



PHOTOCOUPLER PS2581AL1, PS2581AL2

LONG CREEPAGE HIGH ISOLATION VOLTAGE 4-PIN PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS2581AL1, PS2581AL2 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor in a plastic DIP (Dual In-line Package) to realize an excellent cost performance.

Creepage distance and clearance of leads are over 8 millimeters.

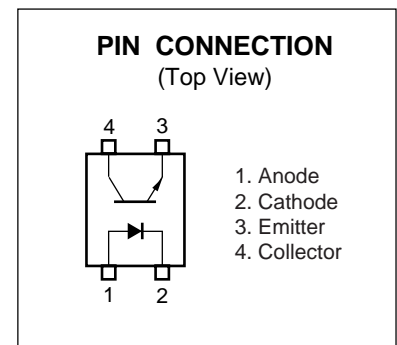
The PS2581AL2 is lead bending type (Gull-wing) for surface mounting.

FEATURES

- Long creepage and clearance distance (8 mm)
- High isolation voltage (BV = 5 000 Vr.m.s.)
- High-speed switching ($t_r = 5 \mu s$ TYP., $t_f = 7 \mu s$ TYP.)
- ★ • Ordering number of tape product: PS2581AL2-E3, E4: 1 000 pcs/reel
- ★ • Pb-Free product
- ★ • Safety standards
 - UL, BSI, CSA, NEMKO, DEMKO, SEMKO, FIMKO approved
 - DIN EN60747-5-2 (VDE0884 Part2) approved

