PC910L0NSZ

Ultra-High Speed Response *OPIC Photocoupler

* VDE (VDE0884) approved type is also available us an option

■ Features

1. Ultra-high speed response
   (t_{PHL}, t_{PLH}: TYP. 50ns at R_L=350Ω)
2. Isolation voltage between input and output
   ($V_{iso\ (rms)}$: 5.0kV)
3. Low input current drive (I_{FHL}: MAX. 5mA)
4. Instantaneous common mode rejection voltage (CM_H: TYP. 20kV/μs)
5. TTL and LSTTL compatible output
6. Recognized by UL, file No. E64380 (model No. PC910L)

■ Applications

1. High speed interfaces for computer peripherals
2. Programmable controllers
3. Inverters

■ Absolute Maximum Ratings

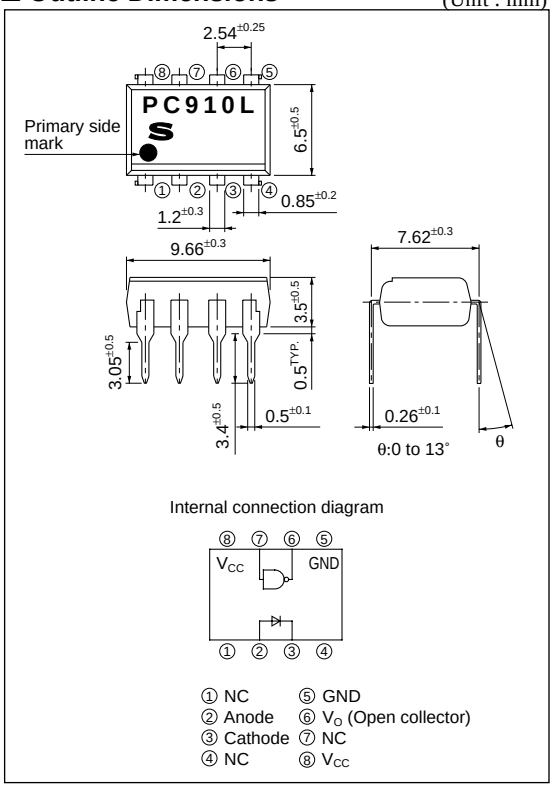
(T_a=25°C)

	Parameter	Symbol	Rating	Unit
Input	*1 Forward current	I_F	20	mA
	Reverse voltage	V_R	5	V
	Power dissipation	P	40	mW
Output	Supply voltage	V_{CC}	7	V
	*2 Enable voltage	V_E	5.5	V
	High level output voltage	V_{OH}	7	V
	Low level output current	I_{OL}	50	mA
	Collector power dissipation	P_C	85	mW
*3 Isolation voltage		$V_{iso\ (rms)}$	5.0	kV
Operating temperature		T_{opr}	−40 to +85	°C
Storage temperature		T_{stg}	−55 to +125	°C
*4 Soldering temperature		T_{sol}	270	°C

*1 T_a=T_{opr}
*2 Shall not exceed 500mV from supply voltage (V_{CC})
*3 40 to 60%RH, AC for 1minute
*4 For 10s

■ Outline Dimensions

(Unit : mm)



* "OPIC"(Optical IC) is a trademark of the SHARP Corporation. An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.

■ Electro-optical Characteristics

(Unspecified T_a=–40 to +85˚C, All typical values at T_a =25˚C, V_{CC}=5V)

Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage		V_F	T_a=25˚C, I_F=10mA	–	1.6	1.9	V
	Reverse current		I_R	T_a=25˚C, V_R=5V	–	–	10	μA
	Terminal capacitance		C_t	T_a=25˚C, V=0, f=1kHz	–	60	150	pF
Output	High level output voltage		I_{OH}	V_{CC}=V_O=5.5V, V_E=2.0V, I_F=250μA	–	0.02	100	μA
	Low level output voltage		V_{OL}	V_{CC}=V_O=5.5V, V_E=2.0V, I_F=5mA, I_{OL}=13mA	–	0.4	0.6	V
	High level enable current		I_{EH}	V_{CC}=5.5V, V_E=2.0V	–	–0.5	–1.6	mA
	Low level enable current		I_{EL}	V_{CC}=5.5V, V_E=0.5V	–	–0.7	–1.6	mA
	High level supply current		I_{CCH}	V_{CC}=5.5V, I_F=0,V_E=2V	–	5	10	mA
				V_{CC}=5.5V, I_F=0,V_E=0.5V	–	5	–	mA
	Low level supply current		I_{CCL}	V_{CC}=5.5V, I_F=10mA,V_E=2V	–	7	13	mA
				V_{CC}=5.5V, I_F=10mA,V_E=0.5V	–	5.5	–	mA
Transfer characteristics	"High→Low" threshold input current		I_{FHL}	V_{CC}=5V,V_E=2.0V, V_O=0.8V, R_L=350Ω	–	2.5	5	mA
	Isolation resistance		R_{ISO}	T_a=25˚C, DC=500V, 40 to 60%RH	5×10^{10}	10^{11}	–	Ω
	Floating capacitance		C_f	T_a=25˚C, V=0, f=1MHz	–	0.6	5	pF
	Response time	"High→Low" propagation time	t_{PHL}	Fig. 1 T_a=25˚C, V_{CC}=5V, R_L=350Ω, C_L=15pF, I_F=7.5mA	25	48	75	ns
		"Low→High" propagation time	t_{PLH}		25	50	75	ns
		Rise time	t_r		–	10	–	ns
		Fall time	t_f		–	20	–	ns
		*7 Distortion of pulse width	Δt_w		–	–	35	ns
		"High→Low" enable propagation delay time	t_{EHL}	Fig.2 T_a=25˚C, V_{CC}=5V, R_L=350Ω, C_L=15pF, I_F=7.5mA, V_{EH}=3V, V_{EL}=0.5V	–	15	–	ns
		"Low→High" enable propagation delay time	t_{ELH}		–	10	–	ns
	CMR	Instantaneous common mode rejection voltage "Output : High level"	CM_H	Fig.3 T_a=25˚C, V_{CC}=5V, V_{CM}=1k$V_{(P-P)}$, R_L=350Ω, I_F=0, $V_{O\ (Min)}$=2V	10	20	–	kV/μs
		Instantaneous common mode rejection voltage "Output : Low level"	CM_L	Fig.3 T_a=25˚C, V_{CC}=5V, V_{CM}=1k$V_{(P-P)}$, R_L=350Ω, I_F=5mA, $V_{O\ (Max)}$=0.8V	–10	–20	–	kV/μs

*6 It shall connect a by-pass capacitor of 0.01μF or more between V_{CC} (Pin ⑧) and GND (Pin ⑤) near the device, when it measures the transfer characteristics and the output side characteristics

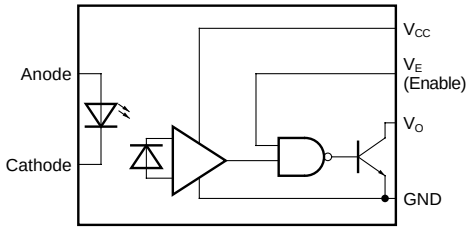
*7 Distortion of pulse width $\Delta t_w = | t_{PHL} - t_{PLH} |$

■ Recommended Operating Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Low level input current	I_{FL}	0	250	μA
High level input current	I_{FH}	8	15	mA
High level enable voltage	V_{EH}	2.0	V_{CC}	V
Low level enable voltage	V_{EL}	0	0.8	V
Supply voltage	V_{CC}	4.5	5.5	V
Fanout (TTL load)	N	–	8	–
Operating temperature	T_{opr}	–40	85	˚C

1. When the enable input is in high level state, extemal pull-up resistor is unnecessary

■ Circuit Block Diagram

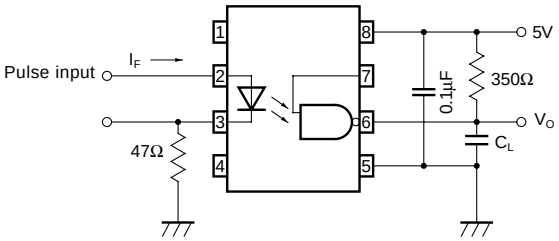


■ Truth Table

Input	Enable	Output
H	H	L
L	H	H
H	L	H
L	L	H

L : Logic (0)
H : Logic (1)

Fig.1 Test Circuit for t_{PHL}, t_{PLH}, t_r and t_f



*C_L includes the probe and wiring capacitance.

