

APPROVAL SHEET

Customer Name: VFI

Date: December. 25 2024

Verifone P/N	
DCT P/N	F4501910001
Description	ANTENNA, M450-PLUS WCN
Version	DVT1

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Document No.:		
Kunshan linnowave Communication Technology Co. ,Ltd		

1 Antenna Description

WCN Antenna Structure
1. FPC with SPRING ; Fixed Internal Antenna (IFA antenna)

1.2 Calibration certificate and darkroom

calibration certificate
Instrument number:M546521029
Calibration Unit: Guangdong Jingheng Testing Technology Co., Ltd
Calibration date: July 10, 2024
Next calibration date: July 9th, 2025
Calibrator: Mai Qifeng

2 Product Specification

2.1 S11 (Return Loss)

The S11 over the frequencies stated in Table 1 below shall be measured at the connector end of the cable for each antenna assembly. The S11 are measured with the antennas installed on platform. The S11 shall be 100% tested in production.

Test Parameter	2400MHz to 2500 MHz	5150 MHz to 5850 MHz
S11:	-5dB Max	-5dB Max



S-parameter test

2.2 Test environment

The radiation pattern and antenna gain shall be tested either with a conventional far field anechoic chamber or a near field anechoic chamber such as a Satimo SG24-L.

For a far field anechoic chamber, the gain measurements shall be made within an RF anechoic chamber with at least 3-meter separation from the receive antenna to the antenna under test (AUT). The RF anechoic chamber must be lined with absorptive material rated as a minimum frequency range from 400MHz to 10GHz. The notebook with the antenna assemblies installed shall be placed on a non-conductive structure at a sufficient height to be in the ‘quiet zone’ of the chamber. All test equipment including horn antennas, adapters, cables, network analyzers, and receivers shall be calibrated per manufacturer’s minimum calibration requirements.

For a near field anechoic chamber, the AUT test must be place in the center (and within the admissible offset) of the probe array elements. The RF anechoic chamber must be lined with absorptive material rated as a minimum frequency range from 400MHz to 10GHz. The notebook with the antenna assemblies installed shall be placed on a non-conductive structure.

2.3 Antenna radiation measurement

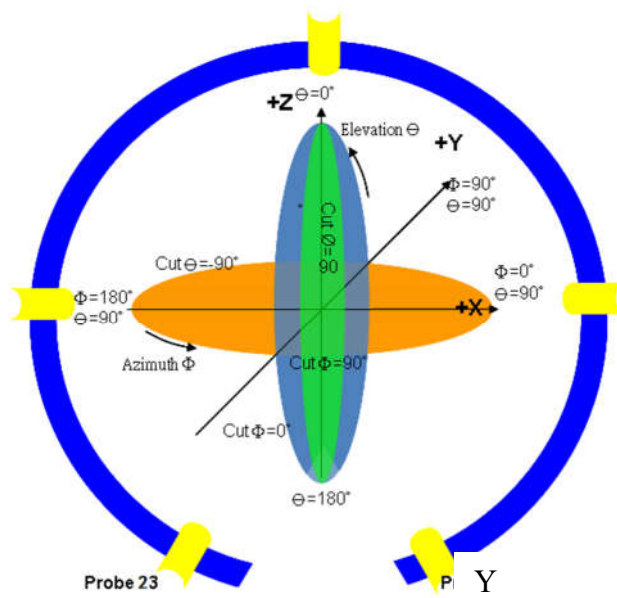
In order to ensure compliance with network carrier specifications, it is required to measure a 3-D gain measurement for WCN Antenna.

Table below specifies the details of the 3-D gain measurement points

Theta Start: 0°	Phi Start: 0°
Theta Stop: 150°	Phi Stop: 330°
Theta increment: 30°	Phi Increment: 30°

The table above specifies the minimum 23 measurement points (x2 polarizations) for each measurement frequency.

