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[CEL \(California Eastern Laboratories\)](#)  
[PS7801J-1A-A](#)

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Solid State Relay  
OCMOS FET

# PS7801J-1A

**4-PIN ULTRA SMALL FLAT-LEAD,  
 LOW  $C \times R$  (3 pF  $\cdot \Omega$ )  
 1-ch Optical Coupled MOS FET**

–NEPOC Series–

## DESCRIPTION

The PS7801J-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.

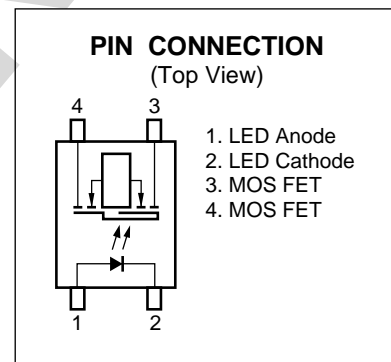
It is suitable for high-frequency signal control, due to its low  $C \times R$  (3 pF  $\cdot \Omega$ ), low output capacitance, and low off-state leakage current.

## FEATURES

- Ultra small flat-lead package (4.2 (L)  $\times$  2.5 (W)  $\times$  1.85 (H) mm)
- Low  $C \times R$  ( $C \times R = 2.9$  pF  $\cdot \Omega$ )
- Low output capacitance ( $C_{out} = 1.3$  pF TYP.)
- 1 channel type (1 a output)
- Designed for AC/DC switching line changer
- Low offset voltage
- Ordering number of taping product: PS7801J-1A-F3: 3 500 pcs/reel
- Pb-Free product
- Safety standards
  - UL approved: File No. E72422

