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SHARP

ELECTRONIC COMPONENTS
GROUP SHARP CORPORATION

SPECIFICATION

SPEC. No. ED-96027

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PAGE' 12 Pages

REPRESENTATIVE DIVISION

OPTO-ELECTRONIC
DEVICES DIV.

DEVICE SPECIFICATION FOR

PHOTOCOUPLER

MODEL No.

PC3H4

Business dealing name : PC3H4

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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

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BY

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ED-96027	February 27, 1996
MODEL No. PC3H4	PAGE 1/1 0

1. Application

This specification applies to the outline and characteristics of photocoupler;
Model No. PC3H4.

2. Outline

Refer to the attached drawing No. CY8374K02.

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 AC input type.

6.3 This product is not designed against irradiation.

This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

6.4 Packaging specifications

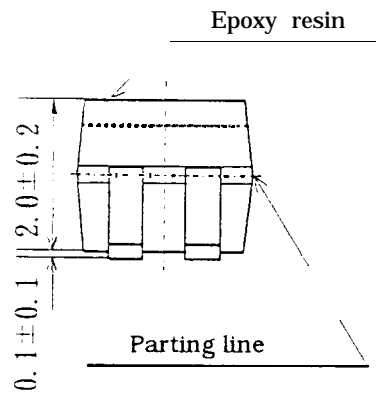
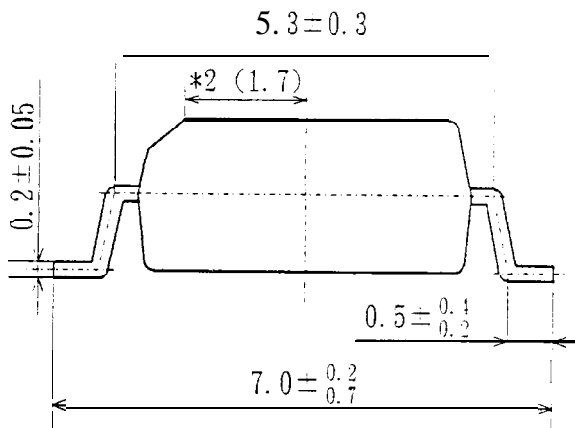
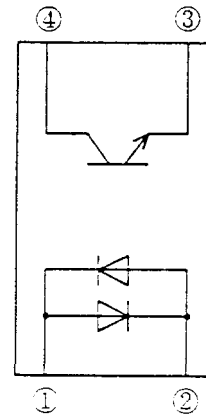
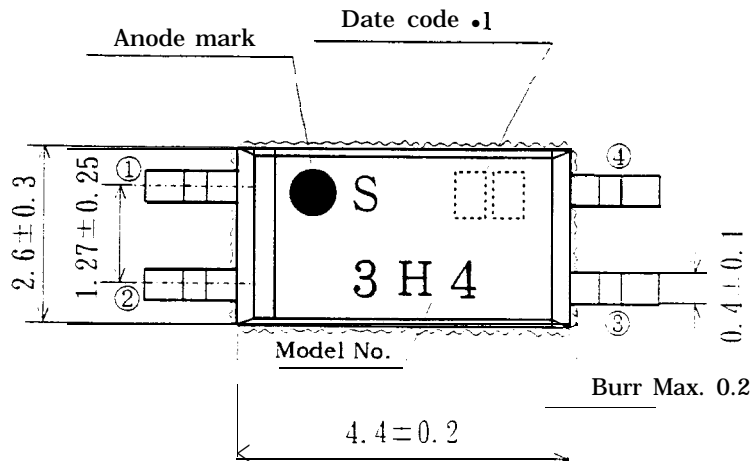
Refer to the attached sheet, page 8 to 10.

