



PHOTOCOUPLER

PS2561-1,-2,-4,PS2561L-1,-2,-4

PS2561L1-1,-2,-4,PS2561L2-1,-2,-4

HIGH ISOLATION VOLTAGE SINGLE TRANSISTOR TYPE MULTI PHOTOCOUPLER SERIES

–NEPOC Series–

★ DESCRIPTION

The PS2561-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2561-1, -2, -4 are in a plastic DIP (Dual In-line Package) and the PS2561L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

The PS2561L1-1, -2, -4 are lead bending type for long creepage distance.

The PS2561L2-1, -2, -4 are lead bending type for long creepage distance (Gull-wing) for surface mount.

FEATURES

- High Isolation voltage ($BV = 5\,000\text{ Vr.m.s.}$)
- High collector to emitter voltage ($V_{CE0} = 80\text{ V}$)
- High current transfer ratio ($CTR = 200\% \text{ TYP.}$)
- High-speed switching ($t_r = 3\ \mu\text{s TYP.}$, $t_f = 5\ \mu\text{s TYP.}$)
- ★ • Ordering number of taping product: PS2561L-1-E3, E4, F3, F4, PS2561L-2-E3, E4, PS2561L2-1-E3, E4
- UL approved: File No. E72422
- CSA approved: No. CA 101391
- ★ • BSI approved: No. 7112/7420
- ★ • SEMKO approved: No. 0144211
- NEMKO approved: No. A21409
- DEMKO approved: No. 300535
- ★ • FIMKO approved: No. FI10620A1
- VDE approved (Option)

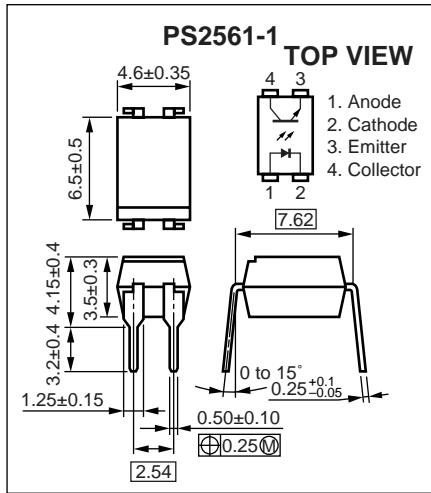
APPLICATIONS

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

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

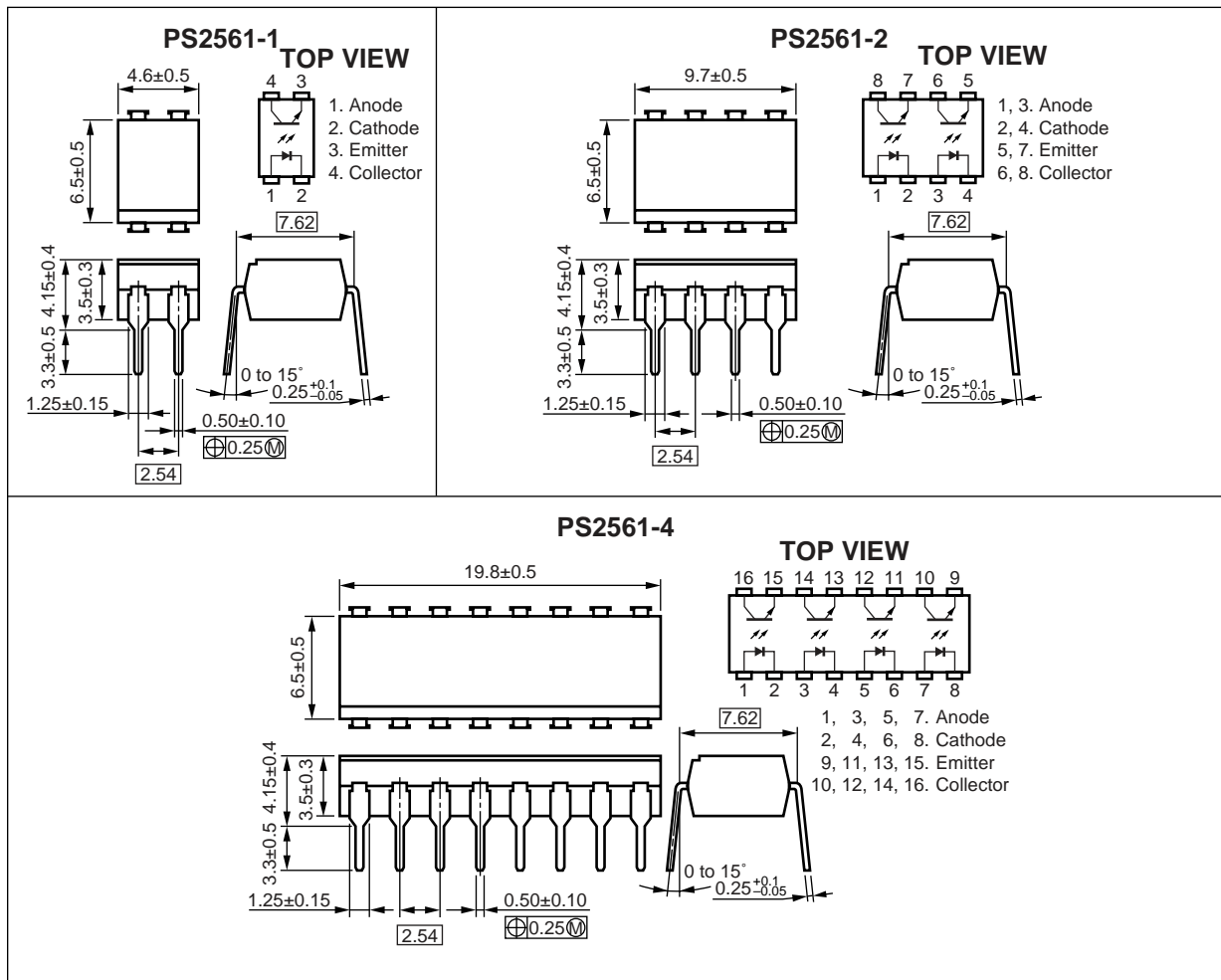
★ PACKAGE DIMENSIONS (UNIT : mm)

DIP Type (New package)

