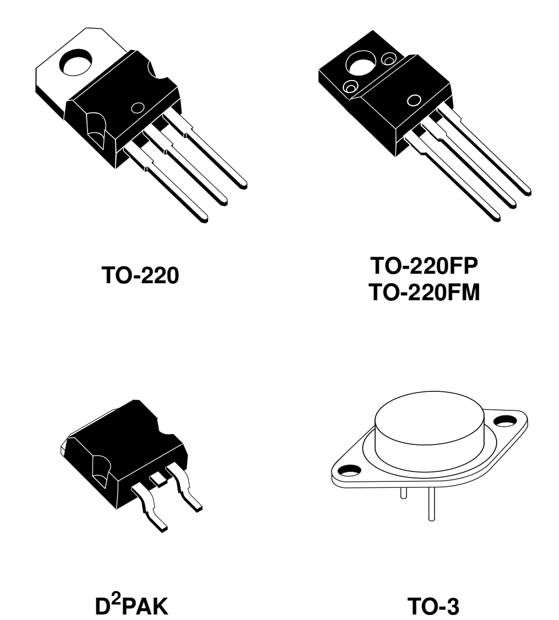
POSITIVE VOLTAGE REGULATORS

- OUTPUT CURRENT TO 1.5A
- OUTPUT VOLTAGES OF 5; 5.2; 6; 8; 8.5; 9; 10; 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-220FM, TO-3 and D^{2}PAK 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.

Figure 1: Schematic Diagram

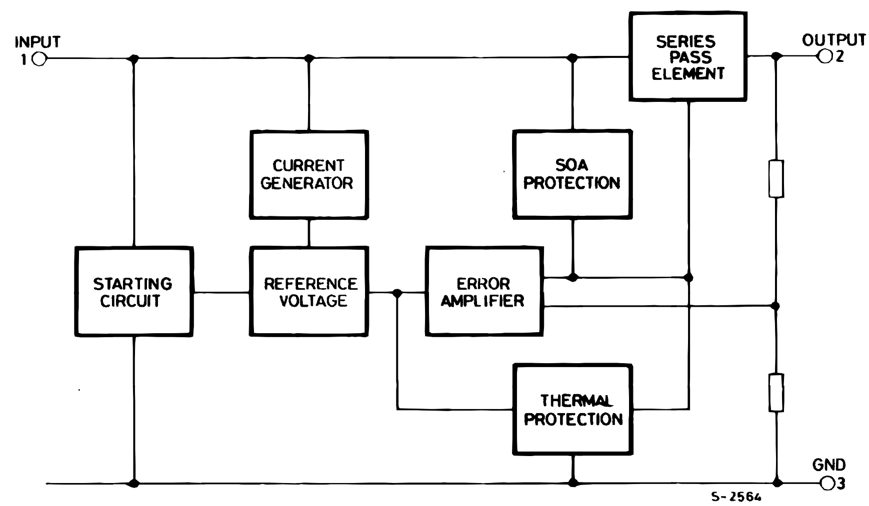


Table 1: Absolute Maximum Ratings

Symbol	Parameter		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.

Table 2: Thermal Data

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

Figure 2: Schematic Diagram

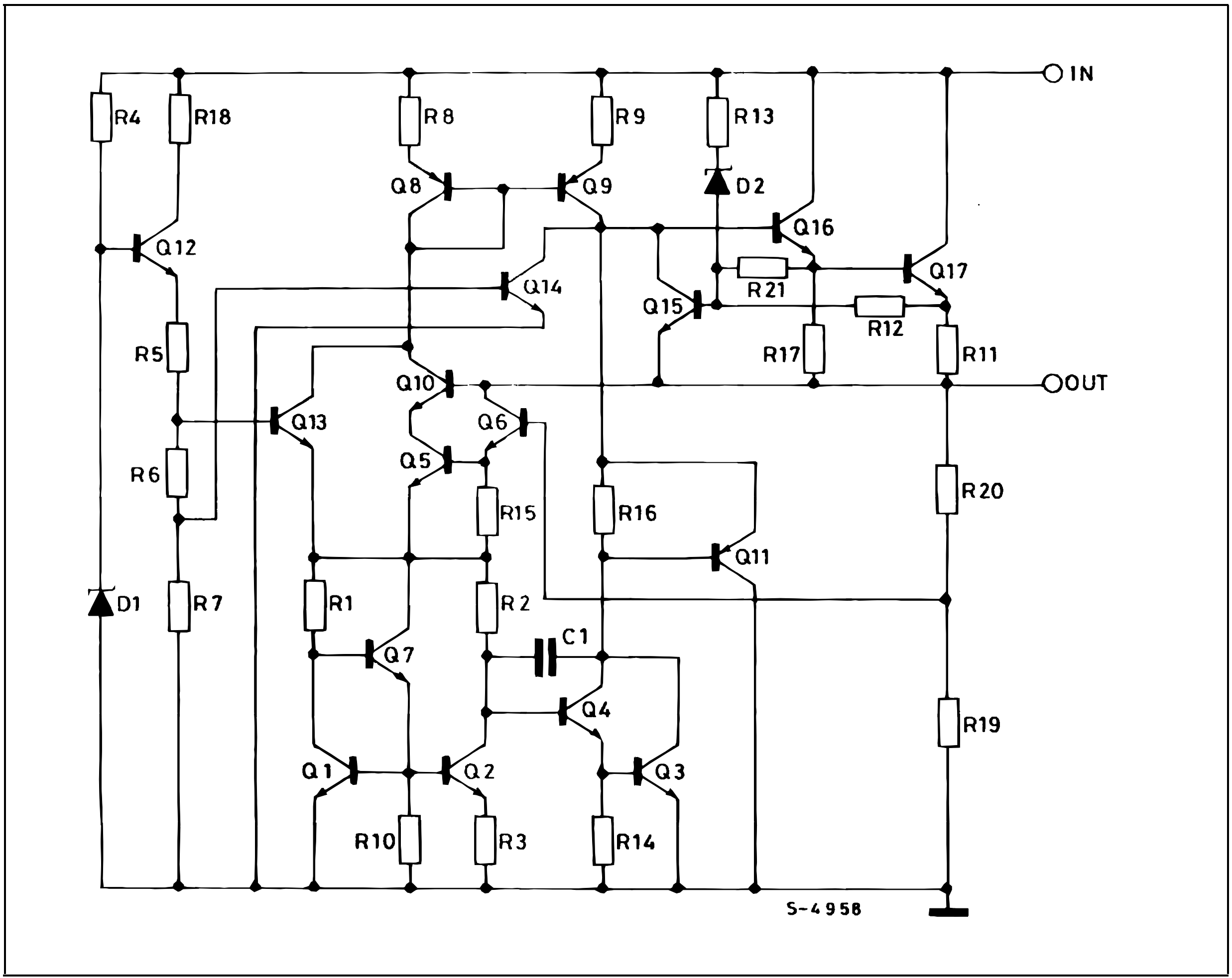
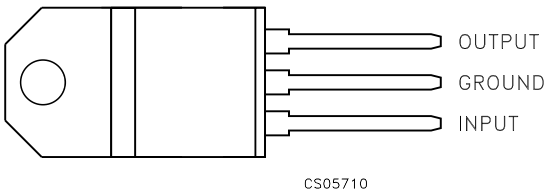
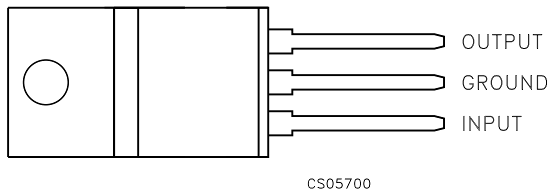


