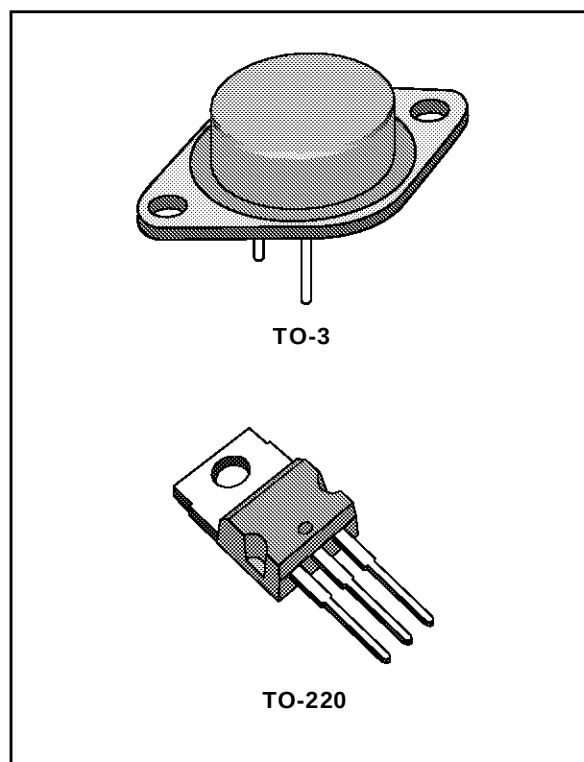


## 2A POSITIVE VOLTAGE REGULATORS

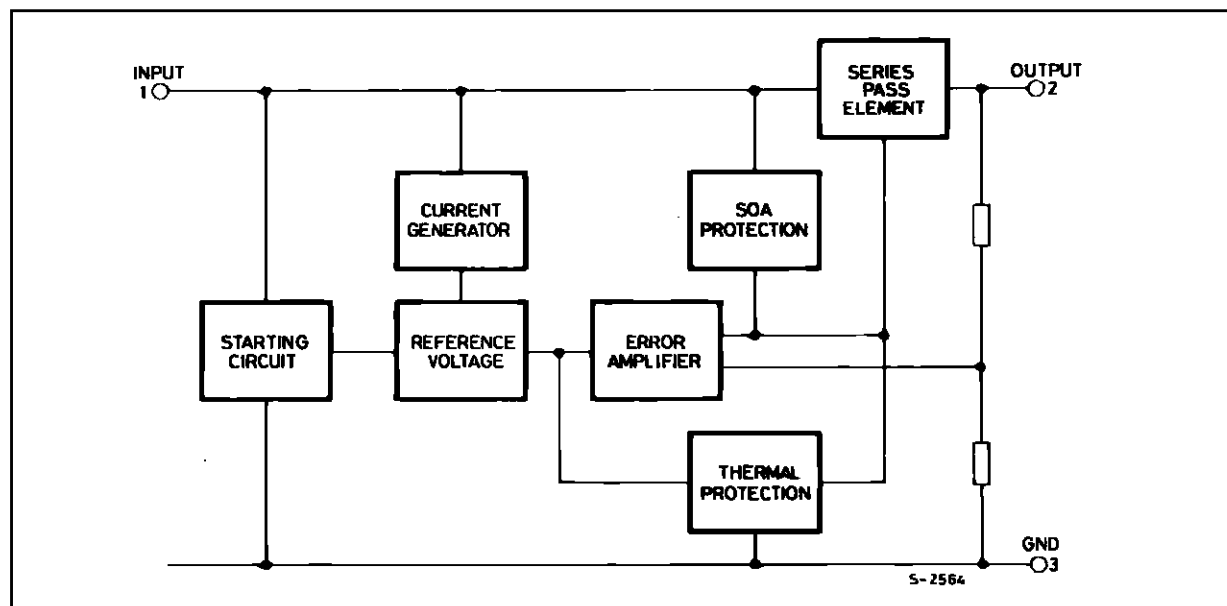
- OUTPUT CURRENT TO 2A
- OUTPUT VOLTAGES OF 5 ; 7.5 ; 9 ; 10 ; 12 ; 15 ; 18 ; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSISTOR SOA PROTECTION

### DESCRIPTION

The L78S00 series of three-terminal positive regulators is available in TO-220 and TO-3 packages and with several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 2A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.



### BLOCK DIAGRAM



## L78S00 SERIES

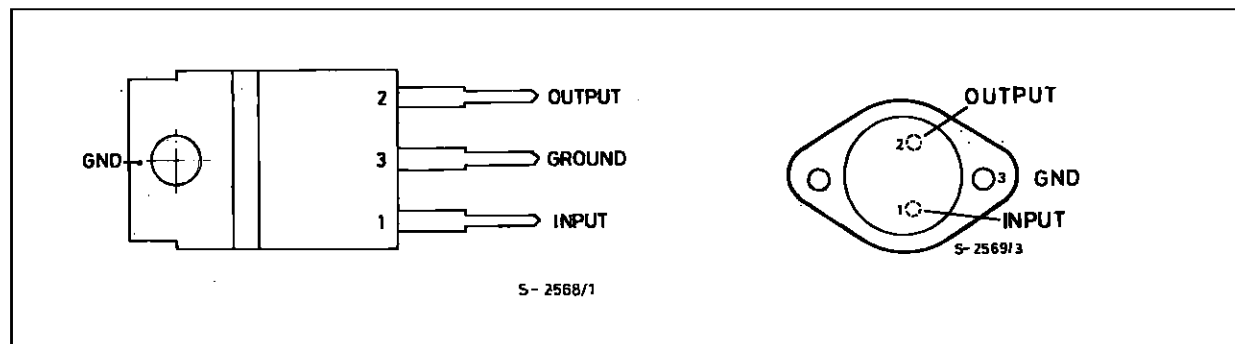
### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter                                                                    | Value              | Unit |
|-----------|------------------------------------------------------------------------------|--------------------|------|
| $V_i$     | DC Input Voltage (for $V_o = 5$ to 18V)<br>(for $V_o = 24$ V)                | 35                 | V    |
|           |                                                                              | 40                 | V    |
| $I_o$     | Output Current                                                               | Internally limited |      |
| $P_{tot}$ | Power Dissipation                                                            | Internally limited |      |
| $T_{stg}$ | Storage Temperature                                                          | - 65 to + 150      | °C   |
| $T_{op}$  | Operating Junction Temperature (for <b>L78S00</b> )<br>(for <b>L78S00C</b> ) | - 55 to + 150      | °C   |
|           |                                                                              | 0 to + 150         | °C   |

### THERMAL DATA

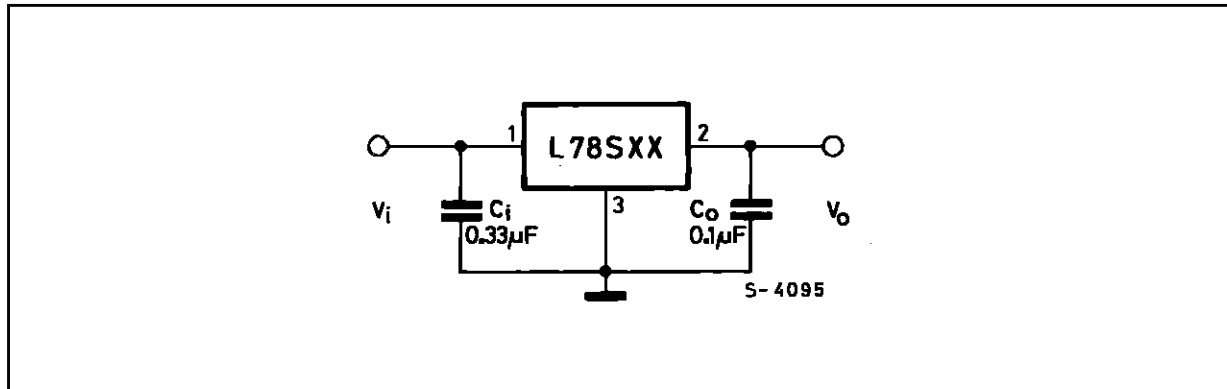
|                  |                                     | TO-220 | TO-3 |      |
|------------------|-------------------------------------|--------|------|------|
| $R_{th\ j-case}$ | Thermal Resistance Junction-case    | 3      | 4    | °C/W |
| $R_{th\ j-amb}$  | Thermal Resistance Junction-ambient | 50     | 35   | °C/W |

