National Semiconductor

LM79MXX Series
3-Terminal Negative Regulators

General Description

The LM79MXX series of 3-terminal regulators is available with fixed output voltages of −5V, −12V, and −15V. These devices need only one external component—a compensation capacitor at the output. The LM79MXX series is packaged in the TO-202 power package and TO-39 metal can and is capable of supplying 0.5A of output current.

These regulators employ internal current limiting, safe area protection, and thermal shotdown for protection against virtually all overload conditions.

Low ground pin current of the LM79MXX series allows output voltage to be easily boosted above the preset value with a resistor divider. The low quiescent current of these devices with a specified maximum change with line and load ensures good regulation in the voltage boosted mode.

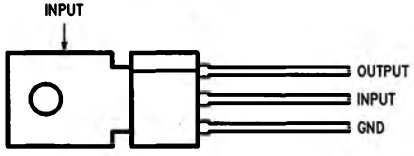
For output voltage other than −5V, −12V, and −15V the LM137 series provides an output voltage range from 1.2V to 57V.

Features

- Thermal, short circuit and safe area protection
- High ripple rejection
- 0.5A output current
- 4% preset output voltage

Connection Diagram

TO-202 (P) Plastic Package



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Front View

Order Number LM79M05CP, LM79M12CP or LM79M15CP
See NS Package Number P03A

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Input Voltage	
V_O = 5V	−25V
V_O = 12V and 15V	−35V
Input/Output Differential	
V_O = 5V	25V
V_O = 12V and 15V	30V
Power Dissipation	Internally Limited
Operating Junction Temperature Range	0°C to +125°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	230°C
ESD Susceptability	TBD

Electrical Characteristics

Conditions unless otherwise noted: I_{OUT} = 350 mA, C_{IN} = 2.2 μF, C_{OUT} = 1 μF, 0°C ≤ T_J ≤ +125°C

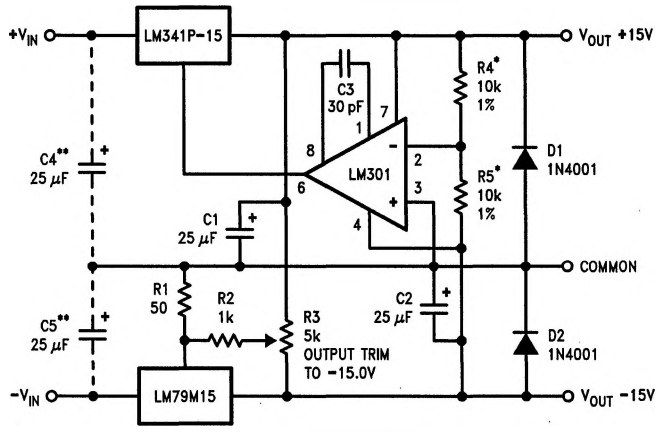
Part Number			LM79M05C			LM79M12C			LM79M15C			Units
Output Voltage			−5V			−12V			−15V			
Input Voltage (Unless Otherwise Specified)			−10V			−19V			−23V			
Symbol	Parameter	Conditions	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_O	Output Voltage	T_J = 25°C	−4.8	−5.0	−5.2	−11.5	−12.0	−12.5	−14.4	−15.0	−15.6	V
		5 mA ≤ I_{OUT} ≤ 350 mA	−4.75 (−25 ≤ V_{IN} ≤ −7)		−5.25	−11.4 (−27 ≤ V_{IN} ≤ −14.5)		−12.6	−14.25 (−30 ≤ V_{IN} ≤ −17.5)		−15.75	V
ΔV_O	Line Regulation	T_J = 25°C (Note 2)		8 (−25 ≤ V_{IN} ≤ −7)	50		5 (−30 ≤ V_{IN} ≤ −14.5)	80		5 (−30 ≤ V_{IN} ≤ −17.5)	80	mV
				2 (−18 ≤ V_{IN} ≤ −8)	30		3 (−25 ≤ V_{IN} ≤ −15)	30		3 (−28 ≤ V_{IN} ≤ −18)	50	mV
ΔV_O	Load Regulation	T_J = 25°C, (Note 2) 5 mA ≤ I_{OUT} ≤ 0.5A		30	100		30	240		30	240	mV
I_Q	Quiescent Current	T_J = 25°C		1	2		1.5	3		1.5	3	mA
ΔI_Q	Quiescent Current Change	With Input Voltage (−25 ≤ V_{IN} ≤ −8)			0.4			0.4			0.4	mA
		With Load, 5 mA ≤ I_{OUT} ≤ 350 mA			0.4			0.4			0.4	mA
V_n	Output Noise Voltage	T_A = 25°C, 10 Hz ≤ f ≤ 100 Hz		750			400			400		μV
	Ripple Rejection	f = 120 Hz	54 (−18 ≤ V_{IN} ≤ −8)	66		54 (−25 ≤ V_{IN} ≤ −15)	70		54 (−30 ≤ V_{IN} ≤ −17.5)	70		dB
	Dropout Voltage	T_J = 25°C, I_{OUT} = 0.5A		1.1			1.1			1.1		V
I_{OMAX}	Peak Output Current	T_J = 25°C		800			800			800		mA
	Average Temperature Coefficient of Output Voltage	I_{OUT} = 5 mA, 0°C ≤ T_J ≤ 100°C		−0.4			−0.8			−1.0		mV/°C
	Thermal Resistance Junction to Case	P Package		12			12			12		°C/W
	Thermal Resistance Junction to Ambient	P Package		70			70			70		°C/W

