



Serial No. : 2015-0038

DATE : 2015/01/09

HCFA CORP.

ITEM : CRYSTAL RESONATOR

DSX321G 24.000MHz

(INDONESIA) 1C224000CCOBN

(THAILAND) 1N224000CCOBN

Please acknowledge receipt of this specification by signing and returning a copy to us.

|          |                           |
|----------|---------------------------|
| RECEIPT  |                           |
| DATE     |                           |
| RECEIVED | (signature)<br><br>(name) |

General Manufacturer of Quartz Devices

**DAISHINKU CORP.**

1389 Shinzaike, Hiraoka-cho, Kakogawa, Hyogo  
675-0194 Japan  
Phone (81)79-425-3141 Fax (81)79-425-1134  
[http://www.kds.info/index\\_en.htm](http://www.kds.info/index_en.htm)

C.ENG.

*T. Kusai*

ENG.

*S. Miura*

## 1. ELECTRICAL CHARACTERISTICS

(This test shall be performed under the conditions of temp.at +25 ± 3°C, Relative Humidity 60% max.)

|   |   |
|---|---|
| (1) NOMINAL FREQUENCY                             | 24.000000 MHz                               |
| (2) OVERTONE ORDER                                | Fundamental                                 |
| (3) LOAD CAPACITANCE(CL)                          | 12.0 pF                                     |
| (4) FREQUENCY TOLERANCE                           | ±30 ppm max. (at +25 ± 3 °C)                |
| (5) DRIVE LEVEL                                   | 10 ± 2 μW                                   |
| (6) SERIES RESISTANCE                             | 40 Ω max. (at Series)                       |
| (7) OPERATING TEMPERATURE RANGE                   | -30 ~ +85 °C                                |
| (8) FREQUENCY CHARACTERISTICS<br>OVER TEMPERATURE | ±30 ppm max. / -30 ~ +85 °C (ref. to +25°C) |
| (9) SHUNT CAPACITANCE                             | 2.0pF max.                                  |
| (10) INSULATION RESISTANCE                        | 500MΩ min. / DC 100 ± 15V                   |
| (11) STORAGE TEMPERATURE RANGE                    | -40 ~ +85 °C                                |

## 2. CONSTRUCTION

(1) DIMENSIONS AND MARKING Refer to 4.

## 3. OTHER SPECIFICATIONS

- (1) EMBOSS CARRIER TAPE & REEL Refer to 5.
- (2) PACKING Refer to 6.
- (3) REFLOW CONDITIONS (REFERENCE) Refer to 7.
- (4) LAND PATTERN (REFERENCE) Refer to 8.
- (5) RELIABILITY SPECIFICATION Refer to 9. ~ 11.
- (6) OTHER  
HANDLING INSTRUCTIONS Refer to 12.

|  |   |      |                    |
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4. DIMENSIONS AND MARKING

