NEC

Solid State Relay
OCMOS FET

PS7801J-1A

4-PIN ULTRA SMALL FLAT-LEAD, LOW C × R (3 pF • Ω) 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.

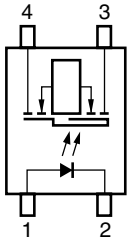
An ultra small flat-lead package has been provided which realizes a reduction in mounting area of about 50% compared with the PS72xx series.

It is suitable for high-frequency signal control, due to its low C × R (3 pF • Ω), 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)
- Low C × R (C × R = 2.9 pF • Ω)
- 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

PIN CONNECTION
(Top View)



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

APPLICATIONS

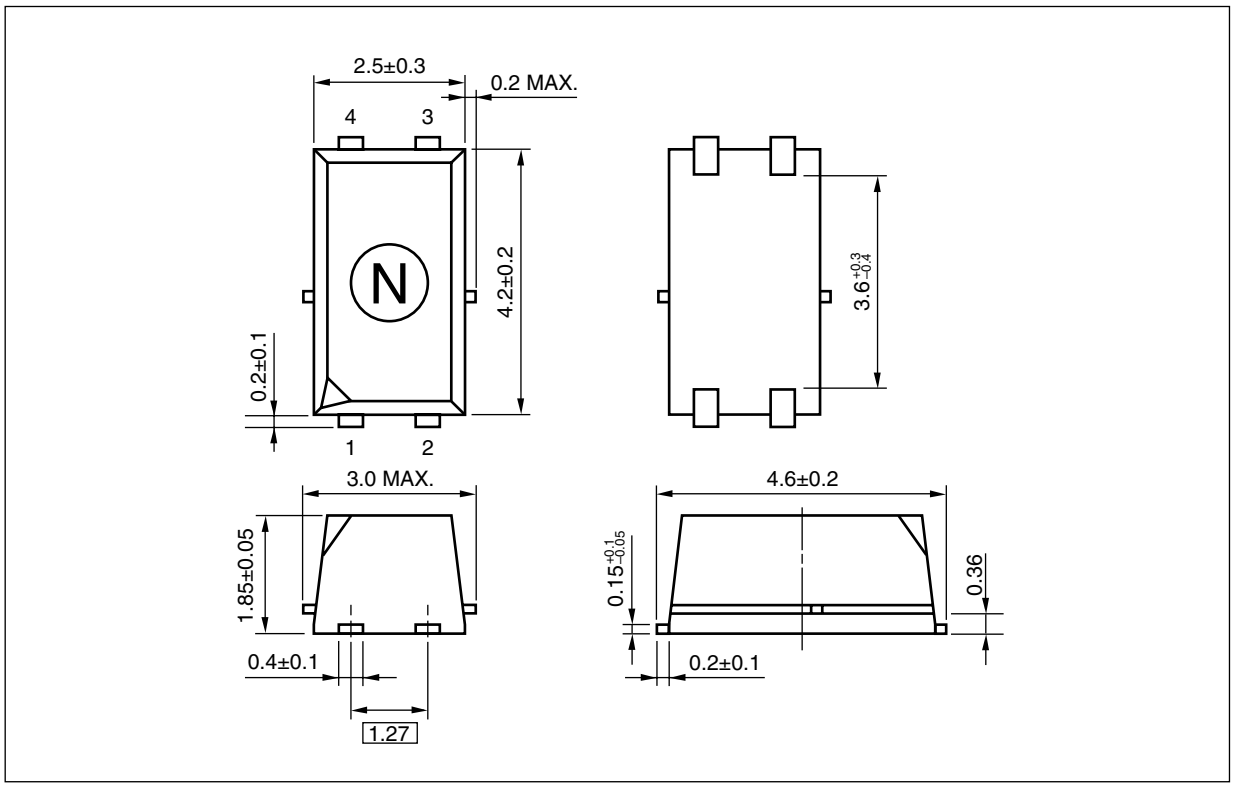
- Measurement equipment

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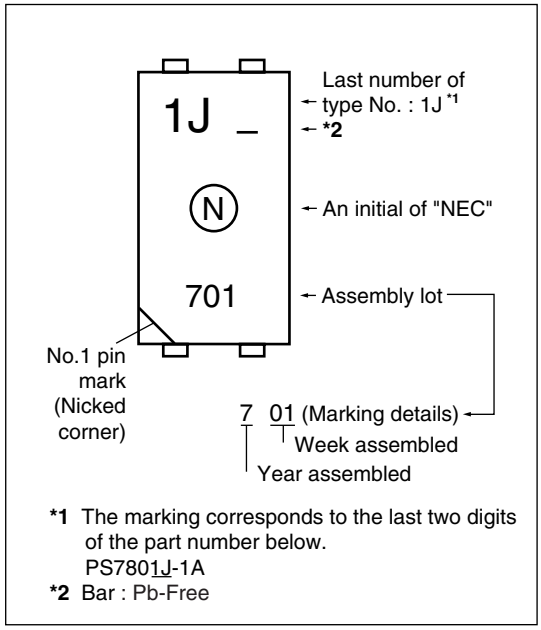
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PACKAGE DIMENSIONS (UNIT: mm)



MARKING EXAMPLE



***1** The marking corresponds to the last two digits of the part number below.
PS7801J-1A

***2** Bar : Pb-Free

ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS7801J-1A	PS7801J-1A-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products	PS7801J-1A
PS7801J-1A-F3	PS7801J-1A-F3-A		Embossed Tape 3 500 pcs/reel	(UL approved)	

