1.5A Positive Voltage Regulator

LM78XX

Description

The Bay Linear LM78XX is integrated linear positive regulator with three terminals. The LM78XX offer several fixed output voltages making them useful in wide range of applications. When used as a zener diode/resistor combination replacement, the LM78XX usually results in an effective output impedance improvement of two orders of magnitude, lower quiescent current.

The LM78XX is available in the TO-252, TO-220 & TO-263 packages,

Features

- Output Current of 1.5A
- Output Voltage Tolerance of 5%
- Internal thermal overload protection
- Internal Short-Circuit Limited
- No External Component
- Output Voltage 5.0V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 24V
- Offer in plastic TO-252, TO-220 & TO-263
- Direct Replacement for LM78XX

Applications

- Post regulator for switching DC/DC converter
- Bias supply for analog circuits

Packaging Information





- 1. Input
- 2. GND
- 3. Output

Ordering Information

Device	Operating Voltage	Тетр.
LM7805	7 to 20	0 to 125 °C
LM7806	8 to 20	0 to 125 °C
LM7808	10.5 to 23	0 to 125 °C
LM7809	11.5 to 24	0 to 125 °C
LM7810	12.5 to 25	0 to 125 °C
LM7812	14.5 to 27	0 to 125 °C
LM7815	17.5 to 30	0 to 125 °C
LM7818	20.5 to 33	0 to 125 °C
LM7824	26.5 to 39	0 to 125 °C

TO-220 (T)

TO-263 (S)

TO-252 (D)

Absolute Maximum Rating

Parameter		LM78	Unit
Input Voltage	LM7824, LM7827	40	V
	All Others	35	
Operating Free-Air, Ca	se, Virtual Junction Temp.	0 to 150	°C
Storage Temperature R	lange	-65 to 150	
Lead temperature 1.6 n	nm from case for sec.	260	

Electrical Characteristics (LM7805)

 $(V_I=10V, I_O=500mA, 0^{\circ}C \le T_J \le 125^{\circ}C$, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_{O}	$T_J = 25 ^{\circ}\text{C}$	4.8	5.0	5.2	V
Line Regulation	ΔV_{O}	$V_{I} = 7V \text{ to } 25V T_{J} = 25 ^{\circ}\text{C}$		3	100	mV
		$V_{I} = 8V \text{ to } 12V T_{J} = 25 ^{\circ}\text{C}$		1	50	
Load Regulation	ΔV_{O}	$I_O = 5$ mA to 1.5A, 25 °C		15	100	mV
		$I_0 = 250 \text{mA} \text{ to } 750 \text{mA}, 25 ^{\circ}\text{C}$		5	50	
Ripple Rejection	RR	$V_I = 8V \text{ to } 18V, f = 120Hz$	62	78		dB
Output Noise Voltage	V_N	$F = 10 \text{Hz to } 100 \text{Hz } T_J = 25 ^{\circ}\text{C}$		40		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}\text{C}$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}C$		4.2	8	mA
Quiescent Current	ΔI_Q	$V_I = 7V \text{ to } 25V, T_J = 25 ^{\circ}\text{C}$			1.3	mA
Change		$I_O = 5 \text{mA to } 1 \text{A}, \ T_J = 25 ^{\circ}\text{C}$			0.5	

Electrical Characteristics (LM7806)

 $(V_I=11V, I_O=500mA, 0^{\circ}C \le T_J \le 125^{\circ}C$, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_{O}	$T_J = 25 ^{\circ}C$	5.75	6.0	6.25	V
Line Regulation	$\Delta V_{\rm O}$	$V_{I} = 8V \text{ to } 25V T_{J} = 25 ^{\circ}\text{C}$		5	120	mV
		$V_{I} = 9V \text{ to } 25V \ T_{J} = 25 \ ^{\circ}C$		1.5	60	
Load Regulation	ΔV_{O}	$I_0 = 5 \text{mA to } 1.5 \text{A}, 25 ^{\circ}\text{C}$		14	120	mV
		$I_{O} = 250 \text{mA}$ to 750 mA, 25 °C		4	60	
Ripple Rejection	RR	V _I = 9V to 19V, f=120Hz	59	75		dB
Output Noise Voltage	V_N	$F = 10 \text{Hz to } 100 \text{Hz } T_J = 25 ^{\circ}\text{C}$		45		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}\text{C}$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}\text{C}$		4.3	8.0	mA
Quiescent Current	ΔI_Q	$V_I = 8V \text{ to } 25V, T_J = 25 ^{\circ}\text{C}$			1.3	mA
Change		$I_O = 5 \text{mA} \text{ to } 1 \text{A}, T_J = 25 ^{\circ}\text{C}$			0.5	

Electrical Characteristics (LM7808)

