

**HIGH ISOLATION VOLTAGE  
DARLINGTON TRANSISTOR TYPE  
SOP PHOTOCOUPLER**

–NEPOC Series–

**DESCRIPTION**

The PS2802-1 and PS2802-4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon darlington-connected photo transistor in a plastic SOP for high density applications.

This package has shield effect to cut off ambient light.

**FEATURES**

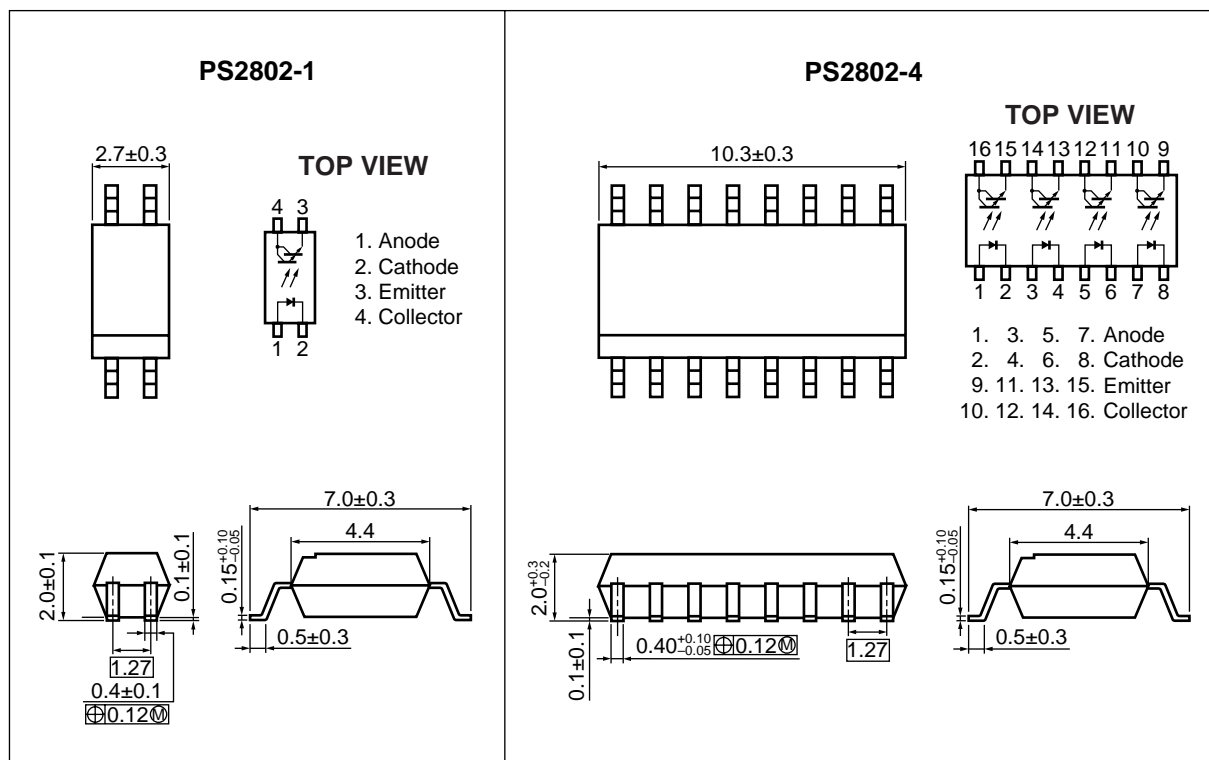
- High isolation voltage ( $BV = 2\,500\text{ V r.m.s.}$ )
- Small and thin package (4,16-pin SOP, Pin pitch 1.27 mm)
- High current transfer ratio ( $CTR = 2\,000\% \text{ TYP. @ } I_F = 1\text{ mA, } V_{CE} = 2\text{ V}$ )
- Ordering number of tape product: PS2802-1-F3, F4, PS2802-4-F3, F4
- Safety standards: PS2802-1, -4
  - UL approved: File No. E72422 (S)
  - BSI approved: No. 8188, 8189
  - VDE0884 approved (Option): PS2802-4 only

