

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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PS7801D-1A

4-PIN ULTRA SMALL FLAT-LEAD,  
LOW OUTPUT CAPACITANCE (0.6 pF)  
1-ch Optical Coupled MOS FET

–NEPOC Series–

DESCRIPTION

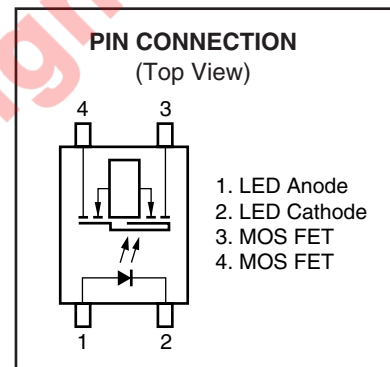
The PS7801D-1A is a low output capacitance solid state relay containing a GaAs LED on the light emitting side (input side) and MOS FETs on the output side.

An ultra small flat-lead package has been provided which realizes a reduction in mounting area of about 50% compared with the PS72xx series.

It is suitable for high-frequency signal control, due to its low  $C \times R$ , low output capacitance, and low off-state leakage current.

FEATURES

- Ultra small flat-lead package (4.2 (L) × 2.5 (W) × 1.85 (H) mm)
- <R> • Low  $C \times R$  ( $C \times R = 7.2 \text{ pF} \cdot \Omega$ )
- <R> • Low output capacitance ( $C_{out} = 0.6 \text{ pF TYP.}$ )
- 1 channel type (1 a output)
- Designed for AC/DC switching line changer
- Low offset voltage
- <R> • Ordering number of taping product: PS7801D-1A-F3: 3 500 pcs/reel
- Pb-Free product
- Safety standards
  - UL approved: File No. E72422

