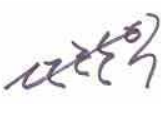
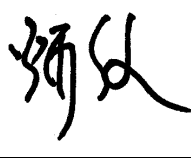


# Approval Sheet

|                         |                                                                                     |                                                                                      |                                                                                       |
|-------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Products                | Dielectric Chip Antenna                                                             |                                                                                      |                                                                                       |
| Customer                | PANTECH&CURITEL                                                                     |                                                                                      |                                                                                       |
| Customer CODE           |                                                                                     |                                                                                      |                                                                                       |
| Supplier                | PARTRON                                                                             |                                                                                      |                                                                                       |
| Supplier CODE           | ACS2450GBAPN33                                                                      |                                                                                      |                                                                                       |
| PANTECH<br>&<br>CURITEL | By designed                                                                         | By checked                                                                           | By approved                                                                           |
|                         |                                                                                     |                                                                                      |                                                                                       |
|                         |                                                                                     |                                                                                      |                                                                                       |
| PARTRON                 | By designed                                                                         | By checked                                                                           | By approved                                                                           |
|                         |  |  |  |
|                         | 05/09                                                                               | 05/09                                                                                | 05/09                                                                                 |

**2006 . 05. 09**

**P A R T R O N**

**33, BANWOL-DONG, HWASEONG-SI,  
KYOONGKI-DO, KOREA**

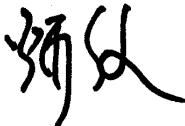
SPECIFICATION

MODEL : ACS2450GBAPN33

DIELECTRIC CHIP ANTENNA

PARTRON

33,Banwol-Dong,Hwaseong-Si,  
Gyeonggi-Do,Korea,445-973

| By designed                                                                         | By checked                                                                          | By approved                                                                          |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  |  |  |
| 05/09                                                                               | 05/09                                                                               | 05/09                                                                                |

**- Contents -**

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## 2. Electrical Characteristics

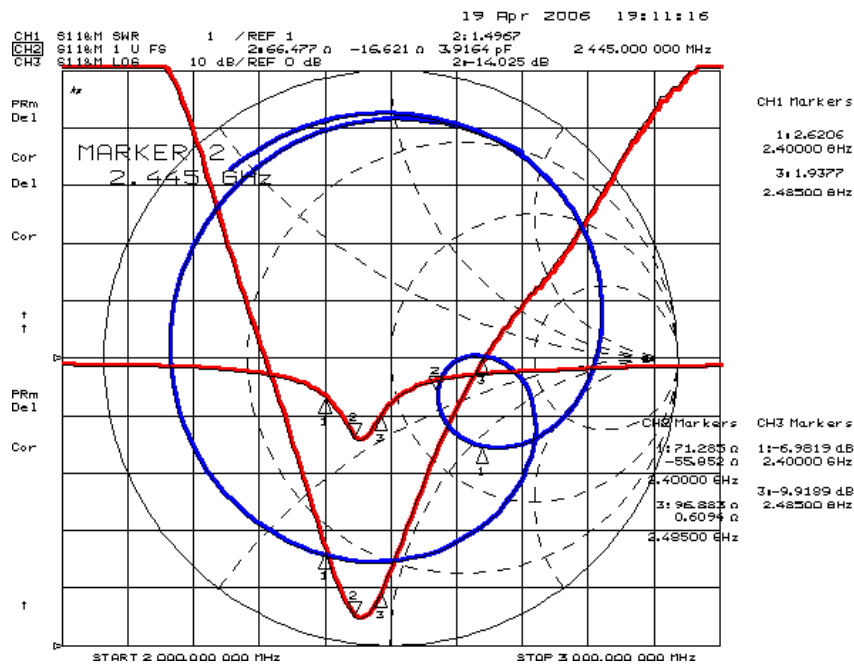
### 2.1 Set Condition

| ITEM                  |             |       |         | SPEC        |
|-----------------------|-------------|-------|---------|-------------|
| Frequency Range [MHz] |             |       |         | 2400 ~ 2485 |
| VSWR [Max]            |             |       |         | 3 : 1       |
| Bandwidth [Mhz]       |             |       |         | 85          |
| Polarization          |             |       |         | Linear      |
| Gain[dBi]             | Azimuth     | Theta | Peak    | -4.19       |
|                       |             |       | Average | -8.15       |
|                       |             | Phi   | Peak    | -10.72      |
|                       |             |       | Average | -16.10      |
|                       | Elevation 1 | Theta | Peak    | -6.73       |
|                       |             |       | Average | -11.20      |
|                       |             | Phi   | Peak    | -6.24       |
|                       |             |       | Average | -11.87      |
|                       | Elevation 2 | Theta | Peak    | -6.85       |
|                       |             |       | Average | -13.63      |
|                       |             | Phi   | Peak    | -7.15       |
|                       |             |       | Average | -12.75      |

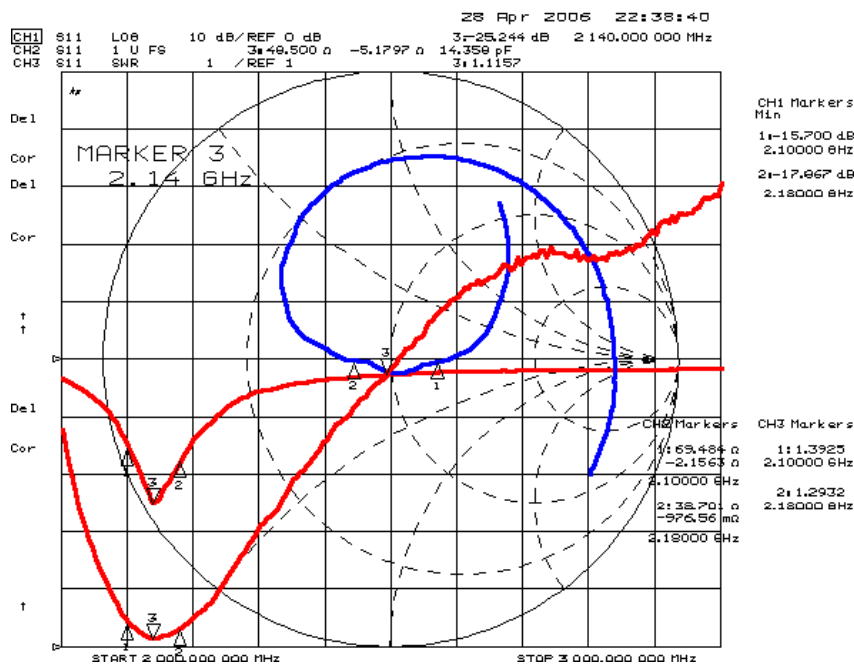
### 2.2 Test Fixture Condition

| ITEM                  | SPEC        |
|-----------------------|-------------|
| Frequency Range [MHz] | 2100 ~ 2180 |
| SWR [Max]             | 3 : 1       |
| Bandwidth [MHz]       | 80          |

