

4-PIN SOP, 0.8 Ω LOW ON-STATE RESISTANCE 1-ch Optical Coupled MOS FET

–NEPOC Series–

DESCRIPTION

The PS7200E-1A is a low on-state resistance solid state relay containing a GaAs LED on the light emitting side (input side) and MOS FETs on the output side.

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

FEATURES

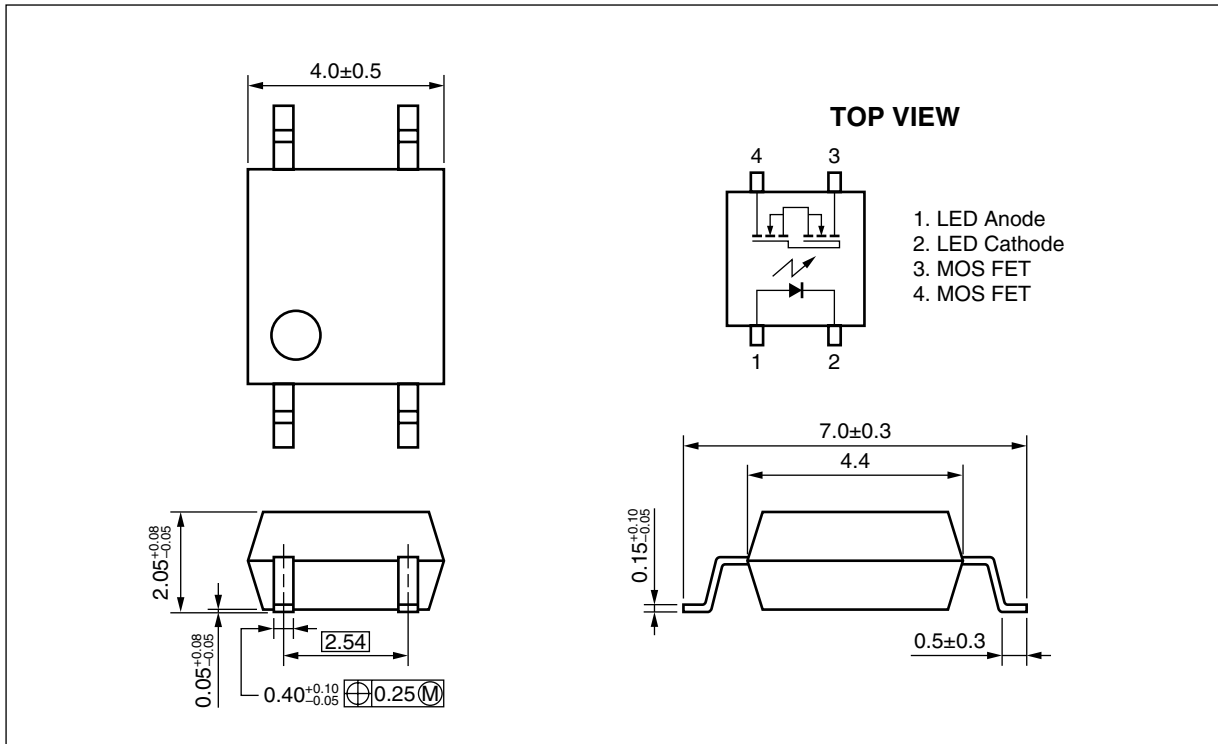
- Low ERT (ERT = 78 ps TYP.)
 - Low $C \times R$ ($C \times R = 27 \text{ pF} \cdot \Omega$)
 - Low on-state resistance ($R_{on} = 0.8 \Omega$ TYP.)
 - Low off-state leakage current
 - 1 channel type (1 a output)
 - Designed for AC/DC switching line changer
 - Small and thin package (4-pin SOP, Height = 2.1 mm)
 - High isolation voltage ($BV = 1\,500 \text{ Vr.m.s.}$)
 - Low offset voltage
 - Ordering number of taping product : PS7200E-1A-E3, E4: 900 pcs/reel
: PS7200E-1A-F3, F4: 3 500 pcs/reel
- <R>
- Pb-Free product

