

Antenna Report

Sentinel

Extract from project P3922

KUDELSKI
I  THINGS

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1. NOMENCLATURE

- **Return loss** - reflected wave or signal strength traveling or returning back to a transmitter from an antenna
- **VSWR** - a measure of how well an RF antenna is matched to its transmission line
- **S11** (Reflection coefficient) – power reflected by impedance mismatch
- **Radiation (rad.) efficiency** - antenna efficiency excluding mismatch loss
- **Radiation Pattern** - graphical representation of the radiation properties of the antenna as a function of space coordinates
- **Total efficiency** - antenna efficiency including mismatch loss
- **System total efficiency** - antenna efficiency including mismatch loss, including matching and losses from external matching network
- **TRP (total radiated power)** – power radiated from the antenna, including all losses
- **EIRP (effective isotropic radiated power)** – power radiated from the antenna to the strongest beam direction compared to isotropic radiator
- **ERP (effective radiated power)** power radiated from the antenna to the strongest beam direction compared to ideal half wavelength dipole. $ERP (dB) = EIRP (dB) - 2,15 \text{ dB}$
- **TIS (total isotropic sensitivity)** - total available receive performance of a device with a real antenna
- **Directivity** - A number telling how well antenna radiates to a certain direction compared to an isotropic radiator when no losses are taken into account.
- **Realized gain** - A number telling how well antenna radiates to a certain direction compared to an isotropic radiator when all the losses are taken into account.
- **ECC - (envelope correlation coefficient)** A number (between 0 and 1) telling how independent the two antenna patterns are.
- **Isolation** - tells how little power is leaking from one RF port to the other
- **VNA** - Vector network analyzer
- **Radio CW Mode (Carrier Wave)** – The radio transmits a continuous sine wave in a fixed frequency with a fixed power level
- **OTA** – (Over-the-air) - a method conducted in an anechoic chamber to validate the performance and reliability of wireless devices in the real world in an isolated

2. MEASUREMENTS

2.1. BT/WIFI MAX GAIN

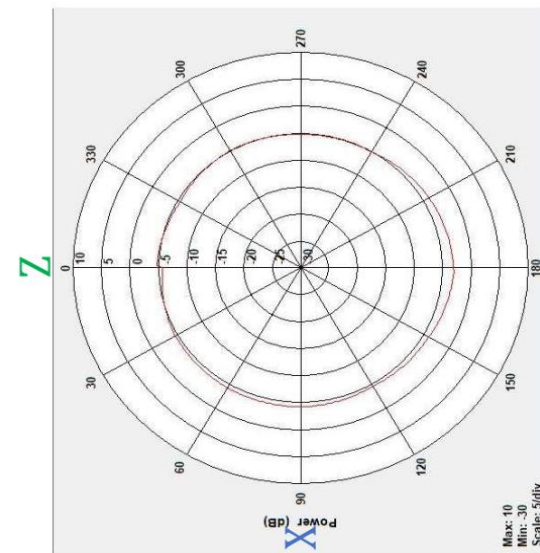
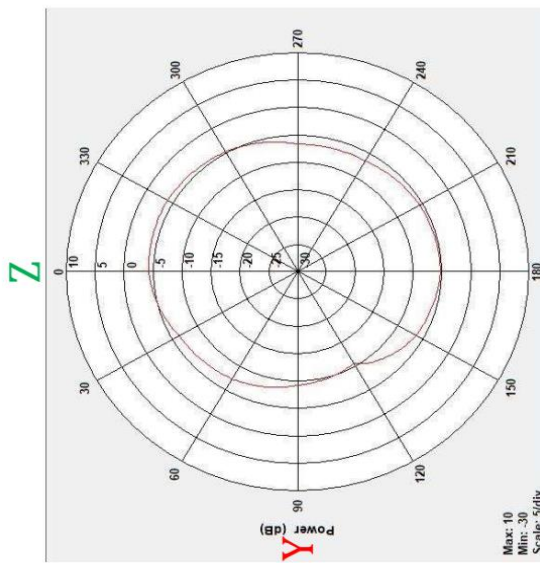
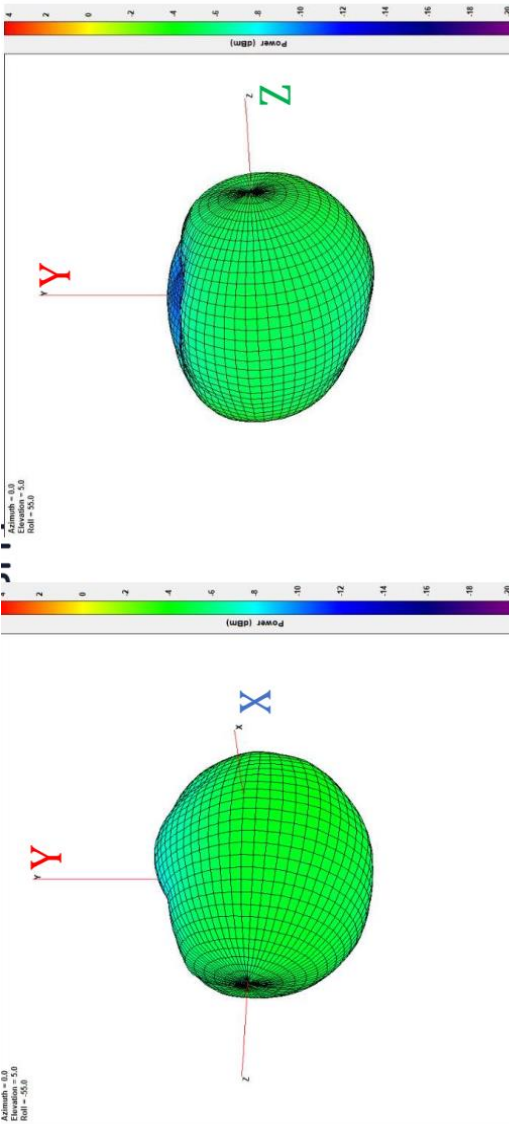
Band	Max gain, freespace
BT/WiFi 2.4 GHz 2.8 dBi @ 2435 MHz	2.8 dBi @ 2435 MHz

