

September 2011

LM78XX/LM78XXA 3-Terminal 1A Positive Voltage Regulator

Features

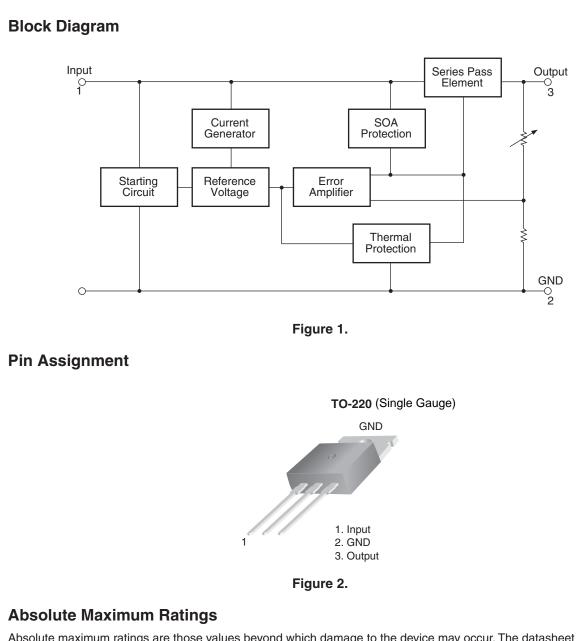
- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

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	±2%		0°C to +125°C
LM7806ACT			
LM7808ACT			
LM7809ACT			
LM7810ACT			
LM7812ACT			
LM7815ACT			
LM7818ACT			
LM7824ACT			



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	Parar	neter	Value	Unit	
VI	Input Voltage	$V_{O} = 5V$ to 18V	35	V	
		$V_{O} = 24V$	40	V	
$R_{ ext{ heta}JC}$	Thermal Resistance Juncti	on-Cases (TO-220)	5	°C/W	
R_{\thetaJA}	Thermal Resistance Juncti	Thermal Resistance Junction-Air (TO-220)		°C/W	
T _{OPR}	Operating Temperature	LM78xx	-40 to +125	°C	
	Range	LM78xxA	0 to +125	-	
T _{STG}	Storage Temperature Rang	je	-65 to +150	°C	

Electrical Characteristics (LM7805)

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

Symbol	Parameter	(Conditions	Min.	Тур.	Max.	Unit
Vo	Output Voltage	$T_J = +25^{\circ}C$		4.8	5.0	5.2	V
		$5mA \le I_O \le 1$ $V_I = 7V$ to 20	A, P _O ≤ 15W,)V	4.75	5.0	5.25	
Regline	Line Regulation ⁽¹⁾	$T_{J} = +25^{\circ}C$ $V_{O} = 7V \text{ to } 25V$		_	4.0	100	mV
			$V_{I} = 8V$ to 12V	_	1.6	50.0	
Regload	Load Regulation ⁽¹⁾	$T_J = +25^{\circ}C$	$I_{O} = 5$ mA to 1.5A	_	9.0	100	mV
			I _O = 250mA to 750mA	_	4.0	50.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		_	5.0	8.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5mA$ to 1A		_	0.03	0.5	mA
		$V_{I} = 7V$ to $25V$		_	0.3	1.3	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽²⁾	I _O = 5mA		_	-0.8	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	00kHz, T _A = +25°C	_	42.0	-	μV/V _O
RR	Ripple Rejection ⁽²⁾	f = 120Hz, V	_O = 8V to 18V	62.0	73.0	_	dB
V _{DROP}	Dropout Voltage	$I_{O} = 1A, T_{J} = +25^{\circ}C$		_	2.0	-	V
r _O	Output Resistance ⁽²⁾	f = 1kHz		_	15.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A	= +25°C	_	230	_	mA
I _{PK}	Peak Current ⁽²⁾	$T_J = +25^{\circ}C$		_	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.

Electrical Characteristics (LM7806) (Continued)

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Befer to the test circuits -40° C $<$ T $< 125^{\circ}$ C l_{\odot}	= 500mA, V_I = 11V, C_I = 0.33 μ F, C_O = 0.1 μ F, unless otherwise specified.
1000×10^{-120}	$=$ 500 m/s, $v_1 = 11v_s$, $o_1 = 0.00\mu_1$, $o_0 = 0.1\mu_1$, unless otherwise specified.

Symbol	Parameter		Conditions	Min	Тур.	Max.	Unit
Vo	Output Voltage	$T_J = +25^{\circ}C$	Γ _J = +25°C		6.0	6.25	V
		$5mA \le I_O \le 1$ $V_I = 8.0V$ to 2	IA, P _O ≤ 15W, 21V	5.7	6.0	6.3	
Regline	Line Regulation ⁽³⁾	$T_J = +25^{\circ}C$	$V_{I} = 8V$ to 25V	-	5.0	120	mV
			V _I = 9V to 13V	-	1.5	60.0	1
Regload	Load Regulation ⁽³⁾	$T_J = +25^{\circ}C$	$I_{O} = 5$ mA to 1.5A	_	9.0	120	mV
			I _O = 250mA to 750mA	-	3.0	60.0)
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		-	5.0	8.0	mA
ΔI_Q	Quiescent Current	$I_{O} = 5$ mA to 1A		-	-	0.5	mA
	Change	V _I = 8V to 25V		-	-	1.3	1
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽⁴⁾	I _O = 5mA		-	-0.8	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	00kHz, $T_A = +25^{\circ}C$	-	45.0	-	μV/V _O
RR	Ripple Rejection ⁽⁴⁾	f = 120Hz, V	_O = 8V to 18V	62.0	73.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J =	: +25°C	-	2.0	-	V
r _O	Output Resistance ⁽⁴⁾	f = 1kHz		-	19.0	-	mΩ
I _{SC}	Short Circuit Current	$V_{I} = 35V, T_{A}$	= +25°C	-	250	-	mA
I _{PK}	Peak Current ⁽⁴⁾	$T_J = +25^{\circ}C$		-	2.2	-	Α

Notes:

3. 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.

