

# UTCLM79XX LINEAR INTEGRATED CIRCUIT

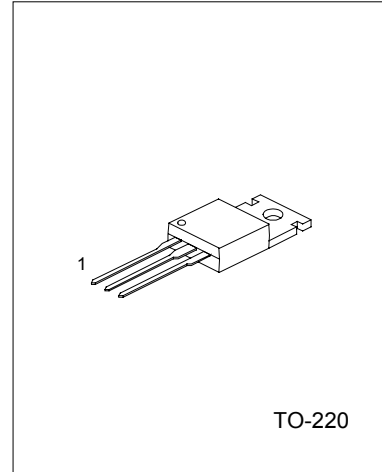
## 3 TERMINAL 1A NEGATIVE VOLTAGE REGULATOR

### DESCRIPTION

The UTC LM79XX series of three-terminal negative regulators are available in TO-220 package and with several fixed output voltage, making them useful in a wide range of application. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible.

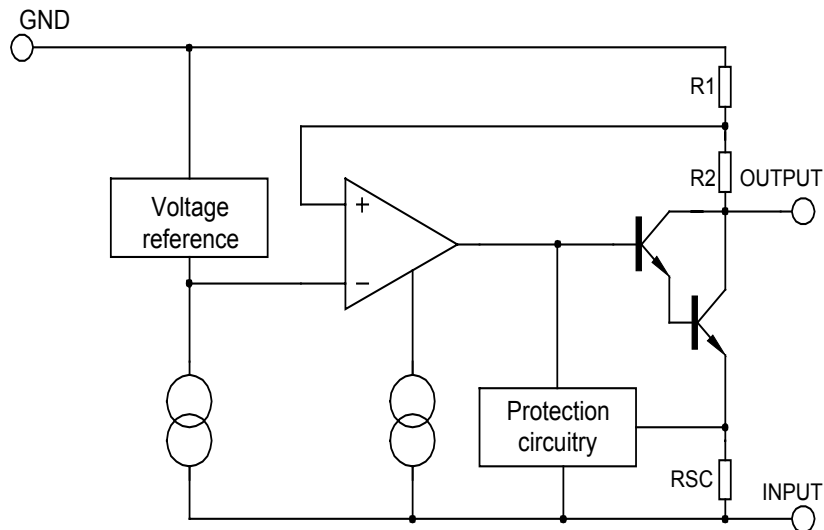
### FEATURES

- \*Output current up to 1A
- \*-5V;-6V;-8V;-12V;-15V;-18V;-24V output voltage available
- \*Thermal overload protection
- \*Short circuit protection



1:GND 2:Input 3:Output

### BLOCK DIAGRAM



# UTC LM79XX LINEAR INTEGRATED CIRCUIT

## ABSOLUTE MAXIMUM RATINGS(Ta=25°C)

| PARAMETER                            | SYMBOL          | VALUE      | UNIT  |
|--------------------------------------|-----------------|------------|-------|
| Input voltage                        | $V_i$           | -35        | V     |
| Thermal resistance<br>junction-air   | $R_{\theta JA}$ | 65         | °C /W |
| Thermal resistance<br>junction-cases | $R_{\theta JC}$ | 5          | °C /W |
| Operating Temperature                | $T_{opr}$       | 0 ~ +125   | °C    |
| Storage Temperature                  | $T_{stg}$       | -65 ~ +150 | °C    |

## UTC7905 ELECTRICAL CHARACTERISTICS

(Refer to test circuits, 0<Tj<125°C, Io=500mA, Vi=-10V, Ci=33uF, Co=1uF, unless otherwise specified)

