

POSITIVE VOLTAGE REGULATORS

- OUTPUT CURRENT TO 1.5A
- OUTPUT VOLTAGES OF 5; 6; 8; 9; 10; 12; 15; 18; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION

DESCRIPTION

The LM78XX series of three-terminal positive regulators is available in TO-220, TO263, 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.

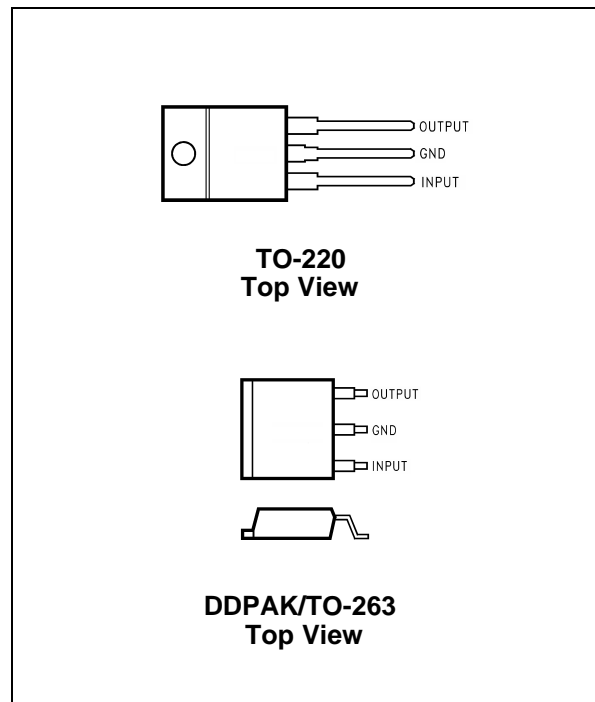


Figure 1: Schematic Diagram

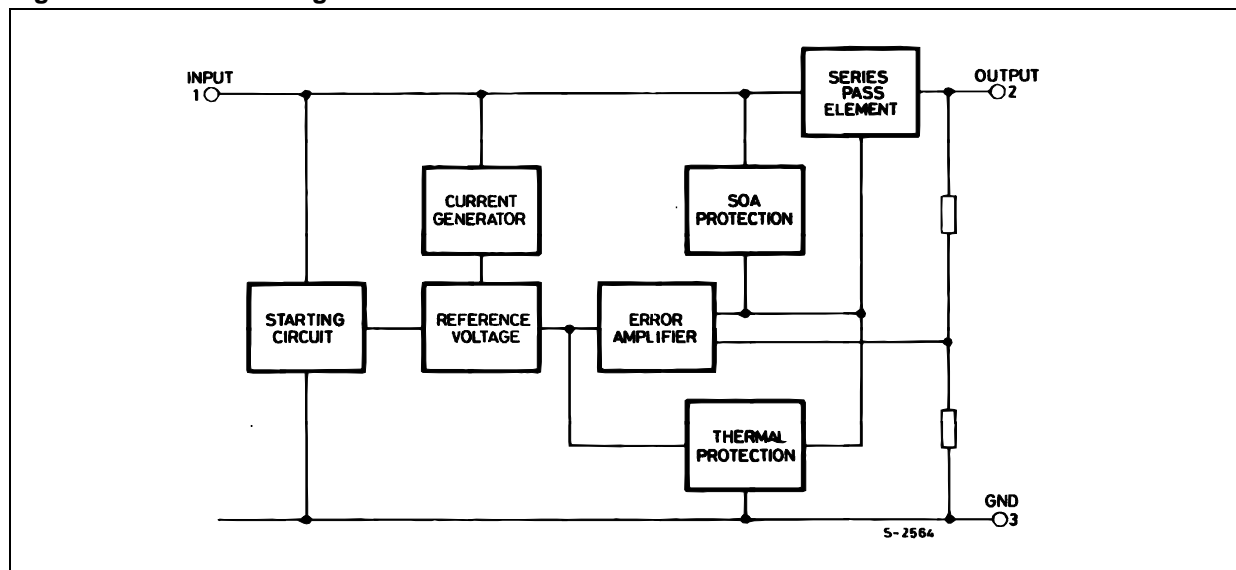


Table 1: Absolute Maximum Ratings

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	TO-220	TO-263	Unit
$R_{thj-case}$	Thermal Resistance Junction-case Max	5	5	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	50	60	°C/W