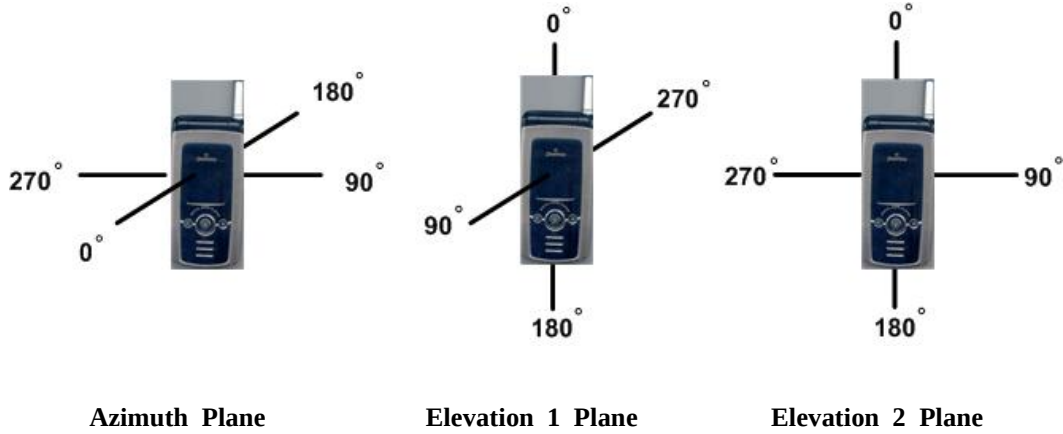
## 2.3 Graph of Set Condition



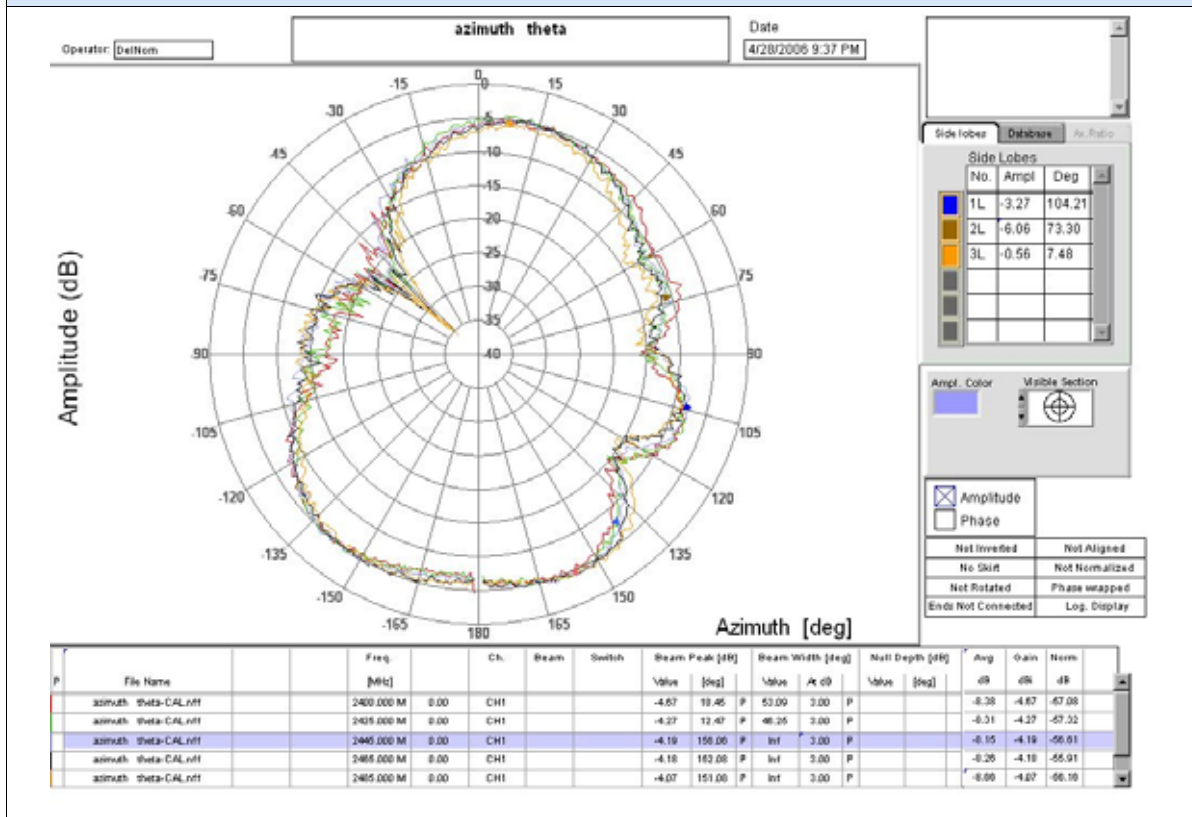
## 2.4 Graph of Test Fixture Condition



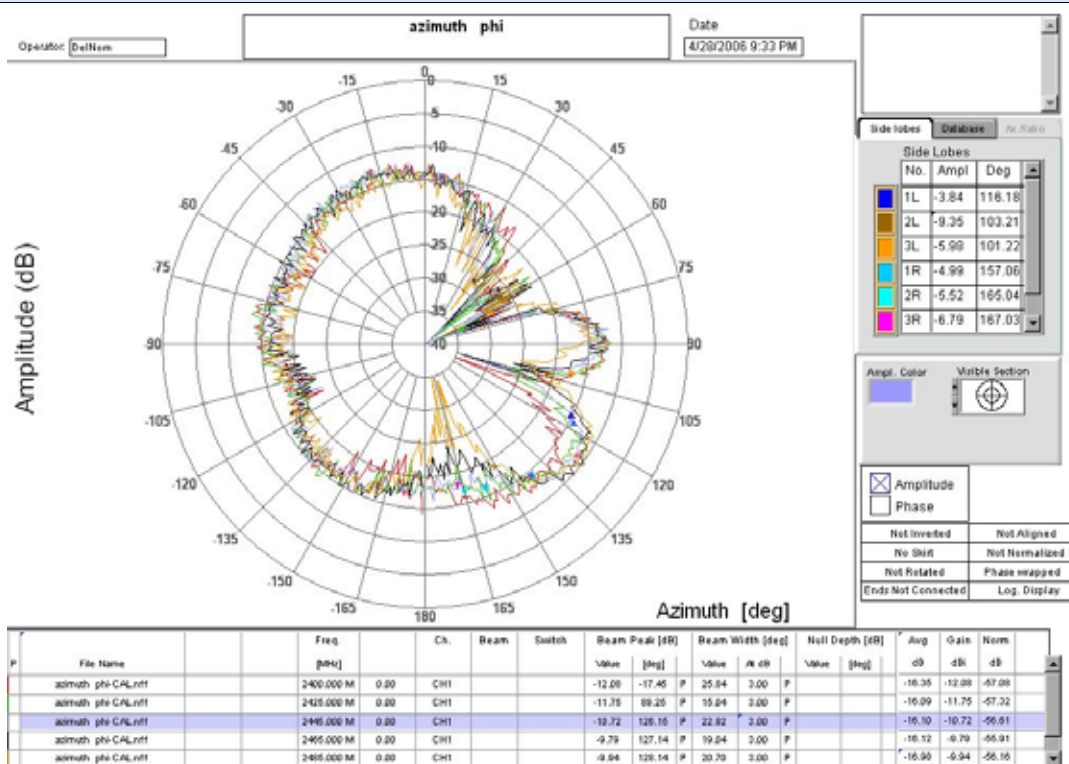
## 2.5 Radiation Pattern



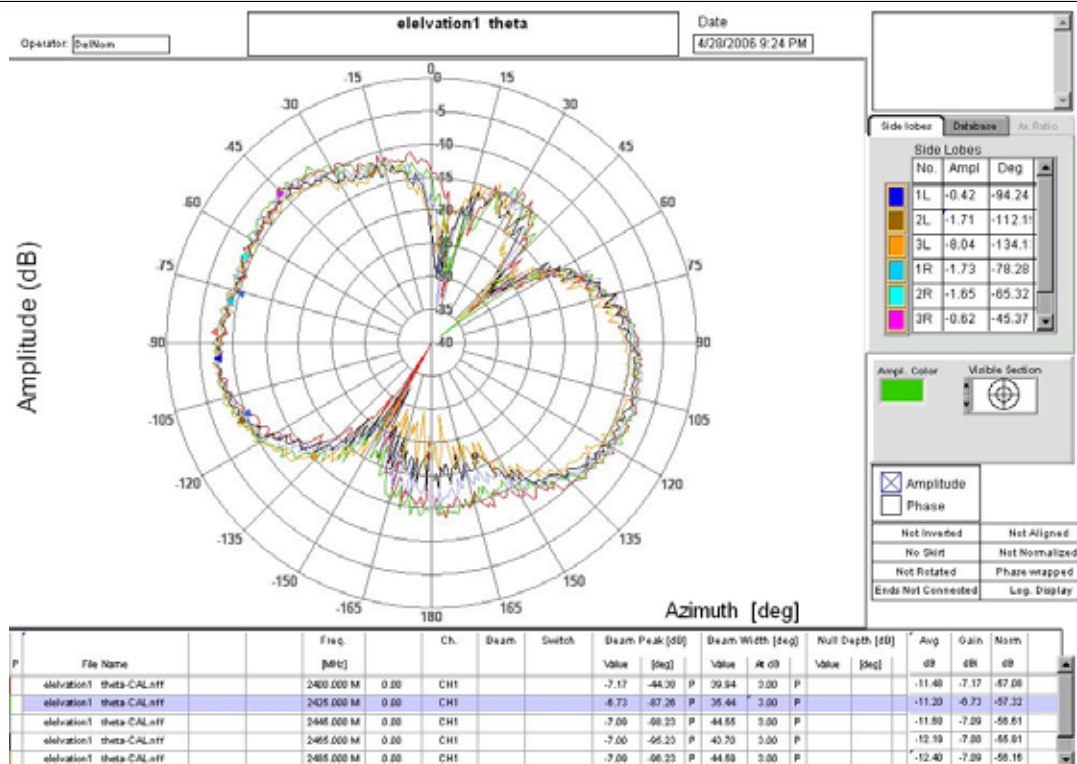
## Azimuth Theta



## Azimuth Phi

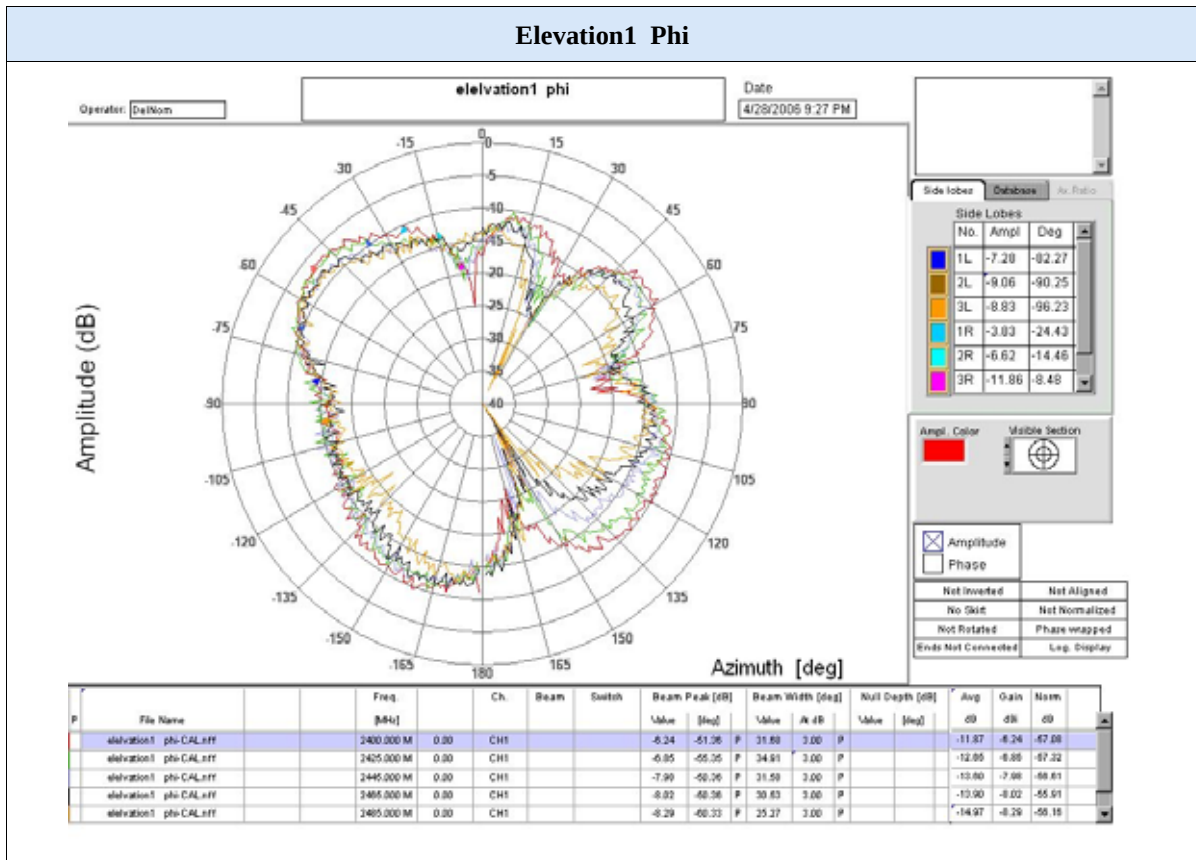


## Elevation1 Theta

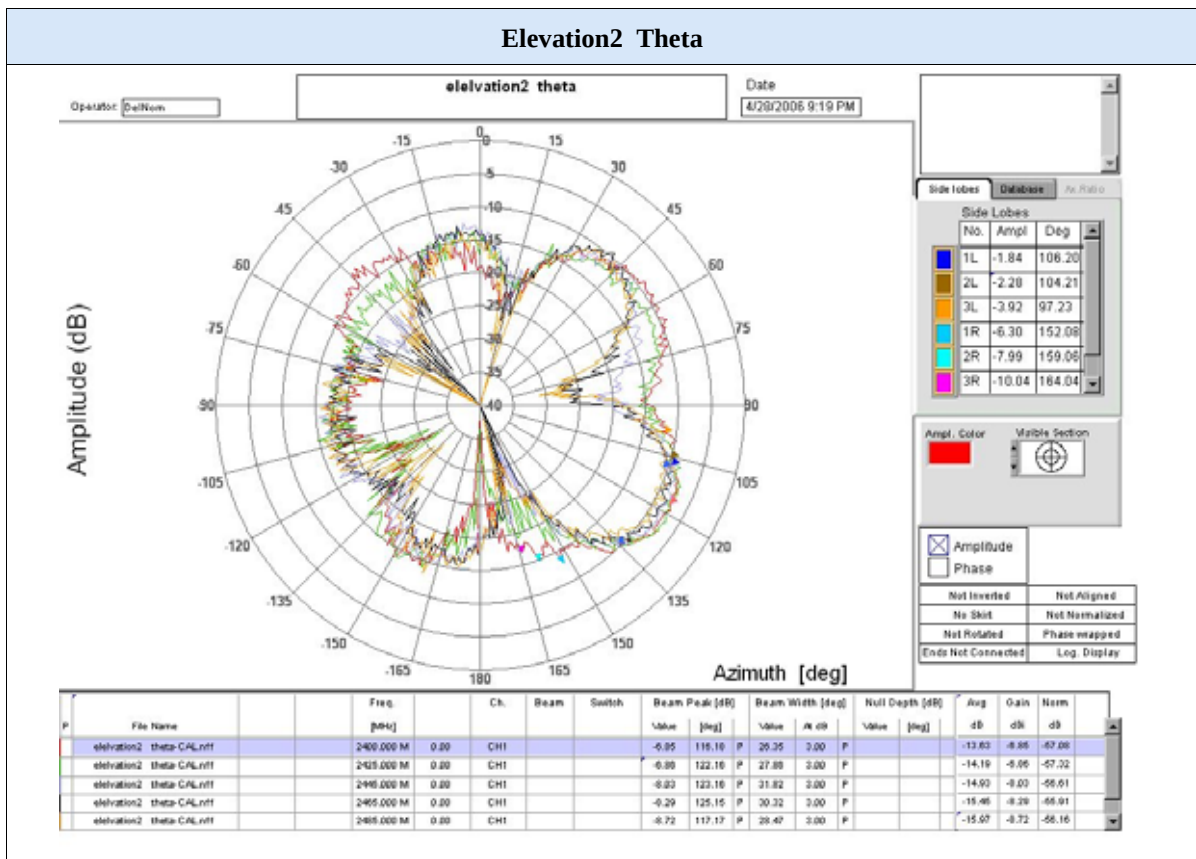


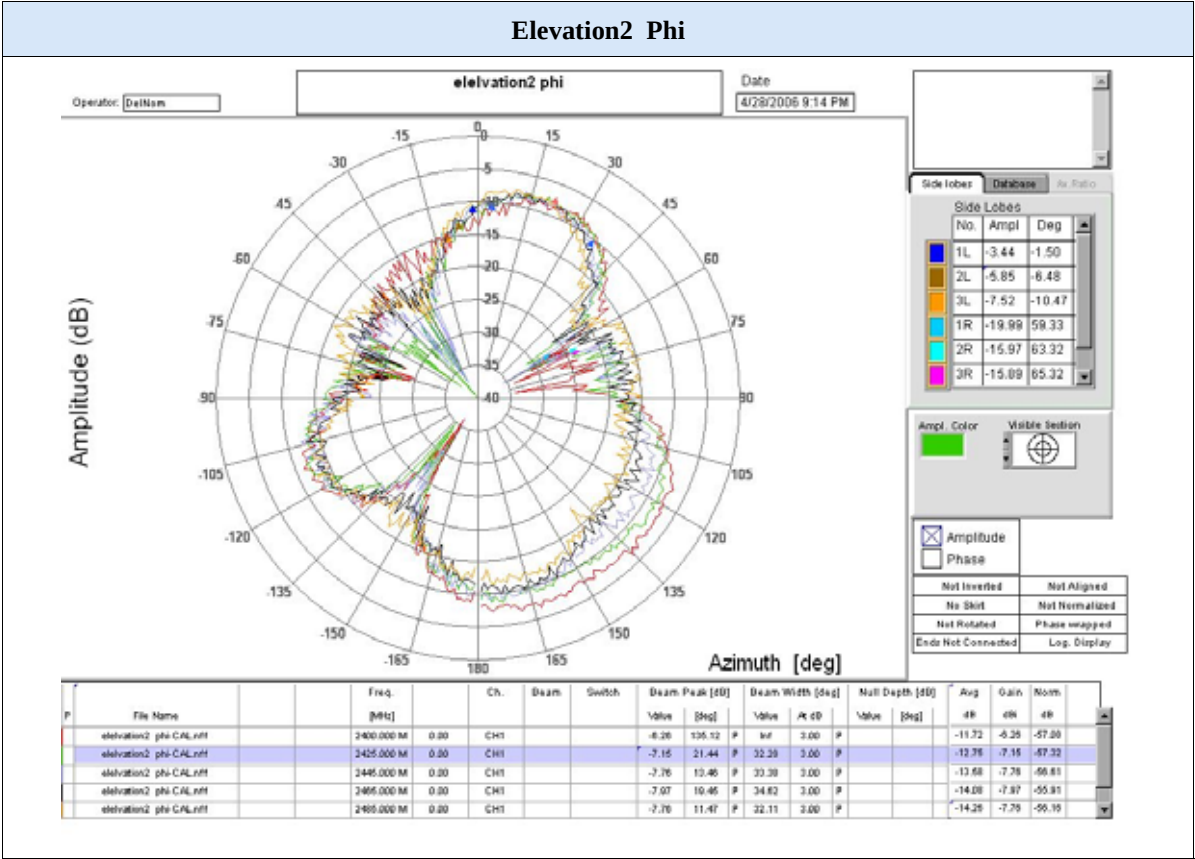


