400mA Low Dropout Linear Regulator

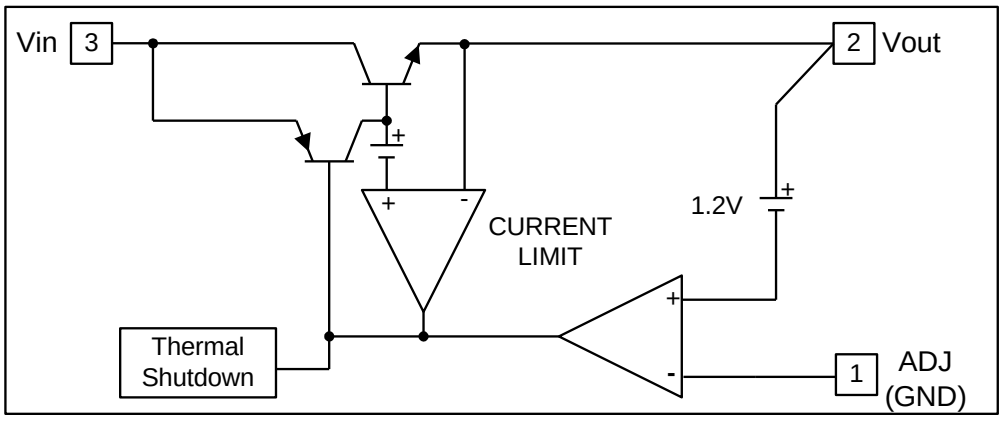
❖ GENERAL DESCRIPTION

AX1113 is a low dropout positive adjustable or fixed-mode regulator with minimum of 400mA 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 5V logic supply. AX1113 is also well suited for other applications such as VGA cards. AX1113 is guaranteed to have lower than 1.2V dropout at full load current.

❖ FEATURES

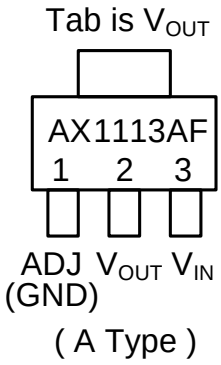
- 3-Terminal Adjustable or Fixed 1.8V, 3.3, 5.0V
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- Packages: SOT89-3L
- RoHS and Halogen free compliance

❖ BLOCK DIAGRAM

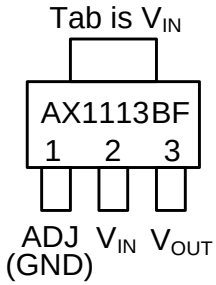


❖ PIN ASSIGNMENT

The package of AX1113 is SOT89-3L; the pin assignment is given by:



(A Type)



(B Type)

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 1.2V higher than V_{OUT} in order for the device to regulate properly.

❖ ORDER/MARKING INFORMATION

Order Information	Top Marking
AX 1113 X X X Type: A: 3.3V (A Type), B: 3.3V (B Type), C: 1.8V (A Type), D: 1.8V (B Type), E: ADJ (A Type), F: ADJ (B Type), G: 5.0V (A Type), H: 5.0V (B Type) Package: F: SOT89-3L Packing: Blank: Bag, A : Taping	1 1 1 3 → Part number L Y W X → ID code: internal WW: 01~26(A~Z), 27~52(a~z) Year: 8=2018, 9=2019, B=2020, C=2021, D=2022, ⋮, Z=2044 Output Type A:AX1113AF B:AX1113BF C:AX1113CF D:AX1113DF E:AX1113EF F:AX1113FF G:AX1113GF H:AX1113HF

❖ ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Rating	Unit
DC Supply Voltage	V_{IN}	-0.3 to 15	V
Operating Junction Temperature Range	T_{OP}	-40 to +125	°C
Maximum junction Temperature	T_{MJ}	150	°C
Power Dissipation (multi-layer PCB cupper area 5mm*5mm) T_A=25°C, T_J=125°C, SOT89	P_D	625	mW
Storage Temperature	T_{ST}	-65 to +150	°C

❖ ELECTRICAL CHARACTERISTICS

(Under Operating Conditions)

