

加急出货

# PC410

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

### ■ Features

1. Opaque, 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, file 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.)	$\phi 370mm$	12mm
PC410T	Taping package(Net: 750pcs.)	$\phi 178mm$	12mm
PC410Z	Sleeve package(Net: 100pcs.)	—	—

### ■ Absolute Maximum Ratings

(Ta = 25°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	°C
Storage temperature		$T_{stg}$	-40 to +125	°C
*4 Soldering temperature		$T_{sol}$	260	°C

\*1 Ta=0 to +70°C

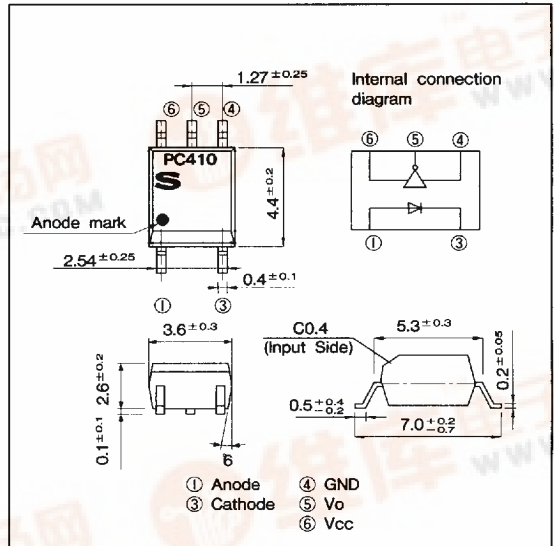
\*2 For 1 minute MAX.

\*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.

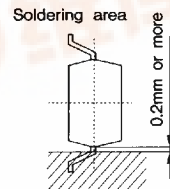
\*4 For 10 seconds.

### ■ 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	—	—	0.6	V	
	High level output current	I <sub>OH</sub>	V <sub>CC</sub> =V <sub>O</sub> =5.5V, I <sub>F</sub> =250 μA	—	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	
Transfer characteristics	"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	
	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>t</sub>	Ta=25°C, V=0, f=1MHz	—	0.6	5	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) R <sub>L</sub> =350Ω Fig. 2	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		—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 1 cm from lead pin.

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

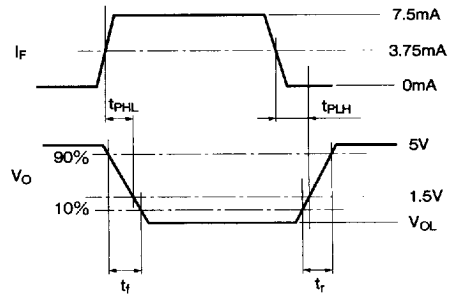
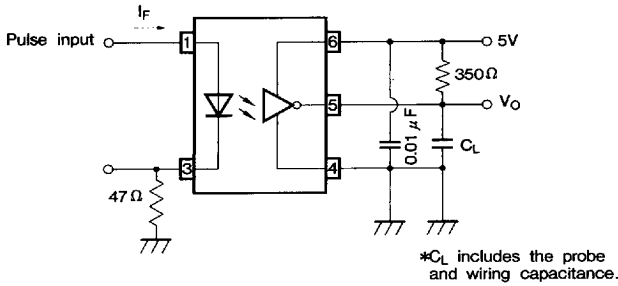


Fig. 2 Test Circuit for Instantaneous Common Mode Rejection Voltage

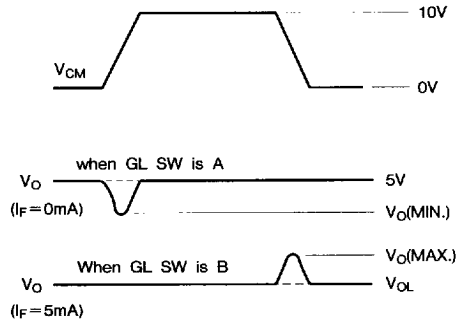
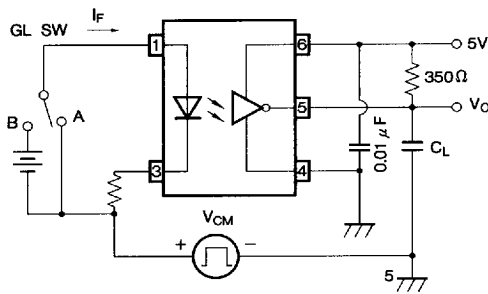


