

# 3.2 x 1.6 x 0.5 (mm) GNSS Ceramic Chip Antenna (AA088)

## Engineering Specification

### 1. Product Number

H 2 U 1 4 W 1 H 1 A 0 4 0 0



### 2. Features

- \*Stable and reliable in performances
- \*Low temperature coefficient of frequency
- \*Low profile, compact size
- \*RoHS 2.0 compliance
- \*SMT processes compatible
- \*AEC-Q200 compliant

### 3. Applications

- \*GNSS (Global Navigation Satellite System)
- \*Hand-held devices when GPS & BDS & GLONASS & Galileo functions are needed, e.g., PDA, Smart phone, PND.

### 4. Description

Unictron's AA088 ceramic chip antenna is designed for GNSS band applications, covering frequencies 1560~1606 MHz. Fabricated with proprietary design and processes, AA088 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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Prepared by : Jane

Designed by : Sam

Checked by : Mike

Approved by : Herbert

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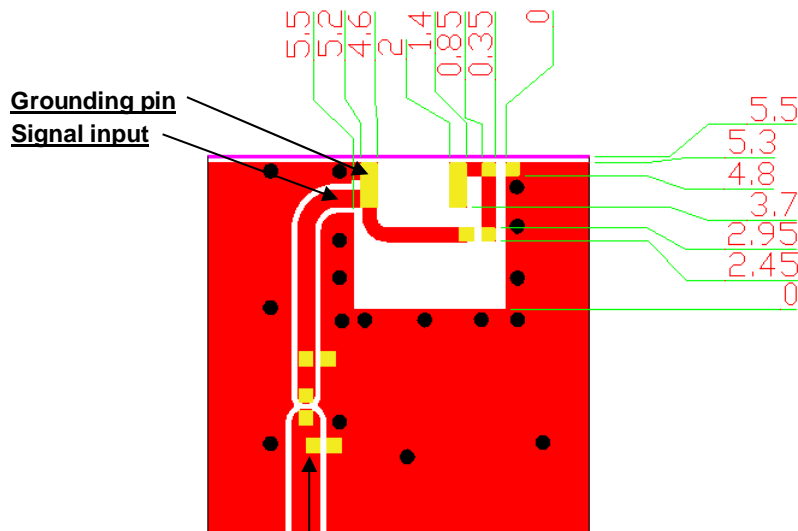
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## 5. Layout Guide & Electrical Specifications

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

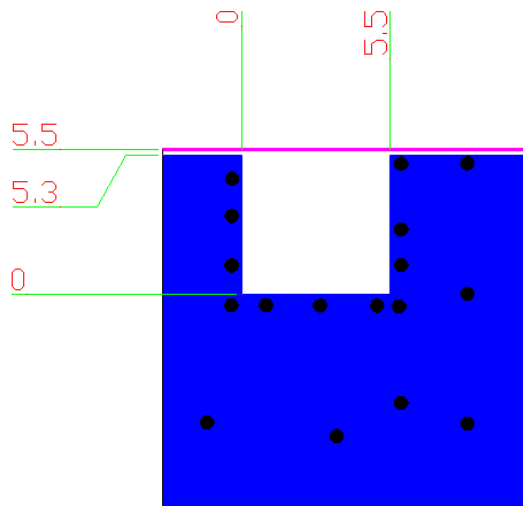
Solder Land Pattern:

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>)

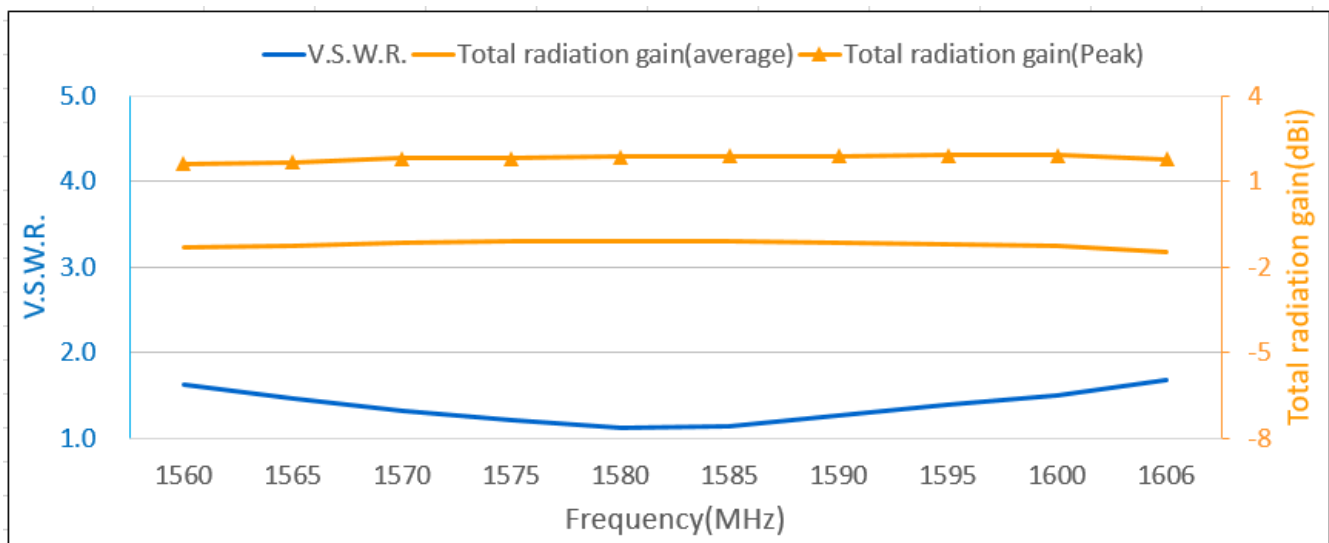
### 5-2-1. Electrical Table

Characteristics		Specifications	Unit
Outline Dimensions		3.2 x 1.6 x 0.5	mm
Ground Plane Dimensions		80 x 40	mm
Working Frequency		1560~1606	MHz
VSWR (@ center frequency)*		2 Max. (typical)	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@ 1575.42MHz)	1.8 (typical**)	dBi
Efficiency		77 (typical**)	%

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

\*\*A typical value is for reference only, not guaranteed.

