NEC

Solid State Relay
OCMOS FET

# PS7200H-1A

## 4-PIN SOP, 2.2 Ω LOW ON-STATE RESISTANCE 1-ch Optical Coupled MOS FET

–NEPOC Series–

### DESCRIPTION

The PS7200H-1A is a low on-state capacitance solid state relay containing a GaAs LED on the light emitting side (input side) and MOS FETs on the output side.

It is suitable for high-frequency signal control, due to its low C × R, low on-state resistance, and low off-state leakage current.

### FEATURES

- Low C × R (C × R = 9.2 pF • Ω)
- Low on-state resistance ($R_{on}$ = 2.2 Ω TYP.)
- Low output capacitance ($C_{out}$ = 4.2 pF TYP.)
- Low off-state leakage current ($I_{Loff}$ = 0.03 nA TYP.)
- High-speed turn-on time ($t_{on}$ = 0.04 ms TYP.)
- 1 channel type (1 a output)
- Designed for AC/DC switching line changer
- Small and thin package (4-pin SOP, Height = 2.1 mm)
- High isolation voltage (BV = 1 500 Vr.m.s.)
- Low offset voltage
- Ordering number of taping product : PS7200H-1A-E3, E4: 900 pcs/reel
  : PS7200H-1A-F3, F4: 3 500 pcs/reel

<R> • Pb-Free product

### APPLICATIONS

- Measurement equipment



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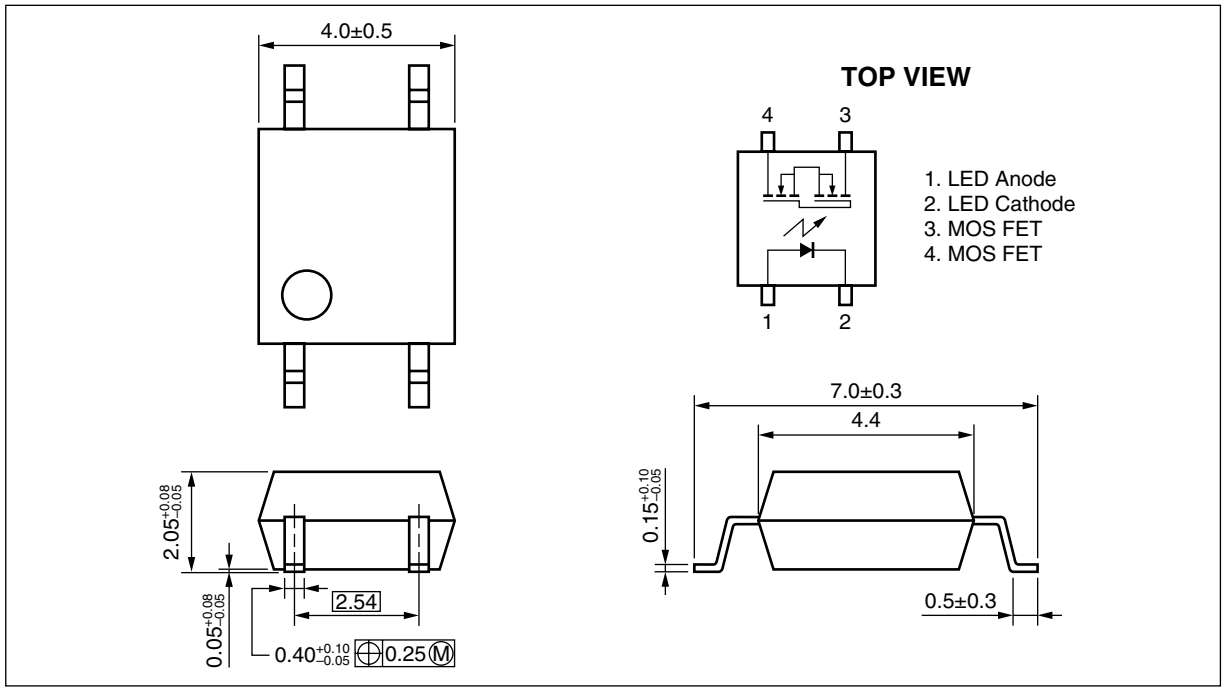
The mark <R> shows major revised points.

