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PREPARED BY: <i>T. Fujitani</i> DATE: <i>Mar. 9, 1995</i>	SHARP ELECTRONIC COMPONENTS GROUP SHARP CORPORATION SPECIFICATION	SPEC No. DG-953054
APPROVED BY: <i>M. Abe</i> DATE: <i>Mar. 9, 1995</i>		FILE No.
		ISSUE MAR. 9, 1995
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		REPRESENTATIVE DIVISION OPTO-ELECTRONIC DEVICES DIV. REFERENCE

DEVICE SPECIFICATION FOR

PHOTO-TRANSISTOR

MODEL No.

P T 6 0 0 T

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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:

[• OA equipment • AV equipment • Home appliance • Telecommunication equipment (Terminal) • Measuring equipment • Tooling machine • Computer, 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.)
• Gas leak detection breaker • Traffic signal • Firebox and burglar alarm box
• Other safety equipment, etc.]

(3) Please do not use for the uses entioned 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

B Y

DATE *Mar. 9, 1995*
PRESENTED
BY *M. Abe*

M, Abe
Department General Manager of
Engineering Dept., III
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

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SHARPPT600T Specification**I. Application**

This specification applies to the outline and characteristics of Silicon photo-transistor Model No. PT600T.

This model is designed for detector of LCD back-light power control.

2. Outline dimensions and terminal connections

Refer to the attached sheet, Page 3/11.

3. Rating and characteristics

Refer to the attached sheet, Page 4/11.

4. Reliability

Refer to the attached sheet, Page 5/11.

S. Quality level

Refer to the attached sheet. Page 6/11.

6. Packing specification

Refer to the attached sheet, Page 7/11 ~ 10/11.

7. Notes

Refer to the attached sheet, Page 11/11.

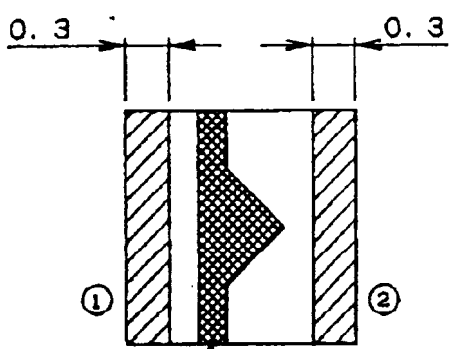
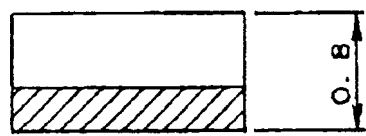
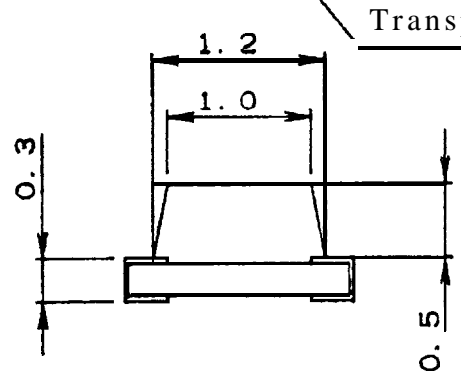
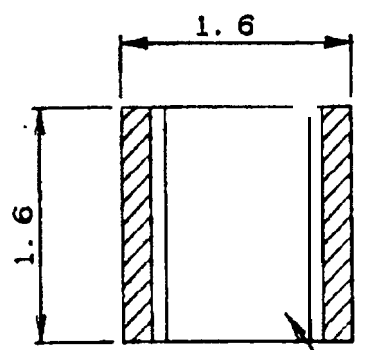
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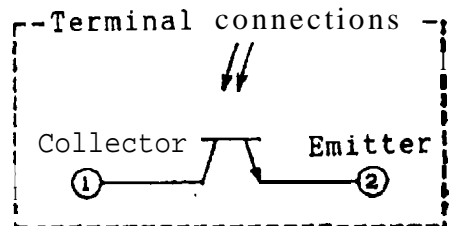
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2. Outline dimensions and terminal connections



Polarity marking/

(Note1)  Plating area
 (Note2) General tolerances $\pm 0.1\text{mm}$



Scale	20/1
Unit	1=1/1mm
Finish	Gilded

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3. Rating and characteristics

