

**HIGH ISOLATION VOLTAGE  
SINGLE TRANSISTOR TYPE  
MULTI PHOTOCOUPLER SERIES**

-NEPOC™ Series-

**DESCRIPTION**

The PS2501-1, -2, -4 and PS2501L-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2501-1, -2, -4 are in a plastic DIP (Dual In-line Package) and the PS2501L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

**FEATURES**

- High isolation voltage ( $BV = 5\,000\text{ V r.m.s.}$ )
- High collector to emitter voltage ( $V_{CEO} = 80\text{ V}$ )
- High-speed switching ( $t_r = 3\text{ }\mu\text{s TYP.}$ ,  $t_f = 5\text{ }\mu\text{s TYP.}$ )
- Ordering number of taping product: PS2501L-1-E3, E4, F3, F4, PS2501L-2-E3, E4
- UL approved: File No. E72422 (S)

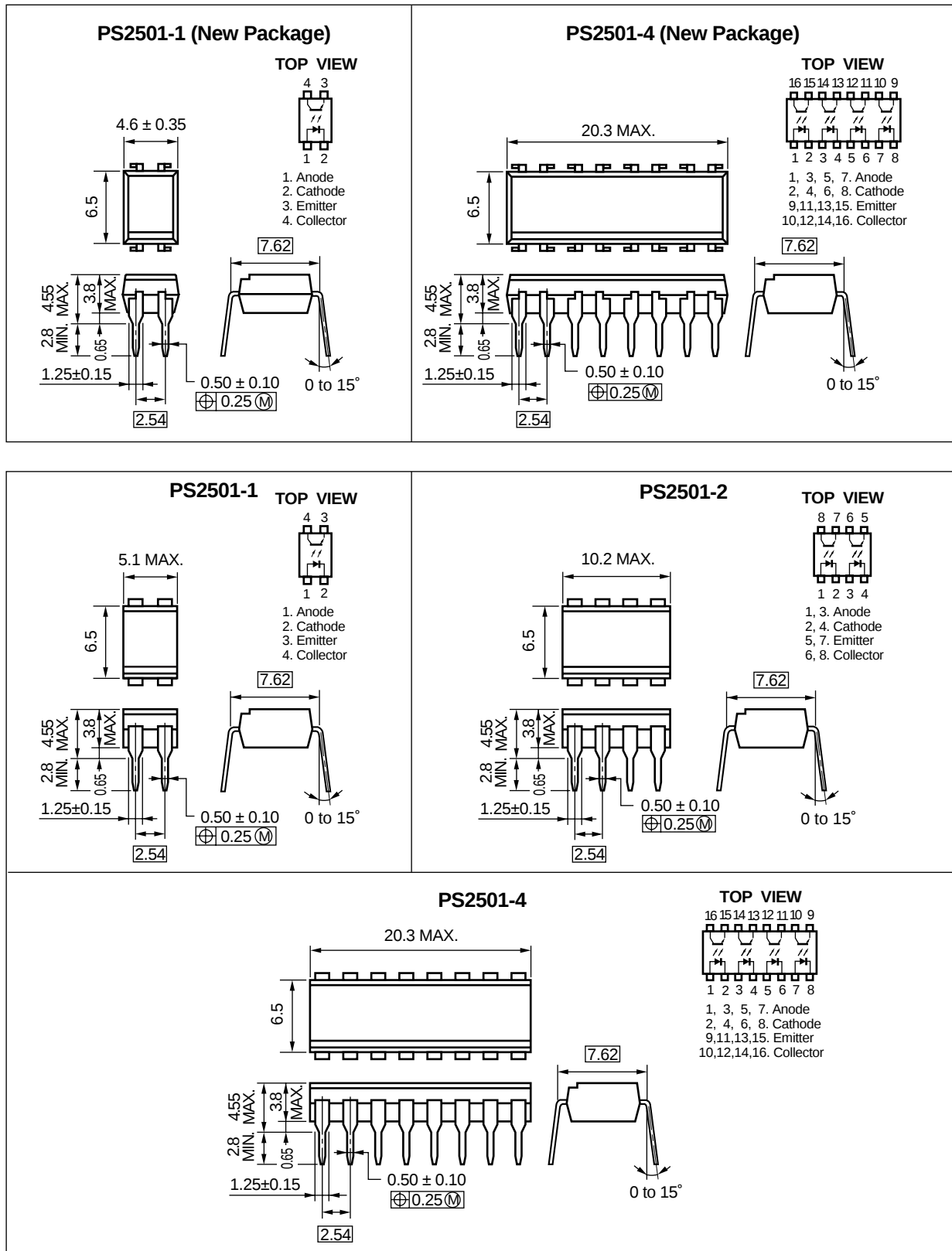
**APPLICATIONS**

- Power supply
- Telephone/FAX.
- FA/OA equipment
- Programmable logic controller

The information in this document is subject to change without notice.

