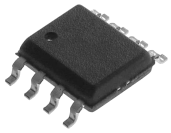
POSITIVE VOLTAGE REGULATORS

DESCRIPTION

The 78Lxx series of three-terminal positive regulators employ internal current limiting and thermal shutdown, making themessentially indestructible. If adequate heat-sink is provided, they can deliver up to 100 mA output current. They are 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 twoorders of magnitude, along with lower quiescent current and lower noise.



SOP-8



SOT89-3



TO-92



SOT-23

FEATURES

- Output current up to 100 mA
- Output voltages of 3.3V, 5V, 6V, 8V, 9V, 10V, 12V, 15V.

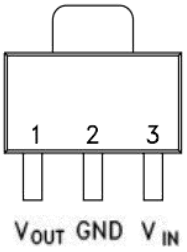
- Thermal overload protection
- Short circuit protection
- No external components are required
- Availableineither ±4%

ORDERING INFORMATION

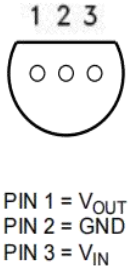
DEVICE	Package Type	MARKING	Packing	Packing Qty
78L33	SOT89-3	78L33	REEL	1000pcs/reel
78L05		78L05	REEL	1000pcs/reel
78L06		78L06	REEL	1000pcs/reel
78L08		78L08	REEL	1000pcs/reel
78L09		78L09	REEL	1000pcs/reel
78L10		78L10	REEL	1000pcs/reel
78L12		78L12	REEL	1000pcs/reel
78L15		78L15	REEL	1000pcs/reel

DEVICE	Package Type	MARKING	Packing	Packing Qty
78L05	TO92-3	78L05	BAG	1000pcs/bag
78L06		78L06	BAG	1000pcs/bag
78L08		78L08	BAG	1000pcs/bag
78L09		78L09	BAG	1000pcs/bag
78L10		78L10	BAG	1000pcs/bag
78L12		78L12	BAG	1000pcs/bag
78L15		78L15	BAG	1000pcs/bag
78L05	SOP-8	78L05A	REEL	2500pcs/bag
78L06		78L06A	REEL	2500pcs/bag
78L08		78L08A	REEL	2500pcs/reel
78L09		78L09A	REEL	2500pcs/reel
78L10		78L10A	REEL	2500pcs/reel
78L12		78L12A	REEL	2500pcs/reel
78L15		78L15A	REEL	2500pcs/reel
78L33	SOT-23	L33	REEL	3000pcs/reel
78L05		L05	REEL	3000pcs/reel
78L06		L06	REEL	3000pcs/reel
78L08		L08	REEL	3000pcs/reel
78L09		L09	REEL	3000pcs/reel
78L10		L10	REEL	3000pcs/reel
78L12		L12	REEL	3000pcs/reel
78L15		L15	REEL	3000pcs/reel

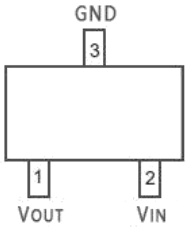
CONNECTION DIAGRAM (top view)



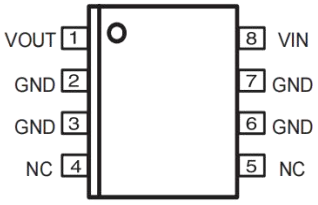
SOT-89-3



TO-92



SOT-23



SOP-8

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter²		Value	Unit
V_I	DC Input Voltage	V_O = 5 to 10 V	30	V
		VO = 12 to 15 V	35	
I_O	Output Current		100	mA
P_{tot}	Power Dissipation		Internally Limited (*)	
T_L	Lead Temperature (Soldering, 10 seconds)		245	°C
T_{stg}	Storage Temperature Range		-40 to 150	°C
T_{op}	Operating Junction TemperatureRange		0 to 70	°C

