FAIRCHILD SEMICONDUCTOR®

August 2013

LM78XX / LM78XXA
3-Terminal 1 A Positive Voltage Regulator

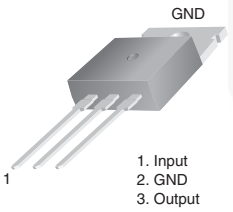
Features

- Output Current up to 1 A
- Output Voltages: 5, 6, 8, 9, 10, 12, 15, 18, 24 V
- Thermal Overload Protection
- Short-Circuit Protection
- Output Transistor Safe Operating Area Protection

Description

The LM78XX series of three-terminal positive regulators is available in the TO-220 package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut-down, and safe operating area protection. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed-voltage regulators, these devices can be used with external components for adjustable voltages and currents.

TO-220 (Single Gauge)



Ordering Information(1)

Product Number	Output Voltage Tolerance	Package	Operating Temperature	Packing Method
LM7805CT	±4%	TO-220 (Single Gauge)	-40°C to +125°C	Rail
LM7806CT				
LM7808CT				
LM7809CT				
LM7810CT				
LM7812CT				
LM7815CT				
LM7818CT				
LM7824CT				
LM7805ACT	±2%		0°C to +125°C	
LM7809ACT				
LM7810ACT				
LM7812ACT				
LM7815ACT				

Note:

1. Above output voltage tolerance is available at 25°C.

Block Diagram

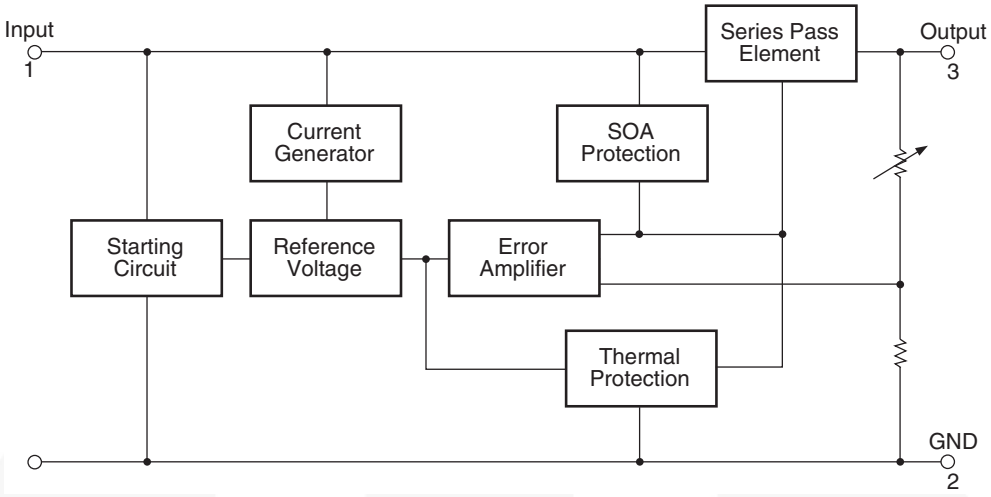


Figure 1. Block Diagram

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter		Value	Unit
V_I	Input Voltage	V_O = 5 V to 18 V	35	V
		V_O = 24 V	40	
$R_{\theta JC}$	Thermal Resistance, Junction-Case (TO-220)		5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-Air (TO-220)		65	°C/W
T_{OPR}	Operating Temperature Range	LM78xx	-40 to +125	°C
		LM78xxA	0 to +125	
T_{STG}	Storage Temperature Range		- 65 to +150	°C

Electrical Characteristics (LM7805)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 10 V, C_I = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		4.80	5.00	5.20	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 7 V to 20 V		4.75	5.00	5.25	
Regline	Line Regulation(2)	T_J = +25°C	V_I = 7 V to 25 V		4.0	100.0	mV
			V_I = 8 V to 12 V		1.6	50.0	
Regload	Load Regulation(2)	T_J = +25°C	I_O = 5 mA to 1.5 A		9.0	100.0	mV
			I_O = 250 mA to 750 mA		4.0	50.0	
I_Q	Quiescent Current	T_J =+25°C			5.0	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A			0.03	0.50	mA
		V_I = 7 V to 25 V			0.30	1.30	
$\Delta V_O/\Delta T$	Output Voltage Drift(3)	I_O = 5 mA			-0.8		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			42.0		µV/V_O
RR	Ripple Rejection(3)	f = 120 Hz, V_I = 8 V to 18 V		62.0	73.0		dB
V_{DROP}	Dropout Voltage	T_J = +25°C, I_O = 1 A			2.0		V
R_O	Output Resistance(3)	f = 1 kHz			15.0		mΩ
I_{SC}	Short-Circuit Current	T_J = +25°C, V_I = 35 V			230		mA
I_{PK}	Peak Current(3)	T_J = +25°C			2.2		A

Notes:

2. 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 is used.
3. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7806)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 11 V, C_I = 0.33 µF,C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		5.75	6.00	6.25	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 8.0 V to 21 V		5.70	6.00	6.30	
Regline	Line Regulation(4)	T_J = +25°C	V_I = 8 V to 25 V		5.0	120	mV
			V_I = 9 V to 13 V		1.5	60.0	
Regload	Load Regulation(4)	T_J = +25°C	I_O = 5 mA to 1.5 A		9.0	120.0	mV
			I_O = 250 mA to 750 mA		3.0	60.0	
I_Q	Quiescent Current	T_J =+25°C			5.0	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 8 V to 25 V				1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift(5)	I_O = 5 mA			-0.8		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			45.0		µV/V_O
RR	Ripple Rejection(5)	f = 120 Hz, V_I = 8 V to 18 V		62.0	73.0		dB
V_{DROP}	Dropout Voltage	T_J = +25°C, I_O = 1 A			2.0		V
R_O	Output Resistance(5)	f = 1 kHz			19.0		mΩ
I_{SC}	Short-Circuit Current	T_J = +25°C, V_I = 35 V			250		mA
I_{PK}	Peak Current(5)	T_J = +25°C			2.2		A

