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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-

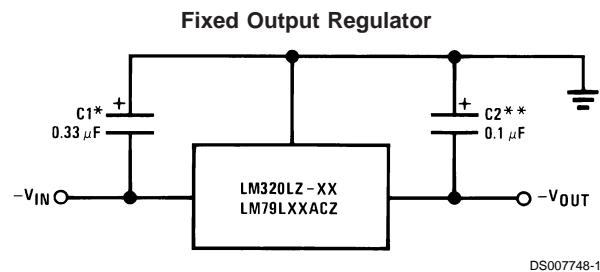
ages and currents. The LM79LXXAC series is available in the 3-lead TO-92 package, and SO-8; 8 lead package. The LM320L series is available in the 3-lead TO-92 package.

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

### Features

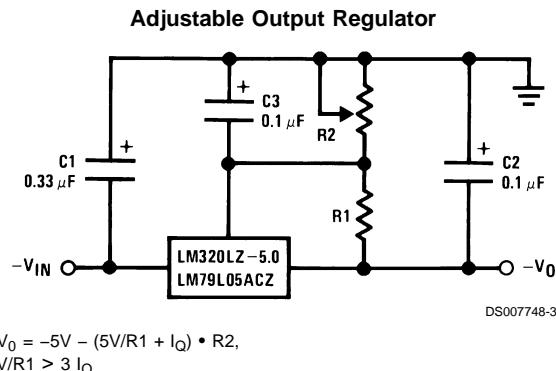
- Preset output voltage error is less than  $\pm 5\%$  overload, line and temperature
- Specified at an output current of  $100mA$
- Easily compensated with a small  $0.1\mu F$  output capacitor
- Internal short-circuit, thermal and safe operating area protection
- Easily adjustable to higher output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

### Typical Applications



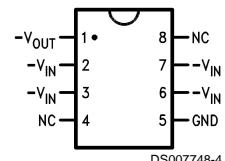
\*Required if the regulator is located far from the power supply filter. A  $1\mu F$  aluminum electrolytic may be substituted.

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



### Connection Diagrams

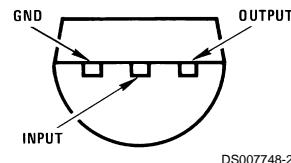
#### SO-8 Plastic (Narrow Body)



#### Top View

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

#### TO-92 Plastic Package (Z)



#### 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)

Internally Limited

 $0^\circ C$  to  $+70^\circ C$  $+125^\circ C$  $-55^\circ C$  to  $+150^\circ C$ 

Storage Temperature Range

Lead Temperature

(Soldering, 10 sec.)

 $260^\circ C$ **Electrical Characteristics** (Note 3) $T_A = 0^\circ C$  to  $+70^\circ C$  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		
$V_O$	Output Voltage	$T_J = 25^\circ C, I_O = 100mA$	-5.2	-5	-4.8	-12.5	-12	-11.5	-15.6	-15	-14.4	V	
		$1mA \leq I_O \leq 100mA$	-5.25	-4.75	-	-12.6	-	-11.4	-15.75	-	-14.25		
		$V_{MIN} \leq V_{IN} \leq V_{MAX}$ ( $-20 \leq V_{IN} \leq -7.5$ )				( $-27 \leq V_{IN} \leq -14.8$ )			( $-30 \leq V_{IN} \leq -18$ )				
		$1mA \leq I_O \leq 40mA$	-5.25	-4.75	-	-12.6	-	-11.4	-15.75	-	-14.25		
$\Delta V_O$	Line Regulation	$V_{MIN} \leq V_{IN} \leq V_{MAX}$ ( $-20 \leq V_{IN} \leq -7$ )				( $-27 \leq V_{IN} \leq -14.5$ )			( $-30 \leq V_{IN} \leq -17.5$ )			mV	
		$T_J = 25^\circ C, I_O = 100mA$		60			45			45			
		$V_{MIN} \leq V_{IN} \leq V_{MAX}$ ( $-20 \leq V_{IN} \leq -7.3$ )				( $-27 \leq V_{IN} \leq -14.6$ )			( $-30 \leq V_{IN} \leq -17.7$ )				
		$T_J = 25^\circ C, I_O = 40mA$		60			45			45			
$\Delta V_O$	Load Regulation	$V_{MIN} \leq V_{IN} \leq V_{MAX}$ ( $-20 \leq V_{IN} \leq -7$ )				( $-27 \leq V_{IN} \leq -14.5$ )			( $-30 \leq V_{IN} \leq -17.5$ )			mV	
		$T_J = 25^\circ C$		50			100			125			
		$1mA \leq I_O \leq 100mA$											
		$I_O = 100mA$		20			48			60			
$\Delta V_O$	Long Term Stability	$I_O = 100mA$										mV/khrs	
$I_Q$	Quiescent Current	$I_O = 100mA$		2	6		2	6		2	6	mA	
$\Delta I_Q$	Quiescent Current Change	$1mA \leq I_O \leq 100mA$		0.3			0.3			0.3		mA	
		$1mA \leq I_O \leq 40mA$		0.1			0.1			0.1			
		$I_O = 100mA$		0.25			0.25			0.25			
		$V_{MIN} \leq V_{IN} \leq V_{MAX}$ ( $-20 \leq V_{IN} \leq -7.5$ )				( $-27 \leq V_{IN} \leq -14.8$ )			( $-30 \leq V_{IN} \leq -18$ )				
$V_n$	Output Noise Voltage	$T_J = 25^\circ C, I_O = 100mA$ $f = 10Hz - 10kHz$		40			96			120		µV	
$\frac{\Delta V_{IN}}{\Delta V_O}$	Ripple Rejection	$T_J = 25^\circ C, I_O = 100mA$ $f = 120Hz$	50			52			50			dB	
	Input Voltage Required to Maintain Line Regulation	$T_J = 25^\circ C, I_O = 100mA$ $I_O = 40mA$			-7.3			-14.6			-17.7	V	
					-7.0			-14.5			-17.5	V	

