20.0 x 5.0 x 1.6 (mm) ISM 433/450/470/510 MHz Chip Antenna

(C420D5) Engineering Specification

1. Product Number

H	2	U	6	6	K	1	K	2	J	0	1	0	0

2. Features

*Stable and reliable in performances
*Low profile, compact size
*RoHS 2.0 compliance
*SMT processes compatible

3. Applications

*Smart meters
*Wireless alarm and security system
*Industrial monitoring and control
*Machine to machine data communication
*433/450/470/510 MHz ISM Band applications
*LTE band 31
*LPD433

4. Description

Unictron's C420D5 chip antenna is designed for ISM 433/450/470/510 MHz bands applications, covering frequencies 433 MHz or 450~470 MHz or 470~510 MHz. Fabricated with proprietary design and processes, C420D5 shows excellent performance and is fully compatible with SMT processes which can decrease the assembly cost and improve device's quality and consistency.

5. Layout Guide & Electrical Specifications

Unictron Technologies Corp.
詠業科技股份有限公司
Unictron Technologies Corporation
Website:www.unictron.com

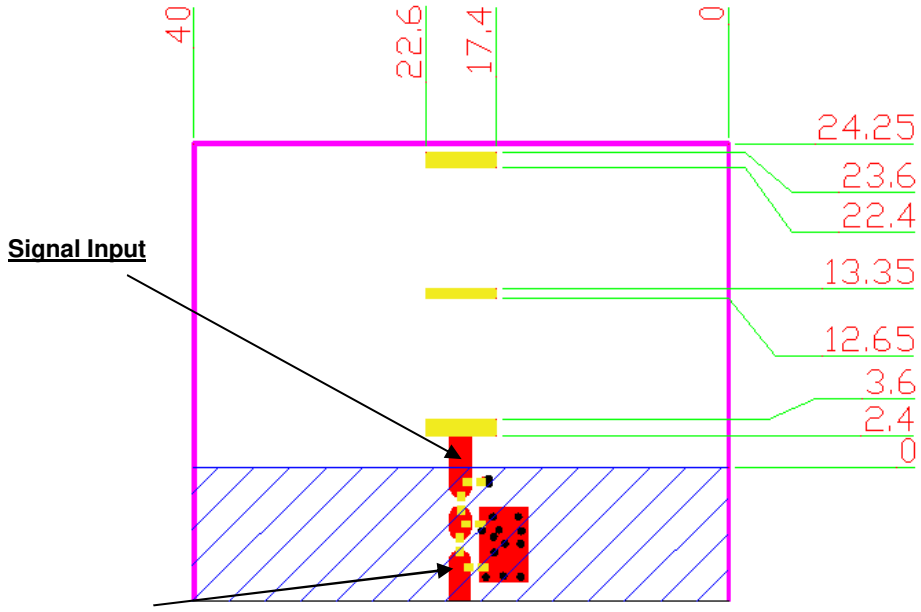
Prepared by : Wen	Designed by : Peter	Checked by : Mike	Approved by : Herbert

TITLE : 20.0 x 5.0 x 1.6 (mm) ISM 433/450/470/510 MHz Chip Antenna (C420D5) Engineering Specification	DOCUMENT NO.	H2U66K1K2J0100	REV. G

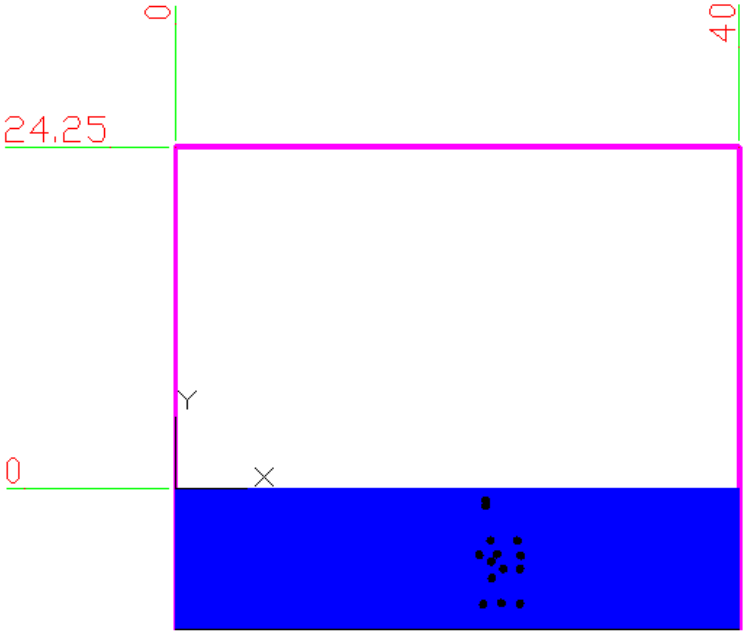
5-1. Layout Guide (unit：mm)

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.



Top View



Bottom View

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

5-2-1. Electrical Table (*for 433 MHz band applications)

Characteristics		Specifications	Unit
Outline Dimensions		20.0 x 5.0 x 1.6	mm
Ground Plane Dimensions		55.75 x 40	mm
Working Frequency		433.05 ~ 434.79	MHz
VSWR(@ center frequency)*		2 Max.	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@433 MHz)	-0.2 (typical) **	dBi
Efficiency		32 (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. Electrical Table (*for 450~470 MHz band applications)

Characteristics		Specifications	Unit
Working Frequency		450 ~ 470	MHz
VSWR(@ center frequency)*		2.5 Max.	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@460 MHz)	-0.2 (typical) **	dBi
Efficiency		35 (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.