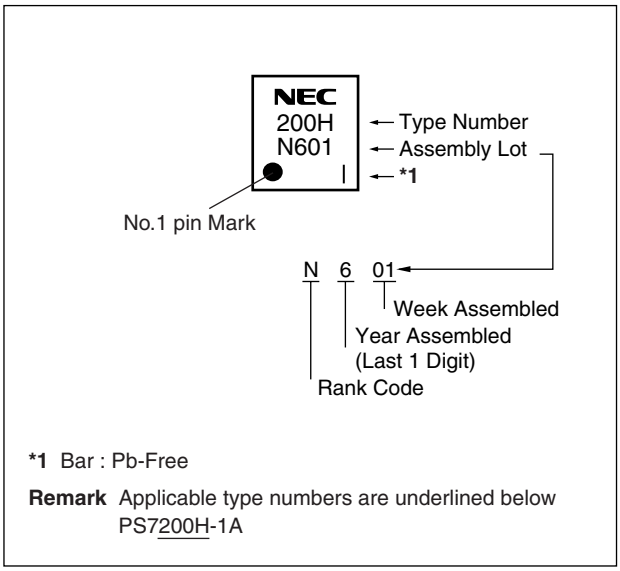


The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

## PACKAGE DIMENSIONS (UNIT: mm)




## <R> MARKING EXAMPLE (LASER MARKING)




***1*** Bar : Pb-Free

**Remark** Applicable type numbers are underlined below
PS7200H-1A

<R> **ORDERING INFORMATION**

| Part Number | Order Number | Solder Plating Specification | Packing Style |
|---|---|---|---|
| PS7200H-1A | PS7200H-1A-A | Pb-Free | Magazine case 100 pcs |
| PS7200H-1A-E3 | PS7200H-1A-E3-A | | Embossed Tape 900 pcs/reel |
| PS7200H-1A-E4 | PS7200H-1A-E4-A | | |
| PS7200H-1A-F3 | PS7200H-1A-F3-A | | Embossed Tape 3 500 pcs/reel |
| PS7200H-1A-F4 | PS7200H-1A-F4-A | | |

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

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Diode | Forward Current (DC) | $I_F$ | 50 | mA |
| | Reverse Voltage | $V_R$ | 5.0 | V |
| | Power Dissipation | $P_D$ | 50 | mW |
| | Peak Forward Current*1 | $I_{FP}$ | 1 | A |
| MOS FET | Break Down Voltage | $V_L$ | 40 | V |
| | Continuous Load Current | $I_L$ | 160 | mA |
| | Pulse Load Current*2 (AC/DC Connection) | $I_{LP}$ | 320 | mA |
| | Power Dissipation | $P_D$ | 100 | mW |
| Isolation Voltage*3 | | BV | 1 500 | Vr.m.s. |
| Total Power Dissipation | | $P_T$ | 150 | mW |
| Operating Ambient Temperature | | $T_A$ | –40 to +85 | °C |
| Storage Temperature | | $T_{stg}$ | –40 to +100 | °C |