Notes:

4. 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 is used.
5. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7808)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 14 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		7.7	8.0	8.3	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 10.5 V to 23 V		7.6	8.0	8.4	
Regline	Line Regulation[6]	T_J = +25°C	V_I = 10.5 V to 25 V		5.0	160.0	mV
			V_I = 11.5 V to 17 V		2.0	80.0	
Regload	Load Regulation[6]	T_J = +25°C	I_O = 5 mA to 1.5 A		10.0	160.0	mV
			I_O = 250 mA to 750 mA		5.0	80.0	
I_Q	Quiescent Current	T_J =+25°C			5.0	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A			0.05	0.50	mA
		V_I = 10.5 V to 25 V			0.5	1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift[7]	I_O = 5 mA			-0.8		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			52.0		µV/V_O
RR	Ripple Rejection[7]	f = 120 Hz, V_I = 11.5 V to 21.5 V		56.0	73.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2.0		V
R_O	Output Resistance[7]	f = 1 kHz			17.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J = +25°C			230		mA
I_{PK}	Peak Current[7]	T_J = +25°C			2.2		A

Notes:

6. 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 is used.
7. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7809)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 15 V, C_I = 0.33 µF,C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		8.65	9.00	9.35	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 11.5 V to 24 V		8.60	9.00	9.40	
Regline	Line Regulation[8]	T_J = +25°C	V_I = 11.5 V to 25 V		6.0	180.0	mV
			V_I = 12 V to 17 V		2.0	90.0	
Regload	Load Regulation[8]	T_J = +25°C	I_O = 5 mA to 1.5 A		12.0	180.0	mV
			I_O = 250 mA to 750 mA		4.0	90.0	
I_Q	Quiescent Current	T_J =+25°C			5.0	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 11.5 V to 26 V				1.3	
$\Delta V_O/\Delta T$	Output Voltage Drift[9]	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			58.0		µV/V_O
RR	Ripple Rejection[9]	f = 120 Hz, V_I = 13 V to 23 V		56.0	71.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2.0		V
R_O	Output Resistance[9]	f = 1 kHz			17.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J = +25°C			250		mA
I_{PK}	Peak Current[9]	T_J = +25°C			2.2		A

Notes:

8. 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 is used.
9. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7810)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 16 V, C_I = 0.33 µF,C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		9.6	10.0	10.4	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 12.5 V to 25 V		9.5	10.0	10.5	
Regline	Line Regulation(10)	T_J = +25°C	V_I = 12.5 V to 25 V		10	200	mV
			V_I = 13 V to 25 V		3	100	
Regload	Load Regulation(10)	T_J = +25°C	I_O = 5 mA to 1.5 A		12	200	mV
			I_O = 250 mA to 750 mA		4	400	
I_Q	Quiescent Current	T_J =+25°C			5.1	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 12.5 V to 29 V				1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(11)	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			58.0		µV/V_O
RR	Ripple Rejection(11)	f = 120 Hz, V_I = 13 V to 23 V		56.0	71.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2.0		V
R_O	Output Resistance(11)	f = 1 kHz			17.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J = +25°C			250		mA
I_{PK}	Peak Current(11)	T_J = +25°C			2.2		A

Notes:

10. 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 is used.
11. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7812)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 19 V, C_I = 0.33 µF,C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		11.5	12.0	12.5	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 14.5 V to 27 V		11.4	12.0	12.6	
Regline	Line Regulation(12)	T_J = +25°C	V_I = 14.5 V to 30 V		10	240	mV
			V_I = 16 V to 22 V		3	120	
Regload	Load Regulation(12)	T_J = +25°C	I_O = 5 mA to 1.5 A		11	240	mV
			I_O = 250 mA to 750 mA		5	120	
I_Q	Quiescent Current	T_J =+25°C			5.1	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A			0.1	0.5	mA
		V_I = 14.5 V to 30 V			0.5	1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(13)	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			76.0		µV/V_O
RR	Ripple Rejection(13)	f = 120 Hz, V_I = 15 V to 25 V		55.0	71.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2.0		V
R_O	Output Resistance(13)	f = 1 kHz			18.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J = +25°C			230		mA
I_{PK}	Peak Current(13)	T_J = +25°C			2.2		A

Notes:

12. 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 is used.
13. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7815)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 23 V, C_I = 0.33 µF,C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		14.40	15.00	15.60	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 17.5 V to 30 V		14.25	15.00	15.75	
Regline	Line Regulation(14)	T_J = +25°C	V_I = 17.5 V to 30 V		11	300	mV
			V_I = 20 V to 26 V		3	150	
Regload	Load Regulation(14)	T_J = +25°C	I_O = 5 mA to 1.5 A		12	300	mV
			I_O = 250 mA to 750 mA		4	150	
I_Q	Quiescent Current	T_J =+25°C			5.2	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 17.5 V to 30 V				1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(15)	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			90.0		µV/V_O
RR	Ripple Rejection(15)	f = 120 Hz, V_I = 18.5 V to 28.5 V		54.0	70.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J =+25°C			2.0		V
R_O	Output Resistance(15)	f = 1 kHz			19.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J = +25°C			250		mA
I_{PK}	Peak Current(15)	T_J = +25°C			2.2		A

Notes:

14. 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 is used.
15. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7818)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 27 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		17.3	18.0	18.7	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 21 V to 33 V		17.1	18.0	18.9	
Regline	Line Regulation(16)	T_J = +25°C	V_I = 21 V to 33 V		15	360	mV
			V_I = 24 V to 30 V		5	180	
Regload	Load Regulation(16)	T_J = +25°C	I_O = 5 mA to 1.5 A		15	360	mV
			I_O = 250 mA to 750 mA		5	180	
I_Q	Quiescent Current	T_J =+25°C			5.2	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 21 V to 33 V				1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift(17)	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			110		µV/V_O
RR	Ripple Rejection(17)	f = 120 Hz, V_I = 22 V to 32 V		53.0	69.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J =+25°C			2.0		V
R_O	Output Resistance(17)	f = 1 kHz			22.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J =+25°C			250		mA
I_{PK}	Peak Current(17)	T_J =+25°C			2.2		A

Notes:

16. 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 is used.
17. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7824)

Refer to the test circuit, -40°C < T_J < 125°C, I_O = 500 mA, V_I = 33 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		23.00	24.00	25.00	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 27 V to 38 V		22.80	24.00	25.25	
Regline	Line Regulation[18]	T_J = +25°C	V_I = 27 V to 38 V		17	480	mV
			V_I = 30 V to 36 V		6	240	
Regload	Load Regulation[18]	T_J = +25°C	I_O = 5 mA to 1.5 A		15	480	mV
			I_O = 250 mA to 750 mA		5	240	
I_Q	Quiescent Current	T_J =+25°C			5.2	8.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A			0.1	0.5	mA
		V_I = 27 V to 38 V			0.5	1.0	
$\Delta V_O/\Delta T$	Output Voltage Drift[19]	I_O = 5 mA			-1.5		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			6.0		µV/V_O
RR	Ripple Rejection[19]	f = 120 Hz, V_I = 28 V to 38 V		50.0	67.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2.0		V
R_O	Output Resistance[19]	f = 1 kHz			28.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J = +25°C			230		mA
I_{PK}	Peak Current[19]	T_J = +25°C			2.2		A

Notes:

18. 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 is used.
19. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7805A)

Refer to the test circuit, 0°C < T_J < 125°C, I_O = 1 A, V_I = 10 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		4.9	5.0	5.1	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 7.5 V to 20 V		4.8	5.0	5.2	
Regline	Line Regulation[20]	V_I = 7.5 V to 25 V, I_O = 500 mA			5.0	50.0	mV
		V_I = 8 V to 12 V			3.0	50.0	
		T_J = +25°C	V_I = 7.3 V to 20 V		5.0	50.0	
			V_I = 8 V to 12 V		1.5	25.0	
Regload	Load Regulation[20]	T_J = +25°C, I_O = 5 mA to 1.5 A			9.0	100.0	mV
		I_O = 5 mA to 1 A			9.0	100.0	
		I_O = 250 mA to 750 mA			4.0	50.0	
I_Q	Quiescent Current	T_J =+25°C			5.0	6.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 8 V to 25 V, I_O = 500 mA				0.8	
		V_I = 7.5 V to 20 V, T_J = +25°C				0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift[21]	I_O = 5 mA			-0.8		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			10.0		µV/V_O
RR	Ripple Rejection[21]	f = 120 Hz, V_O = 500 mA, V_I =8 V to 18 V			68.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J =+25°C			2.0		V
R_O	Output Resistance[21]	f = 1 kHz			17.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J =+25°C			250		mA
I_{PK}	Peak Current[21]	T_J =+25°C			2.2		A

Notes:

20. 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 is used.

21. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7809A)

Refer to the test circuit, 0°C < T_J < 125°C, I_O = 1 A, V_I = 15 V, C_I = 0.33 µF,C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		8.82	9.00	9.16	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 11.2 V to 24 V		8.65	9.00	9.35	
Regline	Line Regulation[22]	V_I = 11.7 V to 25 V, I_O = 500 mA			6.0	90.0	mV
		V_I = 12.5 V to 19 V			4.0	45.0	
		T_J = +25°C	V_I = 11.5 V to 24 V		6.0	90.0	
			V_I = 12.5 V to 19 V		2.0	45.0	
Regload	Load Regulation[22]	T_J = +25°C, I_O = 5 mA to 1.5 A			12.0	100.0	mV
		I_O = 5 mA to 1 A			12.0	100.0	
		I_O = 250 mA to 750 mA			5.0	50.0	
I_Q	Quiescent Current	T_J = +25°C			5.0	6.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 12 V to 25 V, I_O = 500 mA				0.8	
		V_I = 11.7 V to 25 V, T_J = +25°C				0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift[23]	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			10.0		µV/V_O
RR	Ripple Rejection[23]	f = 120 Hz, V_O = 500 mA, V_I =12 V to 22 V			62.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2.0		V
R_O	Output Resistance[23]	f = 1 kHz			17.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J = +25°C			250		mA
I_{PK}	Peak Current[23]	T_J = +25°C			2.2		A

Notes:

22. 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 is used.

23. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7810A)

Refer to the test circuit, 0°C < T_J < 125°C, I_O = 1 A, V_I = 16 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		9.8	10.0	10.2	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 12.8 V to 25 V		9.6	10.0	10.4	
Regline	Line Regulation[24]	V_I = 12.8 V to 26 V, I_O = 500 mA			8.0	100.0	mV
		V_I = 13 V to 20 V			4.0	50.0	
		T_J = +25°C	V_I = 12.5 V to 25 V		8.0	100.0	
			V_I = 13 V to 20 V		3.0	50.0	
Regload	Load Regulation[24]	T_J = +25°C, I_O = 5 mA to 1.5 A			12.0	100.0	mV
		I_O = 5 mA to 1 A			12.0	100.0	
		I_O = 250 mA to 750 mA			5.0	50.0	
I_Q	Quiescent Current	T_J =+25°C			5.0	6.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 12.8 V to 25 V, I_O = 500 mA				0.8	
		V_I = 13 V to 26 V, T_J = +25°C				0.5	
$\Delta V_O/\Delta T$	Output Voltage Drift[25]	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			10.0		µV/V_O
RR	Ripple Rejection[25]	f = 120 Hz, V_O = 500 mA, V_I =14 V to 24 V			62.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J =+25°C			2.0		V
R_O	Output Resistance[25]	f = 1 kHz			17.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J =+25°C			250		mA
I_{PK}	Peak Current[25]	T_J =+25°C			2.2		A

Notes:

24. 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 is used.

25. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7812A)

Refer to the test circuit, 0°C < T_J < 125°C, I_O = 1 A, V_I = 19 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		11.75	12.00	12.25	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 14.8 V to 27 V		11.50	12.00	12.50	
Regline	Line Regulation[26]	V_I = 14.8 V to 30 V, I_O = 500 mA			10.0	120.0	mV
		V_I = 16 V to 22 V			4.0	120.0	
		T_J = +25°C	V_I = 14.5 V to 27 V		10.0	120.0	
			V_I = 16 V to 22 V		3.0	60.0	
Regload	Load Regulation[26]	T_J = +25°C, I_O = 5 mA to 1.5 A			12.0	100.0	mV
		I_O = 5 mA to 1 A			12.0	100.0	
		I_O = 250 mA to 750 mA			5.0	50.0	
I_Q	Quiescent Current	T_J = +25°C			5.0	6.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 14 V to 27 V, I_O = 500 mA				0.8	
		V_I = 15 V to 30 V, T_J = +25°C				0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift[27]	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			10.0		µV/V_O
RR	Ripple Rejection[27]	f = 120 Hz, V_O = 500 mA, V_I =14 V to 24 V			60.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J = +25°C			2.0		V
R_O	Output Resistance[27]	f = 1 kHz			18.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J = +25°C			250		mA
I_{PK}	Peak Current[27]	T_J = +25°C			2.2		A

Notes:

26. 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 is used.
27. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (LM7815A)

Refer to the test circuit, 0°C < T_J < 125°C, I_O = 1 A, V_I = 23 V, C_I = 0.33 µF, C_O = 0.1 µF, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_O	Output Voltage	T_J = +25°C		14.75	15.00	15.30	V
		I_O = 5 mA to 1 A, $P_O \leq$ 15 W, V_I = 17.7 V to 30 V		14.40	15.00	15.60	
Regline	Line Regulation[28]	V_I = 17.4 V to 30 V, I_O = 500 mA			10.0	150.0	mV
		V_I = 20 V to 26 V			5.0	150.0	
		T_J = +25°C	V_I = 17.5 V to 30 V		11.0	150.0	
			V_I = 20 V to 26 V		3.0	75.0	
Regload	Load Regulation[28]	T_J = +25°C, I_O = 5 mA to 1.5 A			12.0	100.0	mV
		I_O = 5 mA to 1 A			12.0	100.0	
		I_O = 250 mA to 750 mA			5.0	50.0	
I_Q	Quiescent Current	T_J =+25°C			5.2	6.0	mA
ΔI_Q	Quiescent Current Change	I_O = 5 mA to 1 A				0.5	mA
		V_I = 17.5 V to 30 V, I_O = 500 mA				0.8	
		V_I = 17.5 V to 30 V, T_J = +25°C				0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift[29]	I_O = 5 mA			-1.0		mV/°C
V_N	Output Noise Voltage	f = 10 Hz to 100 kHz, T_A = +25°C			10.0		µV/V_O
RR	Ripple Rejection[29]	f = 120 Hz, V_O = 500 mA, V_I =18.5 V to 28.5 V			58.0		dB
V_{DROP}	Dropout Voltage	I_O = 1 A, T_J =+25°C			2.0		V
R_O	Output Resistance[29]	f = 1 kHz			19.0		mΩ
I_{SC}	Short-Circuit Current	V_I = 35 V, T_J =+25°C			250		mA
I_{PK}	Peak Current[29]	T_J =+25°C			2.2		A

Notes:

28. 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 is used.
29. These parameters, although guaranteed, are not 100% tested in production.