5-2-3. Electrical Table (*for 470~510 MHz band applications)

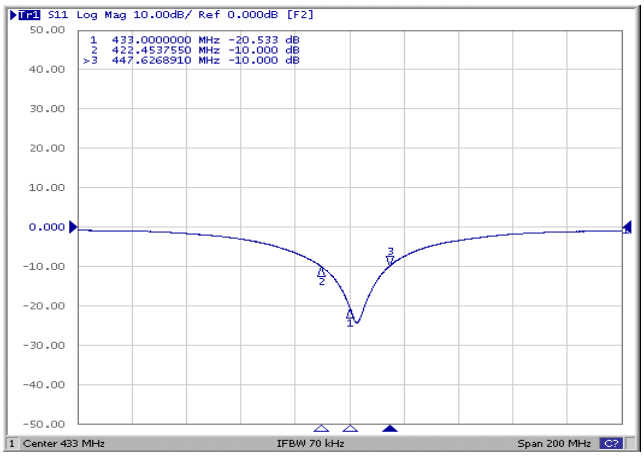
Characteristics		Specifications	Unit
Working Frequency		470 ~ 510	MHz
VSWR(@ center frequency)*		2.5 Max.	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@490 MHz)	-0.2 (typical) **	dBi
Efficiency		34 (typical) **	%

*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..

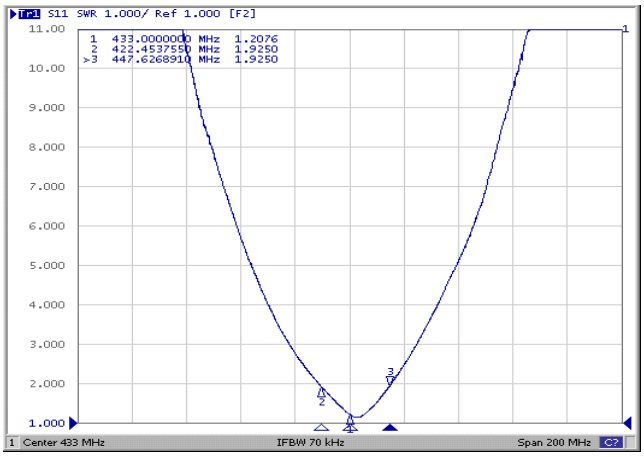
*C420D5 can be implemented for 433MHz / 450MHz / 470 MHz/ 510 MHz with specific matching components.
The specific matching components will be defined base on the environment of cases or devices.

5-2-4. Return Loss & VSWR for 433 MHz Band

Return Loss (S_{11})

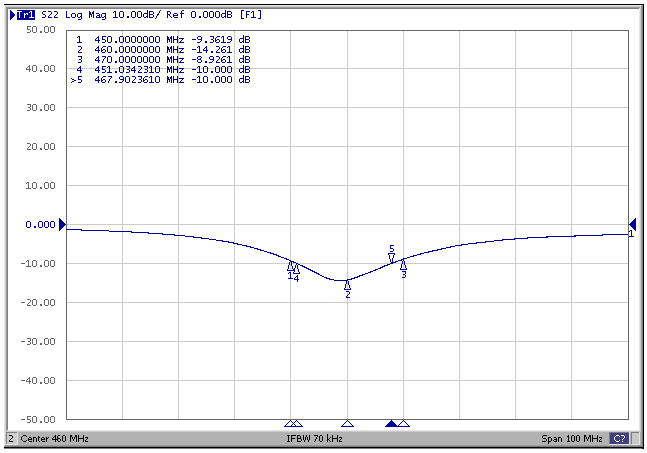


VSWR (S_{11})

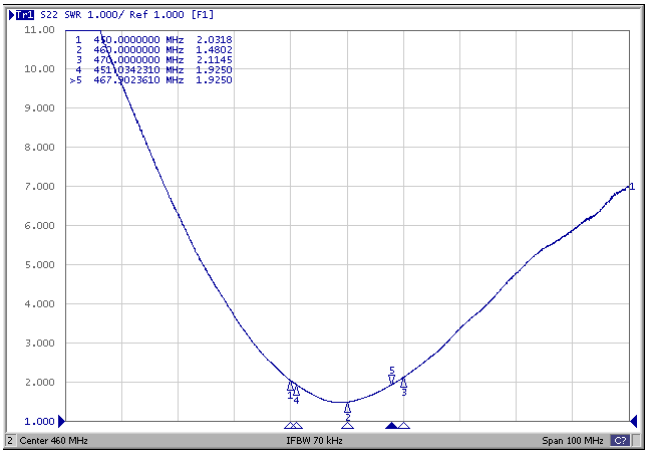


5-2-5. Return Loss & VSWR for 450~470 MHz Band

Return Loss (S_{11})

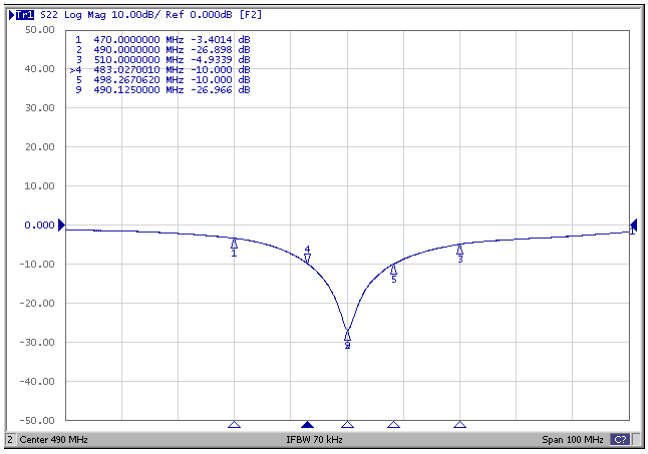


VSWR (S_{11})

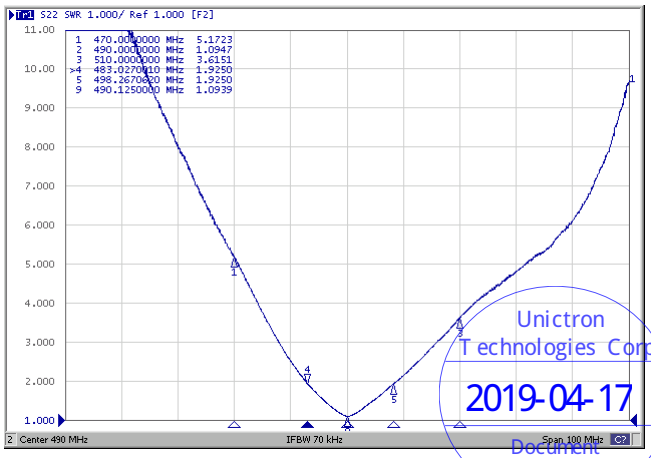


5-2-6. Return Loss & VSWR for 470~510 MHz Band

Return Loss (S_{11})



