

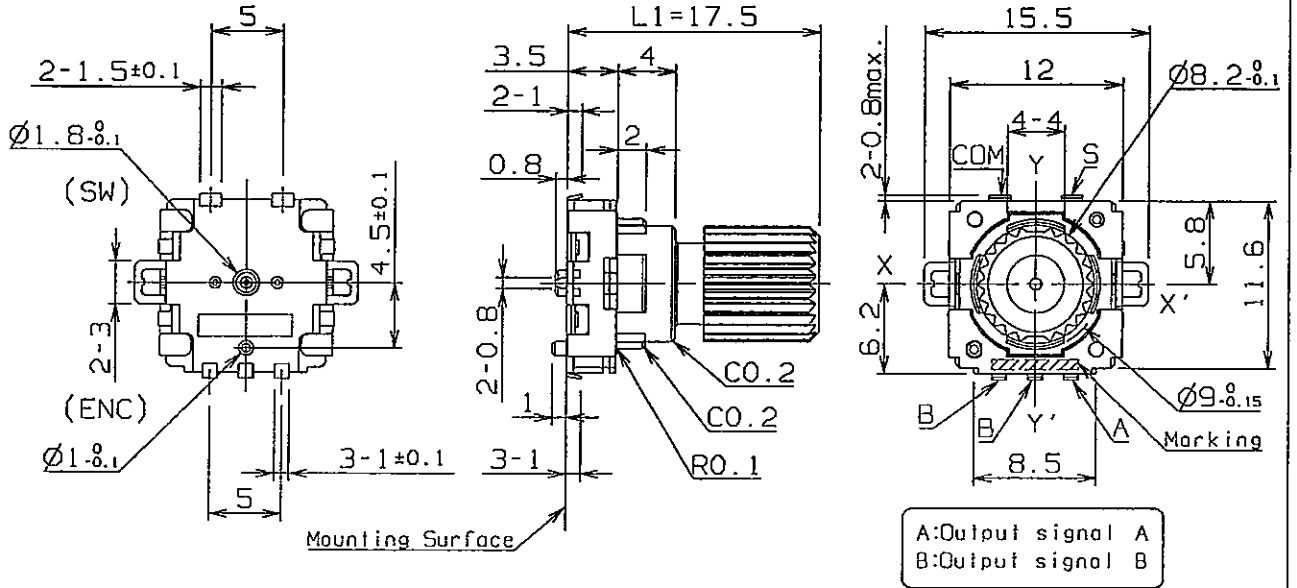
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|---|-----------------|----------------|--------------|-----------|
| Classification | | SPECIFICATIONS | | Issue No. |
| | | | | 2090 |
| Part Name | 11mm GS Encoder | Part No. | EVEUPCAH516B | 2/10 |
| <p>1. Notification items.</p> <p>1.1 Information of Chemical Substance and Environmental Hazardous Substances.</p> <ul style="list-style-type: none"> -This product has not been manufactured with ozone depleting chemical controlled under the Montreal Protocol. -This product complies with the RoHS Directive (Restriction of the use of certain Hazardous Substance in electrical and electronic equipment (DIRECTIVE 2011/65/EU)). -All the materials used in this part are registered material under the Law Concerning the Examination and Regulation of Manufacture etc. or Chemical Substances. -This product does not yet confirm to Halogen Free regulation generally required. <p>1.2 Limitation of Application</p> <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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. <p>1.3 Export control</p> <p>When going through export procedures, please comply with laws and regulations related to export control such as Foreign Exchange and Foreign Trade Law.</p> <p>1.4 Handling of approval specification</p> <ul style="list-style-type: none"> - Writings in this specification from are subject to change through precautions. -This specification from specify this item only. Please perform your approval test in the actual equipment conditions beforehand. <p>1.5 Manufacturing sites</p> <p>Production country : Vietnam Production factory : Panasonic Industrial Devices Vietnam Co., Ltd Address : Plot J1, J2 Thong Long Industrial Park, Dong Anh District, Hanoi, VIETNAM</p> <p>2. Outline</p> <p>2.1 This specification applied to rotary encoder used in electronic equipment.</p> <p>2.2 This specification is a constituent document of contract for business concluded between your company and Panasonic Corporation.</p> <p>2.3 Item not particularly specified in this specification shall be in conformance with JIS Standards.</p> | | | | |

