

HIGH CMR, 10 Mbps, OPEN COLLECTOR OUTPUT TYPE, 8 mm CREEPAGE 6-PIN SDIP PHOTOCOUPLER –NEPOC Series–

DESCRIPTION

The PS9317L and PS9317L2 are optical coupled high-speed, active low type isolators containing a GaAlAs LED on the input side and a photodiode and a signal processing circuit on the output side on one chip.

The PS9317L and PS9317L2 are designed specifically for high common mode transient immunity (CMR) and low pulse width distortion.

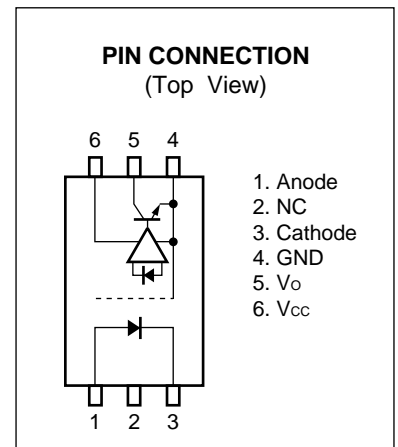
The PS9317L is lead bending type (Gull-wing) for surface mounting.

The PS9317L2 is lead bending type for long creepage distance (Gull-wing) for surface mount.

FEATURES

- Pulse width distortion ($|t_{PHL} - t_{PLH}| = 35 \text{ ns MAX.}$)
- High common mode transient immunity ($CM_H, CM_L = \pm 15 \text{ kV}/\mu\text{s MIN.}$)
- Half size of 8-pin DIP
- Long creepage distance (8 mm MIN. : PS9317L2)
- High-speed (10 Mbps)
- High isolation voltage ($BV = 5\,000 \text{ Vr.m.s.}$)
- Open collector output
- Pb-Free product
- Safety standards
 - UL approved: File No. E72422
 - CSA approved: No. CA 101391
 - DIN EN60747-5-2 (VDE0884 Part2) approved: No. 40024069 (Option)

