

PHOTOCOUPLER PS2705-1

HIGH ISOLATION VOLTAGE AC INPUT RESPONSE TYPE SOP MULTI PHOTOCOUPLER

-NEPOC Series-

DESCRIPTION

The PS2705-1 is an optically coupled isolator containing a GaAs light emitting diode and an NPN silicon phototransistor.

This package is SOP (Small Outline Package) type and has shield effect to cut off ambient light. It is designed for high density mounting applications.

FEATURES

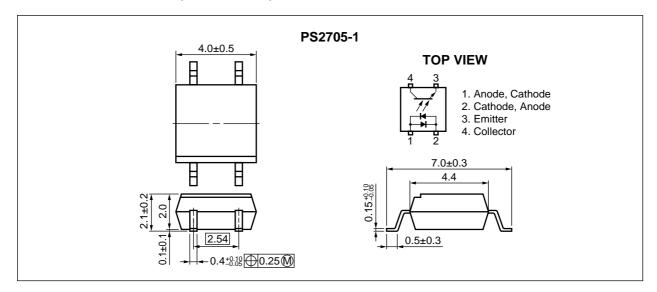
- · AC input response
- High isolation voltage (BV = 3 750 Vr.m.s.)
- High current transfer ratio (CTR = 100% TYP.)
- · SOP (Small Outline Package) type
- High-speed switching ($t_r = 3 \mu s$ TYP., $t_f = 5 \mu s$ TYP.)
- · Ordering number of taping product: PS2705-1-F3, F4
- Safety standards
 - UL approved: File No. E72422
 - BSI approved: File No. 8219/8220
 - CSA approved: File No. CA 101391
 - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)

APPLICATIONS

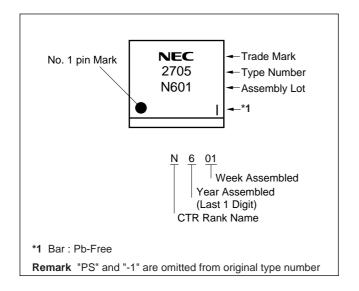
- Hybrid IC
- Telephone/FAX
- FA/OA equipment
- Programmable logic controllers
- · Power supply

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PACKAGE DIMENSIONS (in millimeters)



★ MARKING EXAMPLE



★ ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number*1
PS2705-1	PS2705-1-A	Pb-Free	Magazine case 100 pcs	Standard products	PS2705-1
PS2705-1-F3	PS2705-1-F3-A		Embossed Tape 3 500 pcs/reel	(UL, BSI, CSA	
PS2705-1-F4	PS2705-1-F4-A			approved)	
PS2705-1-V	PS2705-1-V-A		Magazine case 100 pcs	DIN EN60747-5-2	
PS2705-1-V-F3	PS2705-1-V-F3-A		Embossed Tape 3 500 pcs/reel	(VDE0884 Part2)	
PS2705-1-V-F4	PS2705-1-V-F4-A			Approved (Option)	

^{*1} 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	± 50	mA
	Power Dissipation Derating	⊿P₀/°C	0.8	mW/°C
	Power Dissipation	Po	80	mW
	Peak Forward Current*1	IFP	± 1	Α
Transistor	Collector to Emitter Voltage	Vceo	40	V
	Emitter to Collector Voltage	VECO	6	V
	Collector Current	lc	80	mA
	Power Dissipation Derating	⊿Pc/°C	1.5	mW/°C
	Power Dissipation	Pc	150	mW
Isolation Voltage*2		BV	3 750	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.

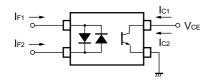
ELECTRICAL CHARACTERISTICS (TA = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	VF	$I_F = \pm 5 \text{ mA}$		1.1	1.4	V
	Terminal Capacitance	Ct	V = 0 V, f = 1 MHz		60		pF
Transistor	Collector to Emitter Dark Current	ICEO	IF = 0 mA, VcE = 40 V			100	nA
Coupled	Current Transfer Ratio	CTR	$I_F = \pm 5$ mA, $V_{CE} = 5$ V	50	100	300	%
	CTR Ratio *2	CTR ₁ /	$I_F = \pm 5$ 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 _{I-O}	Vi-o = 1 kVpc	10 ¹¹			Ω
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz		0.4		pF
	Rise Time *3	tr	$Vcc = 5 \text{ V}, \ Ic = 2 \text{ mA}, \ R_L = 100 \ \Omega$		3		μS
	Fall Time *3	tr			5		

