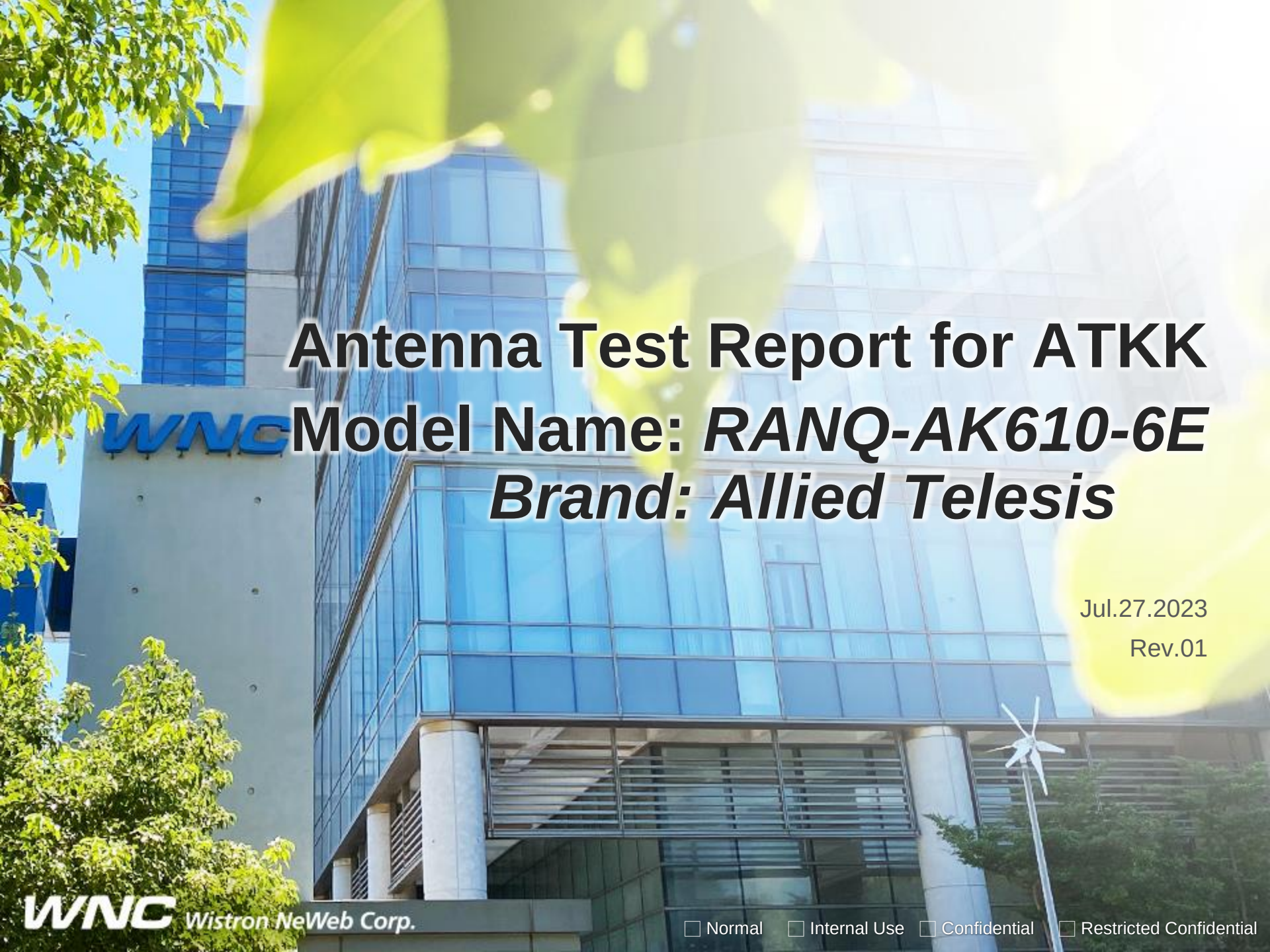




Antenna Test Report for ATKK

Model Name: *RANQ-AK610-6E*
Brand: *Allied Telesis*

Jul.27.2023

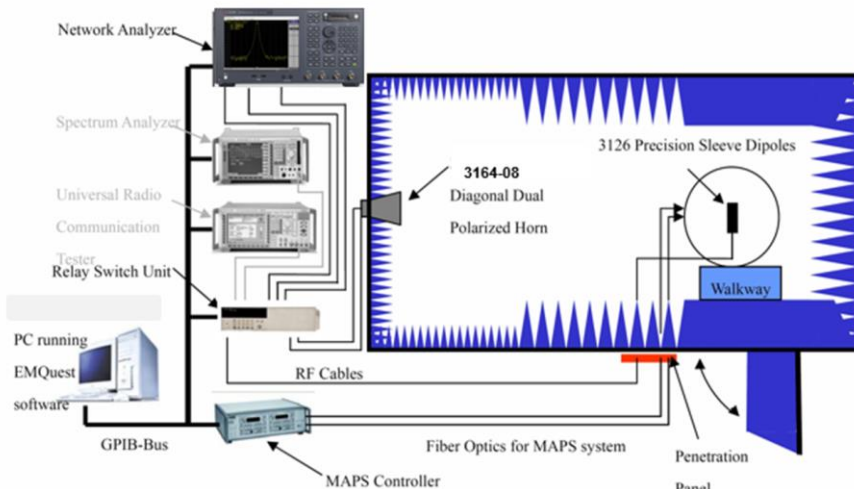
Rev.01

Contents

- Chamber Info.
- Name and address of the antenna manufacture
- Summary
- Antenna Configuration
- VSWR
- Isolation
- Peak Gain
- Radiation Pattern

Chamber Info.

➤ Measurement setup info. & test method:



Test Method

The “great circle” cut method, whereby the Measurement Antenna remains fixed and the EUT is rotated about two axes in sequential order. The radiated RF performance of the Equipment Under Test (EUT) is measured by sampling the radiated transmit power of the mobile at various locations surrounding the device. A three-dimensional characterization of the 'transmit' performance of the EUT is pieced together by analyzing the data from the spatially distributed measurements.

