Antenna Test Report

Date: Feb.15.2023
rev.01

Address: 20 Park Avenue II (or Yuanchiu 2nd Rd.), Hsinchu Science Park, Hsinchu 300, Taiwan

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- Name and address of the antenna manufacture
- Antenna elements
- Peak Gain
- Radiation Pattern
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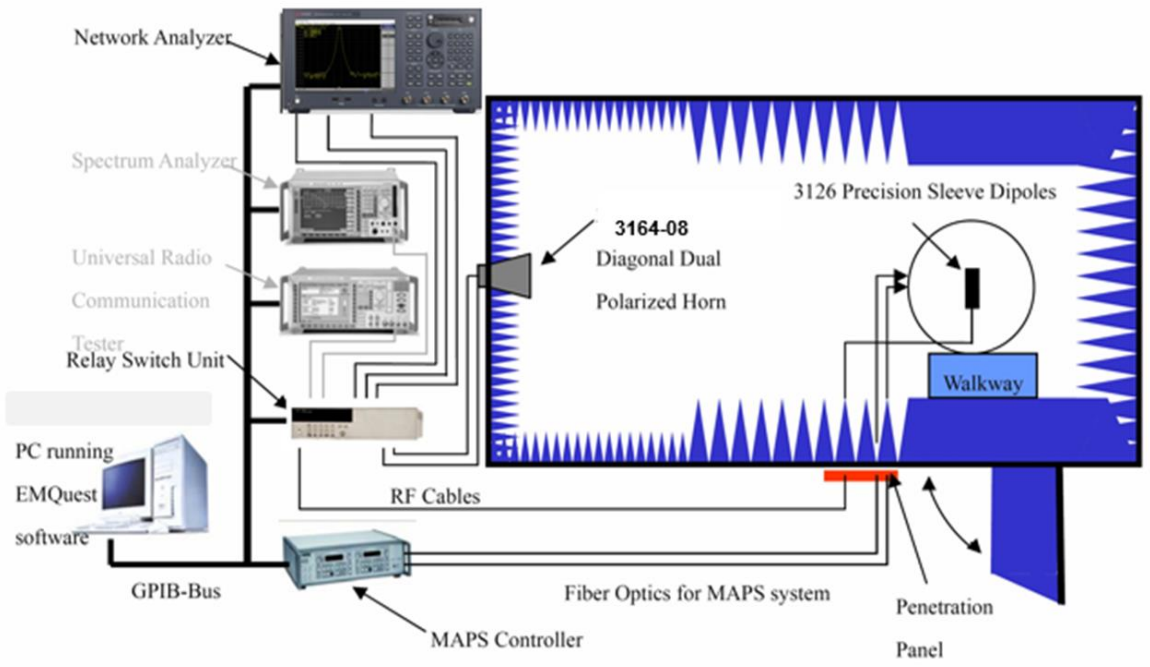
Chamber Info.

➢ 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.

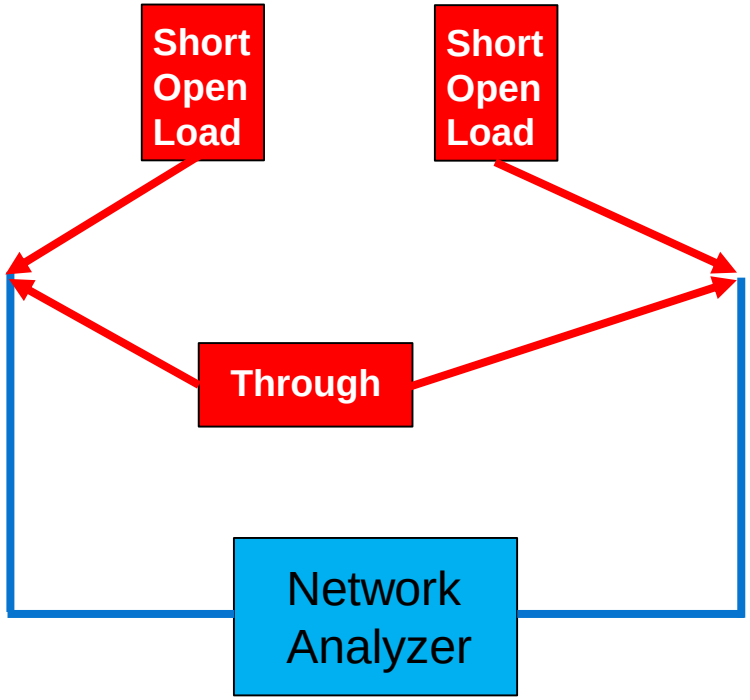
Data points taken every 15 degrees in the theta and in the phi axes are deemed sufficient to fully characterize the EUT's Far-Field radiation pattern and total radiated power All of the measured power values will be integrated.

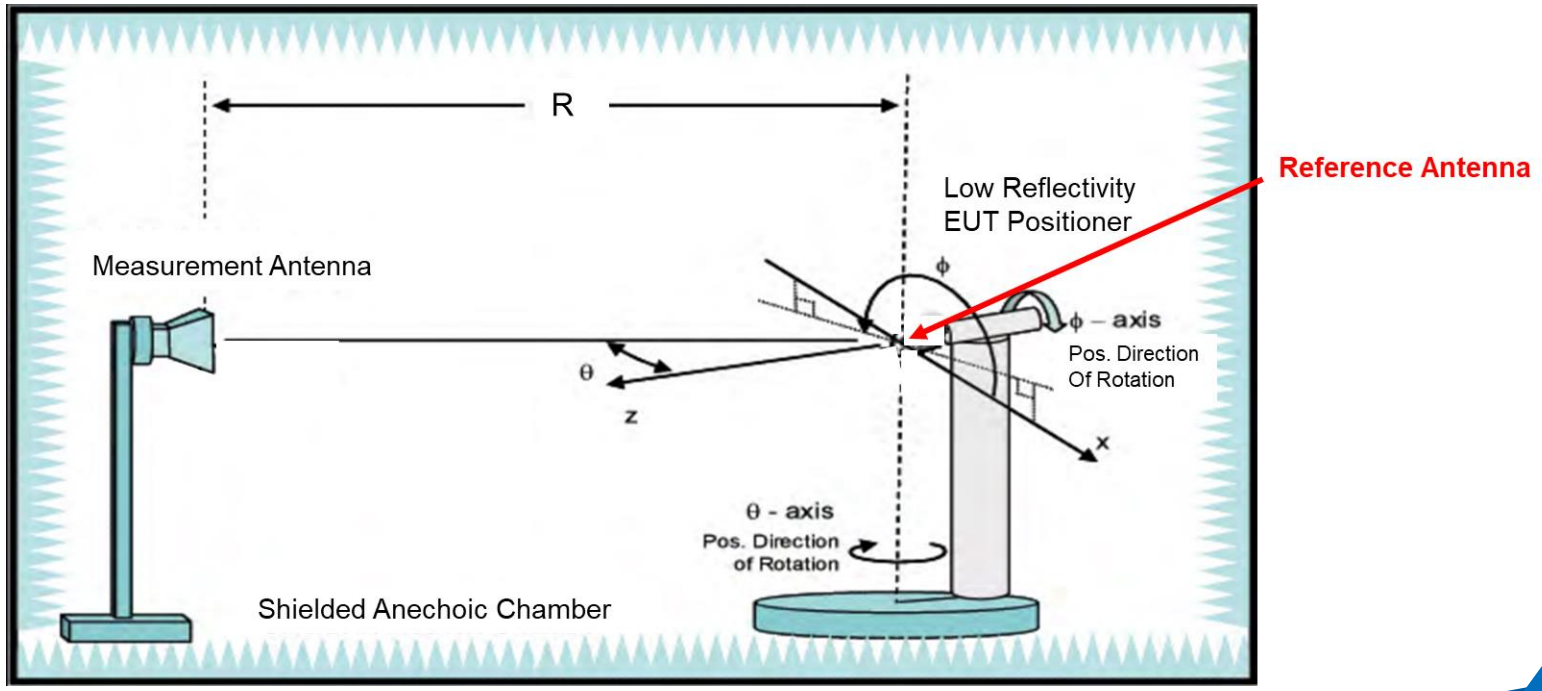
Chamber Info.