***1** PW = 100 $\mu$s, Duty Cycle = 1%

***2** PW = 100 ms, 1 shot

***3** 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.

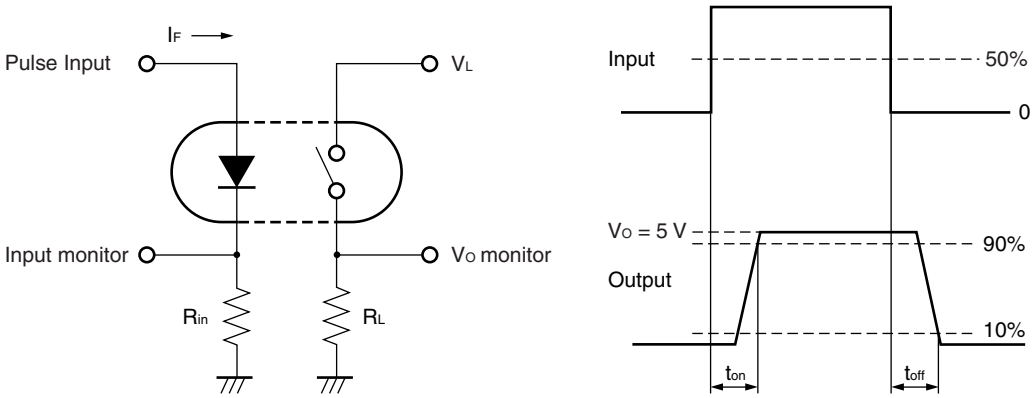
## RECOMMENDED OPERATING CONDITIONS ($T_A$ = 25°C)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|
| LED Operating Current | $I_F$ | 2 | 10 | 20 | mA |
| LED Off Voltage | $V_F$ | 0 | | 0.5 | V |

## 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 | | | 5.0 | $\mu$A |
| MOS FET | Off-state Leakage Current | $I_{Loff}$ | $V_D$ = 40 V | | 0.03 | 10 | nA |
| | Output Capacitance | $C_{out}$ | $V_D$ = 0 V, f = 1 MHz | | 4.2 | | pF |
| Coupled | LED On-state Current | $I_{Fon}$ | $I_L$ = 160 mA | | | 2.0 | mA |
| | On-state Resistance | $R_{on1}$ | $I_F$ = 10 mA, $I_L$ = 50 mA | | 2.2 | 3.5 | Ω |
| | | $R_{on2}$ | $I_F$ = 10 mA, $I_L$ = 160 mA, t ≤ 10 ms | | 2.2 | 3.5 | |
| | Turn-on Time*1, 2 | $t_{on}$ | $I_F$ = 10 mA, $V_O$ = 5 V, $R_L$ = 500 Ω, | | 0.04 | 0.5 | ms |
| | Turn-off Time*1, 2 | $t_{off}$ | PW ≥ 10 ms | | 0.25 | 1.0 | |
| | Isolation Resistance | $R_{I-O}$ | $V_{I-O}$ = 1.0 $kV_{DC}$ | $10^9$ | | | Ω |
| | Isolation Capacitance | $C_{I-O}$ | V = 0 V, f = 1 MHz | | 0.4 | | pF |

