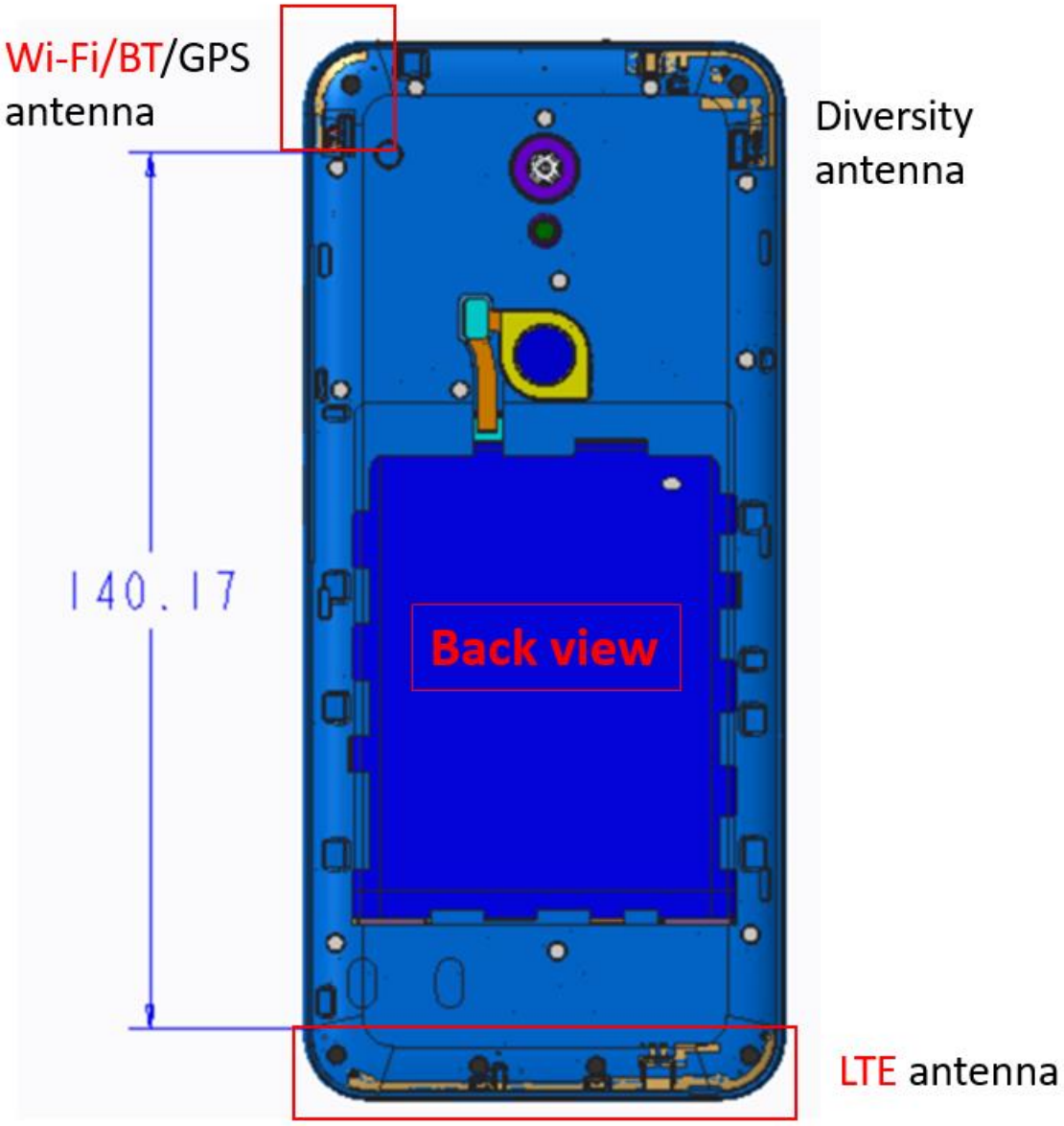
Antenna Detailed Information

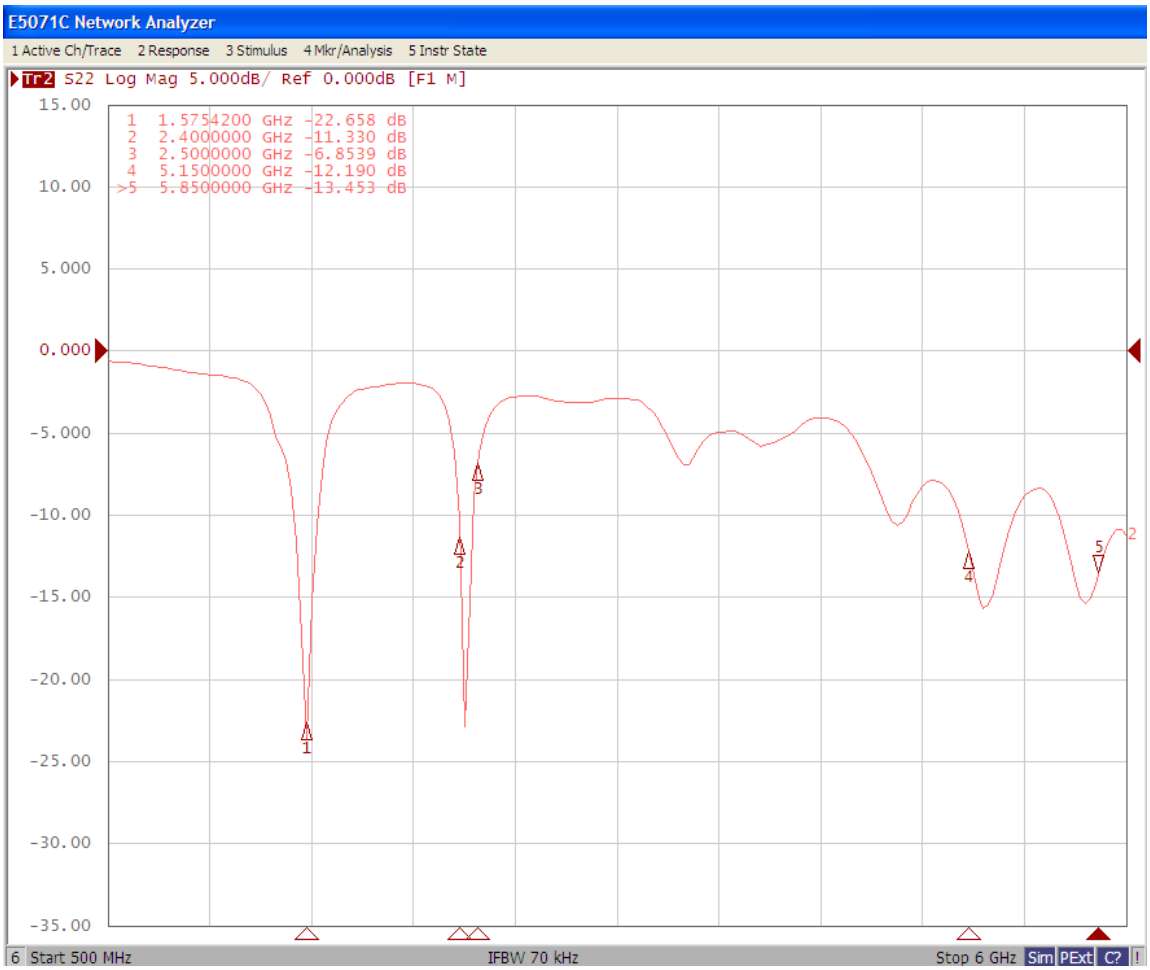


Item	Description
Test Environment	ETS-Lindgren AMS-8500 Antenna Measurement System
Test Equipment	Key-sight E5071C
Test Software	ETS-Lindgren EM-Quest Data Acquisition and Analysis Software V1.12 build 1470
Calibration date	Oct. 07th, 2023
Test date	Oct. 09th 2023
Test engineer	Edward Ou