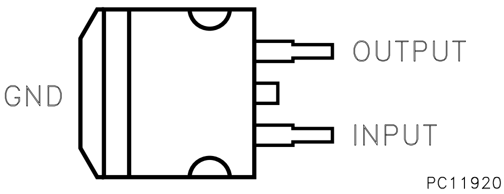
Figure 3: Connection Diagram (top view)



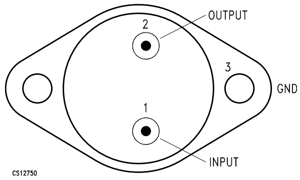
TO-220 (Any Type)



TO-220FP/TO-220FM



D^{2}PAK (Any Type)



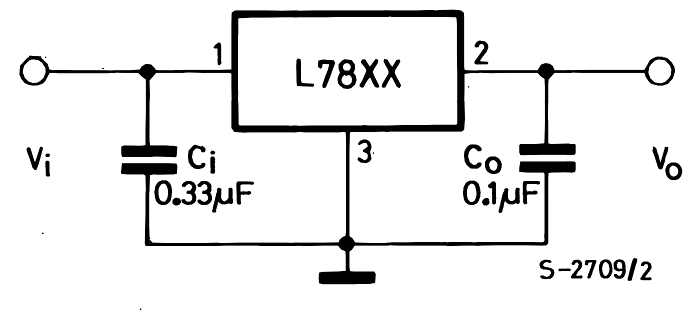
TO-3

Table 3: Order Codes

TYPE	TO-220 (A Type)	TO-220 (C Type)	TO-220 (E Type)	D^{2}PAK (A Type) (*)	D^{2}PAK (C Type) (T & R)	TO-220FP	TO-220FM	TO-3
L7805								L7805T
L7805C	L7805CV	L7805C-V	L7805CV1	L7805CD2T	L7805C-D2TR	L7805CP	L7805CF	L7805CT
L7852C	L7852CV			L7852CD2T		L7852CP	L7852CF	L7852CT
L7806								L7806T
L7806C	L7806CV	L7806C-V		L7806CD2T		L7806CP	L7806CF	L7806CT
L7808								L7808T
L7808C	L7808CV	L7808C-V		L7808CD2T		L7808CP	L7808CF	L7808CT
L7885C	L7885CV			L7885CD2T		L7885CP	L7885CF	L7885CT
L7809C	L7809CV	L7809C-V		L7809CD2T		L7809CP	L7809CF	L7809CT
L7810C	L7810CV			L7810CD2T		L7810CP		
L7812								L7812T
L7812C	L7812CV	L7812C-V		L7812CD2T		L7812CP	L7812CF	L7812CT
L7815								L7815T
L7815C	L7815CV	L7815C-V		L7815CD2T		L7815CP	L7815CF	L7815CT
L7818								L7818T
L7818C	L7818CV			L7818CD2T		L7818CP	L7818CF	L7818CT
L7820								L7820T
L7820C	L7820CV			L7820CD2T		L7820CP	L7820CF	L7820CT
L7824								L7824T
L7824C	L7824CV			L7824CD2T		L7824CP	L7824CF	L7824CT

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

Figure 4: Application Circuits



TEST CIRCUITS

Figure 5: DC Parameter

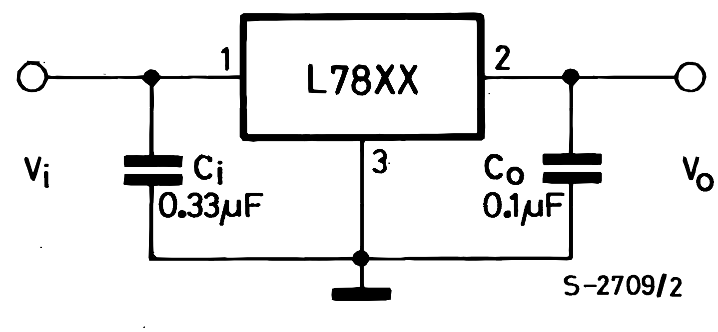


Figure 6: Load Regulation

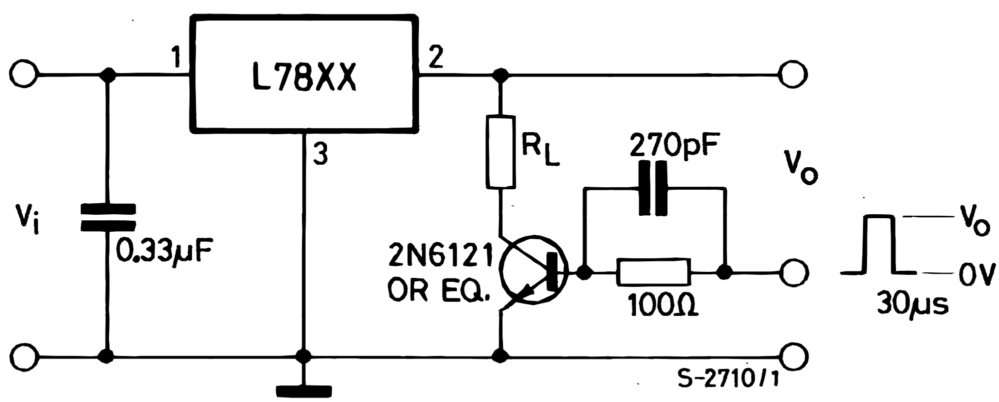


Figure 7: Ripple Rejection

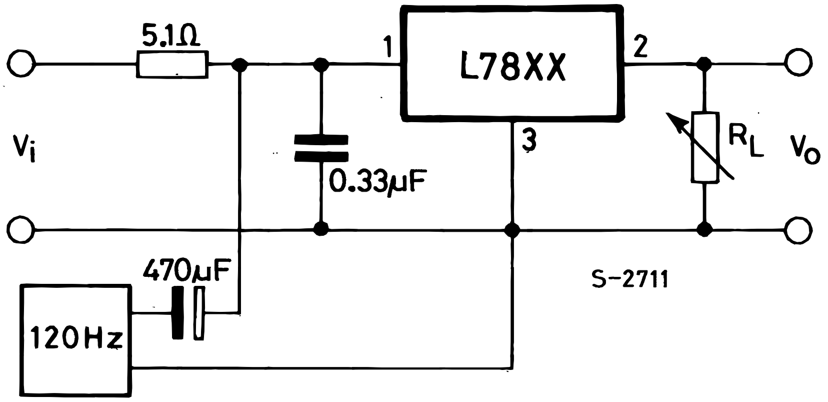


Table 4: Electrical Characteristics Of L7805 (refer to the test circuits, T_J = -55 to 150°C, V_I = 10V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

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.

Table 5: 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.

Table 6: 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.

Table 7: 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.

Table 8: 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.

Table 9: 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.

Table 10: 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.

Table 11: 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 ≤ 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.

Table 12: Electrical Characteristics Of L7805C (refer to the test circuits, T_J = 0 to 125°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 ≤ 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.

Table 13: Electrical Characteristics Of L7852C (refer to the test circuits, T_J = 0 to 125°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		µV/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.

Table 14: Electrical Characteristics Of L7806C (refer to the test circuits, T_J = 0 to 125°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		µV/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.

Table 15: Electrical Characteristics Of L7808C (refer to the test circuits, T_J = 0 to 125°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.

Table 16: Electrical Characteristics Of L7885C (refer to the test circuits, T_J = 0 to 125°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.

Table 17: Electrical Characteristics Of L7809C (refer to the test circuits, T_J = 0 to 125°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	8.64	9	9.36	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.

Table 18: Electrical Characteristics Of L7810C (refer to the test circuits, T_J = 0 to 125°C, V_I = 16V, 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	9.6	10	10.4	V
V_O	Output Voltage	I_O = 5 mA to 1 A $P_O \leq$ 15W V_I = 12.5 to 26 V	9.5	10	10.5	V
ΔV_O(*)	Line Regulation	V_I = 12.5 to 26 V T_J = 25°C			200	mV
		V_I = 13.5 to 19 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			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 12.5 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 = 13 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.

