

**SMD CRYSTAL UNIT SPECIFICATIONS**

|                          |                           |
|--------------------------|---------------------------|
| <b>Customer</b>          | 立创                        |
| <b>Customer P/N</b>      |                           |
| <b>Product</b>           | 2016 Seam Sealing Crystal |
| <b>Nominal Frequency</b> | 24.000000MHz              |
| <b>HOSONIC P/N</b>       | E1SB24E000012E            |
| <b>Version</b>           | 10C0                      |
| <b>Issue Date</b>        | 2021/3/1                  |

| <b>HOSONIC</b> |                |                 |
|----------------|----------------|-----------------|
| <b>Drawn</b>   | <b>Checked</b> | <b>Approved</b> |
| <b>LUCY</b>    | <b>ZOE</b>     | <b>JOHN</b>     |

**Approved By Customer :** \_\_\_\_\_



**HOSONIC ELECTRONIC CO., LTD.**



Revised Record

| Rev. | Rev. Date  | Item | Content          | Remark |
|------|------------|------|------------------|--------|
| 1.0  | 2021-03-01 |      | Initial released |        |

- ELECTRICAL PARAMETERS**

Electrical characteristics measured by S&A250B or equivalent.

| No. | Item   | Symb.            | Electrical Specification |      |      |       | Remark                |
|-----|--|------------------|--------------------------|------|------|-------|-----------------------|
|     |  |                  | Min.                     | Typ. | Max. | Units |                       |
| 1   | Nominal Frequency                                | F0               | 24.000000                |      |      | MHz   |                       |
| 2   | Mode of Vibration                                |                  | Fundamental              |      |      |       |                       |
| 3   | Frequency Tolerance                              | $\Delta F/F0$    | -10                      | -    | 10   | ppm   | At 25°C±3°C           |
| 4   | Operating Temperature Range                      | T <sub>OPR</sub> | -30                      | -    | 85   | °C    |                       |
| 5   | Frequency Stability (over operating temperature) | TC               | -10                      | -    | 10   | ppm   | Ref. to 25°C          |
| 6   | Storage Temperature                              | T <sub>STG</sub> | -55                      | -    | 125  | °C    |                       |
| 7   | Load capacitance                                 | CL               | -                        | 9    | -    | pF    |                       |
| 8   | Equivalent Series Resistance                     | ESR              | -                        | -    | 50   | Ω     |                       |
| 9   | Drive Level                                      | DL               | -                        | 50   | 100  | μW    |                       |
| 10  | Insulation Resistance                            | IR               | 500                      | -    | -    | MΩ    | At 100V <sub>DC</sub> |
| 11  | Shunt Capacitance                                | C0               | -                        | -    | 2    | pF    |                       |
| 12  | Aging Per Year                                   | Fa               | -2                       | -    | 2    | ppm   | First Year            |
| 13  | Package type                                     | E1SB             |                          |      |      |       |                       |

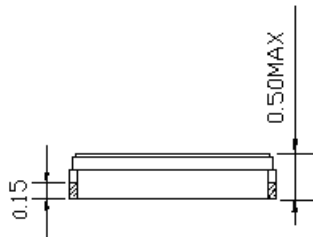
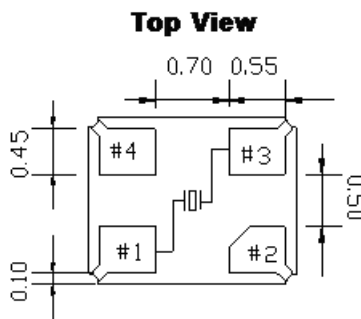
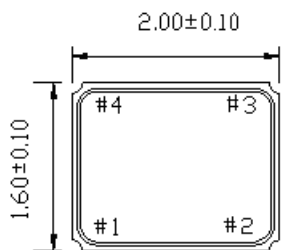
**NOTE: Storage Temperature is only for the product itself, the temperature for the packing material is -4~40°C.**

- STORAGE REQUIRMENT**

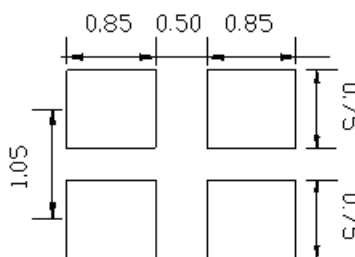
Storage environmental conditions: -4~40°C, 70%RH max.

