



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 3.2X2.5 (4PAD)
NOMINAL FREQ. : 12.000000 MHz
FL P/N : 3C12000002
REVISION : S1
CUSTOMER P/N : _____

CUSTOMER'S APPROVAL&DATE

| |
|--|
| |
|--|

FL CORPORATION

| APPROVED | CHECKED | DESIGNED |
|----------|---------------|----------|
| Xing Yue | Huang Ji Ning | 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.



ELECTRICAL SPECIFICATIONS

Standard atmospheric conditions

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

- Ambient temperature $25\pm 2^{\circ}\text{C}$
- Relative humidity 40%~70%

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

- Ambient temperature $25\pm 2^{\circ}\text{C}$
- Relative humidity 40%~70%

Measure equipment

Electrical characteristics measured by S&A 280B or equivalent.

Crystal cutting type

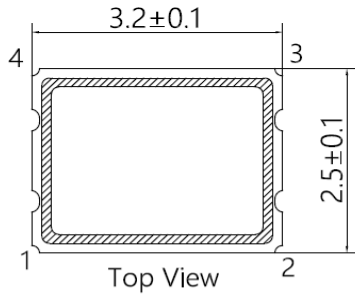
The crystal is using AT CUT (thickness shear mode)

ELECTRICAL SPECIFICATIONS

| Parameters | Symbol | Electrical Spec. | UNITS | Notes |
|----------------------------|----------|------------------|--------------------|----------------------|
| Nominal Frequency | FL | 12.000000 | MHz | - |
| Operating Temperature | TOPR | -40 ~ +85 | $^{\circ}\text{C}$ | - |
| The Total Frequency Offset | - | +/-50 | ppm | - |
| Output Load | CL | 15.0 | p F | Max. |
| Supply Voltage | VDD | 3.3 | V | - |
| "0"Level | VOL | VDD \times 0.1 | V | Max. |
| "1"Level | VOH | VDD \times 0.9 | V | Min. |
| Enable High Voltage | ELH | VDD \times 0.7 | V | Min. |
| Enable Low Voltage | ELL | VDD \times 0.3 | V | Max. |
| Symmetry of Wave Form | Symmetry | 45~55% | | - |
| Current Consumption | IDD | 10.0 | m A | Max. |
| Rise and Fall Time | Tr,Tf | 5.0 | nSec | Max. |
| Start time | tosc | 10.0 | mSec | Max. |
| Aging | - | +/-5 | ppm | 1st Year |
| Storage Temperature Range | - | -55 ~ +125 | $^{\circ}\text{C}$ | - |
| Output waveform | - | CMOS | - | - |
| ESD | - | HBM>2000V | - | JESD22-A114-B |
| MSL | - | Level 1 | - | IPC/JEDEC J-STD-033C |



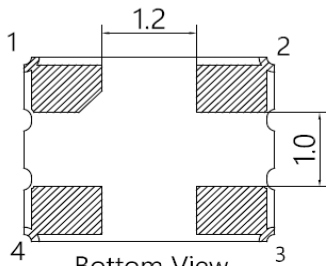
DIMENSIONS



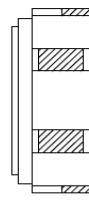
Top View



Side View



Bottom View

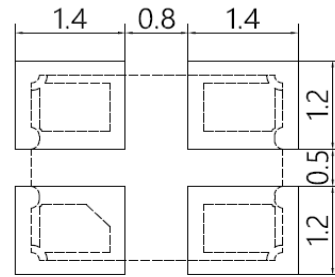


PAD FUNCTION

- 1: ENABLE CONTROL
- 2: GND
- 3: OUT
- 4: VDD

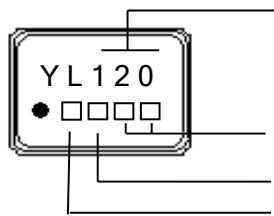
Enable Control

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



Top View Suggested Layout

MARKING



Frequency
Ex: 120=12.000MHz

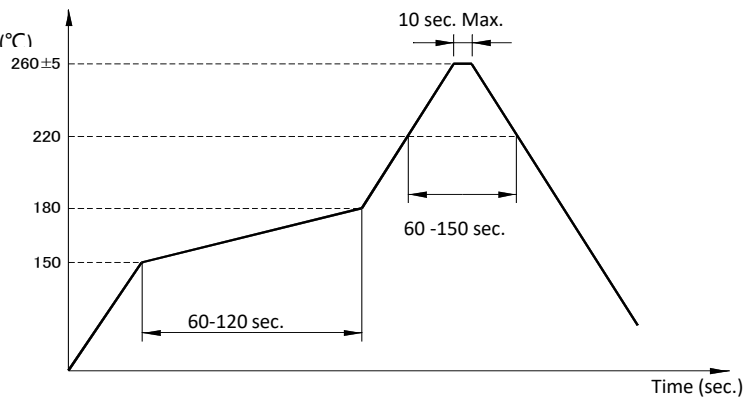
lot (2 digits)
year month code
Administrative Symbol

| | | month | | | | | | | | | | | |
|------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| year | | 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 $T_{\text{reflow}} (^\circ\text{C})$

