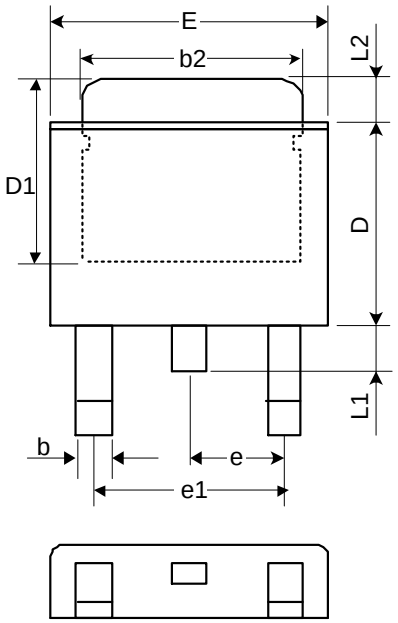


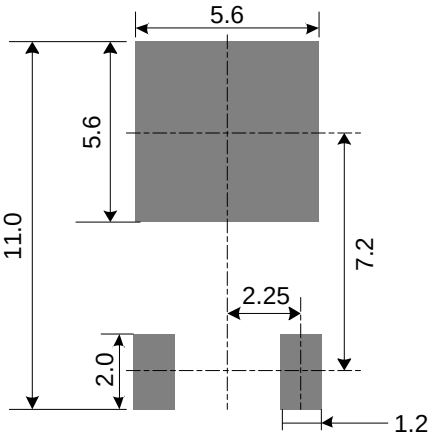


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.8	-	-	0.071
A1	0.02	0.06	0.1	0.001	0.002	0.004
B	0.66	0.75	0.84	0.026	0.03	0.033
B1	2.9	3	3.1	0.114	0.118	0.122
C	0.23	0.315	0.35	0.009	0.012	0.014
D	6.3	6.5	6.7	0.248	0.256	0.264
E	3.3	3.5	3.7	0.13	0.138	0.146
H	6.7	7	7.3	0.264	0.278	0.287
L	0.75	-	-	0.03	-	-
K	1.5	1.75	2	0.059	0.069	0.079
e	2.3 Basic			0.091 Basic		
e1	4.6 Basic			0.181 Basic		

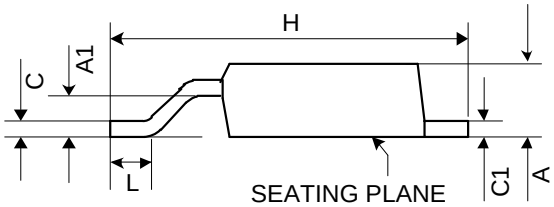
JEDEC outline: TO-261 AB

(2) TO252-3L





Land Pattern Recommendation (Unit: mm)



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	2.18	2.29	2.39	0.086	0.09	0.094
A1	-	-	0.13	-	-	0.005
b	0.51	0.71	0.89	0.02	0.028	0.035
b2	4.95	5.21	5.46	0.195	0.205	0.215
C	0.46	0.53	0.61	0.018	0.021	0.024
C1	0.46	0.53	0.58	0.018	0.021	0.023
D	5.33	5.46	6.22	0.21	0.215	0.245
D1	4.57	-	-	0.18	-	-
E	6.35	6.55	6.73	0.25	0.258	0.265
e	2.29 BSC			0.090 BSC.		
e1	4.58 BSC			0.180 BSC.		
H	9.4	9.7	10.4	0.37	0.382	0.41
L	1.4	1.6	1.78	0.055	0.063	0.07
L1	-	-	1.02	-	-	0.04
L2	1.52	1.78	2.03	0.06	0.07	0.08

Mold flash shall not exceed 0.005inch per side
JEDEC outline: TO-252