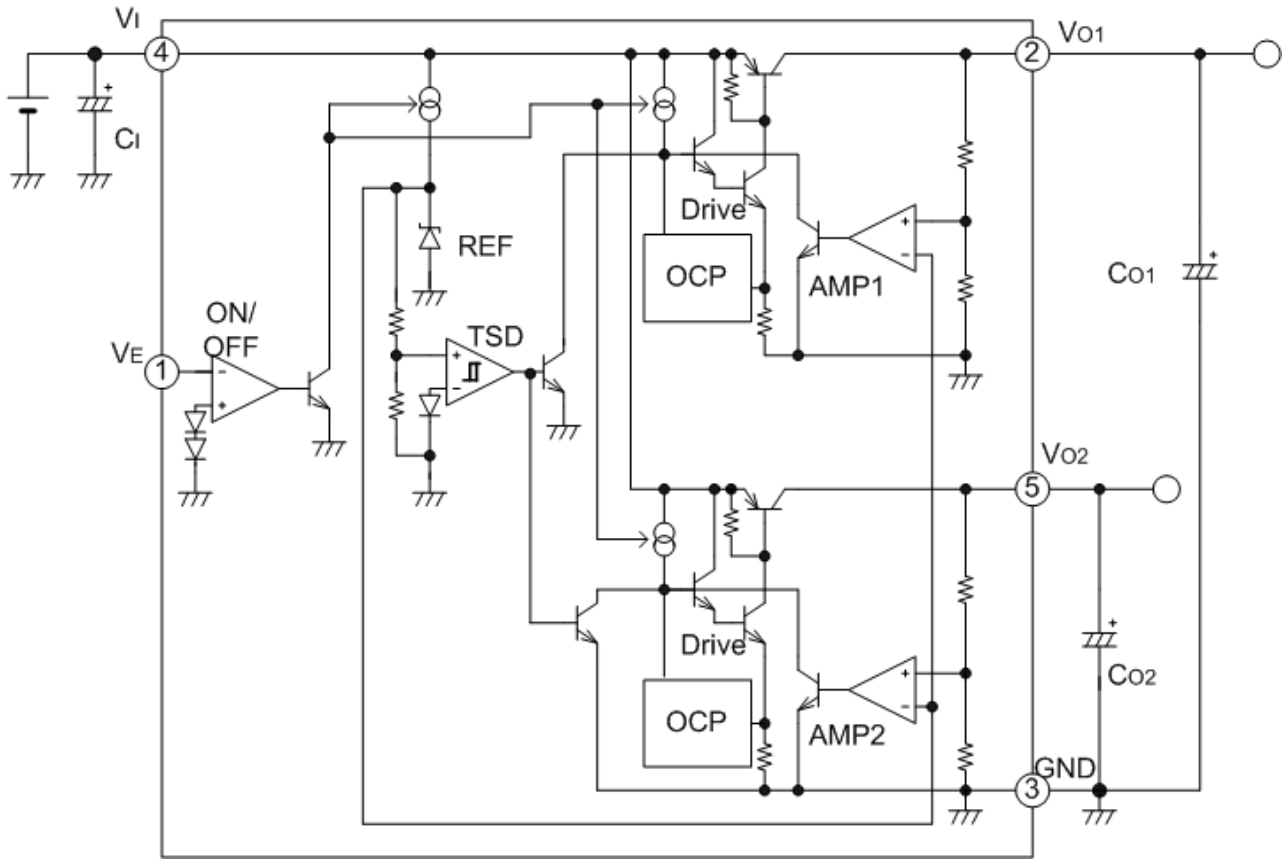
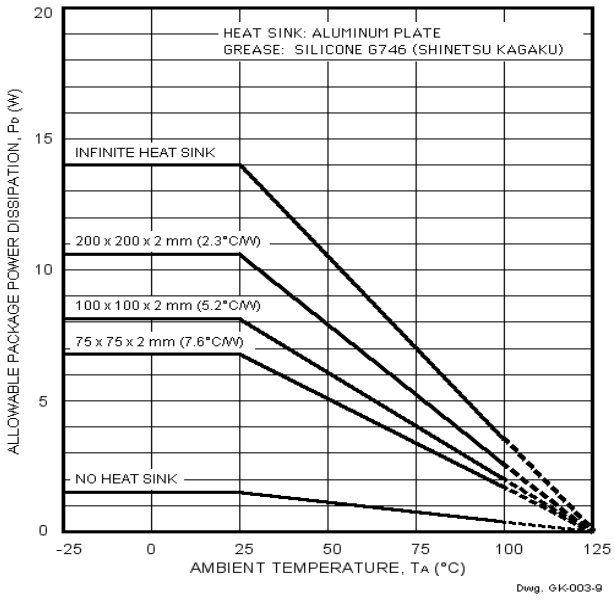
# SI-3002KWF
***1 A, Low-Dropout, Dual Output, 2.5 V & 3.3 V Regulator***

