

**HIGH ISOLATION VOLTAGE HIGH SPEED PHOTOCOUPPLER**

PS9601, PS9601L are optically coupled isolators containing a GaAlAs LED on light emitting side (input side) and a photodiode and a signal processing circuit on light receiving side (output side) on one chip.

PS9601 is in a plastic DIP (Dual In-line Package) and PS9601L is lead bending type (Gull-wing) for surface mount.

**FEATURES**

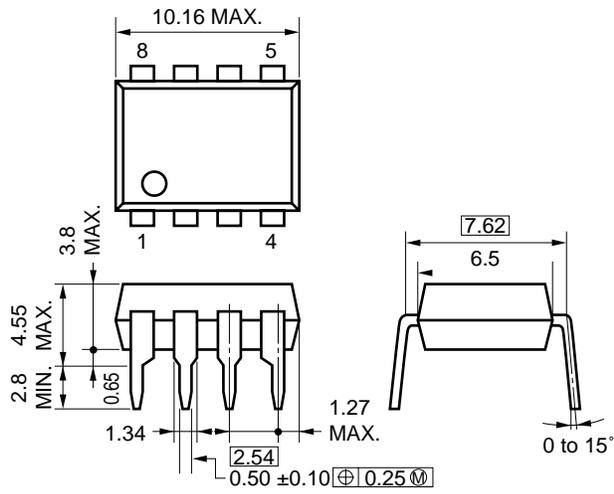
- High isolation voltage                      BV: 5 000 V<sub>r.m.s.</sub> MIN.
- High Propagation delay time              t<sub>PHL</sub>, t<sub>PLH</sub>: 50 ns TYP.
- Low input current                            I<sub>FHL</sub>: 2.5 mA TYP.
- Can be soldered by infrared reflow soldering
- Taping product number PS9601L-E3, E4
- UL recognized                                File No. E72422 (S)

**APPLICATIONS**

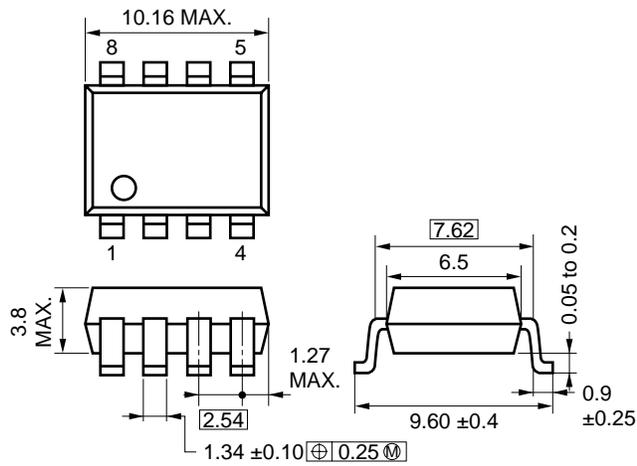
- Computer and peripheral memory
- Electronic instrument
- Audio-visual

PACKAGE DIMENSIONS (Unit: mm)

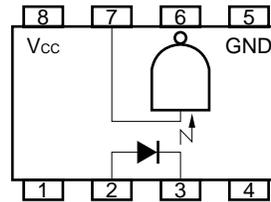
PS9601



PS9601L



PIN CONNECTIONS (Top View)



	PIN	Function
INPUT	1.	NC
	2.	Anode
	3.	Cathode
	4.	NC
OUTPUT	5.	GND
	6.	V <sub>o</sub>
	7.	V <sub>E</sub> *
	8.	V <sub>cc</sub>

\*V<sub>E</sub> is pulled-up to

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

Diode			
Forward Current	I <sub>F</sub>	30	mA
Reverse Voltage	V <sub>R</sub>	5	V
Power Dissipation	P <sub>D</sub>	60	mW
Detector			
Supply Voltage	V <sub>CC</sub>	7	V
Output Voltage	V <sub>O</sub>	7	V
Output Current	I <sub>O</sub>	50	mA
Enable Voltage	V <sub>E</sub>	5.5	V
Power Dissipation	P <sub>C</sub>	85	mW
Isolation Voltage *1	BV	5 000	V <sub>r.m.s.</sub>
Operating Temperature	T <sub>opt</sub>	-40 to +85	°C
Storage Temperature	T <sub>stg</sub>	-55 to +125	°C