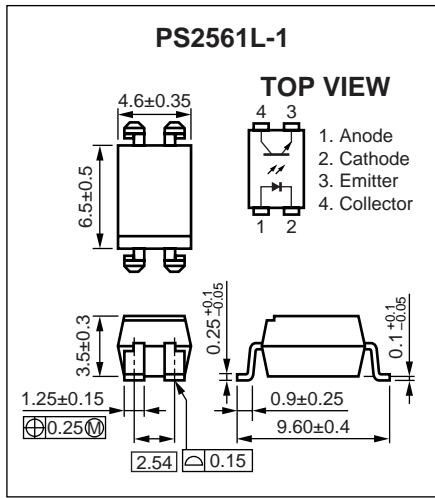


Caution New package 1-ch only

DIP Type

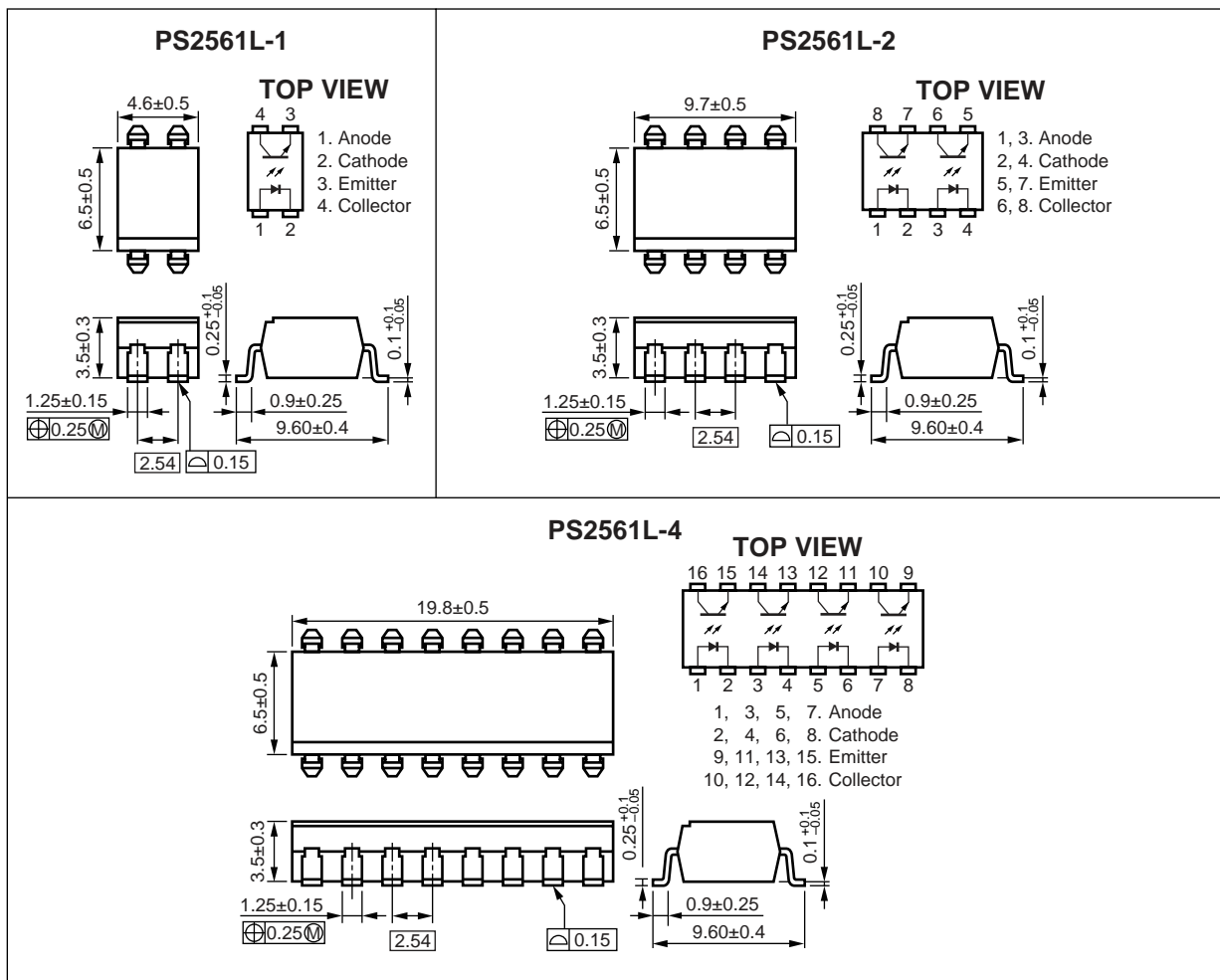


Lead Bending Type (New package)

