

**LM7805 • LM7806 • LM7808 • LM7809 •  
LM7810 • LM7812 • LM7815 • LM7818 • LM7824 •  
LM7805A • LM7806A • LM7808A • LM7809A •  
LM7810A • LM7812A • LM7815A • LM7818A • LM7824A**

## 3-Terminal 1A Positive Voltage Regulator

### 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.

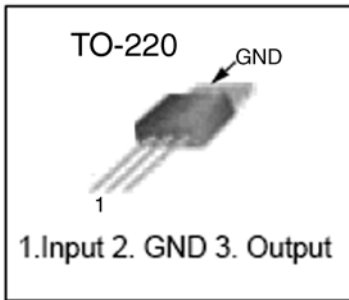
### Features

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

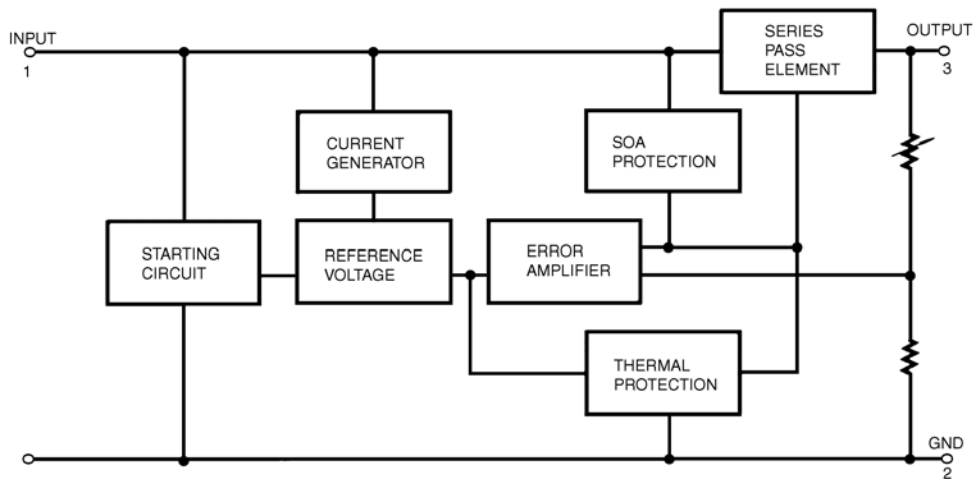
### Ordering Code:

Product Number	Output Voltage Tolerance	Package	Operating Temperature	
LM7805CT	±4%	TO-220	-40°C - +125°C	
LM7806CT				
LM7808CT				
LM7809CT				
LM7810CT				
LM7812CT				
LM7815CT				
LM7818CT				
LM7824CT				
LM7805ACT	±2%		TO-220	0°C - +125°C
LM7806ACT				
LM7808ACT				
LM7809ACT				
LM7810ACT				
LM7812ACT				
LM7815ACT				
LM7818ACT				
LM7824ACT				

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### Internal Block Diagram



## Absolute Maximum Ratings (Note 1)

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

**Note 1:** 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.

## 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)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 2)	Regline	$T_J = +25^{\circ}\text{C}$	$V_O = 7\text{V}$ to $25\text{V}$	-	4.0	100	mV
			$V_I = 8\text{V}$ to $12\text{V}$	-	1.6	50.0	
Load Regulation	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA}$ to $1.5\text{mA}$	-	9.0	100	mV
			$I_O = 250\text{mA}$ to $750\text{mA}$	-	4.0	50.0	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	-	5.0	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA}$ to $1\text{A}$	-	0.03	0.5	mA	
		$V_I = 7\text{V}$ to $25\text{V}$	-	0.3	1.3		
Output Voltage Drift (Note 3)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/°C	
Output Noise Voltage	$V_N$	$f = 10\text{Hz}$ to $100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	-	42.0	-	$\mu\text{V}/V_O$	
Ripple Rejection (Note 3)	RR	$f = 120\text{Hz}$ , $V_O = 8\text{V}$ to $18\text{V}$	62.0	73.0	-	dB	
Dropout Voltage	$V_{DROP}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	-	2.0	-	V	
Output Resistance (Note 3)	$r_O$	$f = 1\text{KHz}$	-	15.0	-	$\text{m}\Omega$	
Short Circuit Current	$I_{SC}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	-	230	-	mA	
Peak Current (Note 3)	$I_{PK}$	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A	

