



## CRYSTAL SPECIFICATION

Manufacturer: ECS Inc. International  
Manufacturer P/N: ECS-320-CDX-2152  
Application: Nordic Chipset nRF5340

Customer Approval :

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Date: 01-25-2021

Approved By: B. Slatten

Checked By: D. Kelly

Designer: A. Anderson



| Rev. | Description of Revision History | Date       | Designer    | Checked By |
|------|---------------------------------|------------|-------------|------------|
| 1    | New Publication                 | 01-25-2021 | A. Anderson | D. Kelly   |



## CRYSTAL SPECIFICATION

1. Description : Quartz Crystal
2. Nominal Frequency : 32.000000 MHz
3. Center Frequency : 32.000000 MHz
4. Dimension & Drawing No. : ECX-1247
5. Oscillation Mode : Fundamental
6. Cutting Mode : AT cut
7. Packing Style : Tape & Reel
8. Measurement Instrument : S&A 250B(Measured FL)
9. Electrical Characteristics :

### [1] Operating Conditions :

| Item                        | Symbol | MIN. | TYP. | MAX. | Unit | Condition |
|-----------------------------|--------|------|------|------|------|-----------|
| Operating Temperature Range | Topt   | -30  |      | 85   | °C   |           |
| Storage Temperature Range   | Tstg   | -40  |      | 105  | °C   |           |
| Load Capacitance            | CL     |      | 8    |      | pF   |           |
| Drive Level                 | DL     |      |      | 100  | μW   |           |

### [2] Frequency Stability :

| Item                       | Symbol | MIN. | TYP. | MAX. | Unit | Condition                         |
|----------------------------|--------|------|------|------|------|-----------------------------------|
| Tolerance                  | dF/Fo  | -10  |      | 10   | ppm  | Refer to Center Frequency @25±3°C |
| Stability Over Temperature | dF/F25 | -10  |      | 10   | ppm  | -30 ~ +85°C                       |
| Aging                      | dF/F25 | -2   |      | 2    | ppm  | First Year                        |

dF/Fo: Frequency Deviation Refer to Center Frequency

dF/F25: Frequency Deviation Refer to 25 °C Frequency



[3] Electrical Performance :

| Item                         | Symbol | MIN. | TYP. | MAX. | Unit       | Condition    |
|------------------------------|--------|------|------|------|------------|--------------|
| Equivalent Series Resistance | ESR    |      |      | 50   | $\Omega$   | @Series      |
| Shunt Capacitance            | C0     |      |      | 5    | pF         |              |
| Insulation Resistance        | IR     | 500  |      |      | M $\Omega$ | @DC 100 Volt |

10. Marking : Laser

|       |
|-------|
| 32.0x |
| 2152  |

x = Variable ECS internal lot

11. Remark :

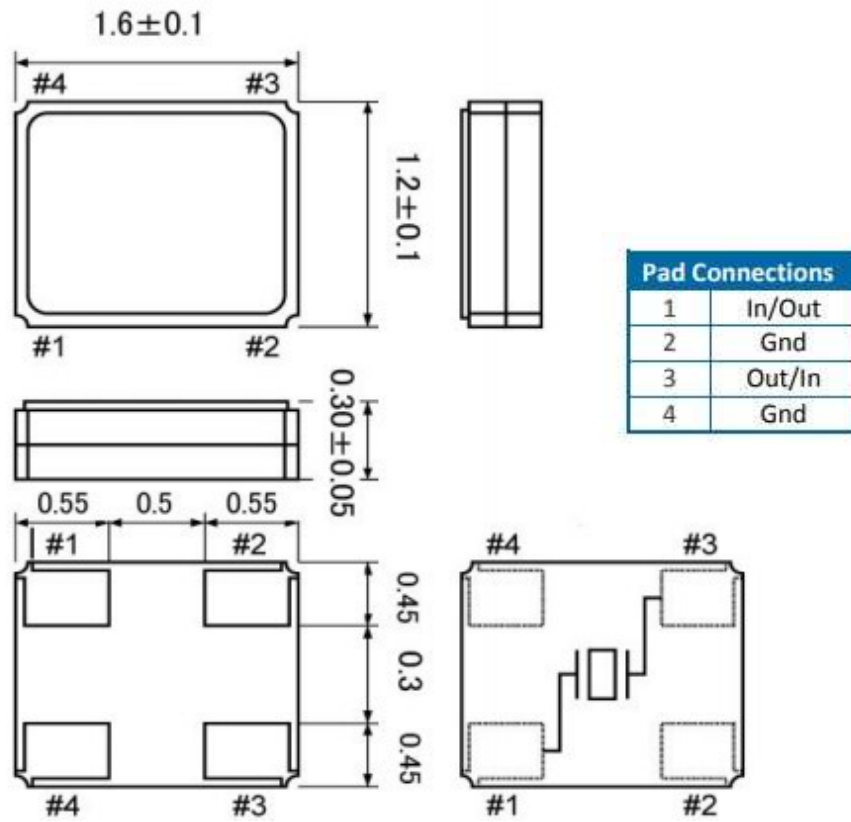
\*Compliant with EU RoHS 2015/863  
 \* MSL 1

