

To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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**HIGH ISOLATION VOLTAGE  
DARLINGTON TRANSISTOR TYPE  
SSOP 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 SSOP for high density applications.

This package has shield effect to cut off ambient light.

**FEATURES**

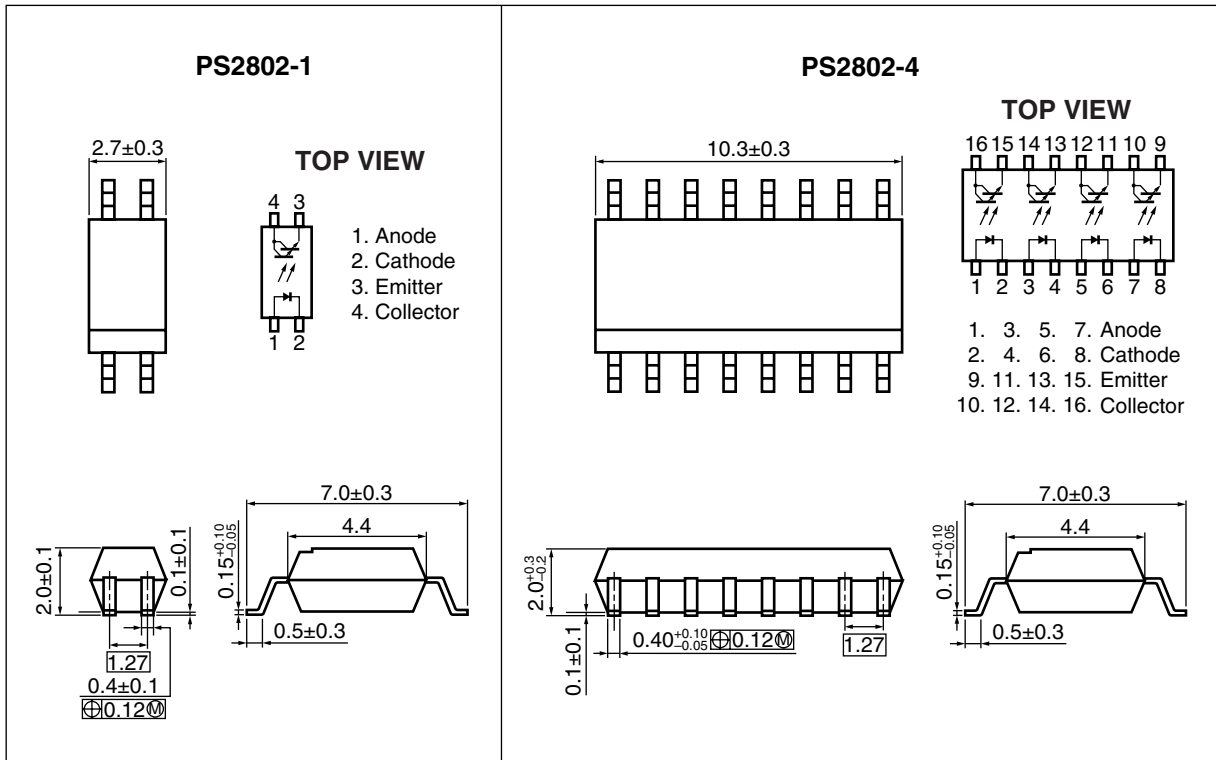
- High isolation voltage (BV = 2 500 Vr.m.s.)
- Small and thin package (4,16-pin SSOP, Pin pitch 1.27 mm)
- High current transfer ratio (CTR = 2 000% TYP. @  $I_F = 1 \text{ mA}$ ,  $V_{CE} = 2 \text{ V}$ )
- Ordering number of tape product: PS2802-1-F3, F4, PS2802-4-F3, F4
- ★ Safety standards: PS2802-1, -4
  - UL approved: File No. E72422
  - BSI approved: No. 8188, 8189
  - CSA approved: File No. CA 101391
  - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