2.2. LTE MAX GAIN

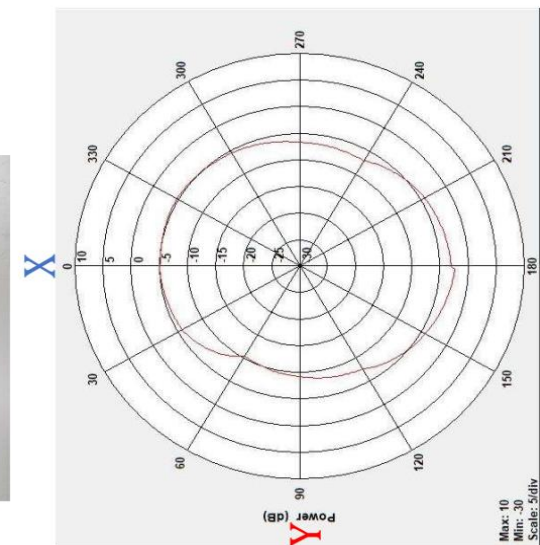
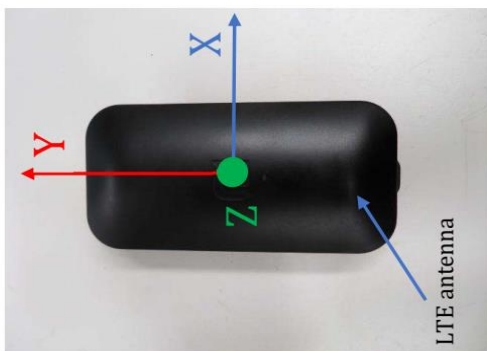
Band	Max gain, freespace
2	4.1 dBi @ 1910 MHz
4	3.5 dBi @ 1755 MHz
5	1.5 dBi @ 845 MHz
12	-2.1 dBi @ 715 MHz
13	-0.1 dBi @ 785 MHz
25	4.2 dBi @ 1915 MHz
26	1.5 dBi @ 845 MHz
66	3.8 dBi @ 1780 MHz

