# PS2561F-1,PS2561FL-1

Data Sheet
R08DS0033EJ0100
Rev.1.00
Jan 06, 2012

DIP PHOTOCOUPLER, OPERATING AMBIENT TEMPERATURE 110°C

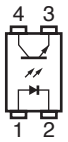
## <R> DESCRIPTION

The PS2561F-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor.
The PS2561F-1 is in a plastic DIP (Dual In-line Package) and the PS2561FL-1 is lead bending type (Gull-wing) for surface mount.

## FEATURES

- Operating ambient temperature: 110°C
- High Isolation voltage (BV = 5 000 Vr.m.s.)
- High collector to emitter voltage ($V_{CEO}$ = 80 V)
- High current transfer ratio (CTR = 450% TYP.)
- High-speed switching ($t_r$ = 5 μs TYP., $t_f$ = 7 μs TYP.)
- <R> Embossed tape product: PS2561FL-1-F3 : 2 000 pcs/reel
- Pb-Free product
- <R> Safety standard
  - UL approved: No. E72422

**PIN CONNECTION**
(Top View)




1. Anode
2. Cathode
3. Emitter
4. Collector

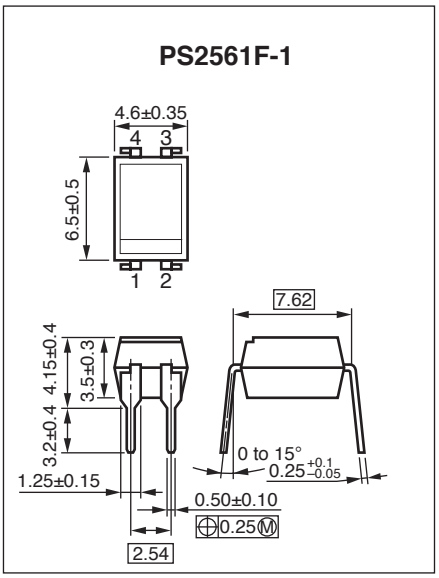
## APPLICATIONS

- <R> Power meter
- Telephone/FAX.
- FA/OA equipment
- Programmable logic controller

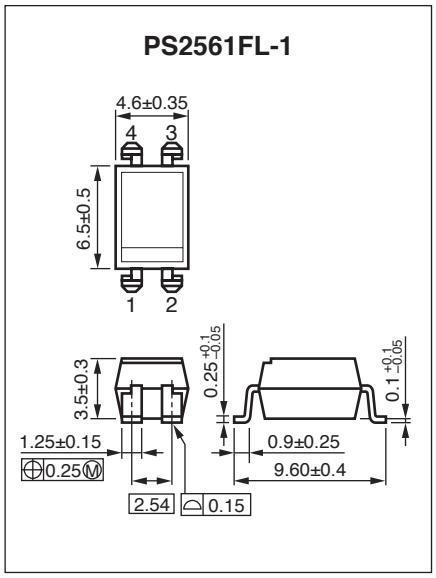
The mark <R> shows major revised points.
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

