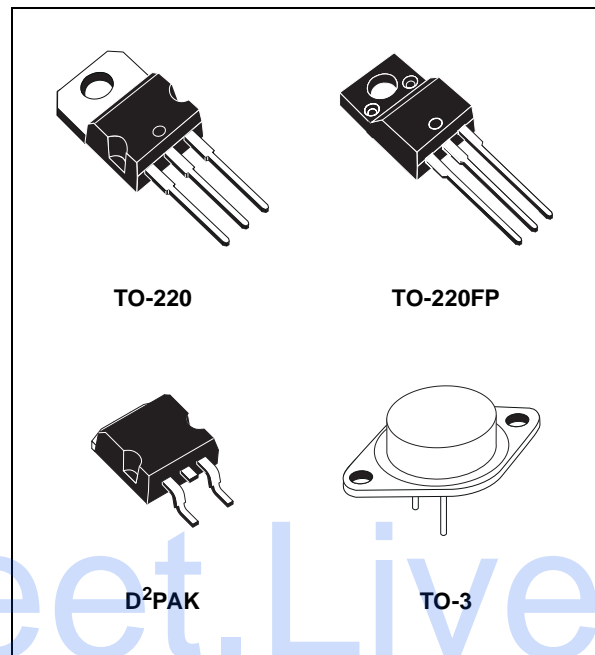


POSITIVE VOLTAGE REGULATORS

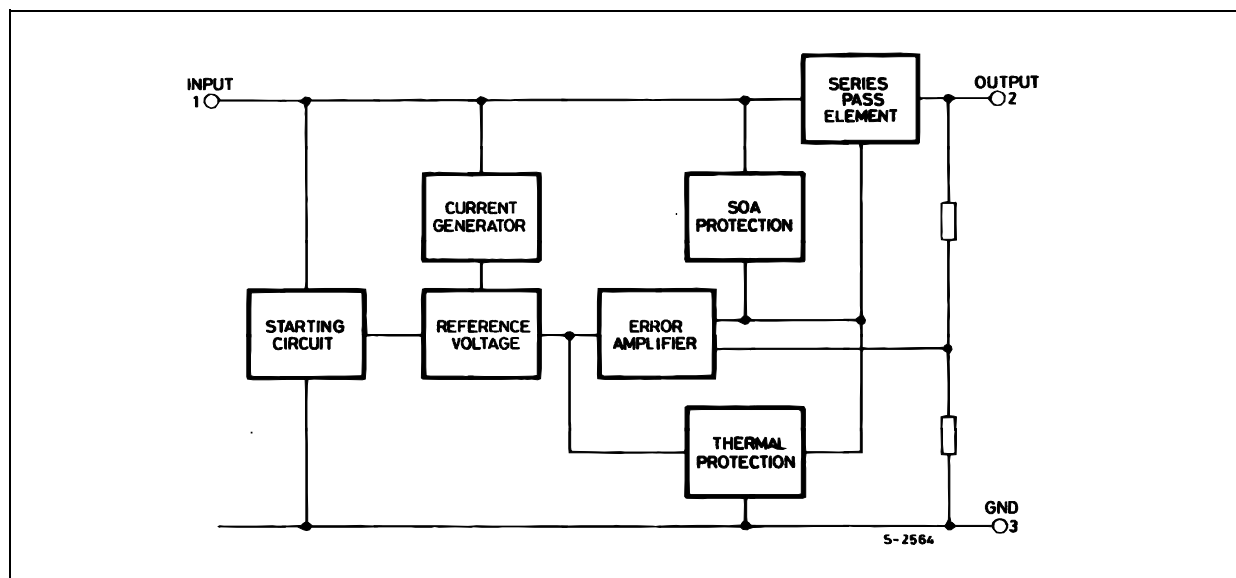
- OUTPUT CURRENT TO 1.5A
- OUTPUT VOLTAGES OF 5; 5.2; 6; 8; 8.5; 9; 12; 15; 18; 24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION

DESCRIPTION

The L7800 series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-3 and D²PAK 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.



SCHEMATIC DIAGRAM



L7800 SERIES

ABSOLUTE MAXIMUM RATINGS

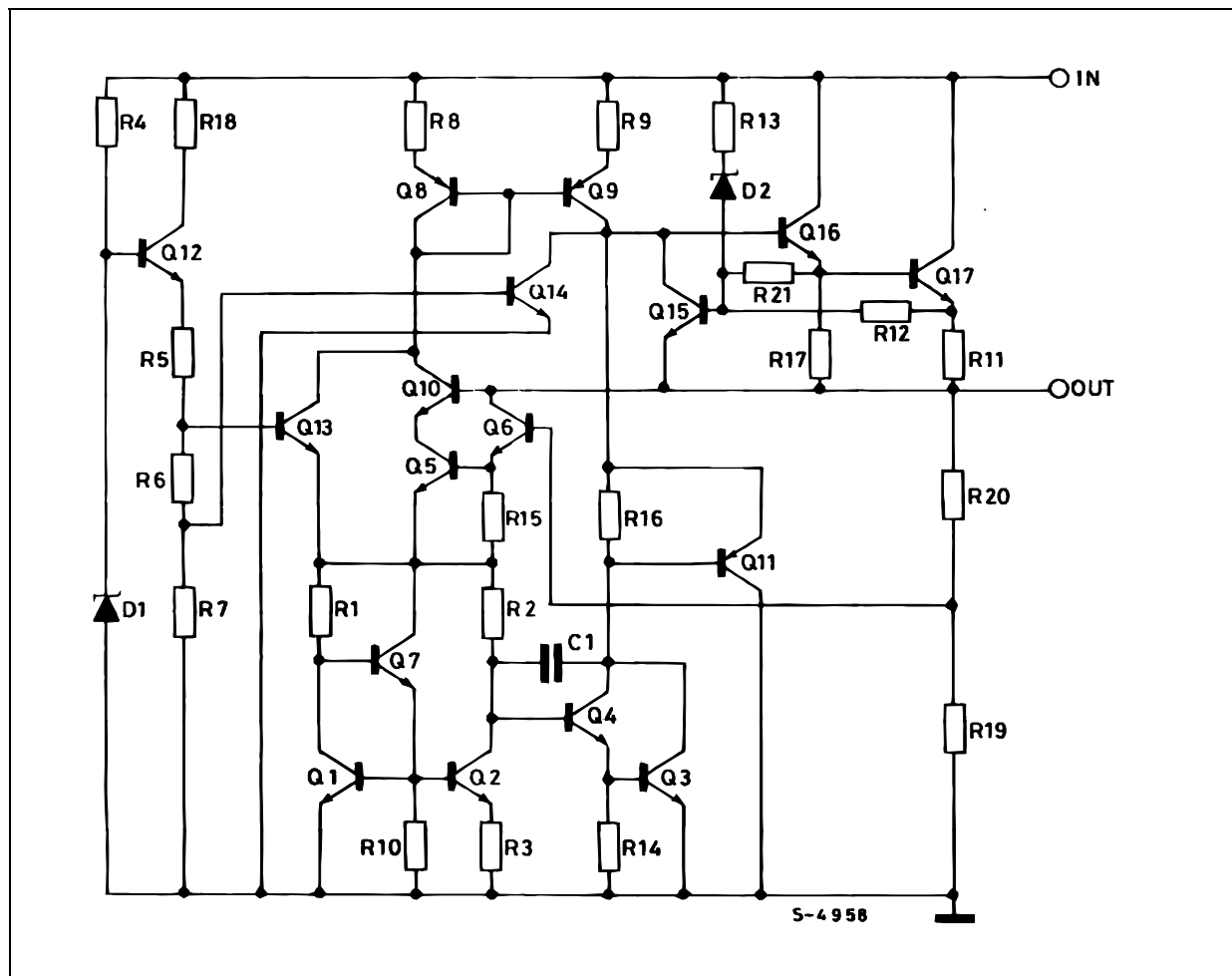
| Symbol | Parameter ² | | Value | Unit |
|-----------|--------------------------------------|-----------------------|--------------------|------|
| V_I | DC Input Voltage | for $V_O= 5$ to $18V$ | 35 | V |
| | | for $V_O= 20, 24V$ | 40 | |
| I_O | Output Current | | Internally Limited | |
| P_{tot} | Power Dissipation | | Internally Limited | |
| T_{stg} | Storage Temperature Range | | -65 to 150 | °C |
| T_{op} | 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.

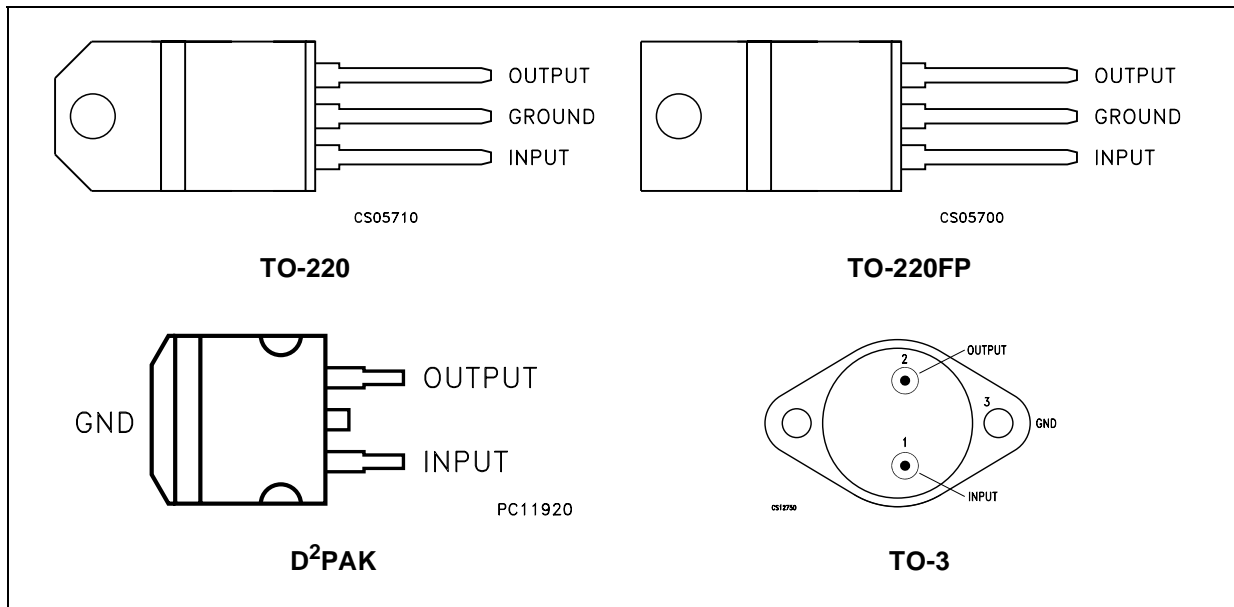
THERMAL DATA

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

SCHEMATIC DIAGRAM



CONNECTION DIAGRAM (top view)