3. LTE RADIATION PATTERNS

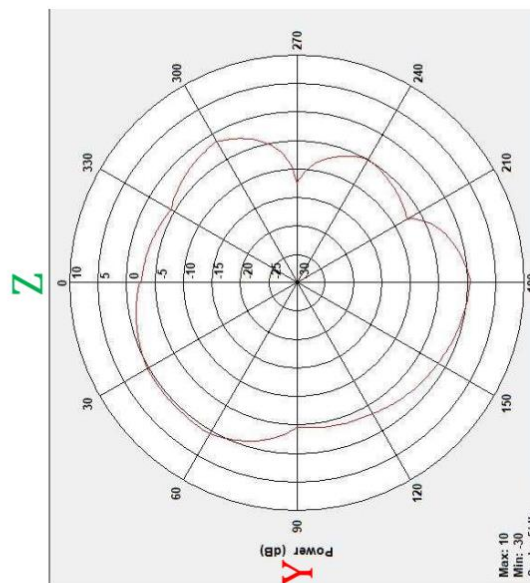
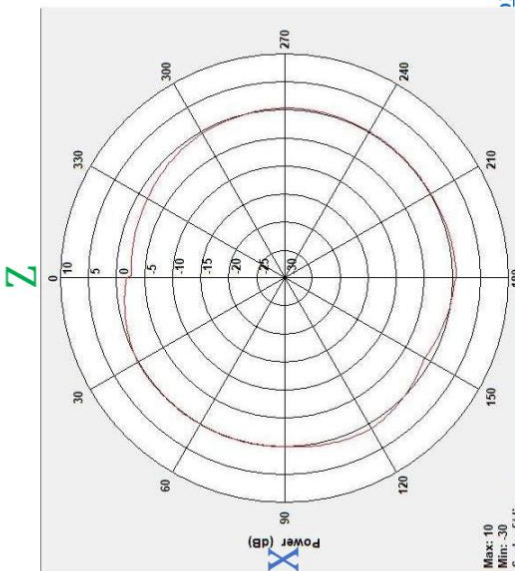
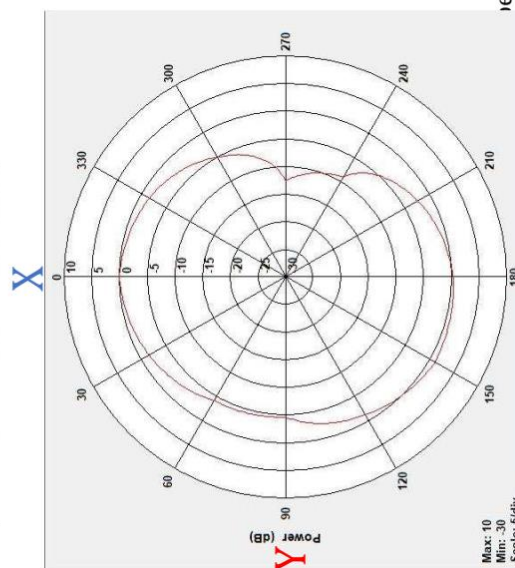
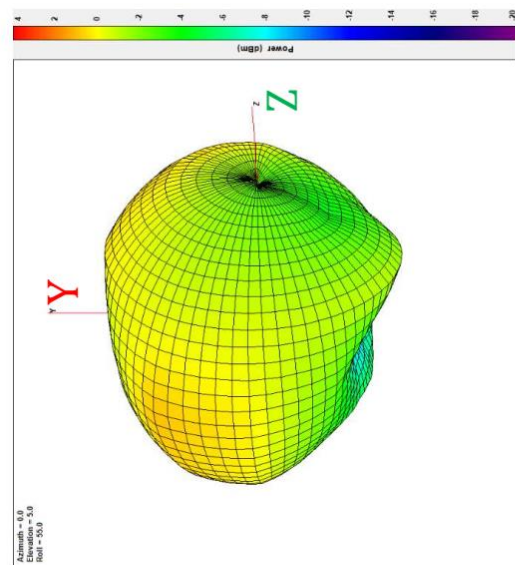
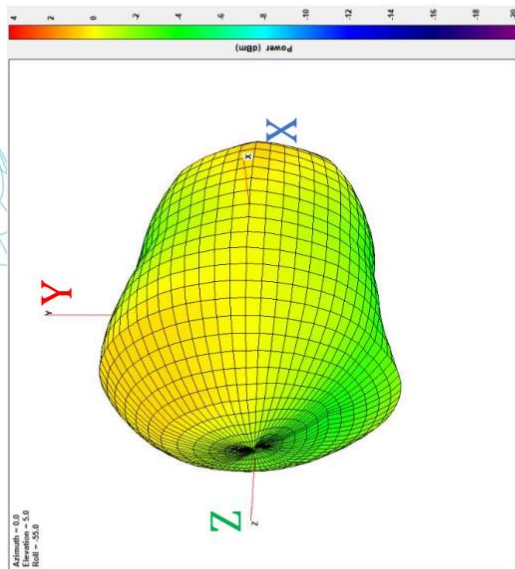
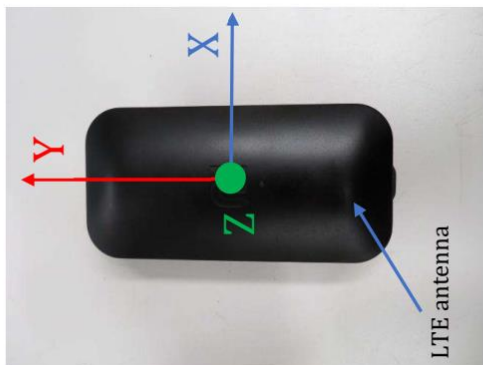
3.1. FREESPACE, 710 MHz



