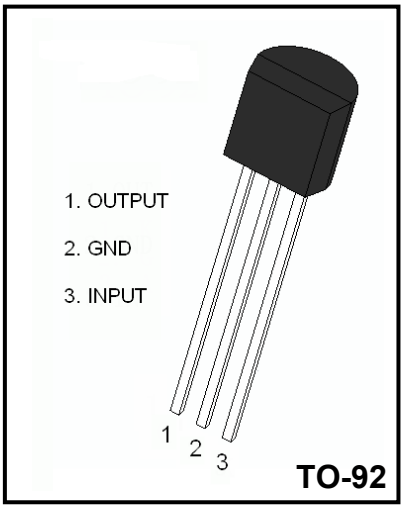
3-Terminal 100mA Positive Voltage Regulator



FEATURES

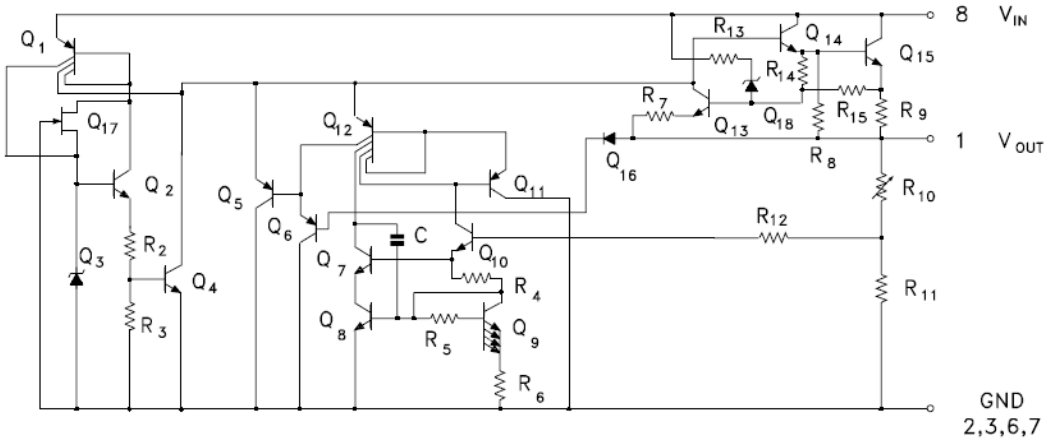
- Output Current up to 100mA
- Output Voltages of 3.3,5,6,8,9 ,12,15,18,24V
- Thermal Overload Protection Short Circuit Protection
- No External Components are required
- Available in either ±5% (AC) or ±10%(C) selection

Description

The 78LXX series of three-terminal positive regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heat-sink is provided, they can deliver up to100mA output current. Theyare intended as fixed voltage regulators in a wide range of applications including local or on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power pass elements to make high-current voltage regulators.

The 78LXX series used as Zener diode/resistor combination replacement, offers an effective Output impedance improvement of typically two orders of magnitude, along with lower quiescent current and lower noise.

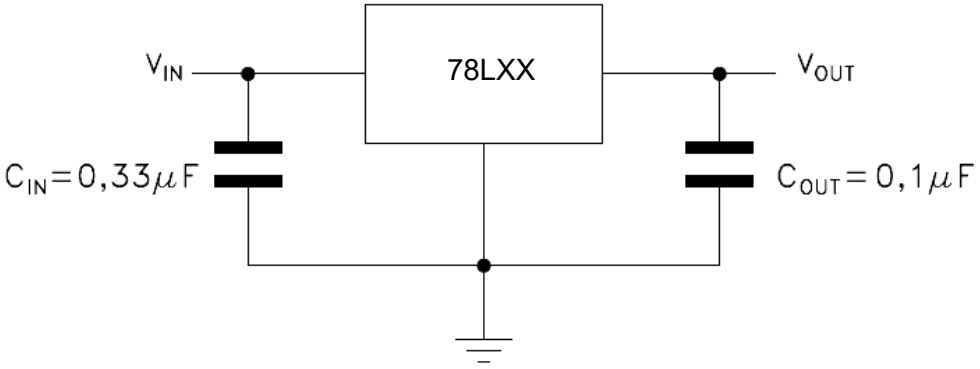
Internal Block Digram



Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{IN}	Input Voltage	3.3 ~ 10V	30	V
		12 ~ 15V	35	
		18 ~ 24V	40	
I_O	Output Current		100	mA
Rthj-amb	Thermal Resistance Junction-ambient MAX		200	°C/W
T_{OPR}	Operating Junction Temperature Range		0 ~ 125	°C
T_{STG}	Storage Temperature Range		-40 ~ + 125	°C

