

# PC922

## High Power OPIC Photocoupler

※ Lead forming type ( I type ) and taping reel type ( P type ) are also available. ( **PC922I/PC922P** )

※※ TÜV ( VDE 0884 ) approved type is also available as an option.

### ■ Features

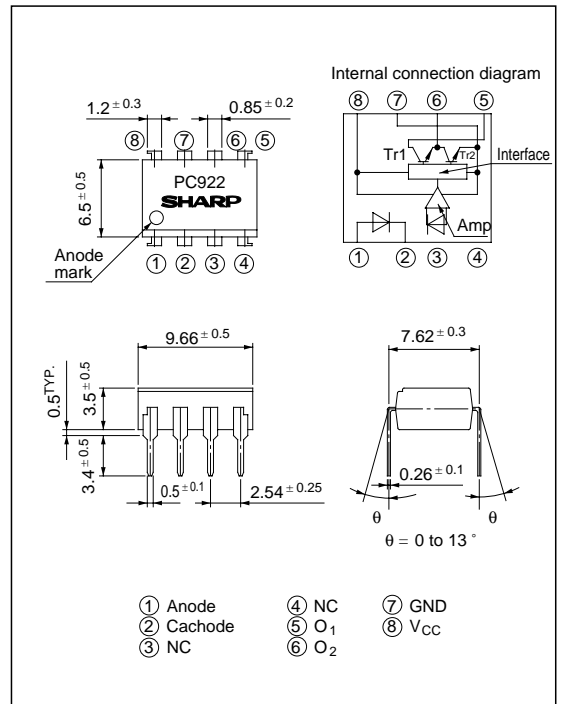
1. Built-in base amplifier for inverter drive
2. High power (  $I_{O1}$ : MAX. 0.5A ( DC )  
(  $I_{O2P}$ : MAX. 2.0A ( pulse ) )
3. High isolation voltage between input and output (  $V_{iso}$ : 5 000V<sub>rms</sub> )
4. High noise reduction type
5. High speed response (  $t_{PHL}$ ,  $t_{PLH}$ : MAX. 5  $\mu$ s )
6. High sensitivity (  $I_{FLH}$ : MAX. 3mA )
7. Recognized by UL, file No. E64380

### ■ Applications

1. Inverter controlled air conditioners
2. Small capacitance general purpose inverters

### ■ 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

(  $T_a = T_{opr}$  unless otherwise specified )

	Parameter	Symbol	Rating	Unit
Input	Forward current	$I_F$	25	mA
	*1 Reverse voltage	$V_R$	6	V
Output	Supply voltage	$V_{CC}$	18	V
	O <sub>1</sub> output current	$I_{O1}$	0.5	A
	*2 O <sub>1</sub> peak output current	$I_{O1P}$	1.0	A
	O <sub>2</sub> output current	$I_{O2}$	0.6	A
	*2 O <sub>2</sub> peak output current	$I_{O2P}$	2.0	A
	O <sub>1</sub> output voltage	$V_{O1}$	18	V
	Power dissipation	$P_O$	500	mW
	Total power dissipation	$P_{tot}$	550	mW
	*3 Isolation voltage	$V_{iso}$	5 000	V <sub>rms</sub>
	Operating temperature	$T_{opr}$	- 20 to + 80	°C
	Storage temperature	$T_{stg}$	- 55 to + 125	°C
	*4 Soldering temperature	$T_{sol}$	260	°C

