



PHOTOCOUPLER PS8302L, PS8302L2

**1 Mbps, HIGH CMR, ANALOG OUTPUT TYPE,
8 mm CREEPAGE 6-PIN SDIP PHOTOCOUPLER**

–NEPOC Series–

DESCRIPTION

The PS8302L and PS8302L2 are optical coupled isolators containing a GaAlAs LED on the input side and a PIN photodiode and a high-speed amplifier transistor on the output side on one chip.

The PS8302L and PS8302L2 are designed specifically for high supply voltage and high common mode transient immunity (CMR).

The PS8302L and PS8302L2 are in 6-pin plastic SDIP (Shrink Dual In-line Package). The PS8302L2 has 8 mm creepage distance and is half size of 8-pin DIP.

The PS8302L is lead bending type (Gull-wing) for surface mounting.

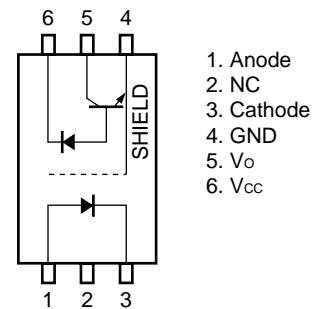
The PS8302L2 is lead bending type for long creepage distance (Gull-wing) for surface mount.

FEATURES

- High common mode transient immunity ($CM_H, CM_L = \pm 15 \text{ kV}/\mu\text{s MIN.}$)
- Half size of 8-pin DIP
- Long creepage distance (8 mm MIN. : PS8302L2)
- High supply voltage ($V_{CC} = 35 \text{ V}$)
- High isolation voltage ($BV = 5\,000 \text{ Vr.m.s.}$)
- High-speed response ($t_{PHL} = 0.8 \mu\text{s MAX.}, t_{PLH} = 0.8 \mu\text{s MAX.}$)
- Pb-Free product
- Safety standards
 - UL approved: No. E72422
 - CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
 - DIN EN60747-5-2 (VDE0884 Part2) approved: No. 40024069 (Option)

<R>

PIN CONNECTION
(Top View)



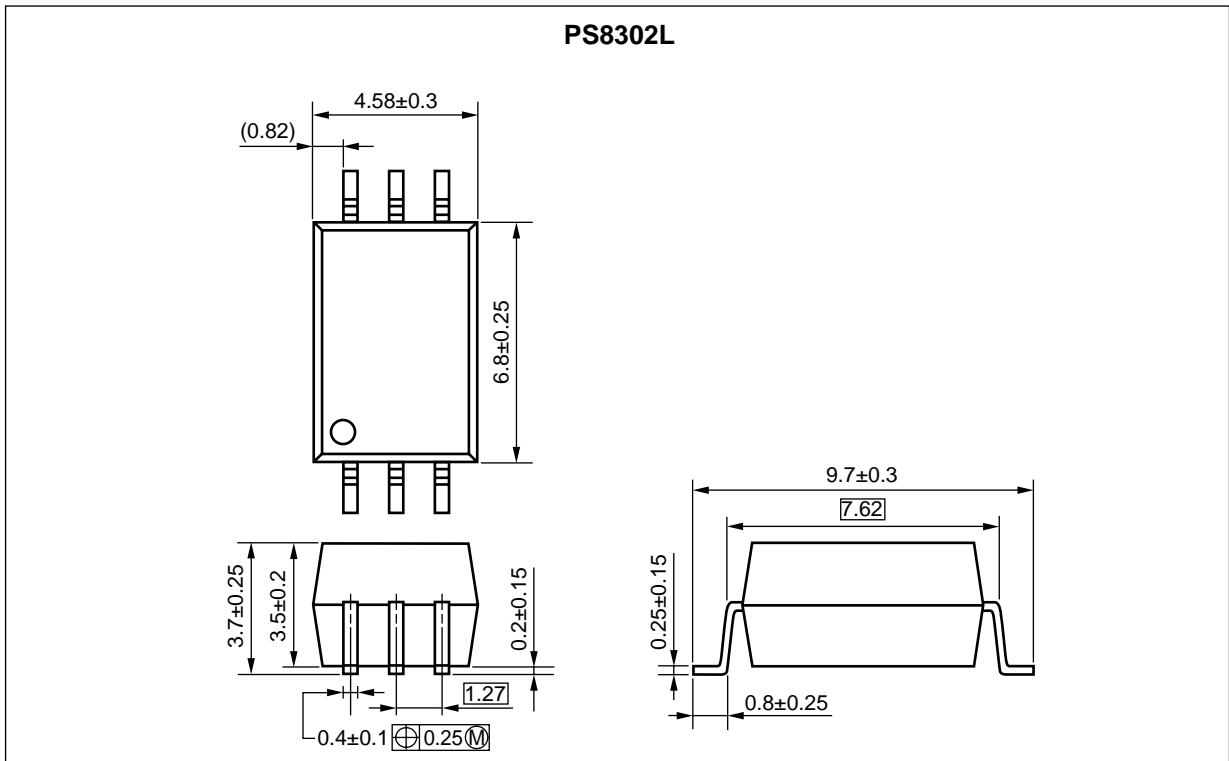
APPLICATIONS

- Computer and peripheral manufactures
- General purpose inverter
- Substitutions for relays and pulse transformers
- Power supply

