

4-PIN SOP, 0.9  $\Omega$  LOW ON-STATE RESISTANCE  
80 V BREAK DOWN VOLTAGE  
500 mA CONTINUOUS LOAD CURRENT  
1-ch Optical Coupled MOS FET

-NEPOC Series-

**DESCRIPTION**

The PS7205B-1A is a low on-state resistance solid state relay containing a GaAs LED on the input side and MOS FETs on the output side.

It is suitable for PLC, etc. because of its large continuous load current and low on-state resistance.

**FEATURES**

- Low on-state resistance ( $R_{on} = 0.9 \Omega$  TYP.)
- Large continuous load current ( $I_L = 500$  mA)
- High-speed switching time ( $t_{on}, t_{off} = 0.5$  ms MAX.)
- 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 : PS7205B-1A-E3, E4: 900 pcs/reel  
: PS7205B-1A-F3, F4: 3 500 pcs/reel

&lt;R&gt; • Pb-Free product

**APPLICATIONS**

- Measurement equipment
- FA equipment

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**Technical Drawing of LED MOSFET Module**

**Front View:** Shows a rectangular module with a width of  $4.0 \pm 0.5$  mm. It features four pins (two top, two bottom) and a circular LED indicator on the left side.

**Top View:** Shows the module's footprint with a width of  $7.0 \pm 0.3$  mm and a length of  $4.4$  mm. It includes a legend for the components:

- 1. LED Anode
- 2. LED Cathode
- 3. MOS FET
- 4. MOS FET

**Side View:** Shows the module's profile with a total height of  $2.05^{+0.08}_{-0.05}$  mm. The LED is mounted at a height of  $0.05^{+0.08}_{-0.05}$  mm. The MOSFETs are mounted at a height of  $0.40^{+0.10}_{-0.05}$  mm. The distance between the LED pins is  $2.54$  mm. The distance between the MOSFET pins is  $0.25$  mm. The module has a trapezoidal shape with a top width of  $4.4$  mm and a bottom width of  $0.5 \pm 0.3$  mm. The height of the top section is  $0.15^{+0.10}_{-0.05}$  mm.

Diagram illustrating the marking on the PS7205B-1A component:

- The marking box contains: **NEC**, **205B**, **N601**.
- A dot in the bottom left corner of the box is labeled **No.1 pin Mark**.
- Arrows point from the marking box to the following labels:
  - Type Number
  - Assembly Lot
  - \*1
- Below the marking box, the marking is expanded:
  - N** is labeled **Rank Code**.
  - 6** is labeled **Year Assembled (Last 1 Digit)**.
  - 01** is labeled **Week Assembled**.

<R> ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style
PS7205B-1A	PS7205B-1A-A	Pb-Free	Magazine case 100 pcs
PS7205B-1A-E3	PS7205B-1A-E3-A		Embossed Tape 900 pcs/reel
PS7205B-1A-E4	PS7205B-1A-E4-A		Embossed Tape 3 500 pcs/reel
PS7205B-1A-F3	PS7205B-1A-F3-A		
PS7205B-1A-F4	PS7205B-1A-F4-A		

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

Parameter		Symbol	Ratings	Unit
Diode	Forward Current (DC)	I <sub>F</sub>	50	mA
	Reverse Voltage	V <sub>R</sub>	5.0	V
	Power Dissipation	P <sub>D</sub>	50	mW
	Peak Forward Current <sup>*1</sup>	I <sub>FP</sub>	1	A
MOS FET	Break Down Voltage	V <sub>L</sub>	80	V
	Continuous Load Current	I <sub>L</sub>	500	mA
	Pulse Load Current <sup>*2</sup> (AC/DC Connection)	I <sub>LP</sub>	1	A
	Power Dissipation	P <sub>D</sub>	300	mW
Isolation Voltage <sup>*3</sup>		BV	1 500	Vr.m.s.
Total Power Dissipation		P <sub>T</sub>	350	mW
Operating Ambient Temperature		T <sub>A</sub>	−40 to +85	°C
Storage Temperature		T <sub>stg</sub>	−40 to +100	°C

\*1 PW = 100 μs, Duty Cycle = 1%

\*2 PW = 100 ms, 1 shot

\*3 AC voltage for 1 minute at T<sub>A</sub> = 25°C, RH = 60% between input and output  
Pins 1-2 shorted together, 3-4 shorted together.