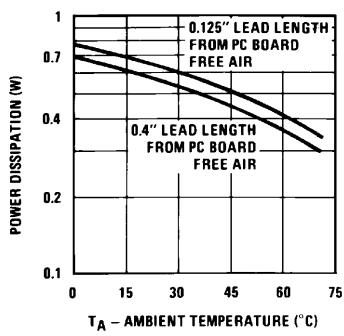
**Note 1:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits.

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

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

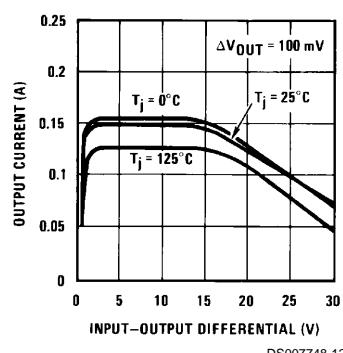
## Typical Performance Characteristics

### Maximum Average Power Dissipation (TO-92)



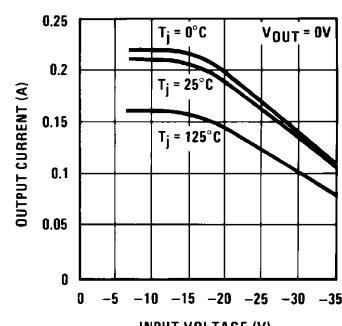
DS007748-11

### Peak Output Current



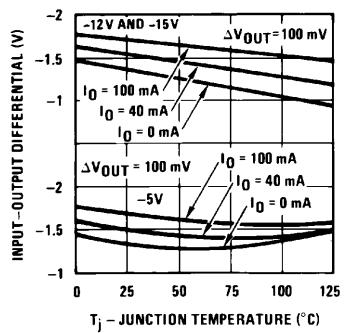
DS007748-12

