

# PS2561-1,-2, PS2561L-1,-2

## HIGH ISOLATION VOLTAGE SINGLE TRANSISTOR TYPE MULTI PHOTOCOUPLER SERIES

### DESCRIPTION

The PS2561-1, -2 and PS2561L-1, -2 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

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

### FEATURES

- High isolation voltage      BV = 5 000 Vr.m.s.: standard products  
                                         BV = 3 750 Vr.m.s.: VDE0884 approved products (Option)
- High collector to emitter voltage ( $V_{CEO} = 80 \text{ V}$ )
- High current transfer ratio (CTR = 200 % TYP.)
- High-speed switching ( $t_r = 3 \mu\text{s}$  TYP.,  $t_f = 5 \mu\text{s}$  TYP.)
- UL approved (File No. E72422 (S) )
- ★ • CSA approved (No. CA 101391)
- BSI approved (BS415, BS7002) No. 7112
- SEMKO approved (SS4410165) No. 9317144
- NEMKO approved (NEK-HD 195S6) No. A21409
- DEMKO approved (Section 101, 137) No. 300535
- ★ • FIMKO approved (E69-89) No. 167265-08
- VDE0884 approved (Option)

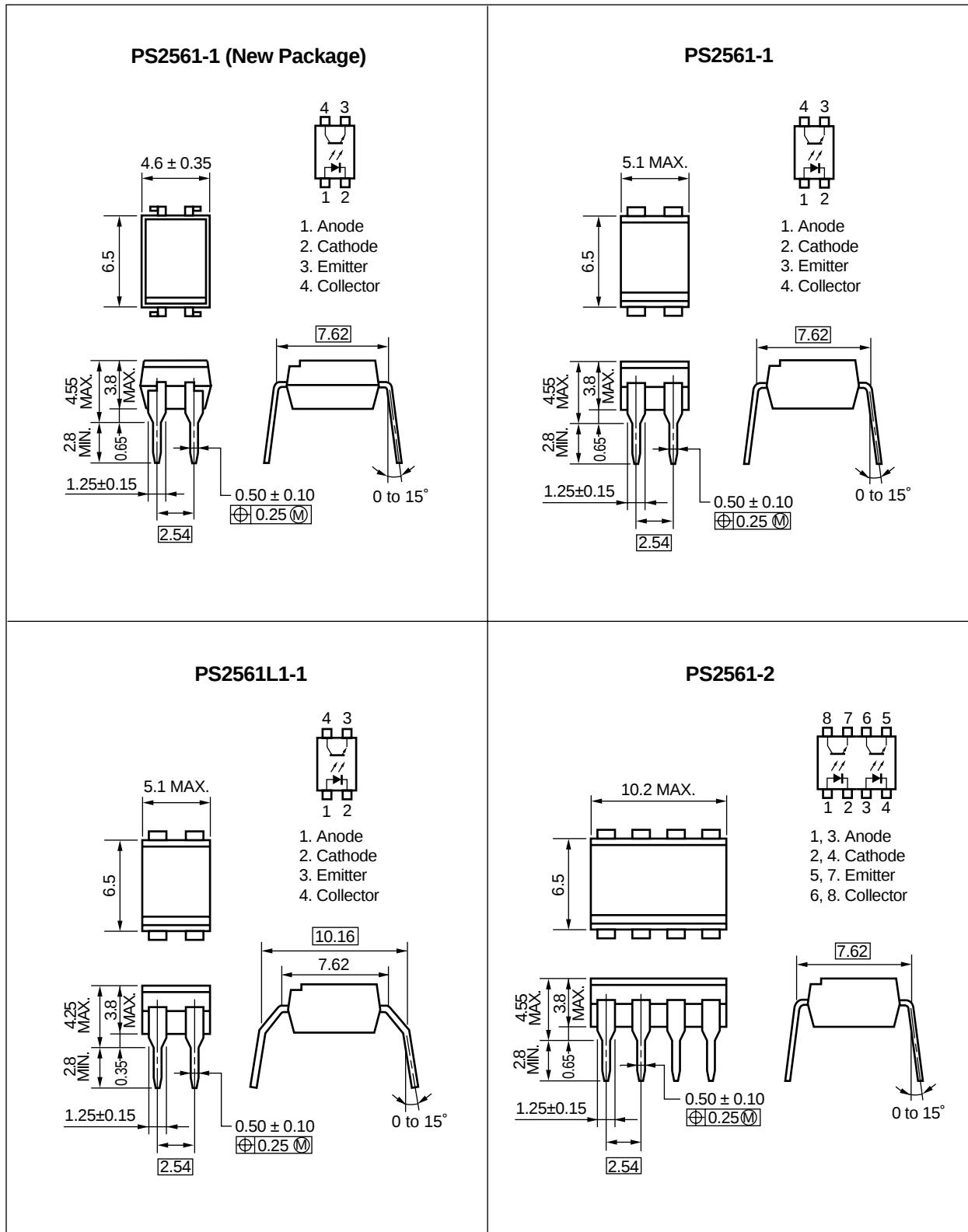
### APPLICATIONS

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

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

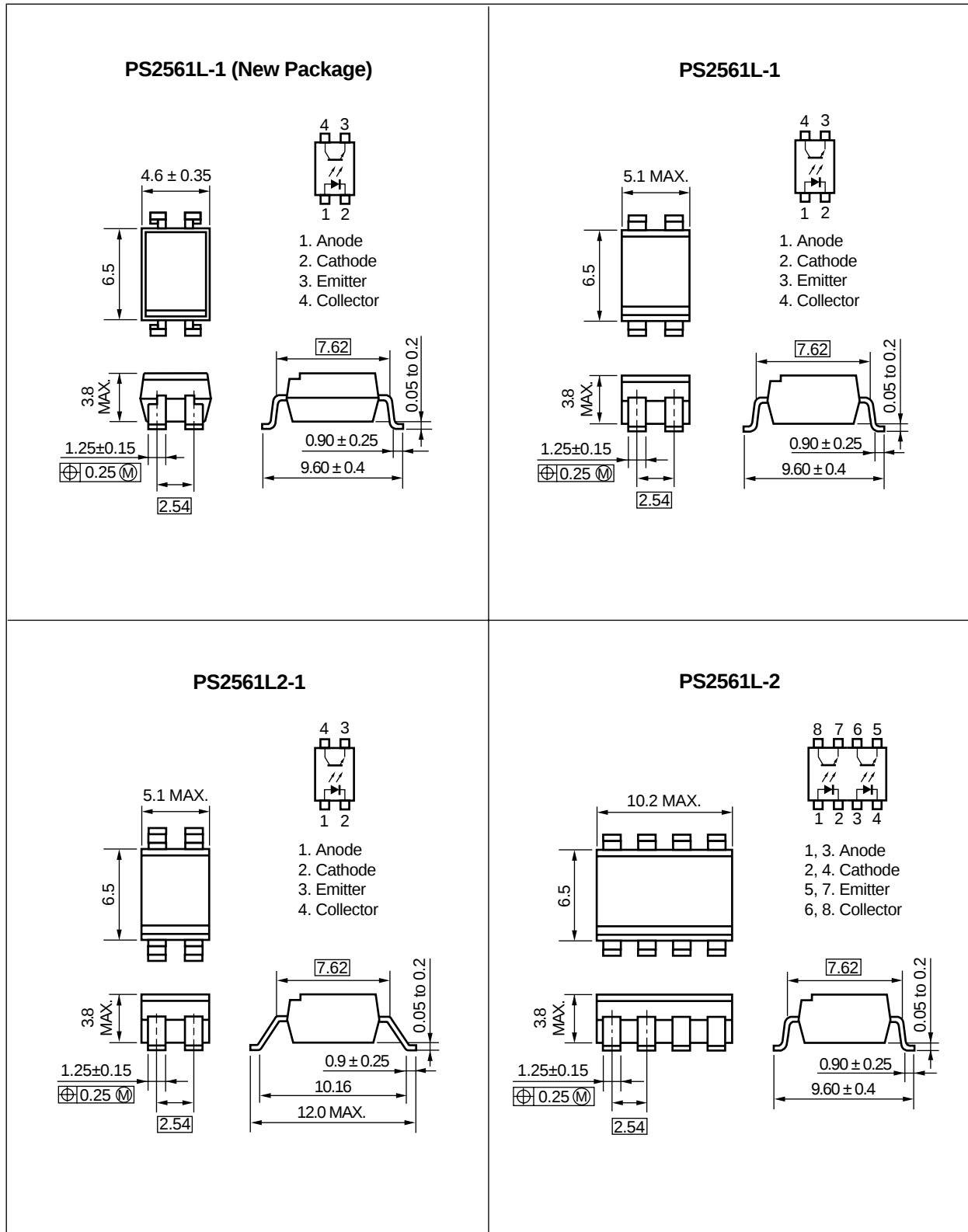
★ PACKAGE DIMENSIONS (in millimeters)

