



# **PHOTOCOUPLER**

# PS2565-1,PS2565L-1,PS2565L1-1,PS2565L2-1

# HIGH ISOLATION VOLTAGE AC INPUT RESPONSE TYPE MULTI PHOTOCOUPLER SERIES

-NEPOC Series-

#### **DESCRIPTION**

The PS2565-1 is optically coupled isolators containing GaAs light emitting diodes and an NPN silicon phototransistor.

The PS2565-1 is in a plastic DIP (Dual In-line Package) and the PS2565L-1 is lead bending type (Gull-wing) for surface mount.

The PS2565L1-1 is lead bending type for long creepage distance.

Ordering number of taping product: PS2565L-1-F3: 2 000 pcs/reel

The PS2565L2-1 is lead bending type for long creepage distance (Gull-wing) 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 current transfer ratio (CTR = 200% TYP.)
- High-speed switching ( $t_r = 3 \mu s$  TYP.,  $t_f = 5 \mu s$  TYP.)
- High-speed switching (tr = 3  $\mu$ s 1 YP., tr = 5  $\mu$ s 1 YP.)

: PS2565L2-1-E3: 1 000 pcs/reel

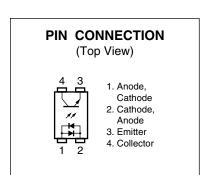
<R> • Safety standards

<R>

- UL approved: No. E72422
- CSA approved: No. CA 101391 (CA5A, CAN/CSA-C22.2 60065, 60950)
- BSI approved: No. 7112/7420
- SEMKO approved: No. 903238
- NEMKO approved: No. P09210868
- DEMKO approved: No. 314999
- FIMKO approved: No. FI 25119
- DIN EN60747-5-2 (VDE0884 Part2) approved: No. 40008862 (Option)

### **APPLICATIONS**

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

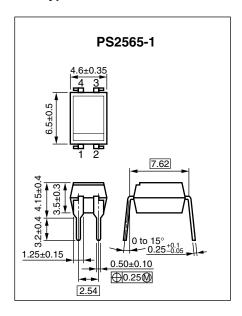


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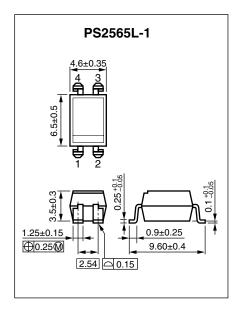


# <R> PACKAGE DIMENSIONS (UNIT: mm)

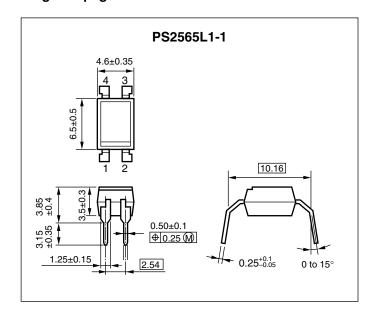
# **DIP Type**



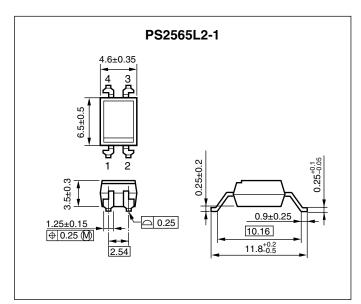
# **Lead Bending Type (Gull-Wing)**



# **Long Creepage Distance**



Long Creepage Distance (Gull-Wing)

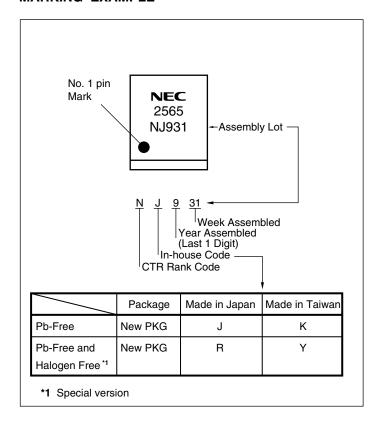


# <R> PHOTOCOUPLER CONSTRUCTION

Parameter	Unit (MIN.)
Air Distance	7 mm
Outer Creepage Distance	7 mm
Inner Creepage Distance	4 mm
Isolation Thickness	0.4 mm