Table 19: Electrical Characteristics Of L7812C (refer to the test circuits, T_J = 0 to 125°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 V_I = 14.5 to 27 V	$P_O \leq$ 15W	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.

Table 20: Electrical Characteristics Of L7815C (refer to the test circuits, T_J = 0 to 125°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 V_I = 17.5 to 30 V	$P_O \leq$ 15W	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.

Table 21: Electrical Characteristics Of L7818C (refer to the test circuits, T_J = 0 to 125°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		$\mu V/V_O$
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.

Table 22: Electrical Characteristics Of L7820C (refer to the test circuits, T_J = 0 to 125°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		$\mu V/V_O$
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.

Table 23: Electrical Characteristics Of L7824C (refer to the test circuits, T_J = 0 to 125°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 8: Dropout Voltage vs Junction Temperature

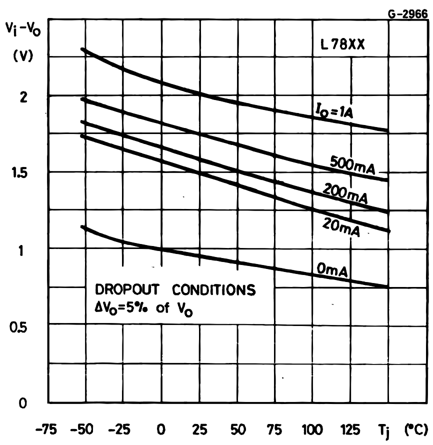


Figure 9: Peak Output Current vs Input/output Differential Voltage

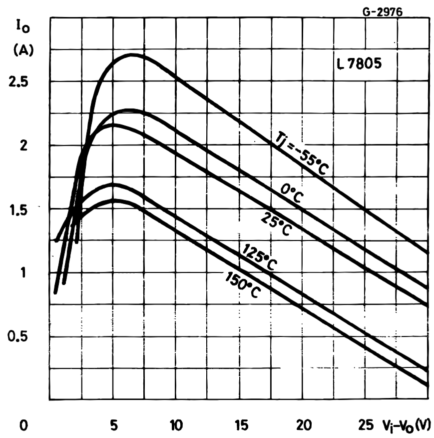


Figure 10: Supply Voltage Rejection vs Frequency

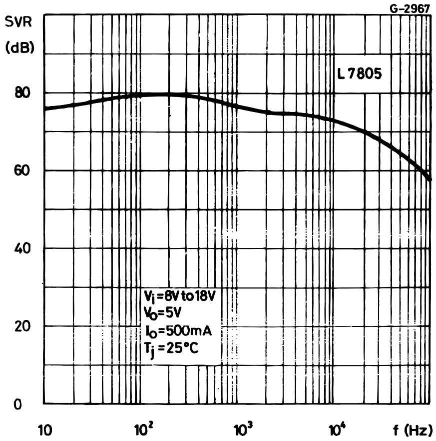


Figure 11: Output Voltage vs Junction Temperature

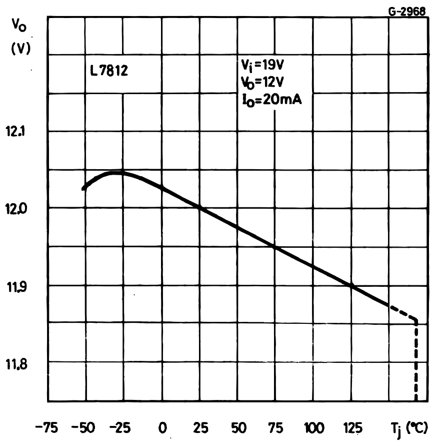


Figure 12: Output Impedance vs Frequency

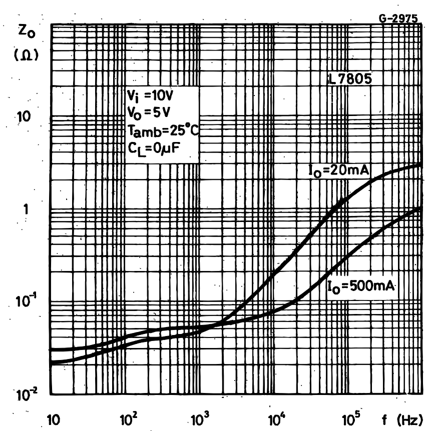


Figure 13: Quiescent Current vs Junction Temperature

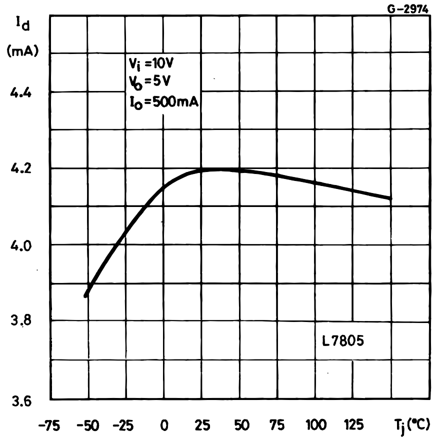


Figure 14: Load Transient Response

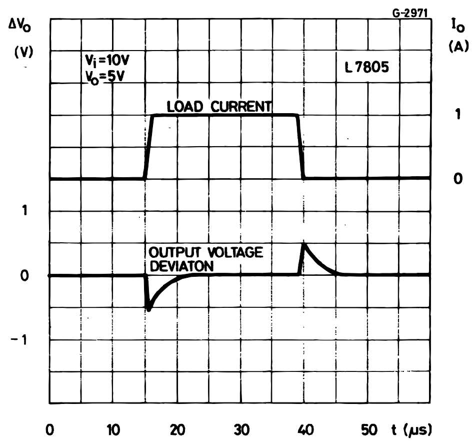


Figure 15: Line Transient Response

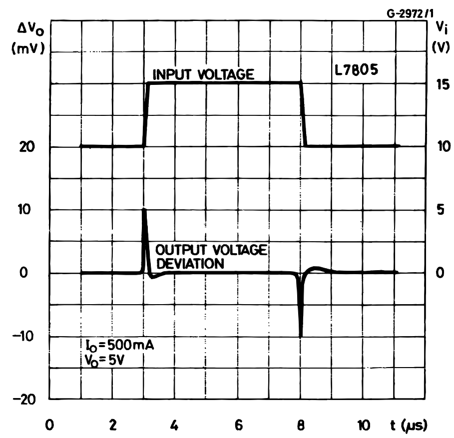


Figure 16: Quiescent Current vs Input Voltage

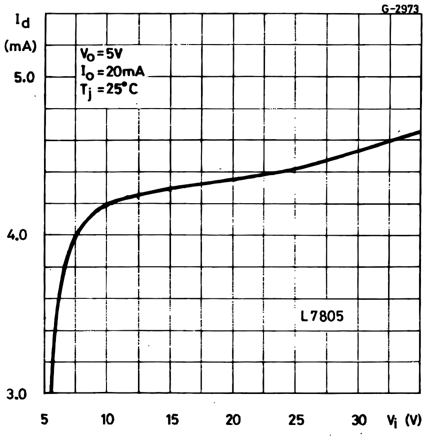
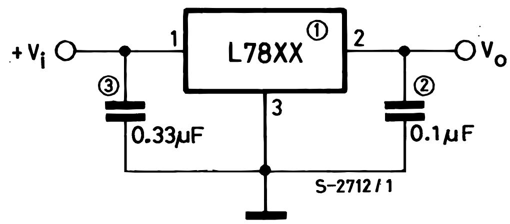
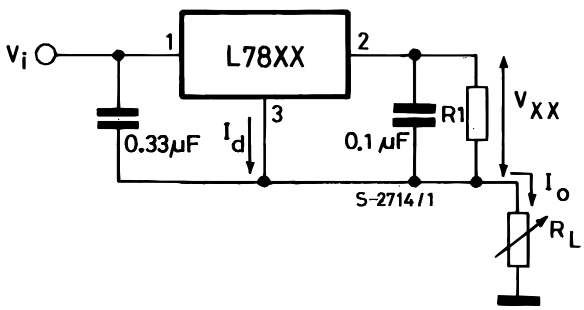


