

PC910L0NSZ

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

■ Features

1. Ultra-high speed response
(t_{PHL} , t_{PLH} : TYP. 50ns at $R_L=350\Omega$)
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/ μ s)
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

($T_a=25^\circ\text{C}$)

	Parameter	Symbol	Rating	Unit
Input	*1 Forward current	I_F	20	mA
	Reverse voltage	V_R	5	V
	Power dissipation	P	40	mW
	Supply voltage	V_{CC}	7	V
Output	*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	$^\circ\text{C}$
	Storage temperature	T_{stg}	-55 to +125	$^\circ\text{C}$
	*4 Soldering temperature	T_{sol}	270	$^\circ\text{C}$

*1 $T_c=T_{opr}$

*2 Shall not exceed 500mV from supply voltage (V_{CC})

*3 40 to 60%RH, AC for 1minute

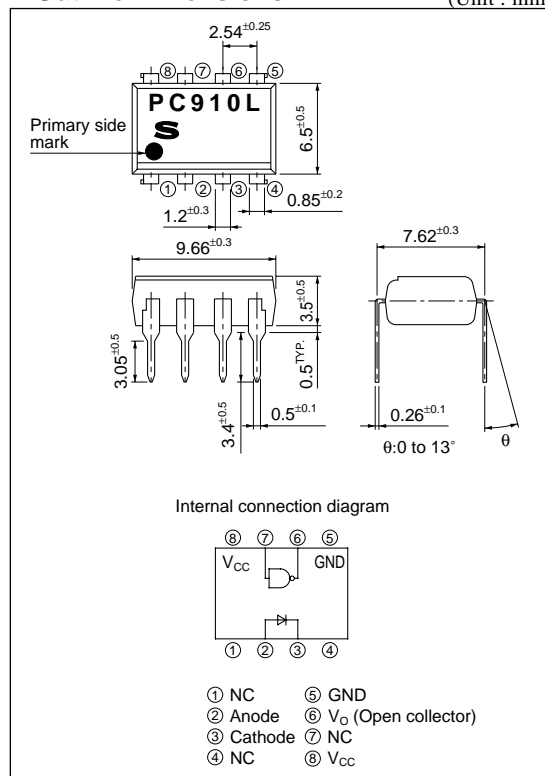
*4 For 10s

Ultra-High Speed Response

* OPIC Photocoupler

■ 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 $+85^\circ\text{C}$, All typical values at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$)

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} =1kV _(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} =1kV _(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 0.01 μF 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

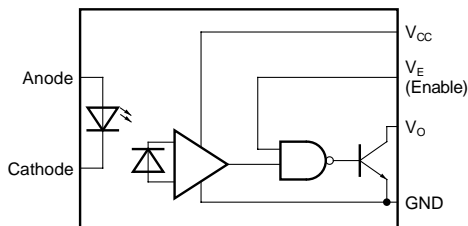
*7 Distortion of pulse width $\Delta t_w = |t_{PHL} - t_{PLH}|$

■ 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	$^\circ\text{C}$

1. When the enable input is in high level state, external 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

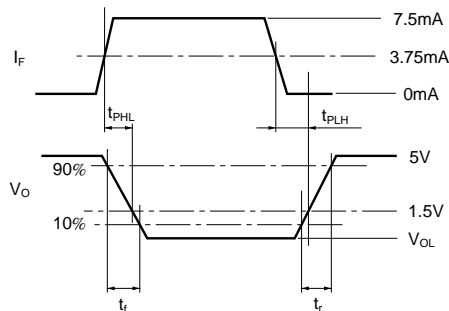
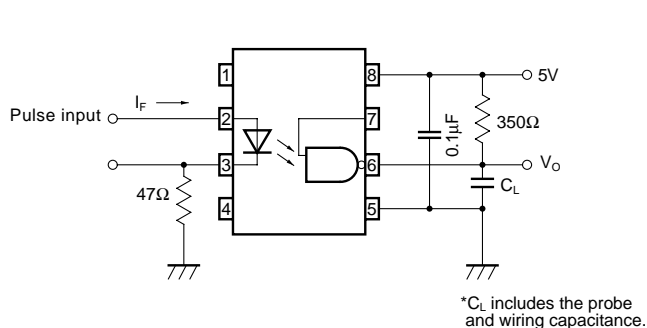