## Elevation1 Phi



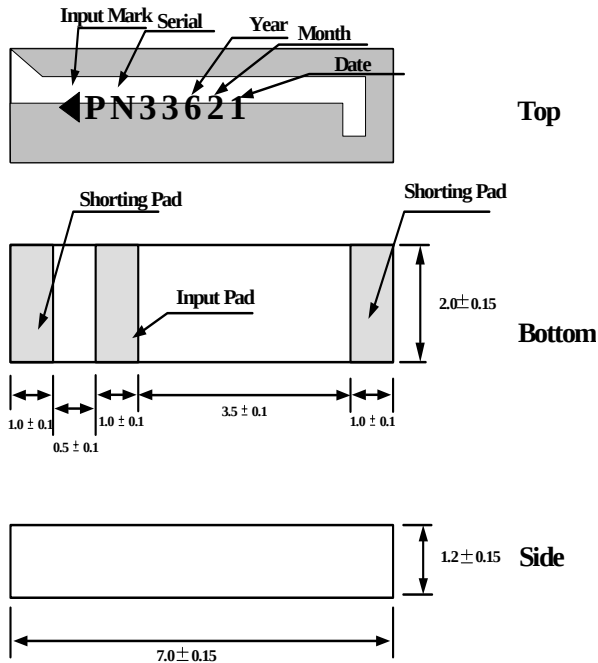
## Elevation2 Theta





### 3. Mechanical Characteristics

#### 3.1 Dimension



| Items            | Contents                         |
|------------------|----------------------------------|
| Dimension[mm]    | $W = 2.0 \pm 0.15$               |
|                  | $L = 7.0 \pm 0.15$               |
|                  | $T = 1.2 \pm 0.15$               |
| Material         | Dielectric (MMS-08)              |
| Temperature [°C] | -40 ~ +80                        |
| Humidity[%]      | at normal temperature,<br>RH 100 |

Unit ; mm

Unless specified tolerances are  $\pm 0.15$

#### 3.2 LOT Notation

|          |          |          |
|----------|----------|----------|
| <u>6</u> | <u>5</u> | <u>1</u> |
| ①        | ②        | ③        |

① Year ; 1 - 2001, 2 - 2002, .... 6 - 2006 ....

