TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

**TA7805F, TA78057F, TA7806F, TA7807F, TA7808F, TA7809F, TA7810F, TA7812F, TA7815F, TA7818F, TA7820F, TA7824F**

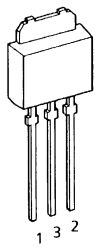
Three Terminal Positive Voltage Regulators

5 V, 5.7 V, 6 V, 7 V, 8 V, 9 V, 10 V, 12 V, 15 V, 18 V, 20 V, 24 V

## Features

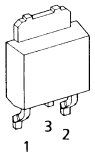
- Suitable for CMOS, TTL, the power supply of the digital ICs
- Internal thermal overload protection.
- Internal short circuit current limiting.
- Maximum output current of 1 A.
- Packaged in POWER MOLD.

TA78XXF




HSIP3-P-2.30B

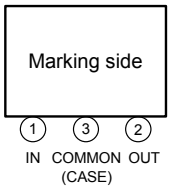
TA78XXF
(LBSTA1)
(TE16L / R)



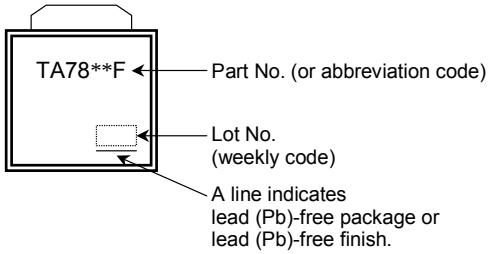

HSOP3-P-2.30A

Weight
HSIP3-P-2.30B: 0.36 g (Typ.)
HSOP3-P-2.30A: 0.36 g (Typ.)

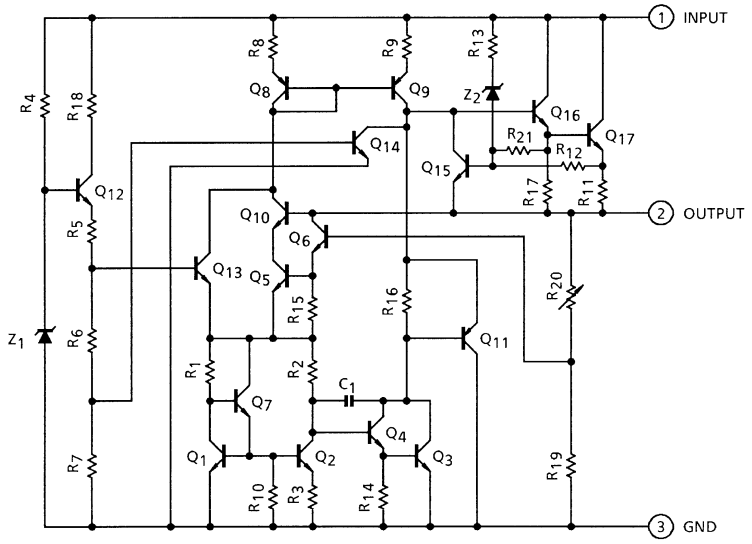
## Pin Assignment




## Marking



## Equivalent Circuit




## Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input voltage | TA7805F | $V_{IN}$ | 35 | V |
| | TA78057F | | | |
| | TA7806F | | | |
| | TA7807F | | | |
| | TA7808F | | | |
| | TA7809F | | | |
| | TA7810F | | | |
| | TA7812F | | | |
| | TA7815F | | | |
| | TA7818F | | 40 | |
| | TA7820F | | | |
| | TA7824F | | | |
| Power dissipation | (Ta = 25°C) | $P_D$ | 1 | W |
| | (Tc = 25°C) | | 10 | |
| Operating temperature | | $T_{opr}$ | −30~85 | °C |
| Storage temperature | | $T_{stg}$ | −55~150 | °C |
| Junction temperature | | $T_j$ | 150 | °C |
| Thermal resistance | | $R_{th\ (j-c)}$ | 12.5 | °C/W |
| | | $R_{th\ (j-a)}$ | 125 | |

## TA7805F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 10 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 4.8 | 5.0 | 5.2 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 7.0 V ≤ $V_{IN}$ ≤ 25 V | — | 3 | 100 | mV |
| | | | | 8.0 V ≤ $V_{IN}$ ≤ 12 V | — | 1 | 50 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 15 | 100 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 5 | 50 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 7.0 V ≤ $V_{IN}$ ≤ 20 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 4.75 | — | 5.25 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.2 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 7.0 V ≤ $V_{IN}$ ≤ 25 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.3 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 50 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 10 V ≤ $V_{IN}$ ≤ 18 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 57 | 73 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 1.6 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −0.6 | — | mV/°C |