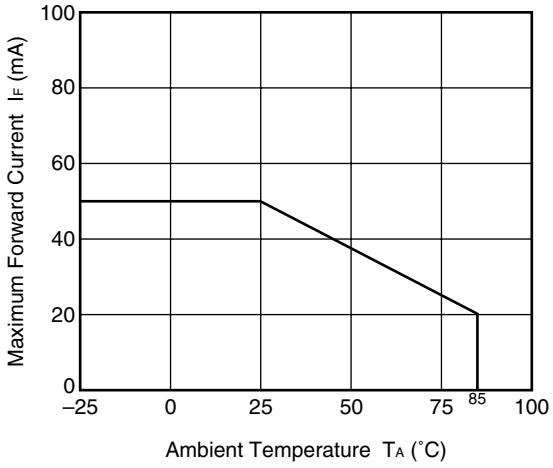
***1** Test Circuit for Switching Time



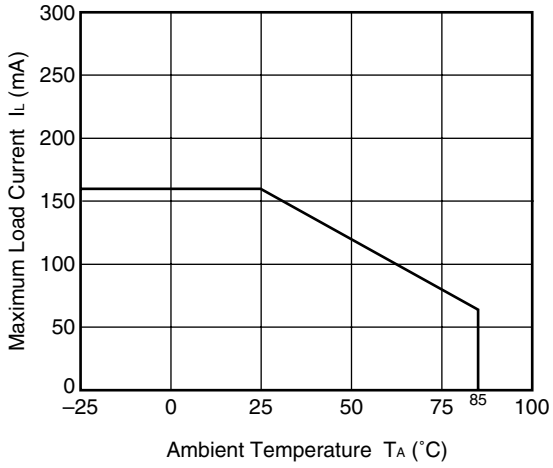

***2** The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms.
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

**TYPICAL CHARACTERISTICS ($T_A$ = 25°C, unless otherwise specified)**

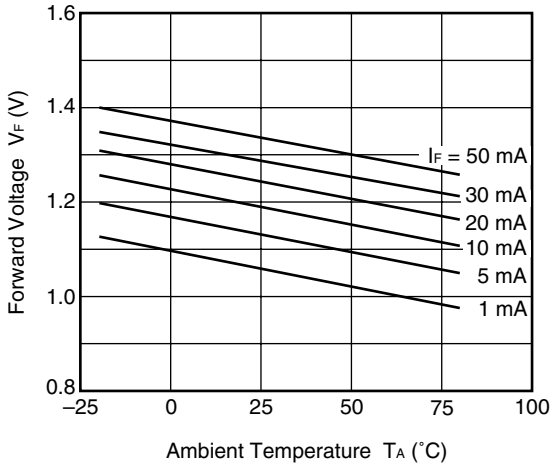
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