➢ 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:*

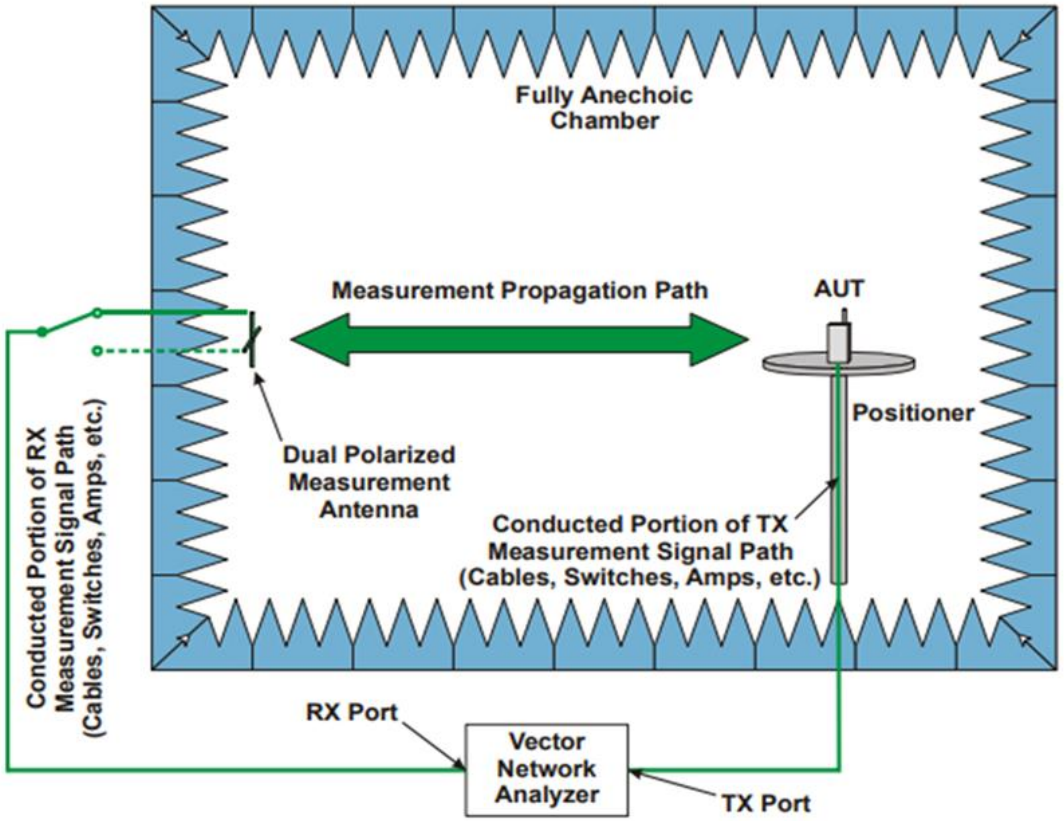
Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Cal. Due Date
Full Anechoic Wireless Test chamber	ETS-Lindgren	AMS-8500	N/A	N.C.R	-----
Test Software	EMQuest™	N/A	N/A	N.C.R	-----
Multi-Axis Positioning System (MAPS)	EMCO	2090	N/A	N.C.R	-----
Turn Table	EMCO	2015	N/A	N.C.R	-----
Dual Polarization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

Note:

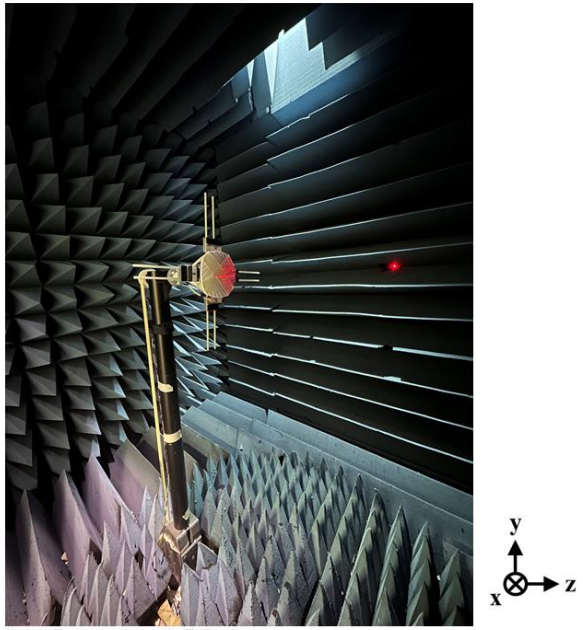
1. N.C.R. = No Calibration Request.
2. This ant. test chamber is located in WNC which address is :
   Add: 20 Park Avenue II (or Yuanchiu 2nd Rd.), Hsinchu Science Park, Hsinchu 300, Taiwan
   Tel: +886-3-666-7799

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

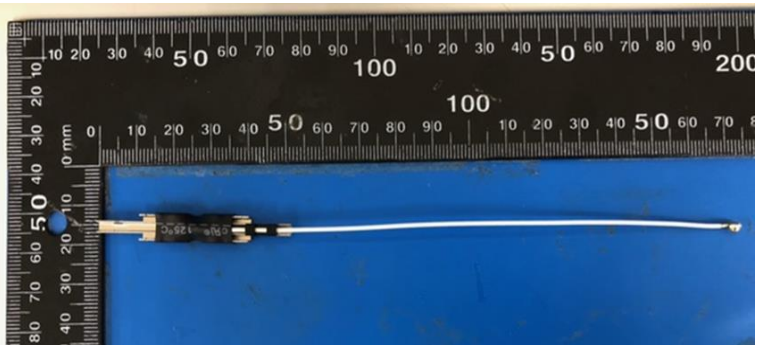
Name and address of the antenna manufacture

NEWEB VIETNAM CO., LTD.

