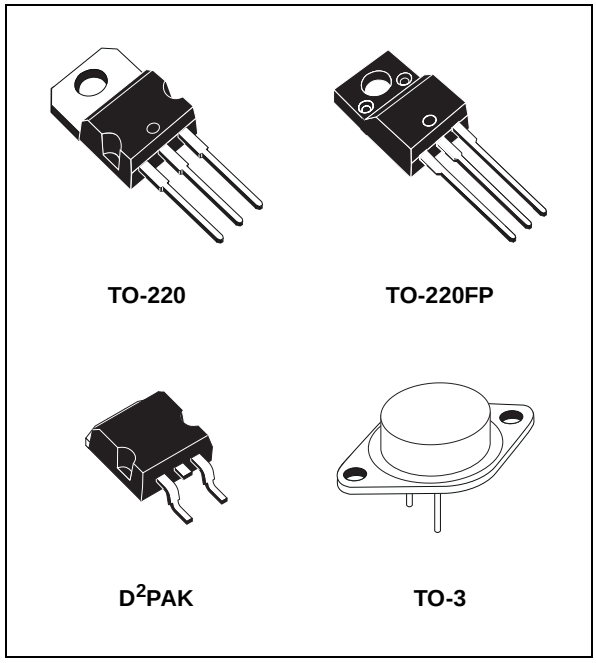
L7800 SERIES

POSITIVE VOLTAGE REGULATORS

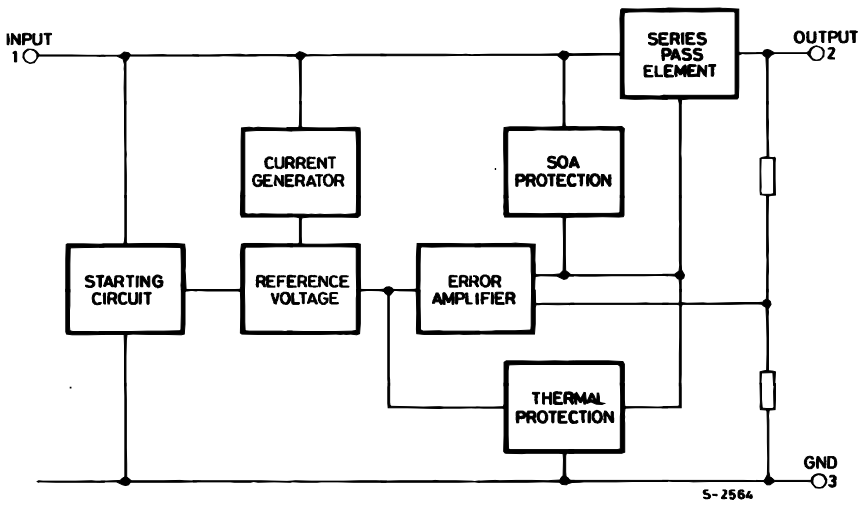
- OUTPUT CURRENT TO 1.5A
- OUTPUT VOLTAGES OF 5; 5.2; 6; 8; 8.5; 9; 12; 15; 18; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION



DESCRIPTION

The L7800 series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-3 and D^2PAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

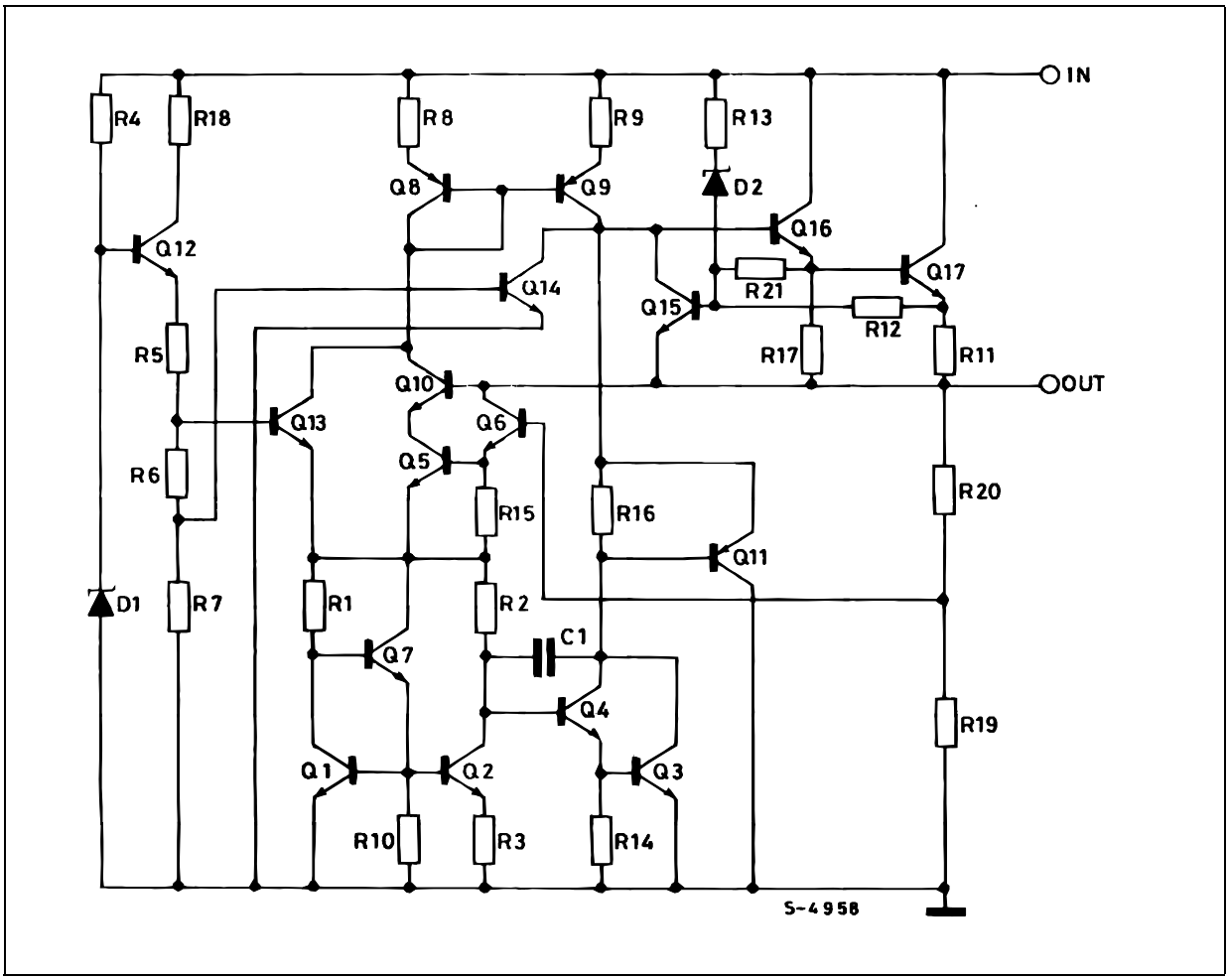
Symbol	Parameter[2]		Value	Unit
V_I	DC Input Voltage	for V_O= 5 to 18V	35	V
		for V_O= 20, 24V	40	
I_O	Output Current		Internally Limited	
P_{tot}	Power Dissipation		Internally Limited	
T_{stg}	Storage Temperature Range		-65 to 150	°C
T_{op}	Operating Junction Temperature Range	for L7800	-55 to 150	°C
		for L7800C	0 to 150	

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

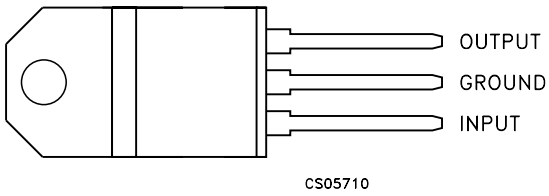
THERMAL DATA

Symbol	Parameter	D^2PAK	TO-220	TO-220FP	TO-3	Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-case Max	3	5	5	4	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient Max	62.5	50	60	35	°C/W

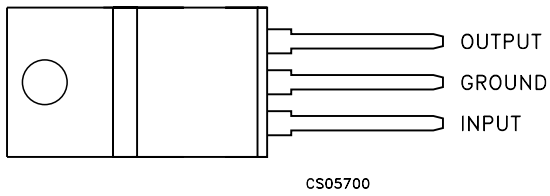
SCHEMATIC DIAGRAM



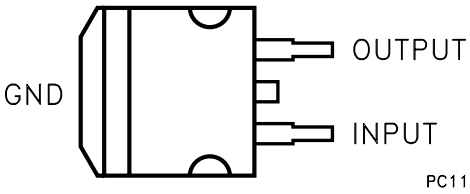
CONNECTION DIAGRAM (top view)



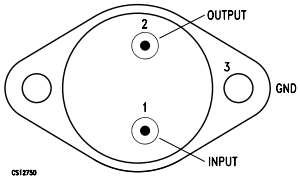
TO-220



TO-220FP



D²PAK



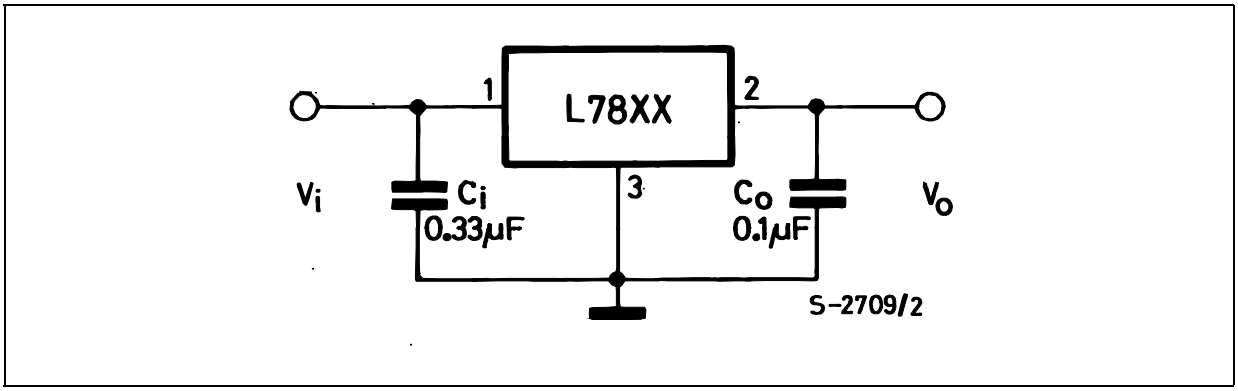
TO-3

ORDERING CODES

TYPE	TO-220	D²PAK (*)	TO-220FP	TO-3	OUTPUT VOLTAGE
L7805				L7805T	5 V
L7805C	L7805CV	L7805CD2T	L7805CP	L7805CT	5 V
L7852C	L7852CV	L7852CD2T	L7852CP	L7852CT	5.2 V
L7806				L7806T	6 V
L7806C	L7806CV	L7806CD2T	L7806CP	L7806CT	6 V
L7808				L7808T	8 V
L7808C	L7808CV	L7808CD2T	L7808CP	L7808CT	8 V
L7885C	L7885CV	L7885CD2T	L7885CP	L7885CT	8.5 V
L7809C	L7809CV	L7809CD2T	L7809CP	L7809CT	9 V
L7812				L7812T	12 V
L7812C	L7812CV	L7812CD2T	L7812CP	L7812CT	12 V
L7815				L7815T	15 V
L7815C	L7815CV	L7815CD2T	L7815CP	L7815CT	15 V
L7818				L7818T	18 V
L7818C	L7818CV	L7818CD2T	L7818CP	L7818CT	18 V
L7820				L7820T	20 V
L7820C	L7820CV	L7820CD2T	L7820CP	L7820CT	20 V
L7824				L7824T	24 V
L7824C	L7824CV	L7824CD2T	L7824CP	L7824CT	24 V

