



JUNIPER AP36M ANTENNA REPORT

Brand: Juniper

Model: AP36M



Contents

- Chamber Information
 - Setup Picture
 - Test Equipment
 - Test Procedure
- Name and Address of The Antenna Manufacture
- Summary
- Antenna Placement
- Peak Gain Table
- Antenna Test Results
 - VSWR
 - Isolation
 - Efficiency
 - Peak Gain
 - Radiation Pattern

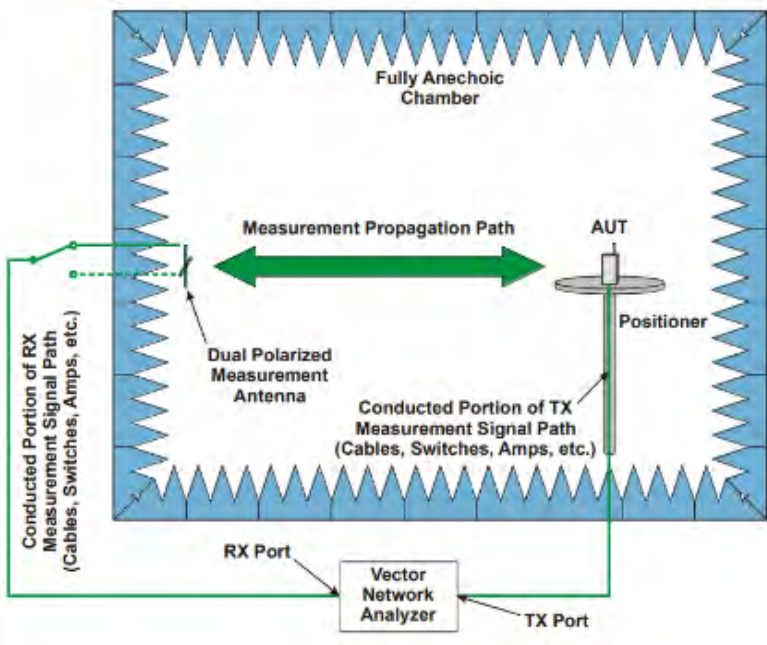
Chamber Information

- Test Date : 2025/06/25
- Test Engineer : Lucien Hsieh
- Measurement System : ETS-AMS-8500
- Software Name : EMQuest
- Software Version : V1.0.8



Test Equipment

- Measurement System : ETS-AMS-8500
- Size:7.32(L)x3.66(W)x3.66(H)m
- Measurement Setup
 - pattern & gain measurement
 - ETS-Lindgren chamber (AMS-8500)
 - ETS-Lindgren program (EMQuest)
 - System overview
 - Test item
 - antenna passive test 700MHz~10GHz
- Calibration Information

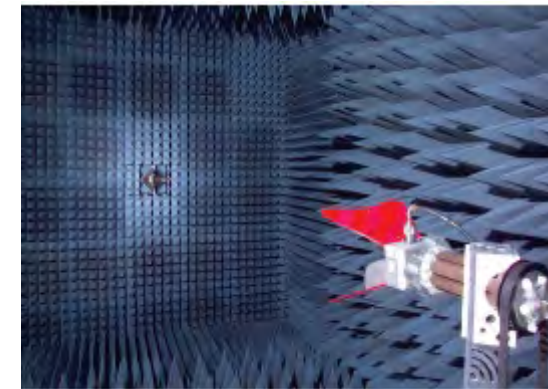
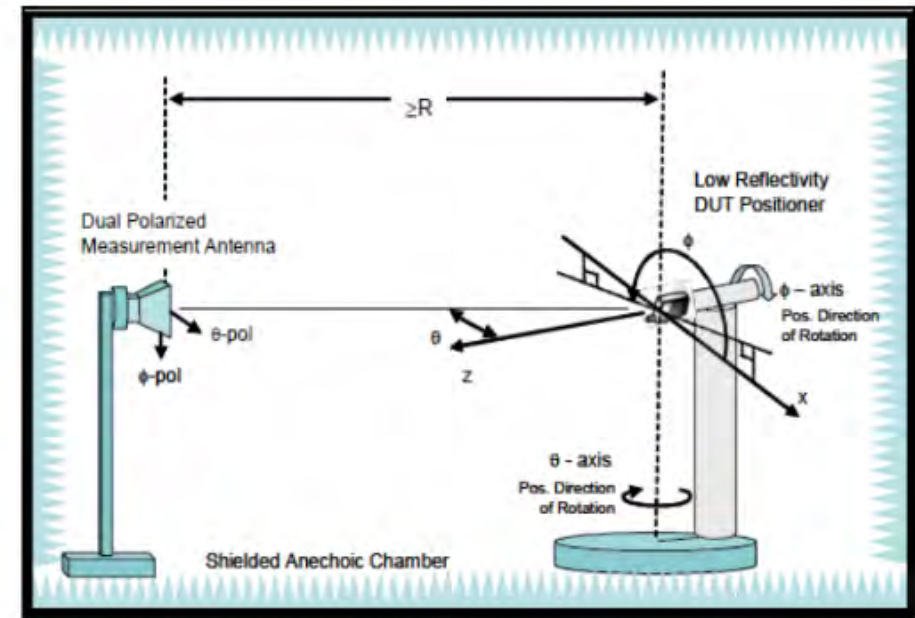


Device	Type / Model	Serial #	Manufacture	Cal. Date	Cal. Until
Full Anechoic Wireless Test chamber	ETS-Lindgren/AMS-8500	1380	ETS-Lindgren	N.C.R	N.C.R
Test Software	EMQuest™	98165	ETS-Lindgren	N.C.R	N.C.R
Dual Polarized Measurement Antenna	ETS-Lindgren/3164-08	920253	ETS-Lindgren	N.C.R	N.C.R
Vector Network Analyzer	Keysight– E5071C	MY46733006	Keysight	2024-09-12	2025-09-12
Positioner	EMCO – 2090	412HA	ETS-Lindgren	N.C.R	N.C.R

Note: N.C.R. = No Calibration Request.

Test Procedure

1. Place the device under test (DUT) on the fixture and align it with the center of the chamber.
2. Connect the antenna cable to the RF connector inside the chamber.
3. Use the software to configure parameters (such as antenna name, frequency points, and measurement angles), then launch the test software (EMQ).
4. Perform a scan with phi (Φ) from 0° to 360° and theta (θ) from 0° to 180° in 3-degree steps to obtain 3D data, including efficiency, peak gain, and 2D/3D radiation patterns.
5. This is a far-field test for antenna verification.
6. This is a passive measurement, meaning the device is powered off and not in operating mode.

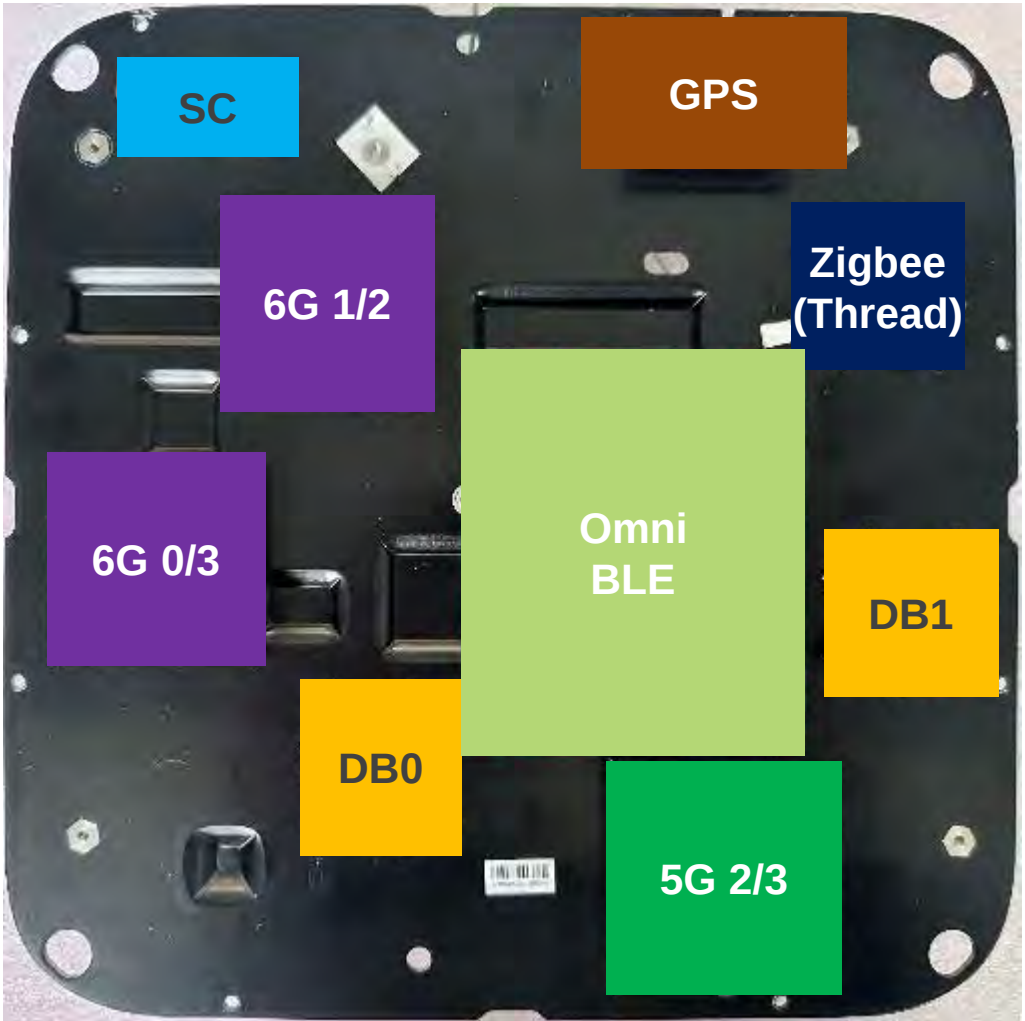


Summary

The summary of antenna performance are shown in below.

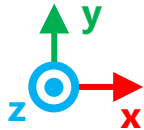
- Radiation efficiency
 - ~64% for 2.4GHz Wi-Fi Dual-band antennas [DB0, DB1]
 - ~63% for 5GHz Wi-Fi 5G antennas [DB0, DB1, 5G2, 5G3]
 - ~56% for 6GHz Wi-Fi 6G antennas [6G0, 6G1, 6G2, 6G3]
 - ~69% for 2.4GHz ~70% for 5GHz, ~65% for 6GHz Scanning antenna [SC]
 - ~65% for 2.4GHz Zigbee(Thread) antenna [Zigbee(Thread)]
 - ~61% for L1, ~51% for L5 GPS antenna [GPS]
 - ~60% for 2.4GHz Omni BLE
- Peak gain
 - 7.5 dBi for 2.4GHz Wi-Fi Dual-band antennas [DB0, DB1]
 - 6.8 dBi for 5GHz Wi-Fi 5G antennas [DB0, DB1, 5G2, 5G3]
 - 6.6 dBi for 6GHz Wi-Fi 6G antennas [6G0, 6G1, 6G2, 6G3]
 - 5.2 dBi for 2.4GHz, 6.0 dBi for 5GHz, 6.0 dBi for 6GHz Scanning antenna [SC]
 - 6.6 dBi for 2.4GHz Zigbee(Thread) antenna [Zigbee(Thread)]
 - 4.4 dBi for L1, 2.7 dBi for L5 GPS antenna [GPS]
 - 4.6 dBi for 2.4GHz Omni BLE

Antenna Placement



Antenna Plate: 221x221mm

Brand	Antenna Type
DB(0-1)	Dipole
5G(2-3)	Patch
6G(0-3)	Patch
SC	PIFA
GPS	PIFA
Zigbee(Thread)	Dipole
Omni_BLE	PIFA

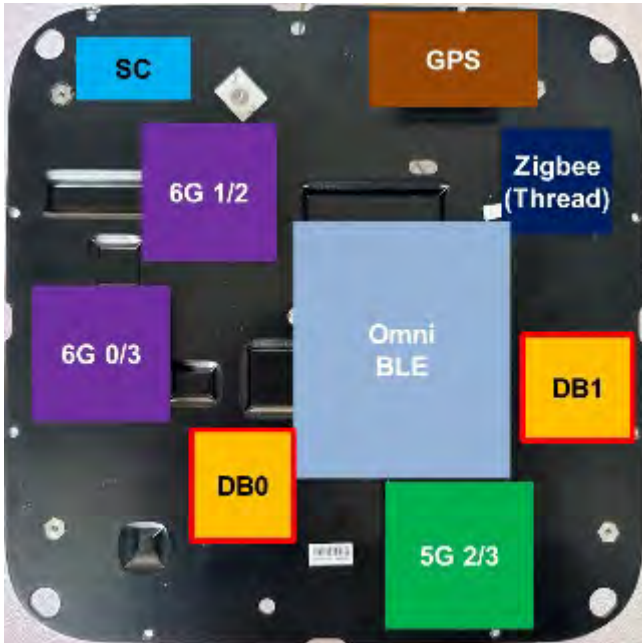


Peak Gain Table

Zigbee(Thread)	Peak Gain	Position of Peak Gain (θ , ϕ)
Zigbee(Thread)	6.6 dBi	$\theta = 12^\circ$, $\phi = 183^\circ$

BLE	Peak Gain	Position of Peak Gain (θ , ϕ)
BLE	4.6 dBi	$\theta = 115.3^\circ$, $\phi = 50.6^\circ$

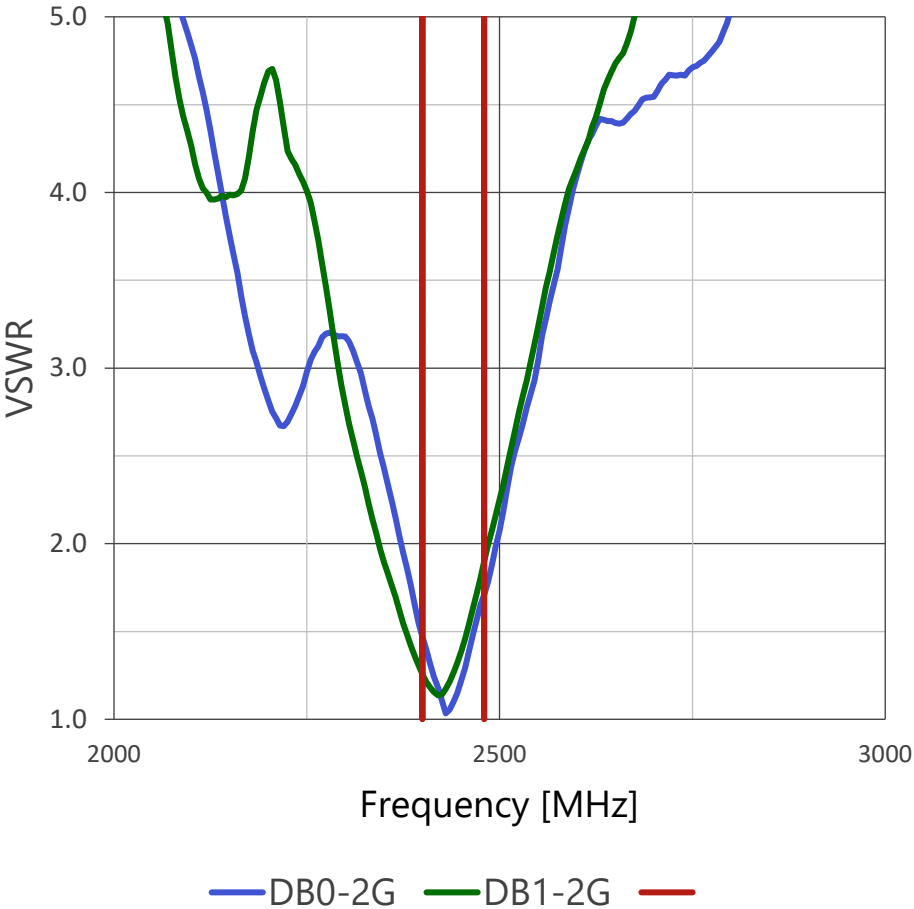
WI-FI 2G



- **Maximum VSWR**
 - 1.9:1 on 2.4GHz
- **Minimum Isolation**
 - 33.7dB on 2.4GHz
- **Average Efficiency**
 - ~64% on 2.4GHz
- **Peak Gain**
 - 7.5dBi on 2.4GHz

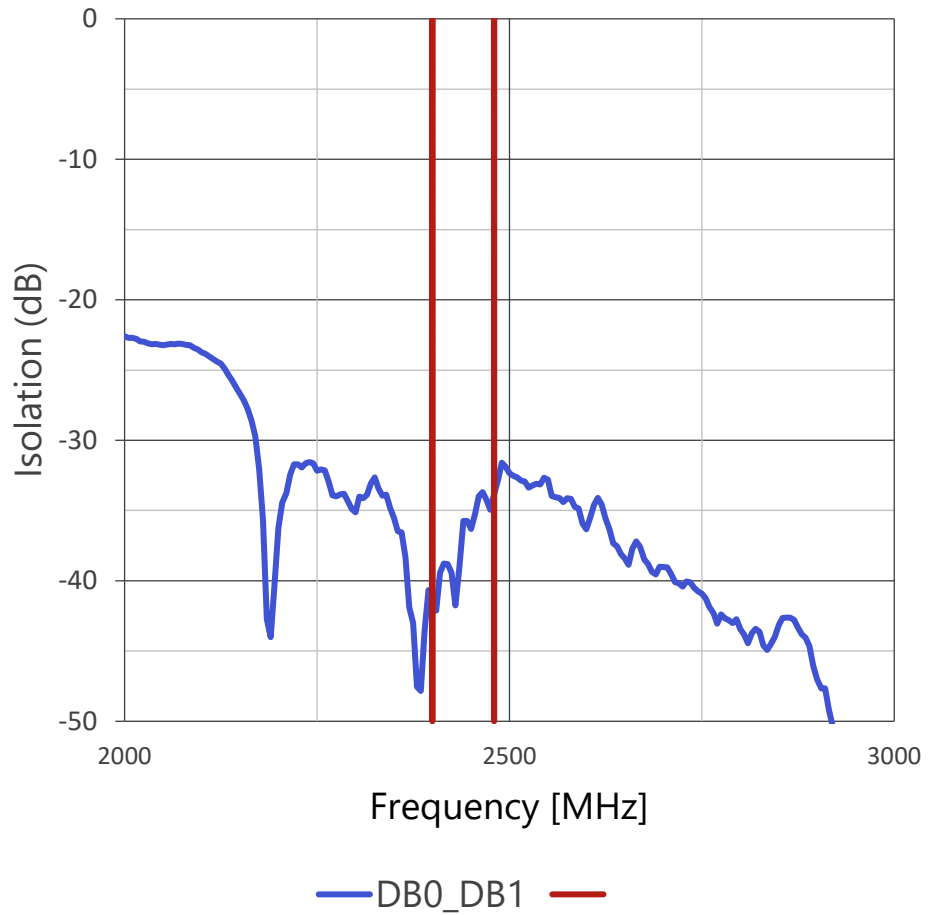
- **Cable Length**
 - DB0 : 327 mm**
 - DB1 : 225 mm**

