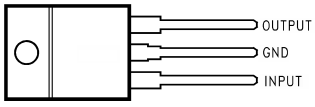
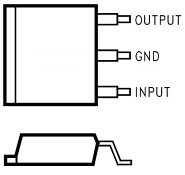
POSITIVE VOLTAGE REGULATORS

- 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



TO-220
Top View



DDPAK/TO-263
Top View

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

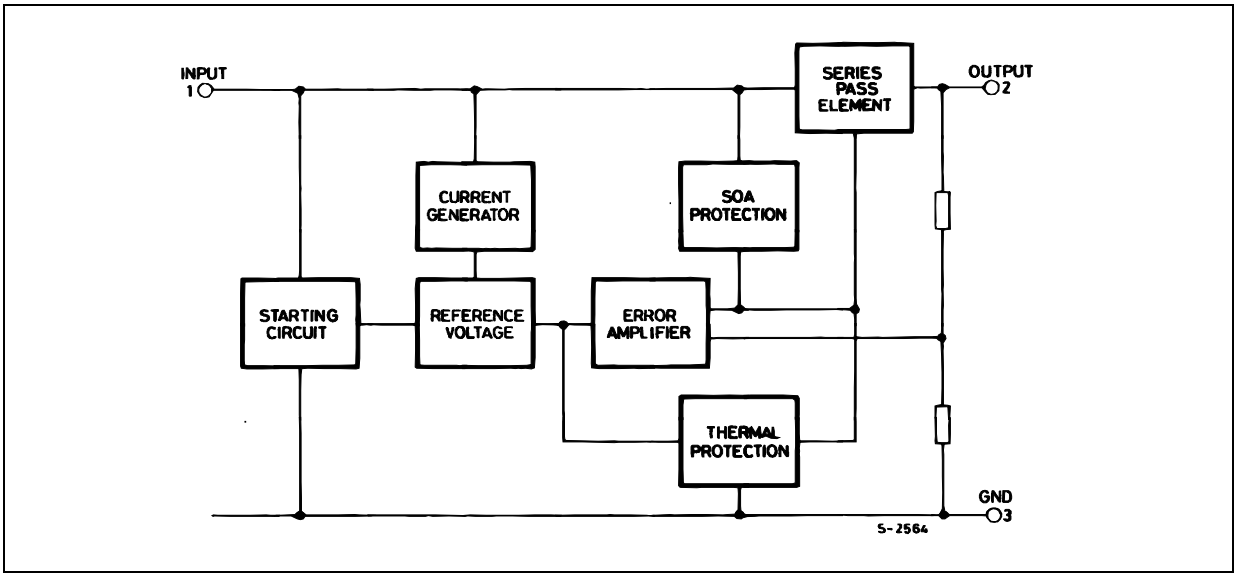


Table 1: Absolute Maximum Ratings

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
$R_{thj\text{-}case}$	Thermal Resistance Junction-case Max	5	5		°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient Max	50	60		°C/W

