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APPROVED BY: DATE:

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ELECTRONIC COMPONENTS
GROUP SHARP CORPORATION
SPECIFICATION

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PAGE 12 Pages

REPRESENTATIVE DIVISION
OPTO-ELECTRONIC DEVICES Div.

DEVICE SPECIFICATION FOR
PHOTOCOUPRER
MODEL No. PC924
(Business dealing mme : PC924)

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 (21 or (3), please be sure to observe the precautions given in those respective paragraphs.

(2) Appropriate measures, such as fad-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, tram, automobile etc.)
- Traffic signals • Gas leakage sensor breakers • Rescue and security equipment
- Other safety 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.

CUSTOMER'S APPROVAL

DATE
PRESENTED
BY

T. Matsumura

DATE

BY

T. Matsumura,
Department General Manager of
Engineering Dept. ,11
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

1. Application

This specification applies to the outline and characteristics of OPIC photocoupler Model No. PC924.

2. Outline

Refer to the attached drawing No. CY4836K02.

3. Ratings and characteristics

Refer to the attached sheet, page 4 to 8.

4. Reliability

Refer to the attached sheet, page 9.

5. Incoming inspection

Refer to the attached sheet, page 10.

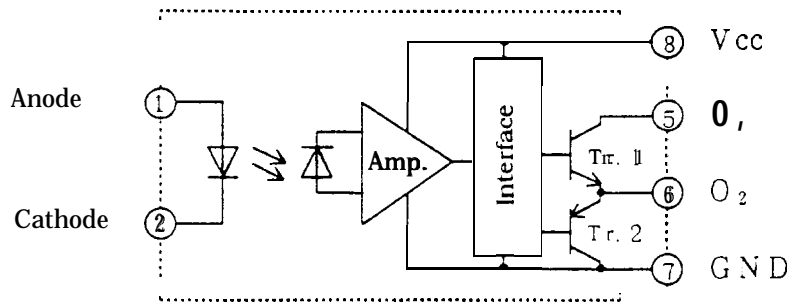
6. Supplement

6.1 Isolation voltage shall be measured in the following method.

- (1) Short among pins 1 to 4 on the primary side and among pins 5 to 8 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.
(It is recommended that the isolation voltage be measured in insulation oil.)

6.2 The business dealing name used for this product when ordered or delivered shall be PC924.

6.3 The block diagram, Table truth



Input	O2 output	Tr. 1	Tr. 2
ON	High level	ON	OFF
OFF	Low level	OFF	ON

6.4 This Model is approved by UL.

Approved Model No. : PC924

UL file No. : E64380

6.5 This product is not designed against irradiation.

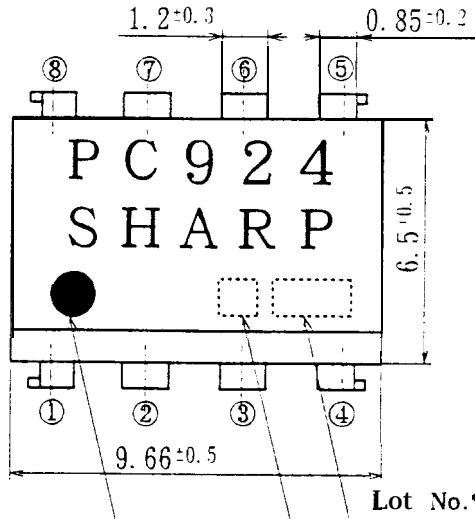
This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

7. Notes

Refer to the attached sheet-1 -1.2.