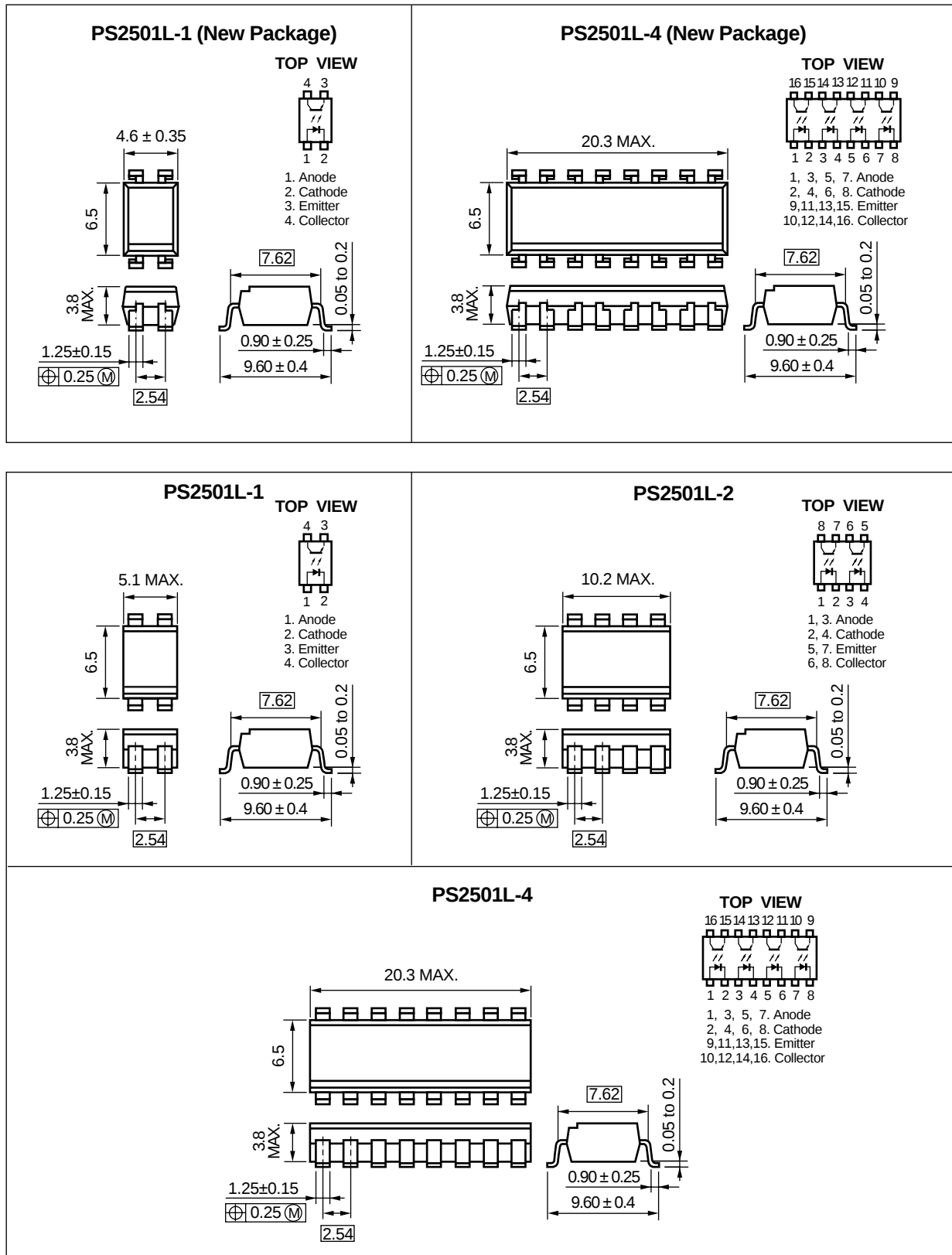
★ PACKAGE DIMENSIONS (in millimeters)