**APPLICATIONS**

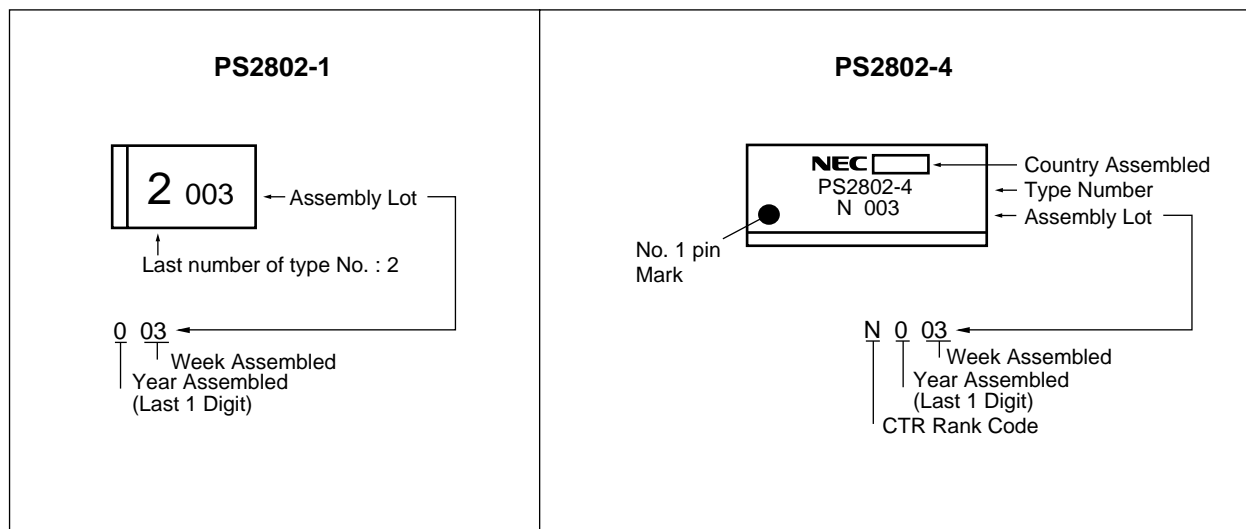
- Programmable logic controllers
- Measuring instruments
- Hybrid IC

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★ PACKAGE DIMENSIONS (UNIT: mm)



MARKING



# ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number <sup>*1</sup>
PS2802-1	4-pin SOP	50 pcs (Tape 50 pcs cut)	PS2802-1
PS2802-1-F3		Embossed Tape 3 500 pcs/reel	
PS2802-1-F4			
PS2802-4	16-pin SOP	Magazine Case 45 pcs	PS2802-4
PS2802-4-F3		Embossed Tape 2 500 pcs/reel	
PS2802-4-F4			

<sup>\*1</sup> 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
			PS2802-1	PS2802-4	
Diode	Forward Current (DC)	I <sub>F</sub>	50		mA
	Reverse Voltage	V <sub>R</sub>	6		V
	Power Dissipation Derating	ΔP <sub>D</sub> /°C	0.6	0.8	mW/°C
	Power Dissipation	P <sub>D</sub>	60	80	mW/ch
	Peak Forward Current <sup>*1</sup>	I <sub>FP</sub>	1		A
Transistor	Collector to Emitter Voltage	V <sub>CEO</sub>	40		V
	Emitter to Collector Voltage	V <sub>ECO</sub>	6		V
	Collector Current	I <sub>C</sub>	90	100	mA/ch
	Power Dissipation Derating	ΔP <sub>C</sub> /°C	1.2		mW/°C
	Power Dissipation	P <sub>C</sub>	120		mW/ch
Isolation Voltage <sup>*2</sup>		BV	2 500		Vr.m.s.
Operating Ambient Temperature		T <sub>A</sub>	-55 to +100		°C
Storage Temperature		T <sub>stg</sub>	-55 to +150		°C

<sup>\*1</sup> PW = 100 μs, Duty Cycle = 1 %

<sup>\*2</sup> AC voltage for 1 minute at T<sub>A</sub> = 25 °C, RH = 60 % between input and output

**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	μA
	Terminal Capacitance	C <sub>t</sub>	V = 0 V, f = 1.0 MHz		15		pF
Transistor	Collector to Emitter Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> = 40 V, I <sub>F</sub> = 0 mA			400	nA
Coupled	Current Transfer Ratio (I <sub>C</sub> /I <sub>F</sub> ) <sup>*1</sup>	CTR	I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 2 V	200	2 000		%
	Collector Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>F</sub> = 1 mA, I <sub>C</sub> = 2 mA			1.0	V
	Isolation Resistance	R <sub>I-O</sub>	V <sub>I-O</sub> = 1.0 kV <sub>DC</sub>	10 <sup>11</sup>			Ω
	Isolation Capacitance	C <sub>I-O</sub>	V = 0 V, f = 1.0 MHz		0.4		pF
	Rise Time <sup>*2</sup>	t <sub>r</sub>	V <sub>CC</sub> = 5 V, I <sub>C</sub> = 2 mA, R <sub>L</sub> = 100 Ω		200		μs
	Fall Time <sup>*2</sup>	t <sub>f</sub>			200		

