Antenna

YC0002AA Datasheet

Antenna Services

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About the Document

Revision History

Version	Date	Author	Note
1.0	2020-06-03	Kenny YIN	Initial
2.0	2020-06-22	Kenny YIN	Updated the specifications in Chapter 3.
2.1	2020-12-16	Kenny YIN	Updated the antenna image in Chapter 2.
2.2	2021-01-27	Kenny YIN	Added the return loss and package, and updated the direction map.
2.3	2021-03-17	Kenny YIN	Updated the product height tolerance in Chapter 12.
2.4	2021-06-17	Kenny YIN	Updated working temperature in Chapter 3.
2.5	2021-07-15	Kenny YIN	Updated the drawing in Chapters 6, 8 and 12.
2.6	2021-12-06	Kenny YIN	Updated the product description in Chapter 1.

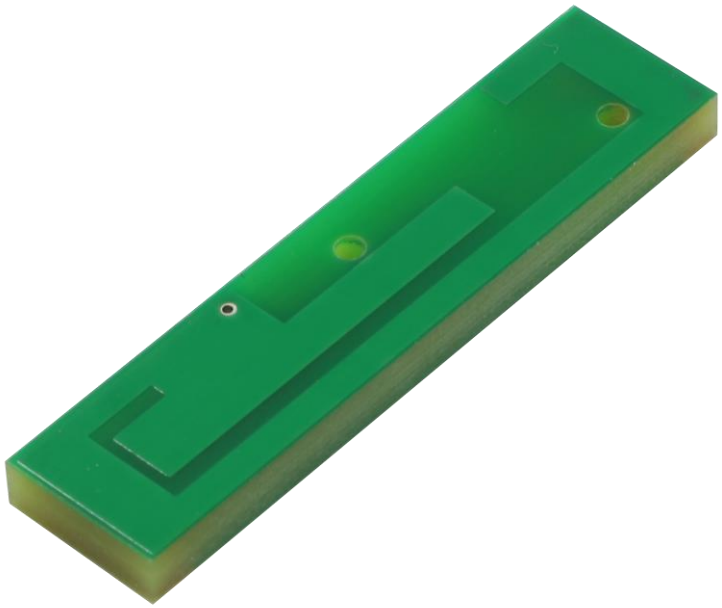
Contents

1 Product Description

This Quectel embedded 4G FPC antenna covers main 4G LTE bands and is compatible with 3G/2G/LPWA bands. Featuring high efficiency and gain, it is an ideal antenna for a smooth and stable connection with high-efficiency data transmission even under the influence of the device's internal structure. Ground plane independent, it's designed to be mounted directly to the underside of either a plastic or non-metallic enclosure. Ease of integration with a cable and connector which can be customized to meet your product design and RF module.

2 Product Features

- 4G LTE SMD Antenna
- High efficiency
- Excellent performance



3 Product Specifications

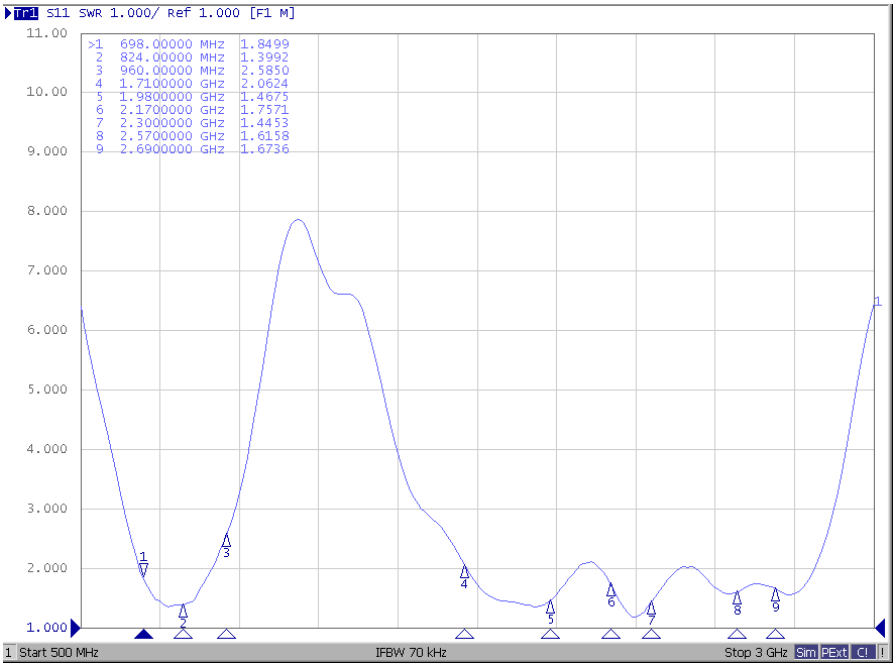
Passive Electrical Specifications	
Frequency Range	698–960 MHz, 1710–2690 MHz
Input Impendence	50 Ω
VSWR	≤ 3.0
Gain	≤ 3 dBi
Polarization Type	Linear
Mechanical Specifications	
Antenna Size	42 mm × 10 mm × 3 mm
Casing	FR4
Connector Type	SMD
Working Temperature	-40 °C to +85°C
Radome Color	Green

4 Overall Performance

4.1. Test Environment

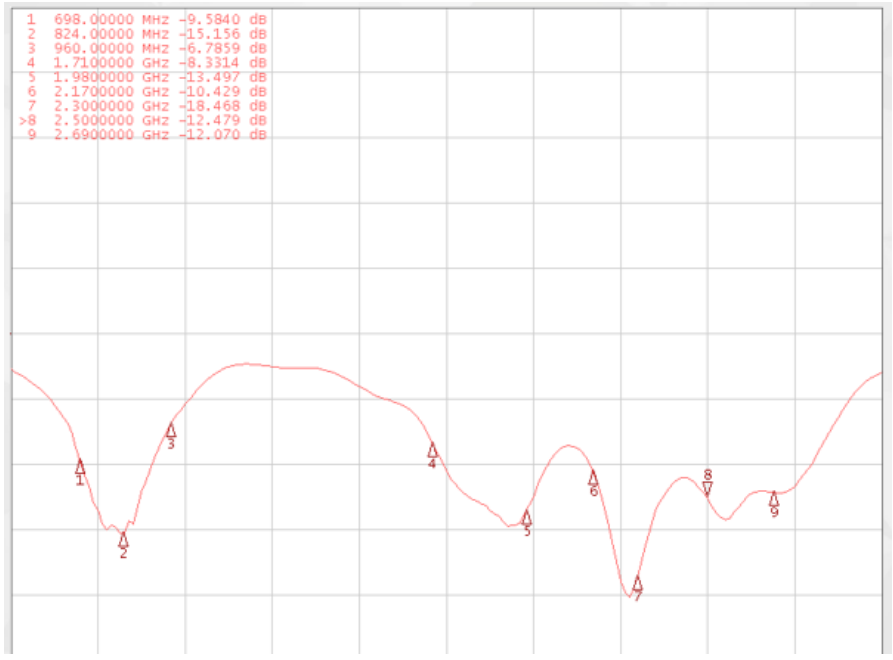
- KEYSIGHT VNA Network Analyzer E5063A 100 kHz – 8.5 GHz
- RayZone® 2800 Chamber 5G (FR1) SISO/MIMO, 400 MHz – 8.0 GHz

4.2. VSWR

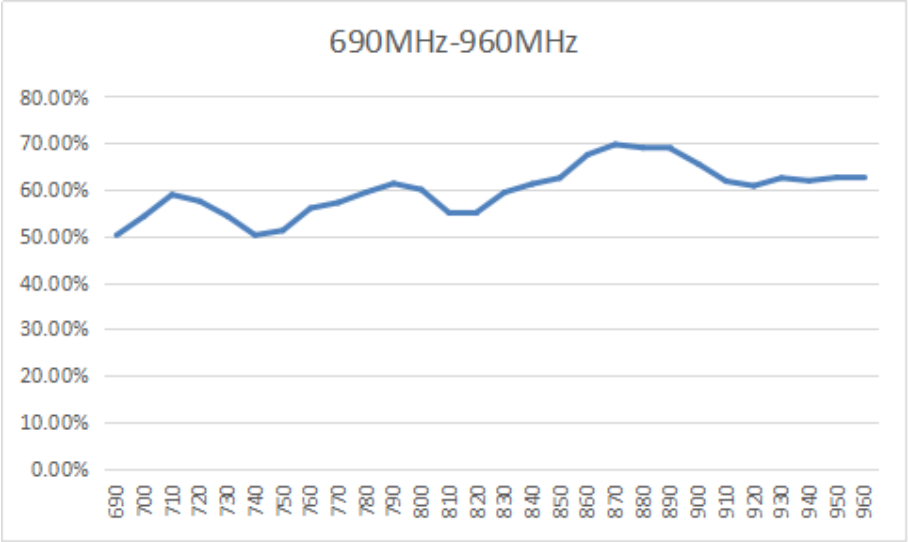


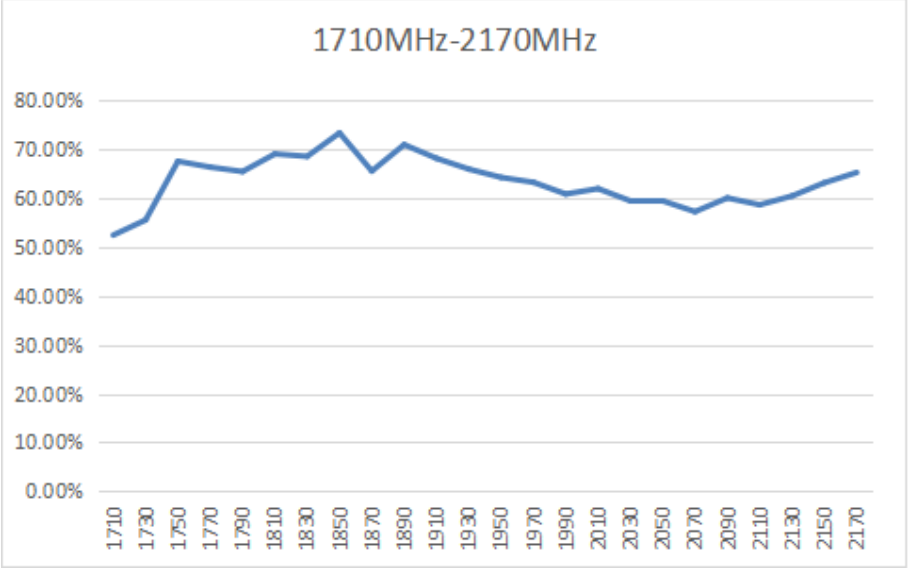
Frequency (MHz)	698	824	960	1710	1980	2170	2300	2570	2690
VSWR	1.85	1.40	2.59	2.06	1.47	1.76	1.45	1.62	1.67

