Crystal Bridge to the Future

RoHS Compliant
Directive 2011/65/EU
Directive (EU) 2015/863

# REFERENCE SPECIFICATION

Customer: DAPU Telecom Technology Co., Ltd

| | |
|---|---|
| Item: | CRYSTAL UNIT |
| Type: | NX2012SA |
| Nominal Frequency: | 32.768kHz |
| Customer's Spec. No.: | --- |
| NDK Spec. No.: | STD-MUB-1 |

For your reference we submit this specification.
Please study and keep in your related document file.

| Revision Record | | | | | | |
|---|---|---|---|---|---|---|
| Rev. | Date | Items | Contents | Approved | Checked | Drawn |
| ----- | 17.Sep.2020 | | --- | S.Kawanishi | H.Iwai | Y.Saito |
| | | | | | | |

1. Customer's Spec. No. : ---

2. NDK Spec. No. : ---

3. Type : NX2012SA

4. Electrical Specifications

| | Parameters | SYM | Electrical Spec. | | | | Notes |
|---|---|---|---|---|---|---|---|
| | | | min | typ | max | Units | |
| 4.1 | Nominal Frequency | $F_{nom}$ | 32.768 | | | kHz | --- |
| 4.2 | Oscillation Mode | - | Fundamental | | | - | --- |
| 4.3 | Load Capacitance | CL | 12.5 | | | pF | Network Analyzer(CNA-LF made in Transat corp.) |
| 4.4 | Frequency Tolerance | - | +/-20 | | | ppm | at +25 +/-3°C ,Not include aging |
| 4.5 | Turning Point | - | +25 +/-5 | | | °C | --- |
| 4.6 | Temperature coefficient | - | - | - | -0.04 | ppm/ $°C^2$ | --- |
| 4.7 | Operating Temperature range | - | -40 | ~ | +85 | °C | --- |
| 4.8 | Aging | - | +/-3 | | | ppm | $1^{st}$ year (at +25°C) |
| 4.9 | Drive level | DL | - | 0.1 | 0.5 | uW | --- |
| 4.10 | Equivalent Resistance | $R_r$ | - | - | 80 | kΩ | Network Analyzer(CNA-LF made in Transat corp.) / Series |
| 4.11 | Shunt Capacitance | $C_0$ | 1.0 | 1.3 | 1.6 | pF | Network Analyzer(CNA-LF made in Transat corp.) / Series |
| 4.12 | Insulation Resistance | - | 500 | - | - | MΩ | Terminal to terminal insulation resistance must be 500MΩ (Min.) when DC100V ±15V is applied. |
| 4.13 | Storage Temperature range | - | -40 | ~ | +85 | °C | --- |
| 4.14 | Motional Capacitance | $C_1$ | 4.0 | 5.0 | 6.0 | fF | Network Analyzer(CNA-LF made in Transat corp.) / Series |

5. Examination results document

Since a performance is guaranteed, an examination results document does not submit.

6. Application drawing

6.1 Dimension drawing : EXD14B-00387
6.2 Taping and reel figure : EXK17B-00273
6.3 Holder marking : EXH11B-00366
6.4 Reliability assurance Item : EXS30B-00845

7. Notes

Order items are manufactured according to specification. As to conditions, which are not indicated in the specification and unpredictable such as applied condition and oscillation margin, please check them beforehand.

8. Prohibited items

Be sure to use the product under the following conditions. Otherwise, the characteristics deterioration or destruction of the product may result.

