DATA SHEET

NEC

PHOTOCOUPLER

PS2503-1,-2,-4,PS2503L-1,-2,-4

LOW INPUT CURRENT, HIGH SPEED SWITCHING MULTI PHOTOCOUPLER SERIES

–NEPOC Series–

DESCRIPTION

The PS2503-1, -2, -4 and PS2503L-1, -2, -4 are optically coupled isolators containing a GaAs light emitting diode and an NPN silicon phototransistor.

The PS2503-1, -2, -4 are in a plastic DIP (Dual In-line Package) and the PS2503L-1, -2, -4 are lead bending type (Gull-wing) for surface mount.

FEATURES

- High isolation voltage (BV = 5 000 Vr.m.s.)
- High-speed switching (t_r = 20 μs TYP., t_f = 30 μs TYP.)
- Ordering number of tape product: PS2503L-1-E3, E4, F3, F4, PS2503L-2-E3, E4
- Safety standards
  - UL approved: File No. E72422 (S)
  - CSA approved: No. CA 101391

APPLICATIONS

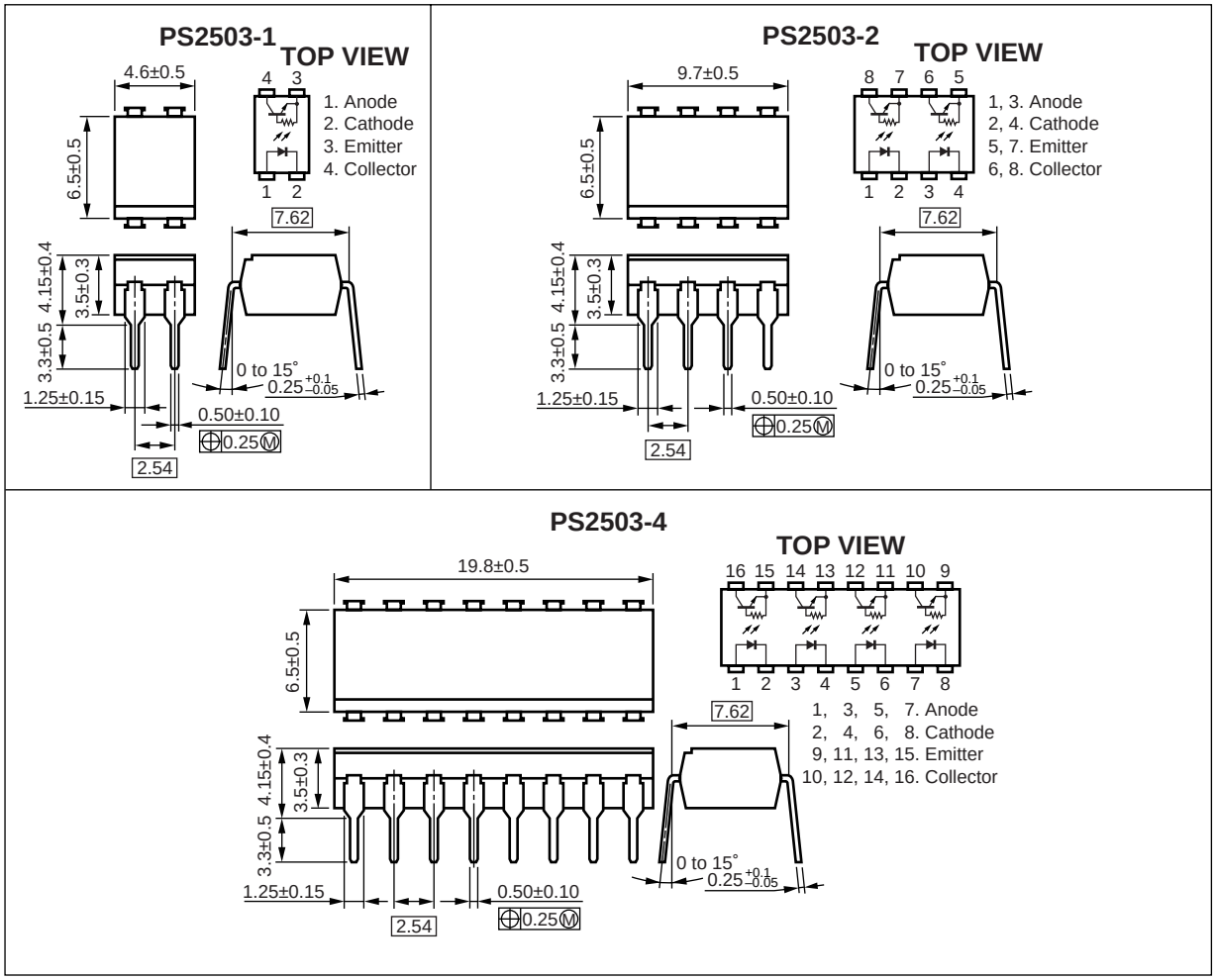
- Measurement equipment
- Programmable logic controller
- Telephone/Telegraph Receiver
- Power supply

