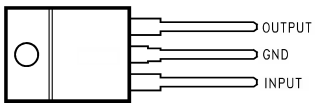
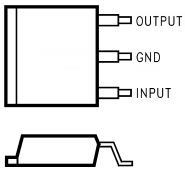
# POSITIVE VOLTAGE REGULATORS

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




**TO-220**
**Top View**




**DDPAK/TO-263**
**Top View**

## DESCRIPTION

The LM78XX series of three-terminal positive regulators is available in TO-220, TO263, 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**

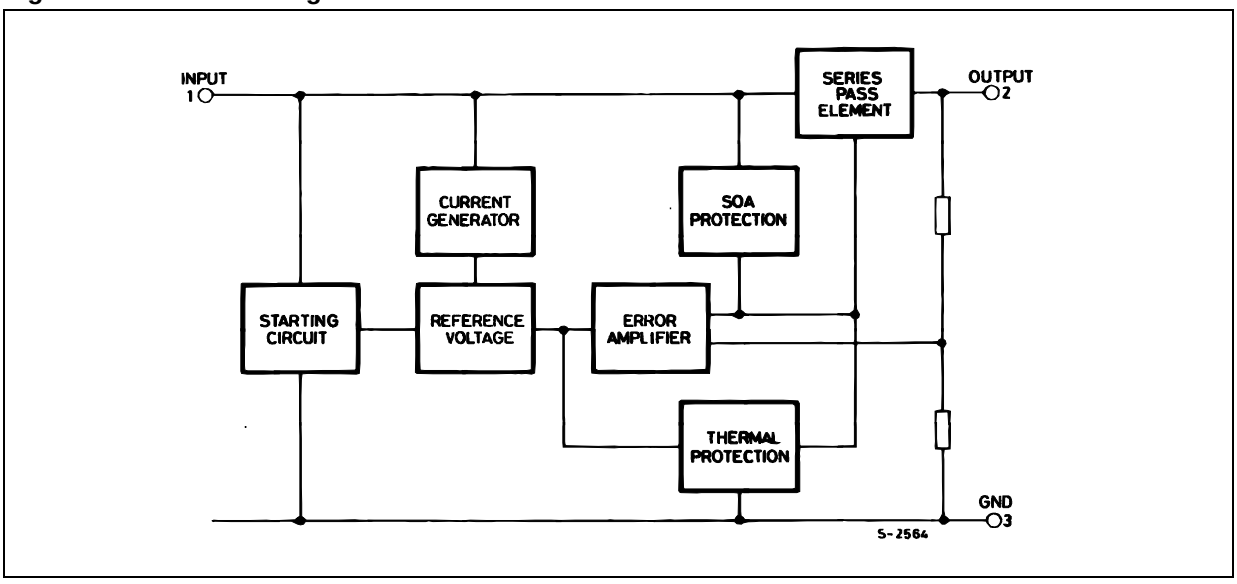


**Table 1: Absolute Maximum Ratings**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_I$ | 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.

**Table 2: Thermal Data**

| Symbol | Parameter | TO-220 | TO-263 | | Unit |
|---|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal Resistance Junction-case Max | 5 | 5 | | °C/W |
| $R_{thj\text{-}amb}$ | Thermal Resistance Junction-ambient Max | 50 | 60 | | °C/W |

