Unictron Technologies Corp.

LTE Full-Band Ceramic Chip Antenna
Model: CC40D9
Product Number: H2UE3P1D2G0100

REFERENCE SPECIFICATION

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Table of Contents

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1 Introduction

Unictron's CC40D9 ceramic chip antenna is designed to cover the full cellular 2G / 3G / GSM / 4G / LTE bands, covering frequencies 698~960 MHz & 1710~2690 MHz. Fabricated with proprietary design and processes, CC40D9 delivers excellent performance and is fully compatible with SMT processes which decreases the assembly cost and improve device's quality and consistency.

Features

* LTE full-band coverage
* High efficiency
* Stable and reliable in performances
* Compact size
* RoHS compliance
* SMT processes compatible

Applications

* LTE / GSM / CDMA / DCS / PCS WCDMA / UMTS / HSDPA / GPRS EDGE / IMT
* Cellular 4G / 3G / 2G applications

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2 Electrical Characteristics

2.1 Table with electrical properties:

Electrical Specifications (Evaluation Board Dimensions: 120 x 45mm^2)

Electrical Table						
Characteristics	**Specifications**					**Unit**
Outline Dimensions	40.0 x 5.0 x 6.0					mm
Ground Plane Dimensions	107 x 45					mm
Working Frequency	698 | 798	824 | 960	1710 | 2170	2300 | 2400	2490 | 2690	MHz
Peak Gain	1.4	1.1	3.2	3.8	4.2	dBi
Efficiency	65	61	71	67	62	%
VSWR*	< 3.0 : 1 (typical)					
Characteristic Impedance	50					Ω
Polarization	Linear Polarization					

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

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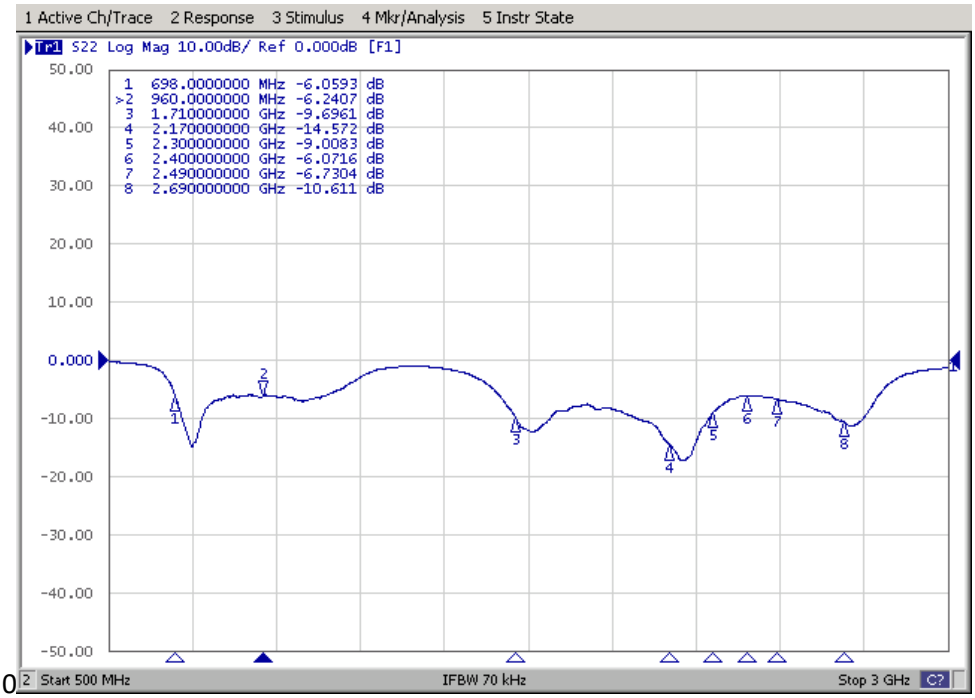
2.2 Return Loss (S_{11})



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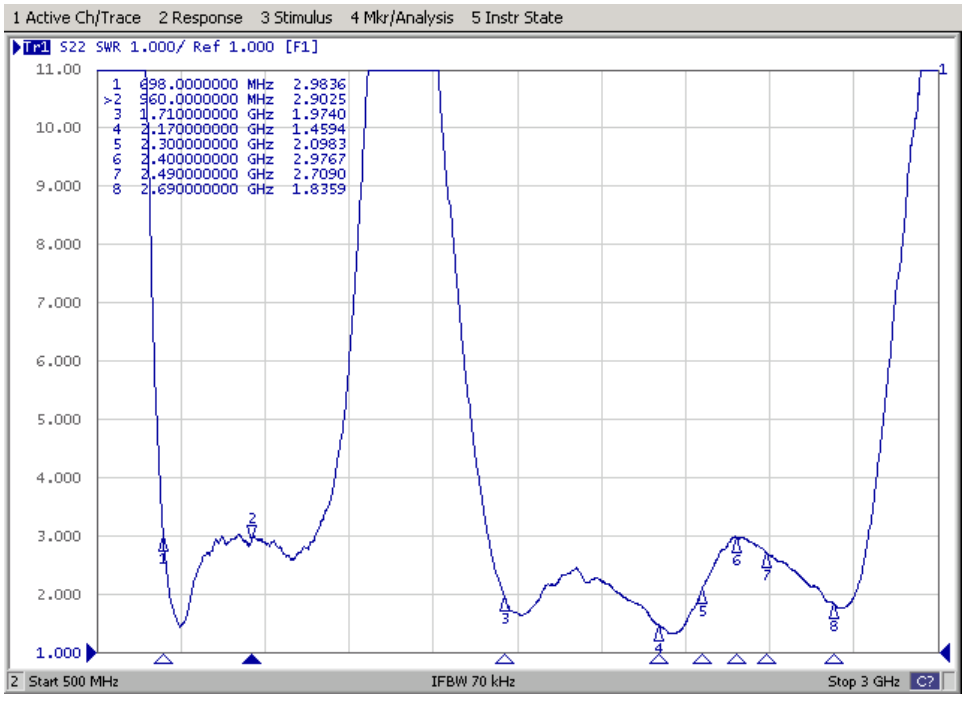
2.3 VSWR (S_{11})