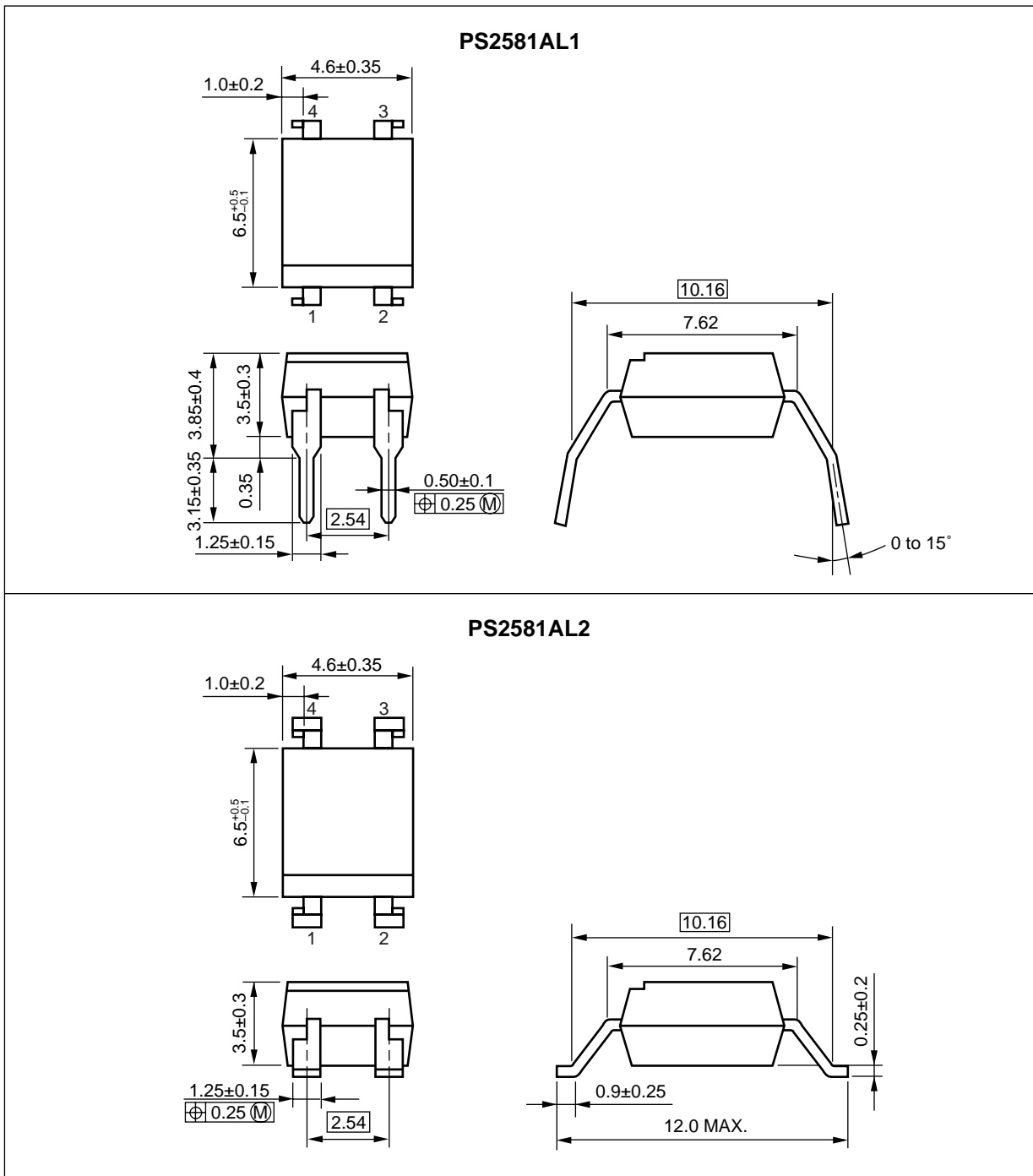
APPLICATIONS

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



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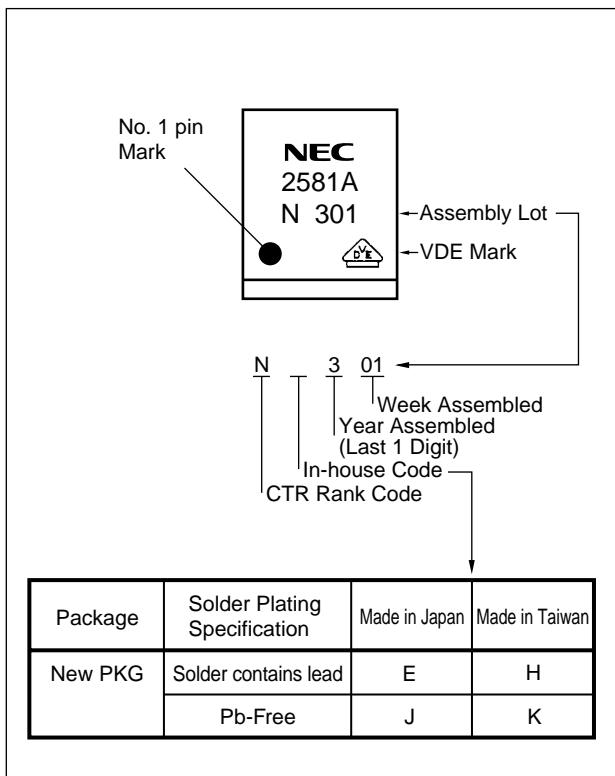
PACKAGE DIMENSIONS (UNIT : mm)



PHOTOCOUPLER CONSTRUCTION

| Parameter | Unit (MIN.) |
|-------------------------|-------------|
| Air Distance | 8 mm |
| Outer Creepage Distance | 8 mm |
| Inner Creepage Distance | 4 mm |
| Isolation Thickness | 0.4 mm |

