

PREPARED BY: <i>J. Hoshino</i>	DATE: <i>Feb. 27, 1996</i>	<b>SHARP</b>  ELECTRONIC COMPONENTS GROUP SHARP CORPORATION  <b>SPECIFICATION</b>	SPEC. No. ED-96028
APPROVED BY: <i>J. Yoshikawa</i>	DATE: <i>Feb. 28, 1996</i>		ISSUE/February 27, 1996
			PAGE 12 Pages
			REPRESENTATIVE DIVISION  OPTO-ELECTRONIC DEVICES DIV.

DEVICE SPECIFICATION FOR

PHOTOCOUPLER

MODEL No.

PC3H7

Business dealing name : PC3H7

1. These specification sheets Include the contents under the **copyright** of Sharp Corporation ("Sharp"). **Please** keep them **with** reasonable care as **important** Information. Please don't reproduce or cause anyone reproduce them without Sharp's consent.

2. **Please** obey the **instructions** mentioned below for actual use of **this** device. **SHARP** takes no responsibility for damage caused by **improper** use of the devices.

(1) This **device is** designed for general electronic equipment.

**Main** uses of **this** device are as **follows**:

• Computer • OA equipment • Telecommunication equipment (Terminal)  
[ • **Measuring** equipment • **Tooling machine** • AV equipment • Home appliance, etc. ]

(2) Please take **proper** steps in order to maintain **reliability** and **safety**. In case **this** device is **used** for the uses mentioned **below** which require high **reliability**,

• Unit **concerning** control and safety of a vehicle (air plane, train, automobile etc.)  
• **Traffic signal** • Gas leak detection breaker • Fire box and burglar alarm box  
[ • Other safety equipment, etc. ]

(3) Please do not use **for the** uses mentioned below which **require** **extremely** high **reliability**.

• Space equipment • Telecommunication equipment (Trunk) ↑  
[ • Nuclear control equipment • **Medical** equipment etc. ]

Contact a **SHARP representative** of **sales office** in advance **when** you intend to use **SHARP** devices for any applications other than those **applications** **for general** electronic equipment **recommend** by SHARP at (1).

CUSTOMER'S APPROVAL

DATE

BY

DATE  
PRESENTED  
BY*J. M.*

T. Matsumura,  
Department General Manager of  
Engineering Dept.,II  
Opto- Electronic Devices Div.  
ELECOM Group  
SHARP CORPORATION

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**REFERENCE****1. Application**

This specification applies to the outline and characteristics of photocoupler;  
Model No. PC3H7.

**2. Outline**

Refer to the attached drawing No. CY8375K02.

**3. Ratings and characteristics**

Refer to the attached sheet, page 3 to 5.

**4. Reliability**

Refer to the attached sheet, page 6.

**5. Incoming inspection**

Refer to the attached sheet, page 7.

**6. Supplement**

6.1 Isolation voltage shall be measured in the following method.

(1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.

(2) The dielectric withstand tester with zero-cross circuit shall be used.

(3) The wave form of applied voltage shall be a sine wave.

6.2 This product is not designed against irradiation.

This product is assembled with electrical input and output,

This product incorporates non-coherent light emitting diode.

6.3 Packaging specifications

Refer to the attached sheet, page 8 to 10.

6.4 The business dealing name used for this product when ordered or delivered shall be PC3H7.

**7. Notes**

Refer to the attached sheet-1-1, 2.

