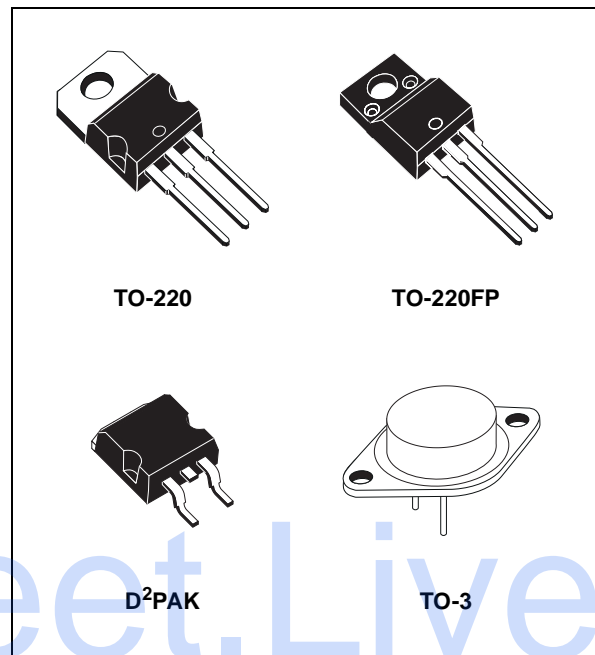


## POSITIVE VOLTAGE REGULATORS

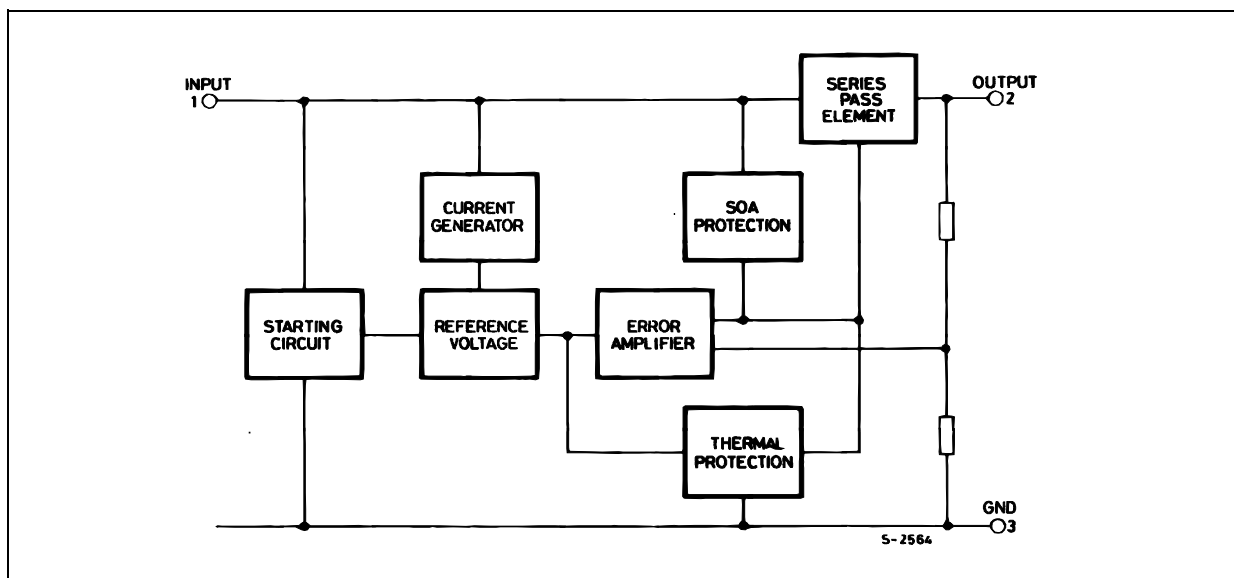
- OUTPUT CURRENT TO 1.5A
- OUTPUT VOLTAGES OF 5; 5.2; 6; 8; 8.5; 9; 12; 15; 18; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION

### DESCRIPTION

The L7800 series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-3 and D<sup>2</sup>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.



### SCHEMATIC DIAGRAM



## L7800 SERIES

### ABSOLUTE MAXIMUM RATINGS

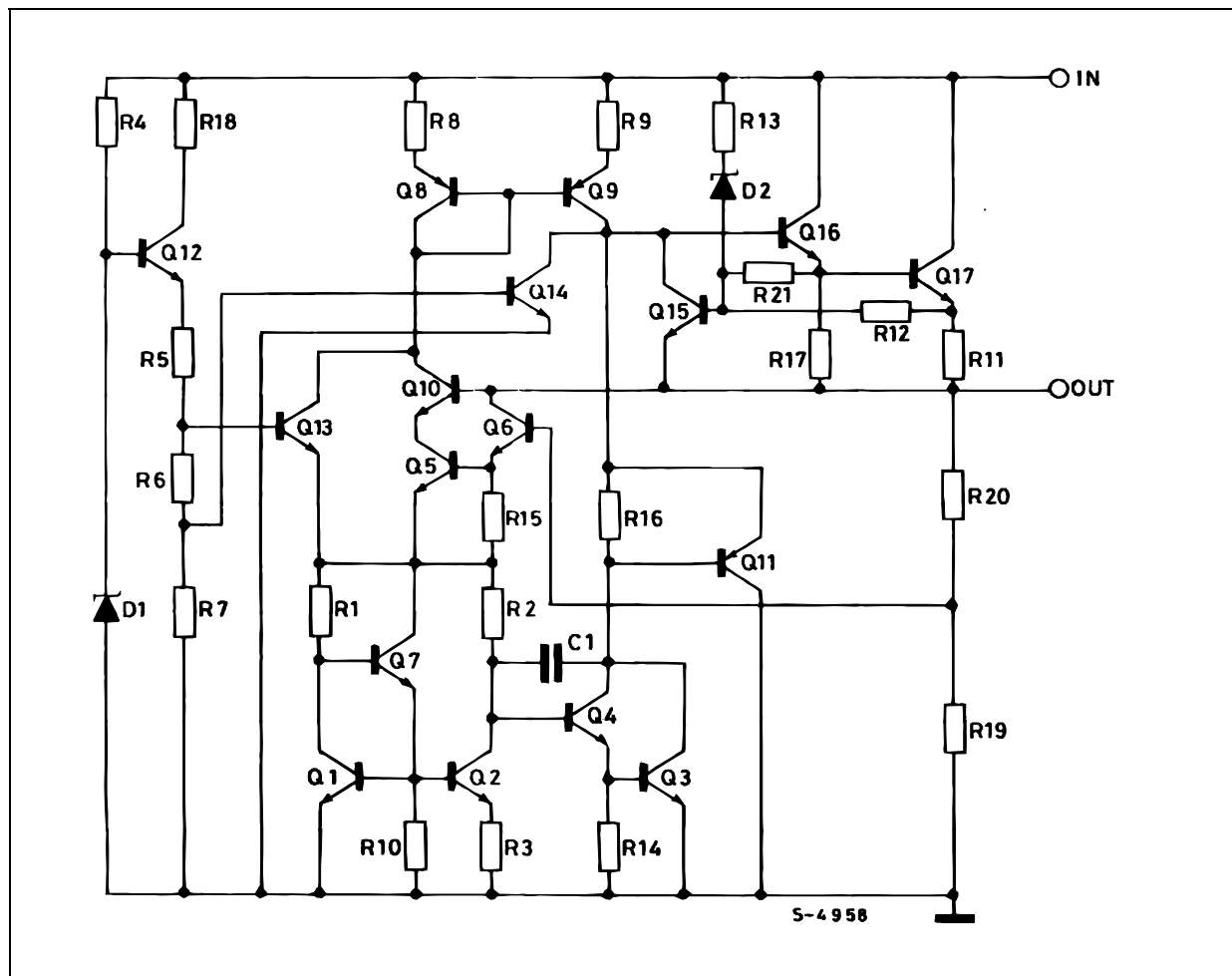
Symbol	Parameter <sup>2</sup>		Value	Unit
$V_I$	DC Input Voltage	for $V_O= 5$ to $18V$	35	V
		for $V_O= 20, 24V$	40	
$I_O$	Output Current		Internally Limited	
$P_{tot}$	Power Dissipation		Internally Limited	
$T_{stg}$	Storage Temperature Range		-65 to 150	°C
$T_{op}$	Operating Junction Temperature Range	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.

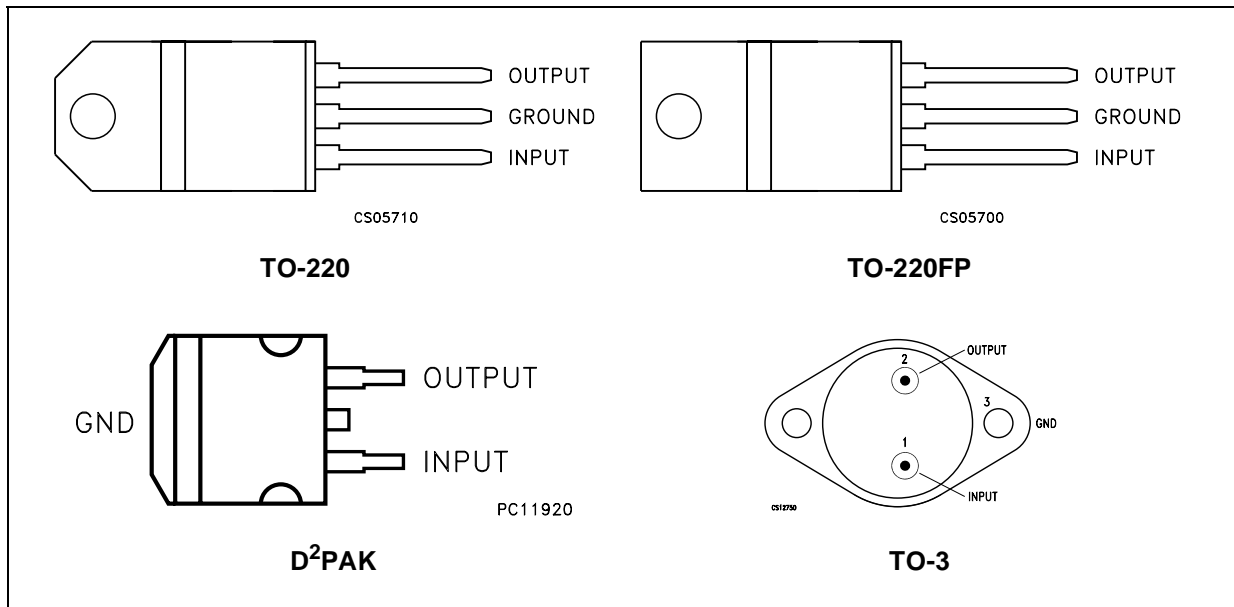
### THERMAL DATA

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

### SCHEMATIC DIAGRAM



CONNECTION DIAGRAM (top view)



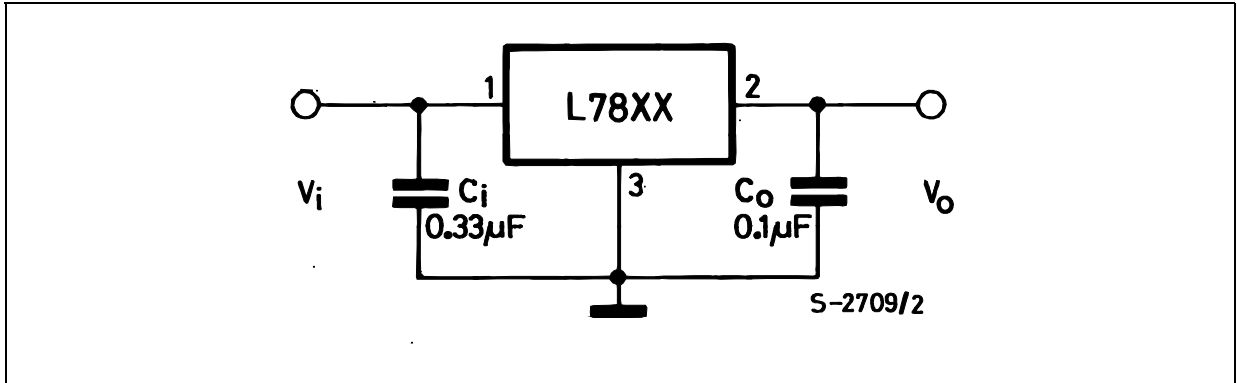
ORDERING CODES

TYPE	TO-220	D <sup>2</sup> PAK (*)	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".

