

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.

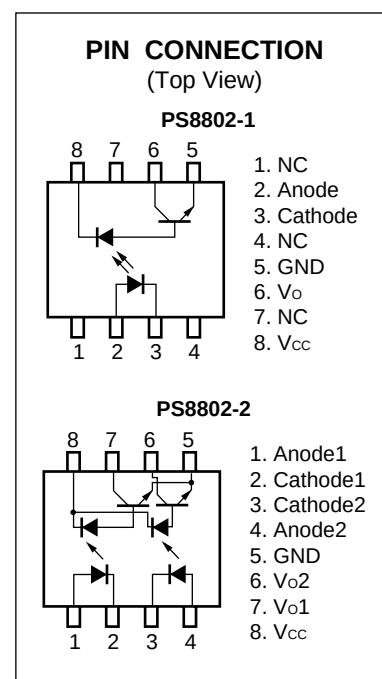
The PS8802-1, -2 are designed specifically for high common mode transient immunity (CMR), the PS8802-2 is suitable for high density applications.

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)

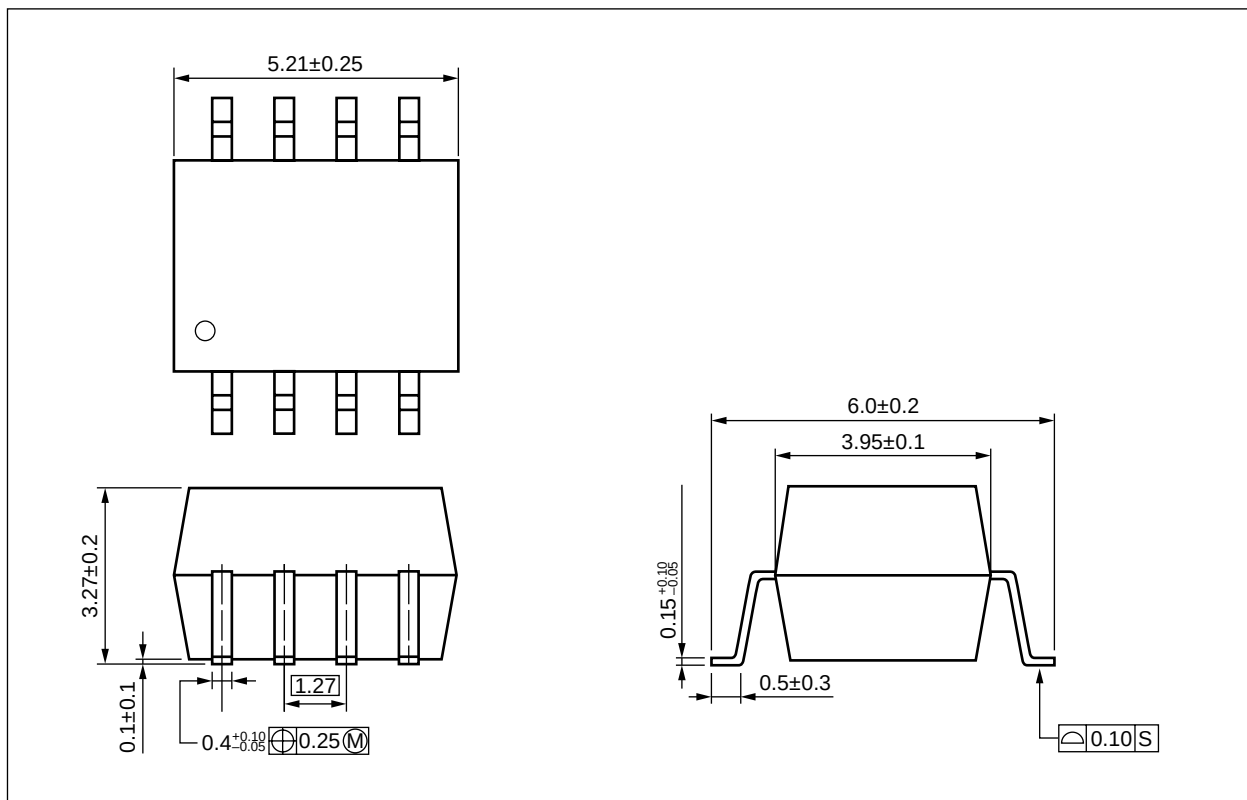
APPLICATIONS

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

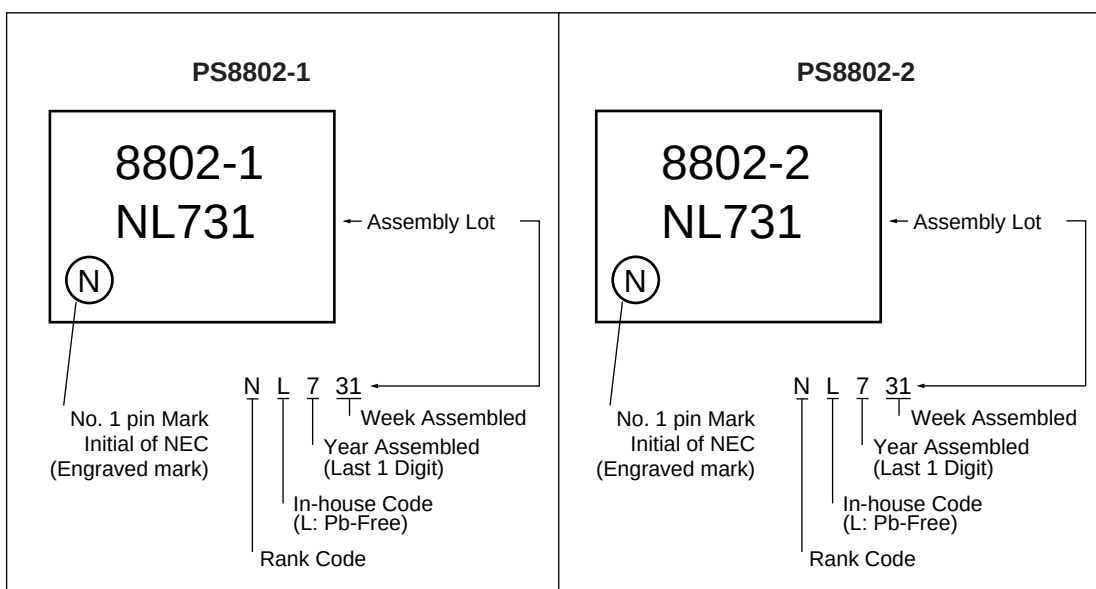


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PACKAGE DIMENSIONS (UNIT: mm)



MARKING EXAMPLE



ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
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 ($T_A = 25^\circ\text{C}$, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current	I_F	25	mA/ch
	Reverse Voltage	V_R	5.0	V/ch
	Power Dissipation ^{*1}	P_D	45	mW/ch
Detector	Supply Voltage	V_{CC}	35	V
	Output Voltage	V_O	35	V/ch
	Output Current	I_O	8.0	mA/ch
	Power Dissipation ^{*2}	P_C	100	mW/ch
Isolation Voltage ^{*3}		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T_A	-55 to +100	$^\circ\text{C}$
Storage Temperature		T_{stg}	-55 to +125	$^\circ\text{C}$

***1** Reduced to 0.45 mW/ $^\circ\text{C}$ at $T_A = 25^\circ\text{C}$ or more.

***2** Reduced to 1.00 mW/ $^\circ\text{C}$ at $T_A = 25^\circ\text{C}$ or more.

***3** AC voltage for 1 minute at $T_A = 25^\circ\text{C}$, RH = 60% between input and output.
Pins 1-4 shorted together, 5-8 shorted together.

