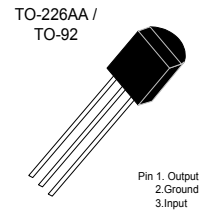


## THREE-TERMINAL LOW CURRENT POSITIVE VOLTAGE REGULATORS

The IL79LXX, A Series negative voltage regulators are inexpensive, easy-to-use devices suitable for numerous applications requiring up to 100 mA. This series features thermal shutdown and current limiting, making them remarkably rugged. In most applications, no external components are required for operation.

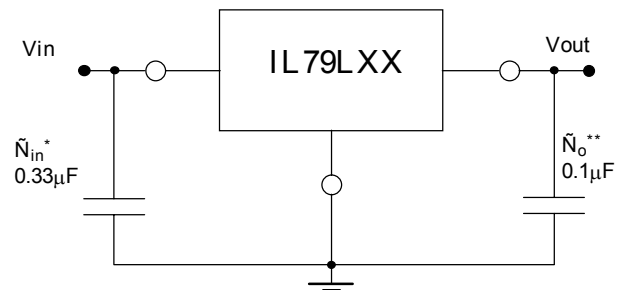
The IL79LXX devices are useful for on-card regulation or any other application where a regulated negative voltage at a modest current level is needed. These regulators offer substantial advantage over the common resistor/zener diode approach.



### FEATURES

- No External Components Required
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- Low Cost
- Complementary Positive Regulators Offered (IL78LXX Series)
- Available in Either  $\pm 5\%$  (AC) or  $\pm 10\%$  (C) Selections

### Standard application



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

\*C in is required if regulator is located an appreciable distance from power supply filter.

\*\*C O is not needed for stability; however, it does improve transient response.

### ABSOLUTE MAXIMUM RATINGS

| Rating                                               | Symbol         | Value             | Unit |
|------------------------------------------------------|----------------|-------------------|------|
| Input Voltage (-5.0 V)<br>(-12, -15, -18V)<br>(-24V) | $V_i$          | -30<br>-35<br>-40 | Vdc  |
| Storage Temperature Range                            | Tstg           | -65 to +150       | °C   |
| Operating Junction Temperature Range                 | T <sub>J</sub> | +150              | °C   |

# IL79LXX

## IL79L05 ELECTRICAL CHARACTERISTICS

( $V_i = -10\text{ V}$ ,  $I_o = 40\text{ mA}$ ,  $C_i = 0.33\text{ }\mu\text{F}$ ,  $C_o = 0.1\text{ }\mu\text{F}$ ,  $-40^\circ\text{C} < T_J < +125^\circ\text{C}$  unless otherwise noted.)

| Characteristics                                                                                                                       | Symbol                     | Min            | Typ    | Max            | Unit          |
|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------|--------|----------------|---------------|
| Output Voltage ( $T_J = +25^\circ\text{C}$ )                                                                                          | $V_o$                      | -4.8           | -5.0   | -5.2           | Vdc           |
| Line Regulation<br>( $T_J = +25^\circ\text{C}$ )<br>-7.0 Vdc $\geq V_i \geq 20\text{ Vdc}$<br>-8.0 Vdc $\geq V_i \geq 20\text{ Vdc}$  | $\text{Reg}_{\text{line}}$ | -<br>-         | -<br>- | 150<br>100     | mV            |
| Load Regulation<br>$T_J = +25^\circ\text{C}$ , $1.0\text{ mA} \leq I_o \leq 100\text{ mA}$ $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ | $\text{Peg}_{\text{load}}$ | -<br>-         | -<br>- | 60<br>30       | mV            |
| Output Voltage<br>-7.0 Vdc $\geq V_i \geq -20\text{ Vdc}$ ,<br>( $V_i = -10\text{ V}$ , $1.0\text{ mA} \leq I_o \leq 70\text{ mA}$ )  | $V_o$                      | -4.75<br>-4.75 | -<br>- | -5.25<br>-5.25 | Vdc           |
| Input Bias Current<br>( $T_J = +25^\circ\text{C}$ )<br>( $T_J = +125^\circ\text{C}$ )                                                 | $I_{IB}$                   | -<br>-         | -<br>- | 6.0<br>5.5     | mA            |
| Input Bias Current Change<br>-8.8 Vdc $\geq V_i \geq -20\text{ Vdc}$<br>$1.0\text{ mA} \leq I_o \leq 40\text{ mA}$                    | $\Delta I_{IB}$            | -<br>-         | -<br>- | 1.5<br>0.1     | mA            |
| Output Noise Voltage<br>( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )                                     | $V_n$                      | -              | 40     | -              | $\mu\text{V}$ |
| Ripple Rejection<br>(-8.0 Vdc $\geq V_i \geq -18\text{ V}$ ,<br>$f = 120\text{ Hz}$ , $T_J = +25^\circ\text{C}$ )                     | RR                         | 41             | 49     | -              | dB            |
| Dropout Voltage ( $I_o = 40\text{ mA}$ , $T_J = +25^\circ\text{C}$ )                                                                  | $V_i - V_o$                | -              | 1.7    | -              | Vdc           |