3-1. Absolute maximum ratings

(Ta=25°C)

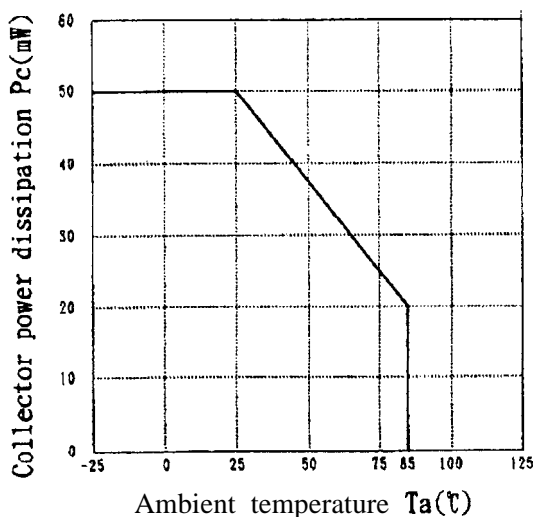
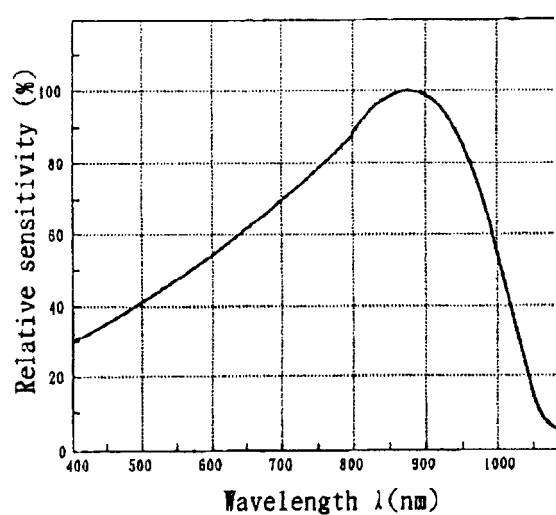
Parameter	Symbol	Rating	Unit
Collector-emitter voltage	V_{CE0}	35	V
Emitter-collector voltage	V_{ECO}	6	V
Collector current	I_C	20	mA
Collector power dissipation	P_C	50	mW
Operating temperature	T_{opr}	-25 ~ +85	°C
Storage temperature	T_{stg}	-25 ~ +100	°C
*Soldering temperature	T_{sol}	260	°C

*1 MAX. 3 seconds

3-2. Electro-optical characteristics

(Ta=25°C)

Parameter	Symbol	Conditions *2	MIN.	TYP.	MAX.	Unit
Collector current	I_C	$E_e=5\text{mW}/\text{cm}^2, V_{CE}=5\text{V}$	0.7	3.5	9.6	mA
Dark current	I_{CE0}	$E_e=0, V_{CE}=20\text{V}$			0.1	μA
Collector-emitter saturation voltage	$V_{CE(sat)}$	$E_e=10\text{mW}/\text{cm}^2, I_C=0.5\text{mA}$		0.2	0.4	V
Peak sensitivity wavelength	λ_p			880	-	nm
Response time (Rise)	t_r	$V_{CE}=20\text{V}, I_C=1\text{mA}$		10	-	μs
Response time (Fall)	t_f	$R_L=1\text{k}\Omega$		10	-	ns
Angle of half intensity	$\Delta\theta$	-	-	±60	-	°

*2 E_e : Illuminance by CIE standard light source A (tungsten lamp).3-3. Collector power dissipation
vs. ambient temperature3-4. Spectral sensitivity characteristics (TYP.)
(Ta=25°C)

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4. Reliability

4-1. The reliability of products shall be satisfied with items listed below.

