

# LM78XX/LM78XXA

## 3-Terminal 1A Positive Voltage Regulator

### Features

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

### General Description

The LM78XX series of three terminal positive regulators are 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, 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 voltages and currents.

### Ordering Information

Product Number	Output Voltage Tolerance	Package	Operating Temperature
LM7805CT	±4%	TO-220 (Single Gauge)	-40°C to +125°C
LM7806CT			
LM7808CT			
LM7809CT			
LM7810CT			
LM7812CT			
LM7815CT			
LM7818CT			
LM7824CT			
LM7805ACT			
LM7806ACT			
LM7808ACT			
LM7809ACT			
LM7810ACT			
LM7812ACT			
LM7815ACT			
LM7818ACT			
LM7824ACT			

## Block Diagram

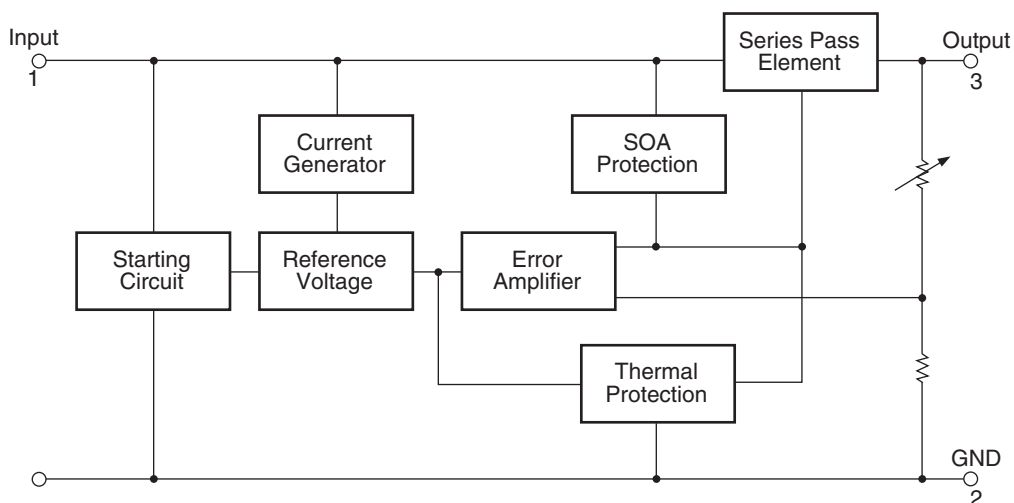


Figure 1.

## Pin Assignment

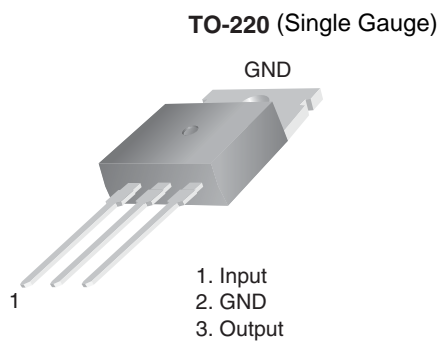


Figure 2.

## Absolute Maximum Ratings

Absolute maximum ratings are those values beyond which damage to the device may occur. The datasheet specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation outside datasheet specifications.

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

**Electrical Characteristics (LM7805)**Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 10\text{V}$ ,  $C_I = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	4.8	5.0	5.2	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 7\text{V to } 20\text{V}$	4.75	5.0	5.25		
Regline	Line Regulation <sup>(1)</sup>	$T_J = +25^{\circ}\text{C}$	$V_O = 7\text{V to } 25\text{V}$	–	4.0	100	mV
			$V_I = 8\text{V to } 12\text{V}$	–	1.6	50.0	
Regload	Load Regulation <sup>(1)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	9.0	100	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	50.0	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	0.03	0.5	mA	
		$V_I = 7\text{V to } 25\text{V}$	–	0.3	1.3		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(2)</sup>	$I_O = 5\text{mA}$	–	-0.8	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	42.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(2)</sup>	$f = 120\text{Hz}$ , $V_O = 8\text{V to } 18\text{V}$	62.0	73.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(2)</sup>	$f = 1\text{kHz}$	–	15.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	230	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(2)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

1. 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.
2. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (LM7806)** (Continued)Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 11\text{V}$ ,  $C_1 = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	5.75	6.0	6.25	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 8.0\text{V to } 21\text{V}$	5.7	6.0	6.3		
Regline	Line Regulation <sup>(3)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 8\text{V to } 25\text{V}$	–	5.0	120	mV
			$V_I = 9\text{V to } 13\text{V}$	–	1.5	60.0	
Regload	Load Regulation <sup>(3)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	9.0	120	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	3.0	60.0	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 8\text{V to } 25\text{V}$	–	–	1.3		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(4)</sup>	$I_O = 5\text{mA}$	–	-0.8	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	45.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(4)</sup>	$f = 120\text{Hz}$ , $V_O = 8\text{V to } 18\text{V}$	62.0	73.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(4)</sup>	$f = 1\text{kHz}$	–	19.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(4)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

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

**Electrical Characteristics (LM7808)** (Continued)Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 14\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	7.7	8.0	8.3	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 10.5\text{V to } 23\text{V}$	7.6	8.0	8.4		
Regline	Line Regulation <sup>(5)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 10.5\text{V to } 25\text{V}$	–	5.0	160	mV
			$V_I = 11.5\text{V to } 17\text{V}$	–	2.0	80.0	
Regload	Load Regulation <sup>(5)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	10.0	160	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	80.0	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	0.05	0.5	mA	
		$V_I = 10.5\text{V to } 25\text{V}$	–	0.5	1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(6)</sup>	$I_O = 5\text{mA}$	–	-0.8	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	52.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(6)</sup>	$f = 120\text{Hz}$ , $V_O = 11.5\text{V to } 21.5\text{V}$	56.0	73.0	–	dB	
$V_{\text{DROPP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(6)</sup>	$f = 1\text{kHz}$	–	17.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	230	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(6)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

