Crystal Bridge to the Future

RoHS Compliant
Directive 2011/65/EU

# SPECIFICATION

Customer: ELTEX

| | |
|---|---|
| Item | Simple Packaged Crystal Oscillator (SPXO) |
| Type | 7311S-DG-255R |
| Nominal Frequency | 133.33 MHz |
| Customer's Spec. No. | ------ |
| NDK Spec. No. | END5037A |

Receipt

| Revision Record | | | | | | |
|---|---|---|---|---|---|---|
| Rev. | Date | Items | Contents | Approved | Checked | Drawn |
| ----- | 5.Oct.2015 | Issue | --- | Y.Akasaka | --- | T.Wada |
| | | | | | | |

NIHON DEMPA KOGYO CO., LTD.

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

2. NDK Spec. No. : END5037A

3. Type : 7311S-DG-255R

4. Absolute Maximum Ratings

| | Item | Ratings | | | Notes |
|---|---|---|---|---|---|
| | | min | Max | Units | |
| 1 | Supply Voltage | -0.3 | +4.0 | V | |
| 2 | Storage Temp. Range | -55 | +125 | °C | |

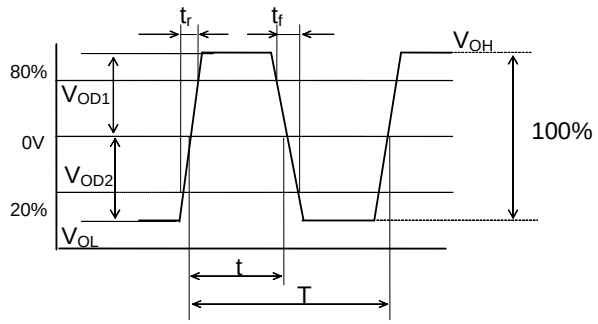
5. Electrical Specifications

(Unless otherwise noted, TA=0 ~ +70 °C, $V_{CC}$=3.3 V, Load=100 Ω)

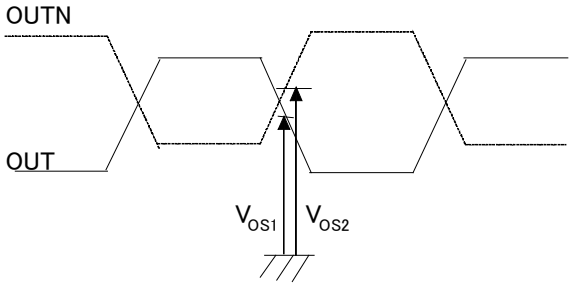
| | Parameters | SYM | Electrical Spec. | | | | Notes |
|---|---|---|---|---|---|---|---|
| | | | min | typ | max | Units | |
| 1 | Nominal Frequency | $f_{nom}$ | | 133.33 | | MHz | |
| 2 | Supply Voltage | $V_{CC}$ | 2.97 | 3.30 | 3.63 | V | |
| 3 | Current Consumption (Operating) | $I_{CC}$ | | - | 40 | mA | at 25°C |
| 4 | Current Consumption (Stand-by) | $I_{ST}$ | | | 20 | μA | at 25°C |
| 5 | Output Level | - | LVDS | | | | |
| 6 | Load Capacitance | $R_L$ | | | 100 | Ω | OUT-Complementary Out |
| 7 | Operating Temperature Range | $T_{opr}$ | 0 | | +70 | °C | |
| 8 | Overall Frequency Tolerance | $\Delta f/f_{nom}$ | -25 | | +25 | ppm | *1 |
| 9 | Offset Voltage | $V_{OS}$ | 1.125 | | 1.375 | V | |
| | | $\Delta V_{OS}$ | | | 50 | mV | |
| 10 | Differential Output Voltage | $V_{OD}$ | 0.247 | | 0.454 | V | |
| | | $\Delta V_{OD}$ | | | 50 | mV | |
| 10 | Rise Time($t_r$), Fall Time($t_f$) | $t_r/t_f$ | | | 1 | ns | at 20% ~ 80% Waveform |
| 11 | Symmetry | SYM | 45 | | 55 | % | at 0 V |
| 12 | Start-up Time | $t_{su}$ | | | 10 | ms | |
| 13 | Output Wave Form | - | Rectangular | | | | |
| 14 | Phase Jitter | $t_{pj}$ | | | 1 | ps | *2 |
| 15 | Stand-by Function | | | | | | |
| | #1 PAD input | | | # 4, 5 PAD output | | | |
| | H level (70% $V_{CC}$ ~ $V_{CC}$) or open | | | Operating | | | |
| | L level (30% $V_{CC}$ max) | | | High impedance | | | |

