

# 20.0 x 5.0 x 1.6 (mm) ISM 433/450/470 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 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 MHz ISM Band applications
- \*LTE band 31
- \*LPD433

### 4. Description

Unictron's C420D5 chip antenna is designed for ISM 433/450/470 MHz bands applications, covering frequencies 433 MHz or 450~470 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.



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Prepared by : Xenia

Designed by : Peter

Checked by : Mike

Approved by : Herbert

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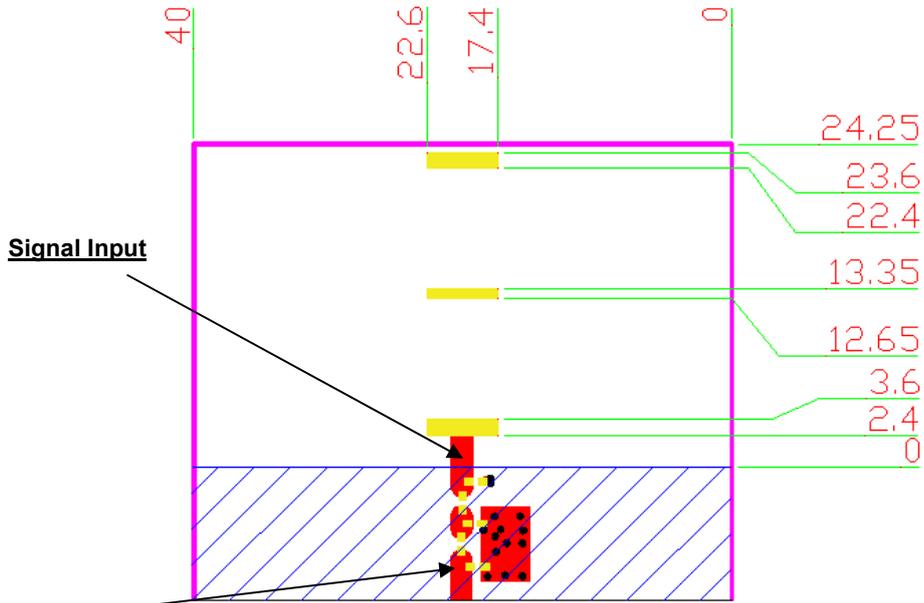
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## 5. Layout Guide & Electrical Specifications

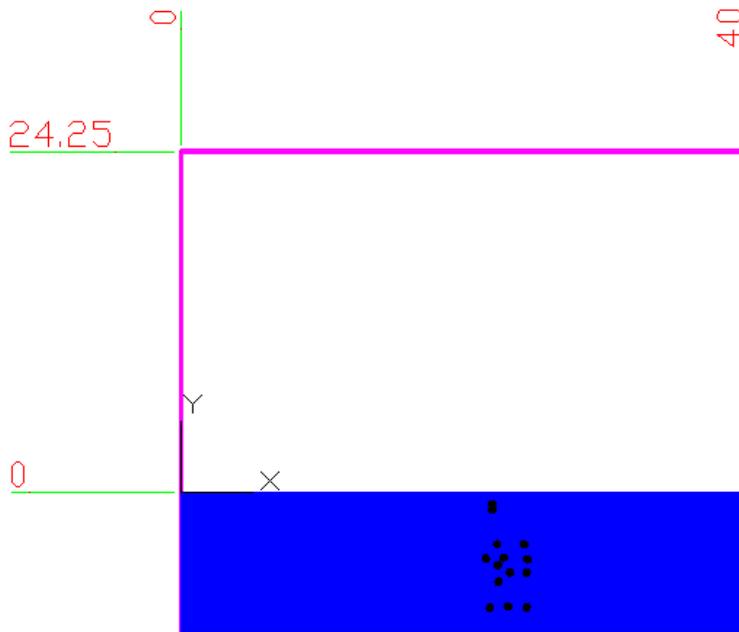
### 5-1. Layout Guide (unit : mm)

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 (\*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..

\*C420D5 can be implemented for 433MHz / 450MHz / 470 MHz with specific matching components.

The specific matching components will be defined base on the environment of cases or devices.



