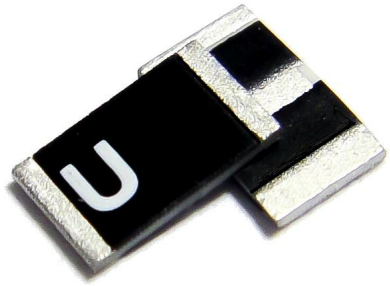
5.0 x 3.0 x 0.5 (mm) ISM 433 MHz Ceramic Chip Antenna (C4501)

Engineering Specification

1. Product Number

H	2	U	6	4	U	1	H	2	J	0	1	0	0



2. Features

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

3. Applications

*ISM 433 band
*Smart meters
*Wireless alarm and security system
*Industrial monitoring and control
*IOT applications
*LPD433

4. Description

Unictron's C4501 ceramic chip antenna is designed for ISM 433 MHz bands applications, covering frequencies 433.05 ~ 434.79 MHz. Fabricated with proprietary design and processes, C4501 shows excellent performance and is fully compatible with SMT processes which can decrease the assembly cost and improve device's quality and consistency.

Prepared by :Jane	Designed by : George	Checked by : Mike	Approved by：Herbert

TITLE：5.0 x 3.0 x 0.5 (mm) ISM 433MHz Ceramic Chip Antenna (C4501) Engineering Specification	DOCUMENT NO.	H2U64U1H2J0100	REV. D

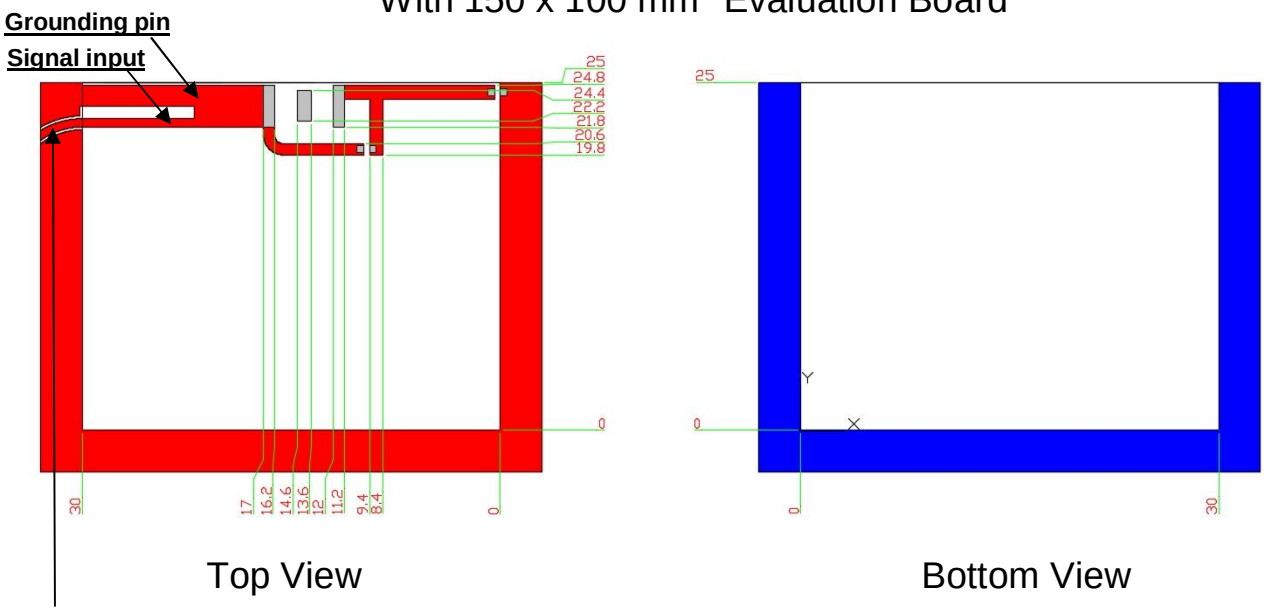
5. Layout Guide & Electrical Specifications

5-1. Layout Guide (unit：mm)

Solder Land Pattern:

