

# DIW377DISH

## Antennas presentation

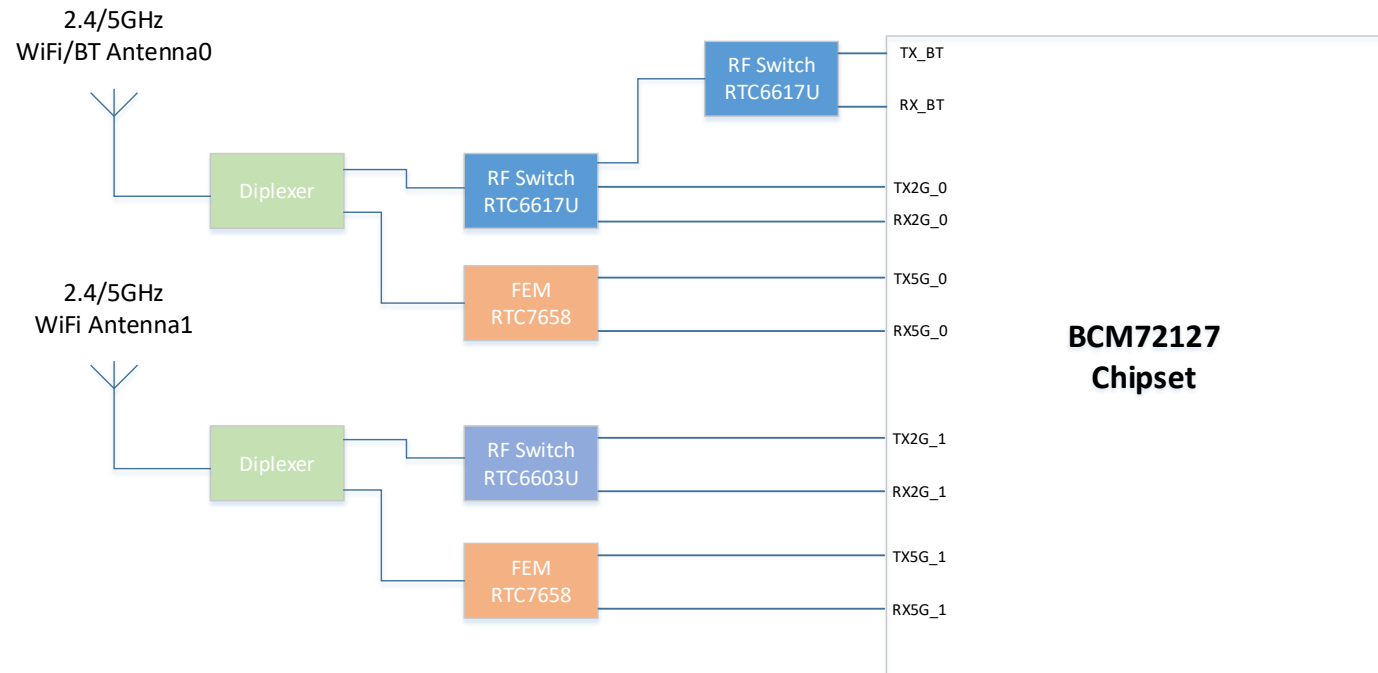
25/05/2023

# Antennas summary

Antennas	
Wireless Function	<ul style="list-style-type: none"> <li>■ Wi-Fi 2.4G+5G MiMo 2X2</li> <li>■ Bluetooth</li> <li>■ Wi-Fi 2.4G and Bluetooth working simultaneously</li> </ul>
Antenna type	<ul style="list-style-type: none"> <li>■ 1x Off-board : 2.4G/5G Dual-band antenna</li> <li>■ 2x on-board PCB : 2.4G/5G Dual-band antenna</li> </ul>

Measurement data		
	WiFi Measurement data	BT Measurement data
Return loss	S11 < -12dB	S11 < -12dB
Isolation	<ul style="list-style-type: none"> <li>■ between 2.4G &lt; -25dB</li> <li>■ between 5G &lt; -25dB</li> </ul>	<ul style="list-style-type: none"> <li>■ between 2.4G &lt; -20dB</li> </ul>
Peak Gain	<ul style="list-style-type: none"> <li>■ 2.4G peak gain combination : 4.85dBi</li> <li>■ 5G peak gain combination : 6.45dBi</li> </ul>	<ul style="list-style-type: none"> <li>■ Gain : 4.15dBi</li> </ul>
Antenna efficiency	<ul style="list-style-type: none"> <li>■ 2.4G antenna &gt; 70%.</li> <li>■ 5G antenna &gt; 65 %</li> </ul>	<ul style="list-style-type: none"> <li>■ 2.4G antenna = 75%</li> </ul>

