

VSB3918DISH

Antennas presentation

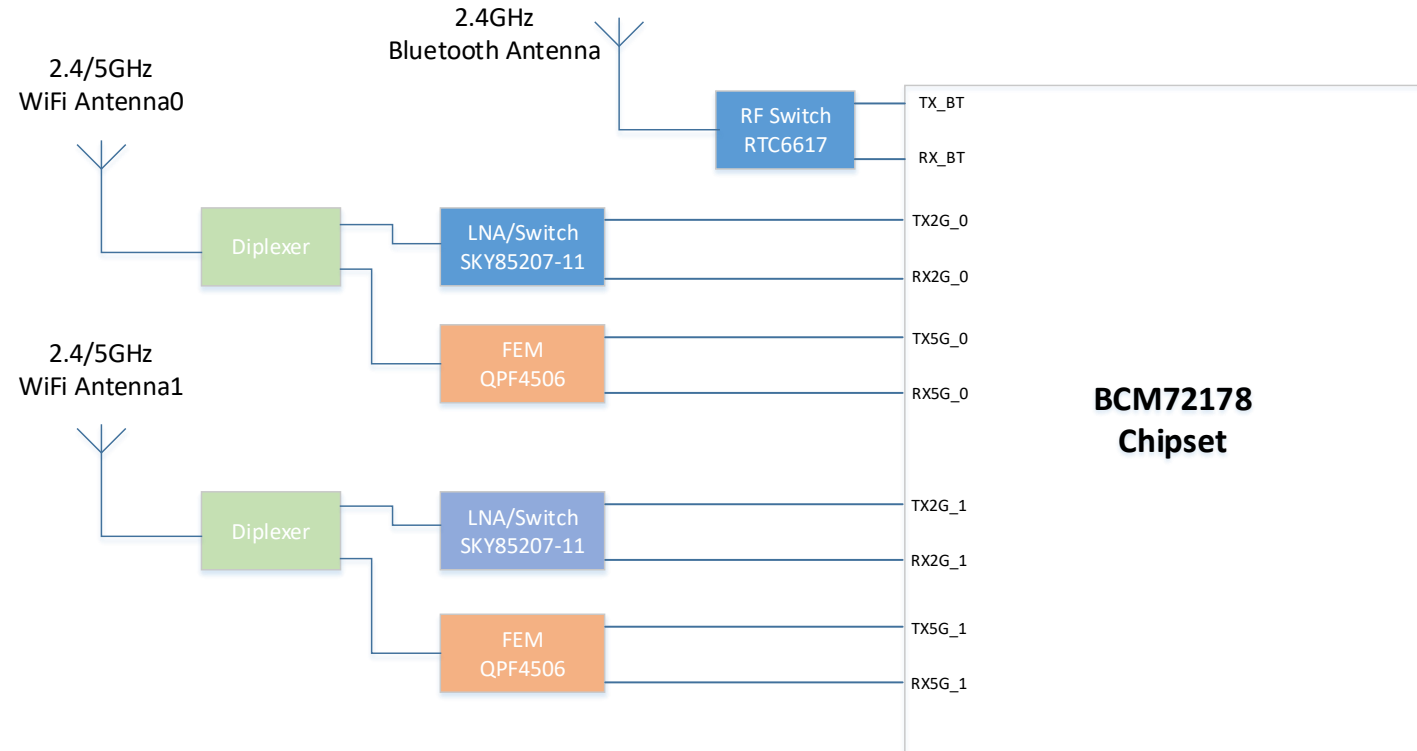
05/06/2023

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"> ■ 3x Off-board : 2.4G/5G Dual-band antenna

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 < -30dB 	<ul style="list-style-type: none"> ■ between 2.4G < -25dB
Peak Gain	<ul style="list-style-type: none"> ■ 2.4G peak gain combination : 5.8dBi ■ 5G peak gain combination : 6.3dBi 	<ul style="list-style-type: none"> ■ Gain : 5.68dBi
Antenna efficiency	<ul style="list-style-type: none"> ■ 2.4G antenna > 65%. ■ 5G antenna > 60 % 	<ul style="list-style-type: none"> ■ 2.4G antenna = 70%

