



Serial No. 2006-1045

DATE : 2006/08/08

ITEM : QUARTZ CRYSTAL

TYPE : DSX321G

NOMINAL FREQUENCY : 19.200000MHZ

SPEC No. : 1B319200AA0A  
1C319200AA0A

USER PARTS NO. :

Please acknowledge receipt of this specification by signing and returning a copy to us.

| RECEIPT  |                       |
|----------|-----------------------|
| DATE     |                       |
| RECEIVED | (signature)<br>(name) |

General Manufacture of Quartz Devices

**DAISHINKU CORP.**

1389 Shinzaike, Hiraoka-cho, Kakogawa, Hyogo  
675-0194 Japan

<http://www.kds.info/english.html>

Phone(81)79-425-3141

Fax (81)79-425-1134

C.ENG.

ENG.

**1. ELECTRICAL CHARACTERISTICS**

(This test shall be performed under the conditions of temp.at 25 +/- 3deg. C, humidity 60% max.)

|      |                                       |  |
|------|---------------------------------------|--|
| 1-1  | NOMINAL FREQUENCY                     | 19.200000 MHz                            |
| 1-2  | MODE                                  | Fundamental                              |
| 1-3  | LOADING CAPACITANCE                   | 8.0 pF - 370 Hz = 0                      |
| 1-4  | FREQUENCY TOLERANCE                   | +/- 10 ppm Max. at +25 deg.C +/- 3 deg.C |
| 1-5  | DRIVE LEVEL                           | 10 uW +/- 2 uW                           |
| 1-6  | EQUIVALENT SERIES RESISTANCE          | 70 ohms Max. / Series                    |
| 1-7  | OPERATING TEMPERATURE RANGE           | -30 deg.C to +85 deg.C                   |
| 1-8  | FREQUENCY TEMPERATURE CHARACTERISTICS | +/- 12 ppm Max. / -30 deg.C to +85 deg.C |
| 1-9  | SHUNT CAPACITANCE                     | 2.0 pF Max.                              |
| 1-10 | INSULATION RESISTANCE                 | 500 Mohms Min. / DC100V +/- 15V          |
| 1-11 | STORAGE TEMPERATURE RANGE             | -40 deg.C to +85 deg.C                   |
| 1-12 | AGING                                 | +/- 1 ppm Max. / year                    |

**2.CONSTRUCTION**

|     |                        |                              |
|-----|------------------------|------------------------------|
| 2-1 | HOLDER                 | DSX321G Ceramic Base         |
| 2-2 | DIMENSIONS AND MARKING | Refer to Fig.-1 and Table-1. |

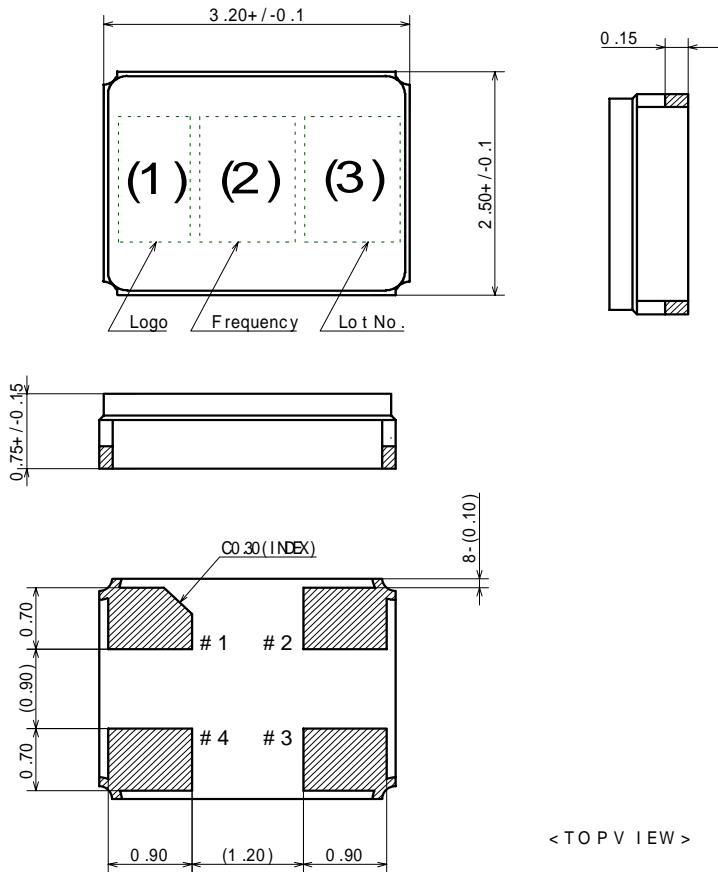
**3.OTHER SPECIFICATIONS**

|     |                               |                                    |
|-----|-------------------------------|------------------------------------|
| 3-1 | EMBOSS CARRIER TAPE & REEL    | Refer to Fig.-2,3,4,5 and Table-2. |
| 3-2 | PACKING                       | Refer to Fig.-6.                   |
| 3-3 | REFLOW CONDITIONS (REFERENCE) | Refer to Fig.-7.                   |
| 3-4 | LAND PATTERN (REFERENCE)      | Refer to Fig.-8.                   |

4. Environmental and mechanical performance shall be specified by attached general specification.

|  |   |      |                   |
|--|---|------|-------------------|
| TITLE<br>DSX321G TYPE SURFACE MOUNT TYPE<br>QUARTZ CRYSTAL SPECIFICATION | Trigonometry                                    | Unit | Scale             |
| Date<br><br>2006/08/08   | Drawing No.<br><br>1B319200AA0A<br>1C319200AA0A | Rev. | Page<br><br>1 / 7 |

< DIMENSIONS AND MARKING >



It is recommended that #2,4 is connected with GND.  
unit : mm  
Tolerance :  $\pm 0.1$

(Fig.-1)

Marking is Laser Marking:  
Marking should be printed as follows:  
Logo , Nominal Frequency , manufactured year & month  
Logo and manufacturing location ( 1 )

| Producing District | Marking | Our Specification.No. |
|--------------------|---------|-----------------------|
| Japan              | D       | 1B319200AA0A          |
| Indonesia          | D       | 1C319200AA0A          |

Nominal Frequency ( 2 ) = Mark two digits from upper  
( ex. 19.2000 MHz --> 19 )

Manufacturing lot No.( 3 )

(year) ex. 2006 shall be marked as ' 6 ' (The last digit of the year)  
(Month) ex. August shall be marked as ' H ' (As shown in Table-1.)

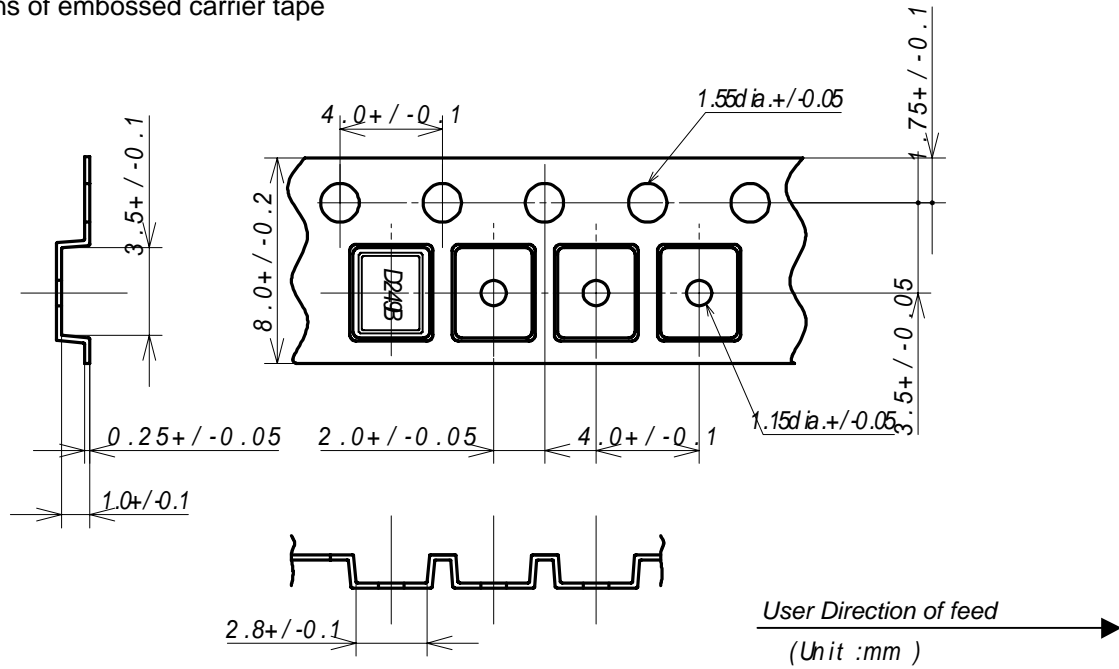
(Table-1)

| 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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| Date<br><br>2006/08/08   | Drawing No.<br><br>1B319200AA0A<br>1C319200AA0A | Rev. | Page<br><br>2 / 7 |

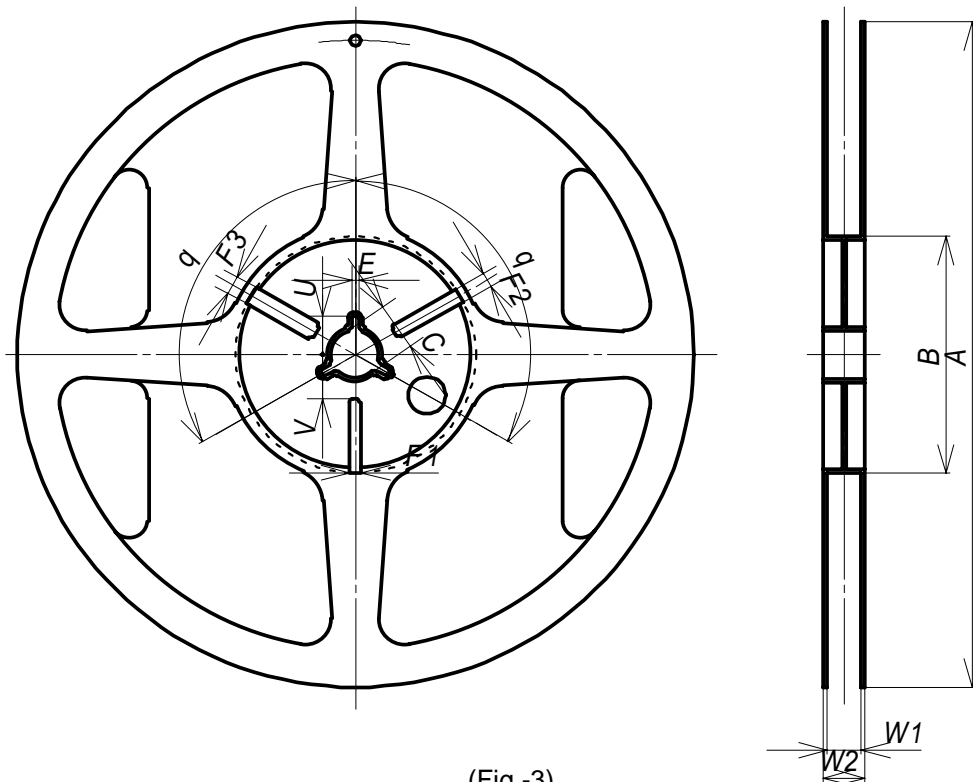
< EMBOSS CARRIER TAPE & REEL >

(1)Dimensions of embossed carrier tape



(Fig.-2)

(2)Dimensions of tape reel



(Fig.-3)

|  |   |      |                   |
|--|---|------|-------------------|
| TITLE<br>DSX321G TYPE SURFACE MOUNT TYPE<br>QUARTZ CRYSTAL SPECIFICATION | Trigonometry                                    | Unit | Scale             |
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(Table-2)

(UNIT:mm)

| Item        |                   | Mark   | Dimensions | Angle       |           |
|-------------|-------------------|--------|------------|-------------|-----------|
| Flange      | Diameter          | A      | 180 dia.   | +0.0 / -3.0 |           |
|             | Inside of Frange  | W1     | 9.0        | + / - 0.3   |           |
|             | Outside of Frange | W2     | 11.4       | + / - 1.0   |           |
|             | Inside Diameter   | B      | 60 dia.    | +1.0 / -0.0 |           |
| Center Core | Center Core Slit  | Width  | F1         | 3.0         | + / - 0.2 |
|             |                   |        | F2         | 4.0         | + / - 0.2 |
|             |                   |        | F3         | 5.0         | + / - 0.2 |
|             | Center Core Slit  | Length | V          | 11.9        |           |
|             |                   |        | Angle      | q           | 120 deg.  |
|             |                   |        |            |             |           |
|             | Spindle Diameter  |        | C          | 13 dia.     | + / - 0.2 |
|             | Key Seats         | Width  | E          | 2.0         | + / - 0.5 |
|             |                   |        | Length     | U           | 10.5      |
| q           |                   |        |            | 120 deg.    |           |

## (3)Storage condition

Temperature : +40 deg.C Max.

Relative Humidity : 80% Max.

( It is a guaranteed term because it obtains an excellent soldering: 6 months)

## (4)Standard packing quantity

3,000 pcs/reel for 180 dia.

## (5)Material of the tape

| Tape         | Material           |
|--------------|--------------------|
| Carrier tape | Polystyrene+Carbon |
| Cover tape   | Polyester          |

## (6)Label contents

Type

Our specification No.

Your Part No.

Lot No.

Nominal Frequency

Quantity

Our Company Name

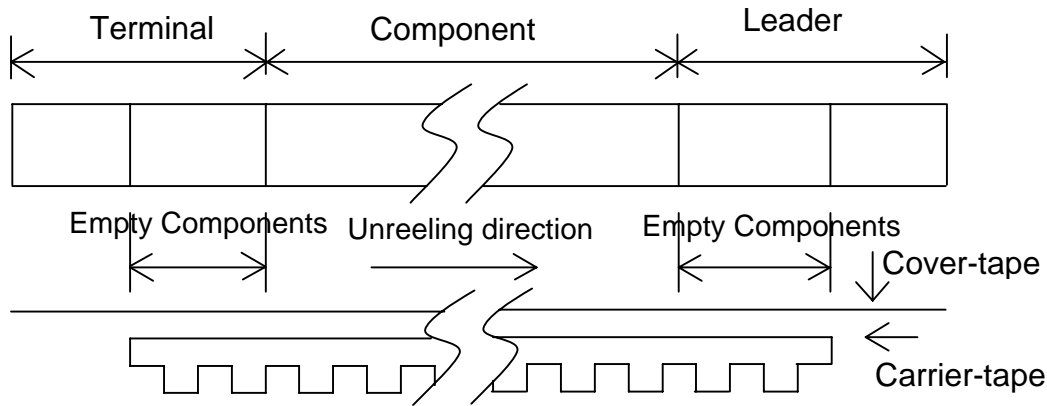
Producing Country

Stick a label on the each reel.

|  |   |      |                   |
|--|---|------|-------------------|
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(7) Taping dimension

|          |              |  |
|----------|--------------|--|
| Leader   | Cover-tape   | The length of cover-tape in the leader is more than 400mm including empty embossed area.   |
|          | Carrier-tape | After all products were packaged, must remain more than twenty pieces or 400mm 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 cover-tape must remain more than 40mm.   |



(Fig.-4)

(8) Joint of tape

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

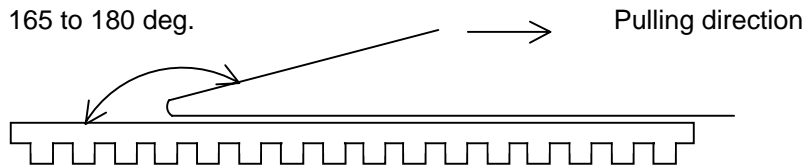
(9) Release strength of cover tape

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

Pulling direction 165 deg. to 180 deg.

Speed 300mm/min.

Otherwise unless specified.



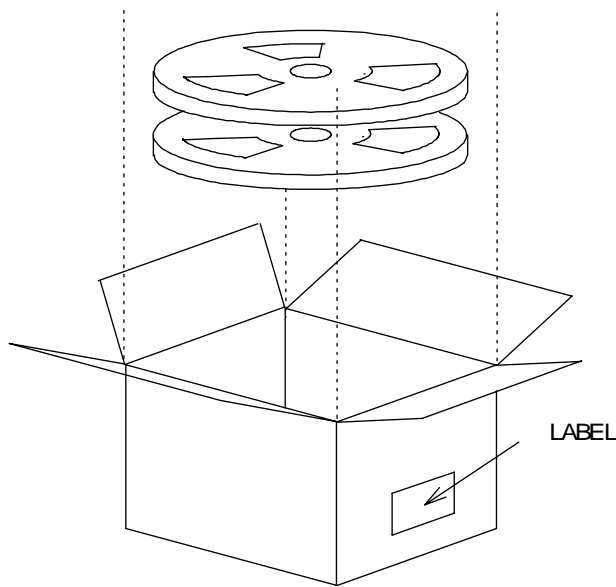
(Fig.-5)

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

|  |   |      |                   |
|--|---|------|-------------------|
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< PACKING >

(1) STORAGE METHOD



Label contents

- The type of product
- Lot No.
- Specification
- Quantity
- Shipment Day
- Remark

(Fig-6)

(2) BOX SIZE

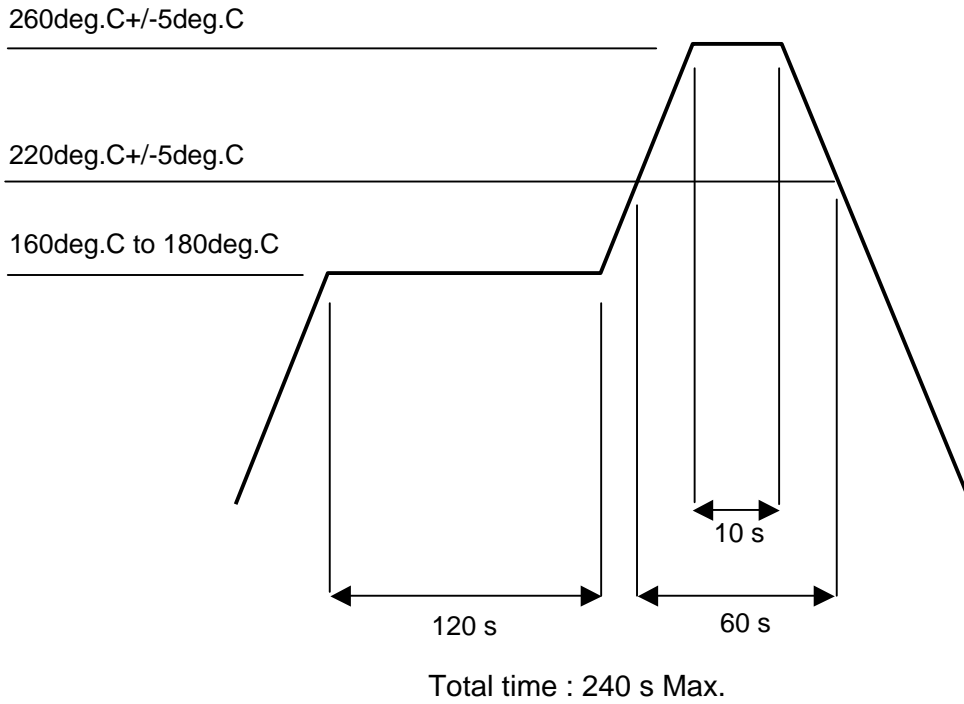
From lot size packingsize shall be changed.