DIP Type



Caution New package 1ch only

Lead Bending Type



Caution New package 1ch only

★ ORDERING INFORMATION

| Part Number                                               | Package                                                                                                                             | Safety Standard Approval                                                                                                                      | Application part number <sup>*1</sup> |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| PS2561-1<br>PS2561L-1<br>PS2561L1-1<br>PS2561L2-1         | 4-pin DIP<br>4-pin DIP (lead bending surface mount)<br>4-pin DIP (for long distance)<br>4-pin DIP (for long distance surface mount) | Standard products<br>• UL approved • CSA approved<br>• BSI approved • NEMKO approved<br>• DEMKO approved • SEMKO approved<br>• FIMKO approved | PS2561-1                              |
| PS2561-2<br>PS2561L-2                                     | 8-pin DIP<br>8-pin DIP (lead bending surface mount)                                                                                 |                                                                                                                                               | PS2561-2                              |
| PS2561-1-V<br>PS2561L-1-V<br>PS2561L1-1-V<br>PS2561L2-1-V | 4-pin DIP<br>4-pin DIP (lead bending surface mount)<br>4-pin DIP (for long distance)<br>4-pin DIP (for long distance surface mount) | VDE0884 approved products (Option)                                                                                                            | PS2561-1                              |
| PS2561-2-V<br>PS2561L-2-V                                 | 8-pin DIP<br>8-pin DIP (lead bending surface mount)                                                                                 |                                                                                                                                               | PS2561-2                              |

\*1 As applying to Safety Standard, following part number should be used.

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

| Parameter                       |                                    | Symbol              | Ratings                      |                        | Unit    |
|---------------------------------|------------------------------------|---------------------|------------------------------|------------------------|---------|
|                                 |                                    |                     | PS2561-1,<br>PS2561L-1       | PS2561-2,<br>PS2561L-2 |         |
| ★ 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<br>3 750 <sup>*3</sup> |                        | 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

\*3 VDE0884 approved products (Option)

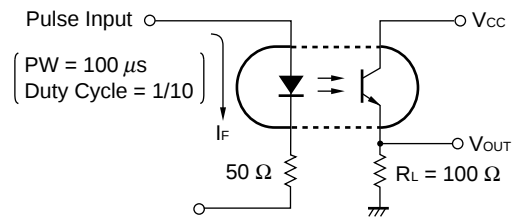
ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

| 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 <sup>*1</sup> | CTR                  | I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V                          | 80               | 200  | 400  | %    |
|              | 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                                             | 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 PS2561-1, PS2561L-1)

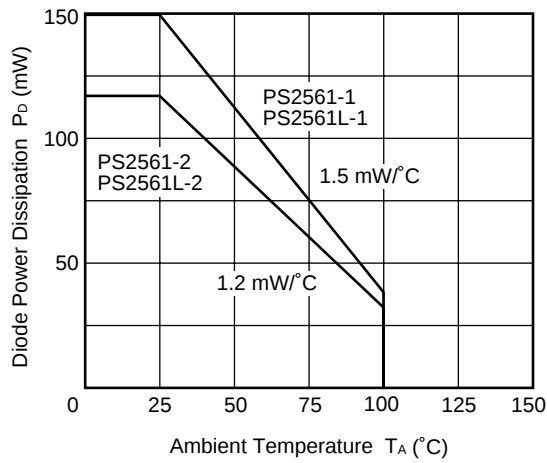
L : 200 to 400 (%)  
M : 80 to 240 (%)  
D : 100 to 300 (%)  
H : 80 to 160 (%)  
W : 130 to 260 (%)