# L7800 SERIES

## APPLICATION CIRCUITS



## TEST CIRCUITS

Figure 1 : DC Parameter

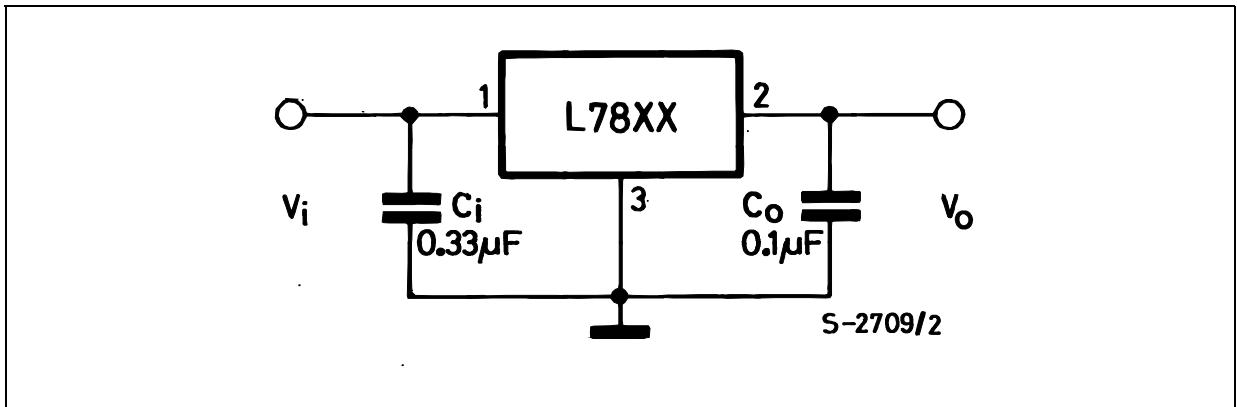


Figure 2 : Load Regulation

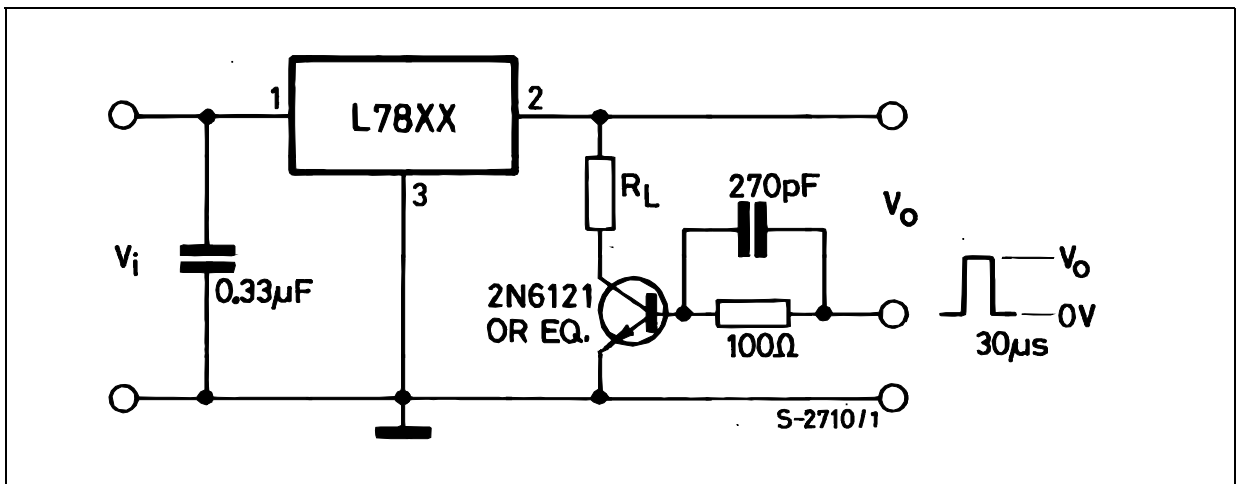
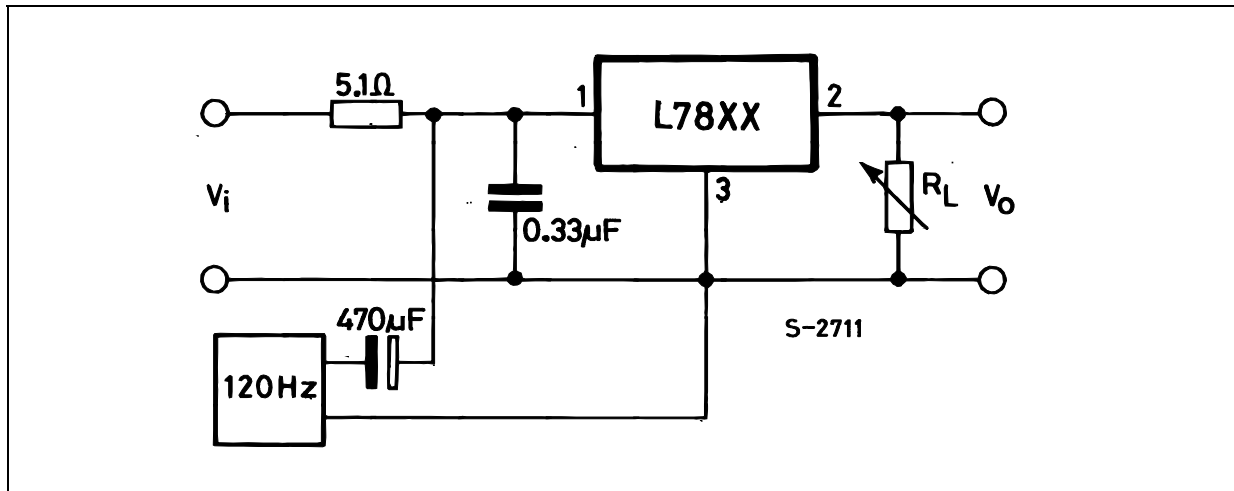


Figure 3 : Ripple Rejection



**ELECTRICAL CHARACTERISTICS OF L7805** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 10\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\ \mu\text{F}$ ,  $C_O = 0.1\ \mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	4.8	5	5.2	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to } 1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 8\text{ to } 20\text{ V}$	4.65	5	5.35	V
$\Delta V_O$ (*)	Line Regulation	$V_I = 7\text{ to } 25\text{ V}$ $T_J = 25^\circ\text{C}$		3	50	mV
		$V_I = 8\text{ to } 12\text{ V}$ $T_J = 25^\circ\text{C}$		1	25	
$\Delta V_O$ (*)	Load Regulation	$I_O = 5\text{ mA to } 1.5\text{ A}$ $T_J = 25^\circ\text{C}$			100	mV
		$I_O = 250\text{ to } 750\text{ mA}$ $T_J = 25^\circ\text{C}$			25	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to } 1\text{ A}$			0.5	mA
		$V_I = 8\text{ to } 25\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		0.6		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to } 100\text{KHz}$ $T_J = 25^\circ\text{C}$			40	$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 8\text{ to } 18\text{ V}$ $f = 120\text{Hz}$	68			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2	2.5	V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		17		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.75	1.2	A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$	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.

## L7800 SERIES

**ELECTRICAL CHARACTERISTICS OF L7806** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 11\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	5.75	6	6.25	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 9\text{ to }21\text{ V}$	5.65	6	6.35	V
$\Delta V_O(^*)$	Line Regulation	$V_I = 8\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$			60	mV
		$V_I = 9\text{ to }13\text{ V}$ $T_J = 25^\circ\text{C}$			30	
$\Delta V_O(^*)$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			100	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			30	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 9\text{ to }25\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		0.7		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$			40	$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 9\text{ to }19\text{ V}$ $f = 120\text{Hz}$	65			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2	2.5	V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		19		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.75	1.2	A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$	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  $150^\circ\text{C}$ ,  $V_I = 14\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	7.7	8	8.3	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 11.5\text{ to }23\text{ V}$	7.6	8	8.4	V
$\Delta V_O(^*)$	Line Regulation	$V_I = 10.5\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$			80	mV
		$V_I = 11\text{ to }17\text{ V}$ $T_J = 25^\circ\text{C}$			40	
$\Delta V_O(^*)$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			100	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			40	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 11.5\text{ to }25\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		1		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$			40	$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 11.5\text{ to }21.5\text{ V}$ $f = 120\text{Hz}$	62			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2	2.5	V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		16		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.75	1.2	A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$	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  $150^\circ\text{C}$ ,  $V_I = 19\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	11.5	12	12.5	V
$V_O$	Output Voltage	$I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 15.5$ to 27 V	11.4	12	12.6	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 14.5$ to 30 V $T_J = 25^\circ\text{C}$			120	mV
		$V_I = 16$ to 22 V $T_J = 25^\circ\text{C}$			60	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$			100	mV
		$I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$			60	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$			40	$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 15$ to 25 V $f = 120\text{Hz}$	61			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2	2.5	V
$R_O$	Output Resistance	$f = 1$ KHz		18		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.75	1.2	A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$	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  $150^\circ\text{C}$ ,  $V_I = 23\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	14.4	15	15.6	V
$V_O$	Output Voltage	$I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 18.5$ to 30 V	14.25	15	15.75	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 17.5$ to 30 V $T_J = 25^\circ\text{C}$			150	mV
		$V_I = 20$ to 26 V $T_J = 25^\circ\text{C}$			75	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$			150	mV
		$I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$			75	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$			40	$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 18.5$ to 28.5 V $f = 120\text{Hz}$	60			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2	2.5	V
$R_O$	Output Resistance	$f = 1$ KHz		19		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.75	1.2	A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$	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.