### CONNECTION DIAGRAMS AND ORDERING NUMBERS (top views)

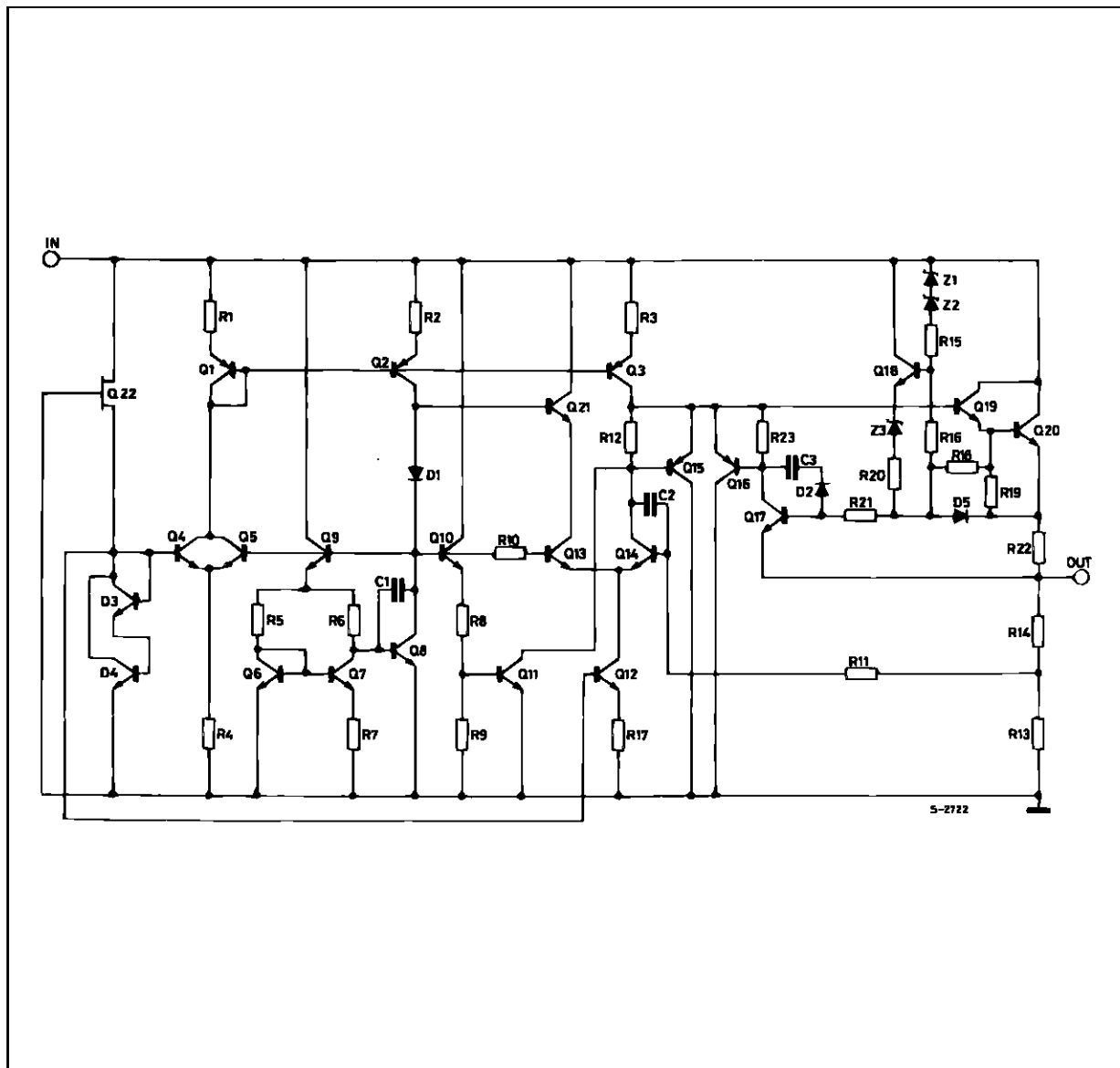


| Type    | TO-220   | TO-3     | Output Voltage |
|---------|----------|----------|----------------|
| L78S05  |          | L78S05T  | 5V             |
| L78S05C | L78S05CV | L78S05CT | 5V             |
| L78S75  |          | L78S75T  | 7.5V           |
| L78S75C | L78S75CV | L78S75CT | 7.5V           |
| L78S09  |          | L78S09T  | 9V             |
| L78S09C | L78S09CV | L78S09CT | 9V             |
| L78S10  |          | L78S10T  | 10V            |
| L78S10C | L78S10CV | L78S10CT | 10V            |
| L78S12  |          | L78S12T  | 12V            |
| L78S12C | L78S12CV | L78S12CT | 12V            |
| L78S15  |          | L78S15T  | 15V            |
| L78S15C | L78S15CV | L78S15CT | 15V            |
| L78S18  |          | L78S18T  | 18V            |
| L78S18C | L78S18CV | L78S18CT | 18V            |
| L78S24  |          | L78S24T  | 24V            |
| L78S24C | L78S24CV | L78S24CT | 24V            |

## APPLICATION CIRCUIT



## SCHEMATIC DIAGRAM



## L78S00 SERIES

### TEST CIRCUITS

Figure 1 : DC Parameters.

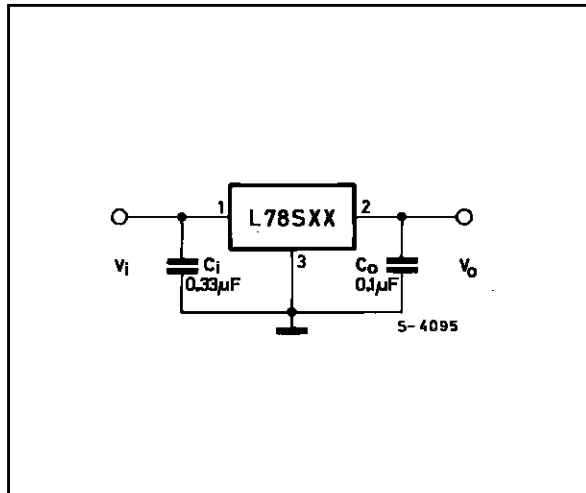


Figure 2 : Load Regulation.

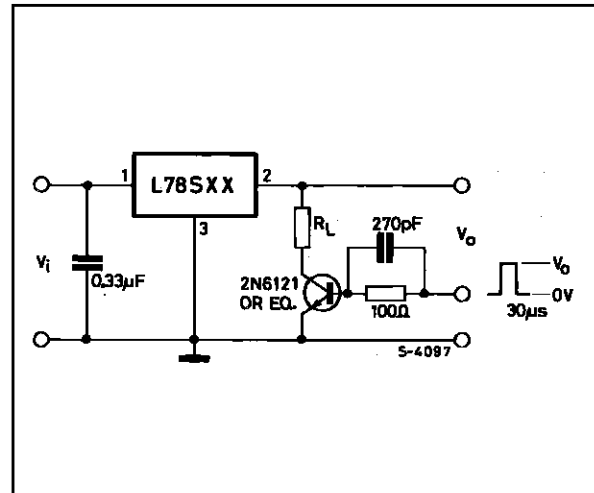
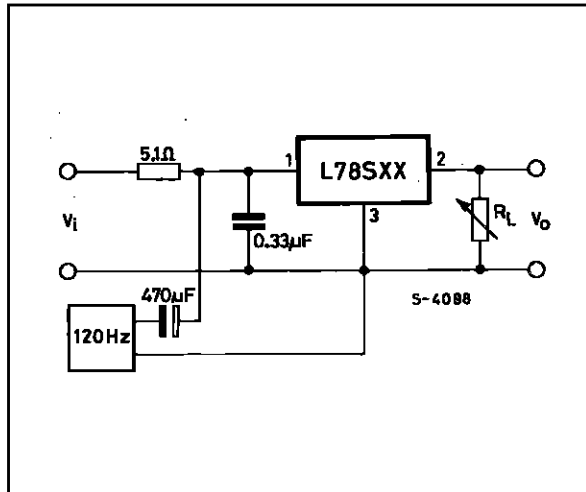


Figure 3 : Ripple Rejection.



**ELECTRICAL CHARACTERISTICS FOR L78S05** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 10\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                       | Min. | Typ. | Max.      | Unit                   |
|-------------------------------|----------------------------|-----------------------------------------------------------------------|------|------|-----------|------------------------|
| $V_o$                         | Output Voltage             |                                                                       | 4.8  | 5    | 5.2       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 7\text{ V}$                                 | 4.75 | 5    | 5.25      | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 7\text{ to }25\text{ V}$<br>$V_i = 8\text{ to }25\text{ V}$    |      |      | 100<br>50 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }2\text{ A}$                                    |      |      | 100       | mV                     |
| $I_d$                         | Quiescent Current          |                                                                       |      |      | 8         | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                    |      |      | 0.5       | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 7\text{ to }25\text{ V}$                  |      |      | 1.3       | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = -55\text{ to }150\text{ }^{\circ}\text{C}$ |      | -1.1 |           | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                    |      | 40   |           | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                   | 60   |      |           | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                               | 8    |      |           | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                     |      | 17   |           | $\text{m}\Omega$       |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                   |      | 500  |           | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                       |      | 3    |           | A                      |

**ELECTRICAL CHARACTERISTICS FOR L78S75** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 12.5\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                         | Min. | Typ. | Max.      | Unit                   |
|-------------------------------|----------------------------|-------------------------------------------------------------------------|------|------|-----------|------------------------|
| $V_o$                         | Output Voltage             |                                                                         | 7.15 | 7.5  | 7.9       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 9.5\text{ V}$                                 | 7.1  | 7.5  | 7.95      | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 9.5\text{ to }25\text{ V}$<br>$V_i = 10.5\text{ to }20\text{ V}$ |      |      | 120<br>60 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }2\text{ A}$                                      |      |      | 120       | mV                     |
| $I_d$                         | Quiescent Current          |                                                                         |      |      | 8         | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                      |      |      | 0.5       | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 9.5\text{ to }25\text{ V}$                  |      |      | 1.3       | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = -55\text{ to }150\text{ }^{\circ}\text{C}$   |      | -0.8 |           | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                      |      | 52   |           | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                     | 54   |      |           | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                 | 10.5 |      |           | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                       |      | 16   |           | $\text{m}\Omega$       |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                     |      | 500  |           | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                         |      | 3    |           | A                      |