### <R> MARKING EXAMPLE





# <R> ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS2565-1	PS2565-1-A	Pb-Free	Magazine case 100 pcs	Standard products	PS2565-1
PS2565L-1	PS2565L-1-A			(UL, CSA, BSI,	
PS2565L1-1	PS2565L1-1-A			SEMKO, NEMKO,	
PS2565L2-1	PS2565L2-1-A			DEMKO, FIMKO	
PS2565L-1-F3	PS2565L-1-F3-A		Embossed Tape 2 000 pcs/reel	approved)	
PS2565L2-1-E3	PS2565L2-1-E3-A		Embossed Tape 1 000 pcs/reel		
PS2565-1-V	PS2565-1-V-A		Magazine case 100 pcs	DIN EN60747-5-2	
PS2565L-1-V	PS2565L-1-V-A			(VDE0884 Part2)	
PS2565L1-1-V	PS2565L1-1-V-A			approved products	
PS2565L2-1-V	PS2565L2-1-V-A			(option)	
PS2565L-1-V-F3	PS2565L-1-V-F3-A		Embossed Tape 2 000 pcs/reel		
PS2565L2-1-V-E3	PS2565L2-1-V-E3-A		Embossed Tape 1 000 pcs/reel		
PS2565-1	PS2565-1Y-A	Special version	Magazine case 100 pcs	Standard products	PS2565-1
PS2565L-1	PS2565L-1Y-A	(Pb-Free and		(UL, CSA, BSI,	
PS2565L1-1	PS2565L1-1Y-A	Halogen Free)		SEMKO, NEMKO,	
PS2565L2-1	PS2565L2-1Y-A			DEMKO, FIMKO	
PS2565L-1-F3	PS2565L-1Y-F3-A		Embossed Tape 2 000 pcs/reel	approved)	
PS2565L2-1-E3	PS2565L2-1Y-E3-A		Embossed Tape 1 000 pcs/reel		
PS2565-1-V	PS2565-1Y-V-A		Magazine case 100 pcs	DIN EN60747-5-2	
PS2565L-1-V	PS2565L-1Y-V-A			(VDE0884 Part2)	
PS2565L1-1-V	PS2565L1-1Y-V-A			approved products	
PS2565L2-1-V	PS2565L2-1Y-V-A			(option)	
PS2565L-1-V-F3	PS2565L-1Y-V-F3-A		Embossed Tape 2 000 pcs/reel		
PS2565L2-1-V-E3	PS2565L2-1Y-V-E3-A		Embossed Tape 1 000 pcs/reel		

<sup>\*1</sup> For the application of the Safety Standard, following part number should be used.



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

Parameter		Symbol	Ratings	Unit
Diode	Forward Current (DC)	lF	80	mA
	Power Dissipation Derating	⊿P₀/°C	1.5	mW/°C
	Power Dissipation	Po	150	mW
	Peak Forward Current <sup>*1</sup>	IFP	1	Α
Transistor	Collector to Emitter Voltage	Vceo	80	V
	Emitter to Collector Voltage	VECO	7	V
	Collector Current	lc	50	mA
	Power Dissipation Derating	⊿Pc/°C	1.5	mW/°C
	Power Dissipation	Pc	150	mW
Isolation Voltage <sup>*2</sup>		BV	5 000	Vr.m.s.
Operating Ambient Temperature		TA	-55 to +100	°C
Storage Temperature		T <sub>stg</sub>	-55 to +150	°C

<sup>\*1</sup> PW = 100  $\mu$ s, Duty Cycle = 1%

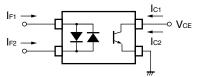
<sup>\*2</sup> AC voltage for 1 minute at  $T_A = 25^{\circ}C$ , RH = 60% between input and output. Pins 1-2 shorted together, 3-4 shorted together.