**Figure 2: Schematic Diagram**

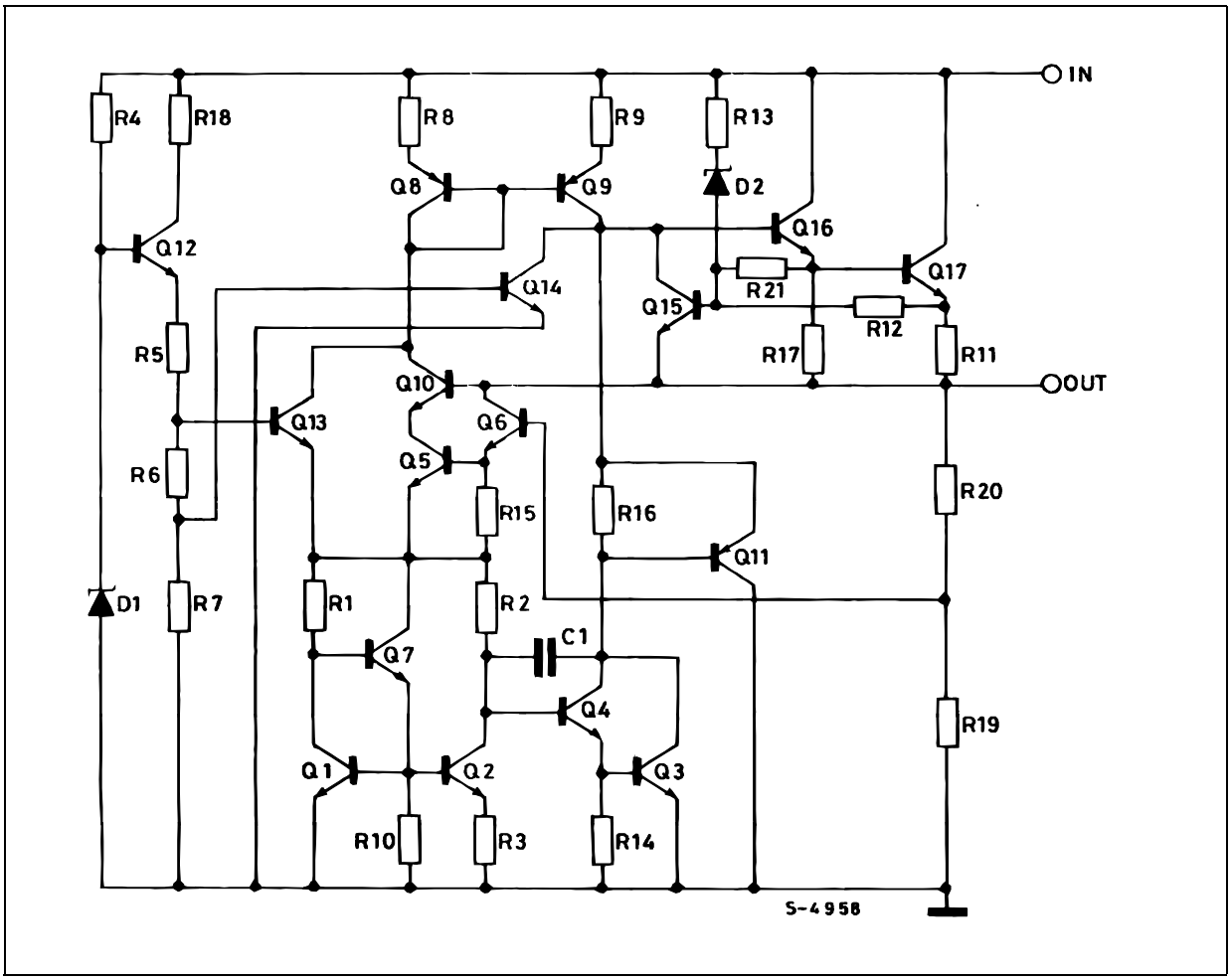
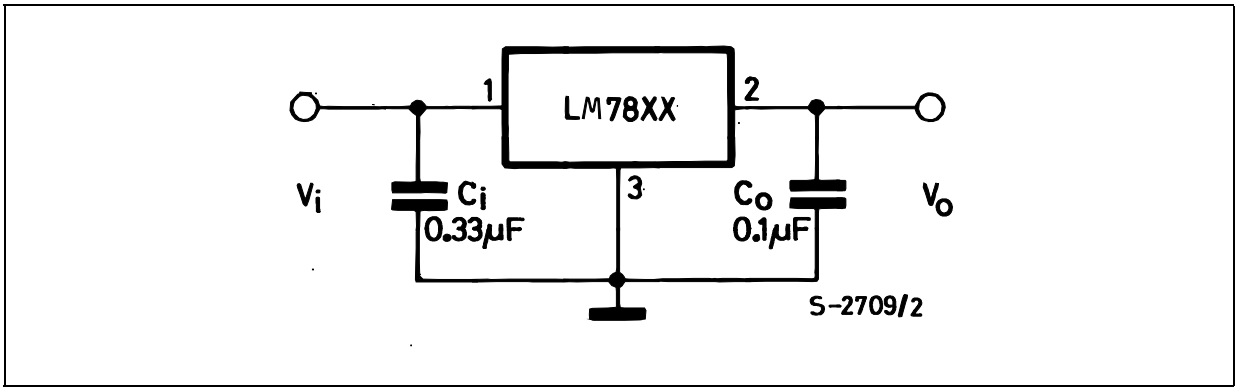