Figure 2: Schematic Diagram

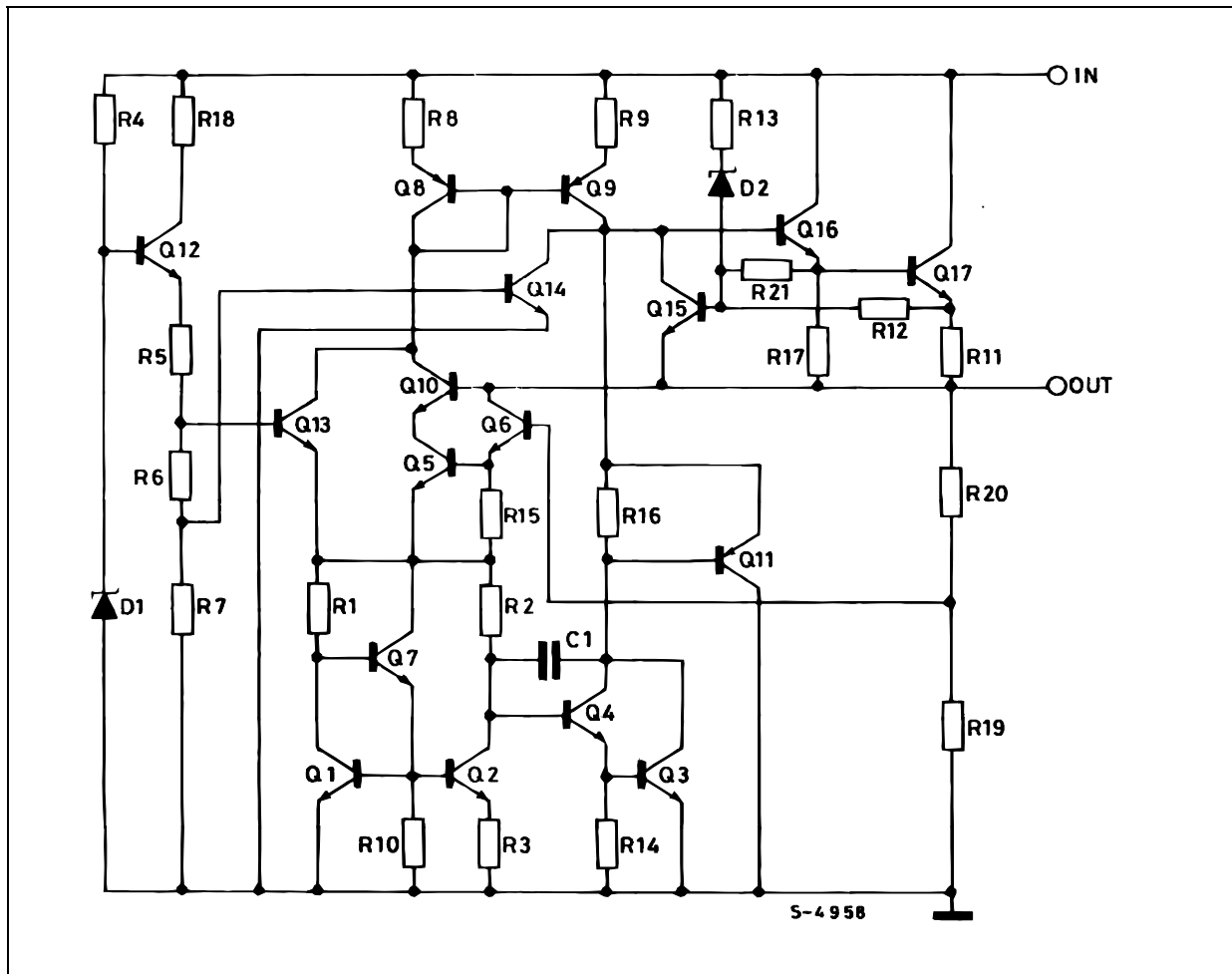
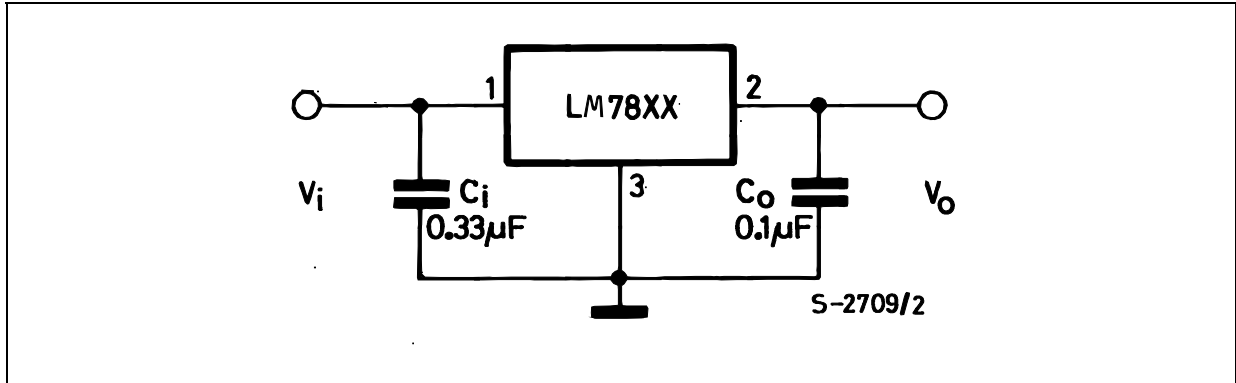