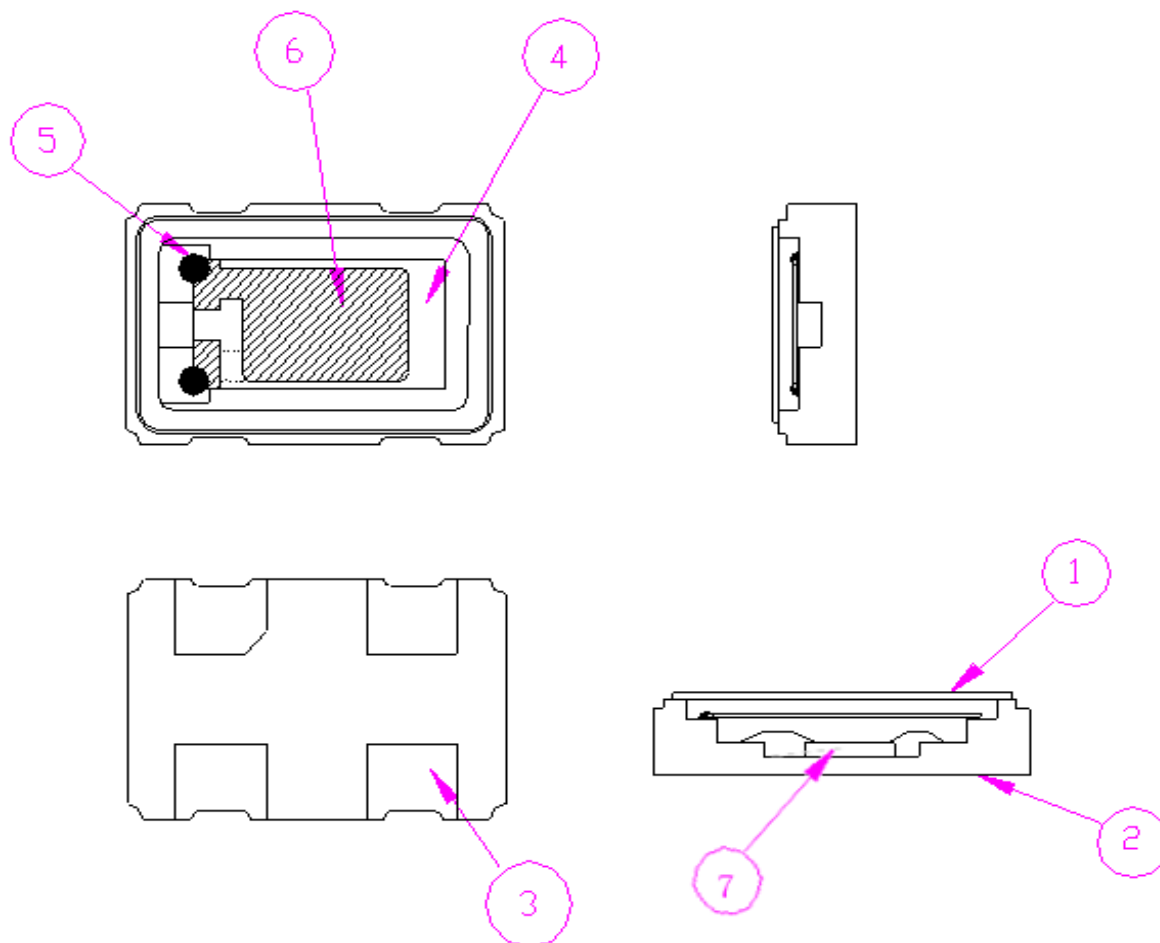
Total time : 360 sec. Max.

