AMC1112

1A LOW DROPOUT POSITIVE REGULATOR

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DESCRIPTION

The AMC1112 of positive fixed regulators is designed to provide 1A for applications requiring high efficiency. All internal circuitry is designed to operated down to 800mV input to output differential and the dropout voltage is fully specified as a function of load current.

The AMC1112 offers current limiting and thermal protection. The on chip trimming adjusts the reference voltage accuracy to 1%.

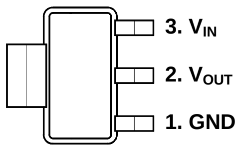
FEATURES

- **Output current of 1A typical**
- **Three-terminal fixed 1.2V outputs**
- **Low dropout of typical 800mV**
- **Thermal protection built in**
- **Typical 0.015% line regulation**
- **Typical 0.01% load regulation**
- **Fast transient response**
- **Available in SOT-223 and TO-252 packages**
- **Pin assignment identical to earlier FAN1112.**

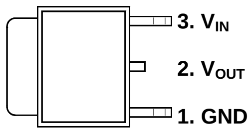
APPLICATIONS

- 2.85V Model for SCSI-2 Active Termination
- Battery Charger
- High Efficiency Linear Regulators
- Battery Powered Instrumentation
- Post Regulator for Switching DC/DC Converter

PACKAGE PIN OUT



3-Pin Plastic SOT-223
Surface Mount
(Top View)



3-Pin Plastic TO-252
Surface Mount
(Top View)

ORDER INFORMATION

T_A (°C)	SK	SOT223 3-pin	SJ	TO-252 3-pin
0 to 70	**AMC1112SK (SnPb)**		**AMC1112SJ (SnPb)**	
	AMC1112KF (Lead Free)		**AMC1112SJF (Lead Free)**	

Note: 1.All surface-mount packages are available in Tape & Reel. Append the letter "T" to part number (i.e. AMC1112SJT).
2.The letter "F" is marked for Lead Free process.

ABSOLUTE MAXIMUM RATINGS (Note 1)

Input Voltage	13V
Operating Junction Temperature Range, T_J	0^oC to 150^oC
Storage Temperature Range	-65^oC to 150^oC
Lead Temperature (soldiering, 10 seconds)	260^oC

Note 1: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

POWER DISSIPATION TABLE

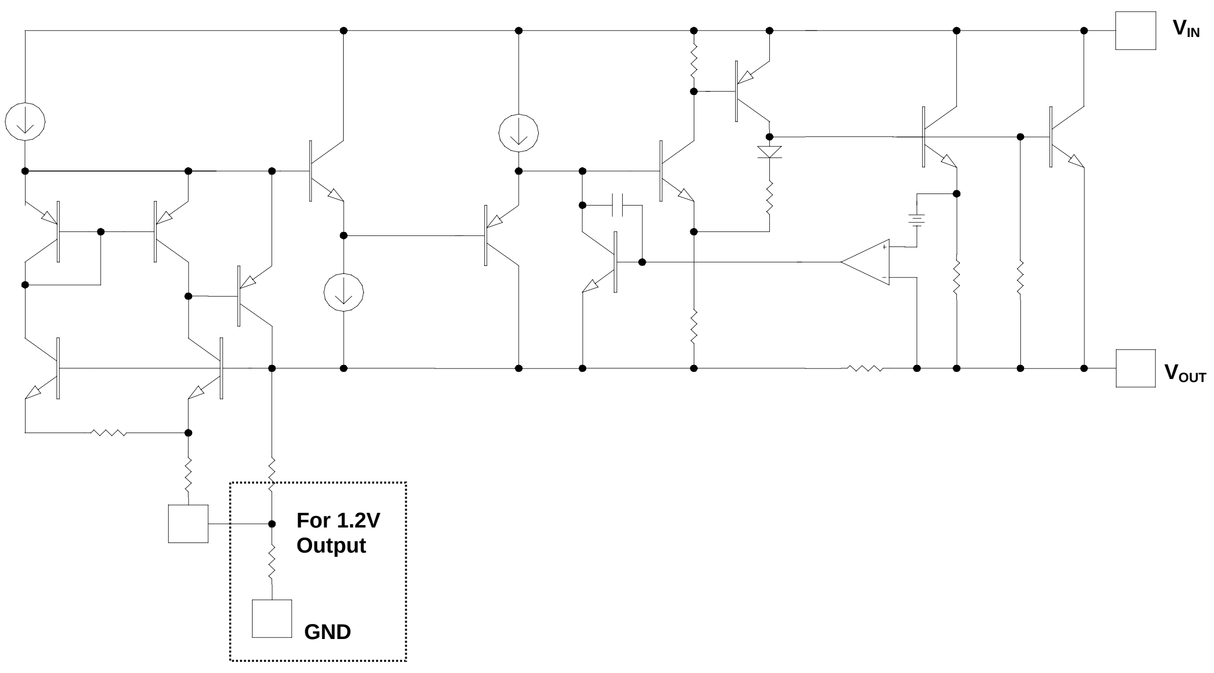
Package	θ_{JA} (^oC /W)	Derating factor (mW/^oC) $T_A \geq 25^oC$	$T_A \leq 25^oC$ Power rating(mW)	T_A=70^oC Power rating(mW)	T_A= 85^oC Power rating (mW)
SK	136	7.35	919	588	478
SKF	136	7.35	919	588	478
SJ	80	12.5	1562	1000	812
SJF	80	12.5	1562	1000	812

