

# SPECIFICATIONS FOR APPROVAL



Customer Part No.: \_\_\_\_\_ HELE. Part No: **X5H008000FC1H-X**  
Application For: \_\_\_\_\_ Products: **QUARTZ CRYSTAL**  
Accepted Model: \_\_\_\_\_ Type & Freq.: **HSX530G/ 8.0000MHz**  
Sample Order No: **EOS-BB0242-1** Date: **2011/11/16**

Approved By :

加高電子股份有限公司  
加高電子股份有限公司

**HARMONY ELECTRONICS CORP.**  
**HARMONY ELECTRONICS (THAILAND) CO., LTD.**  
**HARMONY ELECTRONICS (SHENZHEN) CORP., LTD.**

|   |   |   |  |
|---|---|---|--|
| <b>TAIPEI OFFICE:</b><br>公司:(114)<br>台北市內湖區堤頂大道 2 段 409 號 2 樓<br>2F., NO.409, SEC.2, TIDING BLVD.,<br>NEIHU DISTRICT, TAIPEI CITY 114,<br>TAIWAN (R.O.C.)<br>TEL:886-2-26588883<br>FAX:886-2-26588683 | <b>TAIWAN FACTORY:</b><br>工廠:(831)<br>高雄市大寮區大發工業區華東路 39 號<br>No.39, Hua dong Rd., Daliao Dist.,Dafa<br>Industrial Park., Kaohsiung City 831,<br>Taiwan (R.O.C.)<br>TEL: (07)787-1555-6<br>FAX: (07)787-1557 | <b>THAILAND FACTORY:</b><br>66MOO 5, KAONGU-BEOKPRAI RD.,<br>T.BEOKPRAI, A. BANPONG,<br>RAJCHABUREE PROVINCE 70110,<br>THAILAND<br>TEL: (032)221994-6, 200740-1<br>FAX: (032)200742 | <b>SHENZHEN FACTORY:</b><br>深圳市福永鎮塘尾村塘橋路聚源工業區<br>QIAO TANG RD., TANGWEI VILLAGE<br>FU YONG TOWN SHENZHEN CITY<br>CHINA<br>TEL: 0755-7309272 / 7309262<br>FAX: 0755-7309755 |
|---|---|---|--|

|   |            |            |            |   |      |      |
|---|------------|------------|------------|---|------|------|
| Title <b>HSX530G</b><br><b>QUARTZ CRYSTAL SPECIFICATION</b> |            |            |            | Country of origin <b>TAIWAN FACTORY</b><br><b>THAILAND FACTORY</b><br><b>SHENZHEN FACTORY</b> |      |      |
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# HSX530G SPECIFICATION

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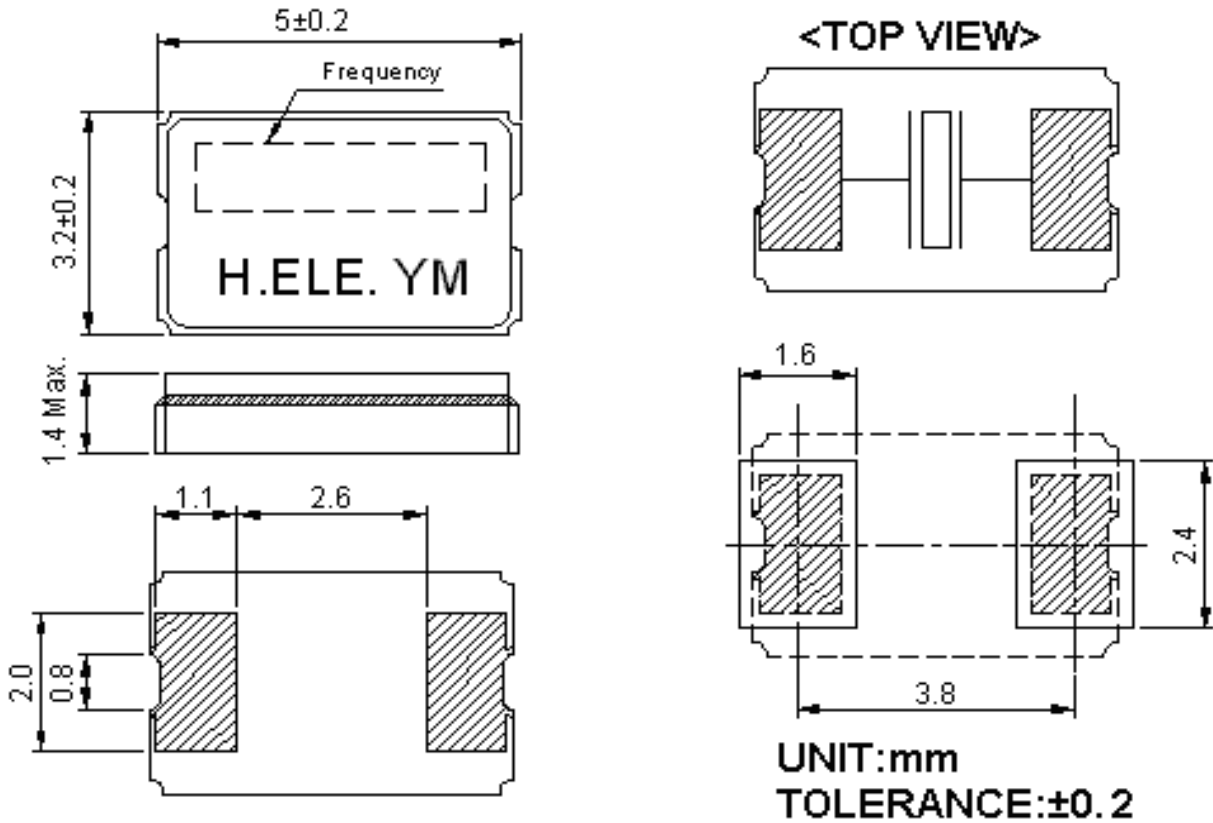
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# 1. QUARTZ CRYSTAL UNIT SPECIFICATION

