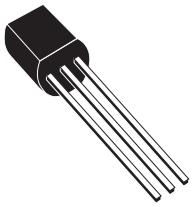
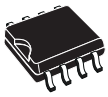
L78L00 SERIES

POSITIVE VOLTAGE REGULATORS

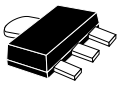
- OUTPUT CURRENT UP TO 100 mA
- OUTPUT VOLTAGES OF 3.3; 5; 6; 8; 9; 10; 12; 15; 18; 20; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- NO EXTERNAL COMPONENTS ARE REQUIRED
- AVAILABLE IN EITHER ±5% (AC) OR ±10% (C) SELECTION



TO-92



SO-8

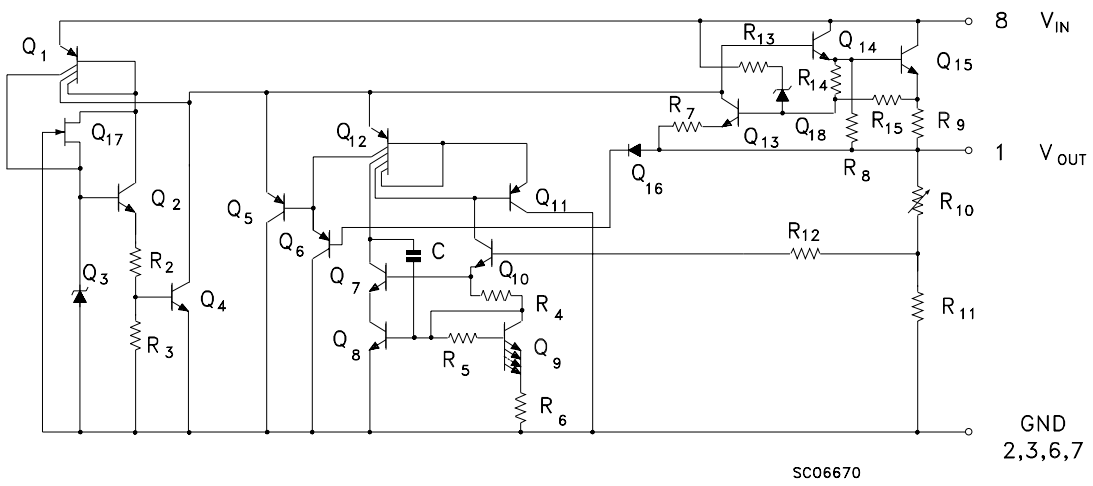


SOT-89

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.

SCHEMATIC DIAGRAM



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	

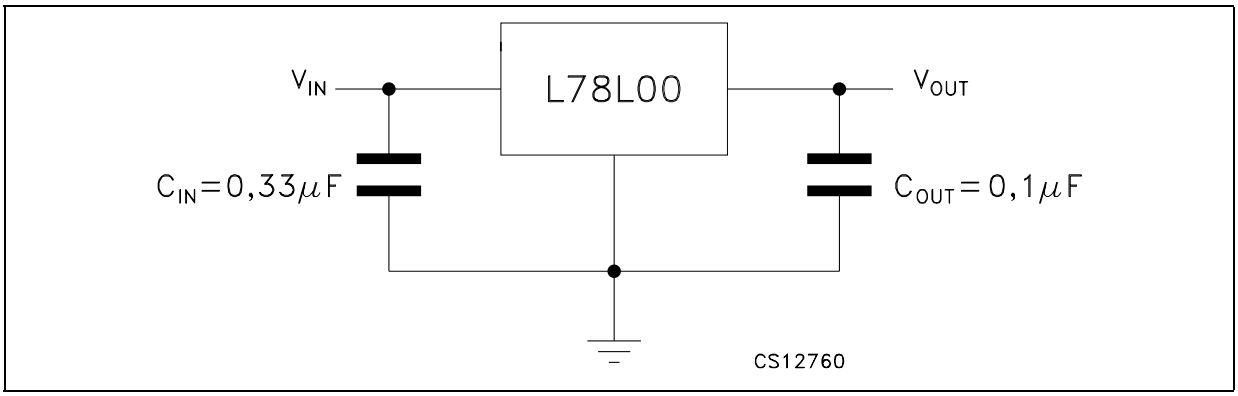
(*) Our SO-8 package used for Voltage Regulators is modified internally to have pins 2, 3, 6 and 7 electrically communed to the die attach flag. This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for heat-sinking. The external dimensions are the same as for the standard SO-8.