\*1  $T_a = 25^\circ\text{C}$

\*2 Pulse width  $\leq 5\mu\text{s}$ , Duty ratio: 0.01

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

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

\*4 For 10 seconds

## Electro-optical Characteristics

( $T_a = T_{opr}$  unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Fig.	
Input	Forward voltage	$V_{F1}$	$T_a = 25^\circ\text{C}, I_F = 5\text{mA}$	-	1.1	1.4	V	-	
		$V_{F2}$	$T_a = 25^\circ\text{C}, I_F = 0.2\text{mA}$	0.6	0.9	-	V	-	
	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	-	
Operating supply voltage		$V_{CC}$		5.4	-	13	V	-	
Output	$O_1$ low level output voltage	$V_{O1L}$	$V_{CC} = 6\text{V}, I_{O1} = 0.4\text{A},$ $R_{L1} = 10\Omega, I_F = 5\text{mA}$	-	0.2	0.4	V	1	
	$O_2$ high level output voltage	$V_{O2H}$	$V_{CC} = 6\text{V}, I_{O2} = -0.4\text{A},$ $I_F = 5\text{mA}$	4.5	5.0	-	V	2	
	$O_2$ low level output voltage	$V_{O2L}$	$V_{CC} = 6\text{V}, I_{O2} = 0.5\text{A}, I_F = 0$	-	0.2	0.4	V	-	
	$O_1$ leak current	$I_{O1L}$	$V_{CC} = 13\text{V}, I_F = 0$	-	-	200	$\mu\text{A}$	3	
	$O_2$ leak current	$I_{O2L}$	$V_{CC} = 13\text{V}, I_F = 5\text{mA}$	-	-	200	$\mu\text{A}$	4	
	High level supply current	$I_{CCH}$	$T_a = 25^\circ\text{C}, V_{CC} = 6\text{V}, I_F = 5\text{mA}$	-	9	13	mA	-	
			$V_{CC} = 6\text{V}, I_F = 5\text{mA}$	-	-	17	mA	-	
Low level supply current	$I_{CCL}$	$T_a = 25^\circ\text{C}, V_{CC} = 6\text{V}, I_F = 0$	-	11	15	mA	-		
		$V_{CC} = 6\text{V}, I_F = 0$	-	-	20	mA	-		
Transfer characteristics	*5 "Low→High" threshold input current		$I_{FLH}$	$T_a = 25^\circ\text{C}, V_{CC} = 6\text{V},$ $R_{L1} = 5\Omega, R_{L2} = 10\Omega$	0.3	1.5	3.0	mA	5
				$V_{CC} = 6\text{V}, R_{L1} = 5\Omega$ $R_{L2} = 10\Omega$	0.2	-	5.0	mA	5
	Isolation resistance		$R_{ISO}$	$T_a = 25^\circ\text{C}, \text{DC} = 500\text{V}$ 40 to 60% RH	$5 \times 10^{10}$	$10^{11}$	-	$\Omega$	-
	Response time	"Low→High" propagation delay time	$t_{PLH}$	$T_a = 25^\circ\text{C}, V_{CC} = 6\text{V}$ $I_F = 5\text{mA}, R_{L1} = 5\Omega$ $R_{L2} = 10\Omega$	-	2	5	$\mu\text{s}$	6
		"High→Low" propagation delay time	$t_{PHL}$		-	2	5	$\mu\text{s}$	
		Rise time	$t_r$		-	0.2	1	$\mu\text{s}$	
		Fall time	$t_f$		-	0.1	1	$\mu\text{s}$	
	Instantaneous common mode rejection voltage "Output : High level"		$CM_H$	$T_a = 25^\circ\text{C}, V_{CM} = 600\text{V}^{(\text{peak})}$ $I_F = 5\text{mA}, R_{L1} = 470\Omega, R_{L2} = 1\text{k}\Omega,$ $\Delta V_{O2H} = 0.5\text{V}$	-1 500	-	-	V/ $\mu\text{s}$	7
Instantaneous common mode rejection voltage "Output : Low level"		$CM_L$	$T_a = 25^\circ\text{C}, V_{CM} = 600\text{V}^{(\text{peak})}$ $I_F = 0, R_{L1} = 470\Omega, R_{L2} = 1\text{k}\Omega$ $\Delta V_{O2L} = 0.5\text{V}$	1 500	-	-	V/ $\mu\text{s}$	7	