Solder melting point : 225 °C





STRUCTURE ILLUSTRATION



| NO | COMPONENTS | MATERIALS | QTY | FINISH/SPECIFICATIONS |
|----|---------------------|---|-----|---|
| 1 | Cap (Lid) | Metal (Fe) | 1 | - |
| 2 | Base (Package) | Ceramic (Al ₂ O ₃) | 1 | Alumina ceramics |
| 3 | Pad (Package) | Au | 4 | Tungsten metalize +Ni plating +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

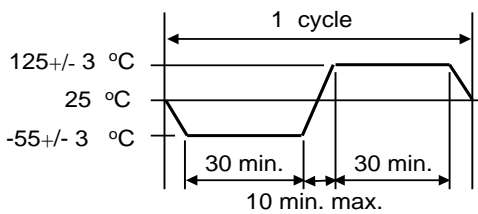
1.MECHANICAL ENDURANCE

| No. | Test Item | Test Methods | |
|-----|------------------------------|--|--------------|
| 1 | Drop Test | 75 cm height, fall freely onto stainless plate 3 times. | JIS C6701 |
| 2 | Mechanical Shock | Device are shocked to half sine wave (1000 G) three mutually pendicular axes each 3 times. 0.5m sec. duration time | MIL-STD-202F |
| 3 | Vibration | Frequency range 10 ~ 2000 Hz Amplitude 1.52 mm Penticular axes each test time 4 hours (Total test time 12 hours) | MIL-STD-883E |
| 4 | Solderability | Temperature 245°C +/- 5 °C Immersing depth 0.5 mm minimum Immersion time 10 +/- 0.5 seconds Flux Rosin resin methyl alcohol solvent (1 : 4) | MIL-STD-883E |
| 5 | Resistance To Soldering Heat | Pre-heat temperature 125 °C Pre-heat time 60 ~ 120 sec. Test temperature 260 +/- 5 °C Test time 5 +/- 1 sec. | MIL-STD-202F |

*Storage conditions : 18 months

*Constant humidity : 40~70%

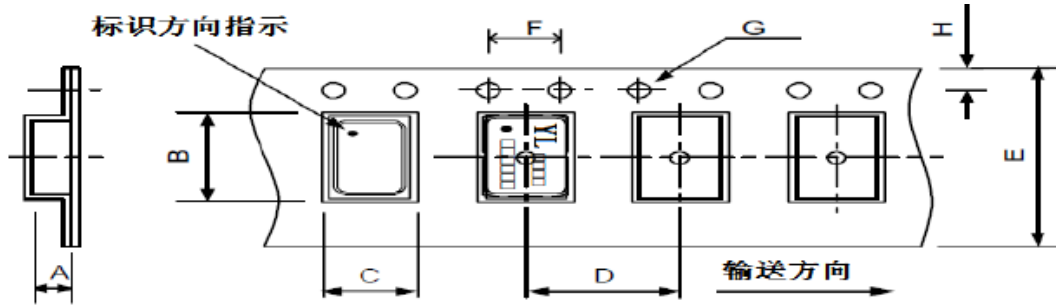
2.ENVIRONMENTAL ENDURANCE

| No. | Test Item | Test Methods | |
|-----|---------------------|---|--------------|
| 6 | High Temp. Storage | + 125 °C +/- 3 °C for 500 +/- 12 hours | MIL-STD-883E |
| 7 | Low Temp. Storage | - 40 °C +/- 3 °C for 500 +/- 12 hours | |
| 8 | Thermal Shock | Total 100 cycles of the following temperature cycle  | MIL-STD-883E |
| 9 | High Temp&Homidity | 85°C±3°C, RH 85%,500Hrs | JIS C5023 |
| 10 | Low Temp. Operation | - 40°C, VCC, for 1000 hours | MIL-STD-883E |