| PARAMETER                | SYMBOL                | TEST CONDITIONS                         | MIN   | TYP  | MAX   | UNIT  |
|--------------------------|-----------------------|-----------------------------------------|-------|------|-------|-------|
| Output voltage           | $V_o$                 | Tj=25°C                                 | -4.80 | -5.0 | -5.20 | V     |
|                          |                       | 5.0mA<Io<1.0A, Po<15W<br>Vi=-7V to -20V | -4.75 |      | -5.25 | V     |
| Line regulation          | $\Delta V_o$          | Tj=25°C, Vi=-7V to -25V                 |       | 10   | 100   | mV    |
|                          |                       | Tj=25°C, Vi=-8V to -12V                 |       |      |       | mV    |
| Load regulation          | $\Delta V_o$          | Tj=25°C, Io=5.0mA to 1.5A               |       | 10   | 100   | mV    |
|                          |                       | Tj=25°C, Io=250mA to 750mA              |       | 3    | 50    | mV    |
| Quiescent current        | $I_q$                 | Tj=25°C                                 |       | 3    | 6     | mA    |
| Quiescent current change | $\Delta I_q$          | Io=5mA to 1.0A                          |       | 0.05 | 0.5   | mA    |
|                          |                       | Vi=-7V to -25V                          |       | 0.1  | 1.3   | mA    |
| Output voltage drift     | $\Delta V_o/\Delta T$ | Io=5mA                                  |       | -0.4 |       | mV/°C |
| Output noise voltage     | $V_N$                 | f=10Hz to 100kHz, Ta=25°C               |       | 100  |       | μV    |
| Ripple rejection         | RR                    | f=120Hz, Vi=-8V to -18V                 | 54    | 60   |       | dB    |
| Dropout voltage          | $V_o$                 | Io=1.0A, Tj=25°C                        |       | 2    |       | V     |
| Short circuit current    | $I_{sc}$              | Vi=-35V, Ta=25°C                        |       | 300  |       | mA    |
| peak current             | $I_{pk}$              | Tj=25°C                                 |       | 2.2  |       | A     |

## UTC7906 ELECTRICAL CHARACTERISTICS

(Refer to test circuits, 0<Tj<125°C, Io=500mA, Vi=-11V, Ci=2.2uF, Co=1uF, unless otherwise specified)

| PARAMETER                | SYMBOL                | TEST CONDITIONS                         | MIN   | TYP   | MAX   | UNIT  |
|--------------------------|-----------------------|-----------------------------------------|-------|-------|-------|-------|
| Output voltage           | $V_o$                 | Tj=25°C                                 | -5.76 | -6.00 | -6.24 | V     |
|                          |                       | 5.0mA<Io<1.0A, Po<15W<br>Vi=-8V to -21V | -5.70 |       | -6.30 | V     |
| Line regulation          | $\Delta V_o$          | Tj=25°C, Vi=-8V to -25V                 |       | 10    | 120   | mV    |
|                          |                       | Tj=25°C, Vi=-9V to -13V                 |       | 5     | 60    | mV    |
| Load regulation          | $\Delta V_o$          | Tj=25°C, Io=5.0mA to 1.5A               |       | 10    | 120   | mV    |
|                          |                       | Tj=25°C, Io=250mA to 750mA              |       | 3     | 60    | mV    |
| Quiescent current        | $I_q$                 | Tj=25°C                                 |       | 3     | 6     | mA    |
| Quiescent current change | $\Delta I_q$          | Io=5mA to 1.0A                          |       |       | 0.5   | mA    |
|                          |                       | Vi=-8V to -25V                          |       |       | 1.3   | mA    |
| Output voltage drift     | $\Delta V_o/\Delta T$ | Io=5mA                                  |       | -0.5  |       | mV/°C |
| Output noise voltage     | $V_N$                 | f=10Hz to 100kHz, Ta=25°C               |       | 130   |       | μV    |
| Ripple rejection         | RR                    | f=120Hz, Vi=-9V to -19V                 | 54    | 60    |       | dB    |
| Dropout voltage          | $V_o$                 | Io=1.0A, Tj=25°C                        |       | 2     |       | V     |
| Short circuit current    | $I_{sc}$              | Vi=-35V, Ta=25°C                        |       | 300   |       | mA    |
| peak current             | $I_{pk}$              | Tj=25°C                                 |       | 2.2   |       | A     |

