LM78L00 Series 3-Terminal Low Current Positive Voltage Regulators

FCI Semiconductor

THREE-TERMINAL LOW CURRENT POSITIVE VOLTAGE REGULATORS

The LM78L00 Series of positive voltage regulators are inexpensive, easy-to-use devices suitable for a multitude of applications that require a regulated supply of up to 100 mA. Like their higher powered LM7800 Series cousins, these regulators feature internal current limiting and thermal shutdown making them remarkably rugged. No external components are required with the LM78L00 devices in many applications.

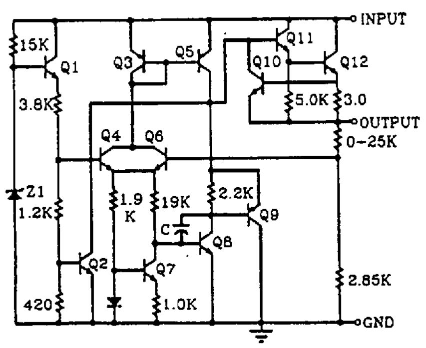
These devices offer a substantial performance advantage over the traditional zener diode-resistor combination, as output impedance and quiescent current are substantially reduced.

FEATURES

- Wide Range of Available, Fixed Output Voltages
- Low Cost
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components Required
- Complementary Negative Regulators Offered (LM79L00 Series)
- Available in ±2% Voltage Tolerance.

CIRCUIT SCHEMATIC

REPRESENTATIVE CIRCUIT SCHEMATIC

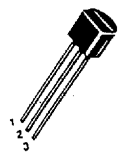


ORDERING INFORMATION

DEVICE	JUNCTION TEMPERATURE	PACKAGE
LM78L05	Tj=0℃ TO +125℃	TO-92
LM78L05S		SOP-8

PIN ARRANGEMENT

TO-92



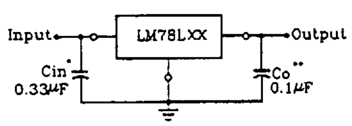
PIN: 1.OUTPUT
2.GROUND
3.INPUT

SOP-8

PIN1.V_{OUT}	5.NC
2.GND	6.GND
3.GND	7.GND
4.NC	8.V_{IN}

TYPICAL CONNECTING CIRCUIT

STANDARD APPLICATION



A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the Input ripple voltage.

* =Cin is required if regulator is located an appreciable distance from power supply filter.

** =Co is not needed for stability; however, it does improve transient response.

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MAXIMUM RATINGS (Ta=+ 25℃ unless otherwise noted.)

RATING	SYMBOL	VALUE	UNIT
Input Voltage	Vi	30	V
Storage Junction Temperature Range	Tstg	-65 TO +150	℃
Operating Junction Temperature Range	Tj	0 TO +125	℃

LM78L05/S ELECTRICAL CHARACTERISTICS :

(Vi=10V, I_O=40mA, Ci=0.33μF, Co=0.1μF, 0℃<Tj<+125℃ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25℃)	Vo	4.9	5.0	5.1	Vdc
Line Regulation (Tj=+25℃, I_O=40mA) 7.0V≤Vi≤20V 8.0V≤Vi≤20V	REGline		55 44	200 150	mV
Load Regulation Tj=+25℃, 1.0mA≤I_O≤100mA Tj=+25℃, 1.0mA≤I_O≤40mA	REGload		11 5.0	60 30	mV
Output Voltage 7.0V≤Vi≤20V, 1.0mA≤I_O≤40mA Vi=10V, 1.0mA≤I_O≤70mA	Vo	4.9 4.9		5.1 5.1	Vdc
Input Bias Current (Tj=+25℃) (Tj=+125℃)	I_{IB}		3.8	6.0 5.5	mA
Input Bias Current Change 8.0V≤Vi≤20V 1.0mA≤I_O≤40mA	ΔI_{IB}			1.5 0.2	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn		40		μV
Ripple Rejection (Io=40mA, f=120Hz, 8.0V≤Vi≤18V, Tj=+25℃)	RR	40	49		dB
Dropout Voltage (Tj=+25℃)	Vi-Vo		1.7		Vdc

LM78L08/S ELECTRICAL CHARACTERISTICS :