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

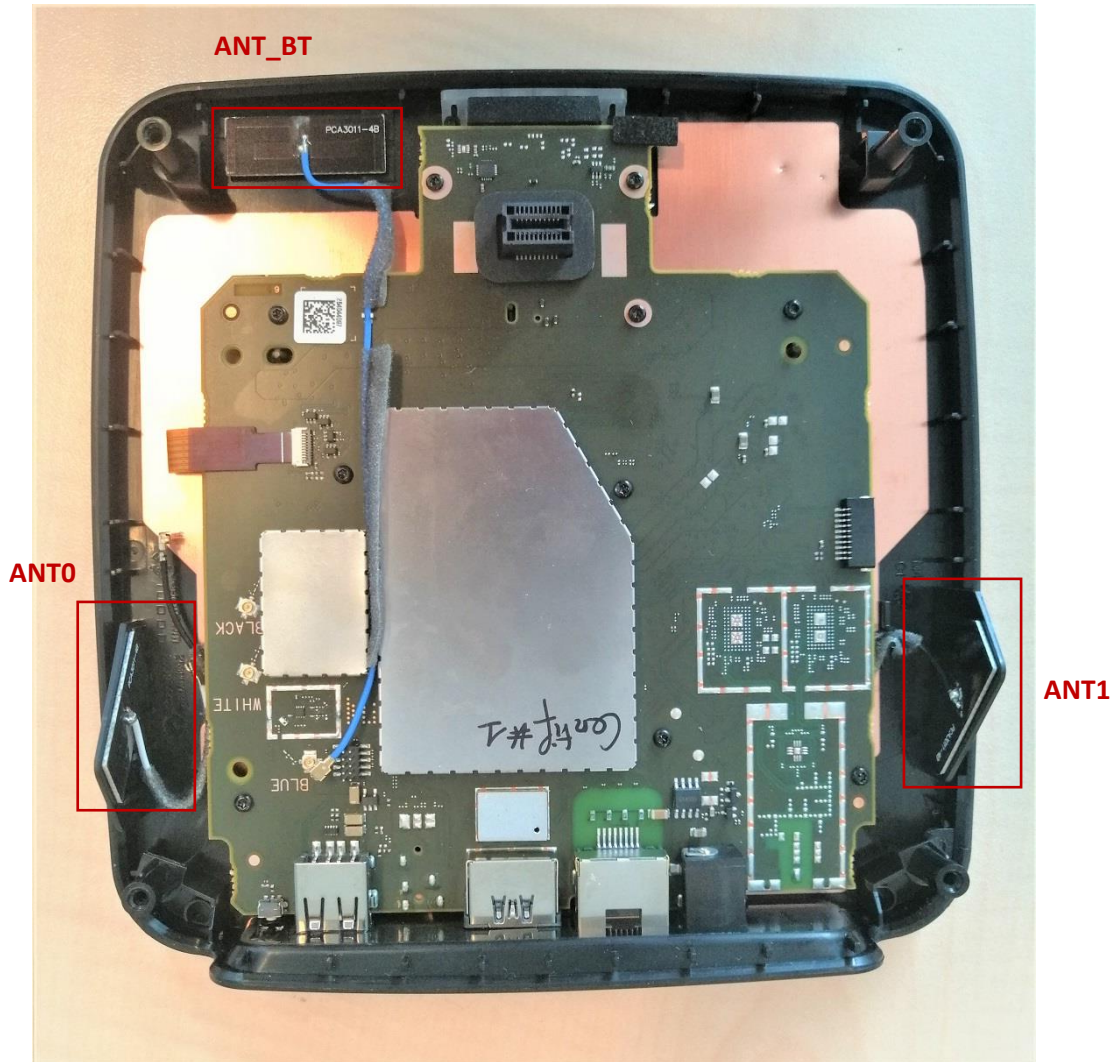
Antenna placement & polarization

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



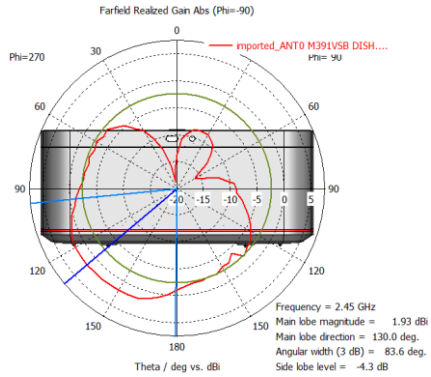
	Distances between antennas
ANT0 / ANT1	145mm
ANT0 / ANT-BT	110mm
ANT1 / ANT-BT	155mm

WiFi Antenna peak gains – ANTO

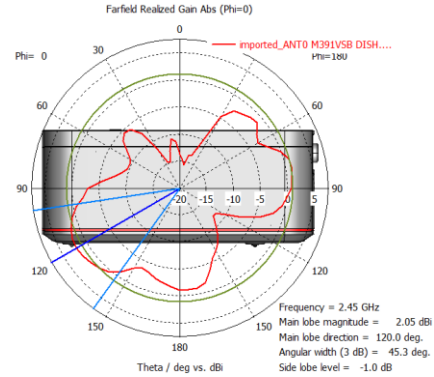
Frequency band	ANTO Gains (dBi)
ISM	2.3
UNII-1/2A	2.5
UNII-2C/UNII-3	3.4

