To: OurPCB Tech. Ltd.

Issue No. : RV-V-EVE-0087
Date of Issue : 13th. Apr .2020
Classification : ■New □ Change

Product Description: : 11mm GS ENCODER
Product Part Number : Panasonic Part Number EVEUPCAH508B
Country of Origin : VIETNAM (Indicated on the packing label in English)
Applications :

Provisional Product Specification

Panasonic Industrial Devices Vietnam Co.,Ltd.

Plot J1-J2, Thang Long Industrial Park, Kim Chung commune, Dong Anh District, Hanoi, Vietnam

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REVISION'S CAREER SHEET

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		New issue	10.Apr.2020	PHUC		

1. Notification items.

1.1 Infomation of Chemical Substance and Environmental Hazardous Substances.

- This product has not been manufactured with ozone depleting chemical controlled under the Montoreal Protocol.
- This product complies with the RoHs Directive (Restriction of the use of certain Hazadous Substance in electrical and electronic equipment (DIRECTIVE 2011/65/EU as amended by EU2015/863).
- The material used in product contain only the substances listed in the List of existing Chemical Substances specified in 'Act on the Evaluation of Chemical Substances and regulation of Their Manufacture, etc'.

1.2 Limitation of Application

- This product has been designed and manufactured for general electronic devices, such as home electronics, office equipment, information devices and communication devices.
  In an event that this product is used for more sophisticated applications requiring higher safety and reliability and its failure or malfunction of this product may impose damage to human life or property, agreement on product specifications for approval suitable for such applications are required.
  Such applications shall include the following:
  . Aircraft equipment, aerospace equipment, disaster prevention / crime prevention equipment, medical equipment, transportation equipment (vehicles, trains, ships, etc.), information processing equipment that are highly publicized, and other equivalent equipment
  . Regardless of its applications, in an event that this product is used for the equipment requiring high safety levels, place protective circuits or redundant circuits and perform safety tests to improve your products' safety.

1.3 Export control

When going through export procedures, please comply with laws and regulations related to export control such as Foreign Exchange and Foreign Trade Law.

1.4 Handling of provisional specification

Since the contents of this reference specification are subject to change without prior notifications. Please request us a formal specification again for your investigation before using.

1.5 Manufacturing sites

Production country : Viet Nam
Production factory : Panasonic Industrial Devices Vietnam Co.,ltd
Address factory : Plot J1, J2 Thang Long Industrial Pack, Dong Anh District, Hanoi, VietNam

2. Outline

2.1 This specification applied to rotary encoder used in electronic equipment.

2.2 This specification is a constituent document of contact for business concluded between your company and Panasonic Corporation.

2.3 Item not particularly specified in this specification shall be in conformance with JIS Standards.

2. Application Notes :

1. Avoid storing the products in a placeat high temperature and high humidity and in corrosive gases.
2. The encoder's pulse count method should be designed with taking operating speed,sampling time,and the design of the microcomputer software, etc. into consideration.
3. Prohibited items on fire and smoking

   Absolutely avoid use of a product beyond its rated range because doing so may cause a fire

   If misuse or abnormal use may result in conditions in whith the encoder is used out of its rated range, take proper measures such sa current interruption using a protective circuit.

   Please do not use the product in any location or circumstances where spreading fire may occur, or necessary measure against spreading fire if use in such locations or circumstances
4. For use in equipment for which safty requested

   Although care is taken to encoder quality, inferior characteristics, short circuits, open circuits are some problems that might be generated. To design a set which places maximam emphasis on safety, review the affect of any single fault of a encoder in advance and perform virtually fail-safe design to ensure maximum safety by:
   - Preparing a protective circuit or a protective device to improve system safety, and
   - Preparing a redundant circuit to improve system safety so that the signal fault of a product. encoder dose not cause a dangerous situation.