# RF Front-end schematic



191646854 DUPLEXEUR.RF CMS DOUBLE BANDE 2.4/5GHZ quantity 2X

191656800 IC.CMS RTC7658 5G WIFI FEM quantity 2X

191699412 IC.CMS RTC6617U SP3T SWITCH QFN8 quantity 2X

191699441 IC.CMS RTC6603U SPDT.SWITCH SC-70 quantity 1X

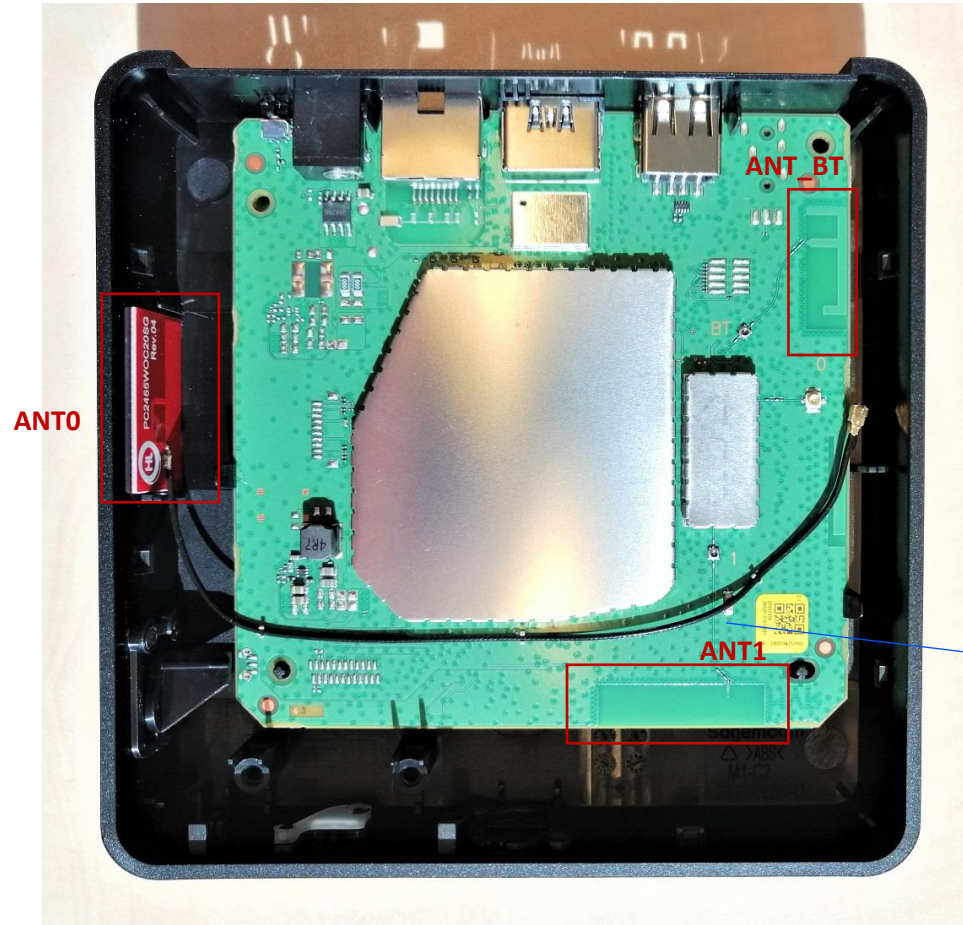
# Antenna placement & polarization

There are 3 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)	Vertical (dipole)	Horizontal (monopole)	Horizontal (monopole)

# Antenna placement & cable routing



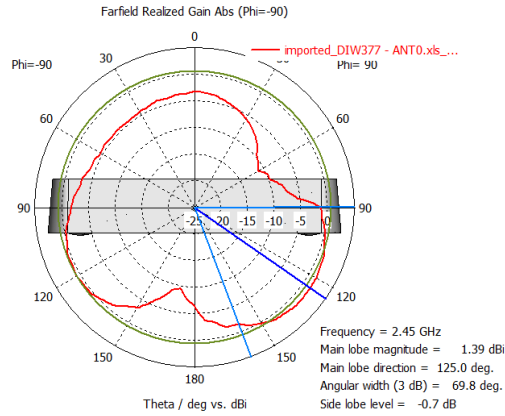
	Distances between antennas
ANT0 / ANT1	100mm
ANT0 / ANT-BT	115mm
ANT1 / ANT-BT	75mm

# WiFi Antenna peak gains – ANTO

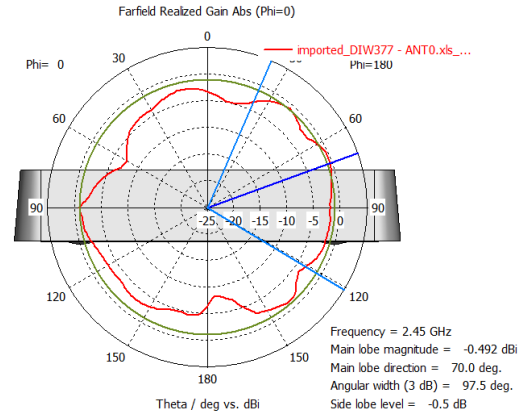
Frequency band	ANTO Gains (dBi)
ISM	2.5
UNII-1/2A	2.8
UNII-2C/UNII-3	4

