

# PHOTOCOUPLER PS9617,PS9617L

## HIGH NOISE REDUCTION, HIGH SPEED DIGITAL OUTPUT TYPE 8-PIN DIP PHOTOCOUPLER \_\_NEPOC Series\_

## DESCRIPTION

The PS9617 and PS9617L are optically coupled isolators containing a GaAlAs LED on the input side and a photo diode and a signal processing circuit on the output side on one chip.

The PS9617 is in a plastic DIP (Dual In-line Package) and the PS9617L is lead bending type (Gull-wing) for surface mounting.

#### FEATURES

- High common mode transient immunity (CMH, CML =  $\pm 20 \text{ kV}/\mu \text{s TYP.}$ )
- High isolation voltage (BV = 5 000 Vr.m.s.)
- High-speed response (10 Mbps)
- Pulse width distortion ( $|t_{PHL} t_{PLH}| = 3 \text{ ns TYP.}$ )
- Open collector output
- Ordering number of tape product: PS9617L-E3, E4: 1 000 pcs/reel
- Safety standards
  - UL approved: File No. E72422
  - DIN EN60747-5-2 (VDE0884 Part2) approved No.40008906 (Option)



#### APPLICATIONS

- FA Network
- Measurement equipment
- PDP

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## PACKAGE DIMENSIONS (UNIT: mm)

## **DIP** Type



## Lead Bending Type



## FUNCTIONAL DIAGRAM



## MARKING EXAMPLE



Data Sheet PN10568EJ01V0DS

## ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number <sup>*1</sup>
PS9617	PS9617-A	Pb-Free	Magazine case 50 pcs	Standard products	PS9617
PS9617L	PS9617L-A			(UL approved)	PS9617L
PS9617L-E3	PS9617L-E3-A		Embossed Tape 1 000 pcs/reel		
PS9617L-E4	PS9617L-E4-A				
PS9617-V	PS9617-V-A		Magazine case 50 pcs	DIN EN60747-5-2	PS9617
PS9617L-V	PS9617L-V-A			(VDE0884 Part2)	PS9617L
PS9617L-V-E3	PS9617L-V-E3-A		Embossed Tape 1 000 pcs/reel	Approved (Option)	
PS9617L-V-E4	PS9617L-V-E4-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		Symbol	Ratings	Unit
Diode	Forward Current <sup>*1</sup>	lf	30	mA
	Reverse Voltage	Vr	5	V
Detector	Supply Voltage	Vcc	7	V
	Output Voltage	Vo	7	V
	Output Current	lo	25	mA
	Power Dissipation <sup>*2</sup>	Pc	40	mW
Isolation Voltage <sup>*3</sup>		BV	5 000	Vr.m.s.
Operating Ambient Temperature		TA	-40 to +85	°C
Storage Temperature		Tstg	-55 to +125	°C

\*1 Reduced to 0.3 mA/°C at  $T_A = 25^{\circ}C$  or more.

- \*2 Applies to output pin Vo (Collector pin). Reduced to 1.5 mW/°C at  $T_A = 65^{\circ}C$  or more.
- \*3 AC voltage for 1 minute at  $T_A = 25^{\circ}$ C, RH = 60% between input and output. Pins 1-4 shorted together, 5-8 shorted together.

## **RECOMMENDED OPERATING CONDITIONS**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
High Level Input Current	Ігн	6.3	10	12.5	mA
Low Level Input Voltage	Vfl	0		0.8	V
Supply Voltage	Vcc	4.5	5.0	5.5	V
TTL (R <sub>L</sub> = 1 k $\Omega$ , loads)	Ν			5	
Pull-up Resistance	R∟	330		4 k	Ω