**Note 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.

**Note 3:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7806)

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

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

**Note 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.

**Note 5:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7808)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 6)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 10.5\text{V to } 25\text{V}$	–	5.0	160	mV
			$V_I = 11.5\text{V to } 17\text{V}$	–	2.0	80.0	
Load Regulation (Note 6)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{mA}$	–	10.0	160	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	80.0	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.0	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$ $V_I = 10.5\text{V to } 25\text{V}$	–	0.05	0.5	mA	
			–	0.5	1.0		
Output Voltage Drift (Note 7)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–0.8	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	52.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 7)	RR	$f = 120\text{Hz}$ , $V_O = 11.5\text{V to } 21.5\text{V}$	56.0	73.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 7)	$r_O$	$f = 1\text{KHz}$	–	17.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	230	–	mA	
Peak Current (Note 7)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

**Note 7:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7809)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 8)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 11.5\text{V to } 25\text{V}$	–	6.0	180	mV
			$V_I = 12\text{V to } 17\text{V}$	–	2.0	90.0	
Load Regulation (Note 8)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{mA}$	–	12.0	180	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	90.0	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.0	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$ $V_I = 11.5\text{V to } 26\text{V}$	–	–	0.5	mA	
			–	–	1.3		
Output Voltage Drift (Note 9)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	58.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 9)	RR	$f = 120\text{Hz}$ , $V_O = 13\text{V to } 23\text{V}$	56.0	71.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 9)	$r_O$	$f = 1\text{KHz}$	–	17.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 9)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

**Note 9:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7810)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 10)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 12.5\text{V to } 25\text{V}$	–	10.0	200	mV
			$V_I = 13\text{V to } 25\text{V}$	–	3.0	100	
Load Regulation (Note 10)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{mA}$	–	12.0	200	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	400	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.1	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$ $V_I = 12.5\text{V to } 29\text{V}$	–	–	0.5	mA	
			–	–	1.0		
Output Voltage Drift (Note 11)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	58.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 11)	RR	$f = 120\text{Hz}$ , $V_O = 13\text{V to } 23\text{V}$	56.0	71.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 11)	$r_O$	$f = 1\text{KHz}$	–	17.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 11)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

**Note 11:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7812)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 12)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{V to } 30\text{V}$	–	10.0	240	mV
			$V_I = 16\text{V to } 22\text{V}$	–	3.0	120	
Load Regulation (Note 12)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{mA}$	–	11.0	240	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	120	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.1	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$ $V_I = 14.5\text{V to } 30\text{V}$	–	0.1	0.5	mA	
			–	0.5	1.0		
Output Voltage Drift (Note 13)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	76.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 13)	RR	$f = 120\text{Hz}$ , $V_I = 15\text{V to } 25\text{V}$	55.0	71.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 13)	$r_O$	$f = 1\text{KHz}$	–	18.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	230	–	mA	
Peak Current (Note 13)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

**Note 13:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7815)

(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)

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

**Note 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.

**Note 15:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7818)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 12)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 21\text{V to } 33\text{V}$	–	15.0	360	mV
			$V_I = 24\text{V to } 30\text{V}$	–	5.0	180	
Load Regulation (Note 12)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{mA}$	–	15.0	360	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	180	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.2	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$ $V_I = 21\text{V to } 33\text{V}$	–	–	0.5	mA	
			–	–	1.0		
Output Voltage Drift (Note 17)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	110	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 17)	RR	$f = 120\text{Hz}$ , $V_I = 22\text{V to } 32\text{V}$	53.0	69.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 17)	$r_O$	$f = 1\text{KHz}$	–	22.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 17)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

**Note 17:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7824)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 18)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 27\text{V to } 38\text{V}$	–	17.0	480	mV
			$V_I = 30\text{V to } 36\text{V}$	–	6.0	240	
Load Regulation (Note 18)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{mA}$	–	15.0	480	mV
			$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	240	
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.2	8.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$ $V_I = 27\text{V to } 38\text{V}$	–	0.1	0.5	mA	
			–	0.5	1.0		
Output Voltage Drift (Note 19)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.5	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	60.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 19)	RR	$f = 120\text{Hz}$ , $V_I = 28\text{V to } 38\text{V}$	50.0	67.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 19)	$r_O$	$f = 1\text{KHz}$	–	28.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	230	–	mA	
Peak Current (Note 19)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