# ANT0 - 2450 MHz Radiation patterns

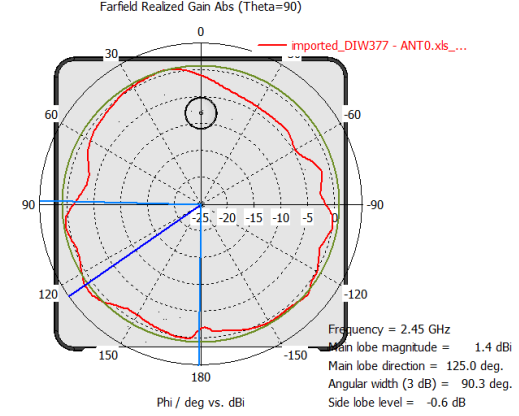
Ox



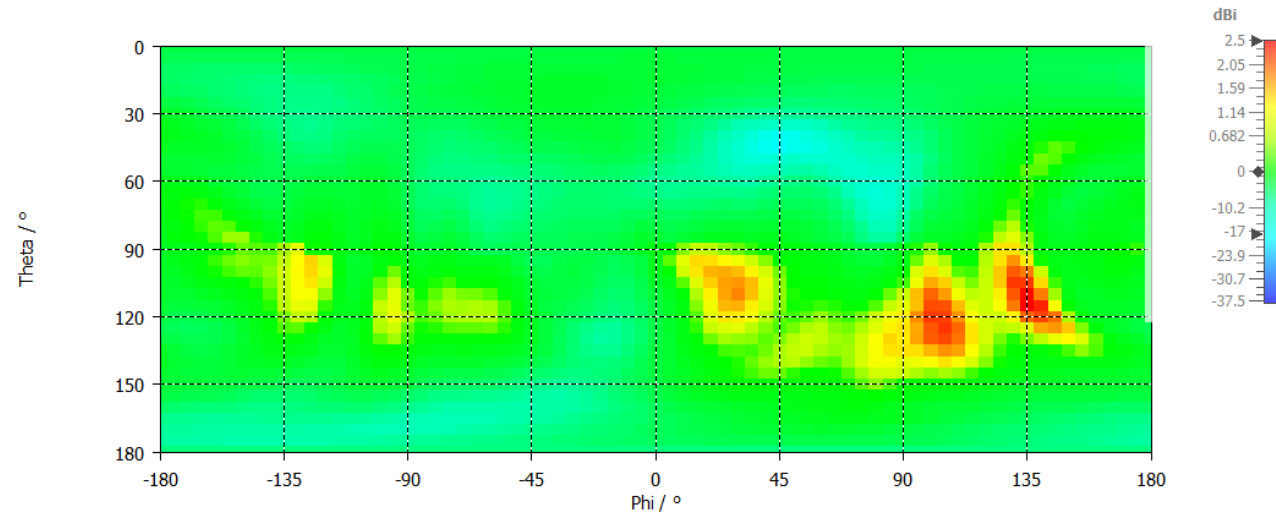
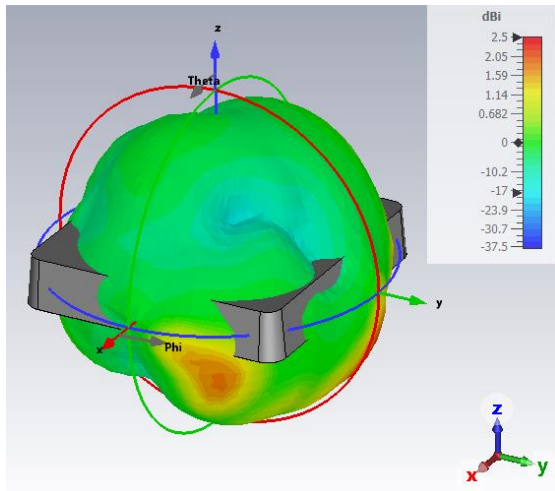
Oy