### 5-2-2. Frequency vs. V.S.W.R. and Total Radiation Gain



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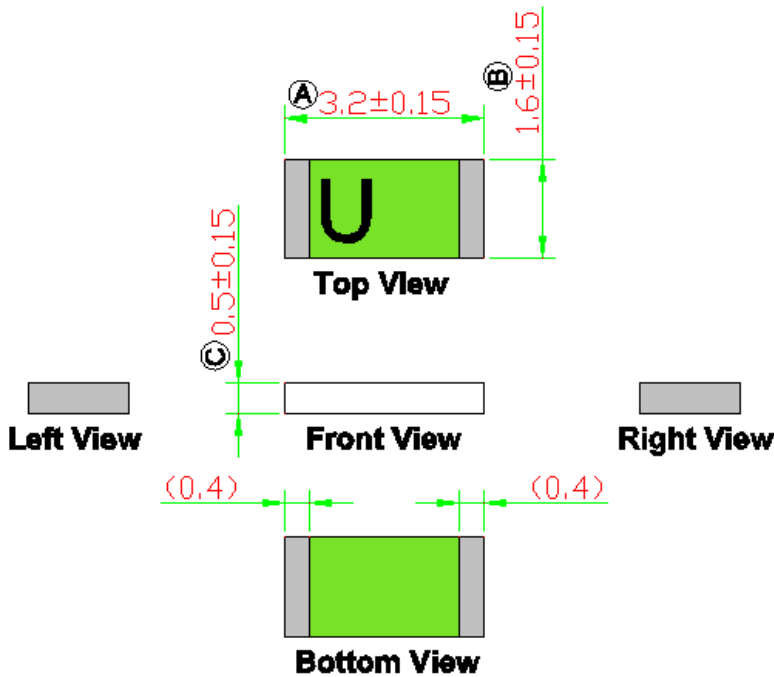
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## 6. Antenna Dimensions & Test Board (unit: mm)

### 6-1. Antenna Dimensions



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

### PIN Definitions



PIN	1	2
Soldering PAD	Signal	Tuning / Ground



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6-2. Evaluation Board with Antenna



**SMA female**  
**1/4"-36UNS-2A**

Unit: mm



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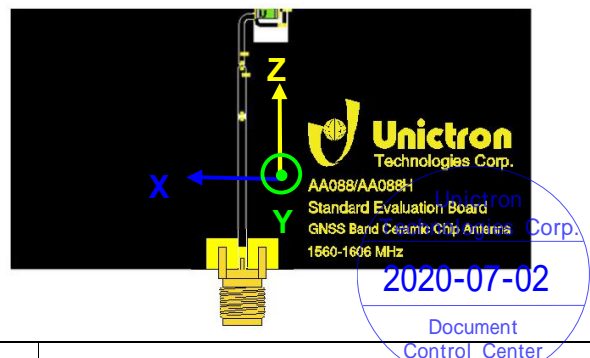
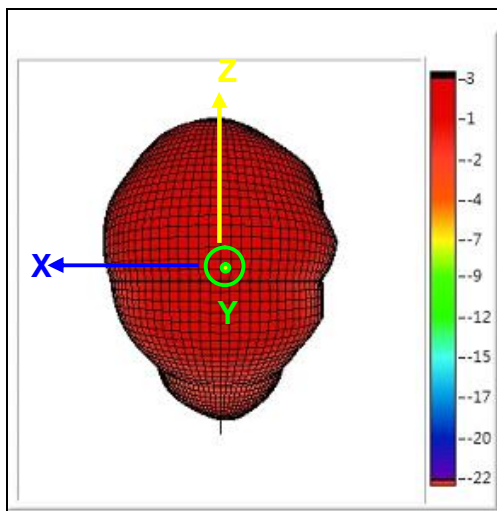
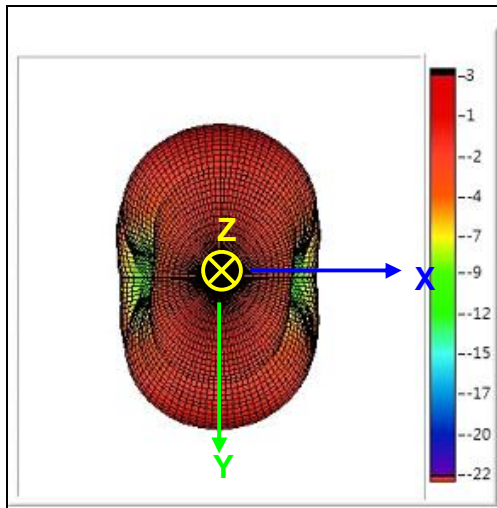
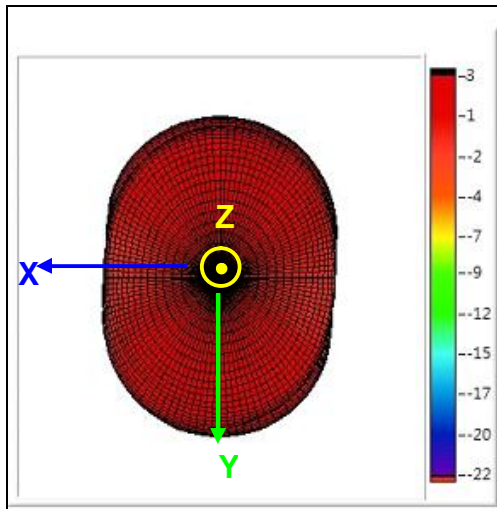
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## 7. Radiation Pattern (80 x 40 mm<sup>2</sup> ground plane)

