

3.2 x 1.6 x 0.5 (mm) WiFi Dual Band Chip Antenna (AA077U)

Engineering Specification

1. Product Number

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



No. 83, Kewang Rd., Longtan Dist., Taoyuan City 325, Taiwan
詠業科技股份有限公司

2. Features

- *Stable and reliable performances in both 2.4 and 5 GHz bands
- *Low profile and compact size
- *RoHS 2.0 compliance
- *SMT processes compatible
- *AEC-Q200 compliant

3. Applications

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

4. Description

Unictron's AA077U 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, AA077U 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 : James

Checked by : Mike

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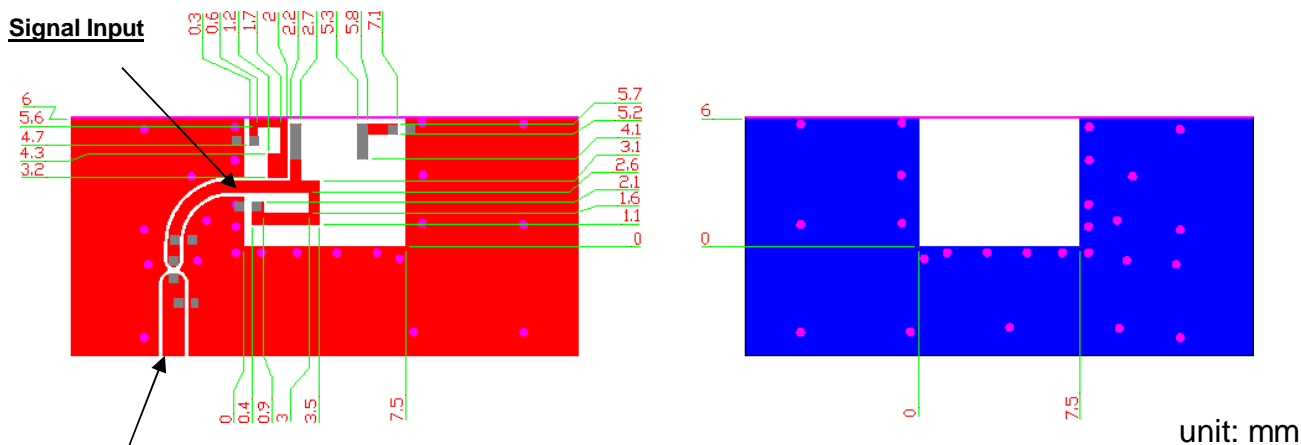
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5. Layout Guide & Electrical Specifications

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

5-2. Electrical Specifications (Evaluation Board Dimensions: 80 x 40 mm²)

5-2-1. Electrical Table

Characteristics	Specifications	
Outline Dimension (mm)	3.2 x 1.6 x 0.5	
Working Frequency (MHz)	2400 ~ 2500	5150 ~ 5850
Peak Gain (dBi) (typical)**	1.4	2.3
Radiation Efficiency (%) (typical)**	76	67
VSWR (@ center frequency)*	< 2 : 1	< 2 : 1
Characteristic Impedance (Ω)	50	
Polarization	Linear Polarization	

*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.

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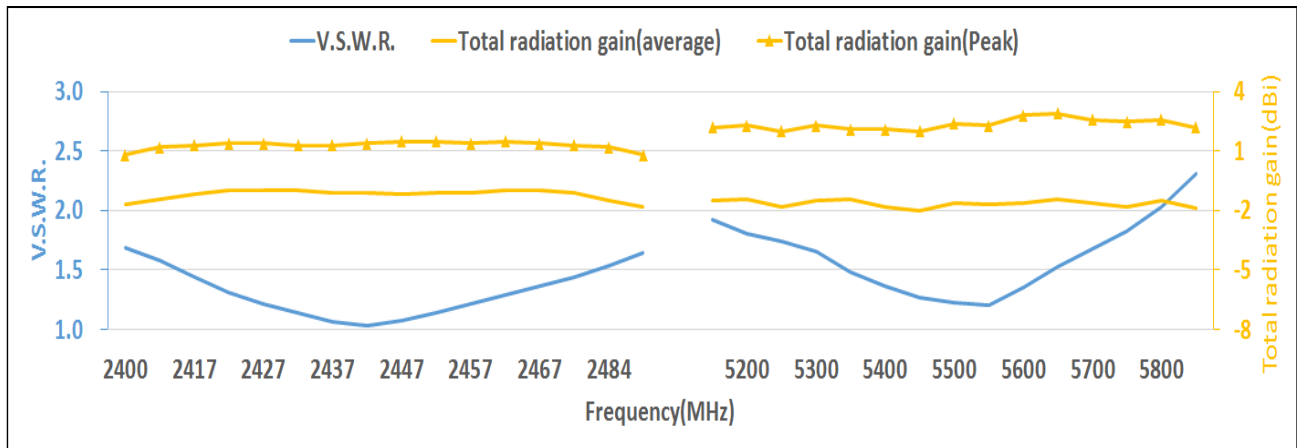
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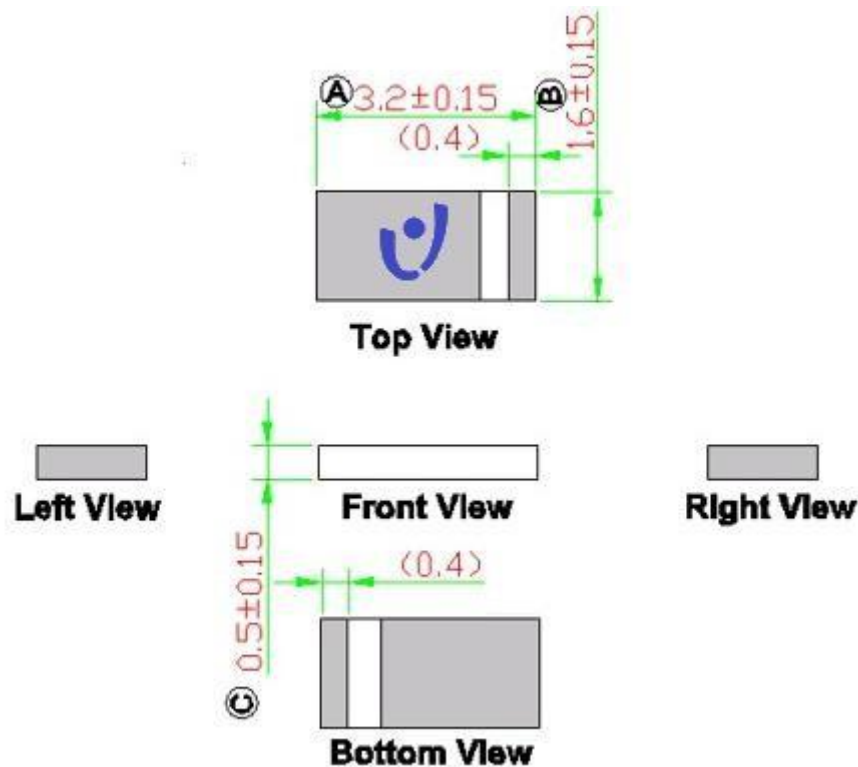
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5-2-2. Frequency vs. V.S.W.R. and Total Radiation Gain