## <R> PACKAGE DIMENSIONS (UNIT: mm)

### DIP Type



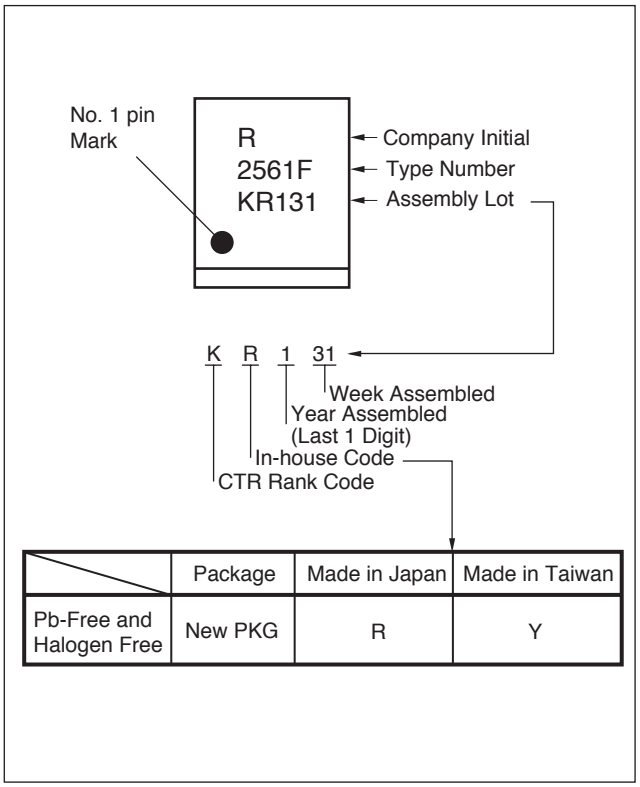

### Lead Bending Type




## <R> PHOTOCOUPLER CONSTRUCTION

| Parameter | PS2561F-1, PS2561FL-1 |
|---|---|
| Air Distance (MIN.) | 7 mm |
| Outer Creepage Distance (MIN.) | 7 mm |
| Inner Creepage Distance (MIN.) | 4 mm |
| Isolation Distance (MIN.) | 0.4 mm |

## <R> MARKING EXAMPLE




| | Package | Made in Japan | Made in Taiwan |
|---|---|---|---|
| Pb-Free and Halogen Free | New PKG | R | Y |

## <R> ORDERING INFORMATION

| Part Number | Order Number | Solder Plating Specification | Packing Style | Safety Standard Approval | Application Part Number*1 |
|---|---|---|---|---|---|
| PS2561F-1 | PS2561F-1Y-A | Pb-Free and Halogen Free | Magazine case 100 pcs | Standard products (UL approved) | PS2561F-1 |
| PS2561FL-1 | PS2561FL-1Y-A | | | | PS2561FL-1 |
| PS2561FL-1-F3 | PS2561FL-1Y-F3-A | | Embossed Tape 2 000 pcs/reel | | |

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

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

<R>

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Diode | Reverse Voltage | $V_R$ | 6 | V |
| | Forward Current (DC) | $I_F$ | 30 | mA |
| | Power Dissipation Derating | $\Delta P_D$/°C | 1.5 | mW/°C |
| | Power Dissipation | $P_D$ | 150 | mW |
| | 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 |
| | Power Dissipation Derating | $\Delta P_C$/°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 +110 | °C |
| Storage Temperature | | $T_{stg}$ | −55 to +150 | °C |

Notes: *1. PW = 100 μs, Duty Cycle = 1%

*2. AC voltage for 1 minute at $T_A$ = 25°C, RH = 60% between input and output.
Pins 1-2 shorted together, 3-4 shorted together.

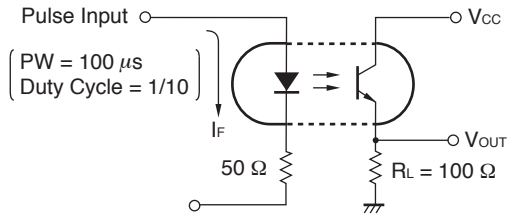
## <R> ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C)

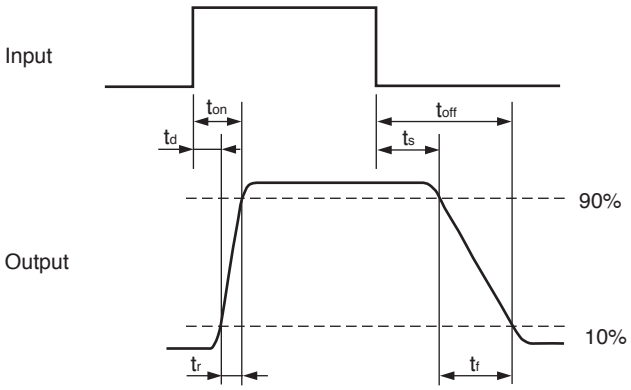
| Parameter | | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|---|
| Diode | Forward Voltage | $V_F$ | $I_F$ = 10 mA | | 1.2 | 1.4 | V |
| | Reverse Current | $I_R$ | $V_R$ = 5 V | | | 5 | μA |
| | Terminal Capacitance | $C_t$ | V = 0 V, f = 1.0 MHz | | 10 | | pF |
| Transistor | Collector to Emitter Dark Current | $I_{CEO}$ | $I_F$ = 0 mA, $V_{CE}$ = 80 V | | | 100 | nA |
| Coupled | Current Transfer Ratio ($I_C/I_F$)*1 | CTR | $I_F$ = 5 mA, $V_{CE}$ = 5 V | 300 | 450 | 600 | % |
| | | | $I_F$ = 1 mA, $V_{CE}$ = 5 V | 60 | | | |
| | 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, | | 5 | 18 | μs |
| | Fall Time*2 | $t_f$ | $R_L$ = 100 Ω | | 7 | 18 | |

