# MC7800, MC7800A, NCV7805

# 1.0 A Positive Voltage Regulators

These voltage regulators are monolithic integrated circuits designed as fixed−voltage regulators for a wide variety of applications including local, on−card regulation. These regulators employ internal current limiting, thermal shutdown, and safe−area compensation. With adequate heatsinking they can deliver output currents in excess of 1.0 A. Although designed primarily as a fixed voltage regulator, these devices can be used with external components to obtain adjustable voltages and currents.

- Output Current in Excess of 1.0 A
- No External Components Required
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting
- Output Transistor Safe−Area Compensation
- Output Voltage Offered in 2% and 4% Tolerance
- Available in Surface Mount $D^2PAK$−3, DPAK−3 and Standard 3−Lead Transistor Packages
- NCV Prefix for Automotive and Other Applications Requiring Site and Control Changes
- Pb−Free Packages are Available

**MAXIMUM RATINGS** ($T_A$ = 25°C, unless otherwise noted)

| Rating | Symbol | Value | | | Unit |
|---|---|---|---|---|---|
| | | 369C | 221A | 936 | |
| Input Voltage (5.0 − 18 V) (24 V) | $V_I$ | 35 40 | | | Vdc |
| Power Dissipation | $P_D$ | Internally Limited | | | W |
| Thermal Resistance, Junction−to−Ambient | $R_{\theta JA}$ | 92 | 65 | Figure 14 | °C/W |
| Thermal Resistance, Junction−to−Case | $R_{\theta JC}$ | 5.0 | 5.0 | 5.0 | °C/W |
| Storage Junction Temperature Range | $T_{stg}$ | −65 to +150 | | | °C |
| Operating Junction Temperature | $T_J$ | +150 | | | °C |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

NOTE: ESD data available upon request.

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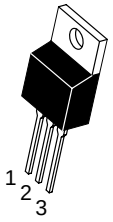
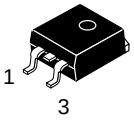



**TO−220−3**
**T SUFFIX**
**CASE 221A**

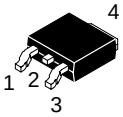
Heatsink surface connected to Pin 2.




Pin 1. Input
2. Ground
3. Output

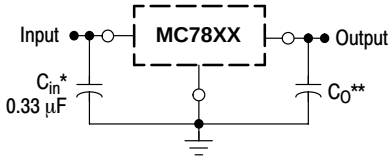
**$D^2PAK$−3**
**D2T SUFFIX**
**CASE 936**

Heatsink surface (shown as terminal 4 in case outline drawing) is connected to Pin 2.




**DPAK−3**
**DT SUFFIX**
**CASE 369C**

## STANDARD APPLICATION




A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

XX, These two digits of the type number indicate nominal voltage.

* $C_{in}$ is required if regulator is located an appreciable distance from power supply filter.

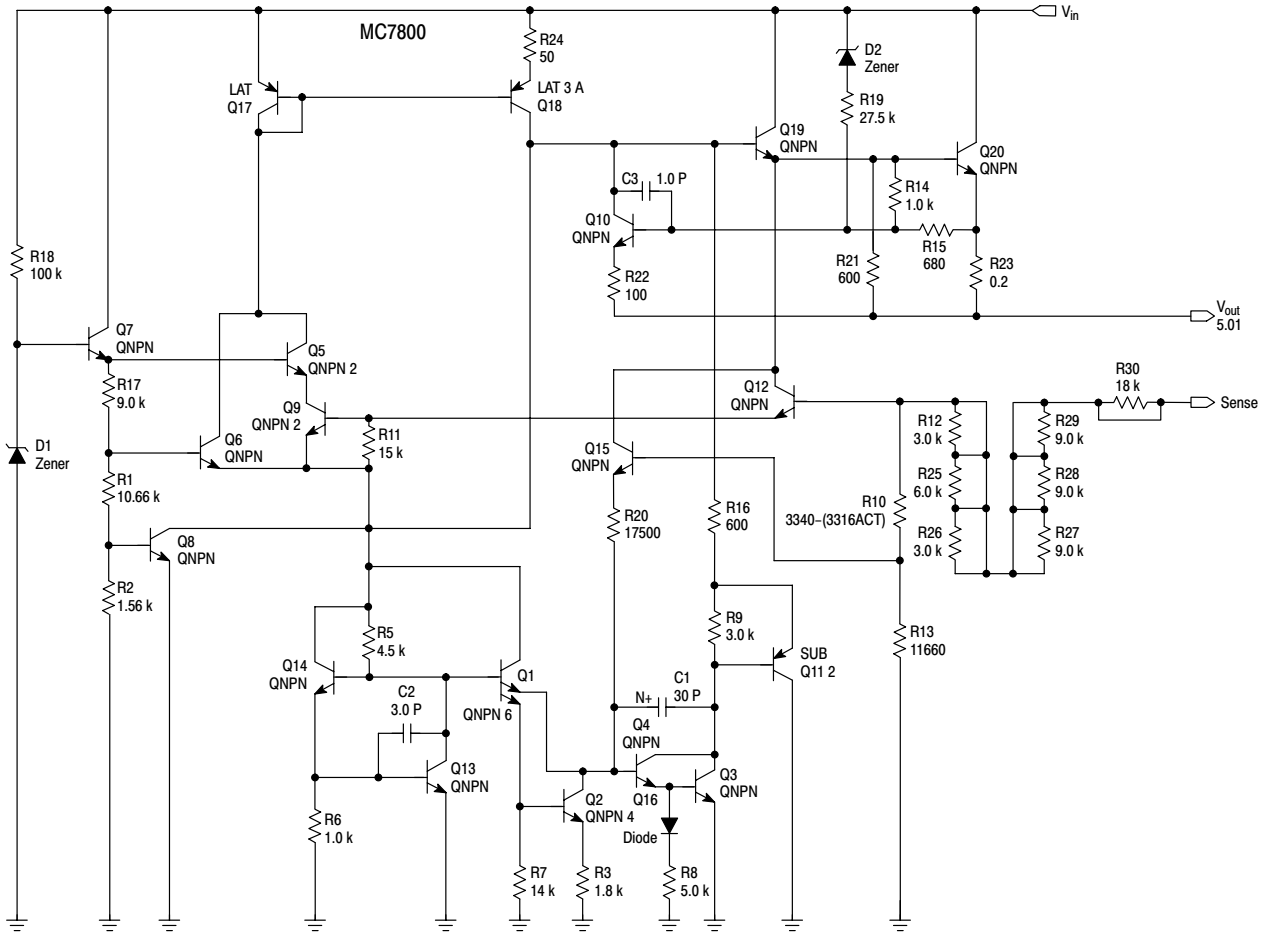
** $C_O$ is not needed for stability; however, it does improve transient response. Values of less than 0.1 μF could cause instability.

## ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 21 of this data sheet.

## DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 25 of this data sheet.




This device contains 22 active transistors.

**Figure 1. Representative Schematic Diagram**

**ELECTRICAL CHARACTERISTICS** ($V_{in}$ = 10 V, $I_O$ = 500 mA, $T_J$ = $T_{low}$ to $T_{high}$ (Note 1), unless otherwise noted)

| Characteristic | Symbol | MC7805B, NCV7805 | | | MC7805C | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 4.8 | 5.0 | 5.2 | 4.8 | 5.0 | 5.2 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W)<br>7.0 Vdc ≤ $V_{in}$ ≤ 20 Vdc<br>8.0 Vdc ≤ $V_{in}$ ≤ 20 Vdc | $V_O$ | <br>–<br>4.75 | <br>–<br>5.0 | <br>–<br>5.25 | <br>4.75<br>– | <br>5.0<br>– | <br>5.25<br>– | Vdc |
| Line Regulation (Note 4)<br>7.5 Vdc ≤ $V_{in}$ ≤ 20 Vdc, 1.0 A<br>8.0 Vdc ≤ $V_{in}$ ≤ 12 Vdc | $Reg_{line}$ | <br>–<br>– | 5.0<br>1.3 | 100<br>50 | –<br>– | 0.5<br>0.8 | 20<br>10 | mV |
| Load Regulation (Note 4)<br>5.0 mA ≤ $I_O$ ≤ 1.0 A<br>5.0 mA ≤ $I_O$ ≤ 1.5 A ($T_A$ = 25°C) | $Reg_{load}$ | <br>–<br>– | 1.3<br>0.15 | 100<br>50 | –<br>– | 1.3<br>1.3 | 25<br>25 | mV |
| Quiescent Current | $I_B$ | – | 3.2 | 8.0 | – | 3.2 | 6.5 | mA |
| Quiescent Current Change<br>7.0 Vdc ≤ $V_{in}$ ≤ 25 Vdc<br>5.0 mA ≤ $I_O$ ≤ 1.0 A ($T_A$ = 25°C) | $\Delta I_B$ | <br>–<br>– | <br>–<br>– | <br>–<br>0.5 | <br>–<br>– | <br>0.3<br>0.08 | <br>1.0<br>0.8 | mA |
| Ripple Rejection<br>8.0 Vdc ≤ $V_{in}$ ≤ 18 Vdc, f = 120 Hz | RR | – | 68 | – | 62 | 83 | – | dB |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C)<br>10 Hz ≤ f ≤ 100 kHz | $V_n$ | – | 10 | – | – | 10 | – | μV/$V_O$ |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 0.9 | – | – | 0.9 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C)<br>$V_{in}$ = 35 Vdc | $I_{SC}$ | – | 0.2 | – | – | 0.6 | – | A |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −0.3 | – | – | −0.3 | – | mV/°C |