DIP Type



Caution New package 1-ch, 4-ch only

Lead Bending Type



Caution New package 1-ch, 4-ch only

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise specified)**

| Parameter                       |                                    | Symbol              | Ratings                |                             | Unit    |
|---------------------------------|------------------------------------|---------------------|------------------------|-----------------------------|---------|
|                                 |                                    |                     | PS2501-1,<br>PS2501L-1 | PS2501-2,-4<br>PS2501L-2,-4 |         |
| Diode                           | Reverse Voltage                    | V <sub>R</sub>      | 6                      |                             | V       |
|                                 | Forward Current (DC)               | I <sub>F</sub>      | 80                     |                             | mA      |
|                                 | Power Dissipation Derating         | ΔP <sub>D</sub> /°C | 1.5                    | 1.2                         | mW/°C   |
|                                 | Power Dissipation                  | P <sub>D</sub>      | 150                    | 120                         | mW/ch   |
|                                 | Peak Forward Current <sup>*1</sup> | I <sub>FP</sub>     | 1                      |                             | A       |
| Transistor                      | Collector to Emitter Voltage       | V <sub>CEO</sub>    | 80                     |                             | V       |
|                                 | Emitter to Collector Voltage       | V <sub>ECO</sub>    | 7                      |                             | V       |
|                                 | Collector Current                  | I <sub>C</sub>      | 50                     |                             | mA/ch   |
|                                 | Power Dissipation Derating         | ΔP <sub>C</sub> /°C | 1.5                    | 1.2                         | mW/°C   |
|                                 | Power Dissipation                  | P <sub>C</sub>      | 150                    | 120                         | mW/ch   |
| Isolation Voltage <sup>*2</sup> |                                    | BV                  | 5 000                  |                             | Vr.m.s. |
| Operating Ambient Temperature   |                                    | T <sub>A</sub>      | -55 to +100            |                             | °C      |
| Storage Temperature             |                                    | T <sub>stg</sub>    | -55 to +150            |                             | °C      |

<sup>\*1</sup> PW = 100 μs, Duty Cycle = 1 %

<sup>\*2</sup> AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input and output

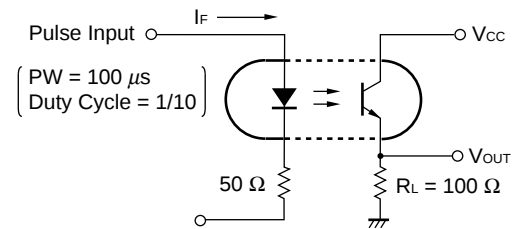
ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

| Parameter  |                                                                        | Symbol               | Conditions                                                            | MIN.             | TYP. | MAX. | Unit |
|------------|------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------|------------------|------|------|------|
| Diode      | Forward Voltage                                                        | V <sub>F</sub>       | I <sub>F</sub> = 10 mA                                                |                  | 1.17 | 1.4  | V    |
|            | Reverse Current                                                        | I <sub>R</sub>       | V <sub>R</sub> = 5 V                                                  |                  |      | 5    | μA   |
|            | Terminal Capacitance                                                   | C <sub>t</sub>       | V = 0 V, f = 1.0 MHz                                                  |                  | 50   |      | pF   |
| Transistor | Collector to Emitter Dark Current                                      | I <sub>CEO</sub>     | V <sub>CE</sub> = 80 V, I <sub>F</sub> = 0 mA                         |                  |      | 100  | nA   |
| Coupled    | Current Transfer Ratio (I <sub>c</sub> /I <sub>F</sub> ) <sup>*1</sup> | CTR                  | I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V                          | 80               | 300  | 600  | %    |
|            | Collector Saturation Voltage                                           | V <sub>CE(sat)</sub> | I <sub>F</sub> = 10 mA, I <sub>c</sub> = 2 mA                         |                  |      | 0.3  | V    |
|            | Isolation Resistance                                                   | R <sub>I-O</sub>     | V <sub>I-O</sub> = 1.0 kV <sub>DC</sub>                               | 10 <sup>11</sup> |      |      | Ω    |
|            | Isolation Capacitance                                                  | C <sub>I-O</sub>     | V = 0 V, f = 1.0 MHz                                                  |                  | 0.5  |      | pF   |
|            | Rise Time <sup>*2</sup>                                                | t <sub>r</sub>       | V <sub>CC</sub> = 10 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω |                  | 3    |      | μs   |
|            | Fall Time <sup>*2</sup>                                                | t <sub>f</sub>       |                                                                       |                  | 5    |      |      |