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APPLICATIONS

- Measurement equipment
- PDP
- FA Network

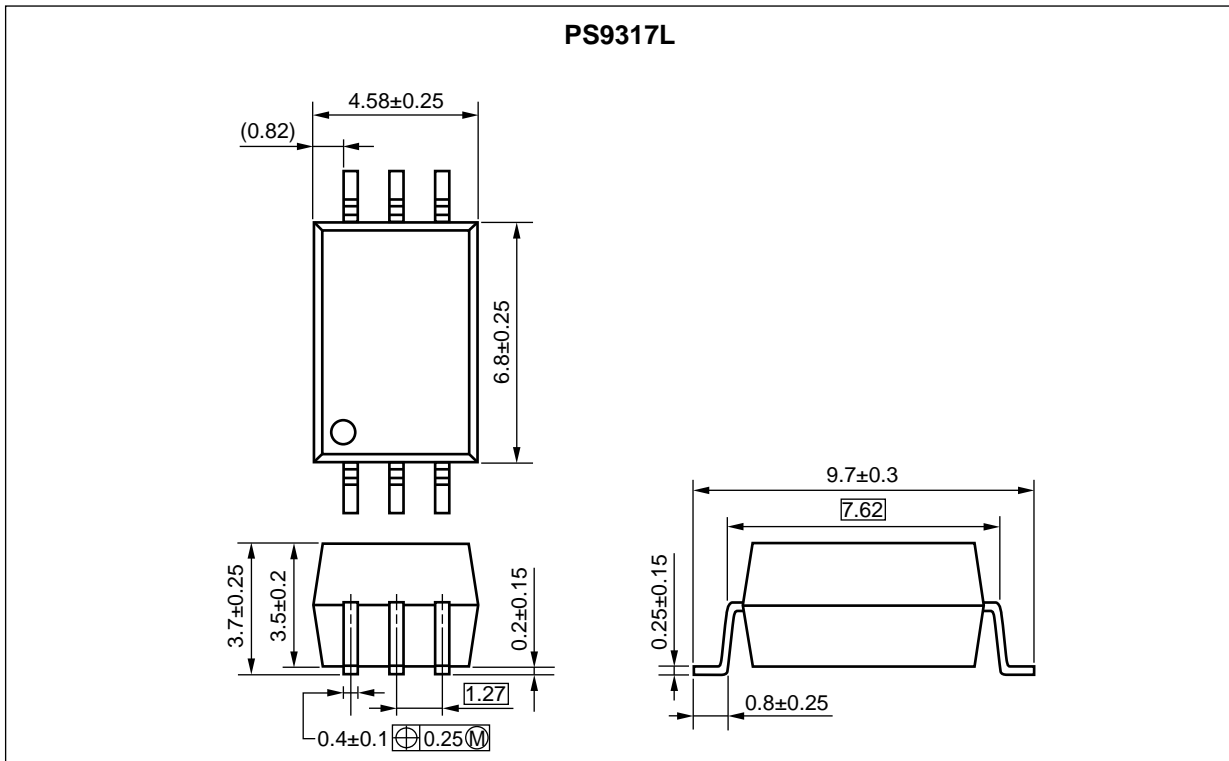
TRUTH TABLE

LED	Output
ON	L
OFF	H

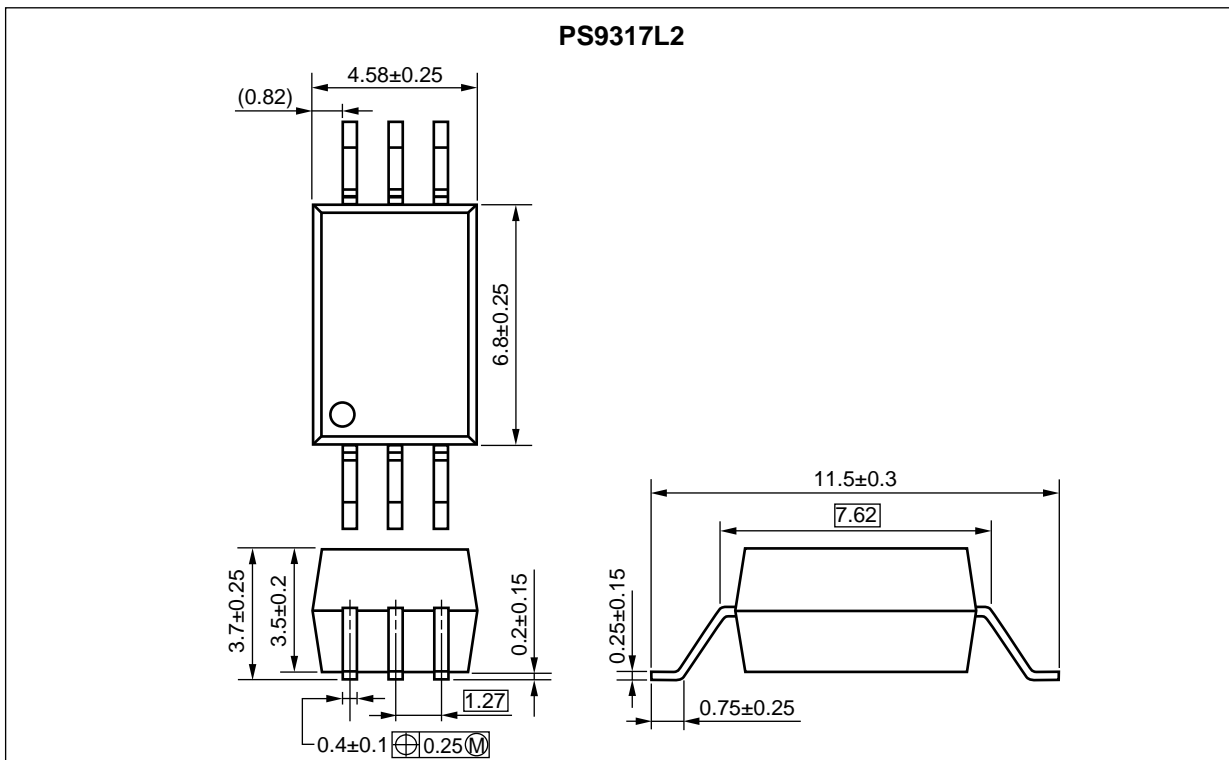
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PACKAGE DIMENSIONS (UNIT: mm)