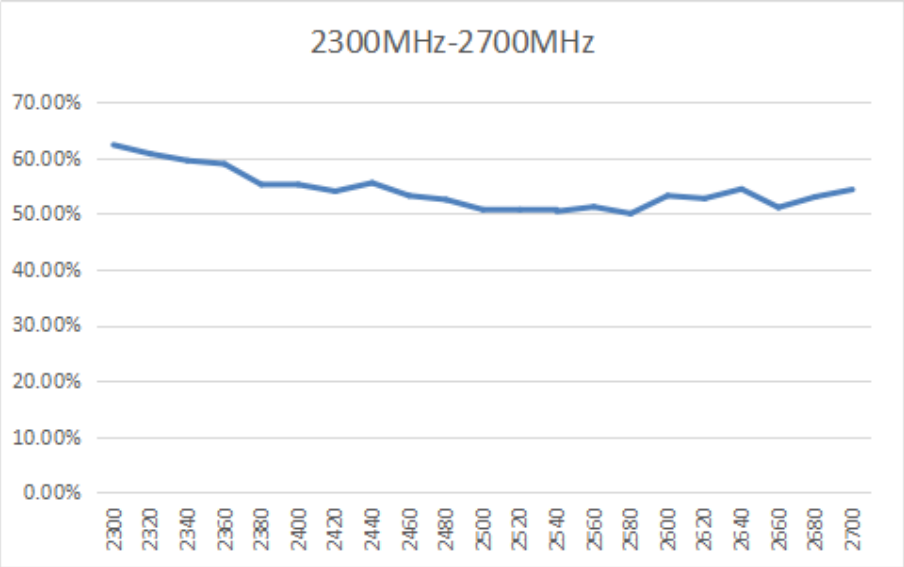
4.3. Return Loss



4.4. Efficiency

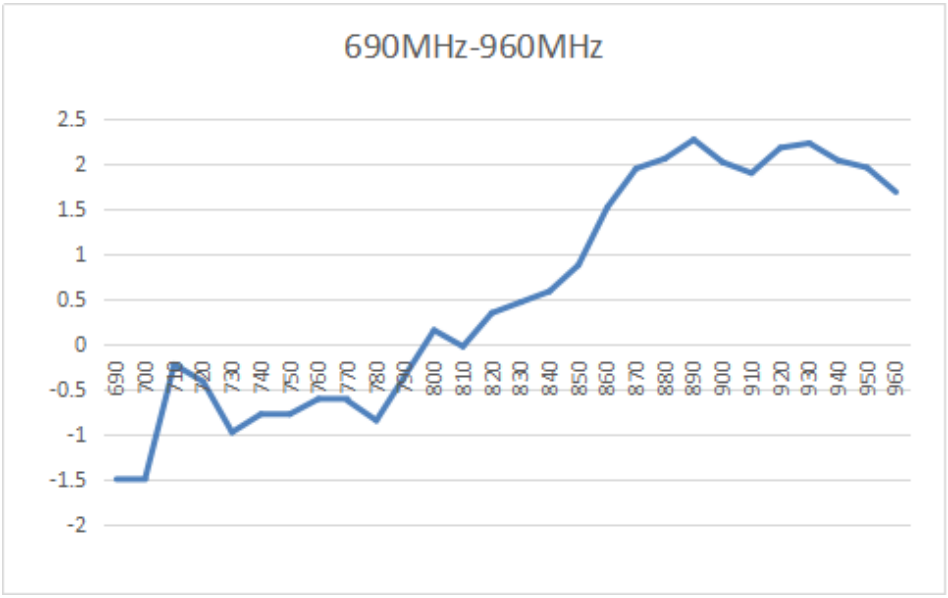


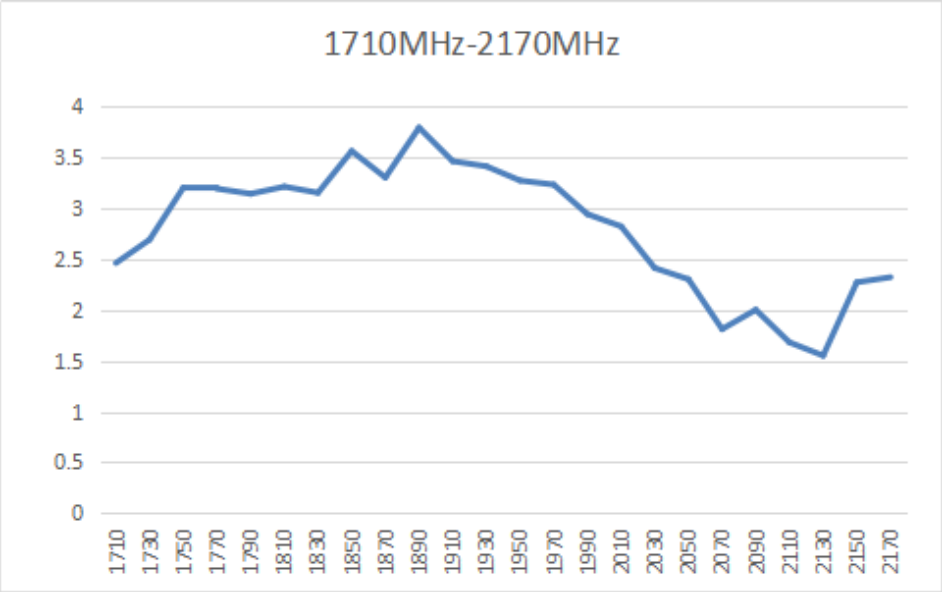


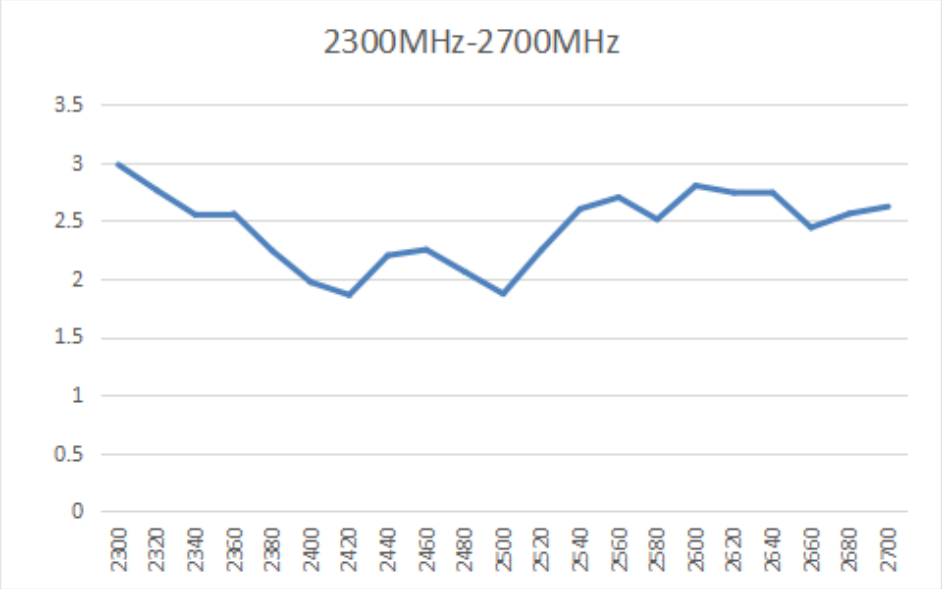


Frequency (MHz)	690	820	960	1710	1990	2170	2300	2580	2680
Eff. (%)	50.20	55.10	62.5	52.4	60.8	65.2	62.3	50	53

4.5. Gain

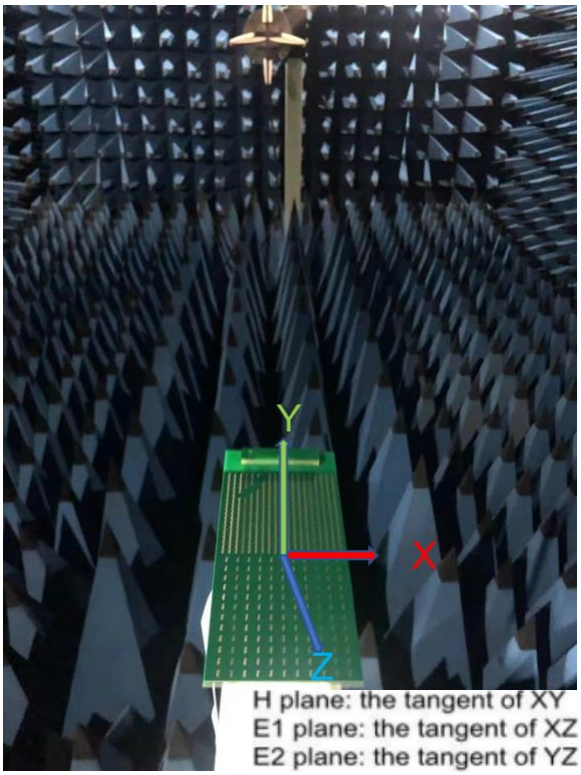




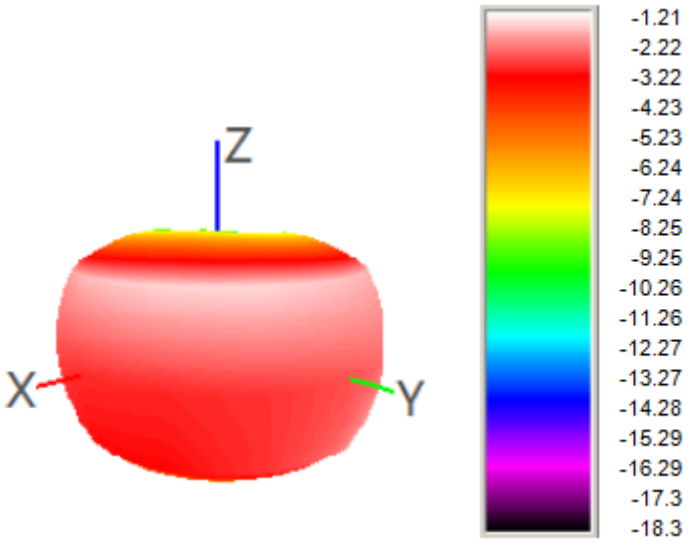


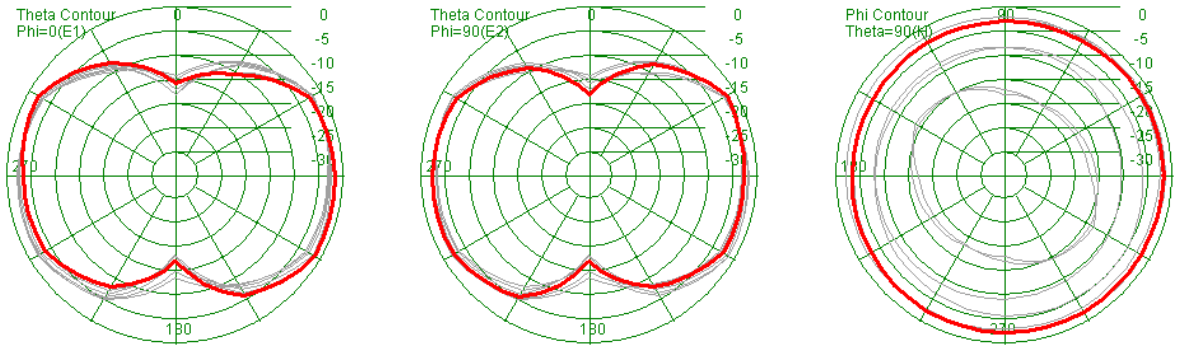
Frequency (MHz)	690	820	960	1710	1990	2170	2300	2580	2680
Gain (dBi)	-1.5	0.34	1.68	2.46	2.94	2.32	2.98	2.51	2.56

