

PC410L0NIP

High Speed Response, High CMR OPIC Photocoupler

■ Features

1. High resistance to noise due to high common rejection voltage (CMR:MIN. 10kV/ μ s)
2. High speed response (t_{pLH} , t_{pHL} :MAX.75ns)
3. Isolation voltage between input and output ($V_{iso(rms)}$:3.75kV)
4. Mini-flat package

■ Applications

1. Programmable controllers
2. Inverters

■ Absolute Maximum Ratings ($T_a=25^\circ\text{C}$)

	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	$V_{iso(rms)}$	3.75	kV
	Operating temperature	T_{opr}	-40 to +85	$^\circ\text{C}$
	Storage temperature	T_{stg}	-40 to +125	$^\circ\text{C}$
	*4 Soldering temperature	T_{sol}	270	$^\circ\text{C}$

*1 Refer to Fig.4

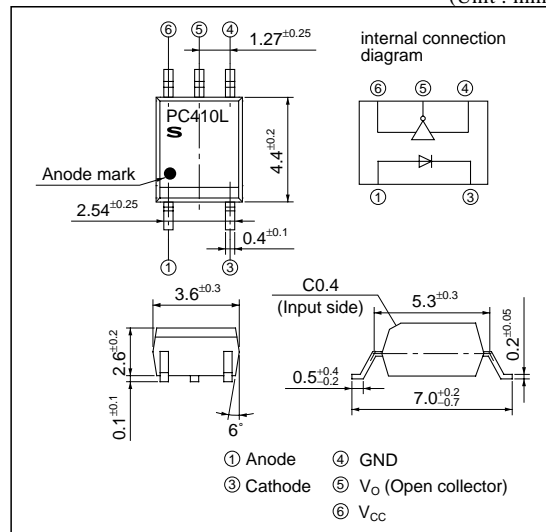
*2 Refer to Fig.5

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

*4 For 10s

■ 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	$T_a = 25^\circ\text{C}$, $V = 0$, $f = 1\text{MHz}$		–	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}	$V_{CC} = 5.5\text{V}$, $I_F = 0$		–	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}	$T_a = 25^\circ\text{C}$, $\text{DC} = 500\text{V}$, 40 to 60% RH		5×10^{10}	1×10^{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	"High→Low" propagation delay time	t_{PHL}	$T_a = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$, $I_F = 7.5\text{mA}$ $R_L = 350\Omega$, $C_L = 15\text{pF}$	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	Δt_W		–	–	35	ns
	CMR	Instantaneous common mode rejection voltage "Output : High level"	CM_H		$I_F = 0$ $V_{O(\text{Min})} = 2\text{V}$	$T_a = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$ $V_{CM} = 1\text{kV(P-P)}$ $R_L = 350\Omega$	10	20
Instantaneous common mode rejection voltage "Output : Low level"		CM_L	$I_F = 5\text{mA}$ $V_{O(\text{Max})} = 0.8\text{V}$	–10	–20		–	kV/ μs

(Note) All typical values: at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$ *5 Pulse width distortion $\Delta t_W = |t_{PHL} - t_{PLH}|$

■ Recommended Operating Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Low level input current	I_{FL}	0	250	μA
High level input current	I_{FH}	8	15	mA
Supply voltage	V_{CC}	4.5	5.5	V
Fanout (TTL load)	N	–	5	–
Operating temperature	T_{opr}	–40	+85	$^\circ\text{C}$