6.5 The business dealing name used for this product when ordered or delivered shall be PC3H4.

7. Notes

Refer to the attached sheet-1 -1, 2

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	PC3H4 Outline Dimensions (Business dealing name : PC3H4)
Drawing No.	CY8374K02

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}	± 1	A
	* 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 :0.00 (Refer to Fig, 5)

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

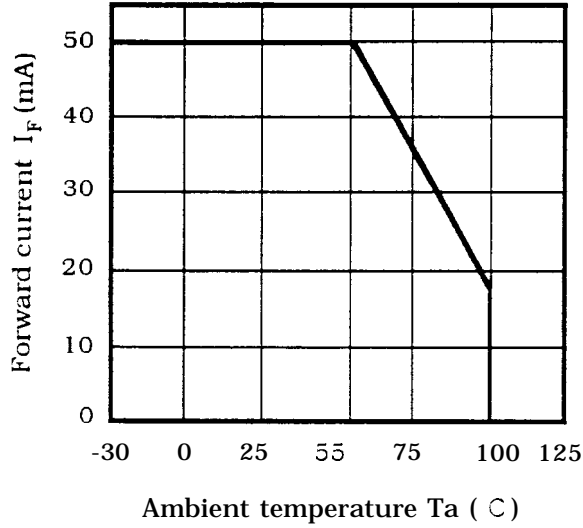
*4 For 10s

3.2 Electro-optical characteristics

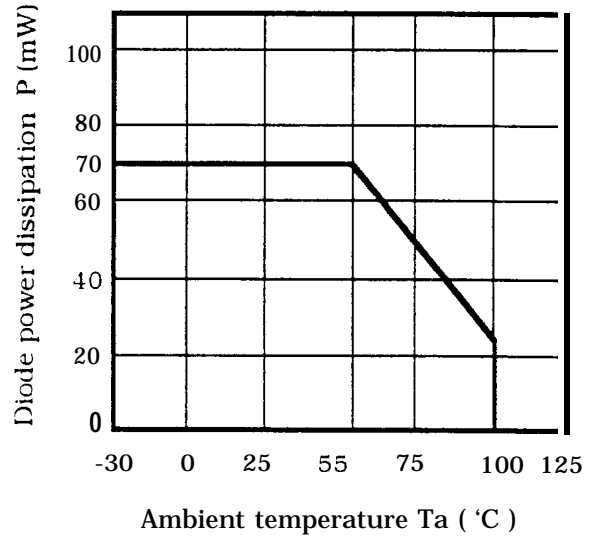
Ta=25°C

Parameter		symbol	Conditions	MIN.	TYP.	MAX.	unit
Input	Forward voltage	V_F	$I_F = \pm 20\text{mA}$		1.2	1.4	v
	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}	$I_E=10\ \mu\text{A}, I_F=0$	6	-	-	v
Transfer characteristics	Collector current	I_C	$I_F = \pm 1\text{mA}, V_{CE}=5\text{V}$	0.2	-	4.0	mA
	Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_F = \pm 20\text{mA}$ $I_C=1\text{mA}$		0.1	0.2	v
	Isolation resistance	Riso	DC500V 40 to 60%RH	5×10^{10}	10^{11}	-	Ω
	Floating capacitance	C_f	$V=0, f=1\text{MHz}$		0.6	1.0	pF
	Response time (Rise)	t_r	$V_{CE}=2\text{V}$ $I_C=2\text{mA}$ $R_L=100\ \Omega$		4	18	μs
	Response time (Fall)	t_f			3	18	μs

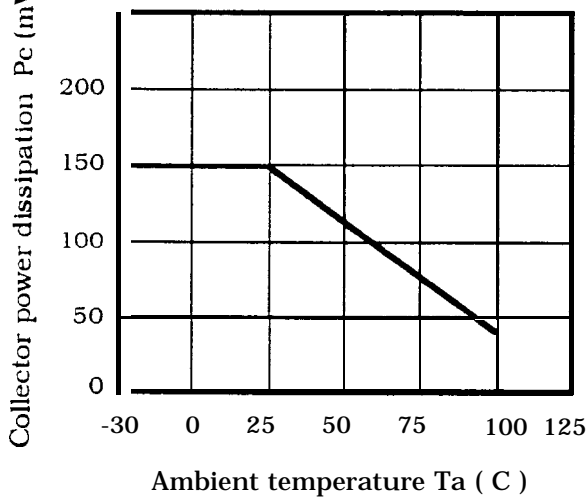
(Fig. 1) Forward current vs. ambient temperature