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

**Electrical Characteristics (LM7809)** (Continued)Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 15\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	8.65	9.0	9.35	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 11.5\text{V to } 24\text{V}$	8.6	9.0	9.4		
Regline	Line Regulation <sup>(7)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 11.5\text{V to } 25\text{V}$	–	6.0	180	mV
			$V_I = 12\text{V to } 17\text{V}$	–	2.0	90.0	
Regload	Load Regulation <sup>(7)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	180	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	90.0	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 11.5\text{V to } 26\text{V}$	–	–	1.3		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(8)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	58.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(8)</sup>	$f = 120\text{Hz}$ , $V_O = 13\text{V to } 23\text{V}$	56.0	71.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(8)</sup>	$f = 1\text{kHz}$	–	17.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(8)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

7. 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.
8. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (LM7810)** (Continued)Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 16\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	9.6	10.0	10.4	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 12.5\text{V to } 25\text{V}$	9.5	10.0	10.5		
Regline	Line Regulation <sup>(9)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 12.5\text{V to } 25\text{V}$	–	10.0	200	mV
			$V_I = 13\text{V to } 25\text{V}$	–	3.0	100	
Regload	Load Regulation <sup>(9)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	200	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	400	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.1	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 12.5\text{V to } 29\text{V}$	–	–	1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(10)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	58.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(10)</sup>	$f = 120\text{Hz}$ , $V_O = 13\text{V to } 23\text{V}$	56.0	71.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(10)</sup>	$f = 1\text{kHz}$	–	17.0	–	$\text{m}\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(10)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

9. 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.
10. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (LM7812)** (Continued)Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 19\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	11.5	12.0	12.5	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 14.5\text{V to } 27\text{V}$	11.4	12.0	12.6		
Regline	Line Regulation <sup>(11)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{V to } 30\text{V}$	–	10.0	240	mV
			$V_I = 16\text{V to } 22\text{V}$	–	3.0	120	
Regload	Load Regulation <sup>(11)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	11.0	240	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	120	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.1	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	0.1	0.5	mA	
		$V_I = 14.5\text{V to } 30\text{V}$	–	0.5	1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(12)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	76.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(12)</sup>	$f = 120\text{Hz}$ , $V_I = 15\text{V to } 25\text{V}$	55.0	71.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(12)</sup>	$f = 1\text{kHz}$	–	18.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	230	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(12)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

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



**Electrical Characteristics (LM7815)** (Continued)Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 23\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	14.4	15.0	15.6	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 17.5\text{V to } 30\text{V}$	14.25	15.0	15.75		
Regline	Line Regulation <sup>(13)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 17.5\text{V to } 30\text{V}$	–	11.0	300	mV
			$V_I = 20\text{V to } 26\text{V}$	–	3.0	150	
Regload	Load Regulation <sup>(13)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	300	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	150	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 17.5\text{V to } 30\text{V}$	–	–	1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(14)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	90.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(14)</sup>	$f = 120\text{Hz}$ , $V_I = 18.5\text{V to } 28.5\text{V}$	54.0	70.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(14)</sup>	$f = 1\text{kHz}$	–	19.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(14)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

13. 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.
14. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (LM7818)** (Continued)Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 27\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	17.3	18.0	18.7	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 21\text{V to } 33\text{V}$	17.1	18.0	18.9		
Regline	Line Regulation <sup>(15)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 21\text{V to } 33\text{V}$	–	15.0	360	mV
			$V_I = 24\text{V to } 30\text{V}$	–	5.0	180	
Regload	Load Regulation <sup>(15)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	15.0	360	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	180	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 21\text{V to } 33\text{V}$	–	–	1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(16)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	110	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(16)</sup>	$f = 120\text{Hz}$ , $V_I = 22\text{V to } 32\text{V}$	53.0	69.0	–	dB	
$V_{\text{DROPP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(16)</sup>	$f = 1\text{kHz}$	–	22.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(16)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

15. 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.
16. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (LM7824)** (Continued)Refer to the test circuits.  $-40^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 500\text{mA}$ ,  $V_I = 33\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	23.0	24.0	25.0	V	
		$5\text{mA} \leq I_O \leq 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 27\text{V to } 38\text{V}$	22.8	24.0	25.25		
Regline	Line Regulation <sup>(17)</sup>	$T_J = +25^{\circ}\text{C}$	$V_I = 27\text{V to } 38\text{V}$	–	17.0	480	mV
			$V_I = 30\text{V to } 36\text{V}$	–	6.0	240	
Regload	Load Regulation <sup>(17)</sup>	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	–	15.0	480	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	240	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	8.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	0.1	0.5	mA	
		$V_I = 27\text{V to } 38\text{V}$	–	0.5	1.0		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(18)</sup>	$I_O = 5\text{mA}$	–	-1.5	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	60.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(18)</sup>	$f = 120\text{Hz}$ , $V_I = 28\text{V to } 38\text{V}$	50.0	67.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
rO	Output Resistance <sup>(18)</sup>	$f = 1\text{kHz}$	–	28.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	230	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(18)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

17. 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.
18. These parameters, although guaranteed, are not 100% tested in production.

**Electrical Characteristics (LM7805A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 10\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	4.9	5.0	5.1	V	
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 7.5\text{V to } 20\text{V}$	4.8	5.0	5.2		
Regline	Line Regulation <sup>(19)</sup>	$V_I = 7.5\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	5.0	50.0	mV	
		$V_I = 8\text{V to } 12\text{V}$	–	3.0	50.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 7.3\text{V to } 20\text{V}$	–	5.0		50.0
			$V_I = 8\text{V to } 12\text{V}$	–	1.5		25.0
Regload	Load Regulation <sup>(19)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	9.0	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	–	9.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	50.0		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 8\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8		
		$V_I = 7.5\text{V to } 20\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(20)</sup>	$I_O = 5\text{mA}$	–	-0.8	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(20)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 8\text{V to } 18\text{V}$	–	68.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(20)</sup>	$f = 1\text{kHz}$	–	17.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(20)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

19. 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.

