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ACU6 Pro OH Internal Antenna Specification	ACTIA Group	U - Uncontrolled	1.1	1.0 Released

ACU6 Pro OH Internal Antenna Specification



Revision history

Table 1 Revision history

Rev	Date	Author(s)	Updates
0.1	2022-09-21	Felix Björk	Document creation
1.0	2022-11-08	Felix Björk	Document release

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1 INTRODUCTION

1.1 PURPOSE

This document, along with referenced documents, defines the overall individual specifications of the internal antennas present in ACU6.

1.2 TARGET GROUP

This document should be read by anyone, involved in, or affected by the RF characteristics of the internal antennas.

1.3 RADIATION PATTERN SETUP DESCRIPTION

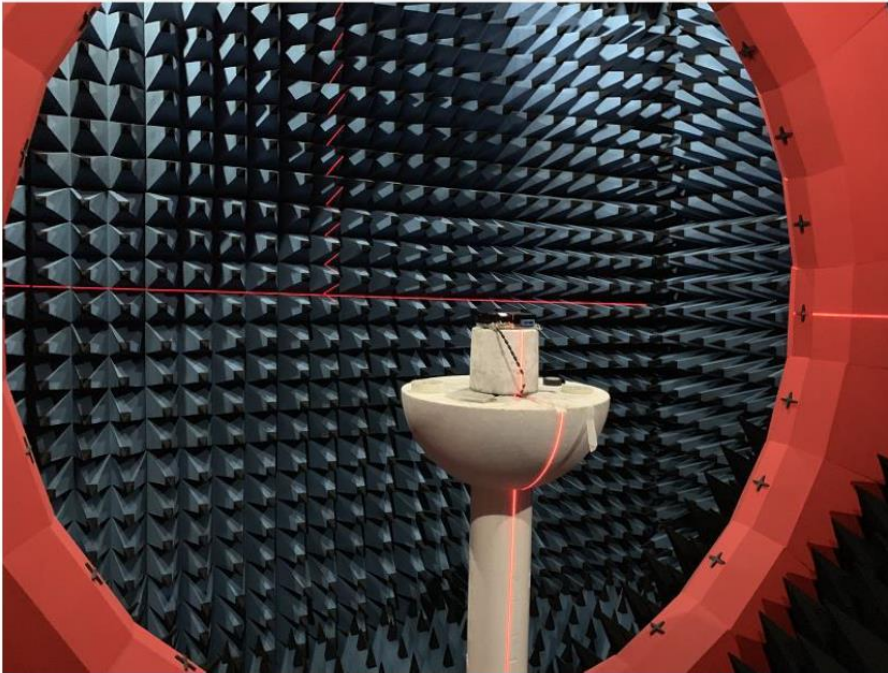


Figure 1 - Radiation pattern measurement set-up

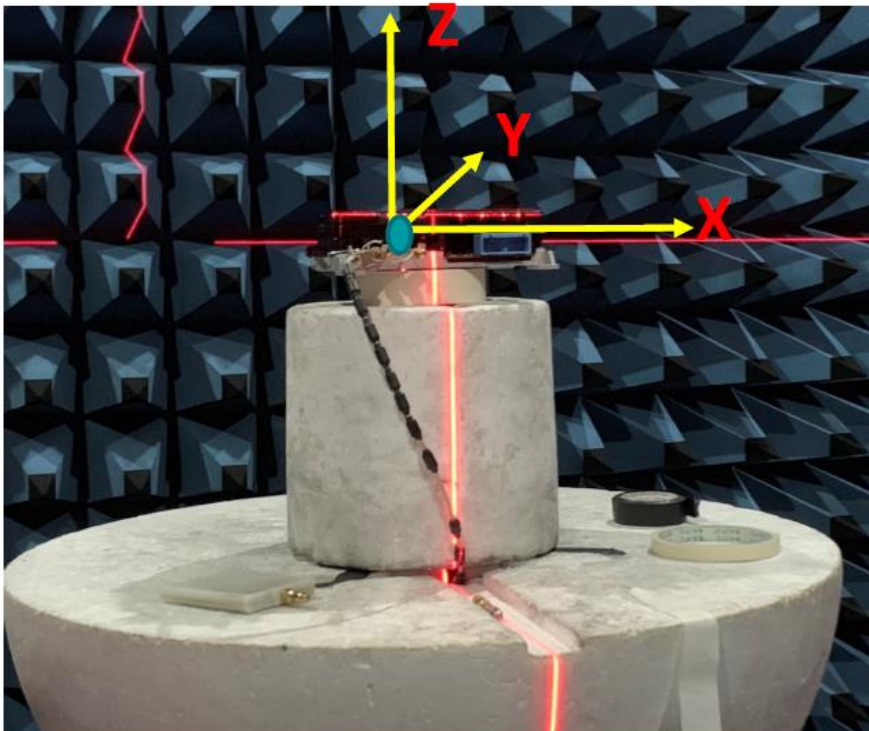


Figure 2 - Radiation pattern orientation description

2 ANTENNAS

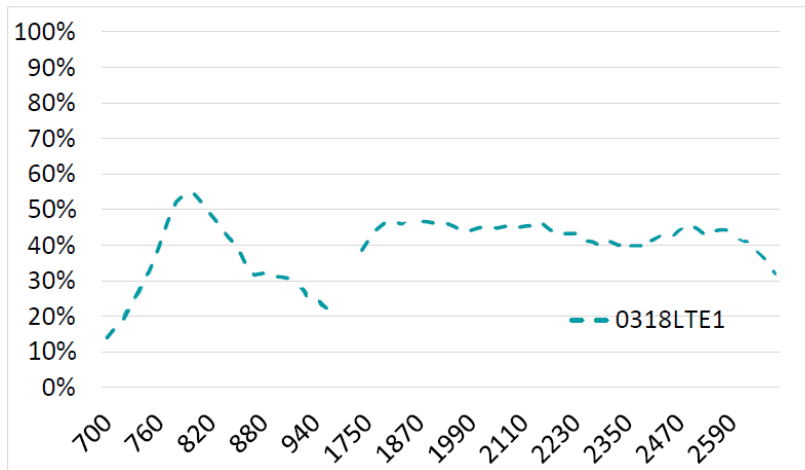
2.1 LTE1

2.1.1 Specifications

Table 2 - LTE1 antenna specifications

Antenna	1034-321-01	
Standard	2G/3G/4G	
Frequency	698-960 MHz	1710-2690 MHz
Peak gain	<0.2dB	<0.2dB
Efficiency	<55%	<50%
Impedance	50Ω	
Polarization	Linear	