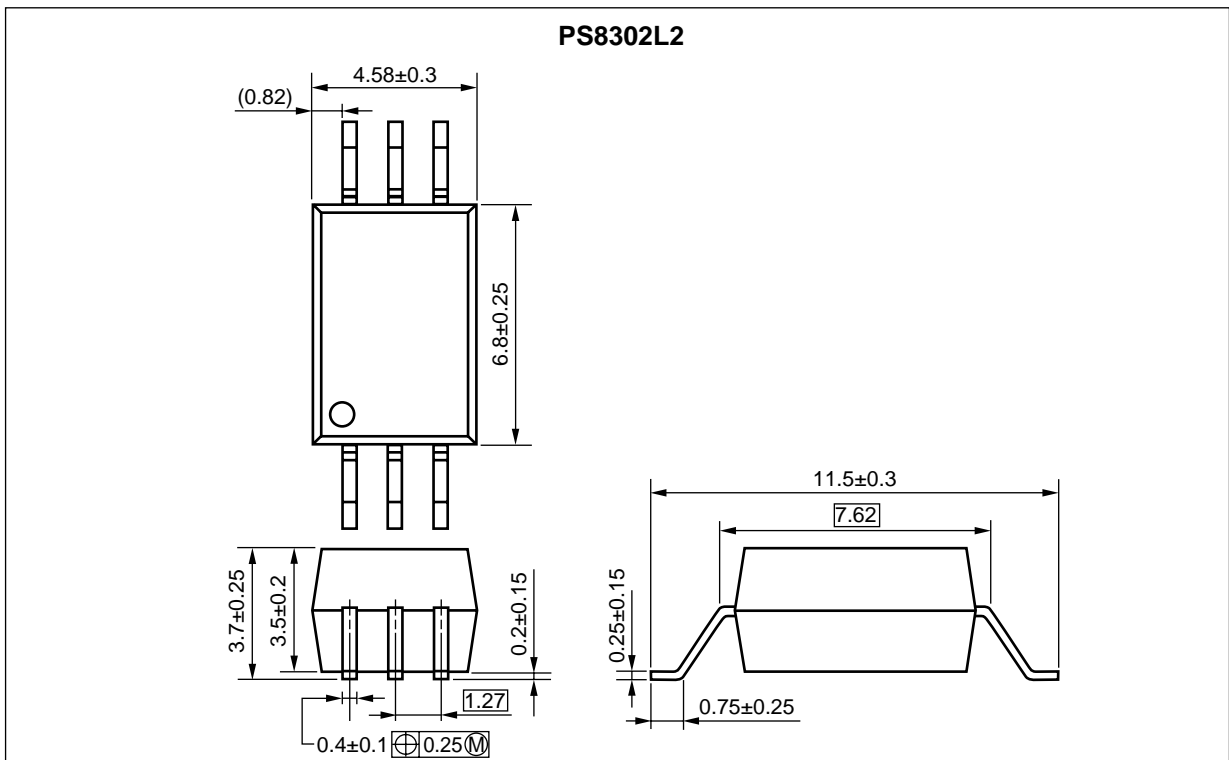
The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

PACKAGE DIMENSIONS (UNIT: mm)

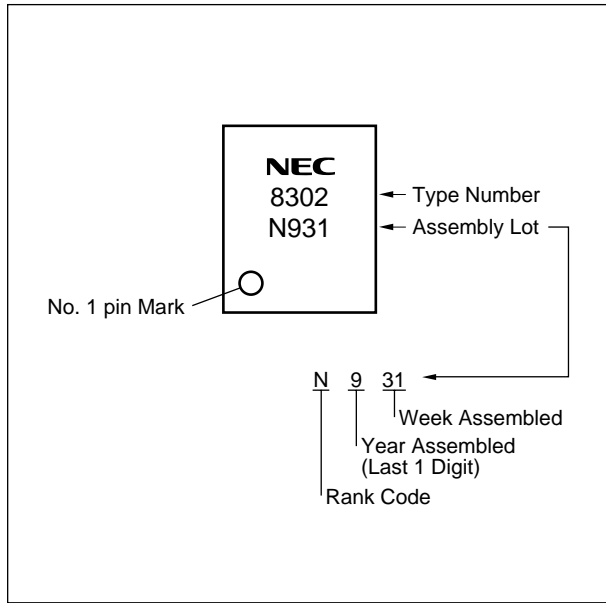
Lead Bending Type (Gull-wing) For Surface Mount



Lead Bending Type For Long Creepage Distance (Gull-wing) For Surface Mount



<R> **MARKING EXAMPLE**



PHOTOCOUPLER CONSTRUCTION

| Parameter | PS8302L | PS8302L2 |
|--------------------------------|---------|----------|
| Air Distance (MIN.) | 7 mm | 8 mm |
| Outer Creepage Distance (MIN.) | 7 mm | 8 mm |
| Isolation Distance (MIN.) | 0.4 mm | 0.4 mm |

ORDERING INFORMATION

| Part Number | Order Number | Solder Plating Specification | Packing Style | Safety Standard Approval | Application Part Number*1 |
|---------------|------------------|------------------------------|------------------------------|---|---------------------------|
| PS8302L | PS8302L-AX | Pb-Free (Ni/Pd/Au) | 20 pcs (Tape 20 pcs cut) | Standard products (UL, CSA approved) | PS8302L |
| PS8302L-E3 | PS8302L-E3-AX | | Embossed Tape 2 000 pcs/reel | | PS8302L2 |
| PS8302L2 | PS8302L2-AX | | 20 pcs (Tape 20 pcs cut) | | |
| PS8302L2-E3 | PS8302L2-E3-AX | | Embossed Tape 2 000 pcs/reel | | |
| PS8302L-V | PS8302L-V-AX | | 20 pcs (Tape 20 pcs cut) | DIN EN60747-5-2 (VDE0884 Part2) | PS8302L |
| PS8302L-V-E3 | PS8302L-V-E3-AX | | Embossed Tape 2 000 pcs/reel | | Approved (Option) |
| PS8302L2-V | PS8302L2-V-AX | | 20 pcs (Tape 20 pcs cut) | PS8302L2 | |
| PS8302L2-V-E3 | PS8302L2-V-E3-AX | | Embossed Tape 2 000 pcs/reel | | |