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

**Electrical Characteristics (LM7806A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 11\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	5.58	6.0	6.12	V
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 8.6\text{V to } 21\text{V}$	5.76	6.0	6.24	
Regline	Line Regulation <sup>(21)</sup>	$V_I = 8.6\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	5.0	60.0	mV
		$V_I = 9\text{V to } 13\text{V}$	–	3.0	60.0	
		$T_J = +25^{\circ}\text{C}$ , $V_I = 8.3\text{V to } 21\text{V}$	–	5.0	60.0	
		$V_I = 9\text{V to } 13\text{V}$	–	1.5	30.0	
Regload	Load Regulation <sup>(21)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	9.0	100	mV
		$I_O = 5\text{mA to } 1\text{A}$	–	9.0	100	
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0	
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	4.3	6.0	mA
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA
		$V_I = 19\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8	
		$V_I = 8.5\text{V to } 21\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.8	
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(22)</sup>	$I_O = 5\text{mA}$	–	-0.8	–	mV/ $^{\circ}\text{C}$
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$
RR	Ripple Rejection <sup>(22)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 9\text{V to } 19\text{V}$	–	65.0	–	dB
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V
$r_O$	Output Resistance <sup>(22)</sup>	$f = 1\text{kHz}$	–	17.0	–	$\text{m}\Omega$
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA
$I_{\text{PK}}$	Peak Current <sup>(22)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A

**Notes:**

21. 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.

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

**Electrical Characteristics (LM7808A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 14\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	7.84	8.0	8.16	V	
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 10.6\text{V to } 23\text{V}$	7.7	8.0	8.3		
Regline	Line Regulation <sup>(23)</sup>	$V_I = 10.6\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	6.0	80.0	mV	
		$V_I = 11\text{V to } 17\text{V}$	–	3.0	80.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 10.4\text{V to } 23\text{V}$	–	6.0		80.0
		$V_I = 11\text{V to } 17\text{V}$	–	2.0	40.0		
Regload	Load Regulation <sup>(23)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 11\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8		
		$V_I = 10.6\text{V to } 23\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(24)</sup>	$I_O = 5\text{mA}$	–	-0.8	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(24)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 11.5\text{V to } 21.5\text{V}$	–	62.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(24)</sup>	$f = 1\text{kHz}$	–	18.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(24)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

23. 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.

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

**Electrical Characteristics (LM7809A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 15\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	8.82	9.0	9.16	V	
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 11.2\text{V to } 24\text{V}$	8.65	9.0	9.35		
Regline	Line Regulation <sup>(25)</sup>	$V_I = 11.7\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	6.0	90.0	mV	
		$V_I = 12.5\text{V to } 19\text{V}$	–	4.0	45.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 11.5\text{V to } 24\text{V}$	–	6.0		90.0
		$V_I = 12.5\text{V to } 19\text{V}$	–	2.0	45.0		
Regload	Load Regulation <sup>(25)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 12\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8		
		$V_I = 11.7\text{V to } 25\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(26)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(26)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 12\text{V to } 22\text{V}$	–	62.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(26)</sup>	$f = 1\text{kHz}$	–	17.0	–	$\text{m}\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(26)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

25. 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.

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

**Electrical Characteristics (LM7810A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 16\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	9.8	10.0	10.2	V	
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 12.8\text{V to } 25\text{V}$	9.6	10.0	10.4		
Regline	Line Regulation <sup>(27)</sup>	$V_I = 12.8\text{V to } 26\text{V}$ , $I_O = 500\text{mA}$	–	8.0	100	mV	
		$V_I = 13\text{V to } 20\text{V}$	–	4.0	50.0		
		$T_J = +25^{\circ}\text{C}$	$V_I = 12.5\text{V to } 25\text{V}$	–	8.0		100
			$V_I = 13\text{V to } 20\text{V}$	–	3.0		50.0
Regload	Load Regulation <sup>(27)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 12.8\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8		
		$V_I = 13\text{V to } 26\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.5		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(28)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(28)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 14\text{V to } 24\text{V}$	–	62.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(28)</sup>	$f = 1\text{kHz}$	–	17.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(28)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

27. 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.

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



**Electrical Characteristics (LM7812A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 19\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	11.75	12.0	12.25	V	
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 14.8\text{V to } 27\text{V}$	11.5	12.0	12.5		
Regline	Line Regulation <sup>(29)</sup>	$V_I = 14.8\text{V to } 30\text{V}$ , $I_O = 500\text{mA}$	–	10.0	120	mV	
		$V_I = 16\text{V to } 22\text{V}$	–	4.0	120		
		$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{V to } 27\text{V}$ $V_I = 16\text{V to } 22\text{V}$	–	10.0		120
		–		3.0	60.0		
Regload	Load Regulation <sup>(29)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.1	6.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 14\text{V to } 27\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8		
		$V_I = 15\text{V to } 30\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(30)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(30)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 14\text{V to } 24\text{V}$	–	60.0	–	dB	
$V_{\text{DROPP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(30)</sup>	$f = 1\text{kHz}$	–	18.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(30)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note:**

29. 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.

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

**Electrical Characteristics (LM7815A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 23\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	14.75	15.0	15.3	V	
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 17.7\text{V to } 30\text{V}$	14.4	15.0	15.6		
Regline	Line Regulation <sup>(31)</sup>	$V_I = 17.4\text{V to } 30\text{V}$ , $I_O = 500\text{mA}$	–	10.0	150	mV	
		$V_I = 20\text{V to } 26\text{V}$	–	5.0	150		
		$T_J = +25^{\circ}\text{C}$	$V_I = 17.5\text{V to } 30\text{V}$	–	11.0		150
			$V_I = 20\text{V to } 26\text{V}$	–	3.0		75.0
Regload	Load Regulation <sup>(31)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 17.5\text{V to } 30\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8		
		$V_I = 17.5\text{V to } 30\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(32)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(32)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 18.5\text{V to } 28.5\text{V}$	–	58.0	–	dB	
$V_{\text{DROPO}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(32)</sup>	$f = 1\text{kHz}$	–	19.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(32)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

31. 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.

