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 0.1µF, exhibits an excellent transient response, a maximum line regulation of 0.07% $V_{OUT}/V$, and a maximum load regulation of 0.01% $V_{OUT}/mA$.

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 voltages 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 ±5% overload, line and temperature
- Specified at an output current of 100mA
- Easily compensated with a small 0.1µF 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

Connection Diagrams

Fixed Output Regulator

<table>
<thead>
<tr>
<th>C1</th>
<th>+</th>
<th>C2</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.33 µF</td>
<td>0.1 µF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LM320LZ−XX
LM79LXXACZ

−VIN | −VOUT

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

*Required for stability. A 1µF aluminum electrolytic may be substituted.

Adjustable Output Regulator

<table>
<thead>
<tr>
<th>C1</th>
<th>+</th>
<th>C3</th>
<th>+</th>
<th>C2</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.33 µF</td>
<td>0.1 µF</td>
<td>0.1 µF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LM320LZ−5.0
LM79L05ACZ

−VIN | −V0

−V0 = −5V − (5V/R1 + Iq) • R2,
5V/R1 > 3 Iq

SO-8 Plastic (Narrow Body)

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

Bottom View
Order Number LM320LZ-5.0, LM79L05ACZ,
LM320LZ-12, LM79L12ACZ, LM320LZ-15 or
LM79L15ACZ
See NS Package Number Z03A

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### Electrical Characteristics

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Input Voltage (unless otherwise noted)</th>
<th>-V0</th>
<th>-12V</th>
<th>-15V</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>V0</td>
<td>Output Voltage</td>
<td>TJ = 25˚C, IO = 100mA</td>
<td></td>
<td>-5.2</td>
<td>-5</td>
<td>-4.8</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1mA ≤ IO ≤ 100mA</td>
<td></td>
<td>-5.25</td>
<td>-4.75</td>
<td>-12.6</td>
<td>-12</td>
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<tr>
<td></td>
<td></td>
<td>VMIN ≤ VIN ≤ MAX</td>
<td></td>
<td>-20 ≤ VIN ≤ -7.5</td>
<td>(-27 ≤ VIN ≤ -14.8)</td>
<td>(-30 ≤ VIN ≤ -18)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1mA ≤ IO ≤ 40mA</td>
<td></td>
<td>-5.25</td>
<td>-4.75</td>
<td>-12.6</td>
<td>-12</td>
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<tr>
<td></td>
<td></td>
<td>VMIN ≤ VIN ≤ MAX</td>
<td></td>
<td>(-20 ≤ VIN ≤ -7)</td>
<td>(-27 ≤ VIN ≤ -14.5)</td>
<td>(-30 ≤ VIN ≤ -17.5)</td>
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<tr>
<td>ΔV0</td>
<td>Line Regulation</td>
<td>TJ = 25˚C, IO = 100mA</td>
<td></td>
<td>60</td>
<td>45</td>
<td>45</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VMIN ≤ VIN ≤ MAX</td>
<td></td>
<td>(-20 ≤ VIN ≤ -7.3)</td>
<td>(-27 ≤ VIN ≤ -14.6)</td>
<td>(-30 ≤ VIN ≤ -17.7)</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TJ = 25˚C, IO = 40mA</td>
<td></td>
<td>60</td>
<td>45</td>
<td>45</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VMIN ≤ VIN ≤ MAX</td>
<td></td>
<td>(-20 ≤ VIN ≤ -7)</td>
<td>(-27 ≤ VIN ≤ -14.5)</td>
<td>(-30 ≤ VIN ≤ -17.5)</td>
<td>V</td>
</tr>
<tr>
<td>ΔV0</td>
<td>Load Regulation</td>
<td>TJ = 25˚C</td>
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<td>50</td>
<td>100</td>
<td>125</td>
<td>mV</td>
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<td></td>
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<td>1mA ≤ IO ≤ 100mA</td>
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<tr>
<td>ΔV0</td>
<td>Long Term Stability</td>
<td>IO = 100mA</td>
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<td>20</td>
<td>48</td>
<td>60</td>
<td>mV/khrs</td>
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<tr>
<td>I0</td>
<td>Quiescent Current</td>
<td>IO = 100mA</td>
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<td>2</td>
<td>6</td>
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<td>6</td>
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<tr>
<td>ΔI0</td>
<td>Quiescent Current Change</td>
<td>1mA ≤ IO ≤ 100mA</td>
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<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>mA</td>
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<tr>
<td></td>
<td></td>
<td>1mA ≤ IO ≤ 40mA</td>
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<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>mA</td>
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<tr>
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<td></td>
<td>IO = 100mA</td>
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<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>mA</td>
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<tr>
<td></td>
<td></td>
<td>VMIN ≤ VIN ≤ MAX</td>
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<td>(-20 ≤ VIN ≤ -7.5)</td>
<td>(-27 ≤ VIN ≤ -14.8)</td>
<td>(-30 ≤ VIN ≤ -18)</td>
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<tr>
<td>Vn</td>
<td>Output Noise Voltage</td>
<td>TJ = 25˚C, IO = 100mA</td>
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<td>40</td>
<td>96</td>
<td>120</td>
<td>µV</td>
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<tr>
<td></td>
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<td>f = 10Hz - 10kHz</td>
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<tr>
<td>ΔVn/ΔV0</td>
<td>Ripple Rejection</td>
<td>TJ = 25˚C, IO = 100mA</td>
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<td>50</td>
<td>52</td>
<td>50</td>
<td>dB</td>
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<td></td>
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<td>f = 120Hz</td>
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<tr>
<td>Input Voltage Required to Maintain Line Regulation</td>
<td>TJ = 25˚C, IO = 100mA</td>
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<td>-7.3</td>
<td>-7.0</td>
<td>-14.6</td>
<td>-14.5</td>
<td>-17.7</td>
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<td>IO = 40mA</td>
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</table>

**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 6Ω/C/W JC, 232˚C/W JA at still air, and 88˚C/W at 400 ft/min of air. The M package JA is 180˚C/W in still air.

The maximum junction temperature shall not exceed 125˚C on electrical parameters.
Typical Performance Characteristics

- Maximum Average Power Dissipation (TO-92)
- Peak Output Current
- Short Circuit Output Current
- Dropout Voltage
- Ripple Rejection
- Output Voltage vs. Temperature (Normalized to 1V @ 25°C)
- Quiescent Current
- Output Impedance

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Typical Applications

±15V, 100mA Dual Power Supply

Schematic Diagrams

-5V
Schematic Diagrams (Continued)

-12V and -15V

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LM320L/LM79LXXAC

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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
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