

4-PIN ULTRA SMALL FLAT-LEAD,  
LOW  $C \times R$  ( $3.4 \text{ pF} \cdot \Omega$ )  
1-ch Optical Coupled MOS FET

-NEPOC Series-

**DESCRIPTION**

The PS7801M-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.

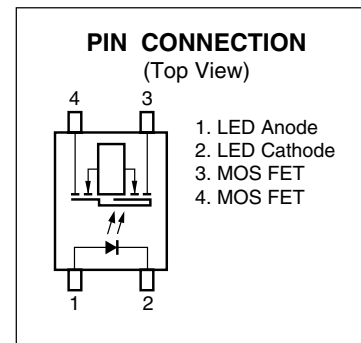
It is suitable for high-frequency signal control, due to its low  $C \times R$  ( $3.4 \text{ pF} \cdot \Omega$ ), low output capacitance, and low off-state leakage current.

**FEATURES**

- Ultra small flat-lead package (4.2 (L)  $\times$  2.5 (W)  $\times$  1.85 (H) mm)
- Low  $C \times R$  ( $C \times R = 3.4 \text{ pF} \cdot \Omega$ )
- Low output capacitance ( $C_{\text{out}} = 0.95 \text{ pF TYP.}$ )
- 1 channel type (1 a output)
- Designed for AC/DC switching line changer
- Low offset voltage
- Ordering number of taping product: PS7801M-1A-F3: 3 500 pcs/reel
- Pb-Free product
- Safety standards

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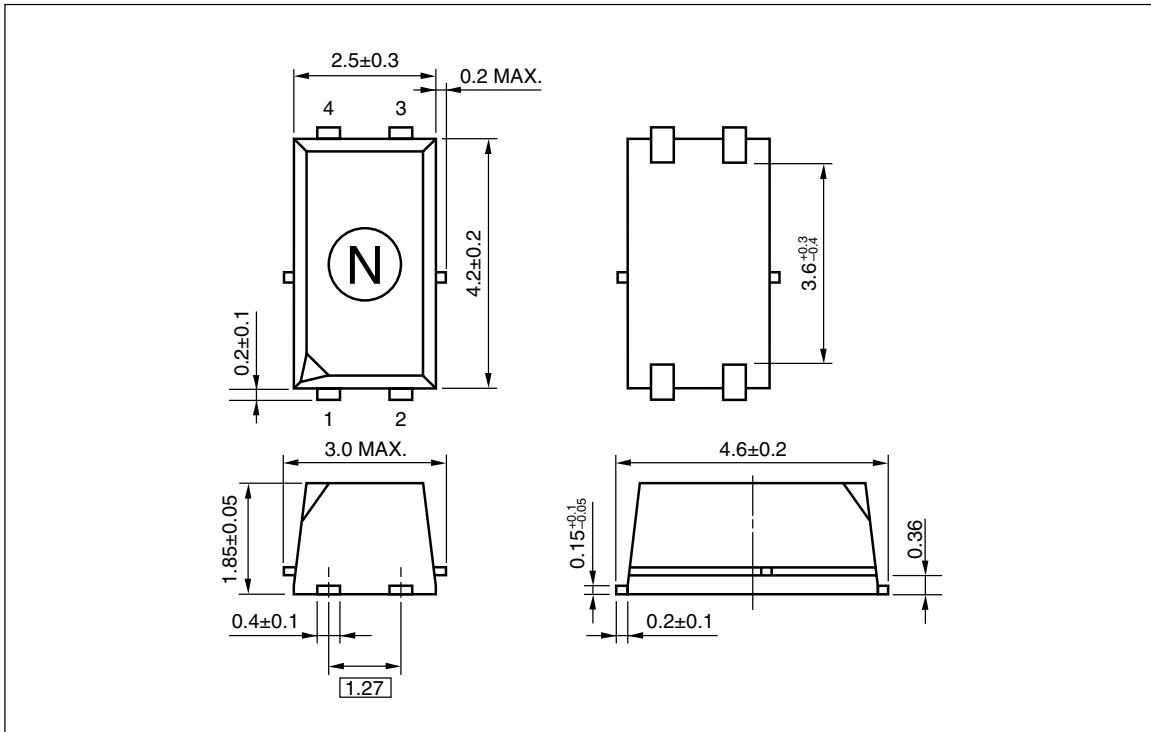
- UL approved: No. E72422