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

| Parameter | | Symbol | Ratings | Unit |
|---------------------------------|---------------------------------|------------------|-------------|---------|
| Diode | Forward Current ^{*1} | I _F | 25 | mA |
| | Reverse Voltage | V _R | 5 | V |
| Detector | Supply Voltage | V _{CC} | 35 | V |
| | Output Voltage | V _O | 35 | V |
| | Output Current | I _O | 8 | mA |
| | Power Dissipation ^{*2} | P _C | 100 | mW |
| Isolation Voltage ^{*3} | | BV | 5 000 | Vr.m.s. |
| Operating Ambient Temperature | | T _A | -55 to +110 | °C |
| Storage Temperature | | T _{stg} | -55 to +125 | °C |

*1 Reduced to 0.3 mA/°C at T_A = 70°C or more.

*2 Reduced to 2.0 mW/°C at T_A = 75°C or more.

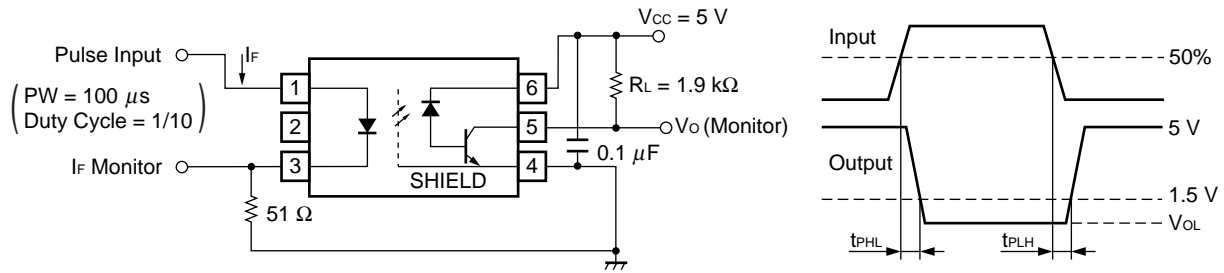
*3 AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output.
Pins 1-3 shorted together, 4-6 shorted together.

<R> **ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise specified)**

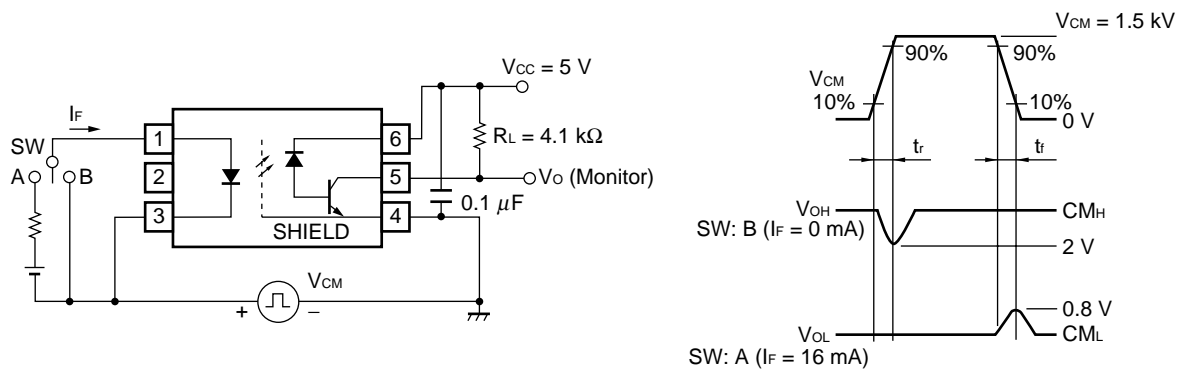
| Parameter | | Symbol | Conditions | MIN. | TYP. ^{*1} | MAX. | Unit |
|-----------|---|----------------------------------|--|------------------|--------------------|------|-------|
| Diode | Forward Voltage | V _F | I _F = 16 mA | | 1.6 | 2.0 | V |
| | Reverse Current | I _R | V _R = 3 V | | | 10 | μA |
| | Forward Voltage Temperature Coefficient | ΔV _F /ΔT _A | I _F = 16 mA | | -2.1 | | mV/°C |
| | Terminal Capacitance | C _t | V = 0 V, f = 1 MHz | | 30 | | pF |
| Detector | High Level Output Current | I _{OH} (1) | I _F = 0 mA, V _{CC} = V _O = 5.5 V | | 3 | 500 | nA |
| | High Level Output Current | I _{OH} (2) | I _F = 0 mA, V _{CC} = V _O = 35 V | | | 100 | μA |
| | Low Level Output Voltage | V _{OL} | I _F = 16 mA, V _{CC} = 4.5 V, I _O = 2.4 mA | | 0.15 | 0.4 | V |
| | High Level Supply Current | I _{CCH} | I _F = 0 mA, V _O = open, V _{CC} = 35 V | | 0.01 | 1 | μA |
| | Low Level Supply Current | I _{CCL} | I _F = 16 mA, V _O = open, V _{CC} = 35 V | | 150 | | |
| Coupled | Current Transfer Ratio | CTR | I _F = 16 mA, V _{CC} = 4.5 V, V _O = 0.4 V | 15 | | | % |
| | Input-Output Isolation Resistance | R _{I-O} | V _{I-O} = 1 kV _{DC} | 10 ¹¹ | | | Ω |
| | Input-Output Isolation Capacitance | C _{I-O} | V = 0 V, f = 1 MHz | | 0.7 | | pF |
| | Propagation Delay Time (H → L) ^{*2} | t _{PHL} | I _F = 16 mA, V _{CC} = 5 V, R _L = 1.9 kΩ | | 0.3 | 0.8 | μS |
| | Propagation Delay Time (L → H) ^{*2} | t _{PLH} | | | 0.33 | 0.8 | |
| | Common Mode Transient Immunity at High Level Output ^{*3} | CM _H | I _F = 0 mA, V _{CC} = 5 V, R _L = 4.1 kΩ, V _{CM} = 1.5 kV | 15 | | | kV/μS |
| | Common Mode Transient Immunity at Low Level Output ^{*3} | CM _L | I _F = 16 mA, V _{CC} = 5 V, R _L = 4.1 kΩ, V _{CM} = 1.5 kV | -15 | | | |