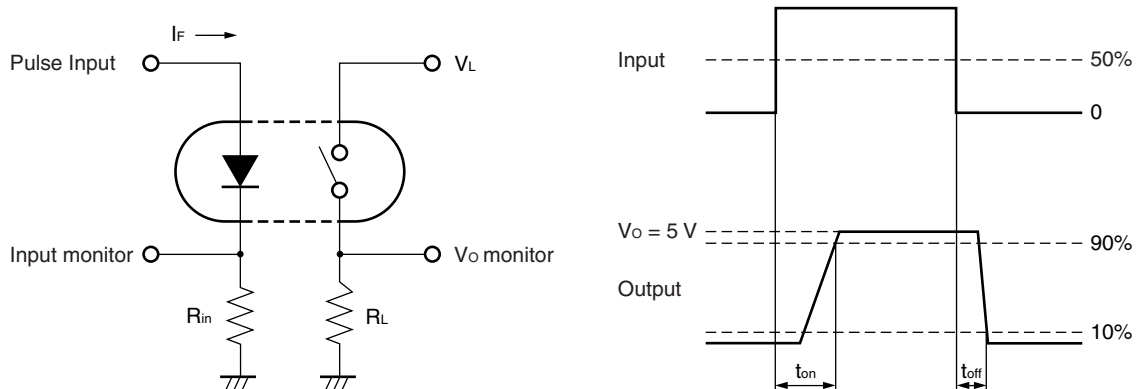
**RECOMMENDED OPERATING CONDITIONS ( $T_A = 25^\circ\text{C}$ )**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	$I_F$	2	5	20	mA
LED Off Voltage	$V_F$	0		0.5	V

**ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )**

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	$V_F$	$I_F = 5\text{ mA}$		1.1	1.4	V
	Reverse Current	$I_R$	$V_R = 5\text{ V}$			5.0	$\mu\text{A}$
MOS FET	Off-state Leakage Current	$I_{\text{Leak}}$	$V_D = 80\text{ V}$		0.15	5.0	nA
	Output Capacitance	$C_{\text{out}}$	$V_D = 0\text{ V}, f = 1\text{ MHz}$		30		pF
Coupled	LED On-state Current	$I_{\text{Fon}}$	$I_L = 500\text{ mA}$			2.0	mA
	On-state Resistance	$R_{\text{on}}$	$I_F = 5\text{ mA}, I_L = 500\text{ mA}, t \leq 10\text{ ms}$		0.9	1.2	$\Omega$
	Turn-on Time <sup>*1,2</sup>	$t_{\text{on}}$	$I_F = 5\text{ mA}, V_O = 5\text{ V}, R_L = 500\text{ }\Omega,$ $PW \geq 10\text{ ms}$		0.18	0.5	ms
	Turn-off Time <sup>*1,2</sup>	$t_{\text{off}}$			0.04	0.5	
	Isolation Resistance	$R_{\text{I-O}}$	$V_{\text{I-O}} = 1.0\text{ kV}_{\text{DC}}$	$10^9$			$\Omega$
	Isolation Capacitance	$C_{\text{I-O}}$	$V = 0\text{ V}, f = 1\text{ MHz}$		0.5		pF

