PC401

Compact, Surface Mount Type OPIC Photocoupler

■ Features

1. Mini-flat package
2. " High " output during light emission
3. Isolation voltage between input and output
   (V_{iso} : 3 750V $_{rms}$)
4. TTL and LSTTL compatible output
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

■ Outline Dimensions

(Unit : mm)

① Anode   ④ V_O
② NC   ⑤ GND
③ Cathode   ⑥ V_{CC}
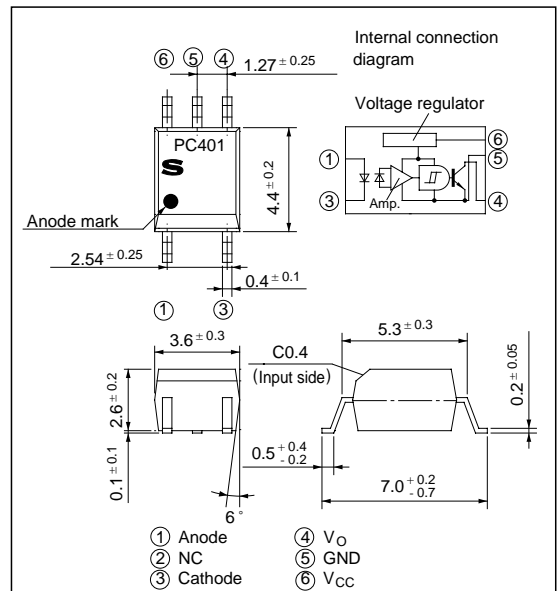
* "OPIC" (Optical IC) is a trademark of the SHARP Corporation.
An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.

■ Package Specifications

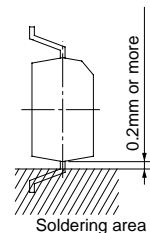| Model No.	Package specifications	Diameter of reel	Tape width
PC401	Taping package (Net : 3 000pcs.)	370mm	12mm
PC401T	Taping package (Net : 750pcs.)	178mm	12mm
PC401Z	Sleeve package (Net : 100pcs.)	-	-

■ Absolute Maximum Ratings

(Ta= 25℃)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Reverse voltage	V_R	6	V
	Power dissipation	P	70	mW
Output	Supply voltage	V_{CC}	16	V
	High level output voltage	V_{OH}	16	V
	Low level output current	I_{OL}	50	mA
	Power dissipation	P_O	130	mW
	Total power dissipation	P_{tot}	150	mW
[*1]	Isolation voltage	V_{iso}	3 750	V $_{rms}$
	Operating temperature	T_{opr}	- 25 to + 85	℃
	Storage temperature	T_{stg}	- 40 to + 125	℃
[*2]	Soldering temperature	T_{sol}	260	℃

*1 AC for 1 minute, 40 to 60% RH
*2 For 10 seconds

■ Electro-optical Characteristics 　　　　　　　(Ta= 0 to + 70°C unless otherwise specified.)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V_F	$I_F = 4mA$	-	1.1	1.4	V
			$I_F = 0.3mA$	0.7	1.0	-	
	Reverse current	I_R	$Ta = 25°C, V_R = 3V$	-	-	10	μA
	Terminal capacitance	C_t	$Ta = 25°C, V = 0, f = 1kHz$	-	30	250	pF
Output	Operating supply voltage	V_{CC}		3	-	15	V
	Low level output voltage	V_{OL}	$I_F = 0, V_{CC} = 5V, I_{OL} = 16mA$	-	0.2	0.4	V
	High level output current	I_{OH}	$I_F = 4mA, V_{CC} = V_O = 15V$	-	-	100	μA
	Low level supply current	I_{CCL}	$I_F = 0, V_{CC} = 5V$	-	2.5	5.0	mA
	High level supply current	I_{CCH}	$I_F = 4mA, V_{CC} = 5V$	-	2.7	5.5	mA
Transfer charac- teristics	[*3] "H→L" threshold input current	I_{FHL}	$Ta = 25°C, V_{CC} = 5V, R_L = 280Ω$	0.4	0.8	-	mA
			$V_{CC} = 5V, R_L = 280Ω$	0.3	-	-	
	[*4] "L→H" threshold input current	I_{FLH}	$Ta = 25°C, V_{CC} = 5V, R_L = 280Ω$	-	1.1	2.0	mA
			$V_{CC} = 5V, R_L = 280Ω$	-	-	4.0	
	[*5]Hysteresis	I_{FHL}/I_{FLH}	$V_{CC} = 5V, R_L = 280Ω$	0.5	0.7	0.9	
	Isolation resistance	R_{ISO}	$Ta = 25°C, DC500V, 40 \text{ to } 60\% RH$	5×10^{10}	10^{11}	-	Ω
	[*6] Response time — "H→L" propagation delay time	t_{PHL}		-	2	6	μs
	"L→H" propagation delay time	t_{PLH}	$Ta = 25°C, V_{CC} = 5V$	-	1	3	
	Fall time	t_f	$R_L = 280Ω, I_F = 4mA$	-	0.05	0.5	
	Rise time	t_r		-	0.1	0.5	

