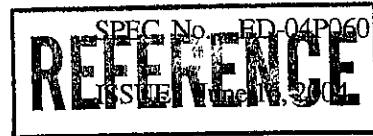


SHARP



OPTO-ELECTRONIC DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

PHOTOCOUPLER

MODEL No.

PC900V

<input checked="" type="radio"/>	PC900V0NSZXF
<input type="radio"/>	PC900V0YSZXF

Specified for _____

Enclosed please find copies of the Specifications which consists of 15 pages including cover.
After confirmation of the contents, please be sure to send back ☐ copies of the Specifications
with approving signature on each.

CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED

DATE JUN 17 2004

BY R. M.

for H. Imanaka,
Department General Manager of
Engineering Dept., II
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

Product name : PHOTOCOUPLER

Model No. : PC900V

Business dealing name

PC900V0NSZXF

PC900V0YSZXF

1. These specification sheets include materials protected under copyright of Sharp Corporation ("Sharp"). Please do not reproduce or cause anyone to reproduce them without Sharp's consent.
2. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets, as well as the precautions mentioned below. Sharp assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets, and the precautions mentioned below.

(Precautions)

- (1) This product is designed for use in the following application areas ;

· OA equipment	· Audio visual equipment	· Home appliances
· Telecommunication equipment (Terminal)	· Measuring equipment	
· Tooling machines	· Computers	

If the use of the product in the above application areas is for equipment listed in paragraphs (2) or (3), please be sure to observe the precautions given in those respective paragraphs.

- (2) Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when this product is used for equipment which demands high reliability and safety in function and precision, such as ;

· Transportation control and safety equipment (aircraft, train, automobile etc.)	
· Traffic signals	· Gas leakage sensor breakers
· Other safety equipment	· Rescue and security equipment

- (3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

· Space equipment	· Telecommunication equipment (for trunk lines)
· Nuclear power control equipment	· Medical equipment

- (4) Please contact and consult with a Sharp sales representative if there are any questions regarding interpretation of the above three paragraphs.

3. Please contact and consult with a Sharp sales representative for any questions about this product.

1. Application

This specification applies to the outline and characteristics of photocoupler Model No. PC900V.

2. Outline: Refer to the attached sheet, page 3.

3. Ratings and characteristics: Refer to the attached sheet, page 4 to 6.

4. Reliability: Refer to the attached sheet, page 7.

5. Outgoing inspection: Refer to the attached sheet, page 8.

6. Supplement

6.1 Isolation voltage shall be measured in the following method.

- (1) Short among pins 1 to 3 on the primary side and among pins 4 to 6 on the secondary side.
- (2) The dielectric withstanding tester with zero-cross circuit shall be used.
- (3) The wave form of applied voltage shall be a sine wave.

(It is recommended that the isolation voltage be measured in insulation oil.

6.2 Package specifications Refer to the attached sheet, page 9, 10.

6.3 Business dealing name

("○" mark indicates business dealing name of ordered product)

Product	Business dealing name	Remark
○	PC900V0NSZXF	
	PC900V0YSZXF	Applied to product as a option (Attachment-2-1 to 2-3.)

6.4 This Model is approved by UL.

Approved Model No. : PC900V

UL file No. : E64380

6.5 Theory of operation

- (1) When the forward current of above the "H→L" threshold input current (I_{FHL}) is applied to the input side, the output will go "Low level".
- (2) When the forward current on the input side goes below the "L→H" threshold input current (I_{FLH}) is applied to the input side, the output will go "High level".

6.6 This product is not designed against irradiation.

This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

6.7 ODS materials

This product shall not contain the following materials.

Also, the following materials shall not be used in the production process for this product.

Materials for ODS : CFCs, Halon, Carbon tetrachloride, 1,1,1-Trichloroethane (Methyl chloroform)

6.8 Brominated flame retardants

Specific brominated flame retardants such as the PBBOs and PBBs are not used in this device at all.