**Figure 4: Application Circuits**




**TEST CIRCUITS**

**Figure 5: DC Parameter**

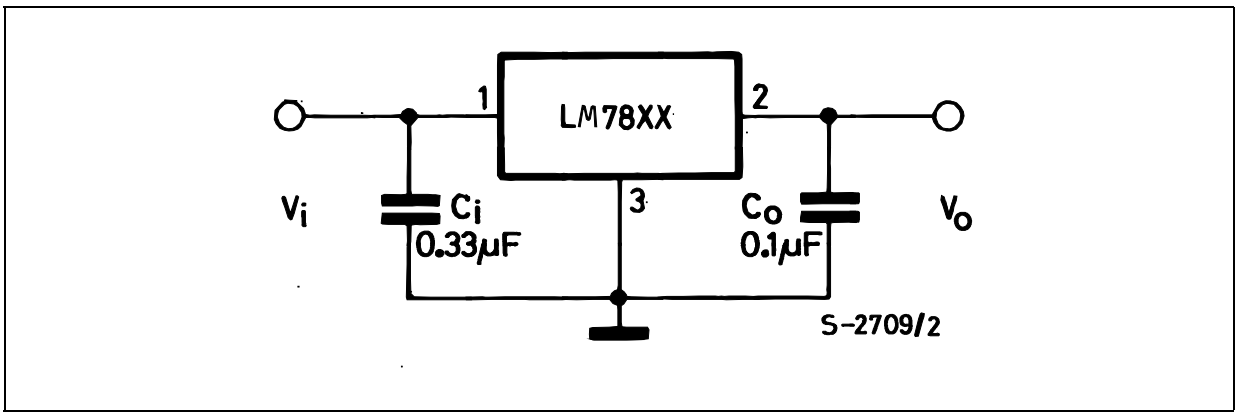



**Figure 6: Load Regulation**

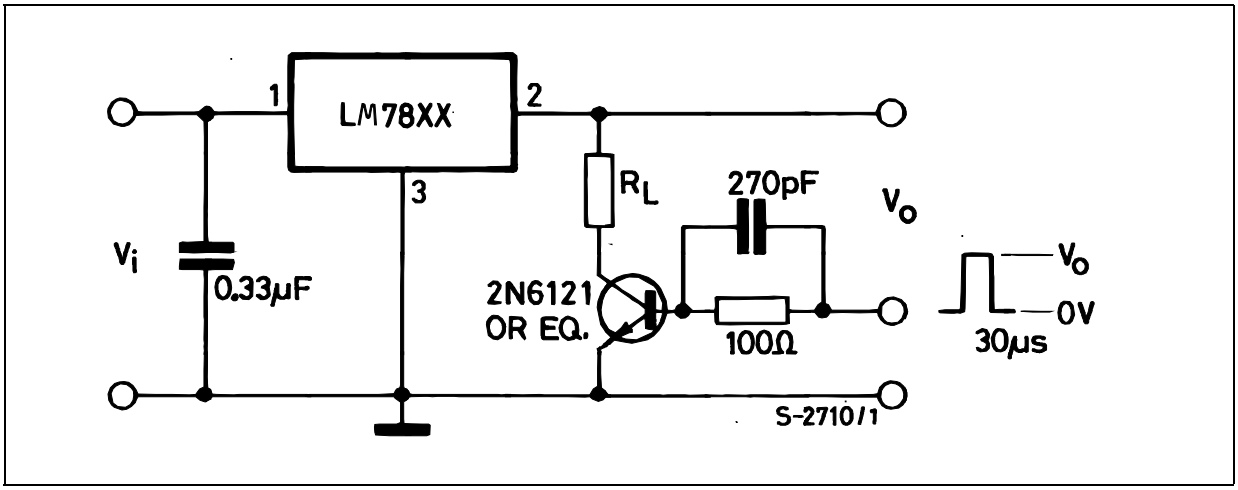


**Figure 7: Ripple Rejection**

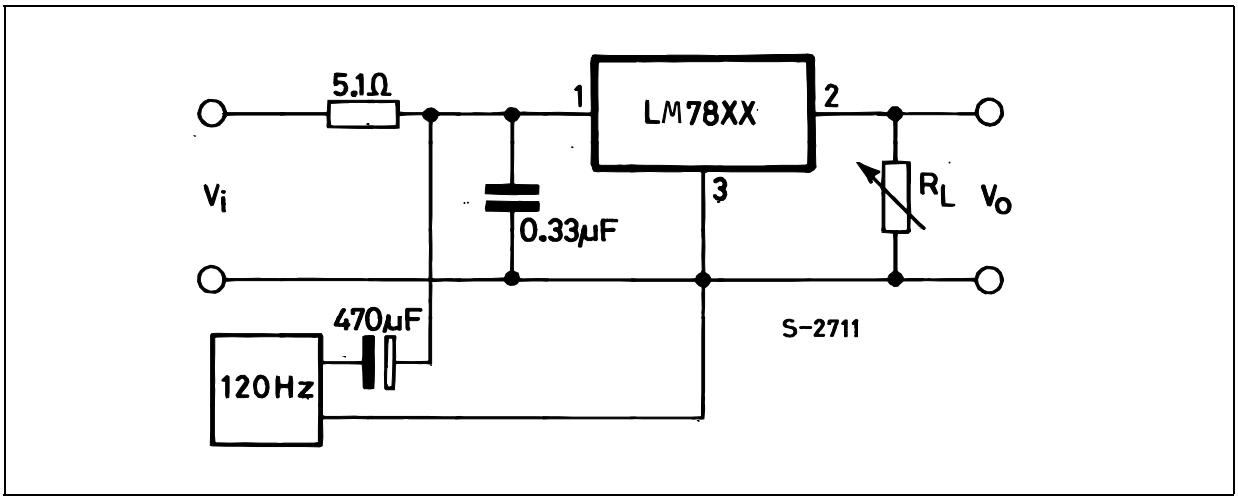



**Table 4: Electrical Characteristics Of LM7805** (refer to the test circuits, $T_J$ = -55 to 150°C, $V_I$ = 10V, $I_O$ = 500 mA, $C_I$ = 0.33 µF, $C_O$ = 0.1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | 4.8 | 5 | 5.2 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \leq$ 15W<br>$V_I$ = 8 to 20 V | 4.65 | 5 | 5.35 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 7 to 25 V $T_J$ = 25°C | | 3 | 50 | mV |
| | | $V_I$ = 8 to 12 V $T_J$ = 25°C | | 1 | 25 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 100 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 25 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 6 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = 8 to 25 V | | | 0.8 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | 0.6 | | mV/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | | 40 | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 8 to 18 V f = 120Hz | 68 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | 2.5 | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 17 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.75 | 1.2 | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7806** (refer to the test circuits, $T_J$ = -55 to 150°C, $V_I$ = 11V, $I_O$ = 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°C | 5.75 | 6 | 6.25 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 9 to 21 V | 5.65 | 6 | 6.35 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 8 to 25 V $T_J$ = 25°C | | | 60 | mV |
| | | $V_I$ = 9 to 13 V $T_J$ = 25°C | | | 30 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 100 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 30 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 6 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = 9 to 25 V | | | 0.8 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | 0.7 | | mV/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | | 40 | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 9 to 19 V f = 120Hz | 65 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | 2.5 | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 19 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.75 | 1.2 | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7808** (refer to the test circuits, $T_J$ = -55 to 150°C, $V_I$ = 14V, $I_O$ = 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°C | 7.7 | 8 | 8.3 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 11.5 to 23 V | 7.6 | 8 | 8.4 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 10.5 to 25 V $T_J$ = 25°C | | | 80 | mV |
| | | $V_I$ = 11 to 17 V $T_J$ = 25°C | | | 40 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 100 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 40 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 6 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = 11.5 to 25 V | | | 0.8 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | 1 | | mV/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | | 40 | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 11.5 to 21.5 V f = 120Hz | 62 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | 2.5 | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 16 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.75 | 1.2 | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7812** (refer to the test circuits, $T_J$ = -55 to 150°C, $V_I$ = 19V, $I_O$ = 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°C | 11.5 | 12 | 12.5 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 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°C | | | 120 | mV |
| | | $V_I$ = 16 to 22 V $T_J$ = 25°C | | | 60 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 100 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 60 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 6 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | | 40 | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 15 to 25 V f = 120Hz | 61 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | 2.5 | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 18 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.75 | 1.2 | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7815** (refer to the test circuits, $T_J$ = -55 to 150°C, $V_I$ = 23V, $I_O$ = 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°C | 14.4 | 15 | 15.6 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 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°C | | | 150 | mV |
