

# 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

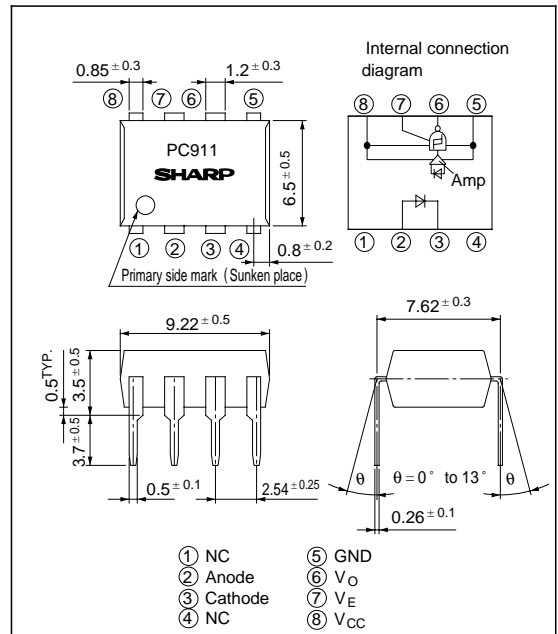
1. Ultra-high speed response  
(  $t_{PHL}$ ,  $t_{PLH}$  : TYP. 50ns )
2. High instantaneous common mode rejection voltage (  $CM_H$  : TYP. 10kV/ $\mu$ s )
3. High isolation voltage  
(  $V_{iso}$  : 4 000V<sub>rms</sub> )
4. Recognized by UL, file No. E64380

### ■ 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

( Ta = 25°C )

Parameter	Symbol	Rating	Unit
Input	*1 Forward current	I <sub>F</sub>	20 mA
	Reverse voltage	V <sub>R</sub>	5 V
Output	*1 Power dissipation	P	40 mW
	Supply voltage	V <sub>CC</sub>	7 V
	*2 Enable voltage	V <sub>E</sub>	7 V
	High level output current	V <sub>OH</sub>	- 8 mA
	Low level output current	I <sub>OL</sub>	25 mA
	*1 *3 Power dissipation	P	40 mW
	*4 Isolation voltage	V <sub>iso</sub>	4 000 V <sub>rms</sub>
Operating temperature	T <sub>opr</sub>	0 to + 70 °C	
Storage temperature	T <sub>stg</sub>	- 55 to + 125 °C	
*5 Soldering temperature	T <sub>sol</sub>	260 °C	

\*1 Ta = 0 to 70°C

\*2 Shall not exceed 500mV from supply voltage(V<sub>CC</sub>).

\*3 Applicable to output terminal (V<sub>O</sub>)

