



## Data Sheet

Type : Ceramic Patch Antenna  
 Amotech Part No : N25-6B02920-GNS6  
 Customer Part No : Beidou&GPS&GLONASS

|      | Designed | Checked |     | Approved |
|------|----------|---------|-----|----------|
| -    |          |         |     |          |
| Date | . .      | . .     | . . | . .      |

| Revision no | Content           | Page | Date       | Name    |
|-------------|-------------------|------|------------|---------|
| 0           | First, documented | -    | 2014.07.08 | S.O Kim |
|             |                   |      |            |         |
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|             |                   |      |            |         |
|             |                   |      |            |         |
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|             |                   |      |            |         |



■ HEAD OFFICE  
 5B-1L, 617, NAMCHON-DONG, NAMDONG-GU, INCHOEN-CITY, KOREA  
 TEL : 82-32-821-0363 FAX : 82-32-811-0283  
 ■ CHINA FACTORY  
 WAISHANGGONGYEYUAN HIGH NEW TECHNOLOGY  
 DEVELOPMENT AREA ZIBO SHANDONG P.R.CHINA 255086  
 TEL: 86-0533-358-7691 FAX: 86-0533-358-7689

| Designed | Checked |     | Approved |
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## 1. Specification

### 1.1 Electrical characteristic

| No | Item             | Specification                                                                              | Unit | Remarks    |
|----|------------------|--------------------------------------------------------------------------------------------|------|------------|
| 1  | frequency(fc)    | 1559.00~1606.00<br>(BEIDOU : 1559.00~1563.00,<br>GPS : 1575.42, GLONASS : 1592.00~1606.00) | MHz  | Notes : 1) |
|    |                  | 1589.42 ± 7.00                                                                             | MHz  | Notes : 2) |
| 2  | Return-Loss @ fc | Min. 10 @ 1559.00~1606.00MHz                                                               | dB   | Notes : 1) |
|    |                  | Min. 15                                                                                    | dB   | Notes : 2) |
| 3  | Axial Ratio      | Typ. 3.0                                                                                   | dB   | Notes : 1) |
| 4  | Gain @ fc        | BEIDOU : Typ. 1.5 @ Zenith<br>GPS : Typ. 3.0 @ Zenith<br>GLONASS : Typ. 2.0 @ Zenith       | dBic | Notes : 1) |
| 5  | Polarization     | RHCP                                                                                       | -    | -          |
| 6  | Impedance        | 50                                                                                         | Ω    | -          |

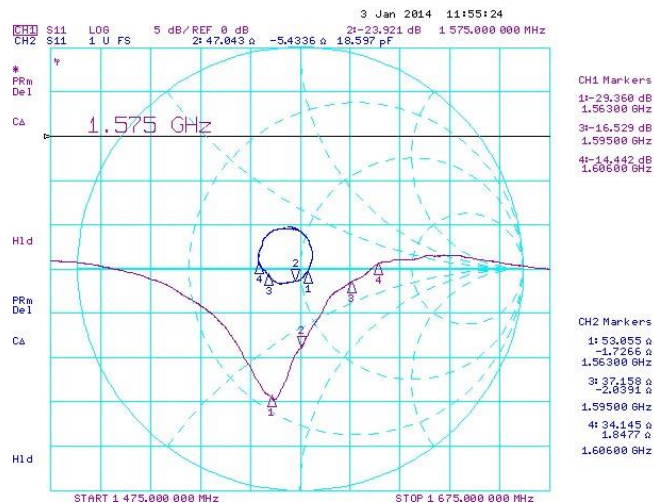
- fc is mid point of loop/cusp in smith chart.

※ Notes: 1) Measured on 70x70mm FR4 ground plane with adhesive tape.

