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Jameco Part Number 51422NSC

## LM320L/LM79LXXAC Series 3-Terminal Negative Regulators

### General Description

The LM320L/LM79LXXAC dual marked series of 3-terminal negative voltage regulators features fixed output voltages of  $-5V$ ,  $-12V$ , and  $-15V$  with output current capabilities in excess of 100mA. These devices were designed using the latest computer techniques for optimizing the packaged IC thermal/electrical performance. The LM79LXXAC series, even when combined with a minimum output compensation capacitor of  $0.1\mu F$ , exhibits an excellent transient response, a maximum line regulation of  $0.07\% V_O/V$ , and a maximum load regulation of  $0.01\% V_O/mA$ .

The LM320L/LM79LXXAC series also includes, as self-protection circuitry: safe operating area circuitry for output transistor power dissipation limiting, a temperature independent short circuit current limit for peak output current limiting, and a thermal shutdown circuit to prevent excessive junction temperature. Although designed primarily as fixed voltage regulators, these devices may be combined with simple external circuitry for boosted and/or adjustable volt-

ages and currents. The LM79LXXAC series is available in the 3-lead TO-92 package, and SO-8; 8 lead package. The LM320L series is available in the 3-lead TO-92 package.

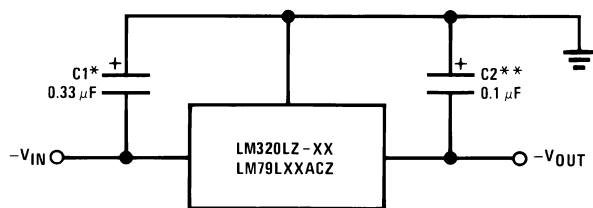
For output voltage other than  $-5V$ ,  $-12V$  and  $-15V$ , the LM137L series provides an output voltage range from 1.2V to 47V.

### Features

- Preset output voltage error is less than  $\pm 5\%$  overload, line and temperature
- Specified at an output current of 100mA
- Easily compensated with a small  $0.1\mu F$  output capacitor
- Internal short-circuit, thermal and safe operating area protection
- Easily adjustable to higher output voltages
- Maximum line regulation less than  $0.07\% V_{OUT}/V$
- Maximum load regulation less than  $0.01\% V_{OUT}/mA$

### Typical Applications

Fixed Output Regulator

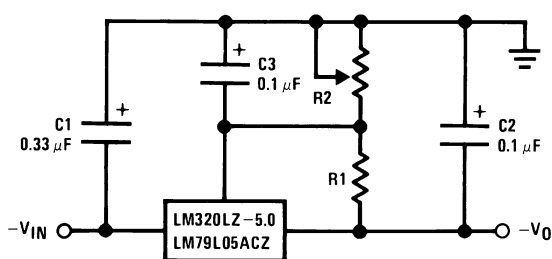


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\*Required if the regulator is located far from the power supply filter. A  $1\mu F$  aluminum electrolytic may be substituted.

\*\*Required for stability. A  $1\mu F$  aluminum electrolytic may be substituted.

Adjustable Output Regulator



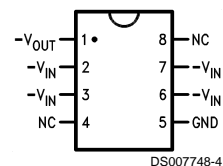
DS007748-3

$$-V_0 = -5V - (5V/R1 + I_Q) \cdot R2,$$

$$5V/R1 > 3 I_Q$$

### Connection Diagrams

SO-8 Plastic (Narrow Body)

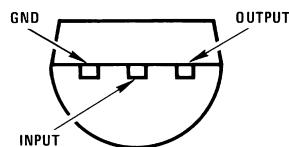


DS007748-4

Top View

Order Number LM79L05ACM, LM79L12ACM  
LM79L15ACM, LM79L05ACMX,  
LM79L12ACMX or LM79L15ACMX  
See NS Package Number M08A

TO-92 Plastic Package (Z)



DS007748-2

Bottom View

Order Number LM320LZ-5.0, LM79L05ACZ,  
LM320LZ-12, LM79L12ACZ, LM320LZ-15 or  
LM79L15ACZ

See NS Package Number Z03A

**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

$$V_O = -5V, -12V, -15V$$

$$-35V$$

Internal Power Dissipation (Note 2)

Operating Temperature Range

Maximum Junction Temperature

Storage Temperature Range

Lead Temperature

(Soldering, 10 sec.)