7. Notes

Precautions for photocouplers : Attachment-1

3.1 Absolute maximum ratings

(Ta=25°C)

Parameter		Symbol	Rating	Unit
Input	*1 Forward current	I_F	50	mA
	*2 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
	*1 Power dissipation	P_o	150	mW
*1	Total power dissipation	P_{tot}	170	mW
*3	Isolation voltage	$V_{iso(rms)}$	5.0	kV
	Operating temperature	T_{opr}	-25 to +85	°C
	Storage temperature	T_{stg}	-40 to +125	°C
*4	Soldering temperature	T_{sol}	270	°C

*4 For 10 s

3.2 Electro-optical characteristics

(Unspecified : Ta=0 to 70°C)

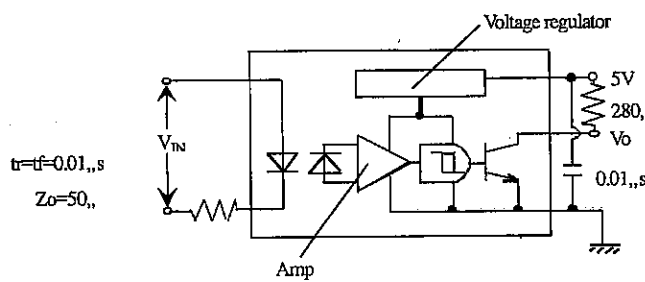
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V_F	$I_F=4\text{mA}$	-	1.1	1.4	V
			$I_F=0.3\text{mA}$	0.7	1.0		
	Reverse current	I_R	Ta=25°C, $V_R=3\text{V}$	-	-	10	μA
	Terminal capacitance	C_t	Ta=25°C, $V=0$, $f=1\text{kHz}$	-	30	250	pF
Output	Operating supply voltage range	V_{cc}		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}	$V_{cc}=V_o=15\text{V}$, $I_F=0$	-	-	100	μA
	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	"H→L" threshold input current *1	I_{FHL}	Ta=25°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	
	"L→H" threshold input current *2	I_{FLH}	Ta=25°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	-	-	
	Hysteresis *3	I_{FLH}/I_{FHL}	$V_{cc}=5\text{V}$, $R_L=280\Omega$	0.5	0.7	0.9	pF
	Isolation resistance	R_{iso}	Ta=25°C DC500V, 40 to 60%RH	5×10^{10}	10^{11}	-	Ω
	*4 Response time	"H→L" propagation time	Ta=25°C $V_{cc}=5\text{V}$, $I_F=4\text{mA}$ $R_L=280\Omega$	-	1	3	μs
		"L→H" propagation time		-	2	6	
		Fall time		-	0.05	0.5	
		Rise time		-	0.1	0.5	

*1 I_{FHL} represents forward current when output goes from "H" to "L".

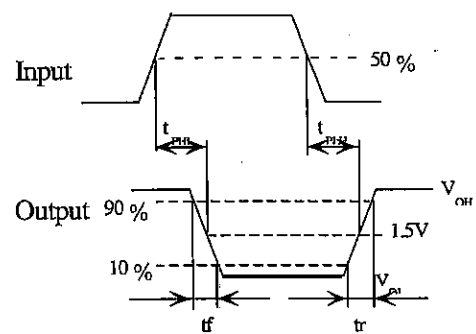
*2 I_{FLH} represents forward current when output goes from "L" to "H".

*3 Hysteresis : I_{FLH}/I_{FHL}

*4 Test circuit for response time shall be shown below.

