广东惠伦晶体科技股份有限公司
GUANGDONG FAITH LONG CRYSTAL TECHNOLOGY Co.,Ltd.
NO.68 Huangjiang Donghuan Road，Huangjiang Town，Dongguan City，Guangdong Province，China
TEL :+86(0)769-38879888 Fax :+86(0)769-38879889 E-mail : yl@dgylec.com

# PRODUCT SPECIFICATION SHEET

| | | |
|---|---|---|
| CUSTOMER | : | |
| PRODUCT TYPE | : | SMD X'TAL 3.2*2.5(4PAD) |
| NOMINAL FREQ. | : | 24.000000 MHz |
| FL P/N | : | 3Y24000005 |
| REVISION | : | S0 |
| CUSTOMER P/N | : | |

CUSTOMER'S APPROVAL&DATE

FL CORPORATION

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

MSL1

RoHS Compliant

**CONTENTS** **PAGE**


- SPECIFICATION REVISION RECORD SHEET 2
- ELECTRICAL SPECIFICATIONS 3
- DIMENSIONS & MARKING 4
- STRUCTURE ILLUSTRATION 5
- RELIABILITY TEST SPECIFICATIONS 6
- PACKAGING REQUIREMENT 7/8
- SPECIFICATION OF THE ENVIRONMENT-RELATED SUBSTANCES 9


**ATTACHMENT（optional）**

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

## SPECIFICATION REVISION RECORD SHEET

| Rev. | Revise page | Revise Contents | Date | Ref. No. | Reviser |
|---|---|---|---|---|---|
| S0 | N/A | Initial released | 20-Jul-22 | 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.

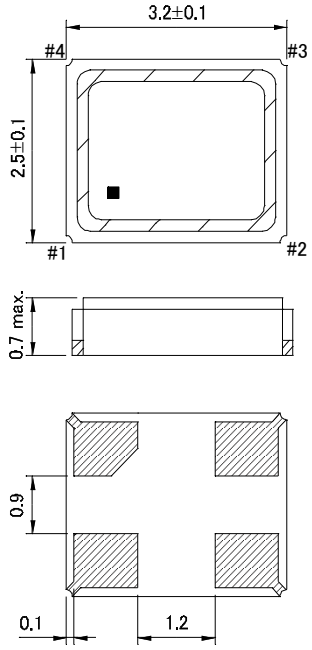
### Crystal cutting type

The crystal is using AT CUT (thickness shear mode)

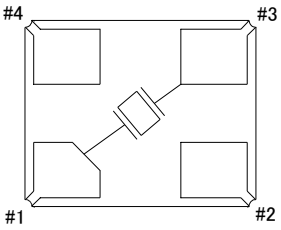
## ELECTRICAL SPECIFICATIONS

| No. | Items | Electrical Spec. | | | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | Symbol | Min | Typ | Max | Units | |
| 1 | Nominal Frequency | FL | - | 24 | - | MHz | |
| 2 | Oscillation Mode | - | Fundamental | | | - | |
| 3 | Load Capacitance | CL | 18.0 | | | pF | |
| 4 | Frequency Tolerance | - | ±50 | | | ppm | at 25±2℃ |
| 5 | Frequency Stability | - | ±50 | | | ppm | at -0～+70℃ (reference 25℃) |
| 6 | Shunt Capacitance | C0 | - | - | 7 | pF | |
| 7 | Aging (/1 year) | - | ±5 | | | ppm/year | at 25±2℃ |
| 8 | Operating Temperature | - | -0 | - | 70 | ℃ | |
| 9 | Storage Temperature | - | -55 | - | 125 | ℃ | |
| 10 | Equivalent series resistance | ESR | - | - | 40 | 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 | Spurious Responses | - | - | - | -3 | dB | |
| 15 | Drive Level | DL | - | - | 100 | uW | |