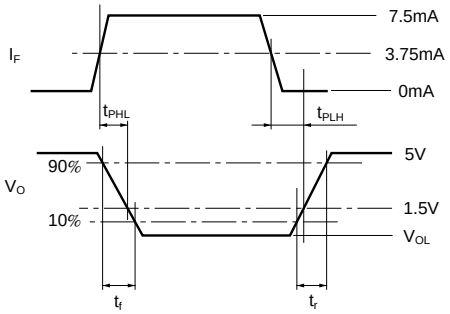
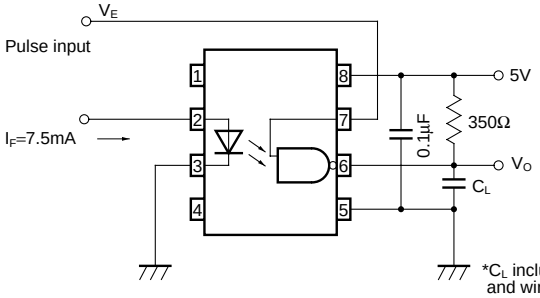


Fig.2 Test Circuit for t_{EHL} and t_{ELH}



*C_L includes the probe and wiring capacitance.

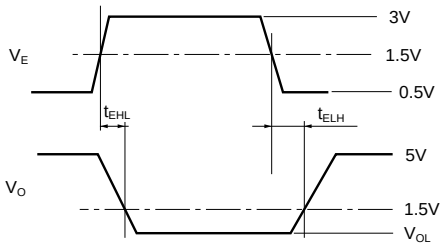
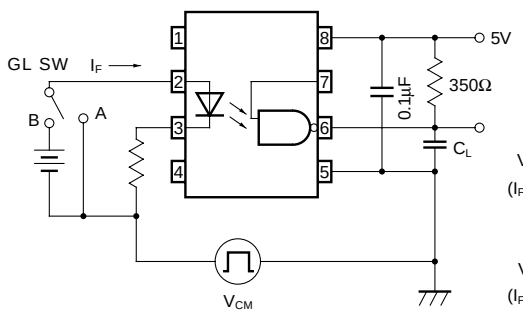
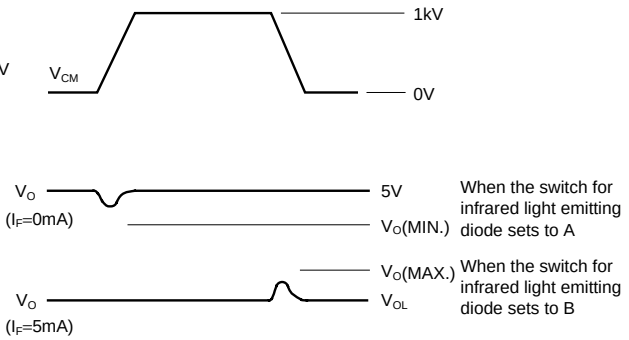


Fig.3 Test Circuit for CM_H and CM_L





*C_L includes the probe and wiring capacitance.