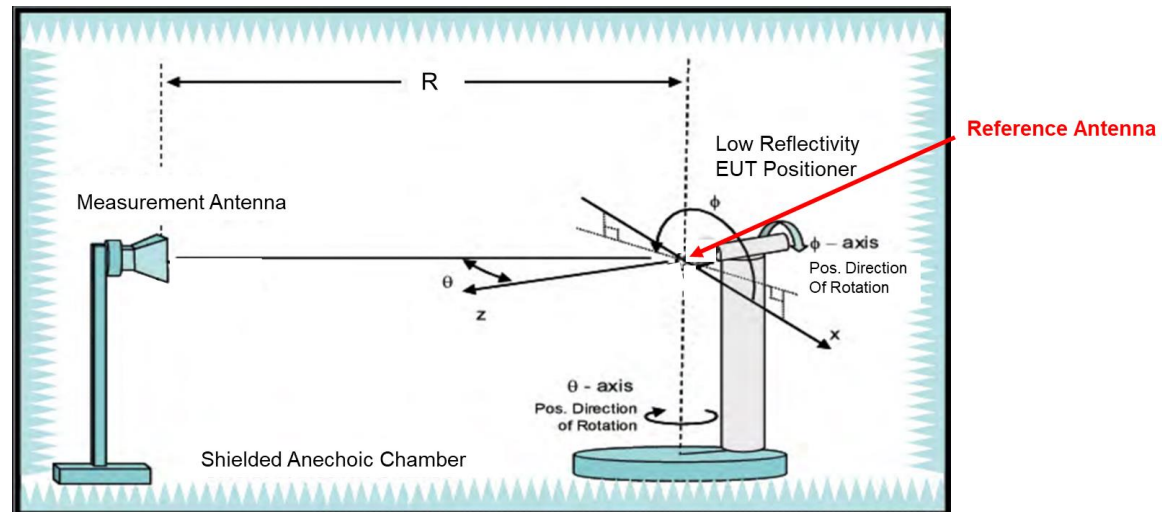
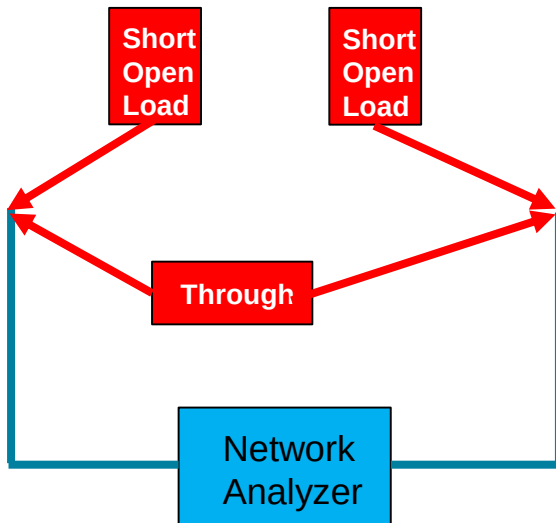
Data points taken every 15 degrees in the theta and in the phi axes are deemed sufficient to fully characterize the EUT's Far-Field radiation pattern and total radiated power. All of the measured power values will be integrated.

Chamber Info.

➤ AUT calibration method:

Connected cables to VNA calibration kit and use network analyzer internal function to do calibration. Do short, open and load to each side. Then connect through to both side and calibrate G values. The cable loss is calibrated and set inside the network analyzer.

Measurement Antenna is connected to port1 of Network analyzer and reference antenna connected to port2 of Network Analyzer. Record G values and used with reference antenna gain to calculate gain factor.



Chamber Info.

➤ *Calibrated and measurement equipment table list:*

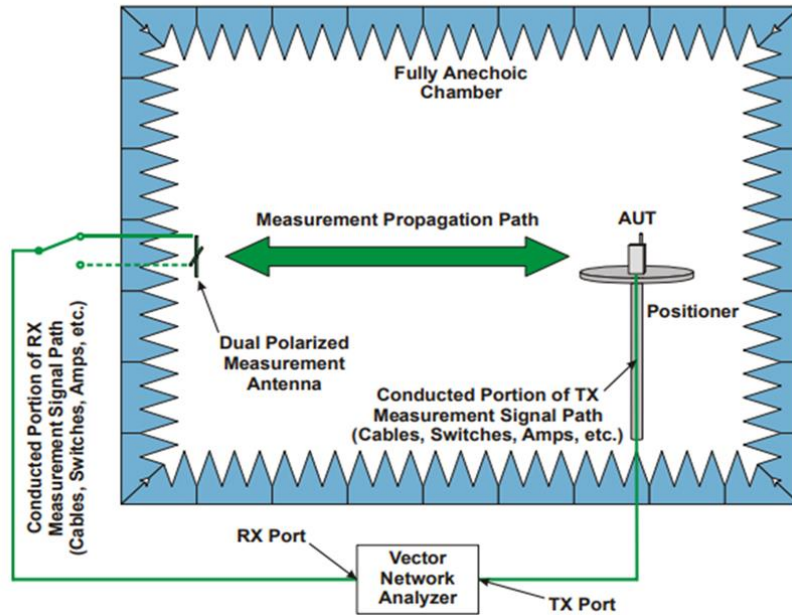
Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Due Date
Full Anechoic Wireless Test chamber	ETS-Lindgren	AMS-8500	N/A	N.C.R	-----
Test Software	EMQuest™	N/A	N/A	N.C.R	-----
Multi-Axis Positioning System (MAPS)	EMCO	2090	N/A	N.C.R	-----
Turn Table	EMCO	2015	N/A	N.C.R	-----
Dual Polarization Horn	ETS-Lindgren	3164-08	00140264	N.C.R	-----
ENA Series Network Analyzer	Keysight	E5071C	MY467330006	May. 31, 2022	May. 31, 2023

Note:

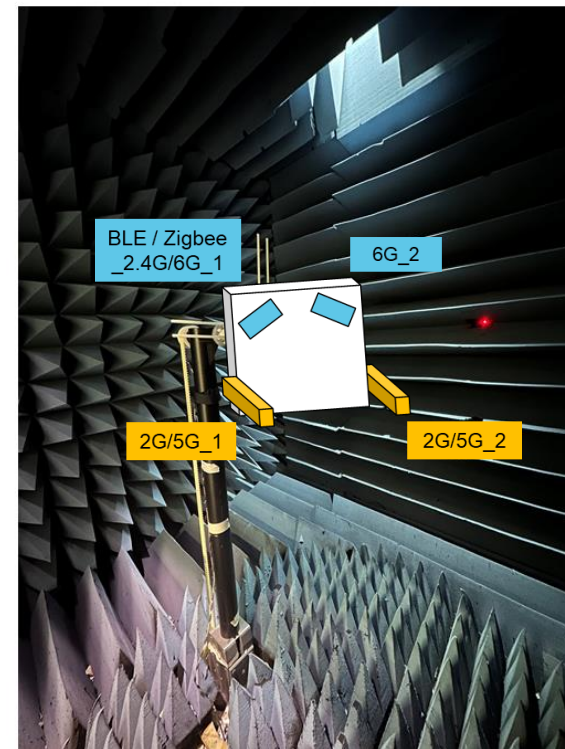
1. N.C.R. = No Calibration Request.
2. This ant. test chamber is located in WNC which address is :
Add: 20 Park Avenue II (or Yuanchiu 2nd Rd.), Hsinchu Science Park, Hsinchu 300, Taiwan
Tel: +886-3-666-7799

Chamber Info.