Figure 4: Application Circuits



TEST CIRCUITS

Figure 5: DC Parameter

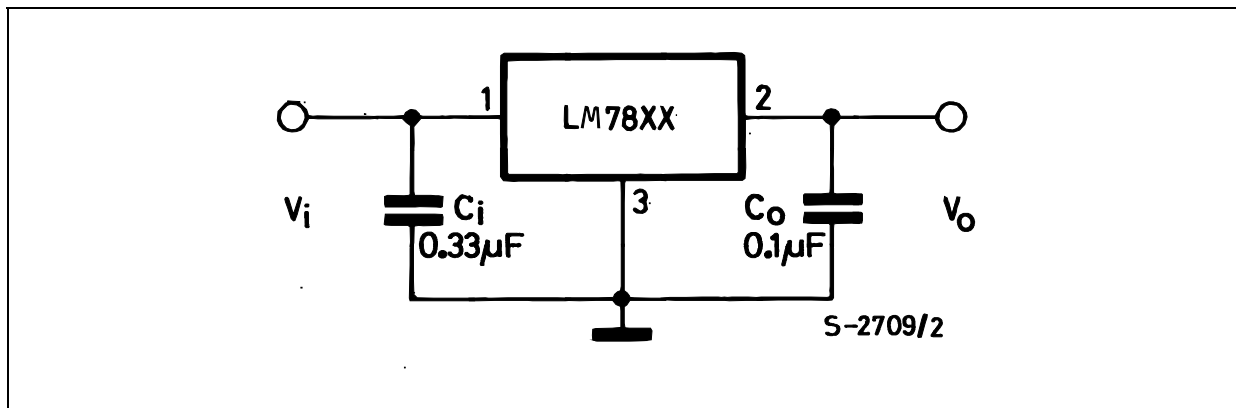


Figure 6: Load Regulation

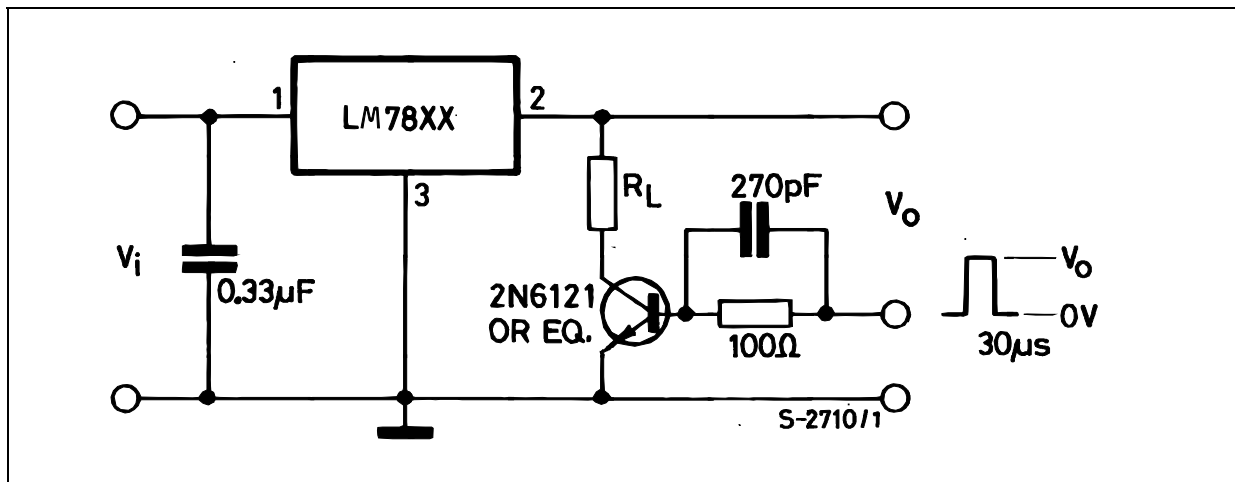
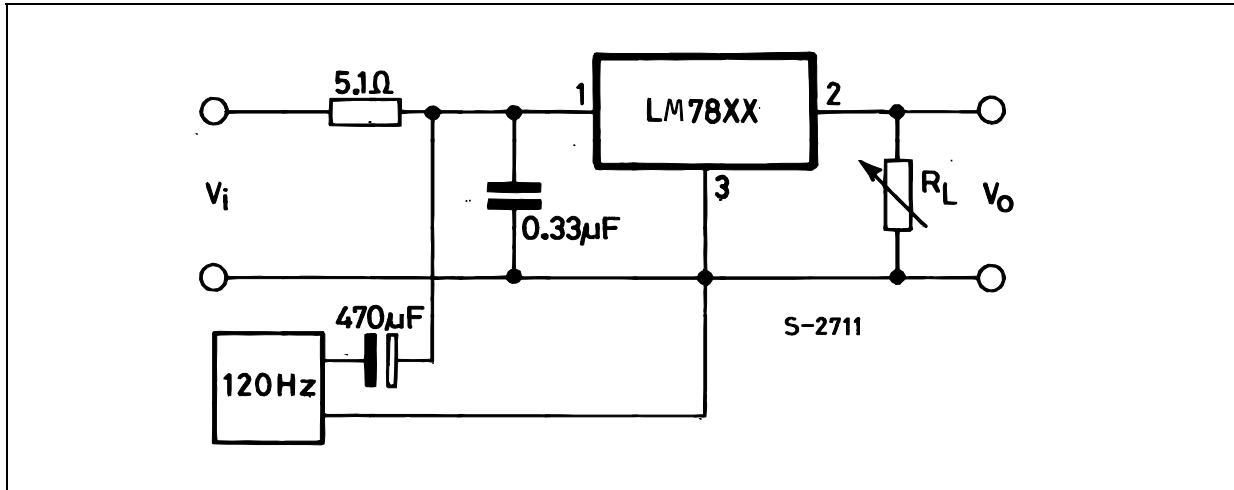