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

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	20	V
	Continuous Load Current	I_L	160	mA
	Pulse Load Current*2 (AC/DC Connection)	I_{LP}	240	mA
	Power Dissipation	P_D	250	mW
Isolation Voltage*3		BV	500	Vr.m.s.
Total Power Dissipation		P_T	300	mW
Operating Ambient Temperature		T_A	–40 to +85	°C
Storage Temperature		T_{stg}	–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_A = 25°C, RH = 60% between input and output
Pins 1-2 shorted together, 3-4 shorted together.

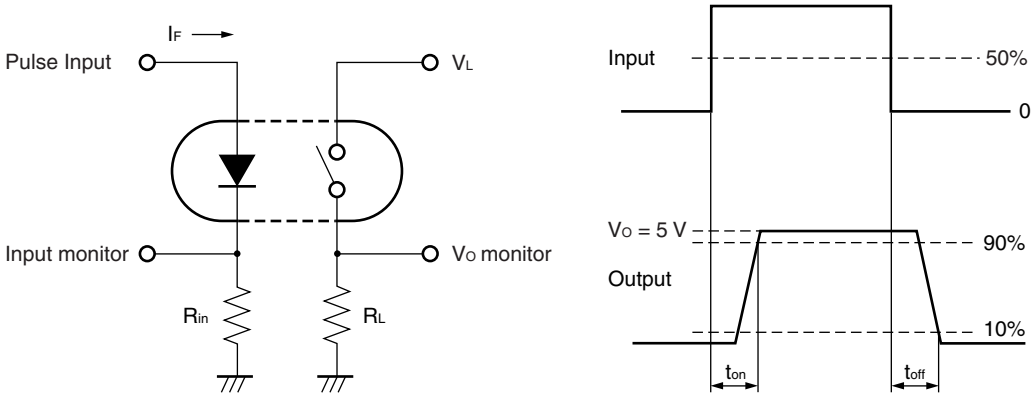
RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
LED Operating Current	I_F	2	5	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 = 5 mA		1.1	1.4	V
	Reverse Current	I_R	V_R = 5 V			5.0	μA
MOS FET	Off-state Leakage Current	I_{Loff}	V_D = 20 V		0.01	0.25	nA
	Output Capacitance	C_{out}	V_D = 0 V, f = 1 MHz, t ≤ 1 s		1.3	1.7	pF
Coupled	LED On-state Current	I_{Fon}	I_L = 160 mA			2.0	mA
	On-state Resistance	R_{on}	I_F = 5 mA, I_L = 160 mA, t ≤ 10 ms		2.2	3.2	Ω
	Turn-on Time*1, 2	t_{on}	I_F = 5 mA, V_O = 5 V, R_L = 500 Ω,		0.05	0.5	ms
	Turn-off Time*1, 2	t_{off}	PW ≥ 10 ms		0.03	0.5	
	Isolation Resistance	R_{I-O}	V_{I-O} = 0.5 kV_{DC}	10^9			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz		0.3		pF