Note:Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

ELECTRICAL CHARACTERISTICS OF 78L05

refer to the test circuits, V_I = 10V, I_O = 40 mA, C_I = 0.33 μF, C_O = 0.1 μF,

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	4.8	5	5.2	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 7 to 20 V	4.75		5.25	V
		I_O = 1 to 70 mA V_I = 10 V	4.75		5.25	
V_O	Line Regulation	V_I = 7 to 20 V T_J = 25°C			150	mV
		V_I = 8 to 20 V T_J = 25°C			100	
V_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			60	mV
		I_O =1 to 40 mA T_J = 25°C			30	
I_d	Quiescent Current	T_J = 25°C			6	mA
		T_J = 125°C			5.5	mA
I_d	Quiescent Current Change	I_O =1 to 40 mA			0.1	mA
		V_I = 8 to 20 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		40		V
SVR	Supply Voltage Rejection	V_I = 8 to 18 V f = 120Hz I_O = 40 mA T_J = 25°C	41	49		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L06

refer to the test circuits, V_I = 12V, I_O = 40 mA, C_I = 0.33 μF, C_O = 0.1 μF,

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	5.76	6	6.24	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 8.5 to 20 V	5.7		6.3	V
		I_O = 1 to 70 mA V_I = 12 V	5.7		6.3	
V_O	Line Regulation	V_I = 8.5 to 20 V T_J = 25°C			150	mV
		V_I = 9 to 20 V T_J = 25°C			100	
V_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			60	mV
		I_O =1 to 40 mA T_J = 25°C			30	
I_d	Quiescent Current	T_J = 25°C			6	mA
		T_J = 125°C			5.5	mA
I_d	Quiescent Current Change	I_O =1 to 40 mA			0.1	mA
		V_I = 9 to 20 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		50		V
SVR	Supply Voltage Rejection	V_I = 9 to 20 V f = 120Hz I_O = 40 mA T_J = 25°C	39	46		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L08

refer to the test circuits, V_I = 14V, I_O = 40 mA, C_I = 0.33 μF, C_O = 0.1 μF,

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	7.68	8	8.32	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 10.5 to 23 V	7.6		8.4	V
		I_O = 1 to 70 mA V_I = 14 V	7.6		8.4	
V_O	Line Regulation	V_I = 10.5 to 23 V T_J = 25°C			175	mV
		V_I = 11 to 23 V T_J = 25°C			125	
V_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			80	mV
		I_O =1 to 40 mA T_J = 25°C			40	
I_d	Quiescent Current	T_J = 25°C			6	mA
		T_J = 125°C			5.5	mA
I_d	Quiescent Current Change	I_O =1 to 40 mA			0.1	mA
		V_I = 11 to 23 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		60		V
SVR	Supply Voltage Rejection	V_I = 12 to 23 V f = 120Hz I_O = 40 mA T_J = 25°C	37	45		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L09

refer to the test circuits, V_I = 15V, I_O = 40 mA, C_I = 0.33 μF, C_O = 0.1 μF,

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	8.64	9	9.36	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 11.5 to 23 V	8.55		9.45	V
		I_O = 1 to 70 mA V_I = 15 V	8.55		9.45	
V_O	Line Regulation	V_I = 11.5 to 23 V T_J = 25°C			225	mV
		V_I = 12 to 23 V T_J = 25°C			150	
V_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			80	mV
		I_O =1 to 40 mA T_J = 25°C			40	
I_d	Quiescent Current	T_J = 25°C			6	mA
		T_J = 125°C			5.5	mA
I_d	Quiescent Current Change	I_O =1 to 40 mA			0.1	mA
		V_I = 12 to 23 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		70		V
SVR	Supply Voltage Rejection	V_I = 12 to 23 V f = 120Hz I_O = 40 mA T_J = 25°C	37	44		dB
Vd	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L10

refer to the test circuits, V_I = 16V, I_O = 40 mA, C_I = 0.33 μF, C_O = 0.1 μF,

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	9.6	10	10.4	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I =12.5 to 23 V	9.5		10.5	V
		I_O = 1 to 70 mA V_I = 16 V	9.5		10.5	
V_O	Line Regulation	V_I = 12.5 to 23 V T_J = 25°C			230	mV
		V_I = 13 to 23 V T_J = 25°C			170	
V_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			80	mV
		I_O =1 to 40 mA T_J = 25°C			40	
I_d	Quiescent Current	T_J = 25°C			6	mA
		T_J = 125°C			5.5	mA
I_d	Quiescent Current Change	I_O =1 to 40 mA			0.1	mA
		V_I = 13 to 23 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		60		V
SVR	Supply Voltage Rejection	V_I = 14 to 23 V f = 120Hz I_O = 40 mA T_J = 25°C	37	45		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L12