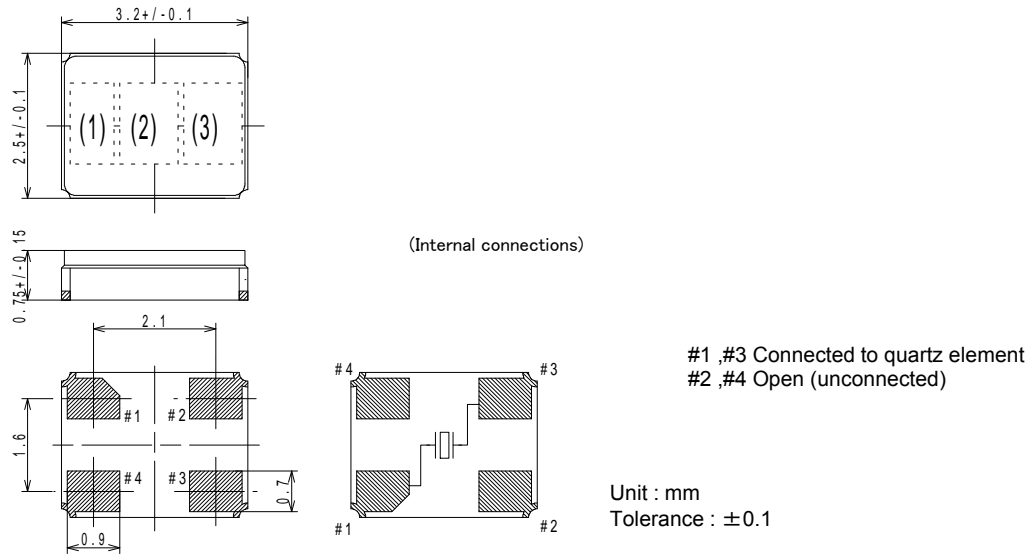


Figure-1

Logo(1) and Nominal Frequency (2) should be printed as follows by producing district

Made in INDONESIA --> Spec. No.: 1C224000CC0BN , Logo : D , Frequency: 24

Made in THAILAND --> Spec. No.: 1N224000CC0BN , Logo :    , Frequency: 24

\* Made in INDONESIA : Under Bar with D  
 \* Made in THAILAND : Top Bar with D

Nominal Frequency ( 2 ) = Mark two digits from upper decimal point  
 (ex. 24.000000 MHz ----> 24 )

Manufacturing lot No.( 3 )

(year) ex. 2015 shall be marked as ' 5 ' (The last digit of the year)  
 (Month) ex. Jan. shall be marked as ' A ' (As shown in Table-1.)

(Table-1.)

|       |      |      |      |      |      |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Month | Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
| Mark  | A    | B    | C    | D    | E    | F    | G    | H    | J    | K    | L    | M    |

Plating material of a terminal. : Ni Plating + Au Plating.

A clearance between the soldering terminal portion and a print circuit board side should be less than 0.1mm.

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5. EMBOSS CARRIER TAPE & REEL

(1) Dimensions of embossed carrier tape

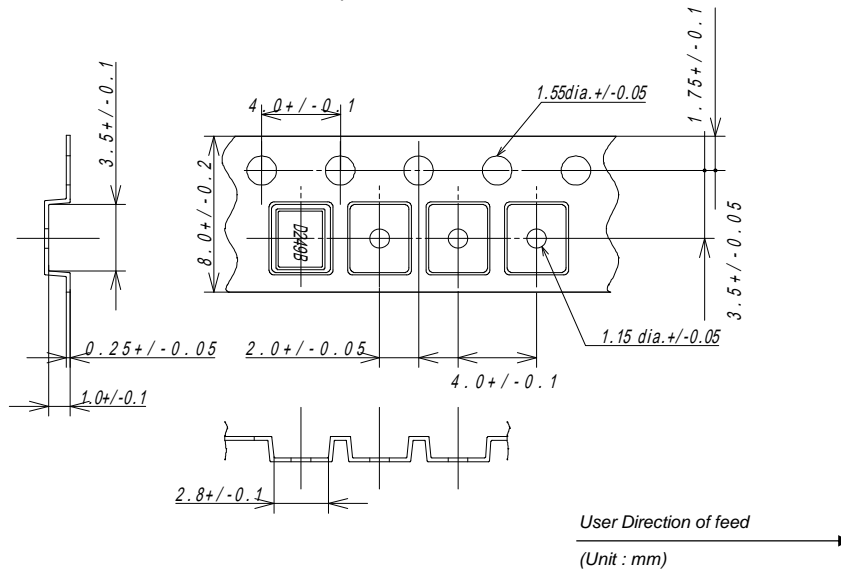


Figure-2

(2) Dimensions of tape reel

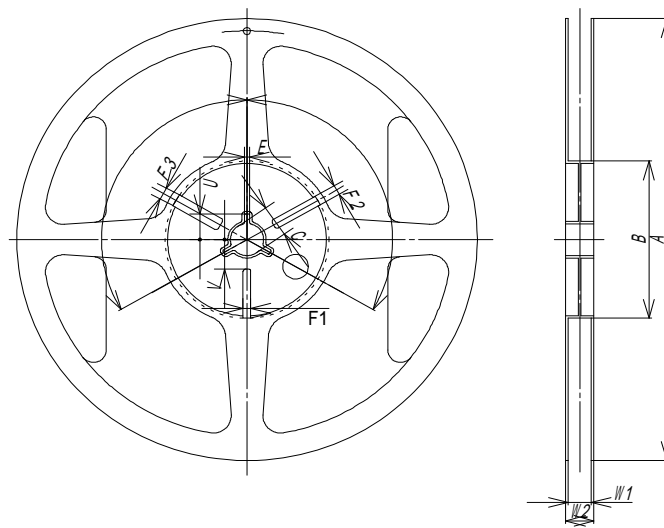


Figure-3

|  |   |        |                    |
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(Unit:mm)