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

6-1. Antenna Dimensions



1. All materials are RoHS 2.0 compliant.
2. "A~C" Critical Dimensions
3. "()" Reference Dimensions

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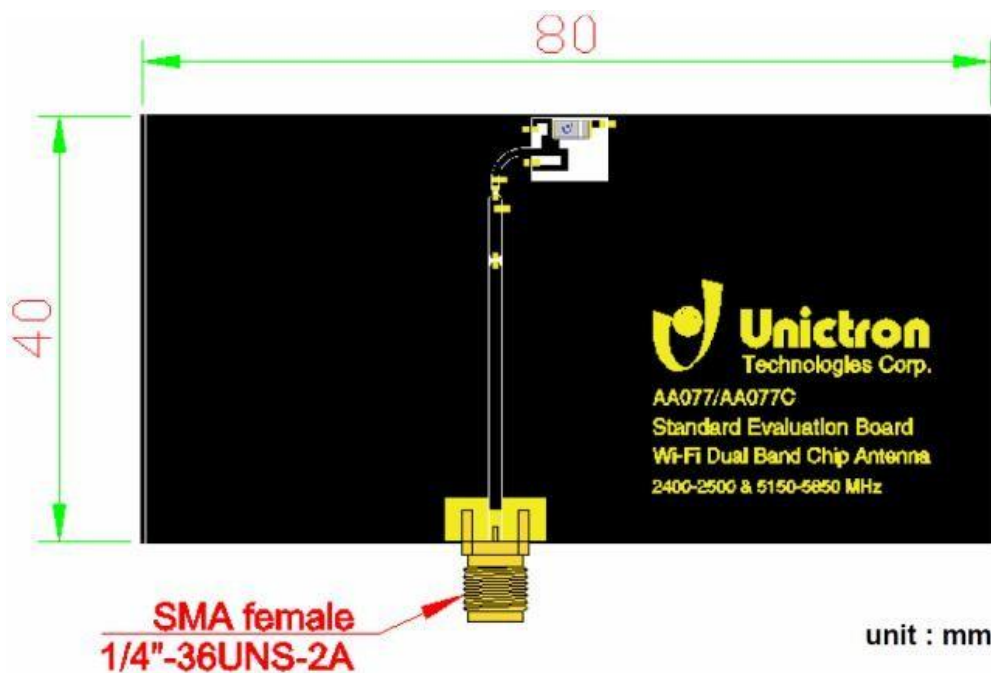
PIN Definition