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 Block Diagram

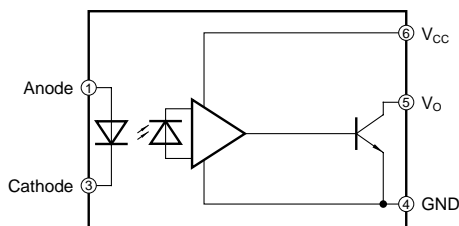


Fig.2 Test Circuit for t_{PHL} , t_{PLH} , t_r and t_f

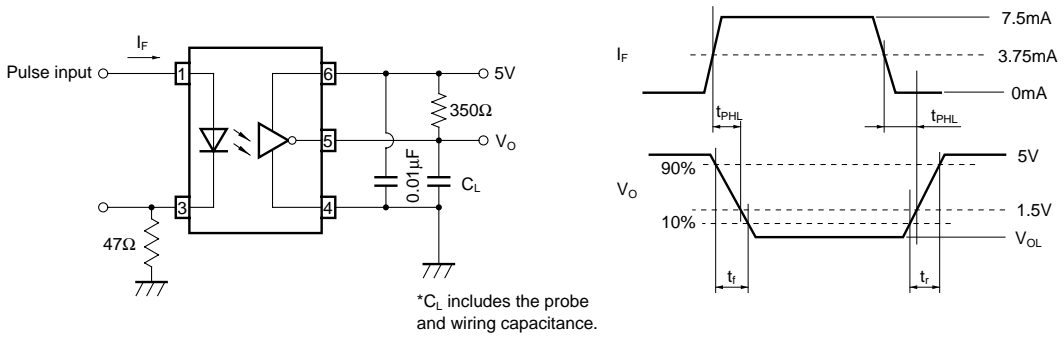


Fig.3 Test Circuit for Common Mode Rejection Voltage

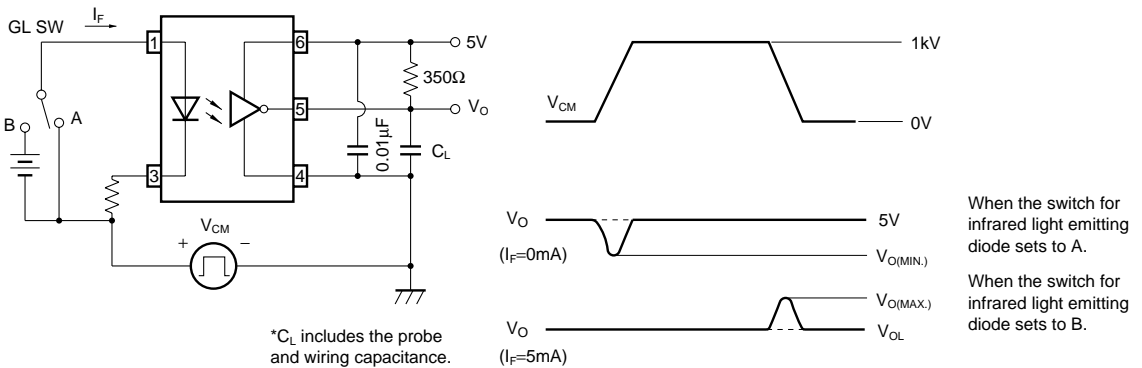


Fig.4 Forward Current vs. Ambient Temperature

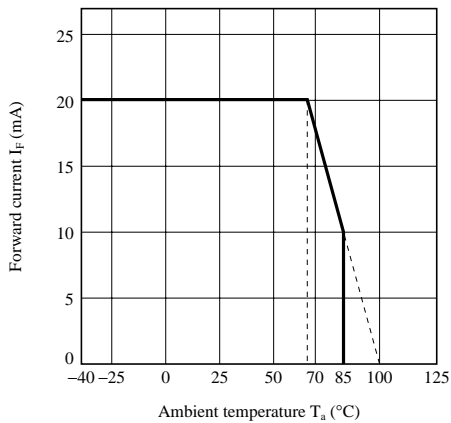


Fig.5 Collector Power Dissipation vs. Ambient Temperature

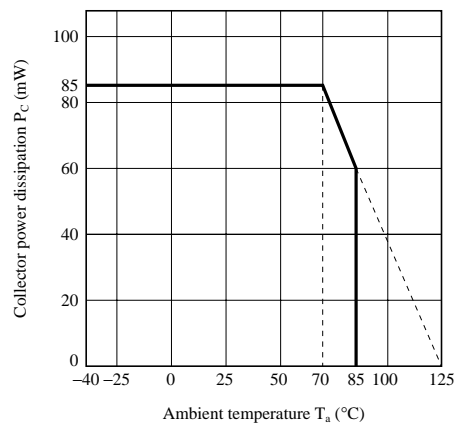


Fig.6 Forward Current vs. Forward Voltage

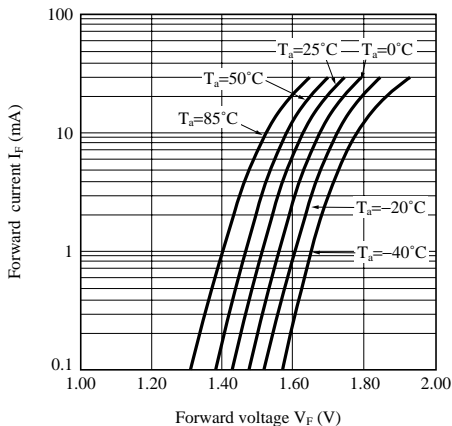


