40.0 x 5.0 x 6.0 (mm) LTE Full-Band Ceramic Chip Antenna (CC40D9) Engineering Specification

1. Product Number

H	2	U	E	3	P	1	D	2	G	0	1	0	0

2. Features

* Compatible with LTE full-band/ 3G/ 2G
* Stable and reliable in performances
* Compact size
* RoHS2.0 compliance
* SMT processes compatib
* AEC-Q200 compliant

3. Applications

* LTE full-band/ 3G/ 2G.
* LTE / GSM / CDMA /DCS /PCS / WCDMA / UMTS / HSDPA / GPRS / EDGE /IMT.

4. Description

Unictron's CC40D9 ceramic chip antenna is designed for cellular 2G/ 3G/ LTE bands applications, covering frequencies 698~960 MHz & 1710~2690 MHz. Fabricated with proprietary design and processes, CC40D9 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 : Tom	Checked by : Mike	Approved by : Herbert

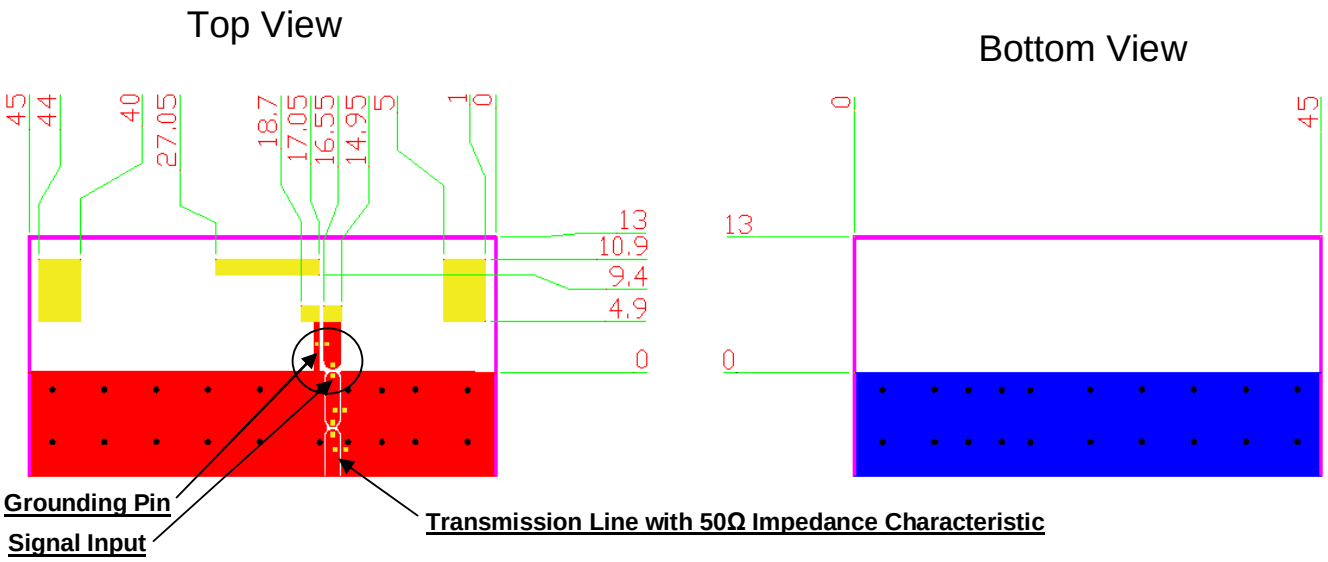
TITLE : 40.0 x 5.0 x 6.0 (mm) LTE Full-Band Ceramic Chip Antenna (CC40D9) Engineering Specification	DOCUMENT NO.	H2UE3P1D2G0100	REV. G

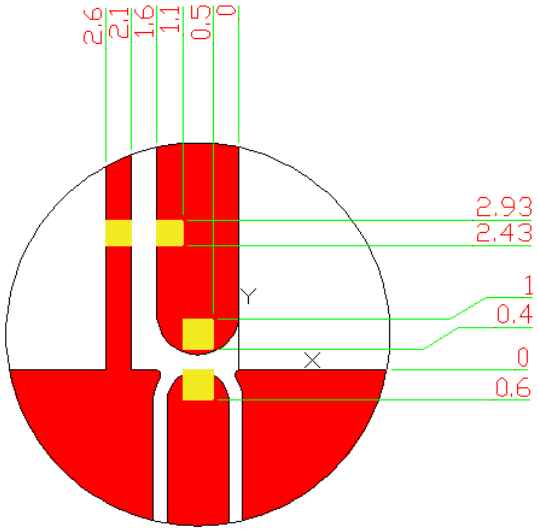
5. Layout Guide & Electrical Specifications

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.





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5-2. Electrical Specifications (with 120 x 45 mm^2 Evaluation Board)