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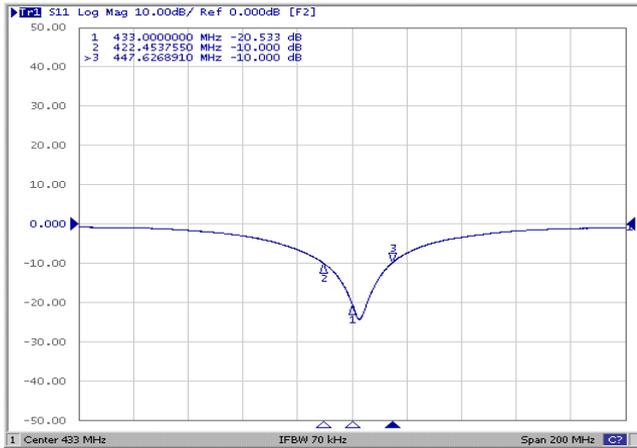
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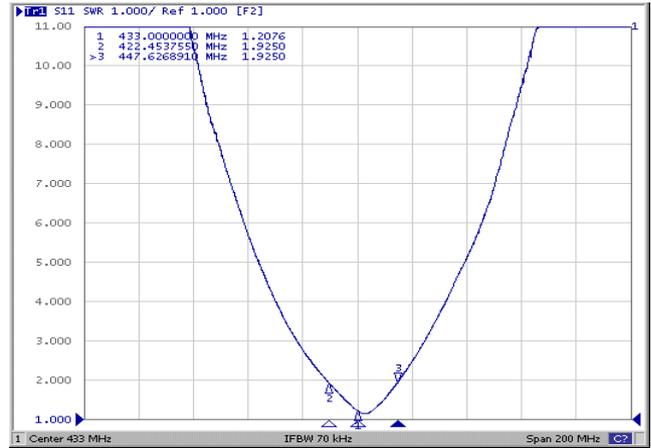
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### 5-2-3. Return Loss & VSWR for 433 MHz Band

Return Loss (S<sub>11</sub>)

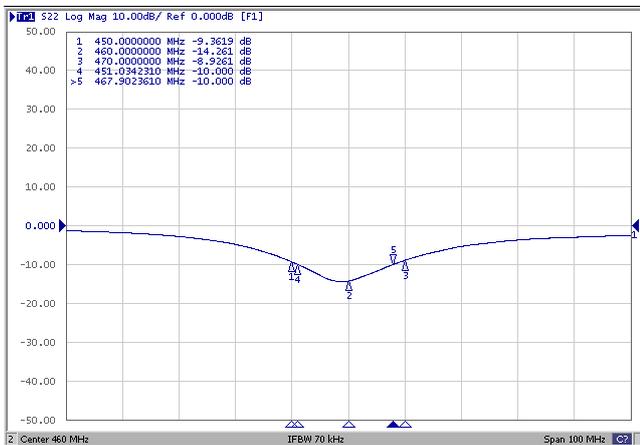


VSWR (S<sub>11</sub>)

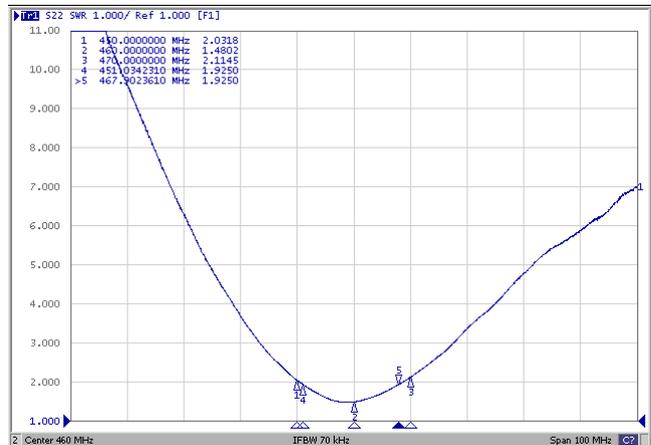


### 5-2-4. Return Loss & VSWR for 450~470 MHz Band

Return Loss (S<sub>11</sub>)



VSWR (S<sub>11</sub>)