**\*1** CTR rank (PS2802-1 only)

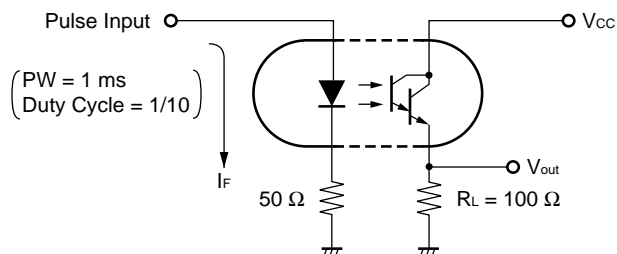
K : 2 000 to (%)

L : 700 to 3 400 (%)

M : 200 to 1 000 (%)

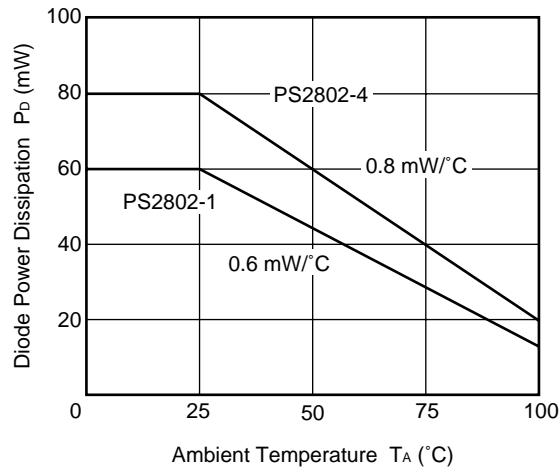
N : 200 to (%)

**\*2** Test circuit for switching time

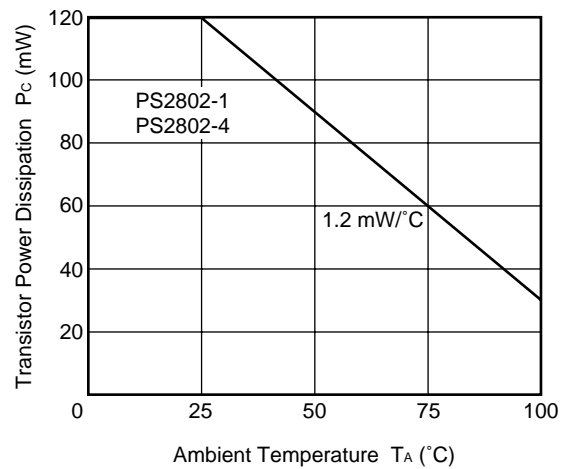


**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)**

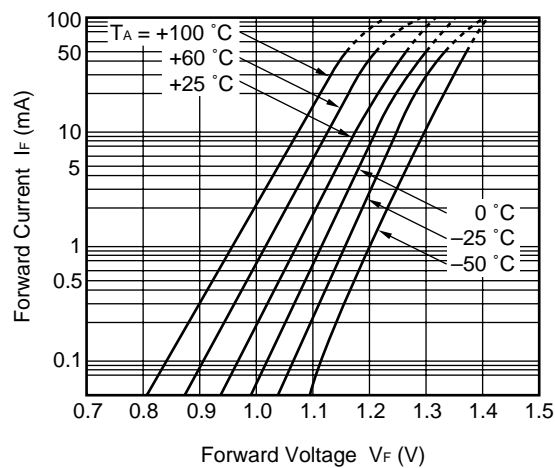
**DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE**



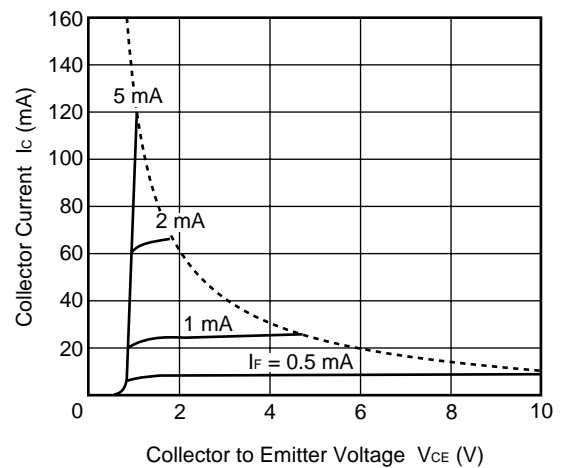
**TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE**



