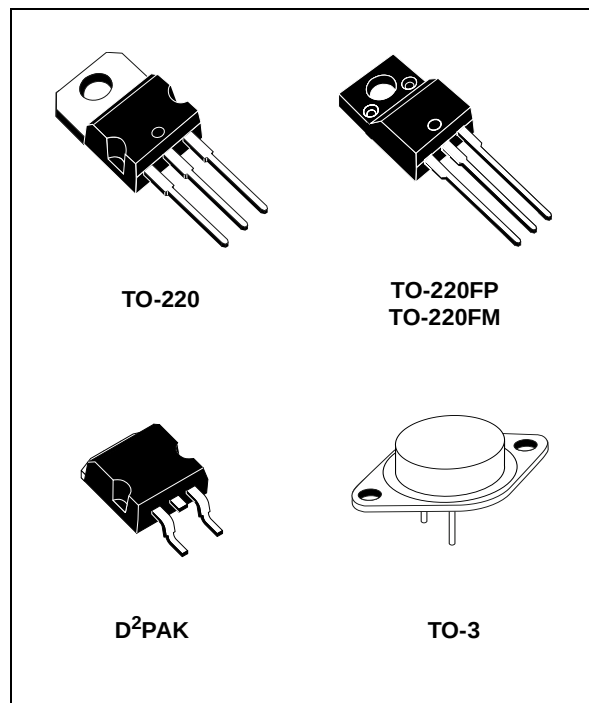


## POSITIVE VOLTAGE REGULATORS

- OUTPUT CURRENT TO 1.5A
- OUTPUT VOLTAGES OF 5; 5.2; 6; 8; 8.5; 9; 10; 12; 15; 18; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION

### DESCRIPTION

The L7800 series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-220FM, TO-3 and D<sup>2</sup>PAK packages and 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 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.



**Figure 1: Schematic Diagram**

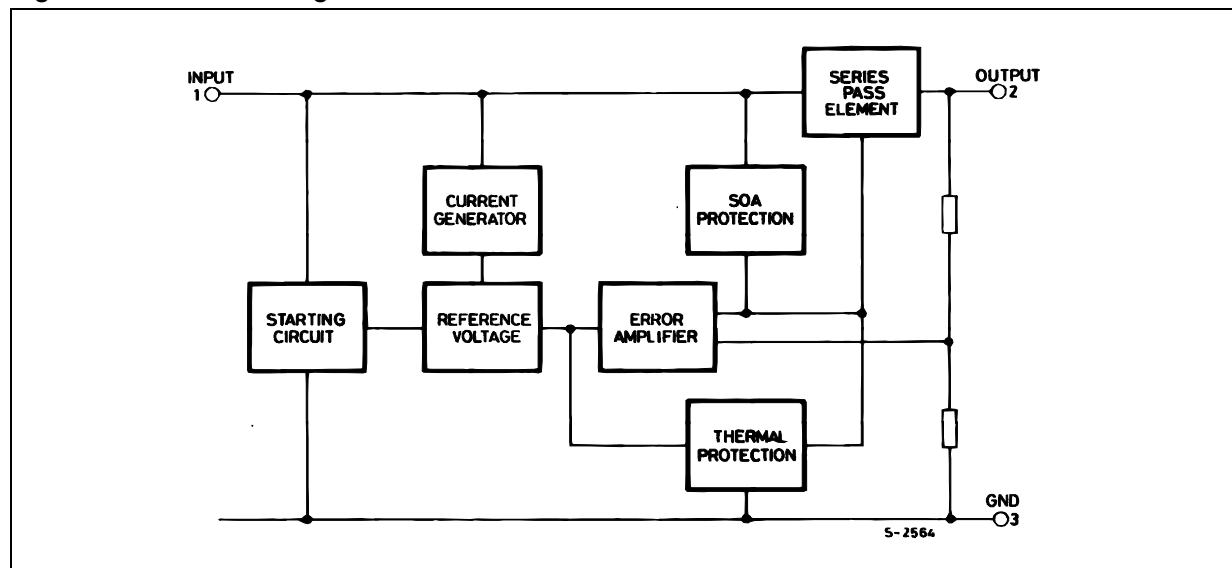


Table 1: Absolute Maximum Ratings

| Symbol           | Parameter                            |                               | Value              | Unit |
|------------------|--------------------------------------|-------------------------------|--------------------|------|
| V <sub>I</sub>   | DC Input Voltage                     | for V <sub>O</sub> = 5 to 18V | 35                 | V    |
|                  |                                      | for V <sub>O</sub> = 20, 24V  | 40                 |      |
| I <sub>O</sub>   | Output Current                       |                               | Internally Limited |      |
| P <sub>tot</sub> | Power Dissipation                    |                               | Internally Limited |      |
| T <sub>stg</sub> | Storage Temperature Range            |                               | -65 to 150         | °C   |
| T <sub>op</sub>  | Operating Junction Temperature Range | for L7800                     | -55 to 150         | °C   |
|                  |                                      | for L7800C                    | 0 to 150           |      |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Table 2: Thermal Data

| Symbol         | Parameter                               | D <sup>2</sup> PAK | TO-220 | TO-220FP | TO-220FM | TO-3 | Unit |
|----------------|-----------------------------------------|--------------------|--------|----------|----------|------|------|
| $R_{thj-case}$ | Thermal Resistance Junction-case Max    | 3                  | 5      | 5        | 5        | 4    | °C/W |
| $R_{thj-amb}$  | Thermal Resistance Junction-ambient Max | 62.5               | 50     | 60       | 60       | 35   | °C/W |

Figure 2: Schematic Diagram

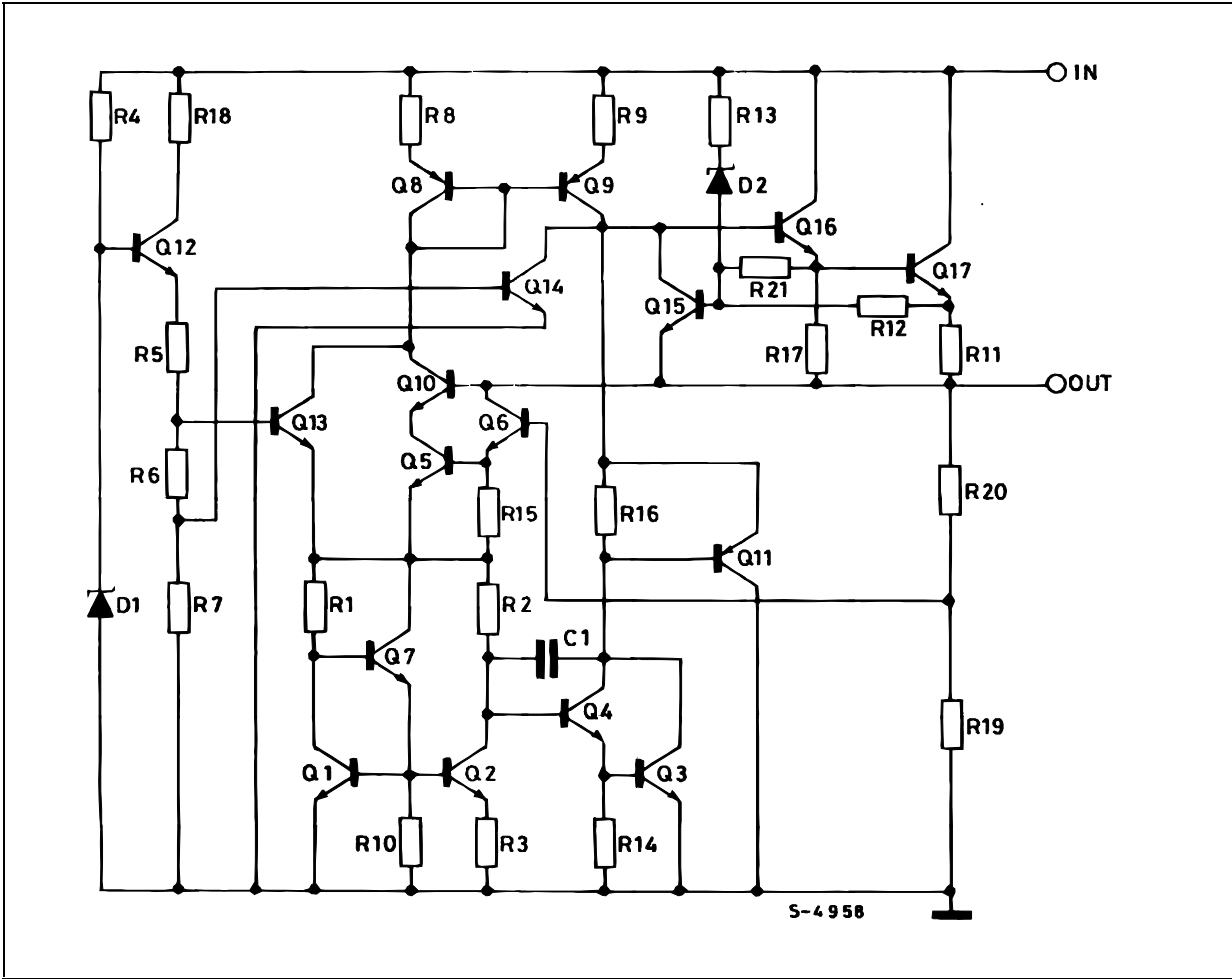


Figure 3: Connection Diagram (top view)

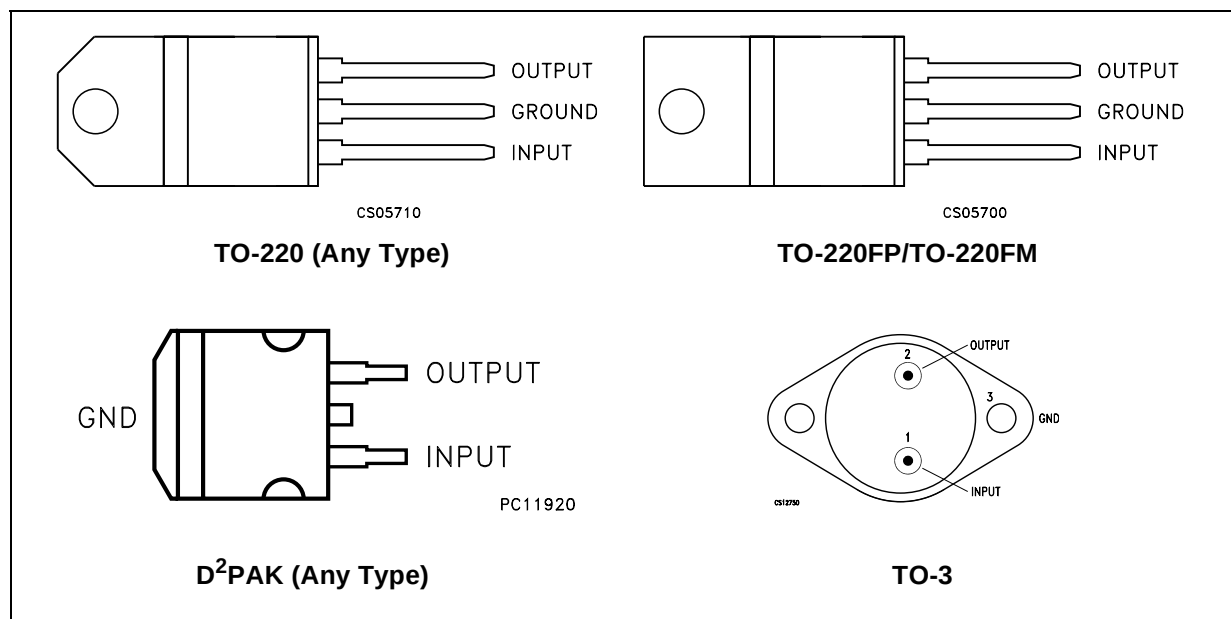
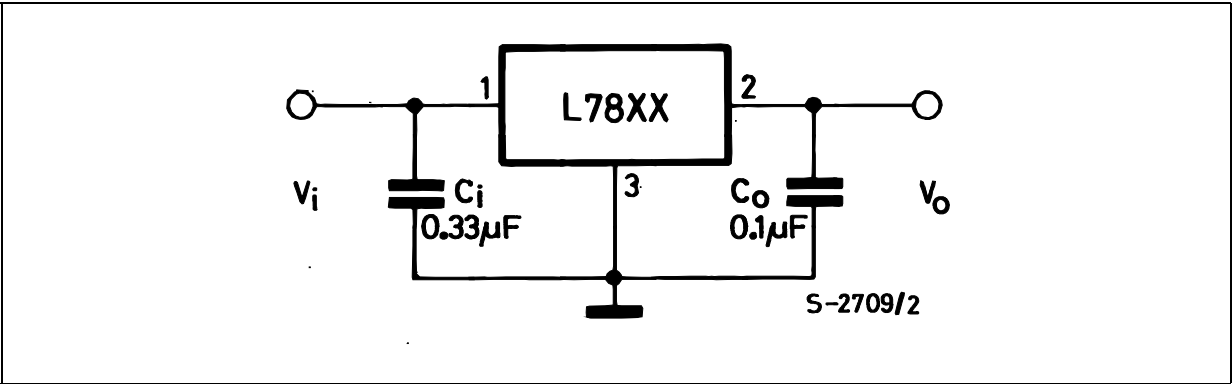


Table 3: Order Codes

| TYPE   | TO-220<br>(A Type) | TO-220<br>(C Type) | TO-220<br>(E Type) | D²PAK<br>(A Type) (*) | D²PAK<br>(C Type)<br>(T & R) | TO-220FP | TO-220FM | TO-3    |
|--------|--------------------|--------------------|--------------------|-----------------------|------------------------------|----------|----------|---------|
| L7805  |                    |                    |                    |                       |                              |          |          | L7805T  |
| L7805C | L7805CV            | L7805C-V           | L7805CV1           | L7805CD2T             | L7805C-D2TR                  | L7805CP  | L7805CF  | L7805CT |
| L7852C | L7852CV            |                    |                    | L7852CD2T             |                              | L7852CP  | L7852CF  | L7852CT |
| L7806  |                    |                    |                    |                       |                              |          |          | L7806T  |
| L7806C | L7806CV            | L7806C-V           |                    | L7806CD2T             |                              | L7806CP  | L7806CF  | L7806CT |
| L7808  |                    |                    |                    |                       |                              |          |          | L7808T  |
| L7808C | L7808CV            | L7808C-V           |                    | L7808CD2T             |                              | L7808CP  | L7808CF  | L7808CT |
| L7885C | L7885CV            |                    |                    | L7885CD2T             |                              | L7885CP  | L7885CF  | L7885CT |
| L7809C | L7809CV            | L7809C-V           |                    | L7809CD2T             |                              | L7809CP  | L7809CF  | L7809CT |
| L7810C | L7810CV            |                    |                    | L7810CD2T             |                              | L7810CP  |          |         |
| L7812  |                    |                    |                    |                       |                              |          |          | L7812T  |
| L7812C | L7812CV            | L7812C-V           |                    | L7812CD2T             |                              | L7812CP  | L7812CF  | L7812CT |
| L7815  |                    |                    |                    |                       |                              |          |          | L7815T  |
| L7815C | L7815CV            | L7815C-V           |                    | L7815CD2T             |                              | L7815CP  | L7815CF  | L7815CT |
| L7818  |                    |                    |                    |                       |                              |          |          | L7818T  |
| L7818C | L7818CV            |                    |                    | L7818CD2T             |                              | L7818CP  | L7818CF  | L7818CT |
| L7820  |                    |                    |                    |                       |                              |          |          | L7820T  |
| L7820C | L7820CV            |                    |                    | L7820CD2T             |                              | L7820CP  | L7820CF  | L7820CT |
| L7824  |                    |                    |                    |                       |                              |          |          | L7824T  |
| L7824C | L7824CV            |                    |                    | L7824CD2T             |                              | L7824CP  | L7824CF  | L7824CT |

(\*) Available in Tape &amp; Reel with the suffix "-TR".

