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# PRODUCT SPECIFICATION SHEET

| | | |
|---|---|---|
| CUSTOMER | : | |
| PRODUCT TYPE | : | SMD X'TAL 2.0*1.6(4PAD) |
| NOMINAL FREQ. | : | 38.400000 MHz |
| FL P/N | : | 9Y38400004 |
| REVISION | : | S0 |
| CUSTOMER P/N | : | |

CUSTOMER'S APPROVAL&DATE

FL CORPORATION

| APPROVED | CHECKED | DESIGNED |
|---|---|---|
| Xing Yue | Jin Qi | Li Xiang |

MSL1

RoHS Compliant

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**ATTACHMENT（optional）**

- ELECTRICAL CHARACTERISTICS TEST A ☐ YES ☑ NO
- TEMPERATURE CHARACTERISTICS TEST B ☐ YES ☑ NO

**Attention**

- If you intend to use products on the controlling equipment that relate to medical, aeronautical, aerospace, military science, space and etc, please make sure to let us know your intentions in advance.

- Ultrasonic related process may cause damage to crystal blank by resonance itself.
  If ultrasonic related process is used, we strongly recommend to assess the damage risk under related ultrasonic conditions before use in production.

**SPECIFICATION REVISION RECORD SHEET**

| Rev. | Revise page | Revise Contents | Date | Ref. No. | Reviser |
|---|---|---|---|---|---|
| S0 | N/A | Initial released | 22-Feb-23 | N/A | Li Xiang |
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## PRODUCT DESCRIPION

### Standard atmospheric conditions

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

Ambient temperature : 25±2℃
Relative humidity 40%~70%

If there is no doubt the results, measurement shall be made within the following limits:

Ambient temperature : 25±2℃
Relative humidity : 40%~70%

### Measure equipment

Electrical characteristics measured by S&A250B or equivalent.

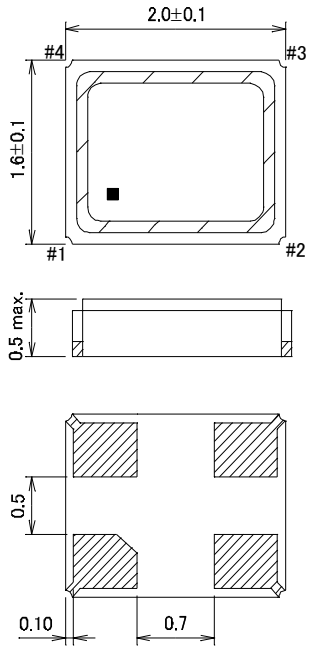
### Crystal cutting type

The crystal is using AT CUT (thickness shear mode)

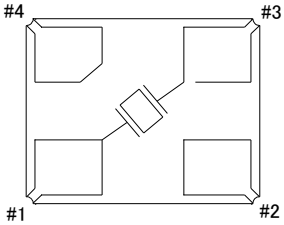
## ELECTRICAL SPECIFICATIONS

| No. | Items | Electrical Spec. | | | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | Symbol | Min | Typ | Max | Units | |
| 1 | Nominal Frequency | FL | 38.400000 | | | MHz | |
| 2 | Oscillation Mode | - | Fundamental | | | - | |
| 3 | Load Capacitance | CL | 8.0 | | | pF | |
| 4 | Frequency Tolerance | - | ±10 | | | ppm | at 25±2℃ |
| 5 | Frequency Stability | - | ±30 | | | ppm | at -40～+105℃ (reference 25℃) |
| 6 | Shunt Capacitance | C0 | - | - | 3 | pF | |
| 7 | Aging (/1 year) | - | ±3 | | | ppm/year | at 25±2℃ |
| 8 | Operating Temperature | - | -40 | - | 105 | ℃ | |
| 9 | Storage Temperature | - | -40 | - | 125 | ℃ | |
| 10 | Equivalent series resistance | ESR | - | - | 60 | ohms | |
| 11 | Insulation Resistance | IR | 500 | - | - | M-ohms | at DC 100V |
| 12 | ESD | - | HBM＞4000V | | | - | JESD22-A114-B |
| 13 | MSL | - | Level 1 | | | - | IPC/JEDEC J-STD-033C |
| 14 | Drive Level | DL | - | - | 100 | uW | |