Note :

1. θ_{JA}: Thermal Resistance-Junction to Ambient, D_F : Derating factor, Po: Power consumption.
   Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$, $Po = D_F \times (T_J - T_A)$
   The θ_{JA} numbers are guidelines for the thermal performance of the device/PC-board system.
   All of the above assume no ambient airflow.

2. θ_{JT}: Thermal Resistance-Junction to Tab, T_C: case(Tab) temperature, $T_J = T_C + (P_D \times \theta_{JT})$
   For SK package, $\theta_{JT} = 15.0^oC$ /W.
   For SJ package, $\theta_{JT} = 7.0^oC$ /W.

BLOCK DIAGRAM



RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Recommended Operating Conditions Min.	Typ.	Max.	Units
Input Voltage	V_{IN}	2.4		12	V
Load Current (with adequate heatsinking)	I_o	10			mA
Input Capacitor (V_{IN} to GND)		1.0			µF
Output Capacitor with ESR of 10Ω max., (V_{OUT} to GND)		4.7			µF
Junction temperature	T_J			125	^oC

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $V_{IN} = V_{OUT} + 2V$, $I_O = 10mA$, and $T_J = 25^oC$.

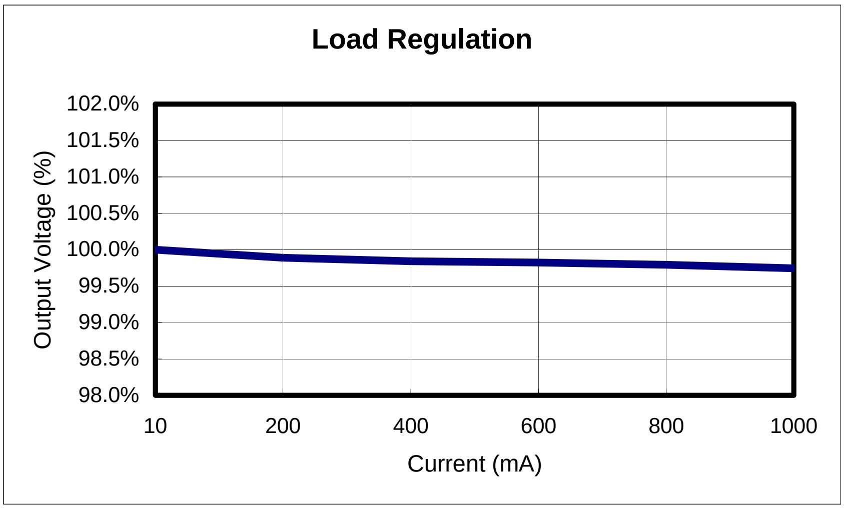
Parameter		Symbol	Test Conditions	AMC1112 Min	Typ	Max	Units
Output Voltage	AMC1112	Vout	$I_O = 10mA$, $V_{IN} - V_{OUT} = 2V$	1.18	1.20	1.26	V
			$10mA \le I_O \le 1A$, $V_{OUT} + 1.5V \le V_{IN} \le 12V$	1.17	1.20	1.27	
Line Regulation	AMC1112	ΔV_{OI}	$I_O = 10mA$, $V_{OUT} + 1.5V \le V_{IN} \le 12V$		0.04	0.20	%
	AMC1112		$I_O = 10mA$, $V_{OUT} + 1.5V \le V_{IN} \le 12V$		1.0	6.0	mV
Load Regulation	AMC1112	ΔV_{OL}	$10mA \le I_O \le 1A$, $V_{IN} - V_{OUT} = 3V$		0.10	0.40	%
	AMC1112		$10mA \le I_O \le 1A$, $V_{IN} = V_{OUT} + 1.5V$		1.0	10.0	mV
Dropout Voltage		ΔV	$I_O = 10mA$		0.8	1.15	V
			$I_O = 500mA$		0.8	1.20	
			$I_O = 1A$		1.0	120	
Minimum Load Current (Note 1)			$3.0V \le Vin \le 12V$	10			mA
Quiescent Current	AMC1112	I_Q	$V_{IN} \le 12V$		6	10	mA
Current Limit		I_{CL}	$V_{IN} - V_{OUT} = 3V$	1	1.2		A
Adjust Pin Current			$I_O = 10mA$, $V_{IN} - V_{OUT} = 2V$		50	120	µA
Thermal Regulation (Note 2)			$T_A = 25^oC$, 30 ms pulse		0.01	0.1	%/W
Ripple rejection (Note 2)		R_R	$f_O = 120Hz$, $1V_{RMS}$, $I_O = 400mA$, $V_{IN} - V_{OUT} = 3V$	60	75		dB