VSWR (S_{11})



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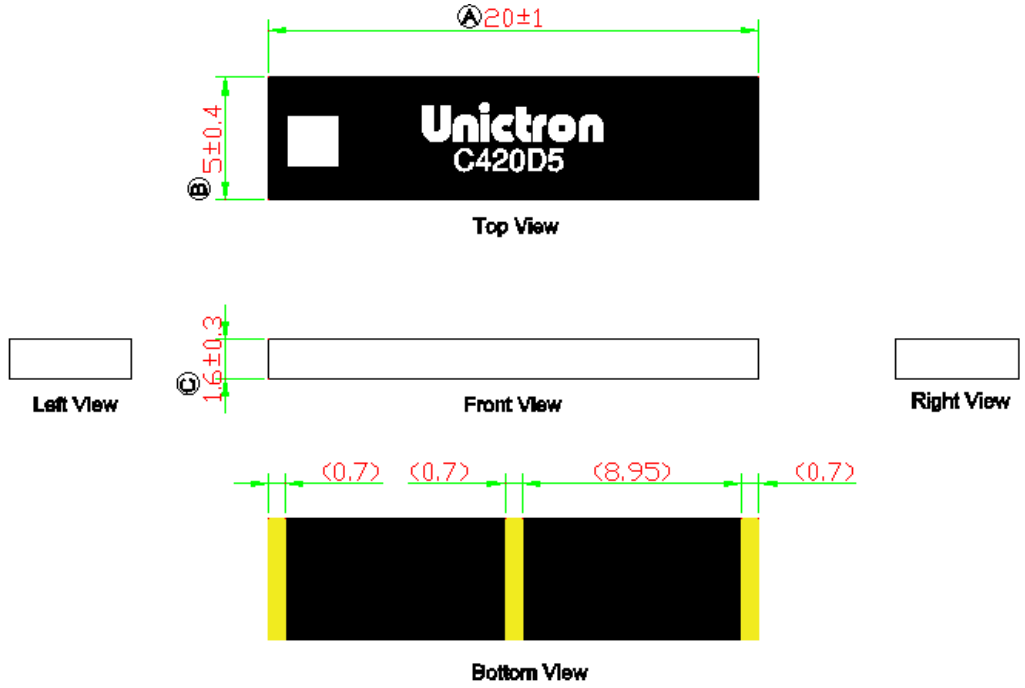
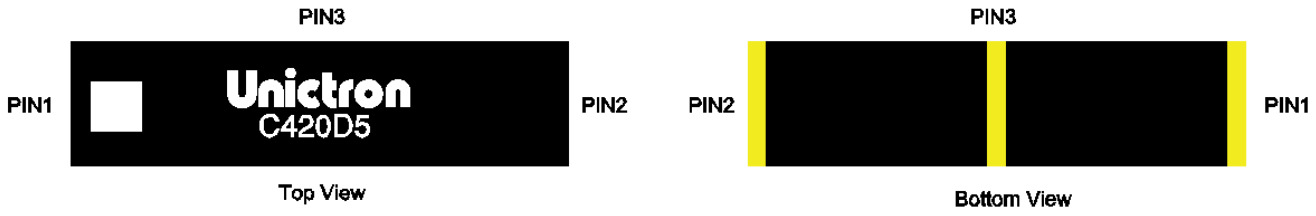
6. Outline Dimensions of Antenna & Evaluation Board (unit: mm)

6-1. Antenna Dimensions



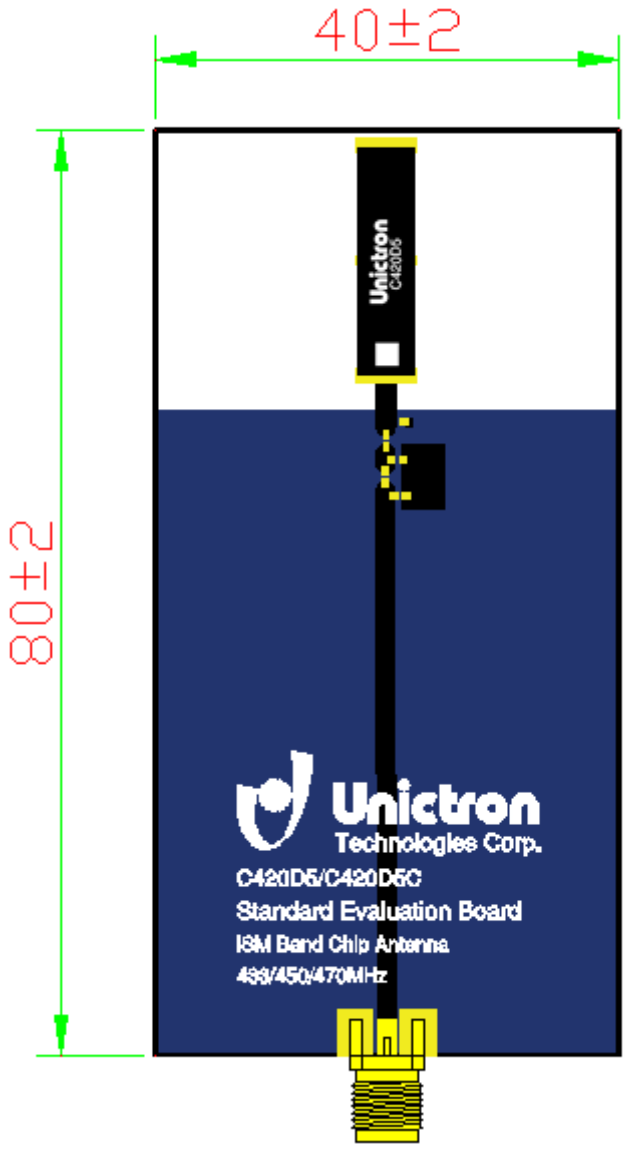
NOTE:
1.All materials are RoHS 2.0 compliant.
2."Ⓐ~Ⓒ" Critical Dimensions.
3."( )" Reference Dimensions.