Electrical Characteristics (LM7808) (Continued)

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

Symbol	Parameter	C	Conditions	Min.	Тур.	Max.	Unit
V _O	Output Voltage	$T_J = +25^{\circ}C$		7.7	8.0	8.3	V
		$5mA \le I_O \le 1$ $V_I = 10.5V$ to	A, P _O ≤ 15W, o 23V	7.6	8.0	8.4	
Regline	Line Regulation ⁽⁵⁾	$T_J = +25^{\circ}C$	V _I = 10.5V to 25V	_	5.0	160	mV
			V _I = 11.5V to 17V	_	2.0	80.0	
Regload	Load Regulation ⁽⁵⁾	T _J = +25°C	I _O = 5mA to 1.5A	_	10.0	160	mV
			I _O = 250mA to 750mA	_	5.0	80.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		_	5.0	8.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5mA$ to 1A		_	0.05	0.5	mA
		$V_{I} = 10.5V \text{ to}$) 25V	_	0.5	1.0	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽⁶⁾	I _O = 5mA		_	-0.8	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	00kHz, T _A = +25°C	_	52.0	-	μV/V _O
RR	Ripple Rejection ⁽⁶⁾	f = 120Hz, V	_O = 11.5V to 21.5V	56.0	73.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J =	: +25°C	_	2.0	-	V
r _O	Output Resistance ⁽⁶⁾	f = 1kHz		_	17.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A	= +25°C	_	230	-	mA
I _{PK}	Peak Current ⁽⁶⁾	$T_J = +25^{\circ}C$		_	2.2	-	Α

Notes:

5. 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.

Electrical Characteristics (LM7809) (Continued)

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

Symbol	Parameter	C	Conditions	Min.	Тур.	Max.	Unit
V _O	Output Voltage	$T_J = +25^{\circ}C$		8.65	9.0	9.35	V
		$5mA \le I_O \le T$ $V_I = 11.5V to$	1A, P _O ≤ 15W, o 24V	8.6	9.0	9.4	
Regline	Line Regulation ⁽⁷⁾	$T_J = +25^{\circ}C$	V _I = 11.5V to 25V	_	6.0	180	mV
			V _I = 12V to 17V	_	2.0	90.0	
Regload	Load Regulation ⁽⁷⁾	$T_J = +25^{\circ}C$	I _O = 5mA to 1.5A	_	12.0	180	mV
			$I_{O} = 250$ mA to 750mA	_	4.0	90.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		_	5.0	8.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5mA$ to 1A		_	-	0.5	mA
		V _I = 11.5V to	V _I = 11.5V to 26V		-	1.3	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽⁸⁾	I _O = 5mA		_	-1.0	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to -	100kHz, T _A = +25°C	_	58.0	-	μV/V _O
RR	Ripple Rejection ⁽⁸⁾	f = 120Hz, V	′ _O = 13V to 23V	56.0	71.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J =	= +25°C	_	2.0	-	V
r _O	Output Resistance ⁽⁸⁾	f = 1kHz		_	17.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A	= +25°C	_	250	-	mA
I _{PK}	Peak Current ⁽⁸⁾	$T_J = +25^{\circ}C$		_	2.2	-	А

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.

Electrical Characteristics	(LM7810) (Continued)
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Refer to the test circuits. -40°C < T_J < 125°C, I_O = 500mA, V_I = 16V, C_I = 0.33 μ F, C_O = 0.1 μ F, unless otherwise specified.

Symbol	Parameter	(Conditions	Min.	Тур.	Max.	Unit
V _O	Output Voltage	put Voltage $T_J = +25^{\circ}C$ 9	9.6	10.0	10.4	V	
		$5mA \le I_O \le 1$ $V_I = 12.5V tc$	A, P _O ≤ 15W, 9 25V	9.5	10.0	10.5	
Regline	Line Regulation ⁽⁹⁾	$T_J = +25^{\circ}C$	V _I = 12.5V to 25V	-	10.0	200	mV
			V _I = 13V to 25V	-	3.0	100	
Regload	Load Regulation ⁽⁹⁾	$T_J = +25^{\circ}C$	$I_{O} = 5$ mA to 1.5A	_	12.0	200	mV
			I _O = 250mA to 750mA	-	4.0	400	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		_	5.1	8.0	mA
ΔI_Q	Quiescent Current Change	I _O = 5mA to 1A		_	_	0.5	mA
		$V_{I} = 12.5V \text{ to}$) 29V	_	-	1.0	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹⁰⁾	I _O = 5mA		-	-1.0	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	00kHz, T _A = +25°C	_	58.0	_	μV/V _O
RR	Ripple Rejection ⁽¹⁰⁾	f = 120Hz, V	_D = 13V to 23V	56.0	71.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J =	I _O = 1A, T _J = +25°C		2.0	_	V
r _O	Output Resistance ⁽¹⁰⁾	f = 1kHz		_	17.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A	= +25°C	_	250	-	mA
I _{PK}	Peak Current ⁽¹⁰⁾	T _J = +25°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.

Electrical Characteristics (LM7812) (Continued)

Symbol	Parameter	(Conditions	Min.	Тур.	Max.	Unit
V _O	Output Voltage	$T_J = +25^{\circ}C$		11.5	12.0	12.5	V
		$5mA \le I_O \le 1A, P_O \le 15W,$ V_I = 14.5V to 27V		11.4	12.0	12.6	
Regline	Line Regulation ⁽¹¹⁾	$T_{J} = +25^{\circ}C$ $V_{I} = 14.5V$ to 30V		_	10.0	240	mV
			V _I = 16V to 22V	-	3.0	120	
Regload	Load Regulation ⁽¹¹⁾	$T_J = +25^{\circ}C$	$I_{O} = 5$ mA to 1.5A	-	11.0	240	mV
			I _O = 250mA to 750mA	_	5.0	120	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		_	5.1	8.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5$ mA to 1A		_	0.1	0.5	mA
		V _I = 14.5V t	V _I = 14.5V to 30V		0.5	1.0	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹²⁾	I _O = 5mA		_	-1.0	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to	100kHz, T _A = +25°C	-	76.0	-	μV/V _O
RR	Ripple Rejection ⁽¹²⁾	f = 120Hz, V	/ _I = 15V to 25V	55.0	71.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J = +25°C		_	2.0	-	V
r _O	Output Resistance ⁽¹²⁾	f = 1kHz		-	18.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A	= +25°C	_	230	-	mA
I _{PK}	Peak Current ⁽¹²⁾	$T_J = +25^{\circ}C$		_	2.2	-	A

Notes:

11. 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.