## L78S00 SERIES

**ELECTRICAL CHARACTERISTICS FOR L78S09** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  $V_i = 14\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                       | Min. | Typ. | Max.      | Unit                         |
|-------------------------------|----------------------------|-----------------------------------------------------------------------|------|------|-----------|------------------------------|
| $V_o$                         | Output Voltage             |                                                                       | 8.65 | 9    | 9.35      | V                            |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 11\text{ V}$                                | 8.6  | 9    | 9.4       | V                            |
| $\Delta V_o$                  | Line Regulation            | $V_i = 11\text{ to }25\text{ V}$<br>$V_i = 11\text{ to }20\text{ V}$  |      |      | 130<br>65 | mV<br>mV                     |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }2\text{ A}$                                    |      |      | 130       | mV                           |
| $I_d$                         | Quiescent Current          |                                                                       |      |      | 8         | mA                           |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                    |      |      | 0.5       | mA                           |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 11\text{ to }25\text{ V}$                 |      |      | 1.3       | mA                           |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = -55\text{ to }150\text{ }^{\circ}\text{C}$ |      | -1   |           | $\text{mV}/^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                    |      | 60   |           | $\mu\text{V}$                |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                   | 53   |      |           | dB                           |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                               | 12   |      |           | V                            |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                     |      | 17   |           | $\text{m}\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                   |      | 500  |           | mA                           |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                       |      | 3    |           | A                            |

**ELECTRICAL CHARACTERISTICS FOR L78S10** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  $V_i = 15\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                        | Min. | Typ. | Max.       | Unit                         |
|-------------------------------|----------------------------|------------------------------------------------------------------------|------|------|------------|------------------------------|
| $V_o$                         | Output Voltage             |                                                                        | 9.5  | 10   | 10.5       | V                            |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 12.5\text{ V}$                               | 9.4  | 10   | 10.6       | V                            |
| $\Delta V_o$                  | Line Regulation            | $V_i = 12.5\text{ to }30\text{ V}$<br>$V_i = 14\text{ to }22\text{ V}$ |      |      | 200<br>100 | mV<br>mV                     |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }2\text{ A}$                                     |      |      | 150        | mV                           |
| $I_d$                         | Quiescent Current          |                                                                        |      |      | 8          | mA                           |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                     |      |      | 0.5        | mA                           |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 12.5\text{ to }30\text{ V}$                |      |      | 1          | mA                           |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = -55\text{ to }150\text{ }^{\circ}\text{C}$  |      | -1   |            | $\text{mV}/^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                     |      | 65   |            | $\mu\text{V}$                |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                    | 53   |      |            | dB                           |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                | 13   |      |            | V                            |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                      |      | 17   |            | $\text{m}\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                    |      | 500  |            | mA                           |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                        |      | 3    |            | A                            |

**ELECTRICAL CHARACTERISTICS FOR L78S12** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 19\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                        | Min. | Typ. | Max.       | Unit                   |
|-------------------------------|----------------------------|------------------------------------------------------------------------|------|------|------------|------------------------|
| $V_o$                         | Output Voltage             |                                                                        | 11.5 | 12   | 12.5       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 14.5\text{ V}$                               | 11.4 | 12   | 12.6       | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 14.5\text{ to }30\text{ V}$<br>$V_i = 16\text{ to }22\text{ V}$ |      |      | 240<br>120 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }2\text{ A}$                                     |      |      | 160        | mV                     |
| $I_d$                         | Quiescent Current          |                                                                        |      |      | 8          | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                     |      |      | 0.5        | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 14.5\text{ to }30\text{ V}$                |      |      | 1          | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = -55\text{ to }150\text{ }^{\circ}\text{C}$  |      | -1   |            | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                     |      | 75   |            | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                    | 53   |      |            | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                | 15   |      |            | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                      |      | 18   |            | $\text{m}\Omega$       |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                    |      | 500  |            | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                        |      | 3    |            | A                      |

**ELECTRICAL CHARACTERISTICS FOR L78S15** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 23\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                        | Min.  | Typ. | Max.       | Unit                   |
|-------------------------------|----------------------------|------------------------------------------------------------------------|-------|------|------------|------------------------|
| $V_o$                         | Output Voltage             |                                                                        | 14.4  | 15   | 15.6       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 17.5\text{ V}$                               | 14.25 | 15   | 15.75      | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 17.5\text{ to }30\text{ V}$<br>$V_i = 20\text{ to }26\text{ V}$ |       |      | 300<br>150 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }2\text{ A}$                                     |       |      | 180        | mV                     |
| $I_d$                         | Quiescent Current          |                                                                        |       |      | 8          | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                     |       |      | 0.5        | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 17.5\text{ to }30\text{ V}$                |       |      | 1          | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = -55\text{ to }150\text{ }^{\circ}\text{C}$  |       | -1   |            | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                     |       | 90   |            | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                    | 52    |      |            | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                | 18    |      |            | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                      |       | 19   |            | $\text{m}\Omega$       |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                    |       | 500  |            | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                        |       | 3    |            | A                      |

## L78S00 SERIES

**ELECTRICAL CHARACTERISTICS FOR L78S18** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  $V_i = 26\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                        | Min. | Typ. | Max.       | Unit                         |
|-------------------------------|----------------------------|------------------------------------------------------------------------|------|------|------------|------------------------------|
| $V_o$                         | Output Voltage             |                                                                        | 17.1 | 18   | 18.9       | V                            |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 20.5\text{ V}$                               | 17   | 18   | 19         | V                            |
| $\Delta V_o$                  | Line Regulation            | $V_i = 20.5\text{ to }30\text{ V}$<br>$V_i = 22\text{ to }28\text{ V}$ |      |      | 360<br>180 | mV<br>mV                     |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }2\text{ A}$                                     |      |      | 200        | mV                           |
| $I_d$                         | Quiescent Current          |                                                                        |      |      | 8          | mA                           |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                     |      |      | 0.5        | mA                           |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 22\text{ to }33\text{ V}$                  |      |      | 1          | mA                           |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = -55\text{ to }150\text{ }^{\circ}\text{C}$  |      | -1   |            | $\text{mV}/^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                     |      | 110  |            | $\mu\text{V}$                |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                    | 49   |      |            | dB                           |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                | 21   |      |            | V                            |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                      |      | 22   |            | $\text{m}\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                    |      | 500  |            | mA                           |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                        |      | 3    |            | A                            |

**ELECTRICAL CHARACTERISTICS FOR L78S24** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  $V_i = 33\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                       | Min. | Typ. | Max.       | Unit                         |
|-------------------------------|----------------------------|-----------------------------------------------------------------------|------|------|------------|------------------------------|
| $V_o$                         | Output Voltage             |                                                                       | 23   | 24   | 25         | V                            |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 27\text{ V}$                                | 22.8 | 24   | 25.2       | V                            |
| $\Delta V_o$                  | Line Regulation            | $V_i = 27\text{ to }38\text{ V}$<br>$V_i = 30\text{ to }36\text{ V}$  |      |      | 480<br>240 | mV<br>mV                     |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }2\text{ A}$                                    |      |      | 250        | mV                           |
| $I_d$                         | Quiescent Current          |                                                                       |      |      | 8          | mA                           |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                    |      |      | 0.5        | mA                           |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 8\text{ to }25\text{ V}$                  |      |      | 1          | mA                           |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = -55\text{ to }150\text{ }^{\circ}\text{C}$ |      | -1.5 |            | $\text{mV}/^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                    |      | 170  |            | $\mu\text{V}$                |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                   | 48   |      |            | dB                           |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                               | 27   |      |            | V                            |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                     |      | 23   |            | $\text{m}\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                   |      | 500  |            | mA                           |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                       |      | 3    |            | A                            |

**ELECTRICAL CHARACTERISTICS FOR L78S05C** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 10\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                    | Min. | Typ. | Max.      | Unit                   |
|-------------------------------|----------------------------|--------------------------------------------------------------------|------|------|-----------|------------------------|
| $V_o$                         | Output Voltage             |                                                                    | 4.8  | 5    | 5.2       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 7\text{ V}$                              | 4.75 | 5    | 5.25      | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 7\text{ to }25\text{ V}$<br>$V_i = 8\text{ to }12\text{ V}$ |      |      | 100<br>50 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }1.5\text{ A}$<br>$I_o = 2\text{ A}$         |      | 80   | 100       | mV                     |
| $I_d$                         | Quiescent Current          |                                                                    |      |      | 8         | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                 |      |      | 0.5       | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 7\text{ to }25\text{ V}$               |      |      | 1.3       | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = 0\text{ to }70\text{ }^{\circ}\text{C}$ |      | -1.1 |           | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                 |      | 40   |           | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                | 54   |      |           | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                            | 8    |      |           | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                  |      | 17   |           | m $\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                |      | 500  |           | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                    |      | 3    |           | A                      |

