PC922

High Power OPIC Photocoupler

※ Lead forming type (I type) and taping reel type (P type) are also available. (**PC922I/PC922P**) (Page 656)

■ 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_{rms})
4. High noise reduction type
5. High speed response (t_{PHL}, t_{PLH}: MAX. 5 μs)
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)

① Anode   ④ NC   ⑦ GND
② Cathode   ⑤ o_1 ⑧ V_{CC}
③ NC   ⑥ O_2
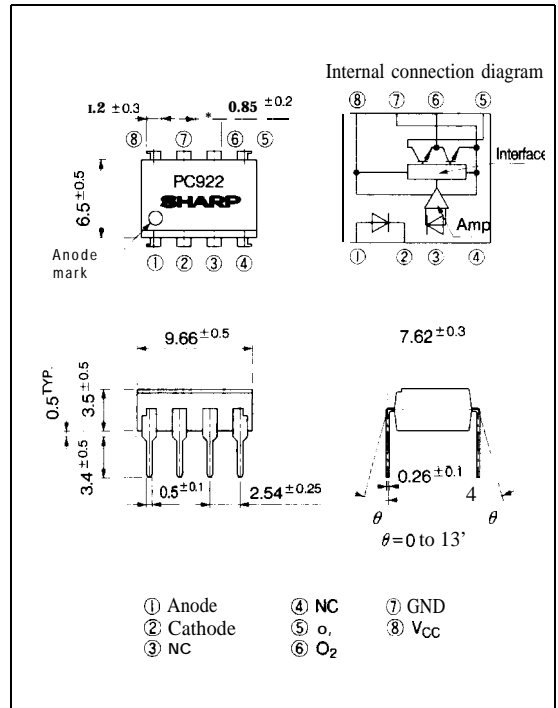
∗ "OPIC" (Optical IC) is a trademark of the SHARP Corporation
An OPIC consists of a light-detecting element and signal.
processing circuit integrated onto a single chip.

■ Absolute Maximum Ratings (Ta = T_{opr} unless otherwise specified)

	Parameter	Symbol	Rating	Unit
Input	Forward current	IF	25	mA
	∗1 Reverse voltage	V_R	6	v
output	Supply voltage	Vcc	18	v
	O_1 output current	IO1	0.5	A
	∗2 O_1 peak output current	I_{O1P}	1.0	A
	O_2 output current	IO2	0.6	A
	∗2 O_2 peak output current	IO2P	2.0	A
	O_1 output voltage	V_{O1}	18	v
	Power dissipation	P_O	500	mW
	Total power dissipation	P_{tot}	550	mW
	Isolation voltage	Viso	5 000	V_{rms}
	Operating temperature	T_{opr}	−20 to +80	℃
	Storage temperature	T_{stg}	−55 to +125	℃
	∗4 Soldering temperature	T_{sol}	260	℃

∗1 Ta = 25℃
∗2 Pulse widths 5 μs, Outy ratio= 0.01
∗3 40 to 60%RH, AC for 1 minute, Ta = 25℃
∗4 For 10 seconds