Figure 7: Ripple Rejection

Table 4: Electrical Characteristics Of LM7805 (refer to the test circuits, $T_J = -55$ to 150°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
ΔV_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	
ΔV_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
ΔI_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 = 10Hz to 100KHz $T_J = 25^\circ\text{C}$			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 Ω
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.

Table 5: Electrical Characteristics Of LM7806 (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 11\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	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
ΔV_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	
ΔV_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
ΔI_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 Ω
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.

Table 6: Electrical Characteristics Of LM7808 (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 14\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	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
ΔV_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	
ΔV_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
ΔI_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 Ω
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.

Table 7: Electrical Characteristics Of LM7812 (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 19\text{V}$, $I_O = 500$ 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	$T_J = 25^\circ\text{C}$	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
ΔV_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	
ΔV_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
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/ $^\circ\text{C}$
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 Ω
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.

Table 8: Electrical Characteristics Of LM7815 (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 23\text{V}$, $I_O = 500$ 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	$T_J = 25^\circ\text{C}$	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
ΔV_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	
ΔV_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
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/ $^\circ\text{C}$
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 Ω
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.

Table 9: Electrical Characteristics Of LM7818 (refer to the test circuits, $T_J = -55$ to 150°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
ΔI_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 Ω
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.

Table 11: Electrical Characteristics Of LM7824 (refer to the test circuits, $T_J = -55$ to 150°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
ΔI_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 Ω
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.

Table 12: Electrical Characteristics Of LM7805C (refer to the test circuits, $T_J = 0$ to 125°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
ΔI_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 Ω
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.

Table 14: Electrical Characteristics Of LM7806C (refer to the test circuits, $T_J = 0$ to 125°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
ΔI_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 Ω
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.

Table 15: Electrical Characteristics Of LM7808C (refer to the test circuits, $T_J = 0$ to 125°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	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 10.5\text{ to }25\text{ V}$	7.6	8	8.4	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 10.5\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$			160	mV
		$V_I = 11\text{ to }17\text{ V}$ $T_J = 25^\circ\text{C}$			80	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			160	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			80	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 10.5\text{ to }25\text{ V}$			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-0.8		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		52		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 11.5\text{ to }21.5\text{ V}$ $f = 120\text{Hz}$	56			dB
V_d	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2		V
R_O	Output Resistance	$f = 1\text{ KHz}$		16		m Ω
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		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.

Table 17: Electrical Characteristics Of LM7809C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 15\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	8.64	9	9.36	V
V_O	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 11.5\text{ to }26\text{ V}$	8.55	9	9.45	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 11.5\text{ to }26\text{ V}$ $T_J = 25^\circ\text{C}$			180	mV
		$V_I = 12\text{ to }18\text{ V}$ $T_J = 25^\circ\text{C}$			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	$T_J = 25^\circ\text{C}$			8	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 11.5\text{ to }26\text{ V}$			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-1		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		70		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 12\text{ to }23\text{ V}$ $f = 120\text{Hz}$	55			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 Ω
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		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.

Table 18: Electrical Characteristics Of LM7810C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 16\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	9.6	10	10.4	V
V_O	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 12.5\text{ to }26\text{ V}$	9.5	10	10.5	V
$\Delta V_O(^*)$	Line Regulation	$V_I = 12.5\text{ to }26\text{ V}$ $T_J = 25^\circ\text{C}$			200	mV
		$V_I = 13.5\text{ to }19\text{ V}$ $T_J = 25^\circ\text{C}$			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	$T_J = 25^\circ\text{C}$			8	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 12.5\text{ to }26\text{ V}$			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-1		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		70		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 13\text{ to }23\text{ V}$ $f = 120\text{Hz}$	55			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 Ω
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		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.

