

VSB3918 ALT US

Antennas presentation

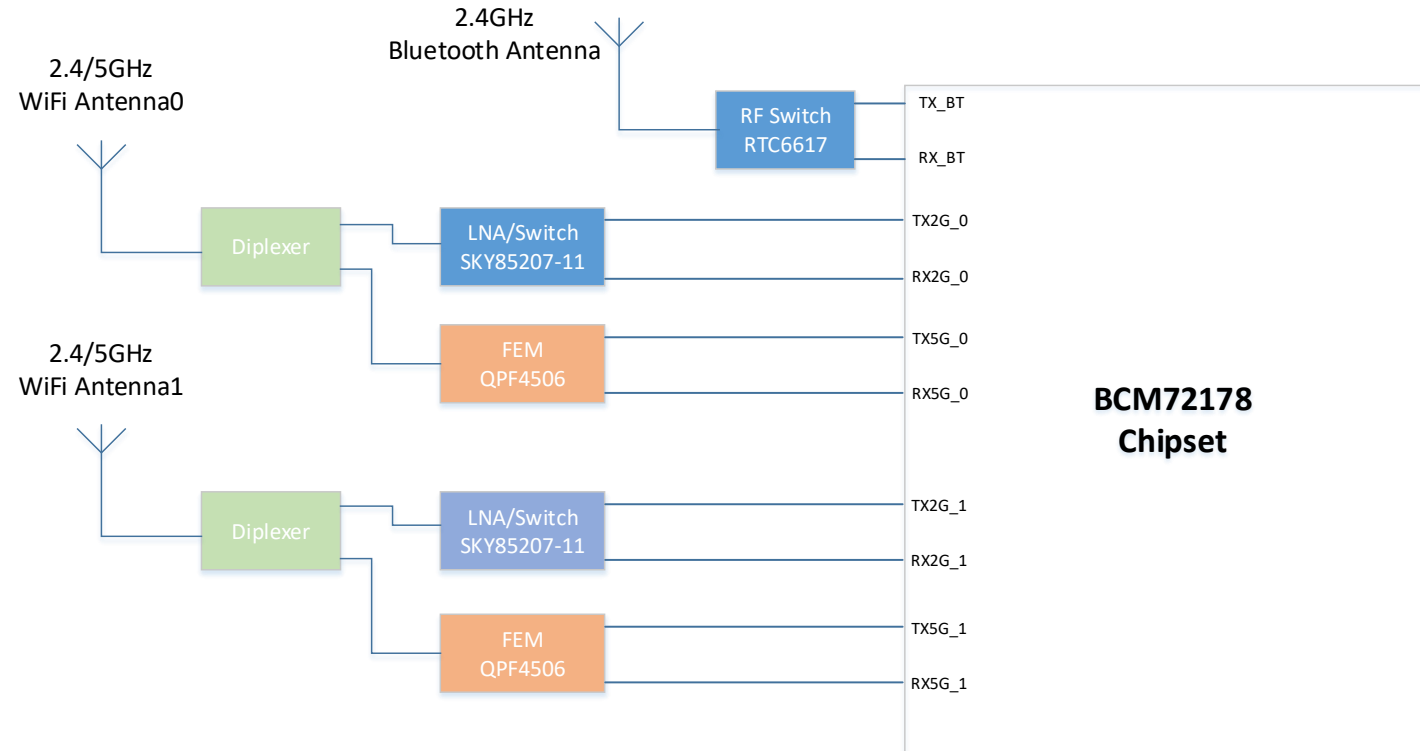
14/04/2023

Antennas summary

| Antennas | |
|-------------------|--|
| Wireless Function | <ul style="list-style-type: none"> ■ Wi-Fi 2.4G+5G MiMo 2X2 ■ Bluetooth ■ Wi-Fi 2.4G and Bluetooth working simultaneously |
| Antenna type | <ul style="list-style-type: none"> ■ Off-board : 2.4G/5G Dual-band antennas x3 |

| Measurement data | | |
|--------------------|---|---|
| | WiFi Measurement data | BT Measurement data |
| Return loss | S11 < -12dB | S11 < -12dB |
| Isolation | <ul style="list-style-type: none"> ■ between 2.4G < -25dB ■ between 5G < -25dB | <ul style="list-style-type: none"> ■ between 2.4G < -25dB |
| Peak Gain | <ul style="list-style-type: none"> ■ 2.4G peak gain combination : 4.85dBi ■ 5G peak gain combination : 6.9dBi | <ul style="list-style-type: none"> ■ Gain : 2.2dBi |
| Antenna efficiency | <ul style="list-style-type: none"> ■ 2.4G antenna > 55%. ■ 5G antenna > 55 % | <ul style="list-style-type: none"> ■ 2.4G antenna = 60% |

RF Front-end schematic



191609447 DUPLEXEUR.RF CMS DOUBLE BANDE 2.4/5GHZ quantity 2X
191479034 IC.CMS QPF4506B 5G WIFI FEM 5V LGA16 quantity 2X
191479021 IC.CMS SWI./LNA FE 2.4GHZ 802.11AC DFN-8 quantity 2X
191479055 IC.CMS RTC6617 SP3T SWITCH QFN8