APPLICATIONS

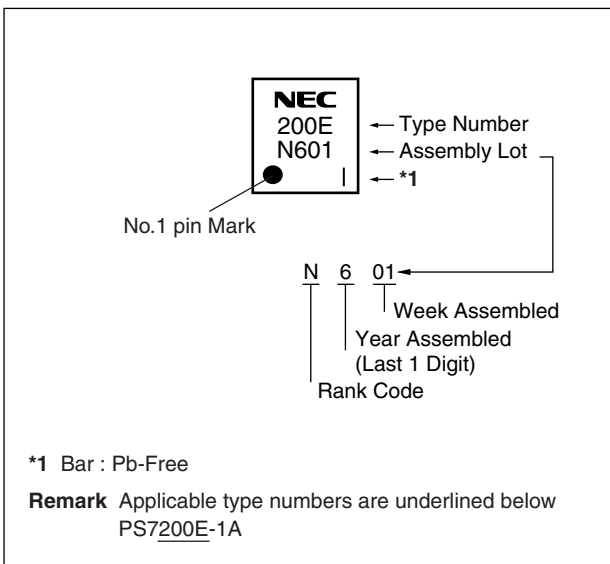
- Measurement equipment

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PACKAGE DIMENSIONS (Unit : mm)



<R> MARKING EXAMPLE (LASER MARKING)



<R> ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style
PS7200E-1A	PS7200E-1A-A	Pb-Free	Magazine case 100 pcs
PS7200E-1A-E3	PS7200E-1A-E3-A		Embossed Tape 900 pcs/reel
PS7200E-1A-E4	PS7200E-1A-E4-A		
PS7200E-1A-F3	PS7200E-1A-F3-A		Embossed Tape 3 500 pcs/reel
PS7200E-1A-F4	PS7200E-1A-F4-A		

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	40	V
	Continuous Load Current	I _L	250	mA
	Power Dissipation	P _D	100	mW
Isolation Voltage ^{*2}		BV	1 500	Vr.m.s.
Total Power Dissipation		P _T	150	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 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.

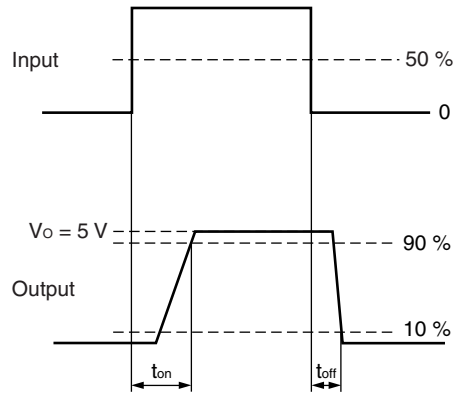
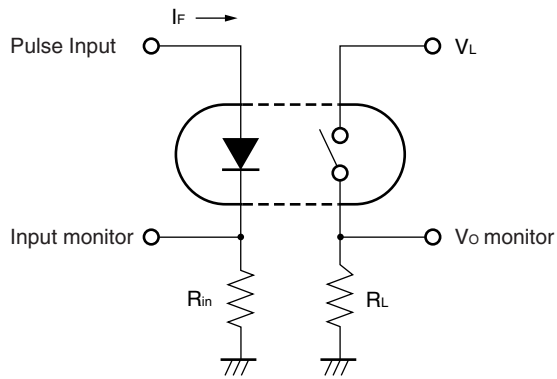
RECOMMENDED OPERATING CONDITIONS (T_A = 25°C)