Figure 4: Application Circuits



TEST CIRCUITS

Figure 5: DC Parameter

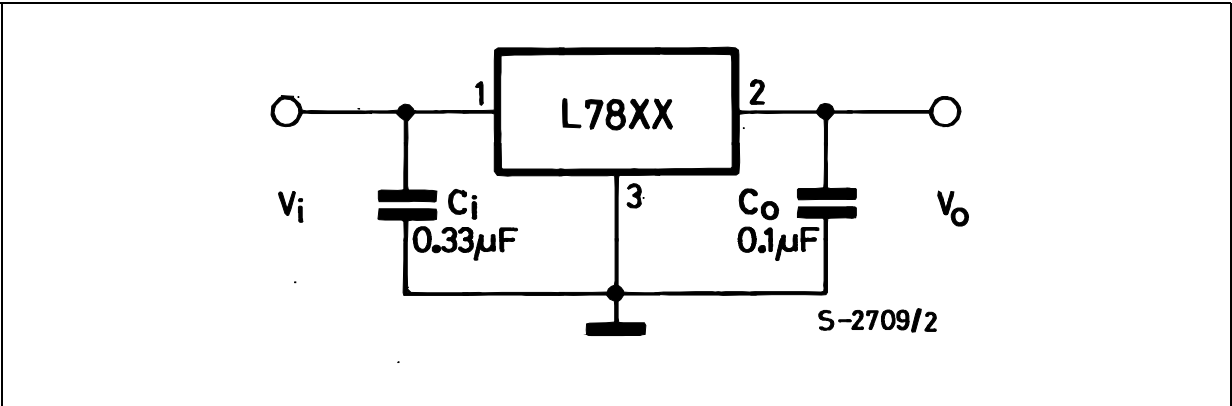


Figure 6: Load Regulation

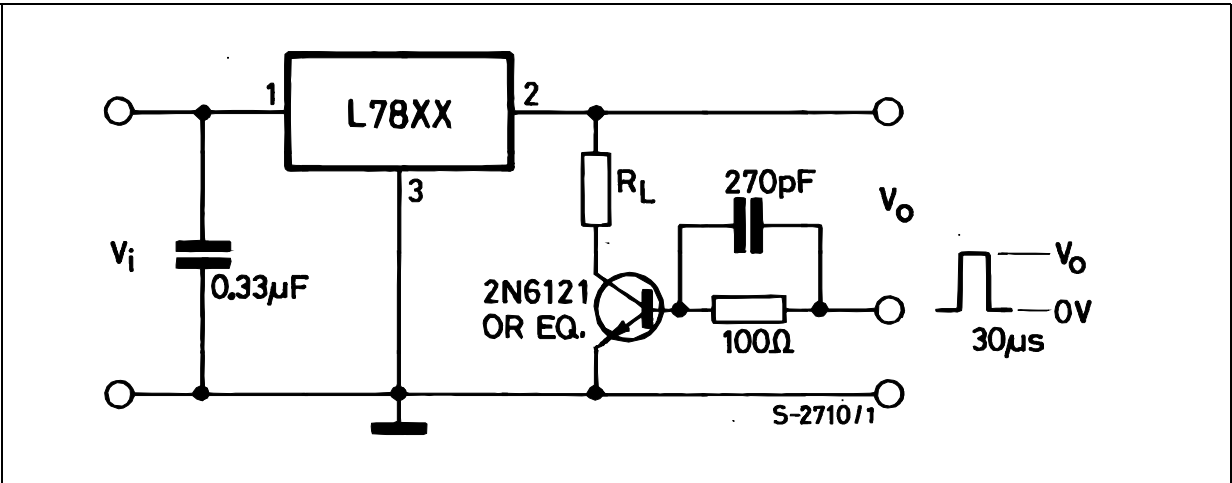
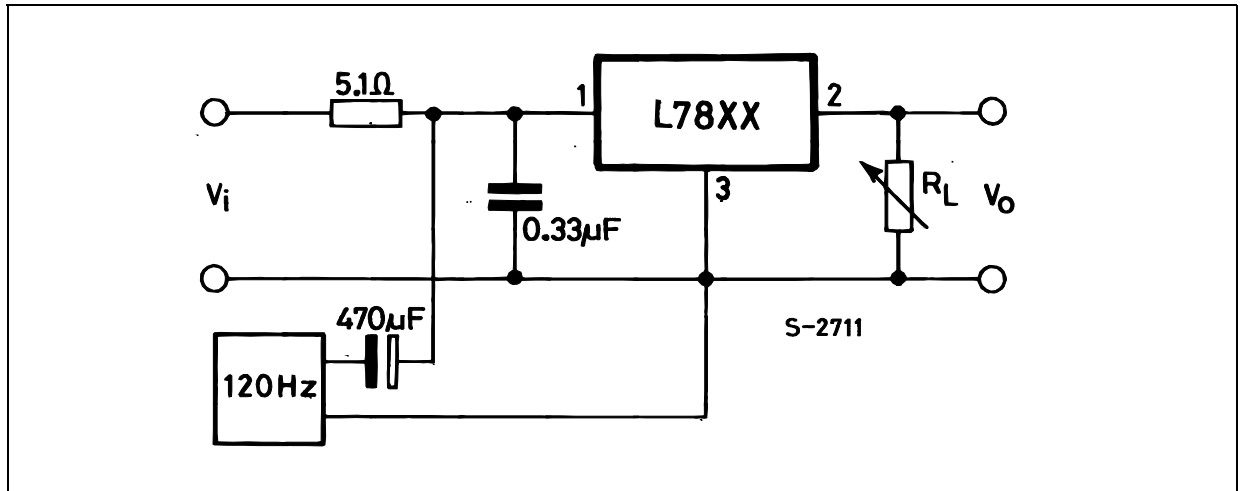


Figure 7: Ripple Rejection



**Table 4: Electrical Characteristics Of L7805** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 10\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                             | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                    | 4.8  | 5    | 5.2  | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{ W}$<br>$V_I = 8\text{ to }20\text{ V}$ | 4.65 | 5    | 5.35 | V                    |
| $\Delta V_O(^*)$      | Line Regulation            | $V_I = 7\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$                                    |      | 3    | 50   | mV                   |
|                       |                            | $V_I = 8\text{ to }12\text{ V}$ $T_J = 25^\circ\text{C}$                                    |      | 1    | 25   |                      |
| $\Delta V_O(^*)$      | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                |      |      | 100  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                |      |      | 25   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                    |      |      | 6    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                           |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 8\text{ to }25\text{ V}$                                                             |      |      | 0.8  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                         |      | 0.6  |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{ Hz to }100\text{ KHz}$ $T_J = 25^\circ\text{C}$                               |      |      | 40   | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 8\text{ to }18\text{ V}$ $f = 120\text{ Hz}$                                         | 68   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                 |      | 2    | 2.5  | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                          |      | 17   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                |      | 0.75 | 1.2  | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                    | 1.3  | 2.2  | 3.3  | A                    |

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

**Table 5: Electrical Characteristics Of L7806** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 11\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                            | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|--------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                   | 5.75 | 6    | 6.25 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 9\text{ to }21\text{ V}$ | 5.65 | 6    | 6.35 | V                    |
| $\Delta V_{O(*)}$     | Line Regulation            | $V_I = 8\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 60   | mV                   |
|                       |                            | $V_I = 9\text{ to }13\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 30   |                      |
| $\Delta V_{O(*)}$     | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                               |      |      | 100  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                               |      |      | 30   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                   |      |      | 6    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                          |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 9\text{ to }25\text{ V}$                                                            |      |      | 0.8  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                        |      | 0.7  |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                |      |      | 40   | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 9\text{ to }19\text{ V}$ $f = 120\text{Hz}$                                         | 65   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                |      | 2    | 2.5  | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                         |      | 19   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                               |      | 0.75 | 1.2  | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                   | 1.3  | 2.2  | 3.3  | A                    |

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

**Table 6: Electrical Characteristics Of L7808** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 14\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                               | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                      | 7.7  | 8    | 8.3  | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 11.5\text{ to }23\text{ V}$ | 7.6  | 8    | 8.4  | V                    |
| $\Delta V_{O(*)}$     | Line Regulation            | $V_I = 10.5\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 80   | mV                   |
|                       |                            | $V_I = 11\text{ to }17\text{ V}$ $T_J = 25^\circ\text{C}$                                     |      |      | 40   |                      |
| $\Delta V_{O(*)}$     | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                  |      |      | 100  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                  |      |      | 40   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                      |      |      | 6    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                             |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 11.5\text{ to }25\text{ V}$                                                            |      |      | 0.8  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                           |      | 1    |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      |      | 40   | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 11.5\text{ to }21.5\text{ V}$ $f = 120\text{Hz}$                                       | 62   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                   |      | 2    | 2.5  | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                            |      | 16   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                  |      | 0.75 | 1.2  | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                      | 1.3  | 2.2  | 3.3  | A                    |

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

**Table 7: Electrical Characteristics Of L7812** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 19\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                               | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                      | 11.5 | 12   | 12.5 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 15.5\text{ to }27\text{ V}$ | 11.4 | 12   | 12.6 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 14.5\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 120  | mV                   |
|                       |                            | $V_I = 16\text{ to }22\text{ V}$ $T_J = 25^\circ\text{C}$                                     |      |      | 60   |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                  |      |      | 100  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                  |      |      | 60   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                      |      |      | 6    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                             |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 15\text{ to }30\text{ V}$                                                              |      |      | 0.8  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                           |      | 1.5  |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      |      | 40   | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 15\text{ to }25\text{ V}$ $f = 120\text{Hz}$                                           | 61   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                   |      | 2    | 2.5  | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                            |      | 18   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                  |      | 0.75 | 1.2  | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                      | 1.3  | 2.2  | 3.3  | A                    |

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

**Table 8: Electrical Characteristics Of L7815** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 23\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                               | Min.  | Typ. | Max.  | Unit                 |
|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|-------|------|-------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                      | 14.4  | 15   | 15.6  | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 18.5\text{ to }30\text{ V}$ | 14.25 | 15   | 15.75 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 17.5\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$                                   |       |      | 150   | mV                   |
|                       |                            | $V_I = 20\text{ to }26\text{ V}$ $T_J = 25^\circ\text{C}$                                     |       |      | 75    |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                  |       |      | 150   | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                  |       |      | 75    |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                      |       |      | 6     | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                             |       |      | 0.5   | mA                   |
|                       |                            | $V_I = 18.5\text{ to }30\text{ V}$                                                            |       |      | 0.8   |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                           |       | 1.8  |       | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |       |      | 40    | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 18.5\text{ to }28.5\text{ V}$ $f = 120\text{Hz}$                                       | 60    |      |       | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                   |       | 2    | 2.5   | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                            |       | 19   |       | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                  |       | 0.75 | 1.2   | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                      | 1.3   | 2.2  | 3.3   | A                    |

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

**Table 9: Electrical Characteristics Of L7818** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 26\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                             | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                    | 17.3 | 18   | 18.7 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 22\text{ to }33\text{ V}$ | 17.1 | 18   | 18.9 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 21\text{ to }33\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 180  | mV                   |
|                       |                            | $V_I = 24\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 90   |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                |      |      | 180  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                |      |      | 90   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                    |      |      | 6    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                           |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 22\text{ to }33\text{ V}$                                                            |      |      | 0.8  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                         |      | 2.3  |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                 |      |      | 40   | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 22\text{ to }32\text{ V}$ $f = 120\text{Hz}$                                         | 59   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                 |      | 2    | 2.5  | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                          |      | 22   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                |      | 0.75 | 1.2  | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                    | 1.3  | 2.2  | 3.3  | A                    |

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

**Table 10: Electrical Characteristics Of L7820** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 28\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                             | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                    | 19.2 | 20   | 20.8 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 24\text{ to }35\text{ V}$ | 19   | 20   | 21   | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 22.5\text{ to }35\text{ V}$ $T_J = 25^\circ\text{C}$                                 |      |      | 200  | mV                   |
|                       |                            | $V_I = 26\text{ to }32\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 100  |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                |      |      | 200  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                |      |      | 100  |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                    |      |      | 6    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                           |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 24\text{ to }35\text{ V}$                                                            |      |      | 0.8  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                         |      | 2.5  |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                 |      |      | 40   | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 24\text{ to }35\text{ V}$ $f = 120\text{Hz}$                                         | 58   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                 |      | 2    | 2.5  | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                          |      | 24   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                |      | 0.75 | 1.2  | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                    | 1.3  | 2.2  | 3.3  | A                    |