**APPLICATIONS**

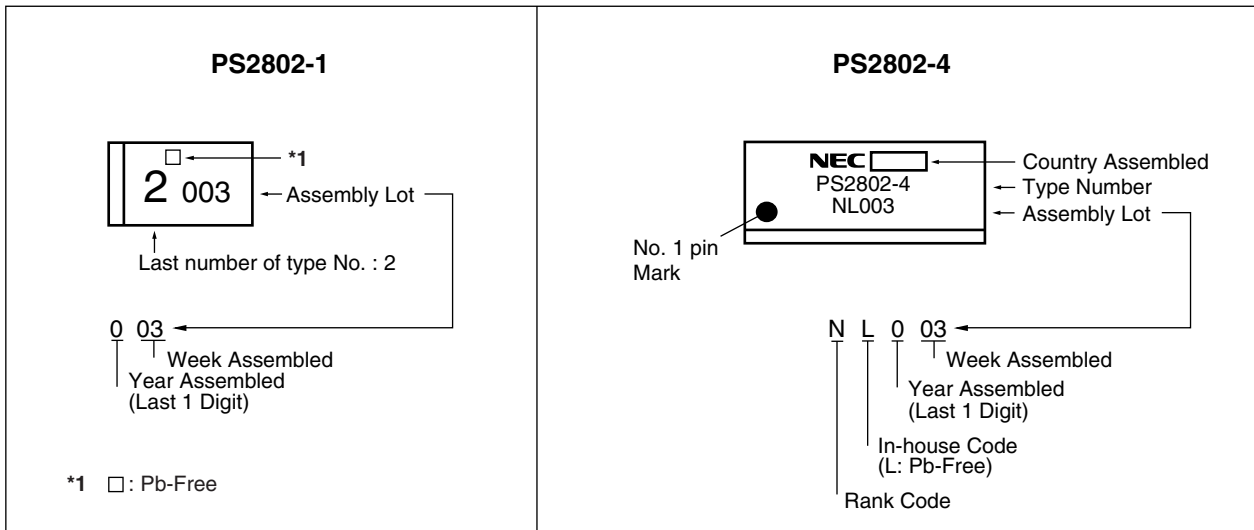
- Programmable logic controllers
- Measuring instruments
- Hybrid IC

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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>
PS2802-1	PS2802-1-A	Pb-Free	50 pcs (Tape 50 pcs cut)	Standard products (UL, BSI, CSA approved)	PS2802-1
PS2802-1-F3	PS2802-1-F3-A		Embossed Tape 3 500 pcs/reel		
PS2802-1-F4	PS2802-1-F4-A				
PS2802-1-V	PS2802-1-V-A		50 pcs (Tape 50 pcs cut)	DIN EN60747-5-2	
PS2802-1-V-F3	PS2802-1-V-F3-A		Embossed Tape 3 500 pcs/reel	(VDE0884 Part2)	
PS2802-1-V-F4	PS2802-1-V-F4-A			Approved (Option)	
PS2802-4	PS2802-4-A	Pb-Free	Magazine Case 45 pcs	Standard products (UL, BSI, CSA approved)	PS2802-4
PS2802-4-F3	PS2802-4-F3-A		Embossed Tape 2 500 pcs/reel		
PS2802-4-F4	PS2802-4-F4-A				
PS2802-4-V	PS2802-4-V-A		Magazine Case 45 pcs	DIN EN60747-5-2	
PS2802-4-V-F3	PS2802-4-V-F3-A		Embossed Tape 2 500 pcs/reel	(VDE0884 Part2)	
PS2802-4-V-F4	PS2802-4-V-F4-A			Approved (Option)	

\*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
			PS2802-1	PS2802-4	
Diode	Forward Current (DC)	I <sub>F</sub>	50		mA/ch
	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/ch
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

\*1 PW = 100 μs, Duty Cycle = 1%

\*2 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 (PS2802-1).  
 Pins 1-8 shorted together, 9-16 shorted together (PS2802-4).