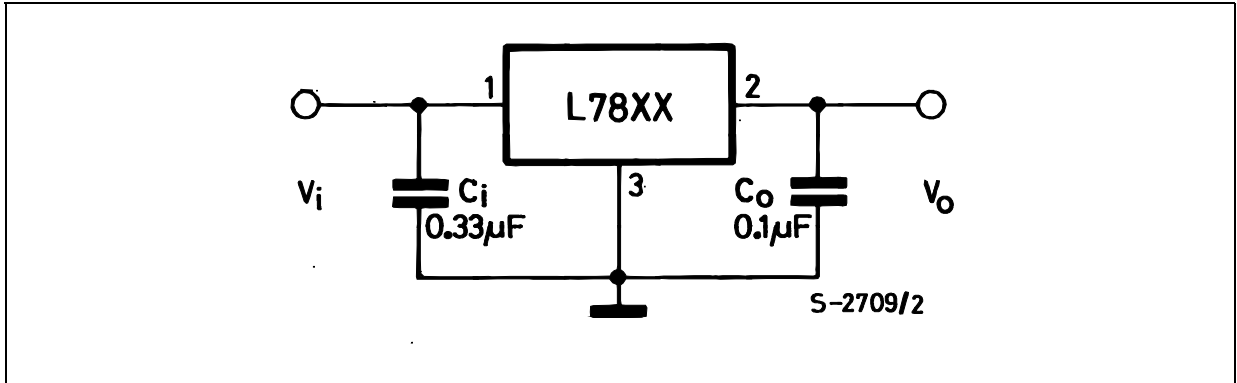
ORDERING CODES

| TYPE | TO-220 | D ² PAK (*) | TO-220FP | TO-3 | OUTPUT VOLTAGE |
|--------|---------|------------------------|----------|---------|----------------|
| L7805 | | | | L7805T | 5 V |
| L7805C | L7805CV | L7805CD2T | L7805CP | L7805CT | 5 V |
| L7852C | L7852CV | L7852CD2T | L7852CP | L7852CT | 5.2 V |
| L7806 | | | | L7806T | 6 V |
| L7806C | L7806CV | L7806CD2T | L7806CP | L7806CT | 6 V |
| L7808 | | | | L7808T | 8 V |
| L7808C | L7808CV | L7808CD2T | L7808CP | L7808CT | 8 V |
| L7885C | L7885CV | L7885CD2T | L7885CP | L7885CT | 8.5 V |
| L7809C | L7809CV | L7809CD2T | L7809CP | L7809CT | 9 V |
| L7812 | | | | L7812T | 12 V |
| L7812C | L7812CV | L7812CD2T | L7812CP | L7812CT | 12 V |
| L7815 | | | | L7815T | 15 V |
| L7815C | L7815CV | L7815CD2T | L7815CP | L7815CT | 15 V |
| L7818 | | | | L7818T | 18 V |
| L7818C | L7818CV | L7818CD2T | L7818CP | L7818CT | 18 V |
| L7820 | | | | L7820T | 20 V |
| L7820C | L7820CV | L7820CD2T | L7820CP | L7820CT | 20 V |
| L7824 | | | | L7824T | 24 V |
| L7824C | L7824CV | L7824CD2T | L7824CP | L7824CT | 24 V |

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

L7800 SERIES

APPLICATION CIRCUITS



TEST CIRCUITS

Figure 1 : DC Parameter

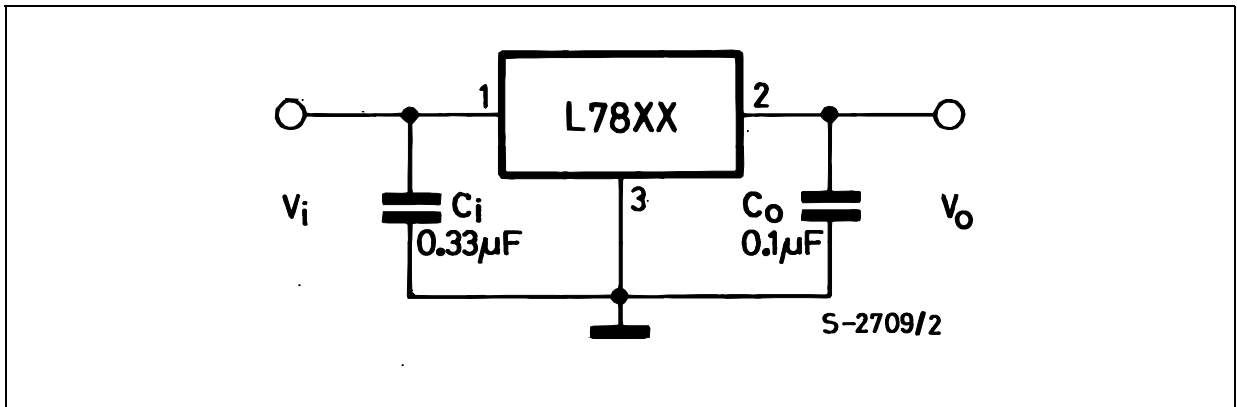


Figure 2 : Load Regulation

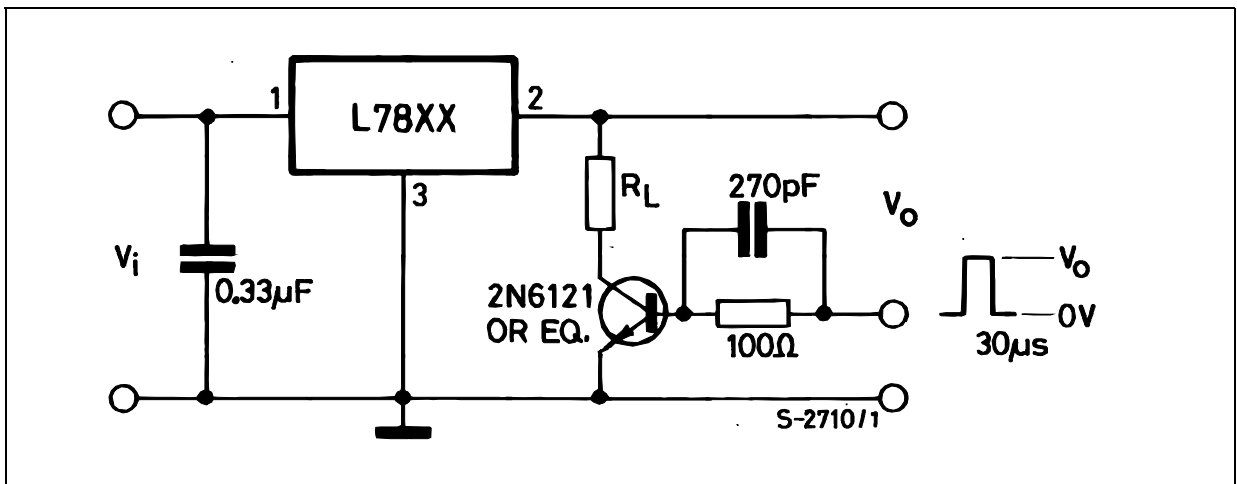
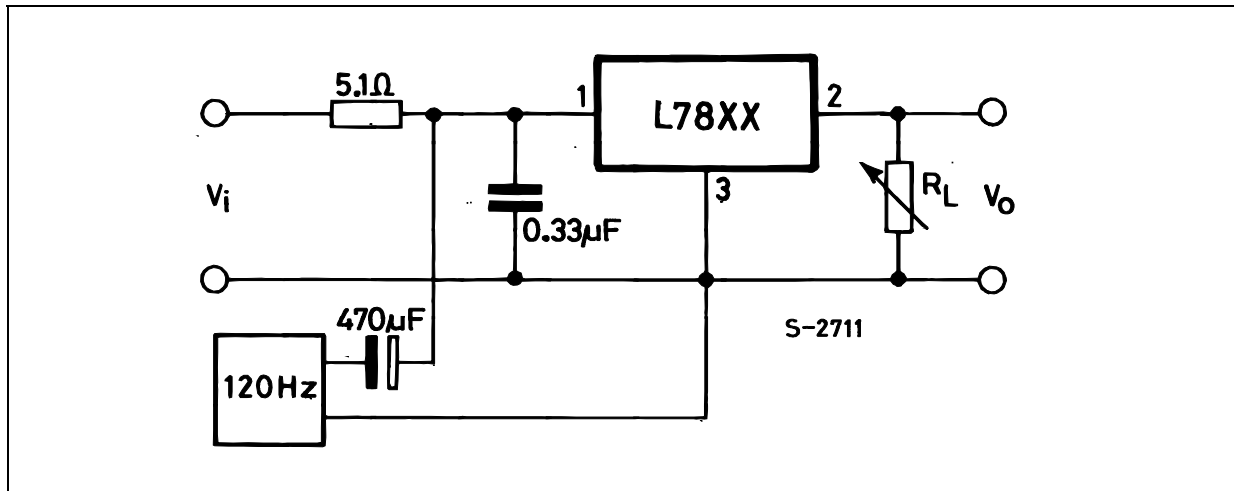


Figure 3 : Ripple Rejection



ELECTRICAL CHARACTERISTICS OF L7805 (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 10\text{V}$, $I_O = 500\text{ mA}$, $C_I = 0.33\ \mu\text{F}$, $C_O = 0.1\ \mu\text{F}$ 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 | $I_O = 5\text{ mA to } 1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 8\text{ to } 20\text{ V}$ | 4.65 | 5 | 5.35 | V |
| ΔV_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 | |
| ΔV_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 |
| ΔI_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 Ω |
| 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.

L7800 SERIES

ELECTRICAL CHARACTERISTICS OF L7806 (refer to the test circuits, $T_J = -55$ to 150°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 | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 9\text{ to }21\text{ V}$ | 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 |
| ΔI_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 Ω |
| 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.

ELECTRICAL CHARACTERISTICS OF L7808 (refer to the test circuits, $T_J = -55$ to 150°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 | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 11.5\text{ to }23\text{ V}$ | 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 |
| ΔI_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 Ω |
| 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.

ELECTRICAL CHARACTERISTICS OF L7812 (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 19\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 15.5$ to 27 V | 11.4 | 12 | 12.6 | V |
| $\Delta V_{O(*)}$ | Line Regulation | $V_I = 14.5$ to 30 V $T_J = 25^\circ\text{C}$ | | | 120 | mV |
| | | $V_I = 16$ to 22 V $T_J = 25^\circ\text{C}$ | | | 60 | |
| $\Delta V_{O(*)}$ | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 100 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 60 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 6 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 15$ to 30 V | | | 0.8 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | 1.5 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$ | | | 40 | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 15$ to 25 V $f = 120\text{Hz}$ | 61 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | 2.5 | V |
| R_O | Output Resistance | $f = 1$ KHz | | 18 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

ELECTRICAL CHARACTERISTICS OF L7815 (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 23\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 18.5$ to 30 V | 14.25 | 15 | 15.75 | V |
| $\Delta V_{O(*)}$ | Line Regulation | $V_I = 17.5$ to 30 V $T_J = 25^\circ\text{C}$ | | | 150 | mV |
| | | $V_I = 20$ to 26 V $T_J = 25^\circ\text{C}$ | | | 75 | |
| $\Delta V_{O(*)}$ | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 150 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 75 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 6 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 18.5$ to 30 V | | | 0.8 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | 1.8 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$ | | | 40 | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 18.5$ to 28.5 V $f = 120\text{Hz}$ | 60 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | 2.5 | V |
| R_O | Output Resistance | $f = 1$ KHz | | 19 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

L7800 SERIES

ELECTRICAL CHARACTERISTICS OF L7818 (refer to the test circuits, $T_J = -55$ to 150°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 | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 22\text{ to }33\text{ V}$ | 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 |
| ΔI_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 Ω |
| 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.

