

# PC900V/PC900VQ

## Digital Output Type OPIC Photocoupler

- \* Lead forming type (I type) and taping reel type (P type) are also available. (PC900VI/PC900VP)
- \*\* TÜV (DIN-VDE0884) approved type is also available as an option.

### ■ Features

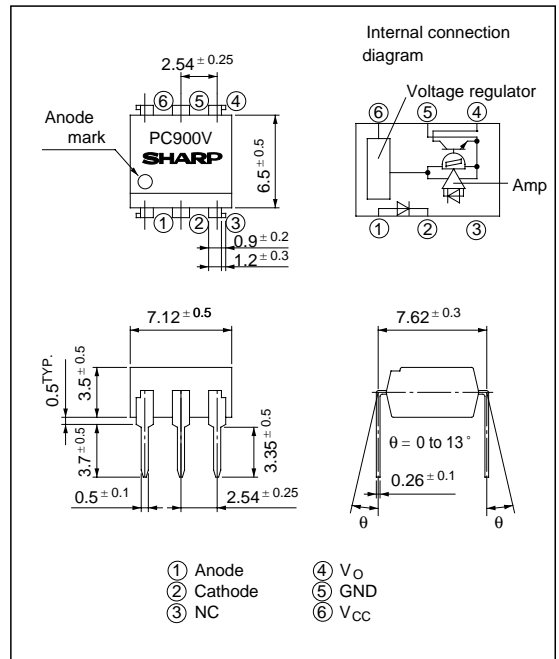
1. High reliability type (PC900VQ)
2. Normal OFF operation, open collector output
3. TTL and LSTTL compatible output
4. Operating supply voltage  $V_{CC}$ : 3 to 15V
5. High isolation voltage between input and output ( $V_{iso}$ : 5 000V<sub>rms</sub>)
6. Recognized by UL, file No. E64380

### ■ 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.

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

### ■ Absolute Maximum Ratings

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

## Electro-optical Characteristics

( $T_a = 0 \text{ to } +70^\circ\text{C}$  unless 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	$I_R$	$T_a = 25^\circ\text{C}, V_R = 3\text{V}$	-	-	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	$I_{CCL}$	$V_{CC} = 5\text{V}, I_F = 4\text{mA}$	-	2.5	5.0	mA	
	High level supply current	$I_{CCH}$	$V_{CC} = 5\text{V}, I_F = 0$	-	1.0	5.0	mA	
Transfer characteristics	*4 "High→Low" threshold input current	$I_{FHL}$	$T_a = 25^\circ\text{C}, V_{CC} = 5\text{V}, R_L = 280\Omega$	-	1.1	2.0	mA	
			$V_{CC} = 5\text{V}, R_L = 280\Omega$	-	-	4.0		
	*5 "Low→High" threshold input current	$I_{FLH}$	$T_a = 25^\circ\text{C}, V_{CC} = 5\text{V}, R_L = 280\Omega$	0.4	0.8	-	mA	
			$V_{CC} = 5\text{V}, R_L = 280\Omega$	0.3	-	-		
	*6 Hysteresis	$I_{FLH} / I_{FHL}$	$V_{CC} = 5\text{V}, R_L = 280\Omega$	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	"High→Low" propagation delay time	$t_{PHL}$	$T_a = 25^\circ\text{C}$ $V_{CC} = 5\text{V}, I_F = 4\text{mA}$ $R_L = 280\Omega$	-	1	3	$\mu\text{s}$
"Low→High" propagation delay time		$t_{PLH}$	-		2	6		
Fall time		$t_f$	-		0.05	0.5		
Rise time		$t_r$	-		0.1	0.5		