*1 Typical values at $T_A = 25^\circ\text{C}$

*2 Test circuit for propagation delay time



*3 Test circuit for common mode transient immunity



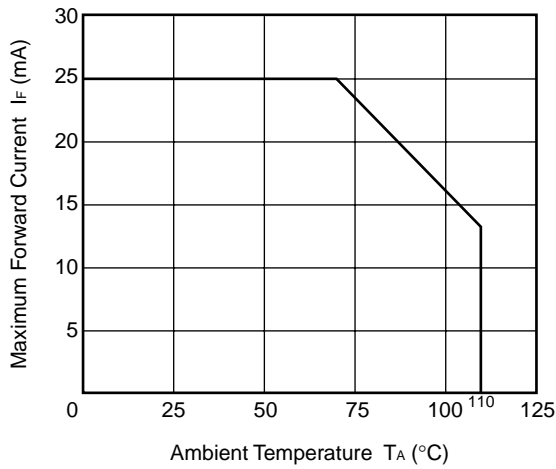
USAGE CAUTIONS

1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of $0.1\ \mu\text{F}$ is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.
3. Pin 2 (which is an NC*1 pin) can either be connected directly to the GND pin on the LED side or left open. Unconnected pins should not be used as a bypass for signals or for any other similar purpose because this may degrade the internal noise environment of the device.
 - *1 NC: Not connected (No connection)
4. Avoid storage at a high temperature and high humidity.

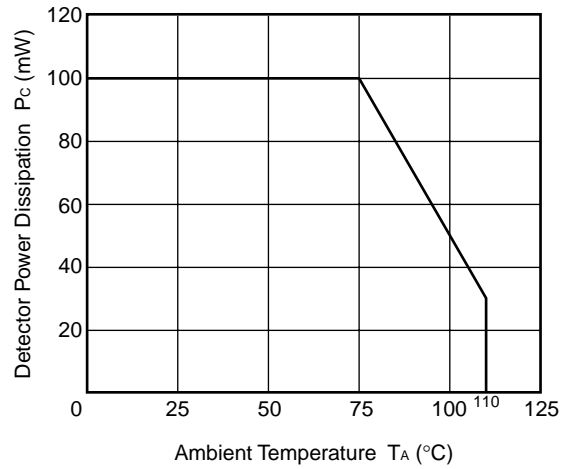
<R>

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

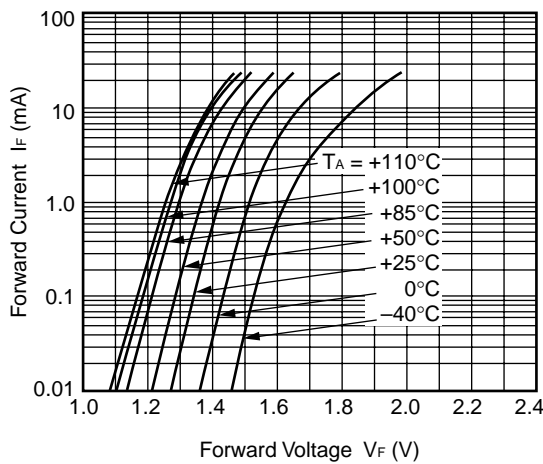
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



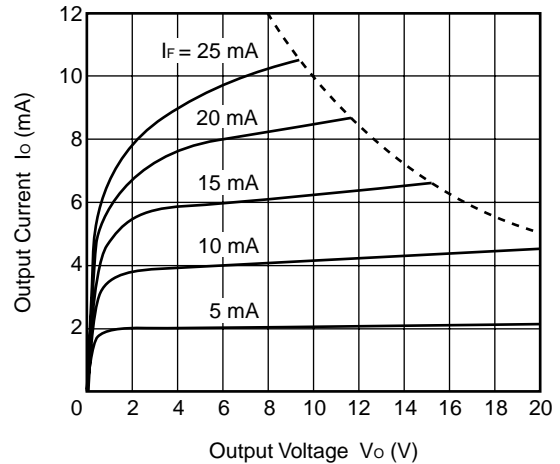
DETECTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



