

The image shows a modern glass skyscraper with a grey concrete section on the left. On this section, the letters 'WNC' are mounted in a bold, blue, sans-serif font. The building's glass facade reflects the sky and surrounding environment. In the foreground, there are out-of-focus green leaves and a small white wind turbine sculpture.

Arctic Antenna Test Report – P2

2023/01/14

Provided by CK Su

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 - IoT (Radio4)

General Information

- Manufacture

Brand: WNC

Address: 20 Park Ave. II, Hsinchu Science Park, Hsinchu 300, Taiwan

- Scanning (Radio 3)

Antenna Type: Dipole.

PN: SC Ant X: 95XEAM15.G09 AUX_1

SC Ant Y: 95XEAM15.G10 AUX_2

- IoT (Radio4),

Antenna type: Loop.

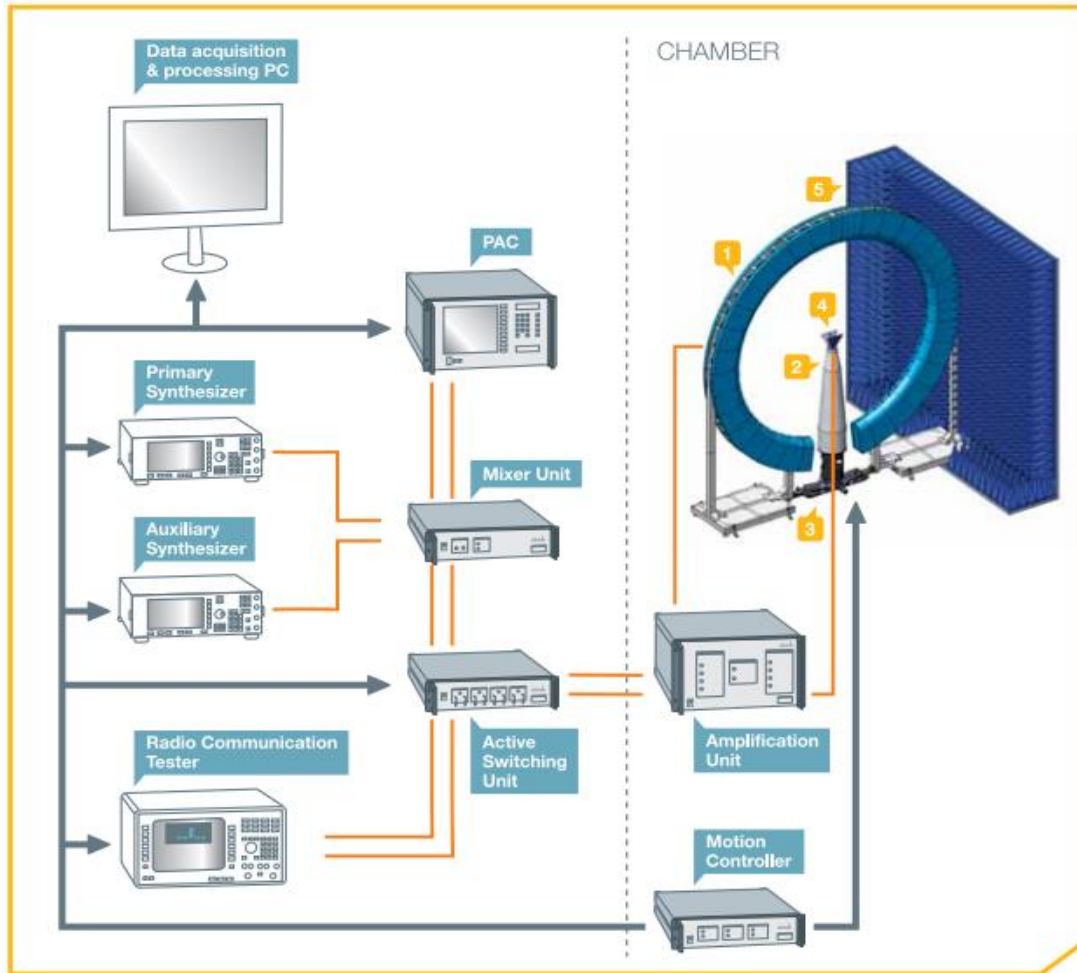
PN: IoT Ant T: 95XEAM15.G11 IOT

- Test Date and Member

Date: 2023/01/10

Member: Chikang Su

Test Setup Diagram



SG 64 uses analog RF signal generators to emit EM waves from the probe array to the antenna under test (AUT) or vice versa.

It uses the NPAC as an RF receiver for antenna measurements. The NPAC also drives the electronic scanning of the probe array.

The NPAC includes the fastest and most accurate sources and receivers on the market.

Equipment

Device	Type/Model	Serial#	Manufacturer	Calibrated Date	Calibrated Until
SG64 Chamber	Standard	SG64	MVG	2022/03/30	2023/03/30
Turn Table	Customization	-	Machinery Dept.	2022/03/30	2023/03/30
New Probe Array Controller	N/A	1102341-4535	MVG	2022/03/30	2023/03/30
Power Supply Unit	N/A	1103211-13204	MVG	2022/03/30	2023/03/30
Active Switching Unit	N/A	1102347-7214	MVG	2022/03/30	2023/03/30
TX Amplification Unit	N/A	1102527-5909	MVG	2022/03/30	2023/03/30
RX Amplification Unit	N/A	1102536-3823	MVG	2022/03/30	2023/03/30
Transfer Switching Unit	N/A	1102183-3351	MVG	2022/03/30	2023/03/30
Mixer Unit	N/A	1102545-7208	MVG	2022/03/30	2023/03/30
Power And Control Unit	N/A	1102706-7209	MVG	2022/03/30	2023/03/30
Antenna Probe	DP 400-6000	-	MVG	2022/03/30	2023/03/30
Cable 13.7m - 400MHz to 18GHz	SS402	00100A1F5A1XXS	Woken	2022/03/30	2023/03/30
Temperature & Humidity Meter	HTC-01	-	Metravi	2022/03/30	2023/03/30

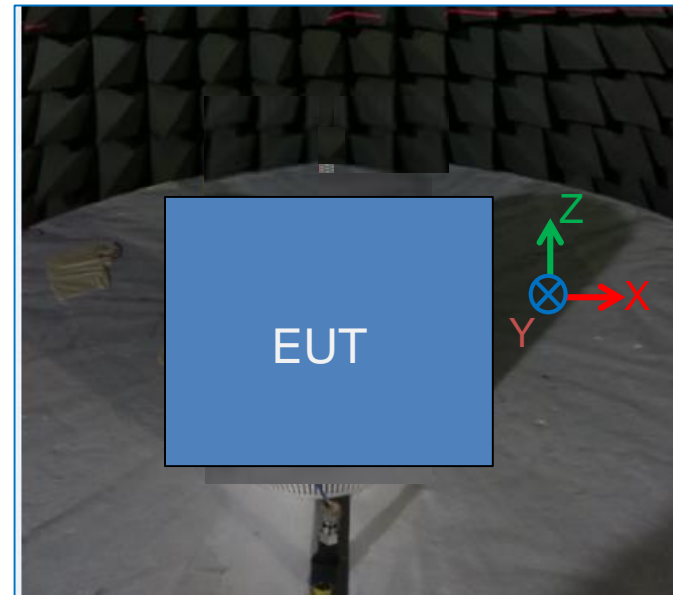
Note:

1. There are 63 set ANT probes in WNC's SG64 Chamber.

Test Setup and Procedure



- Place the device at the center of the chamber.
- Connect the antenna cable to RF cable of the chamber
- Run Satimo test SW (**NPAC Spherical Measurement, v1.5.4 (GIT-E6965664)**)
- Get 3D data in 2.8125 degree step from phi 0° ~ 360° and theta -90° ~ $+90^{\circ}$, including efficiency, peak gain, 2D & 3D radiation pattern.
- This is far field test for antenna verification of Zealand.
- This is passive measurement, which means the device is off and not in any operating mode.



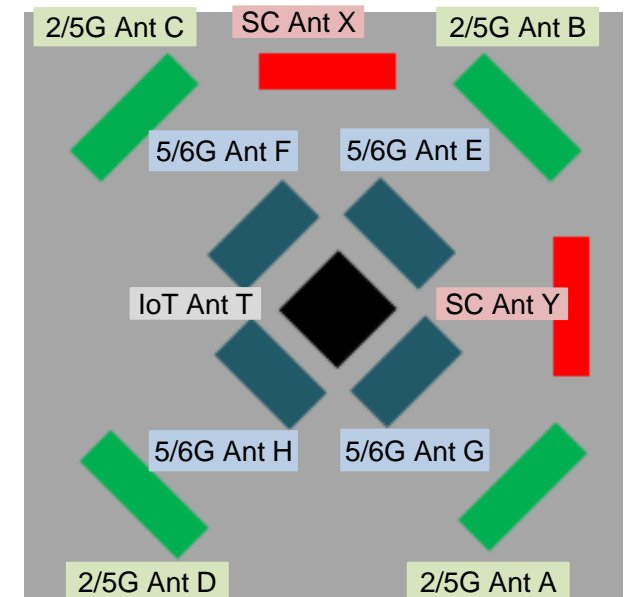
Summary

- WNC verified antenna performance of P2 sample.
- The frequency of each antenna shifted to lower frequency, especially for SC antenna. We can find the efficiency of SC antenna dropped a lot around 7GHz.

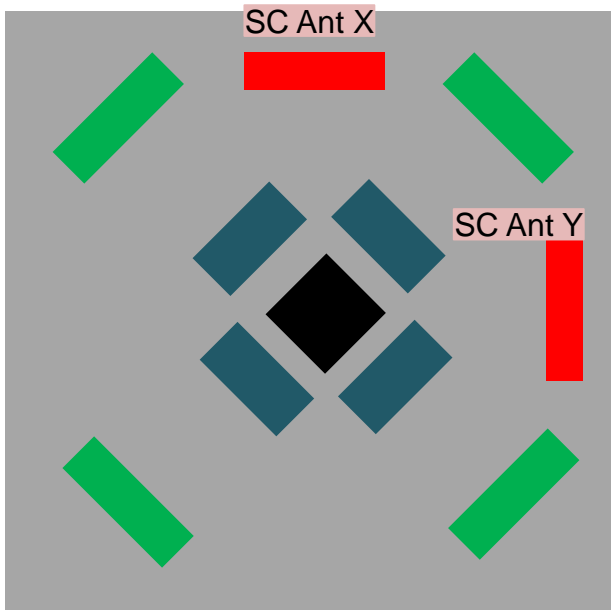
Frequency combination		VSWR	Peak Gain	Isolation
Scanning (Radio3)	2.4~2.5GHz	<2.6	SC Ant X/ SC Ant Y	>28dB
	5.15~5.85GHz	<2.1	6.3dBi (θ :21°/ ϕ :93°)/ 6.9dBi (θ :39°/ ϕ :264°)	>38dB
	5.925~7.125GHz	<5.3	6.6dBi (θ :48°/ ϕ :168°)/ 6.5dBi (θ :15°/ ϕ :78°) 6.1dBi (θ :12°/ ϕ :144°)/ 6.8dBi (θ :6°/ ϕ :141°)	>35dB
IoT (Radio4)	2.4GHz	<2.2	<8.8dBi (θ :9°/ ϕ :249°)	-

Note:

Peak Gain = Product antenna peak gain - path loss + Chamber's receiving RX peak gain.



Scanning (Radio3)



■ Peak Gain

- 6.9dBi on 2.4GHz / 6.6dBi on 5GHz / 6.8dBi on 6GHz

■ Maximum VSWR

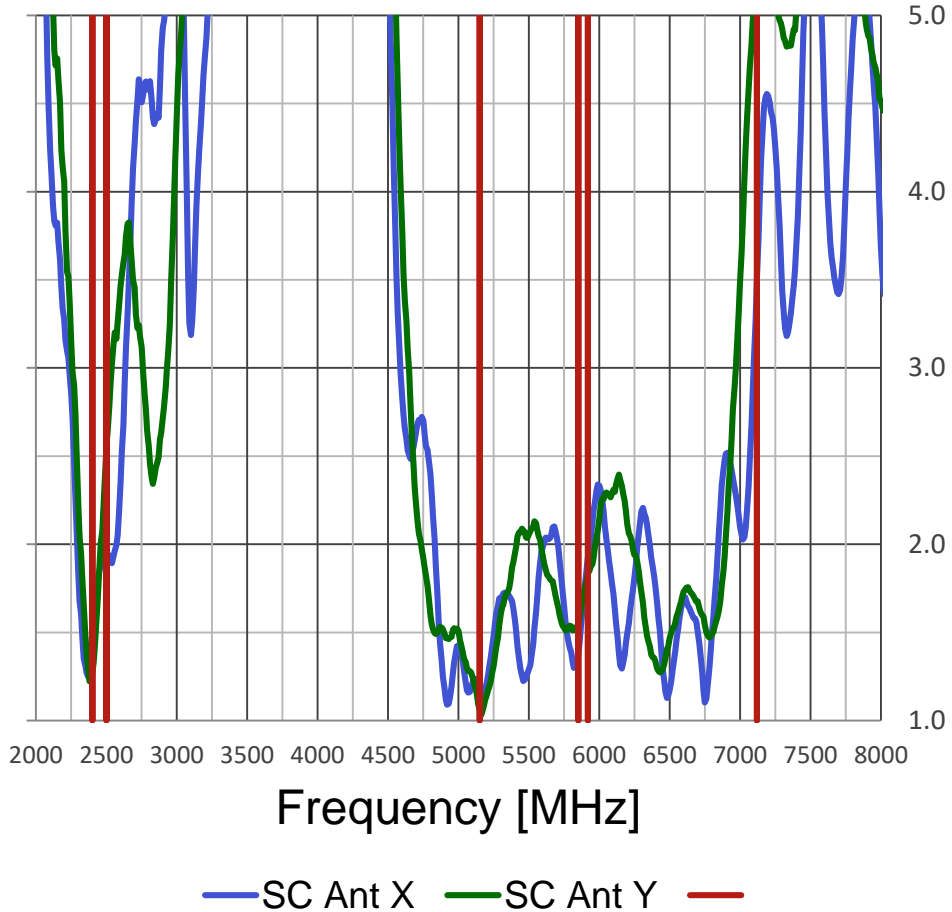
- 2.6:1 on 2.4GHz / 2.1:1 on 5GHz / 5.3:1 on 6GHz

