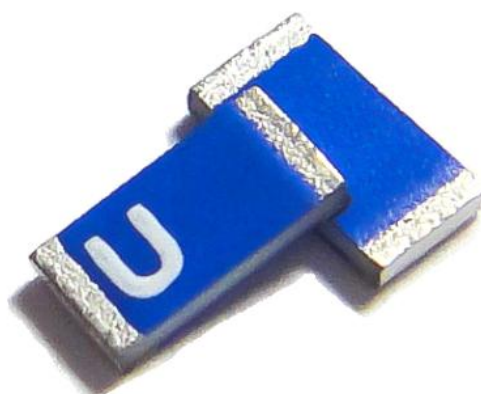


## 3.2 x 1.6 x 0.5 (mm) WiFi Dual Band Chip Antenna (AA077)

### Engineering Specification

H 2 U 8 4 W 1 H 1 S 0 1 0 0

#### 1. Product Number



#### 2. Features

- \*Stable and reliable performances in both 2.4 and 5 GHz bands
- \*Low profile and compact size
- \*RoHS compliance
- \*SMT processes compatible

#### 3. Applications

- \*Wi-Fi CERTIFIED ac applications
- \*Wireless communication devices when IEEE802.11 a/b/g/n/ac functions are needed.
- \*IoT applications

#### 4. Description

Unictron's AA077 ceramic chip antenna is designed for Wi-Fi CERTIFIED ac applications, covering both 2400~2500 MHz & 5150~5850 MHz frequency bands. Fabricated with proprietary design and processes, AA077 shows excellent performance and is fully compatible with SMT processes which can decrease the assembly cost and improve device's quality and consistency.



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Designed by : George

Checked by : Mike

Approved by : Herbert

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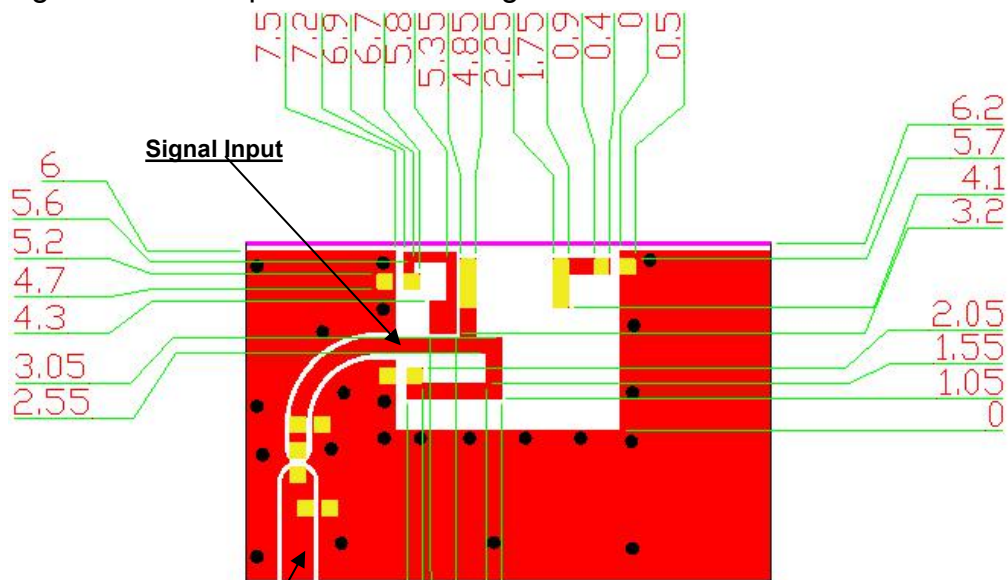
PAGE 1 OF 22

## 5. Layout Guide & Electrical Specifications

### 5-1. Layout Guide (unit : mm)

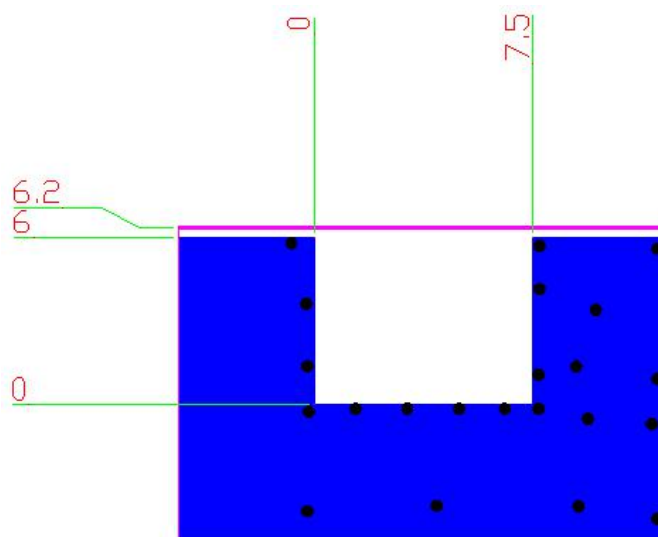
Solder Land Pattern:

The solder land pattern (gold marking areas) is shown below. Recommendation on matching circuit will be provided according to customer's installation conditions.



Transmission Line with 50Ω Impedance Characteristic

Top View



Bottom View



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## 5-2. Electrical Specifications (Evaluation Board Dimensions: 80 x 40 mm<sup>2</sup>)

### 5-2-1. Electrical Table (2400~2500 MHz Band)

| Characteristics           |             | Specifications      | Unit |
|---------------------------|-------------|---------------------|------|
| Outline Dimensions        |             | 3.2 x 1.6 x 0.5     | mm   |
| Ground Plane Dimensions   |             | 80 x 40             | mm   |
| Working Frequency         |             | 2400~2500           | MHz  |
| VSWR(@ center frequency)* |             | 2 Max.              |      |
| Characteristic Impedance  |             | 50                  | Ω    |
| Polarization              |             | Linear Polarization |      |
| Peak Gain                 | (@2442 MHz) | 1.5 (typical)       | dBi  |
| Efficiency                |             | 76 (typical)        | %    |

\*Center frequency means the frequency with the lowest value in return loss of the chip antenna on the evaluation board.

### 5-2-2. Electrical Table (5150~5850 MHz Band)

| Characteristics           |             | Specifications      | Unit |
|---------------------------|-------------|---------------------|------|
| Working Frequency         |             | 5150~5850           | MHz  |
| VSWR(@ center frequency)* |             | 2 Max.              |      |
| Characteristic Impedance  |             | 50                  | Ω    |
| Polarization              |             | Linear Polarization |      |
| Peak Gain                 | (@5550 MHz) | 3.1 (typical)       | dBi  |
| Efficiency                |             | 67 (typical)        | %    |

\*Center frequency means the frequency with the lowest value in return loss of the chip antenna on the evaluation board.



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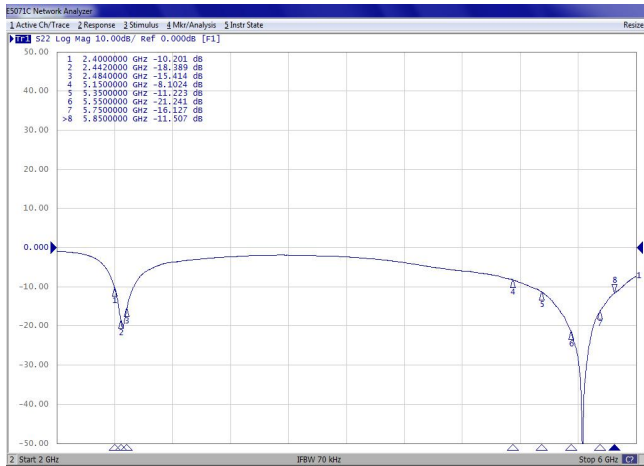
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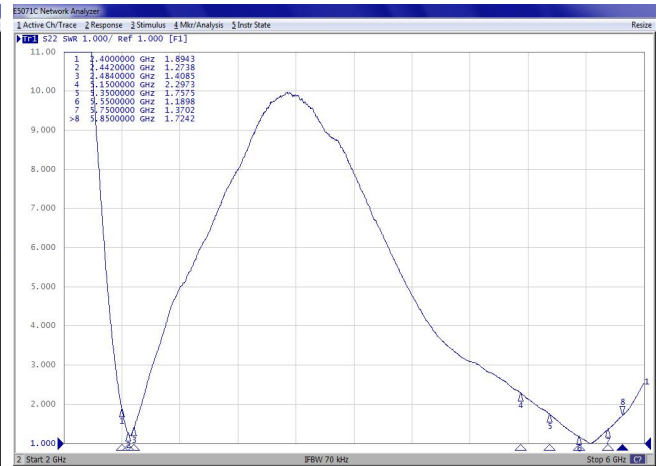
**PAGE 3 OF 22**