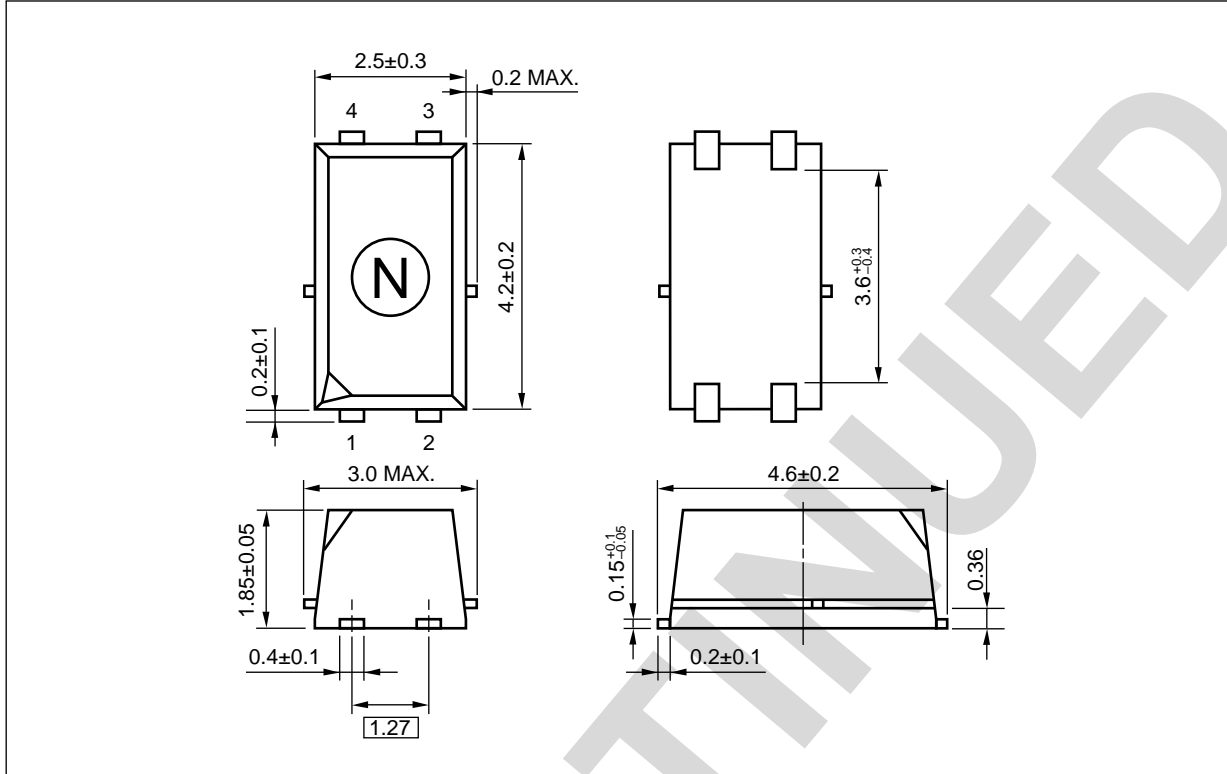
## APPLICATIONS

- Measurement equipment

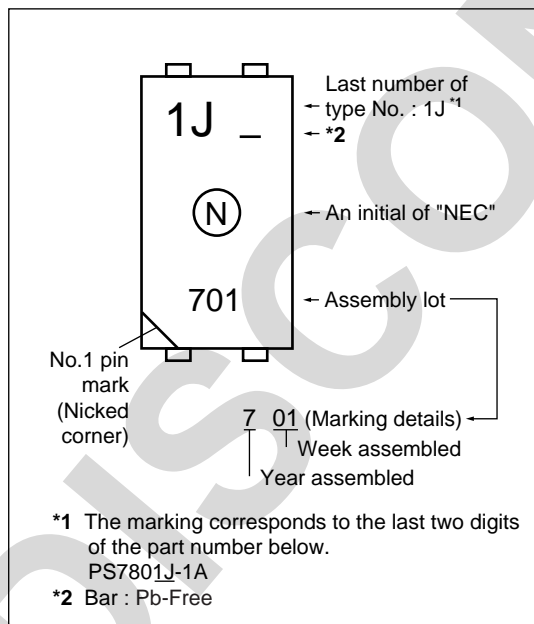


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**PACKAGE DIMENSIONS (UNIT: mm)**



**MARKING EXAMPLE**



**ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number <sup>*1</sup>
PS7801J-1A	PS7801J-1A-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL approved)	PS7801J-1A
PS7801J-1A-F3	PS7801J-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.

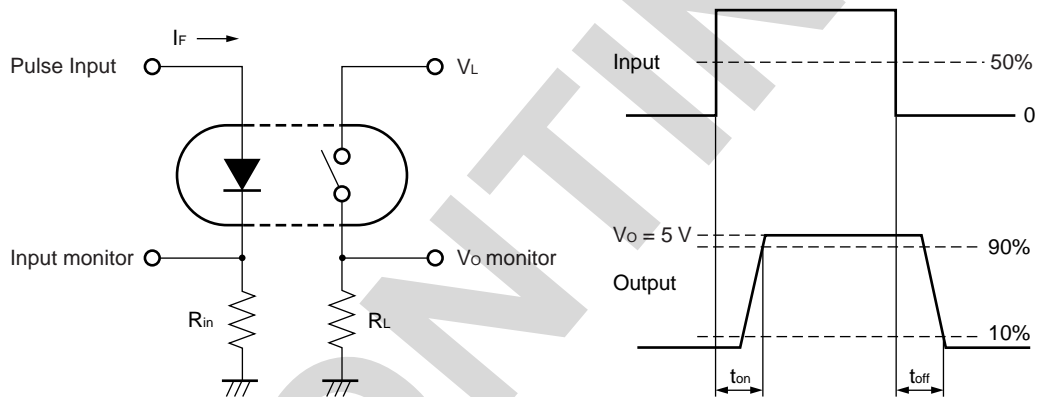
**RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I <sub>F</sub>	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
MOS FET	Off-state Leakage Current	I <sub>Loff</sub>	V <sub>D</sub> = 20 V		0.01	0.25	nA
	Output Capacitance	C <sub>out</sub>	V <sub>D</sub> = 0 V, f = 1 MHz, t ≤ 1 s		1.3	1.7	pF
Coupled	LED On-state Current	I <sub>Fon</sub>	I <sub>L</sub> = 160 mA			2.0	mA
	On-state Resistance	R <sub>on</sub>	I <sub>F</sub> = 5 mA, I <sub>L</sub> = 160 mA, t ≤ 10 ms		2.2	3.2	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, PW ≥ 10 ms		0.05	0.5	ms
	Turn-off Time <sup>*1,2</sup>	t <sub>off</sub>			0.03	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**