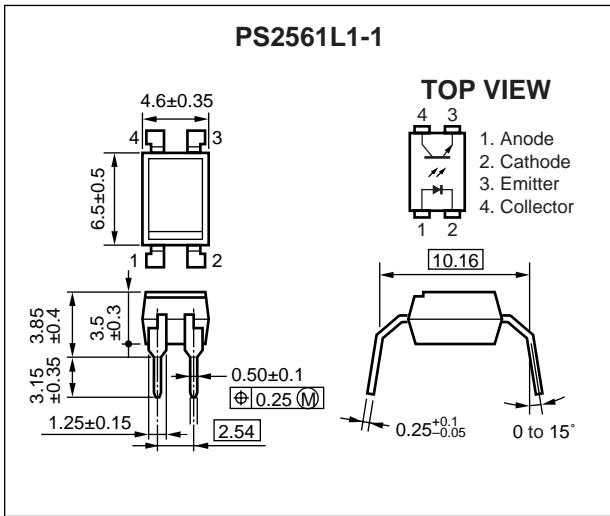


Caution New package 1-ch only

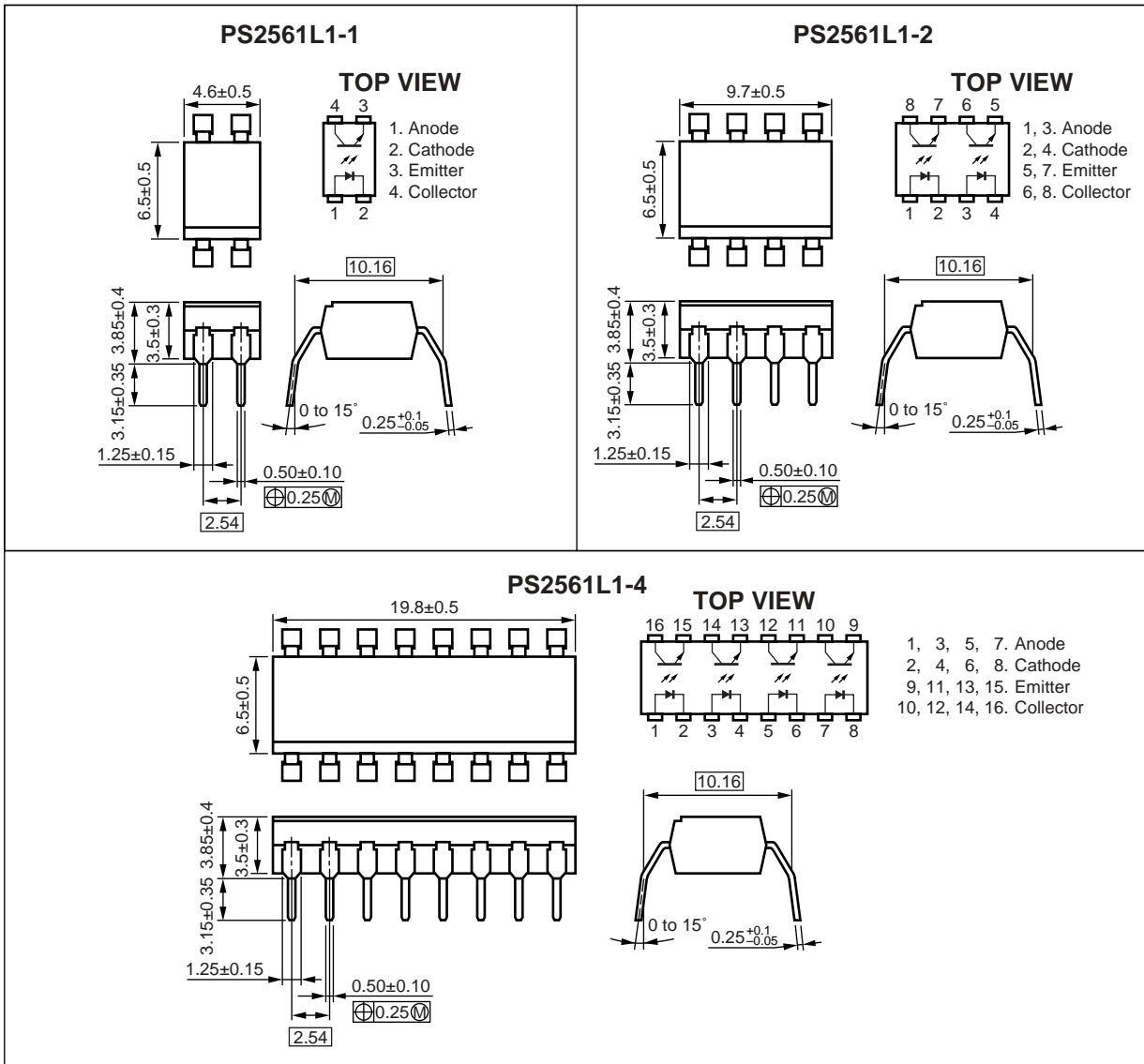
Lead Bending Type



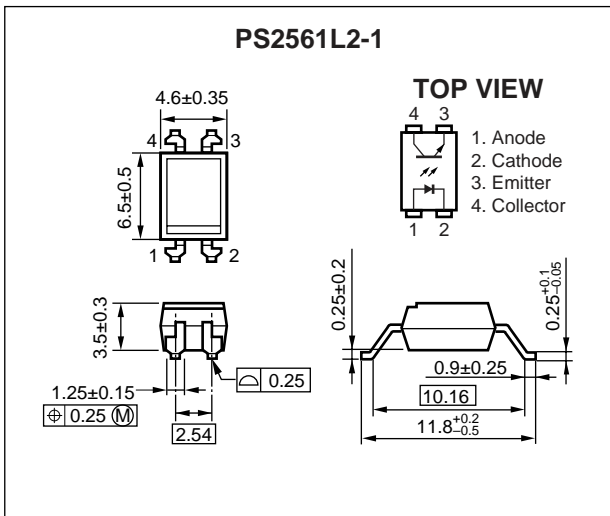
Lead Bending Type For Long Creepage Distance (New Package)



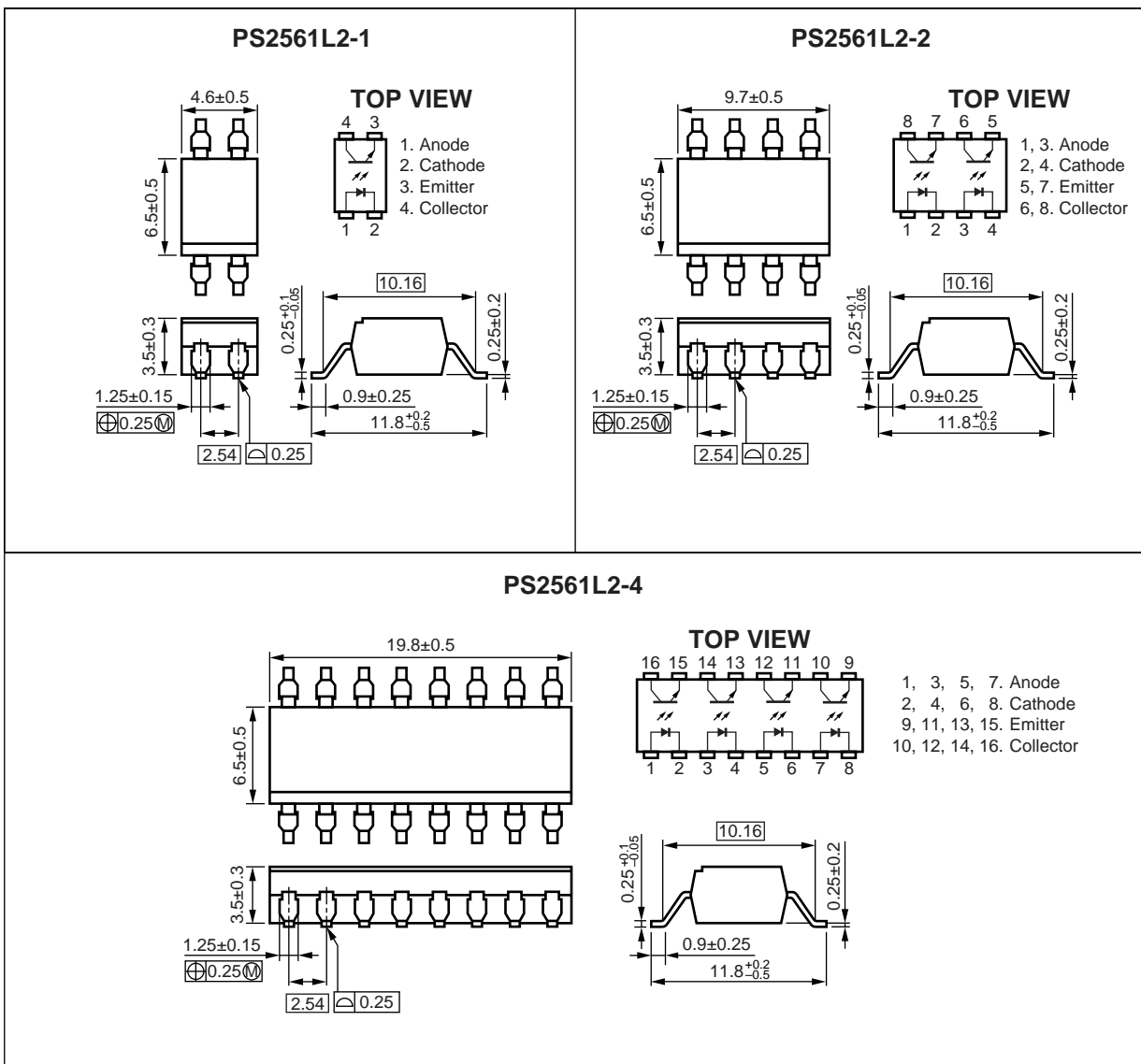
Lead Bending Type For Long Creepage Distance



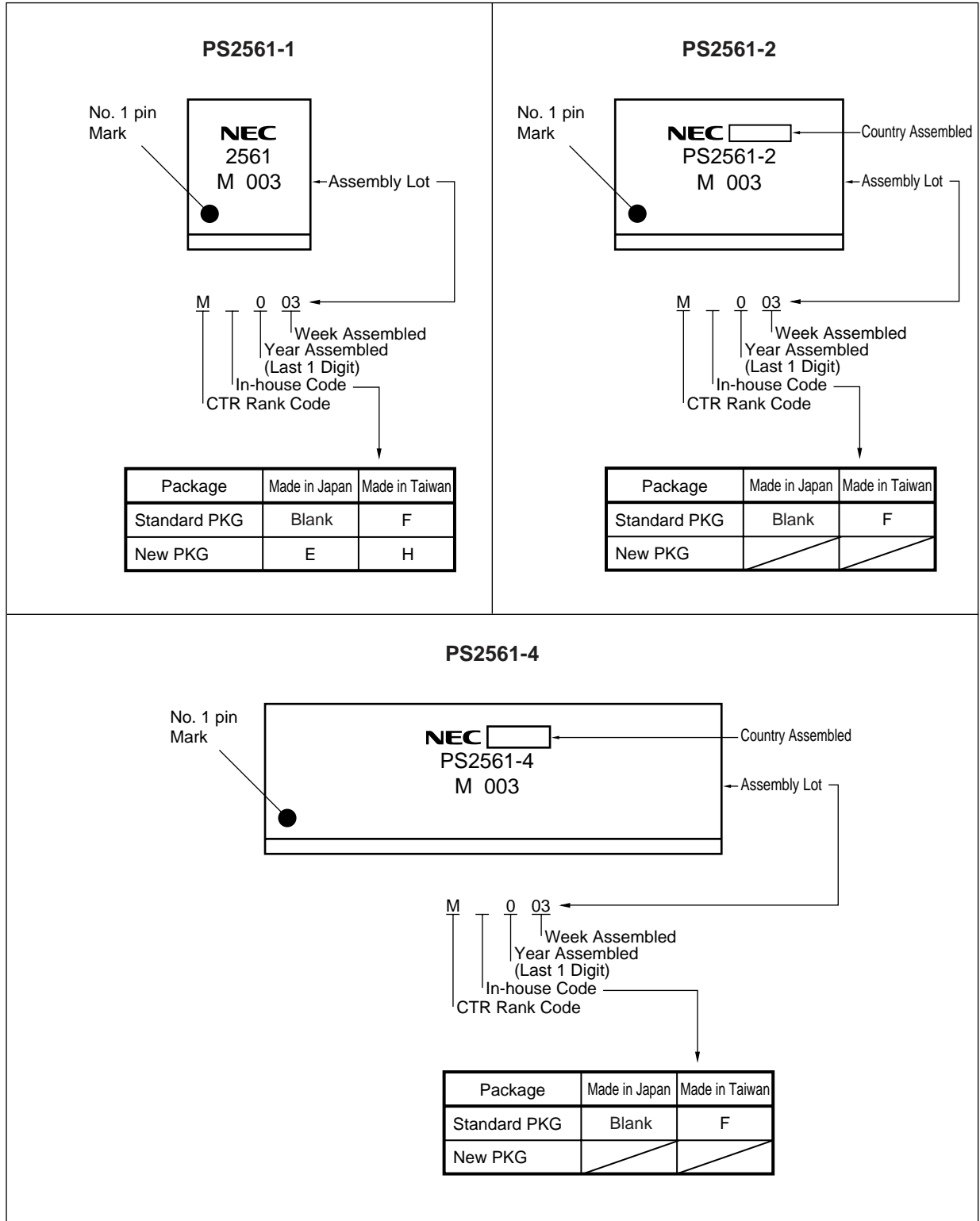
Lead Bending Type For Long Creepage Distance (Gull-Wing) (New Package)