## 5-2-3. Return Loss & VSWR

### Return Loss ( $S_{11}$ )

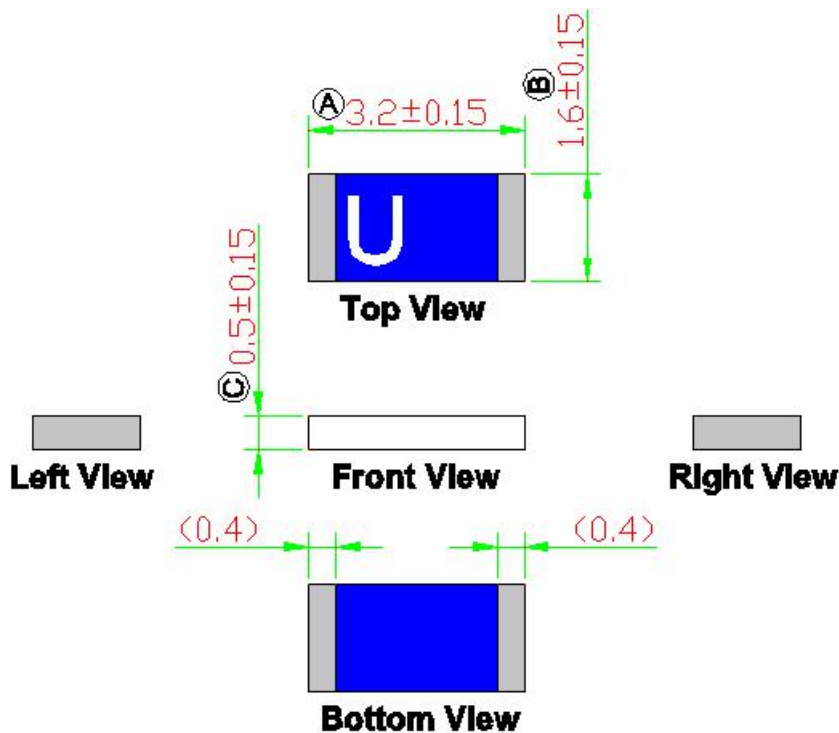


### VSWR ( $S_{11}$ )



## 6. Outline Dimensions of Antenna & Evaluation Board (unit: mm)

### 6-1. Antenna Dimensions



#### NOTE:

1. All materials are RoHS compliant.
2. "A~C" Critical Dimensions.
3. "( )" Reference Dimensions.



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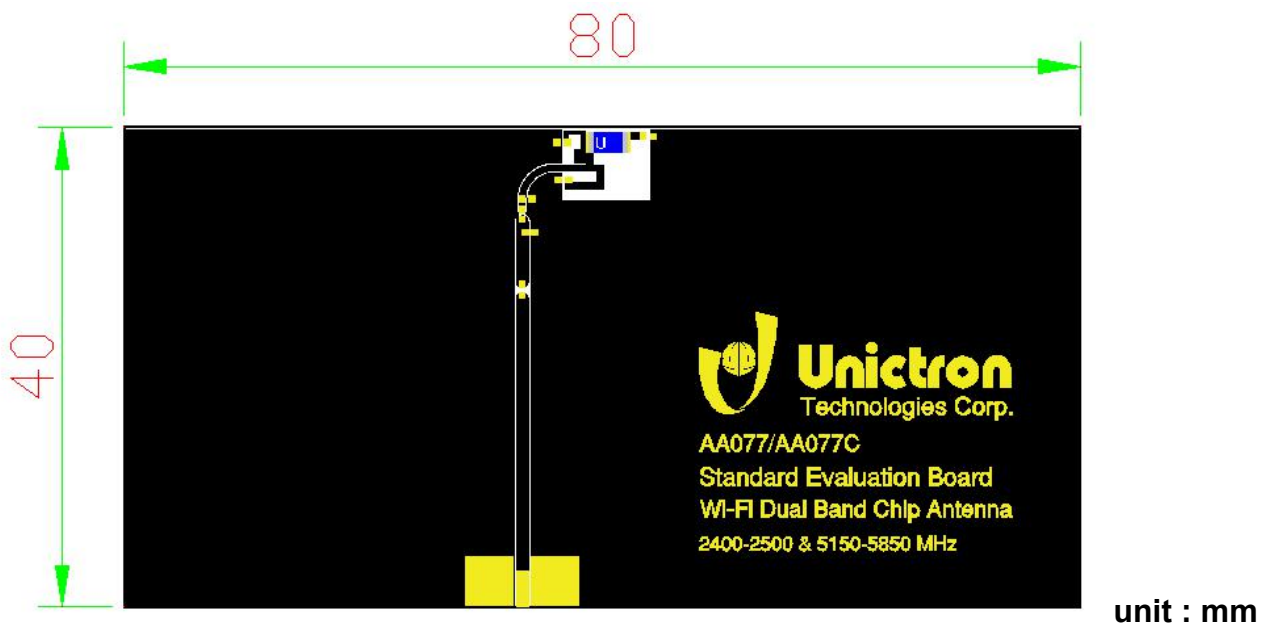
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## PIN Definitions



| PIN           | 1      | 2               |
|---------------|--------|-----------------|
| Soldering PAD | Signal | Tuning / Ground |

## 6-2. Evaluation Board with Antenna



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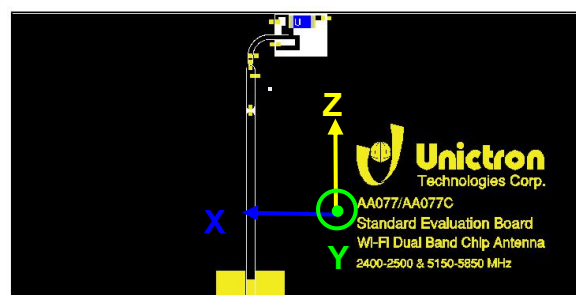
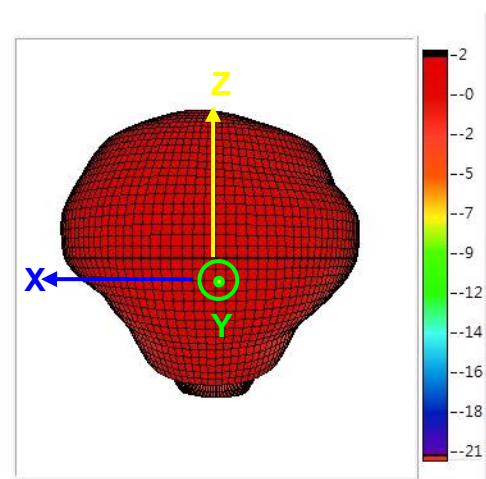
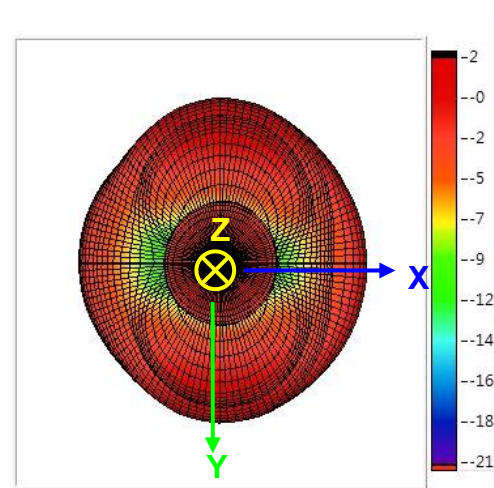
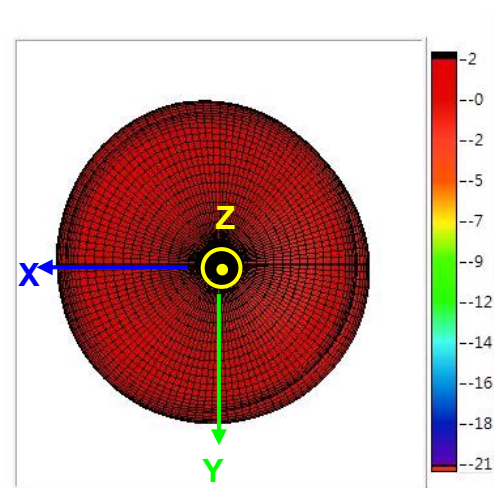
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## 7. Radiation Pattern (with 80 x 40 mm<sup>2</sup> Evaluation Board)

