

PC901V

Digital Output Type OPIC Photocoupler

■ Features

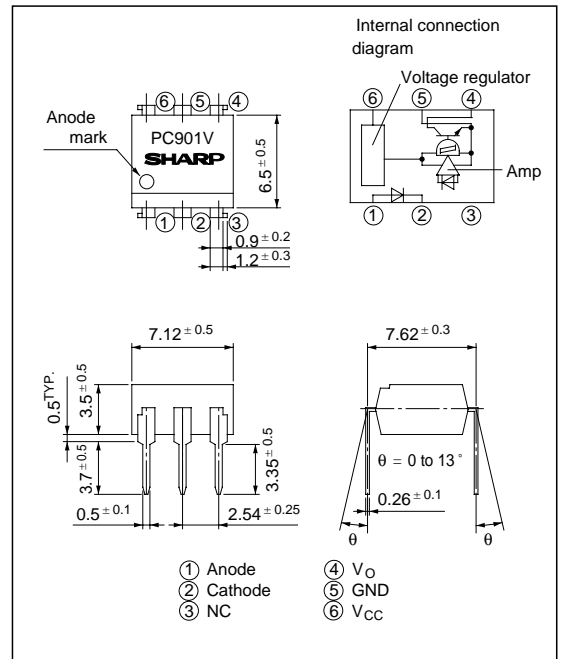
1. Normal-ON operation, open collector output
2. Operating supply voltage (V_{CC} : 3 to 15V)
3. TTL and LSTTL compatible output
4. High isolation voltage between input and output (V_{iso} : 5 000V_{rms})
5. High sensitivity (I_{FLH} : MAX. 2.0mA at $T_a = 25^\circ\text{C}$)
6. Recognized by UL, file 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

($T_a = 25^\circ\text{C}$)

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 _{rms}
Operating temperature	T_{opr}	- 25 to + 85	$^\circ\text{C}$	
Storage temperature	T_{stg}	- 40 to + 125	$^\circ\text{C}$	
*3 Soldering temperature	T_{sol}	260	$^\circ\text{C}$	

*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

Electro-optical Characteristics

($T_a = 0$ to $+70^\circ\text{C}$ 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	μA	
	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	μA	
	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	-	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}	$T_a = 25^\circ\text{C}, \text{DC}500\text{V}, 40$ to 60% RH	5×10^{10}	10^{11}	-	Ω
	*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	μs
		"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	
*8 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	-	V/ μs	
*8 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	-	V/ μs	

*4 I_{FLH} represents forward current when output goes from low to high.

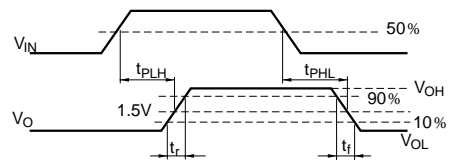
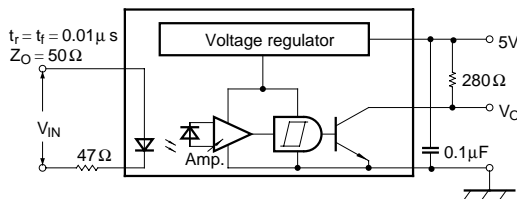
*5 I_{FHL} represents forward current when output goes from high to low.

*6 Hysteresis stands for I_{FHL} / I_{FLH}

*7 Test circuit for response time is shown below.

*8 Test circuit for CM_H, CM_L shown below.

Test Circuit for Response Time



Test Circuit for CM_H, CM_L

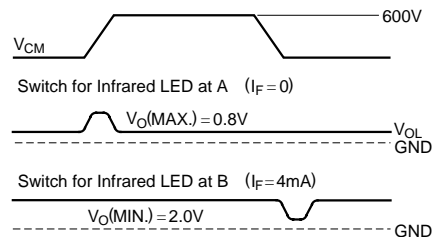
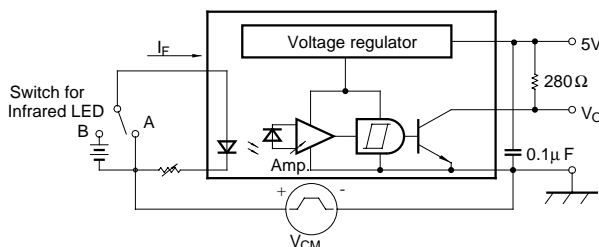