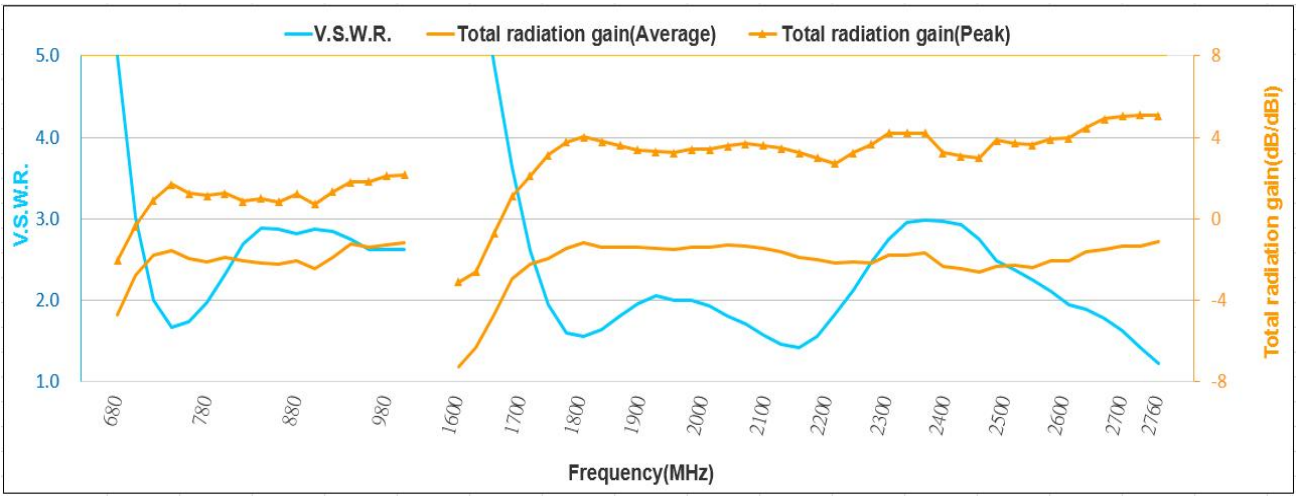
5-2-1. Electrical Table

Characteristics	Specifications				
Outline Dimension (mm)	40.0 x 5.0 x 6.0				
Ground Plane Dimension (mm)	107 x 45				
Working Frequency (MHz)	698 ~ 798	824 ~ 960	1710 ~ 2170	2300 ~ 2400	2490 ~ 2690
Peak Gain (dBi) (typical)**	1.4	0.7	3.2	3.8	4.2
Efficiency (%) (typical)**	65	57	69	67	62
VSWR (@ center frequency)*	＜3.5：1				
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.

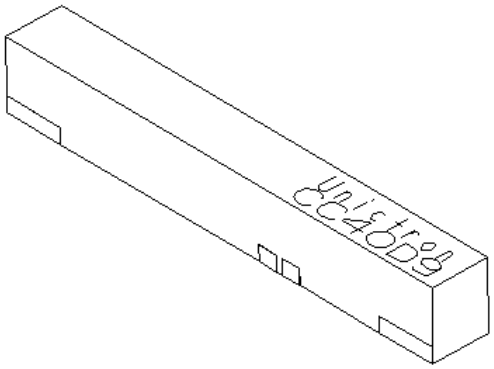
**A typical value is for reference only, not guaranteed.

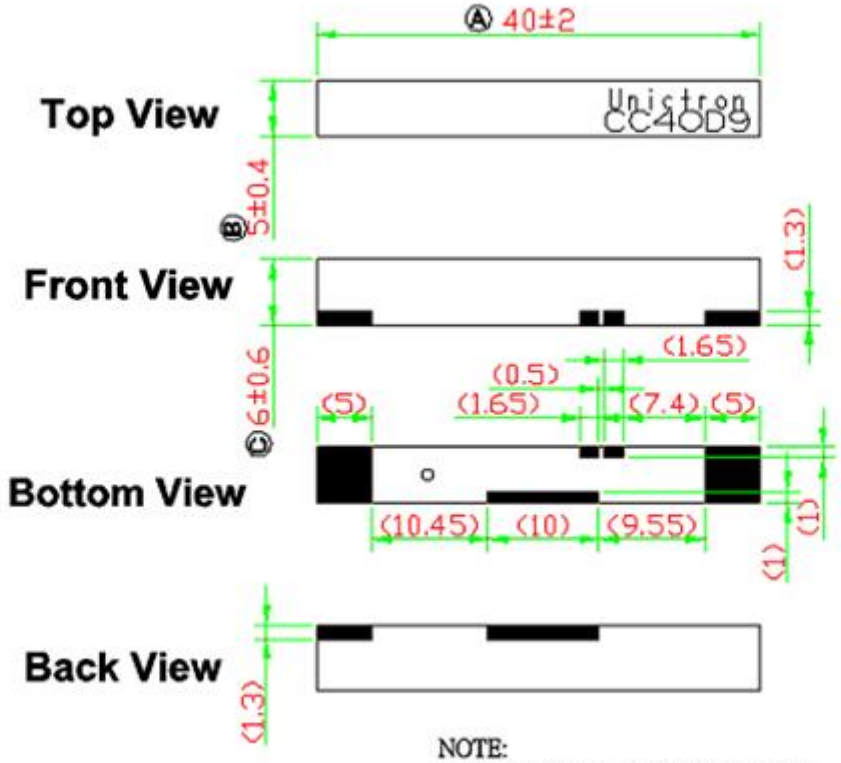
5-2-2. V.S.W.R. and Total Radiation Gain vs. Frequency