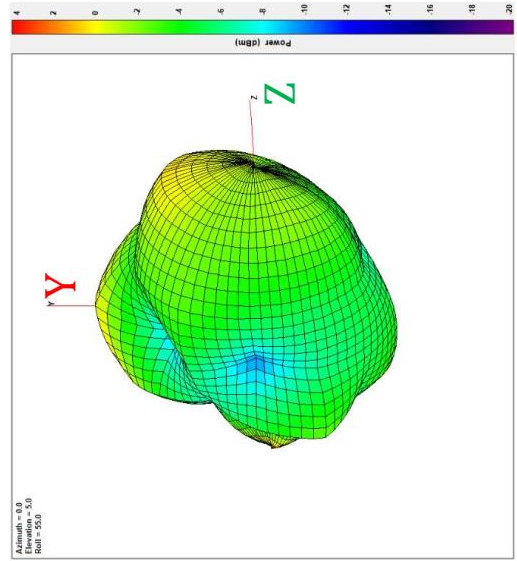
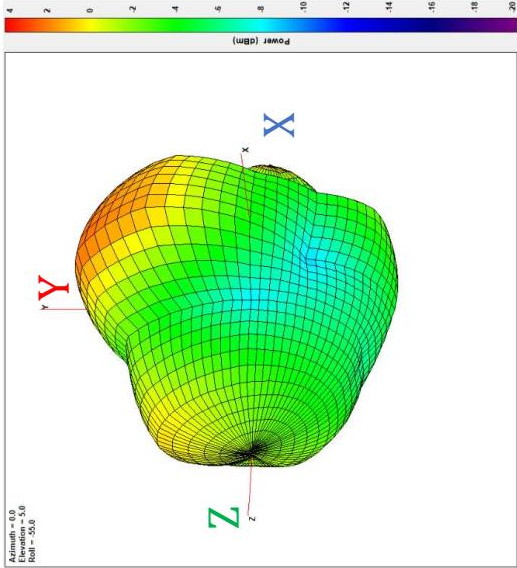
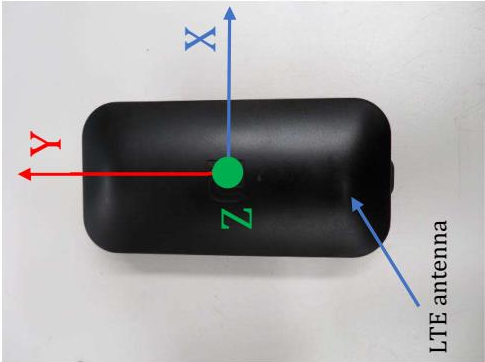
freespace, 710 MHz