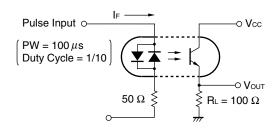
# **ELECTRICAL CHARACTERISTICS (TA = 25°C)**

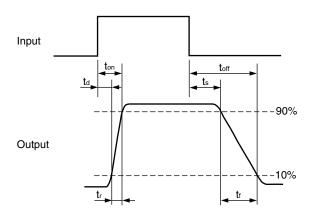
	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	VF	I <sub>F</sub> = ±10 mA		1.17	1.4	٧
	Terminal Capacitance	Ct	V = 0 V, f = 1.0 MHz		100		pF
Transistor	Collector to Emitter Dark Current	Iceo	VcE = 80 V, IF = 0 mA			100	nA
Coupled	Current Transfer Ratio	CTR	I <sub>F</sub> = ±5 mA, V <sub>CE</sub> = 5 V	80	200	400	%
	CTR Ratio"	CTR1/ CTR2	IF = 5 mA, VcE = 5 V	0.3	1.0	3.0	
	Collector Saturation Voltage	VCE (sat)	I <sub>F</sub> = ±10 mA, I <sub>C</sub> = 2 mA			0.3	V
	Isolation Resistance	Ri-o	Vi-o = 1.0 kVpc	10 <sup>11</sup>			Ω
	Isolation Capacitance	Cı-o	V = 0 V, f = 1.0 MHz		0.5		pF
	Rise Time <sup>*2</sup>	tr	Vcc = 10 V, Ic = 2 mA, RL = 100 $\Omega$		3		μs
	Fall Time <sup>*2</sup>	tr			5		

### \*1 CTR1 = $Ic_1/I_{F1}$ , CTR2 = $Ic_2/I_{F2}$

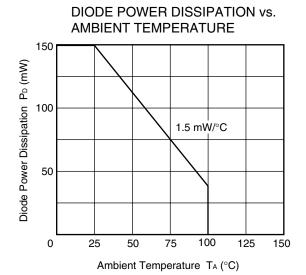


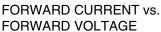
### \*2 Test circuit for switching time

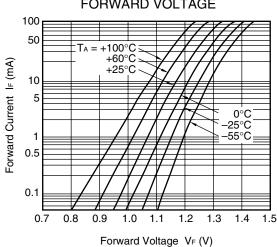




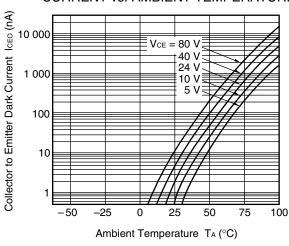
#### TYPICAL CHARACTERISTICS (TA = 25°C, unless otherwise specified)





