# DATA SHEET

| Part No. | AN78L05M |
|---|---|
| Package Code No. | HSIP003-P-0000Q |

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# AN78L05M

## 3-pin positive output voltage regulator (100 mA type)

### ■ Overview

The AN78LxxM series are 3-pin, fixed positive output type monolithic voltage regulators.
Stabilized fixed output voltage is obtained from unstable DC input voltage without using any external components.
12 types of fixed output voltage are available; 4 V, 5 V, 6 V, 7 V, 8 V, 9 V, 10 V, 12 V, 15 V, 18 V, 20 V and 24 V.
They can be used widely in power circuits with current capacity of up to 100 mA.
The AN78L05M is the 5 V output voltage type in these series.

### ■ Features

- No external components
- Output voltage: 5 V
- Built-in overcurrent limit circuit
- Built-in thermal overload protection circuit

### ■ Applications

- 3-pin positive output voltage regulator (100 mA type)

### ■ Package

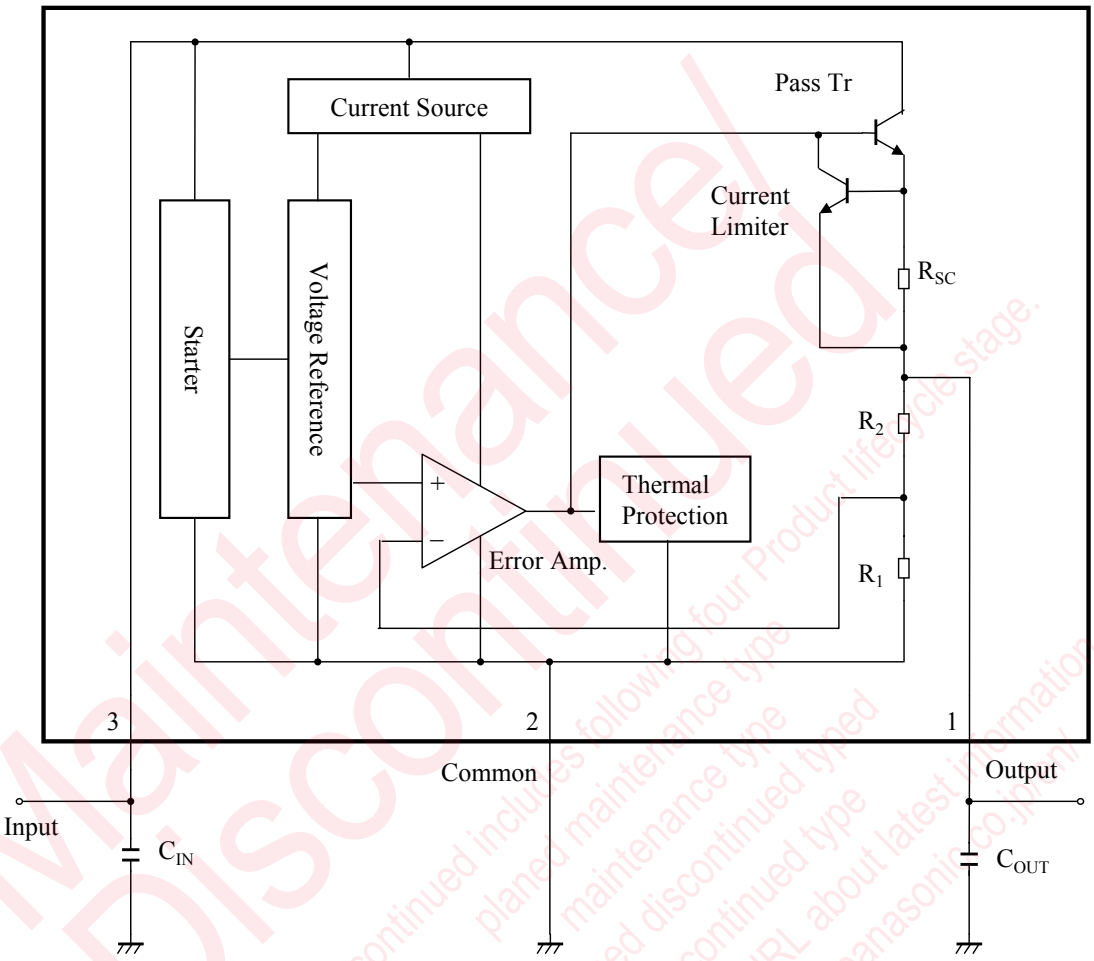
- 3-pin plastic single inline package with heat sink (SIP type)