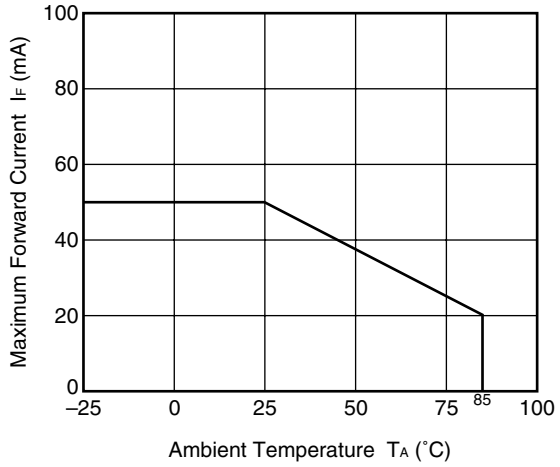
***1** Test Circuit for Switching Time



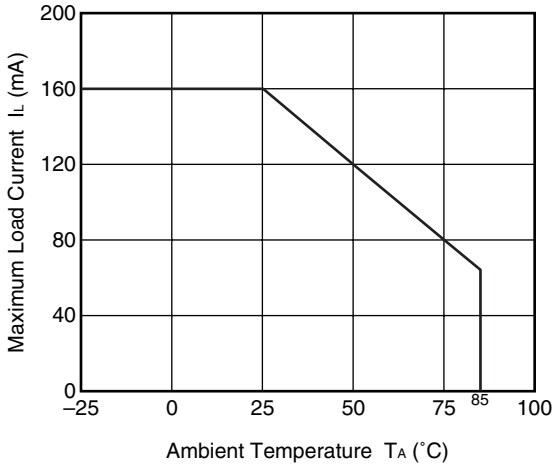
***2** The turn-on time and turn-off time are specified as input-pulse width ≥ 10 ms.
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

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

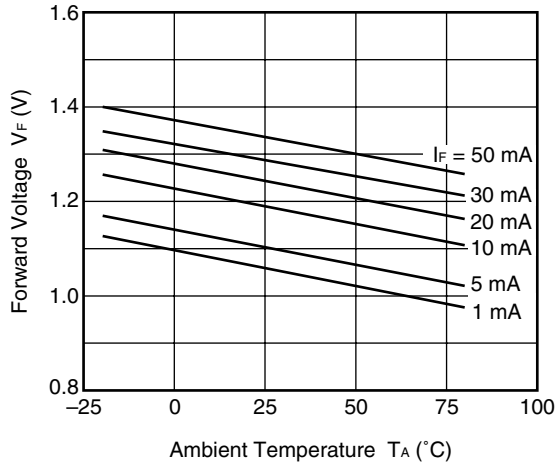
MAXIMUM FORWARD CURRENT vs. AMBIENT TEMPERATURE



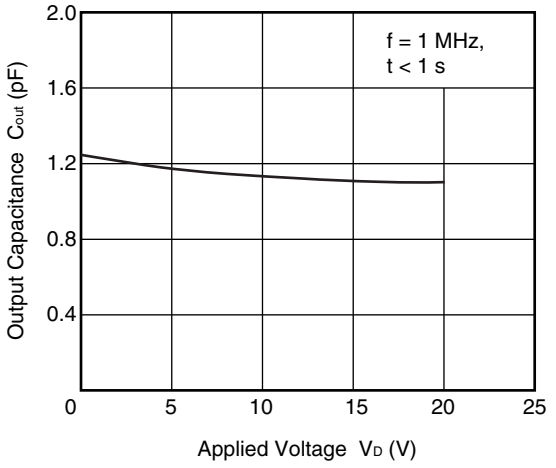
MAXIMUM LOAD CURRENT vs. AMBIENT TEMPERATURE