4.6. Radiation Pattern

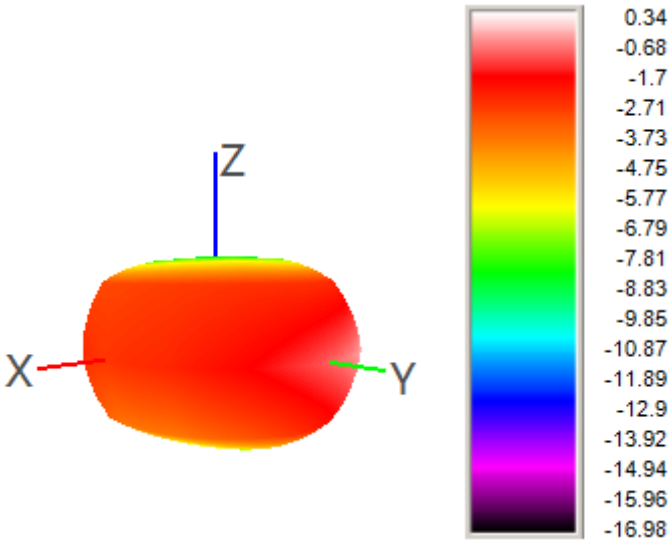


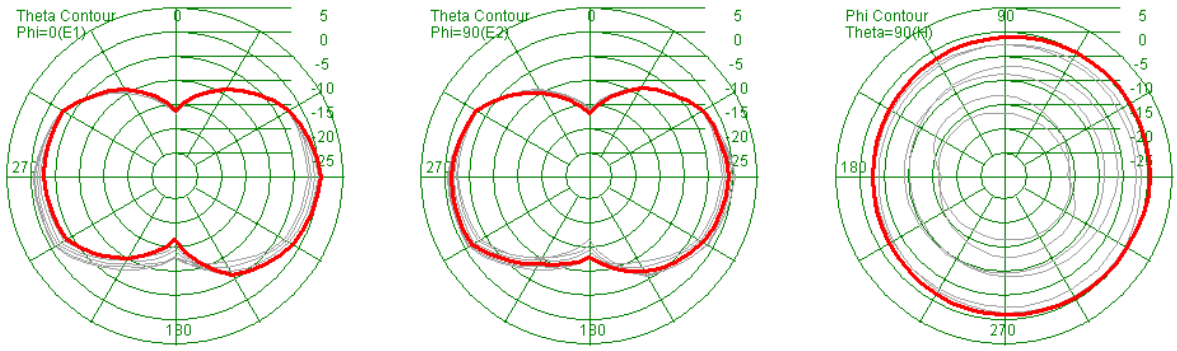
4.6.1. 690 MHz




Theta Contour
Phi=0(E1)
Theta Contour
Phi=90(E2)
Phi Contour
Theta=90(H)

4.6.2. 820 MHz


Z
X
Y
0.34
-0.68
-1.7
-2.71
-3.73
-4.75
-5.77
-6.79
-7.81
-8.83
-9.85
-10.87
-11.89
-12.9
-13.92
-14.94
-15.96
-16.98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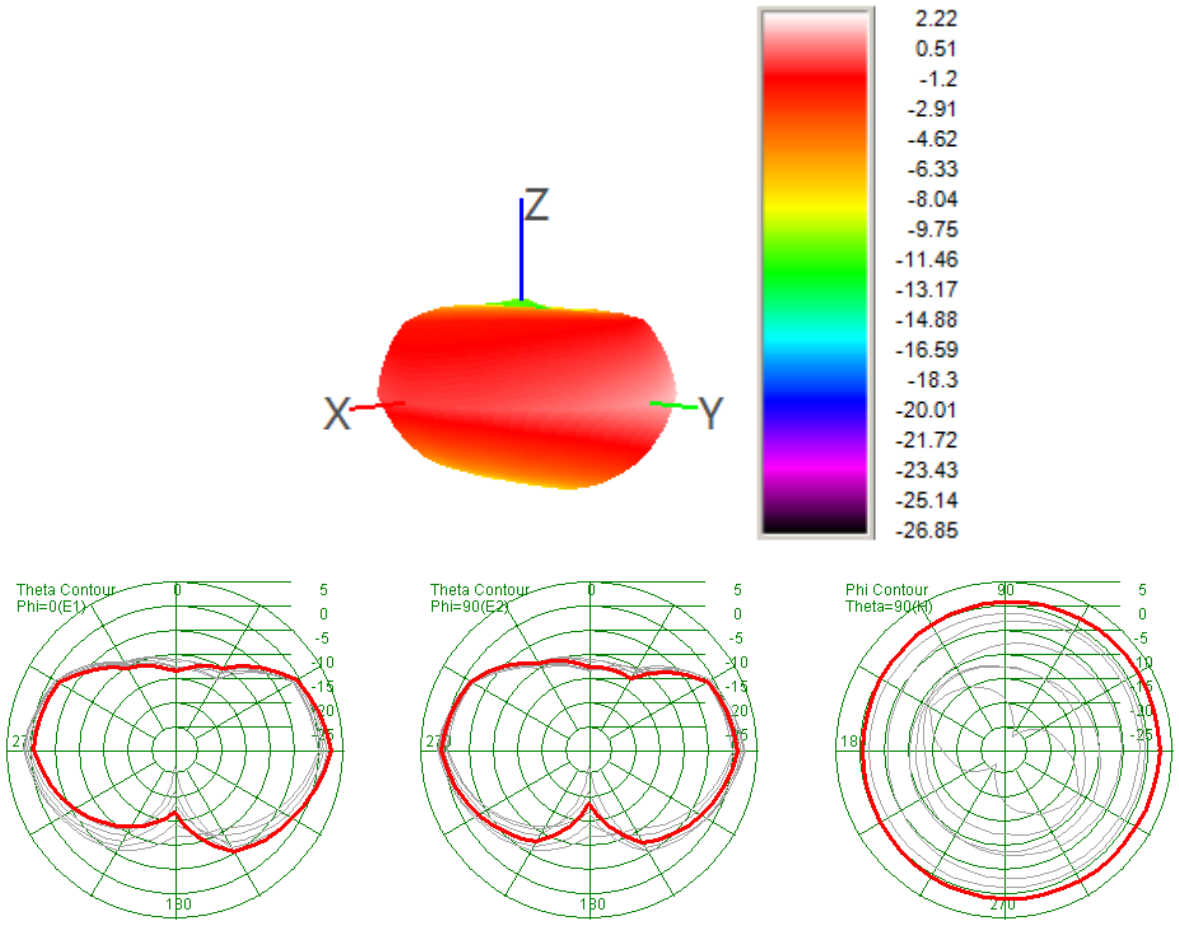
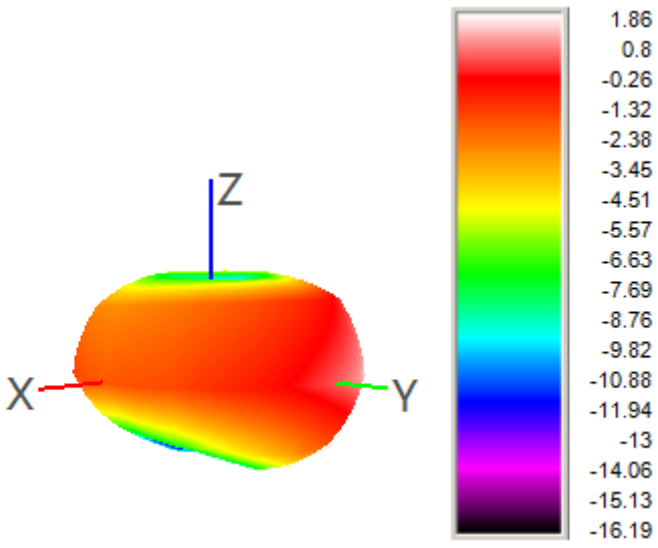
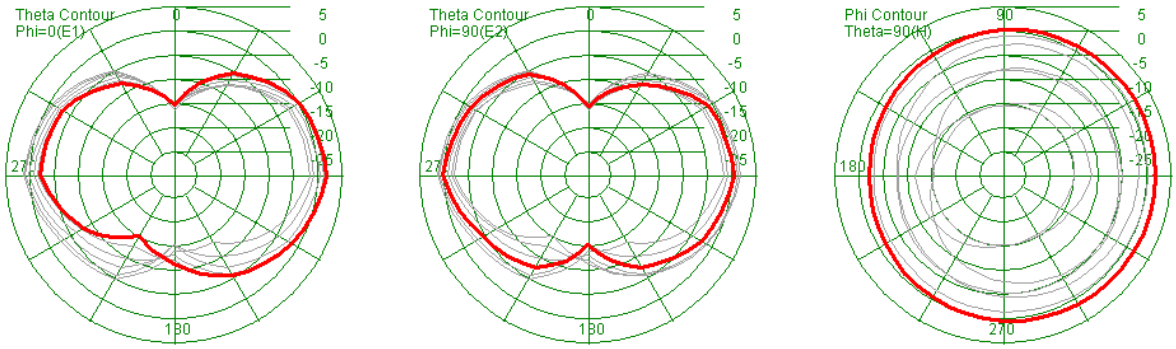
Phi=0(E1)
Theta Contour
Phi=90(E2)
Phi Contour
Theta=90(H)