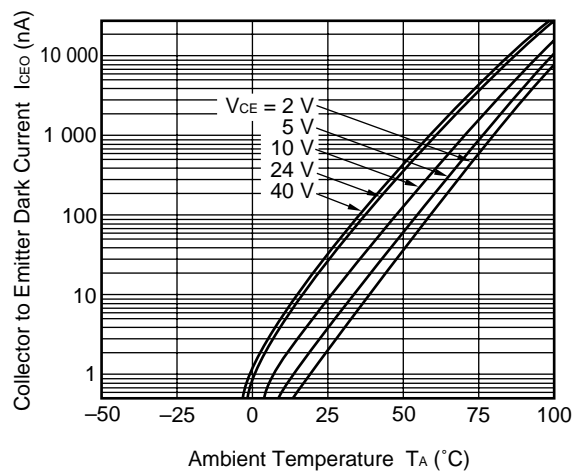
**FORWARD CURRENT vs. FORWARD VOLTAGE**



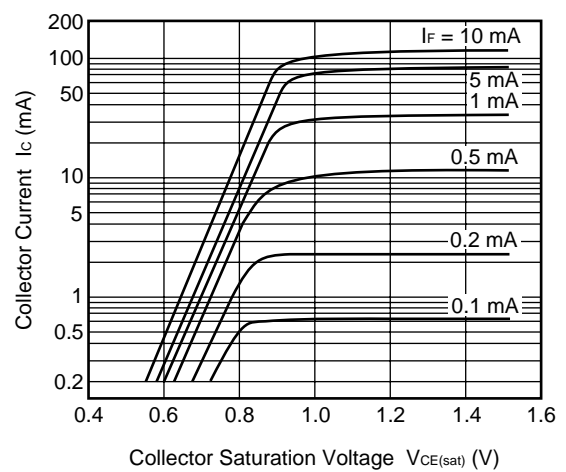
**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



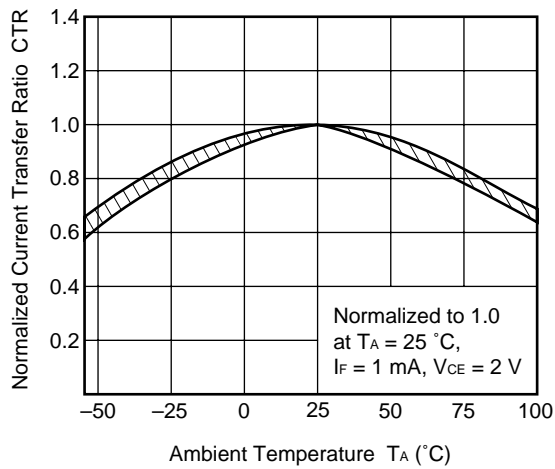
**COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE**



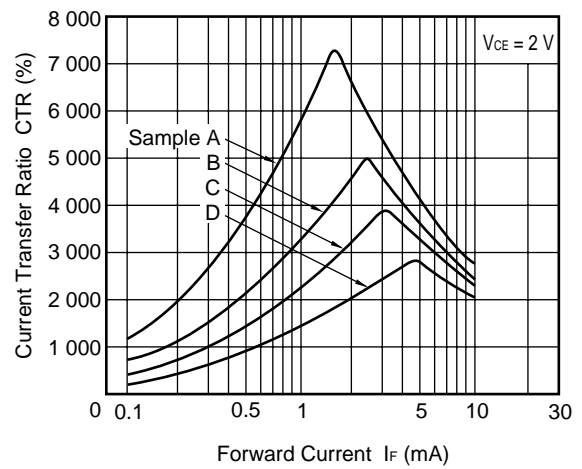
**COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE**



