

# PHOTOCOUPLER

## PS2501-1,-2,-4,PS2501L-1,-2,-4

### HIGH ISOLATION VOLTAGE SINGLE TRANSISTOR TYPE MULTI PHOTOCOUPLER SERIES

–NEPOC Series–

#### DESCRIPTION

The PS2501-1, -2, -4 and PS2501L-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2501-1, -2, -4 are in a plastic DIP (Dual In-line Package) and the PS2501L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

#### FEATURES

- High isolation voltage ( $BV = 5\,000\text{ V r.m.s.}$ )
- High collector to emitter voltage ( $V_{CE0} = 80\text{ V}$ )
- High-speed switching ( $t_r = 3\ \mu\text{s TYP.}$ ,  $t_f = 5\ \mu\text{s TYP.}$ )
- Ordering number of tape product: PS2501L-1-E3, E4, F3, F4, PS2501L-2-E3, E4
- Safety standards
  - UL approved: File No. E72422 (S)

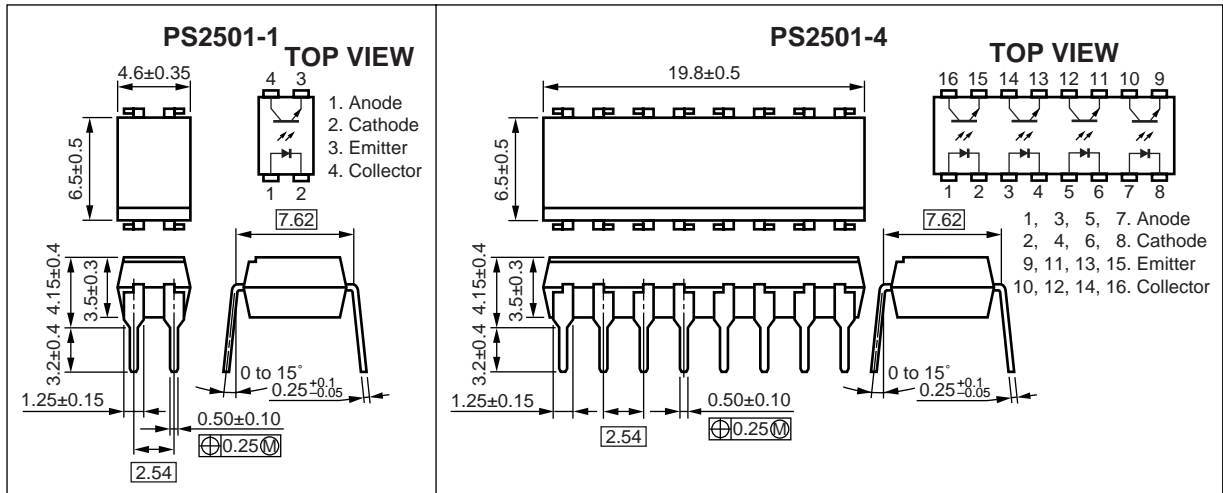
#### APPLICATIONS

- Power supply
- Telephone/FAX.
- FA/OA equipment
- Programmable logic controller

