T-58-11-13

# L79M00ML Series

3100

Monolithic Linear IC

# −5 to −24V 0.5A 3-Pin Voltage Regulator



TENTATIVE

**Features**

- Output Voltage L79M05ML:-5V L79M06ML:-6V L79M08ML:-8V L79M09ML:-9V L79M10ML:-10V L79M12ML:-12V L79M15ML:-15V L79M20ML:-20V L79M24ML:-24V
- Output current 500mA
- On-chip overheat protector
- On-chip overcurrent limiter
- On-chip ASO protector
- TO-220ML package facilitating easy mounting and thermal design
- Micaless version that insulates the package from each pin, requiring no insulation for mounting

**[Common to L79M00ML series]**

**Absolute Maximum Ratings** at Ta=25°C

| | | | | unit |
|---|---|---|---|---|
| Maximum Supply Voltage | $V_{CC}$ max | -5 to -15V output | -35 | V |
| | | -20,-24V output | -40 | V |
| Allowable Power Dissipation | Pd max | | 2.0 | W |
| | Pd (Ta=25°C) | | 7.5 | W |
| Operating Temperature | Topg | | -30 to +80 | °C |
| Storage Temperature | Tstg | | -40 to +150 | °C |

**[L79M05ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -20 to -7.5 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-10V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | -5.2 | -5.0 | -4.8 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, -25V≦$V_{IN}$≦-7V | | 7.0 | 50 | mV |
| | | Tj=25°C, -18V≦$V_{IN}$≦-8V | | 3.0 | 30 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, 5mA≦$I_{OUT}$≦500mA | | 10 | 100 | mV |
| | | Tj=25°C, 5mA≦$I_{OUT}$≦350mA | | 5 | | mV |

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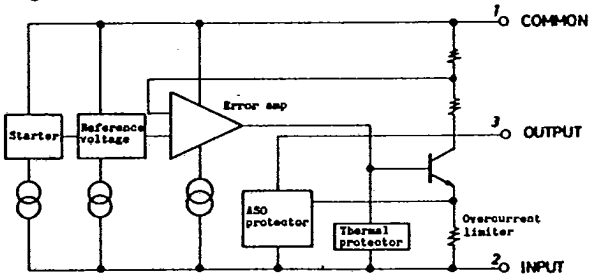
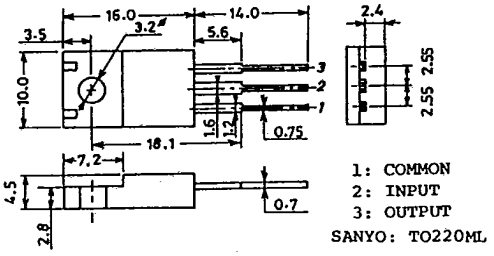
**Equivalent Circuit Diagram**




**Case Outline** 3100-S3TR
(unit:mm)




1: COMMON
2: INPUT
3: OUTPUT
SANYO: TO220ML

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| | | | | min | typ | max | unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $-25V \leqq V_{IN} \leqq -7V$, $5mA \leqq I_{OUT} \leqq 350mA$ | | -5.25 | | -4.75 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | | 1.0 | 2.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | $-25V \leqq V_{IN} \leqq -8V$ | | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | $5mA \leqq I_{OUT} \leqq 350mA$ | | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | $10Hz \leqq f \leqq 100kHz$ | | | 125 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, $-18V \leqq V_{IN} \leqq -8V$, Tj=25°C | $I_{OUT}$=100mA | 50 | | | dB |
| | | | $I_{OUT}$=300mA | 50 | 65 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | | 800 | | mA |

**[L79M06ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -21 to -8.5 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-11V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | | min | typ | max | unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | | -6.25 | -6.0 | -5.75 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, $-25V \leqq V_{IN} \leqq -8V$ | | | 7.0 | 60 | mV |
| | | Tj=25°C, $-19V \leqq V_{IN} \leqq -9V$ | | | 3.0 | 40 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, $5mA \leqq I_{OUT} \leqq 500mA$ | | | 10 | 120 | mV |
| | | Tj=25°C, $5mA \leqq I_{OUT} \leqq 350mA$ | | | 5 | | mV |
| Output Voltage | $V_{OUT}$ | $-25V \leqq V_{IN} \leqq -8V$, $5mA \leqq I_{OUT} \leqq 350mA$ | | -6.3 | | -5.7 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | | 1.0 | 2.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | $-25V \leqq V_{IN} \leqq -9V$ | | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | $5mA \leqq I_{OUT} \leqq 350mA$ | | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | $10Hz \leqq f \leqq 100kHz$ | | | 150 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, $-19V \leqq V_{IN} \leqq -9V$, Tj=25°C | $I_{OUT}$=100mA | 50 | | | dB |
| | | | $I_{OUT}$=300mA | 50 | 65 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | | 800 | | mA |