Lead Bending Type For Long Creepage Distance (Gull-Wing)



★ MARKING EXAMPLE



★ **ORDERING INFORMATION (Solder Contains Lead) (1/2)**

| Part Number | Package | Packing Style | Safety Standard Approval | Application Part Number ^{*1} |
|-----------------|------------|------------------------------|---|---------------------------------------|
| PS2561-1 | 4-pin DIP | Magazine case 100 pcs | Standard products (UL, CSA, BSI, NEMKO, SEMKO, DEMKO, FIMKO approved) | PS2561-1 |
| PS2561L-1 | | | | |
| PS2561L1-1 | | | | |
| PS2561L2-1 | | | | |
| PS2561L-1-E3 | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L-1-E4 | | | | |
| PS2561L-1-F3 | | Embossed Tape 2 000 pcs/reel | | |
| PS2561L-1-F4 | | | | |
| PS2561L2-1-E3 | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L2-1-E4 | | | | |
| PS2561-2 | 8-pin DIP | Magazine case 45 pcs | | PS2561-2 |
| PS2561L-2 | | | | |
| PS2561L1-2 | | | | |
| PS2561L2-2 | | | | |
| PS2561L-2-E3 | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L-2-E4 | | | | |
| PS2561-4 | 16-pin DIP | Magazine case 20 pcs | | PS2561-4 |
| PS2561L-4 | | | | |
| PS2561L1-4 | | | | |
| PS2561L2-4 | | | | |
| PS2561-1-V | 4-pin DIP | Magazine case 100 pcs | VDE approved products (Option) | PS2561-1 |
| PS2561L-1-V | | | | |
| PS2561L1-1-V | | | | |
| PS2561L2-1-V | | | | |
| PS2561L-1-V-E3 | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L-1-V-E4 | | | | |
| PS2561L-1-V-F3 | | Embossed Tape 2 000 pcs/reel | | |
| PS2561L-1-V-F4 | | | | |
| PS2561L2-1-V-E3 | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L2-1-V-E4 | | | | |

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

★ **ORDERING INFORMATION (Solder Contains Lead) (2/2)**

| Part Number | Package | Packing Style | Safety Standard Approval | Application Part Number ^{*1} |
|----------------|------------|------------------------------|--------------------------------|---------------------------------------|
| PS2561-2-V | 8-pin DIP | Magazine case 45 pcs | VDE approved products (Option) | PS2561-2 |
| PS2561L-2-V | | | | |
| PS2561L1-2-V | | | | |
| PS2561L2-2-V | | | | |
| PS2561L-2-V-E3 | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L-2-V-E4 | | | | |
| PS2561-4-V | 16-pin DIP | Magazine case 20 pcs | | PS2561-4 |
| PS2561L-4-V | | | | |
| PS2561L1-4-V | | | | |
| PS2561L2-4-V | | | | |

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

★ **ORDERING INFORMATION (Pb-Free) (1/2)**

| Part Number | Package | Packing Style | Safety Standard Approval | Application Part Number ^{*1} |
|-------------------|------------|------------------------------|---|---------------------------------------|
| PS2561-1-A | 4-pin DIP | Magazine case 100 pcs | Standard products (UL, CSA, BSI, NEMKO, SEMKO, DEMKO, FIMKO approved) | PS2561-1 |
| PS2561L-1-A | | | | |
| PS2561L1-1-A | | | | |
| PS2561L2-1-A | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L-1-E3-A | | | | |
| PS2561L-1-E4-A | | | | |
| PS2561L-1-F3-A | | Embossed Tape 2 000 pcs/reel | | |
| PS2561L-1-F4-A | | | | |
| PS2561L2-1-E3-A | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L2-1-E4-A | | | | |
| PS2561-2-A | 8-pin DIP | Magazine case 45 pcs | | PS2561-2 |
| PS2561L-2-A | | | | |
| PS2561L1-2-A | | | | |
| PS2561L2-2-A | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L-2-E3-A | | | | |
| PS2561L-2-E4-A | | | | |
| PS2561-4-A | 16-pin DIP | Magazine case 20 pcs | | PS2561-4 |
| PS2561L-4-A | | | | |
| PS2561L1-4-A | | | | |
| PS2561L2-4-A | | | | |
| PS2561-1-V-A | 4-pin DIP | Magazine case 100 pcs | VDE approved products (Option) | PS2561-1 |
| PS2561L-1-V-A | | | | |
| PS2561L1-1-V-A | | | | |
| PS2561L2-1-V-A | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L-1-V-E3-A | | | | |
| PS2561L-1-V-E4-A | | | | |
| PS2561L-1-V-F3-A | | Embossed Tape 2 000 pcs/reel | | |
| PS2561L-1-V-F4-A | | | | |
| PS2561L2-1-V-E3-A | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L2-1-V-E4-A | | | | |

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

★ **ORDERING INFORMATION (Pb-Free) (2/2)**

| Part Number | Package | Packing Style | Safety Standard Approval | Application Part Number ^{*1} |
|------------------|------------|------------------------------|--------------------------------|---------------------------------------|
| PS2561-2-V-A | 8-pin DIP | Magazine case 45 pcs | VDE approved products (Option) | PS2561-2 |
| PS2561L-2-V-A | | | | |
| PS2561L1-2-V-A | | | | |
| PS2561L2-2-V-A | | | | |
| PS2561L-2-V-E3-A | | Embossed Tape 1 000 pcs/reel | | |
| PS2561L-2-V-E4-A | | | | |
| PS2561-4-V-A | 16-pin DIP | Magazine case 20 pcs | | PS2561-4 |
| PS2561L-4-V-A | | | | |
| PS2561L1-4-V-A | | | | |
| PS2561L2-4-V-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 | |
|---------------------------------|------------------------------------|---------------------|-------------|---------|-------|
| | | PS2561-1 | PS2561-2,-4 | | |
| Diode | Reverse Voltage | V _R | 6 | | V |
| | Forward Current (DC) | I _F | 80 | | mA |
| | Power Dissipation Derating | ΔP _D /°C | 1.5 | 1.2 | mW/°C |
| | Power Dissipation | P _D | 150 | 120 | mW/ch |
| | Peak Forward Current ^{*1} | I _{FP} | 1 | | A |
| Transistor | Collector to Emitter Voltage | V _{CEO} | 80 | | V |
| | Emitter to Collector Voltage | V _{ECO} | 7 | | V |
| | Collector Current | I _C | 50 | | mA/ch |
| | Power Dissipation Derating | ΔP _C /°C | 1.5 | 1.2 | mW/°C |
| | Power Dissipation | P _C | 150 | 120 | mW/ch |
| 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