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



**Table 11: Electrical Characteristics Of L7824** (refer to the test circuits,  $T_J = -55$  to  $150^\circ\text{C}$ ,  $V_I = 33\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                             | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                    | 23   | 24   | 25   | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 28\text{ to }38\text{ V}$ | 22.8 | 24   | 25.2 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 27\text{ to }38\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 240  | mV                   |
|                       |                            | $V_I = 30\text{ to }36\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 120  |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                |      |      | 240  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                |      |      | 120  |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                    |      |      | 6    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                           |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 28\text{ to }38\text{ V}$                                                            |      |      | 0.8  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                         |      | 3    |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                 |      |      | 40   | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 28\text{ to }38\text{ V}$ $f = 120\text{Hz}$                                         | 56   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                 |      | 2    | 2.5  | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                          |      | 28   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                |      | 0.75 | 1.2  | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                    | 1.3  | 2.2  | 3.3  | A                    |

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

**Table 12: Electrical Characteristics Of L7805C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 10\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                            | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|--------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                   | 4.8  | 5    | 5.2  | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 7\text{ to }20\text{ V}$ | 4.75 | 5    | 5.25 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 7\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      | 3    | 100  | mV                   |
|                       |                            | $V_I = 8\text{ to }12\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      | 1    | 50   |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                               |      |      | 100  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                               |      |      | 50   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                   |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                          |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 7\text{ to }25\text{ V}$                                                            |      |      | 0.8  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                        |      | -1.1 |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                |      | 40   |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 8\text{ to }18\text{ V}$ $f = 120\text{Hz}$                                         | 62   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                         |      | 17   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                               |      | 0.75 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                   |      | 2.2  |      | A                    |

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

**Table 13: Electrical Characteristics Of L7852C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 10\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                            | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|--------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                   | 5.0  | 5.2  | 5.4  | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 8\text{ to }20\text{ V}$ | 4.95 | 5.2  | 5.45 | V                    |
| $\Delta V_{O(*)}$     | Line Regulation            | $V_I = 7\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      | 3    | 105  | mV                   |
|                       |                            | $V_I = 8\text{ to }12\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      | 1    | 52   |                      |
| $\Delta V_{O(*)}$     | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                               |      |      | 105  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                               |      |      | 52   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                   |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                          |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 7\text{ to }25\text{ V}$                                                            |      |      | 1.3  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                        |      | -1   |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                |      | 42   |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 8\text{ to }18\text{ V}$ $f = 120\text{Hz}$                                         | 61   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                         |      | 17   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                               |      | 0.75 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                   |      | 2.2  |      | A                    |

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

**Table 14: Electrical Characteristics Of L7806C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 11\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                            | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|--------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                   | 5.75 | 6    | 6.25 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 8\text{ to }21\text{ V}$ | 5.7  | 6    | 6.3  | V                    |
| $\Delta V_{O(*)}$     | Line Regulation            | $V_I = 8\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 120  | mV                   |
|                       |                            | $V_I = 9\text{ to }13\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 60   |                      |
| $\Delta V_{O(*)}$     | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                               |      |      | 120  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                               |      |      | 60   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                   |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                          |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 8\text{ to }25\text{ V}$                                                            |      |      | 1.3  |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                        |      | -0.8 |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                |      | 45   |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 9\text{ to }19\text{ V}$ $f = 120\text{Hz}$                                         | 59   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                         |      | 19   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                               |      | 0.55 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                   |      | 2.2  |      | A                    |

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

**Table 15: Electrical Characteristics Of L7808C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 14\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                               | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                      | 7.7  | 8    | 8.3  | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 10.5\text{ to }25\text{ V}$ | 7.6  | 8    | 8.4  | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 10.5\text{ to }25\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 160  | mV                   |
|                       |                            | $V_I = 11\text{ to }17\text{ V}$ $T_J = 25^\circ\text{C}$                                     |      |      | 80   |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                  |      |      | 160  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                  |      |      | 80   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                      |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                             |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 10.5\text{ to }25\text{ V}$                                                            |      |      | 1    |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                           |      | -0.8 |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      | 52   |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 11.5\text{ to }21.5\text{ V}$ $f = 120\text{Hz}$                                       | 56   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                   |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                            |      | 16   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                  |      | 0.45 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                      |      | 2.2  |      | A                    |

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

**Table 16: Electrical Characteristics Of L7885C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 14.5\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                             | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                    | 8.2  | 8.5  | 8.8  | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 11\text{ to }26\text{ V}$ | 8.1  | 8.5  | 8.9  | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 11\text{ to }27\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 160  | mV                   |
|                       |                            | $V_I = 11.5\text{ to }17.5\text{ V}$ $T_J = 25^\circ\text{C}$                               |      |      | 80   |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                |      |      | 160  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                |      |      | 80   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                    |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                           |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 11\text{ to }27\text{ V}$                                                            |      |      | 1    |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                         |      | -0.8 |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                 |      | 55   |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 12\text{ to }22\text{ V}$ $f = 120\text{Hz}$                                         | 56   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                 |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                          |      | 16   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                |      | 0.45 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                    |      | 2.2  |      | A                    |

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

**Table 17: Electrical Characteristics Of L7809C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 15\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                               | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                      | 8.64 | 9    | 9.36 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 11.5\text{ to }26\text{ V}$ | 8.55 | 9    | 9.45 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 11.5\text{ to }26\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 180  | mV                   |
|                       |                            | $V_I = 12\text{ to }18\text{ V}$ $T_J = 25^\circ\text{C}$                                     |      |      | 90   |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                  |      |      | 180  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                  |      |      | 90   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                      |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                             |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 11.5\text{ to }26\text{ V}$                                                            |      |      | 1    |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                           |      | -1   |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      | 70   |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 12\text{ to }23\text{ V}$ $f = 120\text{Hz}$                                           | 55   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                   |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                            |      | 17   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                  |      | 0.40 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                      |      | 2.2  |      | A                    |

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

**Table 18: Electrical Characteristics Of L7810C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 16\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                               | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                      | 9.6  | 10   | 10.4 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 12.5\text{ to }26\text{ V}$ | 9.5  | 10   | 10.5 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 12.5\text{ to }26\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 200  | mV                   |
|                       |                            | $V_I = 13.5\text{ to }19\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 100  |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                  |      |      | 200  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                  |      |      | 100  |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                      |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                             |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 12.5\text{ to }26\text{ V}$                                                            |      |      | 1    |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                           |      | -1   |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      | 70   |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 13\text{ to }23\text{ V}$ $f = 120\text{Hz}$                                           | 55   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                   |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                            |      | 17   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                  |      | 0.40 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                      |      | 2.2  |      | A                    |

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

**Table 19: Electrical Characteristics Of L7812C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 19\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                               | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                      | 11.5 | 12   | 12.5 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 14.5\text{ to }27\text{ V}$ | 11.4 | 12   | 12.6 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 14.5\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 240  | mV                   |
|                       |                            | $V_I = 16\text{ to }22\text{ V}$ $T_J = 25^\circ\text{C}$                                     |      |      | 120  |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                  |      |      | 240  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                  |      |      | 120  |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                      |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                             |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 14.5\text{ to }30\text{ V}$                                                            |      |      | 1    |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                           |      | -1   |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |      | 75   |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 15\text{ to }25\text{ V}$ $f = 120\text{Hz}$                                           | 55   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                   |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                            |      | 18   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                  |      | 0.35 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                      |      | 2.2  |      | A                    |

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

**Table 20: Electrical Characteristics Of L7815C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 23\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                               | Min.  | Typ. | Max.  | Unit                 |
|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|-------|------|-------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                      | 14.5  | 15   | 15.6  | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 17.5\text{ to }30\text{ V}$ | 14.25 | 15   | 15.75 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 17.5\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$                                   |       |      | 300   | mV                   |
|                       |                            | $V_I = 20\text{ to }26\text{ V}$ $T_J = 25^\circ\text{C}$                                     |       |      | 150   |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                  |       |      | 300   | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                  |       |      | 150   |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                      |       |      | 8     | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                             |       |      | 0.5   | mA                   |
|                       |                            | $V_I = 17.5\text{ to }30\text{ V}$                                                            |       |      | 1     |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                           |       | -1   |       | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                   |       | 90   |       | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 18.5\text{ to }28.5\text{ V}$ $f = 120\text{Hz}$                                       | 54    |      |       | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                   |       | 2    |       | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                            |       | 19   |       | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                  |       | 0.23 |       | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                      |       | 2.2  |       | A                    |

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

**Table 21: Electrical Characteristics Of L7818C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 26\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                             | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                    | 17.3 | 18   | 18.7 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 21\text{ to }33\text{ V}$ | 17.1 | 18   | 18.9 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 21\text{ to }33\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 360  | mV                   |
|                       |                            | $V_I = 24\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 180  |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                |      |      | 360  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                |      |      | 180  |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                    |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                           |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 21\text{ to }33\text{ V}$                                                            |      |      | 1    |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                         |      | -1   |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                 |      | 110  |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 22\text{ to }32\text{ V}$ $f = 120\text{Hz}$                                         | 53   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                 |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                          |      | 22   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                |      | 0.20 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                    |      | 2.1  |      | A                    |

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

**Table 22: Electrical Characteristics Of L7820C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 28\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                             | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                    | 19.2 | 20   | 20.8 | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 23\text{ to }35\text{ V}$ | 19   | 20   | 21   | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 22.5\text{ to }35\text{ V}$ $T_J = 25^\circ\text{C}$                                 |      |      | 400  | mV                   |
|                       |                            | $V_I = 26\text{ to }32\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 200  |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                |      |      | 400  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                |      |      | 200  |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                    |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                           |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 23\text{ to }35\text{ V}$                                                            |      |      | 1    |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                         |      | -1   |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                 |      | 150  |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 24\text{ to }35\text{ V}$ $f = 120\text{Hz}$                                         | 52   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                 |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                          |      | 24   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                |      | 0.18 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                    |      | 2.1  |      | A                    |

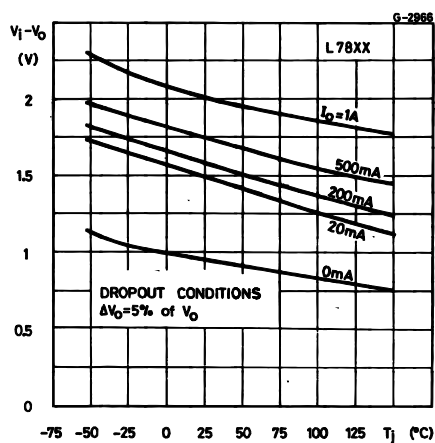
(\*) Load and line regulation are specified at constant junction temperature. Changes in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**Table 23: Electrical Characteristics Of L7824C** (refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$ ,  $V_I = 33\text{V}$ ,  $I_O = 500\text{ mA}$ ,  $C_I = 0.33\text{ }\mu\text{F}$ ,  $C_O = 0.1\text{ }\mu\text{F}$  unless otherwise specified).

| Symbol                | Parameter                  | Test Conditions                                                                             | Min. | Typ. | Max. | Unit                 |
|-----------------------|----------------------------|---------------------------------------------------------------------------------------------|------|------|------|----------------------|
| $V_O$                 | Output Voltage             | $T_J = 25^\circ\text{C}$                                                                    | 23   | 24   | 25   | V                    |
| $V_O$                 | Output Voltage             | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$<br>$V_I = 27\text{ to }38\text{ V}$ | 22.8 | 24   | 25.2 | V                    |
| $\Delta V_O(*)$       | Line Regulation            | $V_I = 27\text{ to }38\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 480  | mV                   |
|                       |                            | $V_I = 30\text{ to }36\text{ V}$ $T_J = 25^\circ\text{C}$                                   |      |      | 240  |                      |
| $\Delta V_O(*)$       | Load Regulation            | $I_O = 5\text{ mA to }1.5\text{ A}$ $T_J = 25^\circ\text{C}$                                |      |      | 480  | mV                   |
|                       |                            | $I_O = 250\text{ to }750\text{ mA}$ $T_J = 25^\circ\text{C}$                                |      |      | 240  |                      |
| $I_d$                 | Quiescent Current          | $T_J = 25^\circ\text{C}$                                                                    |      |      | 8    | mA                   |
| $\Delta I_d$          | Quiescent Current Change   | $I_O = 5\text{ mA to }1\text{ A}$                                                           |      |      | 0.5  | mA                   |
|                       |                            | $V_I = 27\text{ to }38\text{ V}$                                                            |      |      | 1    |                      |
| $\Delta V_O/\Delta T$ | Output Voltage Drift       | $I_O = 5\text{ mA}$                                                                         |      | -1.5 |      | mV/ $^\circ\text{C}$ |
| eN                    | Output Noise Voltage       | $B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$                                 |      | 170  |      | $\mu\text{V}/V_O$    |
| SVR                   | Supply Voltage Rejection   | $V_I = 28\text{ to }38\text{ V}$ $f = 120\text{Hz}$                                         | 50   |      |      | dB                   |
| $V_d$                 | Dropout Voltage            | $I_O = 1\text{ A}$ $T_J = 25^\circ\text{C}$                                                 |      | 2    |      | V                    |
| $R_O$                 | Output Resistance          | $f = 1\text{ KHz}$                                                                          |      | 28   |      | m $\Omega$           |
| $I_{sc}$              | Short Circuit Current      | $V_I = 35\text{ V}$ $T_J = 25^\circ\text{C}$                                                |      | 0.15 |      | A                    |
| $I_{scp}$             | Short Circuit Peak Current | $T_J = 25^\circ\text{C}$                                                                    |      | 2.1  |      | A                    |