PIN Definitions



PIN	1	2 ~3
Soldering Pad	Signal	N/C

6-2. Evaluation Board with Antenna

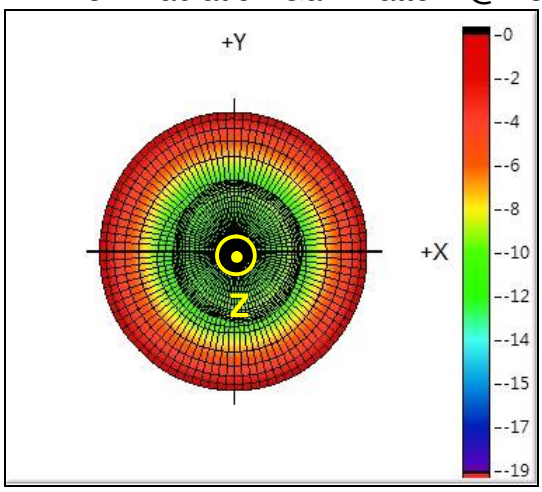


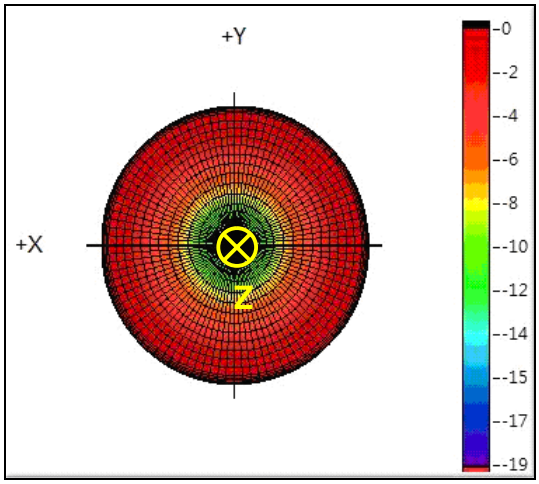
unit：mm

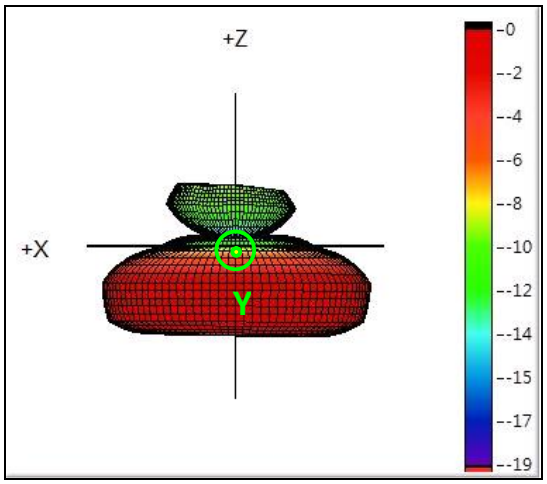
7. Radiation Pattern (with 80 x 40 mm² Evaluation Board)

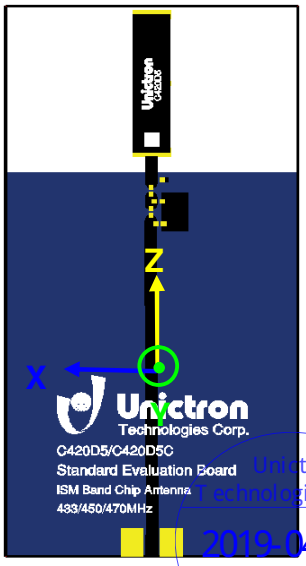
7-1. 433 MHz Band

7-1-1. 3D Radiation Gain Pattern @ 433 MHz (unit: dBi)