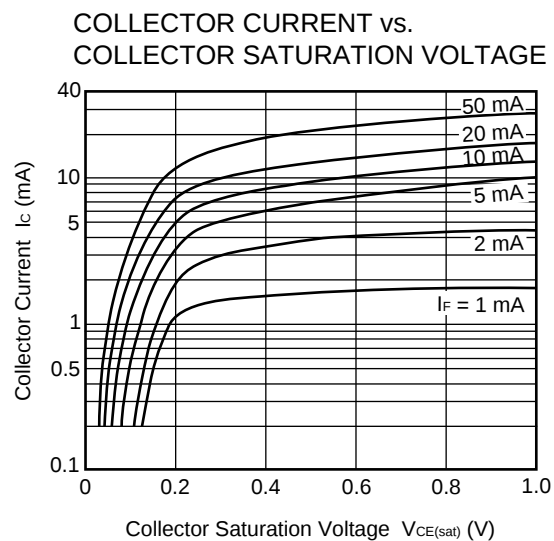
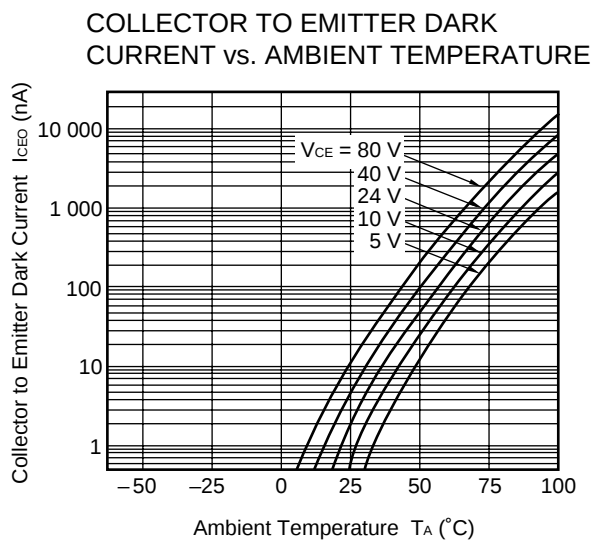
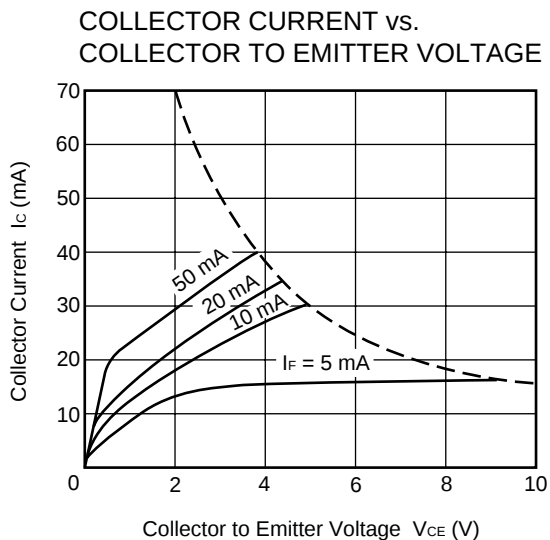
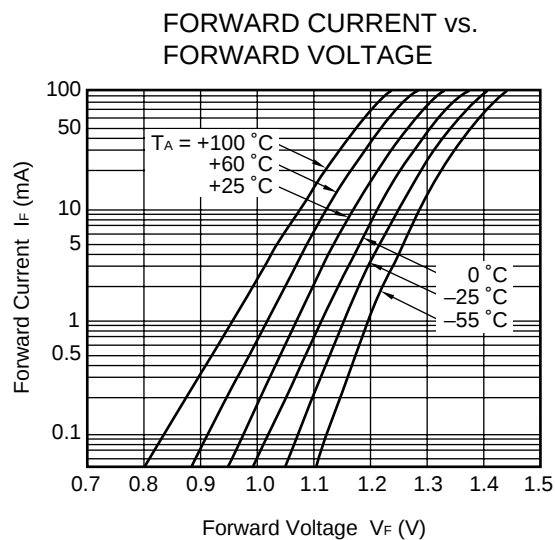
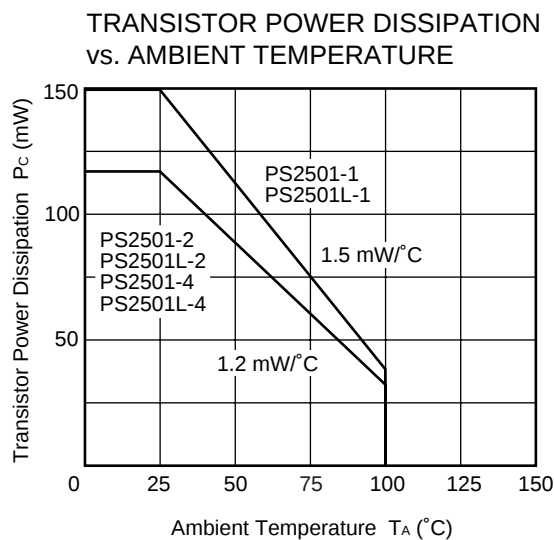
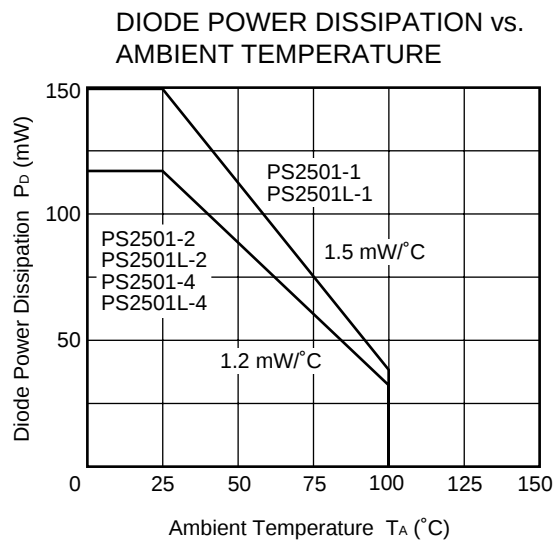
\*1 CTR rank ( \* : only PS2501-1, PS2501L-1)