**ELECTRICAL CHARACTERISTICS FOR L78S75C** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 12.5\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                         | Min. | Typ. | Max.      | Unit                   |
|-------------------------------|----------------------------|-------------------------------------------------------------------------|------|------|-----------|------------------------|
| $V_o$                         | Output Voltage             |                                                                         | 7.15 | 7.5  | 7.9       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 9.5\text{ V}$                                 | 7.1  | 7.5  | 7.95      | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 9.5\text{ to }25\text{ V}$<br>$V_i = 10.5\text{ to }20\text{ V}$ |      |      | 120<br>60 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }1.5\text{ A}$<br>$I_o = 2\text{ A}$              |      | 100  | 140       | mV                     |
| $I_d$                         | Quiescent Current          |                                                                         |      |      | 8         | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                      |      |      | 0.5       | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 9.5\text{ to }25\text{ V}$                  |      |      | 1.3       | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = 0\text{ to }70\text{ }^{\circ}\text{C}$      |      | -0.8 |           | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                      |      | 52   |           | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                     | 48   |      |           | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                 | 10.5 |      |           | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                       |      | 16   |           | m $\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                     |      | 500  |           | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                         |      | 3    |           | A                      |

## L78S00 SERIES

**ELECTRICAL CHARACTERISTICS FOR L78S09C** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  $V_i = 14\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                      | Min. | Typ. | Max.      | Unit                   |
|-------------------------------|----------------------------|----------------------------------------------------------------------|------|------|-----------|------------------------|
| $V_o$                         | Output Voltage             |                                                                      | 8.65 | 9    | 9.35      | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 11\text{ V}$                               | 8.6  | 9    | 9.4       | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 11\text{ to }25\text{ V}$<br>$V_i = 11\text{ to }20\text{ V}$ |      |      | 130<br>65 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }1.5\text{ A}$<br>$I_o = 2\text{ A}$           |      | 100  | 170       | mV                     |
| $I_d$                         | Quiescent Current          |                                                                      |      |      | 8         | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                   |      |      | 0.5       | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 11\text{ to }25\text{ V}$                |      |      | 1.3       | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = 0\text{ to }70\text{ }^{\circ}\text{C}$   |      | -1   |           | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                   |      | 60   |           | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                  | 47   |      |           | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                              | 12   |      |           | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                    |      | 17   |           | m $\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                  |      | 500  |           | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                      |      | 3    |           | A                      |

**ELECTRICAL CHARACTERISTICS FOR L78S10C** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  $V_i = 15\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                        | Min. | Typ. | Max.       | Unit                   |
|-------------------------------|----------------------------|------------------------------------------------------------------------|------|------|------------|------------------------|
| $V_o$                         | Output Voltage             |                                                                        | 9.5  | 10   | 10.5       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 12.5\text{ V}$                               | 9.4  | 10   | 10.6       | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 12.5\text{ to }30\text{ V}$<br>$V_i = 14\text{ to }22\text{ V}$ |      |      | 200<br>100 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }1.5\text{ A}$<br>$I_o = 2\text{ A}$             |      | 150  | 240        | mV                     |
| $I_d$                         | Quiescent Current          |                                                                        |      |      | 8          | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                     |      |      | 0.5        | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 12.5\text{ to }30\text{ V}$                |      |      | 1          | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = 0\text{ to }70\text{ }^{\circ}\text{C}$     |      | -1   |            | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                     |      | 65   |            | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                    | 47   |      |            | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                | 13   |      |            | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                      |      | 17   |            | m $\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                    |      | 500  |            | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                        |      | 3    |            | A                      |

**ELECTRICAL CHARACTERISTICS FOR L78S12C** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 19\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                        | Min. | Typ. | Max.       | Unit                   |
|-------------------------------|----------------------------|------------------------------------------------------------------------|------|------|------------|------------------------|
| $V_o$                         | Output Voltage             |                                                                        | 11.5 | 12   | 12.5       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 14.5\text{ V}$                               | 11.4 | 12   | 12.6       | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 14.5\text{ to }30\text{ V}$<br>$V_i = 16\text{ to }22\text{ V}$ |      |      | 240<br>120 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }1.5\text{ A}$<br>$I_o = 2\text{ A}$             |      | 150  | 240        | mV                     |
| $I_d$                         | Quiescent Current          |                                                                        |      |      | 8          | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                     |      |      | 0.5        | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 14.5\text{ to }30\text{ V}$                |      |      | 1          | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = 0\text{ to }70\text{ }^{\circ}\text{C}$     |      | -1   |            | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                     |      | 75   |            | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                    | 47   |      |            | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                | 15   |      |            | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                      |      | 18   |            | m $\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                    |      | 500  |            | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                        |      | 3    |            | A                      |

**ELECTRICAL CHARACTERISTICS FOR L78S15C** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 23\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                        | Min.  | Typ. | Max.       | Unit                   |
|-------------------------------|----------------------------|------------------------------------------------------------------------|-------|------|------------|------------------------|
| $V_o$                         | Output Voltage             |                                                                        | 14.4  | 15   | 15.6       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 17.5\text{ V}$                               | 14.25 | 15   | 15.75      | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 17.5\text{ to }30\text{ V}$<br>$V_i = 20\text{ to }26\text{ V}$ |       |      | 300<br>150 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }1.5\text{ A}$<br>$I_o = 2\text{ A}$             |       | 150  | 300        | mV                     |
| $I_d$                         | Quiescent Current          |                                                                        |       |      | 8          | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                     |       |      | 0.5        | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 17.5\text{ to }30\text{ V}$                |       |      | 1          | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = 0\text{ to }70\text{ }^{\circ}\text{C}$     |       | -1   |            | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                     |       | 90   |            | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                    | 46    |      |            | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                | 18    |      |            | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                      |       | 19   |            | m $\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                    |       | 500  |            | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                        |       | 3    |            | A                      |

## L78S00 SERIES

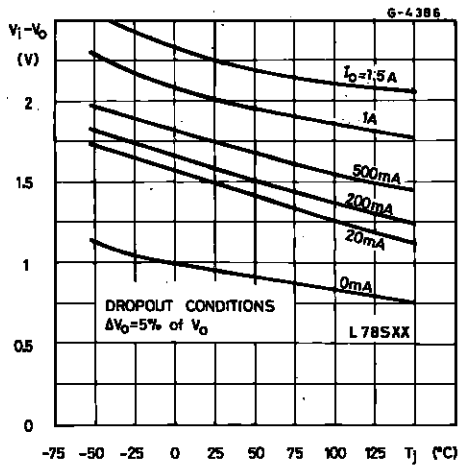
**ELECTRICAL CHARACTERISTICS FOR L78S18C** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 26\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                        | Min. | Typ. | Max.       | Unit                   |
|-------------------------------|----------------------------|------------------------------------------------------------------------|------|------|------------|------------------------|
| $V_o$                         | Output Voltage             |                                                                        | 17.1 | 18   | 18.9       | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 20.5\text{ V}$                               | 17   | 18   | 19         | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 20.5\text{ to }30\text{ V}$<br>$V_i = 22\text{ to }28\text{ V}$ |      |      | 360<br>180 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }1.5\text{ A}$<br>$I_o = 2\text{ A}$             |      | 200  | 360        | mV                     |
| $I_d$                         | Quiescent Current          |                                                                        |      |      | 8          | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                     |      |      | 0.5        | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 20.5\text{ to }30\text{ V}$                |      |      | 1          | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = 0\text{ to }70\text{ }^{\circ}\text{C}$     |      | -1   |            | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                     |      | 110  |            | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                    | 43   |      |            | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                                | 21   |      |            | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                      |      | 22   |            | m $\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                    |      | 500  |            | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                        |      | 3    |            | A                      |

