

# PC410

## Compact, Surface Mount Ultra-high Speed Response OPIC Photocoupler

### ■ Features

1. Mini-flat package
2. Ultra-high speed response  
( $t_{PLH}$ ,  $t_{PHL}$  : TYP. 50ns at  $R_L = 350\Omega$ )
3. Isolation voltage between input and output  
( $V_{iso}$  : 2 500  $V_{rms}$ )
4. Instantaneous common mode rejection  
voltage  $CM_H$  : TYP. 500V/ $\mu s$
5. Recognized by UL(No.64380)

### ■ Applications

1. Hybrid substrate which requires high density mounting
2. Personal computers, office computers and peripheral equipment
3. Electronic musical instruments
4. Audio equipment

### ■ Package Specifications

Model No.	Package specifications	Diameter of reel	Tape width
PC410	Taping package (Net:3 000pcs.)	370 mm	12 mm
PC410T	Taping package (Net: 750pcs.)	180 mm	12 mm
PC410Z	Sleeve package (Net: 100pcs.)	-	-

### ■ Absolute Maximum Ratings

( $T_a = 25^\circ C$ )

Parameter		Symbol	Rating	Unit
Input	*1 Forward current	$I_F$	20	mA
	Reverse voltage	$V_R$	5	V
	Power dissipation	P	40	mW
Output	*2 Supply voltage	$V_{CC}$	7	V
	High level output voltage	$V_{OH}$	7	V
	Low level output current	$I_{OL}$	50	mA
	Output collector power dissipation	$P_O$	85	mW
*3 Isolation voltage	$V_{iso}$	2 500	$V_{rms}$	
Operating temperature		$T_{opr}$	0 to + 70	$^\circ C$
Storage temperature		$T_{stg}$	- 40 to + 125	$^\circ C$
*4 Soldering temperature	$T_{sol}$	260	$^\circ C$	

\*1  $T_a = 0$  to + 70 $^\circ C$

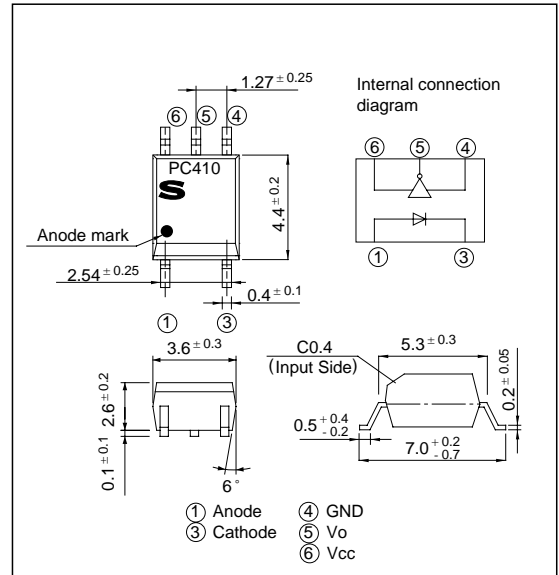
\*2 For 1 minute MAX.

\*3 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.

\*4 For 10 seconds.

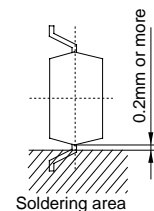
### ■ Outline Dimensions

(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

(Ta = 0 to + 70°C unless otherwise specified)

Parameter		Symbol	Conditions		MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	V <sub>F</sub>	Ta = 25°C, I <sub>F</sub> = 10mA		-	1.6	1.9	V	
	Reverse current	I <sub>R</sub>	Ta = 25°C, V <sub>R</sub> = 5V		-	-	10	μA	
	Terminal capacitance	C <sub>t</sub>	Ta = 25°C, V = 0, f = 1MHz		-	60	150	pF	
Output	Low level output voltage	V <sub>OL</sub>	I <sub>OL</sub> = 13mA, V <sub>CC</sub> = 5.5V, I <sub>F</sub> = 5mA		-	0.4	0.6	V	
	High level output current	I <sub>OH</sub>	V <sub>CC</sub> = V <sub>O</sub> = 5.5V, I <sub>F</sub> = 250mA		-	2	250	μA	
	Low level supply current	I <sub>CCL</sub>	V <sub>CC</sub> = 5.5V, I <sub>F</sub> = 10mA		-	13	18	mA	
	High level supply current	I <sub>CCH</sub>	V <sub>CC</sub> = 5.5V, I <sub>F</sub> = 0		-	7	15	mA	
	"H→L" threshold input current	I <sub>FHL</sub>	V <sub>CC</sub> = 5V, V <sub>O</sub> = 0.8V, R <sub>L</sub> = 350Ω		-	2.5	5	mA	
Transfer characteristics	Isolation resistance	R <sub>ISO</sub>	Ta = 25°C, DC500V, 40 to 60% RH		5 × 10 <sup>10</sup>	10 <sup>11</sup>	-	Ω	
	Floating capacitance	C <sub>f</sub>	Ta = 25°C, V = 0, f = 1MHz		-	0.6	-	pF	
	Response time	"H→L" propagation delay time	t <sub>PHL</sub>	Ta = 25°C V <sub>CC</sub> = 5V, I <sub>F</sub> = 7.5mA R <sub>L</sub> = 350Ω, C <sub>L</sub> = 15pF Fig. 1		-	50	120	ns
		"L→H" propagation delay time	t <sub>PLH</sub>			-	50	120	
		Fall time	t <sub>f</sub>			-	30	60	
		Rise time	t <sub>r</sub>			-	30	60	
	CMR	Instantaneous common mode rejection voltage "High level output"	CM <sub>H</sub>	I <sub>F</sub> = 0 V <sub>O</sub> (MIN.) = 2V	Ta = 25°C V <sub>CC</sub> = 5V V <sub>CM</sub> = 10V(Peak)	100	500	-	V/μs
Instantaneous common mode rejection voltage "Low level output"		CM <sub>L</sub>	I <sub>F</sub> = 5mA V <sub>O</sub> (MAX.) = 0.8V	R <sub>L</sub> = 350Ω Fig. 2	- 100	- 500	-		