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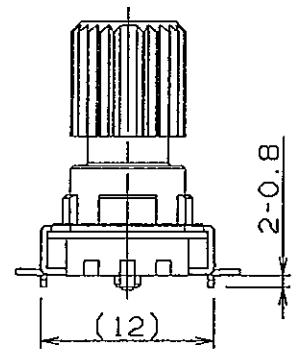
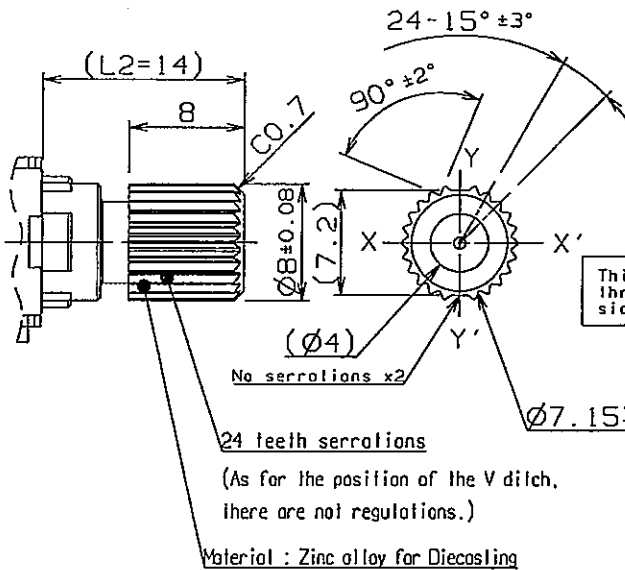
3. Shape and dimension, Circuit diagram, Marking

3.1 Shape and dimension (General dimension tolerance : $\pm 0.5\text{mm}$) <Unit : mm>



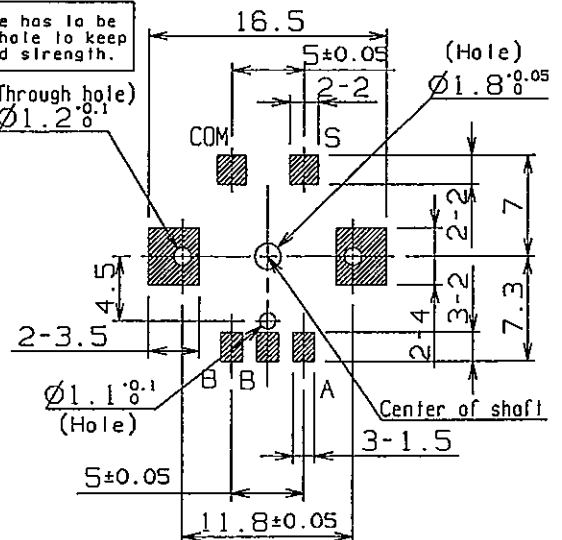
Shaft shape and dimension

Shaft position will be at random.



Recommended land pattern plan.

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



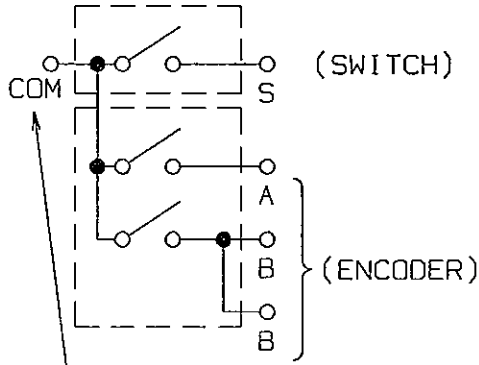
Marking

1. Date code
2. Output signal
3. VN (Distinction of production country)

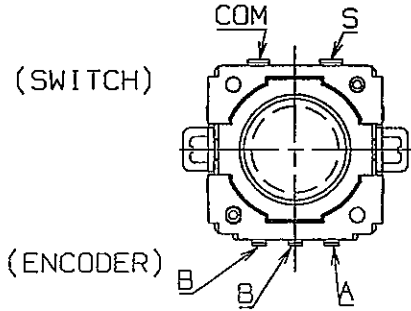
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Encoder terminal layout and switch circuit diagram.