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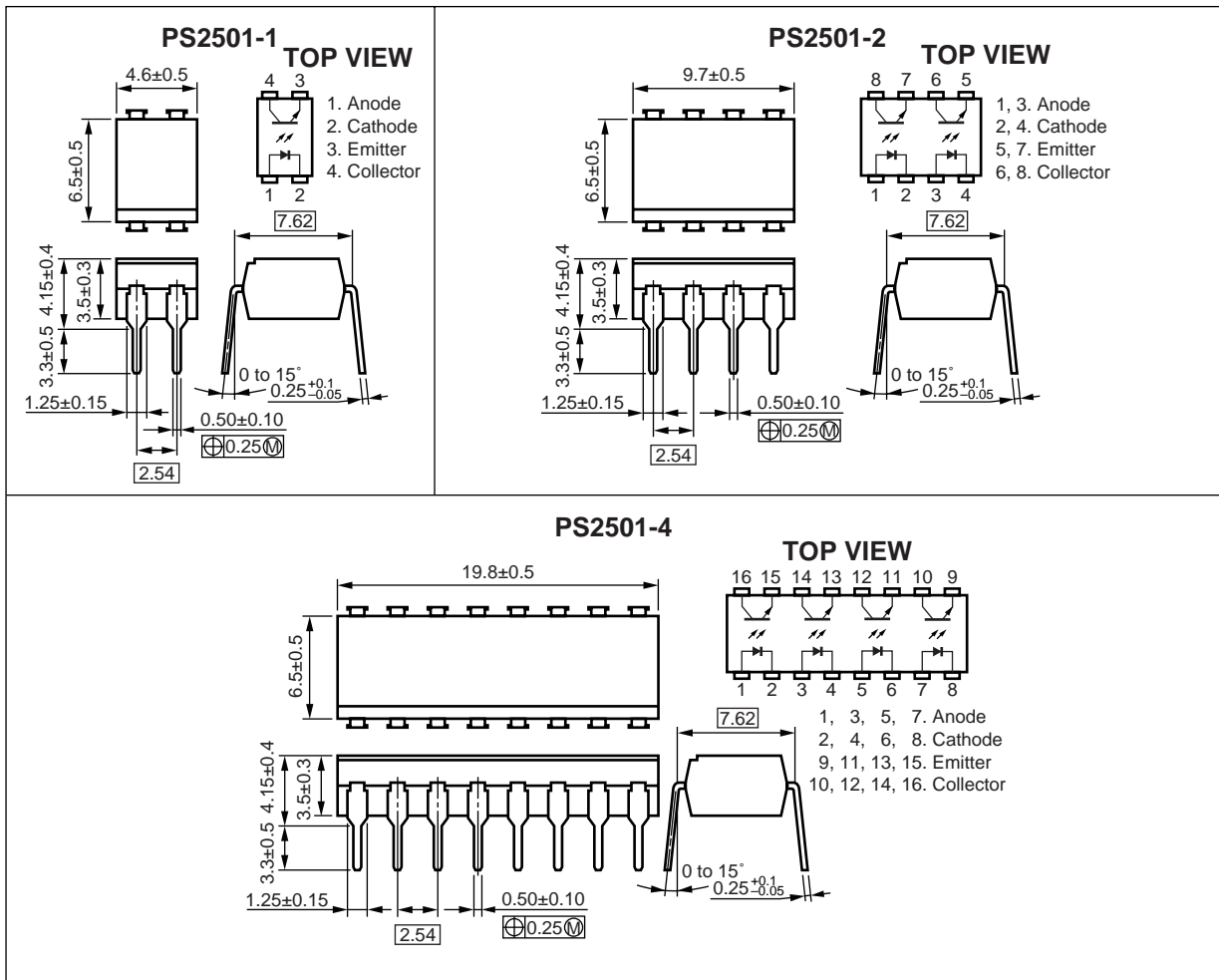
★ PACKAGE DIMENSIONS (UNIT : mm)

DIP Type (New package)