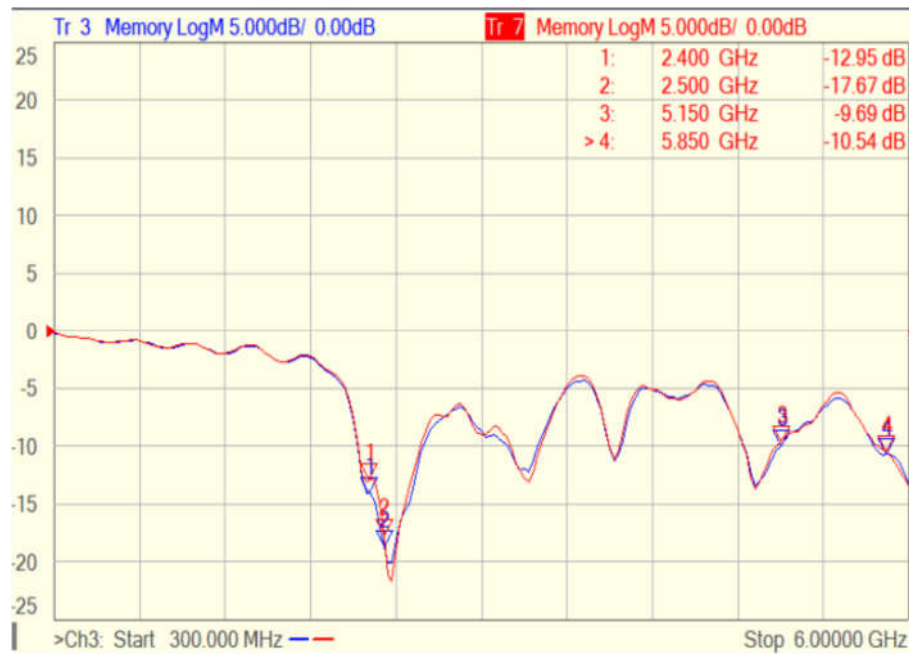
The axis and AUT orientation for gain measurements are outlined in below Figures.



