

## SPECIFICATION FOR APPROVAL

CUSTOMER : \_\_\_\_\_

PRODUCT TYPE : SMD SEAM SEALING X'TAL 5.0\*3.2

NOMINAL FREQ. : 24.000000MHz

STARWAVE P/N : X503242402020A

REVISION : A1

CUSTOMER P/N : \_\_\_\_\_

PM / SALES : \_\_\_\_\_

DATE : \_\_\_\_\_

CUSTOMER SIGNATURE & Date

\_\_\_\_\_

\_\_\_\_\_

- (1) STAR requires one copy returned with signature and title of authorized individual that signifies acceptance of the attached specifications.
- (2) Orders received and accepted by STAR after return of signed copy of specification will be produced per these specifications.
- (3) Any changes to these specifications must be agreed upon by both parties and new revision of the Product Specification Sheet will be issued.
- (4) Any issuance of purchase order prior to consigning back the Approval page of "Specification Sheets" from customers will be regarded as the agreement on the contents of these specifications.

**RoHS Compliant**

## PRODUCT SPECIFICATION SHEET

PRODUCT TYPE : SMD SEAM SEALING X'TAL 5.0\*3.2

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NOMINAL FREQ. : 24.000000MHz



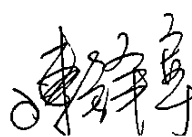
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STARWAVE P/N : X503242402020A

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REVISION : A1

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| PE/RD   | QA  | MFG  |
|---|---|--|
|  |  |  |
| 27-Aug-20   | 27-Aug-20   | 27-Aug-20  |

NOTE:

- (1)Lead Free Products are "Directive 2002/95/EC of The European Parliament of 27 January 2003 on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment" Compliant (Attachment: SGS Test Report).
- (2)Revision "Sx" is for engineering samples only. PE/RD's approval required.
- (3)Revision "Ax" is production ready. PE, QA and MFG's approval required.

**RoHS Compliant**



## ■ ELECTRICAL SPECIFICATIONS

### Standard atmospheric conditions

Unless otherwise specified, the standard range of atmospheric conditions for making measurement and tests are as follow:

Ambient temperature : 25±5℃  
 Relative humidity : 40%~70%

If there is any doubt about the results, measurement shall be made within the following limits:

Ambient temperature : 25±3℃  
 Relative humidity : 40%~70%

### Measure equipment

Electrical characteristics measured by HP E5100A or equivalent.

### Crystal cutting type

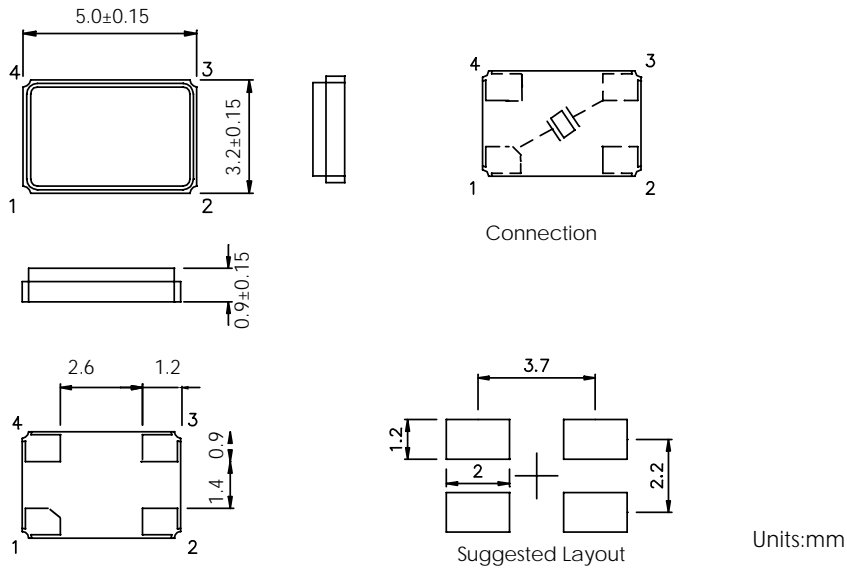
The crystal is using AT CUT (thickness shear mode).