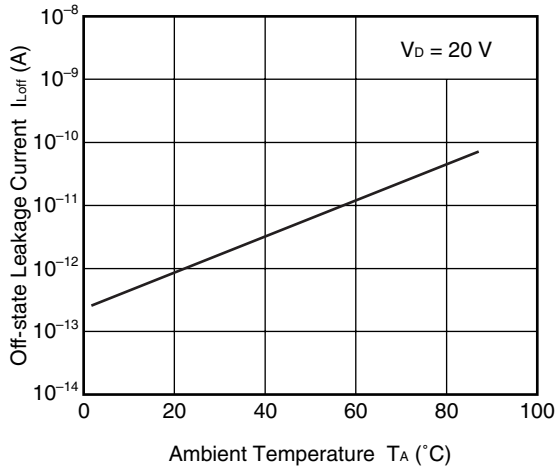
FORWARD VOLTAGE vs. AMBIENT TEMPERATURE



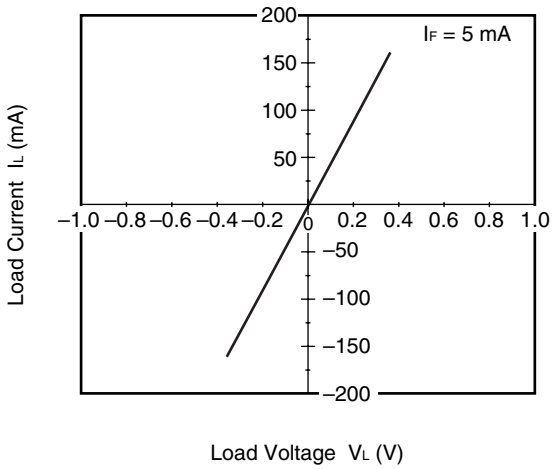
OUTPUT CAPACITANCE vs. APPLIED VOLTAGE



OFF-STATE LEAKAGE CURRENT vs. AMBIENT TEMPERATURE

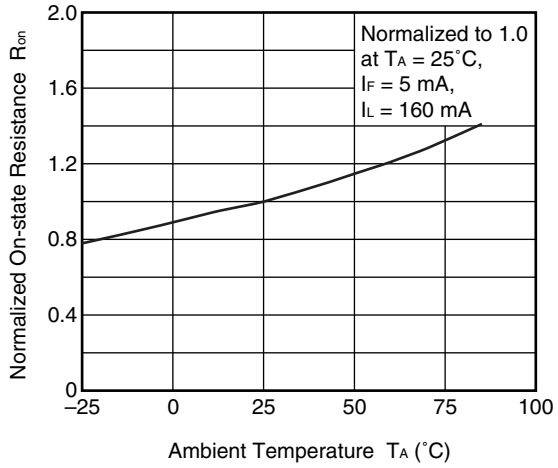


LOAD CURRENT vs. LOAD VOLTAGE

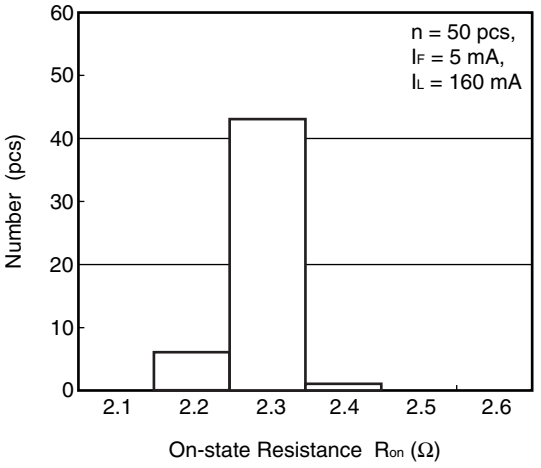


Remark The graphs indicate nominal characteristics.

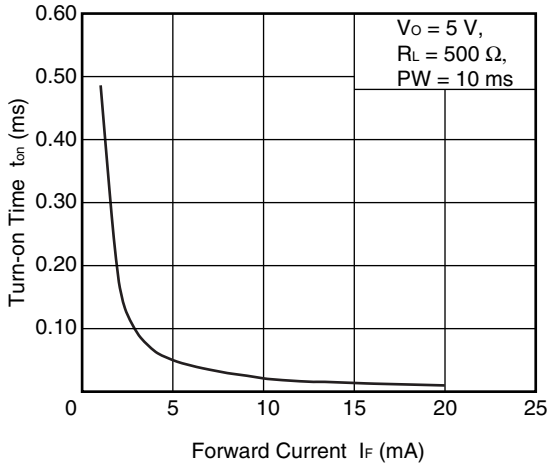
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