VSWR Wi-Fi 2G



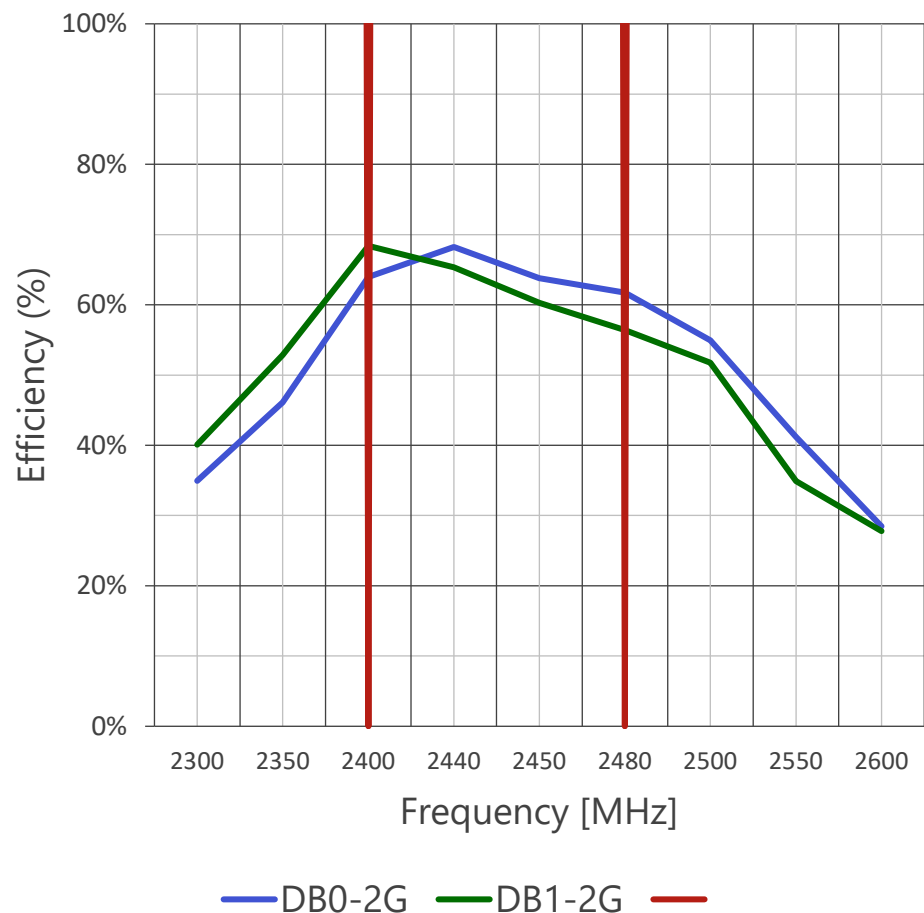
2.4GHz	Max	Mean	Min
DB0-2G	1.7	1.3	1.0
DB1-2G	1.9	1.4	1.1
Summary	1.9	1.3	1.0

Isolation Wi-Fi 2G



2.4GHz	Max	Mean	Min
DB0_DB1	-33.7	-37.3	-42.1

Efficiency Wi-Fi 2G



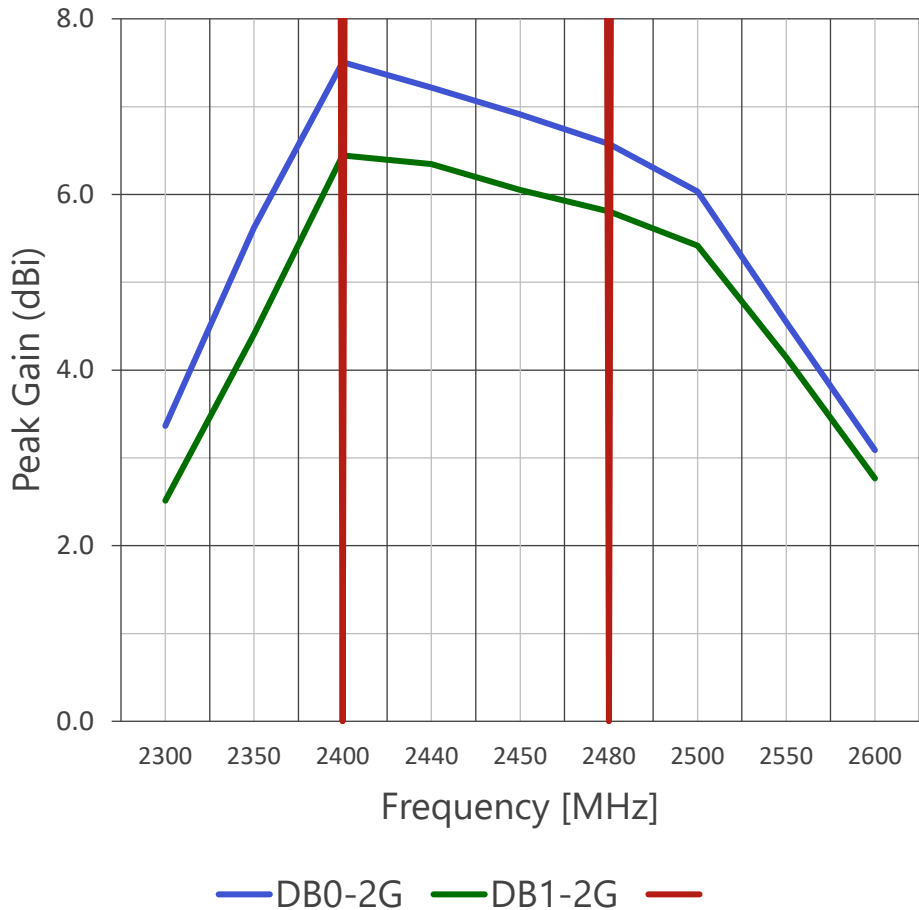
2.4GHz	Max	Mean	Min
DB0-2G	68 %	64 %	62 %
DB1-2G	68 %	63 %	56 %
Summary	68 %	64 %	56 %

■ Cable Length

DB0 : 327 mm

DB1 : 225 mm

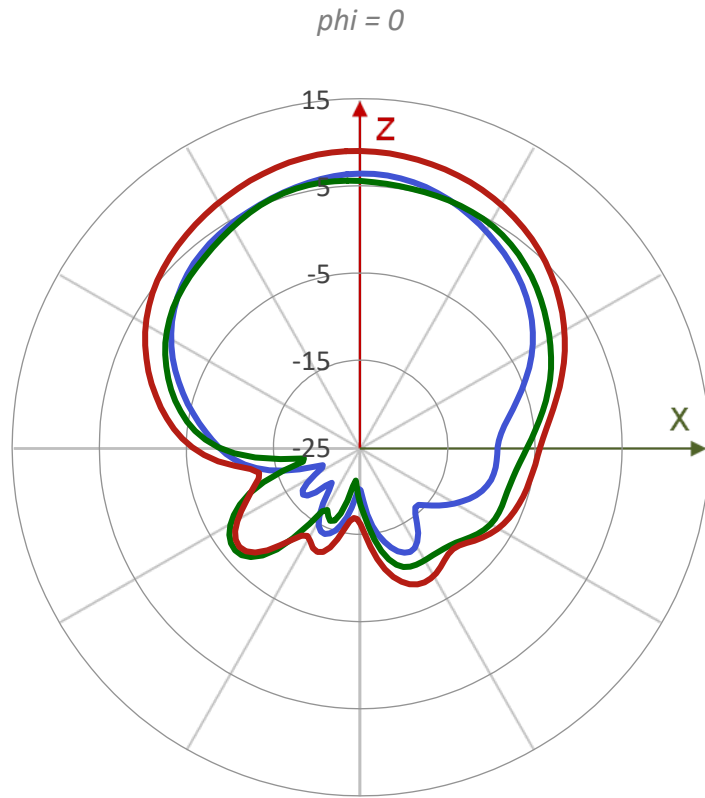
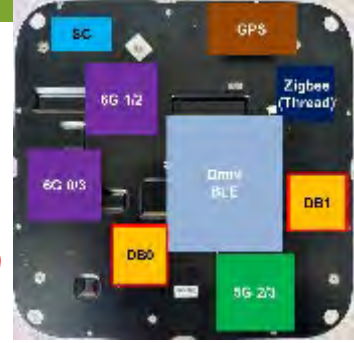
Peak Gain Wi-Fi 2G



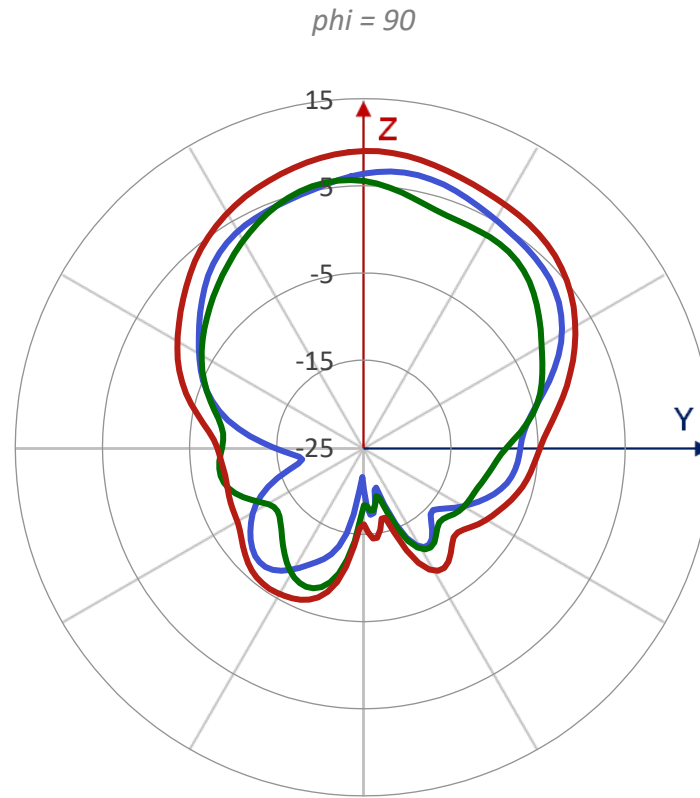
2.4GHz	Max	Mean	Min
DB0-2G	7.5 dBi	7.1 dBi	6.6 dBi
DB1-2G	6.4 dBi	6.2 dBi	5.8 dBi
Summary	7.5 dBi	6.6 dBi	5.8 dBi

- Cable Length
 - DB0 : 327 mm
 - DB1 : 225 mm

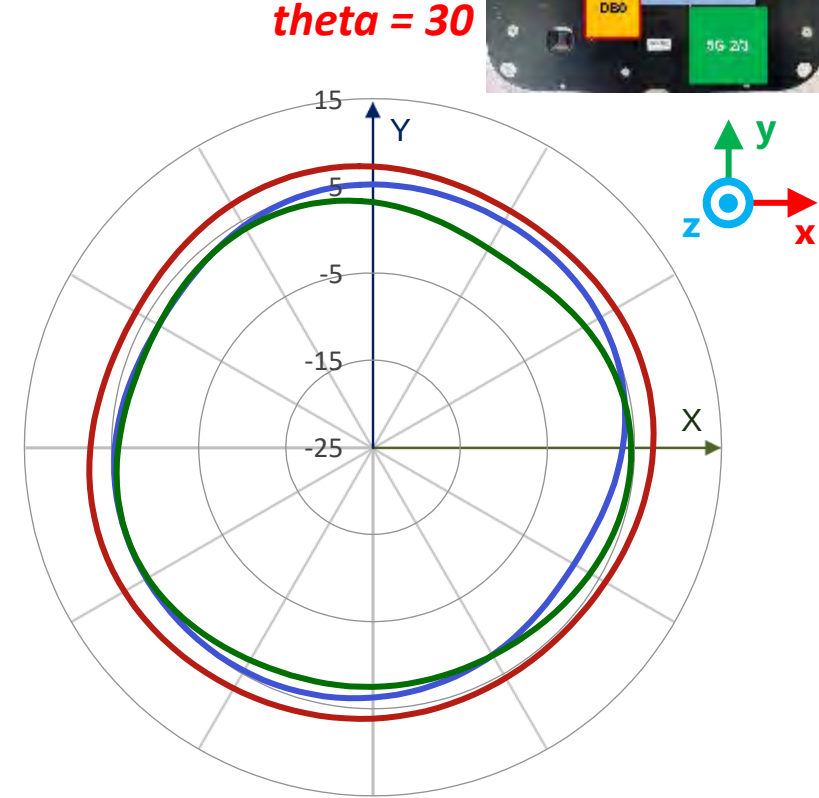
Realized Gain Pattern Wi-Fi 2G @2450MHz_V+H



— DB0-2G — DB1-2G — Composite

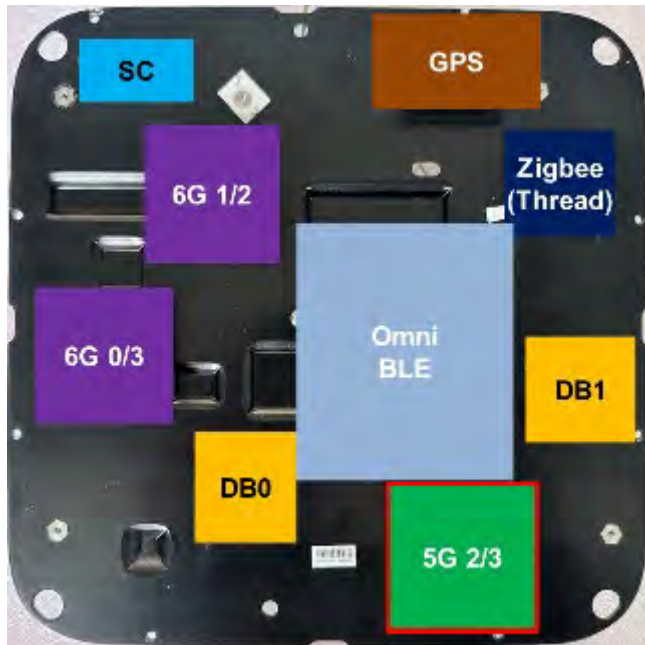


— DB0-2G — DB1-2G — Composite



— DB0-2G — DB1-2G — Composite

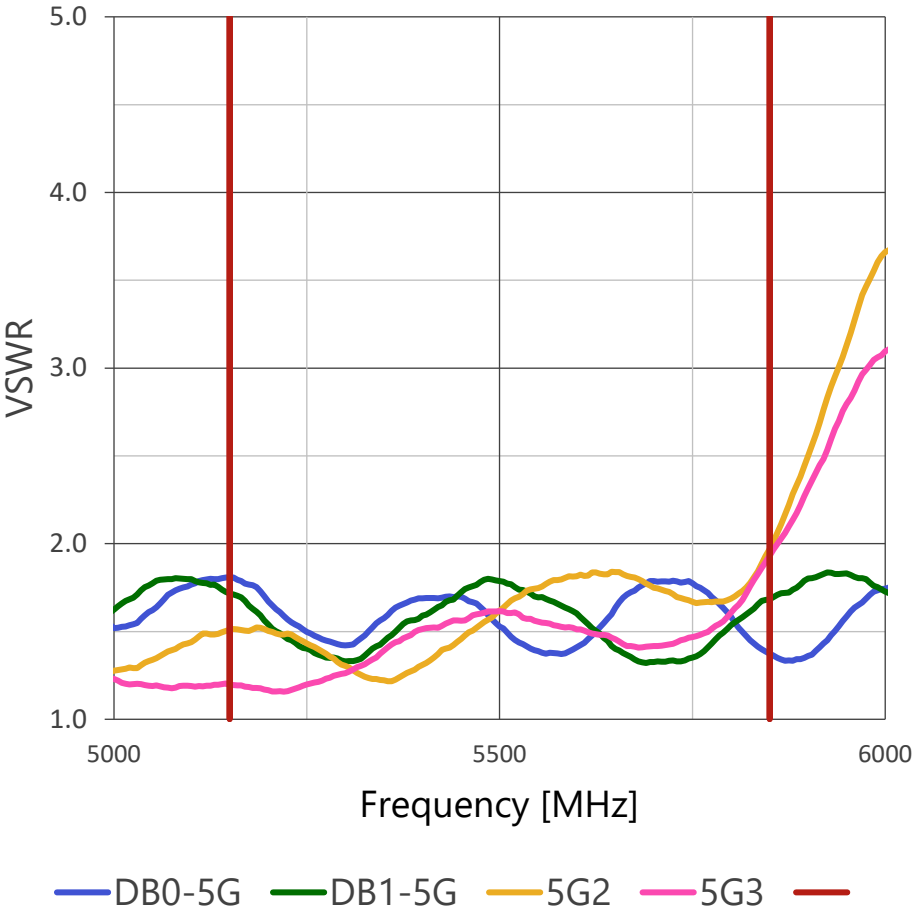
Wi-Fi 5G



- **Maximum VSWR**
 - 2.0:1 on 5GHz
- **Minimum Isolation**
 - 20.8dB on 5GHz
- **Average Efficiency**
 - ~63% on 5GHz
- **Peak Gain**
 - 6.8dBi on 5GHz

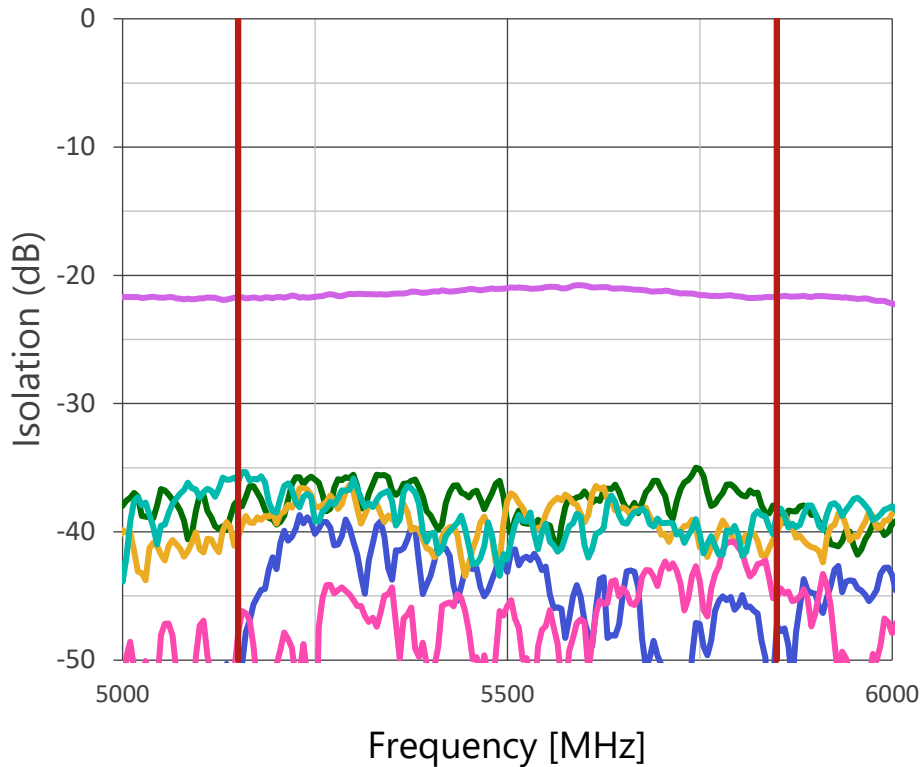
- **Cable Length**
 - DB0 : 327 mm
 - DB1 : 255 mm
 - 5G2 : 253 mm
 - 5G3 : 223 mm