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

APPLICATION CIRCUITS



TEST CIRCUITS

Figure 1 : DC Parameter

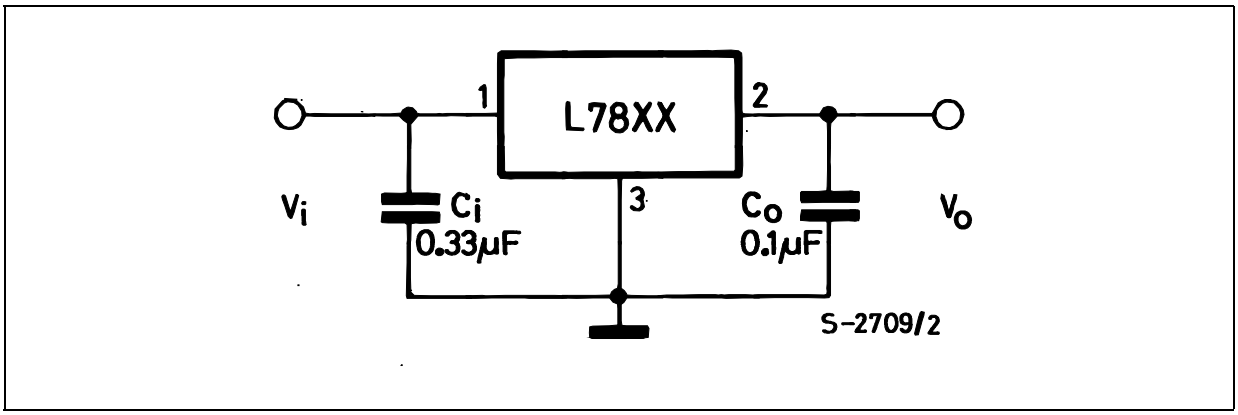


Figure 2 : Load Regulation

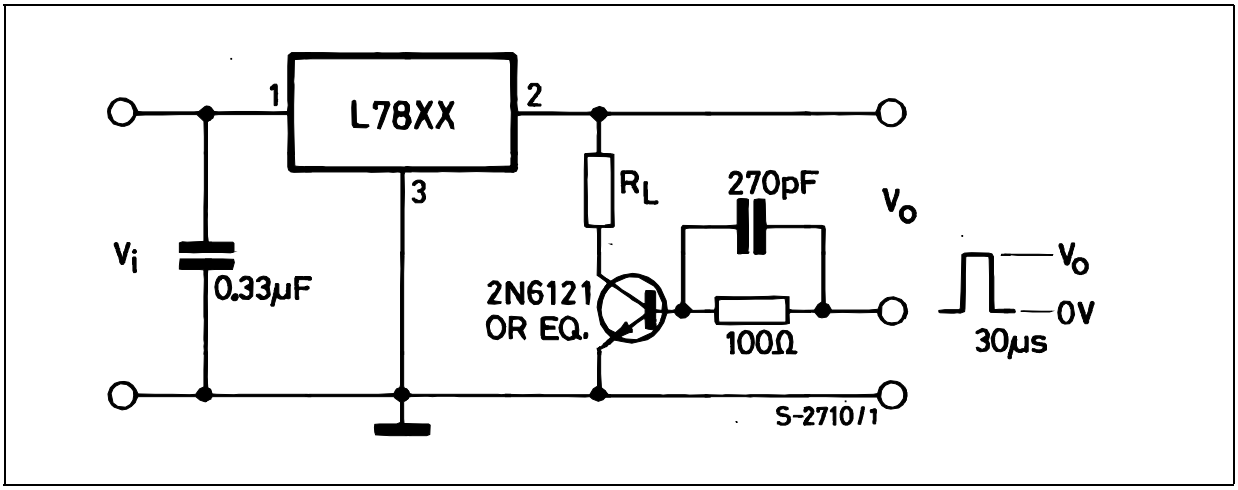
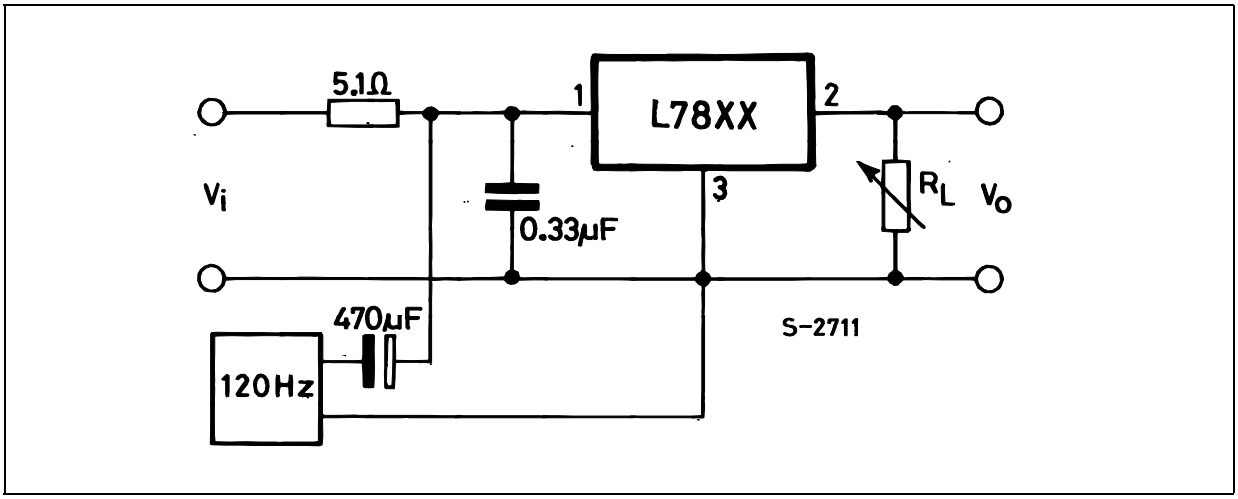