(Notice)
Common terminal is shared
between encoder and switch



ENCODER: A:Output signal A
 B:Output signal B

SWITCH: D:Output signal for switch
 E:Output signal for switch

4. General

- 4.1 Rated voltage :Encoder part D.C 10V
 Switch part D.C 16V
 - 4.2 Rated current :Encoder part D.C 1mA
 Switch part D.C 20mA
 - 4.3 Operating temperature range : -40°C to +85°C
 - 4.4 Storage temperature range : -40°C to +85°C
 - 4.5 Standard atmospheric conditions
- Unless otherwise specified. The standard range of atmospheric conditions for making measurements and tests is as follows.
- Ambient temperature : 15°C to 35°C
 - Relative humidity : 25% to 75%
 - Air pressure : 86kPa to 106kPa

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5. Performance

5.1 Mechanical performance (Encoder part)

| Item | | Conditions | | Specifications |
|-------|--|---|-------------|--|
| 5.1.1 | Rotation angle | | | 360° (Endless) |
| 5.1.2 | Detent points | | | 32 detent point |
| 5.1.3 | Each detent angle | | | 11.25°±3° |
| 5.1.4 | Rotation torque (Detent torque) (Average 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. | | 0.35xL/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 mm -0.2 mm (At push force 8.5N) |
| | | | | 0.3 mm +0.25 mm -0.15 mm (Travel to ON) |

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5.3 Electrical performance (Encoder part)

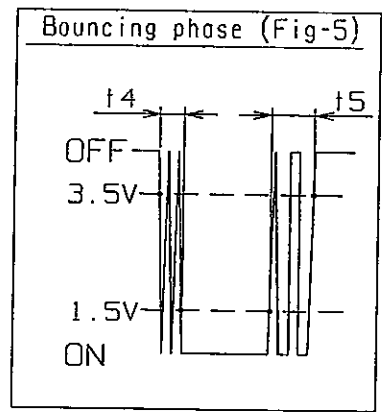
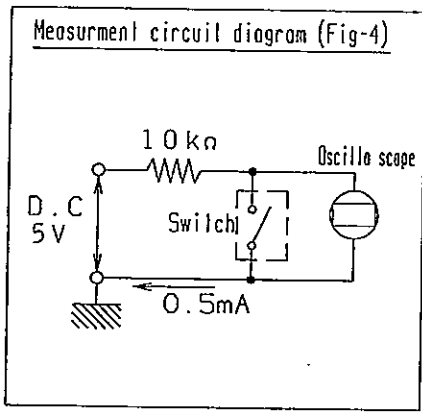
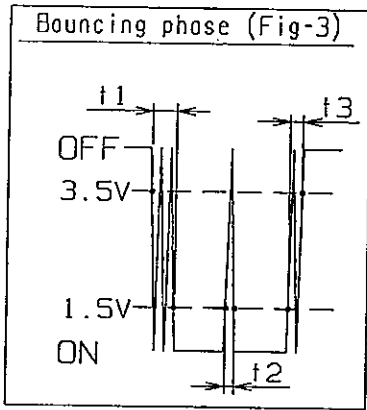
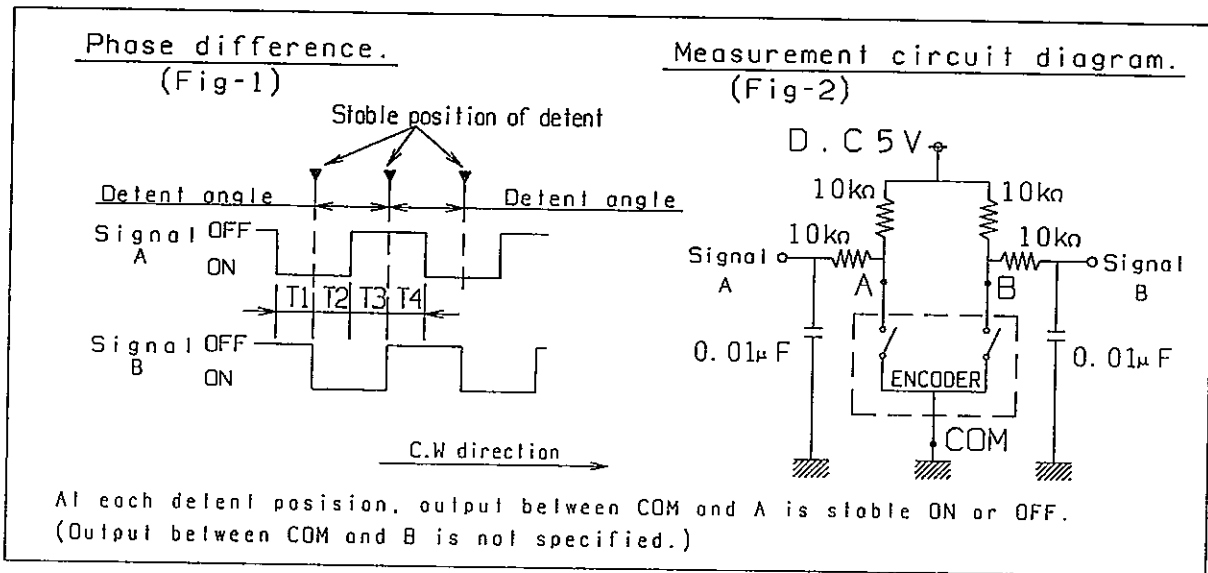
| Item | Conditions | Specifications |
|-------|--|--|
| 5.3.1 | Output signal (Output of phase difference Fig-1) | A,B 2 signals. |
| 5.3.2 | Output resolution | Number of pulses in 360° rotation. |
| 5.3.3 | Contact resistance | Measurement shall be stable condition which a output signal is ON condition. |
| 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) |
| 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. |
| 5.3.6 | Phase-difference | Measurement shall be made under the condition which the shaft is rotated at 60 min ⁻¹ . |
| 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. |
| 5.3.8 | Withstand voltage | A voltage of 300V A.C. shall be applied for 1min. between individual terminals and a shaft. |