In the upper and lower part and the opening in box it shall be protected products using aircushion sheets.

|   |   |             |                            |
|---|---|-------------|----------------------------|
| <p>TITLE<br/>DSX321G TYPE SURFACE MOUNT TYPE<br/>QUARTZ CRYSTAL SPECIFICATION</p> | <p>Trigonometry</p>                                       | <p>Unit</p> | <p>Scale</p>               |
| <p>Date<br/><br/>2006/08/08</p>   | <p>Drawing No.<br/><br/>1B319200AA0A<br/>1C319200AA0A</p> | <p>Rev.</p> | <p>Page<br/><br/>6 / 7</p> |

< REFLOW CONDITIONS (REFERENCE) >

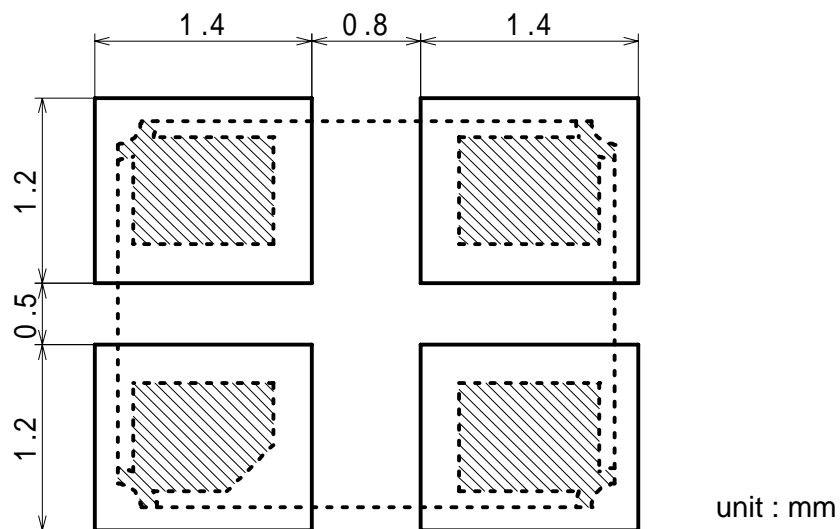
During the solder reflow process, please complete within following temperature, period.  
 Reflow soldering shall be allowed only two times.



(Fig.-7)

HANDSOLDERING METHOD : 340 [deg.C] Max. / 3[s] Max.  
 (Please take care so that a soldering iron should not touch a product directly.)

< LAND PATTERN (REFERENCE) >



(Fig.-8)

|  |   |      |                   |
|--|---|------|-------------------|
| TITLE<br>DSX321G TYPE SURFACE MOUNT TYPE<br>QUARTZ CRYSTAL SPECIFICATION | Trigonometry                                    | Unit | Scale             |
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## 1.MECHANICAL ENDURANCE

### 1.1 SHOCK

After the following test,parts shall conform specification3-1-2.

10cycles(60times) drop from 150 [cm] heights to concrete.

Further,parts shall be solderd on substrate, fixed bakelite materials(about 100[g]).

Substrate materials : Glass Epoxy  
 1 cycle : each 1 times of 6 directions

### 1.2 VIBRATION

After the following test,parts shall conform specification3-1-1.

and no abnormal appearance shall be observed.

(1)Frequency of Vibration : 10[Hz] to 55[Hz]  
 (2)Amplitude(p-p) : Sine waves of 1.5[mm ]  
 (3)Vibration axis : X.Y.Z  
 (4)Vibration period : 2 [h] for each axis

### 1.3 SUBSTRATE BENDING

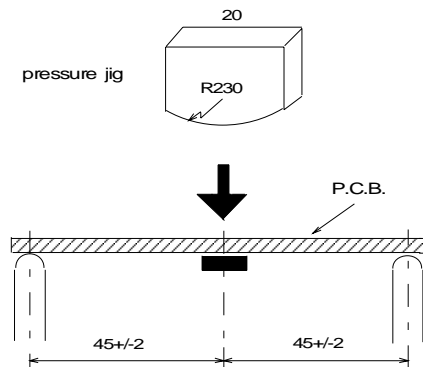
After the following test,parts shall conform specification3-1-1.

and no abnormality shall be observed in external appearance and sealing tightnen and others shall be based on ET-7403 of EIAJ.

Mount the specimen on substrate.

Apply the following pressure

Direction : see Fig.-1  
 Speed : 0.5 [mm/s]  
 Hours : 5 +/- 1 [s]  
 Amount of substrate : 3 [mm] Max.



(Fig.-1)

|  |   |      |                                     |
|--|---|------|-------------------------------------|
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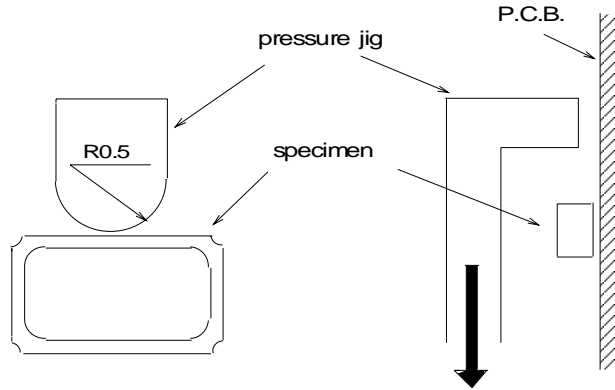
1.4 SHEAR

After the following test, parts shall conform specification 3-1-1.  
and no abnormality shall be observed in external appearance and sealing  
tightness and others shall be based on ET-7403 of EIAJ.

Mount the specimen on substrate.

Apply the following pressure

- Weight : 10 [N]
- Hours : 10 +/- 1 [s]
- Direction : see Fig.-2



(Fig.-2)

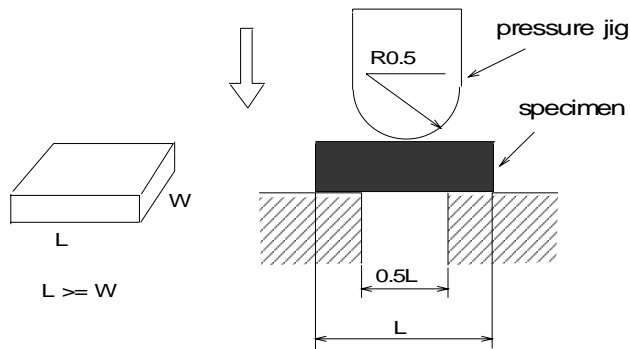
1.5 BODY STRENGTH

After the following test, parts shall conform specification 3-1-1.  
and no abnormality shall be observed in external appearance and sealing  
tightness and others shall be based on ET-7403 of EIAJ.

Mount the specimen on substrate.

Apply the following pressure

- Weight : 10 [N]
- Hours : 10 +/- 1 [s]
- Direction : see Fig.-3



(Fig.-3)

|   |   |             |   |
|---|---|-------------|---|
| <p>TITLE<br/>DSX321G TYPE SURFACE MOUNT TYPE<br/>QUARTZ CRYSTAL SPECIFICATION</p> | <p>Trigonometry</p>                                       | <p>Unit</p> | <p>Scale</p>                                  |
| <p>Date<br/><br/>2006/08/08</p>   | <p>Drawing No.<br/><br/>1B319200AA0A<br/>1C319200AA0A</p> | <p>Rev.</p> | <p>Page<br/>Attached sheet<br/><br/>2 / 5</p> |

1.6 SEAL

Less than  $2.0 \times 10^{-9}$  [Pa m<sup>3</sup>/sec]. by Helium leak detector.  
Also, no serial bubble is observed by Fluorinert tests.

1.7 SOLDERABILITY

After the following test, more than 90[%] of terminal shall be covered by new solder.  
3 seconds +/- 1 second dip in 235 [deg.C] +/- 5 [deg.C] solder.  
(Use rosin type flux for solder.)

2. ENVIRONMENTAL ENDURANCE

2.1 HUMIDITY

Two hours past at room temperature after following test, parts shall conform specification 3-1-1.  
240 hours +60 [deg.C] +/- 2 [deg.C] , relative humidity 85[%] +/- 5[%].

2.2 LOW TEMPERATURE

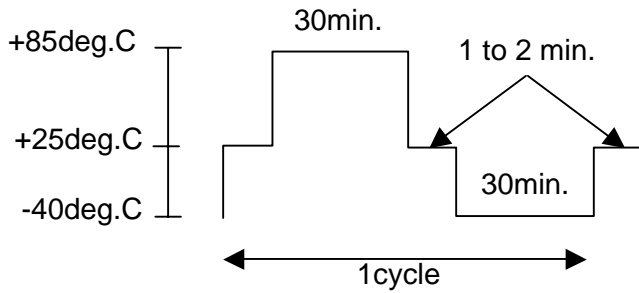
Two hours past at room temperature after following test, parts shall conform specification 3-1-1.  
240 hours -40 [deg.C] +/- 2 [deg.C].

2.3 HIGH TEMPERATURE

Two hours past at room temperature after following test, parts shall conform specification 3-1-1.  
240 hours +85 [deg.C] +/- 2 [deg.C].

2.4 TEMPERATURE CYCLE

Two hours past at room temperature after 25 cycles of following test, parts shall conform specification 3-1-1.



(Fig.-4)

|  |   |      |                                     |
|--|---|------|-------------------------------------|
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### 3.SPECIFICATION

Frequency Variation and Equivalent Resistance shall be within Table-1 after the test.

(Table-1)

|       | Frequency Variation | Equivalent Resistance                                   |
|-------|---------------------|---|
| 3-1-1 | $\pm 2$ [ppm]       | $\pm 15$ [%] or 2[ohms] max. (Use larger specification) |
| 3-1-2 | $\pm 5$ [ppm]       | $\pm 20$ [%] or 3[ohms] max. (Use larger specification) |
| 3-1-3 | $\pm 10$ [ppm]      | $\pm 20$ [%] or 3[ohms] max. (Use larger specification) |

|  |   |      |                                     |
|--|---|------|-------------------------------------|
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1.SOLDERING

Please perform the attached Reflow conditions to reference within 2 times.

2.MOUNT

Although it corresponds to automatic mounting, please carry out the loading test by the loading machine to be used, and check that there is no influence in the characteristic.

Please be careful of the Curve not to influence the characteristic of a product, and a soldering state at the process which makes a substrate generate the Curve, the break of a board etc. .

3.WASHING

About use of the washing liquid of a basin system, an alcoholic system, and a chlorofluorocarbon-replacing material system, it is checking that it is satisfactory. However please consult in advance about other washing liquid. Although the check about ultrasonic washing is performed, since it is an examination with a simple substance, the check for the second time by the use state is recommended.

4.THE CAUTIONS ON USE

The piece of crystal it is processed very smaller than the conventional thing inside DSX321G series crystal unit may be damaged, if excessive excitation electric power is applied.

Please use it below with the value specified on a catalog and specifications. Please refrain from forming patterns under crystal resonators since there is a possibility to cause crack in base.

If the temperature is higher than 280 [deg.C], there is a possibility for the sealing glass to remelt. Avoid using the product at temperature higher than specified.

5.HANDLING OF A PRODUCT

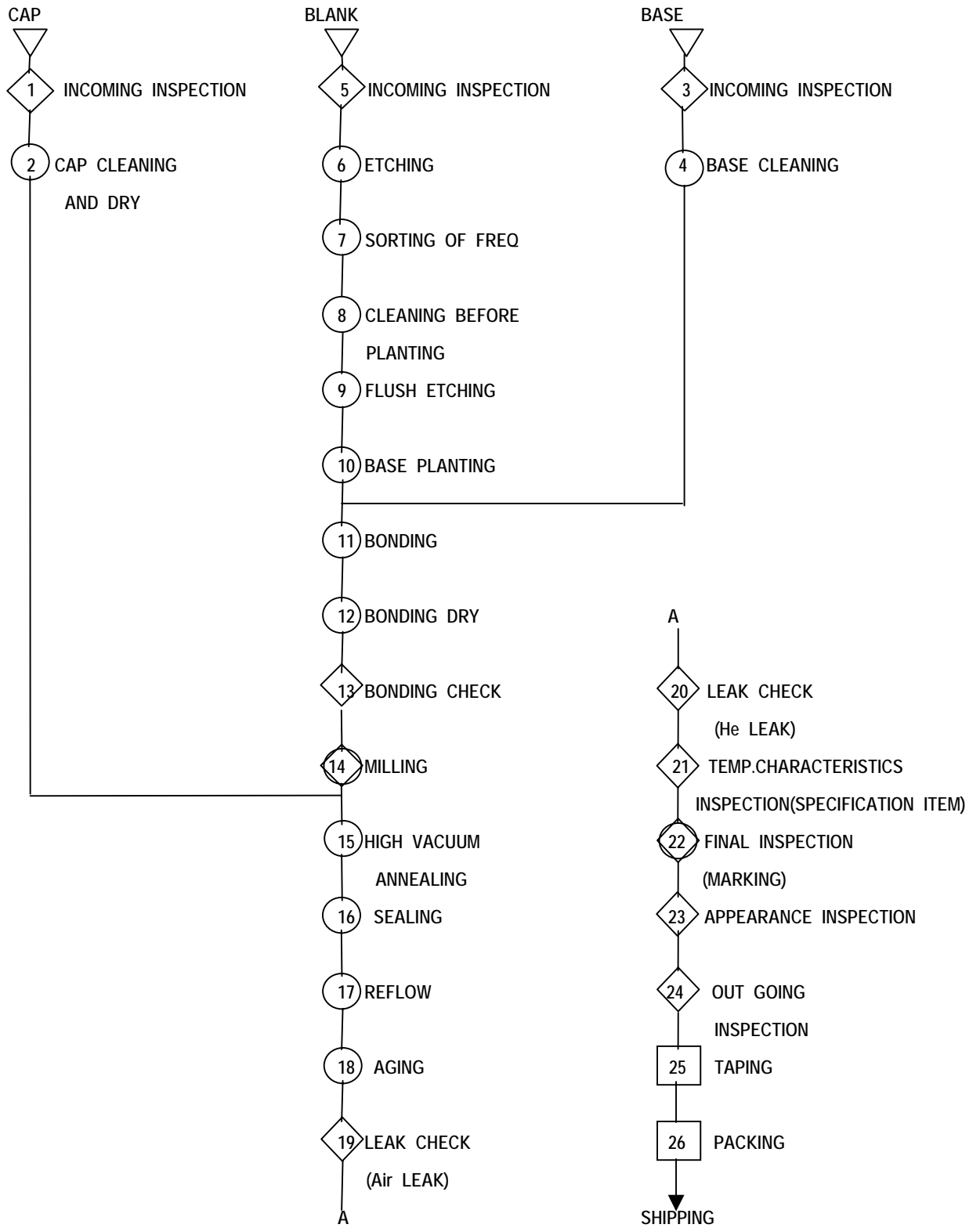
DSX321G series has sufficient intensity to fall and vibration. However when too much shock is added according to a certain cause, the use after a characteristic check is recommended.

6.STORAGE

Since the soldering nature of a terminal may be degraded, please avoid storage in high temperature and a humid place. Please keep it in the place which direct rays do not hit and dew condensation does not generate.

|  |   |      |                                     |
|--|---|------|-------------------------------------|
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|  |  |  |  |  |  |  |  |                |                 |
|--|--|--|--|--|--|--|--|----------------|-----------------|
|  |  |  |  |  |  |  |  | NOTE           | SPEC No.        |
|  |  |  |  |  |  |  |  |                | NQA-1117        |
|  |  |  |  |  |  |  |  | ENACTMENT DATE | ARRANGEMENT No. |
|  |  |  |  |  |  |  |  | 09/29/2003     | NQA-1117R1      |

**DSX421G,321G,221G SERIES CONTROL PLAN**

| PROTOTYPE   |                                     | PRE-LAUNCH                         |                 | PRODUCTION  | O                | PHONE NO            | TOTTORI PLANT (0857)52-4501  | DATE (ISSUE)                             | SEP 29, 2003 | DATE (REVISION)    | MAY 15, 2006              |                          |
|-------------|-------------------------------------|------------------------------------|-----------------|-------------|------------------|---------------------|--|--|--------------|--------------------|---------------------------|--------------------------|
| CONTROL No. | NQA-1118                            | REV. No.                           |                 | NQA-1118 R9 |                  | CORE TEAM           | KISHIMOTO(TEAM LEADER), AOKI(PG)<br>NISHIDA(Q.A.G),SUGITA(Q.A.G),NAGAISHI(Q.A.D),<br>KOMATSU(M.T),MATSUMOTO(ENG) | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D) |              |                    |                           |                          |
| ITEM        | DSX421G,321G,221G SERIES            | PART No.                           |                 |             |                  |                     |  | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D) |              |                    |                           |                          |
| PLANT       | TOTTRI FACTRY                       | PLANT No.                          |                 |             |                  | APPROVED BY:        | OOTUBO   | OTHER APPROVAL/DATE(IF REQ'D)            |              |                    |                           |                          |
| PROCES No.  | PROCESS NAME/ OPERATION DESCRIPTION | MACHINE, DEVICE JIG,TOOLS FOR MFG. | CHARACTERISTICS |             |                  | SPECIAL CHAR. CLASS | METHODS  |  |              |                    | REACTION PLAN             |                          |
|             |                                     |                                    | No.             | PRODUCT     | PROCESS          |                     | PRODUCT/ PROCESS SPECIFICATION/ TOLERANCE  | EVALUATION/ MEASUREMENT TECHNIQUE        | SAMPLE       |                    |                           | CONTROL METHODS          |
|             |                                     |                                    |                 |             |                  |                     |  | SIZE                                     | FREQ.        |                    |                           |                          |
| 1           | CAP INCOMING INSPECTION             |                                    |                 | APPEARANCE  |                  |                     | INCOMING INSPECTION SPEC.<br>BOUNDARY SAMPLE   | MICROSCOPE                               | n=200        | LOT                | INCOMING INSPECTION SHEET | RETURN TO SUPPLIER       |
|             |                                     |                                    |                 | DIMENSION   |                  |                     | INCOMING INSPECTION SPEC.  | MICROMETER                               | n=5          | LOT                | INCOMING INSPECTION SHEET | RETURN TO SUPPLIER       |
| 2           | CAP CLEANNING AND DRY               | U.S.CLEANNING BATH                 |                 |             | EXCHANGE REQUID  |                     | WORKING MANUAL   |  | 1            | WITHIN 100,000pcs. | CHECK SHEET               | MACHINE MAINTENANCE      |
|             |                                     | ANEALING OVEN                      |                 |             | TEMP.            |                     | WORKING MANUAL   | TEMP.CONTROLLER                          | 1            | DAY                | CHECK SHEET               | TEMPERATURE ADJUSTMENT   |
|             |                                     |                                    |                 |             | VACUUM DEGREE    |                     | WORKING MANUAL   | VACUUM METER                             | 1            | DAY                | CHECK SHEET               | MACHINE MAINTENANCE      |
| 3           | BASE INCOMING INSPECTION            |                                    |                 | APPEARANCE  |                  |                     | INCOMING INSPECTION SPEC.<br>BOUNDARY SAMPLE   | MICROSCOPE                               | n=200        | LOT                | INCOMING INSPECTION SHEET | RETURN TO SUPPLIER       |
|             |                                     |                                    |                 | DIMENSION   |                  |                     | INCOMING INSPECTION SPEC.  | MICROMETER                               | n=5          | LOT                | INCOMING INSPECTION SHEET | RETURN TO SUPPLIER       |
| 4           | BASE CLENNING AND DRY               | U.S.CLEANNING BATH                 |                 |             | LIQUID EXCHANGE  |                     | WORKING MANUAL   |  | 1            | WITHIN 100,000pcs. | CHECK SHEET               | MACHINE MAINTENANCE      |
|             |                                     | ANEALING OVEN                      |                 |             | TEMP.            |                     | WORKING MANUAL   | TEMP. CONTROLLER                         | 1            | DAY                | CHECK SHEET               | TEMPERATURE ADJUSTMENT   |
|             |                                     |                                    |                 |             | VACUUM DEGREE    |                     | WORKING MANUAL   | VACUUM METER                             | 1            | DAY                | CHECK SHEET               | MACHINE MAINTENANCE      |
| 5           | BLANK INCOMING INSPECTION           |                                    |                 | FREQUENCY   |                  |                     | INCOMING INSPECTION SPEC.  | FREQ.SORTING MACHINE                     | n=5          | LOT                | INCOMING INSPECTION SHEET | RETURN TO SUPPLIER       |
|             |                                     |                                    |                 | DIMENSION   |                  |                     | INCOMING INSPECTION SPEC.  | MICROMETER                               | n=5          | LOT                | INCOMING INSPECTION SHEET | RETURN TO SUPPLIER       |
|             |                                     |                                    |                 | APPEARANCE  |                  |                     | INCOMING INSPECTION SPEC.  | MICROSCOPE                               | n=200        | LOT                | INCOMING INSPECTION SHEET | RETURN TO SUPPLIER       |
| 6           | ETCHING                             | DRAFT                              |                 |             | MIXTURE RATIO    |                     | WORKING MANUAL   | EYE CHECK                                | 2            | SHIFT              | CHECK SHEET               | TEMP.&DENSITY ADJUSTMENT |
|             |                                     |                                    |                 |             | TEMP.            |                     | WORKING MANUAL   | THERMOMETER                              | 2            | SHIFT              | TREND CHART               | TEMPERATURE ADJUSTMENT   |
| 7           | SORTING OF FREQUENCY                | FREQ' SORTING MACHINE              |                 |             | MACHINE CLEANING |                     | WORKING MANUAL   |  | 1            | SHIFT              | CHECK SHEET               | MACHINE CLEANING         |
|             |                                     |                                    |                 |             | ELECTRODE DIRT   |                     | WORKING MANUAL   |  | 1            | SHIFT              | CHECK SHEET               | ELECTRODE CLEANING       |

“\$” in the column of “Special Characteristics” means critical parameters to be controlled carefully.