## TA78057F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 10.7 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 5.47 | 5.7 | 5.93 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 7.7 V ≤ $V_{IN}$ ≤ 25 V | — | 4 | 110 | mV |
| | | | | 8.7 V ≤ $V_{IN}$ ≤ 12.7 V | — | 2 | 55 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 15 | 110 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 5 | 55 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 7.7 V ≤ $V_{IN}$ ≤ 20.7 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 5.42 | — | 5.98 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.3 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 7.7 V ≤ $V_{IN}$ ≤ 25 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.3 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 55 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 8.8 V ≤ $V_{IN}$ ≤ 18.8 V,<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 56 | 72 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 1.5 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −0.7 | — | mV/°C |

## TA7806F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 11 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 5.75 | 6.0 | 6.25 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 8.0 V ≤ $V_{IN}$ ≤ 25 V | — | 4 | 120 | mV |
| | | | | 9 V ≤ $V_{IN}$ ≤ 13 V | — | 2 | 60 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 15 | 120 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 5 | 60 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 8 V ≤ $V_{IN}$ ≤ 21 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 5.7 | — | 6.3 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.3 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 8.0 V ≤ $V_{IN}$ ≤ 25 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.3 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 55 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 11 V ≤ $V_{IN}$ ≤ 19 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 56 | 72 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 1.5 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −0.7 | — | mV/°C |

## TA7807F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 12 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 6.72 | 7.0 | 7.28 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 9 V ≤ $V_{IN}$ ≤ 25 V | — | 5 | 140 | mV |
| | | | | 10 V ≤ $V_{IN}$ ≤ 14 V | — | 2 | 70 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 15 | 140 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 5 | 70 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 9 V ≤ $V_{IN}$ ≤ 22 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 6.65 | — | 7.35 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.3 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 9 V ≤ $V_{IN}$ ≤ 25 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.3 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 60 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 12 V ≤ $V_{IN}$ ≤ 20 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 54 | 70 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 1.3 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −0.8 | — | mV/°C |

## TA7808F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 14 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 7.7 | 8.0 | 8.3 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 10.5 V ≤ $V_{IN}$ ≤ 25 V | — | 6 | 160 | mV |
| | | | | 11 V ≤ $V_{IN}$ ≤ 17 V | — | 2 | 80 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 12 | 160 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 4 | 80 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 10.5 V ≤ $V_{IN}$ ≤ 23 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 7.6 | — | 8.4 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.3 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 10.5 V ≤ $V_{IN}$ ≤ 25 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.0 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 70 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 14 V ≤ $V_{IN}$ ≤ 21.5 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 53 | 69 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 1.1 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −1.0 | — | mV/°C |

## TA7809F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 15 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 8.64 | 9.0 | 9.36 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 11.5 V ≤ $V_{IN}$ ≤ 26 V | — | 7.0 | 180 | mV |
| | | | | 13 V ≤ $V_{IN}$ ≤ 19 V | — | 2.5 | 90 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 12 | 180 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 4 | 90 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 11.5 V ≤ $V_{IN}$ ≤ 24 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 8.55 | — | 9.45 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.3 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 11.5 V ≤ $V_{IN}$ ≤ 26 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.0 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 75 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 15 V ≤ $V_{IN}$ ≤ 22.5 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 51 | 67 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 1.0 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −1.1 | — | mV/°C |

## TA7810F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 16 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 9.6 | 10.0 | 10.4 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 12.5 V ≤ $V_{IN}$ ≤ 27 V | — | 8 | 200 | mV |
| | | | | 14 V ≤ $V_{IN}$ ≤ 20 V | — | 2.5 | 100 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 12 | 200 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 4 | 100 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 12.5 V ≤ $V_{IN}$ ≤ 25 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 9.5 | — | 10.5 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.3 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 12.5 V ≤ $V_{IN}$ ≤ 27 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.0 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 80 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 16 V ≤ $V_{IN}$ ≤ 23.5 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 50 | 66 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 0.9 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −1.3 | — | mV/°C |

## TA7812F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 19 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 11.5 | 12.0 | 12.5 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 14.5 V ≤ $V_{IN}$ ≤ 30 V | — | 10 | 240 | mV |
| | | | | 16 V ≤ $V_{IN}$ ≤ 22 V | — | 3 | 120 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 12 | 240 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 4 | 120 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 14.5 V ≤ $V_{IN}$ ≤ 27 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 11.4 | — | 12.6 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.3 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 14.5 V ≤ $V_{IN}$ ≤ 30 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.0 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 90 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 19 V ≤ $V_{IN}$ ≤ 25 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 50 | 66 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 0.7 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −1.6 | — | mV/°C |