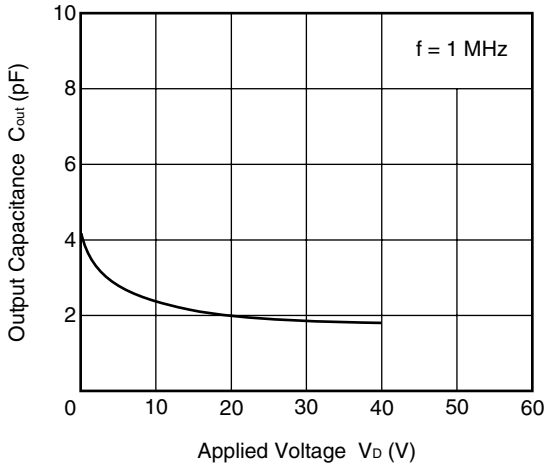

MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



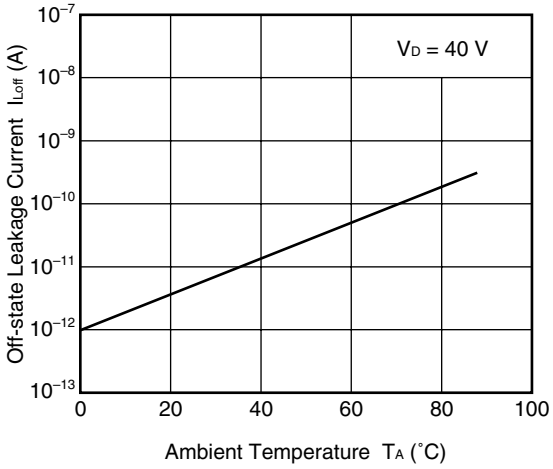

FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



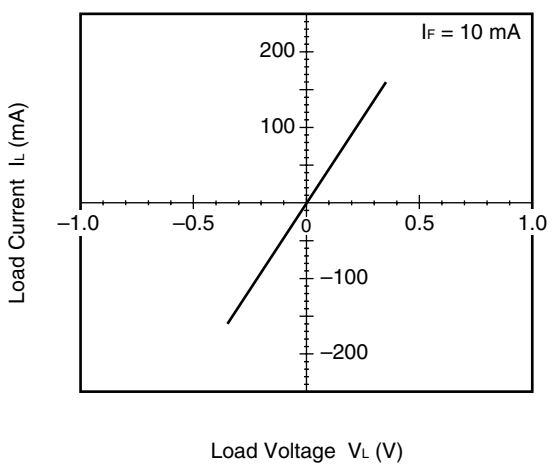

OUTPUT CAPACITANCE vs. APPLIED VOLTAGE




OFF-STATE LEAKAGE CURRENT vs. AMBIENT TEMPERATURE

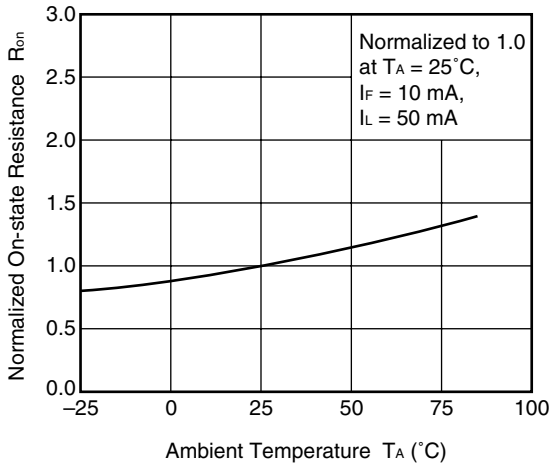



LOAD CURRENT vs. LOAD VOLTAGE

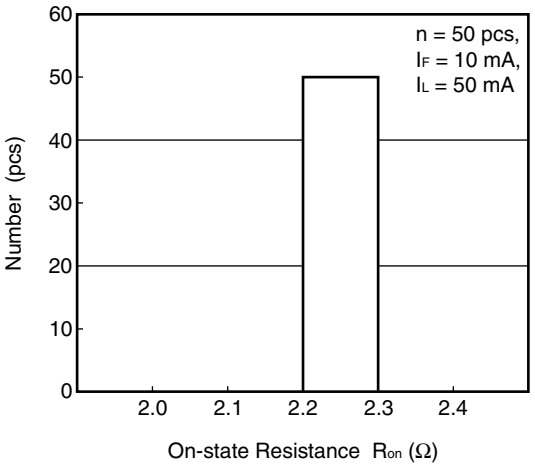



**Remark** The graphs indicate nominal characteristics.

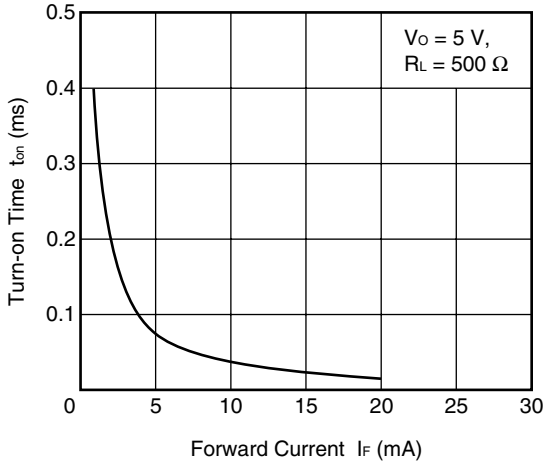
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