★ MARKING EXAMPLE



★ **ORDERING INFORMATION**

| Part Number | Order Number | Solder Plating Specification | Packing Style | Safety Standard Approval | Application Part Number ^{*1} |
|--------------|----------------|------------------------------|------------------------------|---|---------------------------------------|
| PS2581AL1 | PS2581AL1 | Solder contains lead | Magazine case 100 pcs | Standard products (UL, CSA, BSI, NEMKO, SEMKO, DEMKO, FIMKO, DIN EN60747-5-2 (VDE0884 Part2) Approved products) | PS2581AL1 |
| PS2581AL2 | PS2581AL2 | | Embossed Tape 1 000 pcs/reel | | PS2581AL2 |
| PS2581AL2-E3 | PS2581AL2-E3 | | | | PS2581AL2 |
| PS2581AL2-E4 | PS2581AL2-E4 | | | | |
| PS2581AL1 | PS2581AL1-A | Pb-Free | Magazine case 100 pcs | (VDE0884 Part2) Approved products) | PS2581AL1 |
| PS2581AL2 | PS2581AL2-A | | Embossed Tape 1 000 pcs/reel | | PS2581AL2 |
| PS2581AL2-E3 | PS2581AL2-E3-A | | | | PS2581AL2 |
| PS2581AL2-E4 | PS2581AL2-E4-A | | | | |

*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 | Reverse Voltage | V _R | 6 | V |
| | Forward Current (DC) | I _F | 30 | mA |
| | Power Dissipation Derating | ΔP _D /°C | 1.5 | mW/°C |
| | Power Dissipation | P _D | 150 | mW |
| | Peak Forward Current ^{*1} | I _{FP} | 0.5 | A |
| Transistor | Collector to Emitter Voltage | V _{CEO} | 70 | V |
| | Emitter to Collector Voltage | V _{ECO} | 5 | V |
| | Collector Current | I _C | 30 | mA |
| | Power Dissipation Delay | ΔP _C /°C | 1.5 | mW/°C |
| | Power Dissipation | P _C | 150 | mW |
| Isolation Voltage ^{*2} | | BV | 5 000 | Vr.m.s. |
| Operating Ambient Temperature | | T _A | -55 to +100 | °C |
| Storage Temperature | | T _{stg} | -55 to +150 | °C |

*1 PW = 100 μs, Duty Cycle = 1%

*2 AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output

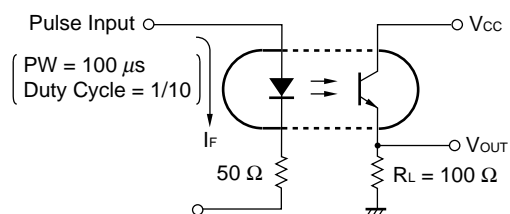
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

| Parameter | | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|------------|--|----------------------|---|------------------|------|------|------|
| Diode | Forward Voltage | V _F | I _F = 10 mA | | 1.2 | 1.4 | V |
| | Reverse Current | I _R | V _R = 5 V | | | 5 | μA |
| | Terminal Capacitance | C _t | V = 0 V, f = 1.0 MHz | | 10 | | pF |
| Transistor | Collector to Emitter Dark Current | I _{CEO} | V _{CE} = 70 V, I _F = 0 mA | | | 100 | nA |
| Coupled | Current Transfer Ratio (I _c /I _F) ^{*1} | CTR | I _F = 5 mA, V _{CE} = 5 V | 50 | | 300 | % |
| | Collector Saturation Voltage | V _{CE(sat)} | I _F = 10 mA, I _c = 2 mA | | 0.13 | 0.3 | V |
| | Isolation Resistance | R _{I-O} | V _{I-O} = 1.0 kV _{DC} | 10 ¹¹ | | | Ω |
| | Isolation Capacitance | C _{I-O} | V = 0 V, f = 1.0 MHz | | 0.4 | | pF |
| | Rise Time ^{*2} | t _r | V _{CC} = 10 V, I _c = 2 mA, R _L = 100 Ω | | 5 | | μs |
| | Fall Time ^{*2} | t _f | | | 7 | | |