Figure 17: Fixed Output Regulator



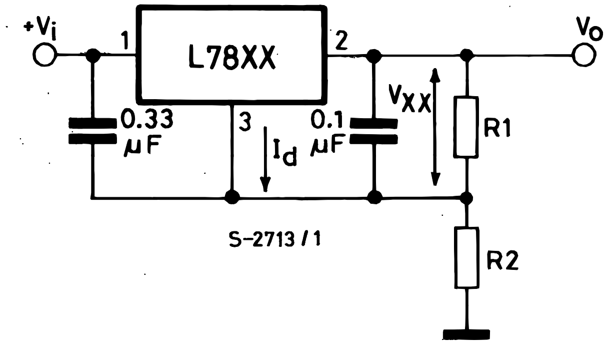
NOTE:
1. To specify an output voltage, substitute voltage value for "XX".
2. Although no output capacitor is need for stability, it does improve transient response.
3. Required if regulator is locate an appreciable distance from power supply filter.

Figure 18: Current Regulator



$$I_O = \frac{V_{xx}}{R_1} + I_d$$

Figure 19: Circuit for Increasing Output Voltage



$I_{R1} \geq 5\ Id$

$V_O = V_{XX}\,(1+\frac{R_2}{R_1}) + I_d\,R_2$

Figure 20: Adjustable Output Regulator (7 to 30V)

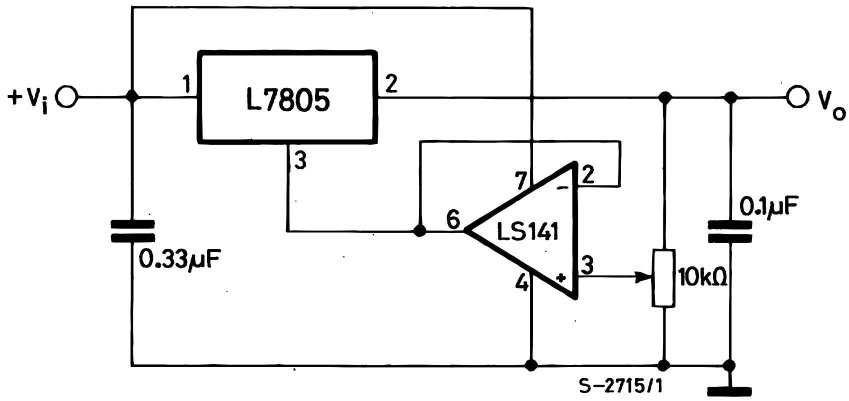
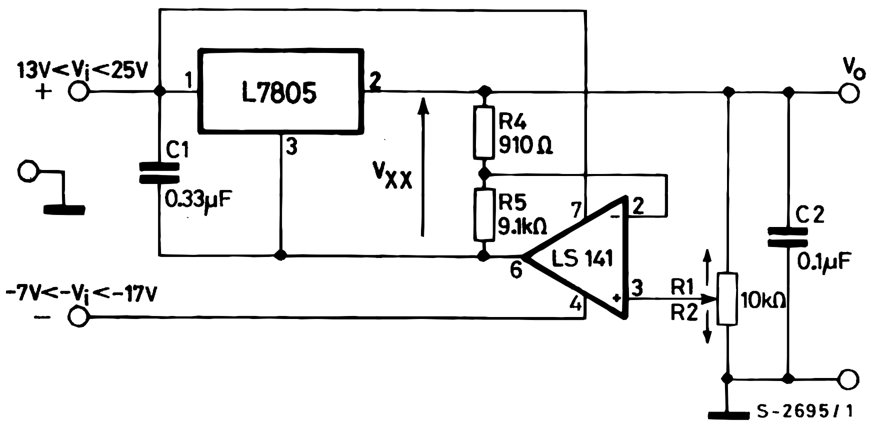


Figure 21: 0.5 to 10V Regulator



$V_O = V_{xx}\frac{R_4}{R_1}$

Figure 22: High Current Voltage Regulator

$$R_1 = \frac{V_{BEQ1}}{I_{REQ} - \frac{I_{Q1}}{\beta_{Q1}}}$$

$$I_O = I_{REG} + Q_1 (I_{REG} \frac{V_{BEQ1}}{R_1})$$

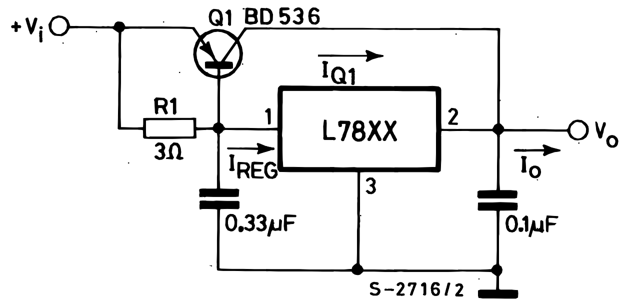


Figure 23: High Output Current with Short Circuit Protection

$$R_{SC} = \frac{V_{BEQ2}}{I_{SC}}$$

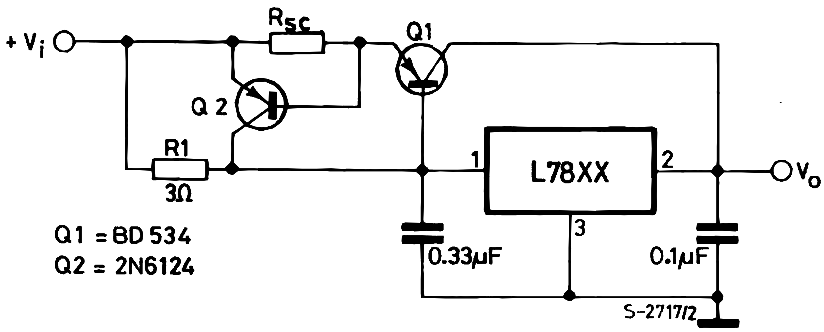


Figure 24: Tracking Voltage Regulator

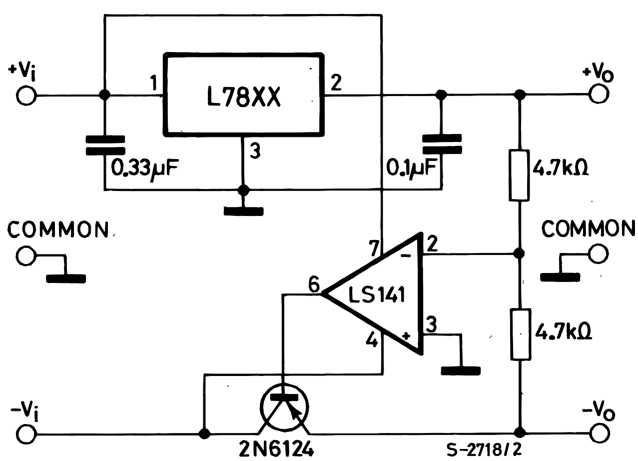
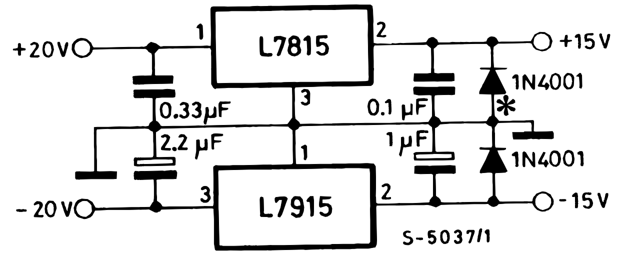


Figure 25: Split Power Supply (± 15V - 1 A)



* Against potential latch-up problems.