Document No. PN10227EJ01V0DS (1st edition)
(Previous No. P11304EJ4V0DS00)
Date Published February 2003 CP(K)
Printed in Japan

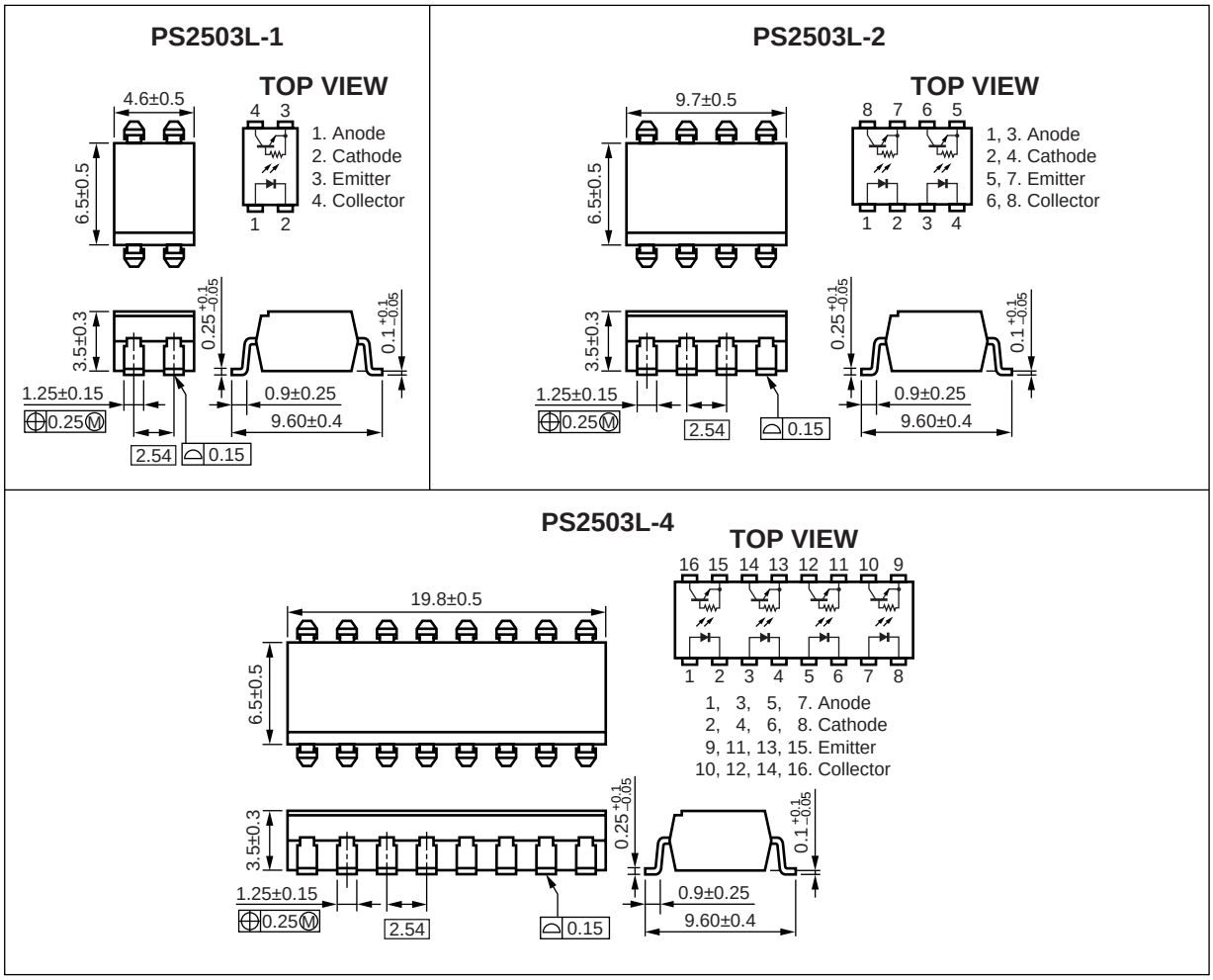
The mark ★ shows major revised points.