**APPLICATIONS**

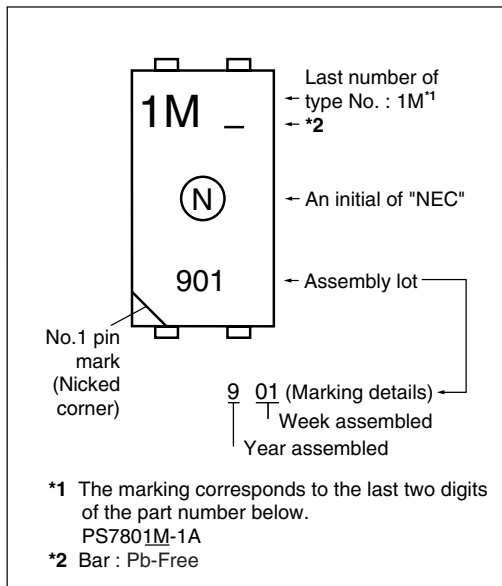
- Measurement equipment

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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>
PS7801M-1A	PS7801M-1A-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL approved)	PS7801M-1A
PS7801M-1A-F3	PS7801M-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>	20	V
	Continuous Load Current	I <sub>L</sub>	160	mA
	Pulse Load Current <sup>*2</sup> (AC/DC Connection)	I <sub>LP</sub>	240	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.

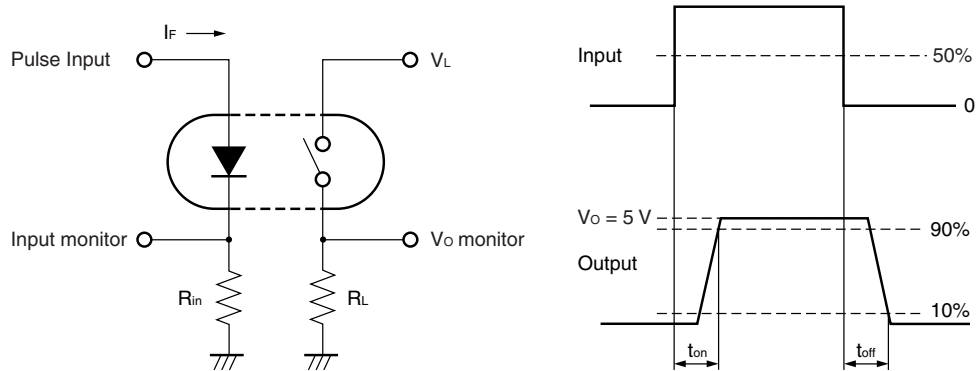
**RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I <sub>F</sub>	4.5	5	20	mA
LED Off Current	I <sub>F</sub>	0.1			mA

**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
MOS FET	Off-state Leakage Current	I <sub>loff</sub>	V <sub>D</sub> = 20 V		0.03	0.25	nA
	Output Capacitance	C <sub>out</sub>	V <sub>D</sub> = 0 V, f = 1 MHz, t ≤ 1 s		0.95	1.5	pF
Coupled	LED On-state Current	I <sub>Fon</sub>	I <sub>L</sub> = 160 mA			4	mA
	On-state Resistance	R <sub>on</sub>	I <sub>F</sub> = 5 mA, I <sub>L</sub> = 160 mA, t ≤ 10 ms		3.6	5.0	Ω
	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,		0.05	0.25	ms
	Turn-off Time <sup>*1,2</sup>	t <sub>off</sub>	PW ≥ 0.5 ms		0.03	0.25	
	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