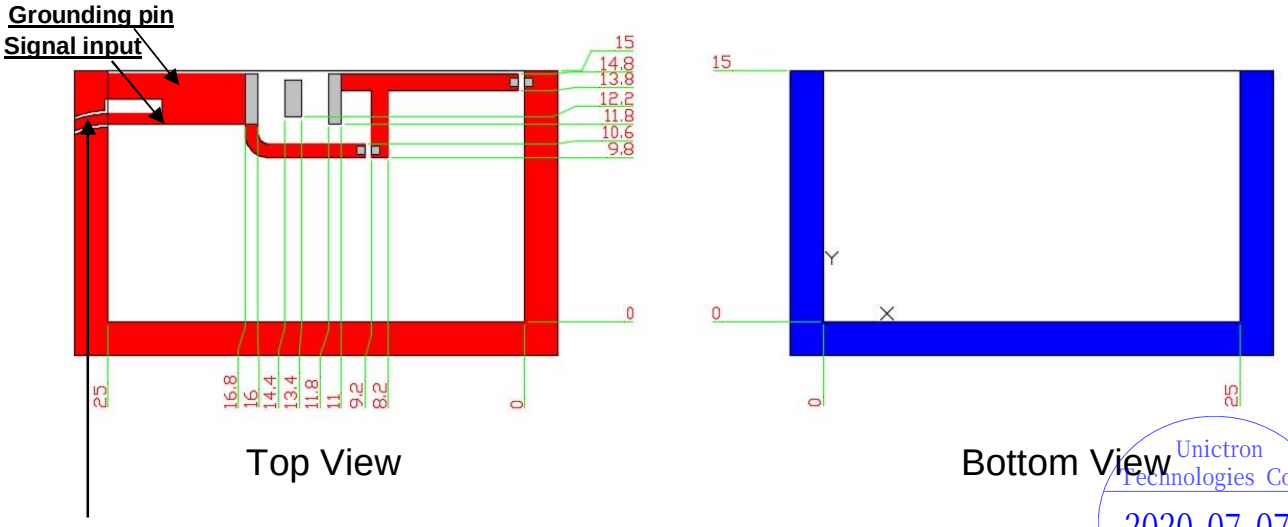
The solder land pattern (gray marking areas) is shown below. Recommendation on matching circuit will be provided according to customer's installation conditions.

With 150 x 100 mm^2 Evaluation Board



Transmission Line with 50Ω Impedance Characteristic

With 80 x 40 mm^2 Evaluation Board



Transmission Line with 50Ω Impedance Characteristic

5-2. Electrical Specifications (Evaluation Board Dimensions:150 x 100 mm^2)

5-2-1. Electrical Table

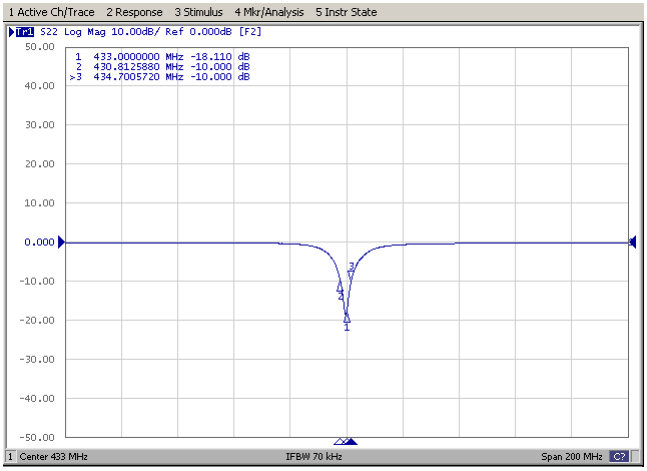
Characteristics		Specifications	Unit
Outline Dimensions		5.0 x 3.0 x 0.5	mm
Ground Plane Dimensions		150 x 100	mm
Working Frequency		433.05 ~ 434.79	MHz
VSWR (@ center frequency)*		2 Max.	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@ 433 MHz)	0.2 (typical)**	dBi
Efficiency		62 (typical)**	%

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

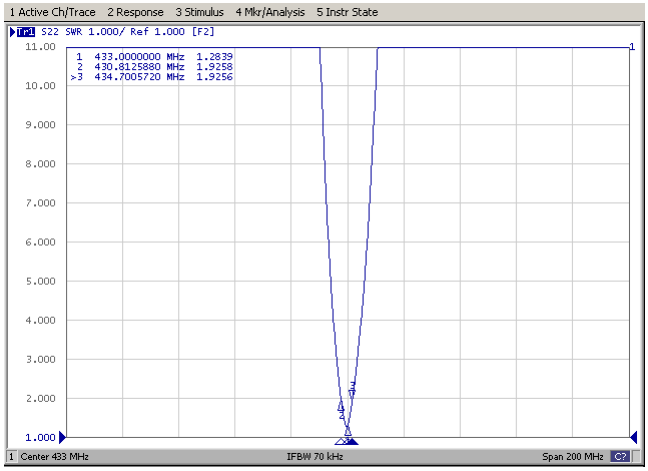
**A Typical value is for reference only, not guaranteed.