VSWR Wi-Fi 5G



5GHz	Max	Mean	Min
DB0-5G	1.8	1.6	1.4
DB1-5G	1.8	1.5	1.3
5G2	2.0	1.6	1.2
5G3	1.9	1.4	1.2
Summary	2.0	1.5	1.2

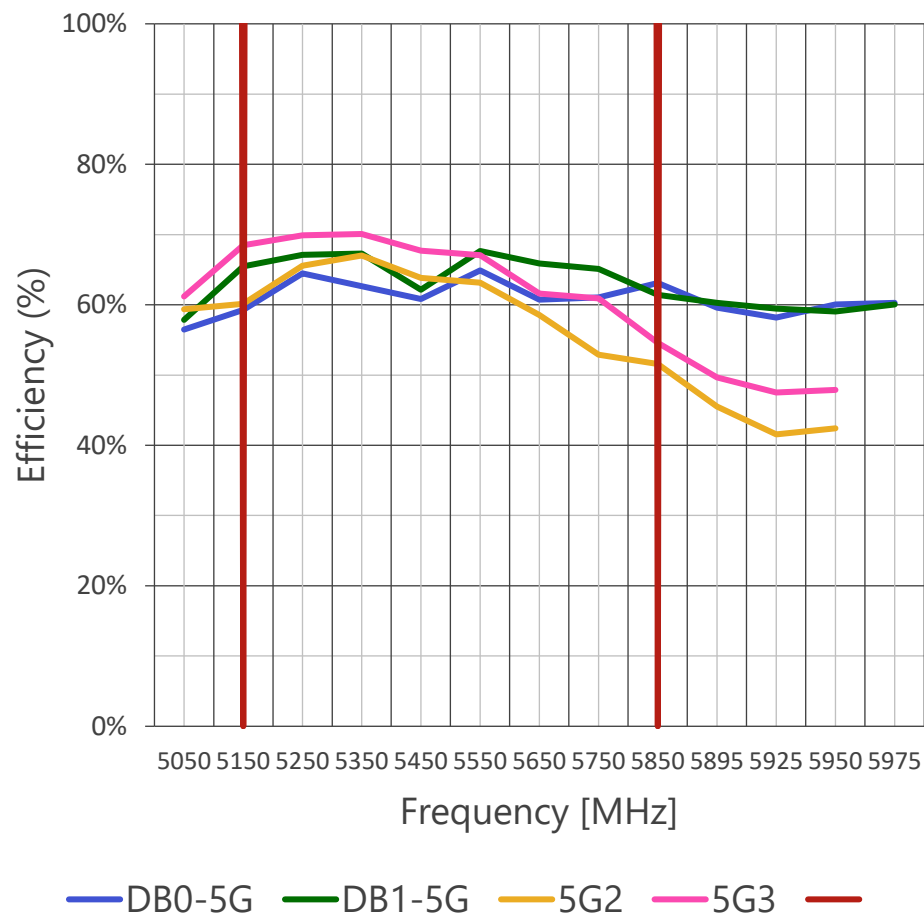
Isolation Wi-Fi 5G



— DB0_DB1 — DB0_5G2 — DB0_5G3 — DB1_5G2
— DB1_5G3 — 5G2_5G3 —

5GHz	Max	Mean	Min
DB0_DB1	-38.7	-44.5	-56.0
DB0_5G2	-35.0	-37.4	-41.5
DB0_5G3	-36.3	-39.1	-43.5
DB1_5G2	-40.8	-46.8	-60.0
DB1_5G3	-35.3	-39.1	-43.4
5G2_5G3	-20.8	-21.3	-21.8
Summary	-20.8	-38.0	-60.0

Efficiency Wi-Fi 5G



5GHz	Max	Mean	Min
DB0-5G	65 %	62 %	59 %
DB1-5G	68 %	65 %	61 %
5G2	67 %	60 %	52 %
5G3	70 %	65 %	55 %
Summary	70 %	63 %	52 %

■ Cable Length

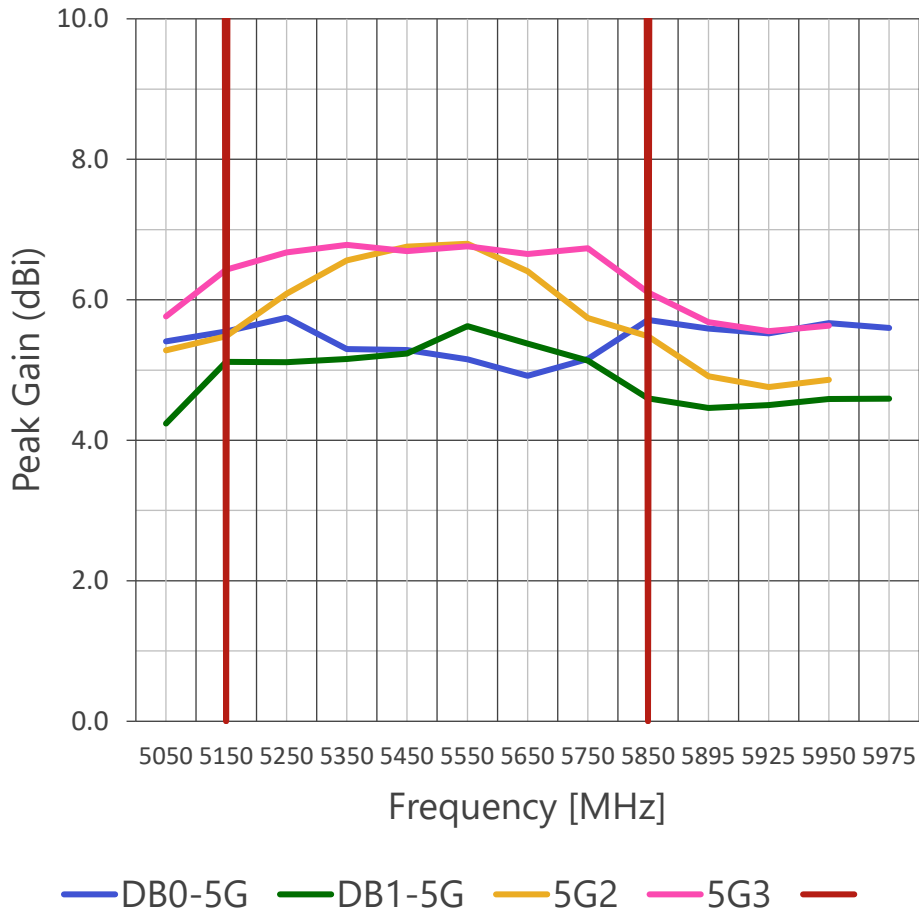
DB0 : 327 mm

DB1 : 225 mm

5G2 : 253 mm

5G3 : 223 mm

Peak Gain Wi-Fi 5G



5GHz	Max	Mean	Min
DB0-5G	5.7 dBi	5.4 dBi	4.9 dBi
DB1-5G	5.6 dBi	5.2 dBi	4.6 dBi
5G2	6.8 dBi	6.2 dBi	5.5 dBi
5G3	6.8 dBi	6.6 dBi	6.1 dBi
Summary	6.8 dBi	5.8 dBi	4.6 dBi

■ Cable Length

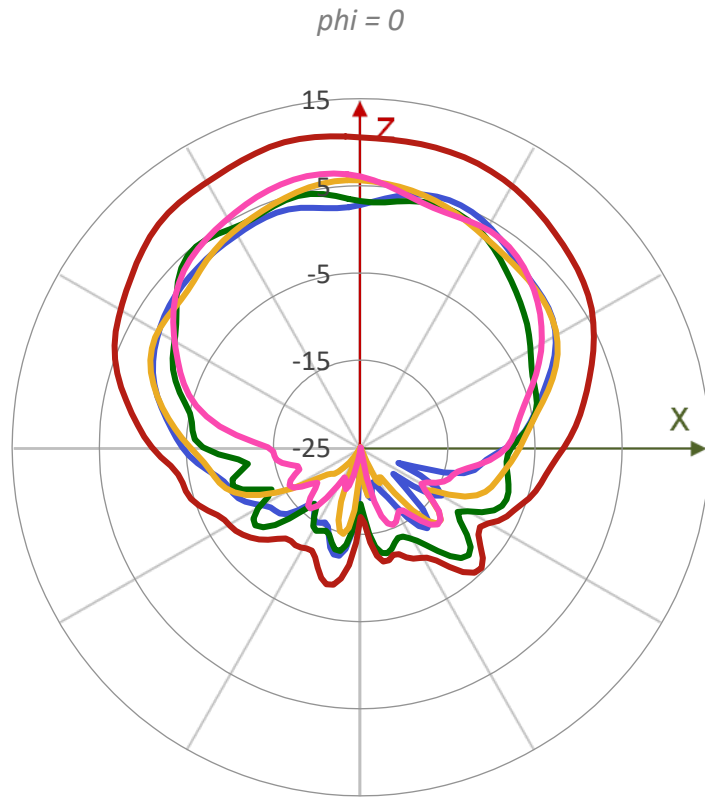
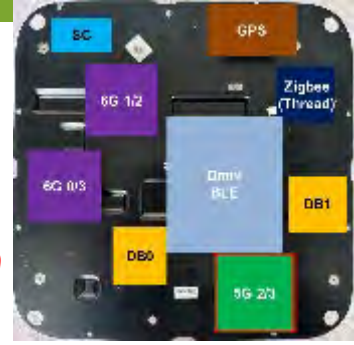
DB0 : 327 mm

DB1 : 225 mm

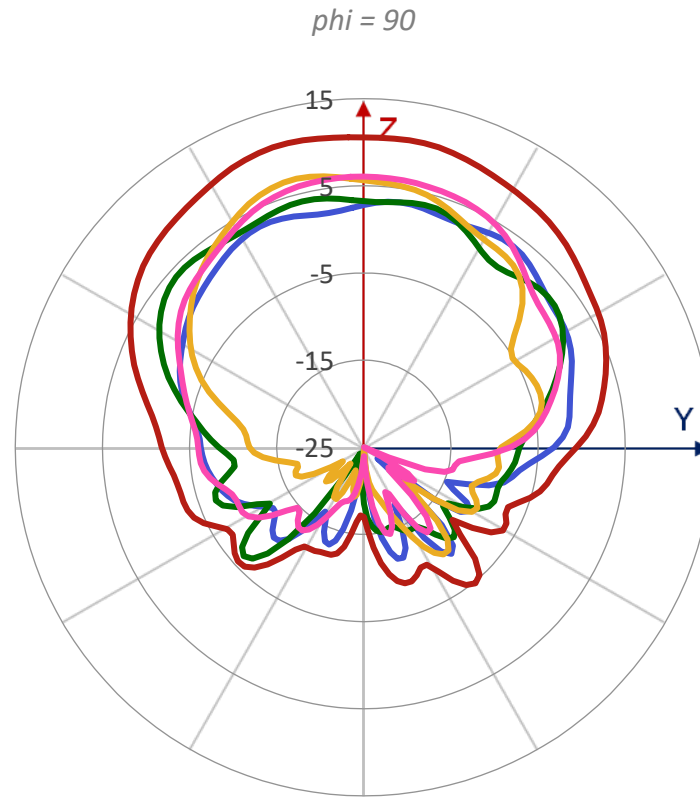
5G2 : 253 mm

5G3 : 223 mm

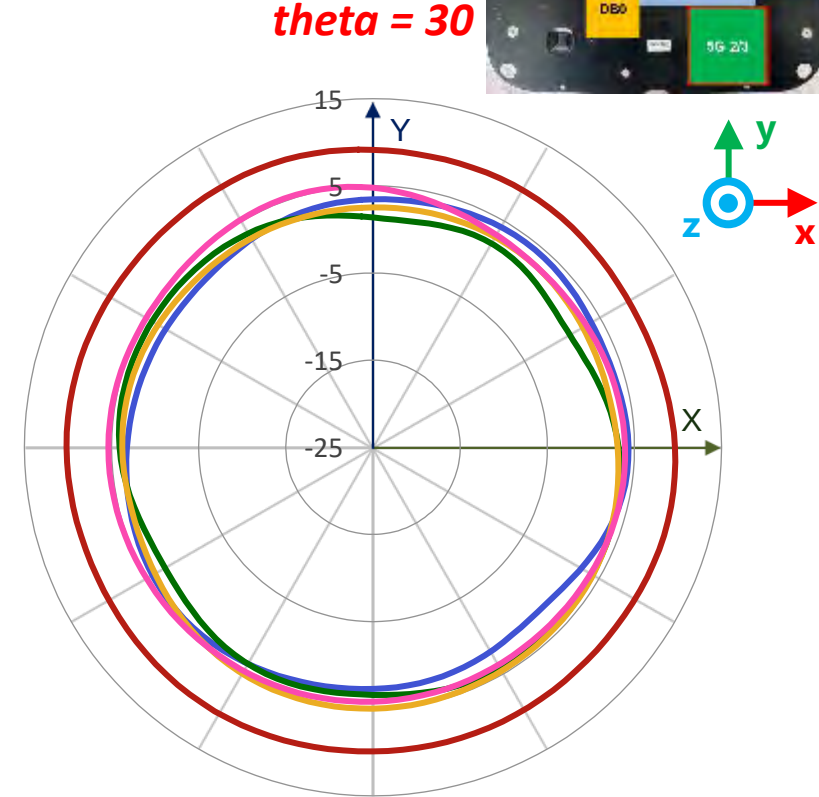
Realized Gain Pattern Wi-Fi 5G @5550MHz_V+H



DB0-5G DB1-5G 5G2
5G3 Composite

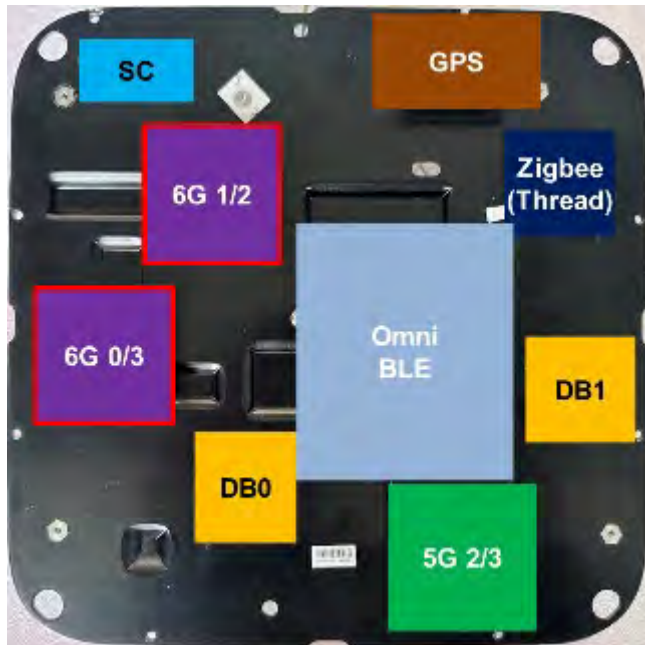


DB0-5G DB1-5G 5G2
5G3 Composite



DB0-5G DB1-5G 5G2
5G3 Composite

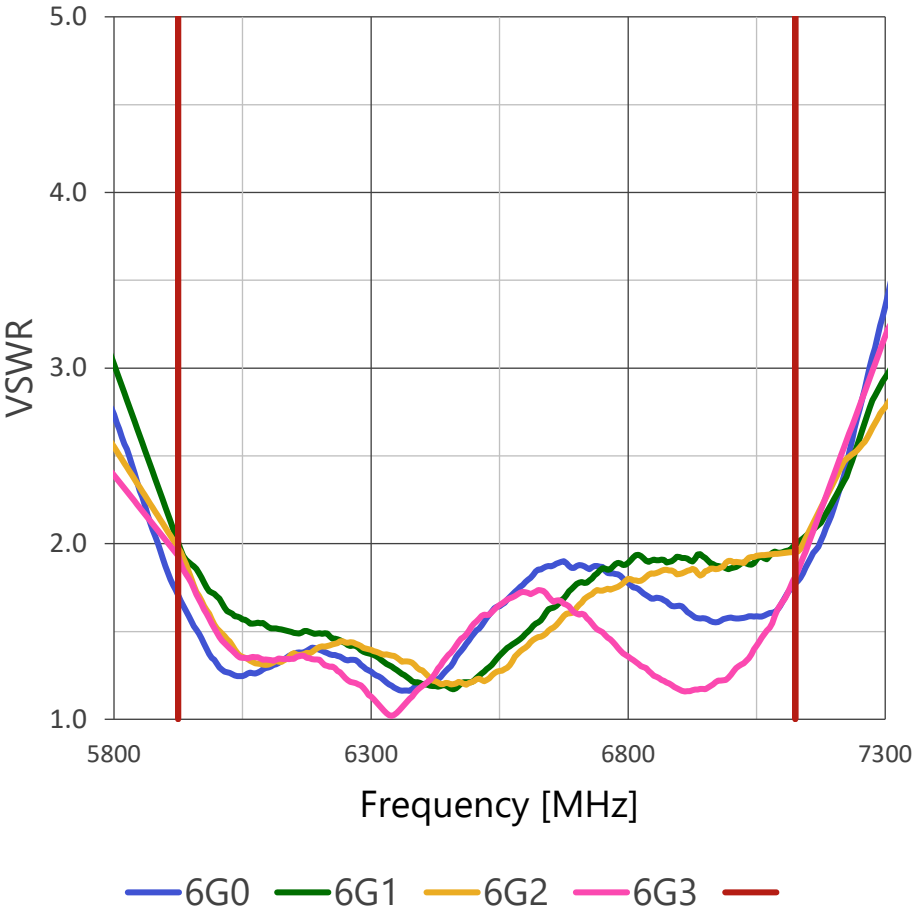
Wi-Fi 6G



- **Maximum VSWR**
 - 2.0:1 on 6GHz
- **Minimum Isolation**
 - 20.0dB on 6GHz
- **Average Efficiency**
 - ~56% on 6GHz
- **Peak Gain**
 - 6.6dBi on 6GHz

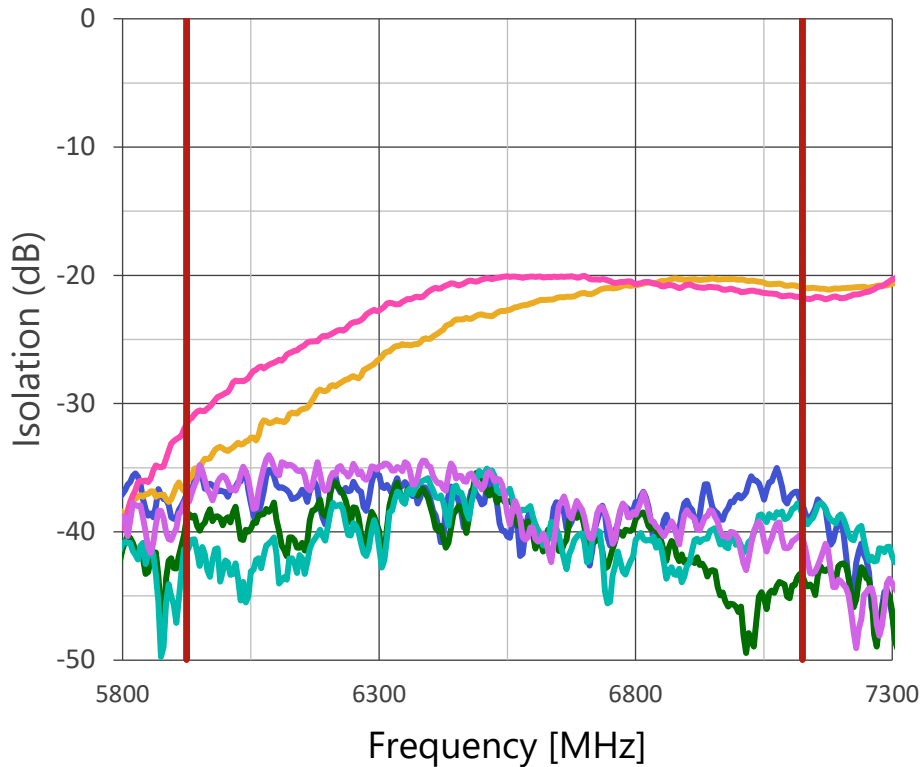
- **Cable Length**
 - 6G0 : 138 mm
 - 6G1 : 90 mm
 - 6G2 : 105 mm
 - 6G3 : 160 mm