Unit : mm

PIN	1	2
Soldering PAD	Signal	Tuning / Ground

6-2. Evaluation Board with Antenna



unit : mm

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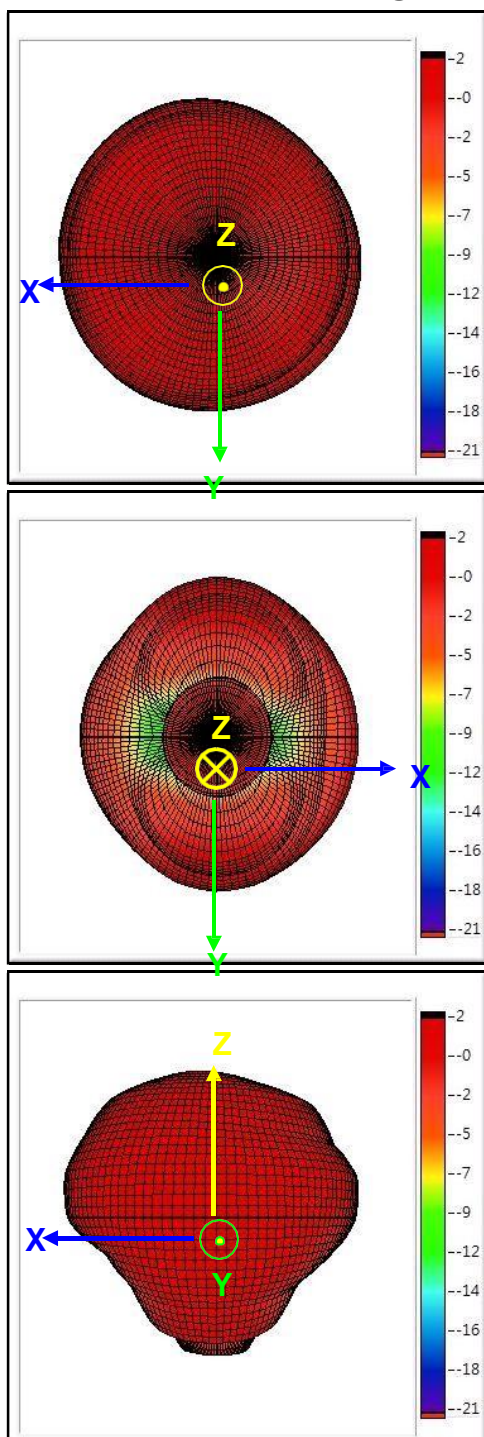
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7. 3D Radiation Gain Pattern (with 80 x 40 mm² Evaluation Board)

7-1. 2400~2500 MHz Band

3D Radiation Gain Pattern @ 2442 MHz (unit: dBi)



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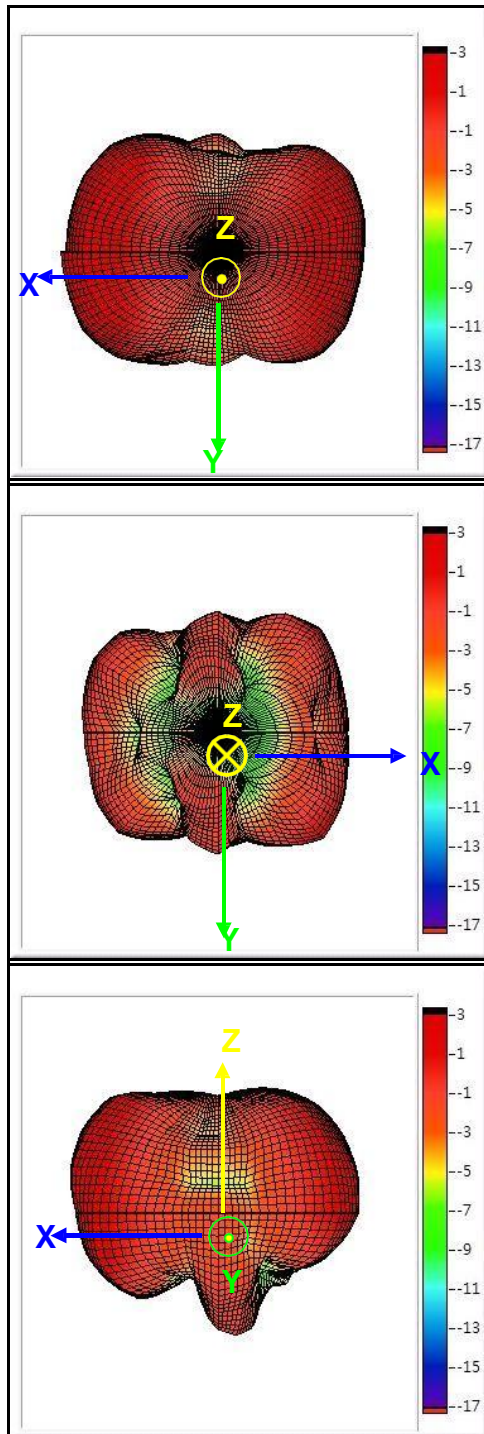
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7-2. 5150~5850 MHz Band