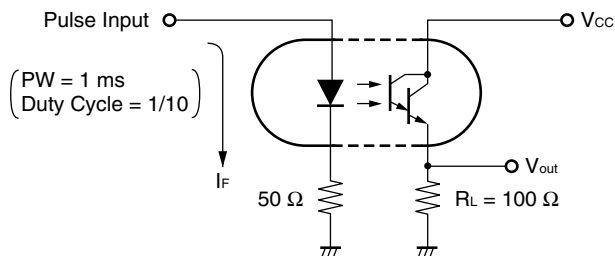
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

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)

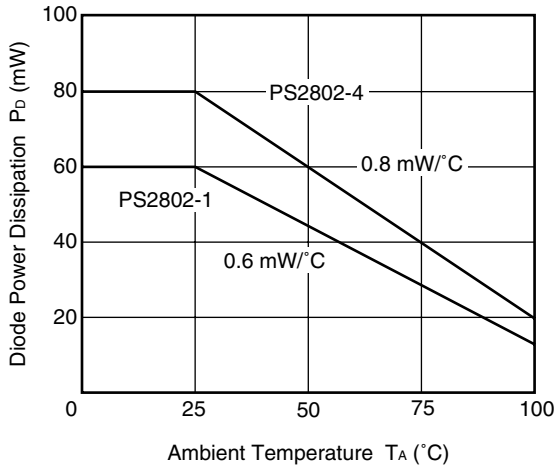
- K : 2 000 to (%)
- L : 700 to 3 400 (%)
- M : 200 to 1 000 (%)
- N : 200 to (%)

\*2 Test circuit for switching time

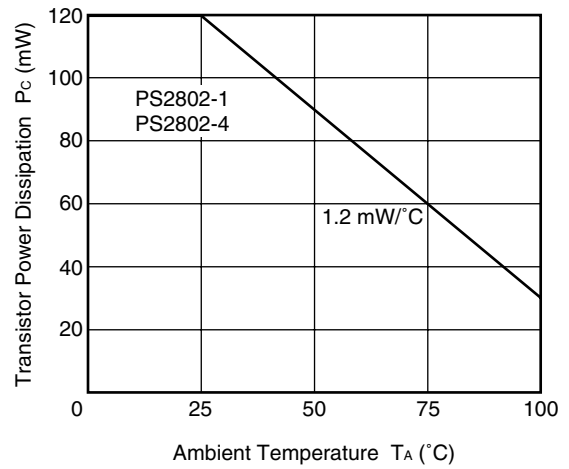


TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

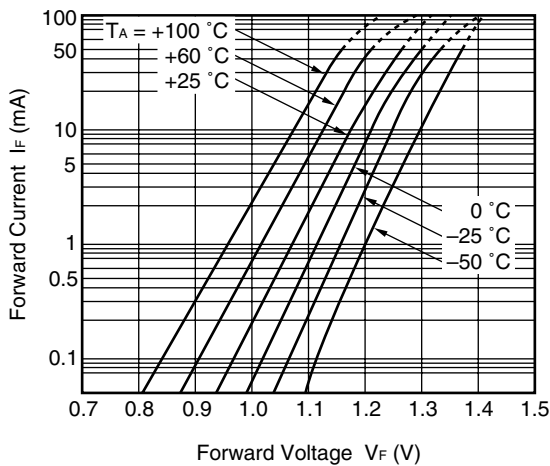
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



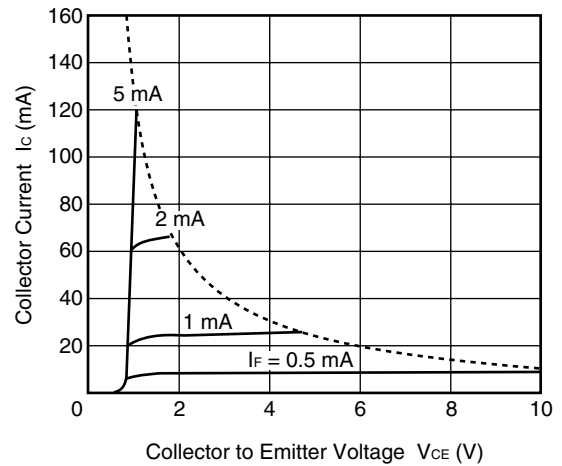
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



