

## LM79LXXA (KA79LXX, MC79LXX) FIXED VOLTAGE REGULATOR (NEGATIVE)

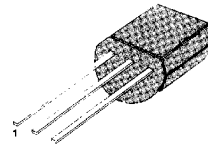
### 3-TERMINAL 0.1A NEGATIVE VOLTAGE REGULATORS

These regulators employ internal current limiting and thermal shutdown, making them essentially indestructible.

### FEATURES

- Output current up to 100mA
- No external components
- Internal thermal over load protection
- Internal short circuit current limiting
- Output Voltage Offered in  $\pm 5\%$  Tolerance
- Output Voltage of -5V, -12V, -15V, -18V and -24V

TO-92

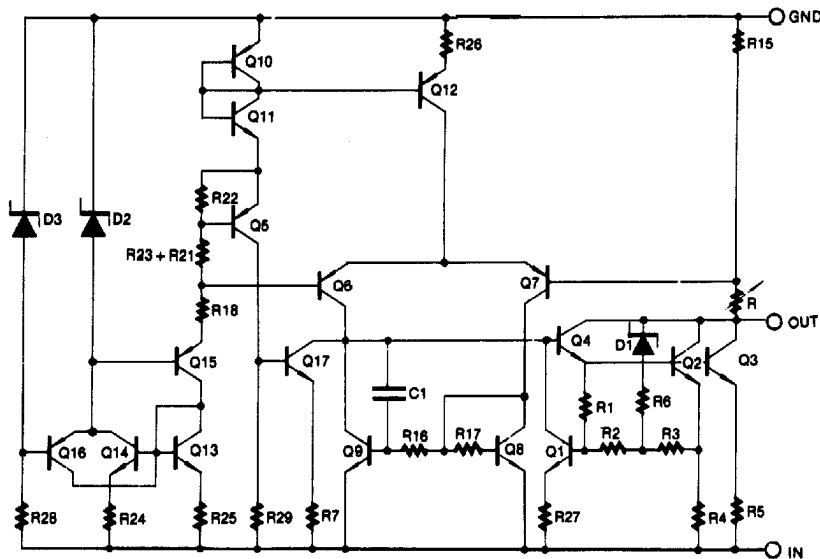


1: GND 2: Input 3: Output

### ORDERING INFORMATION

| Device     | Package | Operating Temperature |
|------------|---------|-----------------------|
| LM79LXXACZ | TO - 92 | 0 ~ + 125°C           |

### SCHEMATIC DIAGRAM



## LM79LXXA (KA79LXX, MC79LXX) FIXED VOLTAGE REGULATOR (NEGATIVE)

### ABSOLUTE MAXIMUM RATINGS ( $T_A = +25^\circ\text{C}$ , unless otherwise specified)

| Characteristic                                  | Symbol    | Value             | Unit             |
|---|-----------|-------------------|------------------|
| Input Voltage (-5V)<br>(-12V to -18V)<br>(-24V) | $V_I$     | -30<br>-35<br>-40 | $V_{DC}$         |
| Operating Temperature Range                     | $T_{OPR}$ | 0 ~ +125          | $^\circ\text{C}$ |
| Storage Temperature Range                       | $T_{STG}$ | -65 ~ +150        | $^\circ\text{C}$ |

### LM79L05A ELECTRICAL CHARACTERISTICS

( $V_I = -10\text{V}$ ,  $I_O = 40\text{mA}$ ,  $C_I = 0.33\mu\text{F}$ ,  $C_O = 0.1\mu\text{F}$ ,  $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$ , unless otherwise specified)