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

**Figure 8: Dropout Voltage vs Junction Temperature**



**Figure 9: Peak Output Current vs Input/output Differential Voltage**

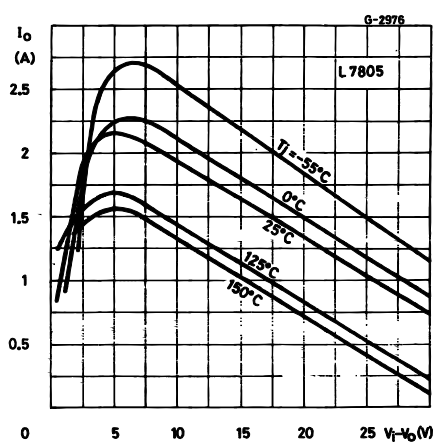


Figure 10: Supply Voltage Rejection vs Frequency

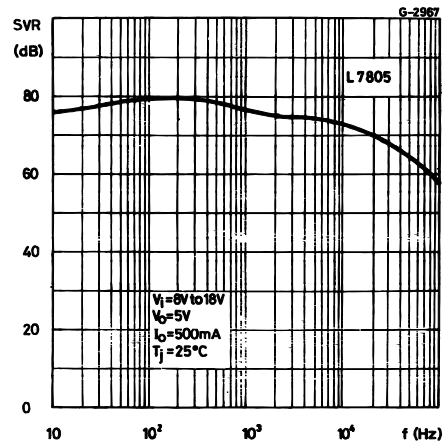


Figure 11: Output Voltage vs Junction Temperature

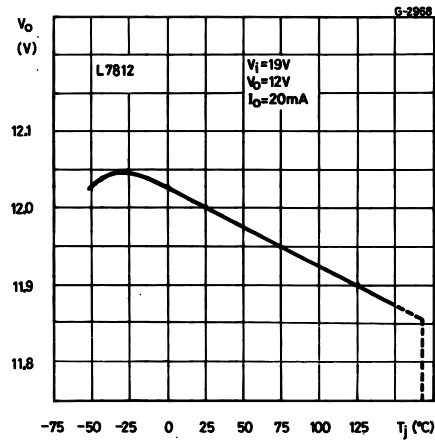


Figure 12: Output Impedance vs Frequency

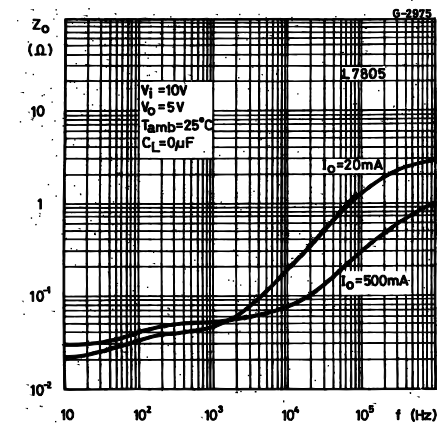


Figure 13: Quiescent Current vs Junction Temperature

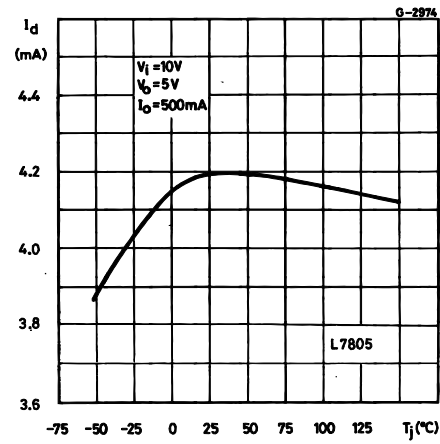


Figure 14: Load Transient Response

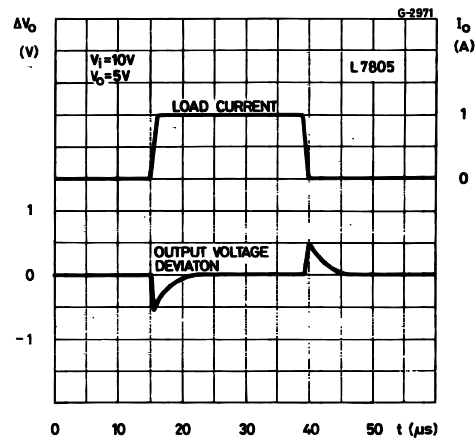
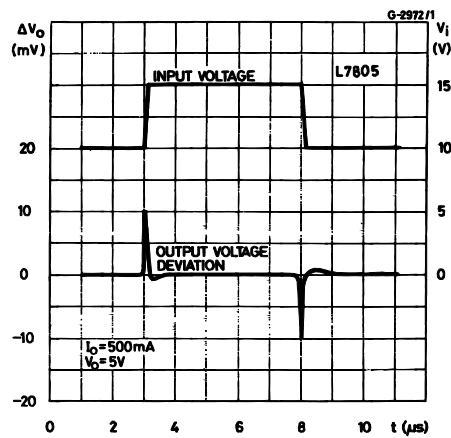
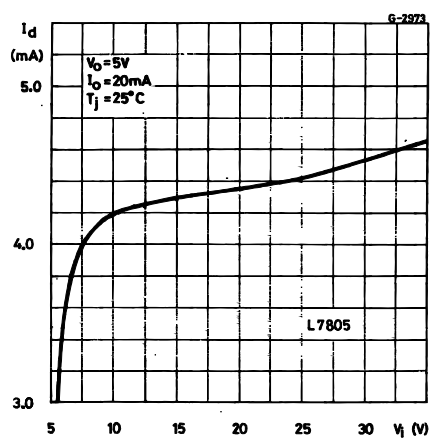
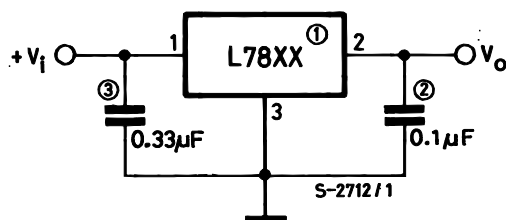


Figure 15: Line Transient Response





**Figure 16:** Quiescent Current vs Input Voltage**Figure 17:** Fixed Output Regulator

NOTE:

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

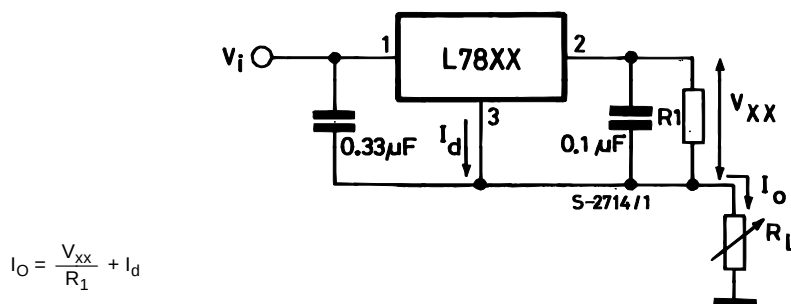
**Figure 18:** Current Regulator

Figure 19: Circuit for Increasing Output Voltage

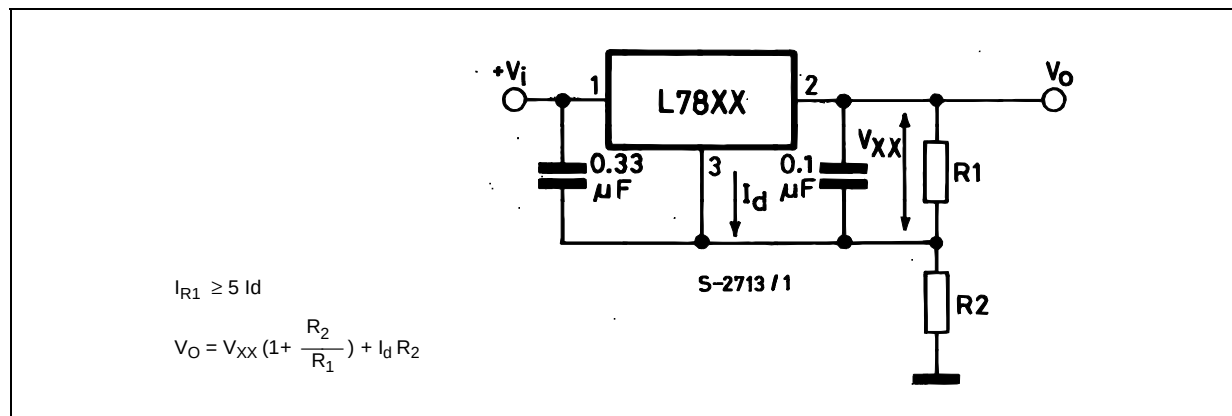


Figure 20: Adjustable Output Regulator (7 to 30V)