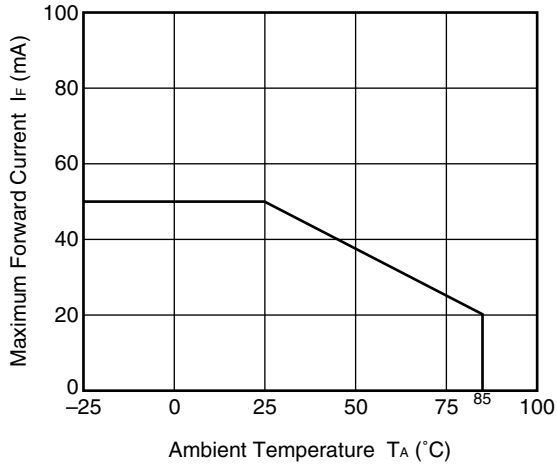


**\*2 The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms.**

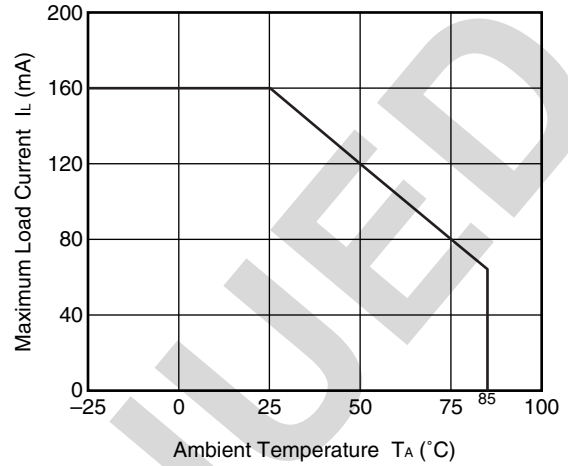
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

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

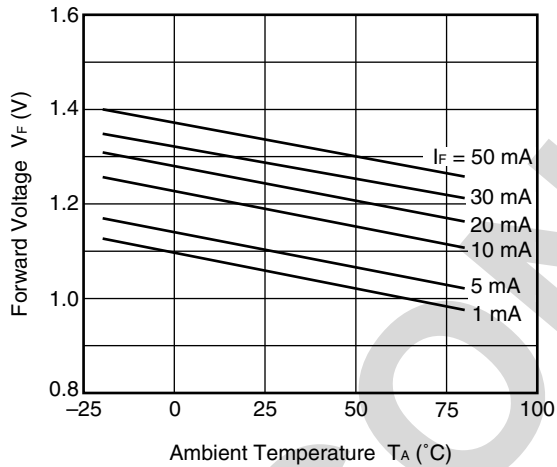
**MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE**



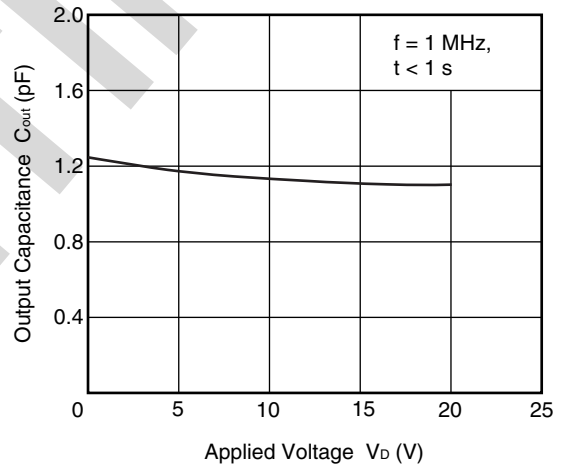
**MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE**



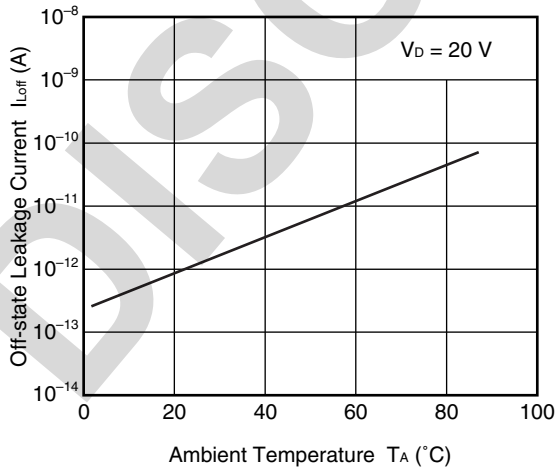
**FORWARD VOLTAGE vs. AMBIENT TEMPERATURE**