| Item        |                   | Mark   | Dimensions | Angle       |             |       |
|-------------|-------------------|--------|------------|-------------|-------------|-------|
| Flange      | Diameter          | A      | Φ180       | +0.0 / -3.0 |             |       |
|             | Inside of Frange  | W1     | 9.0        | ± 0.3       |             |       |
|             | Outside of Frange | W2     | 11.4       | ± 1.0       |             |       |
|             | Inside Diameter   | B      | Φ60        | +1.0-0      |             |       |
| Center Core | Center Core Slit  | Width  | F1         | 3.0 ± 0.2   |             |       |
|             |                   |        | F2         | 4.0 ± 0.2   |             |       |
|             |                   |        | F3         | 5.0 ± 0.2   |             |       |
|             | Center Core Slit  | Length | V          | 11.9        | +0.5 / -0.0 |       |
|             |                   |        | Angle      | θ           | 120°        |       |
|             | Spindle Diameter  |        |            | C           | Φ13         | ± 0.2 |
|             | Key Seats         | Width  | E          | 2.0         | ± 0.5       |       |
|             |                   |        | Length     | U           | 10.5        | ± 0.4 |
|             |                   |        |            | Angle       | θ           | 120°  |

(3) Material of the reel

|      |                           |
|------|---------------------------|
| Reel | Polystyrene+Carbon(Black) |
|      | Polystyrene(White)        |

(4) Storage condition

Temperature : +40 °C max.

Relative Humidity : 80% max.

( It is a guaranteed term because it obtains an excellent soldering: 6 months)

(5) Standard packing quantity

3,000 pcs/reel

(6) Material of the tape

|              |                    |
|--------------|--------------------|
| Tape         | Material           |
| Carrier tape | Polystyrene+Carbon |
| Cover tape   | Polyester          |

|  |   |        |                    |
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(7) Label contents

- Type
- Our specification No.
- Your Part No.
- Lot No.
- Nominal Frequency
- Quantity
- Our Company Name
- Producing Country

Stick a label on the each reel.

(8) Taping dimension

|          |              |  |
|----------|--------------|--|
| Leader   | Cover-tape   | The length of cover-tape in the leader is more than 400mm including empty embossed area.   |
|          | Carrier-tape | After all products were packaged, must remain more than twenty pieces or 400mm empty area, which should be sealed by cover-tape. |
| Terminal | Cover-tape   | The tip of cover-tape shall be fixed temporary by paper tape and roll around the core of reel one round.                         |
|          | Carrier-tape | The empty embossed area which are sealed by cover-tape must remain more than 40mm.   |

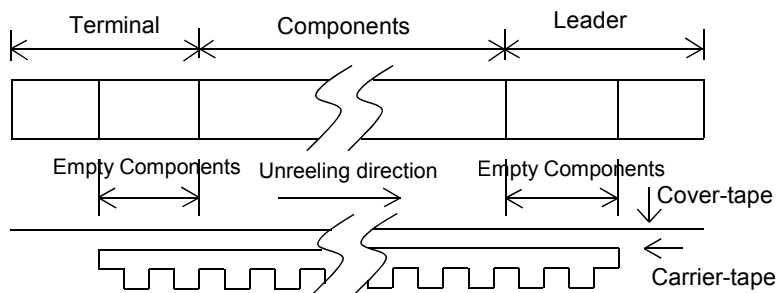


Figure-4

(9) Joint of tape

The carrier-tape and cover-tape should not be jointed.

(10) Release strength of cover tape

It has to between 0.1 ~ 0.7N under following condition.

