

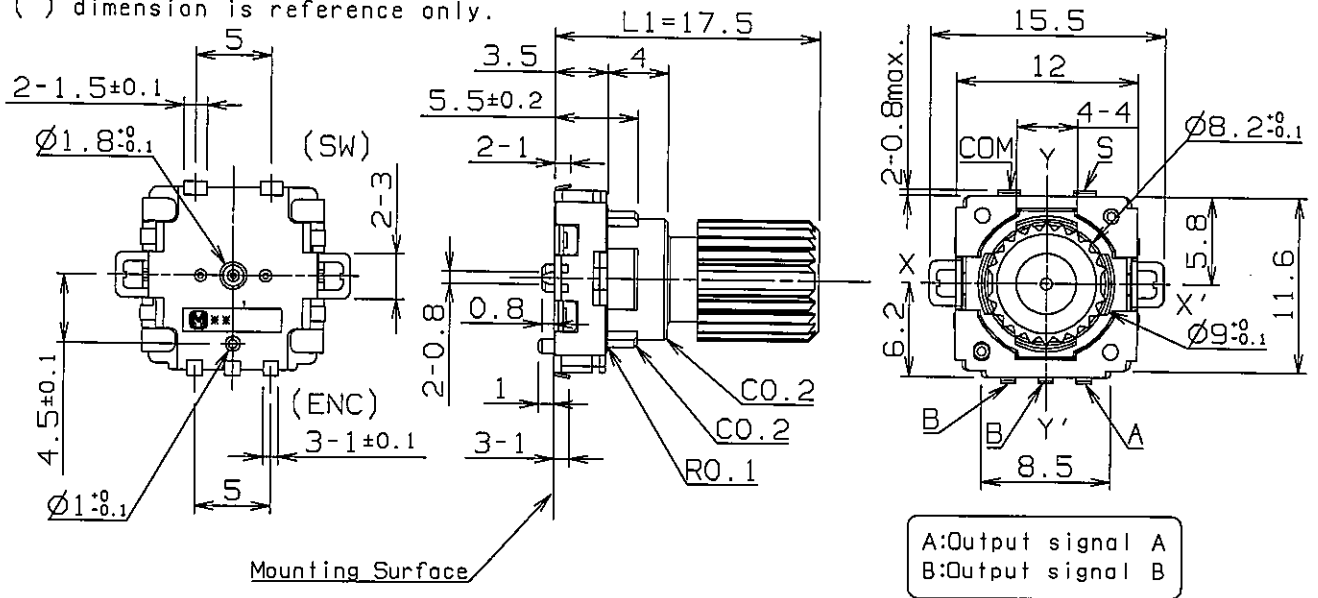
THIRD ANGLE PROJECTION

ALL DIMENSIONS ARE IN MILLIMETERS.

DO NOT SCALE DRAWING

General dimension tolerance : ± 0.5

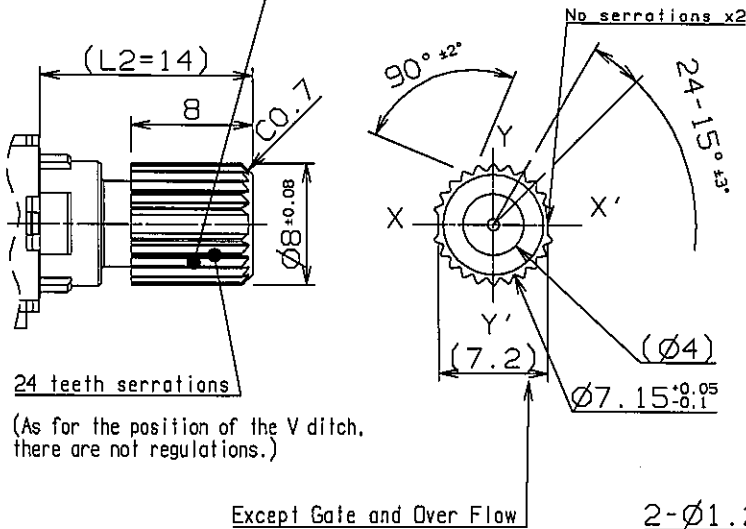
() dimension is reference only.