Figure 3 : Ripple Rejection



ELECTRICAL CHARACTERISTICS OF L7805 (refer to the test circuits, T_J = -55 to 150°C, V_I = 10V, I_O = 500 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	4.8	5	5.2	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 8 to 20 V	4.65	5	5.35	V
ΔV_O(*)	Line Regulation	V_I = 7 to 25 V T_J = 25°C		3	50	mV
		V_I = 8 to 12 V T_J = 25°C		1	25	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			100	mV
		I_O = 250 to 750 mA T_J = 25°C			25	
I_d	Quiescent Current	T_J = 25°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 8 to 25 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		0.6		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C			40	µV/V_O
SVR	Supply Voltage Rejection	V_I = 8 to 18 V f = 120Hz	68			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2	2.5	V
R_O	Output Resistance	f = 1 KHz		17		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75	1.2	A
I_{scp}	Short Circuit Peak Current	T_J = 25°C	1.3	2.2	3.3	A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7806 (refer to the test circuits, T_J = -55 to 150°C, V_I = 11V, I_O = 500 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	5.75	6	6.25	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 9 to 21 V	5.65	6	6.35	V
ΔV_O(*)	Line Regulation	V_I = 8 to 25 V T_J = 25°C			60	mV
		V_I = 9 to 13 V T_J = 25°C			30	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			100	mV
		I_O = 250 to 750 mA T_J = 25°C			30	
I_d	Quiescent Current	T_J = 25°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 9 to 25 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		0.7		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C			40	µV/V_O
SVR	Supply Voltage Rejection	V_I = 9 to 19 V f = 120Hz	65			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2	2.5	V
R_O	Output Resistance	f = 1 KHz		19		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75	1.2	A
I_{scp}	Short Circuit Peak Current	T_J = 25°C	1.3	2.2	3.3	A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7808 (refer to the test circuits, T_J = -55 to 150°C, V_I = 14V, I_O = 500 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	7.7	8	8.3	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 11.5 to 23 V	7.6	8	8.4	V
ΔV_O(*)	Line Regulation	V_I = 10.5 to 25 V T_J = 25°C			80	mV
		V_I = 11 to 17 V T_J = 25°C			40	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			100	mV
		I_O = 250 to 750 mA T_J = 25°C			40	
I_d	Quiescent Current	T_J = 25°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 11.5 to 25 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C			40	µV/V_O
SVR	Supply Voltage Rejection	V_I = 11.5 to 21.5 V f = 120Hz	62			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2	2.5	V
R_O	Output Resistance	f = 1 KHz		16		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75	1.2	A
I_{scp}	Short Circuit Peak Current	T_J = 25°C	1.3	2.2	3.3	A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7812 (refer to the test circuits, T_J = -55 to 150°C, V_I = 19V, I_O = 500 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	11.5	12	12.5	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 15.5 to 27 V	11.4	12	12.6	V
ΔV_O(*)	Line Regulation	V_I = 14.5 to 30 V T_J = 25°C			120	mV
		V_I = 16 to 22 V T_J = 25°C			60	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			100	mV
		I_O = 250 to 750 mA T_J = 25°C			60	
I_d	Quiescent Current	T_J = 25°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 15 to 30 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		1.5		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C			40	µV/V_O
SVR	Supply Voltage Rejection	V_I = 15 to 25 V f = 120Hz	61			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2	2.5	V
R_O	Output Resistance	f = 1 KHz		18		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75	1.2	A
I_{scp}	Short Circuit Peak Current	T_J = 25°C	1.3	2.2	3.3	A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7815 (refer to the test circuits, T_J = -55 to 150°C, V_I = 23V, I_O = 500 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	14.4	15	15.6	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 18.5 to 30 V	14.25	15	15.75	V
ΔV_O(*)	Line Regulation	V_I = 17.5 to 30 V T_J = 25°C			150	mV
		V_I = 20 to 26 V T_J = 25°C			75	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			150	mV
		I_O = 250 to 750 mA T_J = 25°C			75	
I_d	Quiescent Current	T_J = 25°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 18.5 to 30 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		1.8		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C			40	µV/V_O
SVR	Supply Voltage Rejection	V_I = 18.5 to 28.5 V f = 120Hz	60			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2	2.5	V
R_O	Output Resistance	f = 1 KHz		19		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75	1.2	A
I_{scp}	Short Circuit Peak Current	T_J = 25°C	1.3	2.2	3.3	A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7818 (refer to the test circuits, T_J = -55 to 150°C, V_I = 26V, I_O = 500 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	17.3	18	18.7	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 22 to 33 V	17.1	18	18.9	V
ΔV_O(*)	Line Regulation	V_I = 21 to 33 V T_J = 25°C			180	mV
		V_I = 24 to 30 V T_J = 25°C			90	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			180	mV
		I_O = 250 to 750 mA T_J = 25°C			90	
I_d	Quiescent Current	T_J = 25°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 22 to 33 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		2.3		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C			40	µV/V_O
SVR	Supply Voltage Rejection	V_I = 22 to 32 V f = 120Hz	59			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2	2.5	V
R_O	Output Resistance	f = 1 KHz		22		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75	1.2	A
I_{scp}	Short Circuit Peak Current	T_J = 25°C	1.3	2.2	3.3	A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7820 (refer to the test circuits, T_J = -55 to 150°C, V_I = 28V, I_O = 500 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	19.2	20	20.8	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 24 to 35 V	19	20	21	V
ΔV_O(*)	Line Regulation	V_I = 22.5 to 35 V T_J = 25°C			200	mV
		V_I = 26 to 32 V T_J = 25°C			100	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			200	mV
		I_O = 250 to 750 mA T_J = 25°C			100	
I_d	Quiescent Current	T_J = 25°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 24 to 35 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		2.5		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C			40	µV/V_O
SVR	Supply Voltage Rejection	V_I = 24 to 35 V f = 120Hz	58			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2	2.5	V
R_O	Output Resistance	f = 1 KHz		24		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75	1.2	A
I_{scp}	Short Circuit Peak Current	T_J = 25°C	1.3	2.2	3.3	A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7824 (refer to the test circuits, T_J = -55 to 150°C, V_I = 33V, I_O = 500 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	23	24	25	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 28 to 38 V	22.8	24	25.2	V
ΔV_O(*)	Line Regulation	V_I = 27 to 38 V T_J = 25°C			240	mV
		V_I = 30 to 36 V T_J = 25°C			120	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			240	mV
		I_O = 250 to 750 mA T_J = 25°C			120	
I_d	Quiescent Current	T_J = 25°C			6	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 28 to 38 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		3		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C			40	µV/V_O
SVR	Supply Voltage Rejection	V_I = 28 to 38 V f = 120Hz	56			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2	2.5	V
R_O	Output Resistance	f = 1 KHz		28		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75	1.2	A
I_{scp}	Short Circuit Peak Current	T_J = 25°C	1.3	2.2	3.3	A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7805C (refer to the test circuits, T_J = -55 to 150°C, V_I = 10V, I_O = 500 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	4.8	5	5.2	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 7 to 20 V	4.75	5	5.25	V
ΔV_O(*)	Line Regulation	V_I = 7 to 25 V T_J = 25°C		3	100	mV
		V_I = 8 to 12 V T_J = 25°C		1	50	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			100	mV
		I_O = 250 to 750 mA T_J = 25°C			50	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 7 to 25 V			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1.1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		40		µV/V_O
SVR	Supply Voltage Rejection	V_I = 8 to 18 V f = 120Hz	62			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		17		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7852C (refer to the test circuits, T_J = -55 to 150°C, V_I = 10V, I_O = 500 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	5.0	5.2	5.4	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 8 to 20 V	4.95	5.2	5.45	V
ΔV_O(*)	Line Regulation	V_I = 7 to 25 V T_J = 25°C		3	105	mV
		V_I = 8 to 12 V T_J = 25°C		1	52	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			105	mV
		I_O = 250 to 750 mA T_J = 25°C			52	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 7 to 25 V			1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		42		$\mu V/V_O$
SVR	Supply Voltage Rejection	V_I = 8 to 18 V f = 120Hz	61			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		17		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.75		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7806C (refer to the test circuits, T_J = -55 to 150°C, V_I = 11V, I_O = 500 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	5.75	6	6.25	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 8 to 21 V	5.7	6	6.3	V
ΔV_O(*)	Line Regulation	V_I = 8 to 25 V T_J = 25°C			120	mV
		V_I = 9 to 13 V T_J = 25°C			60	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			120	mV
		I_O = 250 to 750 mA T_J = 25°C			60	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 8 to 25 V			1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.8		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		45		$\mu V/V_O$
SVR	Supply Voltage Rejection	V_I = 9 to 19 V f = 120Hz	59			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		19		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.55		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7808C (refer to the test circuits, T_J = -55 to 150°C, V_I = 14V, I_O = 500 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	7.7	8	8.3	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 10.5 to 25 V	7.6	8	8.4	V
ΔV_O(*)	Line Regulation	V_I = 10.5 to 25 V T_J = 25°C			160	mV
		V_I = 11 to 17 V T_J = 25°C			80	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			160	mV
		I_O = 250 to 750 mA T_J = 25°C			80	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 10.5 to 25 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.8		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		52		µV/V_O
SVR	Supply Voltage Rejection	V_I = 11.5 to 21.5 V f = 120Hz	56			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		16		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.45		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7885C (refer to the test circuits, T_J = -55 to 150°C, V_I = 14.5V, I_O = 500 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	8.2	8.5	8.8	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 11 to 26 V	8.1	8.5	8.9	V
ΔV_O(*)	Line Regulation	V_I = 11 to 27 V T_J = 25°C			160	mV
		V_I = 11.5 to 17.5 V T_J = 25°C			80	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			160	mV
		I_O = 250 to 750 mA T_J = 25°C			80	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 11 to 27 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-0.8		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		55		µV/V_O
SVR	Supply Voltage Rejection	V_I = 12 to 22 V f = 120Hz	56			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		16		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.45		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7809C (refer to the test circuits, T_J = -55 to 150°C, V_I = 15V, I_O = 500 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	8.65	9	9.35	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 11.5 to 26 V	8.55	9	9.45	V
ΔV_O(*)	Line Regulation	V_I = 11.5 to 26 V T_J = 25°C			180	mV
		V_I = 12 to 18 V T_J = 25°C			90	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			180	mV
		I_O = 250 to 750 mA T_J = 25°C			90	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 11.5 to 26 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		70		µV/V_O
SVR	Supply Voltage Rejection	V_I = 12 to 23 V f = 120Hz	55			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		17		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.40		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7812C (refer to the test circuits, T_J = -55 to 150°C, V_I = 19V, I_O = 500 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	11.5	12	12.5	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 14.5 to 27 V	11.4	12	12.6	V
ΔV_O(*)	Line Regulation	V_I = 14.5 to 30 V T_J = 25°C			240	mV
		V_I = 16 to 22 V T_J = 25°C			120	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			240	mV
		I_O = 250 to 750 mA T_J = 25°C			120	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 14.5 to 30 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		75		µV/V_O
SVR	Supply Voltage Rejection	V_I = 15 to 25 V f = 120Hz	55			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		18		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.35		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7815C (refer to the test circuits, T_J = -55 to 150°C, V_I = 23V, I_O = 500 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	14.5	15	15.6	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 17.5 to 30 V	14.25	15	15.75	V
ΔV_O(*)	Line Regulation	V_I = 17.5 to 30 V T_J = 25°C			300	mV
		V_I = 20 to 26 V T_J = 25°C			150	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			300	mV
		I_O = 250 to 750 mA T_J = 25°C			150	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 17.5 to 30 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		90		µV/V_O
SVR	Supply Voltage Rejection	V_I = 18.5 to 28.5 V f = 120Hz	54			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		19		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.23		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7818C (refer to the test circuits, T_J = -55 to 150°C, V_I = 26V, I_O = 500 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	17.3	18	18.7	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 21 to 33 V	17.1	18	18.9	V
ΔV_O(*)	Line Regulation	V_I = 21 to 33 V T_J = 25°C			360	mV
		V_I = 24 to 30 V T_J = 25°C			180	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			360	mV
		I_O = 250 to 750 mA T_J = 25°C			180	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 21 to 33 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		110		µV/V_O
SVR	Supply Voltage Rejection	V_I = 22 to 32 V f = 120Hz	53			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		22		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.20		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.1		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7820C (refer to the test circuits, T_J = -55 to 150°C, V_I = 28V, I_O = 500 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	19.2	20	20.8	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 23 to 35 V	19	20	21	V
ΔV_O(*)	Line Regulation	V_I = 22.5 to 35 V T_J = 25°C			400	mV
		V_I = 26 to 32 V T_J = 25°C			200	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			400	mV
		I_O = 250 to 750 mA T_J = 25°C			200	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 23 to 35 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		150		µV/V_O
SVR	Supply Voltage Rejection	V_I = 24 to 35 V f = 120Hz	52			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		24		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.18		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.1		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

ELECTRICAL CHARACTERISTICS OF L7824C (refer to the test circuits, T_J = -55 to 150°C, V_I = 33V, I_O = 500 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	23	24	25	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 27 to 38 V	22.8	24	25.2	V
ΔV_O(*)	Line Regulation	V_I = 27 to 38 V T_J = 25°C			480	mV
		V_I = 30 to 36 V T_J = 25°C			240	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			480	mV
		I_O = 250 to 750 mA T_J = 25°C			240	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 27 to 38 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1.5		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		170		µV/V_O
SVR	Supply Voltage Rejection	V_I = 28 to 38 V f = 120Hz	50			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		28		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.15		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.1		A