### Unit Weight:

0.018±0.001 g/pcs

|    | Parameters                | SYM. | Electrical Spec. |      |     |        | Notes                                       |
|----|---------------------------|------|------------------|------|-----|--------|---|
|    |                           |      | MIN              | TYPE | MAX | UNITS  |   |
| 1  | Nominal Frequency         | FL   | 24.000000        |      |     | MHz    | -   |
| 2  | Oscillation Mode          | -    | Fundamental      |      |     | -      | -   |
| 3  | Load Capacitance          | CL   | 20               |      |     | pF     | -   |
| 4  | Frequency Tolerance       | -    | ±20              |      |     | ppm    | shift to -5ppm at 25 °C ± 3 °C              |
| 5  | Frequency Tolerance       | -    | ±30              |      |     | ppm    | Over Operating Temp. Range (Reference 25°C) |
| 6  | Operating Temperature     | -    | -40              | ~    | 85  | °C     | -   |
| 7  | Aging                     | -    | ±3               |      |     | ppm    | 1st Year                                    |
| 8  | Drive Level               | DL   | -                | 100  | -   | uW     | -   |
| 9  | Effective Resistance Rr   | Rr   | -                | -    | 65  | Ω      | -   |
| 10 | Shunt Capacitance C0      | C0   | -                | 1.3  | -   | pF     | -   |
| 11 | Motional Capacitance C1   | C1   | -                | 3.0  | -   | fF     | -   |
| 12 | Insulation Resistance     | -    | 500              | -    | -   | MΩ     | at DC 100V                                  |
| 13 | Storage Temperature Range | -    | -40              | ~    | 125 | °C     | -   |
| 14 | Pulling Sensitivity       | -    | 15               | ~    | 19  | ppm/pF | -   |

## ■ DIMENSIONS



## ■ MARKING

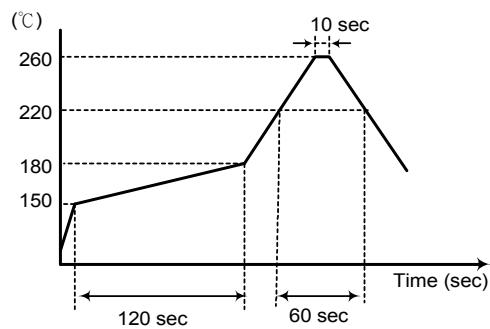


Frequency(MHz)  
ex:12.000=12.000000

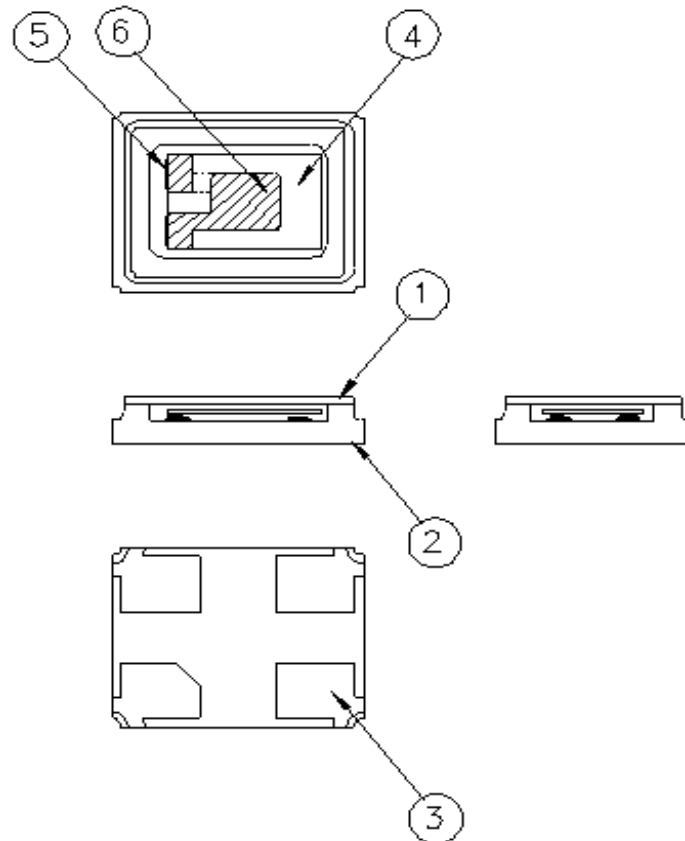
This date code will be cycled every four years