1. $T_{low}$ = 0°C for MC78XXAC, C, $T_{high}$ = +125°C for MC78XXAC, NCV7805
   = −40°C for MC78XXB, MC78XXAB, NCV7805
2. 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** ($V_{in}$ = 10 V, $I_O$ = 1.0 A, $T_J$ = $T_{low}$ to $T_{high}$ (Note 3), unless otherwise noted)

| Characteristic | Symbol | MC7805AB/MC7805AC | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 4.9 | 5.0 | 5.1 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W)<br>7.5 Vdc ≤ $V_{in}$ ≤ 20 Vdc | $V_O$ | 4.8 | 5.0 | 5.2 | Vdc |
| Line Regulation (Note 4) | $Reg_{line}$ | | | | mV |
| 7.5 Vdc ≤ $V_{in}$ ≤ 25 Vdc, $I_O$ = 500 mA | | – | 0.5 | 10 | |
| 8.0 Vdc ≤ $V_{in}$ ≤ 12 Vdc, $I_O$ = 1.0 A | | – | 0.8 | 12 | |
| 8.0 Vdc ≤ $V_{in}$ ≤ 12 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | – | 1.3 | 4.0 | |
| 7.3 Vdc ≤ $V_{in}$ ≤ 20 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | – | 4.5 | 10 | |
| Load Regulation (Note 4) | $Reg_{load}$ | | | | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A, $T_J$ = 25°C | | – | 1.3 | 25 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | 0.8 | 25 | |
| 250 mA ≤ $I_O$ ≤ 750 mA | | – | 0.53 | 15 | |
| Quiescent Current | $I_B$ | – | 3.2 | 6.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | mA |
| 8.0 Vdc ≤ $V_{in}$ ≤ 25 Vdc, $I_O$ = 500 mA | | – | 0.3 | 0.8 | |
| 7.5 Vdc ≤ $V_{in}$ ≤ 20 Vdc, $T_J$ = 25°C | | – | – | 0.8 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | 0.08 | 0.5 | |
| Ripple Rejection<br>8.0 Vdc ≤ $V_{in}$ ≤ 18 Vdc, f = 120 Hz, $I_O$ = 500 mA | RR | 68 | 83 | – | dB |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C)<br>10 Hz ≤ f ≤ 100 kHz | $V_n$ | – | 10 | – | $\mu V/V_O$ |
| Output Resistance (f = 1.0 kHz) | $r_O$ | – | 0.9 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C)<br>$V_{in}$ = 35 Vdc | $I_{SC}$ | – | 0.2 | – | A |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −0.3 | – | mV/°C |

3. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
   = −40°C for MC78XXB, MC78XXAB, NCV7805
4. 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** ($V_{in}$ = 11 V, $I_O$ = 500 mA, $T_J$ = $T_{low}$ to $T_{high}$ (Note 5), unless otherwise noted)

| Characteristic | Symbol | MC7806B | | | MC7806C | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 5.75 | 6.0 | 6.25 | 5.75 | 6.0 | 6.25 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | | | | | | | Vdc |
| 8.0 Vdc ≤ $V_{in}$ ≤ 21 Vdc | | – | – | – | 5.7 | 6.0 | 6.3 | |
| 9.0 Vdc ≤ $V_{in}$ ≤ 21 Vdc | | 5.7 | 6.0 | 6.3 | – | – | – | |
| Line Regulation, $T_J$ = 25°C (Note 6) | $Reg_{line}$ | | | | | | | mV |
| 8.0 Vdc ≤ $V_{in}$ ≤ 25 Vdc | | – | 5.5 | 120 | – | 0.5 | 24 | |
| 9.0 Vdc ≤ $V_{in}$ ≤ 13 Vdc | | – | 1.4 | 60 | – | 0.8 | 12 | |
| Load Regulation, $T_J$ = 25°C (Note 6) | $Reg_{load}$ | – | 1.3 | 120 | – | 1.3 | 30 | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A | | | | | | | | |
| Quiescent Current ($T_J$ = 25°C) | $I_B$ | – | 3.3 | 8.0 | – | 3.3 | 8.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | | | | mA |
| 8.0 Vdc ≤ $V_{in}$ ≤ 25 Vdc | | – | – | – | – | 0.3 | 1.3 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | – | 0.5 | – | 0.08 | 0.5 | |
| Ripple Rejection | RR | – | 65 | – | 58 | 65 | – | dB |
| 9.0 Vdc ≤ $V_{in}$ ≤ 19 Vdc, f = 120 Hz | | | | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | – | 10 | – | – | 10 | – | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 0.9 | – | – | 0.9 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | – | 0.2 | – | – | 0.2 | – | A |
| $V_{in}$ = 35 Vdc | | | | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −0.3 | – | – | −0.3 | – | mV/°C |

5. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, NCV7805
   = −40°C for MC78XXB, MC78XXAB, NCV7805
6. 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** ($V_{in}$ = 11 V, $I_O$ = 1.0 A, $T_J$ = $T_{low}$ to $T_{high}$ (Note 7), unless otherwise noted)

| Characteristic | Symbol | MC7806AC | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 5.88 | 6.0 | 6.12 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W)<br>8.6 Vdc ≤ $V_{in}$ ≤ 21 Vdc | $V_O$ | 5.76 | 6.0 | 6.24 | Vdc |
| Line Regulation (Note 8) | $Reg_{line}$ | | | | mV |
| 8.6 Vdc ≤ $V_{in}$ ≤ 25 Vdc, $I_O$ = 500 mA | | − | 5.0 | 12 | |
| 9.0 Vdc ≤ $V_{in}$ ≤ 13 Vdc, $I_O$ = 1.0 A | | − | 1.4 | 15 | |
| Load Regulation (Note 8) | $Reg_{load}$ | | | | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A, $T_J$ = 25°C | | − | 1.3 | 25 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | − | 0.9 | 25 | |
| 250 mA ≤ $I_O$ ≤ 750 mA | | − | 0.2 | 15 | |
| Quiescent Current | $I_B$ | − | 3.3 | 6.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | mA |
| 9.0 Vdc ≤ $V_{in}$ ≤ 25 Vdc, $I_O$ = 500 mA | | − | − | 0.8 | |
| 9.0 Vdc ≤ $V_{in}$ ≤ 21 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | − | − | 0.8 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | − | − | 0.5 | |
| Ripple Rejection<br>9.0 Vdc ≤ $V_{in}$ ≤ 19 Vdc, f = 120 Hz, $I_O$ = 500 mA | RR | 58 | 65 | − | dB |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | − | 2.0 | − | Vdc |
| Output Noise Voltage ($T_A$ = 25°C)<br>10 Hz ≤ f ≤ 100 kHz | $V_n$ | − | 10 | − | $\mu V/V_O$ |
| Output Resistance (f = 1.0 kHz) | $r_O$ | − | 0.9 | − | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C)<br>$V_{in}$ = 35 Vdc | $I_{SC}$ | − | 0.2 | − | A |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | − | 2.2 | − | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | − | −0.3 | − | mV/°C |

7. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
   = −40°C for MC78XXB, MC78XXAB, NCV7805
8. 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** ($V_{in}$ = 14 V, $I_O$ = 500 mA, $T_J$ = $T_{low}$ to $T_{high}$ (Note 9), unless otherwise noted)

| Characteristic | Symbol | MC7808B | | | MC7808C | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 7.7 | 8.0 | 8.3 | 7.7 | 8.0 | 8.3 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | | | | | | | Vdc |
| 10.5 Vdc ≤ $V_{in}$ ≤ 23 Vdc | | – | – | – | 7.6 | 8.0 | 8.4 | |
| 11.5 Vdc ≤ $V_{in}$ ≤ 23 Vdc | | 7.6 | 8.0 | 8.4 | – | – | – | |
| Line Regulation, $T_J$ = 25°C, (Note 10) | $Reg_{line}$ | | | | | | | mV |
| 10.5 Vdc ≤ $V_{in}$ ≤ 25 Vdc | | – | 6.0 | 160 | – | 6.0 | 32 | |
| 11 Vdc ≤ $V_{in}$ ≤ 17 Vdc | | – | 1.7 | 80 | – | 1.7 | 16 | |
| Load Regulation, $T_J$ = 25°C (Note 10) | $Reg_{load}$ | – | 1.4 | 160 | – | 1.4 | 35 | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A | | | | | | | | |
| Quiescent Current | $I_B$ | – | 3.3 | 8.0 | – | 3.3 | 8.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | | | | mA |
| 10.5 Vdc ≤ $V_{in}$ ≤ 25 Vdc | | – | – | – | – | – | 1.0 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | – | 0.5 | – | – | 0.5 | |
| Ripple Rejection | RR | – | 62 | – | 56 | 62 | – | dB |
| 11.5 Vdc ≤ $V_{in}$ ≤ 18 Vdc, f = 120 Hz | | | | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | – | 10 | – | – | 10 | – | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 0.9 | – | – | 0.9 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | – | 0.2 | – | – | 0.2 | – | A |
| $V_{in}$ = 35 Vdc | | | | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −0.4 | – | – | −0.4 | – | mV/°C |

9. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
   = −40°C for MC78XXB, MC78XXAB, NCV7805
10. 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** ($V_{in}$ = 14 V, $I_O$ = 1.0 A, $T_J$ = $T_{low}$ to $T_{high}$ (Note 11), unless otherwise noted)

| Characteristic | Symbol | MC7808AB/MC7808AC | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 7.84 | 8.0 | 8.16 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W)<br>10.6 Vdc ≤ $V_{in}$ ≤ 23 Vdc | $V_O$ | 7.7 | 8.0 | 8.3 | Vdc |
| Line Regulation (Note 12)<br>10.6 Vdc ≤ $V_{in}$ ≤ 25 Vdc, $I_O$ = 500 mA<br>11 Vdc ≤ $V_{in}$ ≤ 17 Vdc, $I_O$ = 1.0 A<br>10.4 Vdc ≤ $V_{in}$ ≤ 23 Vdc, $T_J$ = 25°C | $Reg_{line}$ | <br>–<br>–<br>– | <br>6.0<br>1.7<br>5.0 | <br>15<br>18<br>15 | mV |
| Load Regulation (Note 12)<br>5.0 mA ≤ $I_O$ ≤ 1.5 A, $T_J$ = 25°C<br>5.0 mA ≤ $I_O$ ≤ 1.0 A<br>250 mA ≤ $I_O$ ≤ 750 mA | $Reg_{load}$ | <br>–<br>–<br>– | <br>1.4<br>1.0<br>0.22 | <br>25<br>25<br>15 | mV |
| Quiescent Current | $I_B$ | – | 3.3 | 6.0 | mA |
| Quiescent Current Change<br>11 Vdc ≤ $V_{in}$ ≤ 25 Vdc, $I_O$ = 500 mA<br>10.6 Vdc ≤ $V_{in}$ ≤ 23 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C<br>5.0 mA ≤ $I_O$ ≤ 1.0 A | $\Delta I_B$ | <br>–<br>–<br>– | <br>–<br>–<br>– | <br>0.8<br>0.8<br>0.5 | mA |
| Ripple Rejection<br>11.5 Vdc ≤ $V_{in}$ ≤ 21.5 Vdc, f = 120 Hz, $I_O$ = 500 mA | RR | 56 | 62 | – | dB |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C)<br>10 Hz ≤ f ≤ 100 kHz | $V_n$ | – | 10 | – | $\mu V/V_O$ |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 0.9 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C)<br>$V_{in}$ = 35 Vdc | $I_{SC}$ | – | 0.2 | – | A |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −0.4 | – | mV/°C |

11. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
12. 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** ($V_{in}$ = 15 V, $I_O$ = 500 mA, $T_J$ = $T_{low}$ to $T_{high}$ (Note 13), unless otherwise noted)

| Characteristic | Symbol | MC7809B | | | MC7809C | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 8.65 | 9.0 | 9.35 | 8.65 | 9.0 | 9.35 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | | | | | | | Vdc |
| 11.5 Vdc ≤ $V_{in}$ ≤ 24 Vdc | | 8.55 | 9.0 | 9.45 | 8.55 | 9.0 | 9.45 | |
| Line Regulation, $T_J$ = 25°C (Note 14) | $Reg_{line}$ | | | | | | | mV |
| 11 Vdc ≤ $V_{in}$ ≤ 26 Vdc | | – | 6.2 | 32 | – | 6.2 | 32 | |
| 11.5 Vdc ≤ $V_{in}$ ≤ 17 Vdc | | – | 1.8 | 16 | – | 1.8 | 16 | |
| Load Regulation, $T_J$ = 25°C (Note 14) | $Reg_{load}$ | – | 1.5 | 35 | – | 1.5 | 35 | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A | | | | | | | | |
| Quiescent Current | $I_B$ | – | 3.4 | 8.0 | – | 3.4 | 8.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | | | | mA |
| 11.5 Vdc ≤ $V_{in}$ ≤ 26 Vdc | | – | – | 1.0 | – | – | 1.0 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | – | 0.5 | – | – | 0.5 | |
| Ripple Rejection | RR | 56 | 61 | – | 56 | 61 | – | dB |
| 11.5 Vdc ≤ $V_{in}$ ≤ 21.5 Vdc, f = 120 Hz | | | | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | – | 10 | – | – | 10 | – | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 1.0 | – | – | 1.0 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | – | 0.2 | – | – | 0.2 | – | A |
| $V_{in}$ = 35 Vdc | | | | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −0.5 | – | – | −0.5 | – | mV/°C |

13. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
14. 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** ($V_{in}$ = 19 V, $I_O$ = 500 mA, $T_J$ = $T_{low}$ to $T_{high}$ (Note 15), unless otherwise noted)

| Characteristic | Symbol | MC7812B | | | MC7812C | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 11.5 | 12 | 12.5 | 11.5 | 12 | 12.5 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | | | | | | | Vdc |
| 14.5 Vdc ≤ $V_{in}$ ≤ 27 Vdc | | – | – | – | 11.4 | 12 | 12.6 | |
| 15.5 Vdc ≤ $V_{in}$ ≤ 27 Vdc | | 11.4 | 12 | 12.6 | – | – | – | |
| Line Regulation, $T_J$ = 25°C (Note 16) | $Reg_{line}$ | | | | | | | mV |
| 14.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc | | – | 7.5 | 240 | – | 3.8 | 24 | |
| 16 Vdc ≤ $V_{in}$ ≤ 22 Vdc | | – | 2.2 | 120 | – | 0.3 | 24 | |
| 14.8 Vdc ≤ $V_{in}$ ≤ 27 Vdc, $I_O$ = 1.0 A | | – | – | – | – | – | 48 | |
| Load Regulation, $T_J$ = 25°C (Note 16) | $Reg_{load}$ | – | 1.6 | 240 | – | 8.1 | 60 | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A | | | | | | | | |
| Quiescent Current | $I_B$ | – | 3.4 | 8.0 | – | 3.4 | 6.5 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | | | | mA |
| 14.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | – | – | – | – | – | 0.7 | |
| 15 Vdc ≤ $V_{in}$ ≤ 30 Vdc | | – | – | 1.0 | – | – | 0.8 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | – | 0.5 | – | – | 0.5 | |
| Ripple Rejection | RR | – | 60 | – | 55 | 60 | – | dB |
| 15 Vdc ≤ $V_{in}$ ≤ 25 Vdc, f = 120 Hz | | | | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | – | 10 | – | – | 10 | – | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 1.1 | – | – | 1.1 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | – | 0.2 | – | – | 0.2 | – | A |
| $V_{in}$ = 35 Vdc | | | | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −0.8 | – | – | −0.8 | – | mV/°C |

15. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
16. 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** ($V_{in}$ = 19 V, $I_O$ = 1.0 A, $T_J$ = $T_{low}$ to $T_{high}$ (Note 17), unless otherwise noted)

| Characteristic | Symbol | MC7812AB/MC7812AC | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 11.75 | 12 | 12.25 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | 11.5 | 12 | 12.5 | Vdc |
| 14.8 Vdc ≤ $V_{in}$ ≤ 27 Vdc | | | | | |
| Line Regulation (Note 18) | $Reg_{line}$ | | | | mV |
| 14.8 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 500 mA | | − | 3.8 | 18 | |
| 16 Vdc ≤ $V_{in}$ ≤ 22 Vdc, $I_O$ = 1.0 A | | − | 2.2 | 20 | |
| 14.5 Vdc ≤ $V_{in}$ ≤ 27 Vdc, $T_J$ = 25°C | | − | 6.0 | 120 | |
| Load Regulation (Note 18) | $Reg_{load}$ | | | | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A, $T_J$ = 25°C | | − | − | 25 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | − | − | 25 | |
| Quiescent Current | $I_B$ | − | 3.4 | 6.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | mA |
| 15 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 500 mA | | − | − | 0.8 | |
| 14.8 Vdc ≤ $V_{in}$ ≤ 27 Vdc, $T_J$ = 25°C | | − | − | 0.8 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A, $T_J$ = 25°C | | − | − | 0.5 | |
| Ripple Rejection | RR | 55 | 60 | − | dB |
| 15 Vdc ≤ $V_{in}$ ≤ 25 Vdc, f = 120 Hz, $I_O$ = 500 mA | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | − | 2.0 | − | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | − | 10 | − | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | |
| Output Resistance (f = 1.0 kHz) | $r_O$ | − | 1.1 | − | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | − | 0.2 | − | A |
| $V_{in}$ = 35 Vdc | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | − | 2.2 | − | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | − | −0.8 | − | mV/°C |

17. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
18. 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** ($V_{in}$ = 23 V, $I_O$ = 500 mA, $T_J$ = $T_{low}$ to $T_{high}$ (Note 19), unless otherwise noted)

| Characteristic | Symbol | MC7815B | | | MC7815C | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 14.4 | 15 | 15.6 | 14.4 | 15 | 15.6 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | | | | | | | Vdc |
| 17.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc | | − | − | − | 14.25 | 15 | 15.75 | |
| 18.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc | | 14.25 | 15 | 15.75 | − | − | − | |
| Line Regulation, $T_J$ = 25°C (Note 20) | $Reg_{line}$ | | | | | | | mV |
| 17.9 Vdc ≤ $V_{in}$ ≤ 30 Vdc | | − | 8.5 | 300 | − | 8.5 | 30 | |
| 20 Vdc ≤ $V_{in}$ ≤ 26 Vdc | | − | 3.0 | 150 | − | 3.0 | 28 | |
| Load Regulation, $T_J$ = 25°C (Note 20) | $Reg_{load}$ | − | 1.8 | 300 | − | 1.8 | 55 | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A | | | | | | | | |
| Quiescent Current | $I_B$ | − | 3.5 | 8.0 | − | 3.5 | 6.5 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | | | | mA |
| 17.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc | | − | − | − | − | − | 0.8 | |
| 17.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | − | − | 1.0 | − | − | 0.7 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | − | − | 0.5 | − | − | 0.5 | |
| Ripple Rejection | RR | − | 58 | − | 54 | 58 | − | dB |
| 18.5 Vdc ≤ $V_{in}$ ≤ 28.5 Vdc, f = 120 Hz | | | | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | − | 2.0 | − | − | 2.0 | − | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | − | 10 | − | − | 10 | − | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | − | 1.2 | − | − | 1.2 | − | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | − | 0.2 | − | − | 0.2 | − | A |
| $V_{in}$ = 35 Vdc | | | | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | − | 2.2 | − | − | 2.2 | − | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | − | −1.0 | − | − | −1.0 | − | mV/°C |

19. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
20. 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** ($V_{in}$ = 23 V, $I_O$ = 1.0 A, $T_J$ = $T_{low}$ to $T_{high}$ (Note 21), unless otherwise noted)

| Characteristic | Symbol | MC7815AB/MC7815AC | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 14.7 | 15 | 15.3 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | 14.4 | 15 | 15.6 | Vdc |
| 17.9 Vdc ≤ $V_{in}$ ≤ 30 Vdc | | | | | |
| Line Regulation (Note 22) | $Reg_{line}$ | | | | mV |
| 17.9 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 500 mA | | – | 8.5 | 20 | |
| 20 Vdc ≤ $V_{in}$ ≤ 26 Vdc | | – | 3.0 | 22 | |
| 17.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | – | 7.0 | 20 | |
| Load Regulation (Note 22) | $Reg_{load}$ | | | | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A, $T_J$ = 25°C | | – | 1.8 | 25 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | 1.5 | 25 | |
| 250 mA ≤ $I_O$ ≤ 750 mA | | – | 1.2 | 15 | |
| Quiescent Current | $I_B$ | – | 3.5 | 6.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | mA |
| 17.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 500 mA | | – | – | 0.8 | |
| 17.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | – | – | 0.8 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | – | 0.5 | |
| Ripple Rejection | RR | 60 | 80 | – | dB |
| 18.5 Vdc ≤ $V_{in}$ ≤ 28.5 Vdc, f = 120 Hz, $I_O$ = 500 mA | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | – | 10 | – | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 1.2 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | – | 0.2 | – | A |
| $V_{in}$ = 35 Vdc | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −1.0 | – | mV/°C |

21. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
22. 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** ($V_{in}$ = 27 V, $I_O$ = 500 mA, $T_J$ = $T_{low}$ to $T_{high}$ (Note 23), unless otherwise noted)

| Characteristic | Symbol | MC7818B | | | MC7818C | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 17.3 | 18 | 18.7 | 17.3 | 18 | 18.7 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | | | | | | | Vdc |
| 21 Vdc ≤ $V_{in}$ ≤ 33 Vdc | | – | – | – | 17.1 | 18 | 18.9 | |
| 22 Vdc ≤ $V_{in}$ ≤ 33 Vdc | | 17.1 | 18 | 18.9 | – | – | – | |
| Line Regulation, (Note 24) | $Reg_{line}$ | | | | | | | mV |
| 21 Vdc ≤ $V_{in}$ ≤ 33 Vdc | | – | 9.5 | 360 | – | 9.5 | 50 | |
| 24 Vdc ≤ $V_{in}$ ≤ 30 Vdc | | – | 3.2 | 180 | – | 3.2 | 25 | |
| Load Regulation, (Note 24) | $Reg_{load}$ | – | 2.0 | 360 | – | 2.0 | 55 | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A | | | | | | | | |
| Quiescent Current | $I_B$ | – | 3.5 | 8.0 | – | 3.5 | 6.5 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | | | | mA |
| 21 Vdc ≤ $V_{in}$ ≤ 33 Vdc | | – | – | – | – | – | 1.0 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | – | 0.5 | – | – | 0.5 | |
| Ripple Rejection | RR | – | 57 | – | 53 | 57 | – | dB |
| 22 Vdc ≤ $V_{in}$ ≤ 33 Vdc, f = 120 Hz | | | | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_{il} - V_O$ | – | 2.0 | – | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | – | 10 | – | – | 10 | – | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 1.3 | – | – | 1.3 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | – | 0.2 | – | – | 0.2 | – | A |
| $V_{in}$ = 35 Vdc | | | | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −1.5 | – | – | −1.5 | – | mV/°C |

23. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
24. 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** ($V_{in}$ = 27 V, $I_O$ = 1.0 A, $T_J$ = $T_{low}$ to $T_{high}$ (Note 25), unless otherwise noted)

| Characteristic | Symbol | MC7818AC | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 17.64 | 18 | 18.36 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | 17.3 | 18 | 18.7 | Vdc |
| 21 Vdc ≤ $V_{in}$ ≤ 33 Vdc | | | | | |
| Line Regulation (Note 26) | $Reg_{line}$ | | | | mV |
| 21 Vdc ≤ $V_{in}$ ≤ 33 Vdc, $I_O$ = 500 mA | | − | 9.5 | 22 | |
| 24 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 1.0 A | | − | 3.2 | 25 | |
| 24 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | − | 3.2 | 10.5 | |
| 20.6 Vdc ≤ $V_{in}$ ≤ 33 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | − | 8.0 | 22 | |
| Load Regulation (Note 26) | $Reg_{load}$ | | | | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A, $T_J$ = 25°C | | − | 2.0 | 25 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | − | 1.8 | 25 | |
| 250 mA ≤ $I_O$ ≤ 750 mA | | − | 1.5 | 15 | |
| Quiescent Current | $I_B$ | − | 3.5 | 6.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | mA |
| 21 Vdc ≤ $V_{in}$ ≤ 33 Vdc, $I_O$ = 500 mA | | − | − | 0.8 | |
| 21.5 Vdc ≤ $V_{in}$ ≤ 30 Vdc, $T_J$ = 25°C | | − | − | 0.8 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | − | − | 0.5 | |
| Ripple Rejection | RR | 53 | 57 | − | dB |
| 22 Vdc ≤ $V_{in}$ ≤ 32 Vdc, f = 120 Hz, $I_O$ = 500 mA | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | − | 2.0 | − | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | − | 10 | − | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | − | 1.3 | − | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | − | 0.2 | − | A |
| $V_{in}$ = 35 Vdc | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | − | 2.2 | − | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | − | −1.5 | − | mV/°C |

25. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
26. 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** ($V_{in}$ = 33 V, $I_O$ = 500 mA, $T_J$ = $T_{low}$ to $T_{high}$ (Note 27), unless otherwise noted)

| Characteristic | Symbol | MC7824B | | | MC7824C | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 23 | 24 | 25 | 23 | 24 | 25 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | | | | | | | Vdc |
| 27 Vdc ≤ $V_{in}$ ≤ 38 Vdc | | – | – | – | 22.8 | 24 | 25.2 | |
| 28 Vdc ≤ $V_{in}$ ≤ 38 Vdc | | 22.8 | 24 | 25.2 | – | – | – | |
| Line Regulation, (Note 28) | $Reg_{line}$ | | | | | | | mV |
| 27 Vdc ≤ $V_{in}$ ≤ 38 Vdc | | – | 11.5 | 480 | – | 2.7 | 60 | |
| 30 Vdc ≤ $V_{in}$ ≤ 36 Vdc | | – | 3.8 | 240 | – | 2.7 | 48 | |
| Load Regulation, (Note 28) | $Reg_{load}$ | – | 2.1 | 480 | – | 4.4 | 65 | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A | | | | | | | | |
| Quiescent Current | $I_B$ | – | 3.6 | 8.0 | – | 3.6 | 6.5 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | | | | mA |
| 27 Vdc ≤ $V_{in}$ ≤ 38 Vdc | | – | – | – | – | – | 1.0 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | – | – | 0.5 | – | – | 0.5 | |
| Ripple Rejection | RR | – | 54 | – | 50 | 54 | – | dB |
| 28 Vdc ≤ $V_{in}$ ≤ 38 Vdc, f = 120 Hz | | | | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | – | 2.0 | – | – | 2.0 | – | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | – | 10 | – | – | 10 | – | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | | | | |
| Output Resistance f = 1.0 kHz | $r_O$ | – | 1.4 | – | – | 1.4 | – | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | – | 0.2 | – | – | 0.2 | – | A |
| $V_{in}$ = 35 Vdc | | | | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | – | 2.2 | – | – | 2.2 | – | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | – | −2.0 | – | – | −2.0 | – | mV/°C |

27. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
28. 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** ($V_{in}$ = 33 V, $I_O$ = 1.0 A, $T_J$ = $T_{low}$ to $T_{high}$ (Note 29), unless otherwise noted)

| Characteristic | Symbol | MC7824AC | | | Unit |
|---|---|---|---|---|---|
| | | Min | Typ | Max | |
| Output Voltage ($T_J$ = 25°C) | $V_O$ | 23.5 | 24 | 24.5 | Vdc |
| Output Voltage (5.0 mA ≤ $I_O$ ≤ 1.0 A, $P_D$ ≤ 15 W) | $V_O$ | 23.2 | 24 | 25.8 | Vdc |
| 27.3 Vdc ≤ $V_{in}$ ≤ 38 Vdc | | | | | |
| Line Regulation (Note 30) | $Reg_{line}$ | | | | mV |
| 27 Vdc ≤ $V_{in}$ ≤ 38 Vdc, $I_O$ = 500 mA | | − | 11.5 | 25 | |
| 30 Vdc ≤ $V_{in}$ ≤ 36 Vdc, $I_O$ = 1.0 A | | − | 3.8 | 28 | |
| 30 Vdc ≤ $V_{in}$ ≤ 36 Vdc, $T_J$ = 25°C | | − | 3.8 | 12 | |
| 26.7 Vdc ≤ $V_{in}$ ≤ 38 Vdc, $I_O$ = 1.0 A, $T_J$ = 25°C | | − | 10 | 25 | |
| Load Regulation (Note 30) | $Reg_{load}$ | | | | mV |
| 5.0 mA ≤ $I_O$ ≤ 1.5 A, $T_J$ = 25°C | | − | 2.1 | 15 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | − | 2.0 | 25 | |
| 250 mA ≤ $I_O$ ≤ 750 mA | | − | 1.8 | 15 | |
| Quiescent Current | $I_B$ | − | 3.6 | 6.0 | mA |
| Quiescent Current Change | $\Delta I_B$ | | | | mA |
| 27.3 Vdc ≤ $V_{in}$ ≤ 38 Vdc, $I_O$ = 500 mA | | − | − | 0.8 | |
| 27 Vdc ≤ $V_{in}$ ≤ 38 Vdc, $T_J$ = 25°C | | − | − | 0.8 | |
| 5.0 mA ≤ $I_O$ ≤ 1.0 A | | − | − | 0.5 | |
| Ripple Rejection | RR | 45 | 54 | − | dB |
| 28 Vdc ≤ $V_{in}$ ≤ 38 Vdc, f = 120 Hz, $I_O$ = 500 mA | | | | | |
| Dropout Voltage ($I_O$ = 1.0 A, $T_J$ = 25°C) | $V_I - V_O$ | − | 2.0 | − | Vdc |
| Output Noise Voltage ($T_A$ = 25°C) | $V_n$ | − | 10 | − | $\mu V/V_O$ |
| 10 Hz ≤ f ≤ 100 kHz | | | | | |
| Output Resistance (f = 1.0 kHz) | $r_O$ | − | 1.4 | − | mΩ |
| Short Circuit Current Limit ($T_A$ = 25°C) | $I_{SC}$ | − | 0.2 | − | A |
| $V_{in}$ = 35 Vdc | | | | | |
| Peak Output Current ($T_J$ = 25°C) | $I_{max}$ | − | 2.2 | − | A |
| Average Temperature Coefficient of Output Voltage | $TCV_O$ | − | −2.0 | − | mV/°C |

29. $T_{low}$ = 0°C for MC78XXAC, C  $T_{high}$ = +125°C for MC78XXAC, C, NCV7805
= −40°C for MC78XXB, MC78XXAB, NCV7805
30. 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.