 $(V_1=14V, I_0=500mA, 0^{\circ}C \le T_1 \le 125^{\circ}C$, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_{O}	$T_J = 25 ^{\circ}C$	7.7	8.0	8.3	V
Line Regulation	$\Delta V_{\rm O}$	$V_I = 10.5 \text{V to } 25 \text{V } T_J = 25 ^{\circ}\text{C}$		6	160	mV
		$V_I = 11V \text{ to } 17V T_J = 25 ^{\circ}\text{C}$		2	80	
Load Regulation	$\Delta V_{\rm O}$	$I_0 = 5 \text{mA to } 1.5 \text{A}, 25 ^{\circ}\text{C}$		12	160	mV
		$I_0 = 250 \text{mA} \text{ to } 750 \text{mA}, 25 ^{\circ}\text{C}$		4	80	
Ripple Rejection	RR	$V_I = 11.5V$ to 21.5V, f=120Hz	55	72		dB
Output Noise Voltage	V_N	$F = 10 \text{Hz} \text{ to } 100 \text{Hz} \text{ T}_J = 25 ^{\circ}\text{C}$		52		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}C$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}\text{C}$		4.3	8	mA
Quiescent Current	ΔI_Q	$V_I = 10.5 \text{V to } 25 \text{V}, \ T_J = 25 ^{\circ}\text{C}$			1	mA
Change		$I_O = 5$ mA to 1A, $T_J = 25$ °C			0.5	

Electrical Characteristics (LM7809)

 $(V_1=16V, I_0=500mA, 0^{\circ}C \le T_1 \le 125^{\circ}C$, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_{O}	$T_J = 25 ^{\circ}\text{C}$	8.6	9.0	9.40	V
Line Regulation	ΔV_{O}	$V_I = 11.5 \text{V to } 27 \text{V } T_J = 25 ^{\circ}\text{C}$		7	180	mV
		$V_{I} = 13V \text{ to } 19V T_{J} = 25 ^{\circ}\text{C}$		2	90	
Load Regulation	ΔV_{O}	$I_0 = 5 \text{mA to } 1.5 \text{A}, 25 ^{\circ}\text{C}$		12	180	mV
		$I_0 = 250 \text{mA} \text{ to } 750 \text{mA}, 25 ^{\circ}\text{C}$		4	90	
Ripple Rejection	RR	$V_I = 12V$ to 19V, f=120Hz	55	70		dB
Output Noise Voltage	V_N	F= 10Hz to 100Hz TJ = 25 °C		60		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}C$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}C$		4.3	8	mA
Quiescent Current	ΔI_Q	$V_I = 11.5 \text{V to } 27 \text{V}, \ T_J = 25 ^{\circ}\text{C}$			1.0	mA
Change		$I_0 = 5 \text{mA to } 1 \text{A}, T_J = 25 ^{\circ}\text{C}$			0.5	

Electrical Characteristics (LM7810)

(V_I=17V, I_O=500mA, 0°C \leq T_J \leq 125 °C, , unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_{O}	$T_J = 25 ^{\circ}C$	9.6	10	10.4	V
Line Regulation	$\Delta V_{\rm O}$	$V_I = 12.5 \text{V to } 28 \text{V } T_J = 25 ^{\circ}\text{C}$		7	200	mV
		$V_{I} = 14V \text{ to } 20V T_{J} = 25 ^{\circ}\text{C}$		2	100	
Load Regulation	$\Delta V_{\rm O}$	$I_0 = 5 \text{mA to } 1.5 \text{A}, 25 ^{\circ}\text{C}$		12	200	mV
		$I_{O} = 250 \text{mA} \text{ to } 750 \text{mA}, 25 ^{\circ}\text{C}$		4	100	
Ripple Rejection	RR	$V_I = 13V \text{ to } 23V, f=120Hz$	55	71		dB
Output Noise Voltage	V_N	F= 10Hz to 100Hz TJ = 25 °C		70		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}\text{C}$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}\text{C}$		4.3	8	mA
Quiescent Current	ΔI_Q	$V_I = 12.5 \text{V to } 28 \text{V}, \ T_J = 25 ^{\circ}\text{C}$			1.0	mA
Change		$I_O = 5 \text{mA to } 1 \text{A}, T_J = 25 ^{\circ}\text{C}$			0.5	

Electrical Characteristics (LM7812)

 $(V_1=19V, I_0=500mA, 0^{\circ}C \le T_1 \le 125^{\circ}C, \text{ unless otherwise specified. (Note 1)}$

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	Vo	$T_J = 25 ^{\circ}\text{C}$	11.50	12	12.5	V
Line Regulation	ΔV_{O}	$V_I = 14.5 \text{V to } 30 \text{V } T_J = 25 ^{\circ}\text{C}$		10	240	mV
		$V_{\rm I} = 16 \text{V to } 22 \text{V } T_{\rm J} = 25 ^{\circ}\text{C}$		3.0	120	
Load Regulation	ΔV_{O}	$I_0 = 5 \text{mA to } 1.5 \text{A}, 25 ^{\circ}\text{C}$		12	240	mV
		$I_0 = 250 \text{mA}$ to 750 mA, 25 °C		4	120	
Ripple Rejection	RR	$V_I = 15V$ to 25V, f=120Hz	55	71		dB
Output Noise Voltage	V_N	F= 10Hz to 100Hz TJ = 25 °C		75		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}\text{C}$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}\text{C}$		4.3	8.0	mA
Quiescent Current	ΔI_Q	$V_I = 14.5 \text{V to } 30 \text{V}, \ T_J = 25 ^{\circ}\text{C}$			1.0	mA
Change		$I_O = 5$ mA to 1A, $T_J = 25$ °C			0.5	