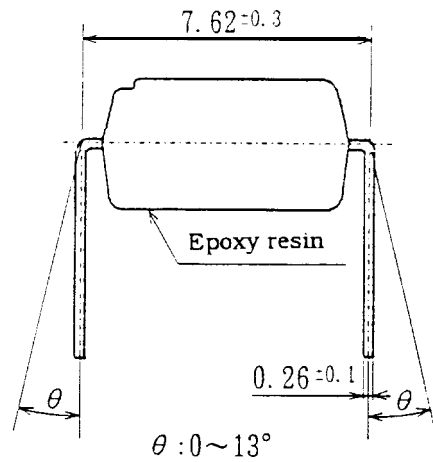
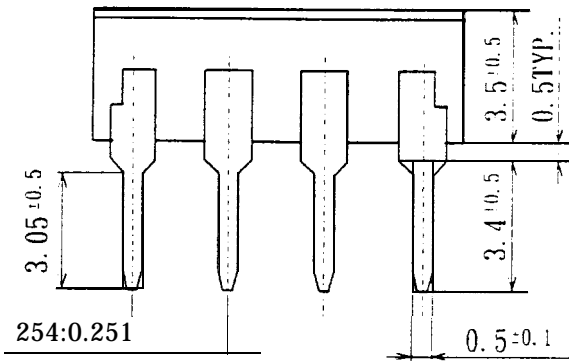
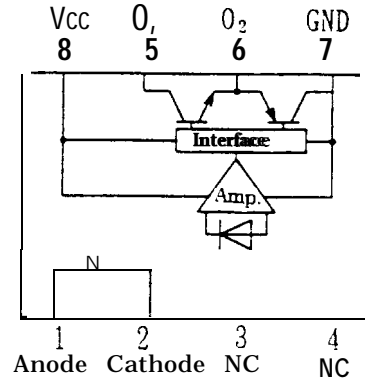
2. Outline



Anode mark

Factory identification mark ● 2

Pin Nos. and internal connection diagram



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

*2) Factory identification mark shall be or shall not be marked.

UNIT: 1/1mm	
Name	PC924 Outline Dimensions (Business dealing name : PC924)
Drawing No.	CY4836K02

3. Ratings and characteristics

3.1 Absolute maximum ratings

(Unspecified : Ta=Topr)

	Parameter	Symbol	Rating	unit
Input	* 1 Forward current	IF	25	mA
	Reverse voltage	VR	6 (Ta=25 °C)	v
output	Supply voltage	Vcc	35	v
	O* Output current	IO ₁	0.1	A
	*4 O ₁ Peak output current	IO _{1P}	0.4	A
	O ₂ Output current	IO ₂	0.1	A
	*4 O ₂ Peak output current	IO _{2P}	0.4	A
	O ₁ Output voltage	Vo ₁	35	V
	*2 Power dissipation	Po	500	mW
	*3 Total power dissipation	Ptot	550	mW
	*5 Isolation voltage	Viso	5.0	kVrms
	Operating temperature	Topr	-25 to +80	°c
	Storage temperature	Tstg	-55 to +125	°c
	Soldering temperature	Tsol	260 (For 10 s)	°C

*1, 2, 3 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1, 2, 3.

*4 Pulse width $\leq 0.15 \mu s$, Duty ratio : 0.01

*5 AC for 1 rein, 40 to 60%RF, Ta=25°C

3.2 Electro-optical characteristics

(Unspecified : Ta=Topr)

	Parameter	Symbol	MIN.	TYP	MAX	unit	Test circuit	Conditions
Input	Forward voltage	V_{F1}	-	1.2	1.4	v		Ta=25°C, $I_F=20mA$
		V_{F2}	0.6	0.9		v		Ta=25°C, $I_F=0.2mA$
	Reverse current	I_R	-		10	μA		Ta=25°C, $V_R=4V$
	Terminal capacitance	c t /	-	30	250	pF		Ta.25°C, V=0, f=1kHz
Output	Operating supply voltage range	V_{CC}	15		30	V		Ta=-10 to 60°C
			15		24			
	O ₁ Low level output voltage	V_{O1L}	-	0.2	0.4	v	(1)	$V_{CC1}=12V, V_{CC2}=-12V$ $I_{O1}=0.1A, I_F=10mA$
	O ₂ High level output voltage	V_{O2H}	18	21		v	(2)	$V_{CC}=V_{O1}=24V,$ $I_{O2}=-0.1A, I_F=10mA$
	O ₂ Low level output voltage	V_{O2L}	-	1.2	2.0	v	(3)	$V_{CC}=24V, I_{O2}=0.1A,$ $I_F=0mA$
	O ₁ Leak current	I_{O1L}	-		500	μA	(4)	Ta=25°C, $V_{CC}=V_{O1}=35V$ $I_F=0mA$
	O ₂ Leak current	I_{O2L}	-		500	μA	(5)	Ta.25°C, $V_{CC}=V_{O2}=35V$ $I_F=10mA$
	High level supply current	I_{CCH}	-	6	10	mA	(6)	Ta.25°C, $V_{CC}=24V$ $I_F=10mA$
			-		14	mA		$V_{CC}=24V, I_F=10mA$
Low level supply current	I_{CCL}	-	8	13	mA	(6)	Ta=25°C, $V_{CC}=24V$ $I_F=0mA$	
		-		17	mA		$V_{CC}=24V, I_F=0mA$	