Shaft shape and dimension

Shaft position will be at random.

Material:
Zinc alloy for Diecasting

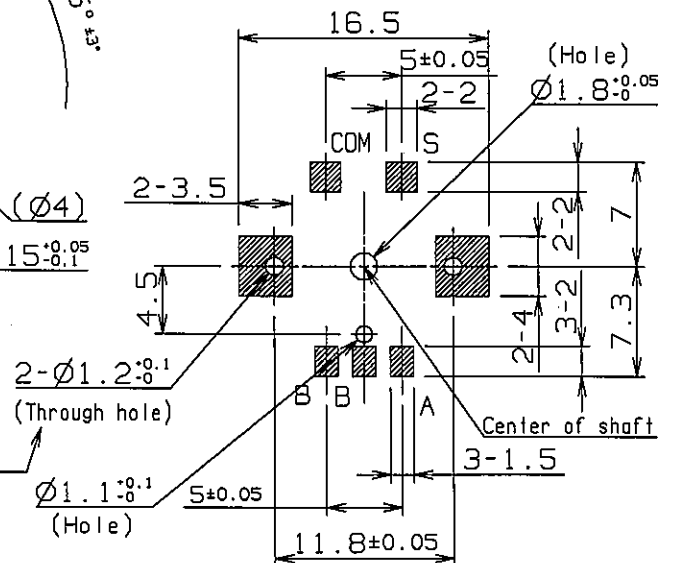


24 teeth serrations
(As for the position of the V ditch, there are not regulations.)

This hole has to be through hole to keep side load strength.

Recommended land pattern plan.

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



| | | | | | | | |
|----------|--------------------|------------|----------|-----------------|----------------------------|-----------|------|
| DESIGN | Siti | 30.10.2012 | NAME | 11mm GS ENCODER | ISSUE | REVISIONS | DATE |
| DRAW | Siti | 30.10.2012 | TYPE NO. | EVE T23 AH5 16B | DRAWING NO. REFERENCE ONLY | | |
| CHECK | <i>[Signature]</i> | 31/10/12 | | | 1 / 7 | | |
| APPROVAL | <i>[Signature]</i> | 31-10-12 | | | | | |

General

1. Scope: This specification applies to rotary encoder(incremental type) used in electronic equipment.
2. Standard atmospheric conditions: Unless otherwise specified. The standard range of atmospheric conditions for making measurements and tests is as follows.
 - Ambient temperature : 5°C ~ 35°C
 - Relative humidity : 25% ~ 85%
 - Air pressure : 86kPa ~ 105kPa
3. Operating temperature range : -40°C ~ +85°C
4. Storage temperature range : -40°C ~ +85°C
5. Rated voltage : Encoder D.C 10V
Switch D.C 16V
6. Rated current : Encoder D.C 1mA
Switch D.C 20mA

Production country : JAPAN or MALAYSIA or VIETNAM

Mechanical characteristics

| Item | Conditions | Specifications |
|------|---------------------------------|---|
| 1 | Rotation angle | 360° (Endless) |
| 2 | Rotation torque (Detent torque) | Operating temperature 5°C ~ 85°C |
| | | -20°C ~ 5°C |
| | | -40°C ~ -20°C |
| 3 | Detent points | 32 detent points |
| 4 | Each detent angle | 11.25° ± 3.0° |
| 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. (Mount the product to P.W.B.) Without damage or excessive play in shaft. No excessive abnormality in rotational feeling. And electrical characteristics shall be satisfied. |
| 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. (Mount the product to P.W.B.) Without excessive play or bending in shaft. No excessive abnormality in rotational feeling. And electrical characteristics shall be satisfied. |
| 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. (Mount the product to P.W.B.) 0.35xL/30 mm(P-P)max. L :Distance between mounting surface and measuring point on the shaft. |
| 8 | Shaft play in rotational wobble | Measure with jig for rotational angle. 2° max. (Initial) |

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|----------|-----------------|-----------|-------------------------------|
| NAME | 11mm GS ENCODER | | |
| | ISSUE | REVISIONS | DATE |
| TYPE NO. | EVE T23 AH5 16B | | DRAWING NO. REFERENCE ONLY |
| | | | 2/7 |