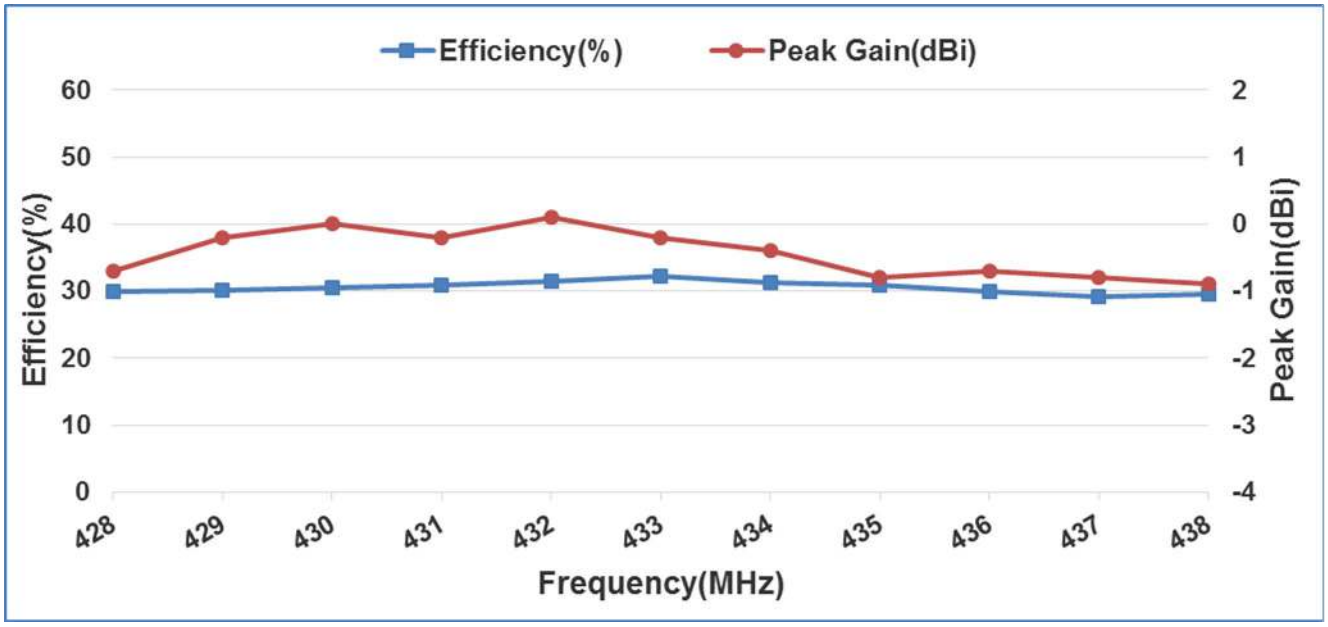




7-1-2. 3D Efficiency Table

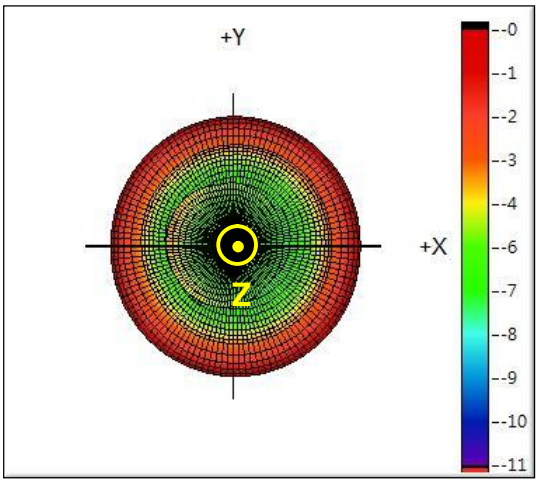
Frequency (MHz)	428	429	430	431	432	433	434	435	436	437	438
Efficiency (dB)	-5.2	-5.2	-5.1	-5.1	-5.0	-4.9	-5.1	-5.1	-5.2	-5.3	-5.3
Efficiency (%)	29.9	30.2	30.6	30.9	31.4	32.2	31.2	30.8	29.9	29.2	29.5
Peak Gain (dBi)	-0.7	-0.2	0.0	-0.2	0.1	-0.2	-0.4	-0.8	-0.7	-0.8	-0.9

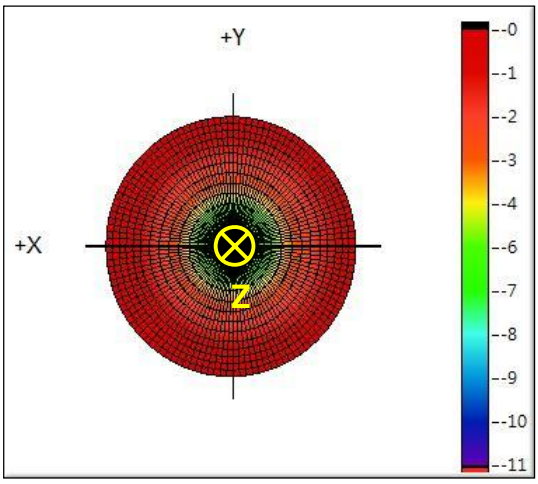
7-1-3. 3D Efficiency vs. Frequency

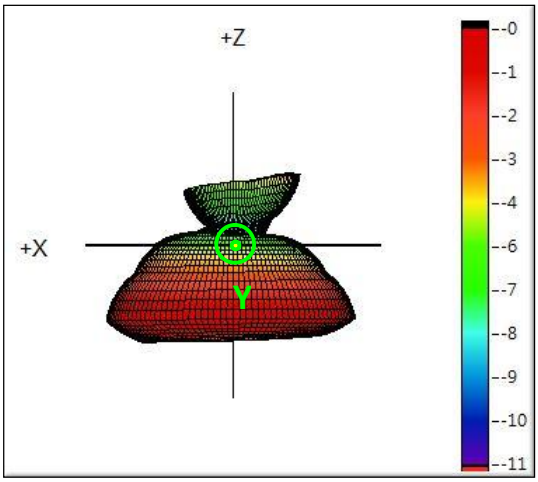


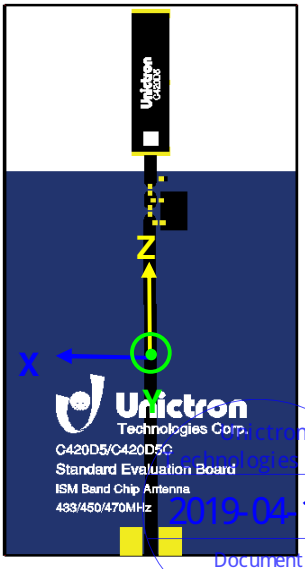
7-2. 450 ~ 470 MHz Band

7-2-1. 3D Radiation Gain Pattern @ 460 MHz (unit: dBi)