THERMAL DATA

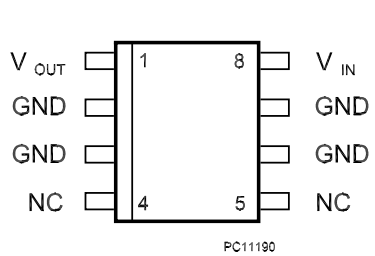
Symbol	Parameter		SO-8	TO-92	SOT-89	Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	20		15	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	55 (*)	200		°C/W

(*) Considering 6 cm^2 of copper Board heat-sink

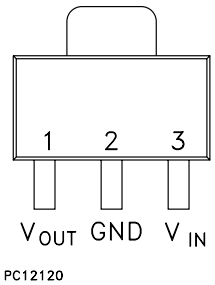
TEST CIRCUITS



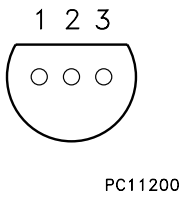
CONNECTION DIAGRAM (top view)



SO-8



SOT-89



PIN 1 = V_{OUT}
PIN 2 = GND
PIN 3 = V_{IN}

TO-92

BOTTOM VIEW

ORDERING CODES

TYPE	SO-8 (TUBE)*	TO-92 (TUBE)**	SOT-89 (T&R)	OUTPUT VOLTAGE
L78L33C	L78L33CD	L78L33CZ		3.3 V
L78L33AC	L78L33ACD	L78L33ACZ	L78L33ACUTR	3.3 V
L78L33AB	L78L33ABD	L78L33ABZ	L78L33ABUTR	3.3 V
L78L05C	L78L05CD	L78L05CZ		5 V
L78L05AC	L78L05ACD	L78L05ACZ	L78L05ACUTR	5 V
L78L05AB	L78L05ABD	L78L05ABZ	L78L05ABUTR	5 V
L78L06C	L78L06CD	L78L06CZ		6 V
L78L06AC	L78L06ACD	L78L06ACZ	L78L06ACUTR	6 V
L78L06AB	L78L06ABD	L78L06ABZ	L78L06ABUTR	6 V
L78L08C	L78L08CD	L78L08CZ		8 V
L78L08AC	L78L08ACD	L78L08ACZ	L78L08ACUTR	8 V
L78L08AB	L78L08ABD	L78L08ABZ	L78L08ABUTR	8 V
L78L09C	L78L09CD	L78L09CZ		9 V
L78L09AC	L78L09ACD	L78L09ACZ	L78L09ACUTR	9 V
L78L09AB	L78L09ABD	L78L09ABZ	L78L09ABUTR	9 V
L78L10C	L78L10CD	L78L10CZ		10 V
L78L10AC	L78L10ACD	L78L10ACZ	L78L10ACUTR	10 V
L78L10AB	L78L10ABD	L78L10ABZ	L78L10ABUTR	10 V
L78L12C	L78L12CD	L78L12CZ		12 V
L78L12AC	L78L12ACD	L78L12ACZ	L78L12ACUTR	12 V
L78L12AB	L78L12ABD	L78L12ABZ	L78L12ABUTR	12 V
L78L15C	L78L15CD	L78L15CZ		15 V
L78L15AC	L78L15ACD	L78L15ACZ	L78L15ACUTR	15 V
L78L15AB	L78L15ABD	L78L15ABZ	L78L15ABUTR	15 V
L78L18C	L78L18CD	L78L18CZ		18 V
L78L18AC	L78L18ACD	L78L18ACZ	L78L18ACUTR	18 V
L78L18AB	L78L18ABD	L78L18ABZ	L78L18ABUTR	18 V
L78L20C	L78L20CD	L78L20CZ		20 V
L78L20AC	L78L20ACD	L78L20ACZ	L78L20ACUTR	20 V
L78L20AB	L78L20ABD	L78L20ABZ	L78L20ABUTR	20 V
L78L24C	L78L24CD	L78L24CZ		24 V
L78L24AC	L78L24ACD	L78L24ACZ	L78L24ACUTR	24 V
L78L24AB	L78L24ABD	L78L24ABZ	L78L24ABUTR	24 V

(*) Available in Tape & Reel with the suffix "13TR".

(**) Available in Ammopak with the suffix "-AP" or in Tape & Reel with the suffix "TR".