**DSX421G,321G,221G SERIES CONTROL PLAN**

| PROTOTYPE   |  | PRE-LAUNCH                         | PRODUCTION            | O                 | PHONE NO                    | TOTTORI PLANT (0857)52-4501  | DATE (ISSUE)                              | SEP 29, 2003                      | DATE (REVISION) | MAY 15, 2006   |                      |                         |
|-------------|--|------------------------------------|-----------------------|-------------------|-----------------------------|--|---|-----------------------------------|-----------------|----------------|----------------------|-------------------------|
| CONTROL No. | NQA-1118                                     | REV. No.                           | NQA-1118 R9           | CORE TEAM         |                             | KISHIMOTO(TEAM LEADER), AOKI(PG)<br>NISHIDA(Q.A.G),SUGITA(Q.A.G),NAGAISHI(Q.A.D),<br>KOMATSU(M.T),MATSUMOTO(ENG) | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D)  |                                   |                 |                |                      |                         |
| ITEM        | DSX421G,321G,221G SERIES                     | PART No.                           |                       |                   |                             |  | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D)  |                                   |                 |                |                      |                         |
| PLANT       | TOTTRI FACTRY                                | PLANT No.                          |                       | APPROVED BY:      | OOTUBO                      |  | OTHER APPROVAL/DATE(IF REQ'D)             |                                   |                 |                |                      |                         |
| PROCES No.  | PROCESS NAME/ OPERATION DESCRIPTION          | MACHINE, DEVICE JIG,TOOLS FOR MFG. | CHARACTERISTICS       |                   |                             | SPECIAL CHAR. CLASS  | METHODS                                   |                                   |                 |                | REACTION PLAN        |                         |
|             |  |                                    | No.                   | PRODUCT           | PROCESS                     |  | PRODUCT/ PROCESS SPECIFICATION/ TOLERANCE | EVALUATION/ MEASUREMENT TECHNIQUE | SAMPLE          |                |                      | CONTROL METHODS         |
|             |  |                                    |                       |                   |                             |  |   | SIZE                              | FREQ.           |                |                      |                         |
| 8           | CLEANING BEFORE BASE PLATING                 | WASHING MACHINE FOR BLANK          |                       |                   | EXCHANGE ACID               |  | WORKING MANUAL                            | 1                                 | 2 DAY           | CHECK SHEET    | MACHINE MAINTENANCE  |                         |
|             |  |                                    |                       |                   | TEMP.                       |  | WORKING MANUAL                            | THERMOMETER                       | 1               | SHIFT          | TREND CHART          | TEMPERATURE ADJUSTMENT. |
| 9           | FLASH ETCHING (BLANK INSERTING) (F.Eg) (DRY) | BLANK INSERTING MACHINE            |                       |                   | MACHINE CLEANING            |  | WORKING MANUAL                            | 1                                 | SHIFT           | CHECK SHEET    | MACHINE MAINTENANCE  |                         |
|             |  |                                    | FLASH ETCHING MACHINE |                   |                             | WATER EXCHANGE (1,3-6BATH)   |   | WORKING MANUAL                    | 2               | DAY            | CHECK SHEET          | WATER EXCHANGE          |
|             |  |                                    |                       |                   | WATER EXCHANGE (2BATH)      |  | WORKING MANUAL                            |                                   | 1               | WEEK           | CHECK SHEET          | WATER EXCHANGE          |
|             |  |                                    |                       | WATER TEMP(2BATH) |                             | WORKING MANUAL   | THERMOMETER                               | 1                                 | SHIFT           | TREND CHART    | TEMP. ADJ            |                         |
|             |  | CLEAN OVEN                         |                       | TEMP              |                             | WORKING MANUAL   | THERMOMETER                               | 1                                 | SHIFT           | TREND CHART    | TEMP. ADJ            |                         |
| 10          | BASE PLATING                                 | BASE PLATING MACHINE               |                       |                   | VACUUM DEGREE               |  | WORKING MANUAL                            | VACUUM METER                      | 1               | DAY            | TREND CHART          | MACHINE MAINTENANCE     |
|             |  |                                    |                       |                   | WASHING BASE PLATING MASK   |  | WORKING MANUAL                            | EYE CHECK                         | 1               | WITHIN 10SHOTS | CHECK SHEET          | RE-WASHING              |
|             |  |                                    |                       | FREQUENCY         |                             |  | WORKING MANUAL                            | NETWORK ANALYZER                  | n=5             | LOT            | LOT CARD             | MACHINE MAINTENANCE     |
|             |  |                                    |                       | APPEARANCE        |                             |  | WORKING MANUAL                            | EYE CHECK                         | ALL             | LOT            | LOT CARD             | MACHINE MAINTENANCE     |
|             |  |                                    |                       | FILM STRENGTH     |                             |  | WORKING MANUAL                            | SEROTAPE                          | n=5             | DAY            | LOT CARD             | MACHINE MAINTENANCE     |
|             |  |                                    | N2 BLOW MACHINE       |                   | N2 PRESSURE                 |  |   | WORKING MANUAL                    | REGULATOR       | 1              | DAY                  | CHECK SHEET             |
|             |  |                                    | TIME                  |                   |                             | WORKING MANUAL   | STOP WATCH                                | 1                                 | DAY             | CHECK SHEET    | REGULATOR ADJUSTMENT |                         |
| 11          | BONDING                                      | BLANK MOUNT MACHINE                |                       | BONDING CONDITION |                             |  | WORKING MANUAL BOUNDARY SAMPLE            | MICROSCOPE                        | n=200           | LOT            | LOT CARD             | MACHINE MAINTENANCE     |
|             |  |                                    |                       |                   | ADHESIVE AGENT STORAGE TEMP |  | WORKING MANUAL                            | THERMOMETER                       | 1               | DAY            | TREND CHART          | TEMPERATURE ADJUSTMENT  |

“\$” in the column of “Special Characteristics” means critical parameters to be controlled carefully.

**DSX421G,321G,221G SERIES CONTROL PLAN**

| PROTOTYPE   |                                     | PRE-LAUNCH                         | PRODUCTION      | O                             | PHONE NO             | TOTTORI PLANT (0857)52-4501  | DATE (ISSUE)                              | SEP 29, 2003                       | DATE (REVISION) | MAY 15, 2006   |                     |                            |
|-------------|-------------------------------------|------------------------------------|-----------------|-------------------------------|----------------------|--|---|------------------------------------|-----------------|----------------|---------------------|----------------------------|
| CONTROL No. | NQA-1118                            | REV. No.                           | NQA-1118 R9     | CORE TEAM                     |                      | KISHIMOTO(TEAM LEADER), AOKI(PG)<br>NISHIDA(Q.A.G),SUGITA(Q.A.G),NAGAISHI(Q.A.D),<br>KOMATSU(M.T),MATSUMOTO(ENG) | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D)  |                                    |                 |                |                     |                            |
| ITEM        | DSX421G,321G,221G SERIES            | PART No.                           |                 |                               |                      |  | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D)  |                                    |                 |                |                     |                            |
| PLANT       | TOTTRI FACTRY                       | PLANT No.                          |                 | APPROVED BY:                  | OOTUBO               |  | OTHER APPROVAL/DATE(IF REQ'D)             |                                    |                 |                |                     |                            |
| PROCES No.  | PROCESS NAME/ OPERATION DESCRIPTION | MACHINE, DEVICE JIG,TOOLS FOR MFG. | CHARACTERISTICS |                               |                      | SPECIAL CHAR. CLASS  | METHODS                                   |                                    |                 |                | REACTION PLAN       |                            |
|             |                                     |                                    | No.             | PRODUCT                       | PROCESS              |  | PRODUCT/ PROCESS SPECIFICATION/ TOLERANCE | EVALUATION/ MEASUREMENT TECHNIQUE  | SAMPLE          |                |                     | CONTROL METHODS            |
|             |                                     |                                    |                 |                               |                      |  |   | SIZE                               | FREQ.           |                |                     |                            |
| 12          | BONDING DRY                         | BONDING DRY OVEN                   |                 |                               | TEMPERATURE          |  | WORKING MANUAL                            | DISPLAY TEMPERATURE                | 1               | DAY            | CHECK SHEET         | TEMPERATURE ADJUSTMENT     |
|             |                                     |                                    |                 |                               | DEW POINT            |  | WORKING MANUAL                            | DEW INDICATOR OR OXYGEN DENSIMETER | 1               | DAY            | TREND CHART         | MACHINE MAINTENANCE        |
|             |                                     |                                    |                 |                               | OVEN TEMP.           |  | WORKING MANUAL                            | THERMOCOUPLE                       | 1               | 3 MONTHS       | PROFILE             | TEMPERATURE ADJUSTMENT     |
| 13          | BONDING CHECK                       |                                    |                 | BONDING CONDITION DUST CHECK  |                      |  | WORKING MANUAL BOUNDARY SAMPLE            | MICROSCOPE                         | ALL             | LOT            | LOT CARD            | CONTACT TO BONDING PROCESS |
|             |                                     |                                    |                 | BONDING STRENGTH              |                      |  | WORKING MANUAL                            | TENSION GAGE                       | LOT/ITEM (n=3)  | SHIFT          | CHECK SHEET         | MACHINE MAINTENANCE        |
|             |                                     |                                    |                 | BONDING EXFOLIATION CONDITION |                      |  | WORKING MANUAL BOUNDARY SAMPLE            | MICROSCOPE                         | LOT/ITEM (n=3)  | SHIFT          | CHECK SHEET         | MACHINE MAINTENANCE        |
| 14          | MILLING                             | AUTO MILLING MACHINE               |                 |                               | VACUUM DEGREE        |  | WORKING MANUAL                            | VACUUM METER                       | 1               | SHIFT          | CHECK SHEET         | MACHINE MAINTENANCE        |
|             |                                     |                                    |                 | FREQENCY                      |                      |  | WORKING MANUAL                            | NETWORK ANALISER                   | n=5/LOT         | SETTING CHANGE | LOT CARD            | MACHINE MAINTENANCE        |
|             |                                     |                                    |                 |                               | MILING MASK CLEANING |  | WORKING MANUAL                            |                                    | 1               | MONTH          | LOT CARD            | MACHINE MAINTENANCE        |
| 15          | HIGH VACUUM ANNELING                | ANNEALING OVEN                     |                 |                               | VACUUM DEGREE        |  | WORKING MANUAL                            | VACUUM METER                       | 1               | SHIFT          | CHECK SHEET         | MACHINE MAINTENANCE        |
|             |                                     |                                    |                 |                               | TEMPERATURE          |  | WORKING MANUAL                            | DISPLAY TEMPERATURE                | 1               | SHIFT          | CHECK SHEET         | TEMP. ADJUSTMENT           |
|             |                                     |                                    |                 |                               | INTERNAL TEMPERATURE |  | WORKING MANUAL                            | THERMOCOUPLE                       | 1               | 3 MONTHS       | TEMPERATURE PROFILE | MACHINE MAINTENANCE        |
| 16          | SEALING                             | SEALING OVEN                       |                 |                               | SEALING TEMPERATURE  |  | WORKING MANUAL                            | TEMP. CONTROLLER                   | 1               | DAY            | CHECK SHEET         | TEMPERATURE ADJUSTMENT     |
|             |                                     |                                    |                 |                               | DEW POINT            |  | WORKING MANUAL                            | DEW INDICATOR OR OXYGEN DENSIMETER | 1               | DAY            | TREND CHART         | MACHINE MAINTENANCE        |
|             |                                     |                                    |                 |                               | SEALING STATE        |  | WORKING MANUAL                            | INSPECTION TOOL                    | ALL             | LOT            | LOT CARD            | MACHINE MAINTENANCE        |

“\$” in the column of “Special Characteristics” means critical parameters to be controlled carefully.

**DSX421G,321G,221G SERIES CONTROL PLAN**

| PROTOTYPE   |  | PRE-LAUNCH                                     | PRODUCTION      | O                          | PHONE NO | TOTTORI PLANT (0857)52-4501  | DATE (ISSUE)                              | SEP 29, 2003                      | DATE (REVISION) | MAY 15, 2006        |                                 |
|-------------|--|--|-----------------|----------------------------|----------|--|---|-----------------------------------|-----------------|---------------------|---------------------------------|
| CONTROL No. | NQA-1118   | REV. No.                                       | NQA-1118 R9     | CORE TEAM                  |          | KISHIMOTO(TEAM LEADER), AOKI(PG)<br>NISHIDA(Q.A.G),SUGITA(Q.A.G),NAGAISHI(Q.A.D),<br>KOMATSU(M.T),MATSUMOTO(ENG) | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D)  |                                   |                 |                     |                                 |
| ITEM        | DSX421G,321G,221G SERIES                                 | PART No.                                       |                 |                            |          |  | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D)  |                                   |                 |                     |                                 |
| PLANT       | TOTTRI FACTRY  | PLANT No.                                      |                 | APPROVED BY:               | OOTUBO   | OTHER APPROVAL/DATE(IF REQ'D)  |   |                                   |                 |                     |                                 |
| PROCES No.  | PROCESS NAME/ OPERATION DESCRIPTION                      | MACHINE, DEVICE JIG,TOOLS FOR MFG.             | CHARACTERISTICS |                            |          | SPECIAL CHAR. CLASS  | METHODS                                   |                                   |                 |                     | REACTION PLAN                   |
|             |  |  | No.             | PRODUCT                    | PROCESS  |  | PRODUCT/ PROCESS SPECIFICATION/ TOLERANCE | EVALUATION/ MEASUREMENT TECHNIQUE | SAMPLE          |                     |                                 |
|             |  |  |                 | SIZE                       | FREQ.    |  |   |                                   |                 |                     |                                 |
| 17          | REFLOW   | REFLOW OVEN                                    |                 | CONBEA SPEED               |          | WORKING MANUAL   | SPEED METER                               | 1                                 | DAY             | CHECK SHEET         | MACHINE MAINTENANCE             |
|             |  |  |                 | TEMPERATURE                |          | WORKING MANUAL   | DISPLAY TEMPERATURE                       | 1                                 | DAY             | CHECK SHEET         | TEMPERATURE ADJUSTMENT          |
|             |  |  |                 | OVEN TEMP.                 |          | WORKING MANUAL   | THERMOCOUPLE                              | 1                                 | 3 MONTHS        | TEMPERATURE PROFILE | TEMPERATURE ADJUSTMENT          |
| 18          | AGING  | AGING OVEN                                     |                 | TEMPERATURE                |          | WORKING MANUAL   | TEMP. CONTROLLER                          | 1                                 | SHIFT           | TREND CHART         | TEMPERATURE ADJUSTMENT          |
|             |  |  |                 | TIME                       |          | WORKING MANUAL   | TIMER                                     | 1                                 | LOT             | LOT CARD            | MACHINE MAINTENANCE             |
| 19          | LEAK CHECK (AIR LEAK)                                    | AIR LEAK TESTER                                |                 | SEALING                    |          | WORKING MANUAL   | AIR LEAK TESTER                           | ALL                               | LOT             | LOT CARD            | CONTACT TO SEAM SEALING PROCESS |
| 20          | LEAK CHECK (He LEAK)                                     | He LEAK DETECTOR                               |                 | SEALING                    |          | WORKING MANUAL   | He LEAK DETECTOR                          | ALL                               | LOT             | LOT CARD            | CONTACT TO SEAM SEALING PROCESS |
|             |  | He pressurization                              |                 | TIME(After pressurization) |          | WORKING MANUAL   | TIMER                                     | ALL                               | LOT             | LOT CARD            | Again He pressurization         |
| 21          | TEMPERATURE CHARACTERISTIC CHECK (* SPECIFIED ITEM ONLY) | TEMPERATURE CHARACTERISTIC MEASUREMENT MACHINE |                 | TEMP.CHARACTERISTIC        |          | WORKING MANUAL   | FREQ.SYNCSIZER                            | ALL                               | LOT             | LOT CARD            | CONTACT TO PREVIOUS PROCESS     |
|             |  |  |                 | CI VALUE                   |          | WORKING MANUAL   | V.V.METER                                 | ALL                               | LOT             | LOT CARD            | CONTACT TO PREVIOUS PROCESS     |
| 22          | FINAL INSPECTION (MARKING)                               | AUTO MEASUREMENT MACHINE                       |                 | LOW DRIVE LEVEL            |          | WORKING MANUAL   | NETWORK ANALYZER                          | ALL                               | LOT             | LOT CARD            | CONTACT TO PREVIOUS PROCESS     |
|             |  |  |                 | FREQUENCY                  |          | WORKING MANUAL   | NETWORK ANALYZER                          | ALL                               | LOT             | LOT CARD            | CONTACT TO PREVIOUS PROCESS     |
|             |  | INSULATION INSPECTION MACHINE                  |                 | CI                         |          | WORKING MANUAL   | NETWORK ANALYZER                          | ALL                               | LOT             | LOT CARD            | CONTACT TO PREVIOUS PROCESS     |
|             |  |  |                 | INSULATION                 |          | WORKING MANUAL   | INSULATION METER                          | ALL                               | LOT             | LOT CARD            | CONTACT TO PREVIOUS PROCESS     |