### ■ Type

- Silicon monolithic bipolar IC

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■ Block Diagram




$C_{IN}$ : 0.33 µF
$C_{OUT}$ : 0.1 µF
$R_1$ : 4 kΩ
$R_2$ : 1 kΩ

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## ■ Pin Descriptions

| Pin No. | Pin name | Type | Description |
|---|---|---|---|
| 1 | Output | Output | Regulated power output |
| 2 | Common | GND | Ground |
| 3 | Input | Input | Input supplies power to the internal circuitry |

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## ■ Absolute Maximum Ratings

| A No. | Parameter | Symbol | Rating | Unit | Note |
|---|---|---|---|---|---|
| 1 | Input voltage | $V_{IN}$ | 35 | V | *1 |
| 2 | Supply current | $I_{CC}$ | 200 | mA | *2 |
| 3 | Power dissipation | $P_D$ | 270 | mW | *3 |
| 4 | Operating ambient temperature | $T_{opr}$ | −30 to + 80 | °C | *4 |
| 5 | Storage temperature | $T_{stg}$ | −55 to +150 | °C | *4 |

Note) *1: The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.
*2: Since current limiting circuit is built in, current value never exceeds the limit.
*3: The power dissipation shown is the value at $T_a$ = 80°C.
When using this IC, refer to the • $P_D - T_a$ diagram in the ■ Technical Data and use under the condition not exceeding the allowable value.
When $T_j$ exceeds 150°C, the internal circuit cuts off the output.
*4: Except for the power dissipation, operating ambient temperature, and storage temperature, all ratings are for $T_a$ = 25°C.

## ■ Operating supply voltage range

| Parameter | Symbol | Range | Unit | Note |
|---|---|---|---|---|
| Supply voltage range | $V_{CC}$ | 7.5 to 20 | V | — |

Note) The values under the condition not exceeding the above absolute maximum ratings and the power dissipation.

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## ■ Electrical Characteristics

Note) Unless otherwise specified, $T_a$ = 25°C±2°C, $V_{IN}$ = 10 V, $I_{OUT}$ = 40 mA, $C_{IN}$ = 0.33 µF and $C_{OUT}$ = 0.1 µF, $T_j$ = 0°C to 125°C

| B No. | Parameter | Symbol | Conditions | Limits | | | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | | |
| 1 | Output voltage | $V_{OUT}$ | $T_j$ = 25°C | 4.8 | 5.0 | 5.2 | V | *1 |
| 2 | Output voltage tolerance | $V_{OUT}$ | $V_{IN}$ = 7.5 V to 20 V, $I_{OUT}$ = 1 mA to 70 mA | 4.75 | — | 5.25 | V | *1 |
| 3 | Line regulation | $REG_{IN}$ | $V_{IN}$ = 7.5 V to 20 V, $T_j$ = 25°C | — | 55 | 150 | mV | *1 |
| | | | $V_{IN}$ = 8 V to 20 V, $T_j$ = 25°C | — | 45 | 100 | | |
| 4 | Load regulation | $REG_L$ | $I_{OUT}$ = 1 mA to 100 mA, $T_j$ = 25°C | — | 11 | 60 | mV | *1 |
| | | | $I_{OUT}$ = 1 mA to 40 mA, $T_j$ = 25°C | — | 5 | 30 | | |
| 5 | Bias current | $I_{Bias}$ | $T_j$ = 25°C | — | 2.0 | 3.0 | mA | *1 |
| 6 | Bias current fluctuation to input | $\Delta I_{Bias(IN)}$ | $V_{IN}$ = 8 V to 20 V, $T_j$ = 25°C | — | — | 1.0 | mA | *1 |
| 7 | Bias current fluctuation to load | $\Delta I_{Bias(L)}$ | $I_{OUT}$ = 1 mA to 40 mA, $T_j$ = 25°C | — | — | 0.1 | mA | *1 |
| 8 | Ripple rejection ratio | RR | $V_{IN}$ = 8 V to 18 V, $I_{OUT}$ = 40 mA, f = 120 Hz | 47 | 57 | — | dB | — |

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.

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## ■ Electrical Characteristics (Reference values for design)

Note) Unless otherwise specified, $T_a$ = 25°C±2°C, $V_{IN}$ = 10 V, $I_{OUT}$ = 40 mA, $C_{IN}$ = 0.33 µF and $C_{OUT}$ = 0.1 µF, $T_j$ = 0°C to 125°C
The characteristics listed below are reference values for design of the IC and are not guaranteed by inspection.
If a problem does occur related to these characteristics, Panasonic will respond in good faith to user concerns.

