NEC

PHOTOCOUPLERS

PS9601, PS9601L

HIGH ISOLATION VOLTAGE HIGH SPEED PHOTOCOUPLER

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 $V_{r.m.s.}$ MIN.
- High Propagation delay time t_{PHL}, t_{PLH}: 50 ns TYP.
- Low input current I_{FHL}: 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

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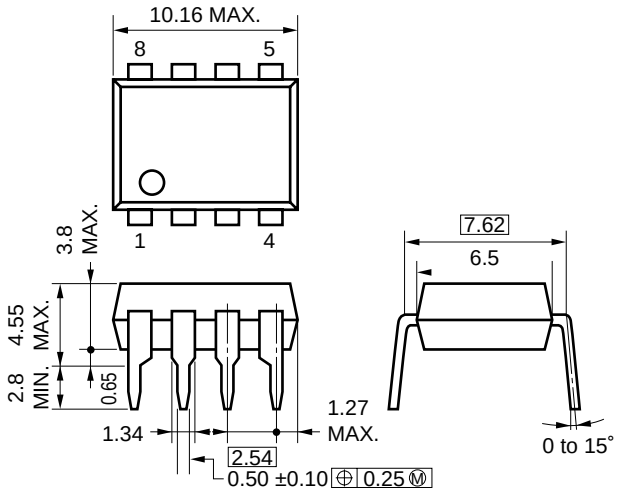
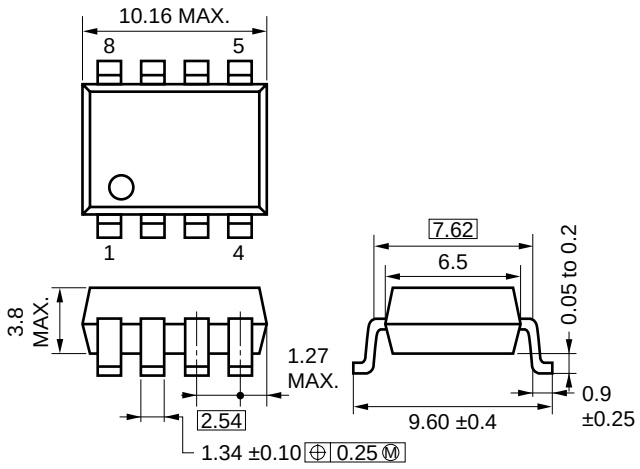
PACKAGE DIMENSIONS (Unit: mm)

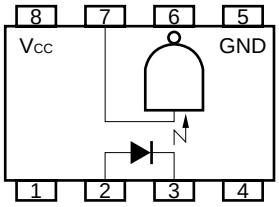
PS9601



PS9601L



PIN CONNECTIONS (Top View)



	PIN	Function
INPUT	1.	NC
	2.	Anode
	3.	Cathode
	4.	NC
OUTPUT	5.	GND
	6.	V_O
	7.	V_E*
	8.	V_{CC}

*V_E is pulled-up to

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Diode			
Forward Current	I_F	30	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_D	60	mW
Detector			
Supply Voltage	V_{CC}	7	V
Output Voltage	V_O	7	V
Output Current	I_O	50	mA
Enable Voltage	V_E	5.5	V
Power Dissipation	P_C	85	mW
Isolation Voltage *1	BV	5 000	$V_{r.m.s.}$
Operating Temperature	T_{opt}	–40 to +85	°C
Storage Temperature	T_{stg}	–55 to +125	°C

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

RECOMMENDED OPERATING CONDITIONS (T_A = 25 °C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Low Level Input Current	I_{FL}	0		250	μA
High Level Input Current	I_{FH}	7	10	15	mA
High Level Enable Voltage	V_{EH}	2		V_{CC}	V
High Level Enable Voltage	V_{EL}	0		0.8	V
Supply Voltage	V_{CC}	4.5	5	5.5	V
Operating Temperature	T_{opt}	0	25	70	°C