➤ Test Procedure & SW :

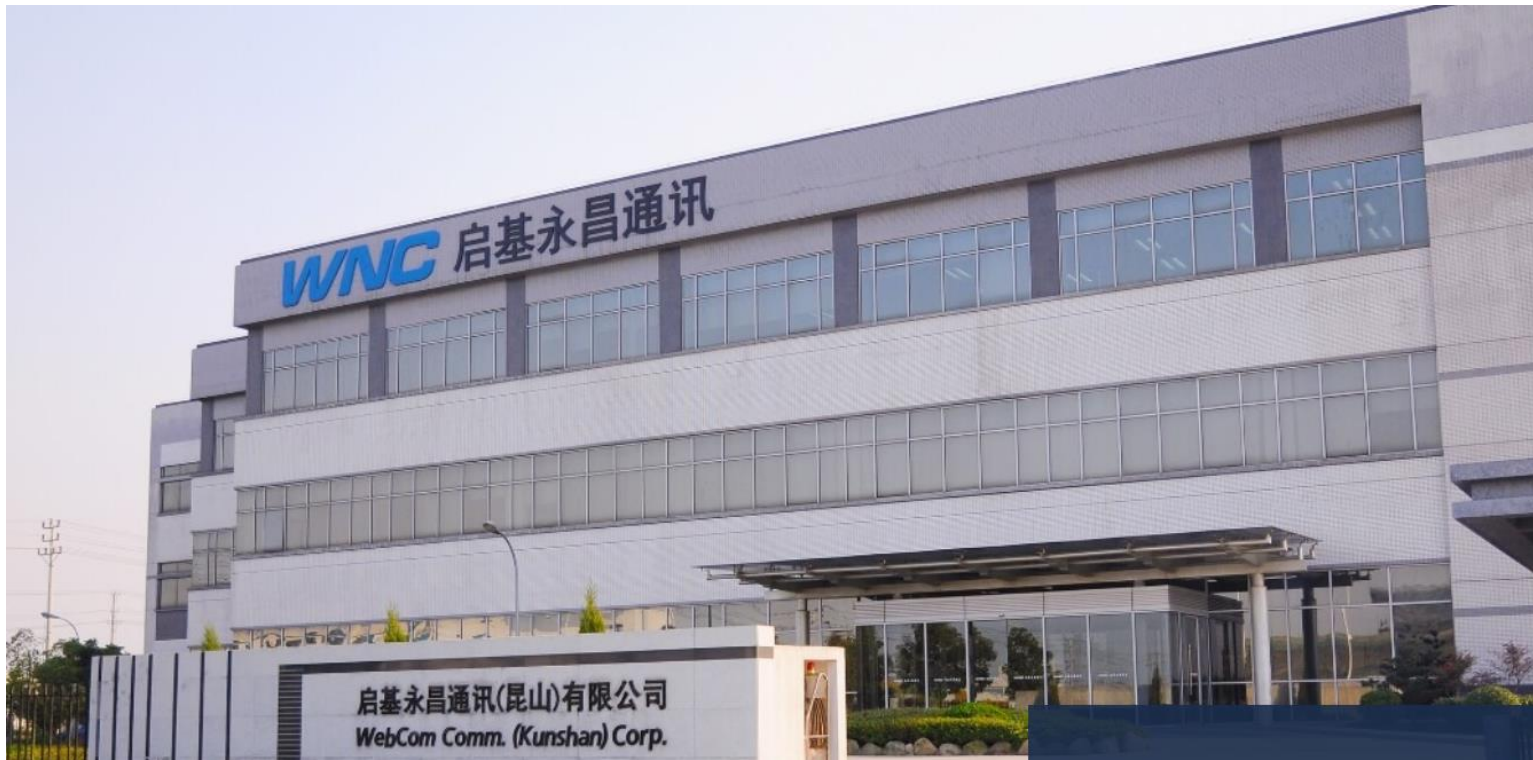


- Place the device at the center of the chamber.
- Connect the antenna cable to RF cable of the chamber.
- Run the test SW (EMQuest™).
- Get 3D data in 15 degree step from phi 0°~360° and theta -90°~+90°, including efficiency, peak gain, 2D & 3D radiation pattern.
- This is far field test for antenna verification.
- This is passive measurement, which means the device is off and not in any operating mode.



Note : Top cover toward +Z direction

Name and address of the antenna manufacture



WebCom Communication (Kunshan) Corporation - Kunshan Plant

- 121 Dujuan Rd., Precision Machinery Industrial Park, Kunshan City, Jiangsu Province, P.R.C
- [+86-512-5761-0668](tel:+86-512-5761-0668)
- +86-512-5761-0666

Summary

– **VSWR**

- *Under 2.0 for BLE / Zigbee*
- *Under 2.0 for 2G antennas*
- *Under 2.0 for 5G antennas*
- *Under 2.0 for 6G antennas*

– **Isolation**

- *> 28.5 dB 2G radio*
- *> 35.3dB 5G radio*
- *> 24.1dB 6G radio*
- *> 23.8dB BLE / Zigbee to 2G radio*
- *> 34.7dB 5G radio to 6G radio*