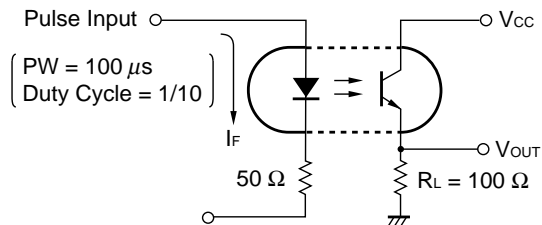
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

| Parameter | | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|------------|--|----------------------|---|------------------|------|------|------|
| Diode | Forward Voltage | V _F | I _F = 10 mA | | 1.17 | 1.4 | V |
| | Reverse Current | I _R | V _R = 5 V | | | 5 | μA |
| | Terminal Capacitance | C _t | V = 0 V, f = 1.0 MHz | | 50 | | pF |
| Transistor | Collector to Emitter Dark Current | I _{CEO} | V _{CE} = 80 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 | 80 | 200 | 400 | % |
| | Collector Saturation Voltage | V _{CE(sat)} | I _F = 10 mA, I _c = 2 mA | | | 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 | | 0.5 | | pF |
| | Rise Time ^{*2} | t _r | V _{CC} = 10 V, I _c = 2 mA, R _L = 100 Ω | | 3 | | μs |
| | Fall Time ^{*2} | t _f | | | 5 | | |

★ *1 CTR rank (only PS2561-1, PS2561L-1, PS2561L1-1, PS2561L2-1)

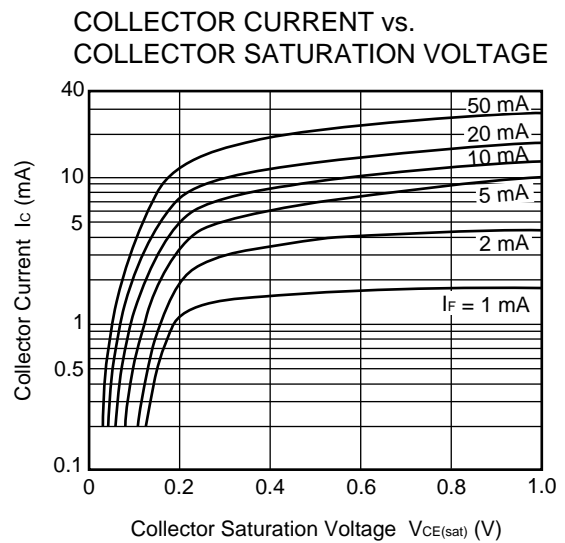
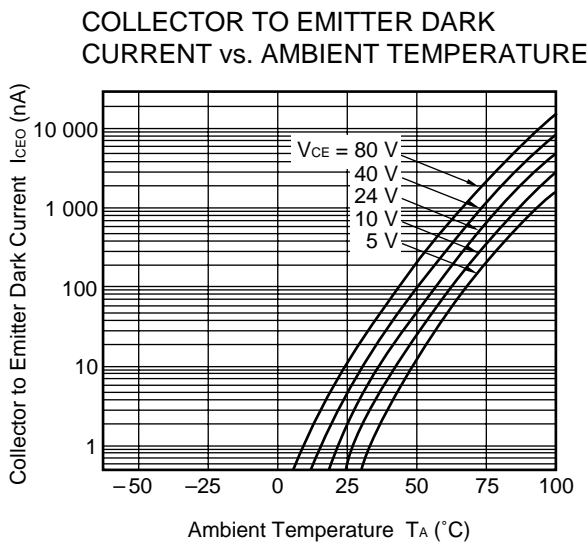
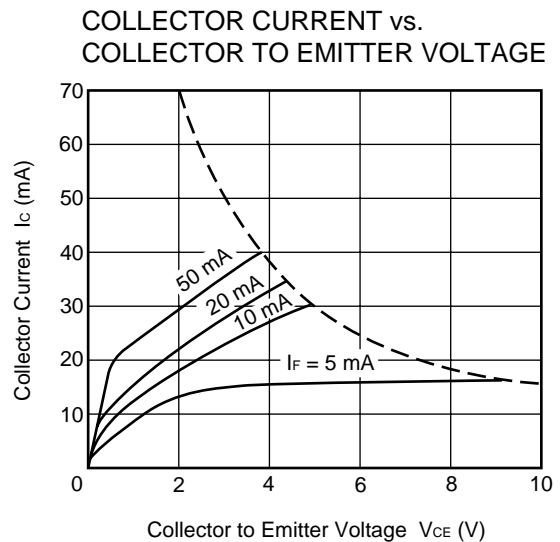
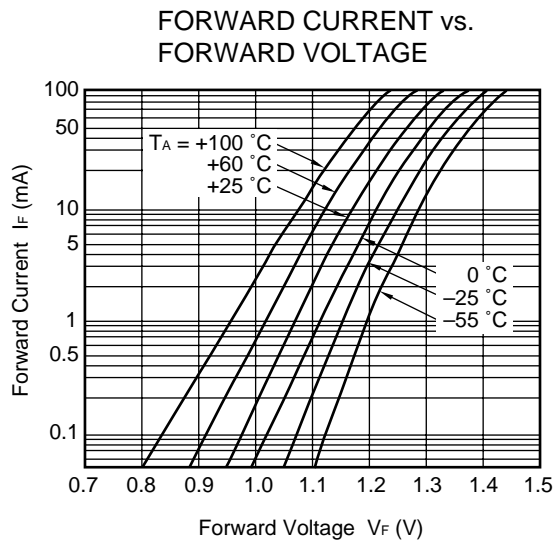
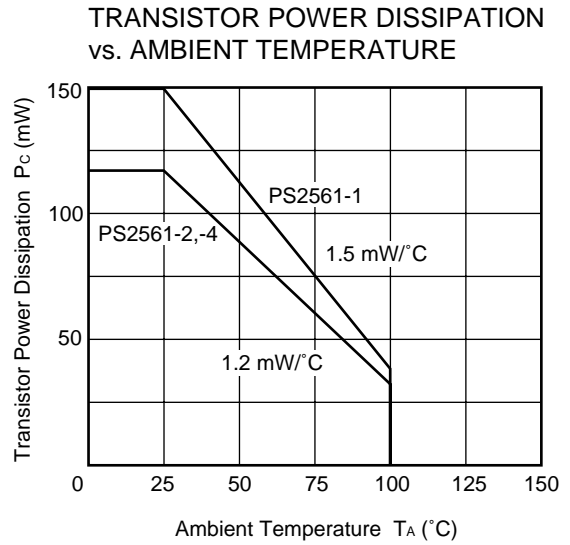
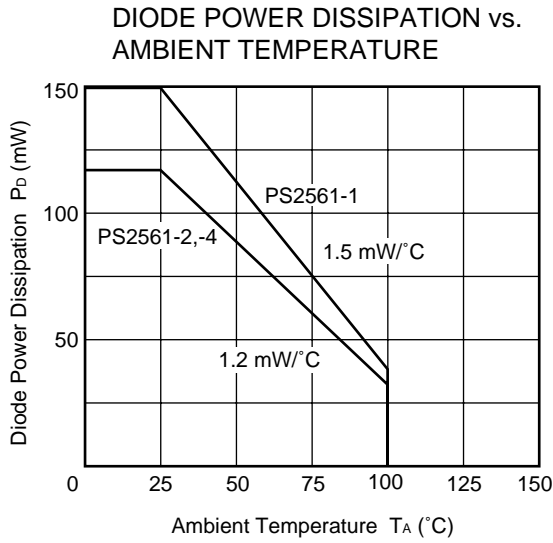
- L : 200 to 400 (%)
- M : 80 to 240 (%)
- D : 100 to 300 (%)
- H : 80 to 160 (%)
- W : 130 to 260 (%)

