

H.ELE.

Specifications for Approval

**CUSTOMER****PRODUCT TYPE**

Quartz Crystal HSX321SK

NOMINAL FREQUENCY

16.000000MHz

H.ELE. SAMPLE O/N

EOS-H40100-1

H.ELE. P/N

X3Z016000B91H-U

RELEASE DATE

2017/04/12

VERSION

00

MSL

Level 01

GREEN PRODUCT Pb free RoHS Compliant HF-Halogen free REACH Compliant**CUSTOMER P/N****APPLICATION & MODEL****APPROVED BY CUSTOMER****(DATE)****Harmony Electronics Corp.**

| | | |
|--------------------------------|-----------------------------|--------------------------------|
| <u>F. S. TSAI</u> (APPROVE) | <u>Y. W. LEE</u> (CHECK) | <u>U. F. CHEN</u> (PREPARE) |
|--------------------------------|-----------------------------|--------------------------------|

| | |
|--------------------|------------------|
| Country of Origin: | Taiwan Factory |
| | Thailand Factory |
| | China Factory |

HARMONY ELECTRONICS CORPRATION

KAOHSIUNG

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1. QUARZ CRYSTAL UNIT SPECIFICATION

| Items | Electrical Spec. | | | Unit | Notes |
|-------------------------------|--------------------------------|------|-----|----------|---------------|
| | Min | Type | Max | | |
| 1. Frequency (FL) | 16.000000 | | | MHz | |
| 2. Mode of oscillation: | Fundamental | | | | |
| 3. Frequency tolerance | -10 | | +10 | ppm | at 25°C±3°C |
| 4. Equivalent resistance (RR) | | | 80 | Ω | SERIES |
| 5. Storage temperature range | -40 | | +85 | °C | |
| 6. Operable temperature range | -40 | | +85 | °C | |
| 7. Temperature stability | -20 | | +20 | ppm | -40°C ~ +85°C |
| 8. Loading capacitance (CL) | | 9.0 | | pF | |
| 9. Drive level (DL) | | 10 | 100 | μW | |
| 10. Shunt Capacitance (C0) | | | 2.0 | pF | |
| 11. Insulation resistance | 500 | | | MΩ | at DC 100V |
| 12. Aging: | -3 | | +3 | ppm/Year | |
| 13. Circuit: | Measured in HP/E5100A,S&A 250B | | | | |

Note:



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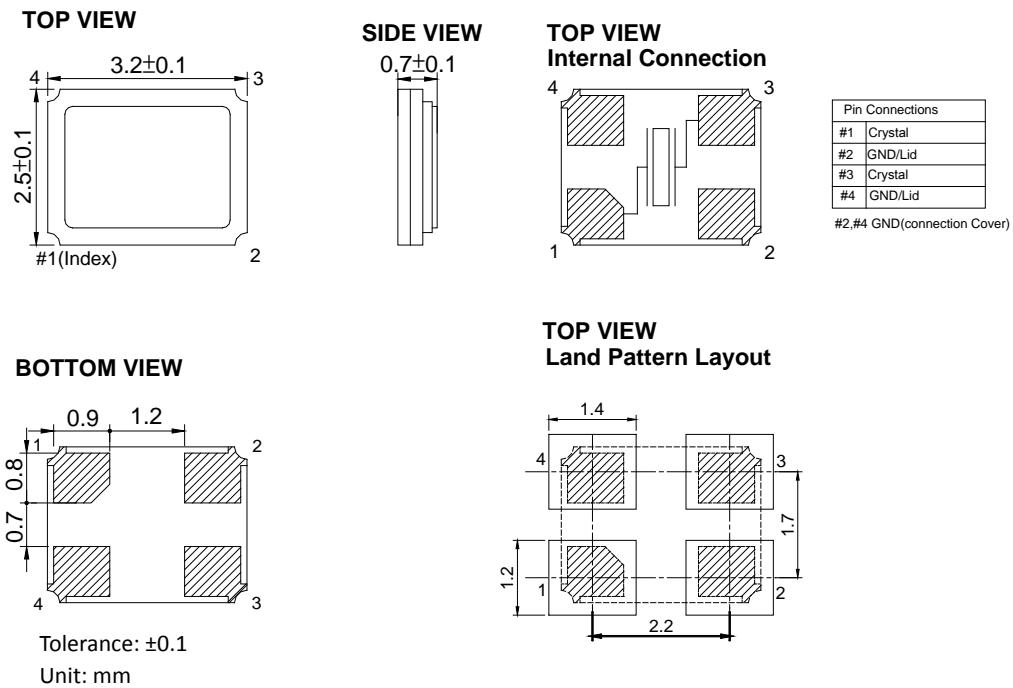
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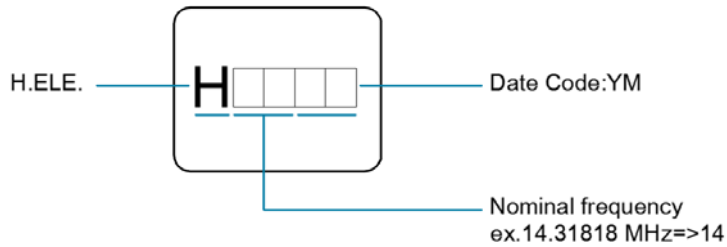


2. DIMENSION



* Note: The Index mark was defined by the BASE suppliers.