ELECTRICAL CHARACTERISTICS OF L78L33C (refer to the test circuits, T_J = 0 to 125°C, V_I = 8.3V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	3.036	3.3	3.564	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 5.3 to 20 V	2.97		3.63	V
		I_O = 1 to 70 mA V_I = 8.3 V	2.97		3.63	
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			0.2	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 L78L05C (refer to the test circuits, T_J = 0 to 125°C, V_I = 10V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	4.6	5	5.4	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I =7 to 20 V	4.5		5.5	V
		I_O = 1 to 70 mA V_I = 10 V	4.5		5.5	
ΔV_O	Line Regulation	V_I = 8.5 to 20 V T_J = 25°C			200	mV
		V_I = 9 to 20 V T_J = 25°C			150	
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			0.2	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 = 9 to 20 V f = 120Hz I_O = 40 mA T_J = 25°C	40	49		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L06C (refer to the test circuits, T_J = 0 to 125°C, V_I = 12V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	5.52	6	6.48	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I =8.5 to 20 V	5.4		6.6	V
		I_O = 1 to 70 mA V_I = 12 V	5.4		6.6	
ΔV_O	Line Regulation	V_I = 8.5 to 20 V T_J = 25°C			200	mV
		V_I = 9 to 20 V T_J = 25°C			150	
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			0.2	mA
		V_I = 8 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	38	46		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L08C (refer to the test circuits, T_J = 0 to 125°C, V_I = 14V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	7.36	8	8.64	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I =10.5 to 23 V	7.2		8.8	V
		I_O = 1 to 70 mA V_I = 14 V	7.2		8.8	
ΔV_O	Line Regulation	V_I = 10.5 to 23 V T_J = 25°C			200	mV
		V_I = 11 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			0.2	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	36	45		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L09C (refer to the test circuits, T_J = 0 to 125°C, V_I = 15V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	8.28	9	9.72	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I =11.5 to 23 V	8.1		9.9	V
		I_O = 1 to 70 mA V_I = 15 V	8.1		9.9	
ΔV_O	Line Regulation	V_I = 11.5 to 23 V T_J = 25°C			250	mV
		V_I = 12 to 23 V T_J = 25°C			200	
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			0.2	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	36	44		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L10C (refer to the test circuits, T_J = 0 to 125°C, V_I = 16V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	9.2	10	10.8	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I =12.5 to 23 V	9		11	V
		I_O = 1 to 70 mA V_I = 16 V	9		11	
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 L78L12C (refer to the test circuits, T_J = 0 to 125°C, V_I = 19V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	11.1	12	12.9	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I =14.5 to 27 V	10.8		13.2	V
		I_O = 1 to 70 mA V_I = 19 V	10.8		13.2	
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			0.2	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	36	42		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L15C (refer to the test circuits, T_J = 0 to 125°C, V_I = 23V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	13.8	15	16.2	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I =17.5 to 30 V	13.5		16.5	V
		I_O = 1 to 70 mA V_I = 23 V	13.5		16.5	
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			0.2	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	33	39		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L18C (refer to the test circuits, T_J = 0 to 125°C, V_I = 27V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	16.6	18	19.4	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 22 to 33 V	16.2		19.8	V
		I_O = 1 to 70 mA V_I = 27 V	16.2		19.8	
ΔV_O	Line Regulation	V_I = 22 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			0.2	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	32	38		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L20C (refer to the test circuits, T_J = 0 to 125°C, V_I = 29V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	18.4	20	21.6	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 24 to 33 V	18		22	V
		I_O = 1 to 70 mA V_I = 29 V	18		22	
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			0.2	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	31	38		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L24C (refer to the test circuits, T_J = 0 to 125°C, V_I = 33V, I_O = 40 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = 25°C	22.1	24	25.9	V
V_O	Output Voltage	I_O = 1 to 40 mA V_I = 27 to 38 V	21.6		26.4	V
		I_O = 1 to 70 mA V_I = 33 V	21.6		26.4	
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			0.2	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 = 29 to 35 V f = 120Hz I_O = 40 mA T_J = 25°C	30	37		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF L78L33AB AND L78L33AC
(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 L78L05AB AND L78L05AC

(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 L78L06AB AND L78L06AC

(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 L78L08AB AND L78L08AC

(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 L78L09AB AND L78L09AC

(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 L78L10AB AND L78L10AC

(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 L78L12AB AND L78L12AC

(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 L78L15AB AND L78L15AC

(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 L78L18AB AND L78L18AC

(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 = 22 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

ELECTRICAL CHARACTERISTICS OF L78L20AB AND L78L20AC

(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 L78L24AB AND L78L24AC

(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 : L78L05/12 Output Voltage vs Ambient Temperature

