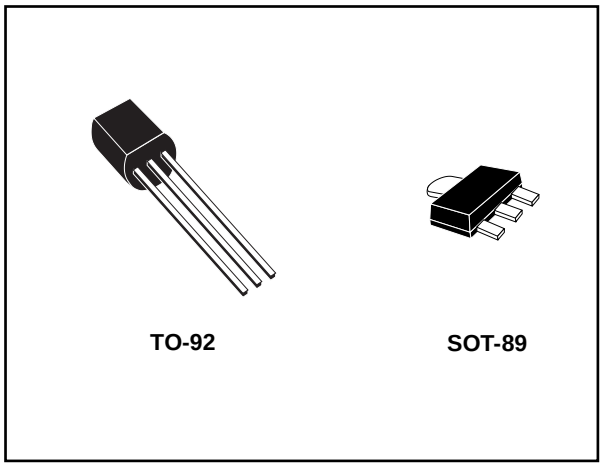
HGSEMI

L78L00 SERIES

POSITIVE VOLTAGE REGULATORS

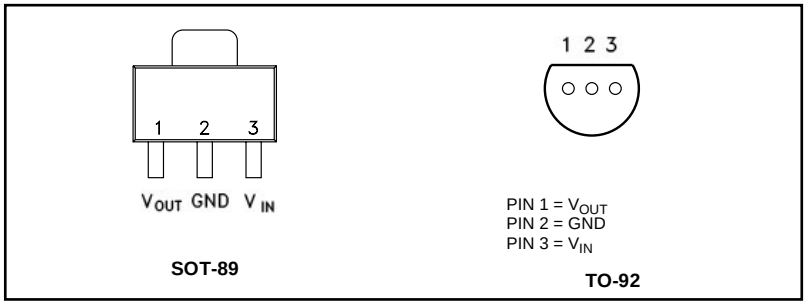
- OUTPUT CURRENT UP TO 100 mA
- OUTPUT VOLTAGES OF 3.3; 5; 6; 8; 9; 10; 12; 15; 18; 20; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- NO EXTERNAL COMPONENTS ARE REQUIRED
- AVAILABLEINEITHER±5%



DESCRIPTION

The L78L00 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 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 L78L00 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.

CONNECTION DIAGRAM (top view)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter[2]		Value	Unit
V_I	DC Input Voltage	V_O = 3.3 to 9 V	30	V
		V_O = 12 to 15 V	35	
		V_O = 18 to 24 V	40	
I_O	Output Current		100	mA
P_{tot}	Power Dissipation		Internally Limited (*)	
T_{stg}	Storage Temperature Range		-40 to 150	°C
T_{op}	Operating Junction Temperature Range	for L78L00C, L78L00AC	0 to 125	°C
		for L78L00AB	-40 to 125	

ELECTRICAL CHARACTERISTICS OF 78L33A

(refer to the test circuits, V_I = 8.3V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L33AC, T_J = -40 to 125°C for L78L33AB, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	3.168	3.3	3.432	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 5.3 to 20 V	3.135		3.465	V
		I_O = 1 to 70 mA V_I = 8.3 V	3.135		3.465	
ΔV_O	Line Regulation	V_I = 5.3 to 20 V T_J = 25°C			150	mV
		V_I = 6.3 to 20 V T_J = 25°C			100	
ΔV_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
ΔI_d	Quiescent Current Change	I_O = 1 to 40 mA			0.1	mA
		V_I = 6.3 to 20 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		40		µV
SVR	Supply Voltage Rejection	V_I = 6.3 to 16.3 V f = 120Hz I_O = 40 mA T_J = 25°C	41	49		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L05A

(refer to the test circuits, V_I = 10V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L05AC, T_J = -40 to 125°C for L78L05AB, unless otherwise specified)

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	
ΔV_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	
ΔV_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
ΔI_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		µV
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 78L06A

(refer to the test circuits, V_I = 12V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L06AC, T_J = -40 to 125°C for L78L06AB, unless otherwise specified)

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	
ΔV_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	
ΔV_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
ΔI_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		µV
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 78L08A