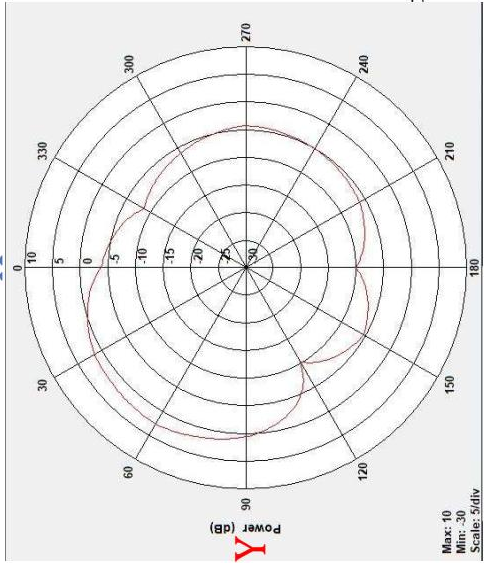
Freespace, 950 MHz



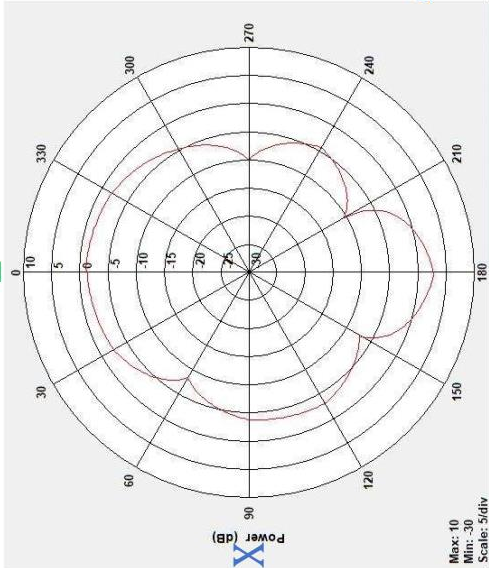
Freespace, 1720 MHz



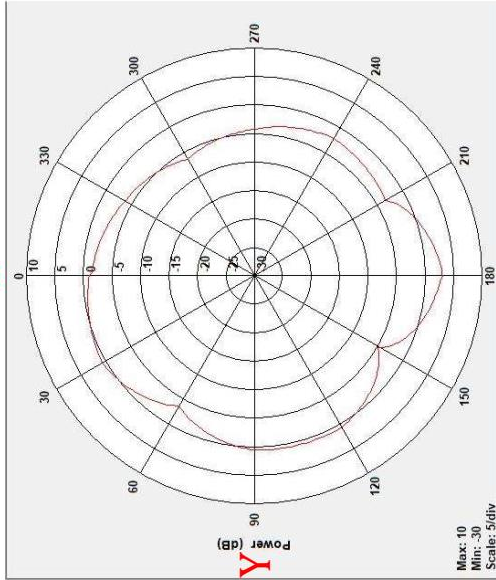
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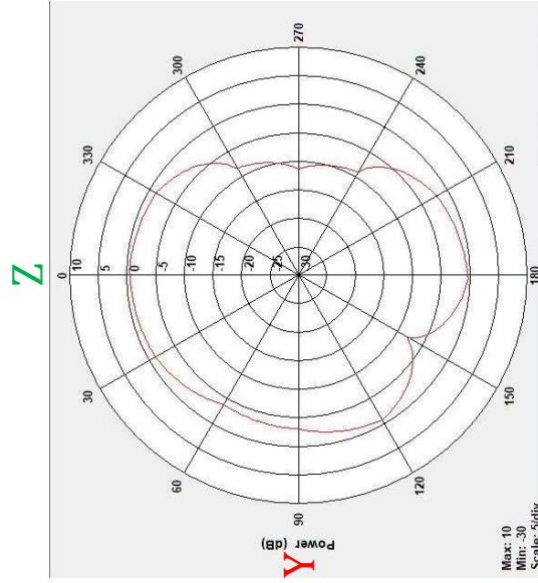