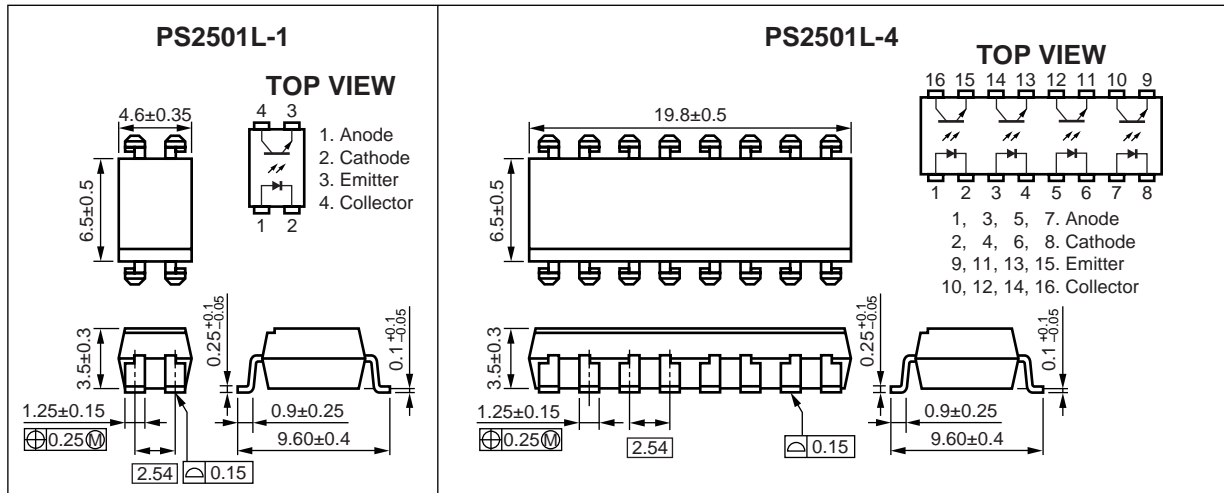


Caution New package 1-ch, 4-ch only

DIP Type

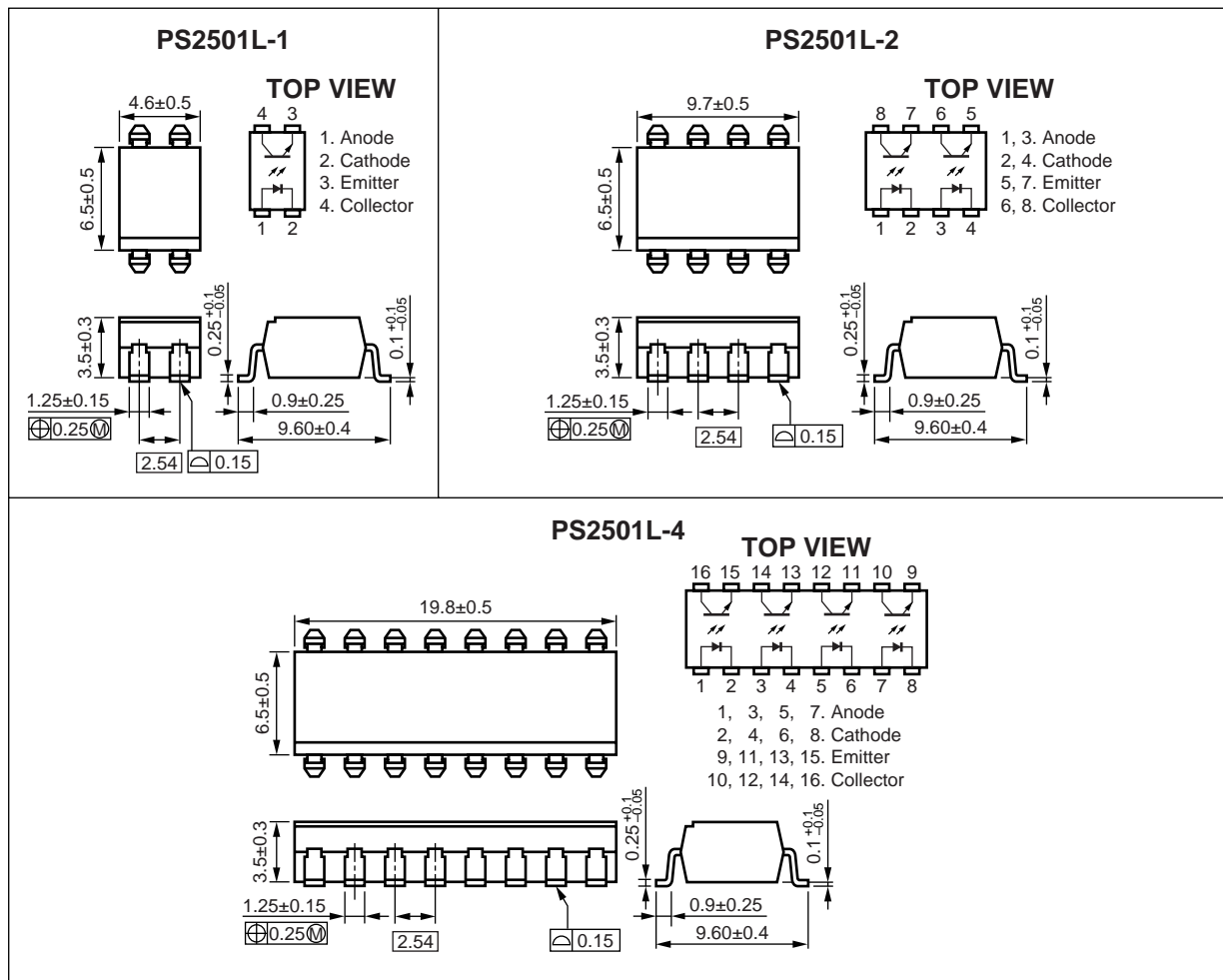


Lead Bending Type (New package)



Caution New package 1-ch, 4-ch only

Lead Bending Type





**ORDERING INFORMATION**

Part Number	Package	Packing Style	Application Part Number <sup>*1</sup>
PS2501-1	4-pin DIP	Magazine case 100 pcs	PS2501-1
PS2501L			
PS2501L-1-E3		Embossed Tape 1 000 pcs/reel	
PS2501L-1-E4			
PS2501L-1-F3		Embossed Tape 2 000 pcs/reel	
PS2501L-1-F4			
PS2501-2	8-pin DIP	Magazine case 45 pcs	PS2501-2
PS2501L-2			
PS2501L-2-E3		Embossed Tape 1 000 pcs/reel	
PS2501L-2-E4			
PS2501-4	16-pin DIP	Magazine case 20 pcs	PS2501-4
PS2501L-4			

\*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
			PS2501-1, PS2501L-1	PS2501-2,-4 PS2501L-2,-4	
Diode	Reverse Voltage	V <sub>R</sub>	6		V
	Forward Current (DC)	I <sub>F</sub>	80		mA
	Power Dissipation Derating	ΔP <sub>D</sub> /°C	1.5	1.2	mW/°C
	Power Dissipation	P <sub>D</sub>	150	120	mW/ch
	Peak Forward Current <sup>*1</sup>	I <sub>FP</sub>	1		A
Transistor	Collector to Emitter Voltage	V <sub>CEO</sub>	80		V
	Emitter to Collector Voltage	V <sub>ECO</sub>	7		V
	Collector Current	I <sub>C</sub>	50		mA/ch
	Power Dissipation Derating	ΔP <sub>C</sub> /°C	1.5	1.2	mW/°C
	Power Dissipation	P <sub>C</sub>	150	120	mW/ch
Isolation Voltage <sup>*2</sup>		BV	5 000		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