Internally Limited

0°C to +70°C

+125°C

-55°C to +150°C

260°C

**Electrical Characteristics** (Note 3)

$T_A = 0^\circ\text{C}$  to  $+70^\circ\text{C}$  unless otherwise noted.

Output Voltage			-5V			-12V			-15V			Units
Input Voltage (unless otherwise noted)			-10V			-17V			-20V			
Symbol	Parameter	Conditions	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V <sub>O</sub>	Output Voltage	T <sub>J</sub> = 25°C, I <sub>O</sub> = 100mA	-5.2	-5	-4.8	-12.5	-12	-11.5	-15.6	-15	-14.4	V
		1mA ≤ I <sub>O</sub> ≤ 100mA	-5.25		-4.75	-12.6		-11.4	-15.75		-14.25	
		V <sub>MIN</sub> ≤ V <sub>IN</sub> ≤ V <sub>MAX</sub>	(-20 ≤ V <sub>IN</sub> ≤ -7.5)			(-27 ≤ V <sub>IN</sub> ≤ -14.8)			(-30 ≤ V <sub>IN</sub> ≤ -18)			
		1mA ≤ I <sub>O</sub> ≤ 40mA	-5.25		-4.75	-12.6		-11.4	-15.75		-14.25	
		V <sub>MIN</sub> ≤ V <sub>IN</sub> ≤ V <sub>MAX</sub>	(-20 ≤ V <sub>IN</sub> ≤ -7)			(-27 ≤ V <sub>IN</sub> ≤ -14.5)			(-30 ≤ V <sub>IN</sub> ≤ -17.5)			
ΔV <sub>O</sub>	Line Regulation	T <sub>J</sub> = 25°C, I <sub>O</sub> = 100mA			60			45			45	mV
		V <sub>MIN</sub> ≤ V <sub>IN</sub> ≤ V <sub>MAX</sub>	(-20 ≤ V <sub>IN</sub> ≤ -7.3)			(-27 ≤ V <sub>IN</sub> ≤ -14.6)			(-30 ≤ V <sub>IN</sub> ≤ -17.7)			V
		T <sub>J</sub> = 25°C, I <sub>O</sub> = 40mA			60			45			45	mV
		V <sub>MIN</sub> ≤ V <sub>IN</sub> ≤ V <sub>MAX</sub>	(-20 ≤ V <sub>IN</sub> ≤ -7)			(-27 ≤ V <sub>IN</sub> ≤ -14.5)			(-30 ≤ V <sub>IN</sub> ≤ -17.5)			V
ΔV <sub>O</sub>	Load Regulation	T <sub>J</sub> = 25°C 1mA ≤ I <sub>O</sub> ≤ 100mA			50			100			125	mV
ΔV <sub>O</sub>	Long Term Stability	I <sub>O</sub> = 100mA		20			48			60		mV/khrs
I <sub>Q</sub>	Quiescent Current	I <sub>O</sub> = 100mA		2	6		2	6		2	6	mA
ΔI <sub>Q</sub>	Quiescent Current Change	1mA ≤ I <sub>O</sub> ≤ 100mA			0.3			0.3			0.3	mA
		1mA ≤ I <sub>O</sub> ≤ 40mA			0.1			0.1			0.1	
		I <sub>O</sub> = 100mA			0.25			0.25			0.25	
		V <sub>MIN</sub> ≤ V <sub>IN</sub> ≤ V <sub>MAX</sub>	(-20 ≤ V <sub>IN</sub> ≤ -7.5)			(-27 ≤ V <sub>IN</sub> ≤ -14.8)			(-30 ≤ V <sub>IN</sub> ≤ -18)			
V <sub>n</sub>	Output Noise Voltage	T <sub>J</sub> = 25°C, I <sub>O</sub> = 100mA f = 10Hz – 10kHz		40			96			120		μV
$\frac{\Delta V_{IN}}{\Delta V_O}$	Ripple Rejection	T <sub>J</sub> = 25°C, I <sub>O</sub> = 100mA f = 120Hz			50			52			50	dB
	Input Voltage	T <sub>J</sub> = 25°C, I <sub>O</sub> = 100mA			-7.3			-14.6			-17.7	V
	Required to Maintain Line Regulation	I <sub>O</sub> = 40mA			-7.0			-14.5			-17.5	V