ANTO - 2450 MHz Radiation patterns

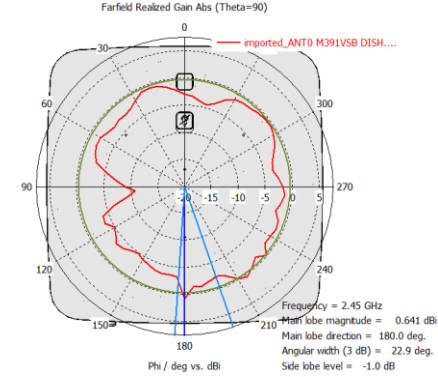
Ox



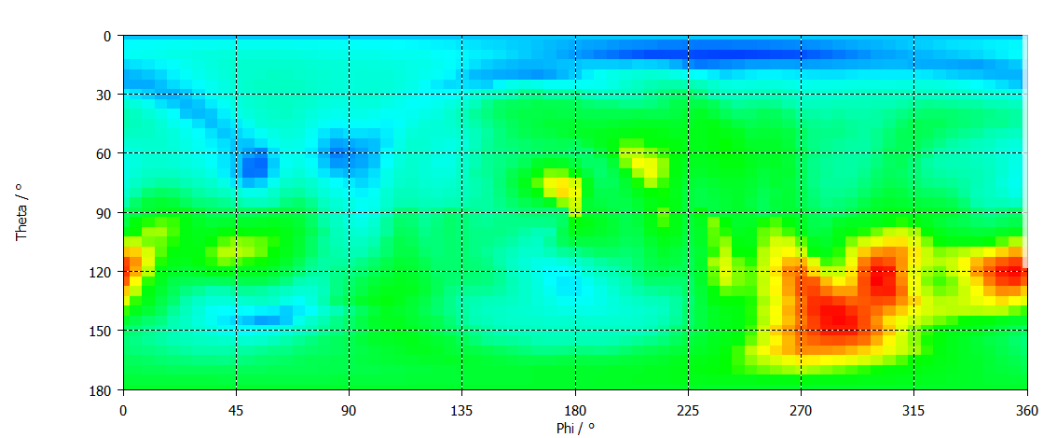
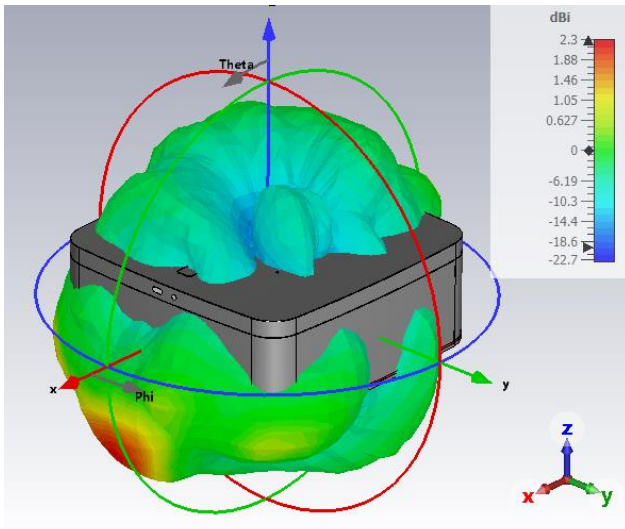
Oy



Oz



1D

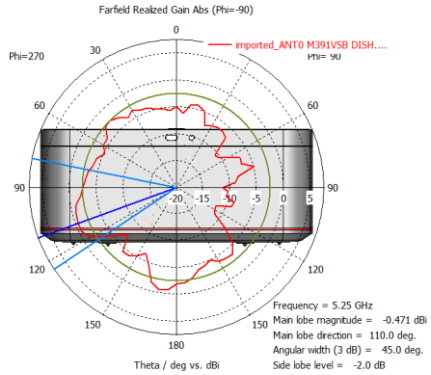


2D

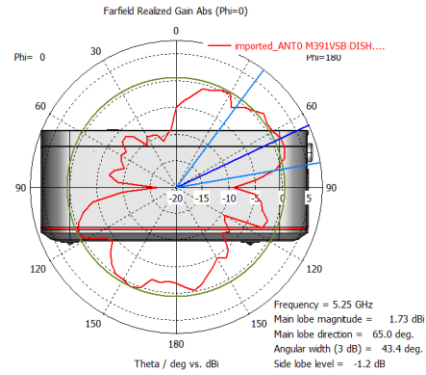
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ANT0 - 5250 MHz Radiation patterns