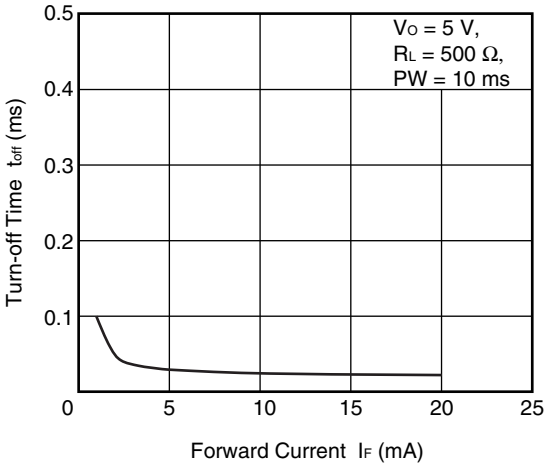
ON-STATE RESISTANCE DISTRIBUTION



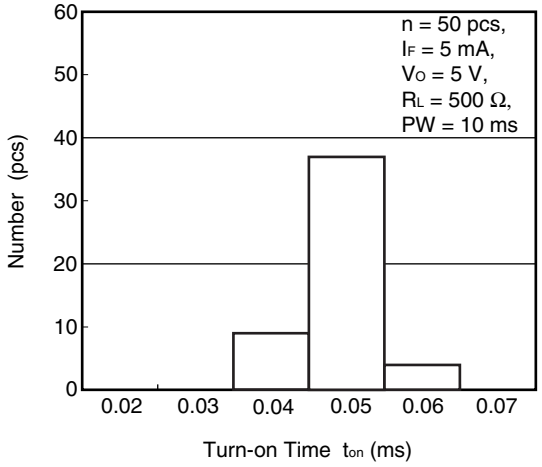
TURN-ON TIME vs. FORWARD CURRENT



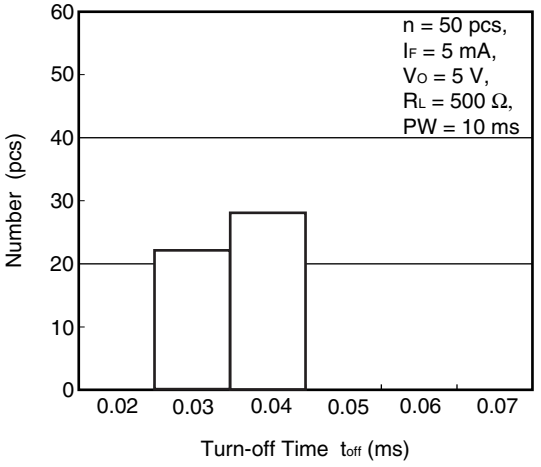
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION

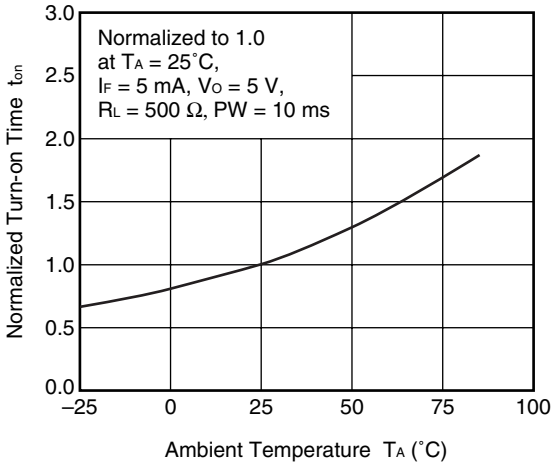


TURN-OFF TIME DISTRIBUTION

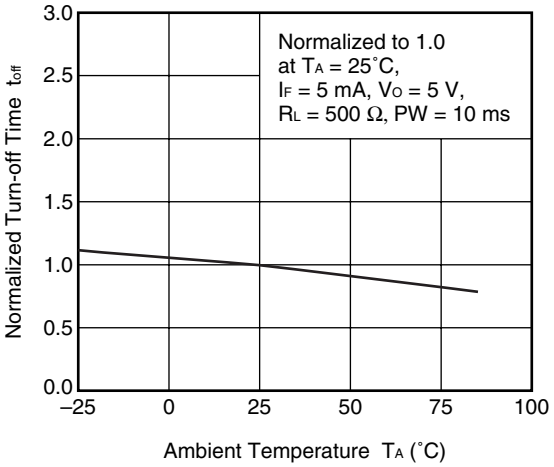


Remark The graphs indicate nominal characteristics.