\*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 <sub>F</sub> = 10mA	-	1.6	1.9	V	
	Reverse current	$I_R$	Ta= 25°C, V <sub>R</sub> = 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 <sub>CC</sub> =4.5V, I <sub>OH</sub> = -2mA, I <sub>F</sub> =0.25mA, V <sub>E</sub> =0.2V	2.4	-	-	V	
	Low level output voltage	$V_{OL}$	V <sub>CC</sub> =4.5V, V <sub>E</sub> =2.0V, I <sub>F</sub> =5mA, I <sub>OL</sub> =13mA	-	0.3	0.6	V	
	High level enable voltage	$V_{EH}$	V <sub>CC</sub> = 5.5V	2.0	-	-	V	
	Low level enable voltage	$V_{EL}$	V <sub>CC</sub> = 5.5V	-	-	0.8	V	
	High level enable current	$I_{EH}$	V <sub>CC</sub> = 5.5V, V <sub>E</sub> = 5.5V	-	-	100	μA	
	Low level enable current	$I_{EL}$	V <sub>CC</sub> = 5.5V, V <sub>E</sub> = 0.5V	-	-0.2	-0.4	mA	
	High level supply current	$I_{CCH}$	V <sub>CC</sub> = 5.5V, I <sub>F</sub> = 0, V <sub>E</sub> = 2.0V	-	13	23	mA	
	Low level supply current	$I_{CCL}$	V <sub>CC</sub> = 5.5V, I <sub>F</sub> = 10mA, V <sub>E</sub> = 2.0V	-	15	25	mA	
	High impedance supply current	$I_{CZ}$	V <sub>CC</sub> = 5.5V, V <sub>E</sub> = 0	-	16	26	mA	
	Output leak current	$I_{OH}$	V <sub>CC</sub> = 5.5V, V <sub>E</sub> = 2.0V, V <sub>O</sub> = 5.5V, I <sub>F</sub> = 0.25mA	-	-	100	μA	
	High impedance output current	$I_{OZH}$	V <sub>CC</sub> = 5.5V, V <sub>E</sub> = 0.4V	-	-	100	μA	
	Output short-circuit current	$I_{OS}$	V <sub>CC</sub> = 5.5V, V <sub>O</sub> = 0, I <sub>F</sub> = 0, within 10ms.	- 10	-	- 50	mA	
	Transfer characteristics	“High→Low” threshold input current	$I_{FHL}$	V <sub>CC</sub> = 5V, V <sub>E</sub> = 2.0V	-	2.5	5	mA
“Low→High” threshold input current		$I_{FLH}$	V <sub>CC</sub> = 5V, V <sub>E</sub> = 2.0V	0.5	1.9	-	mA	
Hysteresis		$I_{FLH}/I_{FHL}$	V <sub>CC</sub> = 5V, V <sub>E</sub> = 2.0V	0.55	-	0.95	-	
Isolation resistance		$R_{ISO}$	Ta= 25°C, DC500V, 40 to 60% RH	5 x 10 <sup>10</sup>	10 <sup>11</sup>	-	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 <sub>CC</sub> = 5V C <sub>L</sub> = 15pF I <sub>F</sub> = 7.5mA, Fig. 1	-	50	75	ns
		“Low→High” propagation delay time	$t_{PLH}$		-	50	75	ns
		*6 Pulse width distortion	$\Delta T_W$		-	-	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 <sub>CC</sub> = 5V R <sub>L</sub> = 350Ω, C <sub>L</sub> = 15pF	-	40	70
	“Low→High” enable propagation delay time	$t_{ELH}$	I <sub>F</sub> = 7.5mA, V <sub>EH</sub> = 3V V <sub>EL</sub> = 0, Fig. 2		-	40	70	ns
CMR	Instantaneous common mode rejection voltage “output : High level”	$CM_H$	Ta= 25°C, V <sub>CC</sub> = 5V, V <sub>CM</sub> = 50V I <sub>F</sub> = 0mA, V <sub>O(MIN.)</sub> = 2V, Fig. 3	3 000	10 000	-	V/μs	
	Instantaneous common mode rejection voltage “output : Low level”	$CM_L$	Ta= 25°C, V <sub>CC</sub> = 5V, V <sub>CM</sub> = 50V I <sub>F</sub> = 5mA, V <sub>O(MAX.)</sub> = 0.8V, Fig. 3	- 3 000	- 10 000	-	V/μs	

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

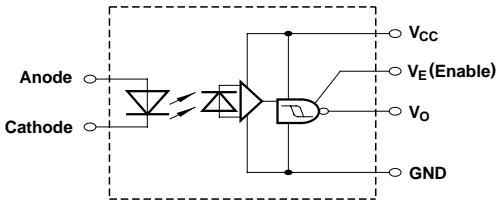
All typical values : at Ta= 25°C, V<sub>CC</sub>= 5V

■ Recommended Operating Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Low level input current	$I_{FL}$	0	250	$\mu A$
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  $\mu F$ ) 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  $t_f$

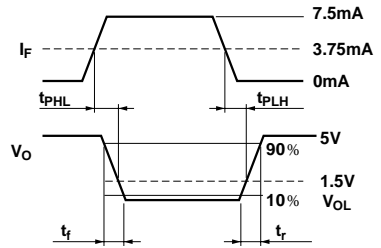
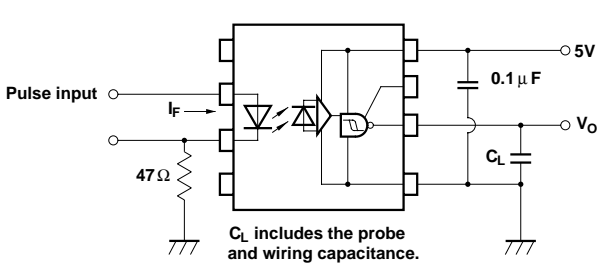


Fig. 2 Test Circuit for  $t_{EHL}$  and  $t_{ELH}$

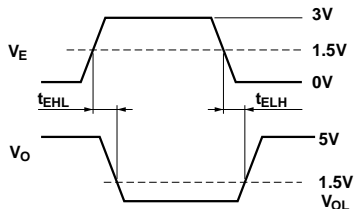
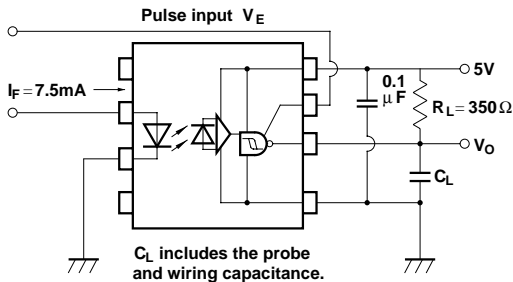