## L7800 SERIES

**ELECTRICAL CHARACTERISTICS OF L7818** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 26\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	17.3	18	18.7	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 22\text{ to }33\text{ V}$	17.1	18	18.9	V
$\Delta V_O(^*)$	Line Regulation	$V_I = 21\text{ to }33\text{ V}$ $T_J = 25^\circ\text{C}$			180	mV
		$V_I = 24\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$			90	
$\Delta V_O(^*)$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			180	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			90	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 22\text{ to }33\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		2.3		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$			40	$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 22\text{ to }32\text{ V}$ $f = 120\text{Hz}$	59			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2	2.5	V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		22		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.75	1.2	A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$	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  $150^\circ\text{C}$ ,  $V_I = 28\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	19.2	20	20.8	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 24\text{ to }35\text{ V}$	19	20	21	V
$\Delta V_O(^*)$	Line Regulation	$V_I = 22.5\text{ to }35\text{ V}$ $T_J = 25^\circ\text{C}$			200	mV
		$V_I = 26\text{ to }32\text{ V}$ $T_J = 25^\circ\text{C}$			100	
$\Delta V_O(^*)$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			200	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			100	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 24\text{ to }35\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		2.5		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$			40	$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 24\text{ to }35\text{ V}$ $f = 120\text{Hz}$	58			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2	2.5	V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		24		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.75	1.2	A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$	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  $150^\circ\text{C}$ ,  $V_I = 33\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	23	24	25	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 28\text{ to }38\text{ V}$	22.8	24	25.2	V
$\Delta V_O(^*)$	Line Regulation	$V_I = 27\text{ to }38\text{ V}$ $T_J = 25^\circ\text{C}$			240	mV
		$V_I = 30\text{ to }36\text{ V}$ $T_J = 25^\circ\text{C}$			120	
$\Delta V_O(^*)$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			240	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			120	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 28\text{ to }38\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		3		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$			40	$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 28\text{ to }38\text{ V}$ $f = 120\text{Hz}$	56			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2	2.5	V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		28		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.75	1.2	A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$	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  $150^\circ\text{C}$ ,  $V_I = 10\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	4.8	5	5.2	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 7\text{ to }20\text{ V}$	4.75	5	5.25	V
$\Delta V_O(^*)$	Line Regulation	$V_I = 7\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$		3	100	mV
		$V_I = 8\text{ to }12\text{ V}$ $T_J = 25^\circ\text{C}$		1	50	
$\Delta V_O(^*)$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			100	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			50	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 7\text{ to }25\text{ V}$			0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-1.1		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		40		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 8\text{ to }18\text{ V}$ $f = 120\text{Hz}$	62			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		17		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.75		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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.

## L7800 SERIES

**ELECTRICAL CHARACTERISTICS OF L7852C** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 10\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	5.0	5.2	5.4	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 8\text{ to }20\text{ V}$	4.95	5.2	5.45	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 7\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$		3	105	mV
		$V_I = 8\text{ to }12\text{ V}$ $T_J = 25^\circ\text{C}$		1	52	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			105	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			52	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 7\text{ to }25\text{ V}$			1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-1		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		42		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 8\text{ to }18\text{ V}$ $f = 120\text{Hz}$	61			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		17		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.75		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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  $150^\circ\text{C}$ ,  $V_I = 11\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	5.75	6	6.25	V
$V_O$	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 8\text{ to }21\text{ V}$	5.7	6	6.3	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 8\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$			120	mV
		$V_I = 9\text{ to }13\text{ V}$ $T_J = 25^\circ\text{C}$			60	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			120	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			60	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 8\text{ to }25\text{ V}$			1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-0.8		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		45		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 9\text{ to }19\text{ V}$ $f = 120\text{Hz}$	59			dB
$V_d$	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1\text{ KHz}$		19		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		0.55		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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  $150^\circ\text{C}$ ,  $V_I = 14\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	7.7	8	8.3	V
$V_O$	Output Voltage	$I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 10.5$ to 25 V	7.6	8	8.4	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 10.5$ to 25 V $T_J = 25^\circ\text{C}$			160	mV
		$V_I = 11$ to 17 V $T_J = 25^\circ\text{C}$			80	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$			160	mV
		$I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$			80	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$		52		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 11.5$ to 21.5 V $f = 120\text{Hz}$	56			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1$ KHz		16		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.45		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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  $150^\circ\text{C}$ ,  $V_I = 14.5\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	8.2	8.5	8.8	V
$V_O$	Output Voltage	$I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 11$ to 26 V	8.1	8.5	8.9	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 11$ to 27 V $T_J = 25^\circ\text{C}$			160	mV
		$V_I = 11.5$ to 17.5 V $T_J = 25^\circ\text{C}$			80	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$			160	mV
		$I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$			80	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$		55		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 12$ to 22 V $f = 120\text{Hz}$	56			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1$ KHz		16		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.45		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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.

## L7800 SERIES

**ELECTRICAL CHARACTERISTICS OF L7809C** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 15\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	8.65	9	9.35	V
$V_O$	Output Voltage	$I_O = 5$ mA to $1$ A $P_O \leq 15\text{W}$ $V_I = 11.5$ to $26$ V	8.55	9	9.45	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 11.5$ to $26$ V $T_J = 25^\circ\text{C}$			180	mV
		$V_I = 12$ to $18$ V $T_J = 25^\circ\text{C}$			90	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to $1.5$ A $T_J = 25^\circ\text{C}$			180	mV
		$I_O = 250$ to $750$ mA $T_J = 25^\circ\text{C}$			90	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz}$ to $100\text{KHz}$ $T_J = 25^\circ\text{C}$		70		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 12$ to $23$ V $f = 120\text{Hz}$	55			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1$ KHz		17		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.40		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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  $150^\circ\text{C}$ ,  $V_I = 19\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	11.5	12	12.5	V
$V_O$	Output Voltage	$I_O = 5$ mA to $1$ A $P_O \leq 15\text{W}$ $V_I = 14.5$ to $27$ V	11.4	12	12.6	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 14.5$ to $30$ V $T_J = 25^\circ\text{C}$			240	mV
		$V_I = 16$ to $22$ V $T_J = 25^\circ\text{C}$			120	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to $1.5$ A $T_J = 25^\circ\text{C}$			240	mV
		$I_O = 250$ to $750$ mA $T_J = 25^\circ\text{C}$			120	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz}$ to $100\text{KHz}$ $T_J = 25^\circ\text{C}$		75		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 15$ to $25$ V $f = 120\text{Hz}$	55			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1$ KHz		18		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.35		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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  $150^\circ\text{C}$ ,  $V_I = 23\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	14.5	15	15.6	V
$V_O$	Output Voltage	$I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 17.5$ to 30 V	14.25	15	15.75	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 17.5$ to 30 V $T_J = 25^\circ\text{C}$			300	mV
		$V_I = 20$ to 26 V $T_J = 25^\circ\text{C}$			150	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$			300	mV
		$I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$			150	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$		90		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 18.5$ to 28.5 V $f = 120\text{Hz}$	54			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1$ KHz		19		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.23		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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  $150^\circ\text{C}$ ,  $V_I = 26\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	17.3	18	18.7	V
$V_O$	Output Voltage	$I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 21$ to 33 V	17.1	18	18.9	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 21$ to 33 V $T_J = 25^\circ\text{C}$			360	mV
		$V_I = 24$ to 30 V $T_J = 25^\circ\text{C}$			180	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$			360	mV
		$I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$			180	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$		110		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 22$ to 32 V $f = 120\text{Hz}$	53			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1$ KHz		22		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.20		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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.

## L7800 SERIES

**ELECTRICAL CHARACTERISTICS OF L7820C** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 28\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	19.2	20	20.8	V
$V_O$	Output Voltage	$I_O = 5$ mA to $1$ A $P_O \leq 15\text{W}$ $V_I = 23$ to $35$ V	19	20	21	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 22.5$ to $35$ V $T_J = 25^\circ\text{C}$			400	mV
		$V_I = 26$ to $32$ V $T_J = 25^\circ\text{C}$			200	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to $1.5$ A $T_J = 25^\circ\text{C}$			400	mV
		$I_O = 250$ to $750$ mA $T_J = 25^\circ\text{C}$			200	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz}$ to $100\text{KHz}$ $T_J = 25^\circ\text{C}$		150		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 24$ to $35$ V $f = 120\text{Hz}$	52			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1$ KHz		24		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.18		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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  $150^\circ\text{C}$ ,  $V_I = 33\text{V}$ ,  $I_O = 500$  mA,  $C_I = 0.33$   $\mu\text{F}$ ,  $C_O = 0.1$   $\mu\text{F}$  unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = 25^\circ\text{C}$	23	24	25	V
$V_O$	Output Voltage	$I_O = 5$ mA to $1$ A $P_O \leq 15\text{W}$ $V_I = 27$ to $38$ V	22.8	24	25.2	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 27$ to $38$ V $T_J = 25^\circ\text{C}$			480	mV
		$V_I = 30$ to $36$ V $T_J = 25^\circ\text{C}$			240	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5$ mA to $1.5$ A $T_J = 25^\circ\text{C}$			480	mV
		$I_O = 250$ to $750$ mA $T_J = 25^\circ\text{C}$			240	
$I_d$	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
$\Delta I_d$	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/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz}$ to $100\text{KHz}$ $T_J = 25^\circ\text{C}$		170		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 28$ to $38$ V $f = 120\text{Hz}$	50			dB
$V_d$	Dropout Voltage	$I_O = 1$ A $T_J = 25^\circ\text{C}$		2		V
$R_O$	Output Resistance	$f = 1$ KHz		28		m $\Omega$
$I_{sc}$	Short Circuit Current	$V_I = 35$ V $T_J = 25^\circ\text{C}$		0.15		A
$I_{scp}$	Short Circuit Peak Current	$T_J = 25^\circ\text{C}$		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

