SPEC. NO.: W52-437

# CRYSTAL SPECIFICATION

Customer :

Customer P/N :

Agent :

Agent Code :

SIWARD P/N : XTL571150-W52-437

Customer Approval :


希華晶體科技股份有限公司
SIWARD CRYSTAL TECHNOLOGY CO., LTD.

業務部/ SALE DEPARTMENT
TEL: (04)25347909
FAX: (04)25327885 / 25337396
URL HTTP://www.siward.com.tw

品質保證部/ QUALITY ASSURANCE DEPT.
TEL: (04)25347909 EXT 1340/1341

研發部/R & D DEPT.
TEL: (04)25347909 EXT 1521

Address:1-1,LANE 111,JUNG-SHAN RD.,SEC.3, TANTZU HSING,TAICHUNG 427,TAIWAN,R.O.C.


DATE : 2016/04/06

Approved By : Steve Chen

Checked By : Tom Tang

Designer : JoJo Lin

| Rev. | Description of Revision History | Date | Designer | Checked By |
|---|---|---|---|---|
| 1 | New Publication | 2012/06/04 | Jo.Jo Lin | Tom Tang |

SPEC. NO.: W52-437

# CRYSTAL SPECIFICATION

1. Description : Quartz Crystal
2. Nominal Frequency : 12.000000 MHz
3. Center Frequency : 12.000000 MHz
4. Dimension & Drawing No. : SX-3225 ; SXD-00306
5. Oscillation Mode : Fundamental
6. Cutting Mode : AT cut
7. Packing Style : TP-094
8. Measurement Instrument : S&A 250B(Measured FL)
9. Electrical Characteristics :

[1] Operating Conditions :

| Item | Symbol | MIN. | TYP. | MAX. | Unit | Condition |
|---|---|---|---|---|---|---|
| Operating Temperature Range | Topt | -40 | | 85 | ℃ | |
| Storage Temperature Range | Tstg | -40 | | 90 | ℃ | |
| Load Capacitance | CL | | 18 | | pF | |
| Drive Level | DL | | | 100 | μW | |

[2] Frequency Stability :

| Item | Symbol | MIN. | TYP. | MAX. | Unit | Condition |
|---|---|---|---|---|---|---|
| Tolerance | dF/Fo | -10 | | 10 | ppm | Refer to Center Frequency @25±3℃ |
| Stability Over Temperature | dF/F25 | -15 | | 15 | ppm | Refer to Operating Temperature |
| Aging | dF/F25 | -2 | | 2 | ppm | Per Year |

dF/Fo: Frequency Deviation Refer to Center Frequency

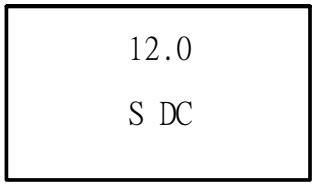
dF/F25: Frequency Deviation Refer to 25 ℃ Frequency

[3] Electrical Performance :

| Item | Symbol | MIN. | TYP. | MAX. | Unit | Condition |
|---|---|---|---|---|---|---|
| Equivalent Series Resistance | ESR | | | 100 | Ω | @Series |
| Shunt Capacitance | C0 | | | 5 | pF | |
| Insulation Resistance | IR | 500 | | | MΩ | @DC 100 Volt |

10. Marking : Laser

*MARKING : D ->YEAR C -> MONTH
YEAR : 1 2 3 4 5 6 7 8 9 0
CODE : A B C D E F G H J K
MONTH: 1 2 3 4 5 6 7 8 9 10 11 12
CODE : A B C D E F G H J K L M




11. Remark :

＊Compliant with RoHS and Siward QAD-S-116 Standard.