(*) Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

Figure 4 : Dropout Voltage vs Junction Temperature

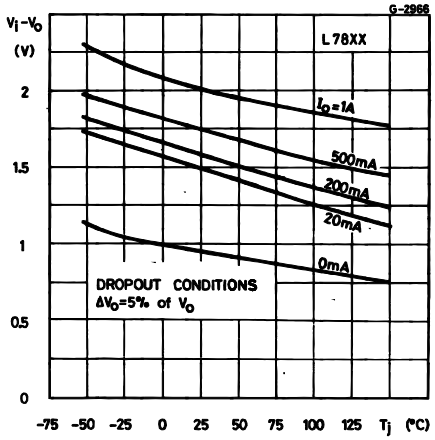


Figure 5 : Peak Output Current vs Input/output Differential Voltage

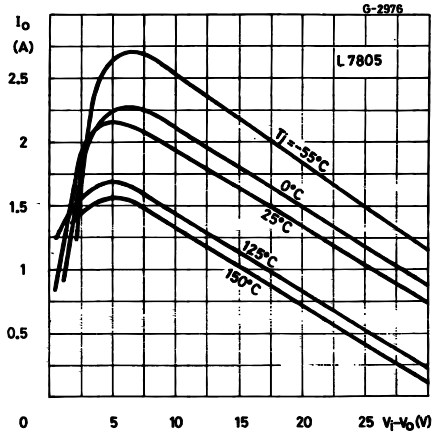


Figure 6 : Supply Voltage Rejection vs Frequency

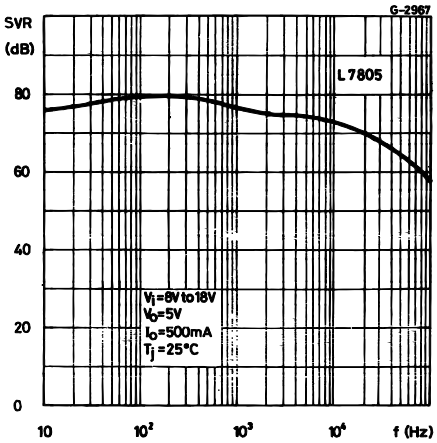


Figure 7 : Output Voltage vs Junction Temperature

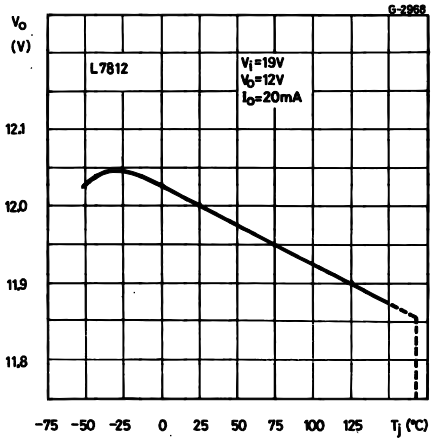


Figure 8 : Output Impedance vs Frequency

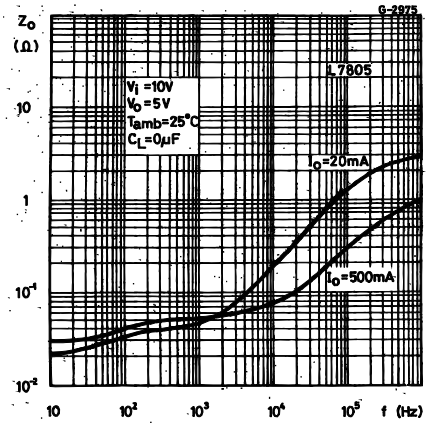


Figure 9 : Quiescent Current vs Junction Temperature

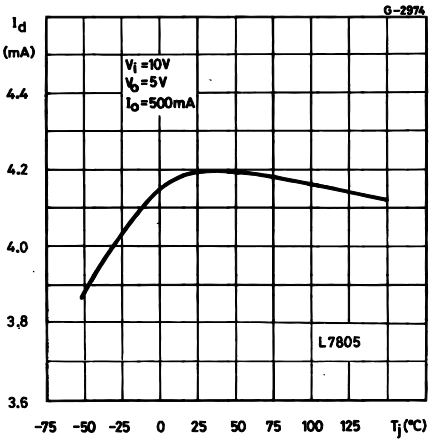


Figure 10 : Load Transient Response

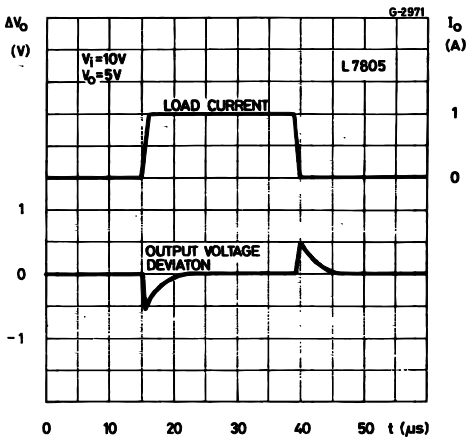


Figure 11 : Line Transient Response

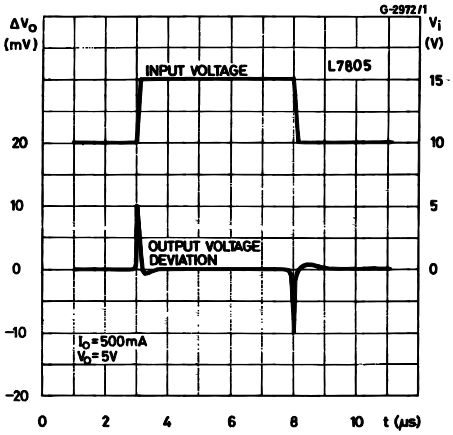


Figure 12 : Quiescent Current vs Input Voltage

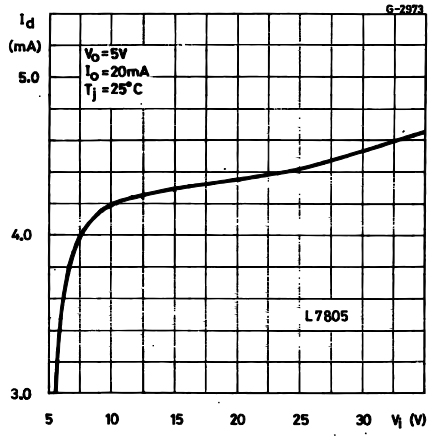
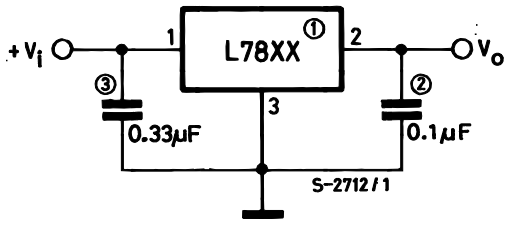


Figure 13 : Fixed Output Regulator



NOTE:
1. To specify an output voltage, substitute voltage value for "XX".
2. Although no output capacitor is need for stability, it does improve transient response.
3. Required if regulator is locate an appreciable distance from power supply filter.

Figure 14 : Current Regulator

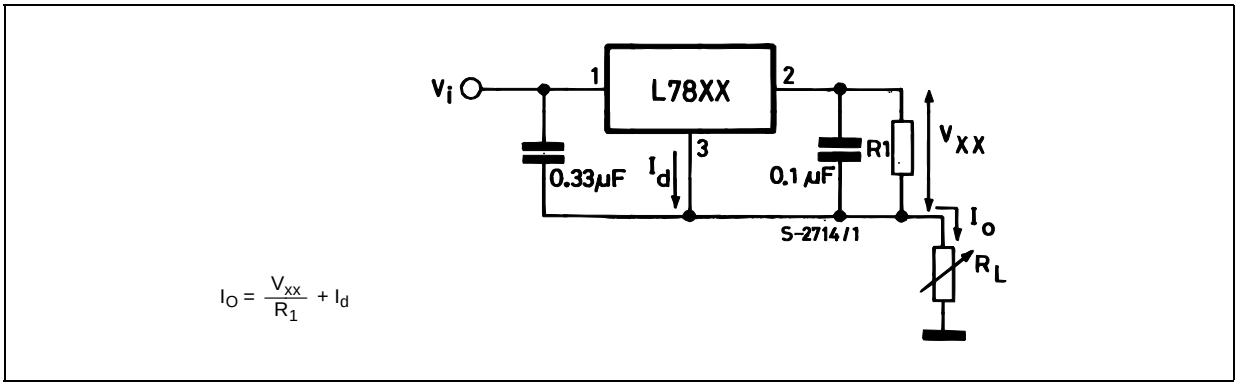


Figure 15 : Circuit for Increasing Output Voltage

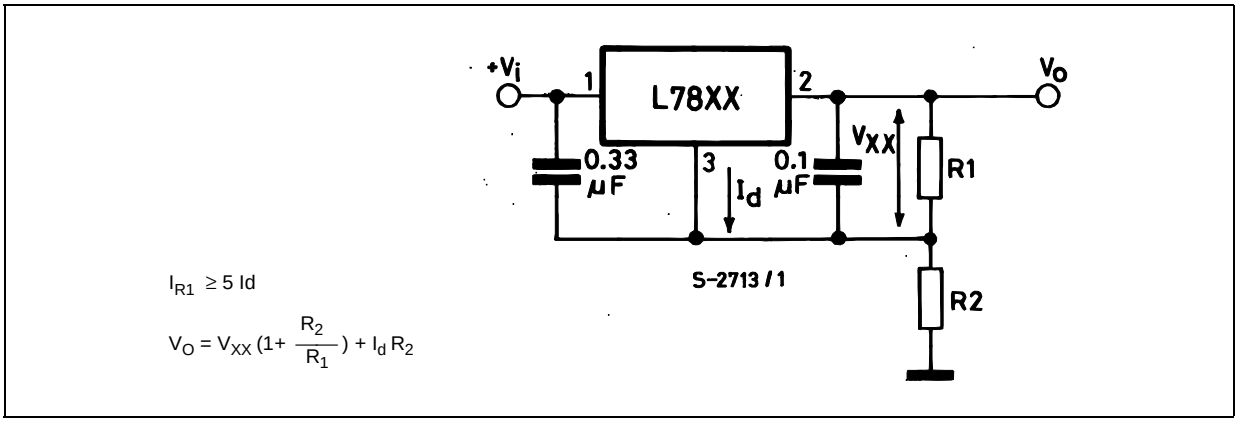


Figure 16 : Adjustable Output Regulator (7 to 30V)