**\*1 Test Circuit for Switching Time**

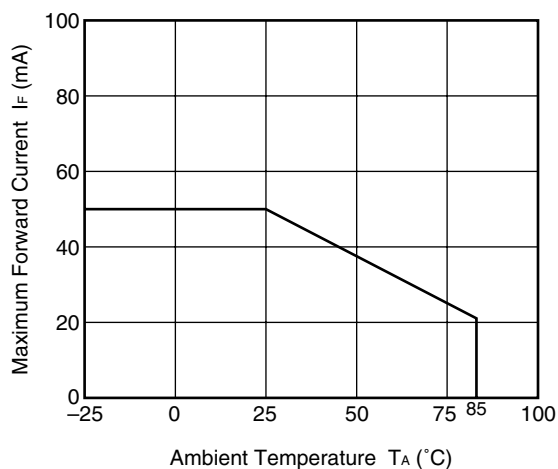


**\*2 The turn-on time and turn-off time are specified as input-pulse width  $\geq 10\text{ ms}$ .**

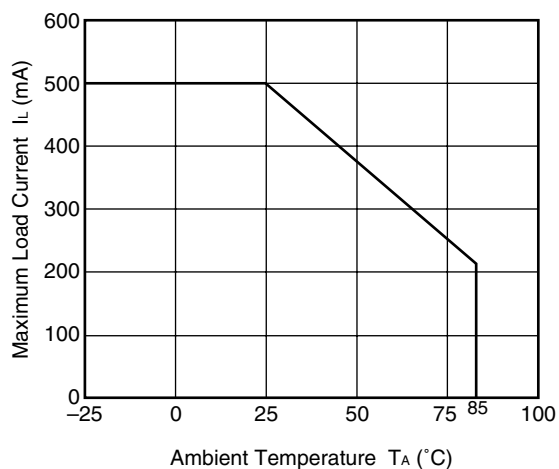
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

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

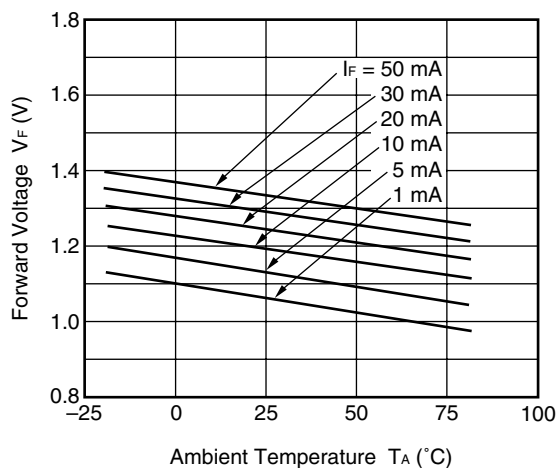
**MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE**



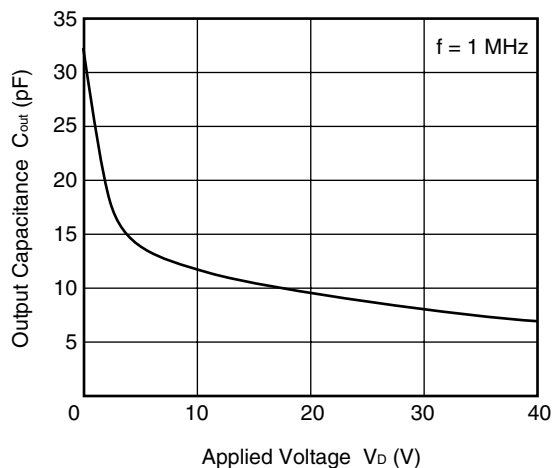
**MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE**



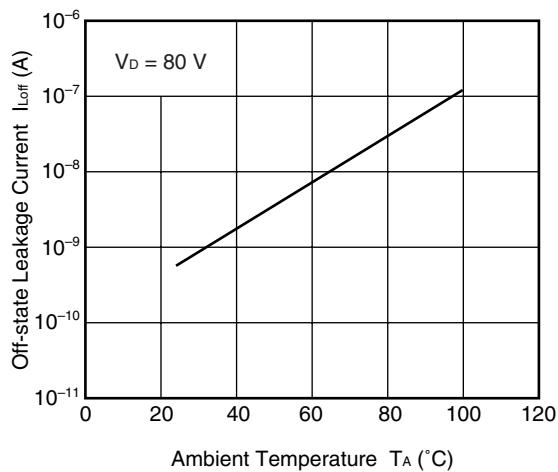
**FORWARD VOLTAGE vs. AMBIENT TEMPERATURE**