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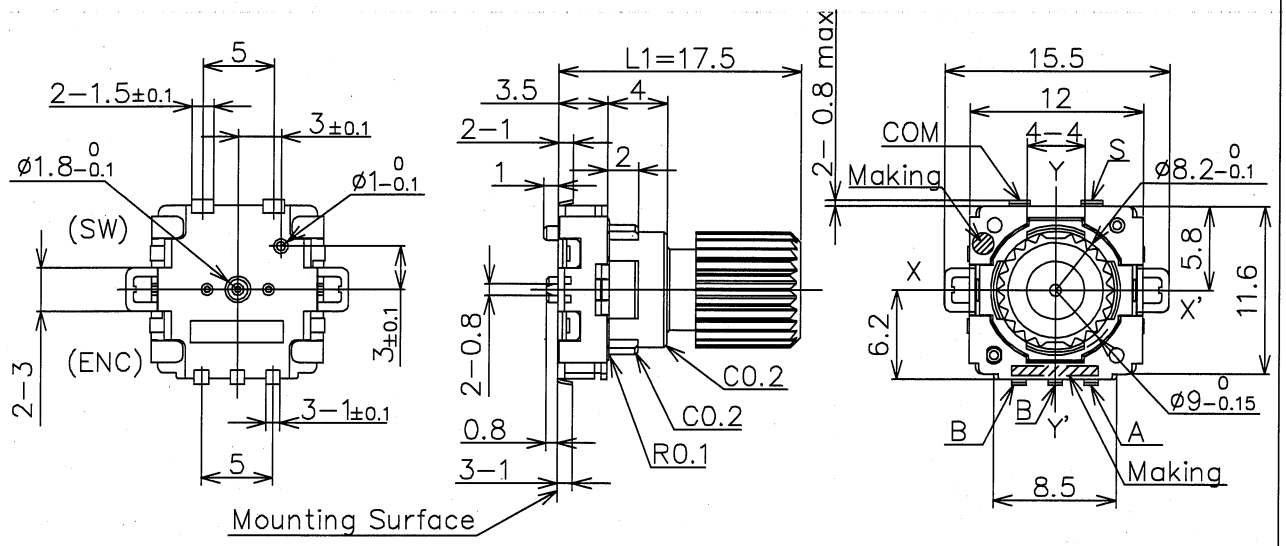
3. Shape and dimension, Circuit diagram, Marking

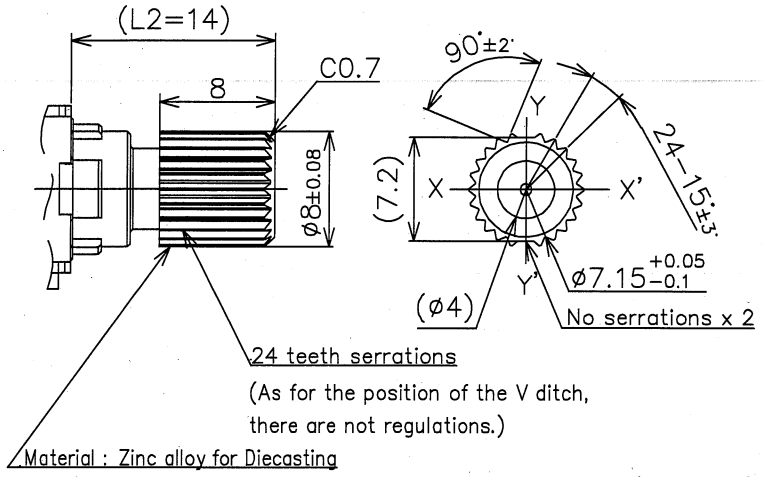
3.1 Shape and dimension (General dimension tolerance : ±0.5mm) <Unit : mm>