Fig. 1 Forward Current vs. Ambient Temperature

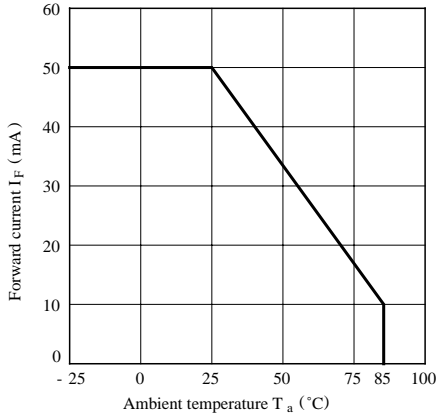


Fig. 2 Power Dissipation vs. Ambient Temperature

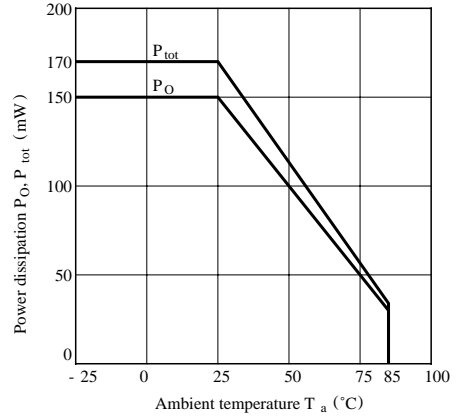


Fig. 3 Forward Current vs. Forward Voltage

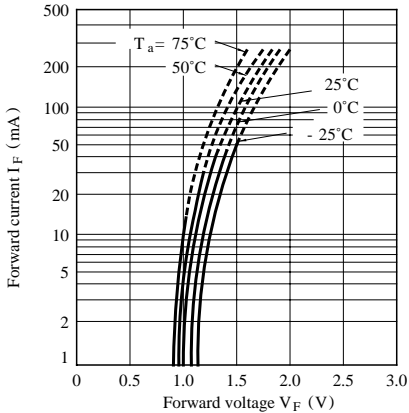


Fig. 4 Relative Threshold Input Current vs. Supply Voltage

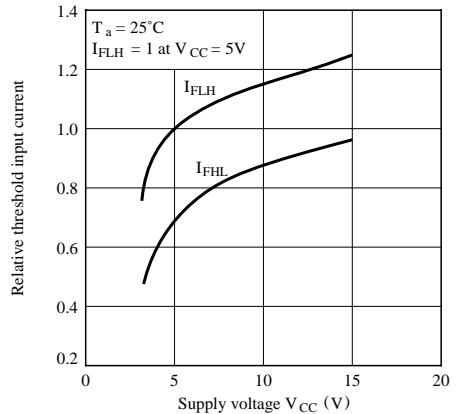


Fig. 5 Relative Threshold Input Current vs. Ambient Temperature

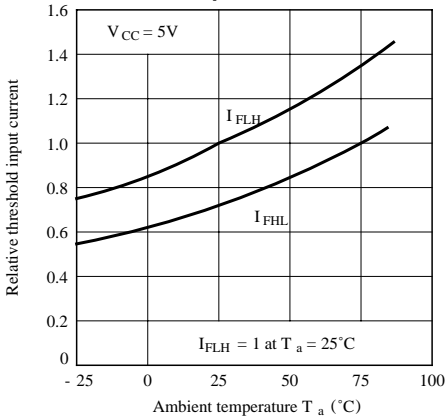


Fig. 6 Low Level Output Voltage vs. Low Level Output Current

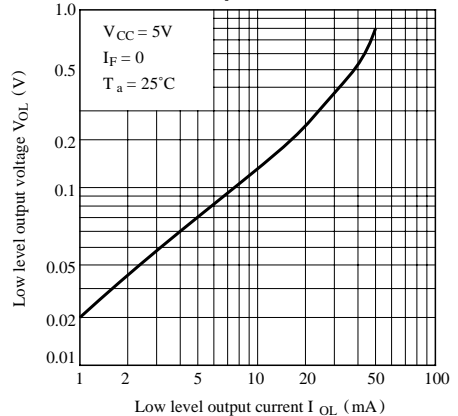


Fig. 7 Low Level Output Voltage vs. Ambient Temperature