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

**Electrical Characteristics (LM7818A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 27\text{V}$ ,  $C_1 = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	17.64	18.0	18.36	V	
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 21\text{V to } 33\text{V}$	17.3	18.0	18.7		
Regline	Line Regulation <sup>(33)</sup>	$V_I = 21\text{V to } 33\text{V}$ , $I_O = 500\text{mA}$	–	15.0	180	mV	
		$V_I = 21\text{V to } 33\text{V}$	–	5.0	180		
		$T_J = +25^{\circ}\text{C}$	$V_I = 20.6\text{V to } 33\text{V}$	–	15.0		180
			$V_I = 24\text{V to } 30\text{V}$	–	5.0		90.0
Regload	Load Regulation <sup>(33)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	15.0	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	–	15.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	7.0	50.0		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 12\text{V to } 33\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8		
		$V_I = 12\text{V to } 33\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(34)</sup>	$I_O = 5\text{mA}$	–	-1.0	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(34)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 22\text{V to } 32\text{V}$	–	57.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(34)</sup>	$f = 1\text{kHz}$	–	19.0	–	$\text{m}\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(34)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

33. 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.

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

**Electrical Characteristics (LM7824A)** (Continued)Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 33\text{V}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified.

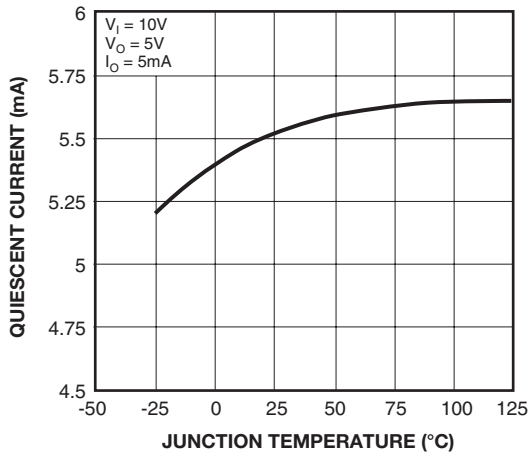
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
$V_O$	Output Voltage	$T_J = +25^{\circ}\text{C}$	23.5	24.0	24.5	V	
		$I_O = 5\text{mA to } 1\text{A}$ , $P_O \leq 15\text{W}$ , $V_I = 27.3\text{V to } 38\text{V}$	23.0	24.0	25.0		
Regline	Line Regulation <sup>(35)</sup>	$V_I = 27\text{V to } 38\text{V}$ , $I_O = 500\text{mA}$	–	18.0	240	mV	
		$V_I = 21\text{V to } 33\text{V}$	–	6.0	240		
		$T_J = +25^{\circ}\text{C}$	$V_I = 26.7\text{V to } 38\text{V}$	–	18.0		240
			$V_I = 30\text{V to } 36\text{V}$	–	6.0		120
Regload	Load Regulation <sup>(35)</sup>	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{A}$	–	15.0	100	mV	
		$I_O = 5\text{mA to } 1\text{A}$	–	15.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	7.0	50.0		
$I_Q$	Quiescent Current	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA	
$\Delta I_Q$	Quiescent Current Change	$I_O = 5\text{mA to } 1\text{A}$	–	–	0.5	mA	
		$V_I = 27.3\text{V to } 38\text{V}$ , $I_O = 500\text{mA}$	–	–	0.8		
		$V_I = 27.3\text{V to } 38\text{V}$ , $T_J = +25^{\circ}\text{C}$	–	–	0.8		
$\Delta V_O/\Delta T$	Output Voltage Drift <sup>(36)</sup>	$I_O = 5\text{mA}$	–	-1.5	–	mV/ $^{\circ}\text{C}$	
$V_N$	Output Noise Voltage	$f = 10\text{Hz to } 100\text{kHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
RR	Ripple Rejection <sup>(36)</sup>	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 28\text{V to } 38\text{V}$	–	54.0	–	dB	
$V_{\text{DROP}}$	Dropout Voltage	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
$r_O$	Output Resistance <sup>(36)</sup>	$f = 1\text{kHz}$	–	20.0	–	m $\Omega$	
$I_{\text{SC}}$	Short Circuit Current	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
$I_{\text{PK}}$	Peak Current <sup>(36)</sup>	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Notes:**

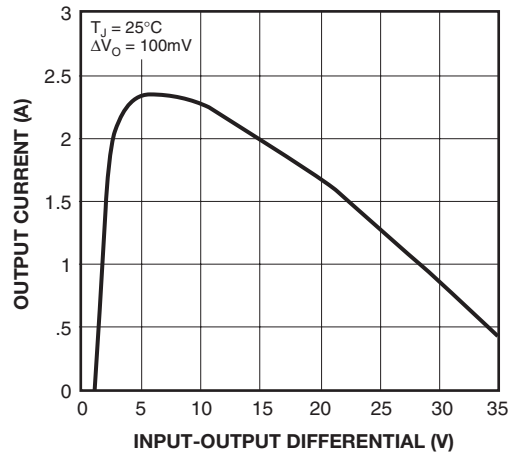
35. Load and line regulation are specified at constant junction temperature. Changes in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