*1 Inclusive of freq. tolerance (at 25 °C), frequency/temperature characteristics and, frequency/voltage coefficient.

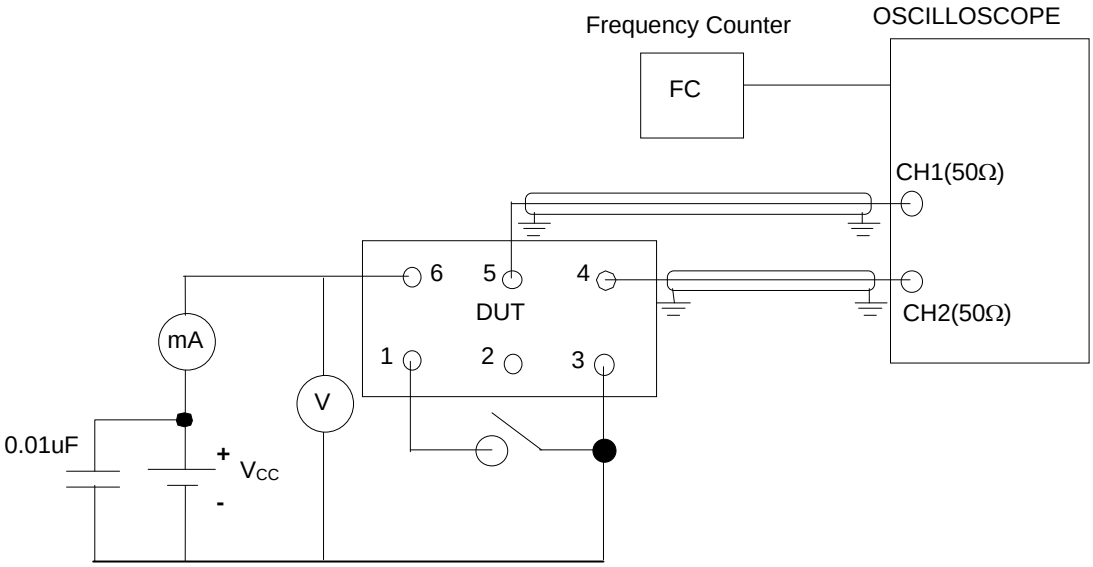
*2 Measured by Agilent E5052A. Offset frequency 12 kHz ~ 20 MHz, at 25 °C




Symmetry = t/T×100%




6. Measuring circuits




7. Test data will not be submitted

8. Application drawing
   8.1 Dimension drawing
   EKD14B-00016
   8.2 Marking drawing
   EKH11B-00048
   8.3 Reliability assurance item
   EKS30B-00045
   8.4 Taping & Reel drawing
   EKK17B-00120

9. Instruction Notice
   9.1 Noise
   When the 7311S series are used, the 0.01μF capacitor should be connected between $V_{CC}$ and GND line. (Closer to the product terminal is desirable.)
   9.2 Resistance to dropping
   The 7311S series is designed to be impactproof so that no damage occurs. However, if dropped from a desk etc., it is advisable to check their performance or contact us to check it.
   9.3 Electrostatic protection
   The 7311S series employ C-MOS ICs for the active element. Please use them in static-free environments.