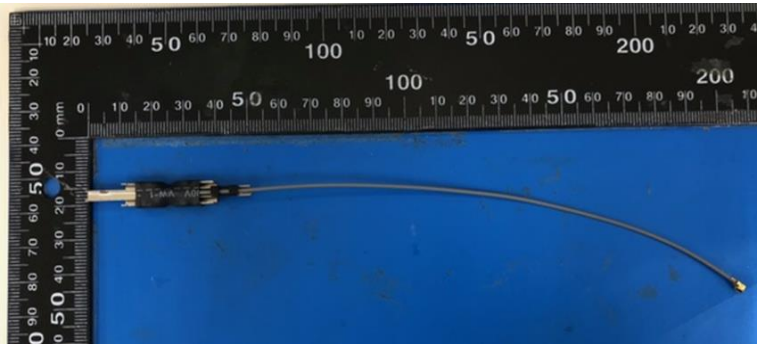
- *Land Lot CN01, Dong Van III Industrial Zone, Dong Van Ward, Duy Tien Town, Ha Nam Province, Vietnam*
- *+84-226-358-8899*
- *+84-226-358-7799*

Antenna elements-Dual band antennas

90XYBH15.G58



90XYBH15.G59

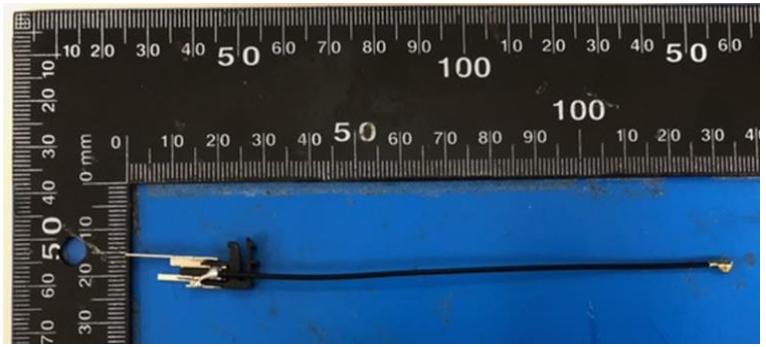


90XYBH15.G60

90XYBH15.G61

- Each antenna connects to an individual RF port.

Antenna elements-5G narrow band antennas



90XYBH15.G62

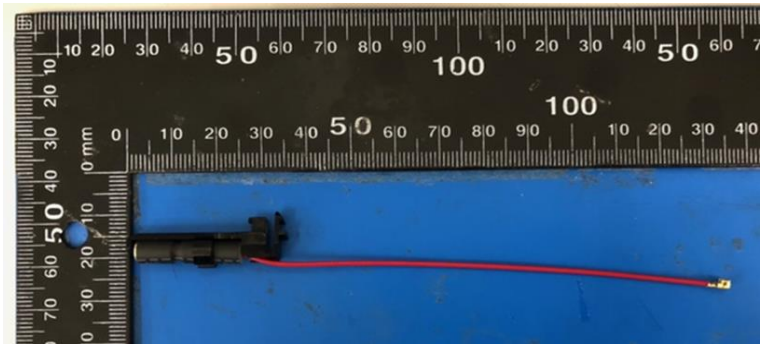
90XYBH15.G63

90XYBH15.G64

90XYBH15.G65

- Each antenna connects to an individual RF port.

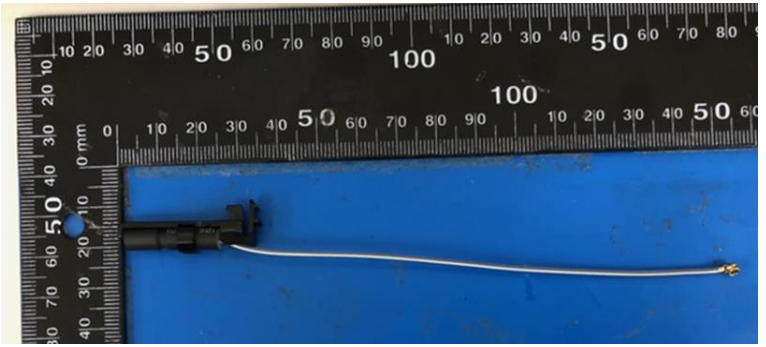
Antenna elements-6G antennas



90XYBH15.G66

90XYBH15.G67

90XYBH15.G68



90XYBH15.G69

- Each antenna connects to an individual RF port.

Peak Gain for Dual Band

Test date: 2023/02/15
Test personnel : Eason Chen

90XYBH15.G58	2400	2450	2500	5150	5350	5550	5750	5850
Peak Gain(dBi)	1.08	1.14	0.96	2.05	2.41	2.97	2.59	2.80
Peak Gain(dBi) @	θ=-64 ; Ø=129	θ=-67 ; Ø=126	θ=-70 ; Ø=120	θ=-98 ; Ø=109	θ=-75 ; Ø=115	θ=-81 ; Ø=140	θ=-81 ; Ø=118	θ=-81 ; Ø=118
90XYBH15.G59	**2400**	**2450**	**2500**	**5150**	**5350**	**5550**	**5750**	**5850**
Peak Gain(dBi)	1.03	1.04	0.99	2.27	2.49	2.96	2.86	2.83
Peak Gain(dBi) @	θ=-75 ; Ø=115	θ=-75 ; Ø=112	θ=-75 ; Ø=112	θ=-81 ; Ø=115	θ=-81 ; Ø=109	θ=-87 ; Ø=123	θ=-87 ; Ø=118	θ=-84 ; Ø=95
90XYBH15.G60	**2400**	**2450**	**2500**	**5150**	**5350**	**5550**	**5750**	**5850**
Peak Gain(dBi)	1.02	1.03	0.86	2.05	2.41	2.97	2.59	2.80
Peak Gain(dBi) @	θ=-87 ; Ø=135	θ=78 ; Ø=92	θ=-87 ; Ø=120	θ=-81 ; Ø=50	θ=-95 ; Ø=106	θ=-84 ; Ø=56	θ=-78 ; Ø=104	θ=-78 ; Ø=90
90XYBH15.G61	**2400**	**2450**	**2500**	**5150**	**5350**	**5550**	**5750**	**5850**
Peak Gain(dBi)	1.10	1.13	0.99	2.25	2.46	2.99	2.79	2.81
Peak Gain(dBi) @	θ=-75 ; Ø=120	θ=-73 ; Ø=118	θ=-73 ; Ø=118	θ=-81 ; Ø=112	θ=-81 ; Ø=106	θ=-81 ; Ø=87	θ=-81 ; Ø=87	θ=-84 ; Ø=92

✓ Antenna Polarization : Vertical

Test date: 2023/02/15
Test personnel : Eason Chen

Peak Gain for 5G Narrow Band

90XYBH15.G62	5600	5750	5800	5895
Peak Gain(dBi)	2.53	2.70	2.90	2.68
Peak Gain(dBi) @	θ=59 ; Ø=2.8	θ=90 ; Ø=8.4	θ=64 ; Ø=5.6	θ=67 ; Ø=5.6
90XYBH15.G63	**5600**	**5750**	**5800**	**5895**
Peak Gain(dBi)	2.52	2.85	2.96	2.77
Peak Gain(dBi) @	θ=84 ; Ø=8.4	θ=112 ; Ø=8.4	θ=59 ; Ø=5.6	θ=87 ; Ø=8.4
90XYBH15.G64	**5600**	**5750**	**5800**	**5895**
Peak Gain(dBi)	2.46	2.61	2.76	2.62
Peak Gain(dBi) @	θ=98 ; Ø=5.6	θ=98 ; Ø=5.6	θ=98 ; Ø=5.6	θ=101 ; Ø=5.6
90XYBH15.G65	**5600**	**5750**	**5800**	**5895**
Peak Gain(dBi)	2.36	2.70	2.66	2.59
Peak Gain(dBi) @	θ=123 ; Ø=92	θ=61 ; Ø=5.6	θ=61 ; Ø=5.6	θ=64 ; Ø=5.6