[*3] I_{FHL} represents forward current when output gose from high to low.
[*4] I_{FLH} represents forward current when output goes from low to high.
[*5] Hysteresis stands for I_{FHL}/I_{FLH} .
[*6] Test circuit for response time is shown below.

Test Circuit for Response Time

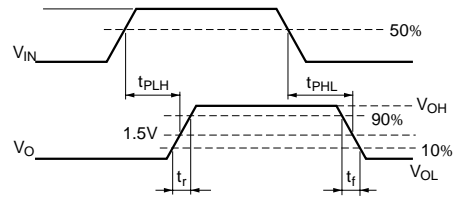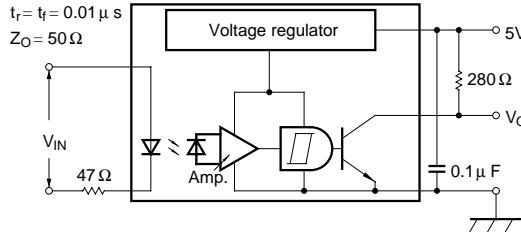$t_r = t_f = 0.01μs$
$Z_O = 50Ω$

Fig. 1 Forward Current vs. Ambient Temperature
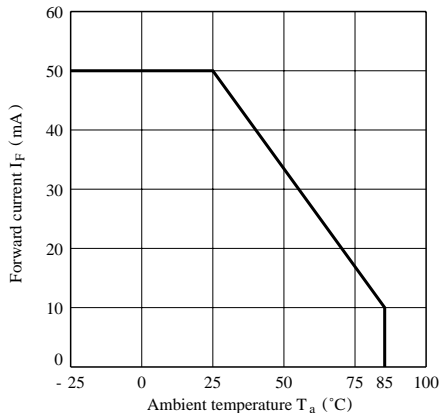
Fig. 2 Power Dissipation vs. Ambient Temperature
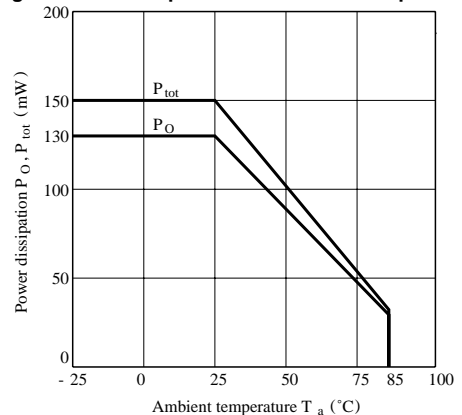
Fig. 3 Forward Current vs. Forward Voltage
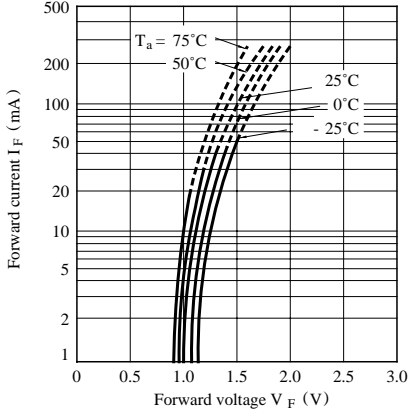

$T_a = 75°C$
$50°C$
$25°C$
$0°C$
$-25°C$

Forward current I_F (mA)