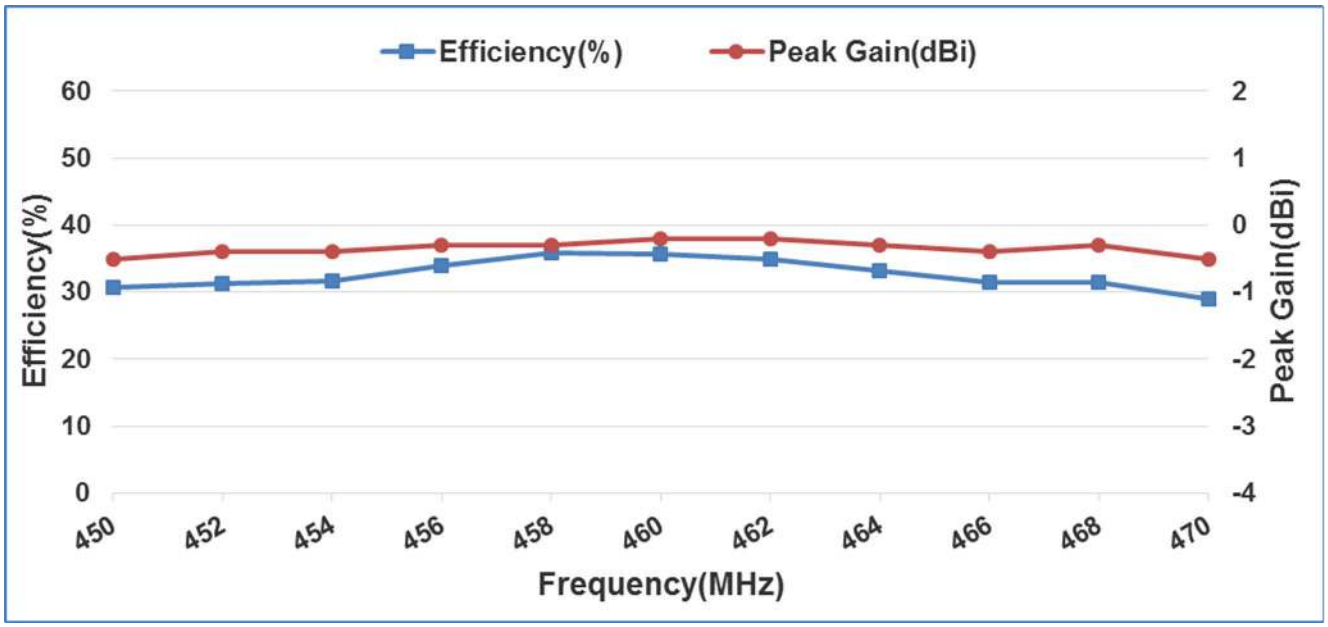




7-2-2. 3D Efficiency Table

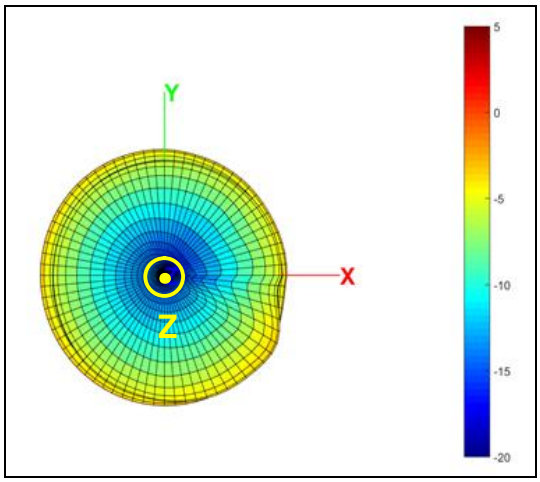
Frequency (MHz)	450	452	454	456	458	460	462	464	466	468	470
Efficiency (dB)	-5.1	-5.1	-5.0	-4.7	-4.5	-4.5	-4.6	-4.8	-5.0	-5.0	-5.4
Efficiency (%)	30.7	31.2	31.6	34.0	35.8	35.6	34.9	33.1	31.4	31.4	29.0
Peak Gain (dBi)	-0.5	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.3	-0.4	-0.3	-0.5

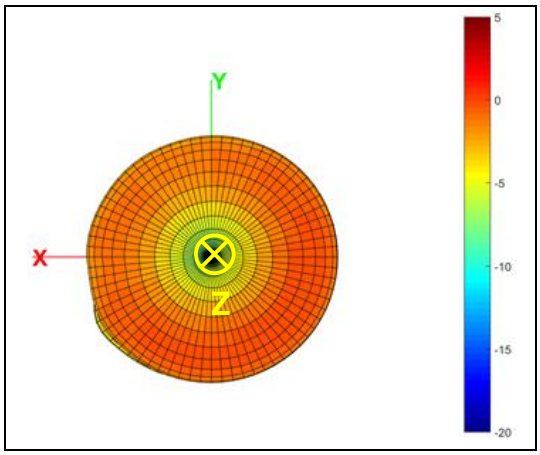
7-2-3. 3D Efficiency vs. Frequency

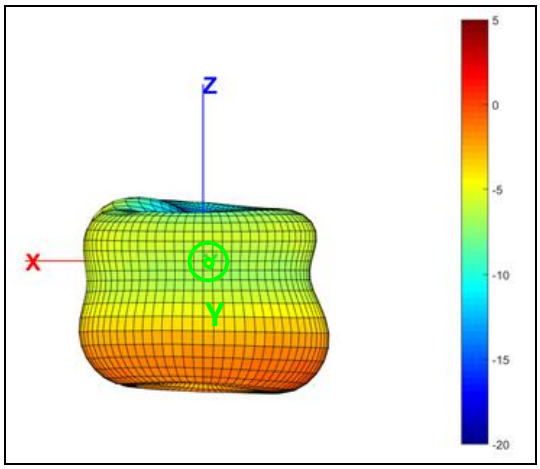


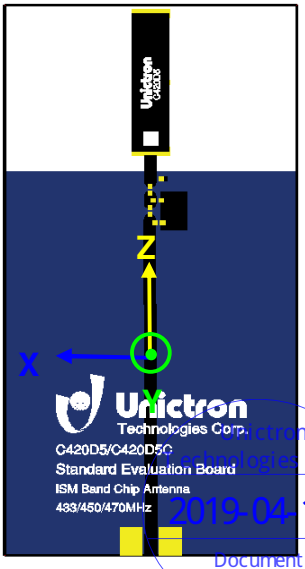
7-3. 470 ~ 510 MHz Band

7-3-1. 3D Radiation Gain Pattern @ 490 MHz (unit: dBi)