3.2 Electro-optical characteristics

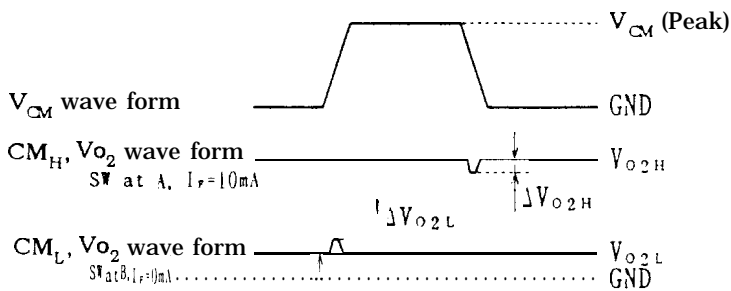
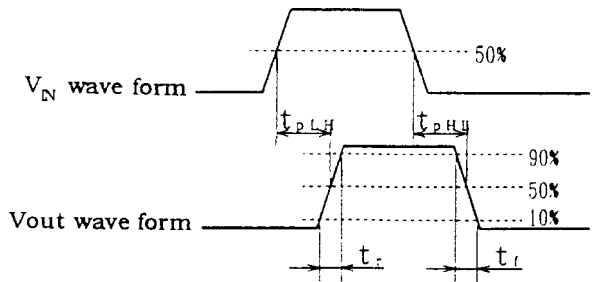
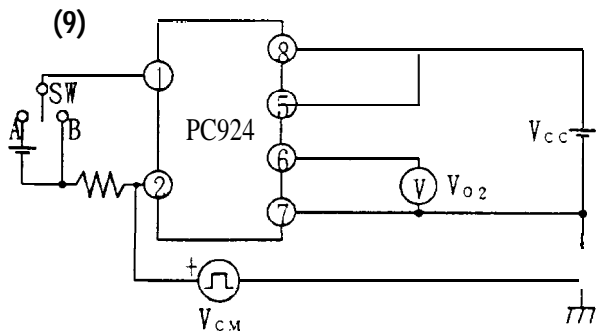
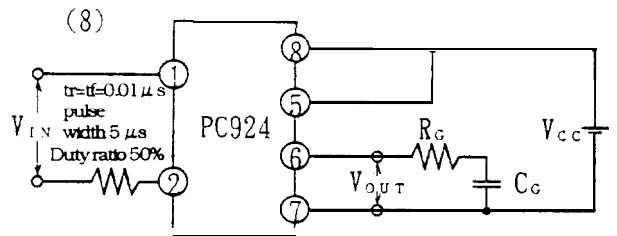
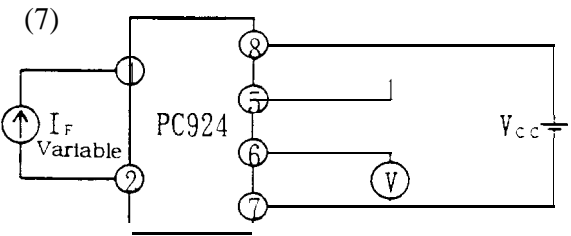
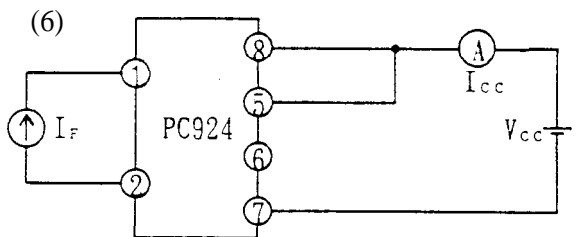
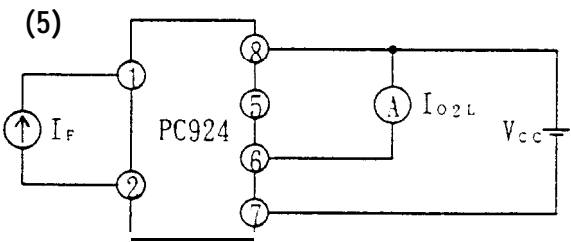
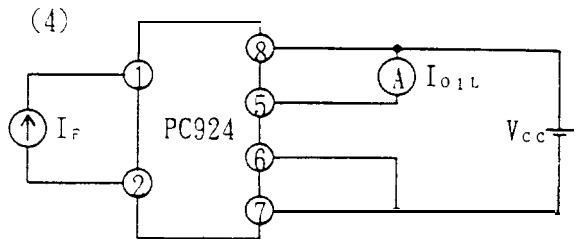
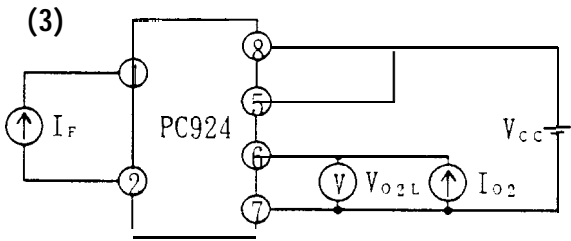
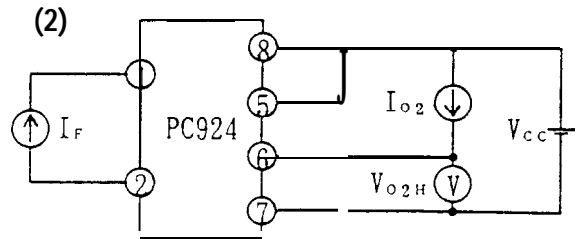
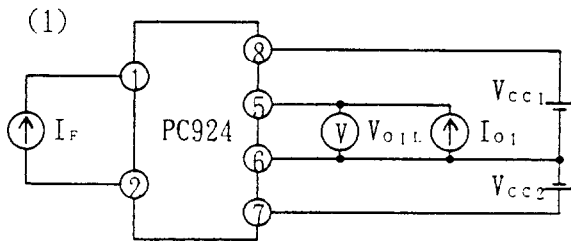
(Unspecified : Ta=Topr)

