

## 1 Mbps HIGH CMR ANALOG OUTPUT TYPE 8-PIN SSOP (SO-8) HIGH-SPEED PHOTOCOUPLER

–NEPOC Series–

### DESCRIPTION

The PS8802-1, -2 are optically coupled isolators containing a GaAlAs LED on the light emitting diode (input side) and a PIN photodiode and a high-speed amplifier transistor on the output side on one chip.

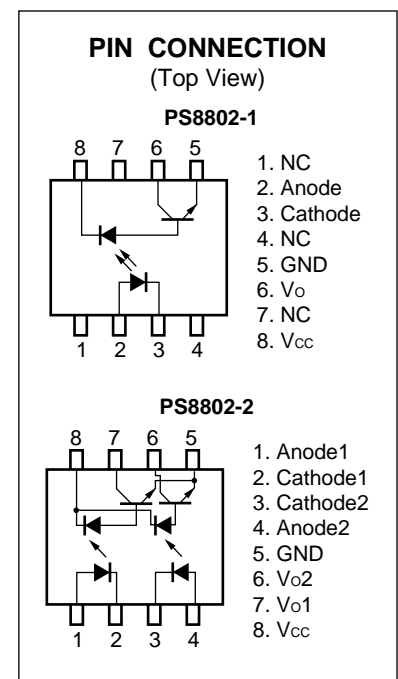
The PS8802-1, -2 are designed specifically for high common mode transient immunity (CMR), the PS8802-2 is suitable for high density applications.

### FEATURES

- 40% reduction of mounting area (5-pin SOP × 2)
- <R> • High common mode transient immunity ( $C_{MH}$ ,  $C_{ML} = \pm 15 \text{ kV}/\mu\text{s}$  MIN.)
- High supply voltage ( $V_{CC} = 35 \text{ V}$ )
- High isolation voltage ( $BV = 2\,500 \text{ Vr.m.s.}$ )
- High-speed response ( $t_{PHL} = 0.8 \mu\text{s}$  MAX.,  $t_{PLH} = 1.2 \mu\text{s}$  MAX.)
- Ordering number of tape product: PS8802-1-F3, F4: 1 500 pcs/reel  
: PS8802-2-F3, F4: 1 500 pcs/reel
- Pb-Free product
- Safety standards
  - UL approved: File No. E72422
  - <R> • DIN EN60747-5-2 (VDE0884 Part2) approved (option)