5-2-2. Return Loss & VSWR

Return Loss (S_{11})



VSWR (S_{11})



5-3. Electrical Specifications (Evaluation Board Dimensions: 80 x 40 mm^2)

5-3-1. Electrical Table

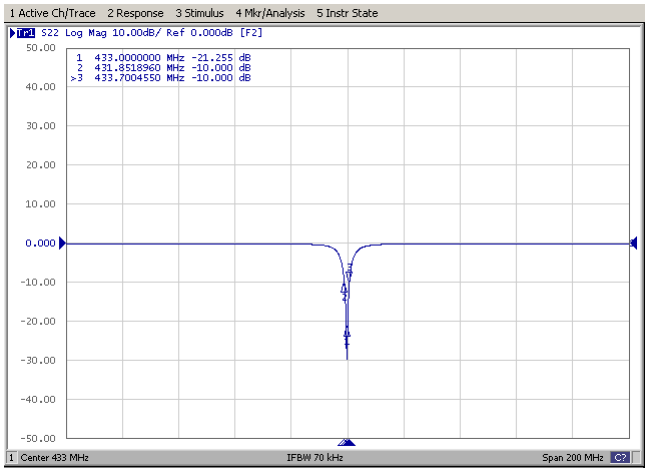
Characteristics		Specifications	Unit
Ground Plane Dimensions		80 x 40	mm
Working Frequency		433.05 ~ 434.79	MHz
VSWR (@ center frequency)*		2 Max.	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@ 433 MHz)	-7.3 (typical)**	dBi
Efficiency		12 (typical)**	%

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

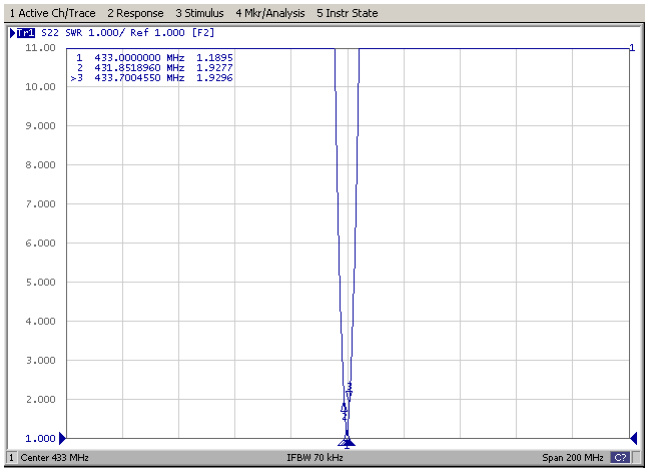
**A Typical value is for reference only, not guaranteed.

5-3-2. Return Loss & VSWR

Return Loss (S_{11})

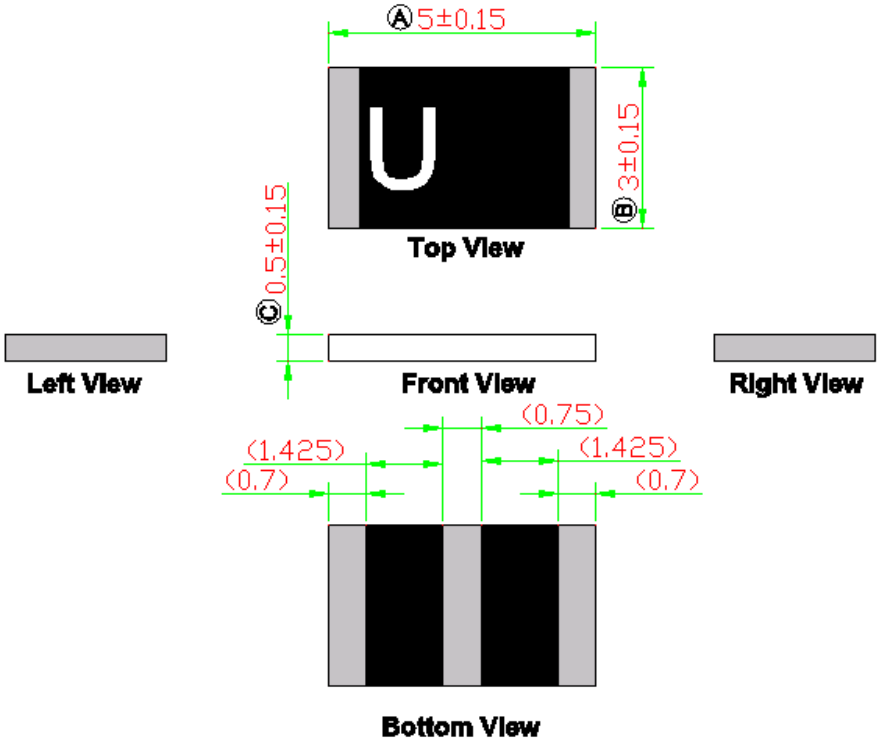


VSWR (S_{11})



