

150mA Ultra Low Dropout Linear Regulator

❖ GENERAL DESCRIPTION

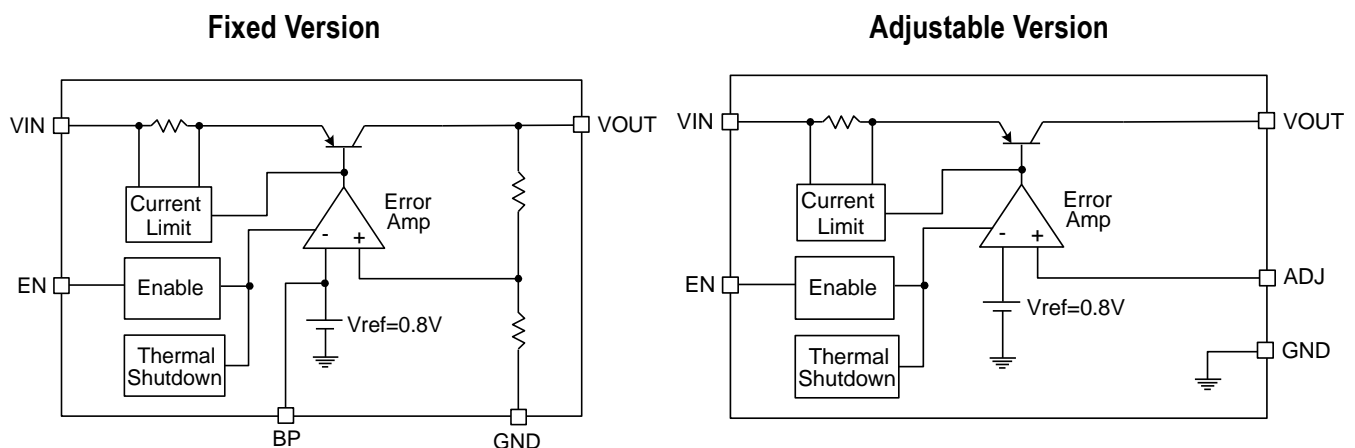
The AX1116 device is an efficient linear voltage regulator with better than 2% initial voltage accuracy, very low dropout voltage and very low ground current designed especially for hand held, battery powered applications. Other features of the device are: TTL compatible enable/shutdown control input, current limiting and thermal shutdown.

The AX1116 is available in fixed and adjustable output voltage versions in a small SOT-23 5-Pin package.

❖ FEATURES

- Wide Operating range: 2.5V ~ 14V
- Adjustable and 1.8V, 2.5V, 2.8V, 3.0V, 3.3V fixed output.
- 2% Voltage Reference Accuracy
- 5uA Shutdown Current
- Stable with 2.2uF Ceramic Capacitor
- Current-Limit and Thermal Shutdown Protection
- Logic input enable pin.
- Available in STO-23-5L Pb-Free Package.

❖ BLOCK DIAGRAM



❖ **PIN ASSIGNMENT**

The package of AX1116 is SOT-23-5L; the pin assignment is given by:



Name	Description
VIN	The input pin of the regulator. Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimum drop out voltage during the load transient response. This pin must always be higher than V _{OUT} by at least the amount of the dropout voltage and some margin in order for the device to regulate properly.
ADJ (Adjustable Only)	A resistor divider from this pin to the V _{OUT} pin and ground sets the output voltage. To minimize the error due to the error amplifier, select the values of the resistor dividers to be less than 10KΩ.
EN	Enable pin. A low signal or left open on this pin shuts down the output. This pin must be tied High or to V _{IN} for normal operation.
BP (Fixed Only)	A 470p to 1000pF bypass capacitor connected to this pin reduces the output noise.
VOUT	The output of the regulator. A minimum of 2.2uF with max ESR of 1Ω capacitor must be connected from this pin to ground to insure stability.
GND	Ground pin. This pin must be connected to the lowest potential in the system and all other pins must be at higher potential with respect to this pin.

