

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

**TA7805SB, TA78057SB, TA7806SB, TA7807SB, TA7808SB, TA7809SB,  
TA7810SB, TA7812SB, TA7815SB, TA7818SB, TA7820SB, TA7824SB**

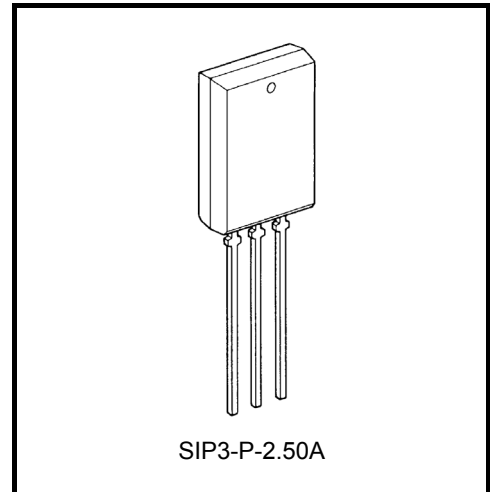
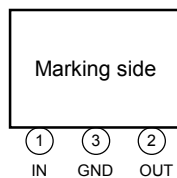
## Three-Terminal Positive Voltage Regulators

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

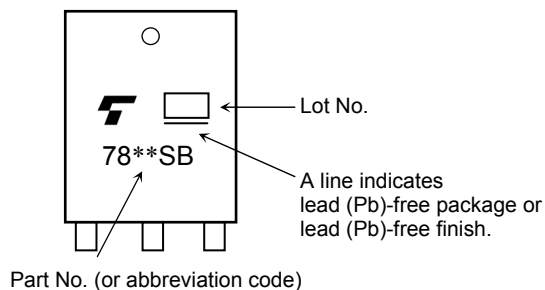
- Suitable for CMOS, TTL, the power supply of other digital ICs
- Internal thermal overload protection
- Internal short circuit current limiting
- Maximum output current of 1 A
- Package in the plastic case TPL (P<sub>D</sub>: 1.8 W)

## Pin Assignment



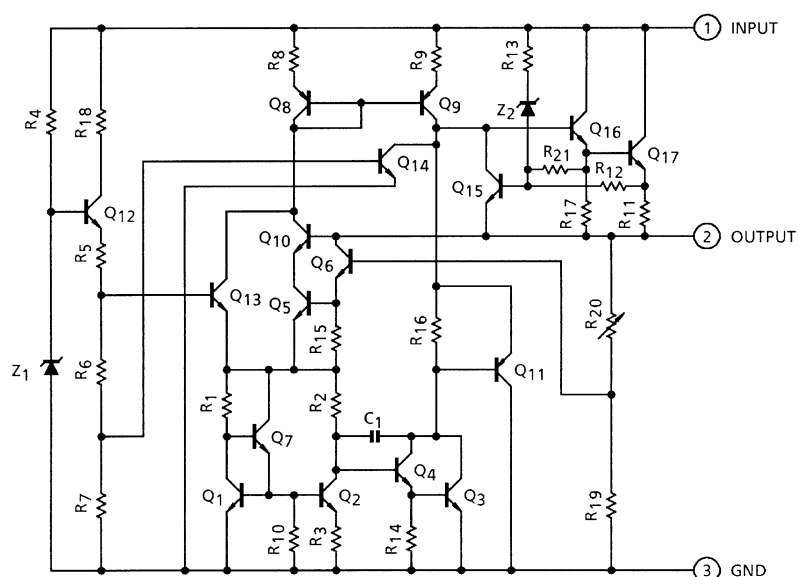
Weight: 1.5 g (Typ.)

## Marking



Note 1: The “\* \*” in the each product number is replaces with the output voltage of each product.

## Equivalent Circuit



## Absolute Maximum Ratings (Ta = 25°C)

| Characteristics       |             | Symbol                | Rating  | Unit |
|-----------------------|-------------|-----------------------|---------|------|
| Input voltage         | TA7805SB    | V <sub>IN</sub>       | 35      | V    |
|                       | TA78057SB   |                       |         |      |
|                       | TA7806SB    |                       |         |      |
|                       | TA7807SB    |                       |         |      |
|                       | TA7808SB    |                       |         |      |
|                       | TA7809SB    |                       |         |      |
|                       | TA7810SB    |                       |         |      |
|                       | TA7812SB    |                       |         |      |
|                       | TA7815SB    |                       |         |      |
|                       | TA7818SB    |                       |         |      |
|                       | TA7820SB    |                       | 40      |      |
|                       | TA7824SB    |                       |         |      |
| Power dissipation     | (Ta = 25°C) | P <sub>D</sub>        | 1.8     | W    |
| Operating temperature |             | T <sub>opr</sub>      | −30~85  | °C   |
| Storage temperature   |             | T <sub>stg</sub>      | −55~150 | °C   |
| Junction temperature  |             | T <sub>j</sub>        | 150     | °C   |
| Thermal resistance    |             | R <sub>th (j-a)</sub> | 69.4    | °C/W |