| | | $V_I$ = 20 to 26 V $T_J$ = 25°C | | | 75 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 150 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 75 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 6 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | | 40 | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 18.5 to 28.5 V f = 120Hz | 60 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | 2.5 | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 19 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.75 | 1.2 | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7818** (refer to the test circuits, $T_J$ = -55 to 150°C, $V_I$ = 26V, $I_O$ = 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°C | 17.3 | 18 | 18.7 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 22 to 33 V | 17.1 | 18 | 18.9 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 21 to 33 V $T_J$ = 25°C | | | 180 | mV |
| | | $V_I$ = 24 to 30 V $T_J$ = 25°C | | | 90 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 180 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 90 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 6 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = 22 to 33 V | | | 0.8 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | 2.3 | | mV/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | | 40 | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 22 to 32 V f = 120Hz | 59 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | 2.5 | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 22 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.75 | 1.2 | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7824** (refer to the test circuits, $T_J$ = -55 to 150°C, $V_I$ = 33V, $I_O$ = 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°C | 23 | 24 | 25 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 28 to 38 V | 22.8 | 24 | 25.2 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 27 to 38 V $T_J$ = 25°C | | | 240 | mV |
| | | $V_I$ = 30 to 36 V $T_J$ = 25°C | | | 120 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 240 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 120 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 6 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | | 40 | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 28 to 38 V f = 120Hz | 56 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | 2.5 | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 28 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.75 | 1.2 | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7805C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 10V, $I_O$ = 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°C | 4.8 | 5 | 5.2 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 7 to 20 V | 4.75 | 5 | 5.25 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 7 to 25 V $T_J$ = 25°C | | 3 | 100 | mV |
| | | $V_I$ = 8 to 12 V $T_J$ = 25°C | | 1 | 50 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 100 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 50 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 40 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 8 to 18 V f = 120Hz | 62 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 17 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.75 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7806C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 11V, $I_O$ = 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°C | 5.75 | 6 | 6.25 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 8 to 21 V | 5.7 | 6 | 6.3 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 8 to 25 V $T_J$ = 25°C | | | 120 | mV |
| | | $V_I$ = 9 to 13 V $T_J$ = 25°C | | | 60 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 120 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 60 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = 8 to 25 V | | | 1.3 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -0.8 | | mV/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 45 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 9 to 19 V f = 120Hz | 59 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 19 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.55 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7808C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 14V, $I_O$ = 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°C | 7.7 | 8 | 8.3 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 10.5 to 25 V | 7.6 | 8 | 8.4 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 10.5 to 25 V $T_J$ = 25°C | | | 160 | mV |
| | | $V_I$ = 11 to 17 V $T_J$ = 25°C | | | 80 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 160 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 80 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 52 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 11.5 to 21.5 V f = 120Hz | 56 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 16 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.45 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7809C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 15V, $I_O$ = 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°C | 8.64 | 9 | 9.36 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 11.5 to 26 V | 8.55 | 9 | 9.45 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 11.5 to 26 V $T_J$ = 25°C | | | 180 | mV |