VSWR Wi-Fi 6G



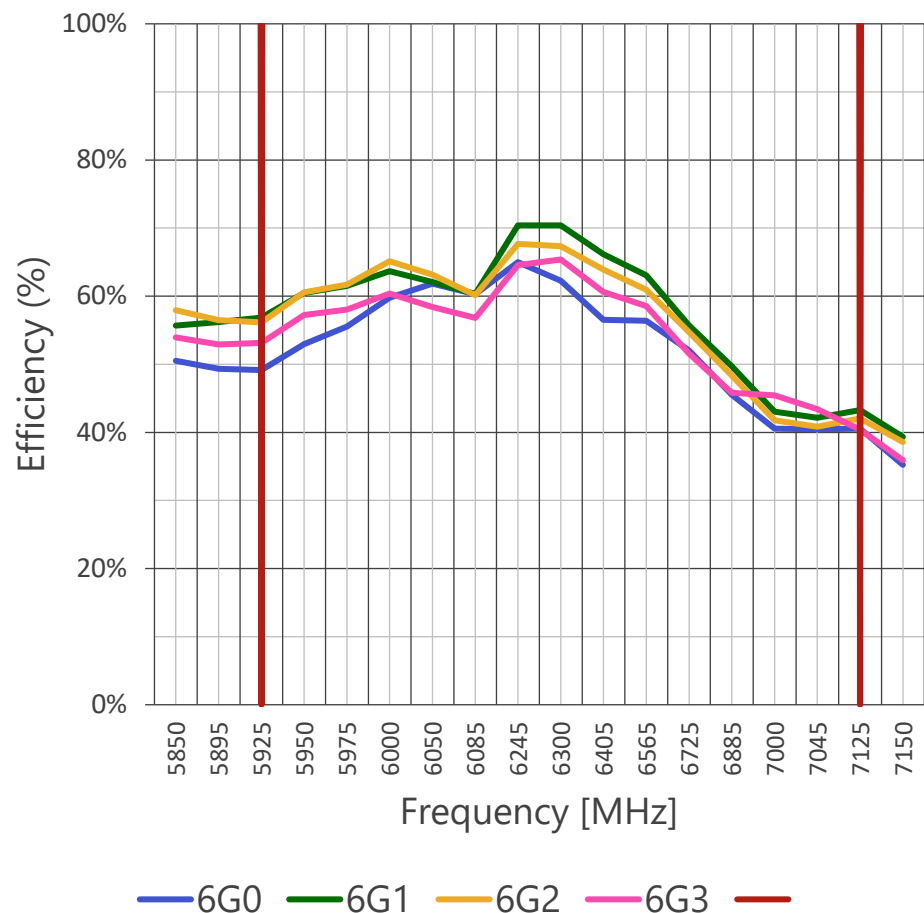
6GHz	Max	Mean	Min
6G0	1.9	1.5	1.2
6G1	2.0	1.6	1.1
6G2	2.0	1.5	1.2
6G3	1.9	1.4	1.0
Summary	2.0	1.5	1.0

Isolation Wi-Fi 6G



6GHz	Max	Mean	Min
6G0_6G1	-35.0	-37.7	-42.6
6G0_6G2	-35.4	-40.2	-49.4
6G0_6G3	-20.2	-24.8	-36.2
6G1_6G2	-20.0	-22.7	-31.6
6G1_6G3	-35.1	-40.2	-45.6
6G2_6G3	-34.0	-37.6	-43.0
Summary	-20.0	-33.8	-49.4

Efficiency Wi-Fi 6G



6GHz	Max	Mean	Min
6G0	65 %	53 %	40 %
6G1	70 %	58 %	42 %
6G2	68 %	57 %	41 %
6G3	65 %	55 %	40 %
Summary	70 %	56 %	40 %

■ Cable Length

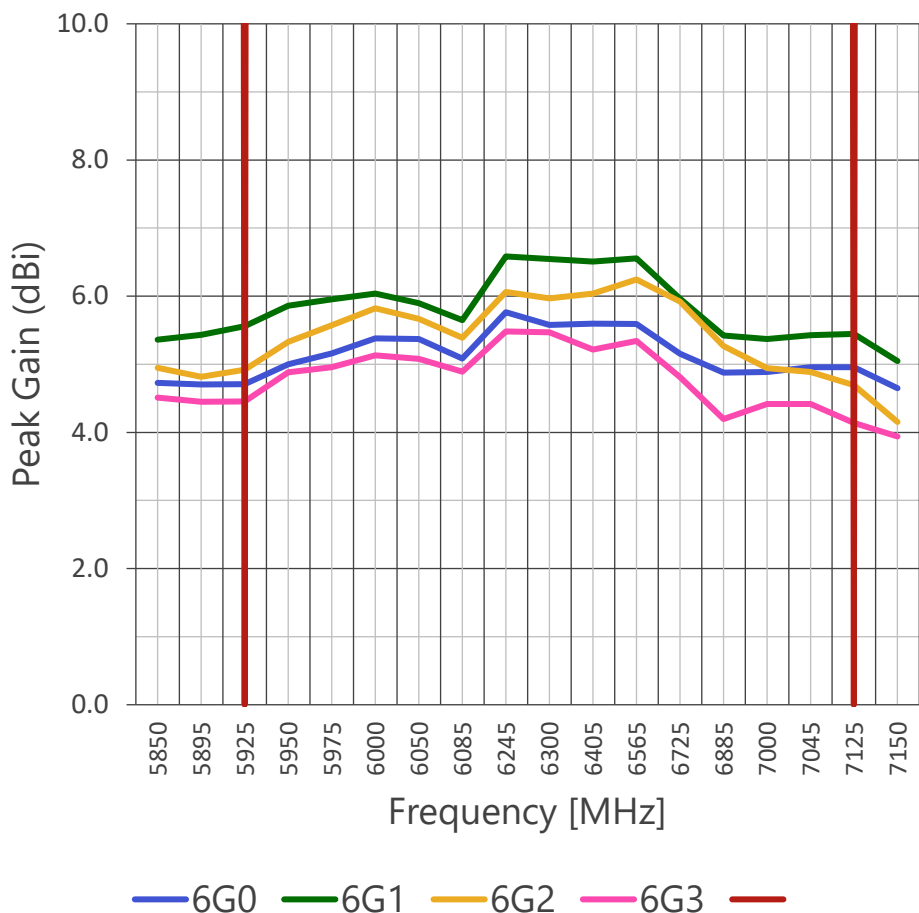
6G0 : 138 mm

6G1 : 90 mm

6G2 : 105 mm

6G3 : 160 mm

Peak Gain Wi-Fi 6G



6GHz	Max	Mean	Min
6G0	5.8 dBi	5.2 dBi	4.7 dBi
6G1	6.6 dBi	5.9 dBi	5.4 dBi
6G2	6.2 dBi	5.5 dBi	4.7 dBi
6G3	5.5 dBi	4.9 dBi	4.1 dBi
Summary	6.6 dBi	5.4 dBi	4.1 dBi

■ Cable Length

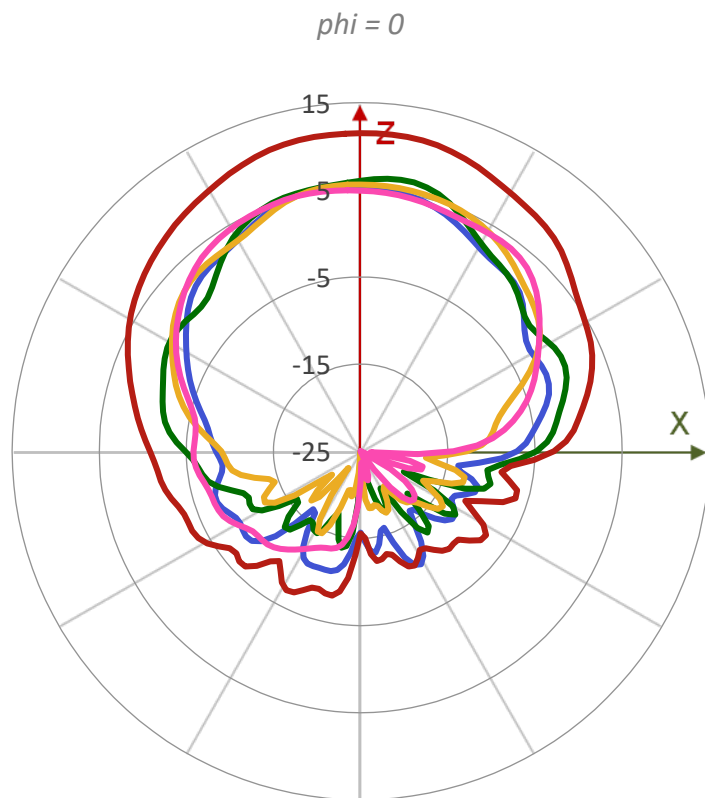
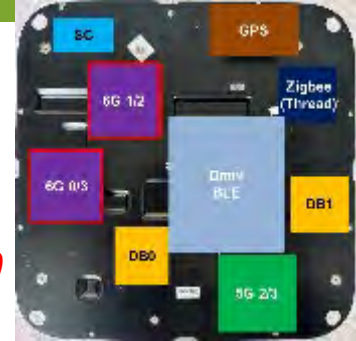
6G0 : 138 mm

6G1 : 90 mm

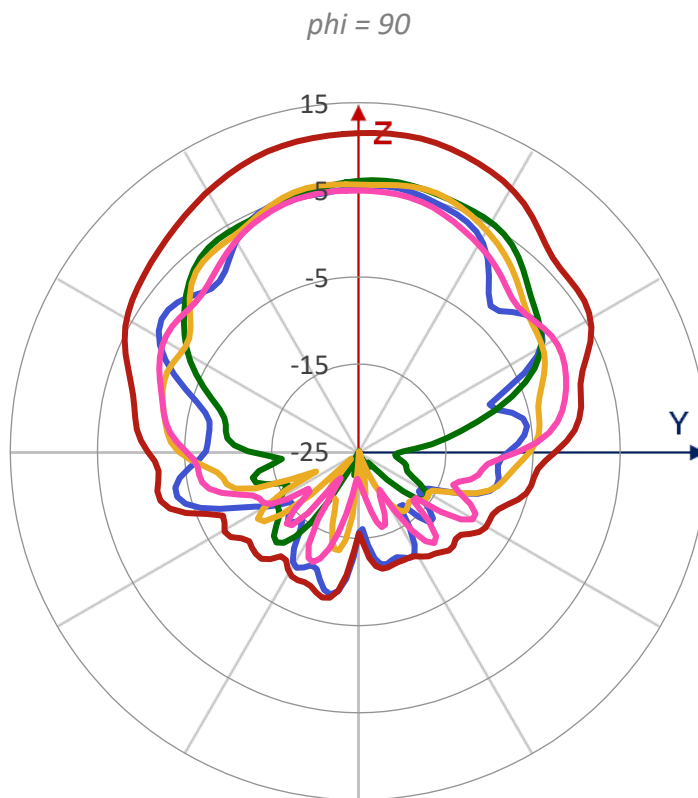
6G2 : 105 mm

6G3 : 160 mm

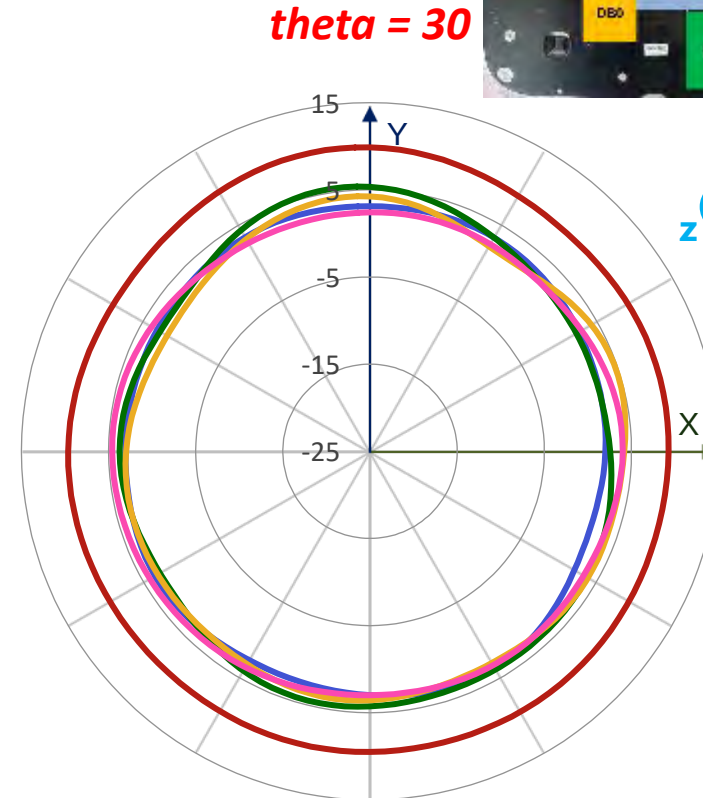
Realized Gain Pattern Wi-Fi 6G @6565MHz_V+H



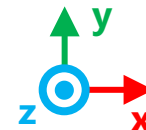
— 6G0 — 6G1 — 6G2
— 6G3 — Composite



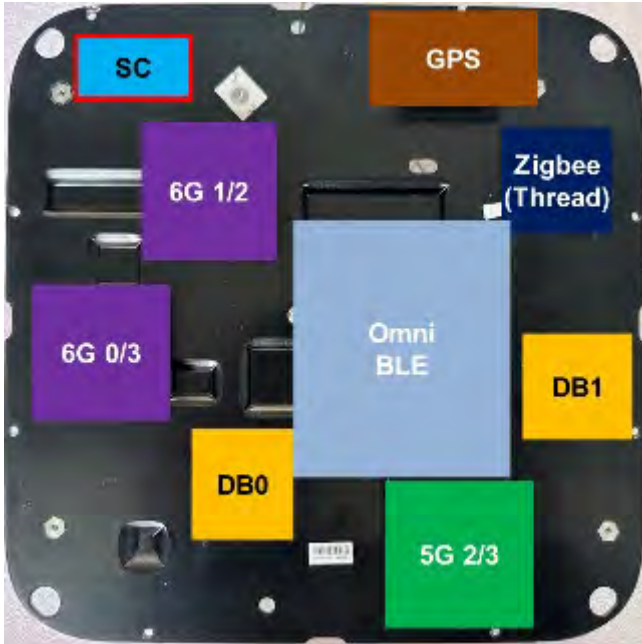
— 6G0 — 6G1 — 6G2
— 6G3 — Composite



— 6G0 — 6G1 — 6G2
— 6G3 — Composite

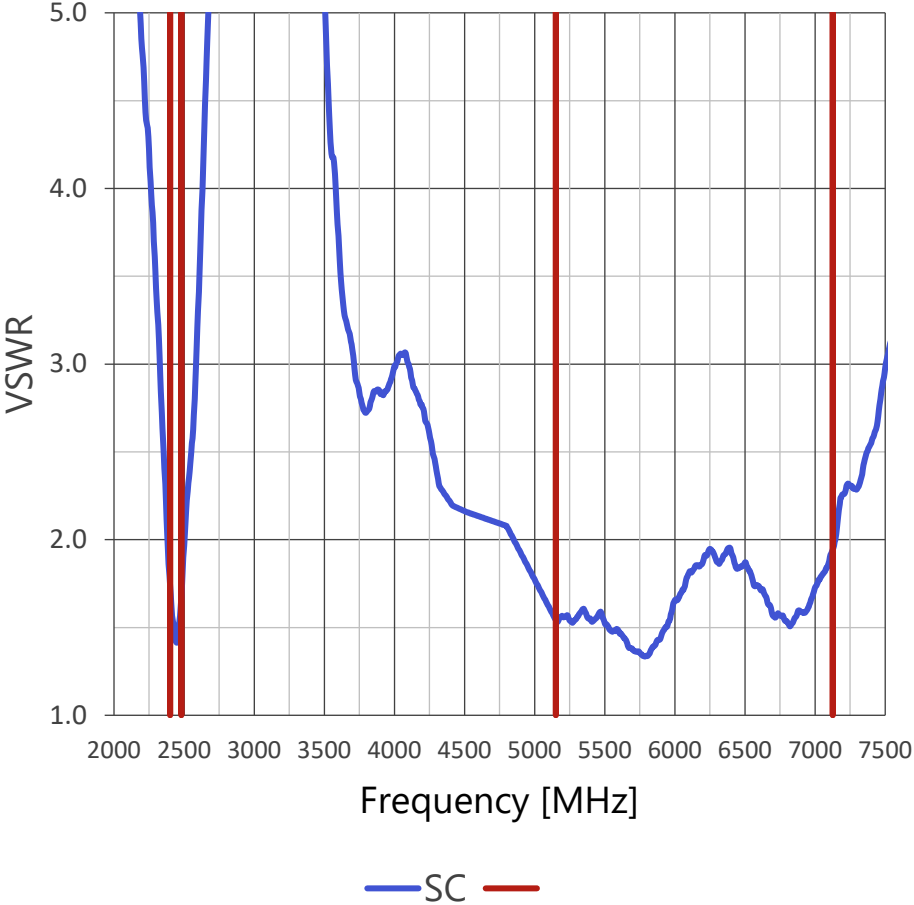


Scan



- **Maximum VSWR**
 - 1.7:1 on 2.4GHz / 1.9:1 on 5/6GHz
 - **Average Efficiency**
 - ~69% on 2.4GHz / ~70% on 5GHz / ~65% on 6GHz
 - **Peak Gain**
 - 5.2dBi on 2.4GHz / 6.0dBi on 5GHz / 6.0dBi on 6GHz
- **Cable Length**
SC : 87 mm