★ **PACKAGE DIMENSIONS (UNIT : mm)**

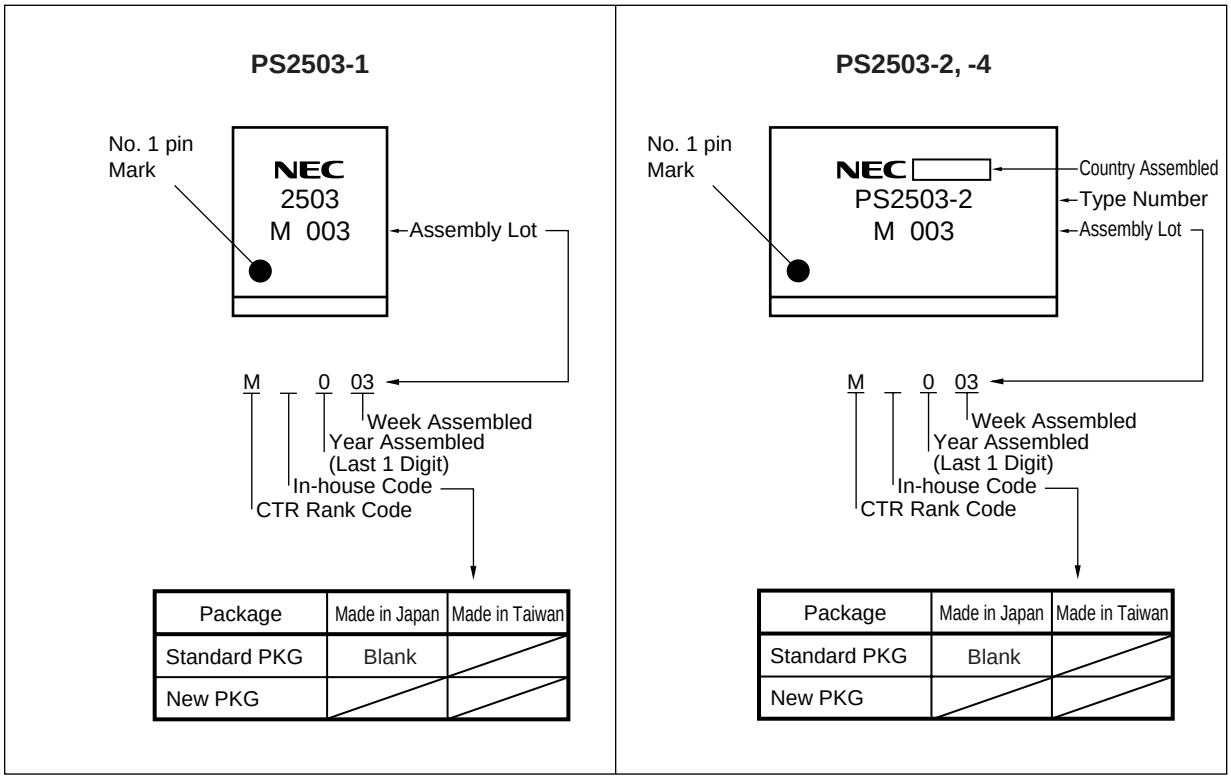
DIP Type



Lead Bending Type



MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Package	Packing Style	Application Part Number*1
PS2503-1	4-pin DIP	Magazine case 100 pcs	PS2503-1
PS2503L-1			
PS2503L-1-E3		Embossed Tape 1 000 pcs/reel	
PS2503L-1-E4			
PS2503L-1-F3		Embossed Tape 2 000 pcs/reel	
PS2503L-1-F4			
PS2503-2	8-pin DIP	Magazine case 45 pcs	PS2503-2
PS2503L-2			
PS2503L-2-E3		Embossed Tape 1 000 pcs/reel	
PS2503L-2-E4			
PS2503-4	16-pin DIP	Magazine case 20 pcs	PS2503-4
PS2503L-4			

***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
			PS2503-1, PS2503L-1	PS2503-2,-4 PS2503L-2,-4	
Diode	Reverse Voltage	V_R	6		V
	Forward Current (DC)	I_F	80		mA
	Power Dissipation Derating	ΔP_D/°C	1.5	1.2	mW/°C
	Power Dissipation	P_D	150	120	mW/ch
	Peak Forward Current*1	I_{FP}	1		A
Transistor	Collector to Emitter Voltage	V_{CEO}	40		V
	Emitter to Collector Voltage	V_{ECO}	0.6		V
	Collector Current	I_C	30		mA/ch
	Power Dissipation Derating	ΔP_C/°C	1.5	1.2	mW/°C
	Power Dissipation	P_C	150	120	mW/ch
Isolation Voltage*2		BV	5 000		Vr.m.s.
Operating Ambient Temperature		T_A	–55 to +100		°C
Storage Temperature		T_{stg}	–55 to +150		°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

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 1 mA		1.1	1.3	V
	Reverse Current	I_R	V_R = 5 V			5	μA
	Terminal Capacitance	C_t	V = 0 V, f = 1.0 MHz		50		pF
Transistor	Collector to Emitter Dark Current	I_{CEO}	V_{CE} = 40 V, I_F = 0 mA			100	nA
Coupled	Current Transfer Ratio (I_C/I_F)*1	CTR	I_F = 1 mA, V_{CE} = 5 V	100	200	400	%
	Collector Saturation Voltage	$V_{CE(sat)}$	I_F = 1 mA, I_C = 0.2 mA			0.25	V
	Isolation Resistance	R_{I-O}	V_{I-O} = 1.0 kV_{DC}	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1.0 MHz		0.5		pF
	Rise Time*2	t_r	V_{CC} = 5 V, I_F = 1 mA, R_L = 10 kΩ		20		μs
	Fall Time*2	t_f			30		

