# AN80xx/AN80xxM Series

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

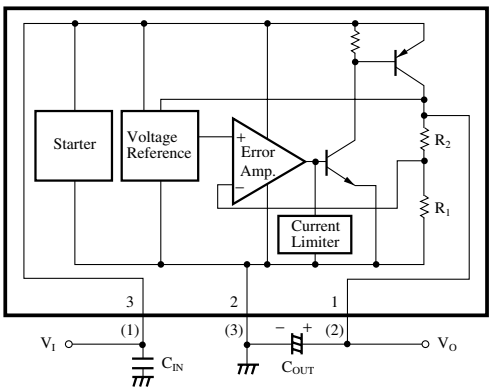
### ■ Overview

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; 2.5V, 3V, 3.5V (SSIP003-P-0000 only), 4V, 4.5V and 5V.

### ■ Features

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

### ■ Block Diagram (AN80xxM series)




$R_1 = 5k\Omega$
$C_{IN} = 0.33\mu F$
$C_{OUT} = 10\mu F$

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

### ■ Pin Descriptions

| Pin No. | Description | |
|---|---|---|
| | AN80xx series | AN80xxM series |
| 1 | Input | Output |
| 2 | Output | GND |
| 3 | GND | Input |

## ■ Absolute Maximum Ratings at $T_a$ = 25°C

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Supply voltage | | $V_I$ | 20 | V |
| Supply current | | $I_{CC}$ | 100 | mA |
| Power dissipation | | $P_D$ | 650 * | mW |
| Operating ambient temperature | | $T_{opr}$ | −30 to +80 | °C |
| Storage temperature | AN80xx series | $T_{stg}$ | −55 to +150 | °C |
| | AN80xxM series | | −55 to +125 | |

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

## ■ Electrical Characteristics at $T_a$ = 25°C

• AN8025, AN8025M (2.5V type)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | $T_j$ = 25°C | 2.4 | 2.5 | 2.6 | V |
| Line regulation | $REG_{IN}$ | $V_I$ = 3 to 8.5V, $T_j$ = 25°C | — | 2.5 | 50 | mV |
| Load regulation | $REG_L$ | $I_O$ = 1 to 40mA, $T_j$ = 25°C | — | 8 | 20 | mV |
| | | $I_O$ = 1 to 50mA, $T_j$ = 25°C | — | 12.5 | 25 | mV |
| Minimum input/output voltage difference | $V_{DIF(min)}$ | $V_I$ = 2.4V, $I_O$ = 20mA, $T_j$ = 25°C | — | 0.07 | 0.2 | V |
| | | $V_I$ = 2.4V, $I_O$ = 50mA, $T_j$ = 25°C | — | 0.12 | 0.3 | V |
| Bias current | $I_{Bias}$ | $I_O$ = 0mA, $T_j$ = 25°C | — | 0.6 | 1 | mA |
| Ripple rejection ratio | RR | $V_I$ = 3.5 to 5.5V, f = 120Hz | 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 to +125°C | — | 0.13 | — | mV/°C |

Note 1) The specified condition $T_j$ = 25°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, $V_I$ = 3.5V, $I_O$ = 20mA and $C_O$ = 10μF.

• AN8003, AN8003M (3V type)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | $T_j$ = 25°C | 2.88 | 3 | 3.12 | V |
| Line regulation | $REG_{IN}$ | $V_I$ = 3.5 to 9V, $T_j$ = 25°C | — | 3 | 50 | mV |
| Load regulation | $REG_L$ | $I_O$ = 1 to 40mA, $T_j$ = 25°C | — | 9 | 25 | mV |
| | | $I_O$ = 1 to 50mA, $T_j$ = 25°C | — | 15 | 30 | mV |
| Minimum input/output voltage difference | $V_{DIF(min)}$ | $V_I$ = 2.9V, $I_O$ = 20mA, $T_j$ = 25°C | — | 0.07 | 0.2 | V |
| | | $V_I$ = 2.9V, $I_O$ = 50mA, $T_j$ = 25°C | — | 0.12 | 0.3 | V |
| Bias current | $I_{Bias}$ | $I_O$ = 0mA, $T_j$ = 25°C | — | 0.6 | 1 | mA |
| Ripple rejection ratio | RR | $V_I$ = 4 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 to +125°C | — | 0.15 | — | mV/°C |

Note 1) The specified condition $T_j$ = 25°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, $I_O$ = 20mA and $C_O$ = 10μF.

## ■ Electrical Characteristics at $T_a$ = 25°C (continued)

• AN8035(3.5V type)

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

Note 1) The specified condition $T_j$ = 25°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, $V_I$ = 4.5V, $I_O$ = 20mA and $C_O$ = 10μF.