Oz



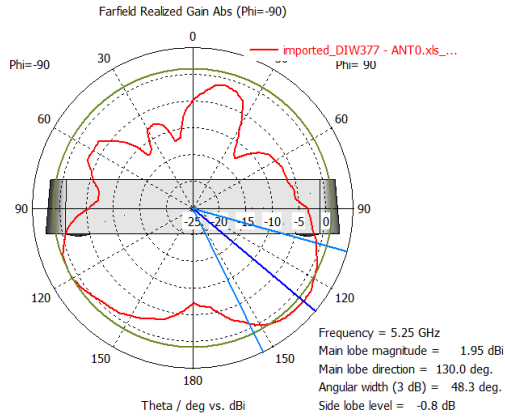
1D



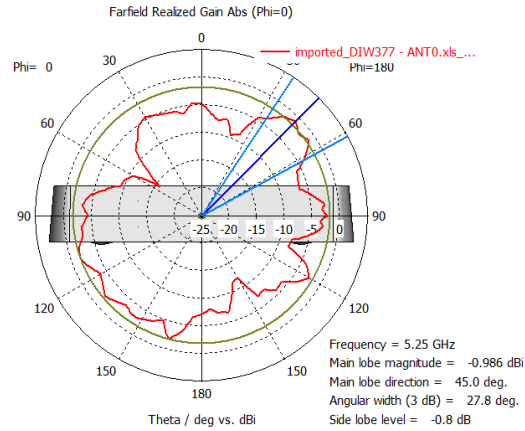
2D

# ANT0 - 5250 MHz Radiation patterns

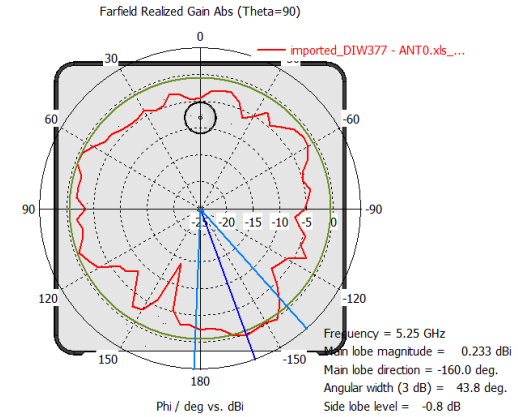
Ox



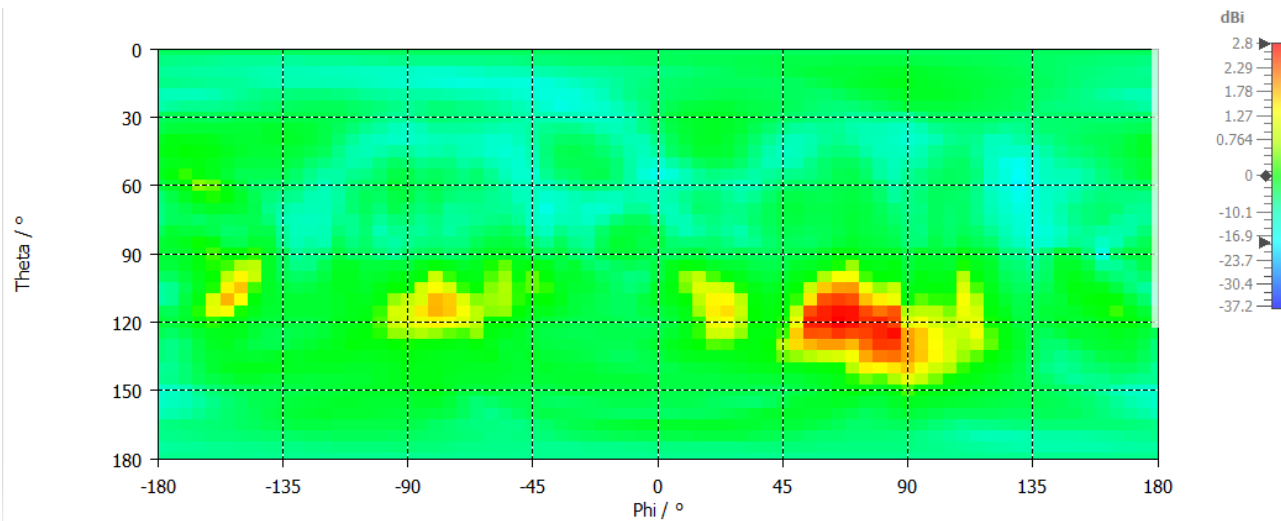
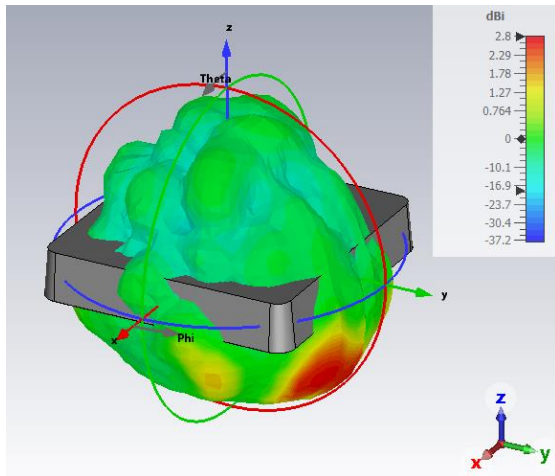
Oy