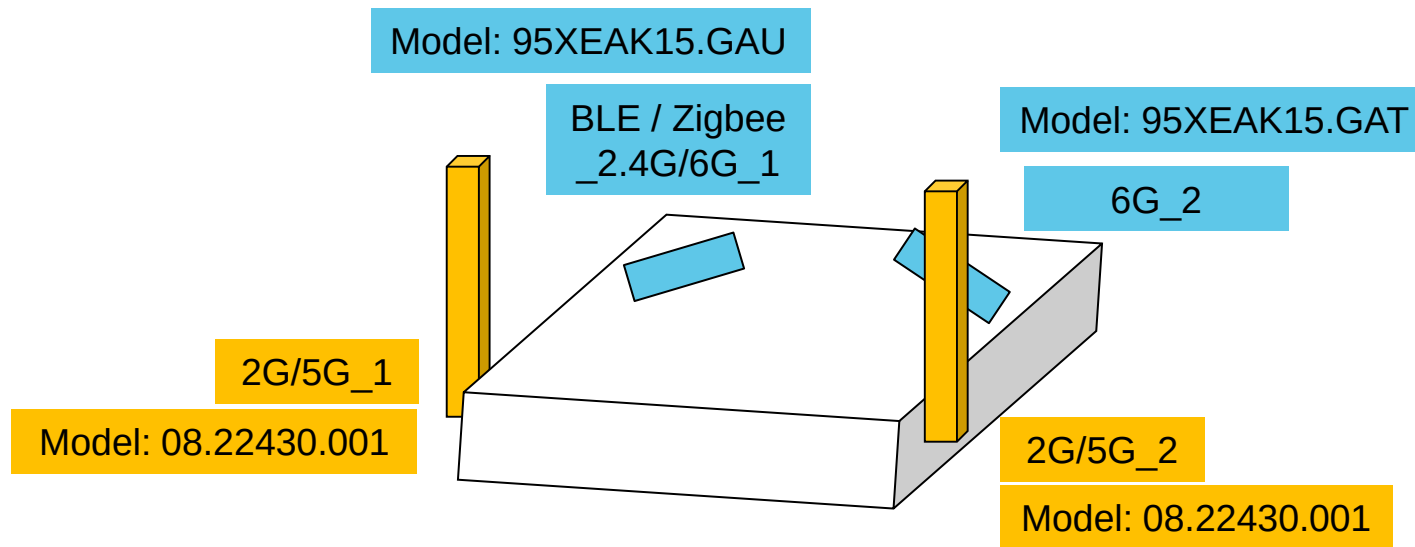
– **Average Radiation efficiency**

- *~ 63% for BLE / Zigbee*
- *~ 64% for 2G radio*
- *~ 62% for 5G radio*
- *~ 65% for 6G radio*

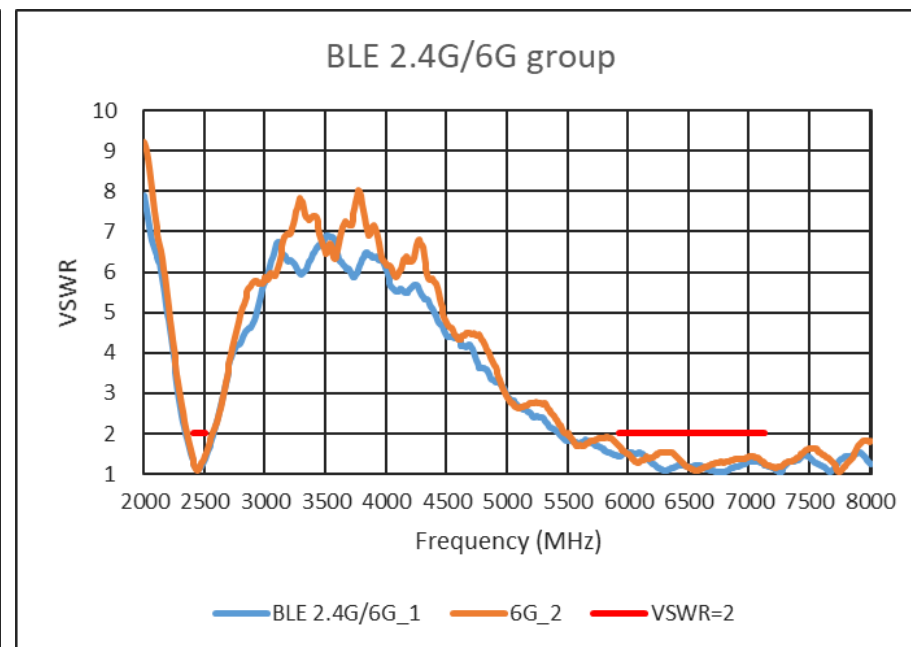
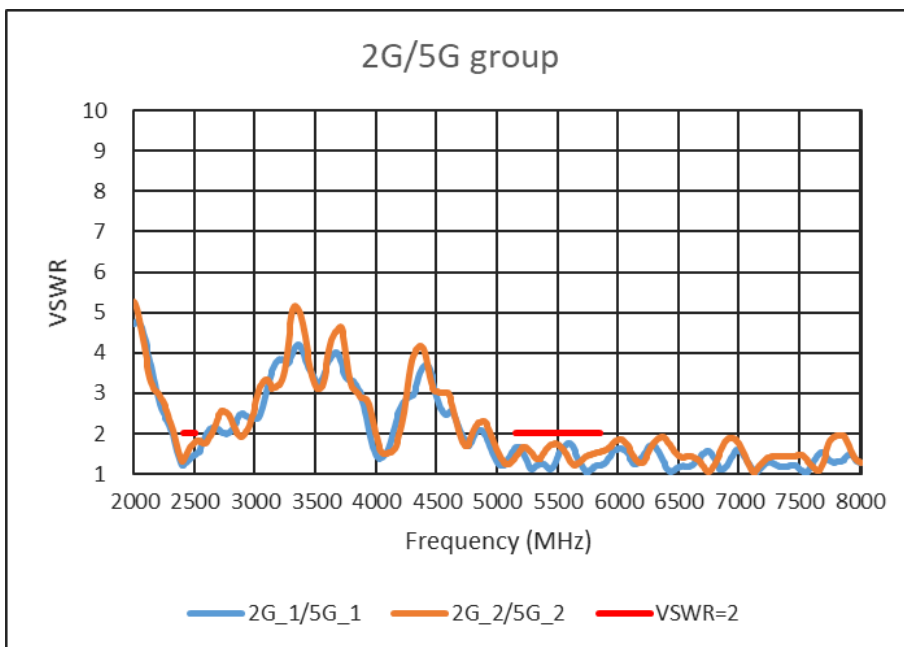
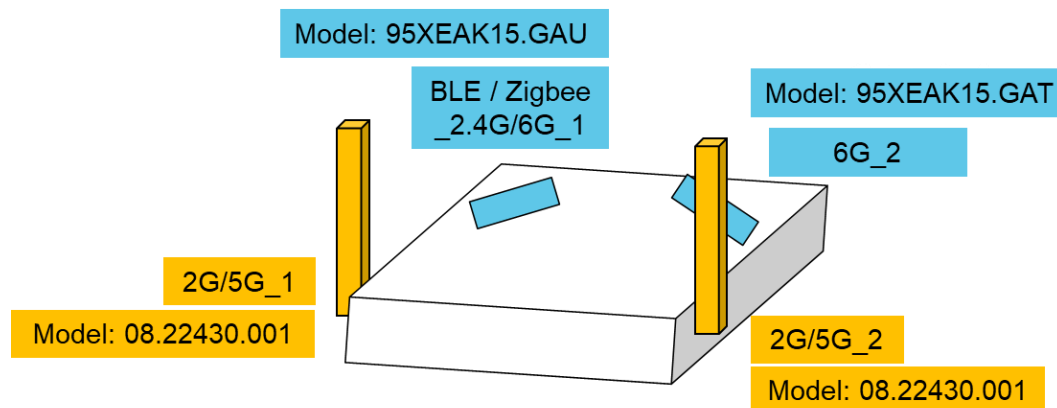
– **Peak gain**