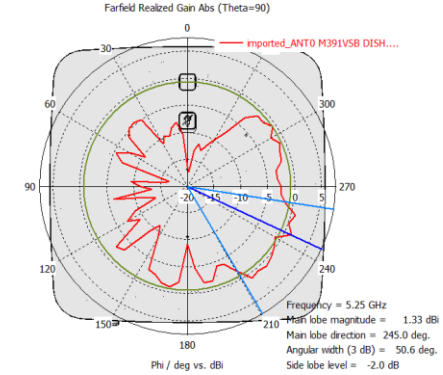
Ox



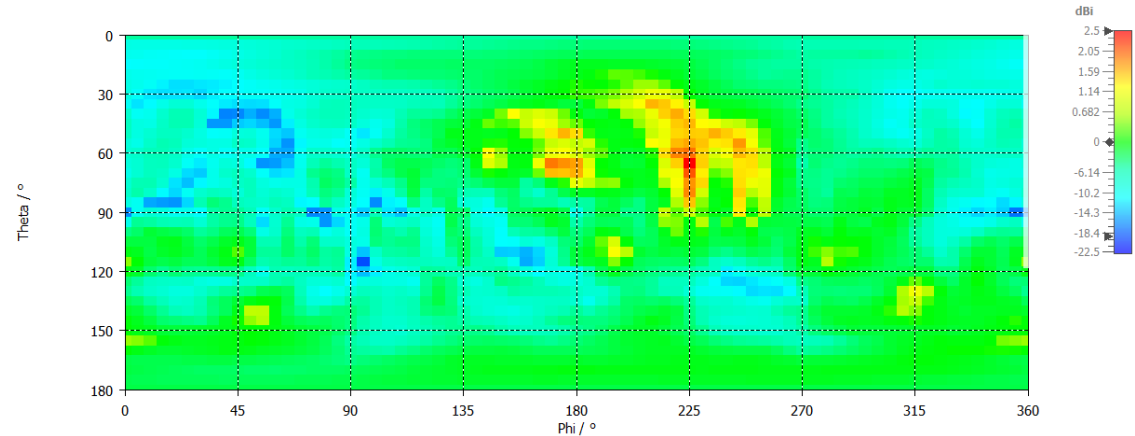
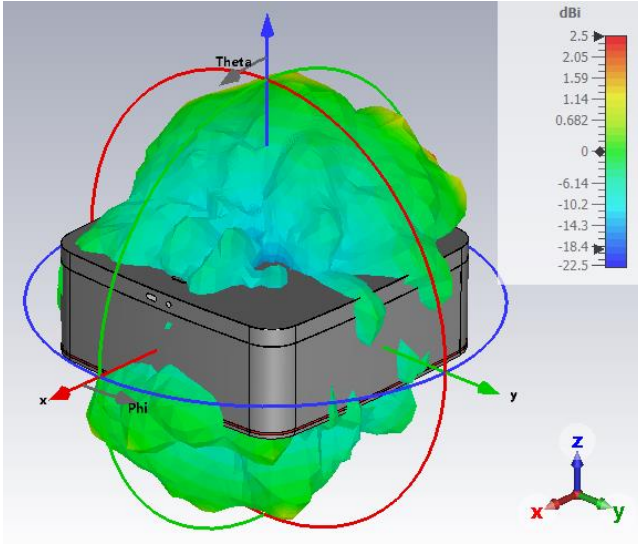
Oy



Oz



1D

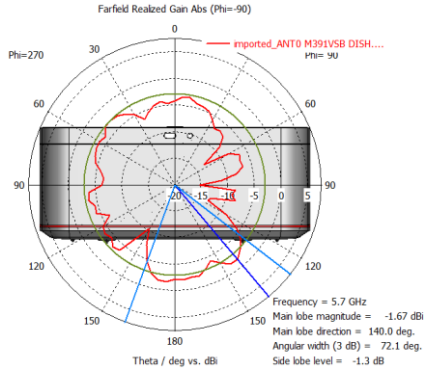


2D

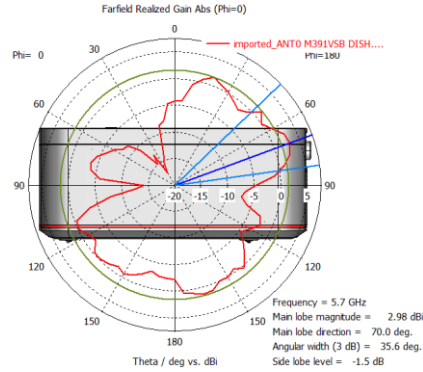
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ANTO - 5700 MHz Radiation patterns

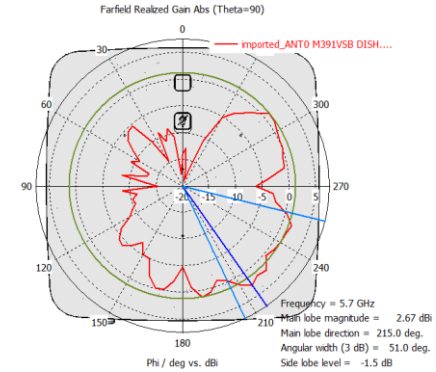
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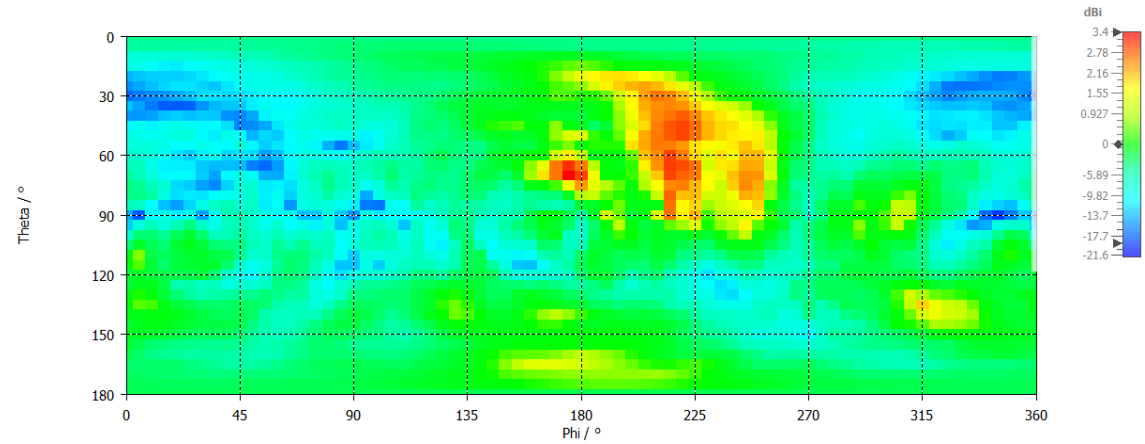
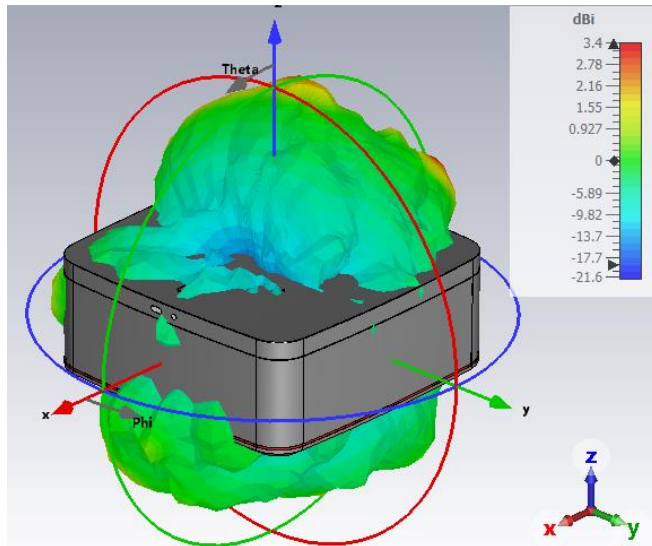
Oy