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 = 40 V		0.1	10	nA
	Output Capacitance	C _{out}	V _D = 0 V, f = 1 MHz		33.5		pF
Coupled	LED On-state Current	I _{Fon}	I _L = 250 mA			2.0	mA
	On-state Resistance	R _{on1}	I _F = 5 mA, I _L = 10 mA		0.8	1.6	Ω
		R _{on2}	I _F = 5 mA, I _L = 250 mA, t ≤ 10 ms		0.8	1.6	
	Turn-on Time ^{1,2}	t _{on}	I _F = 5 mA, V _O = 5 V, R _L = 500 Ω, PW ≥ 10 ms		0.48	1.0	ms
	Turn-off Time ^{1,2}	t _{off}			0.15	0.5	
	Isolation Resistance	R _{I-O}	V _{I-O} = 1.0 kV _{DC}	10 ⁹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz		0.5		pF
Equivalent Rise Time ³	ERT	I _F = 10 mA, t _{r(in)} = 25 ps, V = 250 mV, 50 Ω termination		78		ps	

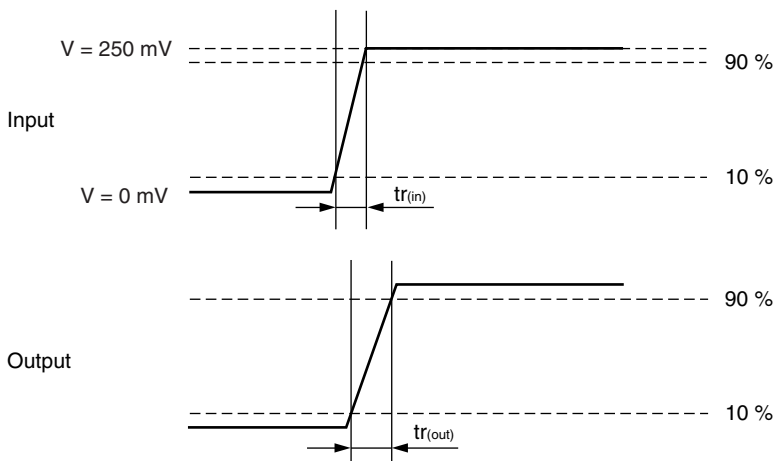
<R> *1 Test Circuit for Switching Time



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

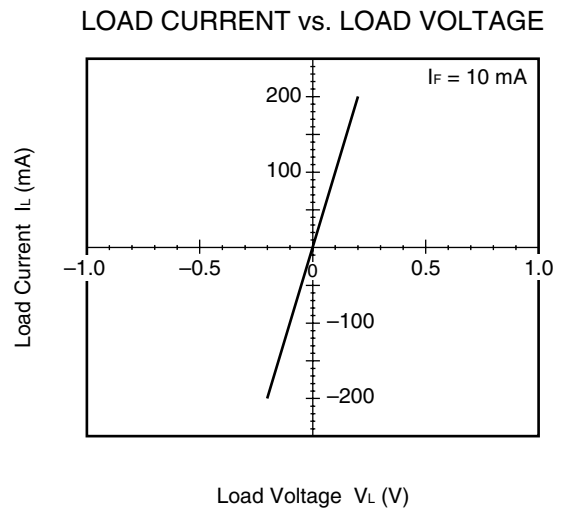
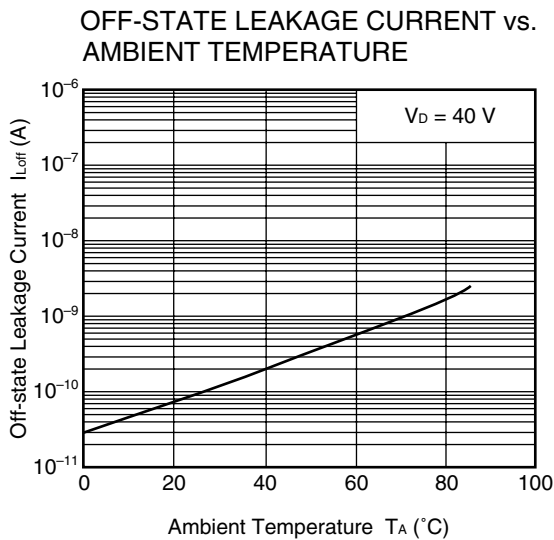
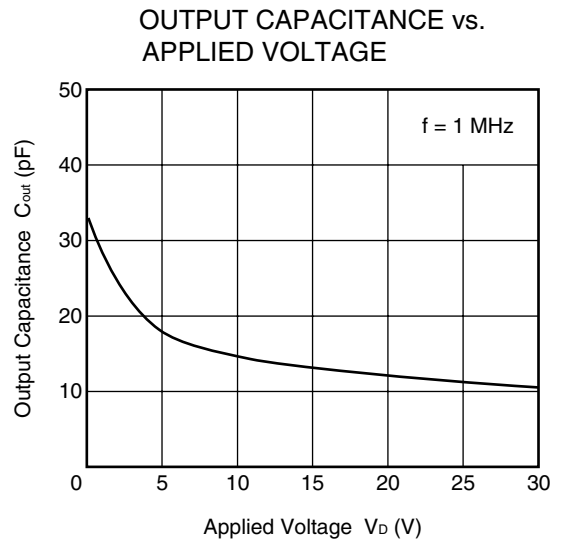
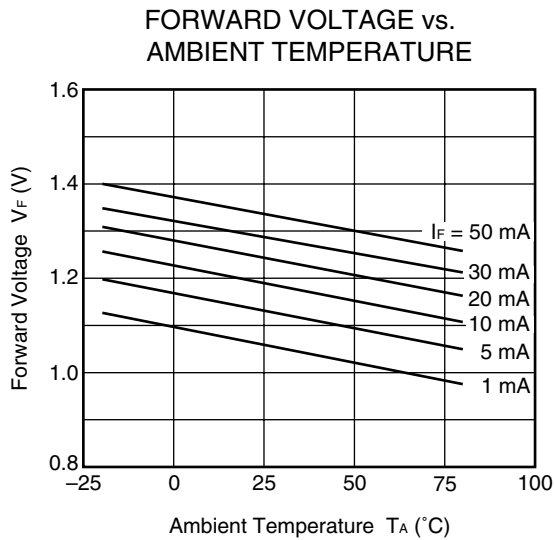
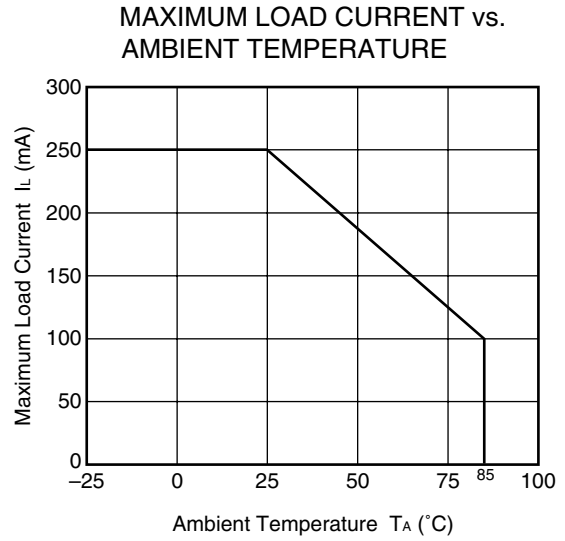
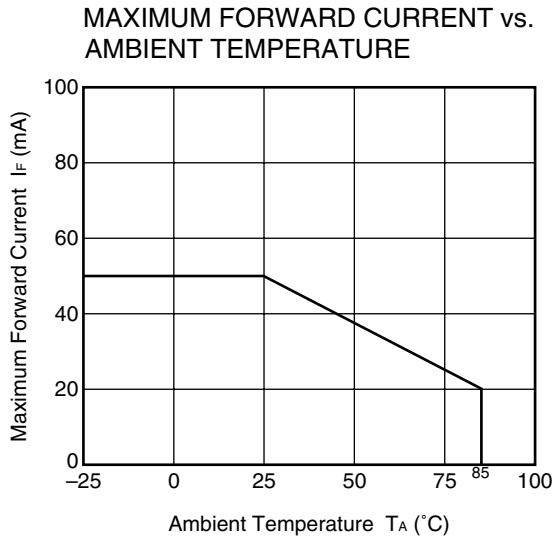
Be aware that when the device operates with an input-pulse width less than 10 ms, the turn-on time and turn-off time will increase.