3. MARKING



Note:

1. Laser marking.
2. Date Code:

| | | | | | | | | | | |
|--------|------|------|------|------|------|------|------|------|------|------|
| Y=Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

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

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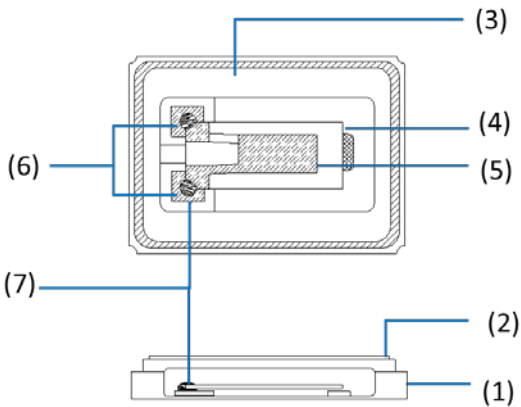
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4. INSIDE STRUCTURE



Reference drawing

| No. | Component | Material | Note |
|-----|---------------------|---------------|--|
| (1) | Base | Ceramic | Al ₂ O ₃ |
| (2) | Lid | Metal | Fe- Ni -Co Ni Plating |
| (3) | Kovar | Metal | Fe- Ni -Co |
| (4) | Crystal Blank | Quartz | SiO ₂ Rectangular At-Cut |
| (5) | Electrode | Metal | - |
| (6) | PAD | Metal | W Ni Plating Au Plating |
| (7) | Connective Adhesive | Silver Powder | Ag |

※The use prohibition chemistry substance of Table 1 of DHE-0204-1 (HE-QA-24) is not included in this item.

5. HANDDLING SUGGESTION

■ Reflow Conditions

Please stay with our proposed reflow conditions and do soldering within 2 times.

| | | | |
|-----|--------------|--------------|--------------|
| (1) | Preheat | 160~180deg.C | 120 sec. |
| (2) | Primary heat | >=220 deg.C | 60~120 sec. |
| (3) | Peak | 260 deg.C | 10 sec. Max. |

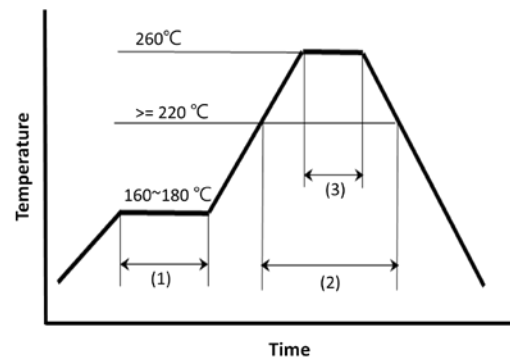
■ Manual Solder iron (Example)

Bit temp.: 350°C max., Time: 3sec max. ,
Each terminal only should be soldered once.

■ Mounting Conditions

Our products are suitable for most automated SMT processes. However, we strongly advise all our customers to conduct SMT sampling prior to mass production in order to make sure production processes will not affect the properties and specifications of our product. Seal welding and mounting procedures involving the use of ultra-sonic processes are not recommended and will affect and/or damage the internal properties of our product. Excessive shock during the mounting process will also affect the product and we strongly recommend setting SMT conditions to minimize such conditions. If a possibility of the PCB being warped exists we strongly advise to ensure the degree of warping will not affect the product. Please also ensure the operating characteristics and or soldering conditions are all within the specifications of use for our product.

Ultimately the worst case scenario of all the above will lead to cases of non-oscillation but other negative effects are also likely should our products be used in an inappropriate way. Please note such cases of misuse and its related quality issues are not included in our product warranty.





■ **Cleansing Conditions**

General cleaning solutions may be used to clean our products but we always recommend testing to be performed prior to mass production processes. Ultrasonic cleaning procedures are not recommended and we strongly advise other forms of cleansing to be evaluated first. Unsuitable cleansing may lead to a number of negative effects such as damage to the product surface, discoloration of the product, corrosion of the package, package contamination, illegible marking, etc. Please note cases of unadvised treatment and its related quality issues are not included in our product warranty.