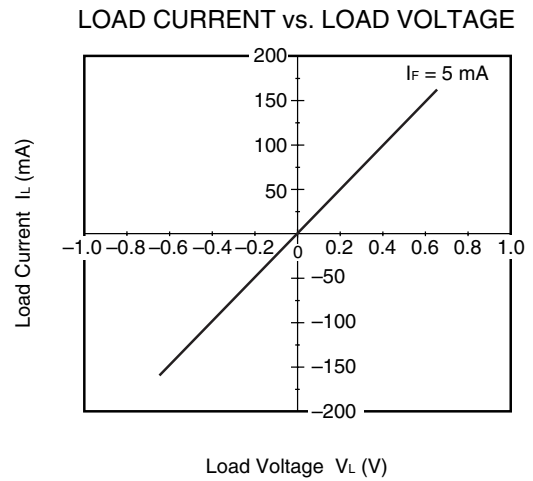
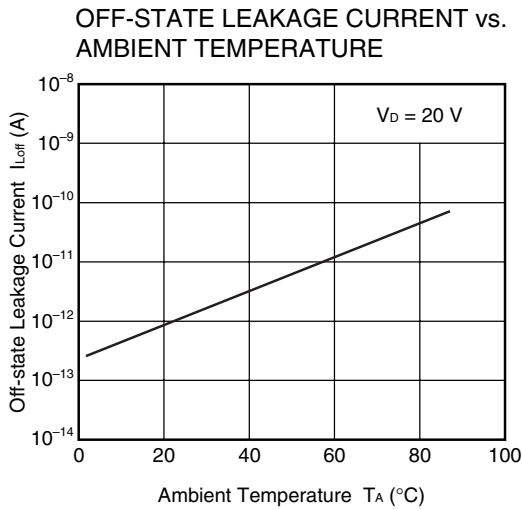
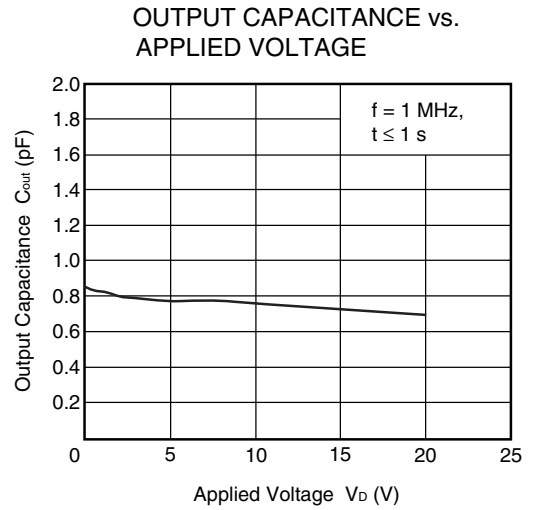
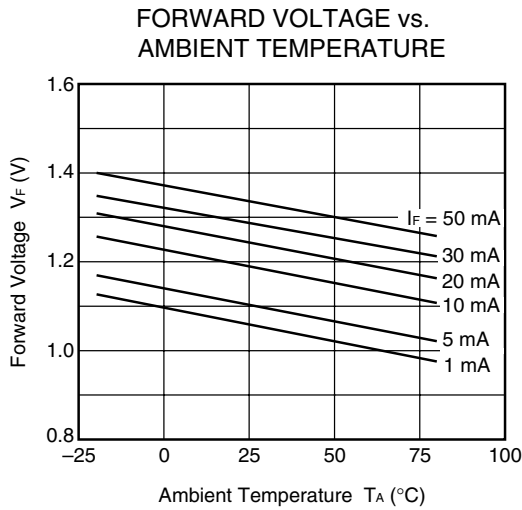
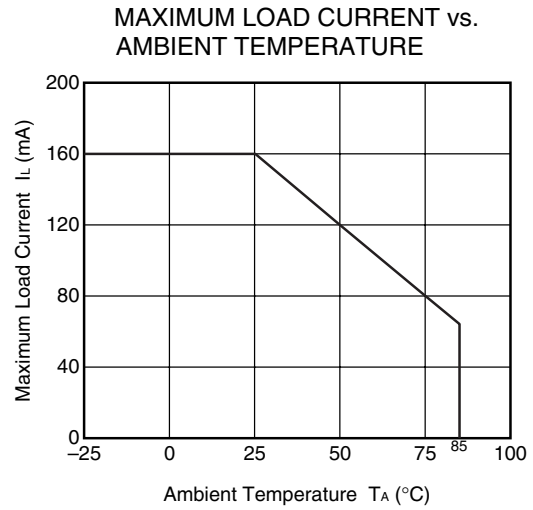
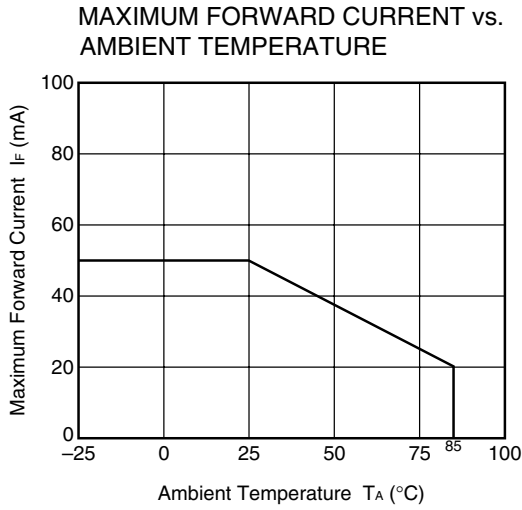
**\*1 Test Circuit for Switching Time**