\*2 Test circuit for switching time

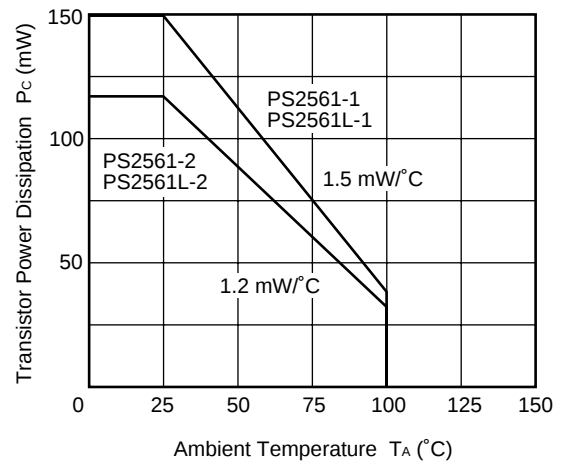


**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)**

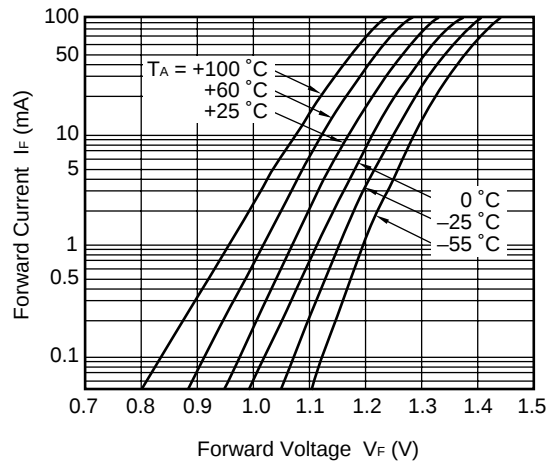
**DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE**



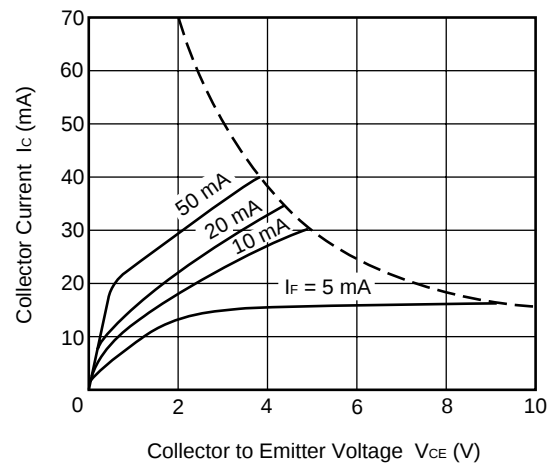
**TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE**



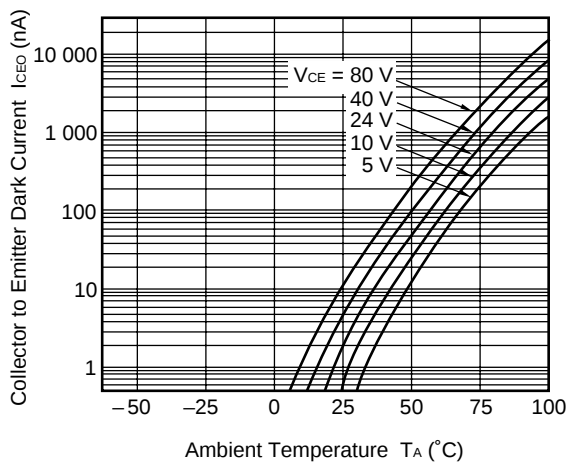
**FORWARD CURRENT vs. FORWARD VOLTAGE**



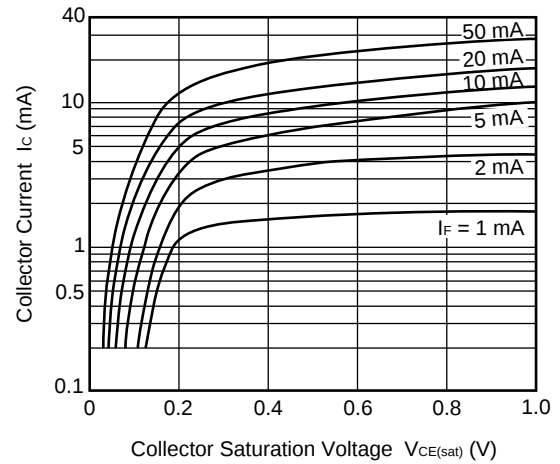
**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