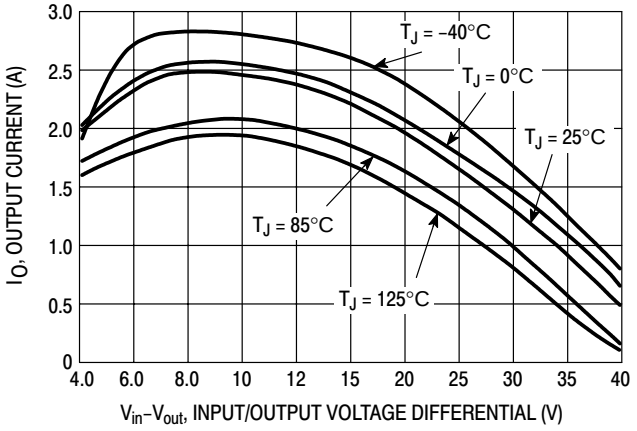



**Figure 2. Peak Output Current as a Function of Input/Output Differential Voltage (MC78XXC, AC, B)**

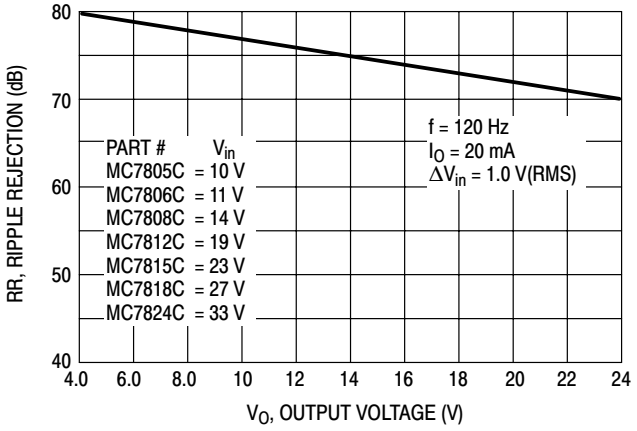



**Figure 3. Ripple Rejection as a Function of Output Voltages (MC78XXC, AC, B)**

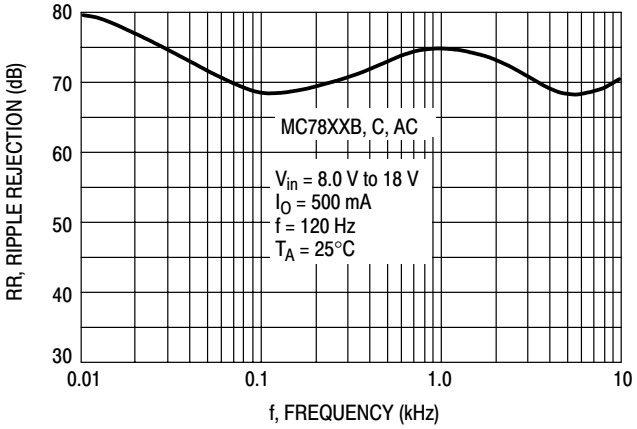



**Figure 4. Ripple Rejection as a Function of Frequency (MC78XXC, AC, B)**

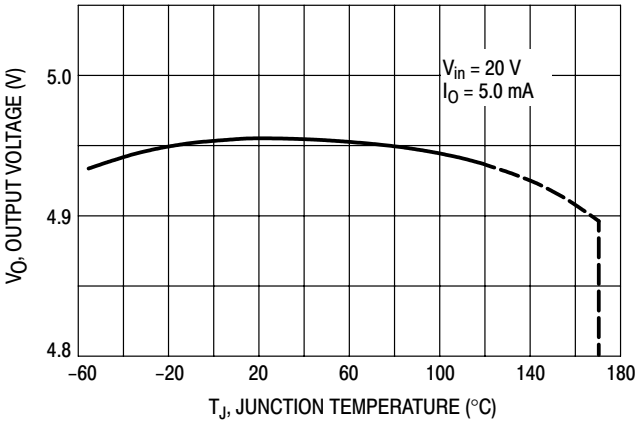



**Figure 5. Output Voltage as a Function of Junction Temperature (MC7805C, AC, B)**

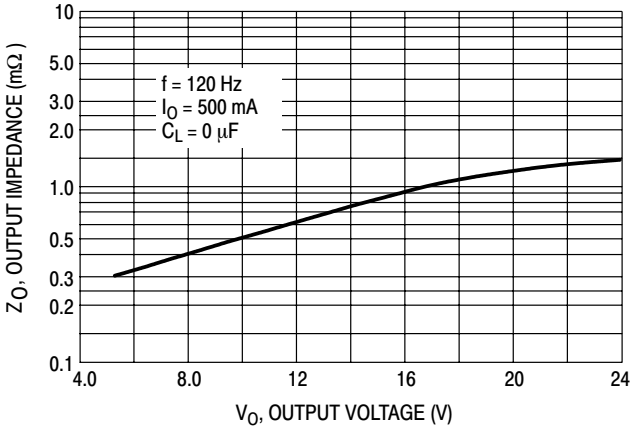



**Figure 6. Output Impedance as a Function of Output Voltage (MC78XXC, AC, B)**

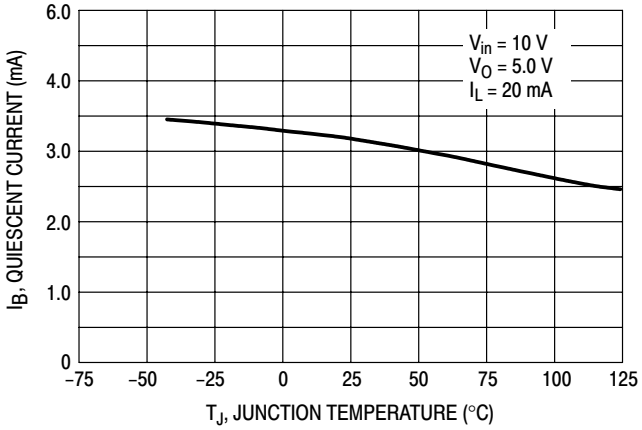


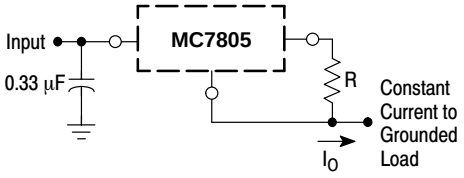

**Figure 7. Quiescent Current as a Function of Temperature (MC78XXC, AC, B)**

## APPLICATIONS INFORMATION

### Design Considerations

The MC7800 Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition, Internal Short Circuit Protection that limits the maximum current the circuit will pass, and Output Transistor Safe−Area Compensation that reduces the output short circuit current as the voltage across the pass transistor is increased.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high−frequency characteristics to insure stable operation under all load conditions. A 0.33 μF or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulators input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead.



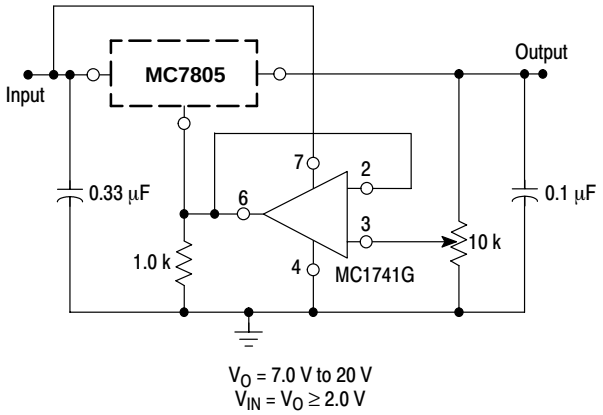

The MC7800 regulators can also be used as a current source when connected as above. In order to minimize dissipation the MC7805C is chosen in this application. Resistor R determines the current as follows:

$$I_O = \frac{5.0\ V}{R} + I_B$$

$I_B \cong 3.2$ mA over line and load changes.

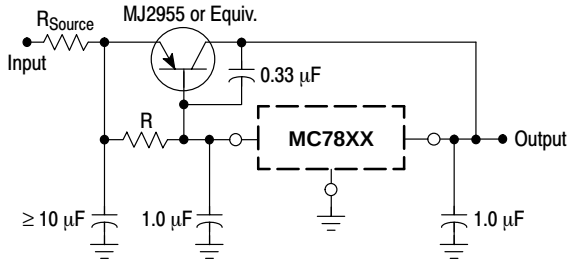
For example, a 1.0 A current source would require R to be a 5.0 Ω, 10 W resistor and the output voltage compliance would be the input voltage less 7.0 V.

**Figure 8. Current Regulator**




The addition of an operational amplifier allows adjustment to higher or intermediate values while retaining regulation characteristics. The minimum voltage obtainable with this arrangement is 2.0 V greater than the regulator voltage.

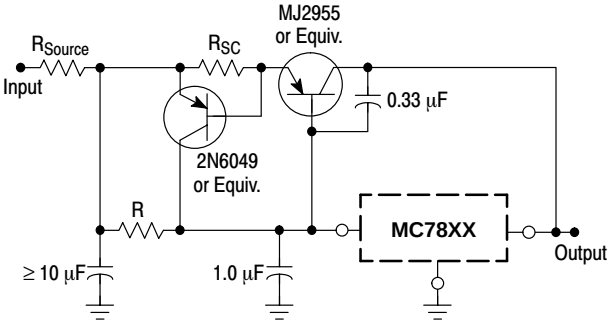
**Figure 9. Adjustable Output Regulator**




XX = 2 digits of type number indicating voltage.

The MC7800 series can be current boosted with a PNP transistor. The MJ2955 provides current to 5.0 A. Resistor R in conjunction with the $V_{BE}$ of the PNP determines when the pass transistor begins conducting; this circuit is not short circuit proof. Input/output differential voltage minimum is increased by $V_{BE}$ of the pass transistor.

**Figure 10. Current Boost Regulator**




XX = 2 digits of type number indicating voltage.

The circuit of Figure 10 can be modified to provide supply protection against short circuits by adding a short circuit sense resistor, $R_{SC}$, and an additional PNP transistor. The current sensing PNP must be able to handle the short circuit current of the three−terminal regulator. Therefore, a four−ampere plastic power transistor is specified.

**Figure 11. Short Circuit Protection**

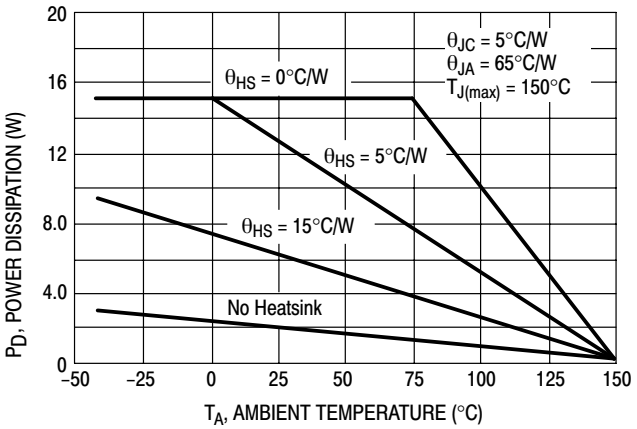



**Figure 12. Worst Case Power Dissipation versus Ambient Temperature (Case 221A)**

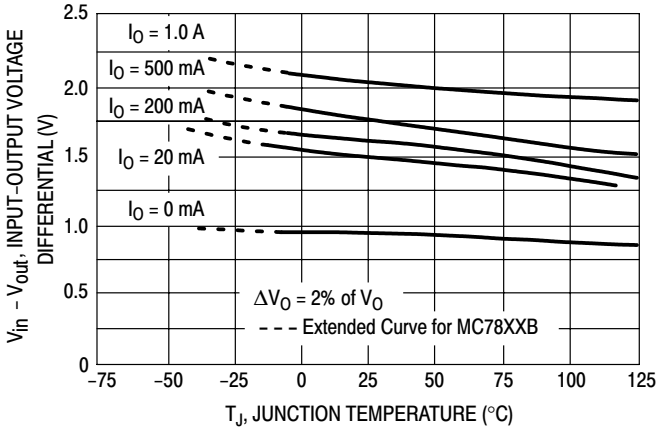



**Figure 13. Input Output Differential as a Function of Junction Temperature (MC78XXC, AC, B)**

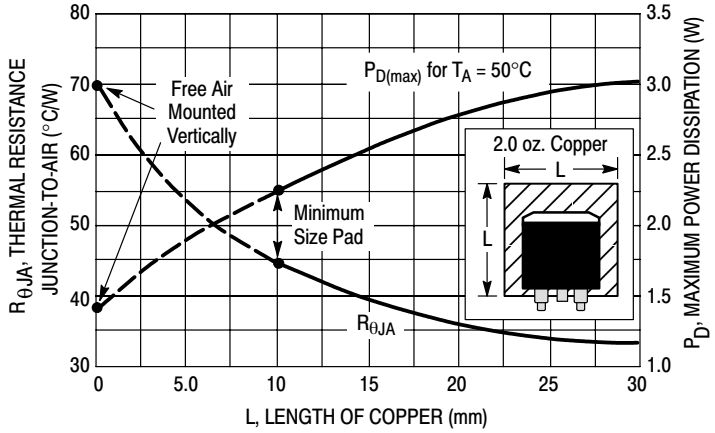



**Figure 14. D²PAK Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length**

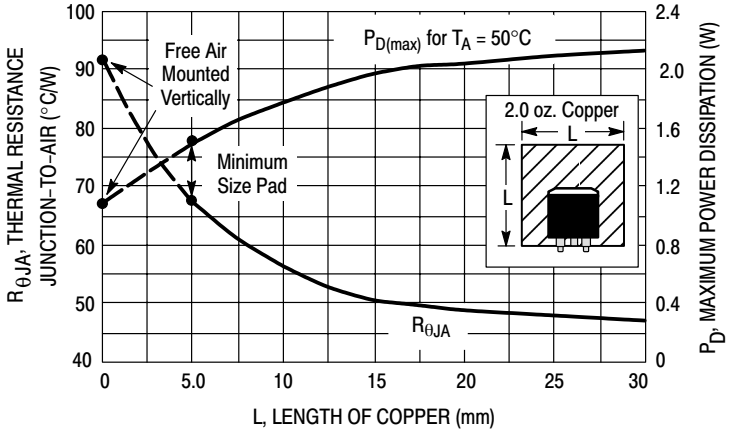



**Figure 15. DPAK Thermal Resistance and Maximum Power Dissipation versus P.C.B. Copper Length**

## DEFINITIONS

**Line Regulation** − The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

**Load Regulation** − The change in output voltage for a change in load current at constant chip temperature.

**Maximum Power Dissipation** − The maximum total device dissipation for which the regulator will operate within specifications.