- *Max 2.6dBi for BLE / Zigbee*
- *Max 2.8dBi for 2G radio*
- *Max 3.8dBi for 5G radio*
- *Max 5.9dBi for 6G radio*

Antenna Configuration

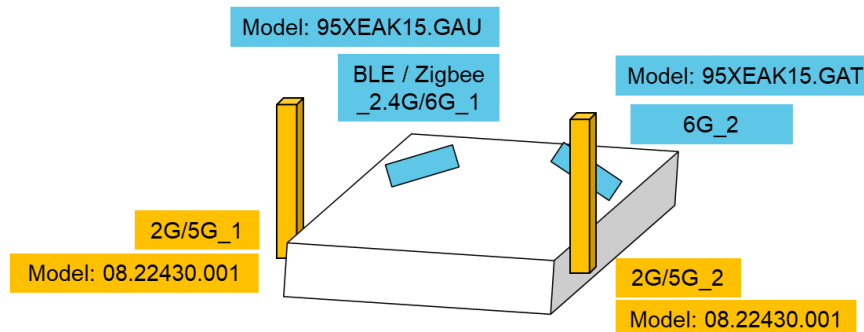
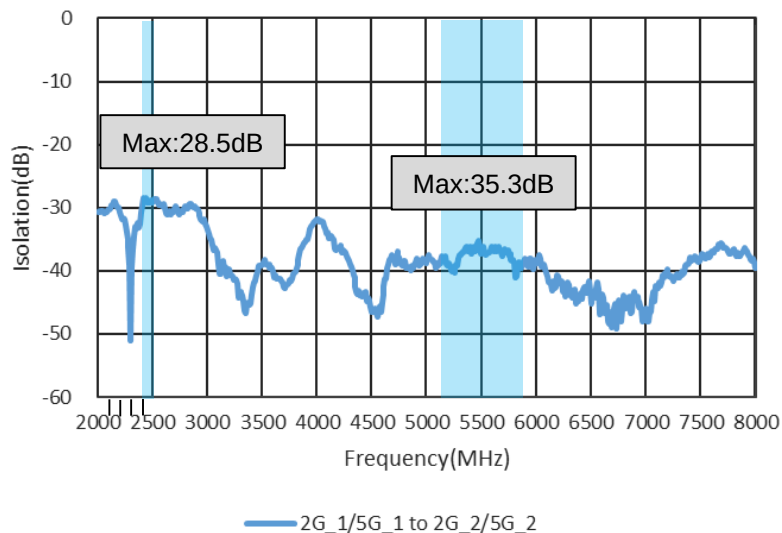


- Antenna Spec. BLE / Zigbee_2.4G + 2G only x2 + 5G only x2 + 6G only x2
 - 2 x External antennas for 2G/5G radio
 - 2 x Metal antennas for 2G/6G radio