## DIMENSIONS unit:mm

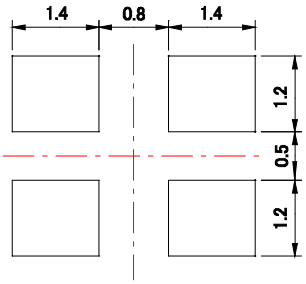



## CONNECTION DIAGRAM (TOP VIEW)

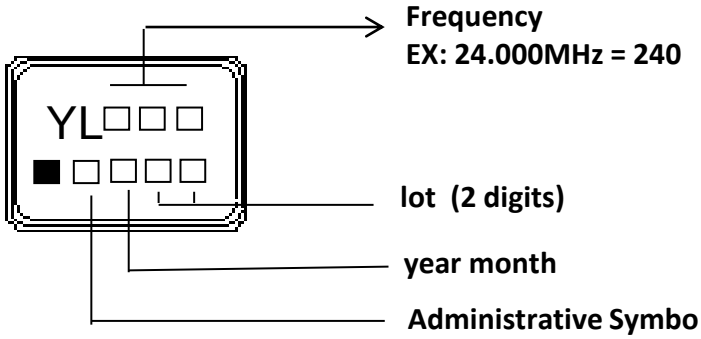



| Pin | Function |
|---|---|
| #1 | Xtal terminal (Input) |
| #2 | GND terminal |
| #3 | Xtal terminal (Output) |
| #4 | GND terminal |

## LAND PATTERN unit:mm




## MARKING

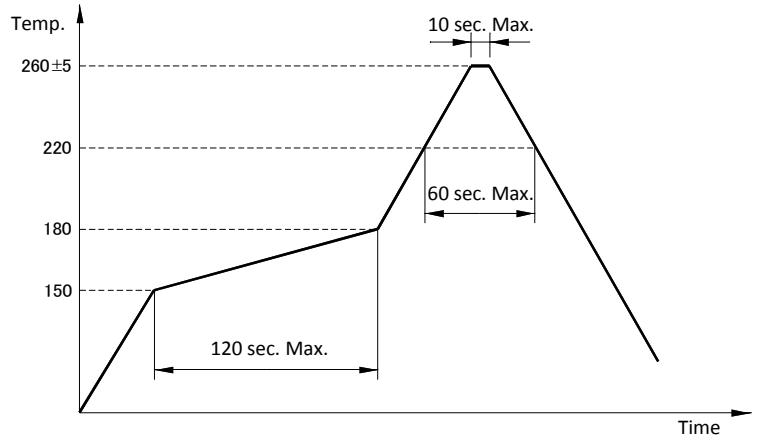



| year \ month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2021 2025 | A | B | C | D | E | F | G | H | J | K | L | M |
| 2022 2026 | N | P | Q | R | S | T | U | V | W | X | Y | Z |
| 2023 2027 | a | b | c | d | e |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

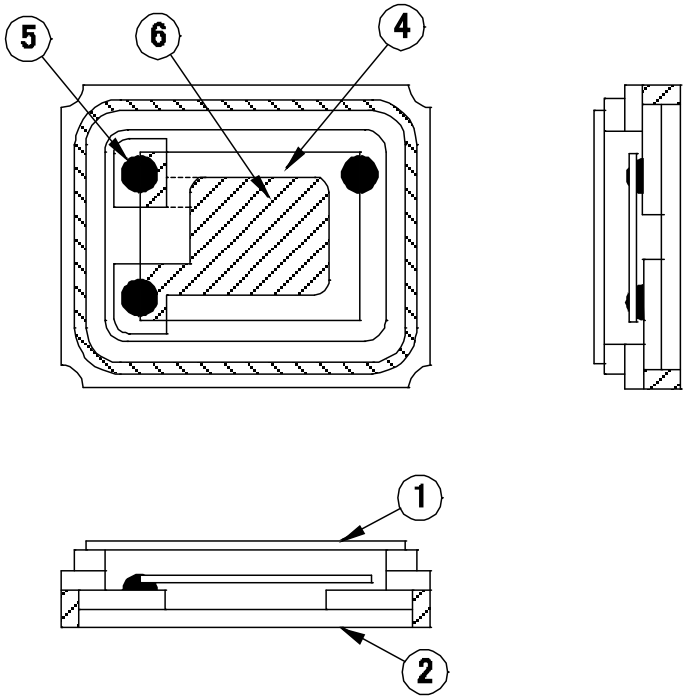
## SUGGESTED REFLOW PROFILE

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 | 3 | Silicone resin |
| 6 | Electrode | Noble metal | 2 | - |