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) |
| 5.4.2 | Contact resistance | Measurement the contact resistance between COM and SW when push SW is ON. Applying force: 8.5N |
| 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. |
| 5.4.4 | Withstand voltage | A voltage of 300V A.C. shall be applied for 1min. between individual terminals and a shaft. |

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| Part Name | 11mm GS Encoder | Part No. | 2090 |
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| Classification | | SPECIFICATIONS | | Issue No. |
| | | | | 2090 |
| Part Name | | Part No. | | |
| 11mm GS Encoder | | EVEUPCAHS16B | | 8/10 |
| 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: 100 Ω 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: 200 mΩ 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. | |
| 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) | 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 | |
| 5.5.5 | 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) | | |

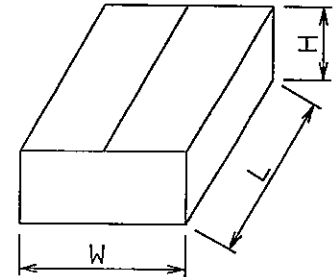
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| Classification | SPECIFICATIONS | | Issue No. |
| Part Name | 11mm GS Encoder | Part No. | 2090 |
| | | EVEUPCAH516B | 9/10 |

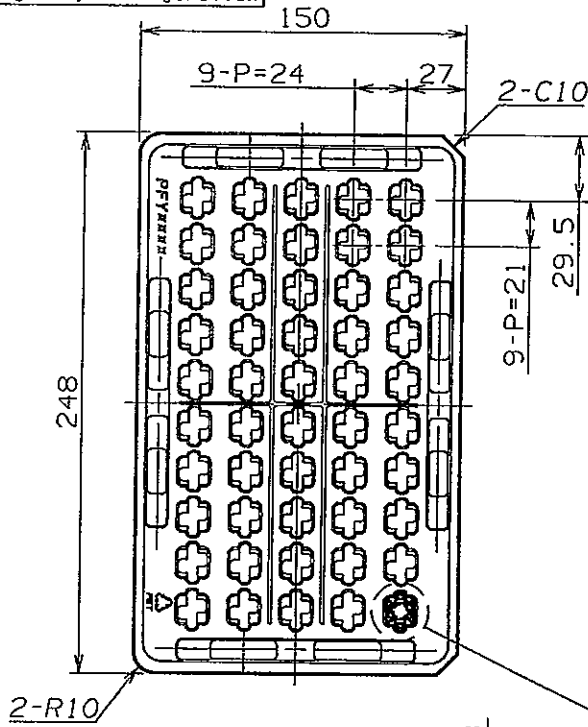
6.Packing:

- (1)Package style : Card bard 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

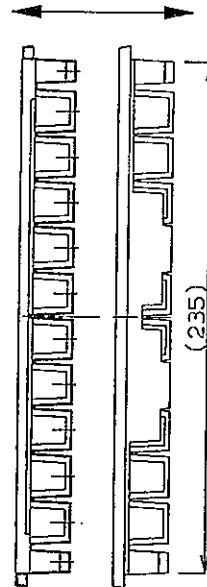
Carton Box Size



Packing Tray Configuration

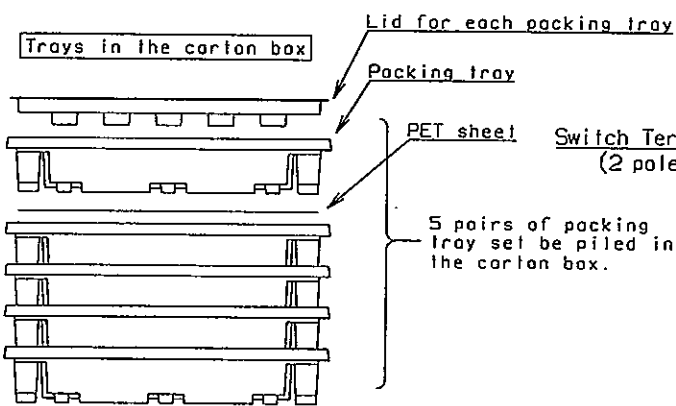
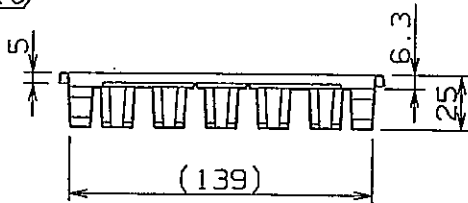
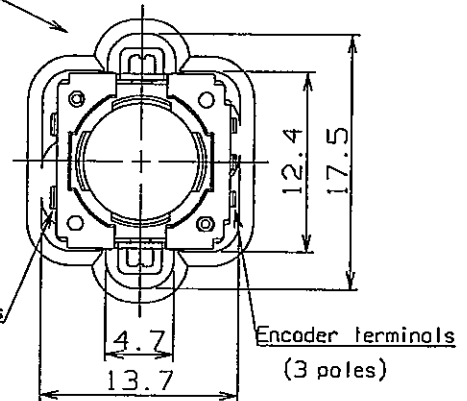


Take out direction.



Details of Cavity

Product Direction



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7. Soldering conditions :

Perform the soldering under the conditions shown below.

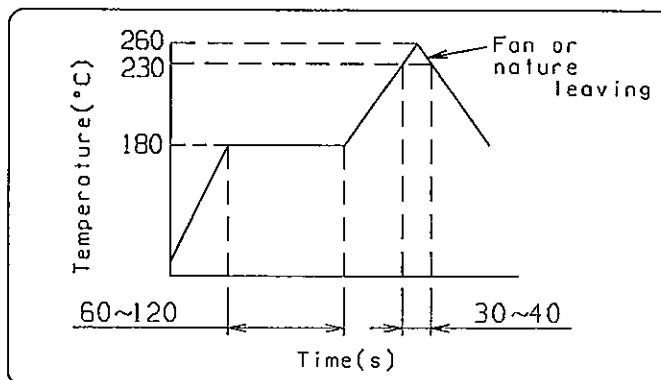
7.1 Soldering conditions (1) Temperature profile of reflow soldering.(Fig-7)

<Reflow soldering>

(Fig-7) 2 time max.

- Solder clean thickness :
t=0.15 mm - 0.2 mm

- Prohibitive items :
You should not use preflux.



7.2 Soldering conditions (2)

<Soldering iron>

Soldering iron : 20W or lower.

Temperature of 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.

