

# PC901V

## Digital Output Type OPIC Photocoupler

### ■ Features

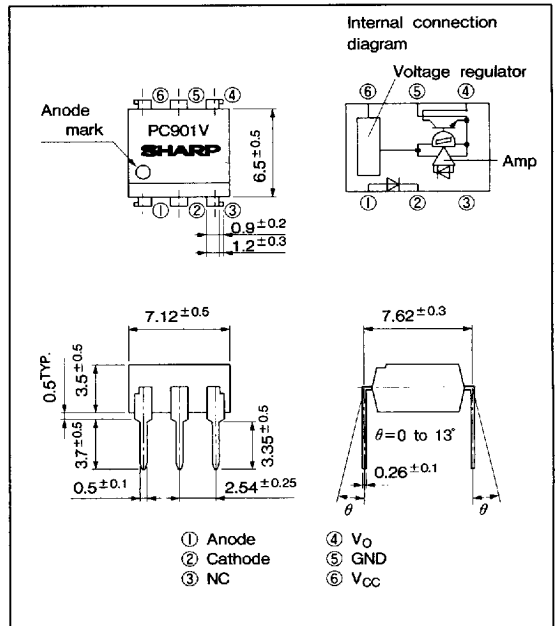
1. Normal-ON operation, open collector output
2. Operating supply voltage ( $V_{CC}$ : 3 to 15V)
3. TTL and LSTTL compatible output
4. High isolation voltage between input and output ( $V_{iso}$ : 5 000V<sub>rms</sub>)
5. High sensitivity ( $I_{FLH}$ : MAX. 2.0mA at  $T_a=25^\circ\text{C}$ )
6. Recognized by UL, file No. 64380

### ■ Applications

1. Isolation between logic circuits
2. Logic level shifters
3. Line receivers
4. Replacements for relays and pulse transformers
5. Noise reduction

### ■ 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.

### ■ Absolute Maximum Ratings

(Ta = 25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	$I_F$	50	mA
	*1 Peak forward current	$I_{FM}$	1	A
	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	$P_O$	150	mW
	Total power dissipation	$P_{tot}$	170	mW
	*2 Isolation voltage	$V_{iso}$	5 000	V <sub>rms</sub>
	Operating temperature	$T_{opr}$	-25 to +85	°C
Storage temperature	$T_{stg}$	-40 to +125	°C	
	*3 Soldering temperature	$T_{sol}$	260	°C

\*1 Pulse width  $\leq 100 \mu\text{s}$ , Duty ratio = 0.001

\*2 40 to 60% RH, AC for 1 minute

\*3 For 10 seconds

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■ Electro-optical Characteristics

(Ta=0 to +70°C unless otherwise specified)