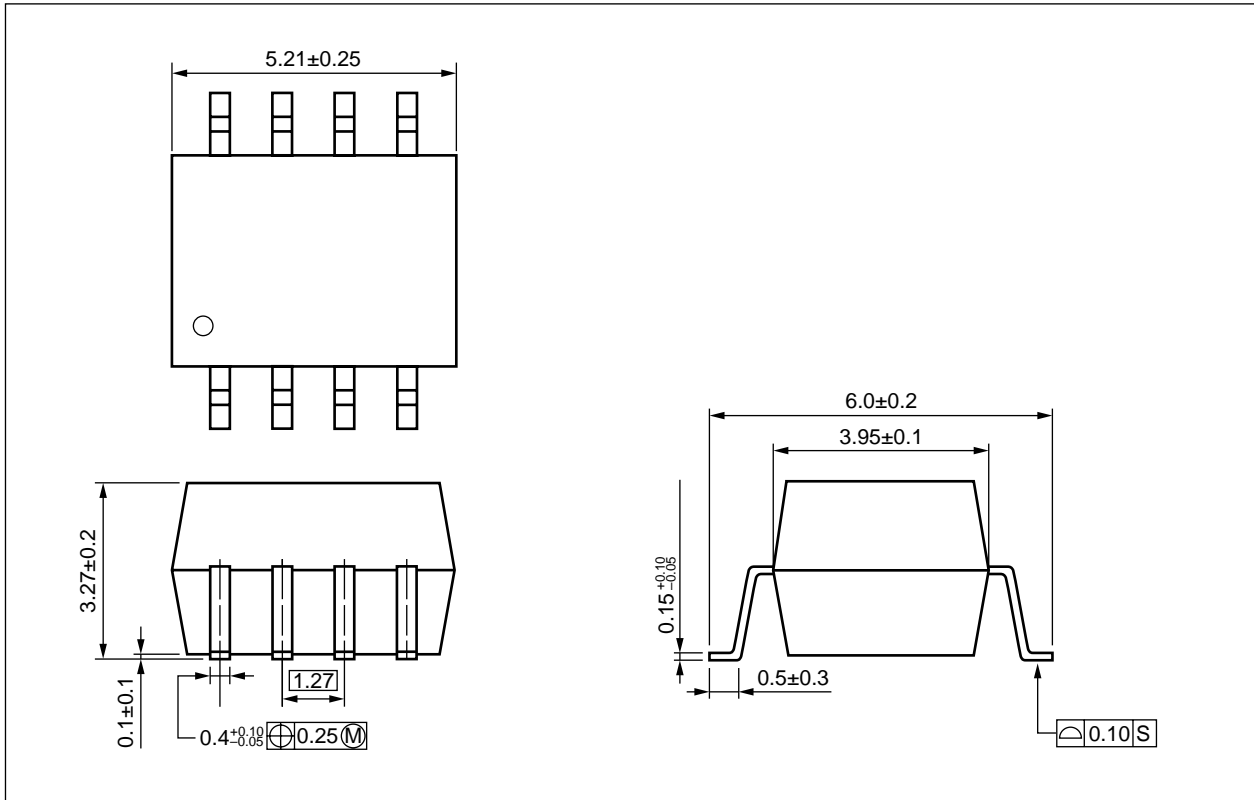
### APPLICATIONS

- Computer and peripheral manufactures
- General purpose inverter
- Substitutions for relays and pulse transformers
- Power supply

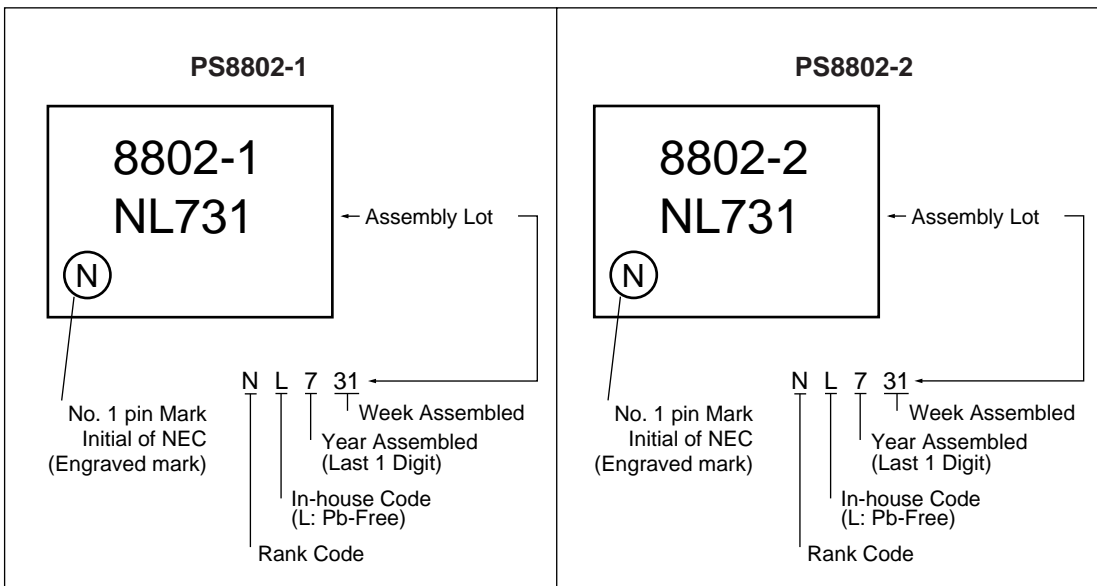


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PACKAGE DIMENSIONS (UNIT: mm)



MARKING EXAMPLE



**ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number <sup>*1</sup>	
PS8802-1	PS8802-1-A	Pb-Free	20 pcs (Tape 20 pcs cut)	Standard products (UL approved)	PS8802-1	
PS8802-1-F3	PS8802-1-F3-A		Embossed Tape 1 500 pcs/reel			
PS8802-1-F4	PS8802-1-F4-A					
PS8802-2	PS8802-2-A		20 pcs (Tape 20 pcs cut)			PS8802-2
PS8802-2-F3	PS8802-2-F3-A		Embossed Tape 1 500 pcs/reel			
PS8802-2-F4	PS8802-2-F4-A					
PS8802-1-V	PS8802-1-V-A		20 pcs (Tape 20 pcs cut)	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	PS8802-1	
PS8802-1-V-F3	PS8802-1-V-F3-A		Embossed Tape 1 500 pcs/reel			
PS8802-1-V-F4	PS8802-1-V-F4-A					
PS8802-2-V	PS8802-2-V-A		20 pcs (Tape 20 pcs cut)			PS8802-2
PS8802-2-V-F3	PS8802-2-V-F3-A		Embossed Tape 1 500 pcs/reel			
PS8802-2-V-F4	PS8802-2-V-F4-A					