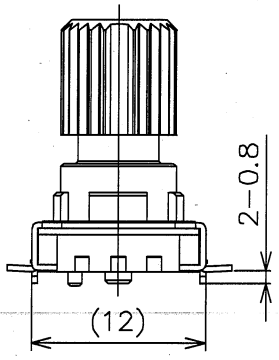


A : Output signal A
B : Output signal B

Shaft shape and dimension

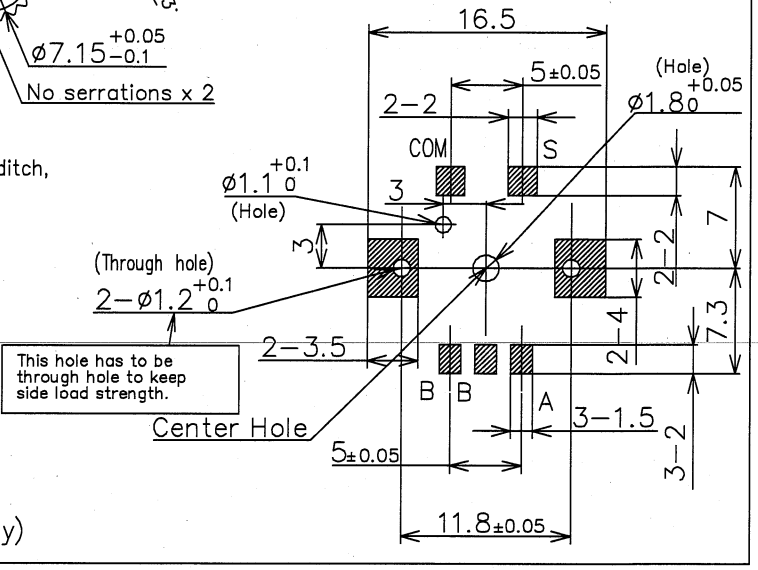
Shaft position will be at random.





Recommended land pattern plan.

(Tolerance : ±0.1)
(View from mounting side)



Marking
1. Date code
2. Out put signal
3. VN (Distinction of production country)

4.General

4.1 Standard atmospheric conditions : Unless otherwise specified. The standard range of atmospheric conditions for making measurements and tests is as follows.

Ambient temperature : 15°C ~ 35°C
Relative humidity : 25% ~ 75%
Air pressure : 86kPa ~ 106kPa

4.2 Operating temperature range : −40°C~+85°C
4.3 Storage temperature range : −40°C~+85°C

4.4 Rated voltage : Encoder D.C 10V
Switch D.C 16V
4.5 Rated current : Encoder D.C 1mA
Switch D.C 20mA

5.Performance

5.1 Mechanical performance(Encoder part)

Item		Conditions		Specifications
5.1.1	Rotation angle			360° (Endless)
5.1.2	Detent points			16 detent point
5.1.3	Each detent angle			22.5°±3°
5.1.4	Rotation torque (Detent torque) (Avarage torque)	Operating temperature	5°C~85°C	Before soldering 14.0mNm ± 8.0mNm After soldering 12.0mNm ± 7.0mNm
			−20°C~5°C	40 mN·m max.
			−40°C~−20°C	50 mN·m max.
5.1.5	Shaft pull−push strength	Pull and push static load of 100N shall be applied to the shaft in the axial direction for 10 second.		Without damage or excessive play in shaft. No excessive abnormality in rotational feeling. And electrical characteristics shall be satisfied.
5.1.6	Shaft side−load strength	A momentary load of 0.5 Nm shall be applied at the point 5mm from the tip of the shaft in a direction perpendicular to the axis of shaft for 10 second.		Without excessive play or bending in shaft. No excessive abnormality in rotational feeling. And electrical characteristics shall be satisfied.
5.1.7	Shaft wobble	A momentary load of 50 mNm shall be applied at the point 2mm from the tip of the shaft in a direction perpendicular to the axis of shaft.		0.35×L/30 mm(P−P)max. L=Distance between mounting surface and measuring point on the shaft.
5.1.8	Shaft play in rotational wobble	Measure with jig for rotational angle.		2° max.

5.2 Mechanical performance(Switch part)

Item		Conditions	Specifications
5.2.1	Switch type		Push type S.P.S.T.
5.2.2	Switch operation force	Measure the max.load until switch turned on when pressing the center of shaft to the operation direction of push SW.	6.0 N ± 2.5 N
5.2.3	Push stroke	Measure the distance until switch turned on when pressing the center of shaft to the operation direction of push SW.	$0.4\ mm^{+0.5}_{-0.2}\ mm$ (At push force 8.5N)
			$0.3\ mm^{+0.25}_{-0.15}\ mm$ (Travel to ON)

5.3 Electrical performance (Encoder part)

Item		Conditions	Specifications
5.3.1	Output signal	(Output of phase difference Fig-1)	A,B 2 signals.
5.3.2	Output resolution	Number of pulses in 360° rotation.	8 Pulse / 360°
5.3.3	Contact resistance	Measurement shall be stable condition which a output signal is ON condition.	1Ω max.
5.3.4	Bouncing	Measurement circuit diagram.(Fig-2) At rotational speed 60 min-1 <Phase t1, t3 (Fig-3)> (Passing time between 3.5V and 1.5V)	t1, t3: 5 ms max.
5.3.5	Sliding noise phase	Take sliding noise as time in the code-on area between bouncing(t1,t3) and voltage change exceed 1.5V.(Fig-3) Rotate shaft at speed 60±3 min-1 and measure.	t2: 3 ms max.
5.3.6	Phase-difference	Measurement shall be made under the condition which the shaft is rotated at 60 min-1.	T1, T2, T3, T4 (Fig-1) 4 ms min.
5.3.7	Insulation resistance	Measurement shall be made under the condition which a voltage of 250V D.C. is applied between individual terminals and a shaft.	50MΩ min.
5.3.8	Withstand voltage	A voltage of 300V A.C. shall be applied for 1min. between individual terminals and a shaft.	Without arcing or breakdown.