9.4 Cleaning

Basically, the 7311S series are applicable for ultrasonic wave cleaning. However, in some case, during ultrasonic wave cleanings, internal design may get damage. Please check condition carefully beforehand.

9.5 Other

The 7311S series are C-MOS applied products. And careful handling(same as with C-MOS IC) are needed to avoid electrostatic problems.

Incorrect PAD connection is cause of trouble. Please make sure to connect correctly as below.

#3 terminal → GND

#6 terminal → $V_{CC}$

10. Notice

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

10.2 Unless we receive request for modification within 3 weeks from the issue date of this NDK specification sheet, we will supply products according to this specification. Also, if you'd like to modify specification of order, which has been placed with delivery request within 3 weeks from the issue data of this specification sheet, we would like to discuss with you separately.

10.3 In no event shall the company be liable for any product failure resulting from an inappropriate handling or operation of the product beyond the scope of its guarantee.

10.4 Where any change to the process condition is made due to the change(s) in the production line, inform personnel of the specifications.

10.5 Should this specification data give rise to any disputes relating to any intellectual property rights or any other rights of a third person, the company shall not indemnify anyone for any damage. Their disclosure must not be construed as the grant of a license to use any of the intellectual property rights owned by the company.

10.6 If you intend to use products listed on this specification for applications that may result in loss of life or assets (controls relating to safety, medical equipment, aeronautical equipment, space equipment, etc.), please do not fail to advise us of your intention beforehand.

10.7 In the company's production process whatever amount of ozone depleting substances (ODS) as specified in the Montreal protocol is not used.

10.8 Information contained in this specification must not be quoted, reproduced or used for other purposes including processing either in part or in full without obtaining prior approval from the company.

10.9 The appearance color and so on have a different case by purchasing it more than 2 suppliers of the component, but characteristic and reliability are guaranteed.

10.10 In case of the product long time keep at high temperature and humidity, may affect product characteristic (solder ability) and a packing condition.

Please keep at storage condition of temperature +5 °C ~+35 °C, humidity ~85 %RH.