Electrical characteristics(encoder)

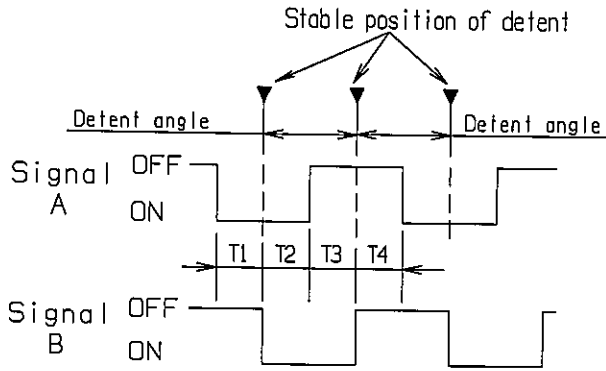
| Item | | Conditions | Specifications |
|------|-----------------------|--|-------------------------------------|
| 1 | Output signal | (Output of phase difference Fig-1) | A,B 2 signals. |
| 2 | Output resolution | Number of pulses in 360° rotation. | 16 Pulse / 360° |
| 3 | Contact resistance | Measurement shall be stable condition which a output signal is ON condition. | 1 Ω max. |
| 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 | 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 \pm 3 min ⁻¹ and measure. | t2: 3 ms max. |
| 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. |
| 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. | 50M Ω min. |
| 8 | Withstand voltage | A voltage of 300V A.C. shall be applied for 1min. between individual terminals and a shaft. | Without arcing or breakdown. |

Switch characteristics(switch)

| Item | | Conditions | Specifications |
|------|------------------------|--|--|
| 1 | Switch type | | Push type S.P.S.T. |
| 2 | Contact resistance | Measurement the contact resistance between COM and SW when push SW is ON. Applying force: 7.ON | 100m Ω max. |
| 3 | Switch operation force | Measure the max.load until switch turned on when pressing the center of shaft to the operation direction of push SW. | 5.0 N \pm 2.0 N |
| 4 | Push stroke | Measure the distance until switch turned on when pressing the center of shaft to the operation direction of push SW. | 1.5 mm \pm 0.5 (At push force 7.ON) |
| | | | 1.4 mm \pm 0.5 (Travel to ON) |
| 5 | Bouncing | Measurement circuit diagram.(Fig-4) At operation speed 3~4 times/s <Phase t4,t5 (Fig-5)> (Passing time between 1.5V and 3.5V) | t4, t5: 10 ms max. |
| 6 | Insulation resistance | Measurement shall be made under the condition which a voltage of 250V D.C. is applied between individual terminals and a shaft. | 50M Ω min. |
| 7 | Withstand voltage | A voltage of 300V A.C. shall be applied for 1min. between individual terminals and a shaft. | Without arcing or breakdown. |

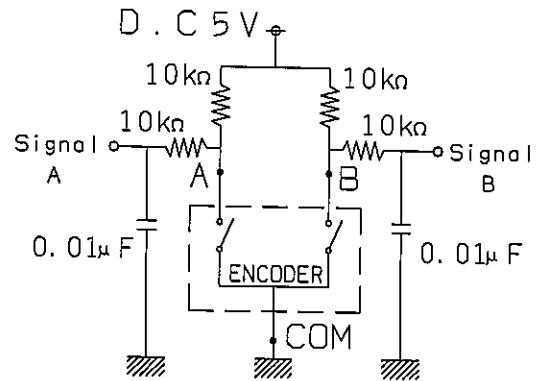
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|----------|-----------------|-------------|----------------|------|
| NAME | 11mm GS ENCODER | ISSUE | REVISIONS | DATE |
| | | | | |
| TYPE NO. | EVE T23 AH5 16B | DRAWING NO. | REFERENCE ONLY | 3/7 |

Phase difference.
(Fig-1)

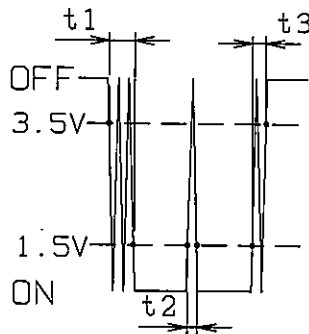


At each detent position, output between COM and A is stable ON or OFF.
(Output between COM and B is not specified.)

