300mA CMOS L.D.O. Regulator LM1108

FEATURES

- Extremely Low Supply Current
- Very Low Dropout Voltage
- 300mA Output Current
- Compatible with MLCC
- High Output Voltage Accuracy +/- 1.4 %
- Standard or Custom Output Voltages
- Over Current and Over Temperature Protection
- Small input/output differential : 0.3V for full load
- Moisture Sensitivity Level 3

APPLICATION

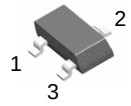
- Battery-Operated Systems
- Portable Computers
- Portable Cameras and Video Recorders
- Medical Instruments
- Cellular/GSM/PHS Phones
- Linear Post-Regulators for SMPS

DESCRIPTION

The LM1108 is a fixed output, high accuracy(typically ±0.5%) CMOS low drop-out regulator. Total supply current is typically 50μA at full load (20 to 60 times lower than in bipolar regulators). LM1108 key features include ultra low noise operation, very low dropout voltage (typically 240mV at full load), and fast response to step changes in load.

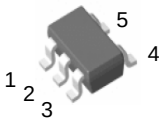
The LM1108 incorporates both over temperature and over current protection. The LM1108 is stable with an output capacitor of only 1μF and has a maximum out put current of 300mA. It is available in a SOT-23 & SOT-89 package

SOT-23



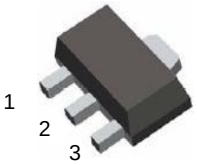
1. GND 2. Vin 3. Vout [A type]
1. Vin 2. Vout 3. GND [B type]

SOT-23-5L (SOT-25)



1. GND 2. Vin 3. Vout 4, 5. N.C

SOT-89



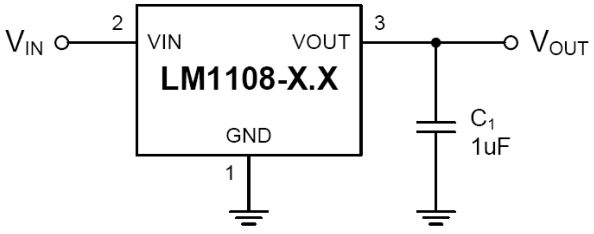
1. GND 2. Vin 3. Vout

ORDERING INFORMATION

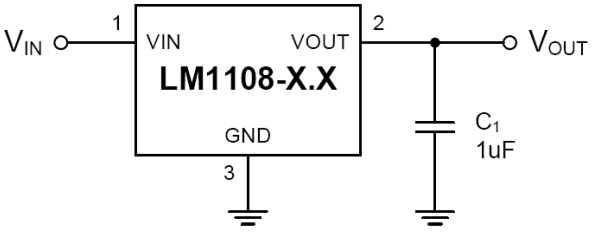
Device	Marking	Package
LM1108SF-X.X (A type)	HXX	SOT-23 3L
LM1108BSF-X.X (B type)	BXX	
LM1108GSF-X.X (H/F)	HGXX	
LM1108SF5-X.X	HXX	SOT-23 5L
LM1108F-X.X	1108 X.X	SOT-89

("X.X" = Output Voltage
= 1.5, 1.8, 2.5, 3.0, 3.3, 3.6, 5.0)

TYPICAL APPLICATION CIRCUIT



A Type



B Type

Maximum Ratings

CHARACTERISTIC		SYMBOL	Value	UNIT
Supply Voltage		V_{IN}	+6.5	V
Output Current		I_{OUT}	300	mA
Output Voltage		V_{OUT}	V_{SS} -0.3 to V_{IN} +0.3	V
Total Power Dissipation	SOT23 PKG	P_D	230	mW
	SOT89 PKG		500	
Package Thermal Resistance		$\theta_{JA\text{-}SOT\text{-}23}$	430	℃/W
		$\theta_{JC\text{-}SOT\text{-}23}$	160	℃/W
		$\theta_{JA\text{-}SOT\text{-}89}$	200	℃/W
		$\theta_{JC\text{-}SOT\text{-}89}$	140	℃/W
Operating Ambient Temperature		Topr	-40 to +85	℃
Lead Temperature (soldering, 5 sec)		-	260	℃
Storage Temperature		Tstg	-40 ~ +125	℃