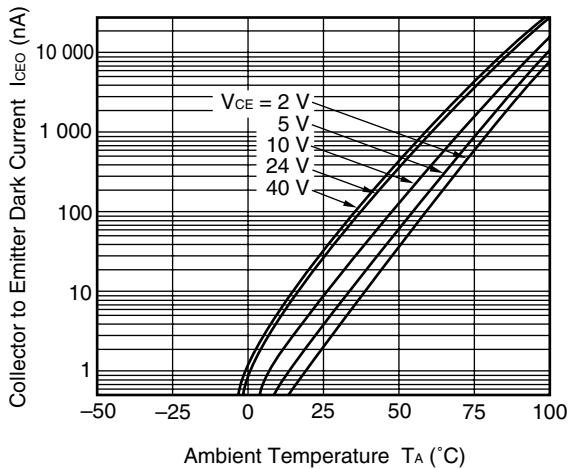
FORWARD CURRENT vs. FORWARD VOLTAGE



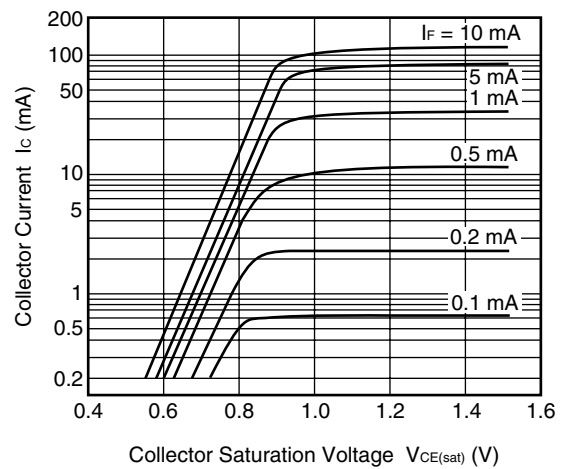
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

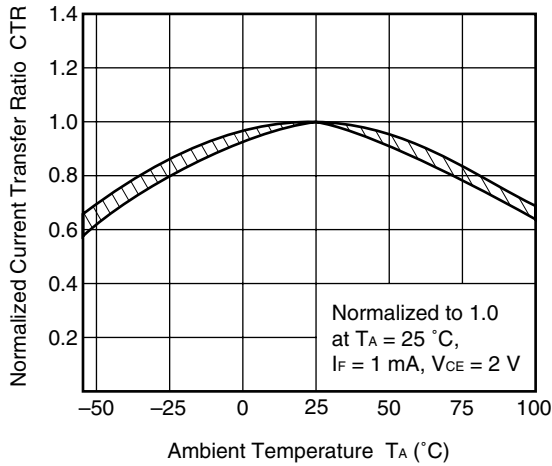


COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

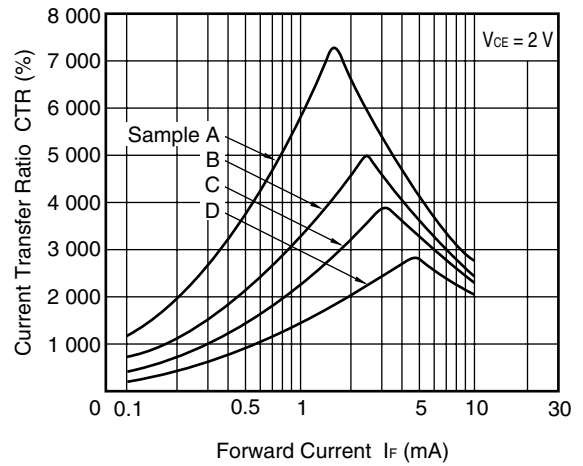


**Remark** The graphs indicate nominal characteristics.

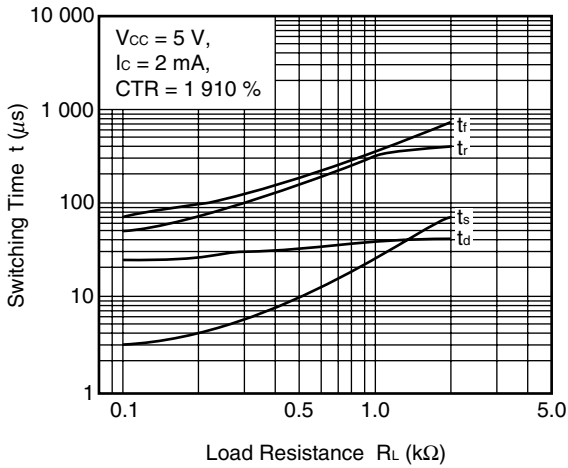
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