Fig.7 High Level Output Current vs. Ambient Temperature

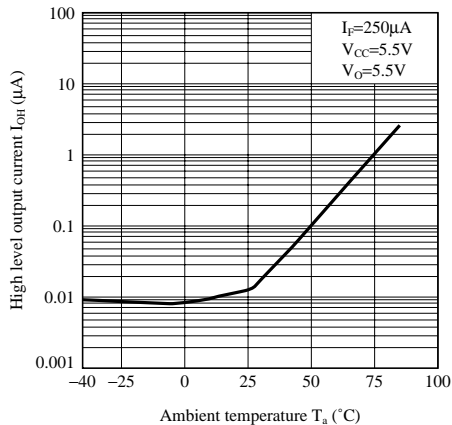


Fig.8 Low Level Output Voltage vs. Ambient Temperature

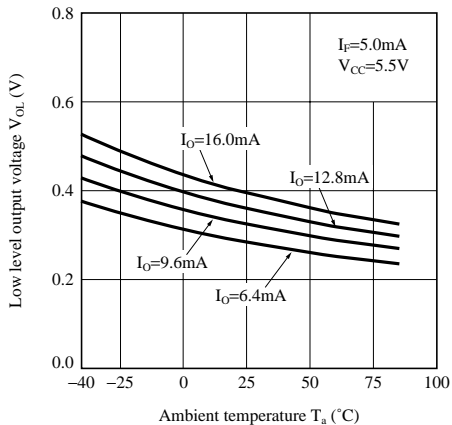


Fig.9 Output Voltage vs. Forward Current

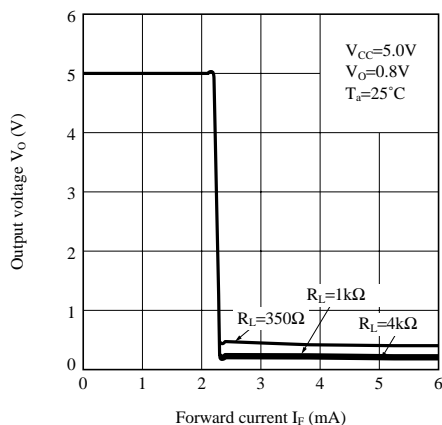


Fig.10 Threshold Input Current vs. Ambient Temperature

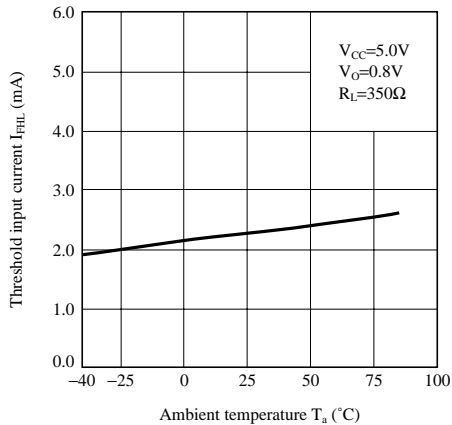


Fig.11 Propagation Delay Time vs. Forward Current

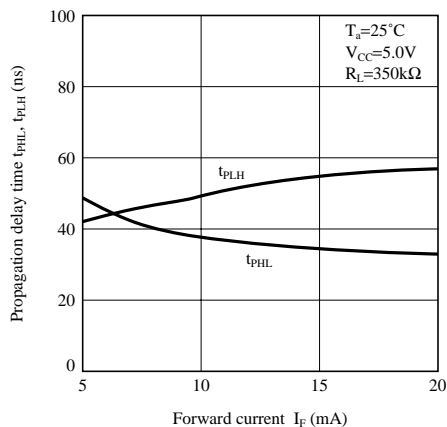
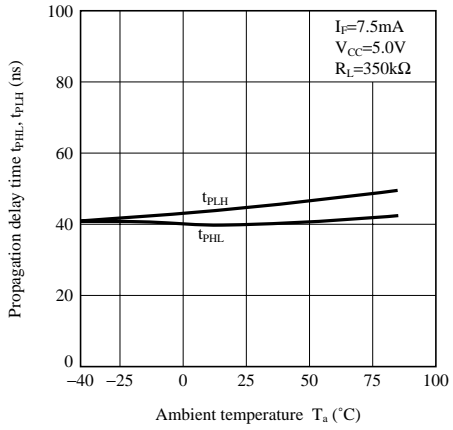


Fig.12 Propagation Delay Time vs. Ambient Temperature



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