Electrical Characteristics (LM7815) (Continued)

Symbol	Parameter	C	Conditions	Min.	Тур.	Max.	Unit
V _O	Output Voltage	T _J = +25°C		14.4	15.0	15.6	V
			$5mA \le I_O \le 1A, P_O \le 15W,$ $V_1 = 17.5V \text{ to } 30V$		15.0	15.75	
Regline	Line Regulation ⁽¹³⁾	$T_J = +25^{\circ}C$	V _I = 17.5V to 30V	_	11.0	300	mV
			V _I = 20V to 26V	-	3.0	150	1
Regload	Load Regulation ⁽¹³⁾	T _J = +25°C	$I_{O} = 5$ mA to 1.5A	-	12.0	300	mV
			I _O = 250mA to 750mA	_	4.0	150	1
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		-	5.2	8.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5mA$ to	$I_{O} = 5mA$ to 1A		-	0.5	mA
		V _I = 17.5V to	o 30V	_	-	1.0	1
$\Delta V_{O} / \Delta T$	Output Voltage Drift ⁽¹⁴⁾	I _O = 5mA		_	-1.0	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	100kHz, T _A = +25°C	-	90.0	-	μV/V _O
RR	Ripple Rejection ⁽¹⁴⁾	f = 120Hz, V	_I = 18.5V to 28.5V	54.0	70.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J =	= +25°C	_	2.0	-	V
r _O	Output Resistance ⁽¹⁴⁾	f = 1kHz		_	19.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A	$V_{I} = 35V, T_{A} = +25^{\circ}C$		250	-	mA
I _{PK}	Peak Current ⁽¹⁴⁾	T _J = +25°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.

Electrical Characteristics (LM7818) (Continued)

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

Symbol	Parameter	(Conditions	Min.	Тур.	Max.	Unit
Vo	Output Voltage	$T_J = +25^{\circ}C$		17.3	18.0	18.7	V
		$5\text{mA} \le I_{O} \le 1\text{A}, P_{O} \le 15\text{W},$ $V_{I} = 21\text{V to }33\text{V}$		17.1	18.0	18.9	
Regline	Line Regulation ⁽¹⁵⁾	$T_J = +25^{\circ}C$	$T_{J} = +25^{\circ}C$ $V_{I} = 21V \text{ to } 33V$		15.0	360	mV
			V _I = 24V to 30V	-	5.0	180	
Regload	Load Regulation ⁽¹⁵⁾	$T_J = +25^{\circ}C$	I _O = 5mA to 1.5A	-	15.0	360	mV
			I _O = 250mA to 750mA	-	5.0	180	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		-	5.2	8.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5mA$ to 1A		-	_	0.5	mA
		$V_{I} = 21V$ to 3	33V	-	-	1.0	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹⁶⁾	I _O = 5mA		-	-1.0	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	100kHz, T _A = +25°C	-	110	_	μV/V _O
RR	Ripple Rejection ⁽¹⁶⁾	f = 120Hz, V	_I = 22V to 32V	53.0	69.0	_	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J =	= +25°C	-	2.0	-	V
r _O	Output Resistance ⁽¹⁶⁾	f = 1kHz		-	22.0	_	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A = +25°C		-	250	-	mA
I _{PK}	Peak Current ⁽¹⁶⁾	$T_J = +25^{\circ}C$		-	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.

Electrical	Characteristics	(LM7824)	(Continued)
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Symbol	Parameter	(Conditions	Min.	Тур.	Max.	Unit
Vo	Output Voltage	T _J = +25°C		23.0	24.0	25.0	V
			$5mA \le I_O \le 1A, P_O \le 15W,$ $V_I = 27V \text{ to } 38V$		24.0	25.25	
Regline	Line Regulation ⁽¹⁷⁾	$T_J = +25^{\circ}C$	V _I = 27V to 38V	_	17.0	480	mV
			V _I = 30V to 36V	-	6.0	240	
Regload	Load Regulation ⁽¹⁷⁾	$T_J = +25^{\circ}C$	I _O = 5mA to 1.5A	_	15.0	480	mV
			I _O = 250mA to 750mA	_	5.0	240	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		-	5.2	8.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5mA$ to 1A		-	0.1	0.5	mA
		$V_{\rm I} = 27V$ to 3	38V	_	0.5	1.0	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽¹⁸⁾	I _O = 5mA		-	-1.5	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	100kHz, T _A = +25°C	-	60.0	-	μV/V _O
RR	Ripple Rejection ⁽¹⁸⁾	f = 120Hz, V	I = 28V to 38V	50.0	67.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J =	= +25°C	-	2.0	-	V
rO	Output Resistance ⁽¹⁸⁾	f = 1kHz		-	28.0	-	mΩ
I _{SC}	Short Circuit Current	$V_{I} = 35V, T_{A} = +25^{\circ}C$		-	230	-	mA
I _{PK}	Peak Current ⁽¹⁸⁾	$T_J = +25^{\circ}C$		_	2.2	-	А

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.

Electrical Characteristics (LM7805A) (Continued)

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

Symbol	Parameter	Co	onditions	Min.	Тур.	Max.	Unit
Vo	Output Voltage	$T_J = +25^{\circ}C$		4.9	5.0	5.1	V
		$I_0 = 5mA \text{ to } 1A,$ $V_1 = 7.5V \text{ to } 20V$		4.8	5.0	5.2	
Regline	Line Regulation ⁽¹⁹⁾	$V_{I} = 7.5V$ to 25V	, I _O = 500mA	_	5.0	50.0	mV
		$V_{I} = 8V$ to 12V	V _I = 8V to 12V		3.0	50.0	
		$T_J = +25^{\circ}C$	V _I = 7.3V to 20V	-	5.0	50.0	
			V _I = 8V to 12V	_	1.5	25.0	
Regload	Load Regulation ⁽¹⁹⁾	$T_{J} = +25^{\circ}C, I_{O} =$	5mA to 1.5A	_	9.0	100	mV
		$I_{O} = 5mA \text{ to } 1A$		_	9.0	100	
		I _O = 250mA to 7	I _O = 250mA to 750mA		4.0	50.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		-	5.0	6.0	mA
ΔI_Q	Quiescent Current	$I_{O} = 5mA \text{ to } 1A$		-	-	0.5	mA
	Change	$V_{\rm I} = 8V$ to 25V, I	_O = 500mA	_	_	0.8	
		V _I = 7.5V to 20V	, T _J = +25°C	_	-	0.8	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽²⁰⁾	I _O = 5mA		_	-0.8	_	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 100k	Hz, T _A = +25°C	_	10.0	_	μV/V _O
RR	Ripple Rejection ⁽²⁰⁾	f = 120Hz, I _O = 5	500mA, V _I = 8V to 18V	_	68.0	_	dB
V _{DROP}	Dropout Voltage	$I_{O} = 1A, T_{J} = +25^{\circ}C$		_	2.0	_	V
r _O	Output Resistance ⁽²⁰⁾	f = 1kHz	f = 1kHz		17.0	_	mΩ
I _{SC}	Short Circuit Current	$V_{I} = 35V, T_{A} = +2$	25°C	_	250	_	mA
I _{PK}	Peak Current ⁽²⁰⁾	$T_J = +25^{\circ}C$		_	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.

