# AN80xx/AN80xxM Series

3-pin, positive output, low dropout voltage regulator (50 mA type)

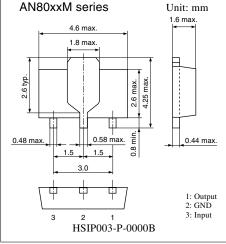
#### ■ Overview

The AN80xx series and the AN80xxM series are 3-pin, low dropout, fixed positive output type monolithic voltage regulators. Since their power consumption can be minimized, they are suitable for battery-used power supply and reference voltage. 13 types of output voltage are available; 2V, 2.5V, 3V, 3.5V (SSIP003-P-0000 only), 4V, 4.5V, 5V, 6V, 7V, 8V, 8.5V, 9V, and 10V.

#### ■ Features

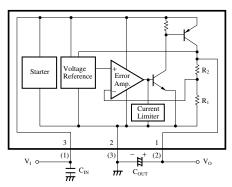
- Input/output voltage difference: 0.3V max.
- Output current of up to 50mA
- Low bias current: 0.6mA typ.
- Output voltage: 2V, 2.5V, 3V, 3.5V (SSIP003-P-0000 only), 4V, 4.5V, 5V, 6V, 7V, 8V, 8.5V, 9V, and 10V
- Built-in overcurrent protection circuit

# AN80xx series Unit: mm 4.0±0.2 0.6±0.15 0.43±0.15 0.43±0.15 0.43±0.15 1: Input 2: Output 3: GND SSIP003-P-0000



Note) The packages (SSIP003-P-0000 and HSIP003-P-0000B) of this product will be changed to lead-free type (SSIP003-P-0000S and HSIP003-P-0000Q). See the new package dimensions section later of this datasheet.

#### ■ Block Diagram (AN80xxM series)



$$\begin{split} R_{\text{1}} &= 5k\Omega \\ C_{\text{IN}} &= 0.33 \mu F \\ C_{\text{OUT}} &= 10 \mu F \end{split}$$

Note) The number in ( ) shows the pin number for the AN80xx series.

#### ■ Absolute Maximum Ratings at T<sub>a</sub> = 25°C

| Parameter           |                               | Symbol           | Rating                     | Unit |            |    |
|---------------------|-------------------------------|------------------|----------------------------|------|------------|----|
| Supply voltage      |                               | V <sub>I</sub>   | 20                         | V    |            |    |
| Supply current      |                               | $I_{CC}$         | 100                        | mA   |            |    |
| Power dissipation   |                               | $P_{\mathrm{D}}$ | 650 *                      | mW   |            |    |
| Operating ambient   | Operating ambient temperature |                  | rating ambient temperature |      | -30 to +80 | °C |
| C4                  | AN80xx series                 |                  | -55 to +150                | 0.0  |            |    |
| Storage temperature | AN80xxM series                | $T_{stg}$        | -55 to +125                | °C   |            |    |

<sup>\*</sup> AN80xxM series is mounted on standard board (glass epoxy: 20mm × 20mm × t1.7mm with Cu foil of 1cm<sup>2</sup> or more).

# ■ Electrical Characteristics at T<sub>a</sub> = 25°C

## • AN8002, AN8002M (2V type)

| Parameter                                | Symbol                       | Conditions  | Min  | Тур  | Max  | Unit  |
|--|------------------------------|---|------|------|------|-------|
| Output voltage                           | $V_{\rm o}$                  | $T_j = 25^{\circ}C$   | 1.92 | 2    | 2.08 | V     |
| Line regulation                          | $REG_{IN}$                   | $V_I = 2.5 \text{ to } 8V, T_j = 25^{\circ}C$               |      | 2    | 40   | mV    |
| Load regulation                          | REG                          | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 7    | 20   | mV    |
|  |                              | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 10   | 25   | mV    |
| Minimum input/output voltage difference  | $V_{\text{DIF}(\text{min})}$ | $V_I = 1.9V$ , $I_O = 20mA$ , $T_j = 25$ °C                 |      | 0.06 | 0.2  | V     |
| willimium input/output voltage unference |                              | $V_I = 1.9V, I_O = 50mA, T_j = 25^{\circ}C$                 | _    | 0.12 | 0.3  | V     |
| Bias current                             | $I_{Bias}$                   | $I_0 = 0$ mA, $T_j = 25$ °C                                 | _    | 0.6  | 1    | mA    |
| Ripple rejection ratio                   | RR                           | $V_I = 3 \text{ to } 5V, f = 120Hz$                         | 62   | 74   |      | dB    |
| Output noise voltage                     | $V_{no}$                     | f = 10Hz to 100kHz  | _    | 60   |      | μV    |
| Output voltage temperature coefficient   | $\Delta V_O/T_a$             | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                |      | 0.1  |      | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