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

## Truth Table

Input	$O_2$ Output	Tr. 1	Tr. 2
ON	High level	ON	OFF
OFF	Low level	OFF	ON

■ Test Circuit

Fig. 1

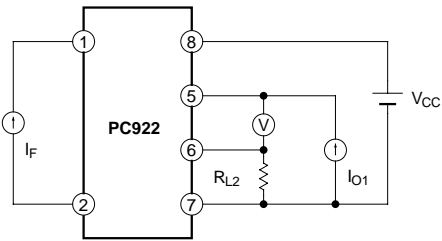


Fig. 2

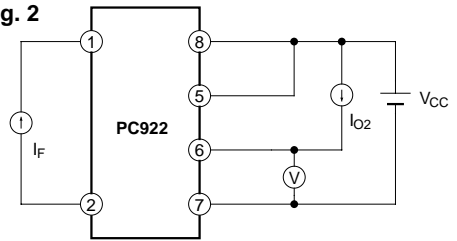


Fig. 3

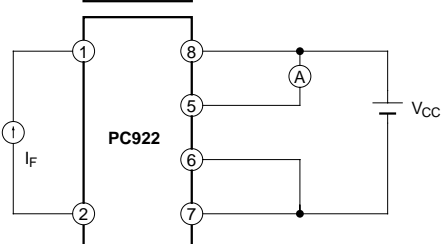


Fig. 4

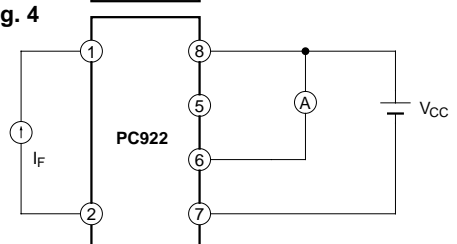


Fig. 5

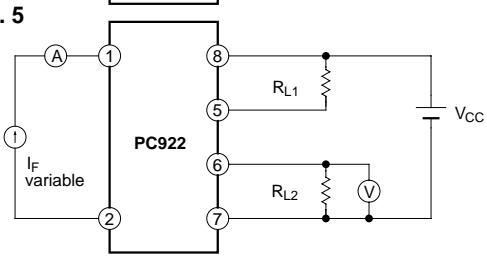


Fig. 6

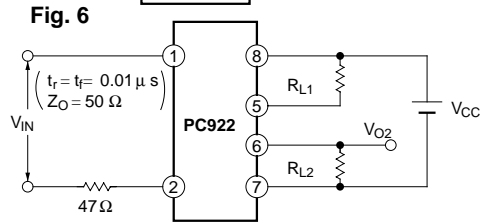


Fig. 7

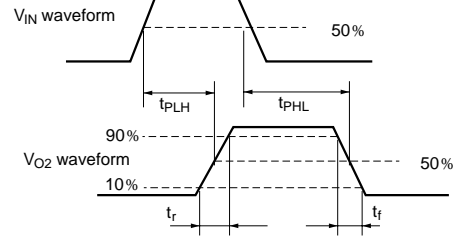
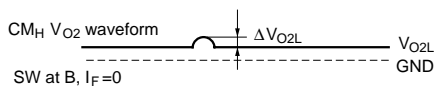
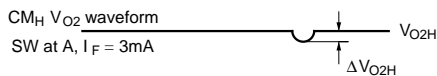
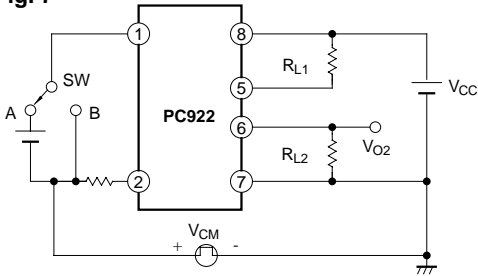
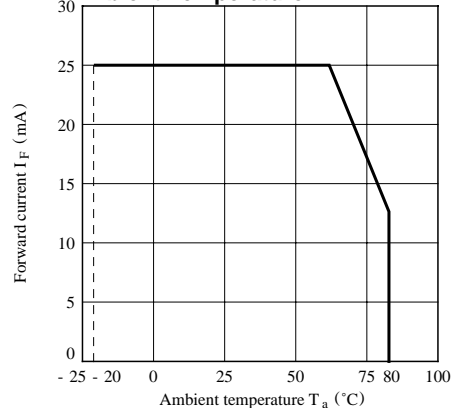
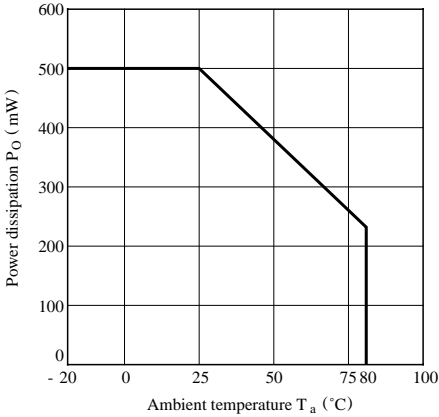