2.1.2 Efficiency



Efficiency of LTE1 antenna

Figure 3 - LTE1 antenna efficiency

2.1.3 Return Loss

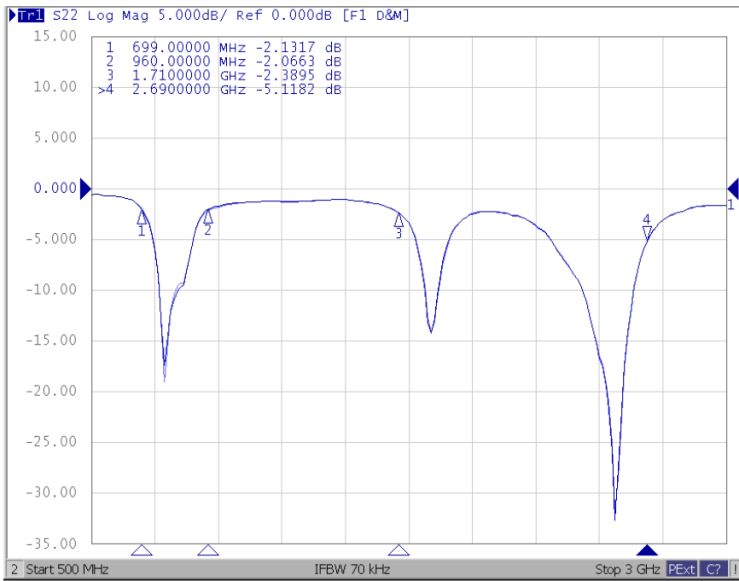


Figure 4 - LTE1 antenna return loss

2.1.4 Radiation pattern - 830MHz

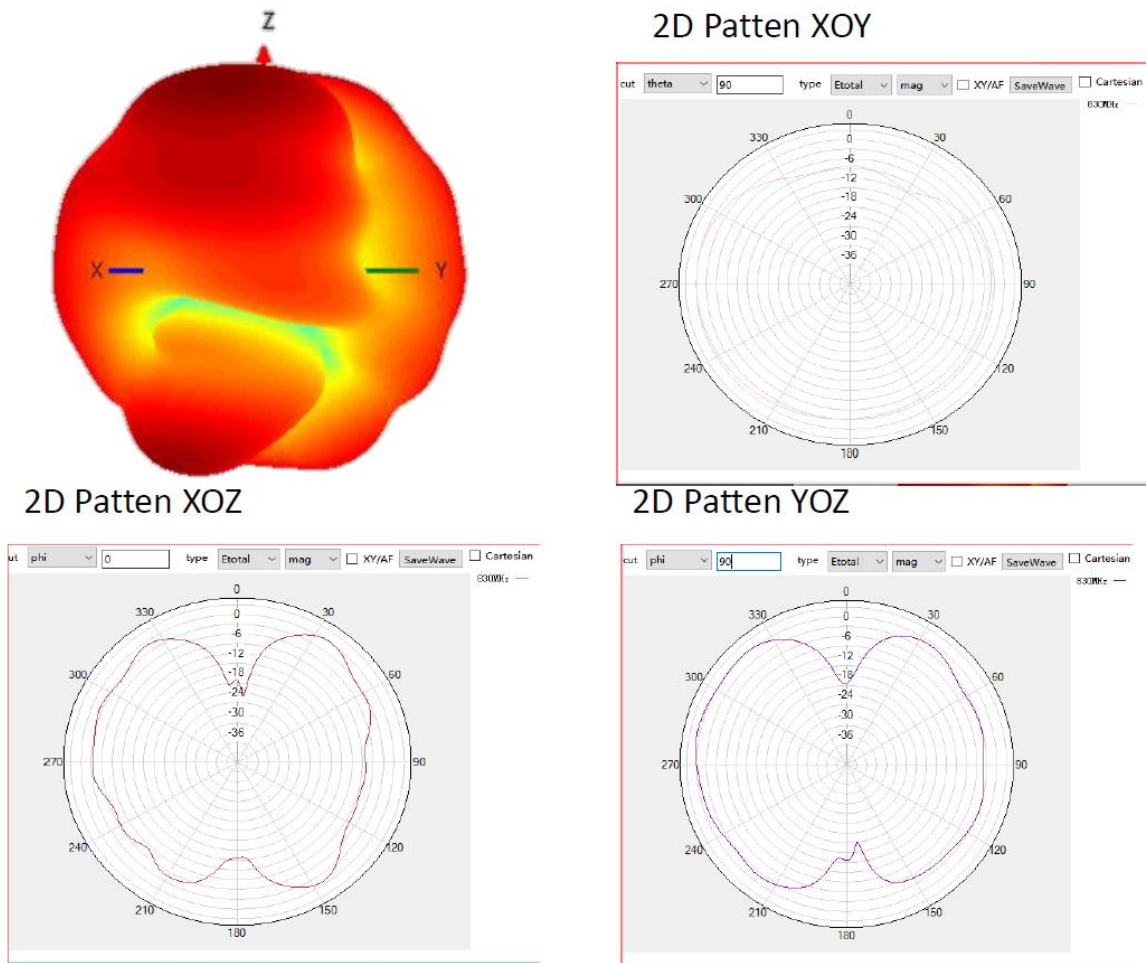


Figure 5 - LTE1 antenna radiation pattern at 830MHz

2.1.5 Radiation pattern - 2230MHz

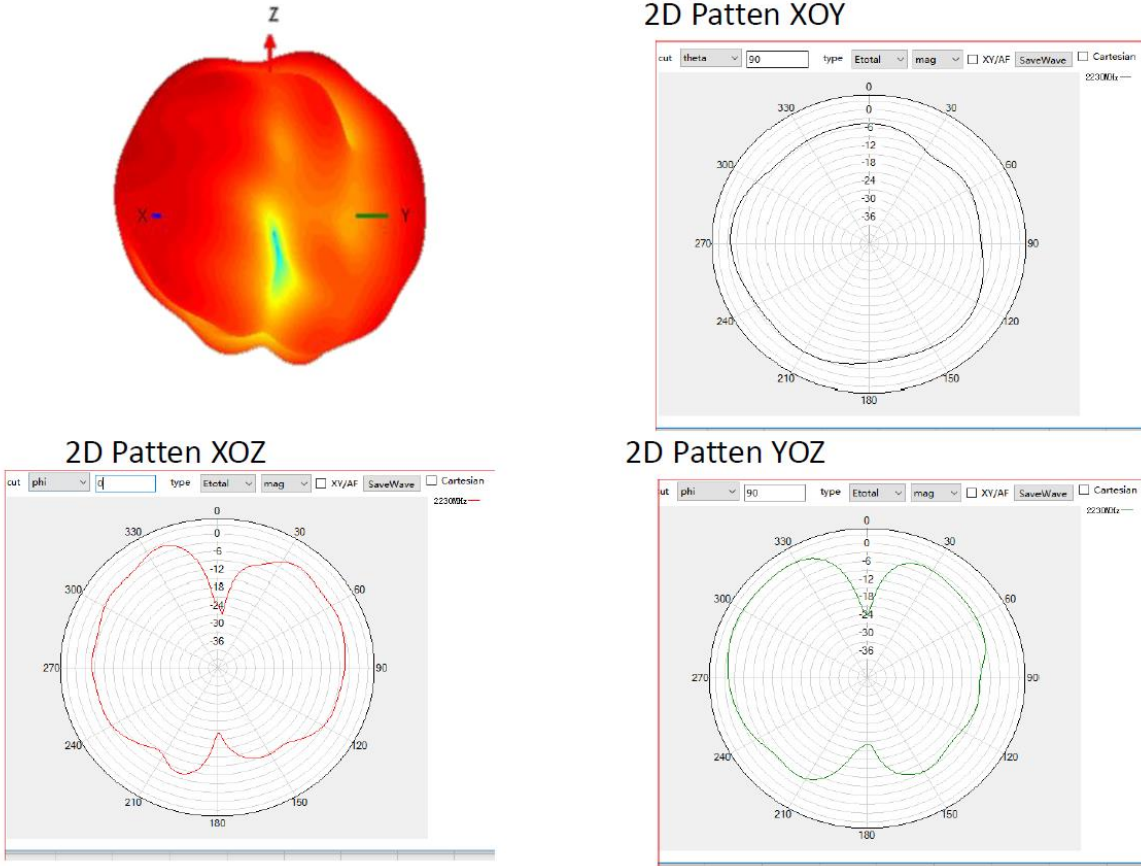


Figure 6 - LTE1 antenna radiation pattern at 2230MHz