8. Δ Application Notes

8.1 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 under conditions in which the product is used out of its rated range, take proper measures such as current interruption using a protective circuit.

The grade of nonflammability for resin used in product is "94HB," which is based on UL94 Standards (flammability test for plastic materials).

Prohibit use in a location where a spreading fire may be generated or prepare against a spreading fire.

8.2 For use in equipment for which safety is requested

Although care is taken to ensure product quality, inferior Characteristics, short circuits, and open circuits are some problems that might be generated. To design a equipment which places maximum emphasis on safety, review the affect of any single fault of a product 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 set
- Preparing a redundant circuit to improve system safety so that the single fault of a product does not cause a dangerous situation.

8.3 Reliability

- Storage condition

Do not store the product under high temperatures and/or high humidity, or in a location where corrosive gas may be generated.

Store the product at room temperature and room humidity in a packed condition.

Use them within a maximum of 6 months.

Check the date of manufacture on the package box

and apply the "first-in-first-out" rule.

If unpacked product must be stored as inventory, Store them in polyethylene bag to keep out air.


- 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.

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| 標準名 Classification | 納入仕様書 SPECIFICATIONS | | 仕様書番号 Classification |
| 品名 Part Name | 11形GSエンコーダ 11mm GS ENCODER | 品番 Part No | EVEUPCAH516B |
| | | | 内部配布用 一付図一 Internal Use |

内部配布用
Internal Use

納入仕様書はユーザ名称・先方品番を除く共通仕様書とする。
 ユーザ名称・先方品番については、付図の**内部配布用**を適用下さい。
 Product specification shall be common except customer name and customer part no. To apply customer name and customer part no. below.

| No. | ユーザ名 Customer Name | 先方品番 Customer Part No. | 内部発行日 Issued Date | 承認 Approval | 検印 Ccheck | 担当 Design | 備考 Remarks |
|-----|-----------------------|---------------------------|----------------------|---|--------------|-------------------|----------------------|
| 1 | PAISEU | — | 2014.12.2 | 西本 T.Nishimoto | / | 松本 A.Matsumoto | Common specification |
| 2 | TTI EUROPE (CEL) | — | 2014.12.2 | 西本 T.Nishimoto | / | 松本 A.Matsumoto | Apprpved by PAISEU |
| 3 | MOUSER | — | 2015. 1.29 | 西本 T.Nishimoto | / | 松本 A.Matsumoto | Apprpved by PAISEU |
| 4 | DIGI-KEY | — | 2015. 2.12 |  T.Nishimoto | / | 松本 A.Matsumoto | Apprpved by PAISEU |
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OFFICIAL VERSION


備考・改訂 ISSUE・REVISIONS

| | | | |
|--|--|--------------|------------------------------------|
| 機構部品事業部 技術グループ Electromechanical Components Business Division Engineering Group | 管理責任者 Approval 西本 T.Nishimoto | 検印 Ccheck | 担当者 Design 松本 A.Matsumoto |
|--|--|--------------|------------------------------------|

パナソニック株式会社
Panasonic Corporation.

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| 標準名 Classification | 納入仕様書 SPECIFICATIONS | 仕様書番号 Classification RV-H-2090 |
| 品名 Part Name 11形GSエンコーダ 11mm GS ENCODER | 品番 Part No EVEUPCAH516B | 内部配布用 -付図- Internal Use |

| | |
|-------------------------------------|--|
| 内部配布用 Internal Use | 納入仕様書はユーザ名称・先方品番を除く共通仕様書とする。 ユーザ名称・先方品番については、付図の 内部配布用 を適用下さい。 Product specification shall be common except customer name and customer part no. To apply customer name and customer part no. below. |
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| No. | ユーザ名 Customer Name | 先方品番 Customer Part No. | 内部発行日 Issued Date | 承認 Approval | 検印 Ccheck | 担当 Design | 備考 Remarks |
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| 1 | PAISEU | — | 2014.12.2 | 西本 T.Nishimoto | / | 松本 A.Matsumoto | Common specification |
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| 機構部品事業部 技術グループ Electromechanical Components Business Division Engineering Group | 管理責任者 Approval 西本 T.Nishimoto | 検印 Ccheck / | 担当者 Design 松本 A.Matsumoto |
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