Maximum storage time: 24 Months from date of manufacture.

● **OUTLINE DIMENSIONS (UNIT: mm)**



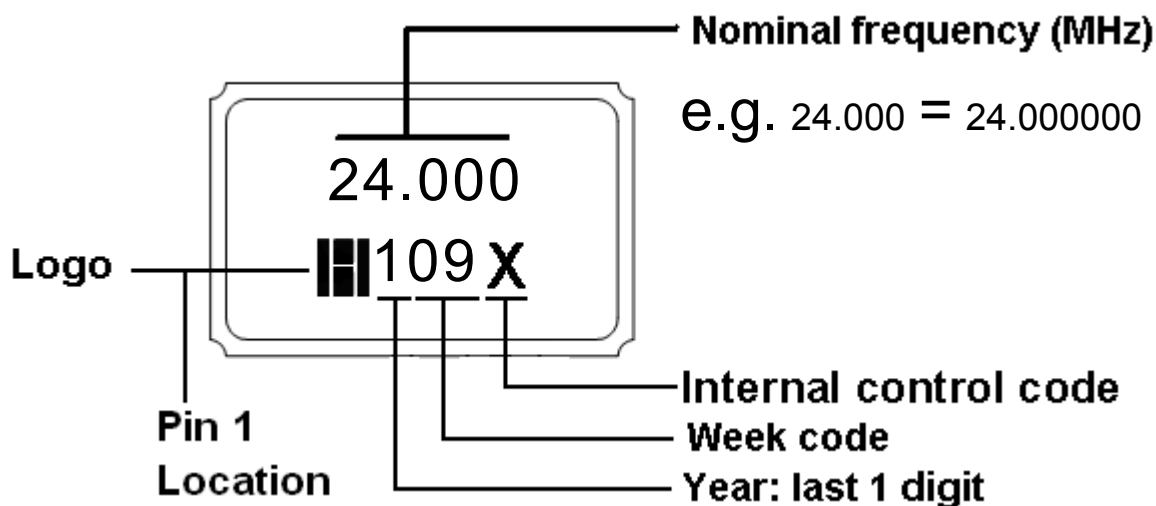
**Recommended Solder Pattern**

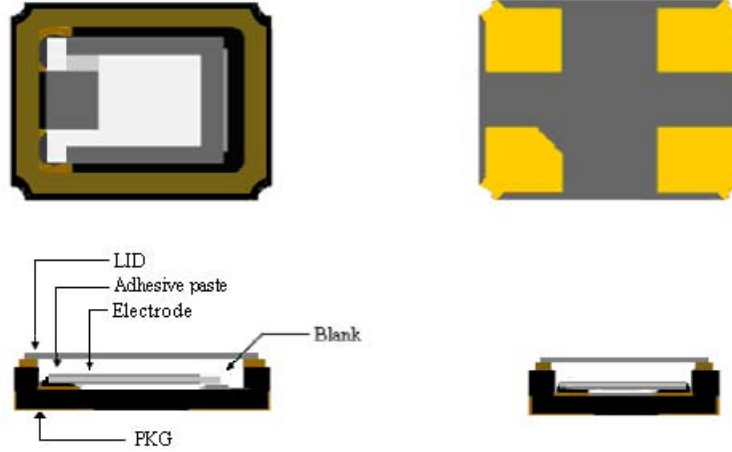


| Pin   | Connection |
|-------|------------|
| #1,#3 | X'tal      |
| #2,#4 | GND        |