Note 2: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

**TA7805SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 10\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                           | Min  | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|--------------------------------------------------------------------------------------------------------------------------|------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_j = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                     | 4.8  | 5.0  | 5.2  | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_j = 25^\circ\text{C}$                                                                                                 | —    | 3    | 100  | mV                         |
|                                                   |              |              | $7.0\text{ V} \leq V_{IN} \leq 25\text{ V}$                                                                              | —    | 1    | 50   |                            |
| Load regulation                                   | Reg-load     | 1            | $T_j = 25^\circ\text{C}$                                                                                                 | —    | 15   | 100  | mV                         |
|                                                   |              |              | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$                                                                             | —    | 5    | 50   |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_j = 25^\circ\text{C}$                                                                                                 | 4.75 | —    | 5.25 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_j = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                       | —    | 4.2  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $7.0\text{ V} \leq V_{IN} \leq 25\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_j = 25^\circ\text{C}$                      | —    | —    | 1.3  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                         | —    | 50   | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $8.0\text{ V} \leq V_{IN} \leq 18\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_j = 25^\circ\text{C}$ | 62   | 78   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_j = 25^\circ\text{C}$                                                                      | —    | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_j = 25^\circ\text{C}$                                                                                                 | —    | 1.6  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                  | —    | -0.6 | —    | $\text{mV}/^\circ\text{C}$ |

**TA78057SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 10.7\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                               | Min  | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|------------------------------------------------------------------------------------------------------------------------------|------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_j = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                         | 5.47 | 5.7  | 5.93 | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_j = 25^\circ\text{C}$                                                                                                     | —    | 4    | 110  | mV                         |
|                                                   |              |              | $7.7\text{ V} \leq V_{IN} \leq 25\text{ V}$                                                                                  | —    | 2    | 55   |                            |
| Load regulation                                   | Reg-load     | 1            | $T_j = 25^\circ\text{C}$                                                                                                     | —    | 15   | 110  | mV                         |
|                                                   |              |              | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$                                                                                 | —    | 5    | 55   |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_j = 25^\circ\text{C}$                                                                                                     | 5.42 | —    | 5.98 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_j = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                           | —    | 4.3  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $7.7\text{ V} \leq V_{IN} \leq 25\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_j = 25^\circ\text{C}$                          | —    | —    | 1.3  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                             | —    | 55   | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $8.8\text{ V} \leq V_{IN} \leq 18.8\text{ V}$ ,<br>$I_{OUT} = 50\text{ mA}$ , $T_j = 25^\circ\text{C}$ | 62   | 77   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_j = 25^\circ\text{C}$                                                                          | —    | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_j = 25^\circ\text{C}$                                                                                                     | —    | 1.5  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                      | —    | -0.7 | —    | $\text{mV}/^\circ\text{C}$ |

**TA7806SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 11\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                          | Min                                             | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                    | 5.75                                            | 6.0  | 6.25 | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                | $8.0\text{ V} \leq V_{IN} \leq 25\text{ V}$     | —    | 4    | mV                         |
|                                                   |              |              |                                                                                                                         | $9\text{ V} \leq V_{IN} \leq 13\text{ V}$       | —    | 2    |                            |
| Load regulation                                   | Reg-load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$    | —    | 15   | mV                         |
|                                                   |              |              |                                                                                                                         | $250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ | —    | 5    |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$<br>$8\text{ V} \leq V_{IN} \leq 21\text{ V}$<br>$5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ | 5.7                                             | —    | 6.3  | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                      | —                                               | 4.3  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $8.0\text{ V} \leq V_{IN} \leq 25\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                     | —                                               | —    | 1.3  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                        | —                                               | 55   | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $9\text{ V} \leq V_{IN} \leq 19\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$  | 61                                              | 77   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                     | —                                               | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                | —                                               | 1.5  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                 | —                                               | -0.7 | —    | $\text{mV}/^\circ\text{C}$ |