- K\* : 300 to 600 (%)
- L\* : 200 to 400 (%)
- M\* : 80 to 240 (%)
- D\* : 100 to 300 (%)
- H\* : 80 to 160 (%)
- W\* : 130 to 260 (%)
- Q\* : 100 to 200 (%)
- N : 80 to 600 (%)

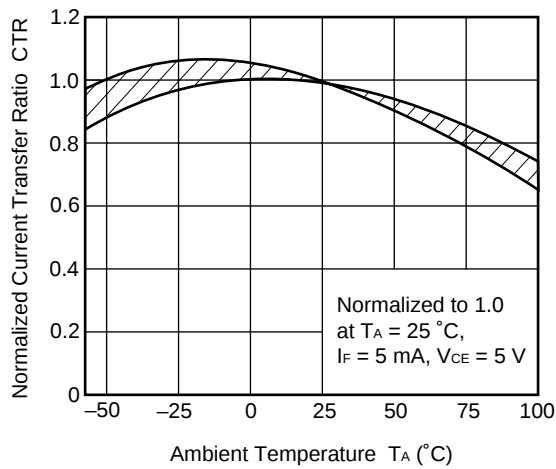
\*2 Test circuit for switching time



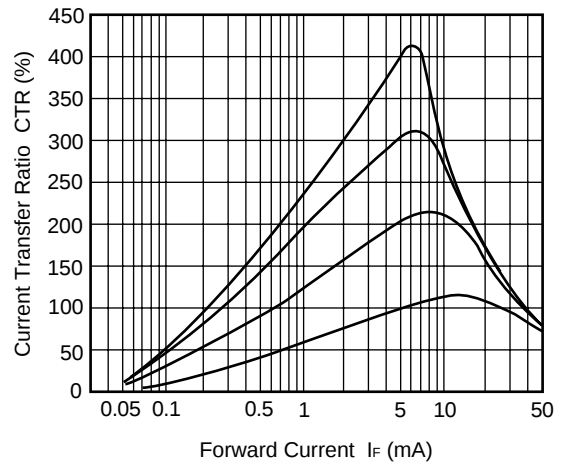
★ TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)