Characteristics	Conditions		Min	Typ	Max	Units
Operation Input Voltage			2.75	-	12	V
Reference Voltage	AX1113EF/FF	T_J=25°C,(V_{IN-OUT})=1.5V, I_{OUT} =10mA	1.225	1.250	1.275	V
Output Voltage	AX1113AF/BF	I_{OUT} = 10mA, T_J = 25°C, 4.8V≦V_{IN}≦12V	3.235	3.300	3.365	V
	AX1113CF/DF	I_{OUT} = 10mA, T_J = 25°C, 3.3V≦V_{IN}≦12V	1.764	1.800	1.836	V
	AX1113GF/HF	I_{OUT} = 10mA, T_J = 25°C, 6.5V≦V_{IN}≦12V	4.900	5.000	5.100	V
Line Regulation **(Note 1,2)**	I_{OUT} = 10mA, V_{OUT}+1.5V≦V_{IN}≦12V, T_J = 25°C		-	9	15	mV
Load Regulation **(Note 1,2)**	AX1113EF/FF	V_{IN}=3.3V, Vadj=0,10Ma < I_{OUT} < 0.4A, T_J=25°C	-	-	0.5	%
	AX1113AF/BF	V_{IN}=5V,10mA≦I_{OUT}≦0.4A, T_J=25°C	-	-	20	mV
	AX1113CF/DF	V_{IN}=3.3V,10mA<I_{OUT}<0.4A, T_J=25°C	-	-	12	mV
	AX1113GF/HF	V_{IN}=6.5V,10mA≦I_{OUT}≦0.4A, T_J=25°C	-	-	30	mV
Dropout Voltage (V_{IN}-V_{OUT})	I_{OUT} = 400mA , ΔV_{OUT}=1%V_{OUT}		-	1.1	1.2	V
Current Limit	(V_{IN}-V_{OUT}) = 2V		0.5	-	-	A
Minimum Load Current	0°C≦Tj≦125°C		-	5	10	mA
Ripple Rejection	F=120Hz,C_{OUT}=25Uf Tantalum, I_{OUT}=400mA		-	60	70	dB
Temperature Stability	I_{OUT} =10mA		-	0.5	-	%
θ_{JA} Thermal Resistance Junction-to-Ambient **(Note4)**	SOT89		-	160	-	°C/W
θ_{JC} Thermal Resistance Junction-to-Case	SOT89		-	100	-	°C/W

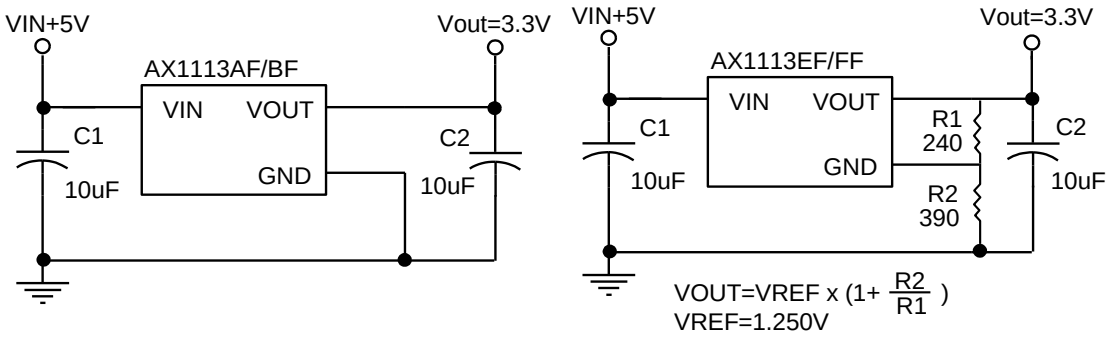
Note1: See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead = 1/18" from the package.

Note2: Line and load regulation are guaranteed up to the maximum power dissipation of 33W. 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.