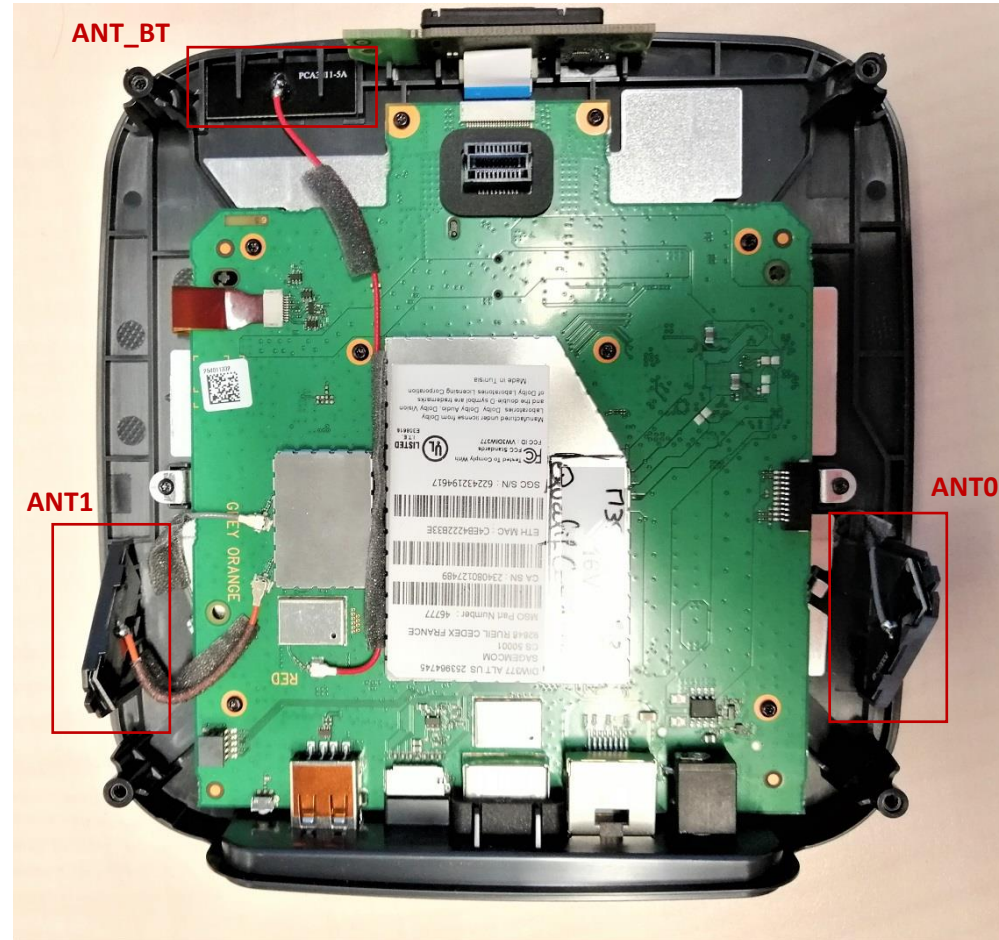
Antenna placement & polarization

There are 3 off-board antennas

- Two Wi-Fi dual bands antennas 2.4GHz and 5GHz used simultaneously (MiMo mode) => ANT0 & ANT1
- One Bluetooth antenna => ANT_BT

| Antennas | ANT0 | ANT1 | ANT-BT |
|---------------------|-------------------------|-------------------------|------------------------|
| Polarization (type) | 45° slanted (dipole) | 45° slanted (dipole) | Horizontal (dipole) |

Antenna placement & cable routing



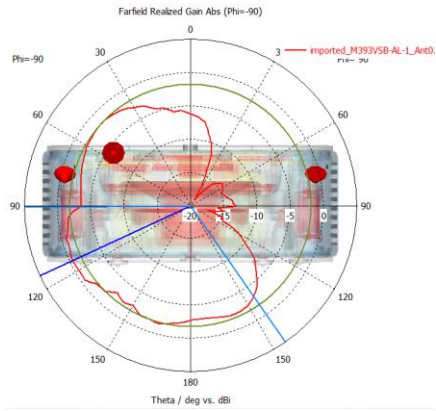
| | Distances between antennas |
|---------------|----------------------------|
| ANT0 / ANT1 | 145mm |
| ANT0 / ANT-BT | 135mm |
| ANT1 / ANT-BT | 90mm |

WiFi Antenna peak gains – ANTO

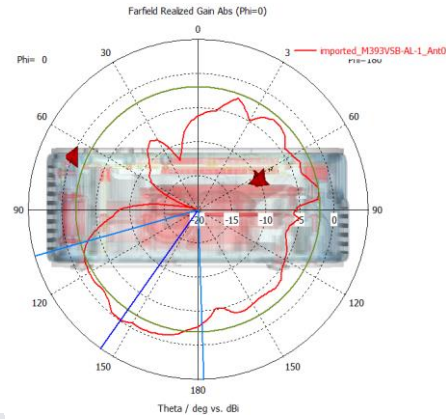
| Frequency (MHz) | ANTO Gains (dBi) |
|--------------------------|------------------|
| ISM band (2.4GHz) | 1.4 |
| UNII-1/2A (5150-5350MHZ) | 2.1 |
| UNII-2C (5470-5725MHZ) | 2.9 |
| UNII-3 (5725-5850MHZ) | 4.2 |

ANT0 - 2450 MHz Radiation patterns

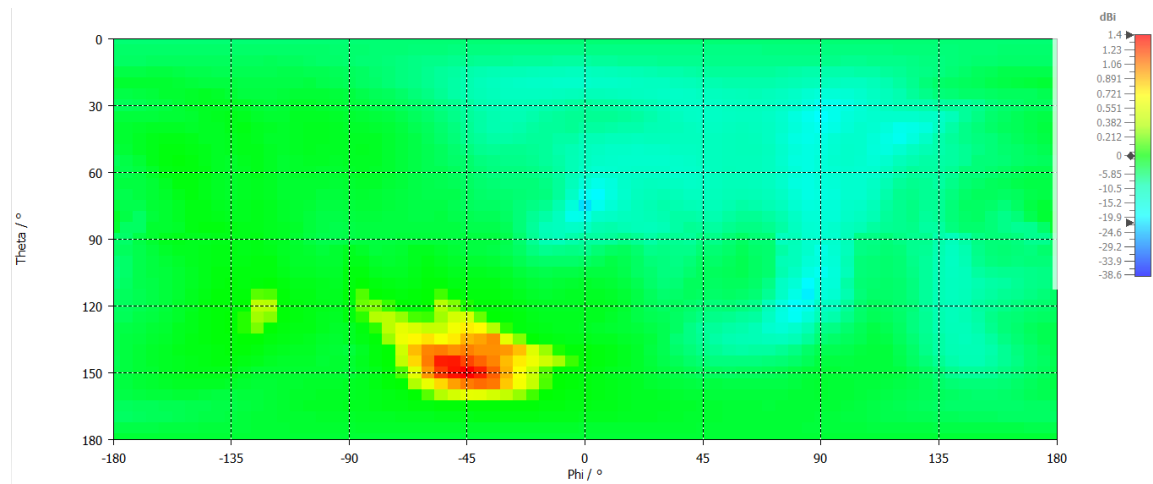
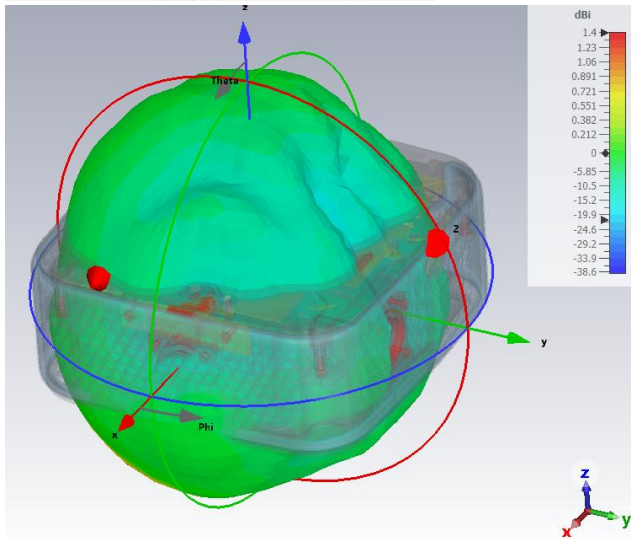
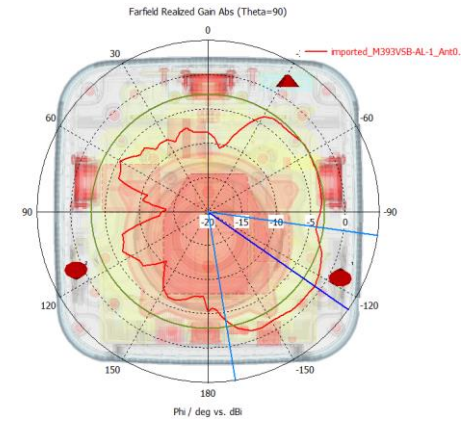
Ox