***1 CTR rank**

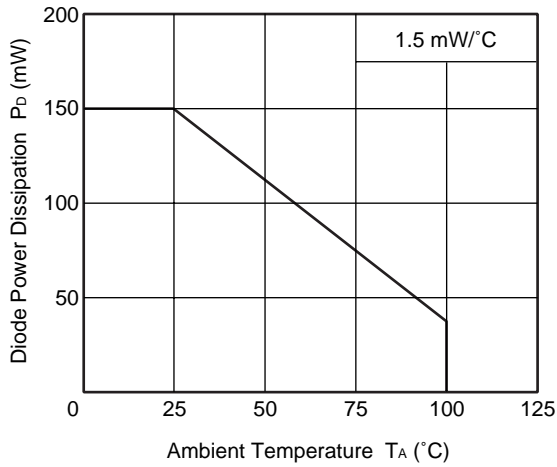
- N : 50 to 300 (%)
- H : 80 to 160 (%)
- Q : 100 to 200 (%)
- W : 130 to 260 (%)

***2 Test circuit for switching time**

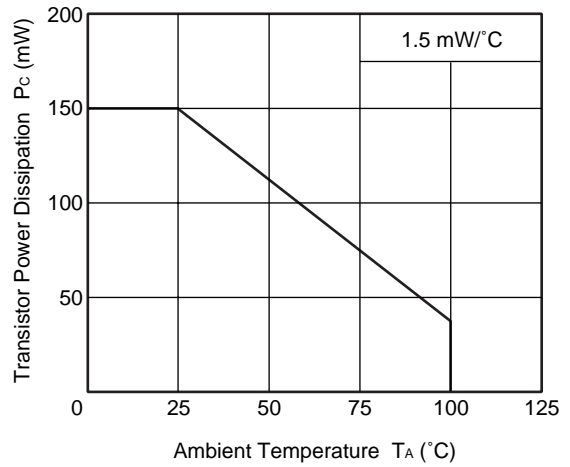


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

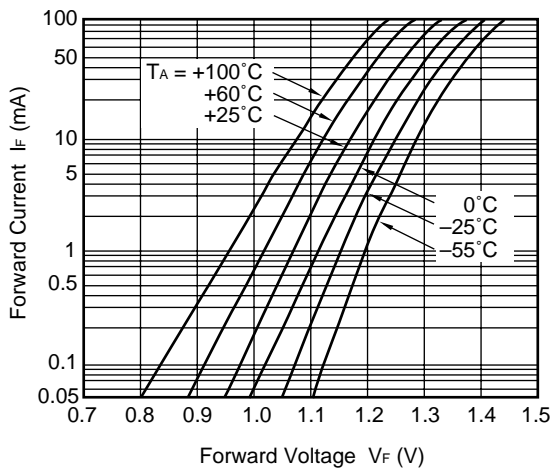
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



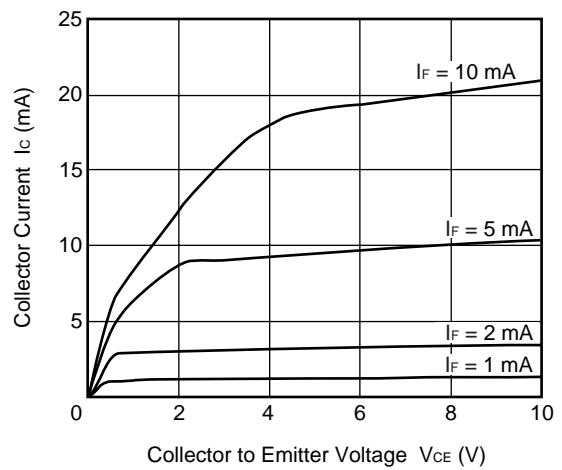
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