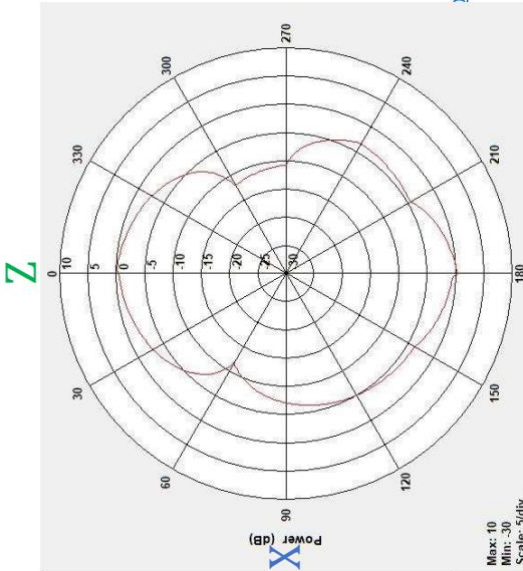
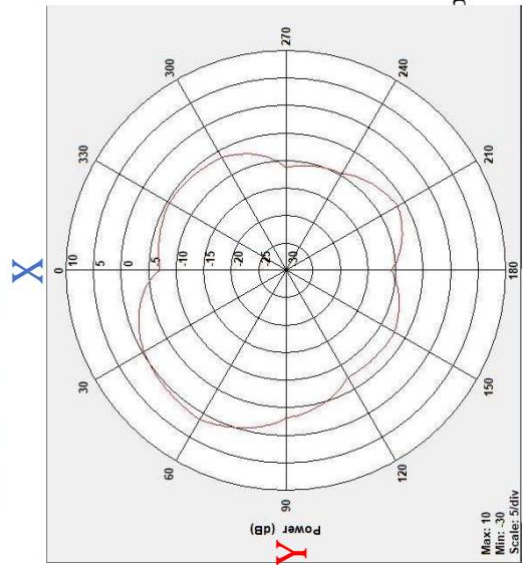
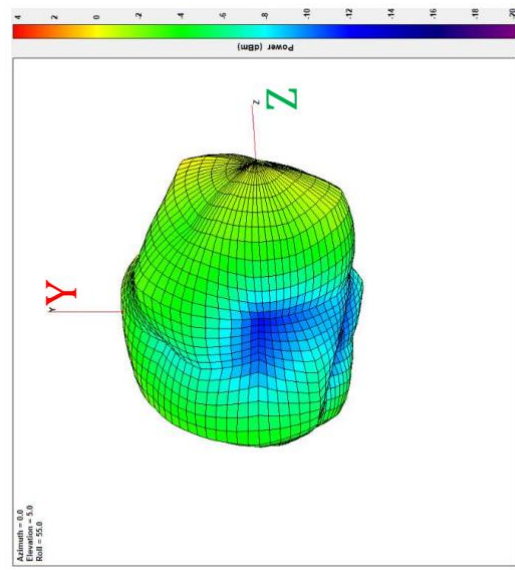
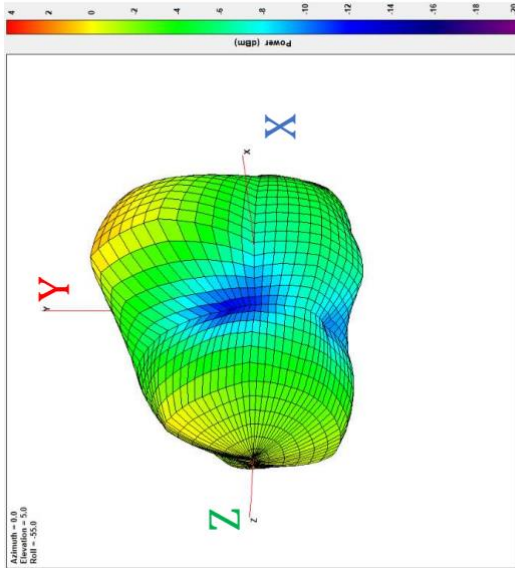
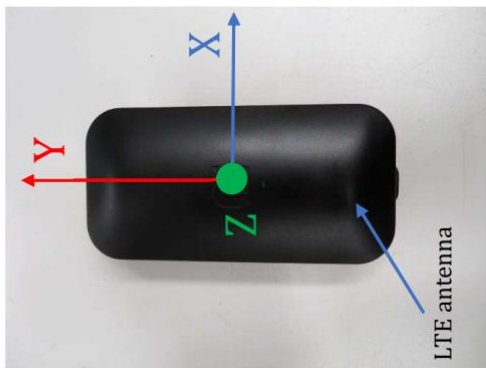
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Z