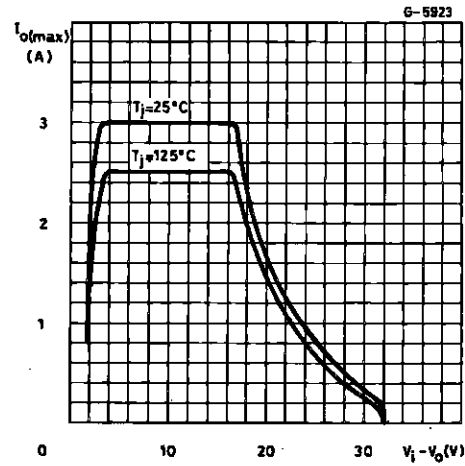
**ELECTRICAL CHARACTERISTICS FOR L78S24C** (refer to the test circuits,  $T_j = 25\text{ }^{\circ}\text{C}$ ,  
 $V_i = 33\text{V}$ ,  $I_o = 500\text{ mA}$  unless otherwise specified)

| Symbol                        | Parameter                  | Test Conditions                                                      | Min. | Typ. | Max.       | Unit                   |
|-------------------------------|----------------------------|----------------------------------------------------------------------|------|------|------------|------------------------|
| $V_o$                         | Output Voltage             |                                                                      | 23   | 24   | 25         | V                      |
| $V_o$                         | Output Voltage             | $I_o = 1\text{ A}$ $V_i = 27\text{ V}$                               | 22.8 | 24   | 25.2       | V                      |
| $\Delta V_o$                  | Line Regulation            | $V_i = 27\text{ to }38\text{ V}$<br>$V_i = 30\text{ to }36\text{ V}$ |      |      | 480<br>240 | mV<br>mV               |
| $\Delta V_o$                  | Load Regulation            | $I_o = 20\text{ mA to }1.5\text{ A}$<br>$I_o = 2\text{ A}$           |      | 300  | 480        | mV                     |
| $I_d$                         | Quiescent Current          |                                                                      |      |      | 8          | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA to }1\text{ A}$                                   |      |      | 0.5        | mA                     |
| $\Delta I_d$                  | Quiescent Current Change   | $I_o = 20\text{ mA}$ $V_i = 27\text{ to }38\text{ V}$                |      |      | 1          | mA                     |
| $\frac{\Delta V_o}{\Delta T}$ | Output Voltage Drift       | $I_o = 5\text{ mA}$ $T_j = 0\text{ to }70\text{ }^{\circ}\text{C}$   |      | -1.5 |            | mV/ $^{\circ}\text{C}$ |
| $e_N$                         | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$                                   |      | 170  |            | $\mu\text{V}$          |
| SVR                           | Supply Voltage Rejection   | $f = 120\text{ Hz}$                                                  | 42   |      |            | dB                     |
| $V_i$                         | Operating Input Voltage    | $I_o \leq 1.5\text{ A}$                                              | 27   |      |            | V                      |
| $R_o$                         | Output Resistance          | $f = 1\text{KHz}$                                                    |      | 28   |            | m $\Omega$             |
| $I_{sc}$                      | Short Circuit Current      | $V_i = 27\text{ V}$                                                  |      | 500  |            | mA                     |
| $I_{scp}$                     | Short Circuit Peak Current |                                                                      |      | 3    |            | A                      |

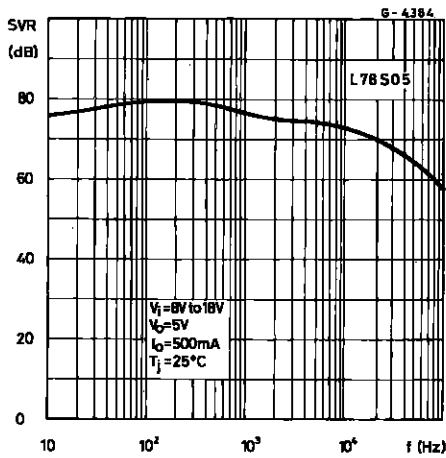
**Figure 4 :** Dropout Voltage vs. Junction Temperature.



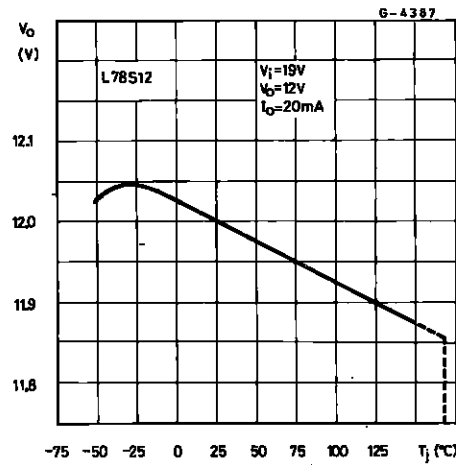
**Figure 5 :** Peak Output Current vs. Input/Output Differential Voltage.



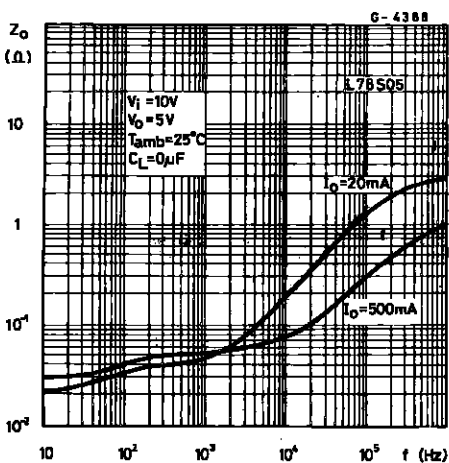
**Figure 6 :** Supply Voltage Rejection vs. Frequency.



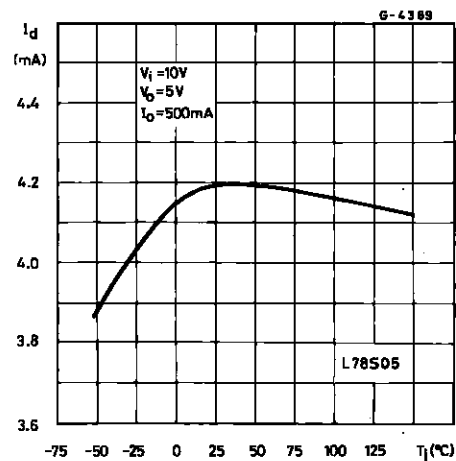
**Figure 7 :** Output Voltage vs. Junction Temperature.



**Figure 8 :** Output Impedance vs. Frequency.



**Figure 9 :** Quiescent Current vs. Junction Temperature.



## L78S00 SERIES

Figure 10 : Load Transient Response.

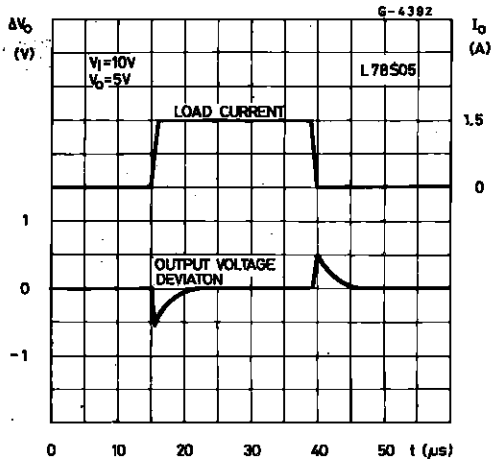


Figure 11 : Line Transient Response.

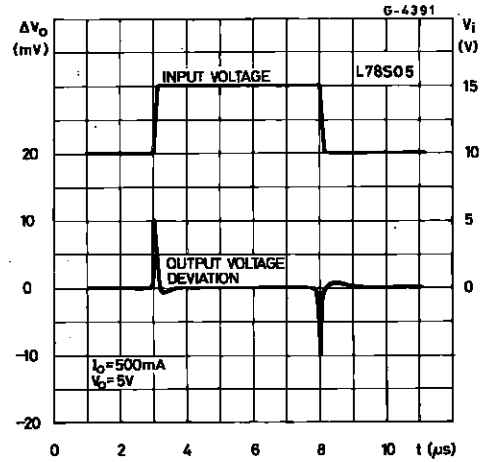


Figure 12 : Quiescent Current vs. Input Voltage.

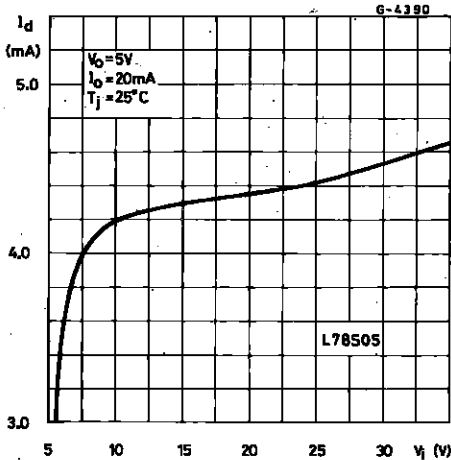


Figure 13 : Fixed Output Regulator.

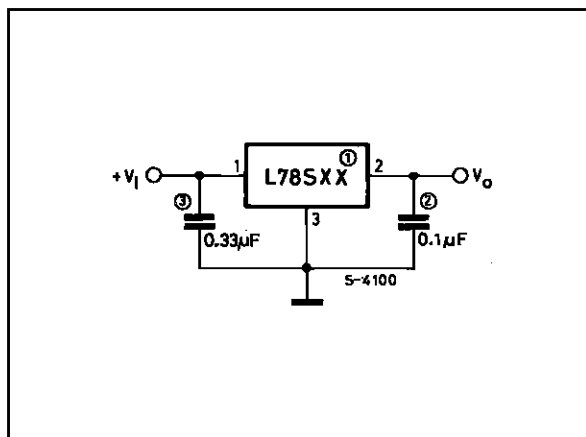
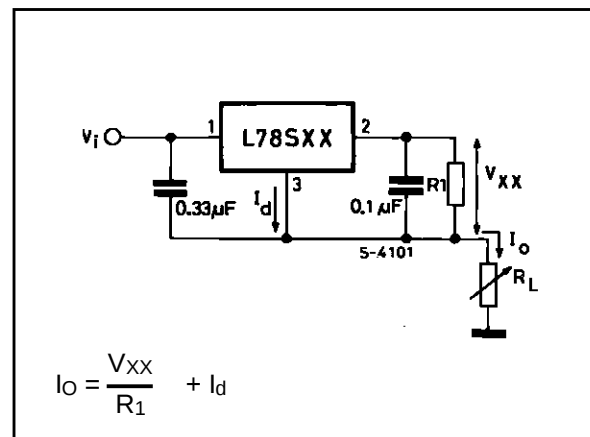
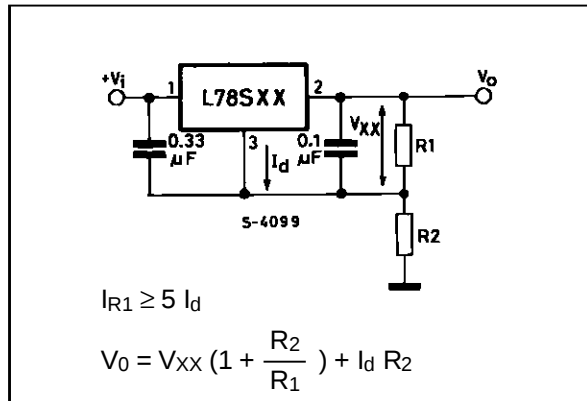


Figure 14 : Constant Current Regulator.

