

**CEL**

**NEC's HIGH CMR,  
10 Mbps 3.3V OPEN COLLECTOR  
OUTPUT TYPE SO8 OPTOCOUPLER**

**PS9821-1/-2**

**DESCRIPTION**

NEC's PS9821 is an optically coupled high-speed isolator containing a GaAlAs LED on the input side and a photodiode and a signal processing circuit on the output side on one chip.

**FEATURES**

- Supply Voltage 3.3V
- Open collector output
- High common mode transient immunity ( $CM_H, CM_L = \pm 15 \text{ kV}/\mu\text{s}$  Min.)
- Small package (SO8)
- High-speed (10 Mbps)
- High isolation voltage ( $BV = 2\,500 \text{ Vr.m.s.}$ )

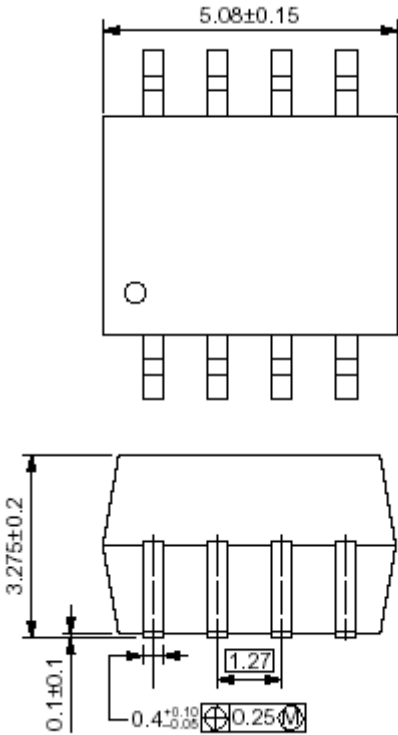
**APPLICATIONS**

- Factory Automation Network
- Measurement equipment
- PDP

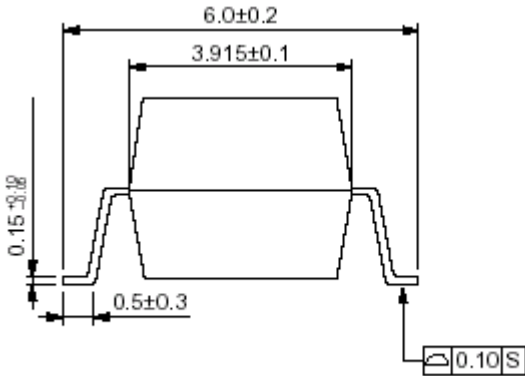
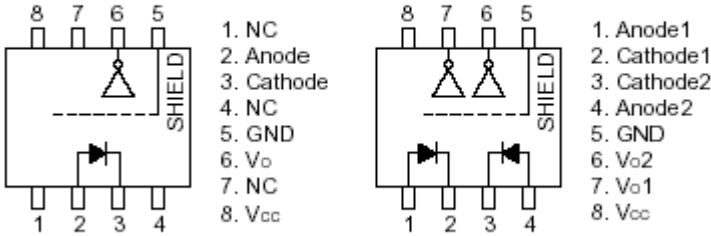
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PACKAGE DIMENSIONS (UNIT: mm)

PS9821-1/-2



TOP VIEW



**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C, unless otherwise specified)**

Parameter		Symbol	Ratings	Unit
Diode	Forward Current	I <sub>F</sub>	20	mA
	Reverse Voltage	V <sub>R</sub>	5	V
Detector	Supply Voltage	V <sub>CC</sub>	7	V
	Output Voltage	V <sub>O</sub>	7	V
	Output Current	I <sub>O</sub>	25	mA
	Power Dissipation	P <sub>C</sub>	40	mW
Isolation Voltage <sup>*1</sup>		BV	2 500	Vr.m.s.
Operating Ambient Temperature		T <sub>A</sub>	-40 to +85	°C
Storage Temperature		T <sub>stg</sub>	-55 to +125	°C

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

**RECOMMENDED OPERATING CONDITIONS**

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Low Level Input Voltage	V <sub>FL</sub>	0		0.8	V
High Level Input Current	I <sub>FH</sub>	6.3		12.5	mA
Supply Voltage	V <sub>CC</sub>	2.7	-	3.6	V
TTL (R <sub>L</sub> = 1 kΩ, loads)	N			5	
Pull-up resistor	R <sub>L</sub>	330		4 k	Ω