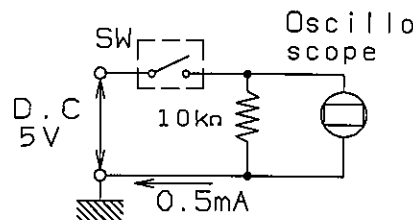
Measurement circuit diagram.
(Fig-2)



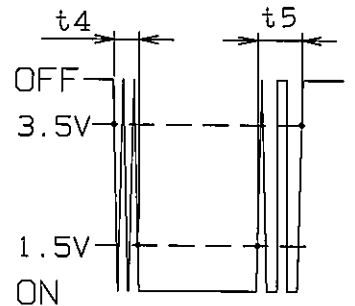
Bouncing phase(Fig-3)



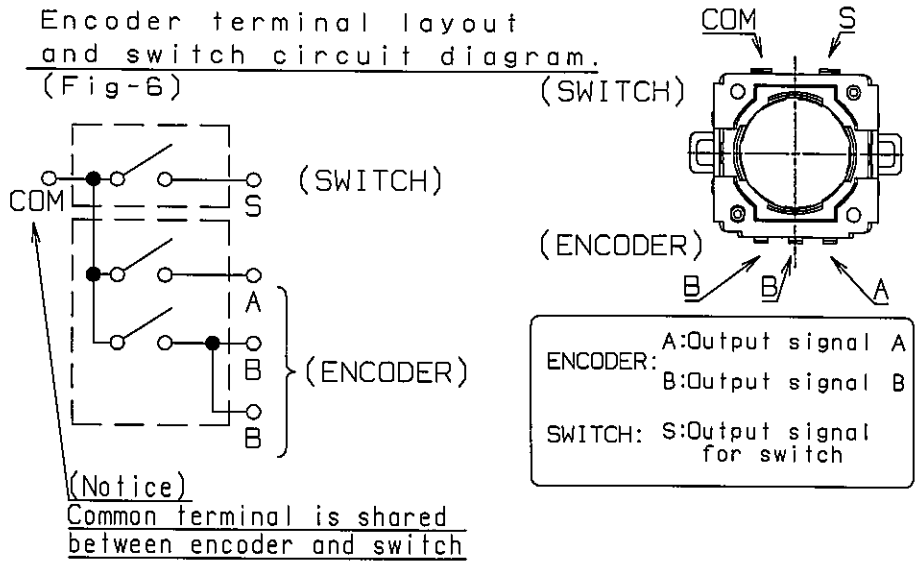
Measurement circuit diagram.
(Fig-4)



Bouncing phase(Fig-5)



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



NAME 11mm GS ENCODER

TYPE NO. EVE T23 AHS 16B

ISSUE

DRAWING NO. REFERENCE ONLY

REVISIONS

DATE

4/7


Durability

| Item | | Conditions | Specifications |
|------|---------------------------------|---|--|
| 1 | Rotation life (Encoder) | The shaft of encoder shall be rotated to 100,000cycles at a speed of 600 to 1000 cycles/h in room temp(5°C to 35°C) without electrical load after which measurements shall be made. | Rotation torque: Initial torque $\pm 80\%$ Phase-difference: 2.5 ms min. Contact resistance: 100 Ω max. Electrical characteristics item: 4,5,7,8 The same as the initial specifications. |
| 2 | Push operating life (Switch) | Apply 7.0N push strength to shaft to the switch operating direction. The shaft of encoder shall be pushed to 100,000 times at a speed of 2500 times/h in room temp(5°C to 35°C) without electrical load after which measurements shall be made. | Operation force: Initial operation force $\pm 40\%$ Contact resistance: 200 Ω max. Switch characteristics item: 4,5,6,7 The same as the initial specifications. |
| 3 | Heat temperature | The encoder shall be stored at a temperature of $85\pm 3^\circ\text{C}$ for $240\pm 10\text{h}$ 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 Ω max. Mechanical characteristics item: 2 Electrical characteristics item: 4,5,6,7,8 Switch characteristics item: 3,4,5,6,7 The same as the initial specifications. |
| 4 | Humidity | The encoder shall be stored at a temperature of $60\pm 3^\circ\text{C}$ with relative humidity of 90% to 95% for $240\pm 10\text{h}$ 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 | Low temperature | The encoder shall be stored at a temperature of $-40\pm 3^\circ\text{C}$ for $240\pm 10\text{h}$ 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) | |