Table 19: Electrical Characteristics Of LM7812C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 19\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	11.5	12	12.5	V
V_O	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 14.5\text{ to }27\text{ V}$	11.4	12	12.6	V
$\Delta V_O(^*)$	Line Regulation	$V_I = 14.5\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$			240	mV
		$V_I = 16\text{ to }22\text{ V}$ $T_J = 25^\circ\text{C}$			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	$T_J = 25^\circ\text{C}$			8	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 14.5\text{ to }30\text{ V}$			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-1		mV/ $^\circ\text{C}$
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		75		$\mu\text{V}/V_O$
SVR	Supply Voltage Rejection	$V_I = 15\text{ to }25\text{ V}$ $f = 120\text{Hz}$	55			dB
V_d	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2		V
R_O	Output Resistance	$f = 1\text{ KHz}$		18		m Ω
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		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.

Table 20: Electrical Characteristics Of LM7815C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 23\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	14.5	15	15.6	V
V_O	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 17.5\text{ to }30\text{ V}$	14.25	15	15.75	V
ΔV_O (*)	Line Regulation	$V_I = 17.5\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$			300	mV
		$V_I = 20\text{ to }26\text{ V}$ $T_J = 25^\circ\text{C}$			150	
ΔV_O (*)	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			300	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			150	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 17.5\text{ to }30\text{ V}$			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-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	$V_I = 18.5\text{ to }28.5\text{ V}$ $f = 120\text{Hz}$	54			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 Ω
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		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.

Table 21: Electrical Characteristics Of LM7818C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 26\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	17.3	18	18.7	V
V_O	Output Voltage	$I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 21\text{ to }33\text{ V}$	17.1	18	18.9	V
ΔV_O (*)	Line Regulation	$V_I = 21\text{ to }33\text{ V}$ $T_J = 25^\circ\text{C}$			360	mV
		$V_I = 24\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$			180	
ΔV_O (*)	Load Regulation	$I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$			360	mV
		$I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$			180	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ mA to }1\text{ A}$			0.5	mA
		$V_I = 21\text{ to }33\text{ V}$			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-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	$V_I = 22\text{ to }32\text{ V}$ $f = 120\text{Hz}$	53			dB
V_d	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2		V
R_O	Output Resistance	$f = 1\text{ KHz}$		22		m Ω
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		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.

Table 23: Electrical Characteristics Of LM7824C (refer to the test circuits, $T_J = 0$ to 125°C , $V_I = 33\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ unless otherwise specified).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	23	24	25	V
V_O	Output Voltage	$I_O = 5\text{ mA to } 1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 27\text{ to } 38\text{ V}$	22.8	24	25.2	V
$\Delta V_{O(*)}$	Line Regulation	$V_I = 27\text{ to } 38\text{ V}$ $T_J = 25^\circ\text{C}$			480	mV
		$V_I = 30\text{ to } 36\text{ V}$ $T_J = 25^\circ\text{C}$			240	
$\Delta V_{O(*)}$	Load Regulation	$I_O = 5\text{ mA to } 1.5\text{ A}$ $T_J = 25^\circ\text{C}$			480	mV
		$I_O = 250\text{ to } 750\text{ mA}$ $T_J = 25^\circ\text{C}$			240	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			8	mA
ΔI_d	Quiescent Current Change	$I_O = 5\text{ mA to } 1\text{ A}$			0.5	mA
		$V_I = 27\text{ to } 38\text{ V}$			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	$I_O = 5\text{ mA}$		-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	$V_I = 28\text{ to } 38\text{ V}$ $f = 120\text{Hz}$	50			dB
V_d	Dropout Voltage	$I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$		2		V
R_O	Output Resistance	$f = 1\text{ KHz}$		28		m Ω
I_{sc}	Short Circuit Current	$V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$		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.

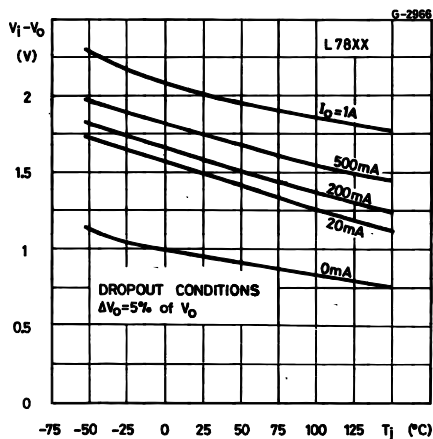
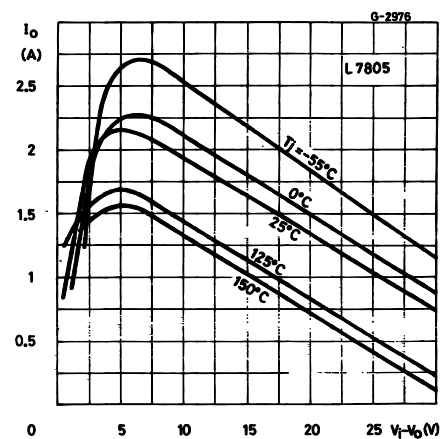
Figure 8: Dropout Voltage vs Junction Temperature