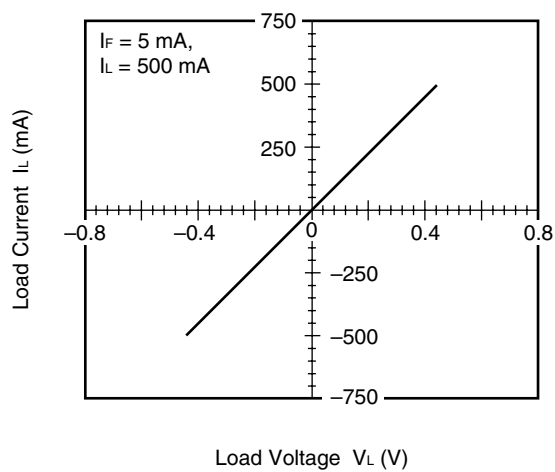
**OUTPUT CAPACITANCE vs. APPLIED VOLTAGE**



**OFF-STATE LEAKAGE CURRENT vs. AMBIENT TEMPERATURE**

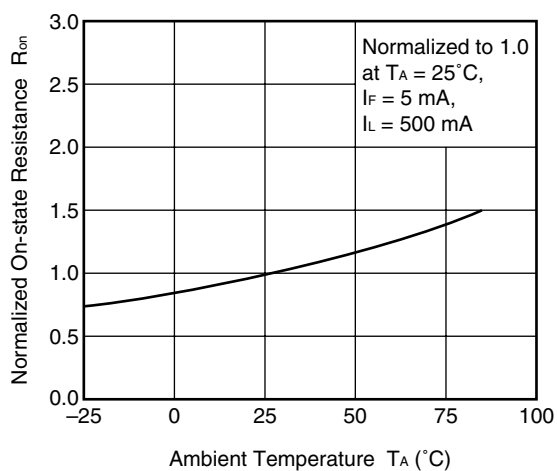


**LOAD CURRENT vs. LOAD VOLTAGE**

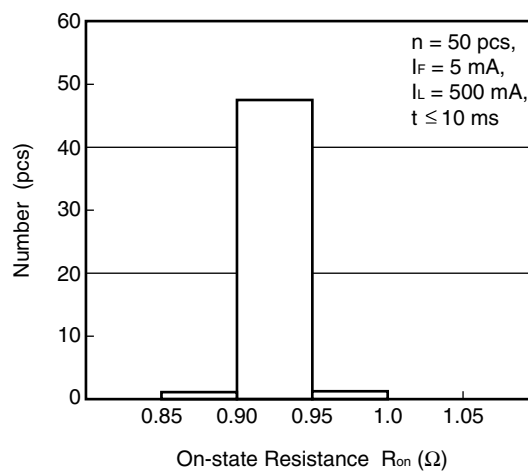


**Remark** The graphs indicate nominal characteristics.

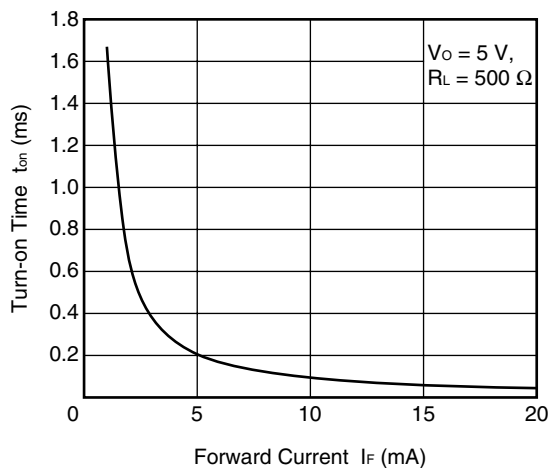
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