✓ Antenna Polarization : Vertical

Peak Gain for 6G

Test date: 2023/02/15
Test personnel : Eason Chen

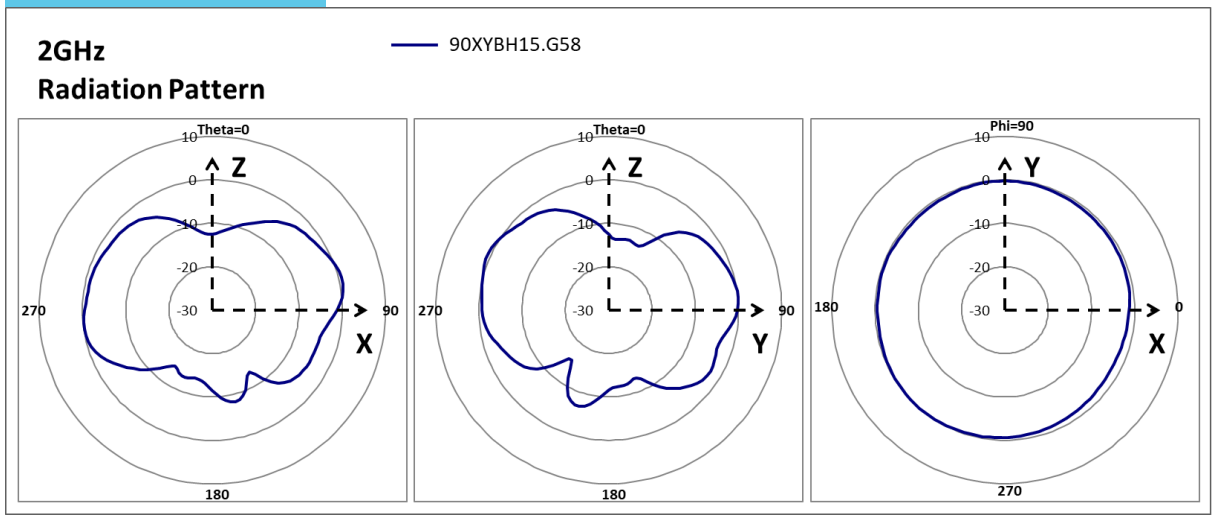
90XYBH15.G66	5925	6000	6085	6300	6405	6565	6725	7000	7125
Peak Gain(dBi)	2.42	2.17	2.60	2.26	2.59	2.85	2.48	2.26	2.46
Peak Gain(dBi) @	θ=21 ; Ø=25	θ=24 ; Ø=24	θ=17 ; Ø=30	θ=17 ; Ø=0	θ=38 ; Ø=34	θ=27 ; Ø=18	θ=44 ; Ø=27	θ=46 ; Ø=29	θ=25 ; Ø=16
90XYBH15.G67	**5925**	**6000**	**6085**	**6300**	**6405**	**6565**	**6725**	**7000**	**7125**
Peak Gain(dBi)	2.37	2.32	2.52	2.30	2.76	2.80	2.42	2.24	2.41
Peak Gain(dBi) @	θ=27 ; Ø=33	θ=28 ; Ø=32	θ=27 ; Ø=31	θ=20 ; Ø=23	θ=20 ; Ø=24	θ=19 ; Ø=24	θ=20 ; Ø=22	θ=30 ; Ø=26	θ=26 ; Ø=23
90XYBH15.G68	**5925**	**6000**	**6085**	**6300**	**6405**	**6565**	**6725**	**7000**	**7125**
Peak Gain(dBi)	2.39	2.37	2.59	2.27	2.85	2.64	2.40	2.22	2.39
Peak Gain(dBi) @	θ=43 ; Ø=34	θ=44 ; Ø=34	θ=45 ; Ø=30	θ=21 ; Ø=31	θ=33 ; Ø=31	θ=43 ; Ø=31	θ=42 ; Ø=27	θ=38 ; Ø=28	θ=42 ; Ø=43
90XYBH15.G69	**5925**	**6000**	**6085**	**6300**	**6405**	**6565**	**6725**	**7000**	**7125**
Peak Gain(dBi)	2.49	2.27	2.58	2.37	2.96	2.75	2.39	2.28	2.41
Peak Gain(dBi) @	θ=21 ; Ø=34	θ=24 ; Ø=36	θ=12 ; Ø=29	θ=45 ; Ø=34	θ=35 ; Ø=33	θ=32 ; Ø=32	θ=24 ; Ø=32	θ=23 ; Ø=29	θ=23 ; Ø=27