**\*2** The turn-on time and turn-off time are specified as input-pulse width ≥ 0.5 ms.

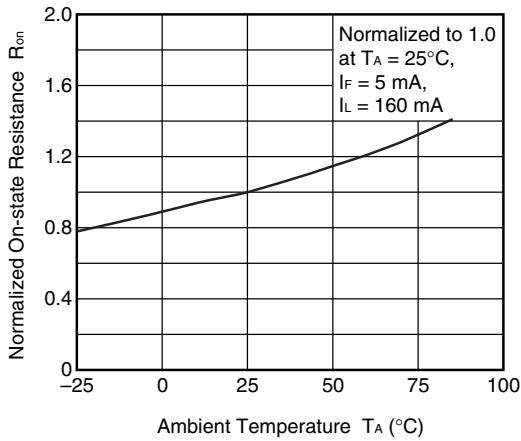
Be aware that when the device operates with an input-pulse width less than 0.5 ms, the turn-on time and turn-off time will increase.

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

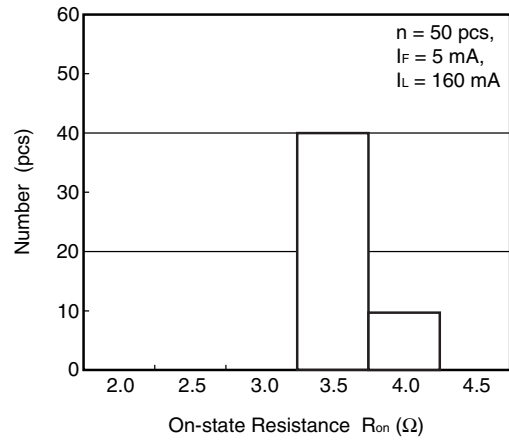


**Remark** The graphs indicate nominal characteristics.

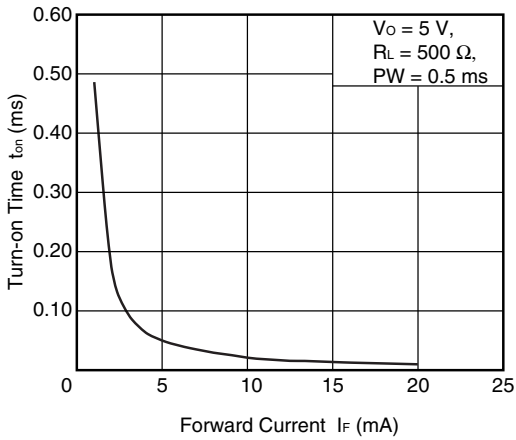
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