ELECTRICAL CHARACTERISTICS OF L7820 (refer to the test circuits, $T_J = -55$ to 150°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 | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 24\text{ to }35\text{ V}$ | 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 |
| ΔI_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 Ω |
| 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.

ELECTRICAL CHARACTERISTICS OF L7824 (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 33\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 28$ to 38 V | 22.8 | 24 | 25.2 | V |
| ΔV_O (*) | Line Regulation | $V_I = 27$ to 38 V $T_J = 25^\circ\text{C}$ | | | 240 | mV |
| | | $V_I = 30$ to 36 V $T_J = 25^\circ\text{C}$ | | | 120 | |
| ΔV_O (*) | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 240 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 120 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 6 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 28$ to 38 V | | | 0.8 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | 3 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$ | | | 40 | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 28$ to 38 V $f = 120\text{Hz}$ | 56 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | 2.5 | V |
| R_O | Output Resistance | $f = 1$ KHz | | 28 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

ELECTRICAL CHARACTERISTICS OF L7805C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 10\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 7$ to 20 V | 4.75 | 5 | 5.25 | V |
| ΔV_O (*) | Line Regulation | $V_I = 7$ to 25 V $T_J = 25^\circ\text{C}$ | | 3 | 100 | mV |
| | | $V_I = 8$ to 12 V $T_J = 25^\circ\text{C}$ | | 1 | 50 | |
| ΔV_O (*) | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 100 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 50 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 7$ to 25 V | | | 0.8 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -1.1 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$ | | 40 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 8$ to 18 V $f = 120\text{Hz}$ | 62 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 17 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

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ELECTRICAL CHARACTERISTICS OF L7852C (refer to the test circuits, $T_J = -55$ to 150°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 | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 8\text{ to }20\text{ V}$ | 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 |
| ΔI_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 Ω |
| 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.

ELECTRICAL CHARACTERISTICS OF L7806C (refer to the test circuits, $T_J = -55$ to 150°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 | $I_O = 5\text{ mA to }1\text{ A}$ $P_O \leq 15\text{W}$ $V_I = 8\text{ to }21\text{ V}$ | 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 |
| ΔI_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 Ω |
| 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.

ELECTRICAL CHARACTERISTICS OF L7808C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 14\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 10.5$ to 25 V | 7.6 | 8 | 8.4 | V |
| ΔV_O (*) | Line Regulation | $V_I = 10.5$ to 25 V $T_J = 25^\circ\text{C}$ | | | 160 | mV |
| | | $V_I = 11$ to 17 V $T_J = 25^\circ\text{C}$ | | | 80 | |
| ΔV_O (*) | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 160 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 80 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 10.5$ to 25 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -0.8 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$ | | 52 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 11.5$ to 21.5 V $f = 120\text{Hz}$ | 56 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 16 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

ELECTRICAL CHARACTERISTICS OF L7885C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 14.5\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 11$ to 26 V | 8.1 | 8.5 | 8.9 | V |
| ΔV_O (*) | Line Regulation | $V_I = 11$ to 27 V $T_J = 25^\circ\text{C}$ | | | 160 | mV |
| | | $V_I = 11.5$ to 17.5 V $T_J = 25^\circ\text{C}$ | | | 80 | |
| ΔV_O (*) | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 160 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 80 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 11$ to 27 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -0.8 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$ | | 55 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 12$ to 22 V $f = 120\text{Hz}$ | 56 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 16 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

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ELECTRICAL CHARACTERISTICS OF L7809C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 15\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|----------------------------|---|------|------|------|----------------------|
| V_O | Output Voltage | $T_J = 25^\circ\text{C}$ | 8.65 | 9 | 9.35 | V |
| V_O | Output Voltage | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 11.5$ to 26 V | 8.55 | 9 | 9.45 | V |
| ΔV_O (*) | Line Regulation | $V_I = 11.5$ to 26 V $T_J = 25^\circ\text{C}$ | | | 180 | mV |
| | | $V_I = 12$ to 18 V $T_J = 25^\circ\text{C}$ | | | 90 | |
| ΔV_O (*) | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 180 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 90 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 11.5$ to 26 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -1 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$ | | 70 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 12$ to 23 V $f = 120\text{Hz}$ | 55 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 17 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

ELECTRICAL CHARACTERISTICS OF L7812C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 19\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 14.5$ to 27 V | 11.4 | 12 | 12.6 | V |
| ΔV_O (*) | Line Regulation | $V_I = 14.5$ to 30 V $T_J = 25^\circ\text{C}$ | | | 240 | mV |
| | | $V_I = 16$ to 22 V $T_J = 25^\circ\text{C}$ | | | 120 | |
| ΔV_O (*) | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 240 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 120 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 14.5$ to 30 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -1 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$ | | 75 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 15$ to 25 V $f = 120\text{Hz}$ | 55 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 18 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

ELECTRICAL CHARACTERISTICS OF L7815C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 23\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 17.5$ to 30 V | 14.25 | 15 | 15.75 | V |
| $\Delta V_{O(*)}$ | Line Regulation | $V_I = 17.5$ to 30 V $T_J = 25^\circ\text{C}$ | | | 300 | mV |
| | | $V_I = 20$ to 26 V $T_J = 25^\circ\text{C}$ | | | 150 | |
| $\Delta V_{O(*)}$ | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 300 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 150 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 17.5$ to 30 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -1 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$ | | 90 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 18.5$ to 28.5 V $f = 120\text{Hz}$ | 54 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 19 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

ELECTRICAL CHARACTERISTICS OF L7818C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 26\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 21$ to 33 V | 17.1 | 18 | 18.9 | V |
| $\Delta V_{O(*)}$ | Line Regulation | $V_I = 21$ to 33 V $T_J = 25^\circ\text{C}$ | | | 360 | mV |
| | | $V_I = 24$ to 30 V $T_J = 25^\circ\text{C}$ | | | 180 | |
| $\Delta V_{O(*)}$ | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 360 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 180 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 21$ to 33 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -1 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$ | | 110 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 22$ to 32 V $f = 120\text{Hz}$ | 53 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 22 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

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ELECTRICAL CHARACTERISTICS OF L7820C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 28\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 23$ to 35 V | 19 | 20 | 21 | V |
| $\Delta V_O(^*)$ | Line Regulation | $V_I = 22.5$ to 35 V $T_J = 25^\circ\text{C}$ | | | 400 | mV |
| | | $V_I = 26$ to 32 V $T_J = 25^\circ\text{C}$ | | | 200 | |
| $\Delta V_O(^*)$ | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 400 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 200 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 23$ to 35 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -1 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$ | | 150 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 24$ to 35 V $f = 120\text{Hz}$ | 52 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 24 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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.

ELECTRICAL CHARACTERISTICS OF L7824C (refer to the test circuits, $T_J = -55$ to 150°C , $V_I = 33\text{V}$, $I_O = 500$ mA, $C_I = 0.33$ μF , $C_O = 0.1$ μF 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 | $I_O = 5$ mA to 1 A $P_O \leq 15\text{W}$ $V_I = 27$ to 38 V | 22.8 | 24 | 25.2 | V |
| $\Delta V_O(^*)$ | Line Regulation | $V_I = 27$ to 38 V $T_J = 25^\circ\text{C}$ | | | 480 | mV |
| | | $V_I = 30$ to 36 V $T_J = 25^\circ\text{C}$ | | | 240 | |
| $\Delta V_O(^*)$ | Load Regulation | $I_O = 5$ mA to 1.5 A $T_J = 25^\circ\text{C}$ | | | 480 | mV |
| | | $I_O = 250$ to 750 mA $T_J = 25^\circ\text{C}$ | | | 240 | |
| I_d | Quiescent Current | $T_J = 25^\circ\text{C}$ | | | 8 | mA |
| ΔI_d | Quiescent Current Change | $I_O = 5$ mA to 1 A | | | 0.5 | mA |
| | | $V_I = 27$ to 38 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O = 5$ mA | | -1.5 | | mV/ $^\circ\text{C}$ |
| eN | Output Noise Voltage | $B = 10\text{Hz}$ to 100KHz $T_J = 25^\circ\text{C}$ | | 170 | | $\mu\text{V}/V_O$ |
| SVR | Supply Voltage Rejection | $V_I = 28$ to 38 V $f = 120\text{Hz}$ | 50 | | | dB |
| V_d | Dropout Voltage | $I_O = 1$ A $T_J = 25^\circ\text{C}$ | | 2 | | V |
| R_O | Output Resistance | $f = 1$ KHz | | 28 | | m Ω |
| I_{sc} | Short Circuit Current | $V_I = 35$ 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 4 : Dropout Voltage vs Junction Temperature