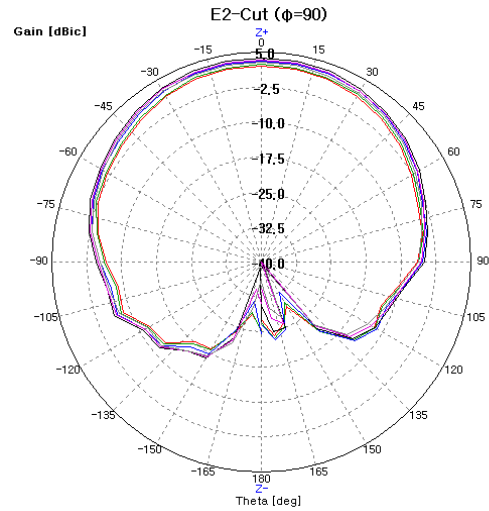
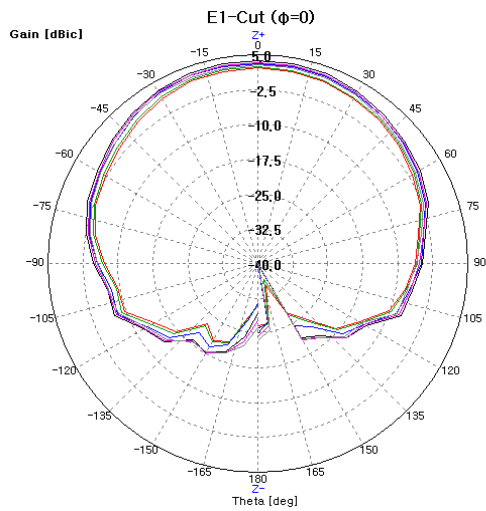
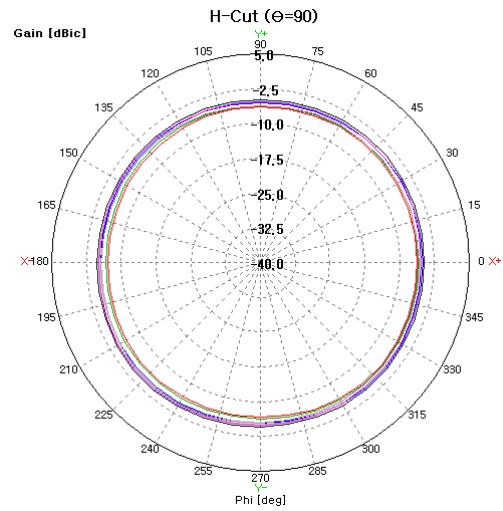
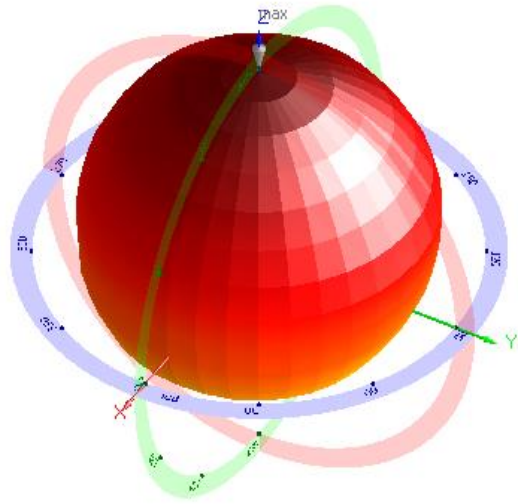
Notes: 2) Measured on 70x70mm FR4 ground plane with adhesive tape and release liner.

### 1.2 Typical S11 (Log mag & Smith chart)

※ Measured on 70x70mm FR4 ground plane with adhesive tape.