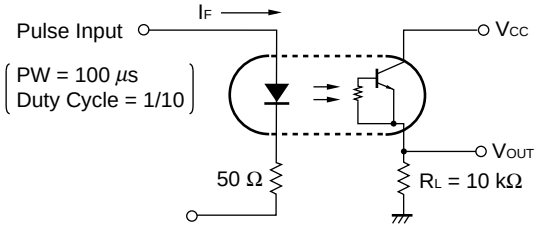
***1** CTR rank (only PS2503-1, PS2503L-1)

K : 200 to 400 (%)

L : 150 to 300 (%)

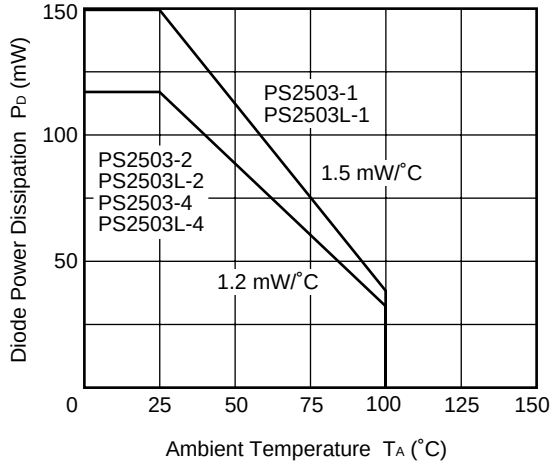
M : 100 to 200 (%)

***2** Test circuit for switching time

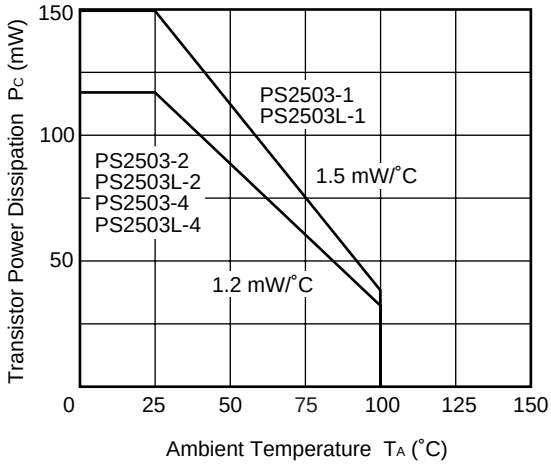


TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

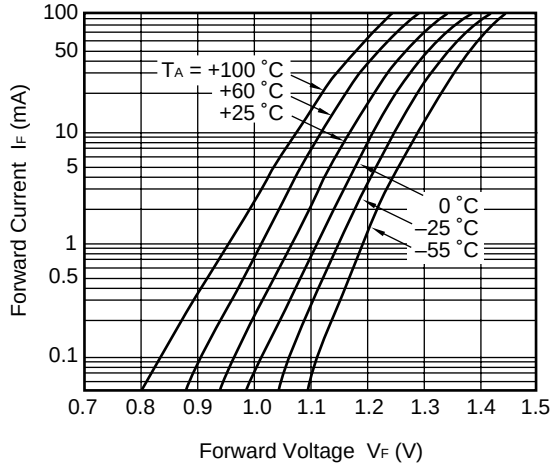
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



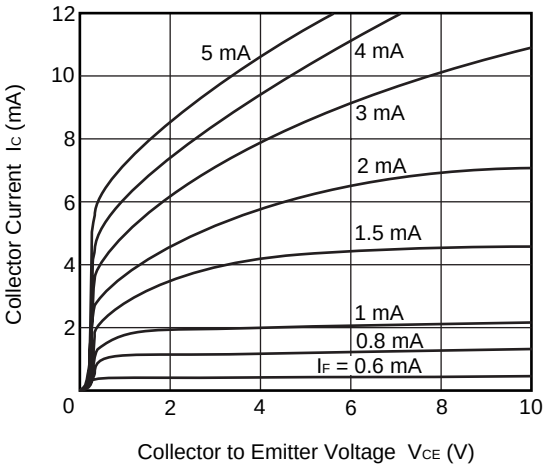
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