**Note 19:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7805A)

(Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 10\text{V}$ ,  $C_1 = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 20)	Regline	$V_I = 7.5\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	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		
Load Regulation (Note 20)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{mA}$	–	9.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	9.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	4.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	–	–	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		
Output Voltage Drift (Note 21)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–0.8	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 21)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 8\text{V to } 18\text{V}$	–	68.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 21)	$r_O$	$f = 1\text{KHz}$	–	17.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 21)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

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



## Electrical Characteristics (LM7806A)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 22)	Regline	$V_I = 8.6\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	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
Load Regulation (Note 22)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{mA}$	–	9.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	4.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	4.3	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	–	–	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		
Output Voltage Drift (Note 23)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–0.8	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 23)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 9\text{V to } 19\text{V}$	–	65.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 23)	$r_O$	$f = 1\text{KHz}$	–	17.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 23)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

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

## Electrical Characteristics (LM7808A)

(Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 14\text{V}$ ,  $C_1 = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 24)	Regline	$V_I = 10.6\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	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
Load Regulation (Note 24)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{mA}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{mA}$	–	–	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		
Output Voltage Drift (Note 25)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–0.8	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 25)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 11.5\text{V to } 21.5\text{V}$	–	62.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 25)	$r_O$	$f = 1\text{KHz}$	–	18.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 25)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

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

## Electrical Characteristics (LM7809A)

(Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 15\text{V}$ ,  $C_1 = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 26)	Regline	$V_I = 11.7\text{V to } 25\text{V}$ , $I_O = 500\text{mA}$	–	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
Load Regulation (Note 26)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.0\text{mA}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	–	–	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		
Output Voltage Drift (Note 27)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 27)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 12\text{V to } 22\text{V}$	–	62.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 27)	$r_O$	$f = 1\text{KHz}$	–	17.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 27)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

**Note 27:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7810A)

(Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 16\text{V}$ ,  $C_1 = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 28)	Regline	$V_I = 12.8\text{V to } 26\text{V}$ , $I_O = 500\text{mA}$	–	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
Load Regulation (Note 28)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{mA}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.0	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	–	–	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		
Output Voltage Drift (Note 29)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 29)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 14\text{V to } 24\text{V}$	–	62.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 29)	$r_O$	$f = 1\text{KHz}$	–	17.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 29)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 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.

**Note 29:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7812A)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Units	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 30)	Regline	$V_I = 14.8\text{V to } 30\text{V}$ , $I_O = 500\text{mA}$	–	10.0	120	mV	
		$V_I = 16\text{V to } 22\text{V}$	–	4.0	120		
		$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{V to } 27\text{V}$	–	10.0		120
			$V_I = 16\text{V to } 22\text{V}$	–	3.0		60.0
Load Regulation (Note 30)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{mA}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.1	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	–	–	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		
Output Voltage Drift (Note 31)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 31)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 14\text{V to } 24\text{V}$	–	60.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 31)	$r_O$	$f = 1\text{KHz}$	–	18.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 31)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 30:** 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.

**Note 31:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7815A)

(Refer to the test circuits.  $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$ ,  $I_O = 1\text{A}$ ,  $V_I = 23\text{V}$ ,  $C_1 = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 32)	Regline	$V_I = 17.4\text{V to } 30\text{V}$ , $I_O = 500\text{mA}$	–	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
Load Regulation (Note 32)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{mA}$	–	12.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	12.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	5.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	–	–	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		
Output Voltage Drift (Note 33)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 33)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 18.5\text{V to } 28.5\text{V}$	–	58.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 33)	$r_O$	$f = 1\text{KHz}$	–	19.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 33)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 32:** 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.

**Note 33:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7818A)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Units	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 34)	Regline	$V_I = 21\text{V to } 33\text{V}$ , $I_O = 500\text{mA}$	–	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
Load Regulation (Note 34)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{mA}$	–	15.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	15.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	7.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	–	–	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		
Output Voltage Drift (Note 35)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.0	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 35)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 22\text{V to } 32\text{V}$	–	57.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 35)	$r_O$	$f = 1\text{KHz}$	–	19.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 35)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 34:** 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.