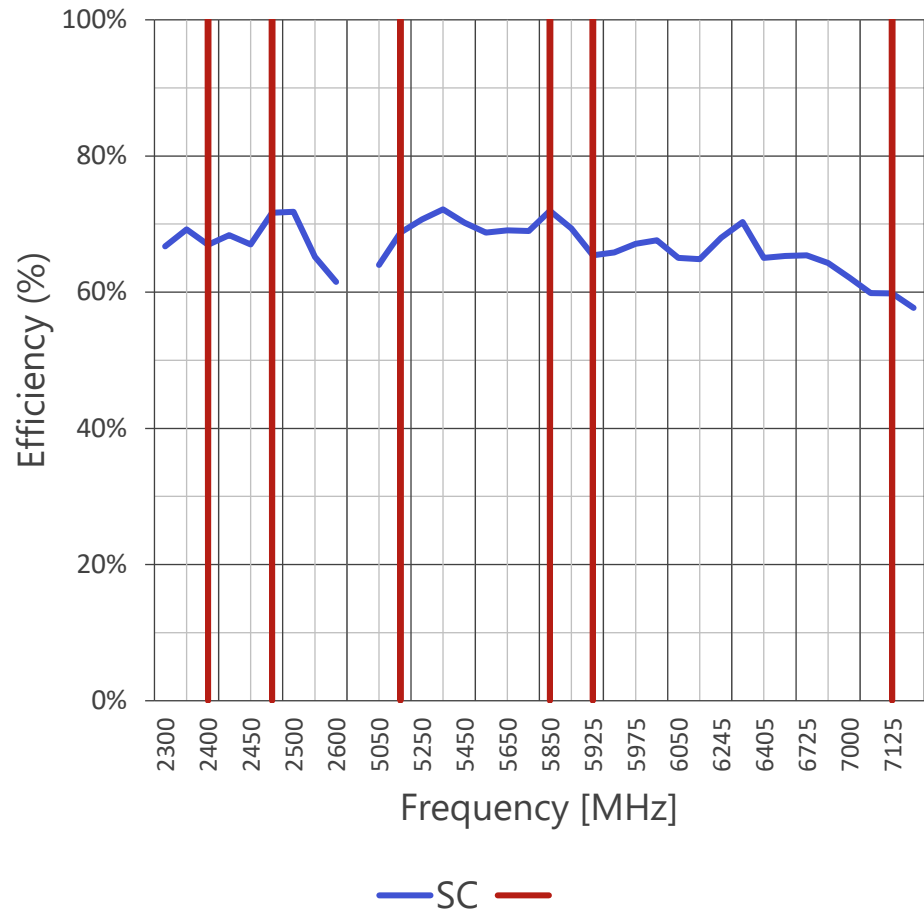
VSWR Scan



2.4GHz	Max	Mean	Min
SC	1.7	1.5	1.4

5/6GHz	Max	Mean	Min
SC	1.9	1.6	1.3

Efficiency Scan



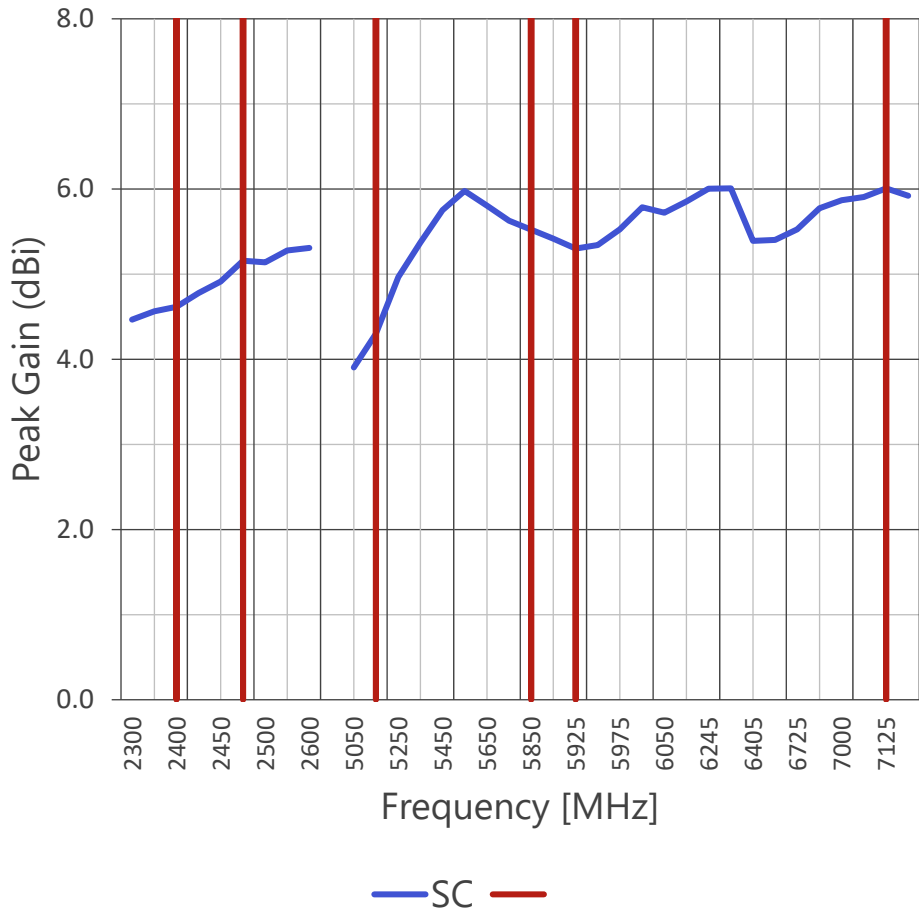
2.4GHz	Max	Mean	Min
SC	72 %	69 %	67 %

5GHz	Max	Mean	Min
SC	72 %	70 %	69 %

6GHz	Max	Mean	Min
SC	70 %	65 %	60 %

■ Cable Length
SC : 87 mm

Peak Gain Scan



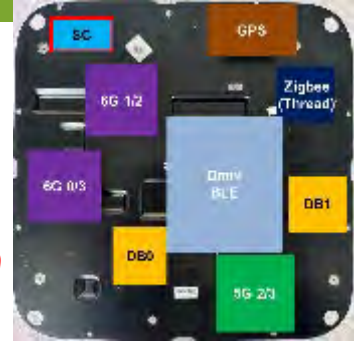
2.4GHz	Max	Mean	Min
SC	5.2 dBi	4.9 dBi	4.6 dBi

5GHz	Max	Mean	Min
SC	6.0 dBi	5.4 dBi	4.3 dBi

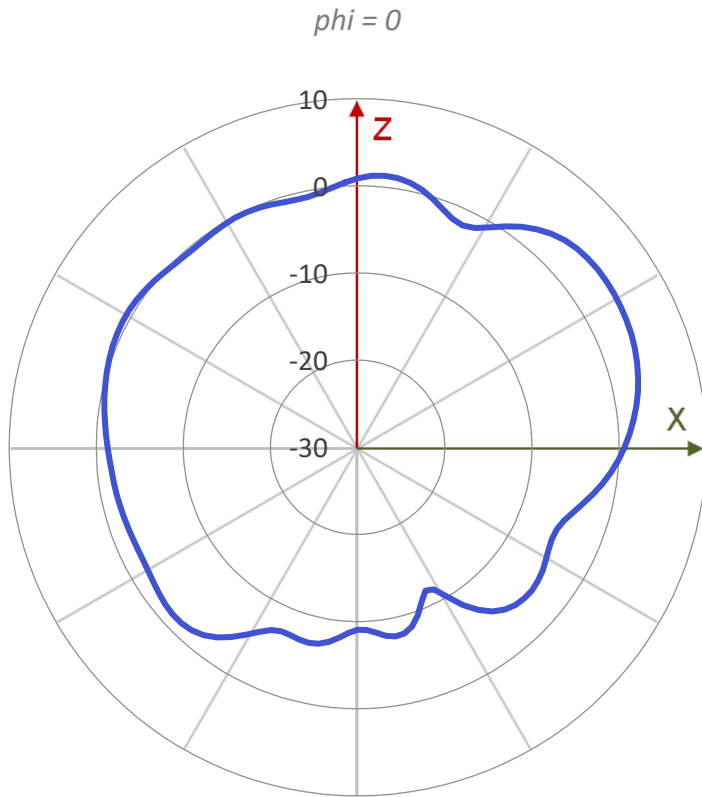
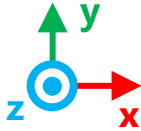
6GHz	Max	Mean	Min
SC	6.0 dBi	5.7 dBi	5.3 dBi

■ Cable Length
SC : 87 mm

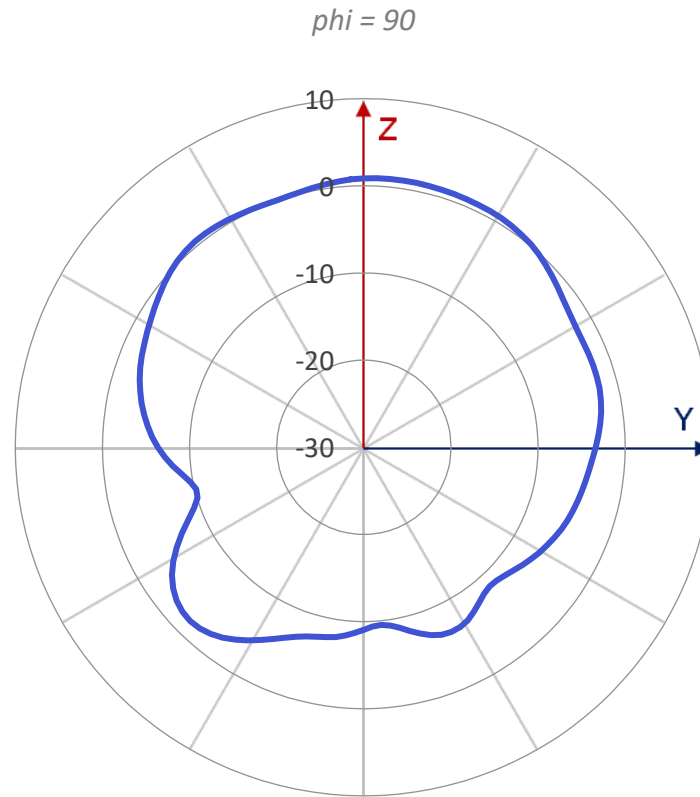
Realized Gain Pattern Scan @2450MHz_V+H



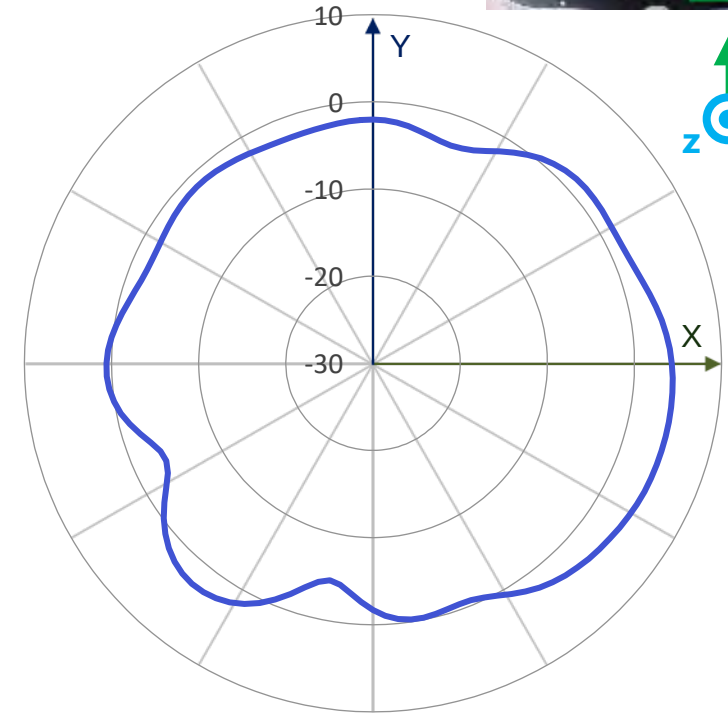
theta = 60



— SC

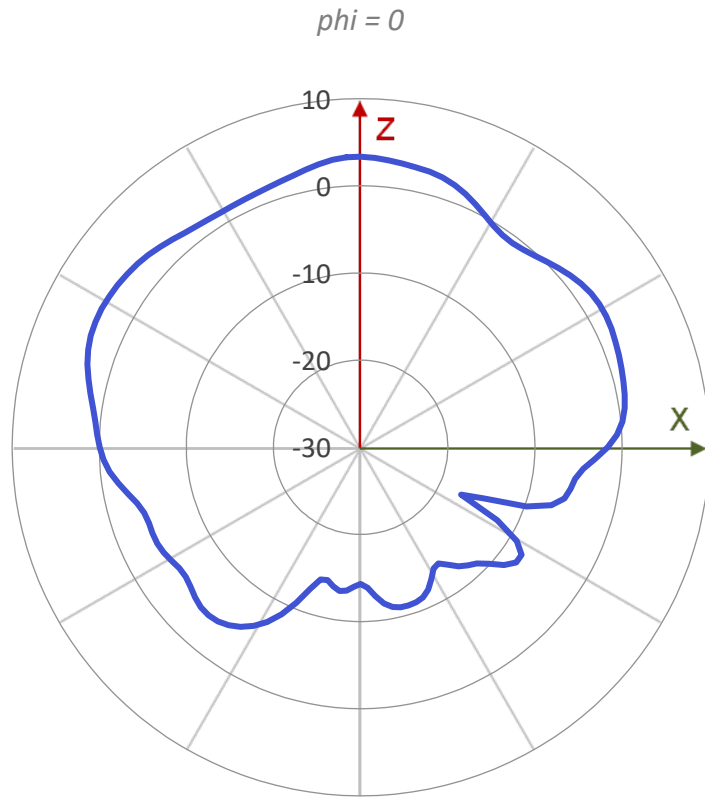
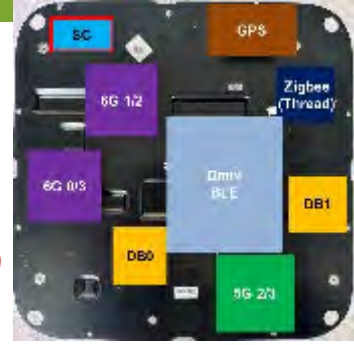


— SC

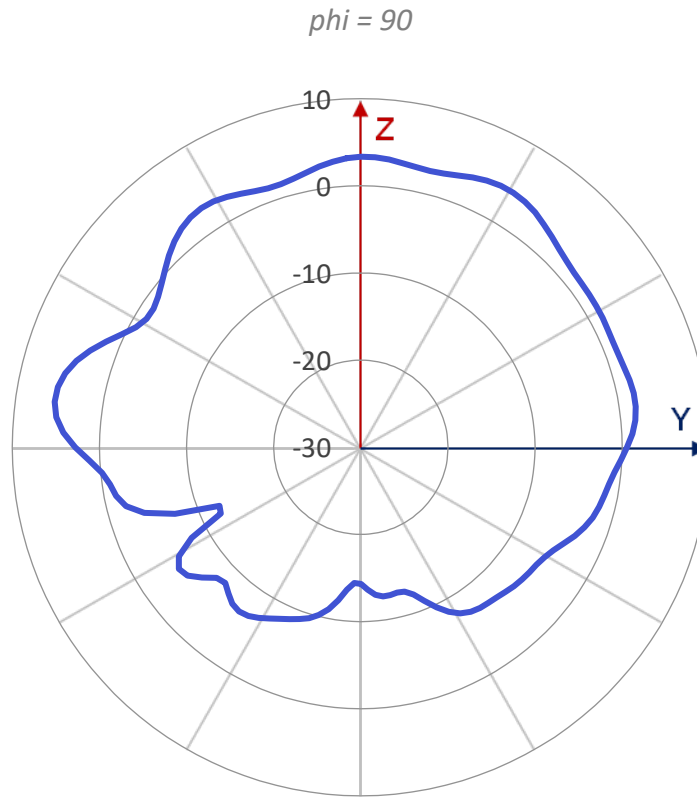


— SC

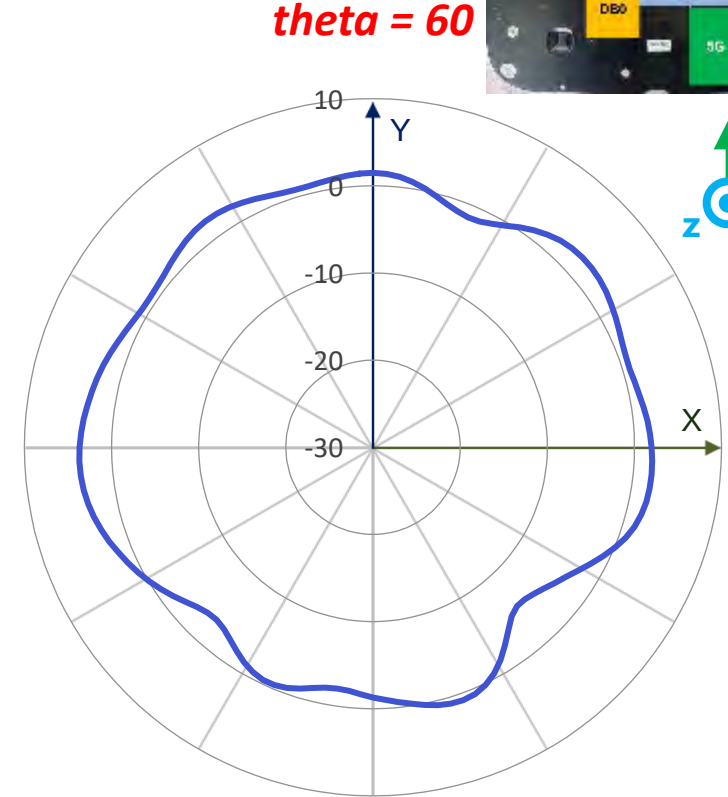
Realized Gain Pattern Scan @5550MHz_V+H



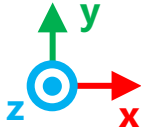
— SC



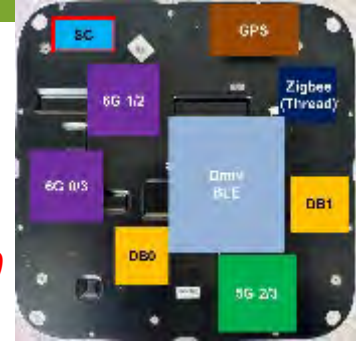
— SC



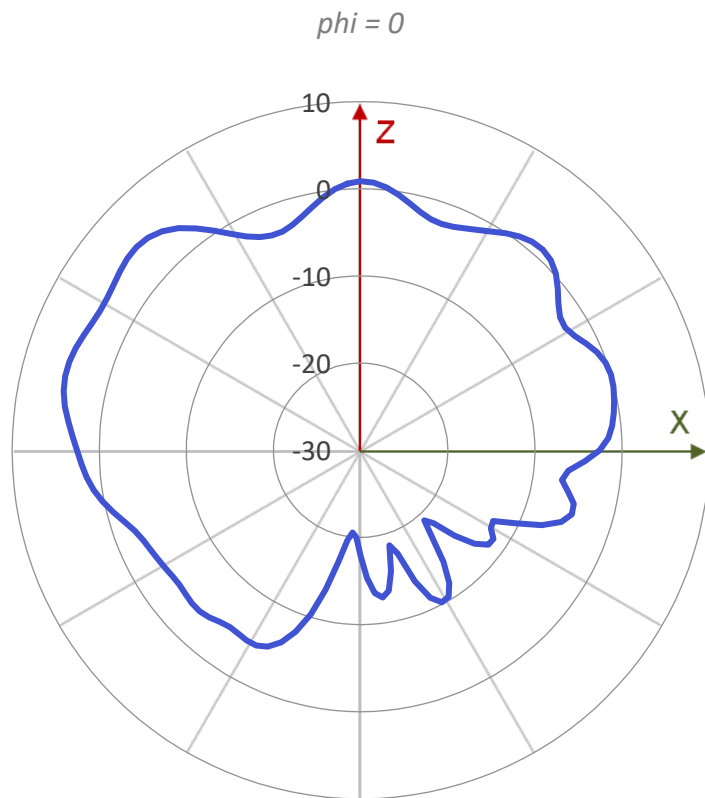
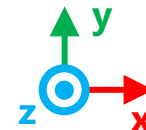
— SC