**Quiescent Current** − That part of the input current that is not delivered to the load.

**Output Noise Voltage** − The rms ac voltage at the output, with constant load and no input ripple, measured over a specified frequency range.

**Long Term Stability** − Output voltage stability under accelerated life test conditions with the maximum rated voltage listed in the devices' electrical characteristics and maximum power dissipation.

### ORDERING INFORMATION

| Device | Output Voltage | Temperature Range | Package | Shipping† |
|---|---|---|---|---|
| MC7805ABD2T | 5.0 V | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7805ABD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7805ABT | | | TO−220 | 50 Units / Rail |
| MC7805ACD2T | | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7805ACD2TG | | | D2PAK (Pb−Free) | 50 Units / Rail |
| MC7805ACD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7805ACD2TR4G | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7805ACT | | | TO−220 | 50 Units / Rail |
| MC7805ACTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7805BD2T | | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7805BD2TG | | | D2PAK (Pb−Free) | 50 Units / Rail |
| MC7805BD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7805BD2TR4G | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7805BDT | | | DPAK | 75 Units / Rail |
| MC7805BDTRK | | | DPAK | 2500 / Tape & Reel |
| MC7805BDTRKG | | | DPAK (Pb−Free) | 2500 / Tape & Reel |
| MC7805BT | | | TO−220 | 50 Units / Rail |
| MC7805BTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| NCV7805BD2T* | | | D2PAK | 50 Units / Rail |
| NCV7805BD2TR4* | | | D2PAK | 50 Units / Rail |
| NCV7805BT* | | | TO−220 | 50 Units / Rail |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NCV devices: $T_{low}$ = −40°C, $T_{high}$ = +125°C. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

**ORDERING INFORMATION**

| Device | Output Voltage | Temperature Range | Package | Shipping† |
|---|---|---|---|---|
| MC7805CD2T | 5.0 V | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7805CD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7805CD2TR4G | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7805CDT | | | DPAK | 75 Units / Rail |
| MC7805CDTRK | | | DPAK | 2500 / Tape & Reel |
| MC7805CT | | | TO−220 | 50 Units / Rail |
| MC7805CTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7806ACT | 6.0 V | T = 0° to +125°C | TO−220 | 50 Units / Rail |
| MC7806BD2T | | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7806BD2TG | | | D2PAK (Pb−Free) | 50 Units / Rail |
| MC7806BD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7806BD2TR4G | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7806BT | | | TO−220 | 50 Units / Rail |
| MC7806CT | | T = 0° to +125°C | TO−220 | 50 Units / Rail |
| MC7806CTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7808ABD2T | 8.0 V | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7808ABD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7808ABT | | | TO−220 | 50 Units / Rail |
| MC7808ACT | | T = 0° to +125°C | TO−220 | 50 Units / Rail |
| MC7808BD2T | | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7808BD2TG | | | D2PAK (Pb−Free) | 50 Units / Rail |
| MC7808BD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7808BDT | | | DPAK | 75 Units / Rail |
| MC7808BDTRK | | | DPAK | 2500 / Tape & Reel |
| MC7808BDTRKG | | | DPAK (Pb−Free) | 2500 / Tape & Reel |
| MC7808BT | | | TO−220 | 50 Units / Rail |
| MC7808BTG | | | TO−220 (Pb−Free) | 50 Units / Rail |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NCV devices: $T_{low}$ = −40°C, $T_{high}$ = +125°C. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

**ORDERING INFORMATION**

| Device | Output Voltage | Temperature Range | Package | Shipping† |
|---|---|---|---|---|
| MC7808CD2T | 8.0 V | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7808CD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7808CD2TR4G | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7808CDT | | | DPAK | 75 Units / Rail |
| MC7808CDTRK | | | DPAK | 2500 / Tape & Reel |
| MC7808CDTT5 | | | DPAK | 2500 / Tape & Reel |
| MC7808CDTT5G | | | DPAK (Pb−Free) | 2500 / Tape & Reel |
| MC7808CT | | | TO−220 | 50 Units / Rail |
| MC7808CTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7809ACT | 9.0 V | T = 0° to +125°C | TO−220 | 50 Units / Rail |
| MC7809BT | | T = −40° to +125°C | TO−220 | 50 Units / Rail |
| MC7809CD2T | | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7809CD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7809CT | | | TO−220 | 50 Units / Rail |
| MC7809CTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7812ABD2T | 12 V | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7812ABD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7812ABT | | | TO−220 | 50 Units / Rail |
| MC7812ACD2T | | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7812ACD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7812ACT | | | TO−220 | 50 Units / Rail |
| MC7812ACTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7812BD2T | | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7812BD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7812BD2TR4G | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7812BDT | | | DPAK | 75 Units / Rail |
| MC7812BDTRK | | | DPAK | 2500 / Tape & Reel |
| MC7812BT | | | TO−220 | 50 Units / Rail |
| MC7812BTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| NCV7812BD2T* | | | D2PAK | 50 Units / Rail |
| NCV7812BD2TR4* | | | D2PAK | 800 / Tape & Reel |
| NCV7812BT* | | | TO−220 | 50 Units / Rail |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NCV devices: $T_{low}$ = −40°C, $T_{high}$ = +125°C. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

**ORDERING INFORMATION**

| Device | Output Voltage | Temperature Range | Package | Shipping† |
|---|---|---|---|---|
| MC7812CD2T | 12 V | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7812CD2TG | | | D2PAK (Pb−Free) | 50 Units / Rail |
| MC7812CD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7812CD2TR4G | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7812CDT | | | DPAK | 75 Units / Rail |
| MC7812CDTRK | | | DPAK | 2500 / Tape & Reel |
| MC7812CT | | | TO−220 | 50 Units / Rail |
| MC7812CTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7815ABD2T | 15 V | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7815ABD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7815ABT | | | TO−220 | 50 Units / Rail |
| MC7815ACD2T | | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7815ACD2TG | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7815ACT | | | TO−220 | 50 Units / Rail |
| MC7815ACTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7815BD2T | | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7815BD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7815BD2TR4G | | | D2PAK (Pb−Free) | 800 / Tape & Reel |
| MC7815BDT | | | DPAK | 75 Units / Rail |
| MC7815BDTRK | | | DPAK | 2500 / Tape & Reel |
| MC7815BDTRKG | | | DPAK (Pb−Free) | 2500 / Tape & Reel |
| MC7815BT | | | TO−220 | 50 Units / Rail |
| MC7815BTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7815CD2T | | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7815CD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7815CDT | | | DPAK | 75 Units / Rail |
| MC7815CDTRK | | | DPAK | 2500 / Tape & Reel |
| MC7815CT | | | TO−220 | 50 Units / Rail |
| MC7815CTG | | | TO−220 (Pb−Free) | 50 Units / Rail |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NCV devices: $T_{low}$ = −40°C, $T_{high}$ = +125°C. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

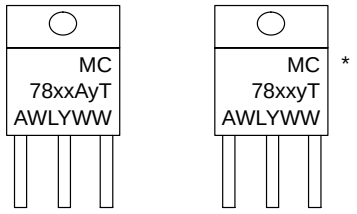
## ORDERING INFORMATION

| Device | Output Voltage | Temperature Range | Package | Shipping† |
|---|---|---|---|---|
| MC7818ACT | 18 V | T = 0° to +125°C | TO−220 | 50 Units / Rail |
| MC7818BT | | T = −40° to +125°C | TO−220 | 50 Units / Rail |
| MC7818CD2T | | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7818CD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7818CT | | | TO−220 | 50 Units / Rail |
| MC7818CTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7824ACT | 24 V | T = 0° to +125°C | TO−220 | 50 Units / Rail |
| MC7824ACTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7824BD2T | | T = −40° to +125°C | D2PAK | 50 Units / Rail |
| MC7824BD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7824BT | | | TO−220 | 50 Units / Rail |
| MC7824BTG | | | TO−220 (Pb−Free) | 50 Units / Rail |
| MC7824CD2T | | T = 0° to +125°C | D2PAK | 50 Units / Rail |
| MC7824CD2TR4 | | | D2PAK | 800 / Tape & Reel |
| MC7824CT | | | TO−220 | 50 Units / Rail |
| MC7824CTG | | | TO−220 (Pb−Free) | 50 Units / Rail |