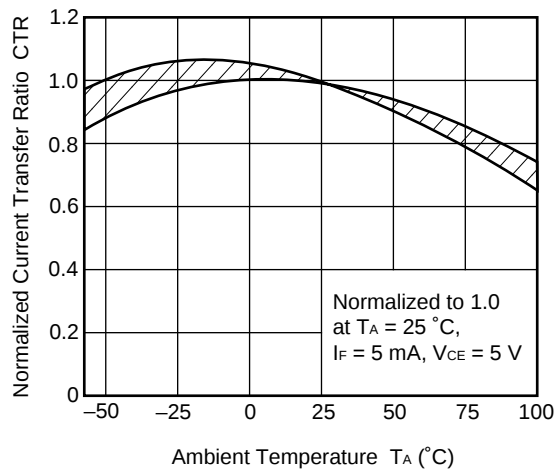
**COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE**



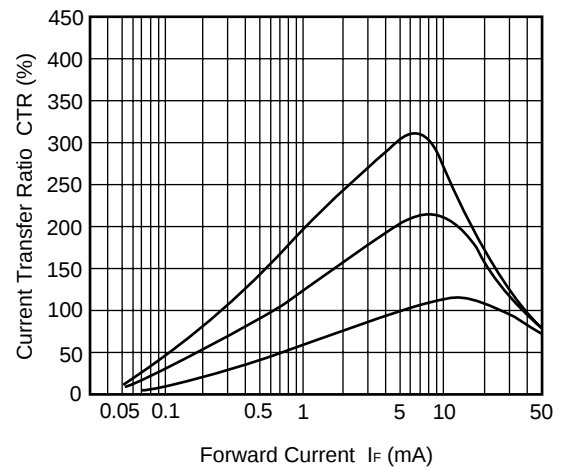
**COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE**



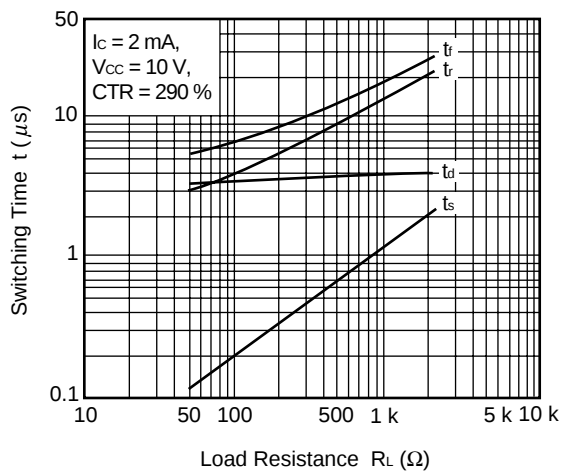
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



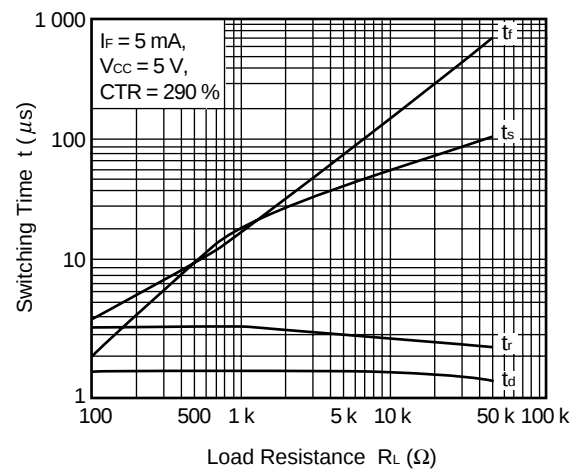
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