*Linear Regulators*

## FUNCTIONAL BLOCK DIAGRAM




### Allowable Package Power Dissipation




### Recommended Operating Conditions

| | Min | Max | Units |
|---|---|---|---|
| DC Output Current | 0 | 1 | A |
| Operating Ambient Temp. | -30 | +85 | °C |
| Operating Junction Temp. | -20 | +100 | °C |

For the availability of parts meeting -40°C requirements, contact Allegro's Sales Representative.

This data sheet is based on Sanken data sheet SSJ-02006.



Allegro MicroSystems, Inc.
115 Northeast Cutoff, Box 15036
Worcester, Massachusetts 01615-0036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**ELECTRICAL CHARACTERISTICS** at $T_A$ = +25°C, $V_E$ = 2 V (unless otherwise noted).

| Characteristic | Symbol | Test Conditions | Limits | | | |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | Units |
| **Channel 1** | | | | | | |
| Output Voltage | $V_{O1}$ | $V_I$ = 5.0 V, $I_{O1}$ = 10 mA | 3.234 | 3.300 | 3.366 | V |
| | $V_{O1(off)}$ | $V_E$ = 0 V | — | — | 0.5 | V |
| Output Volt. Temp. Coeff. | $a_{VO1}$ | 0°C ≤ $T_J$ ≤ 100°C | — | ±0.3 | — | mV/°C |
| Output Short-Circuit Current | $I_{OM1}$ | $V_I$ = 5.0 V, See note | 1.2 | — | — | A |
| Line Regulation | $\Delta V_{O(\Delta VI)1}$ | $V_I$ = 4.5 V ~ 10 V, $I_{O1}$ = 10 mA | — | — | 20 | mV |
| Load Regulation | $\Delta V_{O(\Delta IO)1}$ | $V_I$ = 5.0 V, $I_{O1}$ = 0 A ~ 1.0 A | — | — | 30 | mV |
| Dropout Voltage | $V_{Imin}$ - $V_{O1}$ | $I_{O1}$ = 1.0 A | — | — | 0.6 | V |
| Ripple Rejection Ratio | PSRR | $V_I$ = 5.0 V, 100 Hz ≤ f ≤ 120 Hz | — | 60 | — | dB |
| **Channel 2** | | | | | | |
| Output Voltage | $V_{O2}$ | $V_I$ = 5.0 V, $I_{O2}$ = 10 mA | 2.450 | 2.500 | 2.550 | V |
| | $V_{O2(off)}$ | $V_E$ = 0 V | — | — | 0.5 | V |
| Output Volt. Temp. Coeff. | $a_{VO2}$ | 0°C ≤ $T_J$ ≤ 100°C | — | ±0.3 | — | mV/°C |
| Output Short-Circuit Current | $I_{OM2}$ | $V_I$ = 5.0 V, See note | 1.2 | — | — | A |
| Line Regulation | $\Delta V_{O(\Delta VI)2}$ | $V_I$ = 4.5 V ~ 10 V, $I_{O2}$ = 10 mA | — | — | 20 | mV |
| Load Regulation | $\Delta V_{O(\Delta IO)2}$ | $V_I$ = 5.0 V, $I_{O2}$ = 0 A ~ 1.0 A | — | — | 30 | mV |
| Dropout Voltage | $V_{Imin}$ - $V_{O2}$ | $I_{O2}$ = 1.0 A | — | — | 0.6 | V |
| Ripple Rejection Ratio | PSRR | $V_I$ = 5.0 V, 100 Hz ≤ f ≤ 120 Hz | — | 60 | — | dB |
| **Logic** | | | | | | |
| Ground Terminal Current | $I_{GND}$ | $V_I$ = 5.0 V, $I_O$ = 0 mA, $V_E$ = 2.0 V | — | 1.0 | 1.5 | mA |
| | | $V_I$ = 5.0 V, $V_E$ = 0 V | — | — | 0.5 | mA |
| Enable Input Voltage | $V_{EH}$ | Output ON | 2.0 | — | — | V |
| | $V_{EL}$ | Output OFF | — | — | 0.8 | V |
| Enable Input Current | $I_{EH}$ | $V_E$ = 2.7 V | — | 0 | 5.0 | µA |
| | $I_{EL}$ | $V_E$ = 0.4 V | — | -12 | -100 | µA |
| Thermal Shutdown | $T_J$ | $I_O$ = 10 mA | 135 | 150 | — | °C |