## ■ SUGGESTED REFLOW PROFILE

Total time : 200 sec. Max.  
Solder melting point :220 °C

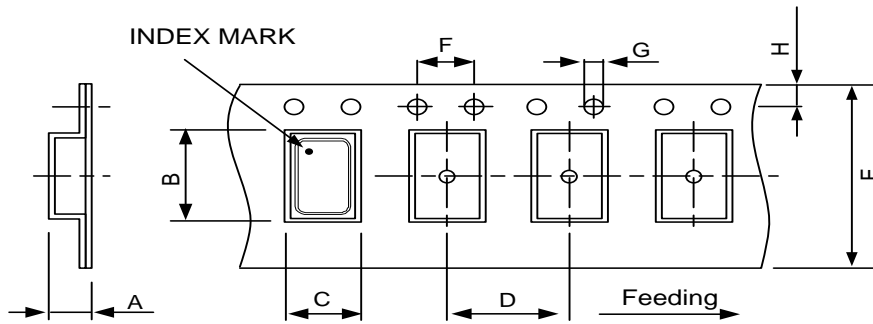


## ■ STRUCTURE ILLUSTRATION



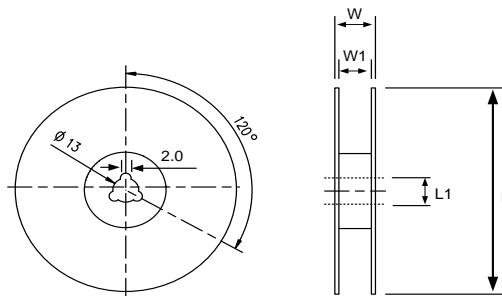
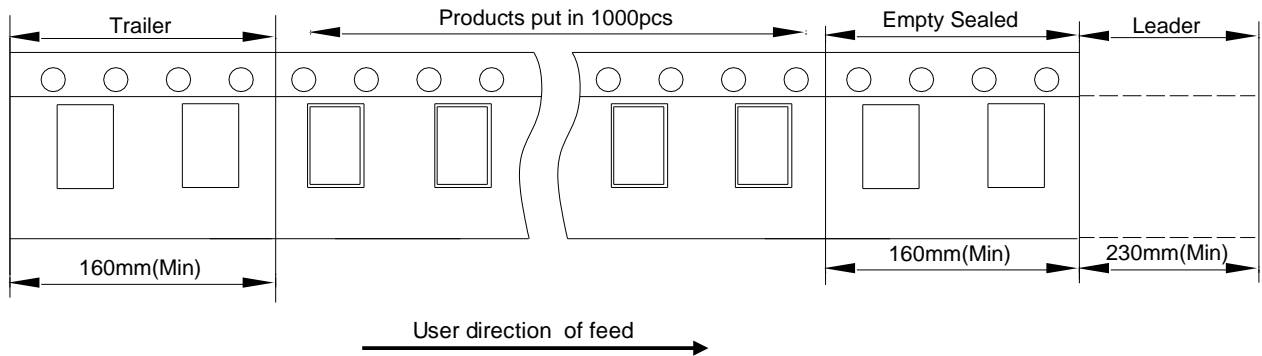
| NO | COMPONENTS          | MATERIALS   | QTY | FINISH/SPECIFICATIONS                             |
|----|---------------------|---|-----|---|
| 1  | Lid                 | Kovar (Fe/Co/Ni)  | 1   | -   |
| 2  | Base(Package)       | Ceramic (Al <sub>2</sub> O <sub>3</sub> ) + Kovar (Fe/Co/Ni)+ Ag/Cu | 1   | Color black                                       |
| 3  | PAD                 | Au  | 4   | Tungsten metalize<br>+ Ni plating<br>+ Au plating |
| 4  | Crystal blank       | SiO <sub>2</sub>  | 1   | -   |
| 5  | Conductive adhesive | Ag  | 4   | Silicon resin                                     |
| 6  | Electrode           | Au + Cr   | 2   | -   |

