

PC912X

Ultra-high Speed Response OPIC Photocoupler

■ Features

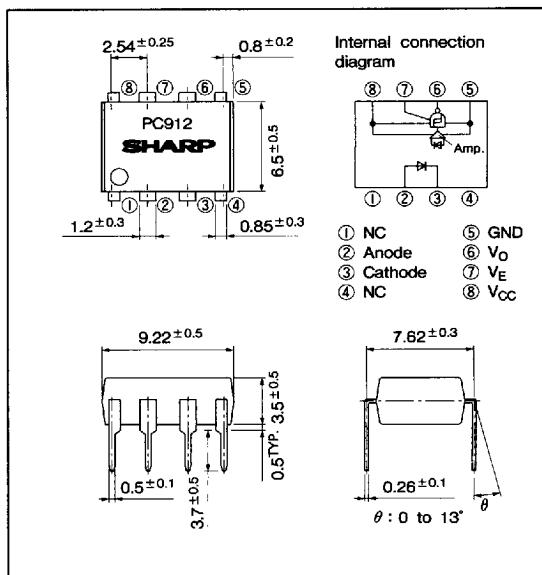
1. Ultra-high speed response (t_{PHL} , t_{PLH} : TYP. 40ns)
2. High instantaneous common mode rejection voltage (CM_H : MIN. 3kV/ μ s)
3. Capable of high speed digital transmission (Transmission speed : MAX. 20Mb/s) (NRZ signal)

■ Applications

1. Personal computers
2. Electrical music instruments

■ 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 _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	I _{OH}	-8	mA
	Low level output current	I _{OL}	25	mA
	* ¹ , ³ Collector power dissipation	P _O	40	mW
	* ⁴ Isolation voltage	V _{iso}	2.5	kV _{rms}
Operating temperature		T _{opr}	0 to +70	°C
Storage temperature		T _{stg}	-55 to +125	°C
* ⁵ Soldering temperature		T _{sol}	260	°C

*1 Ta=0 to 70°C

*2 It shall not exceed 500mV or more over supply voltage (V_{CC}).*3 Applied to output terminal (V_O)

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

*5 For 10 seconds

8180798 0011816 820

512

In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that occur in equipment using any of SHARP's devices, shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest version of the device specification sheets before using any SHARP's device.

■ Electro-optical Characteristics

(Unless specified : $T_a = 0$ to 70°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V_F	$T_a = 25^\circ\text{C}$, $I_F = 10\text{mA}$	—	1.6	1.9	V
	Reverse current	I_R	$T_a = 25^\circ\text{C}$, $V_R = 5\text{V}$	—	—	10	μA
	Terminal capacitance	C_t	$T_a = 25^\circ\text{C}$, $V_F = 0\text{V}$ $f = 1\text{MHz}$	—	60	120	pF
Output	High level output voltage	V_{OH}	$V_{CC} = 4.5\text{V}$, $I_{OH} = -2\text{mA}$ $I_F = 0.25\text{mA}$, $V_E = 2.0\text{V}$	2.4	—	—	V
	Low level output voltage	V_{OL}	$V_{CC} = 4.5\text{V}$, $V_E = 2.0\text{V}$ $I_F = 5\text{mA}$, $I_{OL} = 13\text{mA}$	—	0.3	0.6	V
	High level enable voltage	V_{EH}	$V_{CC} = 5.5\text{V}$	2.0	—	—	V
	Low level enable voltage	V_{EL}	$V_{CC} = 5.5\text{V}$	—	—	0.8	V
	High level enable current	I_{EH}	$V_{CC} = 5.5\text{V}$, $V_E = 5.5\text{V}$	—	—	100	μA
	Low level enable current	I_{EL}	$V_{CC} = 5.5\text{V}$, $V_E = 0.5\text{V}$	—	-0.2	-0.4	mA
	High level supply current	I_{CCH}	$V_{CC} = 5.5\text{V}$, $I_F = 0\text{mA}$ $V_E = 2.0\text{V}$	—	13	23	mA
	Low level supply current	I_{CCL}	$V_{CC} = 5.5\text{V}$, $I_F = 10\text{mA}$ $V_E = 2.0\text{V}$	—	15	25	mA
	High impedance supply current	I_{CCZ}	$V_{CC} = 5.5\text{V}$, $V_E = 0\text{V}$	—	16	26	mA
	Output leak current	I_{OH}	$V_{CC} = 5.5\text{V}$, $V_E = 2.0\text{V}$ $V_O = 5.5\text{V}$, $I_F = 0.25\text{mA}$	—	—	100	μA
Transfer characteristics	High impedance output current	I_{OZH}	$V_{CC} = 5.5\text{V}$, $V_E = 0.4\text{V}$	—	—	100	μA
	Output short-circuit current	I_{OS}	$V_{CC} = 5.5\text{V}$, $V_O = 0\text{V}$ $I_F = 0\text{mA}$ 10ms or less	-10	—	-50	mA
	"High→Low" threshold input current	I_{FHL}	$V_{CC} = 5\text{V}$ $V_E = 2.0\text{V}$	—	2.5	5	mA
	"Low→High" threshold input current	I_{FLH}		0.5	1.9	—	mA
	Hysteresis	I_{FLH}/I_{FHL}		0.55	—	0.95	—
Transfer characteristics	Isolation resistance	R_{iso}	$T_a = 25^\circ\text{C}$, DC = 500V 40 to 60%RH	5×10^{10}	10^{11}	—	Ω
	Floating capacitance	C_f	$T_a = 25^\circ\text{C}$, $V = 0\text{V}$ $f = 1\text{MHz}$	—	0.6	5	pF
	"High→Low" propagation delay time	t_{PHL}	$T_a = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$ $C_L = 15\text{pF}$ $I_F = 7.5\text{mA}$ *6	—	40	55	ns
	"Low→High" propagation delay time	t_{PLH}		—	40	55	ns
	Pulse width distortion $ t_{PHL} - t_{PLH} $	ΔT_w		—	—	15	ns
	Rise/fall time	t_r, t_f		—	15	30	ns
	"High→Low" enable propagation delay time	t_{EHL}		—	40	70	ns
	"Low→High" enable propagation delay time	t_{ELH}	$T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$ $R_L = 350\Omega$, $C_L = 15\text{pF}$ $I_F = 7.5\text{mA}$, $V_{EH} = 3\text{V}$ $V_{EL} = 0\text{V}$, *7	—	40	70	ns
	Instantaneous common mode rejection voltage (High level output)	CM_H		3 000	10 000	—	V/ μs
	Instantaneous common mode rejection voltage (Low level output)	CM_L	$T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$ $V_{CM} = 50\text{V}$, $I_F = 5\text{mA}$ $V_O(\text{Max}) = 0.8\text{V}$, *8	-3 000	10 000	—	V/ μs