11. 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, 40 sec

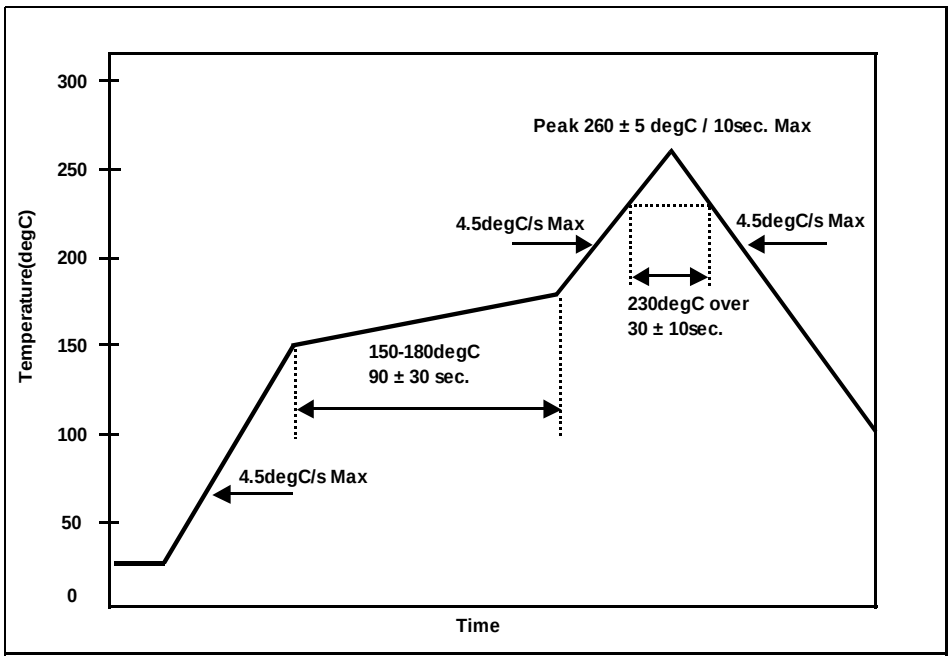
Preheating: 150°C to 180°C, 120 sec

Reflow passage times: 3 times

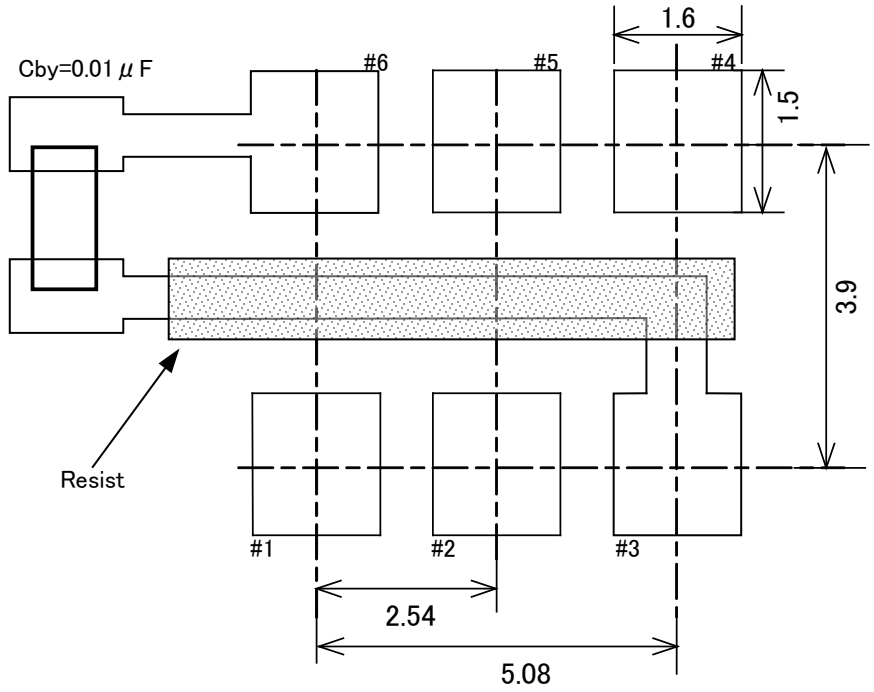
(2) Manual soldering heat resistance

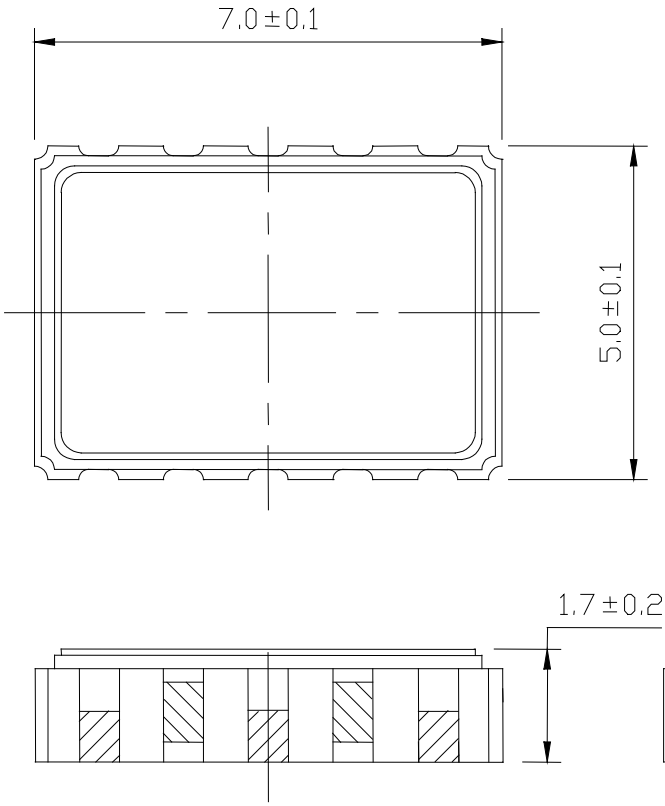
Pressing a soldering iron of 410°C on the terminal electrode for 4 seconds (twice).