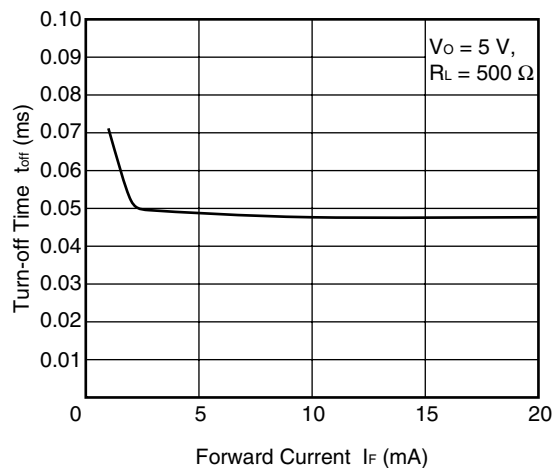
ON-STATE RESISTANCE DISTRIBUTION



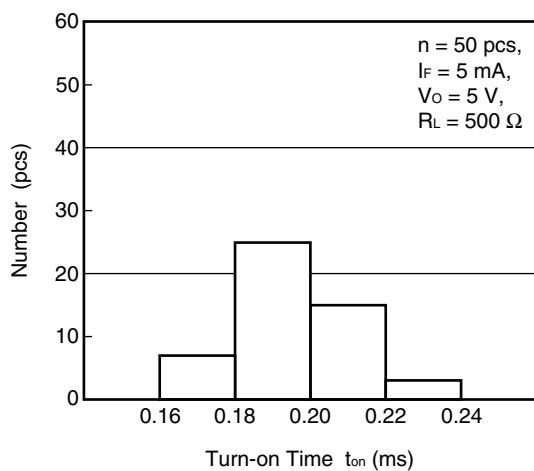
TURN-ON TIME vs. FORWARD CURRENT



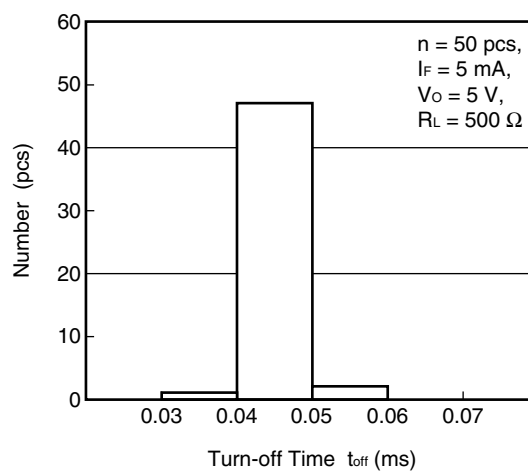
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION

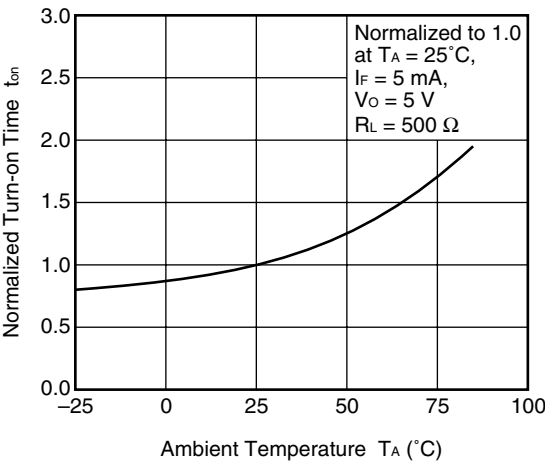


TURN-OFF TIME DISTRIBUTION

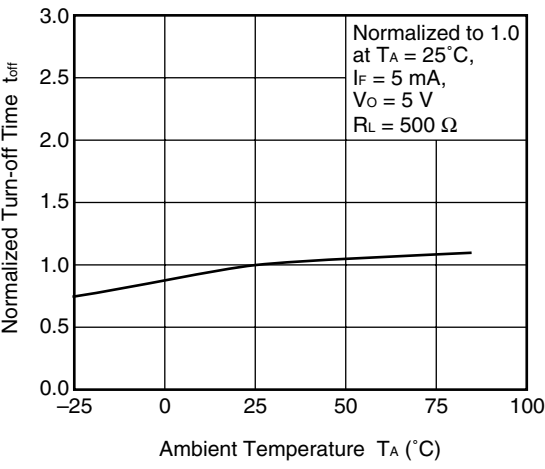


**Remark** The graphs indicate nominal characteristics.

NORMALIZED TURN-ON TIME vs.  
AMBIENT TEMPERATURE



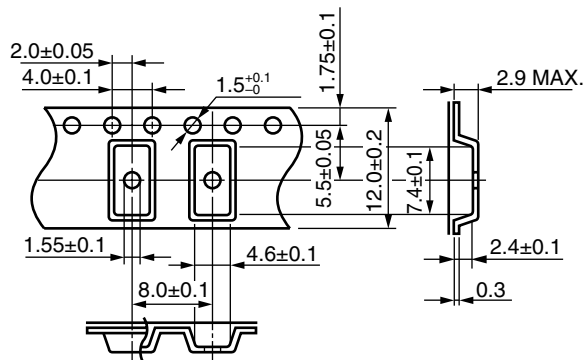
NORMALIZED TURN-OFF TIME vs.  
AMBIENT TEMPERATURE



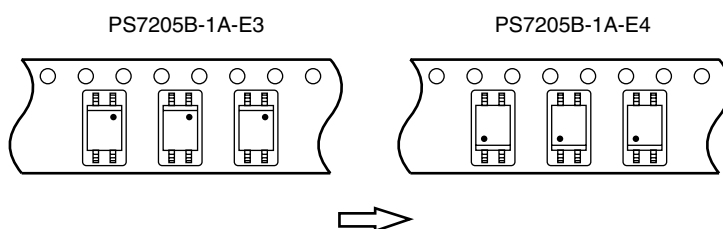
**Remark** The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)

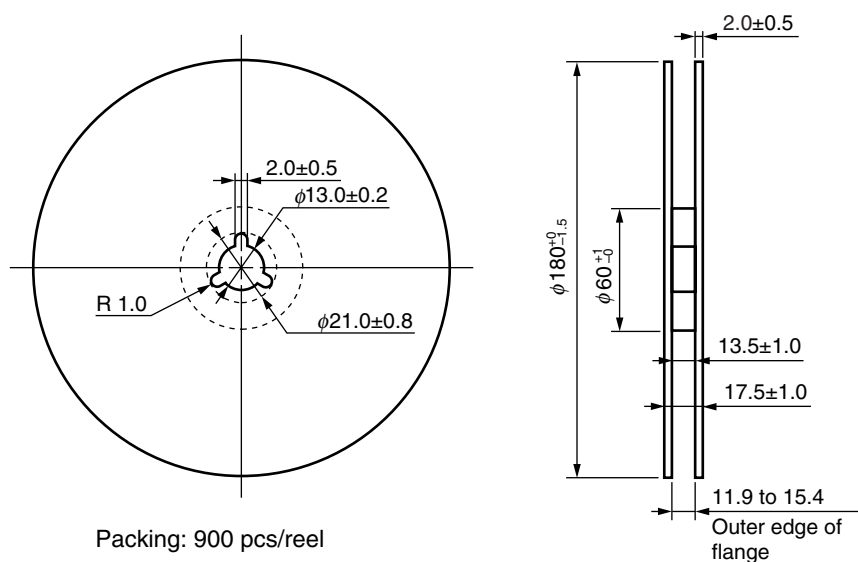
Outline and Dimensions (Tape)



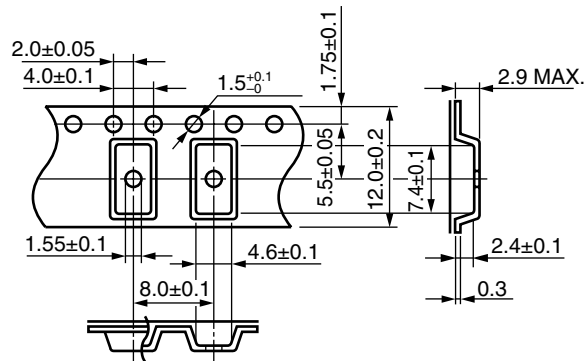
Tape Direction



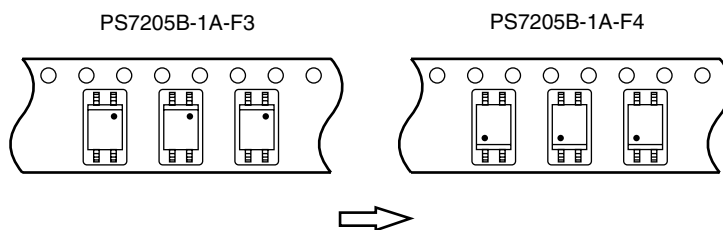
Outline and Dimensions (Reel)