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


Figure 10: Supply Voltage Rejection vs Frequency

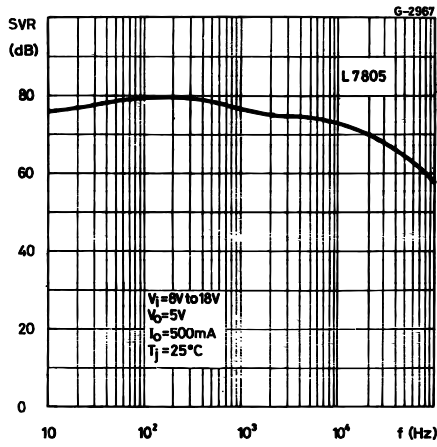


Figure 13: Quiescent Current vs Junction Temperature

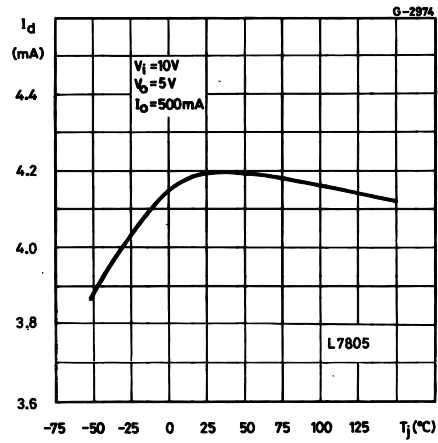


Figure 11: Output Voltage vs Junction Temperature

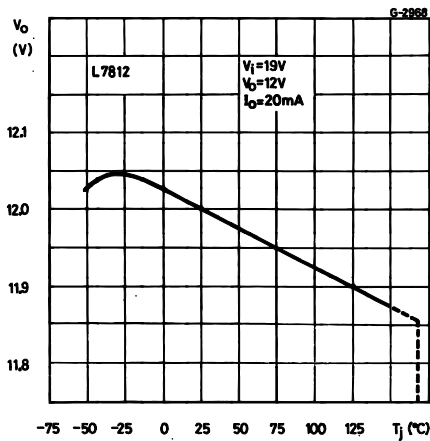


Figure 14: Load Transient Response

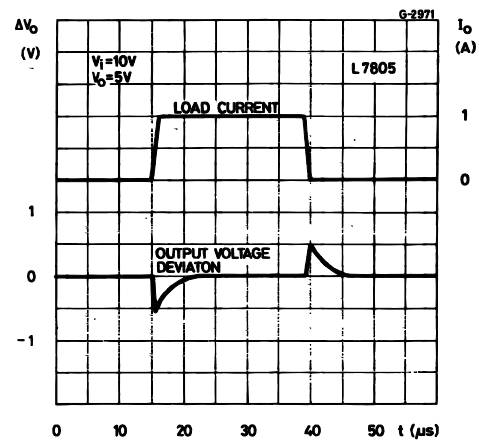


Figure 12: Output Impedance vs Frequency

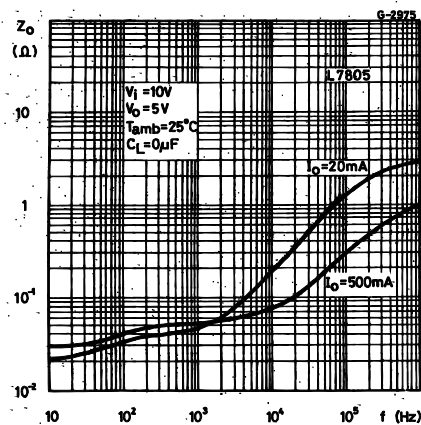