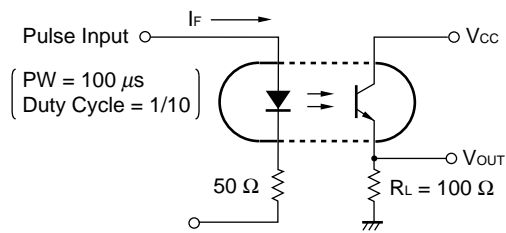
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10 mA		1.17	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		50		pF
Transistor	Collector to Emitter Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> = 80 V, I <sub>F</sub> = 0 mA			100	nA
Coupled	Current Transfer Ratio (I <sub>c</sub> /I <sub>F</sub> ) <sup>1</sup>	CTR	I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V	80	300	600	%
	Collector Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>F</sub> = 10 mA, I <sub>c</sub> = 2 mA			0.3	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		0.5		pF
	Rise Time <sup>2</sup>	t <sub>r</sub>	V <sub>CC</sub> = 10 V, I <sub>c</sub> = 2 mA, R <sub>L</sub> = 100 Ω		3		μs
	Fall Time <sup>2</sup>	t <sub>f</sub>			5		

\*1 CTR rank ( \* : only PS2501-1, PS2501L-1)

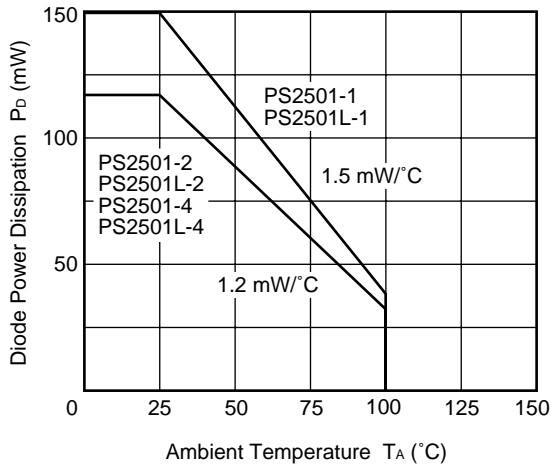
- K\* : 300 to 600 (%)
- L\* : 200 to 400 (%)
- M\* : 80 to 240 (%)
- D\* : 100 to 300 (%)
- H\* : 80 to 160 (%)
- W\* : 130 to 260 (%)
- Q\* : 100 to 200 (%)
- N : 80 to 600 (%)

\*2 Test circuit for switching time

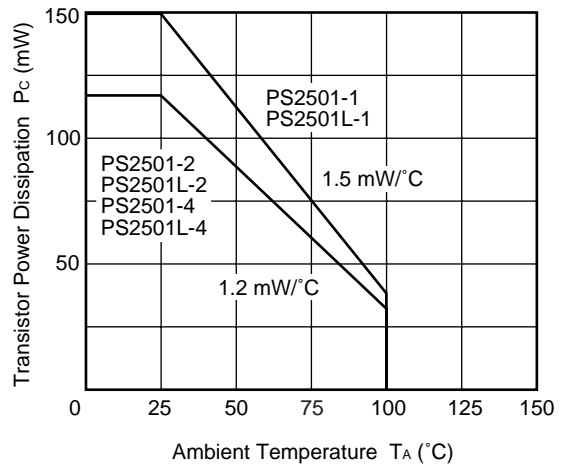


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, unless otherwise specified)

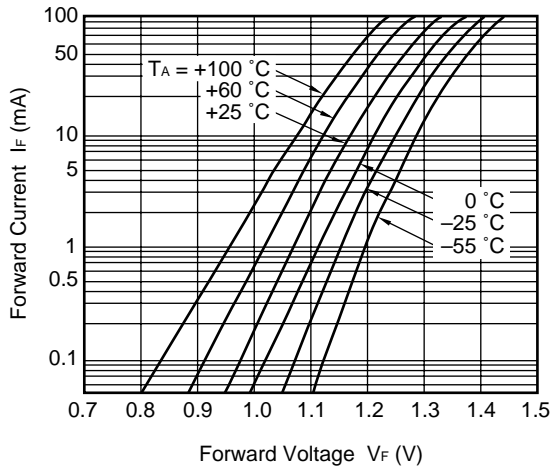
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



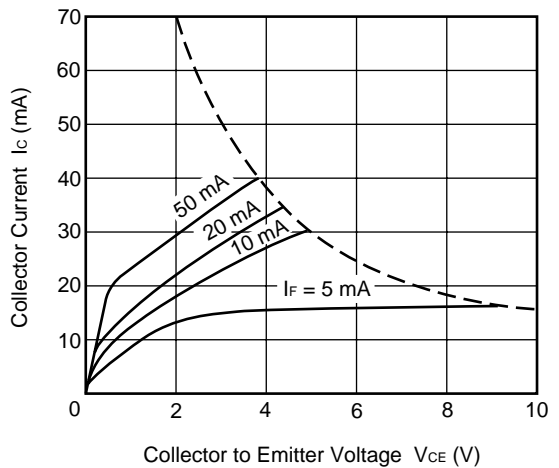
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