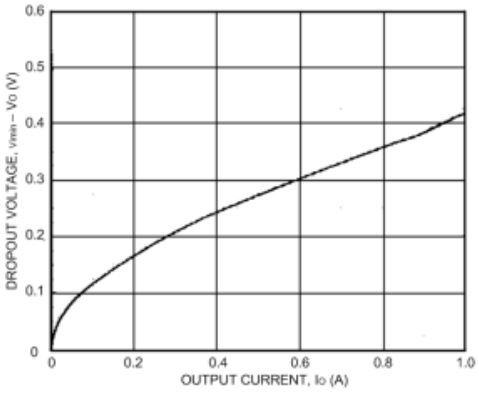
Typical values are given for circuit design information only.

Note: Output short-circuit current is at point where output voltage has decreased 5%.

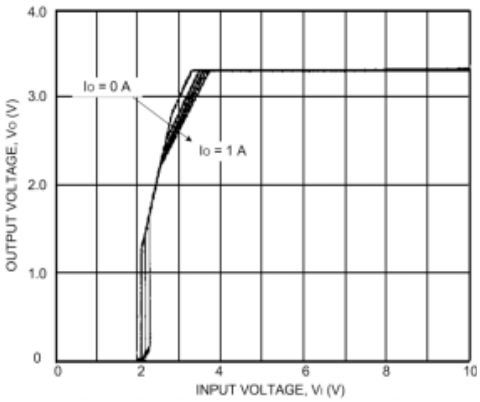
## TYPICAL CHARACTERISTICS

($V_I$ = 5.0 V, $T_A$ = 25°C)