Fig.2 Test Circuit for t_{EHL} and t_{ELH}

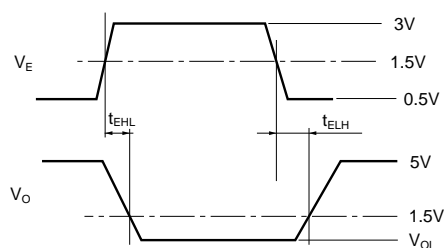
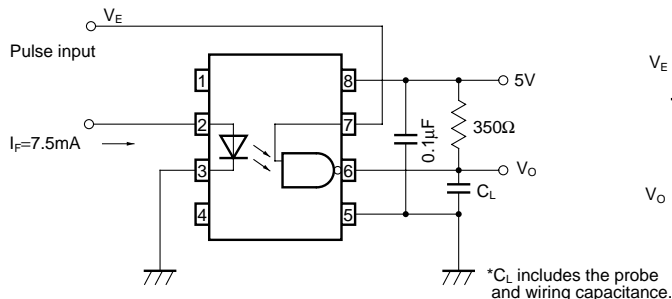
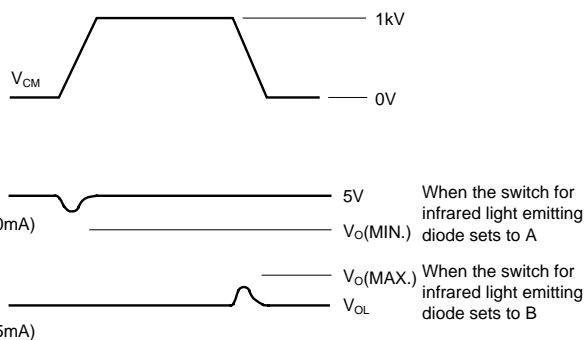
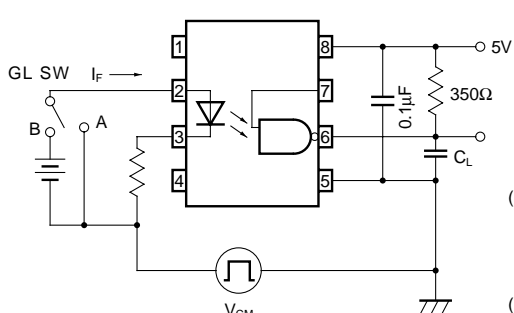


Fig.3 Test Circuit for CM_H and CM_L



*C_L includes the probe and wiring capacitance.

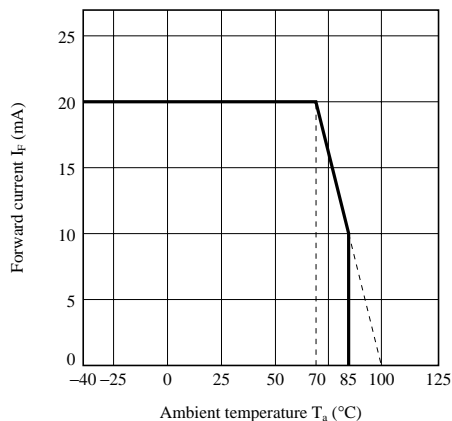
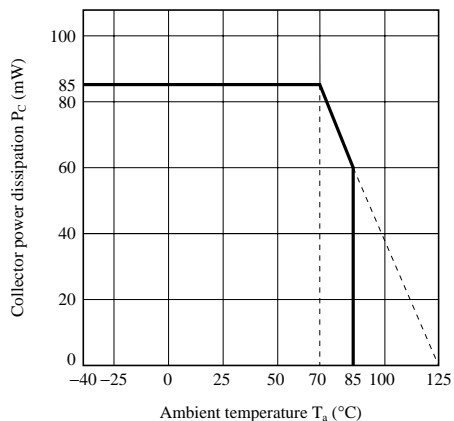
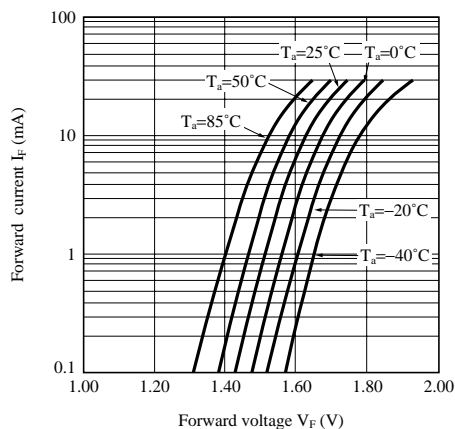
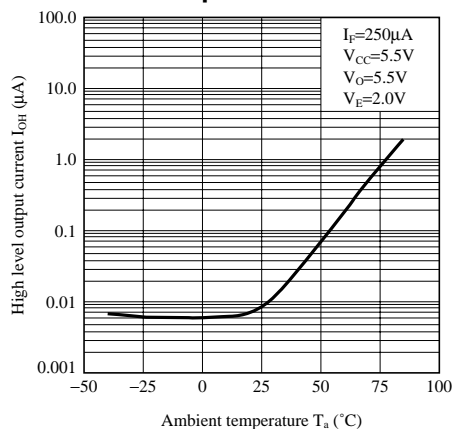
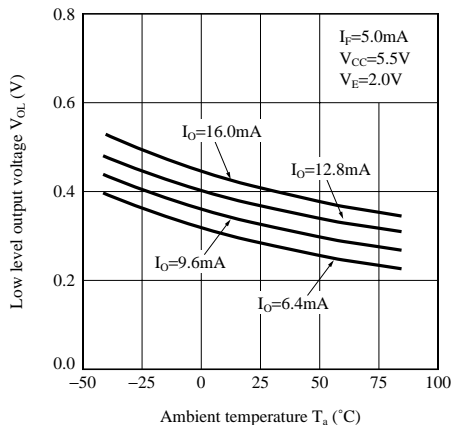
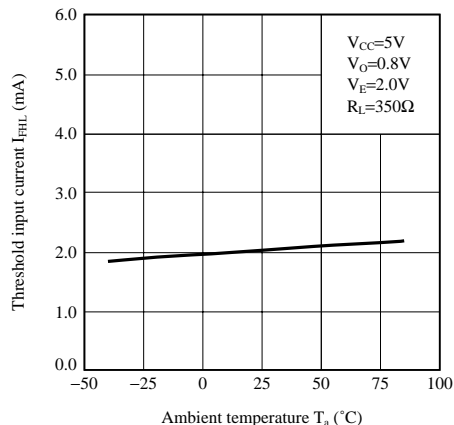
Fig.4 Forward Current vs. Ambient Temperature**Fig.5 Collector Power Dissipation vs. Ambient Temperature****Fig.6 Forward Current vs. Forward Voltage****Fig.7 High Level Output Current vs. Ambient Temperature****Fig.8 Low Level Output Voltage vs. Ambient Temperature****Fig.9 Threshold Input Current vs. Ambient Temperature**

