

PHOTOCOUPLER **PS2505-1,-4,PS2505L-1,-4**

HIGH ISOLATION VOLTAGE AC INPUT RESPONSE TYPE MULTI PHOTOCOUPLER SERIES

-NEPOC Series-

<R> DESCRIPTION

The PS2505-1, -4 and PS2505L-1, -4 are optically coupled isolators containing GaAs light emitting diodes and an NPN silicon phototransistor.

The PS2505-1, -4 are in a plastic DIP (Dual In-line Package) and the PS2505L-1, -4 are lead bending type (Gullwing) for surface mount.

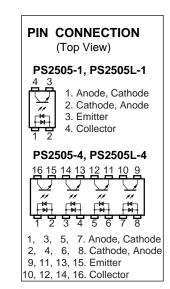
FEATURES

- · AC input response
- High isolation voltage (BV = 5 000 Vr.m.s.)
- High collector to emitter voltage (VcEO = 80 V)
- High-speed switching ($t_r = 3 \mu s$ TYP., $t_f = 5 \mu s$ TYP.)
- <R> Ordering number of tape product: PS2505L-1-F3: 2 000 pcs/reel
 - Safety standards

• UL approved: No. E72422

APPLICATIONS

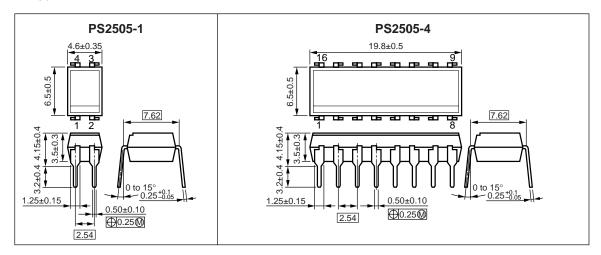
- Power supply
- Telephone/FAX.
- FA/OA equipment
- · Programmable logic controller



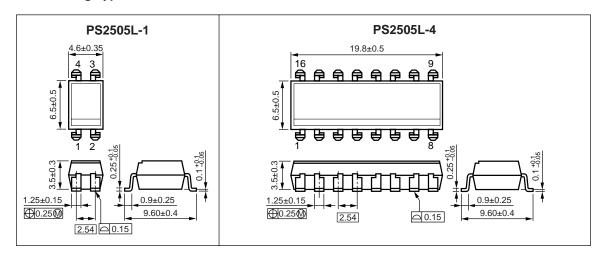
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<R> PACKAGE DIMENSIONS (UNIT : mm)

DIP Type



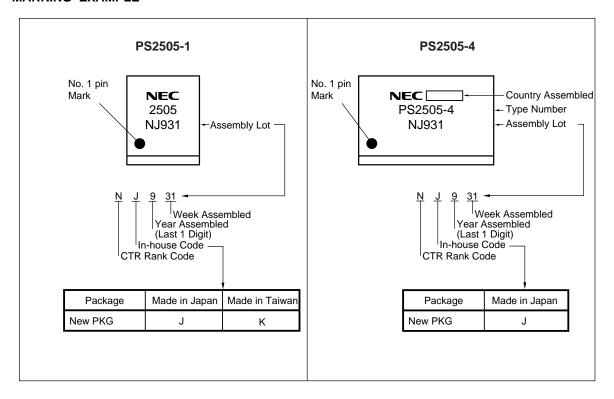
Lead Bending Type



<R> PHOTOCOUPLER CONSTRUCTION

Parameter	Unit (MIN.)		
Air Distance	7 mm		
Outer Creepage Distance	7 mm		
Inner Creepage Distance	3.5 mm		
Isolation Thickness	0.3 mm		

<R> MARKING EXAMPLE



<R> ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS2505-1	PS2505-1-A	Pb-Free	Magazine case 100 pcs	Standard products	PS2505-1
PS2505L-1	PS2505L-1-A			(UL Approved)	
PS2505L-1-F3	PS2505L-1-F3-A		Embossed Tape 2 000 pcs/reel		
PS2505-4	PS2505-4-A		Magazine case 20 pcs		PS2505-4
PS2505L-4	PS2505L-4-A				

^{*1} For the application of the Safety Standard, following part number should be used.