### 1.3 Radiation Pattern

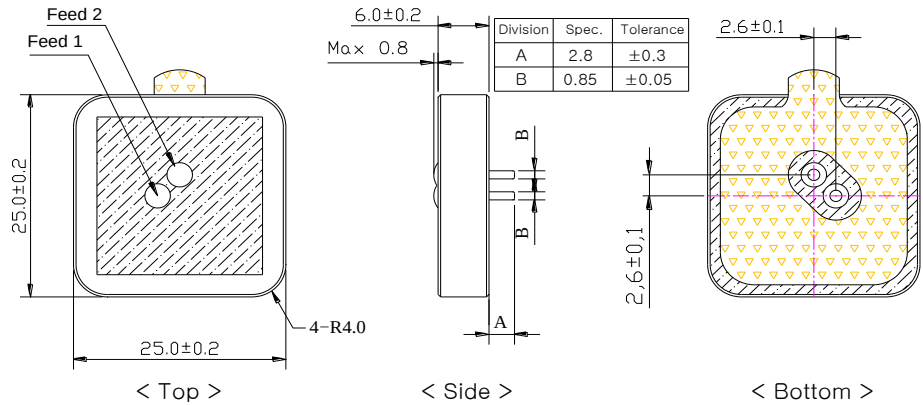


| Freq.[GHz] | $\theta$ -Pol(H) |          |           |                |              | $\phi$ -Pol(V) |          |           |                |              | RHCP    |         |         |                |              | (-)A.R. |
|------------|------------------|----------|-----------|----------------|--------------|----------------|----------|-----------|----------------|--------------|---------|---------|---------|----------------|--------------|---------|
|            | Eff.[%]          | Avg.[dB] | Peak[dBi] | $\theta$ [deg] | $\phi$ [deg] | Eff.[%]        | Avg.[dB] | Peak[dBi] | $\theta$ [deg] | $\phi$ [deg] | Eff.[%] | Av.[dB] | Pk.[dB] | $\theta$ [deg] | $\phi$ [deg] |         |
| 1.560      | 20.11            | -6.97    | -0.33     | 0.00           | 20.00        | 24.90          | -6.04    | 0.16      | 0.00           | 300.00       | 39.85   | -4.00   | 2.11    | 0.00           | 0.00         | -2.63   |
| 1.565      | 21.81            | -6.61    | -0.10     | 0.00           | 200.00       | 26.77          | -5.72    | 0.44      | 0.00           | 300.00       | 43.25   | -3.64   | 2.40    | 0.00           | 270.00       | -1.86   |
| 1.572      | 25.20            | -5.99    | 0.36      | 0.00           | 200.00       | 30.35          | -5.18    | 0.88      | 0.00           | 300.00       | 49.78   | -3.03   | 2.90    | 0.00           | 130.00       | -1.90   |
| 1.575      | 26.77            | -5.72    | 0.56      | 0.00           | 200.00       | 31.84          | -4.97    | 1.05      | 0.00           | 300.00       | 52.65   | -2.79   | 3.11    | 10.00          | 140.00       | -1.68   |
| 1.578      | 27.98            | -5.53    | 0.69      | 0.00           | 200.00       | 32.83          | -4.84    | 1.14      | 0.00           | 300.00       | 54.73   | -2.62   | 3.26    | 10.00          | 140.00       | -1.55   |
| 1.592      | 32.05            | -4.94    | 1.17      | 10.00          | 200.00       | 35.45          | -4.50    | 1.45      | 0.00           | 290.00       | 60.93   | -2.15   | 3.71    | 10.00          | 300.00       | -1.61   |
| 1.600      | 29.70            | -5.27    | 0.83      | 0.00           | 190.00       | 32.24          | -4.92    | 1.12      | 0.00           | 290.00       | 55.78   | -2.54   | 3.37    | 10.00          | 300.00       | -1.53   |
| 1.608      | 26.83            | -5.71    | 0.48      | 0.00           | 190.00       | 28.89          | -5.39    | 0.71      | 0.00           | 290.00       | 50.02   | -3.01   | 2.95    | 0.00           | 300.00       | -1.73   |
| 1.610      | 26.08            | -5.84    | 0.39      | 0.00           | 190.00       | 28.01          | -5.53    | 0.56      | 0.00           | 290.00       | 48.52   | -3.14   | 2.82    | 0.00           | 330.00       | -1.70   |

|                                                                                   |                  |      |
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## 2. Mechanical Outline

### 1. Dimension



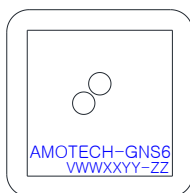
Note  
 1. Unit : mm  
 2. All Around Both Sides Typ. 0.3 Chamfer