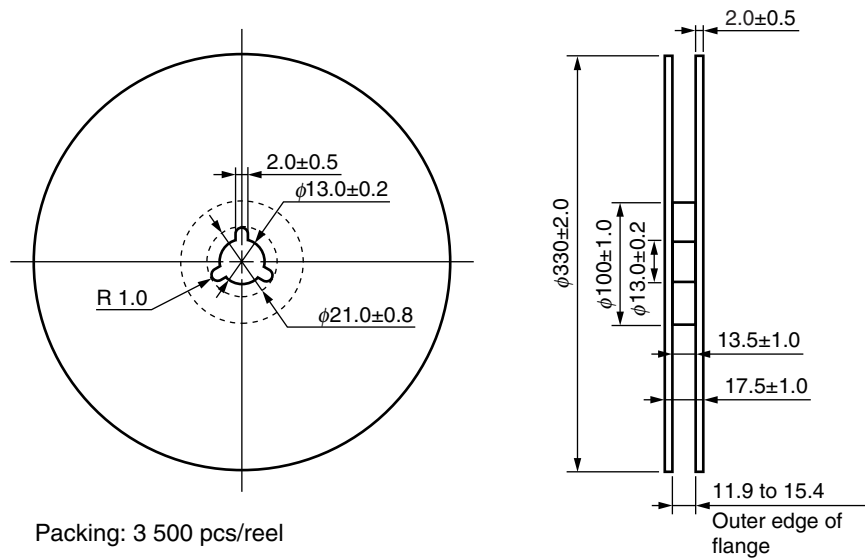
### Outline and Dimensions (Tape)



### Tape Direction



### Outline and Dimensions (Reel)

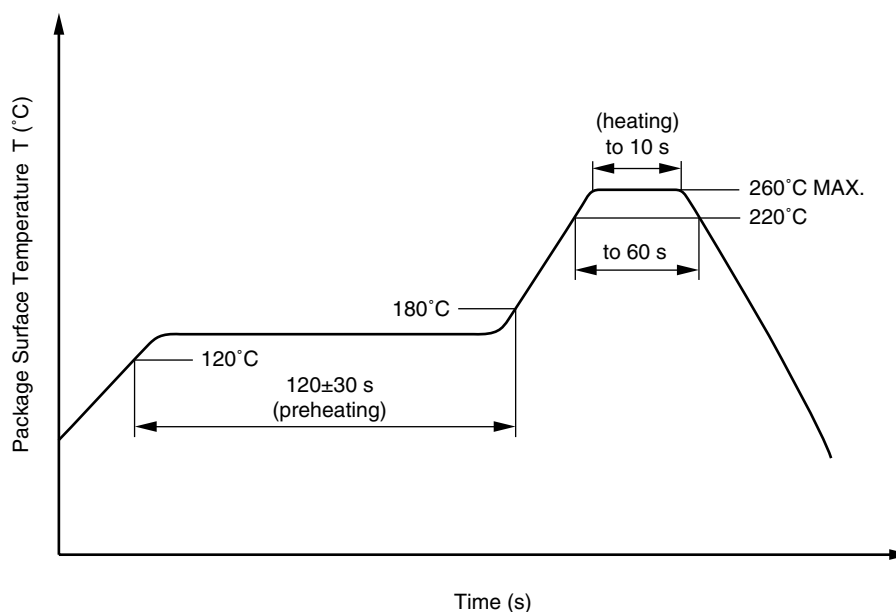


## RECOMMENDED SOLDERING CONDITIONS

### (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.)

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### (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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M8E 02.11-1

<b>Caution</b>	GaAs Products	<p>This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none"> <li>• 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. <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> </ol> </li> <li>• Do not burn, destroy, cut, crush, or chemically dissolve the product.</li> <li>• Do not lick the product or in any way allow it to enter the mouth.</li> </ul>
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► For further information, please contact

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