■ Note

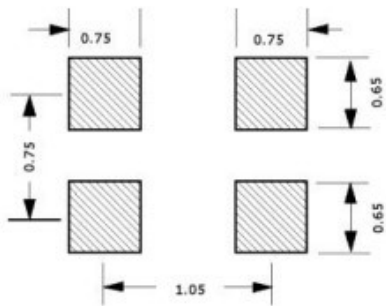
1.General cleaning solutions or ultrasonic cleaning method may be used to clean our products. However, under certain circumstances, ultrasonic cleaning machine could generate resonance at the oscillation frequency of our products and thus deteriorate the electrical characteristics in devices, and even damage the overall structure of devices. Therefore, verification test is recommended before cleaning.

2.Avoid mounting and processing by Ultrasonic welding this method has a possibility of an excessive vibration spreading inside the crystal products and becoming the cause of characteristic deterioration and not oscillating.

Dimensions: Top, Side and Bottom View  
Unit: mm



Land Pattern: (Reference)





## RELIABILITY SPECIFICATION

### 1. ENVIRONMENTAL PERFORMANCE

| ITEM                                          | CONDITION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------|-----------------------------------|---------------------------|-----------------------------------------------|---------------------------|-----------------------------------|---------------------------|-----------------------------------------------|---------------------------|
| 1. HIGH TEMPERATURE STORAGE                   | STORED AT $85 \pm 2^{\circ}\text{C}$ FOR $1000 \pm 12\text{H}$ . (If Customer's temperature request is higher than the standard, Temperature test must be done for customer requirements.)<br>THEN $25 \pm 2^{\circ}\text{C}$ OVER 2H BEFORE TESTING.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |
| 2. LOW TEMPERATURE STORAGE                    | STORED AT $-40 \pm 2^{\circ}\text{C}$ FOR $500 \pm 12\text{H}$ . (If Customer's temperature request is lower than the standard, Temperature test must be done for customer requirements.)<br>THEN $25 \pm 2^{\circ}\text{C}$ OVER 2H BEFORE TESTING.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |
| 3. HIGH TEMP. & HUMIDITY                      | STORED AT $60 \pm 2^{\circ}\text{C}$ AND HUMIDITY $90 \sim 95\%$ FOR $500 \pm 12\text{H}$ .<br>THEN $25 \pm 2^{\circ}\text{C}$ OVER 2H BEFORE TESTING.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |
| 4. TEMPERATURE CYCLE                          | THE CRYSTAL UNIT SHALL BE SUBJECTED TO 1000 SUCCESSIVE CHANGE OF TEMPERATURE CYCLES, THEN $25 \pm 2^{\circ}\text{C}$ OVER 2 H BEFORE TESTING, EACH CYCLE AS BELLOW :<br><br><table> <tr> <td>TEMPERATURE</td><td>DURATION</td></tr> <tr> <td>1. <math>-40 \pm 0/-6^{\circ}\text{C}</math></td><td><math>30 \pm 3\text{ MINUTES}</math></td></tr> <tr> <td>2. <math>25^{\circ}\text{C} \pm 2^{\circ}\text{C}</math></td><td><math>2 \sim 3\text{ MINUTES}</math></td></tr> <tr> <td>3. <math>125 \pm 4/-0^{\circ}\text{C}</math></td><td><math>30 \pm 3\text{ MINUTES}</math></td></tr> <tr> <td>4. <math>25^{\circ}\text{C} \pm 2^{\circ}\text{C}</math></td><td><math>2 \sim 3\text{ MINUTES}</math></td></tr> </table> | TEMPERATURE | DURATION | 1. $-40 \pm 0/-6^{\circ}\text{C}$ | $30 \pm 3\text{ MINUTES}$ | 2. $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ | $2 \sim 3\text{ MINUTES}$ | 3. $125 \pm 4/-0^{\circ}\text{C}$ | $30 \pm 3\text{ MINUTES}$ | 4. $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ | $2 \sim 3\text{ MINUTES}$ |
| TEMPERATURE                                   | DURATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |
| 1. $-40 \pm 0/-6^{\circ}\text{C}$             | $30 \pm 3\text{ MINUTES}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |
| 2. $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ | $2 \sim 3\text{ MINUTES}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |
| 3. $125 \pm 4/-0^{\circ}\text{C}$             | $30 \pm 3\text{ MINUTES}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |
| 4. $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ | $2 \sim 3\text{ MINUTES}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |          |                                   |                           |                                               |                           |                                   |                           |                                               |                           |