### 7-1. 3D Gain Pattern @ 1561 MHz (unit: dBi)



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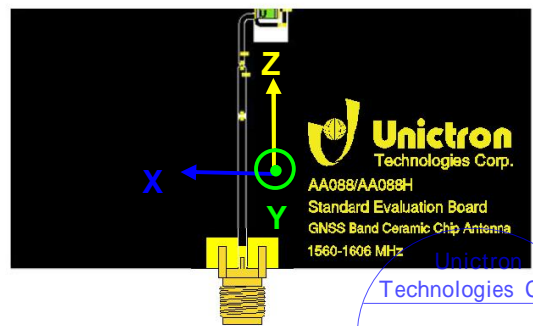
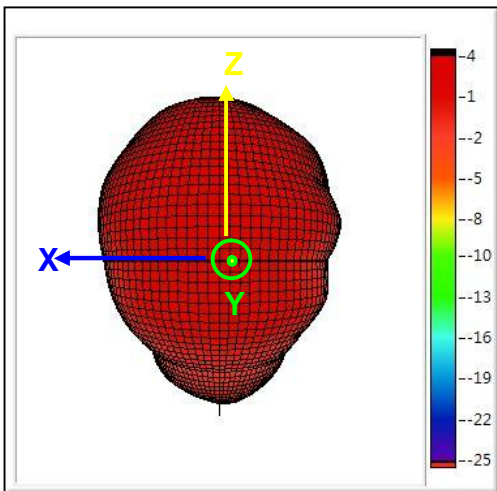
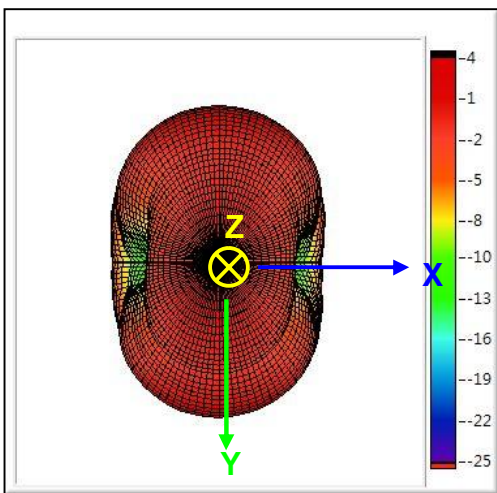
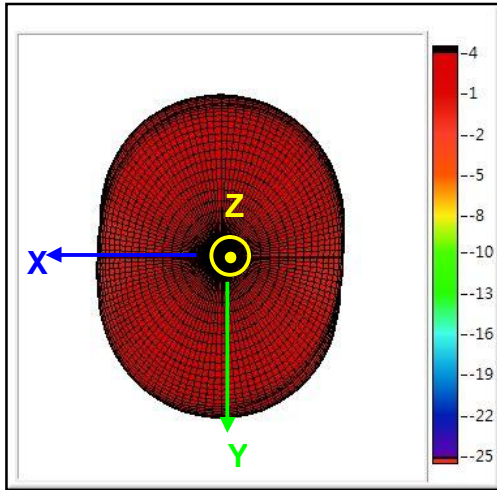
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7-2. 3D Gain Pattern @ 1575.42 MHz (unit: dBi)



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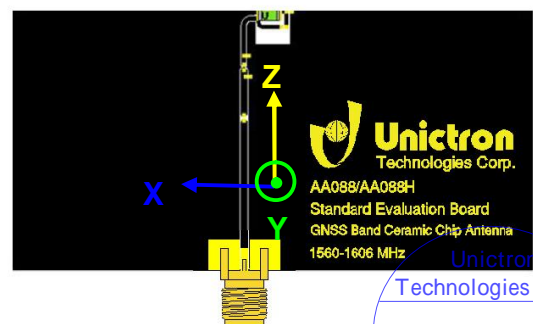
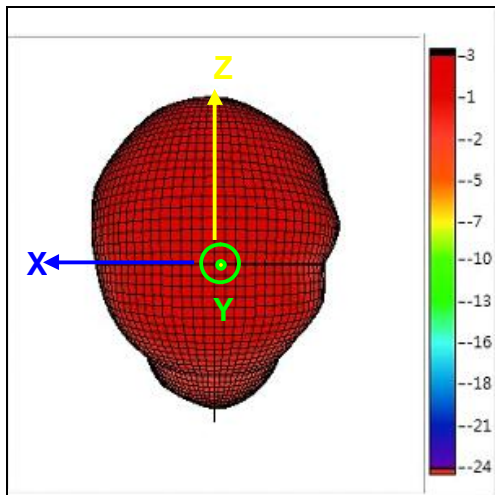
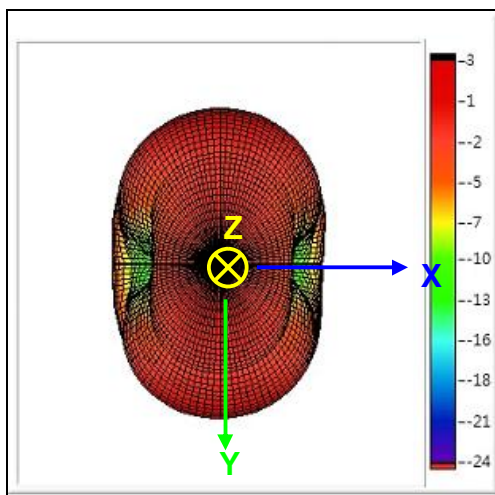
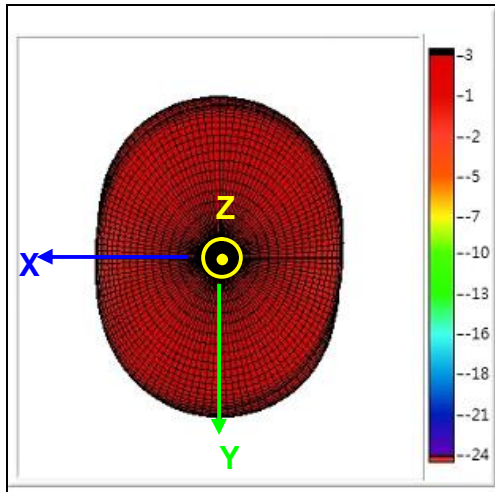
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7-3. 3D Gain Pattern @ 1590 MHz (unit: dBi)