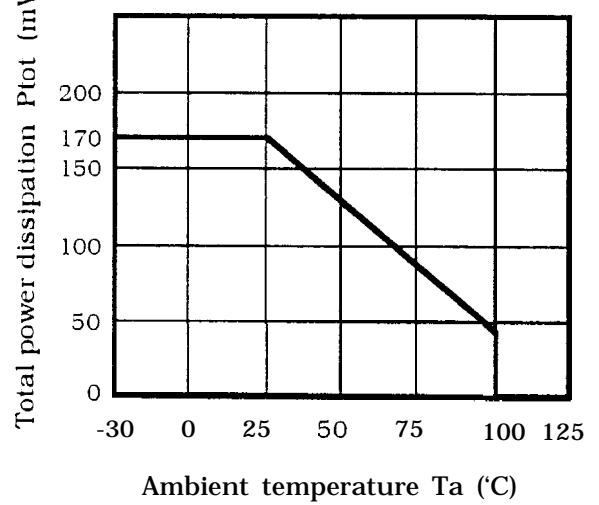
(Fig. 2) Diode power dissipation vs. ambient temperature



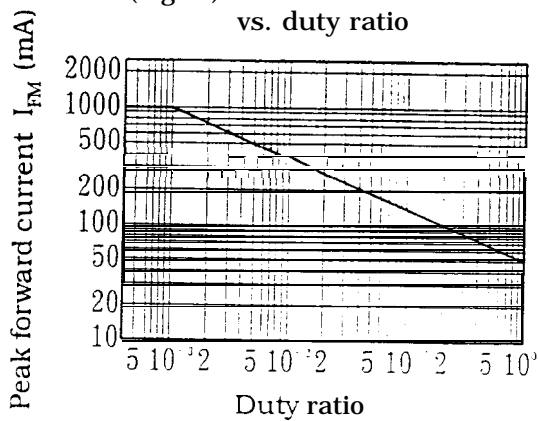
(Fig. 3) Collector power dissipation vs. ambient temperature



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



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



Pulse width ≤ 100 μs
Ta = 25°C

4. Reliability

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

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

Test Items	Test Conditions *1	Failure Judgement Criteria	Samples (n) Defective(C)
Solderability *2	230°C, 5S	—	n=11, C=0
Soldering heat *3	260°C, 10 s	$V_F > U \times 1.2$ $I_{CEO} > U \times 2$ $I_C < L \times 0.7$ $V_{CE(sat)} > u \times 1.2$ U : Upper specification limit L : Lower specification limit	n=11, C=0
Terminal strength (Bending) *4	Weight : 1N 1 time/each terminal		n=11, C=0
Mechanical shock	15000 m/s ² , 0.5ms 3 times/±X, ±Y, ±Z direction		n=11, C=0
Variable frequency vibration	100 to 2000 to 100Hz/4min 200m/s ² 4 times/ X, Y, Z direction		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		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 =50mA, P _{tot} =170mW T _a =25°C, 1000h		n=22, C=0

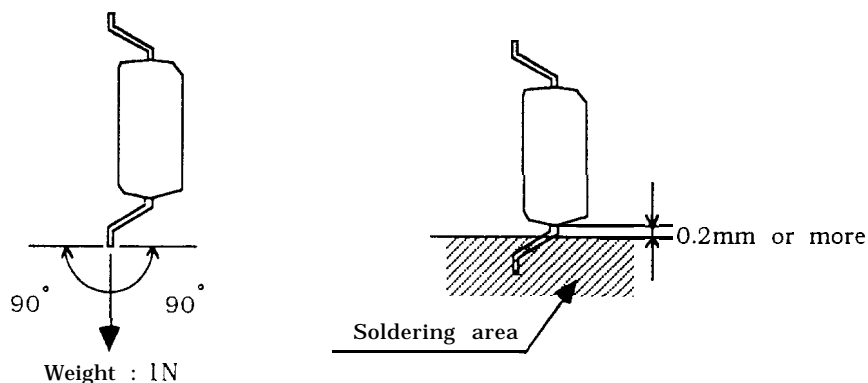
*1 Test method, conforms to JIS C 7021.