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

Each characteristics shall be measured under opaque condition.

## Recommended Operation Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Low level input current	I <sub>FL</sub>	0	250	μA
High level input current	I <sub>FH</sub>	7	15	mA
Supply voltage	V <sub>CC</sub>	4.5	5.5	V
Fanout (TTL load)	N	-	8	-
Operating temperature	T <sub>opr</sub>	0	70	°C

Connect a by-pass ceramic capacitor (0.01 to 0.1 μF) between V<sub>CC</sub> and GND at the position within 1cm from lead pin.

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

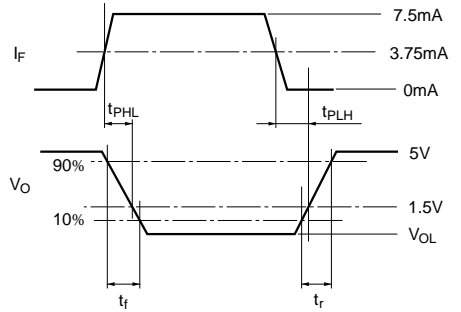
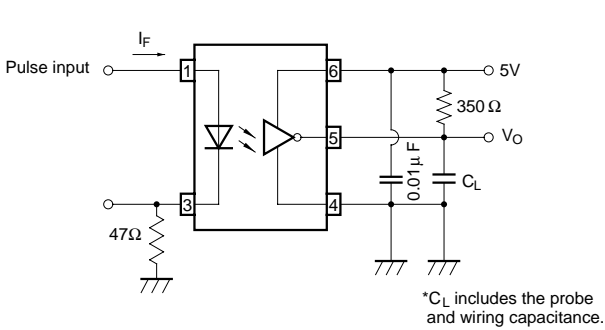


Fig. 2 Test Circuit for Instantaneous Common Mode Rejection Voltage

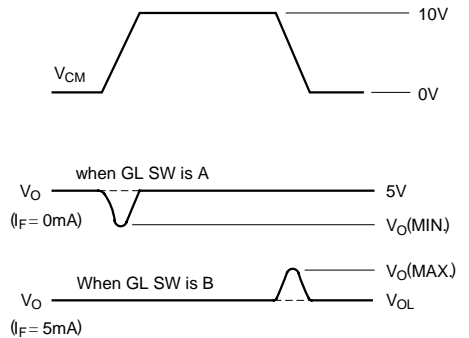
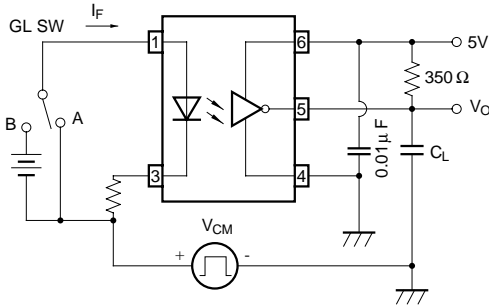


Fig. 3 Collector Power Dissipation vs. Ambient Temperature

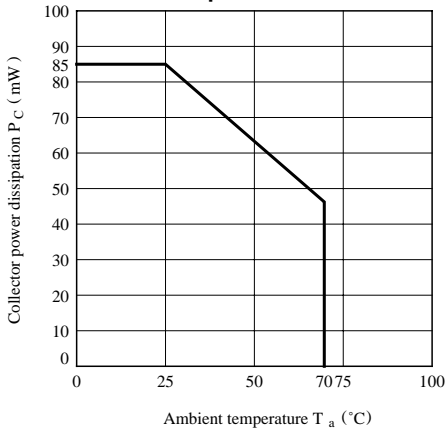
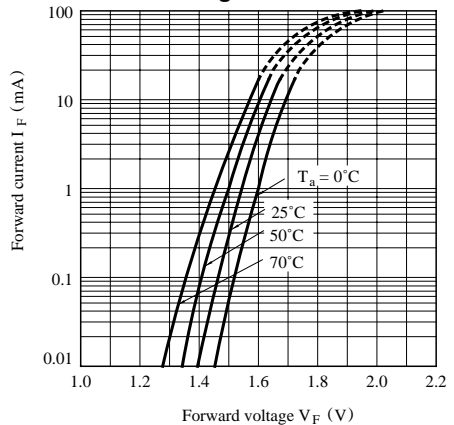
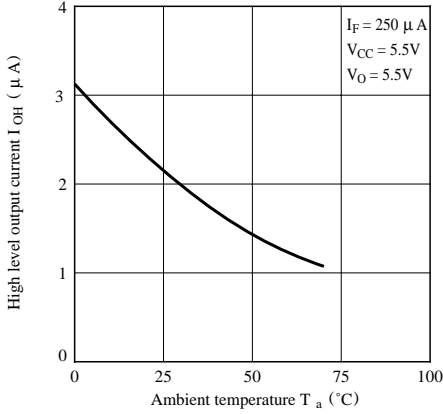