## TA7815F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 23 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 14.4 | 15.0 | 15.6 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 17.5 V ≤ $V_{IN}$ ≤ 30 V | — | 11 | 300 | mV |
| | | | | 20 V ≤ $V_{IN}$ ≤ 26 V | — | 3 | 150 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 12 | 300 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 4 | 150 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 17.5 V ≤ $V_{IN}$ ≤ 30 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 14.25 | — | 15.75 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.4 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 17.5 V ≤ $V_{IN}$ ≤ 30 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.0 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 110 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 23 V ≤ $V_{IN}$ ≤ 28.5 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 49 | 65 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 0.5 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −2.0 | — | mV/°C |

## TA7818F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 27 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 17.3 | 18.0 | 18.7 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 21 V ≤ $V_{IN}$ ≤ 33 V | — | 13 | 360 | mV |
| | | | | 24 V ≤ $V_{IN}$ ≤ 30 V | — | 4 | 180 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 12 | 360 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 4 | 180 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 21 V ≤ $V_{IN}$ ≤ 33 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 17.1 | — | 18.9 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.5 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 21 V ≤ $V_{IN}$ ≤ 33 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.0 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 125 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 27 V ≤ $V_{IN}$ ≤ 32 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 47 | 63 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 0.4 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −2.5 | — | mV/°C |

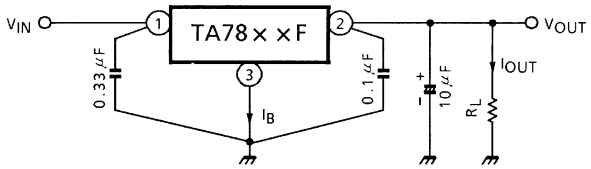
## TA7820F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 29 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 19.2 | 20.0 | 20.8 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 23 V ≤ $V_{IN}$ ≤ 35 V | — | 15 | 400 | mV |
| | | | | 26 V ≤ $V_{IN}$ ≤ 32 V | — | 5 | 200 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 12 | 400 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 4 | 200 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 23 V ≤ $V_{IN}$ ≤ 35 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 19.0 | — | 21.0 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.6 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 23 V ≤ $V_{IN}$ ≤ 35 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.0 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 135 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 29 V ≤ $V_{IN}$ ≤ 34 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 45 | 61 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 0.4 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −3.0 | — | mV/°C |

## TA7824F
## Electrical Characteristics
**(Unless otherwise specified, $V_{IN}$ = 33 V, $I_{OUT}$ = 500 mA, 0°C ≤ $T_j$ ≤ 125°C)**

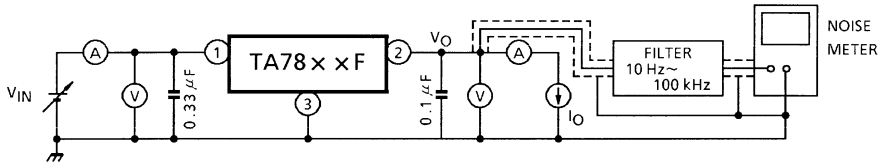
| Characteristics | Symbol | Test Circuit | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 100 mA | | 23.0 | 24.0 | 25.0 | V |
| Line regulation | Reg·line | 1 | $T_j$ = 25°C | 27 V ≤ $V_{IN}$ ≤ 38 V | — | 18 | 480 | mV |
| | | | | 30 V ≤ $V_{IN}$ ≤ 36 V | — | 6 | 240 | |
| Load regulation | Reg·load | 1 | $T_j$ = 25°C | 5 mA ≤ $I_{OUT}$ ≤ 1.4 A | — | 12 | 480 | mV |
| | | | | 250 mA ≤ $I_{OUT}$ ≤ 750 mA | — | 4 | 240 | |
| Output voltage | $V_{OUT}$ | 1 | $T_j$ = 25°C | 27 V ≤ $V_{IN}$ ≤ 38 V<br>5.0 mA ≤ $I_{OUT}$ ≤ 1.0 A | 22.8 | — | 25.2 | V |
| Quiescent current | $I_B$ | 1 | $T_j$ = 25°C, $I_{OUT}$ = 5 mA | | — | 4.6 | 8.0 | mA |
| Quiescent current change | $\Delta I_B$ | 1 | 27 V ≤ $V_{IN}$ ≤ 38 V,<br>$I_{OUT}$ = 5 mA, $T_j$ = 25°C | | — | — | 1.0 | mA |
| Output noise voltage | $V_{NO}$ | 2 | Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz<br>$I_{OUT}$ = 50 mA | | — | 150 | — | $\mu V_{rms}$ |
| Ripple rejection | R.R. | 3 | f = 120 Hz, 33 V ≤ $V_{IN}$ ≤ 38 V<br>$I_{OUT}$ = 50 mA, $T_j$ = 25°C | | 45 | 61 | — | dB |
| Dropout voltage | $V_D$ | 1 | $I_{OUT}$ = 1.0 A, $T_j$ = 25°C | | — | 2.0 | — | V |
| Short circuit current limit | $I_{SC}$ | 1 | $T_j$ = 25°C | | — | 0.3 | — | A |
| Average temperature coefficient of output voltage | $T_{CVO}$ | 1 | $I_{OUT}$ = 5 mA | | — | −3.5 | — | mV/°C |