Oy



Oz



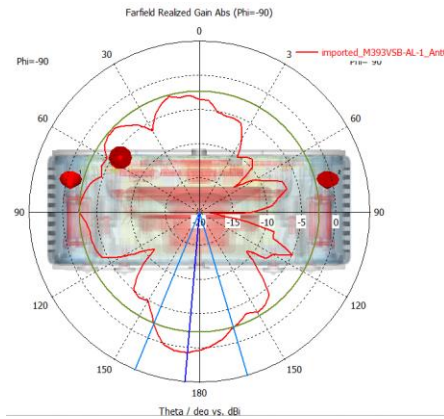
1D

2D

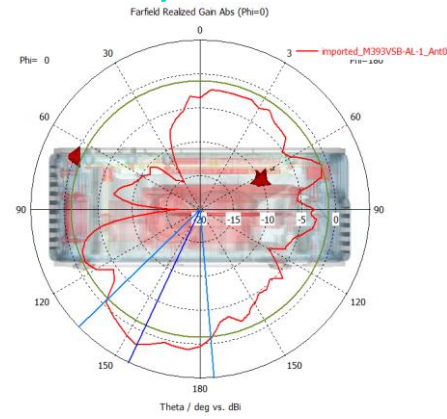
2 - Information interne Sagemcom - Interdiction de communiquer en externe sans autorisation de la direction concernée - Ce document et les informations qu'il contient sont la propriété de Sagemcom 31 003 697 - A

ANT0 - 5250 MHz Radiation patterns

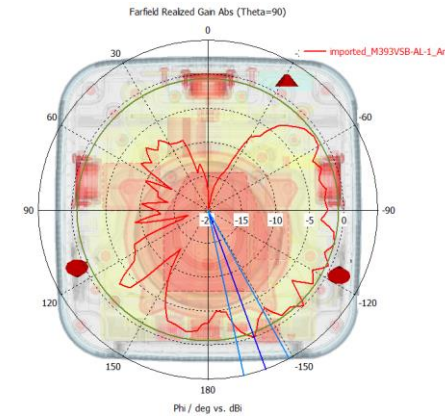
Ox



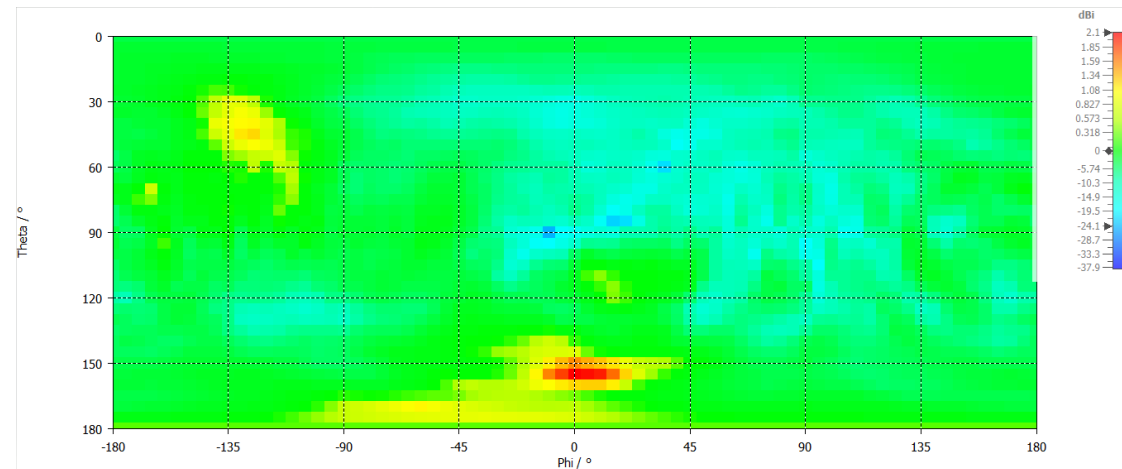
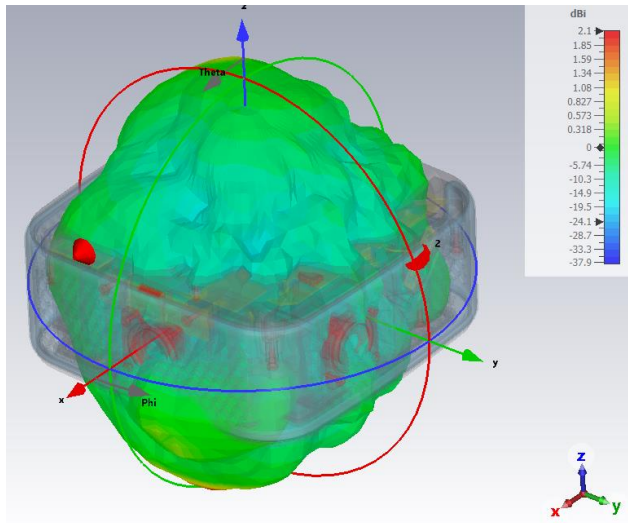
Oy



Oz



1D

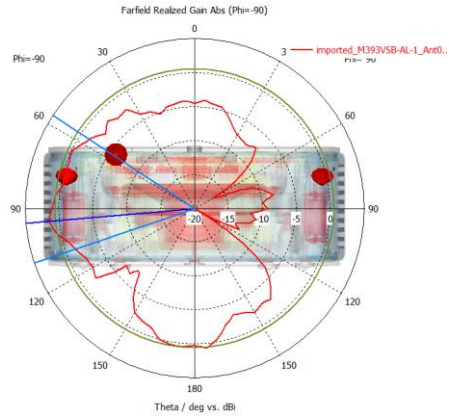


2D

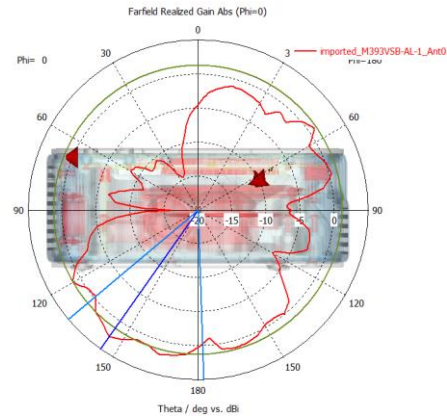
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ANT0 - 5550 MHz Radiation patterns