The axis definition

3 Antenna Performance Test

3.1 S11 of WCN Antenna

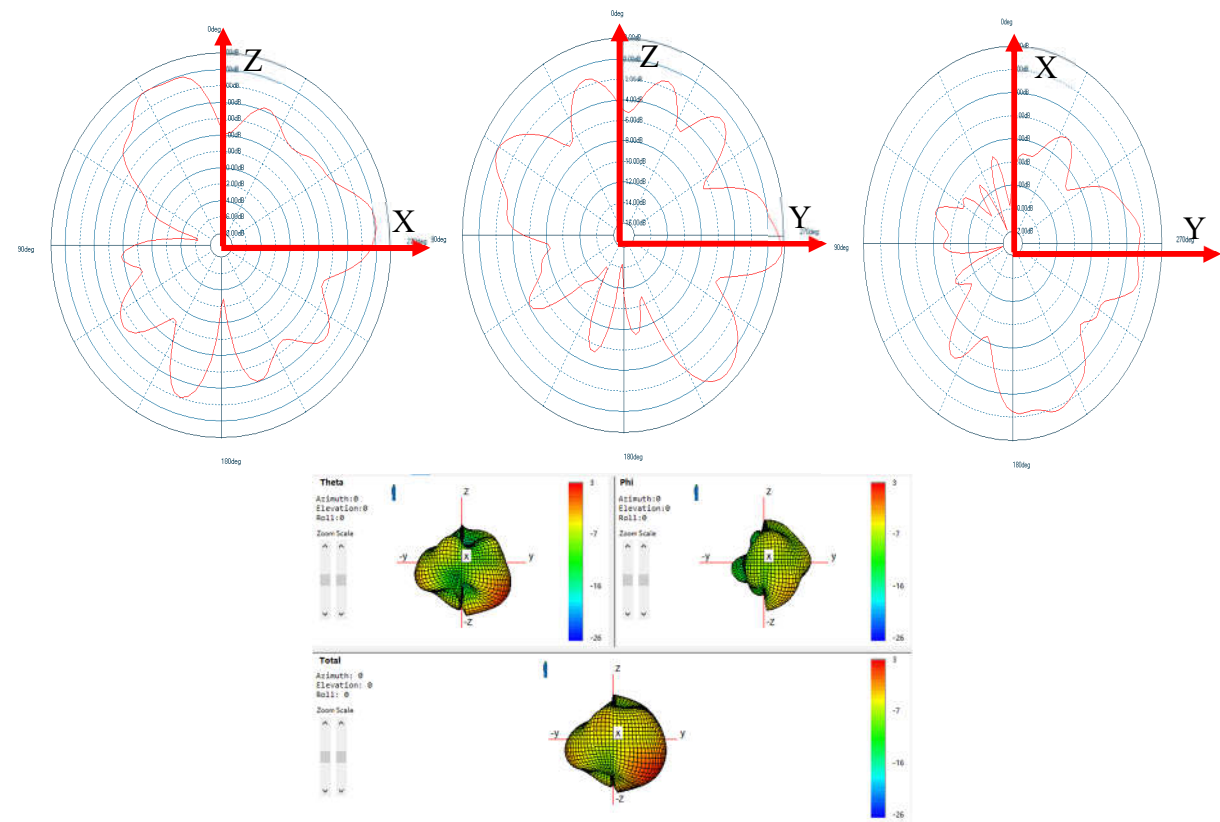


3.2 Antenna Radiated Efficiency

Freq (MHz)	Peak Gain(dBi)	Average Gain(dB)
2400~2483.5MHz	1.1	-3.1
5150~5250MHz	1.0	-4.6
5250~5350MHz	1.2	-4.4
5470~5725MHz	1.0	-4.5
5725~5850MHz	1.1	-4.3