*3 ERT waveform and equation



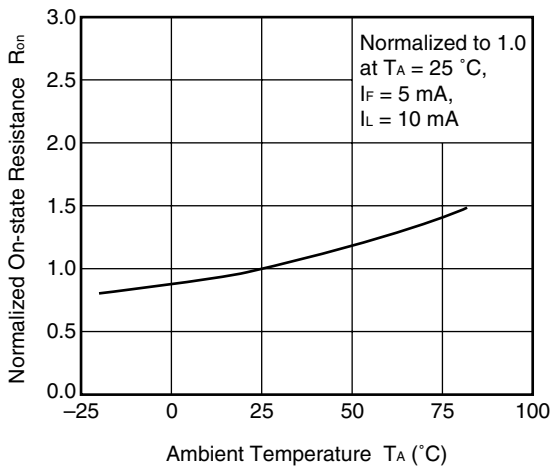
$$ERT = \sqrt{tr_{(out)}^2 - tr_{(in)}^2}$$

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

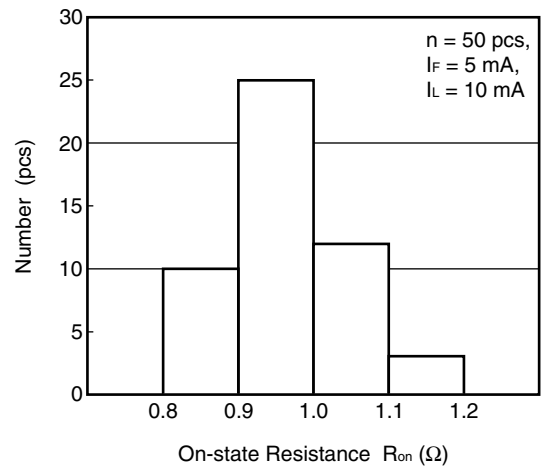


Remark The graphs indicate nominal characteristics.

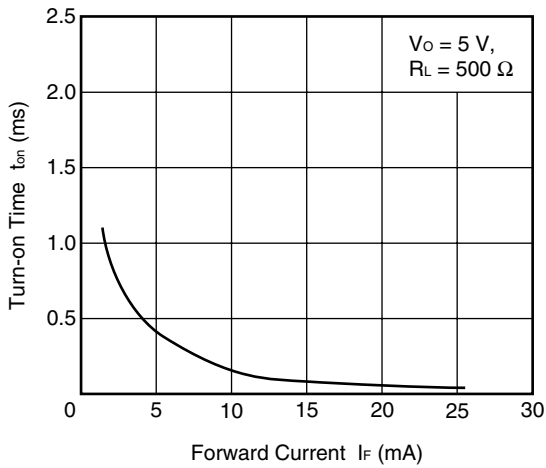
NORMALIZED ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