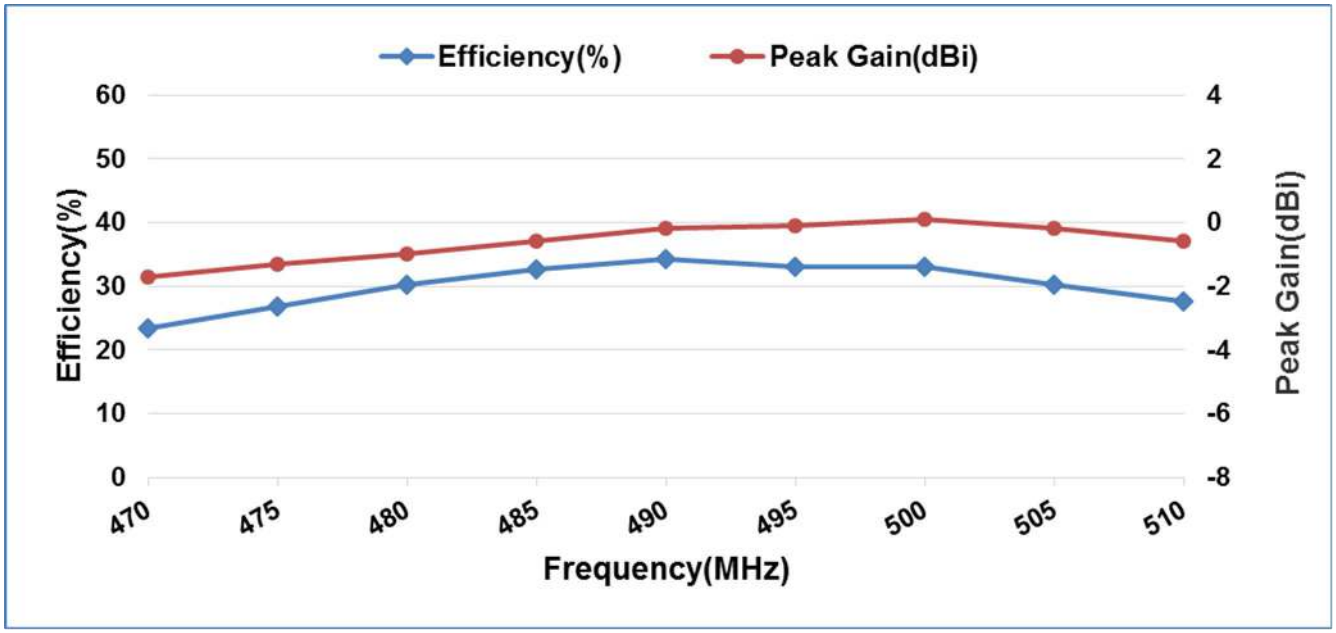




7-3-2. 3D Efficiency Table

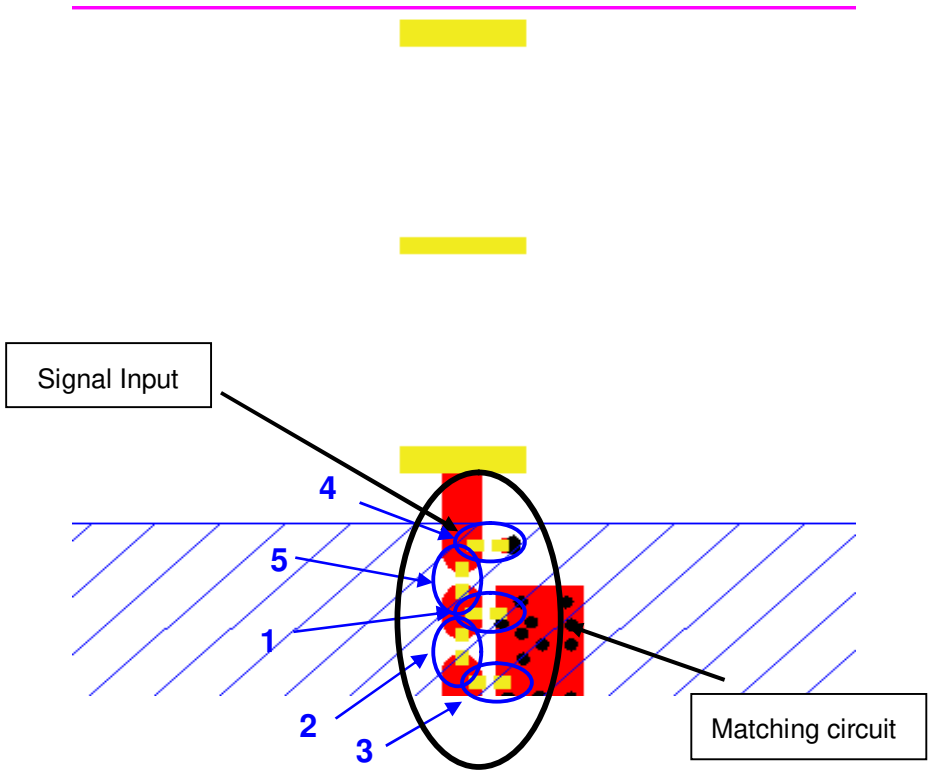
Frequency (MHz)	470	475	480	485	490	495	500	505	510
Efficiency (dB)	-6.3	-5.7	-5.2	-4.9	-4.7	-4.8	-4.8	-5.2	-5.6
Efficiency (%)	23.5	26.8	30.3	32.6	34.3	33.0	33.1	30.3	27.6
Peak Gain (dBi)	-1.7	-1.3	-1.0	-0.6	-0.2	-0.1	0.1	-0.2	-0.6