4.6.3. 890 MHz

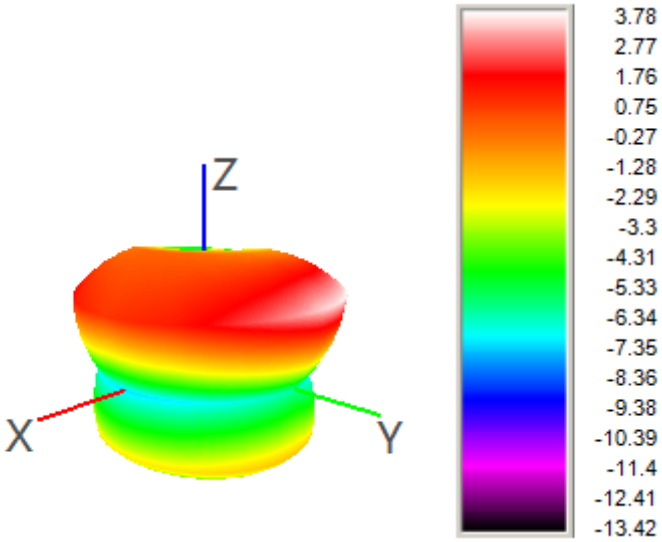


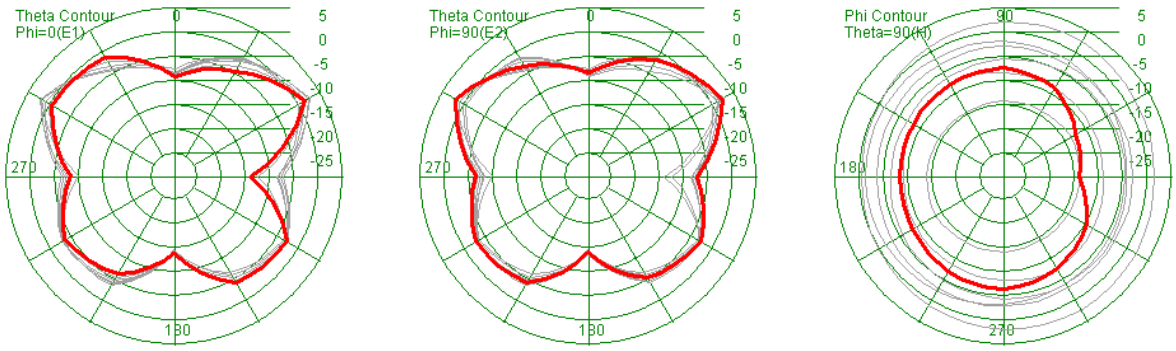
4.6.4. 960 MHz



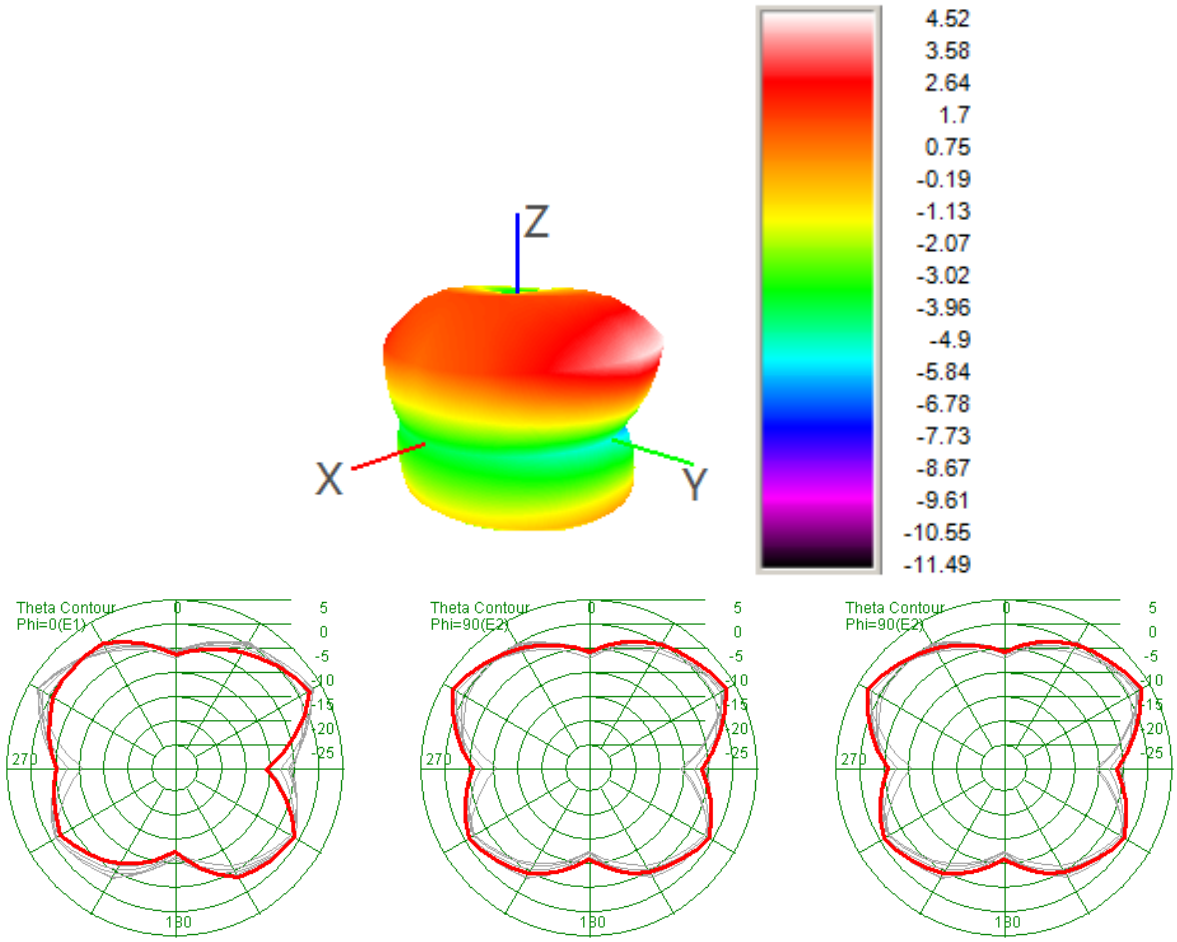

Theta Contour
Phi=0(E1)
Theta Contour
Phi=90(E2)
Phi Contour
Theta=90(H)

4.6.5. 1710 MHz

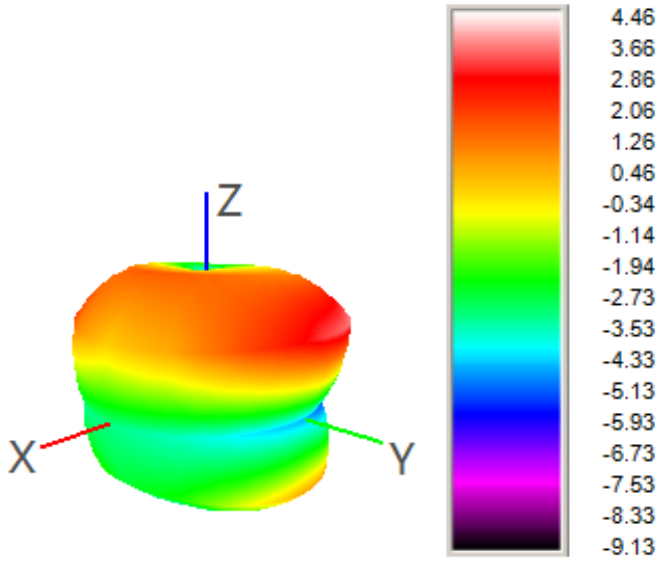

Z
X
Y
3.78
2.77
1.76
0.75
-0.27
-1.28
-2.29
-3.3
-4.31
-5.33
-6.34
-7.35
-8.36
-9.38
-10.39
-11.4
-12.41
-13.42

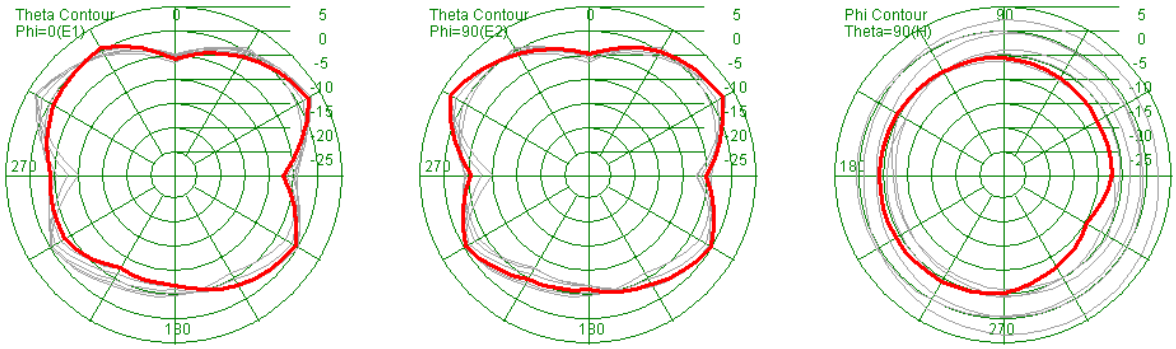

Theta Contour
Phi=0(E1)
Theta Contour
Phi=90(E2)
Phi Contour
Theta=90(H)