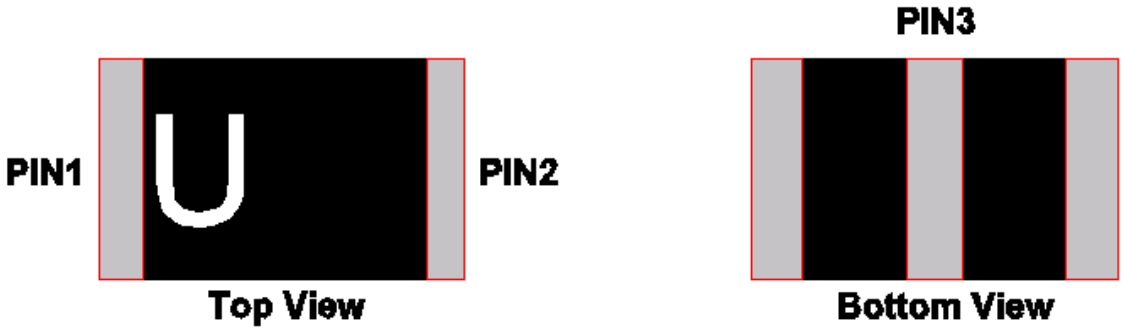
6. Outline Dimensions of Antenna & Evaluation Board (unit: mm)

6-1. Antenna Dimensions



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

PIN Definitions



Item	PIN 1	PIN 2	PIN 3
Terminal	Signal	Tuning / Ground	Soldering Pad

Prepared by :Jane | Designed by : George | Checked by : Mike | Approved by：Herbert

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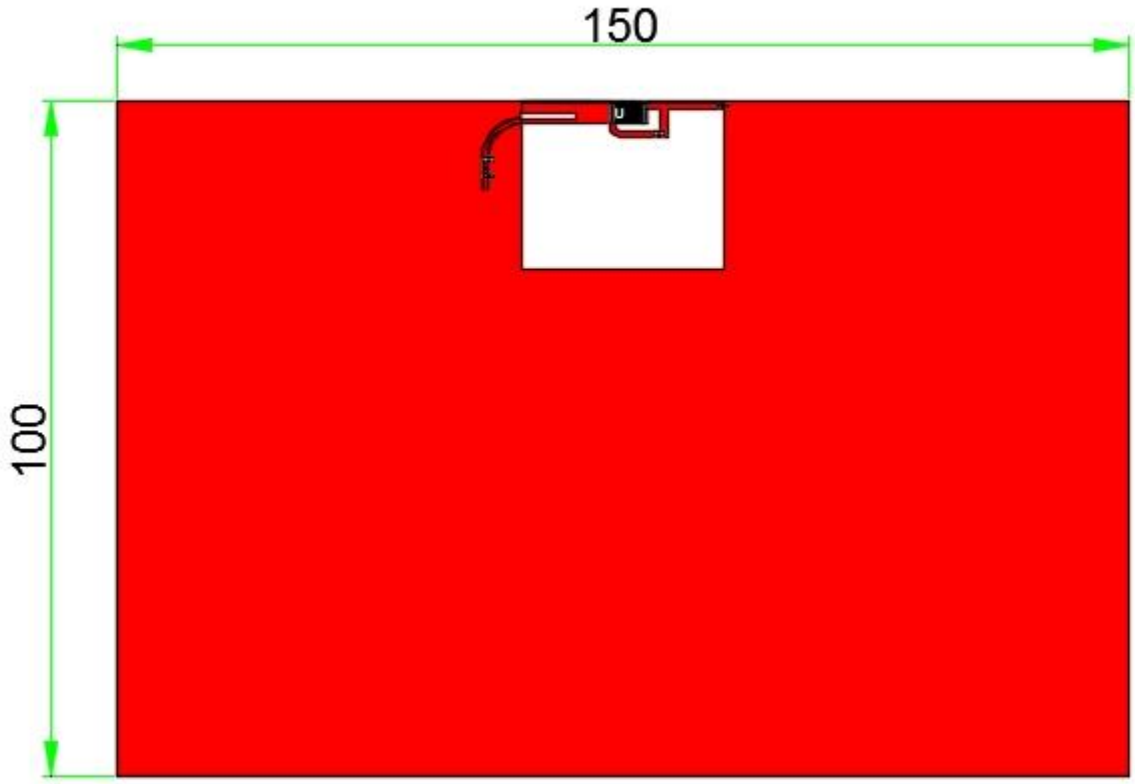
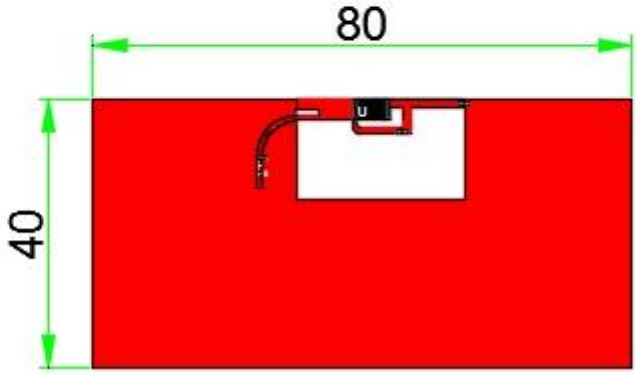
6-2. Evaluation Board with Antenna