Electrical Characteristics (LM7806A) (Continued)

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

Symbol	Parameter		Conditions	Min.	Тур.	Max.	Unit
V _O	Output Voltage	T _J = +25°C		5.58	6.0	6.12	V
		$I_{O} = 5mA$ to $V_{I} = 8.6V$ to 2	1A, P _O ≤ 15W, 21V	5.76	6.0	6.24	
Regline	Line Regulation ⁽²¹⁾	$V_{I} = 8.6V$ to 2	25V, I _O = 500mA	-	5.0	60.0	mV
		V _I = 9V to 13	V	-	3.0	60.0	
		T _J = +25°C	V _I = 8.3V to 21V	_	5.0	60.0]
			V _I = 9V to 13V	-	1.5	30.0	
Regload	Load Regulation ⁽²¹⁾	T _J = +25°C,	_O = 5mA to 1.5A	-	9.0	100	mV
		$I_0 = 5mA \text{ to}$	1A	-	9.0	100	
		I _O = 250mA t	I _O = 250mA to 750mA		5.0	50.0	
Ι _Q	Quiescent Current	T _J = +25°C		_	4.3	6.0	mA
ΔI_Q	Quiescent Current Change	I _O = 5mA to	1A	_	_	0.5	mA
		V _I = 19V to 2	5V, I _O = 500mA	-	_	0.8	
		$V_{\rm I} = 8.5 V$ to 2	21V, T _J = +25°C	_	_	0.8]
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽²²⁾	I _O = 5mA		_	-0.8	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	00kHz, T _A = +25°C	_	10.0	_	μV/V _O
RR	Ripple Rejection ⁽²²⁾	f = 120Hz, I _C	= 500mA, V _I = 9V to 19V	_	65.0	-	dB
V _{DROP}	Dropout Voltage	$I_{O} = 1A, T_{J} = +25^{\circ}C$		_	2.0	_	V
r _O	Output Resistance ⁽²²⁾	f = 1kHz	f = 1kHz		17.0	_	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A :	= +25°C	_	250	_	mA
I _{PK}	Peak Current ⁽²²⁾	T _J = +25°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.

Electrical Characteristics (LM7808A) (Continued)

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

Symbol	Parameter	Со	nditions	Min.	Тур.	Max.	Unit
Vo	Output Voltage	T _J = +25°C		7.84	8.0	8.16	V
			$I_{O} = 5mA$ to 1A, $P_{O} \le 15W$, $V_{I} = 10.6V$ to 23V		8.0	8.3	
Regline	Line Regulation ⁽²³⁾	V _I = 10.6V to 2	25V, I _O = 500mA	-	6.0	80.0	mV
		V _I = 11V to 17V		-	3.0	80.0	
		T _J = +25°C	V _I = 10.4V to 23V	-	6.0	80.0	
			$V_{I} = 11V \text{ to } 17V$	-	2.0	40.0	
Regload	Load Regulation ⁽²³⁾	$T_{\rm J}$ = +25°C, $I_{\rm O}$ = 5mA to 1.5A		-	12.0	100	mV
		$I_{O} = 5mA \text{ to } 1A$	I _O = 5mA to 1A		12.0	100	
		$I_{O} = 250 \text{mA to}$	I _O = 250mA to 750mA		5.0	50.0	
Ι _Q	Quiescent Current	T _J = +25°C		-	5.0	6.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5mA \text{ to } 1A$	Ą	-	-	0.5	mA
		$V_{I} = 11V \text{ to } 25$	V, I _O = 500mA	-	-	0.8	
		V _I = 10.6V to 2	$V_{I} = 10.6V$ to 23V, $T_{J} = +25^{\circ}C$		-	0.8	
$\Delta V_{O} / \Delta T$	Output Voltage Drift ⁽²⁴⁾	I _O = 5mA		-	-0.8	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 10	0kHz, T _A = +25°C	-	10.0	-	μV/V _O
RR	Ripple Rejection ⁽²⁴⁾	$f = 120Hz, I_0 = 500mA,$ $V_1 = 11.5V to 21.5V$		-	62.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J = +25°C		-	2.0	-	V
r _O	Output Resistance ⁽²⁴⁾	f = 1kHz		-	18.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A =	+25°C	-	250	-	mA
I _{PK}	Peak Current ⁽²⁴⁾	T _J = +25°C		_	2.2	_	А

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.