#### • AN8025, AN8025M (2.5V type)

| Parameter                               | Symbol                       | Conditions   | Min | Тур  | Max | Unit  |
|---|------------------------------|--|-----|------|-----|-------|
| Output voltage                          | $V_{O}$                      | $T_j = 25^{\circ}C$  | 2.4 | 2.5  | 2.6 | V     |
| Line regulation                         | $REG_{IN}$                   | $V_I = 3 \text{ to } 8.5 \text{V}, T_j = 25^{\circ}\text{C}$ |     | 2.5  | 50  | mV    |
| Load regulation                         | REG                          | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$  |     | 8    | 20  | mV    |
| Load regulation                         |                              | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$  |     | 12.5 | 25  | mV    |
| Minimum input/output voltage difference | $V_{\text{DIF}(\text{min})}$ | $V_I = 2.4V, I_O = 20mA, T_j = 25^{\circ}C$                  |     | 0.07 | 0.2 | V     |
| Minimum input/output voltage difference |                              | $V_I = 2.4V, I_O = 50mA, T_j = 25^{\circ}C$                  | _   | 0.12 | 0.3 | V     |
| Bias current                            | $I_{Bias}$                   | $I_0 = 0$ mA, $T_j = 25$ °C                                  |     | 0.6  | 1   | mA    |
| Ripple rejection ratio                  | RR                           | $V_I = 3.5 \text{ to } 5.5 \text{V}, f = 120 \text{Hz}$      | 60  | 72   |     | dB    |
| Output noise voltage                    | $V_{no}$                     | f = 10Hz to 100kHz   | _   | 65   |     | μV    |
| Output voltage temperature coefficient  | $\Delta V_{O}/T_{a}$         | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                 | _   | 0.13 |     | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 3V$ ,  $I_O = 20$ mA and  $C_O = 10\mu$ F.

Note 2) Unless otherwise specified,  $V_I = 3.5V$ ,  $I_O = 20 \text{mA}$  and  $C_O = 10 \mu \text{F}$ .

## • AN8003, AN8003M (3V type)

| Parameter                               | Symbol                | Conditions  | Min  | Тур  | Max  | Unit  |
|---|-----------------------|---|------|------|------|-------|
| Output voltage                          | $V_{O}$               | $T_j = 25$ °C   | 2.88 | 3    | 3.12 | V     |
| Line regulation                         | REG <sub>IN</sub>     | $V_I = 3.5 \text{ to } 9V, T_j = 25^{\circ}C$               |      | 3    | 50   | mV    |
| Load regulation                         | REG                   | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 9    | 25   | mV    |
| Load regulation                         |                       | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 15   | 30   | mV    |
| Minimum input/output voltage difference | V <sub>DIF(min)</sub> | $V_I = 2.9V$ , $I_O = 20mA$ , $T_j = 25$ °C                 |      | 0.07 | 0.2  | V     |
| willing input/output voltage difference |                       | $V_I = 2.9V, I_O = 50mA, T_j = 25^{\circ}C$                 |      | 0.12 | 0.3  | V     |
| Bias current                            | $I_{Bias}$            | $I_0 = 0 \text{mA}, T_j = 25^{\circ}\text{C}$               | _    | 0.6  | 1    | mA    |
| Ripple rejection ratio                  | RR                    | $V_I = 4 \text{ to } 6V, f = 120Hz$                         | 58   | 70   |      | dB    |
| Output noise voltage                    | $V_{no}$              | f = 10Hz to 100kHz  |      | 70   | _    | μV    |
| Output voltage temperature coefficient  | $\Delta V_O/T_a$      | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                |      | 0.15 | _    | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