**TA7807SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 12\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                          | Min                                             | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                    | 6.72                                            | 7.0  | 7.28 | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                | $9\text{ V} \leq V_{IN} \leq 25\text{ V}$       | —    | 5    | mV                         |
|                                                   |              |              |                                                                                                                         | $10\text{ V} \leq V_{IN} \leq 14\text{ V}$      | —    | 2    |                            |
| Load regulation                                   | Reg-load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$    | —    | 15   | mV                         |
|                                                   |              |              |                                                                                                                         | $250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ | —    | 5    |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$<br>$9\text{ V} \leq V_{IN} \leq 22\text{ V}$<br>$5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ | 6.65                                            | —    | 7.35 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                      | —                                               | 4.3  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $9\text{ V} \leq V_{IN} \leq 25\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                       | —                                               | —    | 1.3  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                        | —                                               | 60   | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $10\text{ V} \leq V_{IN} \leq 20\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$ | 59                                              | 75   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                     | —                                               | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                | —                                               | 1.3  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                 | —                                               | -0.8 | —    | $\text{mV}/^\circ\text{C}$ |

**TA7808SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 14\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                              | Min | Typ. | Max | Unit                       |
|---------------------------------------------------|--------------|--------------|-----------------------------------------------------------------------------------------------------------------------------|-----|------|-----|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                        | 7.7 | 8.0  | 8.3 | V                          |
| Line regulation                                   | Reg.line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —   | 6    | 160 | mV                         |
|                                                   |              |              | $10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$                                                                                | —   | 2    | 80  |                            |
| Load regulation                                   | Reg.load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —   | 12   | 160 | mV                         |
|                                                   |              |              | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$                                                                                | —   | 4    | 80  |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | 7.6 | —    | 8.4 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                          | —   | 4.3  | 8.0 | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                        | —   | —    | 1.0 | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                            | —   | 70   | —   | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $11.5\text{ V} \leq V_{IN} \leq 21.5\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$ | 58  | 74   | —   | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                         | —   | 2.0  | —   | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —   | 1.1  | —   | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                     | —   | -1.0 | —   | $\text{mV}/^\circ\text{C}$ |

**TA7809SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 15\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                              | Min  | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|-----------------------------------------------------------------------------------------------------------------------------|------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                        | 8.64 | 9.0  | 9.36 | V                          |
| Line regulation                                   | Reg.line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —    | 7    | 180  | mV                         |
|                                                   |              |              | $11.5\text{ V} \leq V_{IN} \leq 26\text{ V}$                                                                                | —    | 2.5  | 90   |                            |
| Load regulation                                   | Reg.load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —    | 12   | 180  | mV                         |
|                                                   |              |              | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$                                                                                | —    | 4    | 90   |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | 8.55 | —    | 9.45 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                          | —    | 4.3  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $11.5\text{ V} \leq V_{IN} \leq 26\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                        | —    | —    | 1.0  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                            | —    | 75   | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $12.5\text{ V} \leq V_{IN} \leq 22.5\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$ | 56   | 72   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                         | —    | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —    | 1.0  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                     | —    | -1.1 | —    | $\text{mV}/^\circ\text{C}$ |

**TA7810SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 16\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                              | Min | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|-----------------------------------------------------------------------------------------------------------------------------|-----|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                        | 9.6 | 10.0 | 10.4 | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —   | 8    | 200  | mV                         |
|                                                   |              |              | $12.5\text{ V} \leq V_{IN} \leq 27\text{ V}$                                                                                | —   | 2.5  | 100  |                            |
| Load regulation                                   | Reg-load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —   | 12   | 200  | mV                         |
|                                                   |              |              | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$                                                                                | —   | 4    | 100  |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$<br>$12.5\text{ V} \leq V_{IN} \leq 25\text{ V}$<br>$5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$  | 9.5 | —    | 10.5 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                          | —   | 4.3  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $12.5\text{ V} \leq V_{IN} \leq 27\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                        | —   | —    | 1.0  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                            | —   | 80   | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $13.5\text{ V} \leq V_{IN} \leq 23.5\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$ | 55  | 72   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                         | —   | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —   | 0.9  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                     | —   | -1.3 | —    | $\text{mV}/^\circ\text{C}$ |

**TA7812SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 19\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                             | Min  | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|----------------------------------------------------------------------------------------------------------------------------|------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                       | 11.5 | 12.0 | 12.5 | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                   | —    | 10   | 240  | mV                         |
|                                                   |              |              | $14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$                                                                               | —    | 3    | 120  |                            |
| Load regulation                                   | Reg-load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                   | —    | 12   | 240  | mV                         |
|                                                   |              |              | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$                                                                               | —    | 4    | 120  |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$<br>$14.5\text{ V} \leq V_{IN} \leq 27\text{ V}$<br>$5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ | 11.4 | —    | 12.6 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                         | —    | 4.3  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                       | —    | —    | 1.0  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                           | —    | 90   | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $15\text{ V} \leq V_{IN} \leq 25\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$    | 55   | 71   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                        | —    | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                   | —    | 0.7  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                    | —    | -1.6 | —    | $\text{mV}/^\circ\text{C}$ |