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



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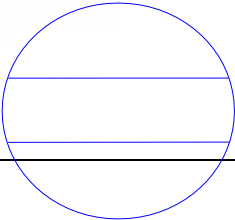
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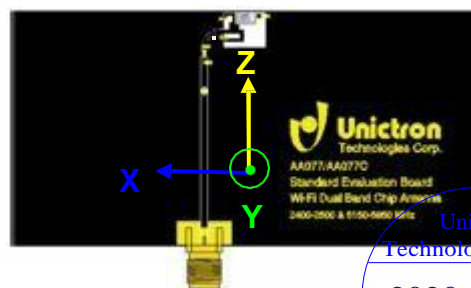
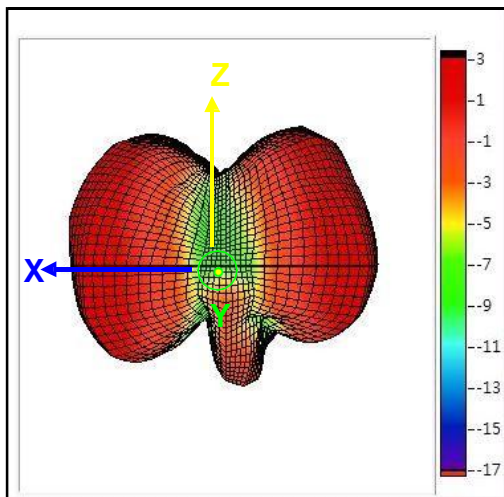
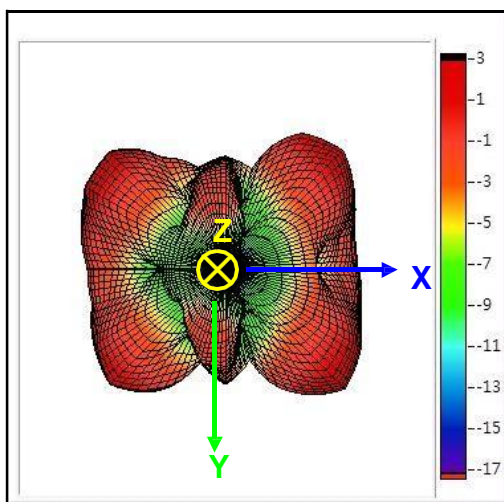
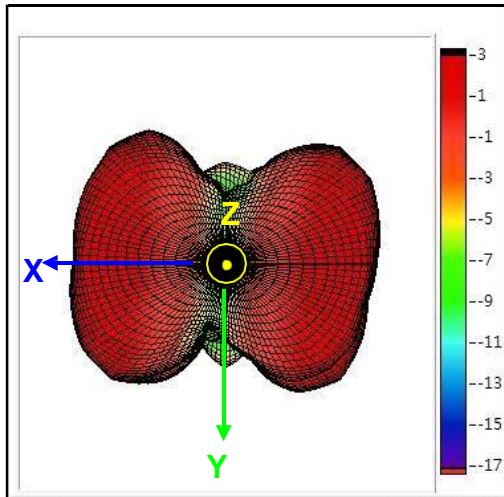
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7-2-2. 3D Radiation Gain Pattern @ 5550 MHz (unit: dBi)



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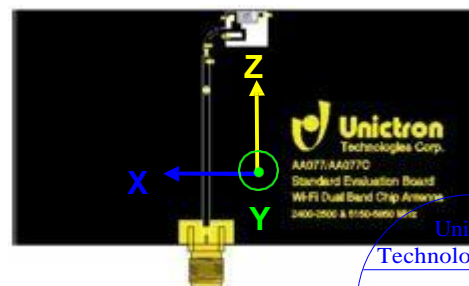
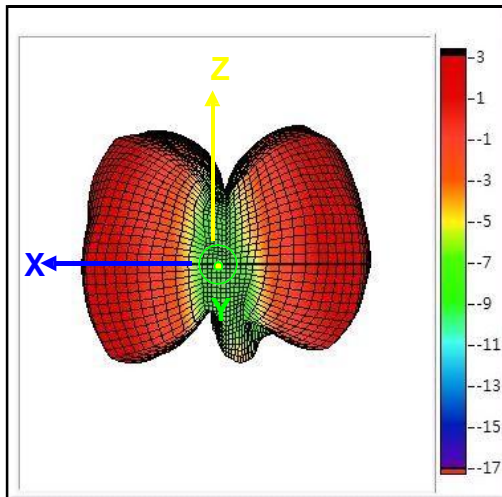
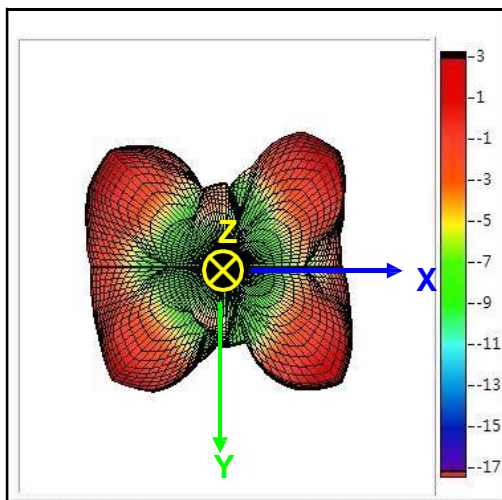
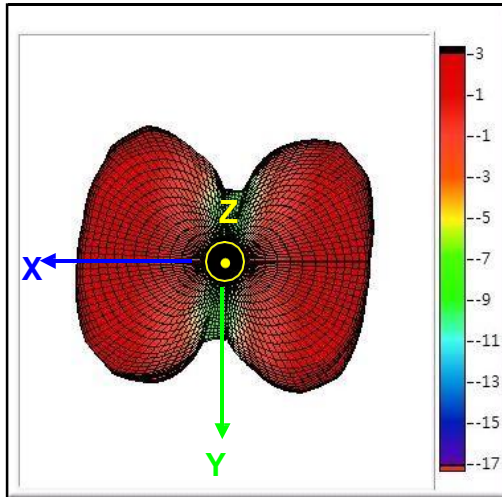
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7-2-3. 3D Radiation Gain Pattern @ 5850 MHz (unit: dBi)