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

**RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = 25 °C)**

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Low Level Input Current	I <sub>FL</sub>	0		250	μA
High Level Input Current	I <sub>FH</sub>	7	10	15	mA
High Level Enable Voltage	V <sub>EH</sub>	2		V <sub>CC</sub>	V
High Level Enable Voltage	V <sub>EL</sub>	0		0.8	V
Supply Voltage	V <sub>CC</sub>	4.5	5	5.5	V
Operating Temperature	T <sub>opt</sub>	0	25	70	°C

\* By-pass capacitor of more than 0.1 μF is used between V<sub>CC</sub> and GND near device.

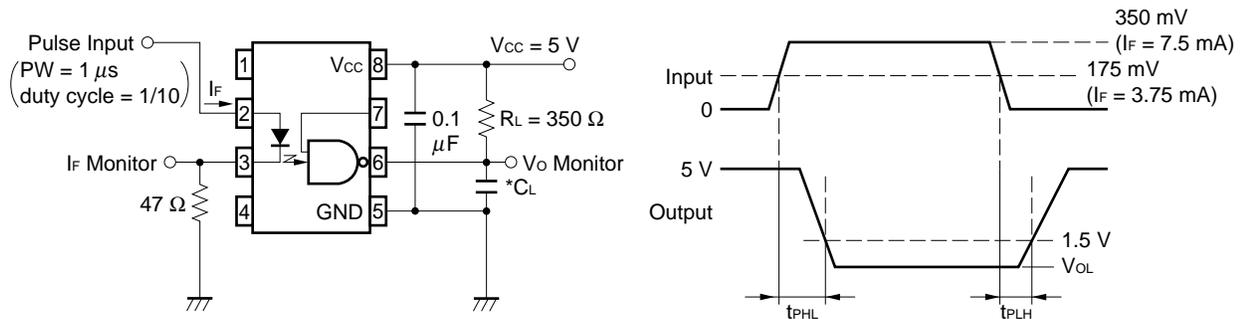
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = -40 to +85 °C)**

	PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V <sub>F</sub>	1.4	1.65	1.9	V	I <sub>F</sub> = 10 mA, T <sub>A</sub> = 25 °C
	Reverse Current	I <sub>R</sub>			10	μA	V <sub>R</sub> = 5 V, T <sub>A</sub> = 25 °C
	Capacitance	C <sub>t</sub>		60		pF	V = 0, f = 1 MHz, T <sub>A</sub> = 25 °C
Detector	High Level Output Current	I <sub>OH</sub>		2	250	μA	V <sub>CC</sub> = V <sub>O</sub> = 5.5 V, I <sub>F</sub> = 250 μs, V <sub>E</sub> = 2 V
	Low Level Output Voltage	V <sub>OL</sub>		0.2	0.6	V	V <sub>CC</sub> = 5.5 V, I <sub>F</sub> = 5 mA, V <sub>E</sub> = 2 V, I <sub>O</sub> = 13 mA
	High Level Supply Current	I <sub>CCH</sub>	5	7	10	mA	V <sub>CC</sub> = 5.5 V, V <sub>E</sub> = 0.5 V, I <sub>F</sub> = 0
	Low Level Supply Current	I <sub>CCL</sub>	10	13	18	mA	V <sub>CC</sub> = 5.5 V, V <sub>E</sub> = 2 V, I <sub>F</sub> = 10 mA
	High Level Enable Current	I <sub>EH</sub>	-0.7	-1	-1.5	mA	V <sub>CC</sub> = 5.5 V, V <sub>EH</sub> = 2 V
	Low Level Enable Current	I <sub>EL</sub>	-1	-1.4	-2	mA	V <sub>CC</sub> = 5.5 V, V <sub>EL</sub> = 0.5 V