(refer to the test circuits, V_I = 14V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L08AC, T_J = -40 to 125°C for L78L08AB, unless otherwise specified)

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	
ΔV_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	
ΔV_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
ΔI_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		µV
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 78L09A

(refer to the test circuits, V_I = 15V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L09AC, T_J = -40 to 125°C for L78L09AB, unless otherwise specified)

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	
ΔV_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	
ΔV_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
ΔI_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		µV
SVR	Supply Voltage Rejection	V_I = 12 to 23 V f = 120Hz I_O = 40 mA T_J = 25°C	37	44		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L10A

(refer to the test circuits, V_I = 16V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L10AC, T_J = -40 to 125°C for L78L10AB, unless otherwise specified)

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	
ΔV_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	
ΔV_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
ΔI_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		µV
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 78L12A

(refer to the test circuits, V_I = 19V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L12AC, T_J = -40 to 125°C for L78L12AB, unless otherwise specified)

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	
ΔV_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	
ΔV_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
ΔI_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		µV
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 78L15A

(refer to the test circuits, V_I = 19V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L15AC, T_J = -40 to 125°C for L78L15AB, unless otherwise specified)

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	
ΔV_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	
ΔV_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
ΔI_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		µV
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

ELECTRICAL CHARACTERISTICS OF 78L18A

(refer to the test circuits, V_I = 27V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L18AC, T_J = -40 to 125°C for L78L18AB, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	17.3	18	18.7	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 22 to 33 V	17.1		18.9	V
		I_O = 1 to 70 mA V_I = 27 V	17.1		18.9	
ΔV_O	Line Regulation	V_I = 21 to 33 V T_J = 25°C			320	mV
		V_I = 22 to 33 V T_J = 25°C			270	
ΔV_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			170	mV
		I_O = 1 to 40 mA T_J = 25°C			85	
I_d	Quiescent Current	T_J = 25°C			6.5	mA
		T_J = 125°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 1 to 40 mA			0.1	mA
		V_I = 23 to 33 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		120		µV
SVR	Supply Voltage Rejection	V_I = 23 to 33 V f = 120Hz I_O = 40 mA T_J = 25°C	33	38		dB
V_d	Dropout Voltage			1.7		V

HGSEMI

L78L00 SERIES

ELECTRICAL CHARACTERISTICS OF 78L20A

(refer to the test circuits, V_I = 29V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L20AC, T_J = -40 to 125°C for L78L20AB, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	19.2	20	20.8	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 24 to 33 V	19		21	V
		I_O = 1 to 70 mA V_I = 29 V	19		21	
ΔV_O	Line Regulation	V_I = 22.5 to 34 V T_J = 25°C			330	mV
		V_I = 24 to 34 V T_J = 25°C			280	
ΔV_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			180	mV
		I_O = 1 to 40 mA T_J = 25°C			90	
I_d	Quiescent Current	T_J = 25°C			6.5	mA
		T_J = 125°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 1 to 40 mA			0.1	mA
		V_I = 25 to 33 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		120		µV
SVR	Supply Voltage Rejection	V_I = 25 to 35 V f = 120Hz I_O = 40 mA T_J = 25°C	32	38		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF 78L24A

(refer to the test circuits, V_I = 27V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF,
T_J = 0 to 125°C for L78L24AC, T_J = -40 to 125°C for L78L24AB, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	23	24	25	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 27 to 38 V	22.8		25.2	V
		I_O = 1 to 70 mA V_I = 33 V	22.8		25.2	
ΔV_O	Line Regulation	V_I = 27 to 38 V T_J = 25°C			350	mV
		V_I = 28 to 38 V T_J = 25°C			300	
ΔV_O	Load Regulation	I_O = 1 to 100 mA T_J = 25°C			200	mV
		I_O = 1 to 40 mA T_J = 25°C			100	
I_d	Quiescent Current	T_J = 25°C			6.5	mA
		T_J = 125°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 1 to 40 mA			0.1	mA
		V_I = 28 to 38 V			1.5	
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		200		µV
SVR	Supply Voltage Rejection	V_I = 23 to 33 V f = 120Hz I_O = 40 mA T_J = 25°C	31	37		dB
V_d	Dropout Voltage			1.7		V