refer to the test circuits, V_I = 19V, I_O = 40 mA, C_I = 0.33 μF, C_O = 0.1 μF,

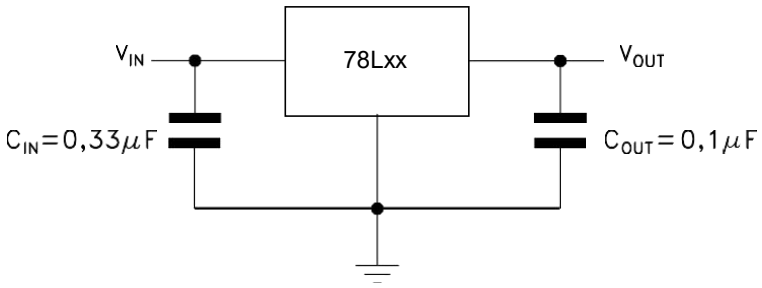
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	11.5	12	12.5	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 14.5 to 27 V	11.4		12.6	V
		I_O = 1 to 70 mA V_I = 19 V	11.4		12.6	
V_O	Line Regulation	V_I = 14.5 to 27 V T_J = 25°C			250	mV
		V_I = 16 to 27 V T_J = 25°C			200	
V_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			100	mV
		I_O =1 to 40 mA T_J = 25°C			50	
I_d	Quiescent Current	T_J = 25°C			6.5	mA
		T_J = 125°C			6	mA
I_d	Quiescent Current Change	I_O =1 to 40 mA			0.1	mA
		V_I = 16 to 27 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		80		V
SVR	Supply Voltage Rejection	V_I = 15 to 25 V f = 120Hz I_O = 40 mA T_J = 25°C	37	42		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L15

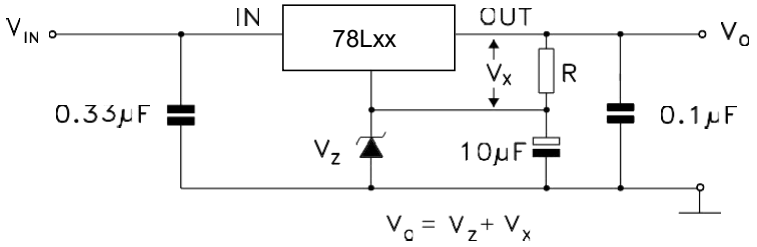
refer to the test circuits, V_I = 19V, I_O = 40 mA, C_I = 0.33 μF, C_O = 0.1 μF,

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	14.4	15	15.6	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 17.5 to 30 V	14.25		15.75	V
		I_O = 1 to 70 mA V_I = 23 V	14.25		15.75	
V_O	Line Regulation	V_I = 17.5 to 30 V T_J = 25°C			300	mV
		V_I = 20 to 30 V T_J = 25°C			250	
V_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			150	mV
		I_O =1 to 40 mA T_J = 25°C			75	
I_d	Quiescent Current	T_J = 25°C			6.5	mA
		T_J = 125°C			6	mA
I_d	Quiescent Current Change	I_O =1 to 40 mA			0.1	mA
		V_I = 20 to 30 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		90		V
SVR	Supply Voltage Rejection	V_I = 18.5 to 28.5 V f = 120Hz I_O = 40 mA T_J = 25°C	34	39		dB
V_d	Dropout Voltage			1.7		V