■ Electro-optical Characteristics

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

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Fig.
Input	Forward voltage	V_{F1}	$T_a=25°C$, $I_F=5mA$		1.1	14	V	-
		V_{F2}	$T_a=25°C$, $I_F=0.2mA$	0.6	0.9		V	-
	Reverse current	I_R	$T_a=25°C$, $V_R=3V$		−	10	μA	−
	Terminal capacitance	C_t	$T_a=25°C$, V=O, f=1kHz	−	30	250	$_pF$	-
output	Operating supply voltage	V_{CC}		5.4		13	V	-
	01 low level output voltage	V_{O1l}	$V_{CC}=6V$, $I_{O1}=0.4A$, $R_{L2}=10\Omega$, $I_F=5mA$		0.2	0.4	V	1
	O_2 high level output voltage	V_{O2H}	$V_{CC}=6V$, $I_{O2}=-0.4A$, $I_F=5mA$	4.5	5.0	−	V	2
	02 low level output voltage	V_{O2L}	$V_{CC}=6V$, $I_{O2}=0.5A$, $I_F=0$	−	0.2	0.4	V	-
	01 leak current	I_{O1L}	$V_{CC}=13V$, $I_F=0$	−	−	200	μA	3
	O_2 leak current	I_{O2L}	$V_{CC}=13V$, $I_F=5mA$			200	μA	4
	High level supply current	I_{CCH}	$T_a=25°C$, $V_{CC}=6V$, $I_F=5mA$	−	9	13	mA	−
			$V_{CC}=6V$, $I_F=5mA$			17	mA	-
	Low level supply current	I_{CCL}	$T_a=25°C$, $V_{CC}=6V$, IF=O	−	11	15	mA	−
			$V_{CC}=6V$, $I_F=0$			20	mA	−
Transfer charac teristics	*5"Low→ High" threshold input current	I_{FLH}	$T_a=25°C$, $V_{CC}=6V$, $R_{L1}=5\Omega$, $R_{L2}=10\Omega$	0.3	1.5	3.0	mA	5
			$V_{CC}=6V$, $R_{L1}=5\Omega$, $R_{L2}=10\Omega$	0.2	−	5.0	mA	5
	Isolation resistance	R_{ISO}	$T_a=25°C$, DC=500V, 40 to 60%RH	5×10^{10}	10^{11}	−	Ω	−
	Response time "Low→High" propagation delay time	t_{PLH}	$T_a=25°C$, $V_{CC}=6V$ $I_F=5mA$ $R_{L1}=5\Omega$ $R_{L2}=10\Omega$		2	5	μs	6
	"High→Low" propagation delay time	t_{PHL}			2	5	μS	
	Rise time	t_r			0.2	1	μs	
	Fall time	t_f			0.1	1	μs	
	Instantaneous common mode rejection voltage "Output : High level"	CMH	$T_a=25°C$, $V_{CM}=600V_{(peak)}$, $I_F=5mA$, $R_{L1}=470\Omega$, $R_{L2}=1k\Omega$, $\Delta V_{O2H}=0.5V$	− 1 500	−		$V/\mu s$	7
	Instantaneous common mode rejection voltage "Output, Low level"	CML	$T_a=25°C$, $V_{CM}=600V_{(peak)}$, $I_F=0$, $R_{L1}=470\Omega$, $R_{L2}=1k\Omega$, $\Delta V_L=0.5V$	1 500	−		$V/\mu s$	7

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

■ Truth Table

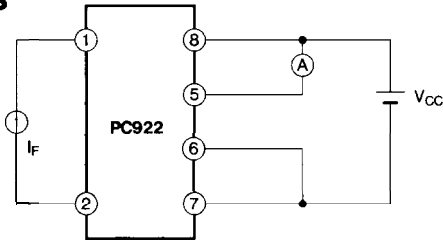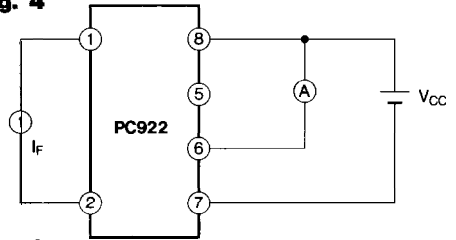| Input	O_2 Output	Tr. 1	Tr. 2
ON	High level	ON	OFF
OFF	Low level	OFF	ON