Pulling direction 165 ~ 180 °

Speed 300mm/min

Otherwise unless specified.

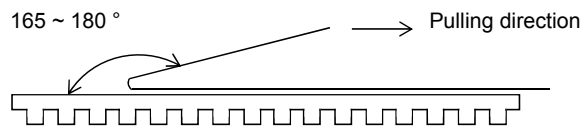


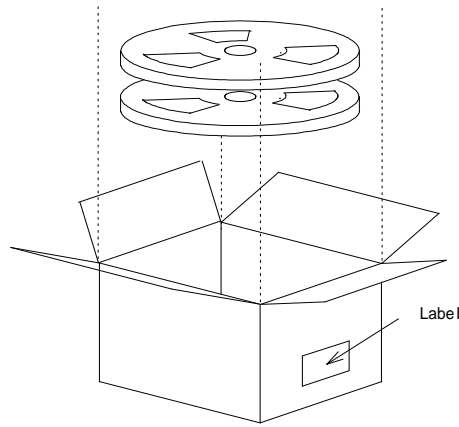
Figure-5

Other standards shall be based on JIS C 0806 .1990.

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6. PACKING

(1) STORAGE METHOD



Label contents

- The type of product
- Lot No.
- Specification
- Quantity
- Shipment Day
- Remark

Figure-6

(2) BOX SIZE

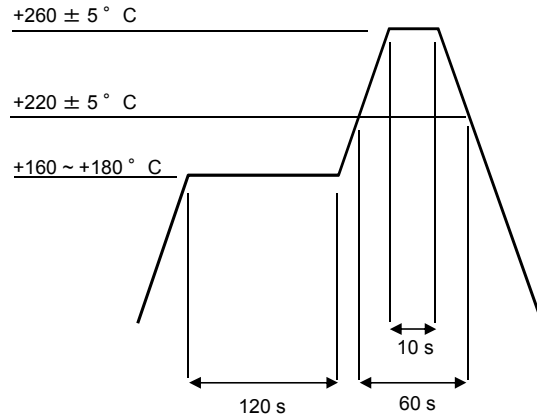
From lot size packingsize shall be changed.

In the upper and lower part and the opening in box it shall be protected products using aircushion sheets.

|  |   |        |                    |
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7. REFLOW CONDITIONS (REFERENCE)

During the solder reflow process, please complete within following temperature, period.  
 Reflow soldering shall be allowed only 3 times.

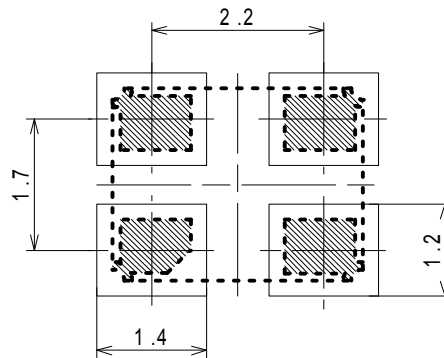


Total time : 240 s max.

Figure-7

HANDSOLDERING METHOD :  $+350 \pm 10^{\circ}\text{C}$  , 3+1/-0s Each terminal once  
 (Please take care so that a soldering iron should not touch a product directly.)

8. LAND PATTERN (REFERENCE)



Unit : mm

Figure-8

|  |   |        |                    |
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9. MECHANICAL ENDURANCE

(1) SHOCK (ACCELERATION)

After the following test, parts shall conform specification 11.C  
 1000m/s<sup>2</sup> by 6ms X,Y,Z each axis (6 directions) , 3cycles

(2) SHOCK (MOUNTING DROP)

After the following test, parts shall conform specification 11.C  
 3cycles(18times) drop from 150 cm heights to concrete.  
 Further, parts shall be soldered on substrate, fixed Aluminum materials(about 100g).  
 Substrate materials : Glass Epoxy  
 1 cycle : each 1 times of 6 directions

(3) VIBRATION

After the following test, parts shall conform specification 11.C  
 and no abnormal appearance shall be observed.  
 Frequency of Vibration : 10 ~ 500 ~ 10 Hz  
 Amplitude(p-p) : Sine waves of 1.5mm or 100m/s<sup>2</sup>  
 Cycle : 11min  
 Vibration axis : X.Y.Z  
 Vibration period : 2 h for each axis

(4) SEAL

Less than 2.0×10<sup>-9</sup> Pa m<sup>3</sup>/s by Helium leak detector.  
 Also, no serial bubble is observed by Fluorocarbon tests.