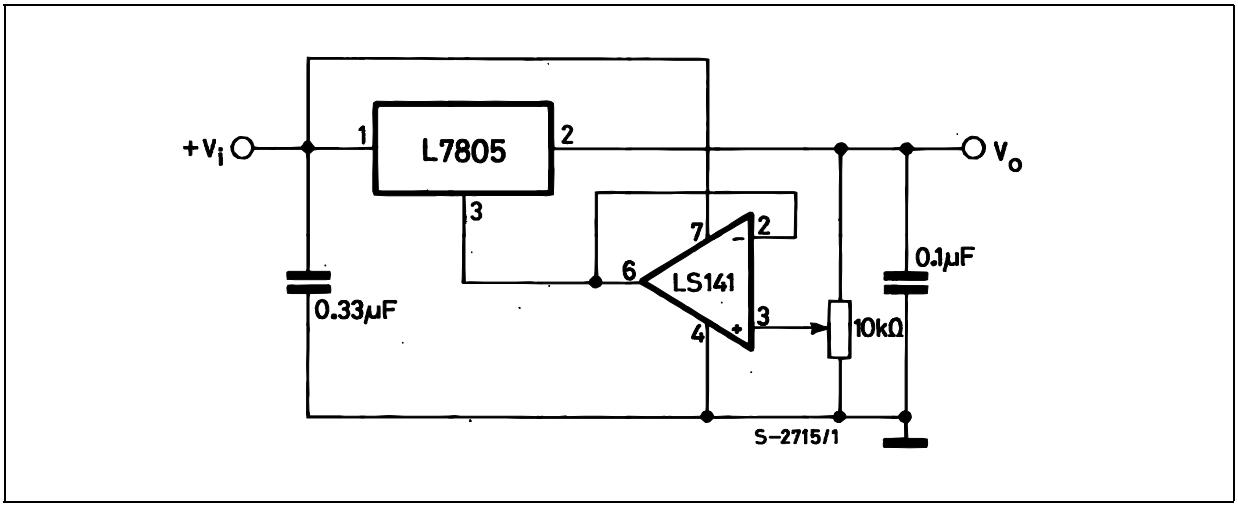


Figure 17 : 0.5 to 10V Regulator

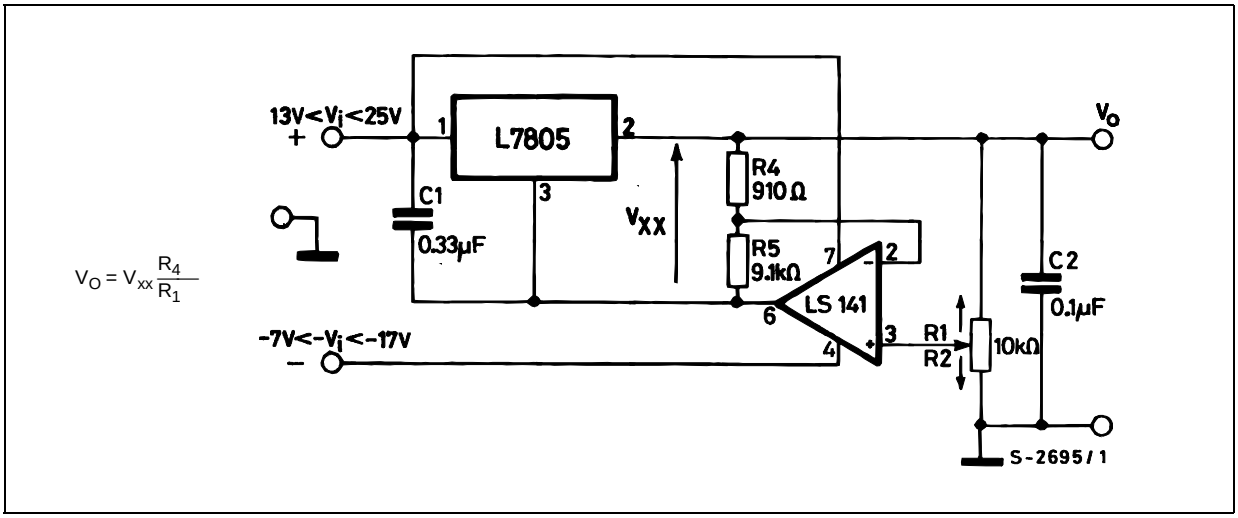


Figure 18 : High Current Voltage Regulator

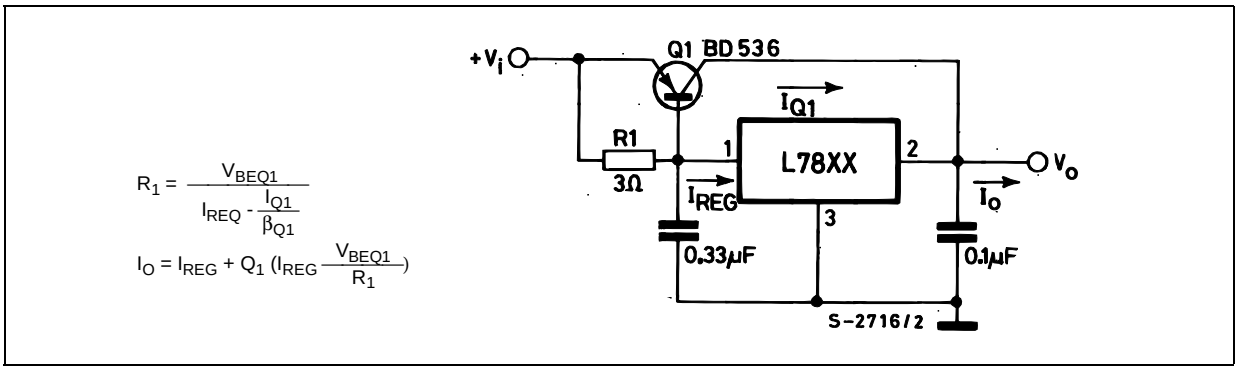


Figure 19 : High Output Current with Short Circuit Protection

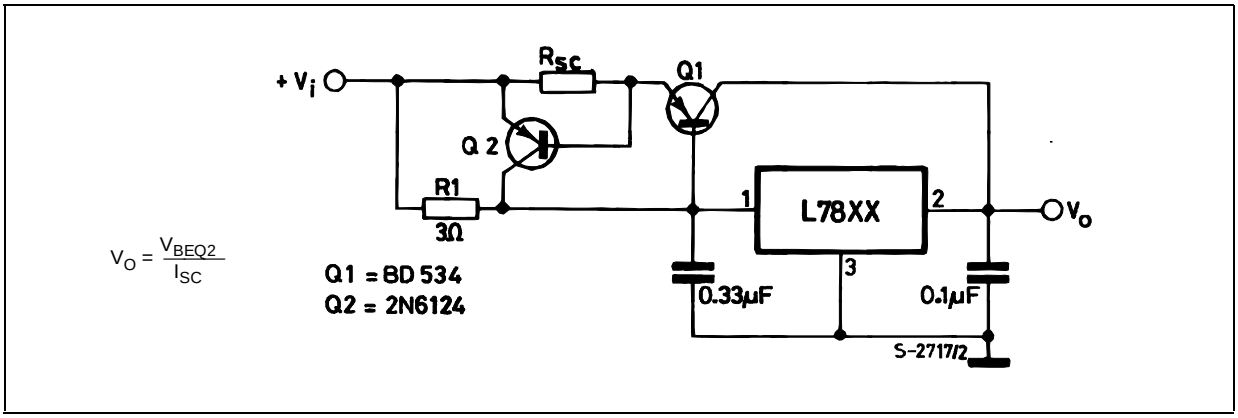


Figure 20 : Tracking Voltage Regulator

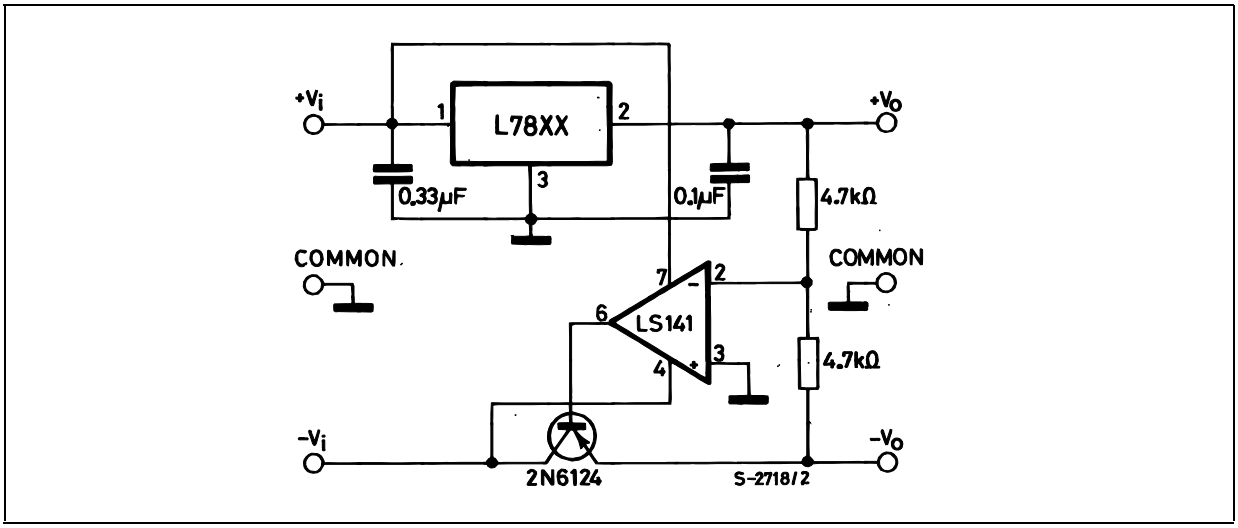
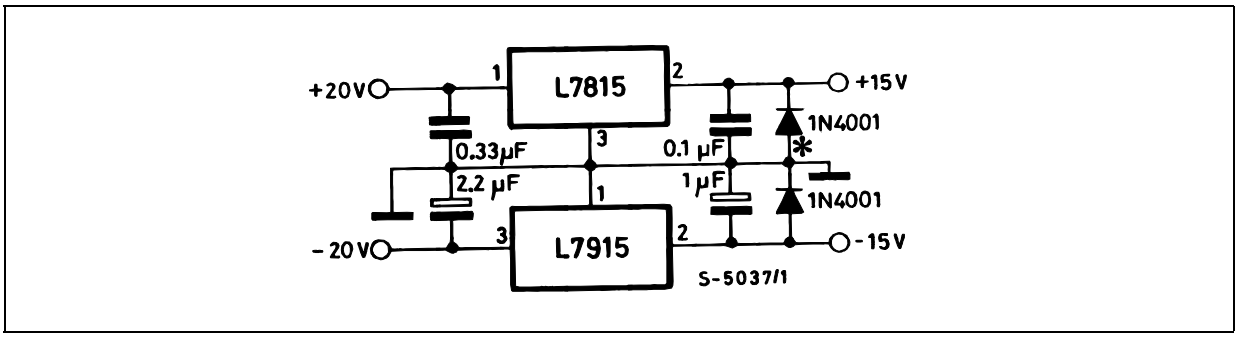


Figure 21 : Split Power Supply (± 15V - 1 A)



* Against potential latch-up problems.