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**DSX421G,321G,221G SERIES CONTROL PLAN**

| PROTOTYPE   |                                     | PRE-LAUNCH                         |                 | PRODUCTION          | O             | PHONE NO   | TOTTORI PLANT (0857)52-4501                           | DATE (ISSUE)  | SEP 29, 2003  | DATE (REVISION)       | MAY 15, 2006                |                             |                             |                             |
|-------------|-------------------------------------|------------------------------------|-----------------|---------------------|---------------|--|---|---|---|-----------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| CONTROL No. | NQA-1118                            | REV. No.                           | NQA-1118 R9     | CORE TEAM           |               | KISHIMOTO(TEAM LEADER), AOKI(PG)<br>NISHIDA(Q.A.G),SUGITA(Q.A.G),NAGAISHI(Q.A.D),<br>KOMATSU(M.T),MATSUMOTO(ENG) |   | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D)              |   |                       |                             |                             |                             |                             |
| ITEM        | DSX421G,321G,221G SERIES            | PART No.                           |                 |                     |               |  |   | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D)              |   |                       |                             |                             |                             |                             |
| PLANT       | TOTTRI FACTRY                       | PLANT No.                          |                 | APPROVED BY:        |               | OOTUBO   |   | OTHER APPROVAL/DATE(IF REQ'D)                         |   |                       |                             |                             |                             |                             |
| PROCES No.  | PROCESS NAME/ OPERATION DESCRIPTION | MACHINE, DEVICE JIG,TOOLS FOR MFG. | CHARACTERISTICS |                     |               | SPECIAL CHAR. CLASS  | METHODS   |   |   |                       | REACTION PLAN               |                             |                             |                             |
|             |                                     |                                    | No.             | PRODUCT             | PROCESS       |  | PRODUCT/ PROCESS SPECIFICATION/ TOLERANCE             | EVALUATION/ MEASUREMENT TECHNIQUE                     | SAMPLE  |                       |                             | CONTROL METHODS             |                             |                             |
|             |                                     | LASER MARKING MACHINE              |                 | MARKING             |               |  | WORKING MANUAL DESIGNED STANDARD BOUNDARY SAMPLE      | EYE CHECK   | n=256   | SHIFT                 | CHECK SHEET                 |                             | MACHINE MAINTENANCE         |                             |
|             |                                     |                                    |                 |                     | MACHINE CHECK |  | WORKING MANUAL  |   | 1   | SHIFT                 | CHECK SHEET                 | MACHINE MAINTENANCE         |                             |                             |
| 23          | APPEARANCE INSPECTION               |                                    |                 | APPEARANCE          |               |  | WORKING MANUAL BOUNDARY SAMPLE                        | EYE CHECK   | ALL   | LOT                   | LOT CARD                    | CONTACT TO PREVIOUS PROCESS |                             |                             |
| 24          | OUT GOING INSPECTION                |                                    |                 | LOW DRIVE LEVEL     |               |  | OUT GOING INSPECTION SPEC DESINED STD. WORKING MANUAL | NETWORK ANALYZER                                      | AQL STANDARD II 0.1 %   | LOT                   | INSPECTION SHEET            | CONTACT TO PREVIOUS PROCESS |                             |                             |
|             |                                     |                                    |                 | FREQUENCY DEVIATION |               | \$   | OUT-GOING INSPECTION SPEC DESINED STD. WORKING MANUAL | NETWORK ANALYZER                                      | AQL STANDARD II 0.1 %   | LOT                   | INSPECTION SHEET            | CONTACT TO PREVIOUS PROCESS |                             |                             |
|             |                                     |                                    |                 |                     |               |  |   |   |   | n=5 (SPECIFIED)       | 1LOT/DAY                    | X-R CHART Cpk               | RETURN TO PREVIOUS PROCESS  |                             |
|             |                                     |                                    |                 | CI                  |               |  | \$  | OUT GOING INSPECTION SPEC DESINED STD. WORKING MANUAL | NETWORK ANALYZER  | AQL STANDARD II 0.1 % | LOT                         | INSPECTION SHEET            | CONTACT TO PREVIOUS PROCESS |                             |
|             |                                     |                                    |                 |                     |               |  |   |   |   | n=5 (SPECIFIED)       | 1LOT/DAY                    | X-R CHART Cpk               | RETURN TO PREVIOUS PROCESS  |                             |
|             |                                     |                                    |                 | APPEARANCE          |               |  |   |   | OUT-GOING INSPECTION SPEC DESINED STD. WORKING MANUAL BOUNDARY SAMPLE | EYE CHECK             | AQL STANDARD I 0.15 %       | LOT                         | INSPECTION SHEET            | CONTACT TO PREVIOUS PROCESS |
|             |                                     |                                    |                 | INSURATION          |               |  |   |   | OUT GOING INSPECTION SPEC DESINED STD. WORKING MANUAL                 | IR TESTER             | AQL STANDARD I 0.1 %        | ONLY FIRST LOT              | INSPECTION SHEET            | CONTACT TO PREVIOUS PROCESS |
|             | DIMENSION                           |                                    |                 |                     |               | OUT GOING INSPECTION SPEC DESINED STD. WORKING MANUAL  | CALIPER   | AQL STANDARD S-2 1.0 %                                | ONLY FIRST LOT  | INSPECTION SHEET      | CONTACT TO PREVIOUS PROCESS |                             |                             |                             |

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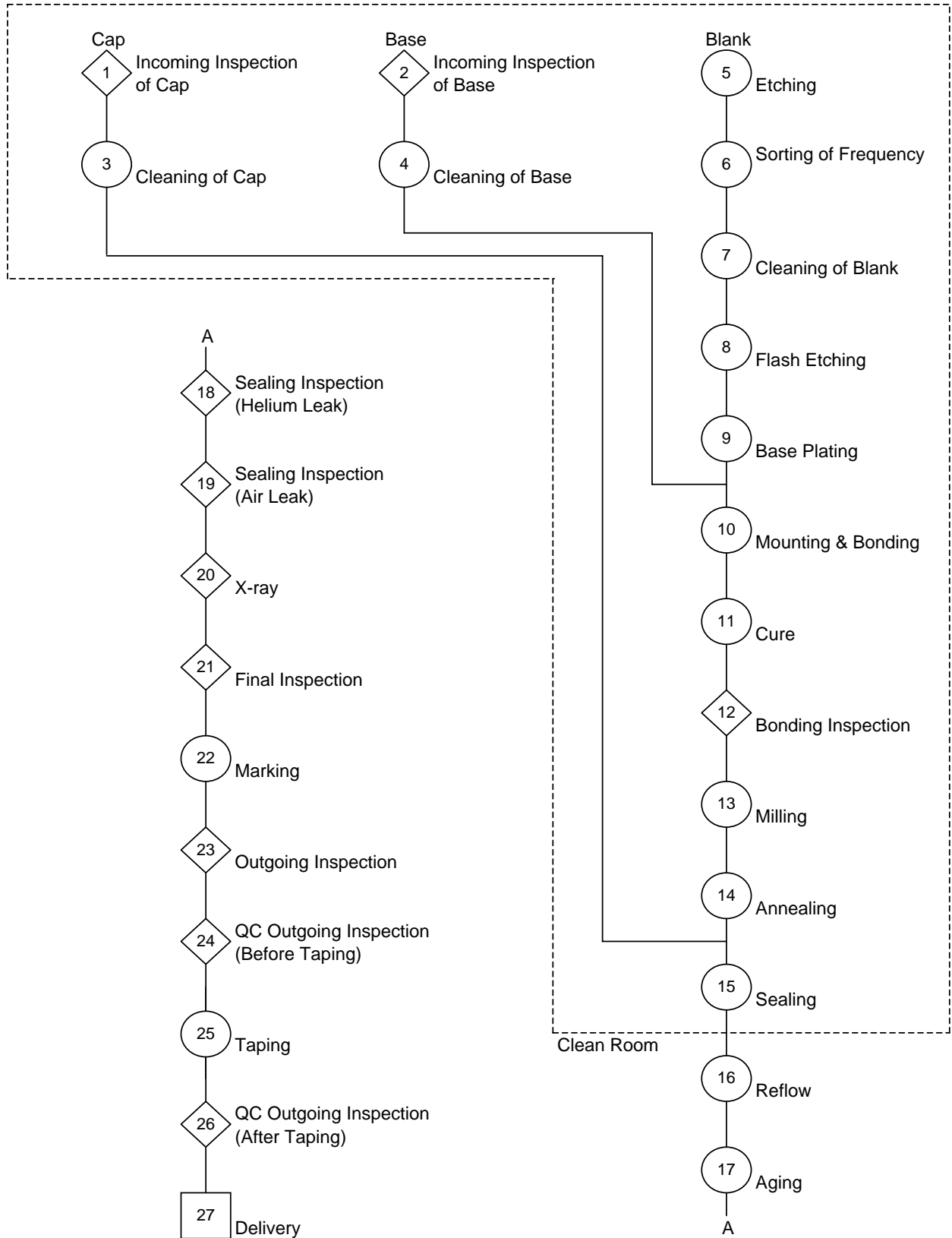
## DSX421G,321G,221G SERIES CONTROL PLAN

| PROTOTYPE   |                                     | PRE-LAUNCH                         |                 | PRODUCTION                    | O       | PHONE NO            | TOTTORI PLANT (0857)52-4501  | DATE (ISSUE)                             | SEP 29, 2003            | DATE (REVISION) | MAY 15, 2006          |  |
|-------------|-------------------------------------|------------------------------------|-----------------|-------------------------------|---------|---------------------|--|--|-------------------------|-----------------|-----------------------|--|
| CONTROL No. | NQA-1118                            | REV. No.                           | NQA-1118 R9     |                               |         | CORE TEAM           | KISHIMOTO(TEAM LEADER), AOKI(PG)<br>NISHIDA(Q.A.G),SUGITA(Q.A.G),NAGAISHI(Q.A.D),<br>KOMATSU(M.T),MATSUMOTO(ENG) | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D) |                         |                 |                       |  |
| ITEM        | DSX421G,321G,221G SERIES            | PART No.                           |                 |                               |         |                     |  | CUSTOMER QUALITY APPROVAL/DATE(IF REQ'D) |                         |                 |                       |  |
| PLANT       | TOTTRI FACTRY                       | PLANT No.                          |                 |                               |         | APPROVED BY:        | OOTUBO   | OTHER APPROVAL/DATE(IF REQ'D)            |                         |                 |                       |  |
| PROCES No.  | PROCESS NAME/ OPERATION DESCRIPTION | MACHINE, DEVICE JIG,TOOLS FOR MFG. | CHARACTERISTICS |                               |         | SPECIAL CHAR. CLASS | METHODS  |  |                         |                 | REACTION PLAN         |  |
|             |                                     |                                    | No.             | PRODUCT                       | PROCESS |                     | PRODUCT/ PROCESS SPECIFICATION/ TOLERANCE  | EVALUATION/ MEASUREMENT TECHNIQUE        | SAMPLE                  |                 |                       | CONTROL METHODS  |
|             |                                     |                                    |                 | OTHER, GUARANTEE ITEM         |         |                     | DESIGN STD.  |  |                         |                 | INSPECTION SHEET      | CONTACT TO PREVIOUS PROCESS                                |
|             |                                     |                                    |                 | DIMENSION (LAYOUT INSPECTION) |         |                     | LAYOUT INSPECTION PROCEDURE DOCUMENT   | DIGITAL CALIPER MICROMETER PROJECTOR     | 1 TIME (n=10) SPECIFIED | YEAR            | RELIABILITY REPORT    | CONTACT TO TOTTORI Q.C. Section. FROM Q.A Division. R.C Gr |
|             |                                     |                                    |                 | FUNCTIONAL INSPECTION         |         |                     | FUNCTIONAL PROCEDURE DOCUMENT  | IR TESTER INPEADANCE ANALYZER            | 1 TIME (n=10) SPECIFIED | YEAR            | RELIABILITY REPORT    | CONTACT TO TOTTORI Q.C. Section. FROM Q.A Division. R.C Gr |
|             |                                     |                                    |                 | SEALING                       |         |                     | OUT GOING INSPECTION SPEC DESINED STD. WORKING MANUAL  | GALDEN                                   | AQL STANDARD S-4 0.1 %  | ONLY FIRST LOT  | INSPECTION SHEET      | CONTACT TO PREVIOUS PROCESS                                |
| 25          | TAPING                              | AUTO TAPING MACHINE                |                 | Q'TY                          |         |                     | WORKING MANUAL   | COUNTER                                  | ALL                     | LOT             | LOT CARD              | CONTACT TO PREVIOUS PROCESS                                |
|             |                                     |                                    |                 | TAPING STRENGTH               |         |                     | WORKING MANUAL   | PEELING FORCE GAUGE                      | 1                       | WEEK            | TREND CHART           | MACHINE MAINTENANCE  |
| 26          | OUT GOING PACKING                   |                                    |                 |                               |         |                     | WORKING MANUAL   |  |                         |                 | SHIPPING DESCRIPTIONS | RE -PACKING  |

“\$” in the column of “Special Characteristics” means critical parameters to be controlled carefully.

# DSX321G Series Process Flow Chart

PT. KDS INDONESIA



Note

Enactment date  
07-Sep-2004  
20-Apr-2006 (R3)

Control No.  
KDS-FC-018

# DSX321G Series ASSEMBLY CONTROL PLAN

| PROTOTYPE               |                                      | PRE-LAUNCH   | PRODUCTION    | O                                     | KEY CONTACT /PHONE |   | DATE (ORIG)                                 | 07-Sep-2004                                   | DATE (REV.)              | 20-Apr-2006 (R2) |                           |  |
|-------------------------|--------------------------------------|--|---------------|---------------------------------------|--------------------|---|---|---|--------------------------|------------------|---------------------------|--|
| CONTROL No.             | KDS-CP-018                           |  |               | CORE TEAM                             |                    | Kristianto, Rini, Ropensius, Samsul (PROD)<br>Endaria, Bowo, Benaniya (QC) Aveltri (QA) |   | CUSTOMER ENGINEERING APPROVAL DATE (IF REQ'D) |                          |                  |                           |  |
| PART NAME / DESCRIPTION | DSX321G Series                       |  |               | APPROVAL / DATE                       |                    | T.lkeda   |   | CUSTOMER QUALITY APPROVAL DATE (IF REQ'D)     |                          |                  |                           |  |
| SUPPLIER                | PT. KDS INDONESIA                    |  | SUPPLIER CODE | OTHER APPROVAL DATE (IF REQ'D)        |                    | OTHER APPROVAL DATE (IF REQ'D)  |   |   |                          |                  |                           |  |
| PROC No.                | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE JIG, TOOLS FOR WORKING MANUFACTURING | No.           | CHARACTERISTICS                       |                    |   | METHODS                                     |   |                          |                  |                           | REACTION PLAN / PERSON WHO TAKE RESPONSIBILITY |
|                         |                                      |  |               | PRODUCT                               | PROCESS            | SPECIAL CHARA. CLASS  | PRODUCT / PROCESS SPECIFICATION / TOLERANCE | EVALUATION / MEASUREMENT TECHNIQUE            | SIZE                     | FREQ             | CONTROL METHOD            |  |
| 1                       | Incoming Inspection of Cap           | Micrometer   |               | Dimension                             |                    |   | Incoming inspection spec                    | Micrometer                                    | Incoming Inspection spec | Lot              | Incoming inspection sheet | Return to supplier                             |
|                         |                                      | Microscope   |               | Appearance                            |                    |   | Boundary sample                             | Microscope                                    | Incoming Inspection spec | Lot              | Incoming inspection sheet | Return to supplier                             |
| 2                       | Incoming Inspection of Base          | Micrometer   |               | Dimension                             |                    |   | Incoming inspection spec                    | Micrometer                                    | Incoming Inspection spec | Lot              | Incoming inspection sheet | Return to supplier                             |
|                         |                                      | Microscope   |               | Appearance                            |                    |   | Boundary sample                             | Microscope                                    | Incoming Inspection spec | Lot              | Incoming inspection sheet | Return to supplier                             |
| 3                       | Cleaning of Cap                      | Cleaning bath  |               | Shake                                 |                    |   | Working manual                              | Visual check                                  | 100%                     | Jig              | -                         | Shake again                                    |
|                         |                                      |  |               | Exchange pure water                   |                    |   | Working manual                              | Visual check                                  | 1                        | Jig              | -                         | Exchange pure water                            |
|                         |                                      |  |               | Temperature water                     |                    |   | Working manual                              | Temperature control meter                     | 1                        | Shift            | Check sheet               | Temperature adjustment                         |
|                         |                                      | Oven   |               | Temperature oven                      |                    |   | Working manual                              | Temperature control meter                     | 1                        | Shift            | Check sheet               | Temperature adjustment                         |
|                         |                                      |  |               | Time                                  |                    |   | Working manual                              | Watch   | 100%                     | Jig              | Working note              | Time adjustment                                |
|                         |                                      |  |               | Cleaning oven                         |                    |   | Working manual                              | Visual check                                  | 1                        | Month            | Check sheet               | Cleaning again                                 |
|                         |                                      |  |               | Wait Time (Cleaning -Partial plating) |                    |   | Working manual                              | Watch   | 100%                     | Lot              | Working note              | Cleaning again                                 |
| 4                       | Cleaning of Base                     | Cleaning bath  |               | Shake                                 |                    |   | Working manual                              | Visual check                                  | 100%                     | Jig              | -                         | Shake again                                    |
|                         |                                      |  |               | Exchange pure water                   |                    |   | Working manual                              | Visual check                                  | 1                        | Jig              | -                         | Exchange pure water                            |
|                         |                                      |  |               | Temperature water                     |                    |   | Working manual                              | Thermometer                                   | 1                        | Shift            | Check sheet               | Temperature adjustment                         |
|                         |                                      | Oven   |               | Temperature oven                      |                    |   | Working manual                              | Temperature control meter                     | 1                        | Shift            | Check sheet               | Temperature adjustment                         |
|                         |                                      |  |               | Time                                  |                    |   | Working manual                              | Watch   | 100%                     | Jig              | Working note              | Time adjustment                                |
|                         |                                      |  |               | Cleaning oven                         |                    |   | Working manual                              | Visual check                                  | 1                        | Month            | Check sheet               | Cleaning again                                 |
|                         |                                      |  |               | Wait time (Cleaning -bonding)         |                    |   | Working manual                              | Watch   | 100%                     | Lot              | Working note              | Cleaning again                                 |
| 5                       | Etching                              | Fundamental oscillator                               |               | Frequency                             |                    |   | Production spec.                            | Fundamental oscillator                        | 5pcs                     | Lot              | Lot card                  | Return to blank-process                        |