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

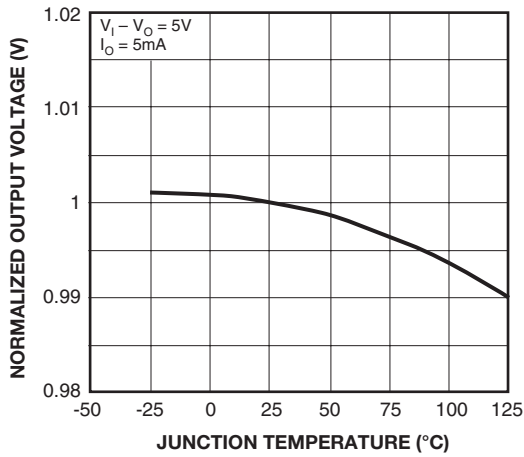
### Typical Performance Characteristics



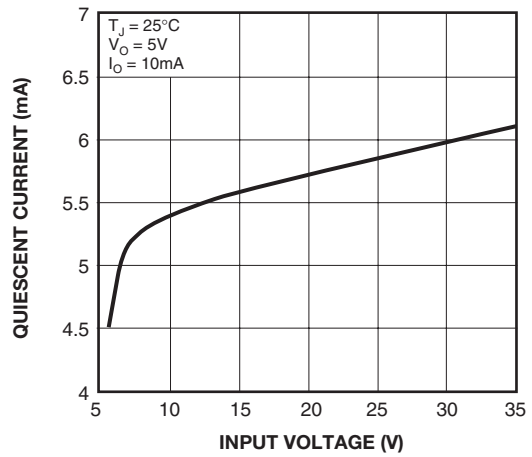
**Figure 3. Quiescent Current**



**Figure 4. Peak Output Current**

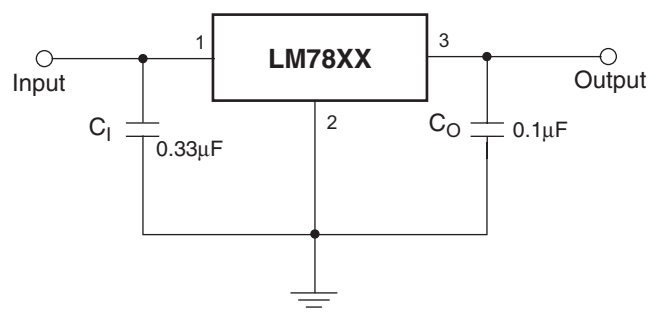


**Figure 5. Output Voltage**

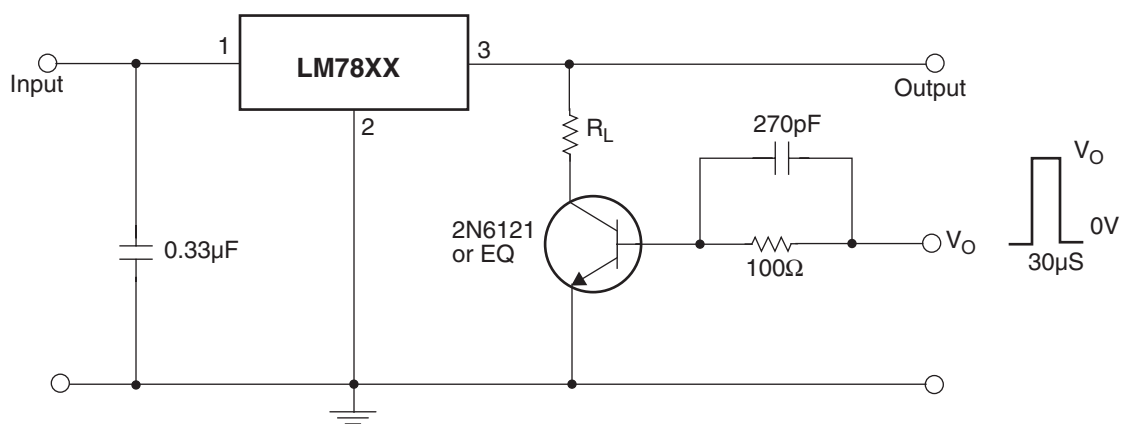


**Figure 6. Quiescent Current**

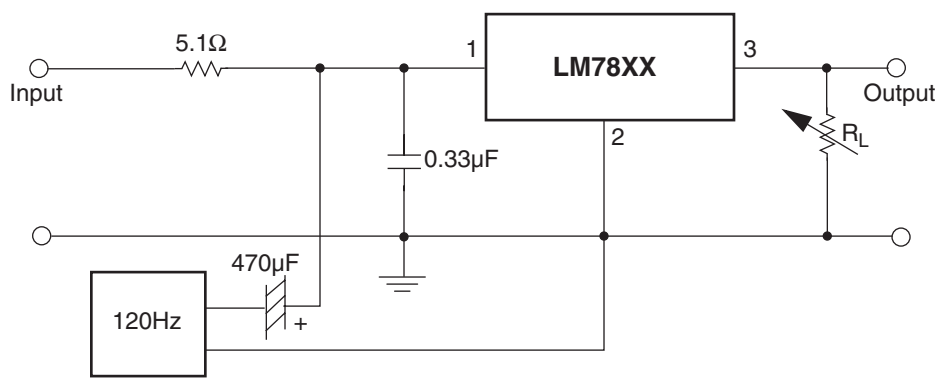
**Typical Applications**



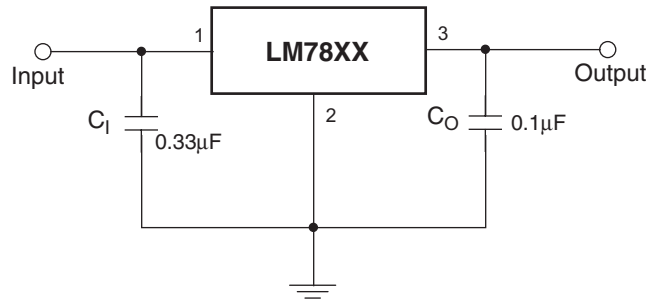
**Figure 7. DC Parameters**



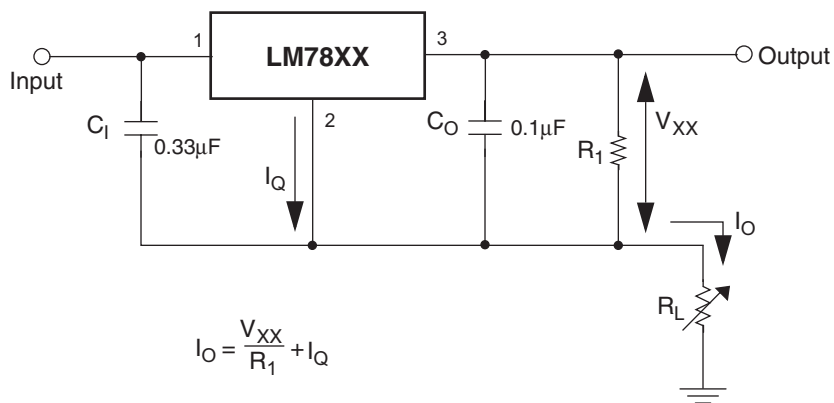