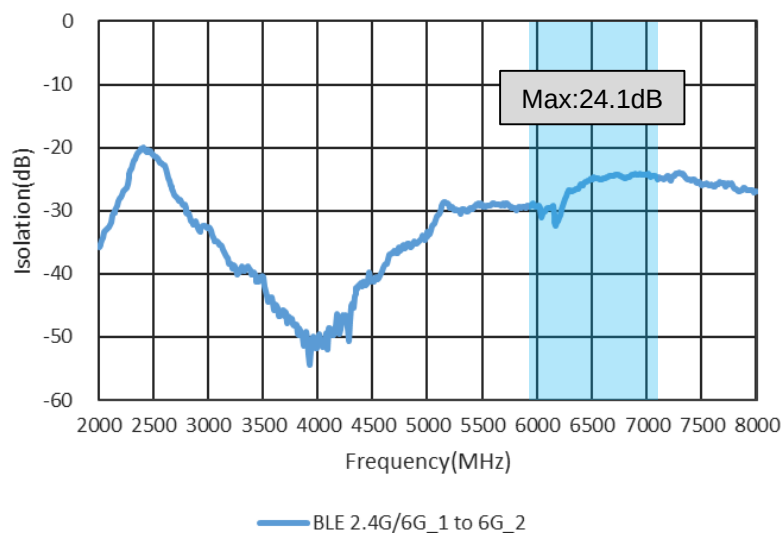


Isolation

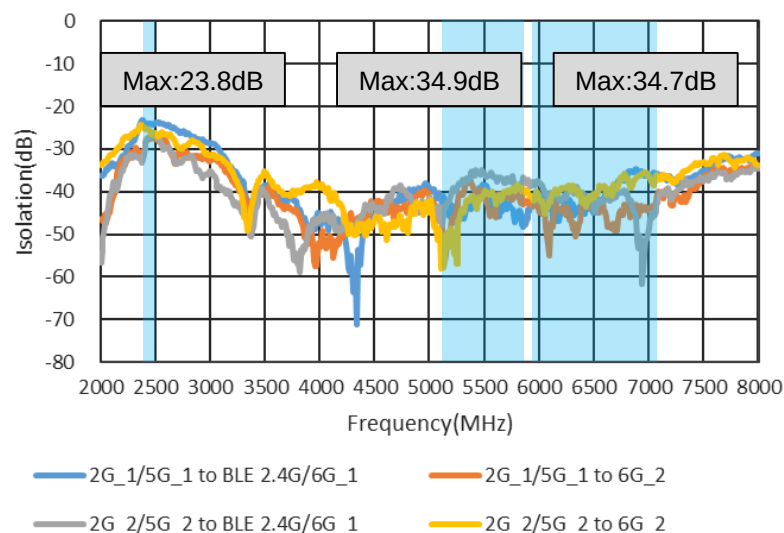
2G/5G group



6G group



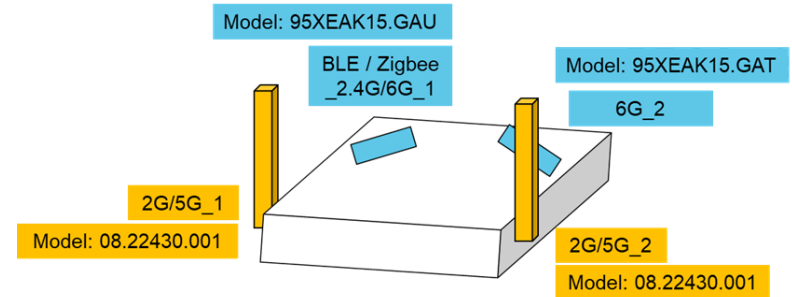
2G/5G to BLE 2.4G/6G



Peak Gain

Test date: 2023/07/27
Test personnel : Eason Chen

BLE / Zigbee 2.4G	2400	2450	2500
Peak Gain(dBi)	2.15	2.62	2.55
Peak Gain(dBi) @	$\theta=-48 ; \varnothing=56$	$\theta=-53 ; \varnothing=70$	$\theta=-53 ; \varnothing=76$
2G_1	2400	2450	2500
Peak Gain	2.25	2.83	1.51
Peak Gain(dBi) @	$\theta=-51 ; \varnothing=143$	$\theta=76 ; \varnothing=174$	$\theta=70 ; \varnothing=160$
2G_2	2400	2450	2500
Peak Gain	2.10	2.51	1.30
Peak Gain(dBi) @	$\theta=45 ; \varnothing=158$	$\theta=73 ; \varnothing=11$	$\theta=65 ; \varnothing=23$
5G_1	5150	5350	5550
Peak Gain	2.20	3.16	2.80
Peak Gain(dBi) @	$\theta=48 ; \varnothing=129$	$\theta=70 ; \varnothing=31$	$\theta=51 ; \varnothing=28$
5G_2	5150	5350	5550
Peak Gain	2.88	3.85	3.56
Peak Gain(dBi) @	$\theta=84 ; \varnothing=156$	$\theta=51 ; \varnothing=146$	$\theta=51 ; \varnothing=149$
6G_1	5925	6000	6500
Peak Gain	5.91	5.93	5.98
Peak Gain(dBi) @	$\theta=-78 ; \varnothing=147$	$\theta=-78 ; \varnothing=147$	$\theta=-81 ; \varnothing=147$
6G_2	5925	6000	6500
Peak Gain	5.83	5.93	5.99
Peak Gain(dBi) @	$\theta=-69 ; \varnothing=60$	$\theta=-72 ; \varnothing=60$	$\theta=-75 ; \varnothing=60$

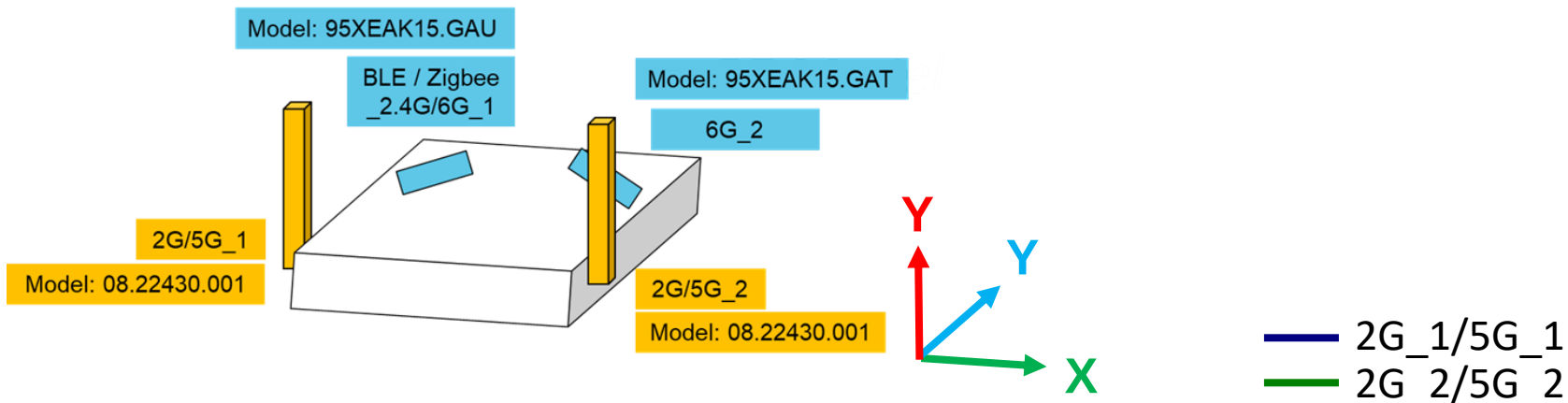


➤ Above Peak Gain= on board antenna peak gain-path loss+ Chamber's receiving RX peak gain.