Figure 22 : Negative Output Voltage Circuit

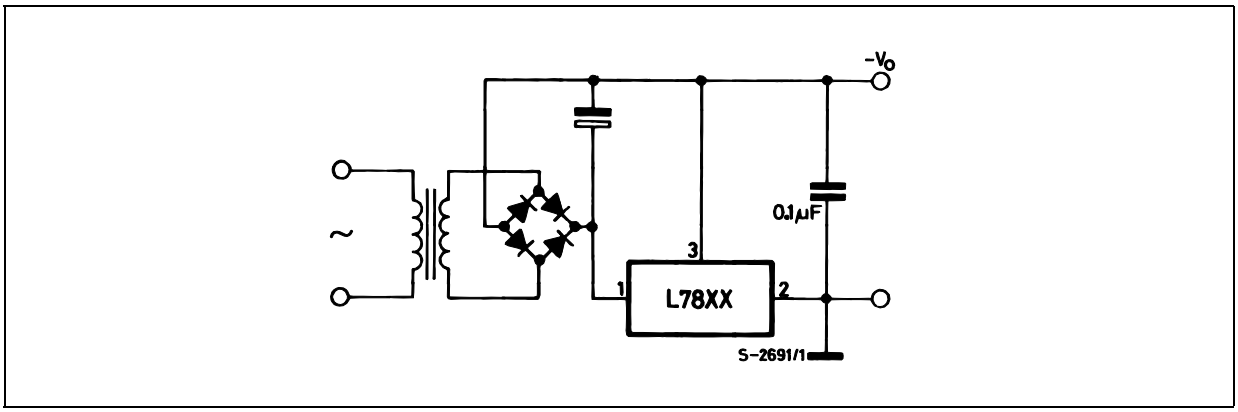


Figure 23 : Switching Regulator

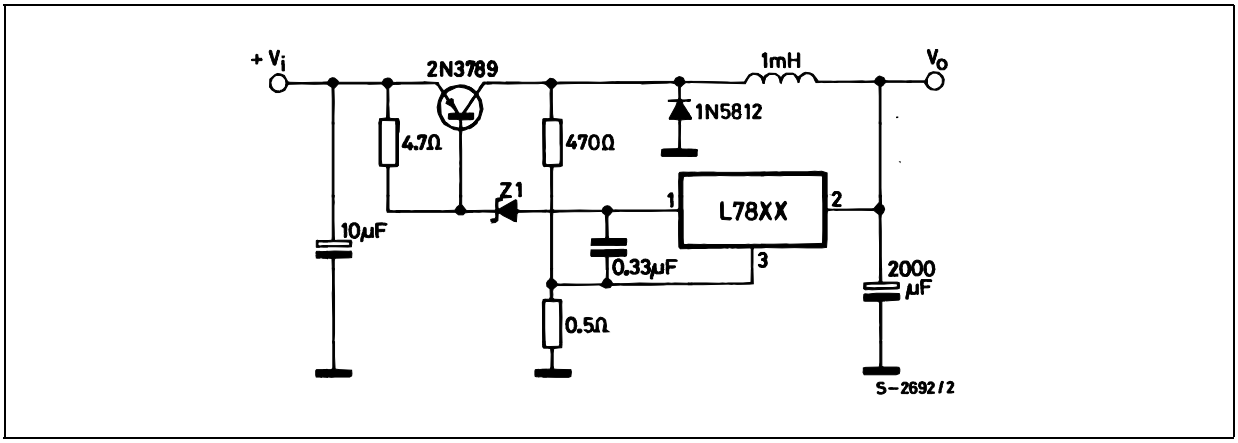


Figure 24 : High Input Voltage Circuit

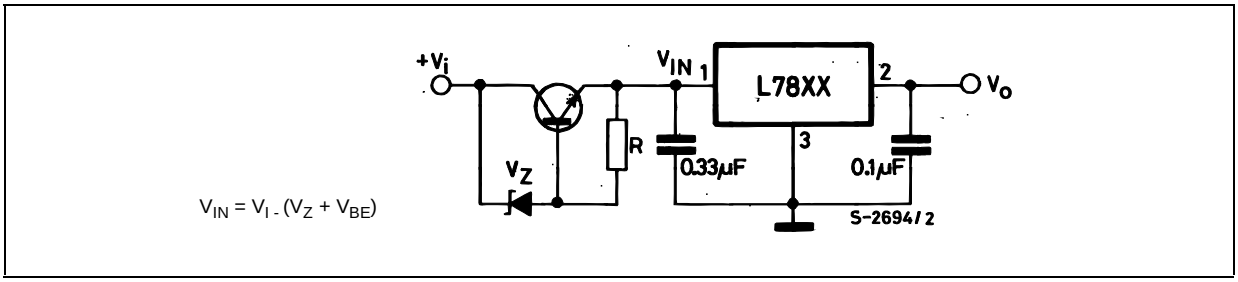


Figure 25 : High Input Voltage Circuit

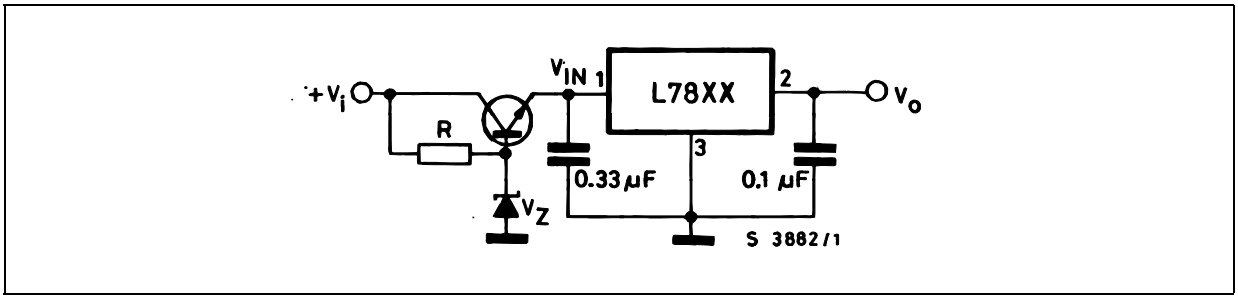


Figure 26 : High Output Voltage Regulator

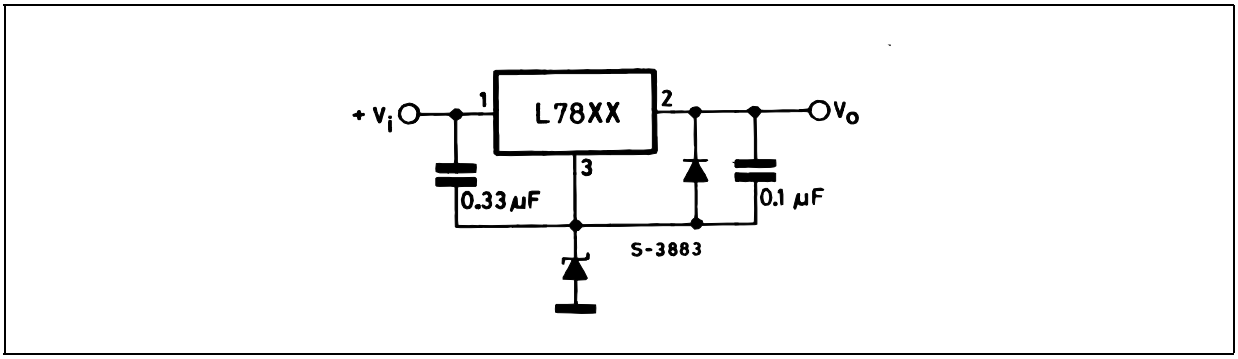
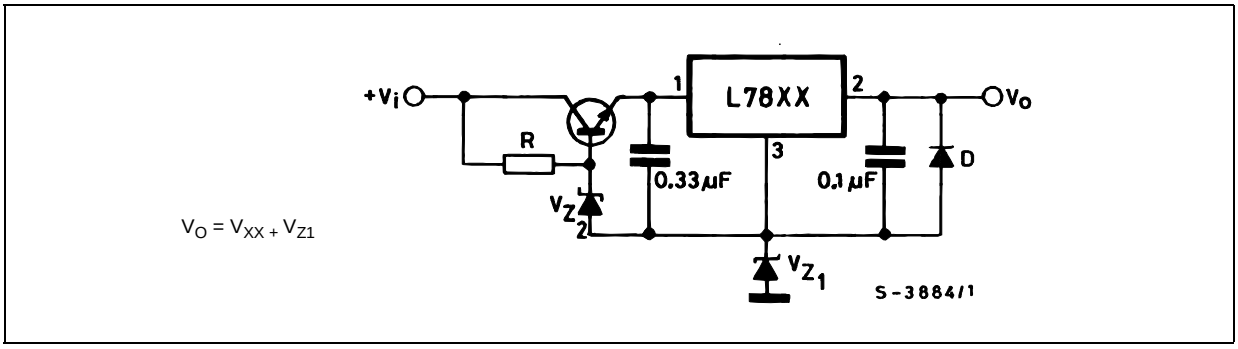
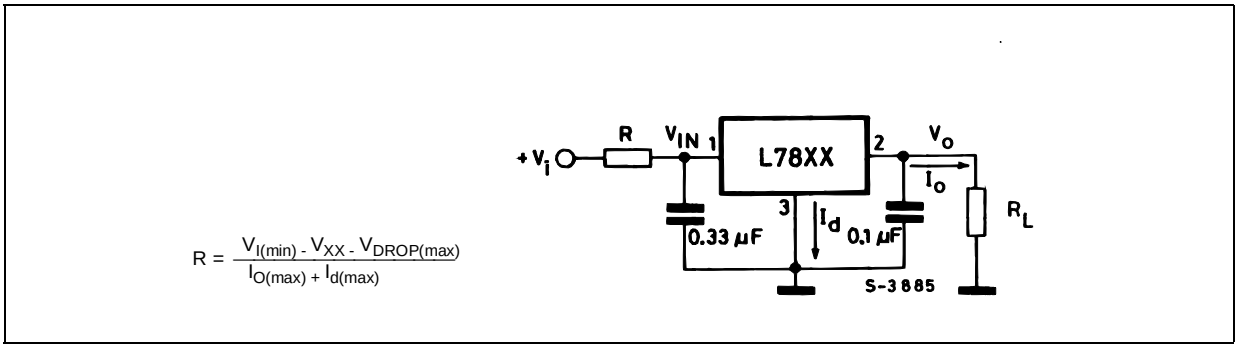


Figure 27 : High Input and Output Voltage



$V_O = V_{XX} + V_{Z1}$

Figure 28 : Reducing Power Dissipation with Dropping Resistor



$$R = \frac{V_{I(min)} - V_{XX} - V_{DROP(max)}}{I_{O(max)} + I_{d(max)}}$$

Figure 29 : Remote Shutdown

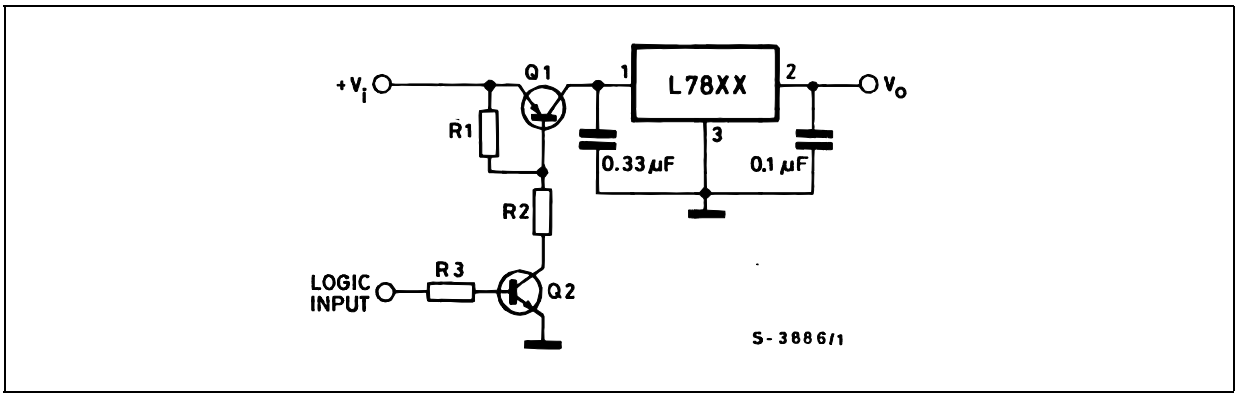
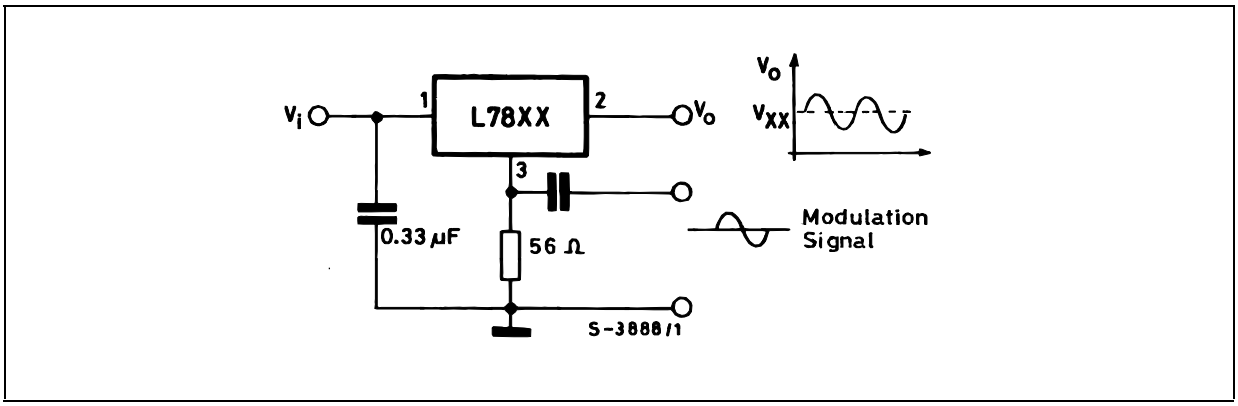
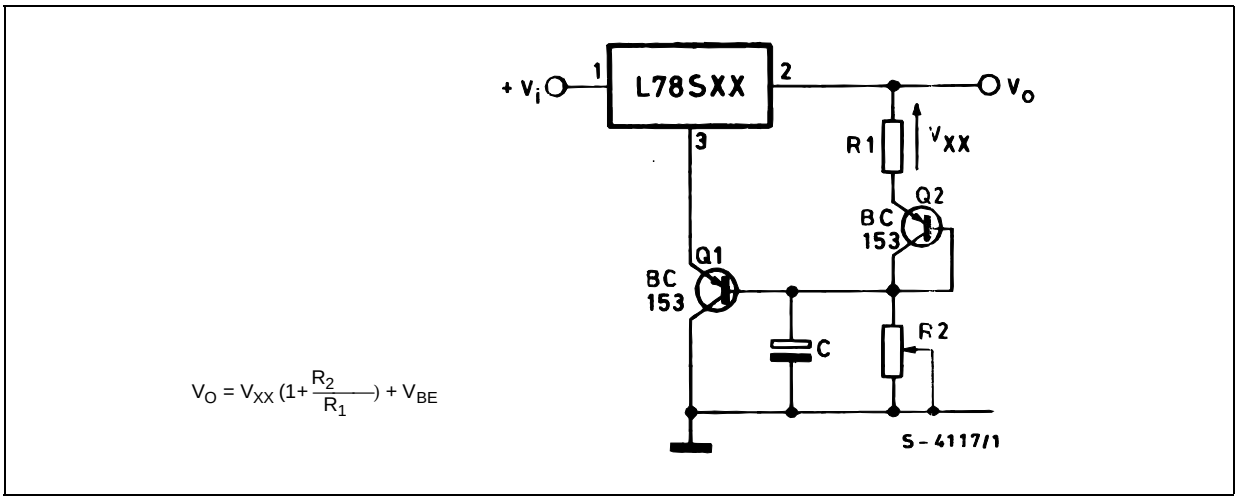