❖ ORDER/MARKING INFORMATION

Order Information	Top Marking
<p>AX1116 X XX X</p> <p>Package B : SOT-23-5L</p> <p>Vout Blank : Adj 18 : 1.8V 25 : 2.5V 28 : 2.8V 30 : 3.0V 33 : 3.3V</p> <p>Packing Blank : Bag A : Taping</p>	<p>LLY WX → ID code:internal</p> <p> → WW:01~26 (A~Z) 27~52 (a~z)</p> <p> → Year: A=2010 1=2011</p> <p>Identification code</p>

Appendix

Part Number	Identification Code
AX1116-ADJ	RG
AX1116-1.8V	RH
AX1116-2.5V	RI
AX1116-2.8V	RJ
AX1116-3.0V	RK
AX1116-3.3V	RL

❖ ABSOLUTE MAXIMUM RATINGS (T_A=25°C)

Characteristics	Symbol	Rating	Unit
V _{IN} Pin Voltage	V _{IN}	-0.3 to 16	V
EN Pin Voltage	V _{EN}	-0.3 to 16	V
Power Dissipation	PD	250	mW
Storage Temperature Range	T _{ST}	-65 to +150	°C
Operating Junction Temperature Range	T _{OP}	0 to +150	°C
Thermal Resistance from Junction to case	θ _{JC}	180	°C/W
Thermal Resistance from Junction to ambient	θ _{JA}	250	°C/W

Note: θ_{JA} is measured with the PCB copper area of approximately 1 in² (Multi-layer). That need connect to GND pin.

❖ ELECTRICAL CHARACTERISTICS

Unless otherwise specified, these specifications apply over $C_{IN}=C_{OUT}=2.2\mu F$, $I_{OUT}=100\mu A$, $V_{IN(MIN)}=2.5V$ (Adjustable devices) $V_{IN}=V_{OUT}+1V$ (for fixed voltage devices), $V_{OUT}=V_{FB}$ (for adjustable version only), $C_{BYP}=470pF$ (for fixed voltage devices), $V_{EN}=2V$ and $T_A=25^\circ C$ Typical values refer to $T_A=25^\circ C$. Low duty cycle pulse testing is used which keeps junction and case temperatures equal to the ambient temperature.

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
VIN Supply Voltage	V_{IN}	-	2.5	-	14	V
Reference Voltage	V_{OUT}	-	-2	-	+2	%
ADJ Pin Current	I_{ADJ}	$V_{IN}=2.5V$, $V_{OUT}=V_{ADJ}$	-	0.1	-	μA
Line regulation	V_{Line}	$V_{OUT}+1V < V_{IN} < 14V$	-	0.1	-	%/V
Load regulation (Note1)	V_{Load}	$1mA < I_{OUT} < 100mA$	-	1.5	-	%
Thermal Regulation	-	$V_{IN}=10V$, $I_{OUT}=150mA$ 10ms pulse	-	0.05	-	%/W
Dropout Voltage (Note2)	V_{DROP}	$I_{OUT}=100\mu A$	-	10	-	mV
		$I_{OUT}=50mA$	-	50	-	
		$I_{OUT}=100mA$	-	120	-	
Ground current (Note3)	I_{GND}	$V_{EN}=2V$ $I_{OUT}=100\mu A$	-	120	-	μA
Shutdown Current	I_{SD}	$V_{EN}=0V$ to 0.8V or Open	-	5	-	μA
Minimum Load Current	I_{Min}	-	-	5	-	mA
Current Limit	CL	$V_{OUT}=0V$	150	-	-	mA
EN Pin Logic input threshold voltage	V_{ENH}	High (regulator ON)	2.0	-	-	V
	V_{ENL}	Low (regulator OFF)	-	-	0.8	V
EN Pin Input Current	I_{ENH}	$V_{EN}=2V$ (ON)	-	20	-	μA
	I_{ENL}	$V_{EN}=0V$ (OFF)	-	0.01	-	μA

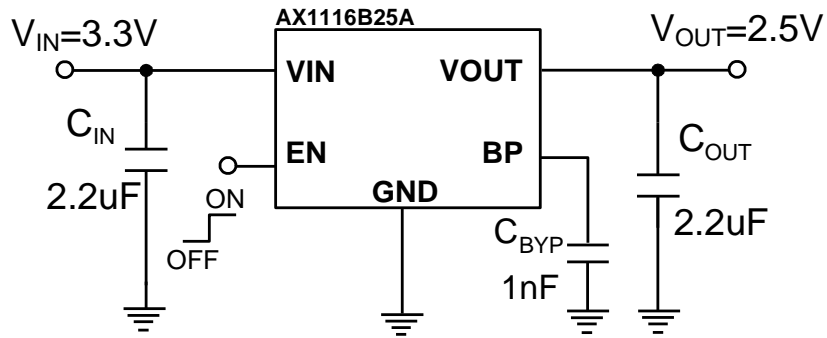
Note1. Low duty cycle pulse testing with Kelvin connections is required in order to maintain accurate data.