# UTC LM79XX LINEAR INTEGRATED CIRCUIT

## UTC7908 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = -14\text{V}$ ,  $C_i = 2.2\mu\text{F}$ ,  $C_o = 1\mu\text{F}$ , unless otherwise specified)

| PARAMETER                | SYMBOL                  | TEST CONDITIONS                                                                                   | MIN   | TYP  | MAX   | UNIT                 |
|--------------------------|-------------------------|---------------------------------------------------------------------------------------------------|-------|------|-------|----------------------|
| Output voltage           | $V_o$                   | $T_j = 25^\circ\text{C}$                                                                          | -7.68 | -8.0 | -8.32 | V                    |
|                          |                         | $5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$<br>$V_i = -10.5\text{V}$ to $-23\text{V}$ | -7.60 |      | -8.40 | V                    |
| Line regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $V_i = -10.5\text{V}$ to $-25\text{V}$                                 |       | 10   | 100   | mV                   |
|                          |                         | $T_j = 25^\circ\text{C}$ , $V_i = -11.5\text{V}$ to $-17\text{V}$                                 |       | 5    | 80    | mV                   |
| Load regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.5\text{A}$                                  |       | 12   | 160   | mV                   |
|                          |                         | $T_j = 25^\circ\text{C}$ , $I_o = 250\text{mA}$ to $750\text{mA}$                                 |       | 4    | 80    | mV                   |
| Quiescent current        | $I_Q$                   | $T_j = 25^\circ\text{C}$                                                                          |       | 3    | 6     | mA                   |
| Quiescent current change | $\Delta I_Q$            | $I_o = 5\text{mA}$ to $1.0\text{A}$                                                               |       | 0.05 | 0.5   | mA                   |
|                          |                         | $V_i = -11.5\text{V}$ to $-25\text{V}$                                                            |       | 0.1  | 1.0   | mA                   |
| Output voltage drift     | $\Delta V_o / \Delta T$ | $I_o = 5\text{mA}$                                                                                |       | -0.6 |       | mV/ $^\circ\text{C}$ |
| Output noise voltage     | $V_N$                   | $f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$                                   |       | 175  |       | $\mu\text{V}$        |
| Ripple rejection         | RR                      | $f = 120\text{Hz}$ , $V_i = -11.5\text{V}$ to $-21.5\text{V}$                                     | 54    | 60   |       | dB                   |
| Dropout voltage          | $V_o$                   | $I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$                                                    |       | 2    |       | V                    |
| Short circuit current    | $I_{sc}$                | $V_i = -35\text{V}$ , $T_a = 25^\circ\text{C}$                                                    |       | 300  |       | mA                   |
| peak current             | $I_{pk}$                | $T_j = 25^\circ\text{C}$                                                                          |       | 2.2  |       | A                    |

## UTC7912 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = -18\text{V}$ ,  $C_i = 2.2\mu\text{F}$ ,  $C_o = 1\mu\text{F}$ , unless otherwise specified)