② Month ; 1 - January, 2 - February .... 9 - September, A - October, B - November ..

③ Date ; 1 - 1st day, 2 - 2nd day .... A - 10th Day, B - 11th Day, .....

#### 3.3 Marking

|   |          |          |          |          |          |          |          |
|---|----------|----------|----------|----------|----------|----------|----------|
| ◀ | <u>P</u> | <u>N</u> | <u>3</u> | <u>3</u> | <u>6</u> | <u>5</u> | <u>1</u> |
| ① | ②        | ③        | ④        | ⑤        |          |          |          |

① Input Signal

② Serial

③ Year ; 1 - 2001, 2 - 2002, .... 6 - 2006 ....

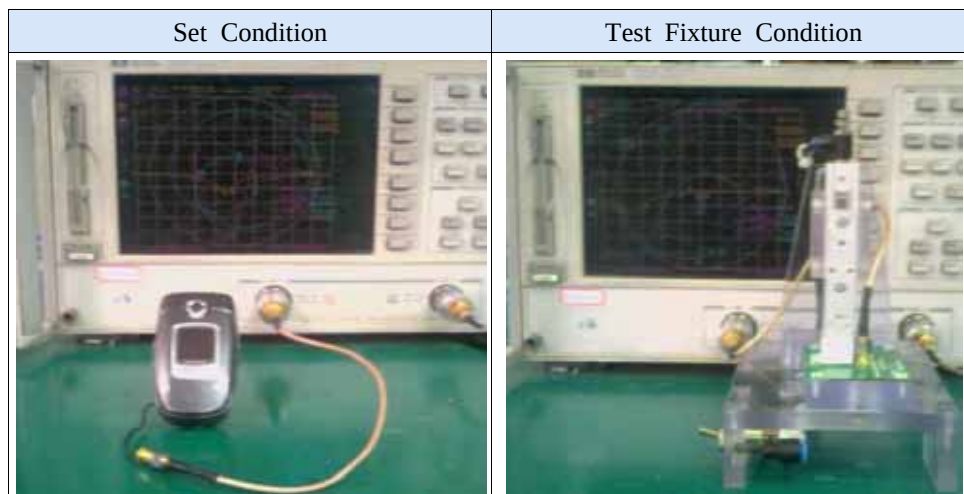
④ Month ; 1 - January, 2 - February .... 9 - September, A - October, B - November ....

⑤ Date ; 1 - 1st day, 2 - 2nd day .... A - 10th Day, B - 11th Day, .....

## 4. Measurement Process

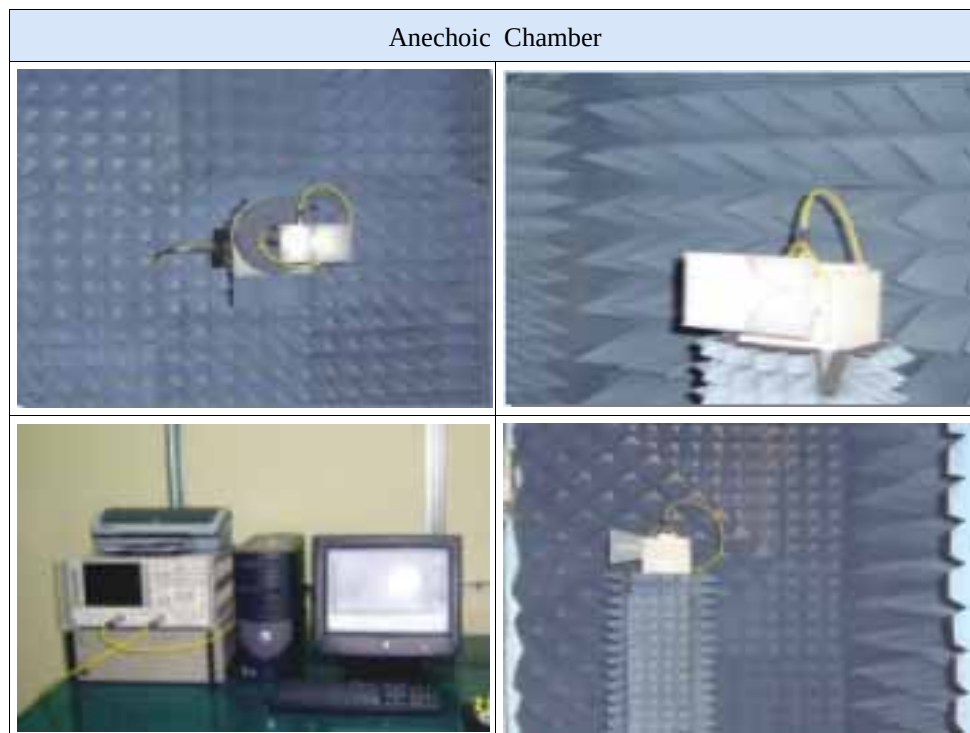
### 4.1 SWR/Returnloss

The SWR/Returnloss is measured by Network Analyzer



### 4.2 Gain

The Antenna Gain is measured using the set at Anechoic Chamber



## 5. Reliability Condition

### 5.1 ENVIRONMENT TEST

| ITEM                        | TEST CONDITION                  | LIMIT                                                                                                                         |
|-----------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| High Temperature Resistance | +85℃ ± 3℃, 120hr ± 2hr          | *After the test,<br>specimen would be kept at<br>25℃ ± 5℃ for 1 hours<br>*specimen sheet meet the electrical<br>specification |
| Low Temperature Resistance  | -40℃ ± 3℃, 120hr ± 2hr          |                                                                                                                               |
| Humidity Resistance         | +60 ± 3℃, RH90~95%, 120hr ± 2hr |                                                                                                                               |

### 5.2 Thermal Shock Test, Reflow Test

| ITEM          | TEST CONDITION                                                                       | LIMIT       |
|---------------|--------------------------------------------------------------------------------------|-------------|
| Thermal Shock | -40℃ ± 3℃ (2Hr) ↔ +85℃ ± 3℃ (2Hr)<br>cycle : 15cycle<br>recovery time : with in 5min | SAME as 5-1 |
| Reflow        | Pre Heating : 140 ± 10℃, 60 ~ 120 sec<br>peak Heating : 240℃, 10sec Max              |             |