Note2. Dropout voltage is defined as the minimum differential voltage between V_{IN} and V_{OUT} required to maintain regulation at V_{OUT} . It is measured when the output voltage drops 1% below its nominal value.

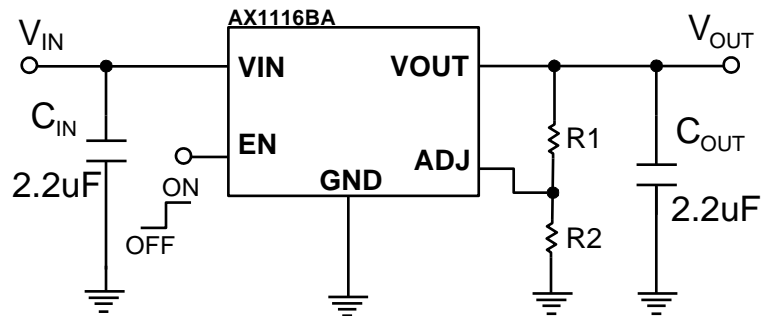
Note3. Ground current is the regulator quiescent current plus the pass transistor current. The total current from the supply is the sum of the load current plus the ground pin current.

❖ APPLICATION CIRCUIT

1. Fixed Version

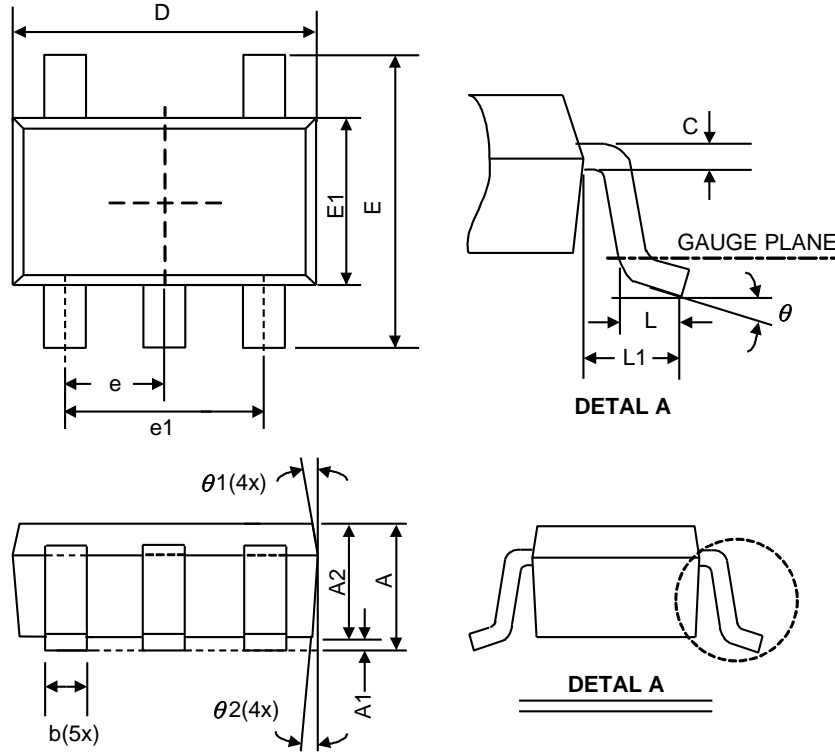


2. Adjustable Version



$$V_{OUT} = 0.8 * (1 + R1/R2)$$

❖ PACKAGE OUTLINES



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.45	-	-	0.057
A1	0.00	0.08	0.15	0	0.003	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
b	0.30	0.40	0.50	0.012	0.016	0.020
C	0.08	0.15	0.22	0.003	0.006	0.009
D	2.70	2.90	3.10	0.106	0.114	0.122
E1	1.40	1.60	1.80	0.055	0.063	0.071
E	2.60	2.80	3.00	0.102	0.110	0.118
L	0.30	0.45	0.60	0.012	0.018	0.024
L1	0.50	0.60	0.70	0.020	0.024	0.028
e1	1.9 BSC			0.075 BSC		
e	0.95 BSC			0.037 BSC		
θ	0°	4°	8°	0°	4°	8°
$\theta 1$	5°	10°	15°	5°	10°	15°
$\theta 2$	5°	10°	15°	5°	10°	15°

JEDEC outline: MO-178 AA