■ Minimum Isolation

- 28.1dB on 2.4GHz / 35.5dB on 5-7GHz



VSWR Scanning

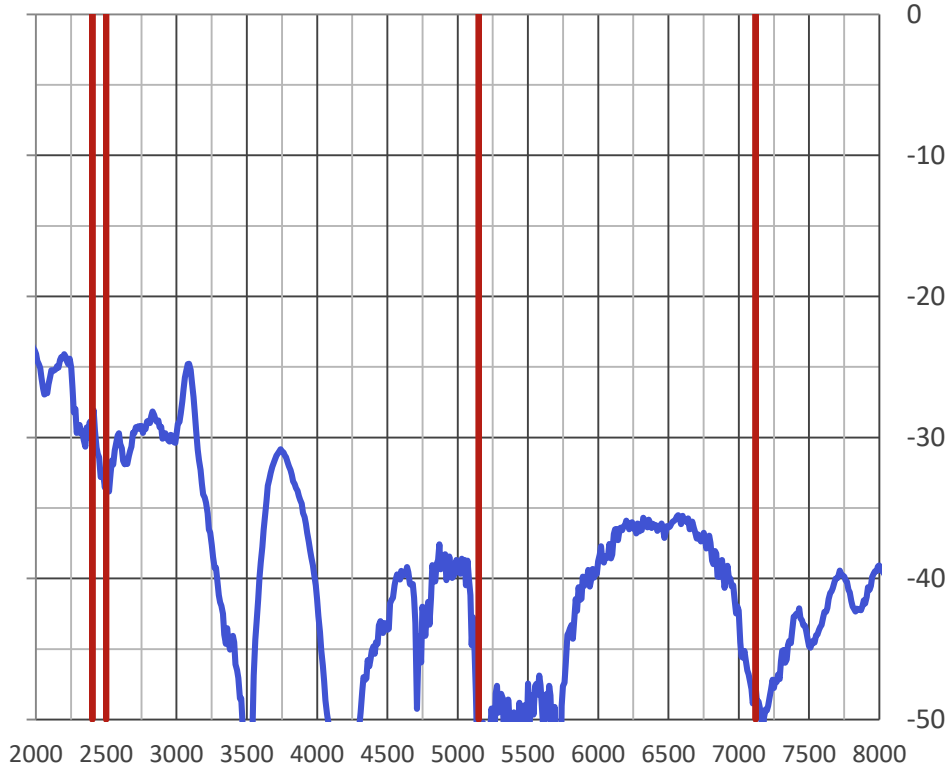


2.4GHz	Max	Mean	Min
SC Ant X	1.9	1.8	1.5
SC Ant Y	2.6	1.9	1.3
Summary	2.6	1.8	1.3

5GHz	Max	Mean	Min
SC Ant X	2.1	1.6	1.2
SC Ant Y	2.1	1.7	1.1
Summary	2.1	1.7	1.1

6GHz	Max	Mean	Min
SC Ant X	3.8	1.9	1.1
SC Ant Y	5.3	2.2	1.3
Summary	5.3	2.1	1.1

Isolation Scanning



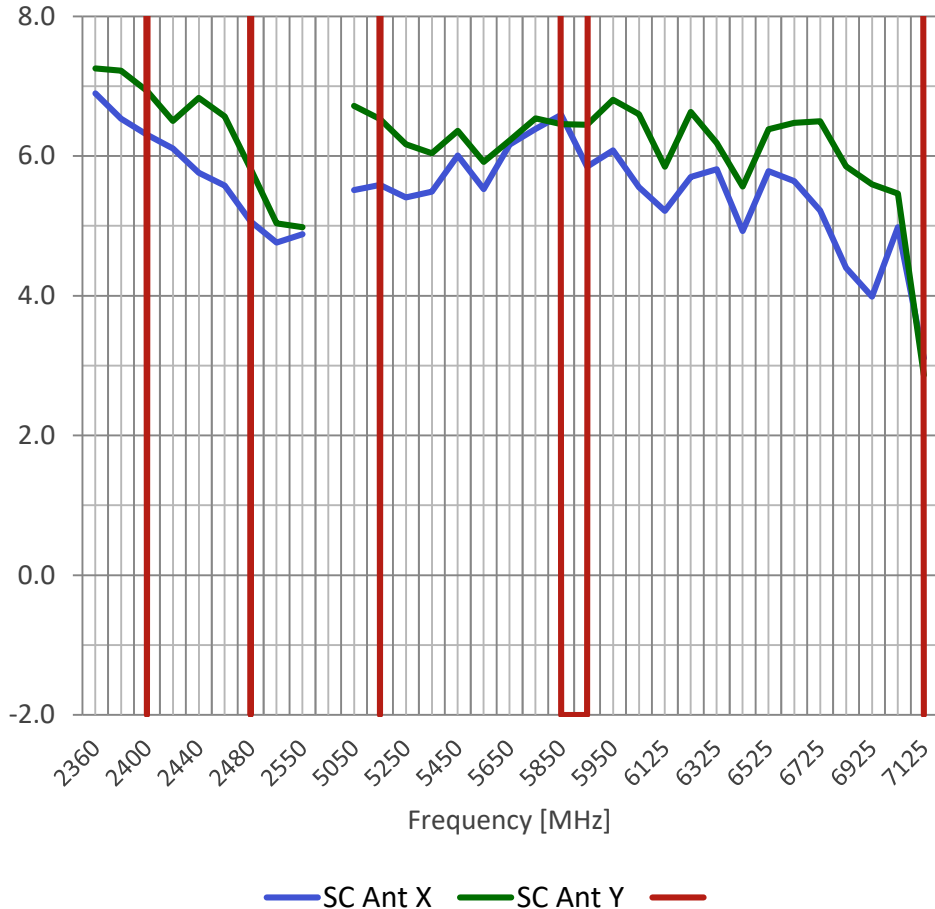
Frequency [MHz]