Forward voltage V_F (V)

Fig. 4 Relative Threshold Input Current vs. Supply Voltage

$T_a = 25°C$
$I_{FLH} = 1$ at $V_{CC} = 5V$
I_{FLH}
I_{FHL}

Relative threshold input current

Supply voltage V_{CC} (V)
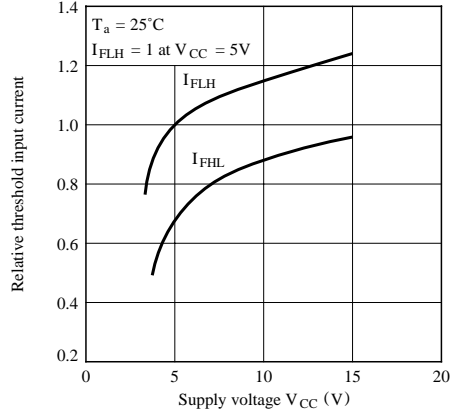
Fig. 5 Relative Threshold Input Current vs. Ambient Temperature

$V_{CC} = 5V$
I_{FLH}
I_{FHL}
$I_{FLH} = 1$ at $T_a = 25°C$

Relative threshold input current

Ambient temperature T_a (°C)
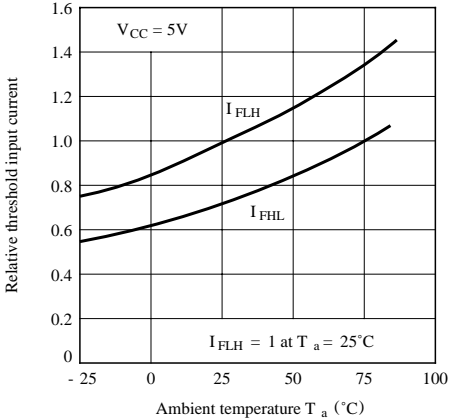
Fig. 6 Low Level Output Voltage vs. Low Level Output Current

$V_{CC} = 5V$
$I_F = 0$
$T_a = 25°C$

Low level output voltage V_{OL} (V)

Low level output current I_{OL} (mA)
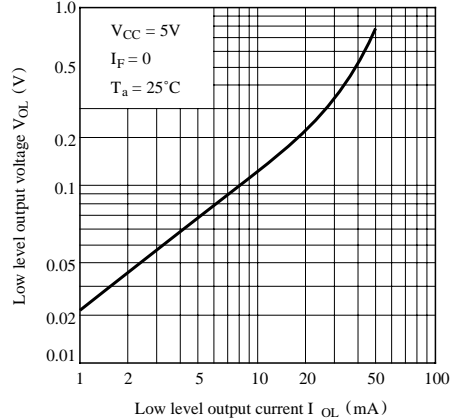
Fig. 7 Low Level Output Voltage vs. Ambient Temperature

$V_{CC} = 5V$
$I_F = 0$
$I_{OL} = 30mA$
$16mA$
$5mA$

Low level output voltage V_{OL} (V)

Ambient temperature T_a (°C)
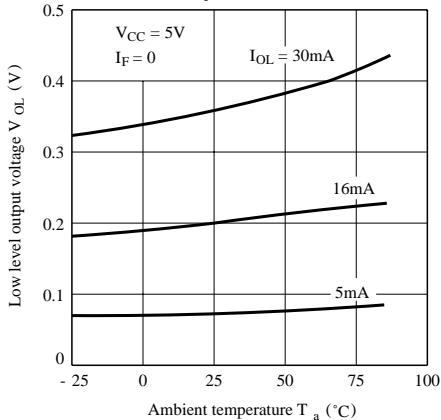
Fig. 8 High Level Output Current vs. Forward Current

$V_{CC} = 5V$
$T_a = 25°C$

High level output current I_{OH} (μA)

Forward current I_F (mA)
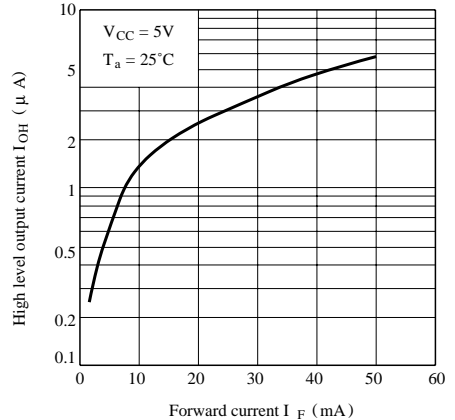
Fig. 9 High Level Output Current vs. Ambient Temperature