(1) Reflow soldering heat resistance

Peak temperature: 265°C, 10 sec

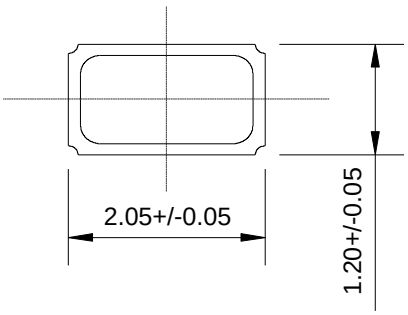
Heating: 230°C or higher, 30 sec

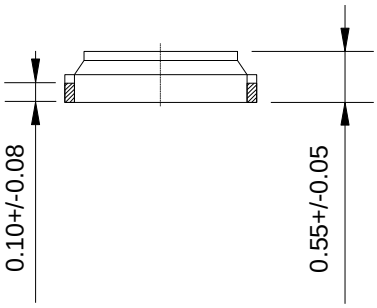
Preheating: 150°C to 180°C, 120 sec

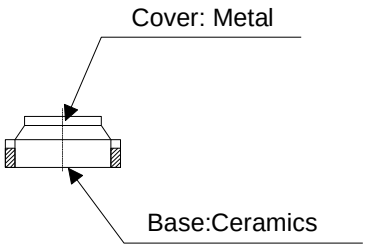
Reflow passage times: twice

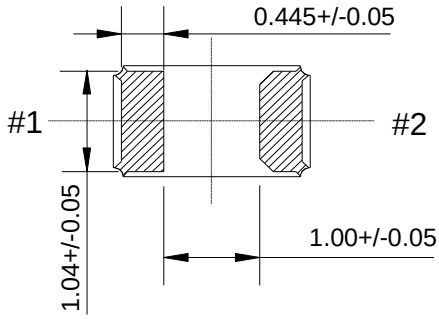
(2) Manual soldering heat resistance

Pressing a soldering iron of 400°C on the terminal electrode for four seconds (twice).

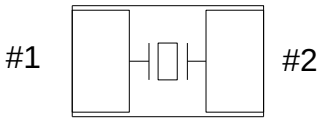


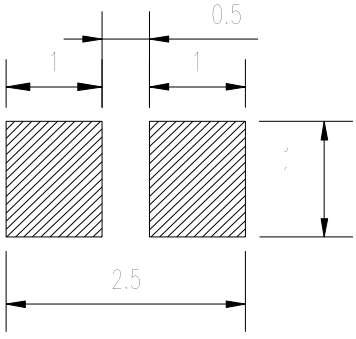




INTERNAL CONNECTION
(TOP VIEW)




Recommended soldering pattern




| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| F | 18.Jan.2018 | Y.Hasuike | S.Sunaba | Added to type. |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 17.July.2007 | S.Kawanishi | Unit:mm | +/-0.2 | --- |
| Designed | 17.July.2007 | S.Kawanishi | Title | Drawing No. | Rev. |
| Checked | 17.July.2007 | M.Yoshimatsu | **NX2012SA/NX2012SE External Dimension Drawing** | **EXD14B-00387** | **F** |
| Approved | 17.July.2007 | K.Ono | | | |