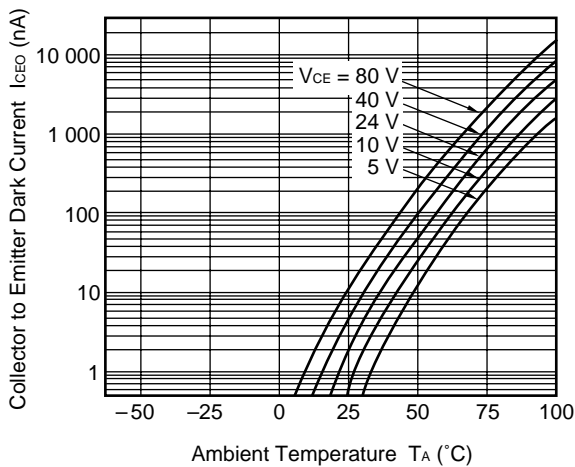
FORWARD CURRENT vs. FORWARD VOLTAGE



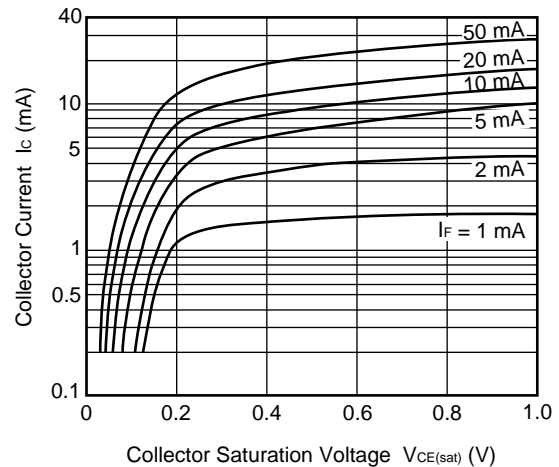
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



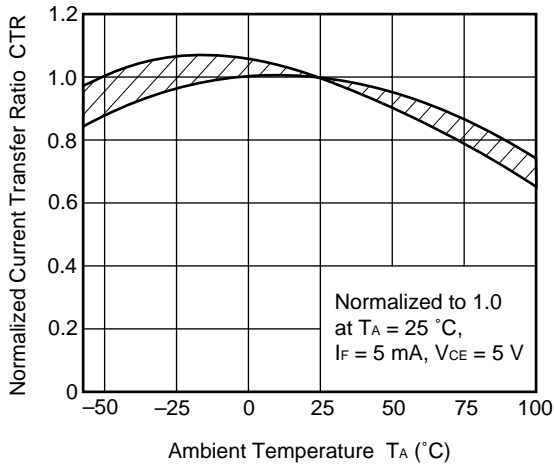
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



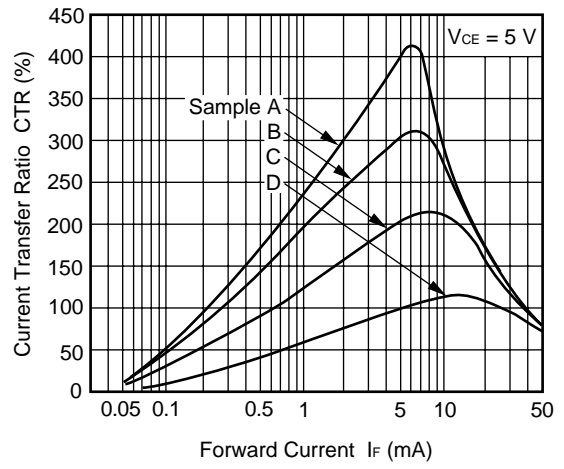
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



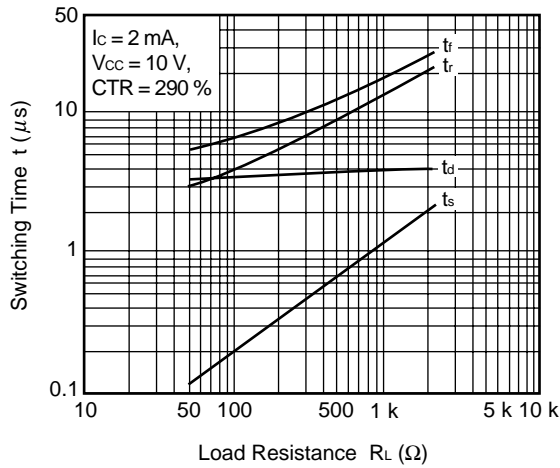
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