• AN8004, AN8004M (4V type)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | $T_j$ = 25°C | 3.84 | 4 | 4.16 | V |
| Line regulation | $REG_{IN}$ | $V_I$ = 4.5 to 10V, $T_j$ = 25°C | — | 3.5 | 50 | mV |
| Load regulation | $REG_L$ | $I_O$ = 1 to 40mA, $T_j$ = 25°C | — | 10 | 30 | mV |
| | | $I_O$ = 1 to 50mA, $T_j$ = 25°C | — | 20 | 40 | mV |
| Minimum input/output voltage difference | $V_{DIF(min)}$ | $V_I$ = 3.8V, $I_O$ = 20mA, $T_j$ = 25°C | — | 0.07 | 0.2 | V |
| | | $V_I$ = 3.8V, $I_O$ = 50mA, $T_j$ = 25°C | — | 0.12 | 0.3 | V |
| Bias current | $I_{Bias}$ | $I_O$ = 0mA, $T_j$ = 25°C | — | 0.6 | 1 | mA |
| Ripple rejection ratio | RR | $V_I$ = 5 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 to +125°C | — | 0.2 | — | mV/°C |

Note 1) The specified condition $T_j$ = 25°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, $V_I$ = 5V, $I_O$ = 20mA and $C_O$ = 10μF.

• AN8045, AN8045M (4.5V type)

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

Note 1) The specified condition $T_j$ = 25°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, $I_O$ = 20mA and $C_O$ = 10μF.

## ■ Electrical Characteristics at $T_a$ = 25°C (continued)

• AN8005, AN8005M (5V type)

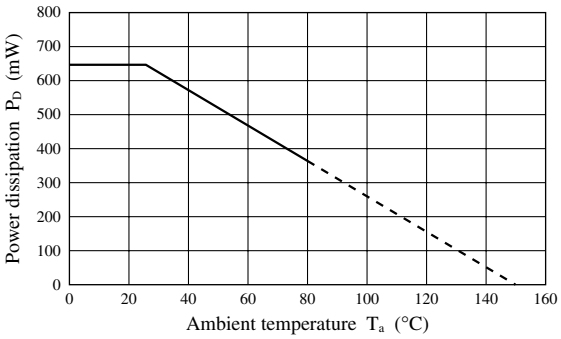
| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output voltage | $V_O$ | $T_j$ = 25°C | 4.8 | 5 | 5.2 | V |
| Line regulation | $REG_{IN}$ | $V_I$ = 5.5 to 11V, $T_j$ = 25°C | — | 4.5 | 50 | mV |
| Load regulation | $REG_L$ | $I_O$ = 1 to 40mA, $T_j$ = 25°C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

Note 1) The specified condition $T_j$ = 25°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.

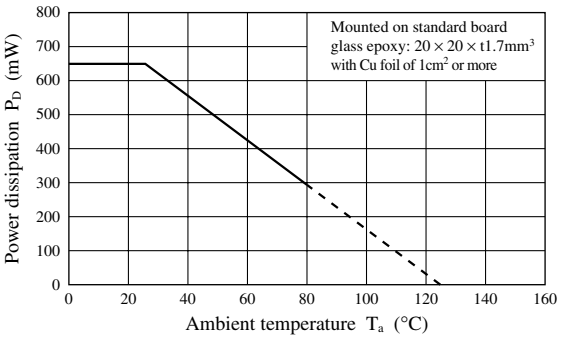
Note 2) Unless otherwise specified, $V_I$ = 6V, $I_O$ = 20mA and $C_O$ = 10μF.

## ■ Main Characteristics

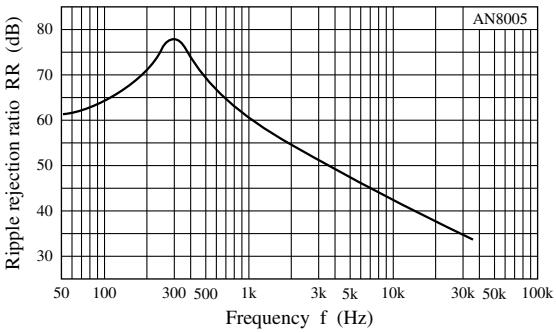
$P_D$ — $T_a$ (AN80xx series)



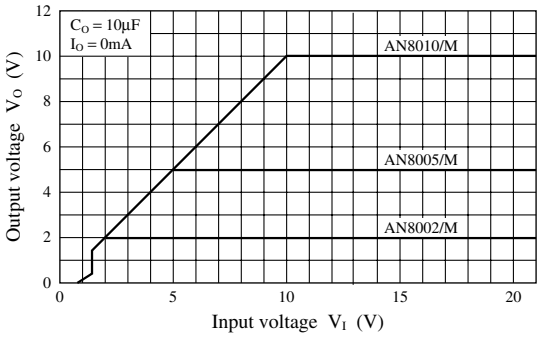

$P_D$ — $T_a$ (AN80xxM series)