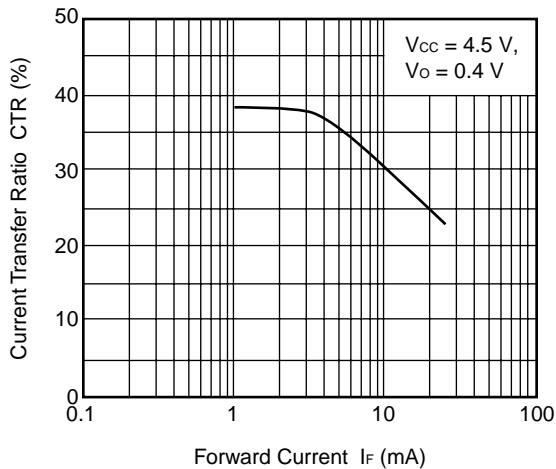
FORWARD CURRENT vs. FORWARD VOLTAGE



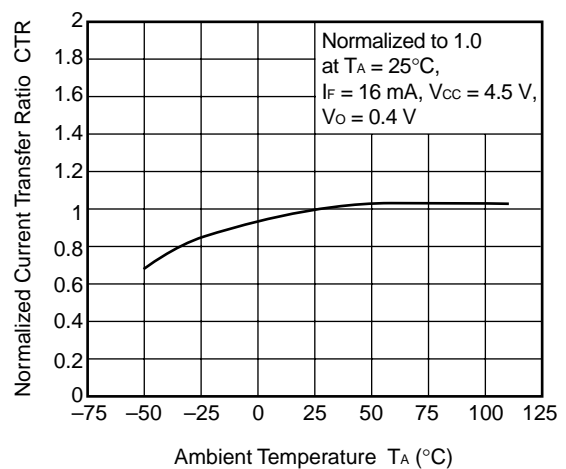
OUTPUT CURRENT vs. OUTPUT VOLTAGE



CURRENT TRANSFER RATIO vs. FORWARD CURRENT

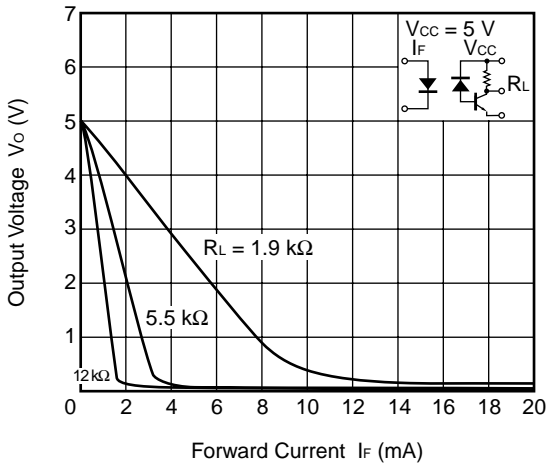


NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE

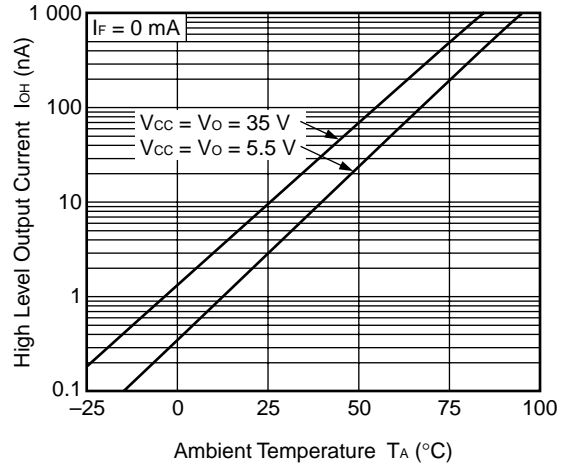


Remark The graphs indicate nominal characteristics.

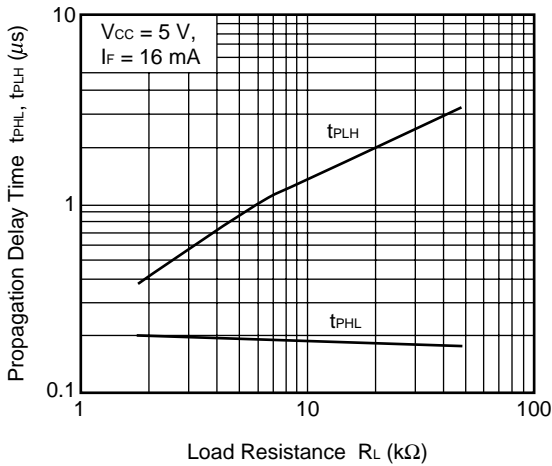
OUTPUT VOLTAGE vs. FORWARD CURRENT



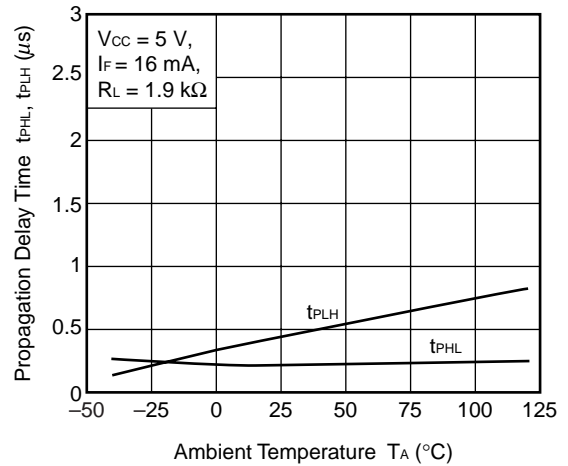
HIGH LEVEL OUTPUT CURRENT vs. AMBIENT TEMPERATURE