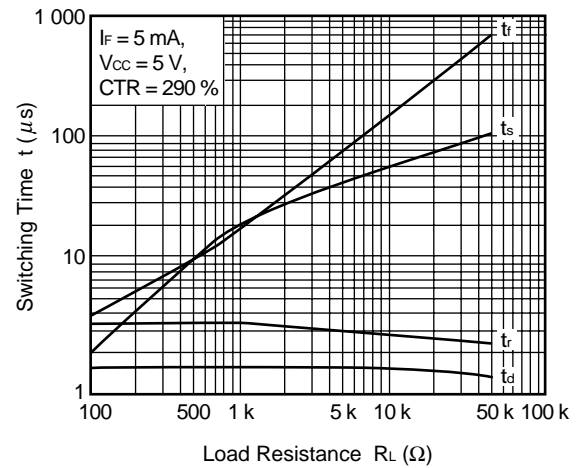
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



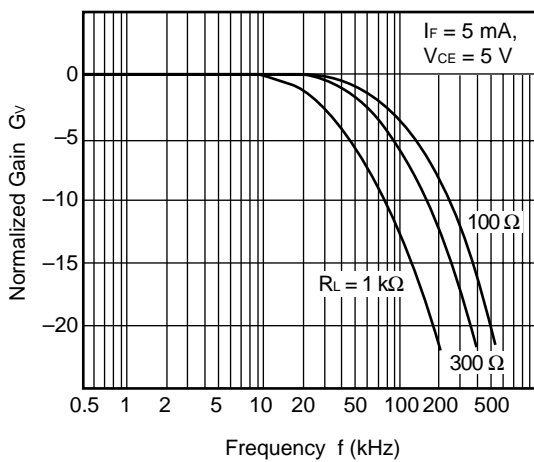
SWITCHING TIME vs. LOAD RESISTANCE



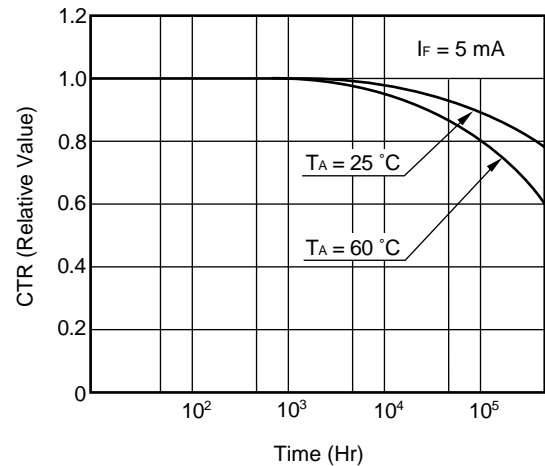
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



LONG TERM CTR DEGRADATION

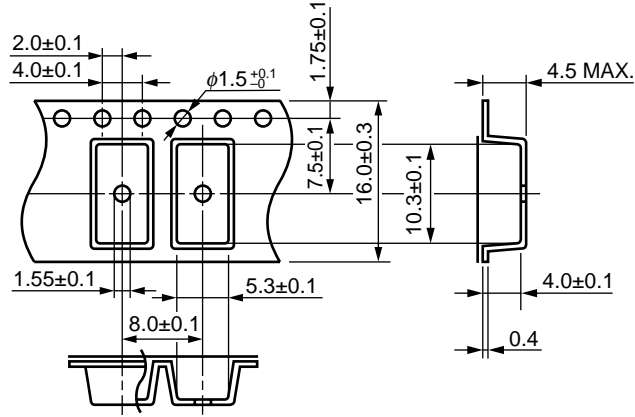


**Remark** The graphs indicate nominal characteristics.

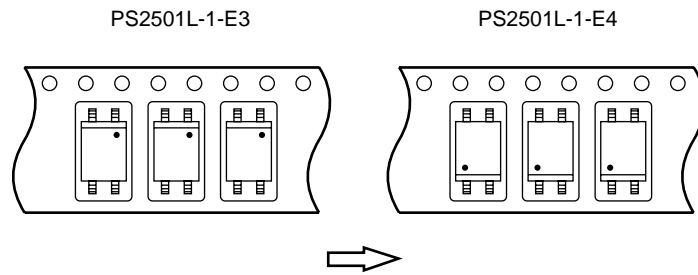


★ TAPING SPECIFICATIONS (UNIT : mm)