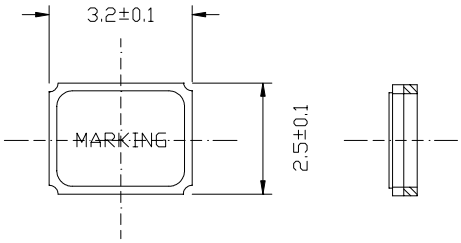
■Note

1.General cleaning solutions or ultrasonic cleaning method may be used to clean our products. However, under certain circumstances, ultrasonic cleaning machine could generate resonance at the oscillaton frequency of our products and thus deteriorate the electrical characteristics in devices, and even damage the overall structure of devices. Therefore, verification test is recommended before cleaning.

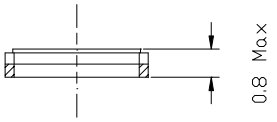
2.Avoid mounting and processing by Ultrasonic welding this method has a possibility of an excessive vibration spreading inside the crystal products and becoming the cause of characteristic deterioration and not oscillating.

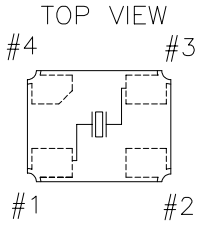
■ DIMENSIONS

Unit: mm

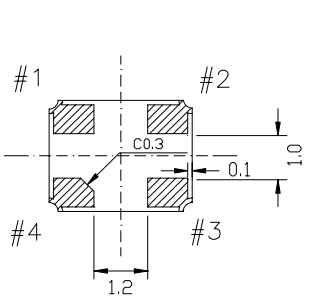


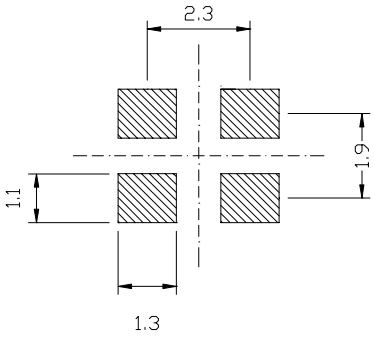

| PIN CONNECT | |
|---|---|
| 1,3 | Crystal |
| 2,4 | GND |



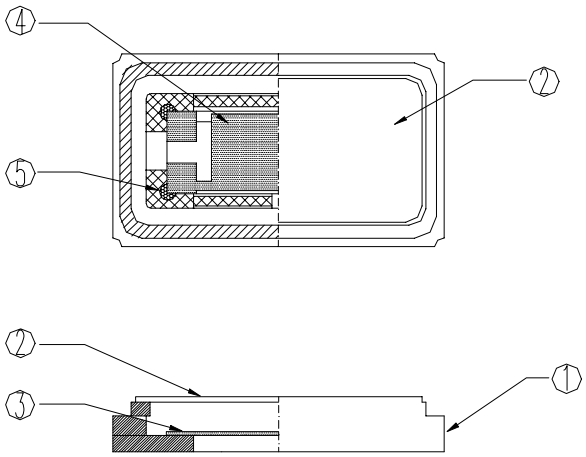




LAND PATTERN (REFERENCE)




■ STRUCTURE ILLUSTRATION




| PART NAME | | MATERIAL | PART NAME | | MATERIAL |
|---|---|---|---|---|---|
| 1. | BASE | CERAMIC | 4. | ELECTRODE | Metal |
| 2. | LID | KOVAR | 5. | ADHESIVES | SILVER GLUE |
| 3. | BLANK | QUARTZ | | | |

■RELIABILITY SPECIFICATION

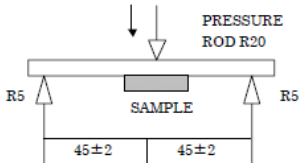
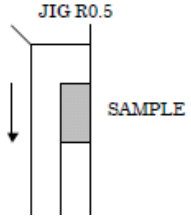
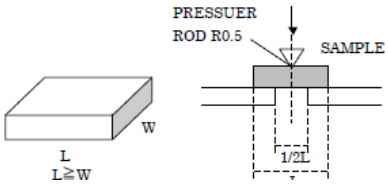
REFER TO JIS C 6701