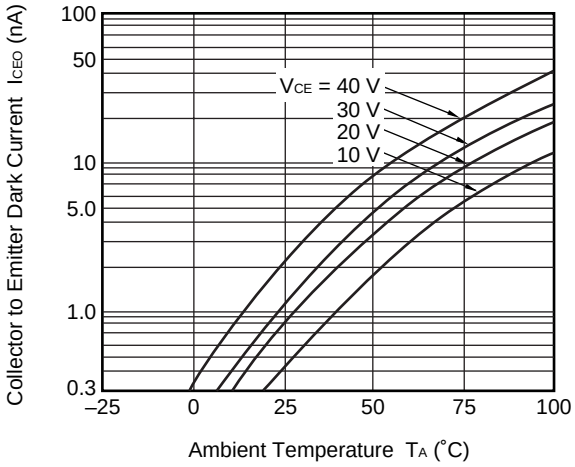
FORWARD CURRENT vs. FORWARD VOLTAGE



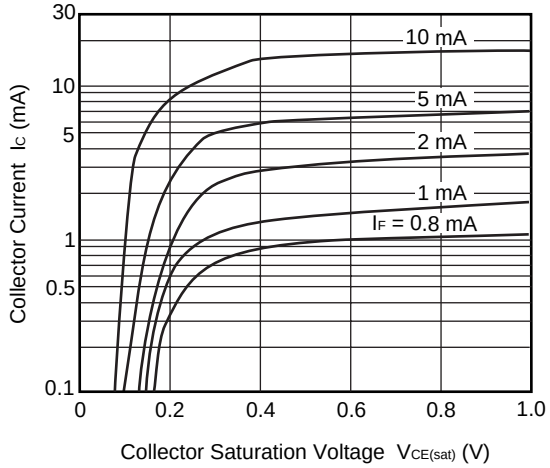
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



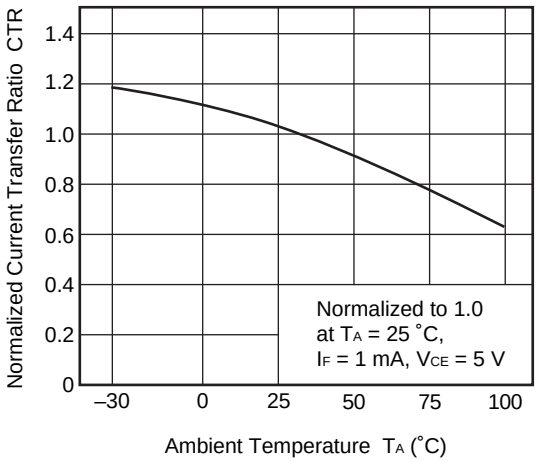
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



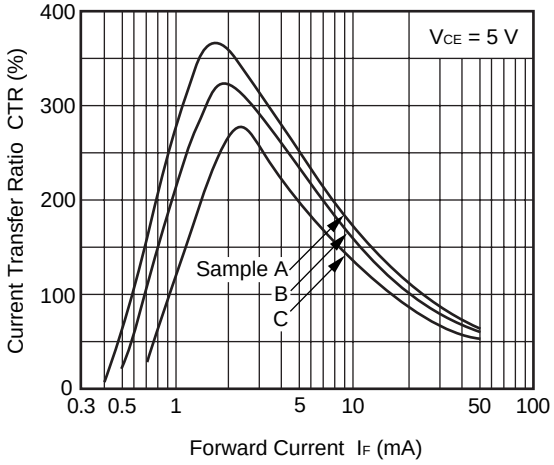
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



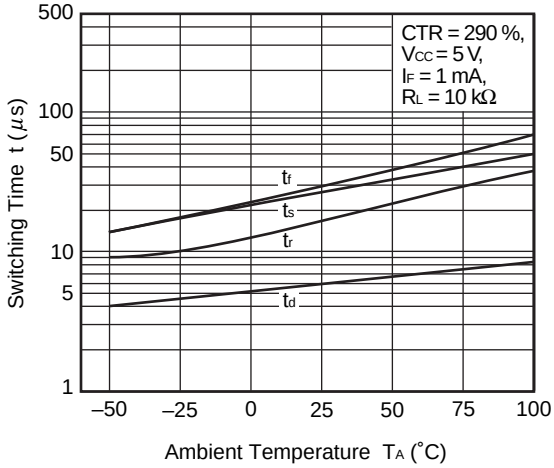
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



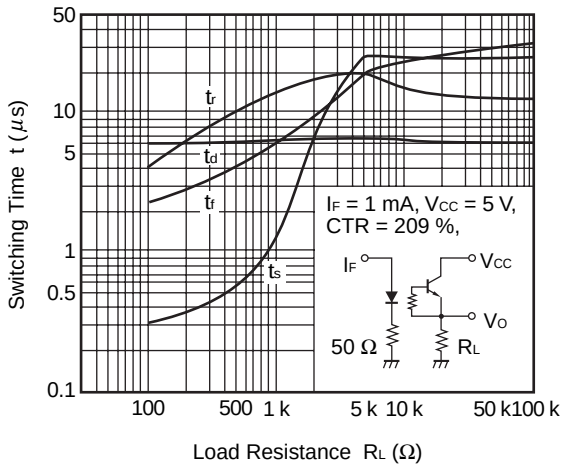
CURRENT TRANSFER RATIO vs. FORWARD CURRENT