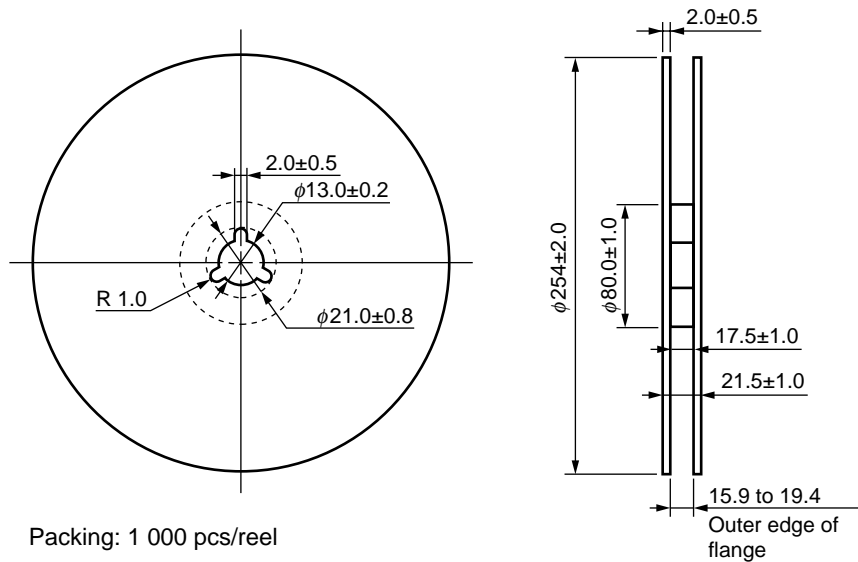
Outline and Dimensions (Tape)



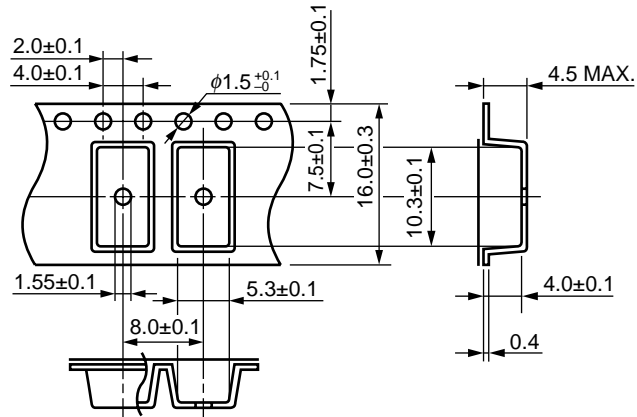
Tape Direction



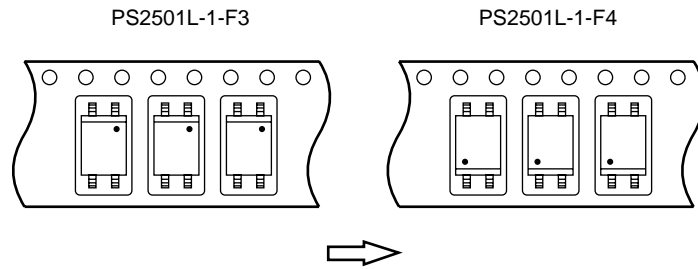
Outline and Dimensions (Reel)



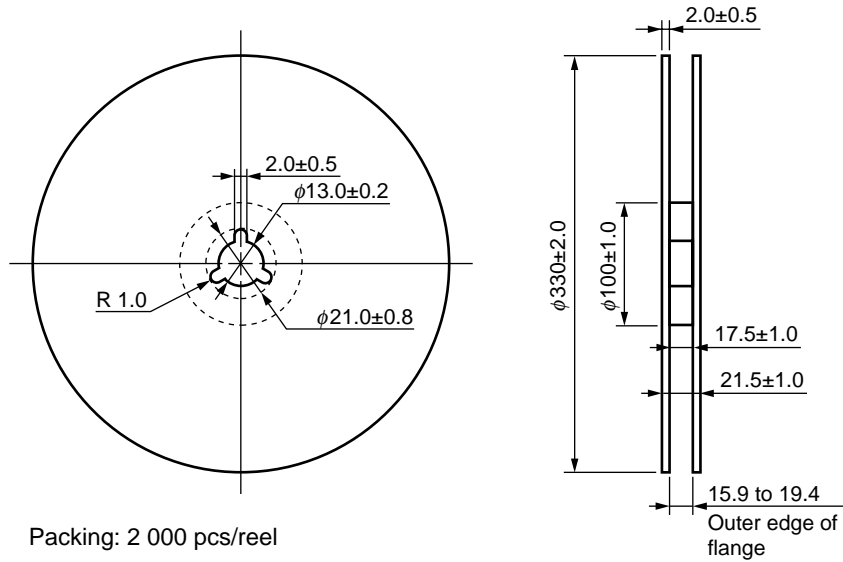
Outline and Dimensions (Tape)