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

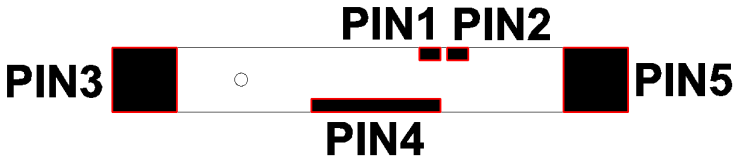
6-1. Antenna Dimensions





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

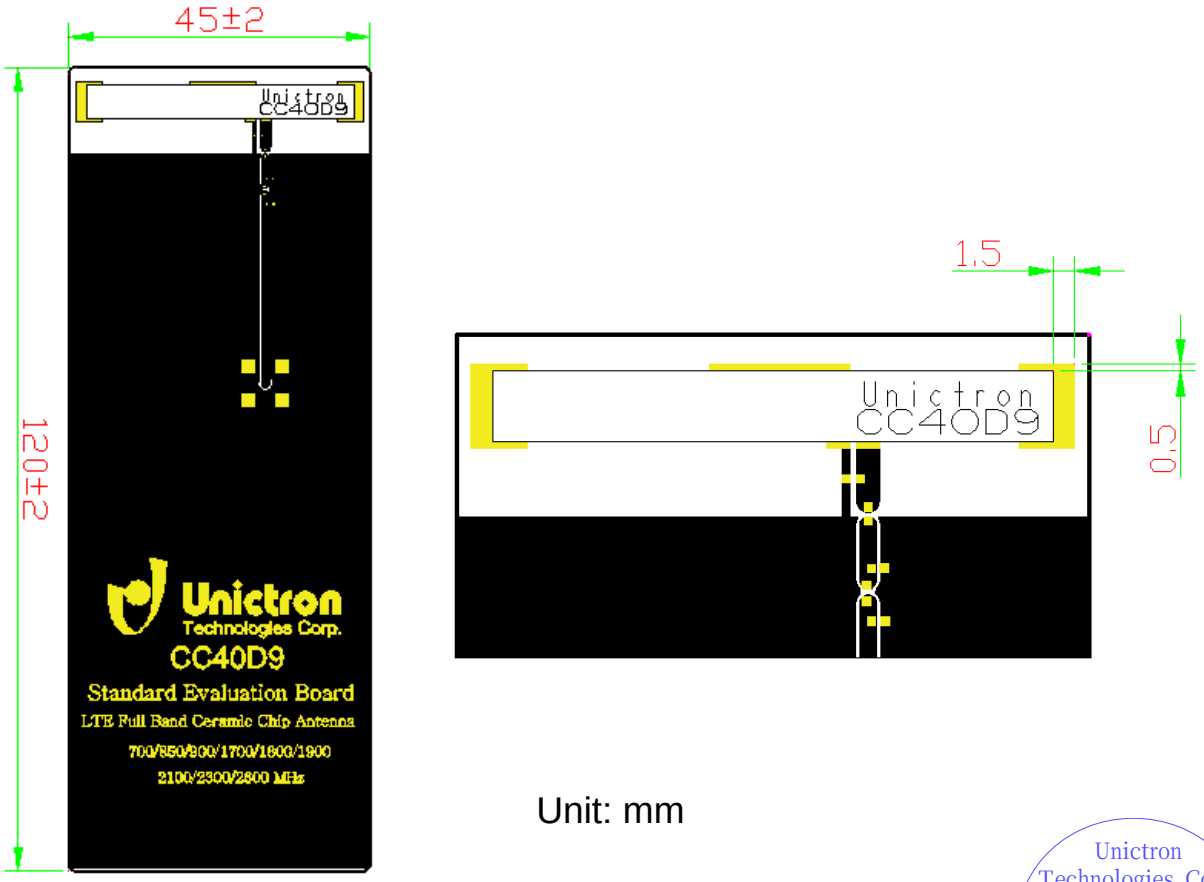
PIN Definitions



Bottom View

PIN	1	2	3~5
Soldering Pad	Tuning/Ground	Signal	N/C

6-2. Evaluation Board & Antenna's Location

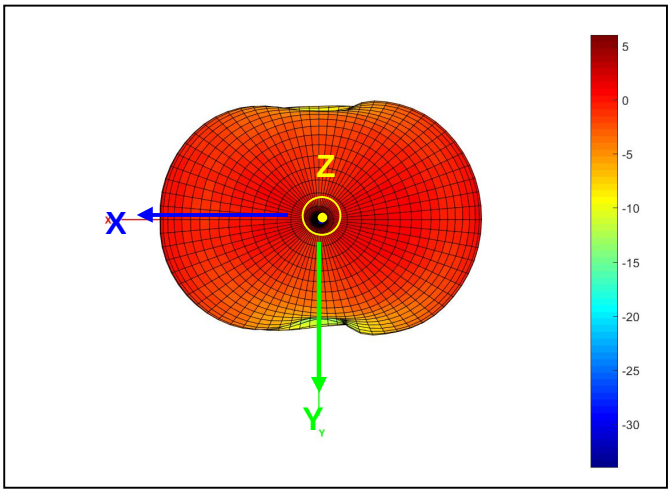


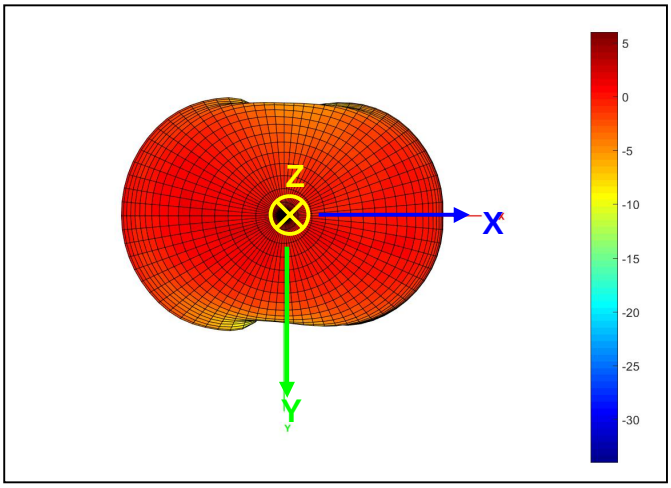
Unit: mm

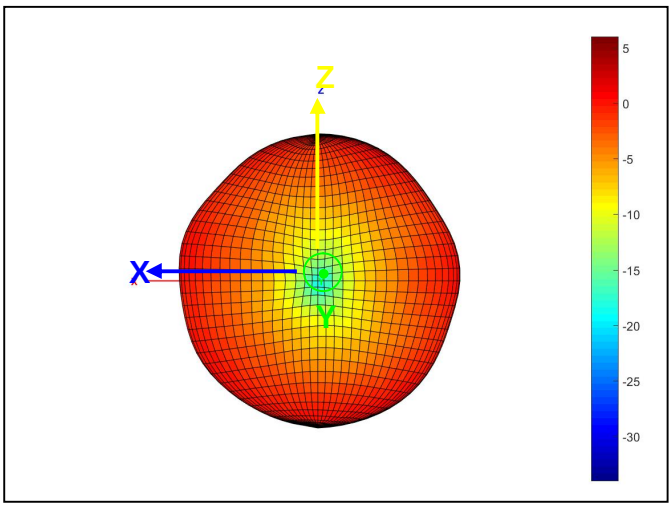
7. 3D Radiation Gain Pattern (with 120 x 45 mm² Evaluation Board)

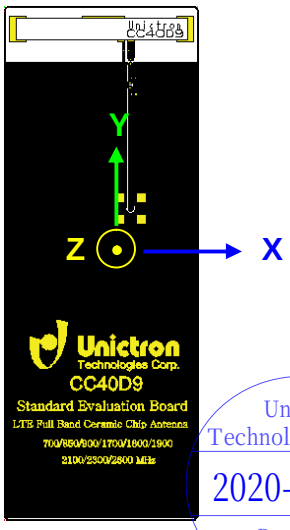
7-1. 698~798MHz Band

3D Radiation Gain Pattern @ 748 MHz (Unit: dBi)