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics.

Note 2: Regulation is measured at a constant junction temperature by pulse testing with a low duty cycle. Changes in output voltage due to heating effects must be taken into account.

Typical Applications

±15V, 1 Amp Tracking Regulators



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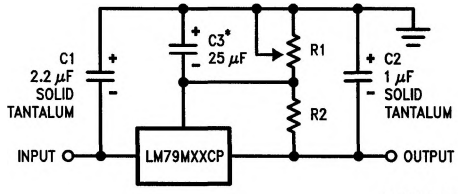
Performance (Typical)

	(−15)	(+15)
Load Regulation at 0.5A	40 mV	2 mV
Output Ripple, C_{IN} = 3000 μF, I_L = 0.5A	100 μVrms	100 μVrms
Temperature Stability	50 mV	50 mV
Output Noise 10 Hz ≤ f ≤ 10 kHz	150 μVrms	150 μVrms

*Resistor tolerance of R4 and R5 determine matching of (+) and (−) outputs

**Necessary only if raw supply filter capacitors are more than 3" from regulators

Variable Output



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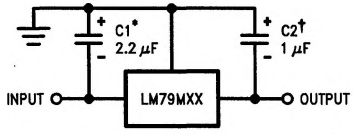
*Improves transient response and ripple rejection. Do not increase beyond 50 μF.

$$V_{OUT} = V_{SET}\left(\frac{R1 + R2}{R2}\right)$$

Select R2 as follows:

LM79M05C	300Ω
LM79M12C	750Ω
LM79M15C	1k

Fixed Regulator



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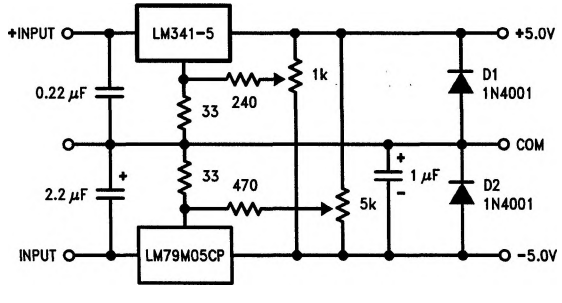
*Required if regulator is separated from filter capacitor by more than 3". For value given, capacitor must be solid tantalum. 25 μF aluminum electrolytic may be substituted.

†Required for stability. For value given, capacitor must be solid tantalum. 25 μF aluminum electrolytic may be substituted. Values given may be increased without limit.

For output capacitance in excess of 100 μF, a high current diode from input to output (1N4001, etc.) will protect the regulator from momentary input shorts.

Dual Trimmed Supply



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