**TA7815SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 23\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                              | Min                                             | Typ. | Max   | Unit                       |
|---------------------------------------------------|--------------|--------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------|-------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                        | 14.4                                            | 15.0 | 15.6  | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | $17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$    | —    | 11    | mV                         |
|                                                   |              |              |                                                                                                                             | $20\text{ V} \leq V_{IN} \leq 26\text{ V}$      | —    | 3     |                            |
| Load regulation                                   | Reg-load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$    | —    | 12    | mV                         |
|                                                   |              |              |                                                                                                                             | $250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ | —    | 4     |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$<br>$17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$<br>$5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$  | 14.25                                           | —    | 15.75 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                          | —                                               | 4.4  | 8.0   | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                        | —                                               | —    | 1.0   | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                            | —                                               | 110  | —     | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $18.5\text{ V} \leq V_{IN} \leq 28.5\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$ | 54                                              | 70   | —     | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                         | —                                               | 2.0  | —     | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                    | —                                               | 0.5  | —     | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                     | —                                               | -2.0 | —     | $\text{mV}/^\circ\text{C}$ |

**TA7818SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 27\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                           | Min                                             | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                     | 17.3                                            | 18.0 | 18.7 | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | $21\text{ V} \leq V_{IN} \leq 33\text{ V}$      | —    | 13   | mV                         |
|                                                   |              |              |                                                                                                                          | $24\text{ V} \leq V_{IN} \leq 30\text{ V}$      | —    | 4    |                            |
| Load regulation                                   | Reg-load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$    | —    | 12   | mV                         |
|                                                   |              |              |                                                                                                                          | $250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ | —    | 4    |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$<br>$21\text{ V} \leq V_{IN} \leq 33\text{ V}$<br>$5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ | 17.1                                            | —    | 18.9 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                       | —                                               | 4.5  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $21\text{ V} \leq V_{IN} \leq 33\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                       | —                                               | —    | 1.0  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                         | —                                               | 125  | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $22\text{ V} \leq V_{IN} \leq 32\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$  | 52                                              | 68   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                      | —                                               | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | —                                               | 0.4  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                  | —                                               | -2.5 | —    | $\text{mV}/^\circ\text{C}$ |

**TA7820SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 29\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

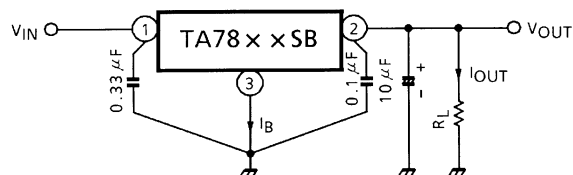
| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                           | Min  | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|--------------------------------------------------------------------------------------------------------------------------|------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                     | 19.2 | 20.0 | 20.8 | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | —    | 15   | 400  | mV                         |
|                                                   |              |              | $23\text{ V} \leq V_{IN} \leq 35\text{ V}$                                                                               | —    | 5    | 200  |                            |
| Load regulation                                   | Reg-load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | —    | 12   | 400  | mV                         |
|                                                   |              |              | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$                                                                             | —    | 4    | 200  |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$<br>$23\text{ V} \leq V_{IN} \leq 35\text{ V}$<br>$5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ | 19.0 | —    | 21.0 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                       | —    | 4.6  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $23\text{ V} \leq V_{IN} \leq 35\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                       | —    | —    | 1.0  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                         | —    | 135  | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $24\text{ V} \leq V_{IN} \leq 34\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$  | 50   | 66   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                      | —    | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | —    | 0.4  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                  | —    | -3.0 | —    | $\text{mV}/^\circ\text{C}$ |

**TA7824SB**
**Electrical Characteristics**

 (Unless otherwise specified,  $V_{IN} = 33\text{ V}$ ,  $I_{OUT} = 500\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq 125^\circ\text{C}$ )