**Note 35:** These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics (LM7824A)

(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)

Parameter	Symbol	Conditions	Min	Typ	Max	Units	
Output Voltage	$V_O$	$T_J = +25^{\circ}\text{C}$	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		
Line Regulation (Note 36)	Regline	$V_I = 27\text{V to } 38\text{V}$ , $I_O = 500\text{mA}$	–	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
Load Regulation (Note 36)	Regload	$T_J = +25^{\circ}\text{C}$ , $I_O = 5\text{mA to } 1.5\text{mA}$	–	15.0	100	mV	
		$I_O = 5\text{mA to } 1\text{mA}$	–	15.0	100		
		$I_O = 250\text{mA to } 750\text{mA}$	–	7.0	50.0		
Quiescent Current	$I_Q$	$T_J = +25^{\circ}\text{C}$	–	5.2	6.0	mA	
Quiescent Current Change	$\Delta I_Q$	$I_O = 5\text{mA to } 1\text{A}$	–	–	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		
Output Voltage Drift (Note 37)	$\Delta V_O/\Delta T$	$I_O = 5\text{mA}$	–	–1.5	–	mV/ $^{\circ}\text{C}$	
Output Noise Voltage	$V_N$	$f = 10\text{Hz to } 100\text{KHz}$ , $T_A = +25^{\circ}\text{C}$	–	10.0	–	$\mu\text{V}/V_O$	
Ripple Rejection (Note 37)	RR	$f = 120\text{Hz}$ , $I_O = 500\text{mA}$ , $V_I = 28\text{V to } 38\text{V}$	–	54.0	–	dB	
Dropout Voltage	$V_{\text{DROP}}$	$I_O = 1\text{A}$ , $T_J = +25^{\circ}\text{C}$	–	2.0	–	V	
Output Resistance (Note 37)	$r_O$	$f = 1\text{KHz}$	–	20.0	–	$\text{m}\Omega$	
Short Circuit Current	$I_{\text{SC}}$	$V_I = 35\text{V}$ , $T_A = +25^{\circ}\text{C}$	–	250	–	mA	
Peak Current (Note 37)	$I_{\text{PK}}$	$T_J = +25^{\circ}\text{C}$	–	2.2	–	A	