✓ Antenna Polarization : Vertical

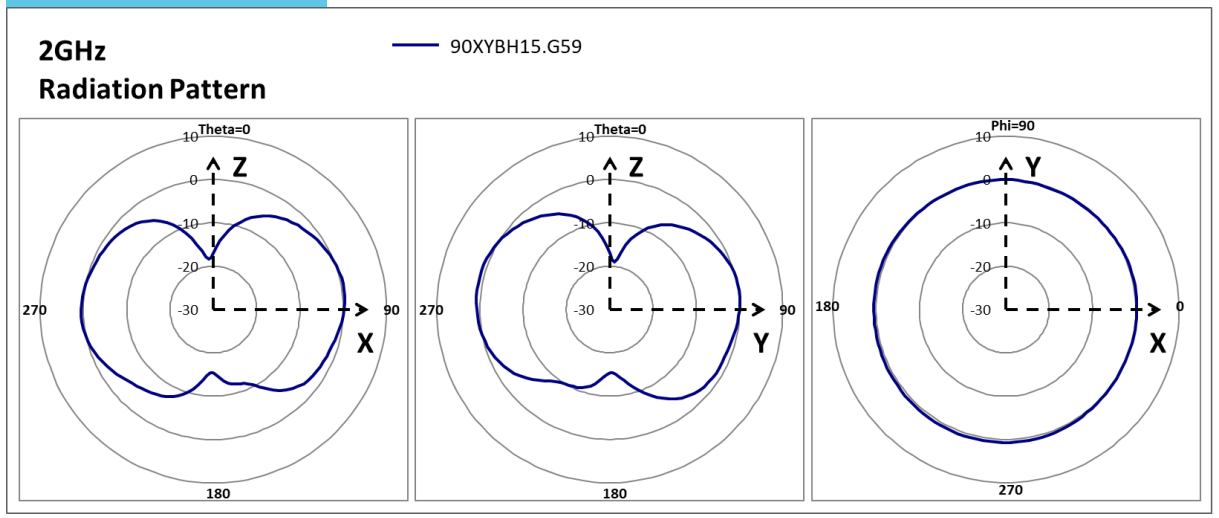
Radiation Pattern for Dual Band

Test date: 2023/02/15
Test personnel : Eason Chen

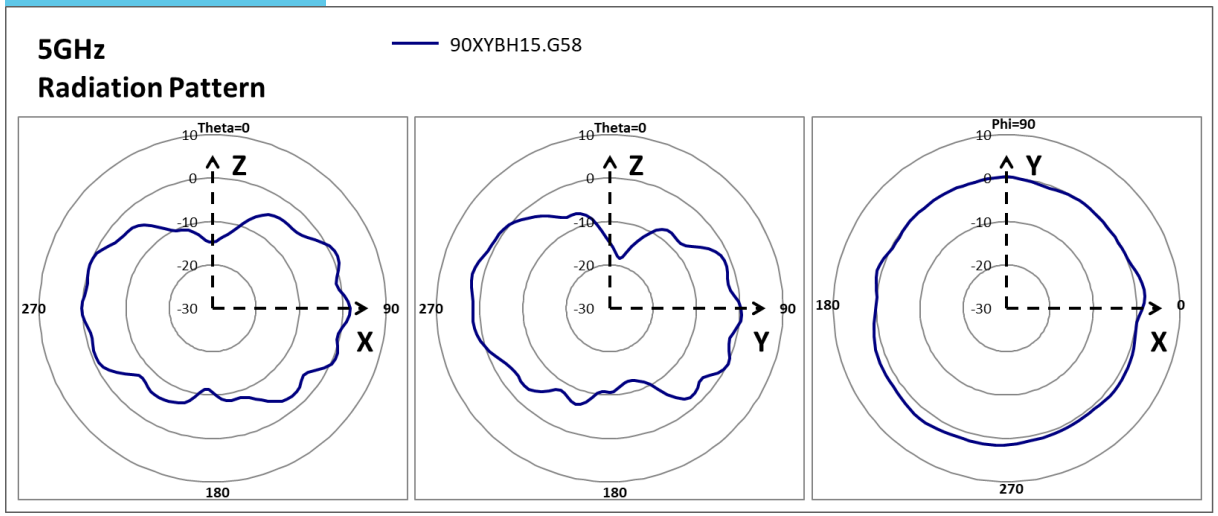
90XYBH15.G58



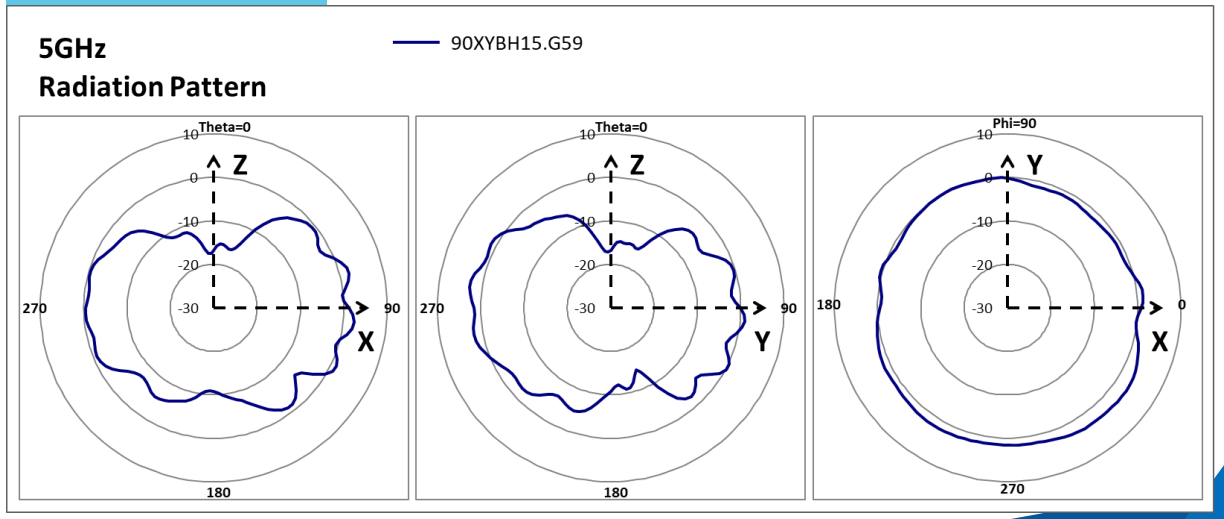
90XYBH15.G59



90XYBH15.G58



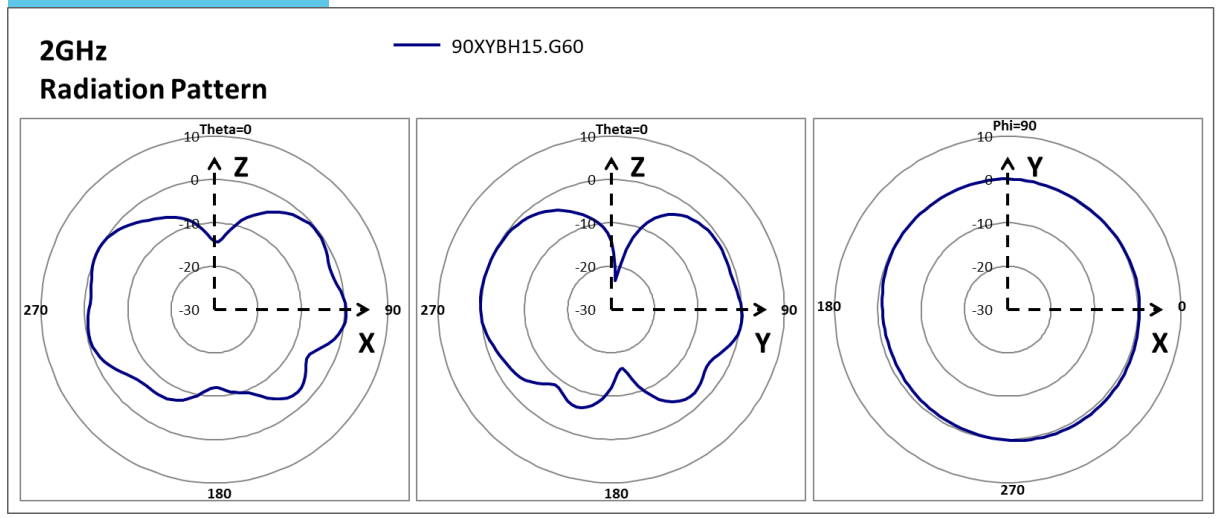