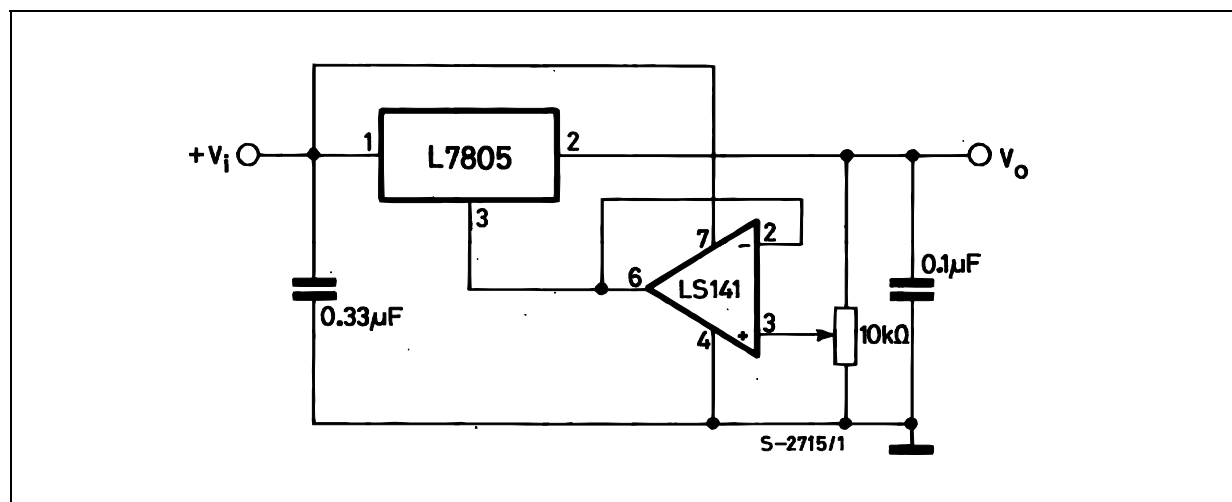


Figure 21: 0.5 to 10V Regulator

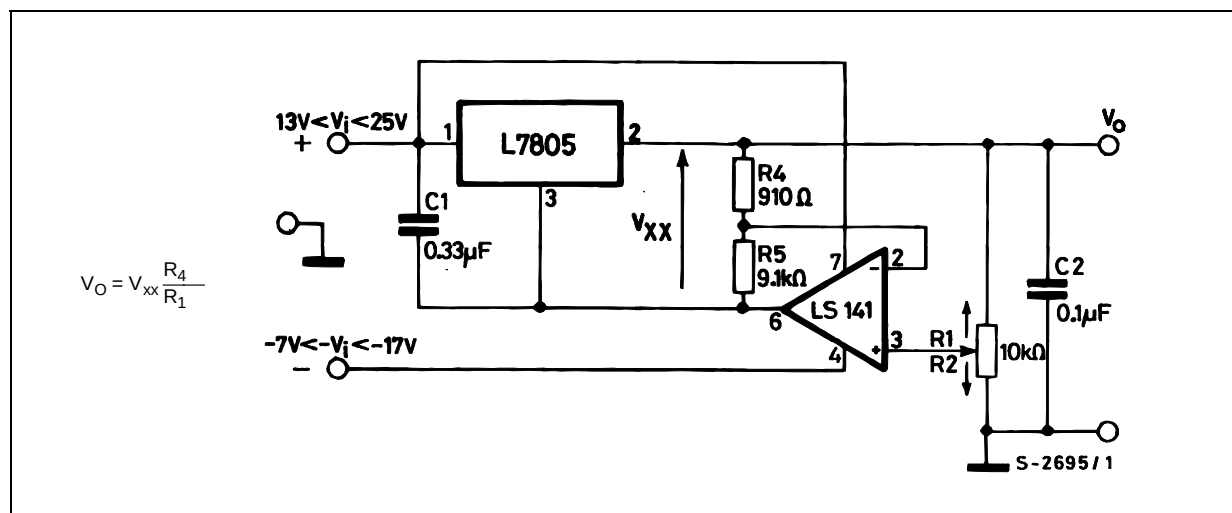


Figure 22: High Current Voltage Regulator

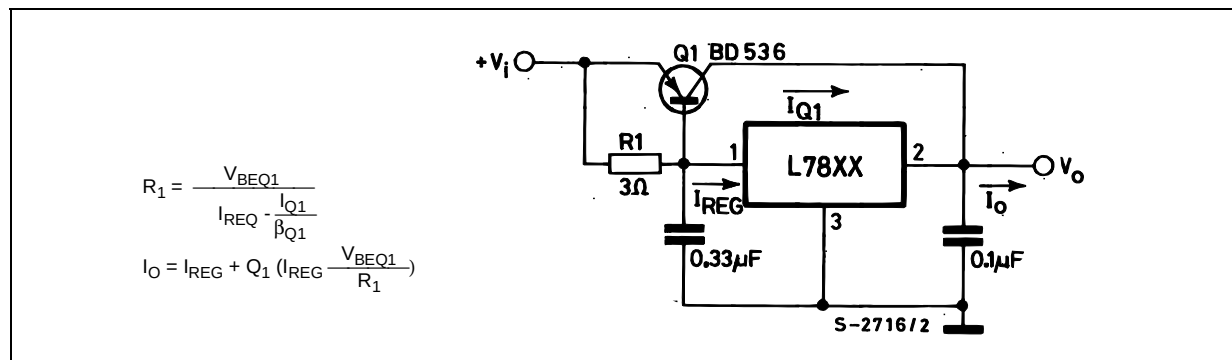


Figure 23: High Output Current with Short Circuit Protection

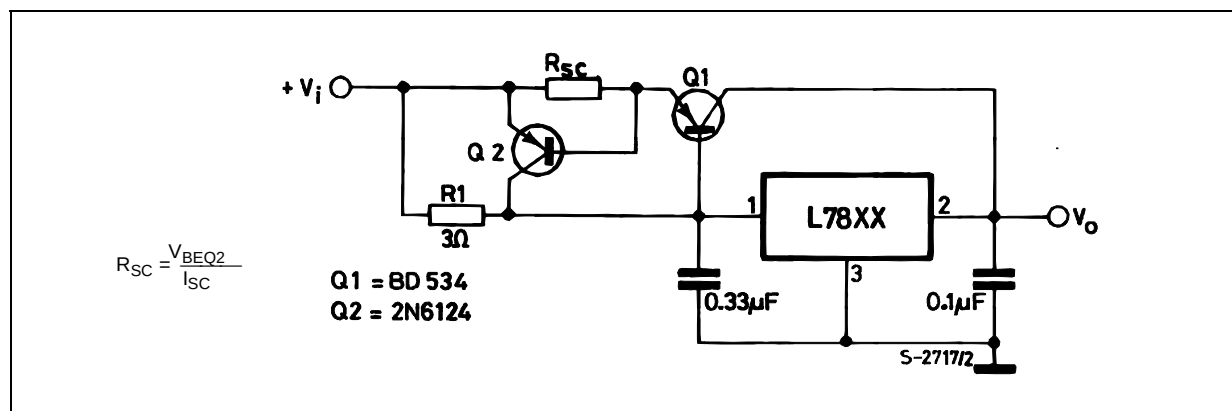


Figure 24: Tracking Voltage Regulator

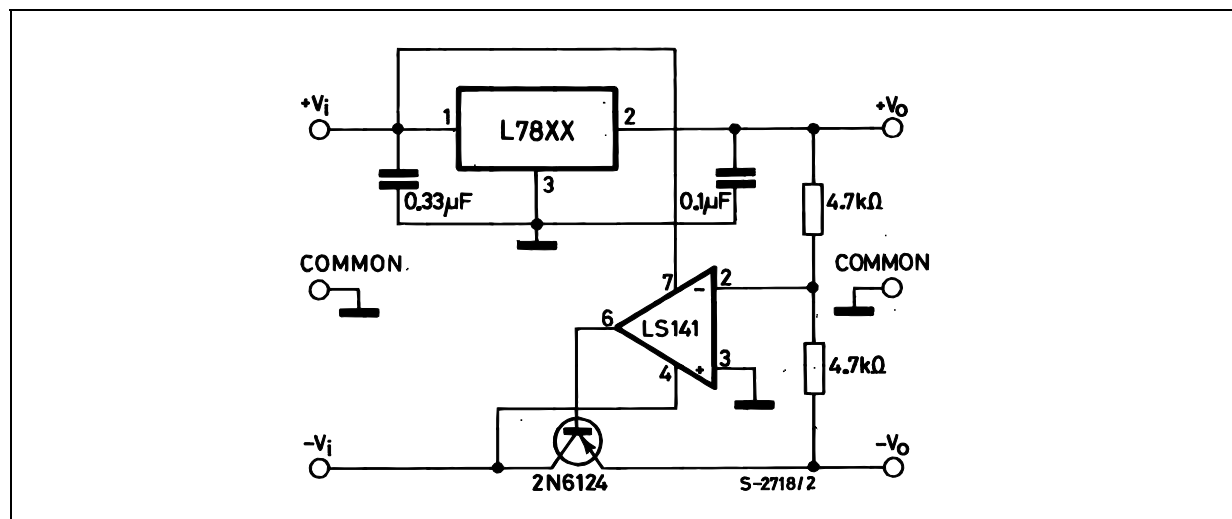
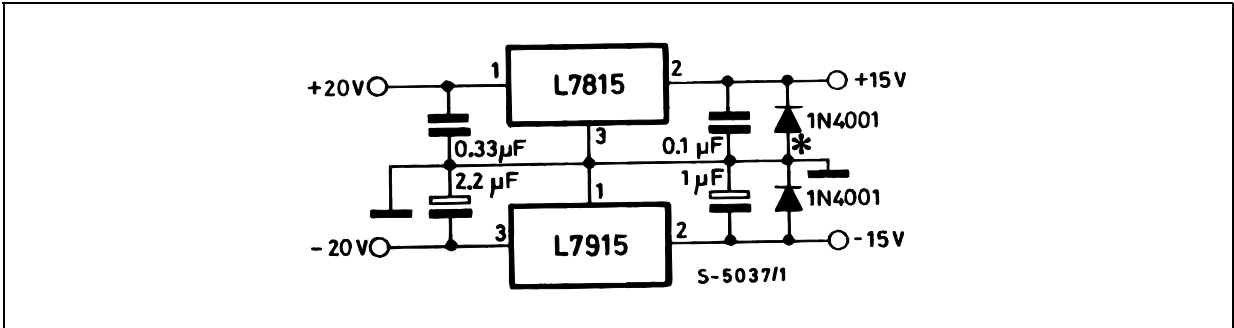


Figure 25: Split Power Supply ( $\pm 15\text{V} - 1\text{A}$ )



\* Against potential latch-up problems.