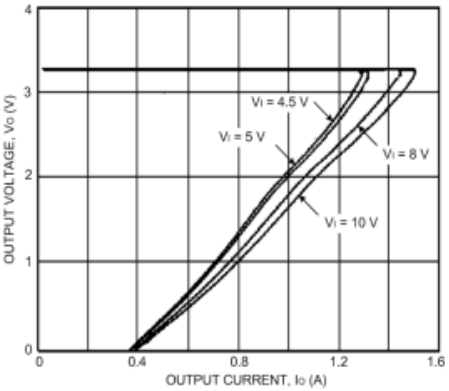
■ Chan. 1 Dropout Voltage



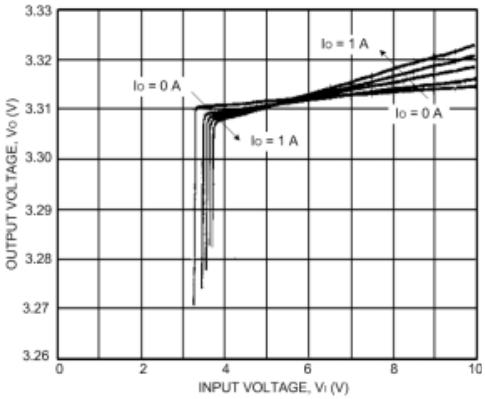

■ Chan. 1 Low-Voltage Behavior



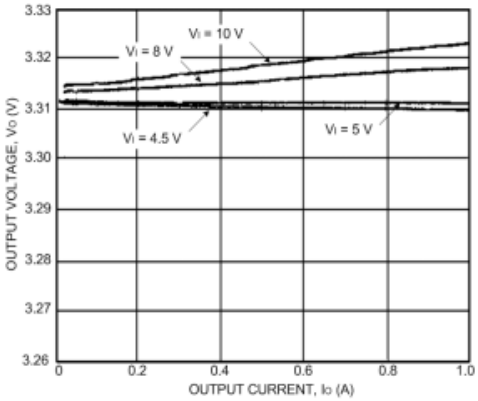

■ Chan. 1 Overcurrent Protection



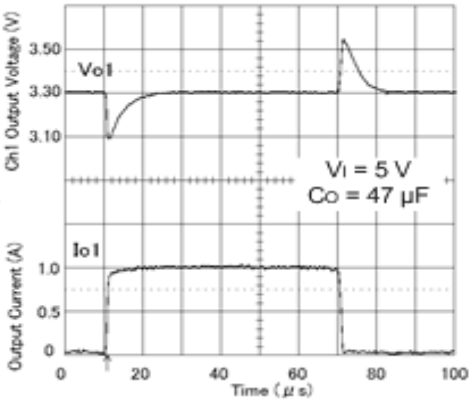

■ Chan. 1 Line Regulation




■ Chan. 1 Load Regulation




■ Chan. 1 Transient Response



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115 Northeast Cutoff, Box 15036
Worcester, Massachusetts 01615-0036
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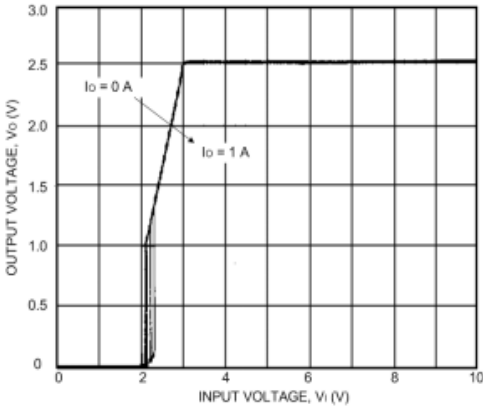
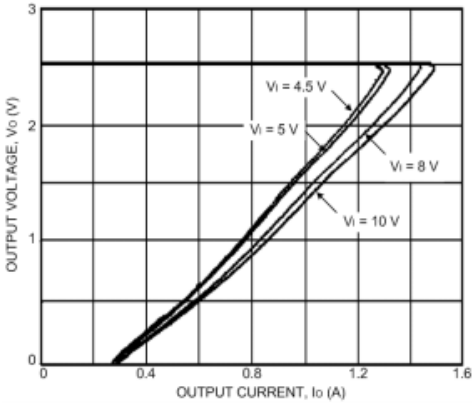
## TYPICAL CHARACTERISTICS (cont.)

($V_I$ = 5.0 V, $T_A$ = 25°C)