1. ENVIRONMENTAL PERFORMANCE

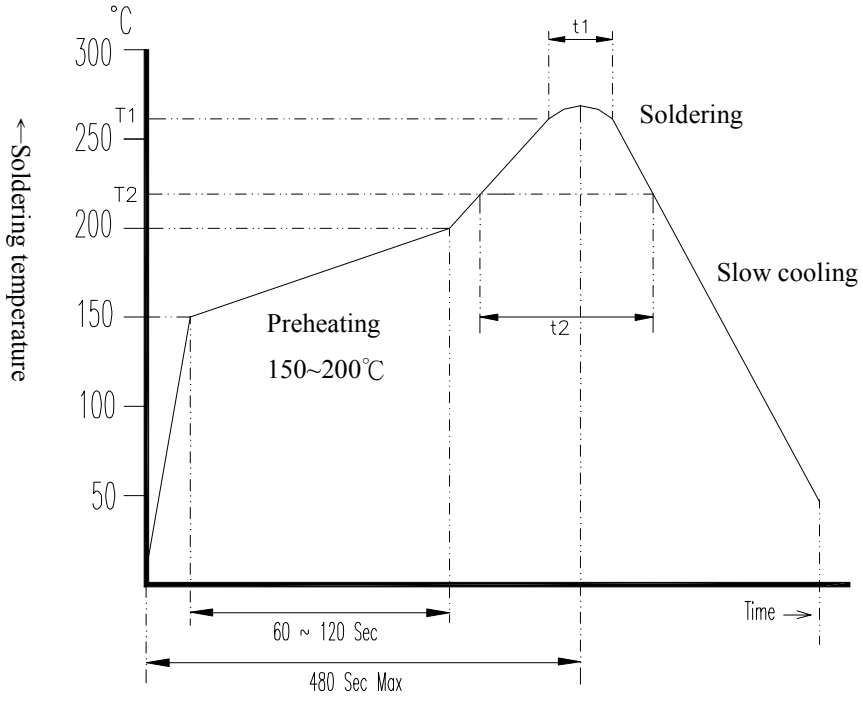
| ITEM | CONDITION |
|---|---|
| 1. HIGH TEMPERATURE STORAGE | STORED AT 85±2℃ FOR 720±12H. ( If Customer's temperature request is higher than the standard,Temperature test must be done for customer requirements. )<br>THEN 25±2℃ OVER 2H BEFORE TESTING. |
| 2. LOW TEMPERATURE STORAGE | STORED AT –40±2℃ FOR 500±12H. ( If Customer's temperature request is lower than the standard,Temperature test must be done for customer requirements. )<br>THEN 25±2℃ OVER 2H BEFORE TESTING. |
| 3. HIGH TEMP. & HUMIDITY | STORED AT 60±2℃ AND HUMIDITY 90～95% FOR 500±12 H.<br>THEN 25±2℃ OVER 2H BEFORE TESTING. |
| 4. TEMPERATURE CYCLE | THE CRYSTAL UNIT SHALL BE SUBJECTED TO 100 SUCCESSIVE CHANGE OF TEMPERATURE CYCLES, THEN 25 ±2℃ OVER 2 H BEFORE TESTING, EACH CYCLE AS BELLOW：<br>TEMPERATURE DURATION<br>1. -40+0/-6℃ 30±3 MINUTES<br>2. 25℃±2℃ 2～3 MINUTES<br>3. 85+4/-0℃ 30 ±3 MINUTES<br>4. 25℃±2℃ 2～3 MINUTES |

2. MECHANICAL PERFORMANCE

| ITEM | CONDITION |
|---|---|
| 5. SOLDERABILITY | THE LEAD IS IMMERSED IN A 260±5℃ SOLDER BATH WITHIN 2±0.6 SECONDS. |
| 6. RESISTANCE TO SOLDERING HEAT | REFLOW CHART AS ATTACH SHEET. TWICE PASS. |
| 7. FREE FALL | FREE DROPPING FROM 75 cm HEIGHT 3 TIMES ON A HARD WOODEN BOARD. |
| 8. VIBRATION | FREQUENCY：10～55Hz,<br>AMPLITUDE (TOTAL EXCURSION)：1.5mm±15%,<br>SWEEP TIME：1MIN, 3 DIRECTION(X, Y, Z) EACH FOR 2 Hrs. |
| 9. GROSS LEAK | STANDARD SAMPLE FOR AUTOMATIC GROSS LEAK DETECTOR, TEST PRESSURE: 0.2 Mpa |
| 10. FINE LEAK | HELIUM BOMBING 5.0～5.5 Kgf / $cm^2$<br>FOR 2 HOURS. |