| | | $V_I$ = 12 to 18 V $T_J$ = 25°C | | | 90 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 180 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 90 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 70 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 12 to 23 V f = 120Hz | 55 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 17 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.40 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7810C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 16V, $I_O$ = 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°C | 9.6 | 10 | 10.4 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 12.5 to 26 V | 9.5 | 10 | 10.5 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 12.5 to 26 V $T_J$ = 25°C | | | 200 | mV |
| | | $V_I$ = 13.5 to 19 V $T_J$ = 25°C | | | 100 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 200 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 100 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = 12.5 to 26 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -1 | | mV/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 70 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 13 to 23 V f = 120Hz | 55 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 17 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.40 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7812C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 19V, $I_O$ = 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°C | 11.5 | 12 | 12.5 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 14.5 to 27 V | 11.4 | 12 | 12.6 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 14.5 to 30 V $T_J$ = 25°C | | | 240 | mV |
| | | $V_I$ = 16 to 22 V $T_J$ = 25°C | | | 120 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 240 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 120 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 75 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 15 to 25 V f = 120Hz | 55 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 18 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.35 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7815C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 23V, $I_O$ = 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°C | 14.5 | 15 | 15.6 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 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°C | | | 300 | mV |
| | | $V_I$ = 20 to 26 V $T_J$ = 25°C | | | 150 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 300 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 150 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 90 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 18.5 to 28.5 V f = 120Hz | 54 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 19 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.23 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7818C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 26V, $I_O$ = 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°C | 17.3 | 18 | 18.7 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \le$ 15W<br>$V_I$ = 21 to 33 V | 17.1 | 18 | 18.9 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 21 to 33 V $T_J$ = 25°C | | | 360 | mV |
| | | $V_I$ = 24 to 30 V $T_J$ = 25°C | | | 180 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 360 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 180 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 110 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 22 to 32 V f = 120Hz | 53 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 22 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.20 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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 LM7824C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = 33V, $I_O$ = 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°C | 23 | 24 | 25 | V |
| $V_O$ | Output Voltage | $I_O$ = 5 mA to 1 A $P_O \leq$ 15W<br>$V_I$ = 27 to 38 V | 22.8 | 24 | 25.2 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = 27 to 38 V $T_J$ = 25°C | | | 480 | mV |
| | | $V_I$ = 30 to 36 V $T_J$ = 25°C | | | 240 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 480 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 240 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 8 | mA |
| $\Delta I_d$ | 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/°C |
| eN | Output Noise Voltage | B =10Hz to 100KHz $T_J$ = 25°C | | 170 | | µV/$V_O$ |
| SVR | Supply Voltage Rejection | $V_I$ = 28 to 38 V f = 120Hz | 50 | | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C | | 2 | | V |
| $R_O$ | Output Resistance | f = 1 KHz | | 28 | | mΩ |
| $I_{sc}$ | Short Circuit Current | $V_I$ = 35 V $T_J$ = 25°C | | 0.15 | | A |
| $I_{scp}$ | Short Circuit Peak Current | $T_J$ = 25°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