### 7-1. 2400~2500 MHz Band

#### 7-1-1. 3D Gain Pattern @ 2442 MHz (unit: dBi)



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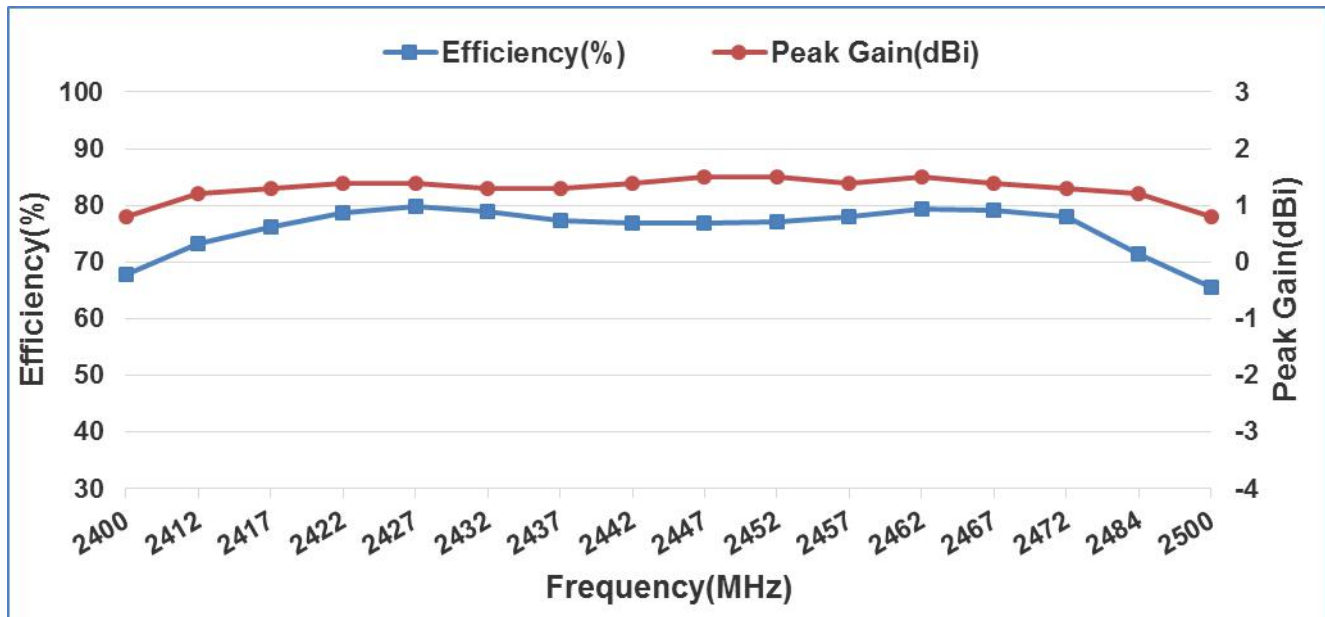
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7-1-2. 3D Efficiency Table

| Frequency(MHz) | 2400 | 2412 | 2417 | 2422 | 2427 | 2432 | 2437 | 2442 | 2447 | 2452 | 2457 | 2462 | 2467 | 2472 | 2484 | 2500 |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Efficiency(dB) | -1.7 | -1.4 | -1.2 | -1.0 | -1.0 | -1.0 | -1.1 | -1.1 | -1.2 | -1.1 | -1.1 | -1.0 | -1.0 | -1.1 | -1.5 | -1.8 |
| Efficiency(%)  | 67.9 | 73.2 | 76.1 | 78.7 | 79.9 | 78.8 | 77.4 | 76.8 | 76.8 | 77.2 | 78.1 | 79.3 | 79.2 | 78.1 | 71.5 | 65.5 |
| Peak Gain(dBi) | 0.8  | 1.2  | 1.3  | 1.4  | 1.4  | 1.3  | 1.3  | 1.4  | 1.5  | 1.5  | 1.4  | 1.5  | 1.4  | 1.3  | 1.2  | 0.8  |

7-1-3. 3D Efficiency vs. Frequency



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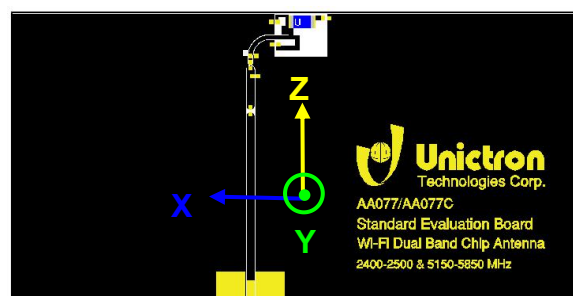
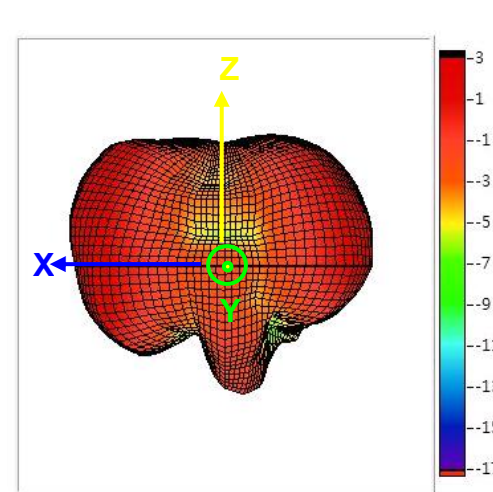
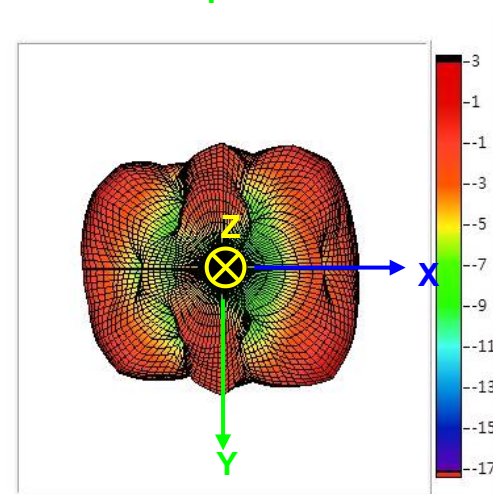
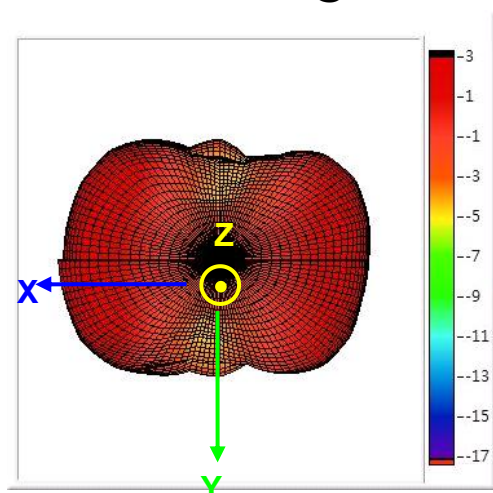
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## 7-2. 5150~5850 MHz Band

### 7-2-1. 3D Gain Pattern @ 5150 MHz (unit: dBi)



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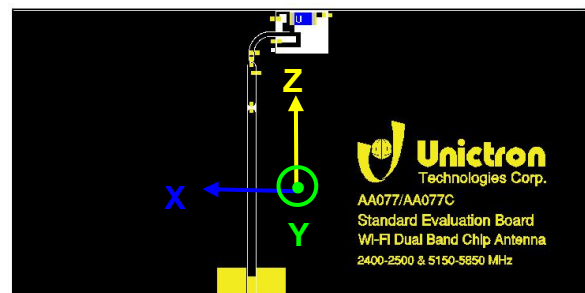
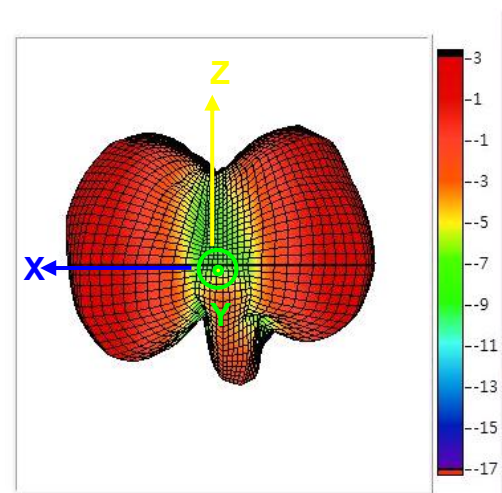
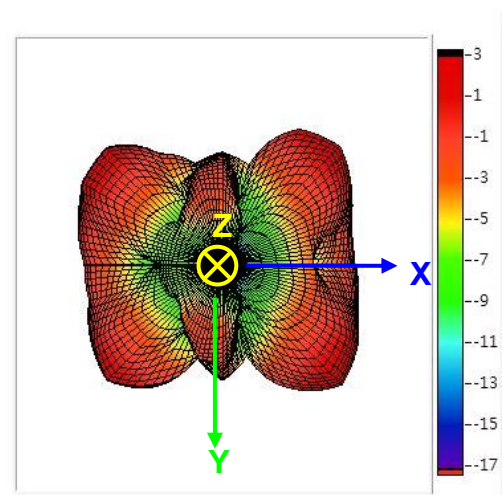
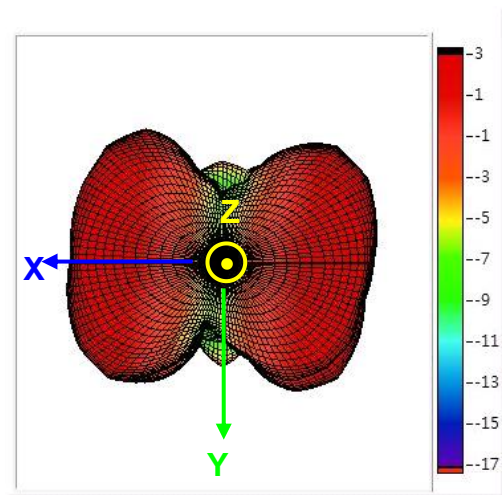
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## 7-2-2. 3D Gain Pattern @ 5550 MHz (unit: dBi)