| | |
|---|---|
| 11. TERMINAL STRENGTH | SHALL BE PRESSURIZED AT A SPEED OF APPROX.0.5mm/sec IN THE DIRECTION INDICATED BY THE ARROW UNTIL THE BENDING WIDTH REACHES 3mm AND HELD FOR 5 SECONDS.   |
| 12. STICKING TENDENCY | A R0.5 JIG SHALL BE USED TO APPLY A 10N DEAD LOAD IN THE DIRECTION INDICATED BY THE ARROW TO THE ELEMENT AND RETAIN IT FOR 10 SECONDS.   |
| 13. ELEMENT ASSEMBLY STRENGTH | A R0.5 PRESSURIZED BAR SHALL BE USED TO APPLY A 10N LOAD IN THE CENTER OF ELEMENT AND RETAIN IT FOR 10 SECONDS.   |

■ SUGGESTED REFLOW PROFILE

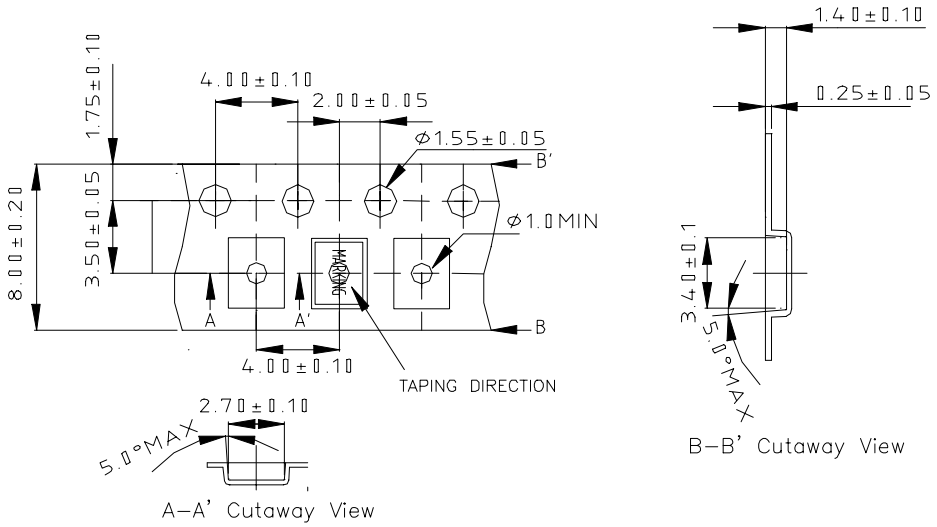


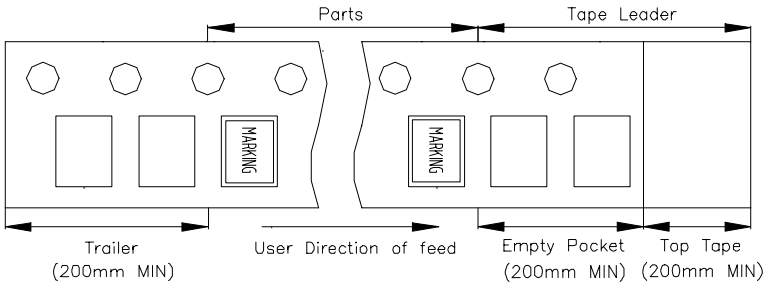

| Application\Temperature Time | T1 / t1 | T2 / t2 |
|---|---|---|
| Lead Free | 260±5℃ / 10±5 Sec Max | 217℃ Min / 60~150 Sec |
| Non Lead Free | 240±5℃ / 10±5 Sec Max | 183℃ Min / 60~150 Sec |