Parameter	Symbol	MIN.	TYP.	MAX.	unit	test circuit	Conditions
"L→H" threshold input current *2	I _{LH}	1.0	4.0	7.0	mA	(7)	Ta=25°C, Vcc=24V
		0.6	-	10.0			VCC=24V
Isolation resistance	Riso	5×10 ¹⁰	10 ¹¹	-	Ω		Ta=25°C, DC500V 40 to 60%RH
Transfer characteristics response time	"L→H" propagation time		1.0	2.0	μs	(8)	Ta=25 °C Vcc=24V, I _F =10mA R _G =47Ω, C _G =3000pF
	"H→L" propagation time		1.0	2.0			
	Rise time		0.2	0.5			
	Fall time		0.2	0.5			
Instantaneous common mode rejection voltage (High level output)	CM _H		-30000	-	V/μs	(9)	Ta=25°C, Vcc=24V V _{CM} =600V(peak) I _F =10mA, ΔV _{O2H} =2.0V
Instantaneous common mode rejection voltage (Low level output)	CM _L		30000	-			Ta=25°C, Vcc=24V V _{CM} =600V(peak) I _F =0mA, ΔV _{O2L} =2.0V

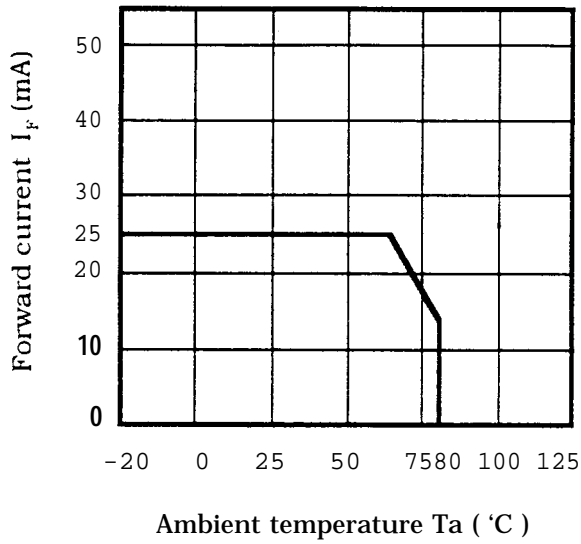
*1 It shall connect a by-pass capacitor of 0.01 μF or more between Vcc (Pin No. 8) and GND (Pin No. 7) near the device, when it measures the transfer characteristics and the output side characteristics.