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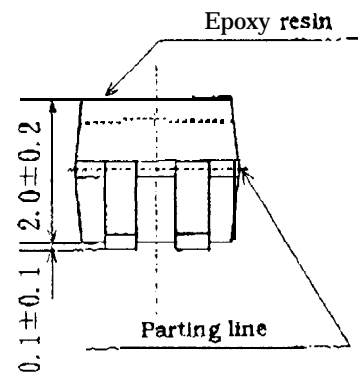
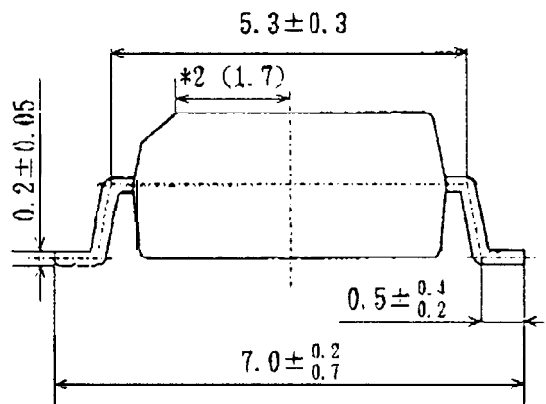
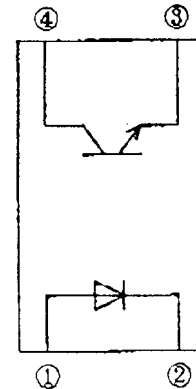
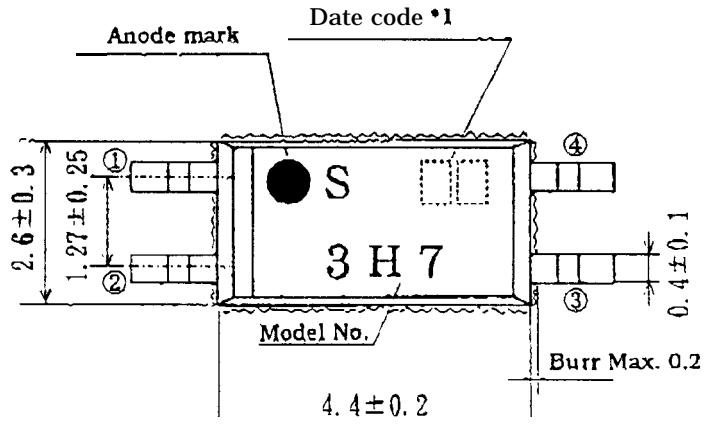
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Pin Nos. and internal  
connection diagram

\*1) 2-digit number shall be marked according to DIN standard.

\*2) Dimensions in parenthesis are shown for reference .

● 3) Marking is laser marking

UNIT : 1/1 mm

Name	PC3H7 Outline Dimensions (Business dealing name : PC3H7)
Drawing No.	CY8375K02

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## 3. Ratings and characteristics

## 3.1 Absolute maximum ratings

Ta=25°C

Parameter		Symbol	Rating	Unit
Input	*1 Forward current	$I_F$	50	mA
	*2 Peak forward current	$I_{FM}$		A
	Reverse voltage	$V_R$	6	V
	*1 Power dissipation	P	70	mW
Output	Collector-emitter voltage	$V_{CEO}$	70	V
	Emitter-collector voltage	$V_{ECO}$	6	V
	Collector current	$I_c$	50	mA
	*1 Collector power dissipation	$P_c$	150	mW
*1 Total power dissipation		$P_{tot}$	170	mW
Operating temperature		$T_{opr}$	-30 to +100	°C
Storage temperature		$T_{stg}$	-40 to +125	°C
*3 Isolation voltage		$V_{iso}$	2.5	kVrms
*4 Soldering temperature		$T_{sol}$	260	°C

\*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1 to 4.

\*2 Pulse width  $\leq 100 \mu s$ . Duty ratio :0.001 (Refer to Fig. 5)

\*3 AC for 1 rein, 40 to 60 %RH, f=60Hz

\*4 For 10s

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## 3.2 Electro-optical characteristics