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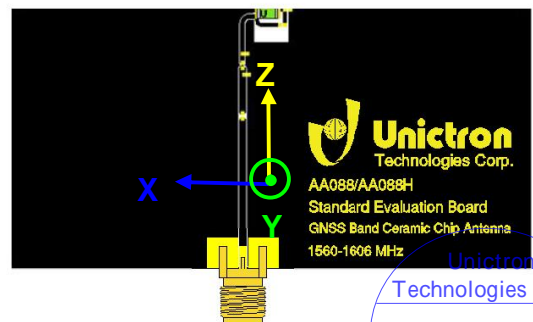
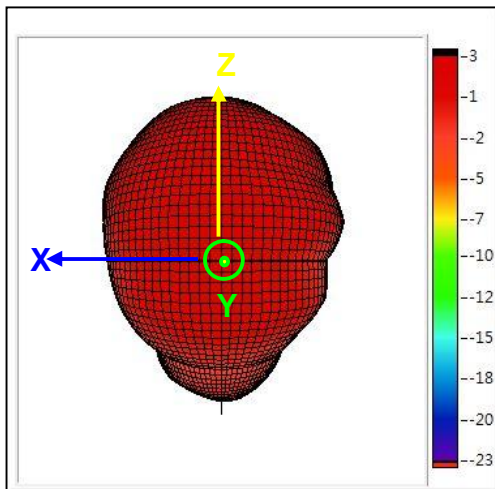
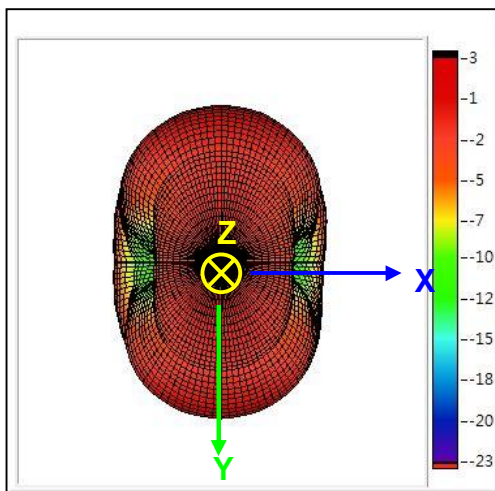
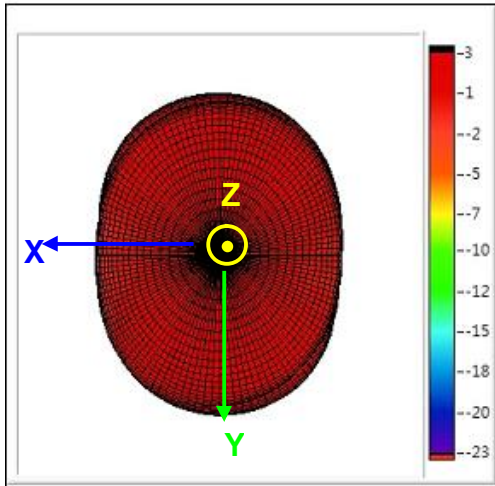
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7-4. 3D Gain Pattern @ 1602 MHz (unit: dBi)



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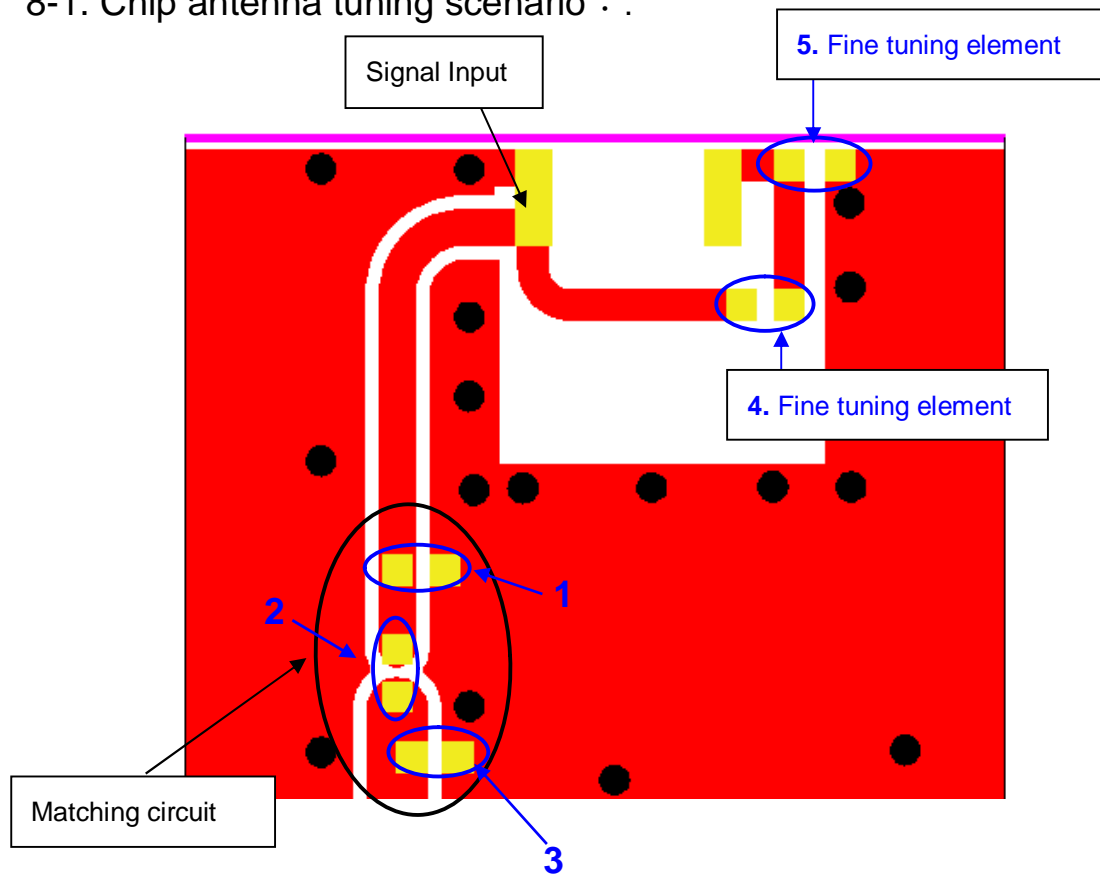
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## 8. Frequency tuning and Matching circuit

8-1. Chip antenna tuning scenario :



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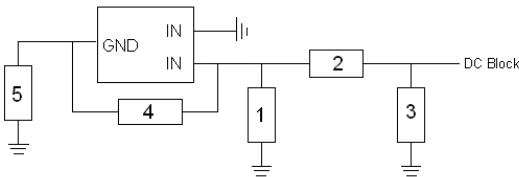
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## 8-2. Matching circuit :

