

PC410H0NIP

High Speed Response, High CMR OPIC Photocoupler

■ Features

1. High resistance to noise due to high common rejection voltage (CMR:MIN. 10kV/μs)
2. High speed response (t_{PLH} , t_{PHL} :MAX. 75us)
3. Isolation voltage between input and output (Viso (rms):2.5kV)
4. Mini-flat package

■ Applications

1. Programmable controllers
2. Inverters

■ 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	Supply voltage	V_{CC}	7	V
	High level output voltage	V_{OH}	7	V
	Low level output current	I_{OL}	50	mA
	*2 Collector power dissipation	P_C	85	mW
	*3 Isolation voltage	$V_{iso (rms)}$	2.5	kV
	Operating temperature	T_{opr}	-40 to +85	°C
Storage temperature	T_{stg}	-40 to +125	°C	
*4 Soldering temperature	T_{sol}	260	°C	

*1 Refer to Fig.3

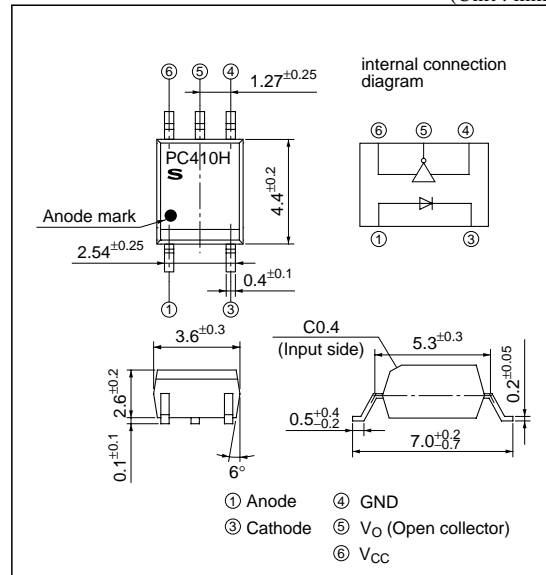
*2 Refer to Fig.4

*3 40 to 60%RH, AC for 1 min

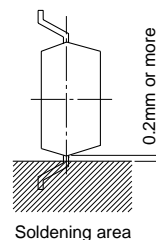
*4 For 10 s

■ 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

(Unless otherwise specified, $T_a = -40$ to 85°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	$T_a = 25^\circ\text{C}$, $V = 0\text{V}$, $f = 1\text{MHz}$	–	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}	$V_{CC} = V_o = 5.5\text{V}$, $I_F = 250\mu\text{A}$	–	0.02	100	μA	
	Low level supply current	I_{CCL}	$V_{CC} = 5.5\text{V}$, $I_F = 10\text{mA}$	–	7	13	mA	
	High level supply current	I_{CCH}	$V_{CC} = 5.5\text{V}$, $I_F = 0\text{mA}$	–	5	10	mA	
	"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}	$T_a = 25^\circ\text{C}$, DC=500V, 40 to 60%RH	5×10^{10}	1×10^{11}	–	Ω	
	Floating capacitance	C_f	$T_a = 25^\circ\text{C}$, $V = 0\text{V}$, $f = 1\text{MHz}$	–	0.6	–	pF	
Transfer characteristics	Response time	"High→Low" propagation delay time	t_{pHL}	Fig.1 $T_a = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$, $I_F = 7.5\text{mA}$ $R_L = 350\Omega$, $C_L = 15\text{pF}$	25	48	75	ns
		"Low→High" propagation delay time	t_{pLH}		25	50	75	ns
		Rise time	t_r		–	10	–	ns
		Fall time	t_f		–	20	–	ns
		*5 Pulse width distortion	Δtw		–	–	35	ns
	CMR	Instantaneous common mode rejection voltage "Output : High level"	CM_H	Fig.2 $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$ $V_{CM(P-P)} = 1\text{kV}$, $R_L = 350\Omega$ $I_F = 0\text{mA}$, $V_o(\text{Min}) = 2\text{V}$	10	20	–	kV/ μs
Instantaneous common mode rejection voltage "Output : Low level"		CM_L	Fig.2 $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$ $V_{CM(P-P)} = 1\text{kV}$, $R_L = 350\Omega$ $I_F = 5\text{mA}$, $V_o(\text{Max}) = 0.8\text{V}$	–10	–20	–	kV/ μs	

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

Each characteristics shall be measured under opaque condition.