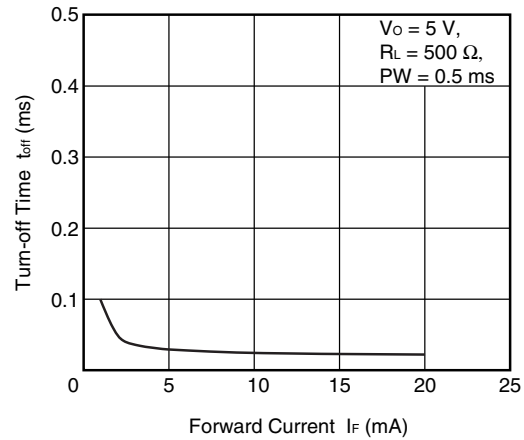
ON-STATE RESISTANCE DISTRIBUTION



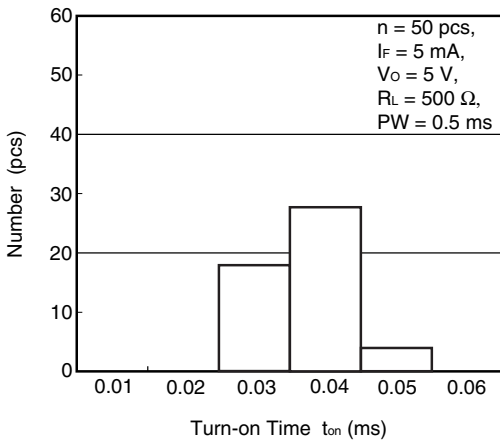
TURN-ON TIME vs. FORWARD CURRENT



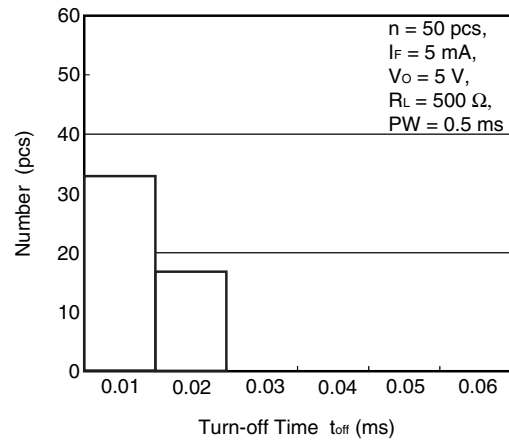
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION

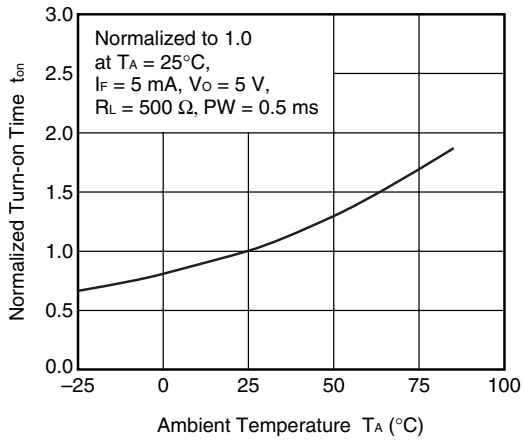


TURN-OFF TIME DISTRIBUTION

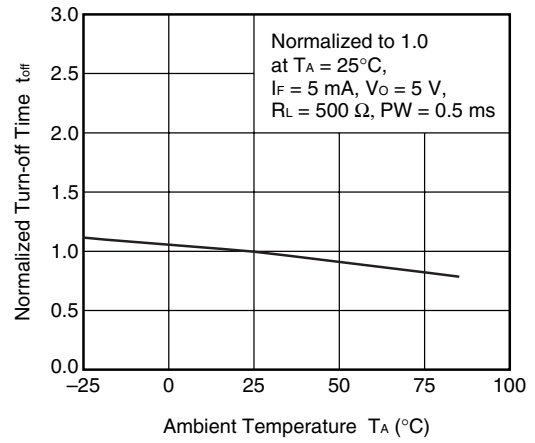


**Remark** The graphs indicate nominal characteristics.

NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE



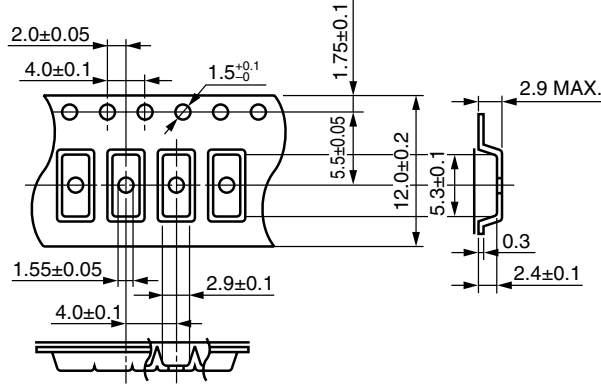
NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE



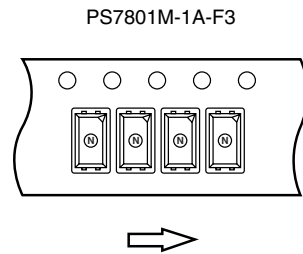
**Remark** The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

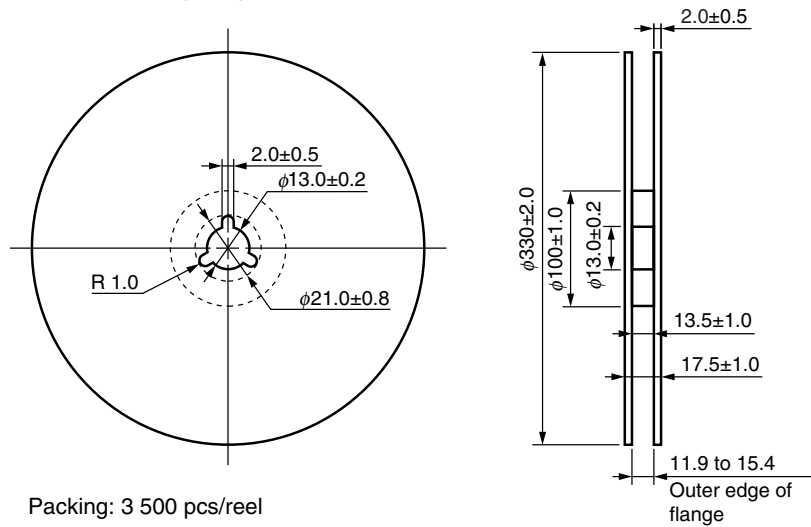
Outline and Dimensions (Tape)