*2 Test circuit for switching time



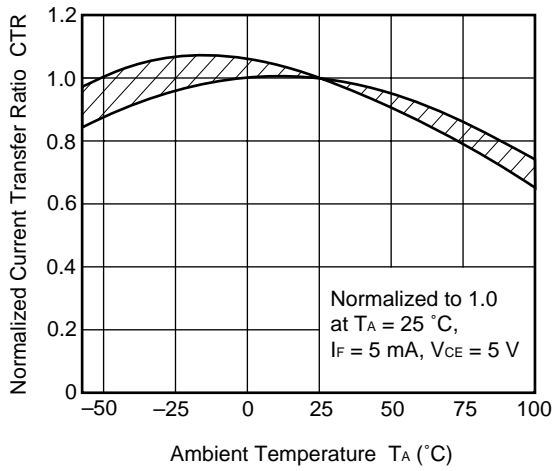
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified)

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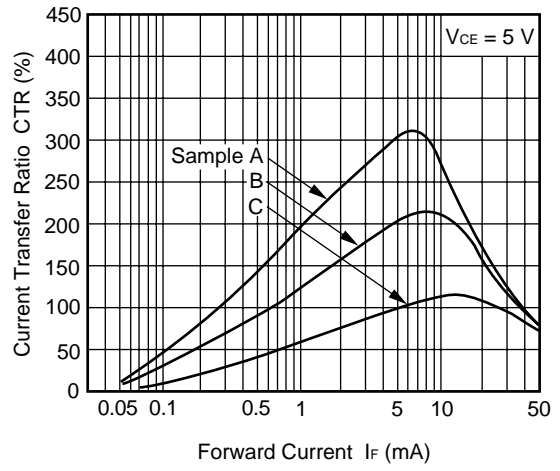


Remark The graphs indicate nominal characteristics.

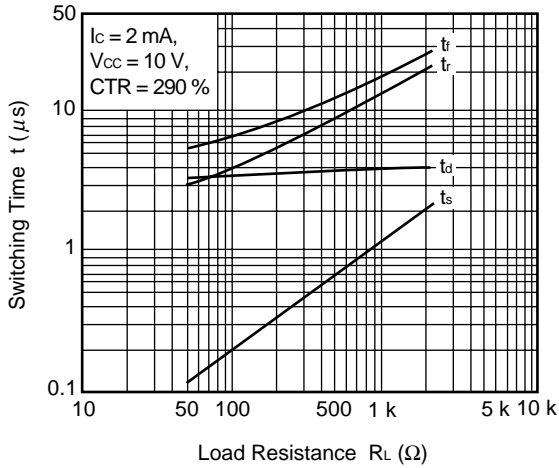
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



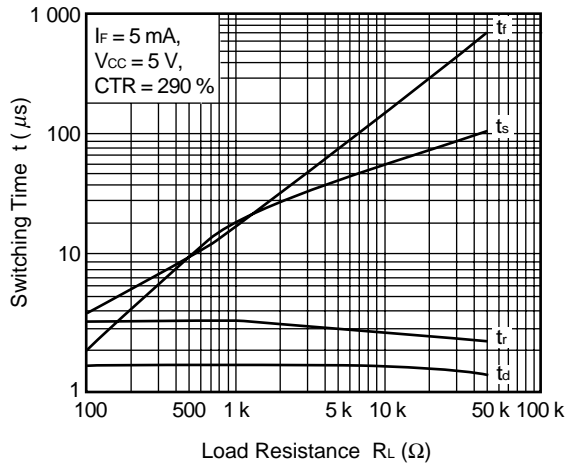
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



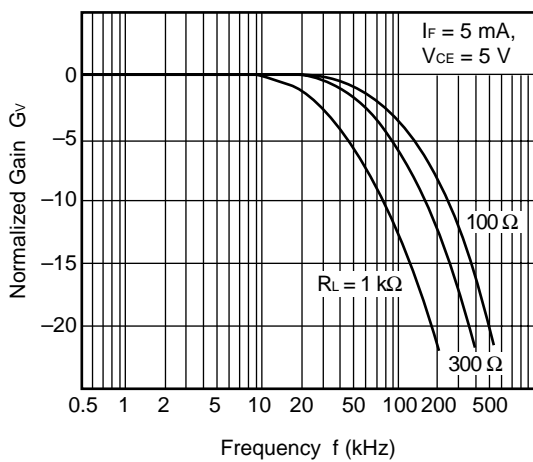
SWITCHING TIME vs. LOAD RESISTANCE



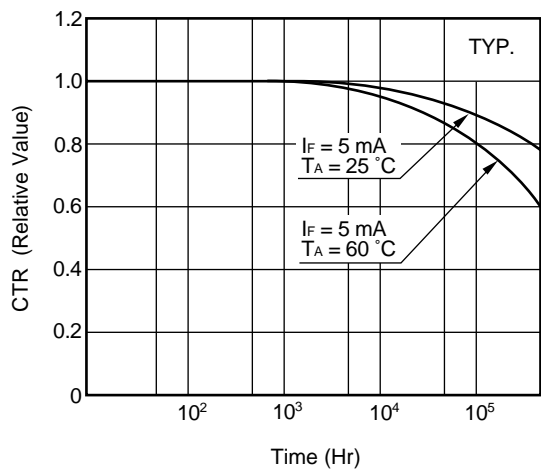
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



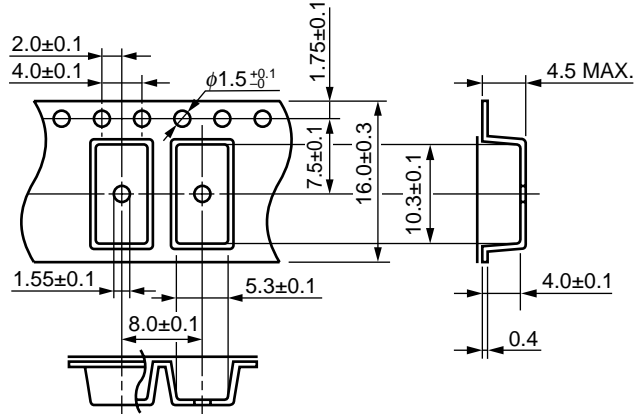
LONG TERM CTR DEGRADATION



Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT : mm)

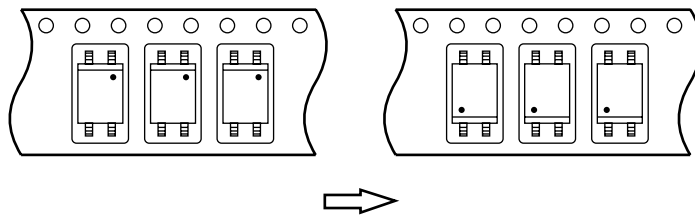
Outline and Dimensions (Tape)