**Figure 8. Load Regulation**



**Figure 9. Ripple Rejection**



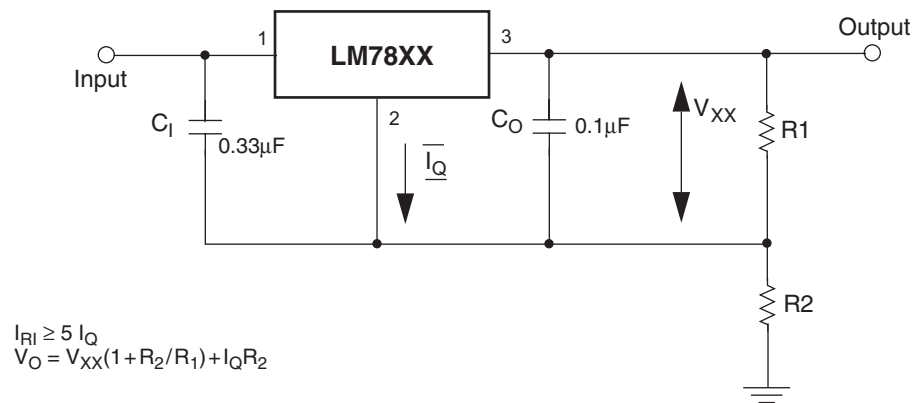
**Figure 10. Fixed Output Regulator**



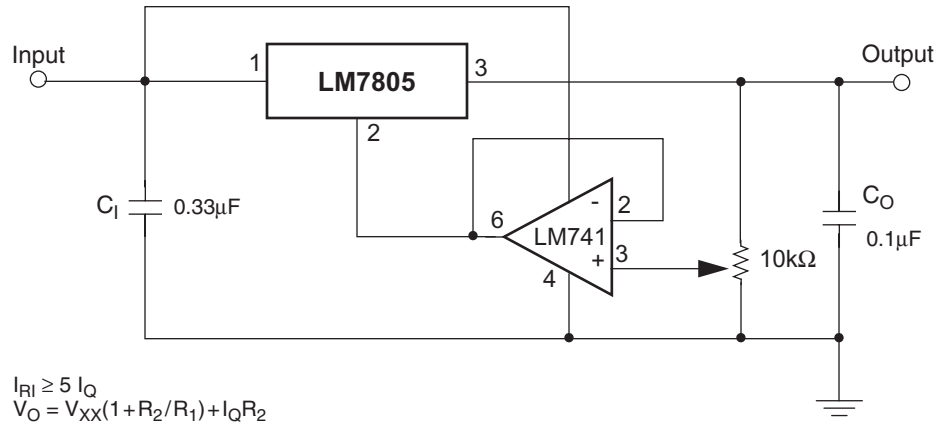
**Notes:**

1. 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 2.0V above the output voltage even during the low point on the input ripple voltage.
2. C<sub>1</sub> is required if regulator is located an appreciable distance from power supply filter.
3. C<sub>0</sub> improves stability and transient response.

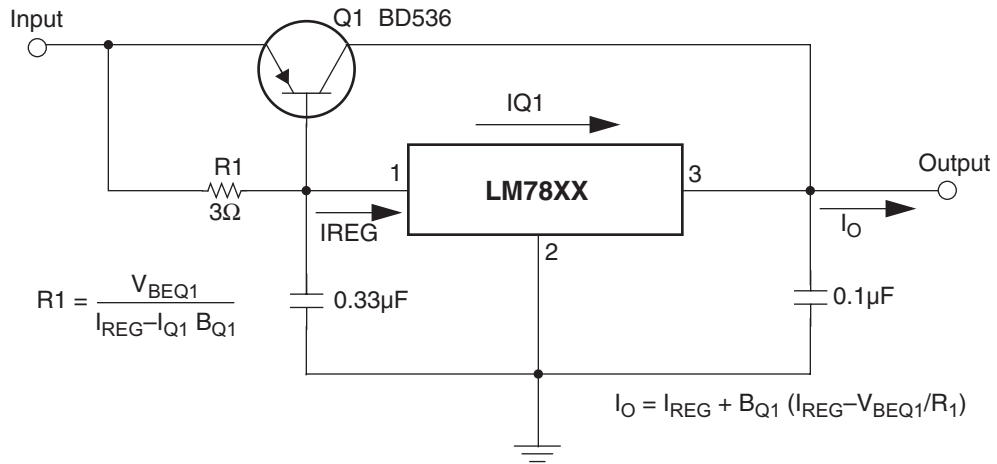
**Figure 11.**



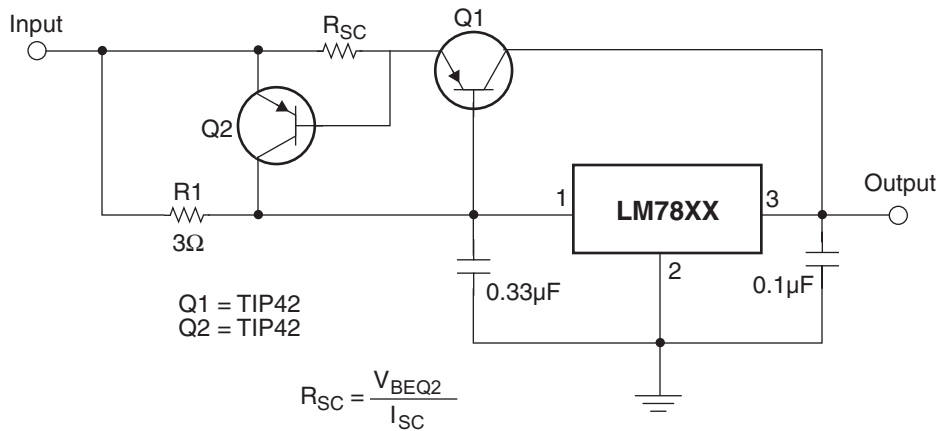
**Figure 12. Circuit for Increasing Output Voltage**