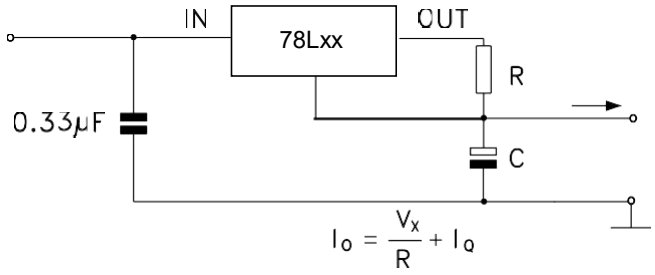
TEST CIRCUITS



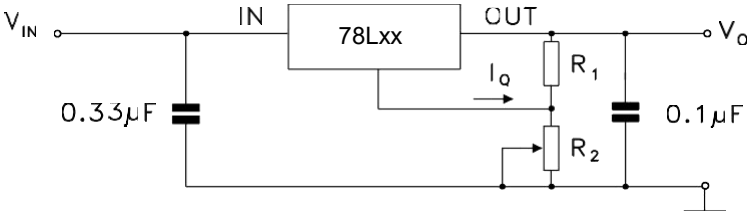
Edit Boost Circuit



Current Regulator

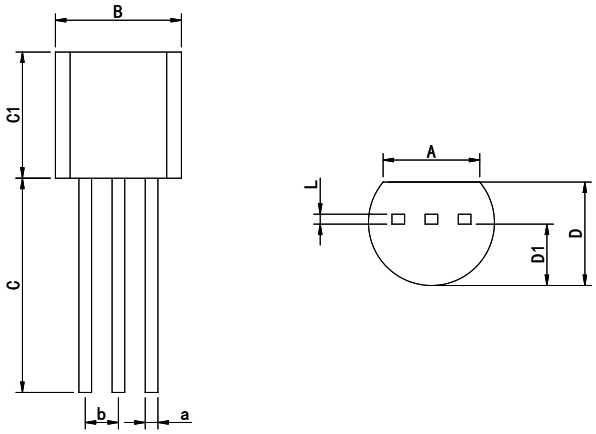


Adjustable Output Regulator



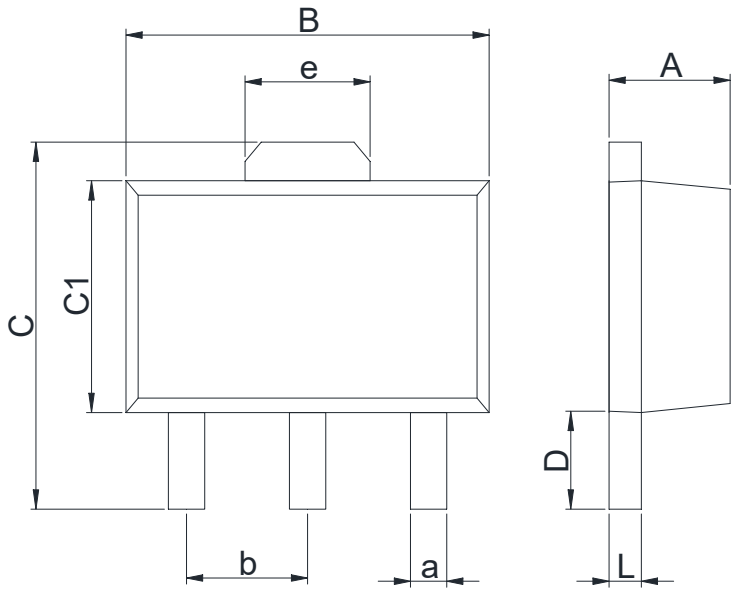
Physical Dimensions

TO-92



Dimensions In Millimeters(TO-92)									
Symbol:	A	B	C	C1	D	D1	L	a	b
Min:	3.43	4.44	13.5	4.32	3.17	2.03	0.33	0.40	1.27BSC
Max:	3.83	5.21	15.3	5.34	4.19	2.67	0.42	0.52	