**[L79M08ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -23 to -11 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-14V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | -8.3 | -8.0 | -7.7 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, -25V≦$V_{IN}$≦-10.5V | | 8.0 | 80 | mV |
| | | Tj=25°C, -21V≦$V_{IN}$≦-11V | | 4.0 | 50 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, 5mA≦$I_{OUT}$≦500mA | | 11 | 160 | mV |
| | | Tj=25°C, 5mA≦$I_{OUT}$≦350mA | | 6 | | mV |
| Output Voltage | $V_{OUT}$ | -25V≦$V_{IN}$≦-10.5V, 5mA≦$I_{OUT}$≦350mA | -8.4 | | -7.6 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | 1.0 | 2.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | -25V≦$V_{IN}$≦-10.5V | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | 5mA≦$I_{OUT}$≦350mA | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | 10Hz≦f≦100kHz | | 200 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, -21.5V≦$V_{IN}$≦-11.5V, Tj=25°C \| $I_{OUT}$=100mA | 50 | | | dB |
| | | \| $I_{OUT}$=300mA | 50 | 64 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | 800 | | mA |

**[L79M09ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -25 to -12 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-16V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | -9.4 | -9.0 | -8.6 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, -25V≦$V_{IN}$≦-11.5V | | 8.0 | 80 | mV |
| | | Tj=25°C, -20V≦$V_{IN}$≦-12V | | 4.0 | 50 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, 5mA≦$I_{OUT}$≦500mA | | 12 | 200 | mV |
| | | Tj=25°C, 5mA≦$I_{OUT}$≦350mA | | 7 | | mV |
| Output Voltage | $V_{OUT}$ | -25V≦$V_{IN}$≦-11.5V, 5mA≦$I_{OUT}$≦350mA | -9.5 | | -8.5 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | 1.0 | 2.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | -25V≦$V_{IN}$≦-11.5V | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | 5mA≦$I_{OUT}$≦350mA | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | 10Hz≦f≦100kHz | | 225 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, -22.5V≦$V_{IN}$≦-12.5V, Tj=25°C \| $I_{OUT}$=100mA | 50 | | | dB |
| | | \| $I_{OUT}$=300mA | 50 | 63 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | 800 | | mA |

**[L79M10ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -25 to -13 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-10V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | -10.4 | -10 | -9.6 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, -25V≦$V_{IN}$≦-12.5V | | 9.0 | 80 | mV |
| | | Tj=25°C, -22V≦$V_{IN}$≦-13V | | 5.0 | 50 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, 5mA≦$I_{OUT}$≦500mA | | 12 | 200 | mV |
| | | Tj=25°C, 5mA≦$I_{OUT}$≦350mA | | 7 | | mV |
| Output Voltage | $V_{OUT}$ | -25V≦$V_{IN}$≦-12.5V, 5mA≦$I_{OUT}$≦350mA | -10.5 | | -9.5 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | 1.0 | 2.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | -25V≦$V_{IN}$≦-12.5V | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | 5mA≦$I_{OUT}$≦350mA | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | 10Hz≦f≦100kHz | | 250 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, -23.5V≦$V_{IN}$≦-13.5V, Tj=25°C, $I_{OUT}$=100mA | 50 | | | dB |
| | | f=120Hz, -23.5V≦$V_{IN}$≦-13.5V, Tj=25°C, $I_{OUT}$=300mA | 50 | 63 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | 800 | | mA |

**[L79M12ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -25 to -15 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-19V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | -12.5 | -12 | -11.5 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, -30V≦$V_{IN}$≦-14.5V | | 9.0 | 80 | mV |
| | | Tj=25°C, -25V≦$V_{IN}$≦-15V | | 5.0 | 50 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, 5mA≦$I_{OUT}$≦500mA | | 9 | 240 | mV |
| | | Tj=25°C, 5mA≦$I_{OUT}$≦350mA | | 6 | | mV |
| Output Voltage | $V_{OUT}$ | -30V≦$V_{IN}$≦-14.5V, 5mA≦$I_{OUT}$≦350mA | -12.6 | | -11.4 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | 1.6 | 3.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | -30V≦$V_{IN}$≦-14.5V | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | 5mA≦$I_{OUT}$≦350mA | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | 10Hz≦f≦100kHz | | 300 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, -25V≦$V_{IN}$≦-15V, Tj=25°C, $I_{OUT}$=100mA | 50 | | | dB |
| | | f=120Hz, -25V≦$V_{IN}$≦-15V, Tj=25°C, $I_{OUT}$=300mA | 50 | 72 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | 800 | | mA |