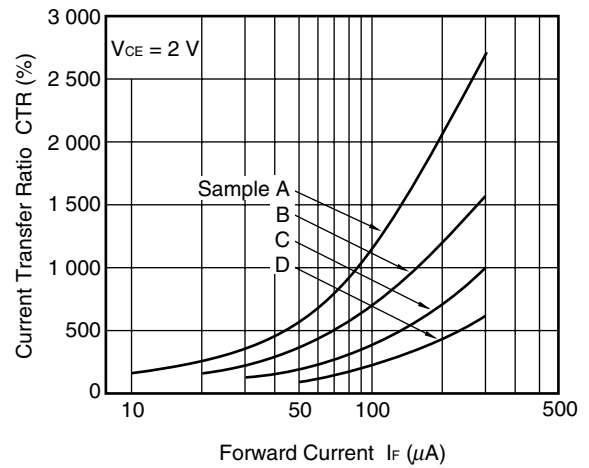
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



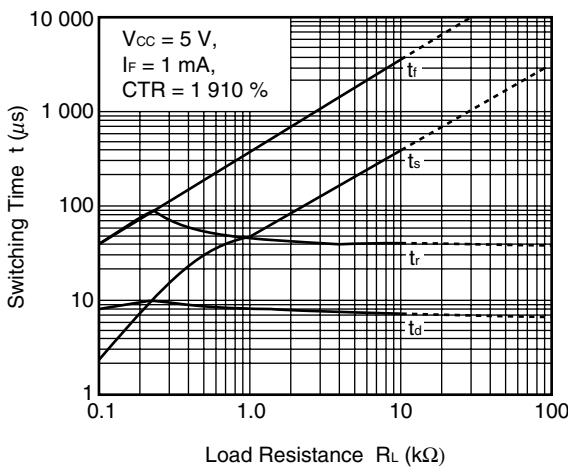
SWITCHING TIME vs. LOAD RESISTANCE



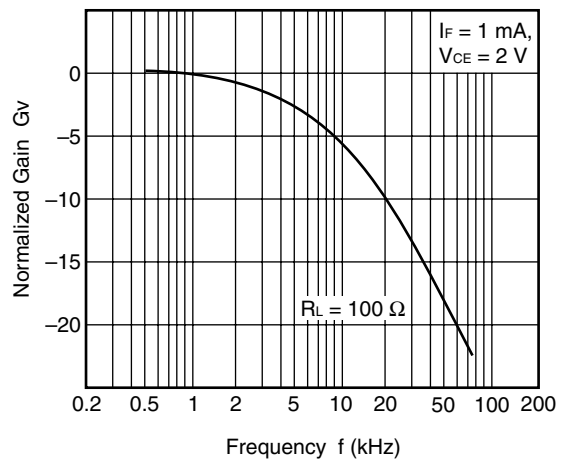
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