Figure 2: Schematic Diagram

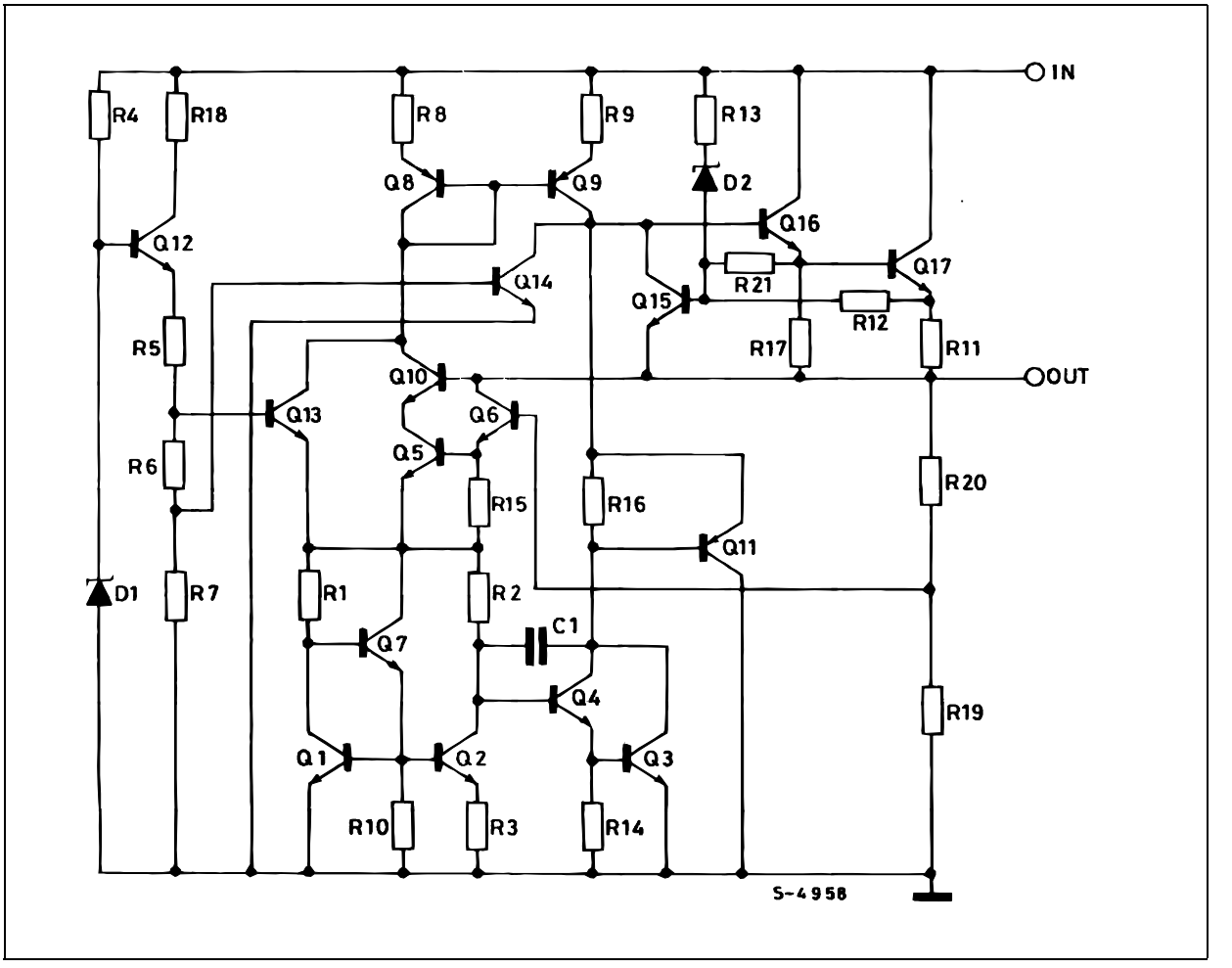
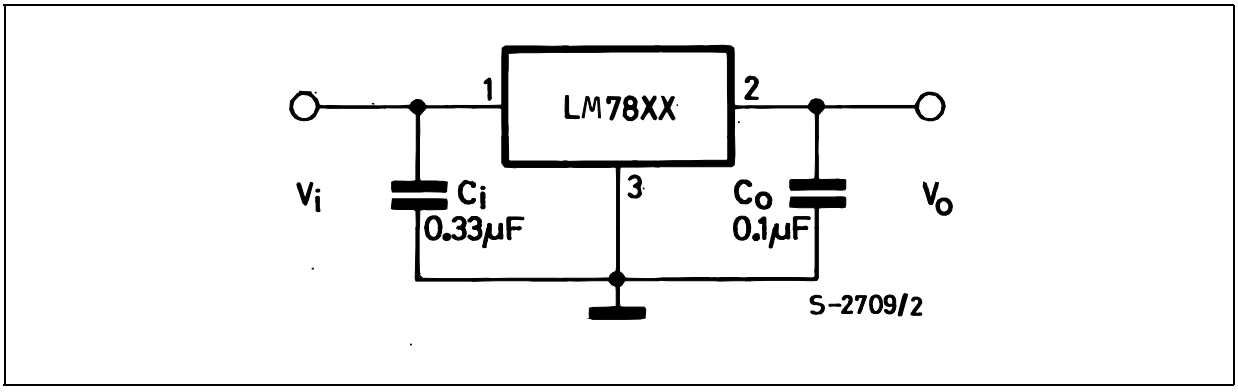