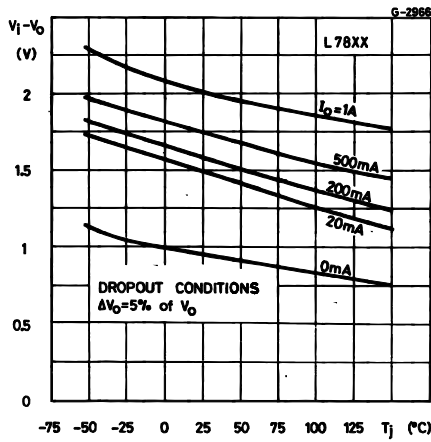


Figure 7 : Output Voltage vs Junction Temperature

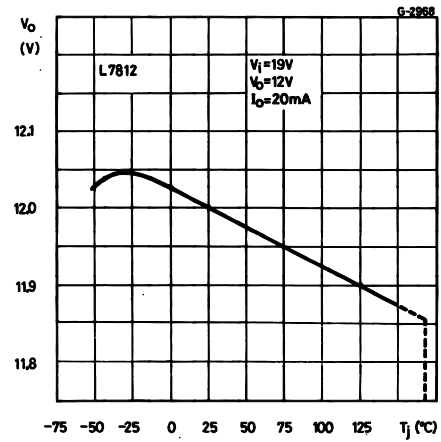


Figure 5 : Peak Output Current vs Input/output Differential Voltage

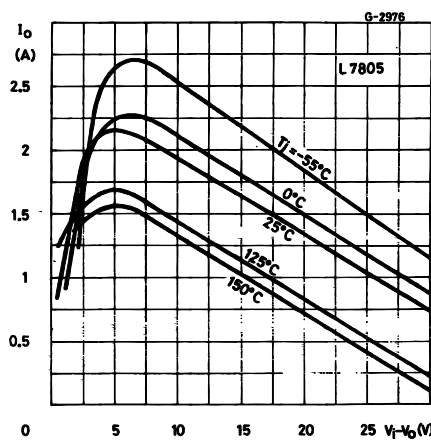


Figure 8 : Output Impedance vs Frequency

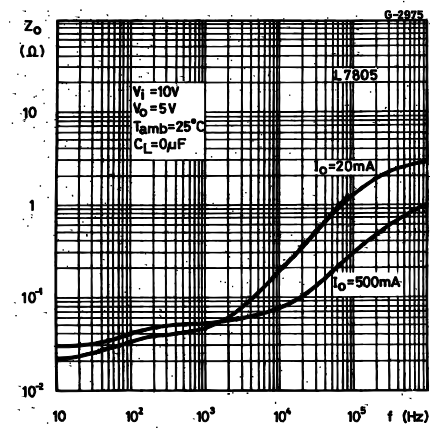


Figure 6 : Supply Voltage Rejection vs Frequency

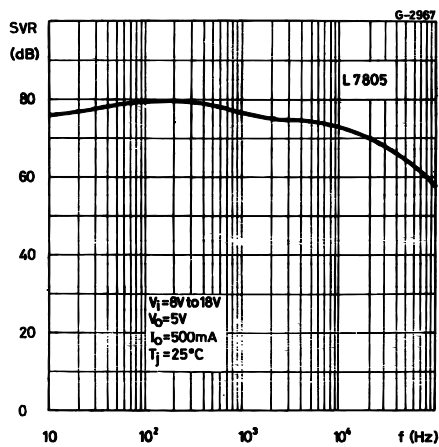


Figure 9 : Quiescent Current vs Junction Temperature

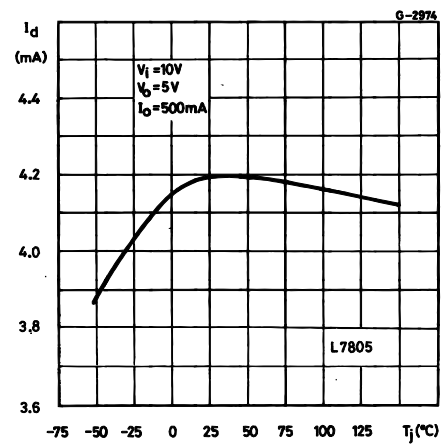


Figure 10 : Load Transient Response

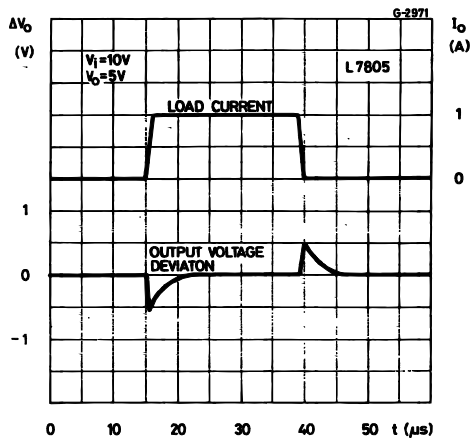


Figure 12 : Quiescent Current vs Input Voltage

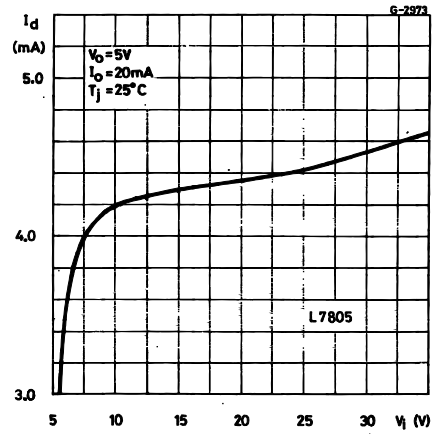


Figure 11 : Line Transient Response

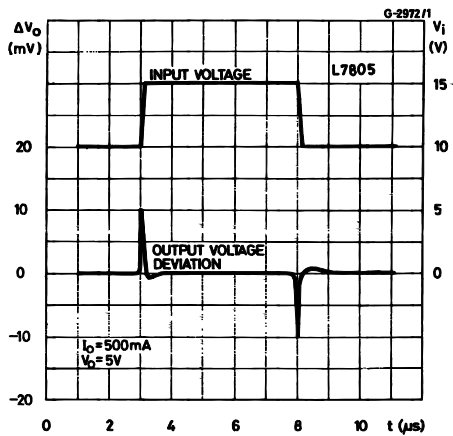
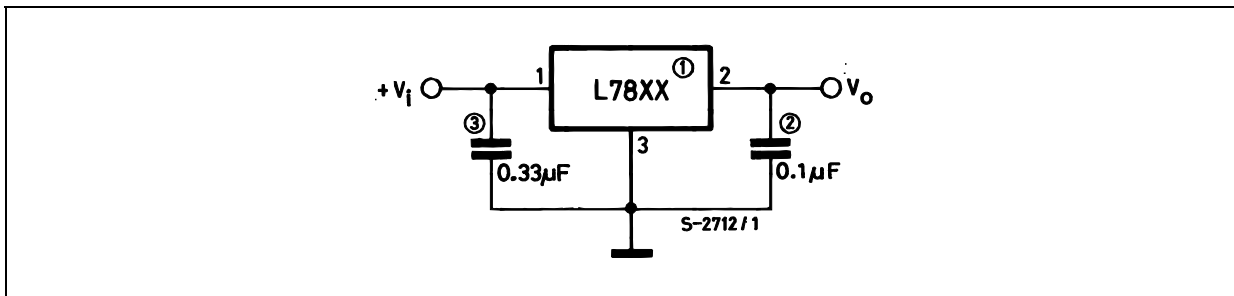


Figure 13 : Fixed Output Regulator



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

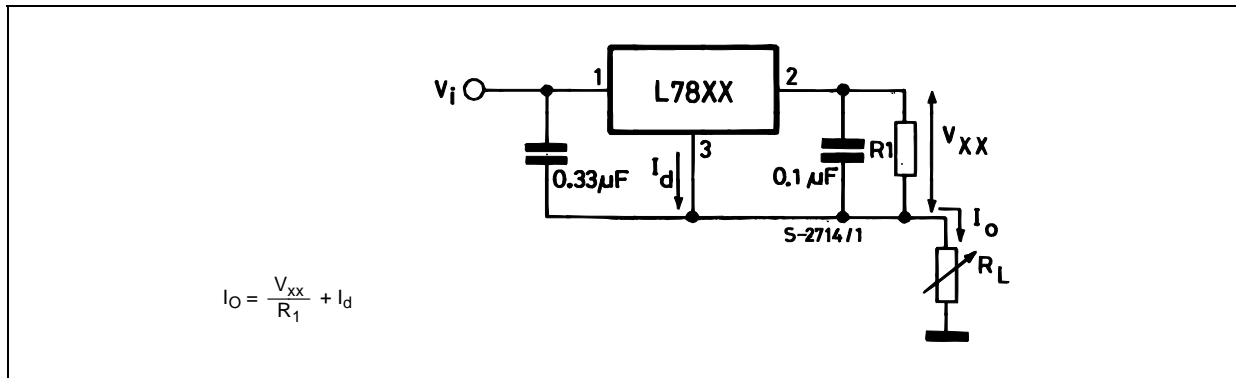


Figure 15 : Circuit for Increasing Output Voltage

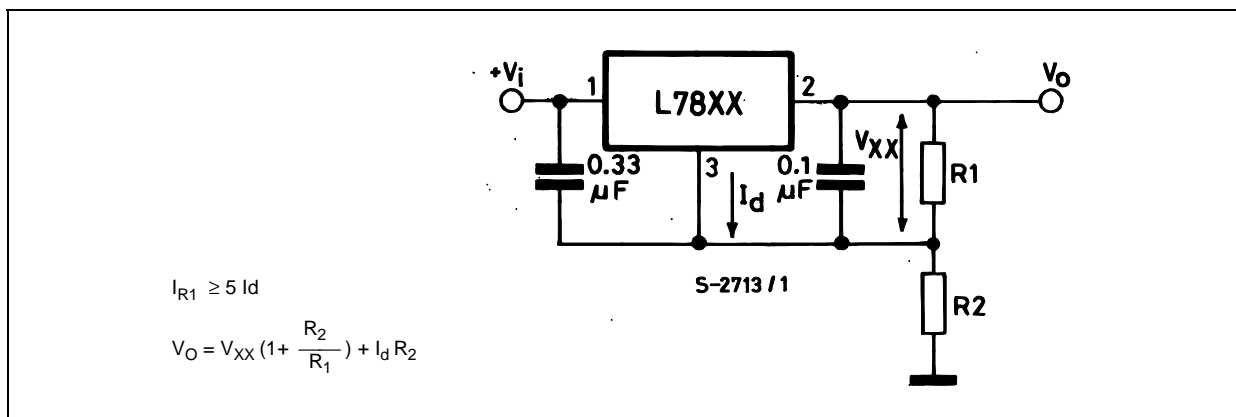
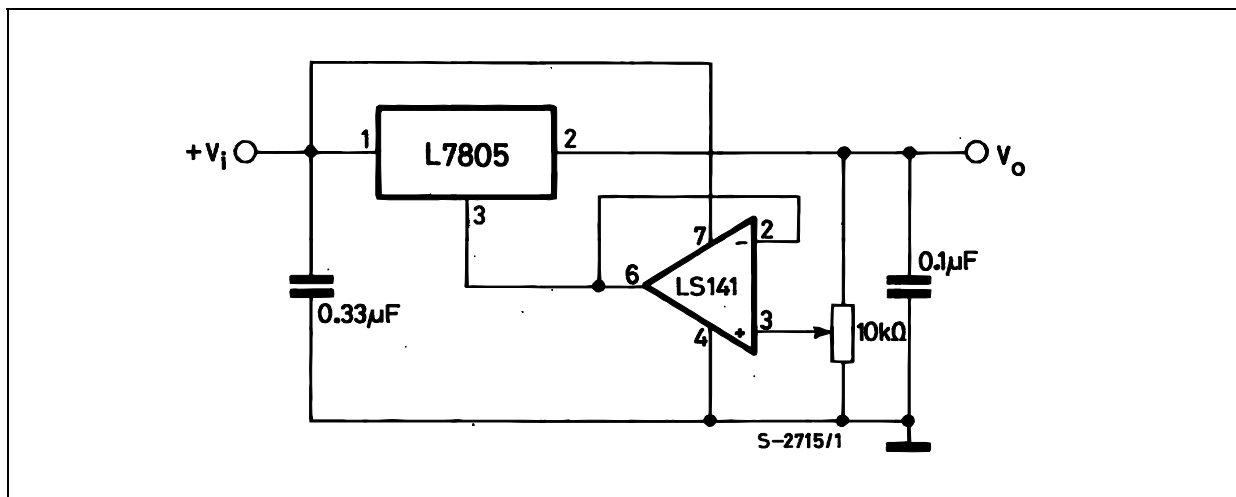