\*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
Diode	Forward Current	I <sub>F</sub>	25	mA/ch
	Reverse Voltage	V <sub>R</sub>	5.0	V/ch
	Power Dissipation <sup>*1</sup>	P <sub>D</sub>	45	mW/ch
Detector	Supply Voltage	V <sub>CC</sub>	35	V
	Output Voltage	V <sub>O</sub>	35	V/ch
	Output Current	I <sub>O</sub>	8.0	mA/ch
	Power Dissipation <sup>*2</sup>	P <sub>C</sub>	100	mW/ch
Isolation Voltage <sup>*3</sup>		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T <sub>A</sub>	-55 to +100	°C
Storage Temperature		T <sub>stg</sub>	-55 to +125	°C

\*1 Reduced to 0.45 mW/°C at T<sub>A</sub> = 25°C or more.

\*2 Reduced to 1.00 mW/°C at T<sub>A</sub> = 25°C or more.

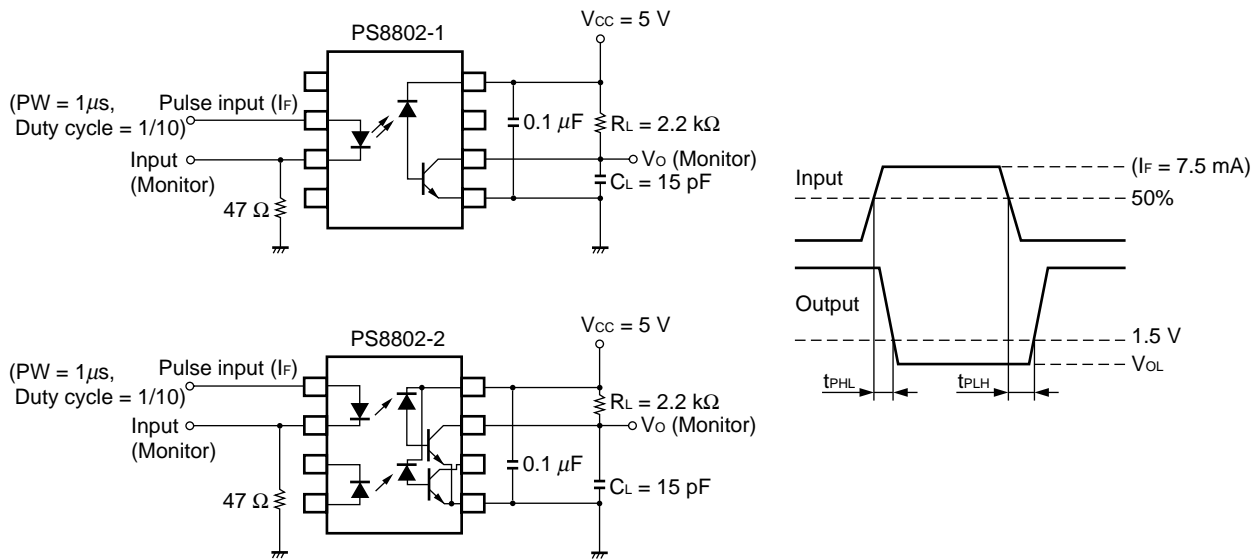
\*3 AC voltage for 1 minute at T<sub>A</sub> = 25°C, RH = 60% between input and output.

Pins 1-4 shorted together, 5-8 shorted together.