■ Test Circuit
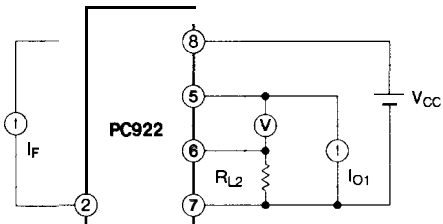
Fig. 1

Fig. 2
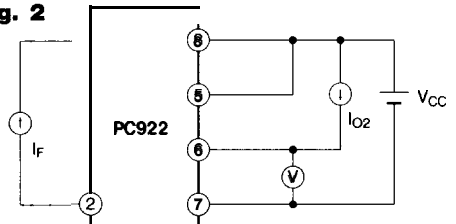
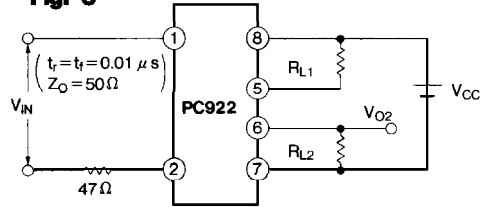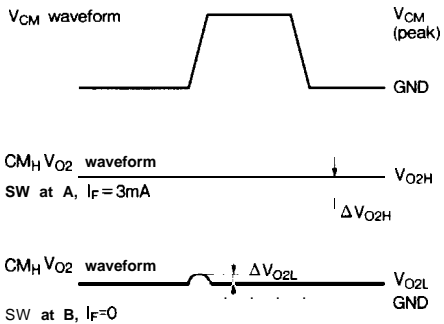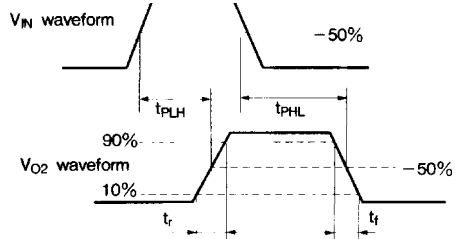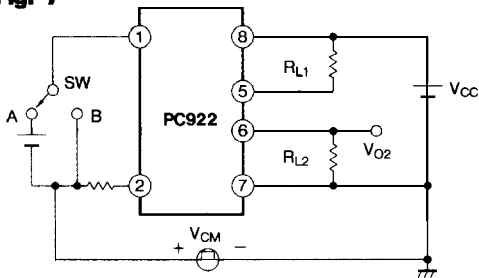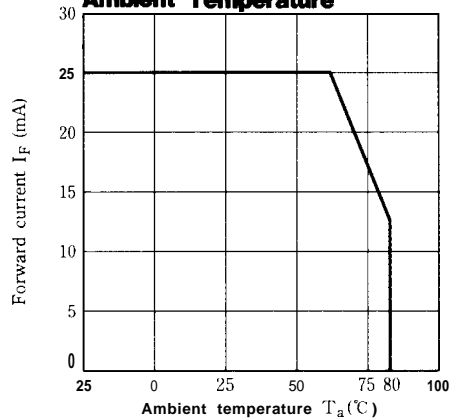**Fig. 3**

Fig. 4

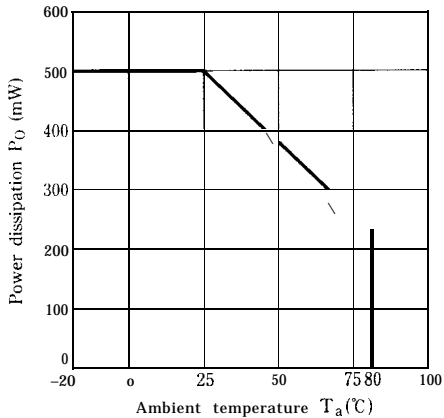

Fig. 5
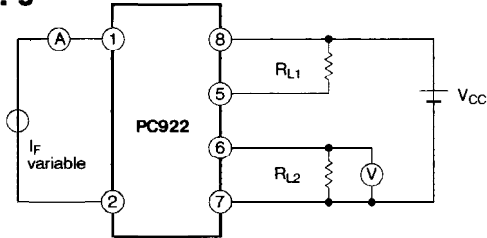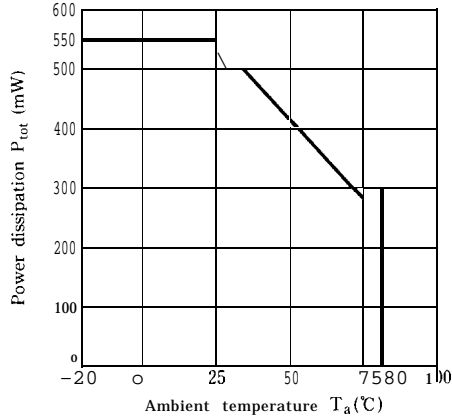