## DIMENSIONS unit:mm

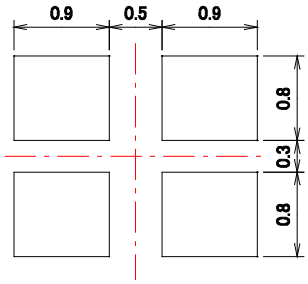



## CONNECTION DIAGRAM (TOP VIEW)

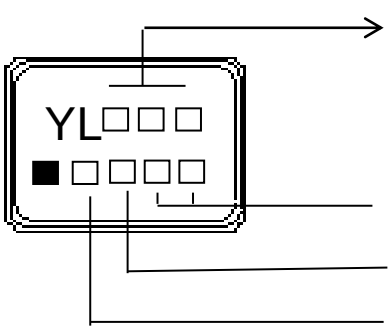



| Pin | Function |
|---|---|
| #1 | Xtal terminal (Input) |
| #2 | GND terminal |
| #3 | Xtal terminal (Output) |
| #4 | GND terminal |

## LAND PATTERN unit:mm




## MARKING




**Frequency**
**EX: 38.400MHz =384**

**lot (2 digits)**

**year month**

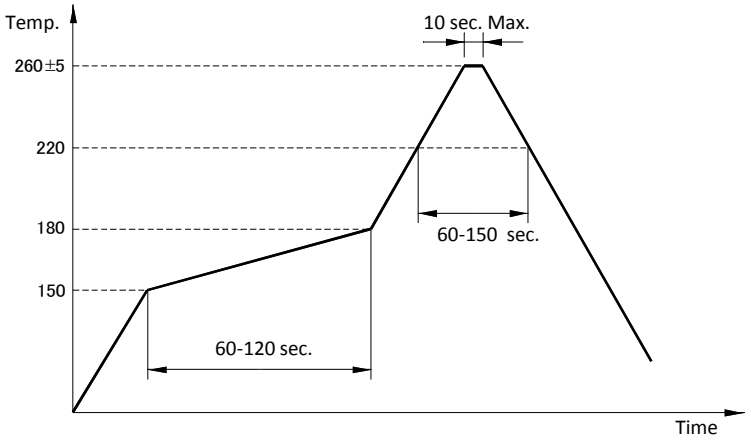
**Administrative Symbol**

| year \ month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2021 | 2025 | A | B | C | D | E | F | G | H | J | K | L | M |
| 2022 | 2026 | N | P | Q | R | S | T | U | V | W | X | Y | Z |
| 2023 | 2027 | a | b | c | d | e | f | g | h | j | k | l | m |
| 2024 | 2028 | n | p | q | r | s | t | u | v | w | x | y | z |

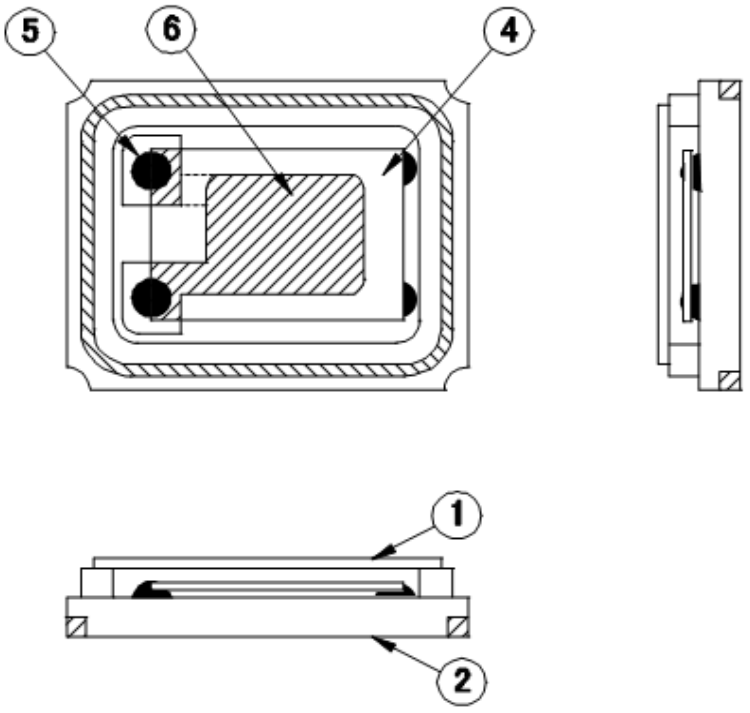
## SUGGESTED REFLOW PROFILE

Total time : 360 sec. Max.

Solder melting point :225 °C



## STRUCTURE ILLUSTRATION




| NO | COMPONENTS | MATERIALS | QTY | FINISH/SPECIFICATIONS |
|---|---|---|---|---|
| 1 | Cap(Lid) | Kovar(Fe+Co+Ni) | 1 | Ni plating |
| 2 | Base(Package) | Almina Ceramics ($Al_2O_3$) | 1 | |
| 3 | Pad(Package) | Ni + Au | 4 | Ni+Au plating |
| 4 | Crystal blank | $SiO_2$ | 1 | - |
| 5 | Conductive adhesive | Ag | 4 | Silicone resin |
| 6 | Electrode | Noble metal | 2 | - |