## RELIABILITY SPECIFICATIONS

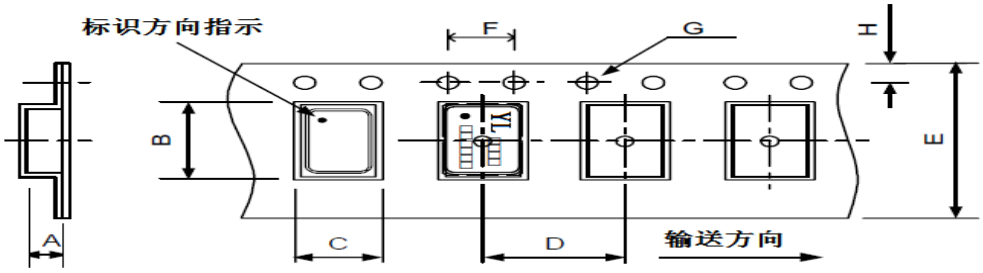
1.ENVIRONMENTAL ENDURANCE (AEC-Q200)

| 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 |

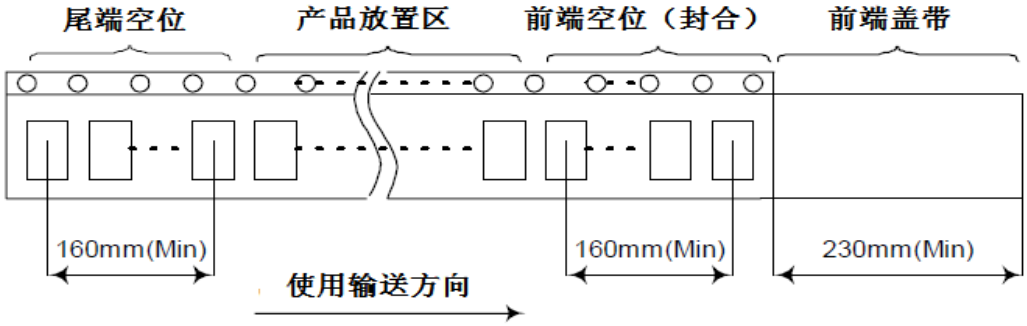
*Storage conditions ： 18 months
*Constant humidity ： 40~70%

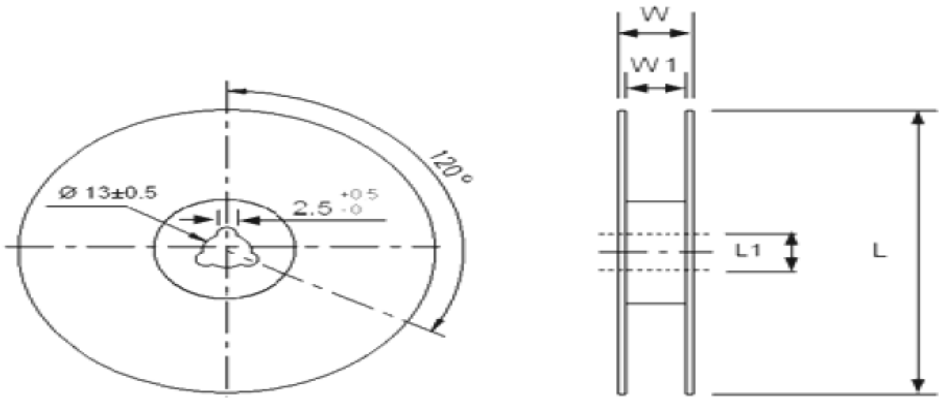
**PACKING :**

8mm-4mm，3000pcs / reel，φ 178；




| | A | B | C | D | E | F | G | H | |
|---|---|---|---|---|---|---|---|---|---|
| Dimension | 1.40 ±0.1 | 3.40 ±0.1 | 2.70 ±0.1 | 4.00 | 8.00 | 4.00 | 1.50 | 1.75 | Unit：mm |

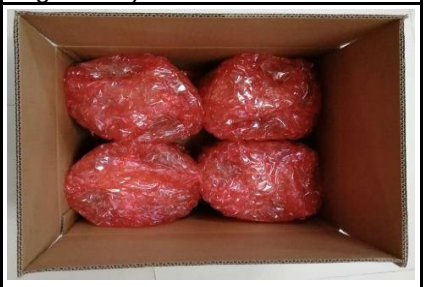



| | L | L1 | W | W1 | |
|---|---|---|---|---|---|
| Dimension | 178 | 13 | 11.5 | 8 | Unit：mm 3000pcs / reel |

## 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 |


惠伦晶体
FAITH LONG CRYSTAL