

PC911

Ultra-high Speed Response and High CMR OPIC Photocoupler

※ Lead forming type (I type) and taping reel type (P type) are also available. (PC911I/PC911P)

■ Features

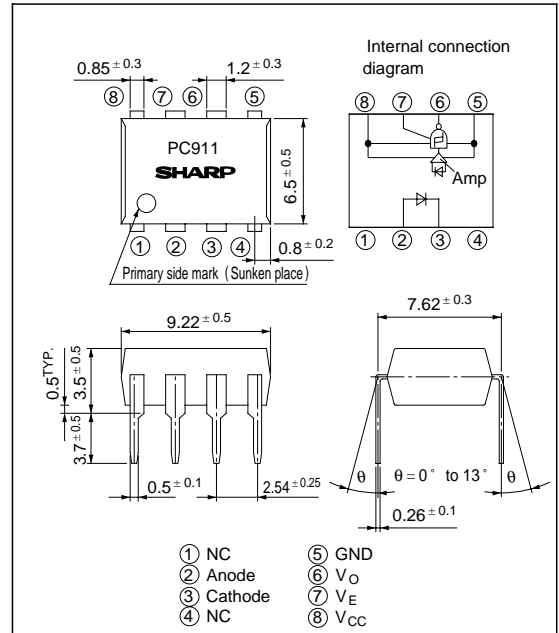
1. Ultra-high speed response
(t_{PHL} , t_{PLH} : TYP. 50ns)
2. High instantaneous common mode rejection voltage (CM_H : TYP. 10kV/ μ s)
3. High isolation voltage
(V_{iso} : 4 000V_{rms})
4. Recognized by UL, file No. E64380

■ Applications

1. High speed interfaces for computer peripherals and microcomputer systems
2. High speed line receivers
3. Interfaces with various data transmission equipment

■ 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.

■ 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
	^{*1} Power dissipation	P	40 mW
Output	Supply voltage	V_{CC}	7 V
	^{*2} Enable voltage	V_E	7 V
	High level output current	V_{OH}	- 8 mA
	Low level output current	I_{OL}	25 mA
	^{*1} _{*3} Power dissipation	P	40 mW
	^{*4} Isolation voltage	V_{iso}	4 000 V _{rms}
Operating temperature	T_{opr}	0 to + 70	$^\circ\text{C}$
Storage temperature	T_{stg}	- 55 to + 125	$^\circ\text{C}$
^{*5} Soldering temperature	T_{sol}	260	$^\circ\text{C}$

*1 $T_a = 0$ to 70°C

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

*3 Applicable to output terminal (V_o)

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

*5 For 10 seconds at the position of 2mm or more from root of lead pins.

■ Electro-optical Characteristics

(Ta= 0 to 70°C unless specified)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit		
Input	Forward voltage	V_F	Ta = 25°C, I _F = 10mA	-	1.6	1.9	V		
	Reverse current	I_R	Ta = 25°C, V _R = 5V	-	-	10	μA		
	Terminal capacitance	C_t	Ta = 25°C, V = 0, f = 1MHz	-	60	120	pF		
Output	High level output voltage	V_{OH}	V _{CC} = 4.5V, I _{OH} = -2mA, I _F = 0.25mA, V _E = 0.2V	2.4	-	-	V		
	Low level output voltage	V_{OL}	V _{CC} = 4.5V, V _E = 2.0V, I _F = 5mA, I _{OL} = 13mA	-	0.3	0.6	V		
	High level enable voltage	V_{EH}	V _{CC} = 5.5V	2.0	-	-	V		
	Low level enable voltage	V_{EL}	V _{CC} = 5.5V	-	-	0.8	V		
	High level enable current	I_{EH}	V _{CC} = 5.5V, V _E = 5.5V	-	-	100	μA		
	Low level enable current	I_{EL}	V _{CC} = 5.5V, V _E = 0.5V	-	-0.2	-0.4	mA		
	High level supply current	I_{CCH}	V _{CC} = 5.5V, I _F = 0, V _E = 2.0V	-	13	23	mA		
	Low level supply current	I_{CCL}	V _{CC} = 5.5V, I _F = 10mA, V _E = 2.0V	-	15	25	mA		
	High impedance supply current	I_{CCZ}	V _{CC} = 5.5V, V _E = 0	-	16	26	mA		
	Output leak current	I_{OH}	V _{CC} = 5.5V, V _E = 2.0V, V _O = 5.5V, I _F = 0.25mA	-	-	100	μA		
	High impedance output current	I_{OZH}	V _{CC} = 5.5V, V _E = 0.4V	-	-	100	μA		
Output short-circuit current	I_{OS}	V _{CC} = 5.5V, V _O = 0, I _F = 0, within 10ms.	-10	-	-50	mA			
Transfer characteristics	“High→Low” threshold input current		I_{FHL}	V _{CC} = 5V, V _E = 2.0V	-	2.5	5	mA	
	“Low→High” threshold input current		I_{FLH}	V _{CC} = 5V, V _E = 2.0V	0.5	1.9	-	mA	
	Hysteresis		I_{FLH}/I_{FHL}	V _{CC} = 5V, V _E = 2.0V	0.55	-	0.95	-	
	Isolation resistance		R_{ISO}	Ta = 25°C, DC500V, 40 to 60% RH	5 x 10 ¹⁰	10 ¹¹	-	Ω	
	Floating capacitance		C_f	Ta = 25°C, V = 0, f = 1MHz	-	0.6	5	pF	
	Response characteristics	“High→Low” propagation delay time		t_{PHL}	Ta = 25°C, V _{CC} = 5V C _L = 15pF I _F = 7.5mA, Fig. 1	-	50	75	ns
		“Low→High” propagation delay time		t_{PLH}		-	50	75	ns
		*6 Pulse width distortion		ΔT_w		-	-	35	ns
		Rise time, Fall time		t_r, t_f		-	15	30	ns
		“High→Low” enable propagation delay time		t_{EHL}		Ta = 25°C, V _{CC} = 5V R _L = 350Ω, C _L = 15pF	-	40	70
“Low→High” enable propagation delay time		t_{ELH}	I _F = 7.5mA, V _{EH} = 3V V _{EL} = 0, Fig. 2	-		40	70	ns	
CMR	Instantaneous common mode rejection voltage “output : High level”		CM_H	Ta = 25°C, V _{CC} = 5V, V _{CM} = 50V I _F = 0mA, V _{O(MIN.)} = 2V, Fig. 3	3 000	10 000	-	V/μs	
	Instantaneous common mode rejection voltage “output : Low level”		CM_L	Ta = 25°C, V _{CC} = 5V, V _{CM} = 50V I _F = 5mA, V _{O(MAX.)} = 0.8V, Fig. 3	-3 000	-10 000	-	V/μs	