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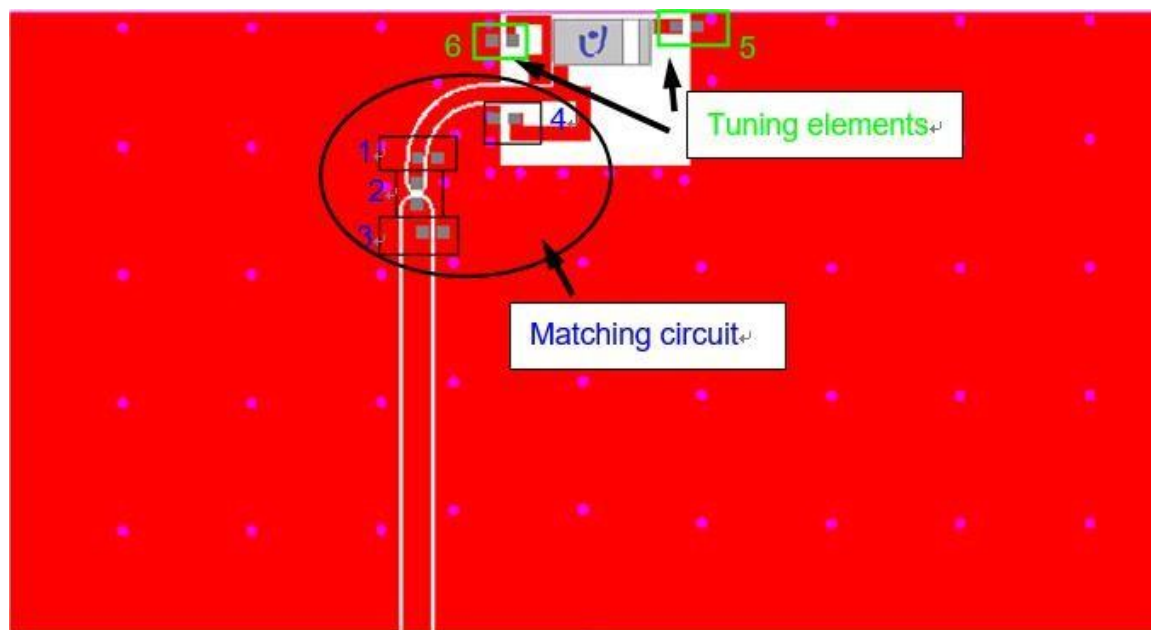
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8. Frequency tuning and Matching circuit

8-1. Chip antenna tuning scenario :



@ 80 x 40 mm² ground plane)

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 mm² evaluation board. However, these are typical reference values which may need to be changed when circuit boards or part vendors are different.



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Typical Matching Circuit Components			
Location	Description	Vendor	Tolerance
1	N/A*	(0402)	-
2	1 nH*	DARFON(0402)	± 0.1 nH
3	0.2 pF*	DARFON(0402)	± 0.1 pF
4	22 pF*	TDK(0402)	$\pm 2\%$
5	1 pF*	DARFON(0402)	± 0.1 pF
6	0.2 pF*	DARFON(0402)	± 0.1 pF

8-3. Reference for frequency tuning element 5 (2400~2500 MHz Band)