Ta=25°C

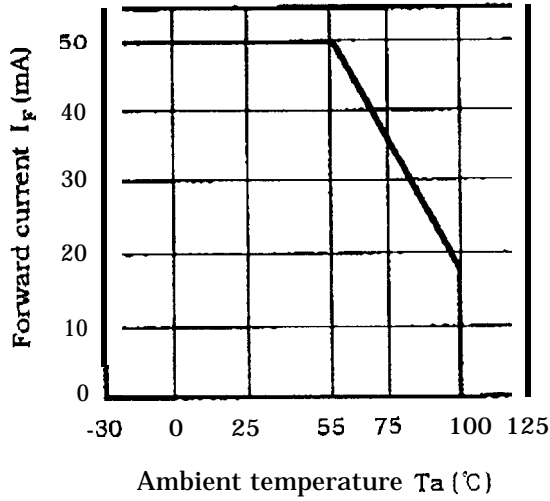
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	unit
Input	Forward voltage	$V_F$   $I_F=20\text{mA}$		1.2	1.4	V
	Reverse current	$I_R$   $V_R=4\text{V}$	-		10	$\mu\text{A}$
	Terminal capacitance	$C_t$   $V=0, f=1\text{kHz}$	-	30	250	pF
output	Dark current	$I_{CEO}$   $V_{CE}=50\text{V}, I_F=0$	-	-	100	nA
	Collector-emitter breakdown voltage	$BV_{CEO}$   $I_C=0.1\text{mA}$ $I_F=0$	70			V
	Emitter-collector breakdown voltage	$BV_{ECO}$   $I_E=10/\sqrt{A}, I_F=0$	6			v
Transfer characteristics	Collector current	$I_C$   $I_F=1\text{mA}, V_{CE}=5\text{V}$	0.2		4	mA
	Collector-emitter saturation voltage	$V_{CE(sat)}$   $I_F=20\text{mA}$ $I_C=1\text{mA}$	-	0.1	0.2	V
	Isolation resistance	$R_{iso}$   DC500V 40 to 60%RH	$5 \times 10^{10}$	$110^{11}$		$\Omega$
	Floating capacitance	$C_f$   $V=0, f=1\text{MHz}$		0.6	1.0	pF
	Response time (Rise)	$t_r$   $V_{CE}=2\text{V}$ $I_C=2\text{mA}$		4	18	$\mu\text{s}$
	Response time (Fall)	$t_f$   $R_L=100\Omega$		3	18	$\mu\text{s}$

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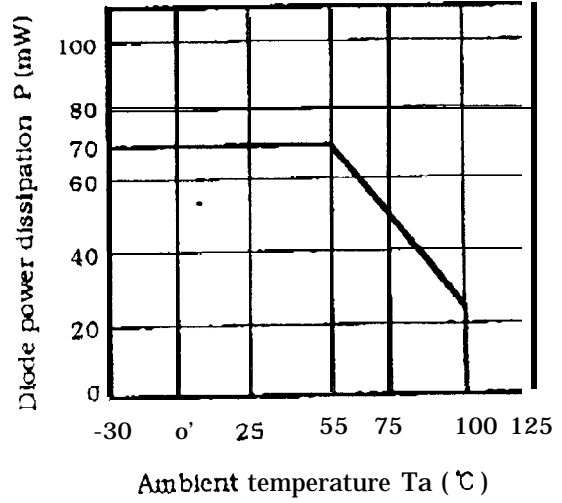
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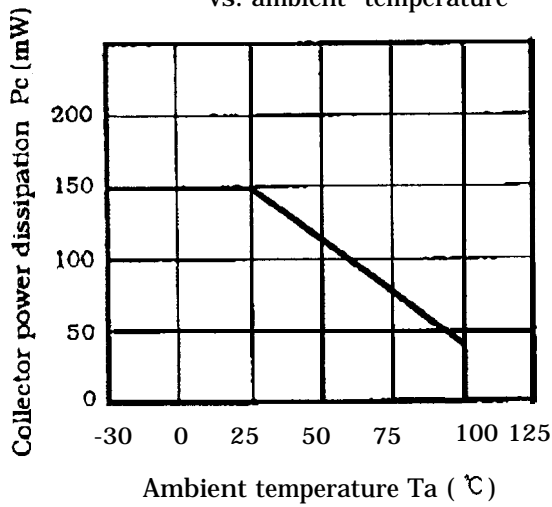
(Fig. 1) Forward current vs. ambient temperature



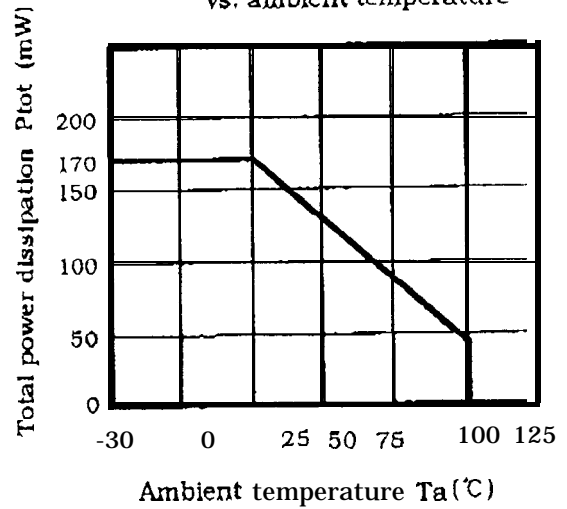
(Fig. 2) Diode power dissipation vs. ambient temperature