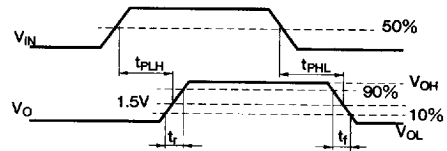
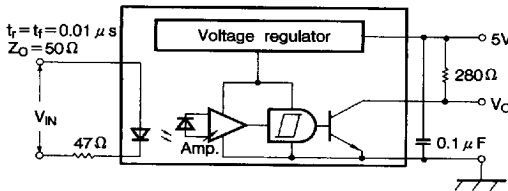
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	$V_F$	$I_F=4\text{mA}$	—	1.1	1.4	V	
			$I_F=0.3\text{mA}$	0.7	1.0	—		
	Reverse current	$I_R$	$T_a=25^\circ\text{C}, V_R=4\text{V}$	—	—	10	$\mu\text{A}$	
	Terminal capacitance	$C_t$	$T_a=25^\circ\text{C}, V=0, f=1\text{kHz}$	—	30	250	pF	
Output	Operating supply voltage	$V_{CC}$		3	—	15	V	
	Low level output voltage	$V_{OL}$	$I_{OL}=16\text{mA}, V_{CC}=5\text{V}, I_F=4\text{mA}$	—	0.2	0.4	V	
	High level output current	$I_{OH}$	$V_O=V_{CC}=15\text{V}, I_F=0$	—	—	100	$\mu\text{A}$	
	Low level supply current	$I_{CCL}$	$V_{CC}=5\text{V}, I_F=0$	—	2.5	5.0	mA	
	High level supply current	$I_{CCH}$	$V_{CC}=5\text{V}, I_F=4\text{mA}$	—	2.7	5.5	mA	
Transfer characteristics	*4 "L→H" threshold input current	$I_{FLH}$	$T_a=25^\circ\text{C}, V_{CC}=5\text{V}, R_L=280\Omega$	—	1.1	2.0	mA	
			$V_{CC}=5\text{V}, R_L=280\Omega$	—	—	4.0		
	*5 "H→L" threshold input current	$I_{FHL}$	$T_a=25^\circ\text{C}, V_{CC}=5\text{V}, R_L=280\Omega$	0.4	0.8	0	mA	
			$V_{CC}=5\text{V}, R_L=280\Omega$	0.3	—	—		
	*6 Hysteresis	$I_{FHL}/I_{FLH}$	$V_{CC}=5\text{V}, R_L=280\Omega$	0.5	0.7	0.9	—	
	Isolation resistance	$R_{ISO}$	$T_a=25^\circ\text{C}, \text{DC}500\text{V}, 40 \text{ to } 60\% \text{ RH}$	$5 \times 10^{10}$	$10^{11}$	—	$\Omega$	
	*7 Response time	"L→H" propagation delay time	$t_{PLH}$	$T_a=25^\circ\text{C}$ $V_{CC}=5\text{V}, I_F=4\text{mA}$ $R_L=280\Omega$	—	1	3	$\mu\text{s}$
		"H→L" propagation delay time	$t_{PHL}$		—	2	6	
		Rise time	$t_r$		—	0.1	0.5	
		Fall time	$t_f$		—	0.05	0.5	
*3 Instantaneous common mode rejection voltage (High level output)	$CM_H$		$V_{CM}=600\text{V(peak)}, V_O(\text{MIN.})=2\text{V}$ $I_F=4\text{mA}, R_L=280\Omega, T_a=25^\circ\text{C}$	—	-2000	—	$\text{V}/\mu\text{s}$	
*3 Instantaneous common mode rejection voltage (Low level output)	$CM_L$		$V_{CM}=600\text{V(peak)}, V_O(\text{MAX.})=0.8\text{V}$ $I_F=0, R_L=280\Omega, T_a=25^\circ\text{C}$	—	2000	—	$\text{V}/\mu\text{s}$	

- \*4  $I_{FLH}$  represents forward current when output goes from low to high.
- \*5  $I_{FHL}$  represents forward current when output goes from high to low.
- \*6 Hysteresis stands for  $I_{FHL}/I_{FLH}$ .
- \*7 Test circuit for response time is shown below.

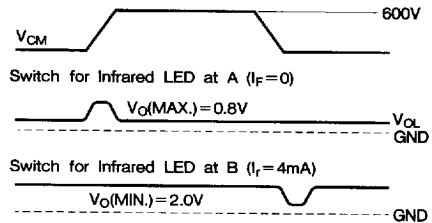
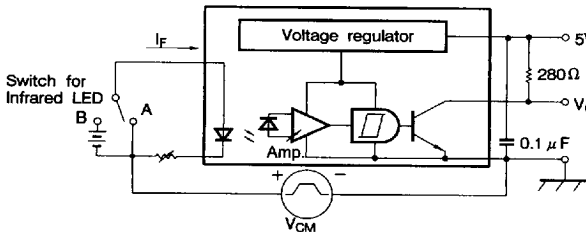
<Precautions for Use>

Connect a capacitor of more than 0.1  $\mu\text{F}$  between  $V_{CC}$  and GND.