### 2. Tuning: Top (According to Procedure of AMOTECH Document)

### 3. Mechanical characteristic

| No | Item                | Specification              | Unit | Remarks  |
|----|---------------------|----------------------------|------|----------|
| 1  | Dielectric constant | 20.5± 0.5                  | -    | -        |
| 2  | Electrode           | Silver                     | -    | -        |
| 3  | Probe               | brass                      | -    | -        |
| 4  | Tape                | Double sided adhesive tape | -    | 3M-468MP |

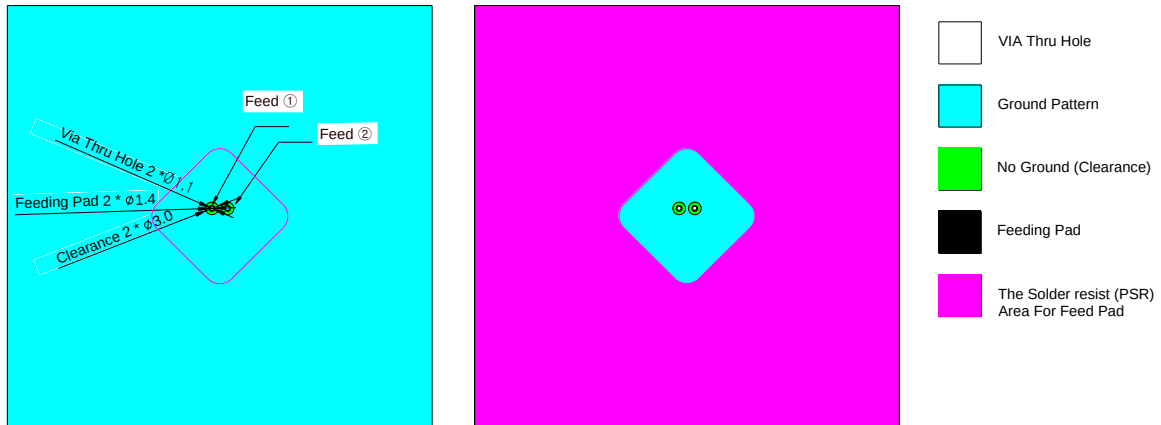
### 4. Marking



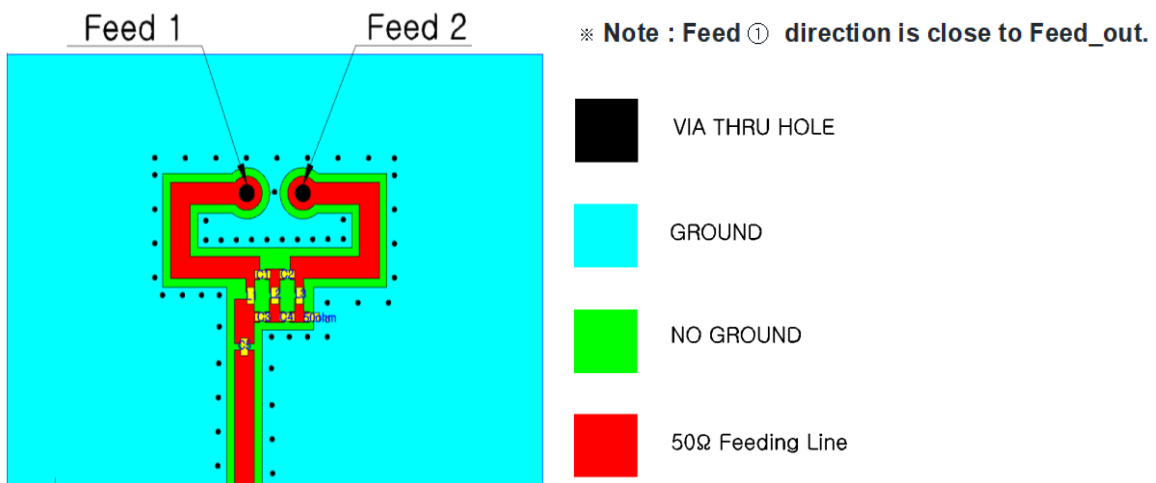
- V : Line section
- WW : Year
- XX : Month
- YY : Day
- ZZ : Serial number of daily