*5 Pulse width distortion $\Delta tw = |t_{pHL} - t_{pLH}|$

Fig.1 Block Diagram

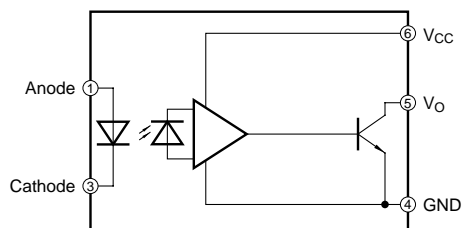


Fig.2 Test Circuit for t_{pHL} , t_{pLH} , t_r and t_f

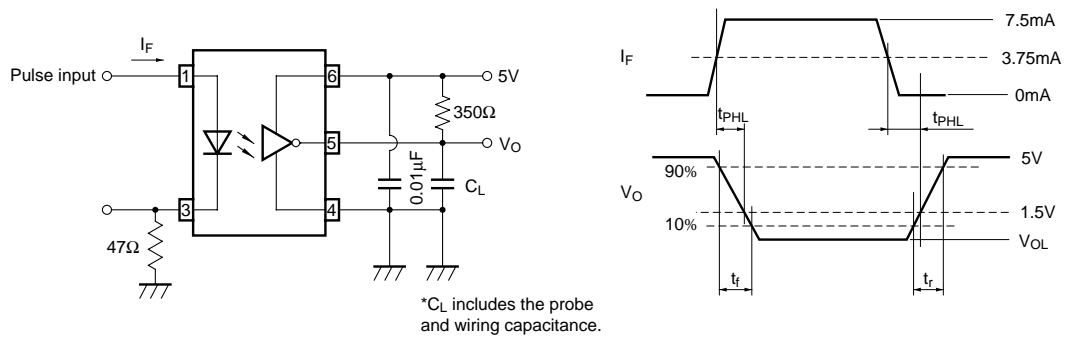


Fig.3 Test Circuit for Common Mode Rejection Voltage

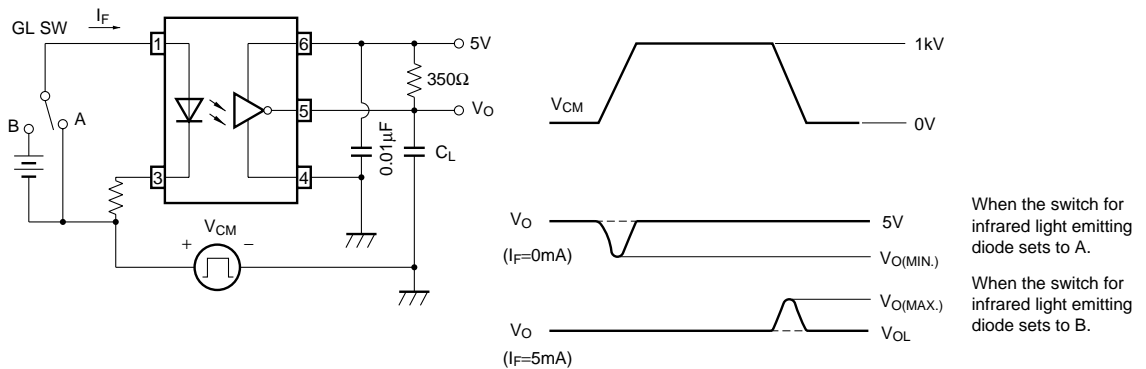


Fig.4 Forward Current vs. Ambient Temperature

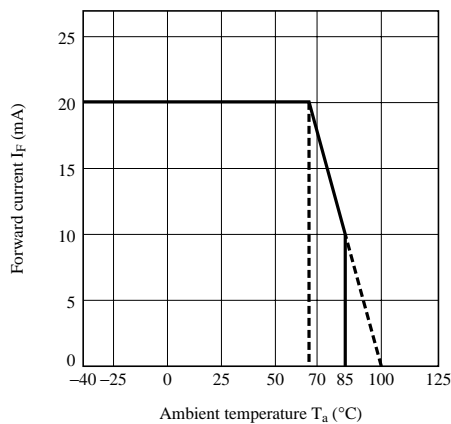
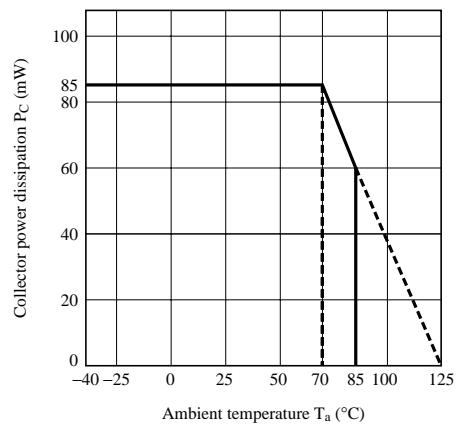


Fig.5 Collector Power Dissipation vs. Ambient Temperature



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