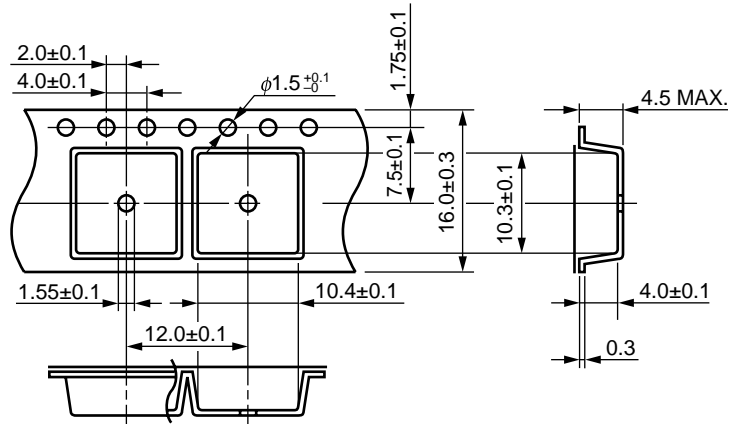
Tape Direction



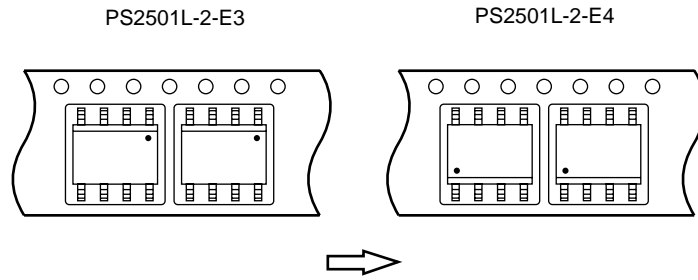
Outline and Dimensions (Reel)



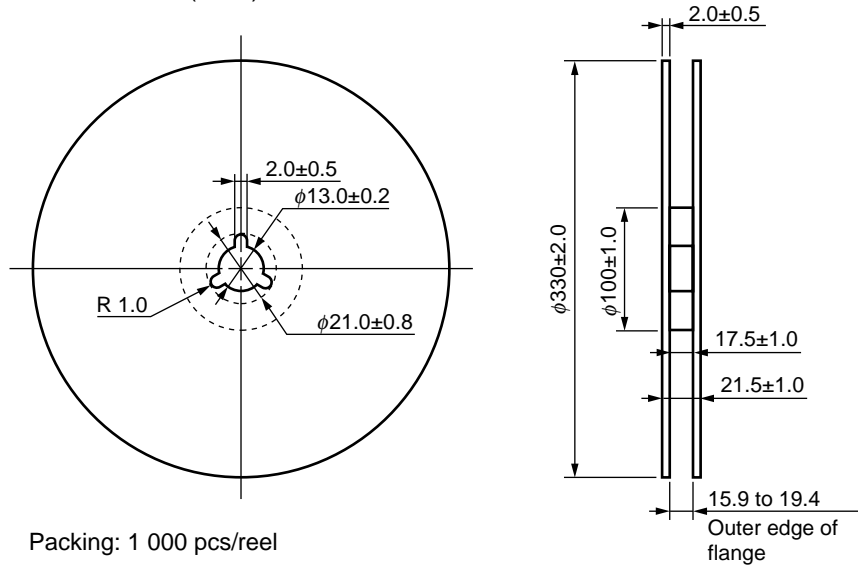
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



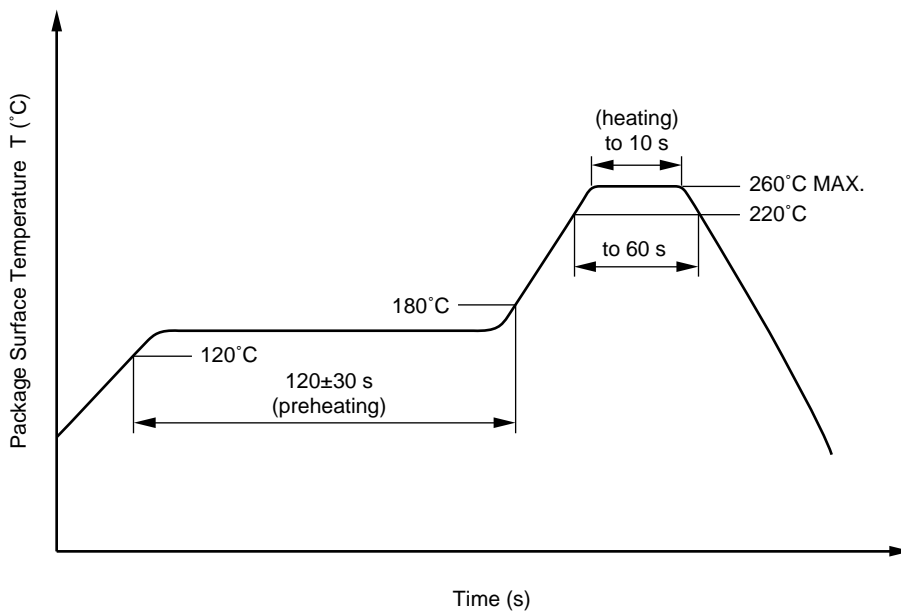
★ NOTES ON HANDLING

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.

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M8E 00.4-0110

**SAFETY INFORMATION ON THIS PRODUCT**

<p><b>Caution</b></p>	<p>GaAs Products</p>	<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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