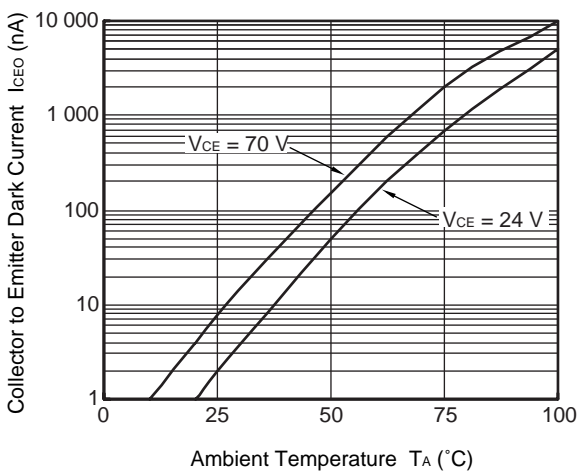
FORWARD CURRENT vs. FORWARD VOLTAGE



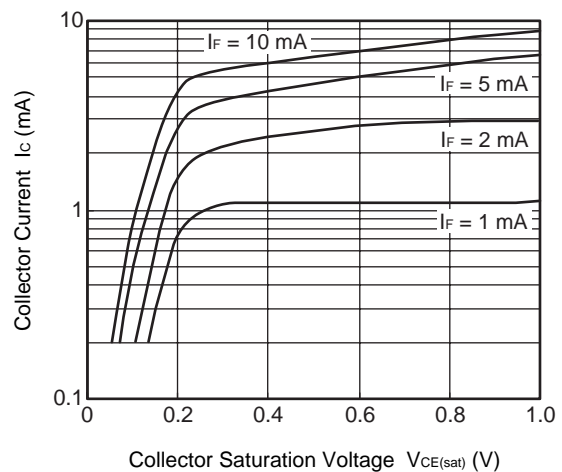
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

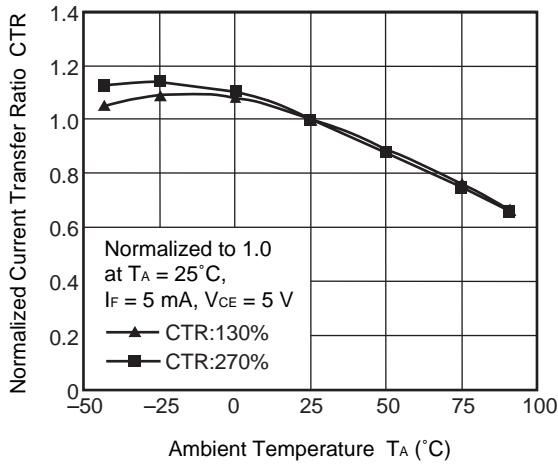


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

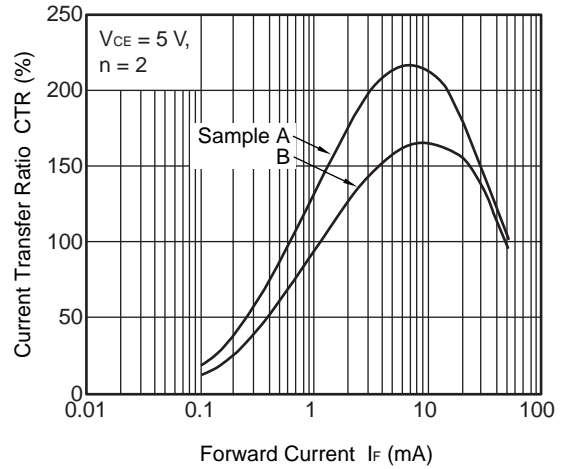


Remark The graphs indicate nominal characteristics.

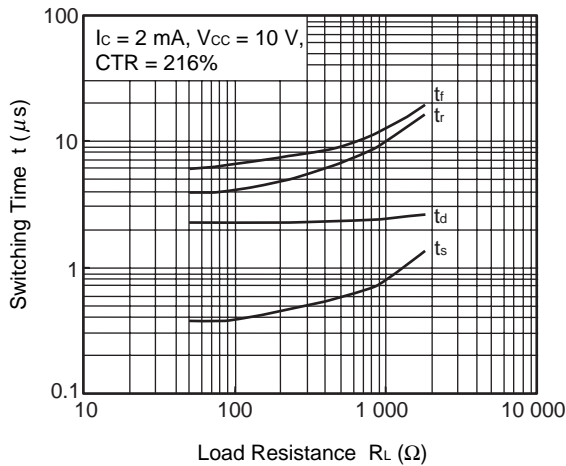
★ NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