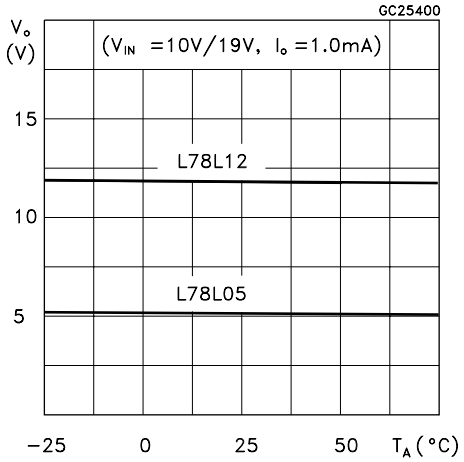


Figure 2 : L78L05/12/24 Load Characteristics

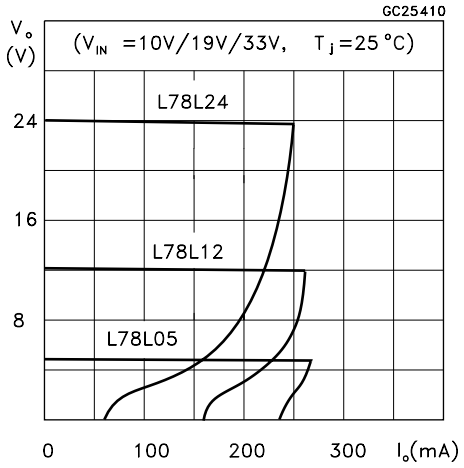


Figure 3 : L78L05/12/24 Thermal Shutdown

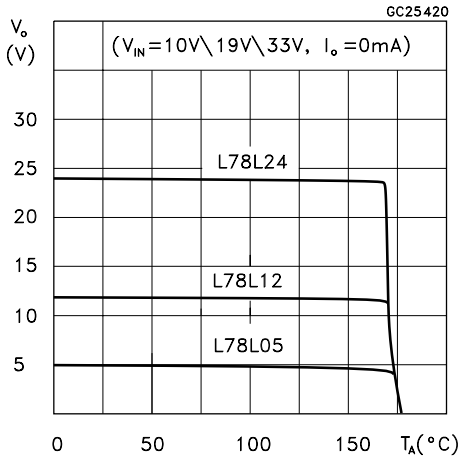


Figure 4 : L78L05/12 Quiescent Current vs Output Current

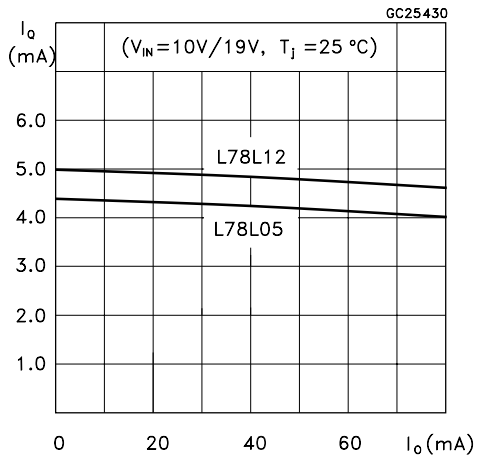


Figure 5 : L78L05 Quiescent Current vs Input Voltage

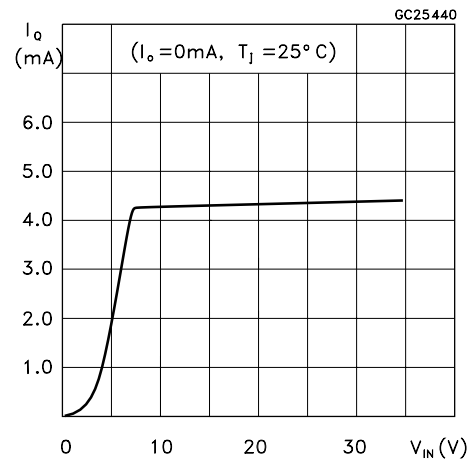


Figure 6 : L78L05/12/24 Output Characteristics

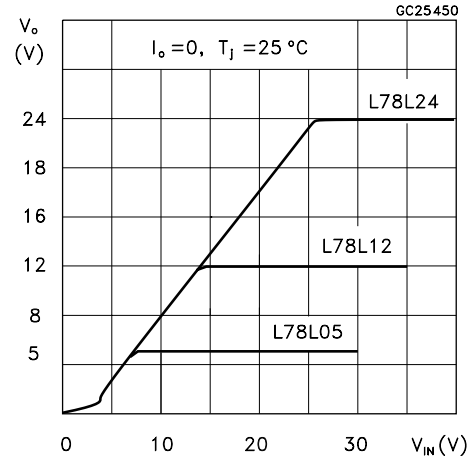


Figure 7 : L78L05/12/24 Ripple Rejection

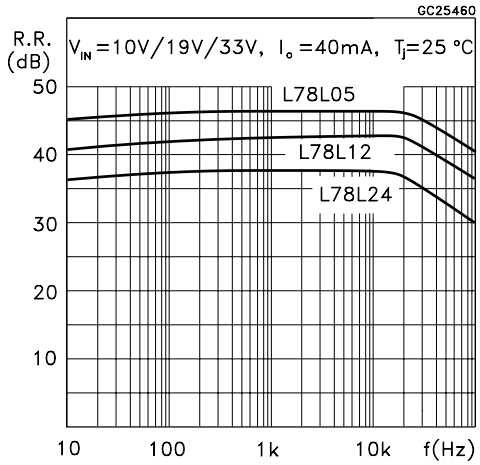


Figure 8 : L78L05 Dropout Characteristics

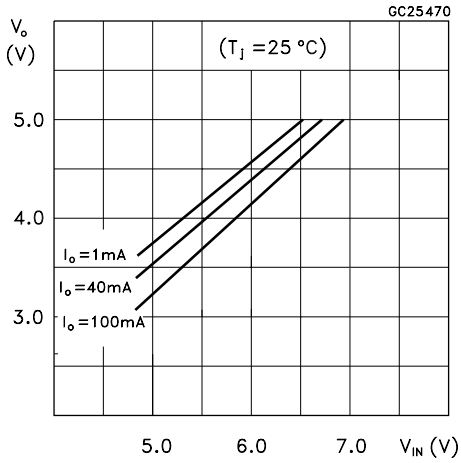
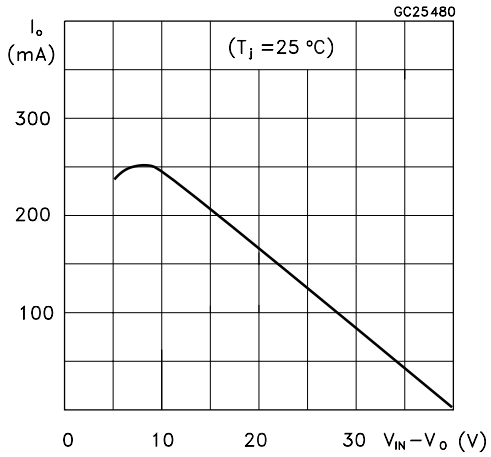