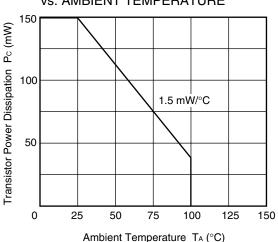


### COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE

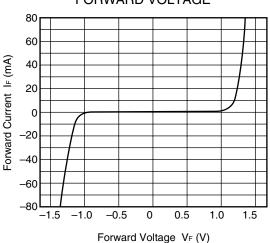


# **Remark** The graphs indicate nominal characteristics.

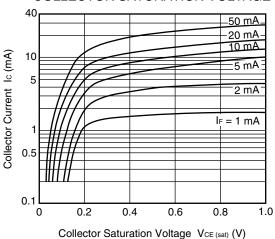




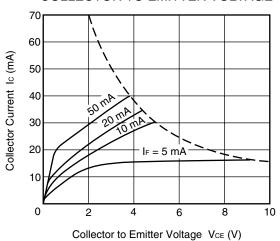
# FORWARD CURRENT vs. FORWARD VOLTAGE



# COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE

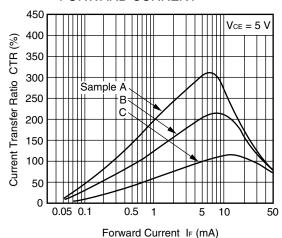


# COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

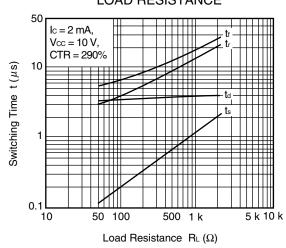


1005NT TO 110550 D 1710

# CURRENT TRANSFER RATIO vs. FORWARD CURRENT

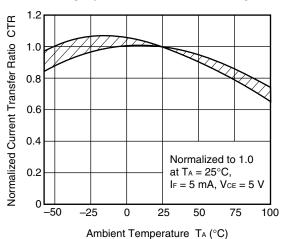


SWITCHING TIME vs. LOAD RESISTANCE

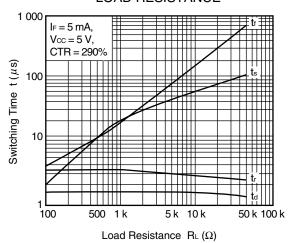


**Remark** The graphs indicate nominal characteristics.

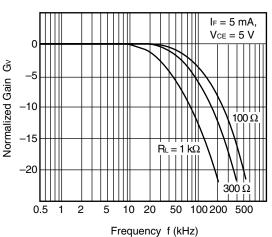
# NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