Oz



1D

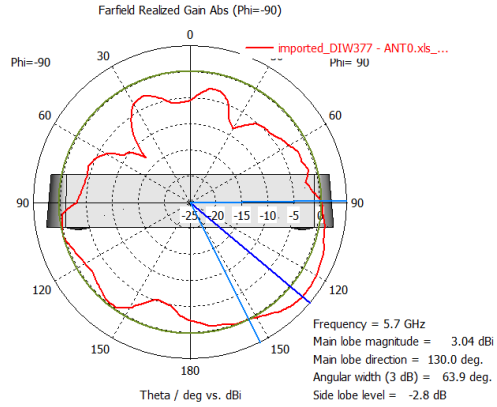


2D

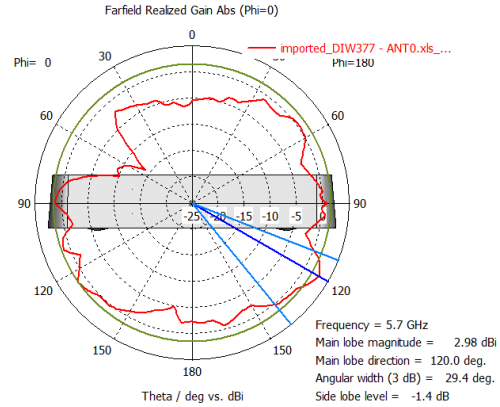


# ANT0 - 5700 MHz Radiation patterns

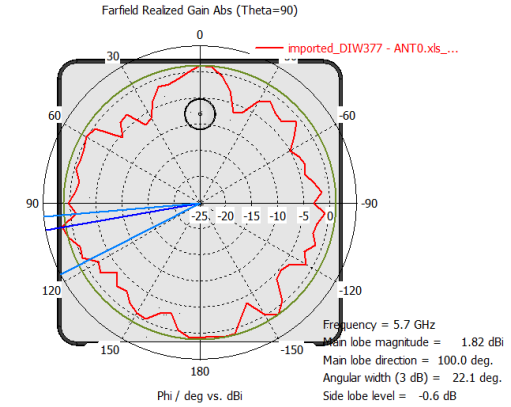
Ox



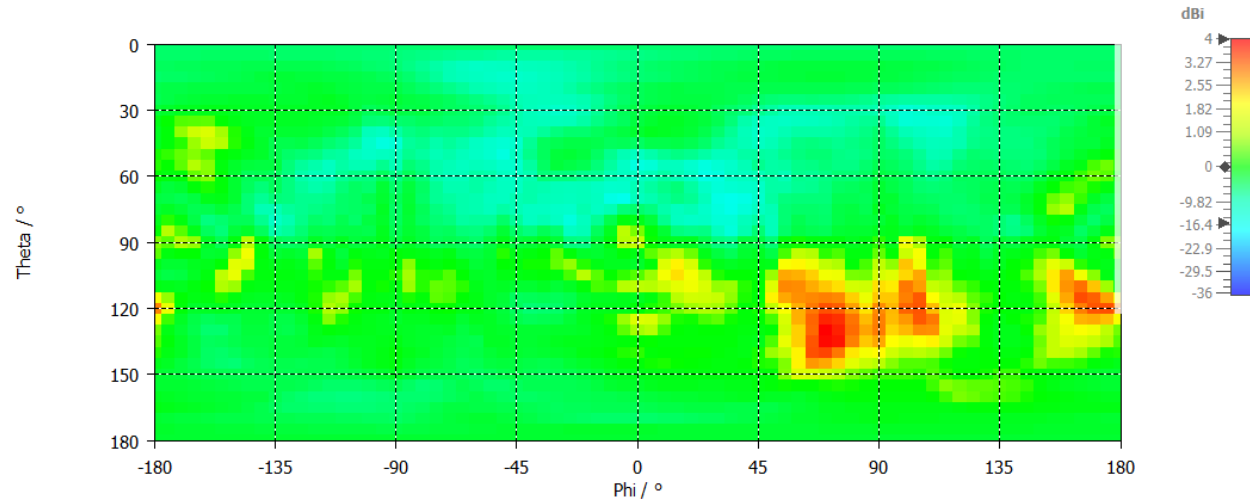
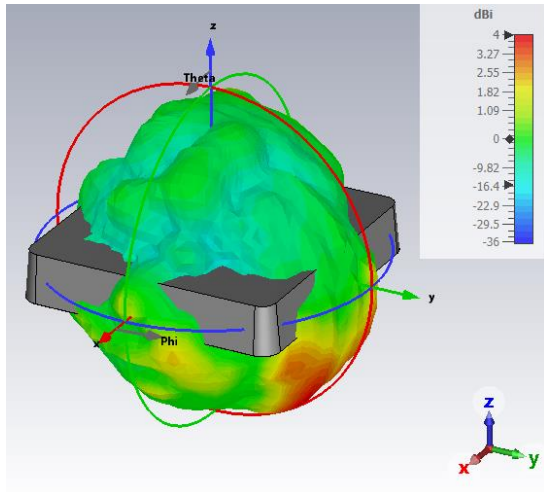
Oy



Oz



1D



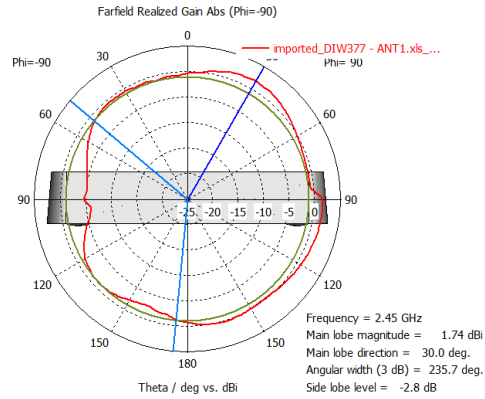
2D

# WiFi Antenna peak gains – ANT1

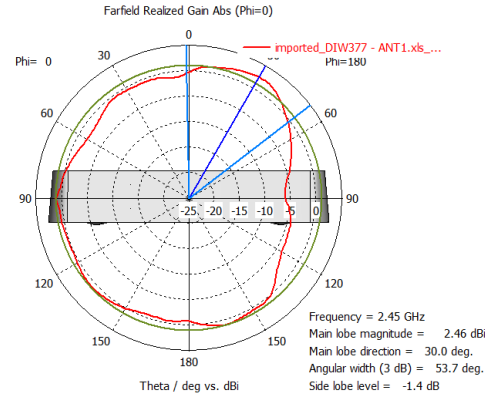
Frequency (MHz)	ANT0 Gains (dBi)
ISM	1.1
UNII-1/2A	4
UNII-2C/UNII-3	2.8