Electrical Characteristics (LM7809A) (Continued)

Refer to the test circuits. 0°C	< T _J < 125°C, I _O = 1A	A, $V_I = 15V$, $C_I = 0.33\mu$ F, $C_O = 0.33\mu$	= 0.1μ F, unless otherwise specified.
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Symbol	Parameter	C	onditions	Min.	Тур.	Max.	Units
V _O	Output Voltage	$T_J = +25^{\circ}C$		8.82	9.0	9.16	V
		- C	$I_O = 5mA$ to 1A, $P_O \le 15W$, $V_I = 11.2V$ to 24V		9.0	9.35	
Regline	Line Regulation ⁽²⁵⁾	$V_{I} = 11.7V \text{ to}$	25V, I _O = 500mA	-	6.0	90.0	mV
		V _I = 12.5V to 19V		-	4.0	45.0	
		$T_J = +25^{\circ}C$	$T_{J} = +25^{\circ}C$ $V_{I} = 11.5V \text{ to } 24V$		6.0	90.0	1
			V _I = 12.5V to 19V	-	2.0	45.0	1
Regload	Load Regulation ⁽²⁵⁾	$T_{\rm J} = +25^{\circ}{\rm C},$	l _O = 5mA to 1.5A	-	12.0	100	mV
		I _O = 5mA to	1A	-	12.0	100	
		I _O = 250mA to 750mA		-	5.0	50.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$	$T_J = +25^{\circ}C$		5.0	6.0	mA
ΔI_Q	Quiescent Current Change	I _O = 5mA to	1A	-	_	0.5	mA
		$V_{I} = 12V \text{ to } 2$	25V, I _O = 500mA	-	-	0.8	
		V _I = 11.7V to) 25V, T _J = +25°C	-	_	0.8	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽²⁶⁾	I _O = 5mA		-	-1.0	_	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 1	00kHz, $T_A = +25^{\circ}C$	-	10.0	_	μV/V _O
RR	Ripple Rejection ⁽²⁶⁾	$f = 120Hz, I_{C}$ V _I = 12V to 2		-	62.0	-	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J = +25°C		-	2.0	_	V
r _O	Output Resistance ⁽²⁶⁾	f = 1kHz		-	17.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A =	= +25°C	-	250	-	mA
I _{PK}	Peak Current ⁽²⁶⁾	T _J = +25°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.

Electrical Characteristics (LM7810A) (Continued)

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

Symbol	Parameter	Con	ditions	Min.	Тур.	Max.	Units
Vo	Output Voltage	$T_J = +25^{\circ}C$		9.8	10.0	10.2	V
		$I_{O} = 5mA \text{ to } 1A, P$ $V_{I} = 12.8V \text{ to } 25V$	•		10.0	10.4	
Regline	Line Regulation ⁽²⁷⁾	$V_{\rm I} = 12.8V$ to 26V,	, I _O = 500mA	_	8.0	100	mV
		V _I = 13V to 20V		-	4.0	50.0	
		$T_J = +25^{\circ}C$	V _I = 12.5V to 25V	-	8.0	100	
			V _I = 13V to 20V	_	3.0	50.0	
Regload	Load Regulation ⁽²⁷⁾	$T_{\rm J} = +25^{\circ}C, I_{\rm O} = 5$	5mA to 1.5A	_	12.0	100	mV
		$I_{O} = 5mA \text{ to } 1A$	$I_{O} = 5$ mA to 1A		12.0	100	
		I _O = 250mA to 750	I _O = 250mA to 750mA		5.0	50.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$	$T_J = +25^{\circ}C$		5.0	6.0	mA
Δl _Q	Quiescent Current	$I_{O} = 5mA$ to 1A		_	_	0.5	mA
	Change	$V_{\rm I} = 12.8V$ to 25V,	, I _O = 500mA	_	_	0.8	
		V _I = 13V to 26V, T	J = +25°C	_	_	0.5	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽²⁸⁾	I _O = 5mA		_	-1.0	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 100kH	$Hz, T_A = +25^{\circ}C$	_	10.0	_	μV/V _O
RR	Ripple Rejection ⁽²⁸⁾	f = 120Hz, I _O = 50	$0mA, V_I = 14V \text{ to } 24V$	_	62.0	_	dB
V _{DROP}	Dropout Voltage	$I_{O} = 1A, T_{J} = +25^{\circ}C$		_	2.0	-	V
r _O	Output Resistance ⁽²⁸⁾	f = 1kHz		_	17.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A = +25	5°C	_	250	-	mA
I _{PK}	Peak Current ⁽²⁸⁾	$T_J = +25^{\circ}C$		_	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.

Electrical Characteristics (LM7812A) (Continued)

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

Symbol	Parameter	Co	nditions	Min.	Тур.	Max.	Units
Vo	Output Voltage	T _J = +25°C		11.75	12.0	12.25	V
			$I_{O} = 5mA \text{ to } 1A, P_{O} \le 15W,$ $V_{I} = 14.8V \text{ to } 27V$		12.0	12.5	
Regline	Line Regulation ⁽²⁹⁾	V _I = 14.8V to	30V, I _O = 500mA	_	10.0	120	mV
		$V_{\rm I} = 16V \text{ to } 22$	2V	_	4.0	120	
		T _J = +25°C	V _I = 14.5V to 27V	-	10.0	120	
			$V_{I} = 16V \text{ to } 22V$	-	3.0	60.0	1
Regload	Load Regulation ⁽²⁹⁾	$T_{J} = +25^{\circ}C, I_{O} = 5mA \text{ to } 1.5A$		-	12.0	100	mV
		$I_{O} = 5mA \text{ to } 1$	A	-	12.0	100	1
		I _O = 250mA to 750mA		-	5.0	50.0	1
Ι _Q	Quiescent Current	T _J = +25°C		-	5.1	6.0	mA
ΔI_Q	Quiescent Current Change	I _O = 5mA to 1	A	-	-	0.5	mA
		$V_{\rm I} = 14V \text{ to } 2^{-1}$	7V, I _O = 500mA	_	-	0.8]
		$V_{I} = 15V$ to 30V, $T_{J} = +25^{\circ}C$		-	-	0.8	1
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽³⁰⁾	I _O = 5mA		_	-1.0	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 10	00kHz, T _A = +25°C	-	10.0	_	μV/V _O
RR	Ripple Rejection ⁽³⁰⁾	$f = 120Hz, I_0 = 500mA,$ V _I = 14V to 24V		-	60.0	_	dB
V _{DROP}	Dropout Voltage	$I_{O} = 1A, T_{J} = +25^{\circ}C$		_	2.0	-	V
r _O	Output Resistance ⁽³⁰⁾	f = 1kHz		_	18.0	_	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A =	= +25°C	-	250	-	mA
I _{PK}	Peak Current ⁽³⁰⁾	T _J = +25°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.