Handling of approval specification :

- 1.This specification form specify this item only. Please perform your approval test in the actual equipment conditions beforehand.
- 2.Please return one copy of this specification form with your approval stamp or signature to us. Otherwise, it might be happened that the item can not be supplied.
The terms to return back us after receipt of this product specification shall be one year past, please request us new specifications again before ordering this product.
- 3.Writing in this specification form are subject to change through precautions.

Marking

1. Our identification mark 
2. Date code(Press marking)
3. JPN or MAL or VN

Manufacturing site:

- (1) Input Devices Division, Electromechanical Components
Business Unit, Industrial Devices Company,
Panasonic Corporation.
- (2) Panasonic Industrial Devices Malaysia Sdn.Bhd.
- (3) Panasonic Industrial Devices Vietnam Co.,.Ltd.

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|----------|-----------------|-------------|----------------|------|
| NAME | 11mm GS ENCODER | ISSUE | REVISIONS | DATE |
| | | | | |
| TYPE NO. | EVE T23 AH5 16B | DRAWING NO. | REFERENCE ONLY | 5/7 |

Soldering conditions :

Perform the soldering under the conditions shown bellow.

Soldering conditions (1)

<Reflow soldering>

· Solder clean thickness :
 $t=0.15 \text{ mm} - 0.2 \text{ mm}$

· Soldering condition(1)

<Reflow soldering>

Fig-7 (Temperature profile of reflow soldering)

· Soldering times : 2 times max.
 (Only the same PWB surface)

· Prohibitive items :

You should not use preflux.

Soldering conditions (2)

<Soldering iron>

Soldering 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.

▲ Application Notes :

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.

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 effect 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.

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.

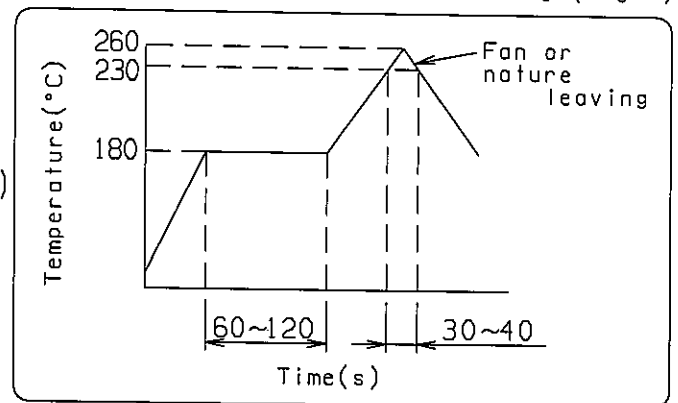
If unpacked product must be stored as inventory, Store them in polyethylene bag to keep out air.

- 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.
- The item designed mainly corresponds to JIS (Japanese Industrial Standards) on the reliability conditions.

<Information of Chemical Substances and Environmental Hazardous Substances.>

- 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 rr

Temperature profile of reflow soldering. (Fig-7)



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|-----------------|-----------------|-----------|------|
| NAME | 11mm GS ENCODER | | |
| | ISSUE | REVISIONS | DATE |
| TYPE NO. | DRAWING NO. | | 6/7 |
| EVE T23 AHS 16B | REFERENCE ONLY | | |

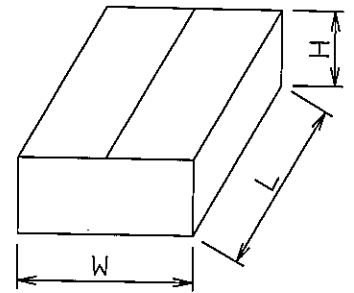
Mounting

Could you validate of placement for product.
(Include absorption method of product)

