## 3-TERMINAL 0.1A NEGATIVE VOLTAGE REGULATORS

This series of fixed-voltage monolithic integrated-circuit voltage regulators is designed for a wide range of applications.

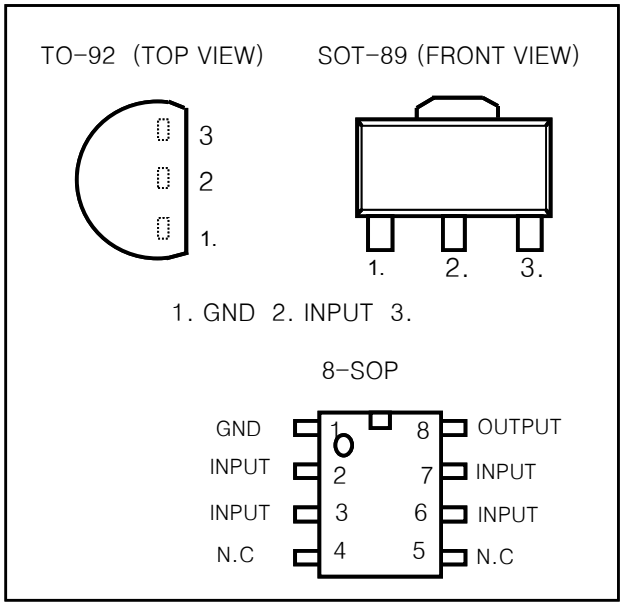
These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation.

In addition, they can be used with power-pass elements to make high current voltage regulators.

Each of these regulators can deliver up to 100㎃ of output current.

The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload.

When used as a replacement for a zener diode-resistor combination, an effective improvement in output impedance can be obtained together with lower-bias current.




## FEATURES

◇ Output Current Up to 100㎃

◇ No External Components

◇ Internal Thermal Overload Protection

◇ Internal Short-Circuit Limiting

◇ Output Voltage of 5V, 12V, 15V, 18V and 24V.

### ORDERING INFORMATION

| Device | Marking | Package |
|---|---|---|
| LM79LXX | LM79LXX | TO-92 |
| LM79LXXF | 9XX | SOT-89 |
| LM79L05ND | 79L05 | SOP-8 |
| LM79L05 AD/CD | 79L05A /C | |
| LM79L06D~24D | 79L06~24 | |

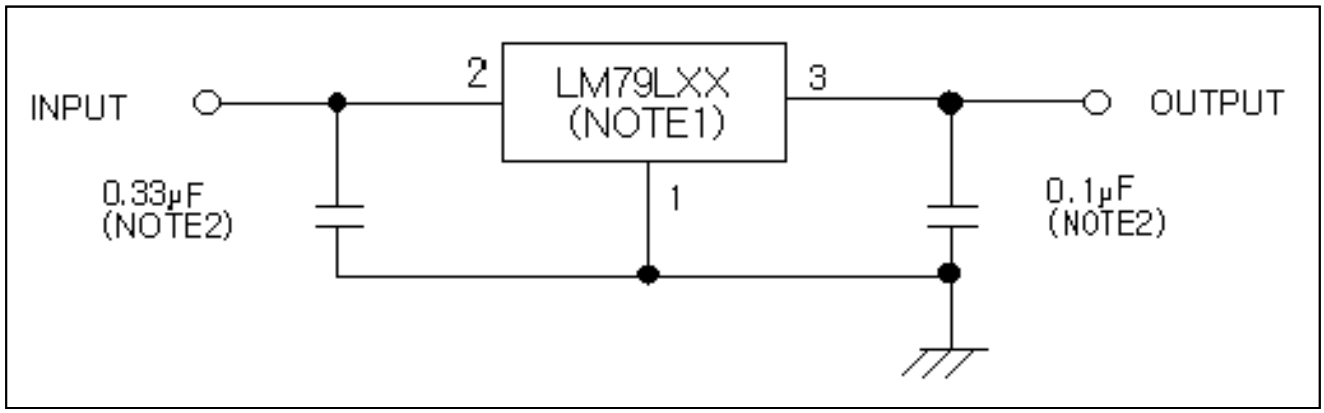
## ABSOLUTE MAXIMUM RATINGS

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Input voltage | LM79L05 | $V_I$ | -30 | V |
| | LM79L12 ~ LM79L18 | | -35 | |
| | LM79L24 | | -40 | |
| Operating junction temperature | | Topr | 0 ~ +150 | ℃ |
| Storage temperature | | Tstg | -65 ~ +150 | |
| Soldering temperature and time | | Tsol | 260/10sec | |