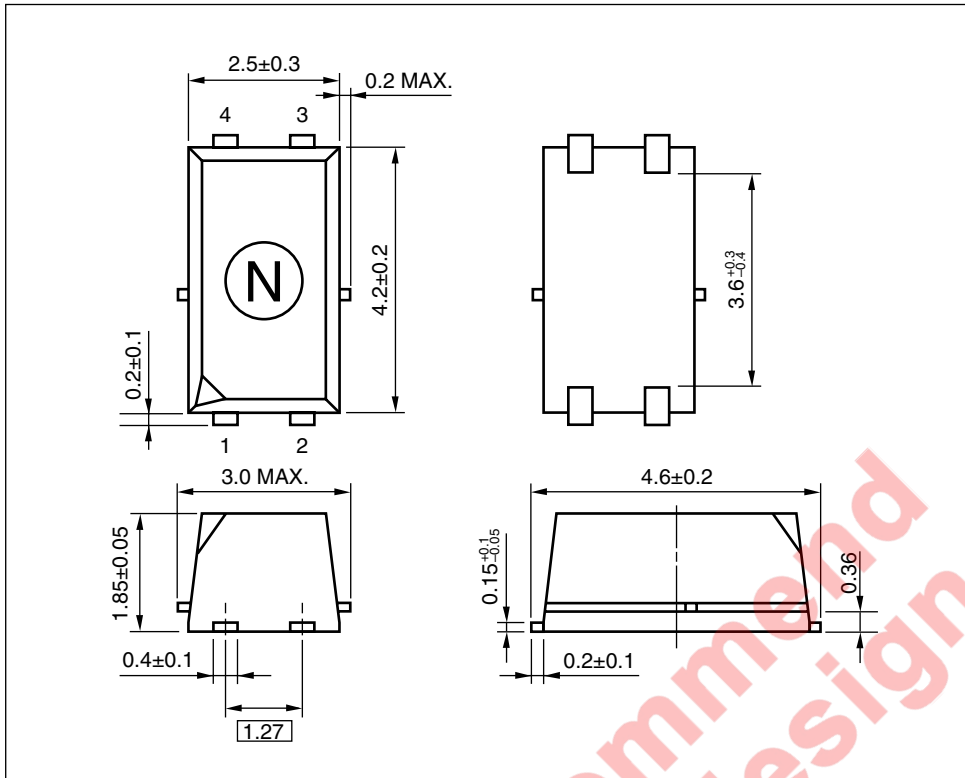


APPLICATIONS

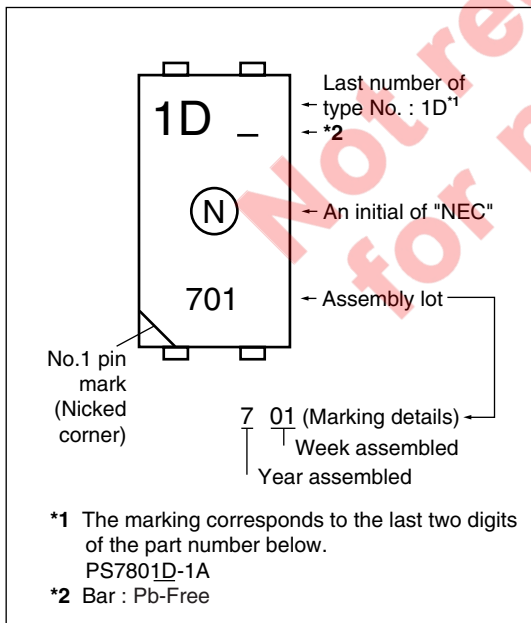
- Measurement equipment

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PACKAGE DIMENSIONS (UNIT: mm)



<R> MARKING EXAMPLE



<R> ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number <sup>*1</sup>
PS7801D-1A	PS7801D-1A-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL approved)	PS7801D-1A
PS7801D-1A-F3	PS7801D-1A-F3-A		Embossed Tape 3 500 pcs/reel		

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

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>	40	V
	Continuous Load Current	I <sub>L</sub>	120	mA
	Pulse Load Current <sup>*2</sup> (AC/DC Connection)	I <sub>LP</sub>	200	mA
	Power Dissipation	P <sub>D</sub>	250	mW
Isolation Voltage <sup>*3</sup>		BV	500	Vr.m.s.
Total Power Dissipation		P <sub>T</sub>	300	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.

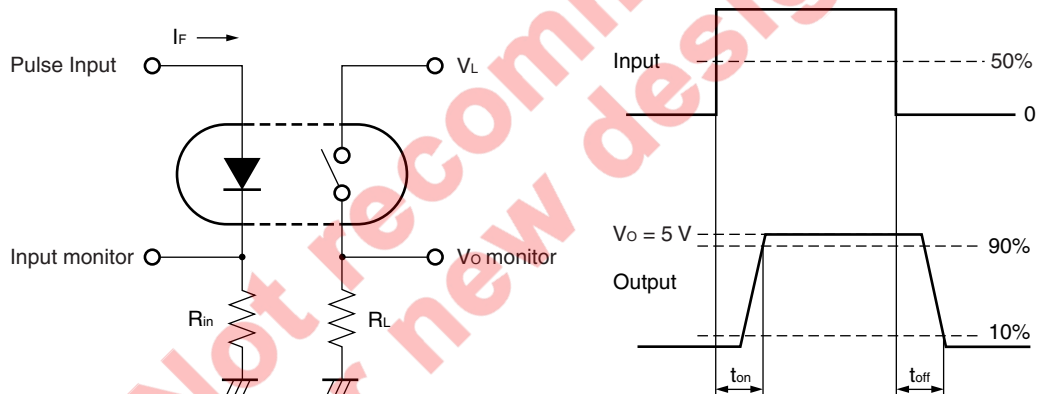
RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = 25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I <sub>F</sub>	2	5	20	mA
LED Off Voltage	V <sub>F</sub>	0		0.5	V

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> = 5 mA		1.1	1.4	V
		Reverse Current	I <sub>R</sub> V <sub>R</sub> = 5 V			5.0	μA
<R>	MOS FET	Off-state Leakage Current	I <sub>Loff1</sub> V <sub>D</sub> = 35 V		0.03	0.3	nA
			I <sub>Loff2</sub> V <sub>D</sub> = 40 V		0.1	1.0	
<R>		Output Capacitance	C <sub>out</sub> V <sub>D</sub> = 0 V, f = 1 MHz		0.6	0.85	pF
	Coupled	LED On-state Current	I <sub>Fon</sub> I <sub>L</sub> = 120 mA			2.0	mA
<R>		On-state Resistance	R <sub>on1</sub> I <sub>F</sub> = 5 mA, I <sub>L</sub> = 10 mA		12	16	Ω
			R <sub>on2</sub> I <sub>F</sub> = 5 mA, I <sub>L</sub> = 120 mA, t ≤ 10 ms		12	16	
<R>		Turn-on Time <sup>*1,2</sup>	t <sub>on</sub> I <sub>F</sub> = 5 mA, V <sub>O</sub> = 5 V, R <sub>L</sub> = 500 Ω, PW ≥ 10 ms		0.04	0.5	ms
		Turn-off Time <sup>*1,2</sup>	t <sub>off</sub>		0.1	0.5	
		Isolation Resistance	R <sub>i-o</sub> V <sub>i-o</sub> = 0.5 kV <sub>DC</sub>	10 <sup>9</sup>			Ω
		Isolation Capacitance	C <sub>i-o</sub> V = 0 V, f = 1 MHz		0.3		pF