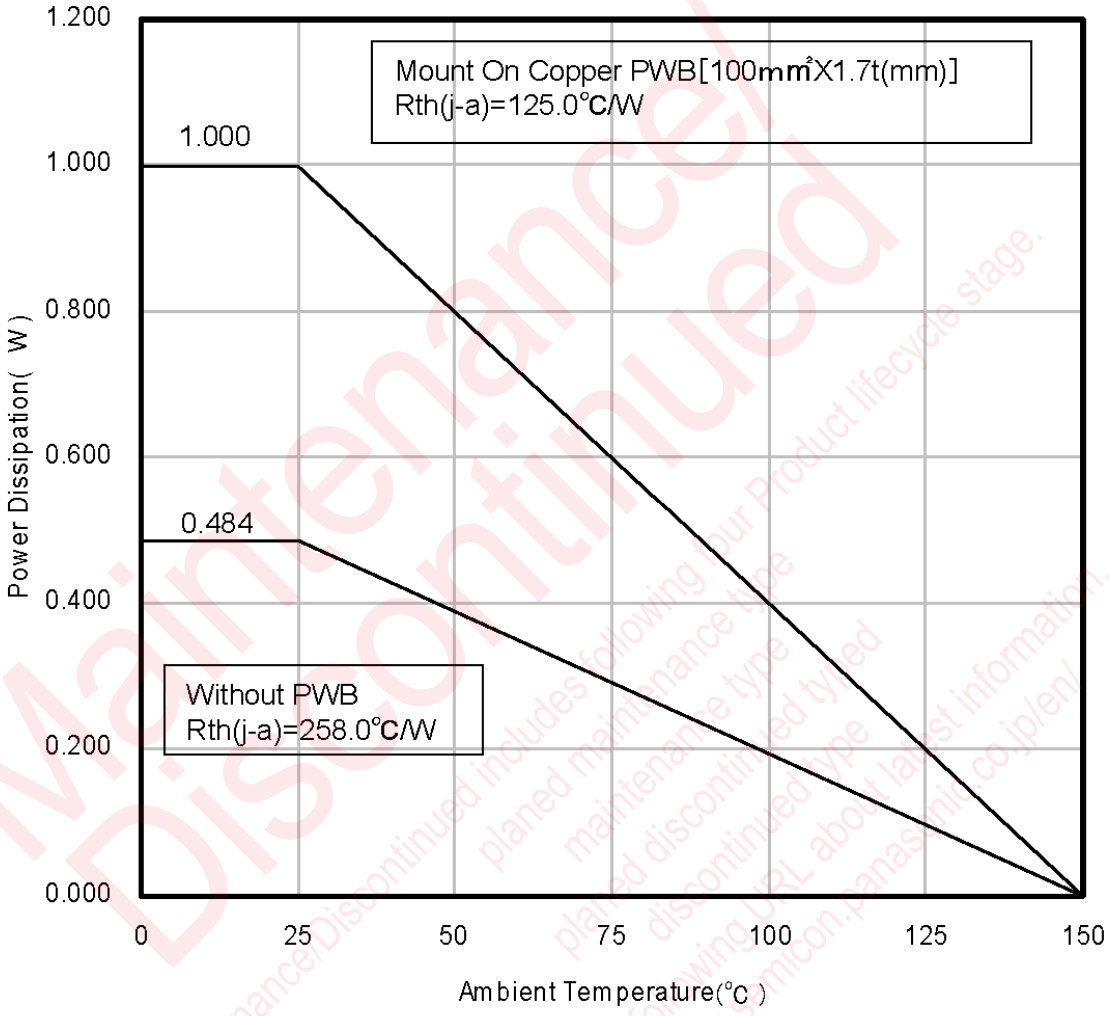
| B No. | Parameter | Symbol | Conditions | Reference values | | | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | | |
| 1 | Output noise voltage | Vno | f = 10 Hz to 100 kHz | — | 40 | — | µV | — |
| 2 | Minimum input/output voltage difference | $V_{DIF(min)}$ | $T_j$ = 25°C | — | 1.7 | — | V | *1 |
| 3 | Output short-circuit current | $I_{O(Short)}$ | $T_j$ = 25°C | — | 140 | — | mA | *1 |
| 4 | Output voltage temperature coefficient | $\frac{\Delta V_{OUT}}{T_a}$ | $I_{OUT}$ = 5 mA, $T_j$ = 0°C to 125°C | — | – 0.65 | — | 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.

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■ Technical Data

• $P_D$ — $T_a$ diagram




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