ABSOLUTE MAXIMUM RATINGS (TA = 25°C, unless otherwise specified)

Parameter			Rati		
		Symbol	PS2505-1, PS2505L-1	PS2505-4, PS2505L-4	Unit
Diode	Forward Current (DC)	lf	±80		mA/ch
	Power Dissipation Derating	⊿P₀/°C	1.5	1.2	mW/°C
	Power Dissipation	Po	150	120	mW/ch
	Peak Forward Current*1	IFP	±1		A/ch
Transistor	Collector to Emitter Voltage	Vceo	80		V
	Emitter to Collector Voltage	Veco	7		V
	Collector Current	lc	50		mA/ch
	Power Dissipation Derating	⊿Pc/°C	1.5	1.2	mW/°C
	Power Dissipation	Pc	150	120	mW/ch
Isolation Voltage ^{*2}		BV	5 000		Vr.m.s.
Operating Ambient Temperature		TA	−55 to +100		°C
Storage Temperature		T _{stg}	-55 to +150		°C

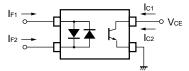
^{*1} PW = 100 μ s, Duty Cycle = 1%

^{*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 (PS2505-1, PS2505L-1). Pins 1-8 shorted together, 9-16 shorted together (PS2505-4, PS2505L-4).

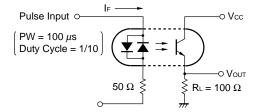
ELECTRICAL CHARACTERISTICS (TA = 25°C)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	VF	IF = ±10 mA		1.17	1.4	V
	Terminal Capacitance	Ct	V = 0 V, f = 1.0 MHz		100		pF
Transistor	Collector to Emitter Dark Current	Iceo	VcE = 80 V, IF = 0 mA			100	nA
Coupled	Current Transfer Ratio	CTR	$I_F = \pm 5$ mA, $V_{CE} = 5$ V	80	300	600	%
	CTR Ratio*1	CTR1/ CTR2	I _F = 5 mA, V _{CE} = 5 V	0.3	1.0	3.0	
	Collector Saturation Voltage	VCE (sat)	$I_F = \pm 10 \text{ mA}, I_C = 2 \text{ mA}$			0.3	V
	Isolation Resistance	R⊩o	Vi-o = 1.0 kVpc	10 ¹¹			Ω
	Isolation Capacitance	CI-O	V = 0 V, f = 1.0 MHz		0.5		pF
	Rise Time*2	tr	Vcc = 10 V, Ic = 2 mA, R_L = 100 Ω		3		μS
	Fall Time*2	tr			5		

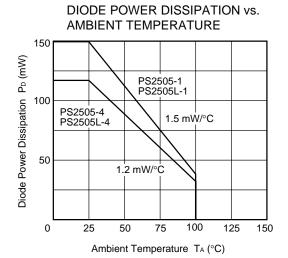
*1 CTR1 = Ic1/IF1, CTR2 = Ic2/IF2



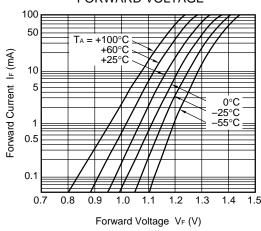
*2 Test circuit for switching time



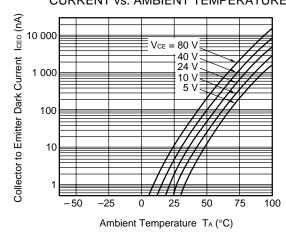
<R> TYPICAL CHARACTERISTICS (TA = 25 °C, unless otherwise specified)



FORWARD CURRENT vs. FORWARD VOLTAGE

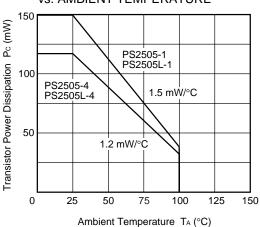


COLLECTOR TO EMITTER DARK **CURRENT vs. AMBIENT TEMPERATURE**

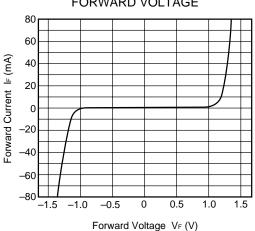


Remark The graphs indicate nominal characteristics.