## Test Circuit 1/Standard Application Circuit



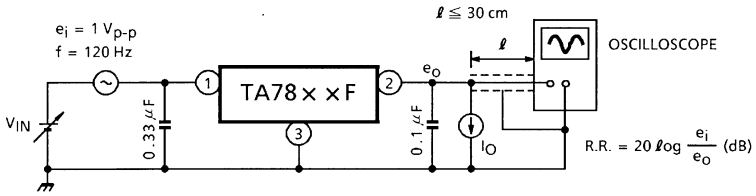

## Test Circuit 2

**$V_{NO}$**

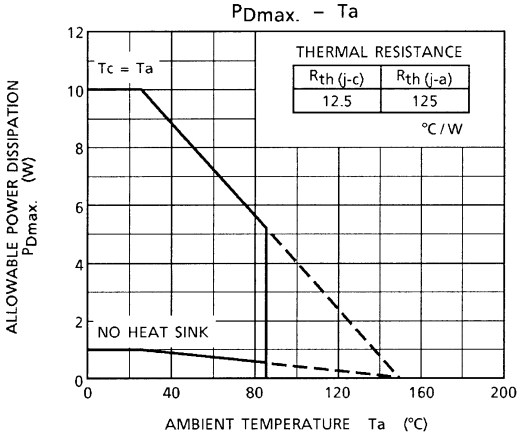



## Test Circuit 3

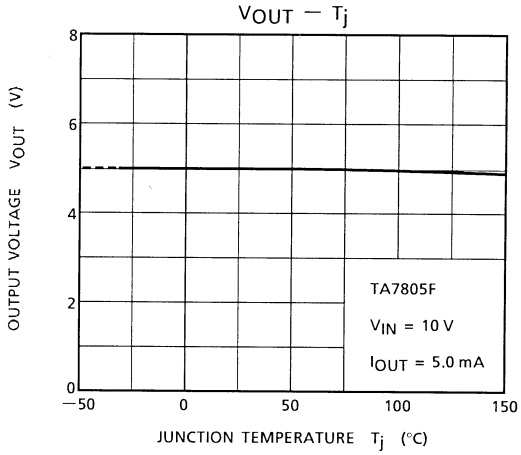
**R.R.**



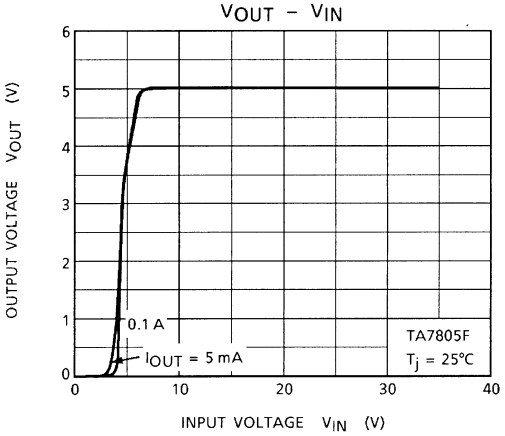
$P_{Dmax.}$ – Ta



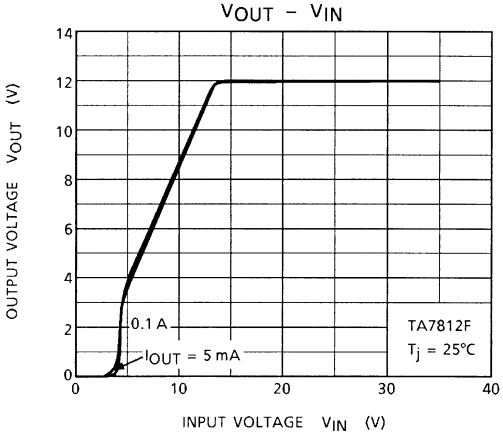

$V_{OUT}$ – $T_j$



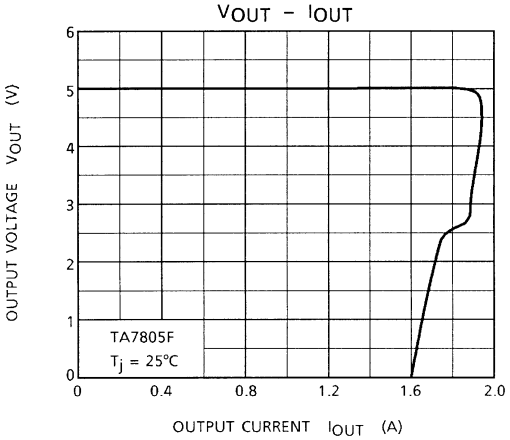

$V_{OUT}$ – $V_{IN}$



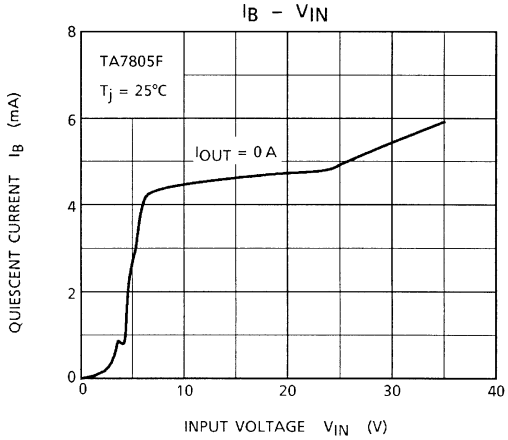

$V_{OUT}$ – $V_{IN}$



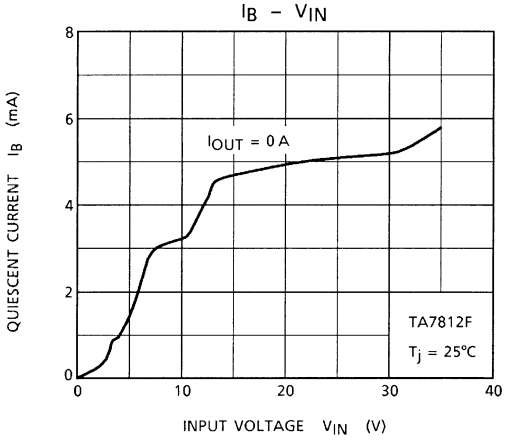

$V_{OUT}$ – $I_{OUT}$



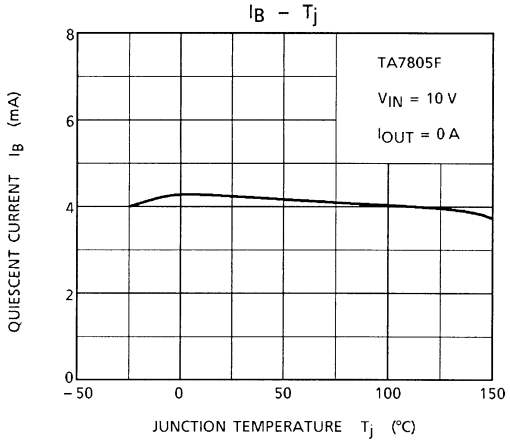

$I_B$ – $V_{IN}$



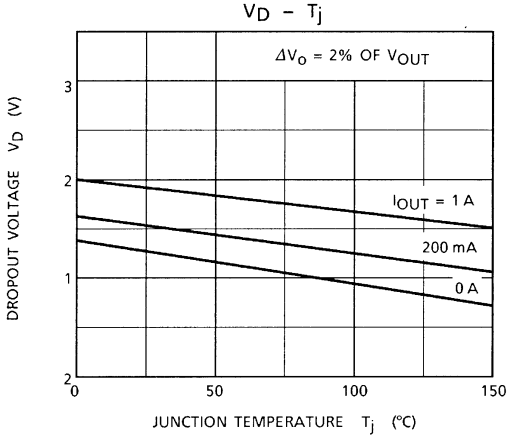
$I_B$ – $V_{IN}$