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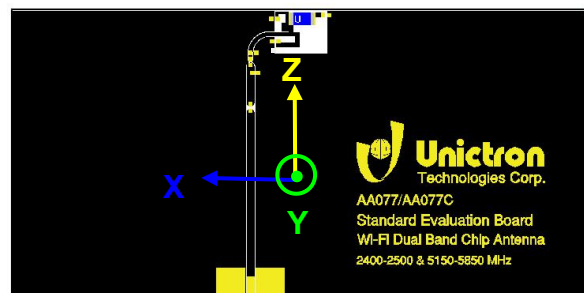
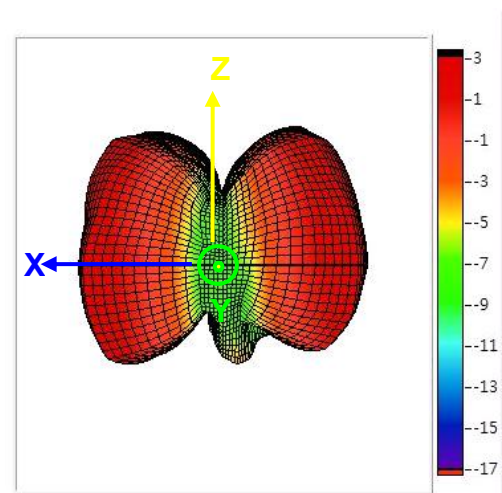
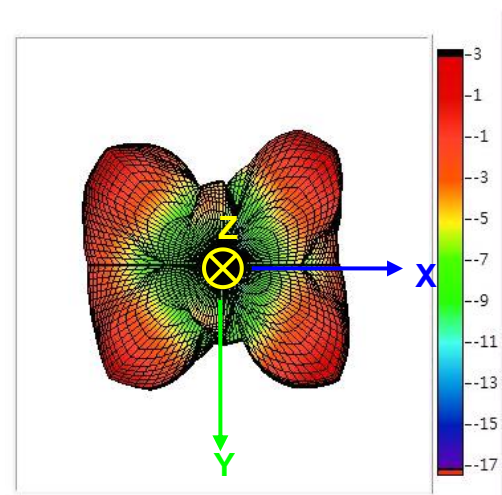
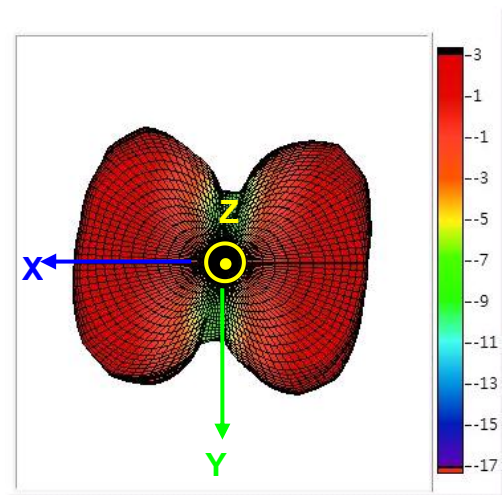
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### 7-2-3. 3D Gain Pattern @ 5850 MHz (unit: dBi)



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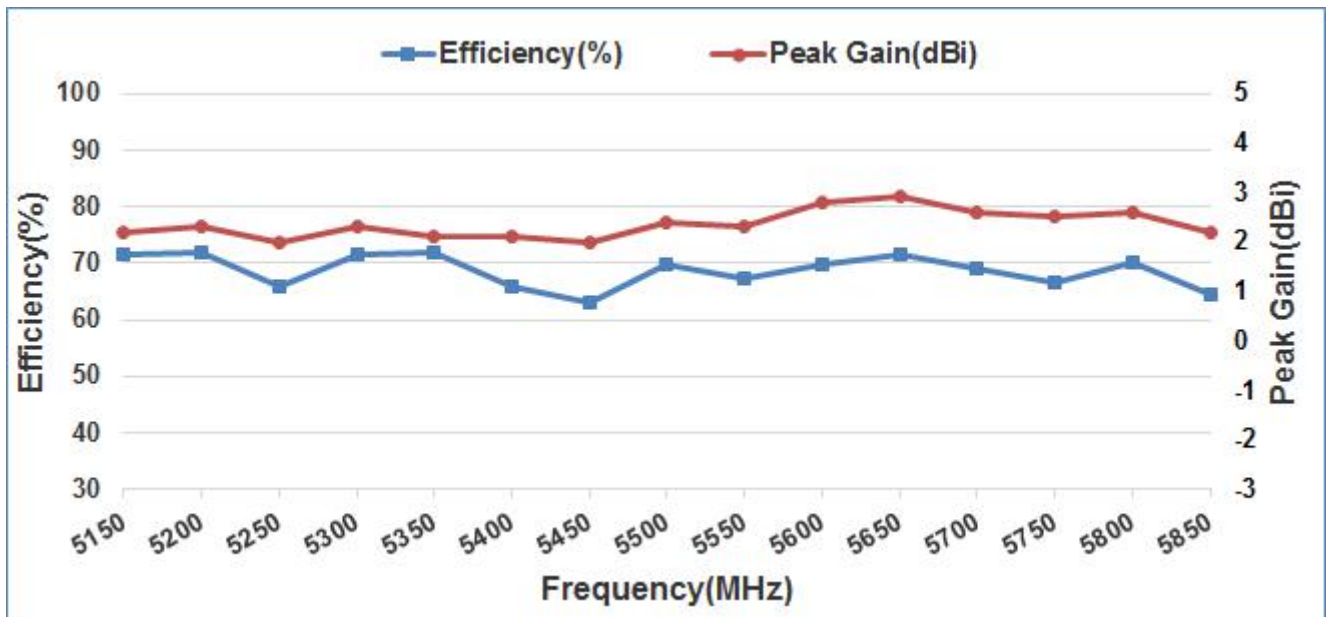
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#### 7-2-4. 3D Efficiency Table

| Frequency(MHz) | 5150 | 5200 | 5250 | 5300 | 5350 | 5400 | 5450 | 5500 | 5550 | 5600 | 5650 | 5700 | 5750 | 5800 | 5850 |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Efficiency(dB) | -1.5 | -1.4 | -1.8 | -1.5 | -1.4 | -1.8 | -2.0 | -1.6 | -1.7 | -1.6 | -1.4 | -1.6 | -1.8 | -1.5 | -1.9 |
| Efficiency(%)  | 71.5 | 71.9 | 65.7 | 71.6 | 71.9 | 65.8 | 63.2 | 69.9 | 67.3 | 69.6 | 71.7 | 68.9 | 66.6 | 70.1 | 64.6 |
| Peak Gain(dBi) | 2.2  | 2.3  | 2.0  | 2.3  | 2.1  | 2.1  | 2.0  | 2.4  | 2.3  | 2.8  | 3.1  | 2.6  | 2.5  | 2.6  | 2.2  |