Figure 30 : Power AM Modulator (unity voltage gain, $I_O \leq 0.5$)



NOTE: The circuit performs well up to 100 KHz.

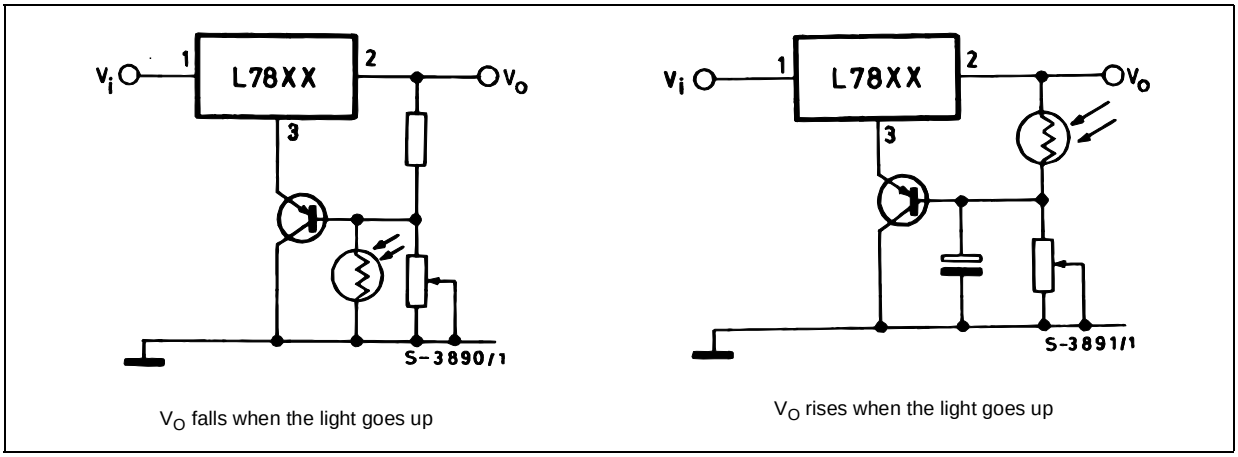
Figure 31 : Adjustable Output Voltage with Temperature Compensation



$$V_O = V_{XX}\left(1+\frac{R_2}{R_1}\right) + V_{BE}$$

NOTE: Q_2 is connected as a diode in order to compensate the variation of the Q_1 V_{BE} with the temperature. C allows a slow rise time of the V_O.

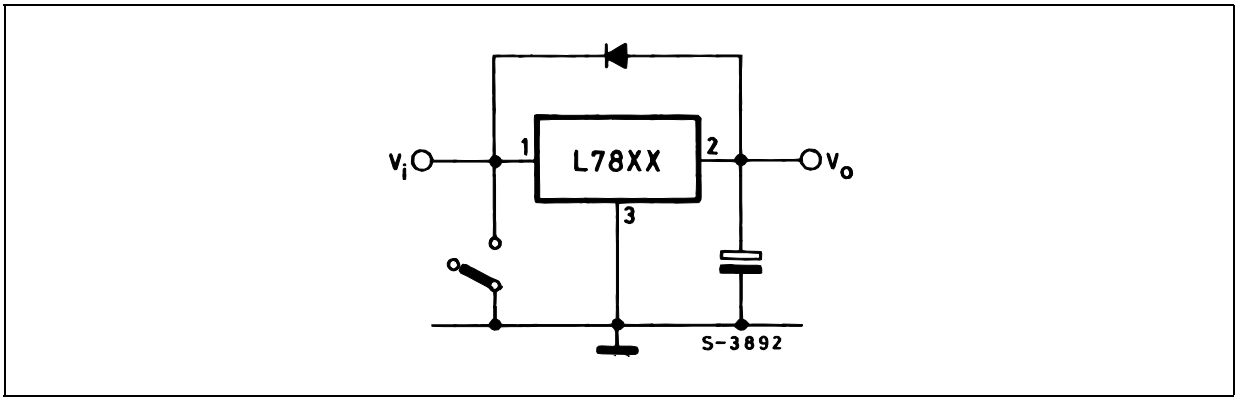
Figure 32 : Light Controllers ($V_{Omin} = V_{XX} + V_{BE}$)



V_O falls when the light goes up

V_O rises when the light goes up

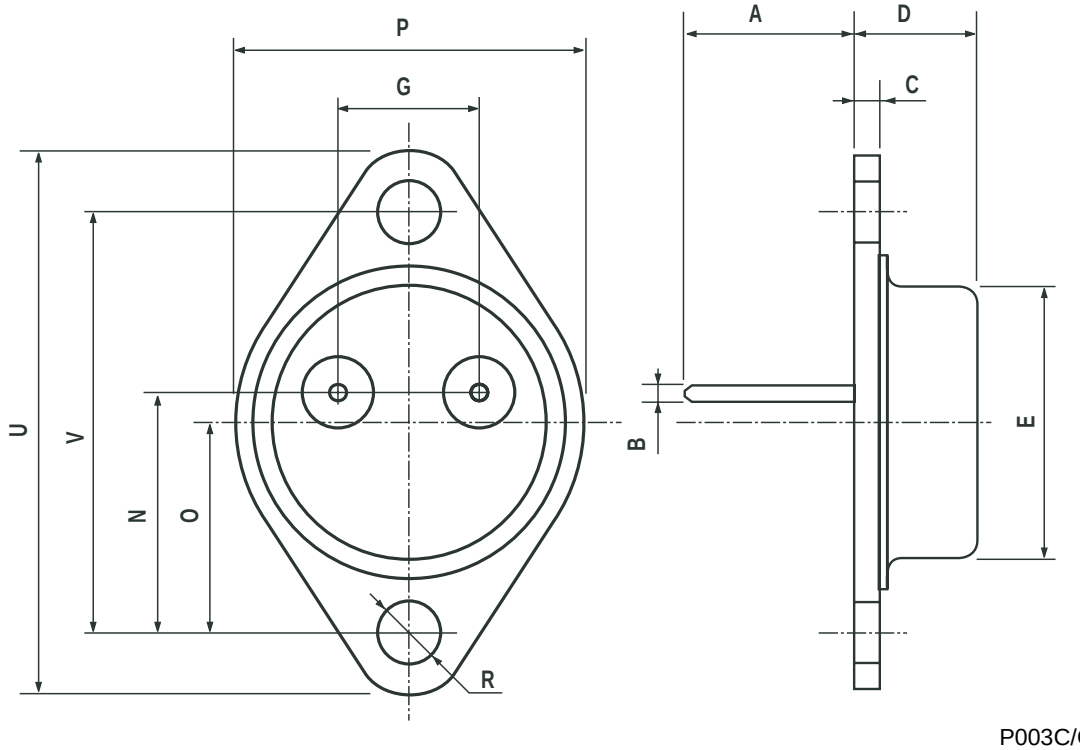
Figure 33 : Protection against Input Short-Circuit with High Capacitance Loads



Application with high capacitance loads and an output voltage greater than 6 volts need an external diode (see fig. 33) to protect the device against input short circuit. In this case the input voltage falls rapidly while the output voltage decrease slowly. The capacitance discharges by means of the Base-Emitter junction of the series pass transistor in the regulator. If the energy is sufficiently high, the transistor may be destroyed. The external diode by-passes the current from the IC to ground.