Notes: *1. CTR rank

| CTR Rank | CTR (%) | Conditions |
|---|---|---|
| K | 300 to 600 | $I_F$ = 5 mA, $V_{CE}$ = 5 V |
| | 60 and larger | $I_F$ = 1 mA, $V_{CE}$ = 5 V |

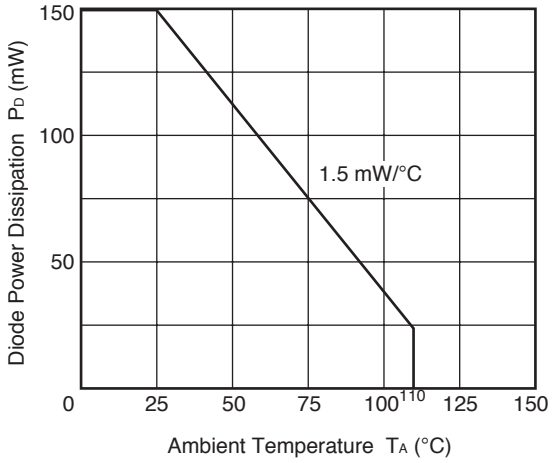
*2. Test circuit for switching time



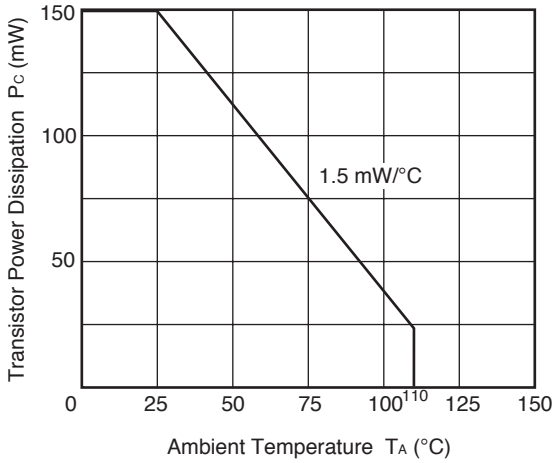



## <R> TYPICAL CHARACTERISTICS ($T_A$ = 25°C, unless otherwise specified)

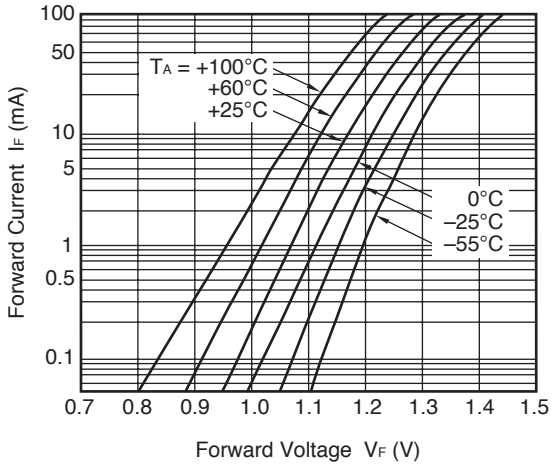
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