*6 Refer to Fig. 1 *7 Refer to Fig. 2 *8 Refer to Fig. 3

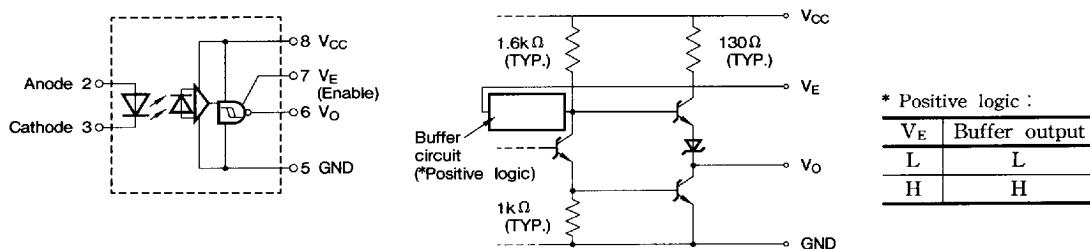
All typical values are at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$.

■ 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
Fan out (TTL load)	N	—	8	—
Operating temperature	T_{OPR}	0	70	°C

- When the enable input is not used, please connect to V_{CC} .
- It is necessary to 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_f and t_r

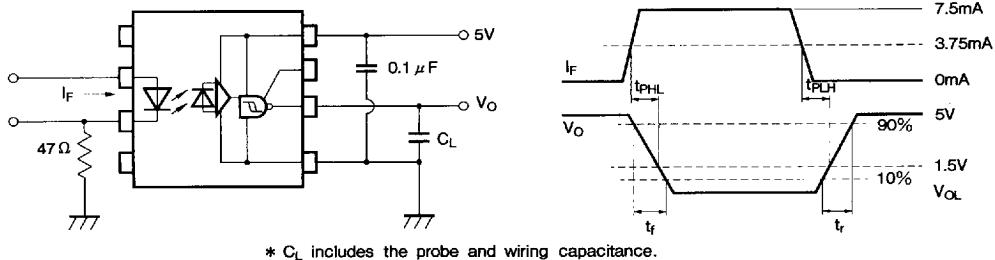
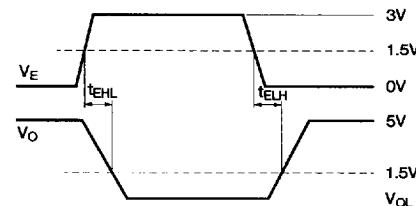
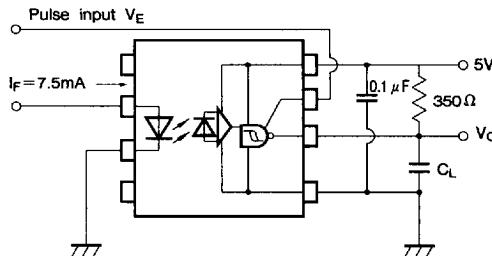
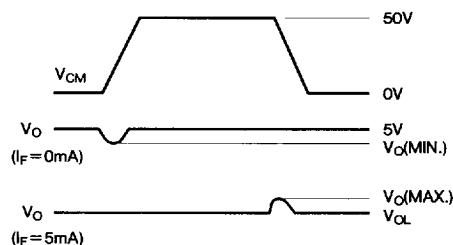
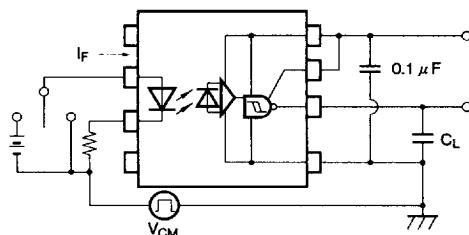