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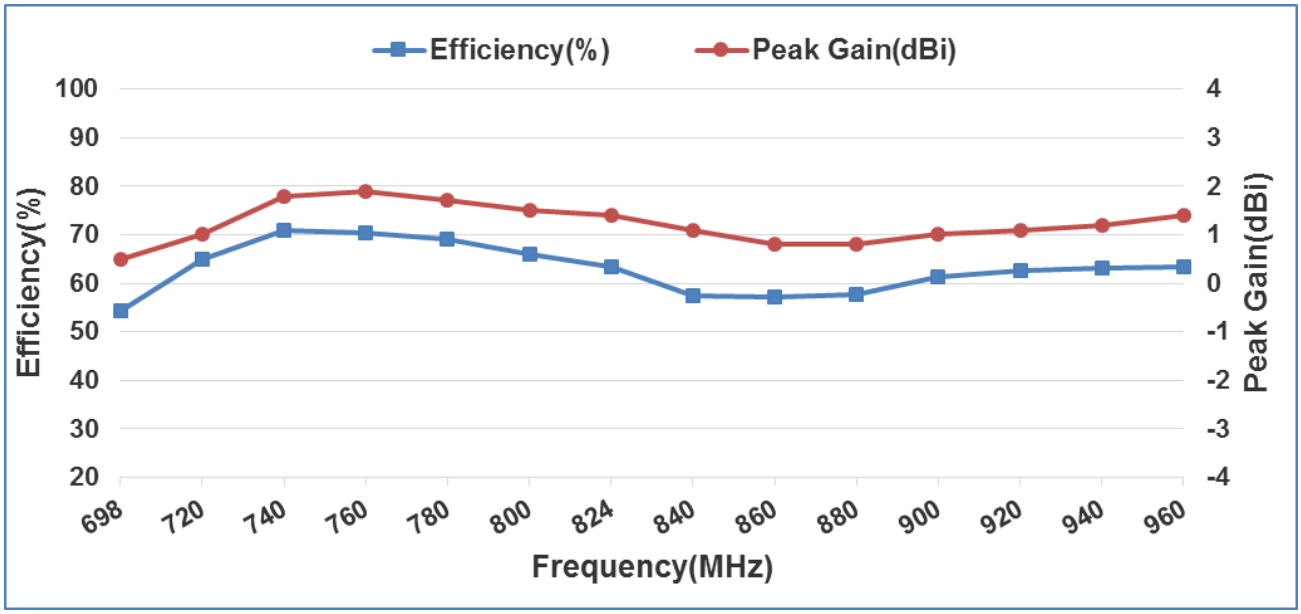
2.4 3D Efficiency Table for 698~960 MHz Band

Frequency(MHz)	698	720	740	760	780	800	824	840	860	880	900	920	940	960
Efficiency(dB)	-2.6	-1.9	-1.5	-1.5	-1.6	-1.8	-2.0	-2.4	-2.4	-2.4	-2.1	-2.0	-2.0	-2.0
Efficiency(%)	54.4	65.0	71.0	70.3	69.0	65.9	63.3	57.5	57.1	57.6	61.2	62.7	63.1	63.5
Gain(dBi)	0.5	1.0	1.8	1.9	1.7	1.5	1.4	1.1	0.8	0.8	1.0	1.1	1.2	1.4

3D Efficiency vs. Frequency 698~960 MHz Band



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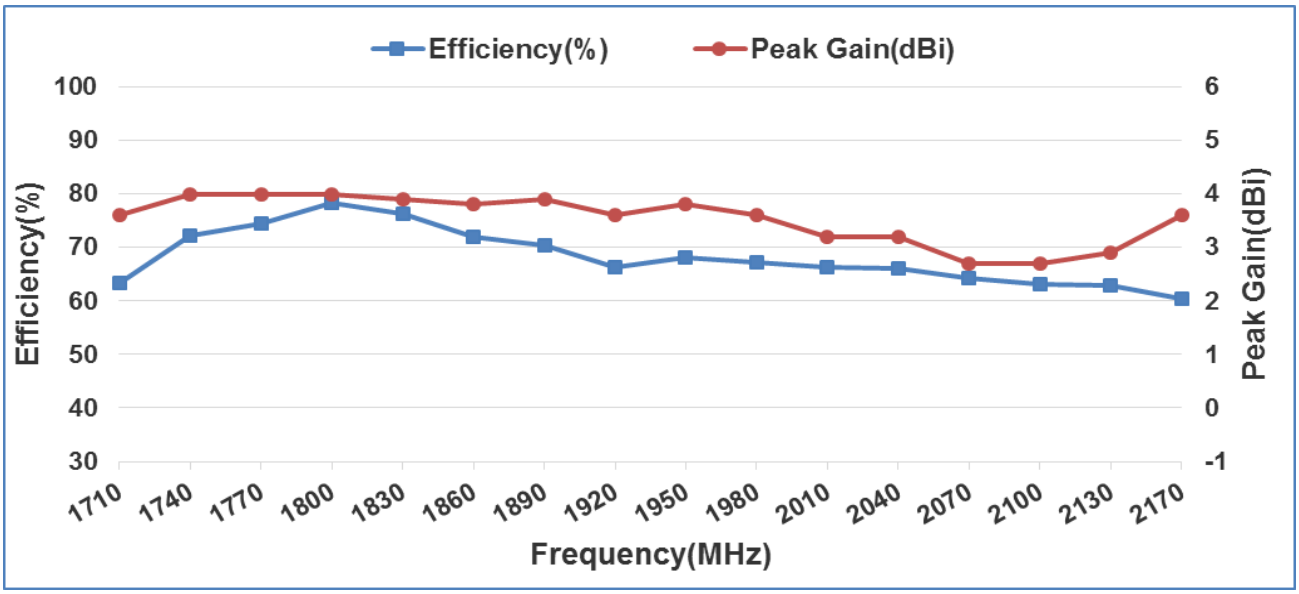
2.5 3D Efficiency Table for 1710~2170 MHz Band

Frequency(MHz)	1710	1740	1770	1800	1830	1860	1890	1920	1950	1980	2010	2040	2070	2100	2130	2170
Efficiency(dB)	-2.0	-1.4	-1.3	-1.1	-1.2	-1.4	-1.5	-1.8	-1.7	-1.7	-1.8	-1.8	-1.9	-2.0	-2.0	-2.2
Efficiency(%)	63.4	72.2	74.4	78.2	76.2	71.9	70.3	66.2	68.0	67.2	66.2	66.1	64.2	63.1	62.9	60.3
Gain(dBi)	3.6	4.0	4.0	4.0	3.9	3.8	3.9	3.6	3.8	3.6	3.2	3.2	2.7	2.7	2.9	3.6

3D Efficiency vs. Frequency 1710~2170 MHz Band



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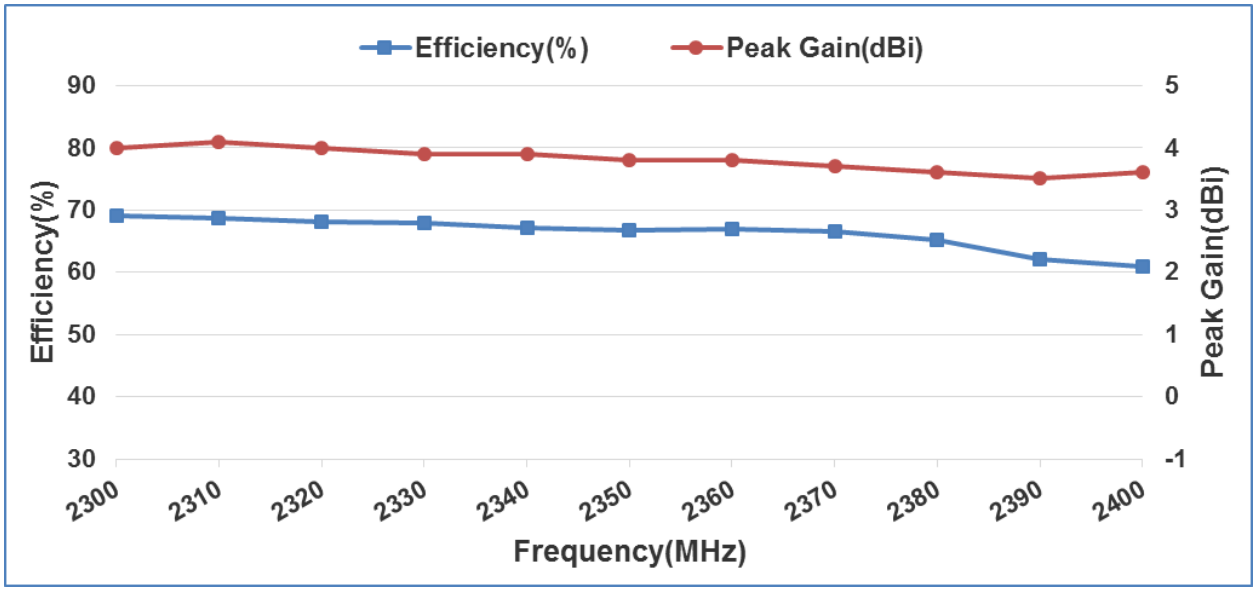
2.6 3D Efficiency Table for 2300~2400 MHz Band