\*unlabeled tolerance: ± 0.1mm

● **MARKING:**



**● PRODUCT LAYOUT**


| NO. | PART           | MATERIAL                       | REMARK  |
|-----|----------------|--------------------------------|---------|
| 1   | LID            | KOVAR(Fe+Co+Ni alloy)          |         |
| 2   | PKG            | Al <sub>2</sub> O <sub>3</sub> | Base    |
| 3   | Blank          | SiO <sub>2</sub>               | Quartz  |
| 4   | Adhesive paste | Ag/Silicon                     | Support |
| 5   | Electrode      | Noble metal                    |         |

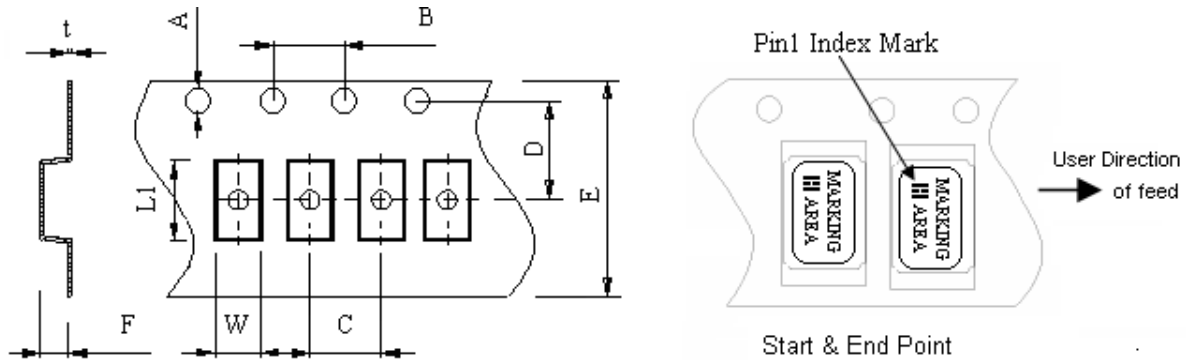
**REFLOW PROFILES**

| Profiles Feature                                     | Pb-Free Assembly   |
|--|--------------------|
| Average Ramp-up Rate (Ts max to Tp)                  | 3°C/second max.    |
| Preheat  |                    |
| ■ Temperature Min (Ts min)                           | 125°C              |
| ■ Temperature Max (Ts max)                           | 200°C              |
| ■ Time (ts min to ts max)                            | 60~180 seconds     |
| Time maintained above                                |                    |
| ■ Temperature ( $T_L$ )                              | 217°C              |
| ■ Time ( $t_L$ )                                     | 60~150 seconds     |
| Peak/Classification Temperature ( $T_p$ )            | 260°C              |
| Time within 5°C of actual Peak Temperature ( $t_p$ ) | 20~40 seconds      |
| Ramp-down rate                                       | 6°C/second max.    |
| Time 25°C to Peak Temperature                        | 8 minutes max.     |
| <b>Suggest reflow times</b>                          | <b>3 Times max</b> |


**Remark: To reference JEDEC J-STD-020**

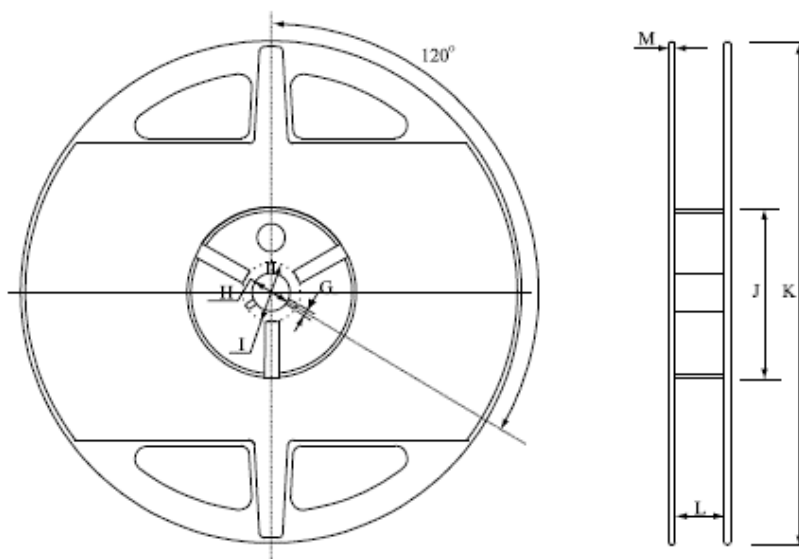
● **PACKAGE**(reference to EIA-481)