#### 7-2-5. 3D Efficiency vs. Frequency



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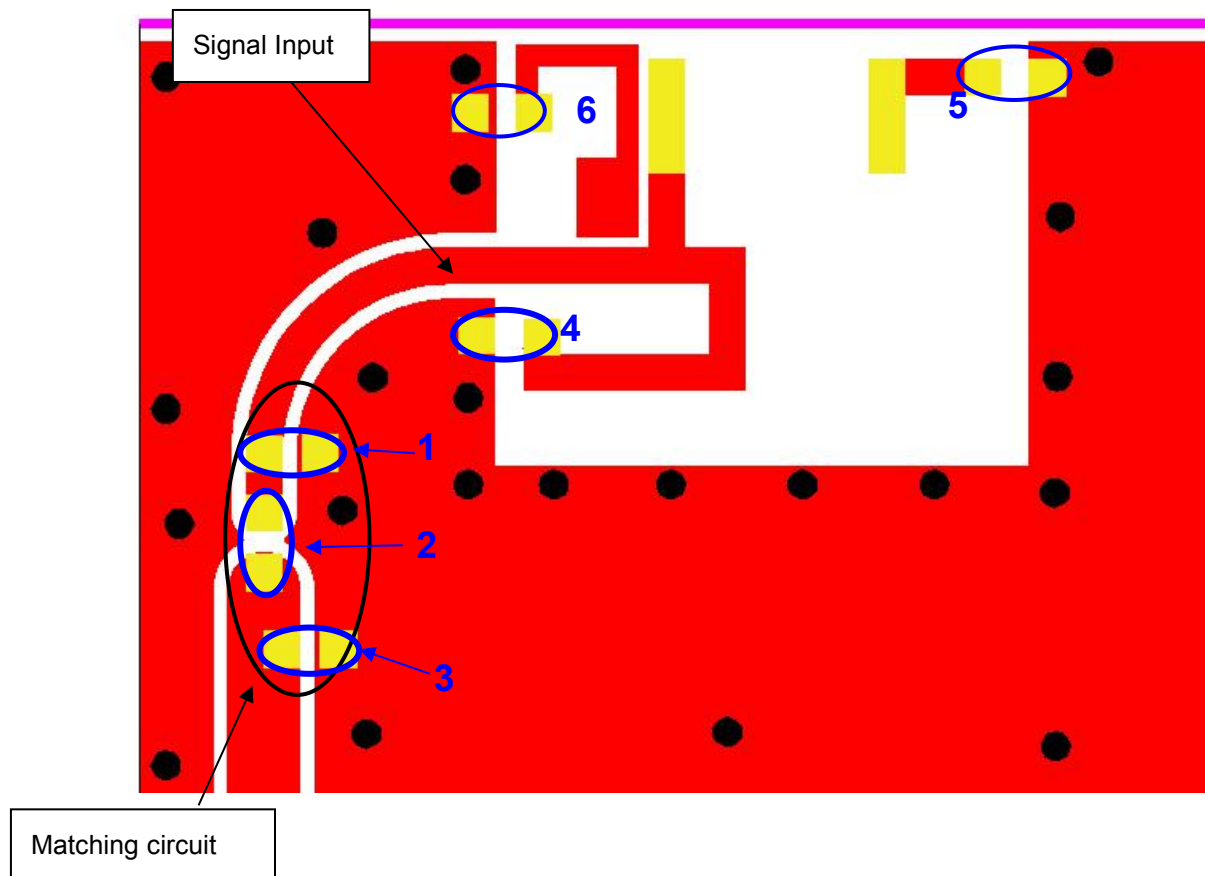
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## 8. Frequency tuning and Matching circuit

### 8-1. Chip antenna tuning scenario :



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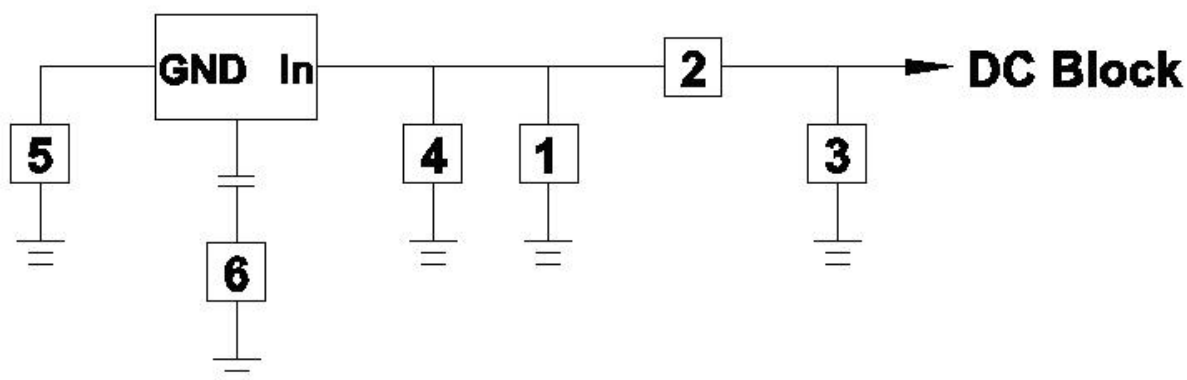
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## 8-2. Matching circuit :

With the following recommended values of matching and tuning components, the center frequencies will be about 2442 MHz for lower band & 5500 MHz for higher band at our standard 80x40 mm<sup>2</sup> evaluation board. However, these are typical reference values which may need to be changed when circuit boards or part vendors are different.



| System Matching Circuit Component |                |        |           |
|-----------------------------------|----------------|--------|-----------|
| Location                          | Description    | Vendor | Tolerance |
| 1                                 | N/A            | -      | -         |
| 2                                 | 1 nH, (0402)   | DARFON | ±0.3 nH   |
| 3                                 | 0.2 pF, (0402) | DARFON | ±0.05 pF  |
| 4                                 | 22 pF, (0402)  | DARFON | ±5%       |
| 5<br>Fine tuning<br>element       | 1 pF, (0402)   | DARFON | ±0.05 pF  |
| 6<br>Fine tuning<br>element       | 0.2 pF, (0402) | DARFON | ±0.05 pF  |



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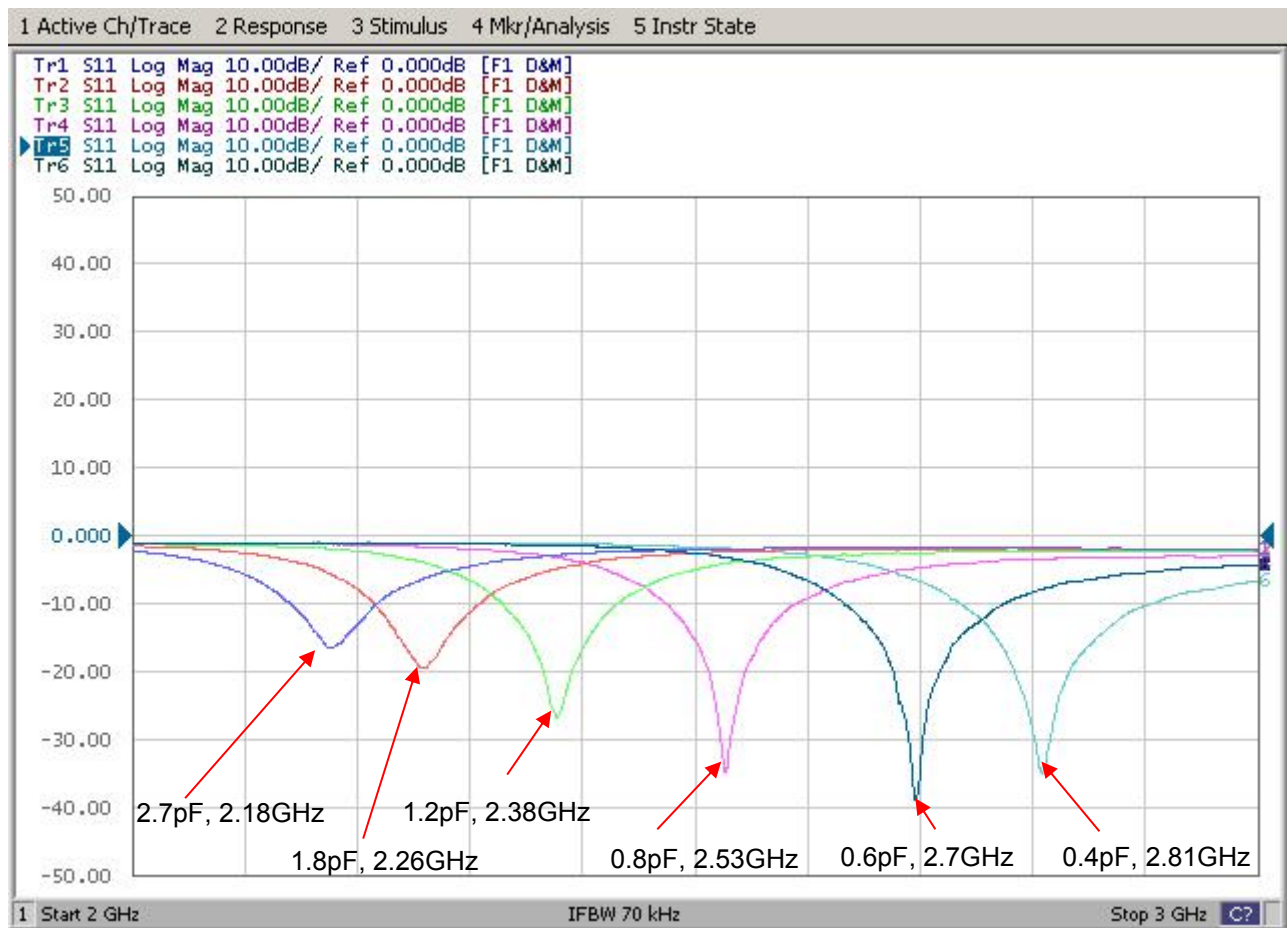
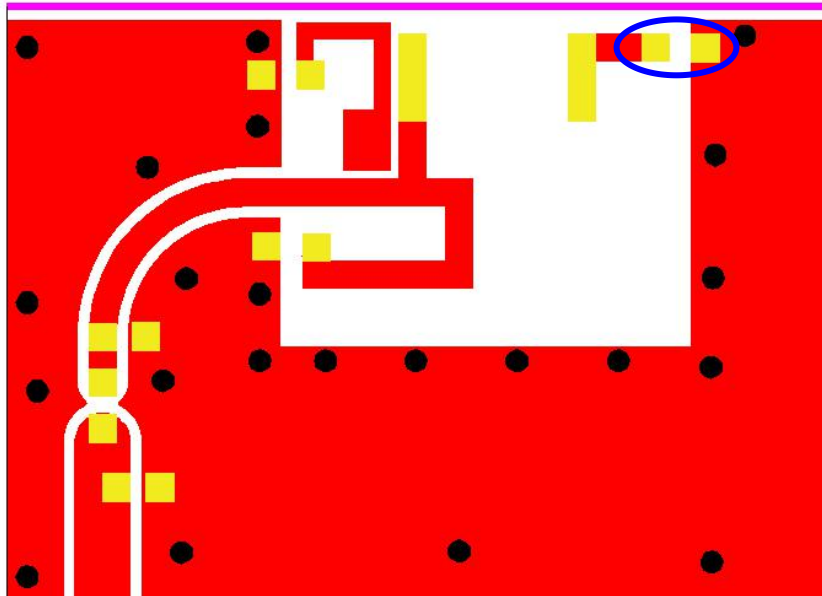
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### 8-3. Reference for frequency tuning element (2400~2500 MHz Band)