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

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

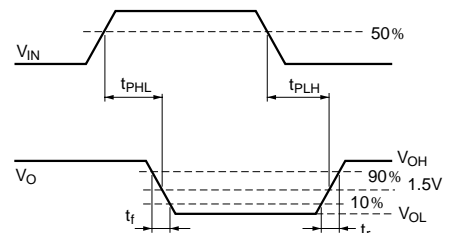
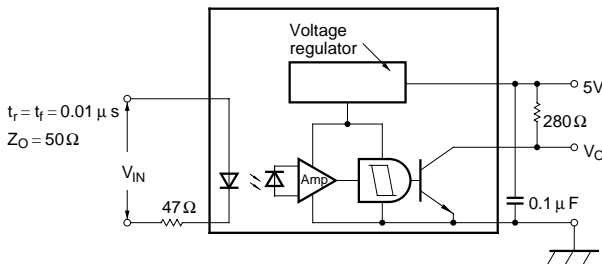
\*6 Hysteresis stands for  $I_{FLH} / I_{FHL}$ .

\*7 Test circuit for response time is shown below.

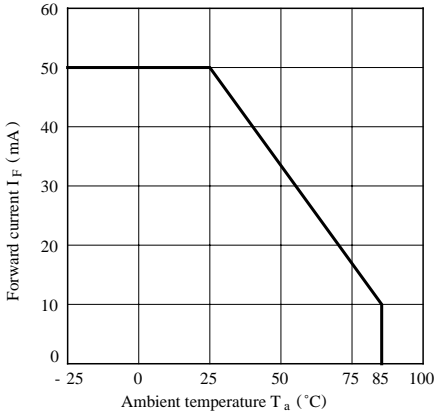
### <Precautions for Use>

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

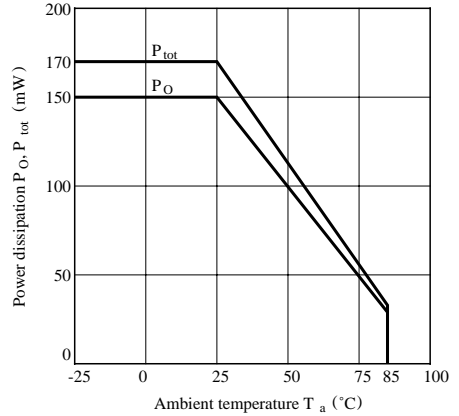
### Test Circuit for Response Time



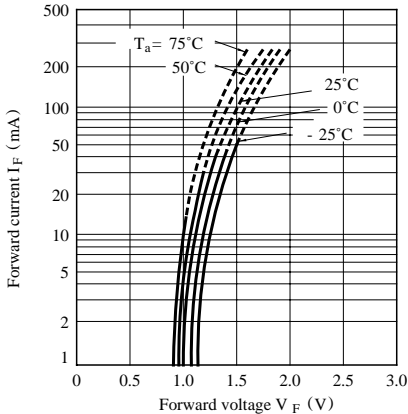
**Fig. 1 Forward Current vs. Ambient Temperature**



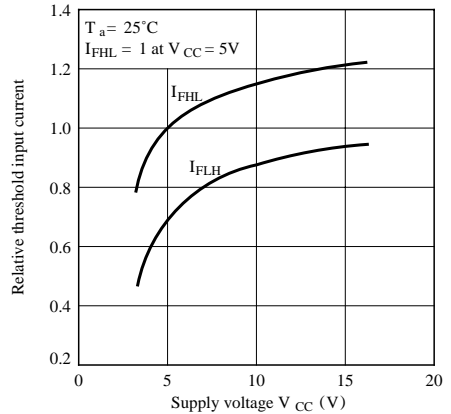
**Fig. 2 Power Dissipation vs. Ambient Temperature**



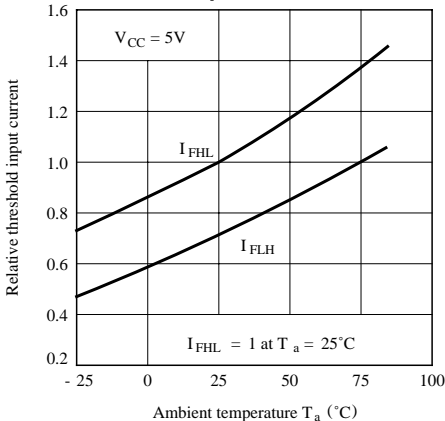
**Fig. 3 Forward Current vs. Forward Voltage**