— SC Ant X_SC Ant Y —

2.4GHz	Max	Mean	Min
SC Ant X_SC Ant Y	-28.1	-31.3	-33.5

5 6GHz	Max	Mean	Min
SC Ant X_SC Ant Y	-35.5	-42.5	-57.3

Peak Gain Scanning

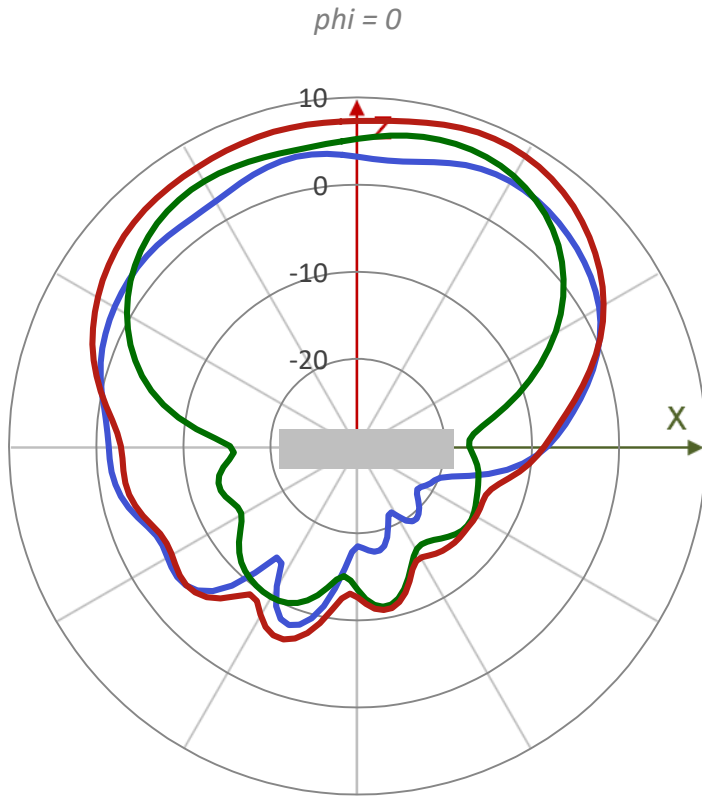
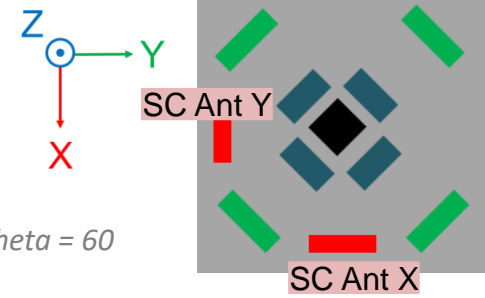


2.4GHz	Max	Mean	Min
SC Ant X	6.3 dBi ($\theta:21^\circ / \varnothing:93^\circ$)	5.8 dBi	5.1 dBi
SC Ant Y	6.9 dBi ($\theta:39^\circ / \varnothing:264^\circ$)	6.5 dBi	5.8 dBi
Summary	6.9 dBi	6.1 dBi	5.1 dBi

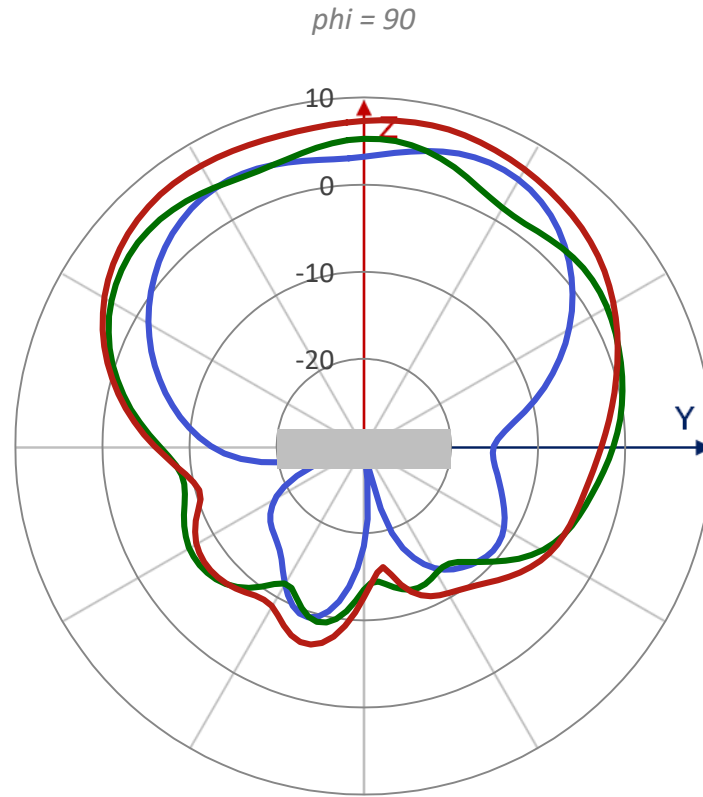
5GHz	Max	Mean	Min
SC Ant X	6.6 dBi ($\theta:48^\circ / \varnothing:168^\circ$)	5.9 dBi	5.4 dBi
SC Ant Y	6.5 dBi ($\theta:15^\circ / \varnothing:78^\circ$)	6.3 dBi	5.9 dBi
Summary	6.6 dBi	6.1 dBi	5.4 dBi

6GHz	Max	Mean	Min
SC Ant X	6.1 dBi ($\theta:12^\circ / \varnothing:144^\circ$)	5.2 dBi	3.1 dBi
SC Ant Y	6.8 dBi ($\theta:6^\circ / \varnothing:141^\circ$)	5.9 dBi	2.9 dBi
Summary	6.8 dBi	5.6 dBi	2.9 dBi