#### AN8035(3.5V type)

| Parameter                               | Symbol                       | Conditions   | Min  | Тур  | Max  | Unit  |
|---|------------------------------|--|------|------|------|-------|
| Output voltage                          | $V_{O}$                      | $T_j = 25^{\circ}C$  | 3.36 | 3.5  | 3.64 | V     |
| Line regulation                         | $REG_{\rm IN}$               | $V_I = 4 \text{ to } 9.5 \text{V}, T_j = 25^{\circ}\text{C}$ |      | 3.5  | 50   | mV    |
| Load regulation                         | REG                          | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$  |      | 10   | 30   | mV    |
| Load regulation                         |                              | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$  |      | 20   | 40   | mV    |
| Minimum imput/output voltage difference | $V_{\text{DIF}(\text{min})}$ | $V_I = 3.4V, I_O = 20mA, T_j = 25^{\circ}C$                  |      | 0.07 | 0.2  | V     |
| Minimum input/output voltage difference |                              | $V_I = 3.4V, I_O = 50mA, T_j = 25^{\circ}C$                  |      | 0.12 | 0.3  | V     |
| Bias current                            | $I_{Bias}$                   | $I_0 = 0$ mA, $T_j = 25$ °C                                  | _    | 0.6  | 1    | mA    |
| Ripple rejection ratio                  | RR                           | $V_I = 4.5 \text{ to } 6.5 \text{V}, f = 120 \text{Hz}$      | 57   | 69   |      | dB    |
| Output noise voltage                    | $V_{no}$                     | f = 10Hz to $100$ kHz  |      | 75   |      | μV    |
| Output voltage temperature coefficient  | $\Delta V_O/T_a$             | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                 |      | 0.2  |      | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

#### AN8004, AN8004M (4V type)

| Parameter                               | Symbol                       | Conditions  | Min  | Тур  | Max  | Unit  |
|---|------------------------------|---|------|------|------|-------|
| Output voltage                          | $V_{O}$                      | $T_j = 25^{\circ}C$   | 3.84 | 4    | 4.16 | V     |
| Line regulation                         | $REG_{IN}$                   | $V_I = 4.5 \text{ to } 10V, T_j = 25^{\circ}C$              |      | 3.5  | 50   | mV    |
| Load regulation                         | REG <sub>L</sub>             | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 10   | 30   | mV    |
| Load regulation                         |                              | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 20   | 40   | mV    |
| Minimum input/output voltage difference | $V_{\text{DIF}(\text{min})}$ | $V_I = 3.8V, I_O = 20mA, T_j = 25^{\circ}C$                 |      | 0.07 | 0.2  | V     |
| willing input output voltage difference |                              | $V_I = 3.8V, I_O = 50mA, T_j = 25^{\circ}C$                 | _    | 0.12 | 0.3  | V     |
| Bias current                            | $I_{Bias}$                   | $I_0 = 0 \text{mA}, T_j = 25^{\circ}\text{C}$               | _    | 0.6  | 1    | mA    |
| Ripple rejection ratio                  | RR                           | $V_I = 5 \text{ to } 7V, f = 120Hz$                         | 56   | 67   |      | dB    |
| Output noise voltage                    | $V_{no}$                     | f = 10Hz to 100kHz  | _    | 80   |      | μV    |
| Output voltage temperature coefficient  | $\Delta V_{O}/T_{a}$         | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                |      | 0.2  |      | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}\text{C}$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 4V$ ,  $I_O = 20$ mA and  $C_O = 10\mu$ F.

Note 2) Unless otherwise specified,  $V_I = 4.5 V$ ,  $I_O = 20 mA$  and  $C_O = 10 \mu F$ .

Note 2) Unless otherwise specified,  $V_I = 5V$ ,  $I_O = 20 \text{mA}$  and  $C_O = 10 \mu\text{F}$ .