**Note 36:** 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.

**Note 37:** These parameters, although guaranteed, are not 100% tested in production.



## Typical Performance Characteristics

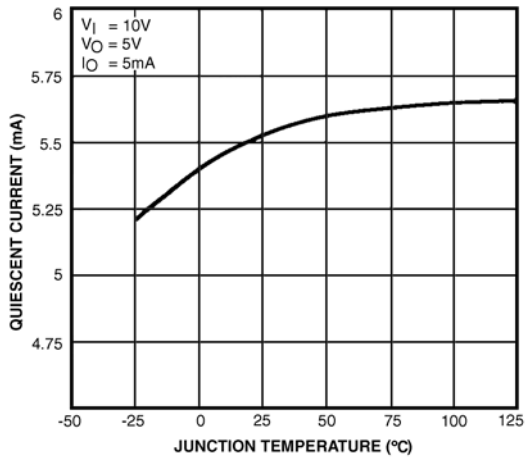


FIGURE 1. Quiescent Current

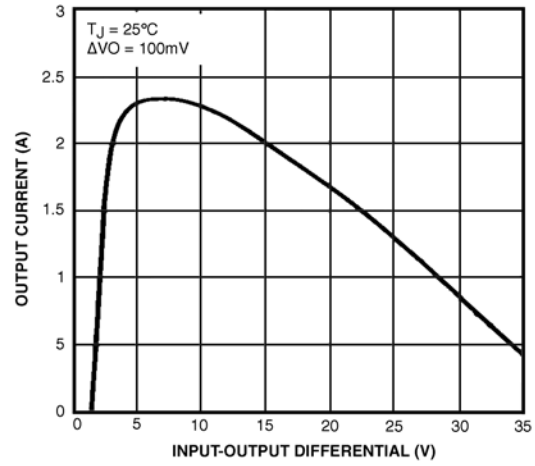


FIGURE 2. Peak Output Current

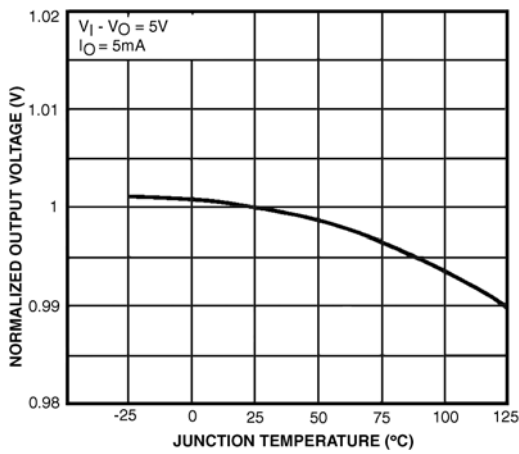


FIGURE 3. Output Voltage

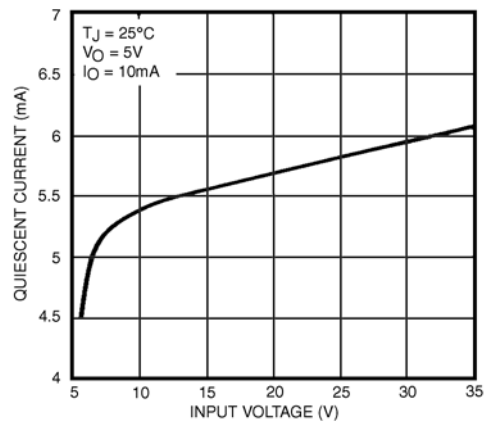


FIGURE 4. Quiescent Current

## Typical Applications

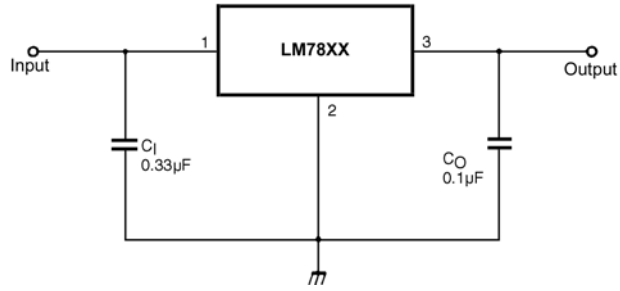


FIGURE 5. DC Parameters

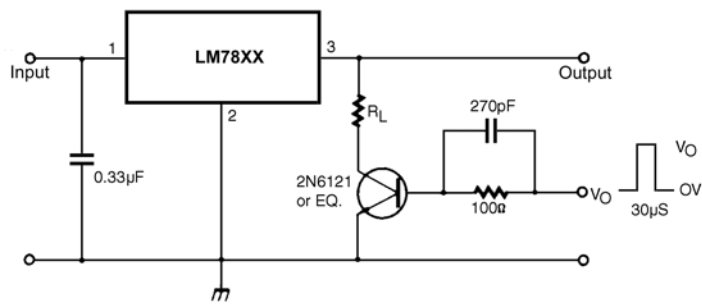


FIGURE 6. Load Regulation

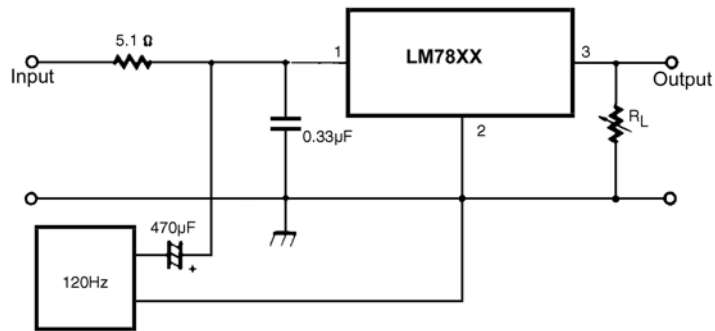


FIGURE 7. Ripple Rejection

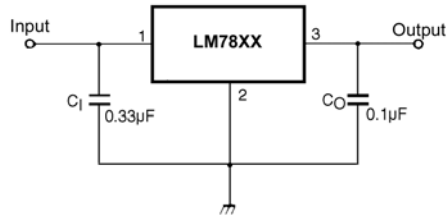
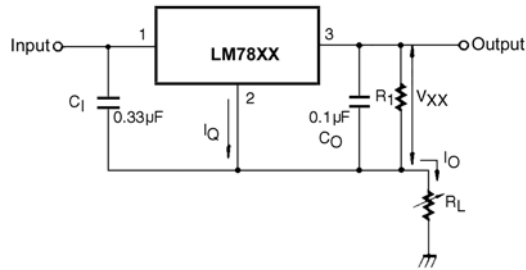