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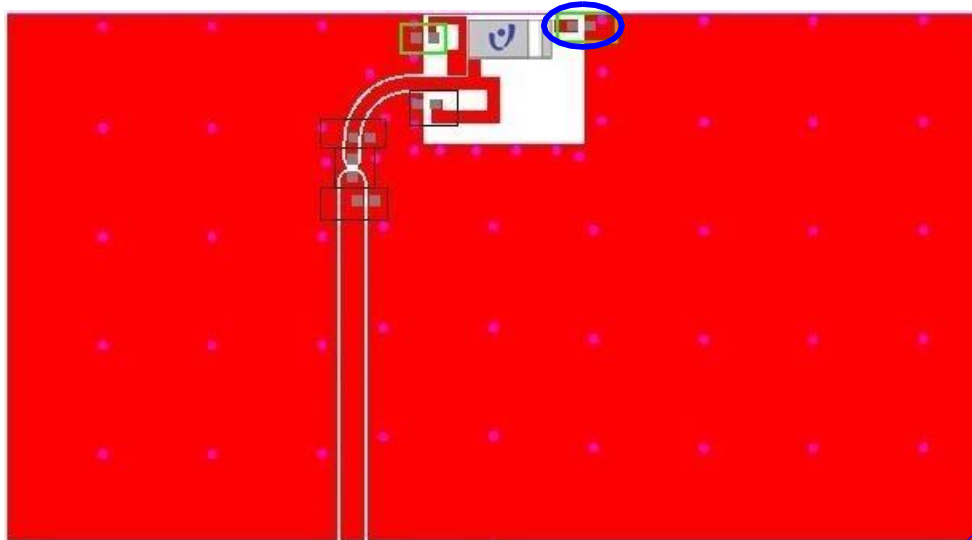
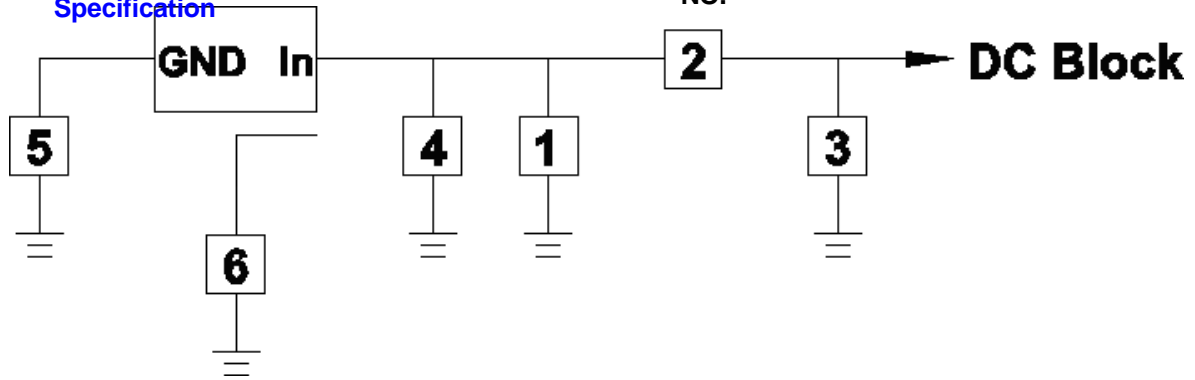
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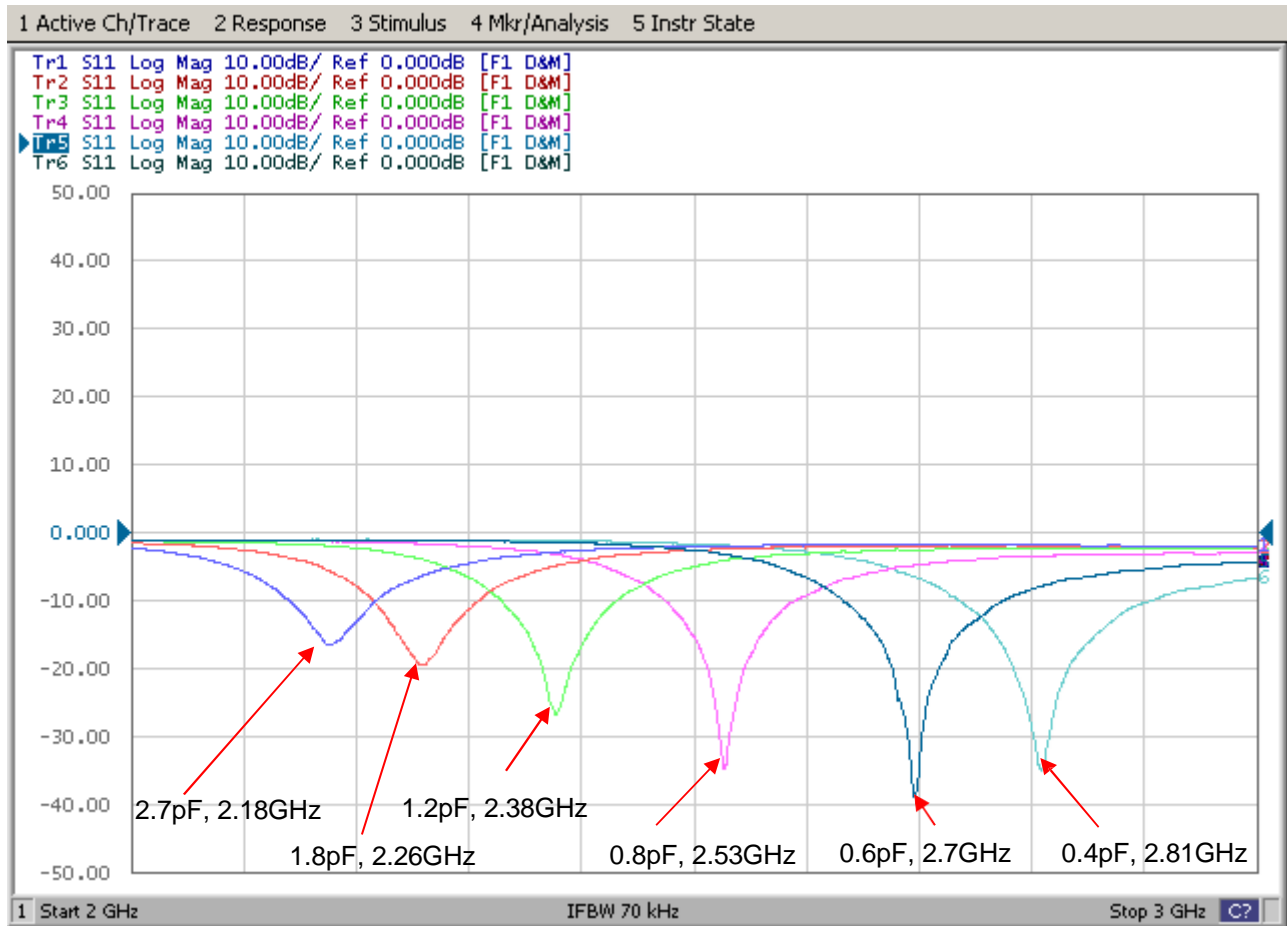
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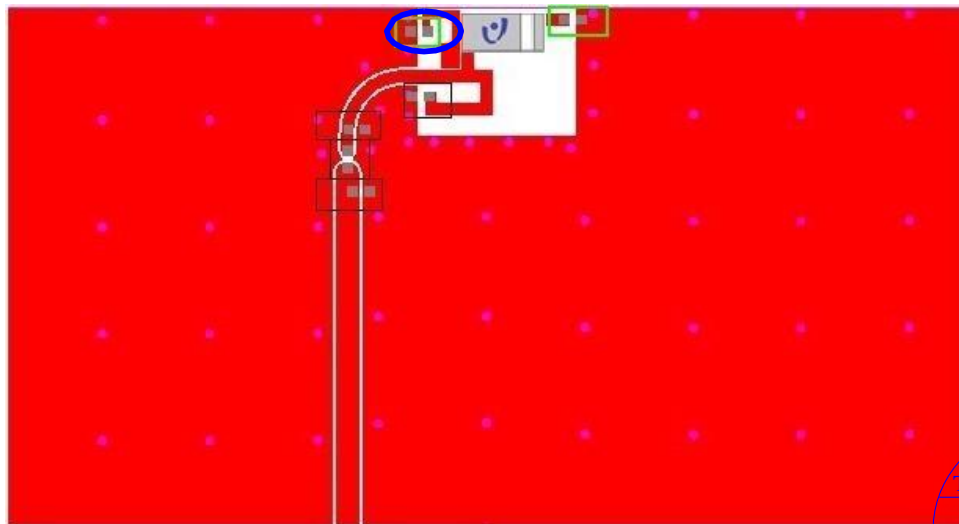
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8-4. Reference for frequency tuning element 6 (5150~5850 MHz Band)