$V_{CC} = V_O = 15V$
$I_F = 4mA$

High level output current I_{OH} (μA) vs. Ambient temperature T_a (°C)
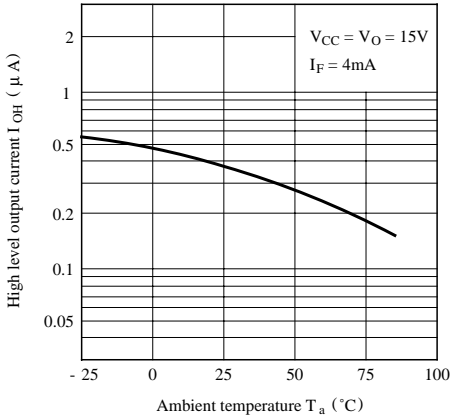
Fig.10 Supply Current vs. Supply Voltage

Supply current I_{CC} (mA) vs. Supply voltage V_{CC} (V)

I_{CCH}
I_{CCL}
I_{CCH}
I_{CCL}

I_{CCH}
I_{CCL}

$T_a =$
-25°C
25°C
85°C
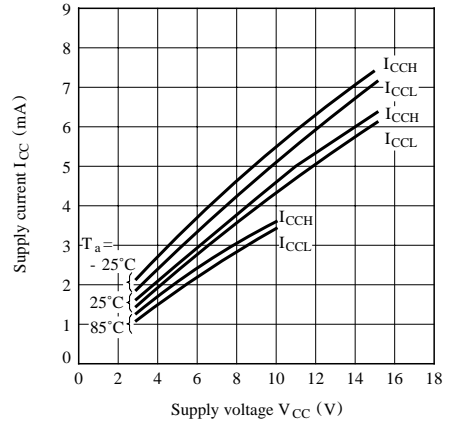
Fig.11 Propagation Delay Time vs. Forward Current

$V_{CC} = 5V$
$R_L = 280\Omega$
$T_a = 25°C$

t_{PHL}
t_{PLH}

Propagation delay time (μs) vs. Forward current I_F (mA)
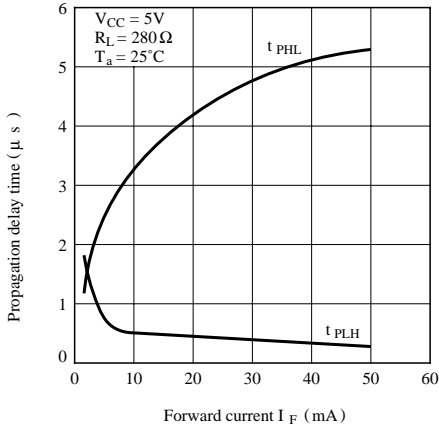
Fig.12 Rise Time, Fall Time vs. Load Resistance

$V_{CC} = 5V$
$I_F = 4mA$
$T_a = 25°C$

t_r
t_f

Rise time, fall time (μs) vs. Load resistance R_L (kΩ)
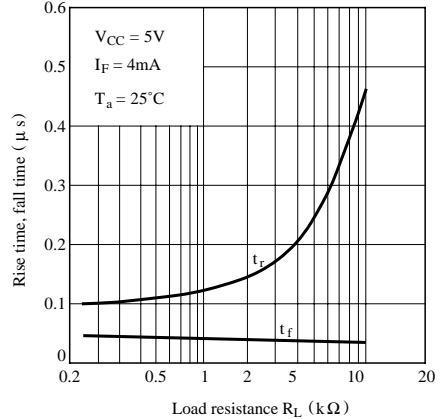
■ Preautions for Use

（1）It is recommended that a by-pass capacitor of more than 0.01μF is added between V_{cc} and GND near the device in order to stabilize power supply line.

（2）Handle this product the same as with other integrated circuits against static electricity.

（3）As for other general cautions, refer to the chapter "Precautions for Use"

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