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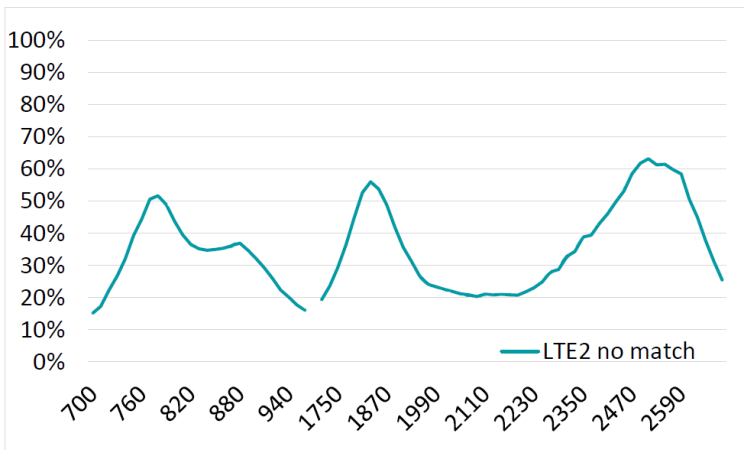
2.2 LTE2

2.2.1 Specifications

Table 3 – LTE2 antenna specifications

Antenna		1034-322-01	
Standard	2G/3G/4G		
Frequency	698-960 MHz	1710-2690 MHz	
Peak gain	<0dB	<0dB	
Efficiency	<55%	<65%	
Impedance	50Ω		
Polarization	Linear		

2.2.2 Efficiency



2.2.3 Return loss

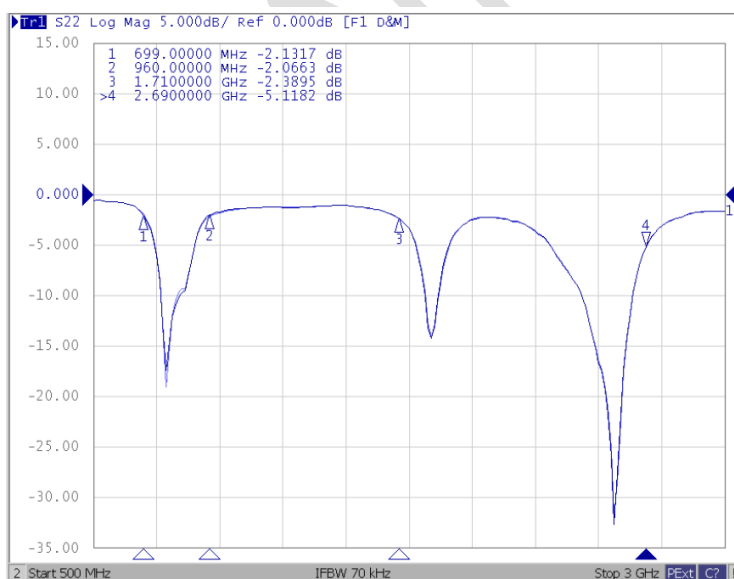
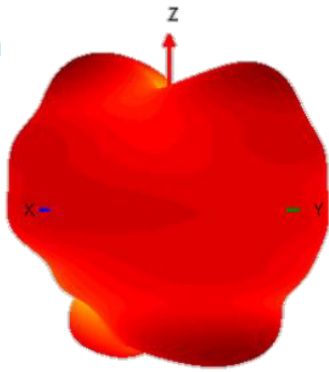