(5) SOLDERABILITY

After the following test, more than 95% of terminal shall be covered by new solder.  
 3 ± 0.5 s dip in +245 ± 5 °C solder.  
 (Solder composition : Sn-3Ag-0.5Cu) (Use rosin type flux for solder.)

(6) RESISTANCE TO SOLDERING HEAT (REFLOW)

48 h past at room temperature from following test, parts shall conform specification 11.C  
 perform the attached Reflow conditions to reference.

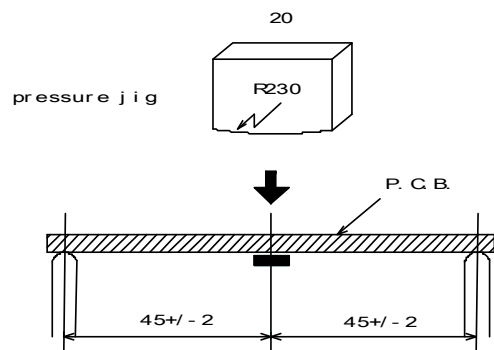
(7) RESISTANCE TO SOLDERING HEAT (HAND SOLDERING METHOD)

48 h past at room temperature from following test, parts shall conform specification 11.C  
 +350 ± 10°C , 3+1/-0s Each terminal once.

(8) SUBSTRATE BENDING

After the following test, parts shall conform specification 11.C  
 and no abnormality shall be observed in external appearance and sealing  
 tightness and others shall be based on ET-7403 of EIAJ.  
 Mount the specimen on substrate.  
 Apply the following pressure

Direction : see right figure  
 Speed : about 1.0 mm/s  
 Hours : 5 ± 1 s  
 Amount of substrate : 3 mm max.



|  |   |        |                |
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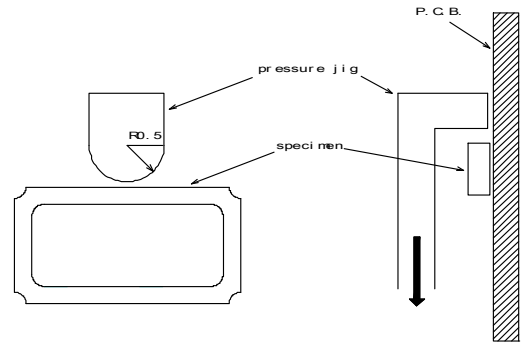
(9) SHEAR

After the following test, parts shall conform specification 11.C and no abnormality shall be observed in external appearance and sealing tightness and others shall be based on ET-7403 of EIAJ.

Mount the specimen on substrate.

Apply the following pressure

- Weight : 10 N
- Hours : 10 ± 1 s
- Direction : see right figure



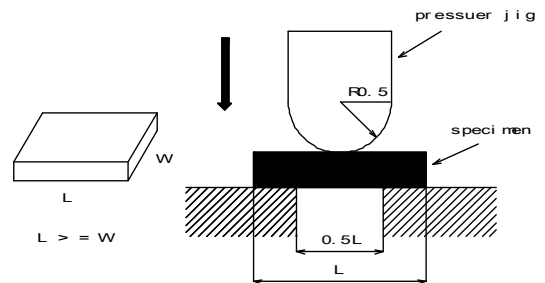
(10) BODY STRENGTH

After the following test, parts shall conform specification 11.C and no abnormality shall be observed in external appearance and sealing tightness and others shall be based on ET-7403 of EIAJ.

Mount the specimen on substrate.

Apply the following pressure

- Pressure jig : R0.5
- Weight : 10N
- Hours : 10 ± 1 s
- Direction : see right figure



|  |   |        |                    |
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10. ENVIRONMENTAL ENDURANCE

(1) LOW TEMPERATURE

2 h past at room temperature after following test, parts shall conform specification 11.C  
 240 h ,  $-40 \pm 3$  °C.