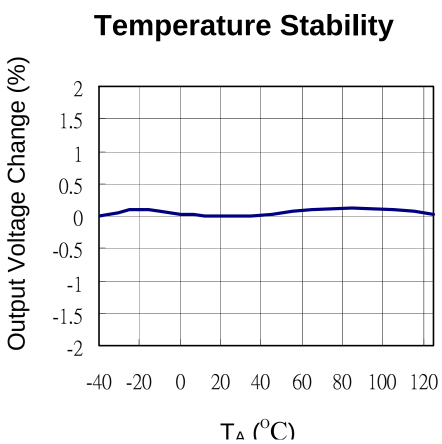
Note 1: For the adjustable device, the minimum load current is the minimum current required to maintain regulation. Normally the current in the resistor divider used to set the output voltage is selected to meet the minimum load current requirement.

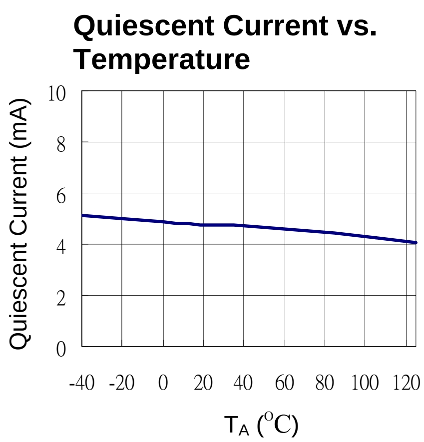
Note 2: These parameters, although guaranteed, are not tested in production.

CHARACTERIZATION CURVES

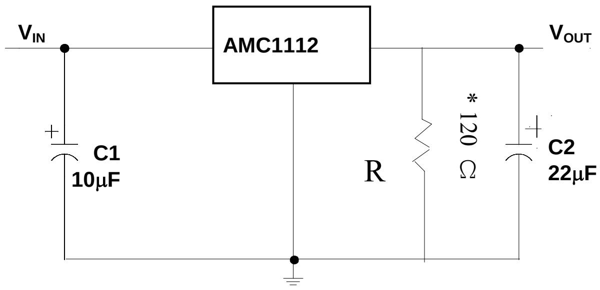
Unless otherwise specified, V_{IN}= V_{OUT}+2V，C_{IN}=1μF，C_{OUT}=4.7μF，T_A=25 °C







APPLICATION INFORMATION



Note: 1. *120Ω for warrant work on 10mA.

2. R doesn't need to use if load more than 120Ω.

Fixed Voltage Regulator

Application Note:

Maximum Power Calculation:

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_{A(MAX)}}{\theta_{JA}}$$

T_J(°C): Maximum recommended junction temperature

T_A(°C): Ambient temperature of the application

θ_{JA}(°C/W): Junction-to-junction temperature thermal resistance of the package, and other heat dissipating materials.

The maximum power dissipation of a single-output regulator :

$P_{D(MAX)} = [(V_{IN(MAX)} - V_{OUT(NOM)})] \times I_{OUT(NOM)} + V_{IN(MAX)} \times I_Q$

Where: $V_{OUT(NOM)}$ = the nominal output voltage
$I_{OUT(NOM)}$ = the nominal output current, and
I_Q = the quiescent current the regulator consumes at $I_{OUT(MAX)}$
$V_{IN(MAX)}$ = the maximum input voltage

Then $\theta_{JA} = (150\,^{o}C - T_A)/ P_D$

Thermal consideration:

When power consumption is over about 404 mW (for SOT-223 package, 687mW for TO-252 package, at T_A=70 °C), additional heat sink is required to control the junction temperature below 125 °C.

The junction temperature is: $T_J = P_D\ (\theta_{JT} + \theta_{CS} + \theta_{SA}) + T_A$

P_D.:Dissipated power.

θ_{JT}.:Thermal resistance from the junction to the mounting tab of the package.