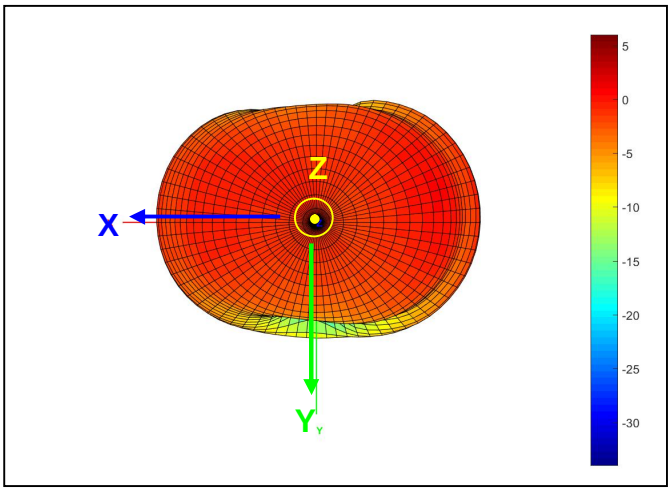


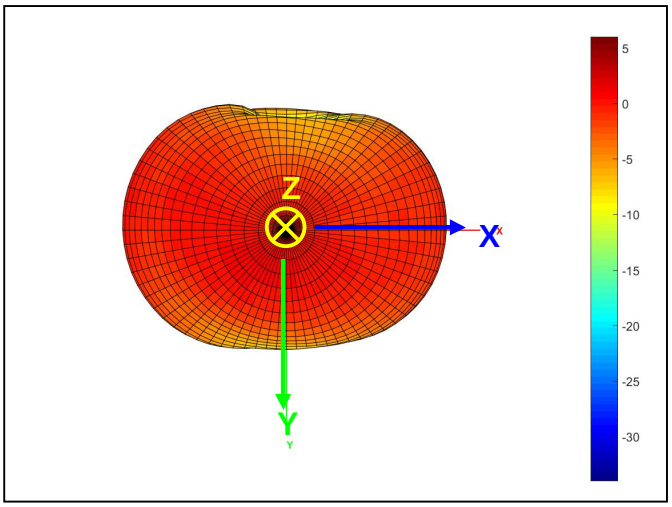


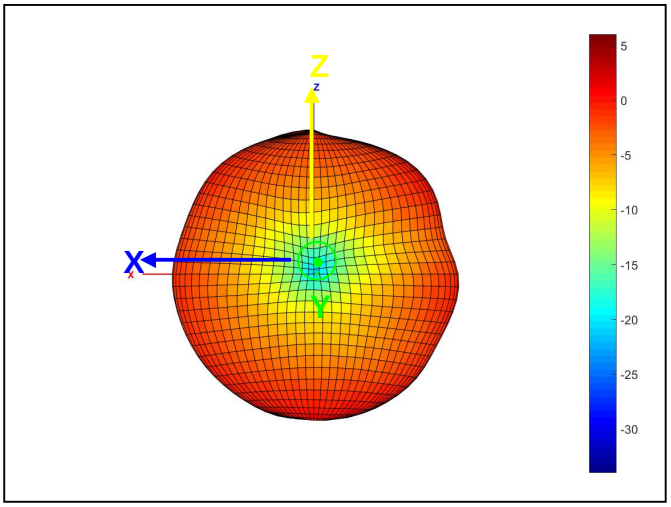


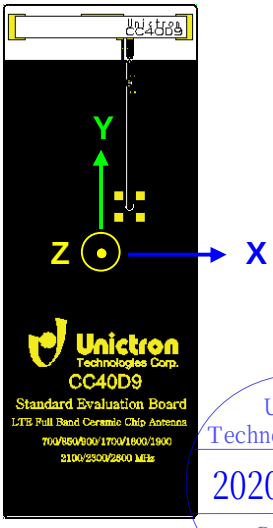
7-2. 824~960MHz Band

3D Radiation Gain Pattern @ 900 MHz (Unit: dBi)