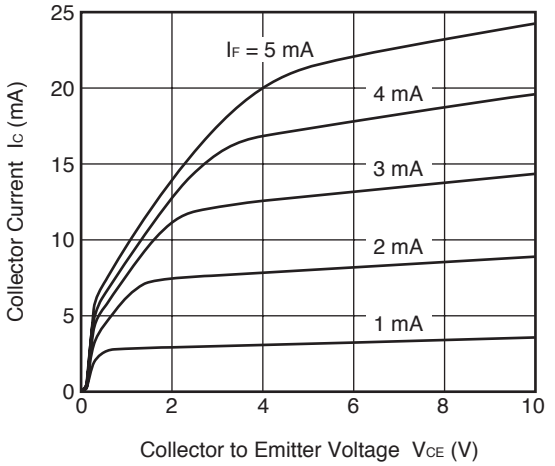

TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



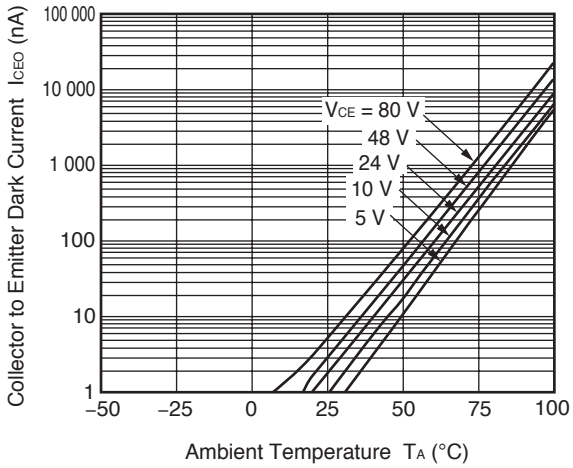

FORWARD CURRENT vs. FORWARD VOLTAGE



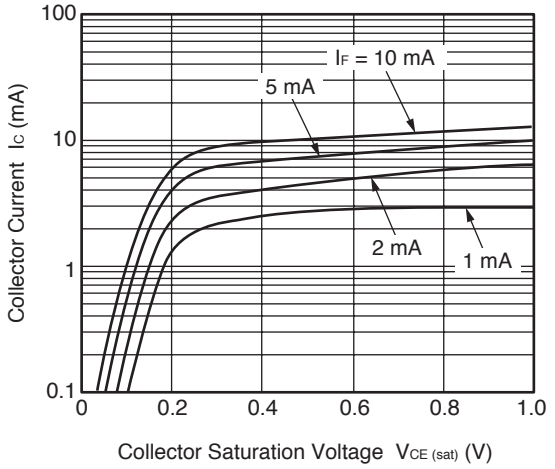

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE




COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

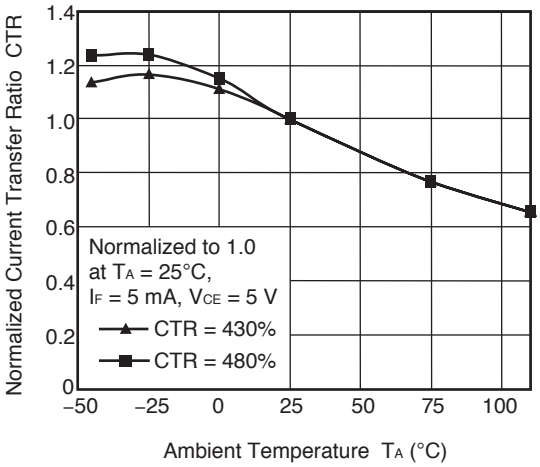



COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

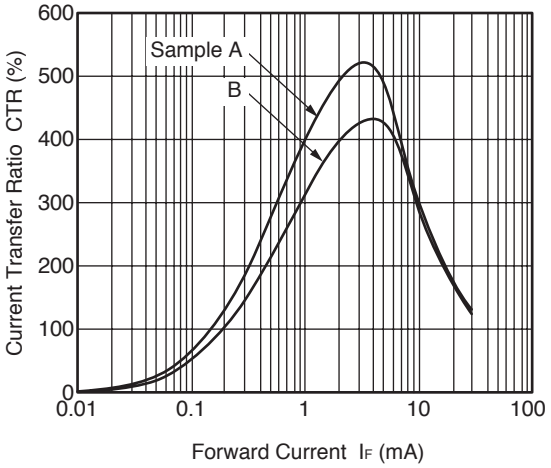



**Remark** The graphs indicate nominal characteristics.

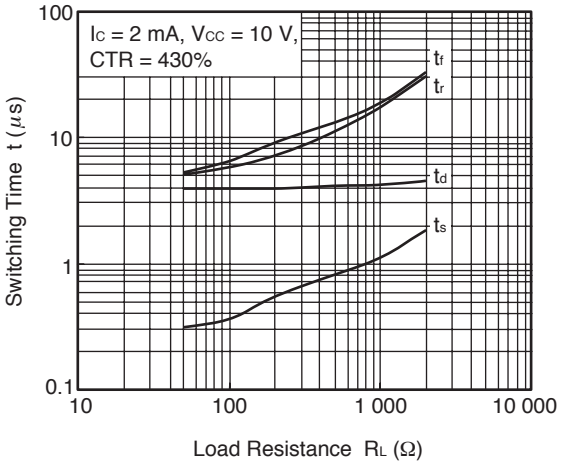
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