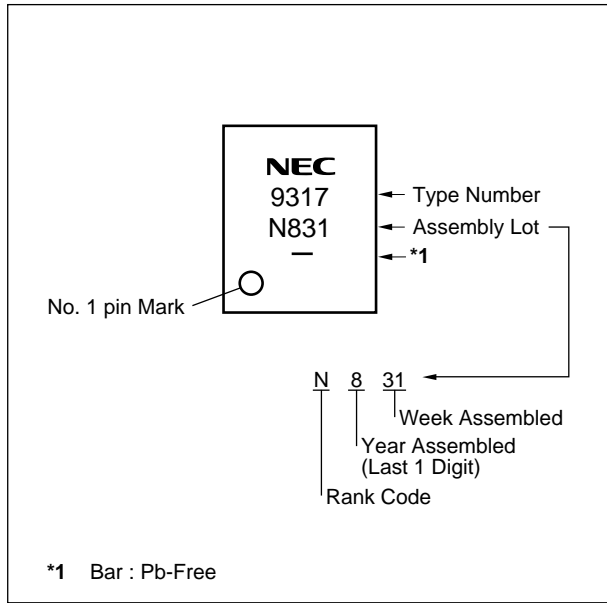
Lead Bending Type (Gull-wing) For Surface Mount



Lead Bending Type For Long Creepage Distance (Gull-wing) For Surface Mount



<R> **MARKING EXAMPLE**



PHOTOCOUPLER CONSTRUCTION

Parameter	PS9317L	PS9317L2
Air Distance (MIN.)	7 mm	8 mm
Outer Creepage Distance (MIN.)	7 mm	8 mm
Isolation Distance (MIN.)	0.4 mm	0.4 mm

<R> **ORDERING INFORMATION**

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number ^{*1}
PS9317L	PS9317L-AX	Pb-Free (Ni/Pd/Au)	20 pcs (Tape 20 pcs cut)	Standard products (UL, CSA approved)	PS9317L
PS9317L-E3	PS9317L-E3-AX		Embossed Tape 2 000 pcs/reel		PS9317L2
PS9317L2	PS9317L2-AX		20 pcs (Tape 20 pcs cut)		
PS9317L2-E3	PS9317L2-E3-AX		Embossed Tape 2 000 pcs/reel		
PS9317L-V	PS9317L-V-AX		20 pcs (Tape 20 pcs cut)	DIN EN60747-5-2 (VDE0884 Part2) Approved (Option)	PS9317L
PS9317L-E3-V	PS9317L-E3-V-AX		Embossed Tape 2 000 pcs/reel		PS9317L2
PS9317L2-V	PS9317L2-V-AX		20 pcs (Tape 20 pcs cut)		
PS9317L2-E3-V	PS9317L2-E3-V-AX		Embossed Tape 2 000 pcs/reel		

*1 For the application of the Safety Standard, following part number should be used.

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

Parameter		Symbol	Ratings	Unit
Diode	Forward Current ^{*1}	I _F	30	mA
	Reverse Voltage	V _R	5	V
Detector	Supply Voltage	V _{CC}	7	V
	Output Voltage	V _O	7	V
	Output Current	I _O	25	mA
	Power Dissipation ^{*2}	P _C	40	mW
Isolation Voltage ^{*3}		BV	5 000	Vr.m.s.
Operating Ambient Temperature		T _A	-40 to +85	°C
Storage Temperature		T _{stg}	-55 to +125	°C

*1 Reduced to 0.3 mA/°C at T_A = 25°C or more.

*2 Applies to output pin V_O (collector pin). Reduced to 1.5 mW/°C at T_A = 65°C or more.

*3 AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output.

Pins 1-3 shorted together, 4-6 shorted together.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Low Level Input Voltage	V _{FL}	0		0.8	V
High Level Input Current	I _{FH}	6		12	mA
Supply Voltage	V _{CC}	4.5	5.0	5.5	V
TTL (R _L = 1 kΩ, loads)	N			5	
Pull-up Resistor	R _L	330		4 k	Ω