| PARAMETER                | SYMBOL                  | TEST CONDITIONS                                                                                   | MIN    | TYP   | MAX    | UNIT                 |
|--------------------------|-------------------------|---------------------------------------------------------------------------------------------------|--------|-------|--------|----------------------|
| Output voltage           | $V_o$                   | $T_j = 25^\circ\text{C}$                                                                          | -11.52 | -12.0 | -12.48 | V                    |
|                          |                         | $5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$<br>$V_i = -14.5\text{V}$ to $-27\text{V}$ | -11.40 |       | -12.60 | V                    |
| Line regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $V_i = -14.5\text{V}$ to $-30\text{V}$                                 |        | 12    | 240    | mV                   |
|                          |                         | $T_j = 25^\circ\text{C}$ , $V_i = -16\text{V}$ to $-22\text{V}$                                   |        | 6     | 120    | mV                   |
| Load regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.5\text{A}$                                  |        | 12    | 240    | mV                   |
|                          |                         | $T_j = 25^\circ\text{C}$ , $I_o = 250\text{mA}$ to $750\text{mA}$                                 |        | 4     | 120    | mV                   |
| Quiescent current        | $I_Q$                   | $T_j = 25^\circ\text{C}$                                                                          |        | 3     | 6      | mA                   |
| Quiescent current change | $\Delta I_Q$            | $I_o = 5\text{mA}$ to $1.0\text{A}$                                                               |        | 0.05  | 0.5    | mA                   |
|                          |                         | $V_i = -14.5\text{V}$ to $-30\text{V}$                                                            |        | 0.1   | 1.0    | mA                   |
| Output voltage drift     | $\Delta V_o / \Delta T$ | $I_o = 5\text{mA}$                                                                                |        | -0.8  |        | mV/ $^\circ\text{C}$ |
| Output noise voltage     | $V_N$                   | $f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$                                   |        | 200   |        | $\mu\text{V}$        |
| Ripple rejection         | RR                      | $f = 120\text{Hz}$ , $V_i = -15\text{V}$ to $-25\text{V}$                                         | 54     | 60    |        | dB                   |
| Dropout voltage          | $V_o$                   | $I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$                                                    |        | 2     |        | V                    |
| Short circuit current    | $I_{sc}$                | $V_i = -35\text{V}$ , $T_a = 25^\circ\text{C}$                                                    |        | 300   |        | mA                   |
| peak current             | $I_{pk}$                | $T_j = 25^\circ\text{C}$                                                                          |        | 2.2   |        | A                    |

# UTC LM79XX LINEAR INTEGRATED CIRCUIT

## UTC7915 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = -23\text{V}$ ,  $C_i = 2.2\mu\text{F}$ ,  $C_o = 1\mu\text{F}$ , unless otherwise specified)

| PARAMETER                | SYMBOL                  | TEST CONDITIONS                                                                                   | MIN    | TYP   | MAX    | UNIT                 |
|--------------------------|-------------------------|---------------------------------------------------------------------------------------------------|--------|-------|--------|----------------------|
| Output voltage           | $V_o$                   | $T_j = 25^\circ\text{C}$                                                                          | -14.40 | -15.0 | -15.60 | V                    |
|                          |                         | $5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$<br>$V_i = -17.5\text{V}$ to $-30\text{V}$ | -14.25 |       | -15.75 | V                    |
| Line regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $V_i = -17.5\text{V}$ to $-30\text{V}$                                 |        | 12    | 300    | mV                   |
| Load regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $V_i = -20\text{V}$ to $-26\text{V}$                                   |        | 6     | 150    | mV                   |
|                          |                         | $T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.5\text{A}$                                  |        | 12    | 300    | mV                   |
| Quiescent current        | $I_Q$                   | $T_j = 25^\circ\text{C}$                                                                          |        | 3     | 6      | mA                   |
| Quiescent current change | $\Delta I_Q$            | $I_o = 5\text{mA}$ to $1.0\text{A}$                                                               |        | 0.05  | 0.5    | mA                   |
|                          |                         | $V_i = -17.5\text{V}$ to $-30.5\text{V}$                                                          |        | 0.1   | 1.0    | mA                   |
| Output voltage drift     | $\Delta V_o / \Delta T$ | $I_o = 5\text{mA}$                                                                                |        | -0.9  |        | mV/ $^\circ\text{C}$ |
| Output noise voltage     | $V_N$                   | $f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$                                   |        | 250   |        | $\mu\text{V}$        |
| Ripple rejection         | RR                      | $f = 120\text{Hz}$ , $V_i = -18.5\text{V}$ to $-28.5\text{V}$                                     | 54     | 60    |        | dB                   |
| Dropout voltage          | $V_o$                   | $I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$                                                    |        | 2     |        | V                    |
| Short circuit current    | $I_{sc}$                | $V_i = -35\text{V}$ , $T_a = 25^\circ\text{C}$                                                    |        | 300   |        | mA                   |
| peak current             | $I_{pk}$                | $T_j = 25^\circ\text{C}$                                                                          |        | 2.2   |        | A                    |