## RECOMMENDED OPERATING CONDITIONS

| Characteristic | | Min. | Max. | Unit |
|---|---|---|---|---|
| Input voltage, V | LM79L05 | −7 | −20 | V |
| | LM79L06 | −8 | −20 | |
| | LM79L08 | −10.5 | −23 | |
| | LM79L09 | −11.5 | −24 | |
| | LM79L12 | −14.5 | −27 | |
| | LM79L15 | −17.5 | −30 | |
| | LM79L18 | −20.7 | −33 | |
| | LM79L24 | −27 | −38 | |
| Output current, $I_O$ | | | 100 | mA |
| Operating virtual junction temperature, Tj | | 0 | 125 | ℃ |

## TYPICAL APPLICATION




Notes

1. To specify an output voltage, substitute voltage for "XX"
2. Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

## LM79L05 ELECTRICAL CHARACTERISTICS

(At specified virtual junction temperature, $V_I$=10V, $I_O$=40mA (unless otherwise noted)

| Characteistic | Symbol | Test condition * | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage ** | $V_{OUT}$ | | 25℃ | -4.8 | -5 | -5.2 | V |
| | | 1mA≤I ≤40mA<br>-7V≤V≤-20V | 0℃ ~ 125℃ | -4.75 | -5 | -5.25 | |
| | | 1mA≤I ≤70mA | | -4.75 | -5 | -5.25 | |
| Line regulation | Reg line | -7V≤V≤-20V | 25℃ | | 32 | 150 | mV |
| | | -8V≤V≤-20V | | | 26 | 100 | |
| Load regulation | Reg load | 1mA≤I ≤100mA | 25℃ | | 15 | 60 | mV |
| | | 1mA≤I ≤40mA | | | 8 | 30 | |
| Bias current | $I_B$ | | 25℃ | | 3.8 | 6 | mA |
| | | | 125℃ | | | 5.5 | |
| Bias current change | $\triangle I_B$ | -8V≤V≤-20V | 0℃ ~ 125℃ | | | 1.5 | mA |
| | | 1mA≤I ≤40mA | | | | 0.1 | |
| Output noise voltage | $V_N$ | 10Hz≤f≤100kHz | 25℃ | | 42 | | μV |
| Ripple rejection | RR | -8V≤V≤-18V<br>f=120Hz | 25℃ | 41 | 49 | | dB |
| Dropout voltage | $V_D$ | | 25℃ | | 1.7 | | V |

Notes

*. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.
Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

**. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## LM79L06 ELECTRICAL CHARACTERISTICS

(At specified virtual junction temperature, $V_I$=10V, $I_O$=40mA (unless otherwise noted)

| Characteistic | Symbol | Test condition * | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage ** | $V_{OUT}$ | | 25℃ | -5.76 | -6 | -6.24 | V |
| | | 1mA≤I ≤40mA<br>-8.0V≤V≤-21V | 0℃ ~ 125℃ | -5.7 | -6 | -6.3 | |
| | | 1mA≤I ≤70mA | | -5.7 | -6 | -6.3 | |
| Line regulation | Reg line | -8V≤V≤-21V | 25℃ | | 50 | 150 | mV |
| | | -9V≤V≤-21V | | | 45 | 110 | |
| Load regulation | Reg load | 1mA≤I ≤100mA | 25℃ | | 12 | 70 | mV |
| | | 1mA≤I ≤40mA | | | 5.5 | 35 | |
| Bias current | $I_B$ | | 25℃ | | | 6 | mA |
| | | | 125℃ | | | 5.5 | |
| Bias current change | $\triangle I_B$ | -9V≤V≤-21V | 0℃ ~ 125℃ | | | 1.5 | mA |
| | | 1mA≤I ≤40mA | | | | 0.1 | |
| Output noise voltage | $V_N$ | 10Hz≤f≤100kHz | 25℃ | | 50 | | μV |
| Ripple rejection | RR | -9V≤V≤-19V<br>f=120Hz | 25℃ | 39 | 47 | | dB |
| Dropout voltage | $V_D$ | | 25℃ | | 1.7 | | V |

Notes

*. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.
Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

**. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## LM79L08 ELECTRICAL CHARACTERISTICS

(At specified virtual junction temperature, $V_I$=14V, $I_O$=40mA (unless otherwise noted)