NORMALIZED TURN-ON TIME vs.
AMBIENT TEMPERATURE



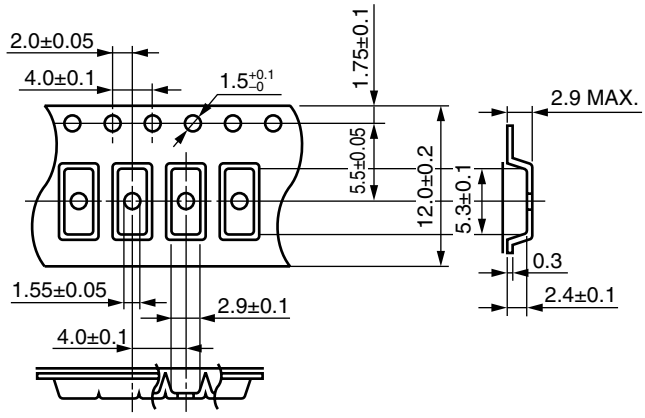
NORMALIZED TURN-OFF TIME vs.
AMBIENT TEMPERATURE



Remark The graphs indicate nominal characteristics.

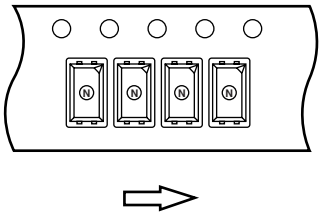
TAPING SPECIFICATIONS (UNIT: mm)

Outline and Dimensions (Tape)