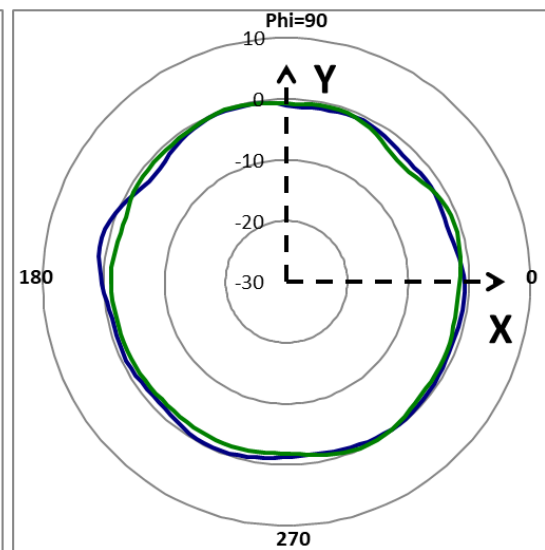
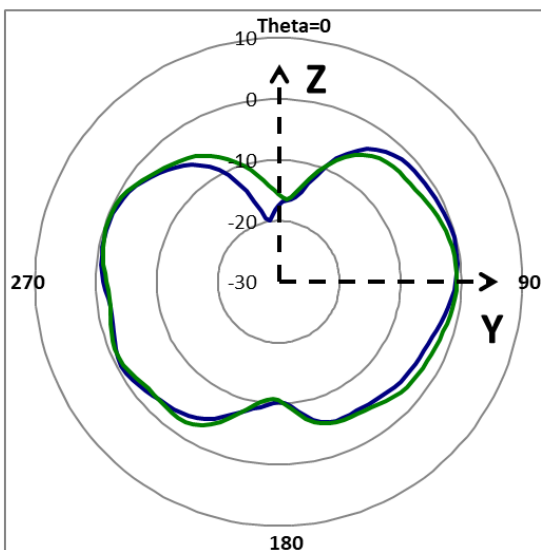
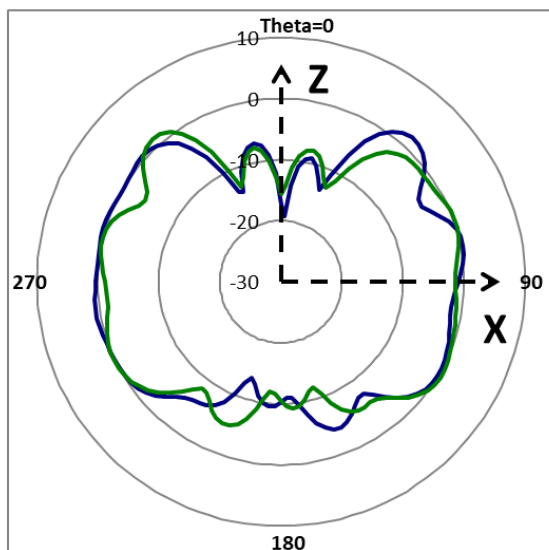
Radiation Pattern for Wi-Fi 2.4GHz

