



LM78L05

100mA, 3-Terminal Positive Voltage Regulators

(Advanced Information) - 2Q '97

FEATURES

- Output Voltage Tolerance of $\pm 5\%$ Over Temp.
- Output Current In Excess of 100 mA
- No External Components
- Output Transistor Safe Area Protection
- Short Circuit Protection
- Internal Thermal Overload Protection
- Output Voltage 5.0 Volts
- Available In TO-92 and TO-220 Packages
- Pin to Pin Compatible with Industrial Standard LM78L05

APPLICATIONS

- Power Supplies
- Automotive Systems
- Computers
- Cordless Telephones
- Instrumentation
- Electronic Equipment

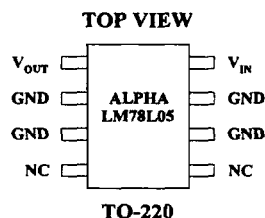
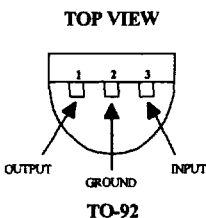
PRODUCT DESCRIPTION

The LM78L05 is a three-terminal Positive Voltage Regulator, offered in 5 Volt and Adjustable versions. These devices are an excellent choice for use in logic systems, instrumentation, Hi-fi, and other solid state electronic equipment. The LM78L0X is used as a Zener diode/resistor combination with the option of adjustable voltage at any voltage. In case the internal power dissipation gets high for the heat sink, the thermal shutdown circuit takes over and prevents the IC from overheating. The LM78L05 is offered in 3-pin TO-92 and TO-220 packages compatible with other 5V regulators.

ORDERING INFORMATION

TO-92 3-PIN	TO-220 3-PIN	Oper. Temp. Range
LM78L05BN	LM78L05BU	IND.

PIN CONFIGURATIONS



ABSOLUTE MAXIMUM RATINGS

Power Dissipation.....	Internally Limited
Lead Temp. (Soldering, 10 Seconds).....	265°C
Storage Temperature Range.....	-65°C to +150°C
Operating Junction Temperature Range.....	0°C to +125°C
Input Supply Voltage.....	35V
ESD Susceptibility.....	2 kV

ELECTRICAL CHARACTERISTICS $V_{IN} = 10V$, unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Units
Output Voltage	$7V < V_{IN} < 20V$, $1 mA < I_O < 40 mA$ $1 mA < I_O < 70 mA$	4.8	5.00	5.20	V
		4.75		5.25	
		4.75		5.25	
Line Regulation	$7V < V_{IN} < 20V$ $8V < V_{IN} < 20V$		18	75	mV
			10	54	
Load Regulation	$1 mA < I_O < 100 mA$ $1 mA < I_O < 40 mA$		20	60	mV
			5	30	
Quiescent Current			3	5	mA
Quiescent Current Change	$8V < V_{IN} < 20V$ $1 mA < I_O < 40 mA$			1.0	mA
				0.1	
Output Noise Voltage	$f = 10 Hz$ to 100 kHz		40		μV
Ripple Rejection	$f = 120 Hz$ $8V < V_{IN} < 16V$	47	62		dB
Peak Output Current			140		mA
Average Output Voltage Tempco	$I_O = 5 mA$		-0.65		mV/°C
Minimum Value of Input Voltage Required to Maintain Line Regulation			6.7	7	V

ELECTRICAL CHARACTERISTICS $V_{IN} = 12V$, unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Units
Output Voltage	$8.5V < V_{IN} < 20V$, $1 mA < I_O < 40 mA$ $1 mA < I_O < 70 mA$	5.95	6.20	6.45	V
		5.90		6.50	
		5.90		6.50	
Line Regulation	$8.5V < V_{IN} < 20V$ $9 < V_{IN} < 20V$		65	175	mV
			55	125	
Load Regulation	$1 mA < I_O < 100 mA$ $1 mA < I_O < 40 mA$		13	80	mV
			6	340	
Quiescent Current			2	5.5	mA
Quiescent Current Change	$8V < V_{IN} < 20V$ $1 mA < I_O < 40 mA$			1.5	mA
				0.1	
Output Noise Voltage	$f = 10 Hz$ to 100 kHz		50		μV
Ripple Rejection	$f = 120 Hz$ $10V < V_{IN} < 20V$	40	46		dB
Peak Output Current			140		mA
Average Output Voltage Tempco	$I_O = 5 mA$		-0.75		mV/°C
Minimum Value of Input Voltage Required to Maintain Line Regulation			7.9		V