Frequency(MHz)	2300	2310	2320	2330	2340	2350	2360	2370	2380	2390	2400
Efficiency(dB)	-1.6	-1.6	-1.7	-1.7	-1.7	-1.8	-1.7	-1.8	-1.9	-2.1	-2.2
Efficiency(%)	69.1	68.7	68.1	68.0	67.1	66.8	66.9	66.6	65.1	62.1	60.9
Gain(dBi)	4.0	4.1	4.0	3.9	3.9	3.8	3.8	3.7	3.6	3.5	3.6

3D Efficiency vs. Frequency 2300~2400 MHz Band



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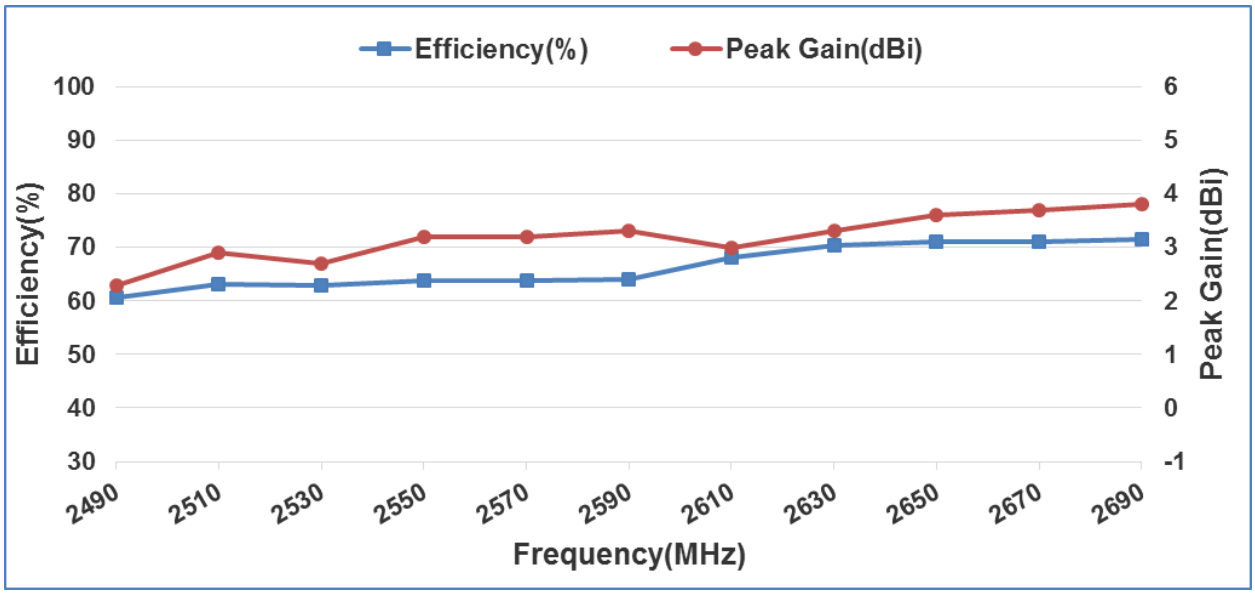
2.7 3D Efficiency Table for 2490~2690 MHz Band

Frequency(MHz)	2490	2510	2530	2550	2570	2590	2610	2630	2650	2670	2690
Efficiency(dB)	-2.2	-2.0	-2.0	-1.9	-1.9	-1.9	-1.7	-1.5	-1.5	-1.5	-1.5
Efficiency(%)	60.6	63.1	62.8	63.9	63.9	64.0	68.1	70.4	71.0	71.0	71.4
Gain(dBi)	2.3	2.9	2.7	3.2	3.2	3.3	3.0	3.3	3.6	3.7	3.8

3D Efficiency vs. Frequency 2490~2690 MHz Band



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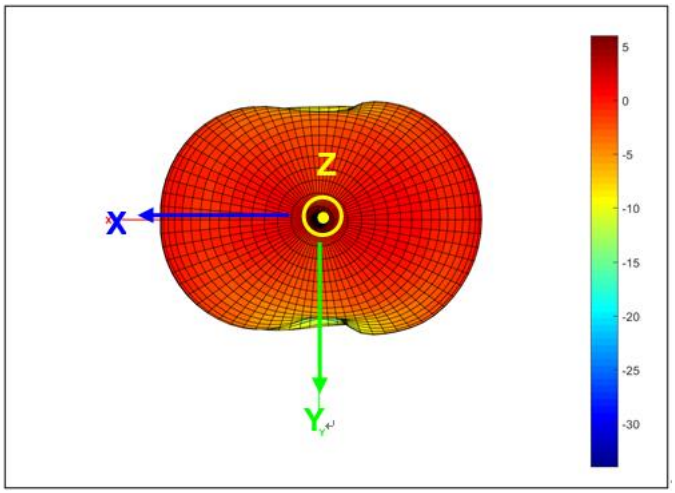
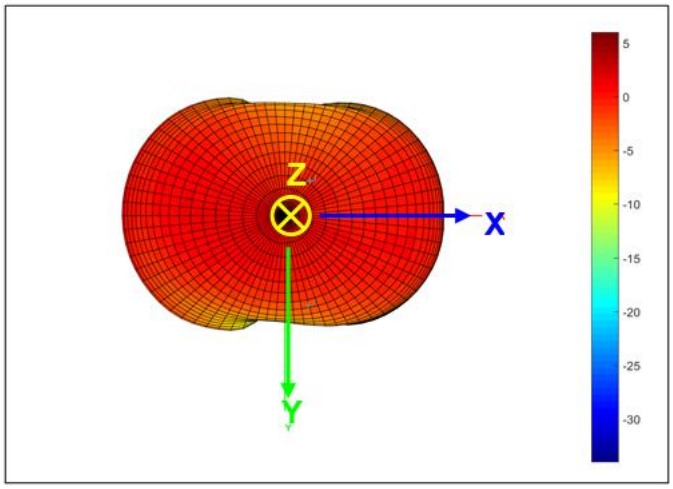
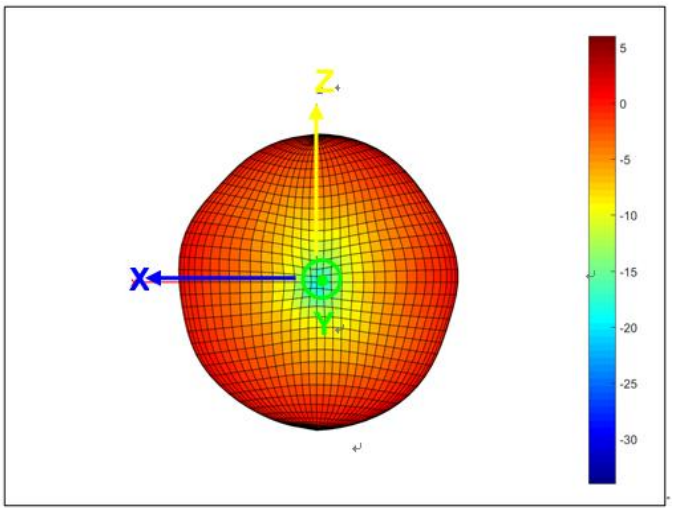
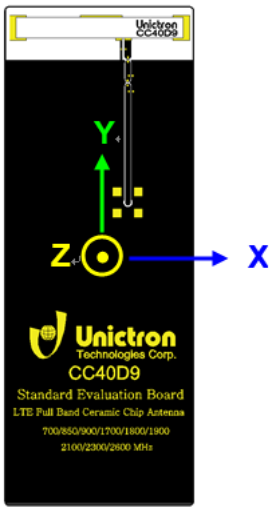
2.8 Radiation Pattern (with 120 x 45mm^2 Evaluation Board)