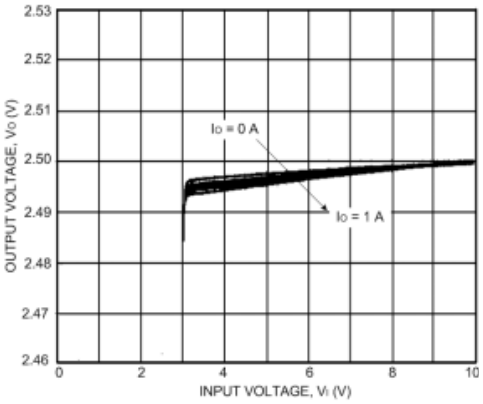
■ Chan. 2 Low-Voltage Behavior



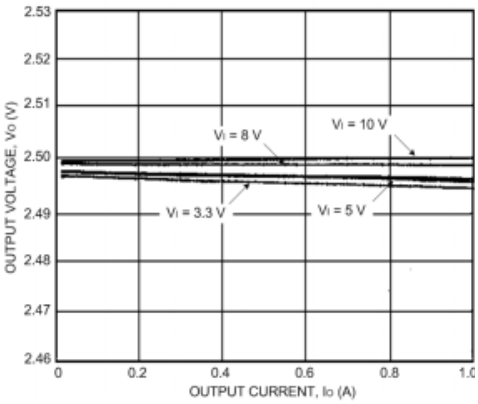

■ Chan. 2 Overcurrent Protection



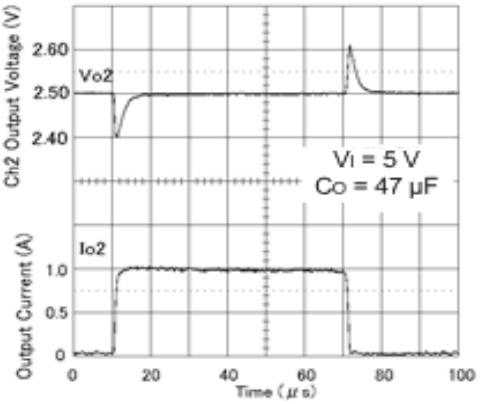

■ Chan. 2 Line Regulation



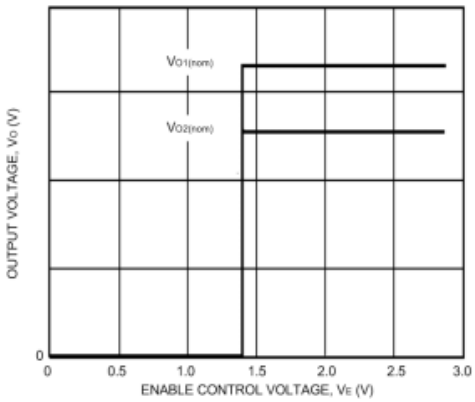

■ Chan. 2 Load Regulation



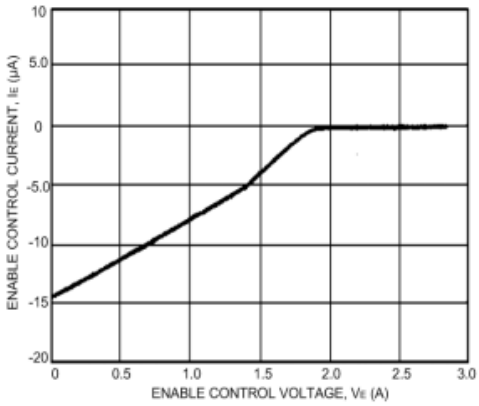

■ Chan. 2 Transient Response



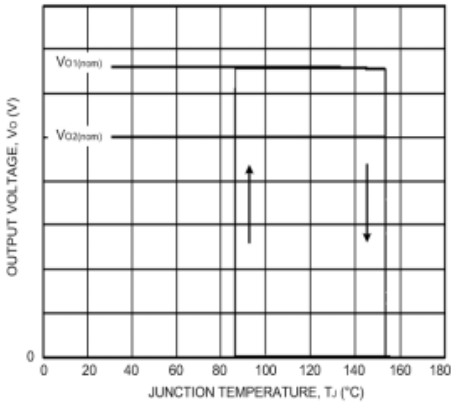

■ ENABLE Control Voltage




■ ENABLE Control Current




■ Thermal Protection



## APPLICATIONS INFORMATION

**Input Capacitor** ($C_I$, 0.1 ~ 10 µF). This is necessary either when the input line includes inductance or when the wiring is long.

**Output Capacitor** ($C_O$, >22 µF). This device is not designed for a use with a very low ESR output capacitor such as a ceramic capacitor. Output oscillation may occur with that kind of capacitor.

**ENABLE Input.** The ENABLE (control) input features an internal pull-up resistor. Leaving this input open causes the output to turn on.

**Parallel Operation.** Parallel operation to increase load current is not permitted.

**Determination of DC Input Voltage.** The minimum input voltage $V_I$(min) should be higher than the sum of the fixed output voltage and the maximum rated dropout voltage.

**Overcurrent Protection.** The SI-3000KWF series has a built-in fold-back type overcurrent protection circuit, which limits the output current at a start-up mode. It thus cannot be used in applications that require current at the start-up mode such as:
(1) constant-current load,
(2) power supply with positive and negative outputs to common load (a center-tap type power supply), or
(3) raising the output voltage by putting a diode or a resistor between the device ground and system ground.

**Thermal Protection.** Circuitry turns off the pass transistor when the junction temperature rises above 135°C. It is intended only to protect the device from failures due to excessive junction temperatures and should not imply that output short circuits or continuous overloads are permitted.

**Heat Radiation and Reliability.** The reliability of the IC is directly related to the junction temperature ($T_J$) in its operation. Accordingly, careful consideration should be given to heat dissipation.

The inner frame on which the integrated circuit is mounted is connected to the GND terminal (pin 3). Therefore, it is very effective for heat radiation to enlarge the copper area that is connected to the GND terminal. The graph on page 2 illustrates the effect of thermal resistance on the allowable package power dissipation.

The junction temperature ($T_J$) can be determined from either of the following equations:

$$T_J = (P_D \times R_{\theta JA}) + T_A$$

or

$$T_J = (P_D \times R_{\theta JC}) + T_C$$

where $P_D = I_{O1}(V_I - V_{O1}) + I_{O2}(V_I - V_{O2})$ and
$R_{\theta JC} = 7°C/W$.