## RELIABILITY SPECIFICATIONS

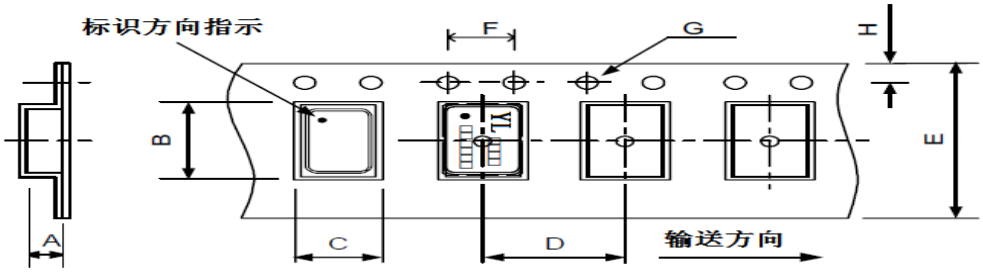
1.ENVIRONMENTAL ENDURANCE (AEC-Q200)

| No. | Test Item | Test Methods | |
|---|---|---|---|
| 1 | High Temperature Exposure | 1000 hours at 85℃. | AEC-Q200 TEST 3, MIL-STD-202 Method 108 |
| 2 | Temp. Cycling | Temperature Cycling 1000 cycles. (-40℃ to 125℃ for 30 minutes each). | AEC-Q200 TEST 4, JESD22 Method JA-104 |
| 3 | Biased Humidity | 1000 hours at 85℃ & 85%RH with $V_{DD}$ applied. | AEC-Q200 TEST 7, MIL-STD-202 Method 103 |
| 4 | Operational Life | 1000 hours at 125℃ with $V_{DD}$ applied. | AEC-Q200 TEST 8, MIL-STD-202 Method 108 |
| 5 | Resistance to Solvents | 3 minutes of immersion and 10 strokes of brush cleaning,for 3 cycles. | AEC-Q200 TEST 12, MIL-STD-202 Method 215 |
| 6 | Mechanical Shock | 100g's,6msec,half-sine,for 3 cycles each in 6 directions | AEC-Q200 TEST 13, MIL-STD-202 Method 213 |
| 7 | Vibration | 10Hz-2000Hz,5g for 20 minutes,12 cycles in each of 3 orientations. | AEC-Q200 TEST 14, MIL-STD-202 Method 204 |
| 8 | Resistance to Soldering Heat | 260℃±5℃,10sec±1sec. | AEC-Q200 TEST 15, MIL-STD-202 Method 210 |
| 9 | Solderability | 260℃±5℃,5sec±1sec, immersing depth:≥0.5mm. | AEC-Q200 TEST 18, J-STD-002 |
| 10 | Board Flex | Board bending: 2.5mm,bending time: 60s. | AEC-Q200 TEST 21, AEC Q200-005 |
| 11 | Terminal Strength | Force:1.8kg,force time:60s. | AEC-Q200 TEST 22, AEC Q200-006 |

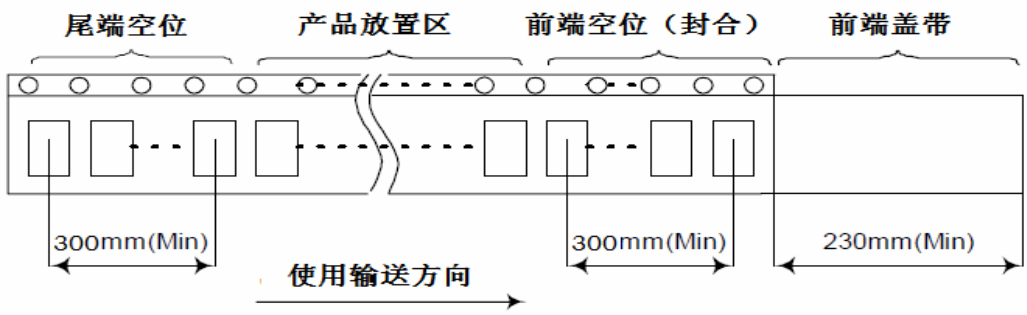
*Storage conditions： 18 months
*Constant humidity： 40~70%