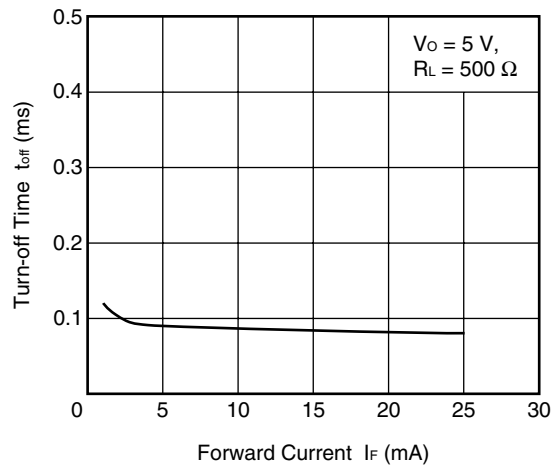
ON-STATE RESISTANCE DISTRIBUTION



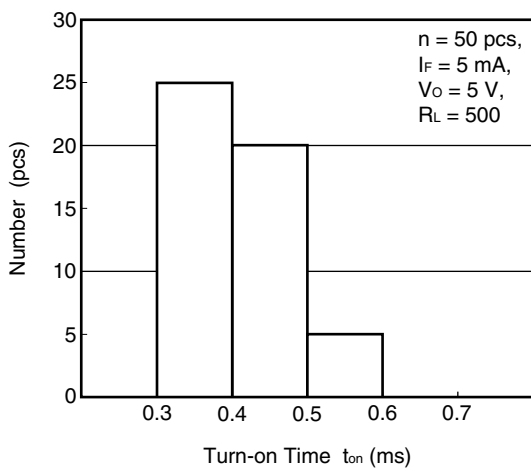
TURN-ON TIME vs. FORWARD CURRENT



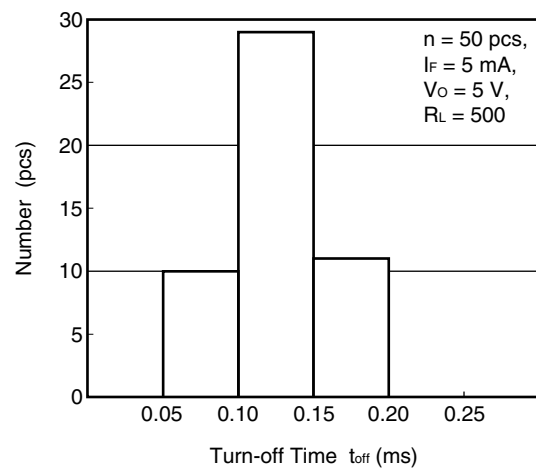
TURN-OFF TIME vs. FORWARD CURRENT



TURN-ON TIME DISTRIBUTION

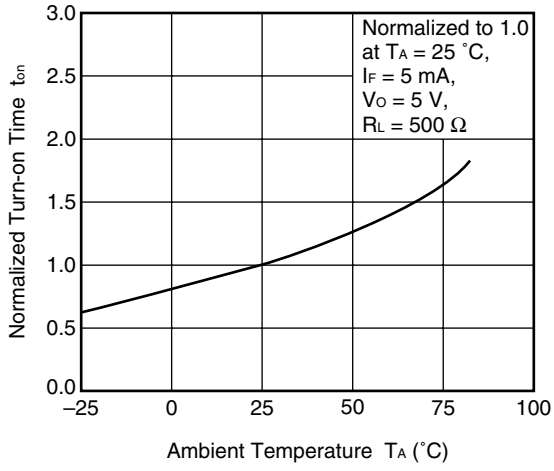


TURN-OFF TIME DISTRIBUTION

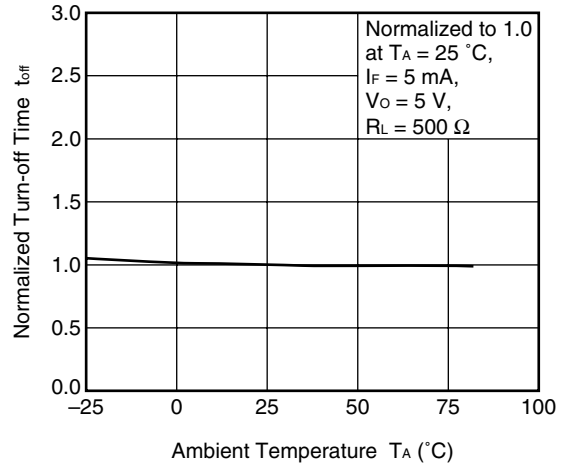


Remark The graphs indicate nominal characteristics.