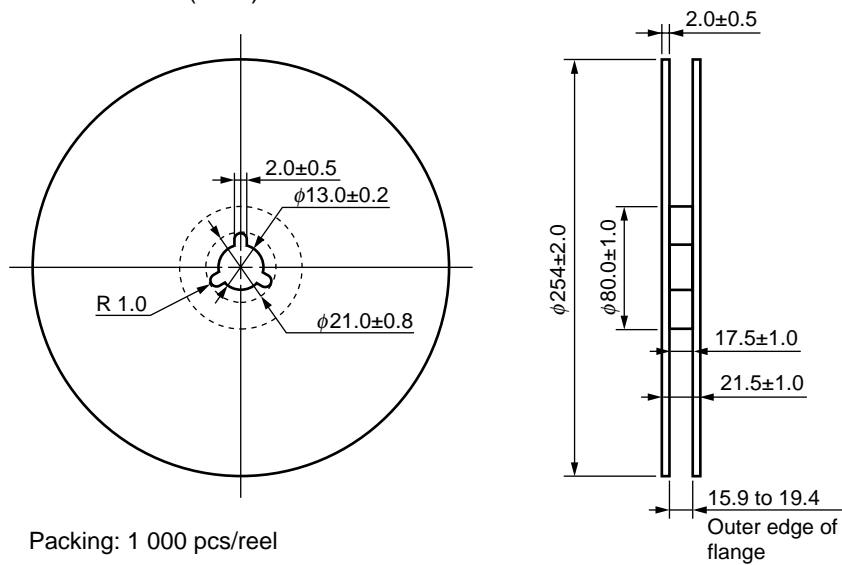
Tape Direction

PS2561L-1-E3

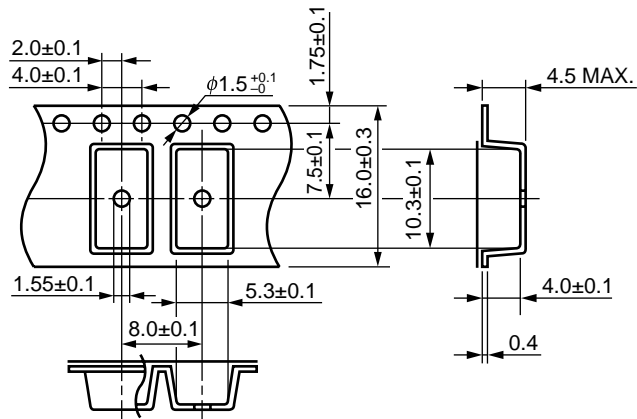
PS2561L-1-E4



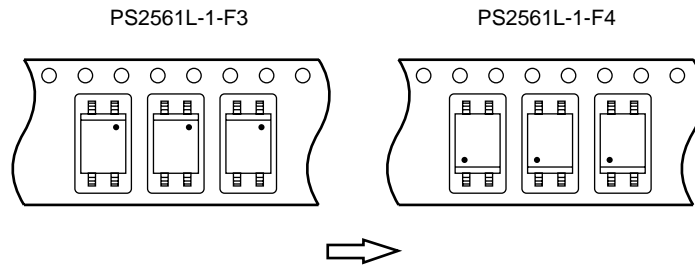
Outline and Dimensions (Reel)



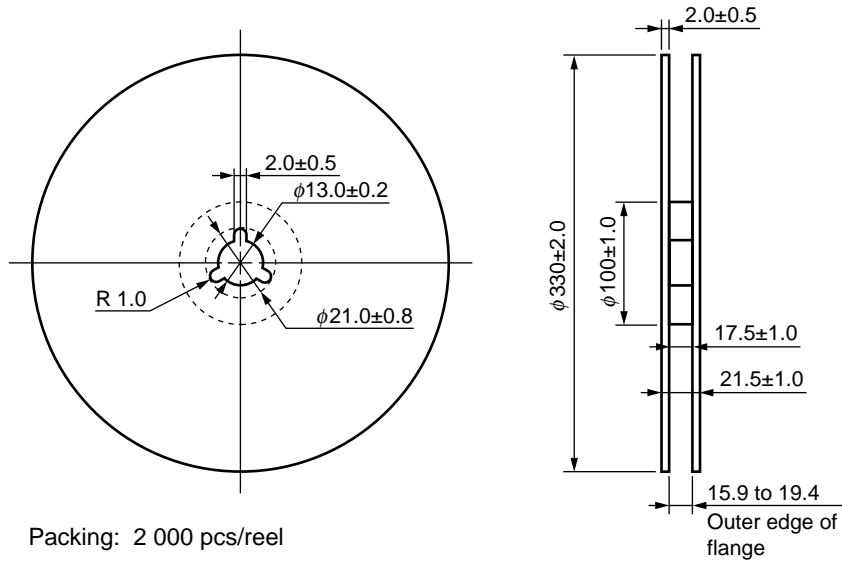
Outline and Dimensions (Tape)



Tape Direction

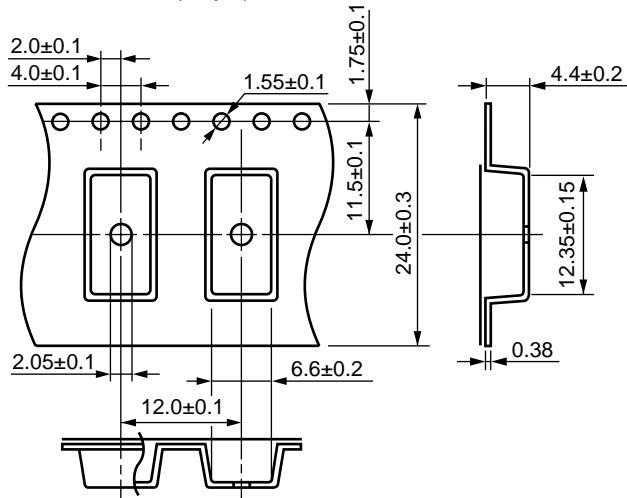


Outline and Dimensions (Reel)

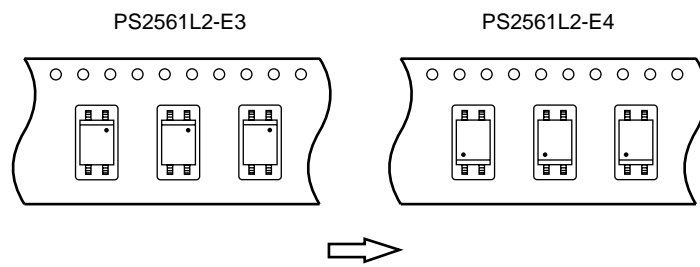


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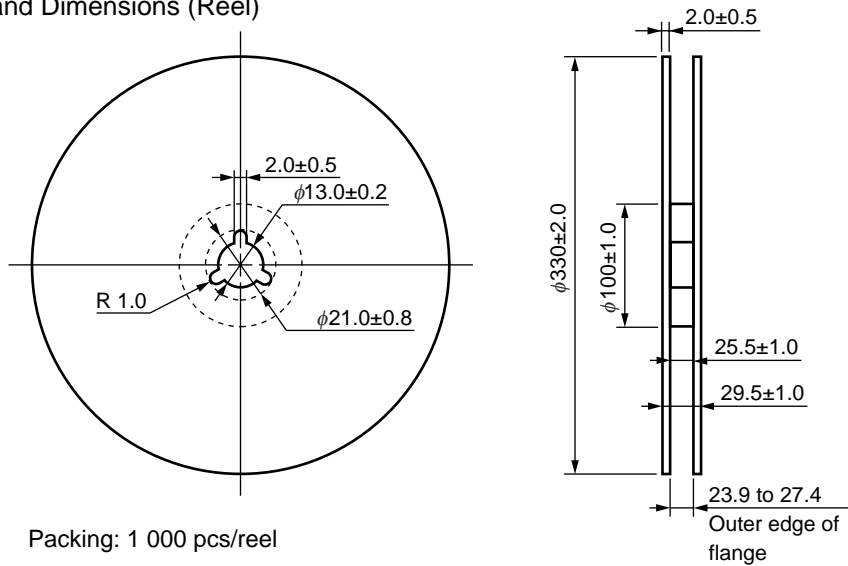
Outline and Dimensions (Tape)