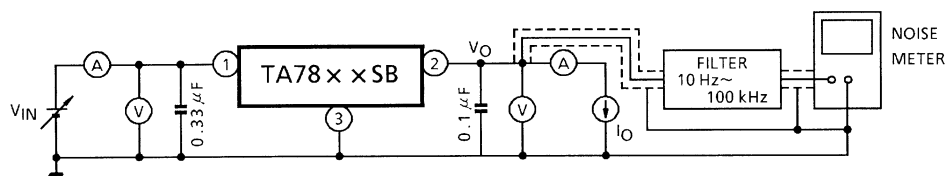
| Characteristics                                   | Symbol       | Test Circuit | Test Condition                                                                                                           | Min  | Typ. | Max  | Unit                       |
|---------------------------------------------------|--------------|--------------|--------------------------------------------------------------------------------------------------------------------------|------|------|------|----------------------------|
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 100\text{ mA}$                                                                     | 23.0 | 24.0 | 25.0 | V                          |
| Line regulation                                   | Reg-line     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | —    | 18   | 480  | mV                         |
|                                                   |              |              | $27\text{ V} \leq V_{IN} \leq 38\text{ V}$                                                                               | —    | 6    | 240  |                            |
| Load regulation                                   | Reg-load     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | —    | 12   | 480  | mV                         |
|                                                   |              |              | $5\text{ mA} \leq I_{OUT} \leq 1.4\text{ A}$                                                                             | —    | 4    | 240  |                            |
| Output voltage                                    | $V_{OUT}$    | 1            | $T_J = 25^\circ\text{C}$<br>$27\text{ V} \leq V_{IN} \leq 38\text{ V}$<br>$5.0\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ | 22.8 | —    | 25.2 | V                          |
| Quiescent current                                 | $I_B$        | 1            | $T_J = 25^\circ\text{C}$ , $I_{OUT} = 5\text{ mA}$                                                                       | —    | 4.6  | 8.0  | mA                         |
| Quiescent current change                          | $\Delta I_B$ | 1            | $27\text{ V} \leq V_{IN} \leq 38\text{ V}$ ,<br>$I_{OUT} = 5\text{ mA}$ , $T_J = 25^\circ\text{C}$                       | —    | —    | 1.0  | mA                         |
| Output noise voltage                              | $V_{NO}$     | 2            | $T_a = 25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 100\text{ kHz}$<br>$I_{OUT} = 50\text{ mA}$                         | —    | 150  | —    | $\mu\text{V}_{rms}$        |
| Ripple rejection                                  | R.R.         | 3            | $f = 120\text{ Hz}$ , $28\text{ V} \leq V_{IN} \leq 38\text{ V}$<br>$I_{OUT} = 50\text{ mA}$ , $T_J = 25^\circ\text{C}$  | 50   | 66   | —    | dB                         |
| Dropout voltage                                   | $V_D$        | 1            | $I_{OUT} = 1.0\text{ A}$ , $T_J = 25^\circ\text{C}$                                                                      | —    | 2.0  | —    | V                          |
| Short circuit current limit                       | $I_{SC}$     | 1            | $T_J = 25^\circ\text{C}$                                                                                                 | —    | 0.3  | —    | A                          |
| Average temperature coefficient of output voltage | $T_{CVO}$    | 1            | $I_{OUT} = 5\text{ mA}$                                                                                                  | —    | -3.5 | —    | $\text{mV}/^\circ\text{C}$ |