698~798MHz Band
3D Gain Pattern @ 748 MHz (Unit: dBi)









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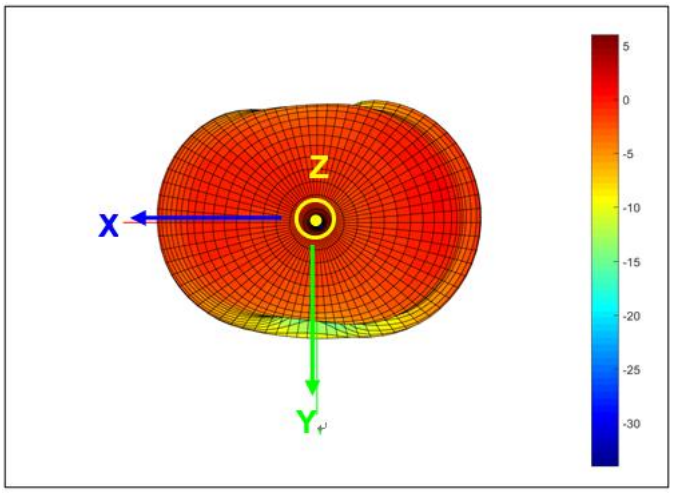
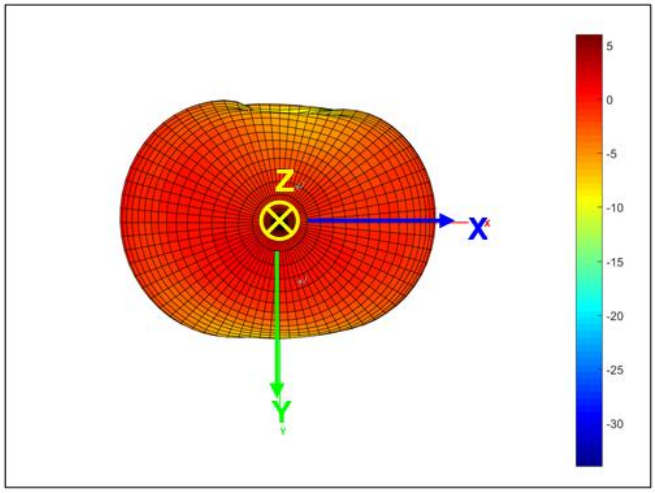
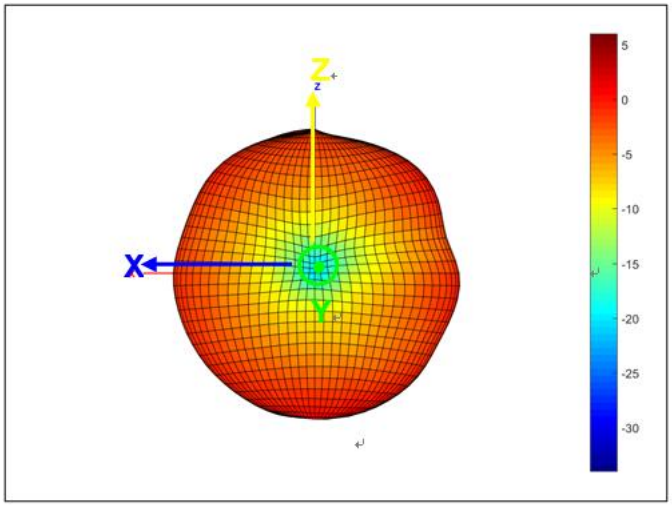
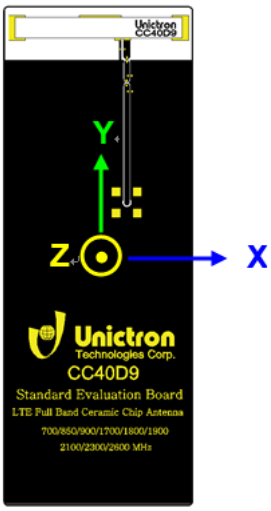
2.9 Radiation Pattern (with 120 x 45mm^2 Evaluation Board)

824~960 MHz Band
3D Gain Pattern @ 900 MHz (Unit: dBi)