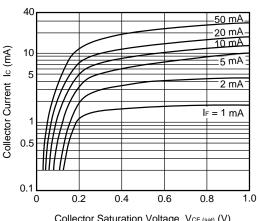




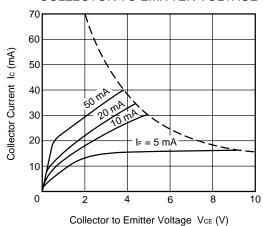
FORWARD CURRENT vs. FORWARD VOLTAGE



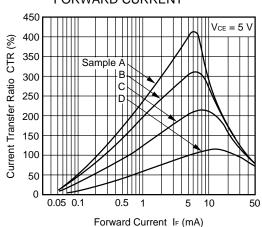
COLLECTOR CURRENT vs. **COLLECTOR SATURATION VOLTAGE**



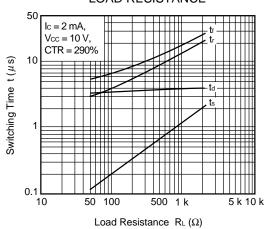
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



CURRENT TRANSFER RATIO vs. FORWARD CURRENT

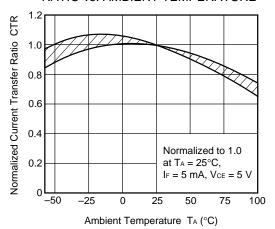


SWITCHING TIME vs. LOAD RESISTANCE

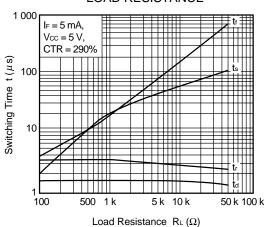


Remark The graphs indicate nominal characteristics.

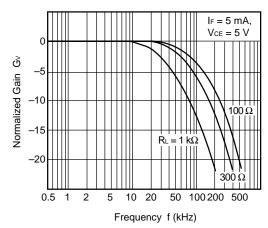
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



SWITCHING TIME vs. LOAD RESISTANCE



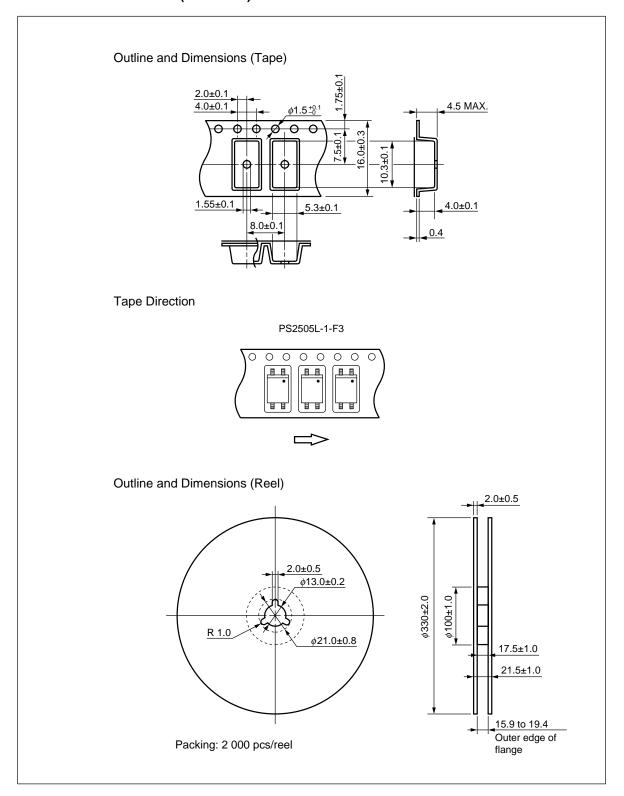
FREQUENCY RESPONSE



LONG TERM CTR DEGRADATION 1.2 1.0 0.8 $T_A = 25^{\circ}C$ 0.4 0.2 0.2 10² 10³ 10⁴ 10⁵ Time (Hr)

Remark The graph indicates nominal characteristics.

<R> TAPING SPECIFICATIONS (UNIT: mm)



NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

• Peak reflow temperature 260°C or below (package surface temperature)

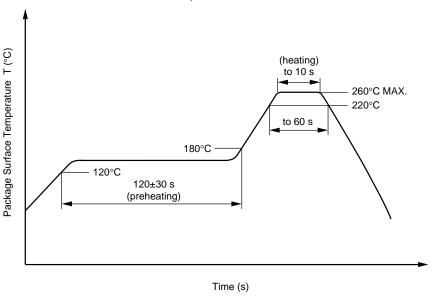
Time of peak reflow temperature
 Time of temperature higher than 220°C
 50 seconds or less
 60 seconds or less

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.)

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. This tendency may sometimes be obvious, especially below $I_E = 1 \text{ mA}$

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.

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M8E0904E

Caution

GaAs Products

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.

- 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.
- 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.