## EMBOSS CARRIER TAPE & REEL



| DIMENSIONS | A         | B         | C         | D         | E          | F         | G         | H         | (UNIT : mm) |
|------------|-----------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-------------|
|            | 1.65±0.10 | 5.40±0.10 | 3.50±0.10 | 8.00±0.10 | 12.00±0.30 | 4.00±0.10 | 1.55±0.10 | 1.75±0.10 |             |

### REMARK :



| DIMENSIONS | L        | L1      | W         | W1      | (UNIT : mm) |
|------------|----------|---------|-----------|---------|-------------|
|            | 180±1.00 | 13±0.50 | 16.5±0.20 | 12±0.10 |             |

## ■ RELIABILITY SPECIFICATIONS

### 1. Mechanical Endurance

| No. | Test Item        | Test Methods   | REF.DOC      |
|-----|------------------|--|--------------|
| 1.1 | Drop Test        | 150 cm height, 3 times on concrete floor.  | JIS C6701    |
| 1.2 | Mechanical Shock | Device are shocked to half sine wave ( 1000 G ) three mutually perpendicular axes each 3 times. 0.5m sec. duration time                                  | MIL-STD-202F |
| 1.3 | Vibration        | Frequency range 10 ~ 2000 Hz<br>Amplitude 1.52 mm/20G<br>Sweep time 20 minute<br>Perpendicular axes each test time 4 hours<br>(Total test time 12 hours) | MIL-STD-883E |
| 1.4 | Gross Leak       | Standard Sample For Automatic Gross Leak Detector, Test Pressure: 2Kg / cm <sup>2</sup>  | MIL-STD-883E |
| 1.5 | Fine Leak        | Helium Bombing 4.5 Kg/ cm <sup>2</sup> for 2 hr  |              |
| 1.6 | Solder ability   | Temperature 260 °C ± 5°C<br>Immersing depth 0.5 mm minimum<br>Immersion time 5 ± 1 seconds<br>Flux Rosin resin methyl alcohol solvent ( 1 : 4 )          | MIL-STD-883E |

### 2. Environmental Endurance

| No. | Test Item                    | Test Methods   | REF. DOC     |
|-----|------------------------------|--|--------------|
| 2.1 | Resistance To Soldering Heat | Pre-heat temperature 125 °C<br>Pre-heat time 60 ~ 120 sec.<br>Test temperature 260 ± 5 °C<br>Test time 10 ± 1 sec. | MIL-STD-202F |
| 2.2 | High Temp. Storage           | + 125 °C ± 3 °C for 500 ± 12 hours   | MIL-STD-883E |
| 2.3 | Low Temp. Storage            | - 40 °C ± 3 °C for 500 ± 12 hours  |              |
| 2.4 | Thermal Shock                | Total 100 cycles of the following temperature cycle<br>  | MIL-STD-883E |
| 2.5 | High Temp & Humidity         | 85°C ± 3°C, RH 85% , 500Hrs  | JIS C5023    |
| 2.6 | Pressure Cooker Storage      | 121 ± 3°C , RH100% , 2 bar , 240Hrs  | JIS C6701    |