Electrical Characteristics (LM7815A) (Continued)

Symbol	Parameter	Conditions		Min.	Тур.	Max.	Units
V _O	Output Voltage	$T_J = +25^{\circ}C$ $I_O = 5mA \text{ to } 1A, P_O \le 15W,$ $V_I = 17.7V \text{ to } 30V$		14.75	15.0	15.3	V
				14.4	15.0	15.6	
Regline	Line Regulation ⁽³¹⁾	$V_{I} = 17.4V$ to 30V, $I_{O} = 500$ mA		-	10.0	150	mV
		V ₁ = 20V to 26V		-	5.0	150	1
		T _J = +25°C	V _I = 17.5V to 30V	-	11.0	150	
			V _I = 20V to 26V	-	3.0	75.0	
Regload	Load Regulation ⁽³¹⁾	$T_{\rm J}$ = +25°C, $I_{\rm O}$ = 5mA to 1.5A		-	12.0	100	mV
		$I_{O} = 5mA$ to 1A		-	12.0	100]
		I _O = 250mA to 750mA		-	5.0	50.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		-	5.2	6.0	mA
ΔI_Q	ΔI _Q Quiescent Current Change		I _O = 5mA to 1A		_	0.5	mA
		$V_{I} = 17.5V$ to 30V, $I_{O} = 500$ mA		-	_	0.8	
		V _I = 17.5V te	o 30V, T _J = +25°C	-	_	0.8	1
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽³²⁾	I _O = 5mA		-	-1.0	-	mV/°C
V _N	Output Noise Voltage	f = 10Hz to 100kHz, $T_A = +25^{\circ}C$		_	10.0	_	μV/V _O
RR	Ripple Rejection ⁽³²⁾	$f = 120Hz, I_0 = 500mA, V_I = 18.5V to 28.5V$		-	58.0	_	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J = +25°C		-	2.0	-	V
r _O	Output Resistance ⁽³²⁾	f = 1kHz		-	19.0	_	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A = +25°C		-	250	_	mA
I _{PK}	Peak Current ⁽³²⁾	T _J = +25°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.

Electrical Characteristics (LM7818A) (Continued)

Refer to the test circuits. $0^{\circ}C < T_J < 125^{\circ}C$, $I_O = 1A$, $V_I = 27V$, $C_I = 0.33\mu$ F, $C_O = 0.1\mu$ F, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Тур.	Max.	Units
V _O	Output Voltage	$T_J = +25^{\circ}C$		17.64	18.0	18.36	V
		$\label{eq:I_O} \begin{array}{l} I_O = 5mA \text{ to } 1A, \ P_O \leq 15W, \\ V_I = 21V \ to \ 33V \end{array}$		17.3	18.0	18.7	
Regline	Line Regulation ⁽³³⁾	$V_{I} = 21V$ to 33V, $I_{O} = 500$ mA		-	15.0	180	mV
			V _I = 21V to 33V		5.0	180	
		T _J = +25°C	V _I = 20.6V to 33V	-	15.0	180	
			V _I = 24V to 30V	-	5.0	90.0	
Regload	Load Regulation ⁽³³⁾	$T_J=+25^\circC,$	l _O = 5mA to 1.5A	-	15.0	100	mV
		I _O = 5mA to 1A		_	15.0	100	
		I _O = 250mA f	to 750mA	-	7.0	50.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		-	5.2	6.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5mA \text{ to}$	1A	-	-	0.5	mA
			$V_{\rm I} = 12V$ to 33V, $I_{\rm O} = 500$ mA		-	0.8	
		$V_{I} = 12V$ to 33V, $T_{J} = +25^{\circ}C$		-	-	0.8	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽³⁴⁾	I _O = 5mA		-	-1.0	-	mV/°C
V _N	Output Noise Voltage	$f = 10Hz$ to 100kHz, $T_A = +25^{\circ}C$		-	10.0	-	μV/V _O
RR	Ripple Rejection ⁽³⁴⁾	$ f = 120Hz, I_O = 500mA, \\ V_I = 22V to 32V $		-	57.0	_	dB
V _{DROP}	Dropout Voltage	I _O = 1A, T _J = +25°C		-	2.0	-	V
r _O	Output Resistance ⁽³⁴⁾	f = 1kHz		-	19.0	-	mΩ
I _{SC}	Short Circuit Current	V _I = 35V, T _A = +25°C		-	250	-	mA
I _{PK}	Peak Current ⁽³⁴⁾	$T_J = +25^{\circ}C$		-	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.

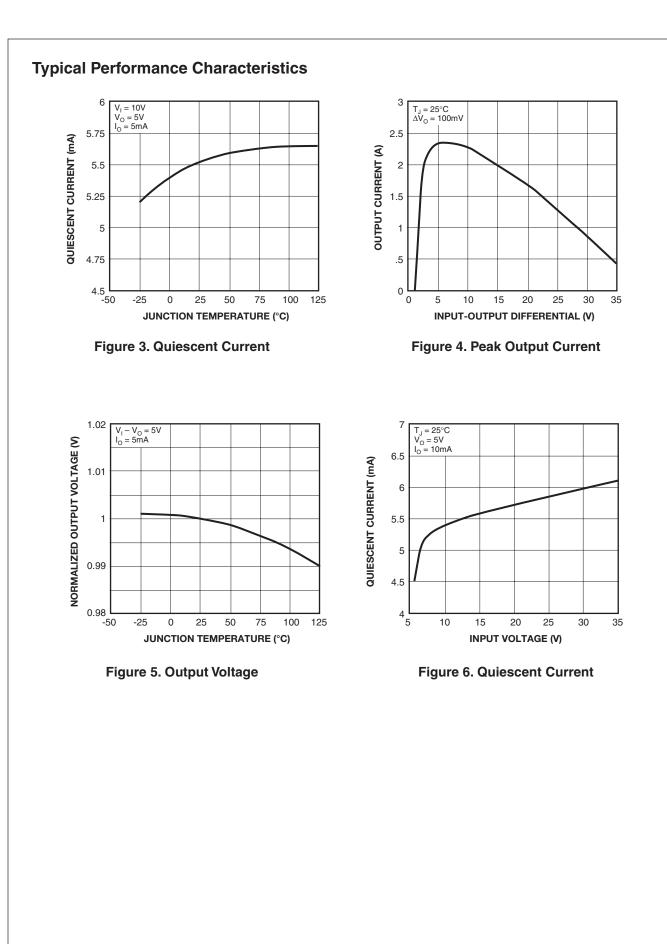
Electrical Characteristics (LM7824A) (Continued)