Test date: 2023/07/27
Test personnel : Eason Chen



2GHz Radiation Pattern

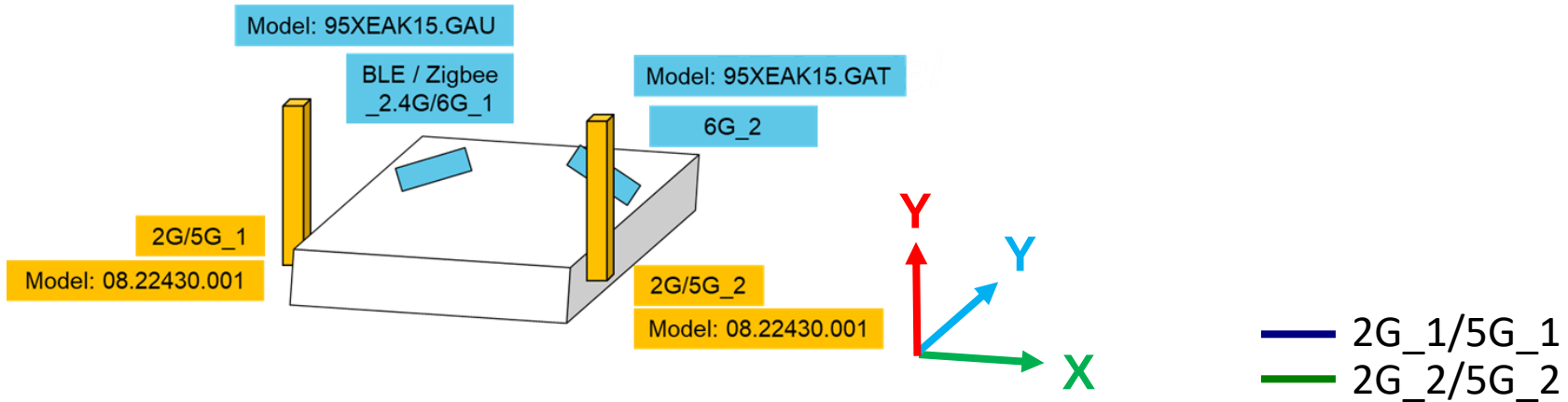
— 2G_1/5G_1
— 2G_2/5G_2



Radiation Pattern for Wi-Fi 5GHz

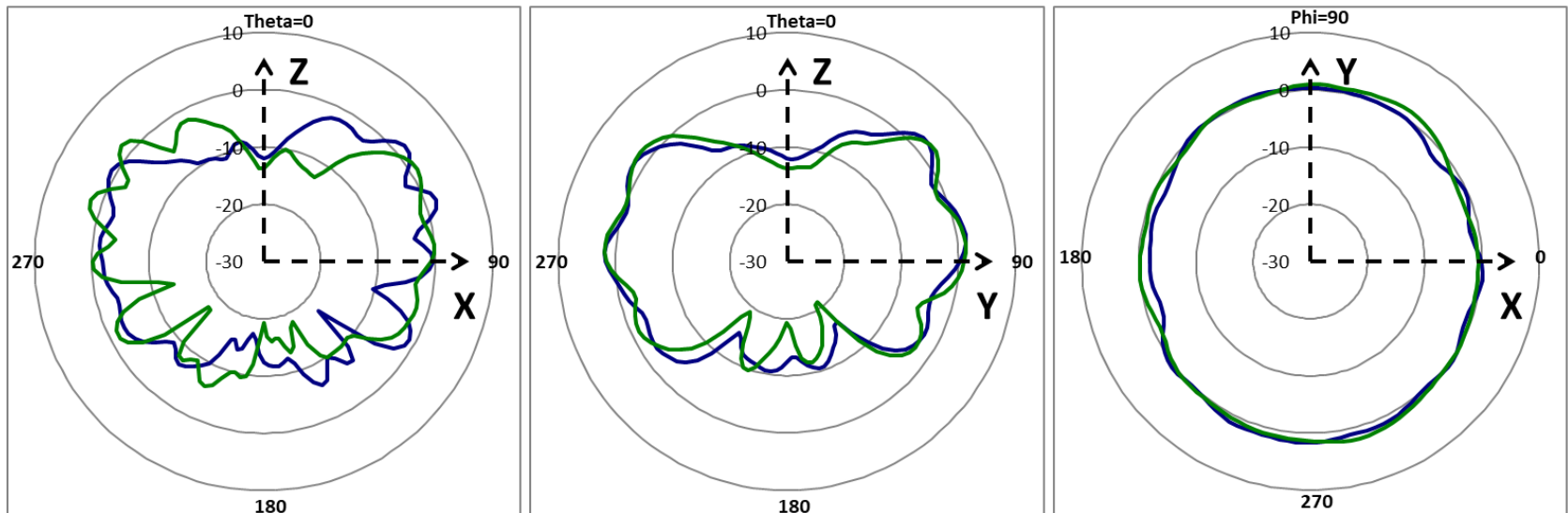
Test date: 2023/07/27

Test personnel : Eason Chen



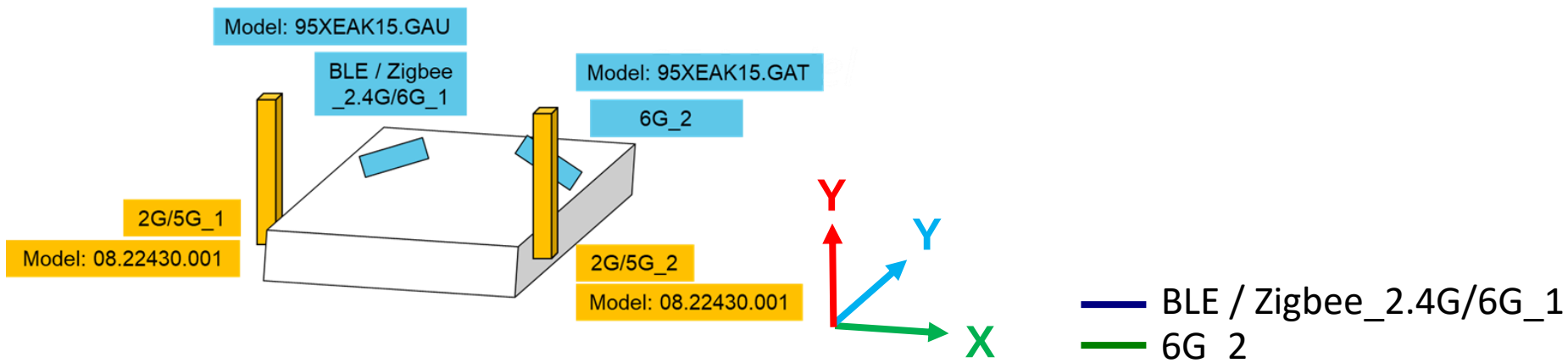
5GHz Radiation Pattern

2G_1/5G_1
2G_2/5G_2



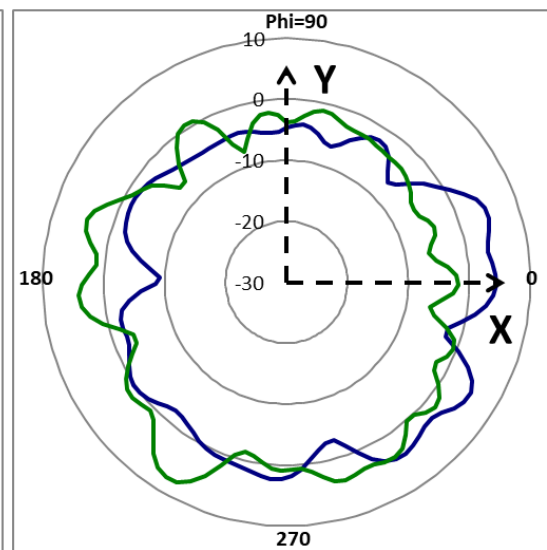
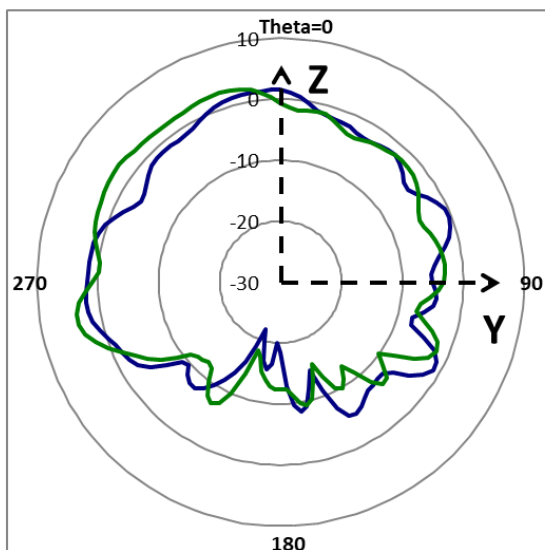
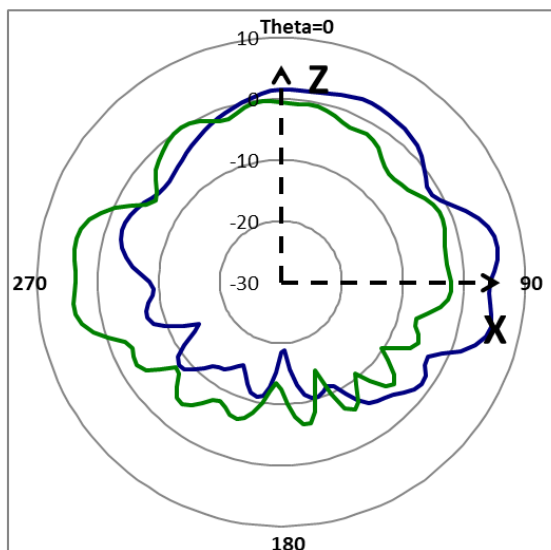
Radiation Pattern for Wi-Fi 6GHz

Test date: 2023/07/27
Test personnel : Eason Chen



6GHz Radiation Pattern

— BLE / Zigbee_2.4G/6G_1
— 6G_2



WNC

Wistron NeWeb Corp.