Tape Direction

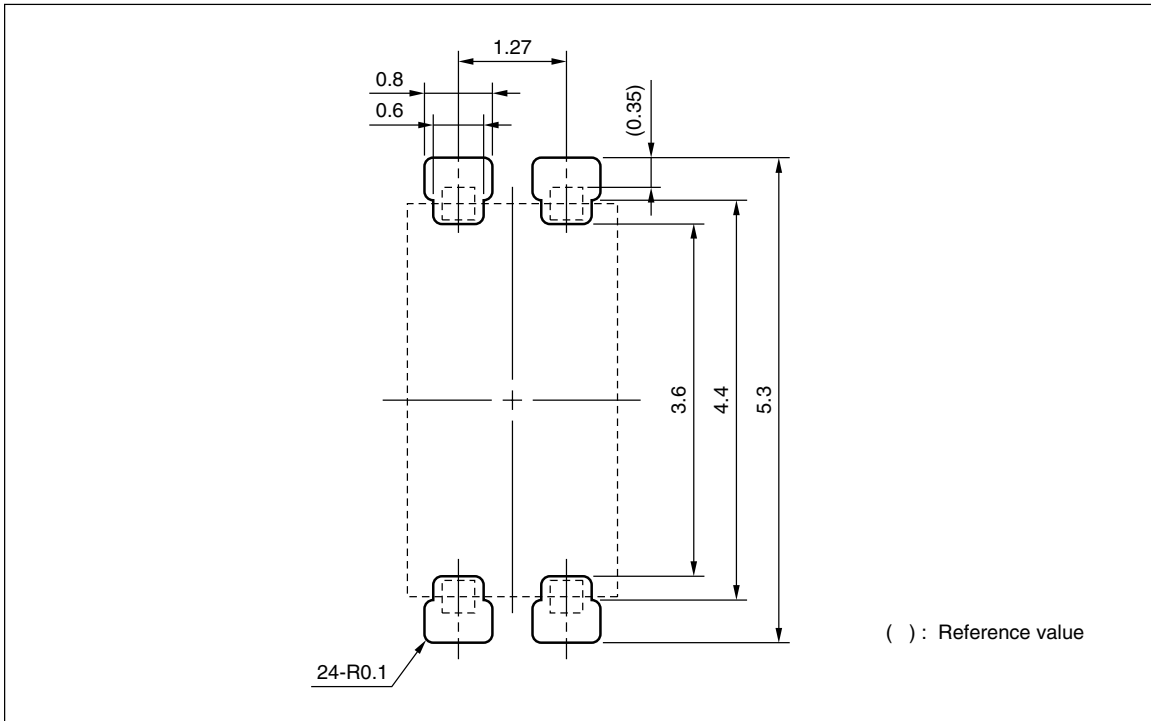


Outline and Dimensions (Reel)





RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



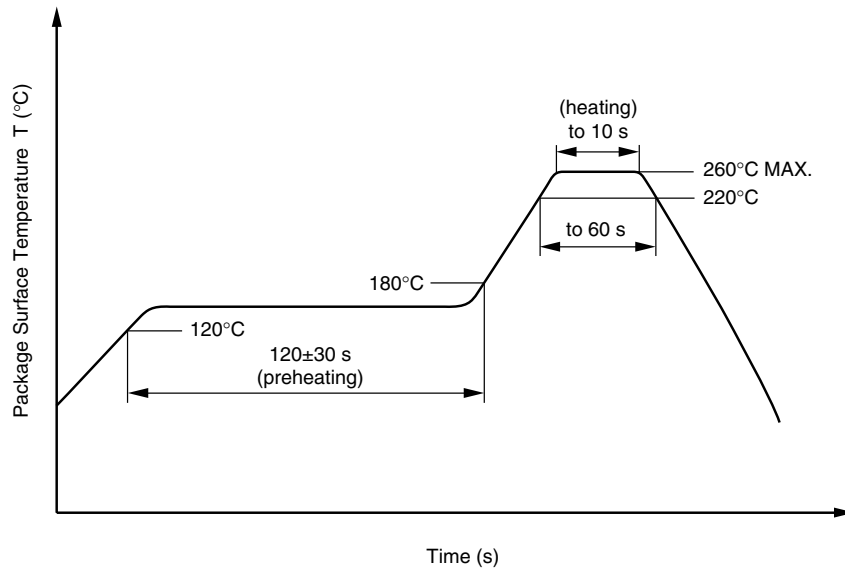
**Remark** All dimensions in this figure must be evaluated before use.

**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.

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<p><b>Caution</b></p>	<p>GaAs Products</p>	<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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