78LXX Series

3-Terminal Positive Regulator

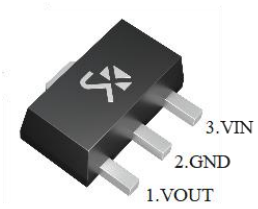
Features

- Output Current of 150mA
- Thermal Overload Protection
- Short Circuit Protection
- Output transistor safe area protection
- No external components
- Package:SOT-89 ,SOT-23 and TO-92
- Output voltage accuracy: tolerance ±5%

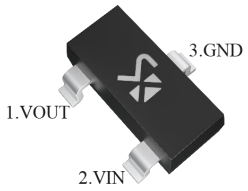
Description

78LXX is three-terminal positive regulators. One of these regulators can deliver up to 150 mA 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.

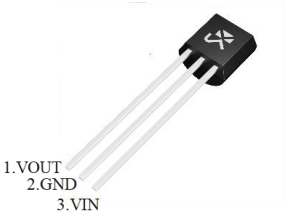
Pin Configuration(PKG)



SOT-89



SOT-23



TO-92

Selection Table

Part.NO.	Output Voltage	Package	Marking
78L33	3.3V	SOT-23 SOT-89 TO-92	78L33
78L05	5.0V		78L05
78L06	6.0V		78L06
78L08	8.0V		78L08
78L09	9.0V		78L09
78L12	12V		78L12
78L15	15V		78L15
78L18	18V		78L18
78L24	24V		78L24

Absolute Maximum Ratings

Parameter		Value	Unit
Input Voltage:V_{IN} MAX		30	V
MAX. Output current: I_{OUT}		150	mA
MAX Power: Pmax	SOT-89	0.5	W
	SOT-23	0.2	W
	TO-92	0.5	W

Junction temperature: T_J	-55~150	℃
Operating Temperature: T_{opr}	-40~125	℃
Storage Temperature Range: T_{STG}	-55~155	℃
Soldering temperature and time	+260(Recommended 10S)	℃
ESD Rating, (HBM)	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.

Electrical Characteristics

(C_{IN}=0.33μF, C_O=0.1μF, T_A=25℃,unless otherwise noted)

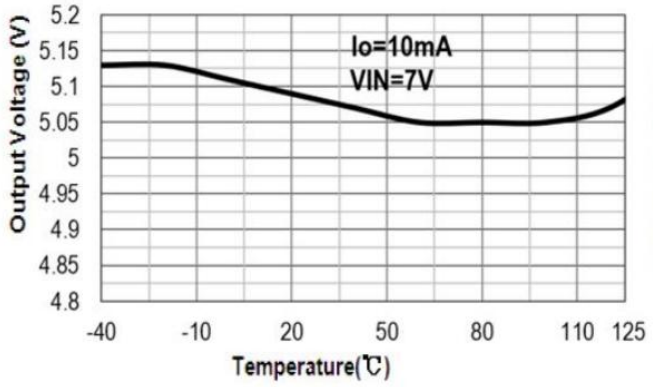
Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	I_O=40mA,V_{IN}=10V	0.964V_{OUT}	V_{OUT}	1.036V_{OUT}	V
		I_O=1mA~40mA,V_{IN}=7V~18V	0.96V_{OUT}	V_{OUT}	1.04V_{OUT}	V
		I_O=1mA~10mA,V_{IN}=10V	0.95V_{OUT}	V_{OUT}	1.05V_{OUT}	V
LNR	Line Regulation(Note)	V_{IN}=7V~18V,I_O=20mA	-150		150	mV
		V_{IN}=8V~18V,I_O=20mA	-100		100	mV
LDR	Load Regulation(Note)	V_{IN}=10V,I_O=1mA~100mA	-100		100	mV
		V_{IN}=10V,I_O=1mA~40mA	-30		30	mV
V_{DIF}	Dropout Voltage	T_A=25℃,I_O=100mA		2		V
V_N	Output noise Voltage	F=10Hz~100KHz		40		uV/V_O
PSRR	Ripple rejection	T_A=25℃,f=120Hz,I_O=40mA,V_{IN}=8V~20V		80		dB
I_q	Quiescent Current	V_{IN}=10V,I_O=40mA			5.5	mA
ΔI_q	Quiescent current change	V_{IN}=8V~18V,I_O=20mA	-1.5		1.5	mA
		V_{IN}=10V,I_O=1mA~40mA	-0.1		0.1	mA

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.