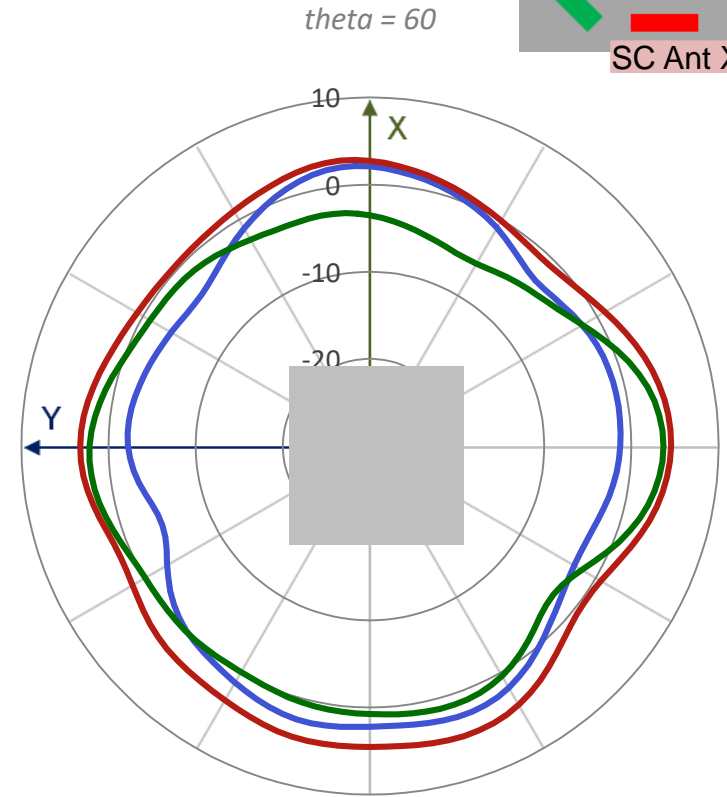
Realized Gain Pattern Scanning @2450MHz for Gtotal