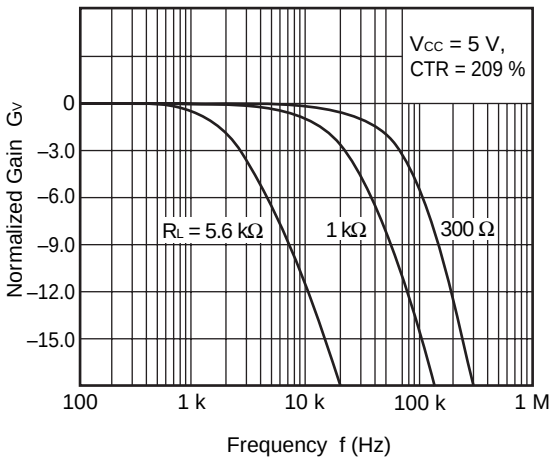
SWITCHING TIME vs. AMBIENT TEMPERATURE



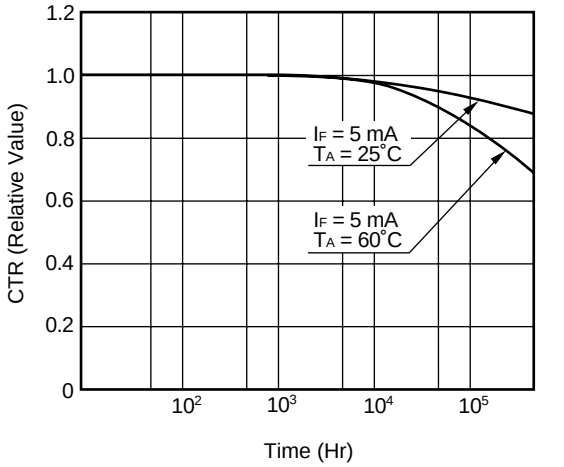
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE



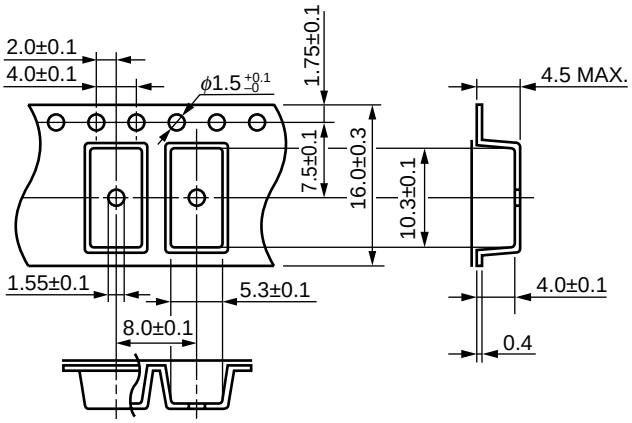
LONG TERM CTR DEGRADATION



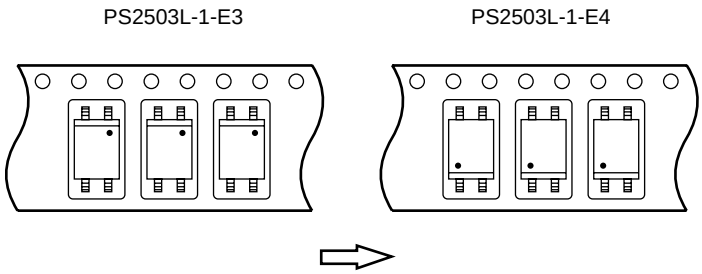
Remark The graphs indicate nominal characteristics.

★ **TAPING SPECIFICATIONS (UNIT : mm)**

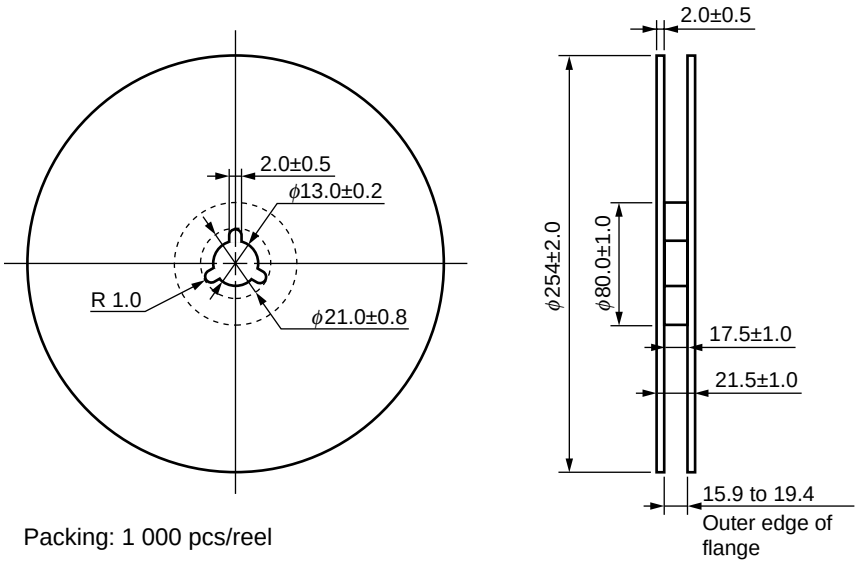
Outline and Dimensions (Tape)