Tape Direction

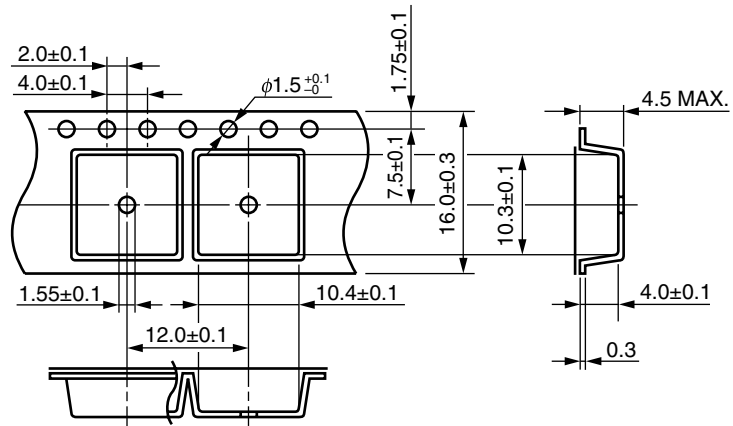


Outline and Dimensions (Reel)

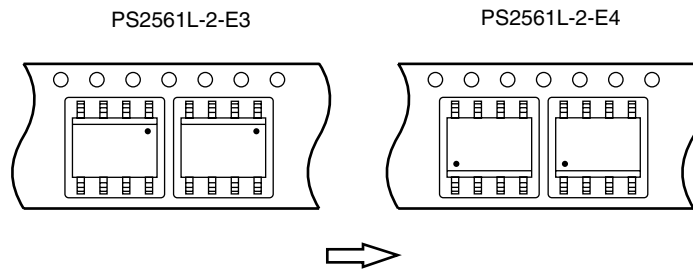


Packing: 1 000 pcs/reel

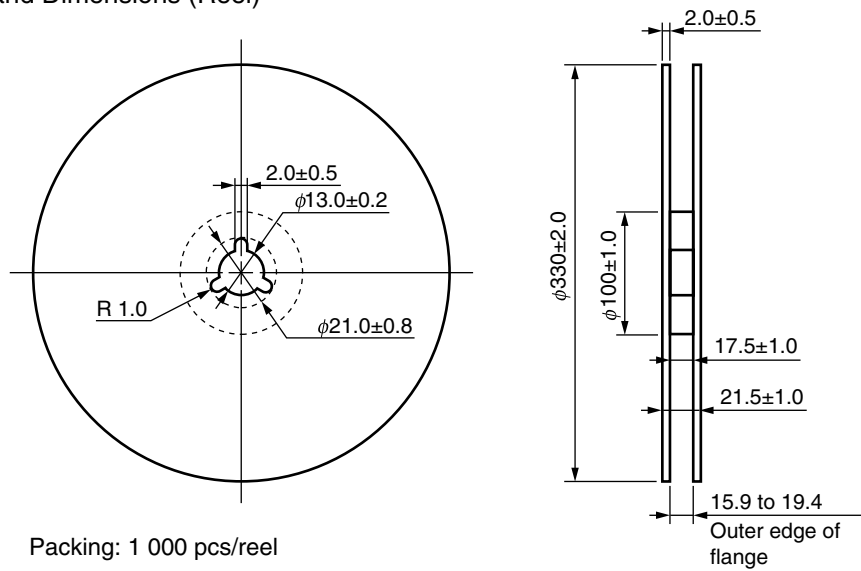
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



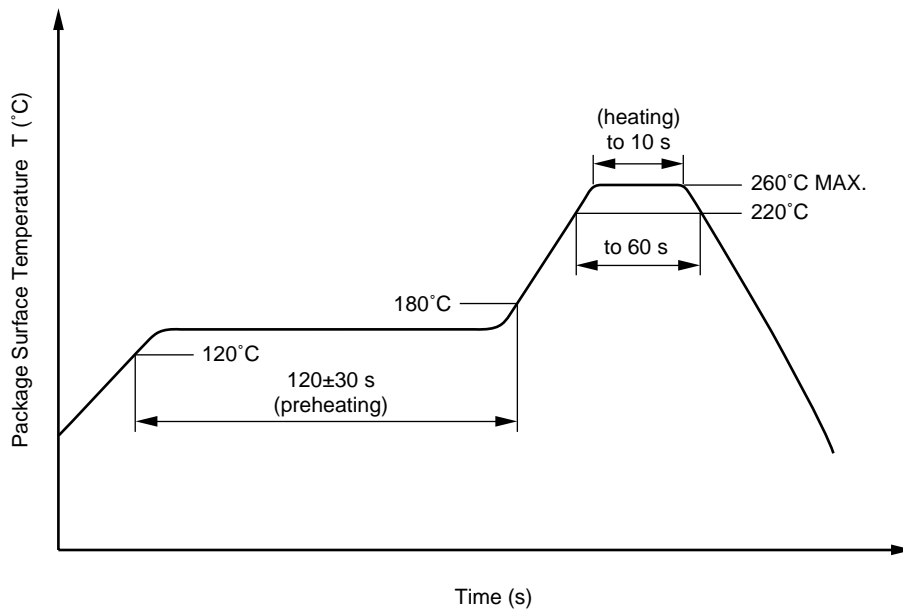
NOTES ON HANDLING

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) 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.

USAGE CAUTIONS

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

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

| Parameter | Symbol | Speck | Unit |
|---|---|-----------------------------|-------------------------------------|
| Application classification (DIN VDE 0109) for rated line voltages ≤ 300 Vr.m.s. for rated line voltages ≤ 600 Vr.m.s. | | IV III | |
| Climatic test class (DIN IEC 68 Teil 1/09.80) | | 55/100/21 | |
| Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.2 \times U_{IORM}$, $P_d < 5$ pC | U_{IORM} U_{pr} | 890 1 068 | V_{peak} V_{peak} |
| Test voltage (partial discharge test, procedure b for all devices test) $U_{pr} = 1.6 \times U_{IORM}$, $P_d < 5$ pC | U_{pr} | 1 424 | V_{peak} |
| Highest permissible overvoltage | U_{TR} | 8 000 | V_{peak} |
| Degree of pollution (DIN VDE 0109) | | 2 | |
| Clearance distance | | > 7.0 | mm |
| Creepage distance | | > 7.0 | mm |
| Comparative tracking index (DIN IEC 112/VDE 0303 part 1) | CTI | 175 | |
| Material group (DIN VDE 0109) | | III a | |
| Storage temperature range | T_{stg} | -55 to +150 | $^{\circ}C$ |
| Operating temperature range | T_A | -55 to +100 | $^{\circ}C$ |
| Isolation resistance, minimum value $V_{IO} = 500$ V dc at $T_A = 25$ $^{\circ}C$ $V_{IO} = 500$ V dc at T_A MAX. at least 100 $^{\circ}C$ | 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 , $\Psi_i = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500$ V dc at $T_A = 175$ $^{\circ}C$ (T_{si}) | T_{si} I_{si} Ψ_{si} Ris MIN. | 175 400 700 10^9 | $^{\circ}C$ mA mW Ω |

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.