*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, 2.



5. Incoming inspection

5.1 Inspection items

(1) Electrical characteristics

$V_F, I_{CEO}, V_{CE(sat)}, I_c, R_{iso}, V_{iso}$

(2) Appearance

5.2 Sampling method and Inspection level

A single sampling plan, normal inspection level 11 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

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 to 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 portion 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 3000pcs.

6.3.4 Marking

The outer packaging case shall be marked with following information.

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

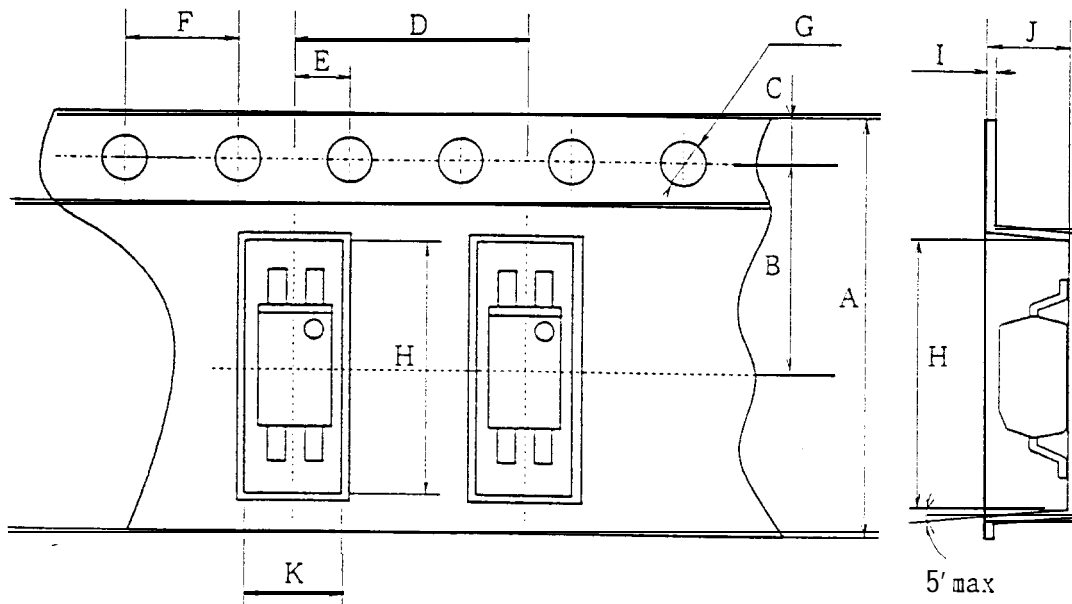
6.3.5 Storage condition

• 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.