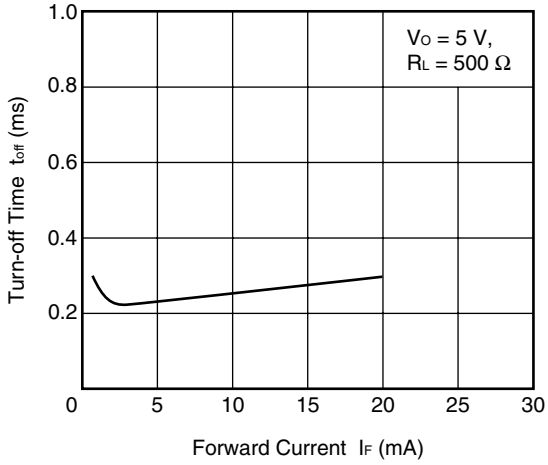

ON-STATE RESISTANCE DISTRIBUTION



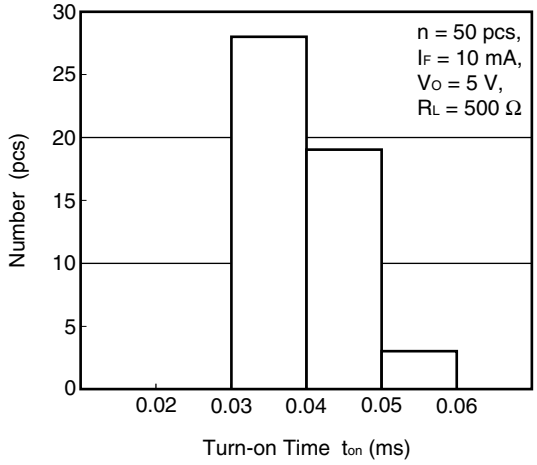

TURN-ON TIME vs. FORWARD CURRENT



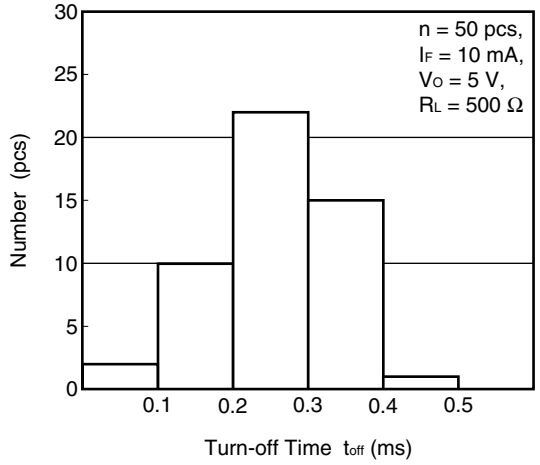

TURN-OFF TIME vs. FORWARD CURRENT




TURN-ON TIME DISTRIBUTION

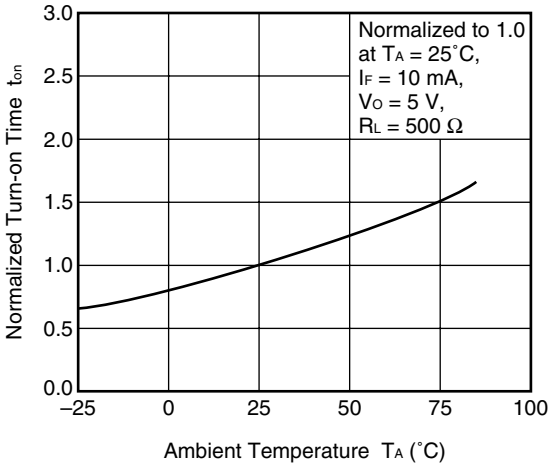



TURN-OFF TIME DISTRIBUTION

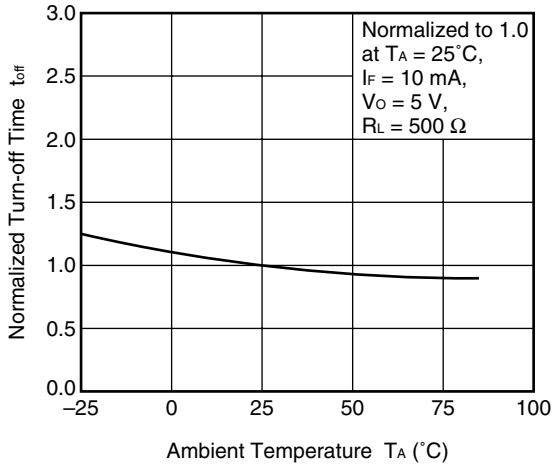



**Remark** The graphs indicate nominal characteristics.

NORMALIZED TURN-ON TIME vs.