## UTC7918 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = -27\text{V}$ ,  $C_i = 2.2\mu\text{F}$ ,  $C_o = 1\mu\text{F}$ , unless otherwise specified)

| PARAMETER                | SYMBOL                  | TEST CONDITIONS                                                                                 | MIN    | TYP   | MAX    | UNIT                 |
|--------------------------|-------------------------|-------------------------------------------------------------------------------------------------|--------|-------|--------|----------------------|
| Output voltage           | $V_o$                   | $T_j = 25^\circ\text{C}$                                                                        | -17.28 | -18.0 | -18.72 | V                    |
|                          |                         | $5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$<br>$V_i = -21\text{V}$ to $-33\text{V}$ | -17.10 |       | -18.90 | V                    |
| Line regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $V_i = -21\text{V}$ to $-33\text{V}$                                 |        | 15    | 360    | mV                   |
| Load regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $V_i = -24\text{V}$ to $-30\text{V}$                                 |        | 8     | 180    | mV                   |
|                          |                         | $T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.5\text{A}$                                |        | 15    | 360    | mV                   |
| Quiescent current        | $I_Q$                   | $T_j = 25^\circ\text{C}$                                                                        |        | 3     | 6      | mA                   |
| Quiescent current change | $\Delta I_Q$            | $I_o = 5\text{mA}$ to $1.0\text{A}$                                                             |        |       | 0.5    | mA                   |
|                          |                         | $V_i = -21\text{V}$ to $-32\text{V}$                                                            |        |       | 1.0    | mA                   |
| Output voltage drift     | $\Delta V_o / \Delta T$ | $I_o = 5\text{mA}$                                                                              |        | -1    |        | mV/ $^\circ\text{C}$ |
| Output noise voltage     | $V_N$                   | $f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$                                 |        | 300   |        | $\mu\text{V}$        |
| Ripple rejection         | RR                      | $f = 120\text{Hz}$ , $V_i = -22\text{V}$ to $-32\text{V}$                                       | 54     | 60    |        | dB                   |
| Dropout voltage          | $V_o$                   | $I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$                                                  |        | 2     |        | V                    |
| Short circuit current    | $I_{sc}$                | $V_i = -35\text{V}$ , $T_a = 25^\circ\text{C}$                                                  |        | 300   |        | mA                   |
| peak current             | $I_{pk}$                | $T_j = 25^\circ\text{C}$                                                                        |        | 2.2   |        | A                    |

# UTC LM79XX LINEAR INTEGRATED CIRCUIT

## UTC7924 ELECTRICAL CHARACTERISTICS

(Refer to test circuits,  $0 < T_j < 125^\circ\text{C}$ ,  $I_o = 500\text{mA}$ ,  $V_i = -33\text{V}$ ,  $C_i = 2.2\mu\text{F}$ ,  $C_o = 1\mu\text{F}$ , unless otherwise specified)