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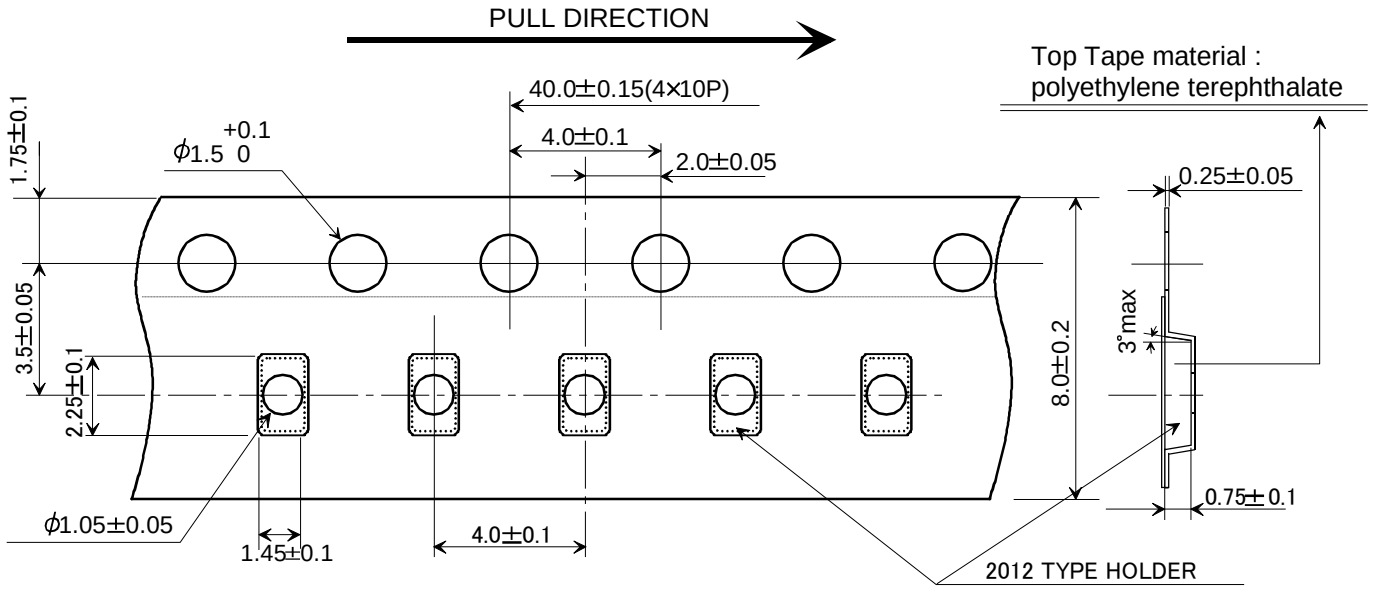
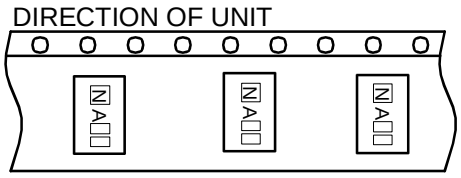
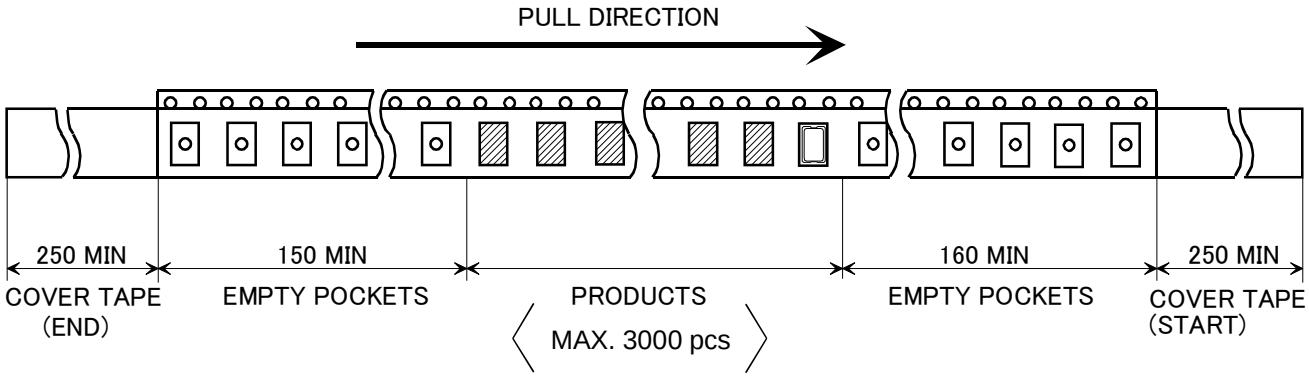



TAPING material: Conductive PS




| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| C | 3 Aug.2012 | Y.Hasuike | H.matsudo | Added of quantity |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 31.Jul.2007 | K.Oguri | Dimension:mm | | / |
| Designed | 31.Jul.2007 | S. Kawanishi | Title | Drawing No. | Rev. |
| Checked | ---------- | ---------- | **2012 TYPE Taping and Reel Spec.** | **EXK17B-00273 1/2** | C |
| Approved | 31.Jul.2007 | K. Ono | | | |