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

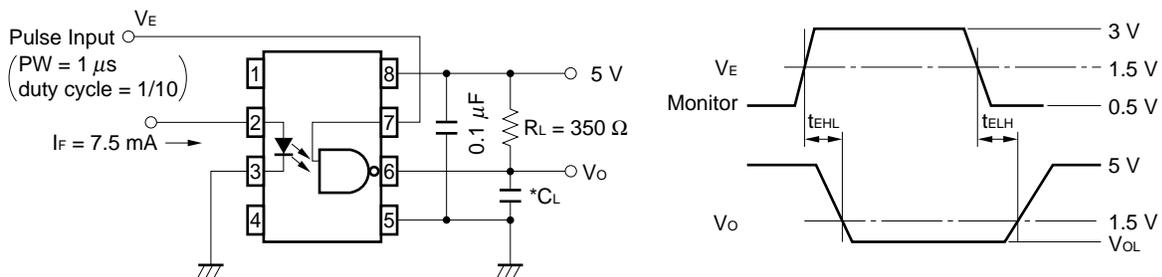
	PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Coupled	Threshold Input Current High → Low	I <sub>FHL</sub>	0.5	2.5	5	mA	V <sub>CC</sub> = 5 V, V <sub>E</sub> = 2 V, T <sub>A</sub> = -40 to + 85 °C V <sub>O</sub> = 0.8 V, R <sub>L</sub> = 350 Ω
	Isolation Resistance	R <sub>1-2</sub>	10 <sup>11</sup>			Ω	V <sub>in-out</sub> = 1 kV <sub>DC</sub> , RH 40 to 60 %
	Isolation Capacitance	C <sub>1-2</sub>		0.6		pF	V = 0, f = 1 MHz
	Propagation Delay Time* <sup>2</sup> High → Low	t <sub>PHL</sub>		50	75	ns	V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA R <sub>L</sub> = 350 Ω, C <sub>L</sub> = 15 pF
	Propagation Delay Time* <sup>2</sup> Low → High	t <sub>PLH</sub>		50	75	ns	
	Rise Time	t <sub>r</sub>		20		ns	
	Fall Time	t <sub>f</sub>		10		ns	
	Enable Propagation Delay Time* <sup>3</sup> High → Low	t <sub>EH</sub> L		10		ns	V <sub>CC</sub> = 5 V, I <sub>F</sub> = 7.5 mA V <sub>EH</sub> = 3 V, V <sub>EL</sub> = 0.5 V R <sub>L</sub> = 350 Ω, C <sub>L</sub> = 15 pF
	Enable Propagation Delay Time* <sup>3</sup> Low → High	t <sub>EL</sub> H		25		ns	