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



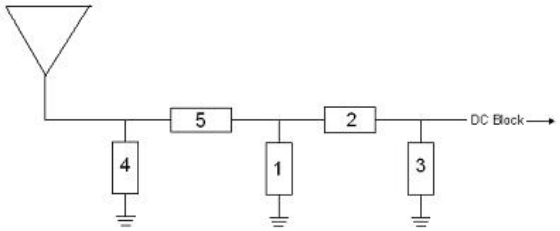
8. Frequency tuning

8-1. Chip antenna tuning scenario：



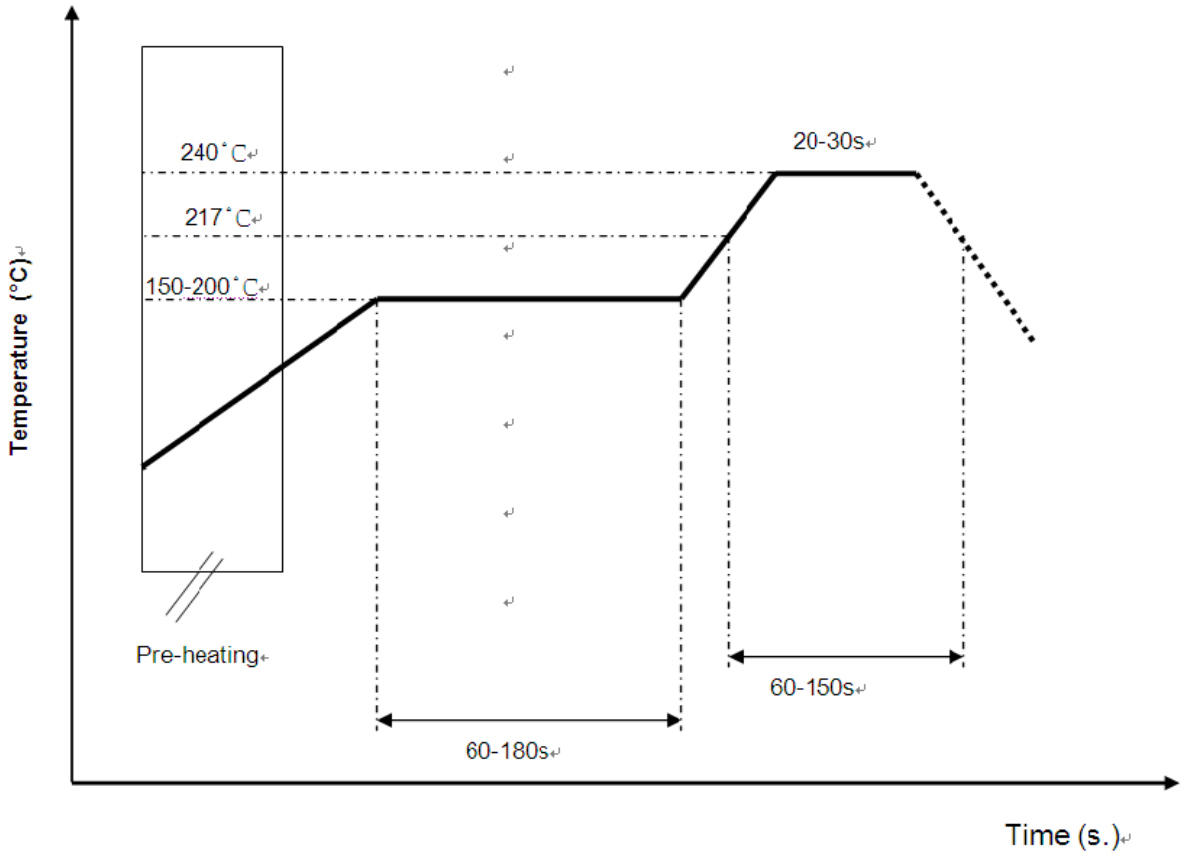
8-2. Matching circuit：

With the following recommended values of matching, the covering frequencies will be about 433 MHz at our standard 80 x 40 mm^2 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	0Ω, (0402)	-	-
3	N/A	-	-
4 Fine tuning element	0.4pF, (0402)	MURATA	±0.05pF
5 Fine tuning element	56nH, (0402)	MURATA	±3%

9. Soldering Conditions



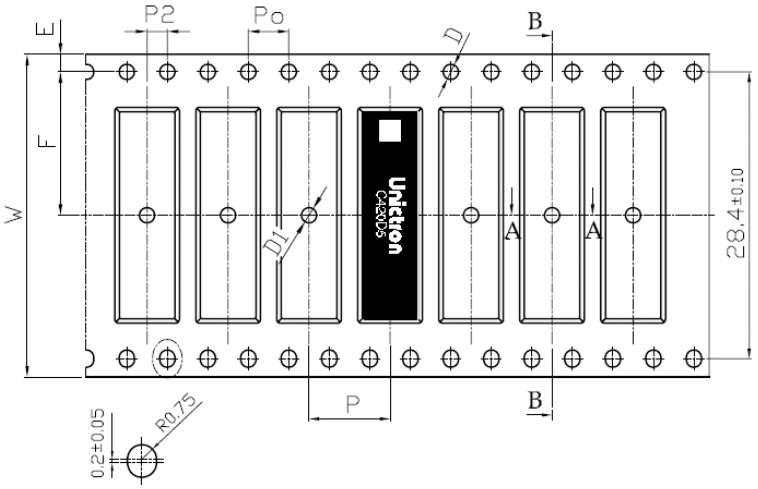
*Recommended solder paste alloy: SAC305 (Sn96.5 /Ag3 /Cu0.5) Lead Free solder paste

10. Packing

(1) Quantity/Reel: 2500 pcs/Reel

(2) Plastic tape: Black Conductive Polystyrene.

a. Tape Drawing



b. Tape Dimensions (unit: mm)

Feature	Specifications	Tolerances
W	32.00	±0.30
P	8.00	±0.10
E	1.75	±0.10
F	14.20	±0.10
P2	2.00	±0.10
D	1.50	+0.10 -0.00
D1	1.50	±0.10
Po	4.00	±0.10
10Po	40.00	±0.20

11. Operating & Storage Conditions

11-1. Operating

(1) Maximum Input Power: 2 W

(2) Operating Temperature: -40℃ to 85℃

(3) Relative Humidity: 10% to 70%

11-2. Storage (sealed)

(1) Storage Temperature: -5℃ to 40℃

(2) Relative Humidity: 20% to 70%

(3) Shelf Life: 1 year

11-3. Storage (unsealed)

Meet the criteria of J-STD-033 MSL2a

11-4. Storage (After mounted on customer's PCB with SMT process)

(1) Storage Temperature: -40℃ to 85℃

(2) Relative Humidity: 10% to 70%

12. 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.