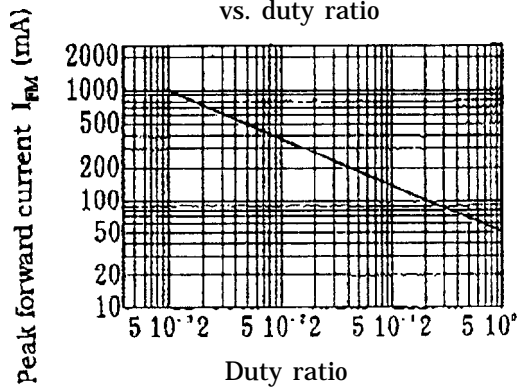
(Fig. 3) Collector power dissipation vs. ambient temperature



(Fig. 4) Total power dissipation vs. ambient temperature



(Fig. 5) Peak forward current vs. duty ratio



Pulse width  $\leq 100 \mu s$   
 $T_a = 25^\circ C$

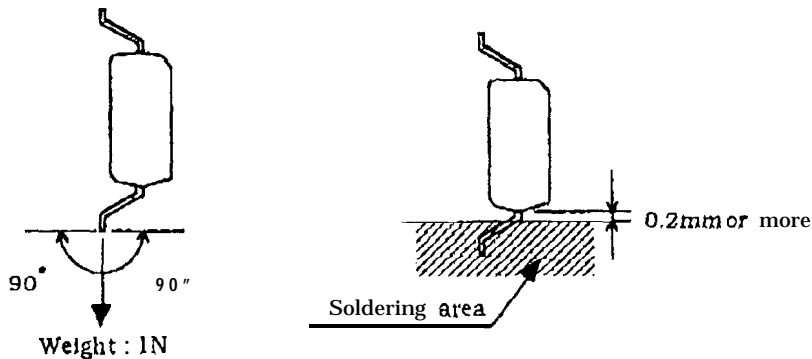
4. Reliability

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

Confidence level : 90%  
 LTPD : 10%/20%

Test Items	Test Conditions	Failure Judgement Criteria	Samples (n)
			Defective
Solderability ● 2	230°C, 5s		n=11, C=0
Soldering heat "3	260°C, 10s	$V_F > U \times 1.2$	n=11, C=0
Terminal strength (Bending) *4	Weight : 1 N 1 time/each terminal	$I_R > U \times 2$	n=11, C=0
Mechanical shock	15000m/s <sup>2</sup> , 0.5ms 3 times/ ±X, ±Y, ±Z direction	$I_{CEO} > U \times 2$ $I_C < L \times 0.7$	n=11, C=0
Variable frequency vibration	100 to 2000 to 100 Hz/4min 200m/s <sup>2</sup> 4 times/ X, Y, Z direction	$V_{CE(beat)} > U \times 1.2$	n=11, C=0
Temperature cycling	1 cycle -40°C to +125°C (30min) (30min) 20 cycles test		n=22, C=0
High temp. and high humidity storage	+85°C, 85%RH, 500h *5	U: Upper specification limit	n=22, C=0
High temp. storage	+125°C, 1000h	L: Lower specification limit	n=22, C=0
Low temp. storage	-40°C, 1000h		n=22, C=0
Operation life	$I_F = 50mA$ , $P_{tot} = 170mW$ $T_a = 25°C$ , 1000h		n=22, C=0

- 1 Test method, conforms to JIS C 7021,
- \*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 The lead pin depth dipped into solder shall be away 0.2mm from the root of lead pins.
- \*4 Terminal bending direction is shown below.
- \*5 It evaluates after washing by specified solvent in attach sheet-1-1+ Z.



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**5. Incoming inspection****6.1 Inspection items****(1) Electrical characteristics**
 $V_F, I_R, I_{CEO}, V_{CE(sat)}, I_c, R_{iso}, V_{iso}$ 
**(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	0.1
Minor defect	Appearance defect except the above mentioned.	0.4



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**6.3 Package specifications****6.3.1 Taping conditions**

- (1) **Tape structure and Dimensions** (Refer to the attached sheet, Page 9)

The tape shall have a structure in which a cover tape is sealed heat-pressed on the carrier tape of protect against static electricity.

