广东惠伦晶体科技股份有限公司
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# PRODUCT SPECIFICATION SHEET

| | | |
|---|---|---|
| CUSTOMER | : | |
| PRODUCT TYPE | : | OSC 2.0X1.6 (4PAD) |
| NOMINAL FREQ. | : | 33.333000 MHz |
| FL P/N | : | 9L33300001 |
| REVISION | : | S0 |
| CUSTOMER P/N | : | |

CUSTOMER'S APPROVAL&DATE

FL CORPORATION

| APPROVED | CHECKED | DESIGNED |
|---|---|---|
| Xing Yue | Huang Ji Ning | Li Xiang |

MSL1

RoHS Compliant

**CONTENTS** **PAGE**


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**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 | 22-Jul-22 | N/A | Li Xiang |
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## ELECTRICAL SPECIFICATIONS

**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&A 280A or equivalent.

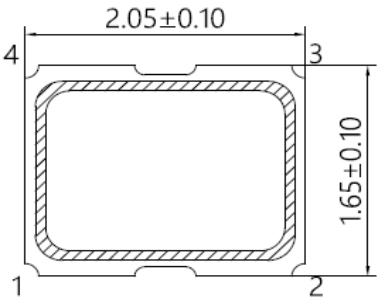
**Crystal cutting type**

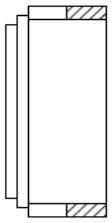
The crystal is using AT CUT (thickness shear mode)

## ELECTRICAL SPECIFICATIONS

| Parameters | Symbol | Electrical Spec. | UNITS | Notes |
|---|---|---|---|---|
| Nominal Frequency | FL | 33.333000 | MHz | - |
| Operating Temperature | TOPR | -40 ~ +105 | ℃ | - |
| The Total Frequency Offset | - | +/-25 | ppm | - |
| Output Load | CL | 15.0 | p F | Max. |
| Supply Voltage | VDD | 3.3 | V | - |
| “0”Level | VOL | VDD×0.1 | V | Max. |
| “1”Level | VOH | VDD×0.9 | V | Min. |
| Enable High Voltage | ELH | VDD×0.7 | V | Min. |
| Enable Low Voltage | ELL | VDD×0.3 | V | Max. |
| Symmetry of Wave Form | Symmetry | 45~55% | | - |
| Current Consumption | IDD | 10.0 | mA | Max. |
| Rise and Fall Time | Tr,Tf | 3.0 | nSec | Max. |
| Start time | tosc | 5.5 | mSec | Max. |
| Aging | - | +/-5 | ppm | 1st Year |
| Storage Temperature Range | - | -55 ~ +125 | ℃ | - |
| Output waveform | | CMOS | | |
| ESD | - | HBM＞2000V | – | JESD22-A114-B |
| MSL | - | Level 1 | – | IPC/JEDEC J-STD-033C |

**DIMENSIONS**

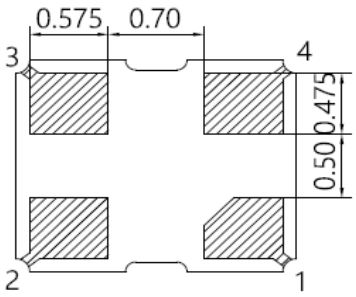


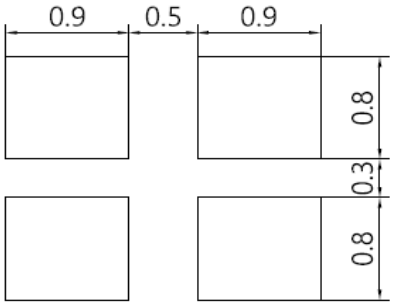



PAD FUNCTION
1: ENABLE CONTROL
2: GND
3: OUT
4: VDD

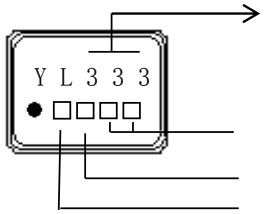
Enable Control

| Pad 1 Input | Pad 3 Output |
|---|---|
| Level High or Open | Normal Operation |
| Level Low | Stopped |