## Test Circuit 1/Standard Application Circuit



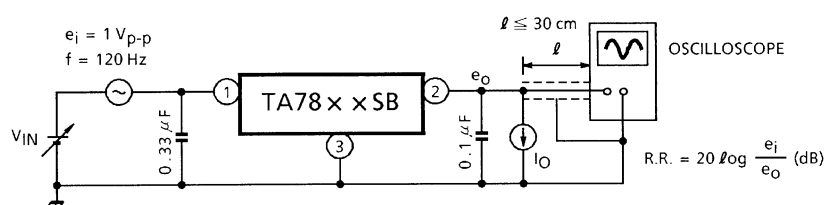
## Test Circuit 2

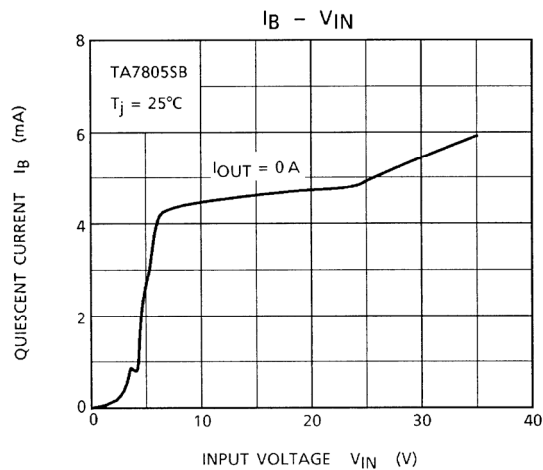
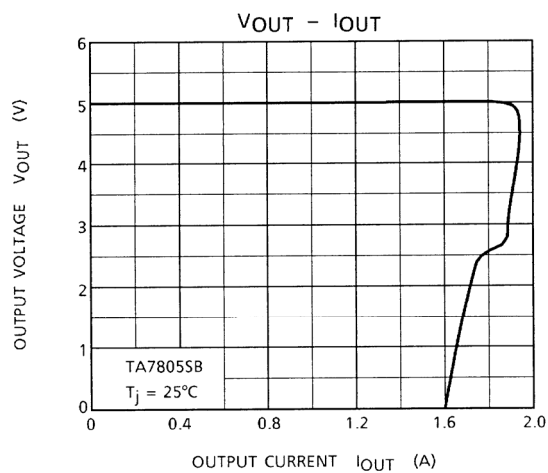
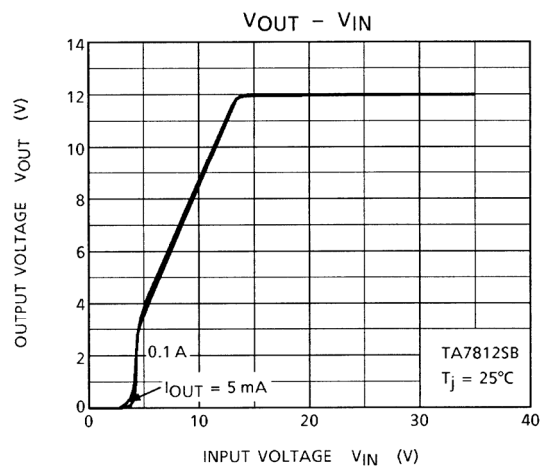
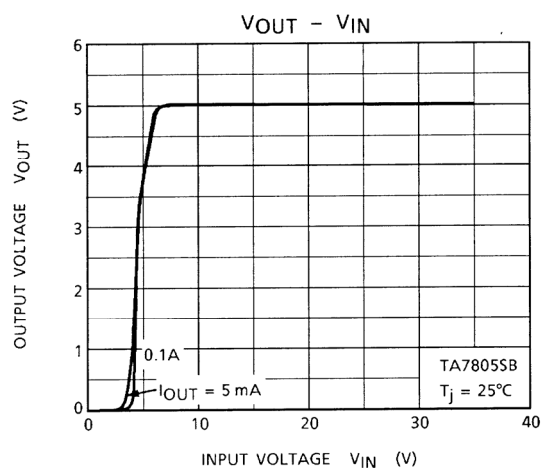
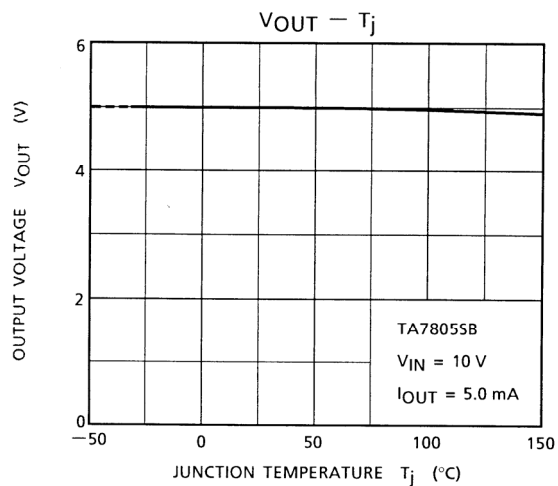
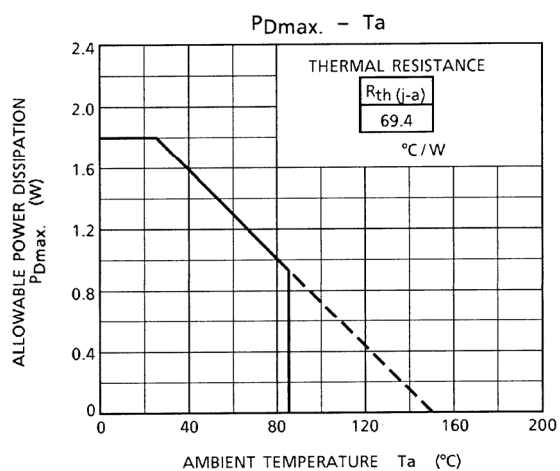
$V_{NO}$