Figure 9 : L78L00 Series Short Circuit Output Current



TYPICAL APPLICATIONS

Table 10 : High Output Current Short Circuit Protected

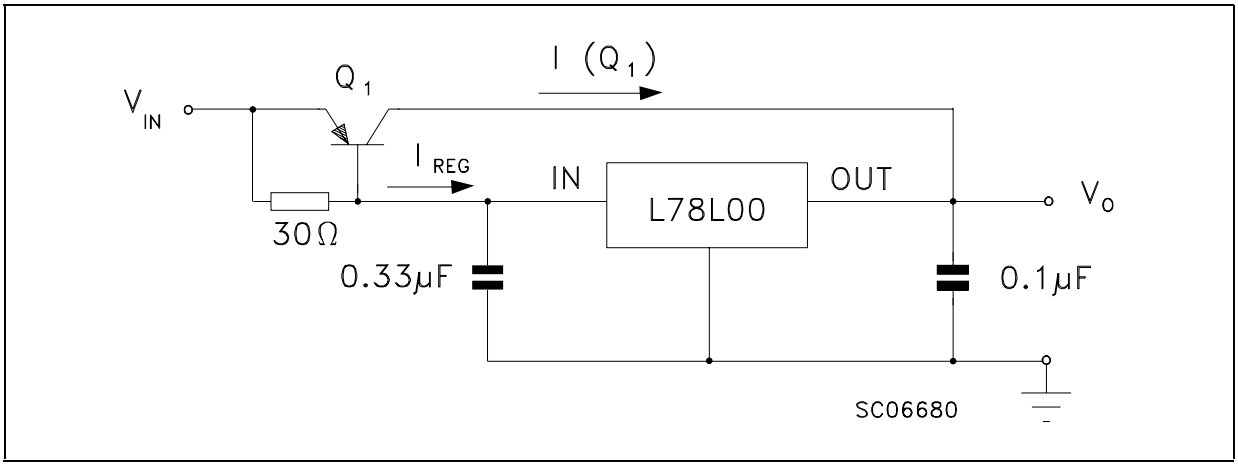


Figure 11 : Edit Boost Circuit