ELECTRICAL CHARACTERISTICS (T_A = 25°)

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

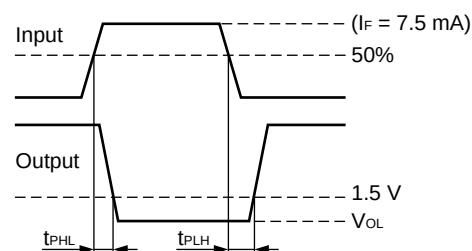
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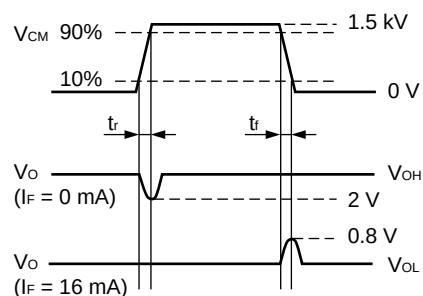
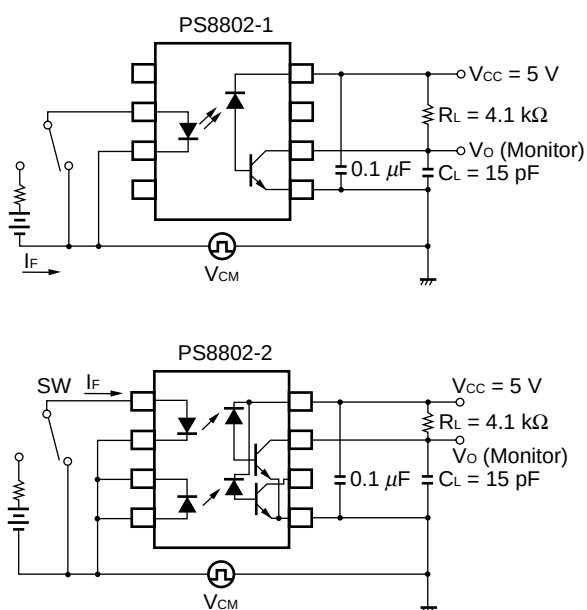
The figure shows two circuit diagrams for optoisolators PS8802-1 and PS8802-2.

PS8802-1: This is a single-channel optoisolator. The input side has a pulse input (I_F) with $PW = 1\mu s$ and a duty cycle of $1/10$. The input is connected to the input pin through a 47Ω resistor. The output side has a collector-emitter load resistor $R_L = 2.2\text{ k}\Omega$ connected to $V_{CC} = 5\text{ V}$. The output voltage V_O (Monitor) is taken from the collector. A $0.1\mu\text{F}$ capacitor is connected between the collector and emitter, and a 15 pF capacitor is connected between the emitter and ground.

PS8802-2: This is a dual-channel optoisolator. The input side is identical to PS8802-1, with a pulse input (I_F) and a 47Ω resistor. The output side has two channels. The first channel has a collector-emitter load resistor $R_L = 2.2\text{ k}\Omega$ connected to $V_{CC} = 5\text{ V}$ and an output voltage V_O (Monitor) taken from the collector. A $0.1\mu\text{F}$ capacitor is connected between the collector and emitter of the first channel, and a 15 pF capacitor is connected between the emitter and ground. The second channel is connected in a similar manner but its output is not monitored.



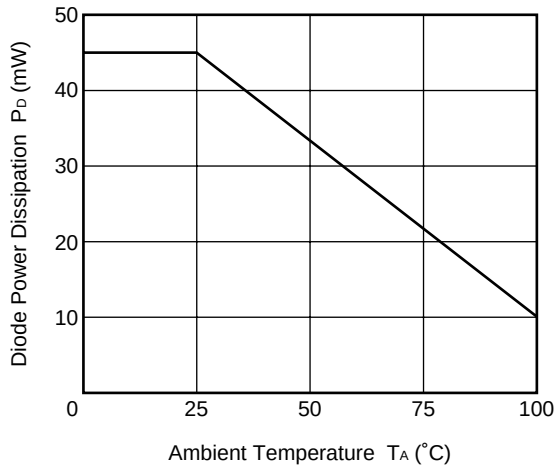
*2 Test circuit for common mode transient immunity