■ PACKING

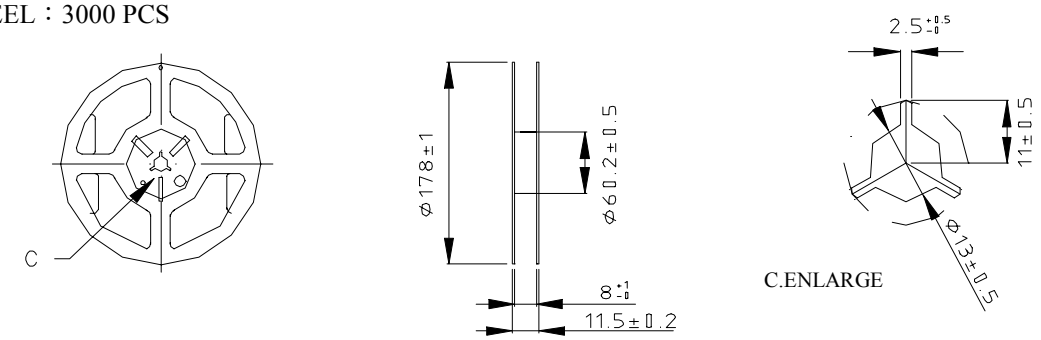
Unit: mm

1. CARRIER TYPE

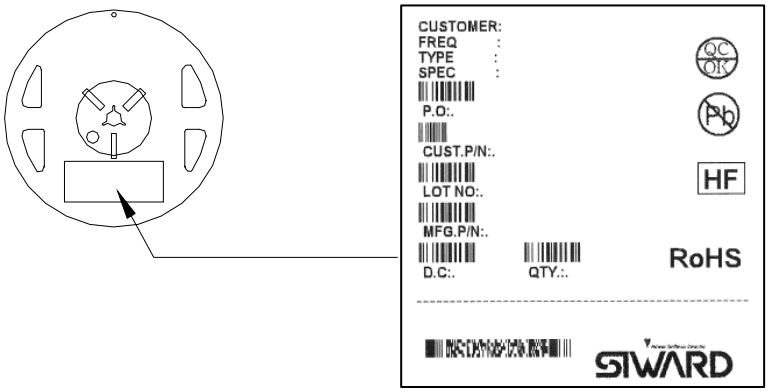



2. REEL：3000 PCS




3. LABEL



Patience Confidence Concentric

SIWARD

# Crystal T/C Test Report

| | | | | | |
|---|---|---|---|---|---|
| Customer Name | : | | | Date | : 2013/04/08 |
| Customer Code | : | | | Spec. No. | : W52-437 |
| Nominal Frequency | : | 12.000000 | MHz | Holder Style | : SX-3225 |
| Center Frequency | : | 12.000000 | MHz | | |

| | Center Frequency : 12.000000 MHz | | | | | Center Frequency : 12.000000 MHz | | | | | Center Frequency : 12.000000 MHz | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | @-40℃ | @85℃ | @℃ | @℃ | No. | @-40℃ | @85℃ | @℃ | @℃ | No. | @-40℃ | @85℃ | @℃ | @℃ |
| | [ PPM ] | [ PPM ] | [ PPM ] | [ PPM ] | | [ PPM ] | [ PPM ] | [ PPM ] | [ PPM ] | | [ PPM ] | [ PPM ] | [ PPM ] | [ PPM ] |
| 1 | -9.24 | -11.23 | | | | | | | | | | | | |
| 2 | -12.58 | -7.75 | | | | | | | | | | | | |
| 3 | -12.79 | -7.89 | | | | | | | | | | | | |
| 4 | -12.09 | -8.60 | | | | | | | | | | | | |
| 5 | -10.63 | -9.54 | | | | | | | | | | | | |
| 6 | -12.15 | -8.29 | | | | | | | | | | | | |
| 7 | -11.61 | -8.83 | | | | | | | | | | | | |
| 8 | -13.20 | -7.00 | | | | | | | | | | | | |
| 9 | -10.93 | -9.81 | | | | | | | | | | | | |
| 10 | -11.55 | -8.50 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Spec. | ± 15.00 | ± 15.00 | | | Spec. | ± 15.00 | ± 15.00 | | | Spec. | ± 15.00 | ± 15.00 | | |
| | ppm max | ppm max | ppm max | ppm max | | ppm max | ppm max | ppm max | ppm max | | ppm max | ppm max | ppm max | ppm max |