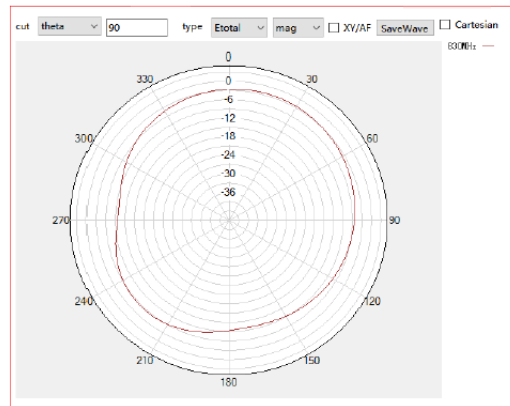
Figure 7 - LTE2 antenna return loss

2.2.4 Radiation pattern - 830MHz

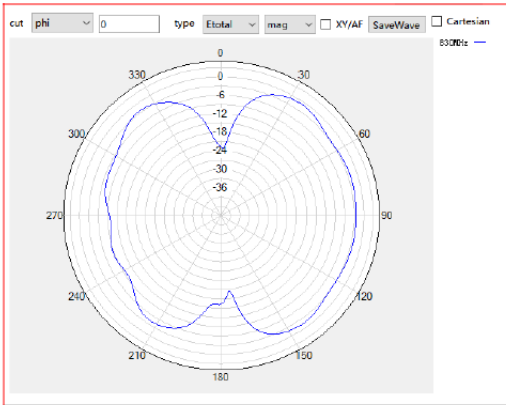
3D Patten



2D Patten XOY



2D Patten XOZ



2D Patten YOZ

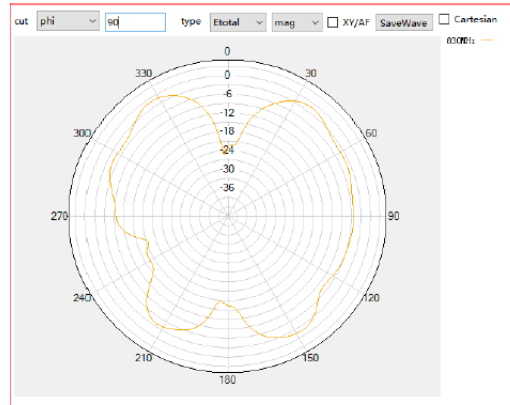
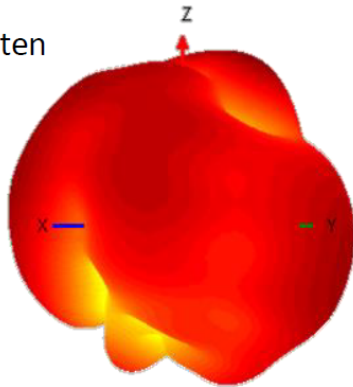


Figure 8 - LTE2 antenna radiation pattern at 830MHz

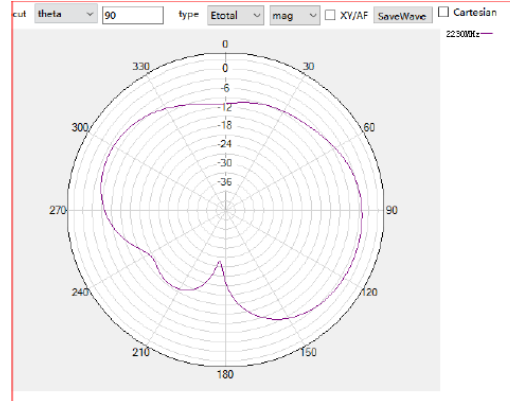
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2.2.5 Radiation pattern - 2230MHz

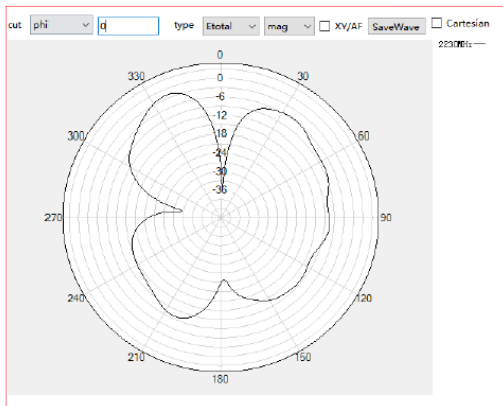
3D Patten



2D Patten XOY



2D Patten XOZ



2D Patten YOZ

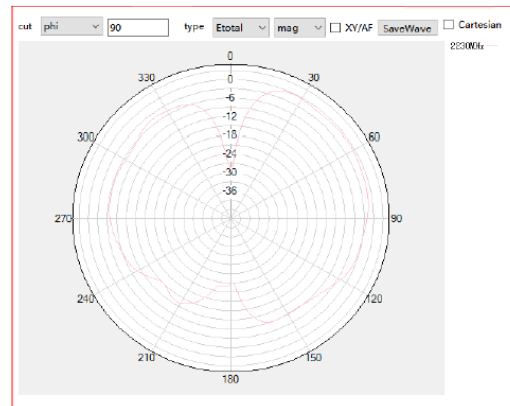


Figure 9 - LTE2 antenna radiation pattern at 2230MHz

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2.3 WIFI

2.3.1 Specifications

Table 4 - WIFI antenna specifications

Antenna	1034-323-01	
Standard	WIFI 2.4G/5G	
Frequency	2400-2500 MHz	5150-5875 MHz
Peak gain	1dB	<3dB
Efficiency	<40%	<40%
Impedance	50Ω	
Polarization	Linear	