## IL79L12 ELECTRICAL CHARACTERISTICS

( $V_i = -19\text{ V}$ ,  $I_o = 40\text{ mA}$ ,  $C_i = 0.33\text{ }\mu\text{F}$ ,  $C_o = 0.1\text{ }\mu\text{F}$ ,  $-40^\circ\text{C} < T_J < +125^\circ\text{C}$ , unless otherwise noted.)

| Characteristics                                                                                                                                                            | Symbol                     | Min              | Typ    | Max            | Unit          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------|--------|----------------|---------------|
| Output Voltage ( $T_J = +25^\circ\text{C}$ )                                                                                                                               | $V_o$                      | -11.1            | -12    | -12.9          | Vdc           |
| Line Regulation<br>( $T_J = +25^\circ\text{C}$ )<br>-14.5Vdc $\geq V_i \geq 27\text{ Vdc}$<br>-16 Vdc $\geq V_i \geq 27\text{ Vdc}$                                        | $\text{Reg}_{\text{line}}$ | -<br>-           | -<br>- | 250<br>200     | mV            |
| Load Regulation<br>$T_J = +25^\circ\text{C}$ , $1.0\text{ mA} \leq I_o \leq 100\text{ mA}$<br>$1.0\text{ mA} \leq I_o \leq 40\text{ mA}$                                   | $\text{Peg}_{\text{load}}$ | -<br>-           | -<br>- | 100<br>50      | mV            |
| Output Voltage<br>-14.5Vdc $\geq V_i \geq -27\text{ Vdc}$ , $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ $V_i = -19\text{ V}$ , $1.0\text{ mA} \leq I_o \leq 70\text{ mA}$ ) | $V_o$                      | -10.8 --<br>10.8 | -<br>- | -13.2<br>-13.2 | Vdc           |
| Input Bias Current<br>( $T_J = +25^\circ\text{C}$ )<br>( $T_J = +125^\circ\text{C}$ )                                                                                      | $I_{IB}$                   | -<br>-           | -<br>- | 6.5<br>6.0     | mA            |
| Input Bias Current Change<br>-16Vdc $\geq V_i \geq -27\text{ Vdc}$<br>$1.0\text{ mA} \leq I_o \leq 40\text{ mA}$                                                           | $\Delta I_{IB}$            | -<br>-           | -<br>- | 1.5<br>0.2     | mA            |
| Output Noise Voltage<br>( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )                                                                          | $V_n$                      | -                | 80     | -              | $\mu\text{V}$ |
| Ripple Rejection<br>-15V $\geq V_i \geq -25\text{ V}$ , $f = 120\text{ Hz}$ , $T_J = +25^\circ\text{C}$ )                                                                  | RR                         | 36               | 42     | -              | dB            |
| Dropout Voltage<br>( $I_o = 40\text{ mA}$ , $T_J = +25^\circ\text{C}$ )                                                                                                    | $V_i - V_o$                | "                | 1.7    | -              | Vdc           |

# IL79LXX

## IL79L15 ELECTRICAL CHARACTERISTICS

( $V_i = -23\text{ V}$ ,  $I_o = 40\text{ mA}$ ,  $C_i = 0.33\text{ }\mu\text{F}$ ,  $C_o = 0.1\text{ }\mu\text{F}$ ,  $-40^\circ\text{C} < T_J < +125^\circ\text{C}$ ), unless otherwise noted.)