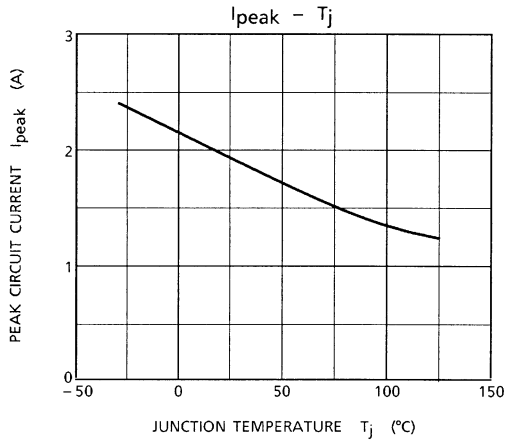

$I_B$ – $T_j$



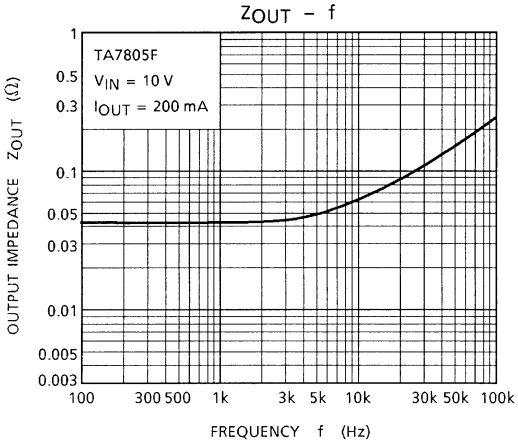

$V_D$ – $T_j$



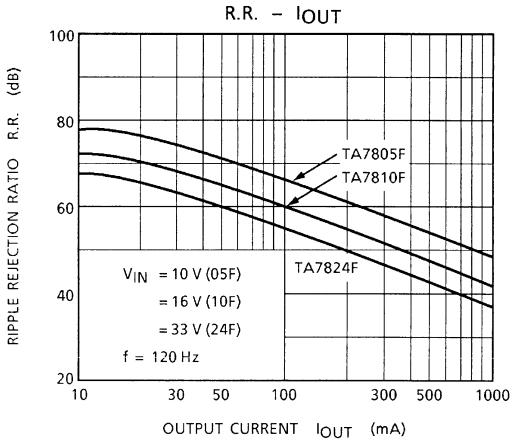

$I_{peak}$ – $T_j$

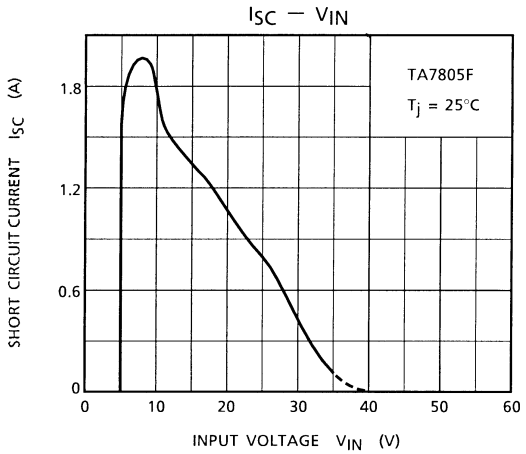



$Z_{OUT}$ – f




R.R. – $I_{OUT}$

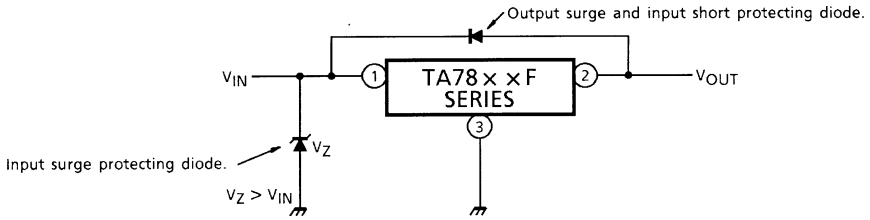



$I_{SC}$ – $V_{IN}$
TA7805F
$T_j$ = 25°C
SHORT CIRCUIT CURRENT $I_{SC}$ (A)
1.8
1.2
0.6
0
0
10
20
30
40
50
60
INPUT VOLTAGE $V_{IN}$ (V)

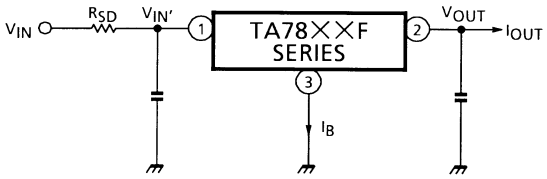
## Precautions on Application

(1) In regard to GND, be careful not to apply a negative voltage to the input/output terminal. Further, special care is necessary in the case of a voltage boost application.

(2) If a surge voltage exceeding the maximum rating is applied to the input terminal or if a voltage in excess of the input terminal voltage is applied to the output terminal, the circuit may be destroyed. Particular care is necessary in the case of the latter.
Circuit destruction may also occur if the input terminal shorts to GND in a state of normal operation, causing the output terminal voltage to exceed the input voltage (GND potential) and the electrical charge of the chemical capacitor connected to the output terminal to flow into the input side.
Where these risks exist, take steps such as connecting zener and general silicon diodes to the circuit, as shown in the figure below.