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# DSX321G Series ASSEMBLY CONTROL PLAN

| PROTOTYPE               |                                      | PRE-LAUNCH   | PRODUCTION | O               | KEY CONTACT /PHONE                 |                      | DATE (ORIG)  | 07-Sep-2004                        | DATE (REV.)                                   | 20-Apr-2006 (R2) |  |                         |
|-------------------------|--------------------------------------|--|------------|-----------------|------------------------------------|----------------------|--|------------------------------------|---|------------------|--|-------------------------|
| CONTROL No.             |                                      | KDS-CP-018   |            |                 | CORE TEAM                          |                      | Kristianto, Rini, Ropensus, Samsul (PROD)<br>Endaria, Bowo, Benaniya (QC) Aveltri (QA) |                                    | CUSTOMER ENGINEERING APPROVAL DATE (IF REQ'D) |                  |  |                         |
| PART NAME / DESCRIPTION |                                      | DSX321G Series                                       |            |                 | APPROVAL / DATE                    |                      | T.lkeda  |                                    | CUSTOMER QUALITY APPROVAL DATE (IF REQ'D)     |                  |  |                         |
| SUPPLIER                |                                      | PT. KDS INDONESIA                                    |            | SUPPLIER CODE   | OTHER APPROVAL DATE (IF REQ'D)     |                      | OTHER APPROVAL DATE (IF REQ'D)   |                                    |   |                  |  |                         |
| PROC No.                | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE JIG, TOOLS FOR WORKING MANUFACTURING | No.        | CHARACTERISTICS |                                    |                      | METHODS  |                                    |   |                  | REACTION PLAN / PERSON WHO TAKE RESPONSIBILITY |                         |
|                         |                                      |  |            | PRODUCT         | PROCESS                            | SPECIAL CHARA. CLASS | PRODUCT / PROCESS SPECIFICATION / TOLERANCE  | EVALUATION / MEASUREMENT TECHNIQUE | SIZE  | FREQ             |  | CONTROL METHOD          |
|                         |                                      | Etching bath   |            |                 | Liquid mixture ratio               |                      | Working manual   | Glass beaker                       | 1   | Shift            | Check sheet                                    | Mixture adjustment      |
|                         |                                      |  |            |                 | Water level                        |                      | Working manual   | Glass beaker                       | 1   | Shift            | Check sheet                                    | Water level adjustment  |
|                         |                                      |  |            |                 | Etching liquid Temperature         |                      | Working manual   | Thermometer                        | 1   | Shift            | Check sheet<br>Control graph                   | Temperature adjustment  |
|                         |                                      | Stop watch   |            |                 | Etching time                       |                      | Working manual   | Stop watch                         | 100%  | Lot              | Lot card                                       | Etching again           |
|                         |                                      |  |            |                 | Quantity                           |                      | Working manual   | Jig                                | 100%  | Lot              | -  | Quantity adjustment     |
| 6                       | Sorting of Frequency                 | Automatic quartz sorter                              |            | Frequency       |                                    |                      | Production spec.   | Frequency counter                  | 100%  | Lot              | Lot card                                       | Return to AT-blank      |
|                         |                                      | Magnifying lamp                                      |            | Appearance      |                                    |                      | Boundary sample  | Magnifying lamp                    | 100%  | Lot              | Working note                                   | Maintenance             |
| 7                       | Cleaning of Blank                    | Cleaning machine                                     |            |                 | Exchange liquid acid               |                      | Working manual   | Glass beaker                       | 1   | 42,000pcs +/-10% | Working note                                   | Mixture again           |
|                         |                                      |  |            |                 | Exchange liquid Alkali             |                      | Working manual   | Glass beaker                       | 1   | 42,000pcs +/-10% | Working note                                   | Exchange liquid alkali  |
|                         |                                      |  |            |                 | Liquid level                       |                      | Working manual   | Pipette                            | 1   | Shift            | Check sheet                                    | Liquid level adjustment |
|                         |                                      |  |            |                 | Liquid temperature (Acid / Alkali) |                      | Working manual   | Temperature control meter          | 1   | Shift            | Check sheet                                    | Temperature adjustment  |
|                         |                                      |  |            |                 | Quantity                           |                      | Working manual   | Jig                                | 100%  | Lot              | -  | Quantity adjustment     |
|                         |                                      | Microwave  |            |                 | Time                               |                      | Working manual   | Auto timer                         | 100%  | Lot              | -  | Time adjustment         |
| 8                       | Flash Etching                        | Flash Etching Machine                                |            |                 | Density                            |                      | Working manual   | Density control meter              | 1   | Shift            | Check sheet                                    | Shake again             |
|                         |                                      |  |            |                 | Exchange DI water                  |                      | Working manual   | -                                  | 1   | Jig              | Check sheet                                    | Exchange DI water       |
|                         |                                      |  |            |                 | Temperature DI water               |                      | Working manual   | Temperature control meter          | 1   | Shift            | Temperature control graph                      | Temperature adjustment  |
|                         |                                      | Oven   |            |                 | Temperature oven                   |                      | Working manual   | Temperature control meter          | 1   | Shift            | Temperature control graph                      | Temperature adjustment  |
|                         |                                      |  |            |                 | Time oven                          |                      | Working manual   | Watch                              | 100%  | Lot              | Working note                                   | Time adjustment         |
|                         |                                      |  |            |                 | Cleaning oven                      |                      | Working manual   | Visual check                       | 1   | Shift            | Check sheet                                    | Cleaning again          |
| 9                       | Base Plating                         | Base plating Machine (SPUTTER machine)               |            |                 | Vacuum degree                      |                      | Working manual   | Vacuum gauge Control meter         | 1   | Shift            | Check sheet                                    | Pump maintenance        |
|                         |                                      |  |            |                 | Heater current                     |                      | Working manual   | Ampere control meter               | 1   | Shift            | Check sheet                                    | Machine adjustment      |

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# DSX321G Series ASSEMBLY CONTROL PLAN

| PROTOTYPE               |                                      | PRE-LAUNCH   | PRODUCTION | O               | KEY CONTACT /PHONE                       |                        | DATE (ORIG)  | 07-Sep-2004                        | DATE (REV.)                                   | 20-Apr-2006 (R2) |  |  |
|-------------------------|--------------------------------------|--|------------|-----------------|--|------------------------|--|------------------------------------|---|------------------|--|--|
| CONTROL No.             |                                      | KDS-CP-018   |            |                 | CORE TEAM                                |                        | Kristianto, Rini, Ropensus, Samsul (PROD)<br>Endaria, Bowo, Benaniya (QC) Aveltri (QA) |                                    | CUSTOMER ENGINEERING APPROVAL DATE (IF REQ'D) |                  |  |  |
| PART NAME / DESCRIPTION |                                      | DSX321G Series                                       |            |                 | APPROVAL / DATE                          |                        | T.lkeda  |                                    | CUSTOMER QUALITY APPROVAL DATE (IF REQ'D)     |                  |  |  |
| SUPPLIER                |                                      | PT. KDS INDONESIA                                    |            | SUPPLIER CODE   | OTHER APPROVAL DATE (IF REQ'D)           |                        | OTHER APPROVAL DATE (IF REQ'D)   |                                    |   |                  |  |  |
| PROC No.                | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE JIG, TOOLS FOR WORKING MANUFACTURING | No.        | CHARACTERISTICS |  |                        | METHODS  |                                    |   |                  | REACTION PLAN / PERSON WHO TAKE RESPONSIBILITY |  |
|                         |                                      |  |            | PRODUCT         | PROCESS                                  | SPECIAL CHARA. CLASS   | PRODUCT / PROCESS SPECIFICATION / TOLERANCE  | EVALUATION / MEASUREMENT TECHNIQUE | SIZE  | FREQ             |  | CONTROL METHOD                           |
|                         |                                      |  |            |                 | Exchange target (Silver)                 |                        | Working manual   | Visual check                       | 1   | 1,900M MAX       | Check sheet                                    | Exchange target                          |
|                         |                                      |  |            |                 | Exchange target (Chromium)               |                        | Working manual   | Visual check                       | 1   | 30,000M MAX      | Check sheet                                    | Exchange target                          |
|                         |                                      |  |            |                 | Time to reach vacuum                     |                        | Working manual   | Stop watch                         | 1   | Shift            | Control graph                                  | Pump maintenance                         |
|                         |                                      |  |            |                 | Plating strength                         |                        | Working manual   | Cellophane Tape test               | n=5   | Lot              | Working note                                   | Machine adjustment                       |
|                         |                                      |  |            |                 | Machine cleaning                         |                        | Working manual   | Visual check                       | 1   | Exchange target  | Check sheet                                    | Cleaning again                           |
|                         |                                      |  |            |                 | Frequency counter                        | Frequency              | Production spec.   | Frequency counter                  | n=5   | Lot              | Lot card                                       | Ag amount adjustment                     |
|                         |                                      |  |            |                 | Microscope                               | Appearance             | Boundary sample  | Microscope                         | 100%  | Lot              | Lot card                                       | Machine adjustment                       |
|                         |                                      |  |            |                 | Base plating mask                        | Mask cleaning          | Working manual   | Visual check                       | 1   | 1time            | Working note                                   | Cleaning again                           |
|                         |                                      |  |            |                 | Standing mask                            | Standing mask cleaning | Working manual   | Visual check                       | 1   | Shift            | Check sheet                                    | Cleaning again                           |
|                         |                                      |  |            |                 | Magazine tray                            | Magazine tray Cleaning | Working manual   | Visual check                       | 1   | Shift            | Check sheet                                    | Cleaning again                           |
| 10                      | Mounting & Bonding                   | Mounting & Bonding machine                           |            |                 | Exchange conductive paste                |                        | Working manual   | Visual check                       | 2   | Shift            | Check sheet                                    | Exchange Conductive paste                |
|                         |                                      |  |            |                 | Head needle cleaning                     |                        | Working manual   | Visual check                       | 2   | Shift            | Check sheet                                    | Cleaning again                           |
|                         |                                      |  |            |                 | Dispenser cleaning                       |                        | Working manual   | Visual check                       | 2   | Shift            | Check sheet                                    | Cleaning again                           |
|                         |                                      |  |            |                 | Storage temperature for conductive paste |                        | Working manual   | Thermometer                        | 1   | Shift            | Check sheet                                    | Temperature adjustment                   |
|                         |                                      |  |            |                 | Microscope                               | Bonding condition      | Boundary sample  | Microscope                         | 100%  | Lot              | Lot card                                       | Machine adjustment                       |
| 11                      | Cure                                 | Oven   |            |                 | Temperature                              |                        | Working manual   | Temperature control meter          | 1   | Shift            | Check sheet<br>Control graph                   | Temperature adjustment                   |
|                         |                                      |  |            |                 | Dew point                                |                        | Working manual   | Dew point control meter            | 1   | Shift            | Check sheet<br>Control graph                   | Dew point adjustment                     |
|                         |                                      |  |            |                 | Speed conveyor                           |                        | Working manual   | Speed control meter                | 1   | Shift            | Check sheet                                    | Speed adjustment                         |
|                         |                                      |  |            |                 | Temperature calibration                  |                        | Working manual   | Thermocouple                       | 1   | month            | Calibration record                             | Machine maintenance                      |
| 12                      | Bonding Inspection                   | Microscope   |            |                 | Appearance                               |                        | Boundary sample  | Microscope                         | 100%  | Lot              | Lot card                                       | Contact to foreman<br>Machine adjustment |

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# DSX321G Series ASSEMBLY CONTROL PLAN

| PROTOTYPE               |                                      | PRE-LAUNCH   | PRODUCTION          | O                    | KEY CONTACT /PHONE             |                          | DATE (ORIG)  | 07-Sep-2004                        | DATE (REV.)                                   | 20-Apr-2006 (R2)         |  |  |                        |
|-------------------------|--------------------------------------|--|---------------------|----------------------|--------------------------------|--------------------------|--|------------------------------------|---|--------------------------|--|--|------------------------|
| CONTROL No.             |                                      | KDS-CP-018   |                     |                      | CORE TEAM                      |                          | Kristianto, Rini, Ropensus, Samsul (PROD)<br>Endaria, Bowo, Benaniya (QC) Aveltri (QA) |                                    | CUSTOMER ENGINEERING APPROVAL DATE (IF REQ'D) |                          |  |  |                        |
| PART NAME / DESCRIPTION |                                      | DSX321G Series                                       |                     |                      | APPROVAL / DATE                |                          | T.lkeda  |                                    | CUSTOMER QUALITY APPROVAL DATE (IF REQ'D)     |                          |  |  |                        |
| SUPPLIER                |                                      | PT. KDS INDONESIA                                    |                     | SUPPLIER CODE        | OTHER APPROVAL DATE (IF REQ'D) |                          | OTHER APPROVAL DATE (IF REQ'D)   |                                    |   |                          |  |  |                        |
| PROC No.                | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE JIG, TOOLS FOR WORKING MANUFACTURING | No.                 | CHARACTERISTICS      |                                |                          | METHODS  |                                    |   |                          | REACTION PLAN / PERSON WHO TAKE RESPONSIBILITY |  |                        |
|                         |                                      |  |                     | PRODUCT              | PROCESS                        | SPECIAL CHARA. CLASS     | PRODUCT / PROCESS SPECIFICATION / TOLERANCE  | EVALUATION / MEASUREMENT TECHNIQUE | SIZE  | FREQ                     |  | CONTROL METHOD                         |                        |
|                         |                                      | Push pull gauge                                      |                     | Bonding strength     |                                |                          | Working manual   | Push pull Gauge                    | n=5<br>n=7                                    | 1-5,000pcs<br>5,001pcs - | Control graph                                  | Contact to foreman<br>Oven maintenance |                        |
| 13                      | Milling                              | Milling machine                                      |                     | Vacuum degree        |                                |                          | Working manual   | Vacuum gauge<br>Control meter      | 1   | Shift                    | Check sheet                                    | Pump maintenance                       |                        |
|                         |                                      |  |                     | Time to reach vacuum |                                |                          | Working manual   | Stop watch                         | 1   | Shift                    | Control graph                                  | Pump maintenance                       |                        |
|                         |                                      |  |                     | Machine cleaning     |                                |                          | Working manual   | Visual check                       | 1   | Shift                    | Check sheet                                    | Cleaning again                         |                        |
|                         |                                      |  | Milling mask        |                      | Milling mask cleaning          |                          |  | Working manual                     | Visual check                                  | 1                        | 15,000pcs<br>MAX                               | Check sheet                            | Cleaning again         |
|                         |                                      |  | Milling carrier     |                      | Milling cleaning               |                          |  | Working manual                     | Visual check                                  | 1                        | Shift  | Check sheet                            | Cleaning again         |
|                         |                                      |  | Over drive machine  |                      | Frequency                      |                          |  | Working manual                     | Frequency Counter                             | 100%                     | Lot  | Lot card                               | Machine adjustment     |
|                         |                                      |  |                     | Over drive setting   |                                |                          |  | Working manual                     | Power meter                                   | 1                        | Lot  | -                                      | Machine adjustment     |
|                         |                                      |  | Comparator CI-meter |                      | Frequency                      |                          |  | Production spec.                   | Comparator                                    | 100%                     | Lot  | Lot card                               | Machine adjustment     |
|                         |                                      |  |                     | CI                   |                                |                          |  | Production spec.                   | CI-meter                                      | 100%                     | Lot  | Lot card                               | Machine adjustment     |
|                         |                                      |  | Cap pallet Jig      |                      |                                | Cap pallet Jig condition |  |                                    | Working manual                                | Visual check             | 100%   | Lot                                    | -                      |
|                         | Appearance                           |  |                     |                      |                                |                          | Working manual   | Visual check                       | 100%  | Lot                      | -  | Pallet Jig maintenance                 |                        |
| 14                      | Annealing                            | Annealing machine                                    |                     | Temperature          |                                |                          | Working manual   | Temperature control meter          | 1   | Shift                    | Check sheet                                    | Temperature adjustment                 |                        |
|                         |                                      |  |                     | Vacuum degree        |                                |                          | Working manual   | Vacuum gauge control meter         | 1   | Shift                    | Check sheet                                    | Pump maintenance                       |                        |
|                         |                                      |  |                     | Time                 |                                |                          | Working manual   | Auto timer                         | 1   | Shift                    | Check sheet                                    | Auto timer maintenance                 |                        |
| 15                      | Sealing                              | Sealing oven   |                     | Temperature          |                                |                          | Working manual   | Temperature control meter          | 1   | Shift                    | Check sheet                                    | Temperature adjustment                 |                        |
|                         |                                      |  |                     | Speed conveyor       |                                |                          | Working manual   | Speed control meter                | 1   | Shift                    | Check sheet                                    | Speed adjustment                       |                        |
|                         |                                      |  | Dew point meter     |                      | Dew point                      |                          |  | Working manual                     | Dew point control meter                       | 1                        | Shift  | Check sheet                            | Dew point adjustment   |
|                         |                                      |  | Oxygen meter        |                      | Oxygen density                 |                          |  | Working manual                     | Oxygen control meter                          | 1                        | Shift  | Check sheet                            | Oxygen adjustment      |
|                         |                                      |  |                     |                      | Appearance                     |                          |  | Boundary sample                    | Visual check                                  | 100%                     | Lot  | Lot card                               | Temperature adjustment |

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# DSX321G Series ASSEMBLY CONTROL PLAN

| PROTOTYPE               |                                      | PRE-LAUNCH   | PRODUCTION           | O                 | KEY CONTACT /PHONE             |                      | DATE (ORIG)   | 07-Sep-2004                        | DATE (REV.)                                   | 20-Apr-2006 (R2) |                            |  |
|-------------------------|--------------------------------------|--|----------------------|-------------------|--------------------------------|----------------------|---|------------------------------------|---|------------------|----------------------------|--|
| CONTROL No.             |                                      | KDS-CP-018   |                      |                   | CORE TEAM                      |                      | Kristianto, Rini, Ropensius, Samsul (PROD)<br>Endaria, Bowo, Benaniya (QC) Aveltri (QA) |                                    | CUSTOMER ENGINEERING APPROVAL DATE (IF REQ'D) |                  |                            |  |
| PART NAME / DESCRIPTION |                                      | DSX321G Series                                       |                      |                   | APPROVAL / DATE                |                      | T.lkeda   |                                    | CUSTOMER QUALITY APPROVAL DATE (IF REQ'D)     |                  |                            |  |
| SUPPLIER                |                                      | PT. KDS INDONESIA                                    |                      | SUPPLIER CODE     | OTHER APPROVAL DATE (IF REQ'D) |                      | OTHER APPROVAL DATE (IF REQ'D)  |                                    |   |                  |                            |  |
| PROC No.                | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE JIG, TOOLS FOR WORKING MANUFACTURING | No.                  | CHARACTERISTICS   |                                |                      | METHODS   |                                    |   |                  |                            | REACTION PLAN / PERSON WHO TAKE RESPONSIBILITY |
|                         |                                      |  |                      | PRODUCT           | PROCESS                        | SPECIAL CHARA. CLASS | PRODUCT / PROCESS SPECIFICATION / TOLERANCE   | EVALUATION / MEASUREMENT TECHNIQUE | SIZE  | FREQ             | CONTROL METHOD             |  |
| 16                      | Reflow                               | Reflow machine                                       |                      |                   | Temperature                    |                      | Working manual  | Temperature control meter          | 1   | Shift            | Check sheet                | Temperature adjustment                         |
|                         |                                      |  |                      |                   | Speed                          |                      | Working manual  | Speed control meter                | 1   | Shift            | Check sheet                | Speed adjustment                               |
| 17                      | Aging                                | Oven   |                      |                   | Temperature                    |                      | Working manual  | Temperature control meter          | 1   | Shift            | Check sheet                | Temperature adjustment                         |
|                         |                                      |  |                      |                   | Time                           |                      | Working manual  | Watch                              | 100%  | Lot              | Working note               | Time adjustment                                |
| 18                      | Sealing Inspection (Helium Leak)     | Helium press   |                      |                   | Vacuum                         |                      | Working manual  | Vacuum gauge Control meter         | 1   | Shift            | Check sheet                | Pump maintenance                               |
|                         |                                      |  |                      |                   | Pressure                       |                      | Working manual  | Pressure control meter             | 1   | Shift            | Check sheet                | Pressure adjustment                            |
|                         |                                      |  |                      |                   | Time pressure                  |                      | Working manual  | Watch                              | 100%  | Lot              | Working note               | Time adjustment                                |
|                         |                                      |  | Helium leak Detector | Sealing           |                                | Working manual       | Helium leak Detector  | 100%                               | Lot   | Lot card         | Contact to sealing process |  |
|                         |                                      |  |                      |                   |                                | Working manual       | Watch   | 100%                               | Lot   | Working note     | Helium press again         |  |
| 19                      | Sealing Inspection (Air Leak)        | Air leak tester machine                              |                      |                   | O-ring                         |                      | Working manual  | Visual check                       | 1   | 200,000pcs MAX   | Working note               | Cleaning again                                 |
|                         |                                      |  |                      | Sealing           |                                |                      | Working manual  | Air leak tester                    | 100%  | Lot              | Lot card                   | Contact to sealing process                     |
| 20                      | X-ray                                | X-ray machine  |                      | Sealing condition |                                |                      | Boundary sample   | X-ray machine                      | 30%   | Lot              | Lot card                   | Contact to sealing process                     |
| 21                      | Final Inspection                     | Comparator CI-meter                                  |                      | Frequency         |                                |                      | Production spec.  | Comparator                         | 100%  | Lot              | Lot card                   | Contact to DSX-Assy.                           |
|                         |                                      |  |                      | CI                |                                | \$                   | Production spec.  | CI-meter                           | 100%  | Lot              | Lot card                   | Contact to DSX-Assy.                           |
|                         |                                      |  | Network analyzer     | Low drive level   |                                |                      | Production spec.  | Network analyzer                   | 100%  | Lot              | Lot card                   | Contact to DSX-Assy.                           |
|                         |                                      |  | IR-meter             | Insulation        |                                |                      | Production spec.  | IR-meter                           | 100%  | Lot              | Lot card                   | Contact to DSX-Assy.                           |
|                         |                                      |  |                      | Appearance        |                                |                      | Boundary sample   | Visual check                       | 100%  | Lot              | Lot card                   | Contact to DSX-Assy.                           |
| 22                      | Marking                              | Marking machine                                      |                      |                   | Marking condition              |                      | Working manual  | Visual check                       | n=5   | Lot              | Lot card                   | Machine adjustment                             |
|                         |                                      |  |                      | Marking strength  |                                |                      | Working manual  | Alcohol                            | n=5   | Lot              | Lot card                   | Machine adjustment                             |
|                         |                                      |  |                      | Appearance        |                                |                      | Boundary sample   | Visual check                       | 100%  | Lot              | Lot card                   | Machine adjustment                             |
| 23                      | Outgoing Inspection                  | Comparator CI-meter                                  |                      | Frequency         |                                |                      | Production spec.  | Comparator                         |   | Lot              | Outgoing Inspection spec   | Outgoing Inspection result                     |
|                         |                                      |  |                      | CI                |                                |                      | Production spec.  | CI-meter                           |   | Lot              | Outgoing inspection spec   | Outgoing Inspection result                     |