Antenna Gain

GPS [dBi]	WiFi 2.4G [dBi]	WiFi 5G [dBi]
Rx	T/Rx	T/Rx
-0.7	-0.5	2.6

CWS (GPS/wifi/BT) Antenna Return loss

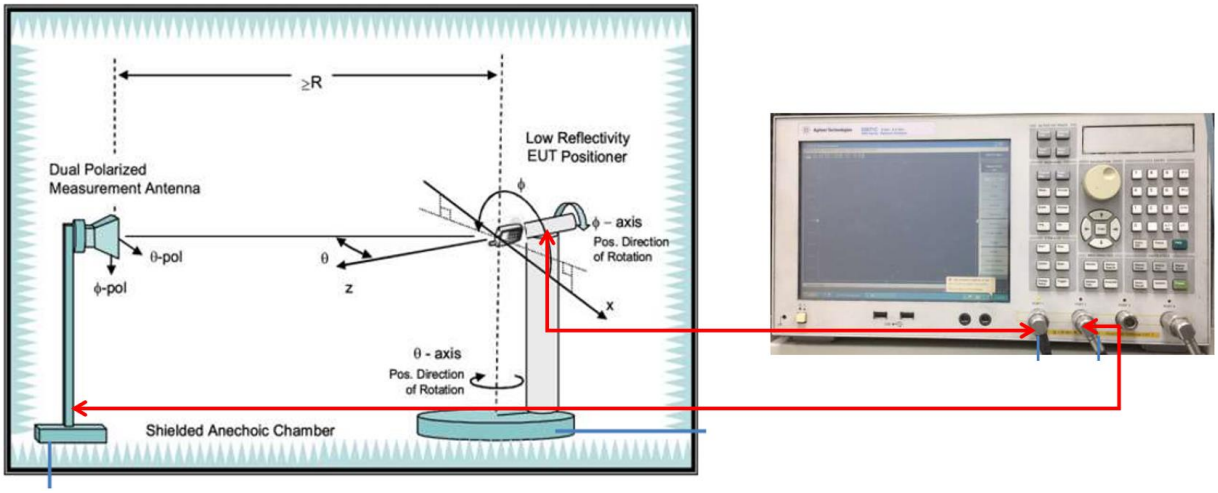


Test method

The antenna gains are obtained through measurements in a fully anechoic OTA chamberwith a 3D positioner.

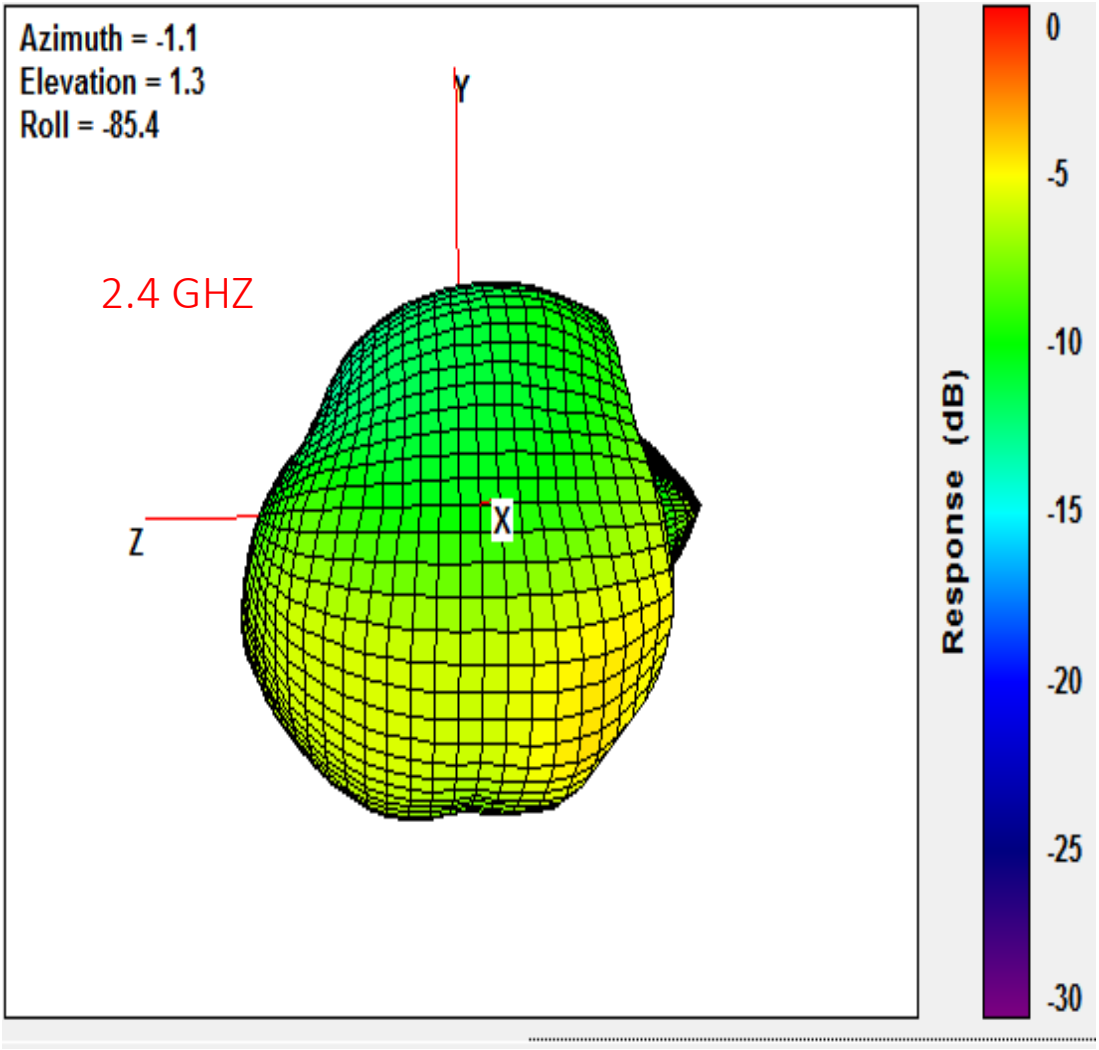
Measurements are taken in discrete stepsin theta and phi direction, data is being recorded using the spectrum analyzer (active) or network analyzer(passive) for both theta and phi polarizations at each position resulting in a 3D gain pattern. Step sizeis <30deg along both axes.

