



## General Description

H78LxxG is three-terminal positive regulators. One of these regulators can deliver up to 150mA of output current. The internal limiting and thermal-shutdown features of the regulator make them essentially immune to overload. When used as a replacement for a zener diode-resistor combination, an effective improvement in output impedance can be obtained, together with lower quiescent current.

## Features

- Output Current of 150mA
- Thermal Overload Protection
- Short Circuit Protection
- Output transistor safe area protection
- No external components
- Package: SOT-89
- Output Voltage Accuracy: tolerance  $\pm 5\%$

## Pin Configuration And Descriptions

SOT-89

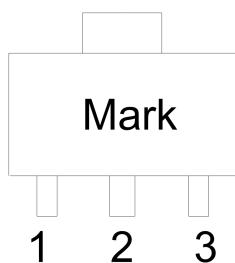


Table1:H78LxxG series (SOT-89 PKG)

PIN NO.	PIN NAME	FUNCTION
1	VOUT	Output voltage pin
2	GND	GND pin
3	VIN	Input voltage pin

## Order Information

Orderable Device	Package	Output Voltage	Packing Option
H78LxxG	SOT-89	3.3V,5.0V,6.0V,8.0V,9.0V,12V,15V,18V,24V	1000/Reel

xx:33,05,06,08,09,12,15,18,24

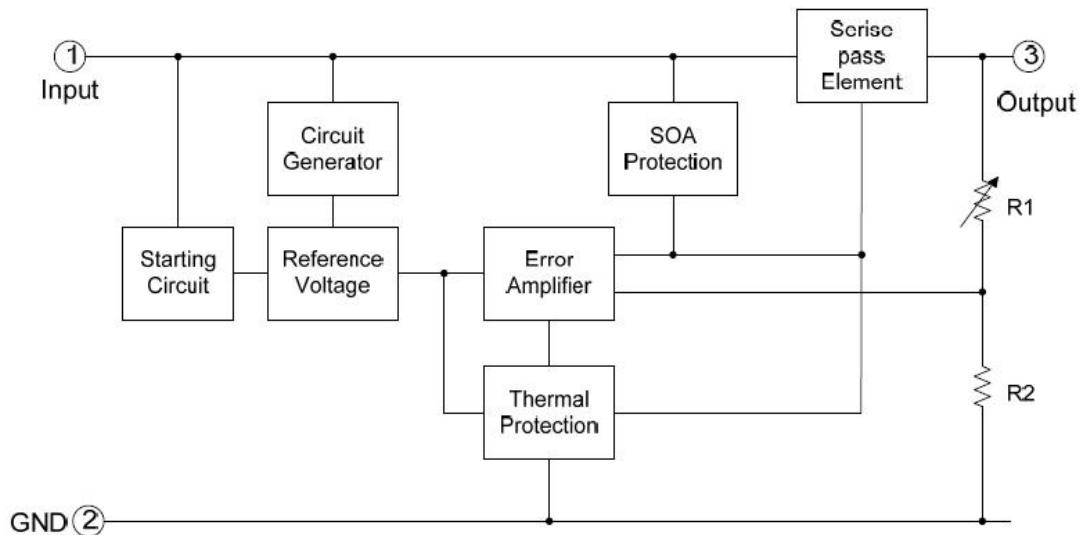


## Absolute Maximum Ratings

Description	Symbol	Value Range	Unit
Input supply voltage	$V_{IN\ MAX}$	30	V
MAX. Output current	$I_{OUT}$	150	mA
MAX Power	$P_{max}$	0.5	W
Junction temperature	$T_j$	-55~+150	°C
Operation temperature	$T_{opr}$	-40~+125	°C
Storage temperature	$T_{str}$	-55~+155	°C
Soldering temperature and time		+260	°C
ESD Rating, (HBM)	ESD	2	kV

Note: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

## Block Diagram





DC Characteristics (unless otherwise noted  $T_A = 25^\circ C$ )