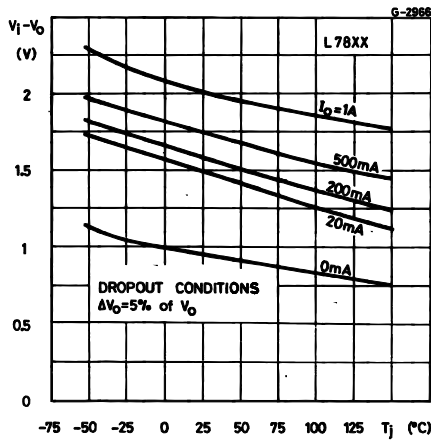


Figure 7 : Output Voltage vs Junction Temperature

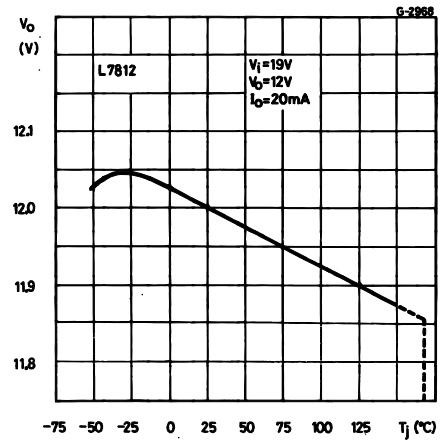


Figure 5 : Peak Output Current vs Input/output Differential Voltage

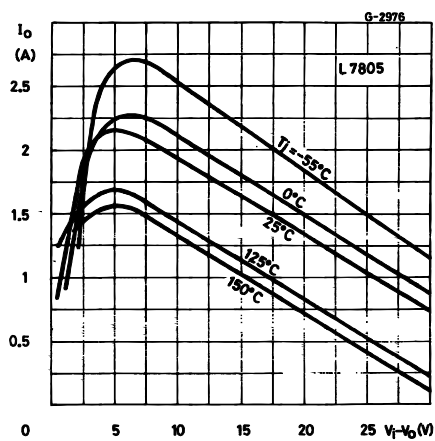


Figure 8 : Output Impedance vs Frequency

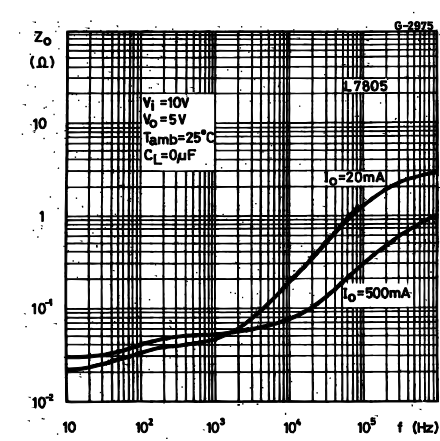


Figure 6 : Supply Voltage Rejection vs Frequency

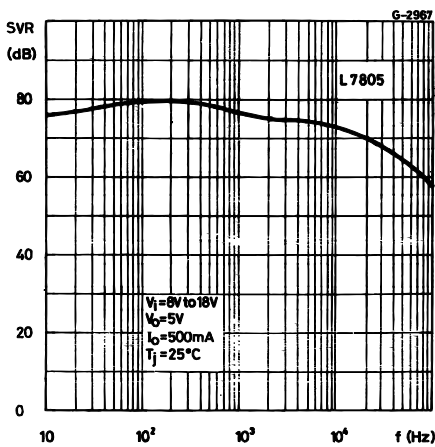


Figure 9 : Quiescent Current vs Junction Temperature

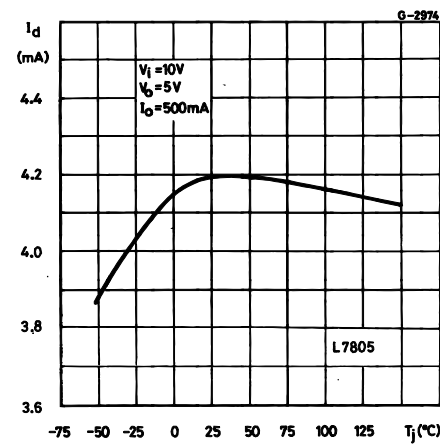


Figure 10 : Load Transient Response

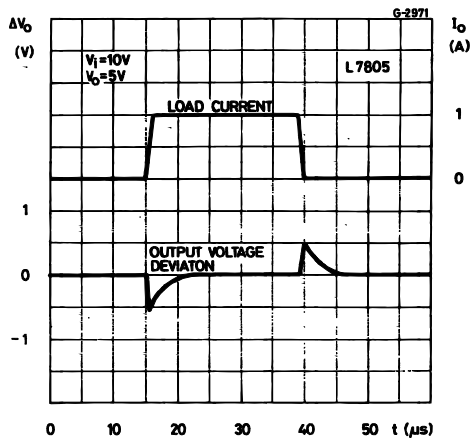


Figure 12 : Quiescent Current vs Input Voltage

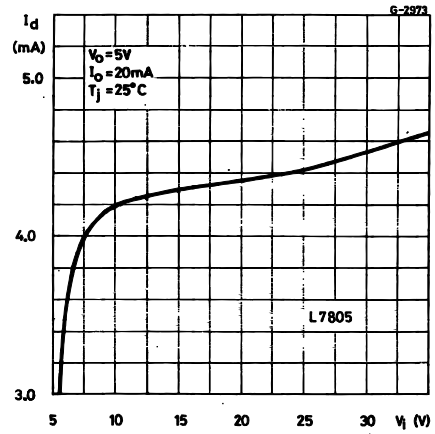


Figure 11 : Line Transient Response

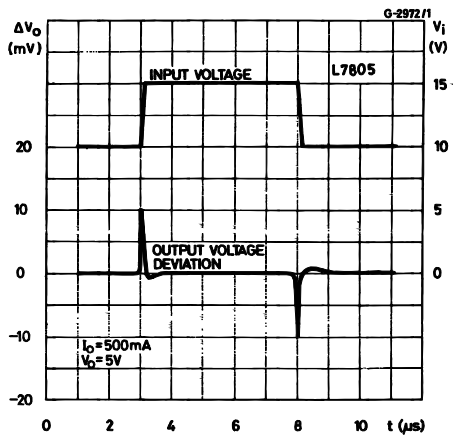
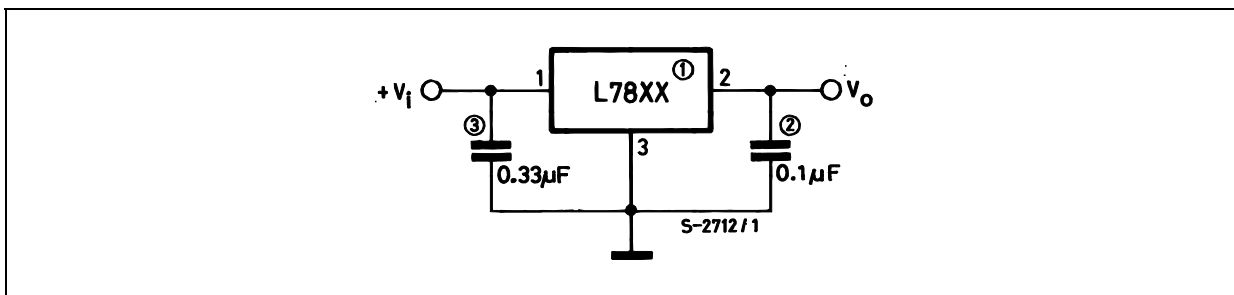


Figure 13 : Fixed Output Regulator



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 14 : Current Regulator

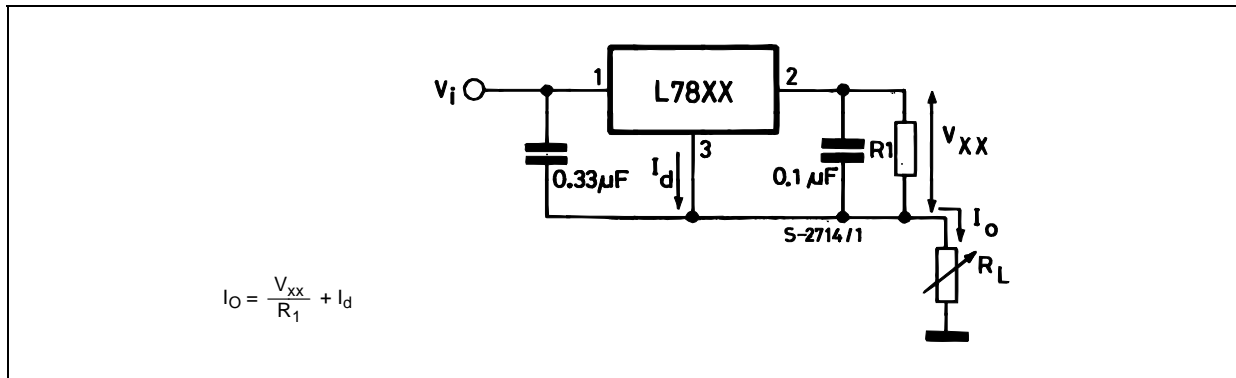


Figure 15 : Circuit for Increasing Output Voltage

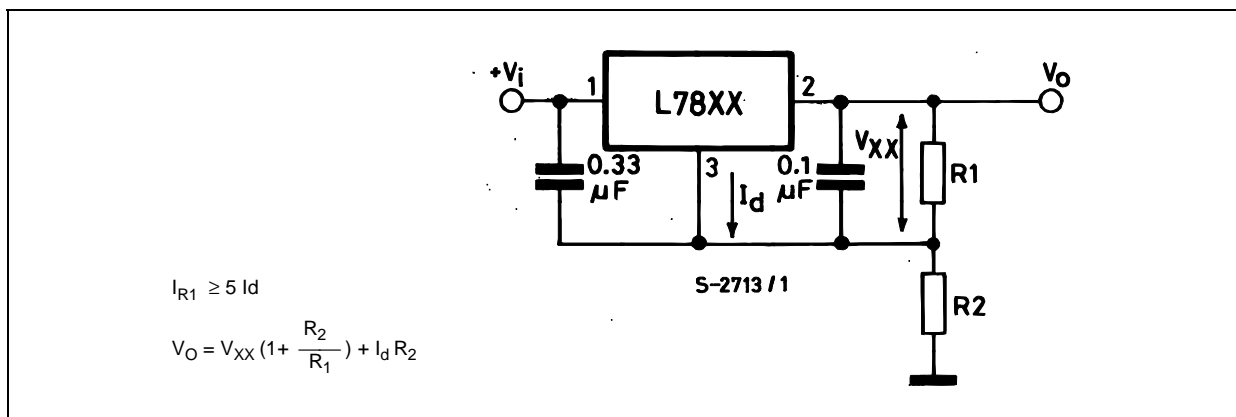
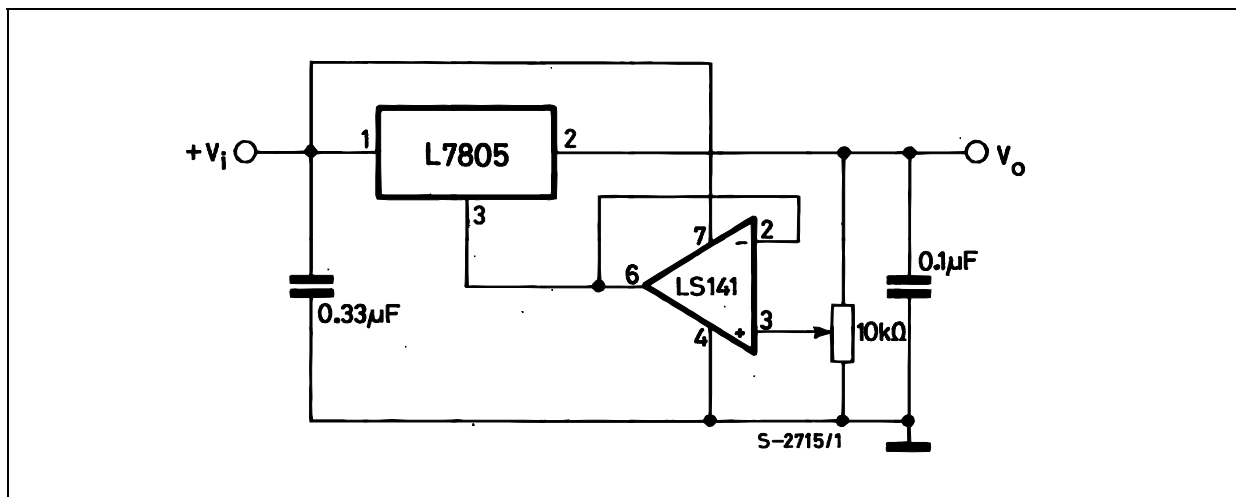


Figure 16 : Adjustable Output Regulator (7 to 30V)



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Figure 17 : 0.5 to 10V Regulator