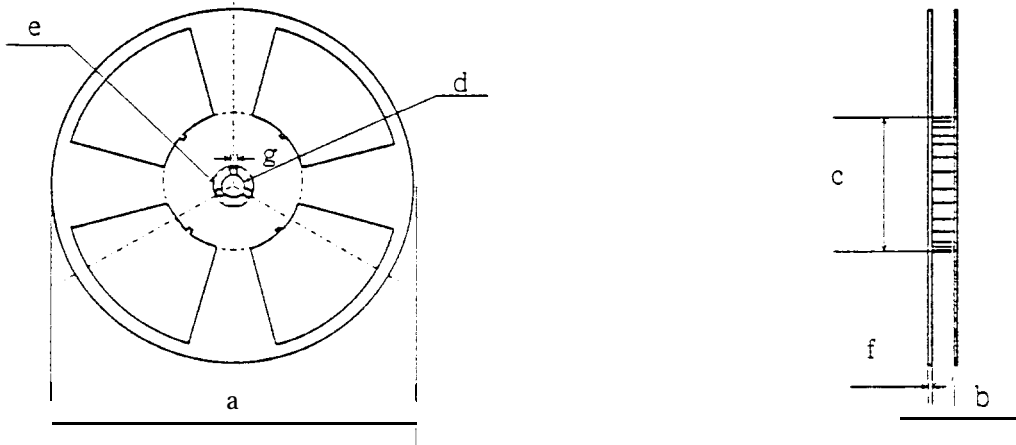
Carrier tape structure and Dimensions



Symbol	A	B	C	D	E	F
unit						
mm	± 0.3 12.0	± 0.1 5.5	*0.1 1.75	*0.1 8.0	± 0.1 2.0	± 0.1 4.0

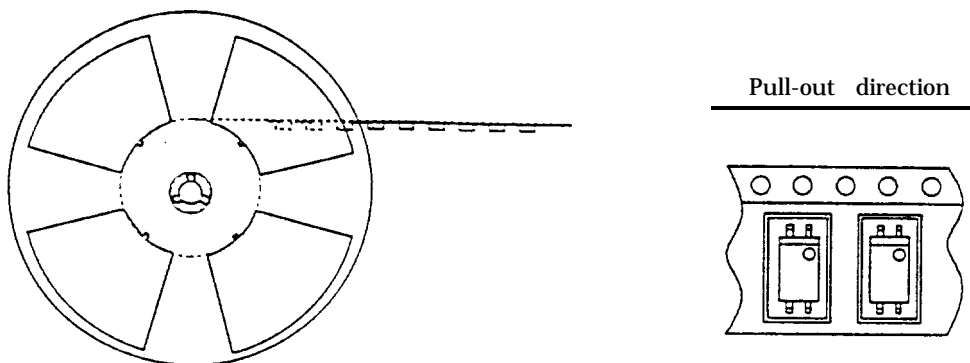
Symbol	G	H	I	J	K
unit					
mm	$\begin{matrix} +0.1 \\ -0.0 \end{matrix}$ $\phi 1.5$	± 0.1 7.5	± 0.05 0.3	± 0.1 2.3	± 0.1 3.1

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



ED-96027	F e	- 27, 1996
MODEL No.	PC3H4 ;	PAGE
		Attach sheet

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

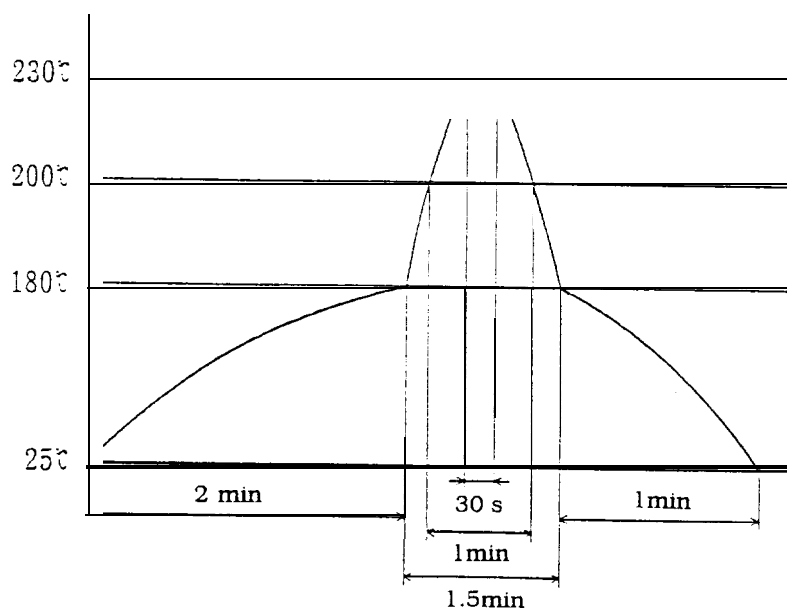
Please refrain from using Chloro Fluoro Carbon type solvent to clean devices as much as possible since it is internationally restricted to protect the ozonosphere. Before you use alternative solvent you are requested to confirm that it does not attack package resin.

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% / 5years)

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.