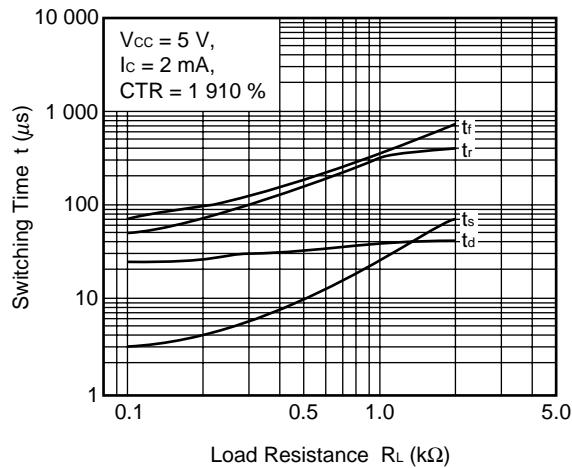
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



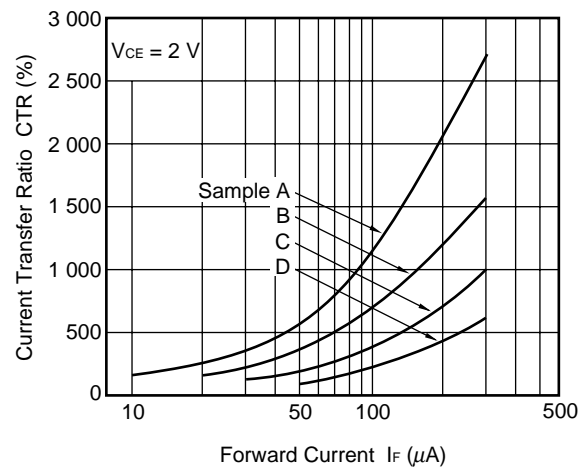
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



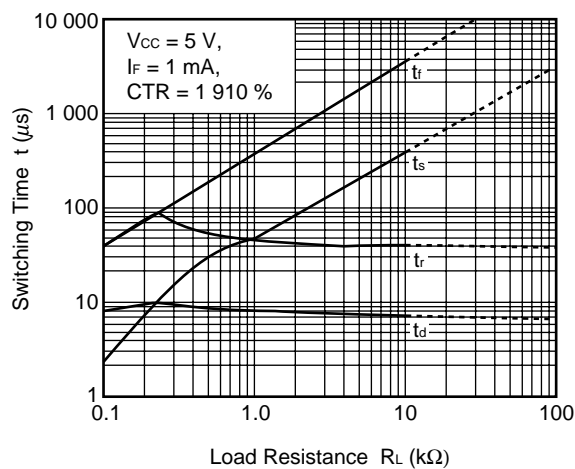
SWITCHING TIME vs. LOAD RESISTANCE



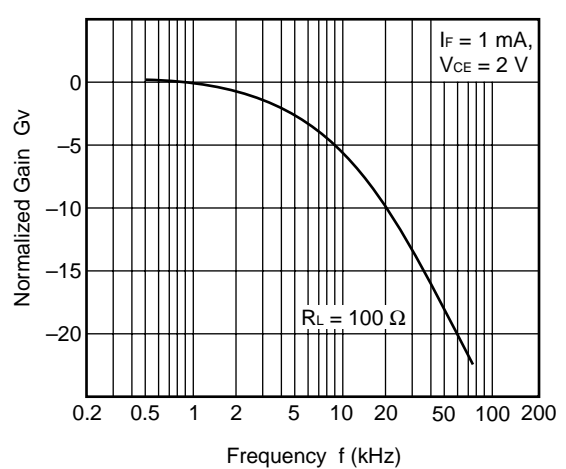
CURRENT TRANSFER RATIO vs. FORWARD CURRENT