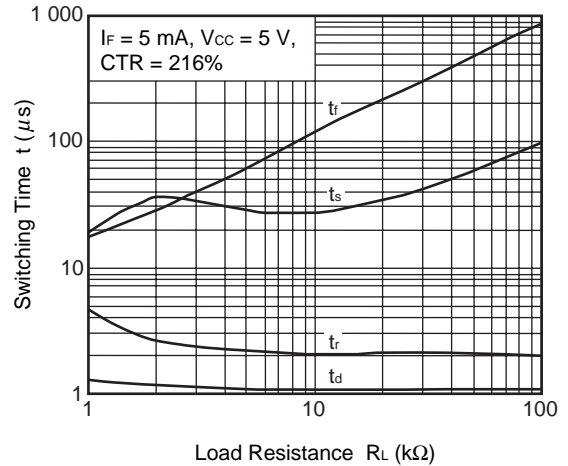
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



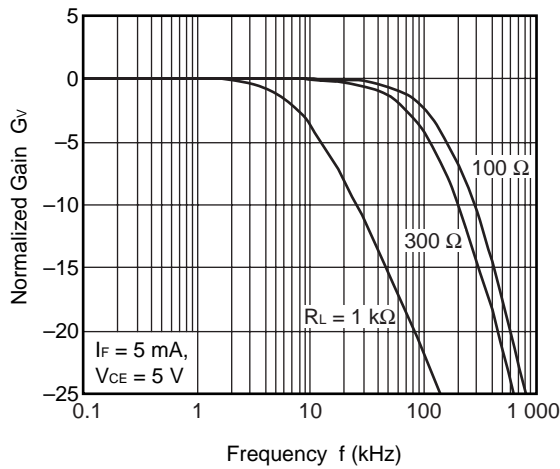
SWITCHING TIME vs. LOAD RESISTANCE



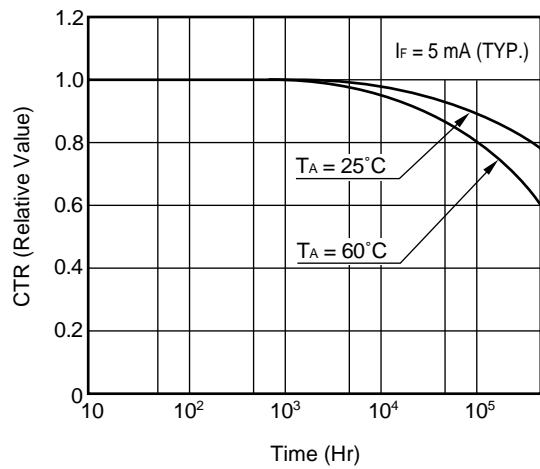
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



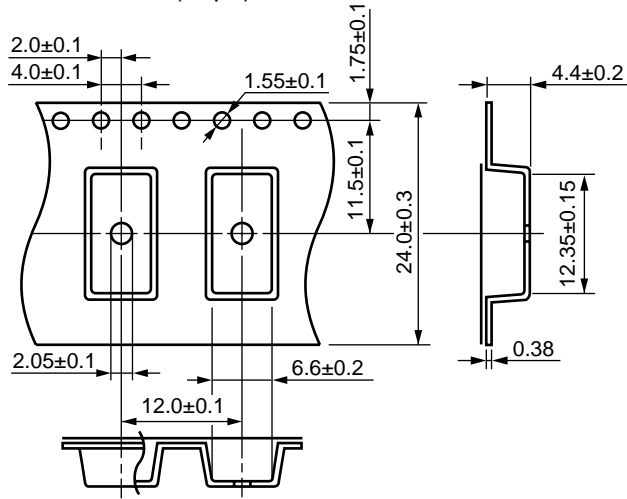
LONG TERM CTR DEGRADATION



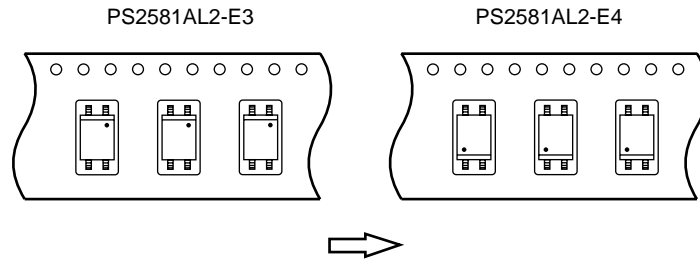
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT : mm)