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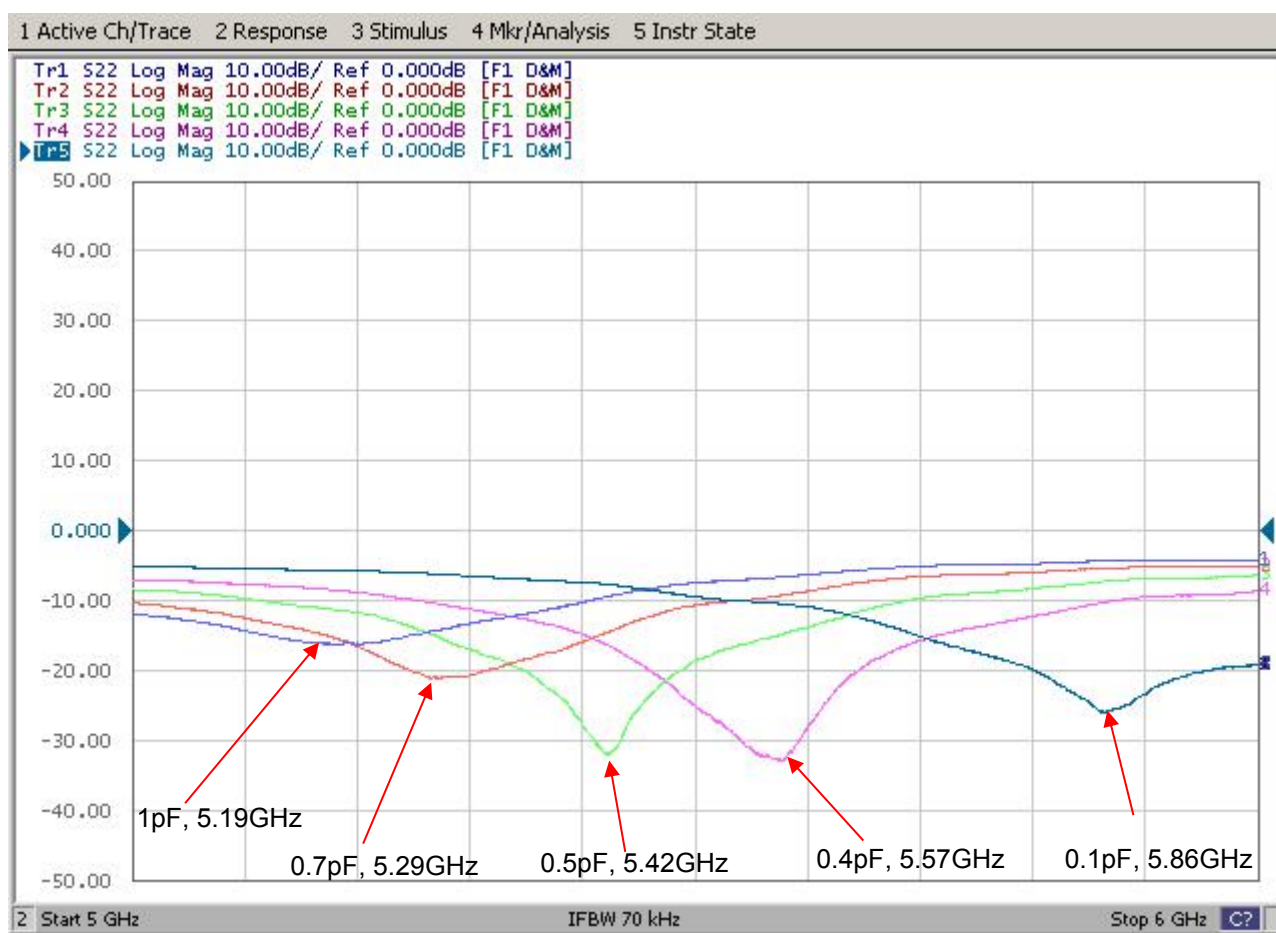
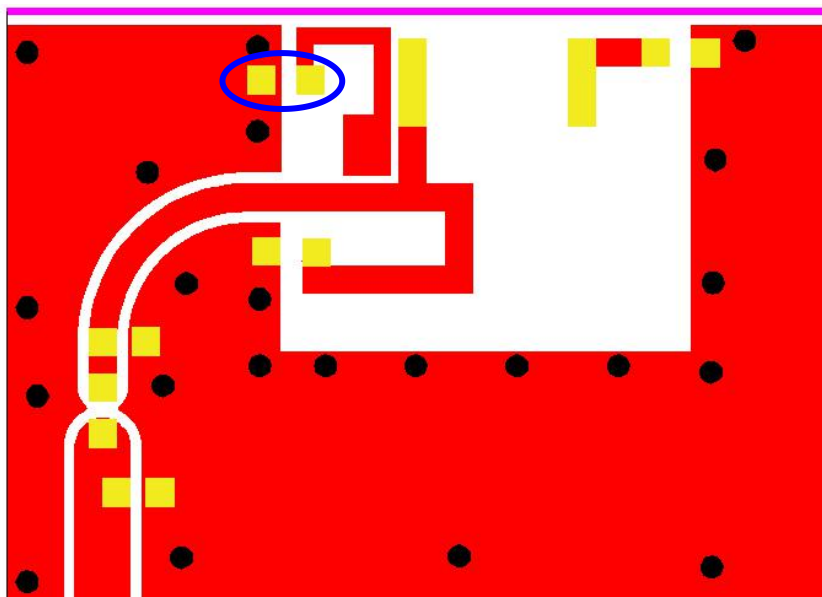
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#### 8-4. Reference for frequency tuning element (5150~5850 MHz Band)



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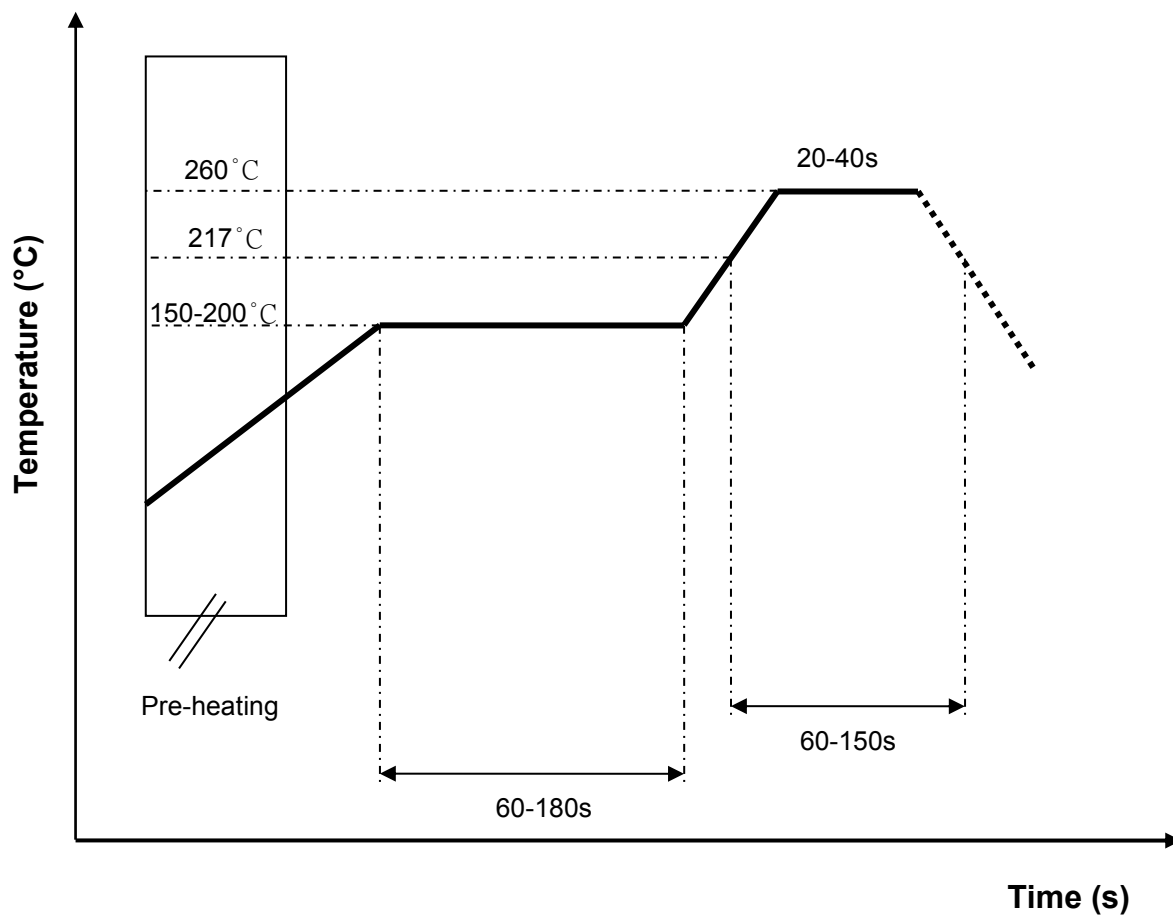
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## 9. Soldering Conditions