- (2) **Reel structure and Dimensions** (Refer to the attached sheet, Page 10)

The taping reel shall be of corrugated cardboard with its dimensions as shown in the attached drawing.

- (3) **Direction of product insertion** (Refer to the attached sheet, Page 10)

Product direction in carrier tape shall direct to the anode mark at the hole side on the tape.

- (4) **Joint of tape**

The cover tape and carrier tape in one reel shall be jointless.

- (5) **The way to repair taped failure devices**

The way to repair taped failure devices cut a bottom of carrier tape with a cutter, and after replacing to good devices, the cutting portions shall be sealed with adhesive tape.

**6.3.2 Adhesiveness of cover tape**

- The exfoliation force between carrier tape and cover tape shall be 0.2N to 0.7N for the angle from 160° to 180°.

**6.3.3 Rolling method and quantity**

Wind the tape back on the reel so that the cover tape will be outside the tape. Attach more than 20cm of blank tape to the trailer and the leader of the tape and fix the both ends with adhesive tape. One reel shall contain 3000 pcs.

**6.3.4 Marking**

- The outer packaging case shall be marked with following information.

\* Model No. \* Number of pieces delivered • Production date

**6.3.5 Storage condition**

Taped products shall be stored at the temperature lower than 5 to 30°C and the humidities lower than 70%RH.

**6.3.6 Safety protection during shipping**

There shall be no deformation of component or degradation of electrical characteristics due to shipping.

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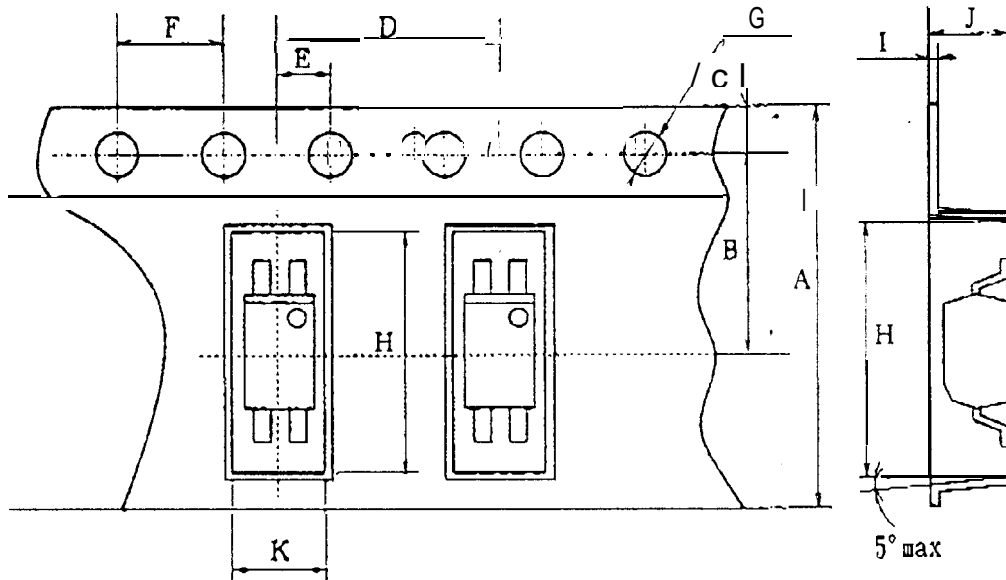
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## Carrier tape structure and Dimensions



Symbol	A	B	C	D	E	F
Unit						
mm	$^{+0.3}$ 12.0	$\pm 0.1$ 5.5	$\pm 0.1$ 1.75	$\pm 0.1$ 8.0	$\pm 0.1$ 2.0	$\pm 0.1$ 4.0