- |                                |  |
|--------------------------------|--|
| 1. Frequency:                  | 8.000000MHz  |
| 2. Holder type :               | <b>HSX530G</b>   |
| 3. Frequency tolerance:        | +/-30ppm at 25deg.C +/- 3deg.C   |
| 4. Equivalent resistance:      | 150 ohms Max. / SERIES   |
| 5. Storage temperature range:  | -40deg.C To +85deg.C   |
| 6. Operable temperature range: | -20deg.C To +70deg.C   |
| 7. Temperature drift:          | +/-30ppm at -20deg.C To +70deg.C   |
| 8. Loading capacitance (CL) :  | 12pF   |
| 9. Drive level:                | 10 uW (300uW Max)  |
| 10. Shunt Capacitance:         | 7.0 pF Max.  |
| 11. Insulation resistance :    | More than 500M ohms at DC 100V   |
| 12. Mode of oscillation:       | Fundamental  |
| 13. Circuit:                   | Measured in HP/E5100A,S&A 250B   |
| 14. Shocking :                 | Dropping from 50 cm height 3 times on firm wood                              |
| Variation :                    | Frequency less than +/- 5 ppm<br>Resistance less than +/- 15 % or 2ohms max. |
| 15. Aging:                     | Less than +/- 5 ppm/Year   |
| 16. Holder                     | HSX530G Ceramic Base   |
| 17. Dimensions and marking     | Refer to page.4  |
| 18 Emboss carrier tape & reel  | Refer to page.6 and page.7   |
| 19 Note:                       |  |

|   |            |            |            |   |      |      |
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## 2. HSX530G MARKING & DIMENSIONS



- \*Marking should be printed as following:  
Nominal Frequency, Logo, Manufactured year & month
- \*Nominal frequency ( $m$ ) = 3 number after decimal point MAX.  
( ex. 12.000 MHz → 12.000 )
- \*Manufacturing Lot No.  
(Y: year) ex. 2000 shall be marked as ' 0 ' (As shown on the Table-1)  
(M: month) ex. June shall be marked as ' F ' (As shown on the Table-2).

Marking : Laser marking.

(Table-1)

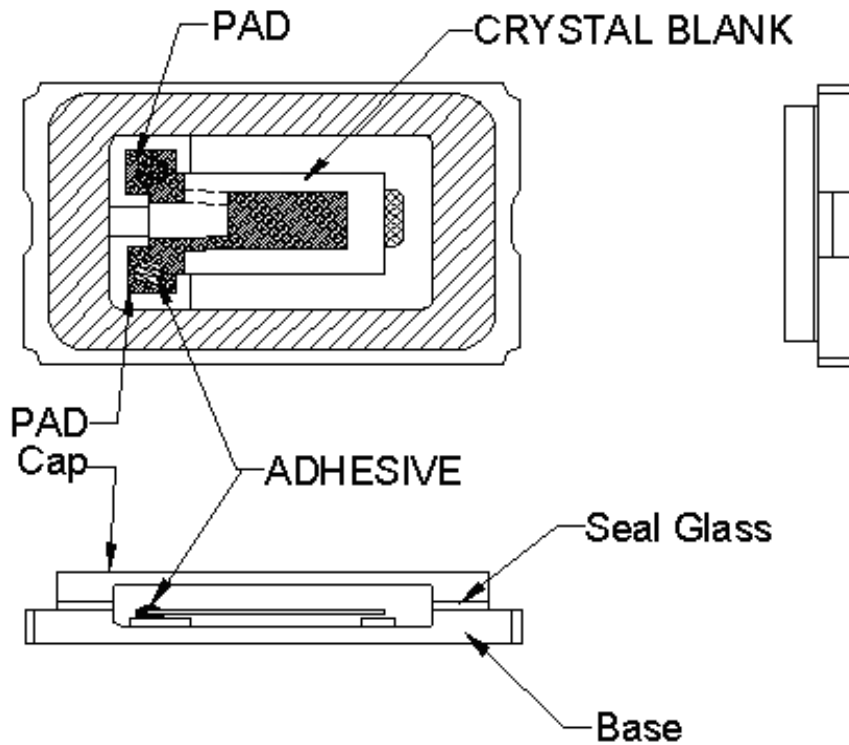
|      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|
| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|      | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| Code | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |

(Table-2)

|      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Jan. | Feb. | Mar. | Apr. | May. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
| A    | B    | C    | D    | E    | F    | G    | H    | J    | K    | L    | M    |

|   |            |            |            |  |      |      |
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### 3. INSIDE STRUCTURE



※Reference drawing

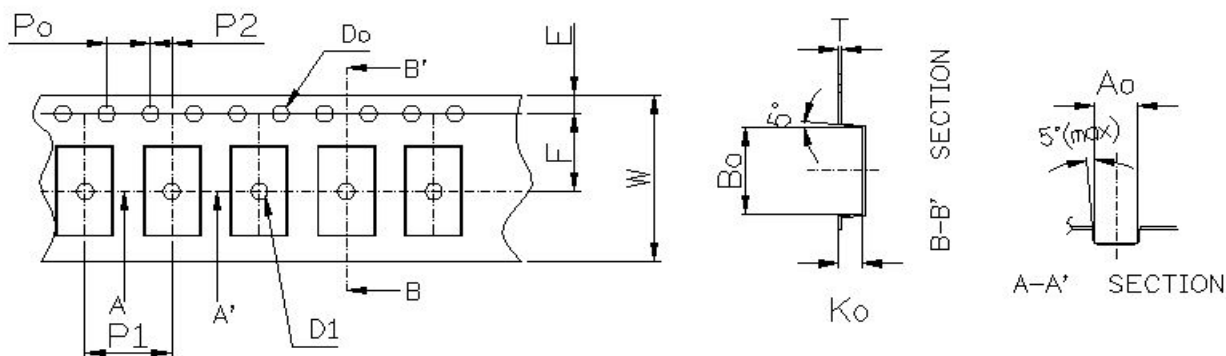
|   |
|---|
| (1) Base:<br>Alumina Ceramic ( $Al_2O_3$ )<br>Metallized Pad: W<br>Ni Plating<br>Au Plating |
| (2) Cap:<br>Alumina Ceramic ( $Al_2O_3$ )   |
| (3) Crystal Enclosure Seal:<br>Seal Glass   |
| (4) Crystal Blank<br>Rectangular At-Cut Quartz Crystal Blank                                |
| (5) Adhesive<br>Silver Conductive Silicon Resin   |
| (6) PAD<br>Alumina Ceramic (W. Ni. Au)  |

The use prohibition chemistry substance of Table 1 of DHE-0204-1 (HE-QA-24) is not included in this item.

|   |            |            |            |   |      |      |
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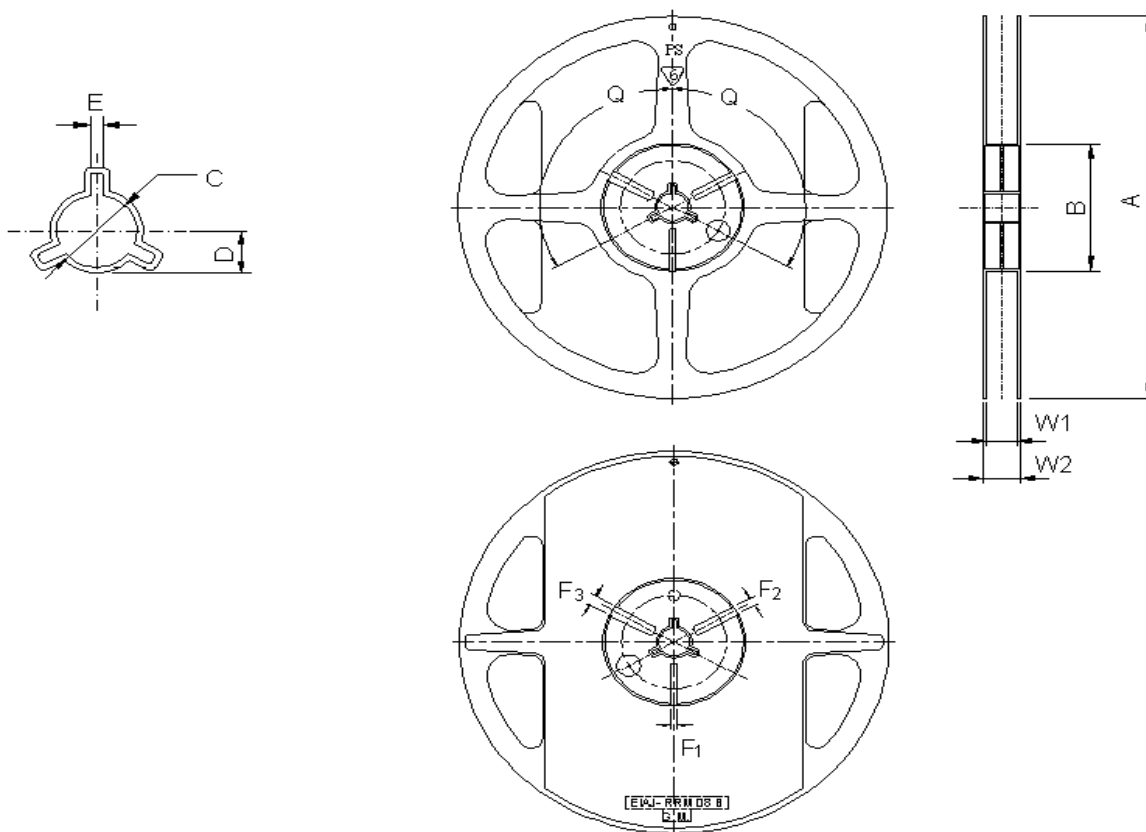
#### 4. HSX530G EMOSS CARRIER TAPE & REEL