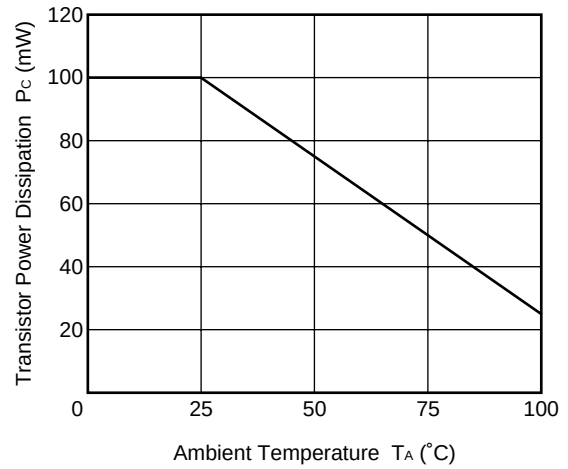
1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. By-pass capacitor of 0.1 μ F is used between V_{CC} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor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

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

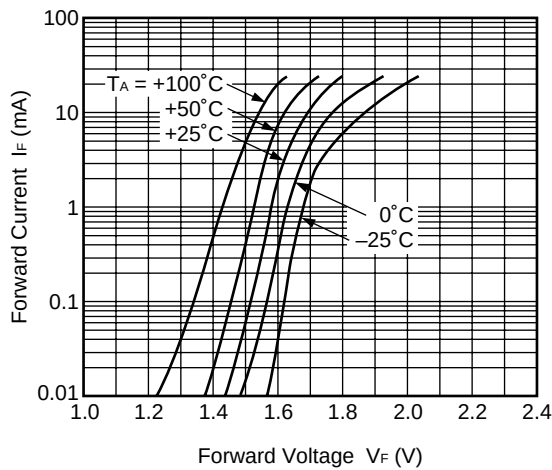
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



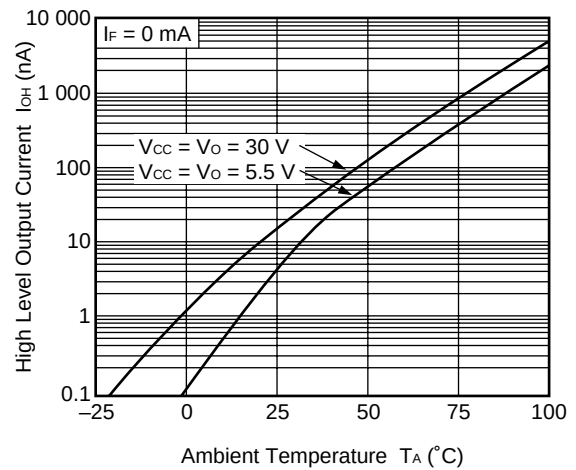
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



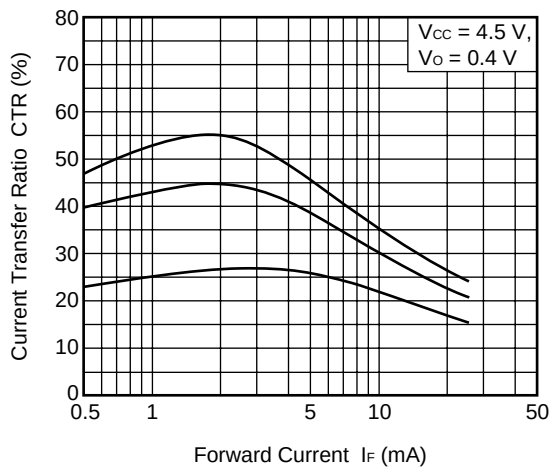
FORWARD CURRENT vs. FORWARD VOLTAGE



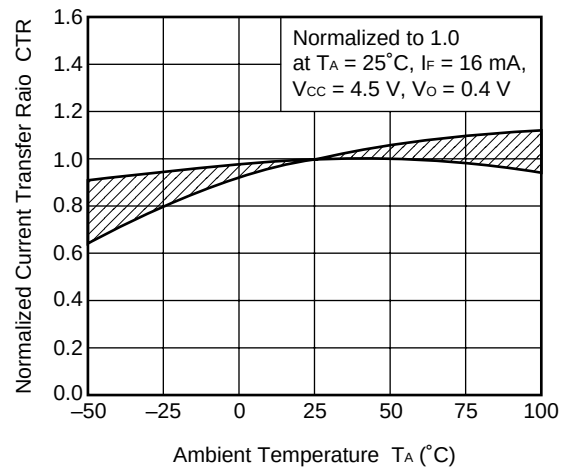
HIGH LEVEL OUTPUT CURRENT vs. AMBIENT TEMPERATURE