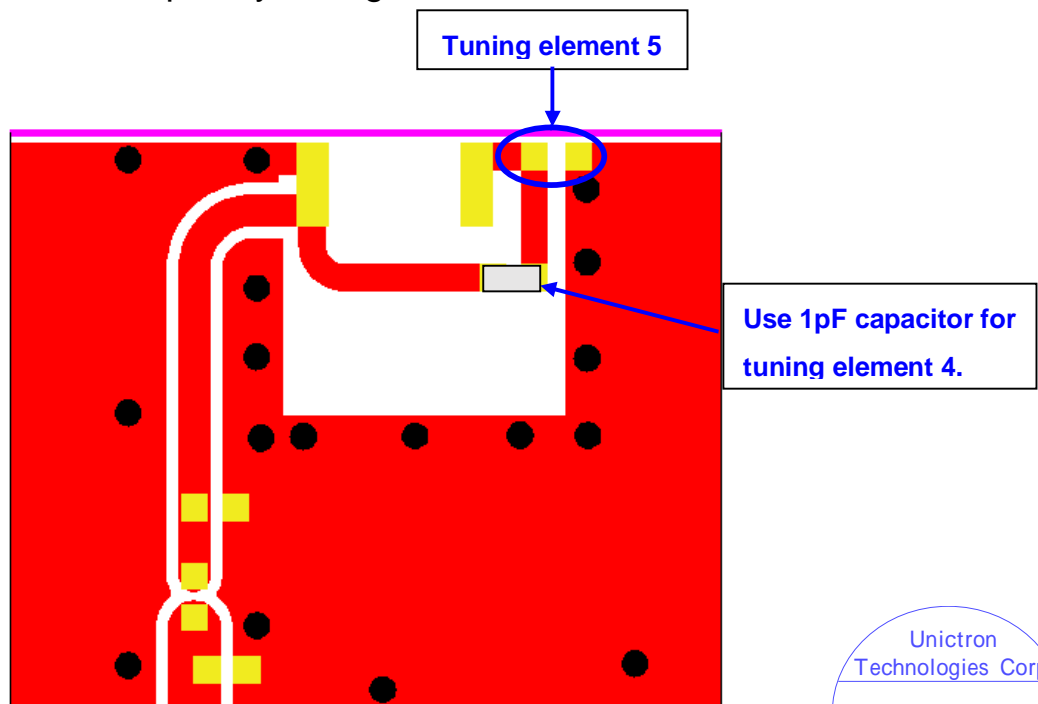
With the following recommended values of matching and tuning components, the Center frequency will be about 1575.42 MHz at our standard 80 x 40 mm<sup>2</sup> evaluation board. However, these are typical reference values which may need to be changed when circuit boards or part vendors are different.



System Matching Circuit Component			
Location	Description	Vendor	Tolerance
1	1.5 pF, (0402)	Murata	±0.05pF
2	0 Ω		
3	3.3 pF, (0402)	Murata	±0.05pF
Fine tuning element 4	1 pF, (0402)	Murata	±0.05pF
Fine tuning element 5	2.7 pF, (0402)	Murata	±0.05pF

\*Typical reference values which may need to be changed when circuit boards or part vendors are different.

## 8-3. Reference for frequency tuning element 5



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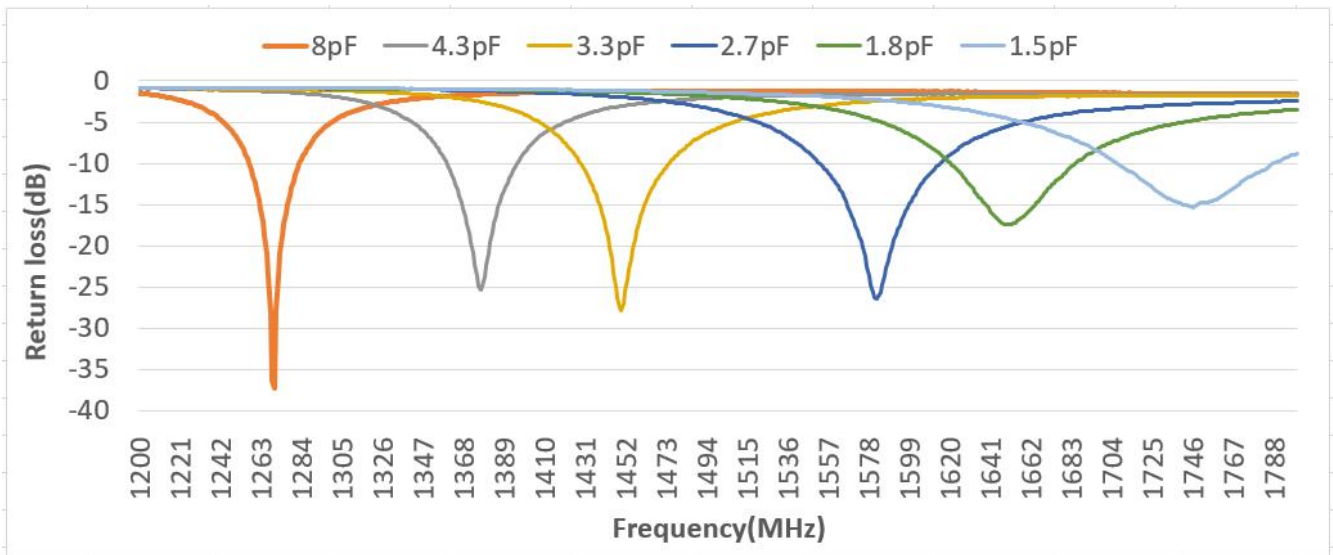
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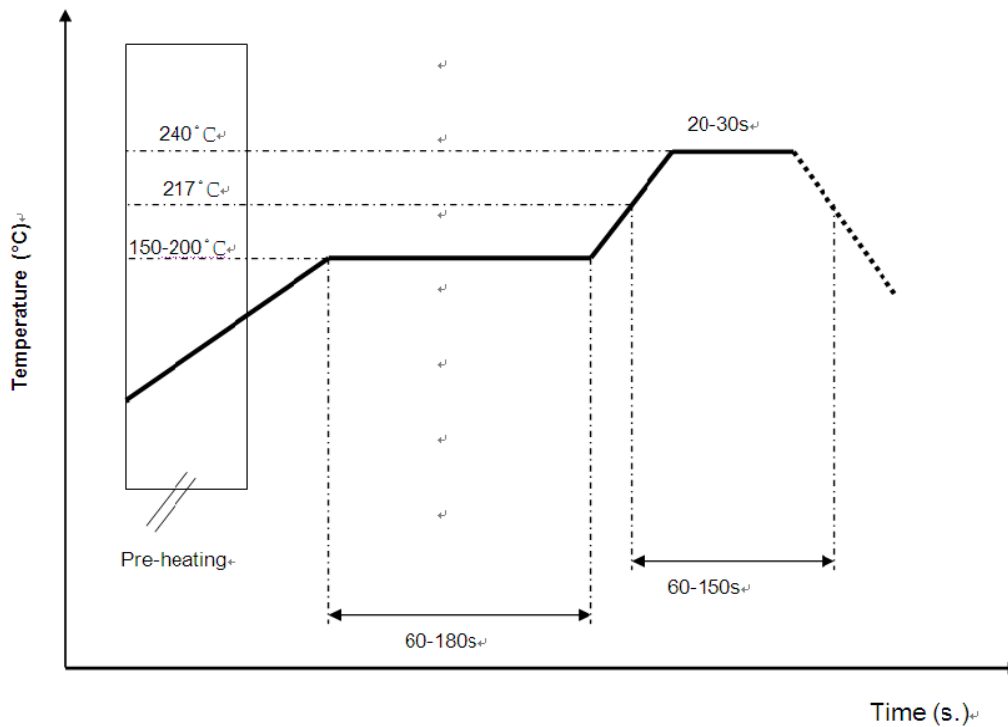
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Frequencies vs. capacitance of tuning element 5