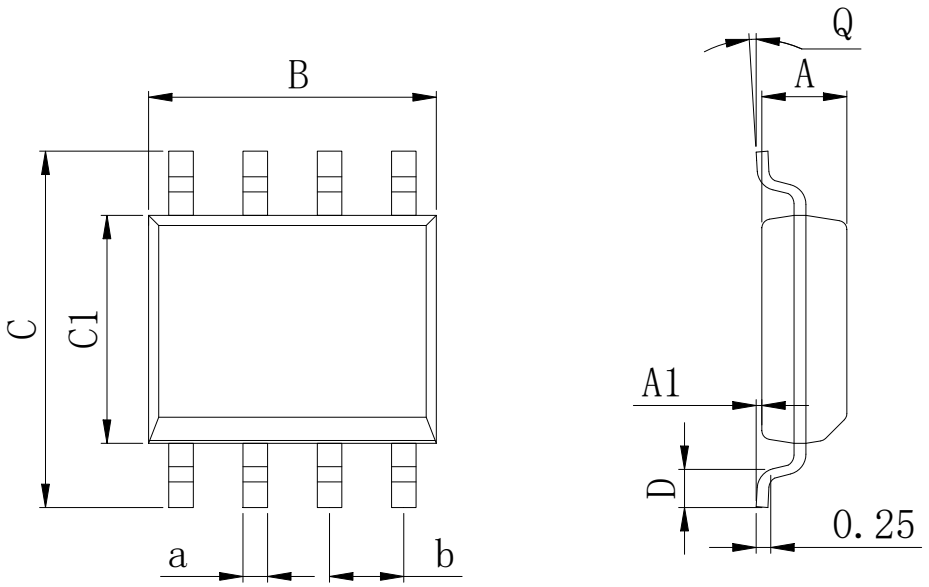
SOT-89-3



Dimensions In Millimeters(SOT-89-3)									
Symbol:	A	B	C	C1	D	L	a	b	e
Min:	1.40	4.40	3.94	2.30	0.90	0.35	0.40	1.50	1.55
Max:	1.60	4.60	4.25	2.60	1.20	0.44	0.50	BSC	BSC

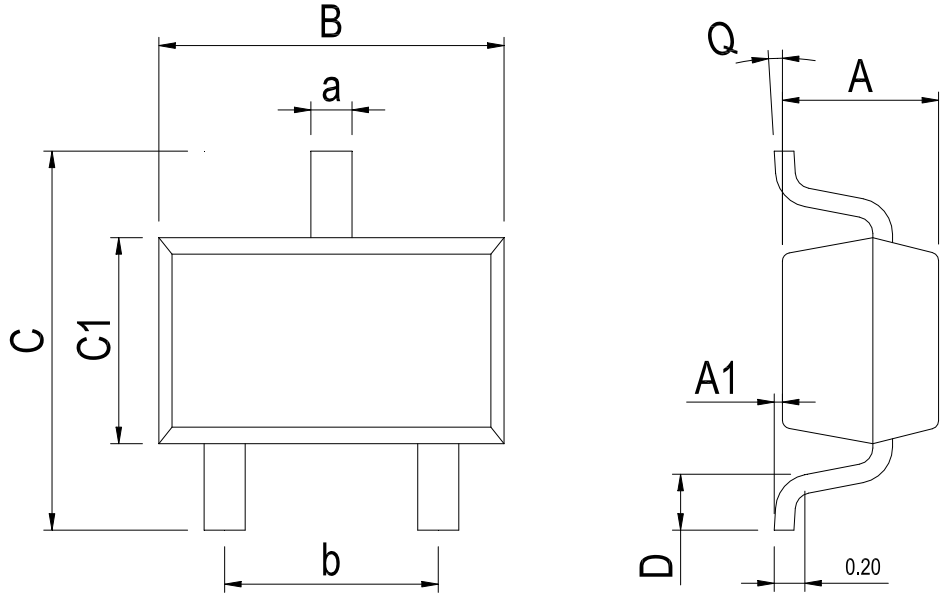
Physical Dimensions

SOP-8



Dimensions In Millimeters(SOP-8)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

SOT-23-3



Dimensions In Millimeters(SOT-23-3)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.05	0.00	2.82	2.65	1.50	0.30	0°	0.30	1.90 BSC
Max:	1.15	0.15	3.02	2.95	1.70	0.60	8°	0.40	