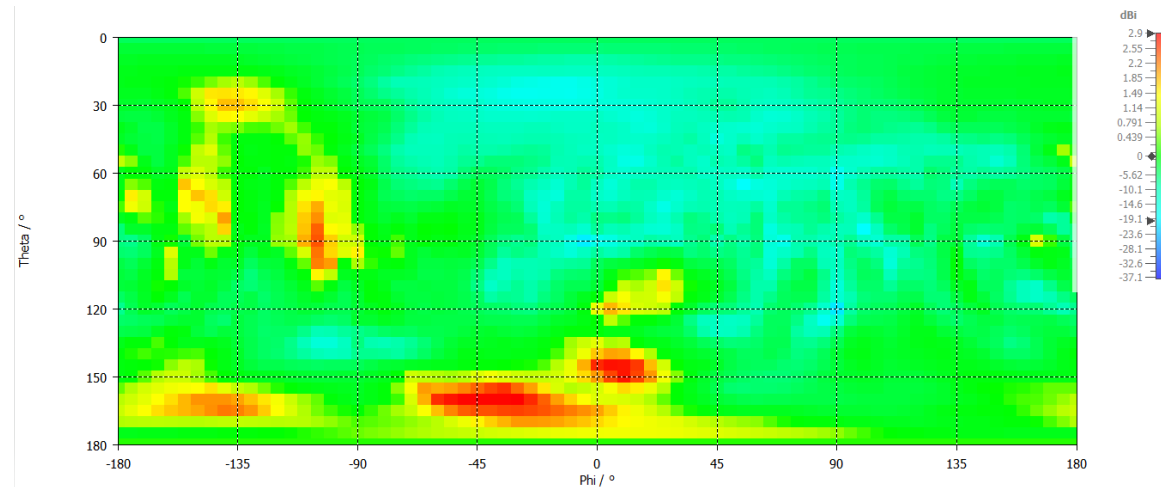
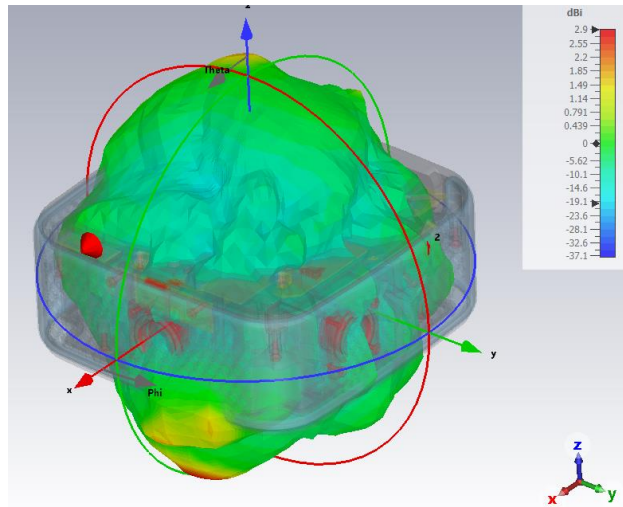
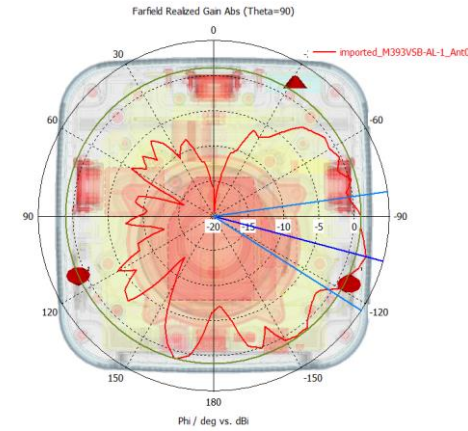
Ox



Oy



Oz



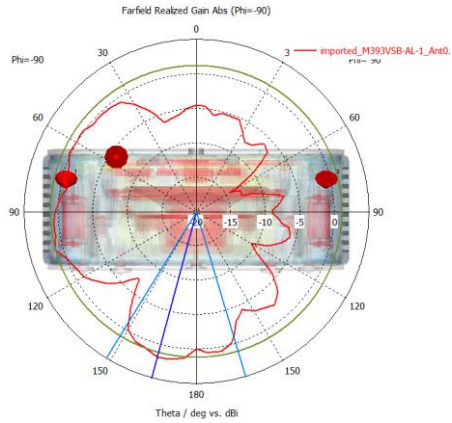
1D

2D

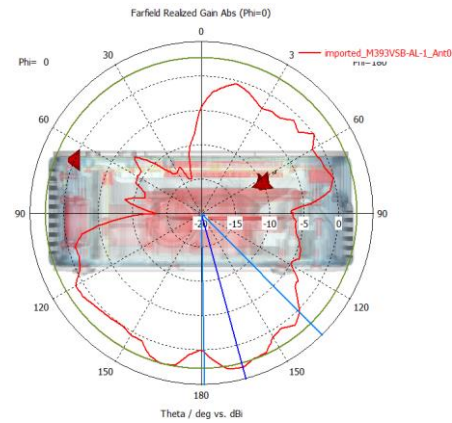
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ANT0 - 5700 MHz Radiation patterns