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# DSX321G Series ASSEMBLY CONTROL PLAN

| PROTOTYPE               |  | PRE-LAUNCH   | PRODUCTION          | O               | KEY CONTACT /PHONE             |                      | DATE (ORIG)   | 07-Sep-2004   | DATE (REV.)                                   | 20-Apr-2006 (R2)              |  |                               |                        |
|-------------------------|--|--|---------------------|-----------------|--------------------------------|----------------------|---|---|---|-------------------------------|--|-------------------------------|------------------------|
| CONTROL No.             |  | KDS-CP-018   |                     |                 | CORE TEAM                      |                      | Kristianto, Rini, Ropensius, Samsul (PROD)<br>Endaria, Bowo, Benaniya (QC) Aveltri (QA) |   | CUSTOMER ENGINEERING APPROVAL DATE (IF REQ'D) |                               |  |                               |                        |
| PART NAME / DESCRIPTION |  | DSX321G Series                                       |                     |                 | APPROVAL / DATE                |                      | T.lkeda   |   | CUSTOMER QUALITY APPROVAL DATE (IF REQ'D)     |                               |  |                               |                        |
| SUPPLIER                |  | PT. KDS INDONESIA                                    |                     | SUPPLIER CODE   | OTHER APPROVAL DATE (IF REQ'D) |                      | OTHER APPROVAL DATE (IF REQ'D)  |   |   |                               |  |                               |                        |
| PROC No.                | PROCESS NAME / OPERATION DESCRIPTION   | MACHINE, DEVICE JIG, TOOLS FOR WORKING MANUFACTURING | No.                 | CHARACTERISTICS |                                |                      | METHODS   |   |   |                               | REACTION PLAN / PERSON WHO TAKE RESPONSIBILITY |                               |                        |
|                         |  |  |                     | PRODUCT         | PROCESS                        | SPECIAL CHARA. CLASS | PRODUCT / PROCESS SPECIFICATION / TOLERANCE   | EVALUATION / MEASUREMENT TECHNIQUE                                  | SIZE  | FREQ                          |  | CONTROL METHOD                |                        |
|                         |  | IR-meter   |                     | Insulation      |                                |                      | Production spec.  | IR-meter  | Outgoing inspection spec                      | Lot                           | Outgoing Inspection result                     | Contact to DSX-Assy.          |                        |
|                         |  | Caliper  |                     | Dimension       |                                |                      | Production spec.  | Caliper   | Outgoing inspection spec                      | Lot                           | Outgoing Inspection result                     | Contact to DSX-Assy.          |                        |
|                         |  | Flourinert   |                     | Sealing         |                                |                      | Production spec.  | Flourinert  | Outgoing inspection spec                      | Lot                           | Outgoing Inspection result                     | Contact to DSX-Assy.          |                        |
|                         |  |  |                     |                 | Temp flourinert                |                      |   | Working manual  | Thermometer                                   | 1                             | Shift  | Check sheet                   | Temperature adjustment |
|                         |  |  |                     |                 | Time                           |                      |   | Working manual  | Stop watch                                    | 100%                          | Lot  | -                             | Check again            |
|                         |  |  |                     | Appearance      |                                |                      | Boundary sample   | Visual check  | Outgoing inspection spec                      | Lot                           | Outgoing Inspection result                     | Contact to DSX-Assy.          |                        |
|                         |  | Pallet Jig   |                     |                 | Quantity                       |                      | Working manual  | Pallet Jig  | 100%  | Lot                           | Lot card                                       | Contact to DSX-Assy.          |                        |
| 24                      | QC Outgoing Inspection (Before Taping) | Flourinert   |                     | Sealing         |                                |                      | Working manual  | Flourinert  | QC Outgoing inspection spec                   | Lot                           | QC Outgoing Inspection result                  | Contact to DSX-Assy.          |                        |
|                         |  |  |                     |                 | Temp flourinert                |                      |   | Working manual  | Thermometer                                   | 1                             | Shift  | Check sheet                   | Temperature adjustment |
|                         |  |  |                     |                 | Time                           |                      |   | Working manual  | Stop watch                                    | 100%                          | Lot  | -                             | Check again            |
|                         |  |  | Network analyzer    |                 | Low drive level                |                      |   | Production spec.  | Network analyzer                              | QC Outgoing inspection spec   | Lot  | QC Outgoing Inspection result | Contact to DSX-Assy.   |
|                         |  |  | Comparator CI-meter |                 | Frequency                      |                      |   | Engineering spec.<br>QC outgoing inspection spec.<br>Working manual | Comparator                                    | QC Outgoing inspection spec   | Lot  | QC Outgoing Inspection result | Contact to DSX-Assy.   |
|                         |  |  |                     |                 | CI                             |                      |   | Engineering spec.<br>QC outgoing inspection spec.<br>Working manual | CI-meter                                      | QC Outgoing inspection spec   | Lot  | QC Outgoing Inspection result | Contact to DSX-Assy.   |
|                         |  |  | Caliper             |                 | Dimension                      |                      |   | Engineering spec.<br>QC outgoing inspection spec.<br>Working manual | Caliper                                       | QC Outgoing inspection spec   | Lot  | QC Outgoing Inspection result | Contact to DSX-Assy.   |
|                         |  |  | Appearance          |                 |                                | Boundary sample      | Visual check  | QC Outgoing inspection spec   | Lot   | QC Outgoing Inspection result | Contact to DSX-Assy.                           |                               |                        |

"\$" in the column of "class" means critical parameters to be controlled carefully.

## DSX321G Series ASSEMBLY CONTROL PLAN

| PROTOTYPE               |                                       | PRE-LAUNCH   | PRODUCTION | O               | KEY CONTACT /PHONE             |                      | DATE (ORIG)   | 07-Sep-2004                        | DATE (REV.)                                   | 20-Apr-2006 (R2)              |  |                        |
|-------------------------|---------------------------------------|--|------------|-----------------|--------------------------------|----------------------|---|------------------------------------|---|-------------------------------|--|------------------------|
| CONTROL No.             |                                       | KDS-CP-018   |            |                 | CORE TEAM                      |                      | Kristianto, Rini, Ropensius, Samsul (PROD)<br>Endaria, Bowo, Benaniya (QC) Aveltri (QA) |                                    | CUSTOMER ENGINEERING APPROVAL DATE (IF REQ'D) |                               |  |                        |
| PART NAME / DESCRIPTION |                                       | DSX321G Series                                       |            |                 | APPROVAL / DATE                |                      | T.lkeda   |                                    | CUSTOMER QUALITY APPROVAL DATE (IF REQ'D)     |                               |  |                        |
| SUPPLIER                |                                       | PT. KDS INDONESIA                                    |            | SUPPLIER CODE   | OTHER APPROVAL DATE (IF REQ'D) |                      | OTHER APPROVAL DATE (IF REQ'D)  |                                    |   |                               |  |                        |
| PROC No.                | PROCESS NAME / OPERATION DESCRIPTION  | MACHINE, DEVICE JIG, TOOLS FOR WORKING MANUFACTURING | No.        | CHARACTERISTICS |                                |                      | METHODS   |                                    |   |                               | REACTION PLAN / PERSON WHO TAKE RESPONSIBILITY |                        |
|                         |                                       |  |            | PRODUCT         | PROCESS                        | SPECIAL CHARA. CLASS | PRODUCT / PROCESS SPECIFICATION / TOLERANCE   | EVALUATION / MEASUREMENT TECHNIQUE | SIZE  | FREQ                          |  | CONTROL METHOD         |
| 25                      | Taping                                | Taping machine                                       |            | Quantity        |                                |                      | Taping spec.  | Quantity counter                   | 100%  | Lot                           | Working note                                   | Quantity adjustment    |
|                         |                                       |  |            |                 | Check sensor                   |                      | Working manual  | Visual check                       | 1   | Shift                         | Check sheet                                    | Machine adjustment     |
|                         |                                       |  |            |                 | Temperature heater             |                      | Working manual  | Temperature control meter          | 1   | Shift                         | Check sheet                                    | Temperature adjustment |
|                         |                                       | Strength taping machine                              |            | Strength taping |                                | Working manual       | Strength taping machine   | 1                                  | Shift   | Check sheet<br>Control graph  | Temperature adjustment                         |                        |
|                         |                                       | Comparator   |            | Frequency       |                                | Production spec.     | Comparator  | 1                                  | Shift   | Check sheet                   | Contact to DSX-Assy.                           |                        |
|                         |                                       | Appearance   |            | Boundary sample | Visual check                   | 100%                 | Lot   | Lot card                           | Contact to DSX-Assy.                          |                               |  |                        |
| 26                      | QC Outgoing Inspection (After Taping) | Jig quantity taping                                  |            | Quantity        |                                |                      | Taping spec.  | Jig                                | 100%  | Lot                           | QC Outgoing Inspection result                  | Contact to DSX-Assy.   |
|                         |                                       | Standard sinker                                      |            | Strength taping |                                |                      | Working manual  | Standard sinker                    | 1   | Lot                           | QC Outgoing Inspection result                  | Contact to DSX-Assy.   |
|                         |                                       |  |            | Appearance      |                                | Boundary sample      | Visual check  | 1reel                              | Lot   | QC Outgoing Inspection result | Contact to DSX-Assy.                           |                        |
| 27                      | Delivery                              |  |            | Quantity        |                                |                      | Working manual  | -                                  | 100%  | Lot                           | Export data                                    | -                      |

“\$” in the column of “class” means critical parameters to be controlled carefully.

**KDS**

Prepared for:

No.R06NH57201

**Techfaith Wireless Communication Technology Limited**

**Reliability Test Data**

**Product : Crystal Resonator**

**Type : DSX321G 19.200MHz**

**(Test Data on 24.576MHz substituted for 19.200MHz)**

**RoHS Compliance Part**

**JEITA : Phase 3A**

**(KDS JAPAN)**

**Date : Aug. 8. 2006**

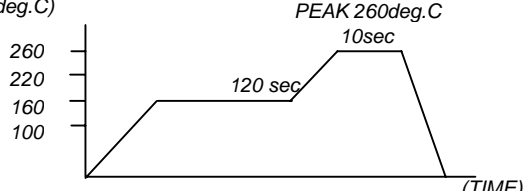
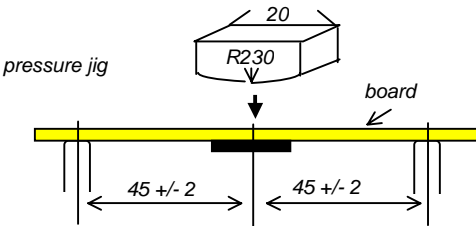
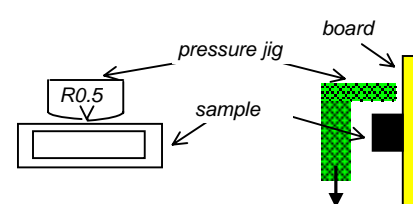
**Daishinku Corporation**

**Quality Assurance Department**

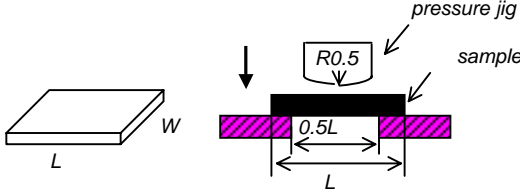
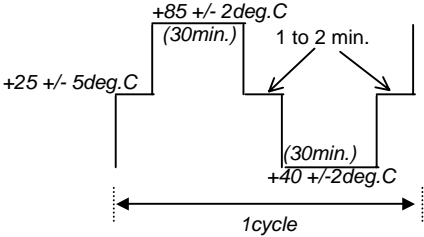
*A. Homma*

**Akihiro Homma / Manager**

## TEST PROCEDURES AND RESULTS

| No. | TEST ITEM              | TEST PROCEDURES  | REQUIREMENT   | RESULT             | PAGE |
|-----|------------------------|--|---|--------------------|------|
| 1   | SHOCK                  | A SAMPLE BOX (BAKELITE : 100g) WHICH INCLUDES A P.C. BOARD (GLASS - EPOXY : 1.6mm) SOLDERED SHALL BE DROPPED ONTO CONCRETE FROM THE HIGHT OF 150cm 10 CYCLES.<br>(1CYCLE = 6 AXES)   | Freq. Variation<br>$\Delta F/F = \pm 5\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 20\%$ or<br>$\pm 30\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |
| 2   | VIBRARION              | SUPPLYING FOLLOWING VIBRATION;<br>VIBRATION FREQ.:10 to 55Hz, 1.5mm or 5G<br><span style="float: right;">FULL WAVE</span><br>DIRECTION:X,Y,Z<br>TIME:120min. TO EACH DIRECTIN  | Freq. Variation<br>$\Delta F/F = \pm 2\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 15\%$ or<br>$\pm 20\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |
| 3   | SEALING TIGHTNESS      | (1)<br>DIPPING IN THE GALDEN (SVX) AT 125 deg.C FOR 5 min.   | THERE IS NO OBSERVATION OF ANY GAS BUBBLE FROM TJHE INSIDE OF THE CAN   | r/n = 0/20<br>GOOD | 1    |
|     |                        | (2)<br>LEAK RATE SHALL BE MEASURED BY USING HELIUM LEAK DETECTOR   | 2.0 E-9 Pa.m <sup>3</sup> /sec MAX  | r/n = 0/20<br>GOOD | 3    |
| 4   | SOLDERABILITY          | AFTER APPLYING ROSIN FLUX. DIPPING IN MOTEN SOLDER IN TANK AS FOLLOWS;<br><br>DIPPING TIME:3 +/- 0.5sec<br>SOLDERING TEMP.:+235 +/-5 deg.C<br>DIPPING DEPTH : WHOLE GOLD PLATED TERMINAL   | OVER 90% GOLD PLATING DIPPED IS COVERED SOLDER  | r/n = 0/20<br>GOOD | -    |
| 5   | REFLOW                 | THE FOLLOWING REFLOW SHALL BE PERFORMED 2TIMES (deg.C)<br><br>   | Freq. Variation<br>$\Delta F/F = \pm 5\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 20\%$ or<br>$\pm 30\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |
| 6   | BOARD BENDING STRENGTH | MOUNT A SAMPLE ON BOARD<br>APPLY PRESSURE TO THE CENTER OF BOARD UNTIL IT IS BENT TO 3mm AND HOLD FOR 5 +/-1 sec<br>PRESSURE SPEED : 0.5mm / sec<br><br>                                | Freq. Variation<br>$\Delta F/F = \pm 2\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 15\%$ or<br>$\pm 20\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |
| 7   | ADHESION TO BOARD      | MOUNT A SAMPLE ON THE CIRCUIT BOARD<br>APPLY PRESSURE VERTICALLY TO THE SIDE OF SPECIMEN ATTACHED TO THE CIRCUIT BOARD WITH THE PRESSURE JIG.<br>PRESSURE : 10N FOR 10 +/- 1sec<br><br> | Freq. Variation<br>$\Delta F/F = \pm 2\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 15\%$ or<br>$\pm 20\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |

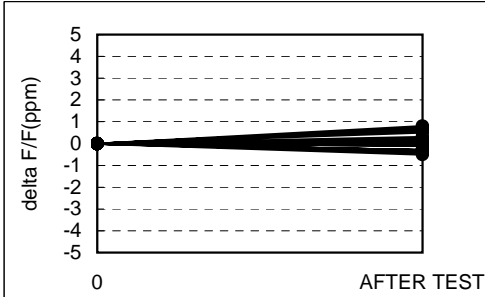
## TEST PROCEDURES AND RESULTS

| No. | TEST ITEM                   | TEST PROCEDURES   | REQUIREMENT  | RESULT             | PAGE |
|-----|-----------------------------|---|--|--------------------|------|
| 8   | BODY STRENGTH               | <p>APPLY PRESSURE TO THE CENTER OF BODY WITH THE R0.5 PRESSURE JIG<br/>PRESSURE : 10N FOR 10 +/- 1sec</p>  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 1    |
| 9   | HUMIDITY                    | KEEP SAMPLE(S) AT +60 +/-2deg.C IN HUMIDITY 90 to 95% FOR 250 HOURS.  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |
| 10  | STORAGE IN LOW TEMP.        | KEEP SAMPLE(S) AT -40 +/-2deg.C FOR 250 HOURS.  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |
| 11  | STORAGE IN HIGH TEMP.       | KEEP SAMPLE(S) AT +85 +/-2deg.C FOR 250 HOURS.  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |
| 12  | VPS (VAPOR PHASE SOLDERING) | PART IS LEFT IN FC-70 (THE BOILING POINT = 215degC) VAPOR FOR 30sec.  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |
| 13  | TEMP. CYCLE                 | <p>SUPPLYING 25CYCLES AS FOLLOWS;</p>    | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |



# DSX321G 24.576MHz (RoHS Compliance Part) (KDS JAPAN)

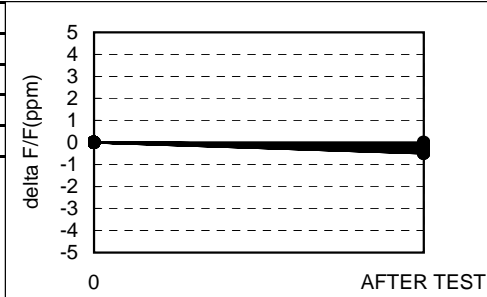
## 1. SHOCK TEST



AFTER TEST

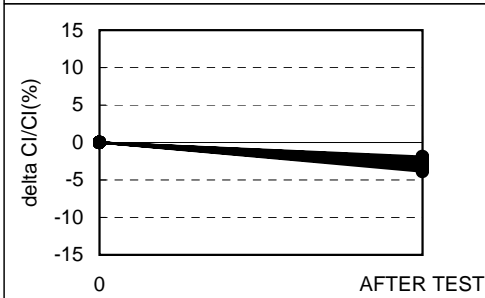
| delta F/F(ppm) |      |
|----------------|------|
| X-bar          | 0.10 |
| 3S             | 1.31 |
| MAX            | 0.8  |
| MIN            | -0.5 |

## 6. BOARD BENDING STRENGTH TEST



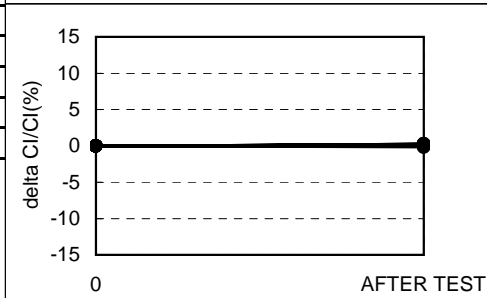
AFTER TEST

| delta F/F(ppm) |       |
|----------------|-------|
| X-bar          | -0.27 |
| 3S             | 0.47  |
| MAX            | 0.0   |
| MIN            | -0.5  |