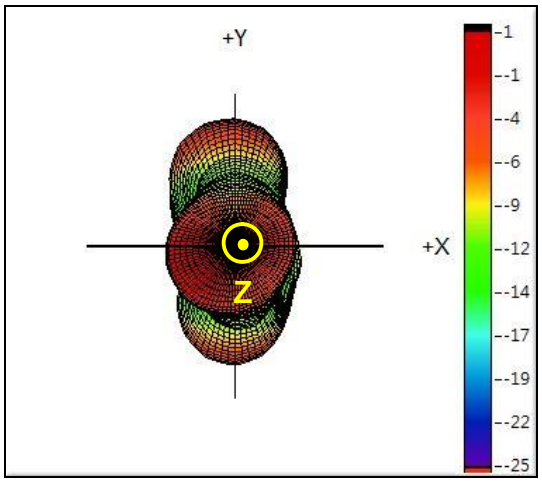


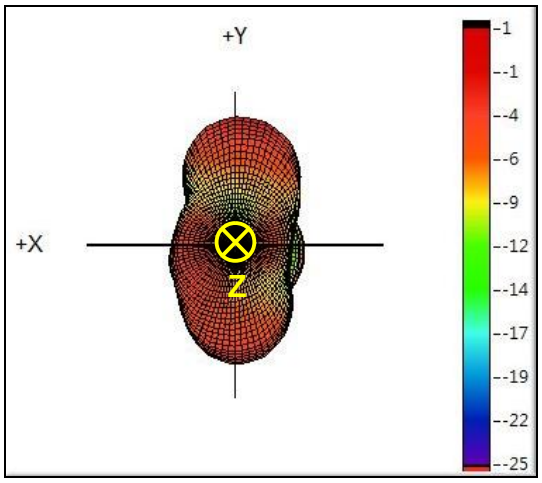
Unit：mm

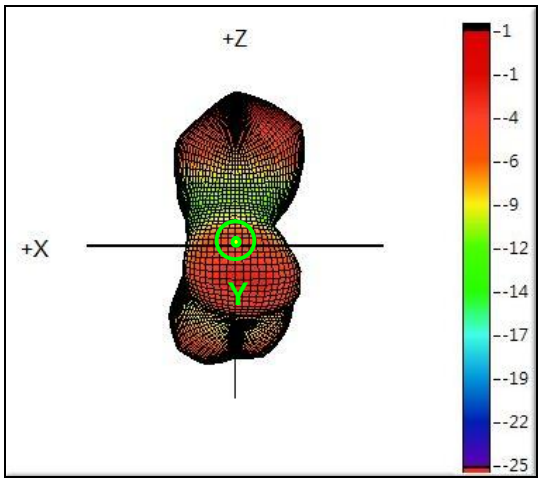
7. 3D Radiation Gain Pattern

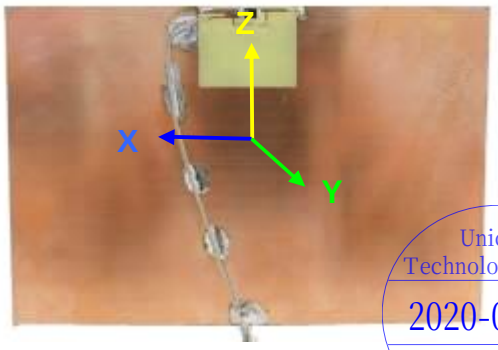
7-1. On 150 x 100 mm^2 Evaluation Board

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





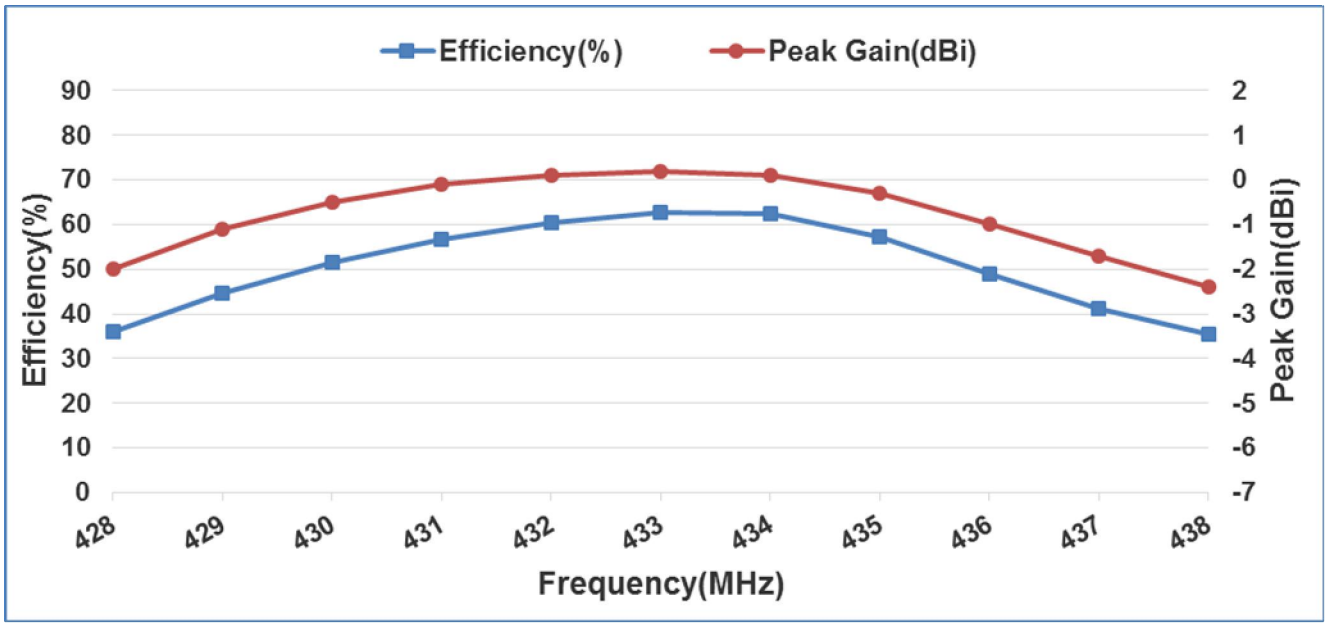




