

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/ μs
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 $^\circ C$

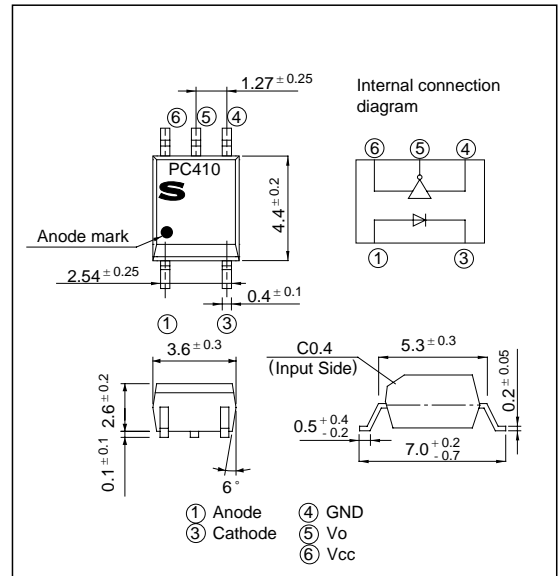
*2 For 1 minute MAX.

*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.

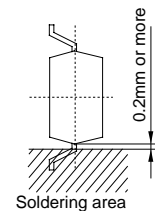
■ Outline Dimensions

(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_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	$T_a = 25^\circ\text{C}, V = 0, f = 1\text{MHz}$		-	60	150	pF	
Output	Low level output voltage	V_{OL}	$I_{OL} = 13\text{mA}, V_{CC} = 5.5\text{V}, I_F = 5\text{mA}$		-	0.4	0.6	V	
	High level output current	I_{OH}	$V_{CC} = V_O = 5.5\text{V}, I_F = 250\text{mA}$		-	2	250	μA	
	Low level supply current	I_{CCL}	$V_{CC} = 5.5\text{V}, I_F = 10\text{mA}$		-	13	18	mA	
	High level supply current	I_{CCH}	$V_{CC} = 5.5\text{V}, I_F = 0$		-	7	15	mA	
	"H→L" 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}	$T_a = 25^\circ\text{C}, \text{DC500V}, 40 \text{ to } 60\% \text{ RH}$		5×10^{10}	10^{11}	-	Ω		
Floating capacitance	C_f	$T_a = 25^\circ\text{C}, V = 0, f = 1\text{MHz}$		-	0.6	-	pF		
Transfer characteristics	Response time	"H→L" propagation delay time	t_{PHL}	$T_a = 25^\circ\text{C}$ $V_{CC} = 5\text{V}, I_F = 7.5\text{mA}$ $R_L = 350\Omega, C_L = 15\text{pF}$ Fig. 1	-	50	120	ns	
		"L→H" propagation delay time	t_{PLH}		-	50	120		
		Fall time	t_f		-	30	60		
		Rise time	t_r		-	30	60		
	CMR	Instantaneous common mode rejection voltage "High level output"	CM_H	$I_F = 0$ $V_O(\text{MIN.}) = 2\text{V}$	$T_a = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$ $V_{CM} = 10\text{V}(\text{Peak})$ $R_L = 350\Omega$ Fig. 2	100	500	-	$\text{V}/\mu\text{s}$
		Instantaneous common mode rejection voltage "Low level output"	CM_L	$I_F = 5\text{mA}$ $V_O(\text{MAX.}) = 0.8\text{V}$		- 100	- 500	-	

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

Each characteristics shall be measured under opaque condition.

Recommended Operation Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Low level input current	I_{FL}	0	250	μA
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 by-pass ceramic capacitor (0.01 to 0.1 μF) between V_{CC} and GND at the position within 1cm from lead pin.