4.6.6. 1810 MHz

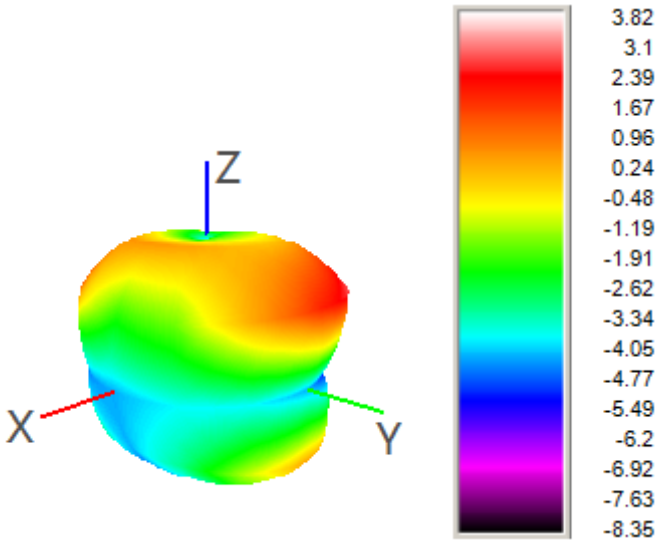


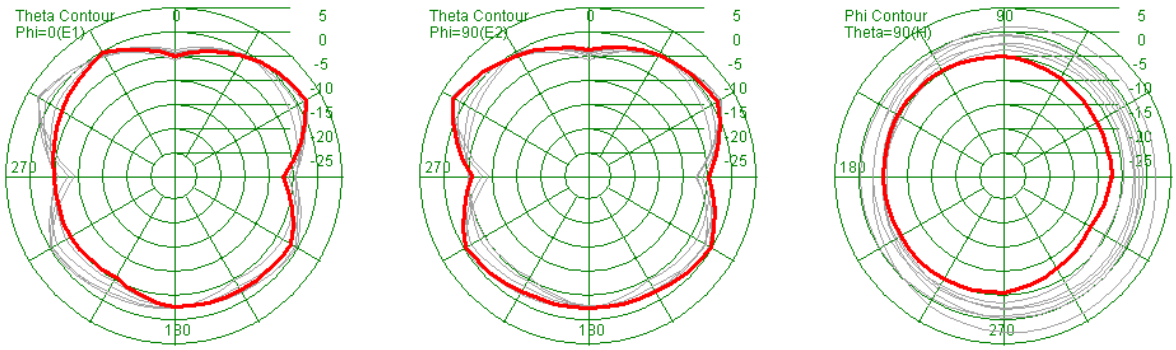
4.6.7. 1910 MHz




Theta Contour
Phi=0(E1)
Theta Contour
Phi=90(E2)
Phi Contour
Theta=90(H)

4.6.8. 1990 MHz


Z
X
Y
3.82
3.1
2.39
1.67
0.96
0.24
-0.48
-1.19
-1.91
-2.62
-3.34
-4.05
-4.77
-5.49
-6.2
-6.92
-7.63
-8.35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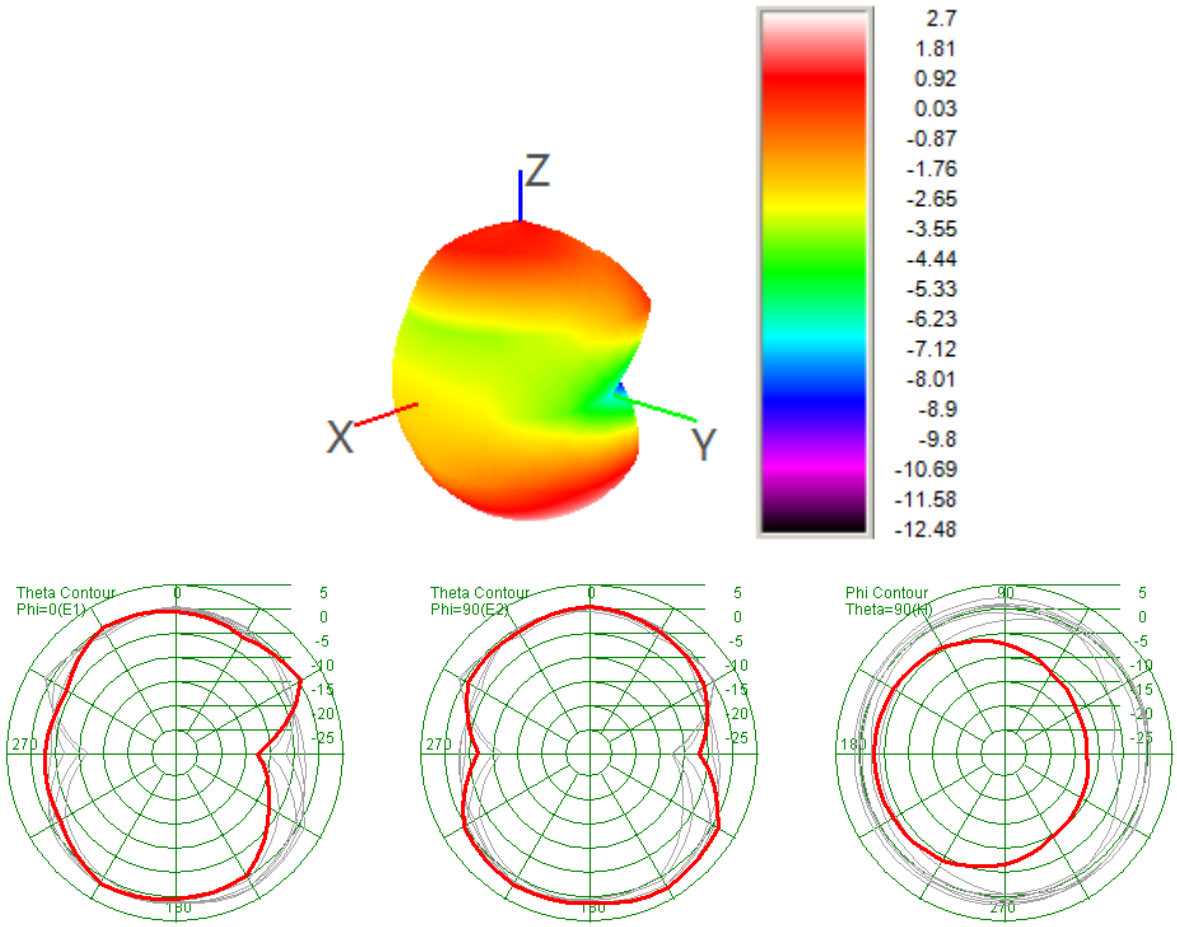
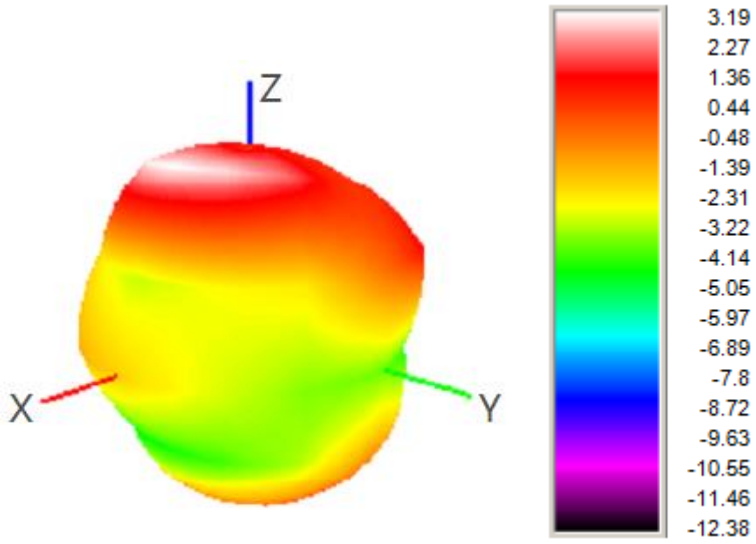
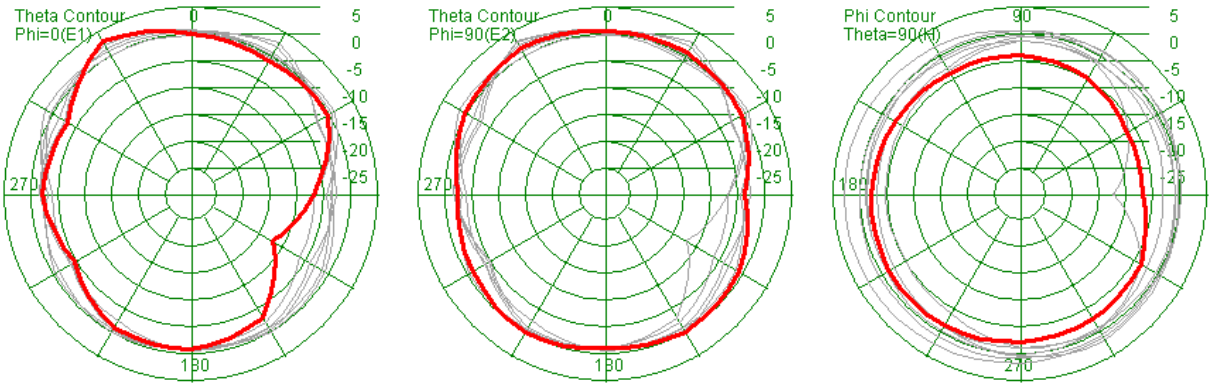
Theta Contour
Phi=90(E2)
Phi Contour
Theta=90(H)