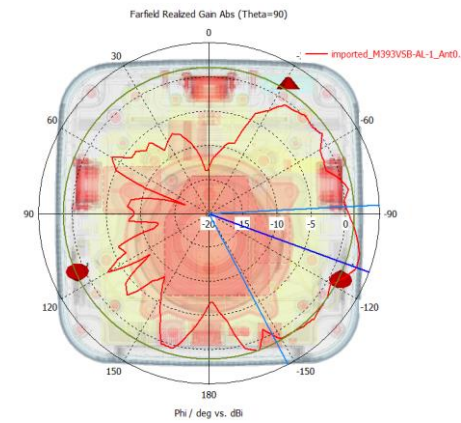
Ox



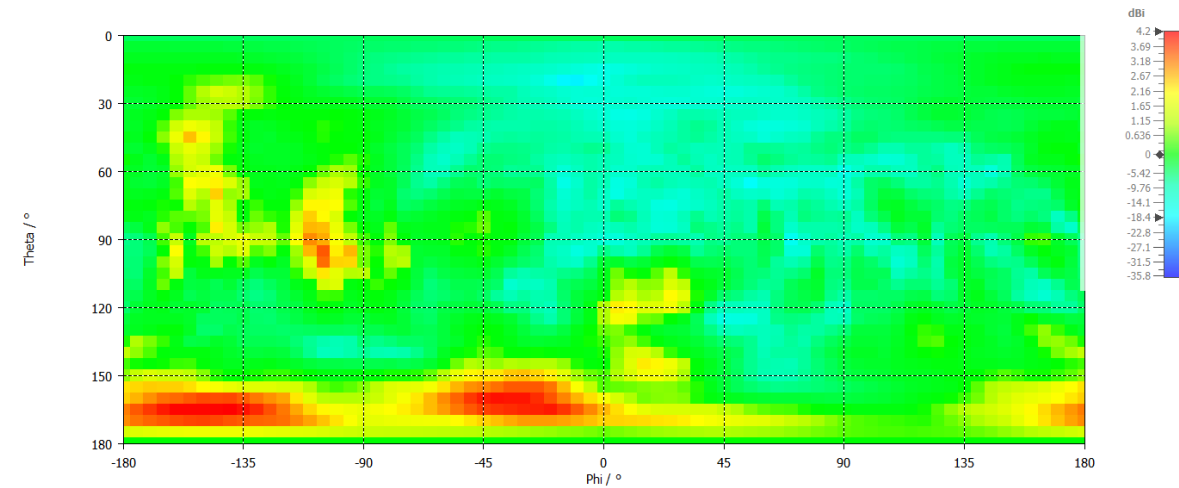
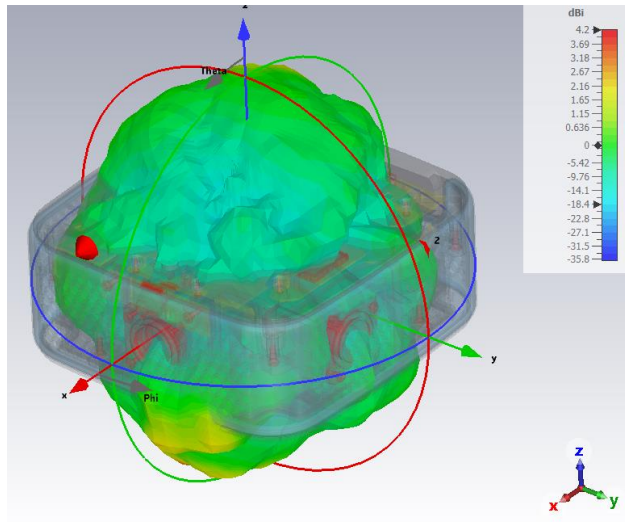
Oy



Oz



1D



2D

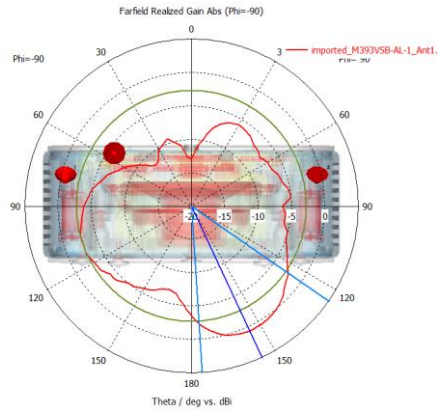
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WiFi Antenna peak gains – ANT1

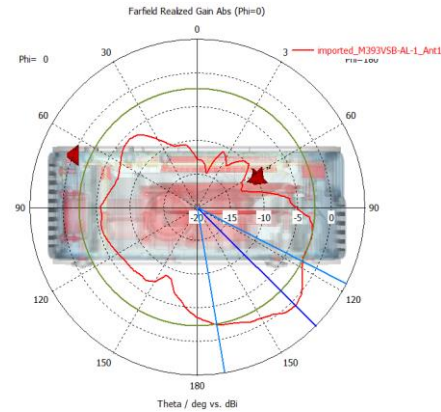
| Frequency (MHz) | ANT0 Gains (dBi) |
|--------------------------|------------------|
| ISM band (2.4GHz) | 2.3 |
| UNII-1/2A (5150-5350MHZ) | 1.7 |
| UNII-2C (5470-5725MHZ) | 3.4 |
| UNII-3 (5725-5850MHZ) | 3.6 |

ANT1 - 2450 MHz Radiation patterns

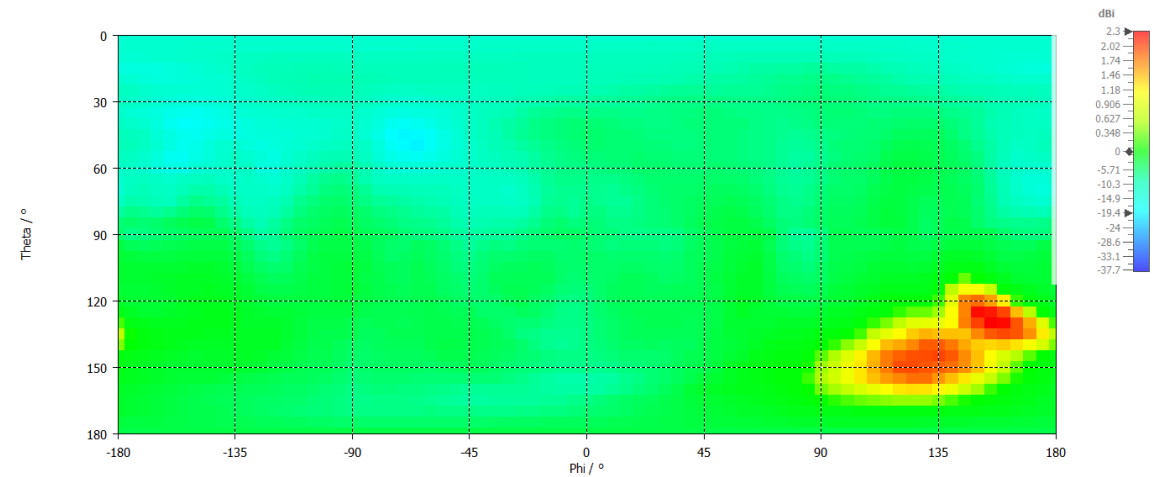
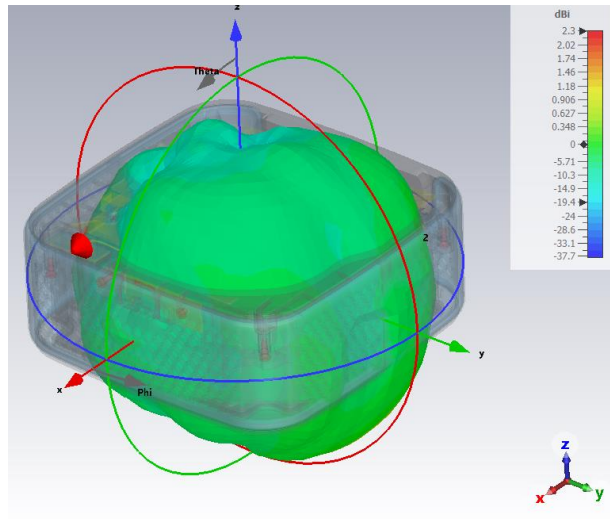
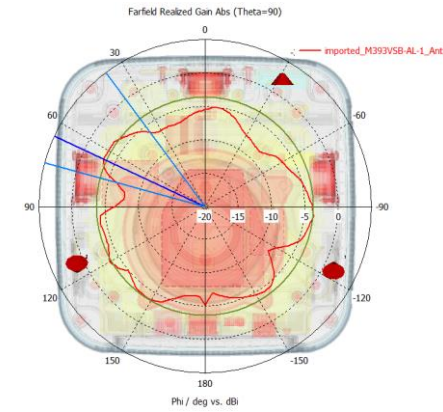
Ox