Confidence level:90%

Test Items	Reference standards	Test Conditions	Samples(n) Defective(C)	LTPD
Temperature cycling	JIS C7021 A-4	1 cycle -25℃(30min)~+100℃(30min) 20 cycle test	n=22, C=0	10%
High temp. and high humidity storage	JIS C7021 B-11	Ta=+40℃, 90%RH, t=250h	n=22, C=0	10%
High temperature storage	JIS C7021 B-10	Ta=+100℃, t=250h	n=22, C=0	10%
Low temperature storage	JIS C7021 B-12	Ta=-25℃, t=250h	n=22, C=0	10%
Operating test	JIS C7035	Ta=+25℃, Pc=50mW, t=250h	n=22, C=0	10%
Soldering heat	JIS C7021 A-1	Refer to the attached sheet, Page 11/11. 1 time	n=11, C=0	20%

4-2. Failure judgement criteria

No.	Parameter	Symbol	Failure judgement criteria
1.	Collector current	I_c	L.S.L x 0.8 or U.S.L x 1.2
2.	Dark current	I_{cEO}	U.S.L x 2.0.
3.	Collector-emitter saturation voltage	$V_{CE(sat)}$	U.S.L x 1.2

※U.S.L: Upper specification limit, L.S.L: Lower specification limit

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5. Quality level

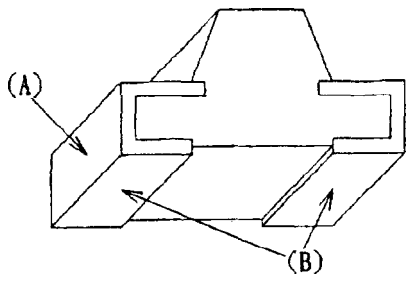
5-1, Inspection method

A single sampling plan, normal inspection level S-4 based on HIL-STD-105 shall be adopted,

5-2. Description of inspection and criteria

No.	Inspected items	Criteria	Defect	AQL
1	Electro-optical characteristics	Ic	Not conforming to the specification	
		I _{CEO}		
		V _{CE(sat)}		
2	Taping	Product inserted in the reverse direction	Major defect	0.1%
3	Tape peeling	Continuous separation of cover tape causing the product to fall out		
4	Label	Model number is not printed, or misprinted		
5	Mix	Another model is Mixing		
6	Quantity wanting	Quantity in package is wanting		
7	Electrode plating	Plating abnormality observed over 50% or greater percentage *'		
8	Outline dimensions	Not conforming to the specification		
9	Label	Quantity or Lot No. is misprinted		
10	Dust and flaw	Effect to the specification		
11	Electrode crack	0.1mm ² or greater from the product side face *1	Slight defect	2.5%
12	Resin flash	0.1mm or greater from the product side face		
13	Resin crack	0.3mm or greater from the product side face		
14	Polarity	Polarity is not conforming to the specification		
15	Solderability	Could solder 50% or greater and less than 90% out of judgement area *'		

*'Judgment area: (A) and (B)