(3) When the input voltage is too high, the power dissipation of the three-terminal regulator, which is a series regulator, increases, causing the junction temperature to rise. In such a case, it is recommended to reduce the power dissipation, and hence the junction temperature, by inserting a power-limiting resistor $R_{SD}$ in the input terminal.




The power dissipation $P_D$ of the IC is expressed in the following equation.

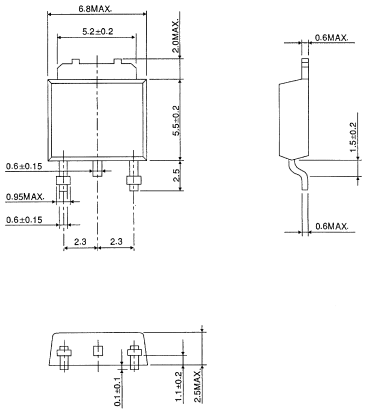
$$P_D = (V_{IN'} - V_{OUT}) \cdot I_{OUT} + V_{IN'} \cdot I_B$$

Reducing $V_{IN'}$ below the lowest voltage necessary for the IC will cause ripple, deterioration in output regulation and, in certain circumstances, parasitic oscillation.
To determine the resistance value of $R_{SD}$, design with a margin, referring to the following equation.

$$R_{SD} < \frac{V_{IN} - V_{IN'}}{I_{OUT} + I_B}$$

(4) Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND. The capacitances should be determined experimentally because they depend on PCB patterns. In particular, adequate investigation should be made to ensure there is no problem even in high or low temperatures.

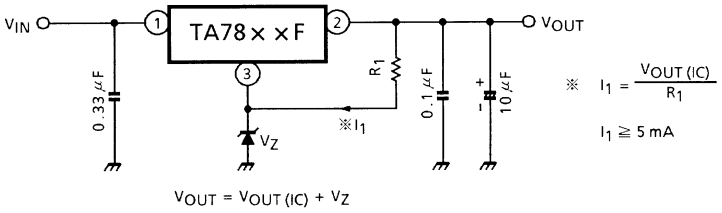
(5) The molded plastic portion of this unit, measuring 5.5 mm (L) by 6.8 mm (W) by 2.5 mm (T), is more compact compared to its equivalent TO-220.
The GND fin extends directly out of the main body, and can be soldered directly to the ceramic circuit board for significant increase in power dissipation.
To obtain high reliability in the heat sink design of the regulator IC, it is generally required to derate more than 20% of maximum junction temperature ($T_j$ max).
Further, full consideration should be given to the installation of IC on a heat sink.



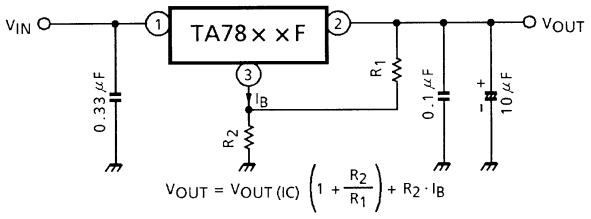

## Application Circuits

### (1) Voltage boost regulator

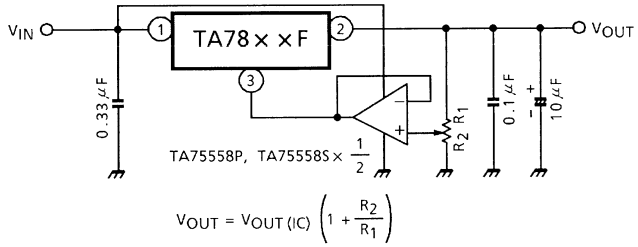
(a) Voltage boost by use of zener diode



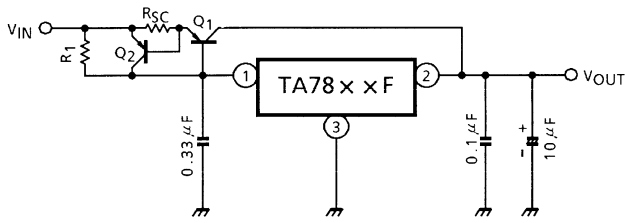

(b) Voltage boost by use of resistor




(c) Adjustable output regulator



### (2) Current boost regulator




Heat sink is needed for $Q_1$.

$$R_1 \leqq \frac{V_{BE1}}{I_{B\ MAX}}$$

where,

$V_{BE1}$ : $V_{BE}$ of external transistor $Q_1$.

$I_{B\ MAX}$ : Quiescent current of IC.