Figure 16 : Adjustable Output Regulator (7 to 30V)



## L7800 SERIES

Figure 17 : 0.5 to 10V Regulator

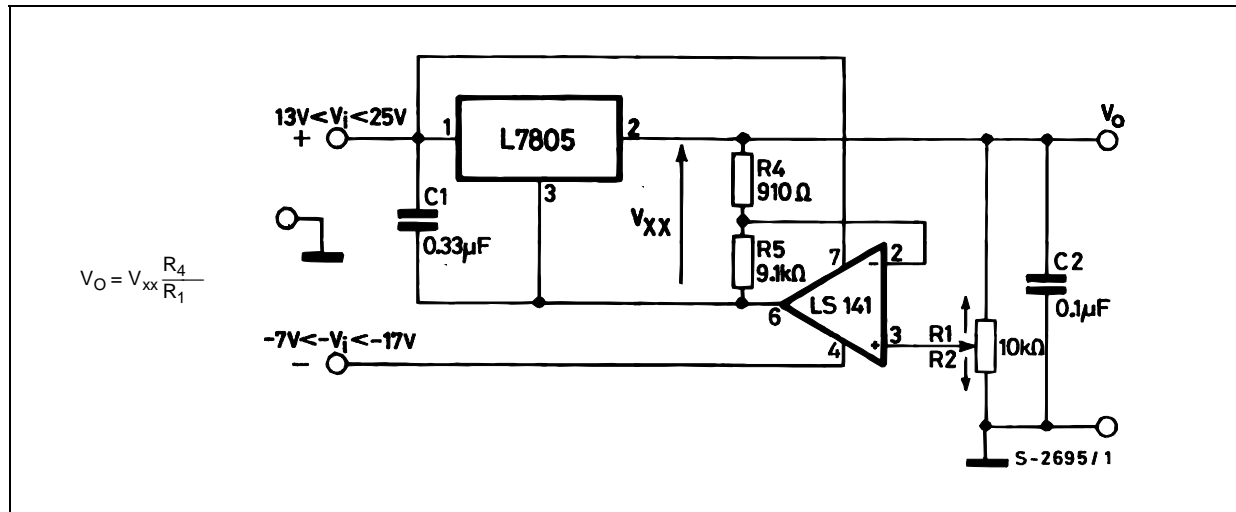


Figure 18 : High Current Voltage Regulator

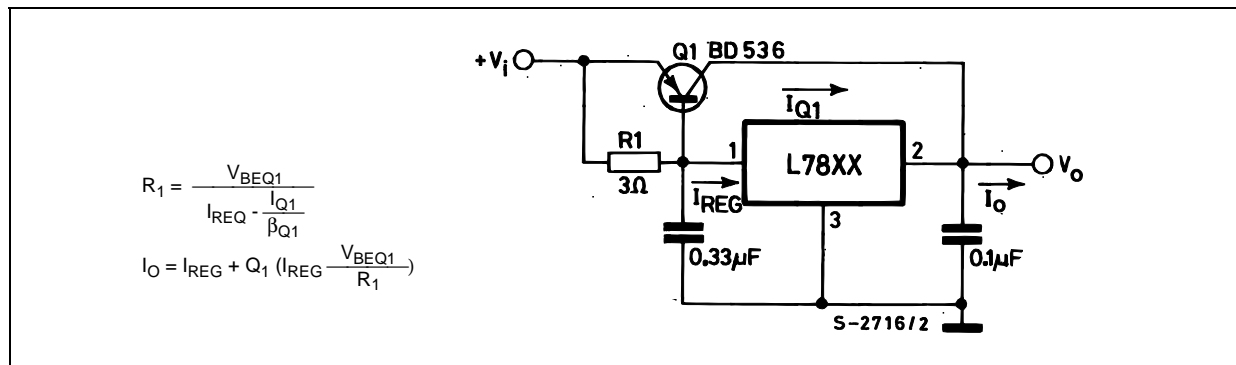


Figure 19 : High Output Current with Short Circuit Protection

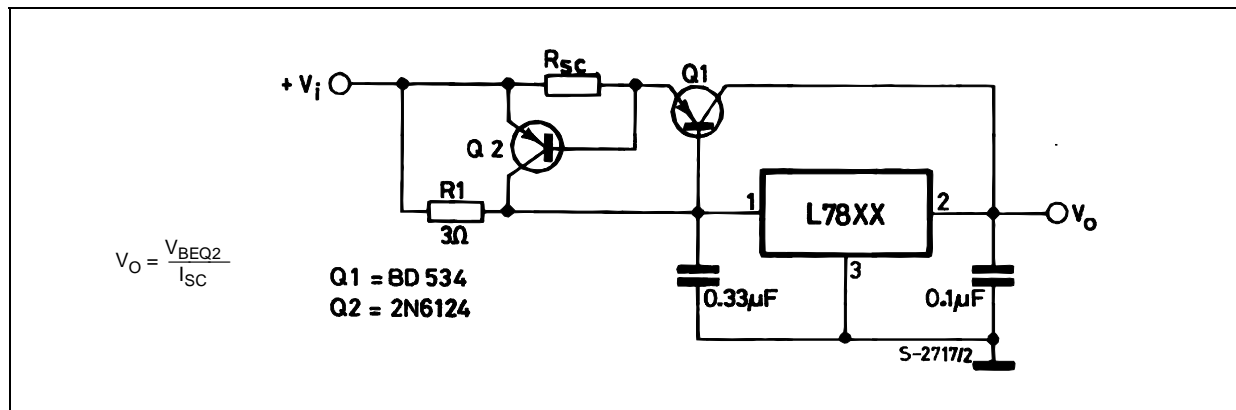


Figure 20 : Tracking Voltage Regulator

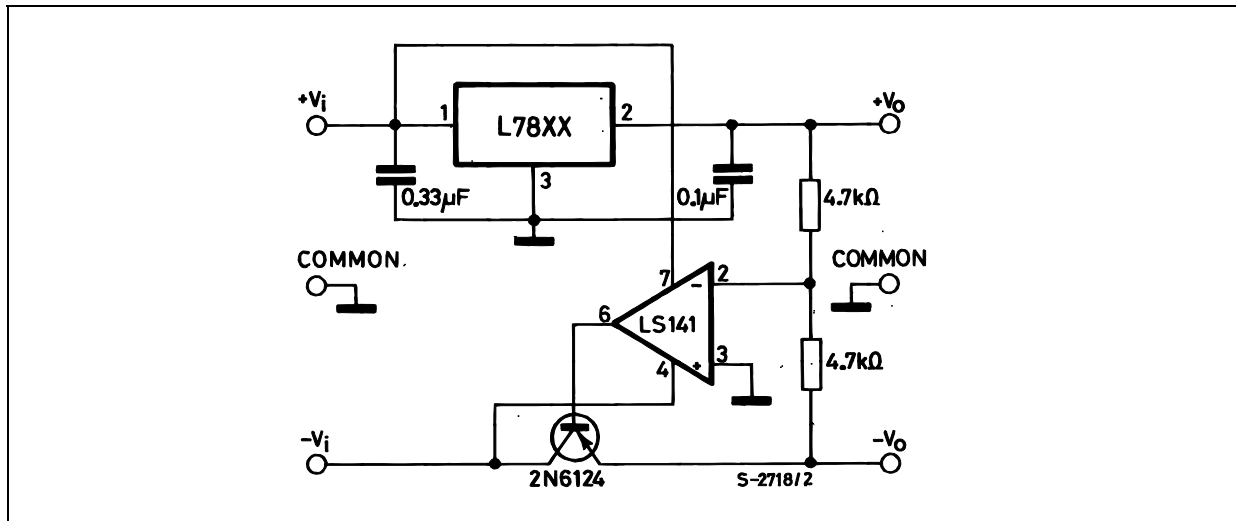
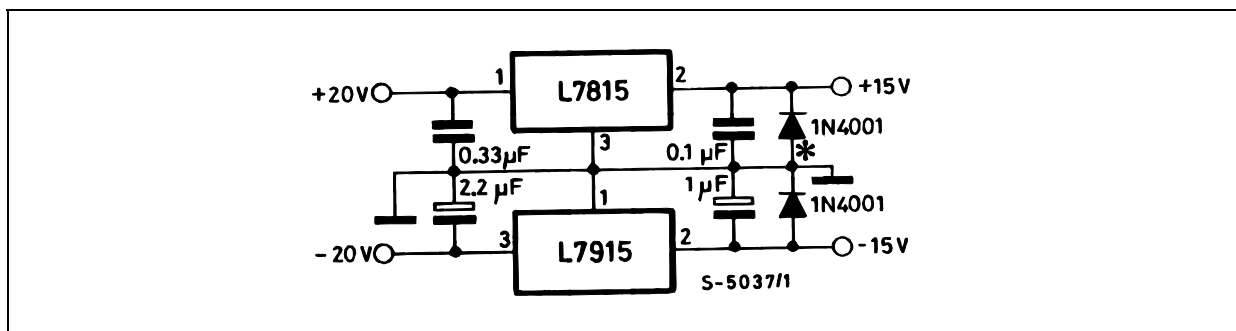
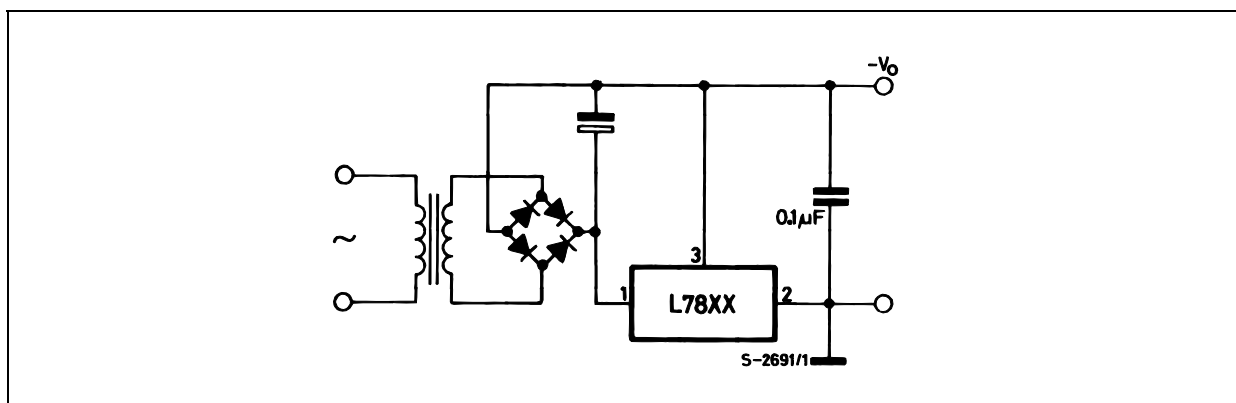


Figure 21 : Split Power Supply ( $\pm 15V - 1 A$ )



\* Against potential latch-up problems.