*2 I_{FLH} is the value of forward current when output becomes from "L" to "H".

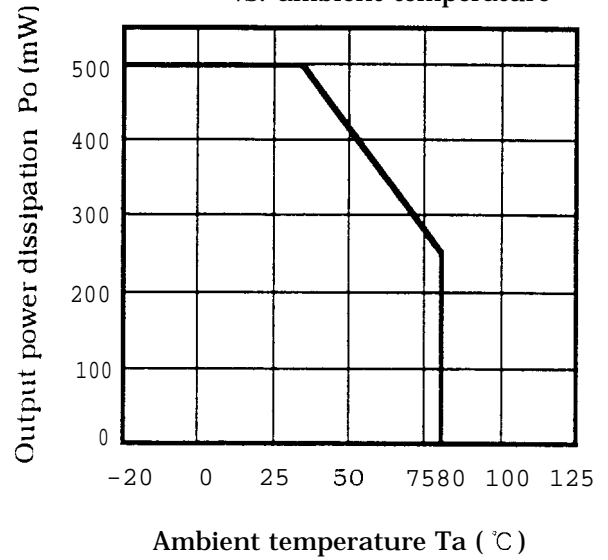
Test circuit



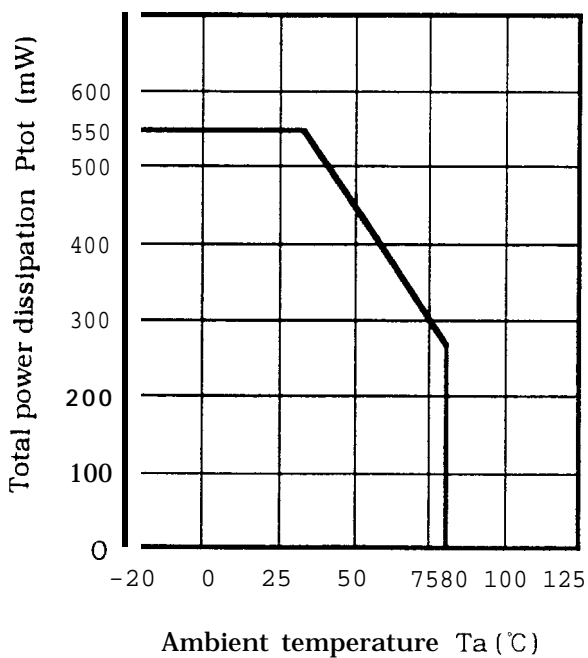
(Fig. 1) Forward current vs. ambient temperature



(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.