### 5.3 Mechanical Test

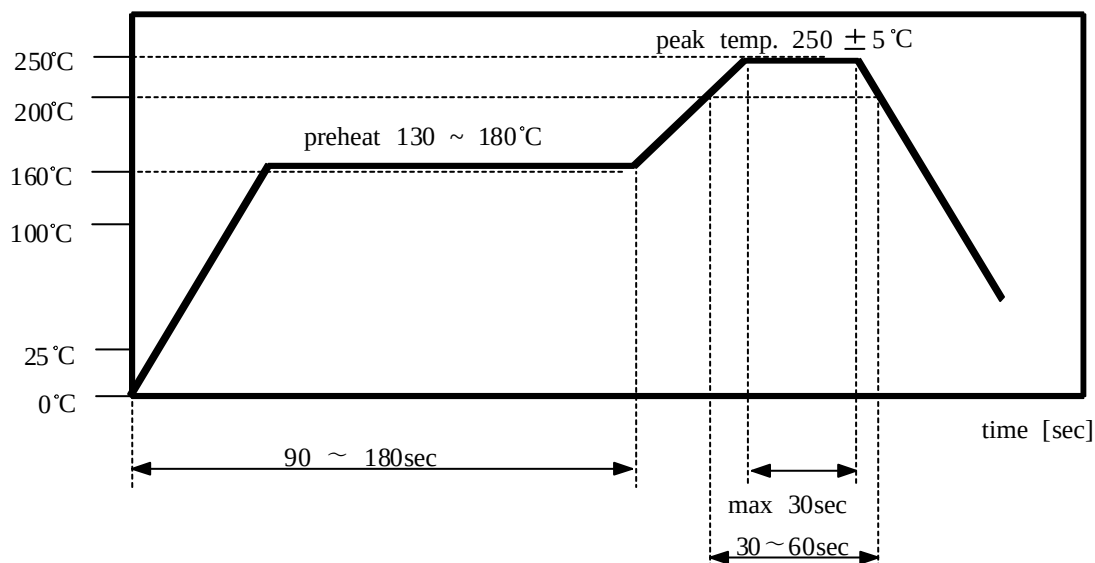
| ITEM             | TEST CONDITION                                                                            | LIMIT                                                                   |
|------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Random Vibration | Frequency 10~500Hz - 10 × 9.8m/s <sup>2</sup> (G)<br>Sweep time 15min, X.Y.Z each 5 times | *After the test,<br>specimen sheet meet the<br>electrical specification |
| Drop             | Height 120cm, 12 times<br>Height 152cm, 19 times                                          |                                                                         |

## 6. Reliability Test Result

※ Appendix #1

## 7. Soldering Condon

### 7.1 Reflow Soldering



### 7.2 Manual Soldering

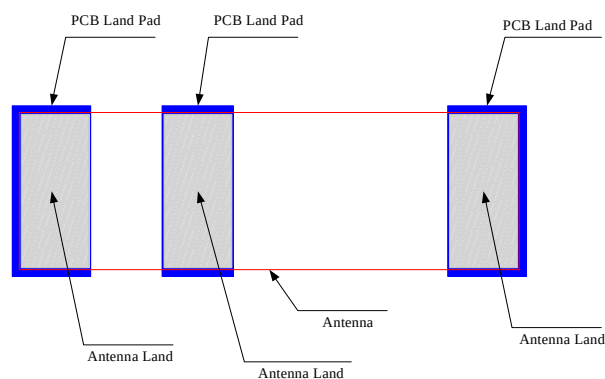
Pre-heating Temperature : 120°C , 60 ~ 300 sec.

Soldering Temperature : 340°C ± 5°C , 5sec max per each terminal

### 7.3 PCB Pattern Design

The soldering pad of PCB is about 0.1 mm larger than land pattern of antenna.

This figure shows the shape of PCB pad

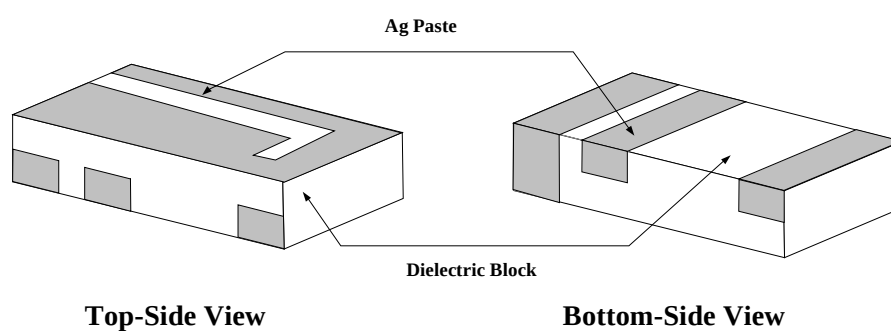


## 8. Structure and Material

### 8.1 Materialization

The structure is materialized printing Ag paste at the dielectric block

### 8.2 Structure



### 8.3 Material

| Items            | Material | The manufacturer |
|------------------|----------|------------------|
| Dielectric Block | POWDER   | Fuji             |
| PATTERN          | Ag Paste | METECH           |

## 9. Attention

### 9.1 Temperature Condition

|             | Range of Temperature | unit |
|-------------|----------------------|------|
| Application | -40 ~ +85            | °C   |
| Keeping     | -40 ~ +85            | °C   |

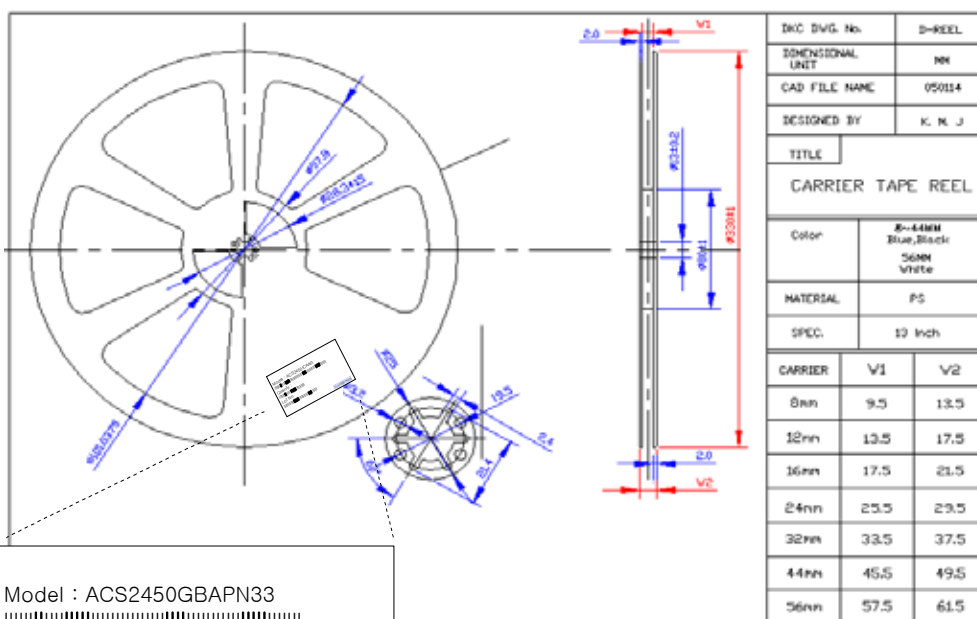
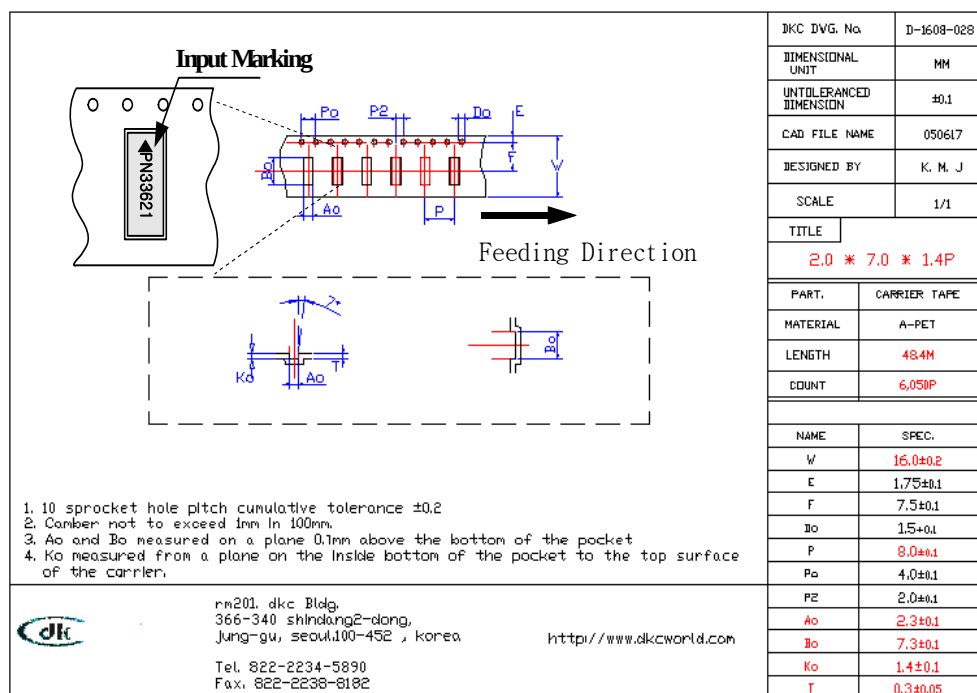
### 9.2 MSL LEVEL 1 (JEDEC J-STD-020C)