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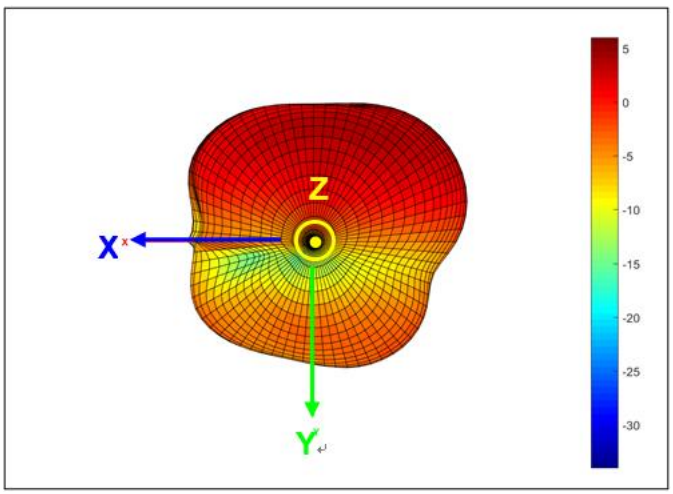
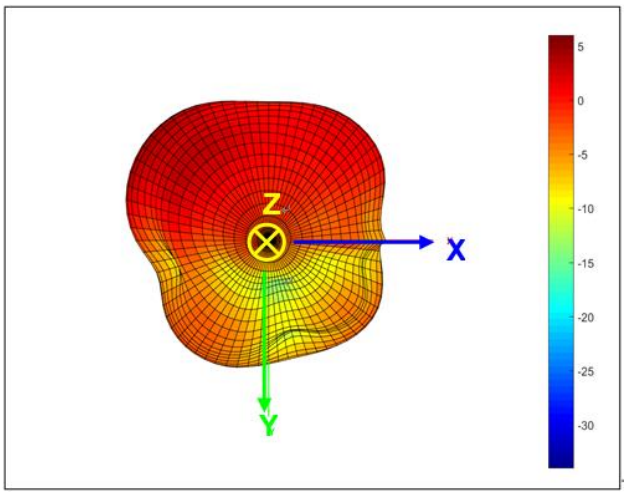
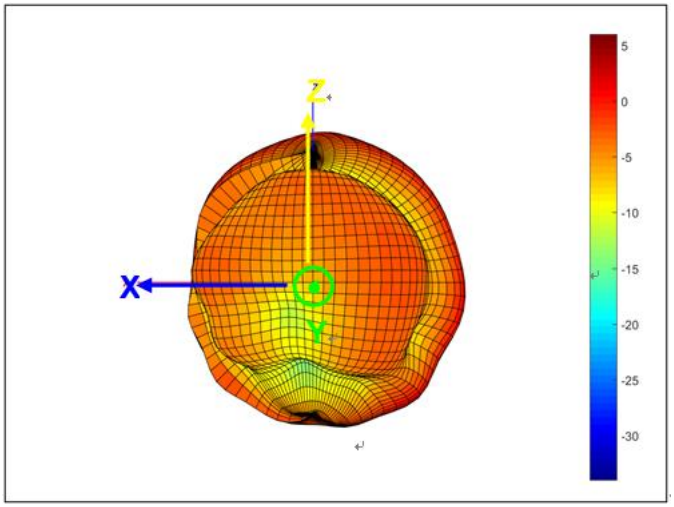
2.10 Radiation Pattern (with 120 x 45mm^2 Evaluation Board)

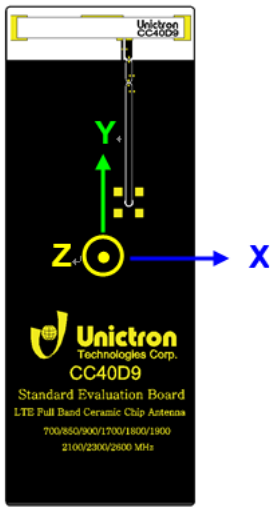
1710~2170 MHz Band

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









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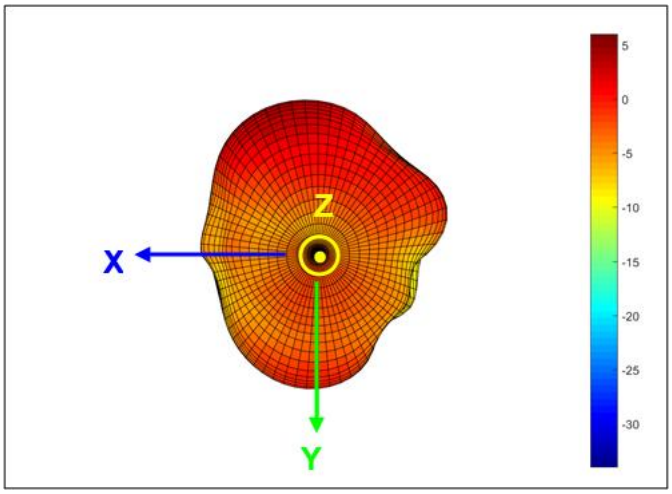
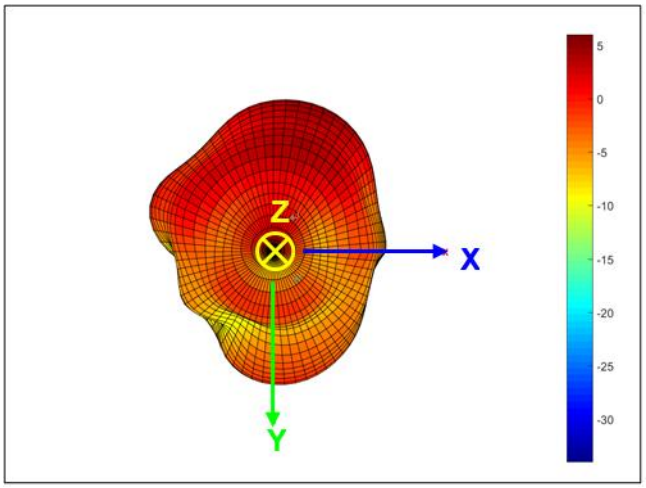
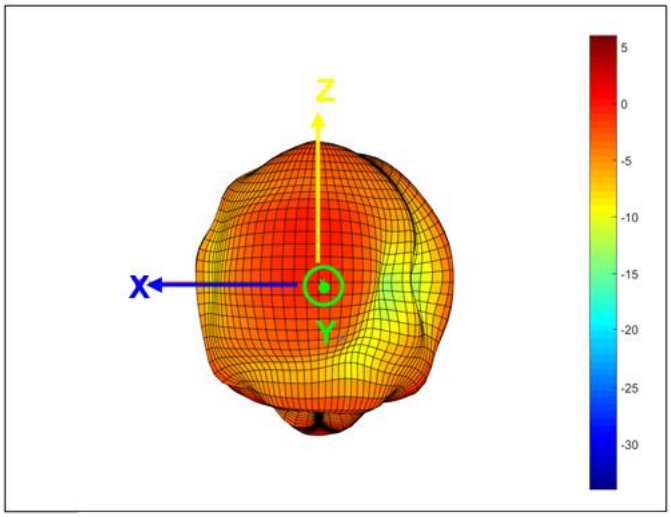
2.11 Radiation Pattern (with 120 x 45mm^2 Evaluation Board)