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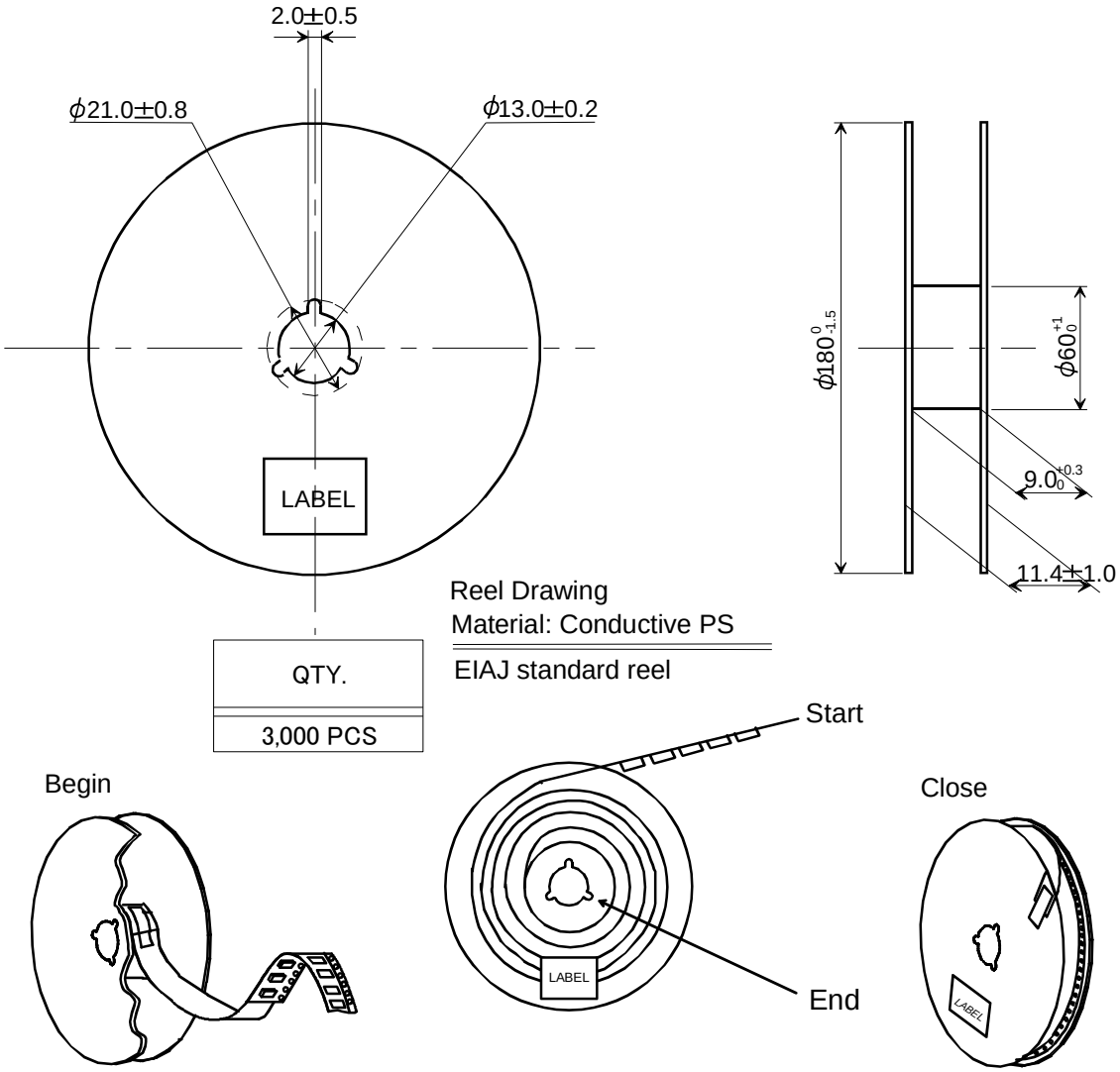
Form M-1