4.6.9. 2170 MHz

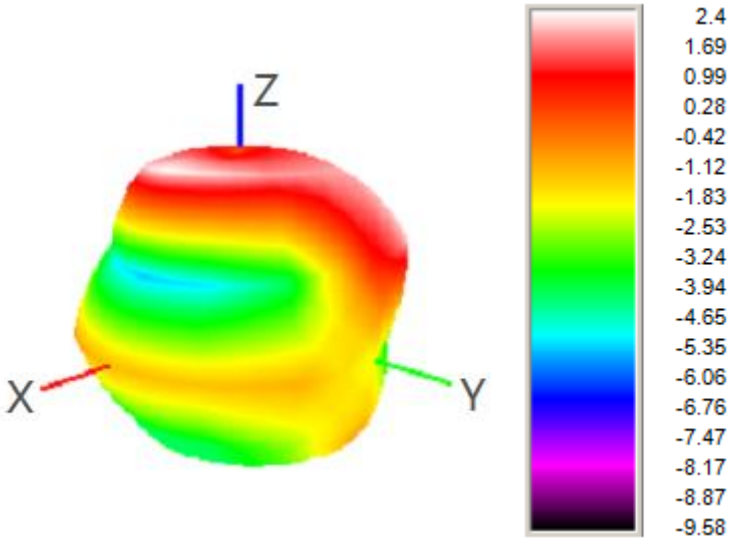


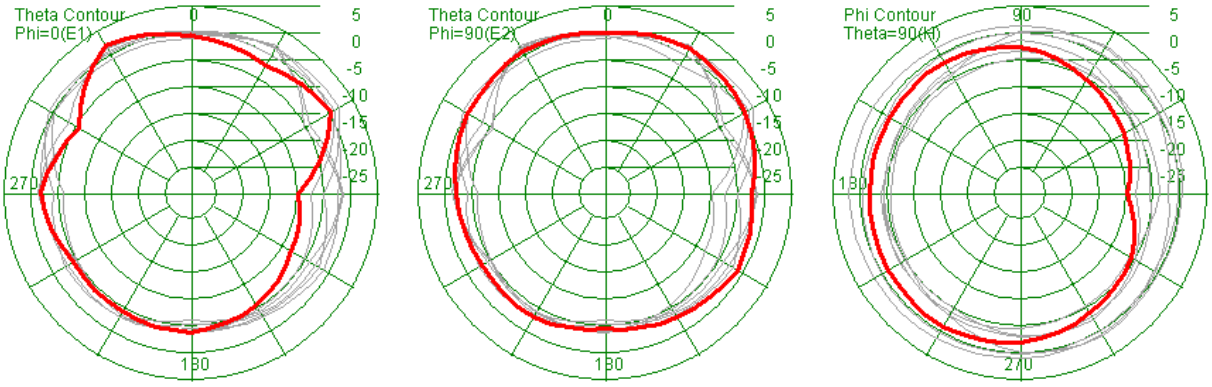
4.6.10. 2300 MHz



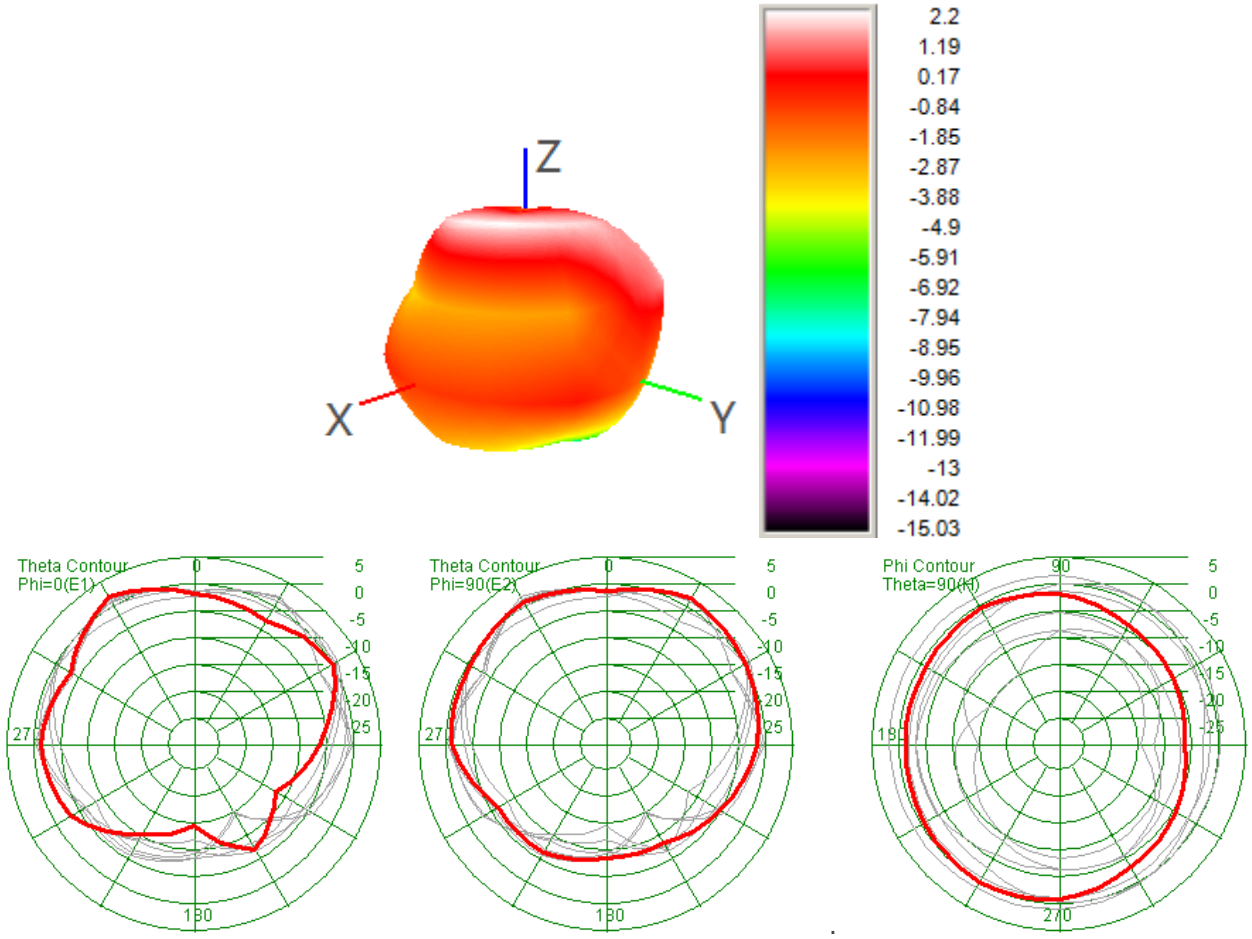


4.6.11. 2400 MHz

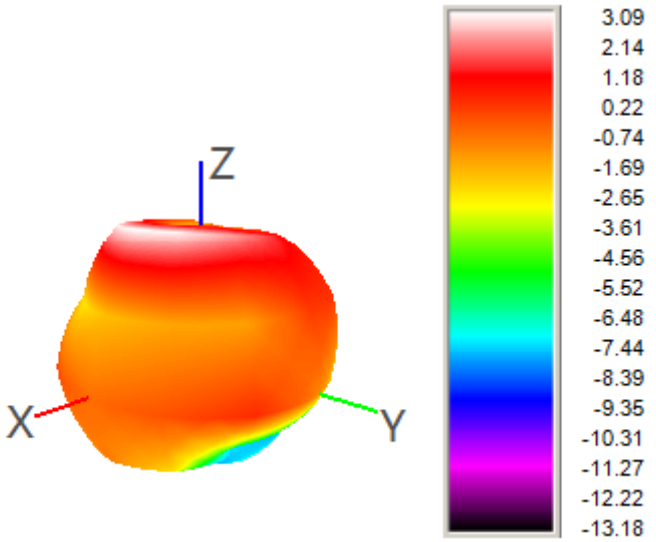


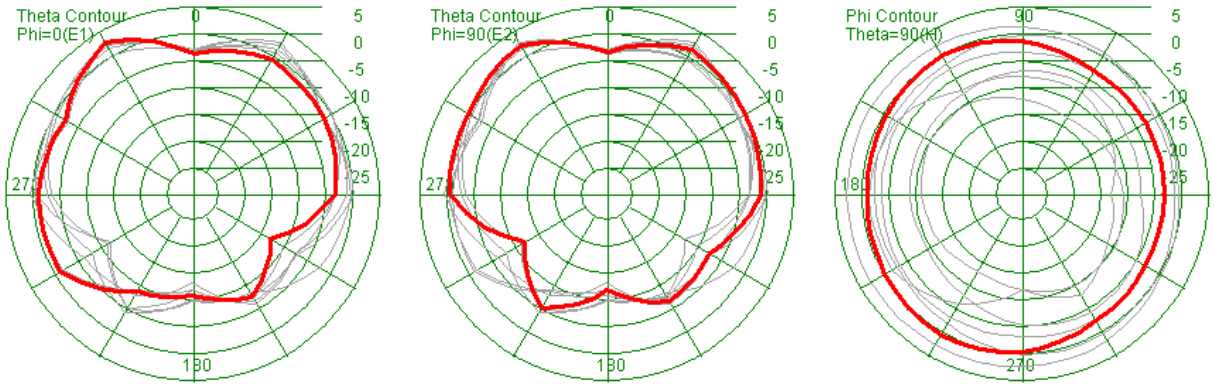


4.6.12. 2500 MHz

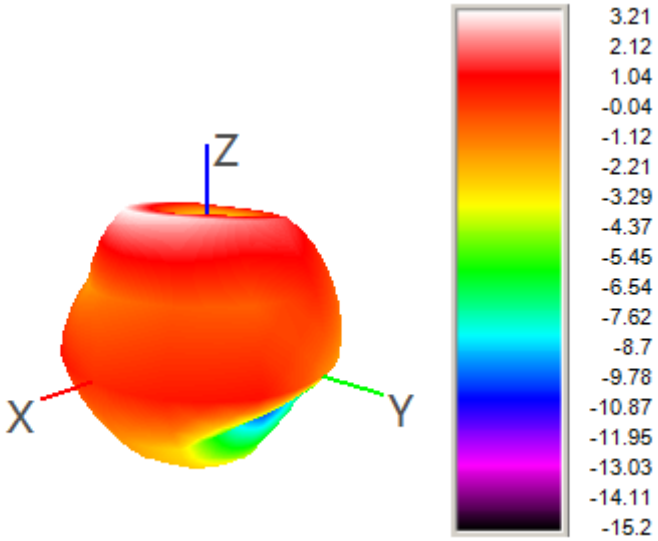


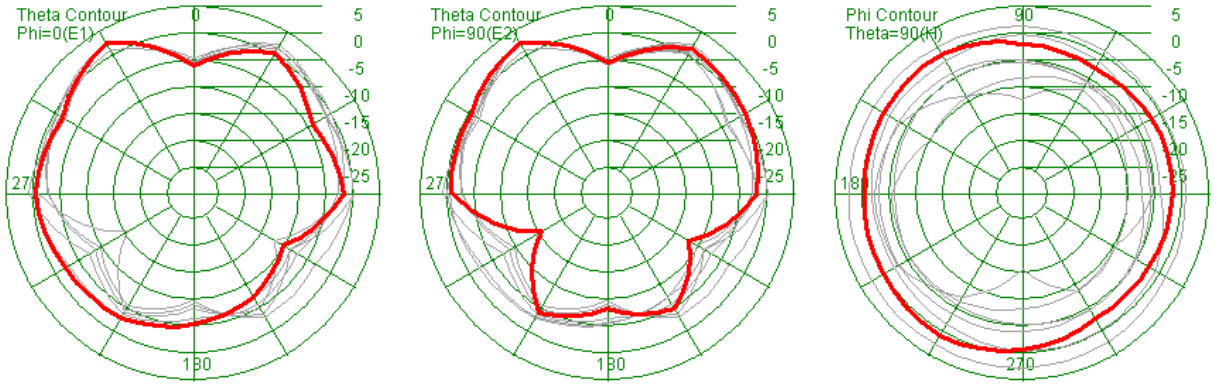
4.6.13. 2600 MHz





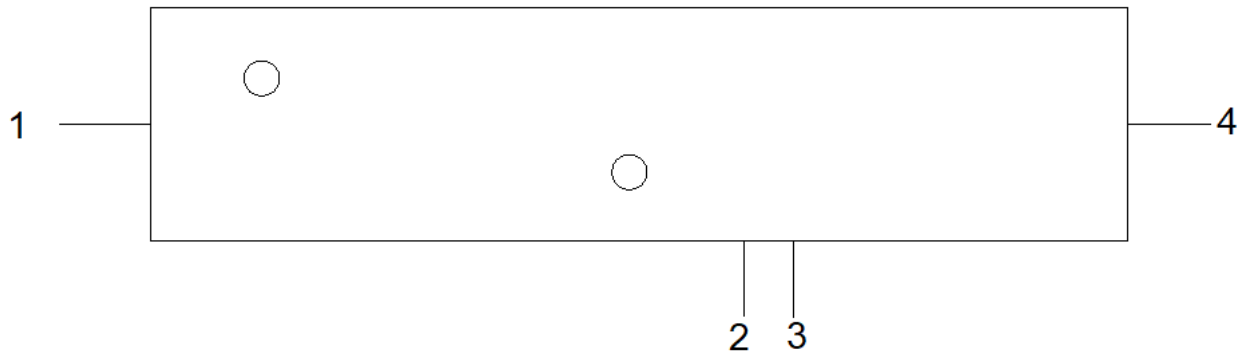
4.6.14. 2700 MHz





5 Schematic Symbol and Pin Definition

The pin assignment for the antenna is as follows. The antenna has 4 pins and only two work. All other pins are designed for mechanical strength.