Fig.4 Forward Current vs. Ambient Temperature

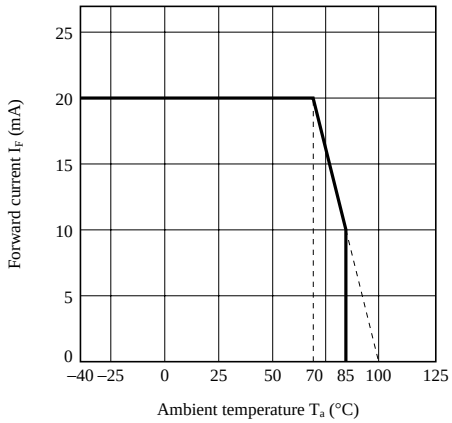


Fig.5 Collector Power Dissipation vs. Ambient Temperature

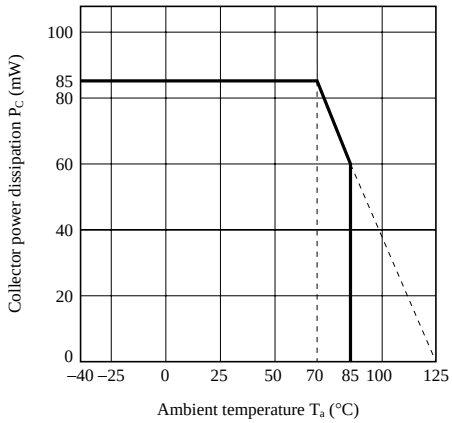


Fig.6 Forward Current vs. Forward Voltage

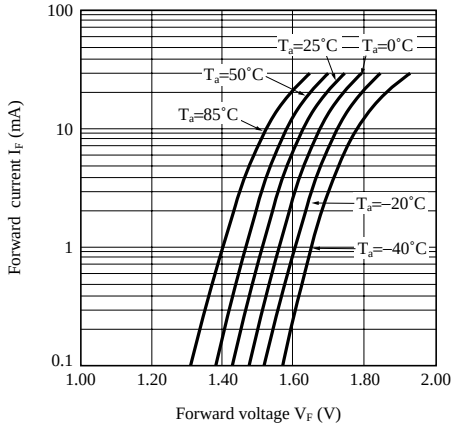


Fig.7 High Level Output Current vs. Ambient Temperature

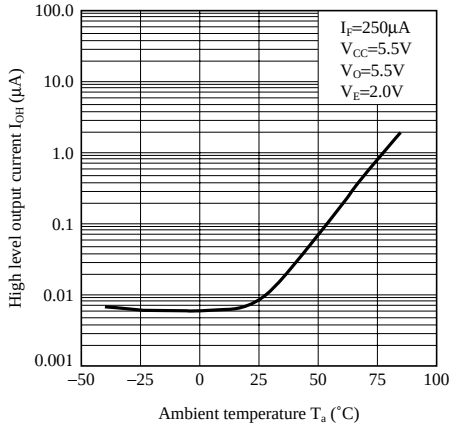


Fig.8 Low Level Output Voltage vs. Ambient Temperature

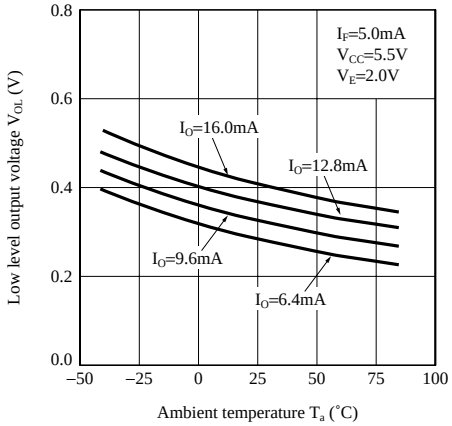


Fig.9 Threshold Input Current vs. Ambient Temperature

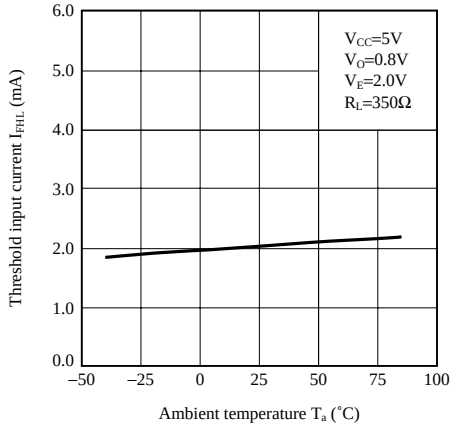


Fig.10 Output Voltage vs. Forward Current

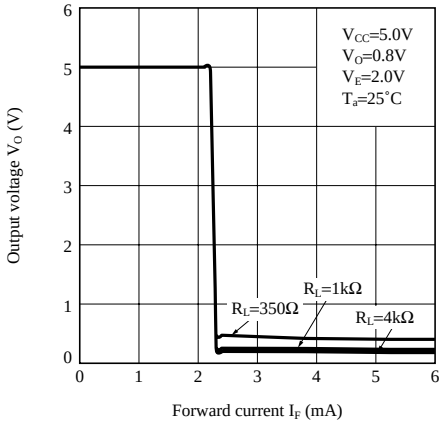


Fig.11 Propagation Delay Time vs. Forward Current

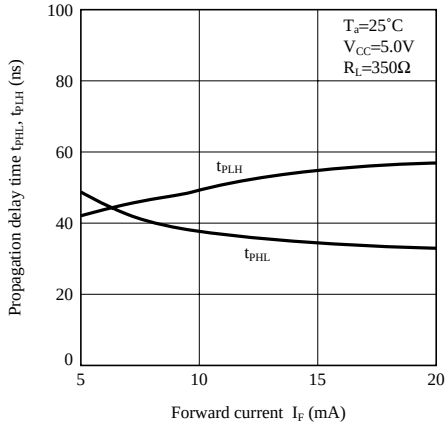
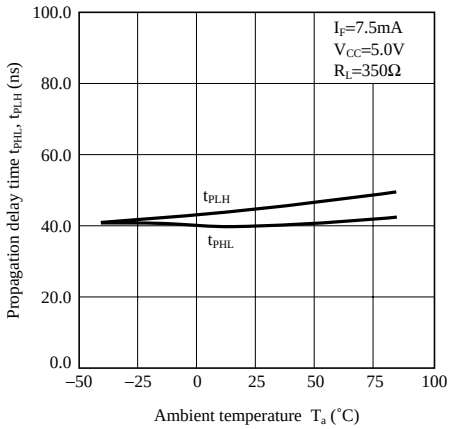


Fig.12 Propagation Delay Time vs. Ambient Temperature



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  --- Industrial control
  --- Audio visual equipment
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