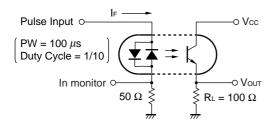
*1 CTR rank

M: 50 to 150 (%) L: 100 to 300 (%) N: 50 to 300 (%)

*2 CTR₁ = Ic₁/I_{F1}, CTR₂ = Ic₂/I_{F2}

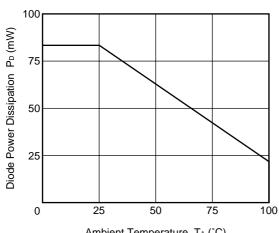


*3 Test circuit for switching time

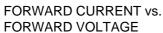


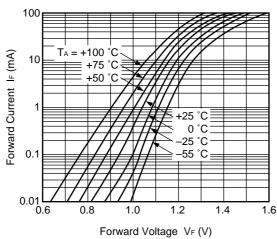
TYPICAL CHARACTERISTICS (TA = 25°C, unless otherwise specified)



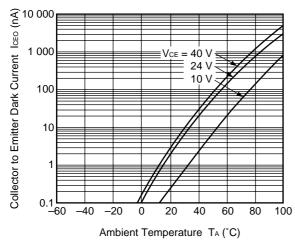


Ambient Temperature TA (°C)



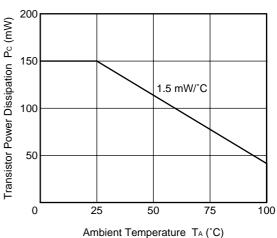


COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



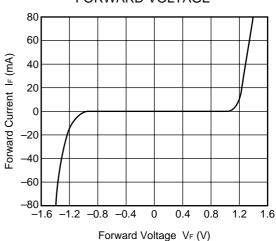
Remark The graphs indicate nominal characteristics.

TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE

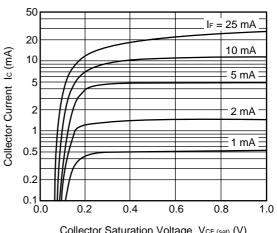


FORWARD CURRENT vs.

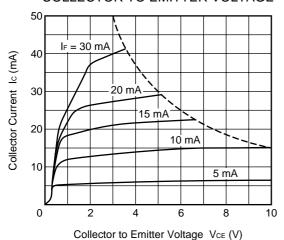
FORWARD VOLTAGE



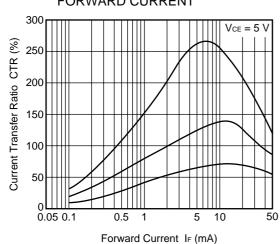
COLLECTOR CURRENT vs. **COLLECTOR SATURATION VOLTAGE**



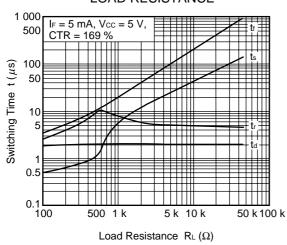
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



CURRENT TRANSFER RATIO vs. FORWARD CURRENT

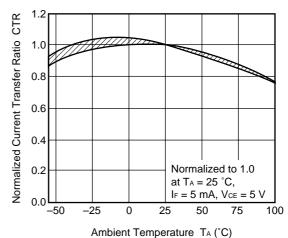


SWITCHING TIME vs. LOAD RESISTANCE

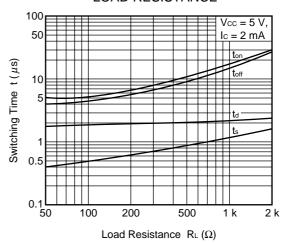


Remark The graphs indicate nominal characteristics.

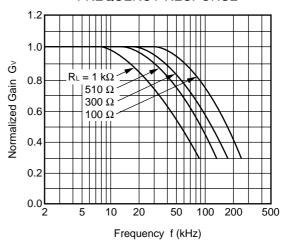
NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE



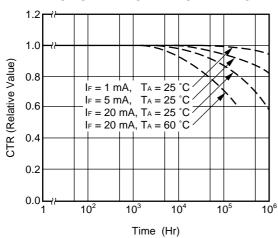
SWITCHING TIME vs. LOAD RESISTANCE



FREQUENCY RESPONSE

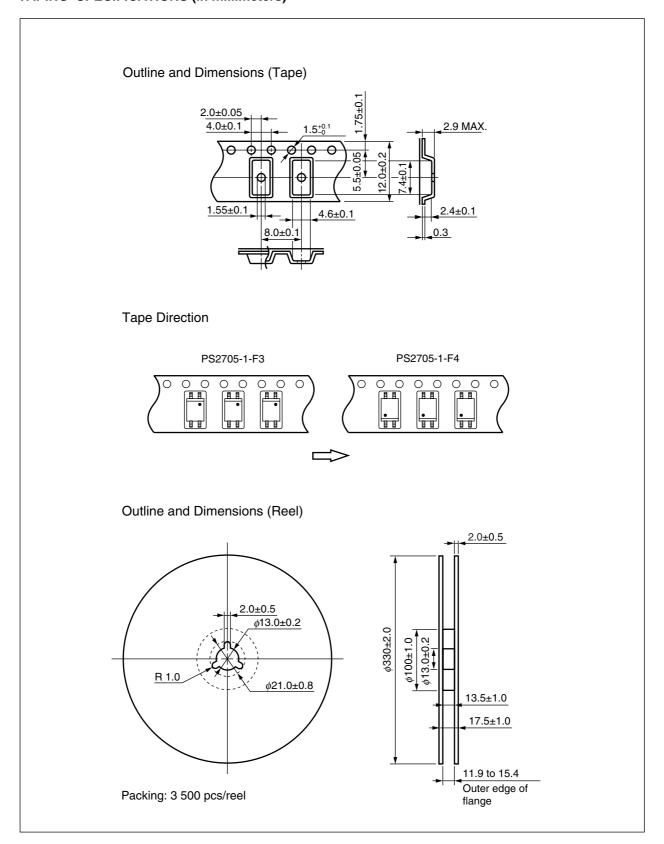


LONG TERM CTR DEGRADATION



Remark The graph indicates nominal characteristics.

TAPING SPECIFICATIONS (in millimeters)



NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

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

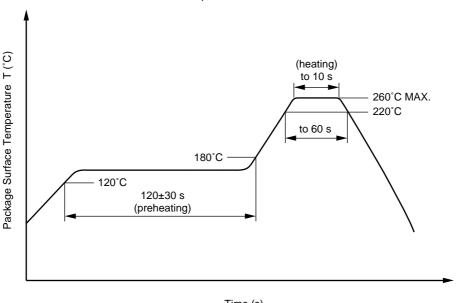
Time of peak reflow temperature
 Time of temperature higher than 220°C
 60 seconds or less

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



Time (s)

(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_F = 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.

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

Parameter	Symbol	Speck	Unit
Application classification (DIN VDE 0109)			
for rated line voltages \leq 300 Vr.m.s.		IV	
for rated line voltages \leq 600 Vr.m.s.		III	
Climatic test class (DIN IEC 68 Teil 1/09.80)		55/100/21	
Dielectric strength			
Maximum operating isolation voltage	UIORM	710	V_{peak}
Test voltage (partial discharge test, procedure a for type test and random test)	U_pr	850	V_{peak}
$U_{pr} = 1.2 \times U_{IORM}, P_d < 5 pC$			
Test voltage (partial discharge test, procedure b for all devices test) $U_{pr} = 1.6 \times U_{IORM}, \ P_d < 5 \ pC$	Upr	1 140	V _{peak}
Highest permissible overvoltage	Utr	6 000	V _{peak}
Degree of pollution (DIN VDE 0109)		2	
Clearance distance		> 5	mm
Creepage distance		> 5	mm
Comparative tracking index (DIN IEC 112/VDE 0303 part 1)	СТІ	175	
Material group (DIN VDE 0109)		III a	
Storage temperature range	Tstg	-55 to +150	°C
Operating temperature range	TA	-55 to +100	°C
Isolation resistance, minimum value			
$V_{10} = 500 \text{ V dc at T}_A = 25 ^{\circ}\text{C}$	Ris MIN.	10 ¹²	Ω
V _{IO} = 500 V dc at T _A MAX. at least 100 °C	Ris MIN.	10 ¹¹	Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve)			
Package temperature	Tsi	150	°C
Current (input current I _F , Psi = 0)	Isi	200	mA
Power (output or total power dissipation)	Psi	300	mW
Isolation resistance			
$V_{IO} = 500 \text{ V dc at T}_A = 175 ^{\circ}\text{C (Tsi)}$	Ris MIN.	10 ⁹	Ω

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M8E 00.4-0110

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.

▶ For further information, please contact

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