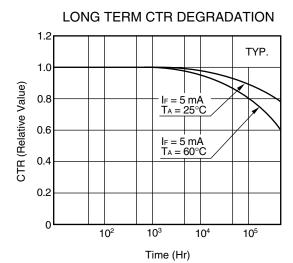
### SWITCHING TIME vs. LOAD RESISTANCE



# FREQUENCY RESPONSE



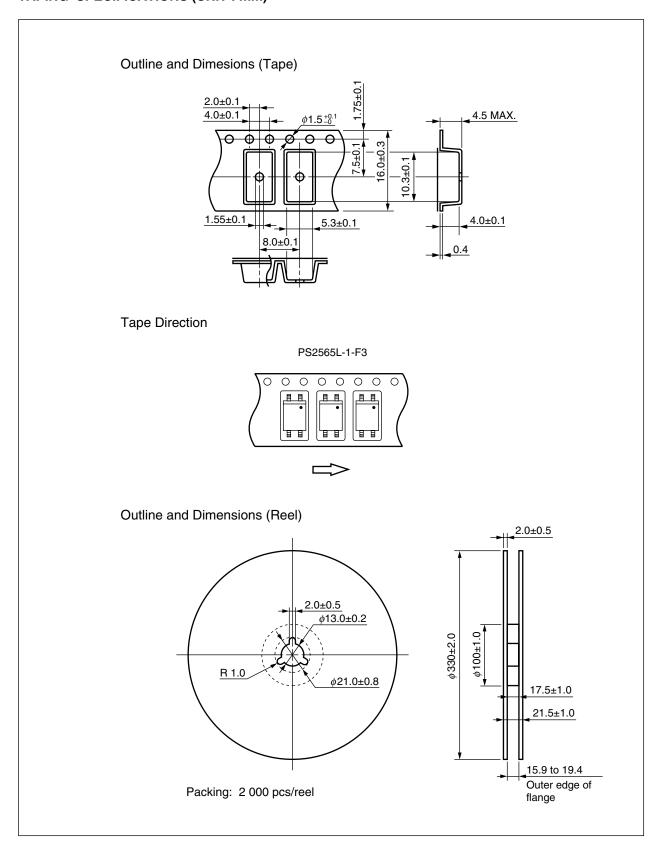




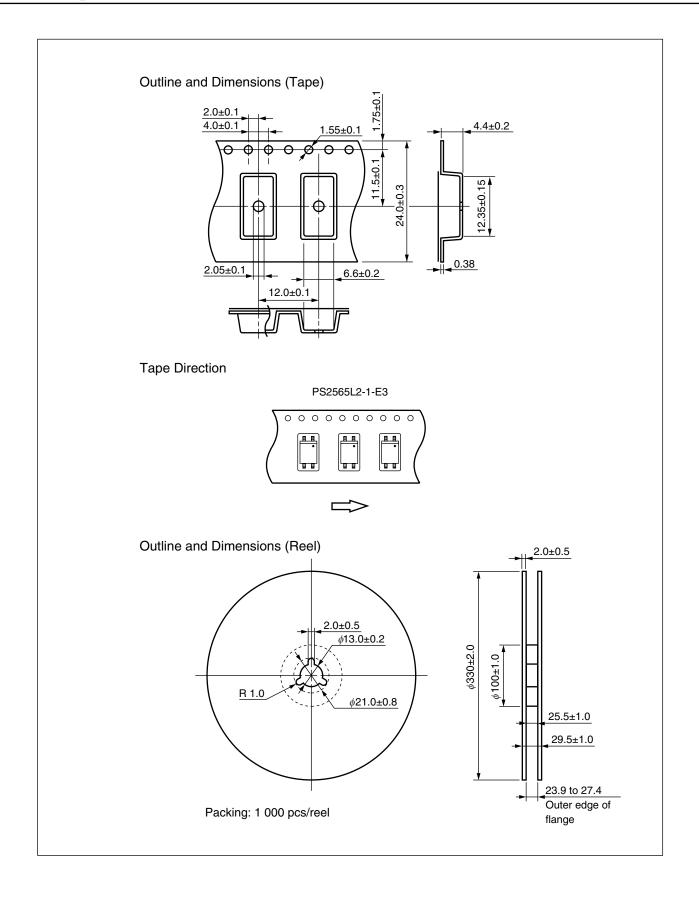
**Remark** The graph indicates nominal characteristics.



# <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)

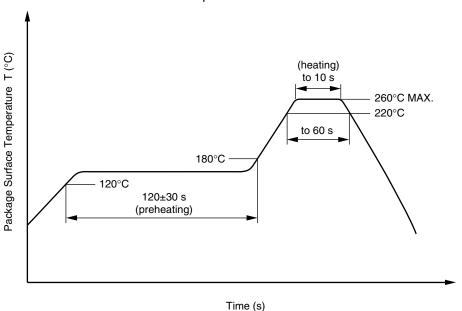
Time of peak reflow temperature
 Time of temperature higher than 220°C
 10 seconds or less
 60 seconds or less

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.)

• 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. This tendency may sometimes be obvious, especially below I<sub>F</sub> = 1 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.



# <R> SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Spec.	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		55/100/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.5 \times U_{IORM}, P_d < 5 pC$	Uювм Upr	890 1 335	V <sub>peak</sub> V <sub>peak</sub>
Test voltage (partial discharge test, procedure b for all devices) $U_{pr}=1.875\times U_{IORM},P_d<5\;pC$	Upr	1 669	$V_{peak}$
Highest permissible overvoltage	Utr	8 000	V <sub>peak</sub>
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303 Part 11))	CTI	175	
Material group (DIN EN 60664-1 VDE0110 Part 1)		III a	
Storage temperature range	Tstg	-55 to +150	°C
Operating temperature range	TA	-55 to +100	°C
Isolation resistance, minimum value  VIO = 500 V dc at TA = 25°C  VIO = 500 V dc at TA MAX. at least 100°C	Ris MIN. Ris MIN.	10 <sup>12</sup> 10 <sup>11</sup>	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I <sub>F</sub> , Psi = 0) Power (output or total power dissipation) Isolation resistance	Tsi Isi Psi	175 400 700	°C mA mW
V <sub>IO</sub> = 500 V dc at T <sub>A</sub> = Tsi	Ris MIN.	10°	Ω



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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.

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

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

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### Наши преимущества:

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- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
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- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
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