PROPAGATION DELAY TIME, vs. LOAD RESISTANCE

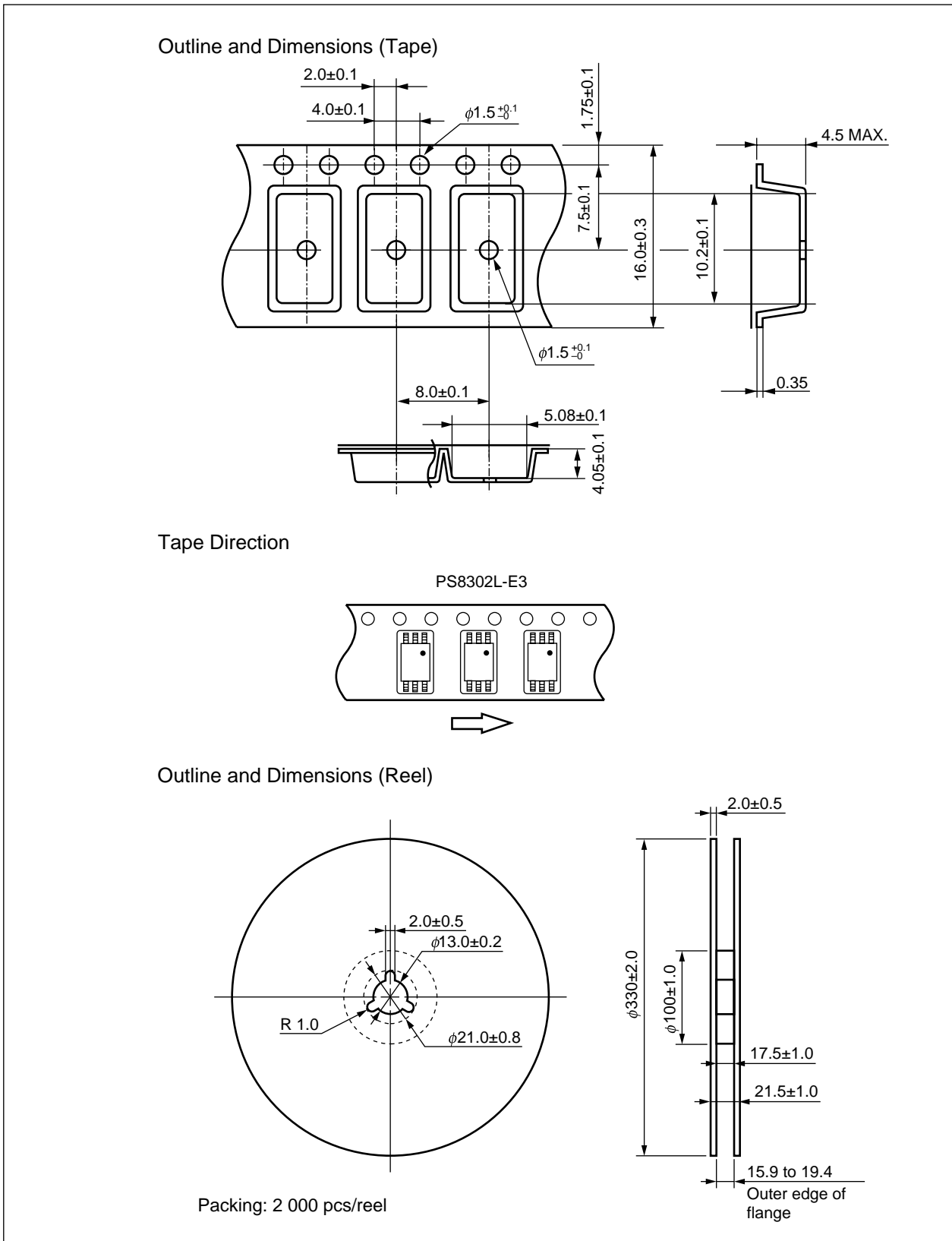


PROPAGATION DELAY TIME, vs. AMBIENT TEMPERATURE

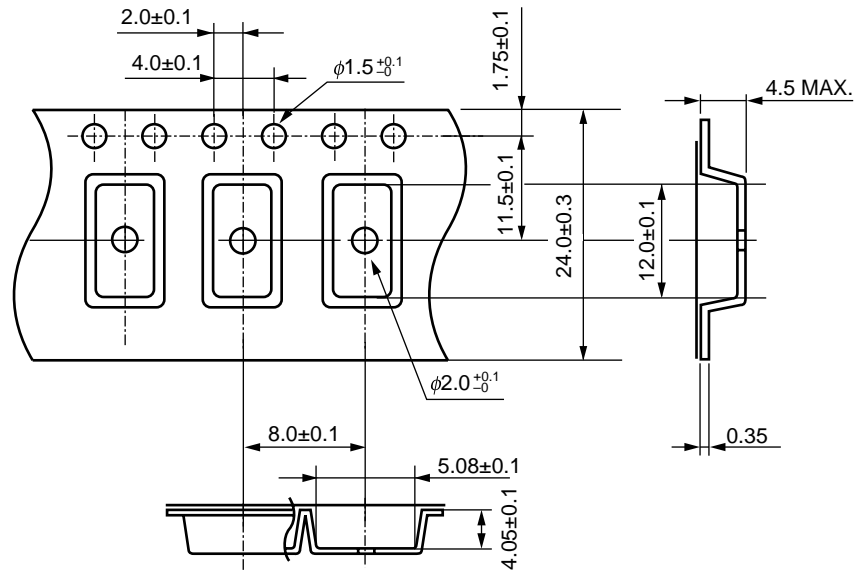


Remark The graphs indicate nominal characteristics.