5.4 Electrical performance (Switch part)

Item		Conditions	Specifications
5.4.1	Bouncing	Measurement circuit diagram.(Fig-4) At operation speed 3~4 times/s <Phase t4, t5 (Fig-5)> (Passing time between 3.5V and 1.5V)	t4, t5 : 10 ms max.
5.4.2	Contact resistance	Measurement the contact resistance between COM and SW when push SW is ON. Applying force: 8.5N	100mΩ max.
5.4.3	Insulation resistance	Measurement shall be made under the condition which a voltage of 250V D.C. is applied between individual terminals and a shaft.	50MΩ min.
5.4.4	Withstand voltage	A voltage of 300V A.C. shall be applied for 1min. between individual terminals and a shaft.	Without arcing or breakdown.

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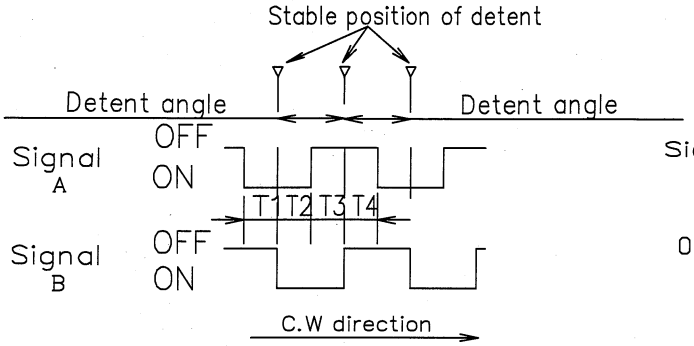
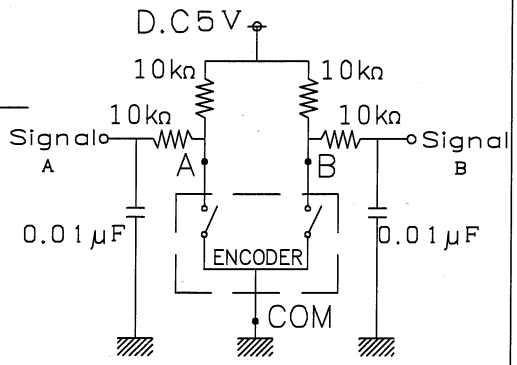
Phase difference.
(Fig-1)

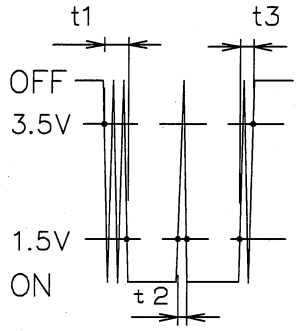


Measurement circuit diagram.
(Fig-2)

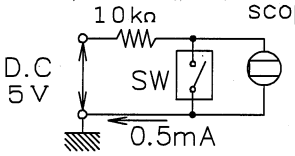


At each detent posision, output between COM and A is stable ON or OFF.
(Output between COM and B is not specified.)

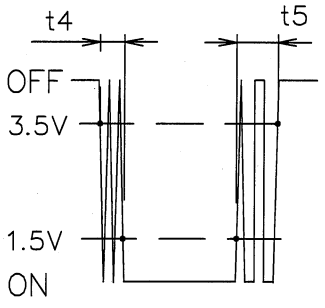
Bouncing phase(Fig-3)



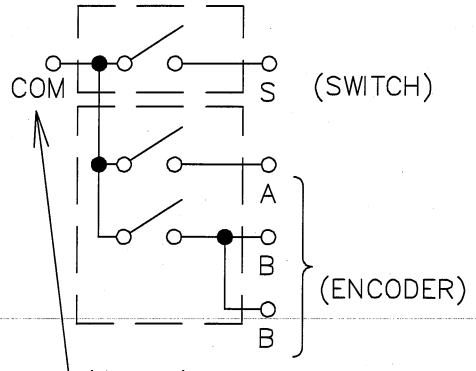
Measurement circuit diagram.(Fig-4) Oscillo scope