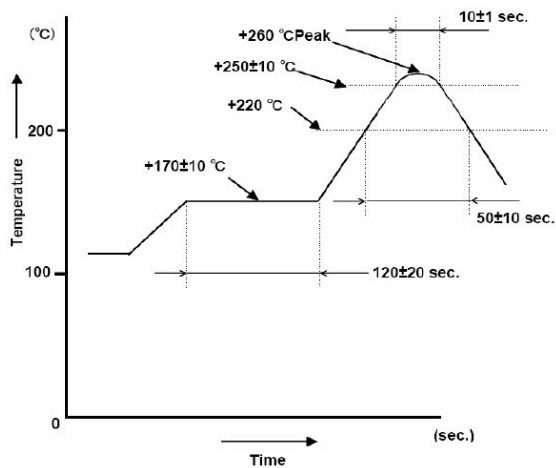
### 2. MECHANICAL PERFORMANCE

| ITEM                            | CONDITION                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5. SOLDERABILITY                | THE LEAD IS IMMERSSED IN A $260 \pm 5^{\circ}\text{C}$ SOLDER BATH WITHIN $2 \pm 0.6\text{ SECONDS}$ .                                                    |
| 6. RESISTANCE TO SOLDERING HEAT | REFLOW CHART AS ATTACH SHEET. TWICE PASS.                                                                                                                 |
| 7. FREE FALL                    | FREE DROPPING FROM 75 cm HEIGHT 3 TIMES ON A HARD WOODEN BOARD.                                                                                           |
| 8. VIBRATION                    | FREQUENCY : $10 \sim 55\text{Hz}$ ,<br>AMPLITUDE (TOTAL EXCURSION) : $1.5\text{mm} \pm 15\%$ ,<br>SWEEP TIME : 1MIN, 3 DIRECTION(X, Y, Z) EACH FOR 2 Hrs. |
| 9. GROSS LEAK                   | STANDARD SAMPLE FOR AUTOMATIC GROSS LEAK DETECTOR,<br>TEST PRESSURE: 0.2 Mpa                                                                              |
| 10. FINE LEAK                   | HELIUM BOMBING $5.0 \sim 5.5\text{ Kg} / \text{cm}^2$<br>FOR 2 HOURS.                                                                                     |

|                               |                                                                                                                                                         |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11. TERMINAL STRENGTH         | SHALL BE PRESSURIZED AT A SPEED OF APPROX.0.5mm/sec IN THE DIRECTION INDICATED BY THE ARROW UNTIL THE BENDING WIDTH REACHES 3mm AND HELD FOR 5 SECONDS. |
| 12. STICKING TENDENCY         | A R0.5 JIG SHALL BE USED TO APPLY A 10N DEAD LOAD IN THE DIRECTION INDICATED BY THE ARROW TO THE ELEMENT AND RETAIN IT FOR 10 SECONDS.                  |
| 13. ELEMENT ASSEMBLY STRENGTH | A R0.5 PRESSURIZED BAR SHALL BE USED TO APPLY A 10N LOAD IN THE CENTER OF ELEMENT AND RETAIN IT FOR 10 SECONDS.                                         |



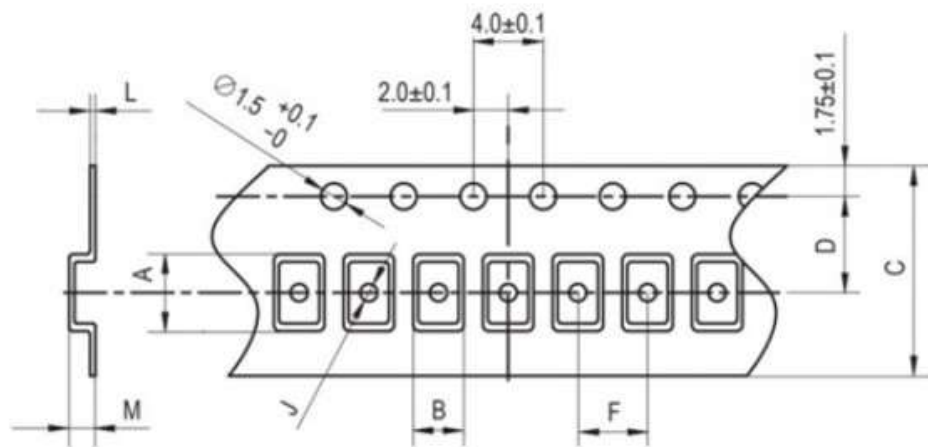
#### SUGGESTED REFLOW PROFILE



◆ PACKING

Unit: mm

1. CARRIER TYPE



| A    | B    | C   | D   | F   | J   | L    | M    | Reel Dia. | Qty/Reel    |
|------|------|-----|-----|-----|-----|------|------|-----------|-------------|
| 1.84 | 1.55 | 8.0 | 3.5 | 4.0 | 0.5 | 0.25 | 0.45 | 180       | <b>3000</b> |