\*2 Test Circuit for Propagation delay time

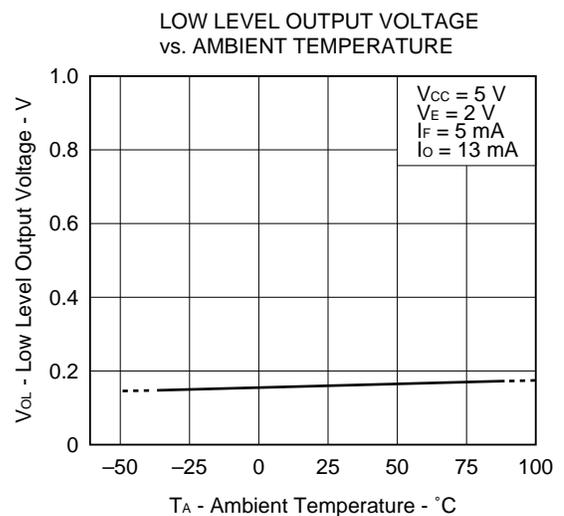
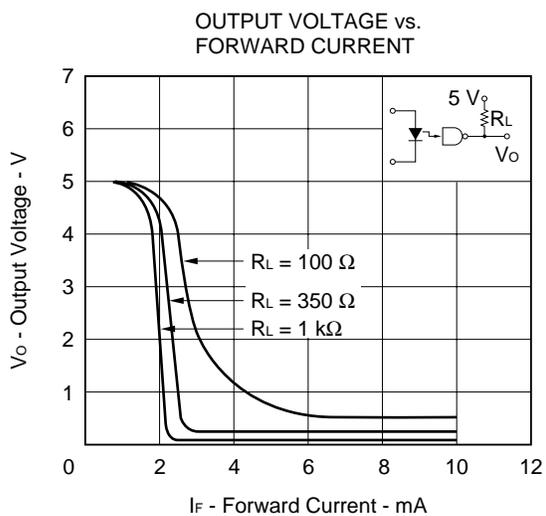
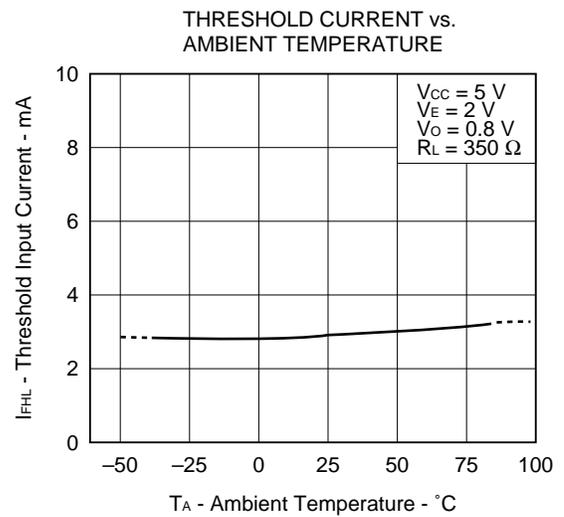
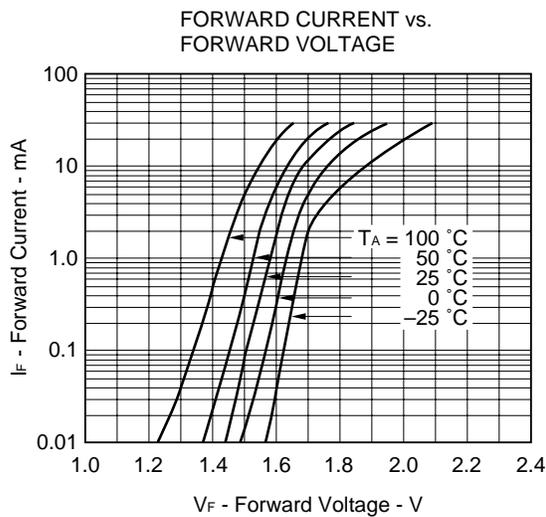
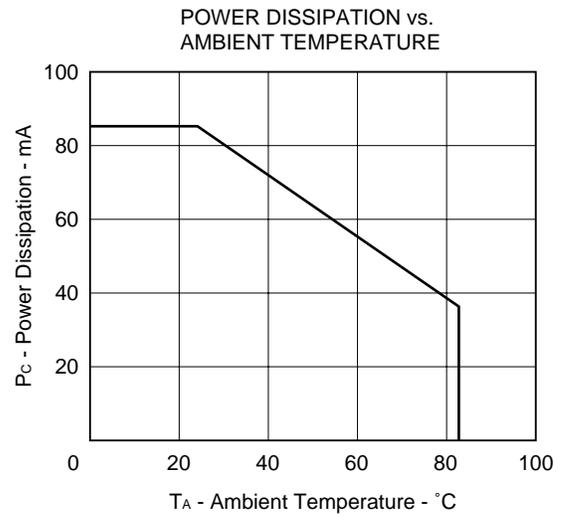
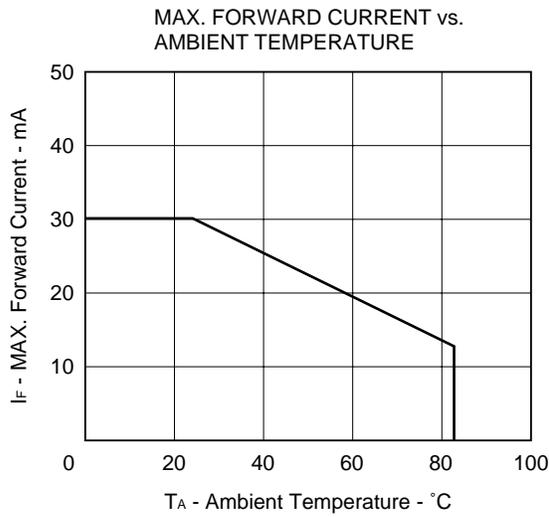