| PARAMETER                | SYMBOL                  | TEST CONDITIONS                                                                                 | MIN    | TYP | MAX    | UNIT                 |
|--------------------------|-------------------------|-------------------------------------------------------------------------------------------------|--------|-----|--------|----------------------|
| Output voltage           | $V_o$                   | $T_j = 25^\circ\text{C}$                                                                        | -23.04 | -24 | -24.96 | V                    |
|                          |                         | $5.0\text{mA} < I_o < 1.0\text{A}$ , $P_o < 15\text{W}$<br>$V_i = -27\text{V}$ to $-38\text{V}$ | -22.80 |     | -25.20 | V                    |
| Line regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $V_i = -27\text{V}$ to $-38\text{V}$                                 |        | 15  | 480    | mV                   |
|                          |                         | $T_j = 25^\circ\text{C}$ , $V_i = -30\text{V}$ to $-36\text{V}$                                 |        | 8   | 240    | mV                   |
| Load regulation          | $\Delta V_o$            | $T_j = 25^\circ\text{C}$ , $I_o = 5.0\text{mA}$ to $1.5\text{A}$                                |        | 15  | 480    | mV                   |
|                          |                         | $T_j = 25^\circ\text{C}$ , $I_o = 250\text{mA}$ to $750\text{mA}$                               |        | 5.0 | 240    | mV                   |
| Quiescent current        | $I_Q$                   | $T_j = 25^\circ\text{C}$                                                                        |        | 3   | 6      | mA                   |
| Quiescent current change | $\Delta I_Q$            | $I_o = 5\text{mA}$ to $1.0\text{A}$                                                             |        |     | 0.5    | mA                   |
|                          |                         | $V_i = -27\text{V}$ to $-38\text{V}$                                                            |        |     | 1.0    | mA                   |
| Output voltage drift     | $\Delta V_o / \Delta T$ | $I_o = 5\text{mA}$                                                                              |        | -1  |        | mV/ $^\circ\text{C}$ |
| Output noise voltage     | $V_N$                   | $f = 10\text{Hz}$ to $100\text{kHz}$ , $T_a = 25^\circ\text{C}$                                 |        | 400 |        | $\mu\text{V}$        |
| Ripple rejection         | RR                      | $f = 120\text{Hz}$ , $V_i = -28\text{V}$ to $-38\text{V}$                                       | 54     | 60  |        | dB                   |
| Dropout voltage          | $V_o$                   | $I_o = 1.0\text{A}$ , $T_j = 25^\circ\text{C}$                                                  |        | 2   |        | V                    |
| Short circuit current    | $I_{sc}$                | $V_i = -35\text{V}$ , $T_a = 25^\circ\text{C}$                                                  |        | 300 |        | mA                   |
| peak current             | $I_{pk}$                | $T_j = 25^\circ\text{C}$                                                                        |        | 2.2 |        | A                    |

## APPLICATION CIRCUITS

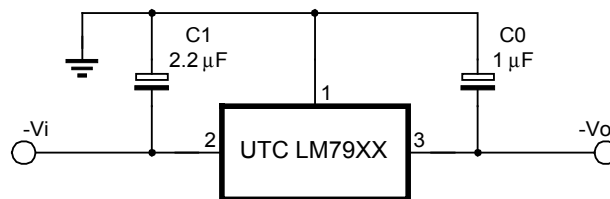


Fig.1 Fixed output regulator

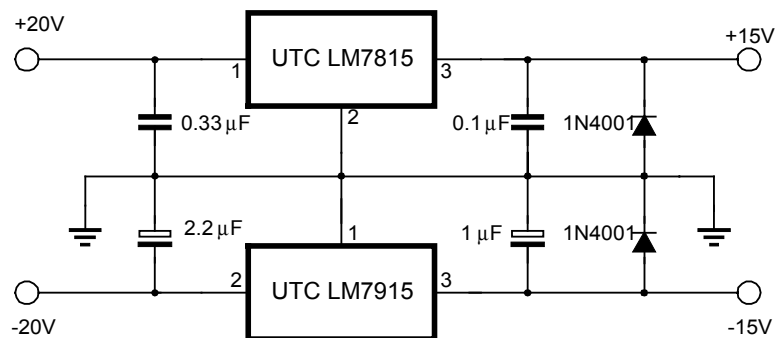


Fig.2 Split power supply(+15V,1A)

# UTCLM79XX LINEAR INTEGRATED CIRCUIT

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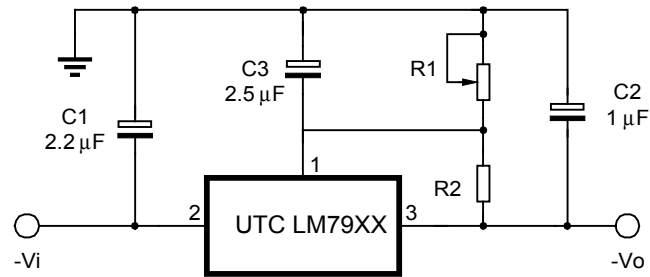


Fig.3 Circuit for increasing output voltage