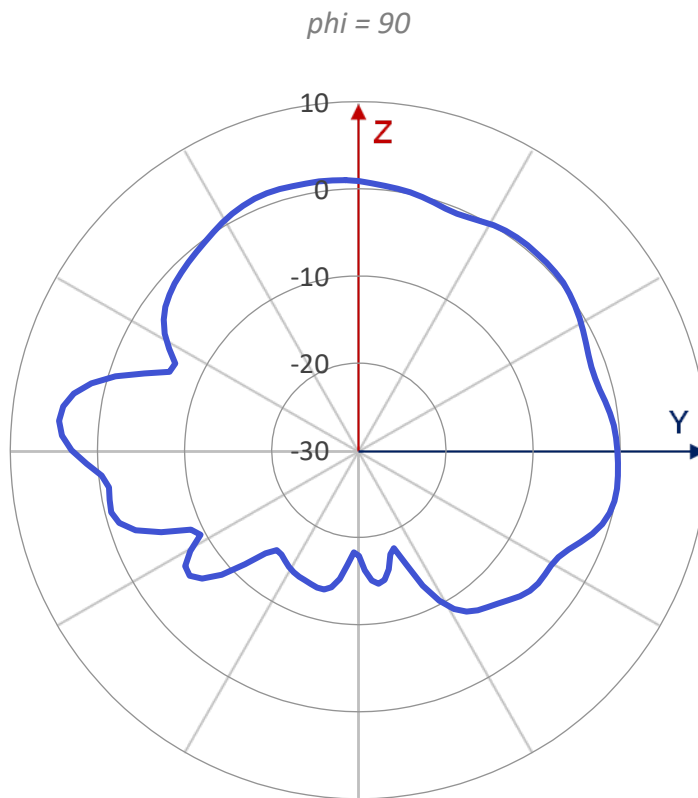
Realized Gain Pattern Scan @6565MHz_V+H



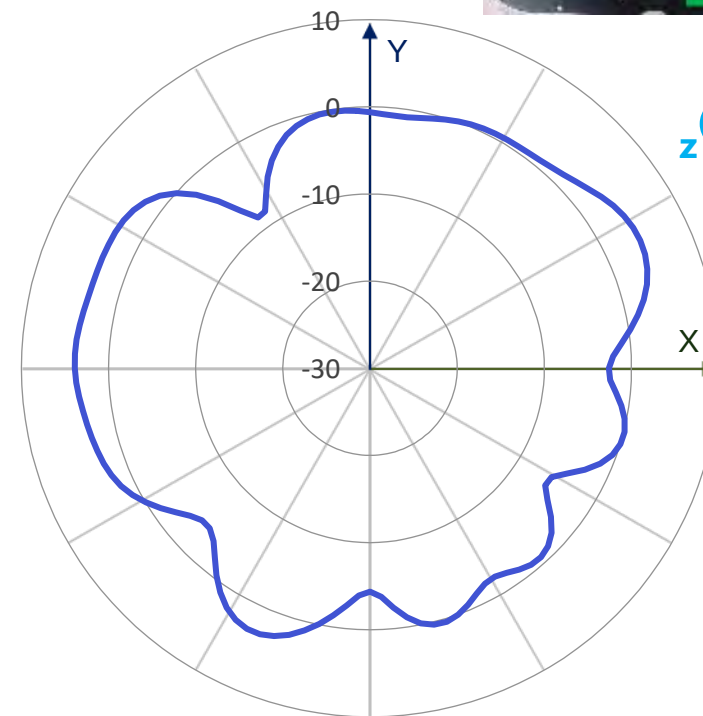
theta = 60



— SC

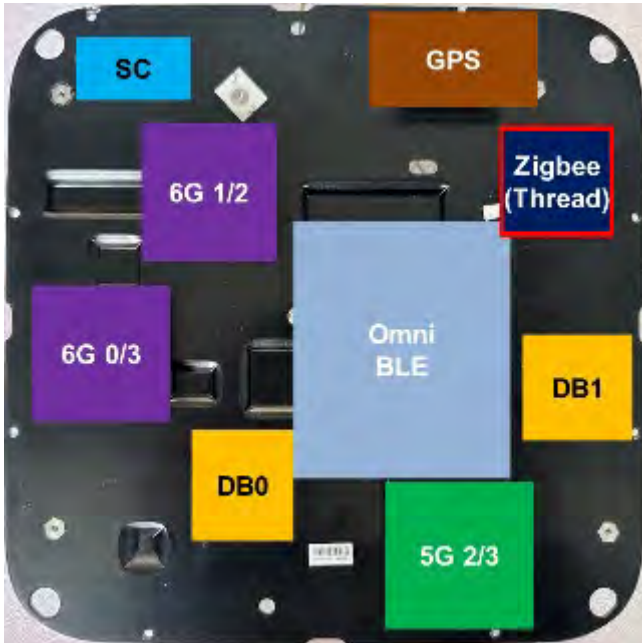


— SC



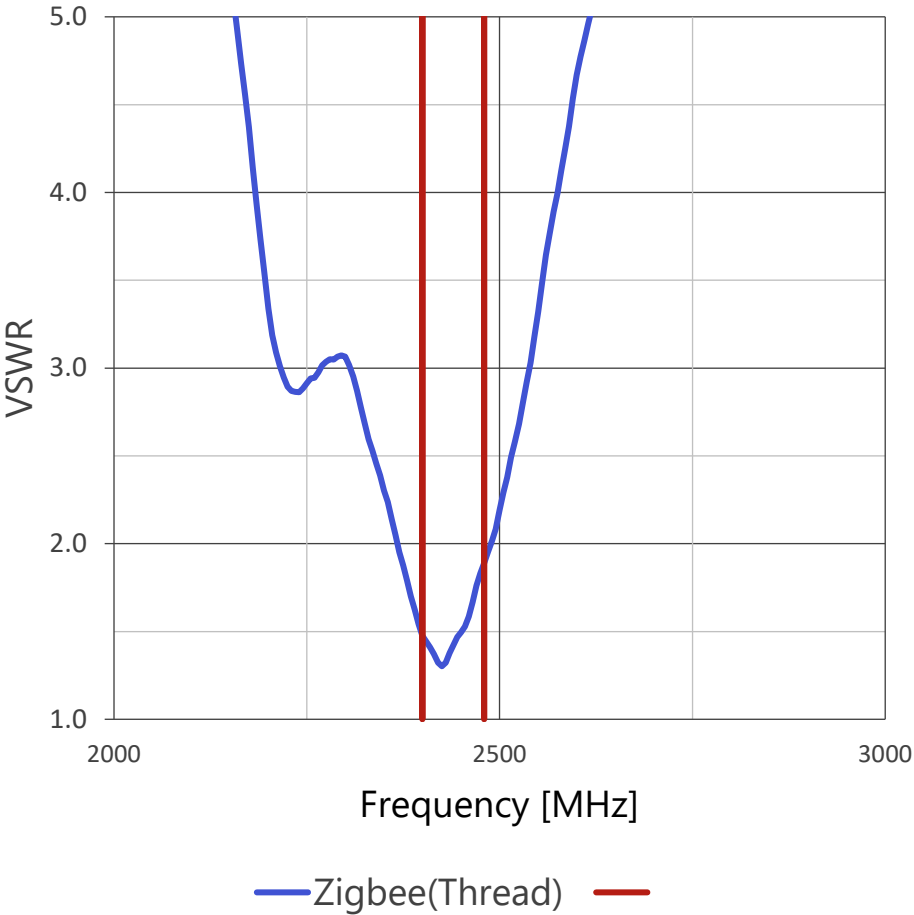
— SC

Zigbee(Thread)



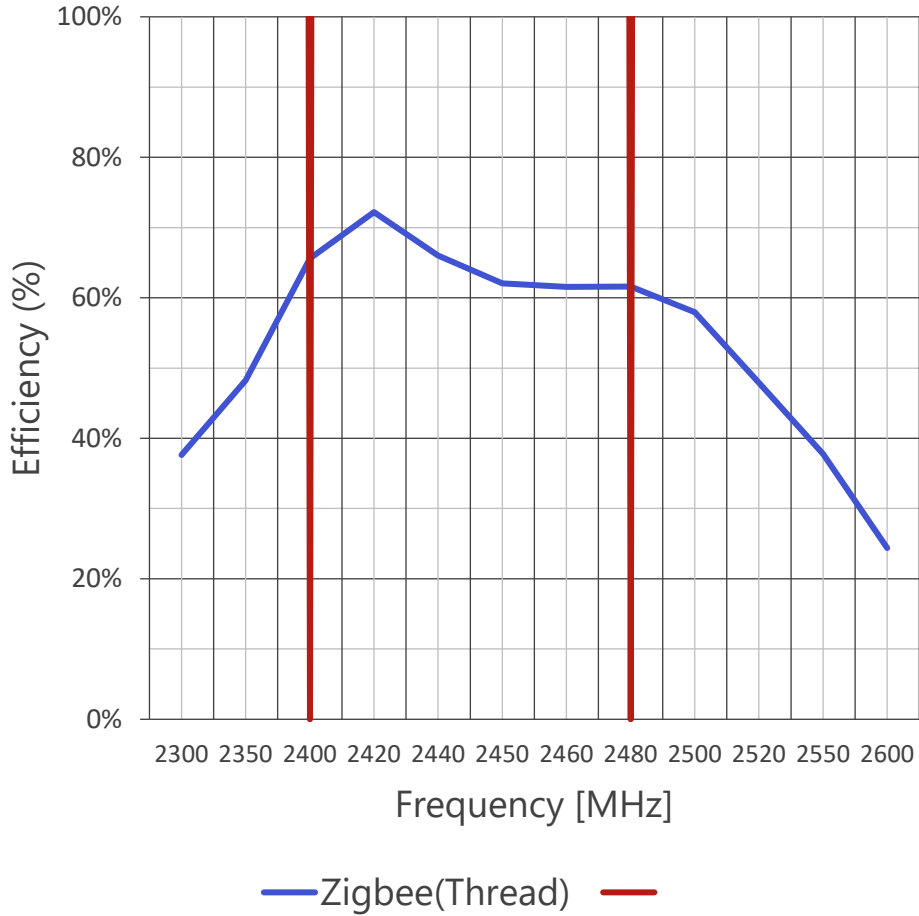
- **Maximum VSWR**
 - 1.9:1 on 2.4GHz
 - **Average Efficiency**
 - ~65% on 2.4GHz
 - **Peak Gain**
 - 6.6dBi on 2.4GHz
- **Cable Length**
Zigbee(Thread) : 143 mm

VSWR Zigbee(Thread)



2.4GHz	Max	Mean	Min
Zigbee(Thread)	1.9	1.5	1.3

Efficiency Zigbee(Thread)

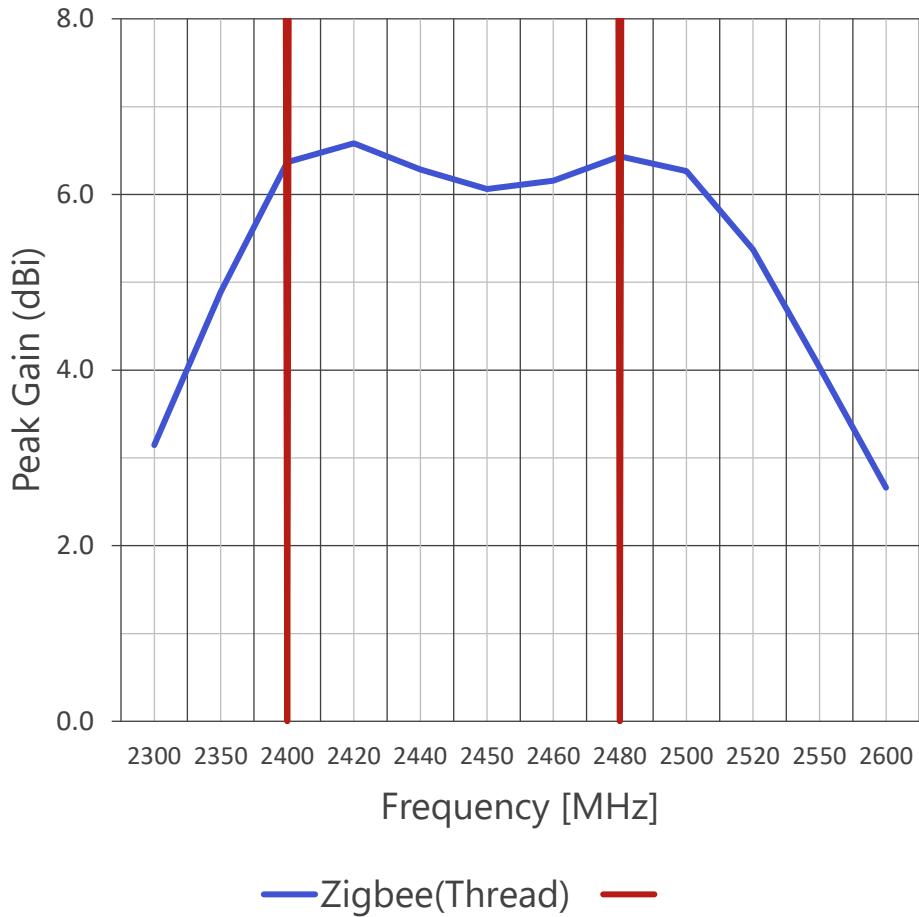


2.4GHz	Max	Mean	Min
Zigbee(Thread)	72 %	65 %	62 %

■ Cable Length

Zigbee(Thread) : 143 mm

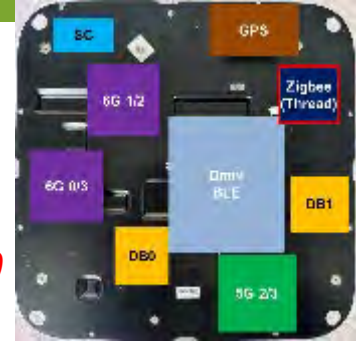
Peak Gain Zigbee(Thread)



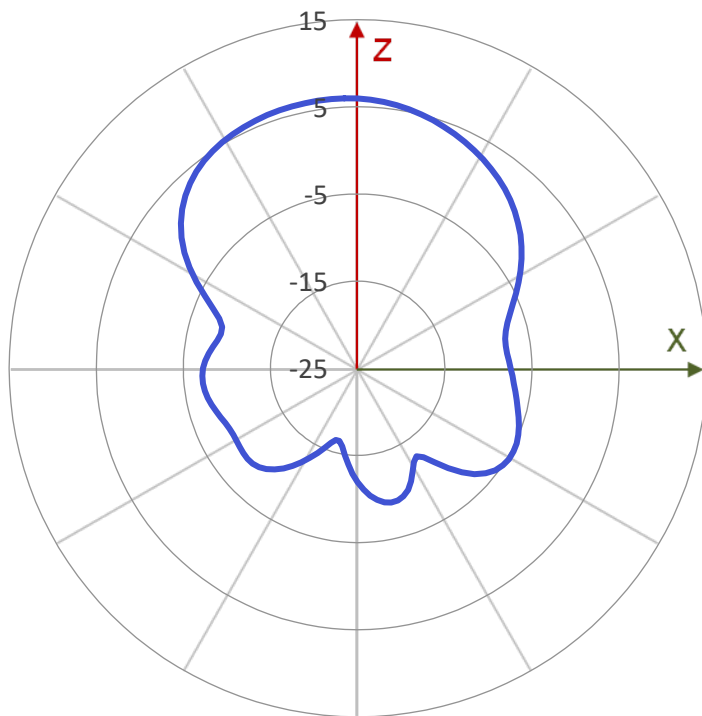
2.4GHz	Max	Mean	Min
Zigbee(Thread)	6.6 dBi	6.3 dBi	6.1 dBi

■ Cable Length
Zigbee(Thread) 143 mm

Realized Gain Pattern Zigbee(Thread) @2450MHz_V+H

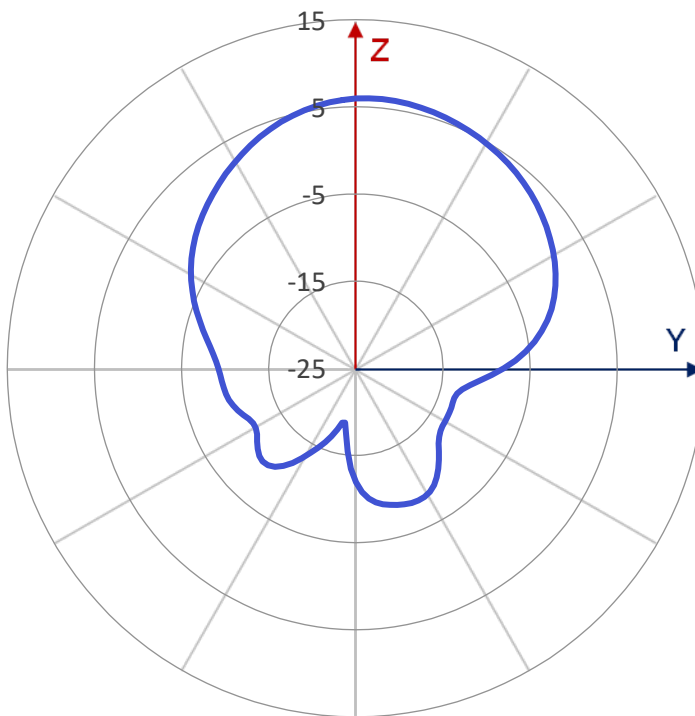


$\phi = 0$



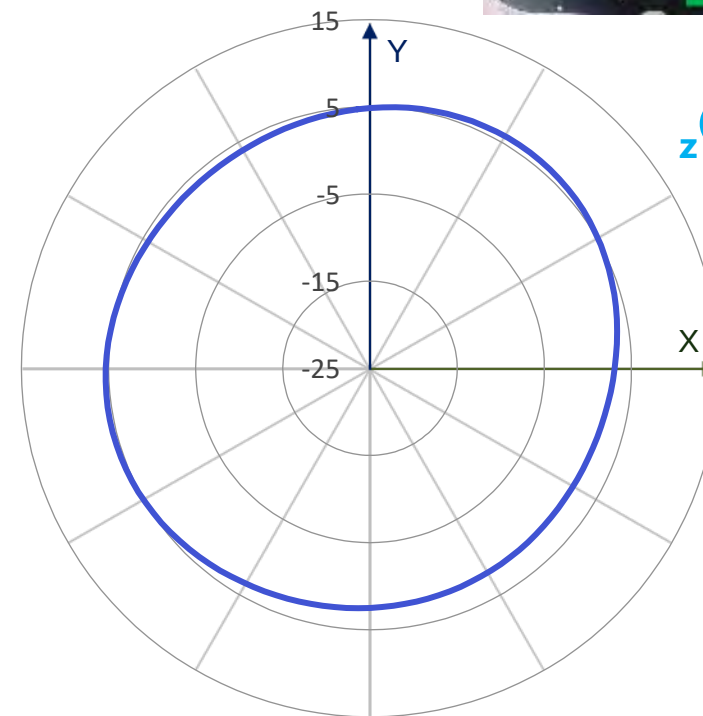
— Zigbee(Thread)