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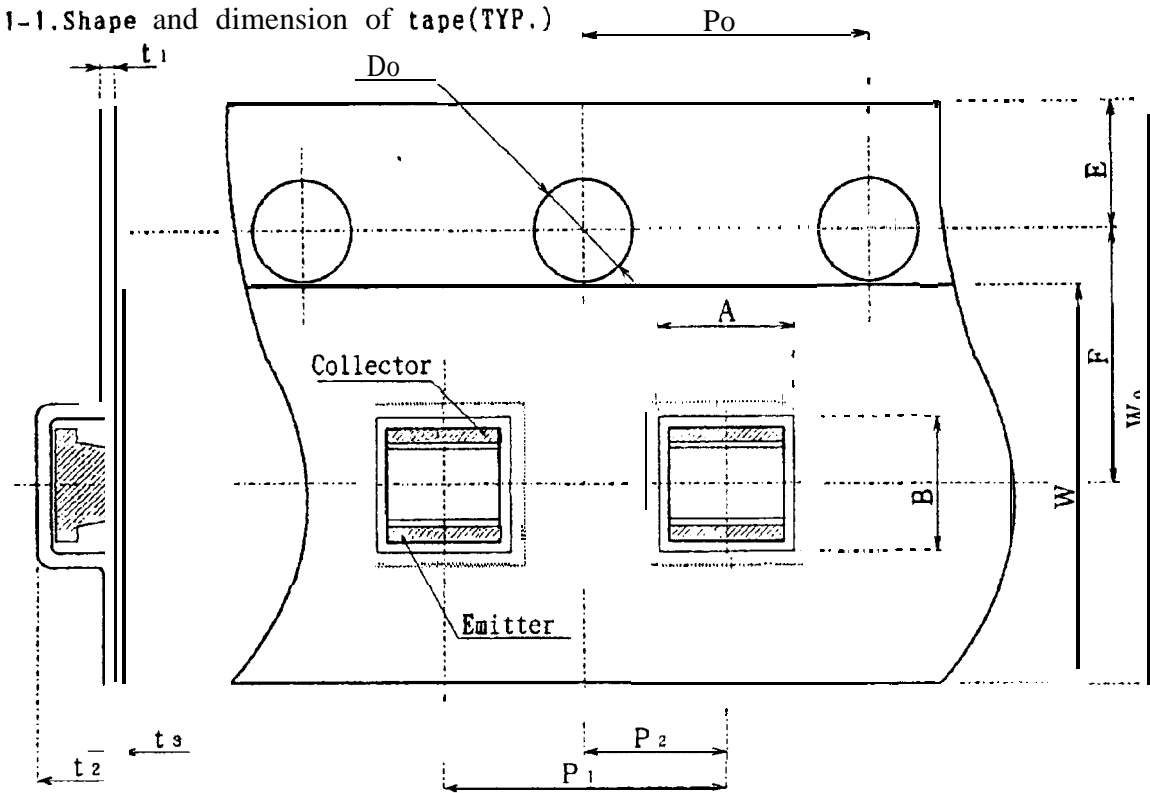
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6. Packing specification

6-1. Taping

6-1-1. Shape and dimension of tape (TYP.)



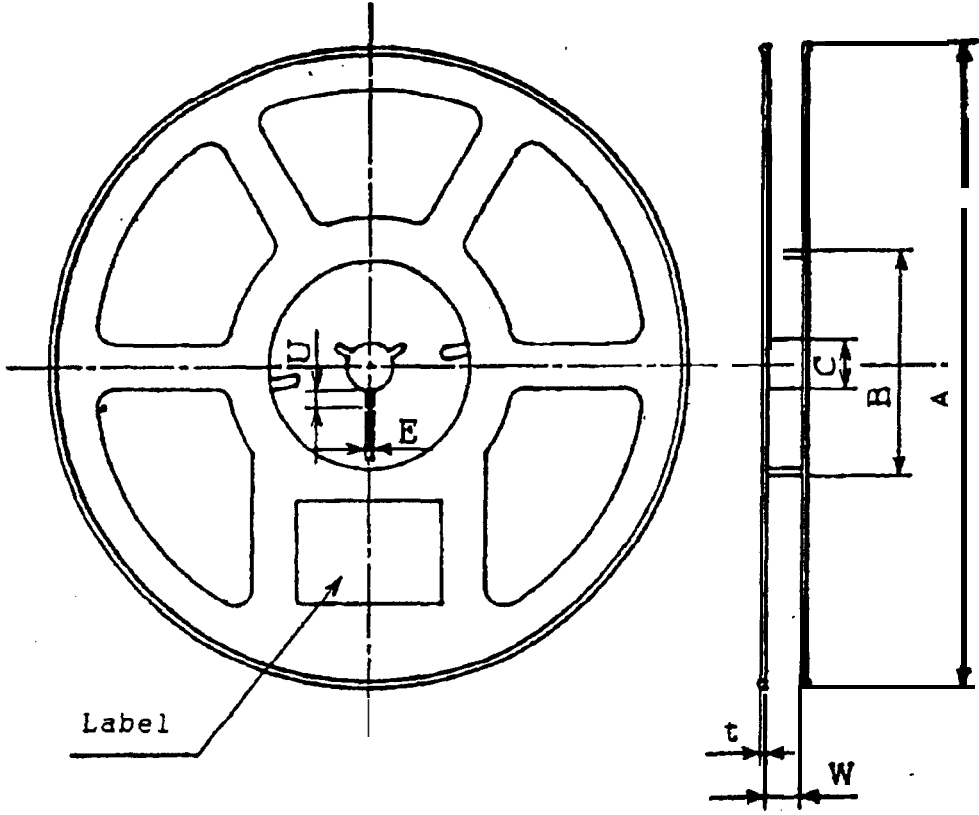
Parameter	Symbol	Dimension	Remarks
Concave square hole for part insertion	Vertical	A	1.9mm Dimension excludes corner R at inside bottom
	Horizontal	B	1.9mm
	Pitch	P ₁	4.0mm
Round sprocket hole	Diameter	Do	1.5mm
	Pitch	P ₀	4.0mm Accumulated error ±0.5mm/10 pitch
	Position	E	1.75mm Distance between tape edge and hole center
Center to center dimension	Vert. dire	P ₂	2.0mm
	Hori. dire	F	3.5mm Center line of the concave square hole and round sprocket hole
Cover tape	Width	W ₁	5.5mm
	Thickness	t ₃	0.1mm
Carrier tape	Width	W ₀	8.0mm
	Thickness	t ₁	0.2mm
Thickness of the entire unit	t ₂	1.2mm	With cover tape and carrier tape combined