Figure 22 : Negative Output Voltage Circuit



## L7800 SERIES

Figure 23 : Switching Regulator

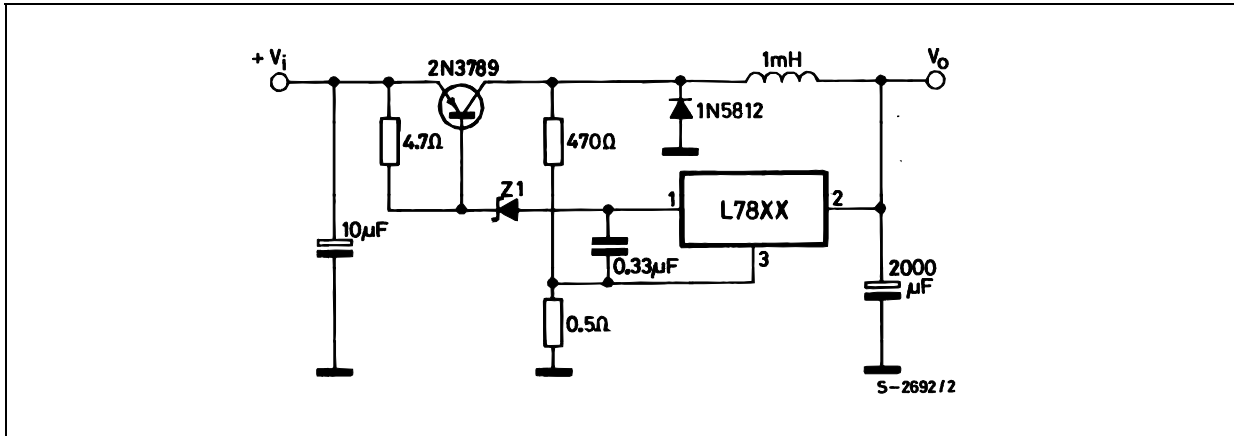


Figure 24 : High Input Voltage Circuit

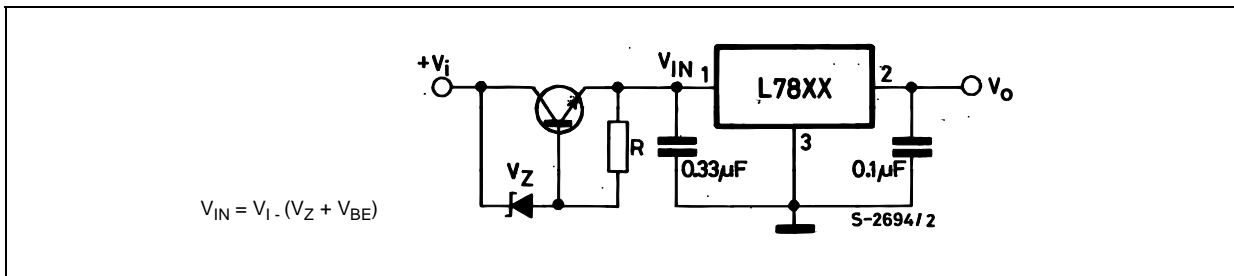


Figure 25 : High Input Voltage Circuit

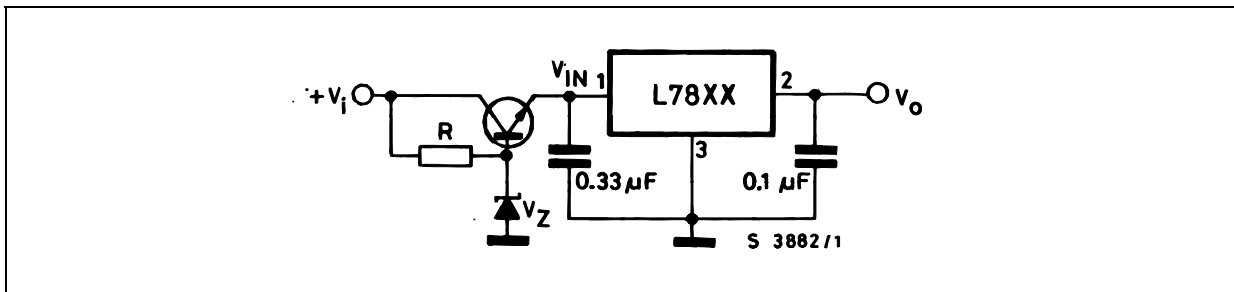


Figure 26 : High Output Voltage Regulator

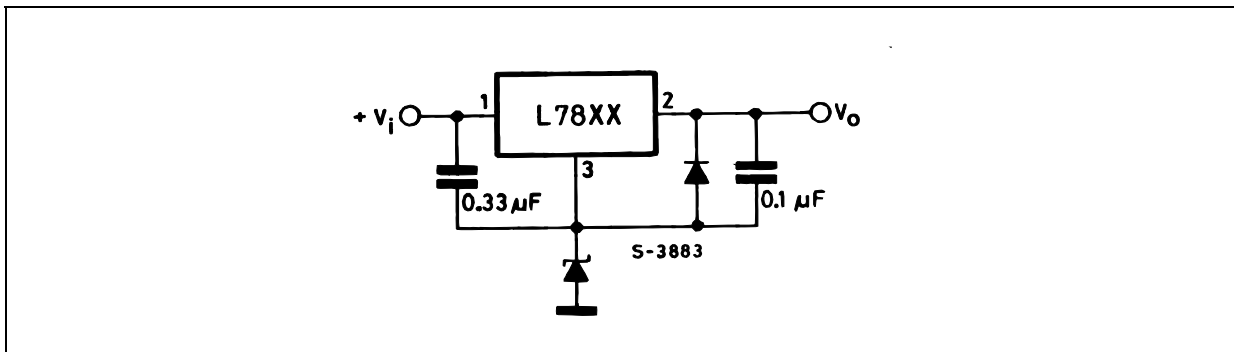


Figure 27 : High Input and Output Voltage

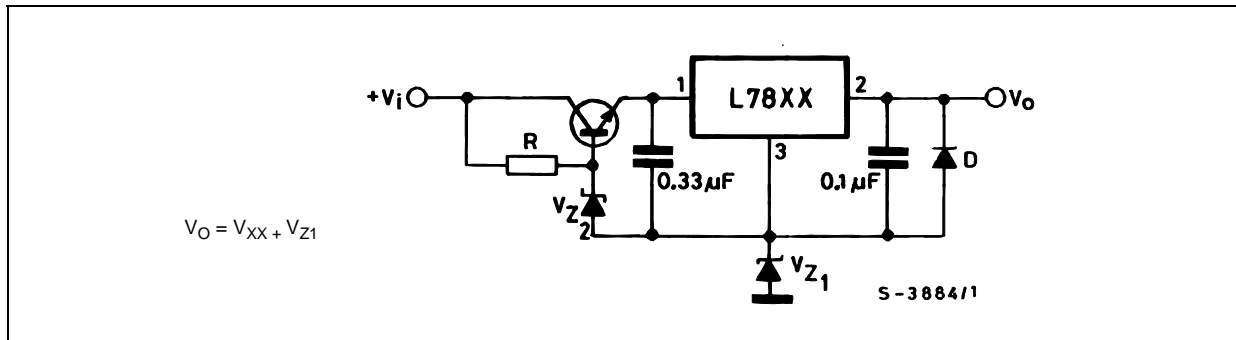


Figure 28 : Reducing Power Dissipation with Dropping Resistor

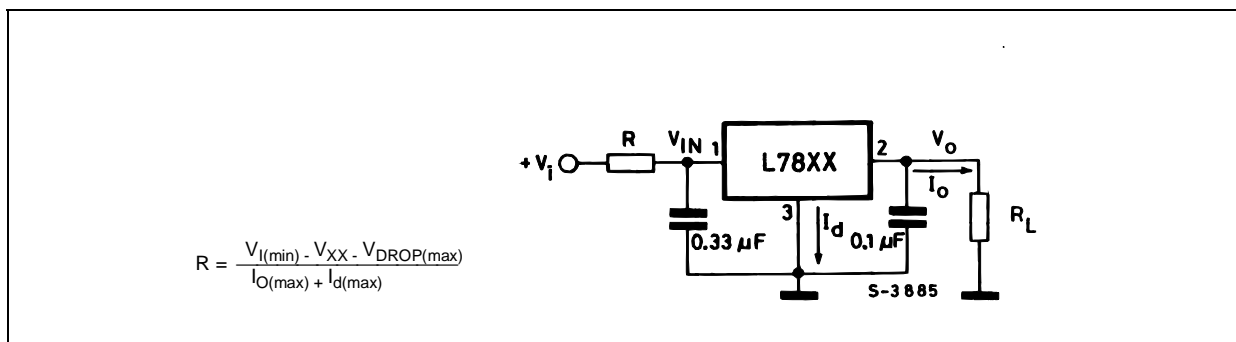
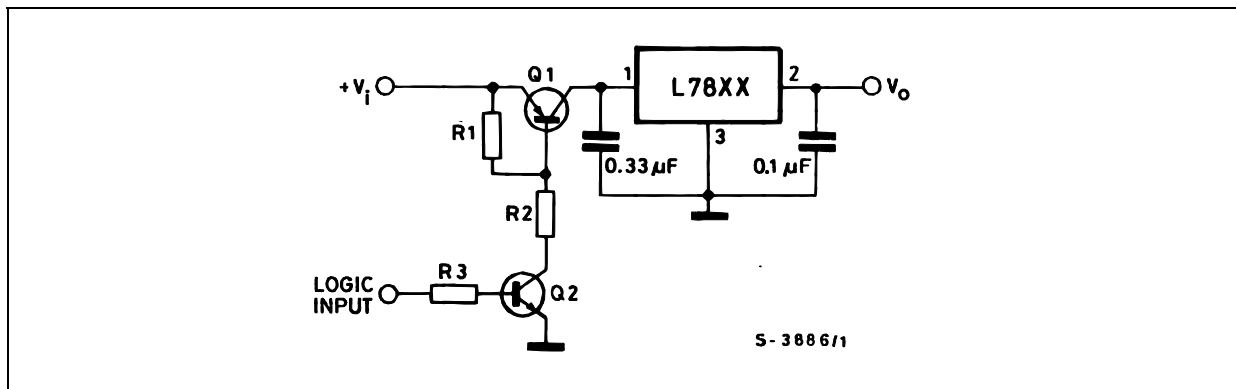
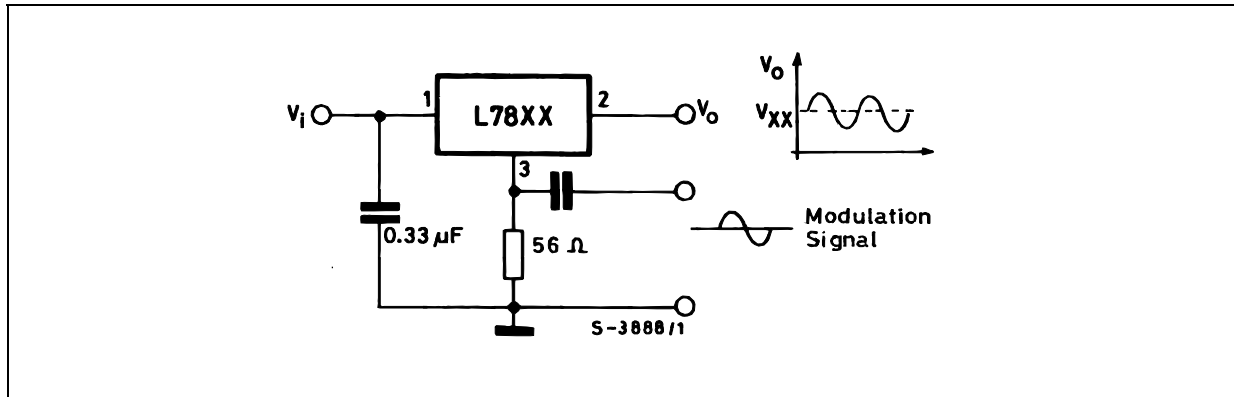