## 9. Soldering Conditions

### a. Typical Soldering Profile for Lead-free Process



\*Recommended solder paste alloy: SAC305 (Sn96.5 /Ag3 /Cu0.5) Lead Free solder paste

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

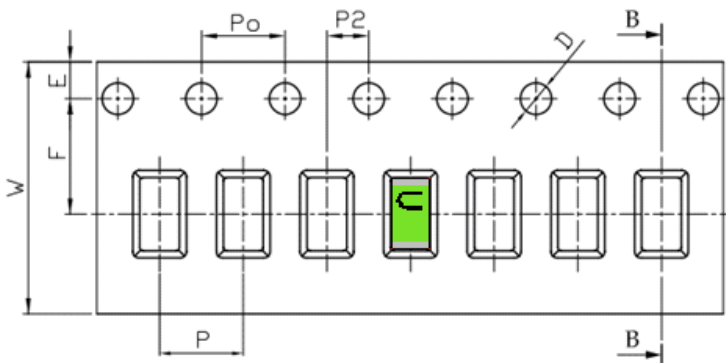
- Since Unictron's chip antennas are made of ceramic materials which show different rigidity than circuit board materials, bending of circuit board at the locations where chip antennas are mounted may cause the cracking of solder joints or antenna itself.
- Any connecting strip which will be cut off at PCB assembly process shall be located away from the installation site of chip antenna. Punching of the connecting strip may cause severe bending of the circuit board and cracking of solder joint or chip antenna itself may occur.
- 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.

## 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 -0.00
P0	4.00	±0.10
10P0	40.00	±0.20

c. Reel Drawing



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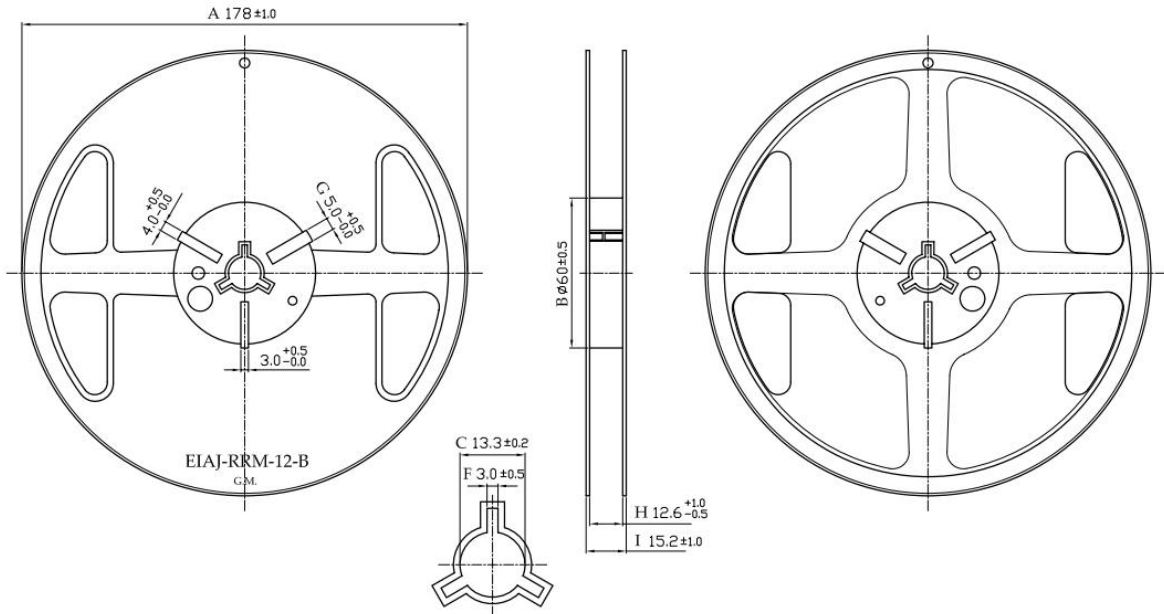
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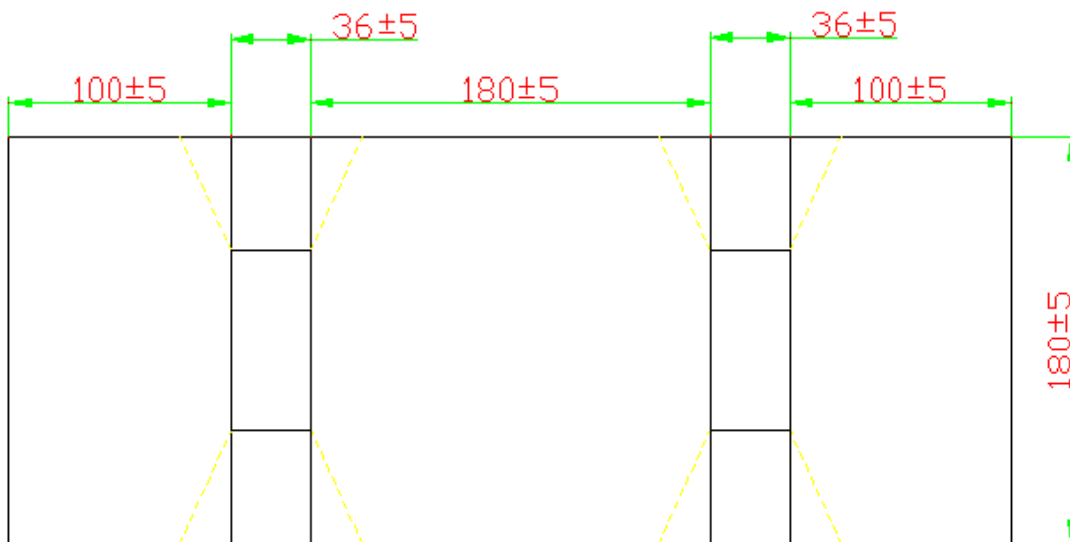
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d. Drawing of small size carton in developed view