##### a.) Dimensions of Carrier Tape



|        |           |           |           |           |           |             |           |
|--------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|
| Symbol | <b>Ao</b> | <b>Bo</b> | <b>Ko</b> | <b>Po</b> | <b>P1</b> | <b>P2</b>   | <b>T</b>  |
| Spec   | 3.60±0.1  | 5.40±0.1  | 1.40±0.1  | 4.0±0.1   | 8.0±0.1   | 2.0±0.05    | 0.30±0.05 |
| Symbol | <b>E</b>  | <b>F</b>  | <b>Do</b> | <b>D1</b> | <b>W</b>  | <b>10Po</b> |           |
| Spec   | 1.75±0.1  | 5.50±0.05 | 1.55±0.05 | 1.50(min) | 12.0±0.2  | 40.0±0.1    |           |

##### b.) Dimensions of Reel



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(Table-2)

(UNIT: mm)

| ITEM      |                   | MARK  | DIMENSIONS · ANGLE |                   |
|-----------|-------------------|-------|--------------------|-------------------|
| FLANCE    | Diameter          | A     | $\phi$ 180+0/-3    |                   |
|           | Inner Width       | W1    | 12.8+/-0.3         |                   |
|           | Outer Width       | W2    | 15.5+/-1.0         |                   |
| HUB       | Out Line diameter |       | B                  | $\phi$ 60.5+/-0.5 |
|           | Center Core slit  | Width | F1                 | 3.0+0.5/-0        |
|           |                   |       | F2                 | 4.0+0.5/-0        |
|           |                   | F3    | 5.0+0.5/-0         |                   |
|           | Position          |       | q                  | 120deg            |
|           | Spindle diameter  |       | C                  | $\phi$ 13.2+/-0.5 |
| Key Ditch | Width             | E     | 3.0+/-0.2          |                   |

## c.) Storage condition

Temperature: +40°C Max.

Relative Humidity: 80% Max.



## d.) Standard packing quantity

1,000 PCS / REEL

## e.) Material of the tape

| Tape         | Material |
|--------------|----------|
| Carrier tape | PS       |
| Top tape     | PET      |

## f.) Label contents

|  |     |
|--|-----|
|                                 |     |
| TYPE:  |     |
| SPEC.No.:  |     |
| Parts No.:   |     |
| Lot No.:   |     |
| FREQ.:   | MHz |
| Q'TY:  | PCS |
| HARMONY ELECTRONICS CORP.  ROHS |     |

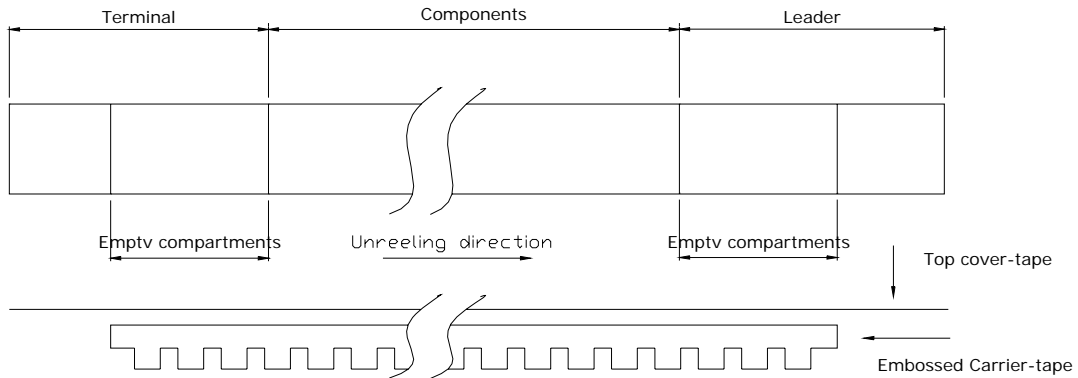
Sticks label for every reel.

|   |            |            |            |   |      |      |
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HARMONY ELECTRONICS CORP.

g.) Taping dimension

|          |              |   |
|----------|--------------|---|
| Leader   | Cover-tape   | The length of cover-tape in the leader is more than 400 mm including empty embossed area.   |
|          | Carrier-tape | After all products were packaged, must remain more than twenty pieces or 400 mm empty area, which should be sealed by cover-tape. |
| Terminal | Cover-tape   | The tip of cover-tape shall be fixed temporary by paper tape and roll around the core of reel one round.                          |
|          | Carrier-tape | The empty embossed area which are sealed by top cover-tape must remain more the 40 mm.  |



h.) Joint of tape

The carrier-tape and top cover-tape should not be jointed.