#### • AN8045, AN8045M (4.5V type)

| Parameter                                 | Symbol            | Conditions  | Min  | Тур  | Max  | Unit  |
|---|-------------------|---|------|------|------|-------|
| Output voltage                            | Vo                | $T_j = 25^{\circ}C$   | 4.32 | 4.5  | 4.68 | V     |
| Line regulation                           | REG <sub>IN</sub> | $V_I = 5 \text{ to } 10.5 \text{V}, T_j = 25^{\circ}\text{C}$ |      | 4    | 50   | mV    |
| Load regulation                           | REG               | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$   |      | 11   | 35   | mV    |
|   |                   | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$   |      | 23   | 45   | mV    |
| Minimum input/output voltage difference   | $V_{DIF(min)}$    | $V_I = 4.3V$ , $I_O = 20mA$ , $T_j = 25^{\circ}C$             |      | 0.07 | 0.2  | V     |
| willimium input/output voltage difference |                   | $V_I = 4.3V$ , $I_O = 50mA$ , $T_j = 25^{\circ}C$             |      | 0.12 | 0.3  | V     |
| Bias current                              | $I_{Bias}$        | $I_0 = 0$ mA, $T_j = 25$ °C                                   | _    | 0.7  | 1    | mA    |
| Ripple rejection ratio                    | RR                | $V_I = 5.5 \text{ to } 7.5 \text{V}, f = 120 \text{Hz}$       | 54   | 66   |      | dB    |
| Output noise voltage                      | V <sub>no</sub>   | f = 10Hz to 100kHz  |      | 85   | _    | μV    |
| Output voltage temperature coefficient    | $\Delta V_O/T_a$  | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                  | _    | 0.23 |      | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

#### AN8005, AN8005M (5V type)

| Parameter                               | Symbol                | Conditions  | Min | Тур  | Max | Unit  |
|---|-----------------------|---|-----|------|-----|-------|
| Output voltage                          | $V_{0}$               | $T_j = 25^{\circ}C$   | 4.8 | 5    | 5.2 | V     |
| Line regulation                         | $REG_{IN}$            | $V_I = 5.5 \text{ to } 11V, T_j = 25^{\circ}C$              |     | 4.5  | 50  | mV    |
| Load regulation                         | REG                   | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |     | 12   | 40  | mV    |
| Load regulation                         |                       | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |     | 25   | 50  | mV    |
| Minimum input/output voltage difference | V <sub>DIF(min)</sub> | $V_I = 4.8V, I_O = 20mA, T_j = 25^{\circ}C$                 |     | 0.07 | 0.2 | V     |
| Minimum input/output voltage difference |                       | $V_I = 4.8V, I_O = 50mA, T_j = 25^{\circ}C$                 |     | 0.12 | 0.3 | V     |
| Bias current                            | $I_{Bias}$            | $I_0 = 0$ mA, $T_j = 25$ °C                                 | _   | 0.7  | 1   | mA    |
| Ripple rejection ratio                  | RR                    | $V_I = 6 \text{ to } 8V, f = 120Hz$                         | 52  | 64   |     | dB    |
| Output noise voltage                    | $V_{no}$              | f = 10Hz to $100$ kHz                                       |     | 95   |     | μV    |
| Output voltage temperature coefficient  | $\Delta V_O/T_a$      | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                | _   | 0.25 |     | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

#### • AN8006, AN8006M (6V type)

| Parameter                               | Symbol                | Conditions  | Min  | Тур  | Max  | Unit  |
|---|-----------------------|---|------|------|------|-------|
| Output voltage                          | $V_{0}$               | $T_j = 25^{\circ}C$   | 5.76 | 6    | 6.24 | V     |
| Line regulation                         | $REG_{IN}$            | $V_I = 6.5 \text{ to } 12V, T_j = 25^{\circ}C$              |      | 5.5  | 60   | mV    |
| Load regulation                         | REG <sub>I</sub>      | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 13   | 45   | mV    |
| Load regulation                         | REGL                  | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 28   | 55   | mV    |
| Minimum input/output voltage difference | $V_{\text{DIF}(min)}$ | $V_I = 5.8V, I_O = 20mA, T_j = 25^{\circ}C$                 |      | 0.07 | 0.2  | V     |
| Minimum input/output voltage difference |                       | $V_I = 5.8V, I_O = 50mA, T_j = 25^{\circ}C$                 |      | 0.13 | 0.3  | V     |
| Bias current                            | $I_{\text{Bias}}$     | $I_{O} = 0$ mA, $T_{j} = 25$ °C                             |      | 0.7  | 1.2  | mA    |
| Ripple rejection ratio                  | RR                    | $V_I = 7 \text{ to } 9V, f = 120Hz$                         | 51   | 63   |      | dB    |
| Output noise voltage                    | V <sub>no</sub>       | f = 10Hz to 100kHz  |      | 105  |      | μV    |
| Output voltage temperature coefficient  | $\Delta V_O/T_a$      | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                |      | 0.3  |      | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 5.5V$ ,  $I_O = 20 \text{mA}$  and  $C_O = 10 \mu \text{F}$ .