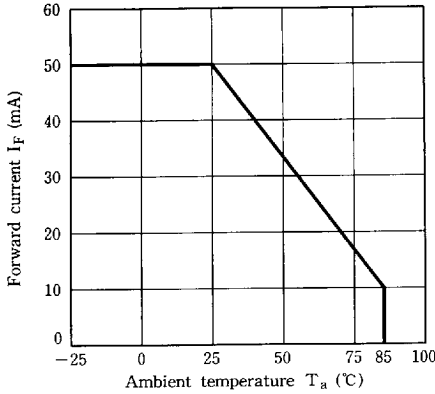
Test Circuit for Response Time



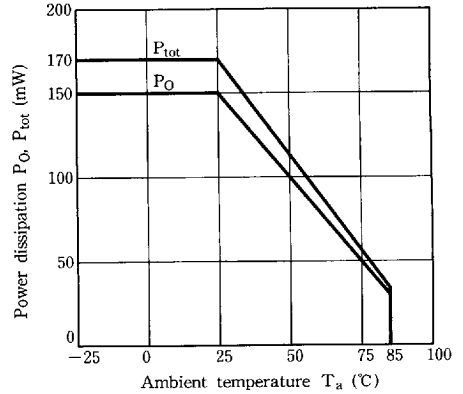
\*8 Test Circuit for  $CM_H, CM_L$



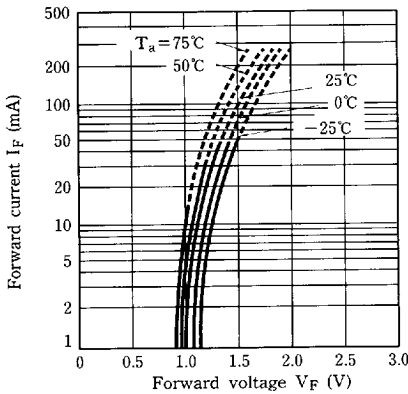
**Fig. 1 Forward Current vs. Ambient Temperature**



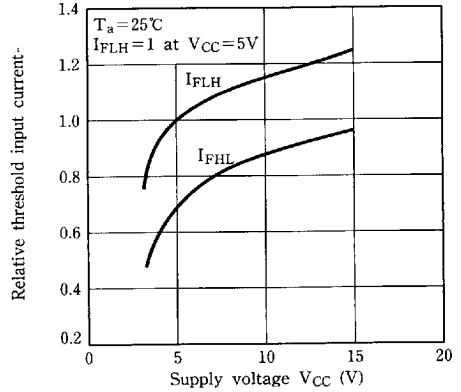
**Fig. 2 Power Dissipation vs. Ambient Temperature**



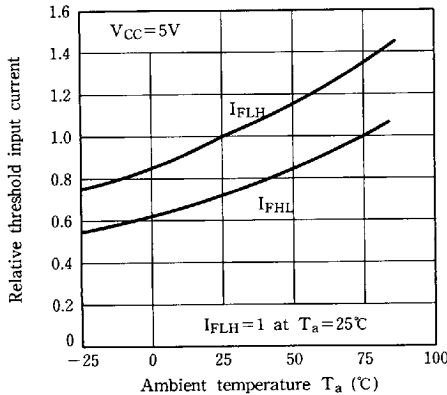
**Fig. 3 Forward Current vs. Forward Voltage**



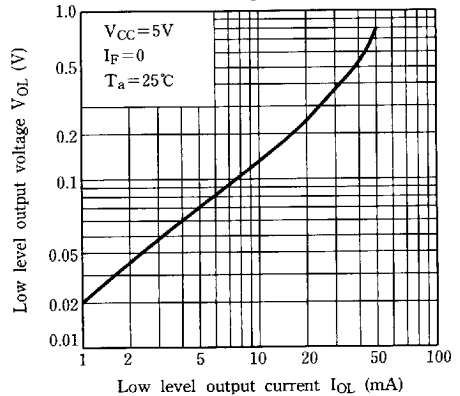
**Fig. 4 Relative Threshold Input Current vs. Supply Voltage**



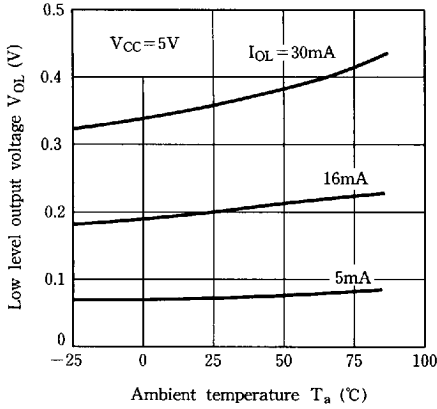
**Fig. 5 Relative Threshold Input Current vs. Ambient Temperature**