Fig. 6

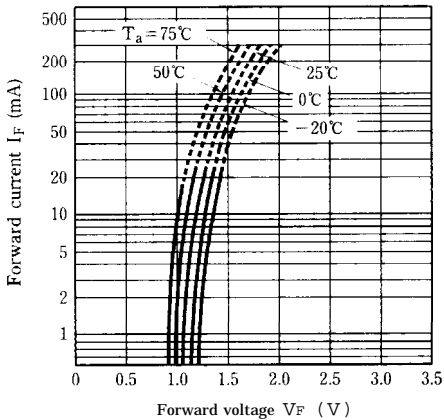**Fig. 7**

Fig. 8 Forward Current vs. Ambient Temperature

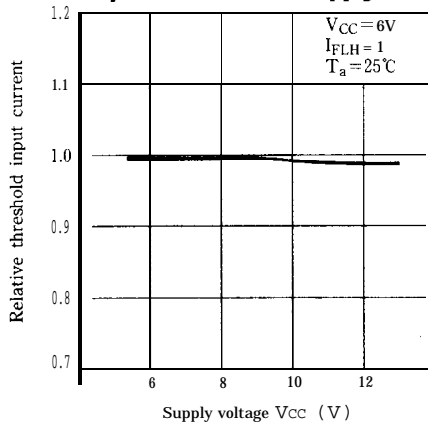### Fig. 9-a Power Dissipation vs. Ambient Temperature

Fig. 9-b Power Dissipation vs. Ambient Temperature

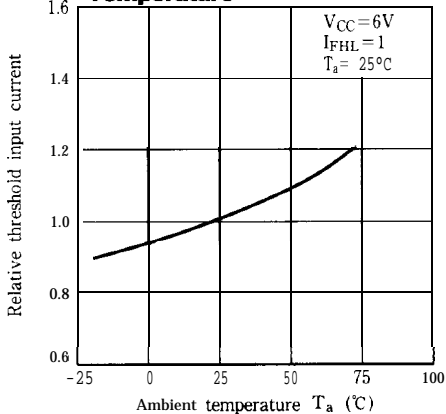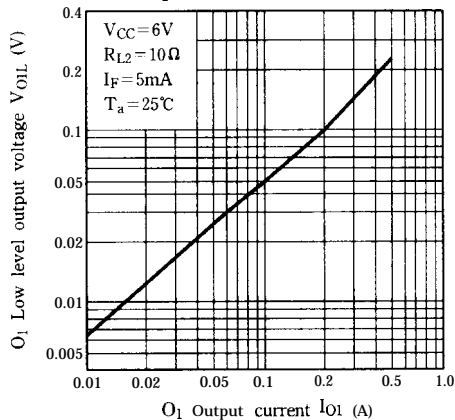### Fig. 10 Forward Current vs. Forward Voltage

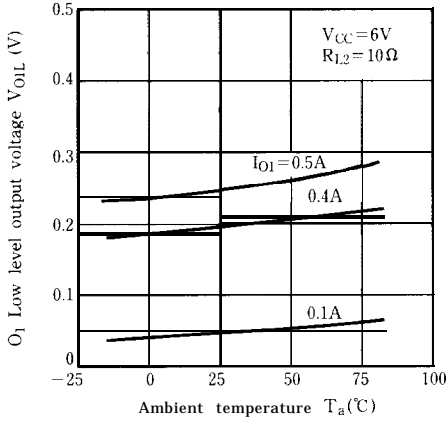### Fig.11 "Low→High" Relative Threshold Input Current vs. Supply Voltage

Fig.12 "Low→High" Relative Threshold Input Current vs. Ambient Temperature

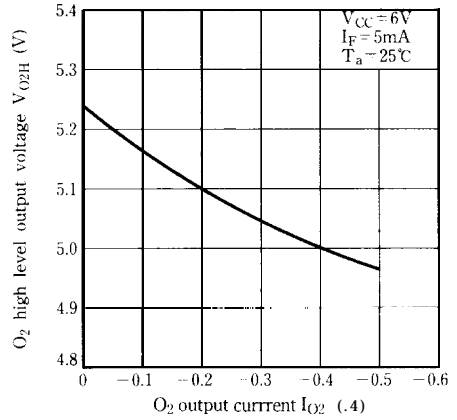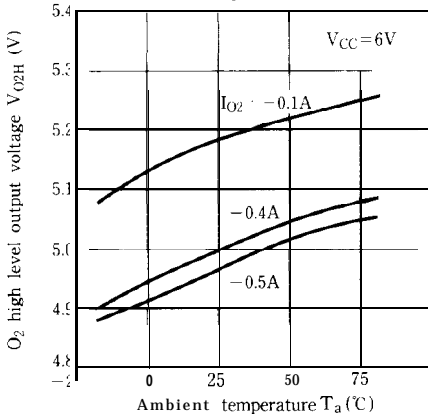### Fig.13 O, Low Level Output Voltage vs. O₁ Output Current