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = -40 to +85°C, unless otherwise specified)**

Parameter		Symbol	Conditions	MIN.	TYP. <sup>*1</sup>	MAX.	Unit
Diode	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10 mA, T <sub>A</sub> = 25°C	1.4	1.65	1.8	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 3 V, T <sub>A</sub> = 25°C			10	μA
	Terminal Capacitance	C <sub>t</sub>	V = 0 V, f = 1 MHz, T <sub>A</sub> = 25°C		30		pF
Detector	High Level Output Current	I <sub>OH</sub>	V <sub>CC</sub> = V <sub>O</sub> = 3.3 V, V <sub>F</sub> = 0.8 V		0.3	50	μA
	Low Level Output Voltage <sup>*2</sup>	V <sub>OL</sub>	V <sub>CC</sub> = 3.3 V, I <sub>F</sub> = 5 mA, I <sub>OL</sub> = 8 mA		0.3	0.6	V
	High Level Supply Current	I <sub>CCH</sub>	V <sub>CC</sub> = 3.3 V, I <sub>F</sub> = 0 mA		4.5	7	mA
	Low Level Supply Current	I <sub>CCL</sub>	V <sub>CC</sub> = 3.3 V, I <sub>F</sub> = 10 mA		7.0	10	mA
Coupled	Threshold Input Current (H → L)	I <sub>FHL</sub>	V <sub>CC</sub> = 3.3 V, V <sub>O</sub> = 0.8 V, R <sub>L</sub> = 350 Ω		3	5	mA
	Isolation Resistance	R <sub>I-O</sub>	V <sub>I-O</sub> = 1 kV <sub>DC</sub> , R <sub>H</sub> = 40 to 60%, T <sub>A</sub> = 25°C	10 <sup>11</sup>			Ω
	Isolation Capacitance	C <sub>I-O</sub>	V = 0 V, f = 1 MHz, T <sub>A</sub> = 25°C		0.9		pF
	Propagation Delay Time (H → L) <sup>*3</sup>	t <sub>PHL</sub>	V <sub>CC</sub> = 3.3 V, R <sub>L</sub> = 350 Ω, I <sub>F</sub> = 7.5 mA T <sub>A</sub> = 25°C		-	75	ns
	Propagation Delay Time (L → H) <sup>*3</sup>	t <sub>PLH</sub>	V <sub>CC</sub> = 3.3 V, R <sub>L</sub> = 350 Ω, I <sub>F</sub> = 7.5 mA T <sub>A</sub> = 25°C			90	ns
	Rise Time	t <sub>r</sub>	V <sub>CC</sub> = 3.3 V, R <sub>L</sub> = 350 Ω, I <sub>F</sub> = 7.5 mA		20		
	Fall Time	t <sub>f</sub>	V <sub>CC</sub> = 3.3 V, R <sub>L</sub> = 350 Ω, I <sub>F</sub> = 7.5 mA		10		
	Pulse Width Distortion (PWD) <sup>*3</sup>	t <sub>PHL</sub> - t <sub>PLH</sub>	V <sub>CC</sub> = 3.3 V, R <sub>L</sub> = 350 Ω, I <sub>F</sub> = 7.5 mA T <sub>A</sub> = 25°C		-	25	ns
	Propagation Delay Skew	t <sub>PSK</sub>	V <sub>CC</sub> = 3.3 V, R <sub>L</sub> = 350 Ω, I <sub>F</sub> = 7.5 mA T <sub>A</sub> = 25°C			40	
	Common Mode Transient Immunity at High Level Output <sup>*4</sup>	CM <sub>H</sub>	R <sub>L</sub> = 350 Ω, T <sub>A</sub> = 25°C, I <sub>F</sub> = 0 mA, V <sub>O (MIN.)</sub> = 2 V, V <sub>CM</sub> = 50V	15			kV/μs
	Common Mode Transient Immunity at Low Level Output <sup>*4</sup>	CM <sub>L</sub>	R <sub>L</sub> = 350 Ω, T <sub>A</sub> = 25°C, I <sub>F</sub> = 7.5 mA, V <sub>O (MAX.)</sub> = 0.8 V, V <sub>CM</sub> = 50V	15			kV/μs

## Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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**NEC**

A Business Partner of NEC Compound Semiconductor Devices, Ltd.

Preliminary Data Sheet