**[L79M15ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -30 to -18 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-23V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | -15.6 | -15 | -14.4 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, -30V≦$V_{IN}$≦-17.5V | | 9.0 | 80 | mV |
| | | Tj=25°C, -28V≦$V_{IN}$≦-18V | | 7.0 | 50 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, 5mA≦$I_{OUT}$≦500mA | | 9 | 240 | mV |
| | | Tj=25°C, 5mA≦$I_{OUT}$≦350mA | | 6 | | mV |
| Output Voltage | $V_{OUT}$ | -30V≦$V_{IN}$≦-17.5V, 5mA≦$I_{OUT}$≦350mA | -15.75 | | -14.25 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | 1.6 | 3.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | -30V≦$V_{IN}$≦-17.5V | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | 5mA≦$I_{OUT}$≦350mA | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | 10Hz≦f≦100kHz | | 375 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, -28.5V≦$V_{IN}$≦-18.5V, Tj=25°C, $I_{OUT}$=100mA | 50 | | | dB |
| | | f=120Hz, -28.5V≦$V_{IN}$≦-18.5V, Tj=25°C, $I_{OUT}$=300mA | 50 | 70 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | 800 | | mA |

**[L79M20ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -35 to -23 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-29V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | -20.8 | -20 | -19.2 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, -35V≦$V_{IN}$≦-23V | | 12 | 80 | mV |
| | | Tj=25°C, -34V≦$V_{IN}$≦-24V | | 10 | 70 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, 5mA≦$I_{OUT}$≦500mA | | 10 | 300 | mV |
| | | Tj=25°C, 5mA≦$I_{OUT}$≦350mA | | 7 | | mV |
| Output Voltage | $V_{OUT}$ | -35V≦$V_{IN}$≦-23V, 5mA≦$I_{OUT}$≦350mA | -21 | | -19 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | 1.6 | 3.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | -35V≦$V_{IN}$≦-23V | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | 5mA≦$I_{OUT}$≦350mA | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | 10Hz≦f≦100kHz | | 500 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, -34V≦$V_{IN}$≦-24V, Tj=25°C, $I_{OUT}$=100mA | 50 | | | dB |
| | | f=120Hz, -34V≦$V_{IN}$≦-24V, Tj=25°C, $I_{OUT}$=300mA | 50 | 67 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | 800 | | mA |

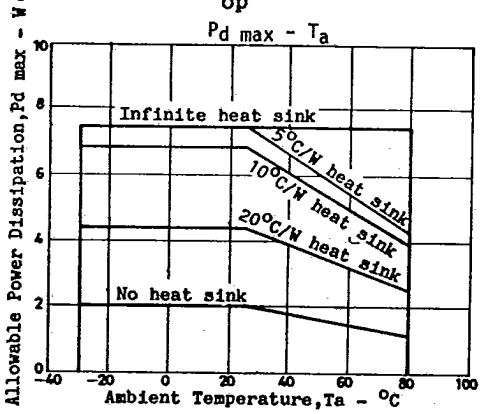
**[L79M24ML]**

**Recommended Operating Conditions** at Ta=25°C

| | | | unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -35 to -27 | V |
| Output Current | $I_{OUT}$ | 5 to 500 | mA |

**Operating Characteristics** at Ta=25°C, $V_{IN}$=-33V, $I_{OUT}$=350mA, $C_{IN}$=2uF, $C_{OUT}$=1uF

| | | | min | typ | max | unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | Tj=25°C | -25 | -24 | -23 | V |
| Line Regulation | $\Delta V_{oline}$ | Tj=25°C, -38V≦$V_{IN}$≦-27V | | 12 | 80 | mV |
| | | Tj=25°C, -38V≦$V_{IN}$≦-28V | | 12 | 70 | mV |
| Load Regulation | $\Delta V_{oload}$ | Tj=25°C, 5mA≦$I_{OUT}$≦500mA | | 10 | 300 | mV |
| | | Tj=25°C, 5mA≦$I_{OUT}$≦350mA | | 7 | | mV |
| Output Voltage | $V_{OUT}$ | -38V≦$V_{IN}$≦-27V, 5mA≦$I_{OUT}$≦350mA | -25.2 | | -22.8 | V |
| Current Dissipation | $I_{CC}$ | Tj=25°C | | 1.6 | 3.5 | mA |
| Current Dissipation Variation (Line) | $\Delta I_{CCline}$ | -38V≦$V_{IN}$≦-27V | | | 1.0 | mA |
| Current Dissipation Variation (Load) | $\Delta I_{CCload}$ | 5mA≦$I_{OUT}$≦350mA | | | 0.4 | mA |
| Output Noise Voltage | $V_{NO}$ | 10Hz≦f≦100kHz | | 600 | | uV |
| Ripple Rejection | $R_{rej}$ | f=120Hz, -38V≦$V_{IN}$≦-28V, Tj=25°C, $I_{OUT}$=100mA | 50 | | | dB |
| | | f=120Hz, -38V≦$V_{IN}$≦-28V, Tj=25°C, $I_{OUT}$=300mA | 50 | 65 | | dB |
| Minimum Input-Output Voltage Drop | $V_{drop}$ | Tj=25°C, $I_{OUT}$=350mA | | 1.1 | | V |
| Short Current | $I_{OS}$ | Tj=25°C, $V_{IN}$=-30V | | 130 | | mA |
| Peak Output Current | $I_{op}$ | | | 800 | | mA |




**Specified Test Circuit** (Common to L79M00ML series)