\*1 Test Circuit for Switching Time

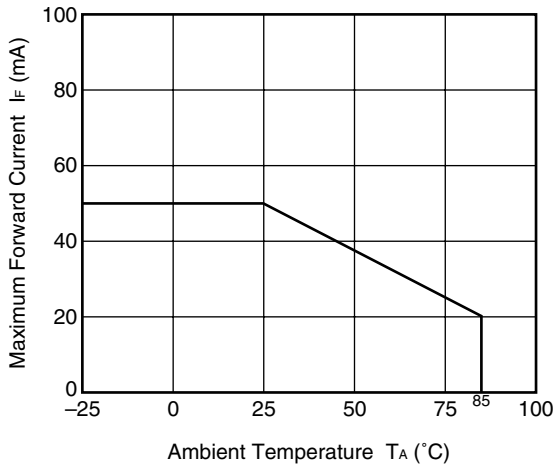


\*2 The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms.

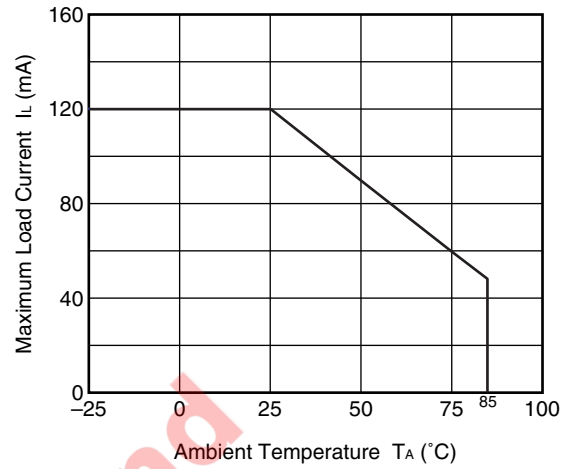
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

<R> **TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, unless otherwise specified)**

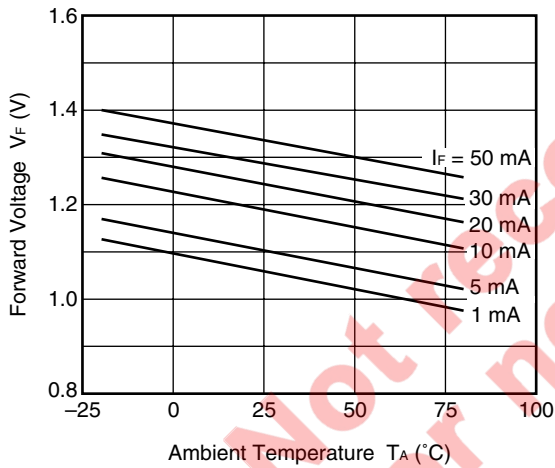
**MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE**



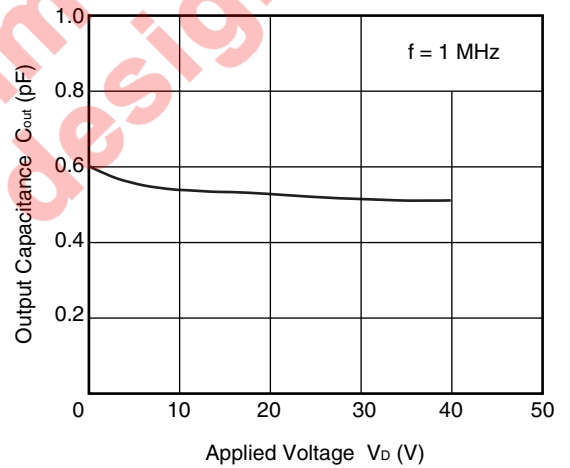
**MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE**