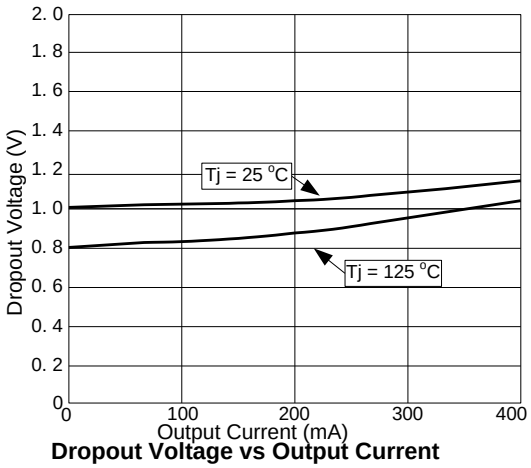
Note3: Quiescent current is defined as the minimum output current required in maintaining regulation. At 12V input/output differential the device is guaranteed to regulate if the output current is greater than 10mA.

Note4: Tab is connected to the multi-layer PCB cupper area 5mm*5mm.

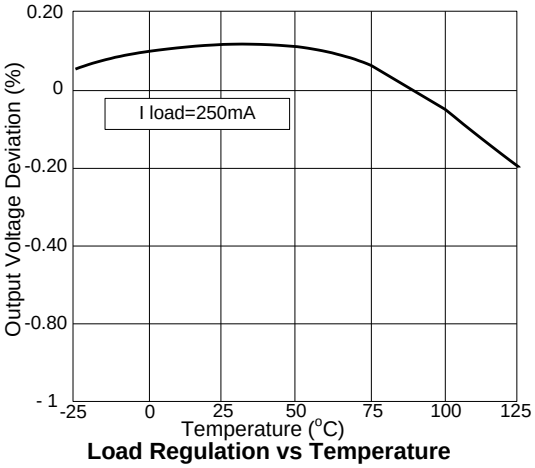
❖ APPLICATION CIRCUIT



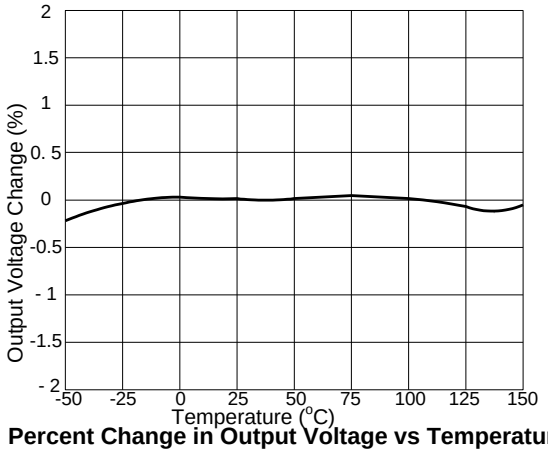
❖ TYPICAL CHARACTERISTICS



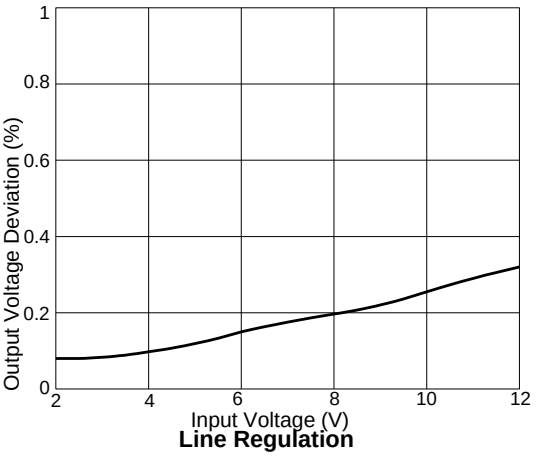
Dropout Voltage vs Output Current



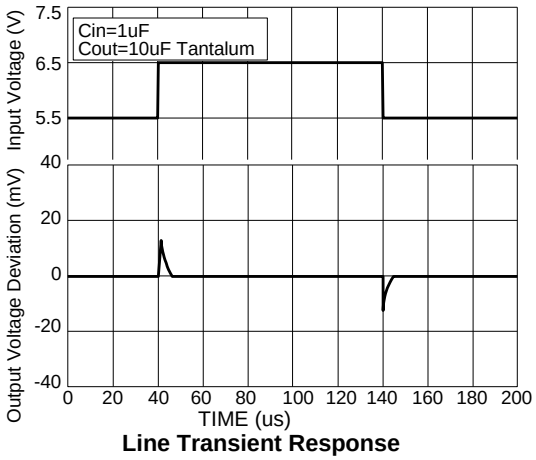
Load Regulation vs Temperature



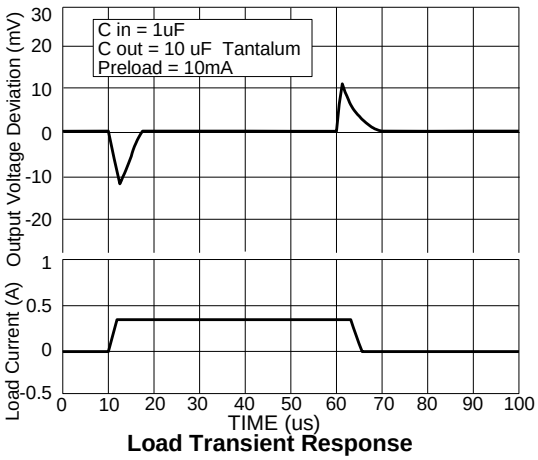
Percent Change in Output Voltage vs Temperature