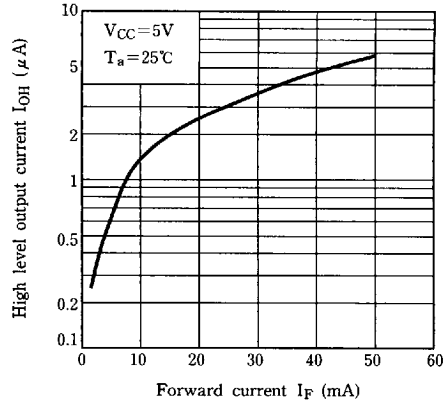
**Fig. 6 Low Level Output Voltage vs. Low Level Output Current**



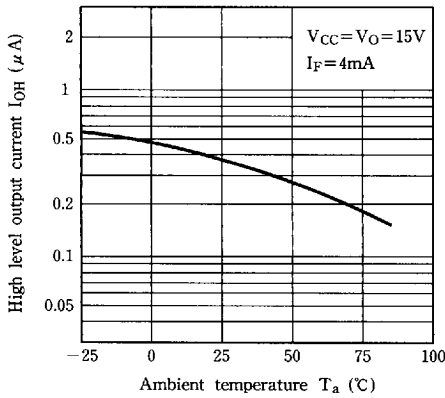
**Fig. 7 Low Level Output Voltage vs. Ambient Temperature**



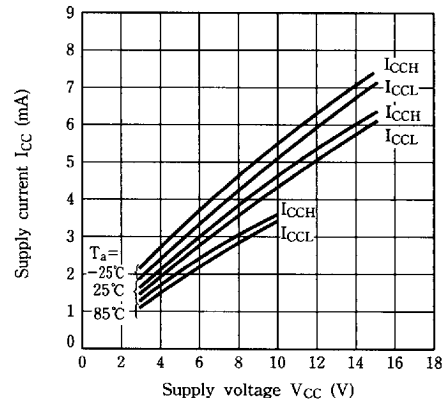
**Fig. 8 High Level Output Current vs. Forward Current**



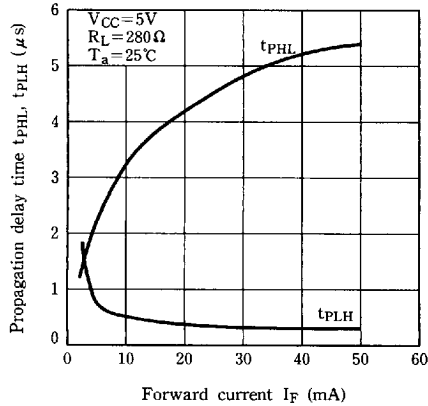
**Fig. 9 High Level Output Current vs. Ambient Temperature**



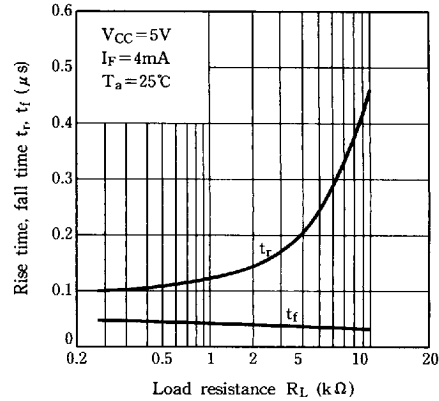
**Fig.10 Supply Current vs. Supply Voltage**



**Fig.11 Propagation Delay Time vs. Forward Current**



**Fig.12 Rise Time, Fall Time vs. Load Resistance**



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Photocouplers

**■ Precautions for Use**

- (1) It is recommended that a by-pass capacitor of more than  $0.01 \mu\text{F}$  is added between  $V_{\text{cc}}$  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, please refer to the chapter "Precautions for Use"  
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