### 9-1. Typical Soldering Profile for Lead-free Process



## 10. Reminders for users of Unictron's AA077 ceramic chip antennas

- 10-1. This chip antenna is made of ceramic materials which are relatively more rigid and brittle compared to printed circuit board materials. Bending of circuit board at the locations where chip antenna is mounted may cause the cracking of solder joints or antenna itself.
- 10-2. Punching/cutting of the break-off tab of PCB panel may cause severe bending of the circuit board which may result in cracking of solder joints or chip antenna itself. Therefore break-off tab shall be located away from the installation site of chip antenna.
- 10-3. Be cautious when ultrasonic welding process needs to be used near the locations where chip antennas are installed. Strong ultrasonic vibration may cause the cracking of chip antenna solder joints.



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TITLE : 3.2 x 1.6 x 0.5 (mm) WiFi Dual Band Chip Antenna (AA077) Engineering Specification

DOCUMENT NO.

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H

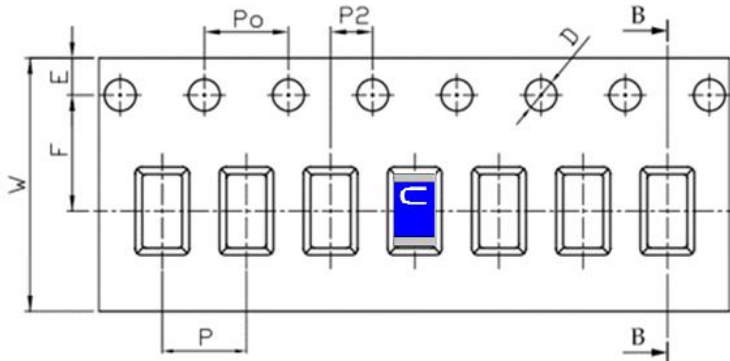
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## 11. Packing

(1) Quantity/Reel: 5000 pcs/Reel

(2) Plastic tape:

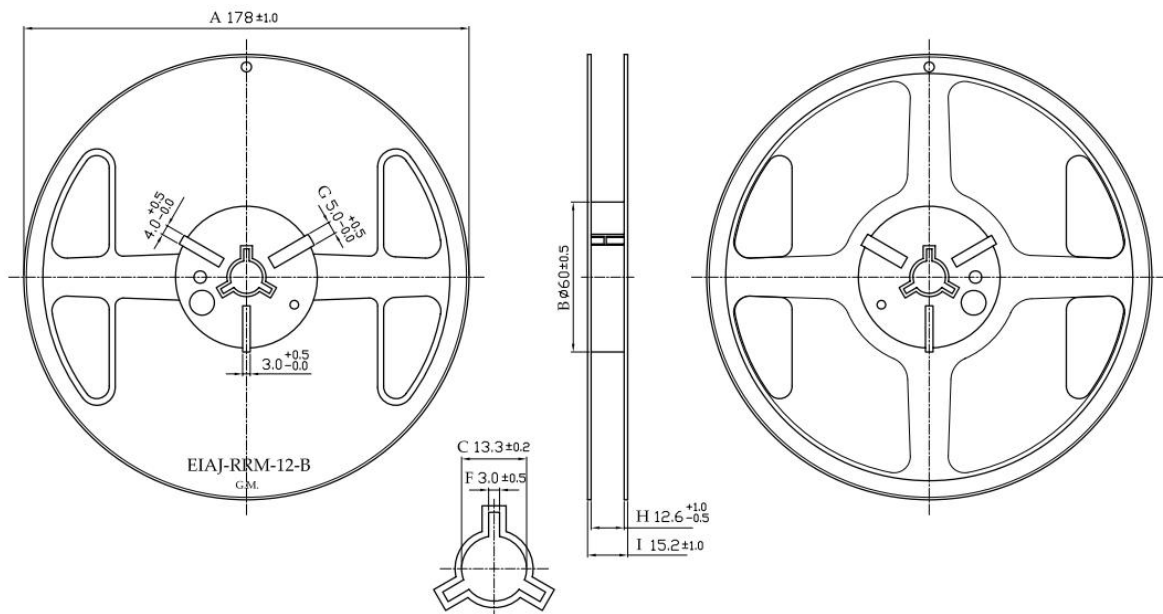
a. Tape Drawing



b. Tape Dimensions (unit: mm)

| Feature | Specifications | Tolerances     |
|---------|----------------|----------------|
| W       | 12.00          | ±0.30          |
| P       | 4.00           | ±0.10          |
| E       | 1.75           | ±0.10          |
| F       | 5.50           | ±0.10          |
| P2      | 2.00           | ±0.10          |
| D       | 1.50           | +0.10<br>-0.00 |
| P0      | 4.00           | ±0.10          |
| 10P0    | 40.00          | ±0.20          |