| Characteristics                                                                                                                                                                       | Symbol                     | Min            | Typ | Max            | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------|-----|----------------|------|
| Output Voltage ( $T_J = +25^\circ\text{C}$ )                                                                                                                                          | $V_o$                      | -13.8          | -15 | -16.2          | Vdc  |
| Line Regulation<br>( $T_J = +25^\circ\text{C}$ , $I_o = 40\text{ mA}$ )<br>$-30\text{ Vdc} \leq V_i \leq -17.5\text{ Vdc}$<br>$-30\text{ Vdc} \leq V_i \leq -20\text{ Vdc}$           | $\text{Reg}_{\text{line}}$ | -              | -   | 300<br>250     | mV   |
| Load Regulation<br>( $T_J = +25^\circ\text{C}$ , $1.0\text{ mA} \leq I_o \leq 100\text{ mA}$ )<br>( $T_J = +25^\circ\text{C}$ , $1.0\text{ mA} \leq I_o < 40\text{ mA}$ )             | $\text{Reg}_{\text{load}}$ | -              | -   | 150<br>75      | mV   |
| Output Voltage<br>( $17.5\text{ Vdc} \leq V_i \leq 30\text{ Vdc}$ , $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ ) ( $V_i = 23\text{ V}$ , $1.0\text{ mA} \leq I_o \leq 70\text{ mA}$ ) | $V_o$                      | -13.5<br>-13.5 | -   | -16.5<br>-16.5 | Vdc  |
| Input Bias Current<br>( $T_J = +25^\circ\text{C}$ )<br>( $T_J = +125^\circ\text{C}$ )                                                                                                 | $I_{\text{IB}}$            | -              | -   | 6.5<br>6.0     | mA   |
| Input Bias Current Change<br>( $20\text{ Vdc} \leq V_i \leq 30\text{ Vdc}$ )<br>( $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ )                                                        | $\Delta I_{\text{IB}}$     | -              | -   | 1.5<br>0.2     | mA   |
| Output Noise Voltage<br>( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )                                                                                     | $V_n$                      | -              | 90  | -              | nV   |
| Ripple Rejection ( $I_o = 40\text{ mA}$ , $f = 120\text{ Hz}$ , $18.5\text{ V} \leq V_i \leq 28.5\text{ V}$ , $T_J = +25^\circ\text{C}$ )                                             | RR                         | 33             | 39  | -              | dB   |
| Dropout Voltage ( $T_J = +25^\circ\text{C}$ )                                                                                                                                         | $ V_i - V_o $              | -              | 1.7 | -              | Vdc  |

## IL79L18 ELECTRICAL CHARACTERISTICS

( $V_i = 27\text{ V}$ ,  $I_o = 40\text{ mA}$ ,  $C_i = 0.33\text{ }\mu\text{F}$ ,  $C_o = 0.1\text{ }\mu\text{F}$ ,  $40^\circ\text{C} < T_J < +125^\circ\text{C}$ ), unless otherwise noted.)

| Characteristics                                                                                                                                                                             | Symbol                     | Min            | Typ | Max            | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------|-----|----------------|------|
| Output Voltage ( $T_J = +25^\circ\text{C}$ )                                                                                                                                                | $V_o$                      | -16.6          | -18 | -19.4          | Vdc  |
| Line Regulation<br>( $T_J = +25^\circ\text{C}$ , $I_o = 40\text{ mA}$ )<br>$-33\text{ Vdc} \leq V_i \leq -20.7\text{ Vdc}$<br>$-33\text{ Vdc} \leq V_i \leq -22\text{ Vdc}$                 | $\text{Reg}_{\text{line}}$ | -              | -   | 325<br>275     | mV   |
| Load Regulation<br>( $T_J = +25^\circ\text{C}$ , $1.0\text{ mA} \leq I_o \leq 100\text{ mA}$ )<br>( $T_J = +25^\circ\text{C}$ , $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ )                | $\text{Reg}_{\text{load}}$ | -              | -   | 170<br>85      | mV   |
| Output Voltage<br>( $-33\text{ Vdc} \leq V_i \leq -21.4\text{ Vdc}$ , $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ )<br>( $V_i = -27\text{ V}$ , $1.0\text{ mA} \leq I_o \leq 70\text{ mA}$ ) | $V_o$                      | -16.2<br>-16.2 | -   | -19.8<br>-19.8 | Vdc  |
| Input Bias Current<br>( $T_J = +25^\circ\text{C}$ )<br>( $T_J = +125^\circ\text{C}$ )                                                                                                       | $I_{\text{IB}}$            | -              | -   | 6.5<br>6.0     | mA   |
| Input Bias Current Change<br>( $-33\text{ Vdc} \leq V_i \leq -22\text{ Vdc}$ )<br>( $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ )                                                            | $\Delta I_{\text{IB}}$     | -              | -   | 1.5<br>0.2     | mA   |
| Output Noise Voltage<br>( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq I_o \leq 100\text{ kHz}$ )                                                                                         | $V_n$                      | -              | 150 | -              | nV   |
| Ripple Rejection<br>( $f = 120\text{ Hz}$ , $-33\text{ V} \leq V_i \leq -23\text{ V}$ , $T_J = +25^\circ\text{C}$ )                                                                         | RR                         | 32             | 46  | -              | dB   |
| Dropout Voltage ( $T_J = +25^\circ\text{C}$ )                                                                                                                                               | $ V_i - V_o $              | -              | 1.7 | -              | Vdc  |