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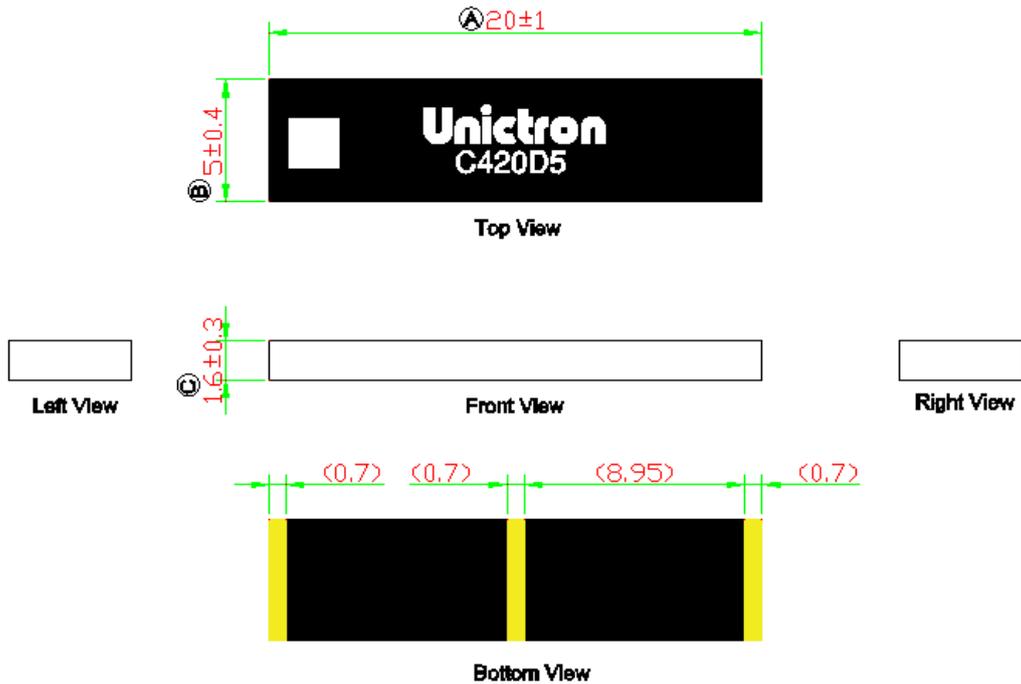
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## 6. Outline Dimensions of Antenna & Evaluation Board (unit: mm)

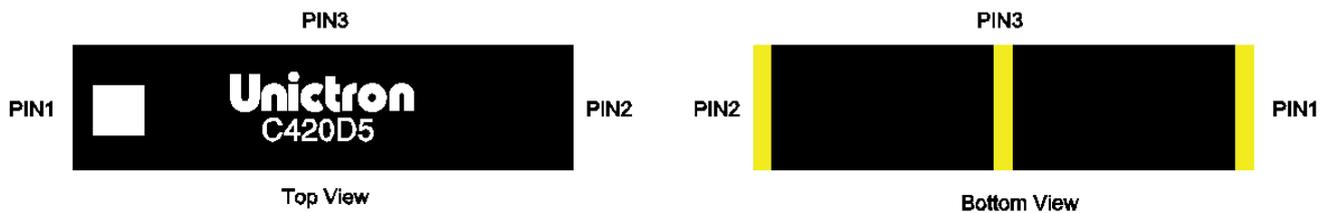
### 6-1. Antenna Dimensions



**NOTE:**

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

### PIN Definitions



PIN	1	2 ~3
Soldering Pad	Signal	N/C



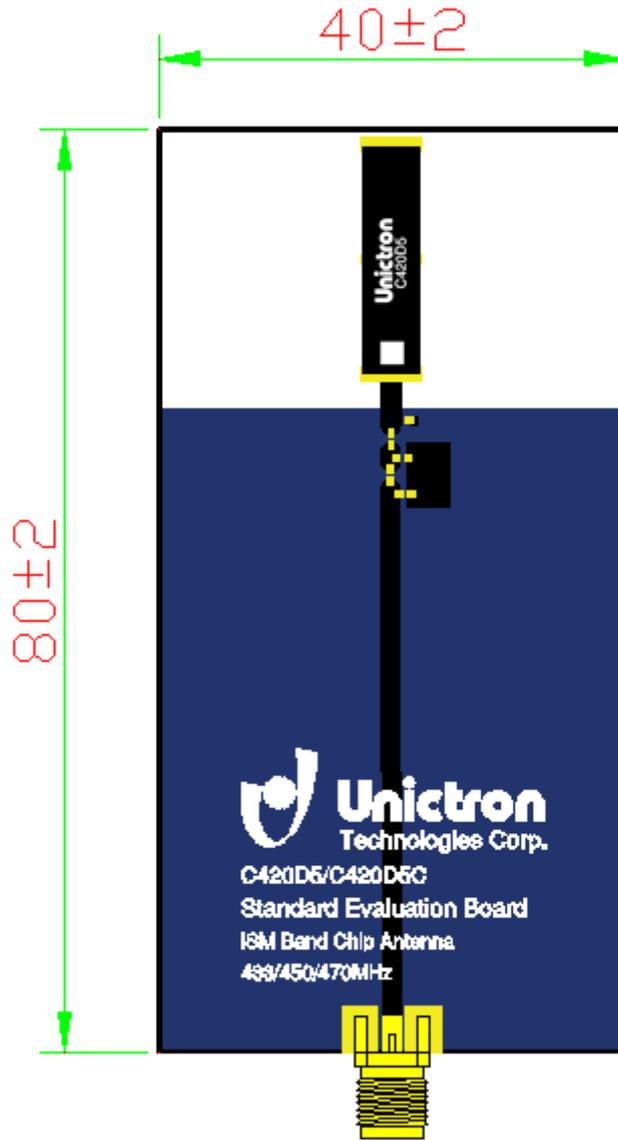
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6-2. Evaluation Board with Antenna