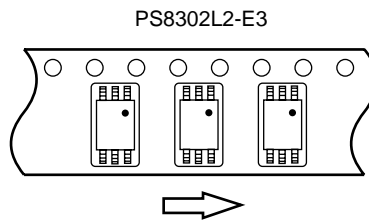
<R> TAPING SPECIFICATIONS (UNIT: mm)



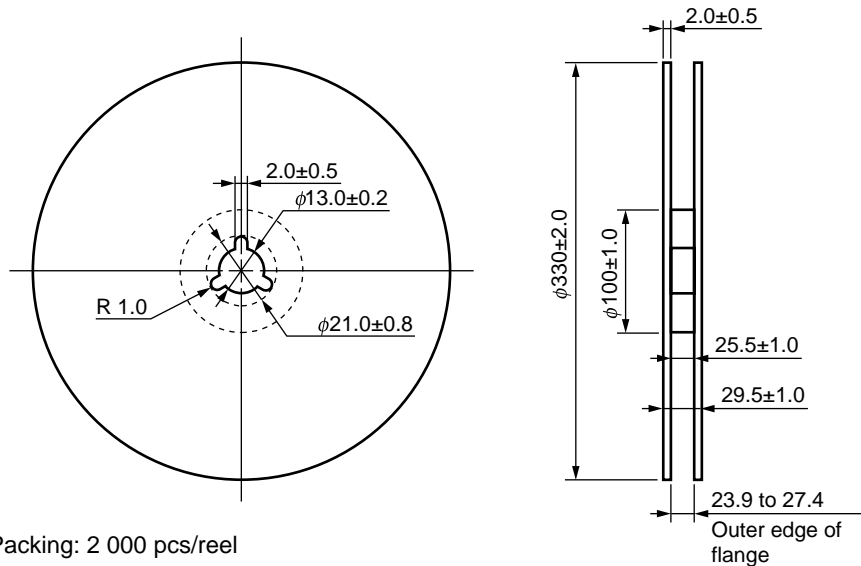
Outline and Dimensions (Tape)