— SC Ant X — SC Ant Y — Composite

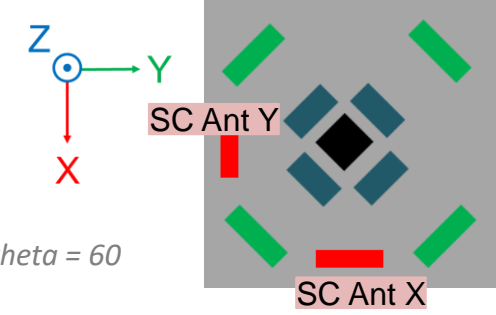


— SC Ant X — SC Ant Y — Composite

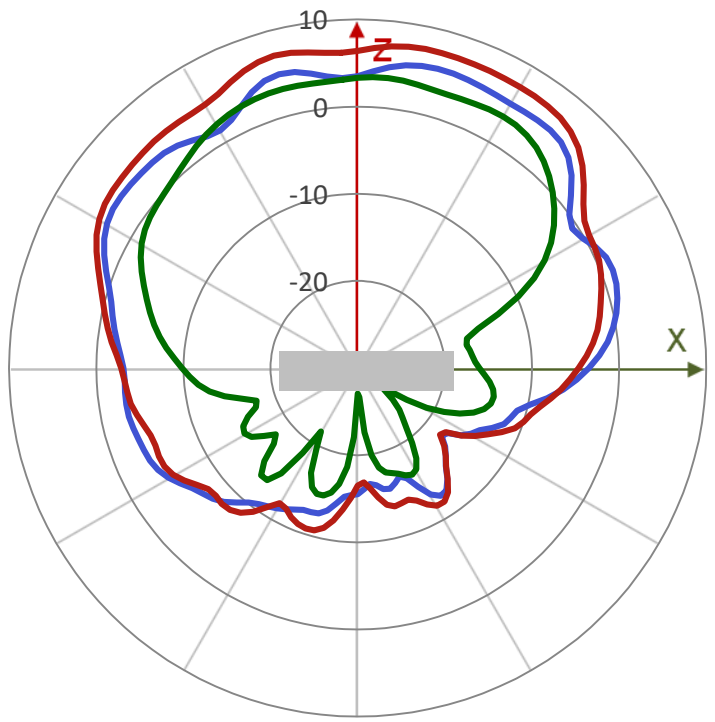


— SC Ant X — SC Ant Y — Composite

Realized Gain Pattern Scanning @5450MHz for Gtotal

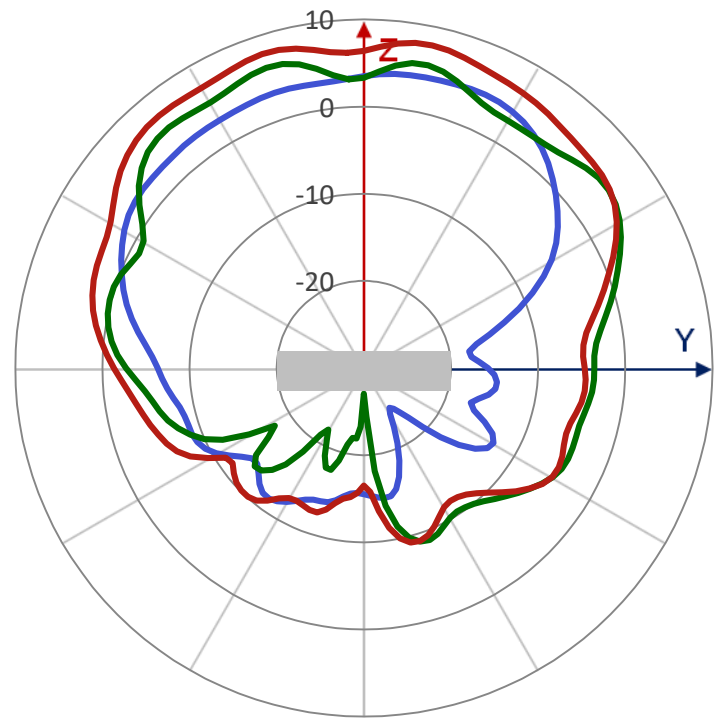


$\phi = 0$



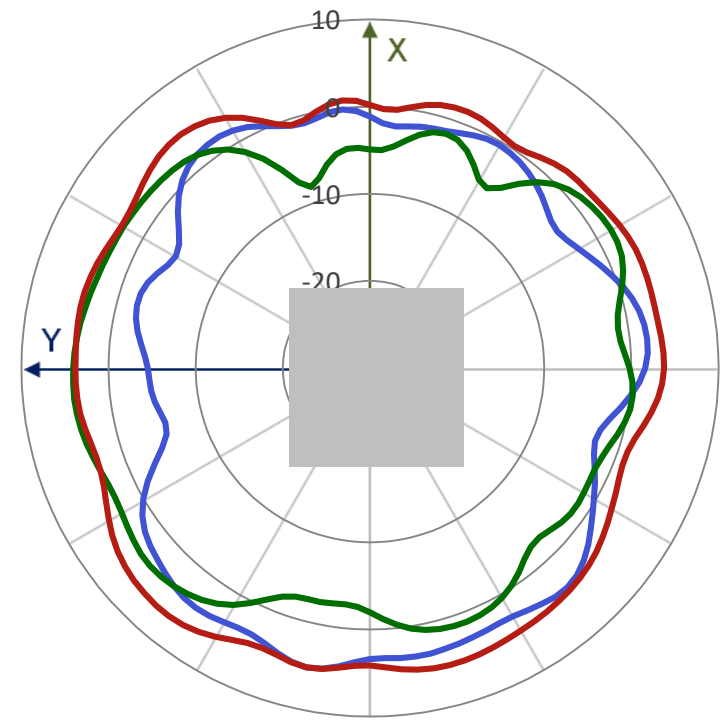
— SC Ant X — SC Ant Y — Composite

$\phi = 90$



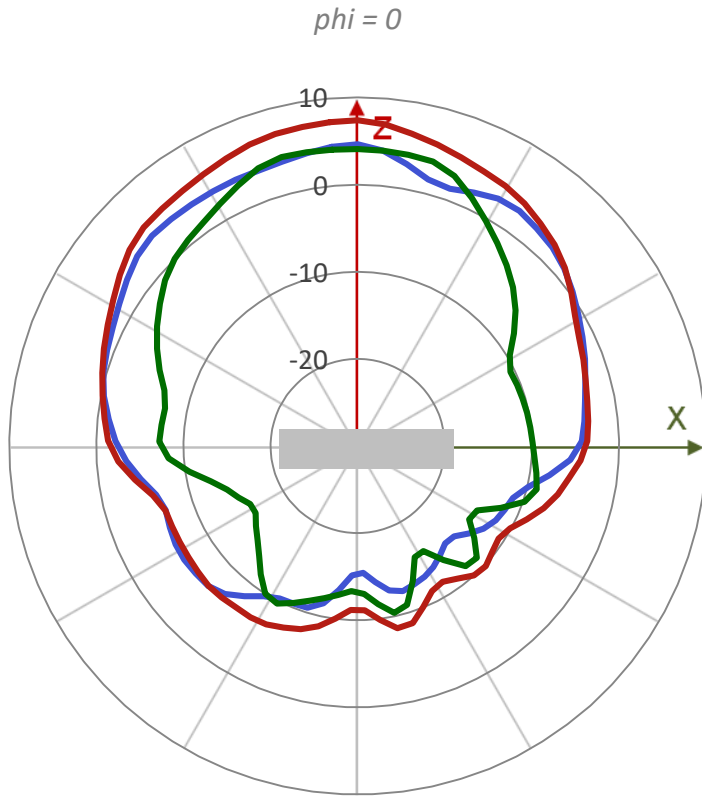
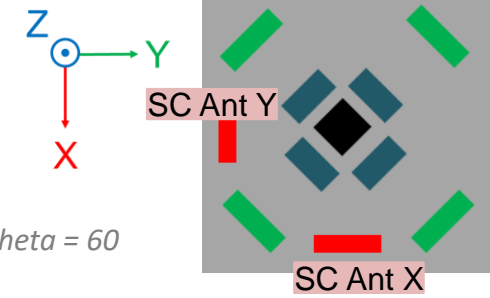
— SC Ant X — SC Ant Y — Composite

$\theta = 60$

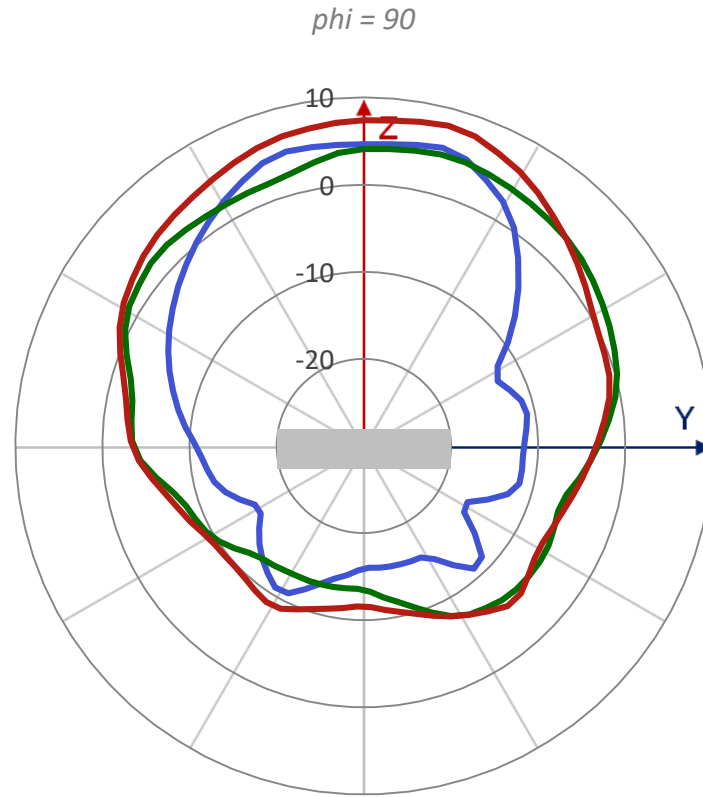


— SC Ant X — SC Ant Y — Composite

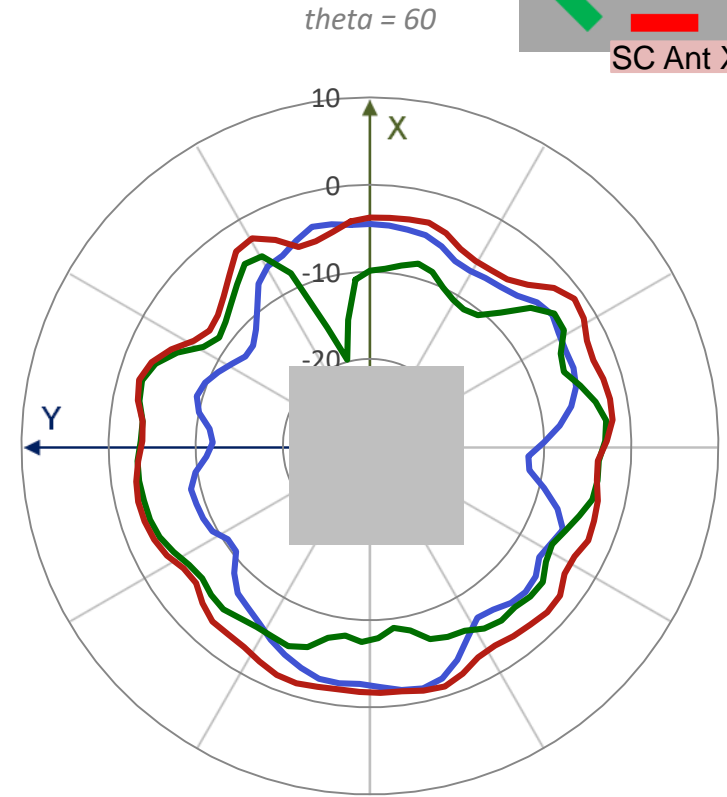
Realized Gain Pattern Scanning @6525MHz for Gtotal