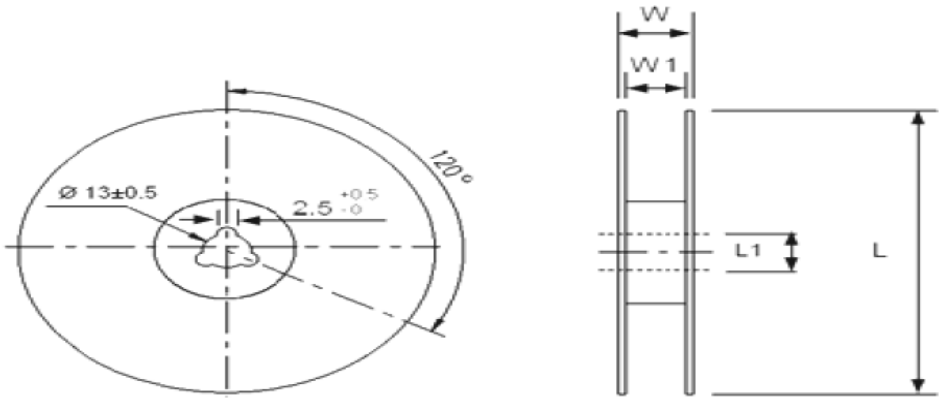
**PACKING :**

8mm-4mm，3000pcs / reel，φ 178；




| | A | B | C | D | E | F | G | H | |
|---|---|---|---|---|---|---|---|---|---|
| Dimension | 0.65 ±0.1 | 2.20 ±0.1 | 1.90 ±0.1 | 4.00 | 8.00 | 4.00 | 1.50 | 1.75 | Unit：mm |

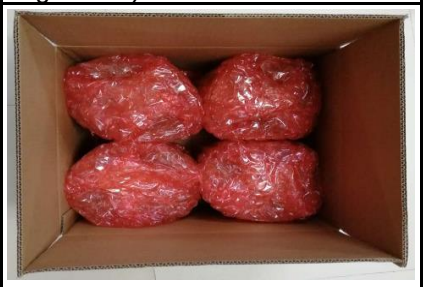



| Dimension | L | L1 | W | W1 | Unit：mm |
|---|---|---|---|---|---|
| | 178 | 13 | 11.5 | 8 | 3000pcs / reel |

## SMD PRODUCT PACKING STANDARD

### Out-going packing instruction

| Reel Packing | Inner Packing | Carton |
|---|---|---|
| name：reel<br>standard：diameter 18cm<br>material：plastics | name：Bubble Wrap<br>standard：430×330+20mm<br>material：HDPE(15 reels enter) | name：carton<br>standard：400×400×280mm<br>material：AB corrugated paper(4 bags enter) |
|  |  |  |
| | |  |

### The label instruction

| Label Drawing | Mark | Name of Article | Spec. | Size | Printing |
|---|---|---|---|---|---|
|  | L1 | 条码标签<br>Bar Code Label<br>(Chintz Paper) | 1.Part No.<br>2.Lot No.<br>3.Q'ty<br>4.Freq | 70x50mm | White |
|  | L2 | 条码标签<br>Bar Code Label<br>(Chintz Paper) | 1.Part No.<br>2.Date Code<br>3.Q'ty<br>4.Freq | 70x50mm | White |

**Remark**

Specifications on the label is for the use of templates with different product specifications may vary.
If customer specified requirements for labels packaging. please provide the operation procedure.

| Range | Products | Packing Material |
|---|---|---|
| **Banned Substances** | **Maximum concentration ppm(mg/kg)** | **Maximum concentration ppm(mg/kg)** |
| 1.镉及镉化合物<br>Cadmium and cadmium compounds | 100 | 100 |
| 2.铅及铅化合物<br>Lead and lead compounds | 1000 | 100 |
| 3.汞及汞化合物<br>Mercury and mercury compounds | 1000 | 100 |
| 4.六价铬化合物<br>Hexavalent-Chromium VI (Cr+6) | 1000 | 100 |
| 5.聚溴联苯 PBB<br>Polybrominated biphenyls | 1000 | N/A |
| 6.聚溴二苯醚 PBDE<br>Polybrominated diphenyl ethers | 1000 | N/A |
| 7.邻苯二甲酸二(2-乙基己基)酯 DEHP<br>Di (2-ethylhexyl) phthalate | 1000 | N/A |
| 8.邻苯二甲酸丁苄酯 BBP<br>Butyl Benzyl Phthalate | 1000 | N/A |
| 9.邻苯二甲酸二丁酯 DBP<br>Dibutyl Phthalate | 1000 | N/A |
| 10 邻苯二甲酸二异丁酯 DIBP<br>Diisobutyl Phthalate | 1000 | N/A |
| 11. 氟（F）、氯（Cl）、溴（Br）、碘（I）<br>Fluorine、Chlorine、 Bromine、Iodine | 900、900、900、900<br>注：Br+Cl＜1000 | N/A |
| 12.包装材料中重金属(汞、镉、六价铬、铅、PBB、PBDE)之总量<br>Heavy metals (mercury, cadmium, lead, Cr+6,PBB and PBDE) in packing materials | N/A | 100<br>铅(Pb) + 镉(Cd) + 汞(Hg) + 六价铬(Cr+6) <100ppm |
| 13.高度关注物质<br>SVHC-Substances of Very High Concern | 1000 | N/A |


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