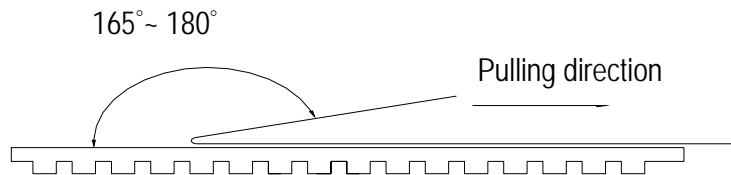
i.) Release strength of cover tape

It has to between 0.1N to 0.7N under following condition.

Pulling direction 165° to 180°

Speed 300mm/min.

Otherwise unless specified.



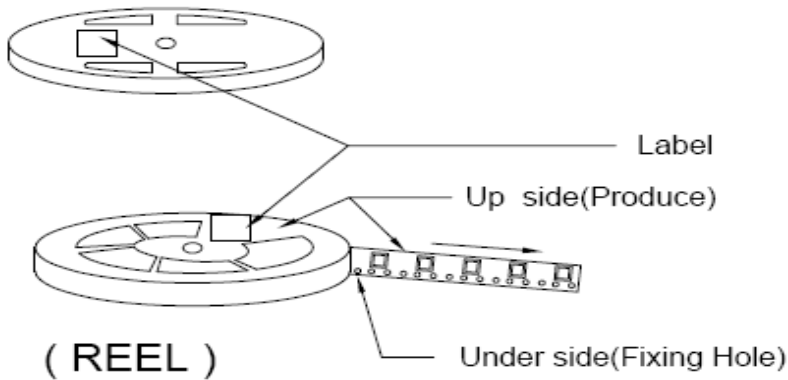
Other standards shall be based on JIS C 0806-1990.

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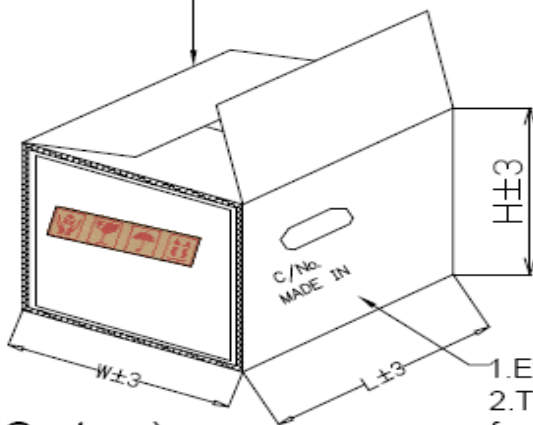
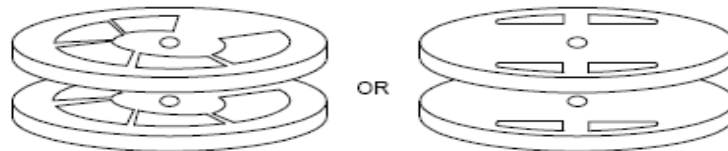
j.) Package

1. Reel :  $\varnothing 180$



**2. Carton** One reel quantity: [ 1000pcs ] & [ 3000pcs ]

- ① Top and bottom with 2.3cm thickness foam-rubber cushion for protection.
- ② Carton's Q'TY: 1~15 pcs.
- ③ Carton Type=A,B,C use 4 trigon pillar to fasten the Reel.
- ④ Need to add 3 pages dry agent in each outer box.



| Carton Type  | A       | B           | C      | D     |
|--------------|---------|-------------|--------|-------|
| Produce Type | 840/751 | 630/531/421 | 321/21 | OTHER |
| Reel         | 15      | 15          | 15     | 1~7   |
| L±3          | 200     | 200         | 200    | 195   |
| W±3          | 200     | 200         | 200    | 195   |
| H±3          | 230     | 230         | 230    | 150   |

(Carton )

- 1. Every Carton with 3 desiccant.
- 2. Top and bottom with 2.3cm thickness foam-rubber cushion for protection

|   |            |            |            |   |      |      |
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**5. Mechanical Endurance: Provided that measurement shall be carried out after it alone in the room temperature for 1 hour.**

| Item | Test Methods   | Specifications Code |
|------|--|---------------------|
| 1    | Drop<br>Should be satisfied after dropping three times from the height of 50 cm onto hard wooden board of thickness more than 30mm.  | A                   |
| 2    | Vibration<br>Should be satisfied after supplying following vibration.<br>(1)Vibration Frequency: 10~55Hz<br>(2)Cycle: 1 to 2 Min.<br>(3)Amplitude: 0.8mm<br>(4)Direction: X.Y.Z<br>(5)Time: 2 Hours / Each Direction | A                   |
| 3    | Substrate Bending<br>Mount the specimen on substrate.<br>Apply the following pressure<br>Direction: see Fig -1<br>Speed: 0.5 mm/sec<br>Hours: 5 ± 1 sec<br>Amount of substrate: 3 mm Max.                            | C                   |
| 4    | Adhesion<br>Mount the specimen on substrate.<br>Apply the following pressure<br>Direction: see Fig -2<br>Weight: 5N<br>Hours: 10 ± 1 sec   |                     |
| 5    | Body strength<br>Mount the specimen on substrate.<br>Apply the following pressure<br>Direction: see Fig -3<br>Weight: 10N<br>Hours: 10 ± 1 sec   |                     |