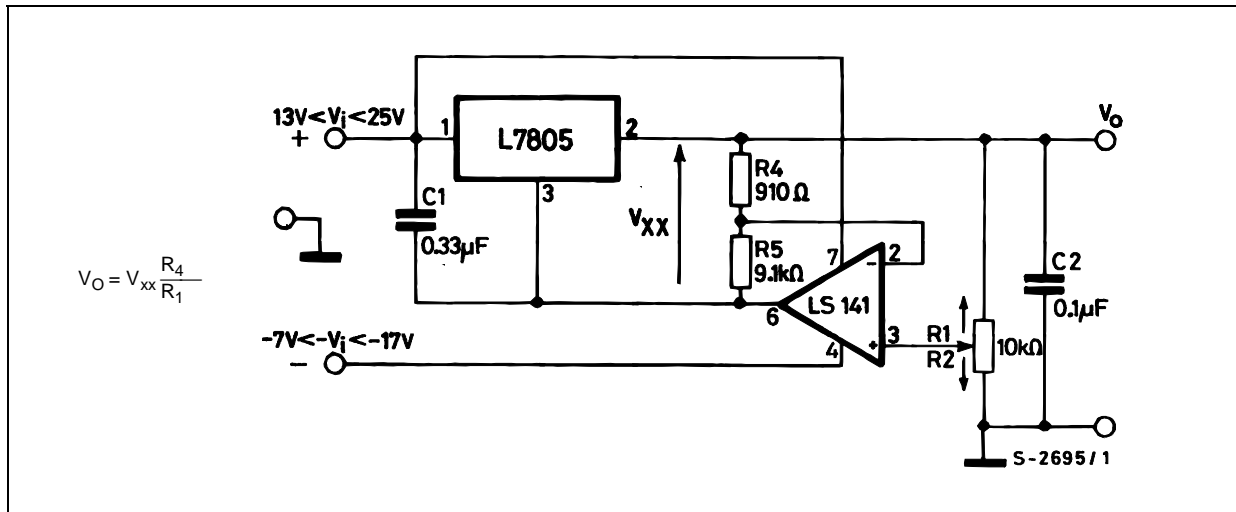


Figure 18 : High Current Voltage Regulator

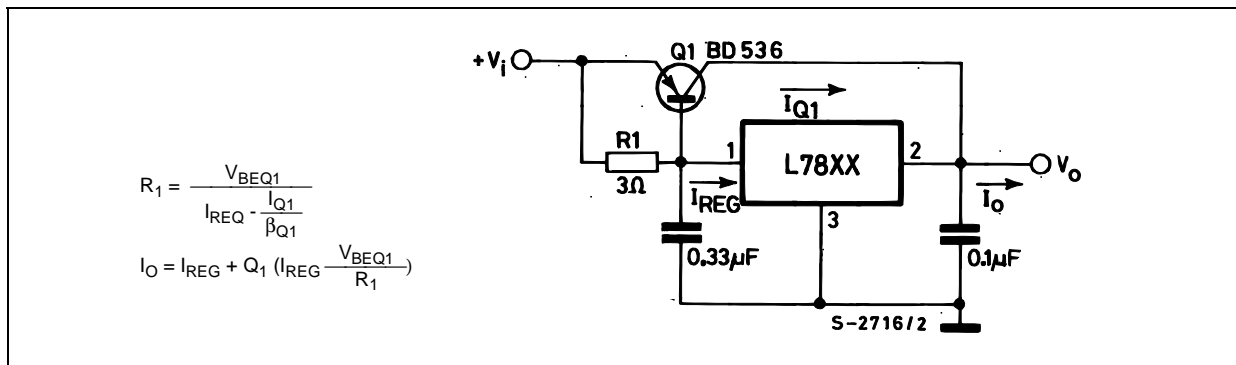


Figure 19 : High Output Current with Short Circuit Protection

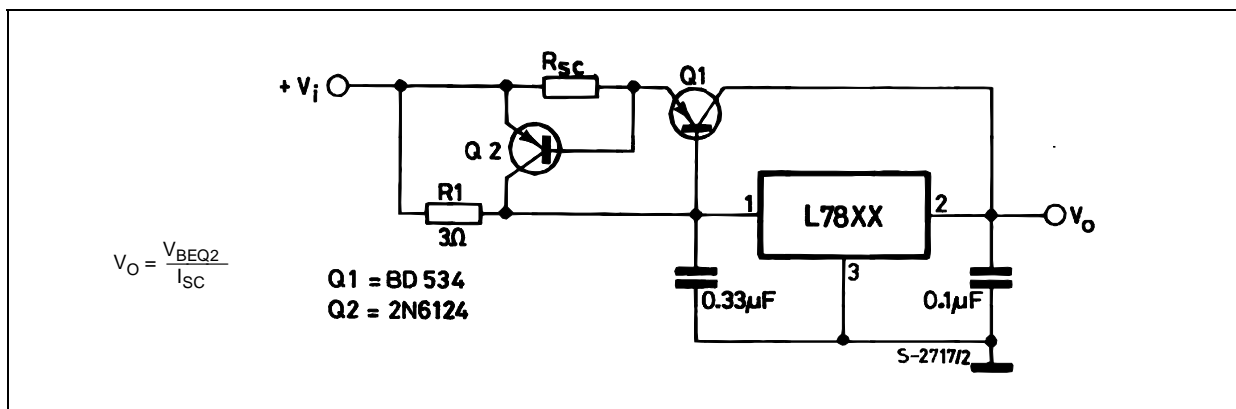


Figure 20 : Tracking Voltage Regulator

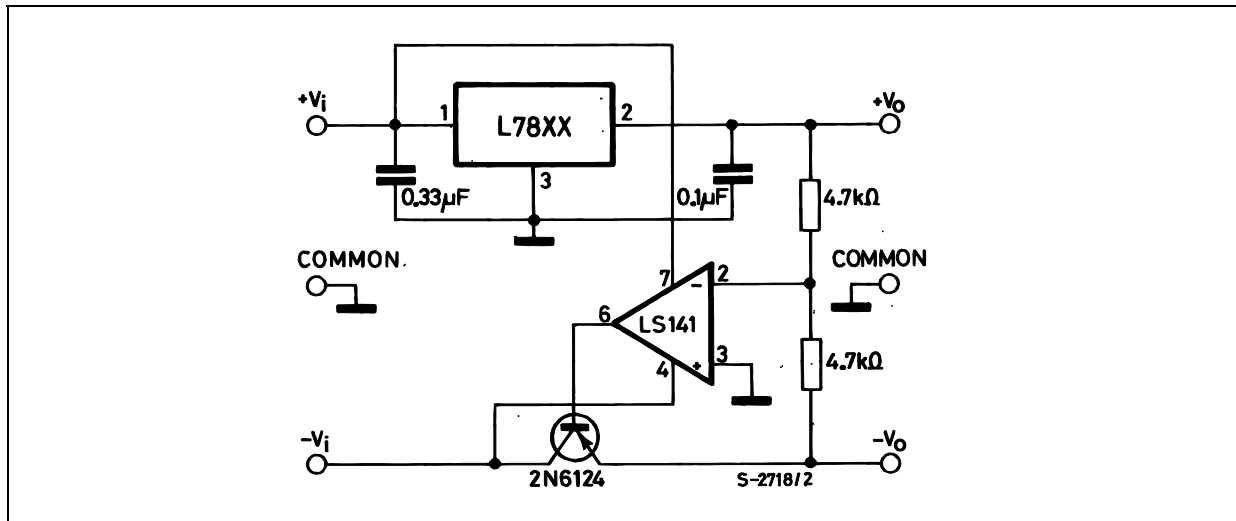
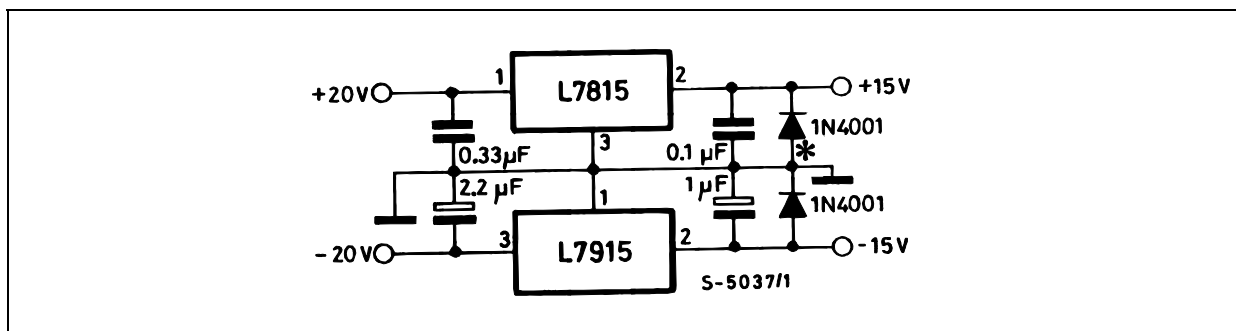
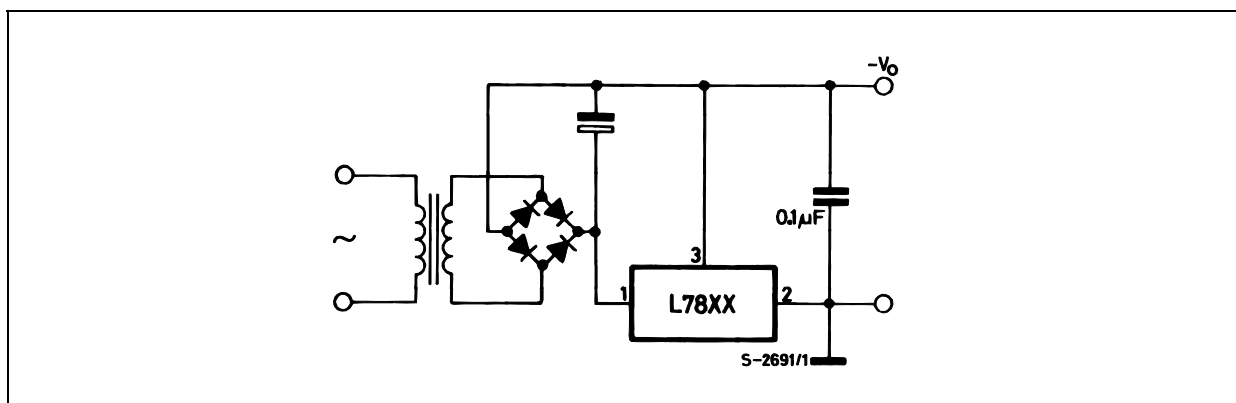


Figure 21 : Split Power Supply ($\pm 15V - 1 A$)



* Against potential latch-up problems.