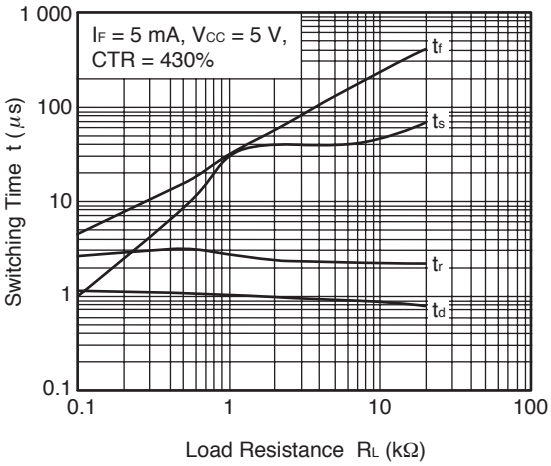

CURRENT TRANSFER RATIO vs. FORWARD CURRENT



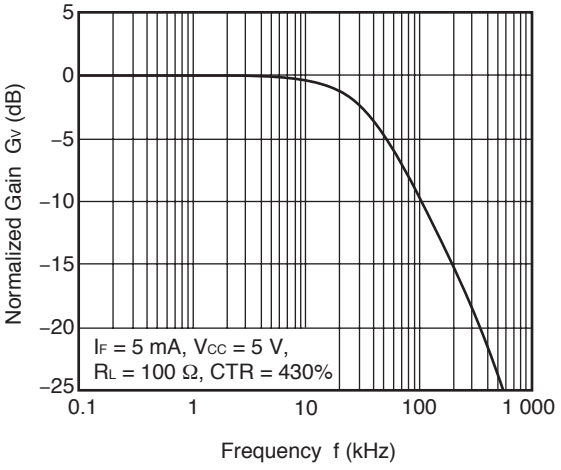

SWITCHING TIME vs. LOAD RESISTANCE




SWITCHING TIME vs. LOAD RESISTANCE

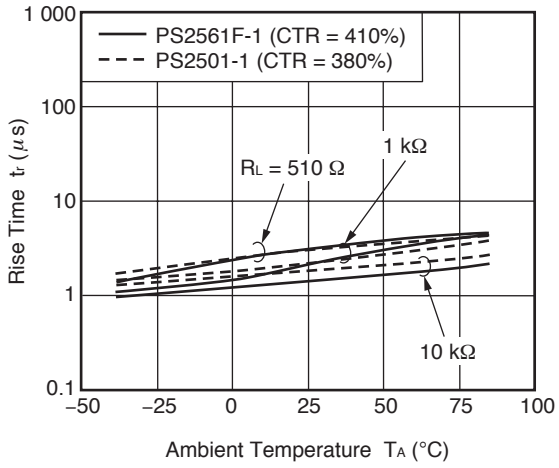



FREQUENCY RESPONSE

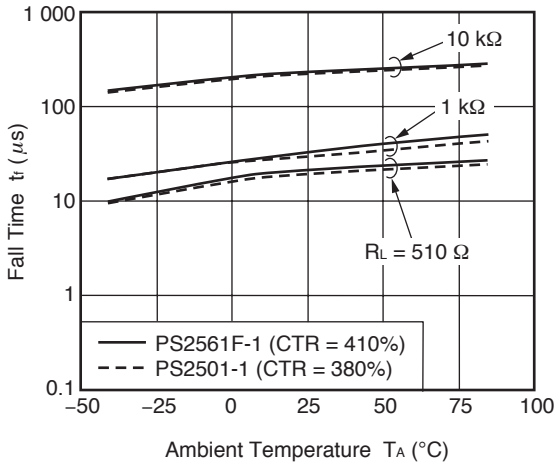



**Remark** The graphs indicate nominal characteristics.

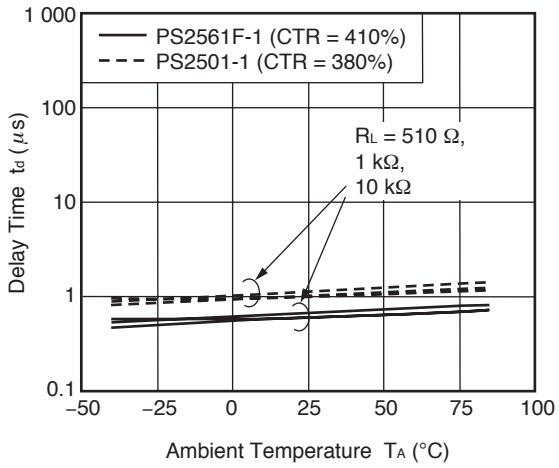