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

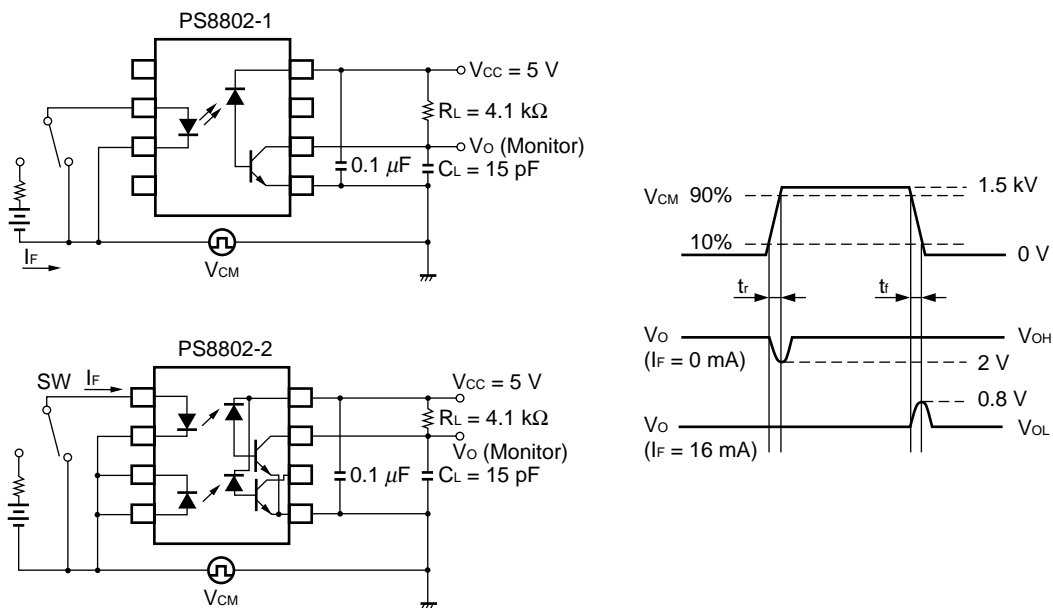
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 16 mA		1.7	2.2	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 3 V			10	μA
	Forward Voltage Temperature Coefficient	ΔV <sub>F</sub> /ΔT <sub>A</sub>	I <sub>F</sub> = 16 mA		-2.1		mV/°C
	Terminal Capacitance	C <sub>t</sub>	V = 0 V, f = 1 MHz		30		pF
Detector	High Level Output Current	I <sub>OH</sub> (1)	I <sub>F</sub> = 0 mA, V <sub>CC</sub> = V <sub>O</sub> = 5.5 V		10	500	nA
	High Level Output Current	I <sub>OH</sub> (2)	I <sub>F</sub> = 0 mA, V <sub>CC</sub> = V <sub>O</sub> = 30 V			100	μA
	Low Level Output Voltage	V <sub>OL</sub>	I <sub>F</sub> = 16 mA, V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 1.2 mA		0.1	0.4	V
	High Level Supply Current (PS8802-1)	I <sub>CCH</sub>	I <sub>F</sub> = 0 mA, V <sub>O</sub> = open, V <sub>CC</sub> = 30 V		0.1	2	μA
	High Level Supply Current (PS8802-2)				0.2	4	
	Low Level Supply Current (PS8802-1)	I <sub>CCL</sub>	I <sub>F</sub> = 16 mA, V <sub>O</sub> = open, V <sub>CC</sub> = 30 V		100		
	Low Level Supply Current (PS8802-2)				200		
Coupled	Current Transfer Ratio	CTR	I <sub>F</sub> = 16 mA, V <sub>CC</sub> = 4.5 V, V <sub>O</sub> = 0.4 V	15	25	45	%
	Input-Output Isolation Resistance	R <sub>I-O</sub>	V <sub>I-O</sub> = 1 kV <sub>DC</sub> , R <sub>H</sub> = 40 to 60%	10 <sup>11</sup>			Ω
	Insulation Resistance (Input-Input), (PS8802-2)	R <sub>I-I</sub>	V <sub>I-I</sub> = 1 kV <sub>DC</sub> , R <sub>H</sub> = 40 to 60%	10 <sup>10</sup>			
	Input-Output Isolation Capacitance	C <sub>I-O</sub>	V = 0 V, f = 1 MHz		0.6		pF
	Insulation Capacitance (Input-Input), (PS8802-2)	C <sub>I-I</sub>			0.3		
	Propagation Delay Time (H → L) <sup>1</sup>	t <sub>PHL</sub>	I <sub>F</sub> = 16 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 2.2 kΩ, C <sub>L</sub> = 15 pF		0.3	0.8	μs
	Propagation Delay Time (L → H) <sup>1</sup>	t <sub>PLH</sub>			0.6	1.2	
	<R> Common Mode Transient Immunity at High Level Output <sup>2</sup>	C <sub>MH</sub>	I <sub>F</sub> = 0 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 4.1 kΩ, V <sub>CM</sub> = 1.5 kV	15			kV/μs
	<R> Common Mode Transient Immunity at Low Level Output <sup>2</sup>	C <sub>ML</sub>	I <sub>F</sub> = 16 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 4.1 kΩ, V <sub>CM</sub> = 1.5 kV	-15			