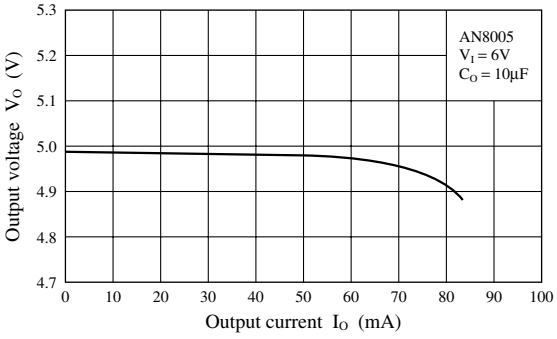

RR — f



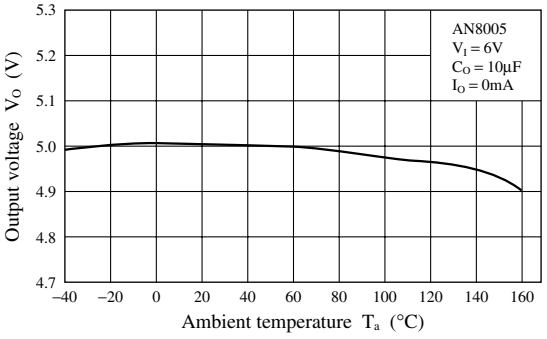

$V_O$ — $V_I$



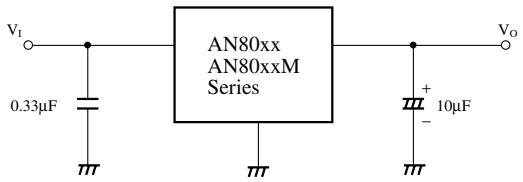

$V_O$ — $I_O$




$V_O$ — $T_a$



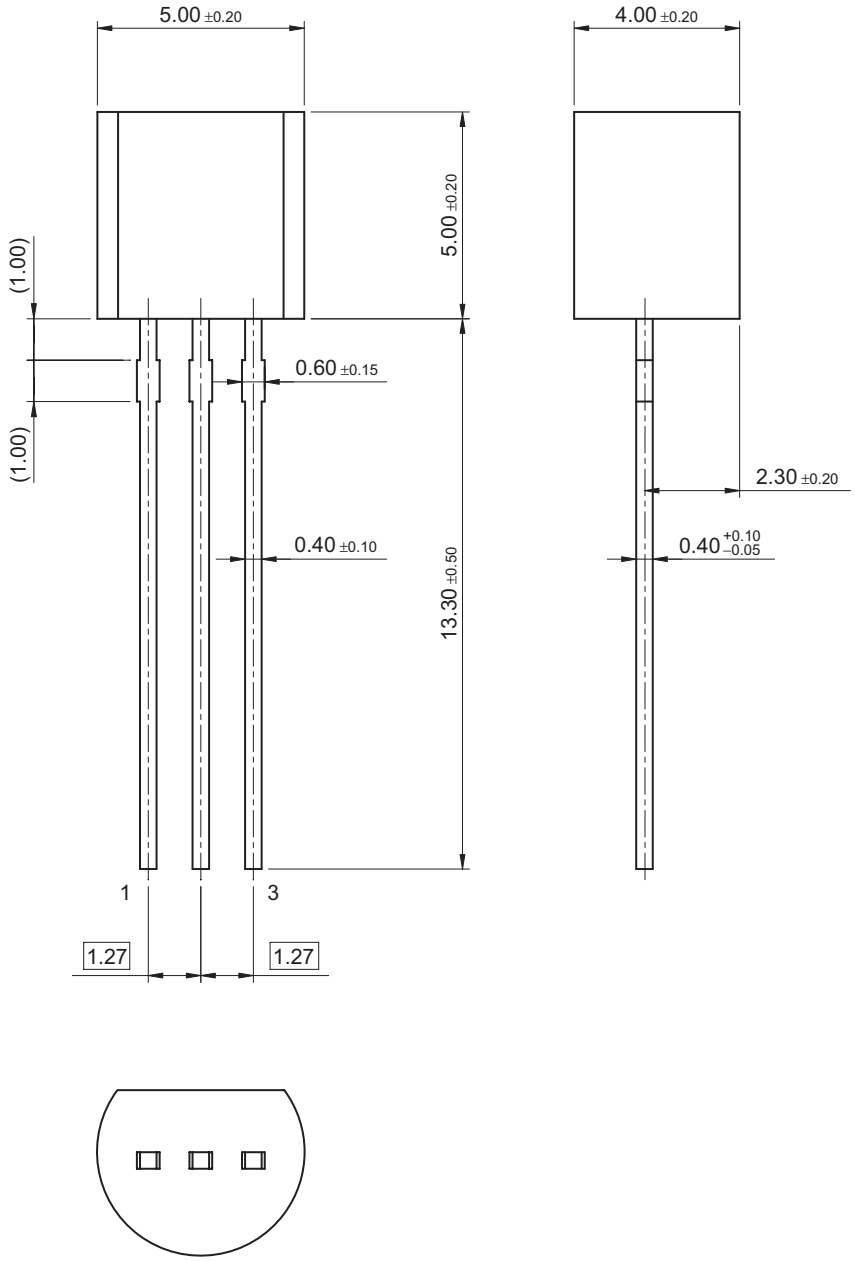