## 2.5. Recommended Land Pattern

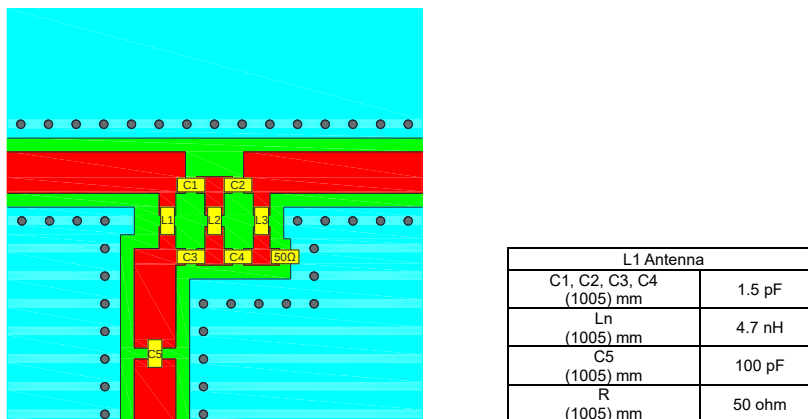
### 2.5.1 Top Pattern (Top View)



### 2.5.2 Bottom Pattern (Bottom View)



### 2.5.3 Component Value for Hybrid Coupler



|                                                                                   |                         |             |
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### 3. Reliability Test

| No | Item                           | Test condition                                                                                         | Requirement                                                         |
|----|--------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1  | Drop Test                      | 1. Place antenna on set<br>2. 1.5m height<br>3. Drop 5 times                                           | 1. No Visible defect<br>2. S11 change rate ( $\Delta f_c < 0.2\%$ ) |
| 2  | Vibration Test                 | 1. 5-55-5 Hz, 1 Octave/min,<br>Amp.=1.5mm, acceleration=2g,<br>Crossover Freq.=18 Hz, Hold time = 2H.R | 1. No Visible defect<br>2. S11 change rate ( $\Delta f_c < 0.2\%$ ) |
| 3  | Humidity                       | 1. 60°C, 95%RH, 96Hr                                                                                   | 1. No Visible defect<br>2. S11 change rate ( $\Delta f_c < 0.2\%$ ) |
| 4  | Thermal Shock                  | 1. +80°C (30min) → -40°C (30min)<br>2. 10 cycle                                                        | 1. No Visible defect<br>2. S11 change rate ( $\Delta f_c < 0.2\%$ ) |
| 5  | High Temperature Resistance    | 1. +90°C, 96Hr                                                                                         | 1. No Visible defect<br>2. S11 change rate ( $\Delta f_c < 0.2\%$ ) |
| 6  | Low Temperature Resistance     | 1. -40°C, 96Hr                                                                                         | 1. No Visible defect<br>2. S11 change rate ( $\Delta f_c < 0.2\%$ ) |
| 7  | Adhesion Strength of Soldering | 1. Used of pull push gauge.                                                                            | 1. Spec( min. 5kgf)                                                 |

※ The sample must satisfy Requirement after 24 hours of test

※ Be base on IEC Climatic category (IEC68-1) -40°C / +90°C / 56h

### 4. Soldering Condition

- Wettability to IEC 68-2-58 :  $\geq 75\%$  (After Aging)

#### 4.1 Manual Soldering( By Iron) – Pb free

- Soldering Temperature : 360°C  $\pm$  5°C, 5sec max.  
(Solder : Sn/Ag/Cu:96.5/3.0/0.5 )

- Must comply with above soldering condition to prevent from degradation of antenna performance.

