

SPECIFICATIONS FOR APPROVAL

Customer Part No. _____ HELE. Part No: **X3S012000FK1H-HV**

Application For: _____ Products: **CRYSTAL**

Accepted Model: _____ Type & Freq.: **HSX321S / 12.000MHz**

Sample Order No: **EOS-860118-17** Date: **2008/06/12**

Approved By :

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| Tittle HSX321S | | | | Remark TAIWAN FACTORY | | |
| QUARTZ CRYSTAL SPECIFICATION | | | | THAILAND FACTORY | | |
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HSX321S SPECIFICATION

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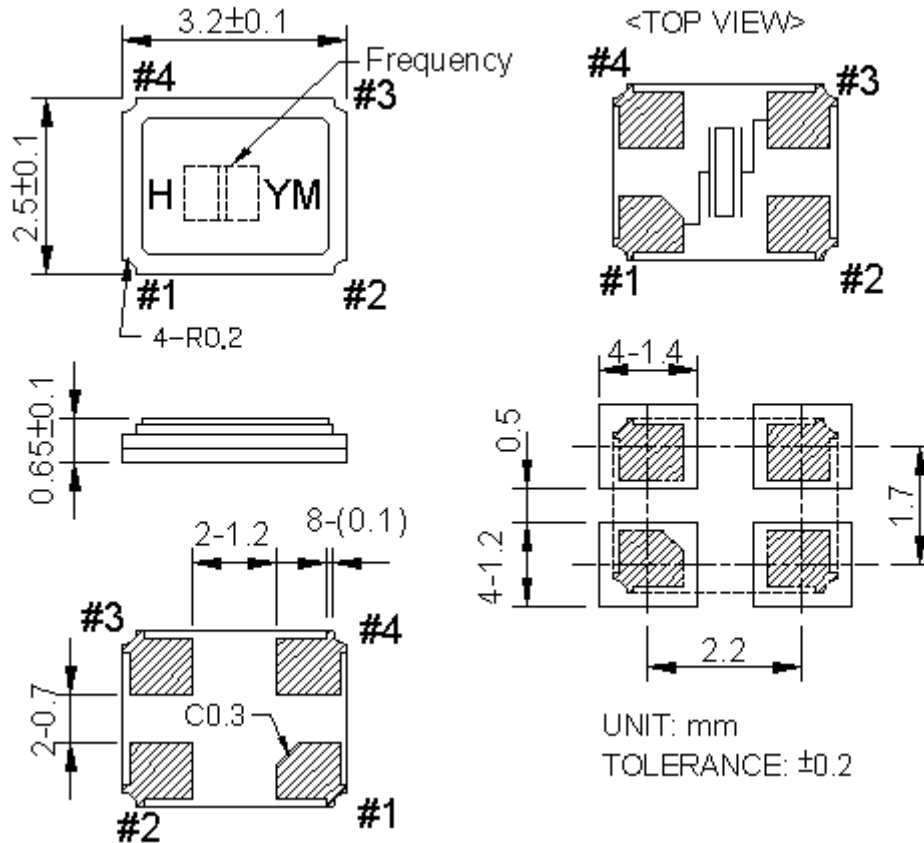
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1. QUARTZ CRYSTAL UNIT SPECIFICATION

- | | |
|--------------------------------|---|
| 1. Frequency: | 12.000000MHz |
| 2. Holder type : | HSX321S |
| 3. Frequency tolerance: | +/-30ppm at 25deg.C +/-3deg.C |
| 4. Equivalent resistance: | 80 ohms Max. / SERIES |
| 5. Storage temperature range: | -40 deg.C To +85 deg.C |
| 6. Operable temperature range: | -30 deg.C To +85deg.C |
| 7. Temperature drift: | +/-30 ppm -30 deg.C To +85deg.C |
| 8. Loading capacitance (CL) : | 20.0pF+/- 0.2 pF |
| 9. Drive level: | 10 μ W+/-2 μ W |
| 10. Shunt Capacitance: | 2.0pF Max |
| 11. Insulation resistance : | More than 500M ohms at DC 100V |
| 12. Mode of oscillation: | Fundamental |
| 13. Circuit: | Measured in S&A 250B ,HP/E5100A |
| 14. Shocking : | Dropping from 50 cm height 3 times on firm wood |
| Variation : | Frequency less than +/-5 ppm Resistance less than +/- 15 % or 2ohms max. |
| 15. Aging: | Less than +/- 5 ppm/Year |
| 16. Holder | HSX321S Seam type |
| 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. HSX321S MARKING & DIMENSIONS



- *Marking should be printed as following:
Logo, Nominal Frequency, Manufactured year & month
- *Nominal frequency = integer only
(ex. 14.31818 MHz \rightarrow 14)
- *Manufacturing Lot No.
(Y: year) ex. 2000 shall be marked as ' 0 ' (The last digit of the year)
(M: month) ex. June shall be marked as ' F ' (As shown on the Table-1).