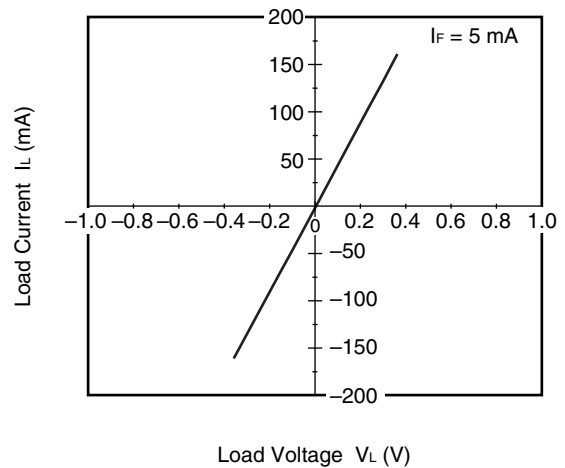
**OUTPUT CAPACITANCE vs. APPLIED VOLTAGE**



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

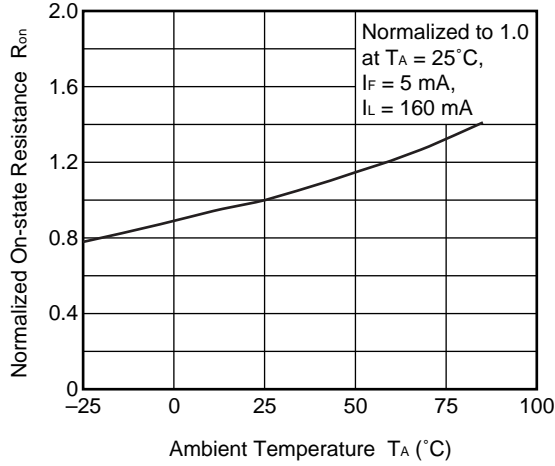


**LOAD CURRENT vs. LOAD VOLTAGE**

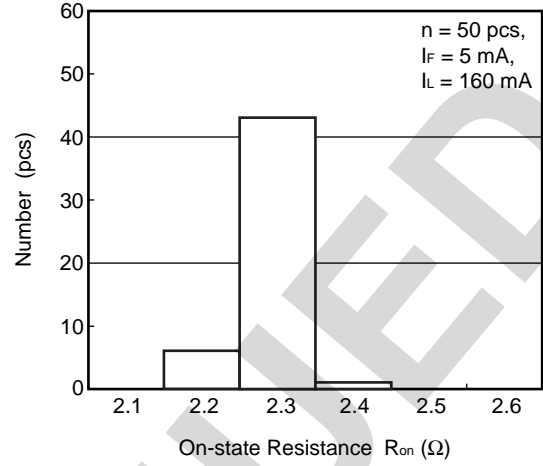


**Remark** The graphs indicate nominal characteristics.

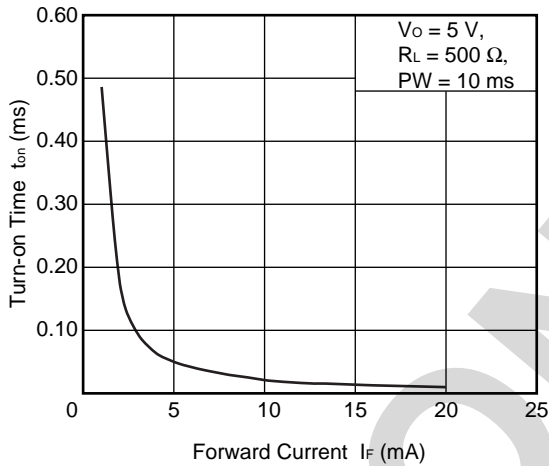
**NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE**