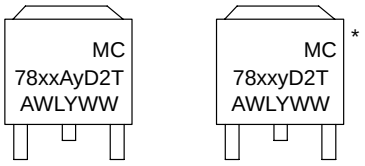
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NCV devices: $T_{low}$ = −40°C, $T_{high}$ = +125°C. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

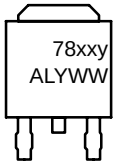
## MARKING DIAGRAMS




**TO−220−3**
**T SUFFIX**
**CASE 221A**




**$D^2$PAK−3**
**D2T SUFFIX**
**CASE 936**



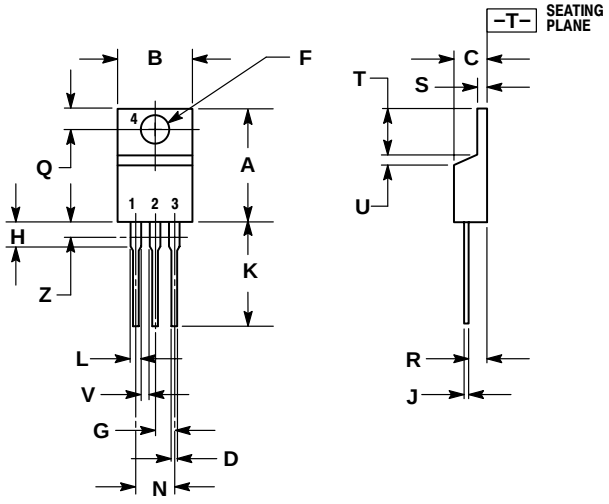

**DPAK−3**
**DT SUFFIX**
**CASE 369C**

*This marking diagram also applies to NCV78xx family.

xx = 05, 06, 08, 09, 12, 15, 18, or 24
y = B or C
A = Assembly Location
WL, L = Wafer Lot
Y = Year
WW = Work Week

## PACKAGE DIMENSIONS

**TO−220−3**
**T SUFFIX**
CASE 221A−09
ISSUE AA

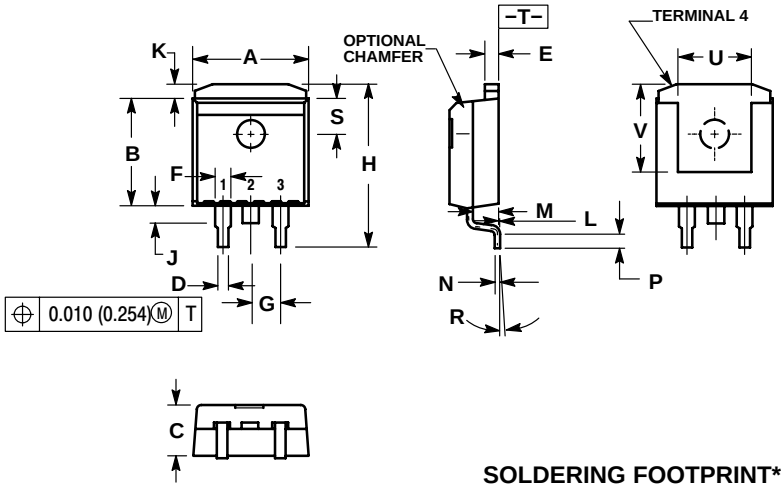



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.405 | 9.66 | 10.28 |
| C | 0.160 | 0.190 | 4.07 | 4.82 |
| D | 0.025 | 0.035 | 0.64 | 0.88 |
| F | 0.142 | 0.147 | 3.61 | 3.73 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.018 | 0.025 | 0.46 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | --- | 1.15 | --- |
| Z | --- | 0.080 | --- | 2.04 |

## PACKAGE DIMENSIONS

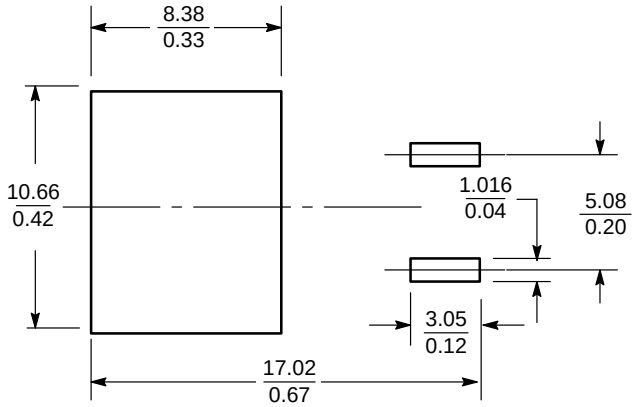
**D²PAK−3**
**D2T SUFFIX**
CASE 936−03
ISSUE B




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. TAB CONTOUR OPTIONAL WITHIN DIMENSIONS A AND K.
4. DIMENSIONS U AND V ESTABLISH A MINIMUM MOUNTING SURFACE FOR TERMINAL 4.
5. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH OR GATE PROTRUSIONS. MOLD FLASH AND GATE PROTRUSIONS NOT TO EXCEED 0.025 (0.635) MAXIMUM.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.386 | 0.403 | 9.804 | 10.236 |
| B | 0.356 | 0.368 | 9.042 | 9.347 |
| C | 0.170 | 0.180 | 4.318 | 4.572 |
| D | 0.026 | 0.036 | 0.660 | 0.914 |
| E | 0.045 | 0.055 | 1.143 | 1.397 |
| F | 0.051 REF | | 1.295 REF | |
| G | 0.100 BSC | | 2.540 BSC | |
| H | 0.539 | 0.579 | 13.691 | 14.707 |
| J | 0.125 MAX | | 3.175 MAX | |
| K | 0.050 REF | | 1.270 REF | |
| L | 0.000 | 0.010 | 0.000 | 0.254 |
| M | 0.088 | 0.102 | 2.235 | 2.591 |
| N | 0.018 | 0.026 | 0.457 | 0.660 |
| P | 0.058 | 0.078 | 1.473 | 1.981 |
| R | 5° REF | | 5° REF | |
| S | 0.116 REF | | 2.946 REF | |
| U | 0.200 MIN | | 5.080 MIN | |
| V | 0.250 MIN | | 6.350 MIN | |

### SOLDERING FOOTPRINT*



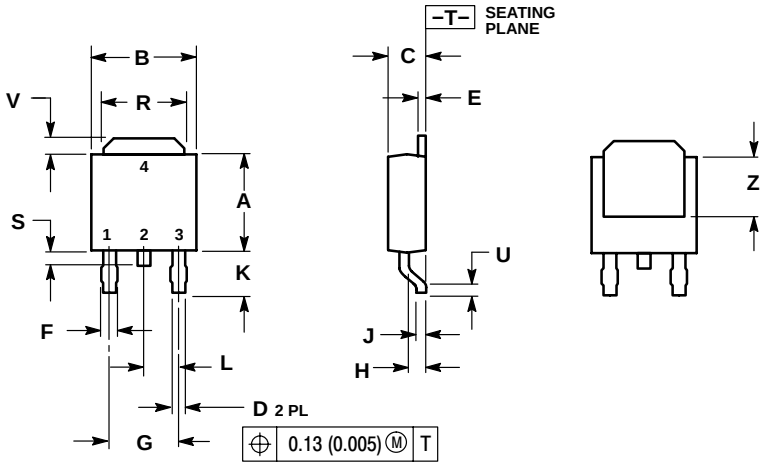

SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

**D²PAK−3**

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## PACKAGE DIMENSIONS

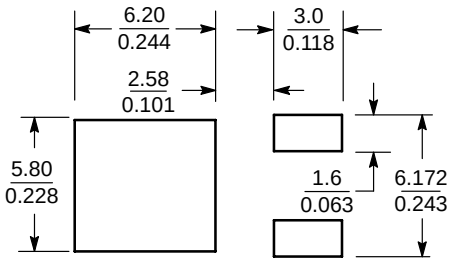
**DPAK−3**
DT SUFFIX
CASE 369C−01
ISSUE O




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.235 | 0.245 | 5.97 | 6.22 |
| B | 0.250 | 0.265 | 6.35 | 6.73 |
| C | 0.086 | 0.094 | 2.19 | 2.38 |
| D | 0.027 | 0.035 | 0.69 | 0.88 |
| E | 0.018 | 0.023 | 0.46 | 0.58 |
| F | 0.037 | 0.045 | 0.94 | 1.14 |
| G | 0.180 BSC | | 4.58 BSC | |
| H | 0.034 | 0.040 | 0.87 | 1.01 |
| J | 0.018 | 0.023 | 0.46 | 0.58 |
| K | 0.102 | 0.114 | 2.60 | 2.89 |
| L | 0.090 BSC | | 2.29 BSC | |
| R | 0.180 | 0.215 | 4.57 | 5.45 |
| S | 0.025 | 0.040 | 0.63 | 1.01 |
| U | 0.020 | −−− | 0.51 | −−− |
| V | 0.035 | 0.050 | 0.89 | 1.27 |
| Z | 0.155 | −−− | 3.93 | −−− |

## SOLDERING FOOTPRINT*




SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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**MC7800/D**