7-1-2. 3D Efficiency Table

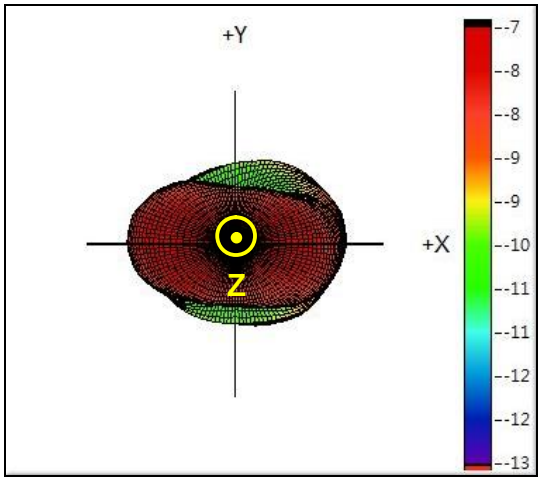
Frequency (MHz)	428	429	430	431	432	433	434	435	436	437	438
Efficiency (dB)	-4.4	-3.5	-2.9	-2.5	-2.2	-2.0	-2.1	-2.4	-3.1	-3.9	-4.5
Efficiency (%)	36.1	44.6	51.6	56.6	60.3	62.8	62.4	57.2	49.0	41.2	35.3
Peak Gain (dBi)	-2.0	-1.1	-0.5	-0.1	0.1	0.2	0.1	-0.3	-1.0	-1.7	-2.4