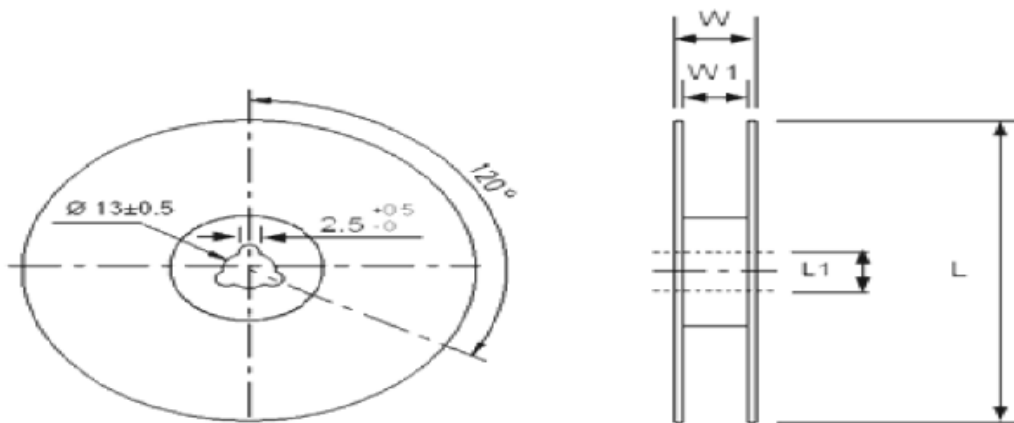
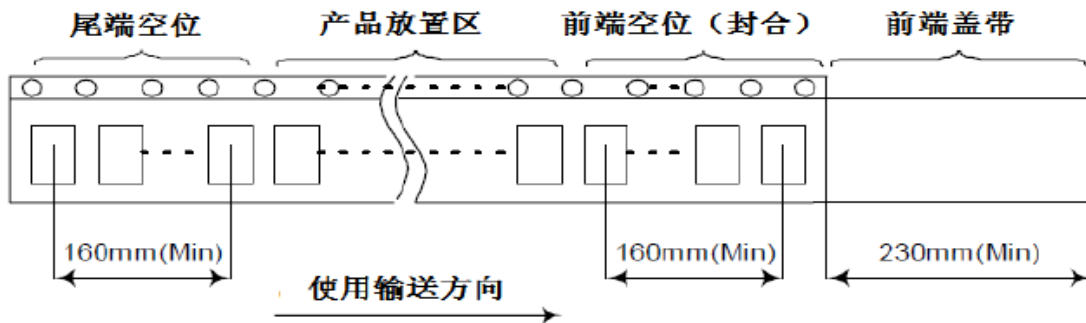


PACKING :

8mm-4mm, 3000pcs / reel, $\phi 178$;



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



| | | | | | |
|----|-----|----|------|----|--------------|
| 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 standard: diameter 18cm material: plastics name: Anti-Static Shielding Bag standard: 205x250mm | name: Anti-Static Bubble Bags standard: 430x330+20mm material: HDPE(15 reels enter) | name: carton standard: 400x400x280mm material: AB corrugated paper (60 boxes enter) |
|  |  |  |
|  | PART NO : 3526000389 LOT NO : 20041400 Q'TY : 3000 FREQ : 26.000000MHz   |  |

The label instruction

| Label Drawing | Mark | Name of Article | Spec. | Size | Printing |
|---|------|---|---|---------|----------|
| PART NO : 3526000389 LOT NO : 20041400 Q'TY : 3000 FREQ : 26.000000MHz   | L1 | 条码标签 Bar Code Label (Chintz Paper) | 1.Part No. 2.Lot No. 3.Q'ty 4.Freq | 70x50mm | White |
| PART NO : 3526000389 DATE CODE: 2015 Q'TY : 30000 FREQ : 26.000000MHz   | L2 | 条码标签 Bar Code Label (Chintz Paper) | 1.Part No. 2.Date Code 3.Q'ty 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 Cadmium and cadmium compounds | 100 | 100 |
| 2.铅及铅化合物 Lead and lead compounds | 1000 | 100 |
| 3.汞及汞化合物 Mercury and mercury compounds | 1000 | 100 |
| 4.六价铬化合物 Hexavalent-Chromium VI (Cr+6) | 1000 | 100 |
| 5.聚溴联苯 PBB Polybrominated biphenyls | 1000 | N/A |
| 6.聚溴二苯醚 PBDE Polybrominated diphenyl ethers | 1000 | N/A |
| 7.邻苯二甲酸二(2-乙基己基)酯 DEHP Di (2-ethylhexyl) phthalate | 1000 | N/A |
| 8.邻苯二甲酸丁苯酯 BBP Butyl Benzyl Phthalate | 1000 | N/A |
| 9.邻苯二甲酸二丁酯 DBP Dibutyl Phthalate | 1000 | N/A |
| 10 邻苯二甲酸二异丁酯 DIBP Diisobutyl Phthalate | 1000 | N/A |
| 11. 氟 (F)、氯 (Cl)、溴 (Br)、碘 (I) Fluorine、Chlorine、Bromine、Iodine | 900、900、900、900 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 Heavy metals (mercury, cadmium, lead, Cr+6,PBB and PBDE) in packing materials | N/A | 100 铅(Pb) + 镉(Cd) + 汞(Hg) + 六价铬 (Cr+6) <100ppm |
| 13.高度关注物质 SVHC-Substances of Very High Concern | 1000 | N/A |