SWITCHING TIME vs. LOAD RESISTANCE

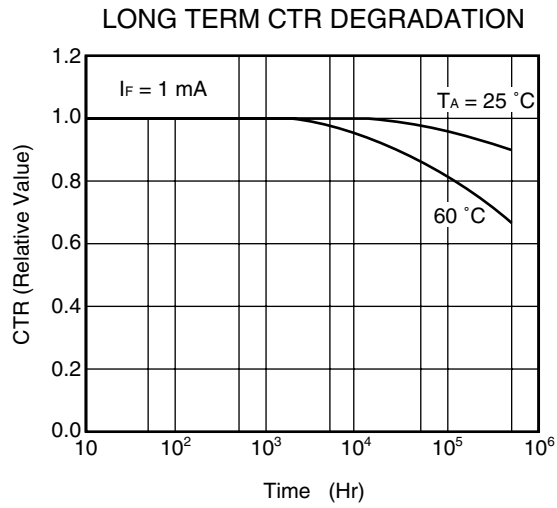


FREQUENCY RESPONSE



**Remark** The graphs indicate nominal characteristics.

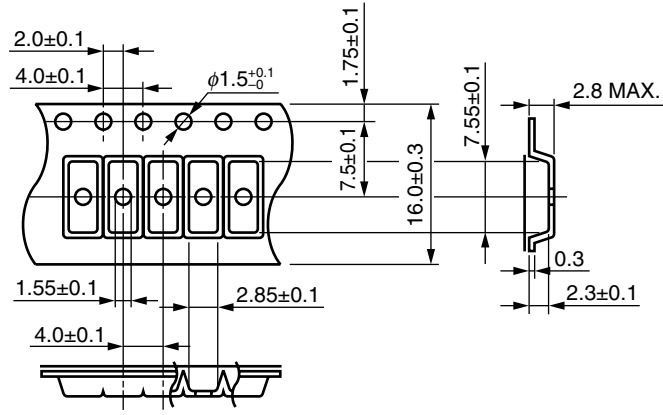




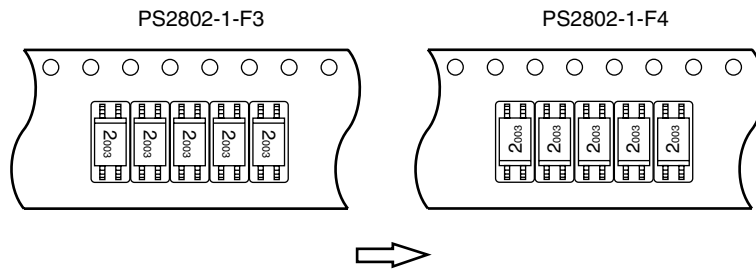
**Remark** The graph indicates nominal characteristics.

TAPING SPECIFICATIONS (UNIT: mm)

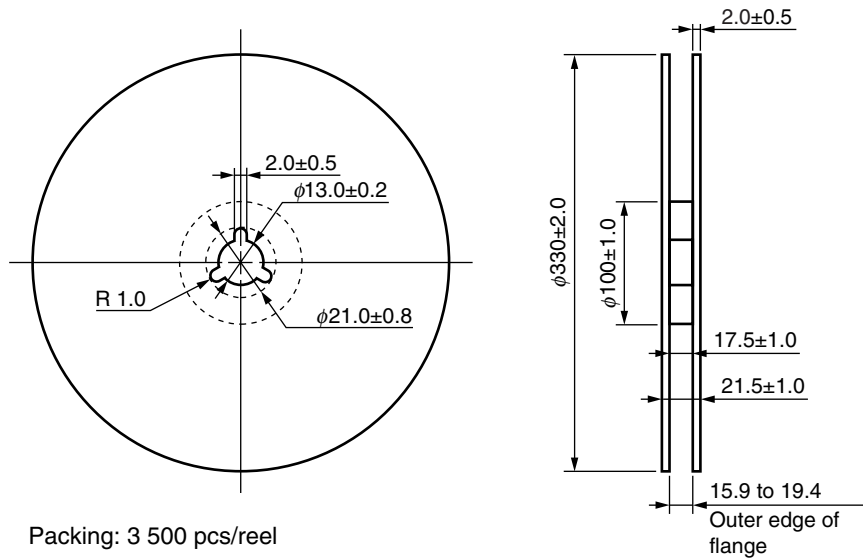
Outline and Dimensions (Tape)



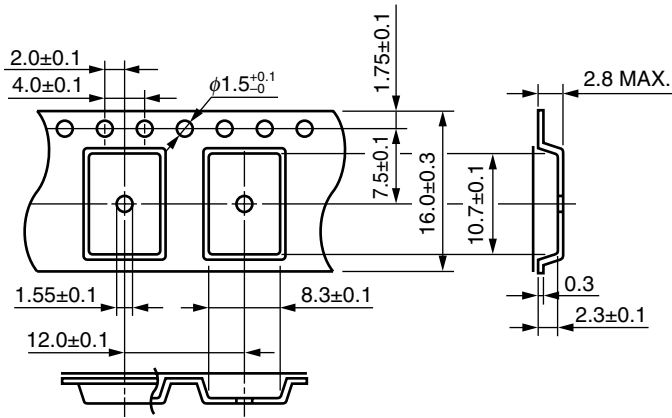
Tape Direction



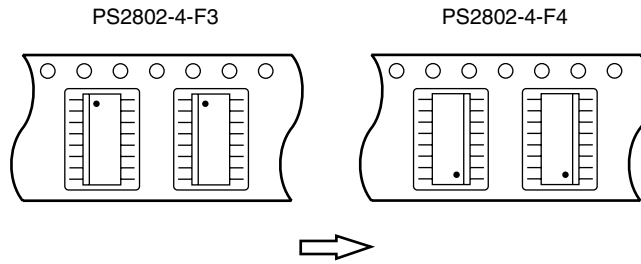
Outline and Dimensions (Reel)