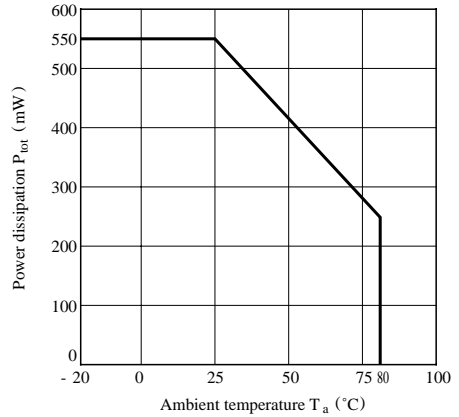
Fig. 8 Forward Current vs. Ambient Temperature



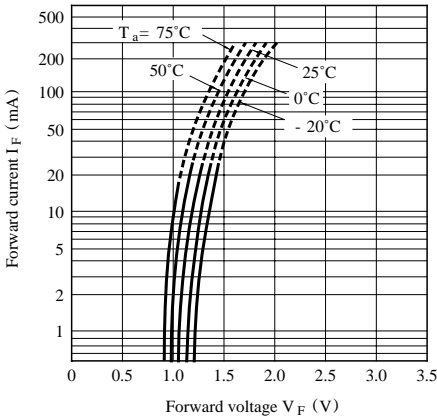
**Fig. 9-a Power Dissipation vs. Ambient Temperature**



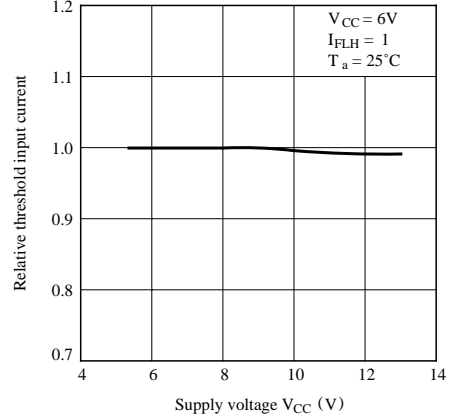
**Fig. 9-b Power Dissipation vs. Ambient Temperature**



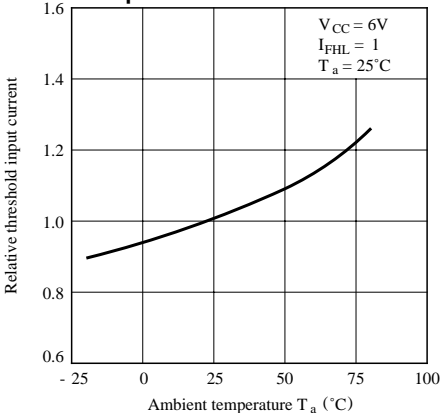
**Fig. 10 Forward Current vs. Forward Voltage**



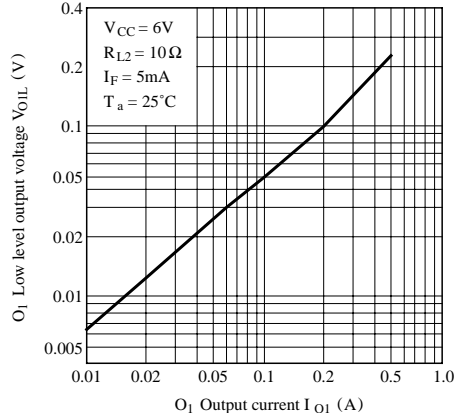
**Fig.11 “ Low→High ” Relative Threshold Input Current vs. Supply Voltage**