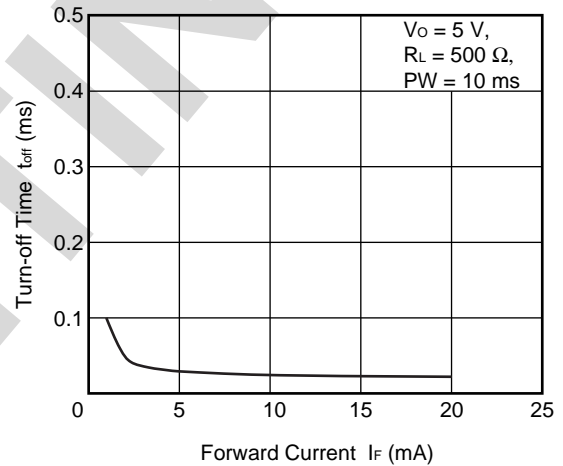
**ON-STATE RESISTANCE DISTRIBUTION**



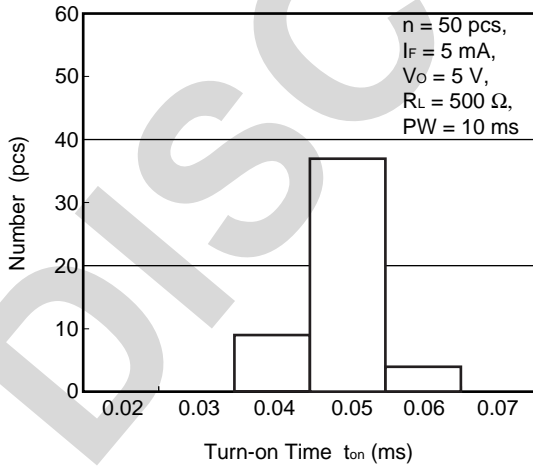
**TURN-ON TIME vs. FORWARD CURRENT**



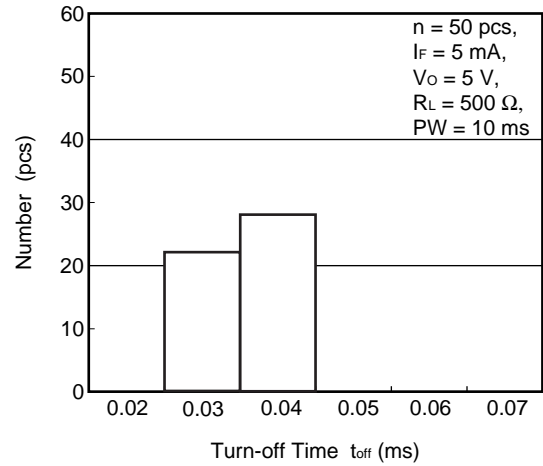
**TURN-OFF TIME vs. FORWARD CURRENT**



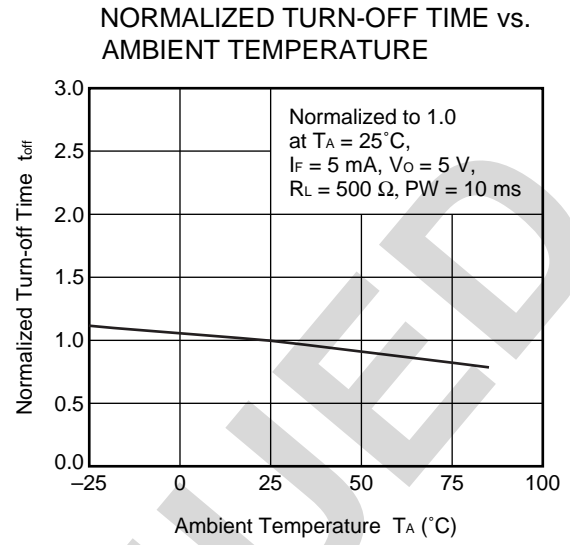
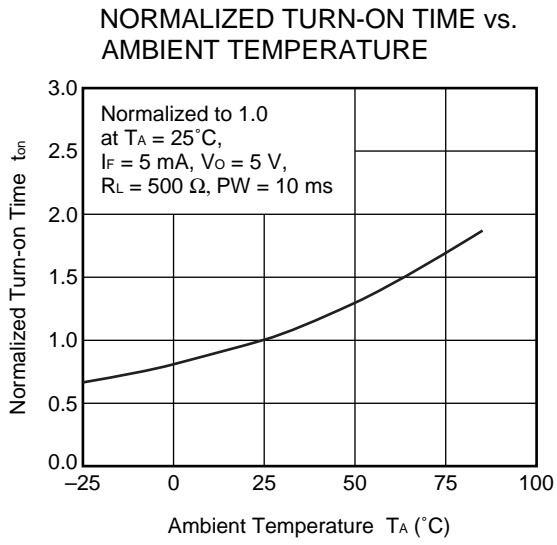
**TURN-ON TIME DISTRIBUTION**