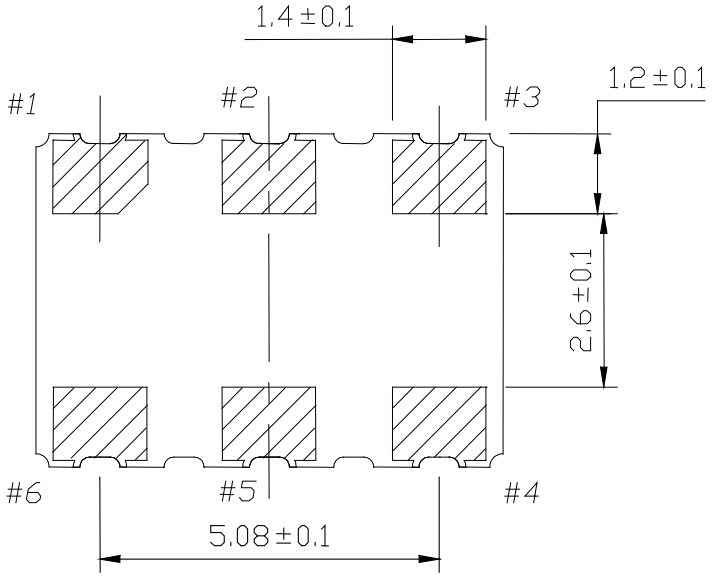
Example For Soldering Conditions (The below graph corresponds to Pb free solder)




Recommended Footprint [mm]






Terminal land connections

| | |
|---|---|
| #1 | ST |
| #2 | NC |
| #3 | GND |
| #4 | OUTPUT |
| #5 | $\overline{\text{OUTPUT}}$ |
| #6 | VCC |

| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| D | 16.May.2013 | A.Kanamaru | C.Ishimaru | Hatching added. |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 5.Agu.2002 | H.Yan | Dimension:mm | ------- | ------- |
| Designed | 5.Agu.2002 | H.Yan | Title: **7311S Dimension of External** | Drawing No.: **EKD14B-00016** | Rev.: D |
| Checked | --------- | ------- | | | |
| Approved | 5.Agu.2002 | H.Omata | | | |

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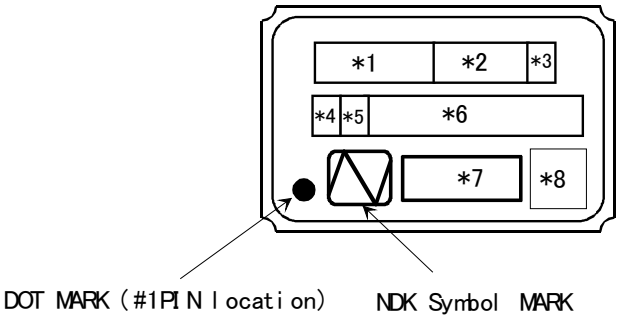


*1 to *5 Model Code

*6 Frequency Code( Nominal frequency)

*7 Week Code

*8 Trace Code

*1 to *5 are the Model Mark.

*1: serias No.(5 digits),*2:Stability code(3 digits),*3:Temperature range code(1digit)

*4: Supply voltage code(1digit),*5: output type code(1digit). Others are omitted.

Example.)

Model: 7311S – GF - 505X (*1 *4 *5 *2 *3)

Marking contens → 7 3 1 1 S 5 0 5 X / G F

*6. FREQUENCY

Digits are eight and 9TH digit & The last zero after decimal point will be omitted.

