



# PHOTOCOUPLER PS2801C-1, PS2801C-4

## HIGH ISOLATION VOLTAGE SSOP PHOTOCOUPLER

–NEPOC Series–

### DESCRIPTION

The PS2801C-1 and PS2801C-4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor in a plastic SSOP for high density applications to realize an excellent cost performance.

This package has shield effect to cut off ambient light.

### FEATURES

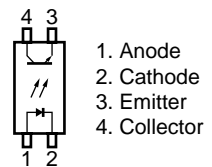
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Small and thin package (4, 16-pin SSOP, Pin pitch 1.27 mm)
- $V_{CE0}$  : 80 V
- Ordering number of tape product: PS2801C-1-F3, F4, PS2801C-4-F3, F4
- Pb-Free product
- Safety standards
  - UL approved: File No. E72422
  - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

### APPLICATIONS

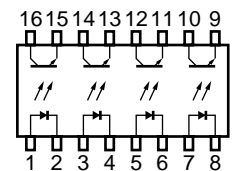
- Programmable logic controllers
- Measuring instruments
- Power supply
- Hybrid IC

### PIN CONNECTION (Top View)

#### PS2801C-1

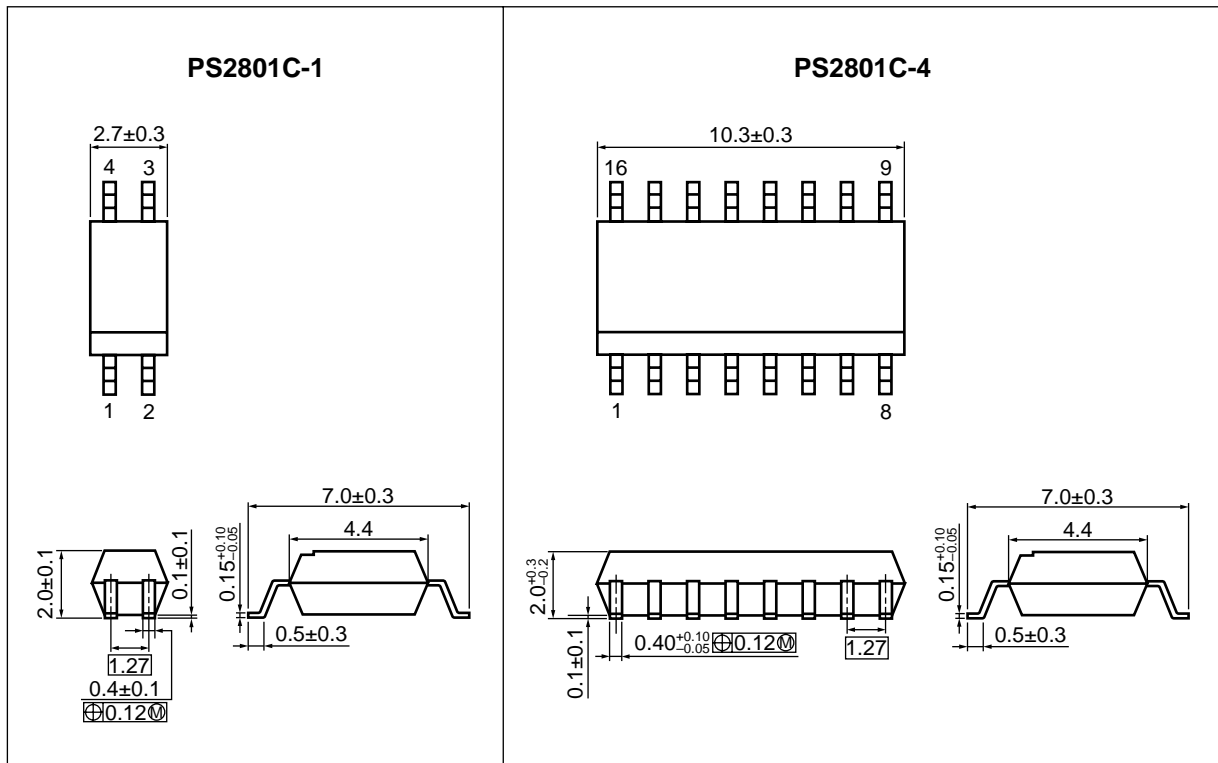


#### PS2801C-4

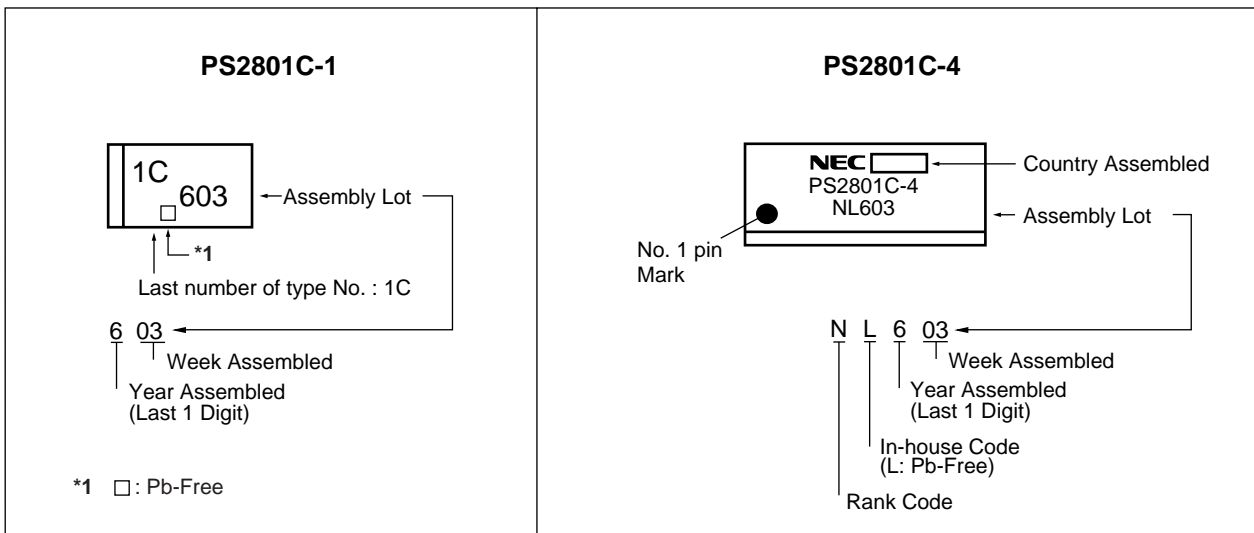


The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

PACKAGE DIMENSIONS (UNIT: mm)



MARKING EXAMPLE



**ORDERING INFORMATION**

| Part Number    | Order Number     | Solder Plating Specification | Packing Style                | Safety Standard Approval                                | Application Part Number <sup>*1</sup> |
|----------------|------------------|------------------------------|------------------------------|---|---------------------------------------|
| PS2801C-1      | PS2801C-1-A      | Pb-Free                      | 50 pcs (Tape 50 pcs cut)     | Standard products<br>(UL approved)                      | PS2801C-1                             |