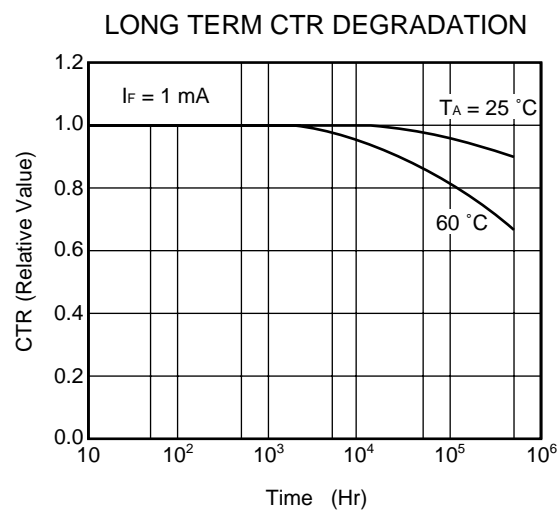


SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

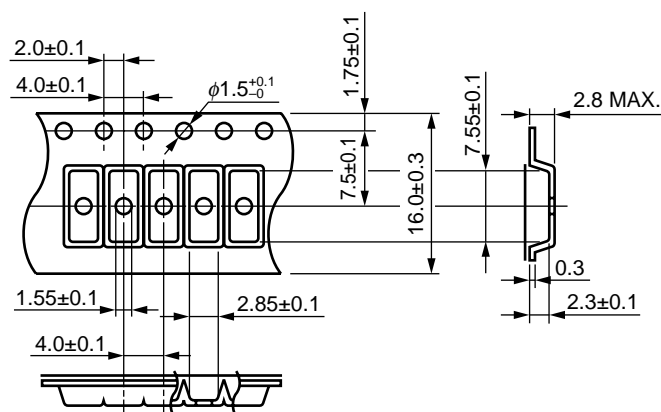




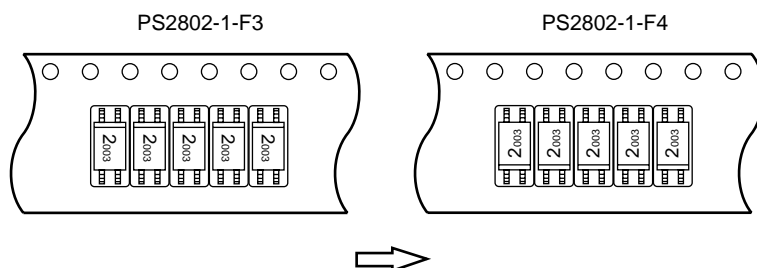
**Remark** The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (UNIT: mm)

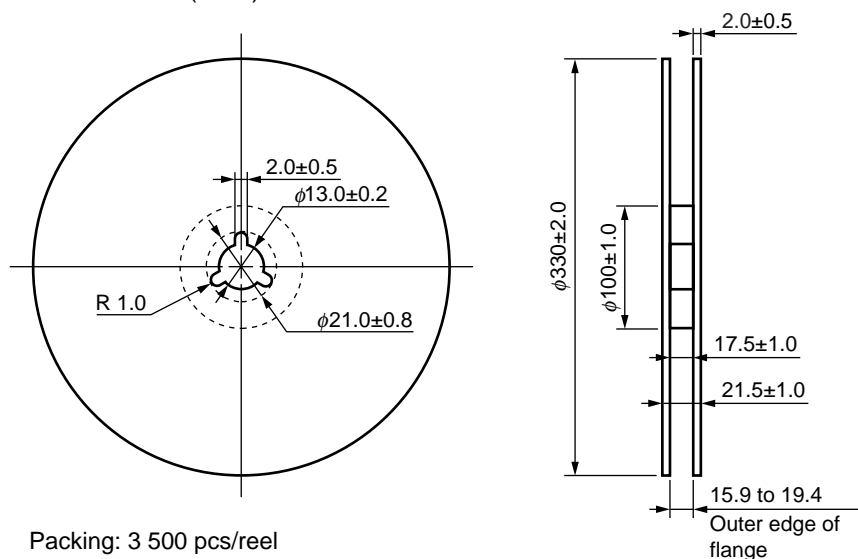
Outline and Dimensions (Tape)



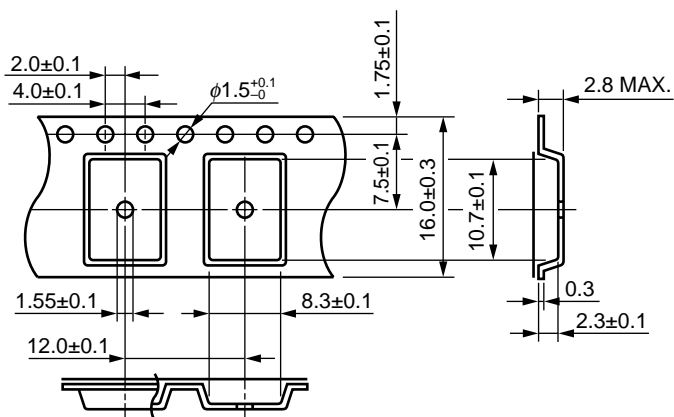
Tape Direction



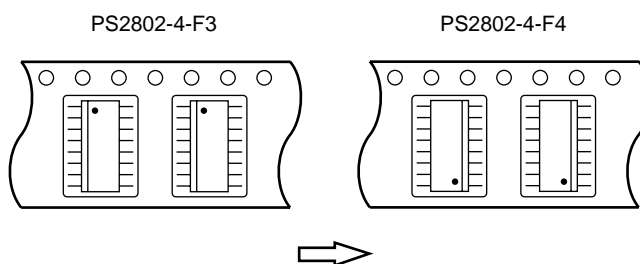
Outline and Dimensions (Reel)