RISE TIME vs. AMBIENT TEMPERATURE*1



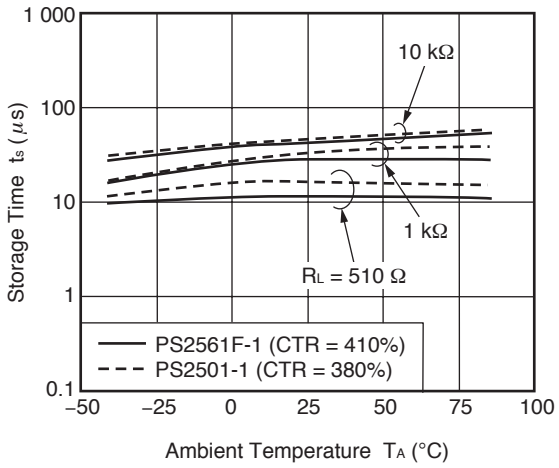

FALL TIME vs. AMBIENT TEMPERATURE*1



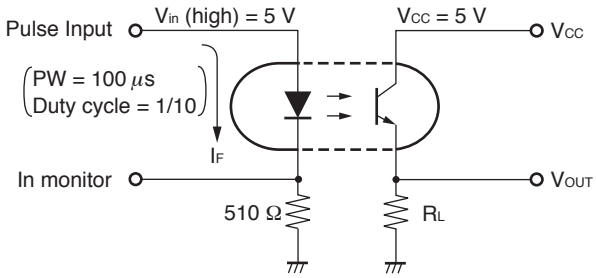

DELAY TIME vs. AMBIENT TEMPERATURE*1

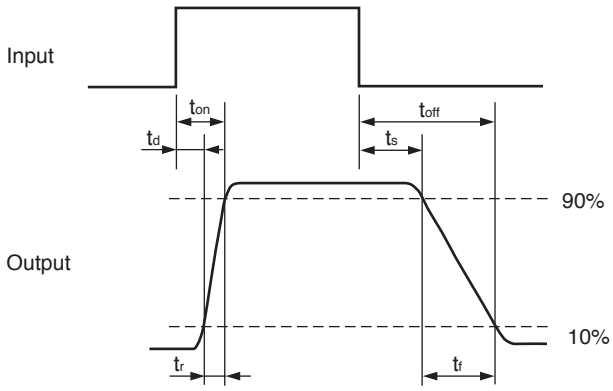



STORAGE TIME vs. AMBIENT TEMPERATURE*1