6

rs

Ph

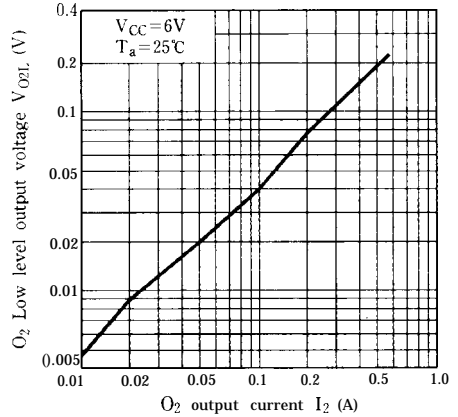### Fig.14 O₁ Low Level Output Voltage vs. Ambient Temperature

Ambient temperature T_a (℃)

O₁ Low level output voltage V_{O1L} (V)

$V_{CC} = 6V$
$R_{L2} = 10\Omega$

$I_{O1} = 0.5A$

0.4A

0.1A

Fg.15 O, High Level Output Voltage vs. o₂ Output Current

O₂ high level output voltage V_{O2H} (V)

O_2 output currrent I_{O2} (.4)

$V_{CC} = 6V$
$I_F = 5mA$
$T_a = 25℃$

Fig.16 O₂ High Level Output Voltage vs. Ambient Temperature

O₂ high level output voltage V_{O2H} (V)

Ambient temperature T_a (℃)

$V_{CC} = 6V$

$I_{O2} = -0.1A$

$-0.4A$

$-0.5A$

Fig.17 02 Low Level Output Voltage VS. O₂ Output Current

O₂ Low level output voltage V_{O2L} (V)

O_2 output current I_2 (A)

$V_{CC} = 6V$
$T_a = 25℃$

Fig.18 O₂ Low Level Output Voltage vs. Ambient Temperature

O₂ Low level output voltage V_{O2L} (V)

Ambient temperature T_a (℃)

$V_{CC} = 6V$

$I_{O2} = 0.6A$

0.5A

0.1A

Fig.19 High Level Supply Current vs. Supply Voltage

High level supply current I_{CCH} (mA)

Supply voltage V_{CC} (V)

$T_a = -20℃$

25℃

80℃

Fig.20 Low Level Supply Current vs. Supply Voltage

Low level supply current I_{CCH} (mA) vs. Supply voltage V_{CC} (V)

$T_a = -20℃$

$25℃$

$80℃$
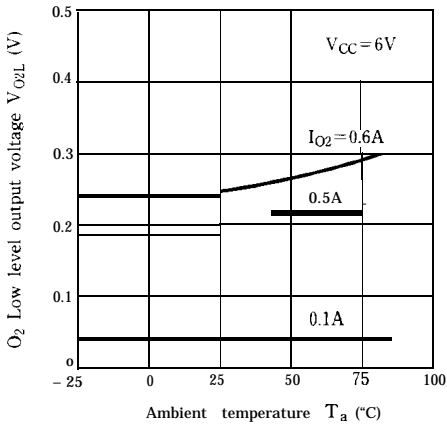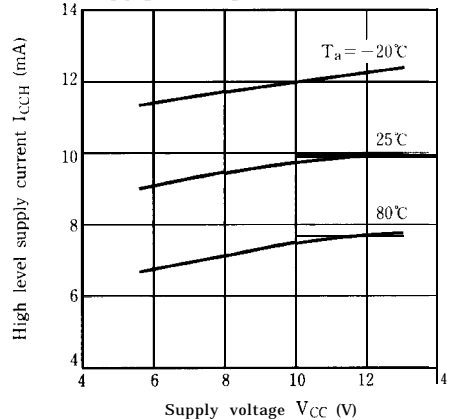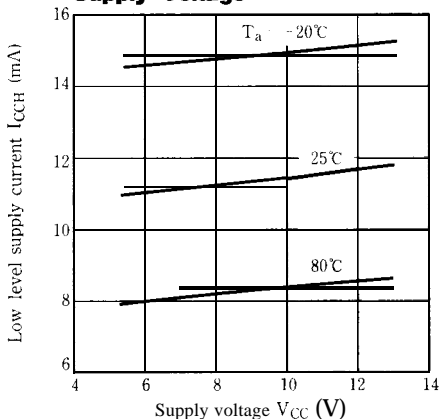
Fig.21 Propagation Delay Time vs. Forward Current