e. Drawing of middle size carton in developed view

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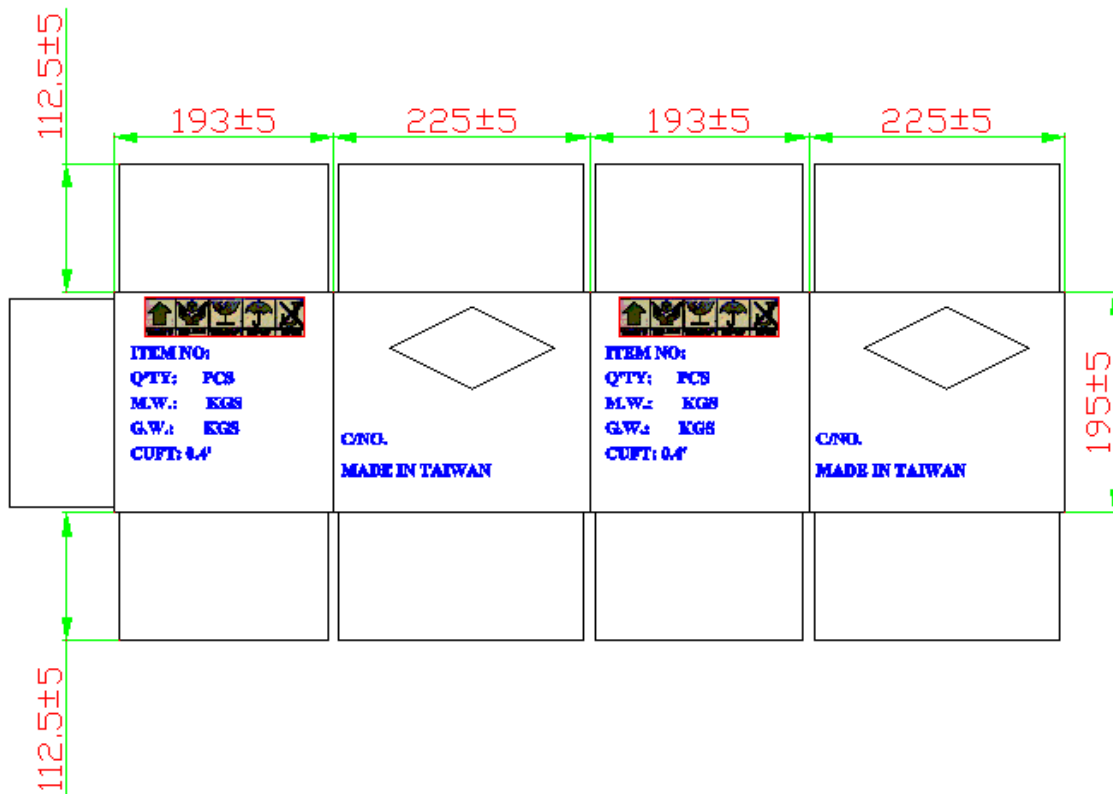
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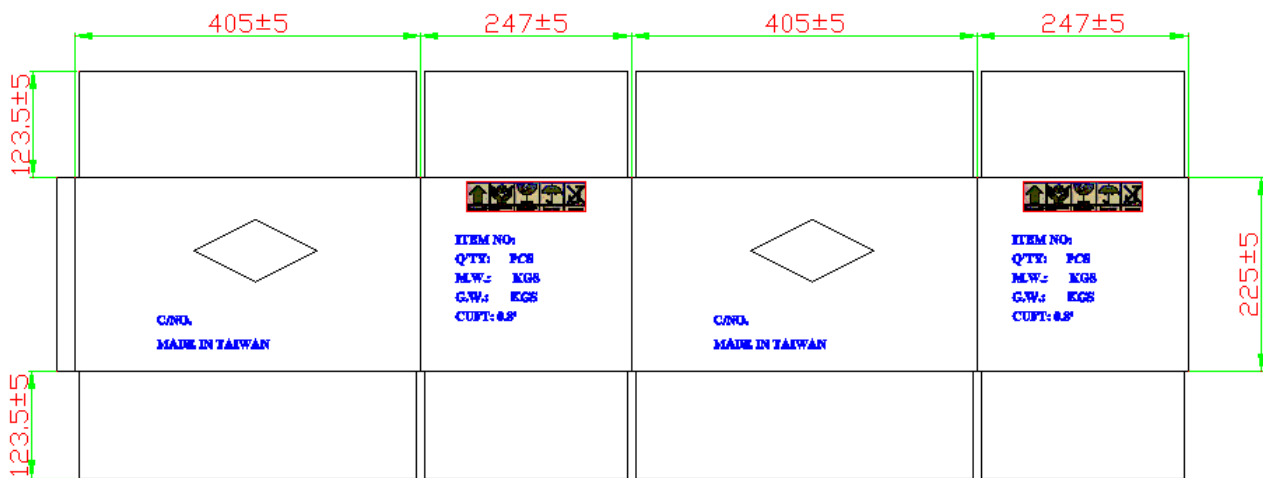
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f. Drawing of large size carton in developed view



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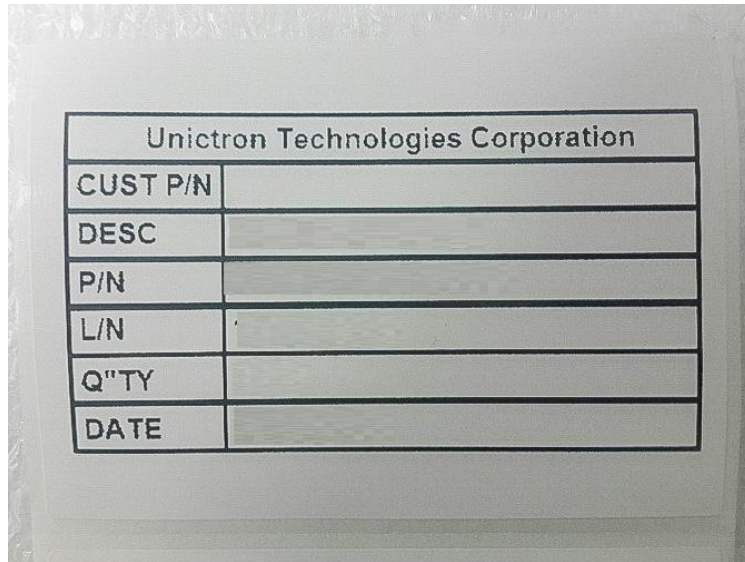
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g. Picture of label