Typical Performance Characteristics

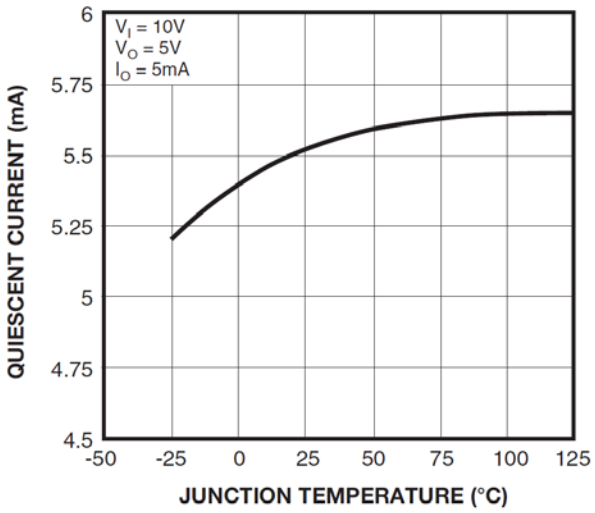


Figure 2. Quiescent Current

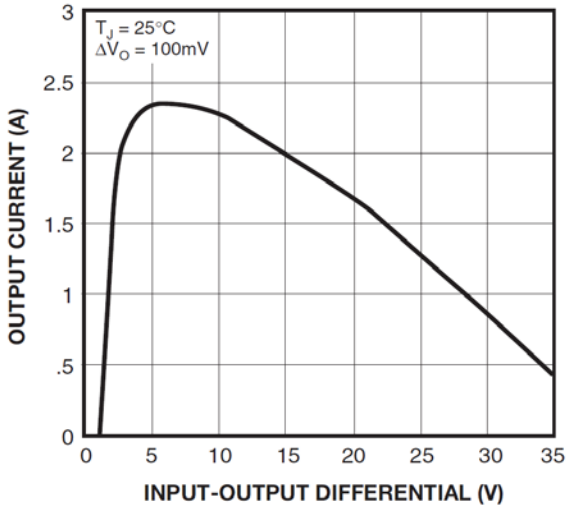


Figure 3. Peak Output Current

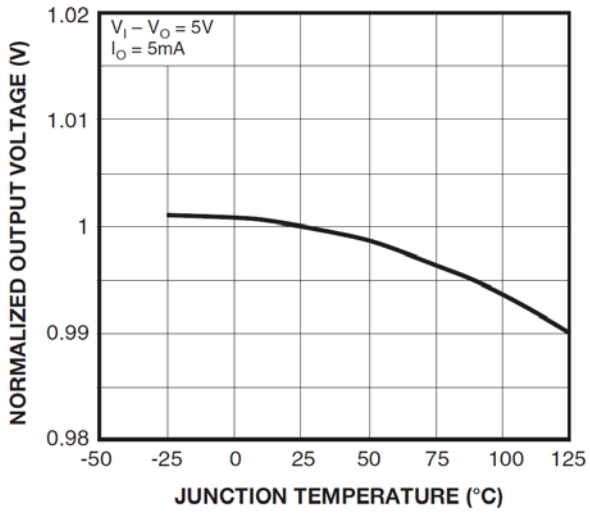


Figure 4. Output Voltage

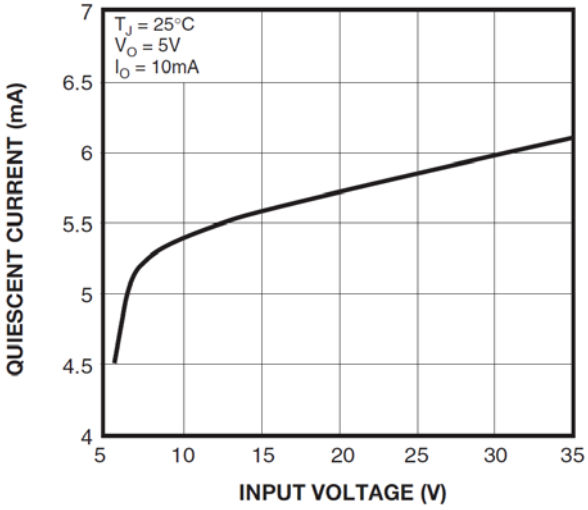


Figure 5. Quiescent Current

Typical Applications

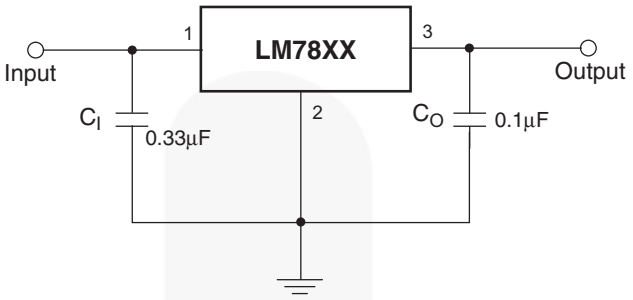


Figure 6. DC Parameters

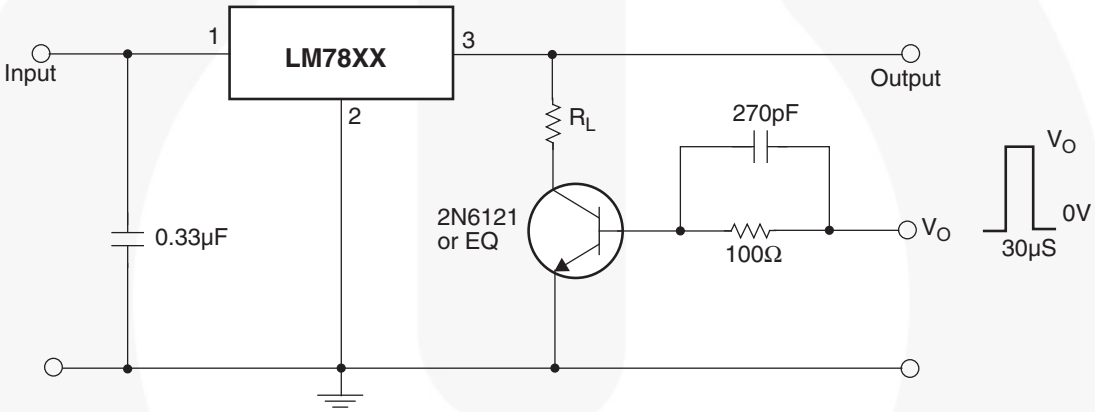


Figure 7. Load Regulation

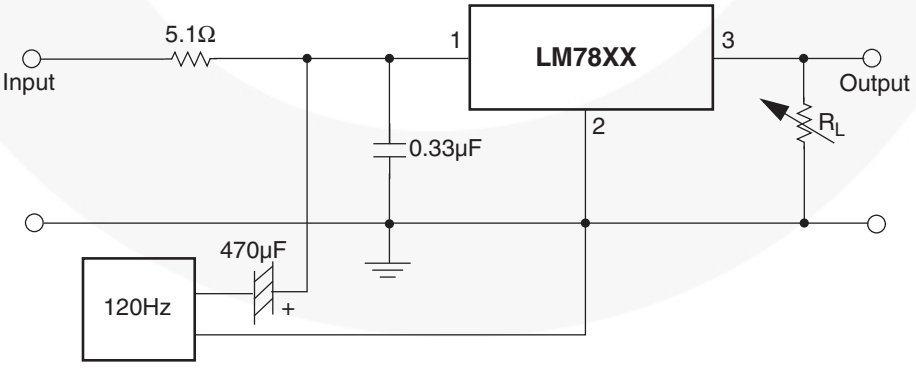


Figure 8. Ripple Rejection

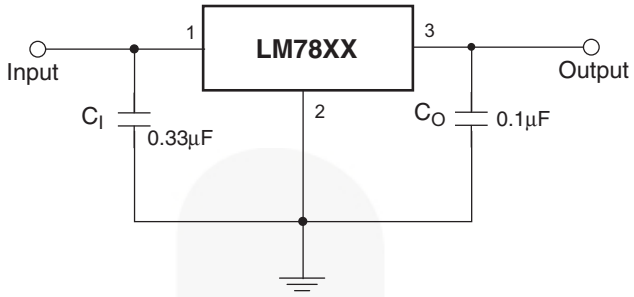