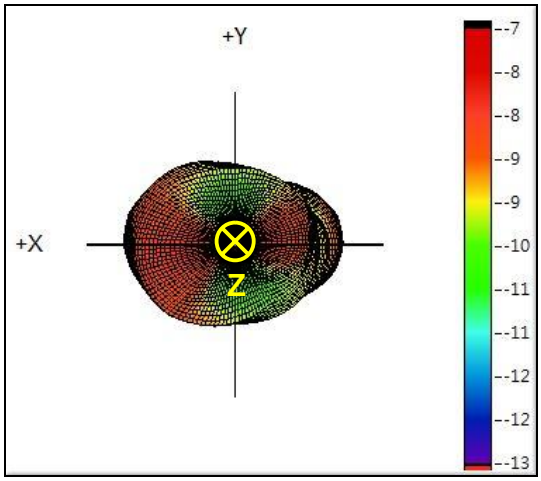
7-1-3. 3D Efficiency vs. Frequency

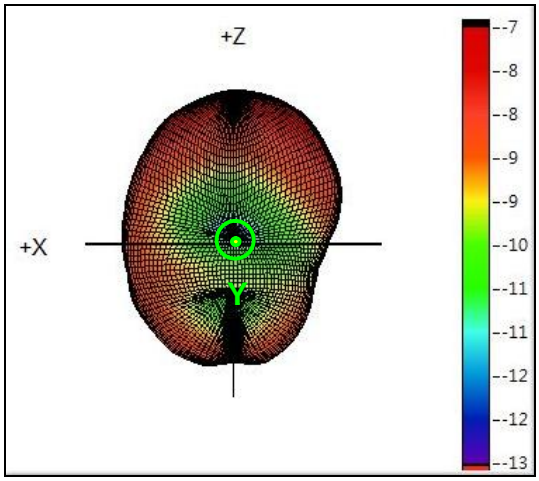


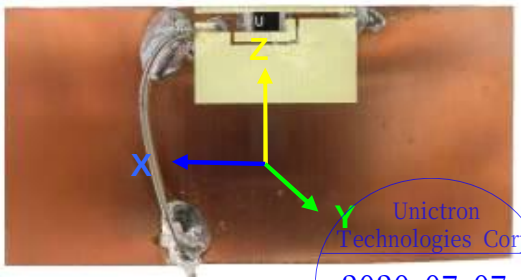
7-2. On 80 x 40 mm^2 Evaluation Board

7-2-1. 3D Radiation Gain Pattern @ 433 MHz (unit: dBi)









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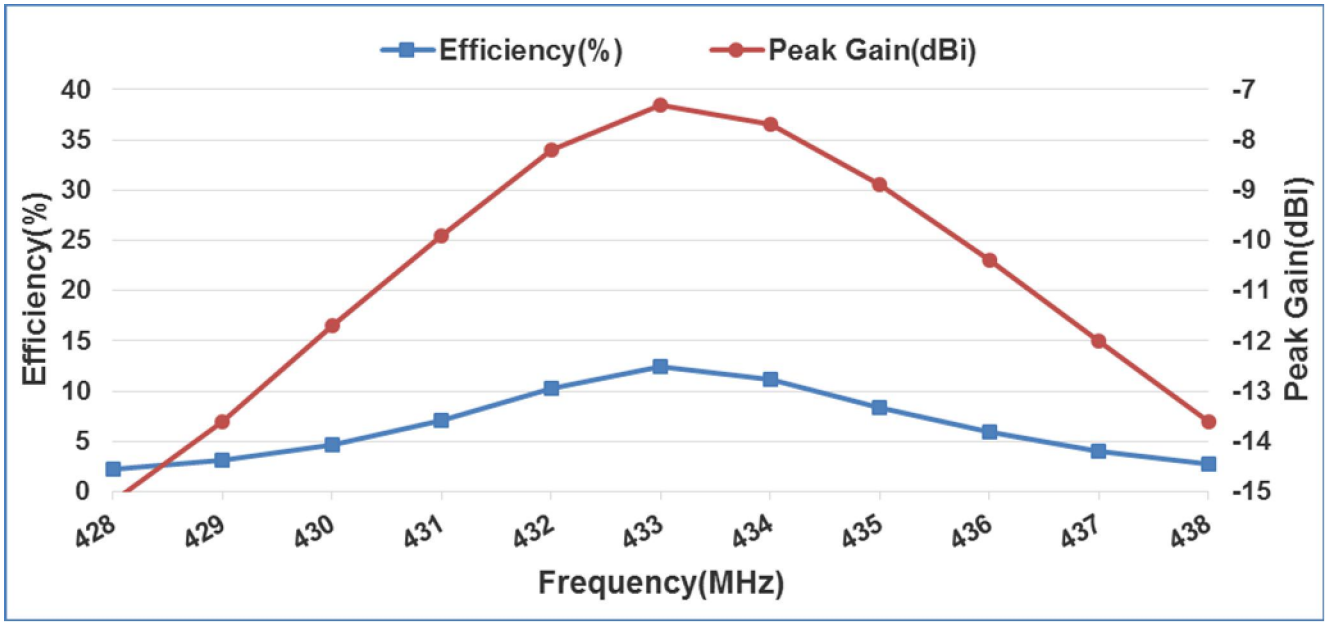
7-2-2. 3D Efficiency Table