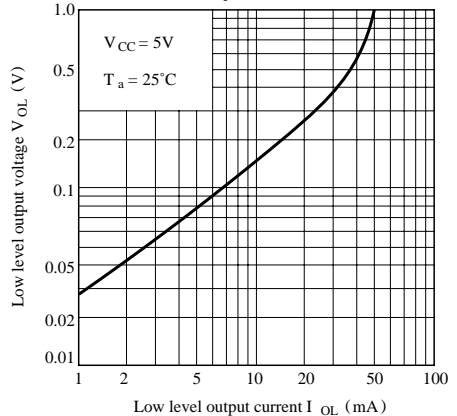
**Fig. 4 Relative Threshold Input Current vs. Supply Voltage**



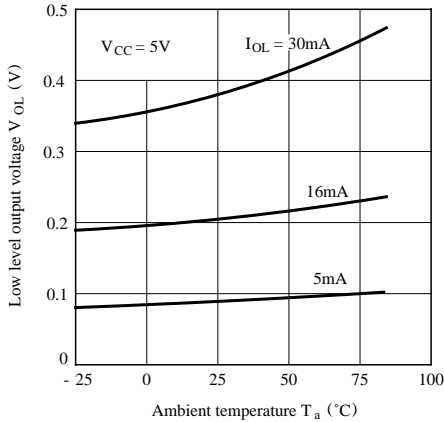
**Fig. 5 Relative Threshold Input Current vs. Ambient Temperature**



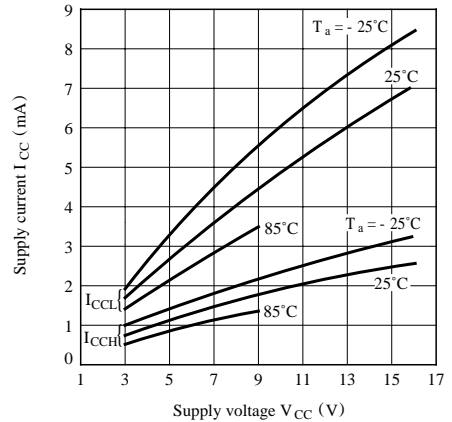
**Fig. 6 Low Level Output Voltage vs. Low Level Output Current**



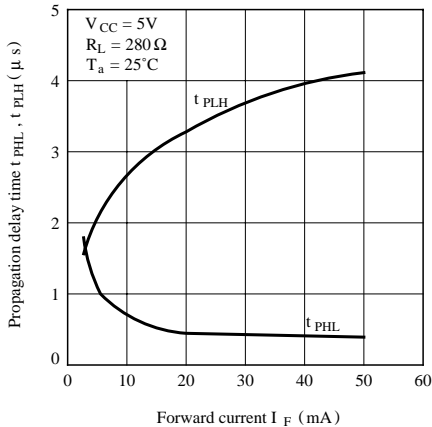
**Fig. 7 Low Level Output Voltage vs. Ambient Temperature**



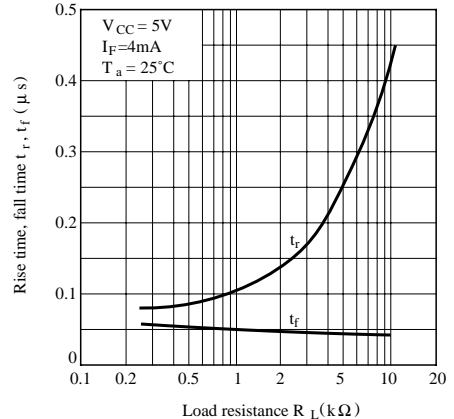
**Fig. 8 Supply Current vs. Supply Voltage**



**Fig. 9 Propagation Delay Time vs. Forward Current**



**Fig.10 Rise Time, Fall Time vs. Load Resistance**



## ■ Precautions for Use

- (1) It is recommended that a by-pass capacitor of more than  $0.01\mu F$  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.
  - Please refrain from soldering under preheating and refrain from soldering by reflow.
  - Please refer to the chapter "Precautions for Use."