\*1 Test circuit for propagation delay time



**Remark**  $C_L$  is approximately  $15\text{ pF}$  which includes probe and stray wiring capacitance.

\*2 Test circuit for common mode transient immunity

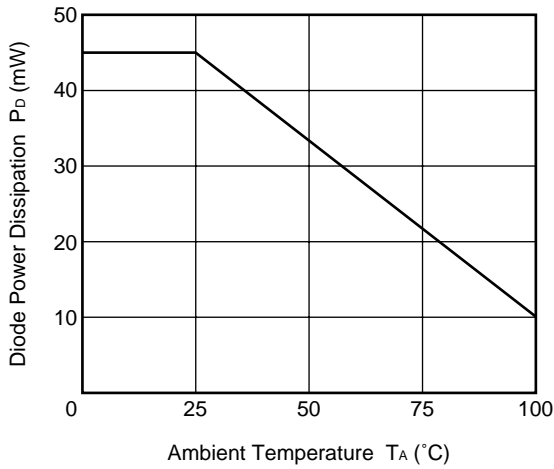


**USAGE CAUTIONS**

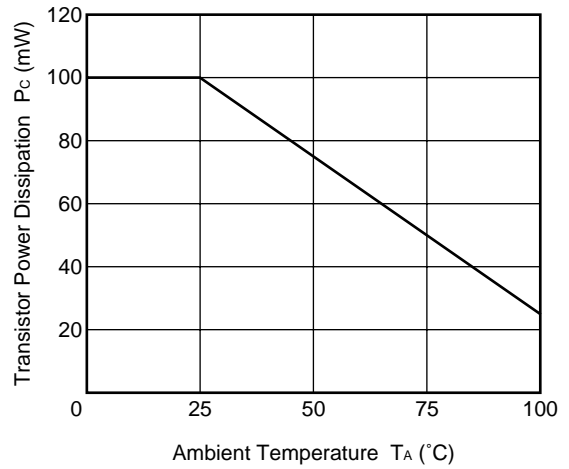
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of  $0.1\ \mu\text{F}$  is used between  $V_{CC}$  and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than  $10\text{ mm}$ .
3. Avoid storage at a high temperature and high humidity.

**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)**

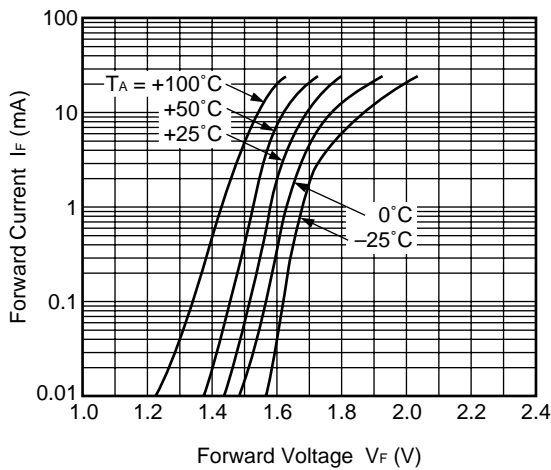
**DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE**



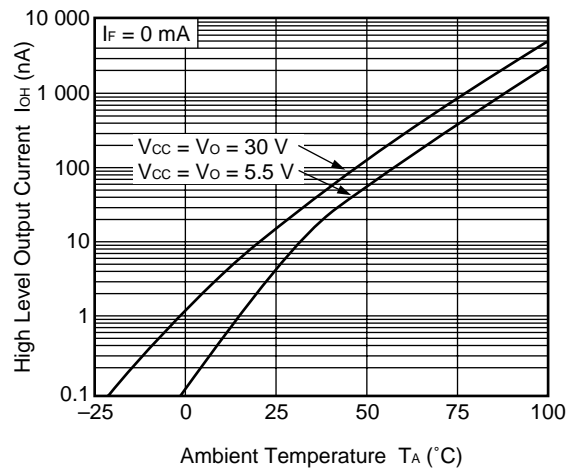
**TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE**



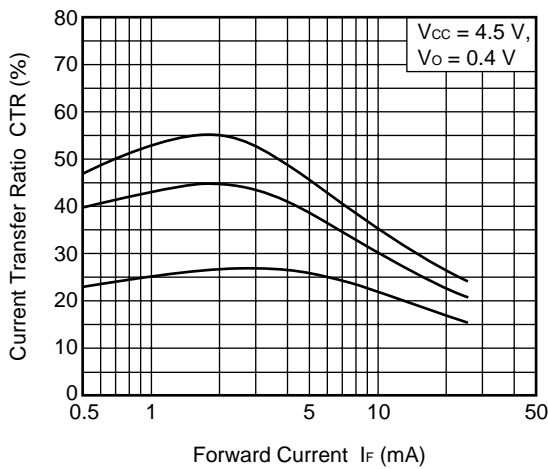
**FORWARD CURRENT vs. FORWARD VOLTAGE**



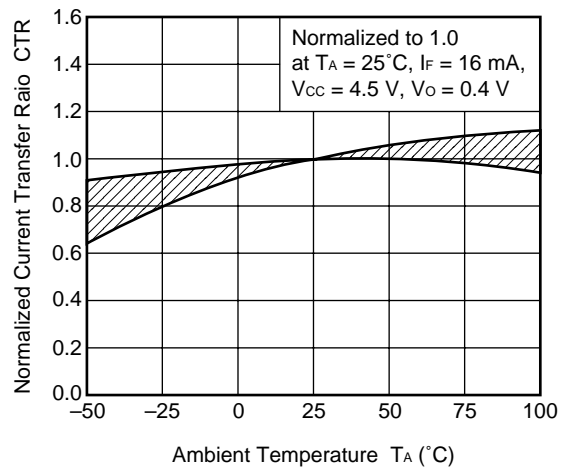
**HIGH LEVEL OUTPUT CURRENT vs. AMBIENT TEMPERATURE**