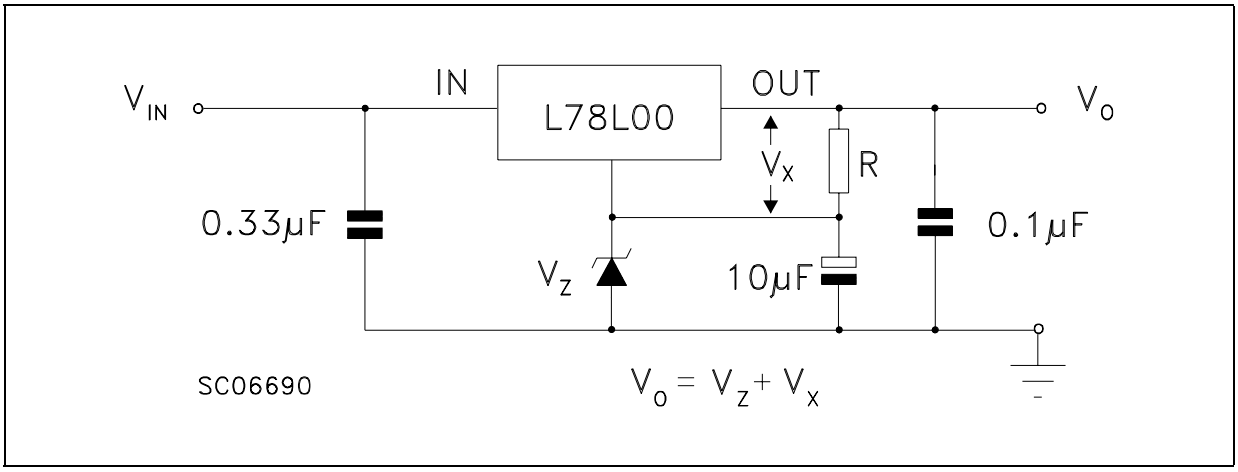


Figure 12 : Current Regulator

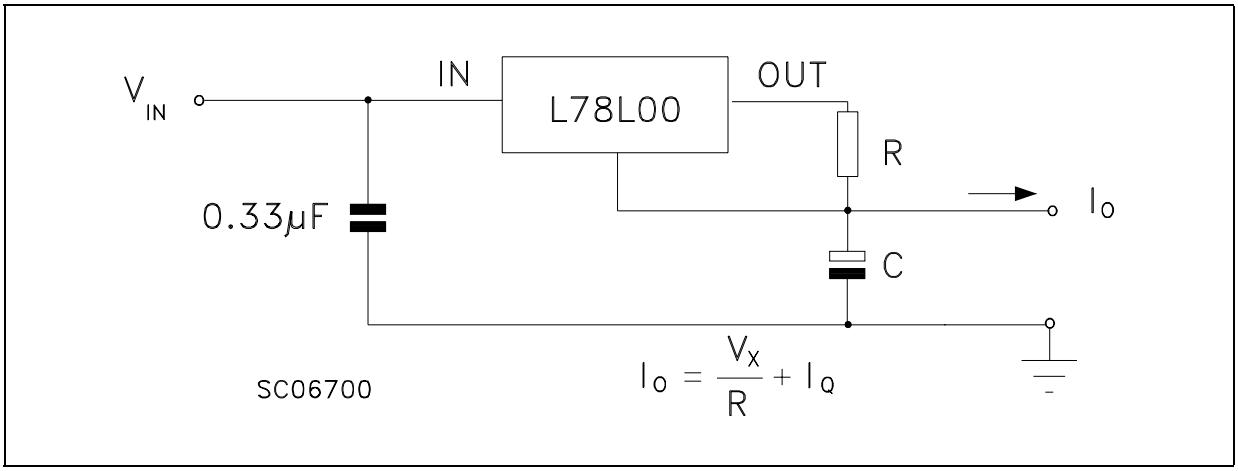
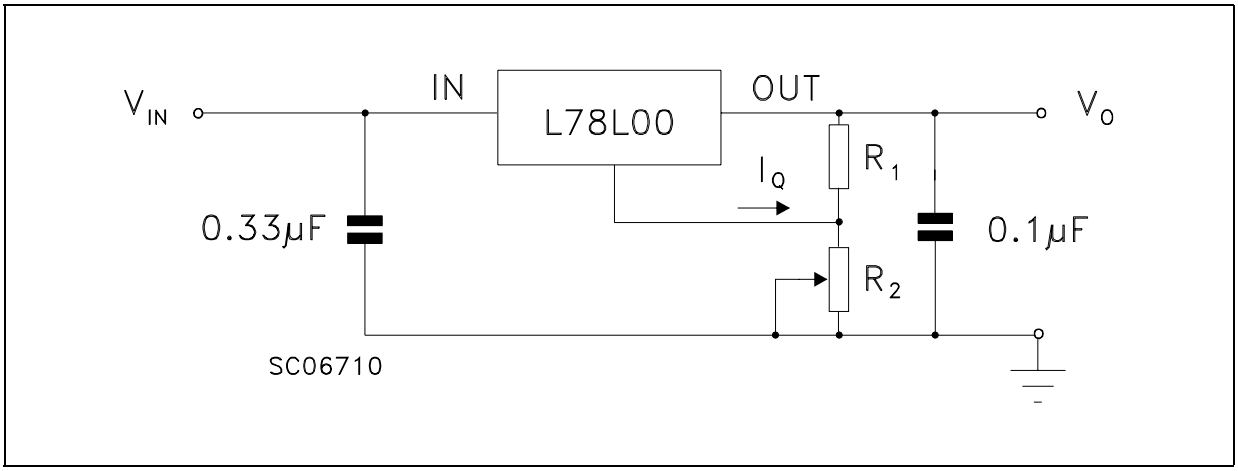
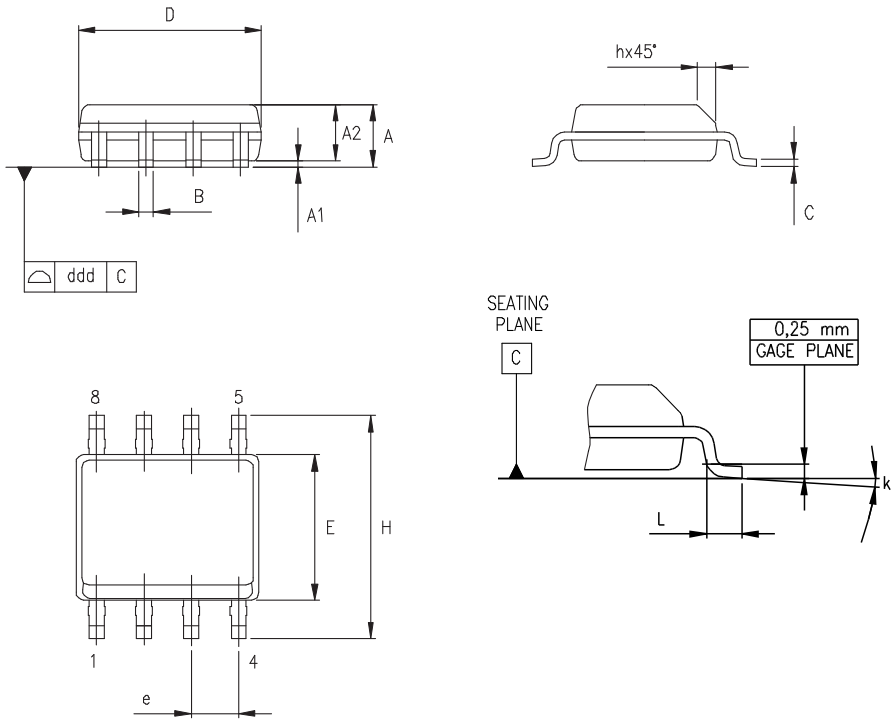