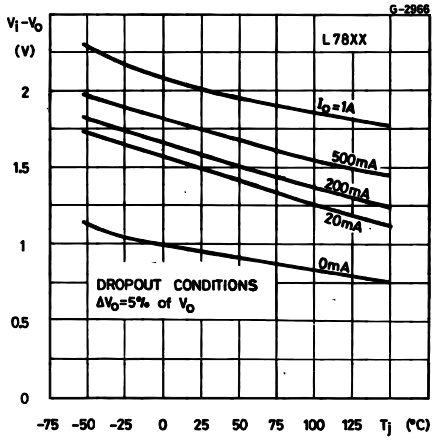



**Figure 9:** Peak Output Current vs Input/output Differential Voltage

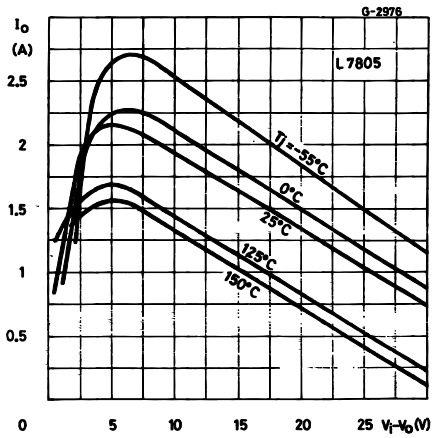


**Figure 10:** Supply Voltage Rejection vs Frequency

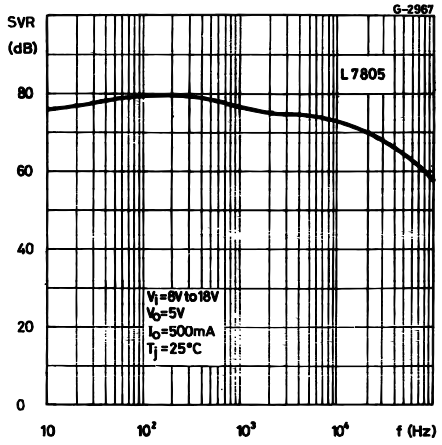



**Figure 11:** Output Voltage vs Junction Temperature

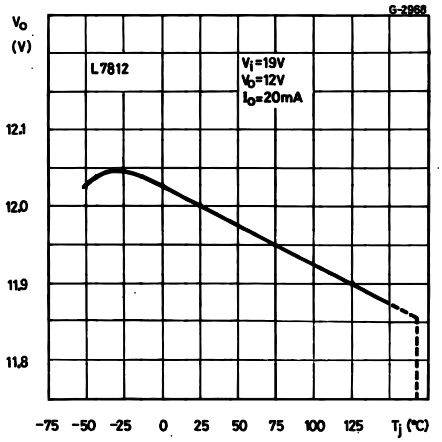



**Figure 12:** Output Impedance vs Frequency

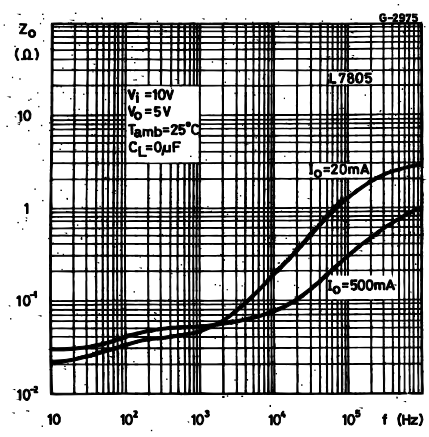



**Figure 13:** Quiescent Current vs Junction Temperature

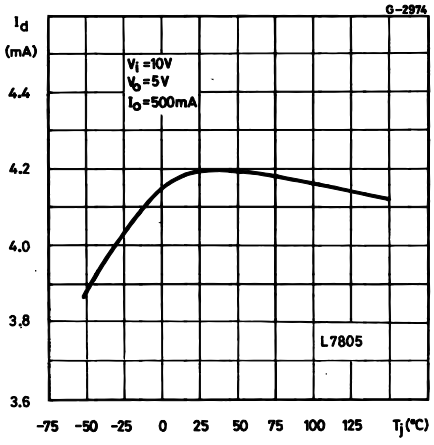



**Figure 14:** Load Transient Response

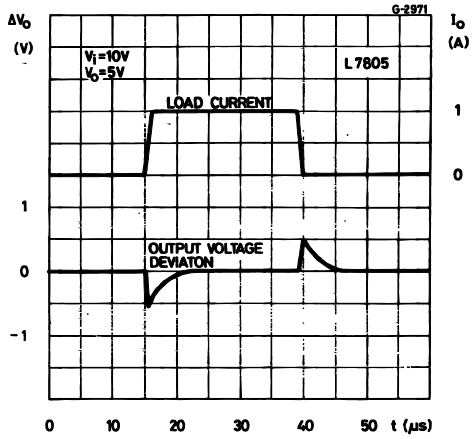



**Figure 15:** Line Transient Response

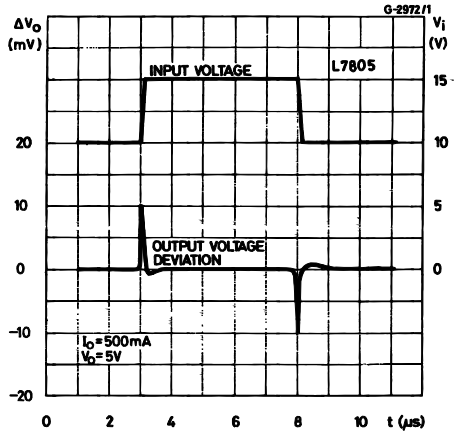


**Figure 16:** Quiescent Current vs Input Voltage

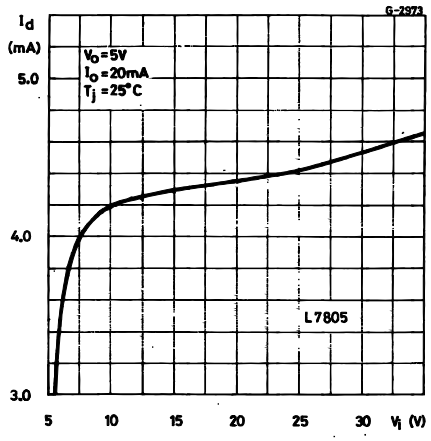
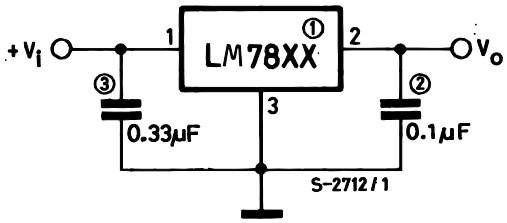
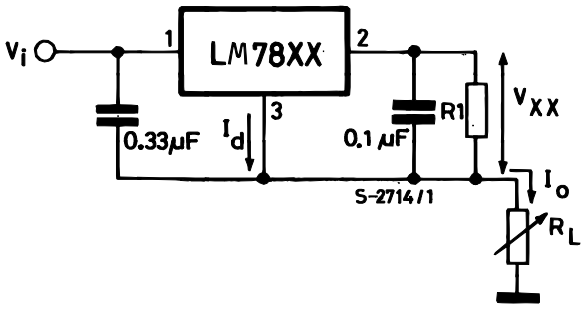