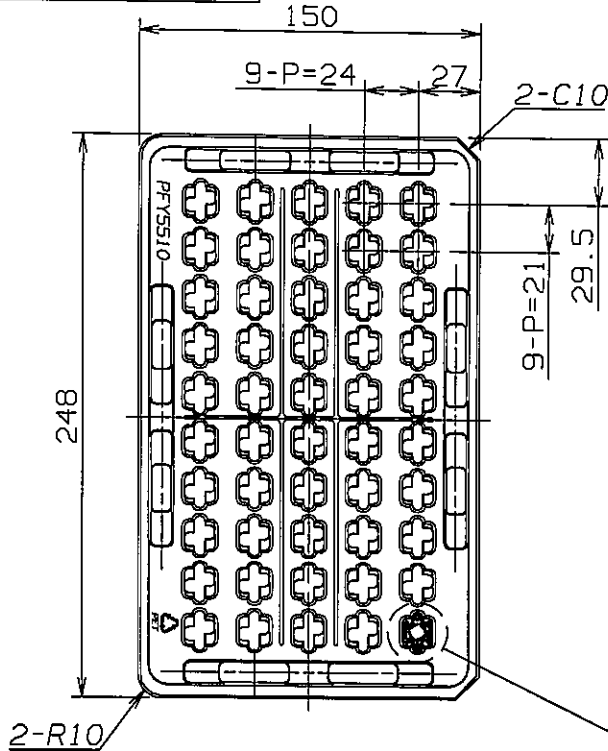
Packing:

- (1) Package style : Card board 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

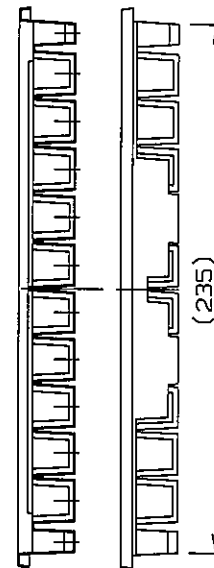
Carton box size



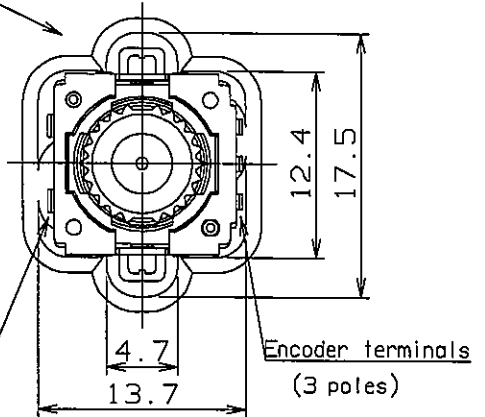
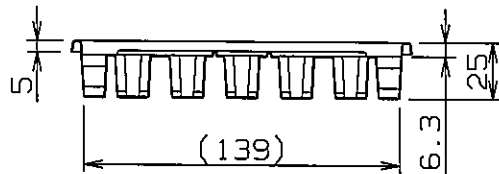
Packing tray configuration



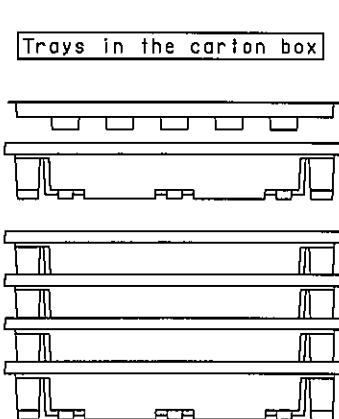
Take out direction.



Details of cavity
Product direction



Trays in the carton box



Lid for each packing tray

Packing tray

Switch terminals
(2 poles)

Encoder terminals
(3 poles)

5 pairs of packing tray set be piled in the carton box.

NAME 11mm GS ENCODER

ISSUE

REVISIONS

DATE

TYPE NO. EVE T23 AH5 16B

DRAWING NO. REFERENCE ONLY

7/7