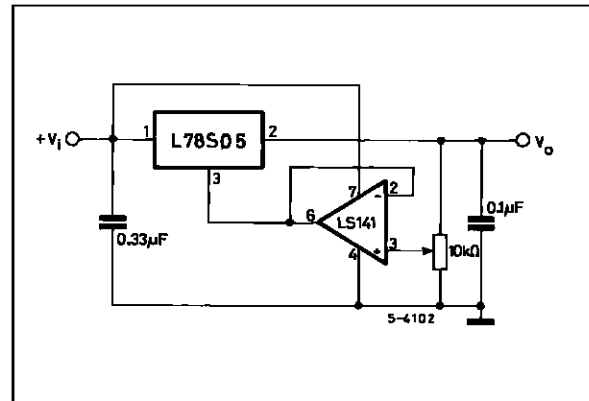


- Notes :
1. To specify an output voltage, substitute voltage value for "XX".
  2. Although no output capacitor is needed for stability, it does improve transient response.
  3. Required if regulator is located an appreciable distance from power supply filter.

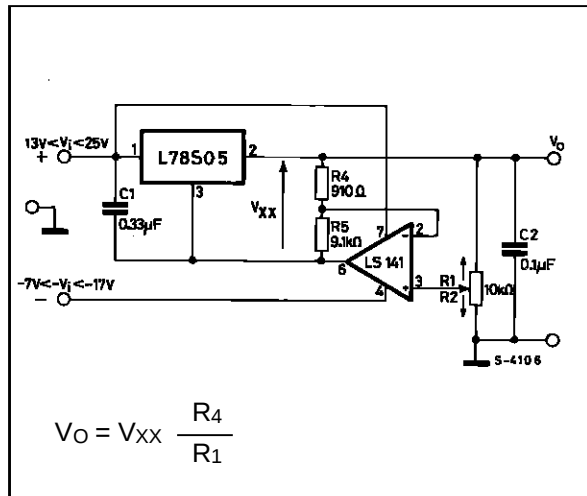
**Figure 15 :** Circuit for Increasing Output Voltage.



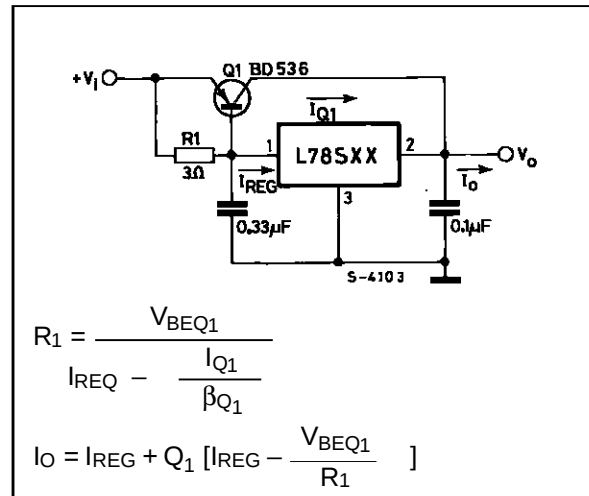
**Figure 16 :** Adjustable Output Regulator (7 to 30V).



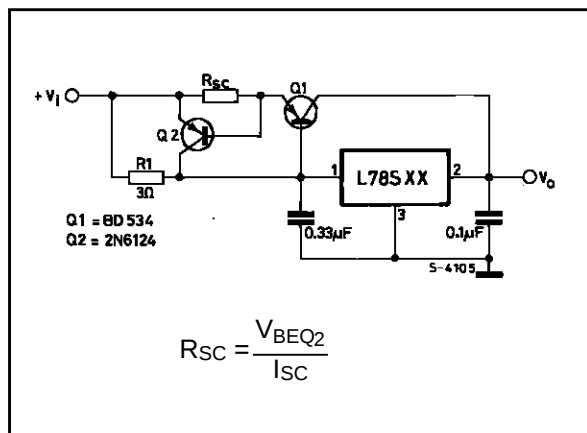
**Figure 17 :** 0.5 to 10V Regulator.



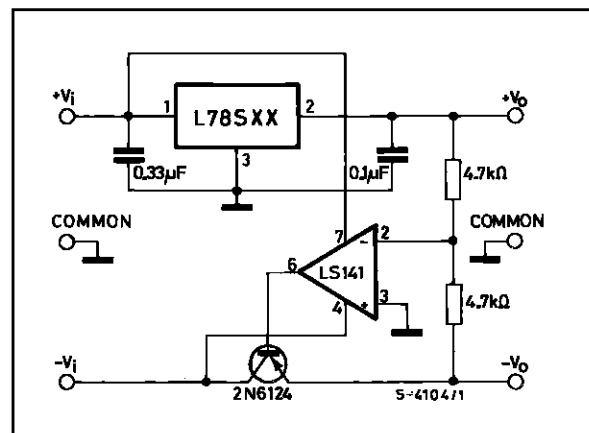
**Figure 18 :** High Current Voltage Regulator.



**Figure 19 :** High Output Current with Short Circuit Protection.

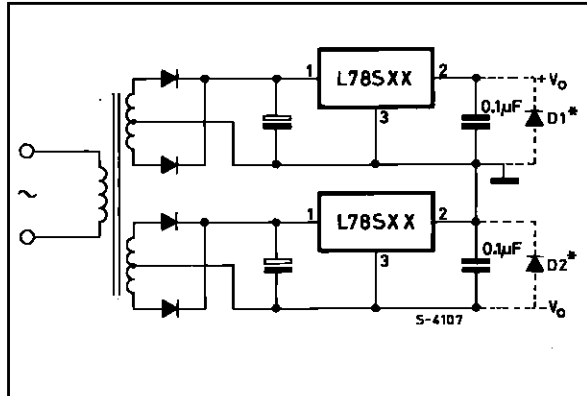


**Figure 20 :** Tracking Voltage Regulator.



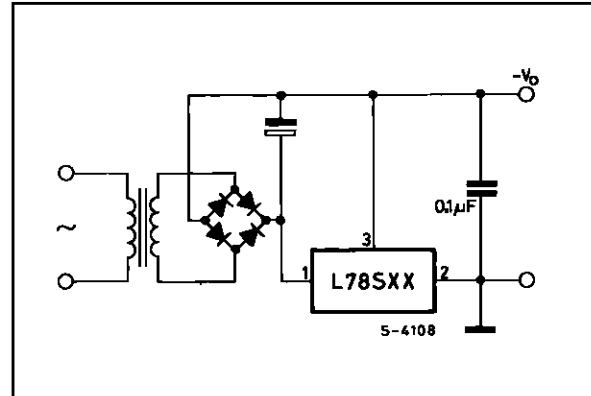
## L78S00 SERIES

**Figure 21 : Positive and Negative Regulator.**

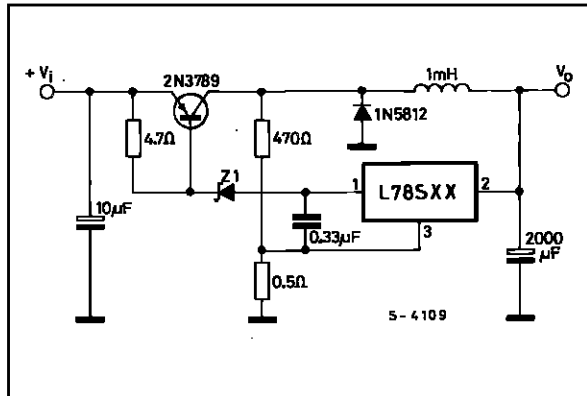


(\*) D<sub>1</sub> and D<sub>2</sub> are necessary if the load is connected between + V<sub>o</sub> and - V<sub>o</sub>.