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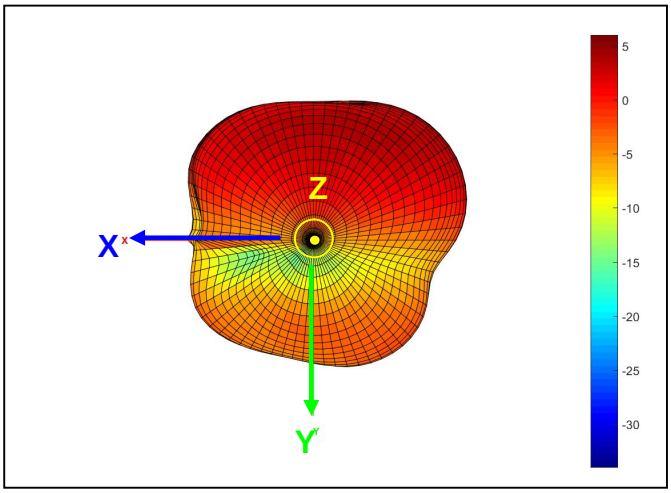
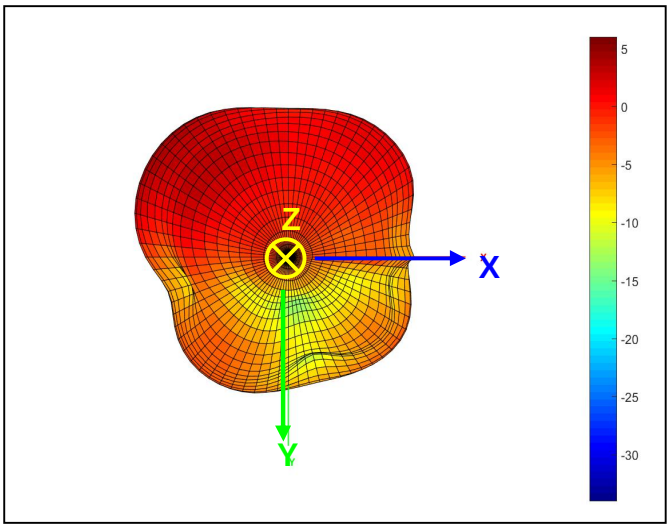
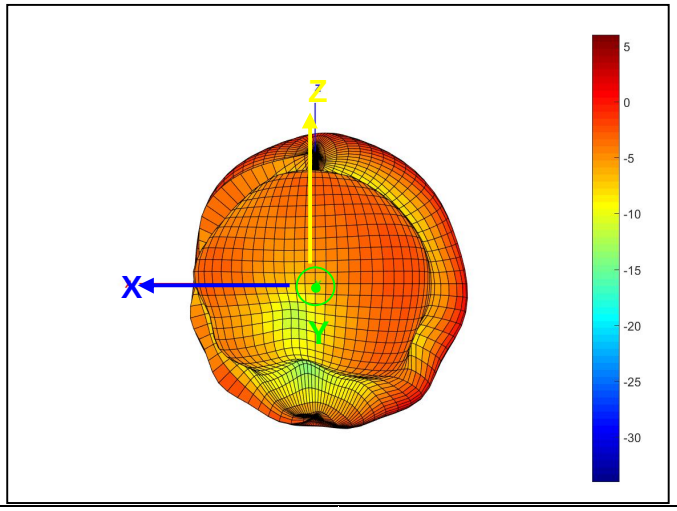
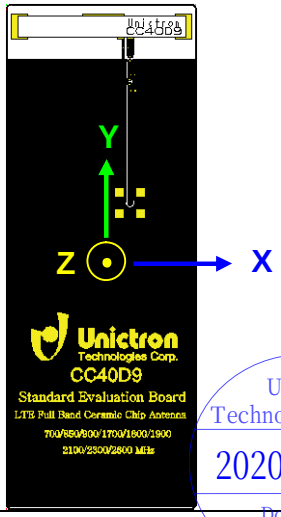
7-3. 1710~2170MHz Band

3D Radiation Gain Pattern @ 1950 MHz (Unit: dBi)



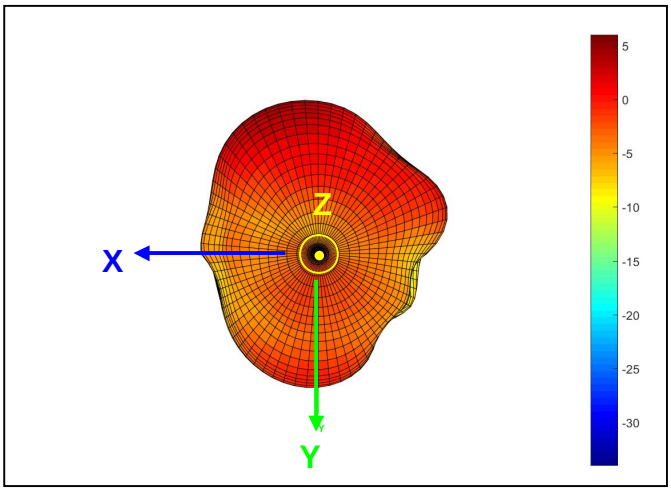


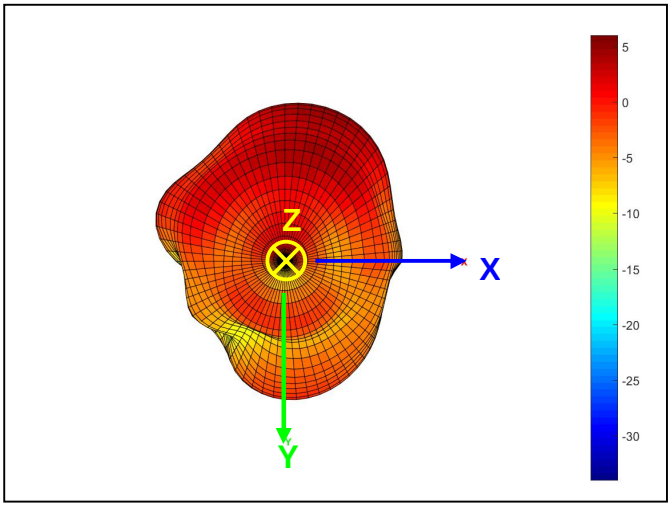


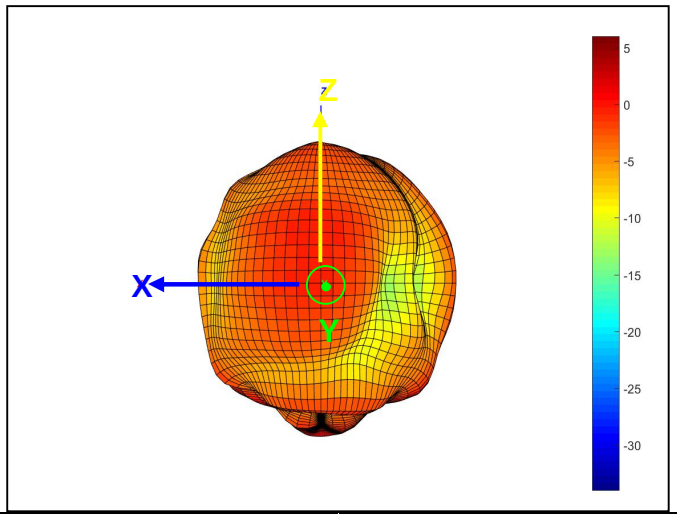


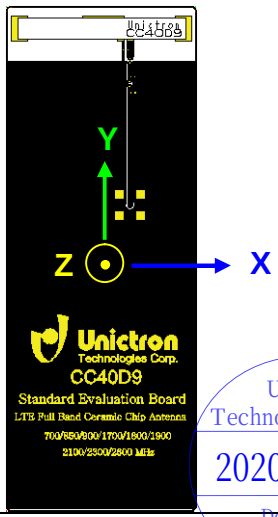
7-4. 2300~2400MHz Band

3D Radiation Gain Pattern @ 2350 MHz (Unit: dBi)