Figure 26: Negative Output Voltage Circuit

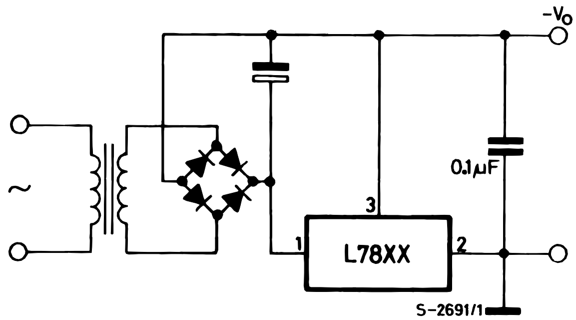


Figure 27: Switching Regulator

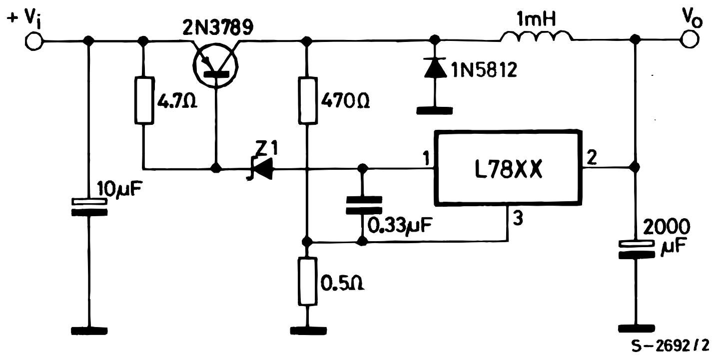
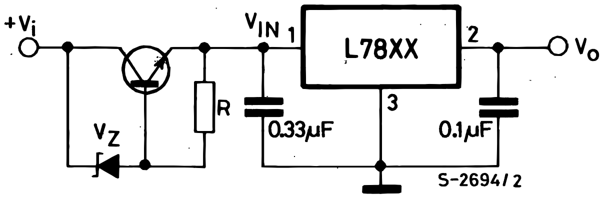


Figure 28: High Input Voltage Circuit



$V_{IN} = V_I - (V_Z + V_{BE})$

Figure 29: High Input Voltage Circuit

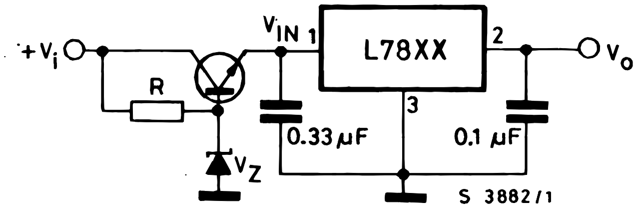


Figure 30: High Output Voltage Regulator

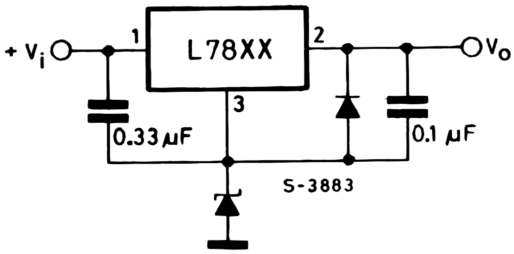
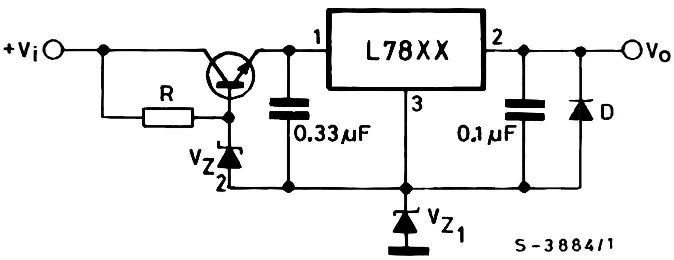


Figure 31: High Input and Output Voltage



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

Figure 32: Reducing Power Dissipation with Dropping Resistor

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

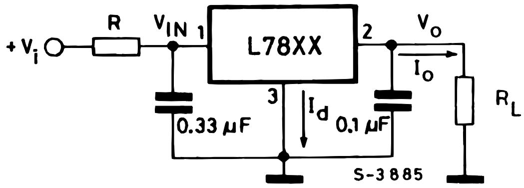


Figure 33: Remote Shutdown

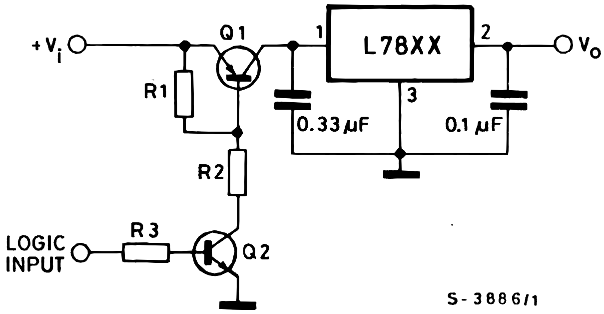
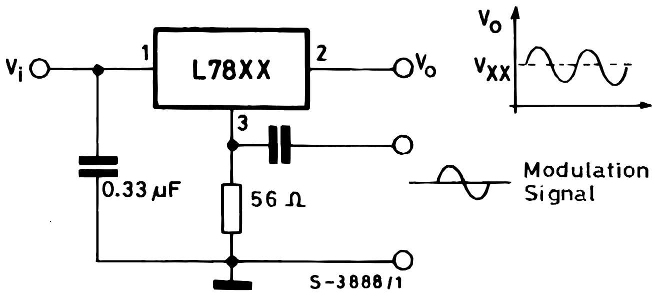
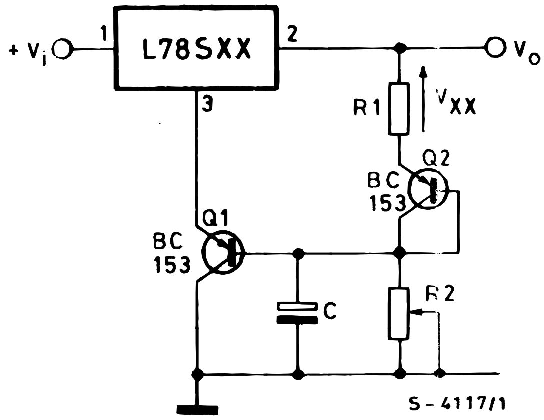


Figure 34: Power AM Modulator (unity voltage gain, $I_O \leq 0.5$)



NOTE: The circuit performs well up to 100 KHz.

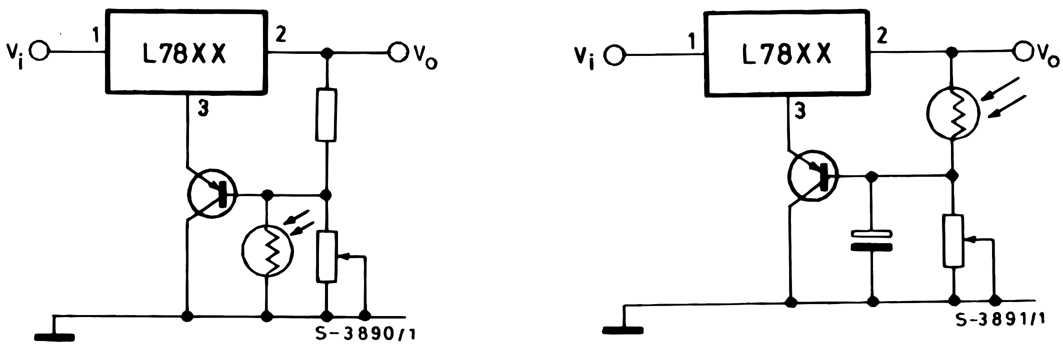
Figure 35: Adjustable Output Voltage with Temperature Compensation



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

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.