Fig. 3 Collector Power Dissipation vs. Ambient Temperature

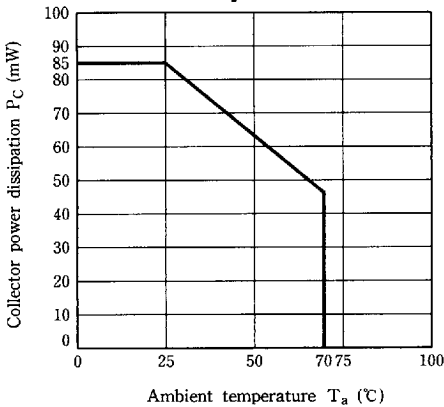
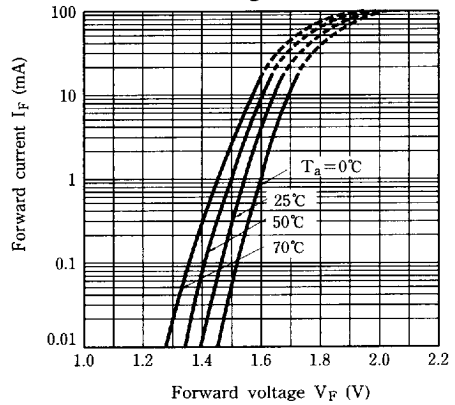
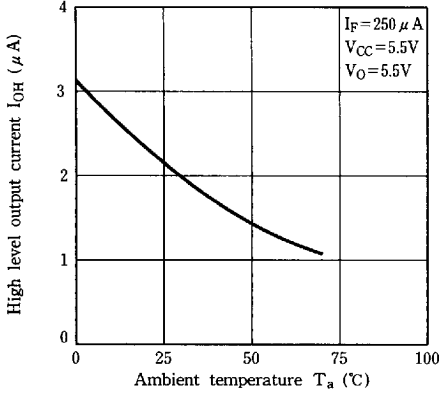


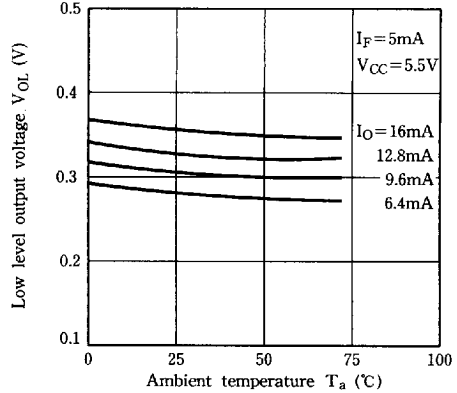
Fig. 4 Forward Current vs. Forward Voltage



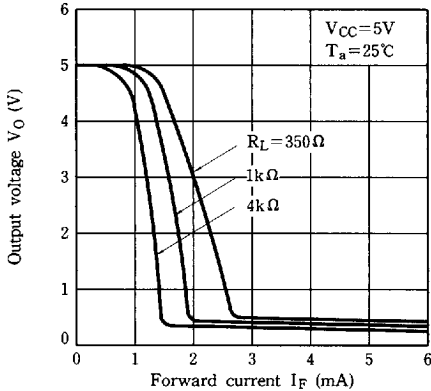
**Fig. 5 High Level Output Current vs. Ambient Temperature**



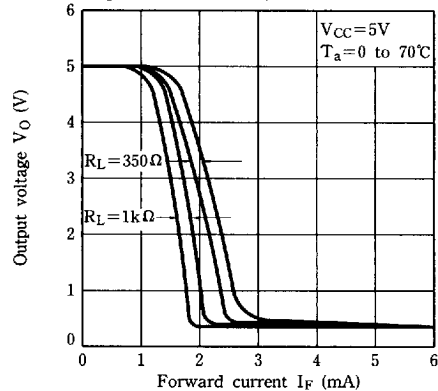
**Fig. 6 Low Level Output Voltage vs. Ambient Temperature**



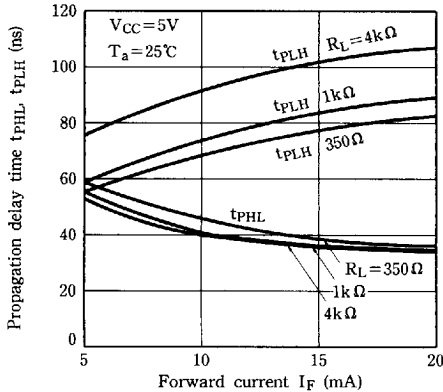
**Fig. 7-a Output Voltage vs. Forward Current**



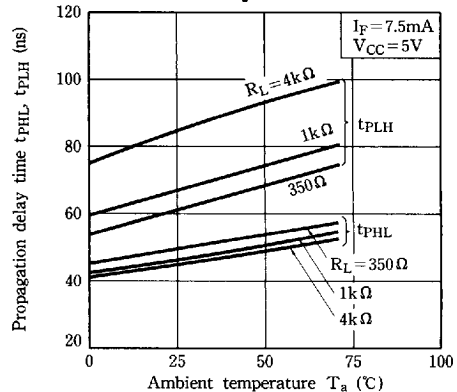
**Fig. 7-b Output Voltage vs. Forward Current (Ambient Temp. Characteristics)**



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

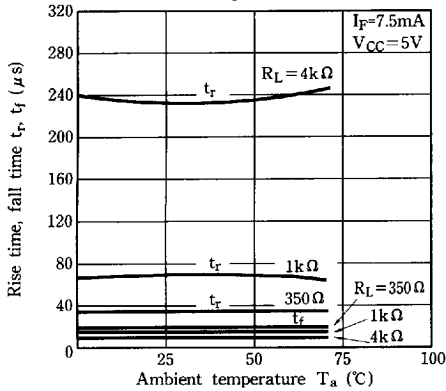


**Fig. 9 Propagation Delay Time vs. Ambient Temperature**



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Photocouplers

**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." (Page 78 to 93).