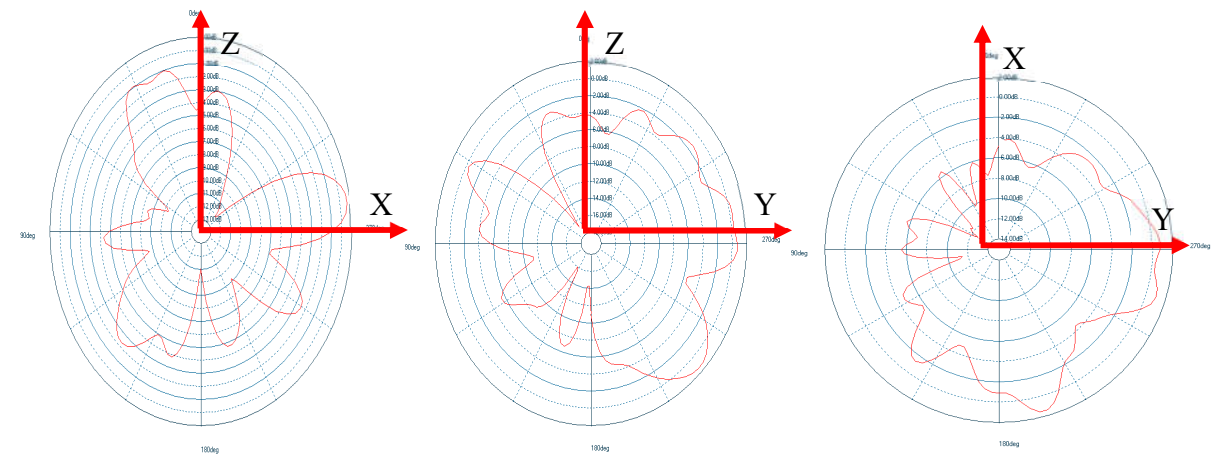
3.3 Radiation Pattern

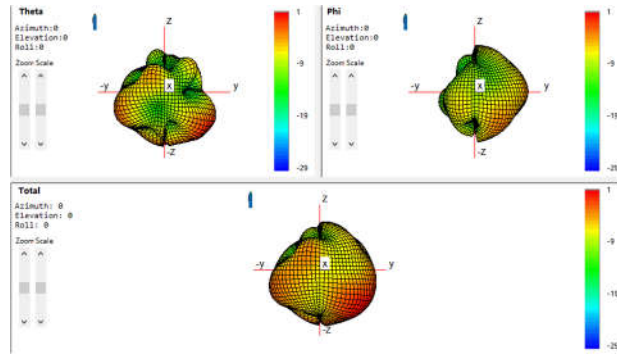
WCN antenna: 2400MHz



2400MHz		
Phi=0deg Peak (dBi)	-1.02	210 deg
Phi=90deg Peak (dBi)	0.15	150 deg
Theta=90deg Peak(dBi)	-1.01	240 deg

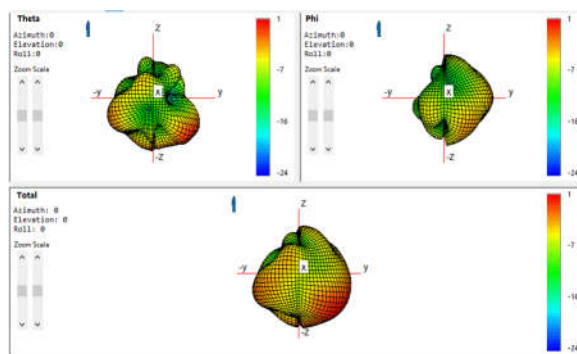
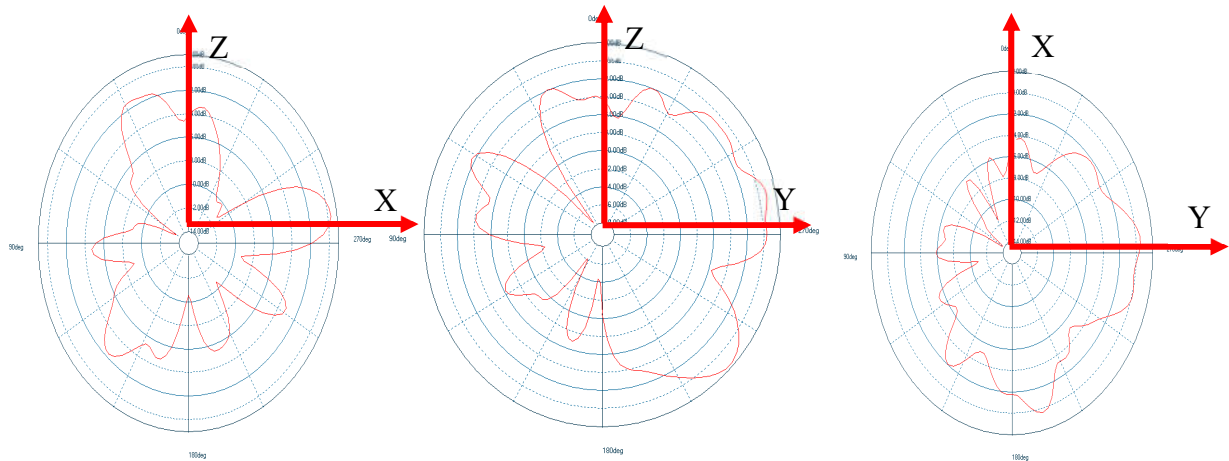
WCN antenna: 2480MHz