Figure 4: Application Circuits



TEST CIRCUITS

Figure 5: DC Parameter

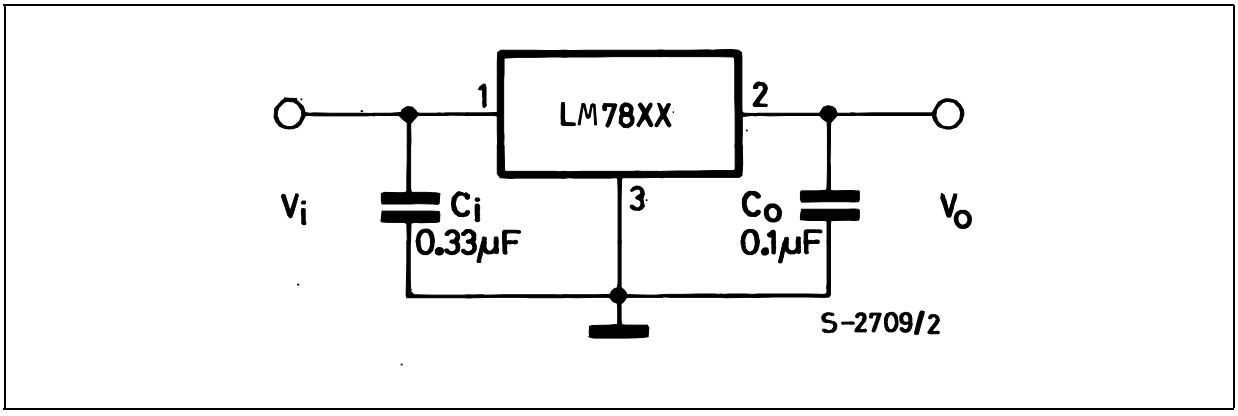


Figure 6: Load Regulation

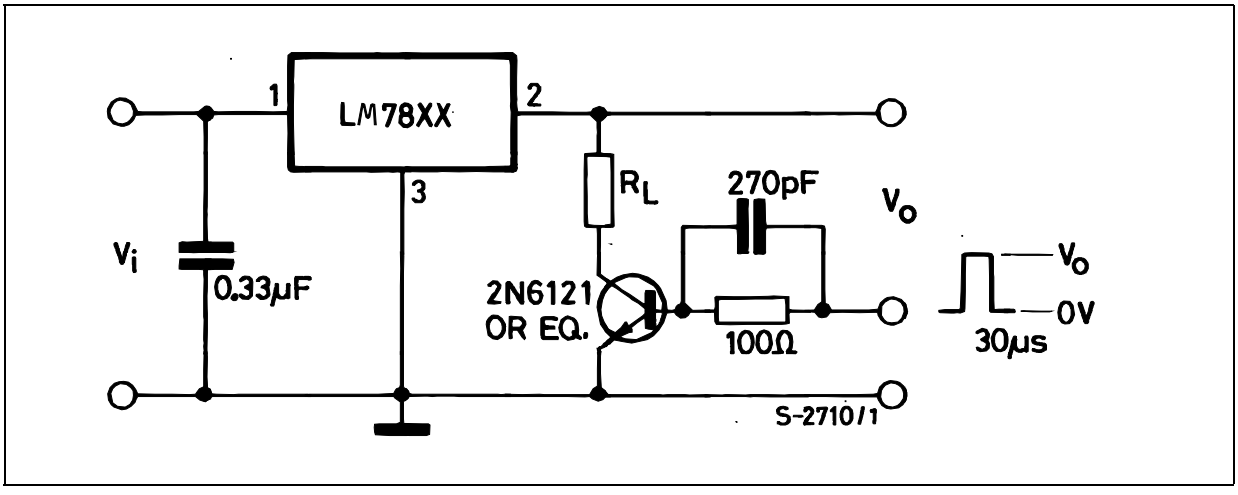


Figure 7: Ripple Rejection

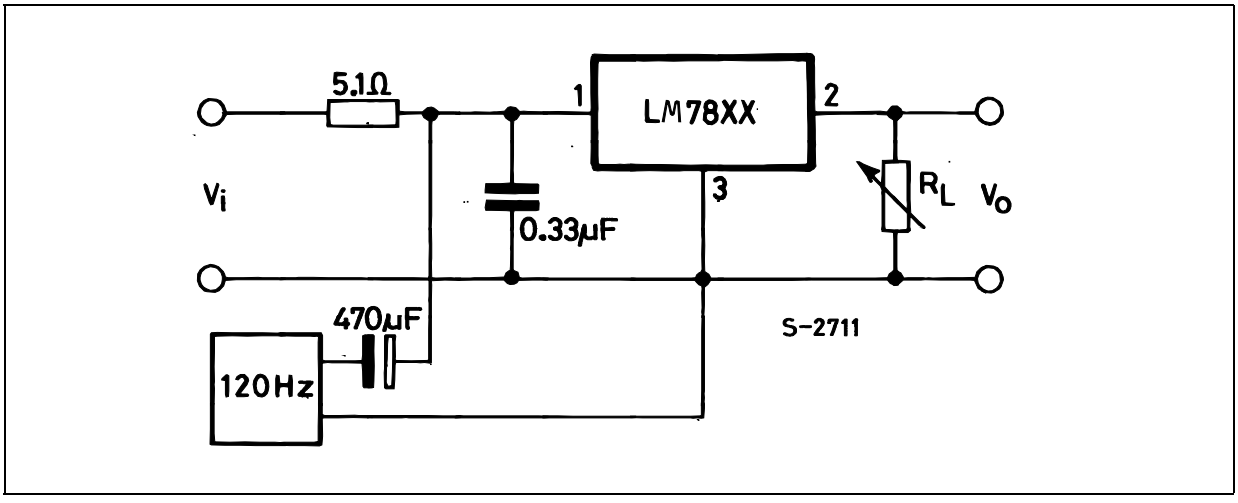


Table 4: Electrical Characteristics Of LM7805 (refer to the test circuits, T_J = -55 to 150°C, V_I = 10V, I_O = 500 mA, C_I = 0.33 µF, C_O = 0.1 µF unless otherwise specified).

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 LM7806 (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 $P_O \le$ 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 LM7808 (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 $P_O \le$ 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 LM7812 (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 $P_O \le$ 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 LM7815 (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 $P_O \le$ 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 LM7818 (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 $P_O \le$ 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 11: Electrical Characteristics Of LM7824 (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 $P_O \le$ 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 LM7805C (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 $P_O \le$ 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 14: Electrical Characteristics Of LM7806C (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 $P_O \le$ 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 LM7808C (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 $P_O \le$ 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 17: Electrical Characteristics Of LM7809C (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 $P_O \le$ 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 LM7810C (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 $P_O \le$ 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 LM7812C (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 $P_O \le$ 15W V_I = 14.5 to 27 V	11.4	12	12.6	V
ΔV_O(*)	Line Regulation	V_I = 14.5 to 30 V T_J = 25°C			240	mV
		V_I = 16 to 22 V T_J = 25°C			120	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			240	mV
		I_O = 250 to 750 mA T_J = 25°C			120	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 14.5 to 30 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		75		µV/V_O
SVR	Supply Voltage Rejection	V_I = 15 to 25 V f = 120Hz	55			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		18		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.35		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