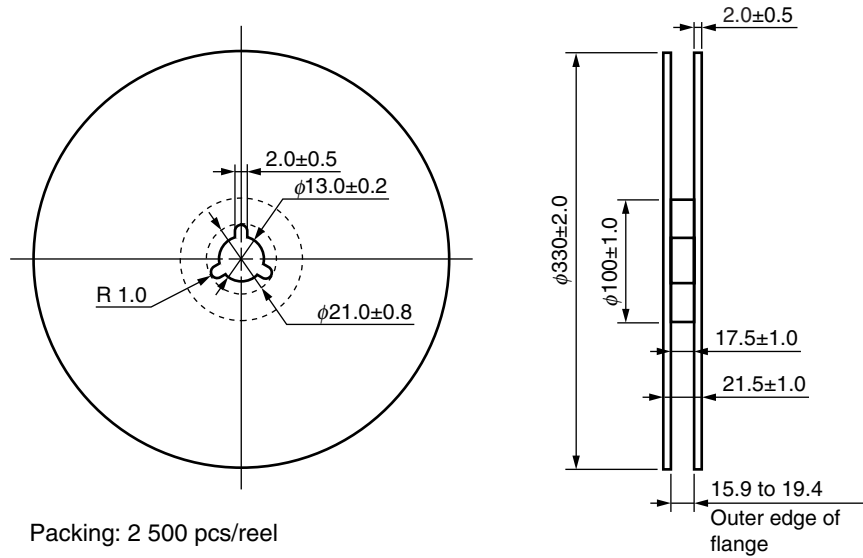
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



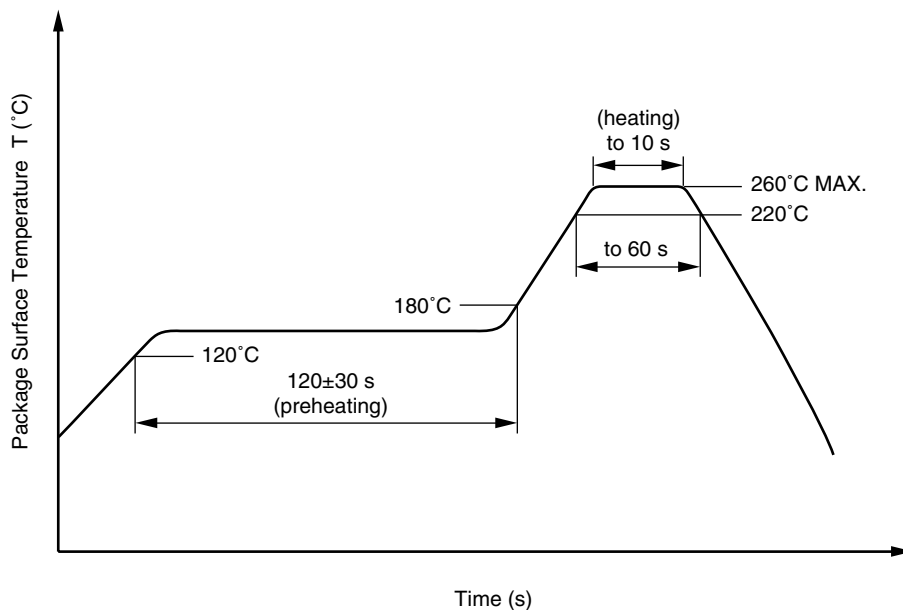
**NOTES ON HANDLING**

**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) 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.

**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 transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

**★ 3. Measurement conditions of current transfer ratios (CTR), which differ according to photocoupler**

Check the setting values before use, since the forward current conditions at CTR measurement differ according to product.