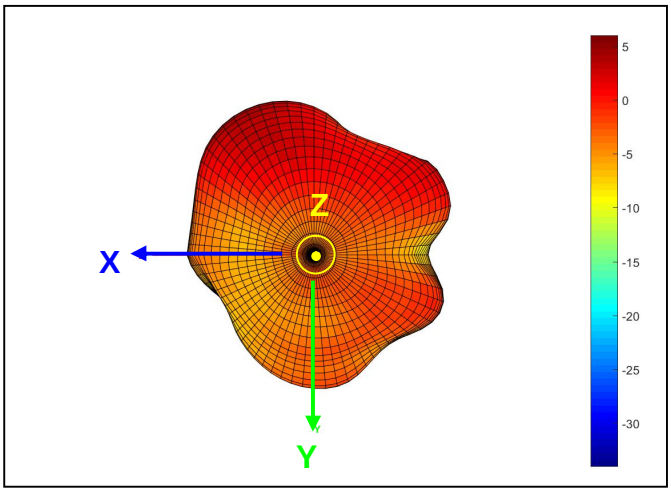


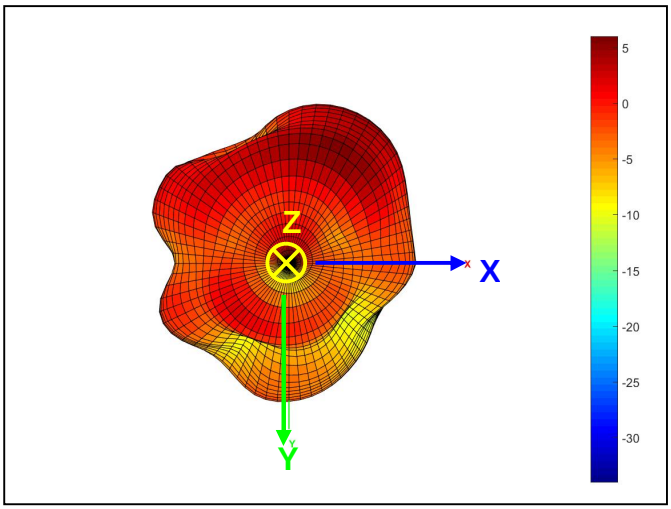


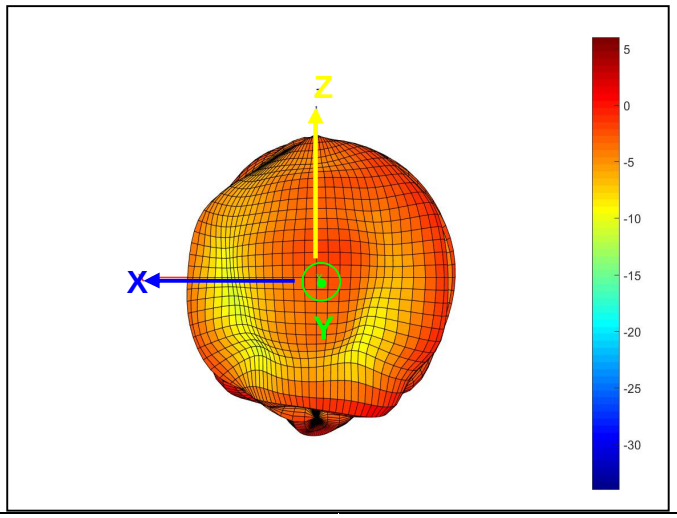


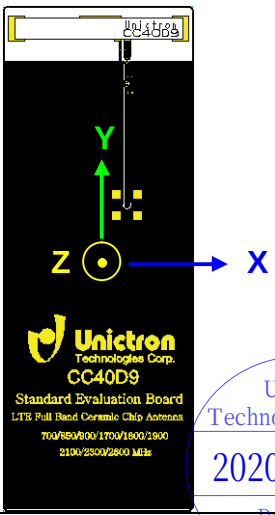
7-5. 2490~2690MHz Band

3D Radiation Gain Pattern @ 2590 MHz (Unit: dBi)