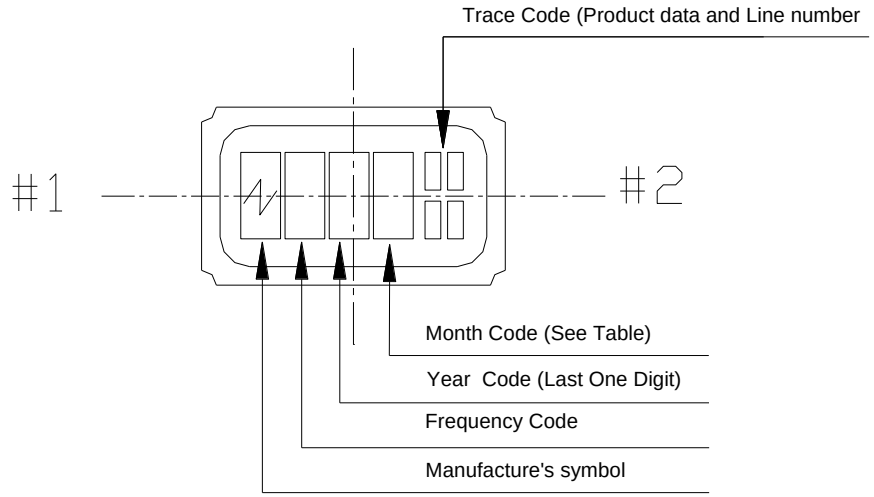


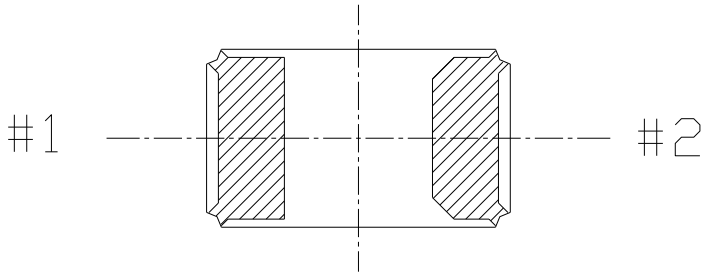

| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| C | 3 Aug.2012 | Y.Hasuike | H.matsudo | Added of quantity |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 31.Jul.2007 | K.Oguri | Dimension:mm | | / |
| Designed | 31.Jul.2007 | S. Kawanishi | Title | Drawing No. | Rev. |
| Checked | ---------- | ---------- | **2012 TYPE Taping and Reel Spec.** | **EXK17B-00273 2/2** | C |
| Approved | 31.Jul.2007 | K. Ono | | | |

**NIHON DEMPA KOGYO CO., LTD.**

Form M-1




NOTE

1. Month Code

| Month | 1 Jan. | 2 Feb. | 3 Mar. | 4 Apr. | 5 May | 6 June | 7 July | 8 Aug. | 9 Sep. | 10 Oct. | 11 Nov. | 12 Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | X | Y | Z |

2. Frequency Code

A : 32.768kHz

3. Marking Method

Marking Method is Laser Trimming.

| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| B | 9.June.2010 | S.Kawanishi | M.Umeki | To change the direction of crystal unit |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 20.July.2007 | S.Kawanishi | Dimension:mm | | / |
| Designed | 20.July.2007 | S.Kawanishi | Title | Drawing No. | Rev. |
| Checked | 20.July.2007 | M.Yoshimatsu | **NX2012SA Marking Drawing** | **EXH11B-00366** | B |
| Approved | 20.July.2007 | K.Ono | | | |

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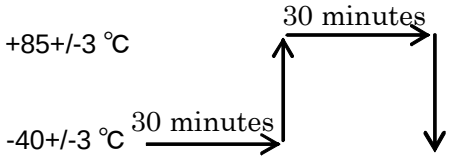
# Reliability assurance item