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

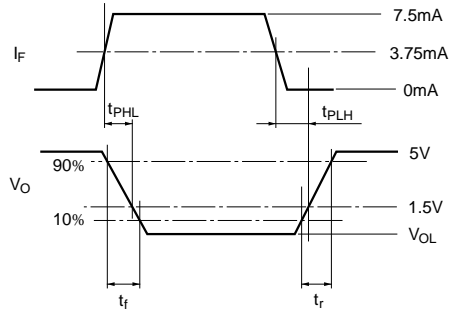
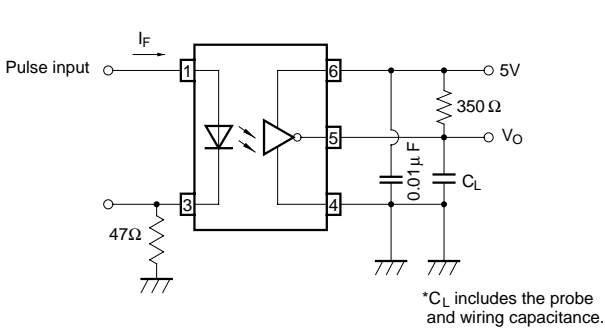


Fig. 2 Test Circuit for Instantaneous Common Mode Rejection Voltage

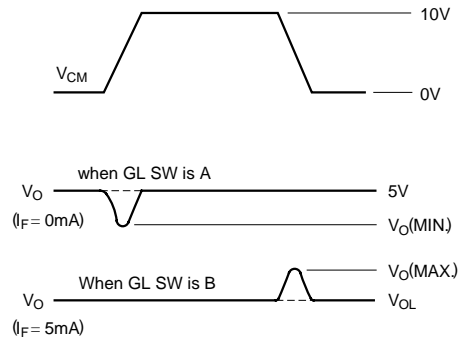
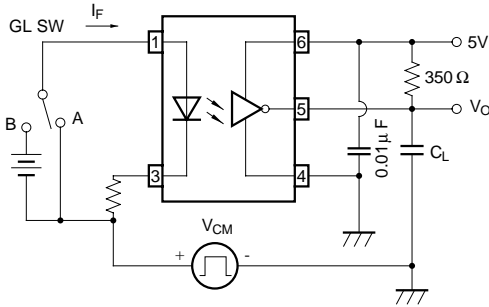