Test Circuits



Electrical Characteristics（78L33）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=8.3V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 5.3 ~ 20V	2.97	3.3	3.63	V
Line Regulation(Note)	ΔV_O	V_I = 5.3V ~ 20V, T_J = 25°C			150	mV
		V_I = 6.3V ~ 20V,T_J = 25°C			100	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			60	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			30	
Quiescent Current	I_Q	Tj = 25°C			6	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 6.3 ~ 20V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		40		μV
Dropout Voltage	V_D			1.7		V

Electrical Characteristics（78L05）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=10V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 7 ~ 20V	4.8	5	5.2	V
Line Regulation(Note)	ΔV_O	V_I = 8.5V ~ 20V, T_J = 25°C			200	mV
		V_I = 9V ~ 20V,T_J = 25°C			150	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			60	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			30	
Quiescent Current	I_Q	Tj = 25°C			6	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 8 ~ 20V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		40		μV
Dropout Voltage	V_D			1.7		V

Electrical Characteristics（78L06）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=12V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 8.5 ~ 20V	5.7	6	6.3	V
Line Regulation(Note)	ΔV_O	V_I = 8.5V ~ 20V, T_J = 25°C			200	mV
		V_I = 9V ~ 20V,T_J = 25°C			150	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			60	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			30	
Quiescent Current	I_Q	Tj = 25°C			6	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 8 ~ 20V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		40		μV
Dropout Voltage	V_D			1.7		V

Electrical Characteristics（78L08）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=14V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 10.5 ~ 23V	7.6	8	8.4	V
Line Regulation(Note)	ΔV_O	V_I = 10.5V ~ 23V, T_J = 25°C			200	mV
		V_I = 11V ~ 20V,T_J = 25°C			150	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			80	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			40	
Quiescent Current	I_Q	Tj = 25°C			6	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 11 ~ 23V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		60		μV
Dropout Voltage	V_D			1.7		V

Electrical Characteristics（78L09）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=15V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 11.5 ~ 23V	8.55	9	9.45	V
Line Regulation(Note)	ΔV_O	V_I = 11.5V ~ 20V, T_J = 25°C			250	mV
		V_I = 11.5V ~ 20V,T_J = 25°C			200	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			80	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			40	
Quiescent Current	I_Q	Tj = 25°C			6	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 12 ~ 23V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		44		μV
Dropout Voltage	V_D			1.7		V

Electrical Characteristics（78L12）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=19V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 14.5 ~ 20V	11.4	12	12.6	V
Line Regulation(Note)	ΔV_O	V_I = 14.5V ~ 27V, T_J = 25°C			250	mV
		V_I = 16V ~ 27V,T_J = 25°C			200	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			100	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			50	
Quiescent Current	I_Q	Tj = 25°C			6.5	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 16 ~ 27V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		80		μV
Dropout Voltage	V_D			1.7		V

Electrical Characteristics（78L15）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=23V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 17.5 ~ 30V	14.25	15	15.75	V
Line Regulation(Note)	ΔV_O	V_I = 17.5V ~ 30V, T_J = 25°C			300	mV
		V_I = 23V,T_J = 25°C			250	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			150	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			75	
Quiescent Current	I_Q	Tj = 25°C			6.5	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 20 ~ 30V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		90		μV
Dropout Voltage	V_D			1.7		V

Electrical Characteristics（78L18）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=26V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 22 ~ 33V	17.1	18	18.9	V
Line Regulation(Note)	ΔV_O	V_I = 22V ~ 33V, T_J = 25°C			320	mV
		V_I = 22V ~ 33V,T_J = 25°C			270	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			170	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			85	
Quiescent Current	I_Q	Tj = 25°C			6.5	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 23 ~ 33V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		120		μV
Dropout Voltage	V_D			1.7		V

Electrical Characteristics（78L24）

(Refer to the test circuits, 0 < T_J < +125°C, I_O=40mA, V_I=33V, unless otherwise specified, C_I = 0.33μF, C_O=0.1μF)

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Output Voltage	V_O	I_O= 1mA ~ 40mA V_I = 27 ~ 38V	22.8	24	25.2	V
Line Regulation(Note)	ΔV_O	V_I = 27V ~ 38V, T_J = 25°C			350	mV
		V_I = 9V ~ 20V,T_J = 25°C			300	
Load Regulation	ΔV_O	I_O= 1mA ~ 100mA, T_J = 25°C			200	mV
		I_O= 1mA ~ 40mA, T_J = 25°C			100	
Quiescent Current	I_Q	Tj = 25°C			6.5	mA
Quiescent Current Change	ΔI_Q	I_O=1mA ~ 40mA			0.2	mA
		V_I = 28 ~ 38V			1.5	
Output Noise Voltage	V_N	f = 10Hz ~ 100KHz		200		μV
Dropout Voltage	V_D			1.7		V

Summary of Packing Options

Package	Packing Method	Pack Quantity
TO-92	Bulk	1000pcs/Bag
TO-92	Tape	2000pcs/Box