(page: 1/2)

| No. | Test Item | Test Methods | Specification Code |
|---|---|---|---|
| 1 | HEAT RESISTANCE | at +85 °C for 1000 hours. | a |
| 2 | COLD RESISTANCE | at –40 °C for 1000 hours. | a |
| 3 | HUMIDITY | at +85 °C with 80 to 85 % RH for 1000 hours. | a |
| 4 | THERMAL SHOCK | Temperature cycle as shown in (Fig.1) for 1000 cycle.<br>  <br><br>ONE CYCLE (Fig.1) | a |
| 5 | VIBRATION | Frequency Range: 10 to 2000Hz<br>Amplitude or Acceleration: 1.52 mm or 20 G.<br>1 cycle: 20 minutes.<br>Test time: Three mutually perpendicular axes each 12 times. | a |
| 6 | SHOCK 1 | Shock: 3000 G 0.3 msec.<br>Test time: Six mutually perpendicular axes each 1 time. | a |
| 7 | SHOCK 2 | Shock: Device are put on the weight of 140 g and dropped on concrete board.<br>Height: 1.5 m<br>Drop times: Three mutually perpendicular axes each 10 times. | b |
| 8 | SOLDERABILITY | Residual heat temperature: 150 °C<br>Residual heat time: 60 to 120 sec.<br>Peak temperature: 240°C (more than 215 °C 10 to 30 sec). | c |
| 9 | REFLOW RESISTANCE | Temperature cycle as shown in (Fig2.) for 3 cycle. | a |

| Specification code | Specification |
|---|---|
| a | dF/F ≤ +/- 10ppm<br>dCI ≤ +/- 20 kohm |
| b | dF/F ≤ +/- 20ppm<br>dCI ≤ +/- 20 kohm |
| c | The electrodes shall acquire a new solder coat over at least 90 % of immersed area. |

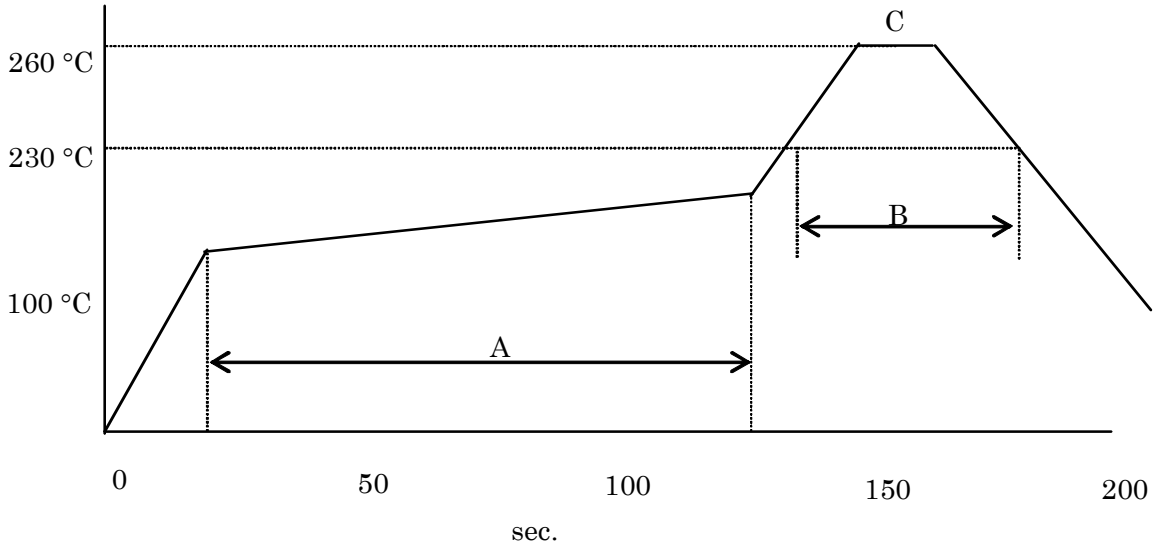



Fig.2 REFLOW

A: 150 to 180 °C ( 60 to 120 sec. )

B: 230 °C min. ( 30 sec. max. )

C: PEAK-TEMP. 260 °C +/- 5 °C ( 10sec. max. )