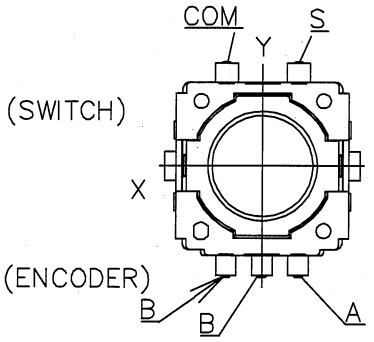
Bouncing phase(Fig-5)



Encoder terminal layout and switch circuit diagram.
(Fig-6)



(Notice)
Common terminal is shared between encoder and switch



ENCODER:	A : Output signal A B : Output signal B
SWITCH:	S : Output signal for switch

5.5 Durability performance

Item		Conditions	Specifications
5.5.1	Rotation life (Encoder)	The shaft of encoder shall be rotated to 30,000 cycles at a speed of 600 to 1000 cycles/h in room temp(15°C to 35°C) without electrical load after which measurements shall be made.	Rotation torque: Initial torque ±80% Phase-difference: 2.5 ms min. Contact resistance: 100Ω max. Clause 5.3.4, 5.3.5, 5.3.7, 5.3.8 be conformed
5.5.2	Push operating life (Switch)	Apply 8.5N push strength to shaft to the switch operating direction. The shaft of encoder shall be pushed to 30,000 times at a speed of 2500 times/h in room temp(15°C to 35°C) without electrical load after which measurements shall be made.	Operation force: Initial operation force ±50% Contact resistance: 200mΩ max. Clause 5.2.3, 5.4.1, 5.4.3, 5.4.4 be conformed
5.5.3	Heat temperature	The encoder shall be stored at a temperature of 85±3°C for 240±10h in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h after which measurements shall be made. (Without electrical load)	Contact resistance: 100 Ω max. SW Contact resistance: 200 mΩ max. Clause 5.1.4, 5.2.2, 5.3.4 to 5.3.8, 5.4.1, 5.4.3, 5.4.4 be conformed
5.5.4	Humidity	The encoder shall be stored at a temperature of 60±3°C with relative humidity of 90% to 95% for 240±10h in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h after which measurements shall be made. (Without electrical load)	
5.5.5	Low temperature	The encoder shall be stored at a temperature of −40±3°C for 240±10h in a thermostatic chamber. And then the encoder shall be subjected to standard atmospheric conditions for 1.5h after which measurements shall be made. (Without electrical load)	

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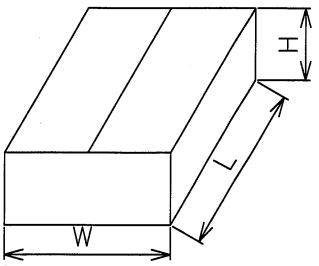
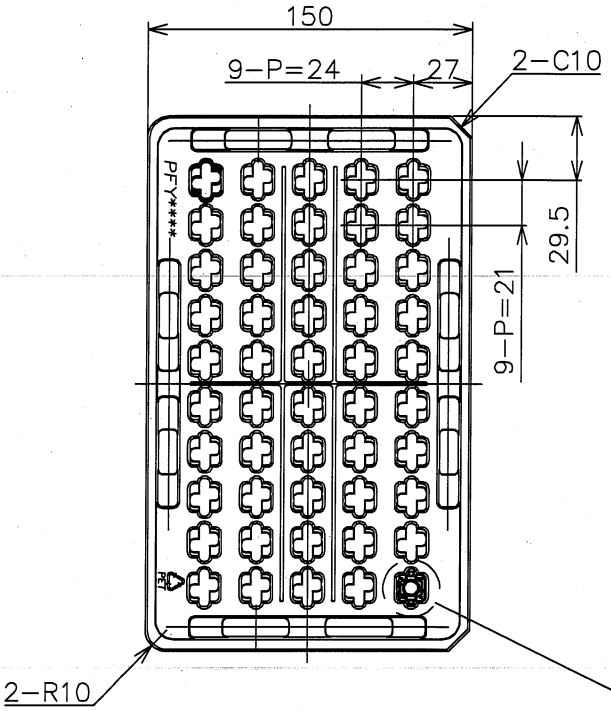
6.Packing:

(1)Package style : Card bord box.(250pcs./pack)
(2)Package size : W:160 X L:260 X H:130
(3)Tray style : Plastic tray.(50pcs./tray)
(4)Tray size : W:150 X L:248 X H:25

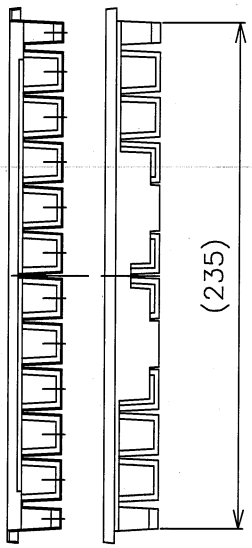
Carton Box Size

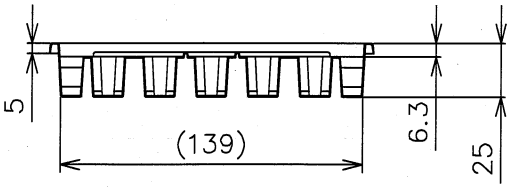


Packing Tray Configuration

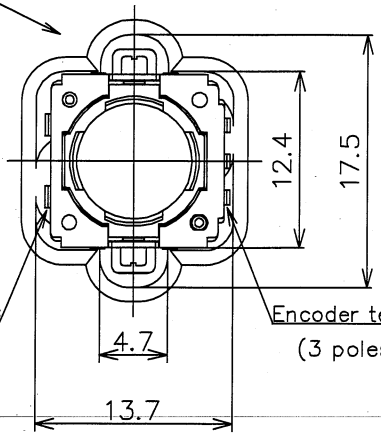


Take out direction.

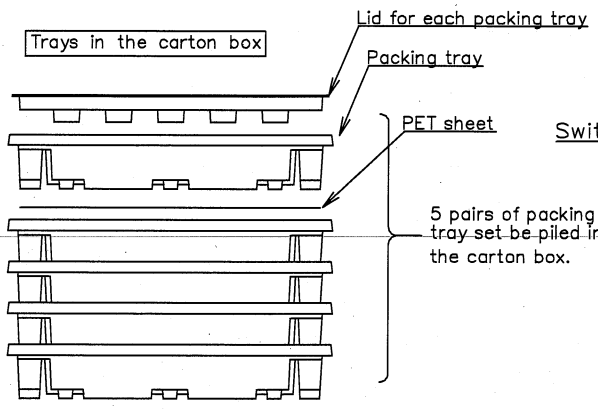




Details of Cavity
Product Direction



Trays in the carton box



7.Soldering conditions :

Perform the soldering under the conditions shown bellow.

7.1 Soldering conditions (1)

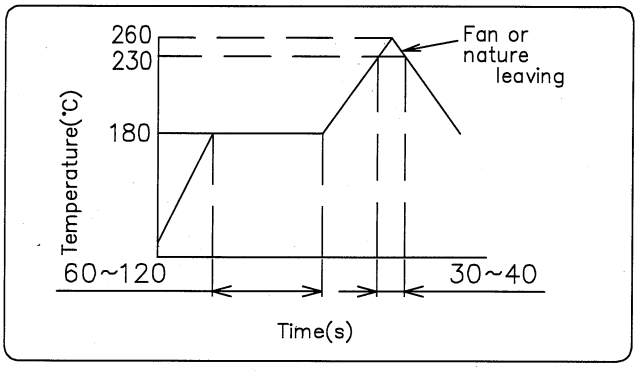
<Reflow soldering>

(Fig-7) 2 time max.

·Solder cleam thickness :
t=0.15 mm – 0.2 mm

·Prohibitive items :
You sould not use preflux.

Temperature profile of reflow soldering.(Fig-7)



7.2 Soldering conditions (2)

<Soldering iron>

Sordering iron : 20W or lower.
Temperature at the iron tip : 350°C or lower.
The duration to apply the soldering iron : 3 seconds or lower. (1 time)

PWB design – When you design mounting hole of PWB, please refer to its dimension defined in this specification.
Particularly, care should be taken in the case of wiring such as jumper wire near the product body where flux is delating.

·If flux is spattered to the product body,it may cause electrical contact or sliding trouble.

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