| PS2801C-1-F3   | PS2801C-1-F3-A   |                              | Embossed Tape 3 500 pcs/reel |   |                                       |
| PS2801C-1-F4   | PS2801C-1-F4-A   |                              |                              |   |                                       |
| PS2801C-4      | PS2801C-4-A      |                              | Magazine Case 45 pcs         |   | PS2801C-4                             |
| PS2801C-4-F3   | PS2801C-4-F3-A   |                              | Embossed Tape 2 500 pcs/reel |   |                                       |
| PS2801C-4-F4   | PS2801C-4-F4-A   |                              |                              |   |                                       |
| PS2801C-1-V    | PS2801C-1-V-A    |                              | 50 pcs (Tape 50 pcs cut)     | DIN EN60747-5-2<br>(VDE0884 Part2)<br>Approved (Option) | PS2801C-1                             |
| PS2801C-1-V-F3 | PS2801C-1-V-F3-A |                              | Embossed Tape 3 500 pcs/reel |   |                                       |
| PS2801C-1-V-F4 | PS2801C-1-V-F4-A |                              |                              |   |                                       |
| PS2801C-4-V    | PS2801C-4-V-A    |                              | Magazine Case 45 pcs         |   | PS2801C-4                             |
| PS2801C-4-V-F3 | PS2801C-4-V-F3-A |                              | Embossed Tape 2 500 pcs/reel |   |                                       |
| PS2801C-4-V-F4 | PS2801C-4-V-F4-A |                              |                              |   |                                       |

\*1 For the application of the Safety Standard, following part number should be used.