CURRENT TRANSFER RATIO vs. FORWARD CURRENT

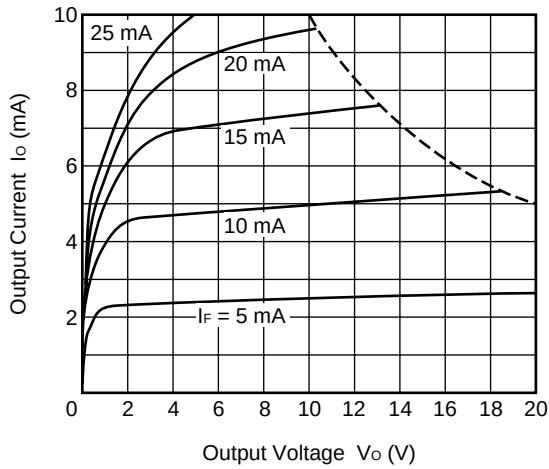


NORMALIZED CURRENT TRANSFER RATIO vs. AMBIENT TEMPERATURE

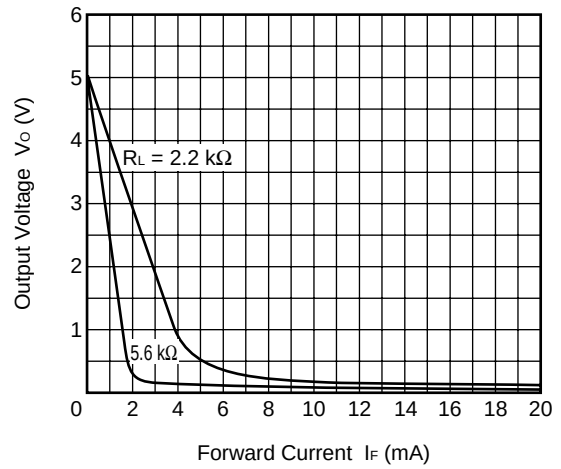


Remark The graphs indicate nominal characteristics.