NORMALIZED TURN-ON TIME vs. AMBIENT TEMPERATURE



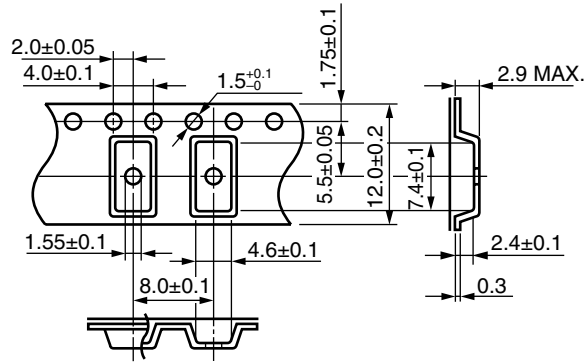
NORMALIZED TURN-OFF TIME vs. AMBIENT TEMPERATURE



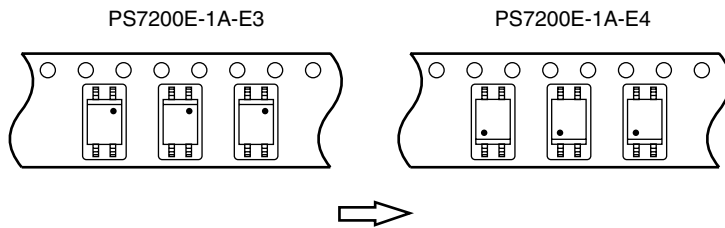
Remark The graphs indicate nominal characteristics.

TAPING SPECIFICATIONS (Unit : mm)

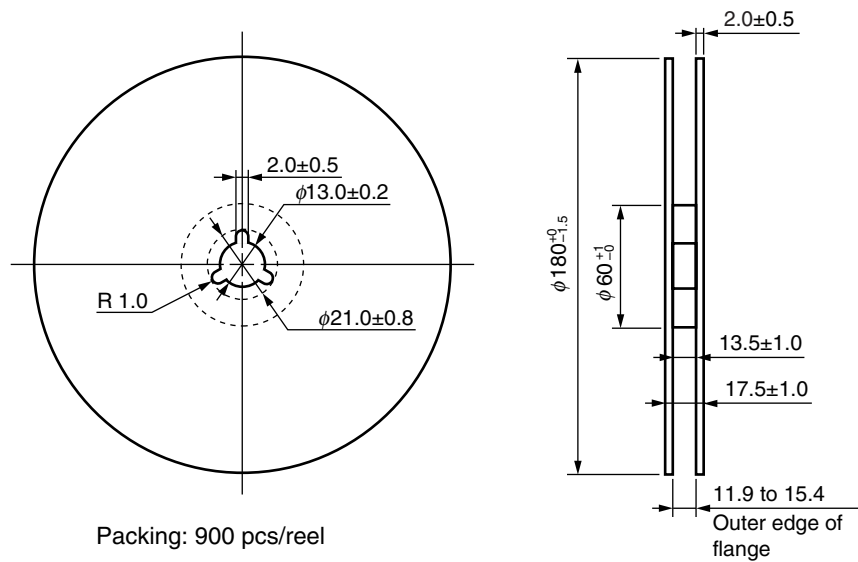
Outline and Dimensions (Tape)



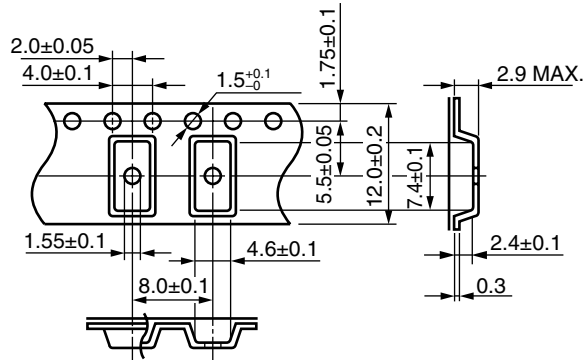
Tape Direction



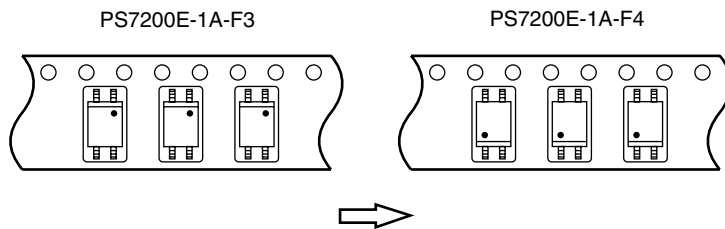
Outline and Dimensions (Reel)