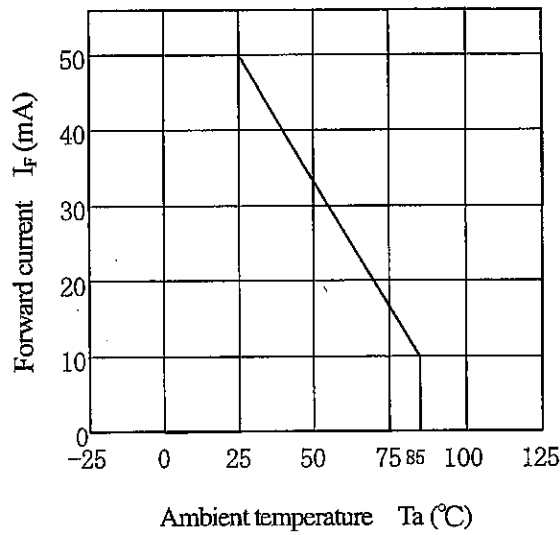


Test circuit diagram

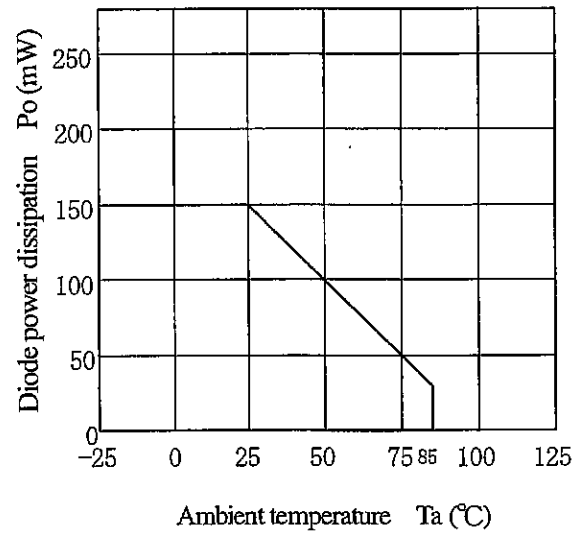


Timing chart

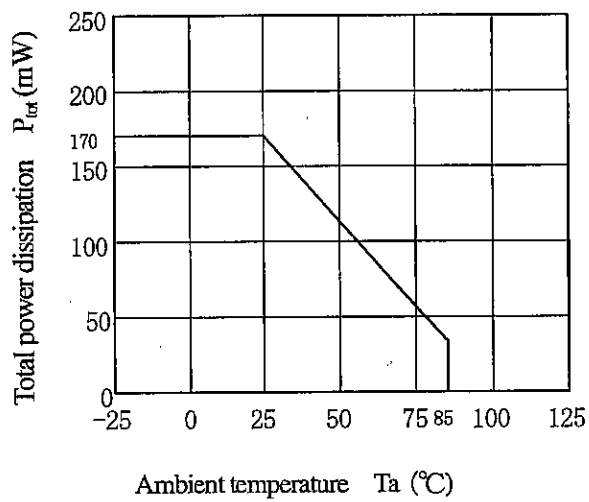
(Fig. 1) Forward current vs.
 ambient temperature



(Fig. 2) Output power dissipation
 vs. ambient temperature



(Fig. 3) Total power dissipation
 vs. ambient temperature



4. Reliability

The reliability of products shall be satisfied with items listed below.

Confidence level : 90%

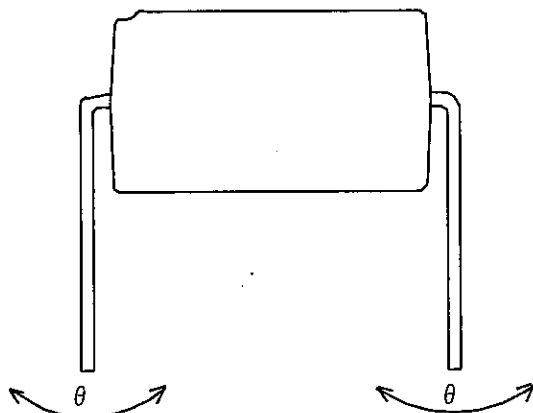
LTPD : 10 or 20

Test Items	Test Conditions *1	Failure Judgement Criteria	Samples (n) Defective (C)
Solderability *2	245±3°C, 5s	—————	n=11, C=0
Soldering heat	(Flow soldering) 270°C, 10 s	$V_F > U \times 1.2$ $I_R > U \times 2$ $V_{OL} > U \times 1.2$ $I_{OH} > U \times 1.2$ $I_{CCL} > U \times 1.2$ $I_{CCH} > U \times 1.2$ $I_{FHL} > U \times 1.3$ $I_{FLH} < L \times 0.7$ $I_{FLH}/I_{FHL} \neq L \times 0.8$ $\sim U \times 1.2$	n=11, C=0
	(Soldering by hand) 400°C, 3 s		n=11, C=0
Terminal strength (Tension)	Weight: 5N 5 s/each terminal	U: Upper specification limit L: Lower specification limit	n=11, C=0
Terminal strength (Bending) *3	Weight: 2.5N 2 times/each terminal		n=11, C=0
Mechanical shock	15km/s ² , 0.5ms 3 times/±X, ±Y, ±Z direction		n=11, C=0
Variable frequency Vibration	200m/s ² , 100 to 2000 to 100Hz/4 min 4 times/X, Y, Z direction		n=11, C=0
Temperature Cyclin	1 cycle -40 °C to +125 °C (30 min) (30 min) 20 cycles test		n=22, C=0
High temp. and high Humidity storage	+85 °C, 85%RH, 1000		n=22, C=0
High temp. storage	+125 °C, 1000h		n=22, C=0
Low temp. storage	-40 °C, 1000h		n=22, C=0
Operation life	$I_F=10\text{mA}$, $V_{CC}=15\text{V}$ $I_{OL}=16\text{mA}$, $T_a=25\text{ °C}$, 1000h		n=22, C=0

*1 Test method, conforms to EIAJ ED 4701.

*2 Solder shall adhere at the area of 95% or more of immersed portion of lead,
and pin hole or other holes shall not be concentrated on one portion.

*3 Terminal bending direction is shown below.