**Figure 13. Adjustable Output Regulator (7V to 30V)**



**Figure 14. High Current Voltage Regulator**



**Figure 15. High Output Current with Short Circuit Protection**



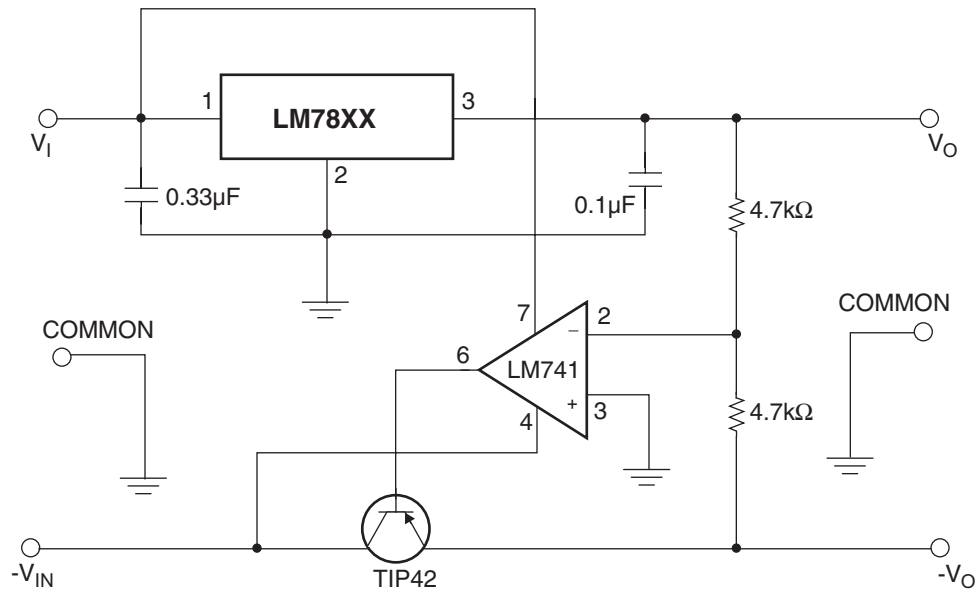


Figure 16. Tracking Voltage Regulator

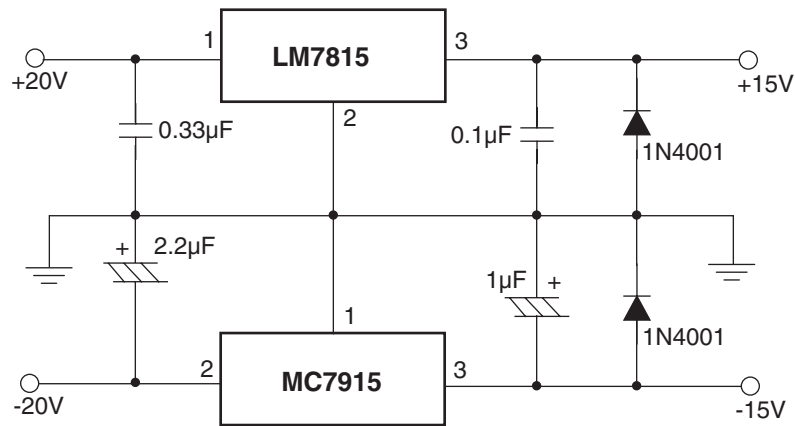
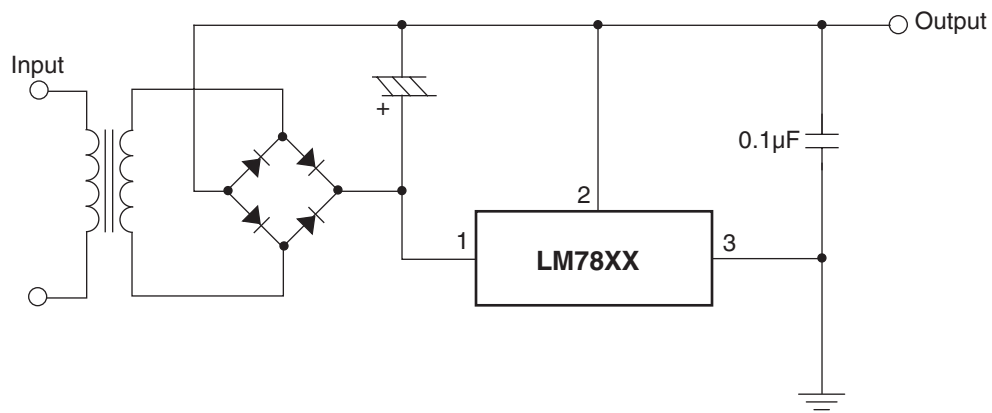
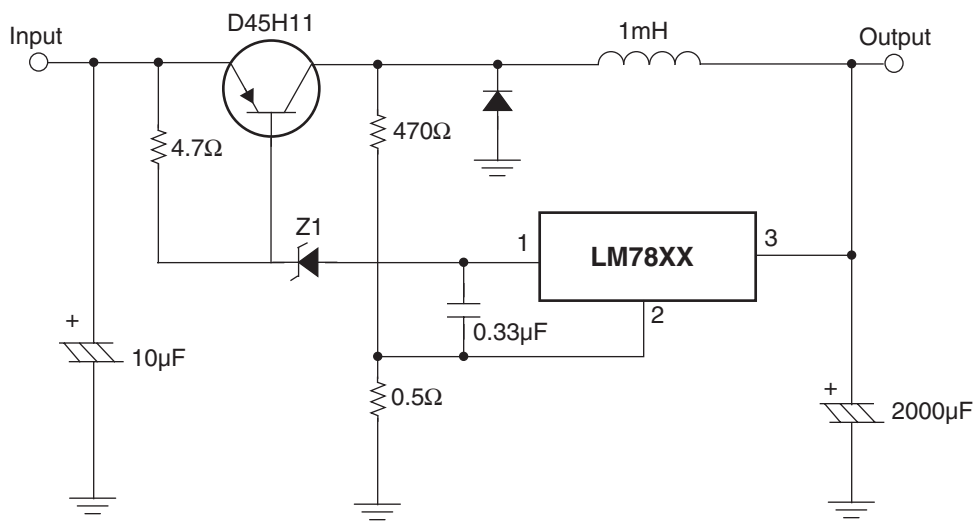


Figure 17. Split Power Supply ( $\pm 15V - 1A$ )