|   | Floor Life |                | Soak Requirements |                |
|---|------------|----------------|-------------------|----------------|
|   | Time       | Conditions     | Time              | Conditions     |
| 1 | Unlimited  | = < 30°C/85%RH | 168+5/-0          | = < 85°C/85%RH |

## 10. Packing

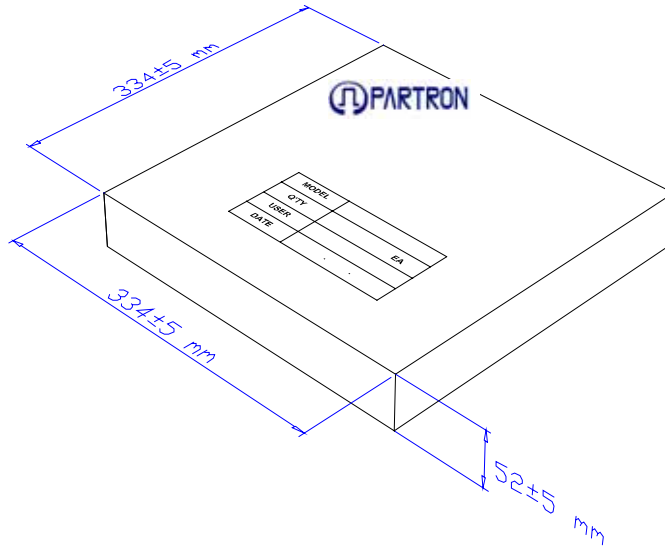
### 10.1 Carrier/Reel

| Material | Surface Resistance    | Method     |
|----------|-----------------------|------------|
| A-PET    | Typical $10^8 \Omega$ | Heat Press |

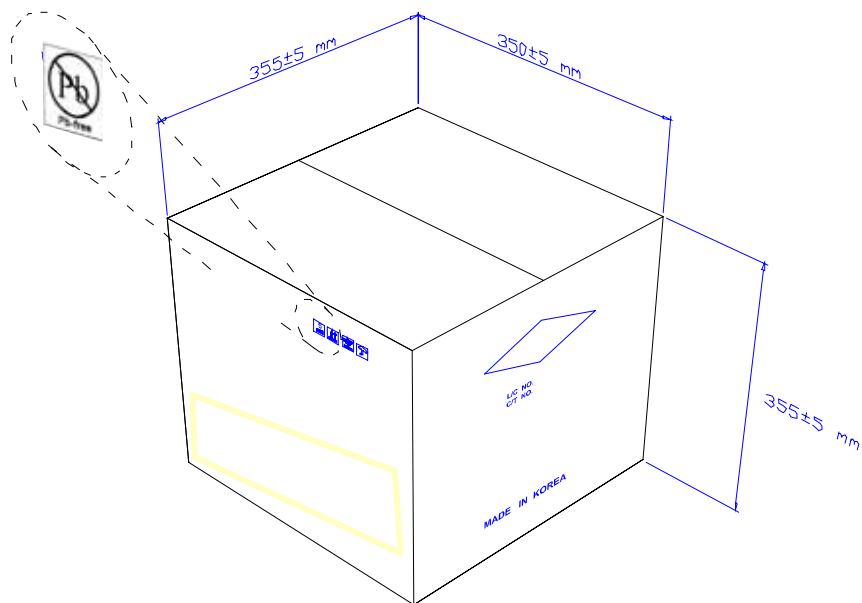




## 10.2 Box Specification



Material : SK/S/K-B  
Cardboard box



## 11. Process Control

| Product           |             |              | Issued/Revision    |                       | Process Control                    |                      |                     |                   |                                          | Record               | By designed                           | By checked            | By approved |         |
|-------------------|-------------|--------------|--------------------|-----------------------|------------------------------------|----------------------|---------------------|-------------------|------------------------------------------|----------------------|---------------------------------------|-----------------------|-------------|---------|
| CHIP ANTENNA      |             |              | Issued             | 04.04.06              |                                    |                      |                     |                   |                                          | PRCP-C001            |                                       |                       |             |         |
|                   |             |              | Revised            | 05.04.03              |                                    |                      |                     |                   |                                          |                      |                                       |                       |             |         |
| Input Materials   | FLOW CHART  |              | Process name       | Management of Factors |                                    |                      |                     |                   | Management of quality                    |                      |                                       |                       |             |         |
|                   | preparation | Main Process |                    | Equipment Name        | Checked                            | Condition            | Cycle of management | Record            | Checked Item                             | Margin               | Method of Inspection                  | Cycle of management   | Record      | Action  |
| Ceramic POWDER    |             | ◇            | Import Inspection  |                       |                                    |                      |                     |                   | shrinking rate permittivity              | refer to Guide Sheet | Micrometer Network                    | 10ea/LOT              | C/sheet     | Return  |
| POWDER lubri cant | ○           |              | powder             | Mixer                 |                                    |                      |                     |                   | mixing                                   | POWDER lubricant     | Scale                                 | PER MIXING            | -           | Exhaust |
|                   |             | ○            | Shaping            | Press                 | pressure Mold Condition            | refer to Guide Sheet | Per LOT 1/day       | parameter C/SHEET | dimension weight density aspect          | refer to Guide Sheet | Micrometer scale Calculated Visual    | 5/100EA 10ea/lot      | LOT CARD    | Exhaust |
|                   |             | ○            | Plasticity         | Plasticity Hole       | SETTER Outside Temperature PROFILE | refer to Guide Sheet | all 2/day 1/month   | C/sheet           |                                          |                      |                                       |                       |             |         |
|                   |             | ◇            | Block              |                       |                                    |                      |                     |                   | wide length shape                        | refer to Guide Sheet | Micrometer Calipers Visual Inspection | 20ea/LOT 20ea/LOT all | C/sheet     | Exhaust |
| AG PASTE          |             | ○            | SIDE1 PAD Printing | Printer screen        | Squeeze velocity/presure SNAP      | refer to Guide Sheet | 1/day               | -                 | PATTERN Dimension aspect                 | refer to Guide Sheet | Microscope                            | 10ea/3Jig             | c/sheet     | Rework  |
|                   |             | ○            | Dry                | Dryer Dry Jig         | Temperature Belt speed             | refer to Guide Sheet | 1/week              | Parameter         | Dry Condition Printed condition breakage | refer to Guide Sheet | Visual Inspection                     | all                   | Lot card    | Rework  |