**Figure 17: Fixed Output Regulator**




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**




$$I_O = \frac{V_{XX}}{R_1} + I_d$$

**Figure 19: Circuit for Increasing Output Voltage**

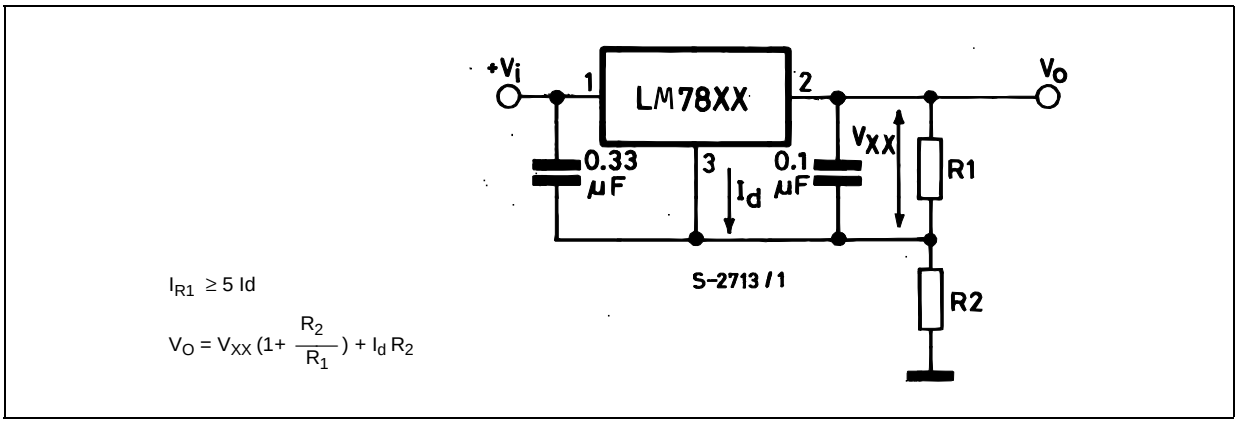



**Figure 20: Adjustable Output Regulator (7 to 30V)**

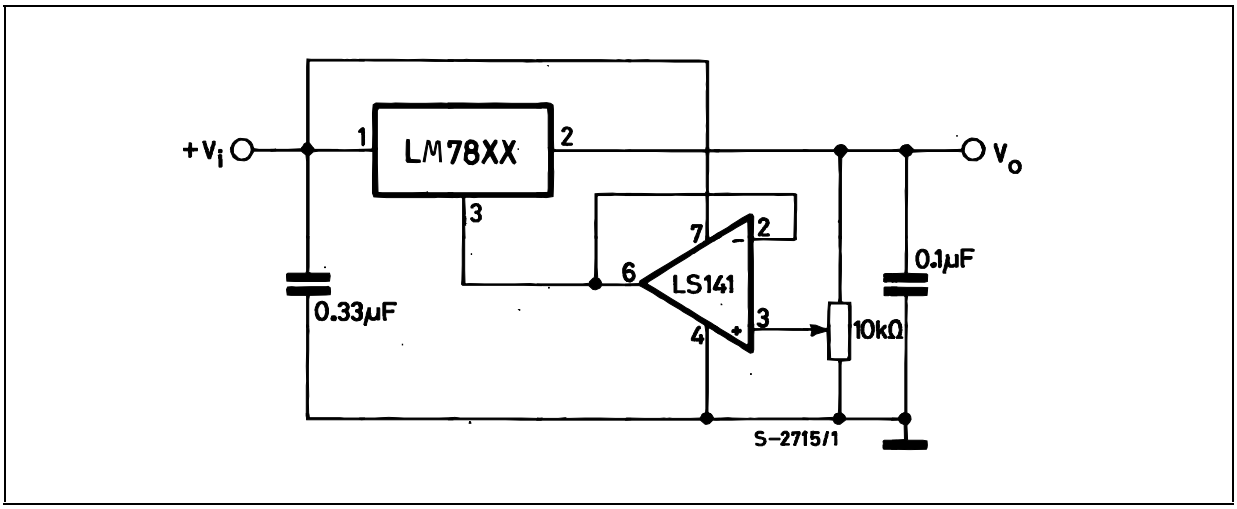
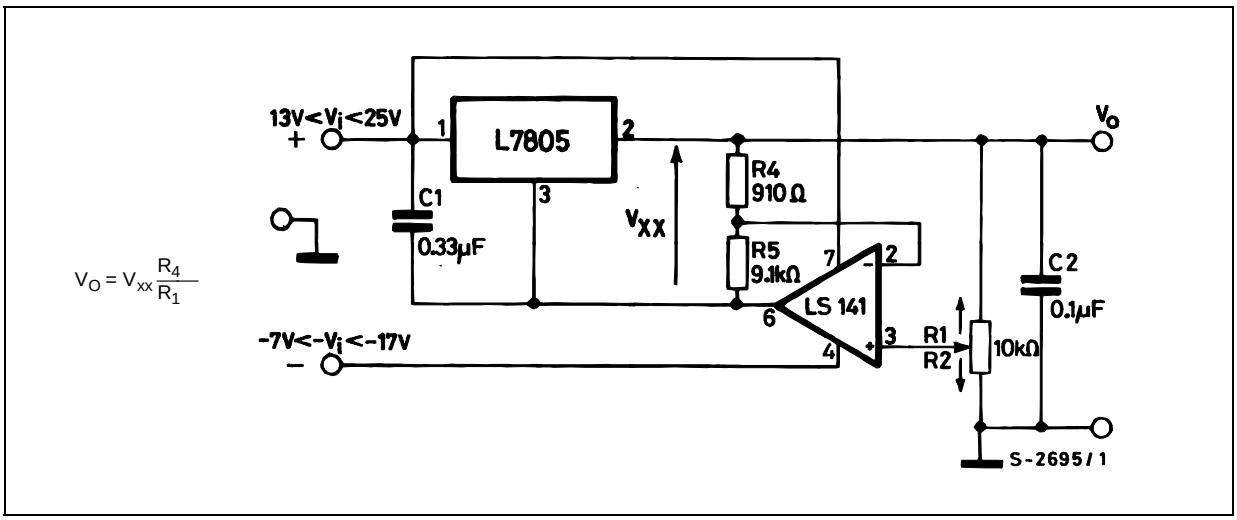



**Figure 21: 0.5 to 10V Regulator**



Important statement:

Huaguan Semiconductor Co,Ltd. reserves the right to change the products and services provided without notice. Customers should obtain the latest relevant information before ordering, and verify the timeliness and accuracy of this information.

Customers are responsible for complying with safety standards and taking safety measures when using our products for system design and machine manufacturing to avoid potential risks that may result in personal injury or property damage.

Our products are not licensed for applications in life support, military, aerospace, etc., so we do not bear the consequences of the application of these products in these fields.