Figure 26: Negative Output Voltage Circuit

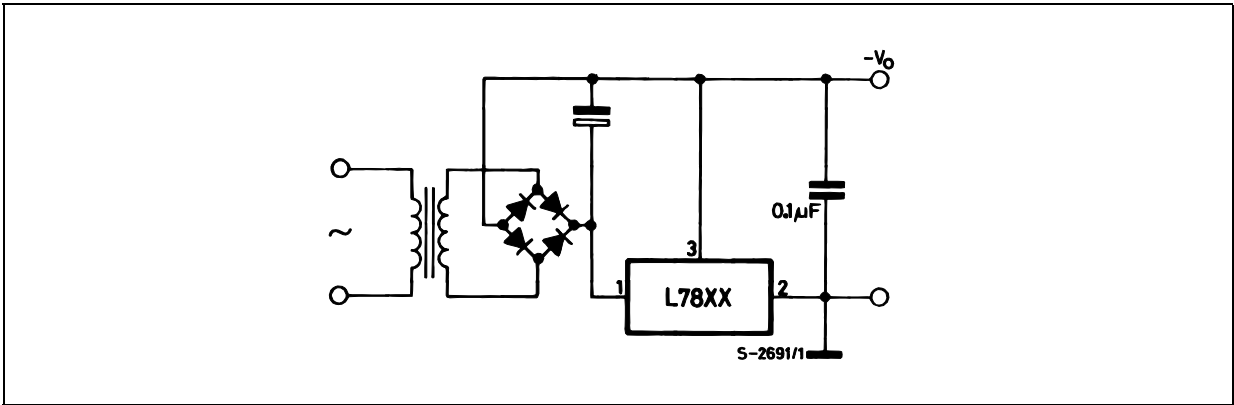


Figure 27: Switching Regulator

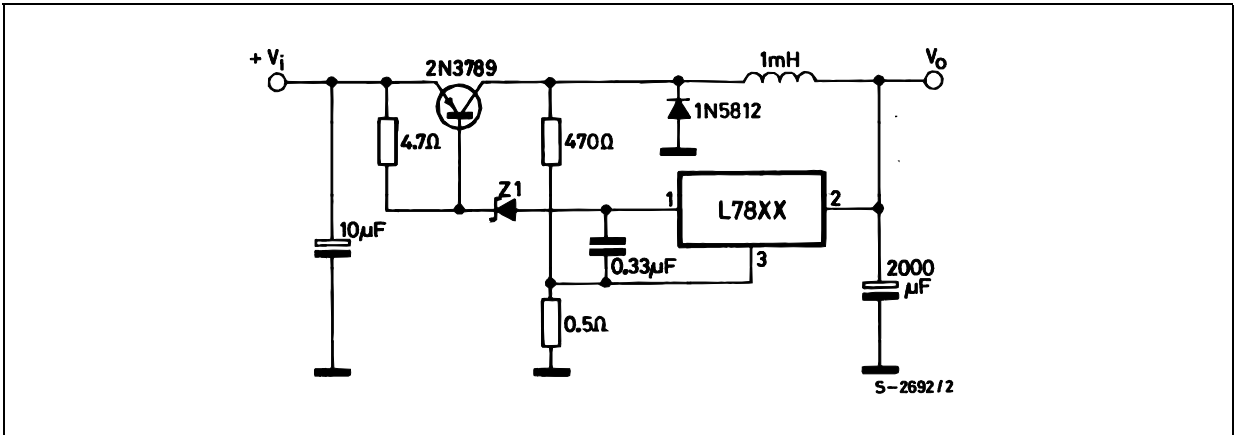


Figure 28: High Input Voltage Circuit

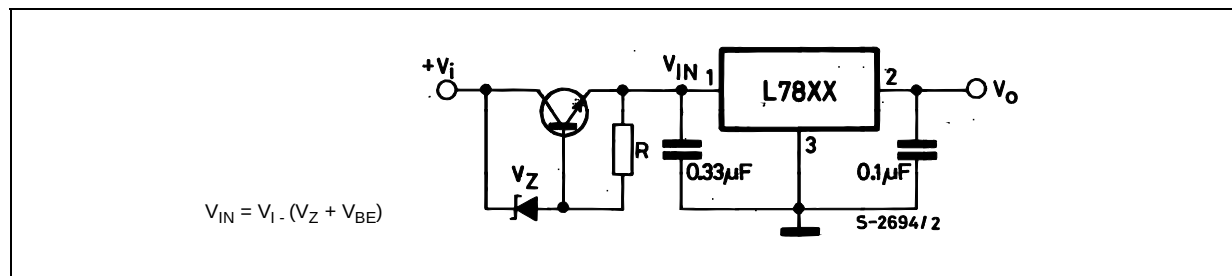


Figure 29: High Input Voltage Circuit

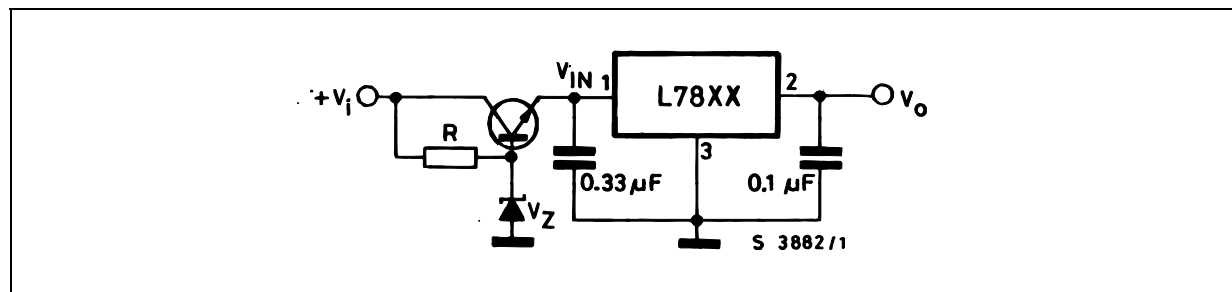


Figure 30: High Output Voltage Regulator

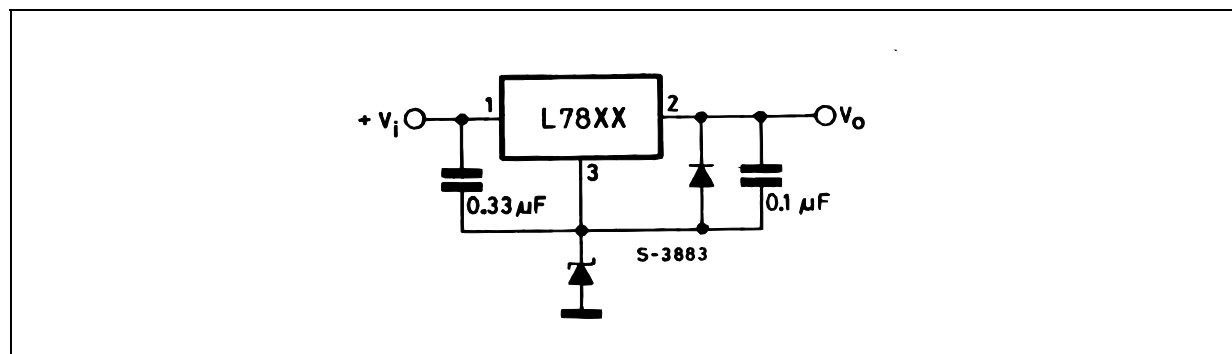


Figure 31: High Input and Output Voltage

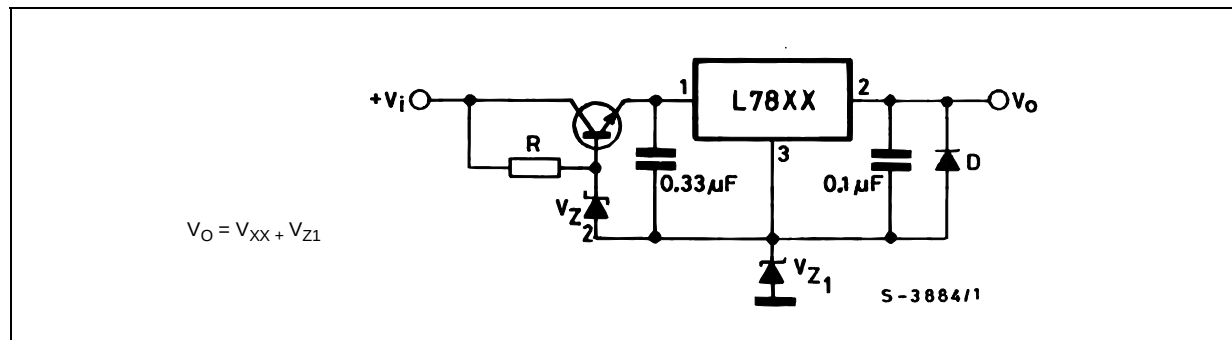


Figure 32: Reducing Power Dissipation with Dropping Resistor

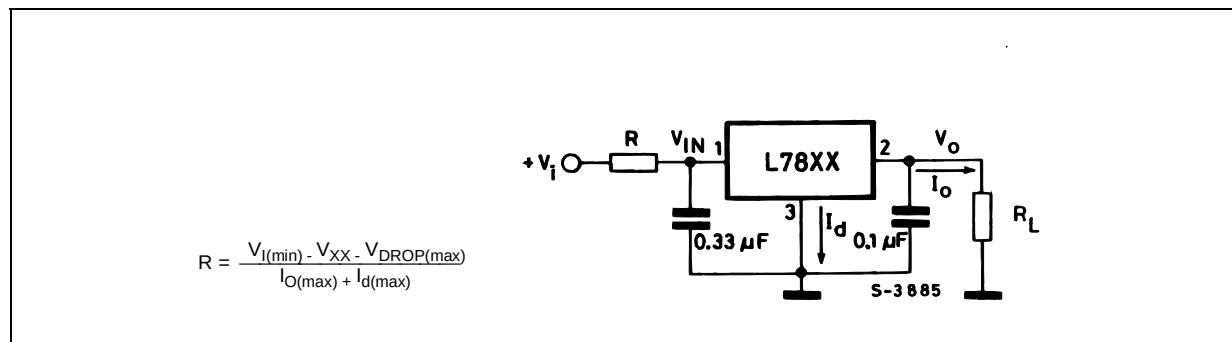


Figure 33: Remote Shutdown

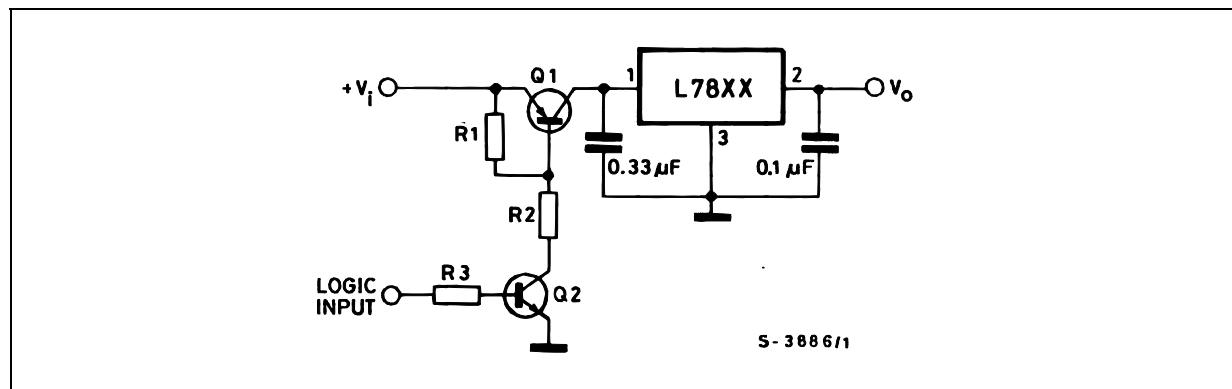
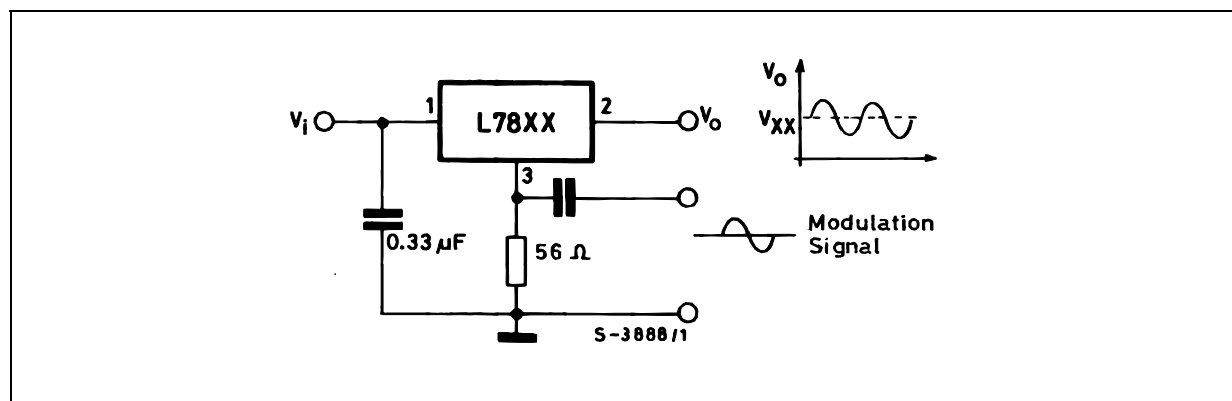
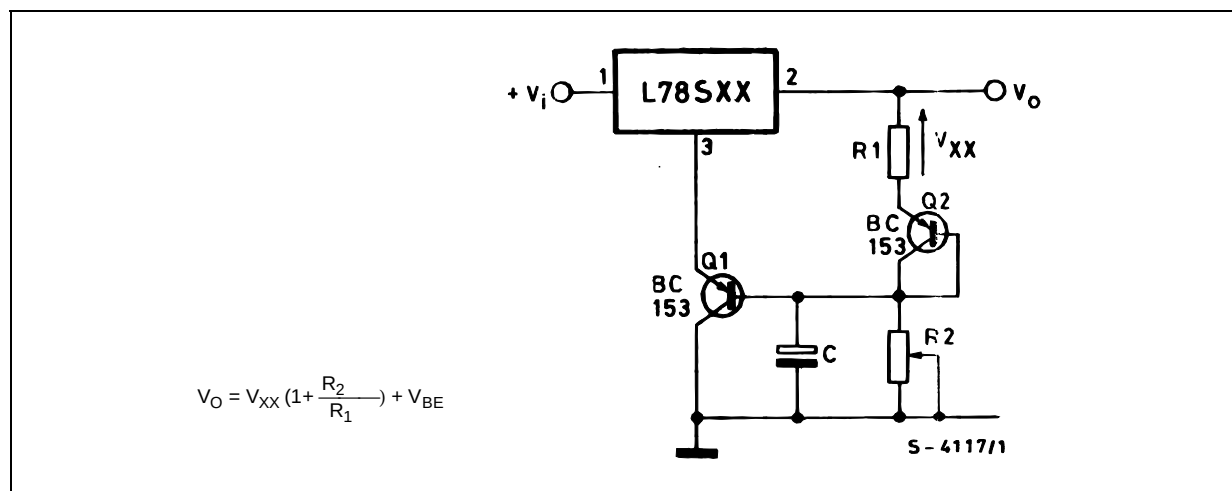


Figure 34: Power AM Modulator (unity voltage gain,  $I_O \leq 0.5$ )



NOTE: The circuit performs well up to 100 KHz.

Figure 35: Adjustable Output Voltage with Temperature Compensation



NOTE: Q<sub>2</sub> is connected as a diode in order to compensate the variation of the Q<sub>1</sub> V<sub>BE</sub> with the temperature. C allows a slow rise time of the V<sub>O</sub>.

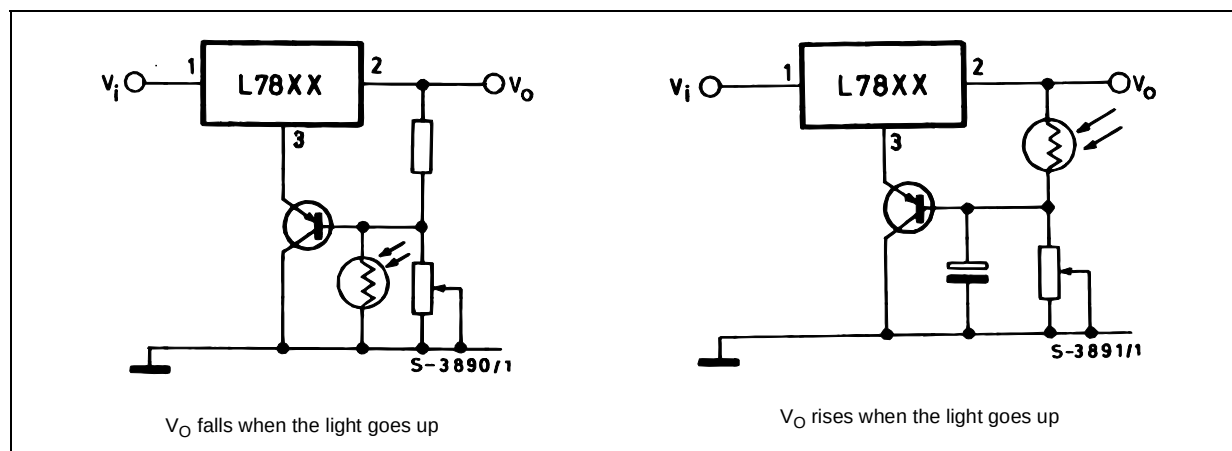
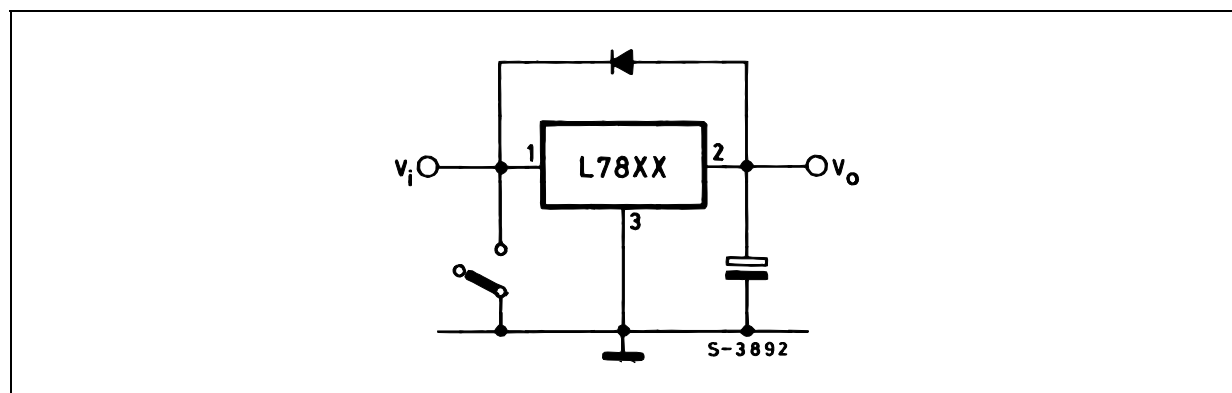
Figure 36: Light Controllers (V<sub>Omin</sub> = V<sub>XX</sub> + V<sub>BE</sub>)

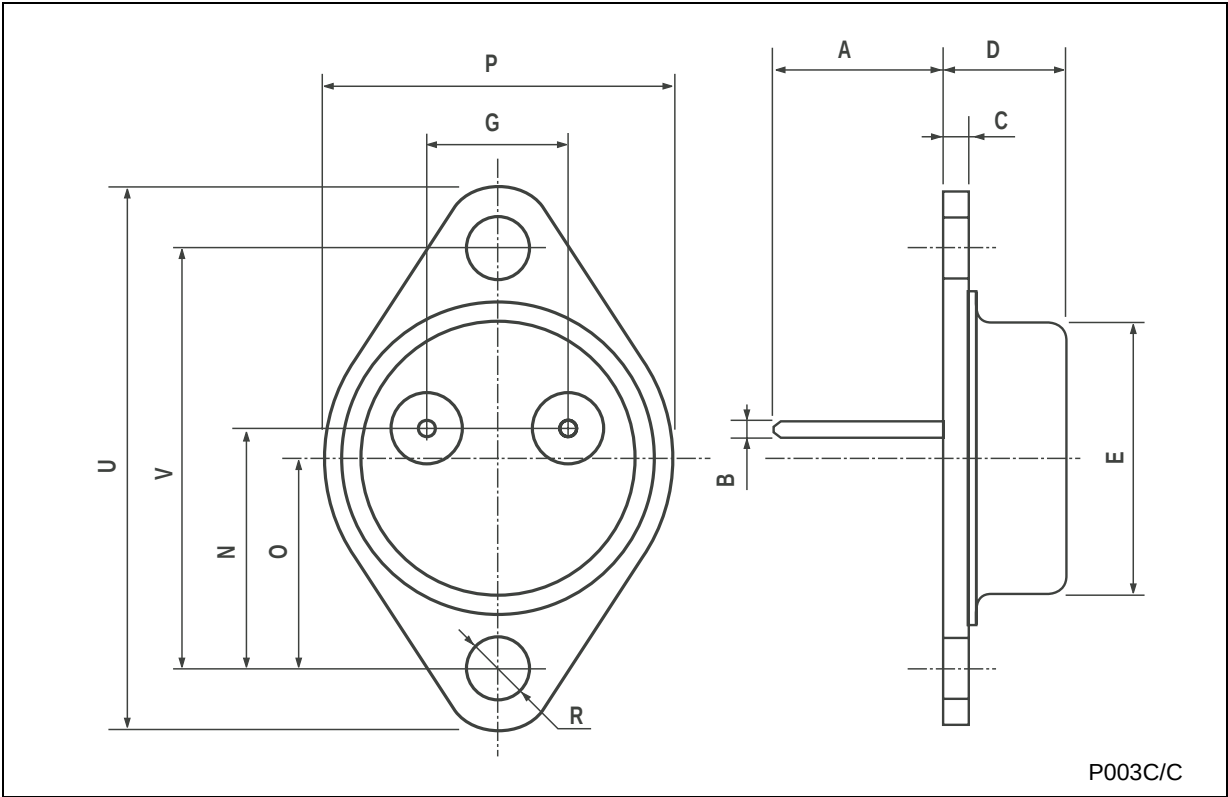
Figure 37: Protection against Input Short-Circuit with High Capacitance Loads



Application 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 decrease 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 by-passes the current from the IC to ground.