AMBIENT TEMPERATURE



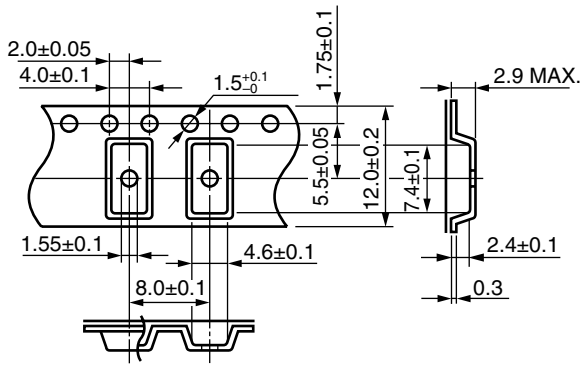

NORMALIZED TURN-OFF TIME vs.
AMBIENT TEMPERATURE



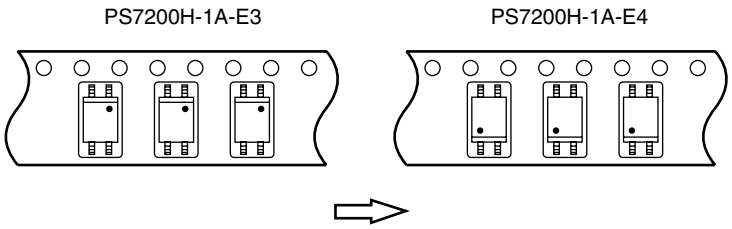

**Remark** The graphs indicate nominal characteristics.

**TAPING SPECIFICATIONS (UNIT: mm)**

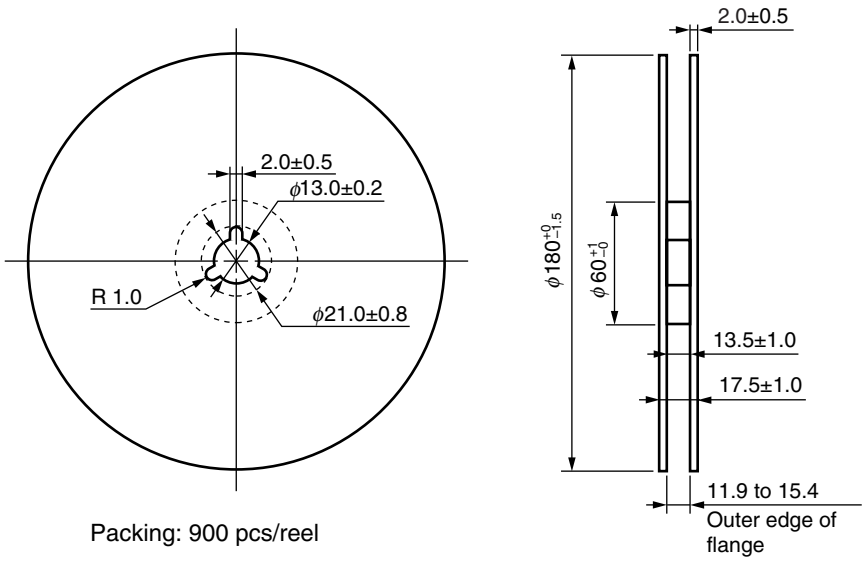
Outline and Dimensions (Tape)




Tape Direction

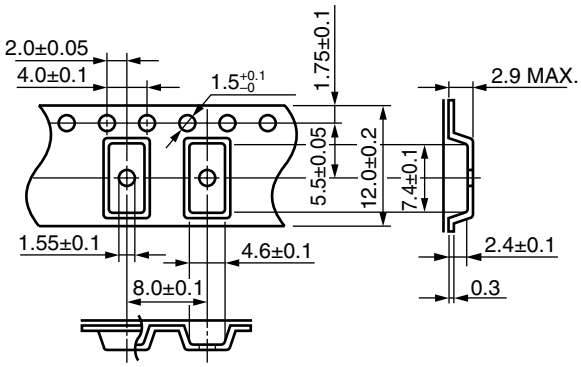



Outline and Dimensions (Reel)