unit : mm



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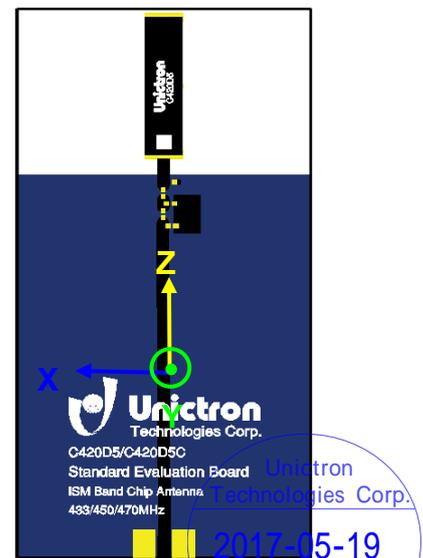
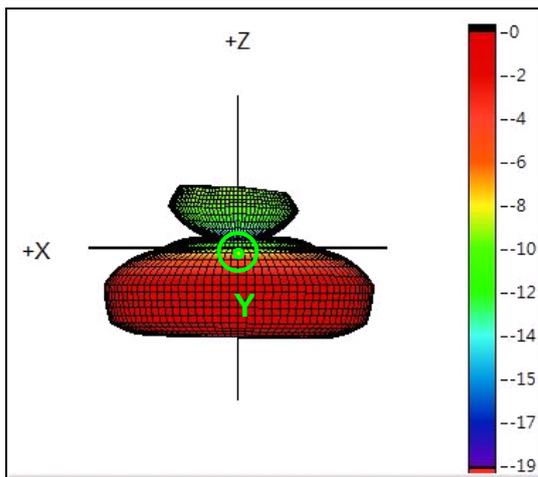
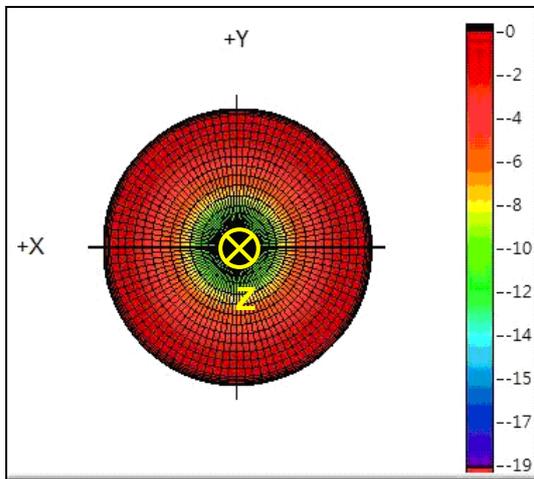
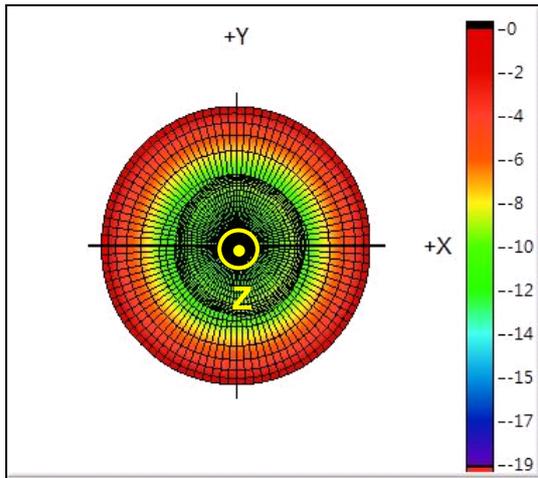
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# 7. Radiation Pattern (with 80 x 40 mm<sup>2</sup> Evaluation Board)