Figure 29 : Remote Shutdown



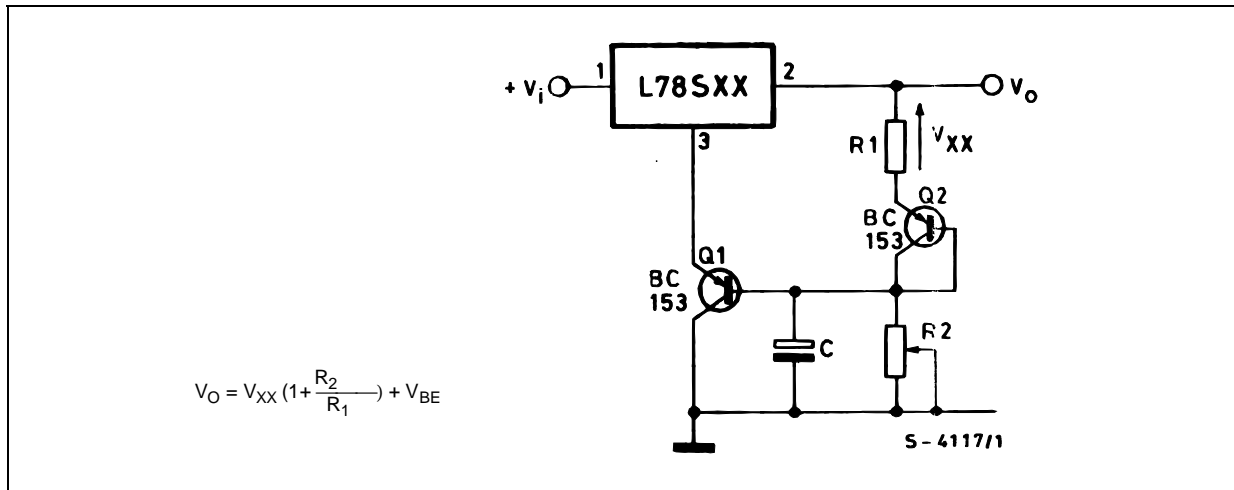
## L7800 SERIES

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



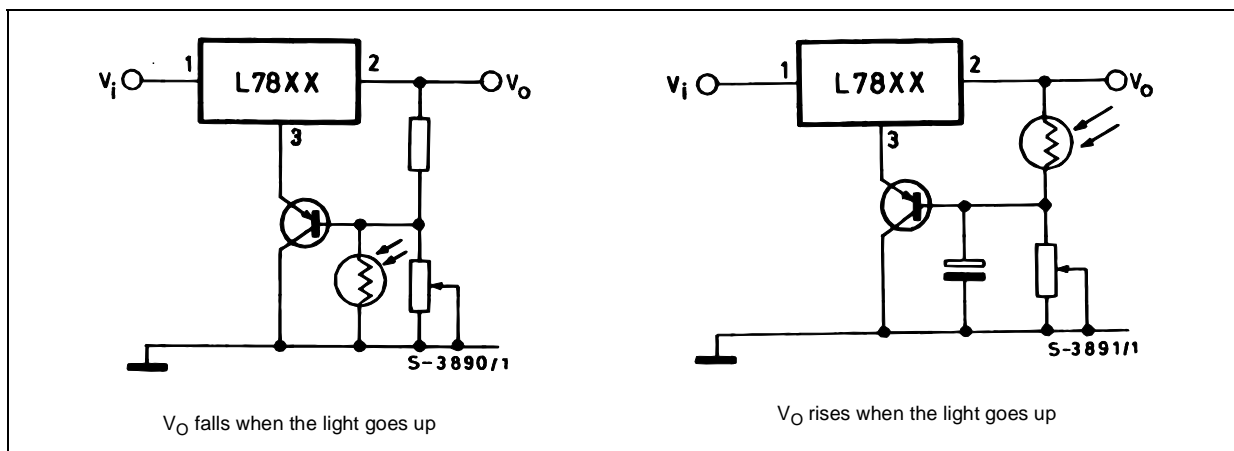
NOTE: The circuit performs well up to 100 KHz.

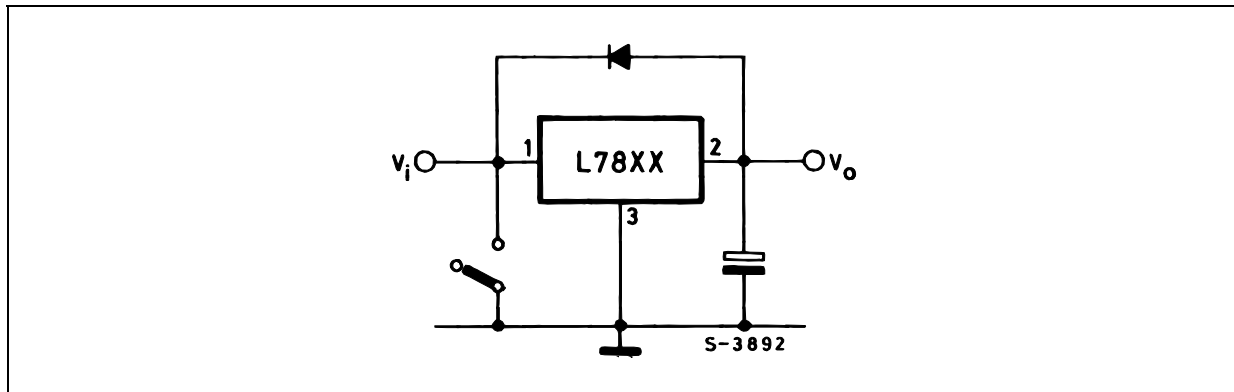
**Figure 31 :** Adjustable Output Voltage with Temperature Compensation



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 ( $V_{Omin} = V_{XX} + V_{BE}$ )