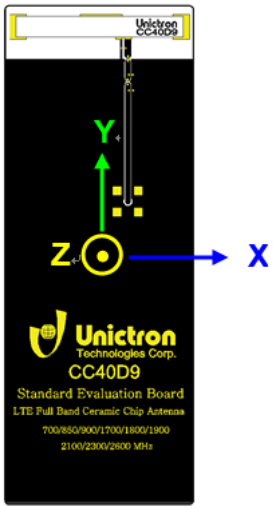
2300~2400MHz Band

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









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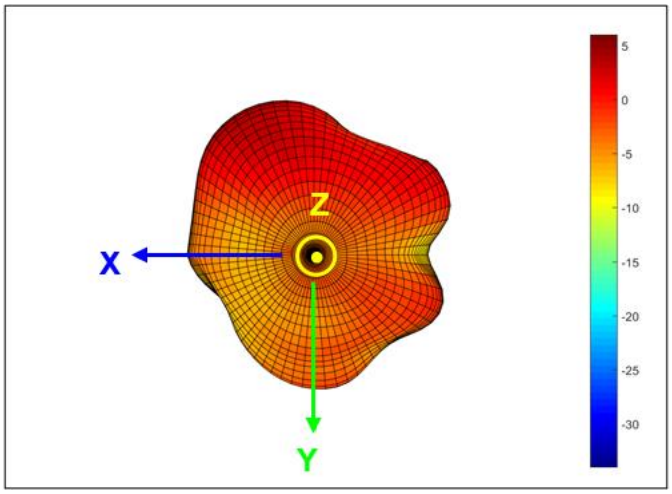
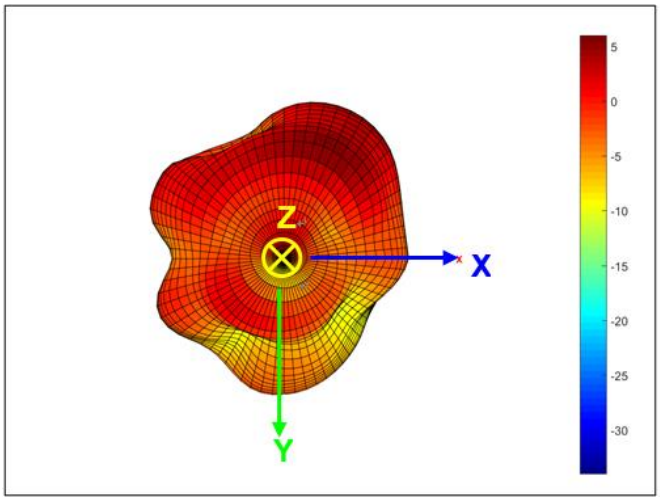
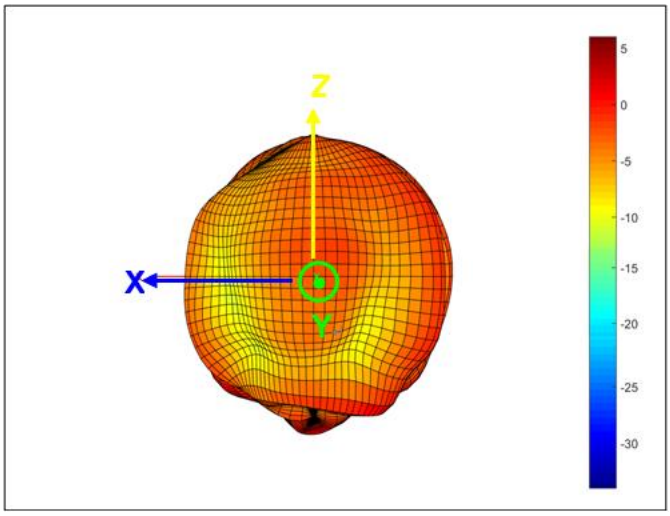
2.12 Radiation Pattern (with 120 x 45mm^2 Evaluation Board)

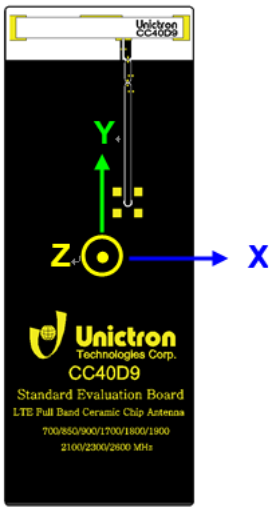
2490~2690MHz Band

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









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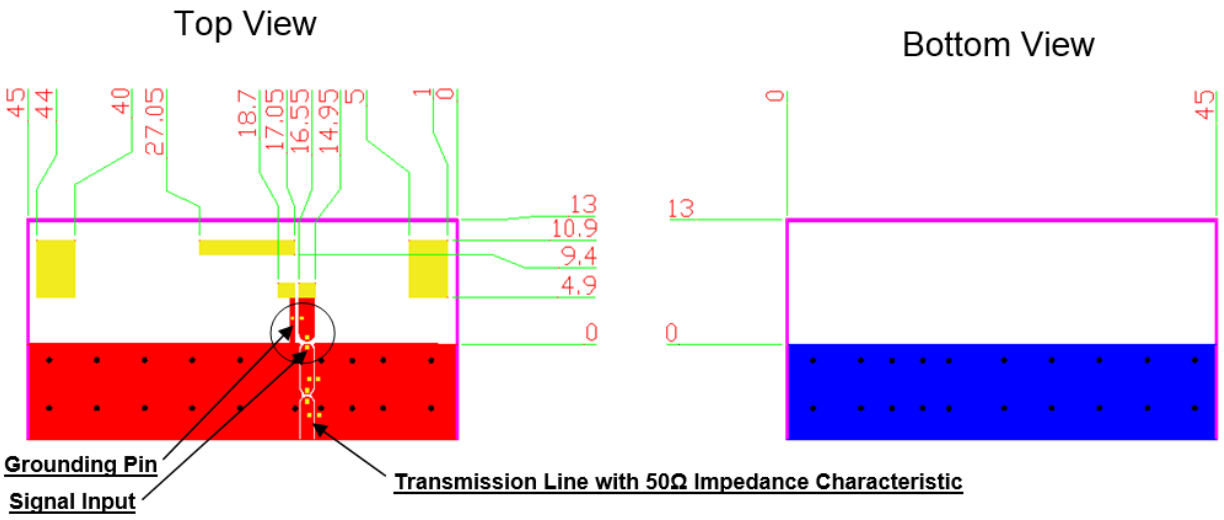
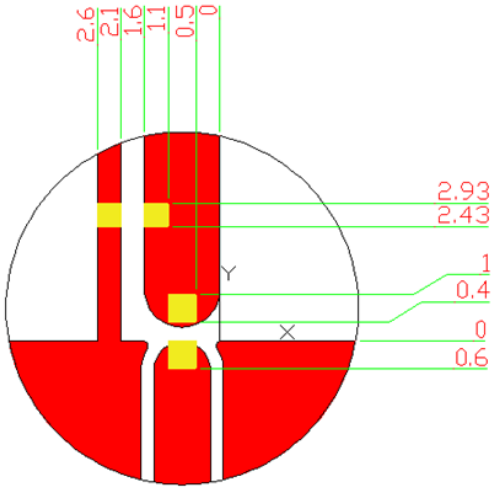
3 Layout Guide

3.1 Layout Guide (Unit: mm)

Solder Land Pattern:

The solder land pattern (golden marking areas) is shown in below figures. Depending on Customer's requirement, an additional matching circuit is normally required.





