

# PC9D10

## Ultra-high Speed Response, 2-channel OPIC Photocoupler

### ■ Features

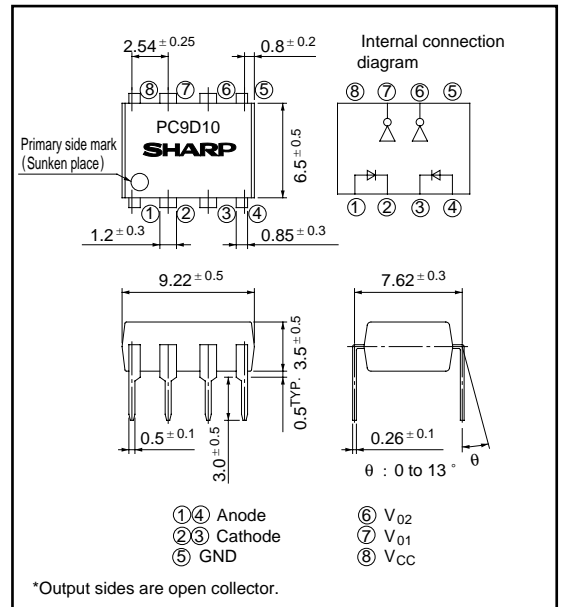
1. Built-in 2-channel
2. Ultra-high speed response  
( $t_{PHL}$ ,  $t_{PLH}$  : TYP. 50ns at  $R_L = 350\Omega$ )
3. Isolation voltage between input and output  
( $V_{ISO}$  : 2 500V<sub>rms</sub>)
4. Low input current drive ( $I_{FHL}$  : MAX. 5mA)
5. Instantaneous common mode rejection  
voltage ( $CM_H$  : TYP. 500V/ $\mu$ s)
6. Recognized by UL. file No. 64380

### ■ Applications

1. Computer peripherals high speed interface  
for microcomputer systems
2. High speed line receivers
3. Digital audio equipment
4. Interface with various data transfer 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 *2 Forward current	$I_F$	15	mA
	*2 Reverse voltage	$V_R$	5	V
	*1 *2 Power dissipation	$P$	40	mW
Output	*3 Supply voltage	$V_{CC}$	7	V
	*2 High level output voltage	$V_{OH}$	7	V
	*2 Low level output current	$I_{OL}$	16	mA
	Collector power dissipation	$P_C$	60	mW
*4 Isolation voltage		$V_{iso}$	2 500	V <sub>rms</sub>
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  $70^\circ\text{C}$

\*2 Each channel

\*3 For 1 minute max.

\*4 AC for 1 minute, 40 to 60% RH. Apply the specified voltage between the whole of the electrode pins on the input side and the whole of the electrode pins on the output side.

\*5 2mm or more away from the lead base for 10 seconds or less

## ■ Electro-optical Characteristics

( Unless otherwise specified,  $T_a = 0$  to  $+ 70^{\circ}\text{C}$  )

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	1.75	V	
	Reverse current	$I_R$	$T_a = 25^{\circ}\text{C}, V_R = 5\text{V}$	-	-	10	$\mu\text{A}$	
	Terminal capacitance	$C_t$	$T_a = 25^{\circ}\text{C}, V = 0, f = 1\text{MHz}$	-	60	250	pF	
Output	High level output current	$I_{OH}$	$V_{CC} = V_O = 5.5\text{V}, I_F = 250\mu\text{A}$	-	2	250	$\mu\text{A}$	
	Low level output voltage	$V_{OL}$	$V_{CC} = 5.5\text{V}, I_F = 5\text{mA}, I_{OL} = 13\text{mA}$	-	0.4	0.6	V	
	High level supply current	$I_{CCH}$	$V_{CC} = 5.5\text{V}, I_F = 0$	-	14	30	mA	
	Low level supply current	$I_{CCL}$	$V_{CC} = 5.5\text{V}, I_F = 10\text{mA}$	-	26	36	mA	
Transfer characteristics	“ High→Low ” threshold input current	$I_{FHL}$	$V_{CC} = 5\text{V}, V_O = 0.8\text{V}, R_L = 350\Omega$	-	2.5	5	mA	
	Isolation resistance	$R_{ISO}$	$T_a = 25^{\circ}\text{C}, \text{DC}500\text{V}, 40$ to $60\% \text{RH}$	$5 \times 10^{10}$	$10^{11}$	-	$\Omega$	
	Floating capacitance	$C_f$	$T_a = 25^{\circ}\text{C}, V = 0, f = 1\text{MHz}$	-	0.6	-	pF	
	Response time	“ High→Low ” propagation delay time	$t_{PHL}$	$T_a = 25^{\circ}\text{C}, V_{CC} = 5\text{V}$ Fig.1	-	50	75	ns
		“ Low→High ” propagation delay time	$t_{PLH}$	$R_L = 350\Omega, C_L = 15\text{pF}$	-	50	75	ns
		Rise time, Fall time	$t_r, t_f$	$I_F = 7.5\text{mA}$	-	30	60	ns
	CMR	Instantaneous common mode rejection voltage “ High level output ”	$CM_H$	$T_a = 25^{\circ}\text{C}, V_{CC} = 5\text{V}, V_{O(MIN)} = 2\text{V}$ Fig.2 $V_{CM} = 10\text{V}, R_L = 350\Omega, I_F = 0$	100	500	-	V/ $\mu\text{s}$
Instantaneous common mode rejection voltage “ Low level output ”		$CM_L$	$T_a = 25^{\circ}\text{C}, V_{CC} = 5\text{V}, V_{O(MAX)} = 0.8\text{V}$ Fig.2 $V_{CM} = 10\text{V}, R_L = 350\Omega, I_F = 5\text{mA}$	- 100	- 500	-	V/ $\mu\text{s}$	