— SC Ant X — SC Ant Y — Composite

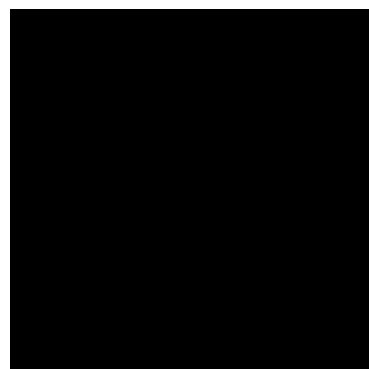
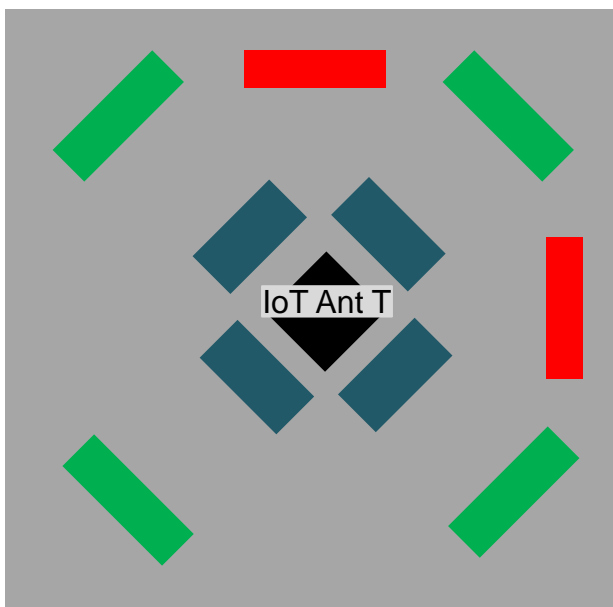


— SC Ant X — SC Ant Y — Composite



— SC Ant X — SC Ant Y — Composite

IoT (Radio4)