Fig.10 Output Voltage vs. Forward Current

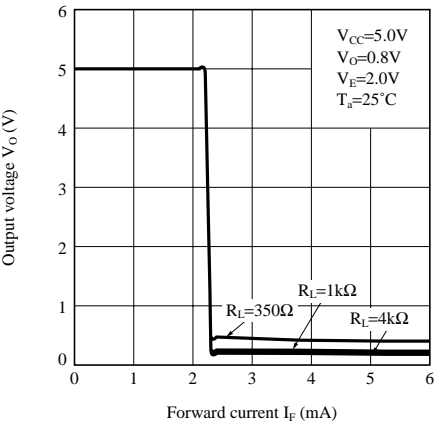


Fig.11 Propagation Delay Time vs. Forward Current

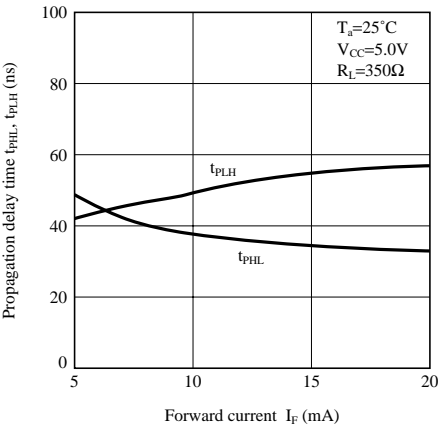
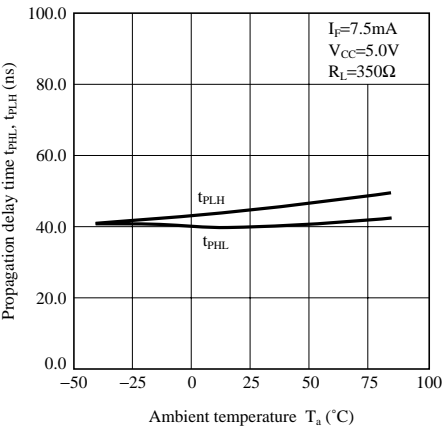


Fig.12 Propagation Delay Time vs. Ambient Temperature



NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:
 - (i) The devices in this publication are designed for use in general electronic equipment designs such as:
 - Personal computers
 - Office automation equipment
 - Telecommunication equipment [terminal]
 - Test and measurement equipment
 - Industrial control
 - Audio visual equipment
 - Consumer electronics
 - (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
 - Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
 - Traffic signals
 - Gas leakage sensor breakers
 - Alarm equipment
 - Various safety devices, etc.
 - (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
 - Space applications
 - Telecommunication equipment [trunk lines]
 - Nuclear power control equipment
 - Medical and other life support equipment (e.g., scuba).
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Law of Japan, it is necessary to obtain approval to export such SHARP devices.
- This publication is the proprietary product of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.