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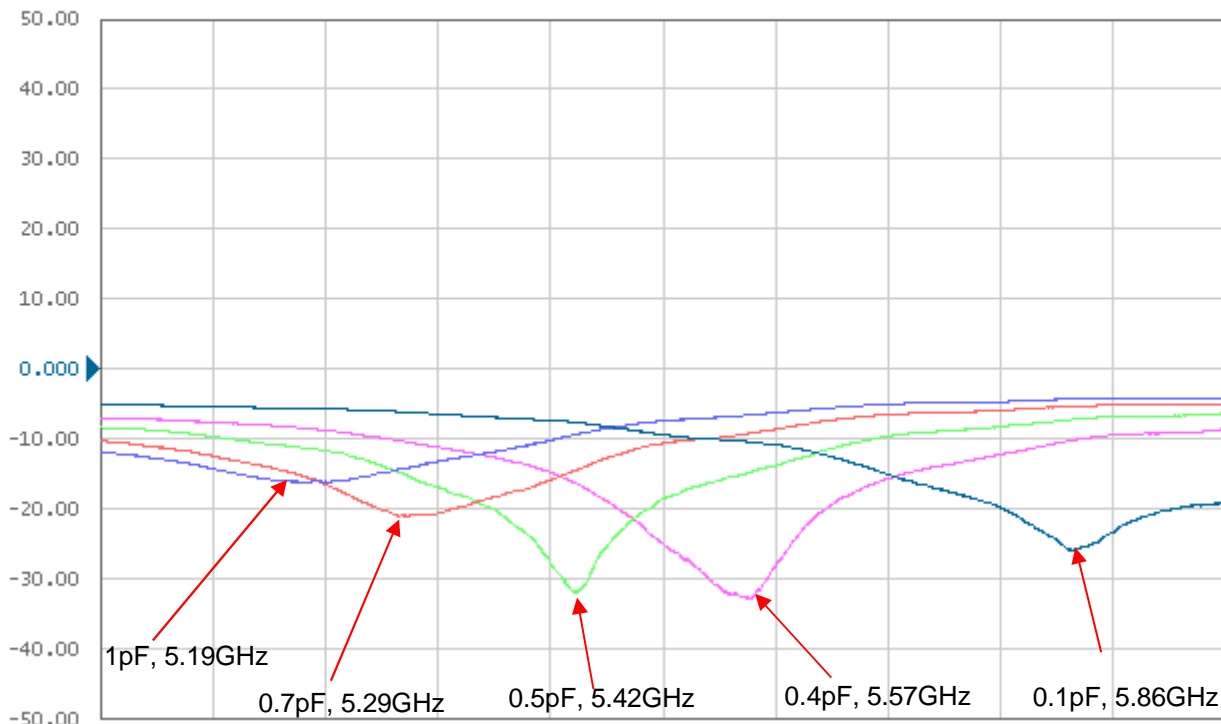
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1 Active Ch/Trace 2 Response 3 Stimulus 4 Mkr/Analysis 5 Instr State

Tr1 S22 Log Mag 10.00dB/ Ref 0.000dB [F1 D&M]
 Tr2 S22 Log Mag 10.00dB/ Ref 0.000dB [F1 D&M]
 Tr3 S22 Log Mag 10.00dB/ Ref 0.000dB [F1 D&M]
 Tr4 S22 Log Mag 10.00dB/ Ref 0.000dB [F1 D&M]
 Tr5 S22 Log Mag 10.00dB/ Ref 0.000dB [F1 D&M]



2 Start 5 GHz

IFBW 70 kHz

Stop 6 GHz C?