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V <sub>out</sub>	$I_o = 40\text{mA}$ , $V_{IN} = 10\text{V}$	0.964v <sub>out</sub>	v <sub>out</sub>	1.036v <sub>out</sub>	V
		$I_o = 1\text{mA} \sim 40\text{mA}$ $V_{IN} = 7\text{V} \sim 18\text{V}$	0.96v <sub>out</sub>	v <sub>out</sub>	1.04v <sub>out</sub>	
		$I_o = 1\text{mA} \sim 10\text{mA}$ $V_{IN} = 10\text{V}$	0.95v <sub>out</sub>	v <sub>out</sub>	1.05v <sub>out</sub>	
Line Regulation	LNR	$V_{IN} = 7\text{V} \sim 18\text{V}$ , $I_o = 20\text{mA}$	-150	-	150	mV
		$V_{IN} = 8\text{V} \sim 18\text{V}$ , $I_o = 20\text{mA}$	-100	-	100	
Load Regulation	LDR	$V_{IN} = 10\text{V}$ , $I_o = 1\text{mA} \sim 100\text{mA}$	-100	-	100	mV
		$V_{IN} = 10\text{V}$ , $I_o = 1\text{mA} \sim 40\text{mA}$	-30	-	30	
Dropout Voltage	$V_{DIF}$	$T_A = 25^\circ C$ , $I_o = 100\text{mA}$	-	2	-	V
Output noise Voltage	$V_N$	$F = 10\text{Hz} \text{ to } 100\text{KHz}$	-	40	-	uV/V <sub>o</sub>
Ripple Rejection	PSRR	$T_A = 25^\circ C$ , $f = 120\text{Hz}$ , $I_o = 40\text{mA}$ , $V_{IN} = 8\text{V} \sim 20\text{V}$	-	80	-	dB
Quiescent Current	$I_Q$	$V_{IN} = 10\text{V}$ , $I_{OUT} = 40\text{mA}$	-	-	5.5	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN} = 8\text{V} \sim 18\text{V}$ , $I_o = 20\text{mA}$	-1.5	-	1.5	mA
		$V_{IN} = 10\text{V}$ , $I_{OUT} = 1\text{mA} \sim 40\text{mA}$ ,	-0.1	-	0.1	

LNR: Line Regulation. The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

LDR: Load Regulation. The change in output voltage for a change in load current at constant chip temperature.



## Application Circuit

### Basic Circuits

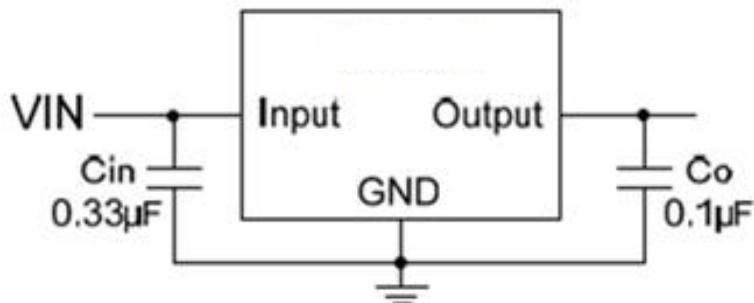


Fig.1 Typical Application

A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage. Cin is required if regulator is located an appreciable distance from power supply filter. Co is not needed for stability; however, it does improve transient response.

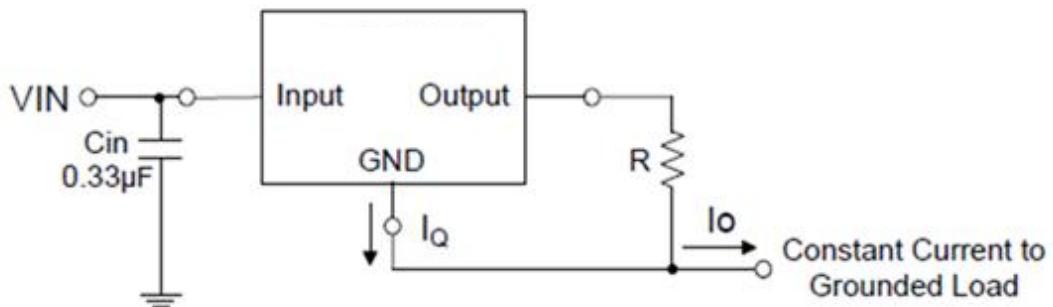


Fig.2 Constant Current Regulator

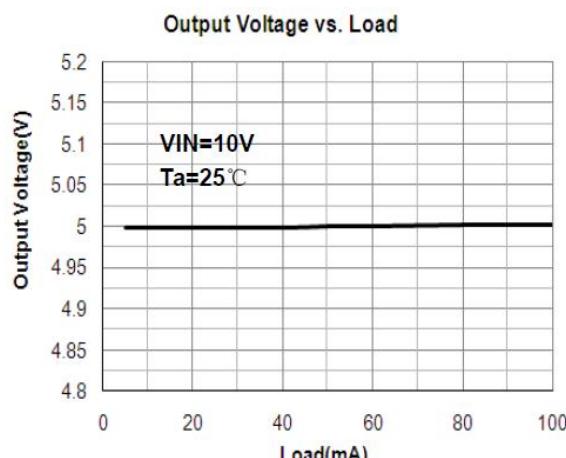
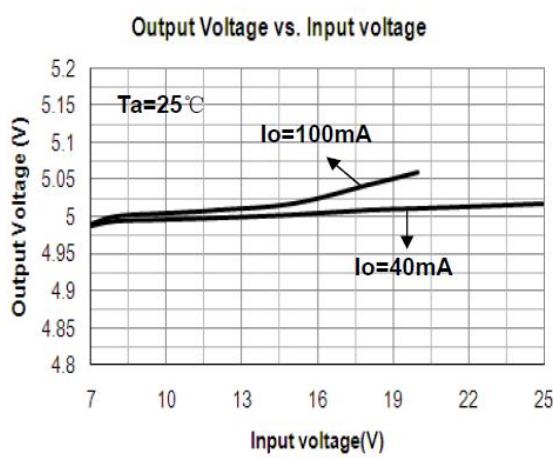
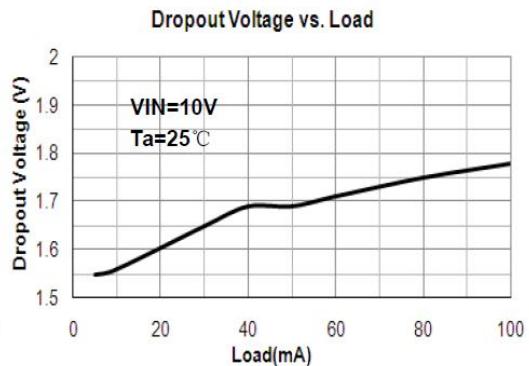
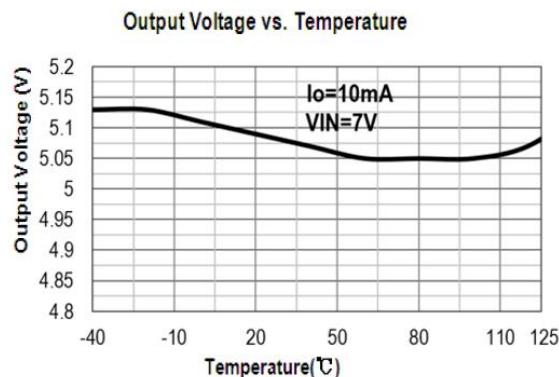