■ **Storage Conditions**

Please ensure our products are preserved appropriately in their original packaging. Irregular environmental instances of moisture will affect our product’s stability and may cause problems such as frequency instability, soldering ability and conditions, package defects, and other problems. It is essential to keep our products in a clean dust-free environment out of direct sunlight.

Our products’ storage conditions should at least meet the following condition:

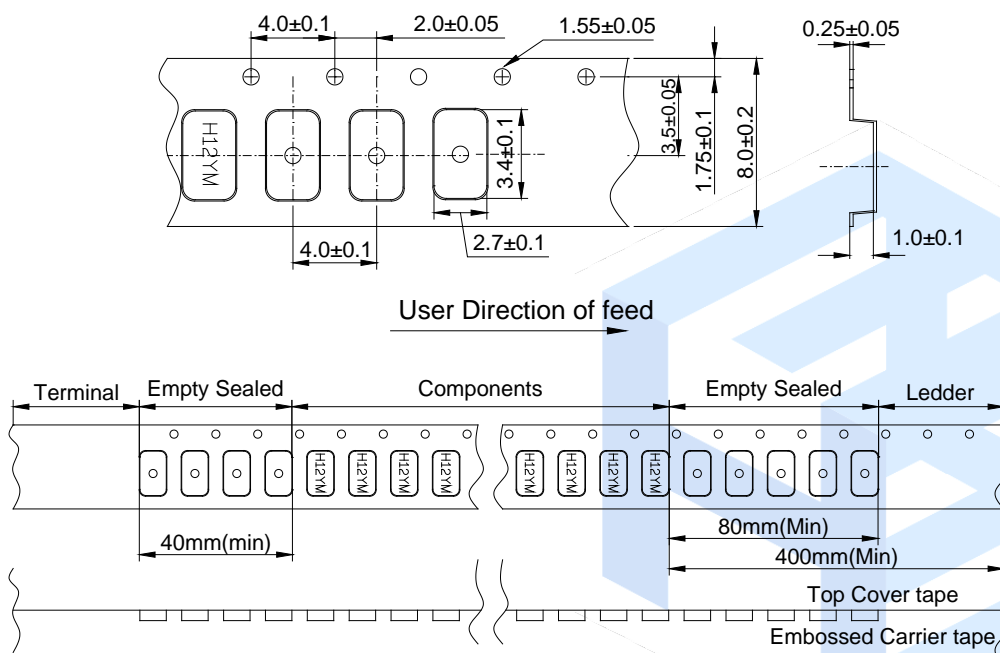
Environmental Temperature: + 40 degrees Celsius Maximum

Relative Humidity: 80% Maximum

Please note storage instances which do not conform to our guidelines and the related quality issues produced as an outcome are not included in our product warranty.

6. EMBOSS CARRIER TAPE AND REEL

■ **Carrier Tape**



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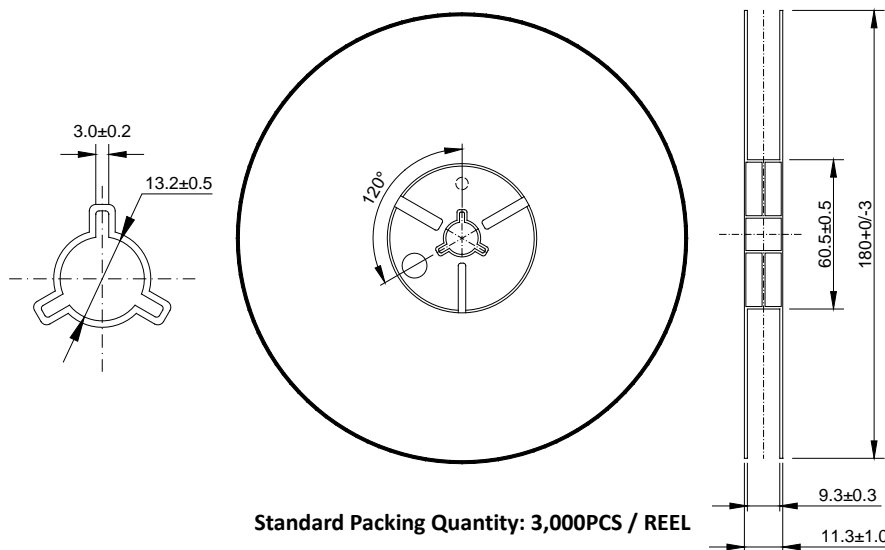
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■ Reel



■ Material of The Tape

| Tape | Material |
|--------------|---------------|
| Carrier tape | PS Conductive |
| Top tape | PET |

■ Joint of tape

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

■ Release strength of cover tape

The force should be controlled between 0.1N to 0.7N under following condition.