FIGURE 8. Fixed Output Regulator

Typical Applications (continued)



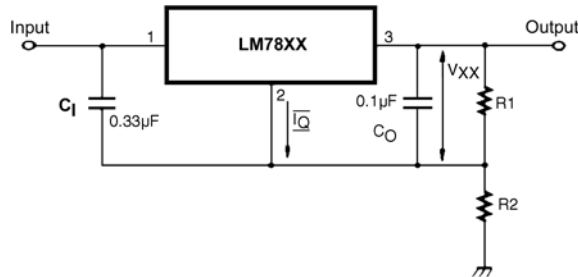
$$I_o = \frac{V_{XX}}{R_1} + I_Q$$

FIGURE 9.

**Note:** 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.

**Note:** C<sub>1</sub> is required if regulator is located an appreciable distance from the power supply filter.

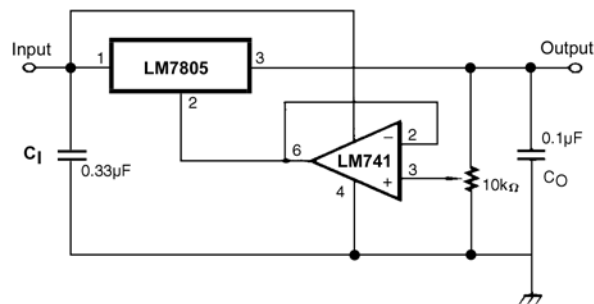
**Note:** C<sub>0</sub> improves stability and transient response.



$$I_{R1} \geq 5 I_Q$$

$$V_o = V_{XX} (1 R_2 / R_1) + I_Q R_2$$

FIGURE 10. Circuit for Increasing Output Voltage



$$I_{R1} \geq 5 I_Q$$

$$V_o = V_{XX} (1 R_2 / R_1) + I_Q R_2$$

FIGURE 11. Adjustable Output Regulator (7V to 30V)



Typical Applications (continued)

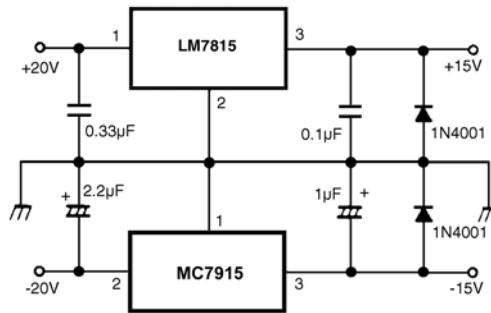


FIGURE 15. Split Power Supply ( $\pm 15V - 1A$ )