***** By-pass capacitor of more than 0.1 μF is used between V_{CC} and GND near device.

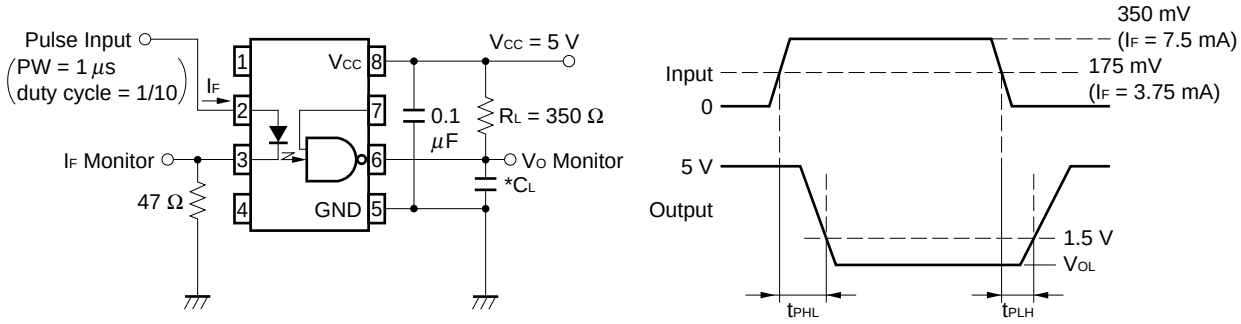
ELECTRICAL CHARACTERISTICS (T_A = –40 to +85 °C)

	PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Diode	Forward Voltage	V_F	1.4	1.65	1.9	V	I_F = 10 mA, T_A = 25 °C
	Reverse Current	IR			10	μA	V_R = 5 V, T_A = 25 °C
	Capacitance	C_t		60		pF	V = 0, f = 1 MHz, T_A = 25 °C
Detector	High Level Output Current	I_{OH}		2	250	μA	V_{CC} = V_O = 5.5 V, I_F = 250 μs, V_E = 2 V
	Low Level Output Voltage	V_{OL}		0.2	0.6	V	V_{CC} = 5.5 V, I_F = 5 mA, V_E = 2 V, I_O = 13 mA
	High Level Supply Current	I_{CCH}	5	7	10	mA	V_{CC} = 5.5 V, V_E = 0.5 V, I_F = 0
	Low Level Supply Current	I_{CCL}	10	13	18	mA	V_{CC} = 5.5 V, V_E = 2 V, I_F = 10 mA
	High Level Enable Current	I_{EH}	–0.7	–1	–1.5	mA	V_{CC} = 5.5 V, V_{EH} = 2 V
	Low Level Enable Current	I_{EL}	–1	–1.4	–2	mA	V_{CC} = 5.5 V, V_{EL} = 0.5 V

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

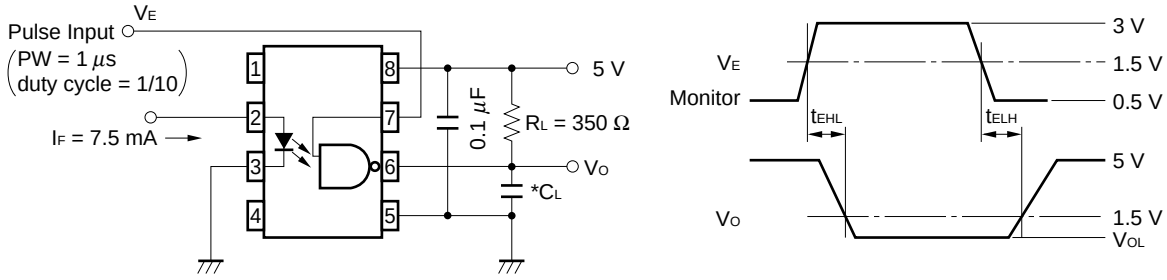
	PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Coupled	Treshold Input Current High → Low	I_{FHL}	0.5	2.5	5	mA	V_{CC} = 5 V, V_E = 2 V, T_A = –40 to + 85 °C V_O = 0.8 V, R_L = 350 Ω
	Isolation Resistance	R_{1-2}	10^{11}			Ω	V_{in-out} = 1 kV_{DC}, RH 40 to 60 %
	Isolation Capacitance	C_{1-2}		0.6		pF	V = 0, f = 1 MHz
	Propagation Delay Time*2 High → Low	t_{PHL}		50	75	ns	V_{CC} = 5 V, I_F = 7.5 mA R_L = 350 Ω, C_L = 15 pF
	Propagation Delay Time*2 Low → High	t_{PLH}		50	75	ns	
	Rise Time	t_r		20		ns	
	Fall Time	t_f		10		ns	
	Enable Propagation Delay Time*3 High → Low	t_{EHL}		10		ns	V_{CC} = 5 V, I_F = 7.5 mA V_{EH} = 3 V, V_{EL} = 0.5 V R_L = 350 Ω, C_L = 15 pF
	Enable Propagation Delay Time*3 Low → High	t_{ELH}		25		ns	