\* C<sub>L</sub> is approximately 15 pF, which includes probe and stray wiring capacitance.

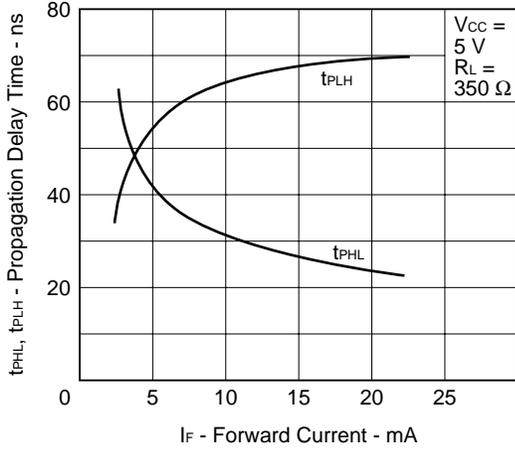
\*3 Test Circuit for enable Propagation delay time



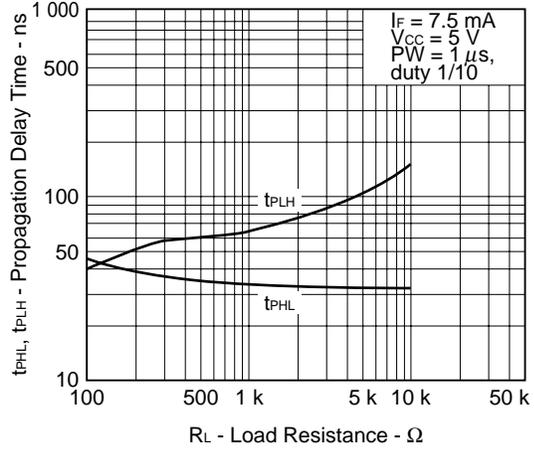
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)



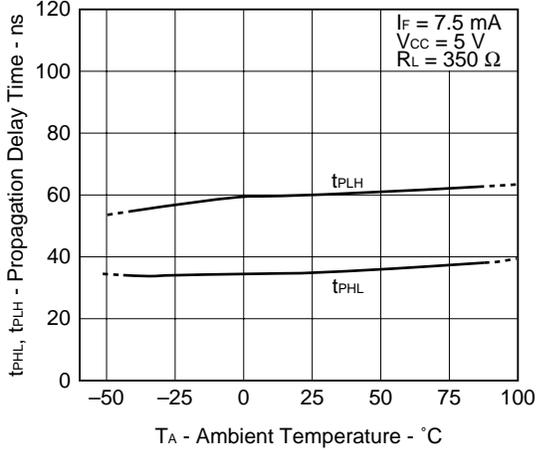
PROPAGATION DELAY TIME vs. FORWARD CURRENT



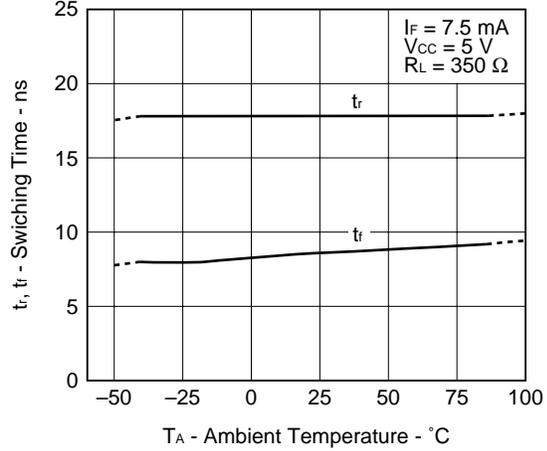
PROPAGATION DELAY TIME vs. LOAD RESISTANCE