## ■ Application Circuit Example




- 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.

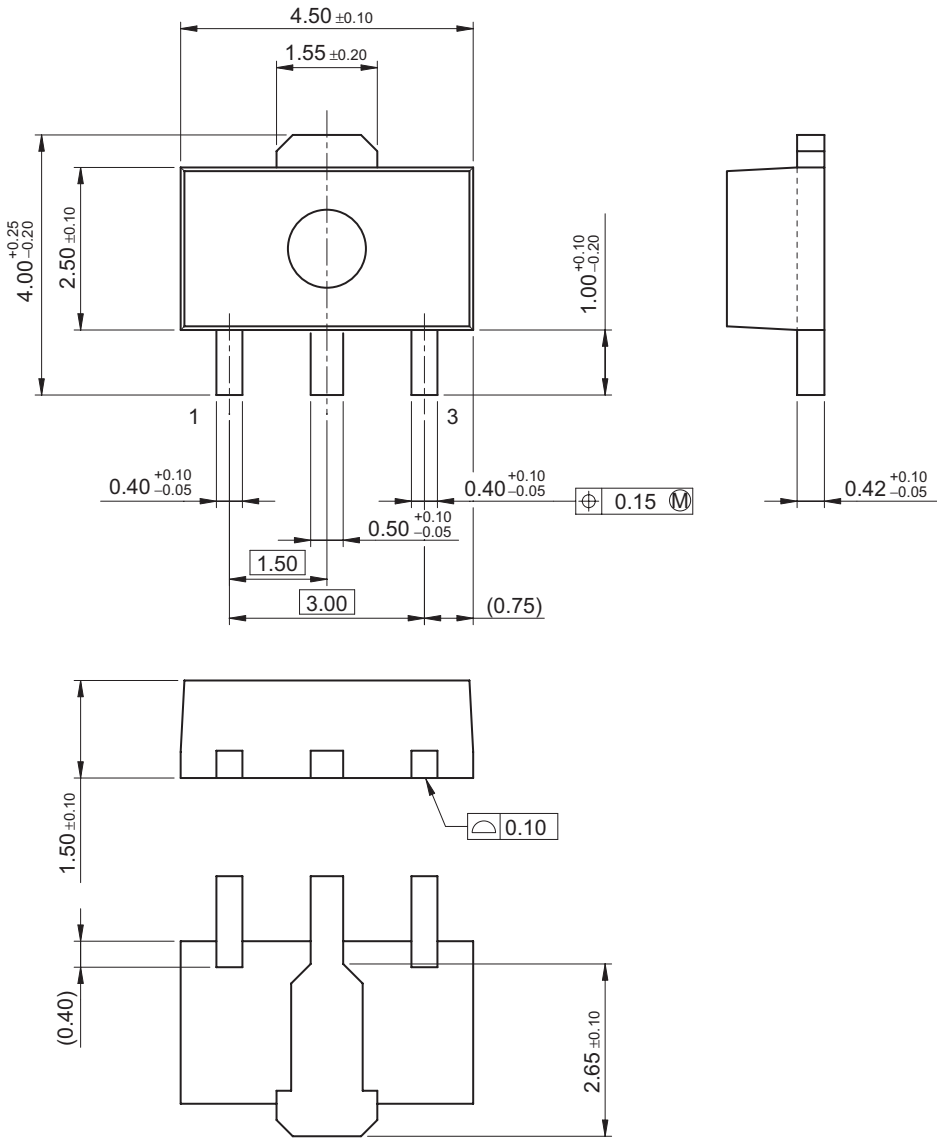
■ Package Dimensions (Unit: mm)

• SSIP003-P-0000S



■ Package Dimensions (Unit: mm)

• HSIP003-P-0000Q



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