Tape Direction

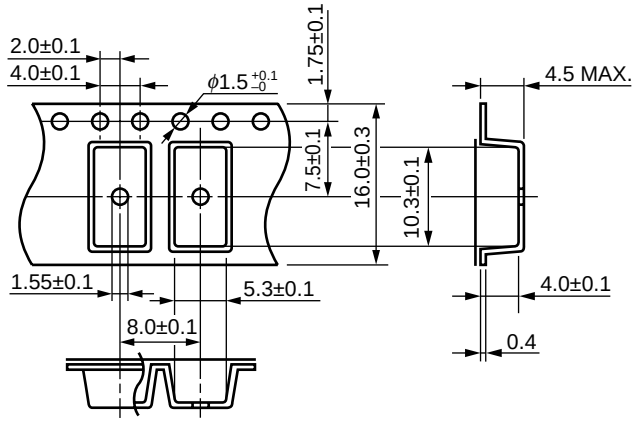


Outline and Dimensions (Reel)

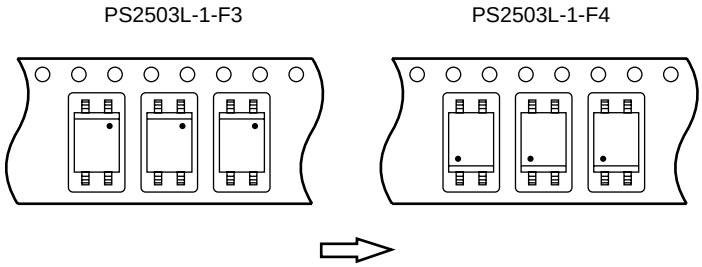


Packing: 1 000 pcs/reel

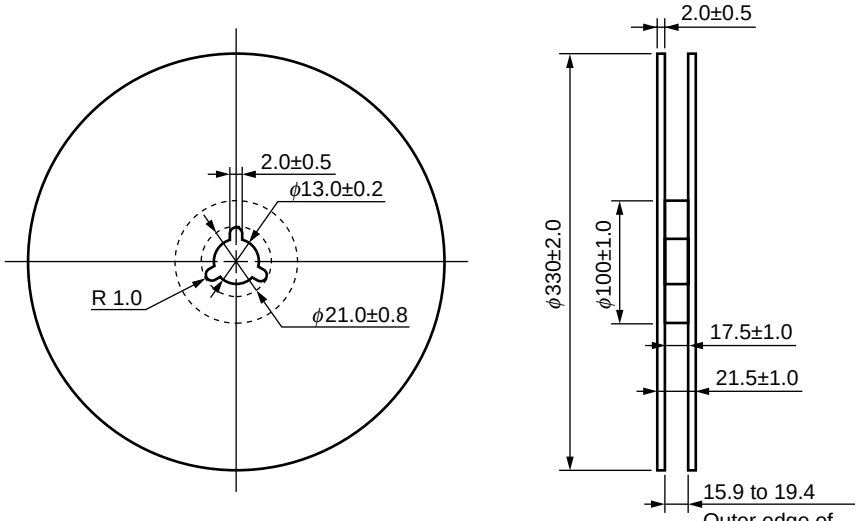
Outline and Dimensions (Tape)



Tape Direction

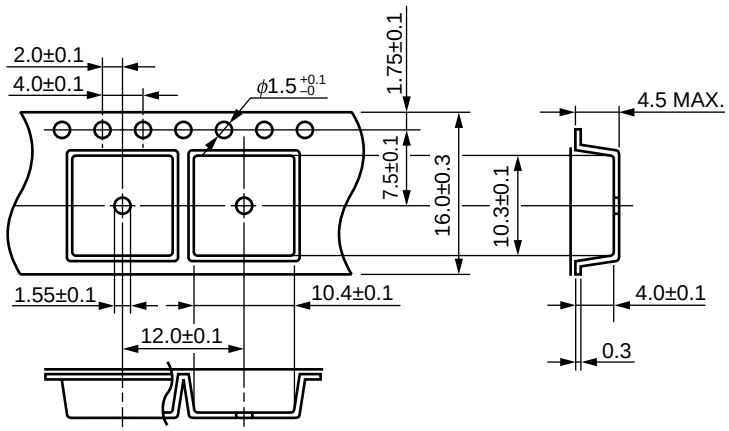


Outline and Dimensions (Reel)