Oz



1D



2D

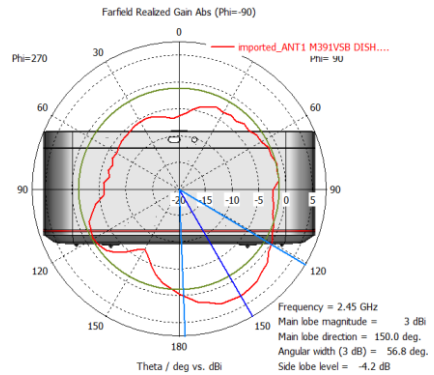
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WiFi Antenna peak gains – ANT1

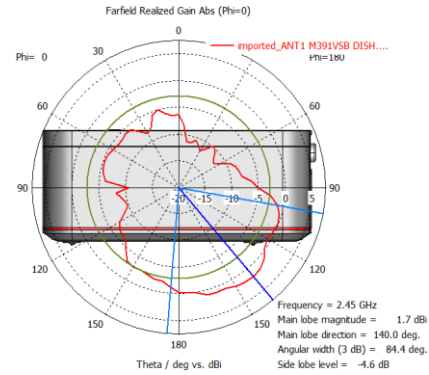
Frequency (MHz)	ANT0 Gains (dBi)
ISM	3.2
UNII-1/2A	3.8
UNII-2C/UNII-3	3.2

ANT1 - 2450 MHz Radiation patterns

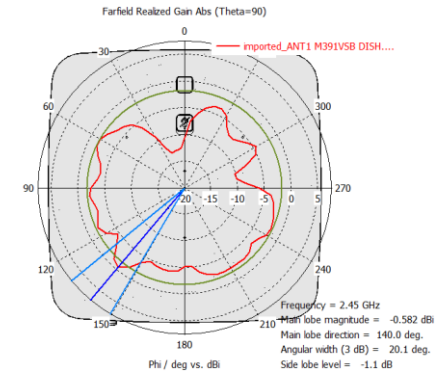
Ox



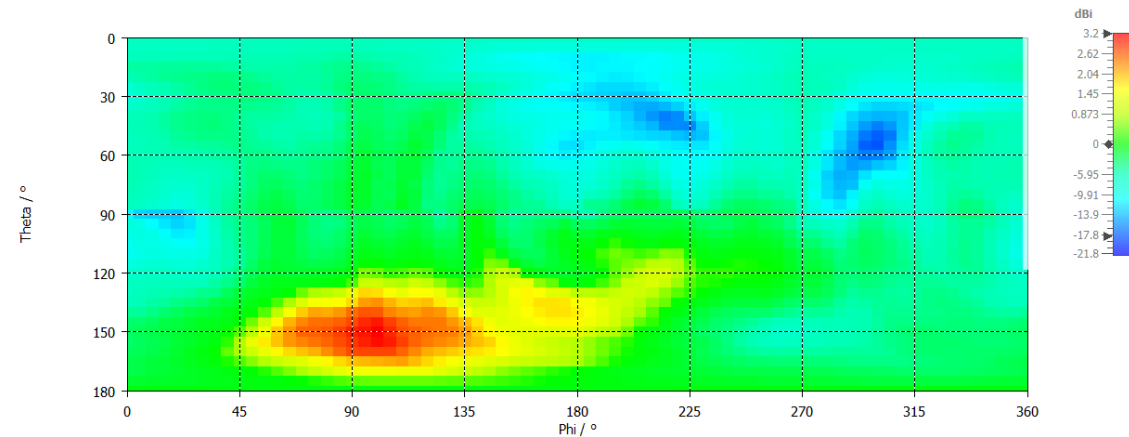
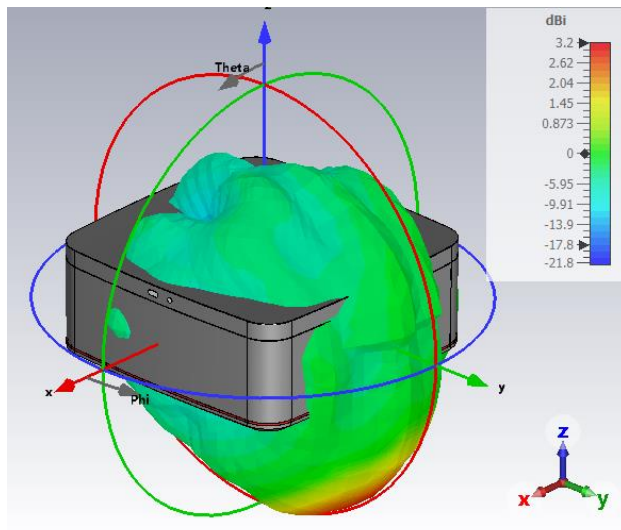
Oy