5. Outgoing inspection

5.1 Inspection items

(1) Electrical characteristics

V_{FB} , I_R , V_{OL} , I_{OH} , I_{CCL} , I_{CCH} , I_{FHL} , I_{FLH} , R_{ISO} , V_{ISO}

(2) Appearance

5.2 Sampling method and Inspection level

A single sampling plan, normal inspection level II based on ISO 2859 is applied.

The AQL according to the inspection items are shown below.

Defect	Inspection item	AQL (%)
Major defect	Electrical characteristics Unreadable marking	0.065
Minor defect	Appearance defect except the above mentioned.	0.25

6.2 Package specification

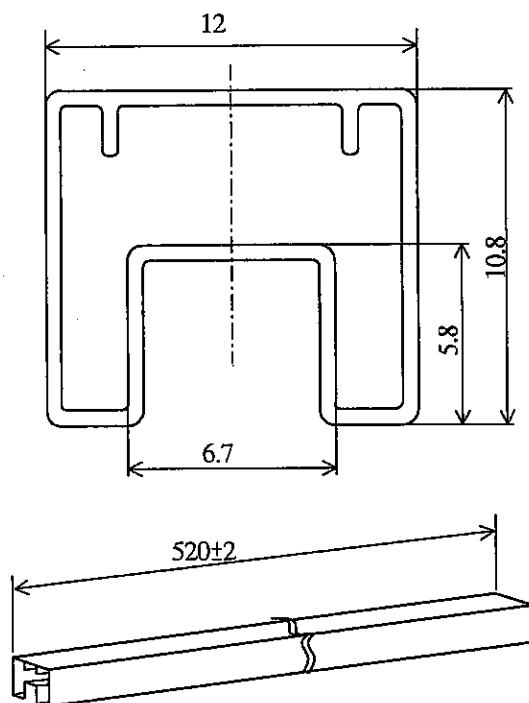
6.2.1 Package materials

No.	Name	Materials	Purposes
①	Sleeve	HIPS with preventing static electricity	Products packaged
②	Stopper	Styrene-Elastomer	Products fixed
③	Outer case	Corrugated cardboard	Sleeve packaged
④	Craft tape	Paper	Lid of packaged case fixed
⑤	Label	Paper	Model No., quantity, inspection date and lot No. specified

6.2.2 Package method

- (1) MAX. 50 pcs. of products shall be packaged in a sleeve and both of sleeve① edges shall be fixed by stoppers②.
- (2) MAX. 20 sleeves (product ; 1000pcs.) above shall be packaged in a packing case③.
- (3) Model No., quantity, inspection date and lot No. shall be marked on the label⑤ and this label shall be put on the side of the outer case.
- (4) Outer case shall be closed with the lid and enclosed with craft tape④.