*6 $\Delta T_w = t_{PHL} - t_{PLH}$

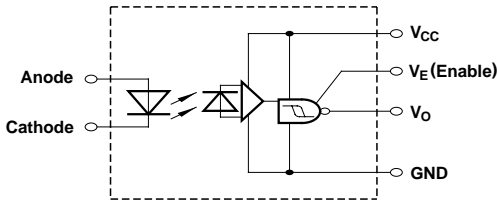
All typical values : at Ta = 25°C, V_{CC} = 5V

■ Recommended Operating Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Low level input current	I_{FL}	0	250	μA
High level input current	I_{FH}	7	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}	0	70	$^{\circ}C$

1. When the enable input is not used, please connect to V_{CC} .
2. In order to stabilize power supply line, connect a by-pass ceramic capacitor (0.01 to 0.1 μF) between V_{CC} and GND at the position within 1cm from pin.

Block Diagram



Truth table

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

L : Logic (0)
 H : Logic (1)
 Z : High impedance

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

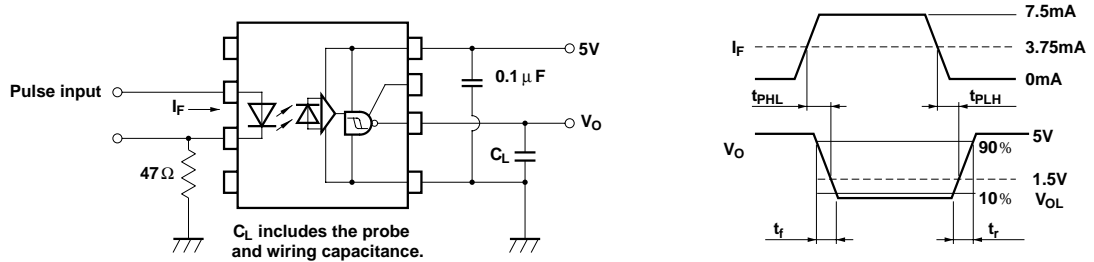


Fig. 2 Test Circuit for t_{EHL} and t_{ELH}

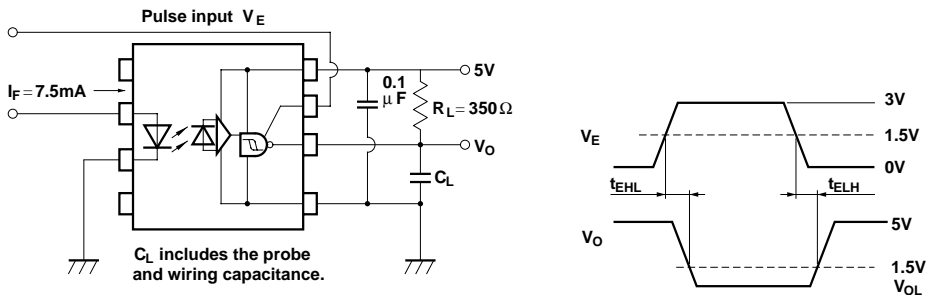


Fig. 3 Test Circuit for CM_H and CM_L

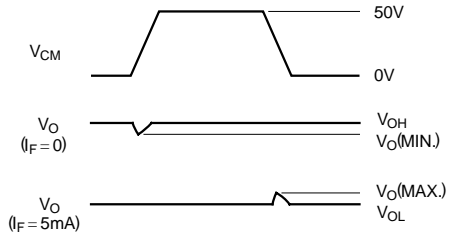
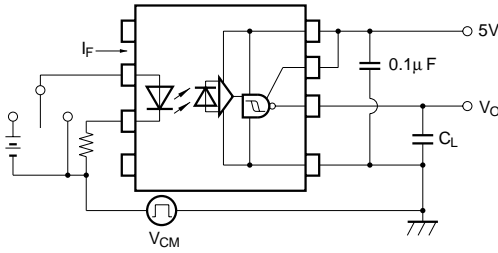


Fig. 4 Forward Current vs. Forward Voltage

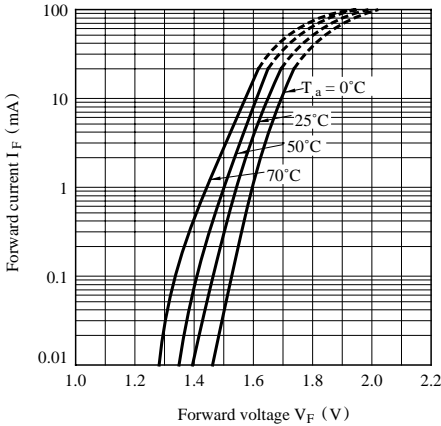


Fig. 5 Low Level Output Voltage vs. Low Level Output Current

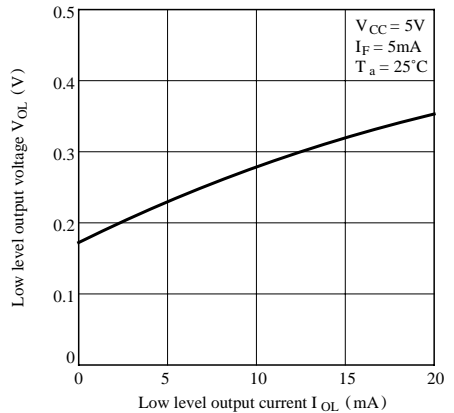


Fig. 6 High Level Output Voltage vs. High Level Output Current

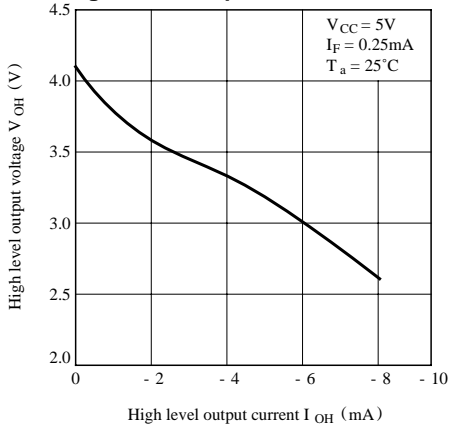


Fig. 7 Propagation Delay Time vs. Ambient Temperature

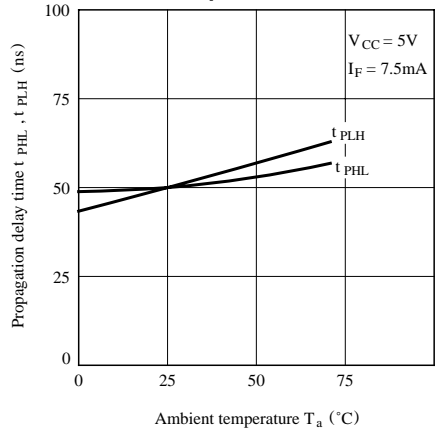
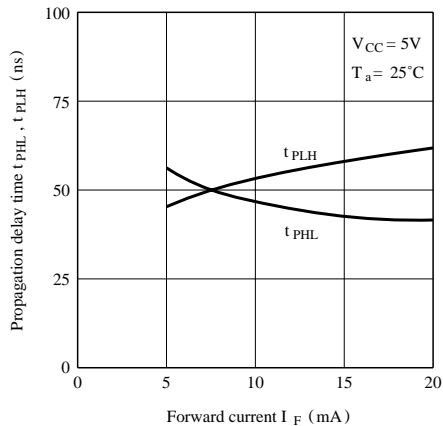


Fig. 8 Propagation Delay Time vs. Forward Current



- Please refer to the chapter “Precautions for Use”