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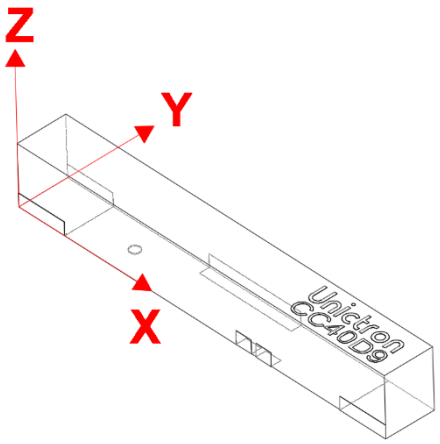
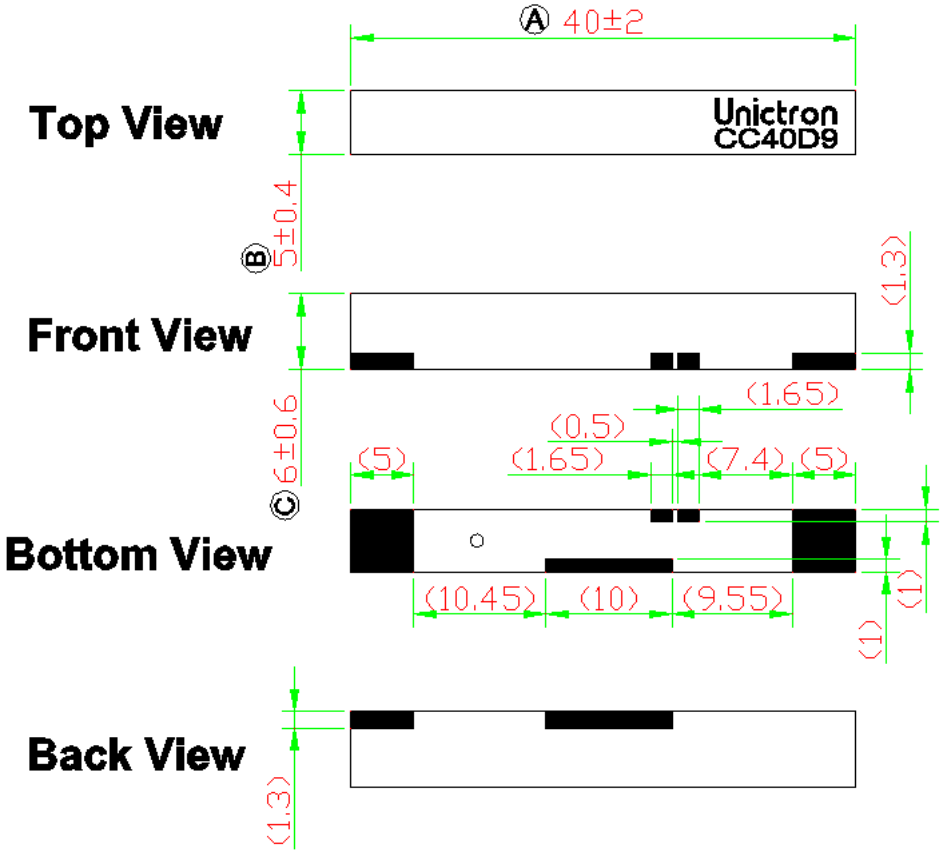
3.2 Outline Dimensions of Antenna & Evaluation Board

3.2.1 Antenna Dimensions





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

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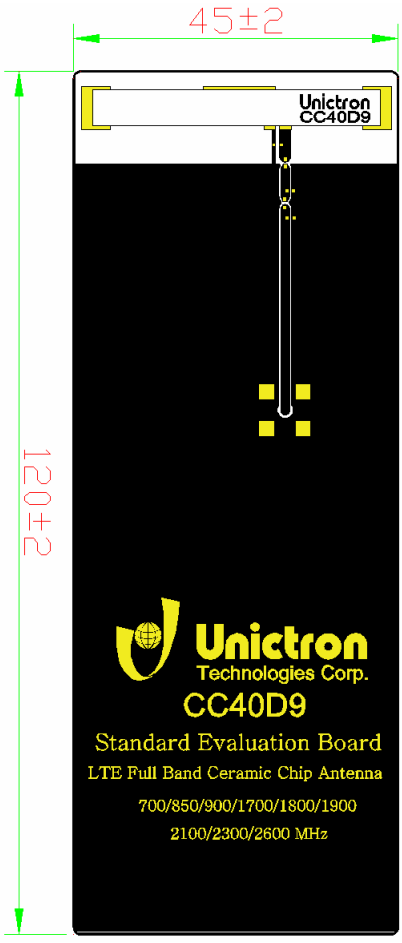
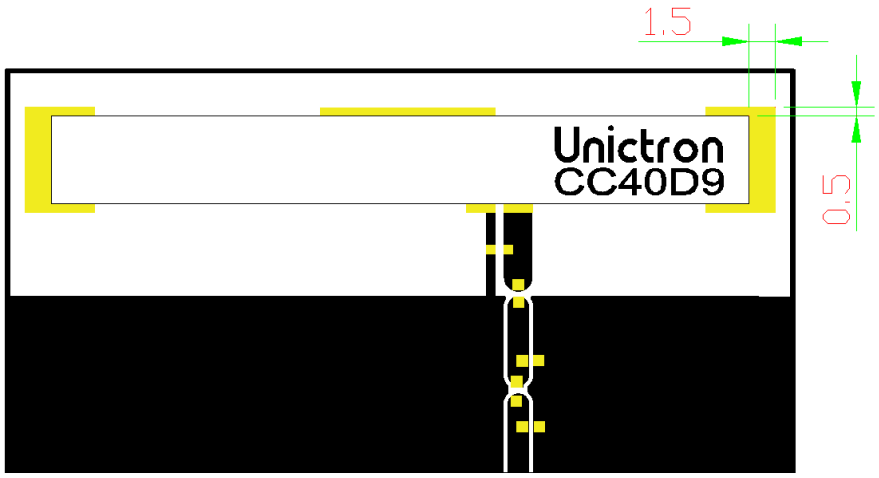
PIN Definitions

Item	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5
Terminal	Tuning/Ground	Signal	Soldering Pad		

3.2.2 Evaluation Board with Antenna





(Unit: mm)

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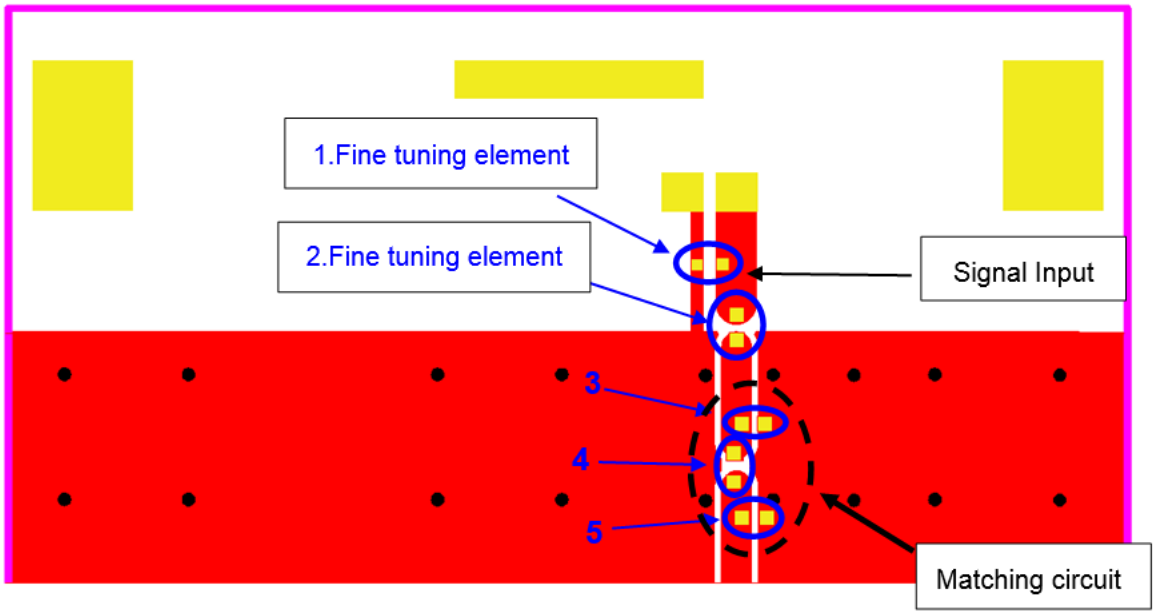
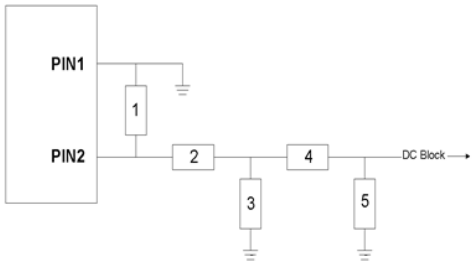
3.3 Frequency tuning and Matching circuit