Line Regulation

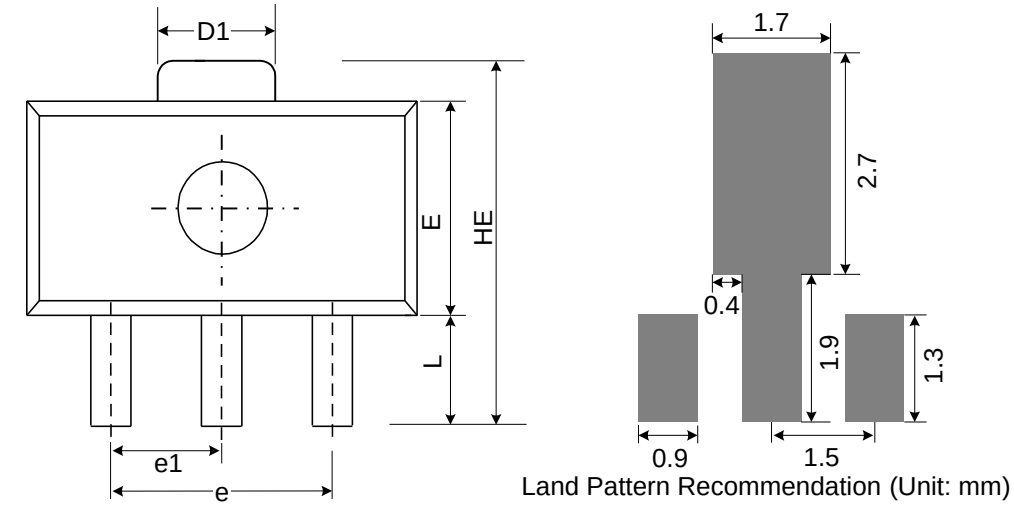


Line Transient Response

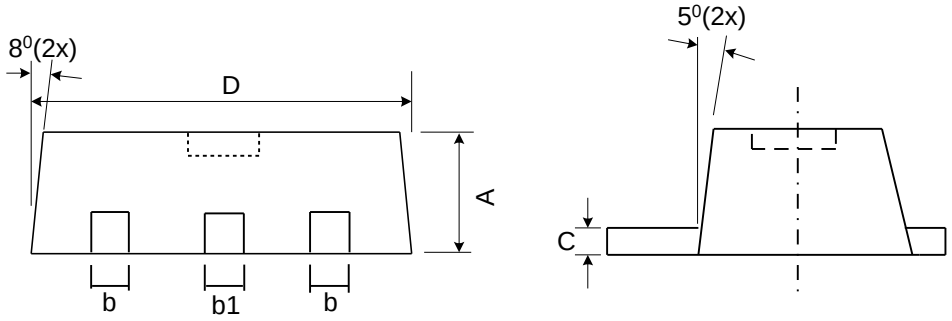


Load Transient Response

❖ PACKAGE OUTLINES



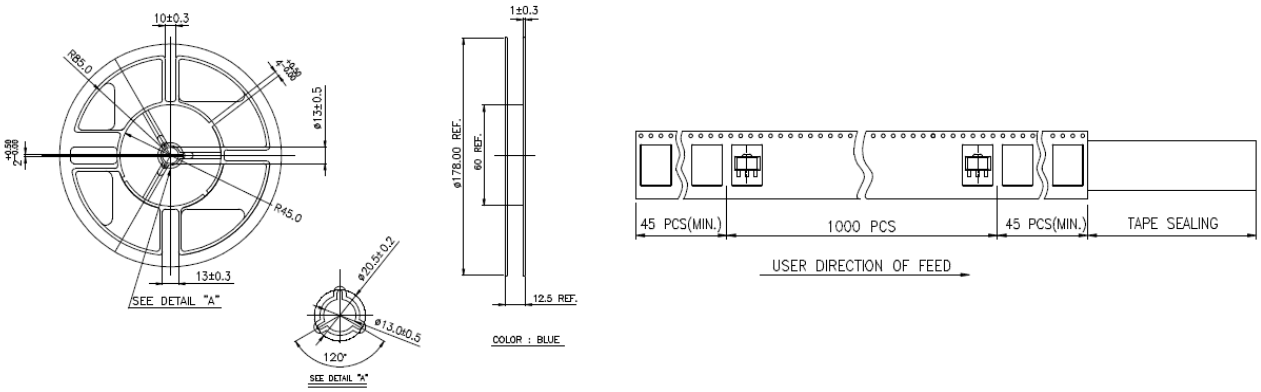
Land Pattern Recommendation (Unit: mm)

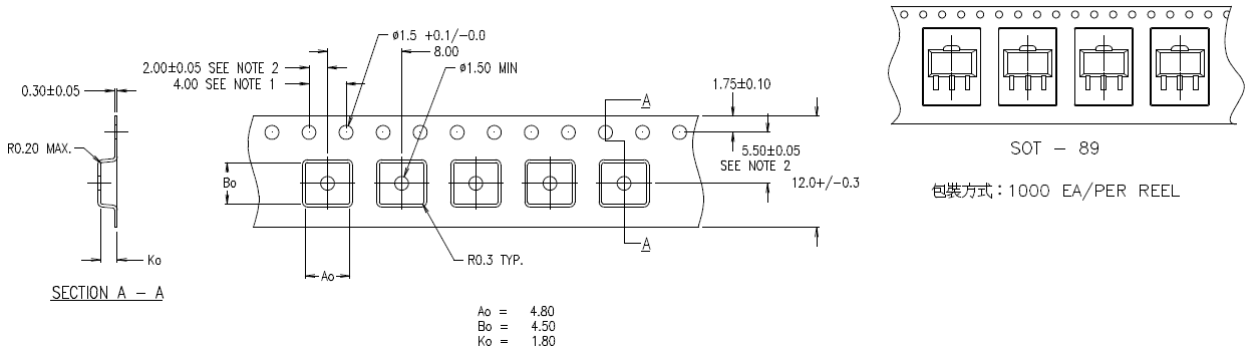


Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.40	1.50	1.60	0.055	0.059	0.063
b	0.36	0.42	0.48	0.014	0.016	0.018
b1	0.41	0.49	0.56	0.016	0.019	0.022
C	0.35	0.40	0.45	0.014	0.016	0.018
D	4.30	4.50	4.70	0.169	0.177	0.185
D1	1.35	1.59	1.83	0.053	0.063	0.072
e	2.90	3.00	3.10	0.114	0.118	0.122
e1	1.45	1.50	1.55	0.057	0.059	0.061
E	2.30	2.50	2.70	0.091	0.098	0.106
HE	3.94	-	4.40	0.155	-	0.173
L	0.80	-	1.20	0.031	-	0.047

❖ Carrier tape dimension

SOT89-3L





Ao = 4.80
Bo = 4.50
Ko = 1.80

NOTES:
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE
3. Ao AND Bo ARE CALCULATED ON A PLANE AT A DISTANCE "R" ABOVE THE BOTTOM OF THE POCKET.