h. Reel with label



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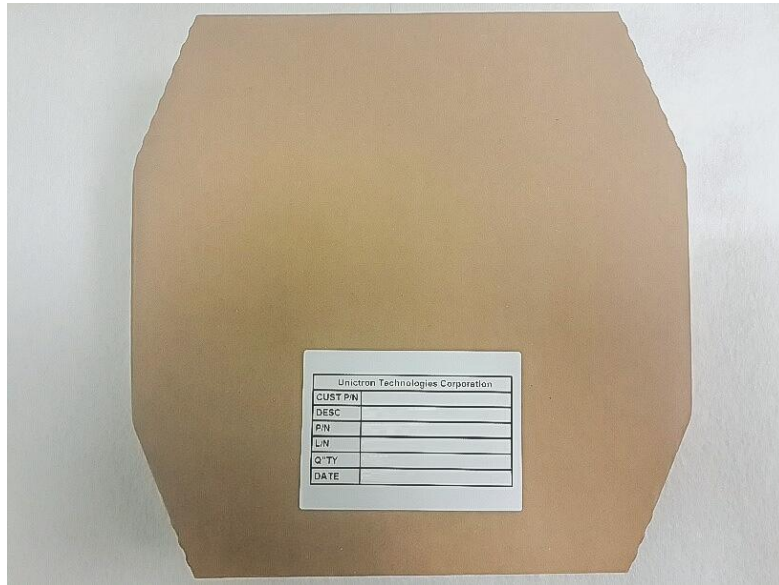
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i. Small size carton with label



i. Middle size carton with label



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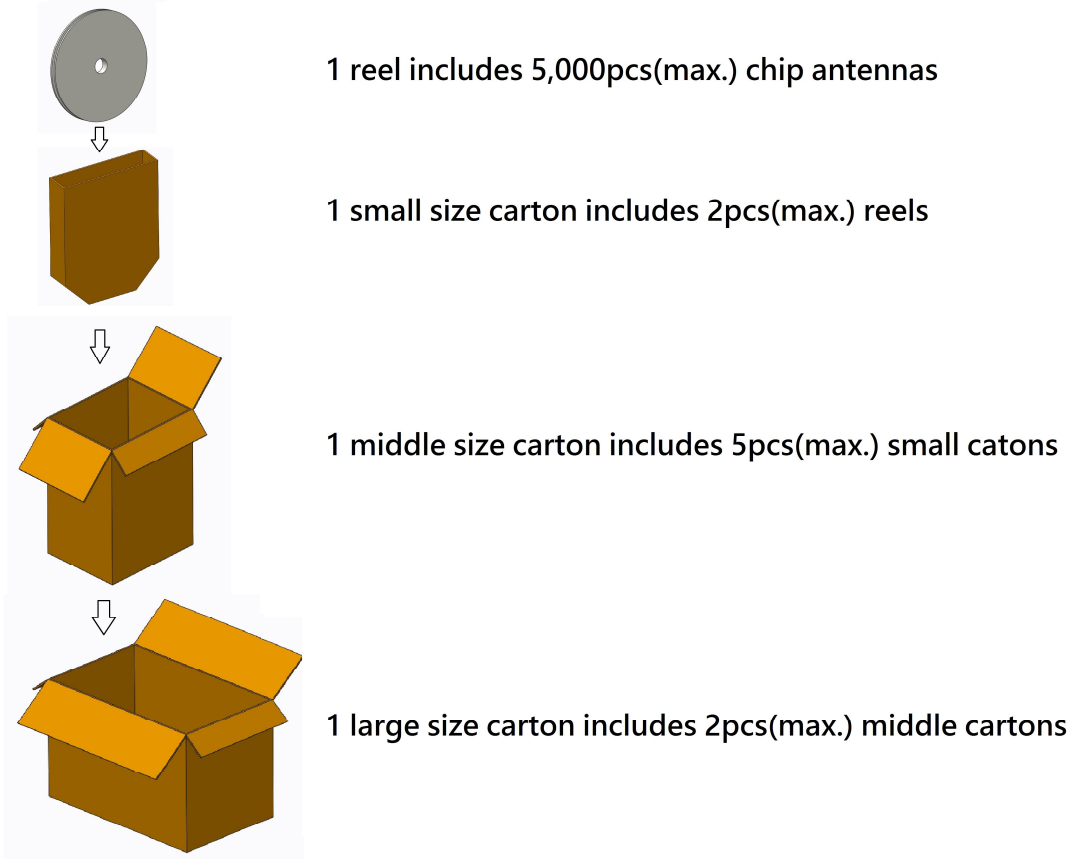
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## 11-2. Process of packing



## 12. Operating & Storage Conditions

### 12-1. Operating

- (1) Maximum Input Power: 2 W
- (2) Operating Temperature: -40°C to 85°C
- (3) Relative Humidity: 10% to 70%

### 12-2. Storage (sealed)

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

### 12-3. Storage (unsealed)

Meet the criteria of J-STD-033 MSL2a



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**TITLE : 3.2 x 1.6 x 0.5 (mm) GNSS Ceramic Chip Antenna (AA088) Engineering Specification**

**DOCUMENT NO.**

**H2U14W1H1A0400**

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12-4. Storage (After mounted on customer's PCB with SMT process)

- (1) Storage Temperature: -40°C to 85°C
- (2) Relative Humidity: 10% to 70%

**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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Prepared by : **Jane**      Designed by : **Sam**      Checked by : **Mike**      Approved by : **Herbert**

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## 14. Reliability Test

Test Items	Test Conditions	Result
1. Solderability	*Solder Temperature : 250 ± 5°C *Test time: 2 +/- 0.5 sec *With solder paste	Pass
2. Temperature cycling	-40°C/ 30min~90°C /30min Total <u>100</u> cycles * Specimens are kept at standard measurement environment for more than 24 hours before testing.	Pass
3. Damp heat	*Humidity:90~95% *Temperature: 85°C *Test time : 240 hours * Specimens are kept at standard measurement environment for more than 24 hours before testing..	Pass
4. Adhesive strength of terminal electrodes	* Resistance to bending of printed-circuit test board(110x40x1.6mm) * Applied force: 1Kgf ; * Duration : 10±1sec	Pass
5. High temperature exposure	*Temperature : 90°C *Test duration : 240 hours * Specimens are kept at standard measurement environment for more than 24 hours before testing.	Pass
6. Low temperature exposure	*Temperature : -40°C *Test duration : 240 hours * Specimens are kept at standard measurement environment for more than 24 hours before testing.	Pass



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