3.3.1 Chip antenna tuning scenario



3.3.2 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 mm2 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	-	-

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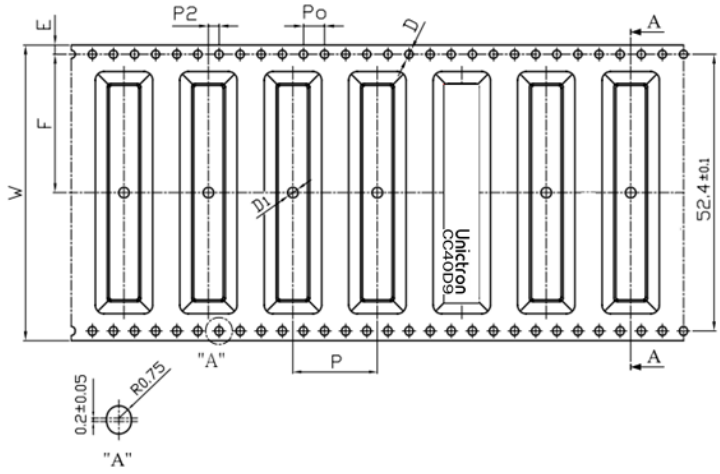
4 Packing

(1) Quantity/Reel: 600 pcs/Reel

(2) Plastic tape: Clear Non Anti-static Polystyrene

a. Tape Drawing



b. Tape Dimensions (unit: mm)

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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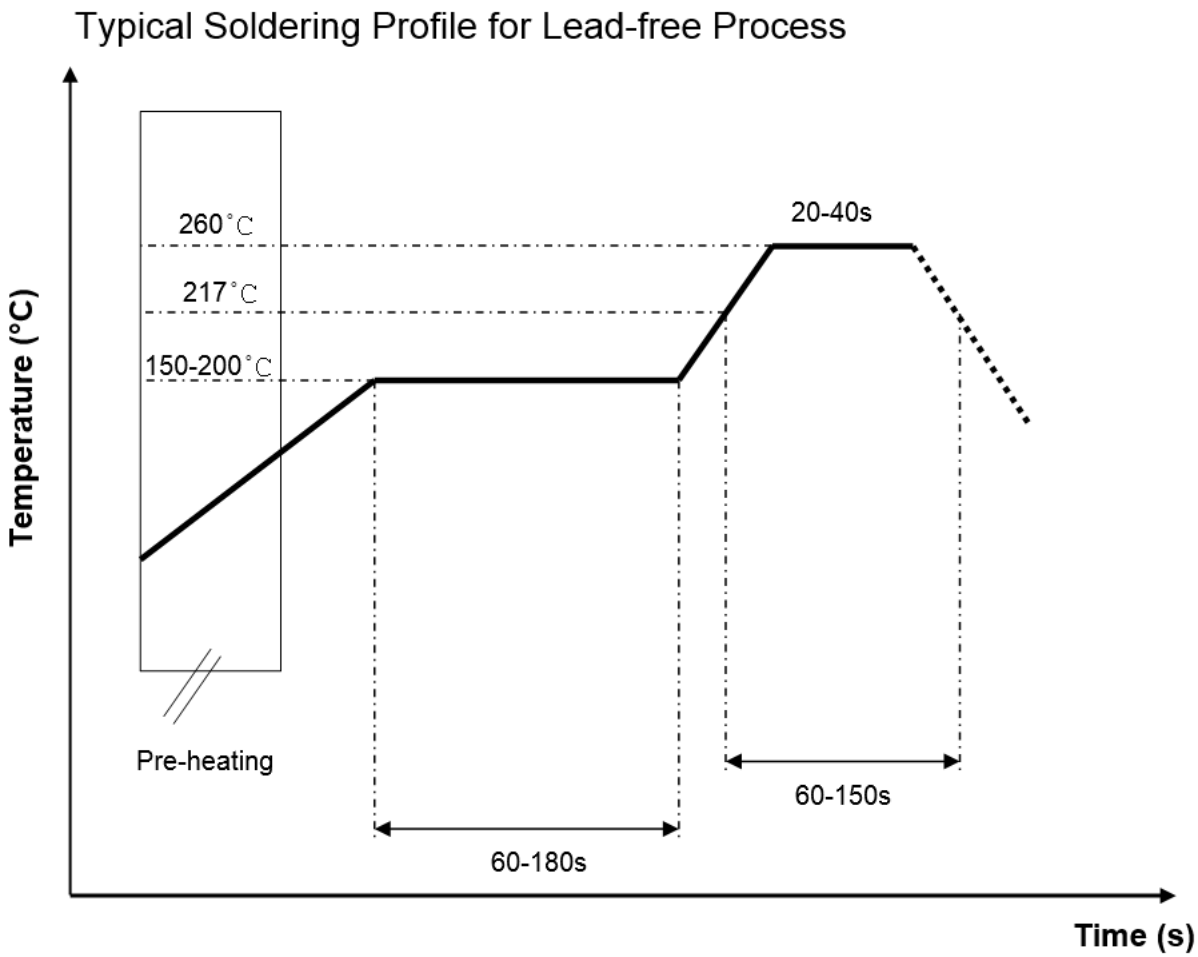
5 Notes

5.1 Soldering Conditions



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5.2 Reminders for users of Unictron's CC40D9 ceramic chip antennas

5.2.1

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.

5.2.2

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.

5.2.3

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.

5.3 Operating & Storage Conditions

5.3.1 Operating

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

5.3.2 Storage

(1) Storage Temperature: -5℃ to 40℃
(2) Relative Humidity: 20% to 70%
(3) Shelf Life: 1 year

5.3.3 Notice

(1) Installation Guide:
Please refer to "General guidelines for the installation of Unictron's chip antennas" document.
(2) All specifications are subject to change without notice.

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Presented data were measured on reference PCB (ground) as shown in this specification. When the antenna placement or size of the PCB is changed, antenna performance and values of matching components may differ from data shown here.

Information presented in this Reference Specification is believed to be correct as of the date of publishing. Unictron Technologies Corporation reserves the rights to change the Reference Specification without notice due to technical improvements, etc. Please consult with Unictron's engineering team about the latest information before using this product. Per request, we may provide advice and assistance in implementing this antenna to a customer's device by simulation or real measurement of the interested device in our testing facilities.

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