***2** Test Circuit for Propagation delay time



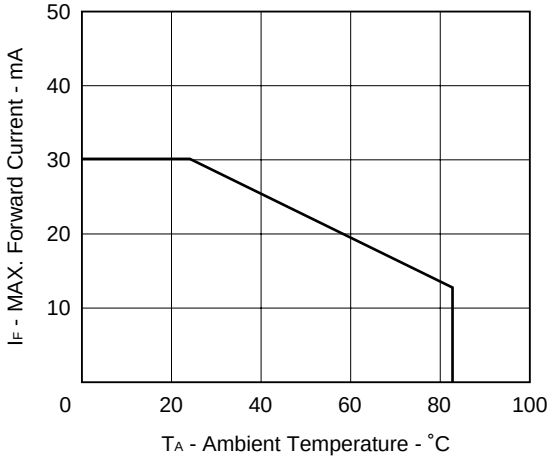
***** C_L is approximately 15 pF, which includes probe and stray wiring capacitance.

***3** Test Circuit for enable Propagation delay time

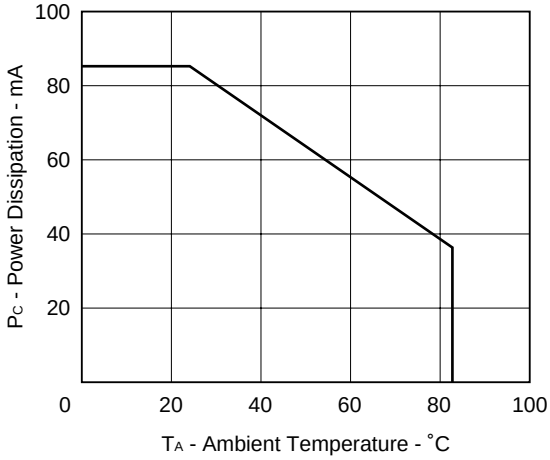


TYPICAL CHARACTERISTICS (T_A = 25 °C)

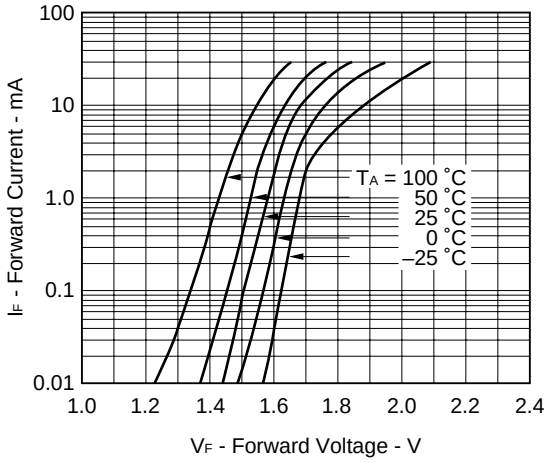
MAX. FORWARD CURRENT vs. AMBIENT TEMPERATURE



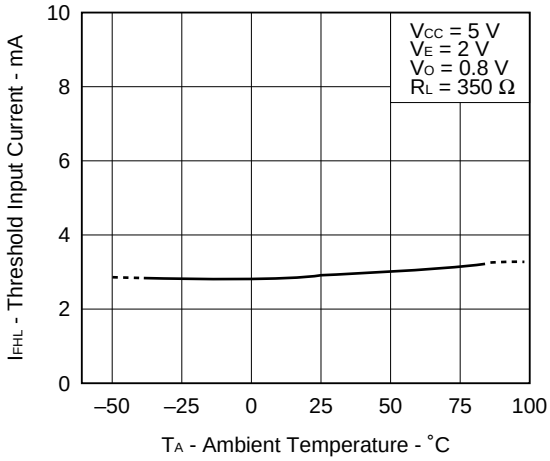
POWER DISSIPATION vs. AMBIENT TEMPERATURE