2.3.2 Efficiency

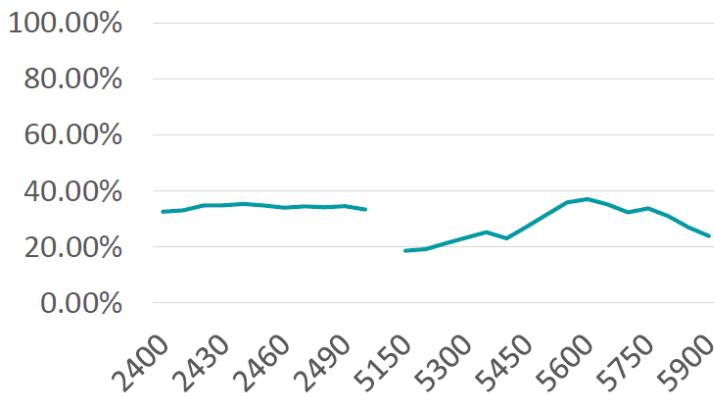


Figure 10 - WIFI antenna efficiency

2.3.3 Return Loss

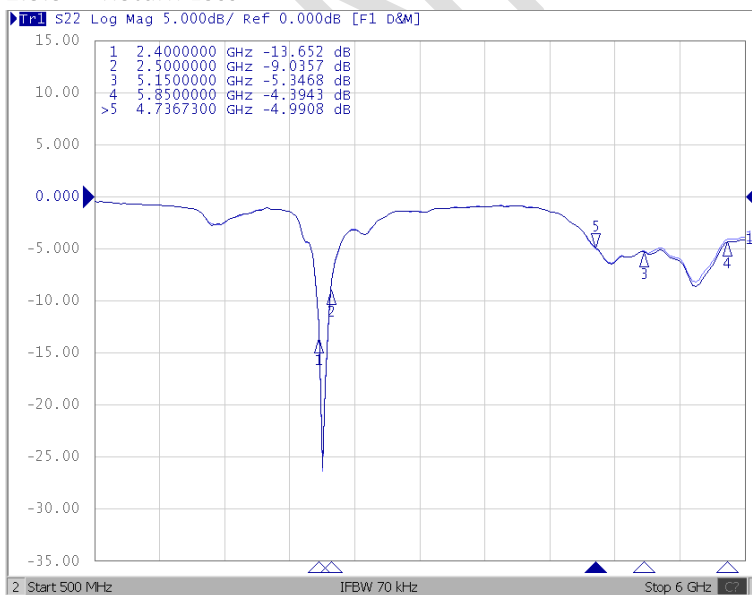


Figure 11 - WIFI antenna return loss

2.3.4 Radiation pattern – 2450MHz

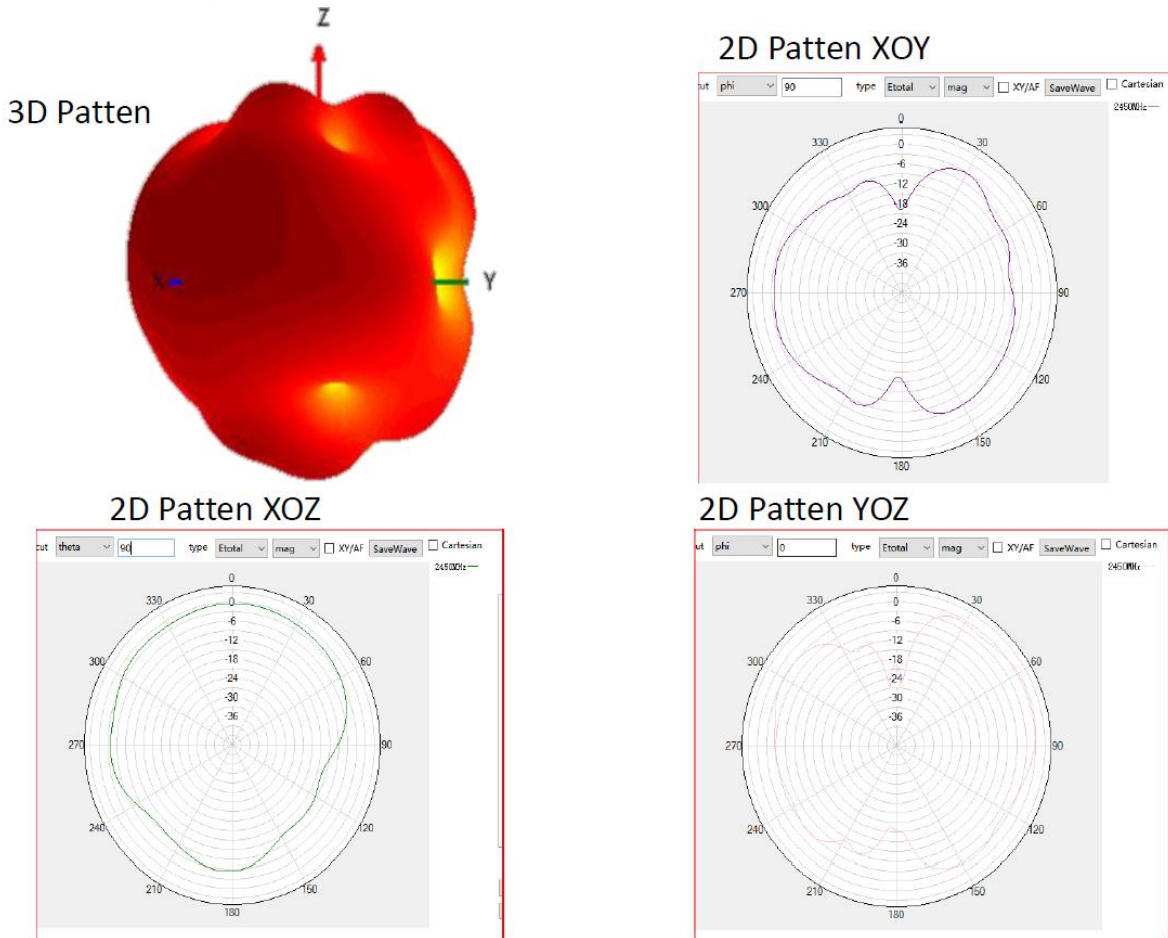
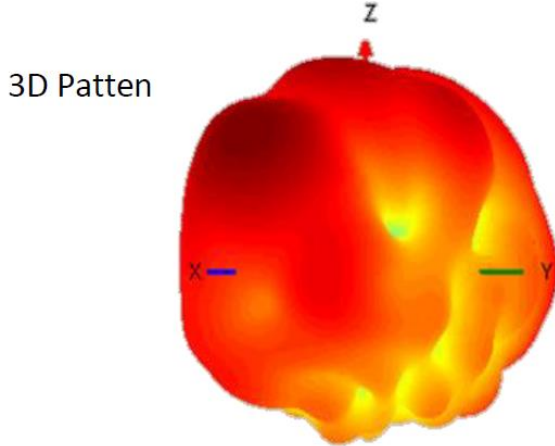