***1** Test circuit for switching time above

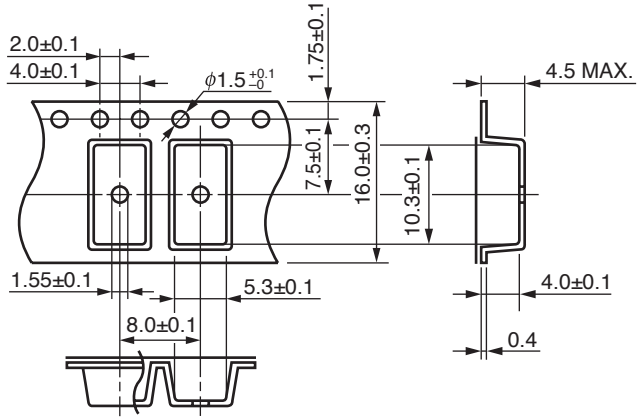


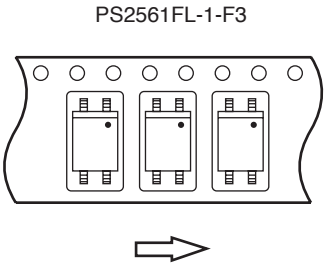

**Remark** The graphs indicate nominal characteristics.

## <R> TAPING SPECIFICATIONS (UNIT: mm)

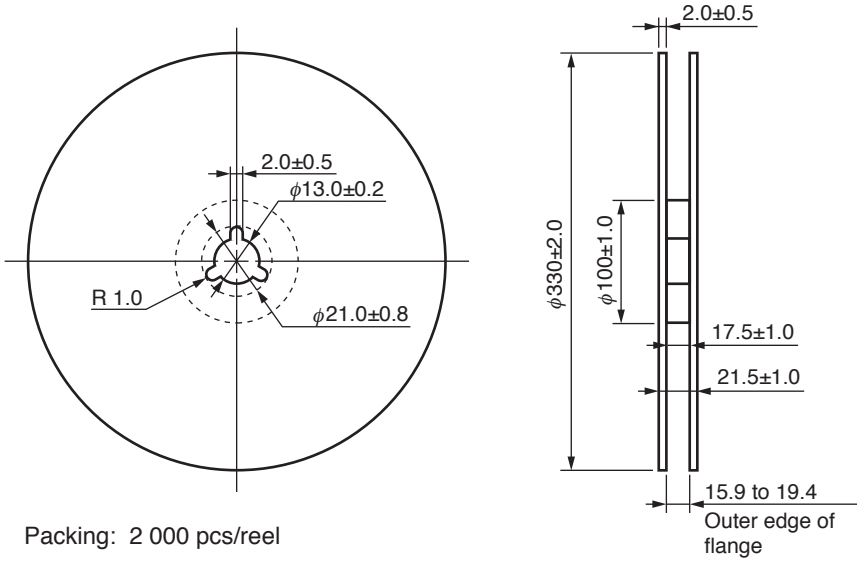
Outline and Dimensions (Tape)




Tape Direction

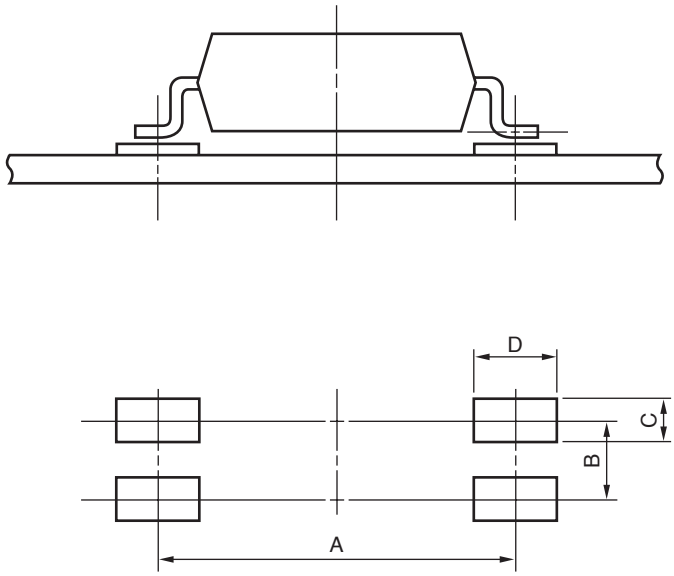



Outline and Dimensions (Reel)