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

Table 20: Electrical Characteristics Of LM7815C (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 $P_O \le$ 15W V_I = 17.5 to 30 V	14.25	15	15.75	V
ΔV_O(*)	Line Regulation	V_I = 17.5 to 30 V T_J = 25°C			300	mV
		V_I = 20 to 26 V T_J = 25°C			150	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			300	mV
		I_O = 250 to 750 mA T_J = 25°C			150	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 17.5 to 30 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		90		µV/V_O
SVR	Supply Voltage Rejection	V_I = 18.5 to 28.5 V f = 120Hz	54			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		19		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.23		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.2		A

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

Table 21: Electrical Characteristics Of LM7818C (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 $P_O \le$ 15W V_I = 21 to 33 V	17.1	18	18.9	V
ΔV_O(*)	Line Regulation	V_I = 21 to 33 V T_J = 25°C			360	mV
		V_I = 24 to 30 V T_J = 25°C			180	
ΔV_O(*)	Load Regulation	I_O = 5 mA to 1.5 A T_J = 25°C			360	mV
		I_O = 250 to 750 mA T_J = 25°C			180	
I_d	Quiescent Current	T_J = 25°C			8	mA
ΔI_d	Quiescent Current Change	I_O = 5 mA to 1 A			0.5	mA
		V_I = 21 to 33 V			1	
$\Delta V_O/\Delta T$	Output Voltage Drift	I_O = 5 mA		-1		mV/°C
eN	Output Noise Voltage	B =10Hz to 100KHz T_J = 25°C		110		µV/V_O
SVR	Supply Voltage Rejection	V_I = 22 to 32 V f = 120Hz	53			dB
V_d	Dropout Voltage	I_O = 1 A T_J = 25°C		2		V
R_O	Output Resistance	f = 1 KHz		22		mΩ
I_{sc}	Short Circuit Current	V_I = 35 V T_J = 25°C		0.20		A
I_{scp}	Short Circuit Peak Current	T_J = 25°C		2.1		A

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

Table 23: Electrical Characteristics Of LM7824C (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 $P_O \le$ 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		$\mu V/V_O$
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