**MARKING**




**Frequency**
**Ex：333=33.333MHz**

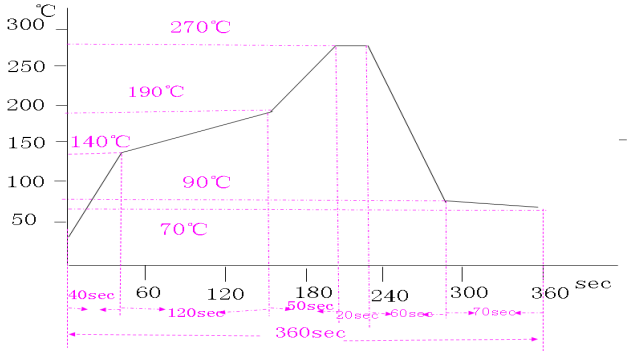
**Lot （2 digits）**
**Year Month Code**
**Administrative Symbo**

| 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 |

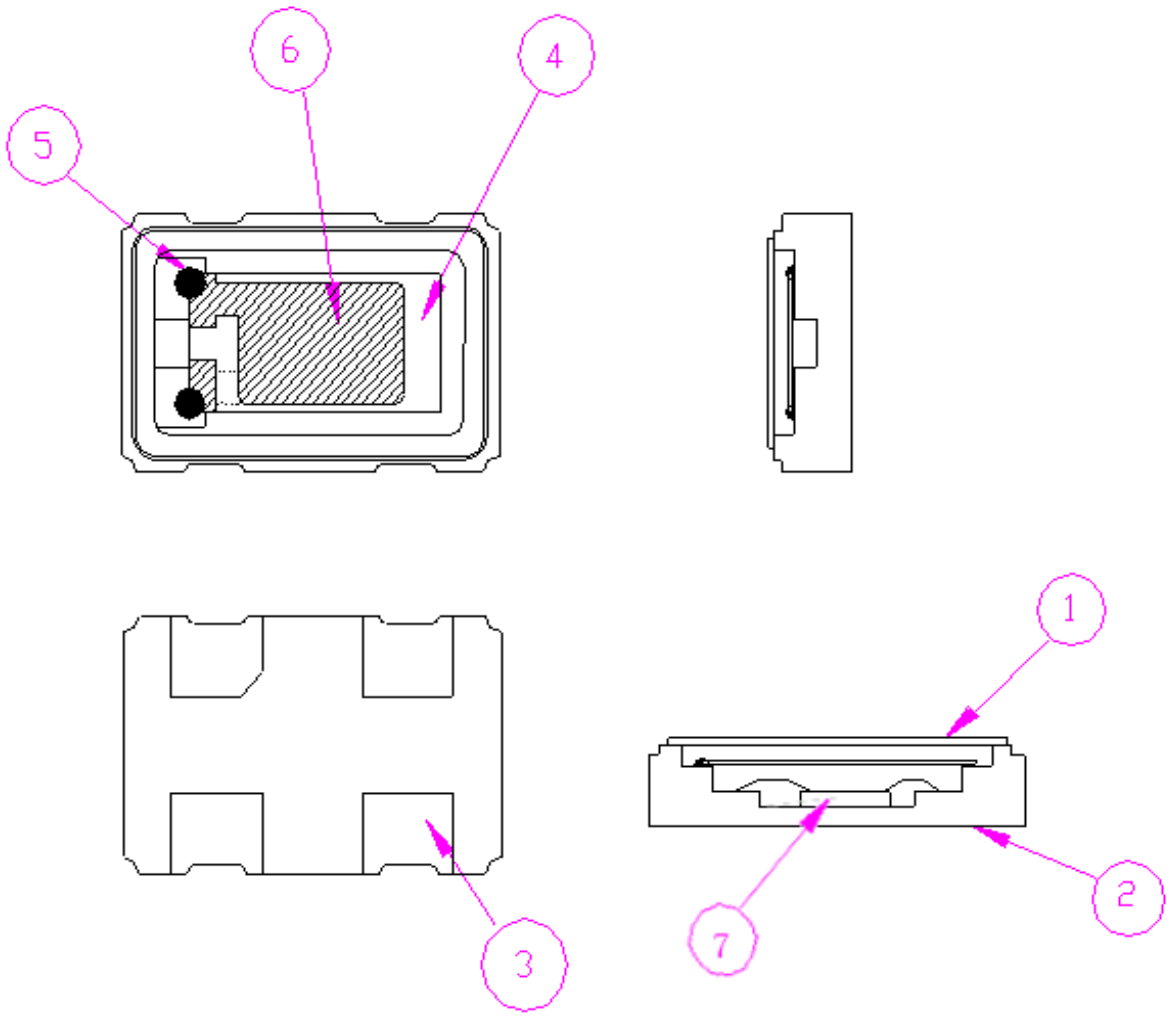
**SUGGESTED REFLOW PROFILE**

Total time : 360 sec. Max.