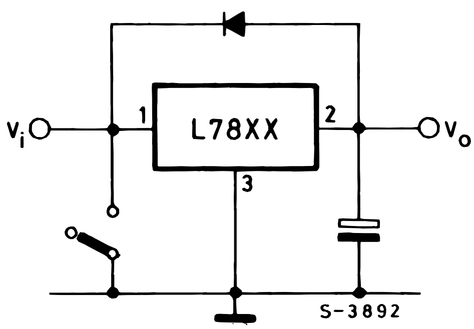
Figure 36: Light Controllers ($V_{Omin} = V_{XX} + V_{BE}$)



V_O falls when the light goes up

V_O rises when the light goes up

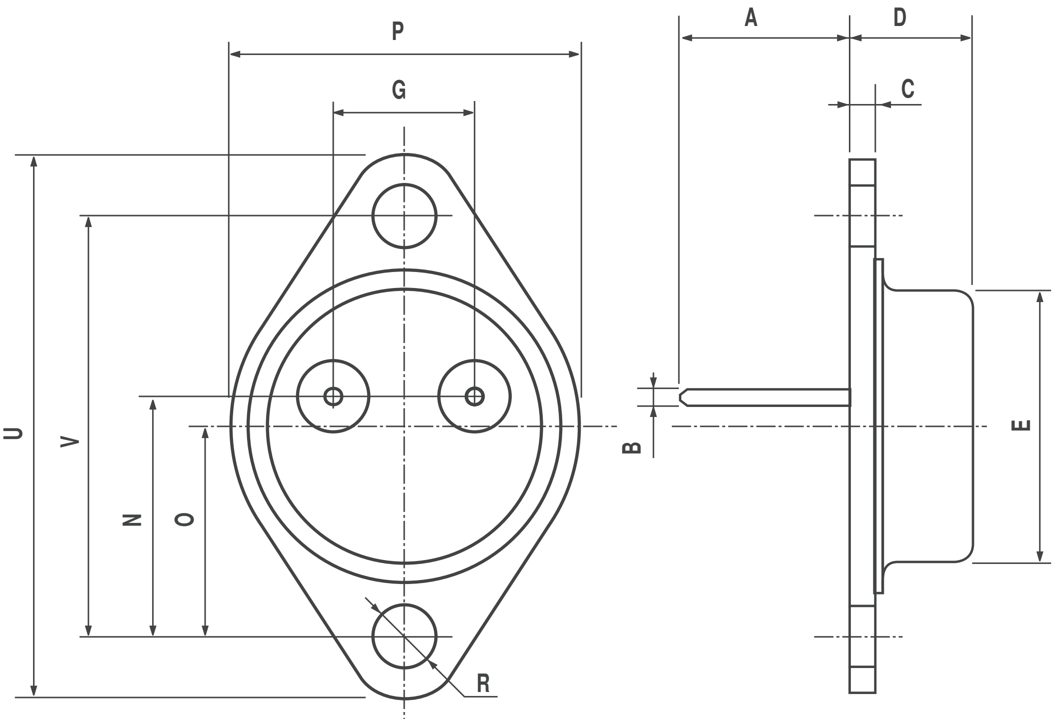
Figure 37: Protection against Input Short-Circuit with High Capacitance Loads



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

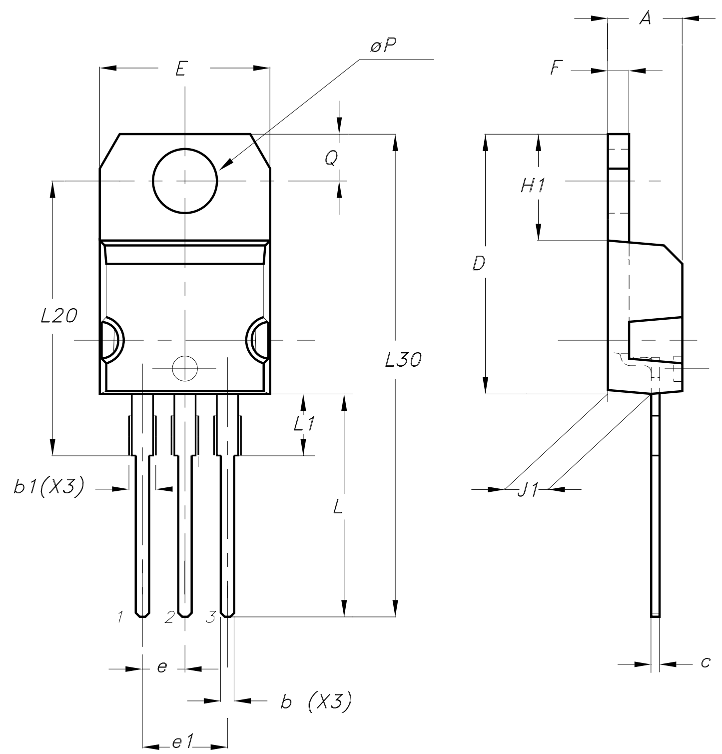
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A		11.85			0.466	
B	0.96	1.05	1.10	0.037	0.041	0.043
C			1.70			0.066
D			8.7			0.342
E			20.0			0.787
G		10.9			0.429	
N		16.9			0.665	
P			26.2			1.031
R	3.88		4.09	0.152		0.161
U			39.5			1.555
V		30.10			1.185	



P003C/C

TO-220 (A TYPE) MECHANICAL DATA

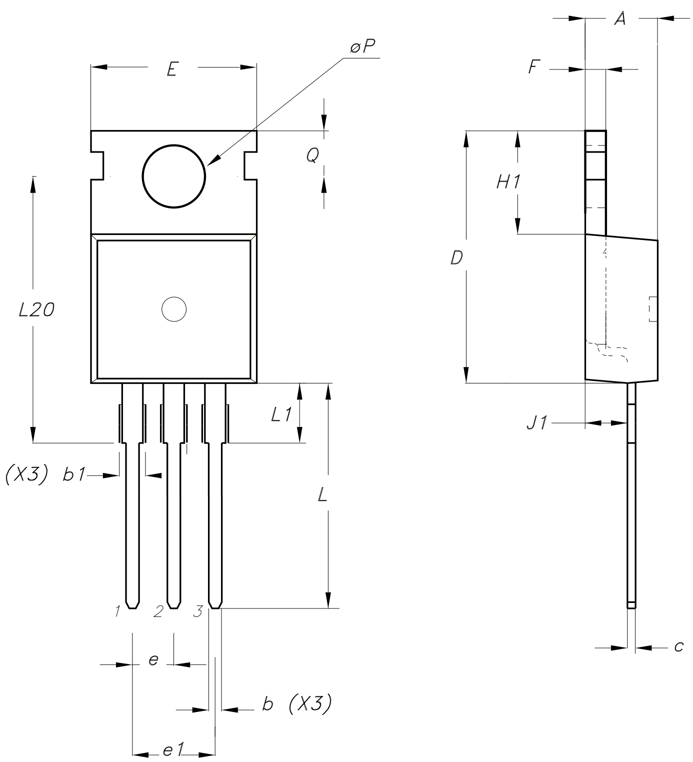
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.067
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.600		0.620
E	10.0		10.40	0.393		0.409
e	2.4		2.7	0.094		0.106
e1	4.95		5.15	0.194		0.203
F	1.23		1.32	0.048		0.051
H1	6.2		6.6	0.244		0.260
J1	2.40		2.72	0.094		0.107
L	13.0		14.0	0.511		0.551
L1	3.5		3.93	0.137		0.154
L20		16.4			0.645	
L30		28.9			1.138	
φP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