Figure 22 : Negative Output Voltage Circuit



L7800 SERIES

Figure 23 : Switching Regulator

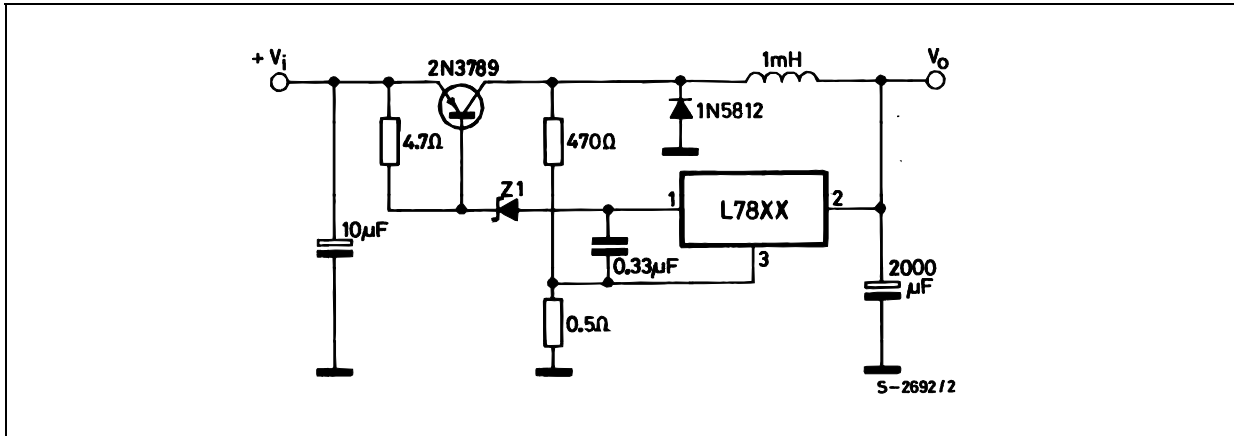


Figure 24 : High Input Voltage Circuit

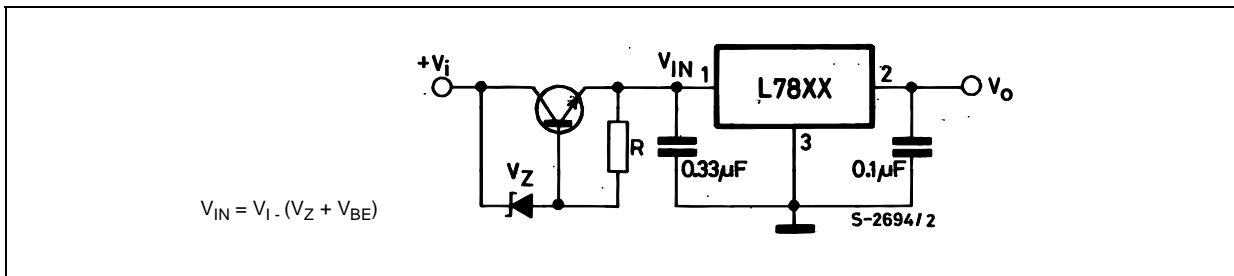


Figure 25 : High Input Voltage Circuit

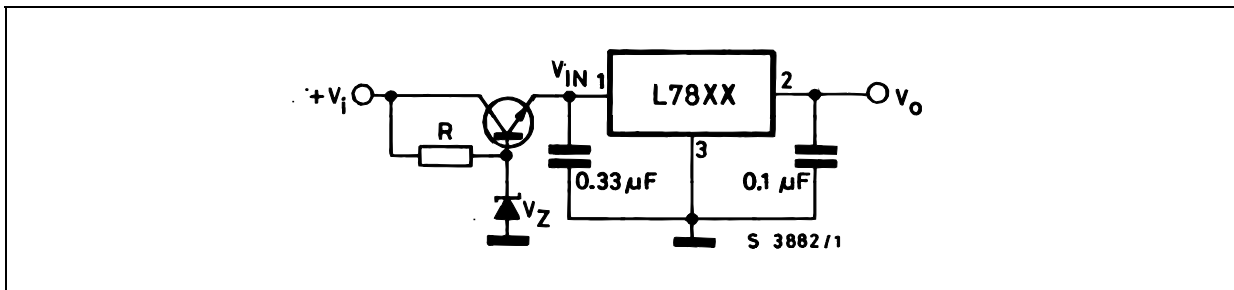


Figure 26 : High Output Voltage Regulator

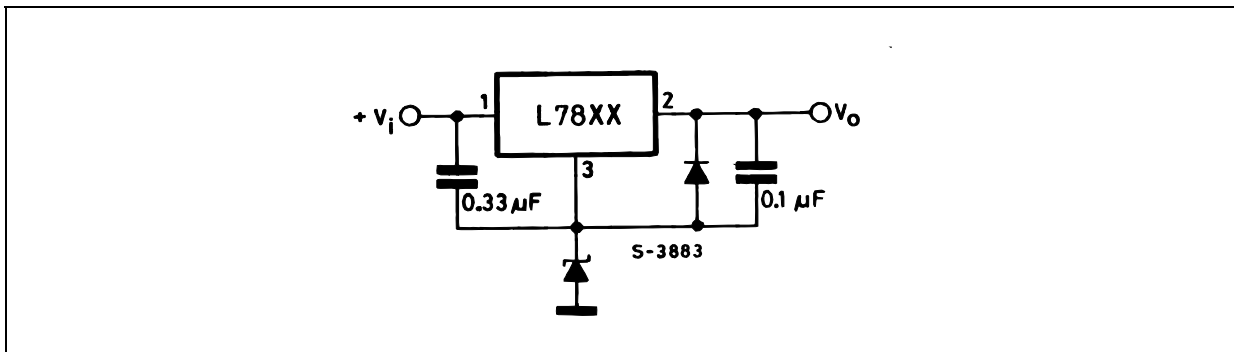


Figure 27 : High Input and Output Voltage

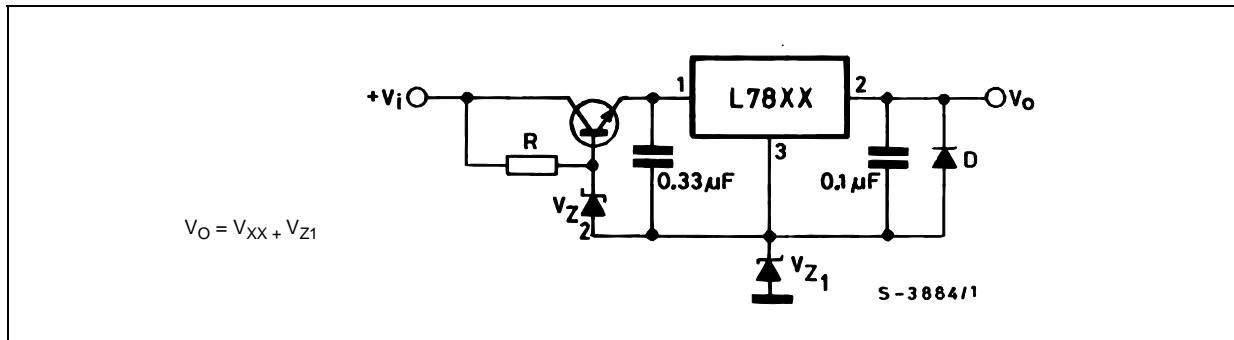


Figure 28 : Reducing Power Dissipation with Dropping Resistor

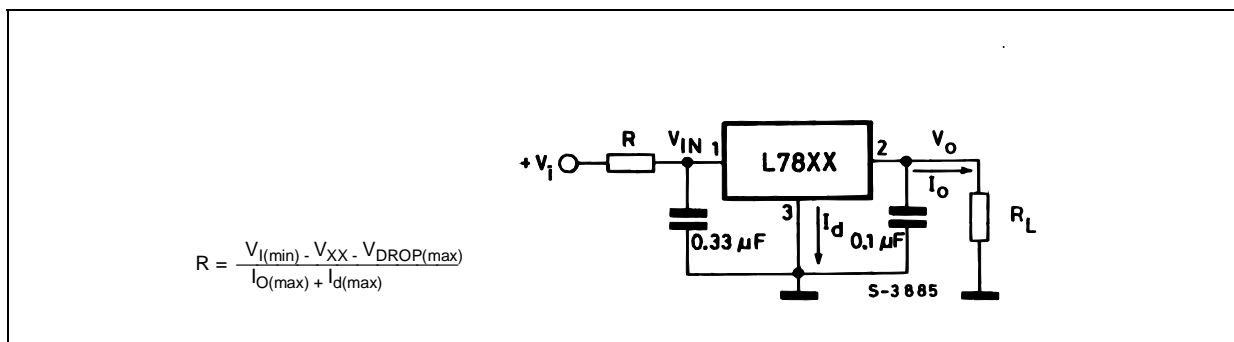
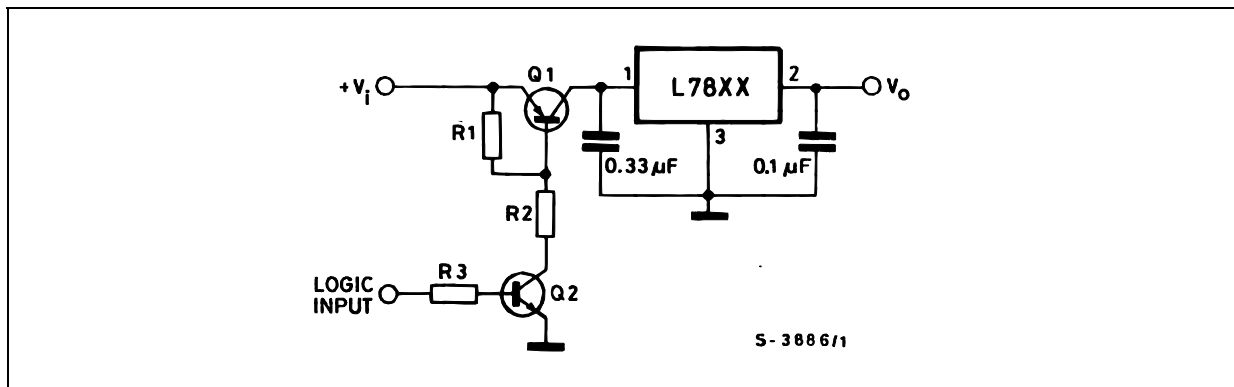
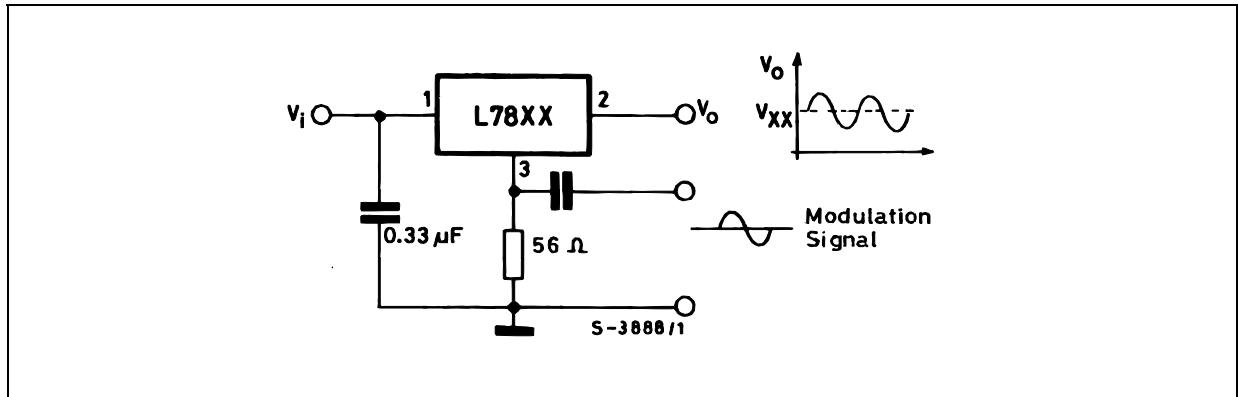


Figure 29 : Remote Shutdown



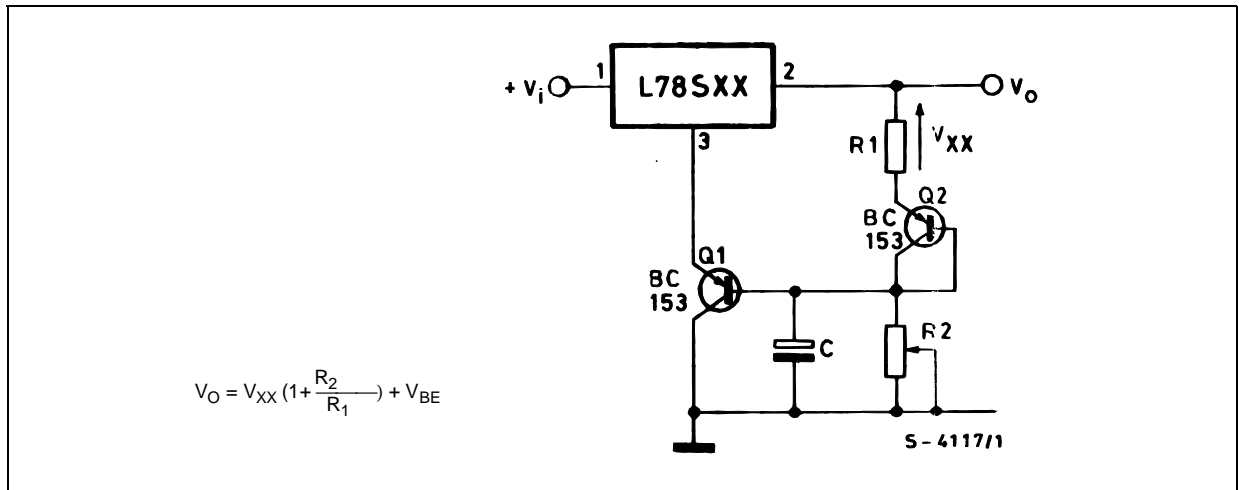
L7800 SERIES

Figure 30 : Power AM Modulator (unity voltage gain, $I_O \leq 0.5$)



NOTE: The circuit performs well up to 100 KHz.