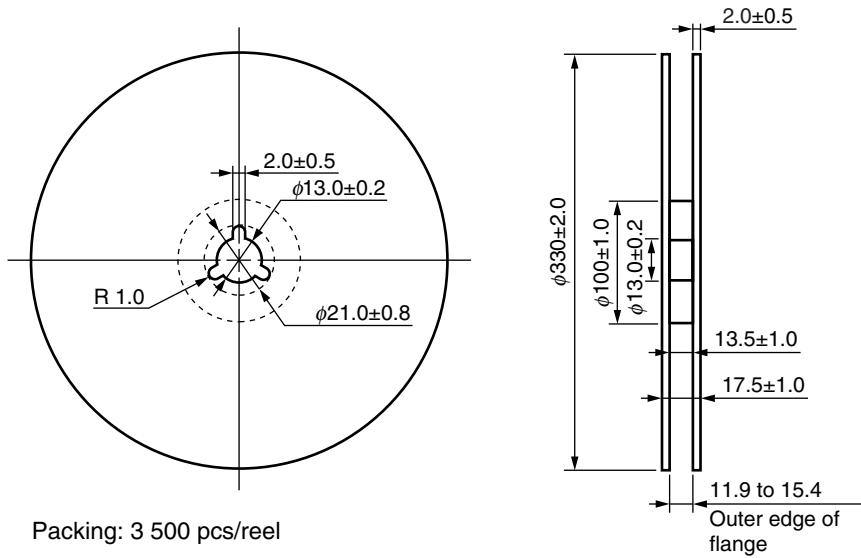
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)

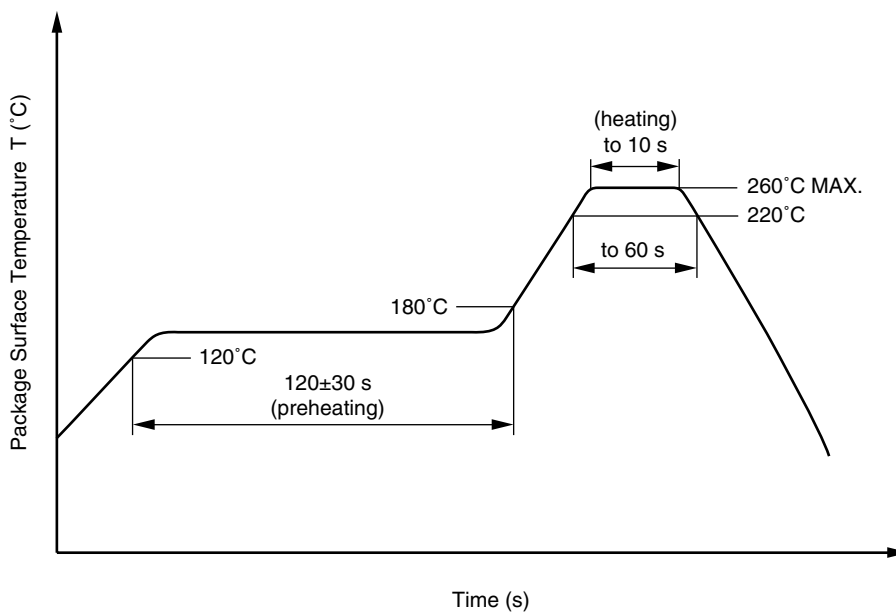


RECOMMENDED SOLDERING CONDITIONS

(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.)

<R> **(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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<p>Caution</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"> • 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"> 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.
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► For further information, please contact

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