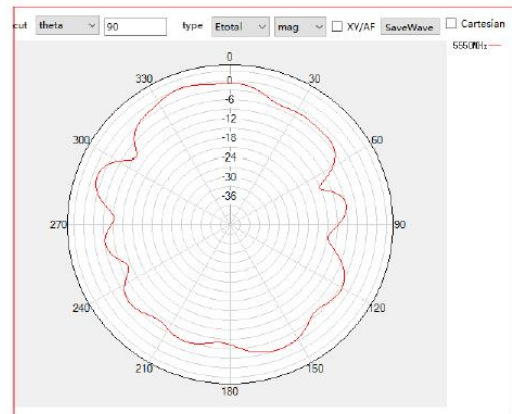
Figure 12 - WIFI antenna radiation pattern at 2450MHz

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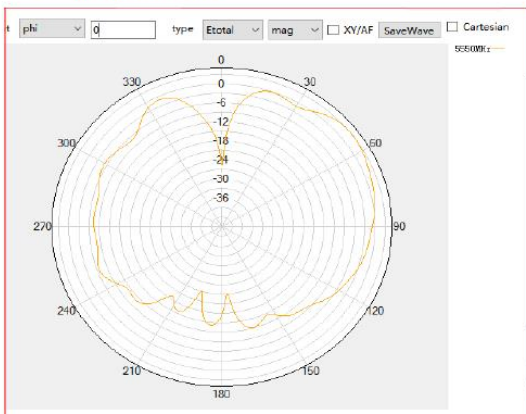
2.3.5 Radiation pattern – 5550MHz



2D Patten XOY



2D Patten XOZ



2D Patten YOZ

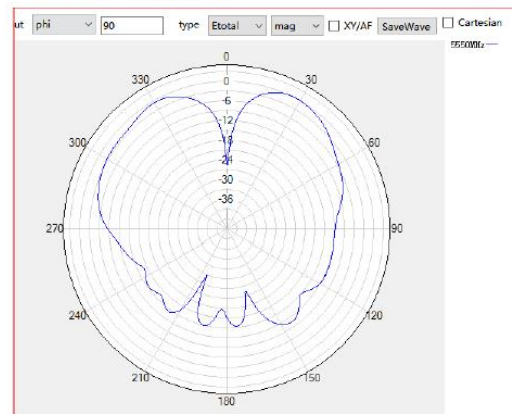


Figure 13 – WIF antenna radiation pattern at 5550MHz

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2.4 BLE

2.4.1 Specifications

Table 5 - BLE antenna specifications

Antenna	ACTIA_ACU6_BLE_ANT_VAR1
Standard	BLE 2.4GHz
Frequency	2400-2484 MHz
Peak gain	<0dB
Efficiency	<20%
Impedance	50Ω
Polarization	Linear

2.4.2 Efficiency

Table 6 - BLE antenna efficiency

Frequency [MHz]	Antenna efficiency [%]	[dB]
2405	10	-10.1
2440	12	-9.1
2480	15	-8.1

2.4.3 Return Loss

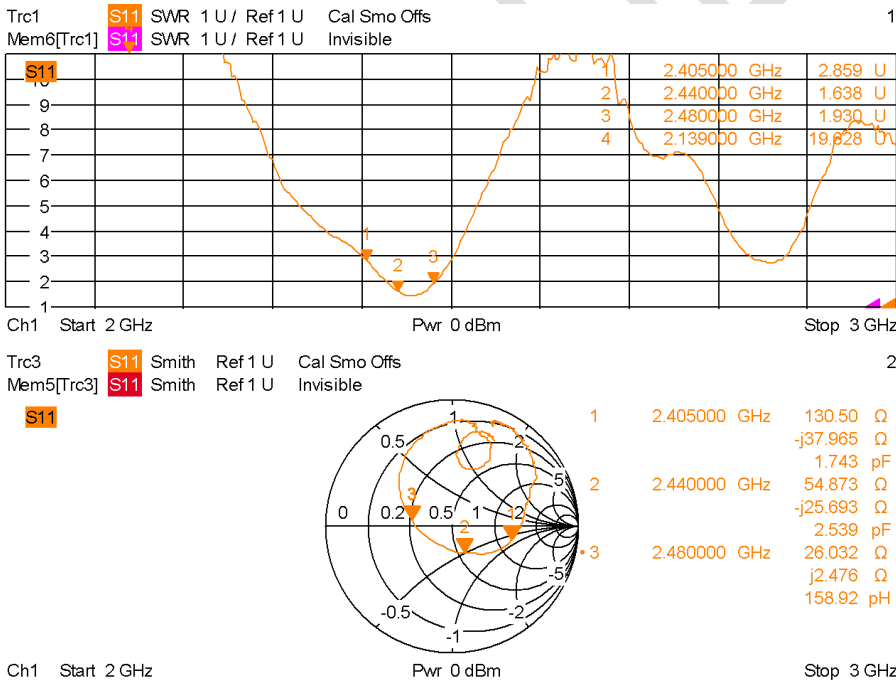


Figure 14 - BLE antenna return loss

2.4.4 Antenna gain

Peak gain is guaranteed to be below 0dB.