Note 2) Unless otherwise specified,  $V_I = 6V$ ,  $I_O = 20$ mA and  $C_O = 10\mu$ F.

Note 2) Unless otherwise specified,  $V_I = 7V$ ,  $I_O = 20$ mA and  $C_O = 10\mu$ F.

#### • AN8007, AN8007M (7V type)

| Parameter                                | Symbol                | Conditions  | Min  | Тур  | Max  | Unit  |
|--|-----------------------|---|------|------|------|-------|
| Output voltage                           | Vo                    | $T_j = 25^{\circ}C$   | 6.72 | 7    | 7.28 | V     |
| Line regulation                          | $REG_{IN}$            | $V_I = 7.5 \text{ to } 13V, T_j = 25^{\circ}C$              |      | 6.5  | 70   | mV    |
| Load regulation                          | REG                   | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 14   | 50   | mV    |
| Load regulation                          |                       | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 31   | 60   | mV    |
| Minimum input/output voltage difference  | V <sub>DIF(min)</sub> | $V_I = 6.8V, I_O = 20mA, T_j = 25^{\circ}C$                 |      | 0.07 | 0.2  | V     |
| willimium input/output voltage unference |                       | $V_I = 6.8V$ , $I_O = 50mA$ , $T_j = 25^{\circ}C$           | _    | 0.13 | 0.3  | V     |
| Bias current                             | $I_{Bias}$            | $I_0 = 0$ mA, $T_j = 25$ °C                                 |      | 0.7  | 1.3  | mA    |
| Ripple rejection ratio                   | RR                    | $V_I = 8 \text{ to } 10V, f = 120Hz$                        | 50   | 62   |      | dB    |
| Output noise voltage                     | $V_{no}$              | f = 10Hz to 100kHz  | _    | 120  | _    | μV    |
| Output voltage temperature coefficient   | $\Delta V_{O}/T_{a}$  | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                |      | 0.35 |      | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

#### AN8008, AN8008M (8V type)

| Parameter                               | Symbol                       | Conditions  | Min  | Тур  | Max  | Unit  |
|---|------------------------------|---|------|------|------|-------|
| Output voltage                          | $V_{O}$                      | $T_j = 25^{\circ}C$   | 7.68 | 8    | 8.32 | V     |
| Line regulation                         | REG <sub>IN</sub>            | $V_I = 8.5 \text{ to } 14V, T_j = 25^{\circ}C$              |      | 7.5  | 80   | mV    |
| Load regulation                         | REG                          | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 15   | 55   | mV    |
| Load regulation                         |                              | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 34   | 65   | mV    |
| Minimum input/output voltage difference | $V_{\text{DIF}(\text{min})}$ | $V_I = 7.8V$ , $I_O = 20mA$ , $T_j = 25$ °C                 |      | 0.07 | 0.2  | V     |
| Minimum input/output voltage difference |                              | $V_I = 7.8V, I_O = 50mA, T_j = 25^{\circ}C$                 |      | 0.14 | 0.3  | V     |
| Bias current                            | $I_{Bias}$                   | $I_0 = 0$ mA, $T_j = 25$ °C                                 | _    | 0.7  | 1.3  | mA    |
| Ripple rejection ratio                  | RR                           | $V_I = 9 \text{ to } 11V, f = 120Hz$                        | 49   | 61   |      | dB    |
| Output noise voltage                    | $V_{no}$                     | f = 10Hz to $100$ kHz                                       |      | 135  |      | μV    |
| Output voltage temperature coefficient  | $\Delta V_O/T_a$             | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                | _    | 0.4  | —    | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