All typical values : 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	$\mu\text{A}$
High level input current	$I_{FH}$	7	15	mA
Supply voltage	$V_{CC}$	4.5	5.5	V
Fanout (TTL load)	N	-	8	-
Operating temperature	$T_{opr}$	0	70	$^{\circ}\text{C}$

Connect a ceramic by-pass capacitor (0.01 to  $0.1\mu\text{F}$ ) between  $V_{CC}$  and GND at the position within 1cm from pin.

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

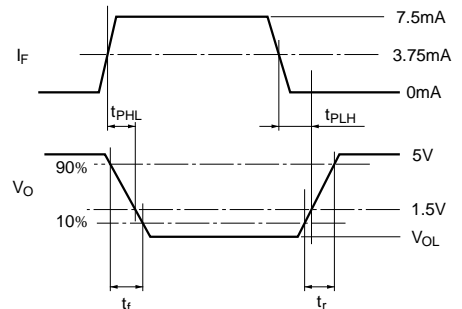
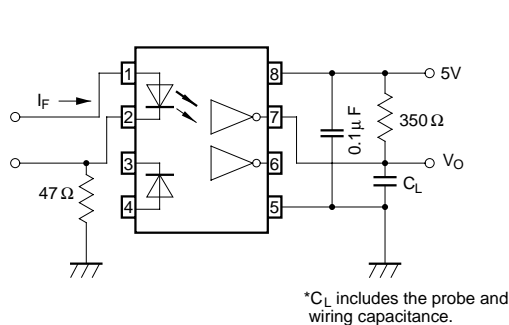


Fig. 2 Test Circuit for CM<sub>H</sub> and CM<sub>L</sub>

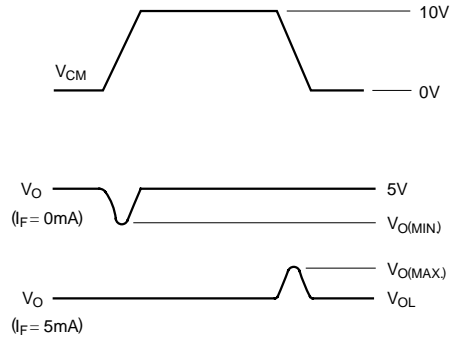
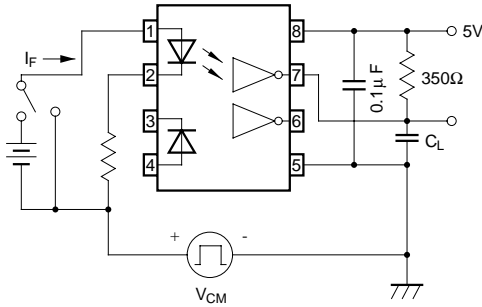