* Material: Carrier tape...PET, Cover tape...Polyester

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6-1-2 .Shape and dimension of reel (TYP.)



Parameter		Symbol	Dimension	Remarks
Flange	Diameter	A	φ 178mm	
	Thickness	t	1.5mm	
	Inner space direction	W	10mm	Dimension of shaft core
Hub	External diameter	B	φ 60mm	
	Spindle hole diameter	C	φ 13mm	
	Key slit	Width	E	2.0mm
Depth		U	4.5mm	
Notation for part name etc.		Labeling on one side of flange. (Part name, quantity, lot No.)		

* Material: Reel ... Polystyrene

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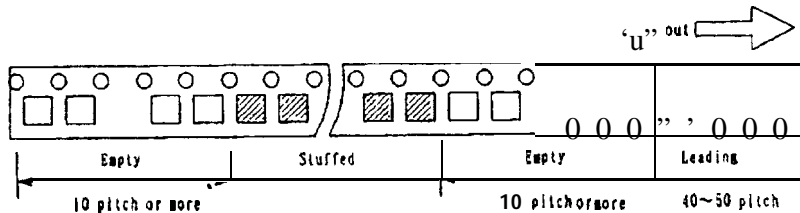
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6-1-3. Taping specification

(1) Lead tape:



(2) Cover tape strength against peeling: $F=0.1\sim0.8N$ ($\theta=10^\circ$ or less)



(3) Tape strength against bending:

The radius of bending circle should be 30mm or more.

If it is less than 30mm, the cover may peel.

(4) Jointing of tape: There should not be joint of cover tape or carrier tape.

(5) Quantity per reel: Average 4,000pcs. per reel

(6) Others: ① Apparent defect of product should not be packed and product should not upset.

- ② There should not be missing above continuous three products.
- ③ Products should be easily taken out.
- ④ Products should not be attached to the cover tape at peeling.

6-2. Label

SHIPMENT TABLE	
PART No.	
QUANTITY	
LOT No.	
SHARP	
MADE IN JAPAN	

← Model number

← Quantity of products

← Lot number*:
 ① ② ③ ④ ⑤

*:Lot indication

- ① Production plant code (to be indicated alphabetically)
- ② Production lot (single or double figures)
- ③ Year of production (the last two figures of the year)
- ④ Month of production
(to be indicated alphabetically with January corresponding to A)
- ⑤ Date of production (01~31)