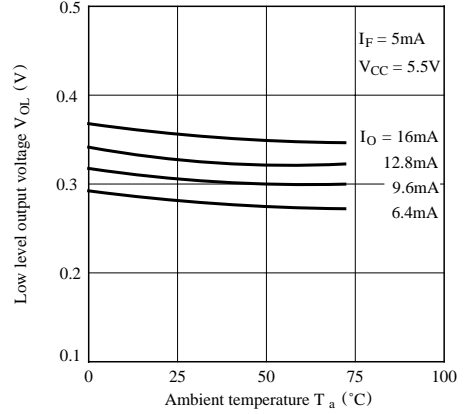
Fig. 4 Forward Current vs. Forward Voltage



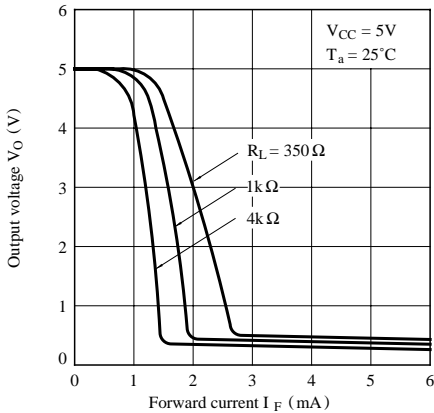
**Fig. 5 High Level Output Current vs. Ambient Temperature**



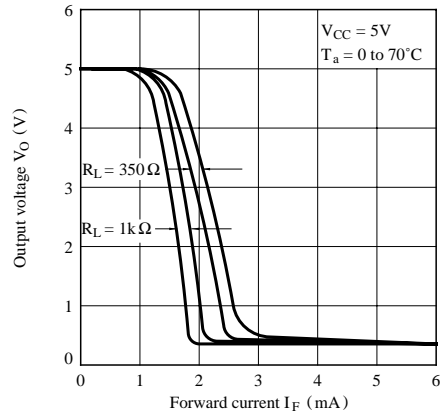
**Fig. 6 Low Level Output Voltage vs. Ambient Temperature**



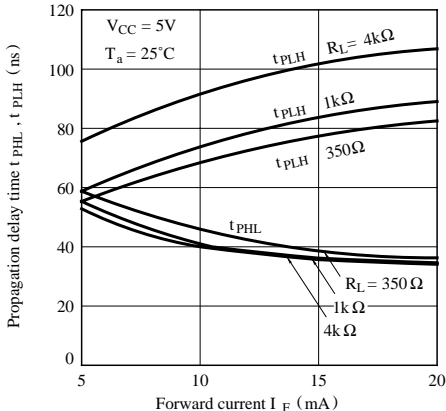
**Fig. 7-a Output Voltage vs. Forward Current**



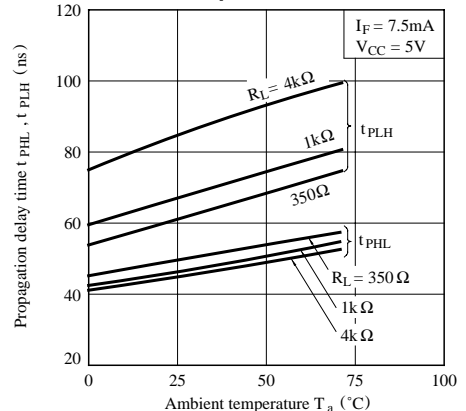
**Fig. 7-b Output Voltage vs. Forward Current (Ambient Temp. Characteristics)**



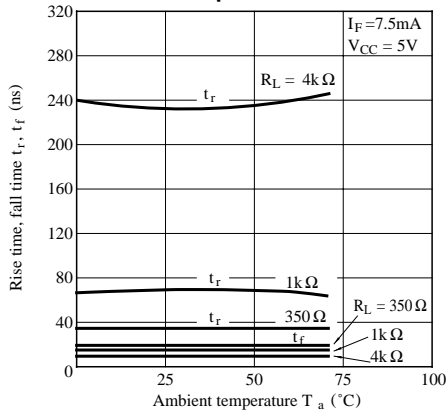
**Fig. 8 Propagation Delay Time vs. Forward Current**



**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."