90XYBH15.G59



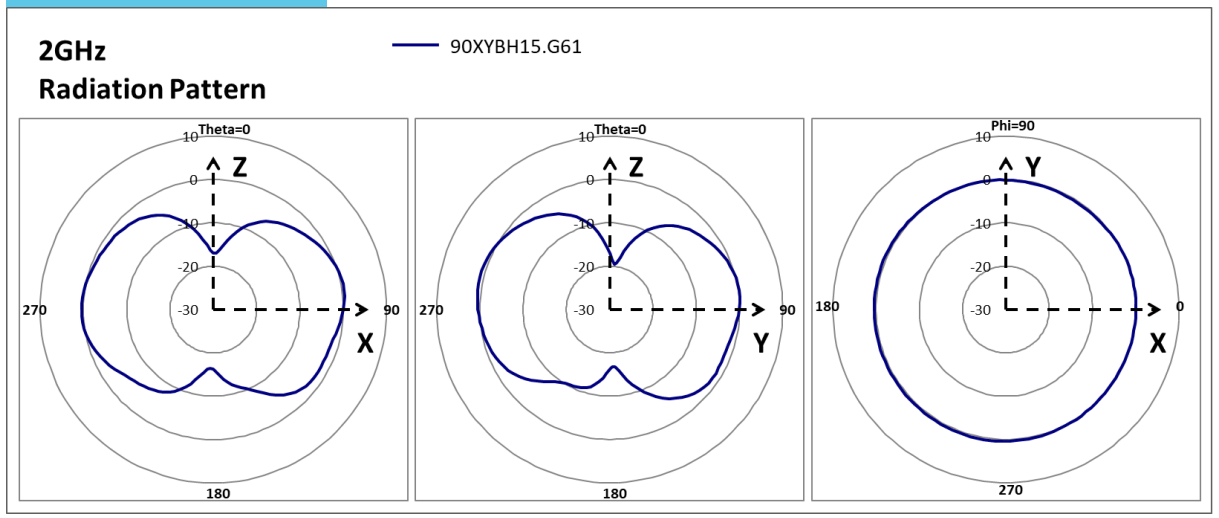
Radiation Pattern for Dual Band

Test date: 2023/02/15
Test personnel : Eason Chen

90XYBH15.G60



90XYBH15.G61



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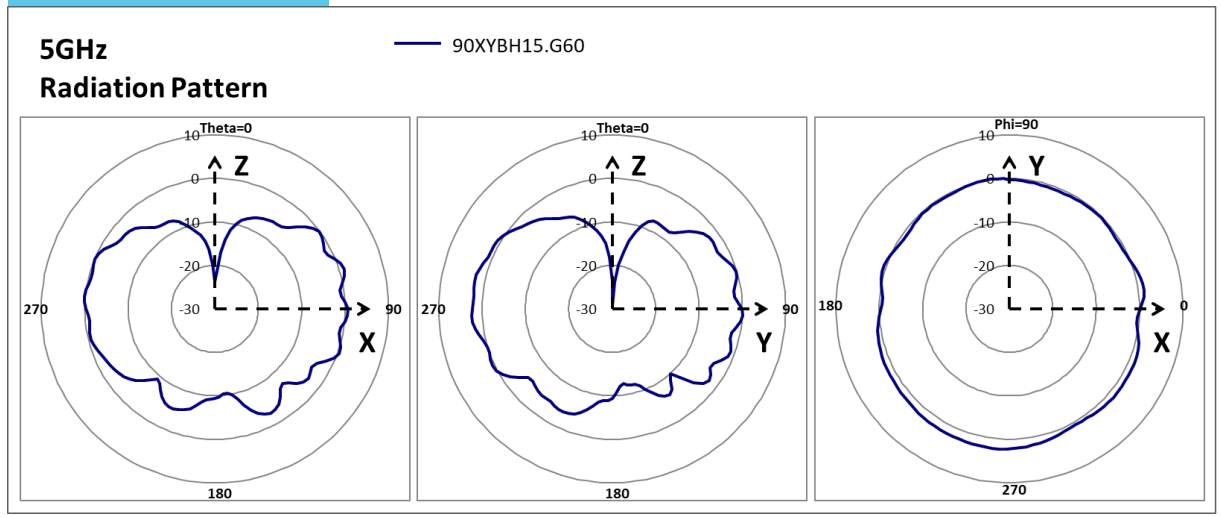
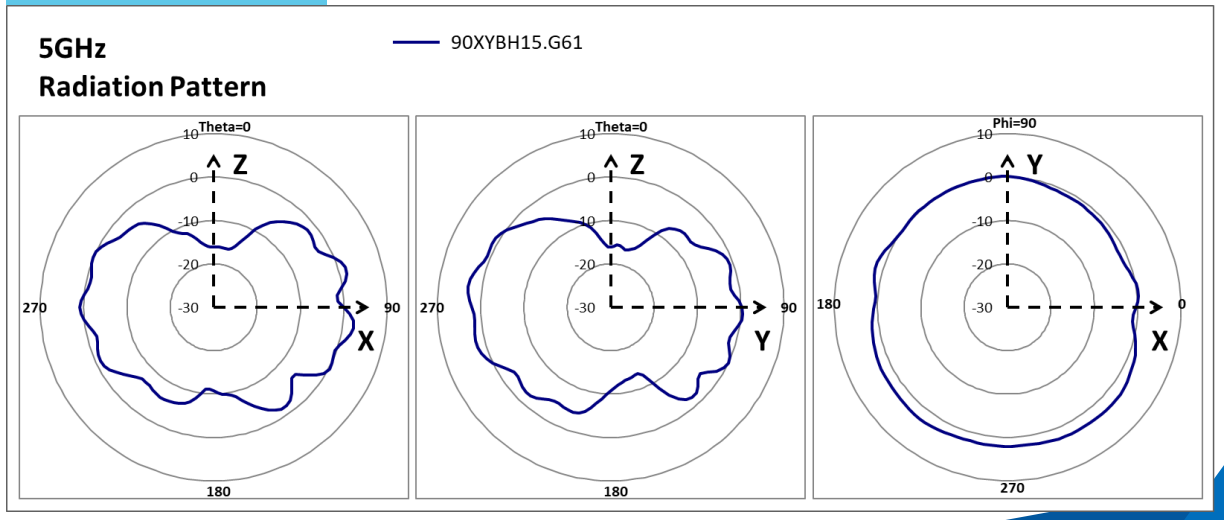