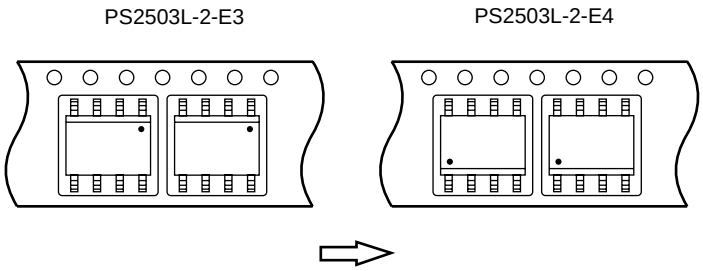


Packing: 2 000 pcs/reel

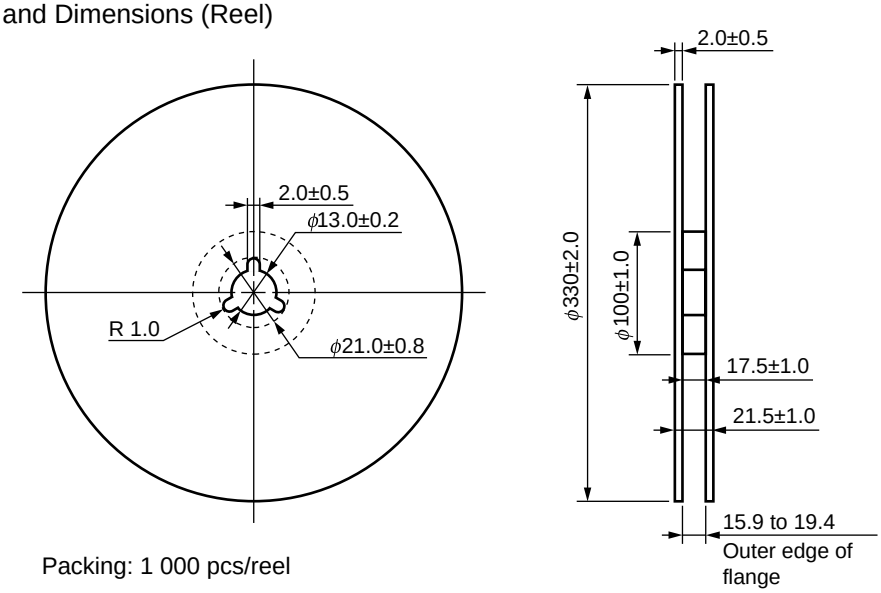
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



Packing: 1 000 pcs/reel

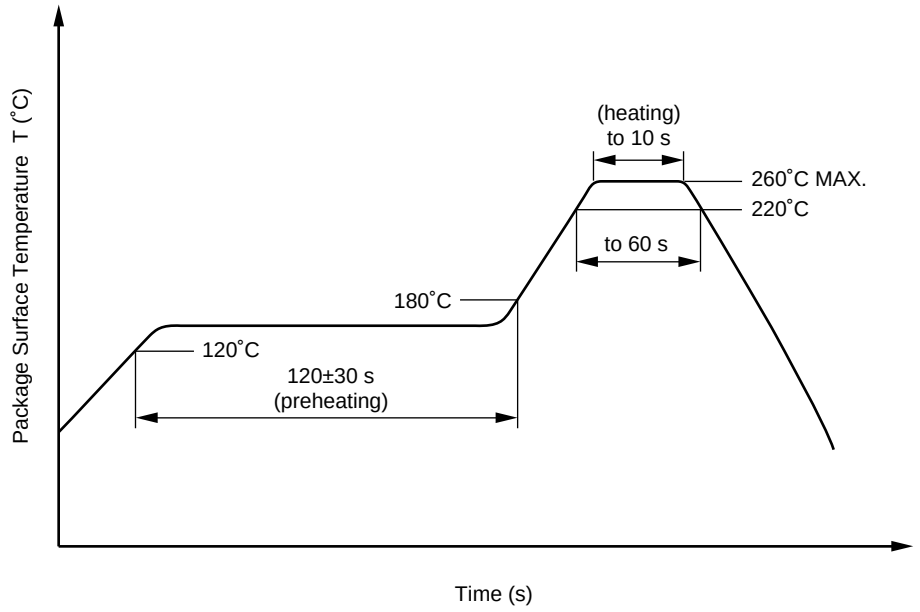
★ NOTES ON HANDLING

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

Caution GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.

▶**For further information, please contact**

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