### 5. Caution and Warranty

5.1 Electrode metallizations are unprotected silver and will tarnish during storage due to sulphuric compounds (namely H<sub>2</sub>S) in the atmosphere. Elevated temperature and humidity will accelerate this process. Human skin contact, wool etc. also cause tarnishing. This has no effect whatsoever on the electrical performance of the patches. Tarnishing of the silver plated feed pins may affect solderability. Because of this normal and to be expected process, AMOTECH accepts no warranty claims for tarnished products.

AMOTECH uses vacuum packaging to reduce atmospheric influence and to extend shelf life.

5.2 Patch Antennas must avoid shock and drop, to prevent cracking of the antenna.

5.3 Patch Antennas should be used within 6 months after delivery, The antennas older than 6 months should be checked for solderability before using.

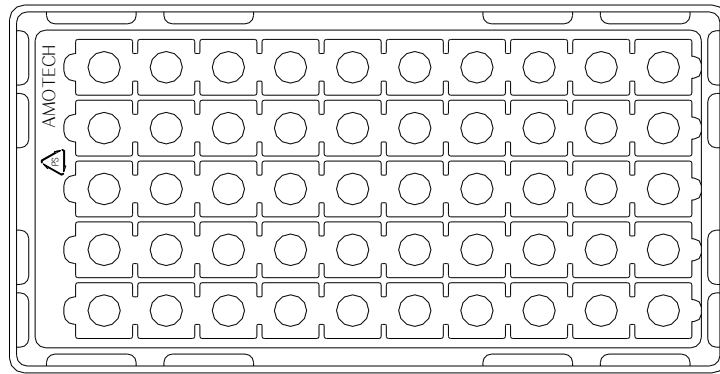
5.4 If you plan to re-use the products that be taken out from packaging. Suggest to re-pack them within 48 hours by re-seal to prevent discoloration.

|                                                                                   |                  |      |
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## 6. Package

### 6.1 Tray

- Quantity : 50ea/tray



### 6.1.2 Inner box

- Dimension: 370 (W) x 195 (D) x 130 (T) (mm)
- Quantity : 8 tray (50ea / tray × 8 tray = 400 ea)



### 6.1.3 Outer box

- Dimension : 390 (W) x 620 (D) x 150 (T) (mm)
- Quantity : 3 inner box (400ea/ inner box × 3 inner box = 1200 ea)

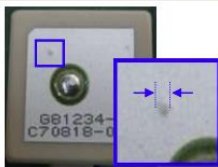
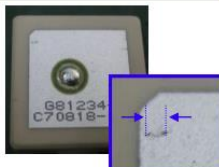


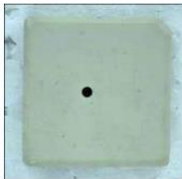
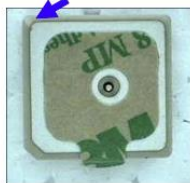
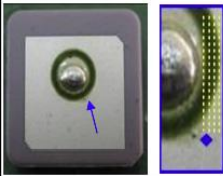
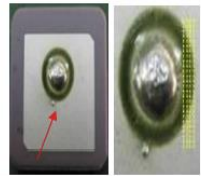
|                  |                        |
|------------------|------------------------|
| DOC. No.         | 15-Tuning Boundary-001 |
| Standard process | Measurement process    |
| Product          | Ceramic Patch Antenna  |
| Written by       | Q.A PART               |
| Original Date    | 2015. 12. 14           |