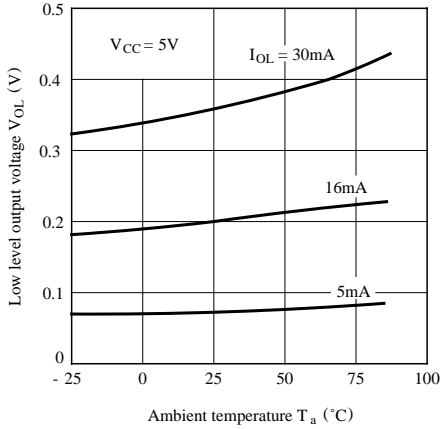


Fig. 8 High Level Output Current vs. Forward Current

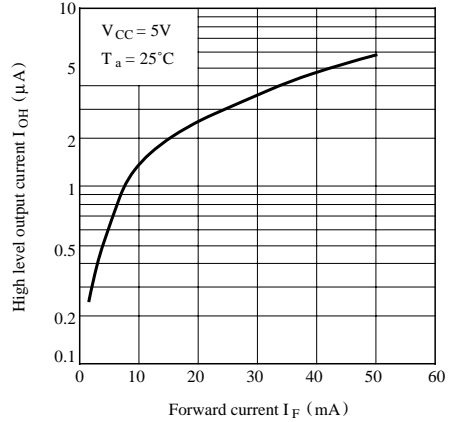


Fig. 9 High Level Output Current vs. Ambient Temperature

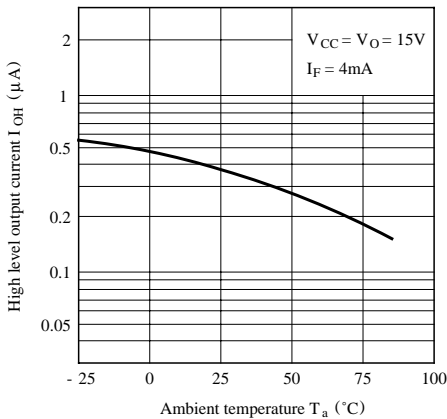


Fig.10 Supply Current vs. Supply Voltage

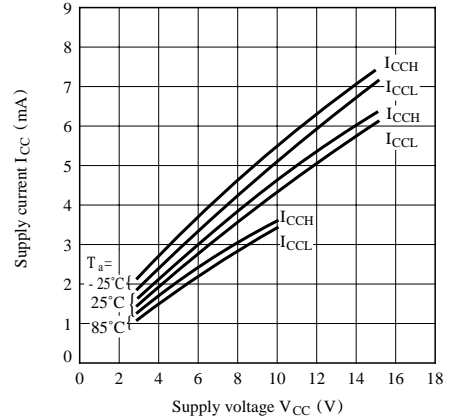


Fig.11 Propagation Delay Time vs. Forward Current

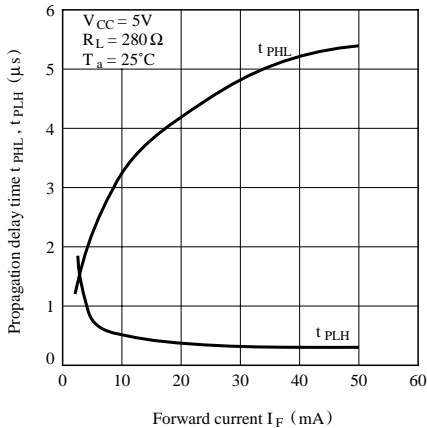
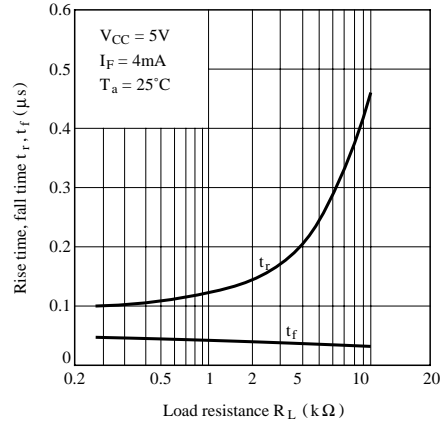


Fig.12 Rise Time, Fall Time vs. Load Resistance



■ Precautions for Use

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