$\phi = 90$

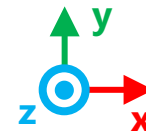


— Zigbee(Thread)

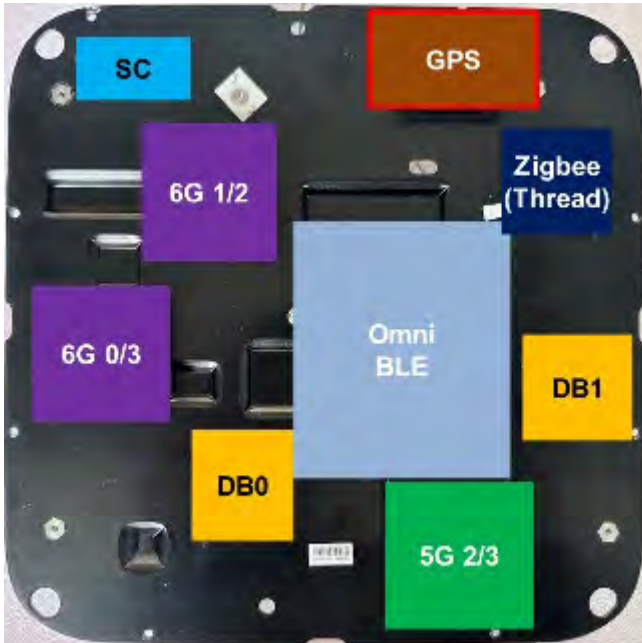
$\theta = 30$



— Zigbee(Thread)



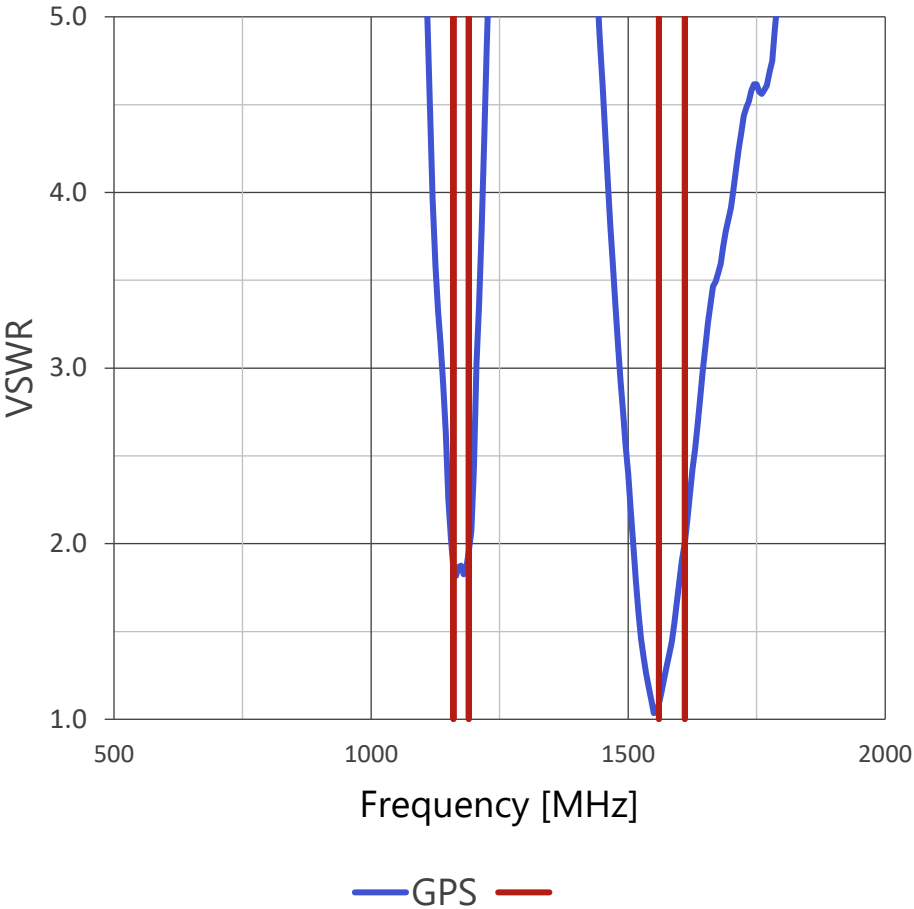
GPS



- **Maximum VSWR**
 - 2.0:1 on L1 / 1.9:1 on L5
- **Minimum Isolation**
 - 34.9dB on L1 / 23.0dB on L5 / 35.7dB on 2.4GHz
- **Average Efficiency**
 - ~61% on L1 / ~51% on L5
- **Peak Gain**
 - 4.4dBi on L1 / 2.7dBi on L5

■ **Cable Length**
GPS : 107 mm

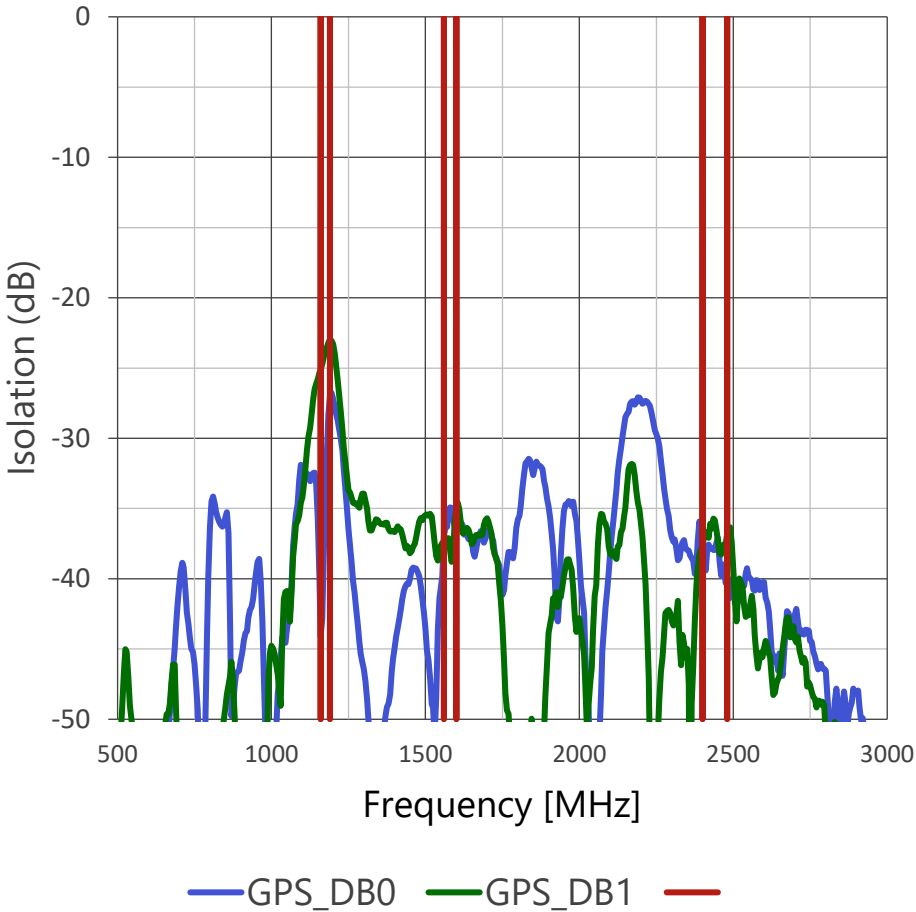
VSWR GPS



L1	Max	Mean	Min
GPS	2.0	1.5	1.1

L5	Max	Mean	Min
GPS	1.9	1.8	1.8

Isolation GPS

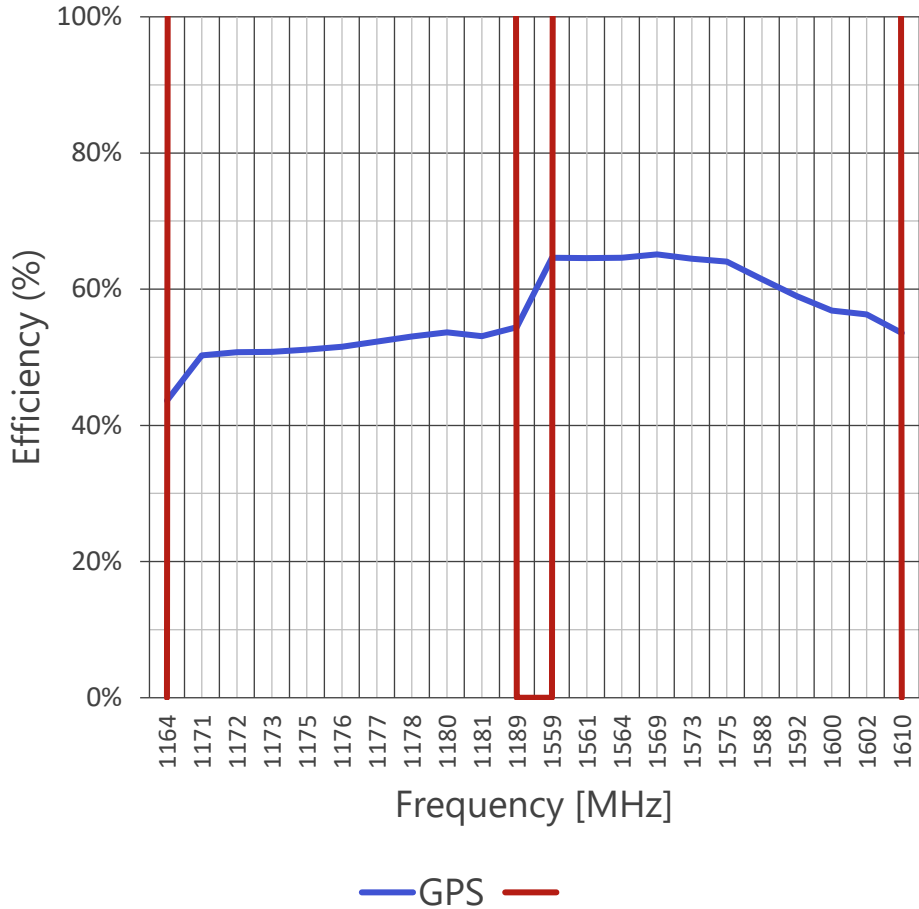


L1	Max	Mean	Min
GPS_DB0	-34.9	-35.9	-37.0
GPS_DB1	-35.0	-37.2	-38.8
Summary	-34.9	-36.5	-38.8

L5	Max	Mean	Min
GPS_DB0	-27.0	-35.0	-44.1
GPS_DB1	-23.0	-23.9	-25.1
Summary	-23.0	-29.4	-44.1

2.4GHz	Max	Mean	Min
GPS_DB0	-37.1	-38.5	-40.3
GPS_DB1	-35.7	-37.0	-38.3
Summary	-35.7	-37.8	-40.3

Efficiency GPS

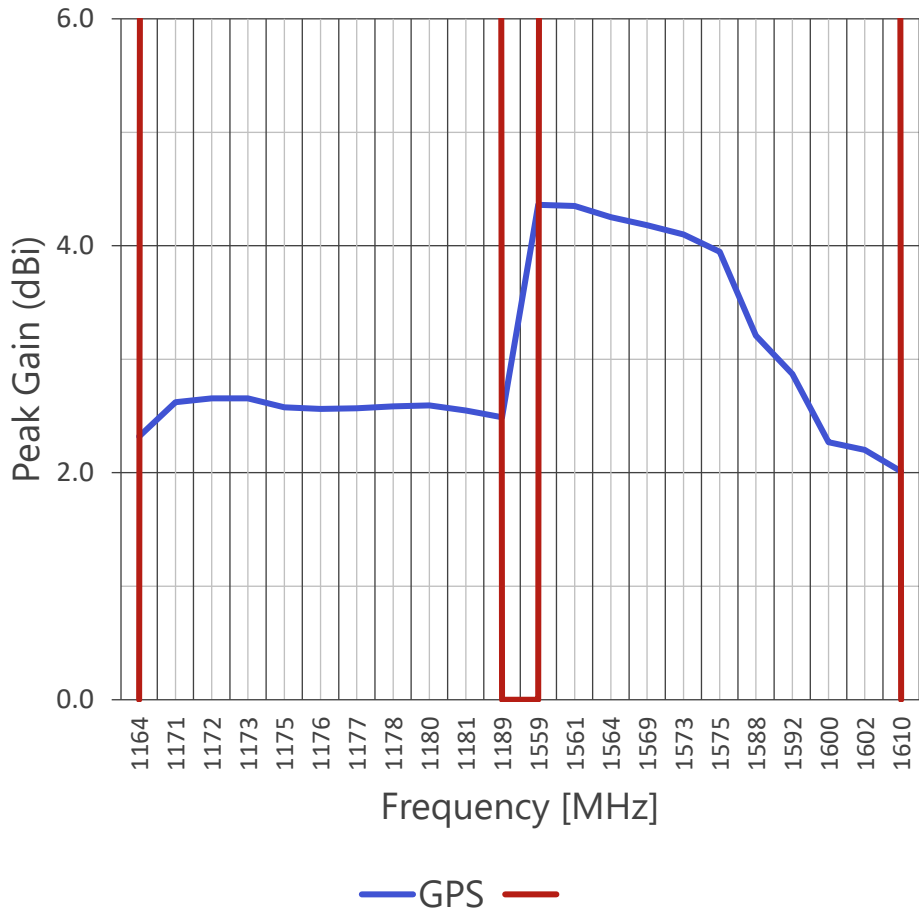


L1	Max	Mean	Min
GPS	65 %	61 %	54 %

L5	Max	Mean	Min
GPS	54 %	51 %	44 %

■ Cable Length
GPS : 107 mm

Peak Gain GPS

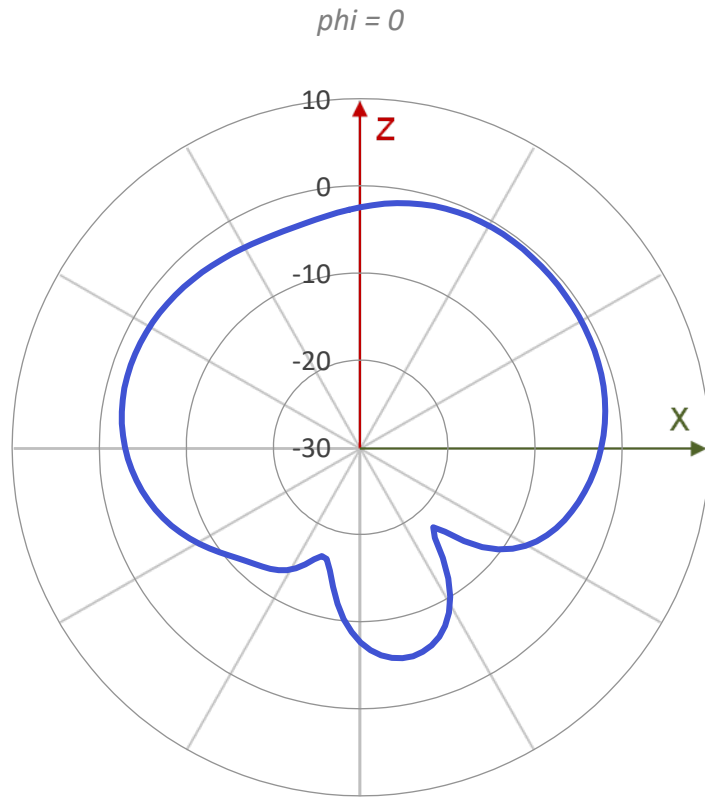
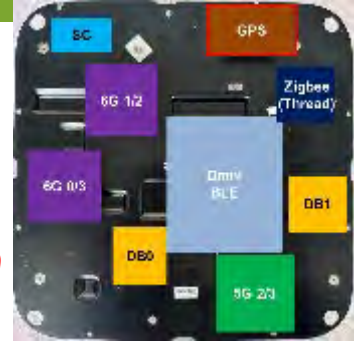


L1	Max	Mean	Min
GPS	4.4 dBi	3.4 dBi	2.0 dBi

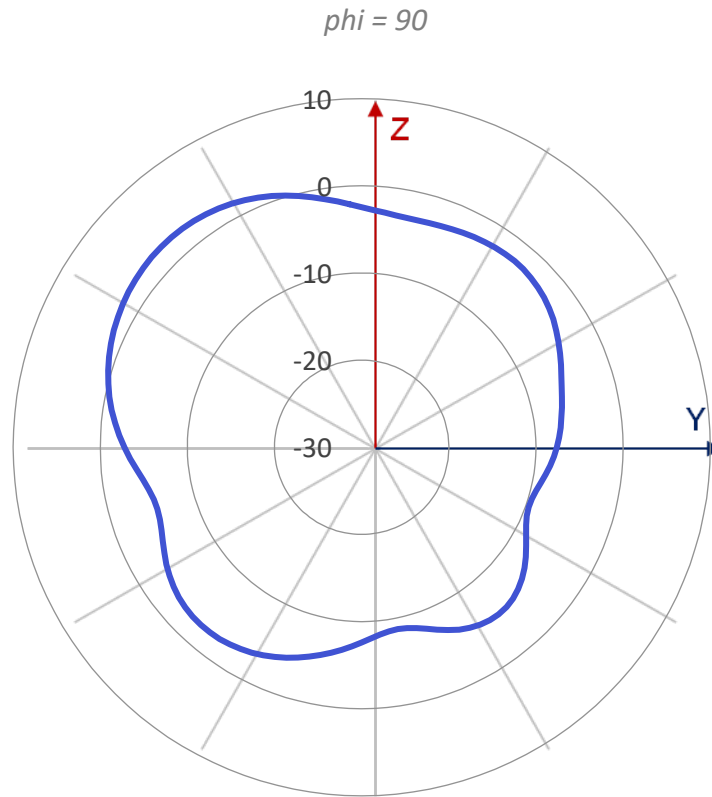
L5	Max	Mean	Min
GPS	2.7 dBi	2.6 dBi	2.3 dBi