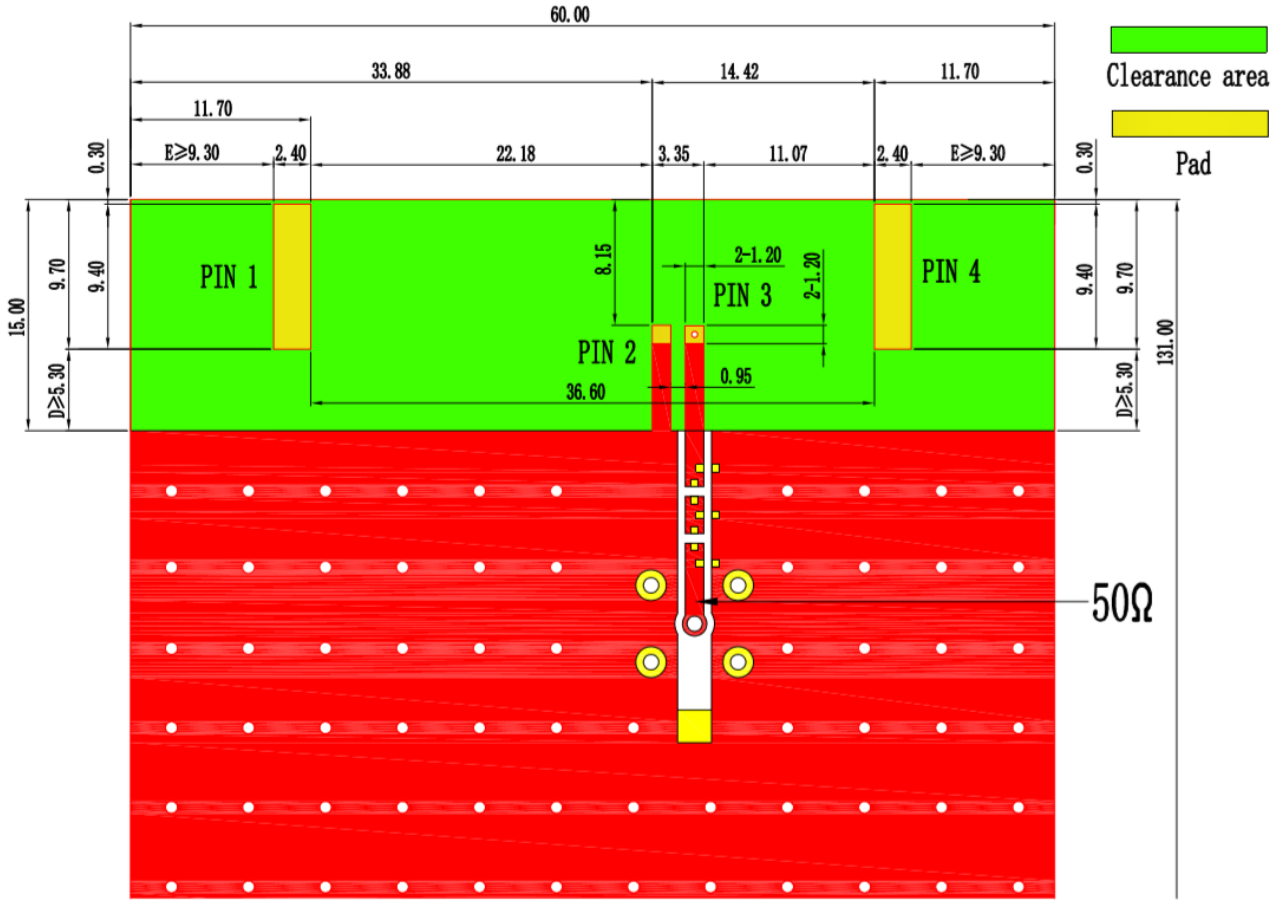


Pin No.	Description
3	Feed
2	Return/GND
1, 4	Not used (mechanical only)

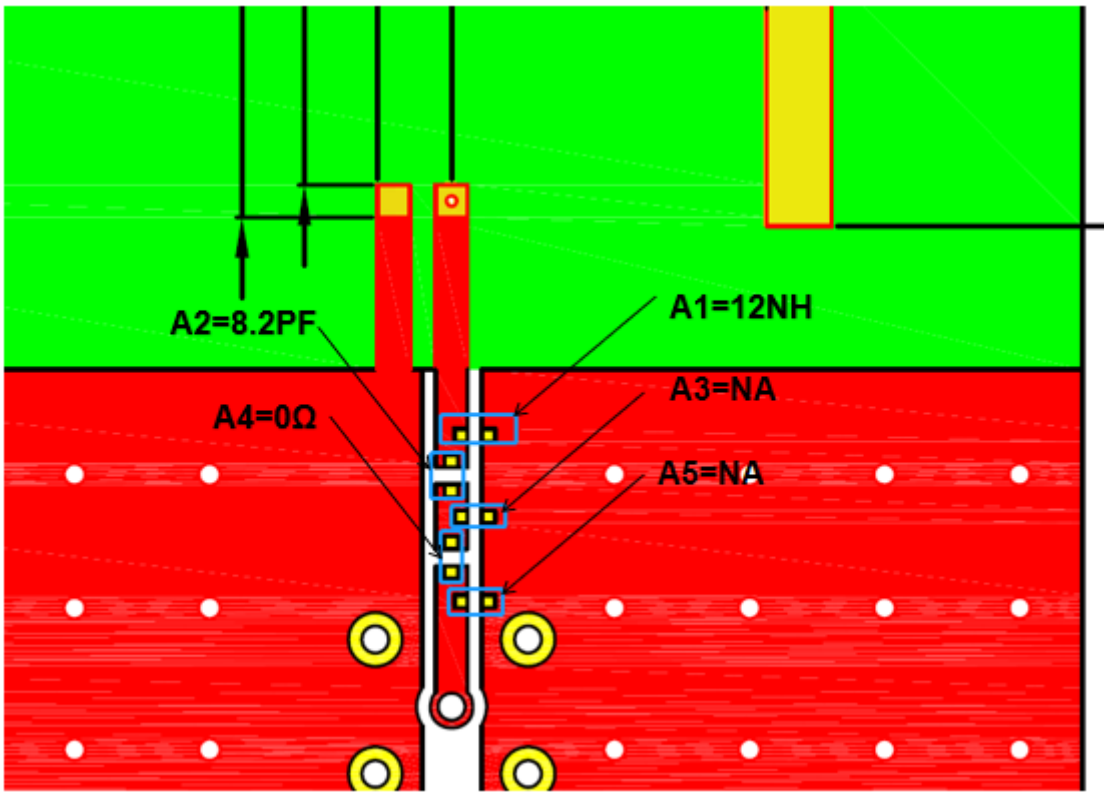
6 Transmission Line

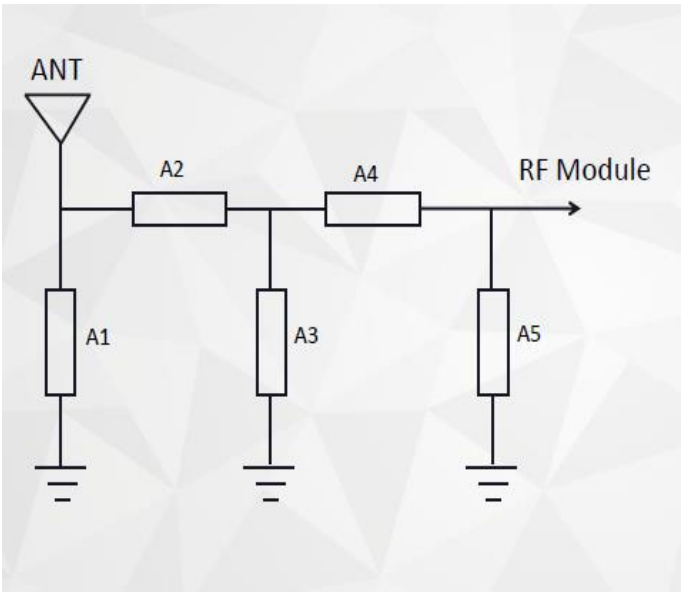
The characteristic impedance of all transmission lines shall be designed as 50 Ω.

- The length of the transmission lines should be kept to as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω.