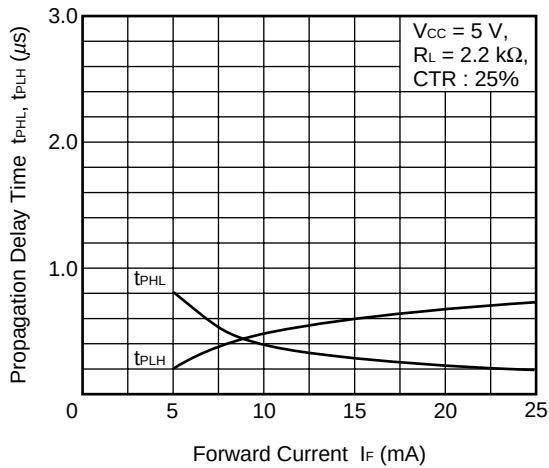
OUTPUT CURRENT vs.
OUTPUT VOLTAGE



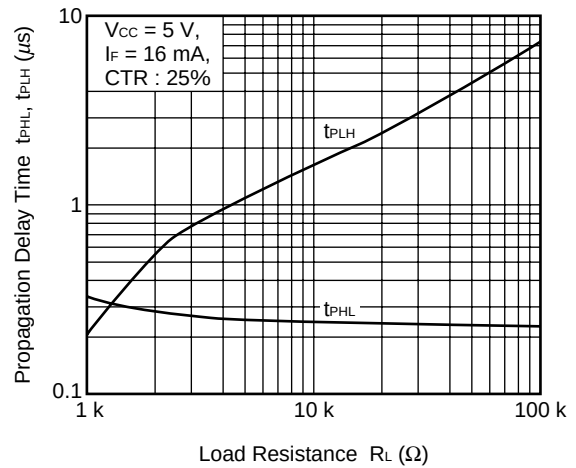
OUTPUT VOLTAGE vs.
FORWARD CURRENT



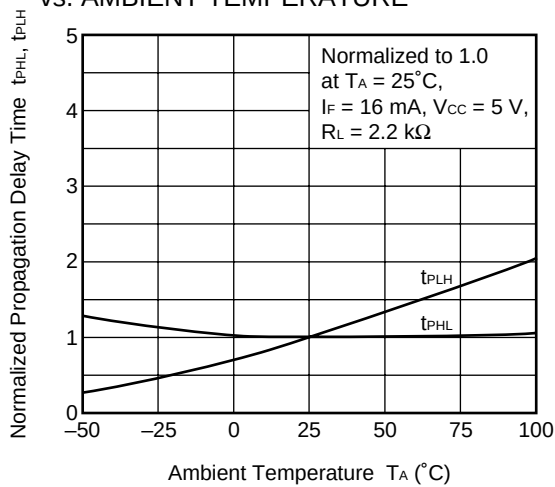
PROPAGATION DELAY TIME vs.
FORWARD CURRENT



PROPAGATION DELAY TIME vs.
LOAD RESISTANCE

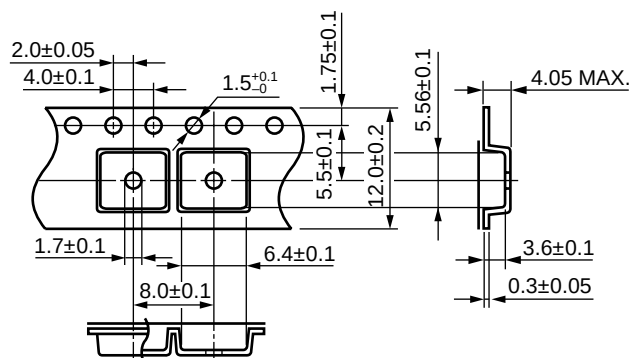


NORMALIZED PROPAGATION DELAY TIME
vs. AMBIENT TEMPERATURE

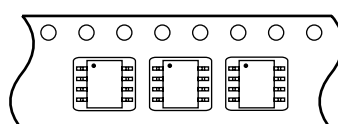


Remark The graphs indicate nominal characteristics.

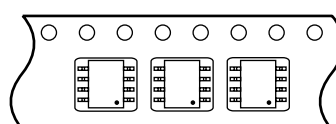
Outline and Dimensions (Tape)