**CURRENT TRANSFER RATIO vs. FORWARD CURRENT**

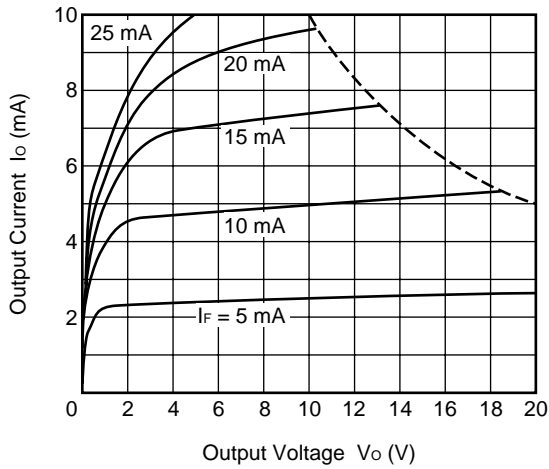


**NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE**

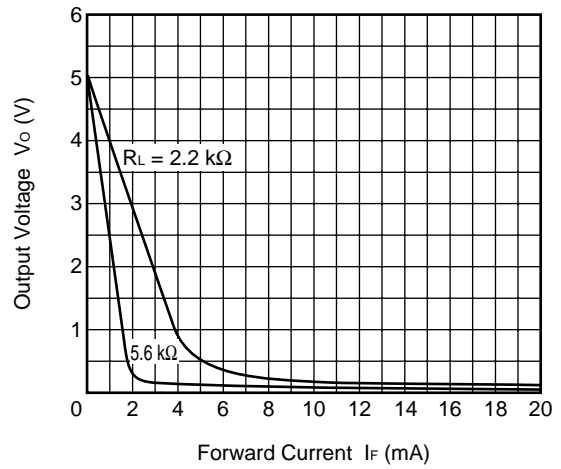


**Remark** The graphs indicate nominal characteristics.

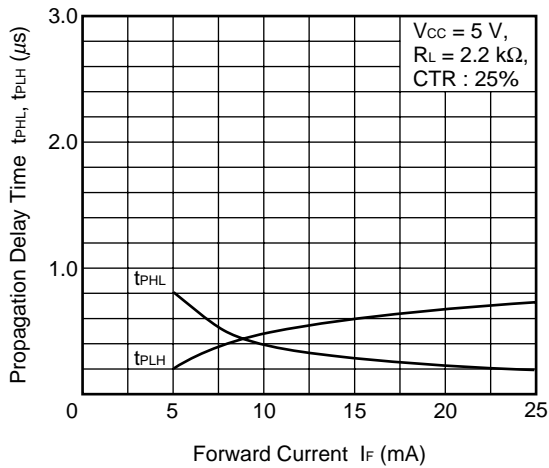
OUTPUT CURRENT vs. OUTPUT VOLTAGE



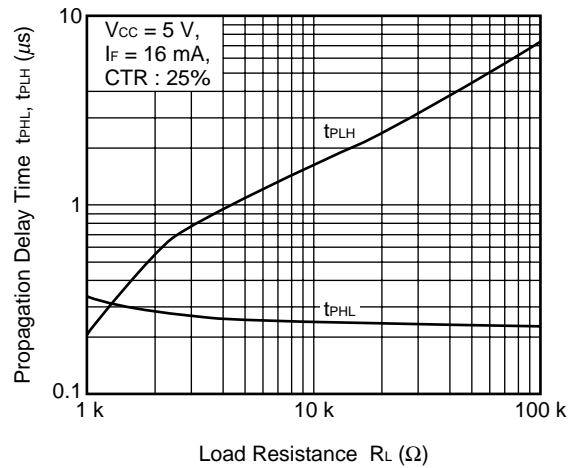
OUTPUT VOLTAGE vs. FORWARD CURRENT



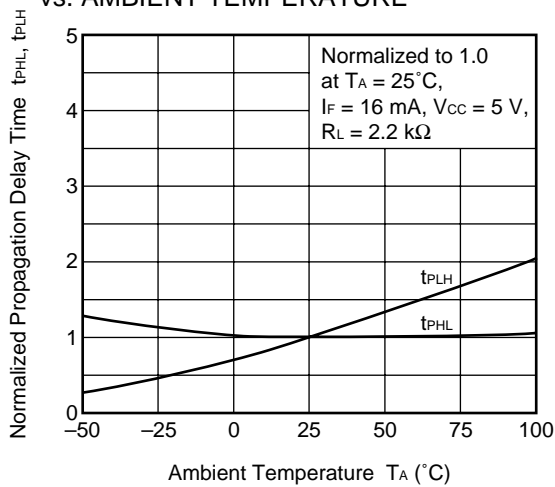
PROPAGATION DELAY TIME vs. FORWARD CURRENT