# ANT1 - 2450 MHz Radiation patterns

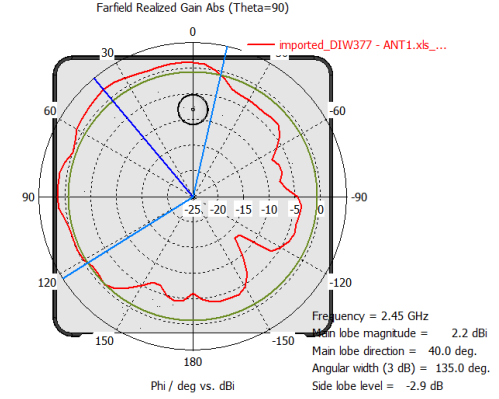
Ox



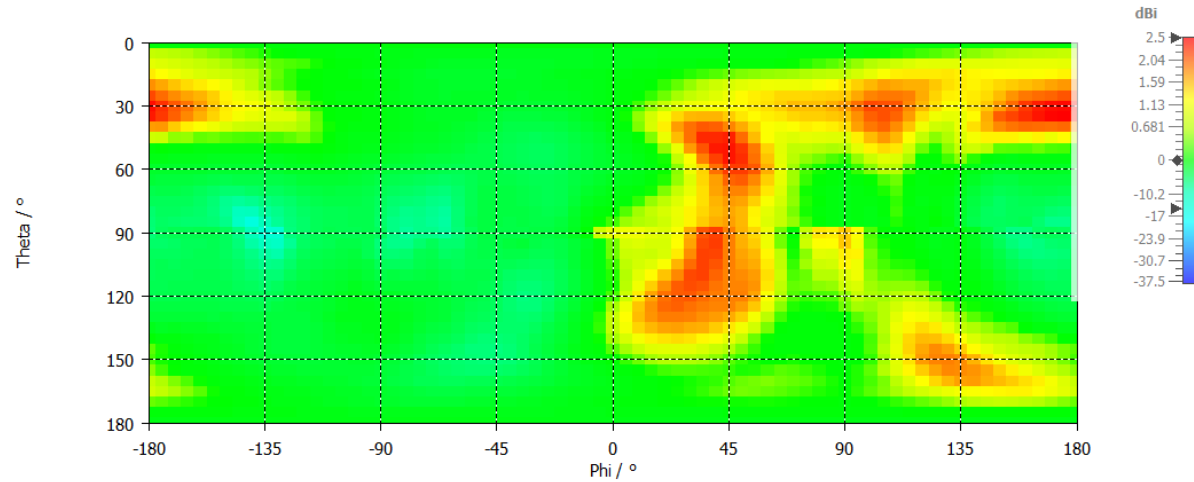
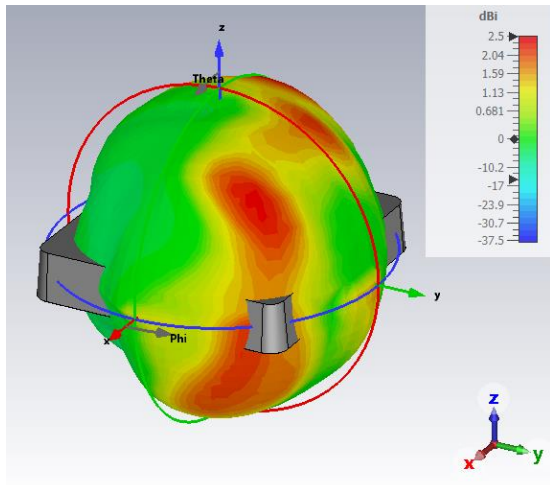
Oy



Oz



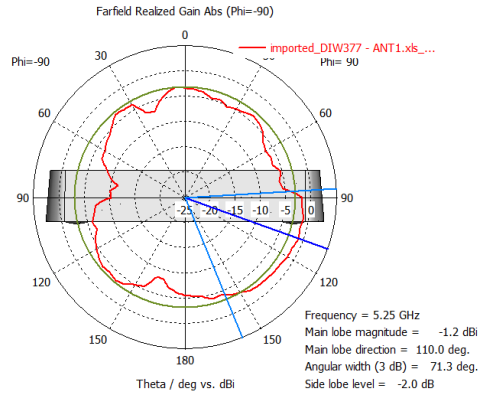
1D



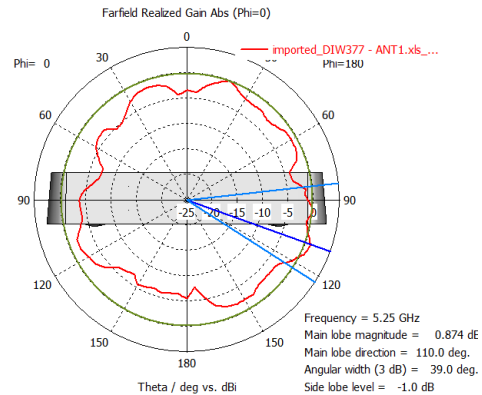
2D

# ANT1 - 5250 MHz Radiation patterns

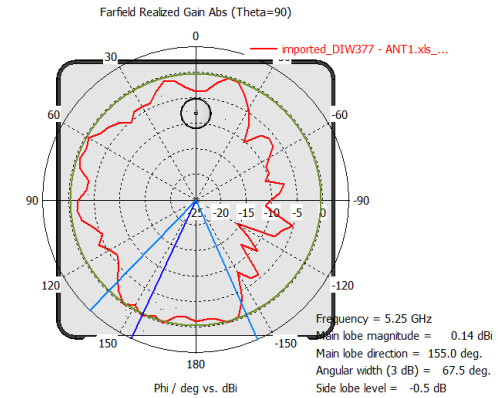
Ox



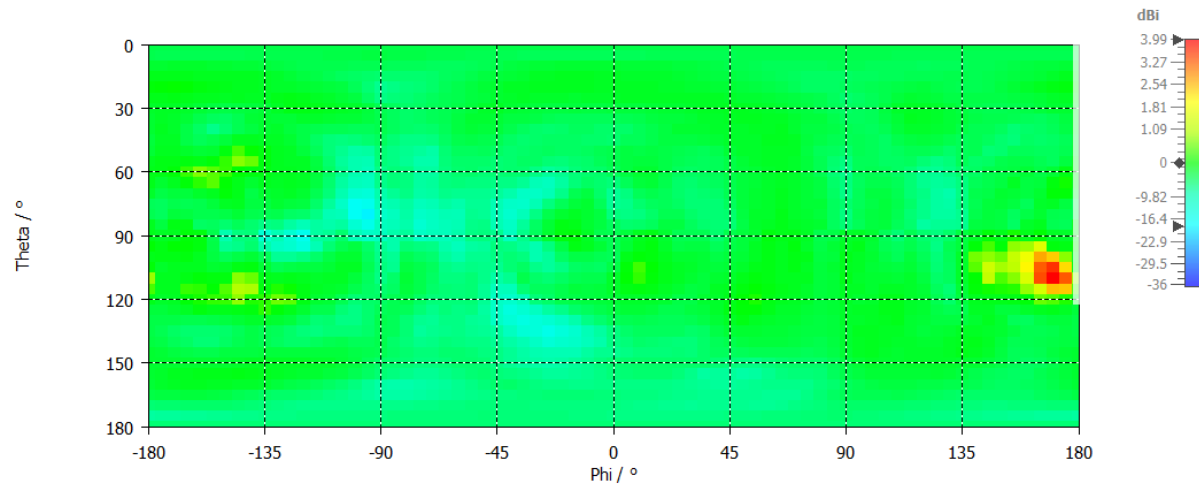
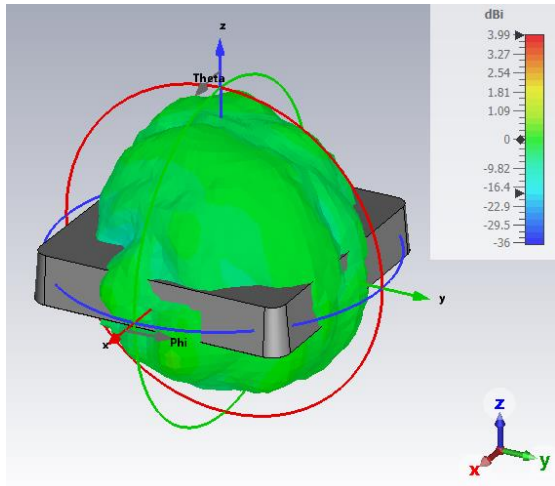
Oy