**(25 by 25 type ≤ Ceramic Patch)  
Manual top tuning procedure**

|                                                                                                                                                                                                                                                                                                                                                                                                                      |              |          |   |                                                                                                                                                                                   |              |      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------|-----|
| Original Date                                                                                                                                                                                                                                                                                                                                                                                                        | 2015. 12. 14 | Rev. No. | 2 | Rev. Date                                                                                                                                                                         | 2019. 08. 20 | Page | 1/1 |
| Top Tuning method 1                                                                                                                                                                                                                                                                                                                                                                                                  |              |          |   | Top Tuning method 2                                                                                                                                                               |              |      |     |
|                                                                                                                                                                                                                                                                                                                                     |              |          |   |                                                                                                 |              |      |     |
| <p>◆ Tuning standard</p> <ul style="list-style-type: none"><li>- Tuning Point: Max 4 points only with method1</li><li>- Tuning Length : <math>a \leq 3.00\text{mm}</math></li><li>- Tuning Wide: <math>W1 \leq 1.00\text{mm}</math></li></ul>                                                                                                                                                                        |              |          |   | <p>◆ Tuning standard</p> <ul style="list-style-type: none"><li>- Tuning Point: Max 4 points only with method2</li><li>- Tuning Wide: <math>W1 \leq 3.00\text{mm}</math></li></ul> |              |      |     |
| <p>◆ The above criteria is for only tuning which is the manual mark by worker. The tuning made in Ag printing process is not applied to the above criteria.</p> <p>◆ Total tuning points with all above 2 methods : Max 4 points</p> <p>◆ Criteria of defective parts</p> <ul style="list-style-type: none"><li>- If tuned antennas do not meet above standard, Amotech will regard them as defective part</li></ul> |              |          |   |                                                                                                                                                                                   |              |      |     |

|             |                                                                                                                                       |                                                                                     |                                                                                     |                                                                                      |   |                                                                                       |                                                                                       |                                                                                       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Doc No.     | 10Patch-Boundary-001                                                                                                                  | Limited Boundary<br>(No Printing / Scratch)                                         |                                                                                     |                                                                                      |   | Write                                                                                 | Check                                                                                 | Approve                                                                               |
| Process     | Appearance Inspect                                                                                                                    |                                                                                     |                                                                                     |                                                                                      |   |  |  |  |
| Product     | All Model                                                                                                                             |                                                                                     |                                                                                     |                                                                                      |   | 2022/10                                                                               | 2/10                                                                                  | 2/10                                                                                  |
| Write Dept  | Quality Dept.                                                                                                                         |                                                                                     |                                                                                     |                                                                                      |   |                                                                                       |                                                                                       |                                                                                       |
| Origin Date | 2010. 02. 08                                                                                                                          | Revision Date                                                                       | 2022.10.31                                                                          | Revision No                                                                          | 3 | Page                                                                                  | 1 / 4                                                                                 |                                                                                       |
| Item        | O K                                                                                                                                   |                                                                                     |                                                                                     | N G                                                                                  |   |                                                                                       | Etc                                                                                   |                                                                                       |
| No Printing |                                                    |                                                                                     |                                                                                     |   |   |  |                                                                                       |                                                                                       |
|             | No printing must have entered allow SPEC.<br>[SPEC : No limit on the number of size≤1mm / 1mm<size≤ 2mm:Allow Q'ty:2ea / 2mm<size:NG] |                                                                                     |                                                                                     |                                                                                      |   |                                                                                       |                                                                                       |                                                                                       |
| Item        | O K                                                                                                                                   |                                                                                     |                                                                                     | N G                                                                                  |   |                                                                                       | Etc                                                                                   |                                                                                       |
| Scratch     |                                                    |  |  |  |   |                                                                                       |                                                                                       |                                                                                       |
|             | Handle badness if there is <u>shape that rake</u> with picture.                                                                       |                                                                                     |                                                                                     |                                                                                      |   |                                                                                       |                                                                                       |                                                                                       |
| Noted Items |                                                                                                                                       |                                                                                     |                                                                                     |                                                                                      |   |                                                                                       |                                                                                       |                                                                                       |