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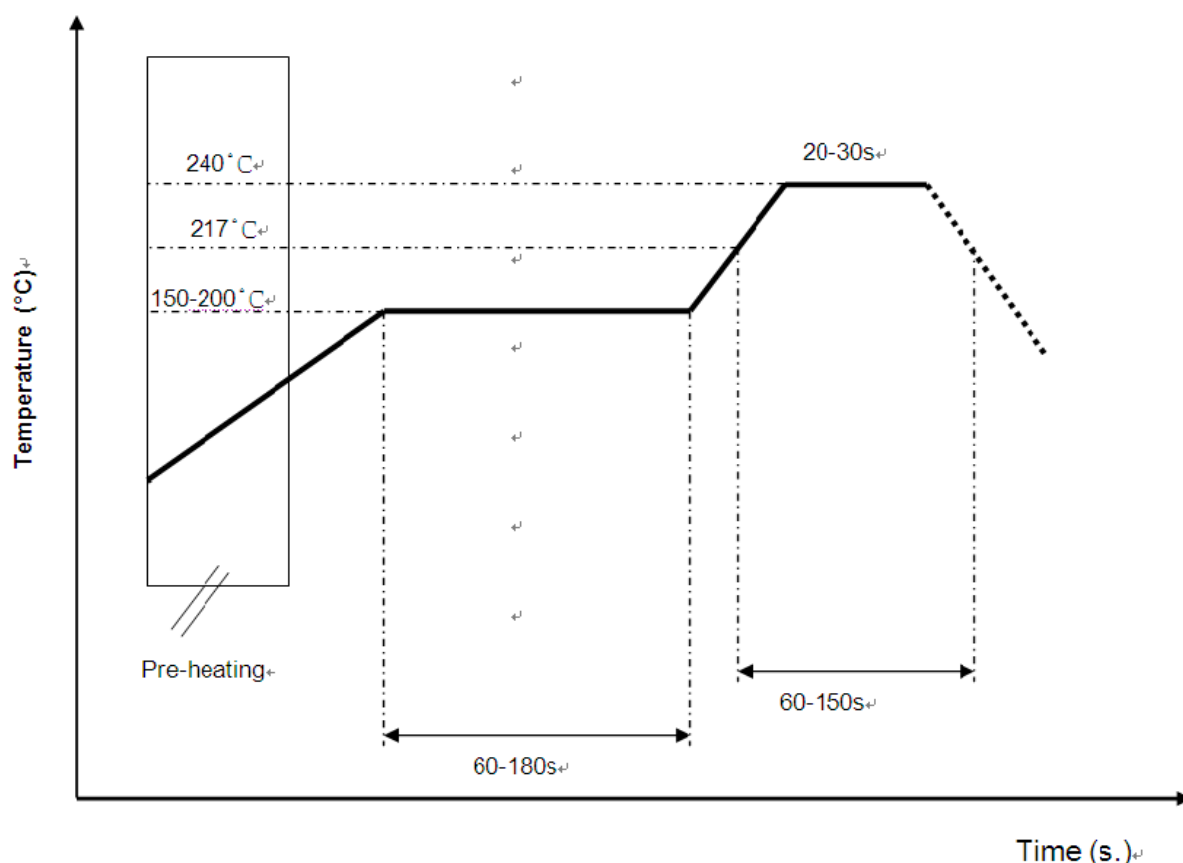
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9. Soldering Conditions

Typical Soldering Profile for Lead-free Process



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

10. Reminders for users of Unictron's AA077U 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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11. Packing

(1) Packaging method is implemented according to "MSL 2a" 

(2) Quantity/Reel: 5000 pcs/Reel

(3) Plastic tape: Black conductive polystyrene.

a. Tape Drawing

b. Tape Dimensions (unit: mm)

2.1 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
Po	4.00	±0.10
10Po	40.00	±0.20

c. Reel Drawing

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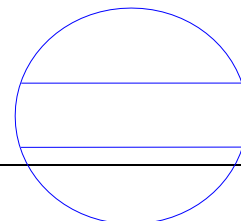
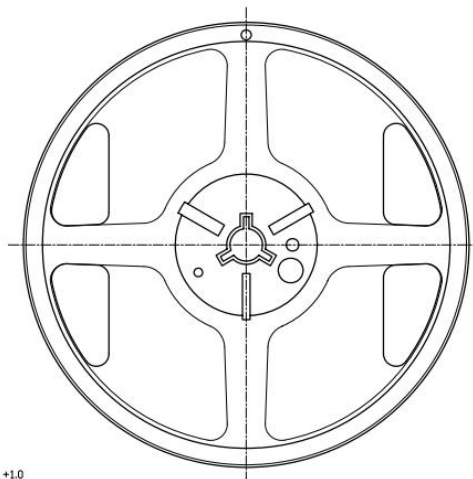
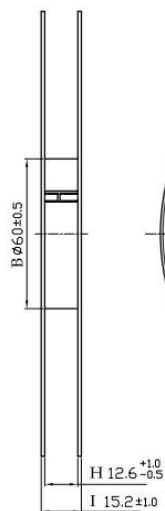
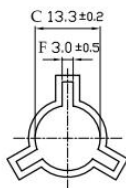
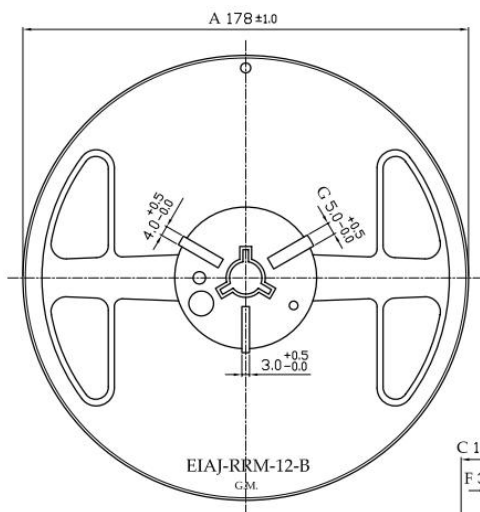
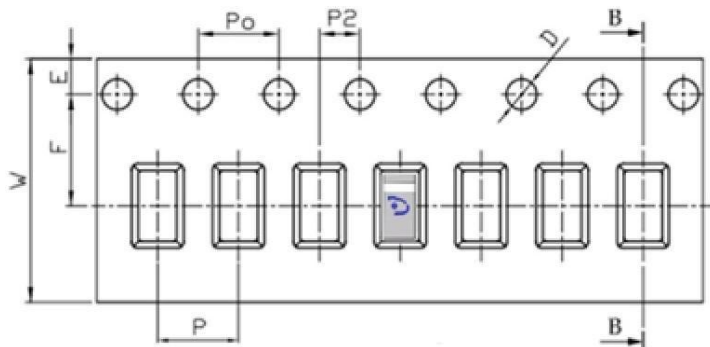
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12. Operating & Storage Conditions

12-1. Operating

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

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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