(Vi=14V, I_O=40mA, Ci=0.33μ F, Co=0.1μ F, 0℃<Tj<+125℃ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25℃)	Vo	7.84	8.0	8.16	Vdc
Line Regulation(Tj=+25℃, I_O=40mA) 10.5V≤Vi≤23V 11V≤Vi≤23V	REGline		20 12	200 150	mV
Load Regulation Tj=+25℃, 1.0mA≤I_O≤100mA Tj=+25℃, 1.0mA≤I_O≤40mA	REGload		15 6.0	80 40	mV
Output Voltage 10.5V≤Vi≤23V, 1.0mA≤I_O≤40mA Vi=14V, 1.0mA≤I_O≤70mA	Vo	7.74 7.74		8.26 8.26	Vdc
Input Bias Current (Tj=+25℃) (Tj=+125℃)	I_{IB}		3.0	6.0 5.5	mA
Input Bias Current Change 11V≤Vi≤23V 1.0mA≤I_O≤40mA	ΔI_{IB}			1.5 0.2	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn		52		μ V
Ripple Rejection (I_O=40mA, f=120Hz, 12V≤Vi≤23V, Tj=+25℃)	RR	36	55		dB
Dropout Voltage (Tj=+25℃)	Vi-Vo		1.7		Vdc

LM78L12/S ELECTRICAL CHARACTERISTICS :

(Vi=19V, I_O=40mA, Ci=0.33μ F, Co=0.1μ F, 0℃<Tj<+125℃ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25℃)	Vo	11.76	12	12.24	Vdc
Line Regulation(Tj=+25℃, I_O=40mA) 14.5V≤Vi≤27V 16V≤Vi≤27V	REGline		120 100	250 200	mV
Load Regulation Tj=+25℃, 1.0mA≤I_O≤100mA Tj=+25℃, 1.0mA≤I_O≤40mA	REGload		20 10	100 50	mV
Output Voltage 14.5V<Vi≤27V, 1.0mA≤I_O≤40mA Vi=19V, 1.0mA≤I_O≤70mA	Vo	11.66 11.66		12.34 12.34	Vdc
Input Bias Current (Tj=+25℃) (Tj=+125℃)	I_{IB}		4.2	6.5 6.0	mA
Input Bias Current Change 16V<Vi<27V 1.0mA≤I_O≤40mA	ΔI_{IB}			1.5 0.2	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn		80		μ V
Ripple Rejection					

LM78L15/S ELECTRICAL CHARACTERISTICS :

(Vi=23V, I_O=40mA, Ci=0.33μ F, Co=0.1μ F, 0℃<Tj<+125℃ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25℃)	Vo	14.7	15	15.3	Vdc
Line Regulation(Tj=+25℃, I_O=40mA) 17.5V≤Vi≤30V 20V≤Vi≤30V	REGline		130 110	300 250	mV
Load Regulation Tj=+25℃, 1.0mA≤I_O≤100mA Tj=+25℃, 1.0mA≤I_O<40mA	REGload		25 12	150 75	mV
Output Voltage 17.5V≤Vi≤30V, 1.0mA≤I_O≤40mA Vi=23V, 1.0mA≤I_O≤70mA	Vo	14.55 14.55		15.45 15.45	Vdc
Input Bias Current (Tj=+25℃) (Tj=+125℃)	I_{IB}		4.4	6.5 6.0	mA
Input Bias Current Change 20V≤Vi≤30V 1.0mA≤I_O≤40mA	△ I_{IB}			1.5 0.2	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn		90		μ V
Ripple Rejection (I_O=40mA, f=120Hz, 18.5V≤Vi≤28.5V, Tj=+25℃)	RR	33	39		dB
Dropout Voltage (Tj=+25℃)	Vi-Vo		1.7		Vdc

LM78L18/S ELECTRICAL CHARACTERISTICS :

(Vi=27V, I_O=40mA, Ci=0.33μ F, Co=0.1μ F, 0℃<Tj<+125℃ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25℃)	Vo	17.64	18	18.36	Vdc
Line Regulation(Tj=+25℃, I_O=40mA) 21.4V≤Vi≤33V 22V≤Vi≤33V	REGline		32 27	325 275	mV
Load Regulation Tj=+25℃, 1.0mA≤I_O≤100mA Tj=+25℃, 1.0mA≤I_O≤40mA	REGload		30 15	170 85	mV
Output Voltage 21.4V<Vi<33V, 1.0mA≤I_O≤40mA Vi=27V, 1.0mA≤I_O≤70mA	Vo	17.44 17.44		18.56 18.56	Vdc
Input Bias Current (Tj=+25℃) (Tj=+125℃)	I_{IB}		3.1	6.5 6.0	mA
Input Bias Current Change 22V≤Vi≤33V 1.0mA≤I_O≤40mA	△ I_{IB}			1.5 0.2	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn		150		μ V
Ripple Rejection					