ELECTRICAL CHARACTERISTICS $V_{IN} = 14V$, unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Units
Output Voltage		7.87	8.20	8.53	V
	$11V < V_{IN} < 23V$, $1 mA < I_O < 40 mA$	7.80		8.60	
	$1 mA < I_O < 70 mA$	7.80		8.60	
Line Regulation	$11V < V_{IN} < 23V$		80	175	mV
	$12V < V_{IN} < 23V$		70	125	
Load Regulation	$1 mA < I_O < 100 mA$		15	80	mV
	$1 mA < I_O < 40 mA$		8	40	
Quiescent Current			2	5.5	mA
Quiescent Current Change	$12V < V_{IN} < 23V$			1.5	mA
	$1 mA < I_O < 40 mA$			0.1	
Output Noise Voltage	$f = 10 Hz$ to $100 kHz$		60		μV
Ripple Rejection	$f = 120 Hz$ $8V < V_{IN} < 16V$	39	45		dB
Peak Output Current			140		mA
Average Output Voltage Tempco	$I_O = 5 mA$		-0.8		mV/°C
Minimum Value of Input Voltage Required to Maintain Line Regulation			9.9		V

ELECTRICAL CHARACTERISTICS $V_{IN} = 15V$, unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Units
Output Voltage		8.64	9.00	9.36	V
	$11.5V < V_{IN} < 24V$, $1 mA < I_O < 40 mA$	8.55		9.45	
	$1 mA < I_O < 70 mA$	8.55		9.45	
Line Regulation	$11.5V < V_{IN} < 24V$		100	200	mV
	$13V < V_{IN} < 2V$		90	150	
Load Regulation	$1 mA < I_O < 100 mA$		20	90	mV
	$1 mA < I_O < 40 mA$		10	45	
Quiescent Current			2	5.5	mA
Quiescent Current Change	$11.5V < V_{IN} < 24V$			1.5	mA
	$1 mA < I_O < 40 mA$			0.1	
Output Noise Voltage			70		μV
Ripple Rejection	$f = 120 Hz$ $15V < V_{IN} < 25V$	38	44		dB
Peak Output Current			140		mA
Average Output Voltage Tempco	$I_O = 5 mA$		-0.9		mV/°C
Minimum Value of Input Voltage Required to Maintain Line Regulation			10.7		V

ELECTRICAL CHARACTERISTICS $V_{IN} = 19V$, unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Units
Output Voltage	$14.5V < V_{IN} < 27V$, $1mA < I_O < 40mA$ $1mA < I_O < 70mA$	11.5	12	12.50	V
		11.4		12.6	
		11.4		12.6	
Line Regulation	$7V < V_{IN} < 20V$ $8V < V_{IN} < 20V$		30	180	mV
			20	110	
Load Regulation	$1mA < I_O < 100mA$ $1mA < I_O < 40mA$		30	100	mV
			10	50	
Quiescent Current			3	5	mA
Quiescent Current Change	$8V < V_{IN} < 20V$ $1mA < I_O < 40mA$			1.0 0.1	mA
Output Noise Voltage			80		μV
Ripple Rejection	$f = 120 \text{ Hz}$ $15V < V_{IN} < 25V$	40	54		dB
Peak Output Current			140		mA
Average Output Voltage Tempco	$I_O = 5mA$		-1.0		mV/°C
Minimum Value of Input Voltage Required to Maintain Line Regulation			13.7	14.5	V

ELECTRICAL CHARACTERISTICS $V_{IN} = 23V$, unless otherwise specified.

Parameter	Conditions	Min	Typ	Max	Units
Output Voltage	$17.5V < V_{IN} < 30V$, $1mA < I_O < 40mA$ $1mA < I_O < 70mA$	14.4	15.0	15.6	V
		14.25		15.75	
		14.25		15.75	
Line Regulation	$17.5V < V_{IN} < 30V$ $20V < V_{IN} < 30V$		37 25	250 140	mV
Load Regulation	$1mA < I_O < 100mA$ $1mA < I_O < 40mA$		35 12	150 75	mV
Quiescent Current			3	5	mA
Quiescent Current Change	$20V < V_{IN} < 30V$ $1mA < I_O < 40mA$			1.0 0.1	mA
Output Noise Voltage			90		μV
Ripple Rejection	$f = 120 \text{ Hz}$ $18.5V < V_{IN} < 28.5V$	37	51		dB
Peak Output Current			140		mA
Average Output Voltage Tempco	$I_O = 5mA$		-1.3		mV/°C
Minimum Value of Input Voltage Required to Maintain Line Regulation			16.7	17.5	V

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.

Electrical specifications do not apply when operating the device outside of its stated operating conditions.

Note 2: Human body model, 1.5 k Ω in series with 100 pF.

Note 3: Power dissipation $\leq 0.75W$.

Note 4: Recommended minimum load capacitance of 0.01 μF to limit high frequency noise.

Note 5: Typical thermal resistance values for the packages are

H Package: $R_{th}(J-C) = 26 \text{ }^\circ C/W$, $R_{th}(J-A) = 120 \text{ }^\circ C$

Z Package: $R_{th}(J-C) = 60 \text{ }^\circ C/W$, $R_{th}(J-A) = 230 \text{ }^\circ C$

M Package: $R_{th}(J-A) = 180 \text{ }^\circ C/W$

TYPICAL CHARACTERISTICS