**Figure 18. Negative Output Voltage Circuit**

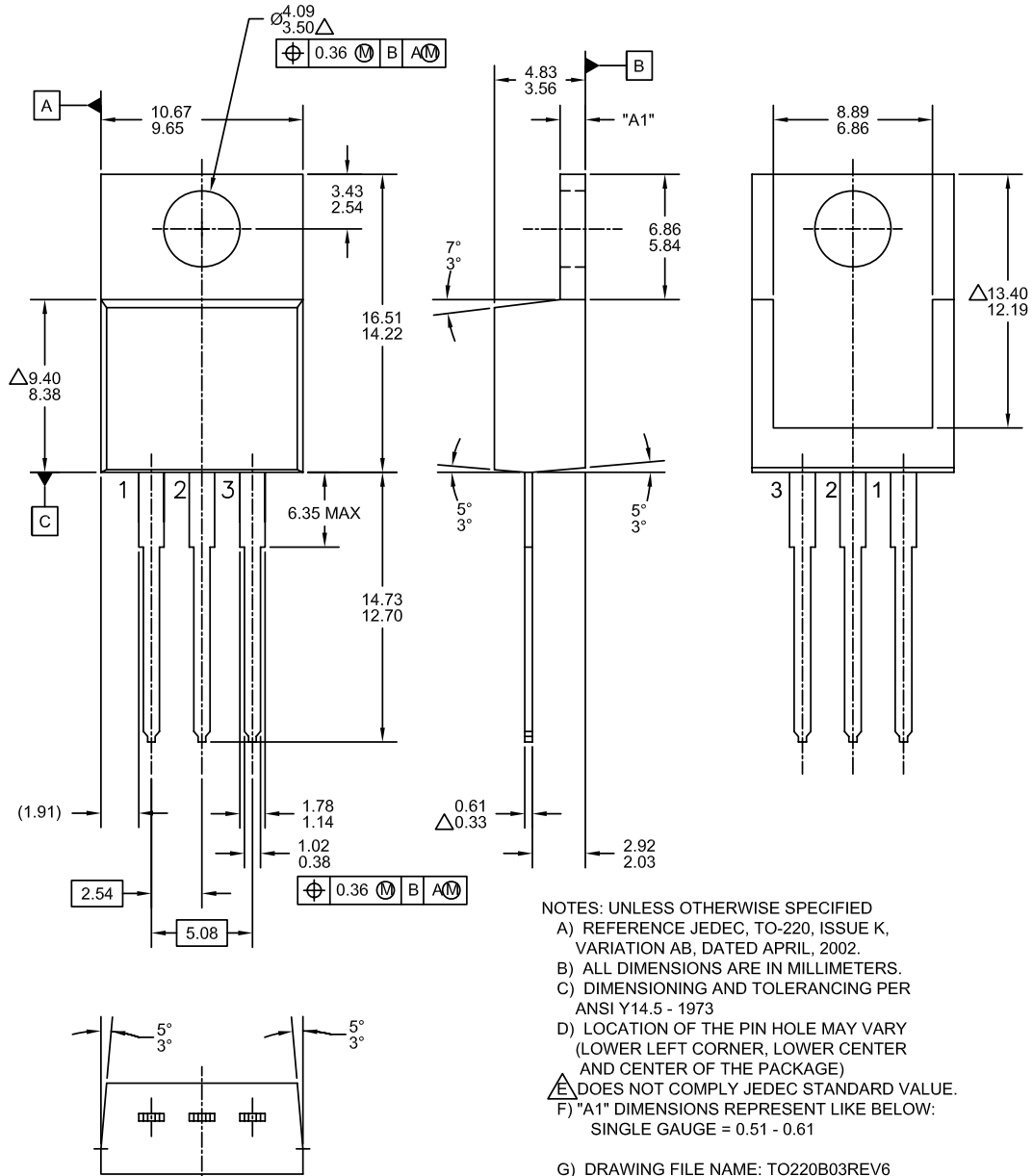


**Figure 19. Switching Regulator**

# Mechanical Dimensions

Dimensions in millimeters

## TO-220 [ SINGLE GAUGE ]







- NOTES: UNLESS OTHERWISE SPECIFIED
- A) REFERENCE JEDEC, TO-220, ISSUE K, VARIATION AB, DATED APRIL, 2002.
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5 - 1973
  - D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
  - $\Delta$  DOES NOT COMPLY JEDEC STANDARD VALUE.
  - F) "A1" DIMENSIONS REPRESENT LIKE BELOW:  
SINGLE GAUGE = 0.51 - 0.61
  - G) DRAWING FILE NAME: TO220B03REV6



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| AccuPower™   | F-PFS™   | Power-SPM™   | the power franchise  |
| Auto-SPM™  | FRFET®   | PowerTrench®   | TinyBoost™   |
| AX-CAP™*   | Global Power Resource™                         | PowerXS™   | TinyBuck™  |
| BitSiC®  | Green FPS™                                     | Programmable Active Droop™   | TinyCalc™  |
| Build it Now™  | Green FPS™ e-Series™                           | QFET®  | TinyLogic®   |
| CorePLUS™  | Gmax™  | QS™  | TINYOPTO™  |
| CorePOWER™   | GTO™   | Quiet Series™  | TinyPower™   |
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| CTL™   | ISOPLANAR™                                     |  ™                | TinyWire™  |
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| DEUXPEED®  | MegaBuck™                                      | SignalWise™  | TriFault Detect™   |
| Dual Cool™   | MICROCOUPLER™                                  | SmartMax™  | TRUECURRENT®*  |
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| ESBC™  | MicroPak2™                                     | STEALTH™   | UHC®   |
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| Fairchild Semiconductor®   | MotionMax™                                     | SuperSOT™-3  | UniFET™  |
| FACT Quiet Series™   | Motion-SPM™                                    | SuperSOT™-6  | VCX™   |
| FACT®  | mWSaver™                                       | SuperSOT™-8  | VisualMax™   |
| FAST®  | OptoHiT™                                       | SupreMOS®  | VoltagePlus™   |
| FastvCore™   | OPTOLOGIC®                                     | SyncFET™   | XST™   |
| FETBench™  | OPTOPLANAR®                                    | Sync-Lock™   |  |
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