Parameter		Symbol	Conditions	MIN.	TYP.*1	MAX.	Unit
Diode	Forward Voltage	VF	IF = 10 mA, TA = 25°C	1.4	1.65	1.8	V
	Reverse Current	Ir	Vr = 3 V, Ta = 25°C			10	μA
	Terminal Capacitance	Ct	VF = 0 V, f = 1 MHz, TA = 25°C		30		pF
Detector	High Level Output Current	Іон	Vcc = Vo = 5.5 V, VF = 0.8 V		1	100	μA
	Low Level Output Voltage <sup>*2</sup>	Vol	Vcc = 5.5 V, I⊧ = 5 mA, Io∟ = 13 mA		0.2	0.6	V
	High Level Supply Current	Іссн	Vcc = 5.5 V, I⊧ = 0 mA, Vo = open		5	8	mA
	Low Level Supply Current	Iccl	$V_{CC} = 5.5 \text{ V}, I_F = 10 \text{ mA}, V_O = \text{open}$		9	11	mA
Coupled	Threshold Input Current	Ifhl	$V_{CC} = 5 \text{ V}, \text{ Vo} = 0.8 \text{ V}, \text{ RL} = 350 \ \Omega$		2.5	5	mA
	$(H\toL)$	l					
	Isolation Resistance	Ri-o	V⊦o = 1 kVbc, RH = 40 to 60%, T <sub>A</sub> = 25°C	10 <sup>11</sup>			Ω
	Isolation Capacitance	CI-O	V = 0 V, f = 1 MHz, T <sub>A</sub> = 25°C		0.9		pF
	Propagation Delay Time	tрнL	$V_{CC} = 5 V$ , $T_A = 25^{\circ}C$		40	75	ns
	$\left(H\toL\right)^{*3}$	ĺ	$R_{L} = 350 \ \Omega$ , $I_{F} = 7.5 \ mA$ , $C_{L} = 15 \ pF$			100	
	Propagation Delay Time	tрін	T <sub>A</sub> = 25 °C		43	75	ns
	$\left(L \to H\right)^{*3}$	ĺ				100	
	Rise Time	tr			20		ns
	Fall Time	tr			10		ns
	Pulse Width Distortion (PWD) <sup>*3</sup>	tphl-tplh			3	35	ns
	Propagation Delay Skew	tрsк				40	ns
	Common Mode Transient Immunity at High Level Output <sup>*4</sup>	СМн		15	20		kV/μs
	Common Mode Transient Immunity at Low Level Output <sup>*4</sup>	CM∟	$\label{eq:Vac} \begin{array}{l} V_{CC}=5  V,  T_{A}=25^{\circ}C,  I_{F}=7.5  mA, \\ V_{O(MAX)}=0.8  V,  V_{CM}=1  kV,  R_{L}=350  \Omega \end{array}$	15	20		kV/μs

## ELECTRICAL CHARACTERISTICS (TA = -40 to +85°C, unless otherwise specified)

\*1 Typical values at  $T_A = 25^{\circ}C$ 

\*2 Because VoL of 2 V or more may be output when LED current input and when output supply of Vcc = 2.6 V or less, it is important to confirm the characteristics (operation with the power supply on and off) during design, before using this device.

\*3 Test circuit for propagation delay time







\*4 Test circuit for common mode transient immunity

**Remark** CL includes probe and stray wiring capacitance.

#### **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 more than 0.1  $\mu$ F is used between Vcc 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.



**Remark** The graphs indicate nominal characteristics.

Data Sheet PN10568EJ01V0DS



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## TAPING SPECIFICATIONS (UNIT: mm)



Data Sheet PN10568EJ01V0DS

## NOTES ON HANDLING

#### 1. Recommended soldering conditions

#### (1) Infrared reflow soldering

- Peak reflow temperature
- Time of peak reflow temperature
- Time of temperature higher than 220°C
- Time to preheat temperature from 120 to 180°C
- Number of reflows
- Flux

260°C or below (package surface temperature) 10 seconds or less 60 seconds or less 120±30 s Three 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.

## **USAGE CAUTIONS**

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



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		
Lead (Pb)	< 1000 PPM	-A -AZ Not Detected (*)		
Mercury	< 1000 PPM	Not Detected		
Cadmium	< 100 PPM	Not Detected		
Hexavalent Chromium	< 1000 PPM	Not Detected		
РВВ	< 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.

In no event shall CEL's liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.

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