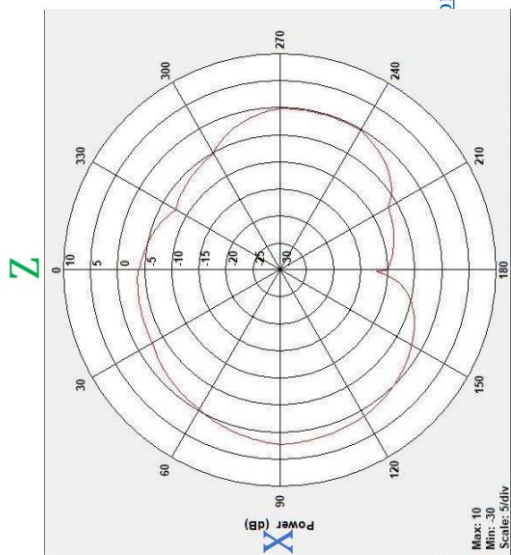
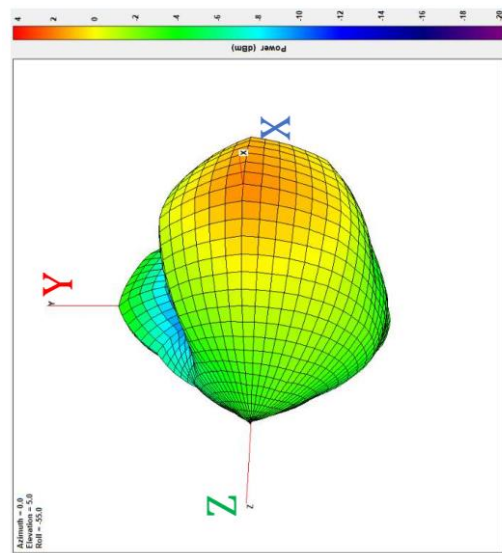
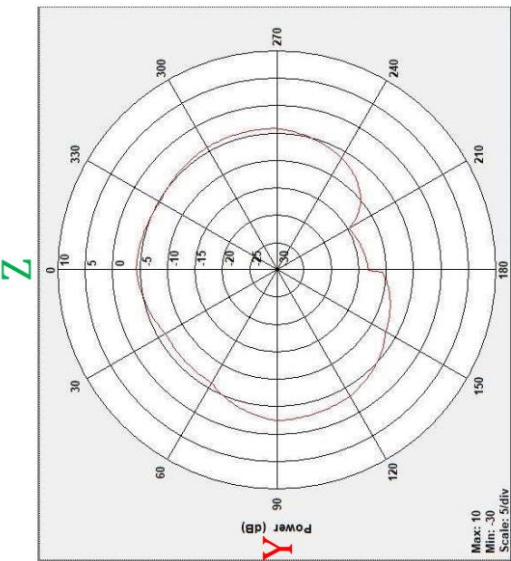
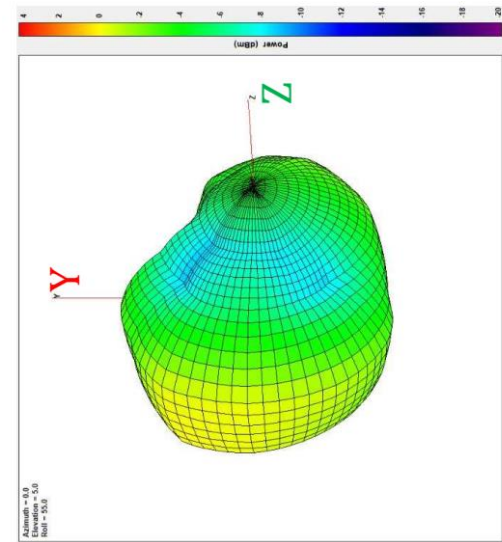
Freespace, 2160 MHz



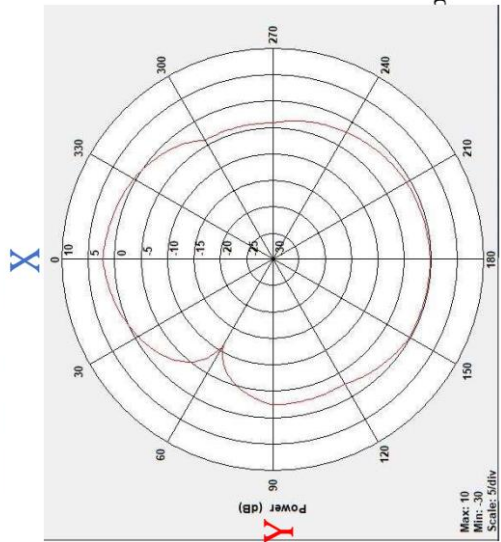
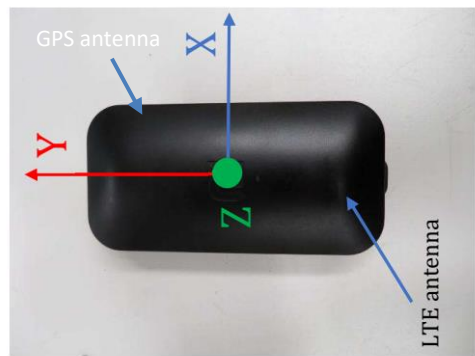
3.3. FREESPACE, 2160 MHz