PROPAGATION DELAY TIME vs. LOAD RESISTANCE



NORMALIZED PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE

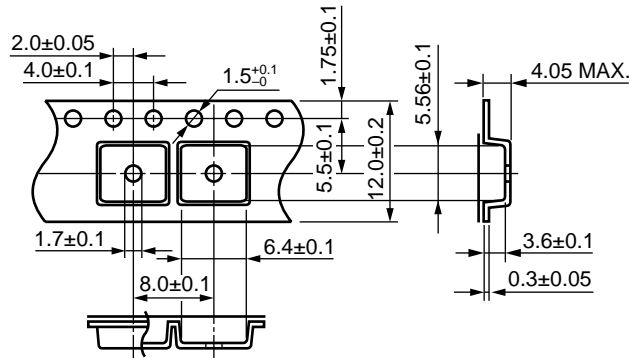


**Remark** The graphs indicate nominal characteristics.

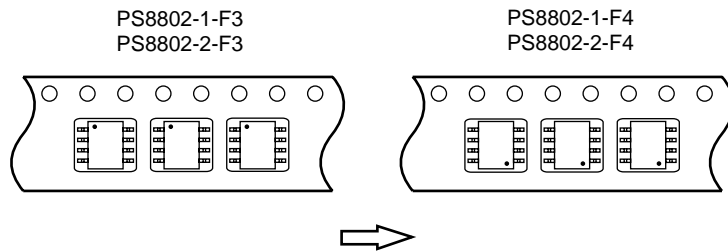


TAPING SPECIFICATIONS (UNIT: mm)

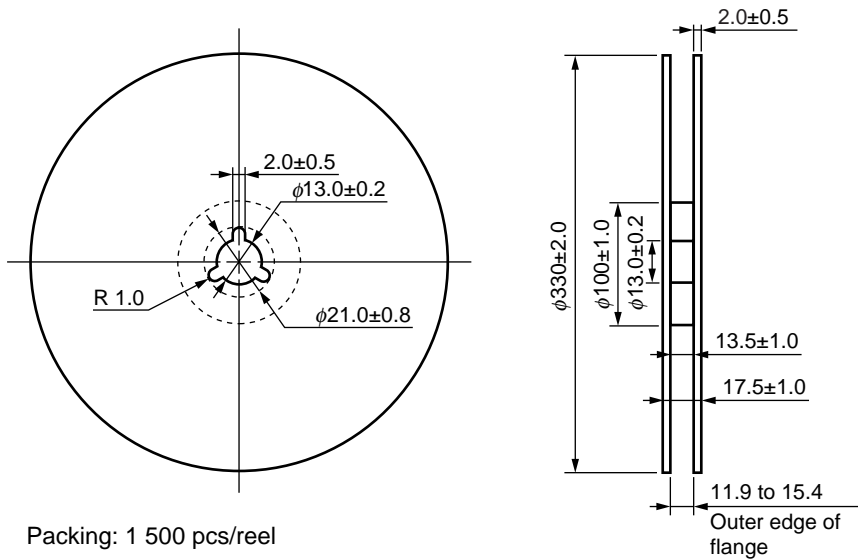
Outline and Dimensions (Tape)