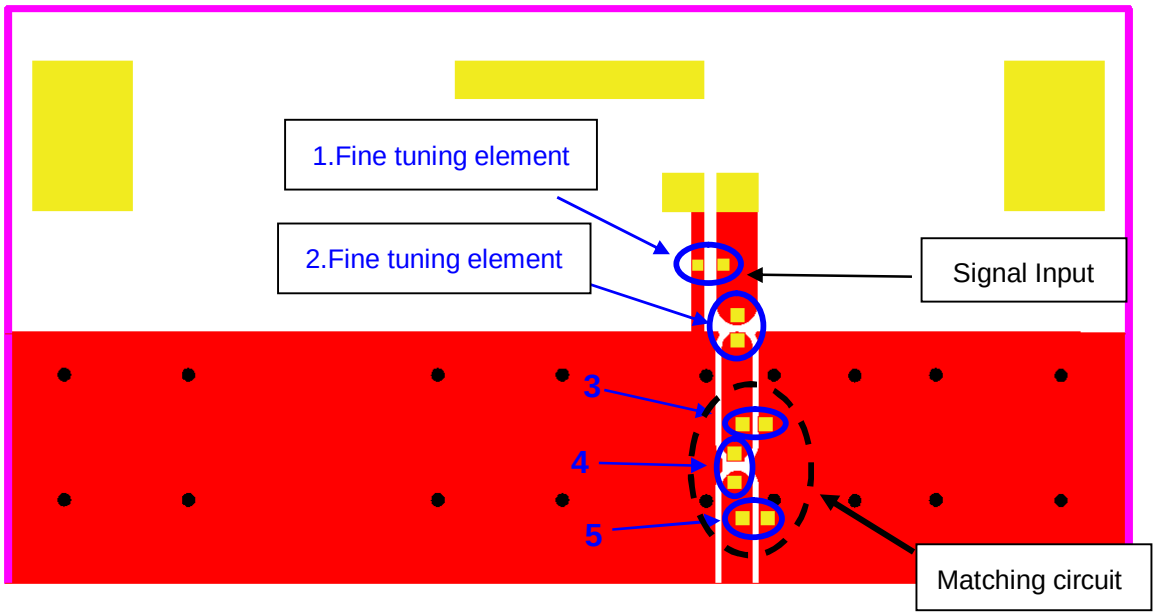






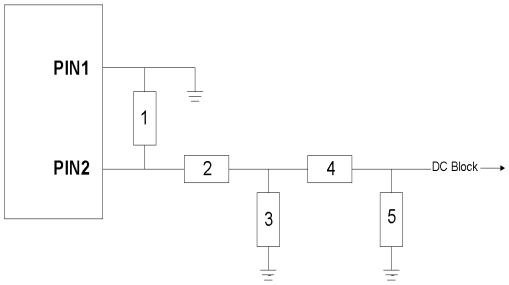
8. Frequency tuning

8-1. Chip antenna tuning scenario：



8-2. Matching circuit：

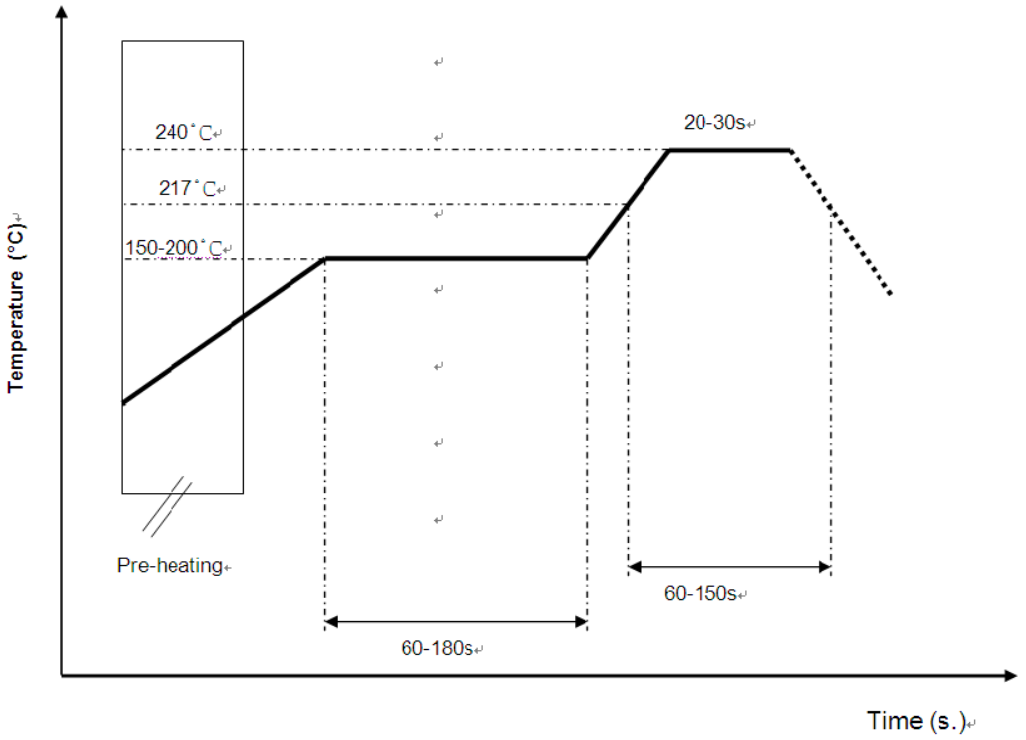
With the following recommended values of matching and tuning components, the covering frequencies will be about 698~960 MHz & 1710~2690 MHz at our standard 120 x 45 mm^2 evaluation board. However, these are typical reference values which may need to be changed when circuit boards or part vendors are different.



System Matching Circuit Component			
Location	Description	Vendor	Tolerance
1 Fine tuning element	5.6 nH (0402)	MURATA	±0.1 nH
2 Fine tuning element	3.6 pF (0402)	MURATA	±0.05 pF
3	N/C	-	-
4	0Ω (0402)	-	-
5	N/C	-	-

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 CC40D9 ceramic chip antennas

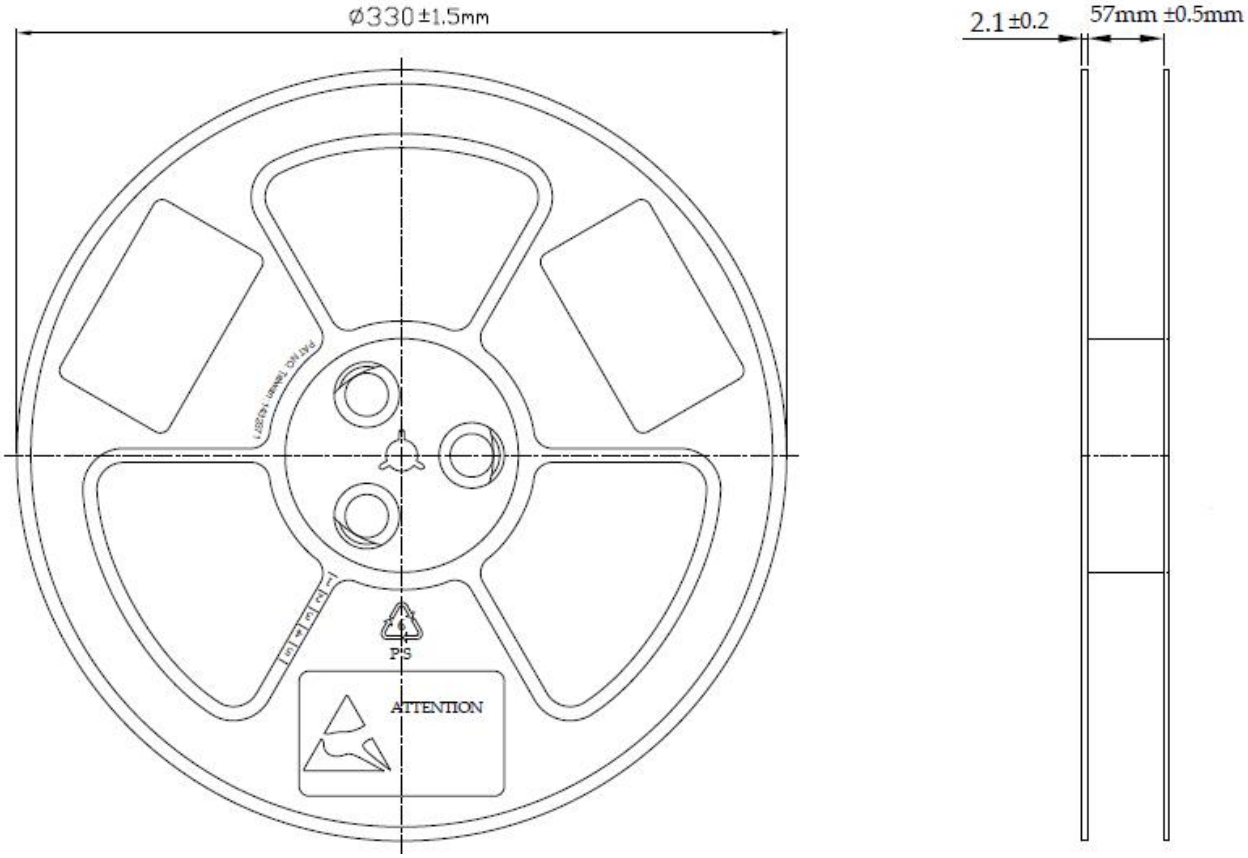
10-1. This chip antenna is made of ceramic materials which is relatively more rigid and brittle compared to circuit board materials. Furthermore, the length of this antenna is quite long. Bending of circuit board at the locations where chip antenna is mounted may cause the cracking of solder joints or antenna itself.