| Product         |             | Issued/Revision                                                                     |                            | Process Control       |                               |                      |                     |                   | Record                                   | By designed          | By checked            | By approved         |          |                |
|-----------------|-------------|-------------------------------------------------------------------------------------|----------------------------|-----------------------|-------------------------------|----------------------|---------------------|-------------------|------------------------------------------|----------------------|-----------------------|---------------------|----------|----------------|
| CHIP ANTENNA    |             | Issued                                                                              | 04.04.06                   |                       |                               |                      |                     |                   | PRCP-C001                                |                      |                       |                     |          |                |
| Input Materials | FLOW CHART  |                                                                                     | Process name               | Management of Factors |                               |                      |                     |                   | Management of quality                    |                      |                       |                     |          |                |
|                 | preparation | Main Process                                                                        |                            | Equipment Name        | Checked                       | Condition            | Cycle of management | Record            | Checked Item                             | Margin               | Method of Inspection  | Cycle of management | Record   | Action         |
| AG PASTE        |             |    | SIDE 2 PAD Printing        | Printer screen        | Squeeze velocity/presure SNAP | refer to Guide Sheet | 1/day               | -                 | PATTERN Dimension aspect                 | refer to Guide Sheet | Microscope            | 10ea/3Jig           | c/sheet  | Rework         |
|                 |             |    | Dry                        | Dryer Dry Jig         | Temperature Belt speed        | refer to Guide Sheet | 1/week              | Parameter         | Dry Condition Printed condition breakage | refer to Guide Sheet | Visual Inspection     | all                 | Lot card | Rework         |
|                 |             |    | Baking                     | Baking Hole mesh net  | Temperature Belt speed        | refer to Guide Sheet | 1/week              | Parameter C/Sheet | Breakage Pollution                       | refer to Guide Sheet | Visual Inspection     | all                 | Lot card | Exhaust Rework |
| AG PASTE        |             |    | TOP printing               | Printer screen        | Squeeze velocity/presure SNAP | refer to Guide Sheet | 1/day               | -                 | PATTERN dimension                        | refer to Guide Sheet | measure               | 10ea/3Jig           | c/sheet  | Rework         |
|                 |             |   | Dry                        | Dryer Dry Jig         | Temperature Belt speed        | refer to Guide Sheet | 1/week              | Parameter         | Dry Condition Printed condition breakage | refer to Guide Sheet | Visual Inspection     | all                 | Lot card | Rework         |
| AG PASTE        |             |  | BOTTOM PAD Printing<br>CTQ | printer screen        | Squeeze velocity/presure SNAP | refer to Guide Sheet | 1/day               | -                 | PATTERN dimension aspect                 | refer to Guide Sheet | measure<br>Microscope | 10ea/3Jig           | c/sheet  | Rework         |

| Product                  |                 | Issued/Revision   |                              | Process Control           |                           |                         |                        |                          | Record                                            | By designed                              | By checked                                 | By approved                |                                 |                   |
|--------------------------|-----------------|-------------------|------------------------------|---------------------------|---------------------------|-------------------------|------------------------|--------------------------|---------------------------------------------------|------------------------------------------|--------------------------------------------|----------------------------|---------------------------------|-------------------|
| CHIP ANTENNA             |                 | Issued<br>Revised | 04.04.06<br>05.04.03         |                           |                           |                         |                        |                          | PRCP-C001                                         |                                          |                                            |                            |                                 |                   |
| Input<br>Materials       | FLOW CHART      |                   | Process<br>name              | Management of Factors     |                           |                         |                        |                          | Management of quality                             |                                          |                                            |                            |                                 |                   |
|                          | prepar<br>ation | Main<br>Process   |                              | Equipment<br>Name         | Checked                   | Condition               | Cycle of<br>management | Record                   | Checked<br>Item                                   | Margin                                   | Method of<br>Inspection                    | Cycle of<br>management     | Record                          | Action            |
|                          |                 | ○                 | Dry                          | Dryer<br>Dry Jig          | Temperature<br>Belt speed | refer to<br>Guide Sheet | 1/week                 | Paramete<br>r            | Dry Condition<br>Printed<br>condition<br>breakage | refer to<br>Guide Sheet                  | Visual Inspection                          | all                        | Lot card                        | Rework            |
|                          |                 | ○                 | Baking                       | Baking Hole<br>mesh net   | Temperature<br>Belt speed | refer to<br>Guide Sheet | 1/week                 | Paramete<br>r<br>C/Sheet | Breakage<br>Pollution                             | refer to<br>Guide Sheet                  | Visual Inspection                          | all                        | Lot card                        | Exhaust<br>Rework |
|                          |                 | ◇                 | aspect<br>inspection         |                           |                           |                         |                        |                          | aspect                                            | Reference SPL<br>refer to<br>Guide Sheet | Visual Inspection<br>microscope            | all                        | Lot card<br>production<br>diary | Exhaust<br>repair |
|                          |                 | ○                 | MARKING                      | Marking<br>Machine        |                           |                         |                        |                          | marking                                           | Reference SPL                            | Visual Inspection                          | all                        | Lot card<br>production<br>diary | Rework<br>Exhaust |
|                          |                 | ◇                 | Electrical<br>Characteristic | NETWORK<br>Inspection Jig | proofreading<br>Condition | refer to<br>Guide Sheet | 1/2hour                | C/sheet                  | Electrical<br>Characteristic                      | refer to<br>Guide Sheet                  | Network                                    | all                        | Lot card<br>production<br>diary | Exhaust<br>repair |
|                          |                 | ◇                 | aspect<br>inspection         |                           |                           |                         |                        |                          | aspect<br>dimension                               | Reference SPL<br>refer to<br>Guide Sheet | Visual Inspection<br>microscope            | all                        | Lot card<br>production<br>diary | Exhaust<br>repair |
| Carrier<br>cover<br>reel |                 | ○                 | Taping                       |                           |                           |                         |                        |                          | Quantity<br>Direction<br>aspect                   | refer to<br>Guide Sheet                  | Manual                                     | all                        | Lot card<br>production<br>diary | Rework            |
|                          |                 | ◇                 | shipper<br>inspection        | NETWORK<br>Inspection Jig | proofreading<br>Condition | refer to<br>Guide Sheet | 1/person               | C/sheet                  | Electrical<br>Characteristic<br>aspect<br>packing | refer to<br>Guide Sheet                  | Network<br>microscope<br>Visual Inspection | refer<br>to Guide<br>Sheet | Result<br>Paper                 | return<br>Exhaust |
| packing<br>box<br>label  |                 | ○                 | packing                      | bar code<br>printer       |                           |                         |                        |                          | packing<br>P/N<br>Quantity                        | refer to<br>Guide Sheet                  | Visual Inspection                          | all                        | -                               | Rework            |
|                          |                 | ◇                 | packing<br>inspection        |                           |                           |                         |                        |                          | packing<br>P/N<br>Quantity                        | refer to<br>Guide Sheet                  | Visual Inspection                          | all                        | -                               | return            |