Marking : Laser marking.

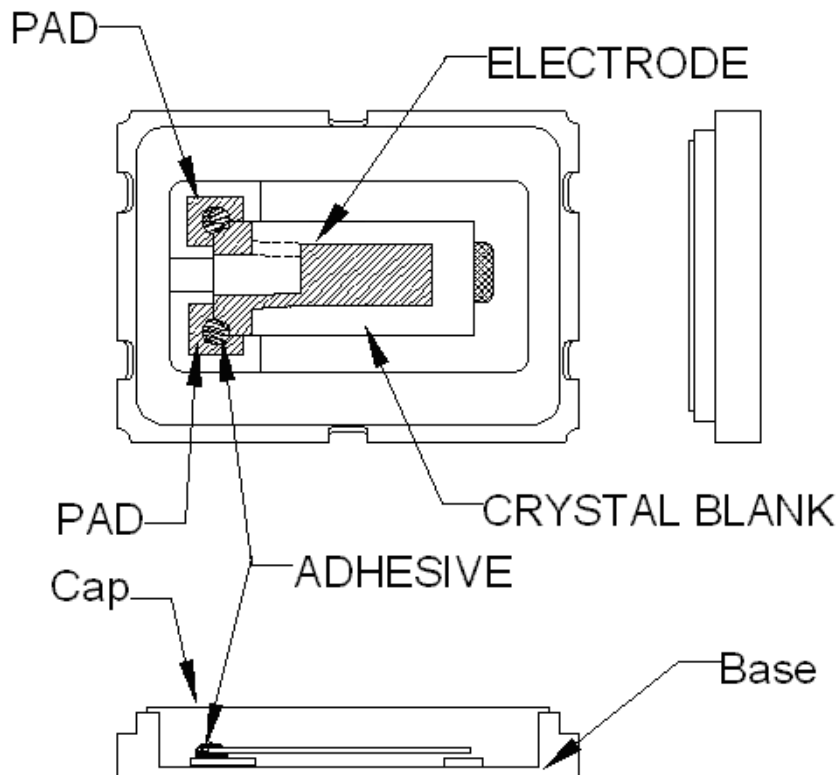
(Table-1)

| 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

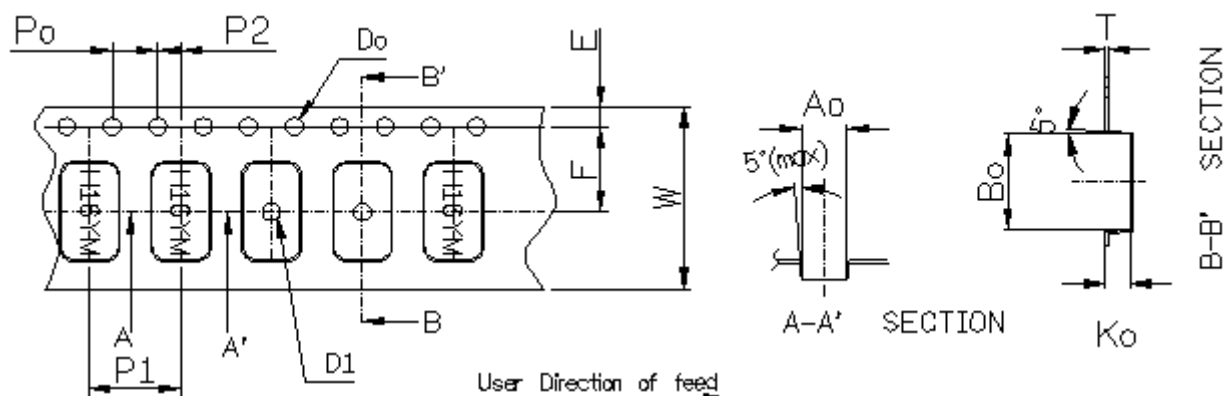
| |
|--|
| (1) Base: Alumina Ceramic (Al_2O_3) Metallized Pad: W Ni Plating Au Plating |
| (2) Cap: Fe-Ni |
| (3) Crystal Enclosure Seal: Seal Seam |
| (4) Crystal Blank Rectangular At-Cut Quartz Crystal Blank |
| (5) Adhesive Silver Conductive Silicon Resin Adhesive bonding: upper & lower bonding/lower bonding only |
| (6) Electrode Ag |
| (7) PAD Alumina Ceramic (W. Ni. Au) |