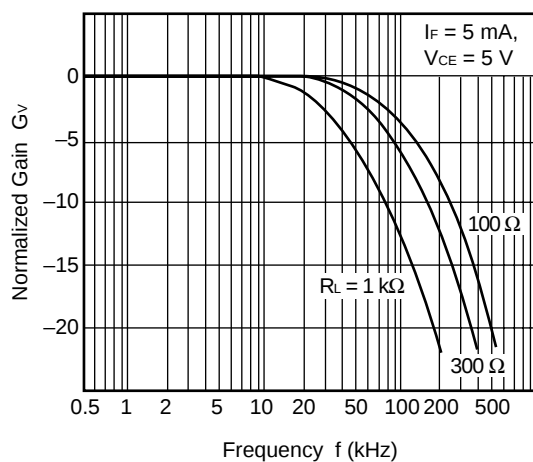
SWITCHING TIME vs. LOAD RESISTANCE



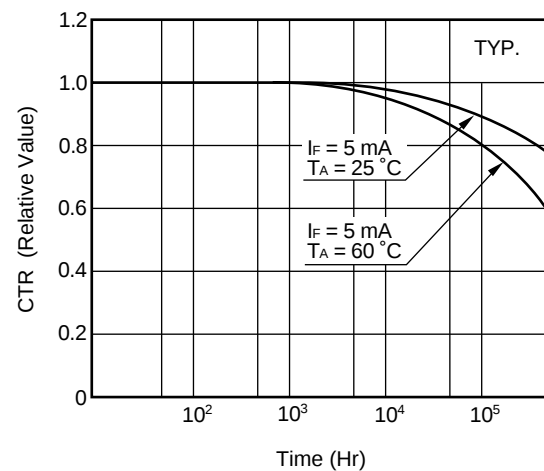
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

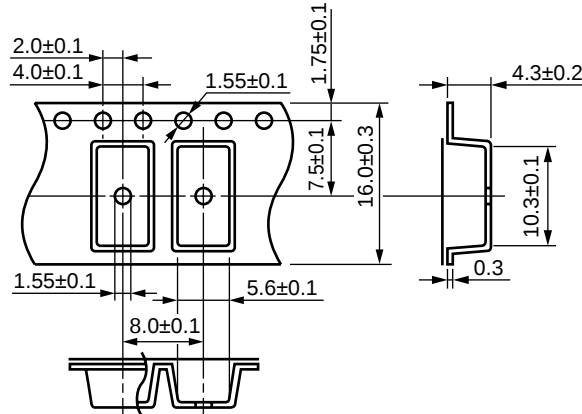


LONG TIME CTR DEGRADATION

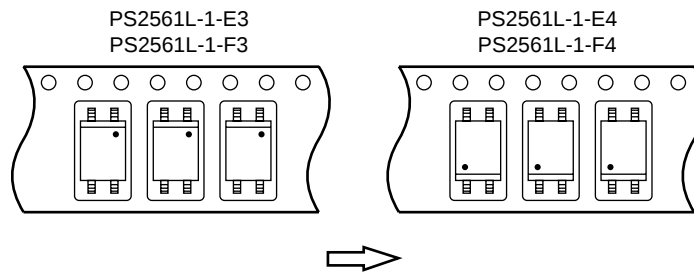


★ TAPING SPECIFICATIONS (in millimeters)

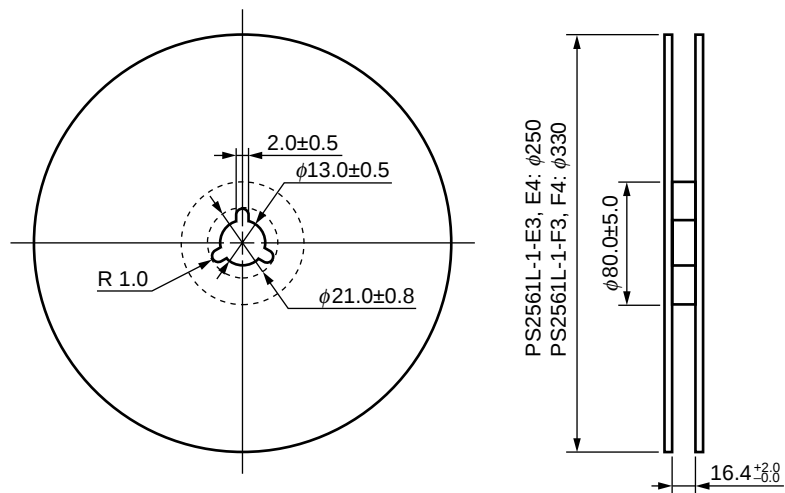
Outline and Dimensions (Tape)