Tape Direction

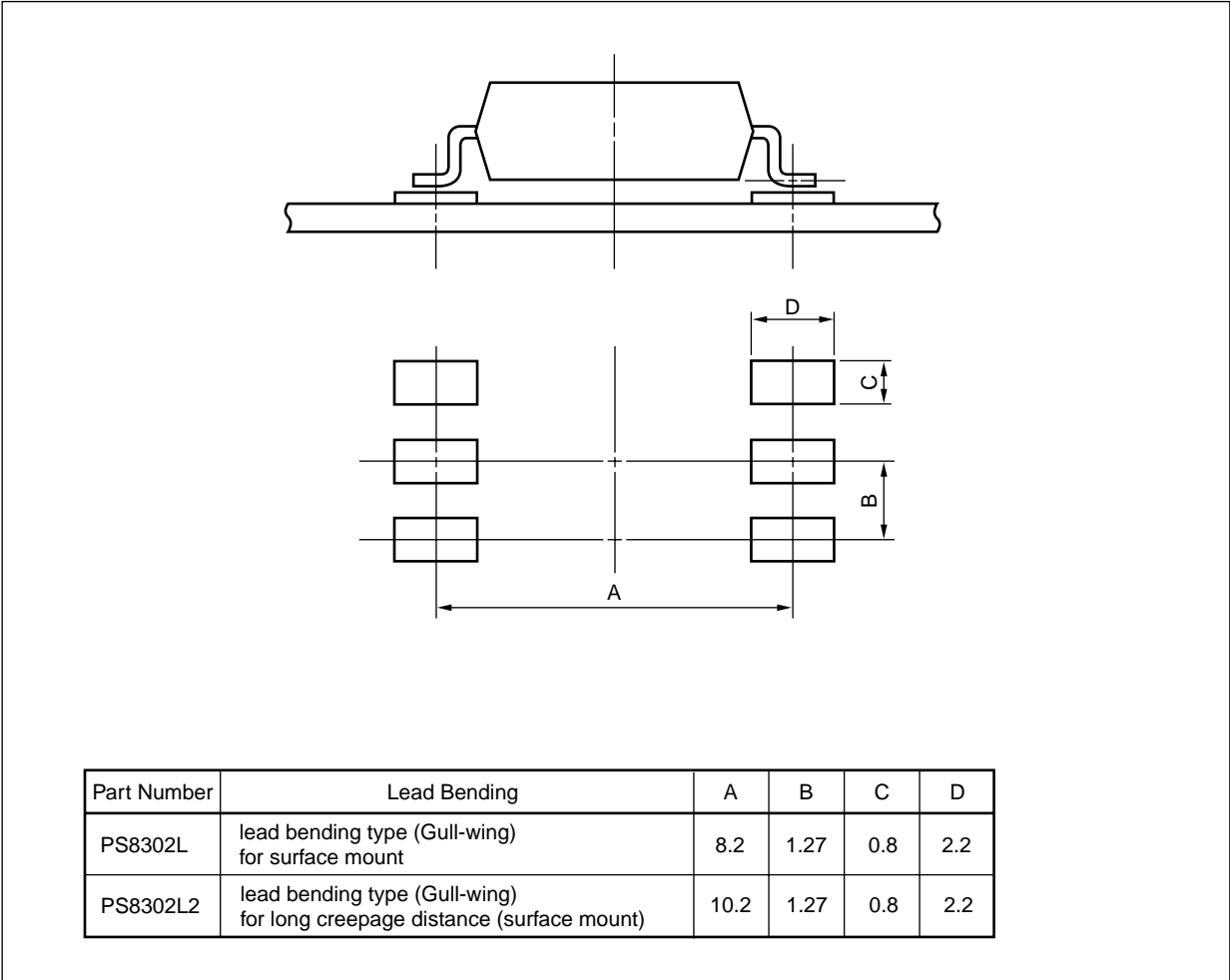


Outline and Dimensions (Reel)



Packing: 2 000 pcs/reel

<R> **RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)**



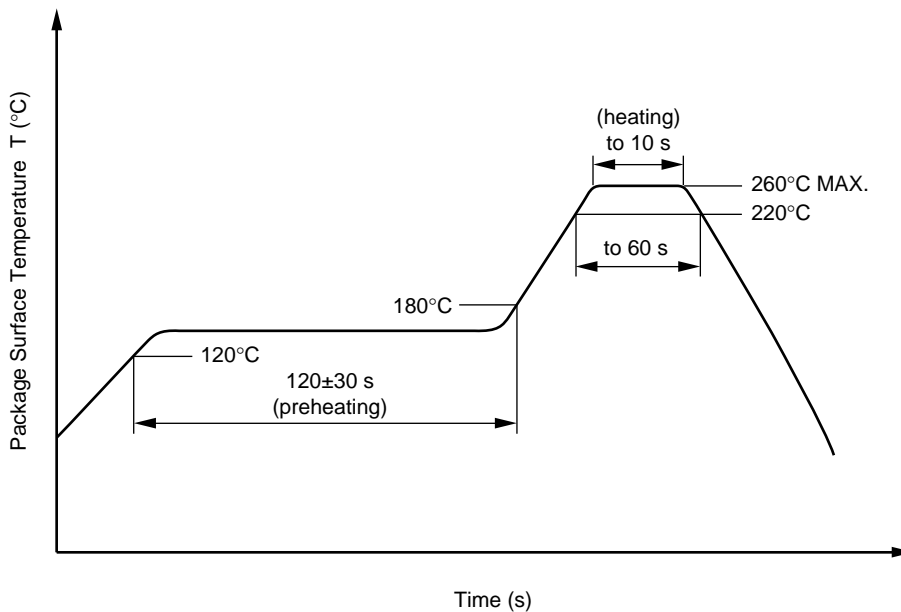
<R> **NOTES ON HANDLING**

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 side may enter the on state, even if the voltage is within the absolute maximum ratings.

<R> **SPECIFICATION OF VDE MARKS LICENSE DOCUMENT**

| Parameter | Symbol | Spec. | Unit |
|--|--|-----------------------------|----------------------------|
| Climatic test class (IEC 60068-1/DIN EN 60068-1) | | 55/110/21 | |
| Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.5 \times U_{IORM}, P_d < 5 \text{ pC}$ | U_{IORM} U_{pr} | 1 130 1 695 | V_{peak} V_{peak} |
| Test voltage (partial discharge test, procedure b for all devices) $U_{pr} = 1.875 \times U_{IORM}, P_d < 5 \text{ pC}$ | U_{pr} | 2 119 | V_{peak} |
| Highest permissible overvoltage | U_{TR} | 8 000 | V_{peak} |
| Degree of pollution (DIN EN 60664-1 VDE0110 Part 1) | | 2 | |
| Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303 Part 11)) | CTI | 175 | |
| Material group (DIN EN 60664-1 VDE0110 Part 1) | | III a | |
| Storage temperature range | T_{stg} | -55 to +125 | °C |
| Operating temperature range | T_A | -55 to +110 | °C |
| Isolation resistance, minimum value $V_{IO} = 500 \text{ V dc at } T_A = 25^\circ\text{C}$ $V_{IO} = 500 \text{ V dc at } T_A \text{ MAX. at least } 100^\circ\text{C}$ | Ris MIN. Ris MIN. | 10^{12} 10^{11} | Ω Ω |
| Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I_F , $P_{si} = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500 \text{ V dc at } T_A = T_{si}$ | T_{si} I_{si} P_{si} Ris MIN. | 175 400 700 10^9 | °C mA mW Ω |

- **The information in this document is current as of June, 2009. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC Electronics data sheets, 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 and safety of NEC Electronics products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. In addition, NEC Electronics products are not taken measures to prevent radioactive rays in the product design. When customers use NEC Electronics products with their products, customers shall, on their own responsibility, incorporate sufficient safety measures such as redundancy, fire-containment and anti-failure features to their products in order to avoid risks of the damages to property (including public or social property) or injury (including death) to persons, as the result of defects of NEC Electronics products.
- 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).

M8E0904E

| | |
|-------------------------------------|---|
| <p>Caution GaAs Products</p> | <p>This product uses gallium arsenide (GaAs). 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"> • 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"> 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. 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. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth. |
|-------------------------------------|---|



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

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.