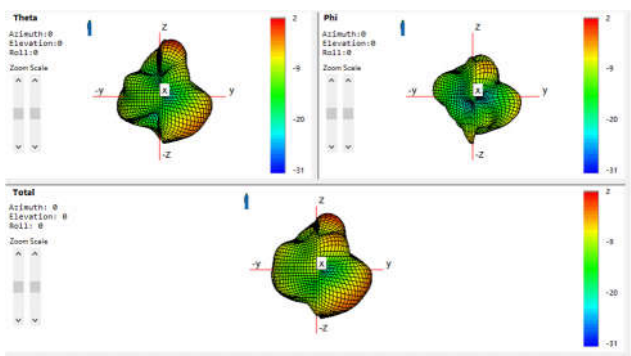
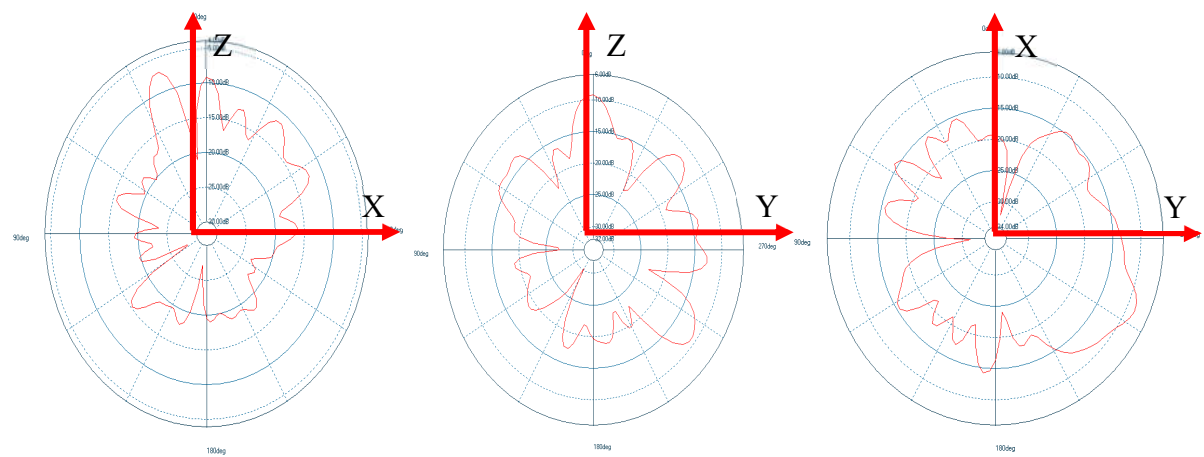
2480MHz		
Phi=0deg Peak (dBi)	0.99	210 deg
Phi=90deg Peak (dBi)	0.58	150 deg
Theta=90deg Peak(dBi)	-0.27	240 deg

WCN antenna: 2500MHz



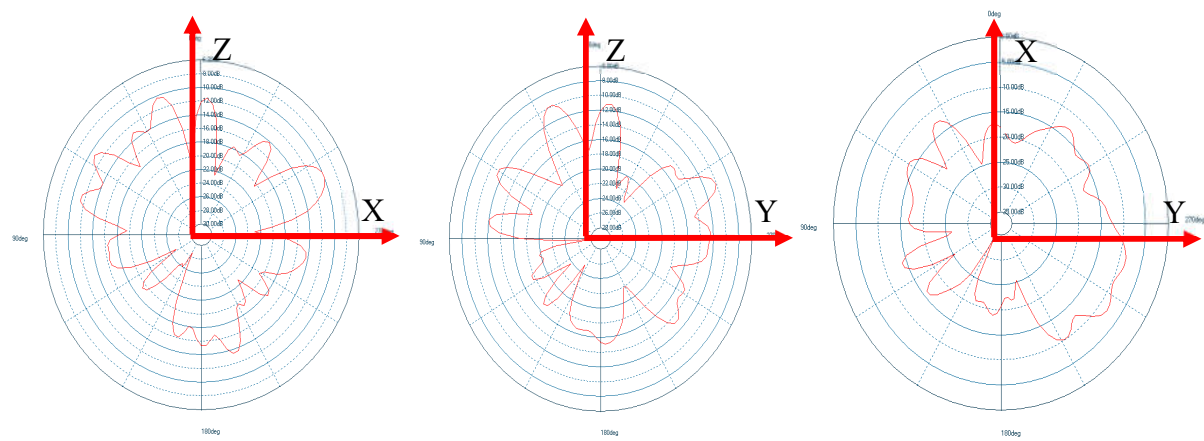
2500MHz		
Phi=0deg Peak (dBi)	0.77	210 deg
Phi=90deg Peak (dBi)	0.56	150 deg
Theta=90deg Peak(dBi)	-0.48	240 deg