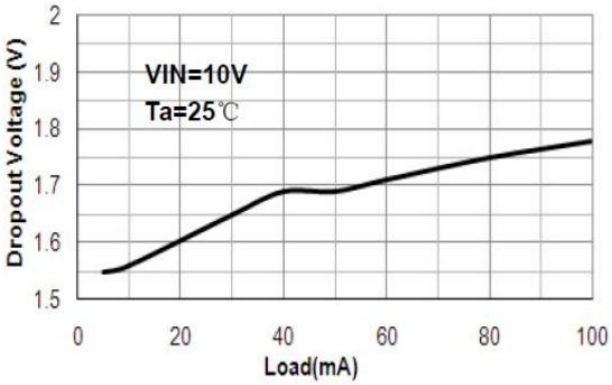
LDR: Load Regulation. The change in output voltage for a change in load current at constant chip temperature.

Typical Characteristics

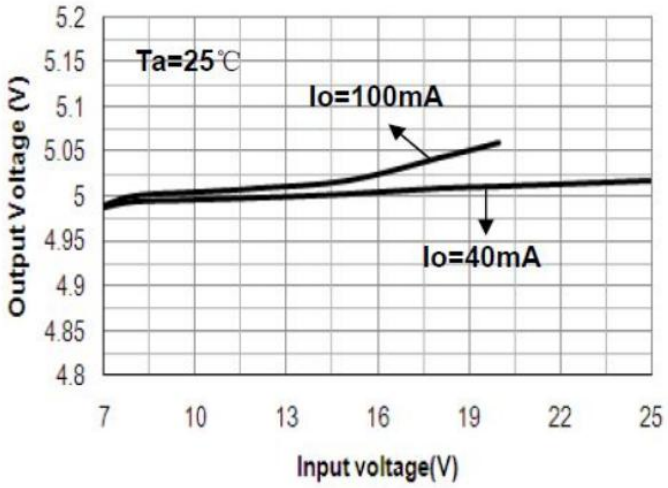
Output Voltage vs. Temperature



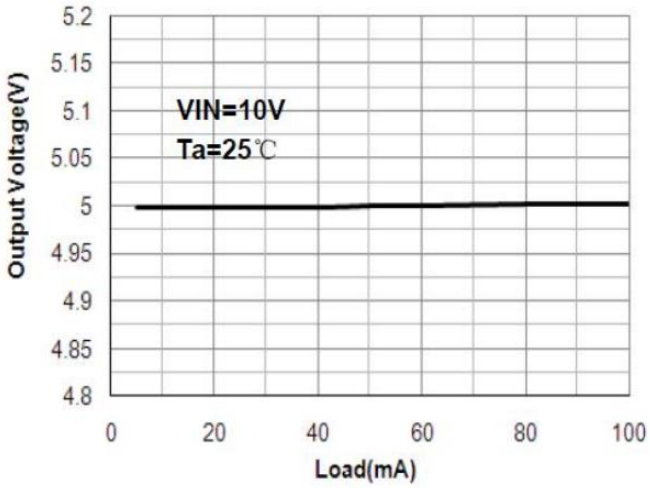
Dropout Voltage vs. Load



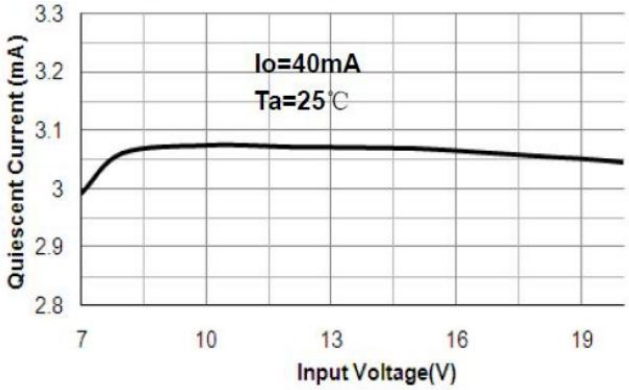
Output Voltage vs. Input voltage



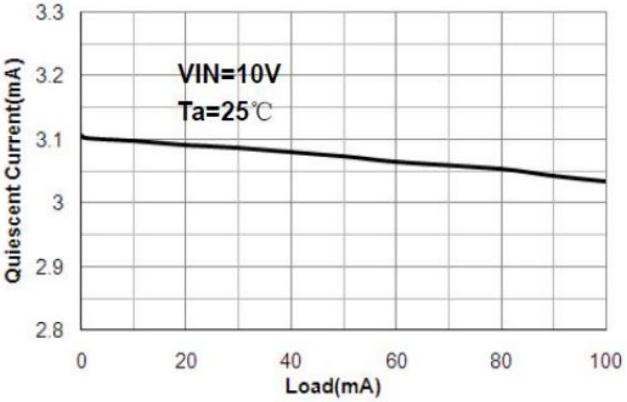
Output Voltage vs. Load



Quiescent Current vs. Input Voltage



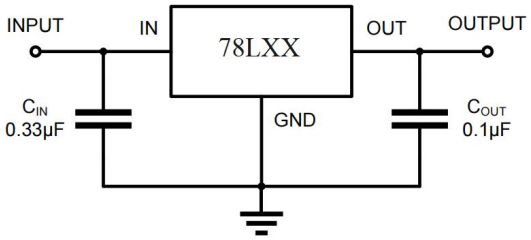
Quiescent Current vs. Load



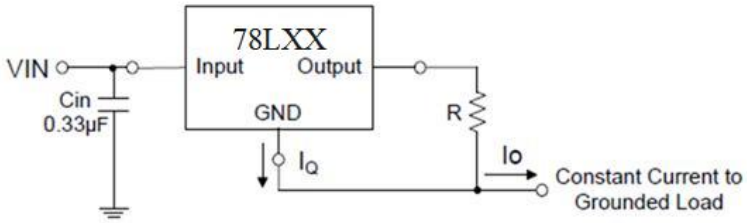
Operation Description

78LXX 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 0.33μFor 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.

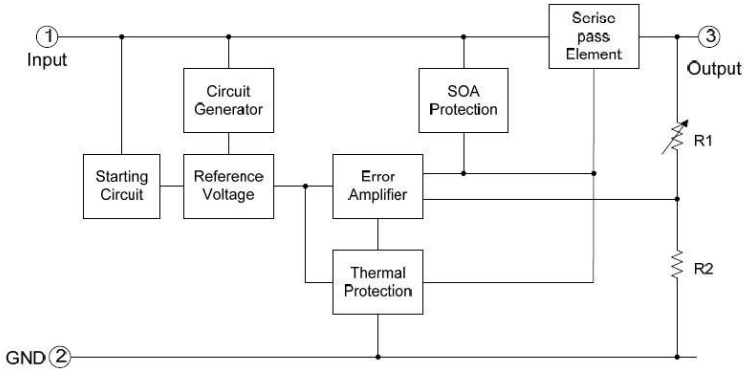
Typical Application



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.