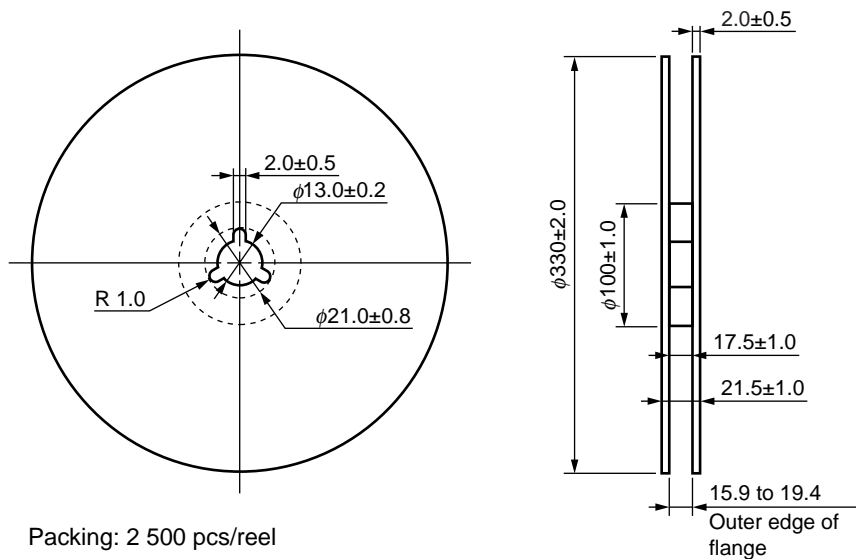
### Outline and Dimensions (Tape)



### Tape Direction



### Outline and Dimensions (Reel)



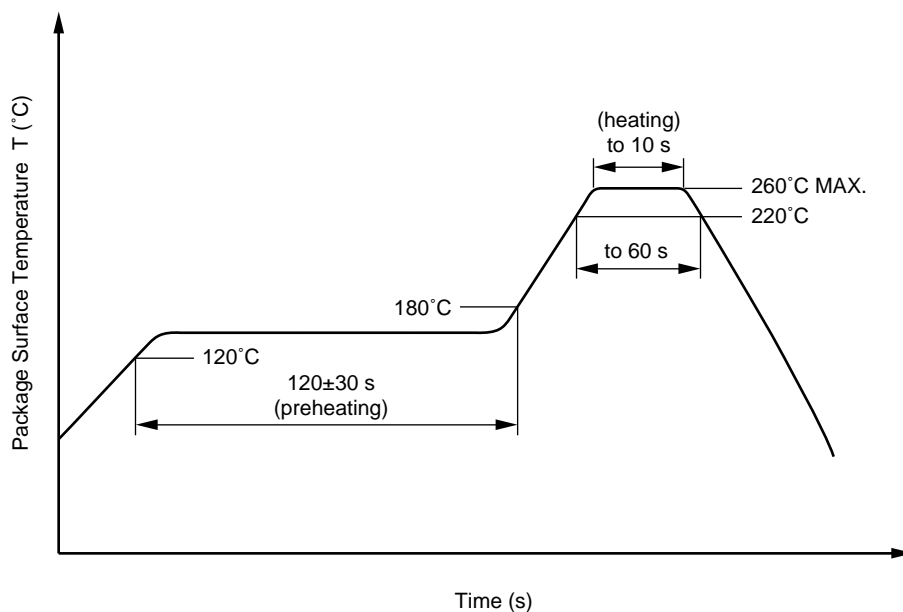
★ NOTES ON HANDLING

1. 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 (Allowed to be dipped in solder including plastic mold portion.)
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(3) Cautions