|                          |                                                                                                                                                                                                                                                                                                                             |                                    |            |                                                                                    |   |      |       |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------|------------------------------------------------------------------------------------|---|------|-------|
| Doc No.                  | 10Patch-Boundary-001                                                                                                                                                                                                                                                                                                        | Limited Boundary<br>(Foreign body) |            |                                                                                    |   |      |       |
| Process                  | Appearance Inspect                                                                                                                                                                                                                                                                                                          |                                    |            |                                                                                    |   |      |       |
| Product                  | All Model                                                                                                                                                                                                                                                                                                                   |                                    |            |                                                                                    |   |      |       |
| Write Dept               | Quality Dept.                                                                                                                                                                                                                                                                                                               |                                    |            |                                                                                    |   |      |       |
| Origin Date              | 2010. 02. 08                                                                                                                                                                                                                                                                                                                | Revision Date                      | 2022.10.31 | Revision No                                                                        | 3 | Page | 2 / 4 |
| Item                     | O K                                                                                                                                                                                                                                                                                                                         |                                    |            | N G                                                                                |   | Etc  |       |
| Foreign body<br>(Bottom) |                                                                                                                                                                                                                                            |                                    |            |  |   |      |       |
|                          | The protruding foreign body is NG, and the non-protruding Foreign body must have entered allow SPEC<br>[W, L SPEC : No limit on the number of size≤2mm / 2mm<size≤ 3mm:Allow Q'ty:2ea / 3mm<size:NG]<br>[H SPEC : If the Foreign Body is thicker than the Tape(Adhesive + Release Liner)Thickness, treat them as defective] |                                    |            |                                                                                    |   |      |       |
| Item                     | O K                                                                                                                                                                                                                                                                                                                         |                                    |            | N G                                                                                |   | Etc  |       |
| Foreign body<br>(Top)    |                                                                                                                                                           |                                    |            |  |   |      |       |
|                          | Foreign body must have entered allow SPEC.<br>[SPEC : No limit on the number of size≤1mm / 1mm<size≤ 2mm:Allow Q'ty:2ea / 2mm<size:NG]                                                                                                                                                                                      |                                    |            |                                                                                    |   |      |       |
| Noted items              |                                                                                                                                                                                                                                                                                                                             |                                    |            |                                                                                    |   |      |       |

|             |                                                                                                                                                     |                                              |                                                                                     |                                                                                     |                                                                                      |                                                                                     |       |                                                                                       |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------|
| Doc No.     | 10Patch-Boundary-001                                                                                                                                | Limited Boundary<br>(Chipping / Solder ball) |                                                                                     |                                                                                     |                                                                                      |                                                                                     |       |                                                                                       |
| Process     | Appearance Inspect                                                                                                                                  |                                              |                                                                                     |                                                                                     |                                                                                      |                                                                                     |       |                                                                                       |
| Product     | All Model                                                                                                                                           |                                              |                                                                                     |                                                                                     |                                                                                      |                                                                                     |       |                                                                                       |
| Write Dept  | Quality Dept.                                                                                                                                       |                                              |                                                                                     |                                                                                     |                                                                                      |                                                                                     |       |                                                                                       |
| Origin Date | 2010. 02. 08                                                                                                                                        | Revision Date                                | 2022.10.31                                                                          | Revision No                                                                         | 3                                                                                    | Page                                                                                | 3 / 4 |                                                                                       |
| Item        | O K                                                                                                                                                 |                                              |                                                                                     | N G                                                                                 |                                                                                      | Etc                                                                                 |       |                                                                                       |
| Chipping    |                                                                  |                                              |                                                                                     |  |                                                                                      |  |       |  |
|             | Chipping must have entered allow SPEC.<br>[SPEC : No limit on the number of chipping≤1mm / 1mm<chipping size≤ 2mm:Allow Q'ty:2ea / 2mm<chipping:NG] |                                              |                                                                                     |                                                                                     |                                                                                      |                                                                                     |       |                                                                                       |
| Item        | O K                                                                                                                                                 |                                              | N G                                                                                 |                                                                                     | N G                                                                                  |                                                                                     | Etc   |                                                                                       |
| Solder ball |                                                                  |                                              |  |                                                                                     |  |                                                                                     |       |                                                                                       |
|             | Solder vall must have entered allow SPEC.<br>[SPEC : Solder ball ≤ 0.3mm]                                                                           |                                              |                                                                                     |                                                                                     | Solder ball of GND size<br>irrelatively badness.                                     |                                                                                     |       |                                                                                       |
| Noted items |                                                                                                                                                     |                                              |                                                                                     |                                                                                     |                                                                                      |                                                                                     |       |                                                                                       |