Figure 1 : 78L05/12 Output Voltage vs Ambient Temperature

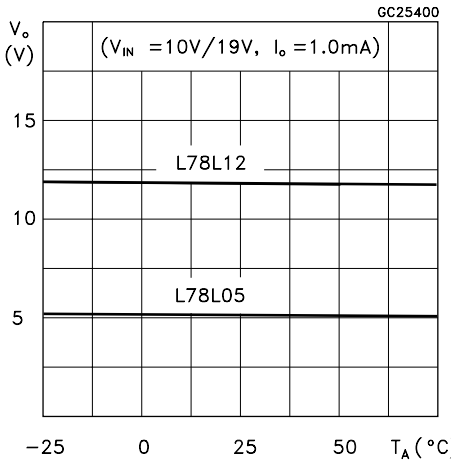
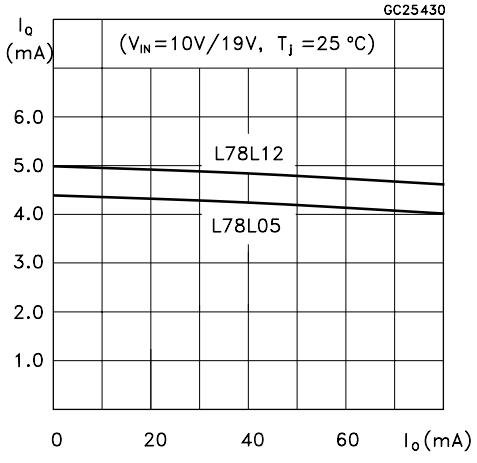
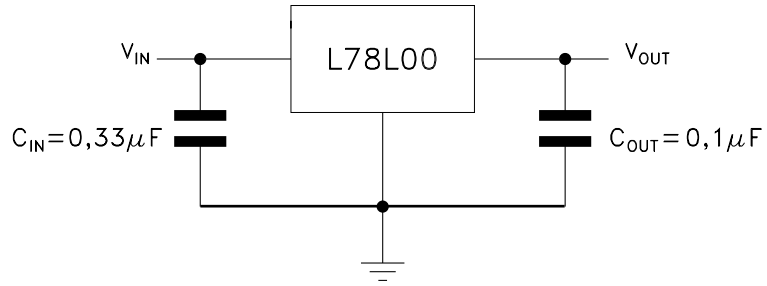


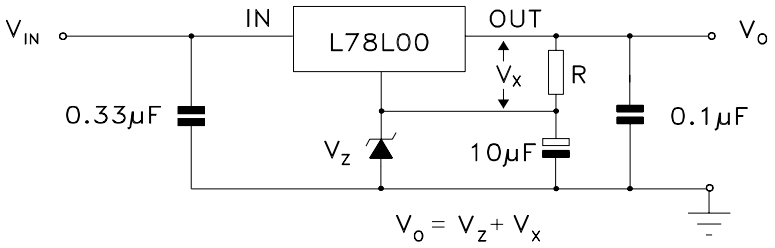
Figure 2: 78L05/12 Quiescent Current vs Output Current



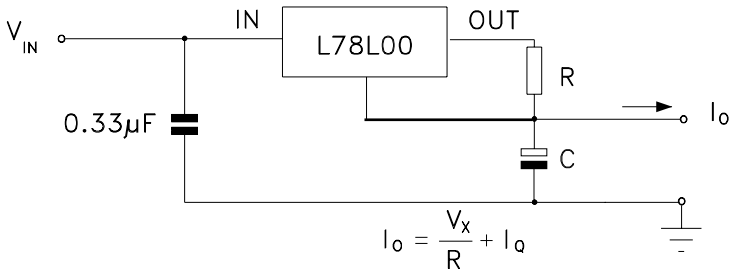
TEST CIRCUITS



Edit Boost Circuit



Current Regulator



Adjustable Output Regulator