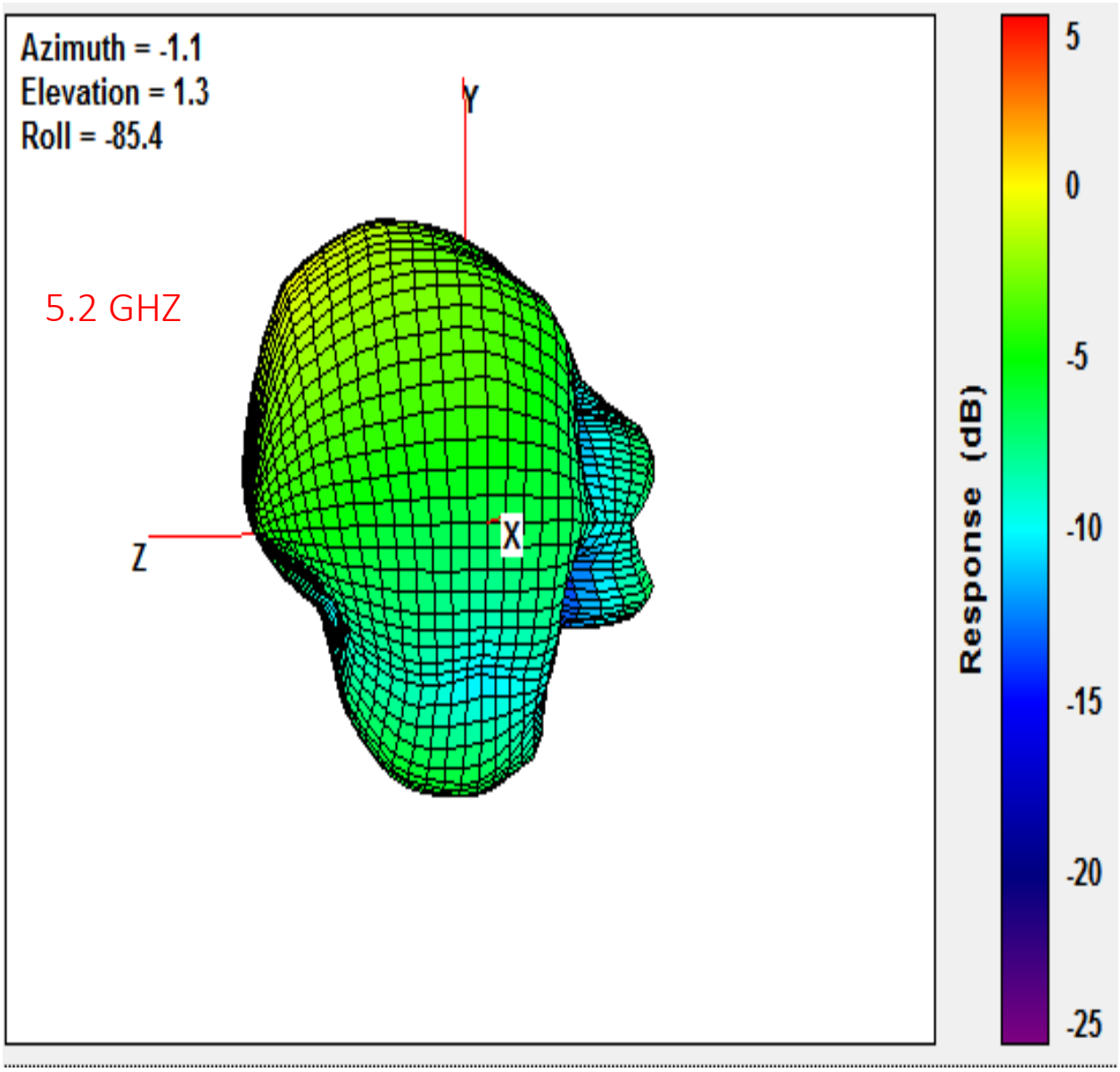
Gain is either derived directly through spatial averaging of VNA S21 measurements (passive measurement)or by the ratio of spatial averaging of 3D EIRP/TRP measurements vs the conducted power (active measurement).