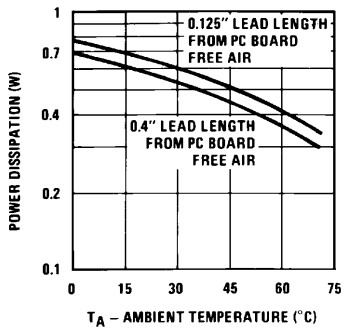
**Note 1:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits.

**Note 2:** Thermal resistance of Z package is  $60^\circ\text{C/W}$   $\theta_{\text{JC}}$ ,  $232^\circ\text{C/W}$   $\theta_{\text{JA}}$  at still air, and  $88^\circ\text{C/W}$  at 400 ft/min of air. The M package  $\theta_{\text{JA}}$  is  $180^\circ\text{C/W}$  in still air. The maximum junction temperature shall not exceed  $125^\circ\text{C}$  on electrical parameters.

**Note 3:** To ensure constant junction temperature, low duty cycle pulse testing is used.

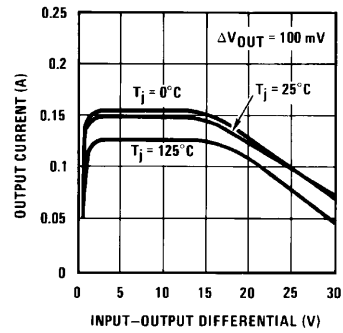
## Typical Performance Characteristics

Maximum Average Power Dissipation (TO-92)



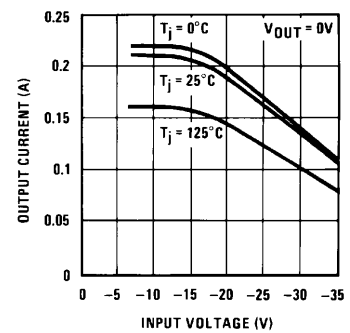
DS007748-11

Peak Output Current



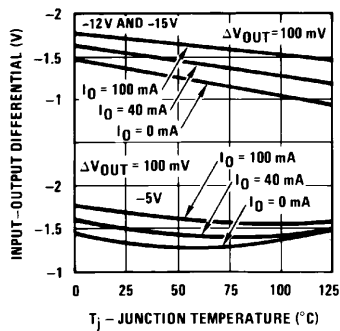
DS007748-12

Short Circuit Output Current



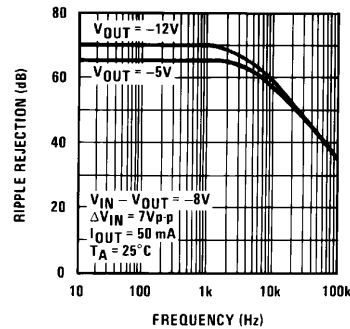
DS007748-13

Dropout Voltage



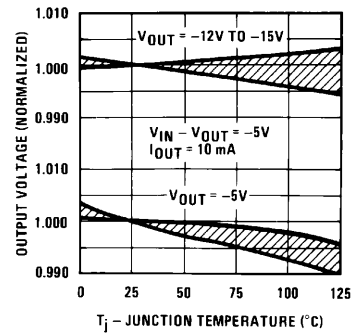
DS007748-14

Ripple Rejection



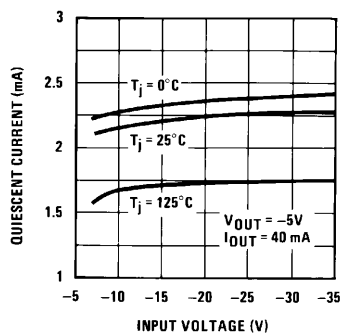
DS007748-15

Output Voltage vs. Temperature (Normalized to 1V @ 25 $^{\circ}\text{C}$ )