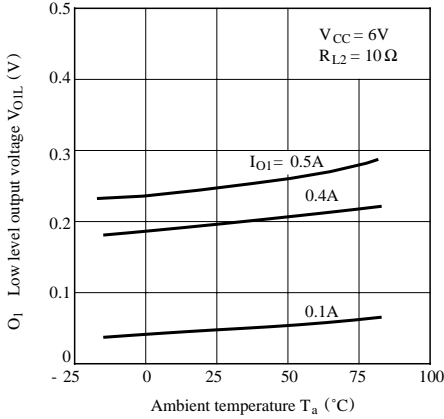
**Fig.12 “ Low→High ” Relative Threshold Input Current vs. Ambient Temperature**



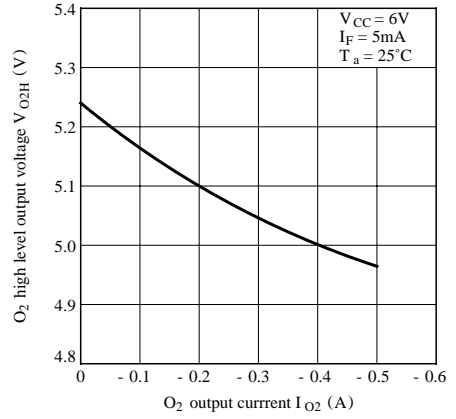
**Fig.13 O<sub>1</sub> Low Level Output Voltage vs. O<sub>1</sub> Output Current**



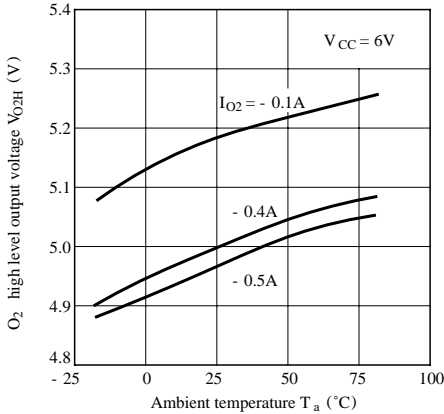
**Fig.14 O<sub>1</sub> Low Level Output Voltage vs. Ambient Temperature**



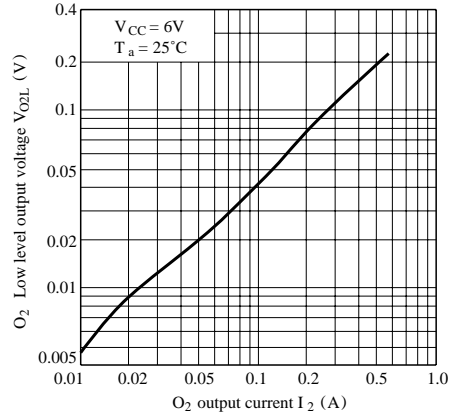
**Fig.15 O<sub>2</sub> High Level Output Voltage vs. O<sub>2</sub> Output Current**



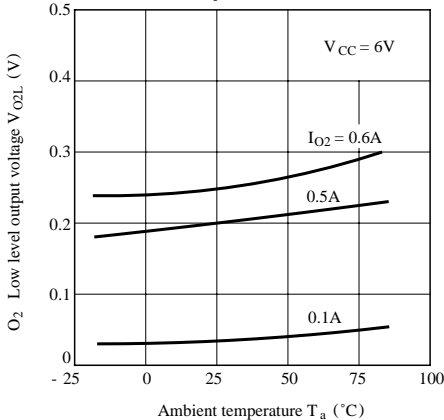
**Fig.16 O<sub>2</sub> High Level Output Voltage vs. Ambient Temperature**



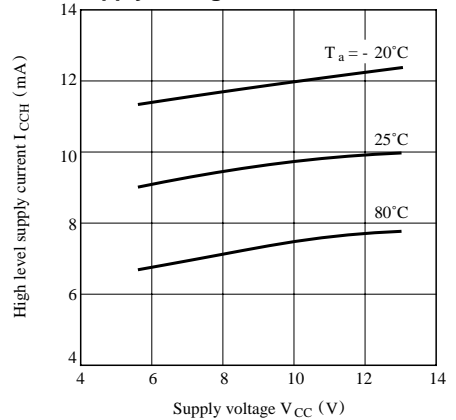
**Fig.17 O<sub>2</sub> Low Level Output Voltage vs. O<sub>2</sub> Output Current**