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

Parameter		Symbol	Conditions	MIN.	TYP.*1	MAX.	Unit	
Diode	Forward Voltage	V _F	I _F = 10 mA, T _A = 25°C	1.2	1.56	1.9	V	
	Reverse Current	I _R	V _R = 3 V, T _A = 25°C			10	μA	
	Terminal Capacitance	C _t	V = 0 V, f = 1 MHz, T _A = 25°C		60		pF	
Detector	High Level Output Current	I _{OH}	V _{CC} = V _O = 5.5 V, V _F = 0.8 V		1	100	μA	
	Low Level Output Voltage*2	V _{OL}	V _{CC} = 5.5 V, I _F = 5 mA, I _{OL} = 13 mA		0.2	0.6	V	
	High Level Supply Current	I _{CCH}	V _{CC} = 5.5 V, I _F = 0 mA, V _O = open		4	7	mA	
	Low Level Supply Current	I _{CCL}	V _{CC} = 5.5 V, I _F = 10 mA, V _O = open		6	10	mA	
Coupled	Threshold Input Current (H → L)	I _{FHL}	V _{CC} = 5 V, V _O = 0.8 V, R _L = 350 Ω		2.5	5	mA	
	Isolation Resistance	R _{I-O}	V _{I-O} = 1 kV _{DC} , R _H = 40 to 60%, T _A = 25°C	10 ¹¹			Ω	
	Isolation Capacitance	C _{I-O}	V = 0 V, f = 1 MHz, T _A = 25°C		0.7		pF	
	Propagation Delay Time (H → L)	t _{PHL}	V _{CC} = 5 V, R _L = 350 Ω, C _L = 15 pF, I _F = 7.5 mA, V _{THHL} = V _{THLH} = 1.5 V	T _A = 25°C		40	75	ns
							100	
	Propagation Delay Time (L → H)	t _{PLH}		T _A = 25°C		35	75	
							100	
	Rise Time	t _r				20		
	Fall Time	t _f				5		
	Pulse Width Distortion (PWD)	t _{PHL} - t _{PLH}				5	35	
Propagation Delay Skew	t _{PSK}					40		
Common Mode Transient Immunity at High Level Output	CM _H	V _{CC} = 5 V, R _L = 350 Ω, T _A = 25°C, I _F = 0 mA, V _O > 2 V, V _{CM} = 1.5 kV		15			kV/μs	
Common Mode Transient Immunity at Low Level Output	CM _L	V _{CC} = 5 V, R _L = 350 Ω, T _A = 25°C, I _F = 7.5 mA, V _O < 0.8 V, V _{CM} = 1.5 kV		15			kV/μs	

*1 Typical values at T_A = 25°C.

*2 Because V_{OL} of 2 V or more may be output when LED current input and when output supply of V_{CC} = 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.

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 μ 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.

NOTES ON HANDLING**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.

<R> **SPECIFICATION OF VDE MARKS LICENSE DOCUMENT**

Parameter	Symbol	Speck	Unit
Application classification (DIN EN 60664-1 VDE0110 Part 1) for rated line voltages ≤ 300 Vr.m.s. for rated line voltages ≤ 600 Vr.m.s.		IV III	
Climatic test class (DIN EN 60664-1 VDE0110)		40/85/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.5 \times U_{IORM}, P_d < 5 \text{ pC}$	U_{IORM} U_{pr}	1 130 1 695	V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for all devices) $U_{pr} = 1.875 \times U_{IORM}, P_d < 5 \text{ pC}$	U_{pr}	2 119	V_{peak}
Highest permissible overvoltage	U_{TR}	8 000	V_{peak}
Degree of pollution (DIN EN 60664-1 VDE0110 Part 1)		2	
Clearance distance	PS9317L	>7.0	mm
	PS9317L2	>8.0	
Creepage distance	PS9317L	>7.0	mm
	PS9317L2	>8.0	
Comparative tracking index (DIN IEC 112/VDE 0303 Part 1)	CTI	175	
Material group (DIN EN 60664-1 VDE0110 Part 1)		III a	
Storage temperature range	T_{stg}	-55 to +125	°C
Operating temperature range	T_A	-40 to +85	°C
Isolation resistance, minimum value $V_{IO} = 500 \text{ V dc at } T_A = 25^\circ\text{C}$ $V_{IO} = 500 \text{ V dc at } T_A \text{ MAX. at least } 100^\circ\text{C}$	$R_{is \text{ MIN.}}$ $R_{is \text{ MIN.}}$	10^{12} 10^{11}	Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I_F , $P_{si} = 0$) Power (output or total power dissipation) Isolation resistance $V_{IO} = 500 \text{ V dc at } T_A = T_{si}$	T_{si} I_{si} P_{si} $R_{is \text{ MIN.}}$	175 400 700 10^9	°C mA mW Ω

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