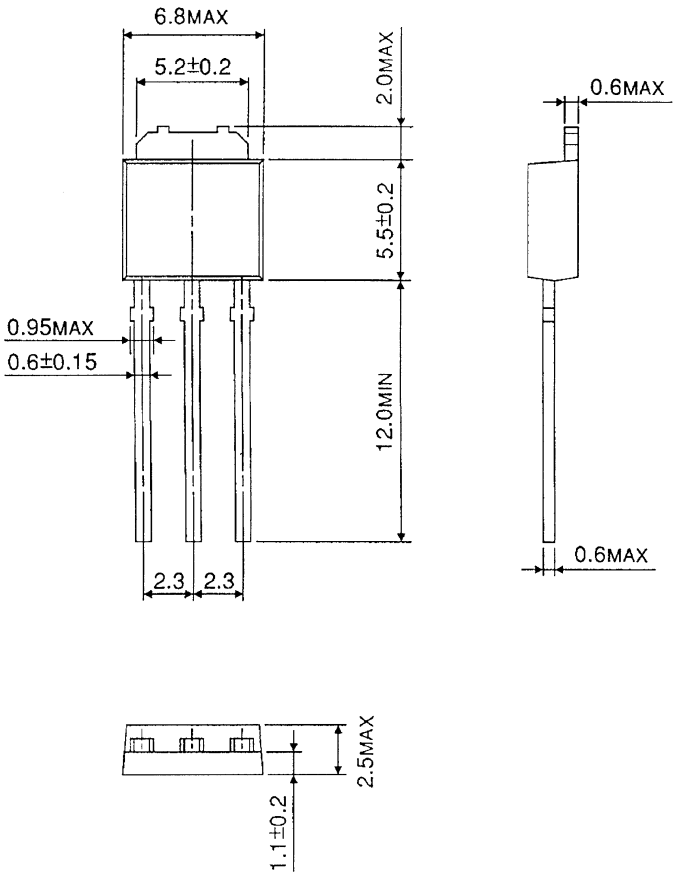
$$R_{SC} = \frac{V_{BE2}}{I_{SC}}$$

where,

$I_{SC}$ : Short-circuit current.

## Package Dimensions

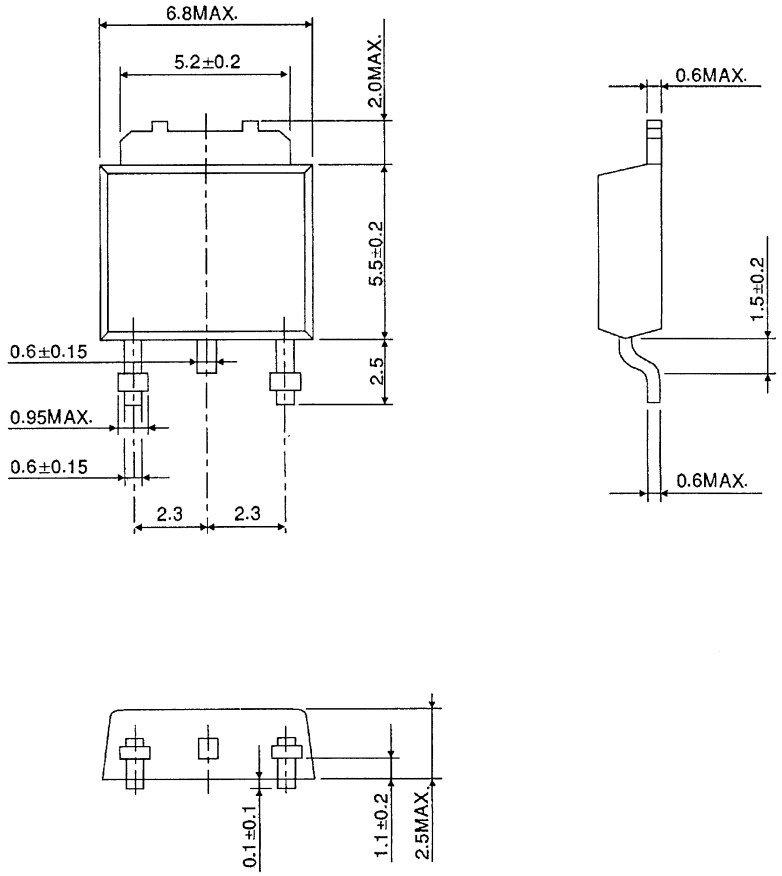
HSIP3-P-2.30B Unit : mm




Weight : 0.36 g (Typ.)

## Package Dimensions

HSOP3-P-2.30A Unit : mm




Weight : 0.36 g (Typ.)

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030619EBA

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