Oz



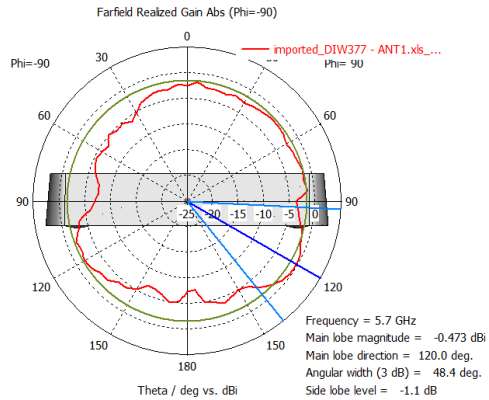
1D



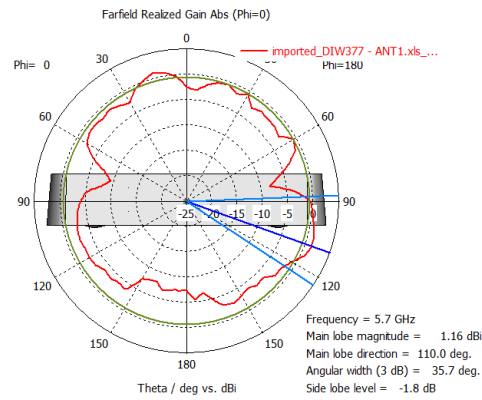
2D

# ANT1 - 5700 MHz Radiation patterns

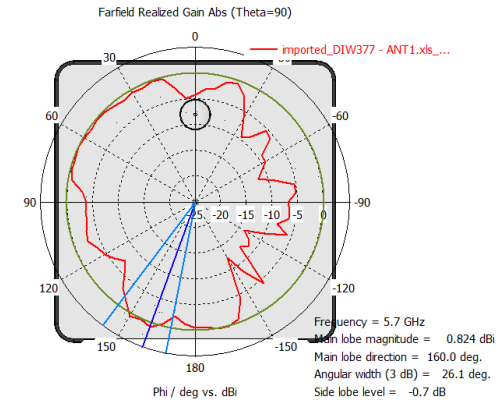
Ox



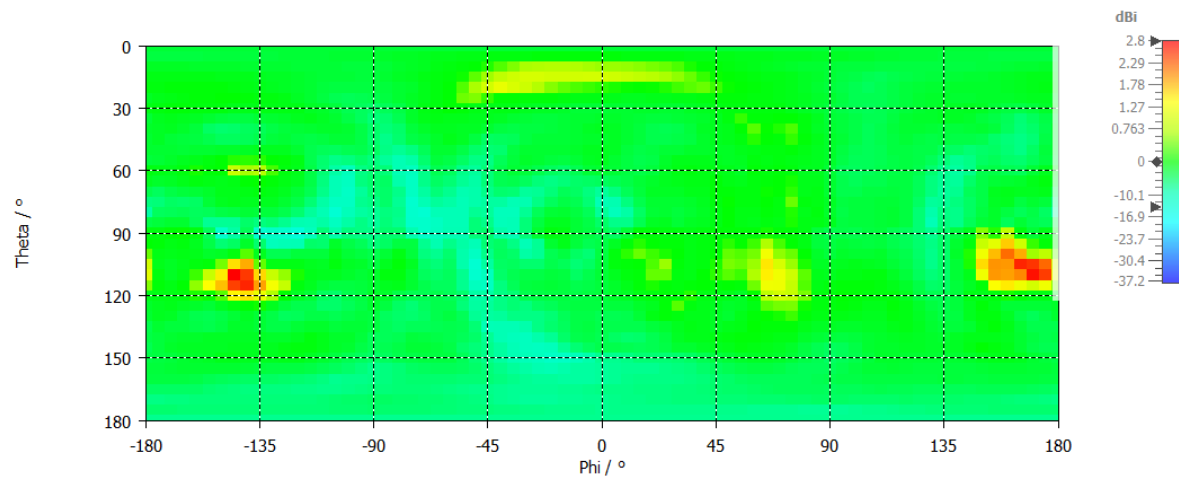
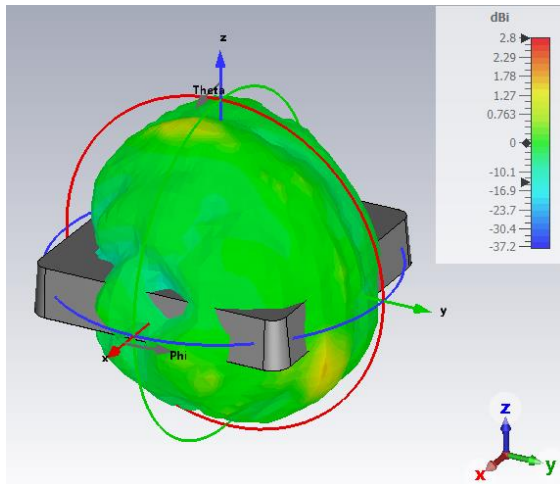
Oy