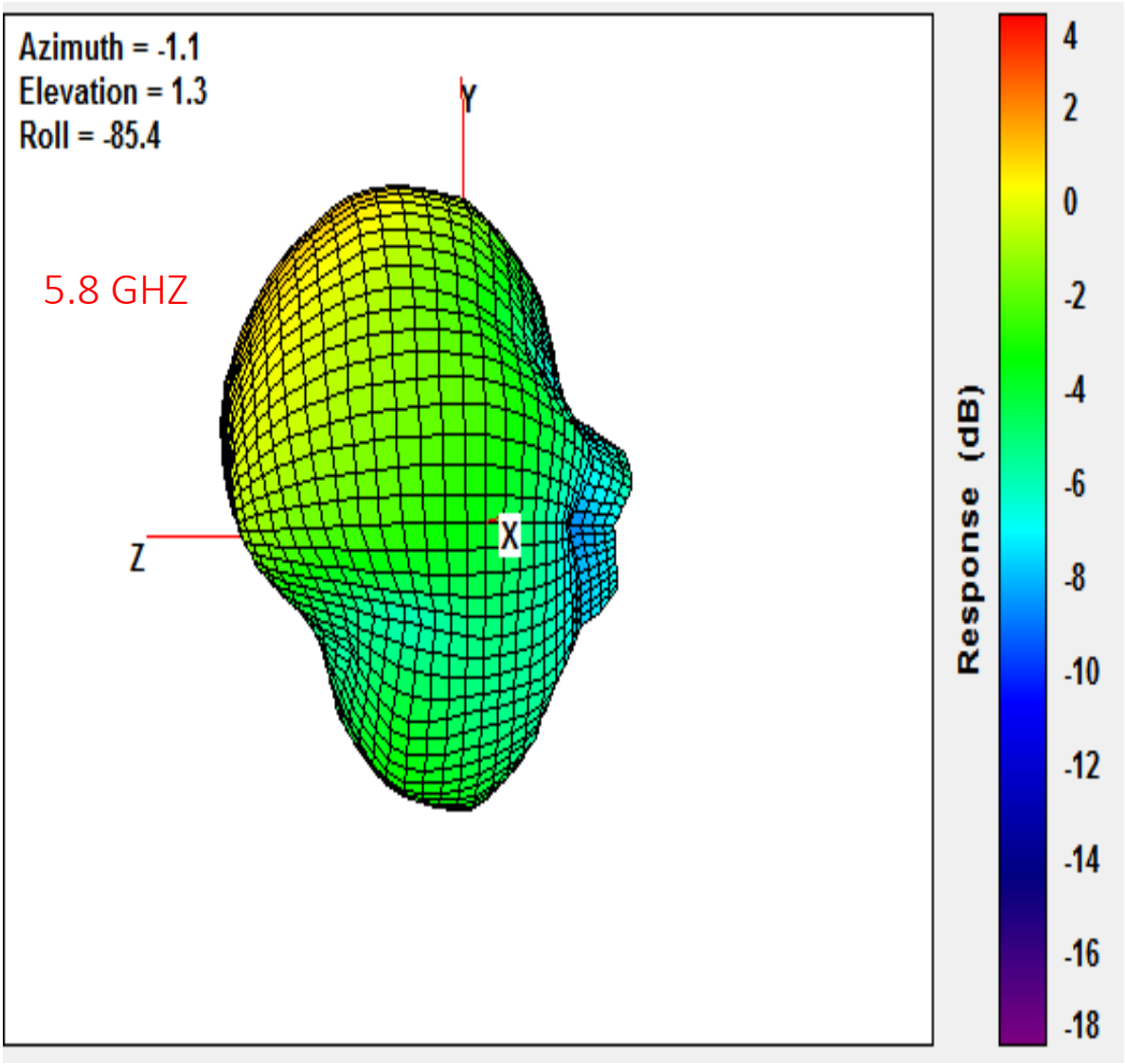


Radiation pattern

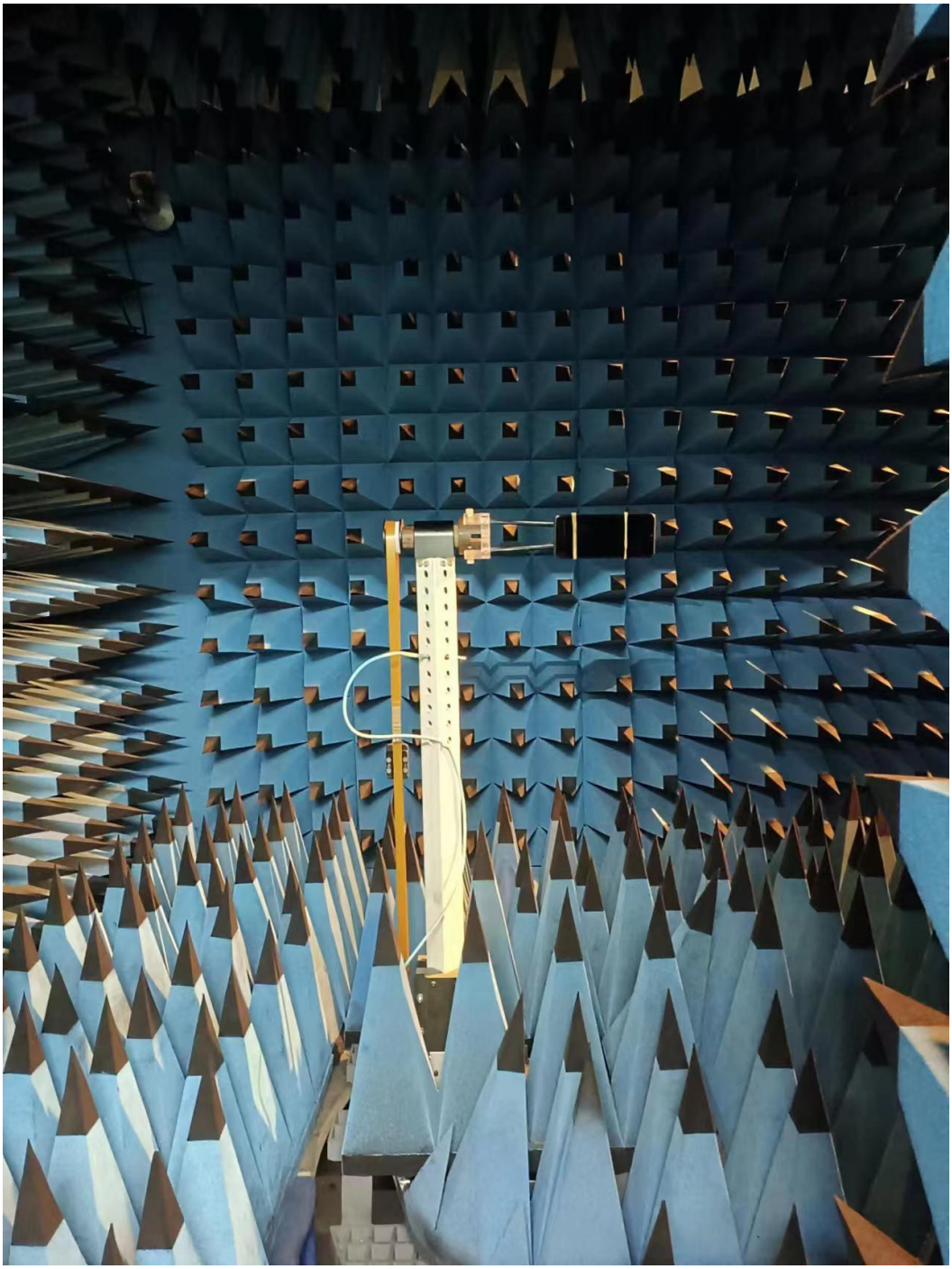
Wi-Fi/BT antenna

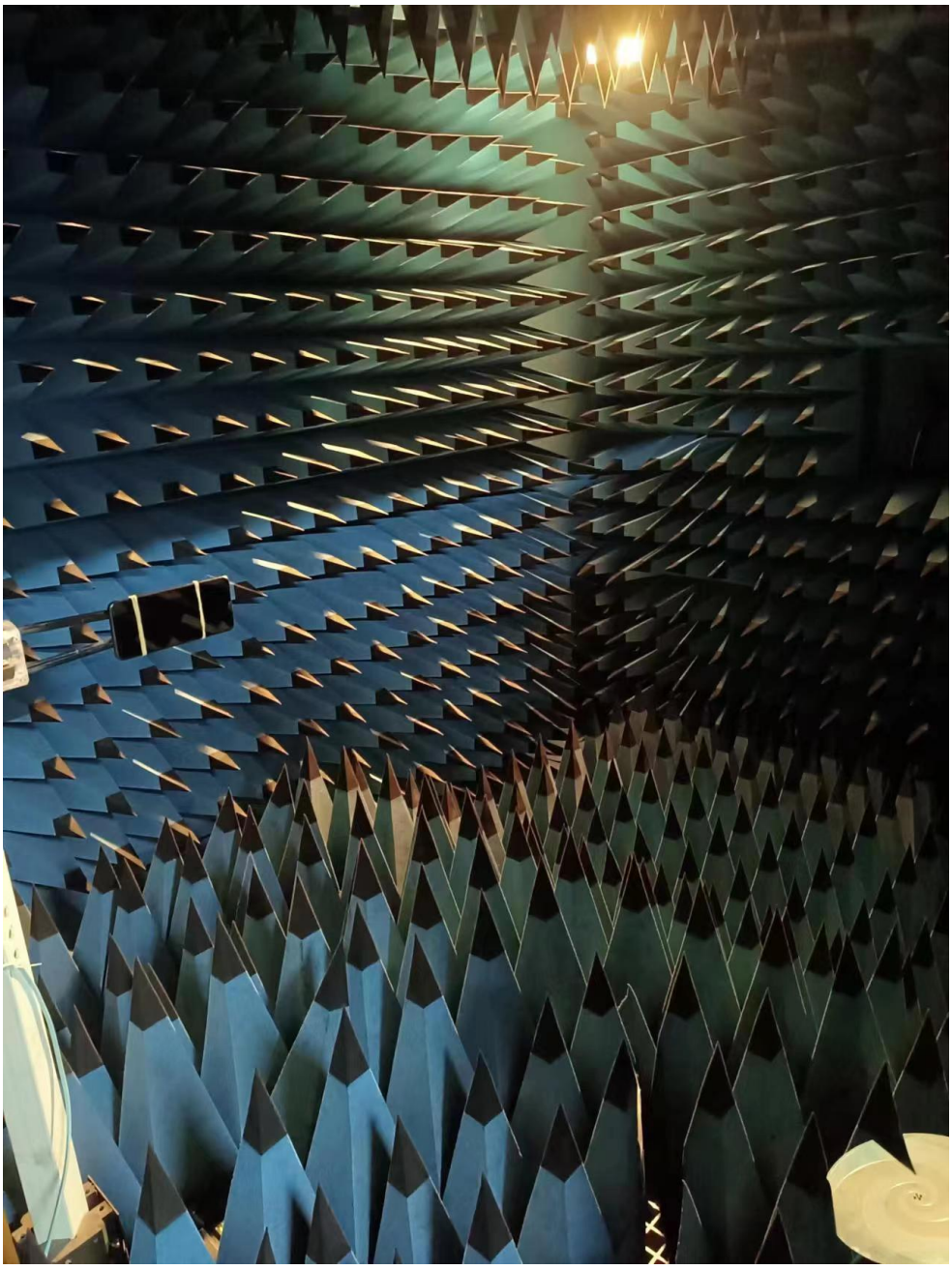



Azimuth = -1.1
Elevation = 1.3
Roll = -85.4
5.2 GHZ
Y
X
Z
Response (dB)
5
0
-5
-10
-15
-20
-25


Azimuth = -1.1
Elevation = 1.3
Roll = -85.4
5.8 GHZ
Y
X
Z
Response (dB)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18

Test set up photos





Mechanical specifications

GPS/WIFI/BT
Antenna pattern