Pulling direction: 165° to 180°

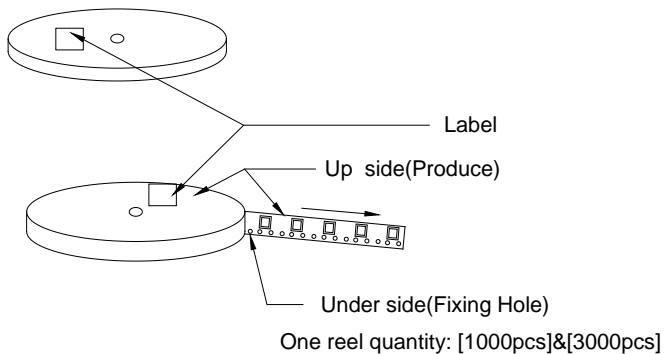
Speed: 300mm/min.

Otherwise unless specified.



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

7. PACKAGE



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use 4 trigon pilla

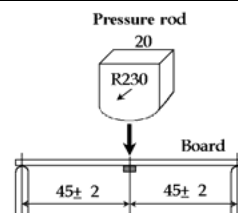


| Carton Type | A | B | C | D |
|--------------|---------|-------------|-----------------|-------|
| Produce Type | 840/751 | 630/531/421 | 321/221/211/111 | OTHER |
| Reel | 15 | 15 | 15 | 1~7 |
| L±3 | 200 | 200 | 200 | 195 |
| W±3 | 200 | 200 | 200 | 195 |
| H±3 | 230/260 | 230 | 230 | 150 |

- ①Top and bottom with 2.3cm thickness foam-rubber cushion for protection.
- ②Carton's Q'TY:1~15 pcs.
- ③Carton Type=A,B,C use 4 trigon pillar to fasten the Reel.
- ④Need to add 3 pages dry agent in each outer box.

8. MECHANICAL PERFORMANCE (Compatible with AEC-Q200.)

| Item | | Test Methods | Specifications Code |
|------|------------------|--|---------------------|
| 1 | Shock | Dropping from 120 cm height 3 times on 30 mm Concrete floor. Refer to: JIS C 60068-2-6 | A |
| 2 | Vibration | Frequency 10-55Hz, Sine Wave full amplitude of 0.8mm to X, Y and Z 3 axes, 2 cycles and duration of 2 hours to each direction. Refer to: MIL-HDBK-781A 6.5.2/ JIS C 60068-2-6 | A |
| 3 | Leakage Test | Leak Rate 1.0×10^{-9} Pa·m ³ /sec. Max. Measured by Helium leak detector. | --- |
| 4 | Solder ability | After applying ROSIN Flux, dipping in solder bath at 245deg.C ±5deg.C for 3 ±0.5 sec. Refer to: JIS C 60068-2-20 | B |
| 5 | Bending Strength | Mount a sample on board. Apply Pressure to the center of board until it is bent to 3 mm and hold for 5 ±1 sec. Pressure speed: 0.5 mm/sec. Refer to: EIAJ ET-7403 | A |



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| | | | | |
|---|---------------|---|--|---|
| 6 | Adhesion | Mount a sample on the circuit board. Apply pressure vertically to the side of specimen attached to the circuit board with the pressure jig. Pressure: 5N for 10±1 sec. Refer to: EIAJ ET-7403 | | A |
| 7 | Body strength | Apply pressure to the center of body with the R0.5 pressure jig. pressure :10N for 10±1sec Refer to: EIAJ ET-7403 | | A |

9. ENVIRONMENT PERFORMANCE (Compatible with AEC-Q200.)

| Item | Test Methods | Specifications Code |
|------|---|---------------------|
| 1 | Performing as the following reflow: | A |
| 2 | Temperature 60°C±2°C, RH 90~95%, duration of 240 hours. Back to room temperature first, then check the component after 1~2 hours. Refer to: JIS C 60068-2-3 | A |
| 3 | -40deg.C ±2deg.C, duration of 240 hours. Back to the room temperature first, then check the component after 1~2 hours. Refer to: JIS C 60068-2-1 | A |
| 4 | +85deg.C ±2deg.C, duration of 240 hours. Back to the room temperature first, then check the component after 1~2 hours. Refer to: JIS C 60068-2-2 | A |
| 5 | -40deg.C ±2deg.C (30min) ↔ +85deg.C ±2deg.C (30min) 25 cycles. And Temperature Increasing/reducing time < 3mins. Back to the room temperature first, then check the component after 1~2 hours. Refer to: JIS C 0025 | A |

| Specifications code | Specifications |
|---------------------|--|
| A | Frequency variation shall be within ±5ppm and equivalent resistance shall be within ±15% or 2Ω |
| B | More than 90% of lead shall be covered by new solder. |

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