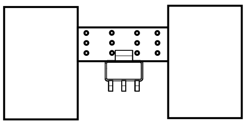
θ_{CS}.:Thermal resistance through the interface between the IC and the surface on which it is mounted. (typically, $\theta_{CS} < 1.0$°C/W)

θ_{SA} : Thermal resistance from the mounting surface to ambient (thermal resistance of the heat sink).

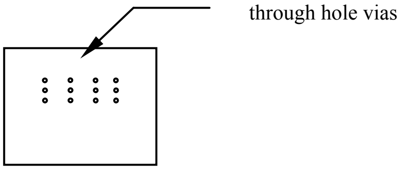
If PC Board copper is going to be used as a heat sink, below table can be used to determine the appropriate size of copper foil required. For multi-layered PCB, these layers can also be used as a heat sink. They can be connected with several through hole vias.

PCB θ_{SA} (°C /W)	59	45	38	33	27	24	21
PCB heat sink size (mm^2)	500	1000	1500	2000	3000	4000	5000

Recommended figure of PCB area used as a heat sink.



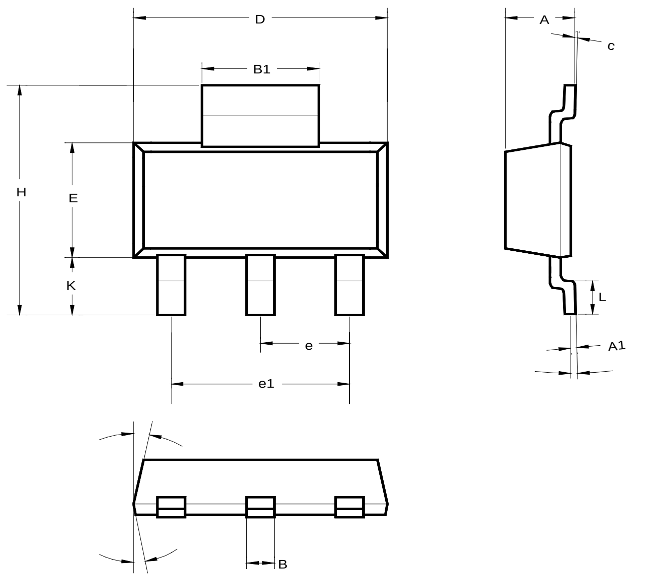
(Top View)



(Bottom View)

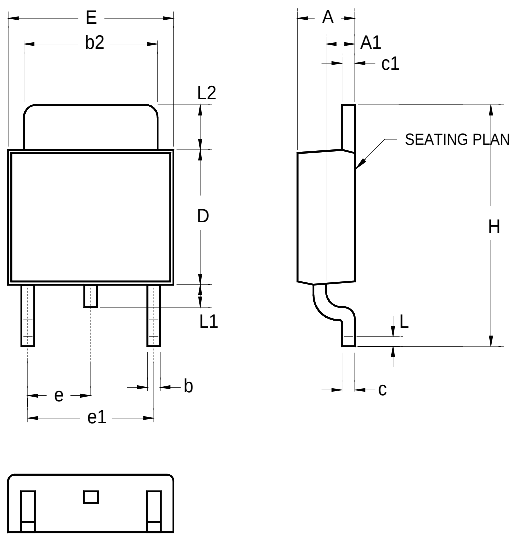
PACKAGE

3-Pin Surface Mount SOT-223 (SK)



	MILLIMETERS		
	MIN	TYP	MAX
A	1.50	1.65	1.80
A1	0.02	0.05	0.08
B	0.60	0.70	0.80
B1	2.90	-	3.15
c	0.28	0.30	0.32
D	6.30	6.50	6.70
E	3.30	3.50	3.70
e	2.3 BSC		
e1	4.6 BSC		
H	6.70	7.00	7.30
L	0.91	1.00	1.10
K	1.50	1.75	2.00
α	0°	5°	10°
β		3°	

3-Pin Surface Mount TO-252 (SJ)



	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.086	-	0.094	2.18	-	2.39
A1	0.040	-	0.050	1.02	-	1.27
b	-	0.024	-	-	0.61	-
b2	0.205	-	0.215	5.21	-	5.46
c	0.018	-	0.023	0.46	-	0.58
c1	0.018	-	0.023	0.46	-	0.58
D	0.210	-	0.220	5.33	-	5.59
E	0.250	-	0.265	6.35	-	6.73
e	0.090 BSC			2.29 BSC		
e1	0.180 BSC			4.58 BSC		
H	0.370	-	0.410	9.40	-	10.41
L	0.020	-	-	0.51	-	-
L1	0.025	-	0.040	0.64	-	1.02
L2	0.060	-	0.080	1.52	-	2.03

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