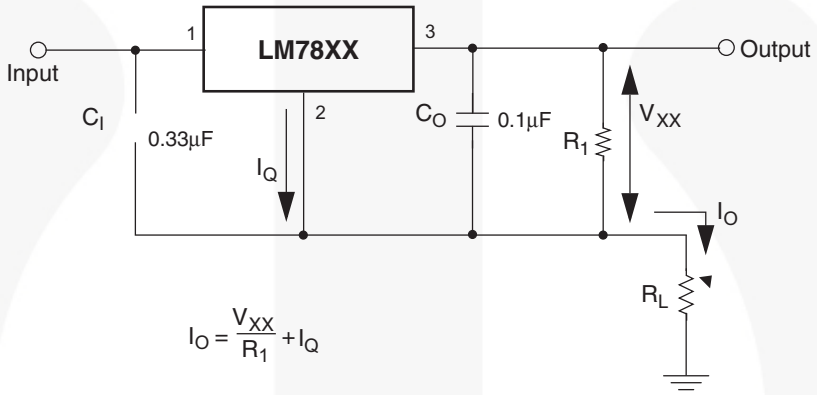


Figure 9. Fixed-Output Regulator



Notes:

29. To specify an output voltage, substitute voltage value for “XX”. A common ground is required between the input and the output voltage. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

30. C_I is required if regulator is located an appreciable distance from power supply filter.

31. C_O improves stability and transient response.

Figure 10.

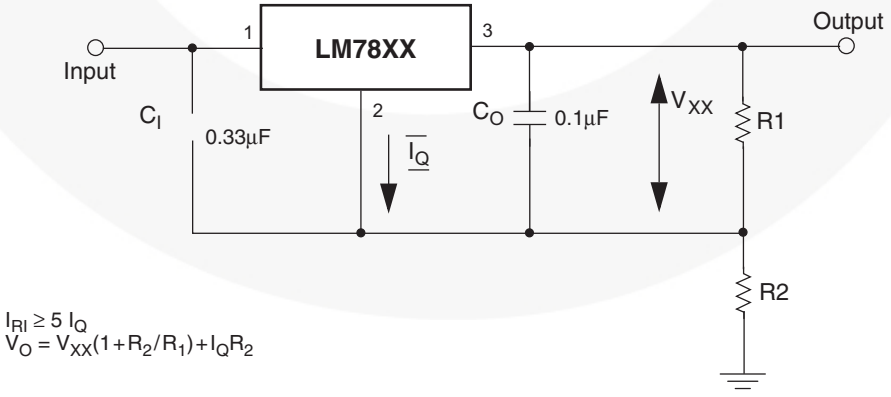


Figure 11. Circuit for Increasing Output Voltage

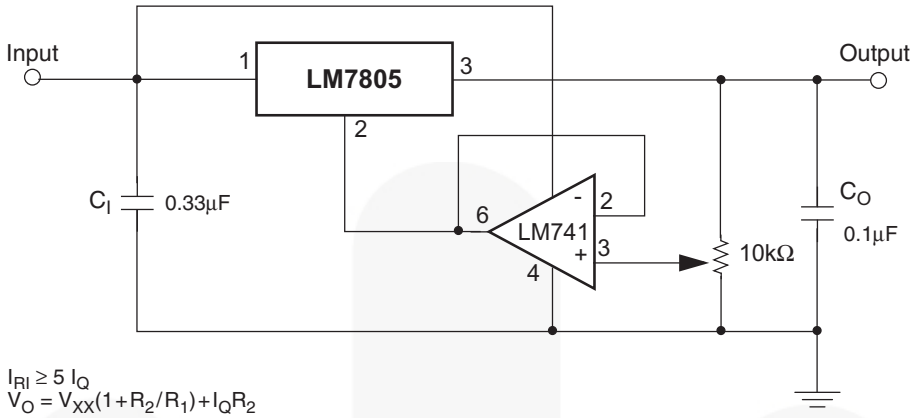


Figure 12. Adjustable Output Regulator (7 V to 30 V)