6.2.3 Sleeve package outline dimensions



Note 1) Thickness : $0.5 \pm 0.2 \text{ mm}$

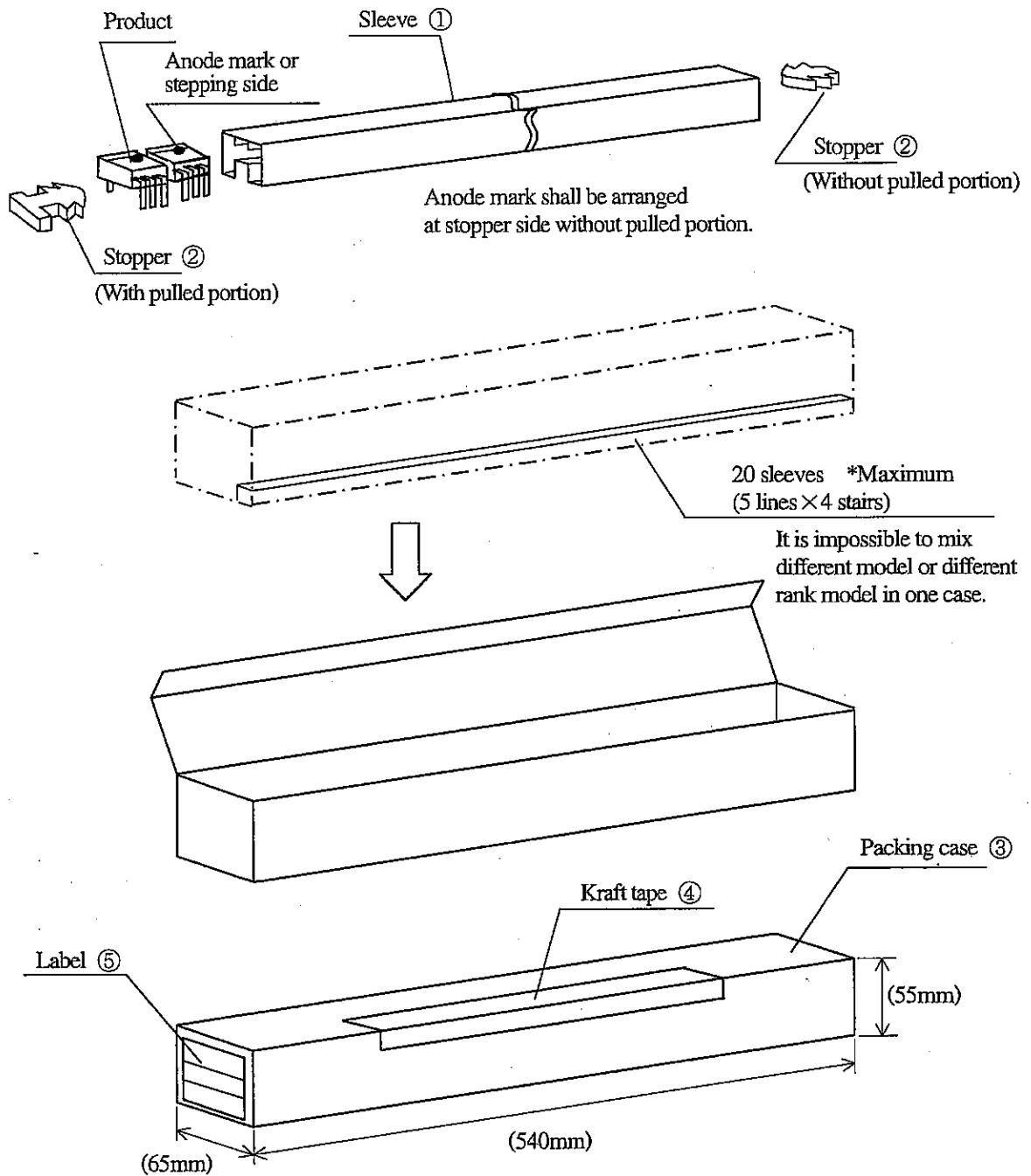
2) Outer R : 0.5mm

3) Process with applying antistatic treatment.

4) Unless otherwise specified tolerances shall be $\pm 0.5 \text{ mm}$.

(However except for deformation due to the rubber stopper in sleeve.)

6.2.4 Packaging outer case outline dimensions



Regular packing mass : Approx. 860g

() : TYP. value

Precautions for Photocouplers

1. For cleaning
 - (1) Solvent cleaning : Solvent temperature 45°C or less
Immersion for 3 min or less
 - (2) Ultrasonic cleaning : The effect to device by ultrasonic cleaning differs by cleaning bath size, ultrasonic power output, cleaning time, PCB size or device mounting condition etc.
Please test it in actual using condition and confirm that doesn't occur any defect before starting the ultrasonic cleaning.
 - (3) Applicable solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol
In case when the other solvent is used, there are cases that the packaging resin is eroded.
Please use the other solvent after thorough confirmation is performed in actual using condition.
2. Precaution for use
Transistor of detector side in bipolar configuration is apt to be affected by static electricity for its minute design.
When handling them, general countermeasure against static electricity should be taken to avoid breakdown of devices or degradation of characteristics.
3. Circuit design
 - 3.1 In order to stabilize power supply line, we recommend to connect a by-pass capacitor of 0.01 μ F or more between Vcc and GND near the device.
 - 3.2 The LED used in the Photocoupler generally decreases the light emission power by operation.
In case of long operation time, please design the circuit with considering the decreases of the light emission power of the LED.(50%/5years) Please decide the input current which become 2 times of MAX. I_{FHL} .
 - 3.3 The detector which is used in this device, has parasitic diode between each pins and GND.
There are cases that miss operation or destruction possibly may be occurred if electric potential of any pin becomes below GND level even for instant.
Therefore it shall be recommended to design the circuit that electric potential of any pin does not become below GND level.
4. Precautions for Soldering
 - 4.1 In case of flow soldering (Whole dipping is possible)
It is recommended that flow soldering should be within 270°C and within 10s
(Pre-heating:100 to 150°C,30 to 80 s) : Within 2 times
 - 4.2 In case of hand soldering
It is recommended that hand soldering should be within 400°C and within 3 s: Within 2 times
 - 4.3 Other precautions
Depending on equipment and soldering conditions (temperature, Using solder etc.), the effect to junction between PCB and lead pins of photocoupler is different.
Please confirm that there is no problem on the actual use conditions