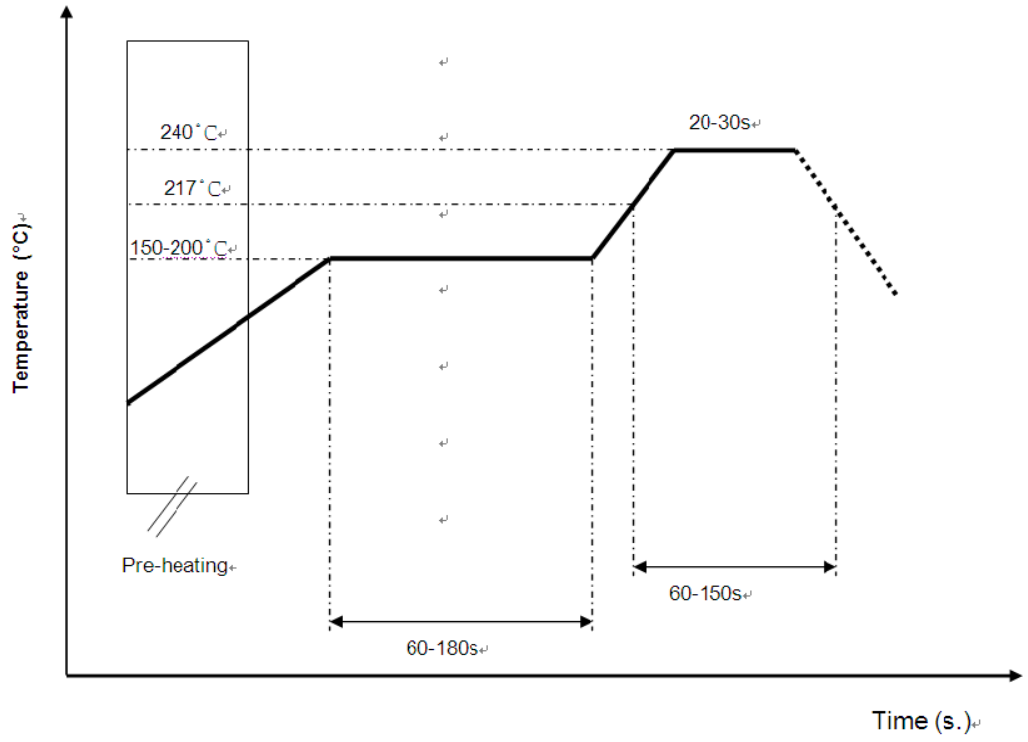
Frequency (MHz)	428	429	430	431	432	433	434	435	436	437	438
Efficiency (dB)	-16.7	-15.1	-13.3	-11.5	-9.9	-9.1	-9.5	-10.8	-12.3	-14.0	-15.6
Efficiency (%)	2.2	3.1	4.7	7.1	10.3	12.4	11.2	8.4	5.9	4.0	2.7
Peak Gain (dBi)	-15.2	-13.6	-11.7	-9.9	-8.2	-7.3	-7.7	-8.9	-10.4	-12.0	-13.6

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



8. Soldering Conditions

Typical Soldering Profile for Lead-free Process



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

9. Reminders for users of Unictron's C4501 ceramic chip antennas

9-1. This chip antenna is made of ceramic materials which is relatively more rigid and brittle compared to circuit board materials. Furthermore, the length of this antenna is quite long. Bending of circuit board at the locations where chip antenna is mounted may cause the cracking of solder joints or antenna itself.

9-2. 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.

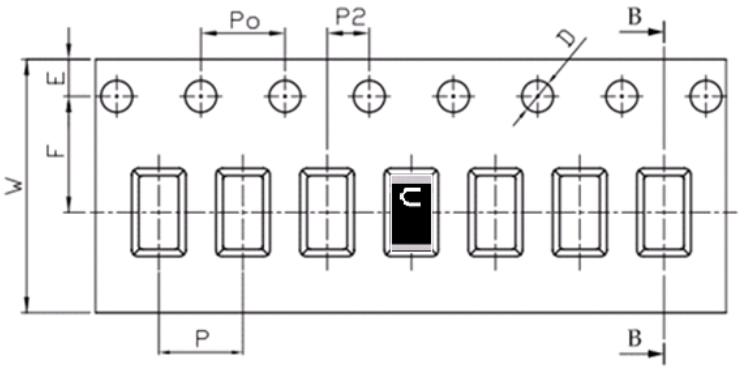
9-3. Be cautious when ultrasonic welding process needs to be used near the locations where chip antennas are installed. Strong ultrasonic vibration may cause the cracking of chip antenna solder joints

10. Packing

(1) Quantity/Reel: 6000 pcs/Reel

(2) Plastic tape:

a. Tape Drawing



b. Tape Dimensions (unit: mm)

Feature	Specifications	Tolerances
W	12.00	±0.30
P	8.00	±0.10
E	1.75	±0.10
F	5.50	±0.10
P2	2.00	±0.10
D	1.20	+0.10 -0.00
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.