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.

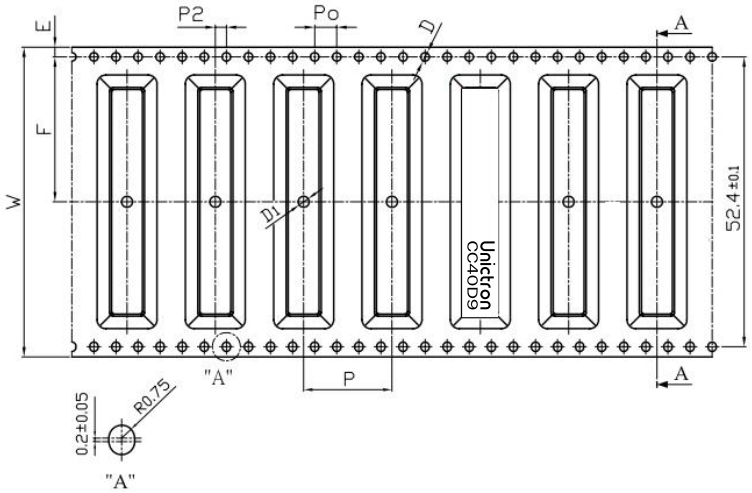
10-3. Be cautious when ultrasonic welding process needs to be used near the locations where chip antennas are installed. Strong ultrasonic vibration may cause the cracking of chip antenna solder joints.

11. Packing(Unit: mm)

a. Reel Dimensions



b. Tape Drawing



c. Tape Dimensions

Feature	Specifications	Tolerances
W	56.00	±0.30
P	16.00	±0.10
E	1.75	±0.10
F	26.20	±0.15
P2	2.00	±0.15
D	1.50	+0.10 -0.00
D1	2.00	±0.10
Po	4.00	±0.10
10Po	40.00	±0.20

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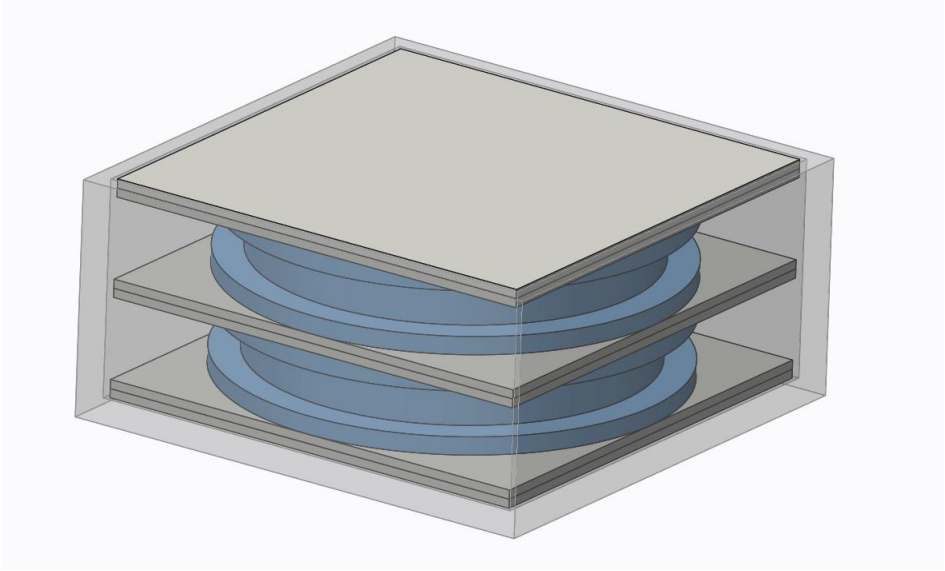
d. (1) Weight: 1 pcs / 4.0g typ
1 Reel / 3.1Kg typ
(2) Quantity/Reel: 600 pcs/Reel
(3) Plastic tape: Clear Non Anti-static Polystyrene

e. (1) Weight: 2 Reel /1 carton 6.8Kg typ
(2) 2 Reel / 1200 pcs in one carton
(3) Carton Dimensions – 340*350*200 mm



12. Operating & Storage Conditions

12-1. Operating

(1) Maximum Input Power: 2 W

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

(3) Relative Humidity: 10% to 70%

12-2. Storage (sealed)

(1) Storage Temperature: -5℃ to 40℃

(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℃ to 85℃

(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.

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 10 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: 5Kgf； * 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