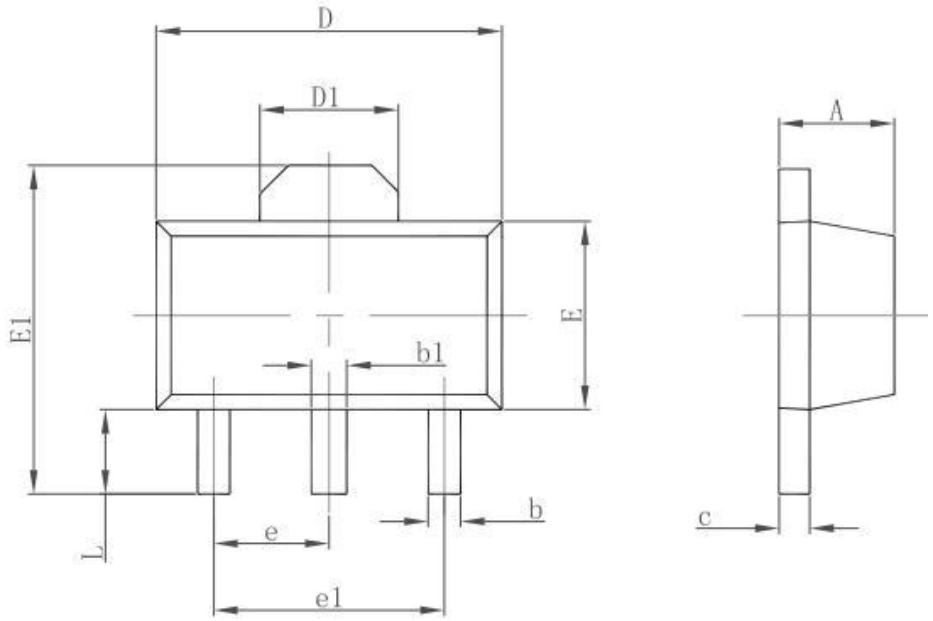
Block Diagram



Package Information

SOT-89

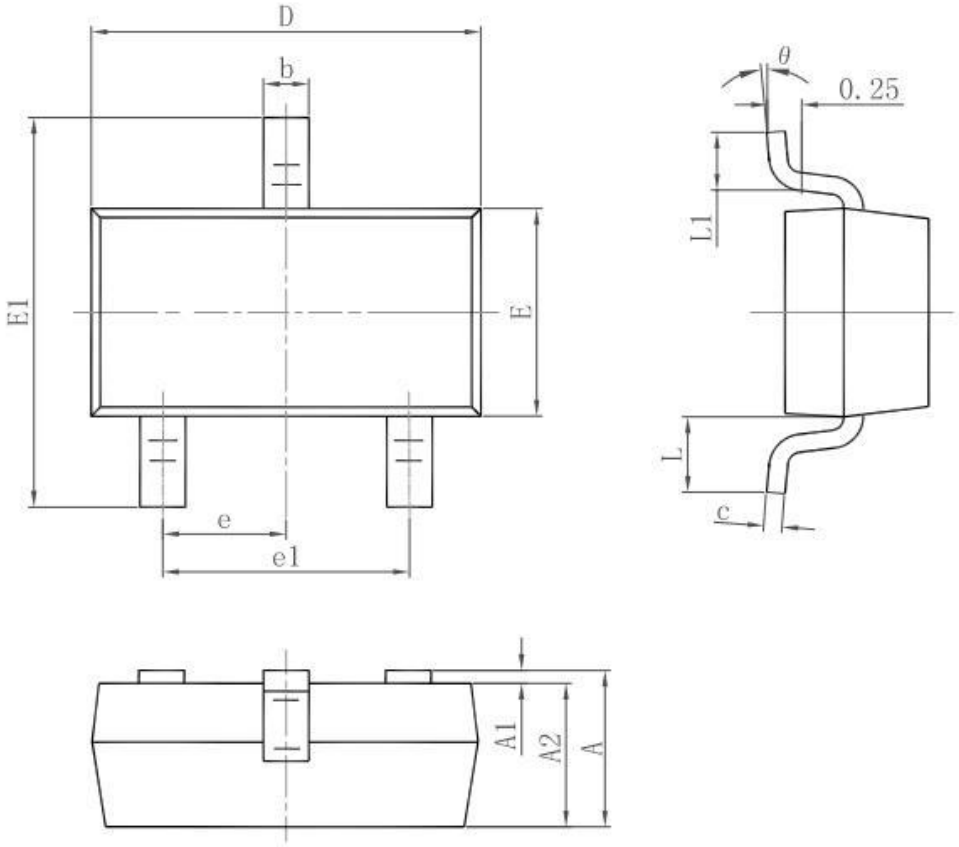
Dimensions in mm



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

SOT-23

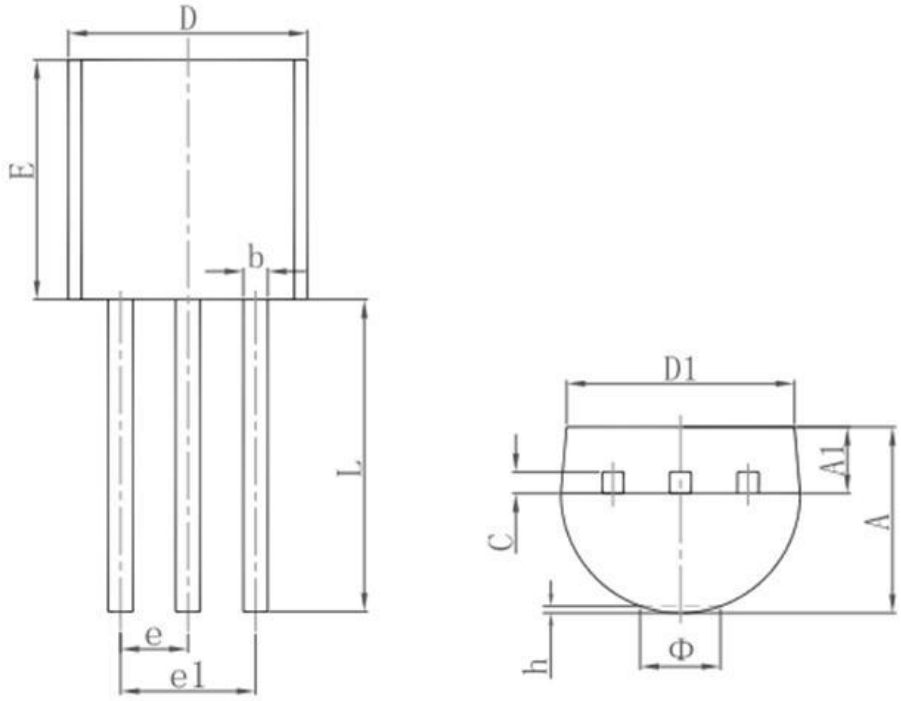
Dimensions in mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

TO-92

Dimensions in mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.300	4.700	0.169	0.185
D1	3.430		0.135	
E	4.300	4.700	0.169	0.185
e	1.270 TYP.		0.050 TYP.	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571
Φ		1.600		0.063
h	0.000	0.380	0.000	0.015