Solder melting point :185 °C



## STRUCTURE ILLUSTRATION




| NO | COMPONENTS | MATERIALS | QTY | FINISH/SPECIFICATIONS |
|---|---|---|---|---|
| 1 | Cap (Lid) | Metal (Fe) | 1 | - |
| 2 | Base (Package) | Ceramic ($Al_2O_3$) | 1 | Alumina ceramics |
| 3 | Pad (Package) | Au | 4 | Tungsten metalize<br>+Ni plating<br>+Au plating |
| 4 | Crystal blank | $SiO_2$ | 1 | - |
| 5 | Conductive adhesive | Ag | 4 | Silicone resin |
| 6 | Electrode | Noble metal | 2 | - |
| 7 | IC | Silicon (Si) | 1 | - |

## RELIABILITY SPECIFICATIONS

Based on AEC-Q100 Rev. H

| No. | Item | Stress and Test Condition | Reference |
|---|---|---|---|
| 1 | Preconditioning | MSL1, bake 125°C 24 hours, 85°C/85% RH 168 hours, reflow x3 times. | JEDEC J-STD-020, JESD22-A113 |
| 2 | Temperature-Humidity-Bias or Biased HAST | Preconditioning before stress. THB (85°C/85%RH for 1000 hours) or HAST (130°C/85%RH for 96 hours, or 110°C/85%RH for 264 hours). | JEDEC JESD22-A101 or A110 |
| 3 | Autoclave or Unbiased HAST or Temperature-Humidity (without Bias) | Preconditioning before stress. AC (121°C/15psig for 96 hours) or unbiased HAST (130°C/85%RH for 96 hours, or 110°C/85%RH for 264 hours). | JEDEC JESD22-A102, A118, or A101 |
| 4 | Temperature Cycling | Preconditioning before stress.<br>Grade 0: -55ºC to +150ºC for 2000 cycles or equivalent.<br>Grade 1: -55ºC to +150ºC for 1000 cycles or equivalent.<br>Grade 2: -55ºC to +125ºC for 1000 cycles or equivalent.<br>Grade 3: -55ºC to +125ºC for 500 cycles or equivalent. | JEDEC JESD22-A104 and Appendix 3 |
| 5 | High Temperature Storage Life | +250ºC Ta for 10 hours or +200ºC Ta for 72 hours. | JEDEC JESD22-A103 |
| 6 | High Temperature Operating Life | Grade 0: +150ºC Ta for 1000 hours.<br>Grade 1: +125°C Ta for 1000 hours.<br>Grade 2: +105ºC Ta for 1000 hours.<br>Grade 3: +85ºC Ta for 1000 hours.<br>Vcc max. | JEDEC JESD22-A108 |
| 7 | Solderability | Perform 8 hour steam aging prior to testing (1 hour for Au-plated leads). 260°C±5°C,5sec±1sec., immersing depth≥0.5mm. | JEDEC JESD22-B102 or JEDEC J-STD-002D |
| 8 | Physical Dimensions | Applicable JEDEC standard outline and individual device spec for significant dimensions and tolerance. | JEDE JESD22-B100 and B108, AEC Q003 |
| 9 | Electrostatic Discharge Human Body Model | 2kV HBM. | AEC Q100-002 |

**RELIABILITY SPECIFICATIONS**

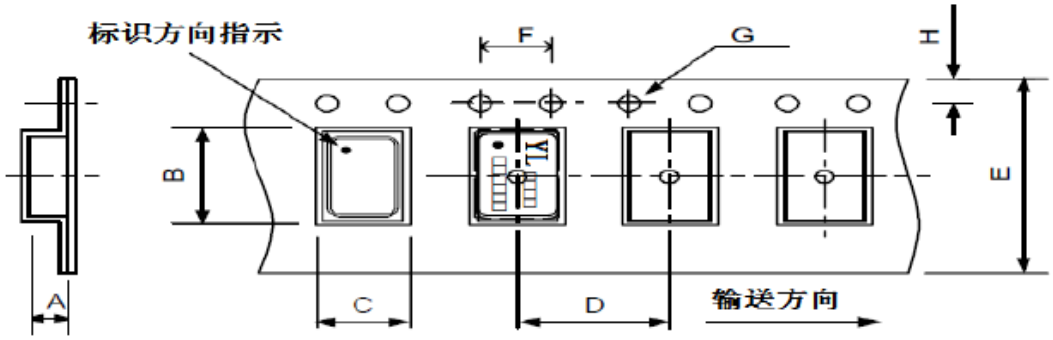
Based on AEC-Q100 Rev. H

| No. | Item | Stress and Test Condition | Reference |
|---|---|---|---|
| 10 | Electrostatic Discharge Charged Device Model | 750V corner pins, 500V all other pins. | AEC Q100-011 |
| 11 | Latch-Up | Maximum ambient operating temperature, maximum operating voltage, 100mA. | AEC Q100-004 |
| 12 | Mechanical Sock | Y1 plane only, 5 pulses, 0.5 msec duration, 1500 g peak acceleration. | JEDEC JESD22-B104 |
| 13 | Variable Frequency Vibration | 20 Hz to 2 KHz to 20 Hz (logarithmic variation) in >4 minutes, 4X in each orientation, 50 g peak acceleration. | JEDEC JESD22-B103 |
| 14 | Constant Acceleration | Y1 plane only, 30 K g force. | MIL-STD-883 2001 |
| 15 | Gross/Fine Leak | Any single-specified fine test followed by any single-specified gross test. | MIL-STD-883 Method 1014 |
| 16 | Package Drop | Drop part on each of 6 axes once from a height of 1.2m onto a concrete surface. | AEC-Q100 #G6 |
| 17 | Internal Water Vapor | 100˚C, moisture <5000ppm. | MIL-STD-883 Method 1018 |