Oz



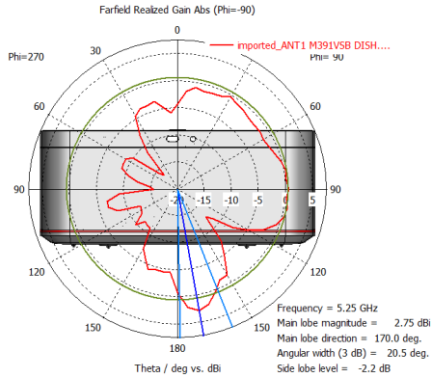
1D



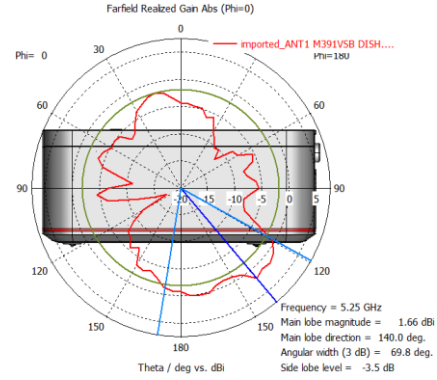
2D

ANT1 - 5250 MHz Radiation patterns

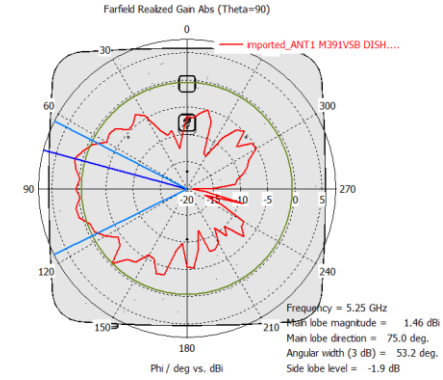
Ox



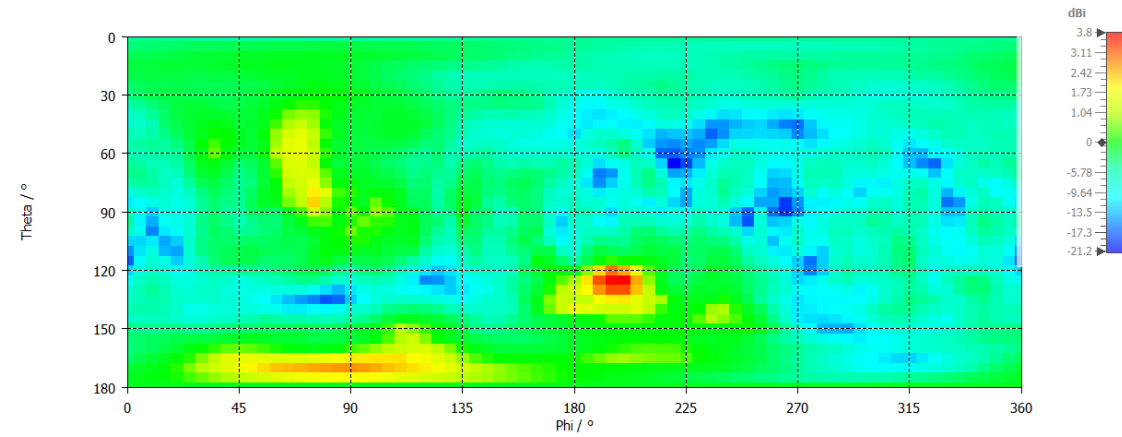
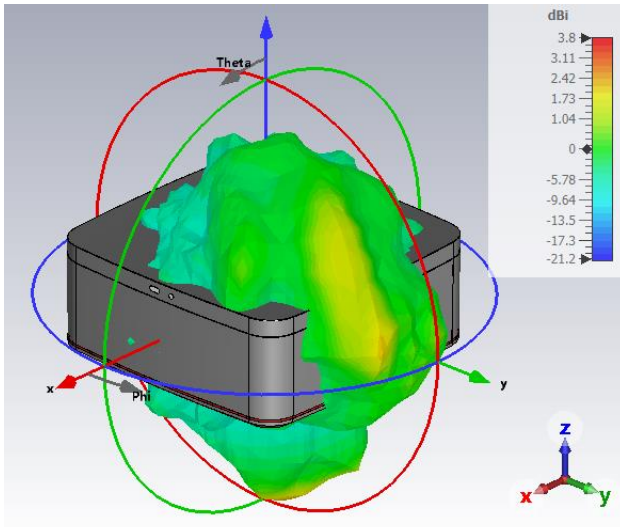
Oy