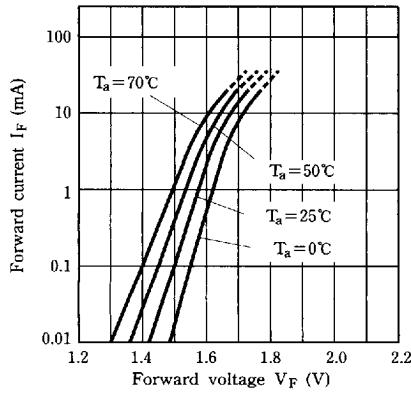
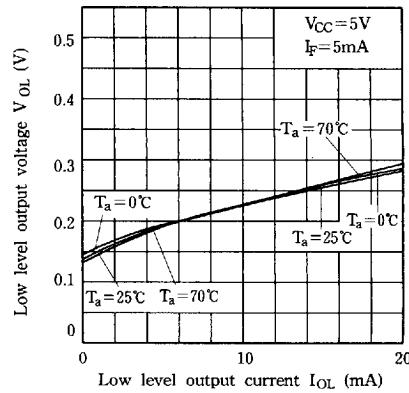
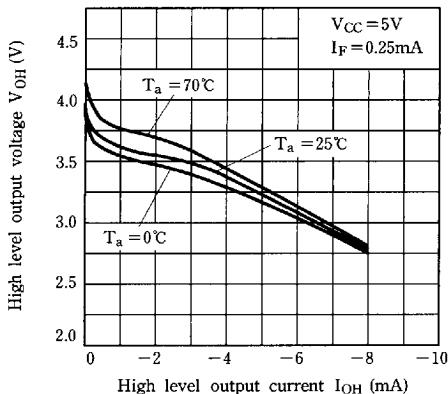


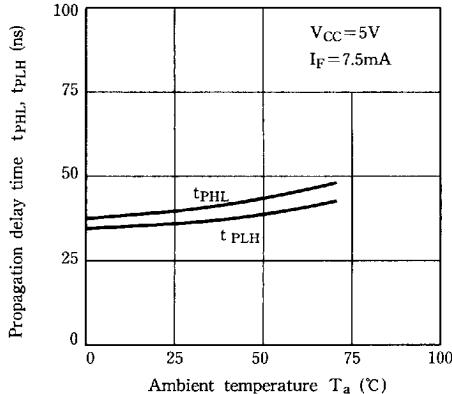
Fig. 2 Test Circuit for t_{ELH} and t_{EHL} **Fig. 3 Test Circuit for CM_H and CM_L** **Fig. 4 Forward Current vs. Forward Voltage****Fig. 5 Low Level Output Voltage vs. Low Level Output Current**

■ 8180798 0011819 53T ■

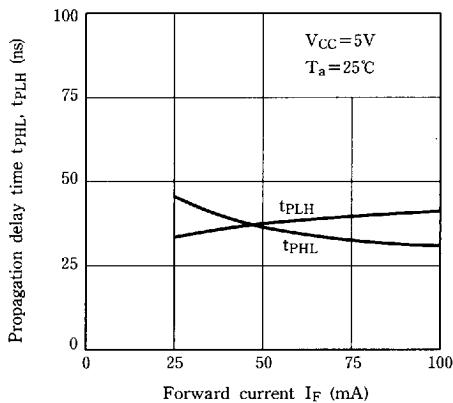
**Fig. 6 High Level Output Voltage vs.
High Level Output Current**



**Fig. 7 Propagation Delay Time vs.
Ambient Temperature**



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



- Please refer to the chapter "Precautions for Use" (Page 78 to 93).