*Tape Dimensions*(unit : mm)



| A    | B   | C   | D   | E   | F    | L1   | W    | t   |
|------|-----|-----|-----|-----|------|------|------|-----|
| 1.50 | 4.0 | 4.0 | 3.5 | 8.0 | 0.65 | 2.25 | 1.85 | 0.2 |

*Reel Dimensions*(unit: mm)



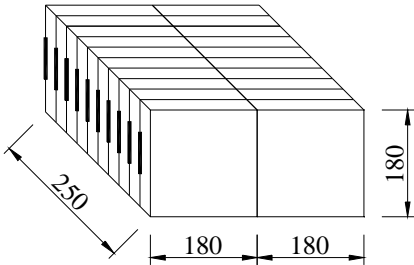
| G   | H    | I    | J    | K   | L   | M   |
|-----|------|------|------|-----|-----|-----|
| 2.5 | 13.5 | 21.6 | 60.0 | 178 | 9.5 | 1.6 |

\*3000pcs/Reel

Carton Dimension (unit : mm)



1 reel = 1 Inner box



20 Inner boxes = 1 Carton

60kpcs = 1 Carton



● **RELIABILITY SPECIFICATIONS**

| No. | Test Item                               | Test Conditions  | Reference                 |
|-----|---|--|---------------------------|
| 1   | High Temperature Storage                | Temperature: $125^{\circ}\text{C} \pm 3^{\circ}\text{C}$<br>Time: 1000 $\pm$ 12 Hours  | MIL-STD-202<br>Method 108 |
| 2   | Temperature Cycle                       | Temperature 1: $-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$<br>Temperature 2: $125^{\circ}\text{C} \pm 3^{\circ}\text{C}$<br>Temperature change between T1 and T2 at soonest<br>Run 1000 cycles, maintain T1 and T2 5minutes each in one cycle  | JESD22 Method JA-104      |
| 3   | Solder Heat Resistance                  | Pre-heat: $125^{\circ}\text{C}$ 60~120 Seconds<br>Solder Temperature: $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$<br>Time: 30 Seconds  | MIL-STD-202<br>Method 210 |
| 4   | Drop Test                               | 3 Times Free Fall from 150cm height to concrete floor.   | IEC 68-2-32               |
| 5   | High Temperature, High Humidity Storage | Temperature: $85^{\circ}\text{C} \pm 5^{\circ}\text{C}$<br>Relative Humidity: 80%--85%<br>Time: 250Hours $\pm$ 12 Hours  | MIL-STD-202<br>Method 103 |
| 6   | Steam Aging                             | Temperature: $97^{\circ}\text{C} \pm 3^{\circ}\text{C}$<br>Time: 24 Hours<br>$260^{\circ}\text{C}$ solder pot to check solderability   | J-STD-002                 |
| 7   | Solderability                           | Dip in flux 5~10 seconds<br>Temperature: $245^{\circ}\text{C} \pm 5^{\circ}\text{C}$<br>Time: 10 Seconds   | J-STD-002                 |
| 8   | Aging                                   | Temperature: $85^{\circ}\text{C} \pm 2^{\circ}\text{C}$<br>Time: 250 $\pm$ 12Hours   | MIL-STD-202<br>Method 108 |
| 9   | Thermal Shock                           | Temperature 1: $-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$<br>Temperature 2: $125^{\circ}\text{C} \pm 3^{\circ}\text{C}$<br>Temperature change between T1 and T2: 5 seconds<br>100 cycles, maintain T1 and T2 for 30 minutes each in one cycle | MIL-STD-202<br>Method 107 |
| 10  | Vibration                               | Frequency Range: 10Hz~2000Hz<br>Amplitude: 1.5mm or 20G<br>4Hours in each direction, total 12Hours   | MIL-STD-202<br>Method 204 |