### Short Circuit Output Current



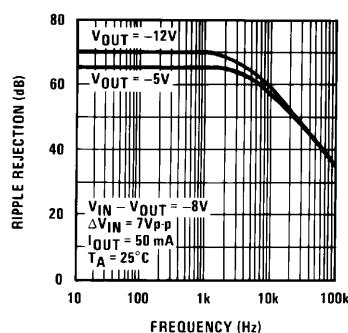
DS007748-13

### Dropout Voltage



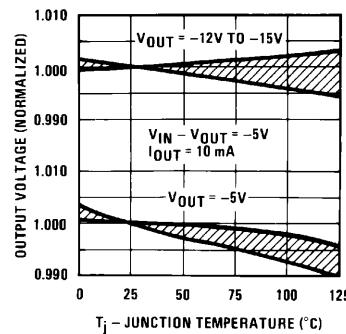
DS007748-14

### Ripple Rejection



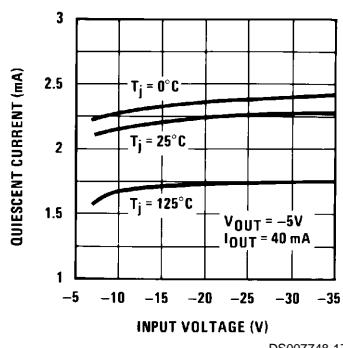
DS007748-15

### Output Voltage vs. Temperature (Normalized to 1V at 25°C)



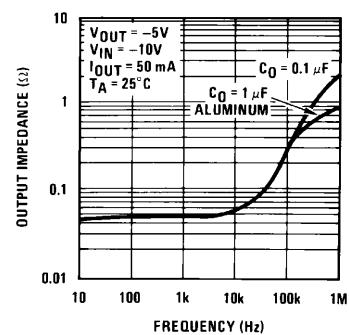
DS007748-16

### Quiescent Current



DS007748-17

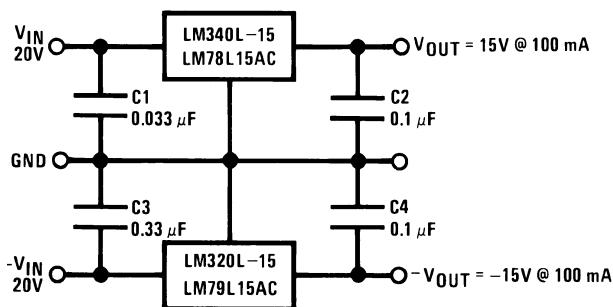
### Output Impedance



DS007748-18