Figure 31 : Adjustable Output Voltage with Temperature Compensation



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

Figure 32 : Light Controllers ($V_{Omin} = V_{XX} + V_{BE}$)

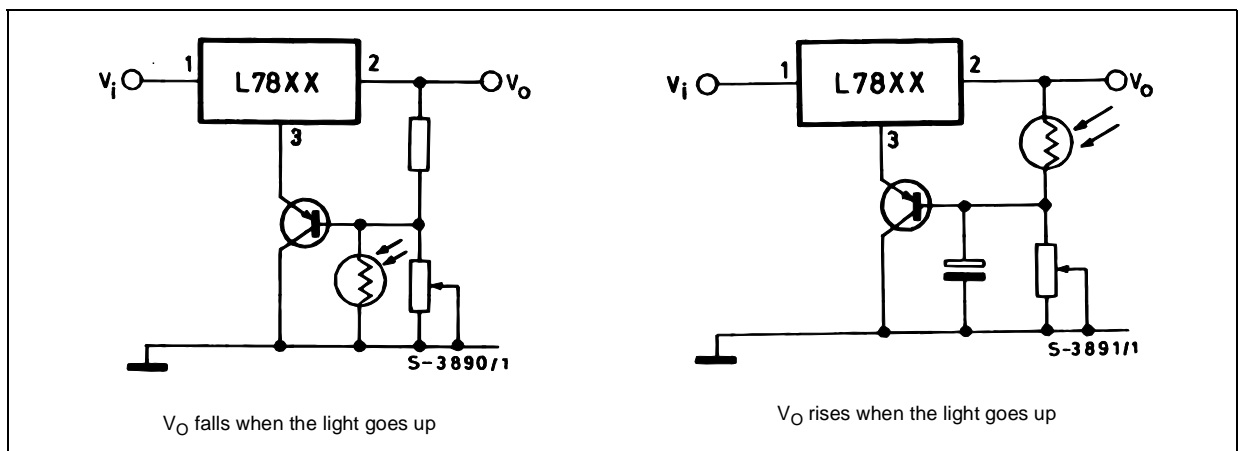
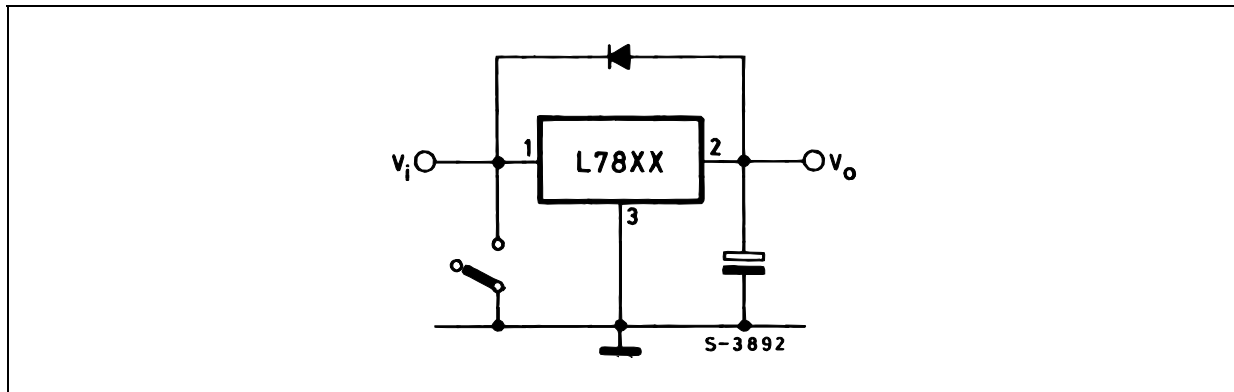
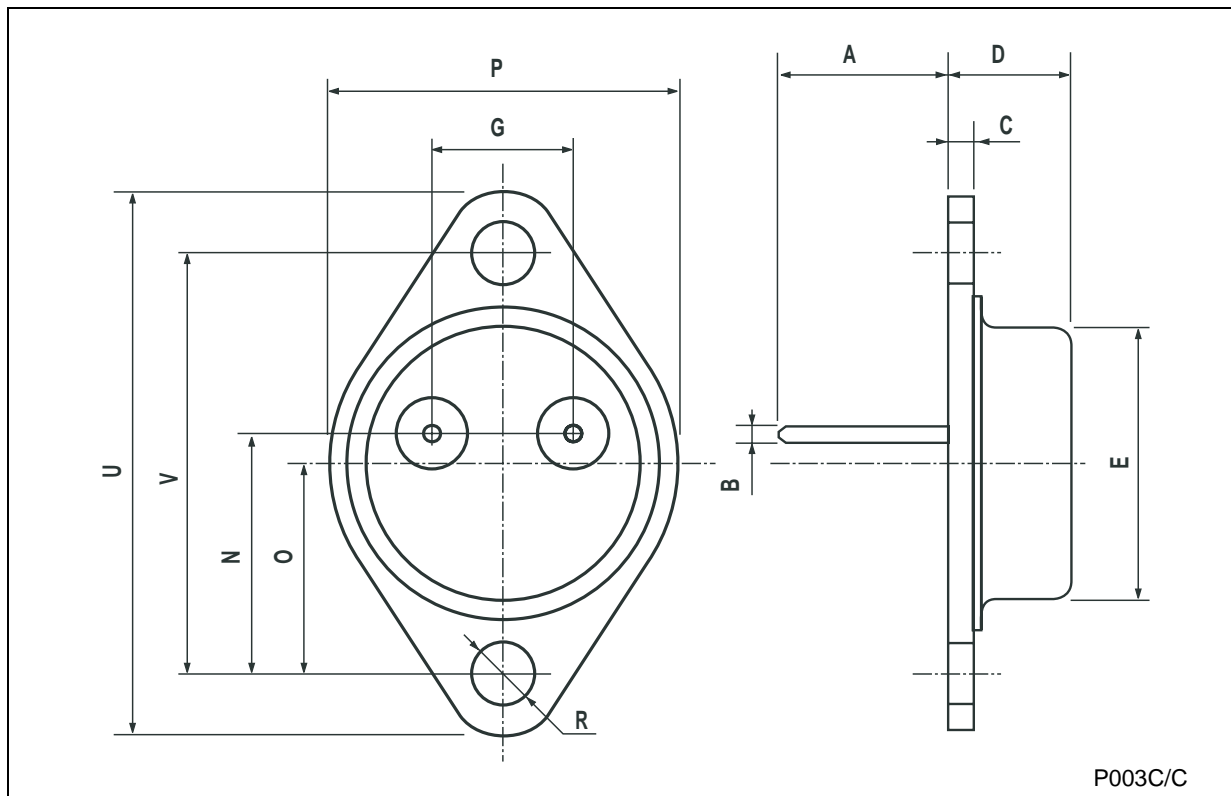


Figure 33 : Protection against Input Short-Circuit with High Capacitance Loads

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

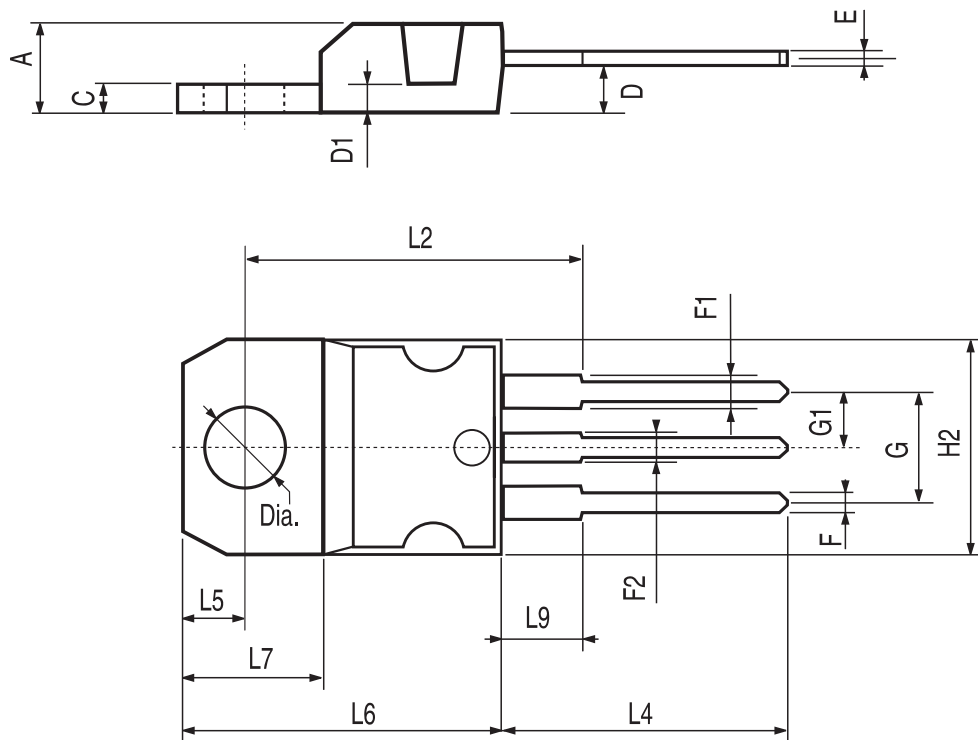
| DIM. | mm. | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | 11.85 | | | 0.466 | |
| B | 0.96 | 1.05 | 1.10 | 0.037 | 0.041 | 0.043 |
| C | | | 1.70 | | | 0.066 |
| D | | | 8.7 | | | 0.342 |
| E | | | 20.0 | | | 0.787 |
| G | | 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 | |