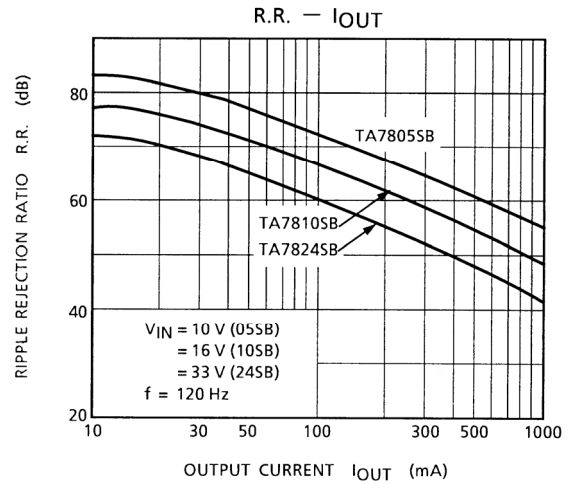
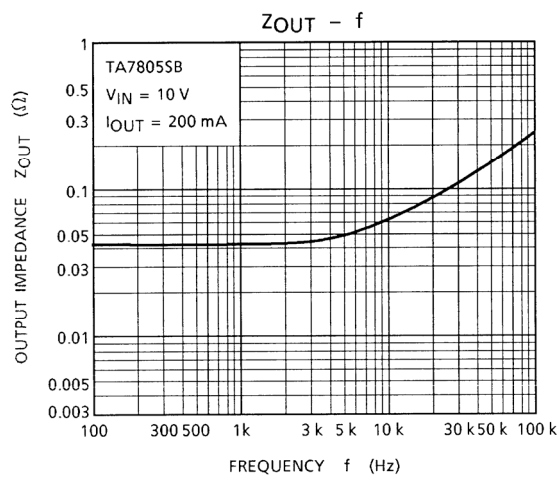
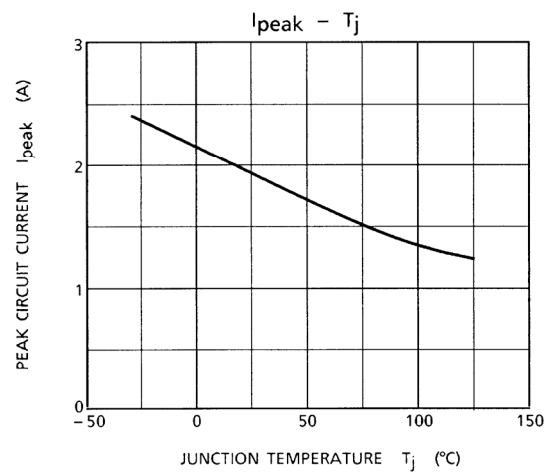
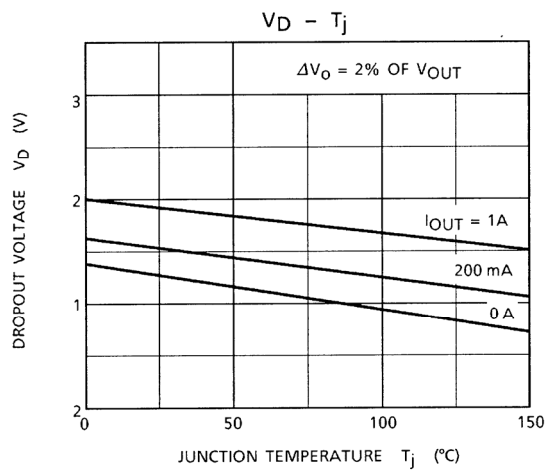
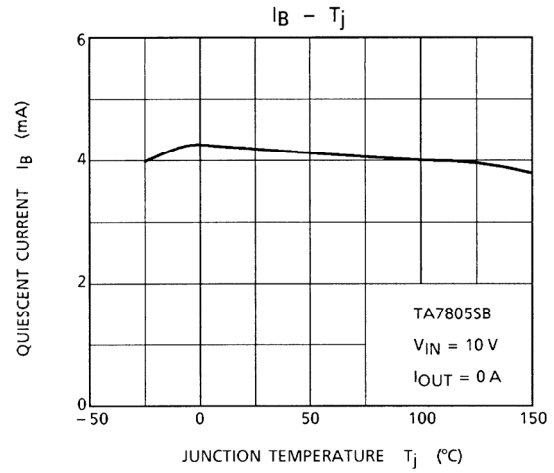
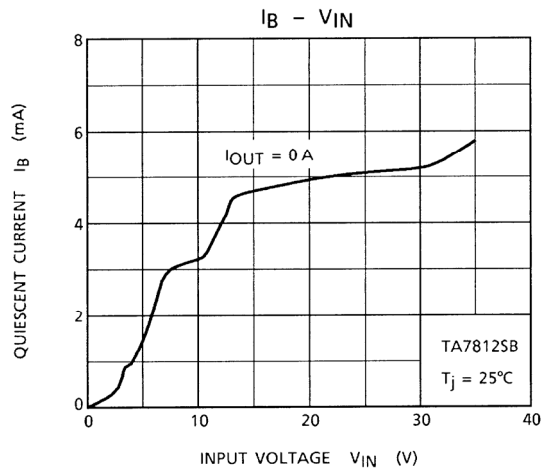