Propagation delay time t_{PHL}, t_{PLH} (ns) vs. Forward current I_F (mA)

$V_{CC} = 6V$
$R_{L1} = 5Ω$
$R_{L2} = 10Ω$

t_{PHL} $T_a = 80℃$
$25℃$
$-20℃$
t_{PLH} $T_a = 80℃$
$25℃$
$-20℃$
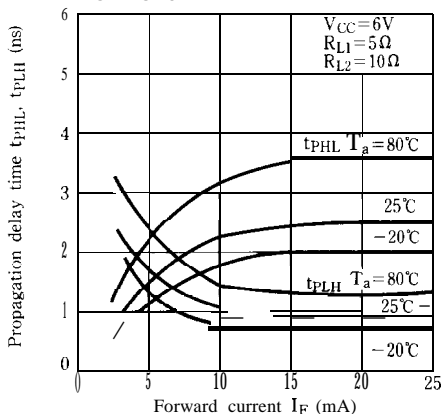
Fig.22 Propagation Delay Time vs. Ambient Temperature

Propagation delay time t_{PHL}, t_{PLH} (μs) vs. Ambient temperature T_a (℃)

$V_{CC} = 6V$
$R_{L1} = 5Ω$
$R_{L2} = 10Ω$
$I_F = 5mA$

t_{PLH}
t_{PHL}
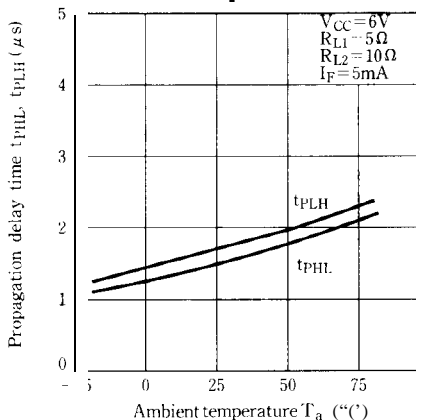
Fig.23 O₂ Peak Output Current vs. O₂ Low Level Output Voltage

O_2 peak output current I_{O2P} (A) vs. O_2 low level output voltage V_{O2L} (V)

*Single osc.pulse
$T_a = 25℃$
$100ms^*$
$10ms^*$
$1ms^*$
I_{O2}MAX. (Pulse)
I_{O2}MAX. (Continuous)
$1s^*$
DC
$DC (T_a = 80℃)$

6

Photocouplers

■ Application Circuit

+ 5V   Anode

Cathode

TTL, microcomputer, etc

V_{CC}
PC922
6V
Power transistor module
Load
B
C
E
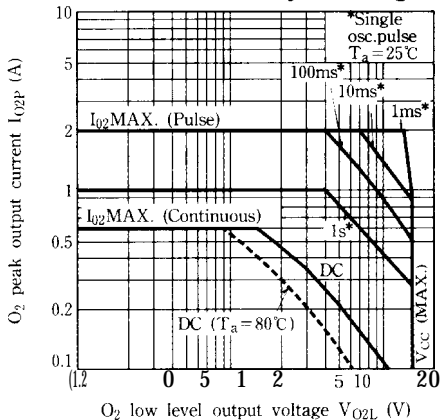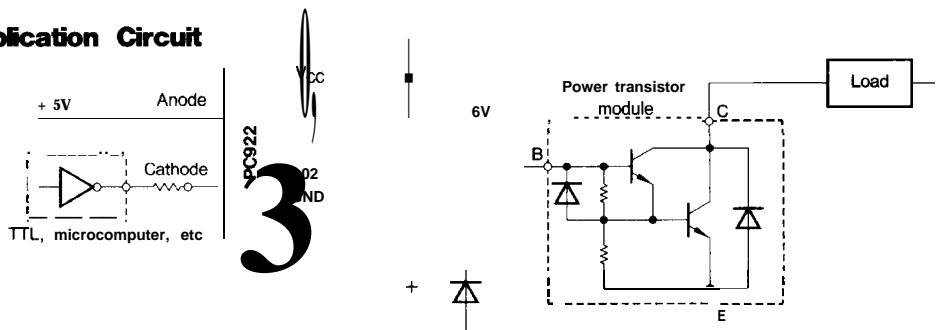
■ Precautions for Use

(1) It is recommended that a by-pass capacitor of more than 0.01 μ 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" .(Page 78 to 93)