0015988/N

TO-220 (C TYPE) MECHANICAL DATA

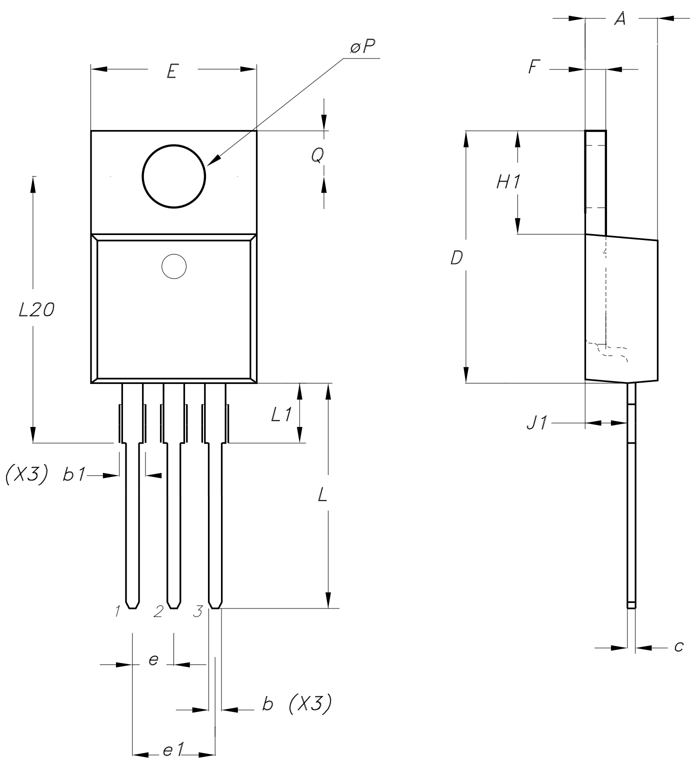
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.30		4.70	0.169		0.185
b	0.70		0.90	0.028		0.035
b1	1.42		1.62	0.056		0.064
c	0.45		0.60	0.018		0.024
D		15.70			0.618	
E	9.80		10.20	0.386		0.402
e		2.54			0.100	
e1		5.08			0.200	
F	1.25		1.39	0.049		0.055
H1		6.5			0.256	
J1	2.20		2.60	0.087		0.202
L	12.88		13.28	0.507		0.523
L1		3			0.118	
L20	15.70		16.1	0.618		0.634
L30		28.9			1.138	
φP	3.50		3.70	0.138		0.146
Q	2.70		2.90	0.106		0.114



0015988/N

TO-220 (E TYPE) MECHANICAL DATA

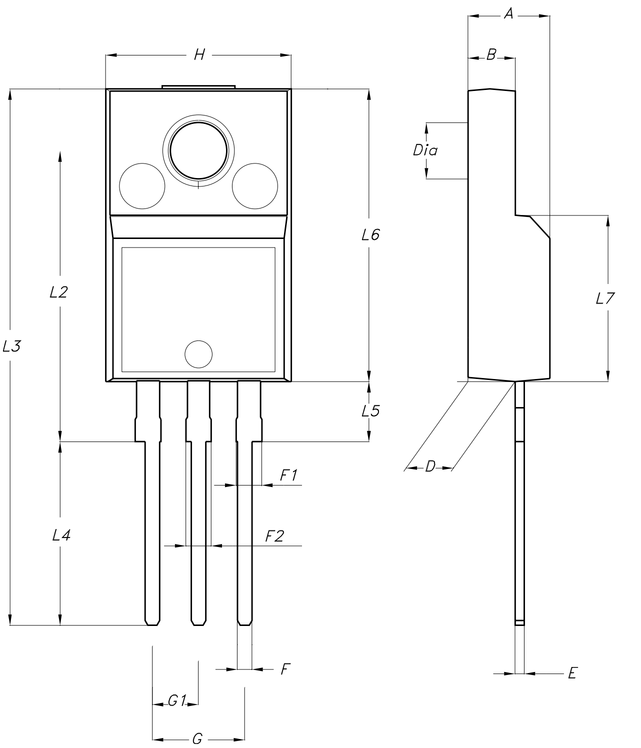
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.47		4.67	0.176		0.184
b	0.70		0.91	0.028		0.036
b1	1.17		1.37	0.046		0.054
c	0.31		0.53	0.012		0.021
D	14.60		15.70	0.575		0.618
E	9.96		10.36	0.392		0.408
e		2.54			0.100	
e1		5.08			0.200	
F	1.17		1.37	0.046		0.054
H1	6.1		6.8	0.240		0.268
J1	2.52		2.82	0.099		0.111
L	12.70		13.80	0.500		0.543
L1	3.20		3.96	0.126		0.156
L20	15.21		16.77	0.599		0.660
ϕP	3.73		3.94	0.147		0.155
Q	2.59		2.89	0.102		0.114



7655923/A

TO-220FP MECHANICAL DATA

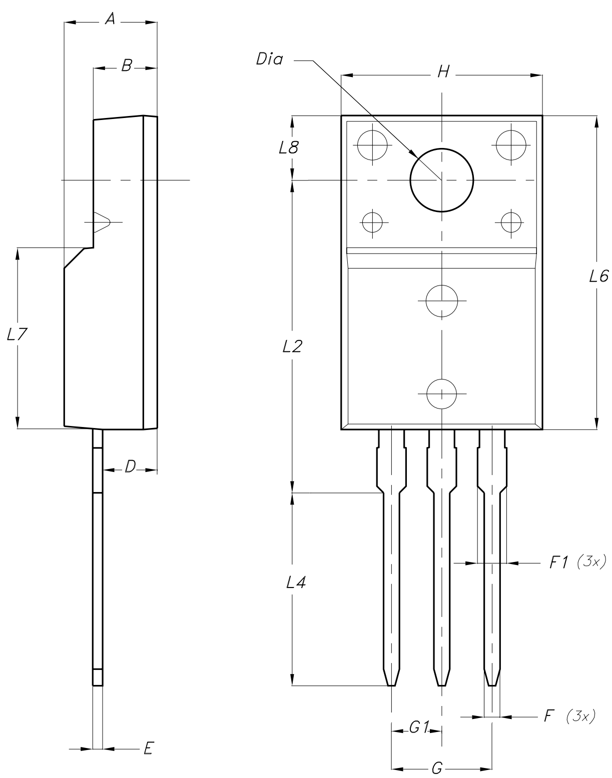
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.50	0.045		0.059
F2	1.15		1.50	0.045		0.059
G	4.95		5.2	0.194		0.204
G1	2.4		2.7	0.094		0.106
H	10.0		10.40	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L5	2.9		3.6	0.114		0.142
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