TO-3 MECHANICAL DATA

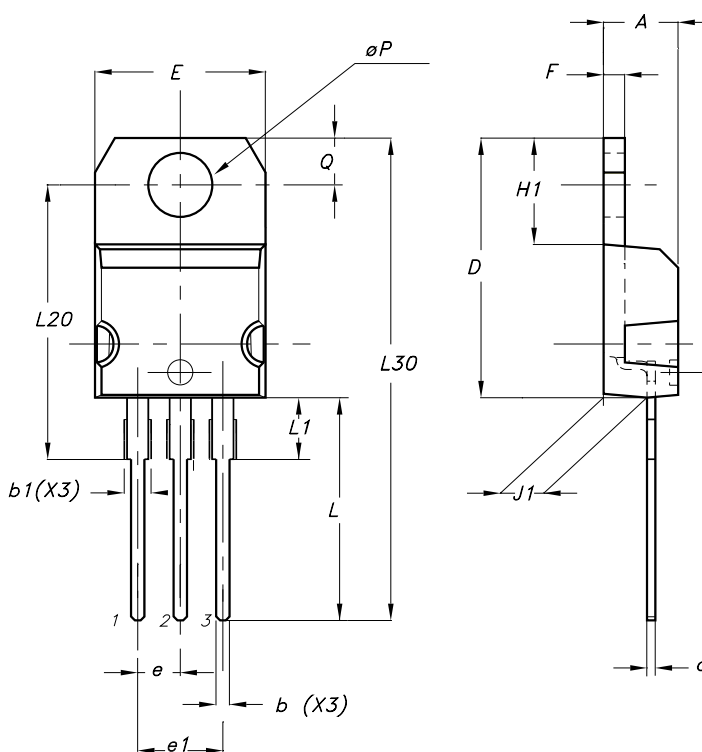
| DIM. | mm.  |       |      | inch  |       |       |
|------|------|-------|------|-------|-------|-------|
|      | MIN. | TYP   | MAX. | MIN.  | TYP.  | MAX.  |
| A    |      | 11.85 |      |       | 0.466 |       |
| B    | 0.96 | 1.05  | 1.10 | 0.037 | 0.041 | 0.043 |
| C    |      |       | 1.70 |       |       | 0.066 |
| D    |      |       | 8.7  |       |       | 0.342 |
| E    |      |       | 20.0 |       |       | 0.787 |
| G    |      | 10.9  |      |       | 0.429 |       |
| N    |      | 16.9  |      |       | 0.665 |       |
| P    |      |       | 26.2 |       |       | 1.031 |
| R    | 3.88 |       | 4.09 | 0.152 |       | 0.161 |
| U    |      |       | 39.5 |       |       | 1.555 |
| V    |      | 30.10 |      |       | 1.185 |       |





## TO-220 (A TYPE) MECHANICAL DATA

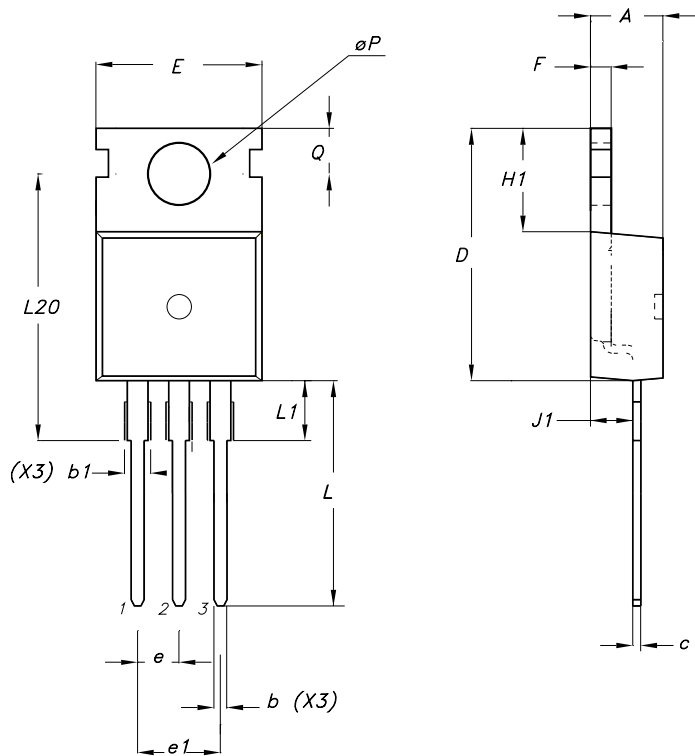
| DIM.     | mm.   |      |       | inch  |       |       |
|----------|-------|------|-------|-------|-------|-------|
|          | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A        | 4.40  |      | 4.60  | 0.173 |       | 0.181 |
| b        | 0.61  |      | 0.88  | 0.024 |       | 0.034 |
| b1       | 1.15  |      | 1.70  | 0.045 |       | 0.067 |
| c        | 0.49  |      | 0.70  | 0.019 |       | 0.027 |
| D        | 15.25 |      | 15.75 | 0.600 |       | 0.620 |
| E        | 10.0  |      | 10.40 | 0.393 |       | 0.409 |
| e        | 2.4   |      | 2.7   | 0.094 |       | 0.106 |
| e1       | 4.95  |      | 5.15  | 0.194 |       | 0.203 |
| F        | 1.23  |      | 1.32  | 0.048 |       | 0.051 |
| H1       | 6.2   |      | 6.6   | 0.244 |       | 0.260 |
| J1       | 2.40  |      | 2.72  | 0.094 |       | 0.107 |
| L        | 13.0  |      | 14.0  | 0.511 |       | 0.551 |
| L1       | 3.5   |      | 3.93  | 0.137 |       | 0.154 |
| L20      |       | 16.4 |       |       | 0.645 |       |
| L30      |       | 28.9 |       |       | 1.138 |       |
| $\phi P$ | 3.75  |      | 3.85  | 0.147 |       | 0.151 |
| Q        | 2.65  |      | 2.95  | 0.104 |       | 0.116 |



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TO-220 (C TYPE) MECHANICAL DATA

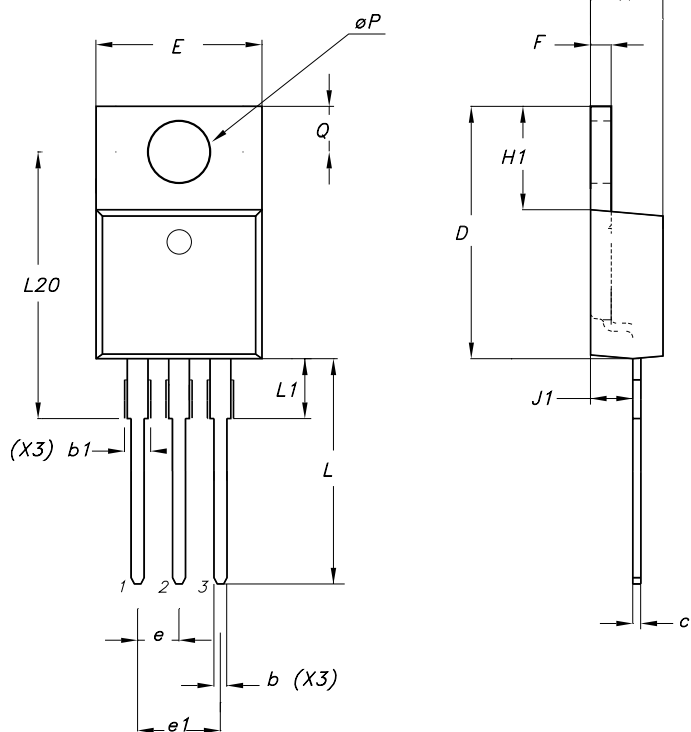
| DIM. | mm.   |       |       | inch  |       |       |
|------|-------|-------|-------|-------|-------|-------|
|      | MIN.  | TYP   | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.30  |       | 4.70  | 0.169 |       | 0.185 |
| b    | 0.70  |       | 0.90  | 0.028 |       | 0.035 |
| b1   | 1.42  |       | 1.62  | 0.056 |       | 0.064 |
| c    | 0.45  |       | 0.60  | 0.018 |       | 0.024 |
| D    |       | 15.70 |       |       | 0.618 |       |
| E    | 9.80  |       | 10.20 | 0.386 |       | 0.402 |
| e    |       | 2.54  |       |       | 0.100 |       |
| e1   |       | 5.08  |       |       | 0.200 |       |
| F    | 1.25  |       | 1.39  | 0.049 |       | 0.055 |
| H1   |       | 6.5   |       |       | 0.256 |       |
| J1   | 2.20  |       | 2.60  | 0.087 |       | 0.202 |
| L    | 12.88 |       | 13.28 | 0.507 |       | 0.523 |
| L1   |       | 3     |       |       | 0.118 |       |
| L20  | 15.70 |       | 16.1  | 0.618 |       | 0.634 |
| L30  |       | 28.9  |       |       | 1.138 |       |
| φP   | 3.50  |       | 3.70  | 0.138 |       | 0.146 |
| Q    | 2.70  |       | 2.90  | 0.106 |       | 0.114 |



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## TO-220 (E TYPE) MECHANICAL DATA

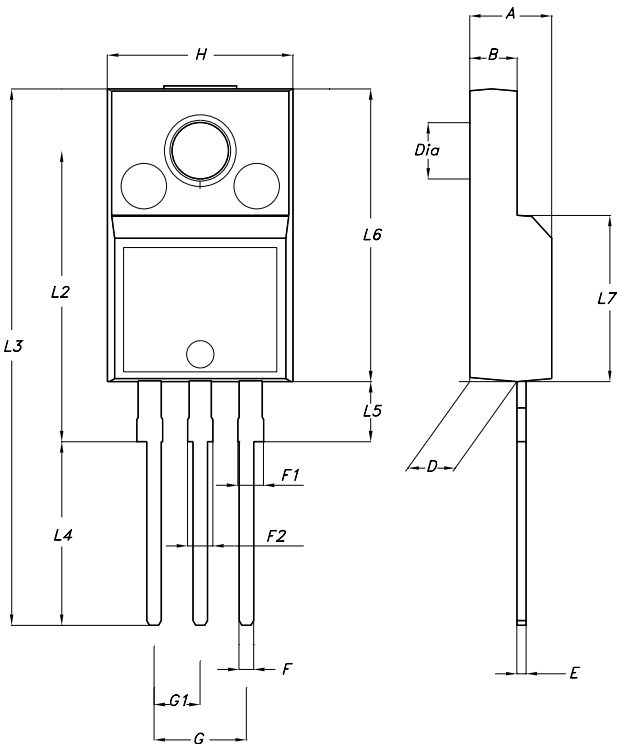
| DIM.     | mm.   |      |       | inch  |       |       |
|----------|-------|------|-------|-------|-------|-------|
|          | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A        | 4.47  |      | 4.67  | 0.176 |       | 0.184 |
| b        | 0.70  |      | 0.91  | 0.028 |       | 0.036 |
| b1       | 1.17  |      | 1.37  | 0.046 |       | 0.054 |
| c        | 0.31  |      | 0.53  | 0.012 |       | 0.021 |
| D        | 14.60 |      | 15.70 | 0.575 |       | 0.618 |
| E        | 9.96  |      | 10.36 | 0.392 |       | 0.408 |
| e        |       | 2.54 |       |       | 0.100 |       |
| e1       |       | 5.08 |       |       | 0.200 |       |
| F        | 1.17  |      | 1.37  | 0.046 |       | 0.054 |
| H1       | 6.1   |      | 6.8   | 0.240 |       | 0.268 |
| J1       | 2.52  |      | 2.82  | 0.099 |       | 0.111 |
| L        | 12.70 |      | 13.80 | 0.500 |       | 0.543 |
| L1       | 3.20  |      | 3.96  | 0.126 |       | 0.156 |
| L20      | 15.21 |      | 16.77 | 0.599 |       | 0.660 |
| $\phi P$ | 3.73  |      | 3.94  | 0.147 |       | 0.155 |
| Q        | 2.59  |      | 2.89  | 0.102 |       | 0.114 |



7655923/A

TO-220FP MECHANICAL DATA

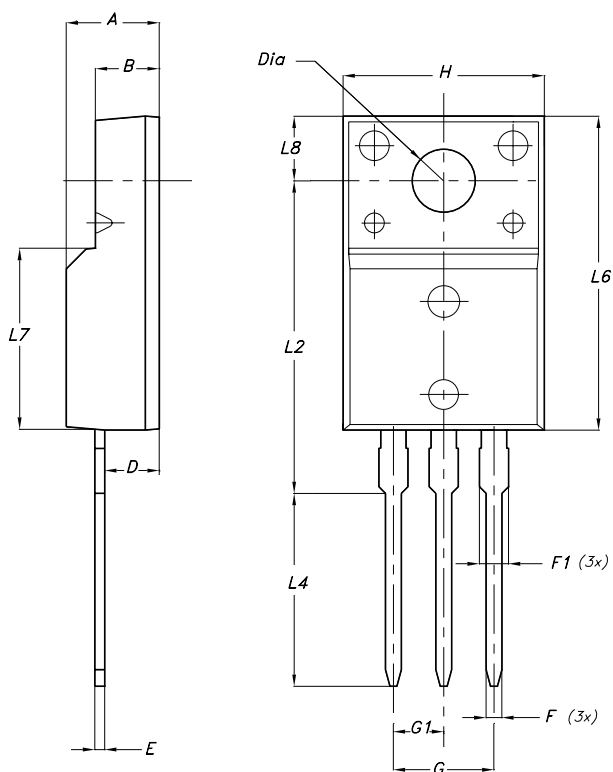
| DIM. | mm.  |     |       | inch  |       |       |
|------|------|-----|-------|-------|-------|-------|
|      | MIN. | TYP | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40 |     | 4.60  | 0.173 |       | 0.181 |
| B    | 2.5  |     | 2.7   | 0.098 |       | 0.106 |
| D    | 2.5  |     | 2.75  | 0.098 |       | 0.108 |
| E    | 0.45 |     | 0.70  | 0.017 |       | 0.027 |
| F    | 0.75 |     | 1     | 0.030 |       | 0.039 |
| F1   | 1.15 |     | 1.50  | 0.045 |       | 0.059 |
| F2   | 1.15 |     | 1.50  | 0.045 |       | 0.059 |
| G    | 4.95 |     | 5.2   | 0.194 |       | 0.204 |
| G1   | 2.4  |     | 2.7   | 0.094 |       | 0.106 |
| H    | 10.0 |     | 10.40 | 0.393 |       | 0.409 |
| L2   |      | 16  |       |       | 0.630 |       |
| L3   | 28.6 |     | 30.6  | 1.126 |       | 1.204 |
| L4   | 9.8  |     | 10.6  | 0.385 |       | 0.417 |
| L5   | 2.9  |     | 3.6   | 0.114 |       | 0.142 |
| L6   | 15.9 |     | 16.4  | 0.626 |       | 0.645 |
| L7   | 9    |     | 9.3   | 0.354 |       | 0.366 |
| DIA. | 3    |     | 3.2   | 0.118 |       | 0.126 |