| Characteistic | Symbol | Test condition * | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage ** | $V_{OUT}$ | | 25℃ | -8.3 | -8 | -7.7 | V |
| | | 1mA≤I ≤40mA<br>-10.5V≤V≤-23V | 0℃ ~ 125℃ | -8.4 | -8 | -7.6 | |
| | | 1mA≤I ≤70mA | | -8.4 | -8 | -7.6 | |
| Line regulation | Reg line | -10.5V≤V≤-23V | 25℃ | | 20 | 175 | mV |
| | | -11V≤V≤-23V | | | 12 | 125 | |
| Load regulation | Reg load | 1mA≤I ≤100mA | 25℃ | | 18 | 80 | mV |
| | | 1mA≤I ≤40mA | | | 9 | 42 | |
| Bias current | $I_B$ | | 25℃ | | | 6.5 | mA |
| | | | 125℃ | | | 6 | |
| Bias current change | $\triangle I_B$ | -11V≤V≤-23V | 0℃ ~ 125℃ | | | 1.5 | mA |
| | | 1mA≤I ≤40mA | | | | 0.1 | |
| Output noise voltage | $V_N$ | 10Hz≤f≤100kHz | 25℃ | | 60 | | μV |
| Ripple rejection | RR | -12V≤V≤-23V<br>f=120Hz | 25℃ | 42 | 49 | | dB |
| Dropout voltage | $V_D$ | | 25℃ | | 1.7 | | V |

Notes

*. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.
Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

**. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## LM79L09 ELECTRICAL CHARACTERISTICS

(At specified virtual junction temperature, $V_I$=−15V, $I_O$=40mA (unless otherwise noted)

| Characteistic | Symbol | Test condition * | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage ** | $V_{OUT}$ | | 25℃ | −8.64 | −9 | −9.36 | V |
| | | 1mA≤I ≤40mA<br>−11.4V≤V≤−24V | 0℃ ~ 125℃ | −8.55 | | −9.45 | |
| | | 1mA≤I ≤70mA | | −8.55 | | −9.45 | |
| Line regulation | Reg line | −11.4V≤V≤−24V | 25℃ | | 80 | 200 | mV |
| | | −12V≤V≤−24V | | | 20 | 160 | |
| Load regulation | Reg load | 1mA≤I ≤100mA | 25℃ | | 17 | 90 | mV |
| | | 1mA≤I ≤40mA | | | 8 | 45 | |
| Bias current | $I_B$ | | 25℃ | | 3.8 | 6.5 | mA |
| | | | 125℃ | | | 6 | |
| Bias current change | $\triangle I_B$ | −12V≤V≤−24V | 0℃ ~ 125℃ | | | 1.5 | mA |
| | | 1mA≤I ≤40mA | | | | 0.1 | |
| Output noise voltage | $V_N$ | 10Hz≤f≤100kHz | 25℃ | | 64 | | μV |
| Ripple rejection | RR | −8V≤V≤−18V<br>f=120Hz | 25℃ | 35 | 43 | | dB |
| Dropout voltage | $V_D$ | | 25℃ | | 1.7 | | V |

Notes

*. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.
Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

**. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## LM79L12 ELECTRICAL CHARACTERISTICS

(At specified virtual junction temperature, $V_I$=19V, $I_O$=40mA (unless otherwise noted)

| Characteistic | Symbol | Test condition * | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage ** | $V_{OUT}$ | | 25℃ | -11.5 | -12 | -12.5 | V |
| | | 1mA≤I ≤40mA<br>-14.5V≤V≤-27V | 0℃ ~ 125℃ | -11.4 | -12 | -12.6 | |
| | | 1mA≤I ≤70mA | | -11.4 | -12 | -12.6 | |
| Line regulation | Reg line | -14.5V≤V≤-27V | 25℃ | | 50 | 250 | mV |
| | | -16V≤V≤-27V | | | 40 | 200 | |
| Load regulation | Reg load | 1mA≤I ≤100mA | 25℃ | | 24 | 100 | mV |
| | | 1mA≤I ≤40mA | | | 15 | 50 | |
| Bias current | $I_B$ | | 25℃ | | | 6.5 | mA |
| | | | 125℃ | | | 6 | |
| Bias current change | $\triangle I_B$ | -16V≤V≤-27V | 0℃ ~ 125℃ | | | 1.5 | mA |
| | | 1mA≤I ≤40mA | | | | 0.1 | |
| Output noise voltage | $V_N$ | 10Hz≤f≤100kHz | 25℃ | | 70 | | μV |
| Ripple rejection | RR | -15V≤V≤-25V<br>f=120Hz | 25℃ | 37 | 42 | | dB |
| Dropout voltage | $V_D$ | | 25℃ | | 1.7 | | V |

Notes

*. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.
Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

**. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## LM79L15 ELECTRICAL CHARACTERISTICS

(At specified virtual junction temperature, $V_I$=23V, $I_O$=40mA (unless otherwise noted)

| Characteistic | Symbol | Test condition * | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage ** | $V_{OUT}$ | | 25℃ | -14.4 | -15 | -15.6 | V |
| | | 1mA≤I ≤40mA<br>-17.5V≤V≤-30V | 0℃ ~ 125℃ | -14.25 | -15 | -15.75 | |
| | | 1mA≤I ≤70mA | | -14.25 | -15 | -15.75 | |
| Line regulation | Reg line | -17.5V≤V≤-30V | 25℃ | | 65 | 300 | mV |
| | | -27V≤V≤-30V | | | 58 | 250 | |
| Load regulation | Reg load | 1mA≤I ≤100mA | 25℃ | | 25 | 150 | mV |
| | | 1mA≤I ≤40mA | | | 15 | 75 | |
| Bias current | $I_B$ | | 25℃ | | 4.2 | 6.5 | mA |
| | | | 125℃ | | | 6 | |
| Bias current change | $\triangle I_B$ | -20V≤V≤-30V | 0℃ ~ 125℃ | | | 1.5 | mA |
| | | 1mA≤I ≤40mA | | | | 0.1 | |
| Output noise voltage | $V_N$ | 10Hz≤f≤100kHz | 25℃ | | 82 | | μV |
| Ripple rejection | RR | -18.5V≤V≤-28.5V<br>f=120Hz | 25℃ | 37 | 44 | | dB |
| Dropout voltage | $V_D$ | | 25℃ | | 1.7 | | V |

Notes

*. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.
Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

**. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## LM79L18 ELECTRICAL CHARACTERISTICS

(At specified virtual junction temperature, $V_I$=26V, $I_O$=40mA (unless otherwise noted)

| Characteistic | Symbol | Test condition * | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage ** | $V_{OUT}$ | | 25℃ | -17.3 | -18 | -18.7 | V |
| | | 1mA≤I ≤40mA<br>-20.7V≤V≤-33V | 0℃ ~ 125℃ | -17.1 | -18 | -18.9 | |
| | | 1mA≤I ≤70mA | | -17.1 | -18 | -18.9 | |
| Line regulation | Reg line | -20.7V≤V≤-33V | 25℃ | | 70 | 360 | mV |
| | | -21V≤V≤-33V | | | 64 | 300 | |
| Load regulation | Reg load | 1mA≤I ≤100mA | 25℃ | | 27 | 180 | mV |
| | | 1mA≤I ≤40mA | | | 19 | 90 | |
| Bias current | $I_B$ | | 25℃ | | 4.7 | 6.5 | mA |
| | | | 125℃ | | | 6 | |
| Bias current change | $\triangle I_B$ | -21V≤V≤-33V | 0℃ ~ 125℃ | | | 1.5 | mA |
| | | 1mA≤I ≤40mA | | | | 0.1 | |
| Output noise voltage | $V_N$ | 10Hz≤f≤100kHz | 25℃ | | 82 | | μV |
| Ripple rejection | RR | -23V≤V≤-33V<br>f=120Hz | 25℃ | 32 | 36 | | dB |
| Dropout voltage | $V_D$ | | 25℃ | | 1.7 | | V |

Notes

*. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.
Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

**. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## LM79L24 ELECTRICAL CHARACTERISTICS

(At specified virtual junction temperature, $V_I$=32V, $I_O$=40mA (unless otherwise noted)

| Characteistic | Symbol | Test condition * | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage ** | $V_{OUT}$ | | 25℃ | -23 | -24 | -25 | V |
| | | 1mA≤I ≤40mA<br>-27V≤V≤-38V | 0℃ ~ 125℃ | -22.8 | -24 | -25.2 | |
| | | 1mA≤I ≤70mA | | -22.8 | -24 | -25.2 | |
| Line regulation | Reg line | -27V≤V≤-38V | 25℃ | | 95 | 480 | mV |
| | | -28V≤$V_I$≤-38V | | | 78 | 400 | |
| Load regulation | Reg load | 1mA≤$I_O$≤100mA | 25℃ | | 41 | 240 | mV |
| | | 1mA≤$I_O$≤40mA | | | 28 | 120 | |
| Bias current | $I_B$ | | 25℃ | | 4.8 | 6.5 | mA |
| | | | 125℃ | | | 6 | |
| Bias current change | $\triangle I_B$ | -21V≤V≤-38V | 0℃ ~ 125℃ | | | 1.5 | mA |
| | | 1mA≤I ≤40mA | | | | 0.1 | |
| Output noise voltage | $V_N$ | 10Hz≤f≤100kHz | 25℃ | | 82 | | μV |
| Ripple rejection | RR | -29V≤$V_I$≤-35V<br>f=120Hz | 25℃ | 30 | 33 | | dB |
| Dropout voltage | $V_D$ | | 25℃ | | 1.7 | | V |

Notes

*. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible.
Thermal effects must be taken into account separately.
All characteristics are measured with a 0.33μF capacitor across the input and a 0.1μF capacitor across the output.

**. This specification applies only for DC power dissipation permitted by absolute maximum ratings.