Figure 13 : Adjustable Output Regulator



SO-8 MECHANICAL DATA

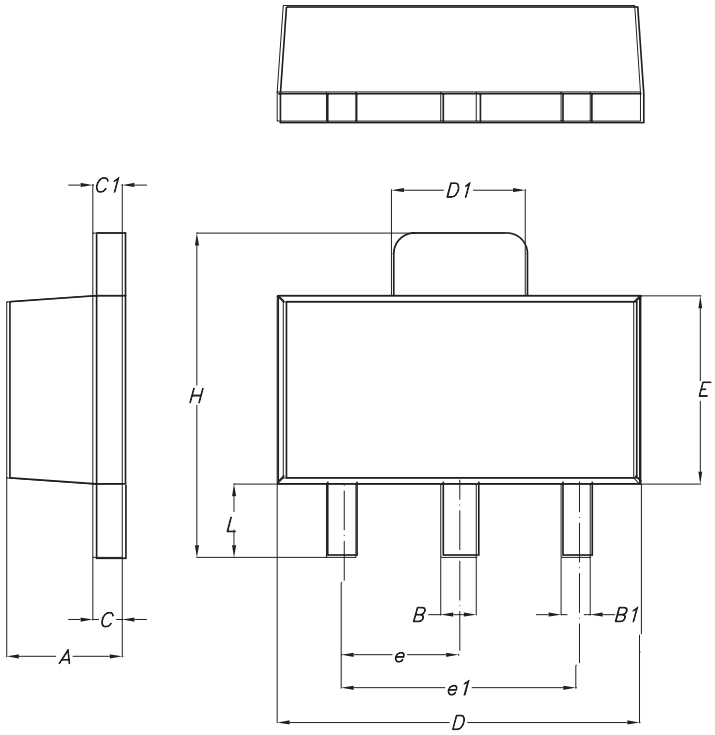
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



0016023/C

SOT-89 MECHANICAL DATA

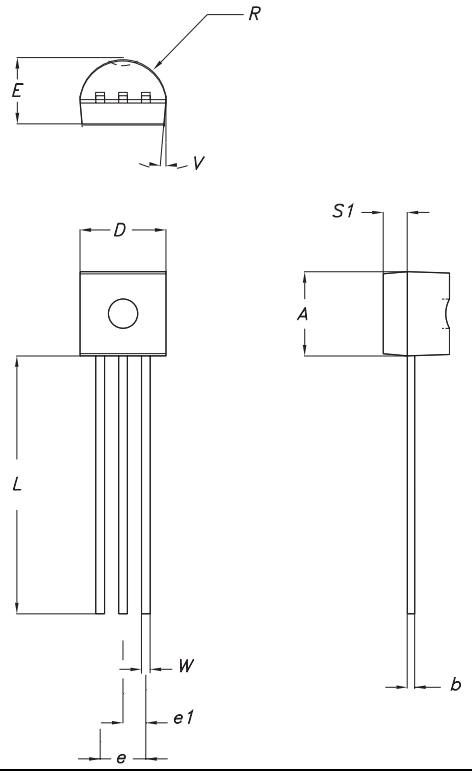
DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.4		1.6	55.1		63.0
B	0.44		0.56	17.3		22.0
B1	0.36		0.48	14.2		18.9
C	0.35		0.44	13.8		17.3
C1	0.35		0.44	13.8		17.3
D	4.4		4.6	173.2		181.1
D1	1.62		1.83	63.8		72.0
E	2.29		2.6	90.2		102.4
e	1.42		1.57	55.9		61.8
e1	2.92		3.07	115.0		120.9
H	3.94		4.25	155.1		167.3
L	0.89		1.2	35.0		47.2



P025H

TO-92 MECHANICA DATA

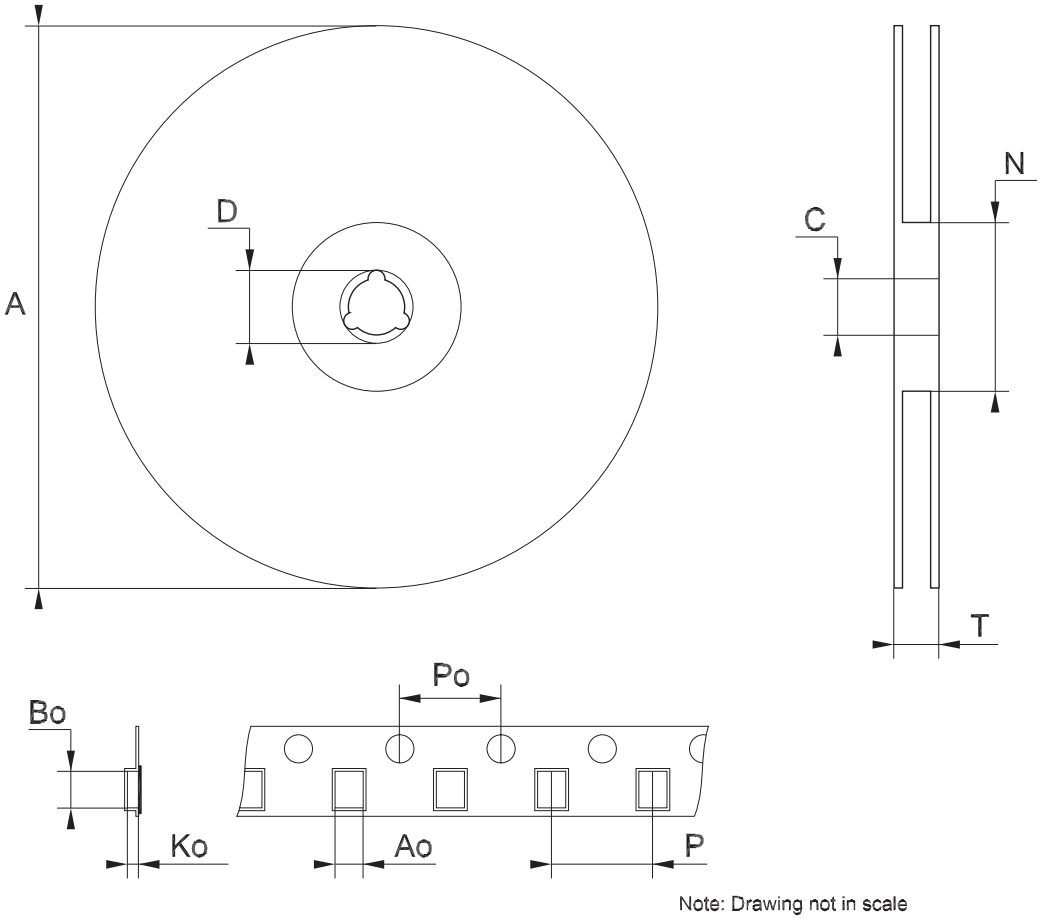
DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.32		4.95	170.1		194.9
b	0.36		0.51	14.2		20.1
D	4.45		4.95	175.2		194.9
E	3.30		3.94	129.9		155.1
e	2.41		2.67	94.9		105.1
e1	1.14		1.40	44.9		55.1
L	12.7		15.49	500.0		609.8
R	2.16		2.41	85.0		94.9
S1	0.92		1.52	36.2		59.8
W	0.41		0.56	16.1		22.0