- Fluxes  
Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

2. Cautions regarding noise

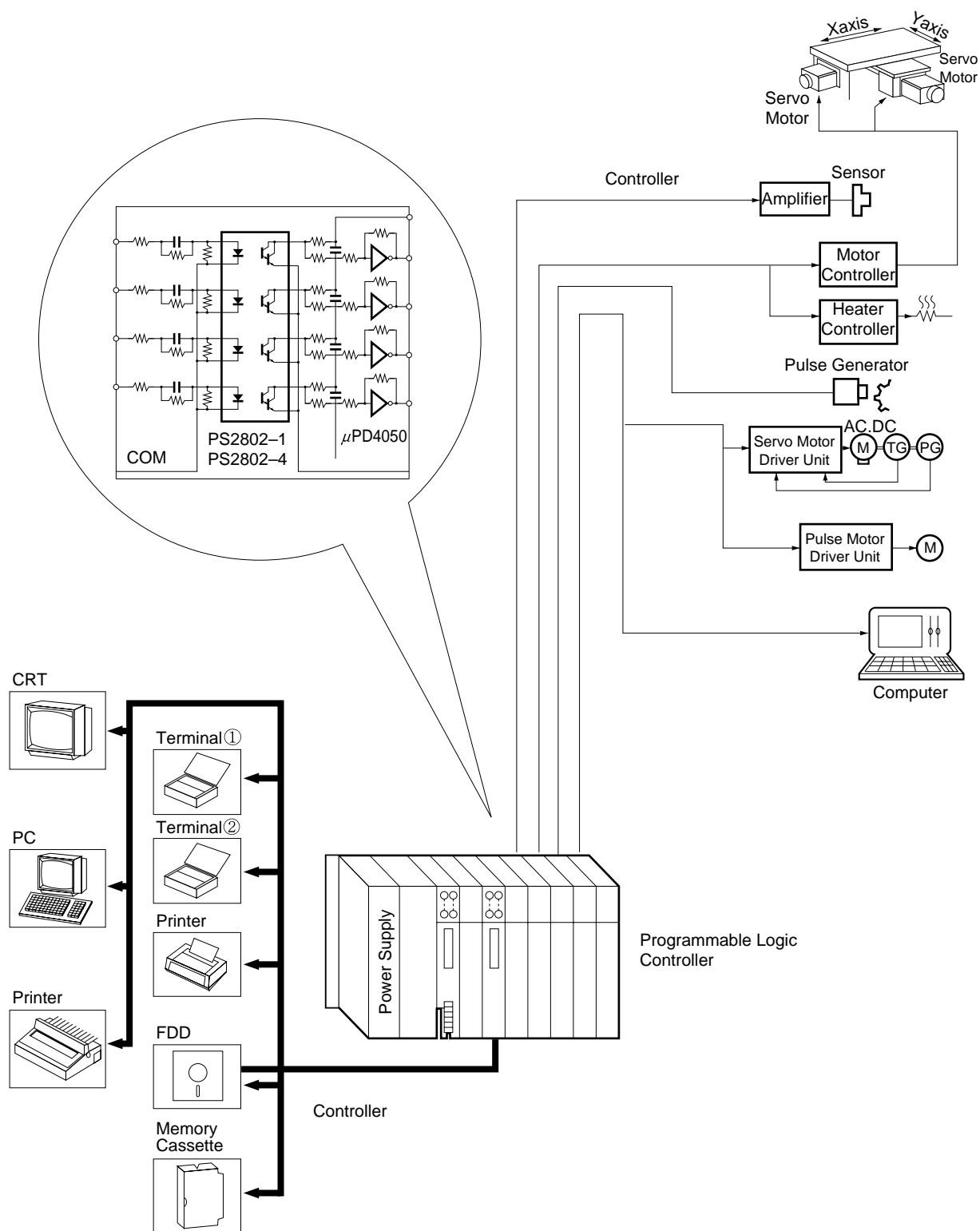
Be aware that when voltage is applied suddenly between the photocoupler's input and output or between collector-emitters at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

**★ USAGE CAUTIONS**

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

# PROGRAMMABLE LOGIC CONTROLLERS EXAMPLE

Purpose: In-out interface



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M8E 00.4-0110

**SAFETY INFORMATION ON THIS PRODUCT**

<div data-bbox="177 271 288 315" data-label="Section-Header"> <p><b>Caution</b></p> </div> <div data-bbox="300 277 448 300" data-label="Text"> <p>GaAs Products</p> </div>	<p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> <li>• Do not destroy or burn the product.</li> <li>• Do not cut or cleave off any part of the product.</li> <li>• Do not crush or chemically dissolve the product.</li> <li>• Do not put the product in the mouth.</li> </ul> <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p>
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