Oy



Oz

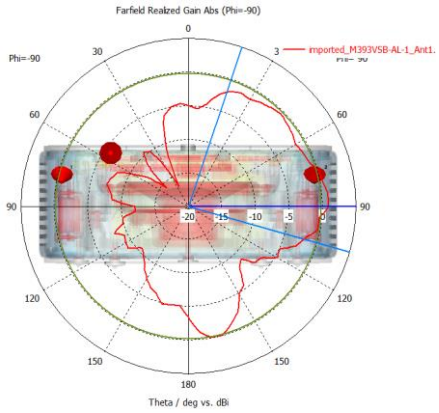


1D

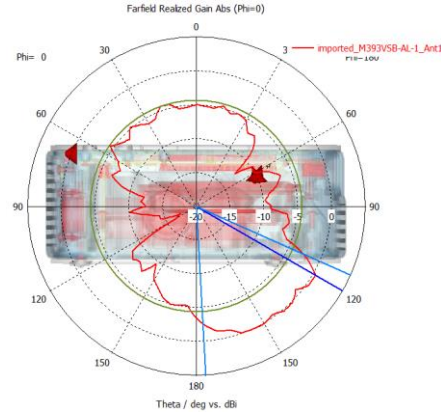
2D

ANT1 - 5250 MHz Radiation patterns

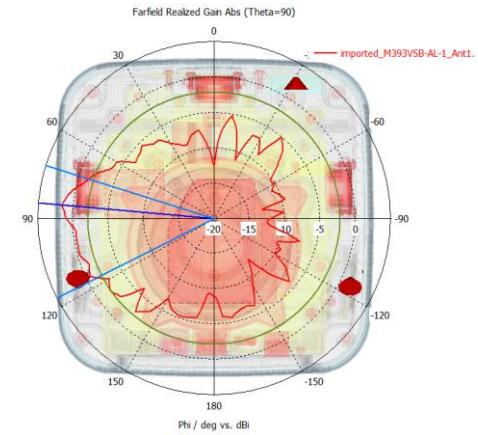
Ox



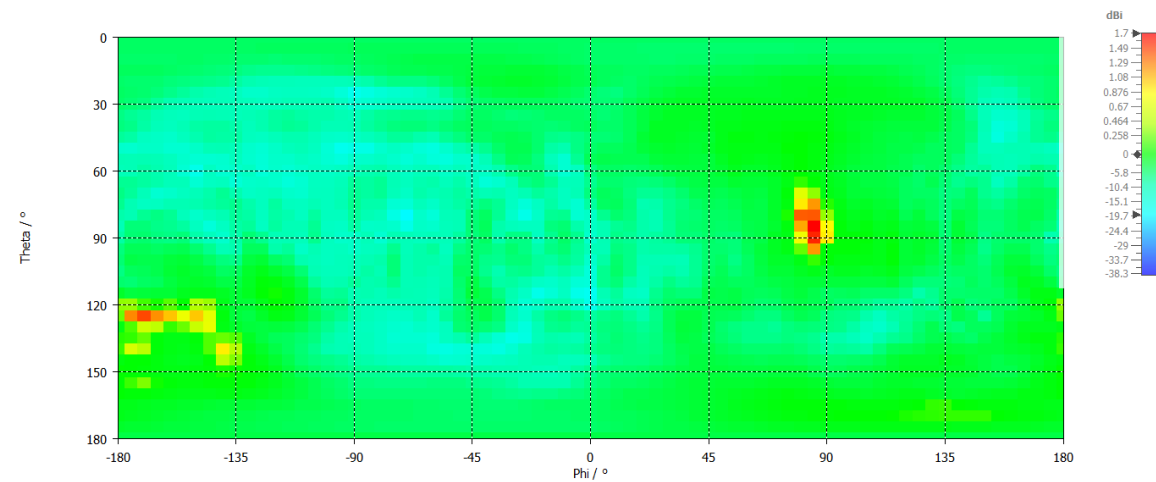
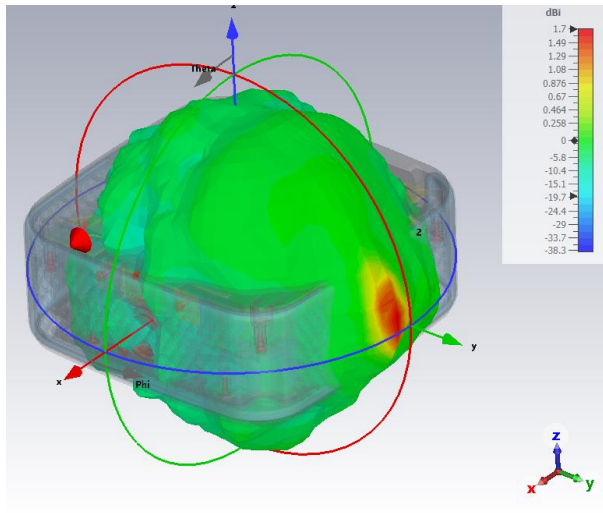
Oy



Oz



1D

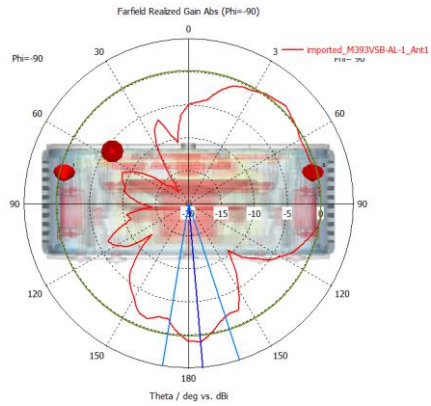


2D

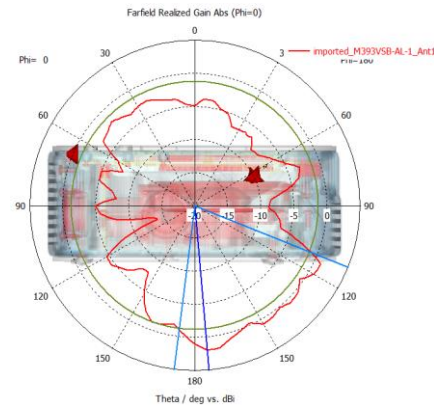
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ANT1 - 5550 MHz Radiation patterns