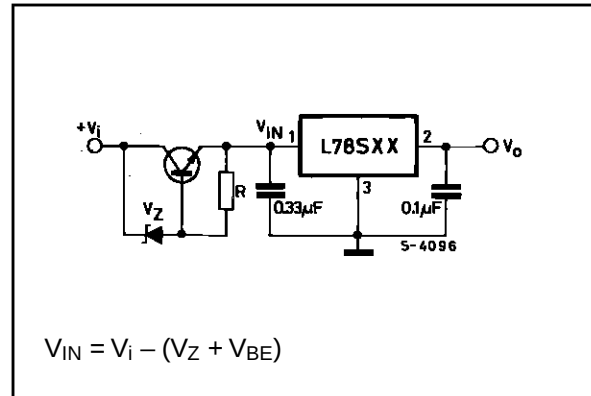
**Figure 22 : Negative Output Voltage Circuit.**



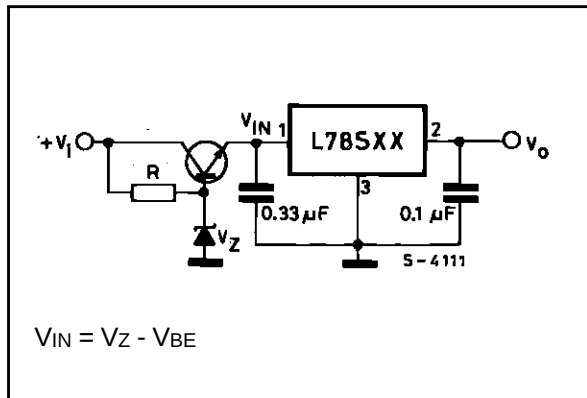
**Figure 23 : Switching Regulator.**



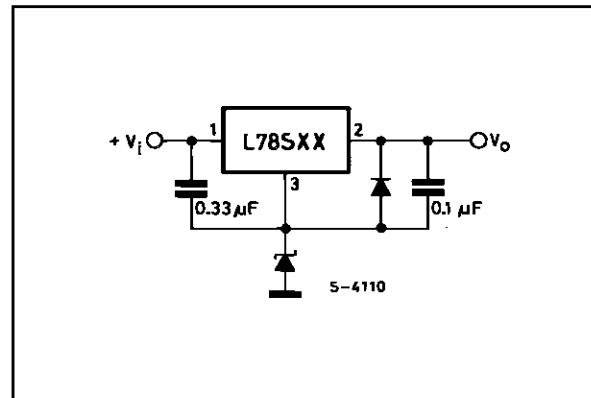
**Figure 24 : High Input Voltage Circuit.**



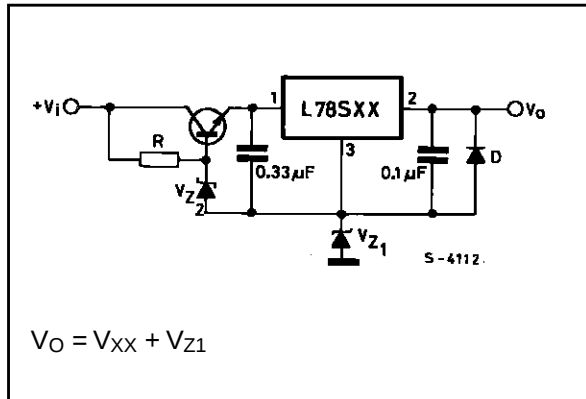
**Figure 25 : High Input Voltage Circuit.**



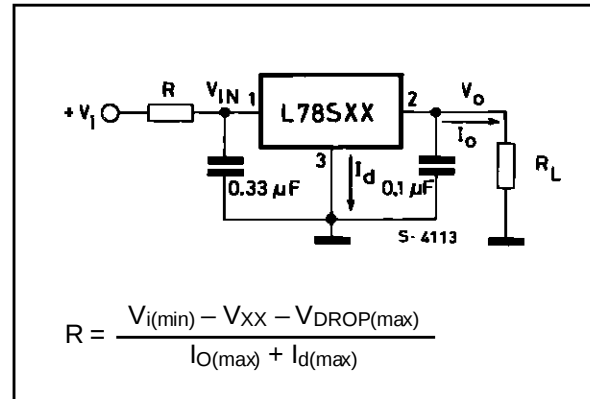
**Figure 26 : High Output Voltage Regulator.**



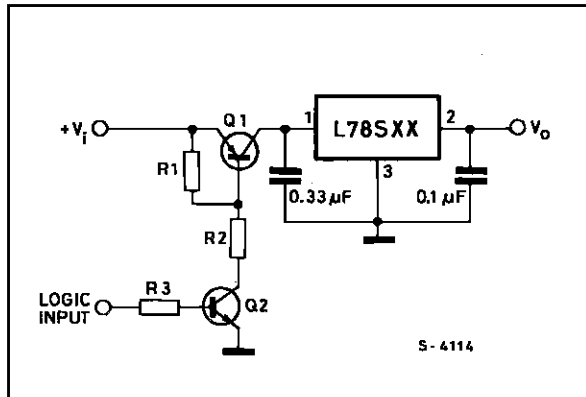
**Figure 27 :** High Input and Output Voltage.



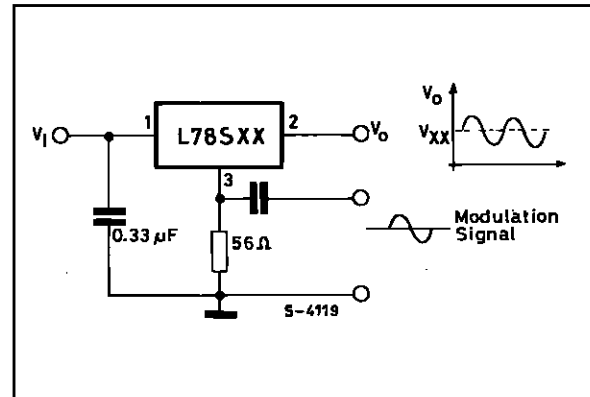
**Figure 28 :** Reducing Power Dissipation with Dropping Resistor.



**Figure 29 :** Remote Shutdown.

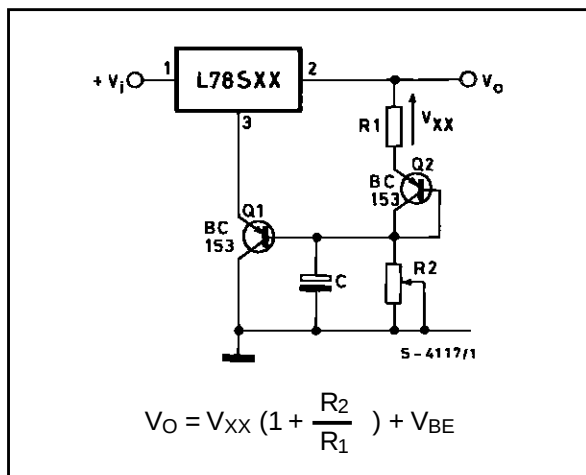


**Figure 30 :** Power AM Modulator (unity voltage gain,  $I_O \leq 1A$ ).



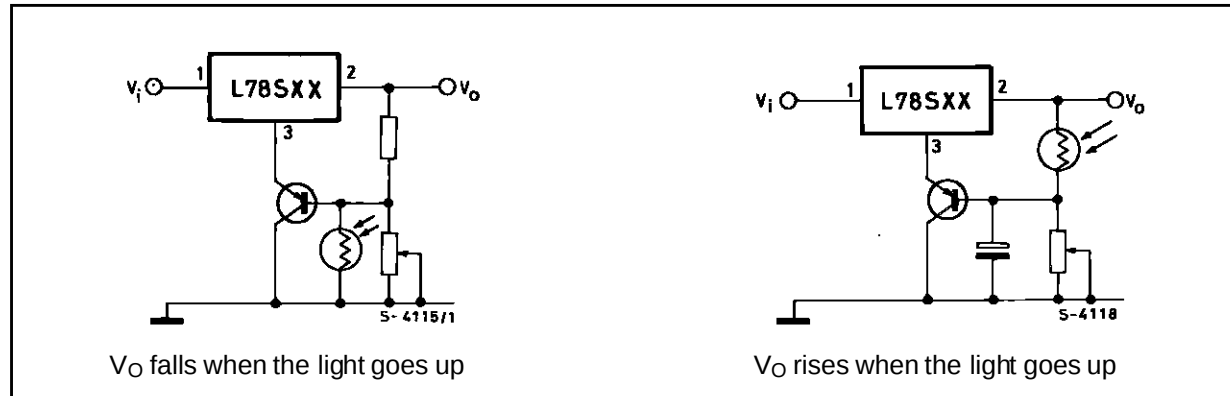
**Note :** The circuit performs well up to 100KHz.