#### • AN8085, AN8085M (8.5V type)

| Parameter                                | Symbol                | Conditions  | Min  | Тур  | Max  | Unit  |
|--|-----------------------|---|------|------|------|-------|
| Output voltage                           | $V_{O}$               | $T_j = 25^{\circ}C$   | 8.16 | 8.50 | 8.84 | V     |
| Line regulation                          | $REG_{IN}$            | $V_I = 9 \text{ to } 14.5 \text{V}, T_j = 25^{\circ}\text{C}$ |      | 8.3  | 90   | mV    |
| Load regulation                          | REG <sub>1</sub>      | $I_0 = 1$ to 40mA, $T_j = 25^{\circ}C$                        |      | 16   | 60   | mV    |
| Load regulation                          |                       | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$   |      | 36   | 70   | mV    |
| Minimum input/output voltage difference  | $V_{\text{DIF}(min)}$ | $V_I = 8.3V$ , $I_O = 20mA$ , $T_j = 25^{\circ}C$             |      | 0.07 | 0.2  | V     |
| willimum input/output voltage difference |                       | $V_I = 8.3V$ , $I_O = 50mA$ , $T_j = 25^{\circ}C$             |      | 0.14 | 0.3  | V     |
| Bias current                             | $I_{Bias}$            | $I_0 = 0$ mA, $T_j = 25$ °C                                   | _    | 0.8  | 1.4  | mA    |
| Ripple rejection ratio                   | RR                    | $V_I = 9.5 \text{ to } 11.5 \text{V}, f = 120 \text{Hz}$      | 48   | 60   |      | dB    |
| Output noise voltage                     | $V_{no}$              | f = 10Hz to 100kHz  |      | 140  |      | μV    |
| Output voltage temperature coefficient   | $\Delta V_{O}/T_{a}$  | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                  | _    | 0.43 | _    | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}C$  means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

Note 2) Unless otherwise specified,  $V_I = 8V$ ,  $I_O = 20$ mA and  $\hat{C}_O = 10\mu F$ .

Note 2) Unless otherwise specified,  $V_I = 9V$ ,  $I_O = 20$ mA and  $C_O = 10\mu$ F.

Note 2) Unless otherwise specified,  $V_I = 9.5V$ ,  $I_O = 20$ mA and  $C_O = 10\mu$ F.

# • AN8009, AN8009M (9V type)

| Parameter                               | Symbol                       | Conditions  | Min  | Тур  | Max  | Unit  |
|---|------------------------------|---|------|------|------|-------|
| Output voltage                          | $V_{0}$                      | $T_j = 25^{\circ}C$   | 8.64 | 9    | 9.36 | V     |
| Line regulation                         | $REG_{IN}$                   | $V_I = 9.5 \text{ to } 15V, T_j = 25^{\circ}C$              |      | 9    | 100  | mV    |
| Load regulation                         | $REG_L$                      | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 17   | 70   | mV    |
|   |                              | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |      | 37   | 75   | mV    |
| Minimum input/output voltage difference | $V_{\text{DIF}(\text{min})}$ | $V_I = 8.8V, I_O = 20mA, T_j = 25^{\circ}C$                 |      | 0.07 | 0.2  | V     |
|   |                              | $V_I = 8.8V, I_O = 50mA, T_j = 25^{\circ}C$                 |      | 0.14 | 0.3  | V     |
| Bias current                            | $I_{Bias}$                   | $I_0 = 0$ mA, $T_j = 25$ °C                                 |      | 0.8  | 1.4  | mA    |
| Ripple rejection ratio                  | RR                           | $V_I = 10 \text{ to } 12V, f = 120Hz$                       | 47   | 59   |      | dB    |
| Output noise voltage                    | $V_{no}$                     | f = 10Hz to 100kHz  |      | 150  | _    | μV    |
| Output voltage temperature coefficient  | $\Delta V_O/T_a$             | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                |      | 0.45 |      | mV/°C |

Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

#### • AN8010, AN8010M (10V type)

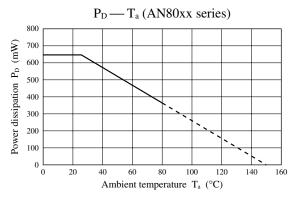
| Parameter                               | Symbol                | Conditions  | Min | Тур  | Max  | Unit  |
|---|-----------------------|---|-----|------|------|-------|
| Output voltage                          | $V_{O}$               | $T_j = 25^{\circ}C$   | 9.6 | 10   | 10.4 | V     |
| Line regulation                         | $REG_{IN}$            | $V_I = 10.5 \text{ to } 16V, T_j = 25^{\circ}C$             |     | 10   | 100  | mV    |
| Load regulation                         | $REG_L$               | $I_0 = 1 \text{ to } 40\text{mA}, T_j = 25^{\circ}\text{C}$ |     | 18   | 75   | mV    |
|   |                       | $I_0 = 1 \text{ to } 50\text{mA}, T_j = 25^{\circ}\text{C}$ |     | 40   | 85   | mV    |
| Minimum input/output voltage difference | V <sub>DIF(min)</sub> | $V_I = 9.8V, I_O = 20mA, T_j = 25^{\circ}C$                 |     | 0.07 | 0.2  | V     |
|   |                       | $V_I = 9.8V$ , $I_O = 50mA$ , $T_j = 25^{\circ}C$           | _   | 0.14 | 0.3  | V     |
| Bias current                            | $I_{Bias}$            | $I_0 = 0$ mA, $T_j = 25$ °C                                 |     | 0.8  | 1.4  | mA    |
| Ripple rejection ratio                  | RR                    | $V_I = 11 \text{ to } 13V, f = 120Hz$                       | 46  | 58   |      | dB    |
| Output noise voltage                    | $V_{no}$              | f = 10Hz to 100kHz  | _   | 165  |      | μV    |
| Output voltage temperature coefficient  | $\Delta V_{O}/T_{a}$  | $T_j = -30 \text{ to } +125^{\circ}\text{C}$                |     | 0.5  |      | mV/°C |

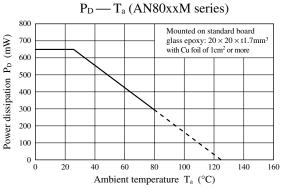
Note 1) The specified condition  $T_j = 25^{\circ}$ C means that the test should be carried out within so short a test time (within 10ms) that the characteristic value drift due to the chip junction temperature rise can be ignored.

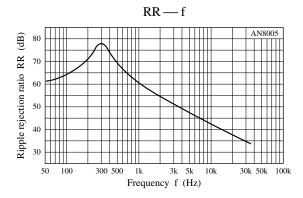
Note 2) Unless otherwise specified,  $V_I = 10V$ ,  $I_O = 20$ mA and  $C_O = 10\mu$ F.

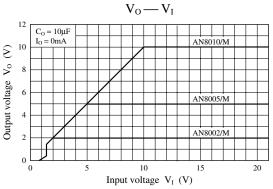
Note 2) Unless otherwise specified,  $V_I = 11V$ ,  $I_O = 20$ mA and  $C_O = 10\mu$ F.

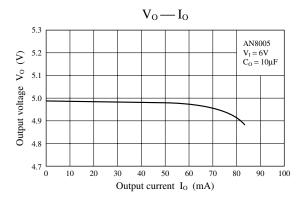
#### ■ Main Characteristics

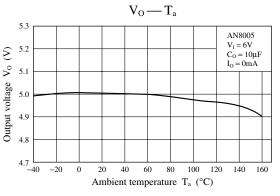




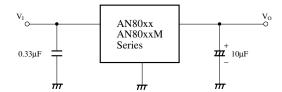




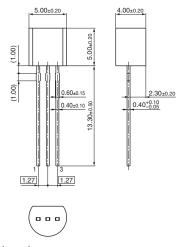




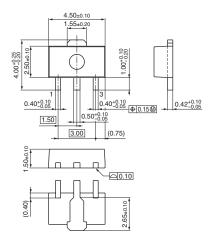
### ■ Application Circuit Example



- AN80xx and AN80xxM series have their internal gain increased in order to improve performance. When the power line on the output side is long, use a capacitor of 10μF.
  - Also, the capacitor on the output side should be attached as close to the IC as possible.
- When using at a low temperature, it is recommended to use the capacitors with low internal impedance (for example, tantalum capacitor) for output capacitors.
- New Package Dimensions (Unit: mm)
- SSIP003-P-0000S (Lead-free package)



• HSIP003-P-0000Q (Lead-free package)



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