Unit(MHz) is not marked.

Example. )

156.20500MHz → 156.205[Unit sign not marked]

*7. WEEK CODE(4 Digits)

Example.)

In case of 1ST week of 2006

06 0 1

Week No. (Digit are two)

Lower tow digit of year

*8. Trace code

Trace code consists of four digits number or letter.

This code indicates production date and production line number.

| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| A | | | | |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | 19.Jan.2006 | H.Yan | Unit/mm | ------- | ------- |
| Designed | 19.Jan.2006 | H.Yan | Title: 7311S Marking | Drawing No.: **EKH11B-00048** | Rev. |
| Checked | ---------- | ---------- | | | |
| Approved | 19.Jan.2006 | H.Omata | | | |

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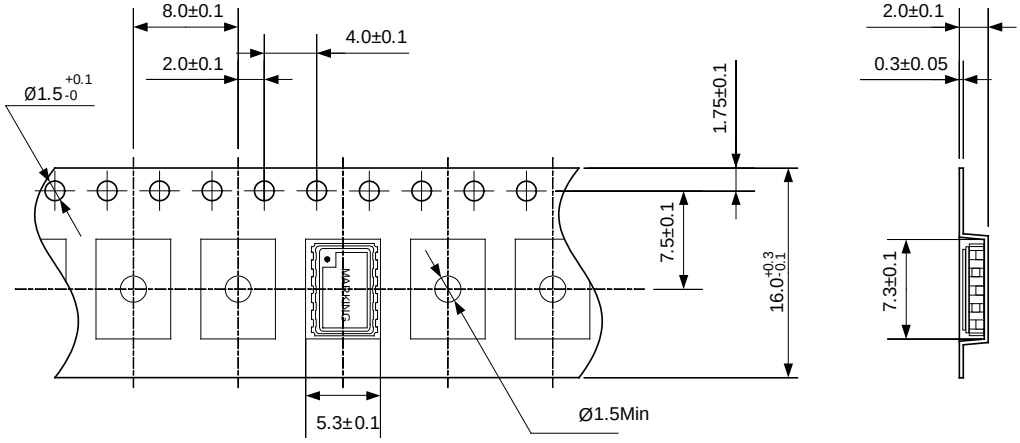
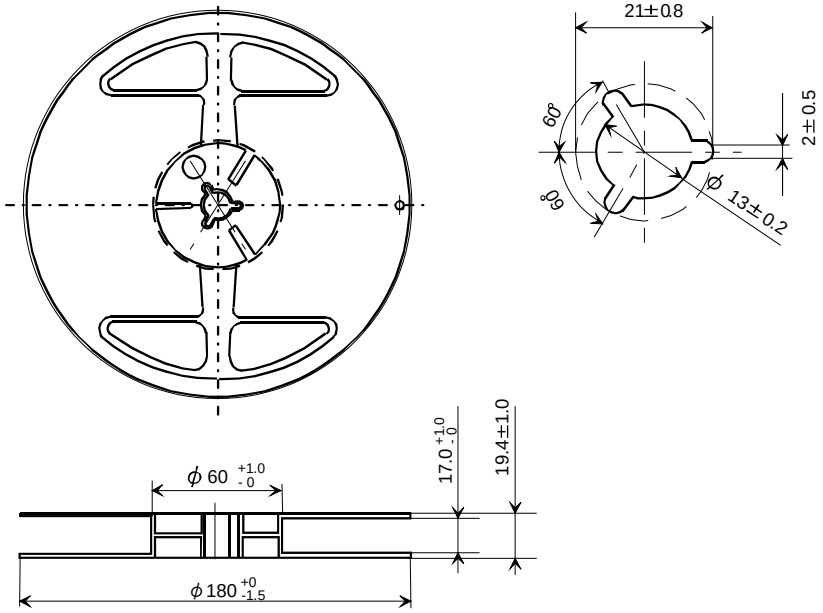
| Environmental Test Conditions | Specification |
|---|---|
| 1.Thermal Shock Test<br>1 cycle: -40°C (30 minutes) ~ +85°C(30 minutes)<br>Number of cycle: 100 cycle. | ∗1 |
| 2.High Temperature High Humidity Test<br>Temperature : +60°C, Humidity : 90 ~ 95%,<br>Time : 1000 hours. | ∗1 |
| 3.+85°C Aging (Non Operating)<br>Temperature : +85°C, Time : 1000 Hours. | ∗2 |
| 4.Vibration Test<br>10 ~ 55Hz, 1.52mmp-p,<br>1 minutes/cycle, XYZ 3 directions 2 Hours each. | ∗1 |
| 5.Shock Test<br>Test condition : Half sine pulse<br>981m/s$^2$, 6ms, 3 directions: ±x, ±y, ±z, 3 times each.<br>(18times total) | ∗1 |
| 6.Free Drop Test<br>Fall height :75cm, 3 drop onto hard wooden board. | ∗1 |
| 7.Soldering Test<br>Residual heat : 140~160°C, 60~120 sec, Peak 240°C,<br>30 ±1 second after reaching 215 °C . | More than 90% of should be covered by solder. |
| 8.Soldering Resistance<br>Residual heat : 150~180°C, 60~120 sec,<br>Peak 260± 5°C For 10sec max (230°C min 20~40 sec),<br>3 times. | ∗1 |