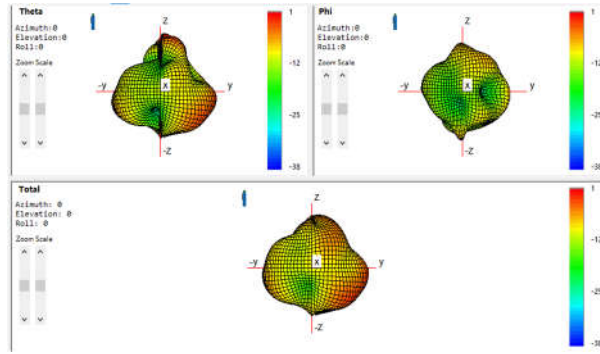
WCN antenna: 5150MHz



5150MHz		
Phi=0deg Peak (dBi)	-0.46	210 deg
Phi=90deg Peak (dBi)	-0.65	120 deg
Theta=90deg Peak(dBi)	-0.89	90 deg

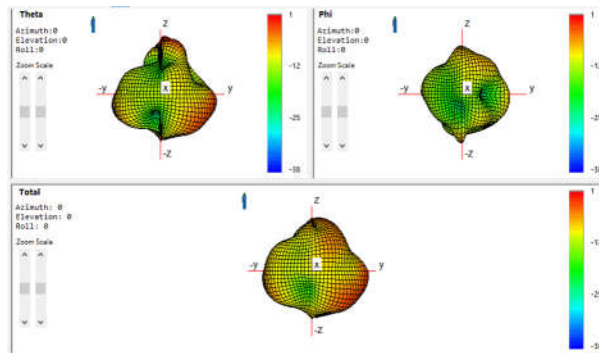
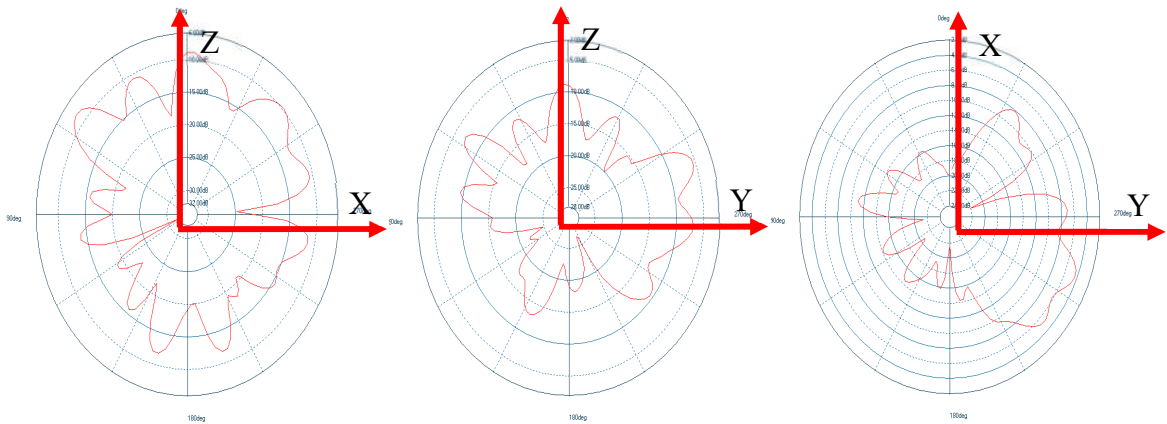
WCN antenna: 5350MHz