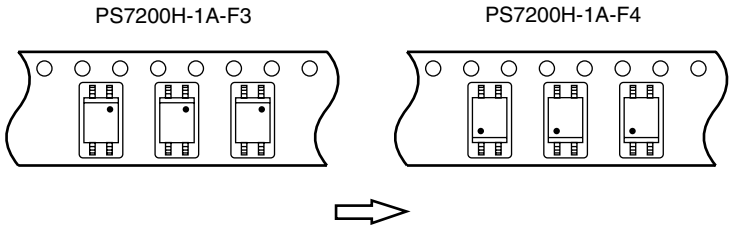



Packing: 900 pcs/reel

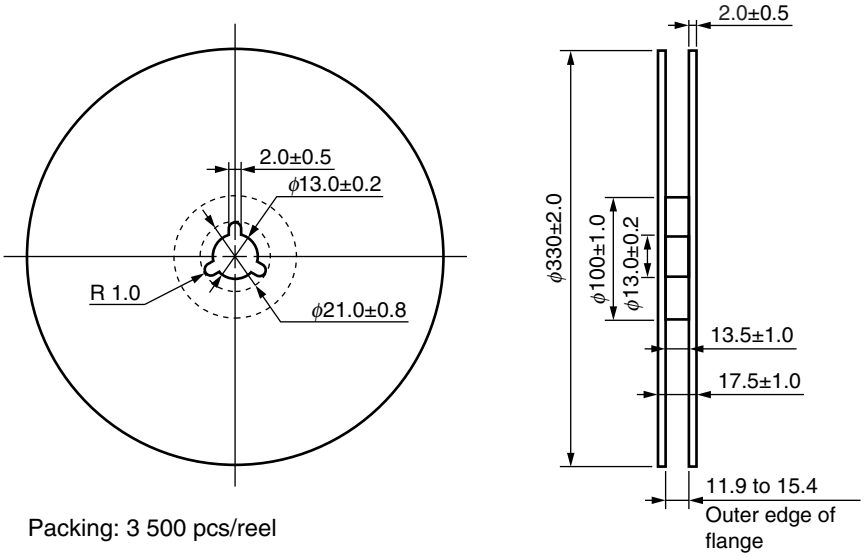
Outline and Dimensions (Tape)




Tape Direction




Outline and Dimensions (Reel)



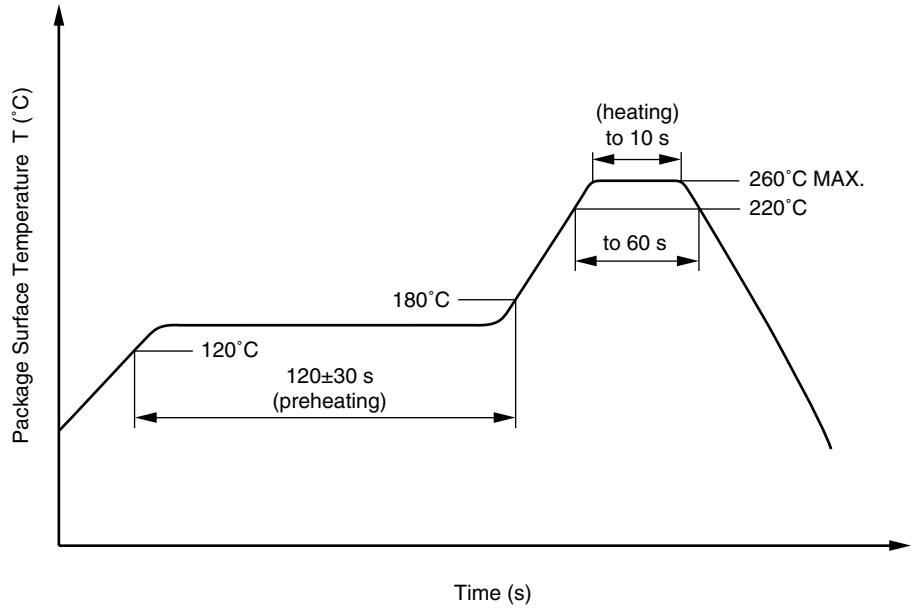

Packing: 3 500 pcs/reel

## 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 |
| • Flux | Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.) |

<R> **(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.

<R> **USAGE CAUTIONS**

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

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| | |
|---|---|
| **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. |

▶**For further information, please contact**

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