Figure 15: Line Transient Response

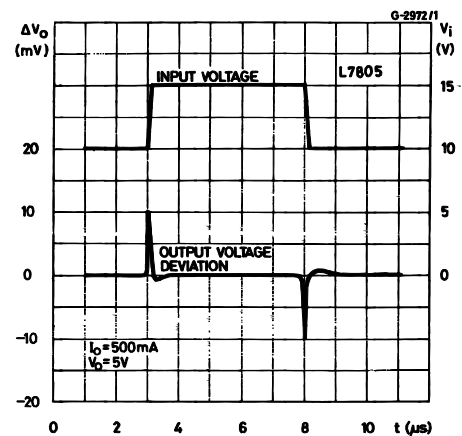


Figure 16: Quiescent Current vs Input Voltage

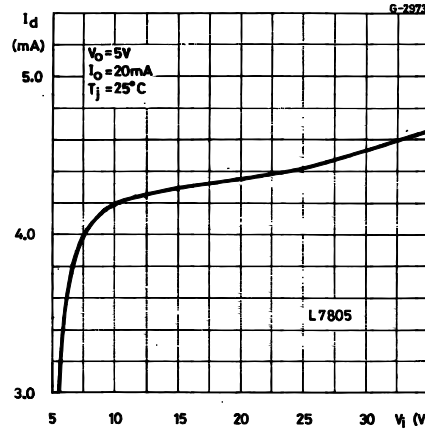
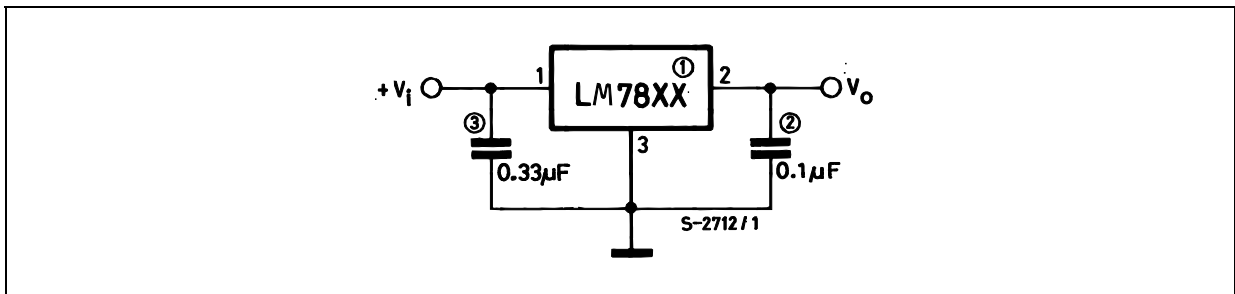


Figure 17: Fixed Output Regulator



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

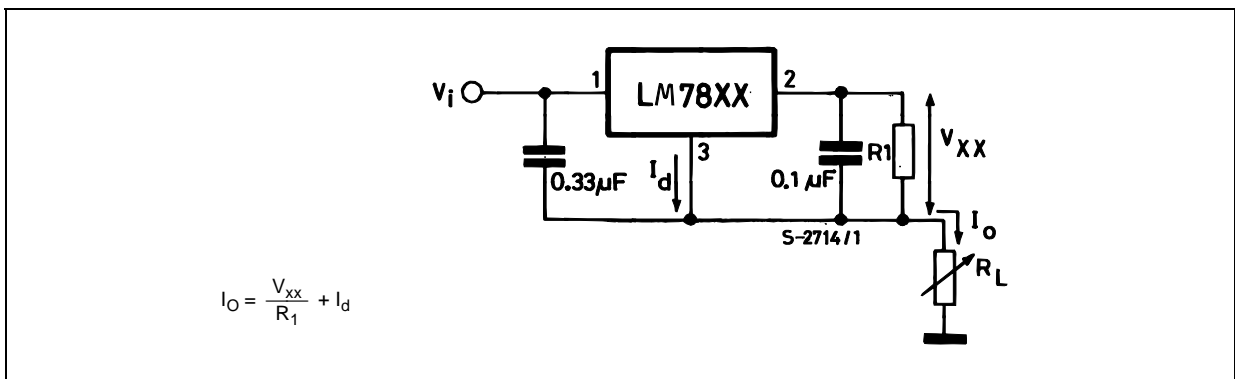


Figure 19: Circuit for Increasing Output Voltage

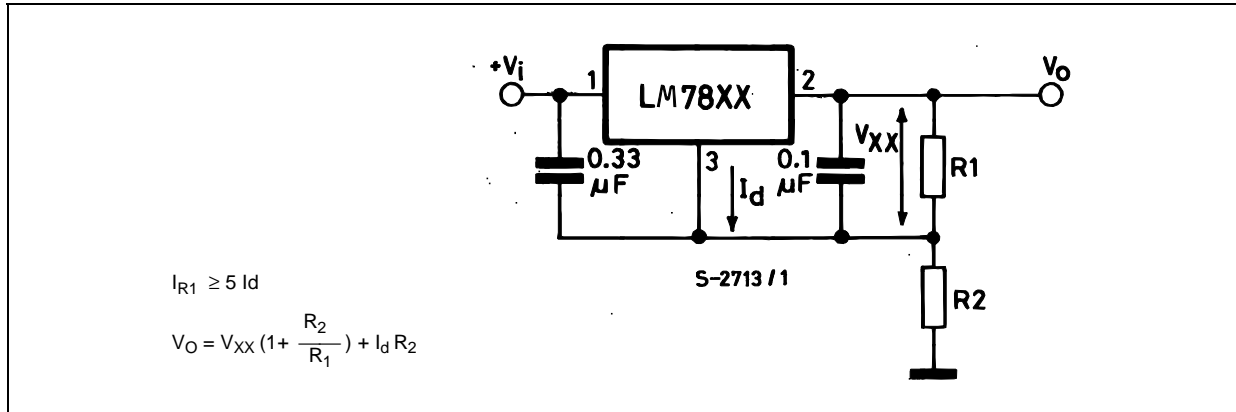


Figure 20: Adjustable Output Regulator (7 to 30V)