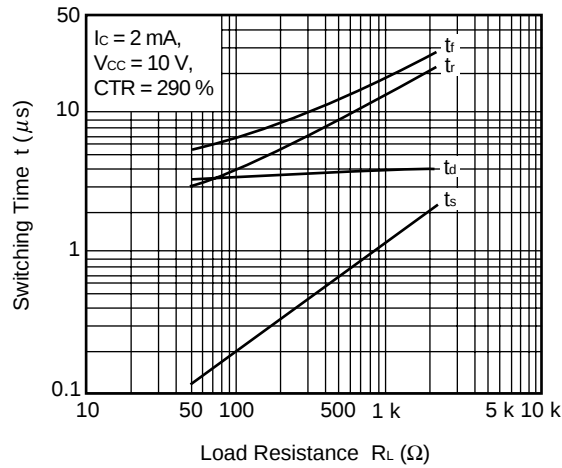
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



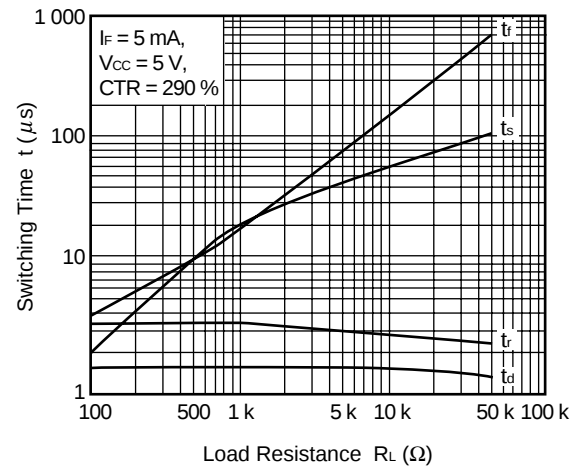
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



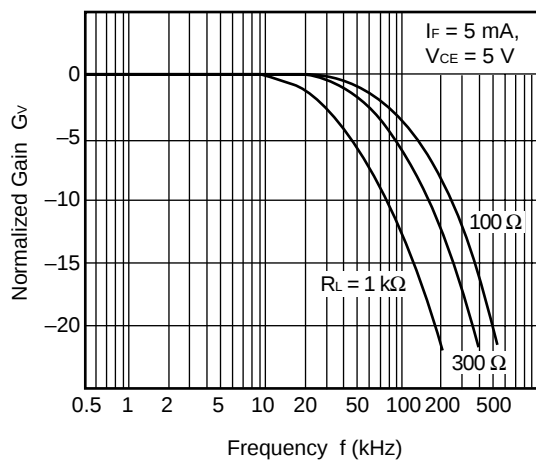
SWITCHING TIME vs. LOAD RESISTANCE



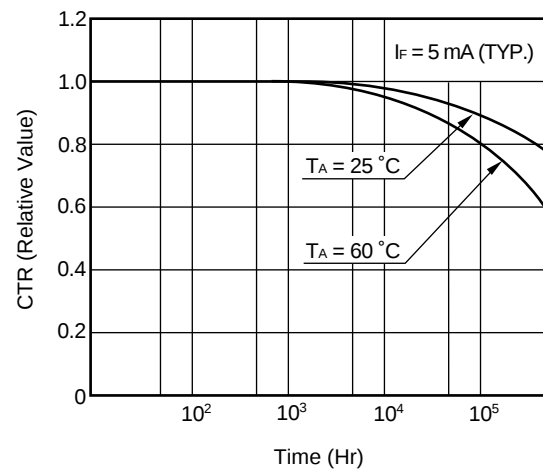
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