Fig. 3 Test Circuit for CM<sub>H</sub> and CM<sub>L</sub>

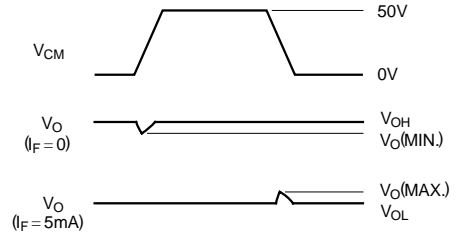
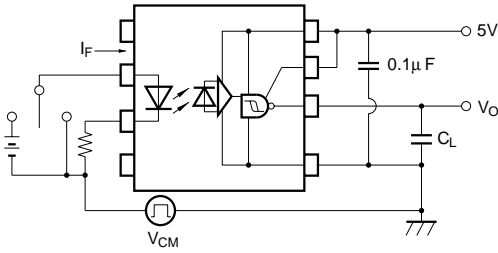


Fig. 4 Forward Current vs. Forward Voltage

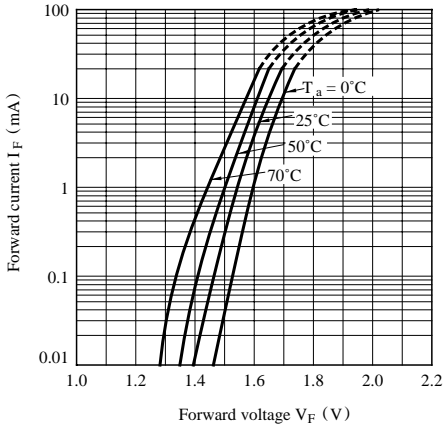


Fig. 5 Low Level Output Voltage vs. Low Level Output Current

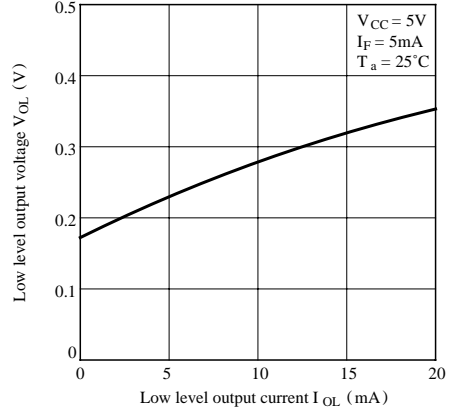


Fig. 6 High Level Output Voltage vs. High Level Output Current

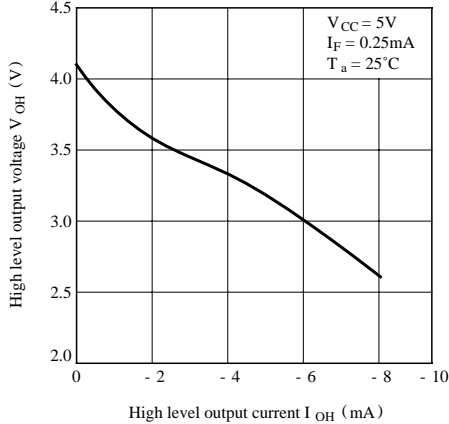
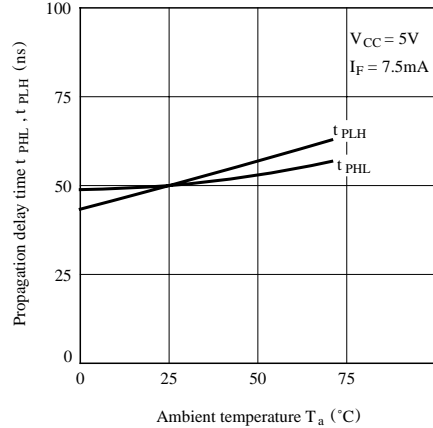
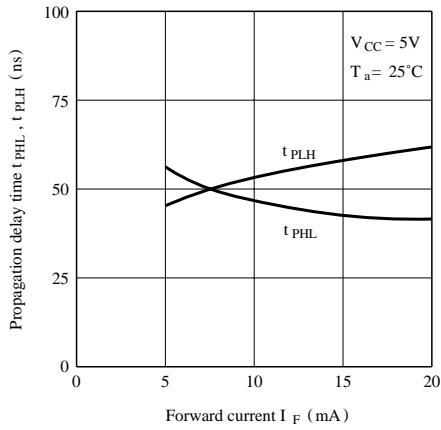


Fig. 7 Propagation Delay Time vs. Ambient Temperature



**Fig. 8 Propagation Delay Time vs. Forward Current**



- Please refer to the chapter “Precautions for Use”