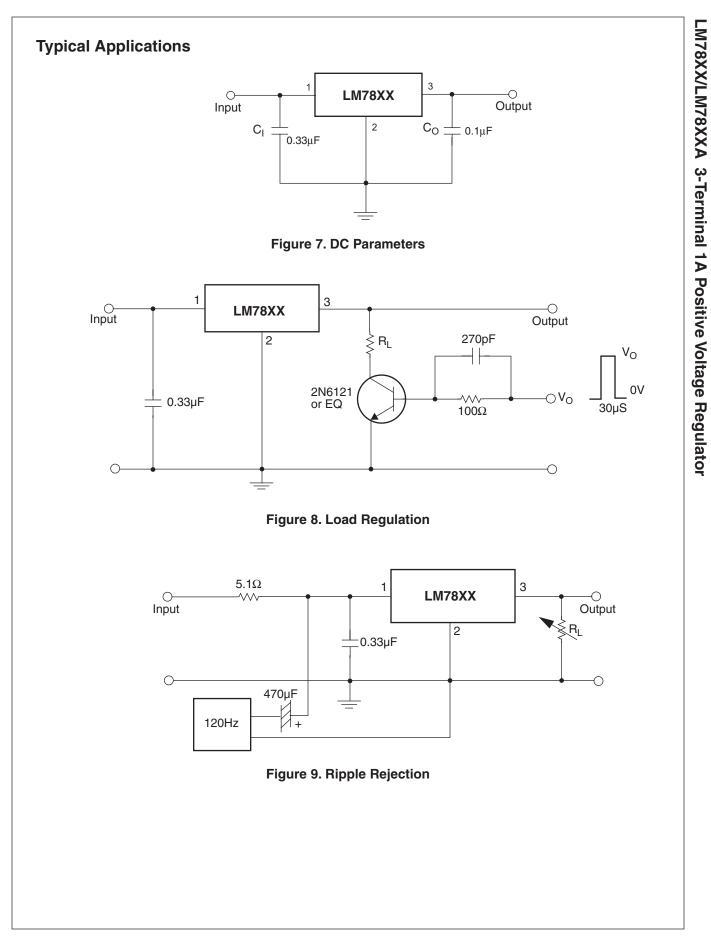
Refer to the test circuits. $0^{\circ}C < T_J < 125^{\circ}C$, $I_O = 1A$, $V_I = 33V$, $C_I = 0.33\mu$ F, $C_O = 0.1\mu$ F, unless otherwise specified.

Symbol	Parameter	Conditions		Min.	Тур.	Max.	Units
V _O	Output Voltage	$T_{J} = +25^{\circ}C$ $I_{O} = 5mA \text{ to } 1A, P_{O} \le 15W,$ $V_{I} = 27.3V \text{ to } 38V$		23.5	24.0	24.5	V
				23.0	24.0	25.0	
Regline	Line Regulation ⁽³⁵⁾	$V_{I} = 27V$ to 38V, $I_{O} = 500$ mA		_	18.0	240	mV
		$V_{I} = 21V$ to 33V		-	6.0	240	
		T _J = +25°C	V _I = 26.7V to 38V	-	18.0	240	
			$V_{I} = 30V \text{ to } 36V$	-	6.0	120	
Regload	Load Regulation ⁽³⁵⁾	$T_{J} = +25^{\circ}C, I_{O} = 5mA \text{ to } 1.5A$		-	15.0	100	mV
		$I_{O} = 5$ mA to 1A		-	15.0	100	
		I _O = 250mA to 750mA		_	7.0	50.0	
Ι _Q	Quiescent Current	$T_J = +25^{\circ}C$		-	5.2	6.0	mA
ΔI_Q	Quiescent Current Change	$I_{O} = 5$ mA to 1A		-	_	0.5	mA
		$V_{\rm I} = 27.3 V$ to 38V, $I_{\rm O} = 500 \text{mA}$		-	_	0.8	
		V _I = 27.3V to 3	8V, T _J = +25°C	-	_	0.8	
$\Delta V_O / \Delta T$	Output Voltage Drift ⁽³⁶⁾	I _O = 5mA		-	-1.5	_	mV/°C
V _N	Output Noise Voltage	$f = 10Hz$ to 100kHz, $T_A = +25^{\circ}C$		-	10.0	_	μV/V _O
RR	Ripple Rejection ⁽³⁶⁾	$\label{eq:states} \begin{array}{l} f = 120 Hz, \ I_O = 500 mA, \\ V_I = 28 V \ to \ 38 V \end{array}$		-	54.0	_	dB
V _{DROP}	Dropout Voltage	$I_{O} = 1A, T_{J} = +25^{\circ}C$		-	2.0	-	V
r _O	Output Resistance ⁽³⁶⁾	f = 1kHz		-	20.0	_	mΩ
I _{SC}	Short Circuit Current	$V_{I} = 35V, T_{A} = +25^{\circ}C$		-	250	_	mA
I _{PK}	Peak Current ⁽³⁶⁾	$T_{.1} = +25^{\circ}C$		-	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.





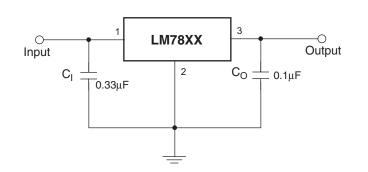
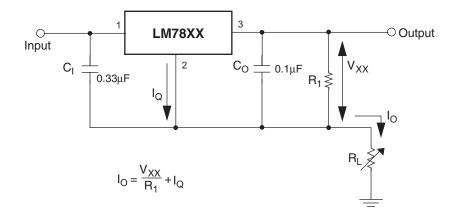


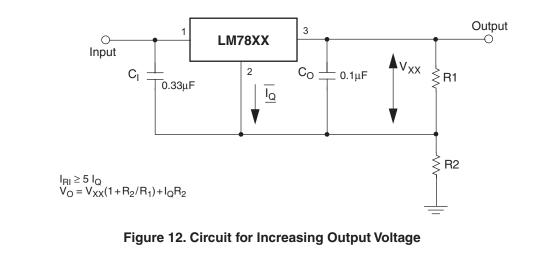
Figure 10. Fixed Output Regulator

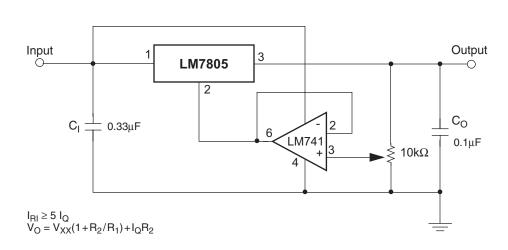


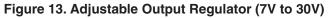
Notes:

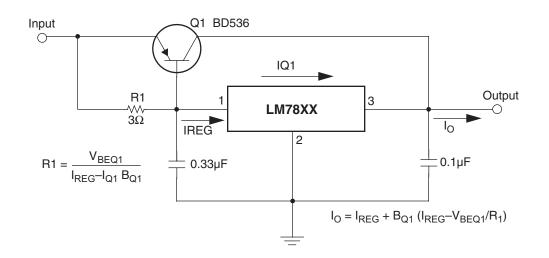
- 1. To specify an output voltage, substitute voltage value for "XX." A common ground is required between the input and the output voltage. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.
- 2. C₁ is required if regulator is located an appreciable distance from power supply filter.
- 3. C_O improves stability and transient response.



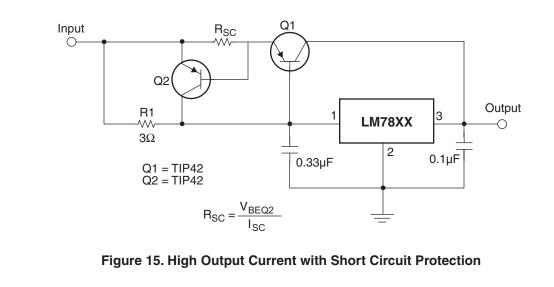


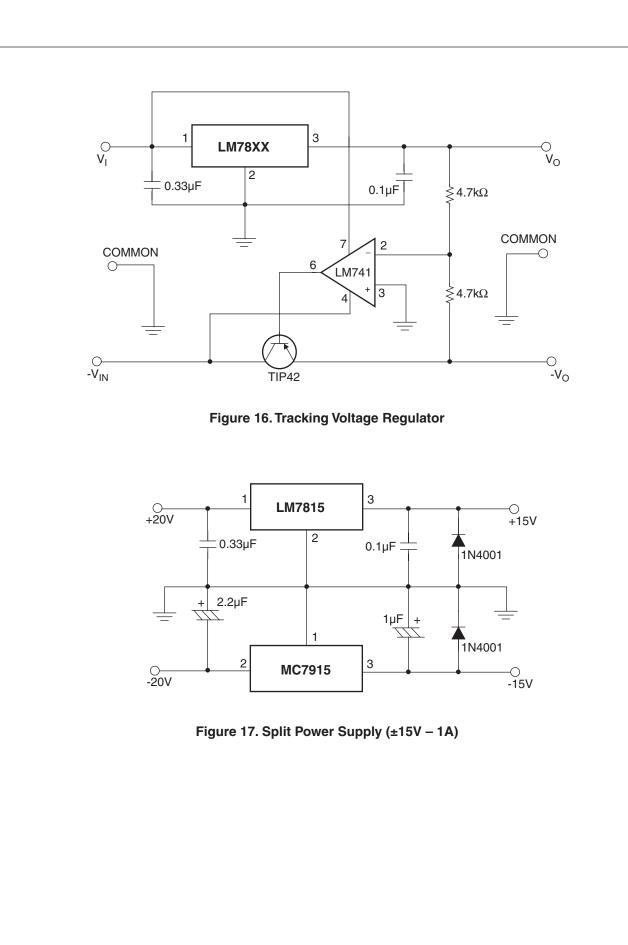












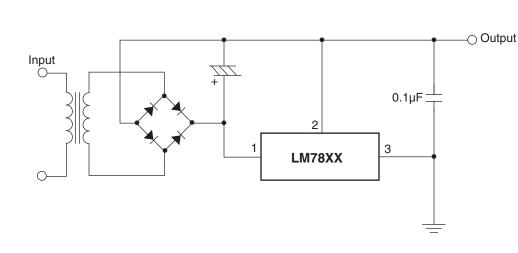
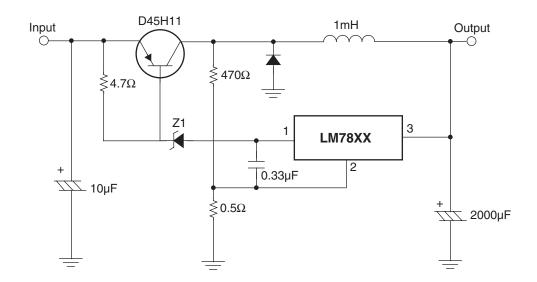


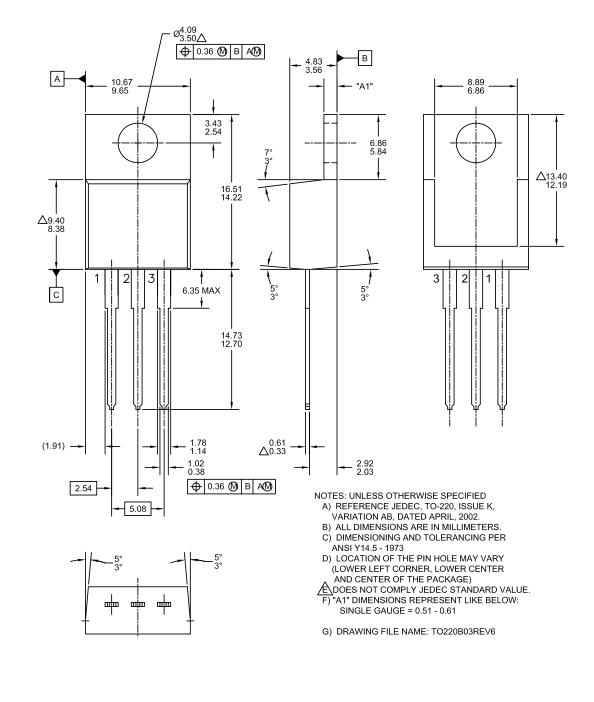
Figure 18. Negative Output Voltage Circuit





Dimensions in millimeters

TO-220 [SINGLE GAUGE]



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Definition of Torms

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