TO-3 MECHANICAL DATA

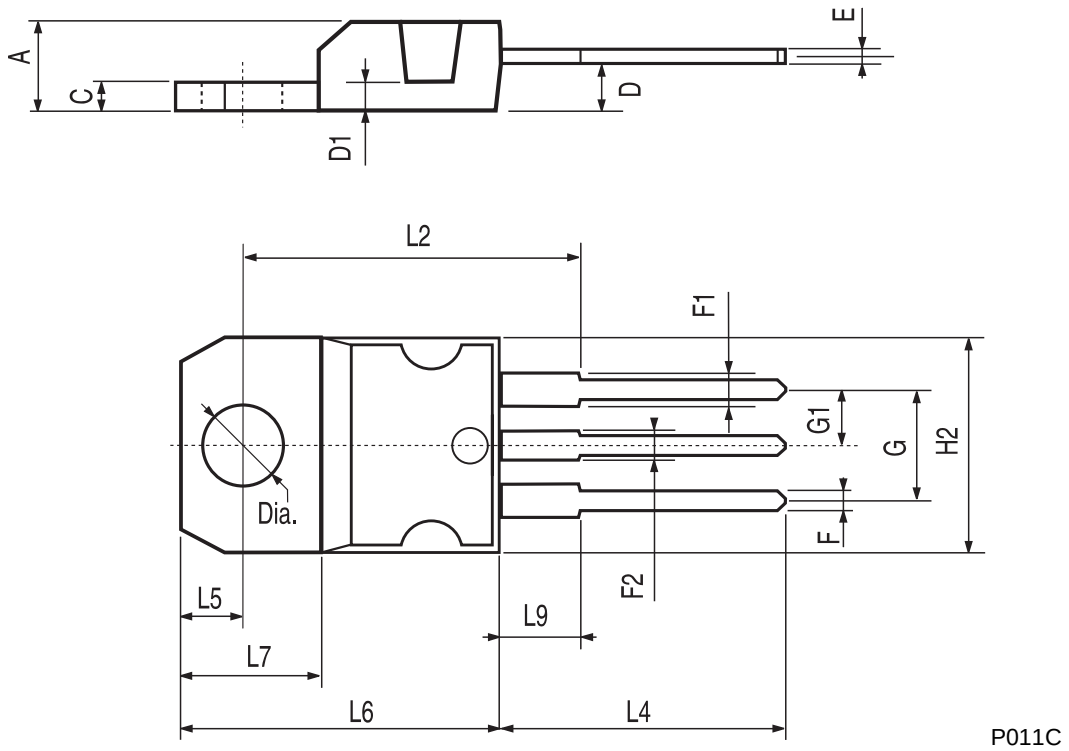
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A		11.85			0.466	
B	0.96	1.05	1.10	0.037	0.041	0.043
C			1.70			0.066
D			8.7			0.342
E			20.0			0.787
G		10.9			0.429	
N		16.9			0.665	
P			26.2			1.031
R	3.88		4.09	0.152		0.161
U			39.5			1.555
V		30.10			1.185	



P003C/C

TO-220 MECHANICAL DATA

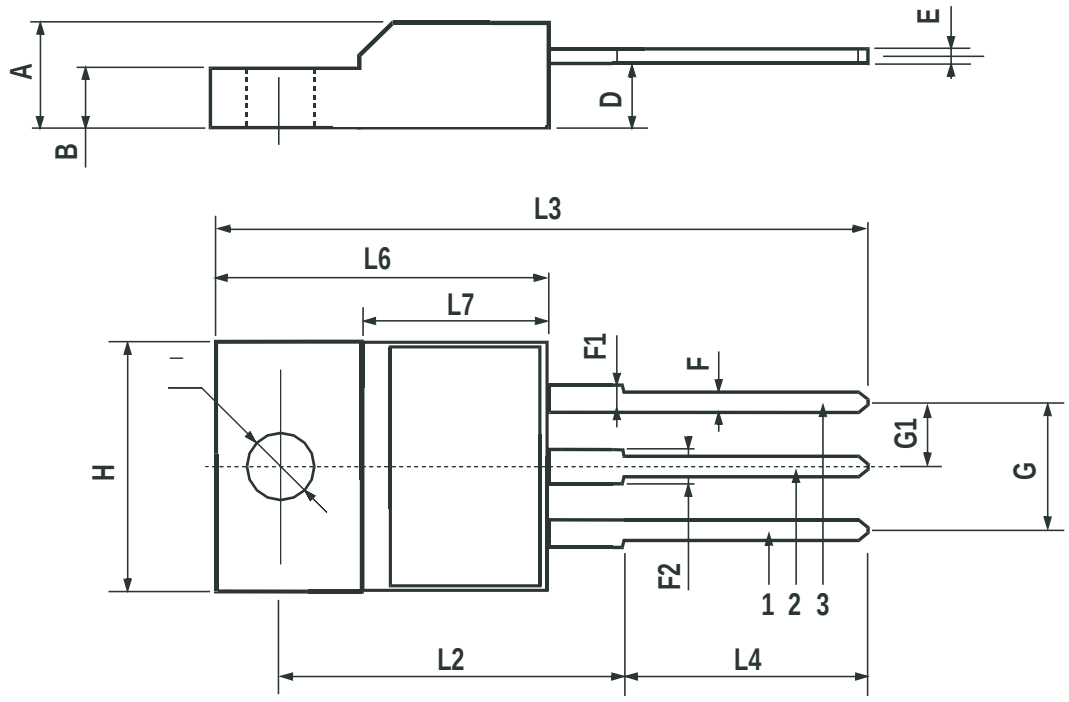
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



P011C

TO-220FP MECHANICAL DATA

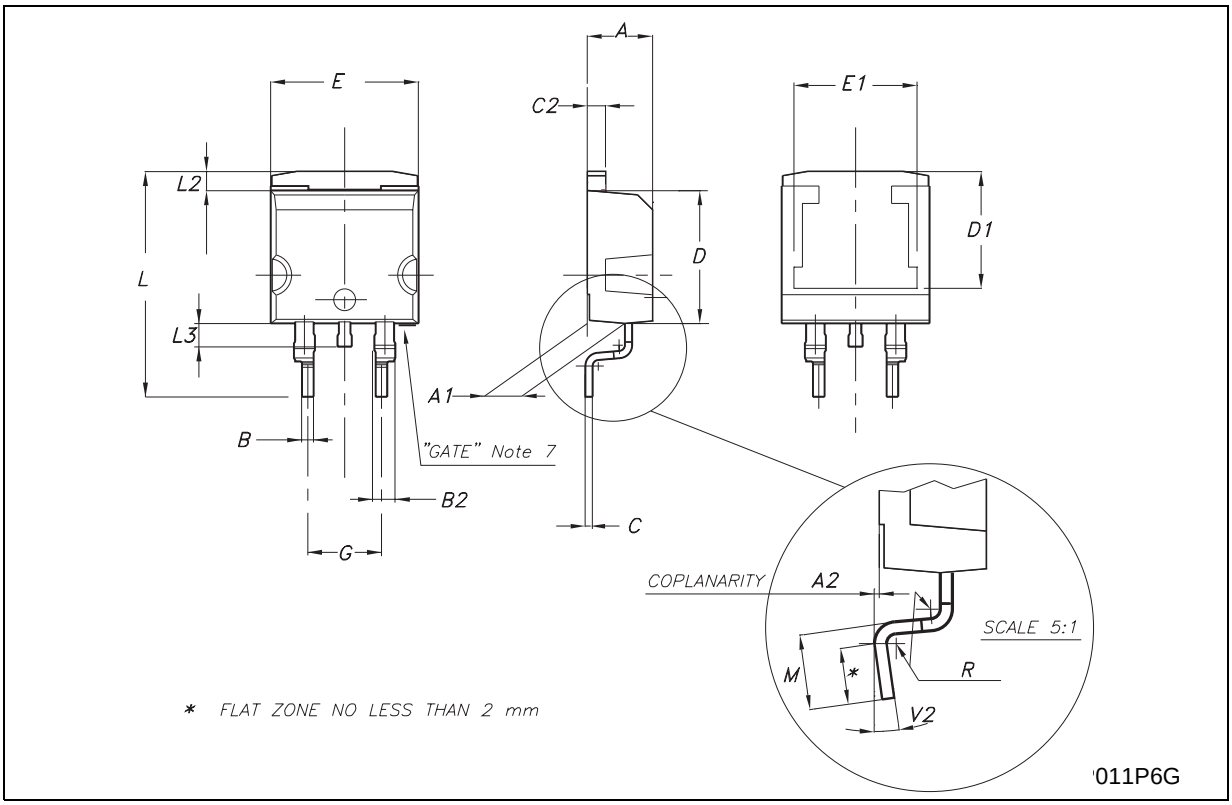
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.50	0.045		0.059
F2	1.15		1.50	0.045		0.059
G	4.95		5.2	0.194		0.204
G1	2.4		2.7	0.094		0.106
H	10.0		10.40	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
DIA.	3		3.2	0.118		0.126



7012510/F

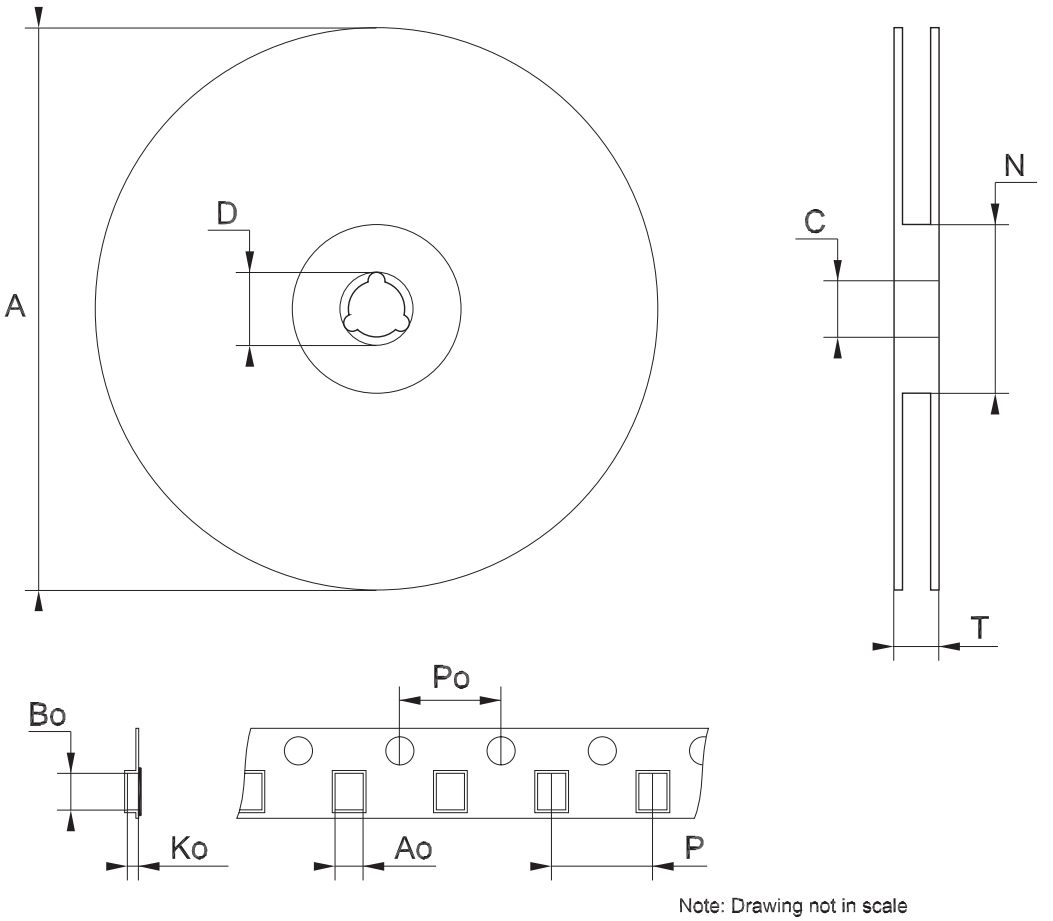
D²PAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		0.409
E1		8.5			0.335	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.016	
V2	0°		8°	0°		8°



Tape & Reel D^2PAK-P^2PAK-D^2PAK/A-P^2PAK/A 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	10.50	10.6	10.70	0.413	0.417	0.421
Bo	15.70	15.80	15.90	0.618	0.622	0.626
Ko	4.80	4.90	5.00	0.189	0.193	0.197
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	11.9	12.0	12.1	0.468	0.472	0.476



Note: Drawing not in scale