**TURN-OFF TIME DISTRIBUTION**



**Remark** The graphs indicate nominal characteristics.



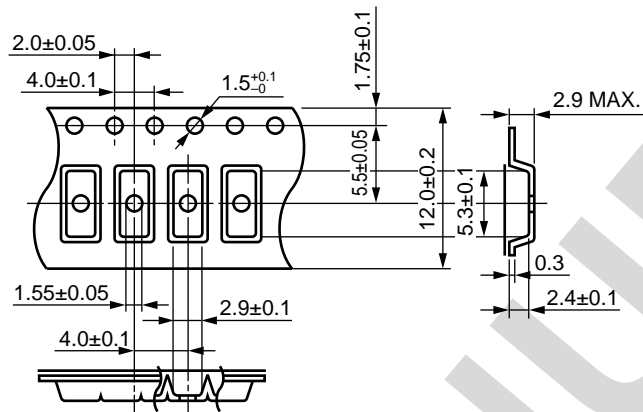
**Remark** The graphs indicate nominal characteristics.

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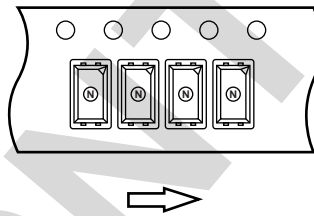
**TAPING SPECIFICATIONS (UNIT: mm)**