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

| Parameter                     |                              | Symbol              | Ratings     |           | Unit    |
|-------------------------------|------------------------------|---------------------|-------------|-----------|---------|
|                               |                              |                     | PS2801C-1   | PS2801C-4 |         |
| Diode                         | Forward Current (DC)         | I <sub>F</sub>      | 30          |           | mA/ch   |
|                               | Reverse Voltage              | V <sub>R</sub>      | 6           |           | V       |
|                               | Power Dissipation Derating   | ΔP <sub>D</sub> /°C | 0.6         | 0.8       | mW/°C   |
|                               | Power Dissipation            | P <sub>D</sub>      | 60          | 80        | mW/ch   |
|                               | Peak Forward Current *1      | I <sub>FP</sub>     | 0.5         |           | A/ch    |
| Transistor                    | Collector to Emitter Voltage | V <sub>CEO</sub>    | 80          |           | V       |
|                               | Emitter to Collector Voltage | V <sub>ECO</sub>    | 5           |           | V       |
|                               | Collector Current            | I <sub>C</sub>      | 30          |           | mA/ch   |
|                               | Power Dissipation Derating   | ΔP <sub>C</sub> /°C | 1.2         |           | mW/°C   |
|                               | Power Dissipation            | P <sub>C</sub>      | 120         |           | mW/ch   |
| Isolation Voltage *2          |                              | BV                  | 2 500       |           | Vr.m.s. |
| Operating Ambient Temperature |                              | T <sub>A</sub>      | -55 to +100 |           | °C      |
| Storage Temperature           |                              | T <sub>stg</sub>    | -55 to +150 |           | °C      |

\*1 PW = 100 μs, Duty Cycle = 1%

\*2 AC voltage for 1 minute at T<sub>A</sub> = 25°C, RH = 60% between input and output  
 Pins 1-2 shorted together, 3-4 shorted together (PS2801C-1).  
 Pins 1-8 shorted together, 9-16 shorted together (PS2801C-4).

**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> = 5 mA  |                  | 1.2  | 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   |                  | 10   |      | 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                         | 50               |      | 400  | %    |
|            | Collector Saturation Voltage   | V <sub>CE(sat)</sub> | I <sub>F</sub> = 10 mA, I <sub>c</sub> = 2 mA                        |                  | 0.13 | 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   |                  | 0.4  |      | pF   |
|            | Rise Time <sup>*2</sup>  | t <sub>r</sub>       | V <sub>CC</sub> = 5 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω |                  | 5    |      | μs   |
|            | Fall Time <sup>*2</sup>  | t <sub>f</sub>       |  |                  | 7    |      |      |

**\*1 CTR rank**

PS2801C-1

N : 50 to 400 (%)

P : 150 to 300 (%)

L : 100 to 300 (%)

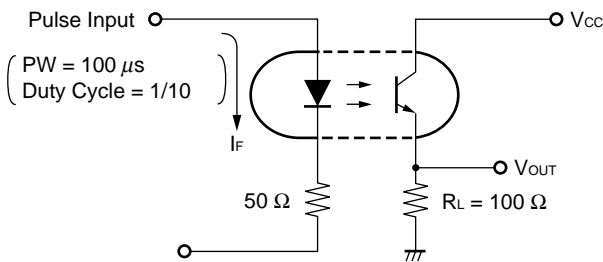
M : 100 to 400 (%)

PS2801C-4

N : 50 to 400 (%)

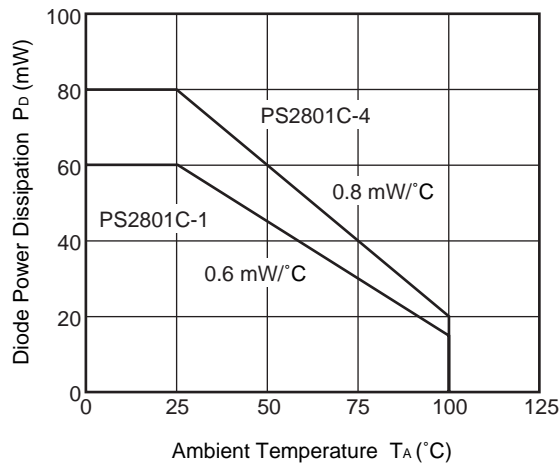
M : 100 to 400 (%)