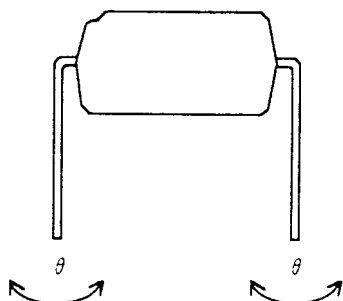
Confidence level : 90%
LTPD : 10% / 20%

Test Items	Test Conditions *1	Failure Judgement Criteria	Samples (n) Defective(C)
Solderability *2	230°C, 5 s	—	n=11, C=0
Soldering heat	260°C, 10 s	$V_F > U \times 1.2$	n=11, C=0
Terminal strength (Tension)	Weight : 5N 5 s /each terminal	$I_R > U \times 2$	n=11, C=0
Terminal strength (Bending) *3	Weight : 2.5N 2 times/each terminal	$v_{O1L} > U \times 1.2$ $v_{O2H} < L \times 0.8$	n=11, C=0
Mechanical shock	15000 m/s ² , 0.5ms 3 times/ ±X, ±Y, ±Z direction	$v_{O2L} > U \times 1.2$	n=11, C=0
Variable frequency vibration	100 to 2000 to 100 Hz/4min 200m/s ² 4 times/ X, Y, Z direction	$I_{O1L} > U \times 1.2$ $I_{O2L} > U \times 1.2$	n=11, C=0
Temperature cycling	1 cycle -55-C to +125°C (30min) (30min) 20 cycles test	$I_{CCH} > U \times 1.2$ $I_{CCL} > U \times 1.2$	n=22, C=0
High temp. and high humidity storage	+60°C, 90%RH, 1000h	$I_{FLH} > U \times 1.3$	n=22, C=0
High temp. storage	+125°C, 1000h	U : Upper specification limit	n=22, C=0
Low temp. storage	-55-C, 1000h		n=22, C=0
Operation life	$I_F = 20mA, VCC = 24V$ $T_a = 25°C, 1000h$		L : Lower specification limit

*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 Terminal bending direction is shown below.



5. Incoming inspection

5.1 Inspection items

(1) Electrical characteristics

$V_F, I_R, V_{O1L}, V_{O2H}, V_{O2L}, I_{O1L}, I_{O2L}, I_{CCH}, I_{CCL}, I_{FLH}, R_{iso}, V_{iso}$

(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	0.1
Minor defect	Appearance defect except the above mentioned.	0.4

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.

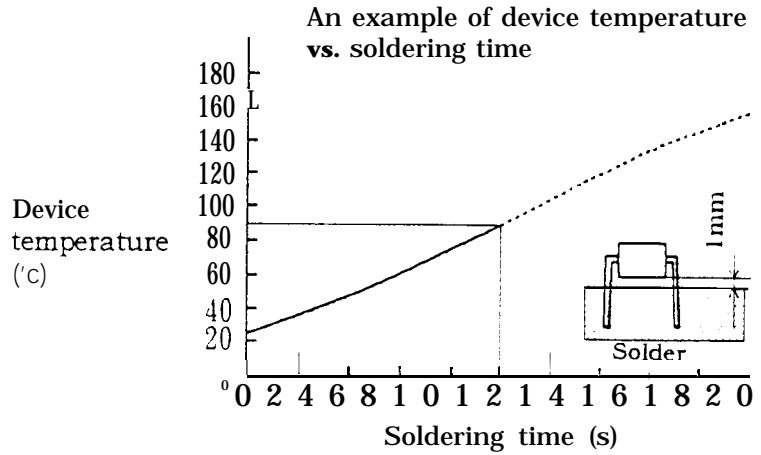
Applicable solvent : Ethyl alcohol. Methyl alcohol
Freon TE · TF. Diflon-solvent S3-E

Please refrain form using ChloroFluoro Carbon type solvent to clean device 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. Please use the same as normal integration circuit about static electricity in order that this device is OPIC photocoupler.
3. In order to stabilize power supply line, we should certainly recommend to connect a by-pass capacitor of 0.01 μ F or more between Vcc and GND near the device.
4. 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_{FLH}.

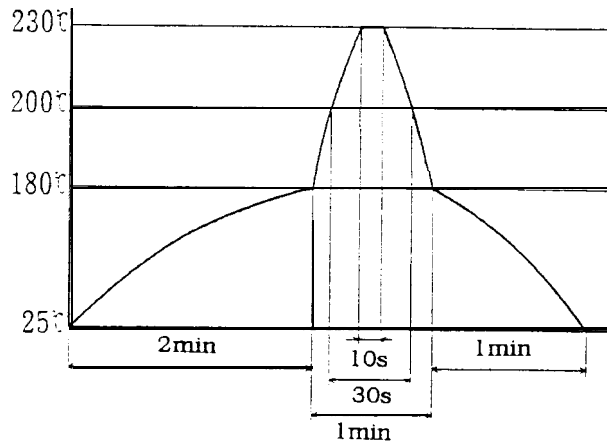
5. Precautions for Soldering Photocouplers

- (1) In case of soldering to lead
260 °C 10 s or less



- (2) 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.



- (3) 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 2. Also avoid immersing the resin part in the solder.