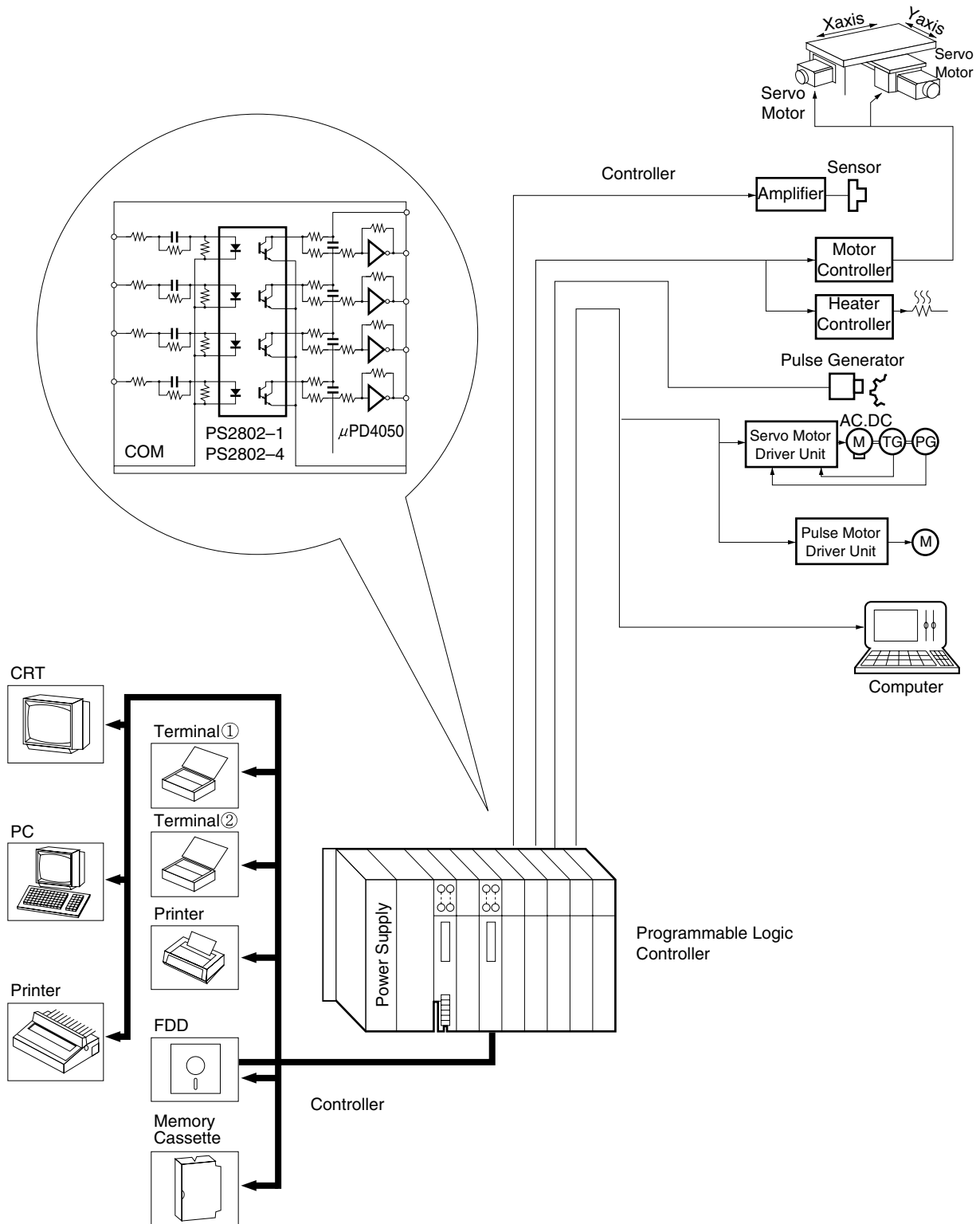
When using products other than at the specified forward current, the characteristics curves may differ from the standard curves due to CTR value variations or the like. Therefore, check the characteristics under the actual operating conditions and thoroughly take variations or the like into consideration before use.

**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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► For further information, please contact

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