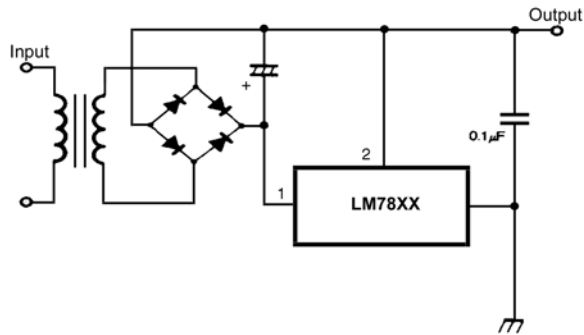


FIGURE 16. Negative Output Voltage Circuit

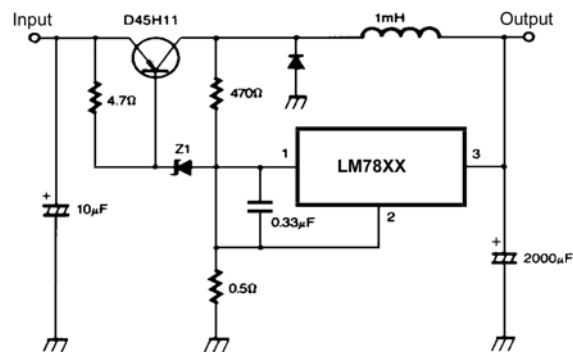
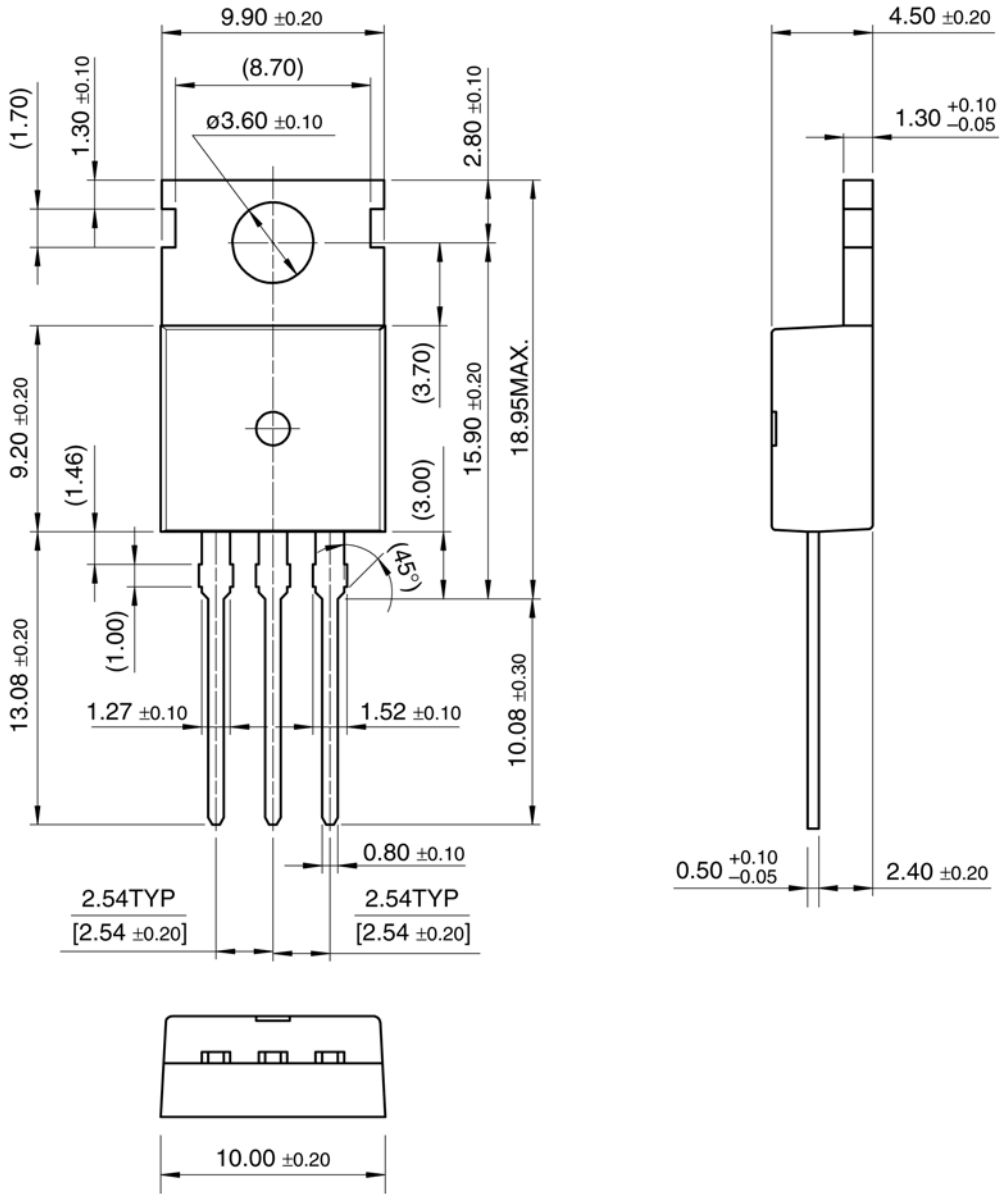


FIGURE 17. Switching Regulator

LM7805 • LM7806 • LM7808 • LM7809 • LM7810 • LM7812 • LM7815 • LM7818 • LM7824 • LM7805A • LM7806A • LM7808A  
 • LM7809A • LM7810A • LM7812A • LM7815A • LM7818A • LM7824A

**Physical Dimensions** inches (millimeters) unless otherwise noted

**TO-220**



Package Number TO-220

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