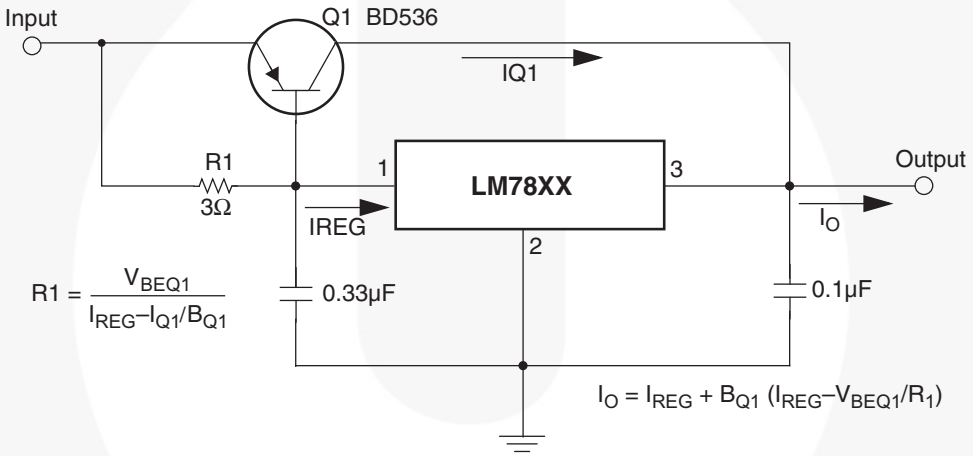


Figure 13. High-Current Voltage Regulator

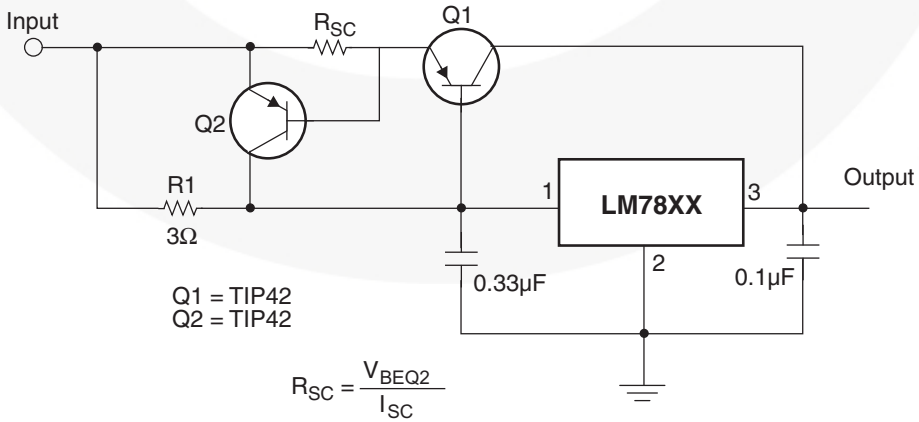


Figure 14. High Output Current with Short-Circuit Protection

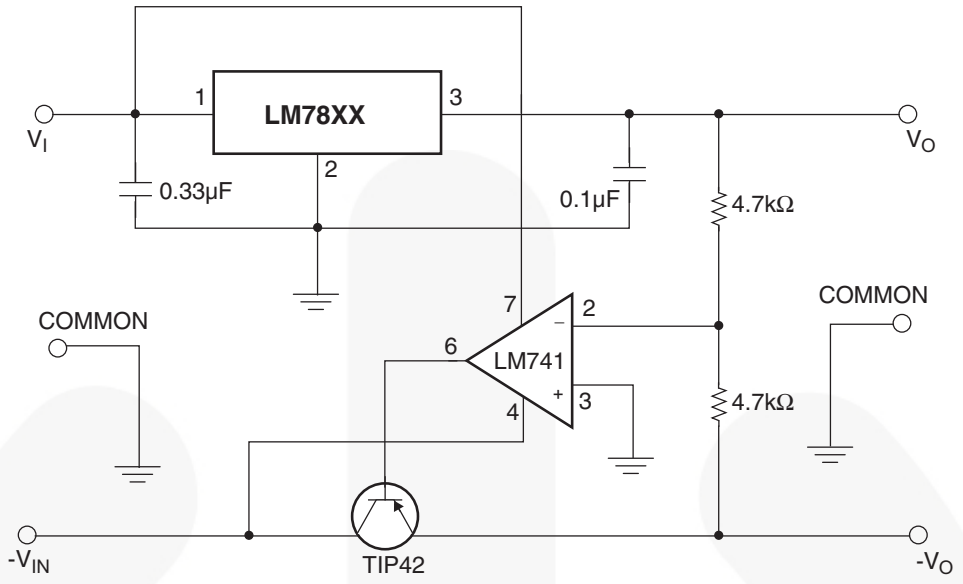


Figure 15. Tracking Voltage Regulator

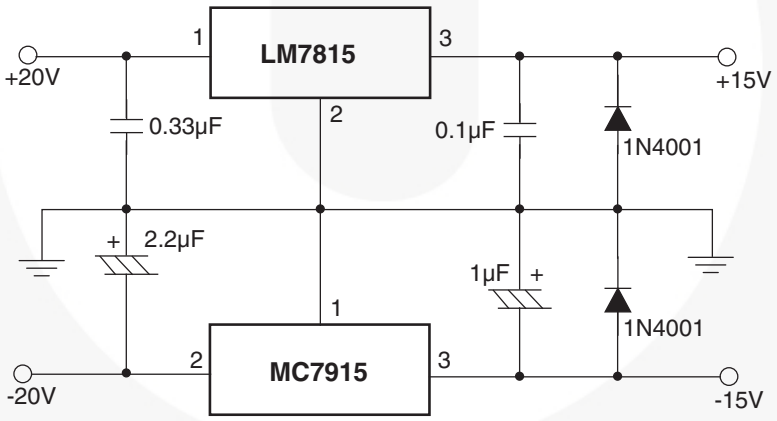


Figure 16. Split Power Supply (±15 V - 1 A)