7012510A-H

## TO-220FM MECHANICAL DATA

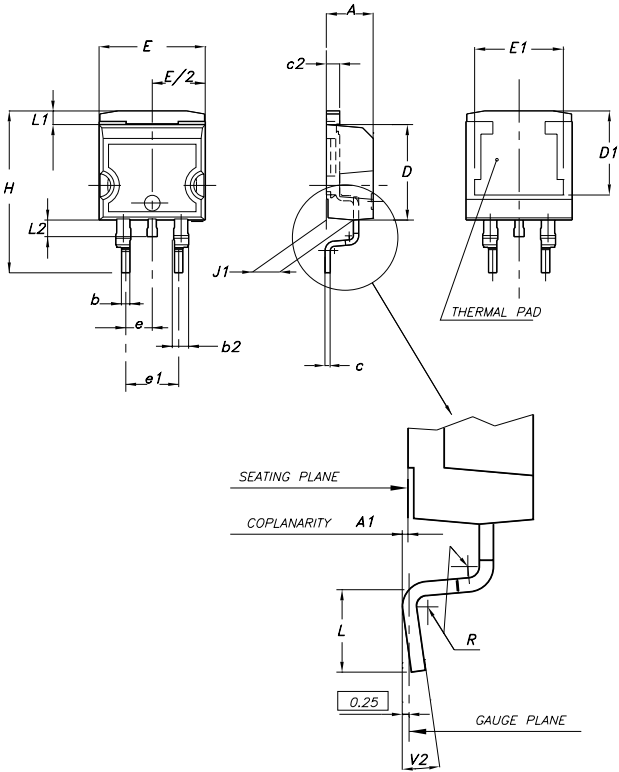
| DIM. | mm.   |      |       | inch  |       |       |
|------|-------|------|-------|-------|-------|-------|
|      | MIN.  | TYP  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.50  |      | 4.90  | 0.177 |       | 0.193 |
| B    | 2.34  |      | 2.74  | 0.092 |       | 0.108 |
| D    | 2.56  |      | 2.96  | 0.101 |       | 0.117 |
| E    | 0.45  | 0.50 | 0.60  | 0.018 | 0.020 | 0.024 |
| F    | 0.70  |      | 0.90  | 0.028 |       | 0.035 |
| F1   |       |      | 1.47  |       |       | 0.058 |
| G    |       | 5.08 |       |       | 0.200 |       |
| G1   | 2.34  | 2.54 | 2.74  | 0.092 | 0.100 | 0.108 |
| H    | 9.96  |      | 10.36 | 0.392 |       | 0.408 |
| L2   |       | 15.8 |       |       | 0.622 |       |
| L4   | 9.45  |      | 10.05 | 0.372 |       | 0.396 |
| L6   | 15.67 |      | 16.07 | 0.617 |       | 0.633 |
| L7   | 8.99  |      | 9.39  | 0.354 |       | 0.370 |
| L8   |       | 3.30 |       |       | 0.130 |       |
| DIA. | 3.08  |      | 3.28  | 0.121 |       | 0.129 |



7012510C-H

D<sup>2</sup>PAK (A TYPE) MECHANICAL DATA

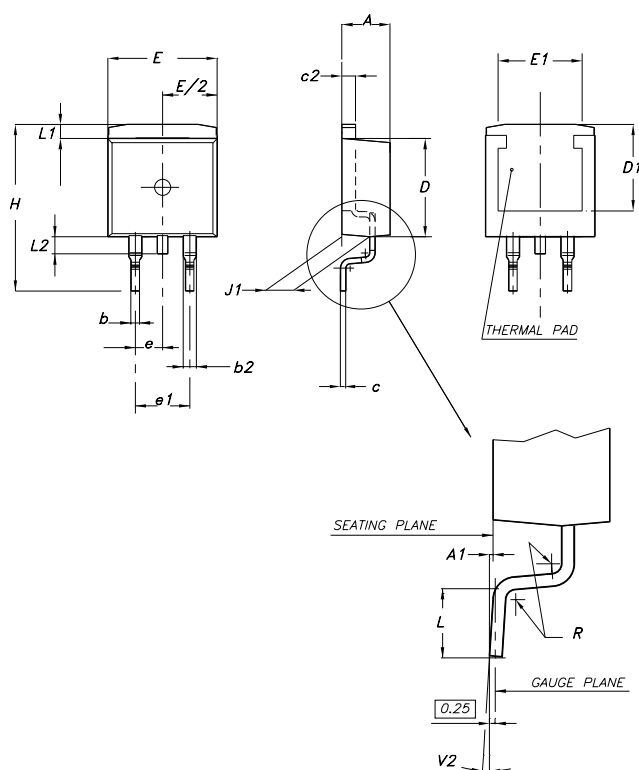
| DIM. | mm.  |      |       | inch  |       |       |
|------|------|------|-------|-------|-------|-------|
|      | MIN. | TYP  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.4  |      | 4.6   | 0.173 |       | 0.181 |
| A1   | 0.03 |      | 0.23  | 0.001 |       | 0.009 |
| b    | 0.7  |      | 0.93  | 0.027 |       | 0.036 |
| b2   | 1.14 |      | 1.7   | 0.044 |       | 0.067 |
| c    | 0.45 |      | 0.6   | 0.017 |       | 0.023 |
| c2   | 1.23 |      | 1.36  | 0.048 |       | 0.053 |
| D    | 8.95 |      | 9.35  | 0.352 |       | 0.368 |
| D1   | 8    |      |       | 0.315 |       |       |
| E    | 10   |      | 10.4  | 0.393 |       | 0.409 |
| E1   | 8.5  |      |       | 0.335 |       |       |
| e    |      | 2.54 |       |       | 0.100 |       |
| e1   | 4.88 |      | 5.28  | 0.192 |       | 0.208 |
| H    | 15   |      | 15.85 | 0.590 |       | 0.624 |
| J1   | 2.49 |      | 2.69  | 0.098 |       | 0.106 |
| L    | 2.29 |      | 2.79  | 0.090 |       | 0.110 |
| L1   | 1.27 |      | 1.4   | 0.050 |       | 0.055 |
| L2   | 1.3  |      | 1.75  | 0.051 |       | 0.069 |
| R    |      | 0.4  |       |       | 0.016 |       |
| V2   | 0°   |      | 8°    | 0°    |       | 8°    |



0079457/J

## D<sup>2</sup>PAK (C TYPE) MECHANICAL DATA

| DIM. | mm.  |       |       | inch  |       |       |
|------|------|-------|-------|-------|-------|-------|
|      | MIN. | TYP   | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.3  |       | 4.7   | 0.169 |       | 0.185 |
| A1   | 0    |       | 0.20  | 0.000 |       | 0.008 |
| b    | 0.70 |       | 0.90  | 0.028 |       | 0.035 |
| b2   | 1.17 |       | 1.37  | 0.046 |       | 0.054 |
| c    | 0.45 | 0.50  | 0.6   | 0.018 | 0.020 | 0.024 |
| c2   | 1.25 | 1.30  | 1.40  | 0.049 | 0.051 | 0.055 |
| D    | 9.0  | 9.2   | 9.4   | 0.354 | 0.362 | 0.370 |
| D1   | 7.5  |       |       | 0.295 |       |       |
| E    | 9.8  |       | 10.2  | 0.386 |       | 0.402 |
| E1   | 7.5  |       |       | 0.295 |       |       |
| e    |      | 2.54  |       |       | 0.100 |       |
| e1   |      | 5.08  |       |       | 0.200 |       |
| H    | 15   | 15.30 | 15.60 | 0.591 | 0.602 | 0.614 |
| J1   | 2.20 |       | 2.60  | 0.087 |       | 0.102 |
| L    | 1.79 |       | 2.79  | 0.070 |       | 0.110 |
| L1   | 1.0  |       | 1.4   | 0.039 |       | 0.055 |
| L2   | 1.2  |       | 1.6   | 0.047 |       | 0.063 |
| R    |      | 0.3   |       |       | 0.012 |       |
| V2   | 0°   |       | 3°    | 0°    |       | 3°    |



0079457/J

Tape & Reel D<sup>2</sup>PAK-P<sup>2</sup>PAK-D<sup>2</sup>PAK/A-P<sup>2</sup>PAK/A MECHANICAL DATA

| DIM. | mm.   |       |       | inch  |       |       |
|------|-------|-------|-------|-------|-------|-------|
|      | MIN.  | TYP   | MAX.  | MIN.  | TYP.  | MAX.  |
| A    |       |       | 180   |       |       | 7.086 |
| C    | 12.8  | 13.0  | 13.2  | 0.504 | 0.512 | 0.519 |
| D    | 20.2  |       |       | 0.795 |       |       |
| N    | 60    |       |       | 2.362 |       |       |
| T    |       |       | 14.4  |       |       | 0.567 |
| Ao   | 10.50 | 10.6  | 10.70 | 0.413 | 0.417 | 0.421 |
| Bo   | 15.70 | 15.80 | 15.90 | 0.618 | 0.622 | 0.626 |
| Ko   | 4.80  | 4.90  | 5.00  | 0.189 | 0.193 | 0.197 |
| Po   | 3.9   | 4.0   | 4.1   | 0.153 | 0.157 | 0.161 |
| P    | 11.9  | 12.0  | 12.1  | 0.468 | 0.472 | 0.476 |

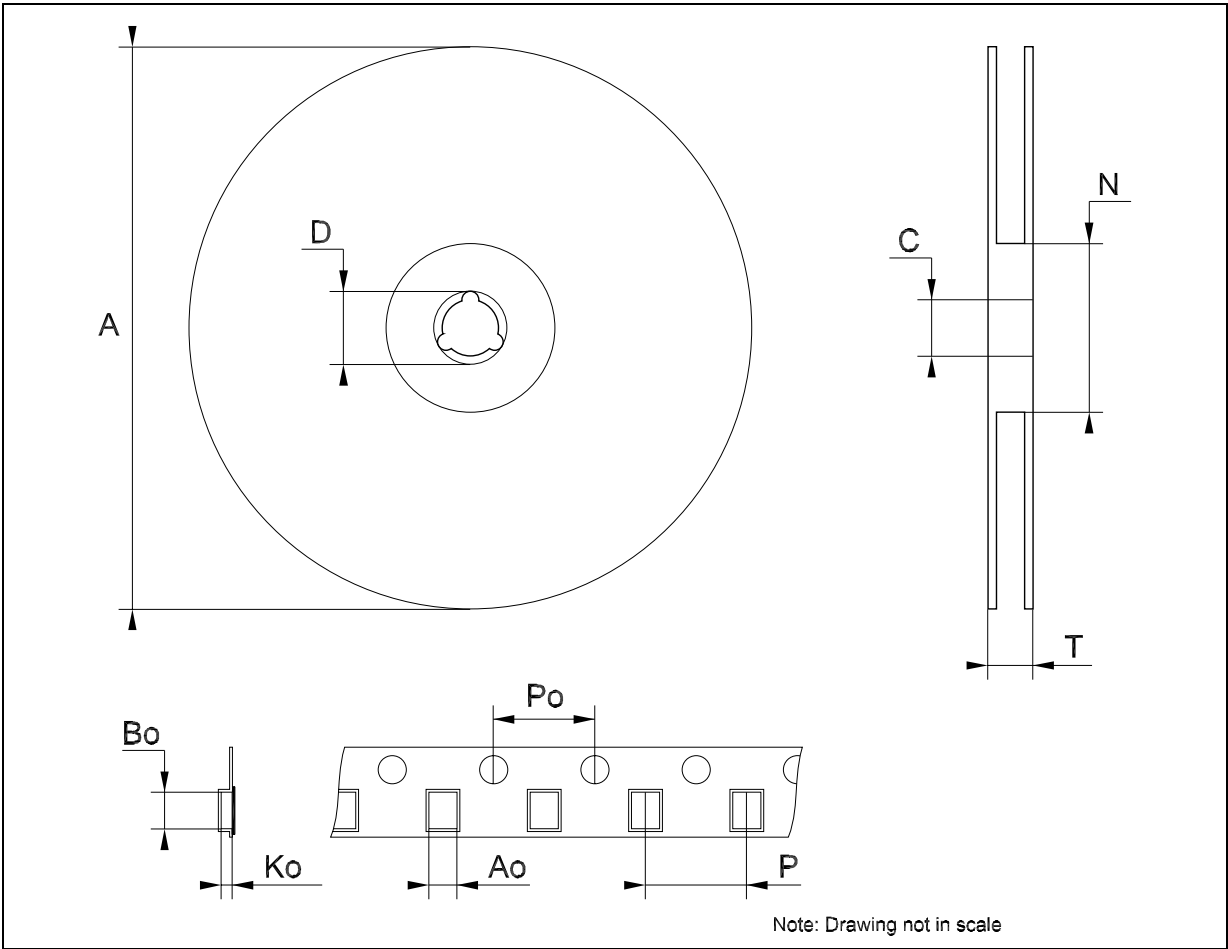




Table 24: Revision History

| Date        | Revision | Description of Changes |
|-------------|----------|------------------------|
| 09-Nov-2004 | 12       | Add New Part Number.   |

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