(2) HUMIDITY

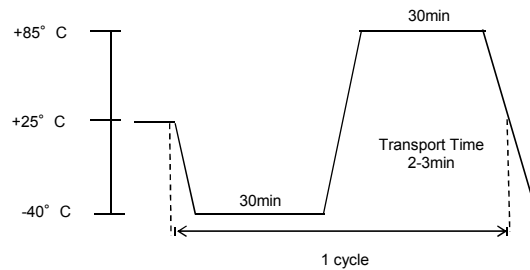
2 h past at room temperature after following test, parts shall conform specification 11.C  
 240 h ,  $+85 \pm 2$  °C , relative humidity  $85 \pm 5\%$ .

(3) HIGH TEMPERATURE

2 h past at room temperature after following test, parts shall conform specification 11.C  
 240 h ,  $+85 \pm 2$  °C.

(4) TEMPERATURE CYCLE

2 h past at room temperature after 25 cycles of following test, parts shall conform specification 11.C



11. SPECIFICATION

Frequency Variation and Equivalent Resistance shall be within Table below after the reliability test.

| Spec. | Frequency Variation | Equivalent Resistance                                       |
|-------|---------------------|---|
| A     | $\pm 2$ ppm         | $\pm 15$ % or 2.0 $\Omega$ max. (Use larger specification)  |
| B     | $\pm 5$ ppm         | $\pm 15$ % or 2.0 $\Omega$ max. (Use larger specification)  |
| C     | $\pm 5$ ppm         | $\pm 20$ % or 3.0 $\Omega$ max. (Use larger specification)  |
| D     | $\pm 10$ ppm        | $\pm 20$ % or 3.0 $\Omega$ max. (Use larger specification)  |
| E     | $\pm 20$ ppm        | $\pm 25$ % or 10.0 $\Omega$ max. (Use larger specification) |

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## 12. DSX321G TYPE QUARTZ CRYSTAL HANDLING INSTRUCTIONS

## (1) SOLDERING

Please perform the attached Reflow conditions to reference within 3 times.

## (2) MOUNT

Crystal products are designed to be compatible with automatic mounting.

Be sure to have a mounting test in advance by using the actual mounting machine and check that the characteristics of the products are not damaged by the automatic mounting.

In the process where the board is warped, such as board separation process, be careful that the warping does not influence the characteristics and soldering of crystal products.

Since mounting by Ultrasonic welding and processing have a possibility of an excessive vibration spreading inside a crystal resonator and becoming the cause of characteristic deterioration and not oscillating, it does not recommend.

Underfilling Material for DSX321G Types, KDS considers underfilling material such as heat-cured resin would not affect the characteristics of the DSX321G crystal mounted, however, we recommend the crystal be tested and checked in such a case prior to use so that there are the possibility that the crystal may have a cap off or a crack in the ceramic base.

## (3) WASHING

About use of the washing liquid of a basin system, an alcoholic system, and a chlorofluorocarbon-replacing material system, it is checking that it is satisfactory.

However please consult in advance about other washing liquid.

Although the check about ultrasonic washing is performed,

since it is an examination with a simple substance,

the check for the second time by the use state is recommended.

## (4) THE CAUTIONS ON USE

The piece of crystal it is processed very smaller than the conventional thing inside DSX321G series crystal unit may be damaged,

if excessive excitation electric power is applied.

Please use it below with the value specified on a catalog and specifications.

Please refrain from forming patterns between crystal land pattern's since there is a possibility to cause crack in base.

If the temperature is higher than +280 °C, there is a possibility for the sealing glass to remelt.

Avoid using the product at temperature higher than specified.

## (5) HANDLING OF A PRODUCT

DSX321G series has sufficient intensity to fall and vibration.

However when too much shock is added according to a certain cause, the use after a characteristic check is recommended.

## (6) STORAGE

Since the soldering nature of a terminal may be degraded,

please avoid storage in high temperature and a humid place.

Please keep it in the place which direct rays do not hit

and dew condensation does not generate.

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