c. Reel Drawing



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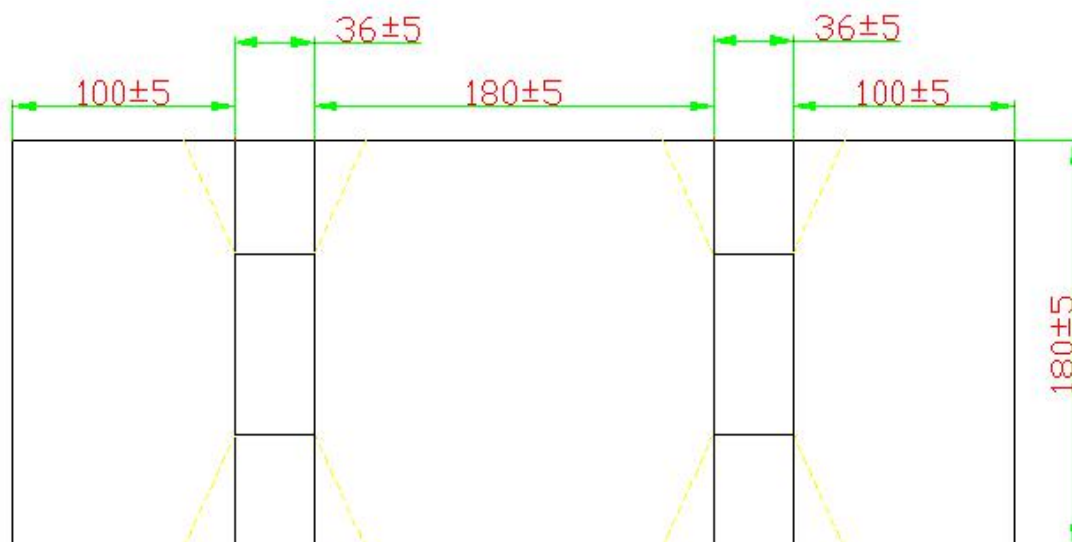
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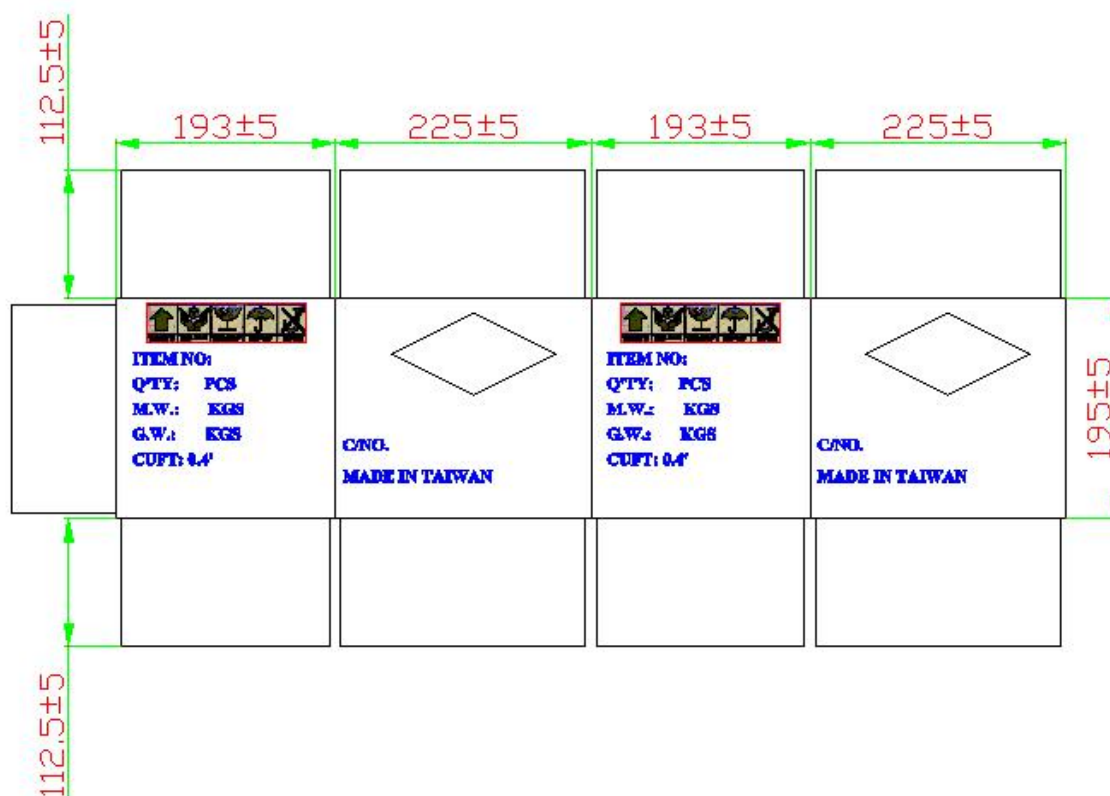
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d. Drawing of small size carton in developed view



e. Drawing of middle size carton in developed view



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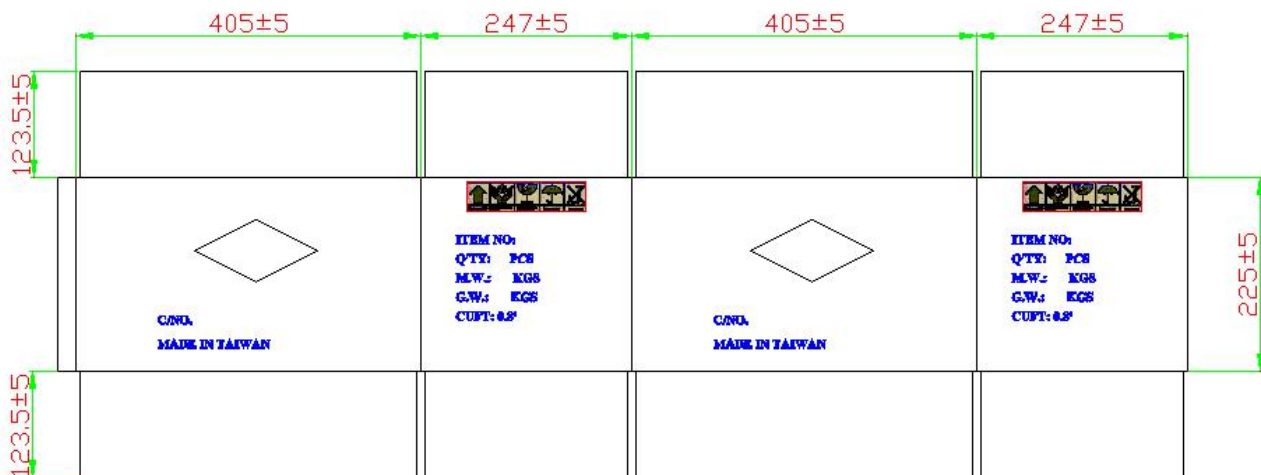
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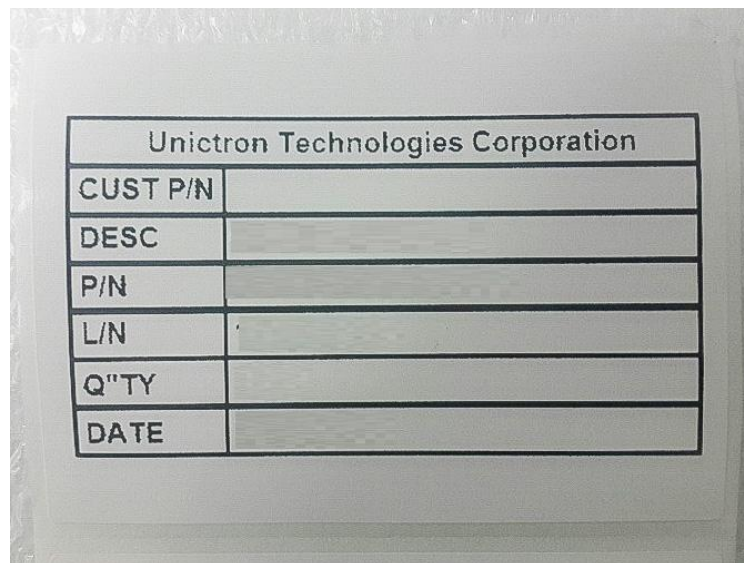
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e. Drawing of large size carton in developed view



f. Picture of label



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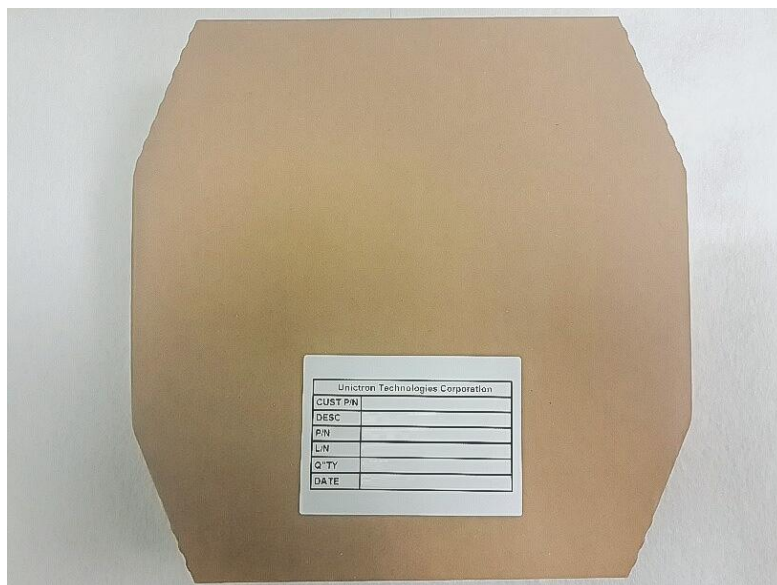
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g. Reel with label



h. Small size carton with label



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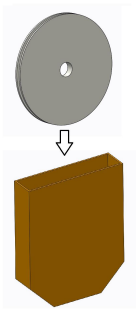
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i. Middle size carton with label

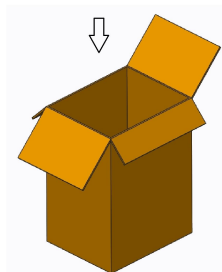


11-2. Process of packing

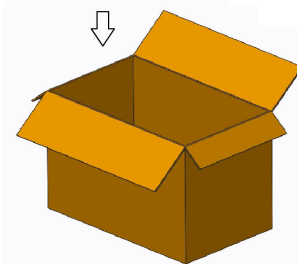


1 reel includes 5,000pcs(max.) chip antennas

1 small size carton includes 2pcs(max.) reels



1 middle size carton includes 5pcs(max.) small cartons



1 large size carton includes 2pcs(max.) middle cartons



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## 12. Operating & Storage Conditions

### 12-1. Operating

- (1) Maximum Input Power: 2 W
- (2) Operating Temperature: -40°C to 85°C

### 12-2. Storage

- (1) Storage Temperature: -5°C to 40°C
- (2) Relative Humidity: 20% to 70%
- (3) Shelf Life: 1 year

## 13. Notice

### (1) Installation Guide:

Please refer to Unictron's application note "General guidelines for the installation of Unictron's chip antennas" for further information.

- (2) All specifications are subject to change without notice.



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