| Characteristic           | Symbol       | Test Conditions  | Min              | Typ   | Max              | Unit          |
|--------------------------|--------------|--|------------------|-------|------------------|---------------|
| Output Voltage           | $V_O$        | $T_J = +25^\circ\text{C}$  | - 4.8            | - 5.0 | - 5.2            | V             |
| Line Regulation          | $\Delta V_O$ | $T_J = +25^\circ\text{C}$<br>-7.0V $\geq V_I \geq -20\text{V}$<br>-8V $\geq V_I \geq -20\text{V}$                          |                  | 15    | 150              | mV            |
| Load Regulation          | $\Delta V_O$ | $T_J = +25^\circ\text{C}$<br>1.0mA $\leq I_O \leq 100\text{mA}$<br>1.0mA $\leq I_O \leq 40\text{mA}$                       |                  | 20    | 60               | mV            |
| Output Voltage           | $V_O$        | -7.0V $> V_I > -20\text{V}$ , 1.0mA $\leq I_O \leq 40\text{mA}$<br>$V_I = -10\text{V}$ , 1.0mA $\leq I_O \leq 70\text{mA}$ | - 4.75<br>- 4.75 |       | - 5.25<br>- 5.25 | V             |
| Quiescent Current        | $I_Q$        | $T_J = +25^\circ\text{C}$<br>$T_J = +125^\circ\text{C}$  |                  | 2.0   | 6.0              | mA            |
| Quiescent Current Change | $\Delta I_Q$ | With Line<br>With Load<br>-8V $\geq V_I \geq -20\text{V}$<br>1.0mA $\leq I_O \leq 40\text{mA}$                             |                  |       | 1.5              | mA            |
| Output Noise Voltage     | $V_N$        | $T_A = +25^\circ\text{C}$ , 10Hz $\leq f \leq 100\text{KHz}$   |                  | 30    |                  | $\mu\text{V}$ |
| Ripple Rejection         | RR           | $f = 120\text{Hz}$ , -8V $\geq V_I \geq -18\text{V}$<br>$T_J = +25^\circ\text{C}$  | 41               | 60    |                  | dB            |
| Dropout Voltage          | $V_D$        | $T_J = +25^\circ\text{C}$  |                  | 1.7   |                  | V             |

\* Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## LM79LXXA (KA79LXX, MC79LXX) FIXED VOLTAGE REGULATOR (NEGATIVE)

### LM79L12A ELECTRICAL CHARACTERISTICS

( $V_I = -19V$ ,  $I_O = 40mA$ ,  $C_I = 0.33\mu F$ ,  $C_O = 0.1\mu F$ ,  $0^\circ C \leq T_J \leq +125^\circ C$ , unless otherwise specified)

| Characteristic           | Symbol                 | Test Conditions   | Min  | Typ                       | Max                        | Unit    |
|--------------------------|------------------------|---|--|---------------------------|----------------------------|---------|
| Output Voltage           | $V_O$                  | $T_J = +25^\circ C$   | -11.5  | -12.0                     | -12.5                      | V       |
| Line Regulation          | $\Delta V_O$           | $T_J = +25^\circ C$   | $-14.5V \geq V_I \geq -27V$                        |                           | 250                        | mV      |
|                          |                        |   | $-16V \geq V_I \geq -27V$                          |                           | 200                        |         |
| Load Regulation          | $\Delta V_O$           | $T_J = +25^\circ C$   | $1.0mA \leq I_O \leq 100mA$                        |                           | 100                        | mV      |
|                          |                        |   | $1.0mA \leq I_O \leq 40mA$                         |                           | 50                         |         |
| Output Voltage           | $V_O$                  | $T_J = +25^\circ C$   | $-14.5V > V_I > -27V$ , $1.0mA \leq I_O \leq 40mA$ | -11.4                     | -12.6                      | V       |
|                          |                        |   | $V_I = -19V$ , $1.0mA \leq I_O \leq 70mA$          | -11.4                     | -12.6                      |         |
| Quiescent Current        | $I_Q$                  | $T_J = +25^\circ C$   |  |                           | 6.5                        | mA      |
|                          |                        |   | $T_J = +125^\circ C$                               |                           | 6.0                        |         |
| Quiescent Current Change | With Line<br>With Load | $\Delta I_Q$  | $T_J = +25^\circ C$                                | $-16V \geq V_I \geq -27V$ | 1.5                        | mA      |
|                          |                        |   |  |                           | $1.0mA \leq I_O \leq 40mA$ |         |
| Output Noise Voltage     | $V_N$                  | $T_A = +25^\circ C$ , $10Hz \leq f \leq 100KHz$                 |  | 80                        |                            | $\mu V$ |
| Ripple Rejection         | RR                     | $f = 120Hz$ , $-150V \geq V_I \geq -25V$<br>$T_J = +25^\circ C$ | 37   | 42                        |                            | dB      |
| Dropout Voltage          | $V_D$                  | $T_J = +25^\circ C$   |  | 1.7                       |                            | V       |

\* Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

### LM79L15A ELECTRICAL CHARACTERISTICS

( $V_I = -23V$ ,  $I_O = 40mA$ ,  $C_I = 0.33\mu F$ ,  $C_O = 0.1\mu F$ ,  $0^\circ C \leq T_J \leq +125^\circ C$ , unless otherwise specified)

| Characteristic           | Symbol                 | Test Conditions  | Min  | Typ                       | Max                        | Unit    |
|--------------------------|------------------------|--|--|---------------------------|----------------------------|---------|
| Output Voltage           | $V_O$                  | $T_J = +25^\circ C$  | -14.4  | -15.0                     | -15.6                      | V       |
| Line Regulation          | $\Delta V_O$           | $T_J = +25^\circ C$  | $-17.5V \geq V_I \geq -30V$                        |                           | 300                        | mV      |
|                          |                        |  | $-27V \geq V_I \geq -30V$                          |                           | 250                        |         |
| Load Regulation          | $\Delta V_O$           | $T_J = +25^\circ C$  | $1.0mA \leq I_O \leq 100mA$                        |                           | 150                        | mV      |
|                          |                        |  | $1.0mA \leq I_O \leq 40mA$                         |                           | 75                         |         |
| Output Voltage           | $V_O$                  | $T_J = +25^\circ C$  | $-17.5V > V_I > -30V$ , $1.0mA \leq I_O \leq 40mA$ | -14.25                    | -15.75                     | V       |
|                          |                        |  | $V_I = -23V$ , $1.0mA \leq I_O \leq 70mA$          | -14.25                    | -15.75                     |         |
| Quiescent Current        | $I_Q$                  | $T_J = +25^\circ C$  |  |                           | 6.5                        | mA      |
|                          |                        |  | $T_J = +125^\circ C$                               |                           | 6.0                        |         |
| Quiescent Current Change | With Line<br>With Load | $\Delta I_Q$   | $T_J = +25^\circ C$                                | $-20V \geq V_I \geq -30V$ | 1.5                        | mA      |
|                          |                        |  |  |                           | $1.0mA \leq I_O \leq 40mA$ |         |
| Output Noise Voltage     | $V_N$                  | $T_A = 25^\circ C$ , $10Hz \leq f \leq 100KHz$                     |  | 90                        |                            | $\mu V$ |
| Ripple Rejection         | RR                     | $f = 120Hz$ , $-18.5V \geq V_I \geq -28.5V$<br>$T_J = +25^\circ C$ | 34   | 39                        |                            | dB      |
| Dropout Voltage          | $V_D$                  | $T_J = +25^\circ C$  |  | 1.7                       |                            | V       |

\* Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## LM79LXXA (KA79LXX, MC79LXX) FIXED VOLTAGE REGULATOR (NEGATIVE)

### LM79L18A ELECTRICAL CHARACTERISTICS

( $V_I = -27V$ ,  $I_O = 40mA$ ,  $C_I = 0.33\mu F$ ,  $C_O = 0.1\mu F$ ,  $0^\circ C \leq T_J \leq +125^\circ C$ , unless otherwise specified)

| Characteristic           | Symbol       | Test Conditions  | Min  | Typ   | Max   | Unit    |
|--------------------------|--------------|--|--|-------|-------|---------|
| Output Voltage           | $V_O$        | $T_J = +25^\circ C$  | -17.3                                      | -18.0 | -18.7 | V       |
| Line Regulation          | $\Delta V_O$ | $T_J = +25^\circ C$  | $-20.7V \geq V_I \geq -33V$                |       | 325   | mV      |
|                          |              |  | $-21V \geq V_I \geq -33V$                  |       | 275   |         |
| Load Regulation          | $\Delta V_O$ | $T_J = +25^\circ C$  | $1.0mA \leq I_O \leq 100mA$                |       | 170   | mV      |
|                          |              |  | $1.0mA \leq I_O \leq 40mA$                 |       | 85    |         |
| Output Voltage           | $V_O$        | $-20.7V > V_I > -33V$ , $1.0mA \leq I_O \leq 40mA$             | -17.1                                      |       | -18.9 | V       |
|                          |              |  | $V_I = -1.0V$ , $1.0mA \leq I_O \leq 70mA$ | -17.1 |       |         |
| Quiescent Current        | $I_Q$        | $T_J = +25^\circ C$  |  |       | 6.5   | mA      |
|                          |              |  | $T_J = +125^\circ C$                       |       |       |         |
| Quiescent Current Change | $\Delta I_Q$ | $-21V \geq V_I \geq -33V$                                      | $1.0mA \leq I_O \leq 40mA$                 |       | 1.5   | mA      |
|                          |              |  |  |       | 0.1   |         |
| Output Noise Voltage     | $V_N$        | $T_A = +25^\circ C$ , $10Hz \leq f \leq 100KHz$                |  | 150   |       | $\mu V$ |
| Ripple Rejection         | RR           | $f = 120Hz$ , $-23V \geq V_I \geq -33V$<br>$T_J = +25^\circ C$ | 33   | 48    |       | dB      |
| Dropout Voltage          | $V_D$        | $T_J = +25^\circ C$  |  | 1.7   |       | V       |

\* Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

### LM79L24A ELECTRICAL CHARACTERISTICS

( $V_I = -33V$ ,  $I_O = 40mA$ ,  $C_I = 0.33\mu F$ ,  $C_O = 0.1\mu F$ ,  $0^\circ C \leq T_J \leq +125^\circ C$ , unless otherwise specified)

| Characteristic           | Symbol       | Test Conditions  | Min                                       | Typ   | Max   | Unit    |
|--------------------------|--------------|--|---|-------|-------|---------|
| Output Voltage           | $V_O$        | $T_J = +25^\circ C$  | -23                                       | -24   | -25   | V       |
| Line Regulation          | $\Delta V_O$ | $T_J = +25^\circ C$  | $-27V \geq V_I \geq -38V$                 |       | 350   | mV      |
|                          |              |  | $-28V \geq V_I \geq -38V$                 |       | 300   |         |
| Load Regulation          | $\Delta V_O$ | $T_J = +25^\circ C$  | $1.0mA \leq I_O \leq 100mA$               |       | 200   | mV      |
|                          |              |  | $1.0mA \leq I_O \leq 40mA$                |       | 100   |         |
| Output Voltage           | $V_O$        | $-27V > V_I > -38V$ , $1.0mA \leq I_O \leq 40mA$               | -22.8                                     |       | -25.2 | V       |
|                          |              |  | $V_I = -33V$ , $1.0mA \leq I_O \leq 70mA$ | -22.8 |       |         |
| Quiescent Current        | $I_Q$        | $T_J = +25^\circ C$  |   |       | 6.5   | mA      |
|                          |              |  | $T_J = +125^\circ C$                      |       |       |         |
| Quiescent Current Change | $\Delta I_Q$ | $-28V \geq V_I \geq -38V$                                      | $1.0mA \leq I_O \leq 40mA$                |       | 1.5   | mA      |
|                          |              |  |   |       | 0.1   |         |
| Output Noise Voltage     | $V_N$        | $T_A = +25^\circ C$ , $10Hz \leq f \leq 100KHz$                |   | 200   |       | $\mu V$ |
| Ripple Rejection         | RR           | $f = 120Hz$ , $-29V \geq V_I \geq -35V$<br>$T_J = +25^\circ C$ | 31  | 47    |       | dB      |
| Dropout Voltage          | $V_D$        | $T_J = +25^\circ C$  |   | 1.7   |       | V       |

\* Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.

## LM79LXXA (KA79LXX, MC79LXX) FIXED VOLTAGE REGULATOR (NEGATIVE)

### TYPICAL APPLICATIONS

#### Design Considerations

The LM79LXXA Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition. Internal Short-Circuit Protection that limits the maximum current the circuit will pass.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass

capacitor should be selected to provide good high - frequency characteristics to insure stable operation under all load conditions. A 0.33 $\mu$ F or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead. Bypassing the output is also recommended.

Fig. 1 Positive And Negative Regulator

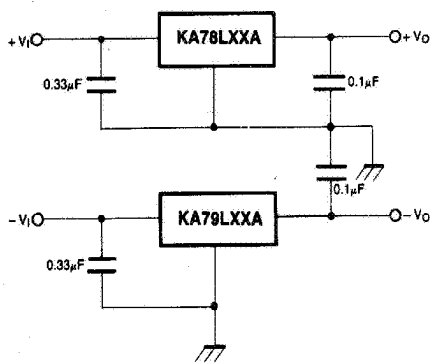
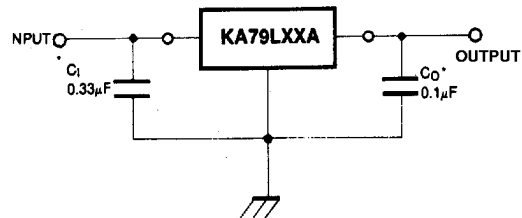


Fig. 2 Typical Application



A common ground is required between the Input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.

=  $C_1$  is required if regulator is located an appreciable distance from power supply filter.

\*\* =  $C_0$  improves stability and transient response.