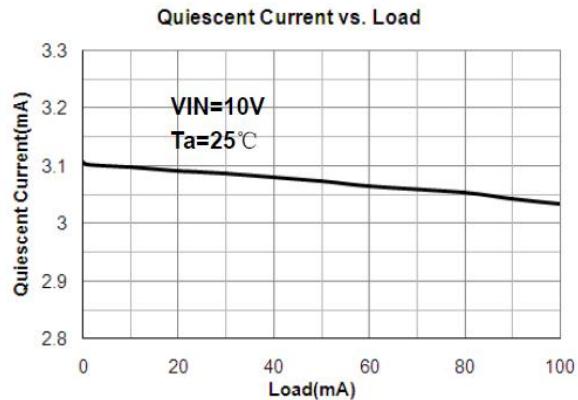
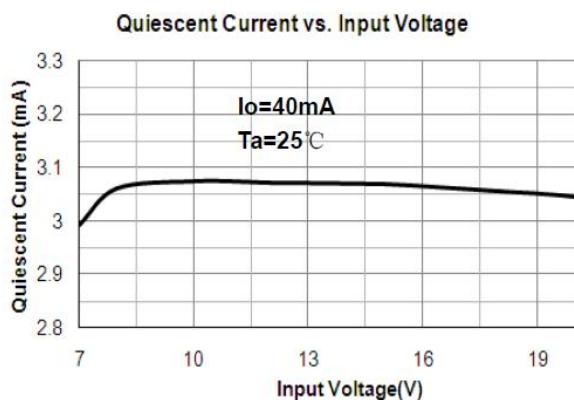
## Function Description

H78LxxG is designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, and Output Transistor Safe-Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33  $\mu$ For larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.

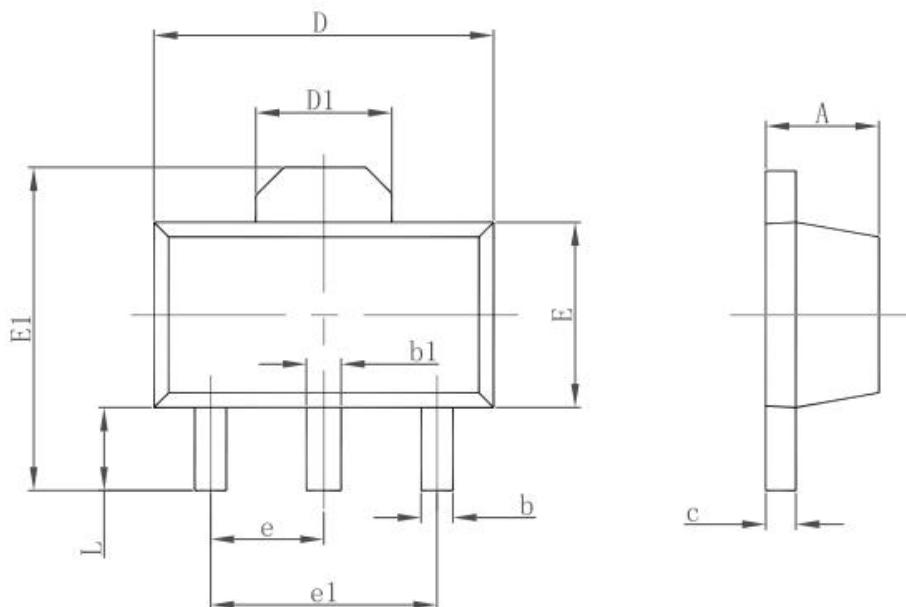
## Typical Characteristics





### Package Outline Dimensions

SOT-89



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047



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