## 7-1. 433 MHz Band

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



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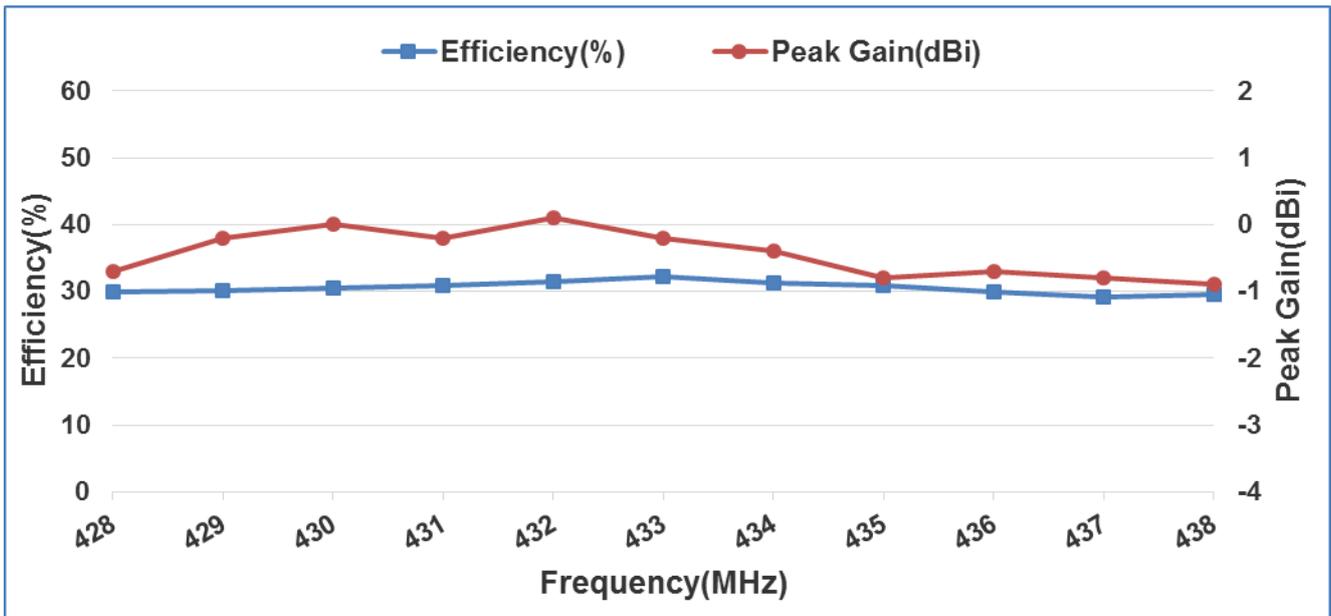
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7-1-2. 3D Efficiency Table