Oz



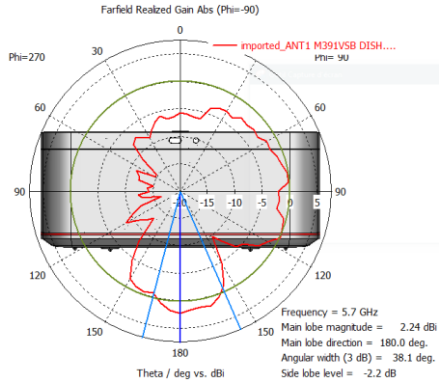
1D



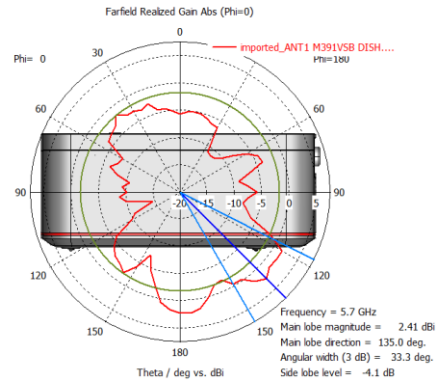
2D

ANT1 - 5700 MHz Radiation patterns

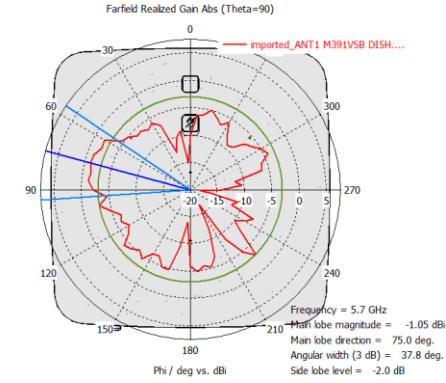
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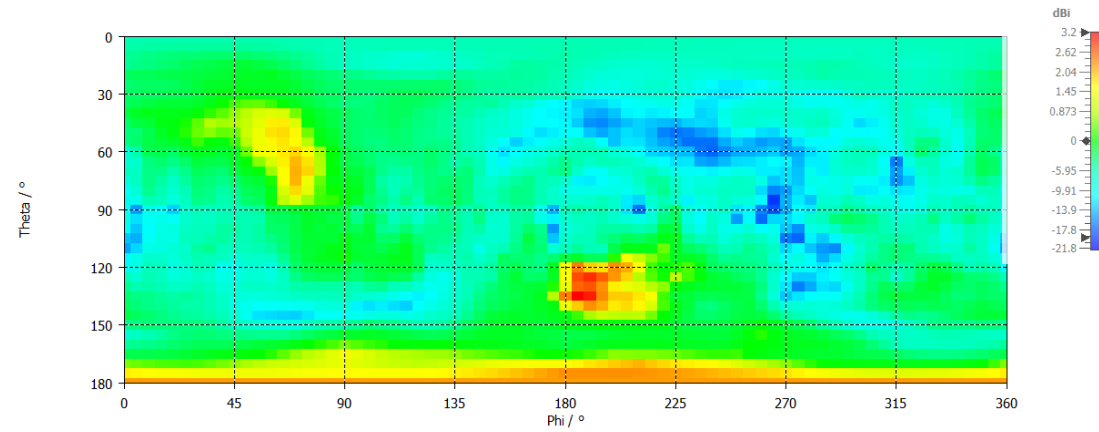
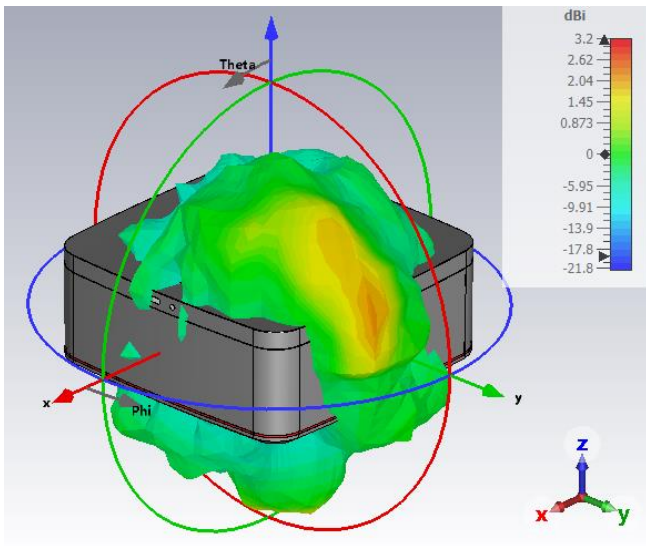
Oy



Oz



1D



2D

WiFi Antenna peak gains – Combined gains

- Peak gains combination [ANT0;ANT1]

Frequency (MHz)	Correlated Gains (dBi)
ISM band (2.4GHz)	5.8
UNII-1/2A (5150-5350MHZ)	6.2
UNII-2C/3 (5470-5850MHZ)	6.3