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115 Northeast Cutoff, Box 15036
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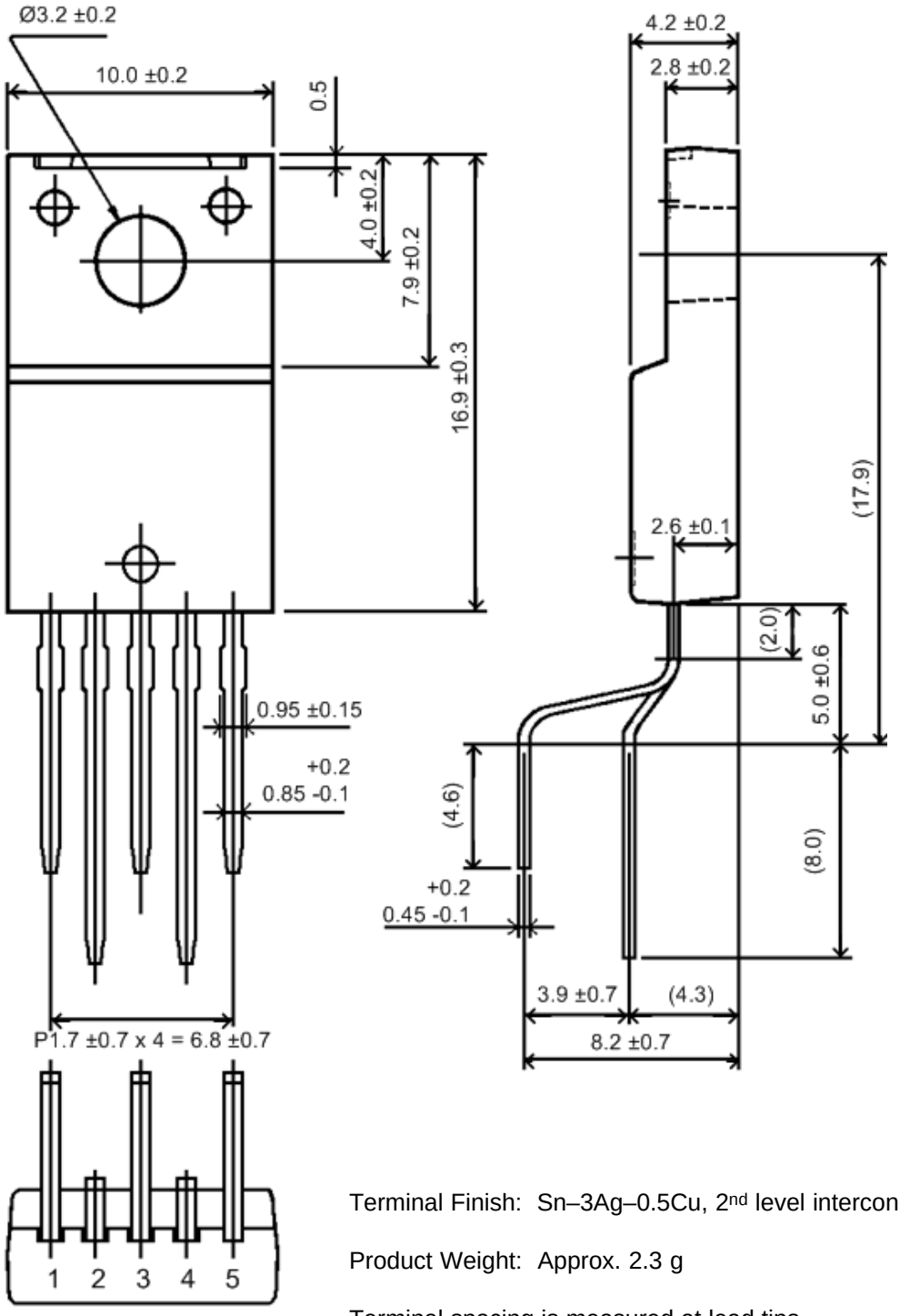
## Dimensions in Millimeters




Terminal Finish: Sn–3Ag–0.5Cu, 2nd level interconnect category (e1)

Product Weight: Approx. 2.3 g

Terminal spacing is measured at lead tips.