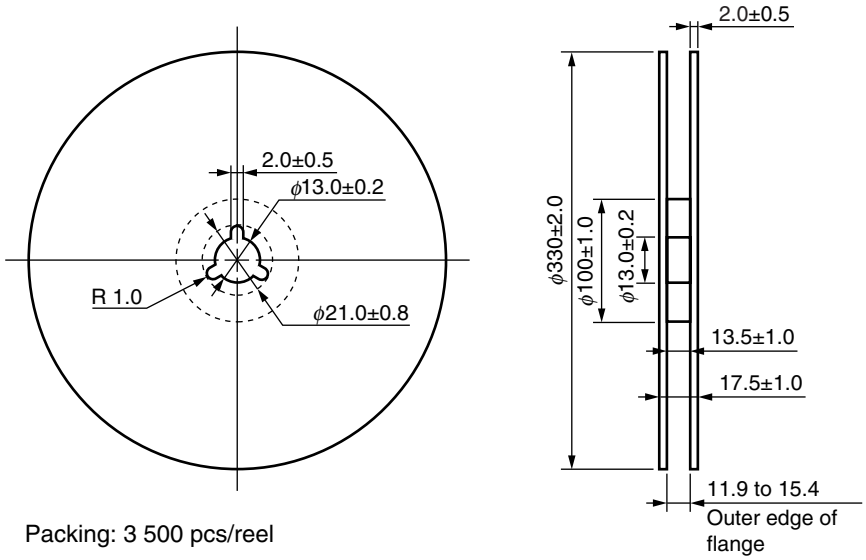


Tape Direction

PS7801J-1A-F3

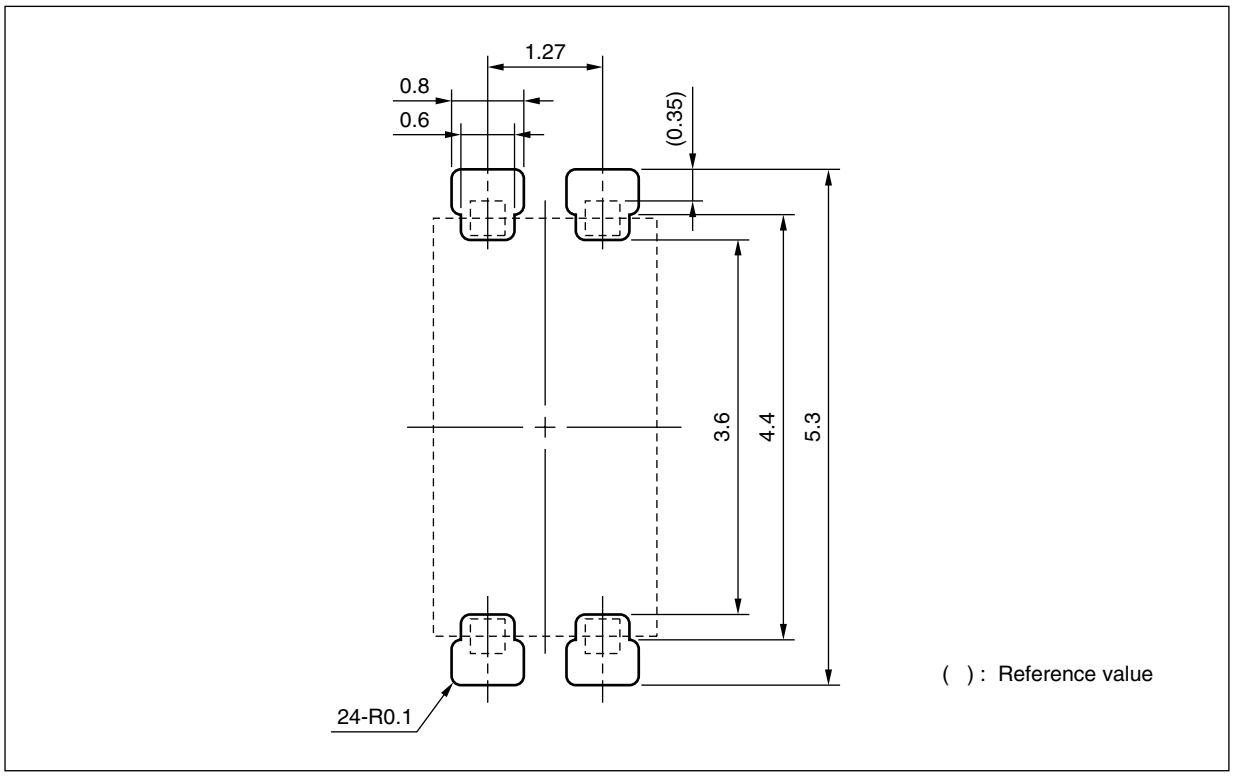


Outline and Dimensions (Reel)



Packing: 3 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



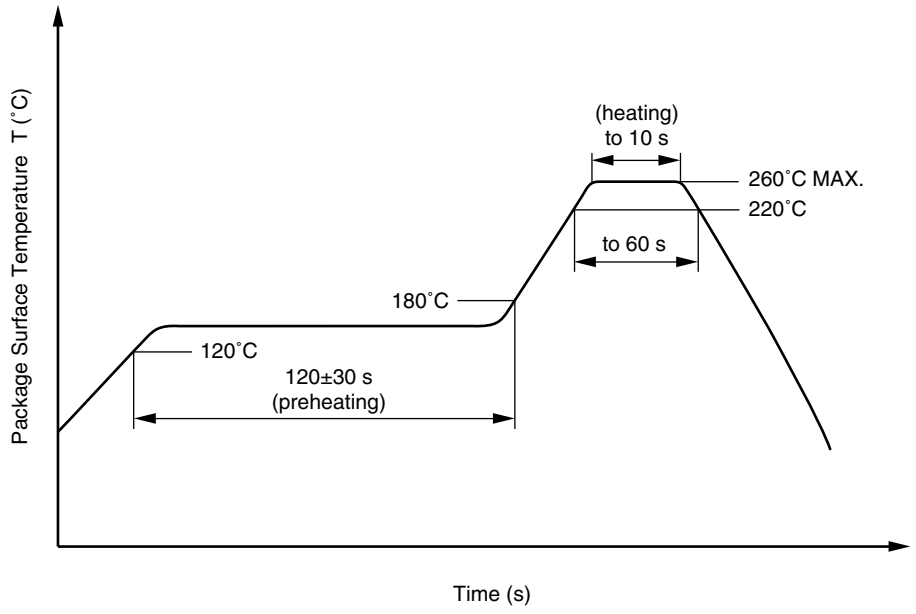
Remark All dimensions in this figure must be evaluated before use.

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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M8E 02. 11-1

Caution GaAs Products	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. • 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. 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. 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. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.