**IL79L24 ELECTRICAL CHARACTERISTICS**

( $V_i = 33\text{ V}$ ,  $I_o = 40\text{ mA}$ ,  $C_i = 0.33\text{ }\mu\text{F}$ ,  $C_o = 0.1\text{ }\mu\text{F}$ ,  
 $0^\circ\text{C} < T_J < +125^\circ\text{C}$ , unless otherwise noted.)

| Characteristics                                                                                                                                                                     | Symbol                     | Min            | Typ      | Max            | Unit |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------|----------|----------------|------|
| Output Voltage ( $T_J = +25^\circ\text{C}$ )                                                                                                                                        | $V_o$                      | -22.1          | -24      | -25.9          | Vdc  |
| Line Regulation<br>( $T_J = +25^\circ\text{C}$ , $I_o = 40\text{ mA}$ )<br>$38\text{ Vdc} \leq V_i \leq 27.5\text{ Vdc}$<br>$38\text{ Vdc} \leq V_i \leq 28\text{ Vdc}$             | $\text{Reg}_{\text{line}}$ | -<br>-         | 35<br>30 | 350<br>300     | mV   |
| Load Regulation<br>( $T_J = +25^\circ\text{C}$ , $1.0\text{ mA} \leq I_o \leq 100\text{ mA}$ )<br>( $T_J = +25^\circ\text{C}$ , $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ )        | $\text{Reg}_{\text{load}}$ | -<br>-         | 40<br>20 | 200<br>100     | mV   |
| Output Voltage<br>$-38\text{ Vdc} \leq V_i \leq -28\text{ Vdc}$ , $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$<br>$V_i = -33\text{ Vdc}$ , $1.0\text{ mA} \leq I_o \leq 70\text{ mA}$ | $V_o$                      | -21.6<br>-21.6 | -<br>-   | -26.4<br>-26.4 | Vdc  |
| Input Bias Current<br>( $T_J = +25^\circ\text{C}$ )<br>( $T_J = +125^\circ\text{C}$ )                                                                                               | $I_{IB}$                   | -<br>-         | -<br>-   | 6.5<br>6.0     | mA   |
| Input Bias Current Change<br>( $-38\text{ Vdc} \leq V_i \leq -28\text{ Vdc}$ )<br>( $1.0\text{ mA} \leq I_o \leq 40\text{ mA}$ )                                                    | $\Delta I_{IB}$            | -<br>-         | -<br>-   | 1.5<br>0.2     | mA   |
| Output Noise Voltage<br>( $T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$ )                                                                                   | $V_n$                      | -              | 200      | -              | nV   |
| Ripple Rejection ( $I_o = 40\text{ mA}$ , $f = 120\text{ Hz}$ ,<br>$-35\text{ V} \leq V_i \leq -29\text{ V}$ , $T_J = +25^\circ\text{C}$ )                                          | RR                         | 30             | 43       | -              | dB   |
| Dropout Voltage ( $T_J = +25^\circ\text{C}$ )                                                                                                                                       | $ V_i - V_o $              | -              | 1.7      | -              | Vdc  |