National Semiconductor

Voltage Regulators

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-5 metal can and is capable of supplying 0.5A of output current.

These regulators employ internal current limiting safe area protection and thermal shutdown 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 drain of these devices with a specified maximum change with line and load ensures good regulation in the voltage boosted mode.

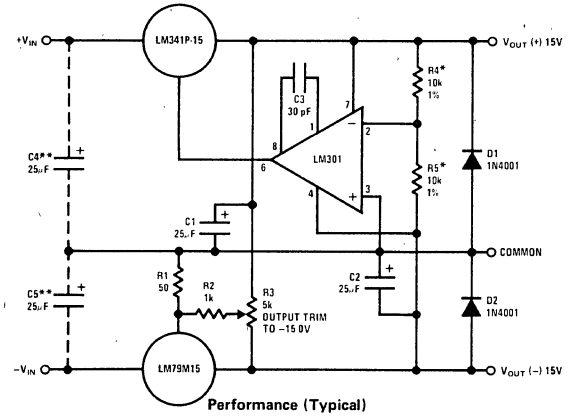
For applications requiring other voltages, see LM137 data sheet.

Features

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

Typical Applications

±15V, 1 Amp Tracking Regulators

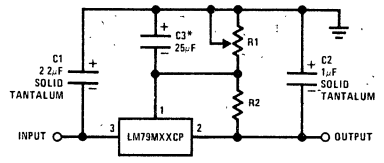


Performance (Typical)

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

*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



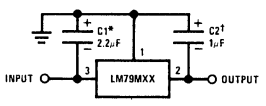
*Improves transient response and ripple rejection. Do not increase beyond 50µF.

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

Select R2 as follows:

LM79M05CP	300Ω
LM79M12CP	750Ω
LM79M15CP	1k

Fixed Regulator

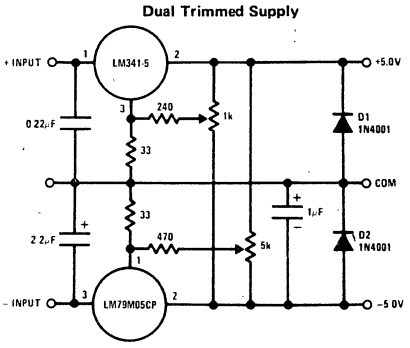


*Required if regulator is separated from filter capacitor by more than 3". For value given, capacitor must be solid tantalum. 25µF aluminum electrolytic may be substituted.

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

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

Dual Trimmed Supply



Absolute Maximum Ratings

Input Voltage	
(V_O = 5V)	25V
(V_O = 12V and 15V)	−35V
Input/Output Differential	
(V_O = 5V to 8V)	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 seconds)	230°C

Electrical Characteristics

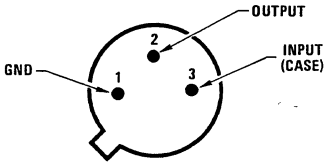
Conditions unless otherwise noted: I_{OUT} = 350 mA, C_{IN} = 2.2μF, C_{OUT} = 1μF, 0°C ≤ Tj ≤ +125°C

PART NUMBER			LM79M05C			LM79M12C			LM79M15C			
OUTPUT VOLTAGE			−5V			−12V			−15V			
INPUT VOLTAGE (unless otherwise specified)			−10V			−19V			−23V			UNITS
	PARAMETER	CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_O	Output Voltage	Tj = 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		−5.25	−11.4		−12.6	−14.25		−15.75	V
			($-25 \le V_{IN} \le -7$)			($-27 \le V_{IN} \le -14.5$)			($-30 \le V_{IN} \le -17.5$)			V
ΔV_O	Line Regulation	Tj = 25°C, (Note 2)		8	50		5	80		5	80	mV
			($-25 \le V_{IN} \le -7$)			($-30 \le V_{IN} \le -14.5$)			($- \le V_{IN} \le -17.5$)			V
				2	30		3	30		3	50	mV
			($-18 \le V_{IN} \le -8$)			($-25 \le V_{IN} \le -15$)			($-28 \le V_{IN} \le -18$)			V
ΔV_O	Load Regulation	Tj = 25°C, (Note 2) 5 mA ≤ I_{OUT} ≤ 0.5A		30	100		30	240		30	240	mV
I_Q	Quiescent Current	Tj = 25°C		1	2		1.5	3		1.5	3	mA
ΔI_Q	Quiescent Current Change	With Line			0.4			0.4			0.4	mA
			($-25 \le V_{IN} \le -8$)			($-30 \le V_{IN} \le -14.5$)			($-30 \le V_{IN} \le -27$)			V
		With Load, 5 mA ≤ I_{OUT} ≤ 350 mA			0.4			0.4			0.4	mA
V_n	Output Noise Voltage	TA = 25°C, 10 Hz ≤ f ≤ 100 Hz		750			400			400		μV
	Ripple Rejection	f = 120 Hz	54	66		54	70		54	70		dB
			($-18 \le V_{IN} \le -8$)			($-25 \le V_{IN} \le -15$)			($-30 \le V_{IN} \le -17.5$)			V
	Dropout Voltage	Tj = 25°C, I_{OUT} = 0.5A		1.1			1.1			1.1		V
I_{OMAX}	Peak Output Current	Tj = 25°C		800			800			800		A
	Average Temperature Coefficient of Output Voltage	I_{OUT} = 5 mA, 0°C ≤ Tj ≤ 100°C		0.4			−0.8			−1.0		mV/°C

Note 1: For calculations of junction temperature rise due to power dissipation, thermal resistance junction to ambient (θ_{JA}) is 70°C/W (no heat sink) and 12°C/W (infinite heat sink).

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.

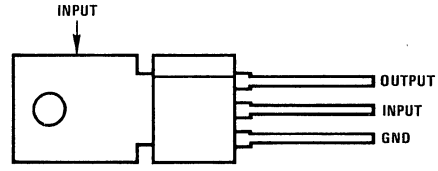
Connection Diagrams



BOTTOM VIEW

Metal Can Package TO-39 (H)
Order Number:

LM79M05CH
LM79M12CH
LM79M15CH
See NS Package H03A



FRONT VIEW

Power Package TO-202 (P)
Order Number:

LM79M05CP
LM79M12CP
LM79M15CP
See NS Package P03A

For Tab Bend TO-202
Order Number:

LM79M05CP TB
LM79M12CP TB
LM79M15CP TB
See NS Package P03E