**\*2 Test circuit for switching time**

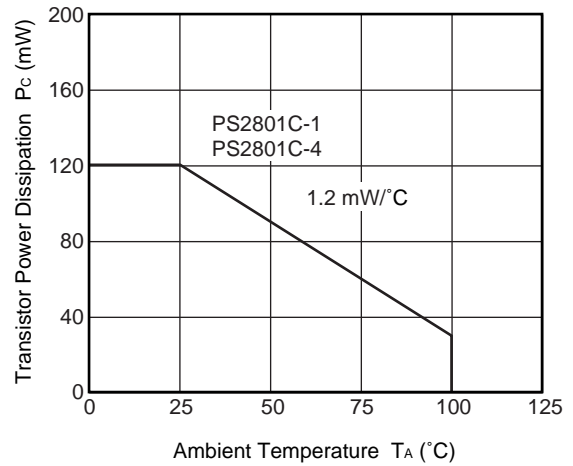


**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)**

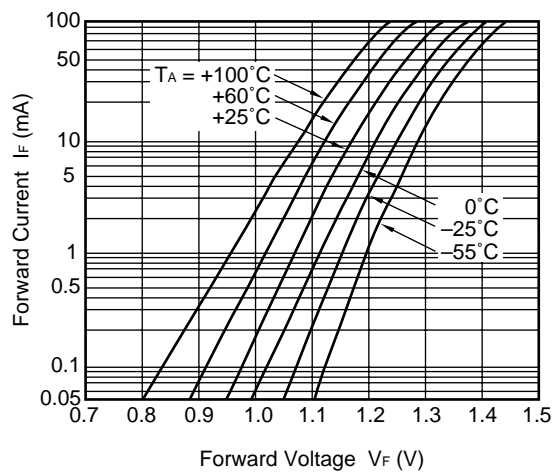
**DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE**



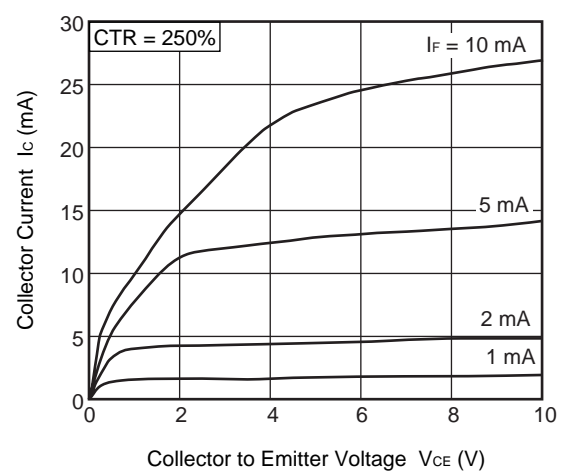
**TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE**



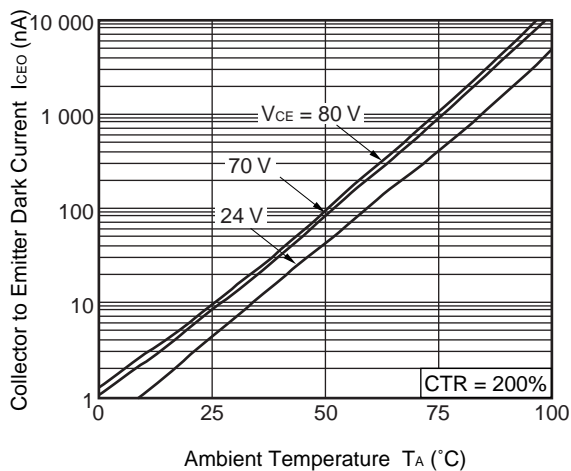
**FORWARD CURRENT vs. FORWARD VOLTAGE**



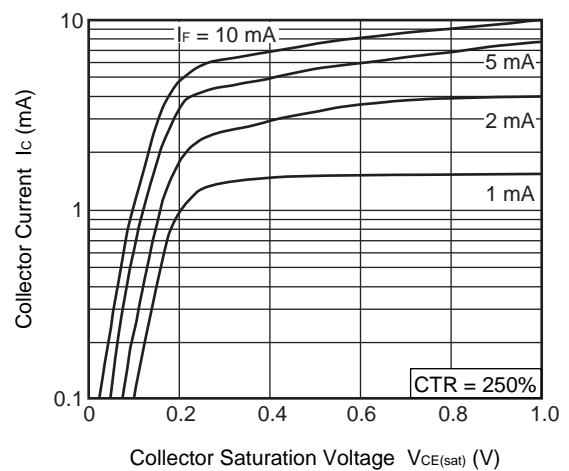
**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



**COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE**

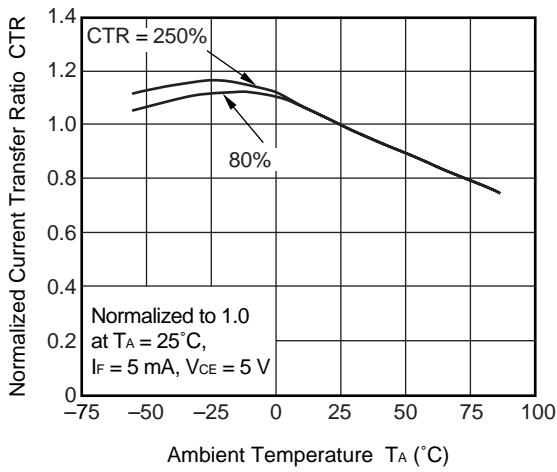


**COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE**

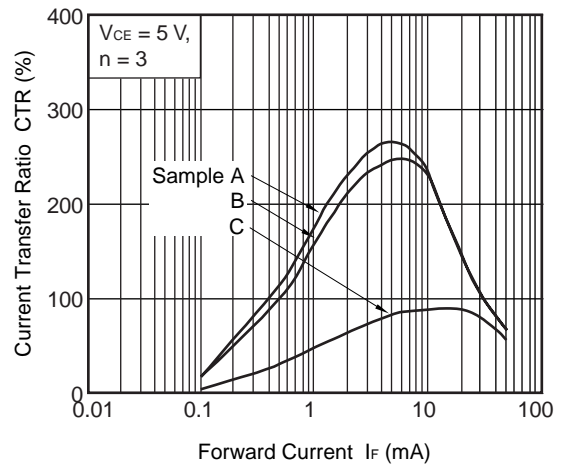


**Remark** The graphs indicate nominal characteristics.

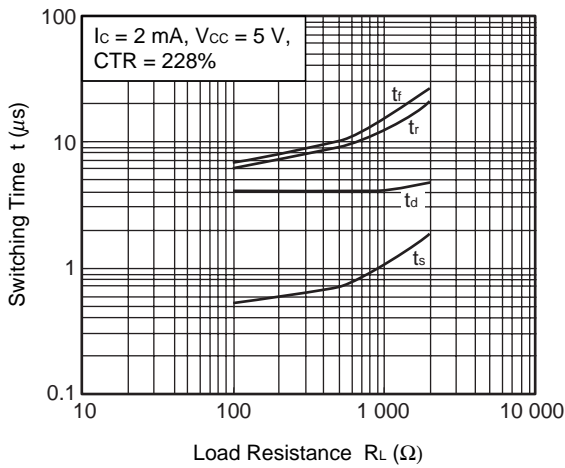
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



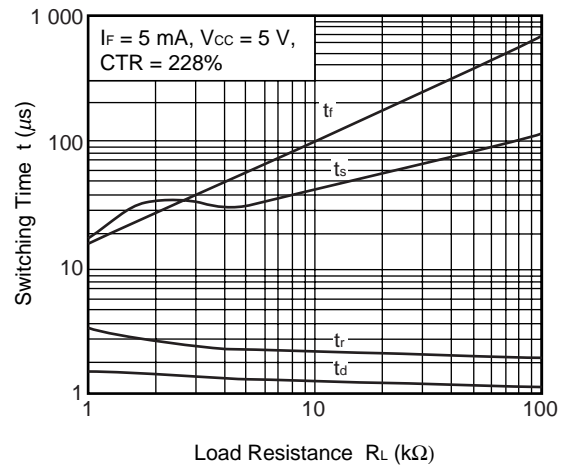
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