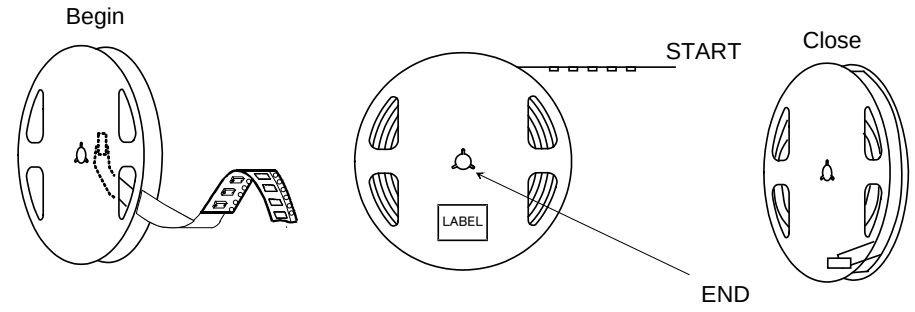
∗1 After a test, the electrical specifications are satisfied.
Also frequency deviation before and after test should be
$\Delta F/F \leqq \pm 5 \times 10^{-6}$

∗2 After a test, the electrical specifications are satisfied.
Also frequency deviation before and after test should be
$\Delta F/F \leqq \pm 10 \times 10^{-6}$

The electrical specifications are $I_{CC}$, Tr/Tf, $V_{OL}/V_{OH}$, duty cycle, stand-by function, stand-by current consumption.




1000pcs Max/Reel

| | Embossed carrier tape | Top cover tape | Reel |
|---|---|---|---|
| Materials | PS | PET + PE+ Adhesive layer | PS |
| Disposition | Antistatic | Antistatic | Antistatic |

| | Date of Revise | Charge | Approved | Reason |
|---|---|---|---|---|
| A | Apr.25.2012 | Y.Oishi | C.Ishimaru | Carrier tape pocket depth: 1.9mm→2.0mm |

| | Date | Name | Third Angle Projection | Tolerance | Scale |
|---|---|---|---|---|---|
| Drawn | Dec.7.2011 | Y.Oishi | Unit:mm | --- | --- |
| Designed | Dec.7.2011 | Y.Oishi | Title | Drawing No. | Rev. |
| Checked | Dec.7.2011 | S.Murase | **Taping and Reel Spec.** | **EKK17B-00120** | **A** |
| Approved | Dec.7.2011 | C.Ishimaru | | | |

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