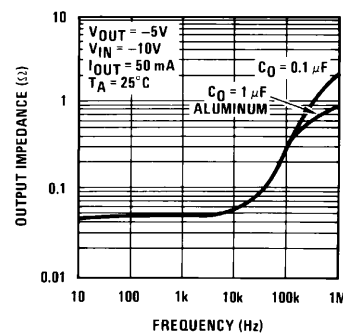
DS007748-16

Quiescent Current



DS007748-17

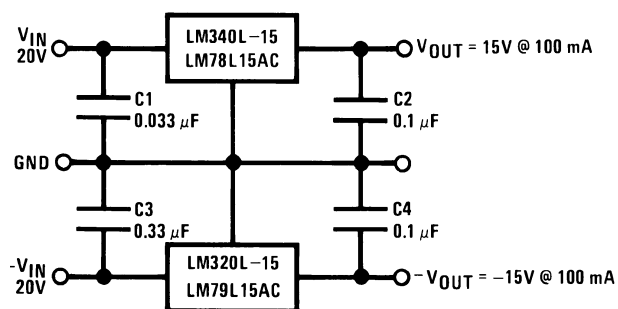
Output Impedance



DS007748-18

## Typical Applications

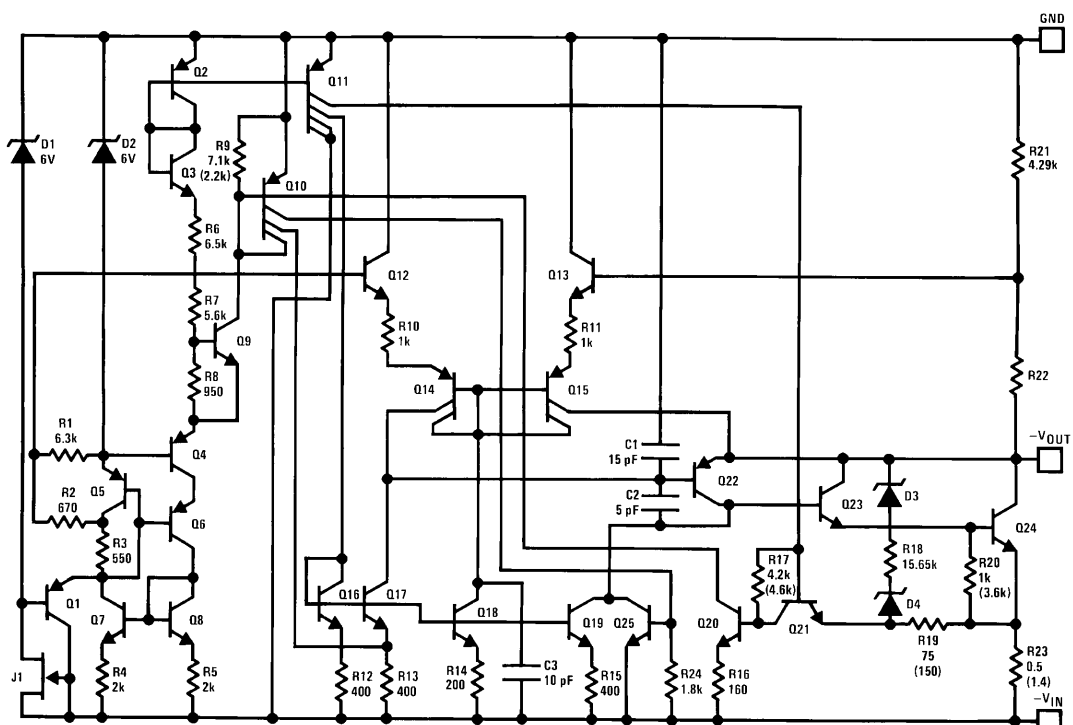
±15V, 100mA Dual Power Supply



DS007748-6

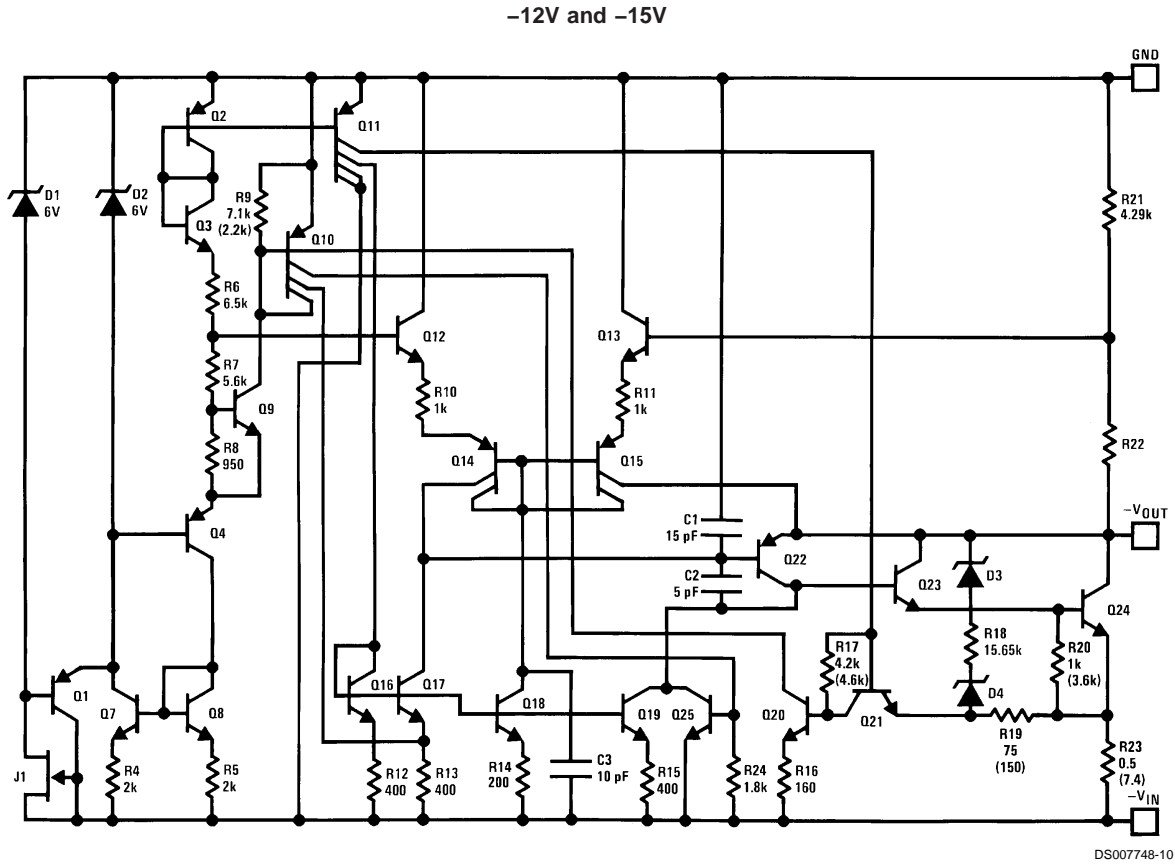
## Schematic Diagrams

-5V

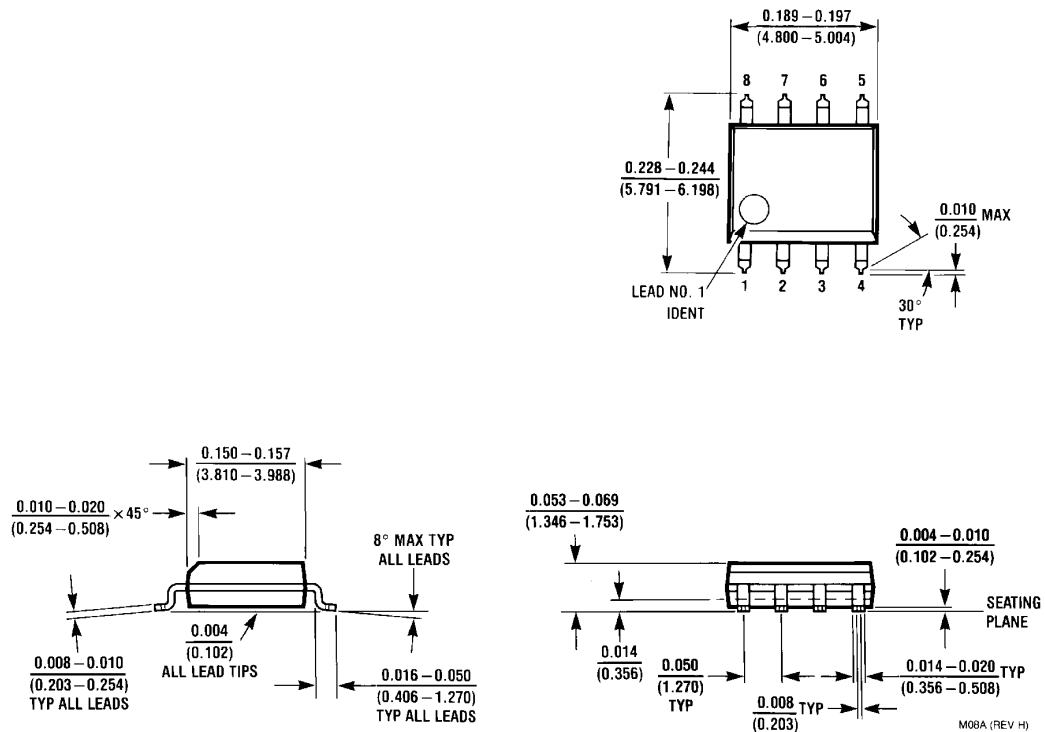


DS007748-9

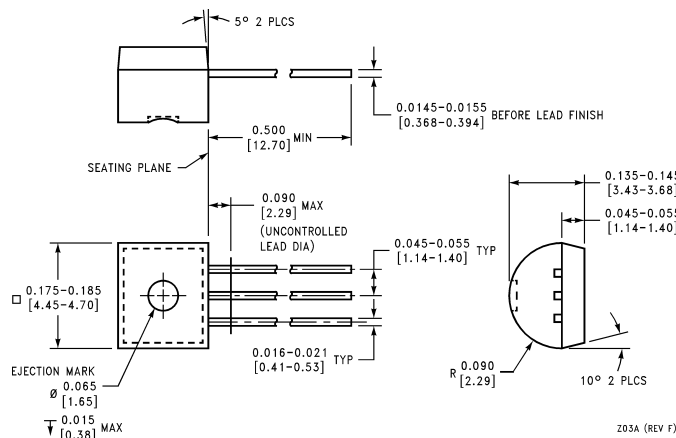
## Schematic Diagrams (Continued)



# Physical Dimensions inches (millimeters) unless otherwise noted



**S.O. Package (M)**  
**Order Number LM79L05ACM, LM79L12ACM, LM79L15ACM,**  
**LM79L05ACMX, LM79L12ACMX, or LM79L15ACMX**  
**NS Package Number M08A**



**Molded Offset TO-92 (Z)**  
**Order Number LM320LZ-5.0, LM79L05ACZ, LM320LZ-12,**  
**LM79L12ACZ, LM320LZ-15 or LM79L15ACZ**  
**NS Package Number Z03A**

## Notes

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**National Semiconductor Corporation**  
Americas  
Email: support@nsc.com

www.national.com

**National Semiconductor Europe**

Fax: +49 (0) 180-530 85 86  
Email: europe.support@nsc.com  
Deutsch Tel: +49 (0) 69 9508 6208  
English Tel: +44 (0) 870 24 0 2171  
Français Tel: +33 (0) 1 41 91 8790

**National Semiconductor Asia Pacific Customer Response Group**

Tel: 65-2544466  
Fax: 65-2504466  
Email: ap.support@nsc.com

**National Semiconductor Japan Ltd.**

Tel: 81-3-5639-7560  
Fax: 81-3-5639-7507