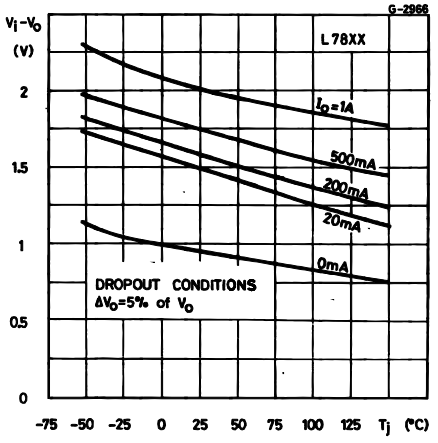


Figure 9: Peak Output Current vs Input/output Differential Voltage

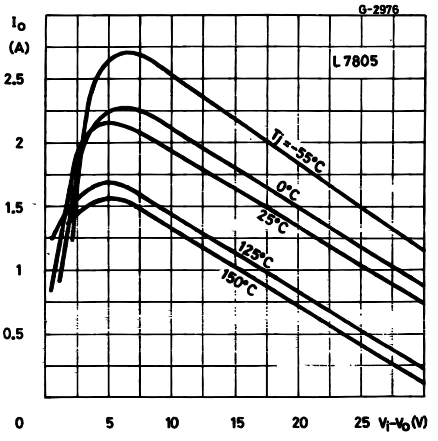


Figure 10: Supply Voltage Rejection vs Frequency

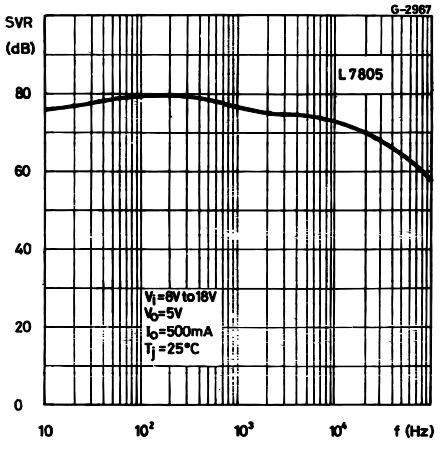


Figure 11: Output Voltage vs Junction Temperature

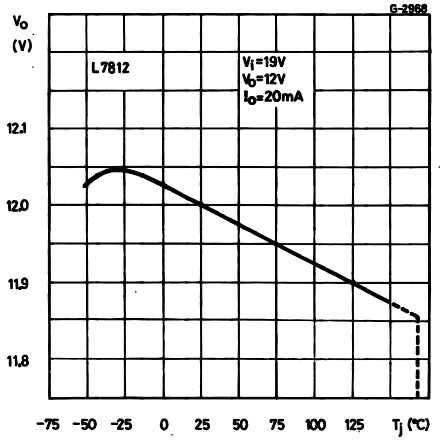


Figure 12: Output Impedance vs Frequency

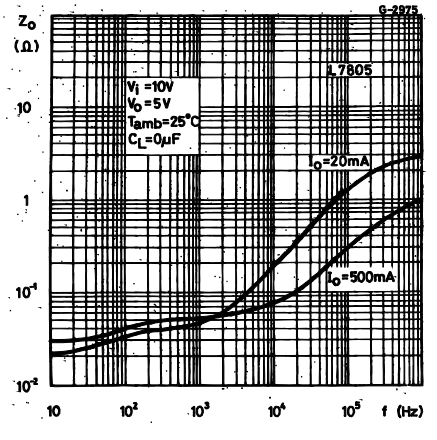


Figure 13: Quiescent Current vs Junction Temperature

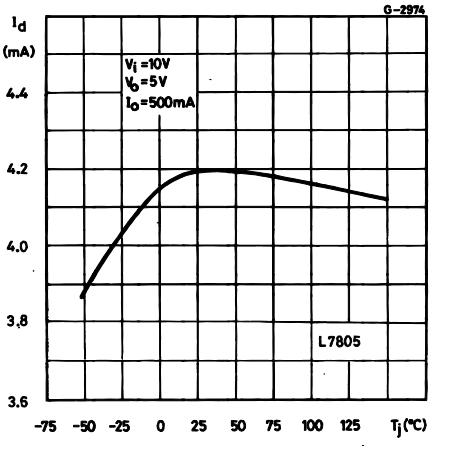


Figure 14: Load Transient Response

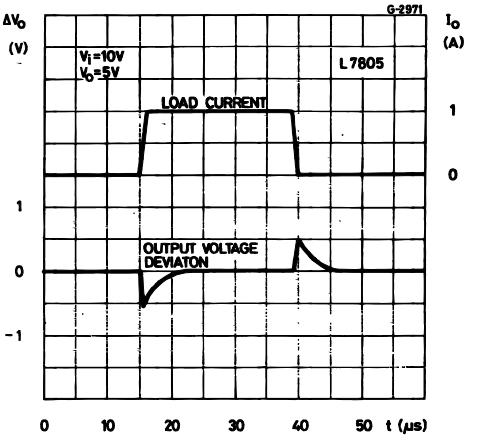