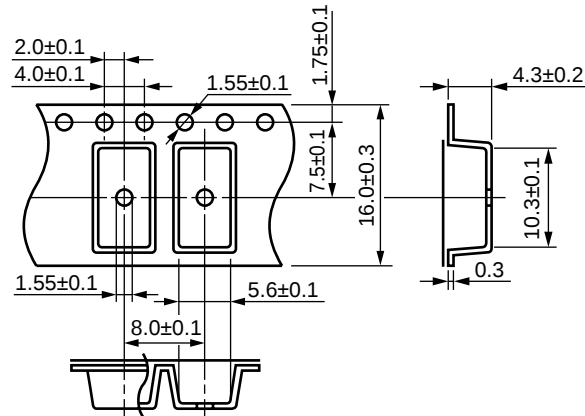
LONG TERM CTR DEGRADATION



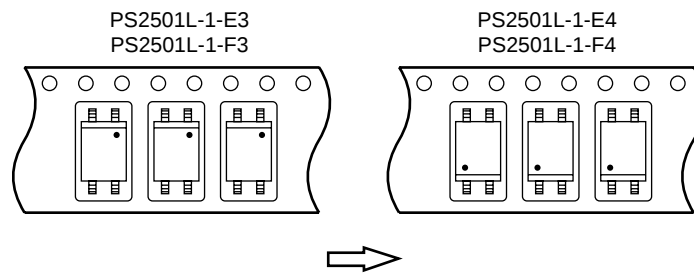
**Remark** The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (in millimeters)

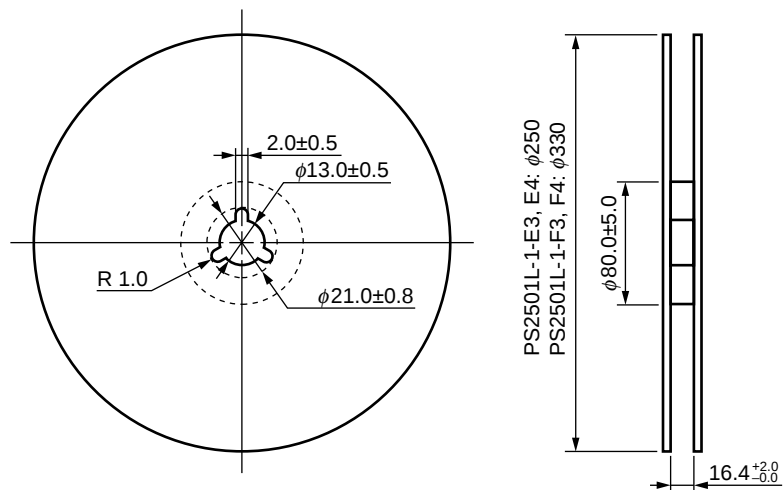
Outline and Dimensions (Tape)



Tape Direction

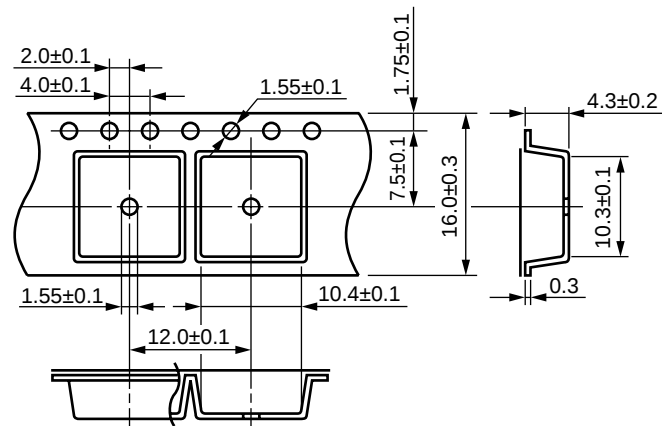


Outline and Dimensions (Reel)