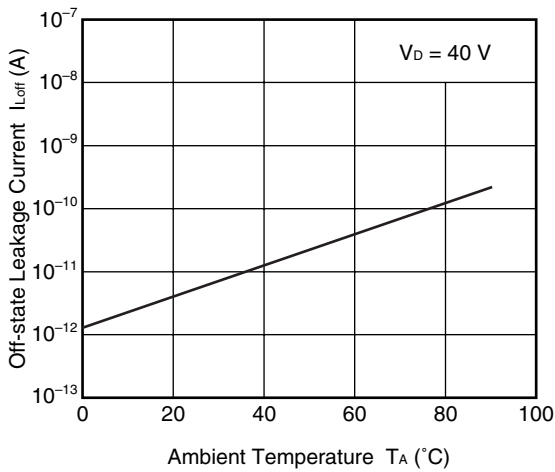
**FORWARD VOLTAGE vs. AMBIENT TEMPERATURE**



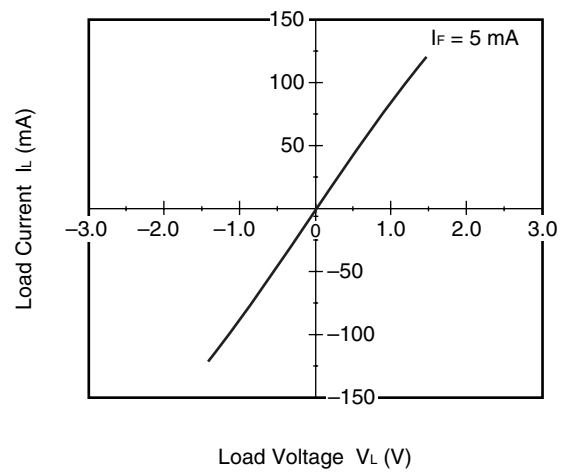
**OUTPUT CAPACITANCE vs. APPLIED VOLTAGE**



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

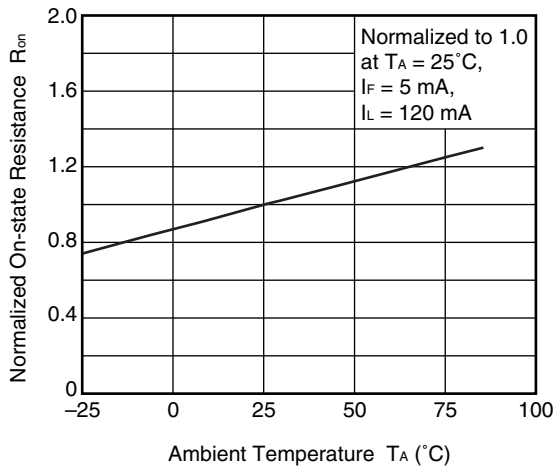


**LOAD CURRENT vs. LOAD VOLTAGE**

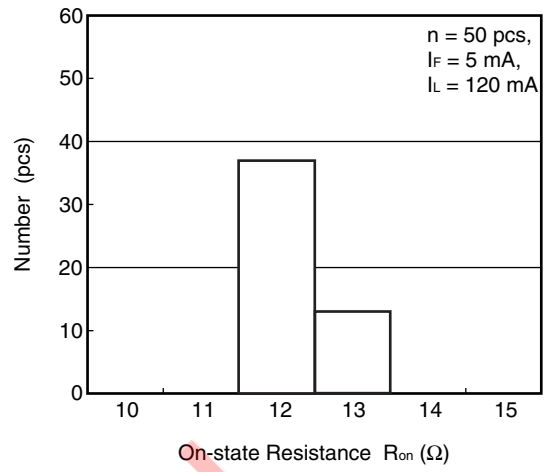


**Remark** The graphs indicate nominal characteristics.

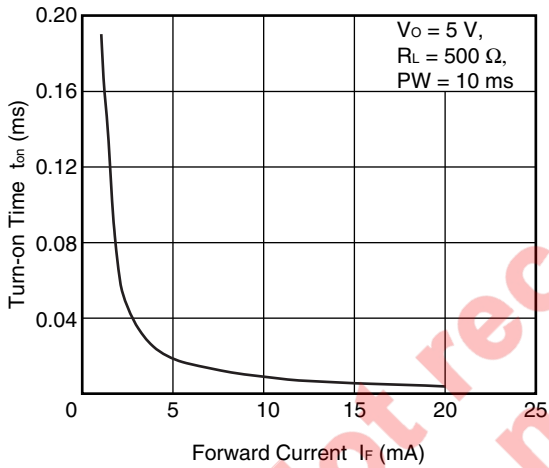
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