4. GNSS RADIATION PATTERNS

4.1. FREESPACE, 1575 MHz

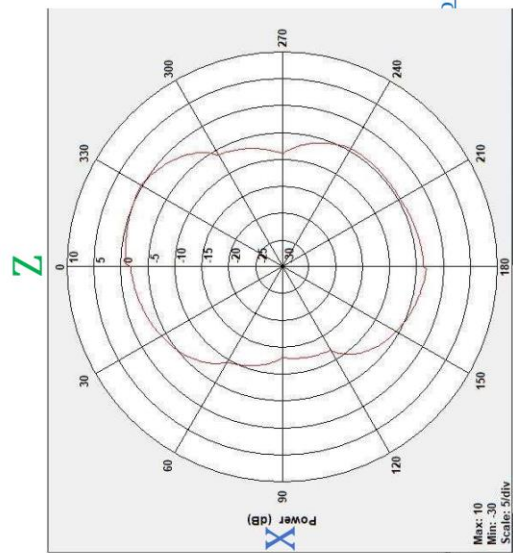
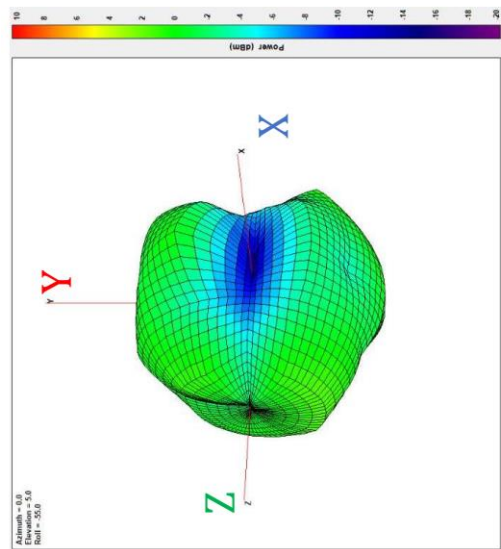
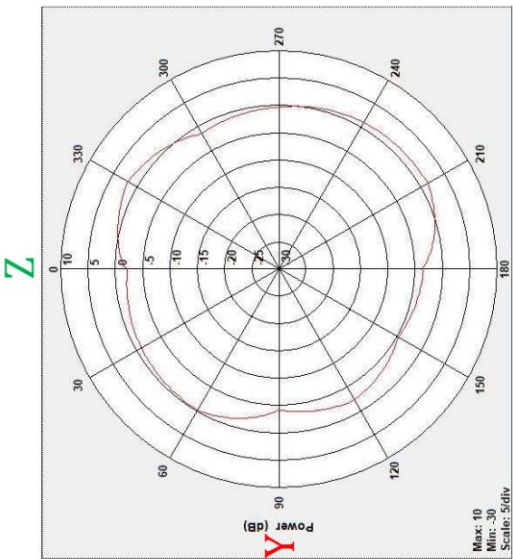
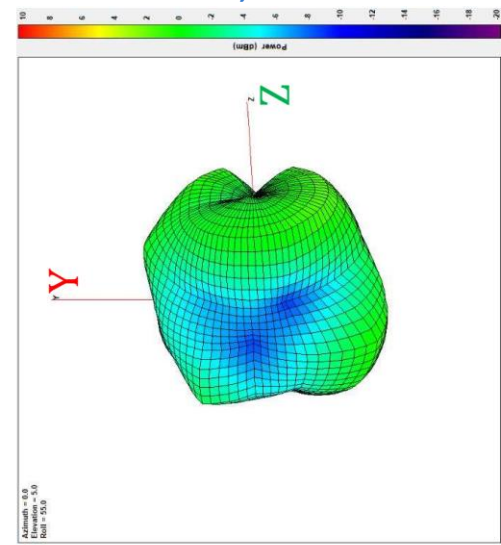


Freespace, 1575 MHz



5. BT/WIFI RADIATION PATTERNS

5.1. FREESPACE, 2445 MHz



Freespace, 2445 MHz