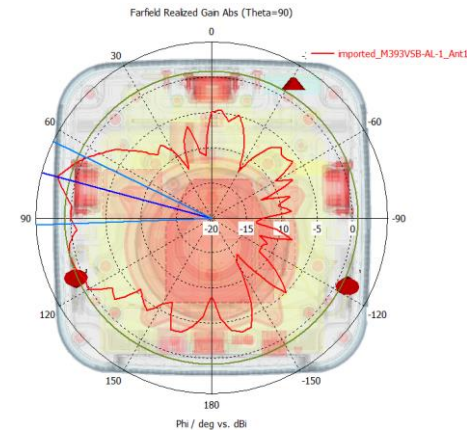
Ox



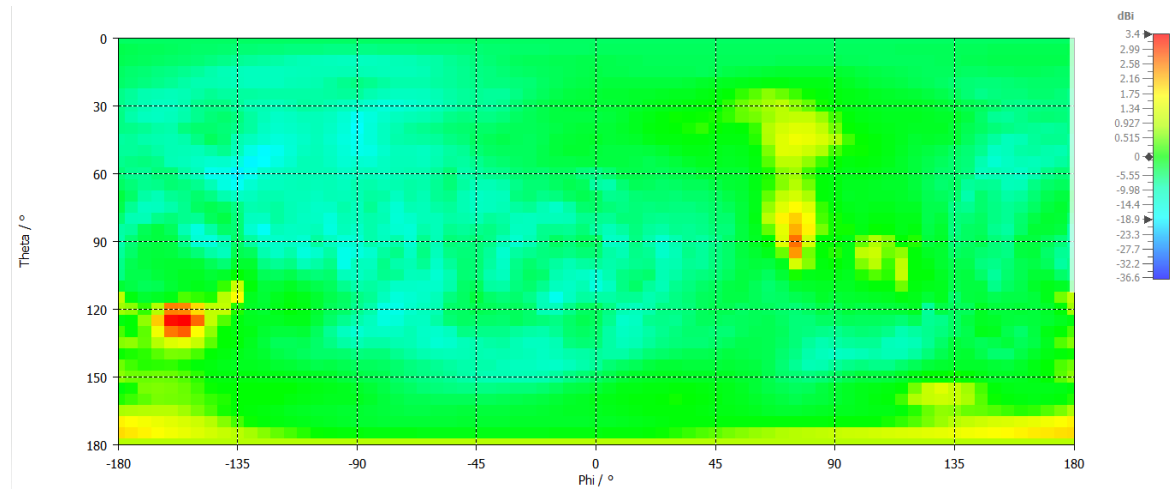
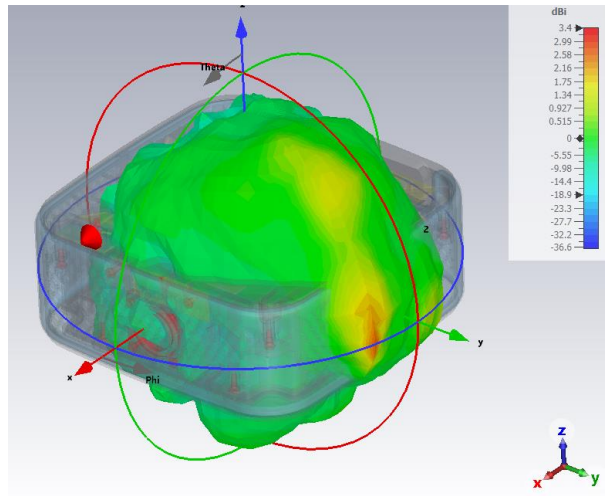
Oy



Oz



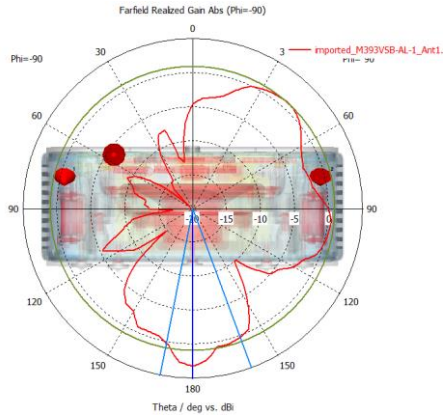
1D



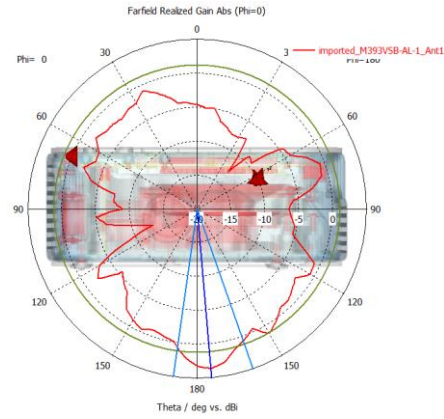
2D

ANT1 - 5700 MHz Radiation patterns

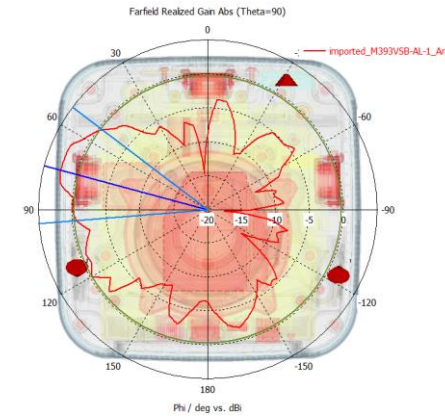
Ox



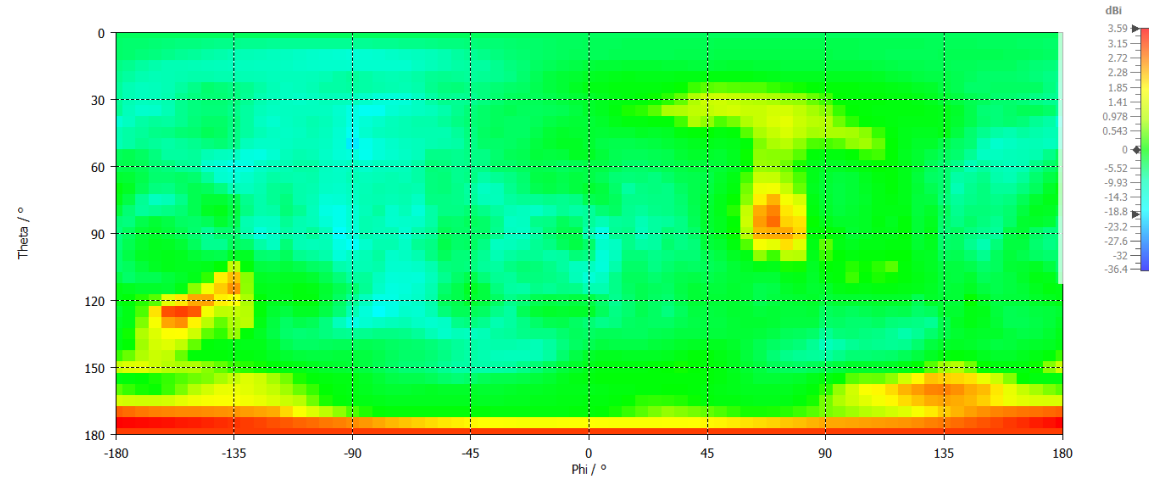
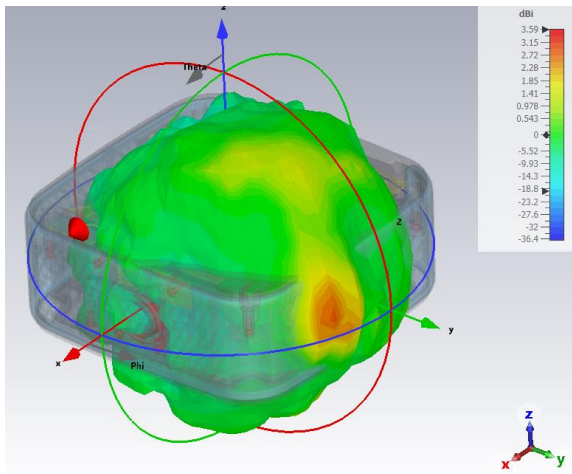
Oy