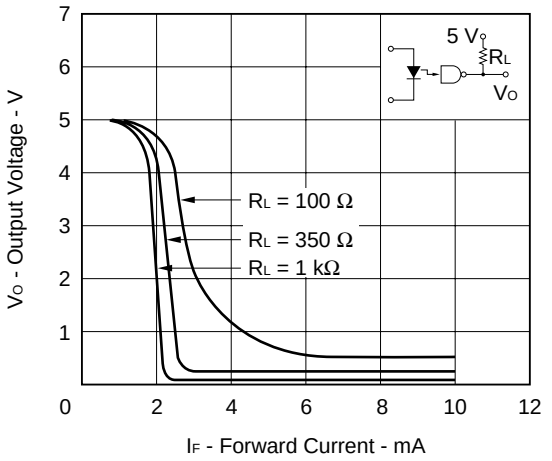
FORWARD CURRENT vs. FORWARD VOLTAGE



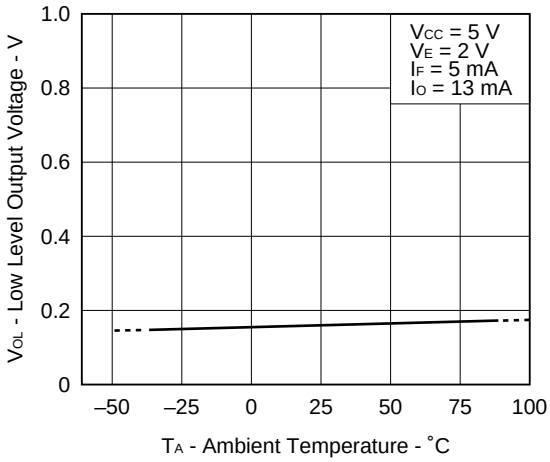
THRESHOLD CURRENT vs. AMBIENT TEMPERATURE



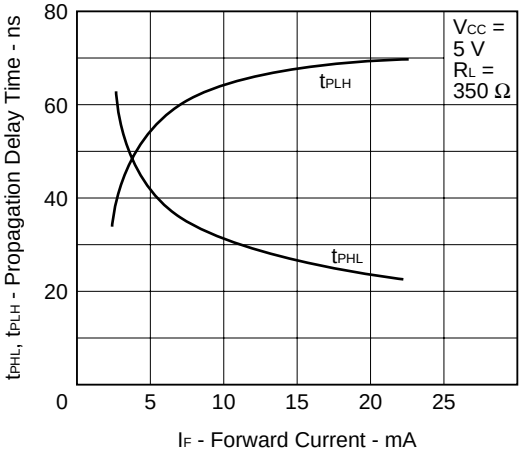
OUTPUT VOLTAGE vs. FORWARD CURRENT



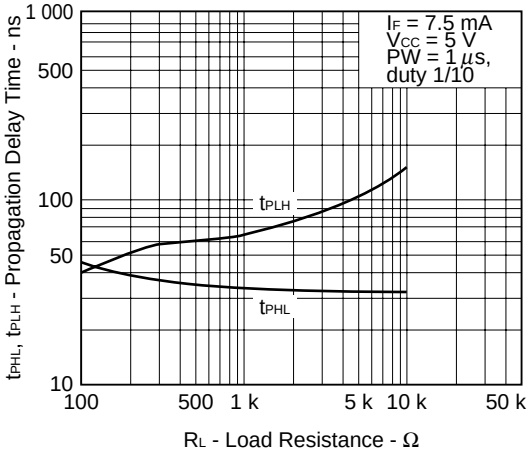
LOW LEVEL OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



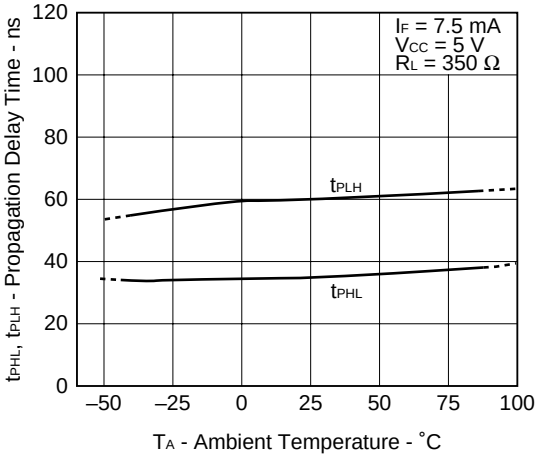
PROPAGATION DELAY TIME
vs. FORWARD CURRENT