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Condition	Limit			Units
			Min	Typ	Max	
Output Voltage Accuracy	V_{OUT}	I_{OUT} = 1mA	-1.5	1	1.5	%
		I_{OUT} = 0 ~ 300mA		2		
Line Regulation	$\triangle V_{LINE}$	I_{OUT} = 1mA, (V_{OUT}+0.1V) < V_{IN} < 6.5V		0.1	0.3	%/V
Load Regulation (Note. 1)	$\triangle V_{LOAD}$	V_{IN} = 6V, 0.1mA < I_{OUT} < 300mA, C_{OUT} = 1uF		0.005	0.04	%/mA
Maximum Output Current	Io	V_{IN} = 5V, V_{OUT} > 0.96V Rating	300	500		mA
Current Limit	I_{CL}		400			mA
Ground Current	I_{GND}	I_{OUT} = 0 ~ 300mA		15	30	uA
Dropout Voltage for						
V_{OUT} > 2.5V	V_{DROP}	I_{OUT} = 100mA		100	180	mV
		I_{OUT} = 300mA		300	550	
2.0V < V_{OUT} < 2.5V		I_{OUT} = 100mA		150	300	
		I_{OUT} = 300mA		450	800	
V_{OUT} < 2.0V		I_{OUT} = 100mA		200	400	
		I_{OUT} = 300mA		600	1100	

Note.1: Load Regulation is measured using pulse techniques with duty cycle < 5%

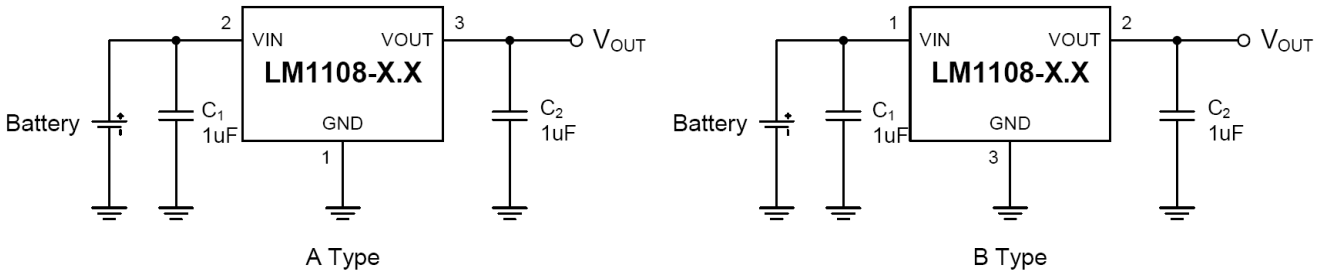
Detail Description

- The LM1108 is a precision, fixed output LDO.

Un like bipolar regulators, the LM1108's supply current does not increase with load current.

In addition, VOUT remains stable and with in regulation over theen tire 0mA to IOUT MAX operating load current range, (an important consideration in RTC and CMOS RAM battery back-up applications).

Figure 3-1shows a typical application circuit.



1. Output Capacitor

1uF(min) capacitor from VOUT to ground is required.

The output capacitor should have an effective series resistance greater than 0Ω and less than 0.1Ω.

1uF capacitor should be connected from VIN to GND if there is more than 10 inches of wire between the regulator and the AC filter capacitor or if a battery is used as the power source. As well as Low ESR Ceramic Capacitors, aluminum electrolytic or tantalum capacitor types can also be used. (Since many aluminum electrolytic capacitors freeze at approximately -30°C, solid tantalums are recommended for applications operating below -25°C)

When operating from sources other than batteries,supply-noise rejection and transient response can be improved by increasing the value of the input and output capacitors and employing passive filtering techniques.

2. THERMAL CONSIDERATIONS

2.1 Thermal Shutdown

Integrated thermal protection circuitry shuts the regulator off when die temperature exceeds150°C.

The regulator remains off until the die temperature drops to approximately 140°C.

2.2 Power Dissipation

The amount of power the regulator dissipates is primarily a function of input and output voltage, and output current. The following equation is used to calculate worst case actual power dissipation:

EQUATION 2-1:

$$P_D \approx (V_{INMAX} - V_{OUTMIN}) \times I_{LOADMAX}$$

where, P_D = Worst case actual power dissipation

V_{INMAX} = Maximum voltage on V_{IN}

V_{OUTMIN} = Minimum regulator output voltage

$I_{LOADMAX}$ = Maximum output (load) current

EQUATION 2-2:

$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\Theta_{JA}}$$, where all items are previously defined.

The maximum allowable power dissipation (Equation 2-2) is a function of the maximum ambient temperature (T_{AMAX}), the maximum allowable die temperature (T_{JMAX}) and the thermal resistance from junction-to-air(θ_{JA}).