**Figure 31 :** Adjustable Output Voltage with Temperature Compensation.

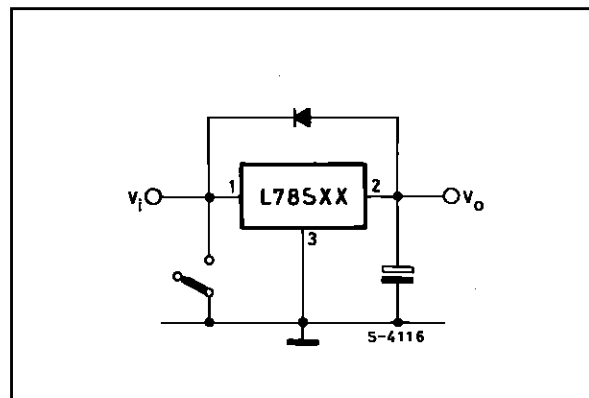


**Note :**  $Q_2$  is connected as a diode in order to compensate the variation of the  $Q_1$   $V_{BE}$  with the temperature. C allows a slow rise-time of the  $V_O$

**Figure 32 :** Light Controllers ( $V_{O\min} = V_{XX} + V_{BE}$ ).



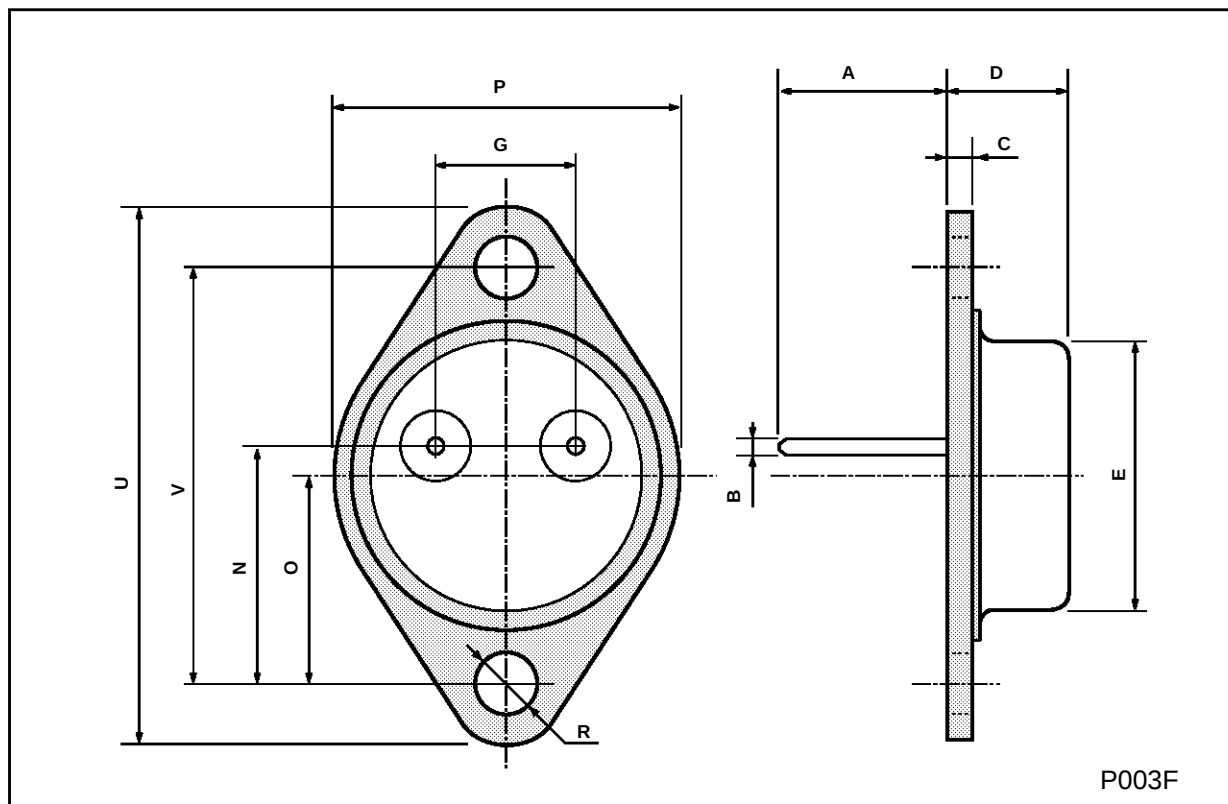
**Figure 33 :** Protection against Input Short-circuit with High Capacitance Loads.



Applications with high capacitance loads and an output voltage greater than 6 volts need an external diode (see fig. 33) to protect the device against input short circuit. In this case the input voltage falls rapidly while the output voltage decreases slowly. The capacitance discharges by means of the Base-Emitter junction of the series pass transistor in the regulator. If the energy is sufficiently high, the transistor may be destroyed. The external diode bypasses the current from the IC to ground.

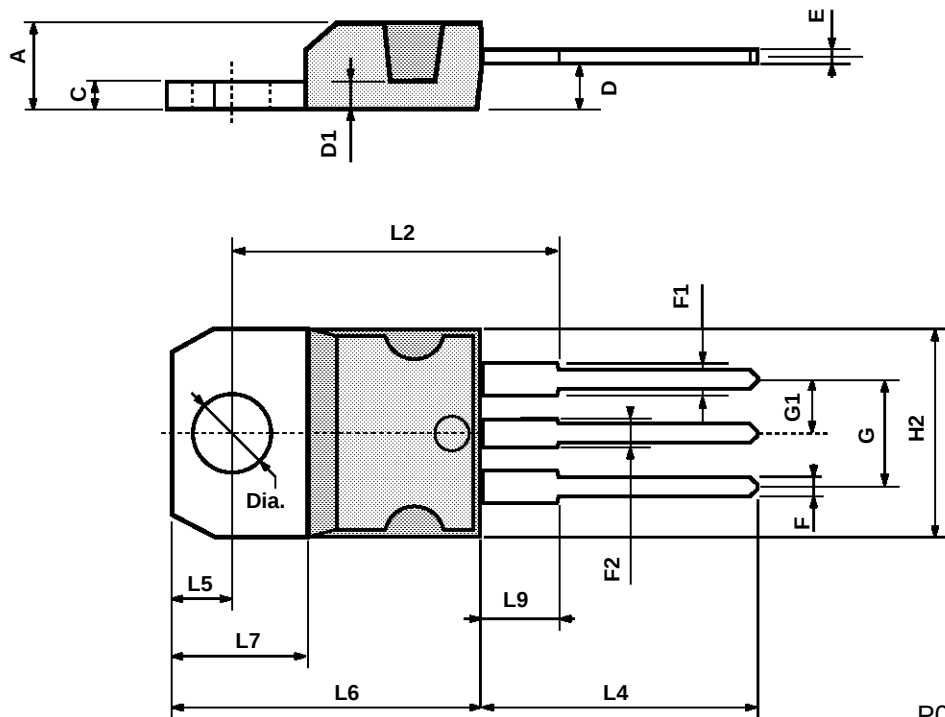
## TO-3 MECHANICAL DATA

| DIM. | mm    |      |       | inch  |      |       |
|------|-------|------|-------|-------|------|-------|
|      | MIN.  | TYP. | MAX.  | MIN.  | TYP. | MAX.  |
| A    | 11.00 |      | 13.10 | 0.433 |      | 0.516 |
| B    | 0.97  |      | 1.15  | 0.038 |      | 0.045 |
| C    | 1.50  |      | 1.65  | 0.059 |      | 0.065 |
| D    | 8.32  |      | 8.92  | 0.327 |      | 0.351 |
| E    | 19.00 |      | 20.00 | 0.748 |      | 0.787 |
| G    | 10.70 |      | 11.10 | 0.421 |      | 0.437 |
| N    | 16.50 |      | 17.20 | 0.649 |      | 0.677 |
| P    | 25.00 |      | 26.00 | 0.984 |      | 1.023 |
| R    | 4.00  |      | 4.09  | 0.157 |      | 0.161 |
| U    | 38.50 |      | 39.30 | 1.515 |      | 1.547 |
| V    | 30.00 |      | 30.30 | 1.187 |      | 1.193 |



TO-220 MECHANICAL DATA

| DIM. | mm   |      |       | inch  |       |       |
|------|------|------|-------|-------|-------|-------|
|      | MIN. | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40 |      | 4.60  | 0.173 |       | 0.181 |
| C    | 1.23 |      | 1.32  | 0.048 |       | 0.051 |
| D    | 2.40 |      | 2.72  | 0.094 |       | 0.107 |
| D1   |      | 1.27 |       |       | 0.050 |       |
| E    | 0.49 |      | 0.70  | 0.019 |       | 0.027 |
| F    | 0.61 |      | 0.88  | 0.024 |       | 0.034 |
| F1   | 1.14 |      | 1.70  | 0.044 |       | 0.067 |
| F2   | 1.14 |      | 1.70  | 0.044 |       | 0.067 |
| G    | 4.95 |      | 5.15  | 0.194 |       | 0.203 |
| G1   | 2.4  |      | 2.7   | 0.094 |       | 0.106 |
| H2   | 10.0 |      | 10.40 | 0.393 |       | 0.409 |
| L2   |      | 16.4 |       |       | 0.645 |       |
| L4   | 13.0 |      | 14.0  | 0.511 |       | 0.551 |
| L5   | 2.65 |      | 2.95  | 0.104 |       | 0.116 |
| L6   | 15.2 |      | 15.9  | 0.598 |       | 0.625 |
| L7   | 6.2  |      | 6.6   | 0.244 |       | 0.260 |
| L9   | 3.5  |      | 4.2   | 0.137 |       | 0.165 |
| DIA. | 3.75 |      | 3.85  | 0.147 |       | 0.151 |



Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES

Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands -  
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A