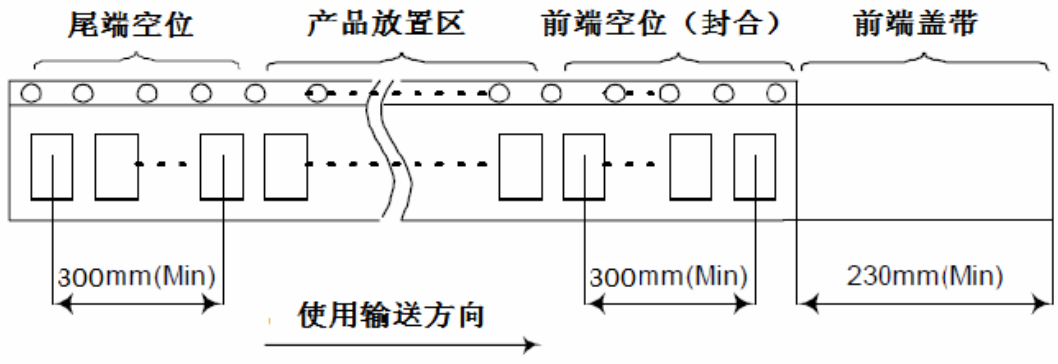
*Storage conditions： 18 months
*Constant humidity： 40~70%

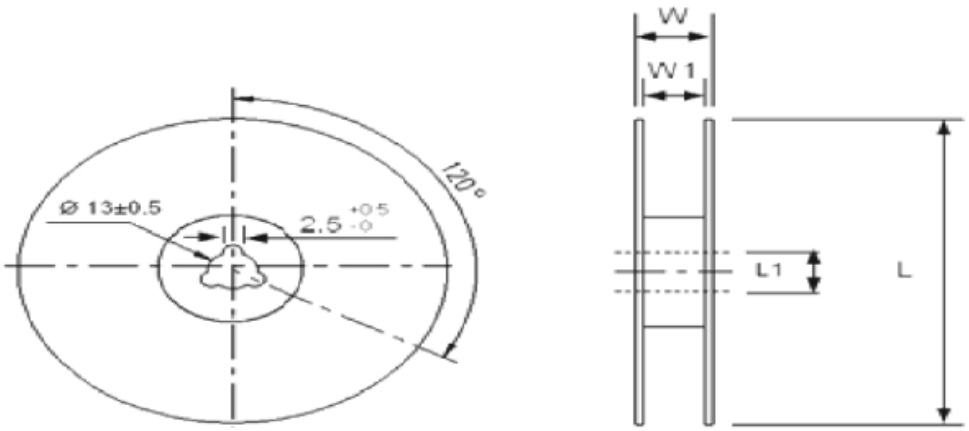
**PACKING :**

8mm-4mm，3000pcs / reel，ϕ 178；




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

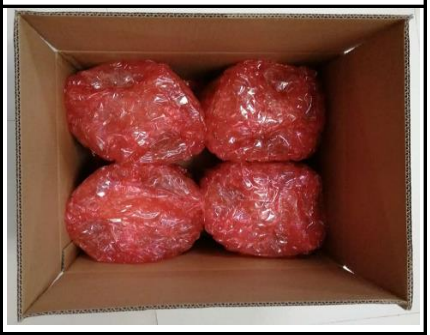



| 尺寸 | L | L1 | W | W1 | 单位:mm |
|---|---|---|---|---|---|
| | 178 | 13 | 11.5 | 8 | 每卷数量:3000 支 |

## SMD PRODUCT PACKING STANDARD

### Out-going packing instruction

| Reel Packing | Inner Packing | Carton |
|---|---|---|
| name：reel<br>standard：diameter 18cm<br>material：plastics<br>name：Anti-Static Shielding Bag<br>standard：205×250mm<br>material：APET/CPP | name：Anti-Static Bubble Bags<br>standard：430x330+20mm<br>material：HDPE(15 reels enter) | name：carton<br>standard：400x400x280mm<br>material：AB corrugated paper (60 boxes 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