Taping Direction

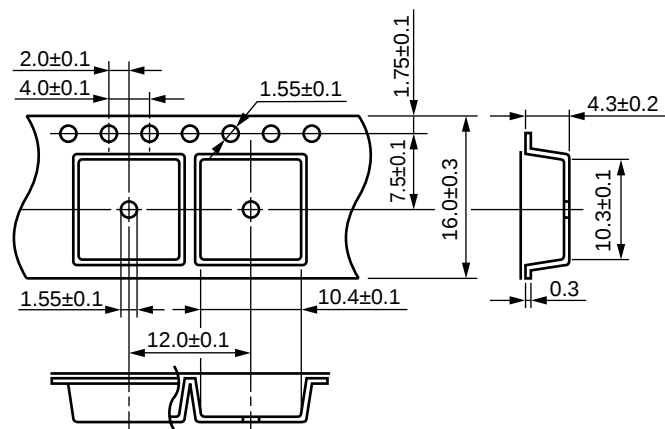


Outline and Dimensions (Reel)

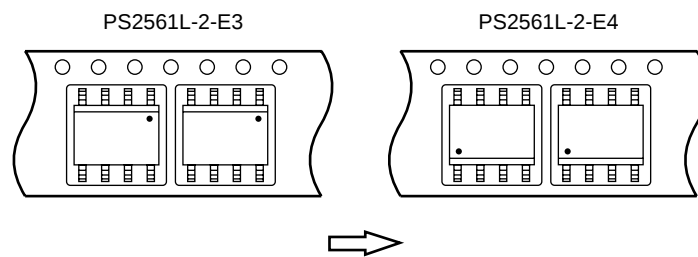


Packing: PS2561L-1-E3, E4 1 000 pcs/reel  
PS2561L-1-F3, F4 2 000 pcs/reel

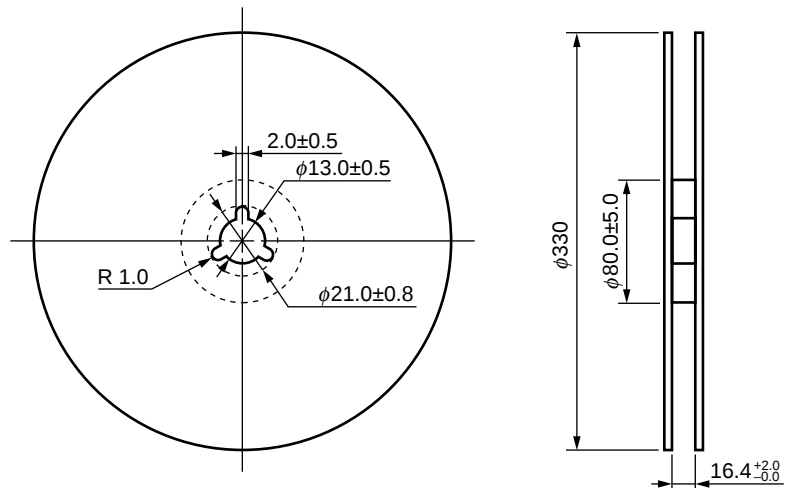
Outline and Dimensions (Tape)



Taping Direction



Outline and Dimensions (Reel)