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



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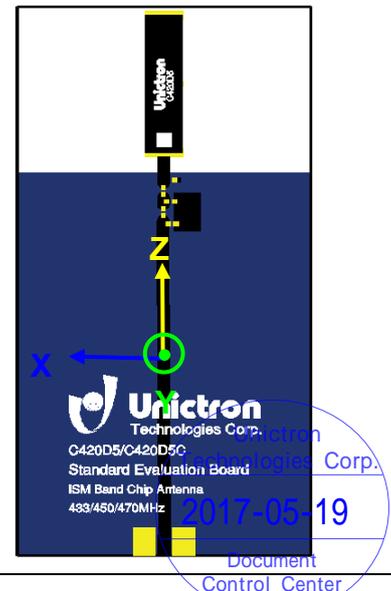
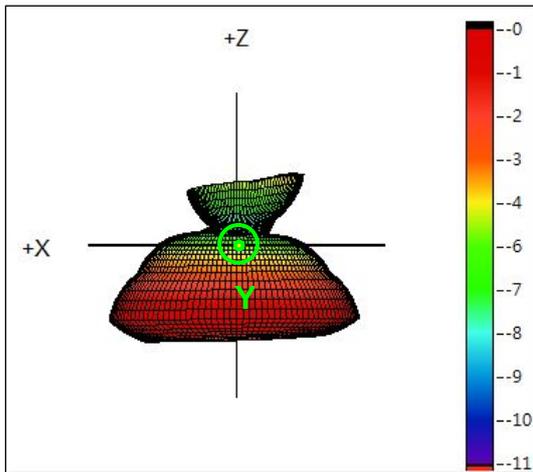
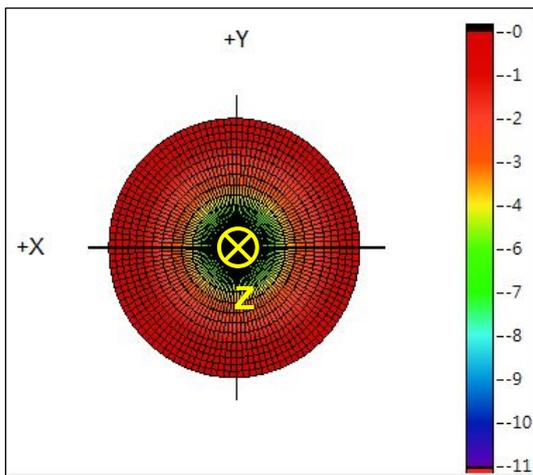
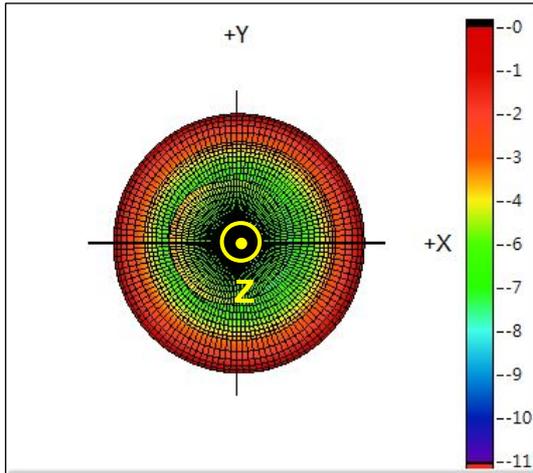
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7-2. 450 ~ 470 MHz Band

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



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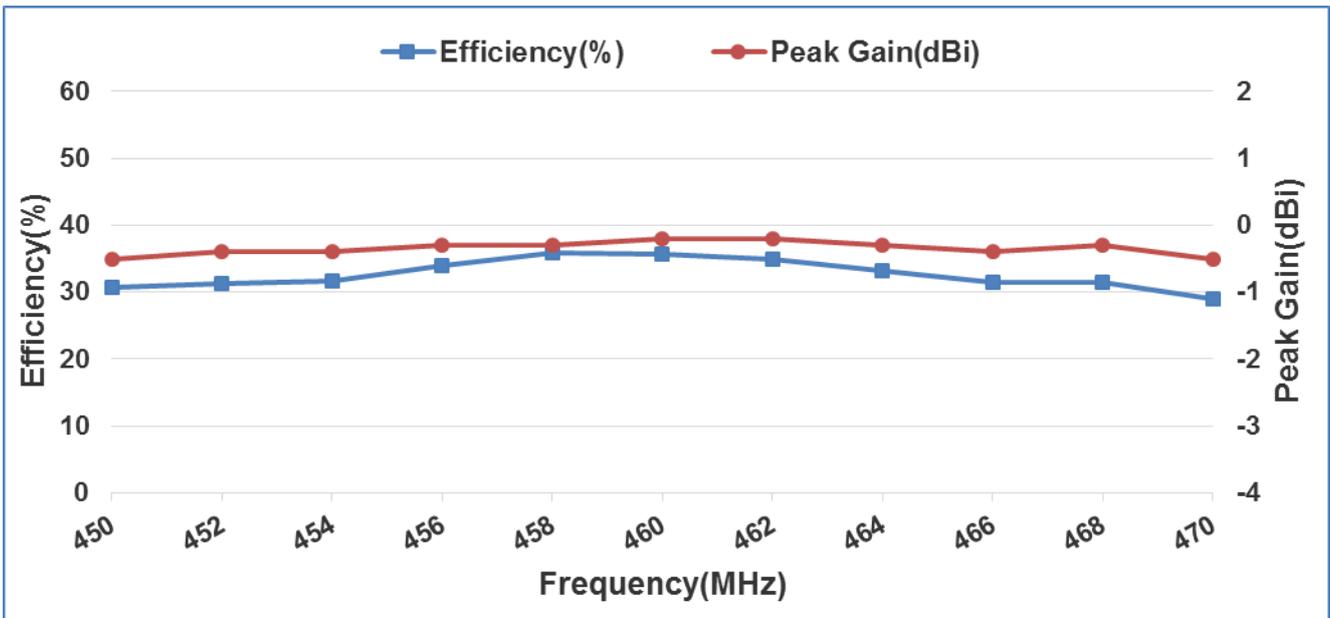
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7-2-2. 3D Efficiency Table