Figure 15: Line Transient Response

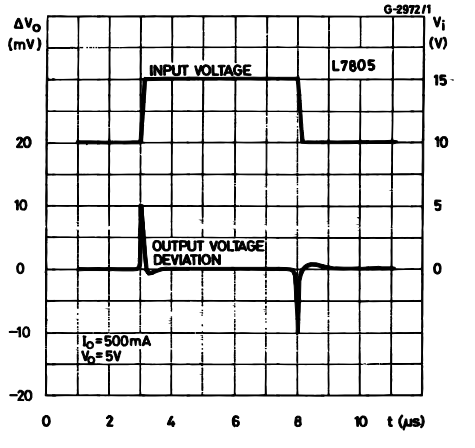


Figure 16: Quiescent Current vs Input Voltage

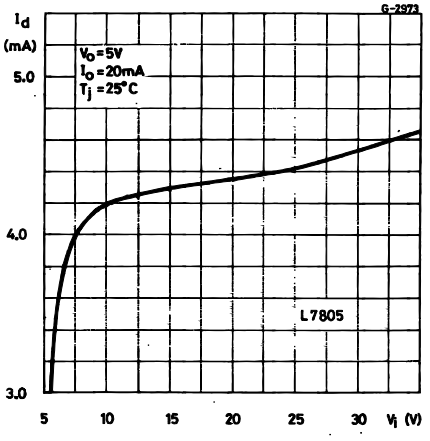
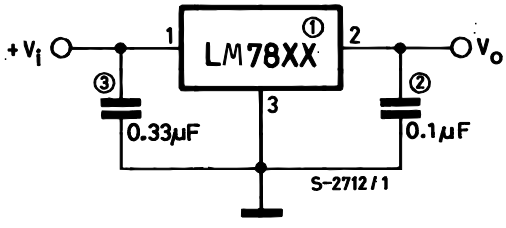
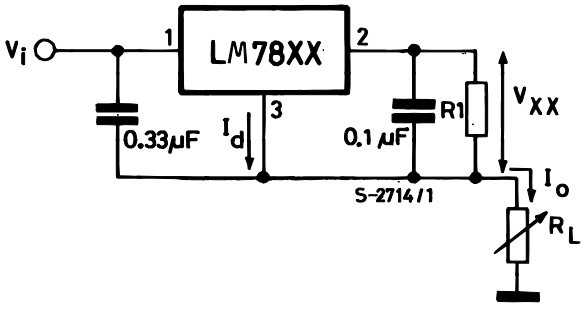


Figure 17: Fixed Output Regulator



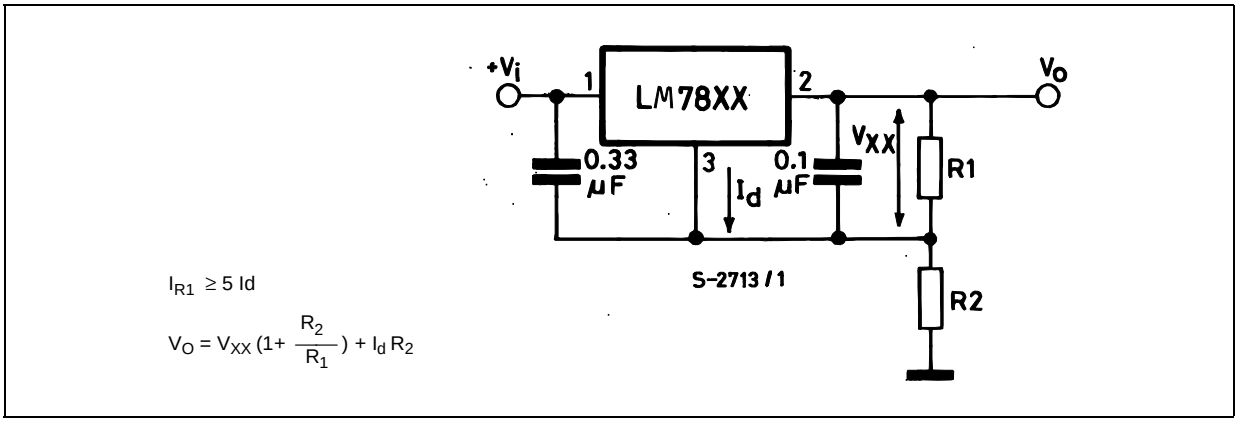
NOTE:
1. To specify an output voltage, substitute voltage value for "XX".
2. Although no output capacitor is need for stability, it does improve transient response.
3. Required if regulator is locate an appreciable distance from power supply filter.