Fig. 3 Collector Power Dissipation vs. Ambient Temperature

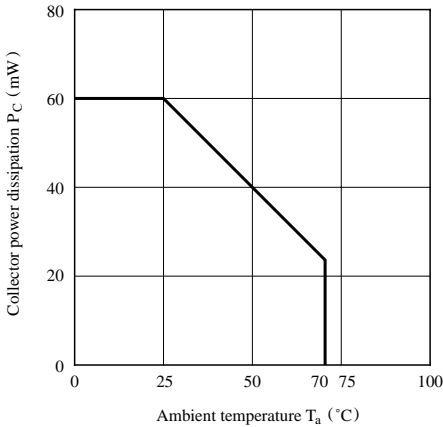


Fig. 4 Forward Current vs. Forward Voltage

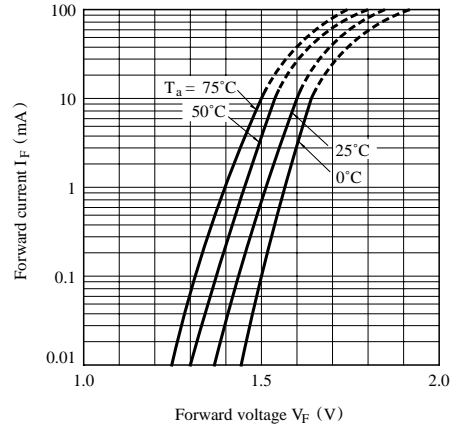


Fig. 5 High Level Output Current vs. Ambient Temperature

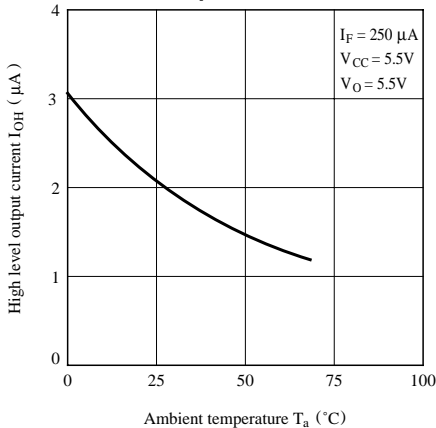


Fig. 6 Low Level Output Voltage vs. Ambient Temperature

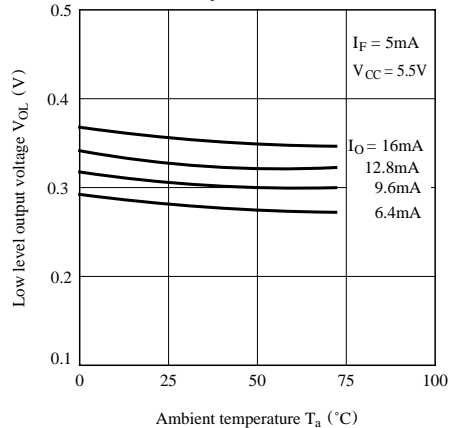


Fig. 7-a Output Voltage vs. Forward Current

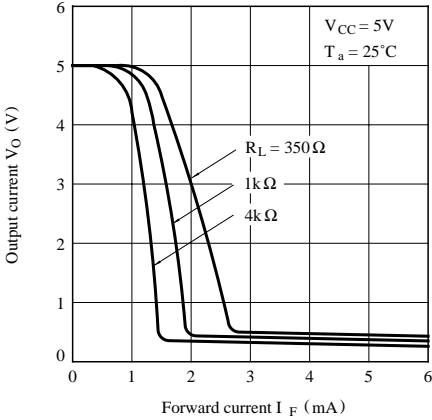


Fig. 7-b Output Voltage vs. Forward Current (Ambient Temp. Characteristics)

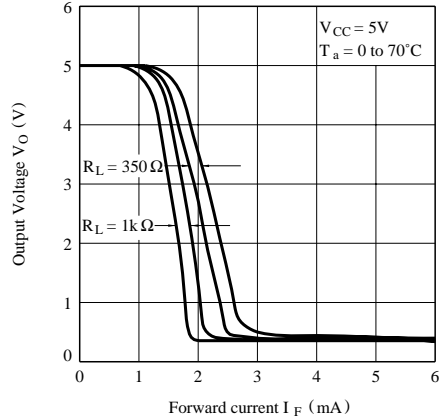


Fig. 8 Propagation Delay Time vs. Forward Current

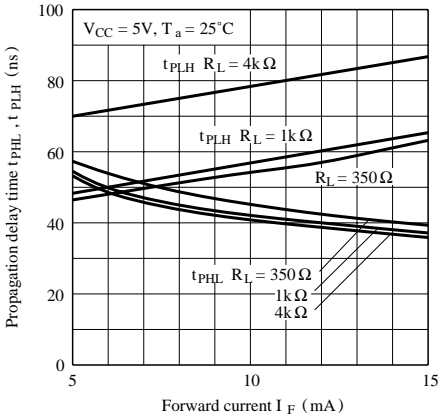


Fig. 9 Propagation Delay Time vs. Ambient Temperature

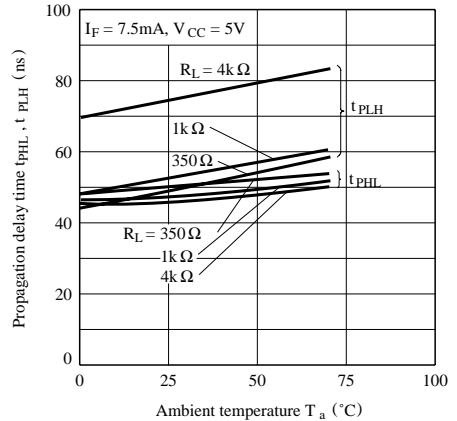
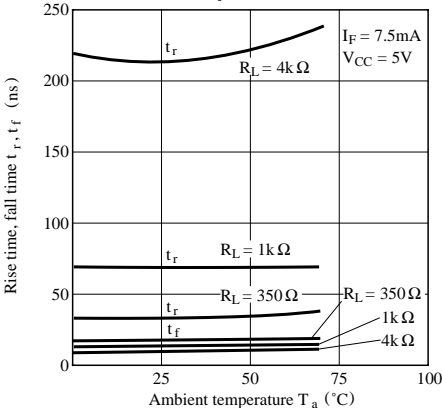


Fig. 10 Rise Time, Fall Time vs. Ambient Temperature



■ Precautions for Use

- (1) Handle this product the same as with other integrated circuits against static electricity.
- (2) As for other general cautions, refer to the chapter "Precautions for Use"

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