P003C/C

TO-220 MECHANICAL DATA

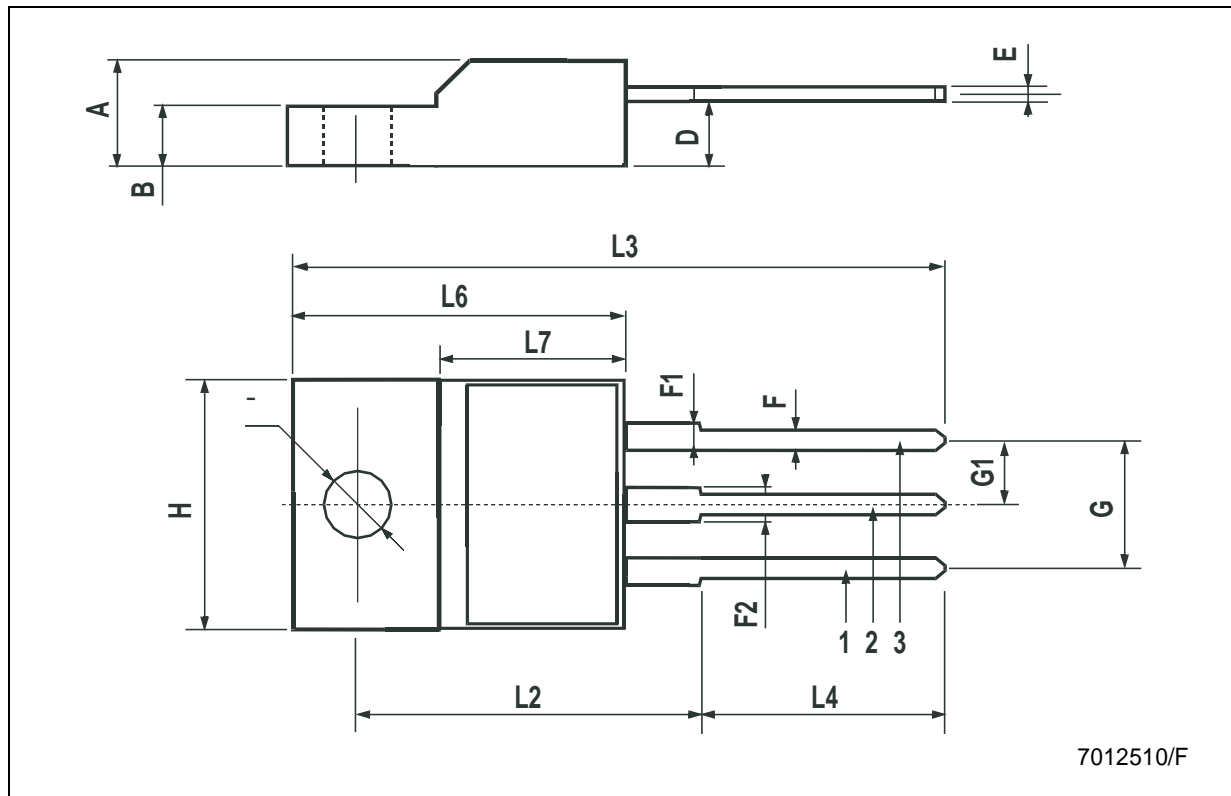
| DIM. | mm. | | | inch | | |
|------|-------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| C | 1.23 | | 1.32 | 0.048 | | 0.051 |
| D | 2.40 | | 2.72 | 0.094 | | 0.107 |
| D1 | | 1.27 | | | 0.050 | |
| E | 0.49 | | 0.70 | 0.019 | | 0.027 |
| F | 0.61 | | 0.88 | 0.024 | | 0.034 |
| F1 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| F2 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| G | 4.95 | | 5.15 | 0.194 | | 0.203 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H2 | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 | | | 0.645 | |
| L4 | 13.0 | | 14.0 | 0.511 | | 0.551 |
| L5 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| L6 | 15.25 | | 15.75 | 0.600 | | 0.620 |
| L7 | 6.2 | | 6.6 | 0.244 | | 0.260 |
| L9 | 3.5 | | 3.93 | 0.137 | | 0.154 |
| DIA. | 3.75 | | 3.85 | 0.147 | | 0.151 |



P011C

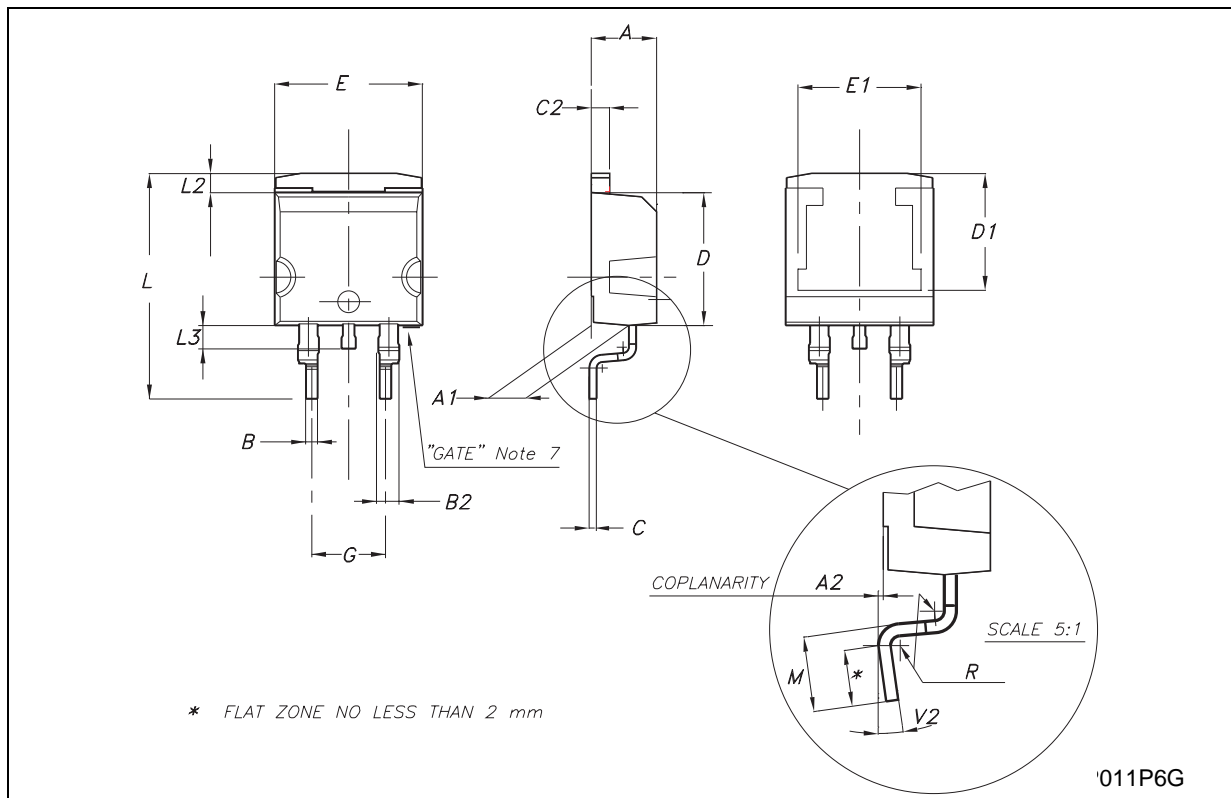
TO-220FP MECHANICAL DATA

| 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 |
| 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 |



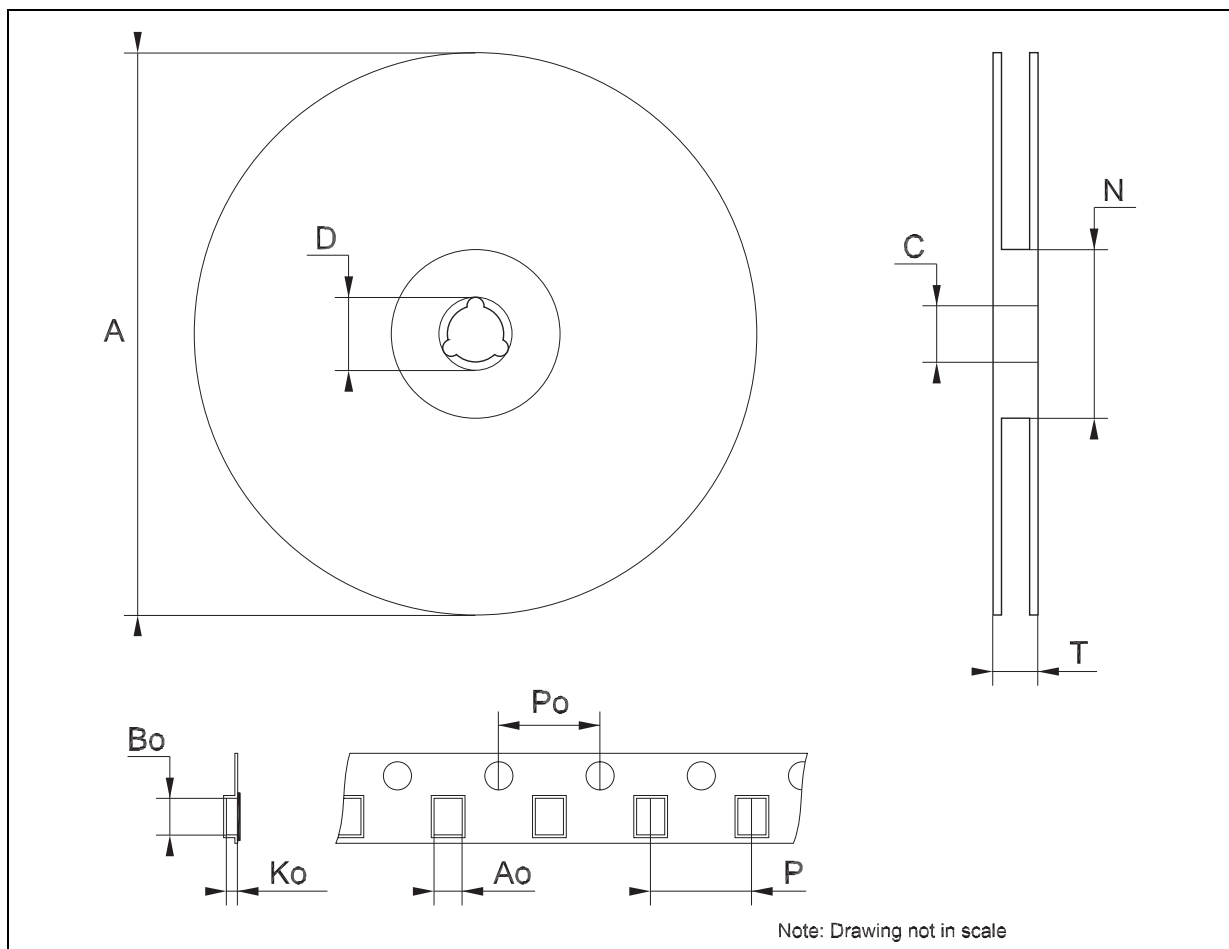
D²PAK MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|-----|-------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.4 | | 4.6 | 0.173 | | 0.181 |
| A1 | 2.49 | | 2.69 | 0.098 | | 0.106 |
| A2 | 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 | |
| G | 4.88 | | 5.28 | 0.192 | | 0.208 |
| L | 15 | | 15.85 | 0.590 | | 0.624 |
| L2 | 1.27 | | 1.4 | 0.050 | | 0.055 |
| L3 | 1.4 | | 1.75 | 0.055 | | 0.068 |
| M | 2.4 | | 3.2 | 0.094 | | 0.126 |
| R | | 0.4 | | | 0.016 | |
| V2 | 0° | | 8° | 0° | | 8° |



Tape & Reel D²PAK-P²PAK-D²PAK/A-P²PAK/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 |



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