The use prohibition chemistry substance of Table 1 of DHE-0204-1 (QA-QM-08) is not included in this item.

| | | | | | | |
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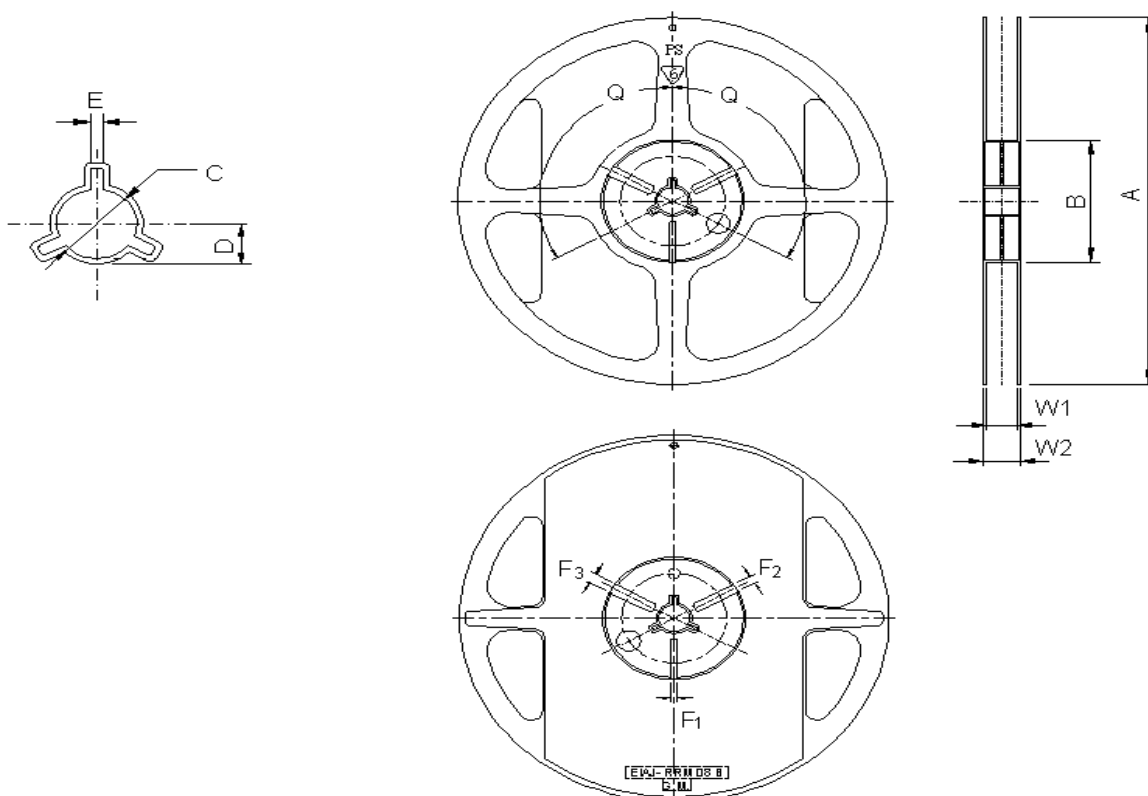
4. HSX321S EMOSS CARRIER TAPE & REEL

a.) Dimensions of Carrier Tape



| | | | | | | |
|--------|----------------|----------------|----------------------|---------------------------|---------------|-----------------|
| Symbol | A_0 | B_0 | K_0 | P_0 | P_1 | P_2 |
| Spec | 2.70 ± 0.1 | 3.4 ± 0.1 | 1.40 ± 0.1 | 4.0 ± 0.1 | 4.0 ± 0.1 | 2.0 ± 0.05 |
| Symbol | E | F | D_0 | D_1 | W | T |
| Spec | 1.75 ± 0.1 | 3.5 ± 0.05 | $\phi 1.55 \pm 0.05$ | $\phi 1.0 < \text{min} >$ | 8.0 ± 0.2 | 0.25 ± 0.05 |

b.) Dimensions of Reel



(Table-2)