Fig. 3 Collector Power Dissipation vs. Ambient Temperature

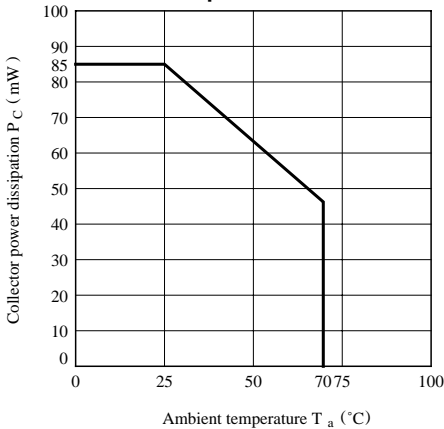


Fig. 4 Forward Current vs. Forward Voltage

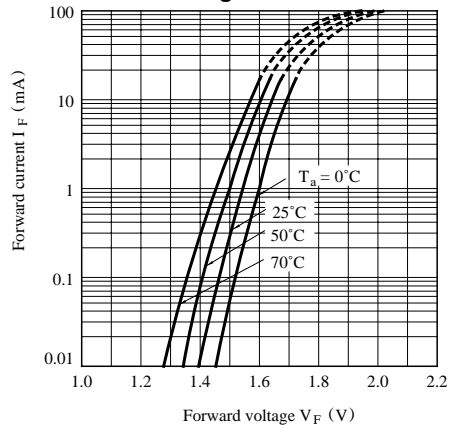


Fig. 5 High Level Output Current vs. Ambient Temperature

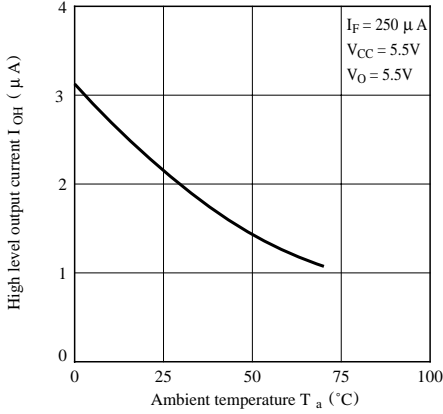


Fig. 6 Low Level Output Voltage vs. Ambient Temperature

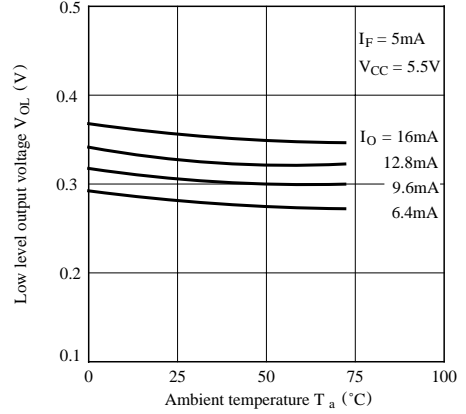


Fig. 7-a Output Voltage vs. Forward Current

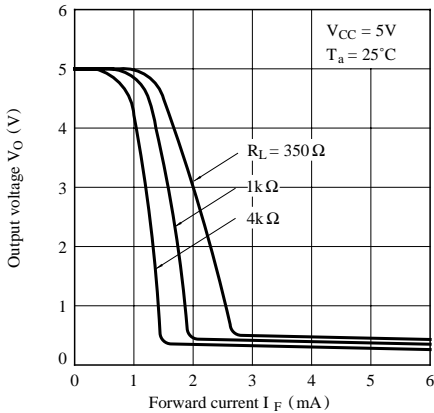


Fig. 7-b Output Voltage vs. Forward Current (Ambient Temp. Characteristics)

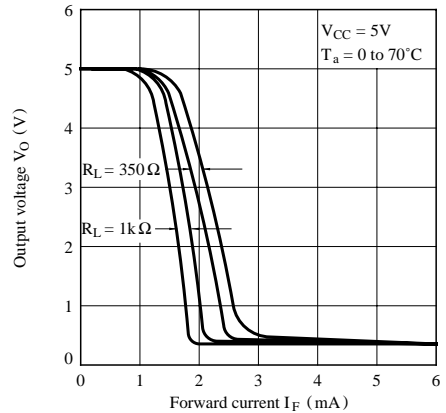


Fig. 8 Propagation Delay Time vs. Forward Current

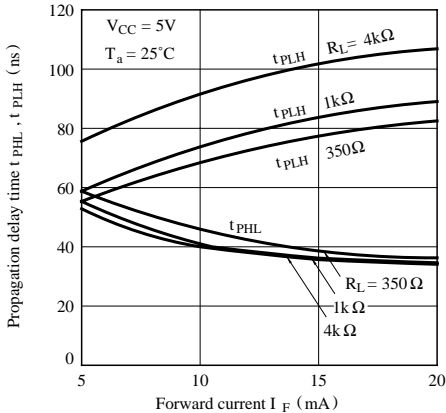


Fig. 9 Propagation Delay Time vs. Ambient Temperature

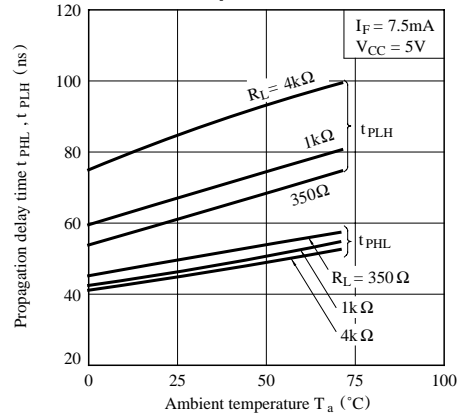
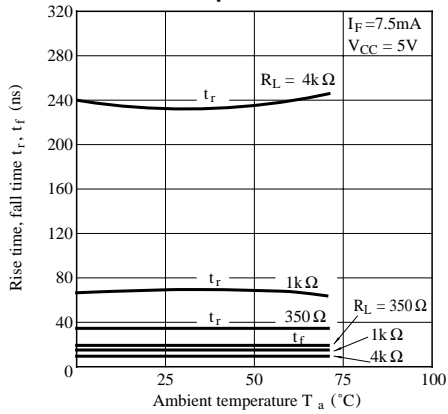


Fig.10 Rise Time, Fall Time vs. Ambient Temperature



■ 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."