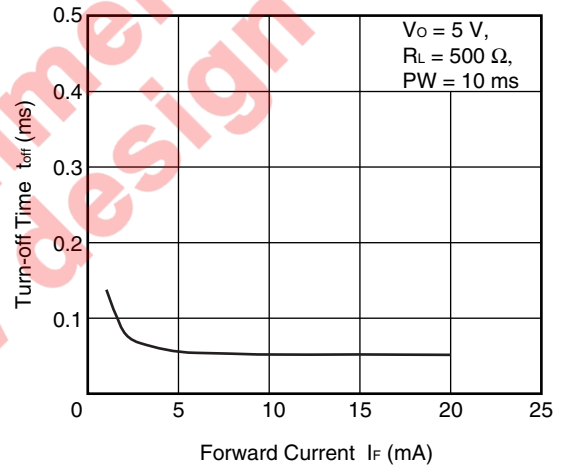
ON-STATE RESISTANCE DISTRIBUTION



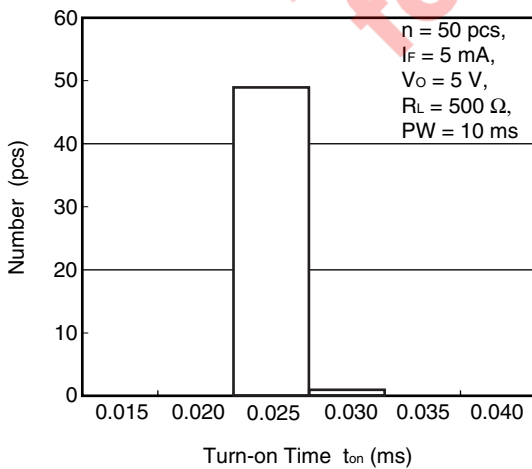
TURN-ON TIME vs. FORWARD CURRENT



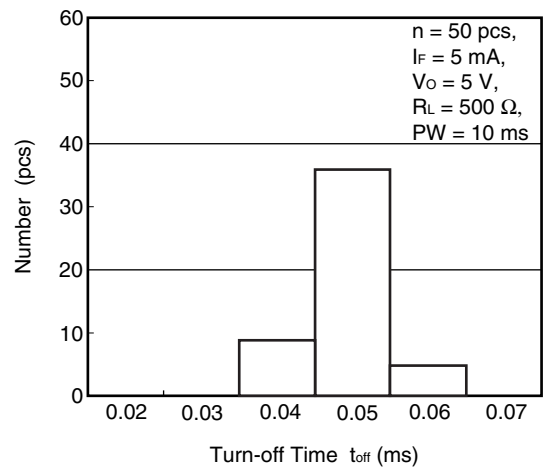
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION



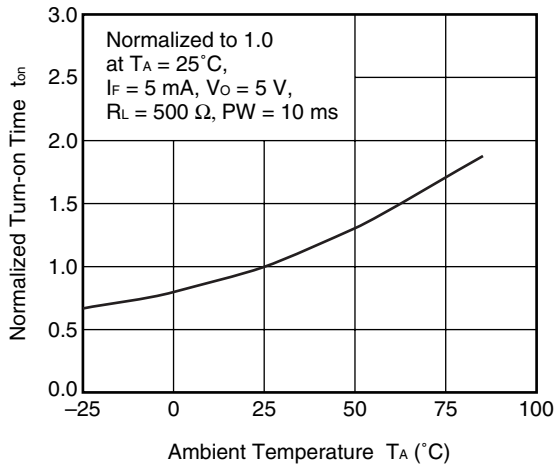
TURN-OFF TIME DISTRIBUTION



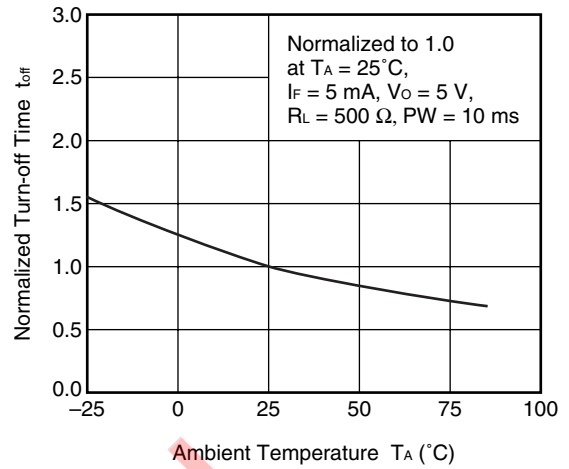
**Remark** The graphs indicate nominal characteristics.



NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE



NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE

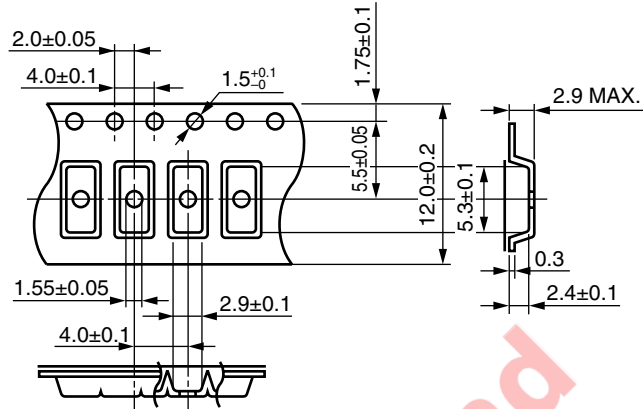


**Remark** The graphs indicate nominal characteristics.

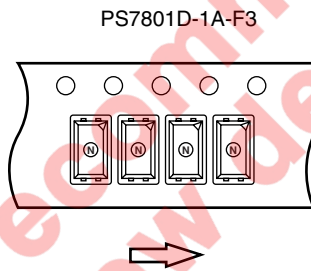
Not recommended for new design

<R> TAPING SPECIFICATIONS (UNIT: mm)

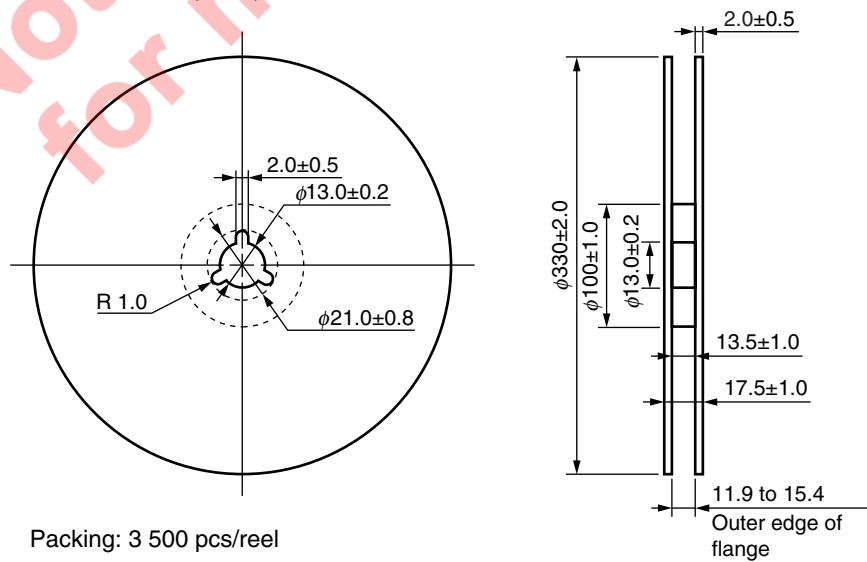
Outline and Dimensions (Tape)