7012510A-H

TO-220FM MECHANICAL DATA

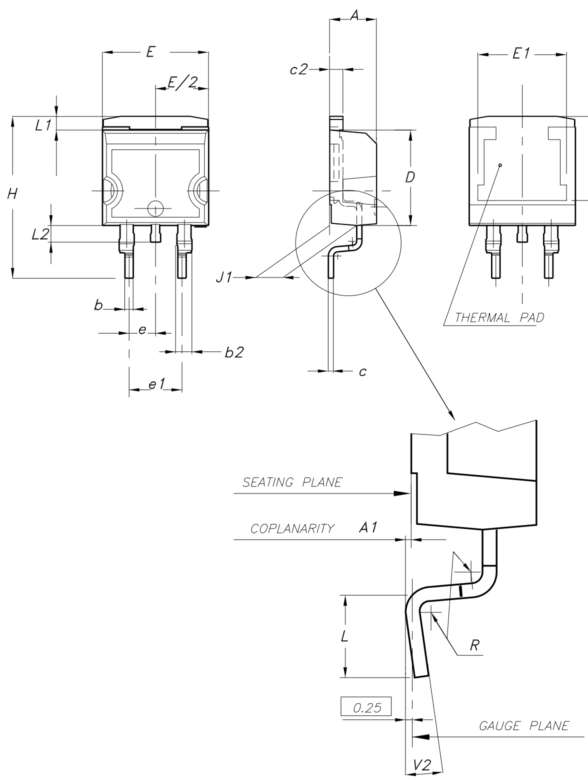
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.50		4.90	0.177		0.193
B	2.34		2.74	0.092		0.108
D	2.56		2.96	0.101		0.117
E	0.45	0.50	0.60	0.018	0.020	0.024
F	0.70		0.90	0.028		0.035
F1			1.47			0.058
G		5.08			0.200	
G1	2.34	2.54	2.74	0.092	0.100	0.108
H	9.96		10.36	0.392		0.408
L2		15.8			0.622	
L4	9.45		10.05	0.372		0.396
L6	15.67		16.07	0.617		0.633
L7	8.99		9.39	0.354		0.370
L8		3.30			0.130	
DIA.	3.08		3.28	0.121		0.129



7012510C-H

D^2PAK (A TYPE) MECHANICAL DATA

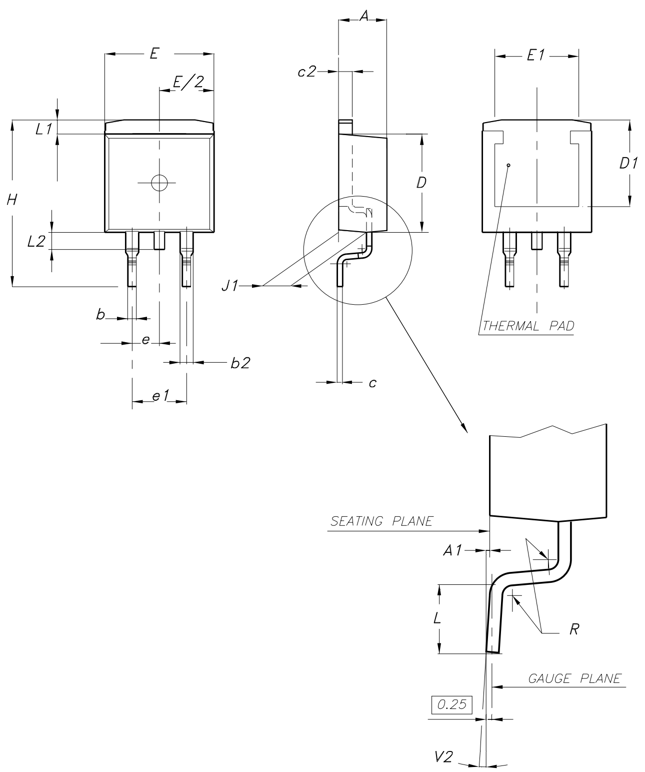
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	0.03		0.23	0.001		0.009
b	0.7		0.93	0.027		0.036
b2	1.14		1.7	0.044		0.067
c	0.45		0.6	0.017		0.023
c2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1	8			0.315		
E	10		10.4	0.393		0.409
E1	8.5			0.335		
e		2.54			0.100	
e1	4.88		5.28	0.192		0.208
H	15		15.85	0.590		0.624
J1	2.49		2.69	0.098		0.106
L	2.29		2.79	0.090		0.110
L1	1.27		1.4	0.050		0.055
L2	1.3		1.75	0.051		0.069
R		0.4			0.016	
V2	0°		8°	0°		8°



0079457/J

D²PAK (C TYPE) MECHANICAL DATA

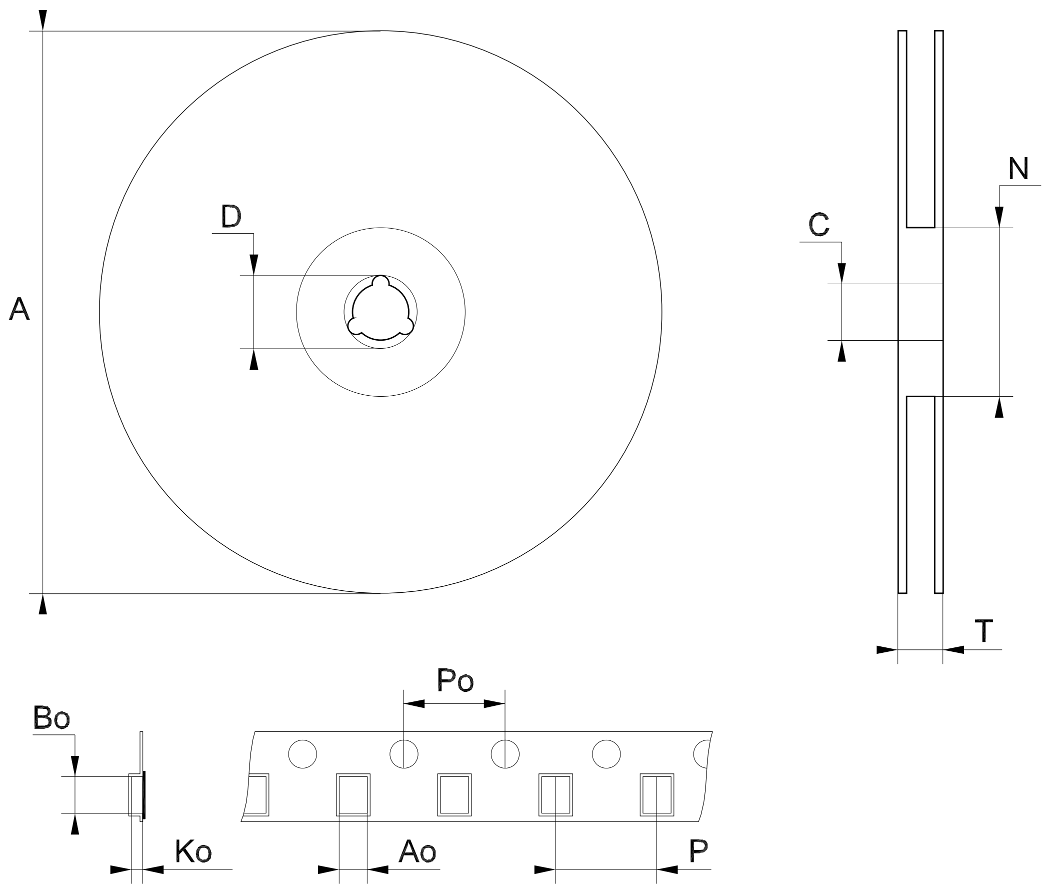
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.3		4.7	0.169		0.185
A1	0		0.20	0.000		0.008
b	0.70		0.90	0.028		0.035
b2	1.17		1.37	0.046		0.054
c	0.45	0.50	0.6	0.018	0.020	0.024
c2	1.25	1.30	1.40	0.049	0.051	0.055
D	9.0	9.2	9.4	0.354	0.362	0.370
D1	7.5			0.295		
E	9.8		10.2	0.386		0.402
E1	7.5			0.295		
e		2.54			0.100	
e1		5.08			0.200	
H	15	15.30	15.60	0.591	0.602	0.614
J1	2.20		2.60	0.087		0.102
L	1.79		2.79	0.070		0.110
L1	1.0		1.4	0.039		0.055
L2	1.2		1.6	0.047		0.063
R		0.3			0.012	
V2	0°		3°	0°		3°



0079457/J

Tape & Reel D²PAK-P²PAK-D²PAK/A-P²PAK/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

Table 24: Revision History

Date	Revision	Description of Changes
09-Nov-2004	12	Add New Part Number.