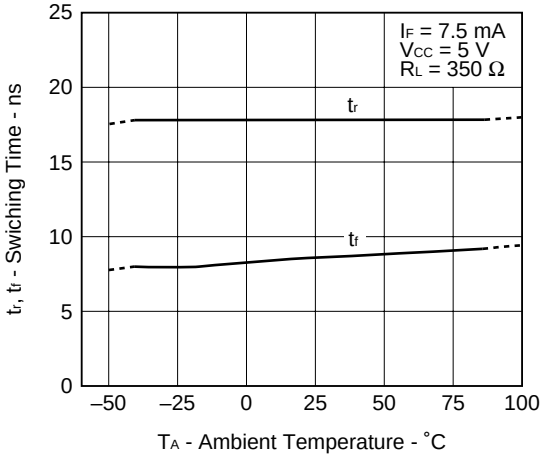
PROPAGATION DELAY TIME vs.
LOAD RESISTANCE



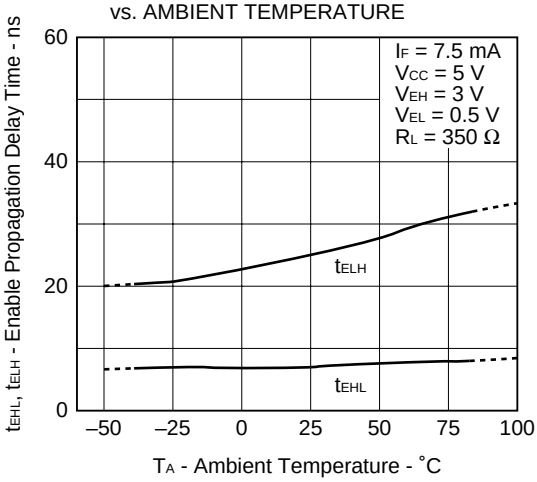
PROPAGATION DELAY TIME
vs. AMBIENT TEMPERATURE



SWITCHING TIME vs.
AMBIENT TEMPERATURE



ENABLE PROPAGATION DELAY TIME
vs. AMBIENT TEMPERATURE

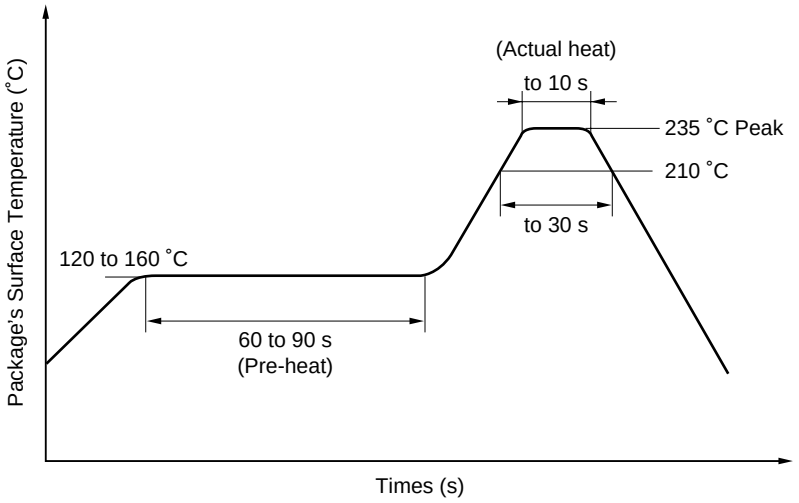


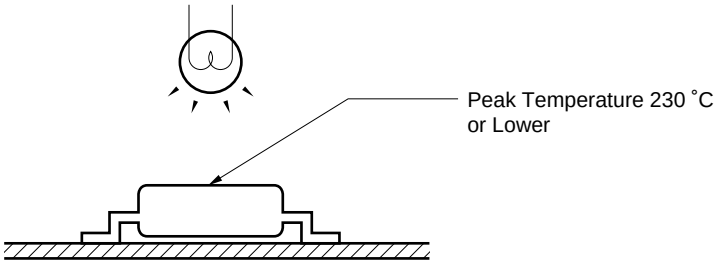
PRECAUTIONS IN MOUNTING THE DEVICE

(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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