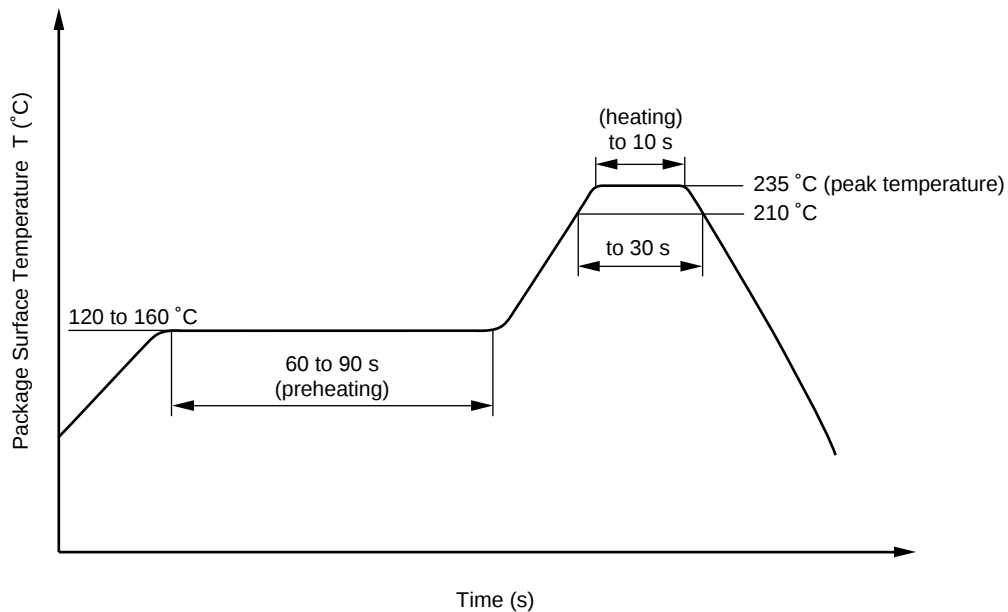
Packing: 1 000 pcs/reel

★ **RECOMMENDED SOLDERING CONDITIONS**

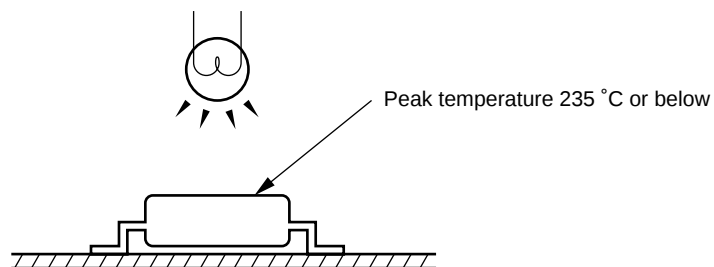
**(1) Infrared reflow soldering**

- 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** Please avoid to removed the residual flux by water after the first reflow processes.



**(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.)

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

| Parameter                                                                                                                                                                                                                                                                                    | Symbol                                       | Speck                       | Unit                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------|----------------------------|
| Application classification (DIN VDE 0109)<br>for rated line voltages $\leq 300$ Vr.m.s.<br>for rated line voltages $\leq 600$ Vr.m.s.                                                                                                                                                        |                                              | IV<br>III                   |                            |
| Climatic test class (DIN IEC 68 Teil 1/09.80)                                                                                                                                                                                                                                                |                                              | 55/100/21                   |                            |
| Dielectric strength maximum operating isolation voltage<br>Test voltage (partial discharge test procedure a for type test and random test)<br>$U_{pr} = 1.2 \times U_{IORM}$ , $P_d < 5$ pC                                                                                                  | $U_{IORM}$<br>$U_{pr}$                       | 890<br>1 068                | $V_{peak}$<br>$V_{peak}$   |
| Test voltage (partial discharge test procedure b for random test)<br>$U_{pr} = 1.6 \times U_{IORM}$ , $P_d < 5$ pC                                                                                                                                                                           | $U_{pr}$                                     | 1 424                       | $V_{peak}$                 |
| Highest permissible overvoltage                                                                                                                                                                                                                                                              | $U_{TR}$                                     | 6 000                       | $V_{peak}$                 |
| 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                 | °C                         |
| Operating temperature range                                                                                                                                                                                                                                                                  | $T_A$                                        | -55 to +100                 | °C                         |
| Isolation resistance, minimum value<br>$V_{IO} = 500$ V dc at $T_A = 25$ °C<br>$V_{IO} = 500$ V dc at $T_A$ MAX. at least 100 °C                                                                                                                                                             | Ris MIN.<br>Ris MIN.                         | $10^{12}$<br>$10^{11}$      | $\Omega$<br>$\Omega$       |
| Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)<br>Package temperature<br>Current (input current $I_F$ , $P_{si} = 0$ )<br>Power (output or total power dissipation)<br>Isolation resistance<br>$V_{IO} = 500$ V dc at $T_A = 175$ °C ( $T_{si}$ ) | $T_{si}$<br>$I_{si}$<br>$P_{si}$<br>Ris MIN. | 175<br>400<br>700<br>$10^9$ | °C<br>mA<br>mW<br>$\Omega$ |

## 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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Anti-radioactive design is not implemented in this product.