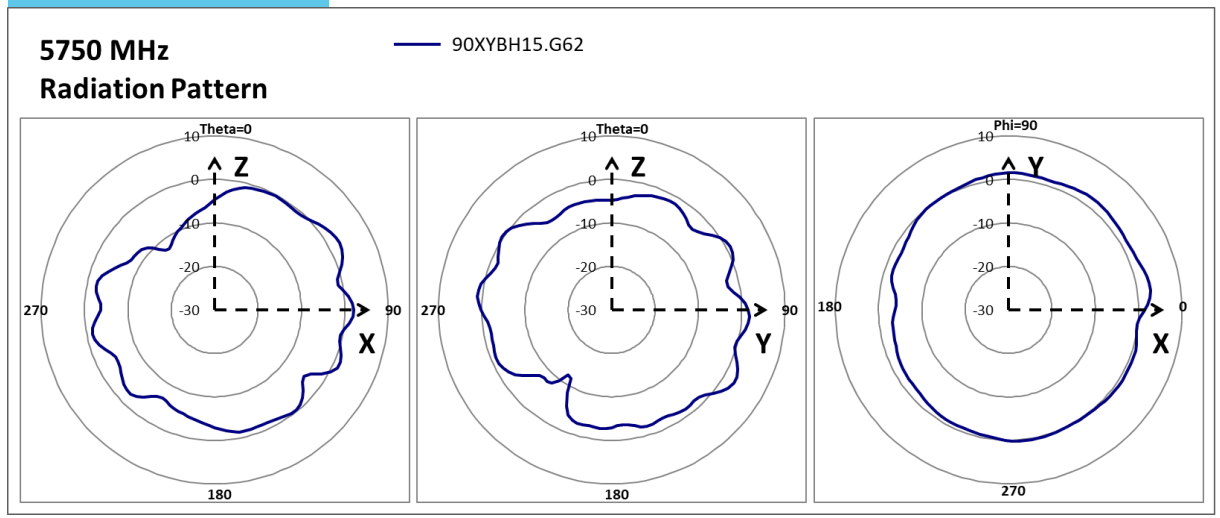
90XYBH15.G61



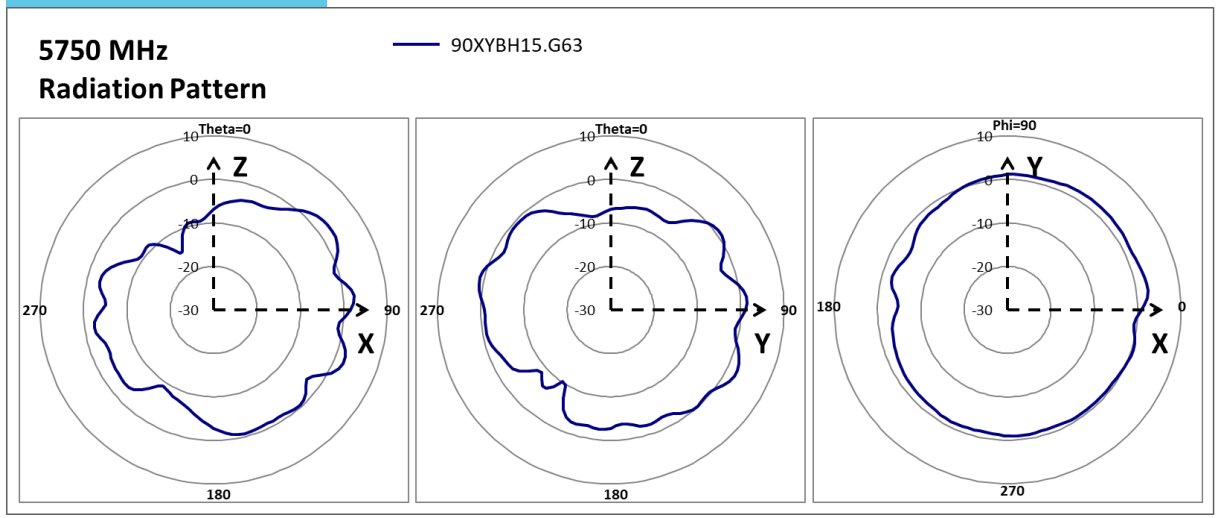
Radiation Pattern for 5G Narrow Band

Test date: 2023/02/15
Test personnel : Eason Chen

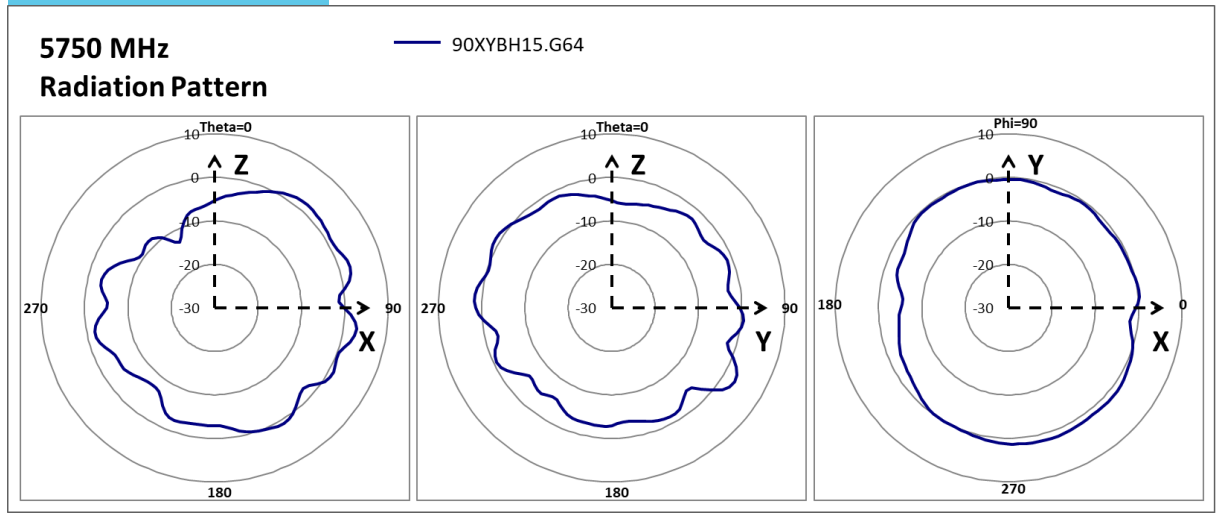
90XYBH15.G62



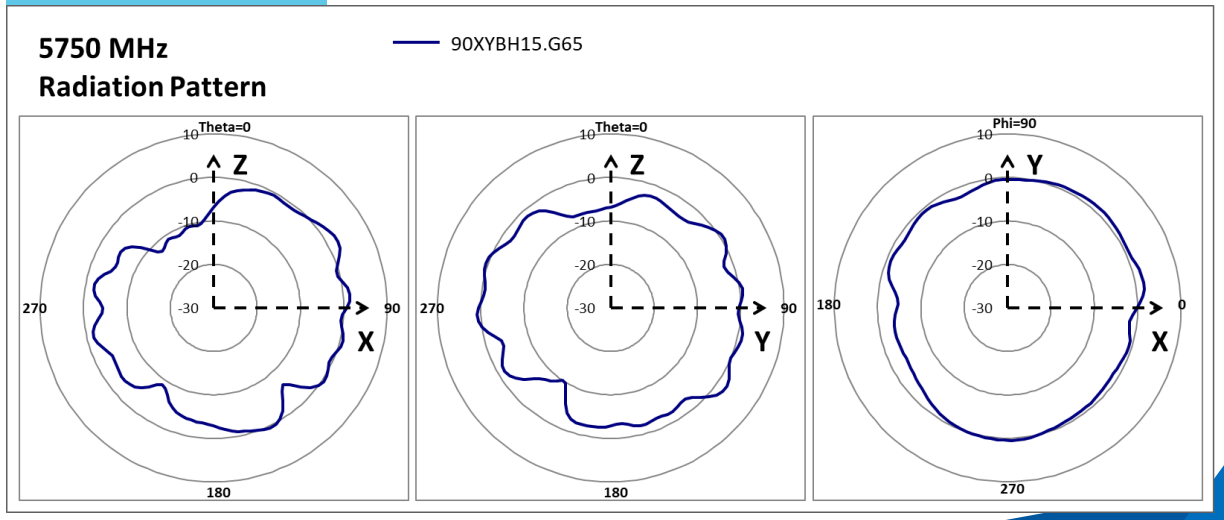
90XYBH15.G63



90XYBH15.G64



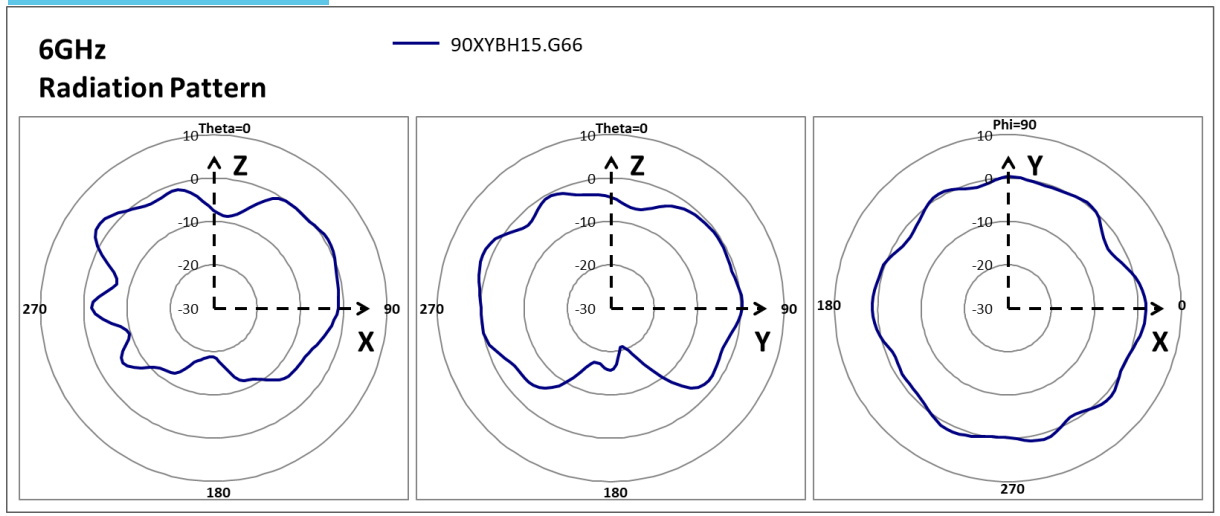
90XYBH15.G65



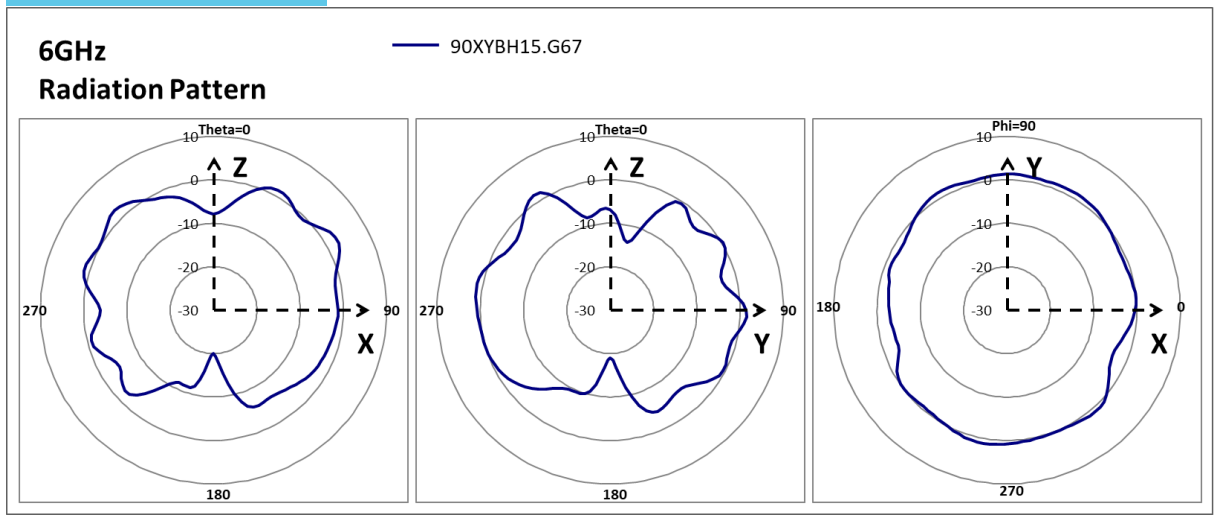
Radiation Pattern for 6G

Test date: 2023/02/15
Test personnel : Eason Chen

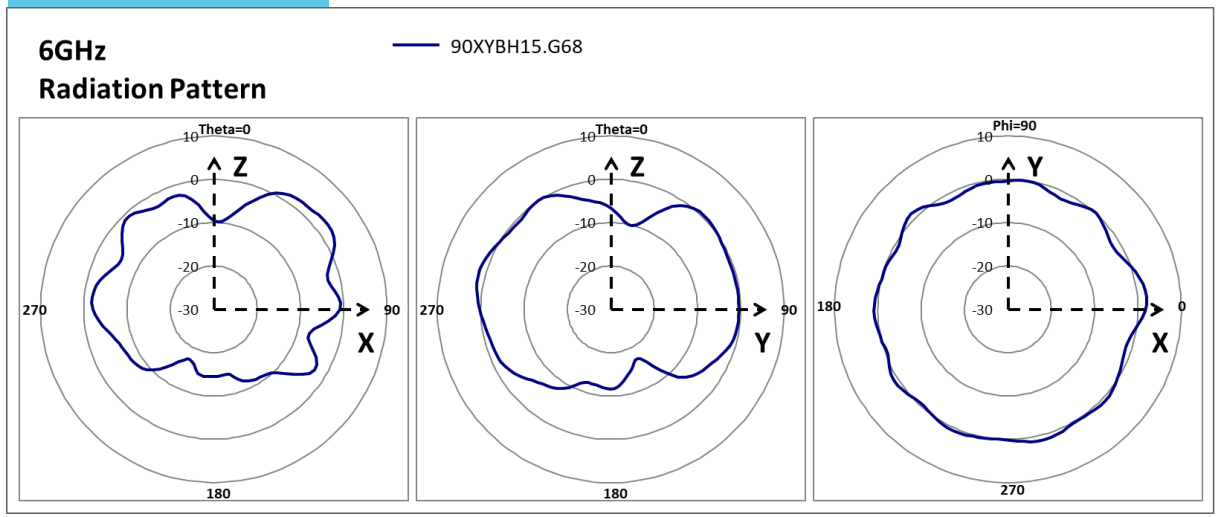