Taping Direction

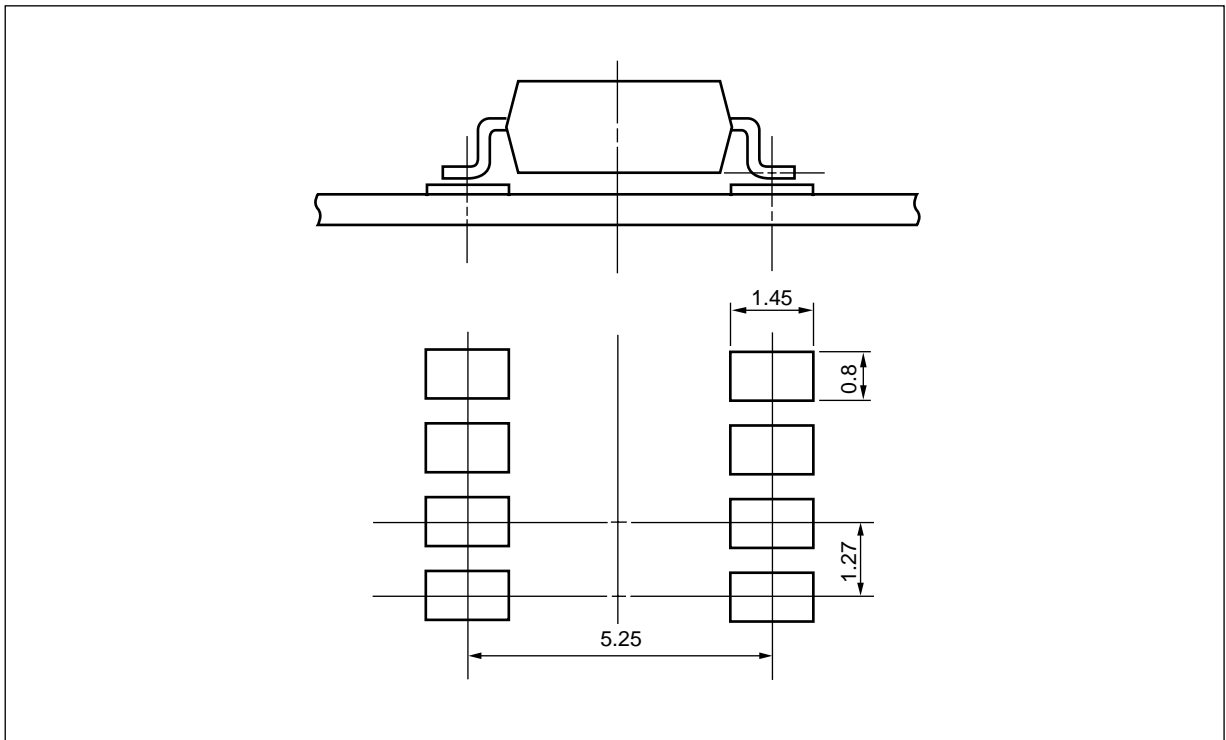


Outline and Dimensions (Reel)



Packing: 1 500 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



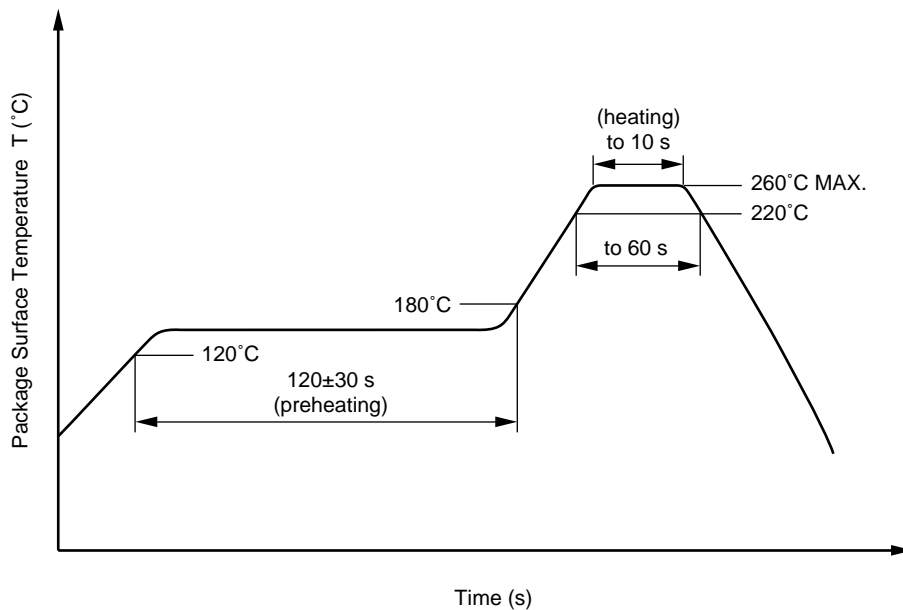
**NOTES ON HANDLING**

**1. Recommended soldering conditions**

**(1) Infrared reflow soldering**

- Peak reflow temperature 260°C or below (package surface temperature)
- Time of peak reflow temperature 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) 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.

**USAGE CAUTIONS**

1. Protect against static electricity when handling.
2. Avoid storage at a high temperature and high humidity.

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<p><b>Caution</b> GaAs Products</p>	<p>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.</p> <ul style="list-style-type: none"> <li>• 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.             <ol style="list-style-type: none"> <li>1. 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.</li> <li>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.</li> </ol> </li> <li>• Do not burn, destroy, cut, crush, or chemically dissolve the product.</li> <li>• Do not lick the product or in any way allow it to enter the mouth.</li> </ul>
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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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