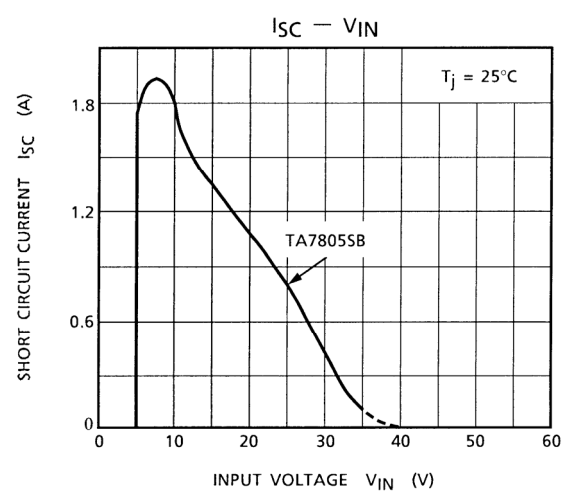
## Test Circuit 3

R.R.









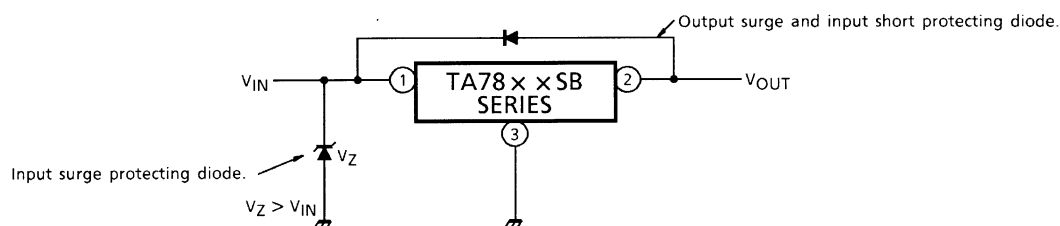
## Precautions on Application

- (1) In regard to GND, be careful not to apply a negative voltage to the input/output terminal.
- (2) If a surge voltage exceeding the absolute 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.

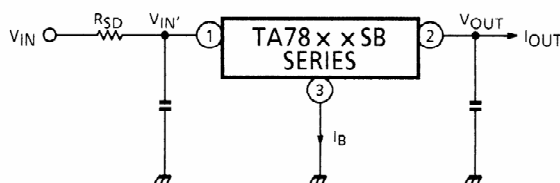
Particular care is necessary in the case of the latter.

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.

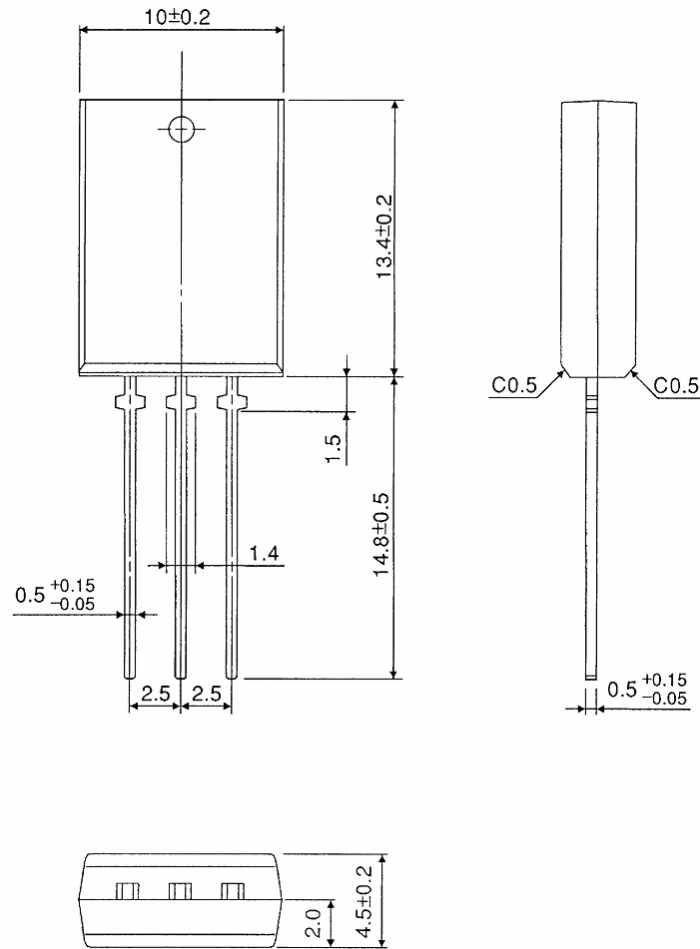
$$R_{SD} < \frac{V_{IN} - V_{IN'}}{I_{OUT} + I_B}$$

- (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

## Package Dimensions

SIP3-P-2.50A

Unit : mm



Weight: 1.5 g (typ.)

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20070701-EN

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