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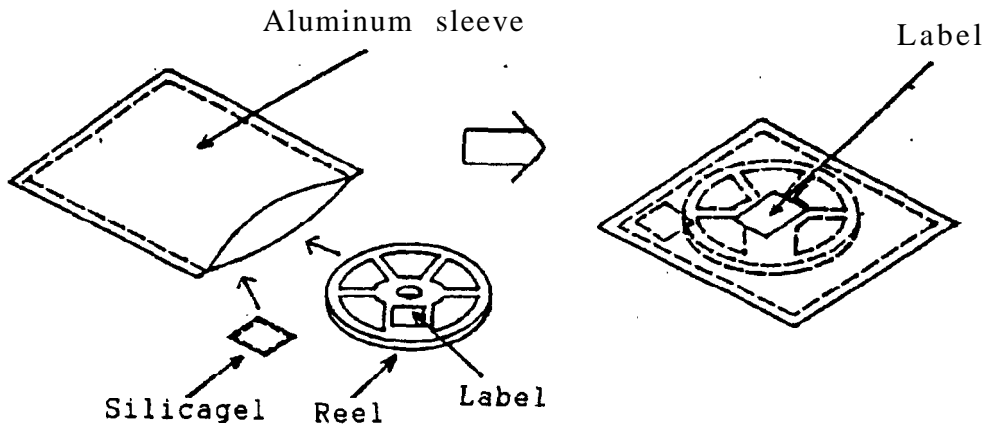
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6-3. Dampproof package

In order to avoid the absorption of humidity in transport and storage, the devices are packed in aluminum sleeve.



6-3-1. Storage conditions

Temperature: 5 to 30°C, Humidity: less than 60%RH

6-3-2. Treatment after opening

- ① Please make a soldering within 2 days after opening.
- ② In case the devices are not used for a long time after opening, the storage in dry box is recommendable. Or it is better to repack the devices with a desiccative by the sealer and put them in the same storage conditions as 6-3-1. Then they should be used within 2 weeks.
- ③ Please make a soldering after a following baking treatment if unused term should be over the conditions of ②.

*Recommendable conditions:

Temperature: 60°C, Time: 90~100 hours (in taping)

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7. Notes

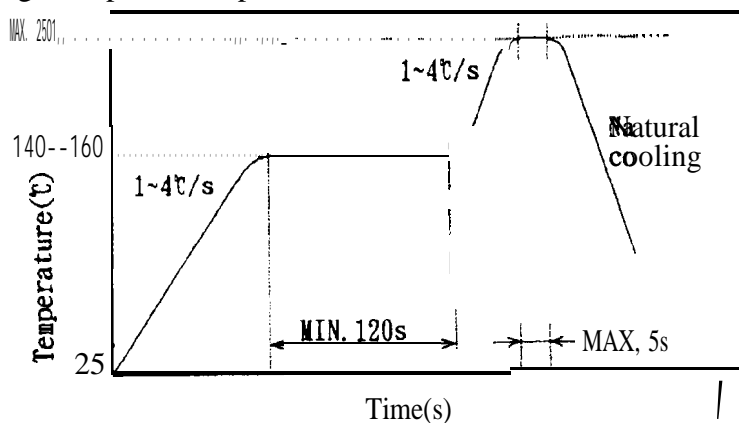
7-1. Precautions for designing

This product is not designed as electromagnetic and ionized-particle radiation resistant.

7-2. Soldering

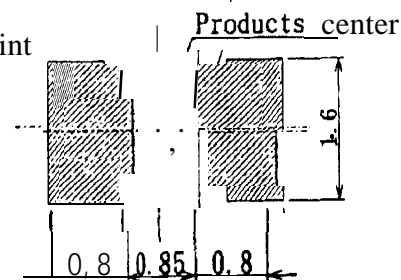
7-2-1. Reflow soldering

- ① It is recommended not to exceed the soldering temperature and time shown below. Caused by substrate bend or the other mechanical stress during reflow soldering may happen gold wire disconnection etc. Therefore please check and study your solder reflow machine's best condition.
- ② In case of 2 times reflow process, 2nd reflow process should be done within 8 hours after 1st reflow process.
- ③ Reflow soldering temperature profile



- ④ Recommendable Metal Mask pattern for screen print

Recommend 0.2mm to 0.3mm thickness metal mask for screen print. Caused by solder reflow condition, solder paste, substrate and the other material etc., may change solderability. Please check and study actual solderability before usage.



7-2-2. Manual soldering

- ① It is recommended to keep the soldering iron temperature at 260°C (soldering iron power consumption 20W) and not to solder more than once or for over 3 seconds.
- ② Transform and breakdowns pay attention stress by thermal and mechanical,