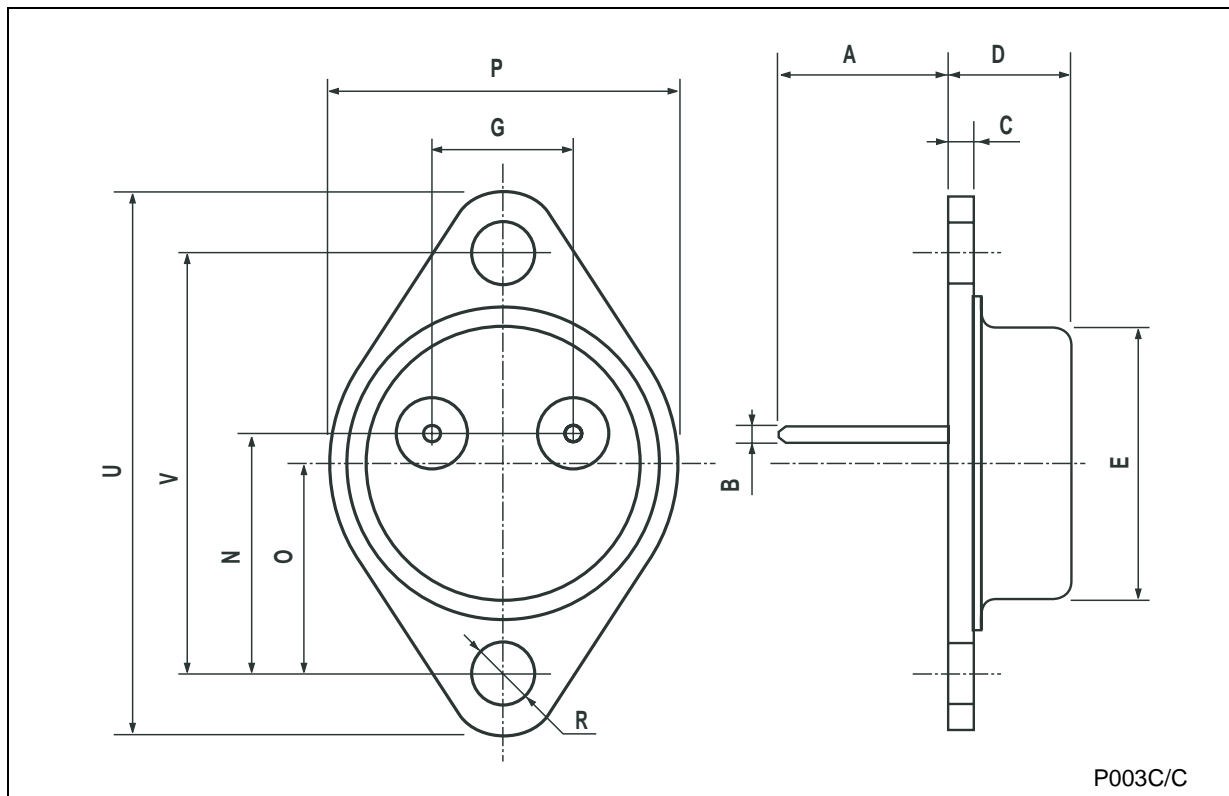


**Figure 33** : Protection against Input Short-Circuit with High Capacitance Loads

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	

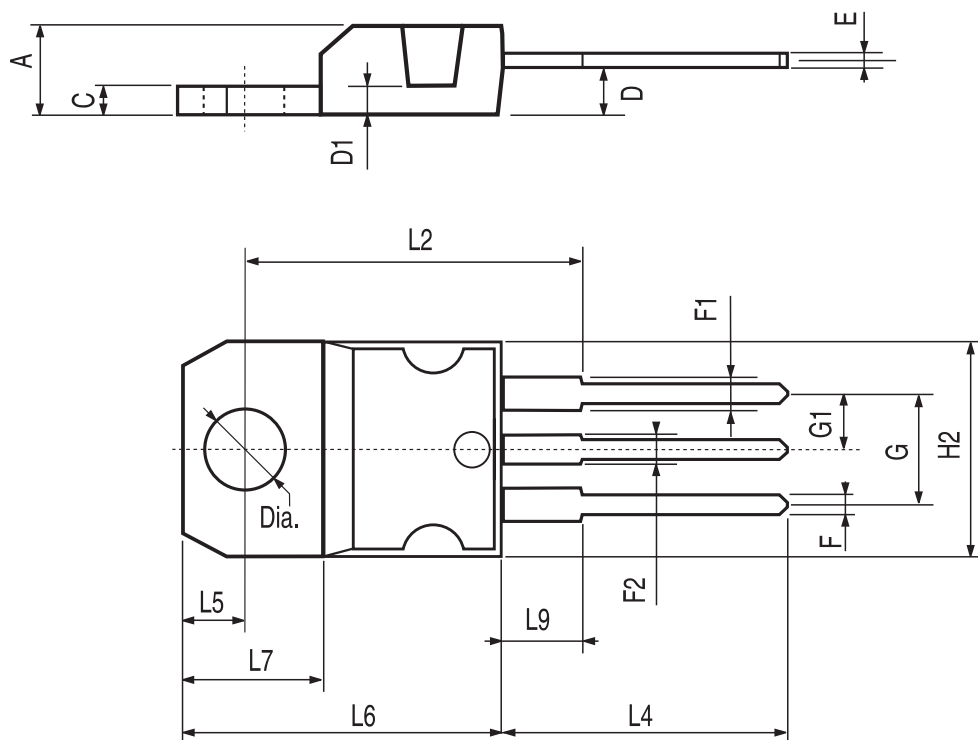


P003C/C



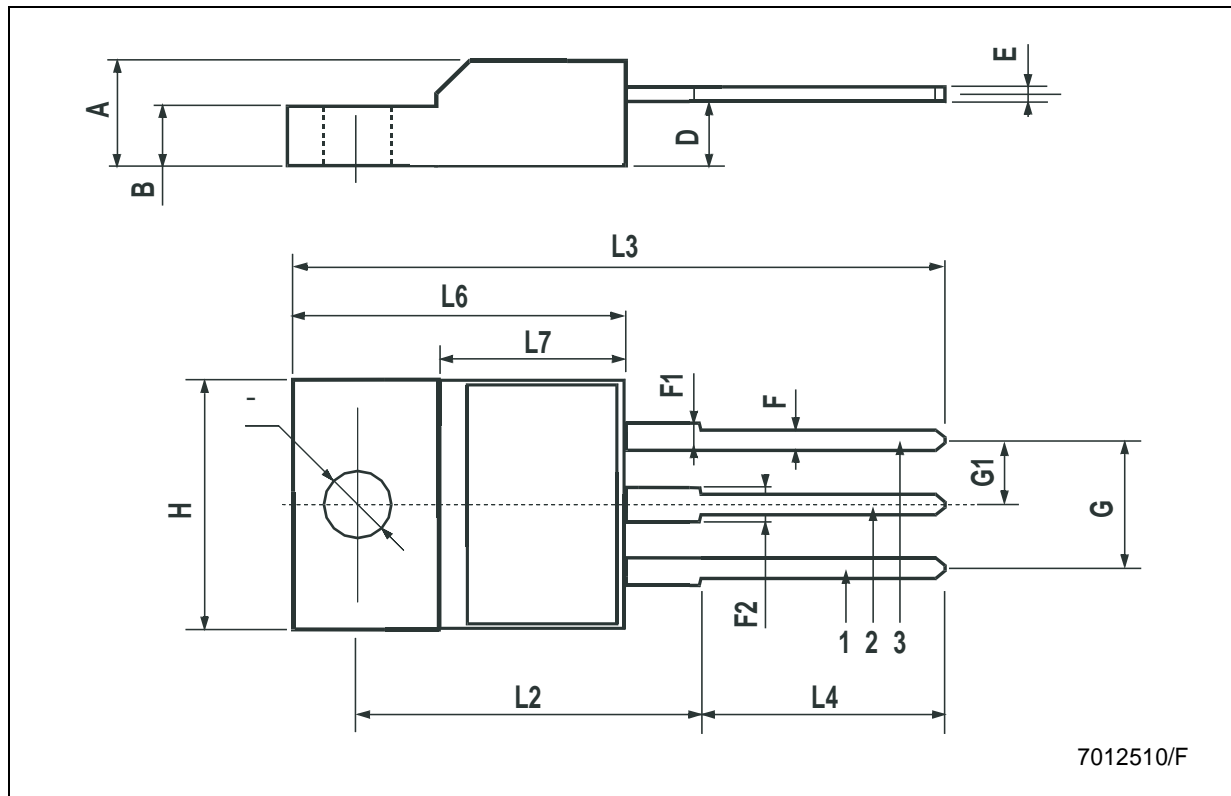
## TO-220 MECHANICAL DATA

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



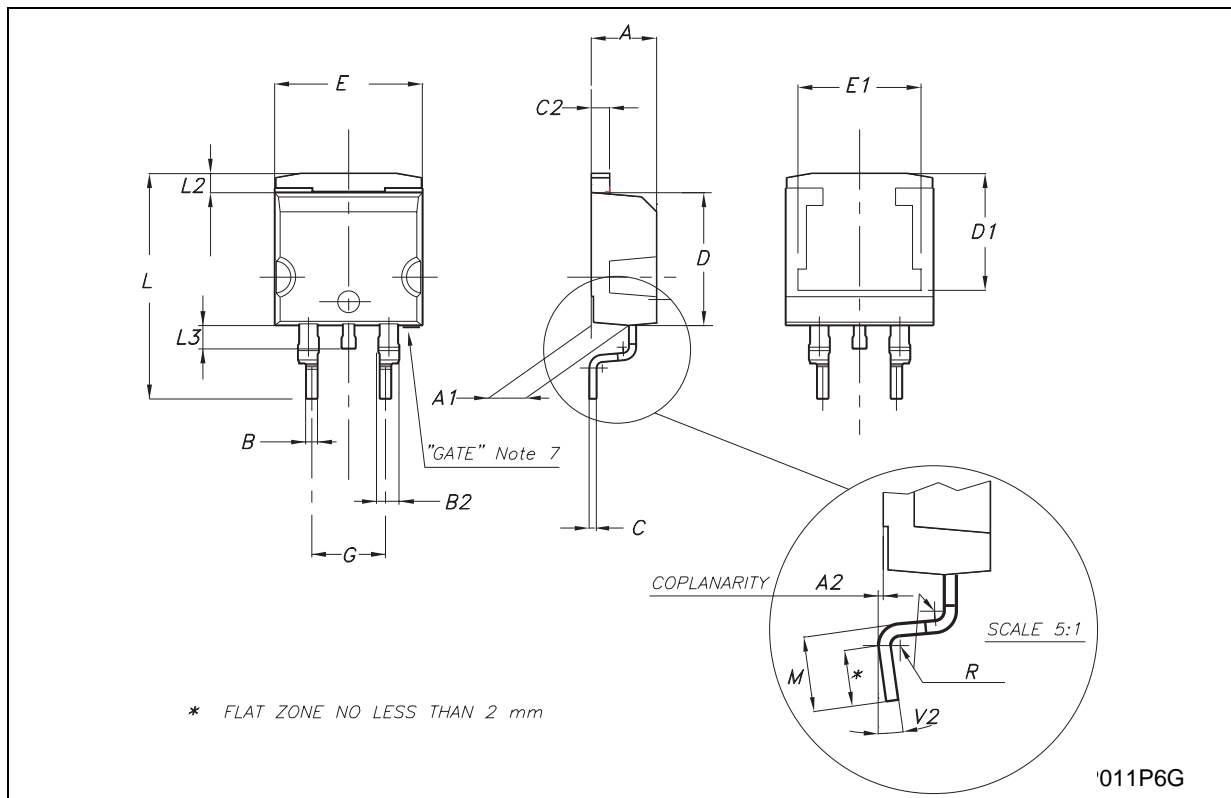
TO-220FP MECHANICAL DATA

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



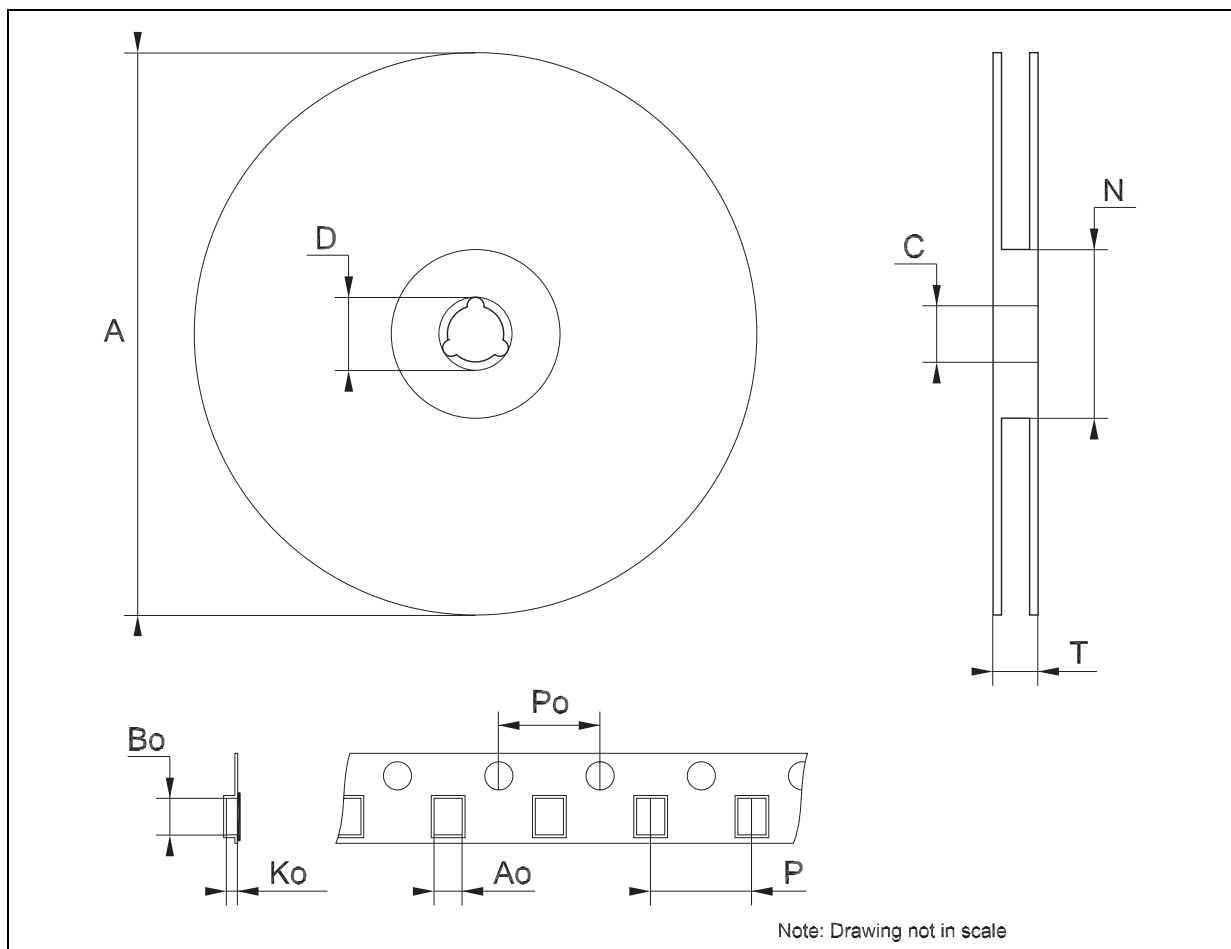
**D<sup>2</sup>PAK MECHANICAL DATA**

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<sup>2</sup>PAK-P<sup>2</sup>PAK-D<sup>2</sup>PAK/A-P<sup>2</sup>PAK/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



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>