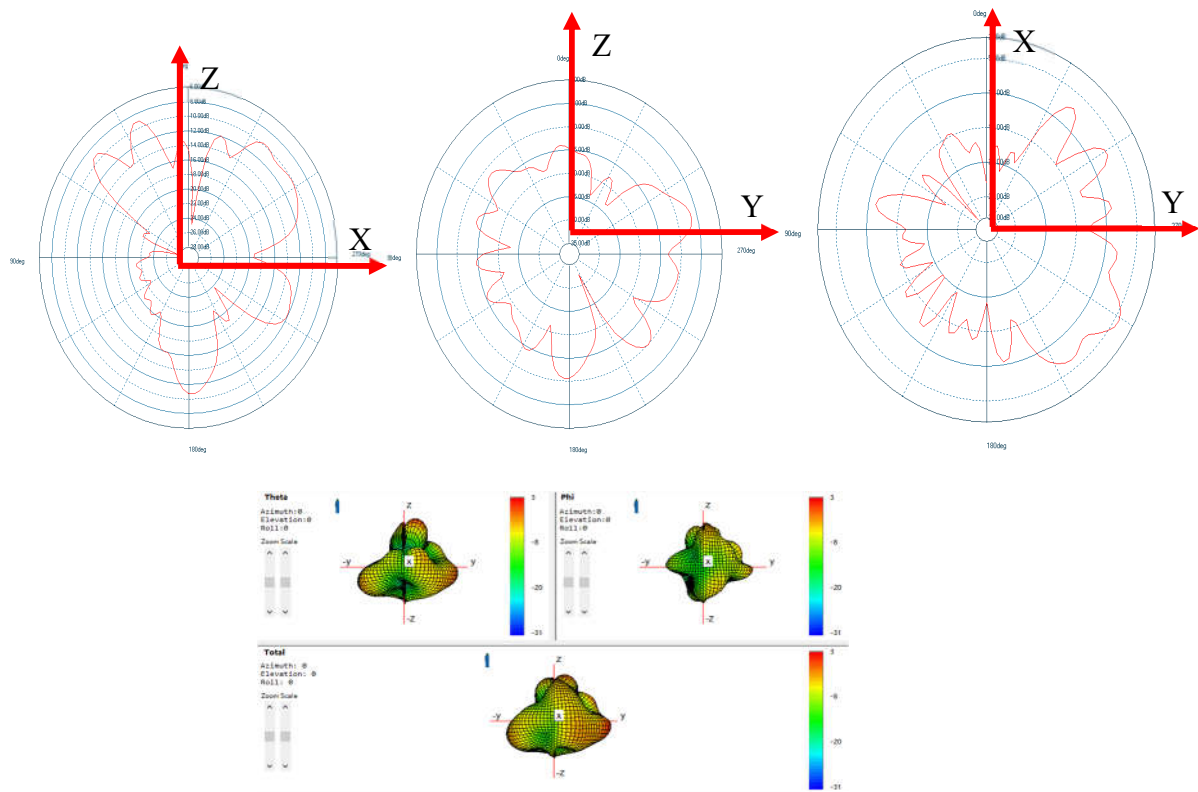
5350MHz		
Phi=0deg Peak (dBi)	0.36	120 deg
Phi=90deg Peak (dBi)	1.02	330 deg
Theta=90deg Peak(dBi)	0.05	0 deg

WCN antenna: 5600MHz



5600MHz		
Phi=0deg Peak (dBi)	-0.39	120 deg
Phi=90deg Peak (dBi)	-0.52	60 deg
Theta=90deg Peak(dBi)	-1.1	60 deg

WCN antenna: 5850MHz



5850MHz		
Phi=0deg Peak (dBi)	-0.67	90 deg
Phi=90deg Peak (dBi)	-0.57	90 deg
Theta=90deg Peak(dBi)	-0.86	90 deg

4 Mechanical description

4.1 NFC Antenna

NFC Frequency Band : 13.553 - 13.567 MHz

Modulation Type : ASK

Supported Card Type : A / B

NFC Antenna Type : Loop Antenna

NFC Antenna size : 52.19*66.39mm

NFC Antenna location :