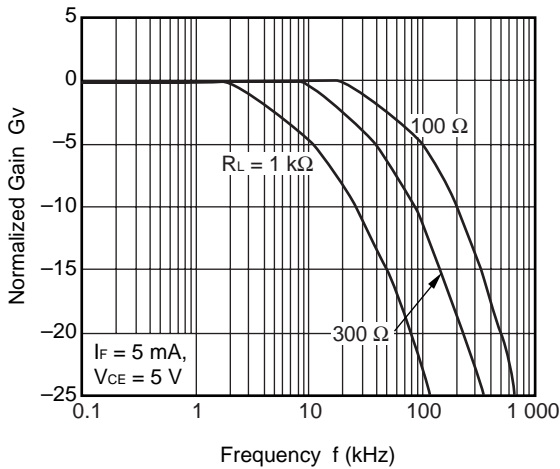
SWITCHING TIME vs. LOAD RESISTANCE



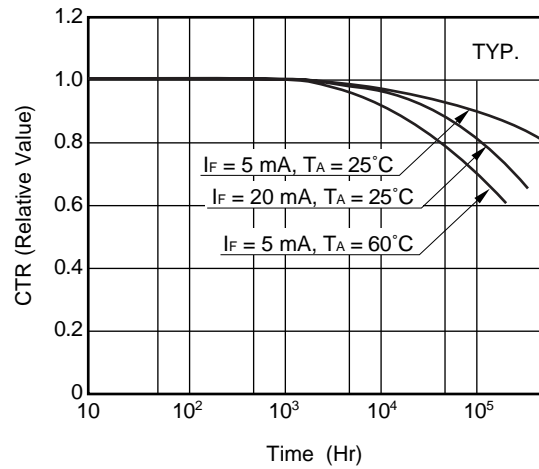
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



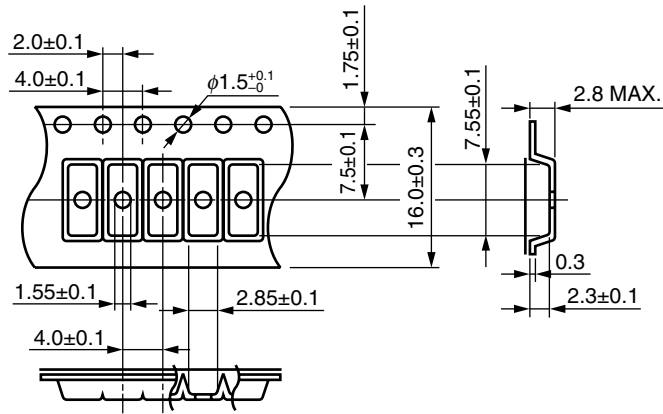
LONG TERM CTR DEGRADATION



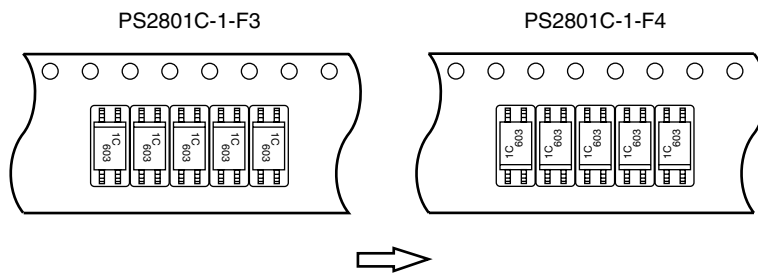
**Remark** The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

Outline and Dimensions (Tape)



Tape Direction

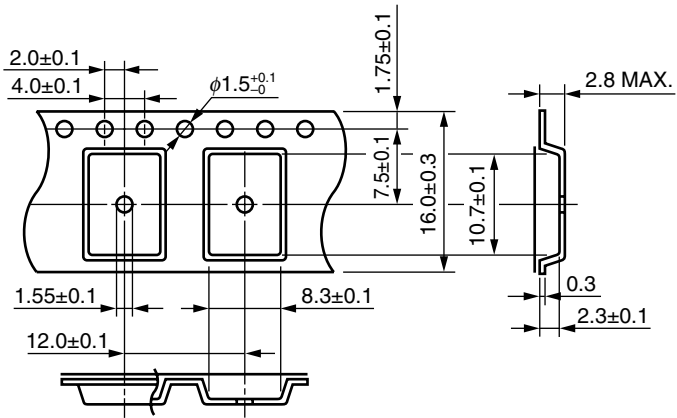


Outline and Dimensions (Reel)