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



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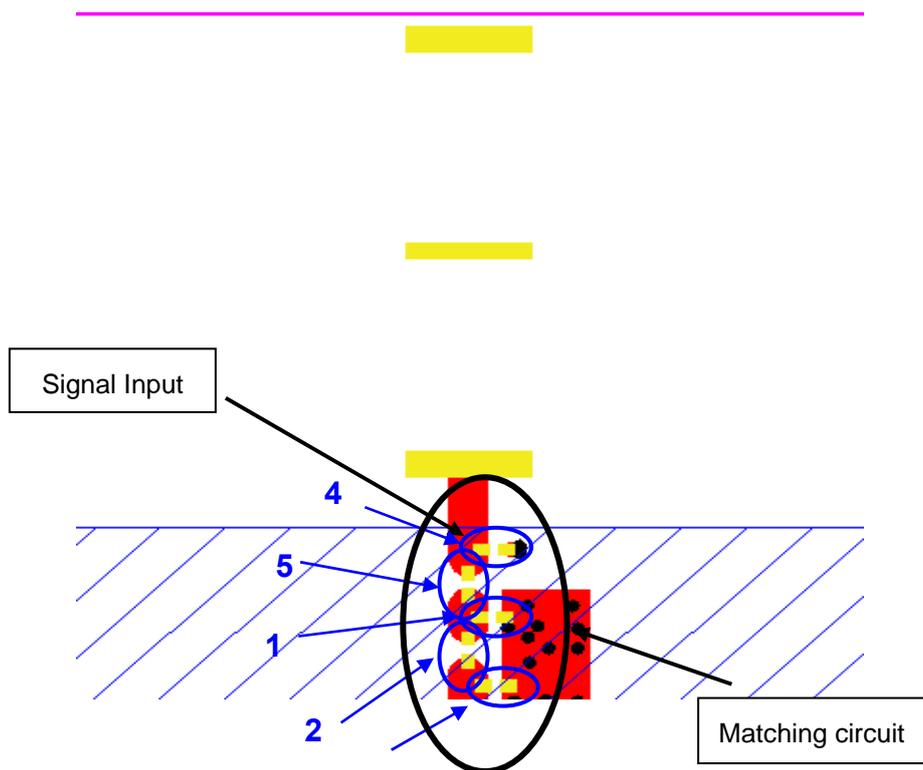
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## 8. Frequency tuning

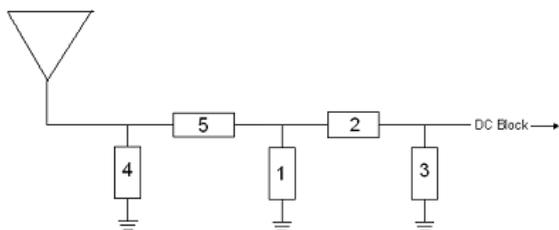
### 8-1. Chip antenna tuning scenario :



### 8-2. Matching circuit :

3

With the following recommended values of matching, the covering frequencies will be about 433 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	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%