90XYBH15.G66



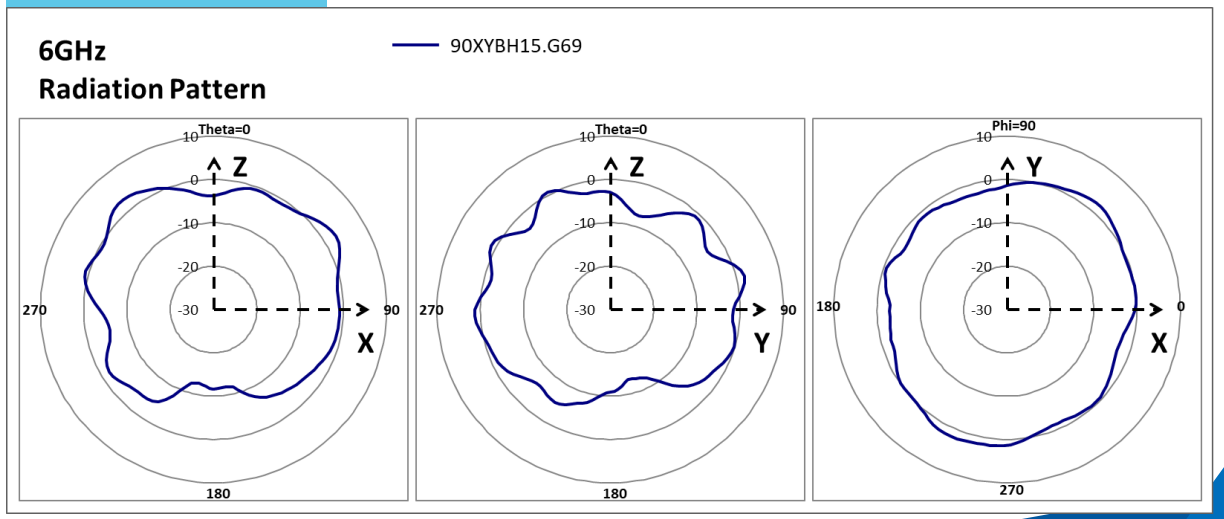
90XYBH15.G67



90XYBH15.G68



90XYBH15.G69



Composite antenna radiation plots

- The directional gain of 2.4GHz and 5GHz is evaluated by following KDB662911 D03.
  - For detailed content and data, please refer to another document – Test report (Antenna Directional Gain).pdf

- The 6GHz EIRP is evaluated and obtained through radiated measurement procedure.
  - Detailed content and data have been recorded in the RF test report.

WNC

Wistron NeWeb Corp.