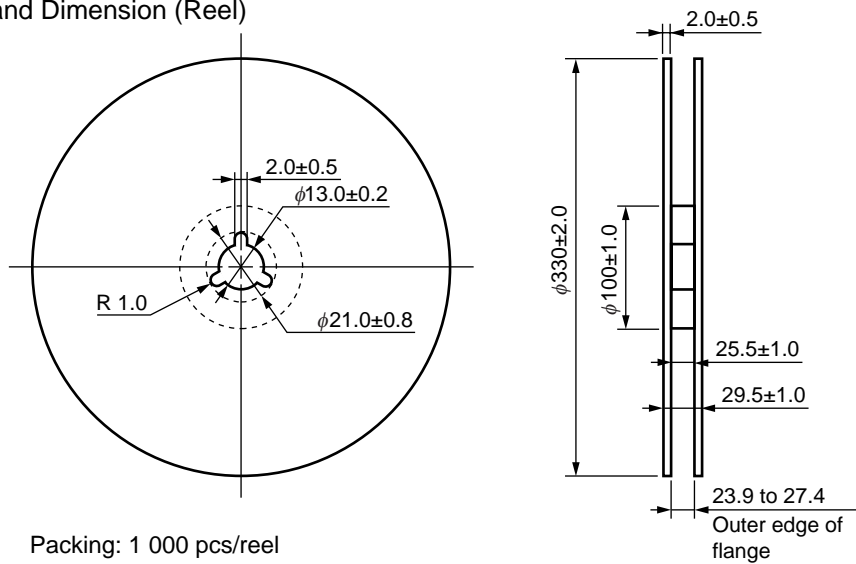
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimension (Reel)



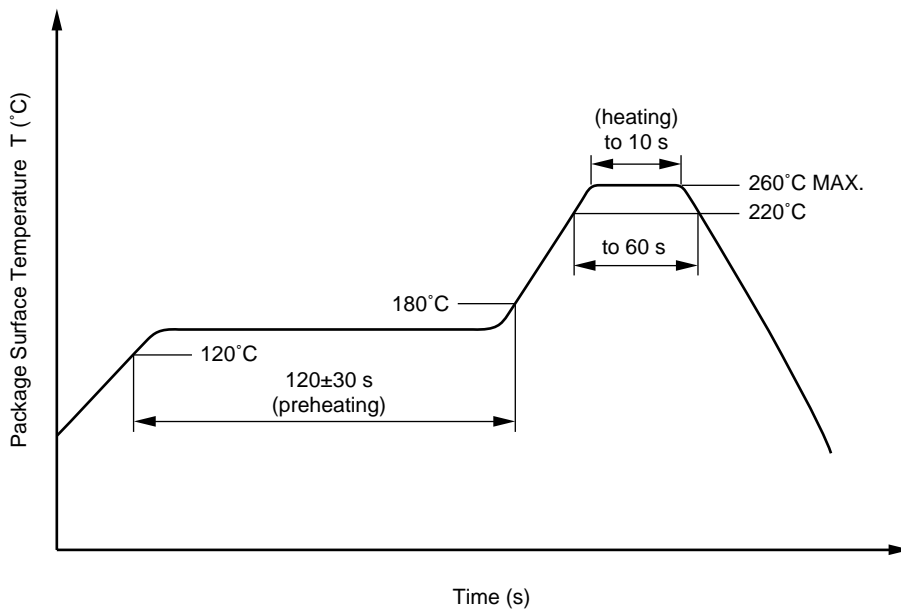
NOTES ON HANDLING

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.

USAGE CAUTIONS

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

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.

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