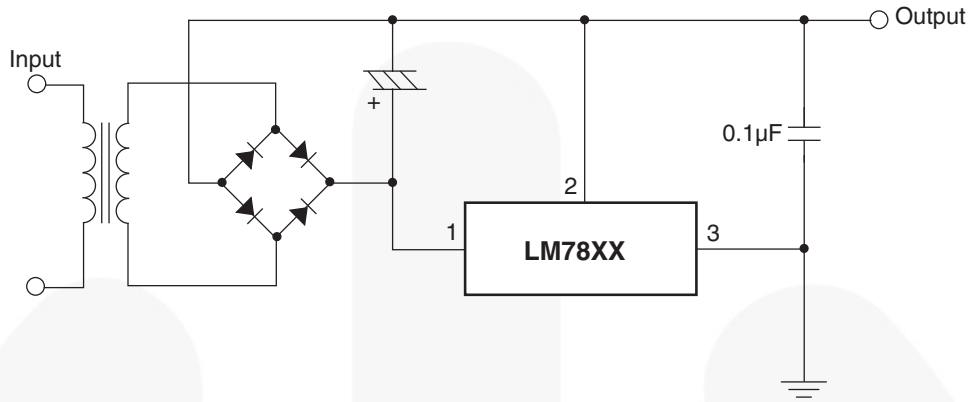


Figure 17. Negative Output Voltage Circuit

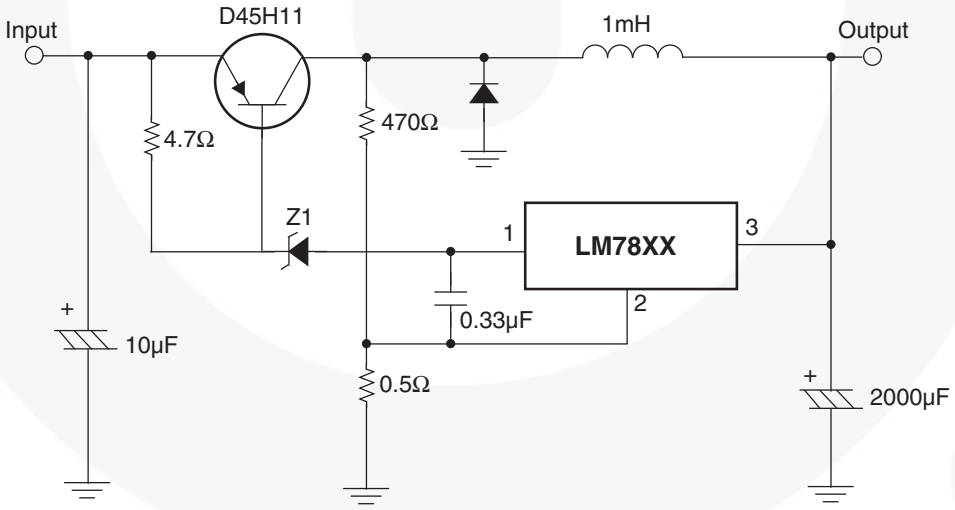


Figure 18. Switching Regulator

Physical Dimensions

TO-220 (SINGLE GAUGE)

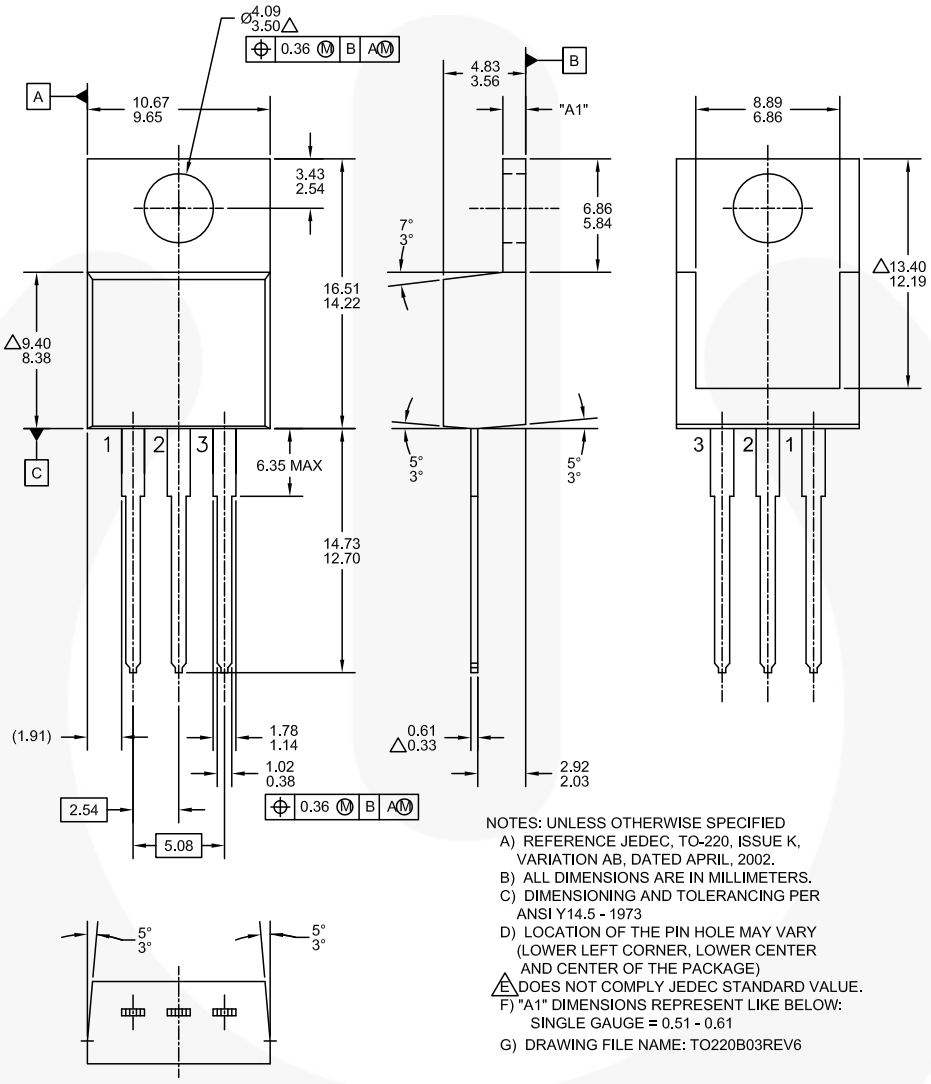


Figure 19. TO-220, MOLDED, 3-LEAD, JEDEC VARIATION AB (ACTIVE)

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