## Typical Applications

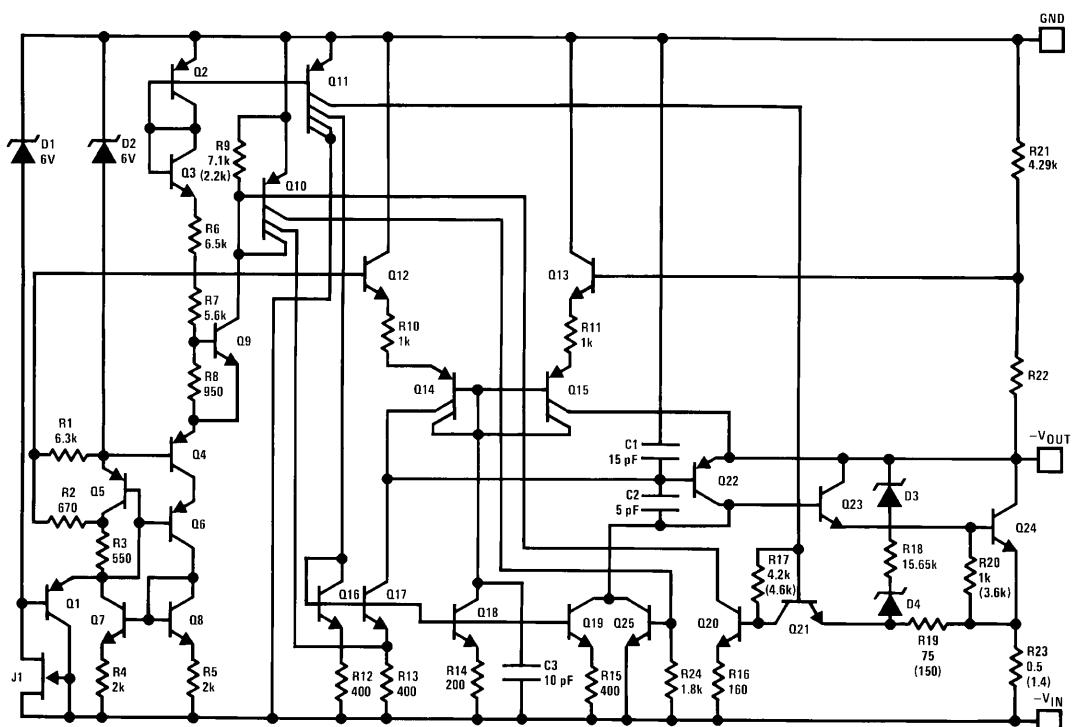
$\pm 15V, 100mA$  Dual Power Supply



DS007748-6

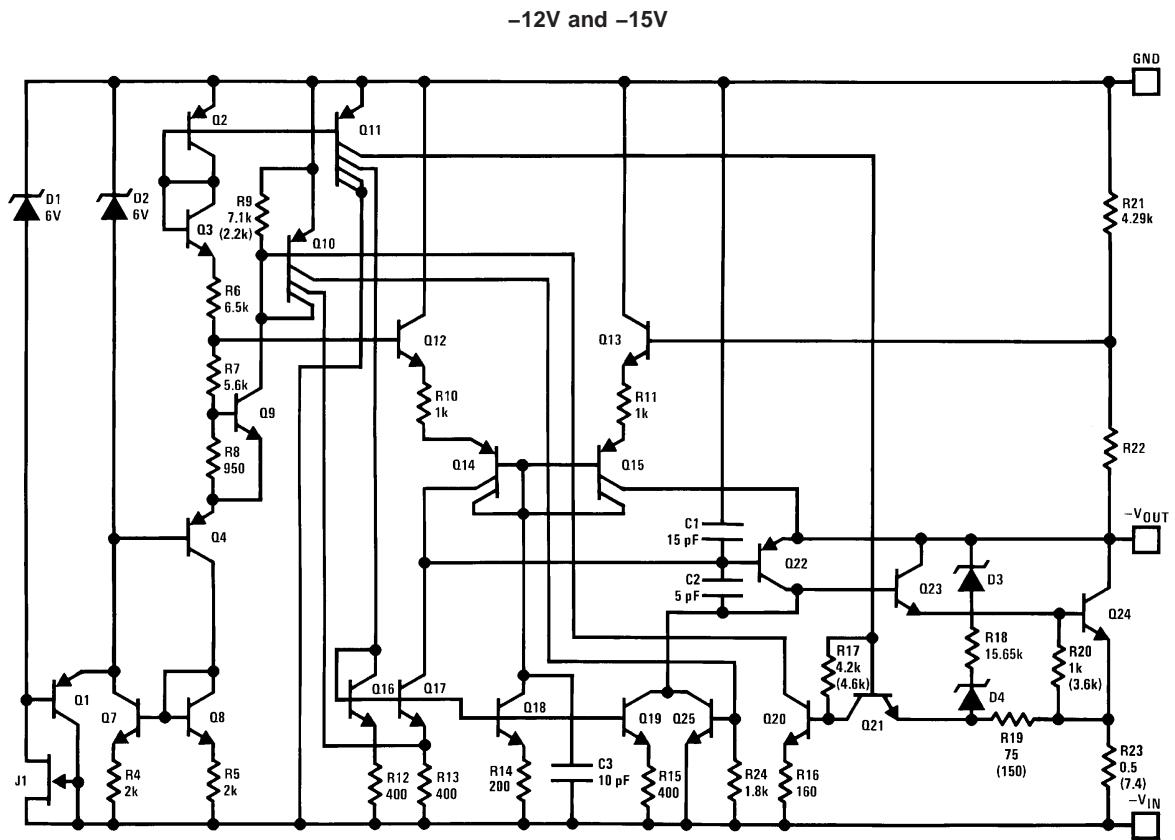
## Schematic Diagrams

-5V



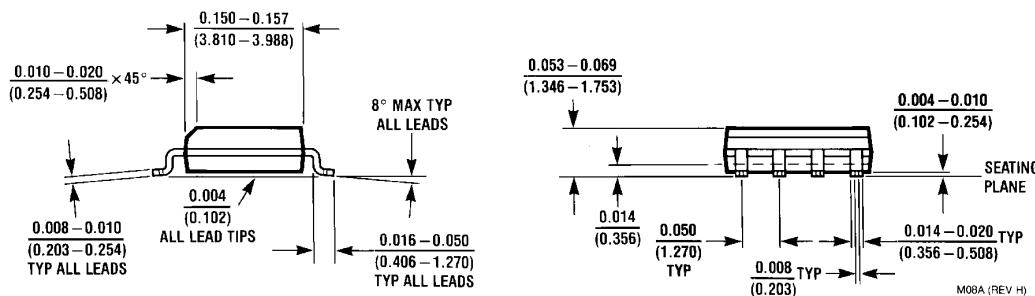
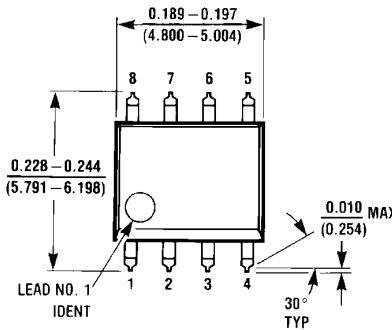
DS007748-9

## Schematic Diagrams (Continued)

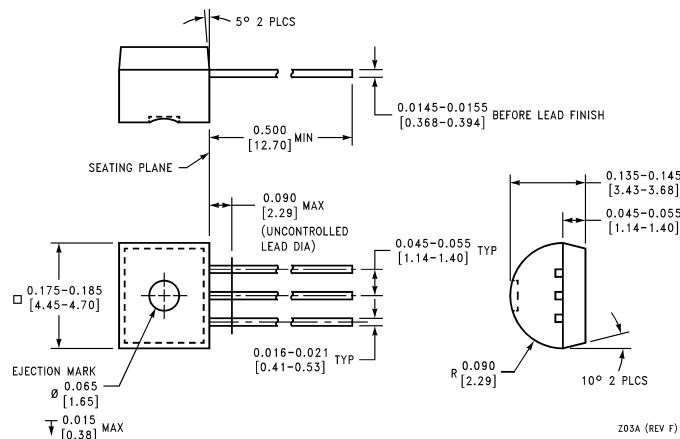


## Physical Dimensions

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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