Packing: 2 000 pcs/reel

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




| Part Number | Lead Bending | A | B | C | D |
|---|---|---|---|---|---|
| PS2561FL | lead bending type (Gull-wing) for surface mount | 9.2 | 2.54 | 1.7 | 2.2 |

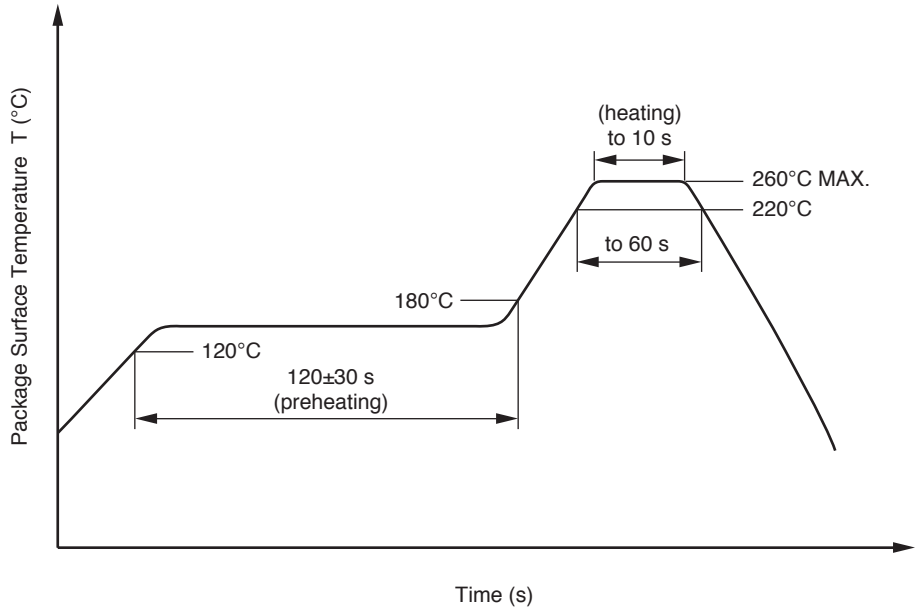
## <R> NOTES ON HANDLING

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

(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 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. 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.

| | |
|---|---|
| **Caution** GaAs Products | 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.<br>• 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.<br>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.<br>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.<br>• Do not burn, destroy, cut, crush, or chemically dissolve the product.<br>• Do not lick the product or in any way allow it to enter the mouth. |

| Revision History | PS2561F-1,PS2561FL-1 Data Sheet |
|---|---|

| Rev. | Date | Description | |
|---|---|---|---|
| | | Page | Summary |
| 0.01 | Dec 22, 2010 | – | First edition issued |
| 1.00 | Jan 06, 2012 | Throughout | Preliminary Data Sheet -> Data Sheet |
| | | Throughout | Safety standards approved |
| | | Throughout | Deletion of the descriptions for PS2561FL1-1,PS2561FL2-1 |
| | | p.1 | Modification of **APPLICATIONS** |
| | | p.3 | Modification of **MARKING EXAMPLE** |
| | | p.3 | Addition of **ORDERING INFORMATION** |
| | | p.4 | Modification of **ABSOLUTE MAXIMUM RATINGS** $I_C$ |
| | | p.5 | Modification of **ELECTRICAL CHARACTERISTICS** $t_r$, $t_f$ |
| | | pp.6 to 8 | Addition of **TYPICAL CHARACTERISTICS** |
| | | p.9 | Addition of **TAPING SPECIFICATIONS** |
| | | p.10 | Modification of **RECOMMENDED MOUNT PAD DIMENSIONS** |
| | | p.11 | Modification of **NOTES ON HANDLING** |

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