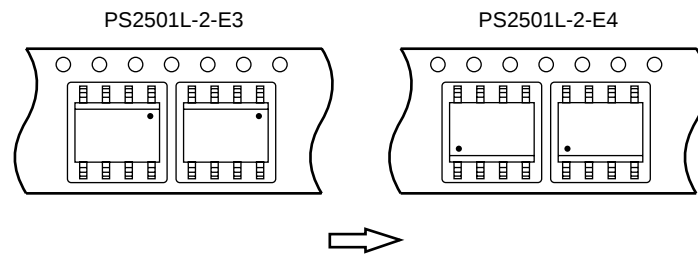


Packing: PS2501L-1-E3, E4 1 000 pcs/reel  
PS2501L-1-F3, F4 2 000 pcs/reel

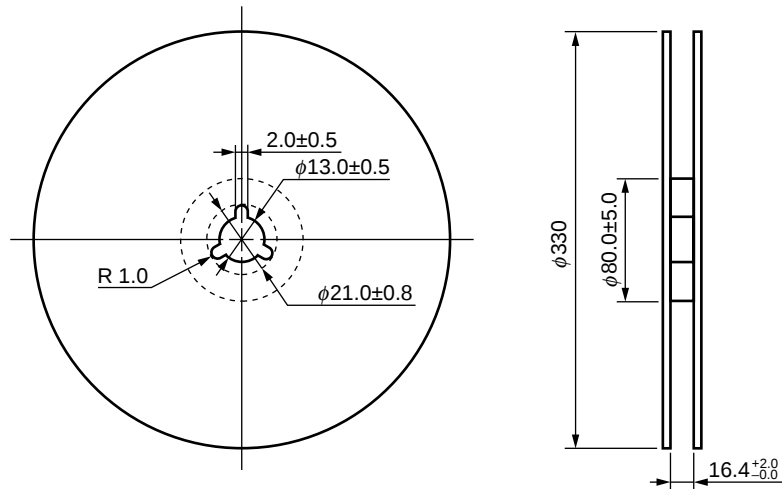
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



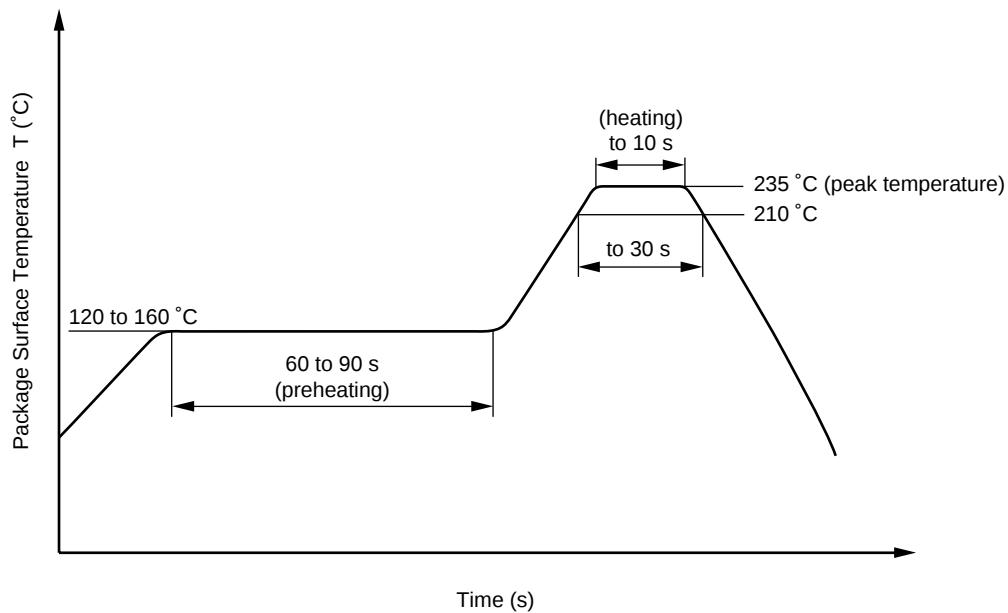
Packing: 1 000 pcs/reel

★ **RECOMMENDED SOLDERING CONDITIONS**

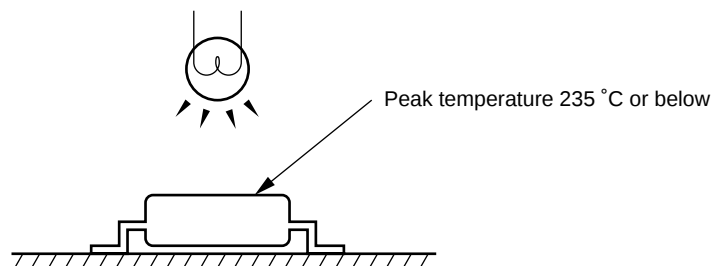
**(1) Infrared reflow soldering**

- Peak reflow temperature 235 °C (package surface temperature)
- Time of temperature higher than 210 °C 30 seconds or less
- Number of reflows Three
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

Recommended Temperature Profile of Infrared Reflow



**Caution** Avoid removing the residual flux with chlorine-based cleaning solvent after a reflow process.



**(2) Dip soldering**

- Temperature 260 °C or below (molten solder temperature)
- Time 10 seconds or less
- Number of times One
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

[MEMO]

**CAUTION**

**Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.**

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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.