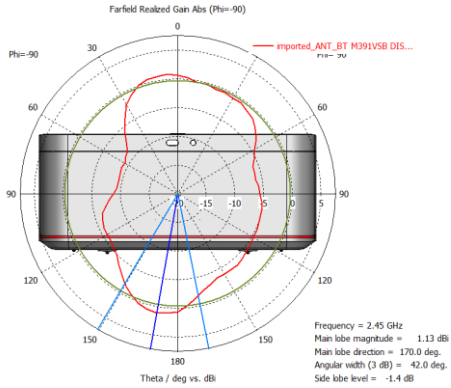
Correlated combination gain formula → Directional gain = $10 \log[(10G1 / 20 + 10G2 / 20 + \dots + 10GN / 20) 2 / NANT]$ dBi
From KDB 662911 D01 Multiple Transmitter Output v02r01

Bluetooth Antenna peak gains – ANT-BT

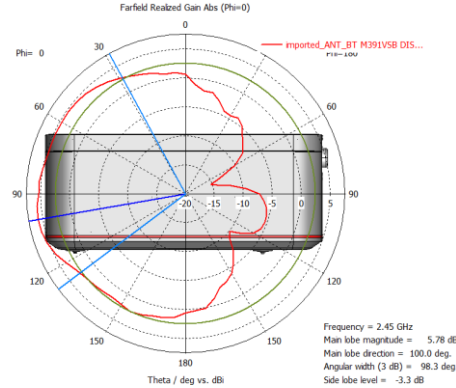
Frequency (MHz)	ANTO Gains (dBi)
ISM band (2.4GHz)	5.68

ANT-BT - 2450 MHz Radiation patterns

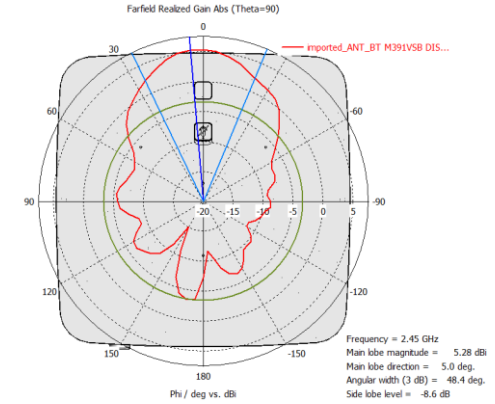
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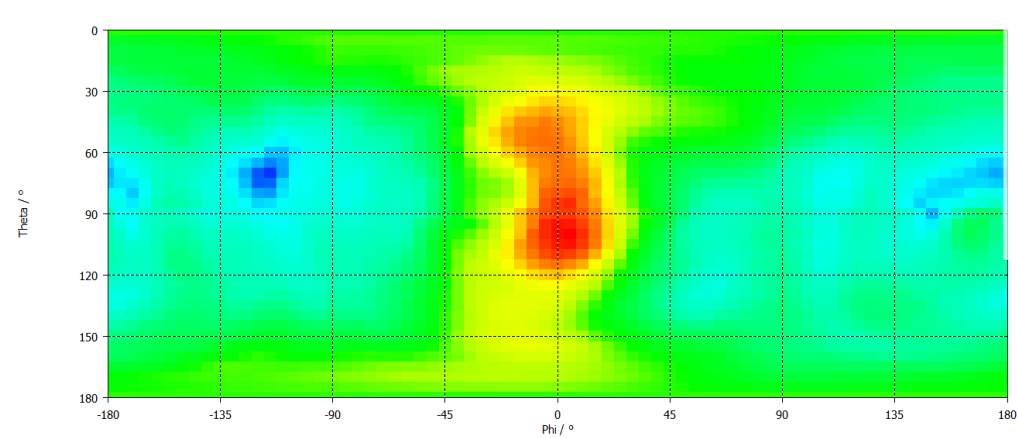
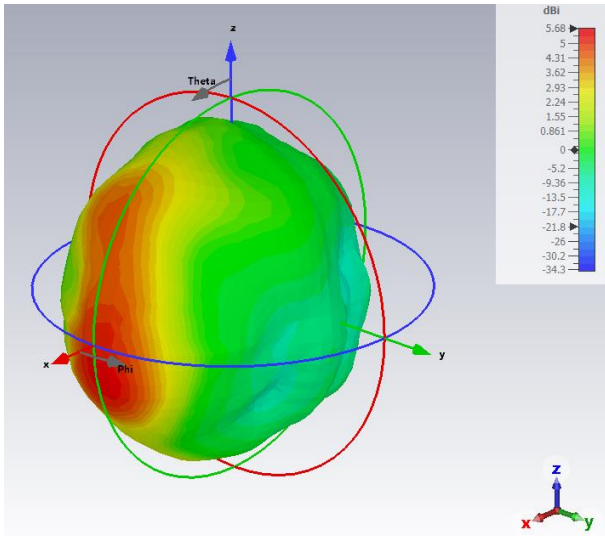
Oy



Oz



1D



2D

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Software

WIFI

Chipset Ref → BCM72178

Software → 1.1000 RC23.0

wl0: Feb 21 2023 08:01:05 version 18.40.16.65 (1189660cc9396da2e7b803246815c395011dfc83 WLTEST) FWID 01-e4f2825c

BT

Chipset réf → BCM72127

Software → Firmware : STB_BCM4375B1_100.010_4375B1_UART_37_4MHz_fcbga_ipa_ref_stbda_class2.hcd

END