PS8802-1-F3
PS8802-2-F3



PS8802-1-F4
PS8802-2-F4



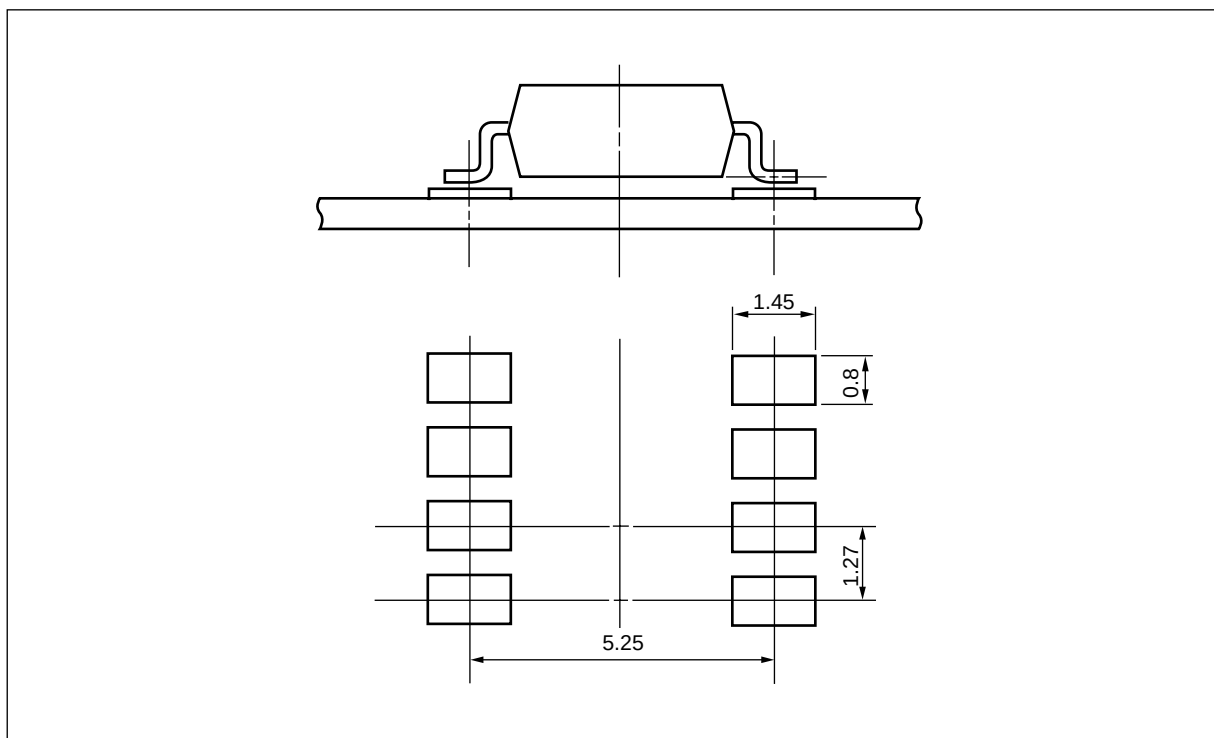
Technical drawing of a vertical pipe section showing dimensions for a flange. The drawing includes a side view and a cross-sectional view.

Dimensions:

- Overall height: $\phi 330 \pm 2.0$
- Flange thickness: 2.0 ± 0.5
- Inner hole diameter: $\phi 100 \pm 1.0$
- Outer hole diameter: $\phi 13.0 \pm 0.2$
- Flange offset (top): 13.5 ± 1.0
- Flange offset (bottom): 17.5 ± 1.0
- Flange offset (bottom range): 11.9 to 15.4

Outer edge of flange

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)



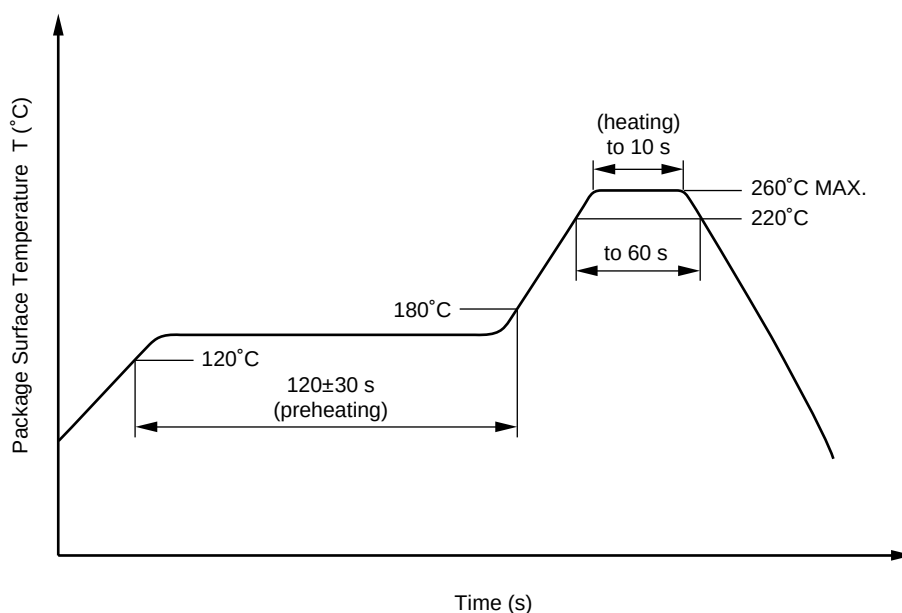
NOTES ON HANDLING

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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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.
 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.
 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.

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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