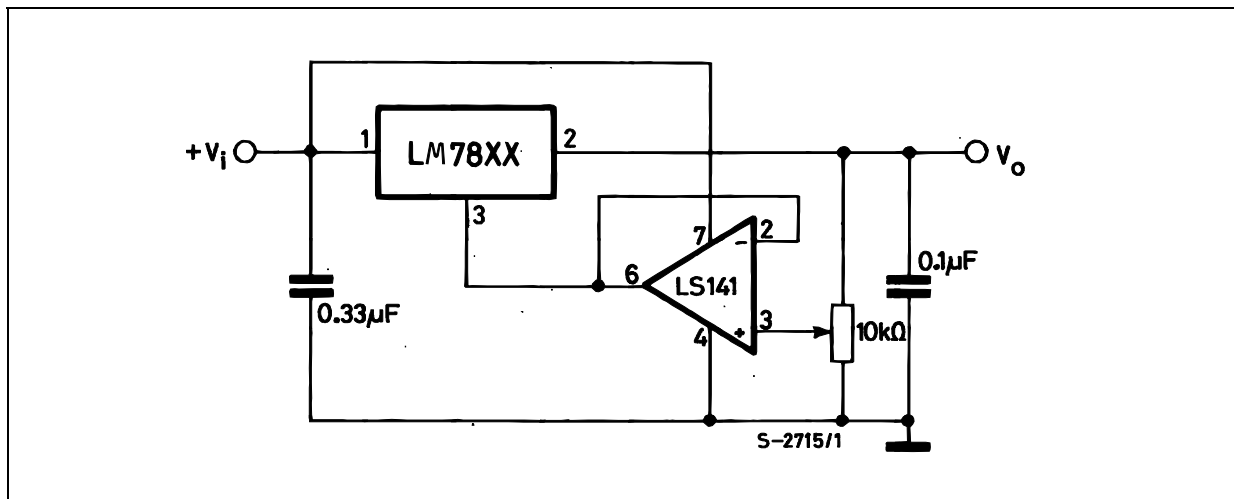
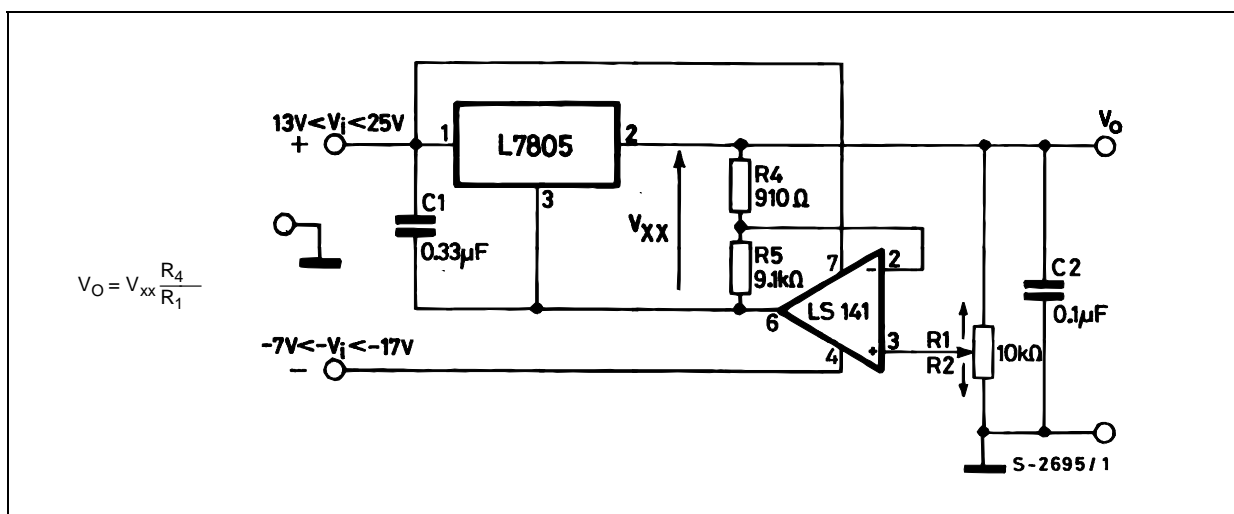


Figure 21: 0.5 to 10V Regulator



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