Our documentation is only permitted to be copied without any tampering with the content, so we do not accept any responsibility or liability for the altered documents.

# X-ON Electronics

Largest Supplier of Electrical and Electronic Components

***Click to view similar products for*** Linear Voltage Regulators ***category:***

***Click to view products by*** HGSEMI ***manufacturer:***

Other Similar products are found below :

LV56831P-E LV5684PVD-XH MCDTSA6-2R L7815ACV-DG PQ3DZ53U LV56801P-E TLE42794G L78L05CZ/1SX L78LR05DL-MA-E 636416C 714954EB BA033LBSG2-TR LV5680P-E L78M15CV-DG L79M05T-E TLS202A1MBVHTSA1 L78LR05D-MA-E NCV317MBTG NTE7227 LV5680NPVC-XH LT1054CN8 MP2018GZD-5-Z MP2018GZD-33-Z MIC5281-3.3YMM MC78L06BP-AP TA48LS05F(TE85L,F) TA78L12F(TE12L,F) TC47BR5003ECT TCR2LN12,LF(S TCR2LN28,LF(S TCR2LN30,LF(S TCR3DF295,LM(CT TCR3DF40,LM(CT BA178M20CP-E2 L78M12ABDT LM7812SX/NOPB LR645N3-G-P003 LR645N3-G-P013 ZXTR2005P5-13 SCD7812BTG TCR3DF335,LM(CT ZXTR2012K-13 TLE42994E V33 ZXTR2008K-13 ZXTR2005K-13 L88R05DL-E ADP3300ARTZ-2.7RL7 LM120K-15/883 IFX54441LDVXUMA1 LM317D2T-TR