0102782/C

Tape & Reel SO-8 MECHANICAL DATA

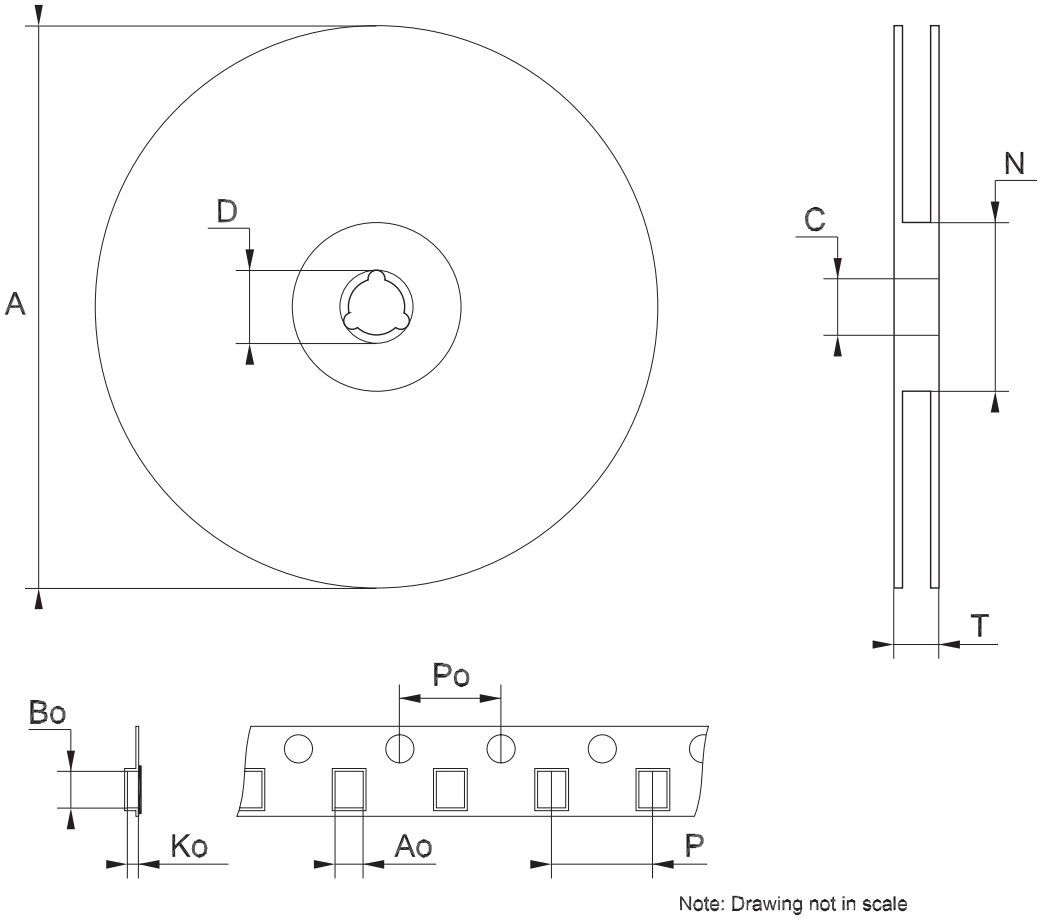
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Note: Drawing not in scale

Tape & Reel SOT89 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	4.70	4.80	4.90	0.185	0.189	0.193
Bo	4.30	4.40	4.50	0.169	0.173	0.177
Ko	1.70	1.80	1.90	0.067	0.071	0.075
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	7.9	8.0	8.1	0.311	0.315	0.319



Note: Drawing not in scale