Electrical Characteristics (LM7815)

 $(V_1=23V, I_0=500mA, 0^{\circ}C \le T_1 \le 125^{\circ}C$, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_{O}	$T_J = 25 ^{\circ}C$	14.40	15	15.60	V
Line Regulation	ΔV_{O}	$V_I = 17.5 \text{V to } 30 \text{V } T_J = 25 ^{\circ}\text{C}$		12	300	mV
		$V_{I} = 20V \text{ to } 26V \text{ T}_{J} = 25 ^{\circ}\text{C}$		3	150	
Load Regulation	ΔV_{O}	$I_0 = 5 \text{mA to } 1.5 \text{A}, 25 ^{\circ}\text{C}$		12	300	mV
		I _O = 250mA to 750mA, 25 °C		4	150	
Ripple Rejection	RR	$V_I = 18.5 \text{V to } 28.5 \text{V}, f = 120 \text{Hz}$	54	70		dB
Output Noise Voltage	V_N	F= 10Hz to 100Hz TJ = 25 °C		90		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}C$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}C$		4.3	8.0	mA
Quiescent Current	ΔI_Q	$V_I = 17.5 \text{V to } 30 \text{V}, \ T_J = 25 ^{\circ}\text{C}$			1.0	mA
Change		$I_O = 5$ mA to 1A, $T_J = 25$ °C			0.5	

Electrical Characteristics (LM7818)

 $(V_1=27V, I_0=500mA, 0^{\circ}C \le T_1 \le 125^{\circ}C$, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_{O}	$T_J = 25 ^{\circ}\text{C}$	17.30	18	18.7	V
Line Regulation	$\Delta V_{\rm O}$	$V_I = 21V \text{ to } 33V \ T_J = 25 ^{\circ}\text{C}$		15	360	mV
		$V_I = 24V \text{ to } 33V \ T_J = 25 \ ^{\circ}C$		5	180	
Load Regulation	ΔV_{O}	$I_0 = 5 \text{mA to } 1.5 \text{A}, 25 ^{\circ}\text{C}$		12	360	mV
		I _O = 250mA to 750mA, 25 °C		4	180	
Ripple Rejection	RR	$V_I = 22V$ to 32V, f=120Hz	53	69		dB
Output Noise Voltage	V_N	F= 10Hz to 100Hz TJ = 25 °C		110		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}\text{C}$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}\text{C}$		4.5	8.0	mA
Quiescent Current	ΔI_Q	$V_I = 21V \text{ to } 33V, T_J = 25 ^{\circ}\text{C}$			1.0	mA
Change		$I_O = 5 \text{mA to } 1 \text{A}, \ T_J = 25 ^{\circ}\text{C}$			0.5	

Electrical Characteristics (LM7824)

 $(V_I=33V, I_O=500mA, 0^{\circ}C \le T_J \le 125 ^{\circ}C, unless otherwise specified. (Note 1)$

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V_{O}	$T_J = 25 ^{\circ}\text{C}$	23	24	25	V
Line Regulation	$\Delta V_{\rm O}$	$V_{I} = 27V \text{ to } 38V T_{J} = 25 ^{\circ}\text{C}$		18	480	mV
		$V_{\rm I} = 30 \text{V to } 36 \text{V } T_{\rm J} = 25 ^{\circ}\text{C}$		6	240	
Load Regulation	$\Delta V_{\rm O}$	$I_0 = 5 \text{mA to } 1.5 \text{A}, 25 ^{\circ}\text{C}$		12	480	mV
		$I_{O} = 250 \text{mA} \text{ to } 750 \text{mA}, 25 ^{\circ}\text{C}$		4	240	
Ripple Rejection	RR	$V_I = 28V \text{ to } 38V, f=120Hz$	50	66		dB
Output Noise Voltage	V_N	F= 10Hz to 100Hz TJ = 25 °C		170		μV
Dropout Voltage	V_{D}	$T_J = 25 ^{\circ}\text{C}$		2.0		V
Quiescent Current		$T_J = 25 ^{\circ}C$		4.6	8.0	mA
Quiescent Current	ΔI_Q	$V_I = 27V \text{ to } 38V, T_J = 25 ^{\circ}\text{C}$			1.0	mA
Change		$I_0 = 5 \text{mA to } 1.0 \text{A}, \ T_J = 25 ^{\circ}\text{C}$			0.5	

Advance Information- These data sheets contain descriptions of products that are in development. The specifications are based on the engineering calculations, computer simulations and/ or initial prototype evaluation.

Preliminary Information- These data sheets contain minimum and maximum specifications that are based on the initial device characterizations. These limits are subject to change upon the completion of the full characterization over the specified temperature and supply voltage ranges.

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