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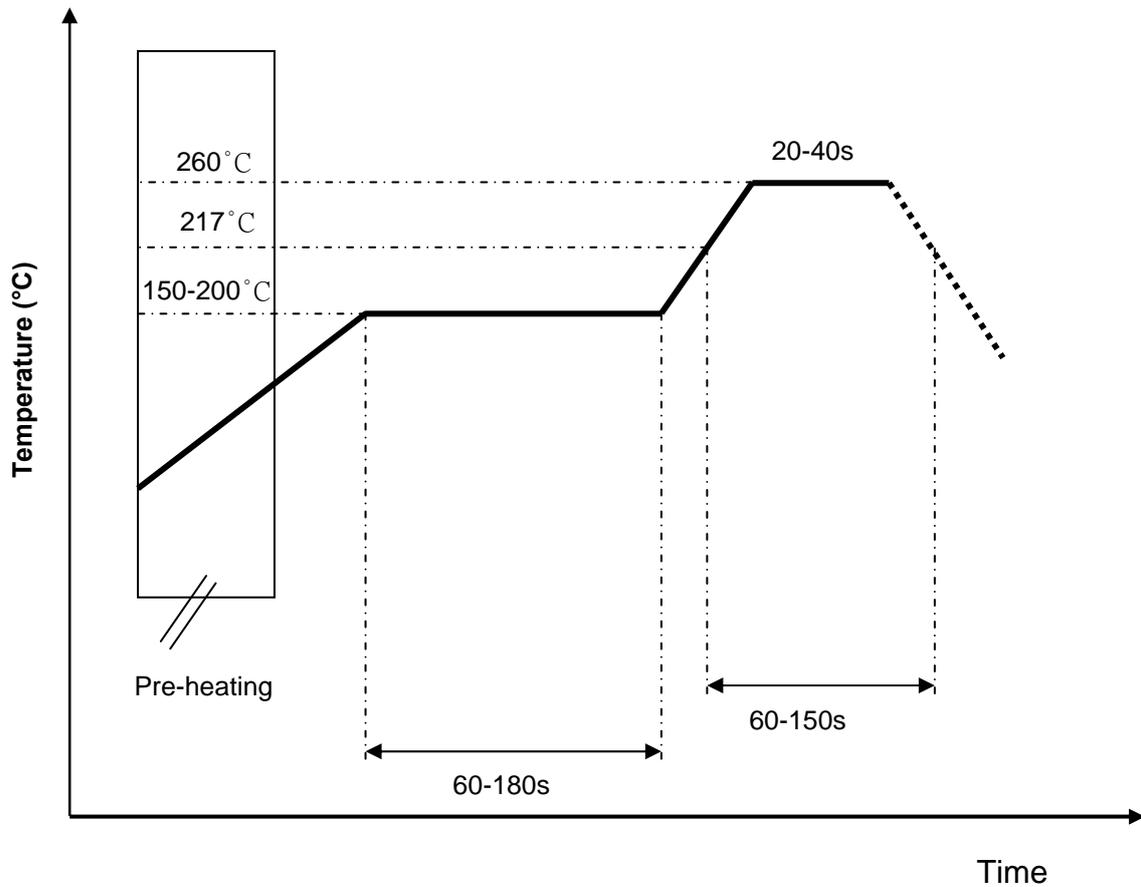
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## 9. Soldering Conditions



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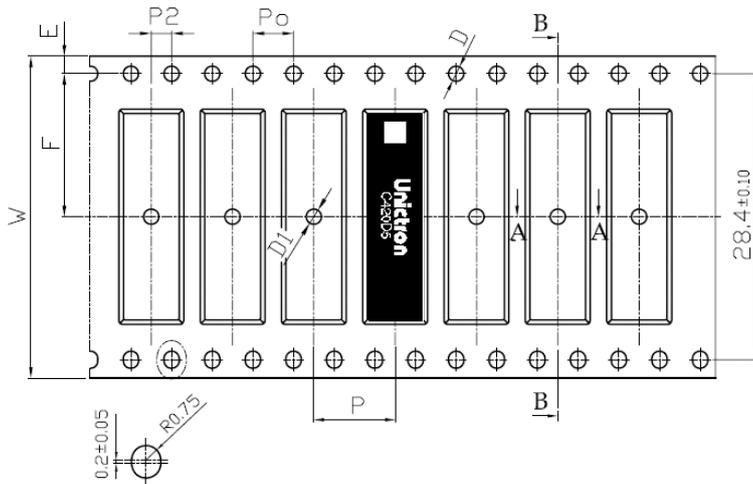
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## 10. Packing

- (1) Quantity/Reel: 3500 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°C to 85°C
- (3) Relative Humidity: 10% to 70%

### 11-2. Storage (sealed)

- (1) Storage Temperature: -5°C to 40°C
- (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°C to 85°C
- (2) Relative Humidity: 10% to 70%



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## 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.



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