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)

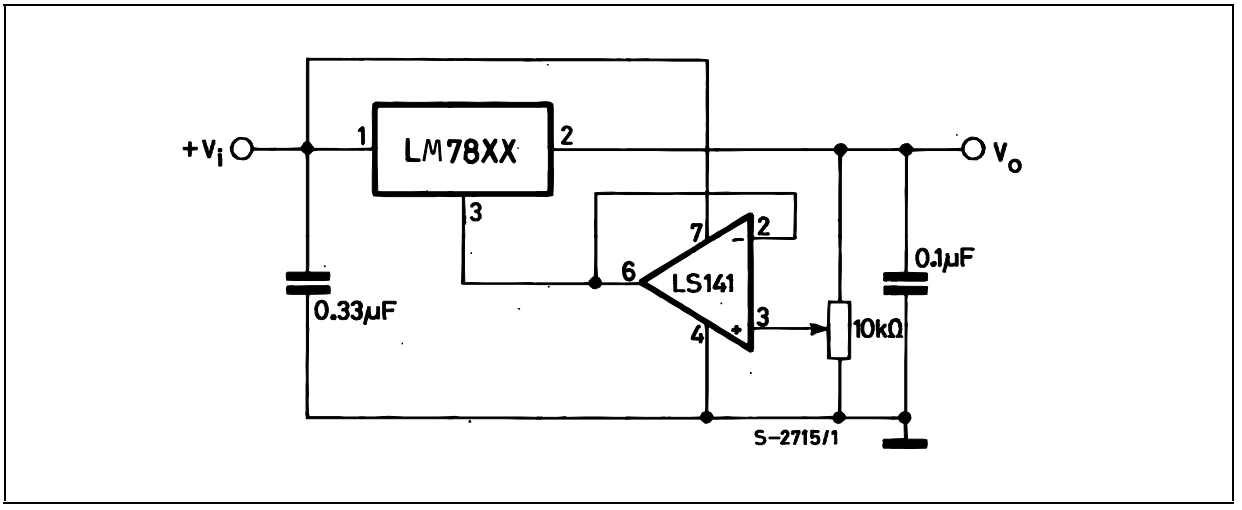
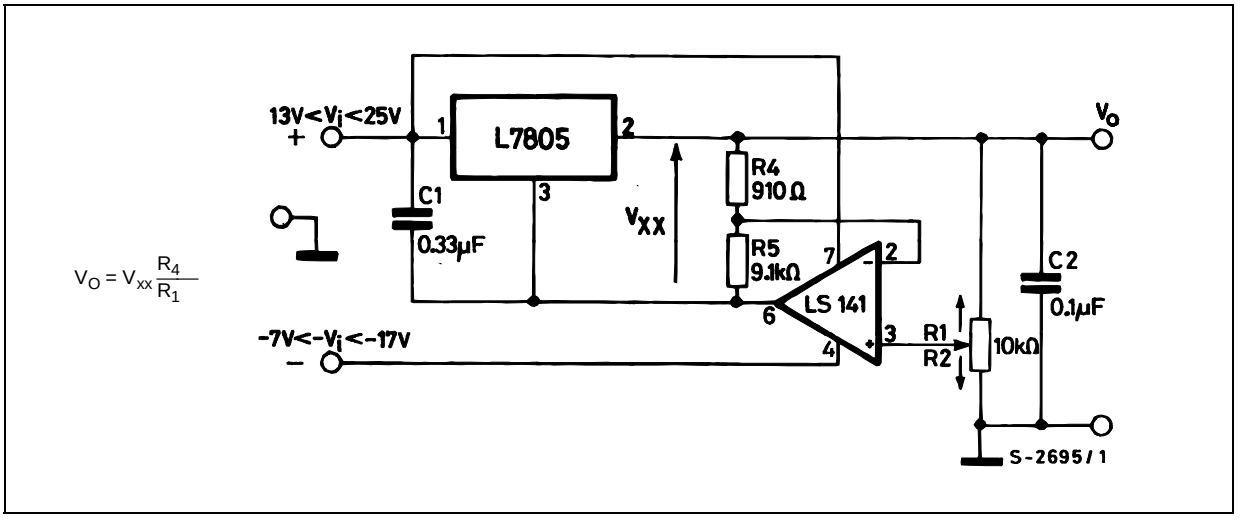


Figure 21: 0.5 to 10V Regulator



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

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