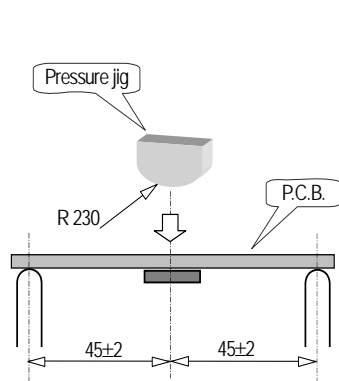


Fig-1

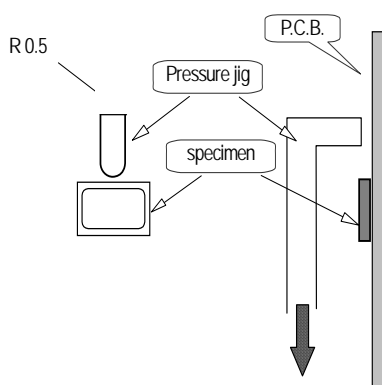


Fig-2

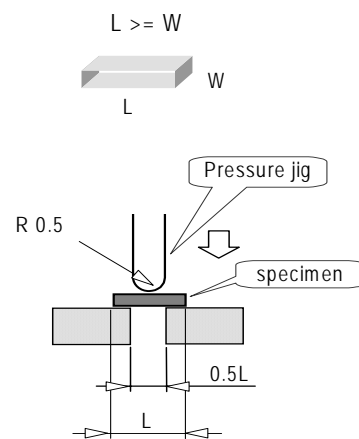
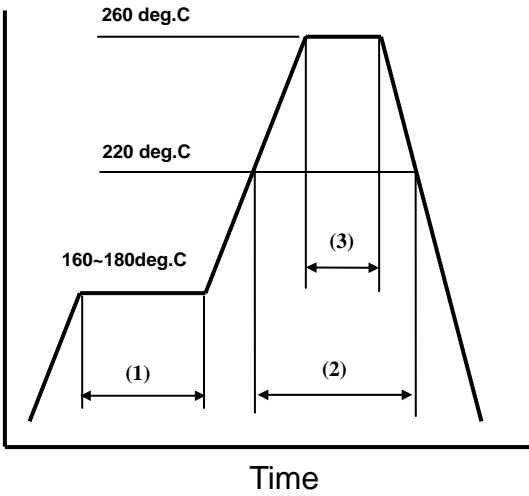


Fig-3

Title **HSX530G**  
**QUARTZ CRYSTAL SPECIFICATION**

Country of origin **TAIWAN** **FACTORY**  
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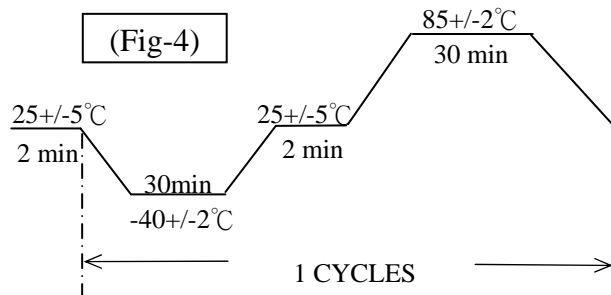
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|     |                              |  |             |         |               |         |     |              |           |        |     |      |           |             |   |
|-----|------------------------------|--|-------------|---------|---------------|---------|-----|--------------|-----------|--------|-----|------|-----------|-------------|---|
| 6   | Seal                         | Less than $1.0 \times 10^{-8}$ Pa.m <sup>3</sup> /sec by Helium leak detector.<br>Also, no serial bubble is observed by Fluorinate tests.  | ---         |         |               |         |     |              |           |        |     |      |           |             |   |
| 7   | Solder ability               | 3sec +/-0.5sec. Dip in 245deg.C +/-5deg.C solder.<br>(Use ROSIN type flux for solder.)   | B           |         |               |         |     |              |           |        |     |      |           |             |   |
| 8   | Resistance to Soldering Heat | <p>Run in reflow<br/>Reflow soldering shall be allowed<br/>Only two (2) time.</p> <p><i>Available for Lead Free Soldering</i></p>  <table border="1" data-bbox="534 1086 1093 1189"> <tr> <td>(1)</td> <td>Preheat</td> <td>160~180 deg.C</td> <td>120sec.</td> </tr> <tr> <td>(2)</td> <td>Primary heat</td> <td>220 deg.C</td> <td>60sec.</td> </tr> <tr> <td>(3)</td> <td>Peak</td> <td>260 deg.C</td> <td>10sec. Max.</td> </tr> </table> | (1)         | Preheat | 160~180 deg.C | 120sec. | (2) | Primary heat | 220 deg.C | 60sec. | (3) | Peak | 260 deg.C | 10sec. Max. | A |
| (1) | Preheat                      | 160~180 deg.C  | 120sec.     |         |               |         |     |              |           |        |     |      |           |             |   |
| (2) | Primary heat                 | 220 deg.C  | 60sec.      |         |               |         |     |              |           |        |     |      |           |             |   |
| (3) | Peak                         | 260 deg.C  | 10sec. Max. |         |               |         |     |              |           |        |     |      |           |             |   |