7 Matching Circuit





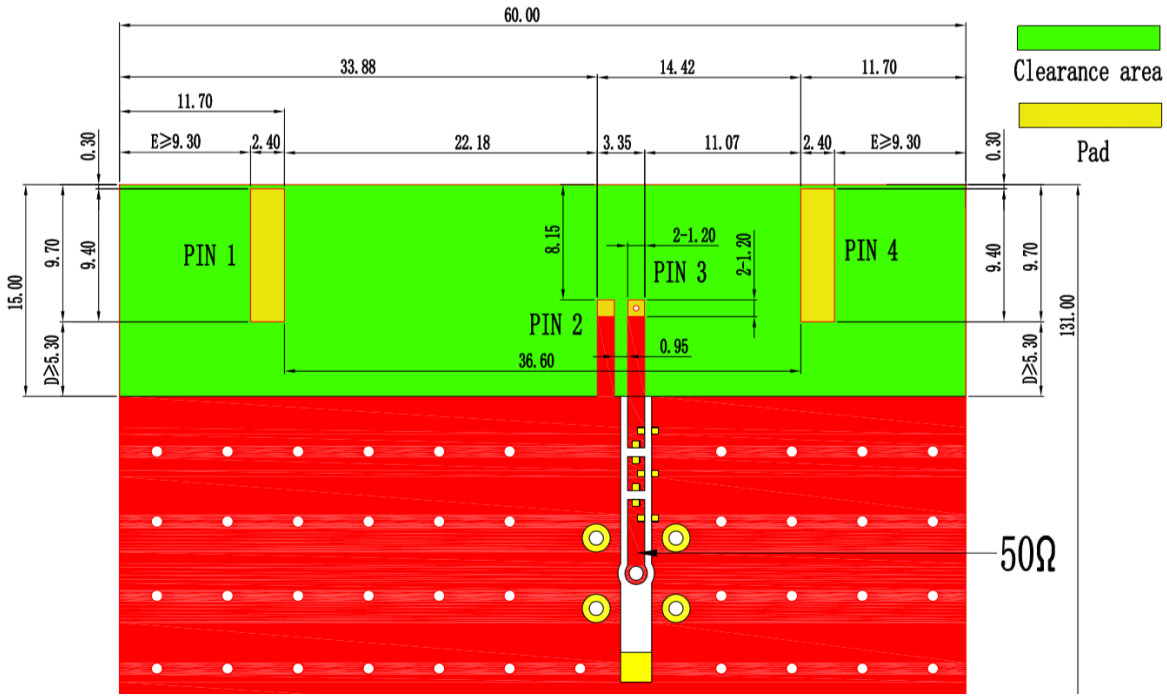
A1	12 nH
A2	8.2 pF
A3	nA
A4	0 Ω
A5	nA

8 Host PCB Requirement (unit: mm)

The printed circuit board of the host must ensure that the antenna clearance area meets the antenna specifications. It is suggested to put the antenna in the mid of the PCB.

An example of a PCB layout is shown as below:

Reference PCB size: 131 mm x 60 mm, clearance area size: 60 mm x 15 mm.



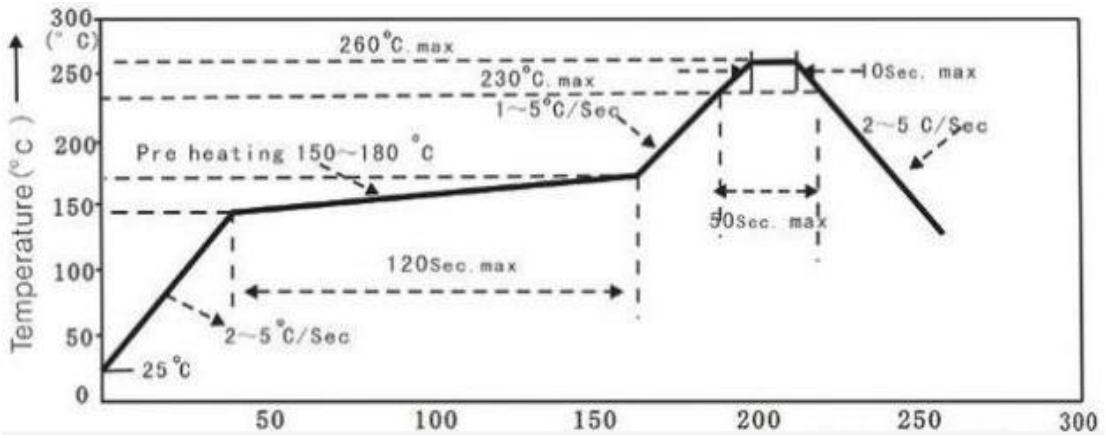
- **Gap D** is required from the edge of the antenna to the ground plane. This should be maintained along the edge of the antenna placement, **minimum value is 5.3 mm**.

- **Gap E** is required from the edge of the antenna to the ground plane or PCB traces, **minimum value is 9.3 mm.**

9 Soldering Temperature

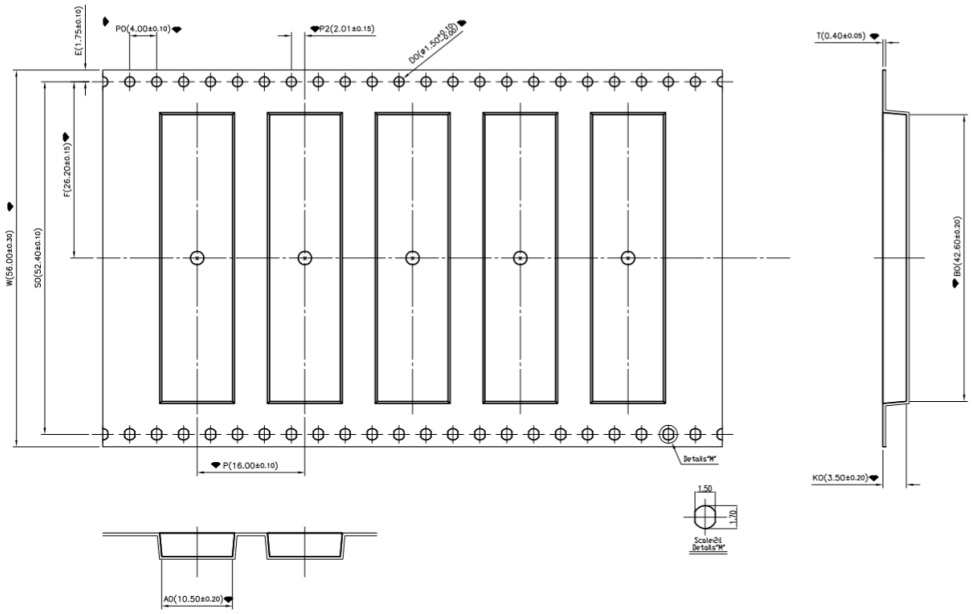
Phase	Profile Features	PB-Free Assembly (Max.)
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	3 °C/second
PREHEAT	Temperature Min. (Tsmin) Temperature Max. (Tsmax) Time (Tsmin to Tsmax)	150 °C 180 °C 120 seconds
REFLOW	Temperature (TL) Total Time above TL (tl)	210 °C 50 seconds
PEAK	Temperature (Tp) Time (tp)	260 °C 10 seconds
RAMP-DOWN	Rate	5 °C/second

10 Reflow Profile

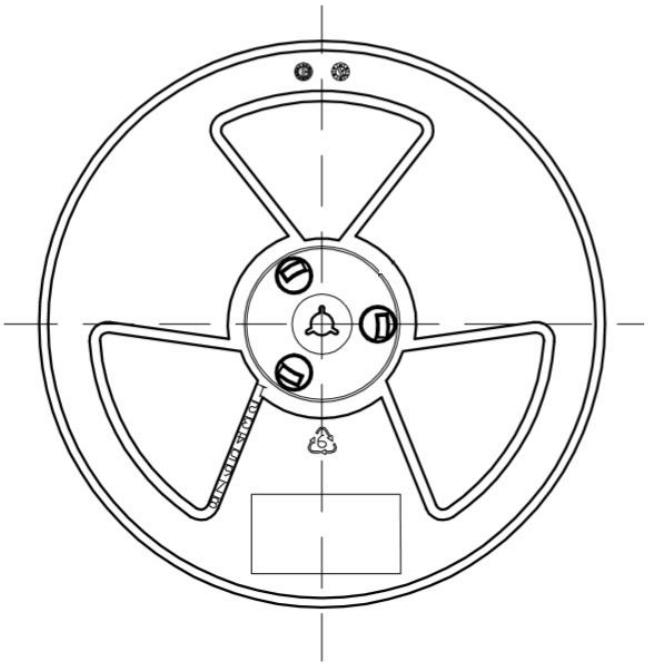


11 Package

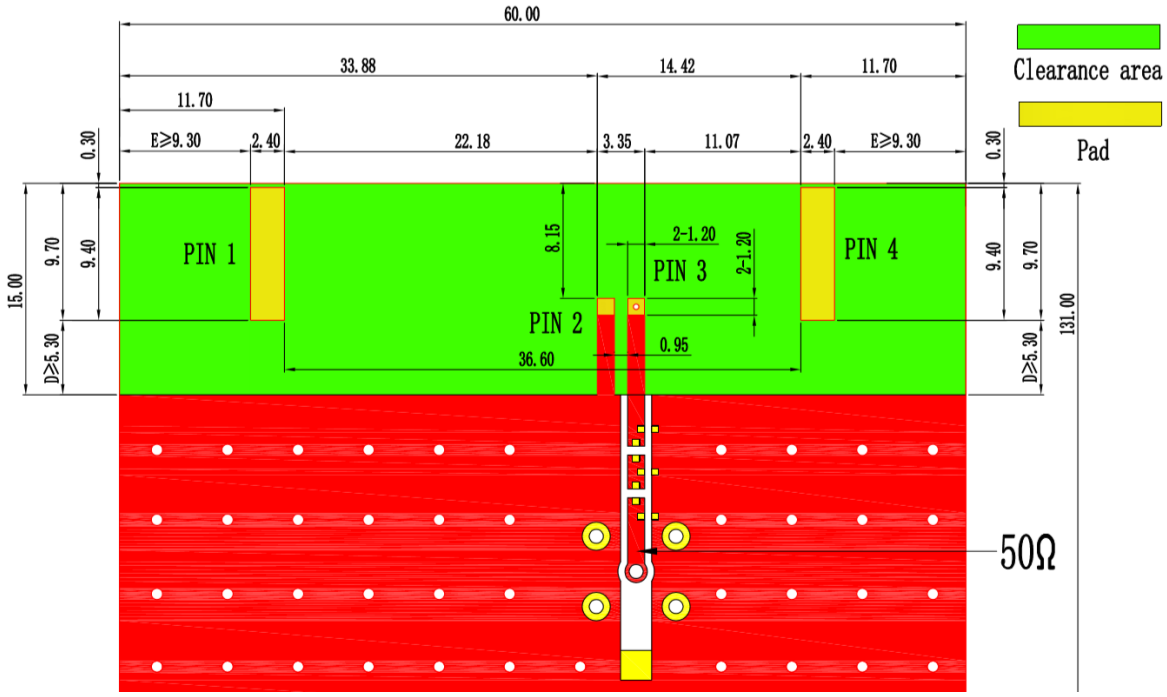
- Quantity/Reel: 1100 pcs/Reel
- Carrier tape dimensions (mm)



- Taping reel dimensions: 330 mm × 56.4 mm



12 Product Size (unit: mm)



PCB Reference