Oz



1D



2D

2 - Information interne Sagemcom - Interdiction de communiquer en externe sans autorisation de la direction concernée - Ce document et les informations qu'il contient sont la propriété de Sagemcom 31 003 697 - A

WiFi Antenna peak gains – Combined gains

- Peak gains combination [ANT0;ANT1]

| Frequency (MHz) | Correlated Gains (dBi) |
|--------------------------|------------------------|
| ISM band (2.4GHz) | 4.85 |
| UNII-1/2A (5150-5350MHZ) | 4.95 |
| UNII-2C (5470-5725MHZ) | 6.2 |
| UNII-3 (5725-5850MHZ) | 6.9 |

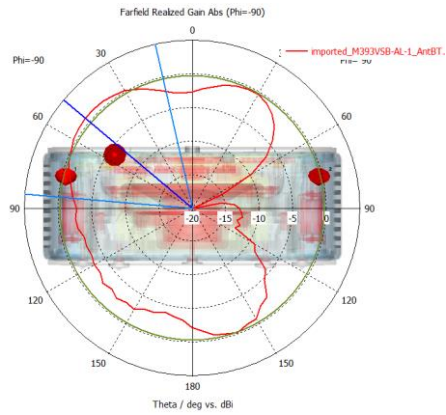
Correlated combination gain formula → Directional gain = $10 \log[(10G1 / 20 + 10G2 / 20 + \dots + 10GN / 20) 2 / NANT]$ dBi
From KDB 662911 D01 Multiple Transmitter Output v02r01

Bluetooth Antenna peak gains – ANT-BT

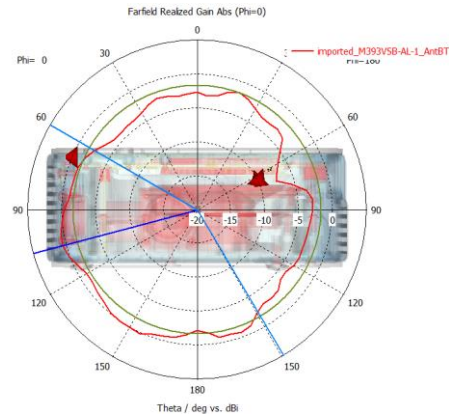
| Frequency (MHz) | ANTO Gains (dBi) |
|-------------------|------------------|
| ISM band (2.4GHz) | 2.2 |

ANT-BT - 2450 MHz Radiation patterns

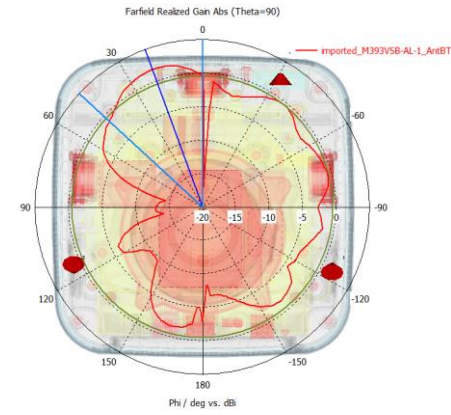
Ox



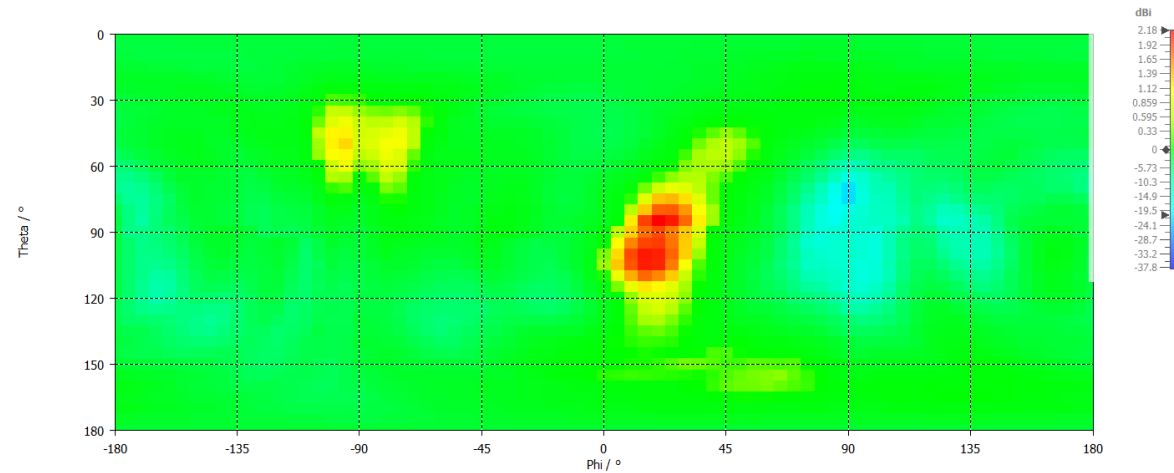
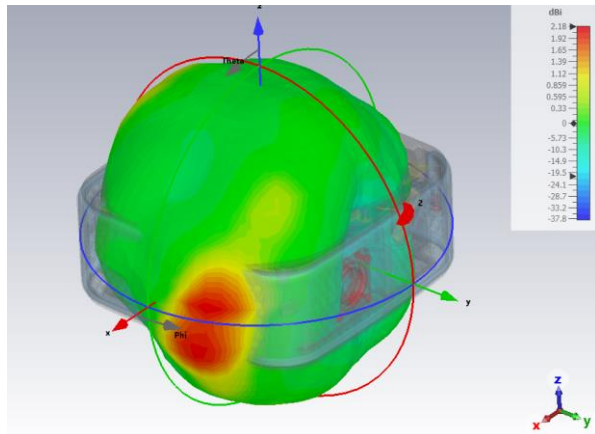
Oy



Oz



1D



2D

Software

WIFI

Chipset Ref → BCM72178

Software → 1.1000 RC22.0

wl0: Nov 18 2022 13:14:55 version 18.40.16.61 (2c9f2e75ce2bcf1c4f43dfbdb18ee7ad143be004 WLTEST) FWID 01-a9c4533a

BT

Chipset réf → BCM72178

Software → Firmware : STB_BCM4375B1_100.007_4375B1_UART_37_4MHz_fcbga_ipa_ref_stbda_class2.hcd

END