|   |                       |                     |                       |   |           |            |
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| Date<br><b>2011/11/16</b>                                   | Confirm<br>F. S. TSAI | Check<br>C. L. WANG | Prepare<br>U. F. CHEN | Spec. No.<br><b>X5H008000FC1H-X</b>   | Rev.<br>0 | Page<br>11 |

**6. Environmental Endurance: Provided that measurement shall be carried out after letting it alone in the room temperature for 1 hour.**

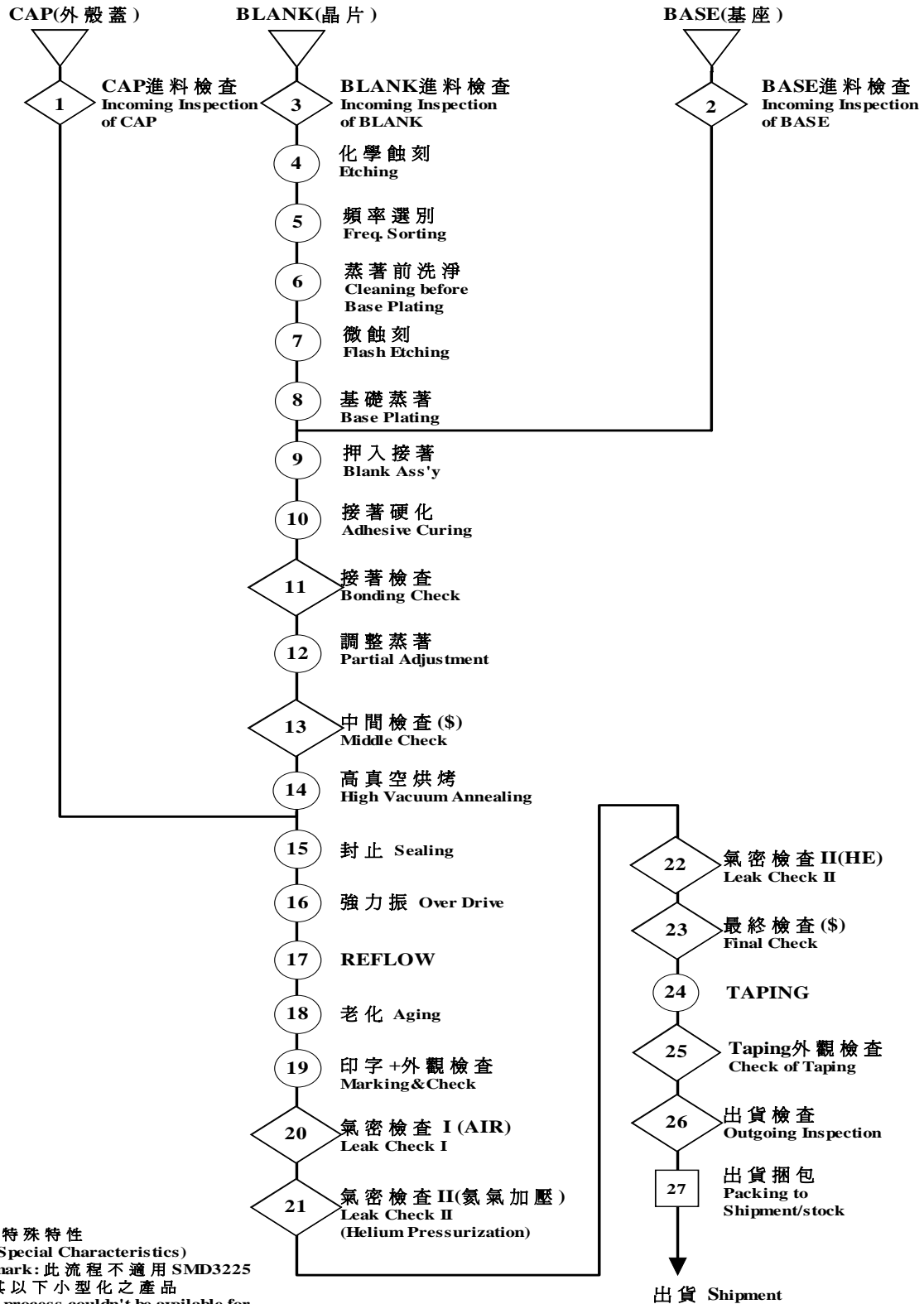
| Item                          | Test Methods   | Specifications Code |
|-------------------------------|--|---------------------|
| 1 Humidity                    | Should be satisfied after letting it alone at +60deg.C+/-2deg.C in humidity of 90% ~ 95% for 240 hours.  | A                   |
| 2 Storage in Low Temperature  | Should be satisfied after letting it alone at -40deg.C+/-2deg.C for 240 hours.   | A                   |
| 3 Storage in High Temperature | Should be satisfied after letting it alone at +85deg.C+/-2deg.C for 240 hours.   | A                   |
| 4 Thermal Shock               | Should be satisfied after supplying the following temperature cycle (25 cycles). (Refer to Fig-4). Temperature increasing or reducing time within 3 minutes. | A                   |