AFTER TEST

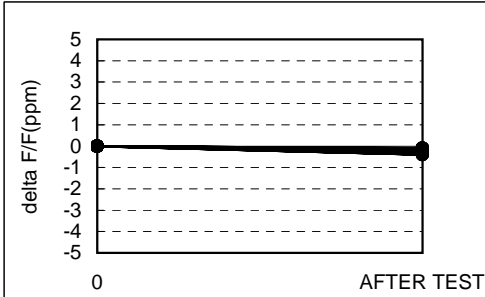
| delta CI/CI(%) |       |
|----------------|-------|
| X-bar          | -2.80 |
| 3S             | 1.90  |
| MAX            | -1.9  |
| MIN            | -3.9  |



AFTER TEST

| delta CI/CI(%) |      |
|----------------|------|
| X-bar          | 0.08 |
| 3S             | 0.42 |
| MAX            | 0.3  |
| MIN            | -0.2 |

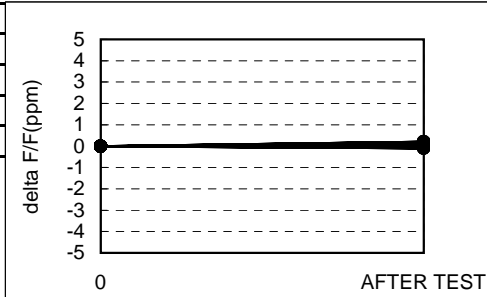
## 2. VIBRATION TEST



AFTER TEST

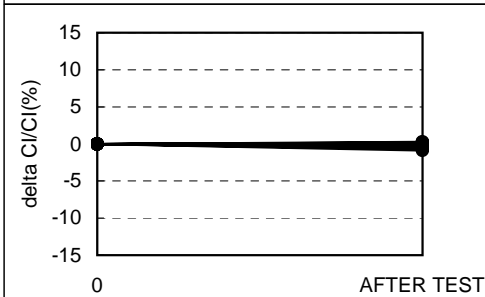
| delta F/F(ppm) |       |
|----------------|-------|
| X-bar          | -0.25 |
| 3S             | 0.33  |
| MAX            | -0.1  |
| MIN            | -0.4  |

## 7. ADHESION TO BOARD TEST



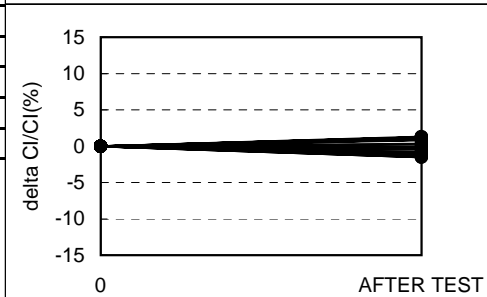
AFTER TEST

| delta F/F(ppm) |      |
|----------------|------|
| X-bar          | 0.06 |
| 3S             | 0.31 |
| MAX            | 0.2  |
| MIN            | -0.1 |



AFTER TEST

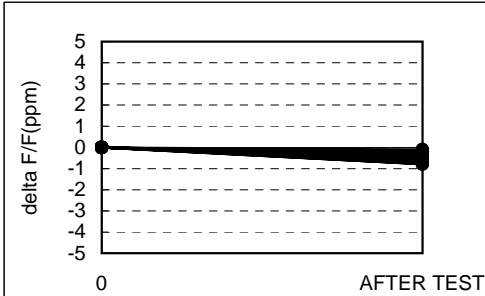
| delta CI/CI(%) |       |
|----------------|-------|
| X-bar          | -0.22 |
| 3S             | 1.02  |
| MAX            | 0.3   |
| MIN            | -0.9  |



AFTER TEST

| delta CI/CI(%) |       |
|----------------|-------|
| X-bar          | -0.14 |
| 3S             | 3.10  |
| MAX            | 1.3   |
| MIN            | -1.5  |

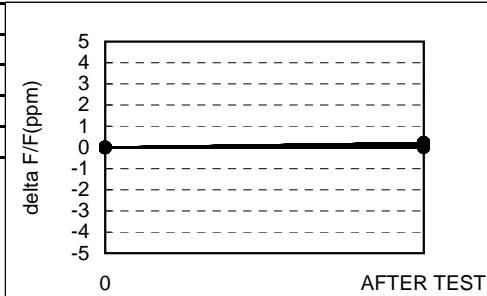
## 5. REFLOW TEST



AFTER TEST

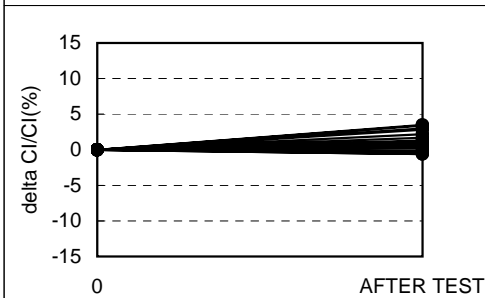
| delta F/F(ppm) |       |
|----------------|-------|
| X-bar          | -0.47 |
| 3S             | 0.62  |
| MAX            | -0.1  |
| MIN            | -0.8  |

## 8. BODY STRENGTH TEST



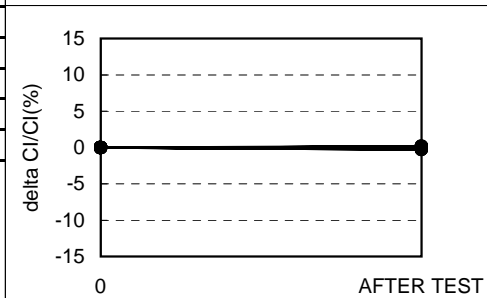
AFTER TEST

| delta F/F(ppm) |      |
|----------------|------|
| X-bar          | 0.15 |
| 3S             | 0.21 |
| MAX            | 0.2  |
| MIN            | 0.0  |



AFTER TEST

| delta CI/CI(%) |      |
|----------------|------|
| X-bar          | 1.15 |
| 3S             | 3.82 |
| MAX            | 3.5  |
| MIN            | -0.6 |

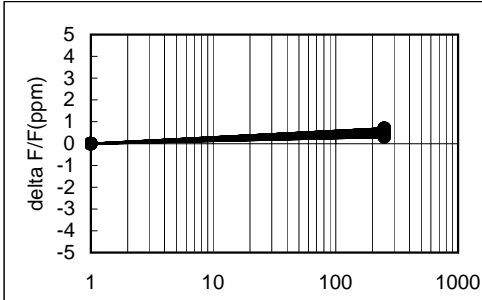


AFTER TEST

| delta CI/CI(%) |       |
|----------------|-------|
| X-bar          | -0.07 |
| 3S             | 0.47  |
| MAX            | 0.2   |
| MIN            | -0.3  |

# DSX321G 24.576MHz (RoHS Compliance Part) (KDS JAPAN)

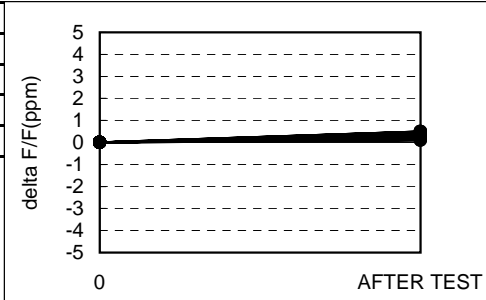
## 9. HUMIDITY TEST



AFTER 250hours

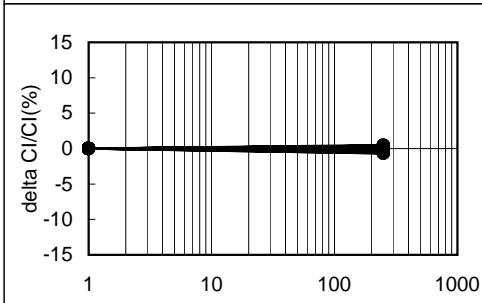
|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.51 |
| 3S             | 0.42 |
| MAX            | 0.7  |
| MIN            | 0.3  |

## 12. VPS TEST



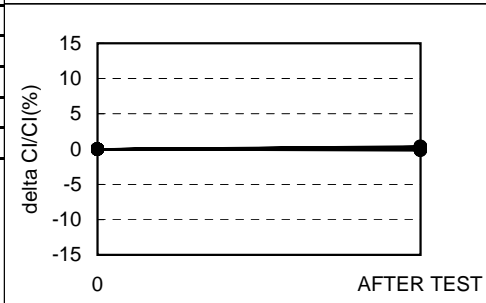
AFTER TEST

|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.30 |
| 3S             | 0.38 |
| MAX            | 0.5  |
| MIN            | 0.1  |



AFTER 250hours

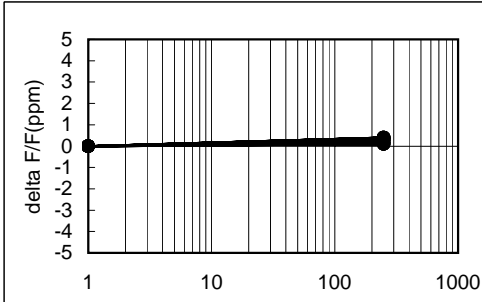
|                |       |
|----------------|-------|
| delta CI/CI(%) |       |
| X-bar          | -0.10 |
| 3S             | 1.19  |
| MAX            | 0.5   |
| MIN            | -0.7  |



AFTER TEST

|                |      |
|----------------|------|
| delta CI/CI(%) |      |
| X-bar          | 0.08 |
| 3S             | 0.53 |
| MAX            | 0.4  |
| MIN            | -0.2 |

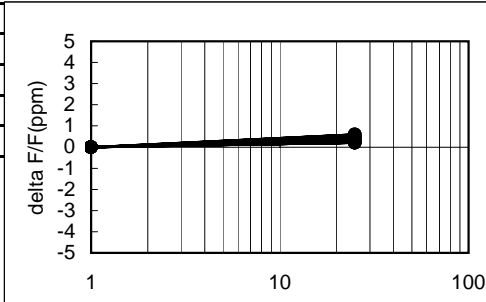
## 10. STORAGE IN LOW TEMP. TEST



AFTER 250hours

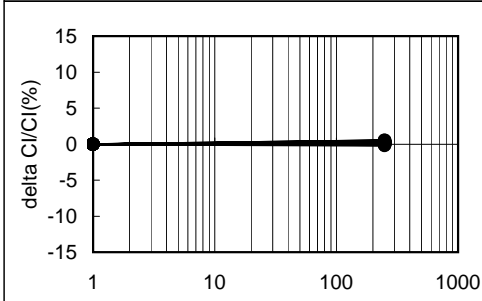
|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.26 |
| 3S             | 0.36 |
| MAX            | 0.4  |
| MIN            | 0.1  |

## 13. TEMP. CYCLE TEST



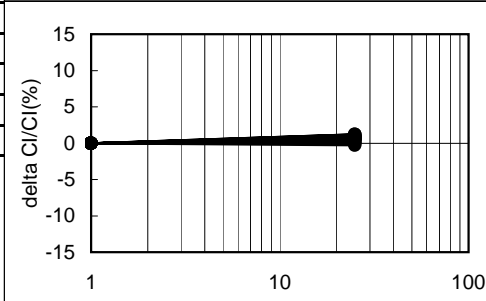
AFTER 25cycles

|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.37 |
| 3S             | 0.45 |
| MAX            | 0.6  |
| MIN            | 0.2  |



AFTER 250hours

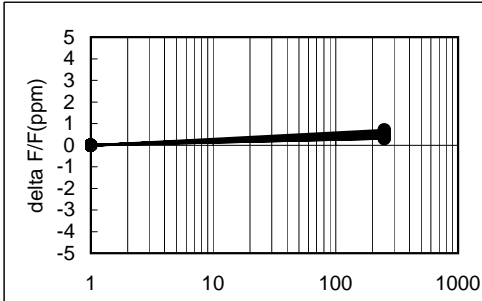
|                |      |
|----------------|------|
| delta CI/CI(%) |      |
| X-bar          | 0.18 |
| 3S             | 0.62 |
| MAX            | 0.5  |
| MIN            | -0.2 |



AFTER 25cycles

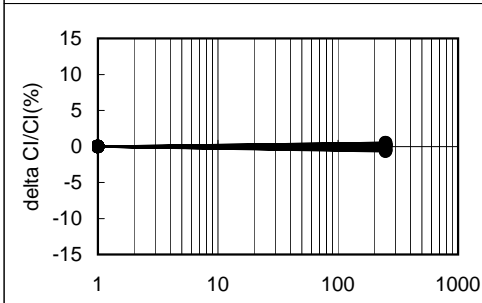
|                |      |
|----------------|------|
| delta CI/CI(%) |      |
| X-bar          | 0.61 |
| 3S             | 1.21 |
| MAX            | 1.2  |
| MIN            | -0.3 |

## 11. STORAGE IN HIGH TEMP. TEST



AFTER 250hours

|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.50 |
| 3S             | 0.33 |
| MAX            | 0.7  |
| MIN            | 0.3  |



AFTER 250hours

|                |       |
|----------------|-------|
| delta CI/CI(%) |       |
| X-bar          | -0.04 |
| 3S             | 1.10  |
| MAX            | 0.5   |
| MIN            | -0.7  |

**DSX321G 24.576MHz (RoHS Compliance Part)**  
**(KDS JAPAN)**

**3(2).SEALING TIGHTNESS TEST**

SPEC : 2.0E-9 Pa.m<sup>3</sup>/sec MAX.

RESULT

|                |     |                          |      |
|----------------|-----|--------------------------|------|
| CAL            |     |                          |      |
|                |     | (Pa.m <sup>3</sup> /sec) |      |
| QMIN           |     | 9.9 E-11                 |      |
| CLN            |     |                          |      |
| TEMP. 27 DEG C |     |                          |      |
| No.            |     |                          |      |
| 1              | *1* | 4.1                      | E-10 |
| 2              | *1* | 4.2                      | E-10 |
| 3              | *1* | 4.1                      | E-10 |
| 4              | *1* | 4.2                      | E-10 |
| 5              | *1* | 4.3                      | E-10 |
| 6              | *1* | 4.4                      | E-10 |
| 7              | *1* | 4.2                      | E-10 |
| 8              | *1* | 4.4                      | E-10 |
| 9              | *1* | 4.3                      | E-10 |
| 10             | *1* | 4.1                      | E-10 |
| 11             | *1* | 4.3                      | E-10 |
| 12             | *1* | 4.3                      | E-10 |
| 13             | *1* | 4.0                      | E-10 |
| 14             | *1* | 4.0                      | E-10 |
| 15             | *1* | 4.1                      | E-10 |
| 16             | *1* | 4.2                      | E-10 |
| 17             | *1* | 4.3                      | E-10 |
| 18             | *1* | 4.1                      | E-10 |
| 19             | *1* | 4.3                      | E-10 |
| 20             | *1* | 4.2                      | E-10 |

**KDS**

Prepared for:

No.R06NH57202

**Techfaith Wireless Communication Technology Limited**

## **Reliability Test Data**

**Product : Crystal Resonator**

**Type : DSX321G 19.200MHz**

**(Test Data on 24.576MHz substituted for 19.200MHz)**

**RoHS Compliance Part**

**JEITA : Phase 3A**

**(PT.KDS INDONESIA)**

**Date : Aug. 8. 2006**

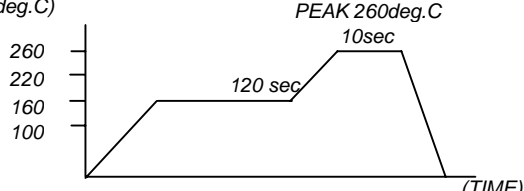
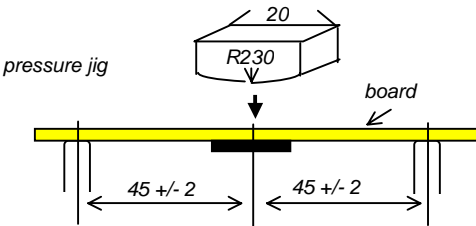
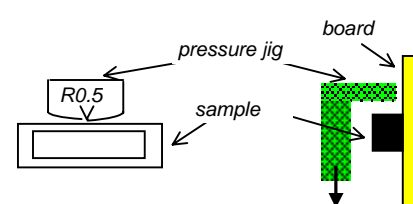
**Daishinku Corporation**

**Quality Assurance Department**

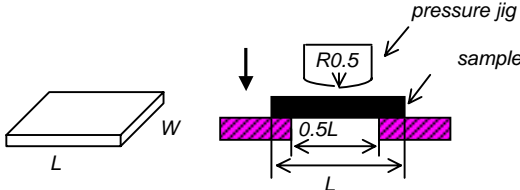
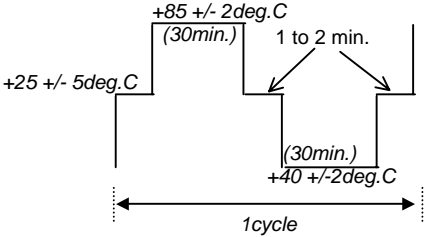


**Akihiro Homma / Manager**

## TEST PROCEDURES AND RESULTS

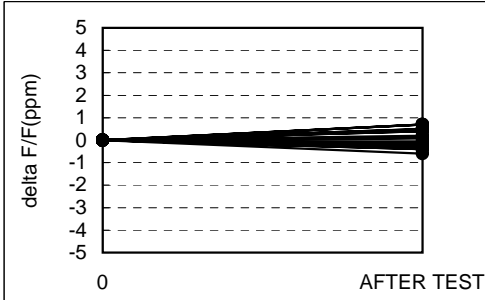
| No. | TEST ITEM              | TEST PROCEDURES  | REQUIREMENT   | RESULT             | PAGE |
|-----|------------------------|--|---|--------------------|------|
| 1   | SHOCK                  | A SAMPLE BOX (BAKELITE : 100g) WHICH INCLUDES A P.C. BOARD (GLASS - EPOXY : 1.6mm) SOLDERED SHALL BE DROPPED ONTO CONCRETE FROM THE HIGHT OF 150cm 10 CYCLES.<br>(1CYCLE = 6 AXES)   | Freq. Variation<br>$\Delta F/F = \pm 5\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 20\%$ or<br>$\pm 30\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |
| 2   | VIBRARION              | SUPPLYING FOLLOWING VIBRATION;<br>VIBRATION FREQ.:10 to 55Hz, 1.5mm or 5G<br><span style="float: right;">FULL WAVE</span><br>DIRECTION:X,Y,Z<br>TIME:120min. TO EACH DIRECTIN  | Freq. Variation<br>$\Delta F/F = \pm 2\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 15\%$ or<br>$\pm 20\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |
| 3   | SEALING TIGHTNESS      | (1)<br>DIPPING IN THE GALDEN (SVX) AT 125 deg.C FOR 5 min.   | THERE IS NO OBSERVATION OF ANY GAS BUBBLE FROM TJHE INSIDE OF THE CAN   | r/n = 0/20<br>GOOD | 1    |
|     |                        | (2)<br>LEAK RATE SHALL BE MEASURED BY USING HELIUM LEAK DETECTOR   | 2.0 E-9 Pa.m <sup>3</sup> /sec MAX  | r/n = 0/20<br>GOOD | 3    |
| 4   | SOLDERABILITY          | AFTER APPLYING ROSIN FLUX. DIPPING IN MOTEN SOLDER IN TANK AS FOLLOWS;<br><br>DIPPING TIME:3 +/- 0.5sec<br>SOLDERING TEMP.:+235 +/-5 deg.C<br>DIPPING DEPTH : WHOLE GOLD PLATED TERMINAL   | OVER 90% GOLD PLATING DIPPED IS COVERED SOLDER  | r/n = 0/20<br>GOOD | -    |
| 5   | REFLOW                 | THE FOLLOWING REFLOW SHALL BE PERFORMED 2TIMES (deg.C)<br><br>   | Freq. Variation<br>$\Delta F/F = \pm 5\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 20\%$ or<br>$\pm 30\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |
| 6   | BOARD BENDING STRENGTH | MOUNT A SAMPLE ON BOARD<br>APPLY PRESSURE TO THE CENTER OF BOARD UNTIL IT IS BENT TO 3mm AND HOLD FOR 5 +/-1 sec<br>PRESSURE SPEED : 0.5mm / sec<br><br>                                | Freq. Variation<br>$\Delta F/F = \pm 2\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 15\%$ or<br>$\pm 20\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |
| 7   | ADHESION TO BOARD      | MOUNT A SAMPLE ON THE CIRCUIT BOARD<br>APPLY PRESSURE VERTICALLY TO THE SIDE OF SPECIMEN ATTACHED TO THE CIRCUIT BOARD WITH THE PRESSURE JIG.<br>PRESSURE : 10N FOR 10 +/- 1sec<br><br> | Freq. Variation<br>$\Delta F/F = \pm 2\text{ppm MAX.}$<br>CI Variation<br>$\Delta CI = \pm 15\%$ or<br>$\pm 20\text{ohms MAX.}$ | r/n = 0/20<br>GOOD | 1    |