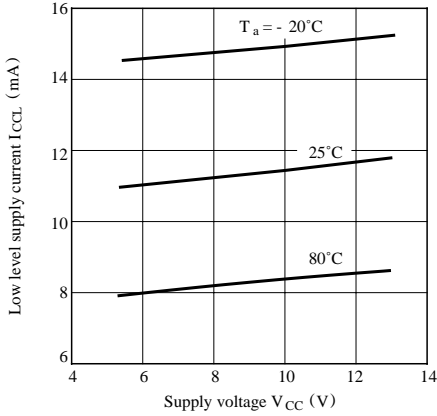
**Fig.18 O<sub>2</sub> Low Level Output Voltage vs. Ambient Temperature**



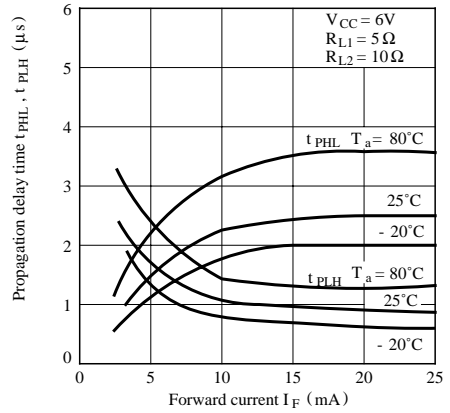
**Fig.19 High Level Supply Current vs. Supply Voltage**



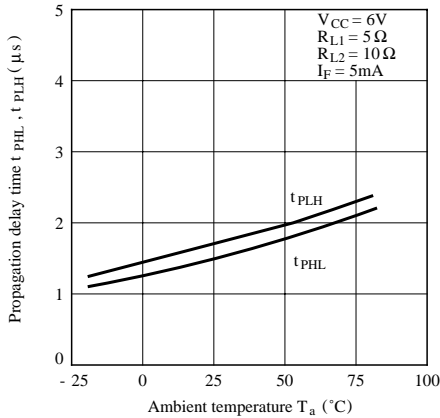
**Fig.20 Low Level Supply Current vs. Supply Voltage**



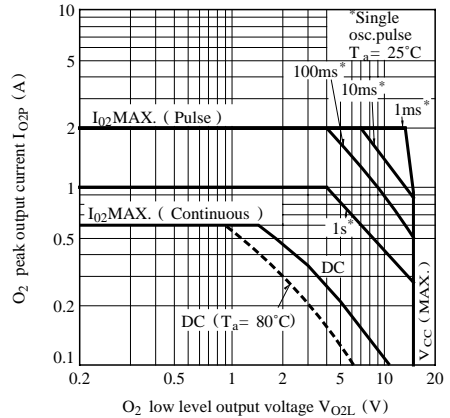
**Fig.21 Propagation Delay Time vs. Forward Current**



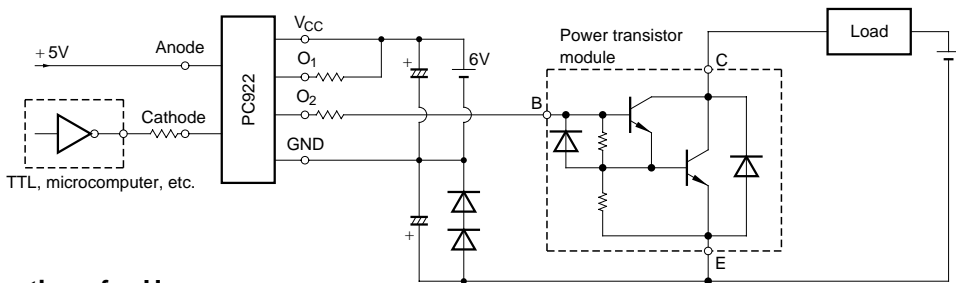
**Fig.22 Propagation Delay Time vs. Ambient Temperature**



**Fig.23  $O_2$  Peak Output Current vs.  $O_2$  Low Level Output Voltage**



**Application Circuit**



**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, refer to the chapter "Precautions for Use".