| Specifications code | Specifications  |
|---------------------|---|
| <b>A</b>            | Frequency variation shall be within +/-5ppm and equivalent resistance shall be within the specification after the test    |
| <b>B</b>            | More than 90% of lead shall be covered by new solder.   |
| <b>C</b>            | Without mechanical damage such as breaks.<br>Without electrode peeling.<br>Electrical characteristics shall be satisfied. |

|   |            |            |            |   |      |      |
|---|------------|------------|------------|---|------|------|
| Title <b>HSX530G</b><br><b>QUARTZ CRYSTAL SPECIFICATION</b> |            |            |            | Country of origin <b>TAIWAN FACTORY</b><br><b>THAILAND FACTORY</b><br><b>SHENZHEN FACTORY</b> |      |      |
| Date  | Confirm    | Check      | Prepare    | Spec. No.   | Rev. | Page |
| 2011/11/16  | F. S. TSAI | C. L. WANG | U. F. CHEN | <b>X5H008000FC1H-X</b>  | 0    | 12   |

## 7. Flow Chart



|   |            |            |            |   |      |      |
|---|------------|------------|------------|---|------|------|
| Title <b>HSX530G</b><br><b>QUARTZ CRYSTAL SPECIFICATION</b> |            |            |            | Country of origin <b>TAIWAN FACTORY</b><br><b>THAILAND FACTORY</b><br><b>SHENZHEN FACTORY</b> |      |      |
| Date  | Confirm    | Check      | Prepare    | Spec. No.   | Rev. | Page |
| 2011/11/16  | F. S. TSAI | C. L. WANG | U. F. CHEN | <b>X5H008000FC1H-X</b>  | 0    | 13   |

**8. Environmental Workload Chemical Substance Components List**

| <b>Environmental Workload Chemical Substance Components List</b>   |                   |                  |
|--|-------------------|------------------|
| <div style="text-align: center;">                     TYPE<br/>                     PERCENTAGE<br/>                     Chemical Substance Components                 </div> | <b>H(D)SX530G</b> |                  |
|  | <b>47(mg)</b>     | <b>ppm</b>       |
| <b>Silicon(Si)</b>   | <b>0.21150</b>    | <b>99.4050</b>   |
| <b>Gold(Au)</b>  | <b>0.06110</b>    | <b>28.7170</b>   |
| <b>Fluorinre(F)</b>  | <b>0.98700</b>    | <b>463.8900</b>  |
| <b>Titanium(Ti)</b>  | <b>0.22560</b>    | <b>106.0320</b>  |
| <b>Boron(B)</b>  | <b>0.06110</b>    | <b>28.7170</b>   |
| <b>Cobalt and its compound(Co)</b>   | <b>0.04042</b>    | <b>18.9974</b>   |
| <b>Lead(Pb)</b>  | <b>3.40280</b>    | <b>1599.3160</b> |
| <b>Bismuth(Bi)</b>   | <b>0.23500</b>    | <b>110.4500</b>  |
| <b>Silver(Ag)</b>  | <b>0.08930</b>    | <b>41.9710</b>   |
| <b>Chromium and its compound(Cr)</b>   | <b>0.07520</b>    | <b>35.3440</b>   |
| <b>Zinc(Zn)</b>  | <b>0.68620</b>    | <b>322.5140</b>  |
| <b>Aluminum(Al)</b>  | <b>21.14530</b>   | <b>9938.2910</b> |
| <b>Manganese and its compound(Mn)</b>  | <b>0.22090</b>    | <b>103.8230</b>  |
| <b>Wolfram and its compound(W)</b>   | <b>0.24910</b>    | <b>117.0770</b>  |
| <b>Nickel and its compound(Ni)</b>   | <b>0.17390</b>    | <b>81.7330</b>   |
| <b>Iron(Fe)</b>  | <b>1.82830</b>    | <b>859.3010</b>  |

|   |                   |                   |                   |   |          |           |
|---|-------------------|-------------------|-------------------|---|----------|-----------|
| Title <b>HSX530G</b><br><b>QUARTZ CRYSTAL SPECIFICATION</b> |                   |                   |                   | Country of origin <b>TAIWAN FACTORY</b><br><b>THAILAND FACTORY</b><br><b>SHENZHEN FACTORY</b> |          |           |
| Date  | Confirm           | Check             | Prepare           | Spec. No.   | Rev.     | Page      |
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