## TEST PROCEDURES AND RESULTS

| No. | TEST ITEM                   | TEST PROCEDURES   | REQUIREMENT  | RESULT             | PAGE |
|-----|-----------------------------|---|--|--------------------|------|
| 8   | BODY STRENGTH               | <p>APPLY PRESSURE TO THE CENTER OF BODY WITH THE R0.5 PRESSURE JIG<br/>PRESSURE : 10N FOR 10 +/- 1sec</p>  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 1    |
| 9   | HUMIDITY                    | KEEP SAMPLE(S) AT +60 +/-2deg.C IN HUMIDITY 90 to 95% FOR 250 HOURS.  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |
| 10  | STORAGE IN LOW TEMP.        | KEEP SAMPLE(S) AT -40 +/-2deg.C FOR 250 HOURS.  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |
| 11  | STORAGE IN HIGH TEMP.       | KEEP SAMPLE(S) AT +85 +/-2deg.C FOR 250 HOURS.  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |
| 12  | VPS (VAPOR PHASE SOLDERING) | PART IS LEFT IN FC-70 (THE BOILING POINT = 215degC) VAPOR FOR 30sec.  | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |
| 13  | TEMP. CYCLE                 | <p>SUPPLYING 25CYCLES AS FOLLOWS;</p>    | <p>Freq. Variation<br/><math>\Delta F/F = \pm 2\text{ppm MAX.}</math><br/>CI Variation<br/><math>\Delta CI = \pm 15\%</math> or<br/><math>\pm 2\text{ohms MAX.}</math></p> | r/n = 0/20<br>GOOD | 2    |

# DSX321G 24.576MHz (RoHS Compliance Part) (PT.KDS INDONESIA)

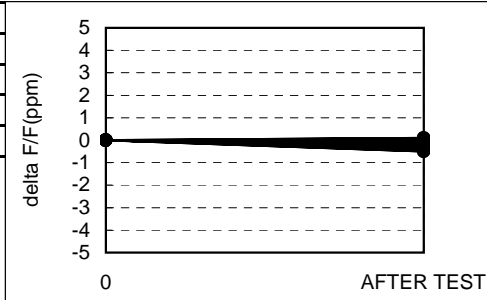
## 1. SHOCK TEST



AFTER TEST

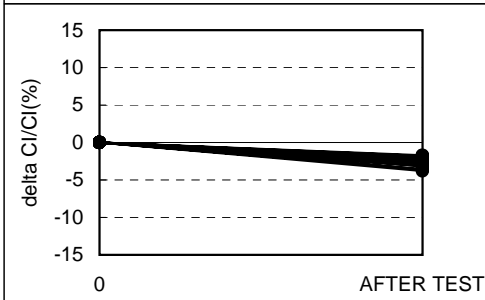
| delta F/F(ppm) |      |
|----------------|------|
| X-bar          | 0.09 |
| 3S             | 1.22 |
| MAX            | 0.7  |
| MIN            | -0.6 |

## 6. BOARD BENDING STRENGTH TEST



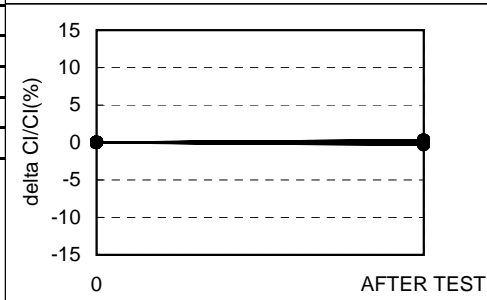
AFTER TEST

| delta F/F(ppm) |       |
|----------------|-------|
| X-bar          | -0.19 |
| 3S             | 0.61  |
| MAX            | 0.1   |
| MIN            | -0.5  |



AFTER TEST

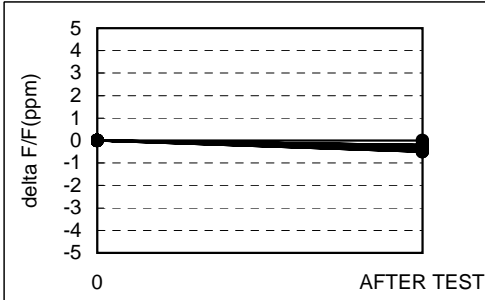
| delta CI/CI(%) |       |
|----------------|-------|
| X-bar          | -2.61 |
| 3S             | 1.84  |
| MAX            | -1.7  |
| MIN            | -3.8  |



AFTER TEST

| delta CI/CI(%) |      |
|----------------|------|
| X-bar          | 0.01 |
| 3S             | 0.61 |
| MAX            | 0.3  |
| MIN            | -0.3 |

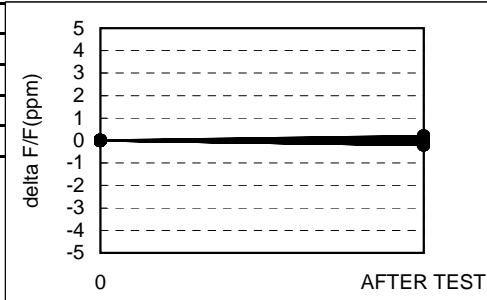
## 2. VIBRATION TEST



AFTER TEST

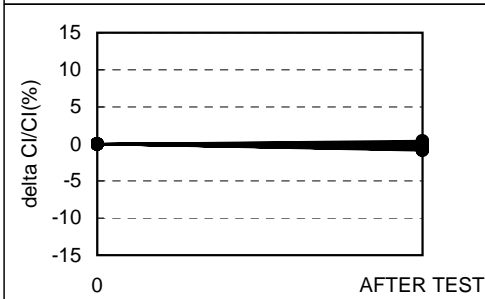
| delta F/F(ppm) |       |
|----------------|-------|
| X-bar          | -0.33 |
| 3S             | 0.38  |
| MAX            | 0.0   |
| MIN            | -0.5  |

## 7. ADHESION TO BOARD TEST



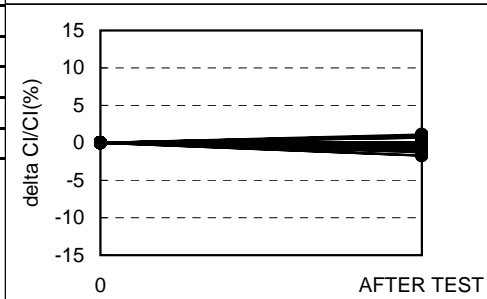
AFTER TEST

| delta F/F(ppm) |       |
|----------------|-------|
| X-bar          | -0.05 |
| 3S             | 0.40  |
| MAX            | 0.2   |
| MIN            | -0.2  |



AFTER TEST

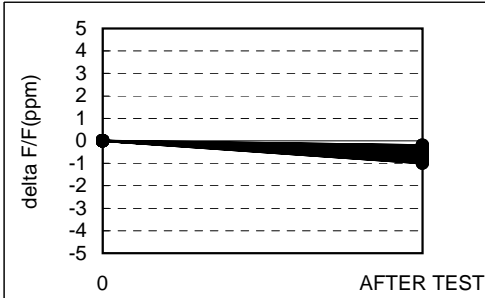
| delta CI/CI(%) |       |
|----------------|-------|
| X-bar          | -0.27 |
| 3S             | 1.35  |
| MAX            | 0.4   |
| MIN            | -0.9  |



AFTER TEST

| delta CI/CI(%) |       |
|----------------|-------|
| X-bar          | -0.22 |
| 3S             | 2.69  |
| MAX            | 1.1   |
| MIN            | -1.7  |

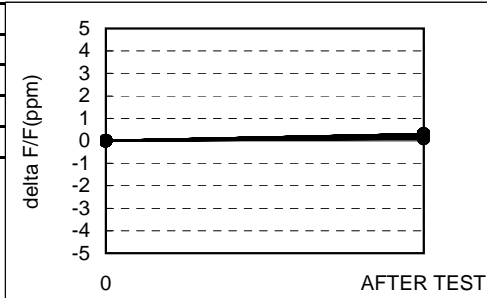
## 5. REFLOW TEST



AFTER TEST

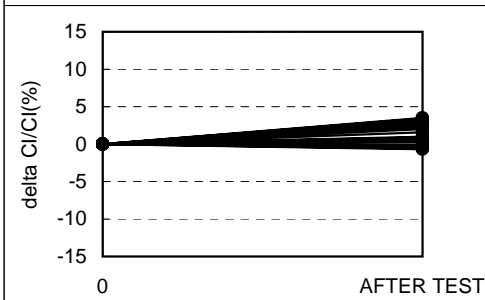
| delta F/F(ppm) |       |
|----------------|-------|
| X-bar          | -0.61 |
| 3S             | 0.79  |
| MAX            | -0.2  |
| MIN            | -1.0  |

## 8. BODY STRENGTH TEST



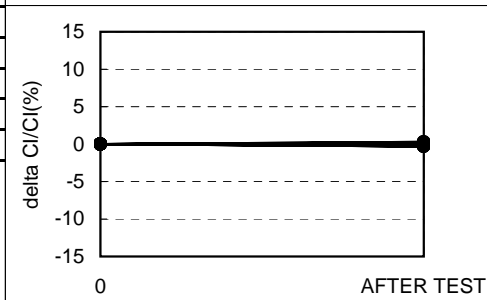
AFTER TEST

| delta F/F(ppm) |      |
|----------------|------|
| X-bar          | 0.24 |
| 3S             | 0.22 |
| MAX            | 0.3  |
| MIN            | 0.1  |



AFTER TEST

| delta CI/CI(%) |      |
|----------------|------|
| X-bar          | 1.51 |
| 3S             | 4.13 |
| MAX            | 3.5  |
| MIN            | -0.7 |

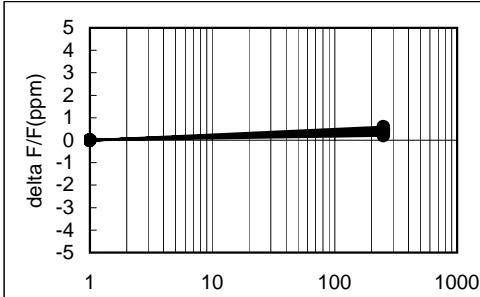


AFTER TEST

| delta CI/CI(%) |       |
|----------------|-------|
| X-bar          | -0.06 |
| 3S             | 0.63  |
| MAX            | 0.3   |
| MIN            | -0.3  |

# DSX321G 24.576MHz (RoHS Compliance Part) (PT.KDS INDONESIA)

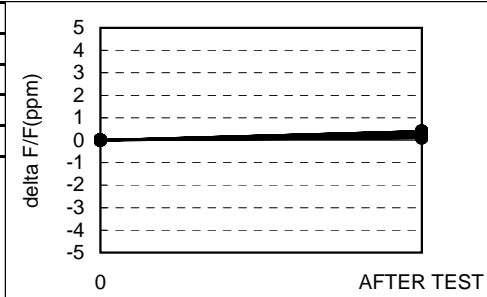
## 9.HUMIDITY TEST



AFTER 250hours

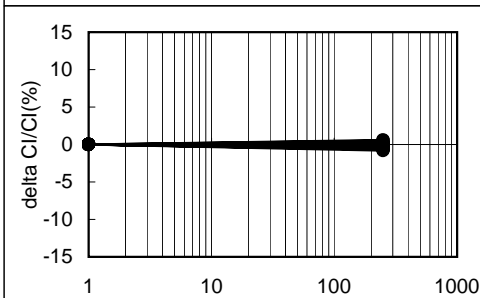
|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.41 |
| 3S             | 0.30 |
| MAX            | 0.6  |
| MIN            | 0.2  |

## 12.VPS TEST



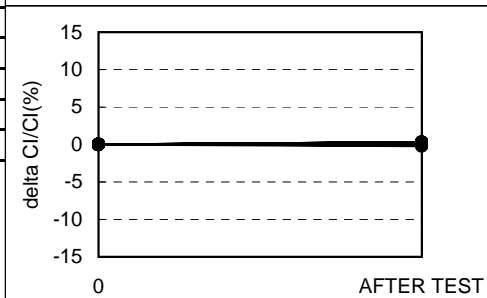
AFTER TEST

|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.27 |
| 3S             | 0.30 |
| MAX            | 0.4  |
| MIN            | 0.1  |



AFTER 250hours

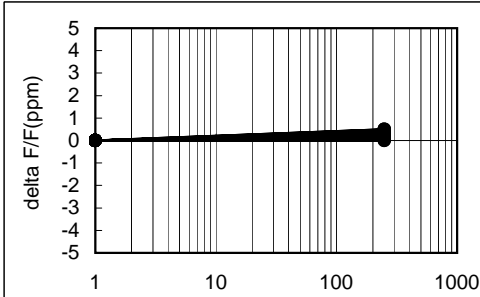
|                |       |
|----------------|-------|
| delta CI/CI(%) |       |
| X-bar          | -0.19 |
| 3S             | 1.22  |
| MAX            | 0.6   |
| MIN            | -0.8  |



AFTER TEST

|                |      |
|----------------|------|
| delta CI/CI(%) |      |
| X-bar          | 0.10 |
| 3S             | 0.47 |
| MAX            | 0.3  |
| MIN            | -0.2 |

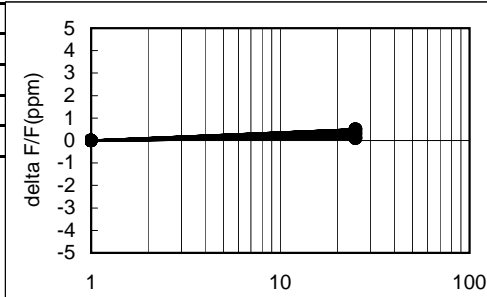
## 10.STORAGE IN LOW TEMP. TEST



AFTER 250hours

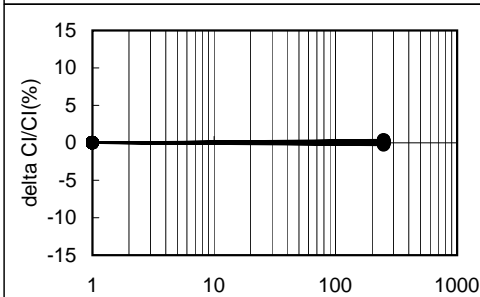
|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.24 |
| 3S             | 0.47 |
| MAX            | 0.5  |
| MIN            | 0.0  |

## 13.TEMP. CYCLE TEST



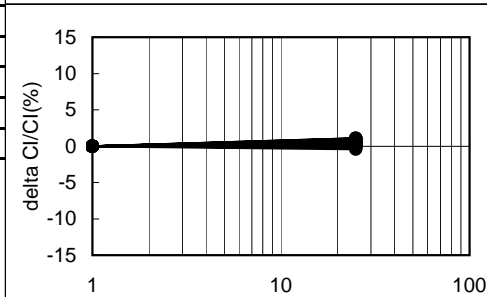
AFTER 25cycles

|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.30 |
| 3S             | 0.48 |
| MAX            | 0.5  |
| MIN            | 0.1  |



AFTER 250hours

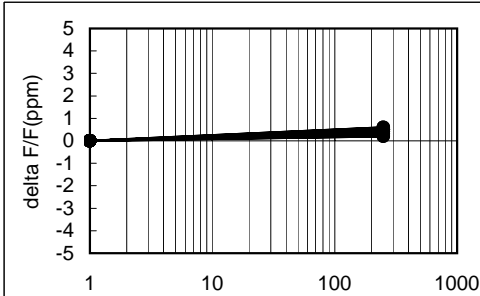
|                |      |
|----------------|------|
| delta CI/CI(%) |      |
| X-bar          | 0.05 |
| 3S             | 0.60 |
| MAX            | 0.4  |
| MIN            | -0.3 |



AFTER 25cycles

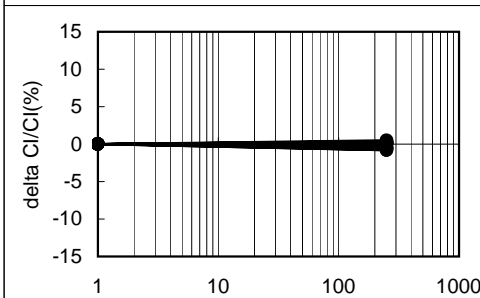
|                |      |
|----------------|------|
| delta CI/CI(%) |      |
| X-bar          | 0.45 |
| 3S             | 1.34 |
| MAX            | 1.1  |
| MIN            | -0.4 |

## 11.STORAGE IN HIGH TEMP. TEST



AFTER 250hours

|                |      |
|----------------|------|
| delta F/F(ppm) |      |
| X-bar          | 0.43 |
| 3S             | 0.35 |
| MAX            | 0.6  |
| MIN            | 0.2  |



AFTER 250hours

|                |       |
|----------------|-------|
| delta CI/CI(%) |       |
| X-bar          | -0.12 |
| 3S             | 1.27  |
| MAX            | 0.5   |
| MIN            | -0.8  |



**DSX321G 24.576MHz (RoHS Compliance Part)  
(PT.KDS INDONESIA)**

**3(2).SEALING TIGHTNESS TEST**

SPEC : 2.0E-9 Pa.m<sup>3</sup>/sec MAX.

RESULT

|                |     |                          |      |
|----------------|-----|--------------------------|------|
| CAL            |     |                          |      |
|                |     | (Pa.m <sup>3</sup> /sec) |      |
| QMIN           |     | 9.9 E-11                 |      |
| CLN            |     |                          |      |
| TEMP. 27 DEG C |     |                          |      |
| No.            |     |                          |      |
| 1              | *1* | 4.4                      | E-10 |
| 2              | *1* | 4.0                      | E-10 |
| 3              | *1* | 4.1                      | E-10 |
| 4              | *1* | 4.1                      | E-10 |
| 5              | *1* | 4.2                      | E-10 |
| 6              | *1* | 4.0                      | E-10 |
| 7              | *1* | 4.3                      | E-10 |
| 8              | *1* | 4.0                      | E-10 |
| 9              | *1* | 4.2                      | E-10 |
| 10             | *1* | 4.0                      | E-10 |
| 11             | *1* | 4.0                      | E-10 |
| 12             | *1* | 4.3                      | E-10 |
| 13             | *1* | 4.3                      | E-10 |
| 14             | *1* | 4.2                      | E-10 |
| 15             | *1* | 4.4                      | E-10 |
| 16             | *1* | 4.4                      | E-10 |
| 17             | *1* | 4.3                      | E-10 |
| 18             | *1* | 4.1                      | E-10 |
| 19             | *1* | 4.2                      | E-10 |
| 20             | *1* | 4.3                      | E-10 |