(UNIT: mm)

| | | | | | | |
|---|------------|------------|------------|---|------|------|
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| ITEM | | MARK | DIMENSIONS · ANGLE |
|-----------|-------------------|----------------|----------------------|
| FLANCE | Diameter | | A ϕ 178+1/-1 |
| | Inner Width | | W1 8.0+/-1.5 |
| | Outer Width | | W2 11.5+/-0.2 |
| HUB | Out Line diameter | | B ϕ 60+1.0/-0.0 |
| | 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 ϕ 13+/-0.5 |
| Key Ditch | Width | E 2.5+/-0.5/-0 | |

c.) Storage condition

Temperature: +40deg.C Max.

Relative Humidity: 80% Max.

d.) Standard packing quantity

3,000PCS / REEL

e.) Material of the tape

| Tape | Material |
|--------------|-----------|
| Carrier tape | A – PET |
| Top tape | Polyester |

f.) Label contents

- .The type of product
- .Our specification No.
- .Your Part No.
- .Lot No.
- .Nominal Frequency
- .Quantity
- .Our Company Name

Sticks label for every reel.

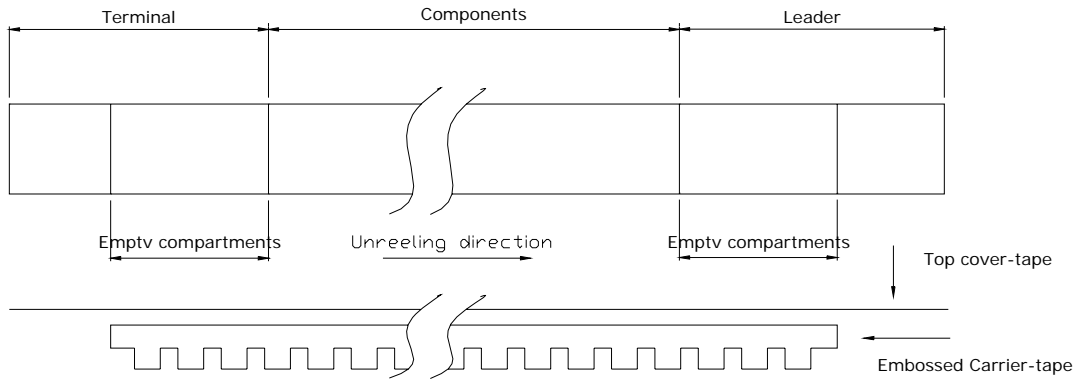
| | |
|---------------------------------|---------------------|
| TYPE | |
| SPEC NO. | |
| Parts NO. | |
| Lot No. | |
| FREQ. | |
| Q'TY | (RoHS Compliance) |
| H.ELE HARMONY ELECTRONICS CORP. | |

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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.

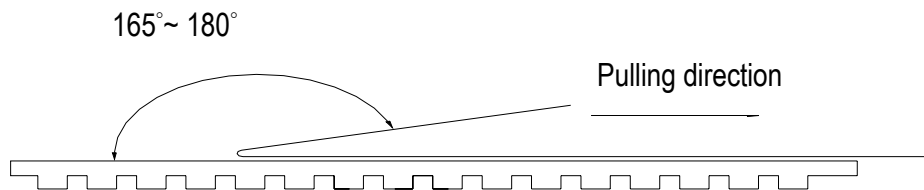
i.) Release strength of cover tape

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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5. Mechanical Performance

5.1.Natural Drop

Drop 3 times from the height of 50cm onto min. 30mm thickness hard wooden board
The component shall satisfy requirement of the electrical characteristics.

5.2.Vibration

Frequency 10-55Hz, Sine Wave full amplitude of 1.5mm to X,Y and Z 3 axes, Duration of 2 hours to each axis.

The component shall satisfy requirement of the electrical characteristics.

5.3.Sealing Tightness

Leak Rate 1.0×10^{-8} Pa-m³/sec. Max. measured by Helium leak detector.