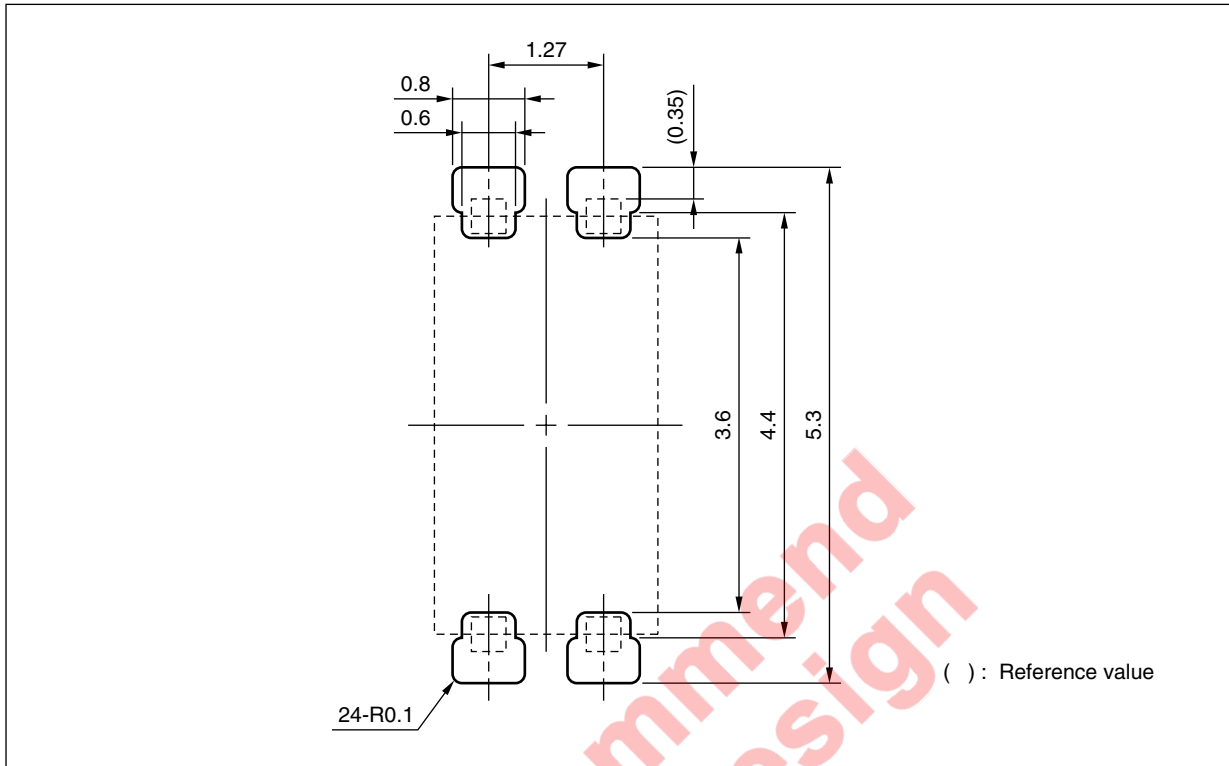
Tape Direction



Outline and Dimensions (Reel)



RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



**Remark** All dimensions in this figure must be evaluated before use.

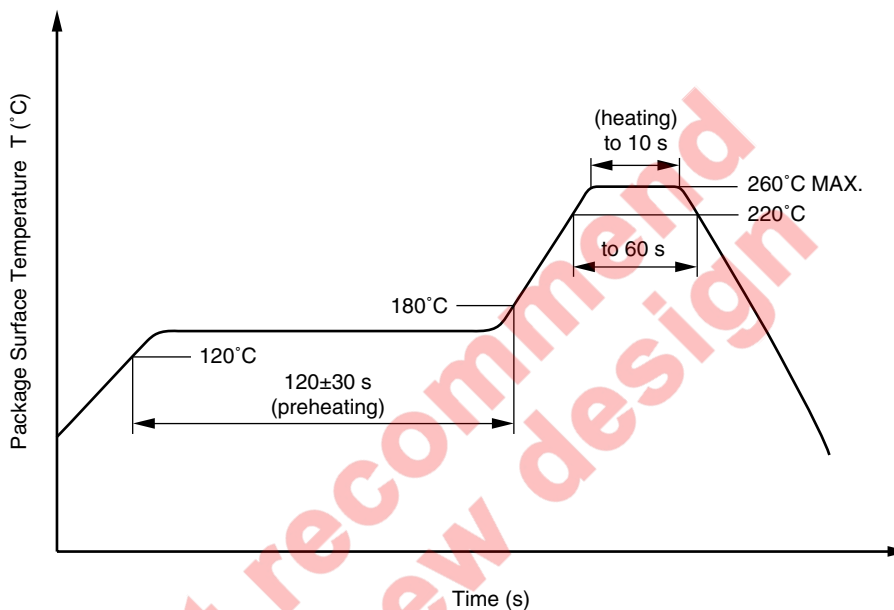
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**RECOMMENDED SOLDERING CONDITIONS**

**(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.)

**(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.

**USAGE CAUTIONS**

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

**Not recommend  
for new design**

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