Notes :

| | | |
|---|---|---|
| *Measure In | : | S&A 2200A |
| *Drive Level | : | 100μW |
| *Load Capacitance | : | 18.0pF |
| *Reference Temperature | : | 25℃ |
| *Humidity | : | 64% |

Remark:

Tested By : JOJO

Checked By : TOM

***SIWARD*** *CRYSTAL TECHNOLOGY CO., LTD.*

# CRYSTAL TEST REPORT

| | | | | |
|---|---|---|---|---|
| Customer name | : | | Date | : 2013/04/08 |
| Frequency | : 12.000000 | MHz | SPEC. NO. | : W52-437 |
| Load Capacitance | : 18.00 | pF | | |
| Driver Level | : 100.0 | μW | | |

| NO. | FL | RR | C0 | C1 | DLD2 | FDLD | TS | RLD2 | SPDB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | [ppm] | [Ohms] | [pF] | [fF] | [Ohms] | [ppm] | [ppm/pF] | [Ohms] | [dB] | | |
| MAX. | 10 | 100 | 5 | | | | | | | | |
| MIN. | -10 | | | | | | | | | | |
| 1 | -0.50 | 54.50 | 0.79 | 1.543 | 3.75 | 1.84 | 2.18 | 54.14 | -36.86 | | |
| 2 | -1.18 | 70.41 | 0.79 | 1.580 | 2.38 | 1.34 | 2.24 | 69.57 | -37.94 | | |
| 3 | -0.69 | 68.25 | 0.80 | 1.586 | 2.48 | 1.33 | 2.24 | 67.31 | -36.17 | | |
| 4 | -0.09 | 57.61 | 0.79 | 1.622 | 2.93 | 1.64 | 2.30 | 56.92 | -37.61 | | |
| 5 | 0.18 | 57.55 | 0.80 | 1.612 | 2.60 | 1.61 | 2.28 | 56.94 | -36.83 | | |
| 6 | 0.78 | 45.80 | 0.80 | 1.619 | 4.46 | 2.01 | 2.29 | 45.81 | -40.47 | | |
| 7 | -0.56 | 56.72 | 0.79 | 1.552 | 3.02 | 1.74 | 2.20 | 56.19 | -34.95 | | |
| 8 | -0.84 | 52.61 | 0.81 | 1.581 | 3.15 | 1.83 | 2.23 | 52.11 | -34.27 | | |
| 9 | -1.04 | 47.66 | 0.80 | 1.618 | 2.86 | 1.90 | 2.29 | 47.28 | -35.81 | | |
| 10 | -0.11 | 52.76 | 0.79 | 1.624 | 3.27 | 1.81 | 2.30 | 52.39 | -36.19 | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| MAX | 0.78 | 70.41 | 0.81 | 1.624 | 4.46 | 2.01 | 2.30 | 69.57 | -34.27 | | |
| MIN | -1.18 | 45.80 | 0.79 | 1.543 | 2.38 | 1.33 | 2.18 | 45.81 | -40.47 | | |
| AVG | -0.40 | 56.39 | 0.80 | 1.594 | 3.09 | 1.71 | 2.26 | 55.87 | -36.71 | | |
| STD | 0.60 | 7.89 | 0.01 | 0.030 | 0.63 | 0.23 | 0.04 | 7.64 | 1.73 | | |

NOTES :

MEASURE IN S&A 250B

Tested By : JOJO LIN

Checked By : TOM TANG

*SIWARD CRYSTAL TECHNOLOGY CO., LTD.*