5.4.Solderability

After applying ROSIN Flux, dipping in solder bath at 230°C +/-5°C for 5 sec.

Over 90% of terminal shall be covered by solder.

6. Environment Performance

6.1.Humidity

Temperature 60°C +/-2°C, RH 90~95%, Duration of 240 hours

Back to room temperature first, then in 1~2 hours, the component shall be checked.

The component shall satisfy requirement of the electrical characteristics.

No physical damage

6.2.Storage in Low Temperature

-30°C +/-2°C, Duration of 240 hours.

Back to the room temperature first, then in 1~2 hours, the component shall be checked.

The component shall satisfy requirement of the electrical characteristics.

No physical damage

6.3.Storage in High Temperature

+85°C +/-2°C, Duration of 240 hours.

Back to the room temperature first, then in 1~2 hours, the component shall be checked.

The component shall satisfy requirement of the electrical characteristics.

No physical damage

| | | | | | | |
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6.4. Temperature cycles

-30°C +/- 2°C (30min) ↔ +85°C +/- 2°C (30min) 20 cycles

Back to the room temperature first, then in 1~2 hours, the component shall be checked.

The component shall satisfy requirement of the electrical characteristics.

No physical damage

6.5. VPS

FC-70 (the boiling point: +215°C) Vapor for 30 sec

Back to the room temperature first, then in 1~2 hours, the component shall be checked.

The component shall satisfy requirement of the electrical characteristics.

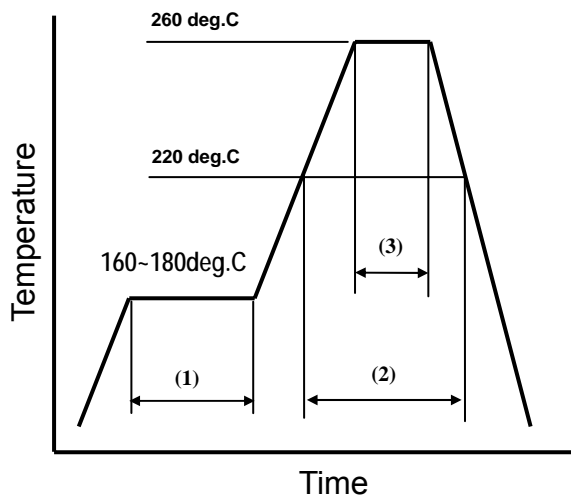
No physical damage

7. Supplement

7.1. Soldering

7.2. Please stay with our proposed reflow condition and do then soldering 2 times max.

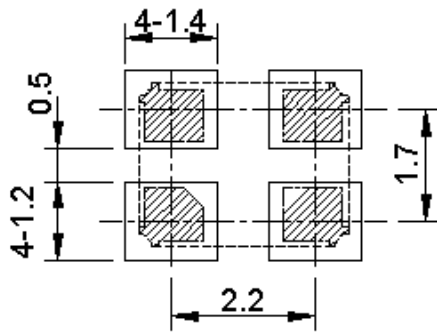
Available for Lead Free Soldering



| | | | |
|-----|--------------|---------------|-------------|
| (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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7.3.Land pattern layout(Example)



7.4.Solder iron (Example)

Bit temp.:350°C max.,Time:3sec max. ,Each terminal solder a 1 time max.

7.5.Mounting

This component is designed for automatic insertion.

However, you are requested to do the trial with your insertion machine in order to be sure of proper operation and no damage of component.

Please pay attention to board warp which may damage the component and cause Soldering Process.

7.6.Cleaning

Cleaning liquid which corrodes Nickel shall not be used

It may cause the problem on the surface, color, marking etc.

Ultra-sonic cleaning is possible, however, you are requested to check on your board.