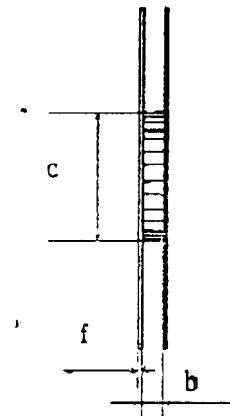
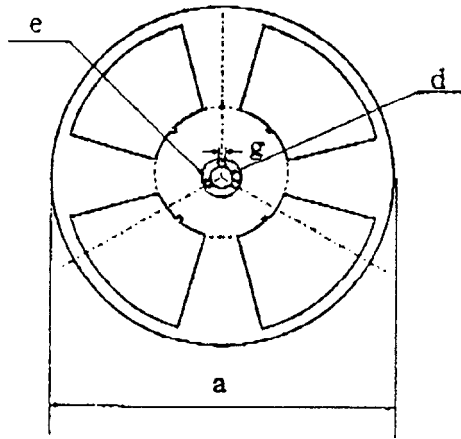
Symbol	G	H	I	J	K
Unit					
mm	$^{+0.1}$ $^{-0.0}$ $\phi 1.5$	$\pm 0.1$ 7.5	$\pm 0.05$ 0.3	$\pm 0.1$ 2.3	$\pm 0.1$ 3.1

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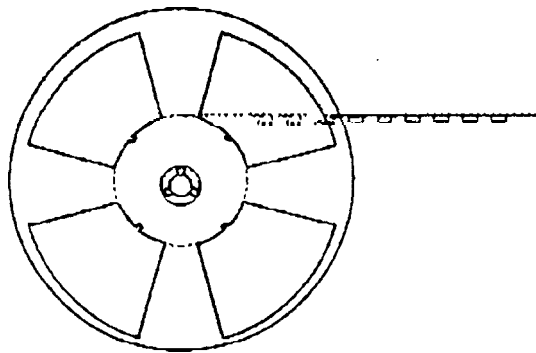
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Reel structure and Dimensions

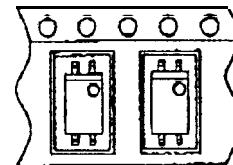


Symbol Unit	Check word						
	a	b	c	d	e	f	g
mm	330	13.5* 1.5	100*1	13±0.5	23±1	2.0*0.5	2.0±0.5

Direction of product insertion



Pull-out direction →



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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 affect to device by ultrasonic cleaning is different by cleaning bath size, ultrasonic power output, cleaning time, PWB 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.

Applicable solvent : Ethyl alcohol, Methyl alcohol, Freon TE . TF  
Diflon-solvent S3-E, Trichloroethane ,

Please refrain from using Chloro Fluoro Carbon type solvent to clean devices as much as possible since it is internationally restricted to protect the ozonosphere. Before you use alternative solvent you are requested to confirm that it does not attack package resin.

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 degradation of the Light emission power of the LED. (50?6/ 5years)

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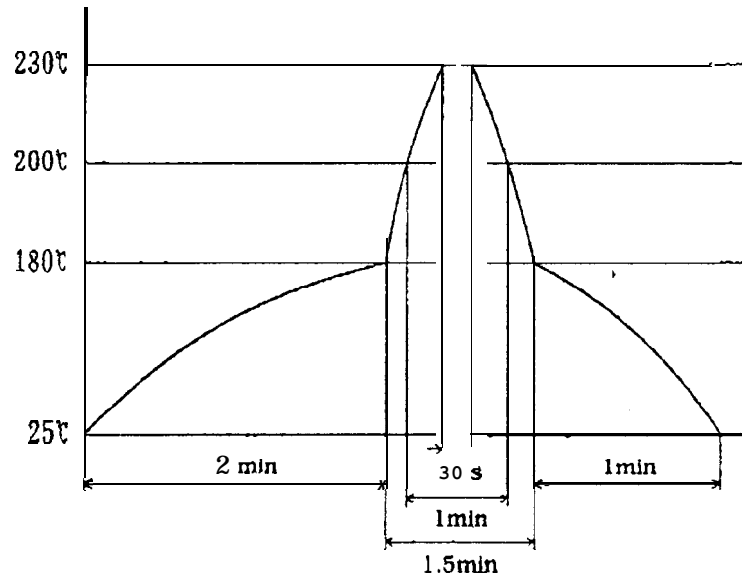
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Attach  
Sheet 1-2

## 3. Precautions for Soldering Photocouplers

## (1) If solder reflow :

It is recommended that only one soldering be done at the temperature and the time within the temperature profile as shown in the figure.



Since, influence to the device is different according to reflow equipment and its condition, please use the device after confirming no damage in the actual using condition.

## (2) Other precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin. So keep the package temperature within that specified in Item (1). Also avoid immersing the resin part in the solder.