2.5 GNSS

2.5.1 Specifications

Table 7 - GNSS antenna specifications

Antenna	1034-323-01
Standard	GNSS (B1, L1, E1 & G1)
Frequency	1559 – 1610 MHz
Peak gain	3.8dB
Efficiency	43%
Impedance	50Ω
Polarization	Linear

2.5.2 Efficiency

Frequency	Efficiency	Gain	Directivity
1560.00 MHz	-3,9 dB / 41%	2,8	6,7
1565.00 MHz	-3,8 dB / 42%	2,9	6,6
1570.00 MHz	-3,8 dB / 42%	2,9	6,7
1575.00 MHz	-3,7 dB / 43%	3,0	6,7
1580.00 MHz	-3,6 dB / 44%	3,2	6,8
1585.00 MHz	-3,5 dB / 45%	3,4	6,9
1590.00 MHz	-3,4 dB / 46%	3,5	7,0
1595.00 MHz	-3,4 dB / 46%	3,7	7,1
1600.00 MHz	-3,3 dB / 47%	3,8	7,1
1605.00 MHz	-3,2 dB / 48%	3,8	7,0
1610.00 MHz	-3,3 dB / 47%	3,7	7,0

Figure 15 - GNSS antenna efficiency

2.5.3 Return Loss

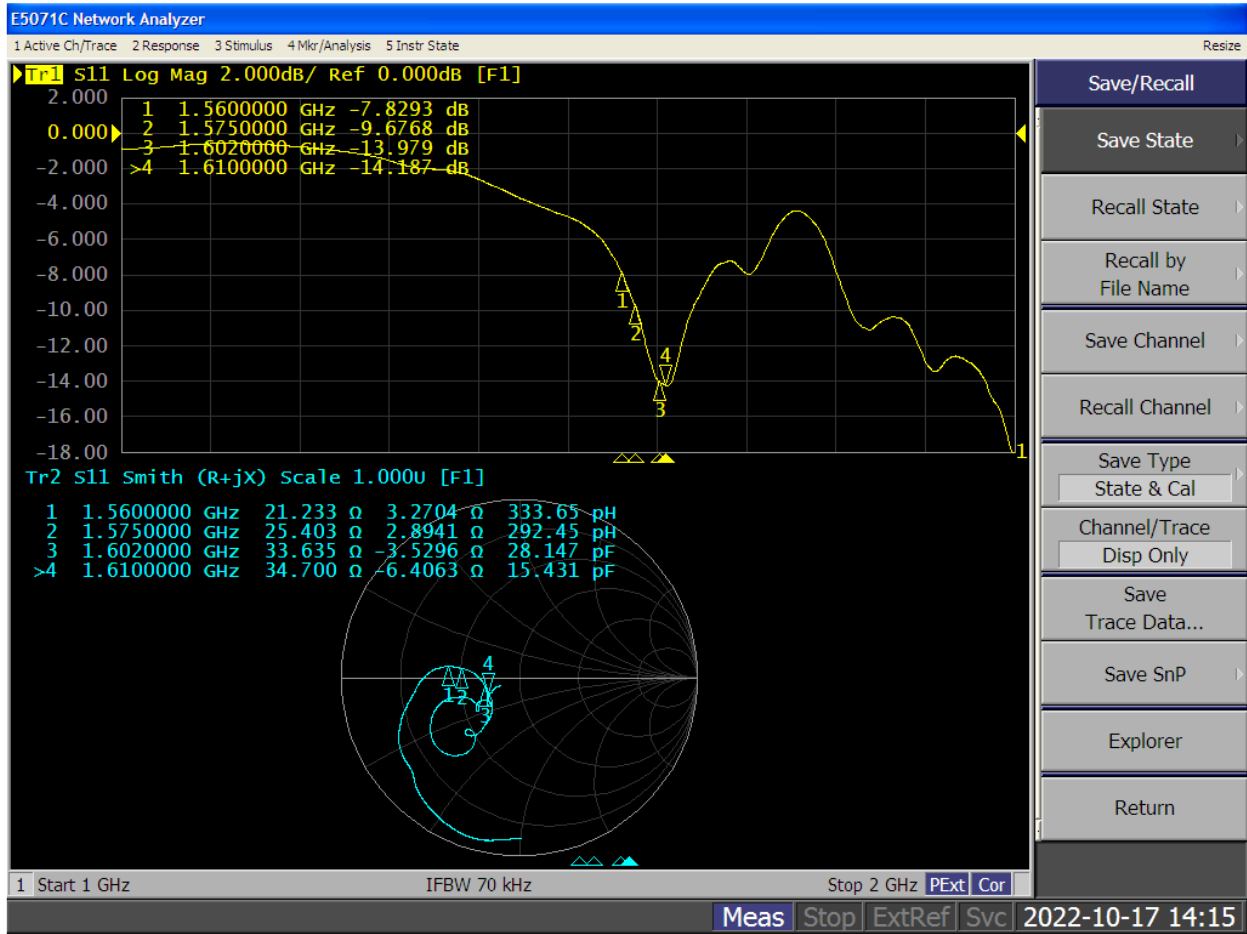


Figure 16 - GNSS antenna return loss

2.5.4 Radiation pattern – 1575MHz

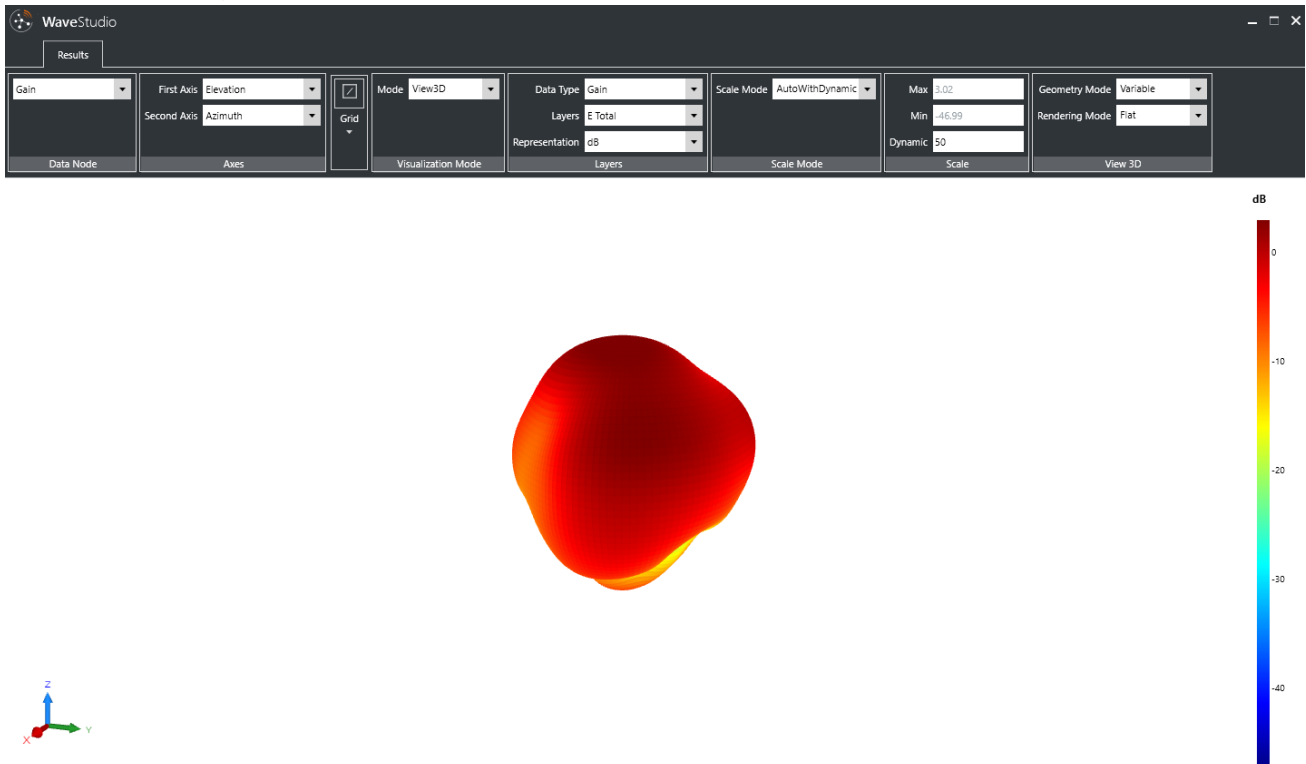


Figure 17 - GNSS antenna radiation pattern 1575MHz

2.5.5 Radiation pattern – 1602MHz

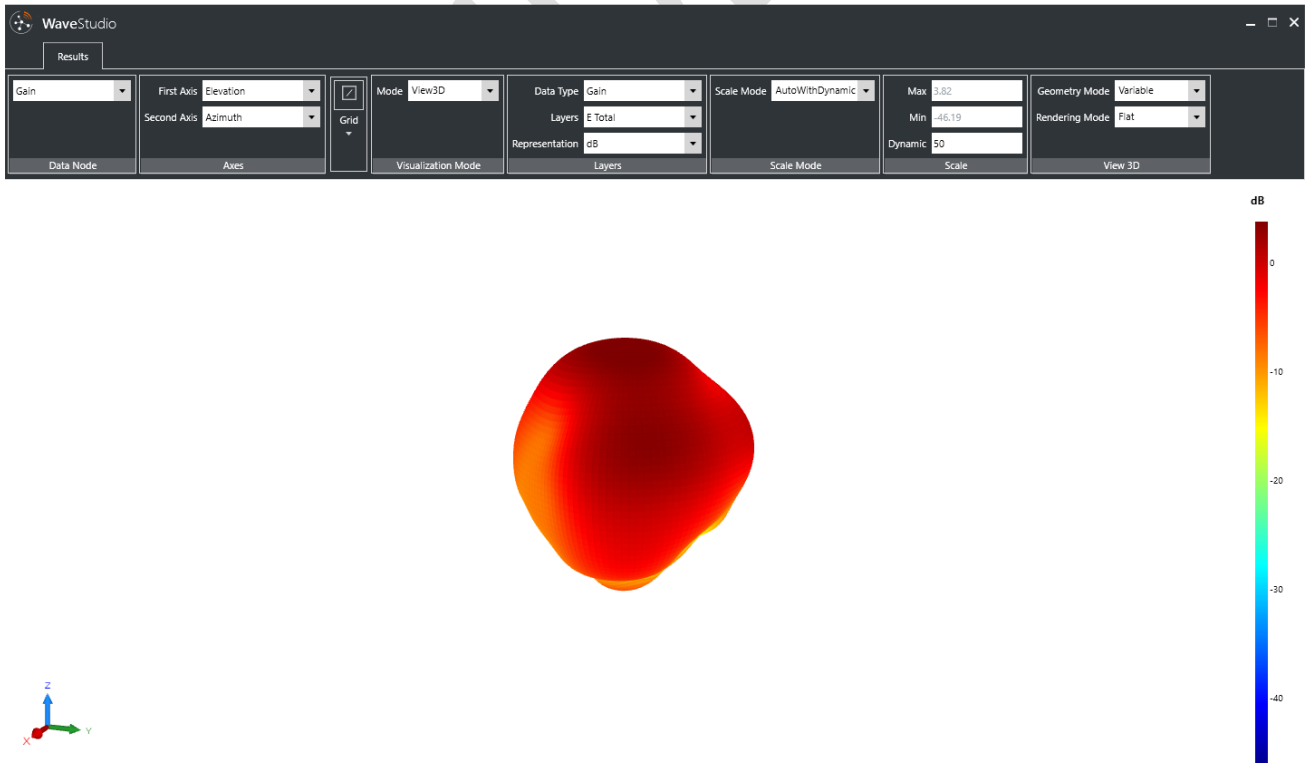


Figure 18 - GNSS antenna radiation pattern 1602MHz

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