Oz



1D



2D

# 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)	6.45
UNII-2C (5470-5725MHZ)	6.3
UNII-3 (5725-5850MHZ)	6.4

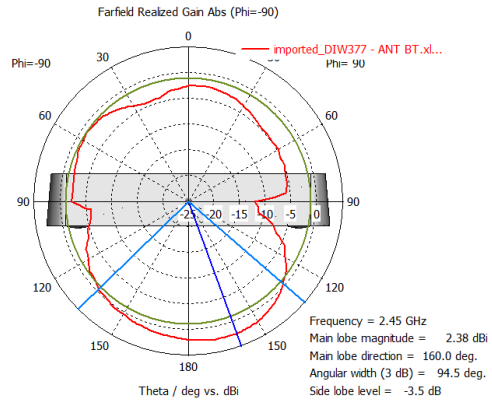
Correlated combination gain formula → Directional gain =  $10 \log[(10G1 / 20 + 10G2 / 20 + \dots + 10GN / 20) 2 / NANT]$  dBi  
From KDB 662911 D01 Multiple Transmitter Output v02r01

# Bluetooth Antenna peak gains – ANT-BT

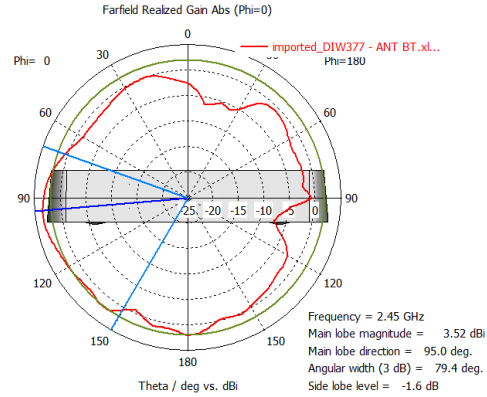
Frequency (MHz)	ANTO Gains (dBi)
ISM band (2.4GHz)	4.15

# ANT-BT - 2450 MHz Radiation patterns

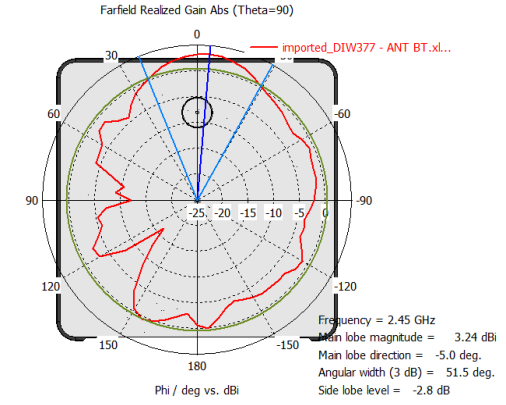
Ox



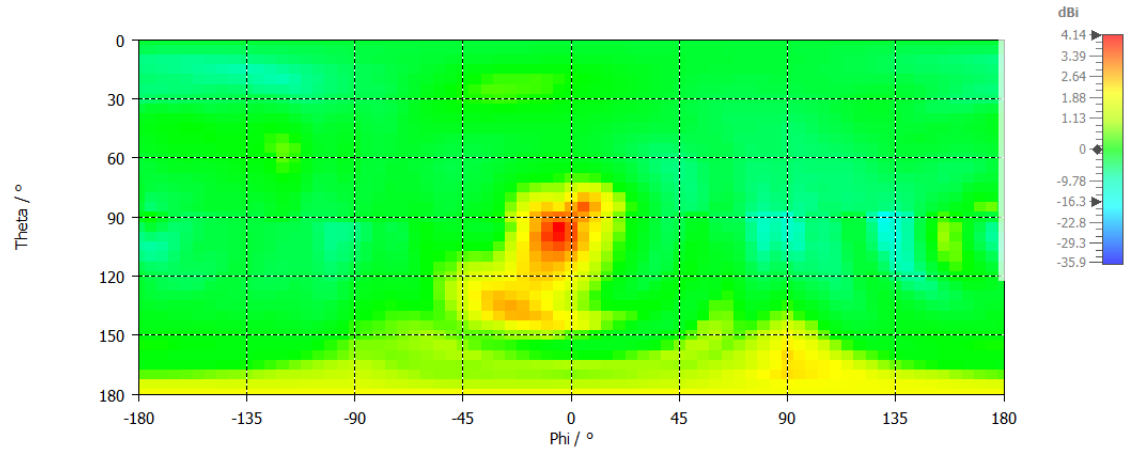
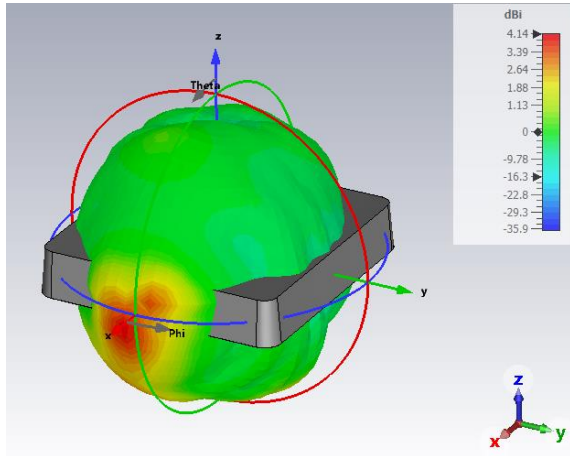
Oy



Oz



1D



2D



# Software

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## WIFI

Chipset Ref → BCM72127

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**