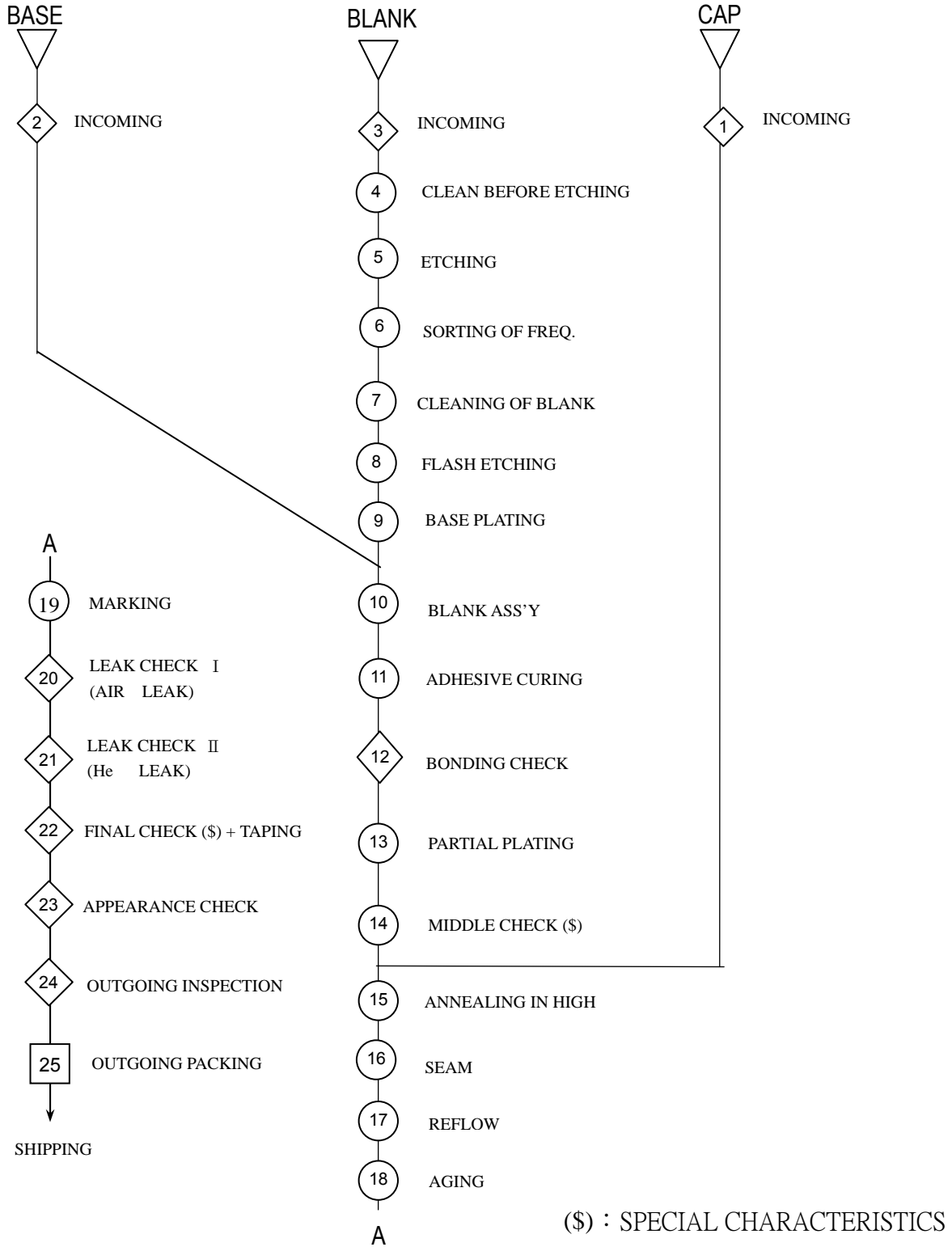
Because we only checked as single unit.

7.7.Storage

Please keep away from high temperature and high humidity ,which may cause put solderbility. No direct Sunlight, No dew as well.

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8. Flow Chard



| | | | | | | |
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9. Environmental Workload Chemical Substance Components List

| Environmental Workload Chemical Substance Components List | | |
|---|------------|---------|
| TYPE | H(D)SX321S | |
| PERCENTAGE | | |
| Chemical Substance Components | 19(mg) | ppm |
| Si | 0.0437 | 2,300 |
| Au | 0.1463 | 7,700 |
| Co & Co Compound | 1.1286 | 59,400 |
| Mo & Mo Compound | 0.0380 | 2,000 |
| Ag | 0.3952 | 20,800 |
| Cu | 0.1102 | 5,800 |
| Cr & Cr Compound | 0.0380 | 2,000 |
| Al | 4.7234 | 248,600 |
| Mn & Mn Compound | 0.0228 | 1,200 |
| W & W Compound | 0.1843 | 9,700 |
| Ni & Ni Compound | 2.8424 | 149,600 |
| Fe | 3.8437 | 202,300 |

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