LM78L24/S ELECTRICAL CHARACTERISTICS :

(Vi=33V, I_O=40mA, Ci=0.33μF, Co=0.1μF, 0℃<Tj<+125℃ unless otherwise noted.)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Output Voltage (Tj=+25℃)	Vo	23.52	24	24.48	Vdc
Line Regulation(Tj=+25℃, I_O=40mA) 27.5V≤Vi≤38V 28V≤Vi≤38V	REGline		35 30	350 300	mV
Load Regulation Tj=+25℃, 1.0mA≤I_O≤100mA Tj=+25℃, 1.0mA≤I_O≤40mA	REGload		40 20	200 100	mV
Output Voltage 28V≤Vi≤38V, 1.0mA≤I_O≤40mA 28V≤Vi≤33V, 1.0mA≤I_O≤70mA	Vo	23.32 23.32		24.68 24.68	Vdc
Input Bias Current (Tj=+25℃) (Tj=+125℃)	I_{IB}		3.1	6.5 6.0	mA
Input Bias Current Change 28V≤Vi≤38V 1.0mA≤I_O≤40mA	△ I_{IB}			1.5 0.2	mA
Output Noise Voltage (Ta=+25℃, 10Hz≤f≤100KHz)	Vn		200		μV
Ripple Rejection (I_O=40mA, f=120Hz, 29V≤Vi≤35V, Tj=+25℃)	RR	30	43		dB
Dropout Voltage (Tj=+25℃)	Vi-Vo		1.7		Vdc

FIGURE 1-DROPOUT CHARACTERISTIC

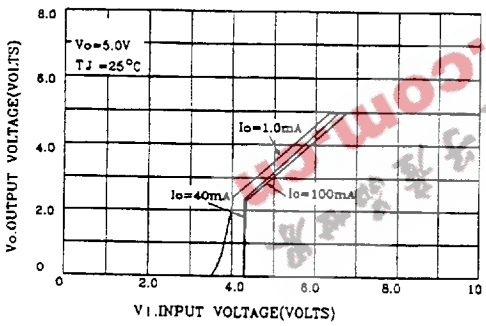

FIGURE 2-DROPOUT VOLTAGE versus JUNCTION TEMPERATURE

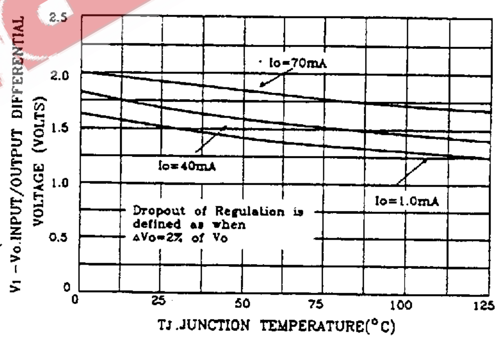

FIGURE 3-INPUT BIAS CURRENT versus AMBIENT TEMPERATURE

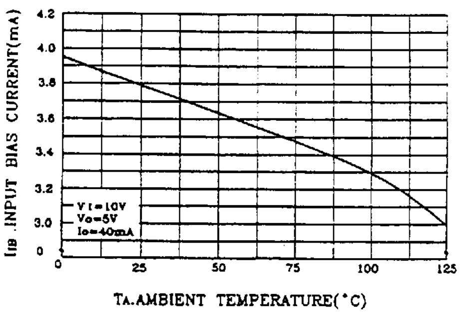

FIGURE 4-INPUT BIAS CURRENT versus INPUT VOLTAGE

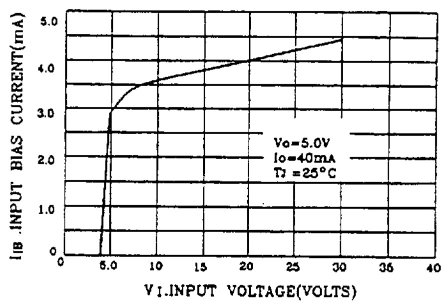

FIGURE 5-MAXIMUM AVERAGE POWER DISSIPATION versus AMBIENT TEMPERATURE - TO-92 Type Package