**Outline and Dimensions (Tape)**

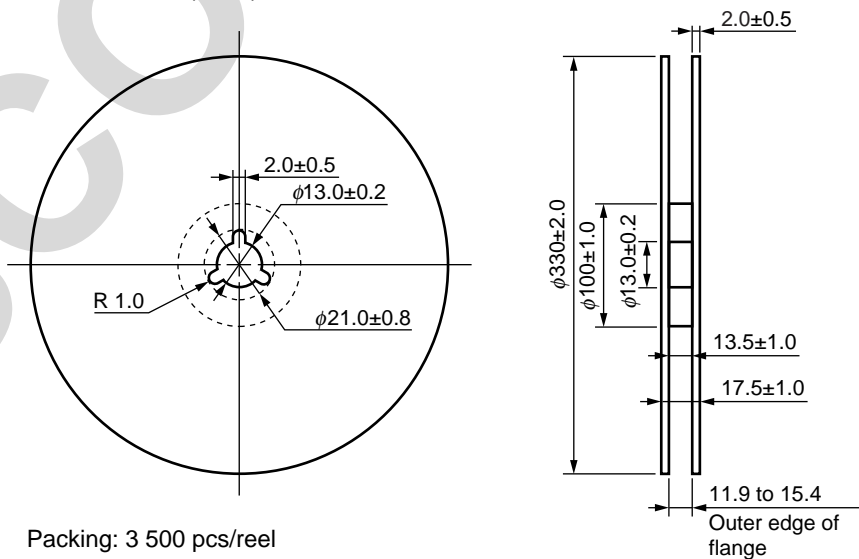


**Tape Direction**

PS7801J-1A-F3

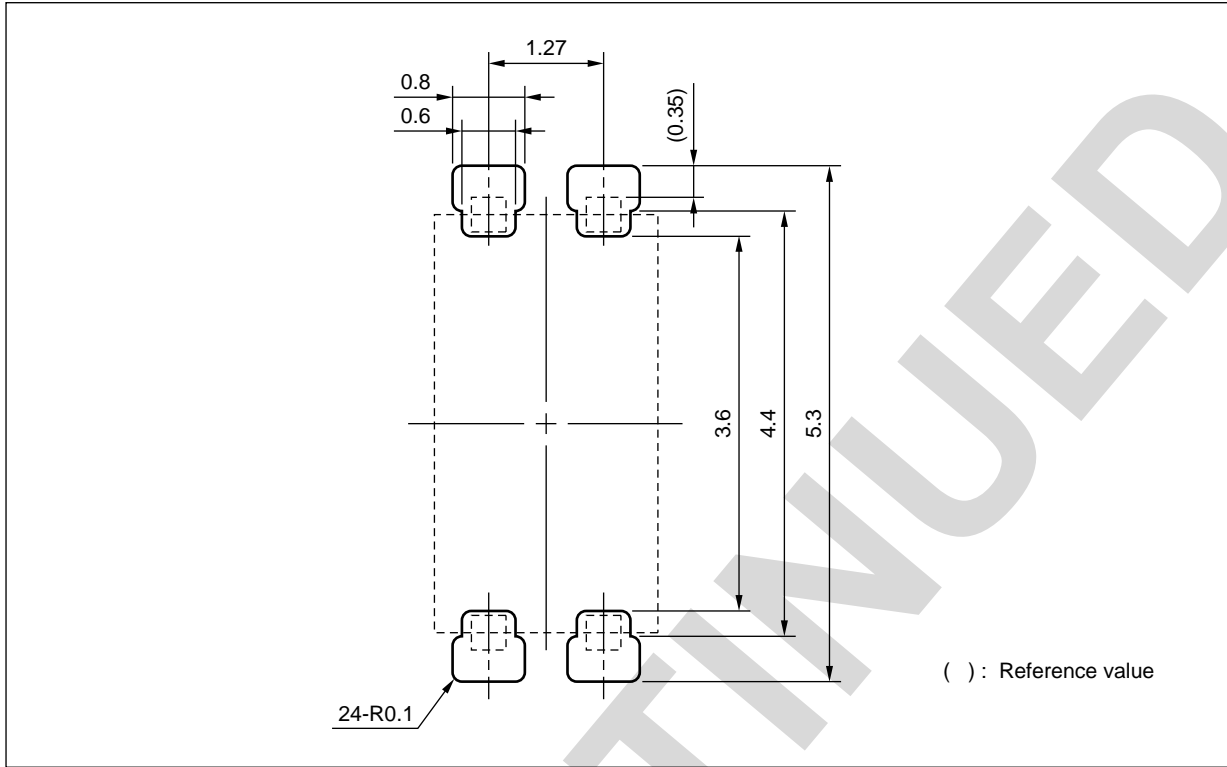


**Outline and Dimensions (Reel)**



Packing: 3 500 pcs/reel

**RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)**



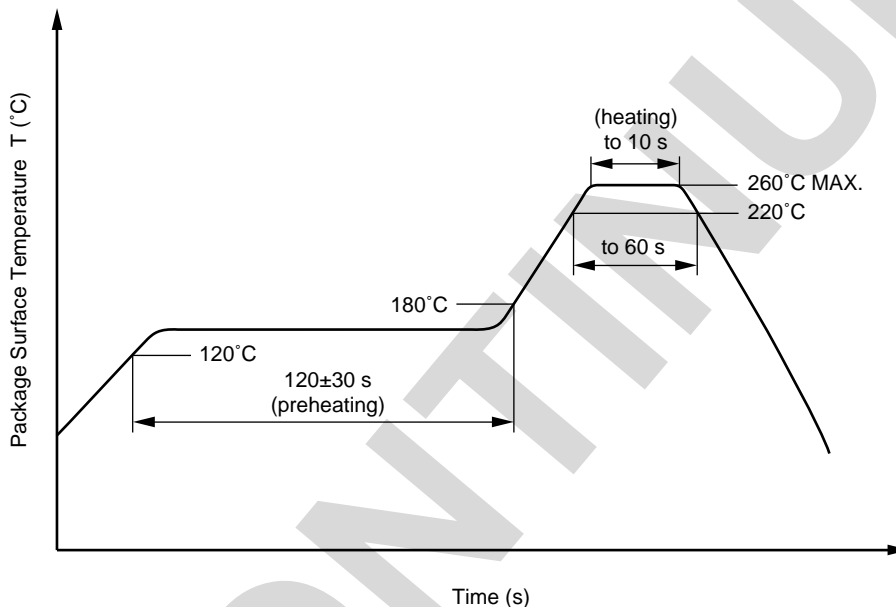
**Remark** All dimensions in this figure must be evaluated before use.

**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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<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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Subject: Compliance with EU Directives

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CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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