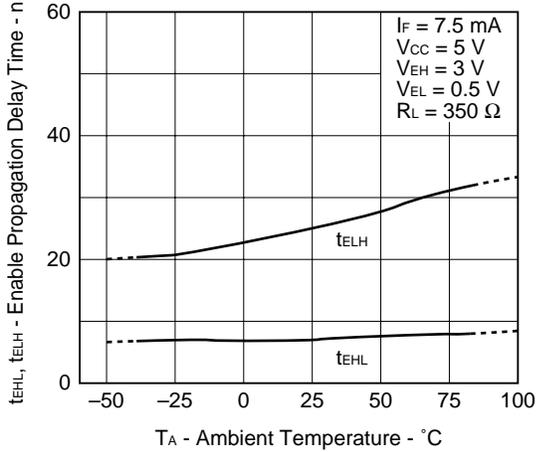
PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE



SWITCHING TIME vs. AMBIENT TEMPERATURE



ENABLE PROPAGATION DELAY TIME vs. AMBIENT TEMPERATURE

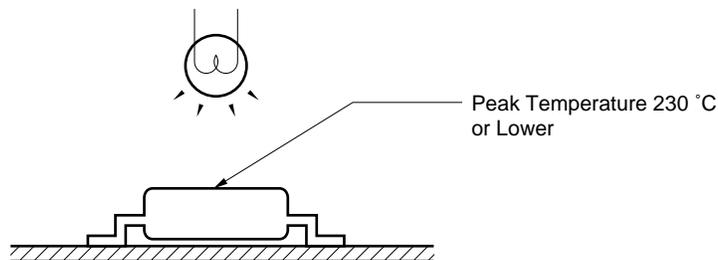
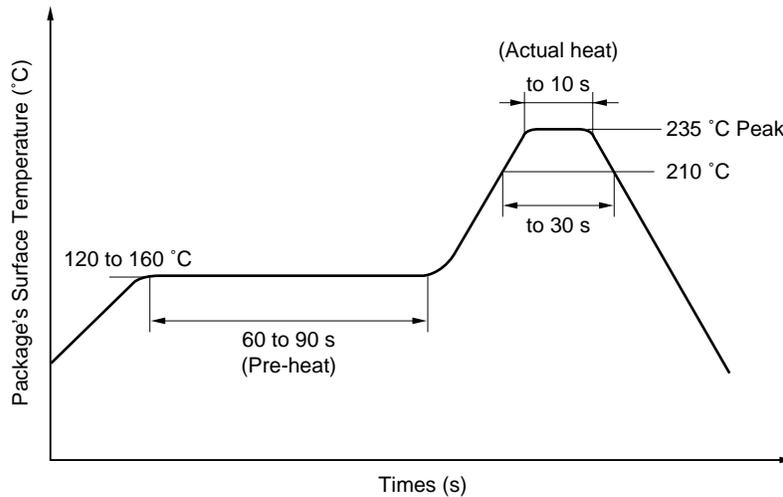


**PRECAUTIONS IN MOUNTING THE DEVICE**

(1) Precautions in mounting the device by infrared reflow soldering

- Peak reflow temperature : 235 °C or below (Plastic surface temperature)
- Reflow time : 30 seconds or less (Time period during which the plastic surface temperature is 210 °C)
- Number of reflow processes: One
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

**INFRARED RAY REFLOW TEMPERATURE PROFILE**



(2) Precautions in mounting the device in solder dip method

- Temperature : 260 °C or lower
- Time : 10 sec. or less
- Flux : Rosin group flux, where the amount of chloride component is small.

## Caution

**The Great Care must be taken in dealing with the devices in this guide.**

**The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.**

**Keep the law concerned and so on, especially in case of removal.**

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Anti-radioactive design is not implemented in this product.