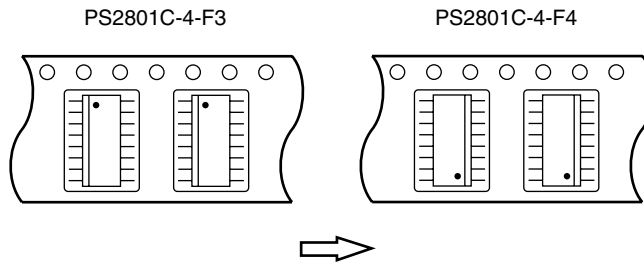




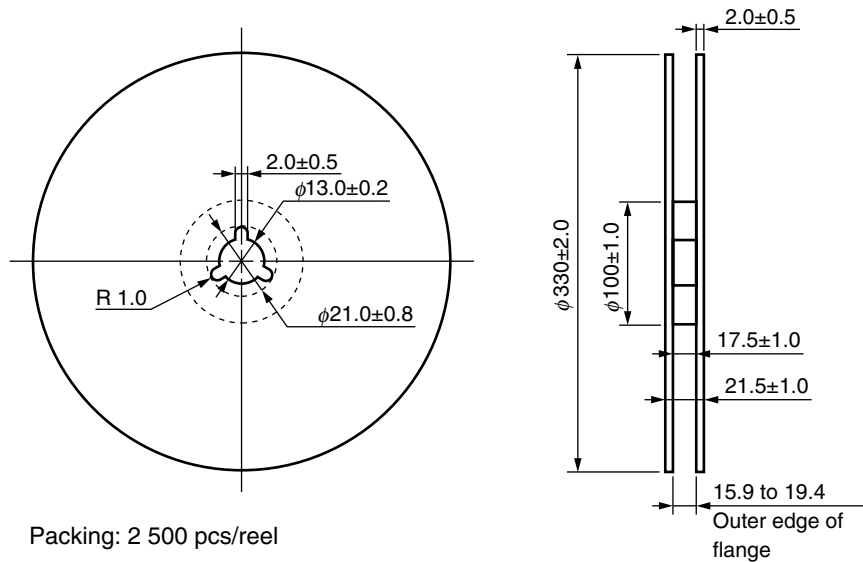
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



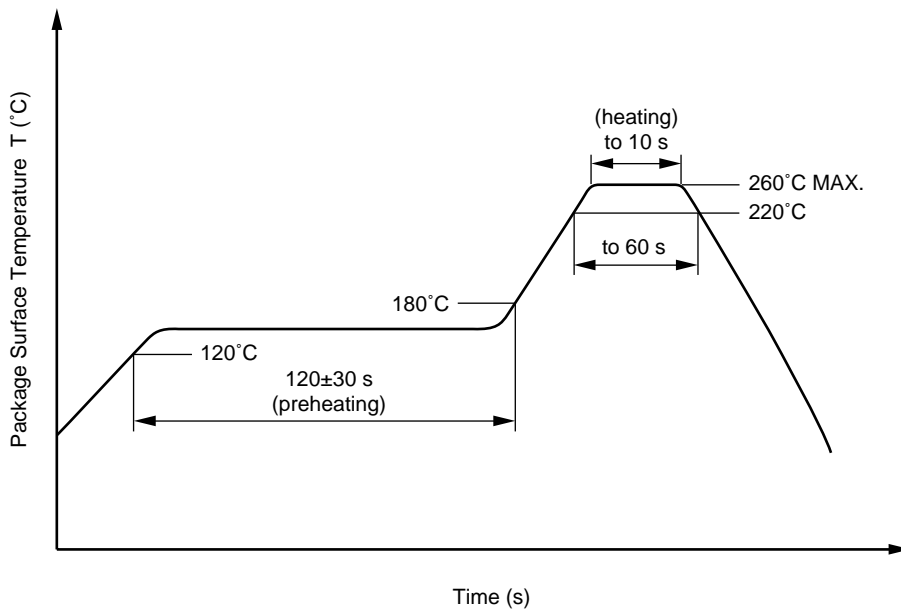
**NOTES ON HANDLING**

**1. Recommended soldering conditions**

**(1) Infrared reflow soldering**

- Peak reflow temperature 260°C or below (package surface temperature)
- Time of peak reflow temperature 10 seconds or less
- Time of temperature higher than 220°C 60 seconds or less
- Time to preheat temperature from 120 to 180°C 120±30 s
- 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



**(2) Wave soldering**

- Temperature 260°C or below (molten solder temperature)
- Time 10 seconds or less
- Preheating conditions 120°C or below (package surface temperature)
- Number of times One (Allowed to be dipped in solder including plastic mold portion.)
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

**(3) Soldering by Soldering Iron**

- Peak Temperature (lead part temperature) 350°C or below
- Time (each pins) 3 seconds or less
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead

(b) Please be sure that the temperature of the package would not be heated over 100°C

**(4) Cautions**

- Fluxes

Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

**2. Cautions regarding noise**

Be aware that when voltage is applied suddenly between the photocoupler's input and output or between collector-emitters at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

**3. Measurement conditions of current transfer ratios (CTR), which differ according to photocoupler**

Check the setting values before use, since the forward current conditions at CTR measurement differ according to product.