- **Peak Gain**

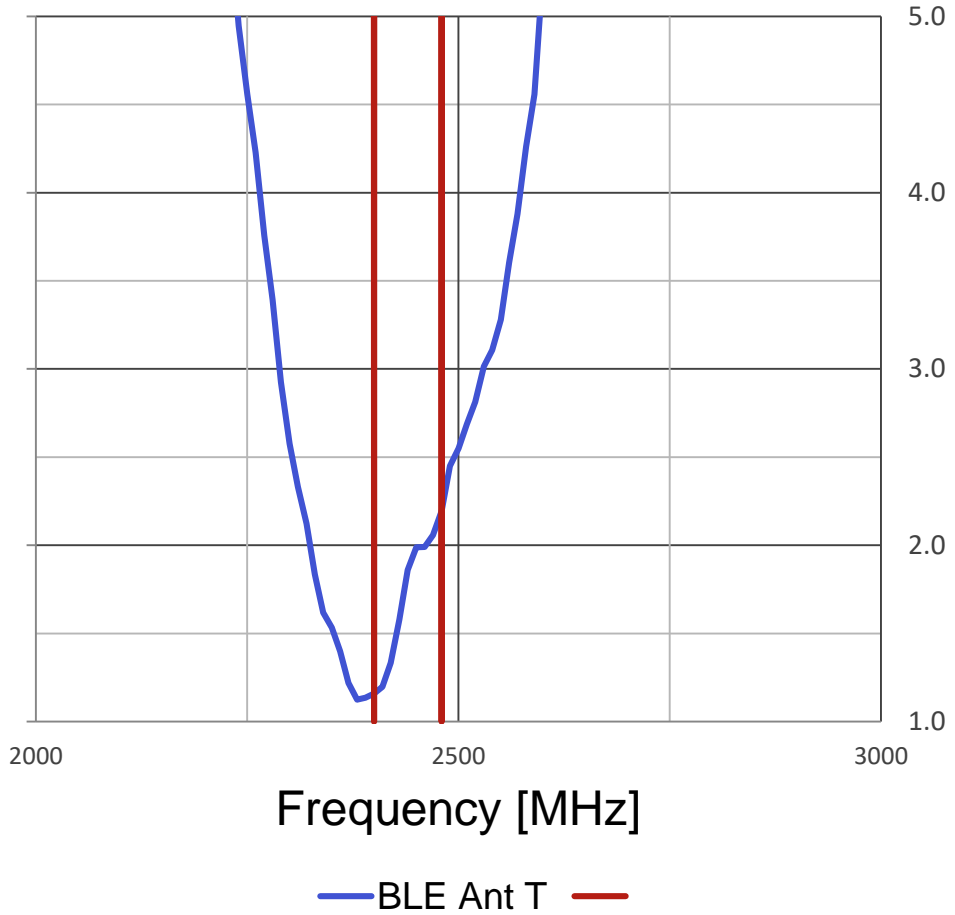
- 8.8dBi on 2.4GHz

- **Maximum VSWR**

- 2.2:1 on 2.4GHz

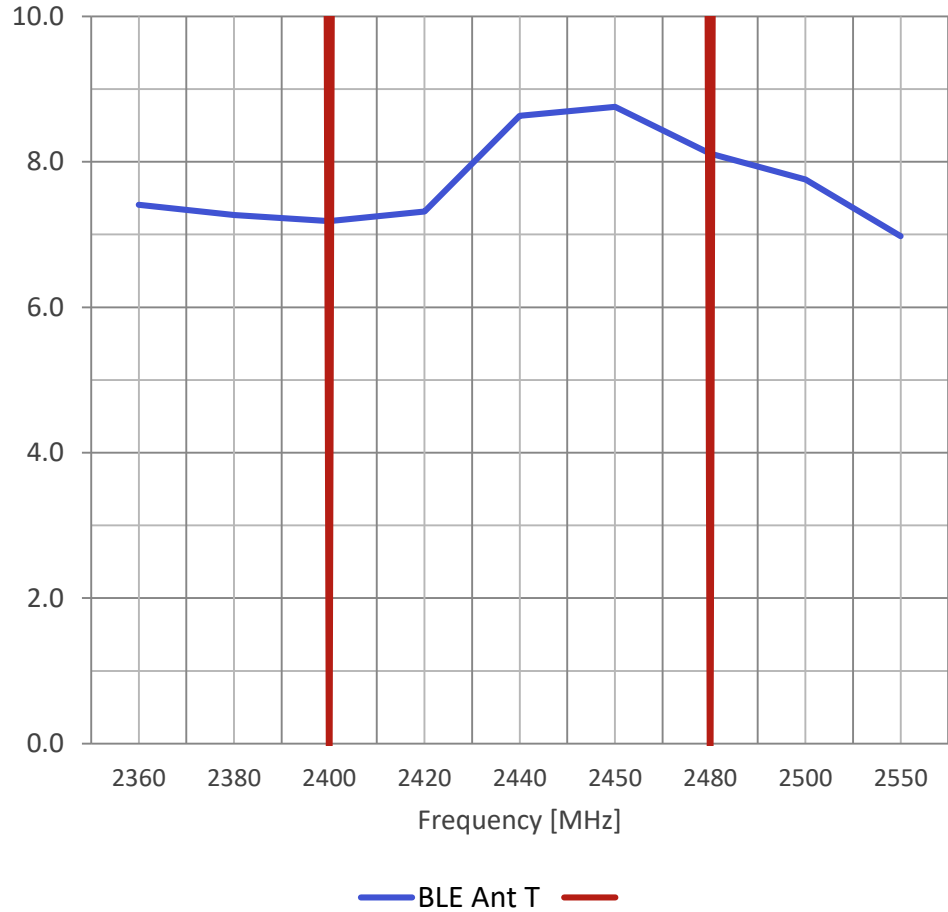


VSWR IoT



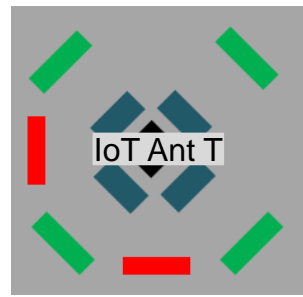
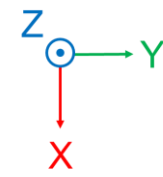
2.4GHz	Max	Mean	Min
BLE Ant T	2.2	1.7	1.2

Peak Gain IoT

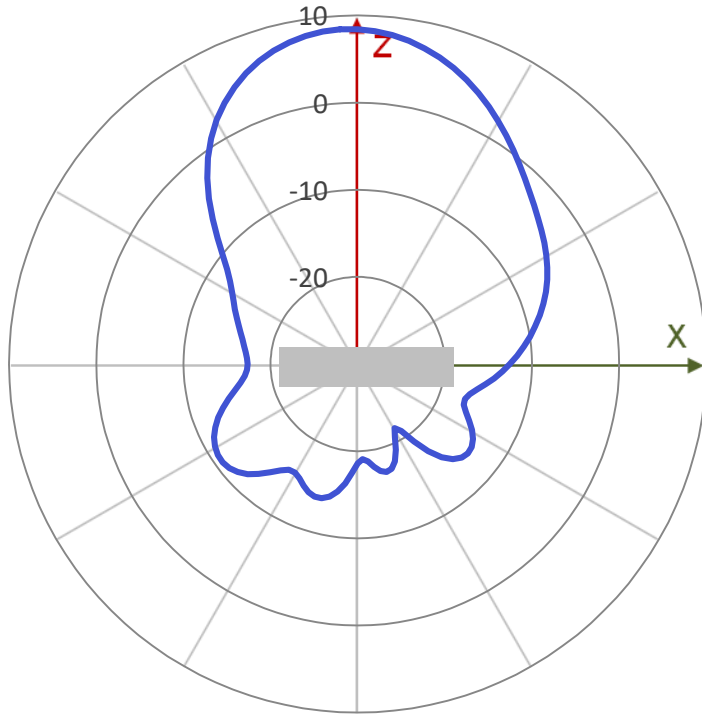


2.4GHz	Max	Mean	Min
BLE Ant T	8.8 dBi ($\theta:9^\circ / \phi:249^\circ$)	8.0 dBi	7.2 dBi

Realized Gain Pattern BLE @2450MHz for Gtotal

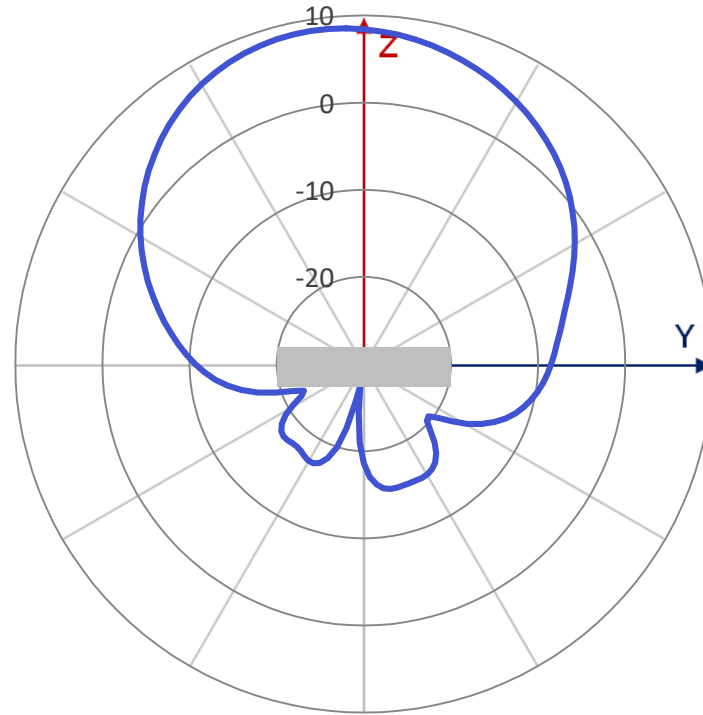


$\phi = 0$



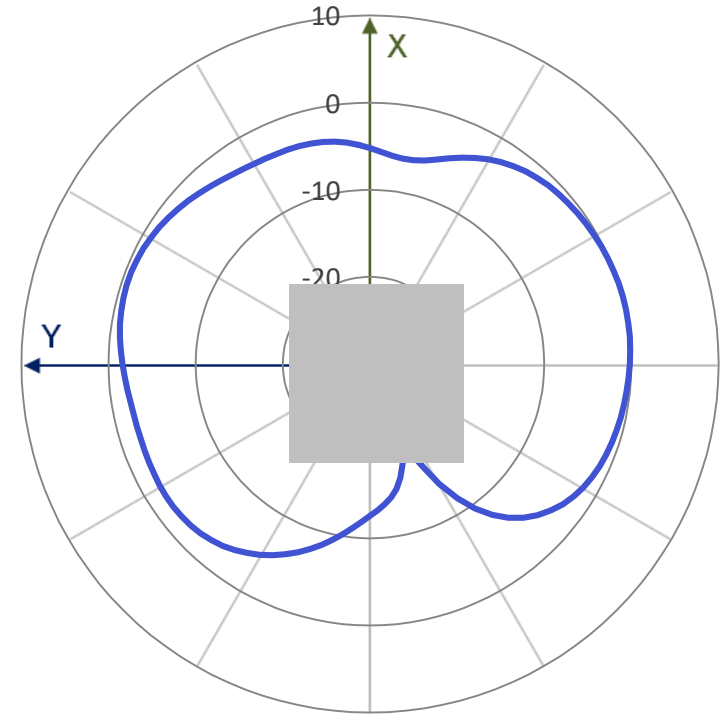
— BLE Ant T

$\phi = 90$



— BLE Ant T

$\theta = 60$



— BLE Ant T

The logo consists of the letters 'WNC' in a bold, blue, italicized sans-serif font. The 'W' and 'C' are connected at the top, and the 'N' is positioned between them. The background is a bright, slightly hazy outdoor scene with a modern glass building and green foliage in the foreground.

WNC

Wistron NeWeb Corp.