When using products other than at the specified forward current, the characteristics curves may differ from the standard curves due to CTR value variations or the like. This tendency may sometimes be obvious, especially below  $I_F = 1$  mA.

Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

**USAGE CAUTIONS**

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

- **The information in this document is current as of May, 2006. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets or data books, etc., for the most up-to-date specifications of NEC Electronics products. Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.**
- No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Electronics. NEC Electronics assumes no responsibility for any errors that may appear in this document.
- NEC Electronics does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC Electronics products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Electronics or others.
- Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of a customer's equipment shall be done under the full responsibility of the customer. NEC Electronics assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
- While NEC Electronics endeavors to enhance the quality, reliability and safety of NEC Electronics products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC Electronics products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment and anti-failure features.
- NEC Electronics products are classified into the following three quality grades: "Standard", "Special" and "Specific".

The "Specific" quality grade applies only to NEC Electronics products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of an NEC Electronics product depend on its quality grade, as indicated below. Customers must check the quality grade of each NEC Electronics product before using it in a particular application.

"Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots.

"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": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC Electronics products is "Standard" unless otherwise expressly specified in NEC Electronics data sheets or data books, etc. If customers wish to use NEC Electronics products in applications not intended by NEC Electronics, they must contact an NEC Electronics sales representative in advance to determine NEC Electronics' willingness to support a given application.

(Note)

(1) "NEC Electronics" as used in this statement means NEC Electronics Corporation and also includes its majority-owned subsidiaries.

(2) "NEC Electronics products" means any product developed or manufactured by or for NEC Electronics (as defined above).

|                       |                      |   |
|-----------------------|----------------------|---|
| <p><b>Caution</b></p> | <p>GaAs Products</p> | <p>This product uses gallium arsenide (GaAs).<br/>GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none"> <li>• Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.             <ol style="list-style-type: none"> <li>1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.</li> <li>2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.</li> </ol> </li> <li>• Do not burn, destroy, cut, crush, or chemically dissolve the product.</li> <li>• Do not lick the product or in any way allow it to enter the mouth.</li> </ul> |
|-----------------------|----------------------|---|

► For further information, please contact

**NEC Compound Semiconductor Devices Hong Kong Limited**

E-mail: [contact@ncsd-hk.necel.com](mailto:contact@ncsd-hk.necel.com)

Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309  
 Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859  
 Korea Branch Office TEL: +82-2-558-2120 FAX: +82-2-558-5209

**NEC Electronics (Europe) GmbH** <http://www.eu.necel.com/>

TEL: +49-211-6503-0 FAX: +49-211-6503-1327

**California Eastern Laboratories, Inc.** <http://www.cel.com/>

TEL: +1-408-988-3500 FAX: +1-408-988-0279

**Compound Semiconductor Devices Division**

**NEC Electronics Corporation**

URL: <http://www.ncsd.necel.com/>

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance per RoHS | Concentration Limit per RoHS (values are not yet fixed) | Concentration contained in CEL devices |     |
|-------------------------------|---|--|-----|
|                               |   | -A                                     | -AZ |
| Lead (Pb)                     | < 1000 PPM  | Not Detected                           | (*) |
| Mercury                       | < 1000 PPM  | Not Detected                           |     |
| Cadmium                       | < 100 PPM   | Not Detected                           |     |
| Hexavalent Chromium           | < 1000 PPM  | Not Detected                           |     |
| PBB                           | < 1000 PPM  | Not Detected                           |     |
| PBDE                          | < 1000 PPM  | Not Detected                           |     |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

Important Information and Disclaimer: Information provided by CEL on its website or in other communications concerning the substance content of its products represents knowledge and belief as of the date that it is provided. CEL bases its knowledge and belief on information provided by third parties and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. CEL has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. CEL and CEL suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall CEL’s liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.

See CEL Terms and Conditions for additional clarification of warranties and liability.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А