■ Cable Length
GPS : 107 mm

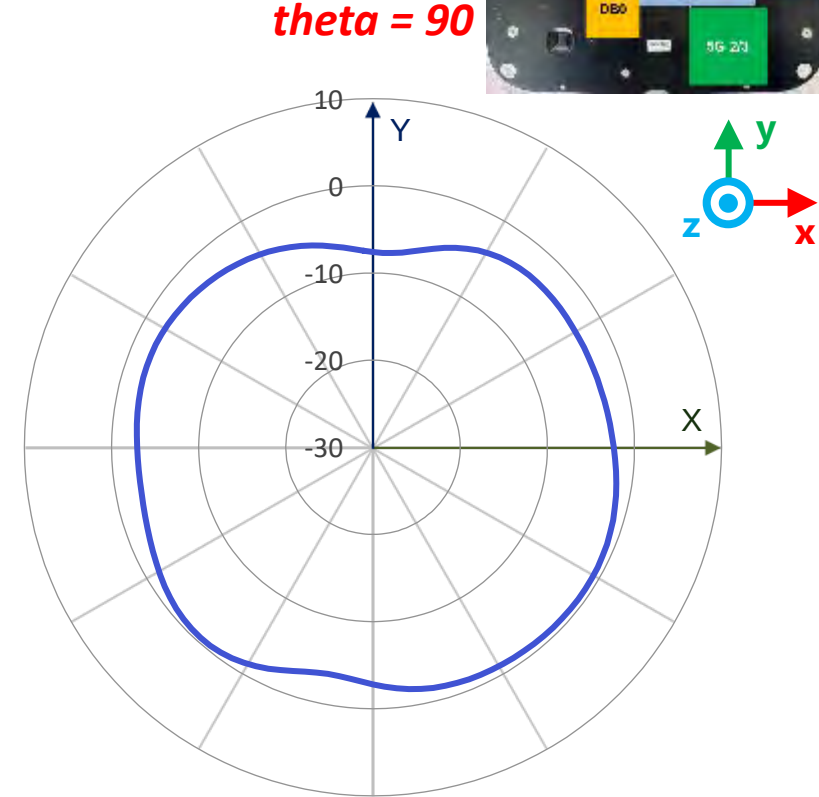
Realized Gain Pattern GPS @1176MHz_V+H



— GPS

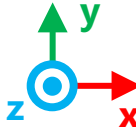
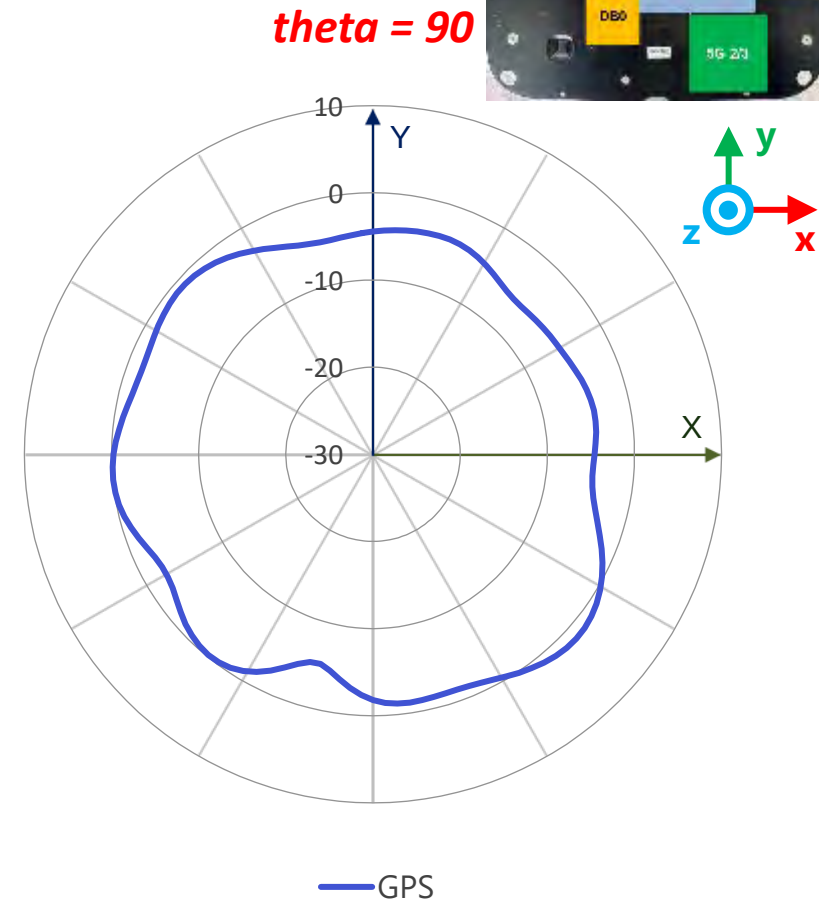
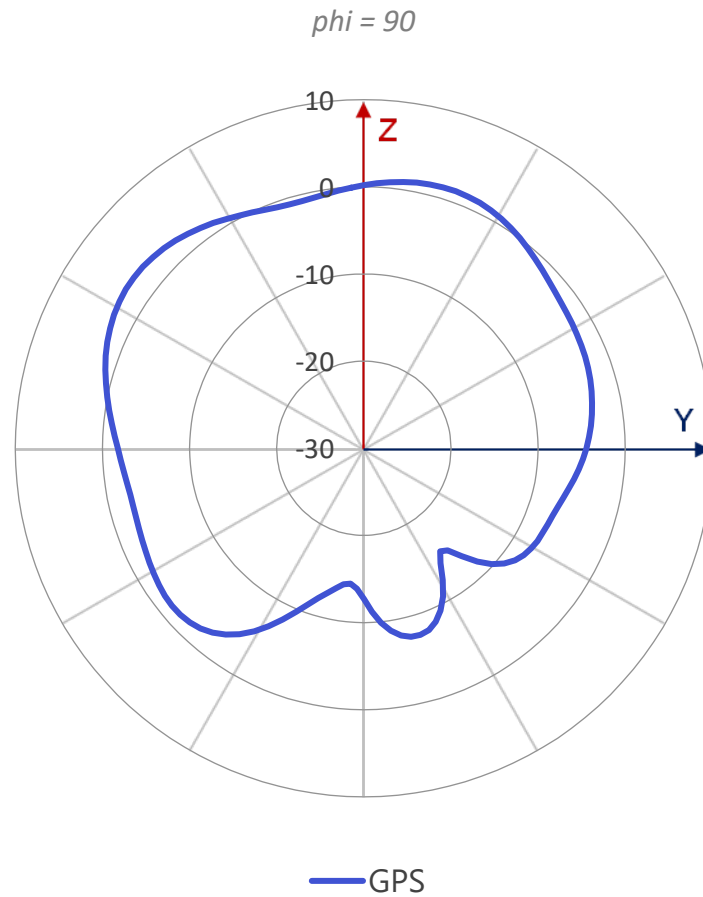
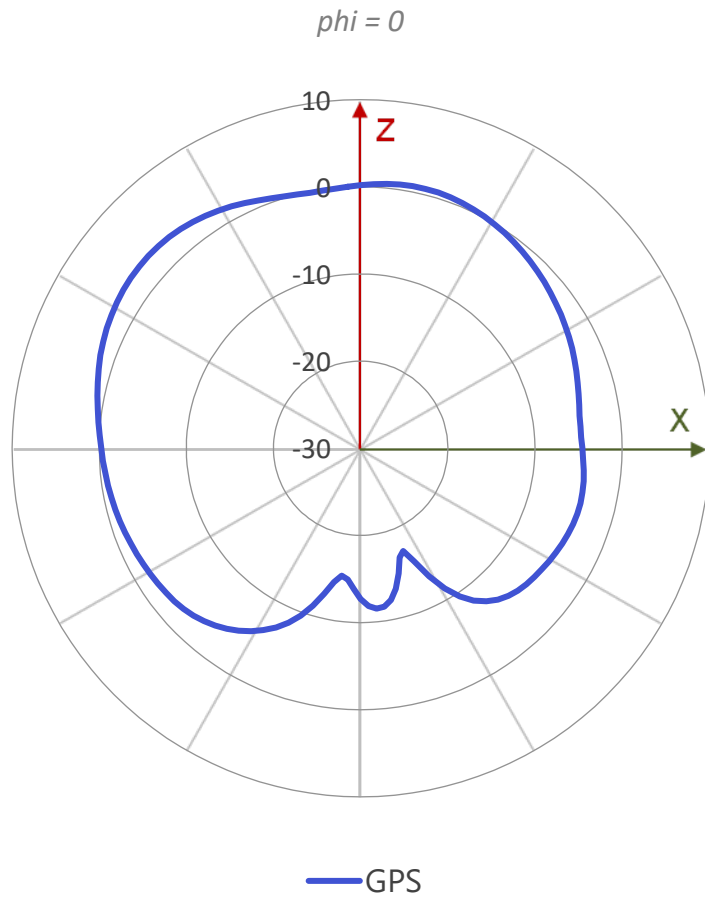


— GPS

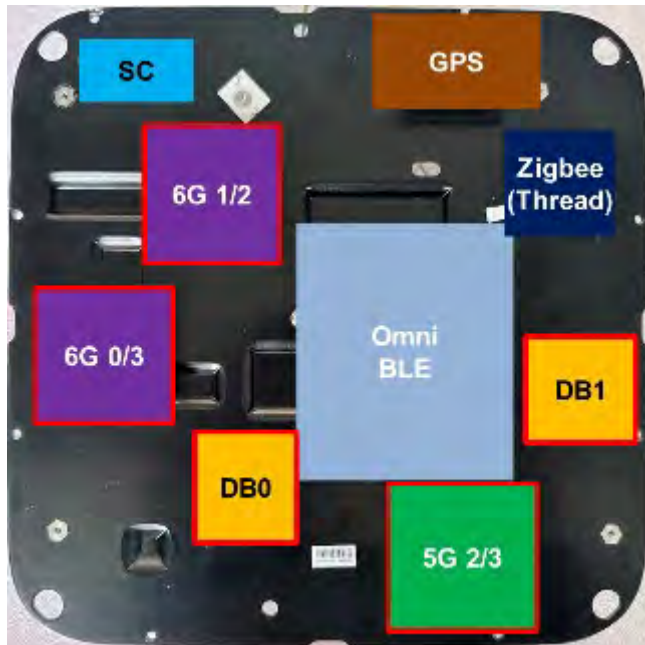


— GPS

Realized Gain Pattern GPS @1575MHz_V+H

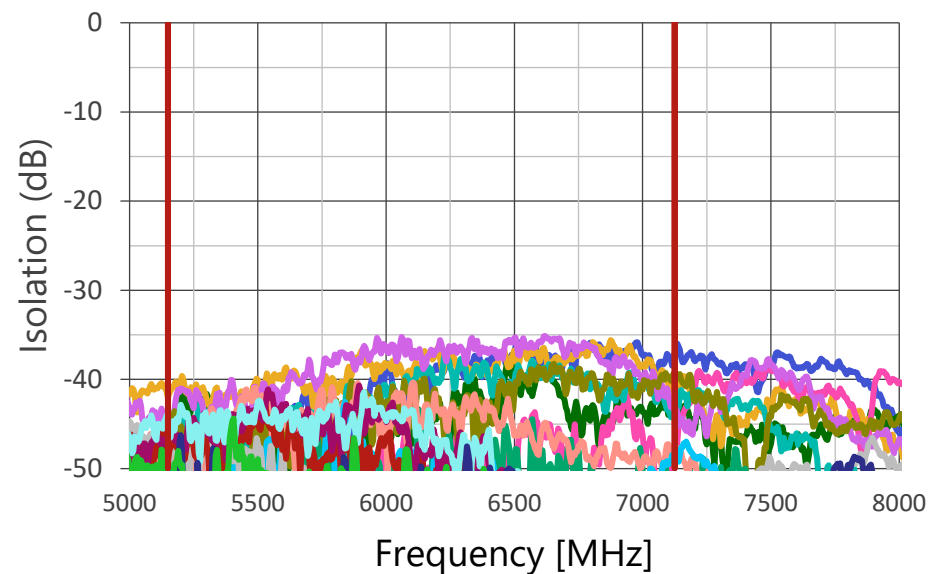


Isolation among Radio



- **Minimum Isolation**
 - 35.1dB on 5/6GHz

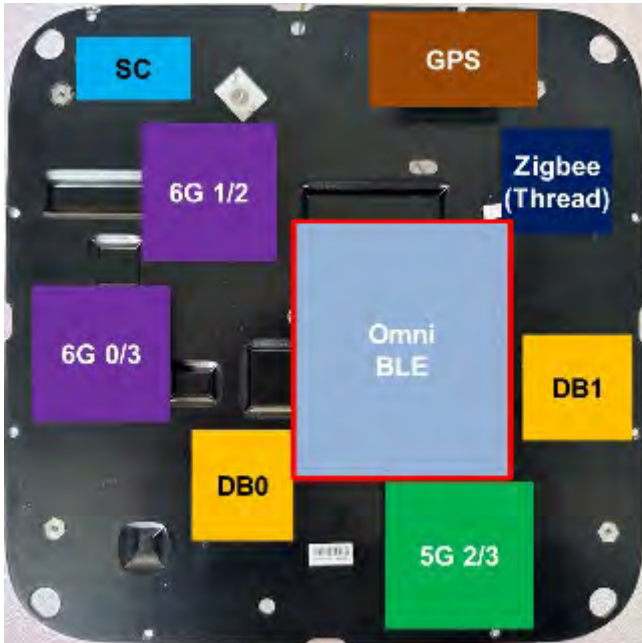
Isolation Wi-Fi 5G to Wi-Fi 6G



— DB0_6G0 — DB0_6G1 — DB0_6G2 — DB0_6G3
— DB1_6G0 — DB1_6G1 — DB1_6G2 — DB1_6G3
— 5G2_6G0 — 5G2_6G1 — 5G2_6G2 — 5G2_6G3
— 5G3_6G0 — 5G3_6G1 — 5G3_6G2 — 5G3_6G3
—

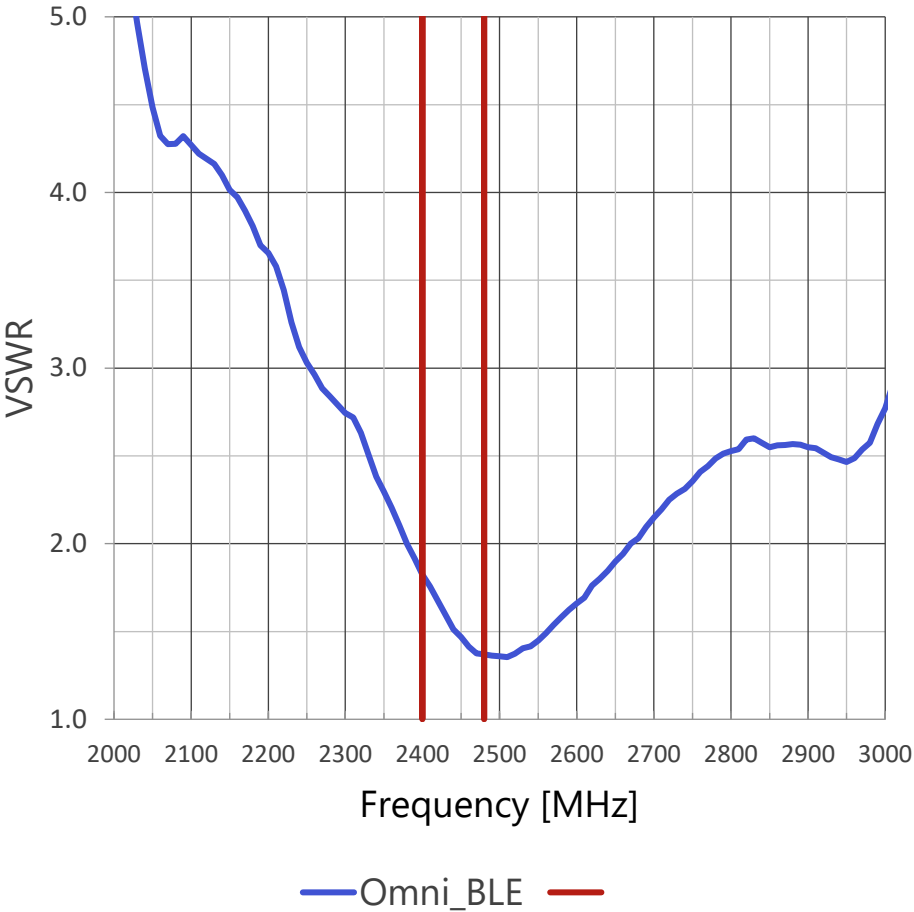
5/6GHz	Max	Mean	Min
DB0_6G0	-35.5	-41.7	-58.8
DB0_6G1	-37.9	-44.9	-59.8
DB0_6G2	-35.6	-39.0	-44.5
DB0_6G3	-41.7	-52.3	-72.3
DB1_6G0	-37.0	-42.1	-47.8
DB1_6G1	-35.1	-38.7	-46.0
DB1_6G2	-38.2	-43.4	-56.8
DB1_6G3	-43.5	-52.7	-77.5
5G2_6G0	-40.3	-45.5	-56.3
5G2_6G1	-42.5	-53.2	-76.9
5G2_6G2	-45.1	-56.0	-75.6
5G2_6G3	-43.0	-52.3	-78.3
5G3_6G0	-40.7	-49.4	-63.1
5G3_6G1	-41.4	-49.3	-62.9
5G3_6G2	-46.2	-57.1	-78.8
5G3_6G3	-44.4	-57.0	-88.3
Summary	-35.1	-48.4	-88.3

Omni BLE



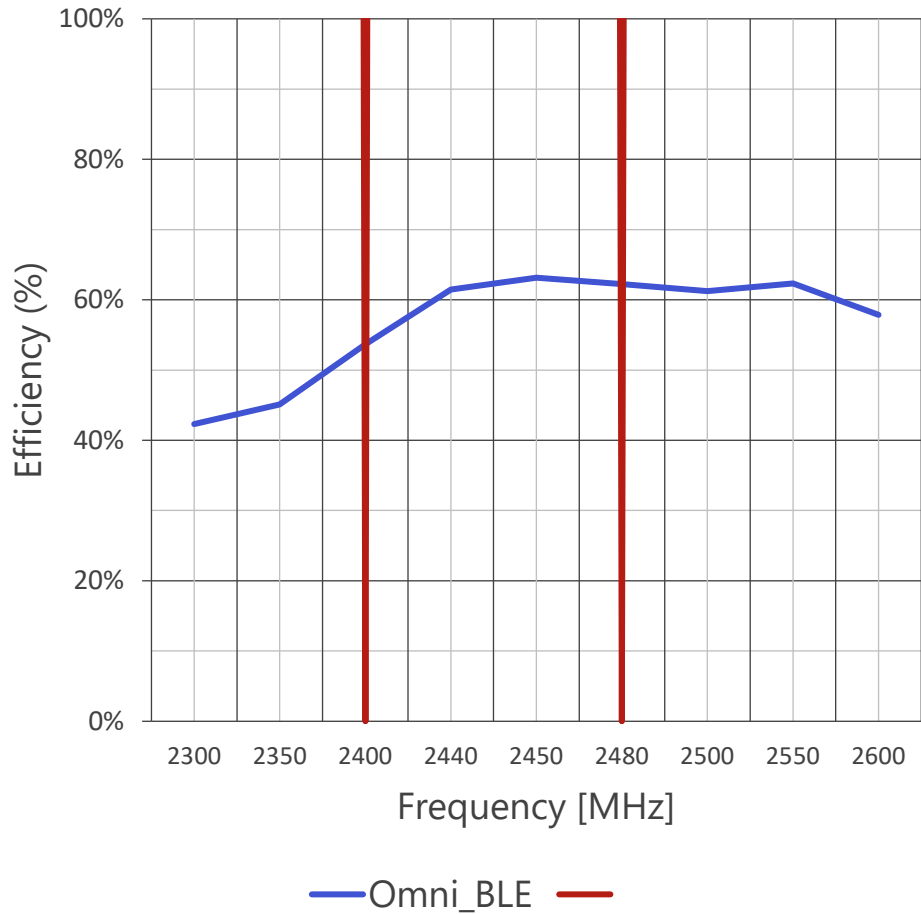
- **Maximum VSWR**
 - 1.8:1 on 2.4GHz
- **Average Efficiency**
 - ~60% on 2.4GHz
- **Peak Gain**
 - 4.6dBi on 2.4GHz

VSWR Omni_BLE



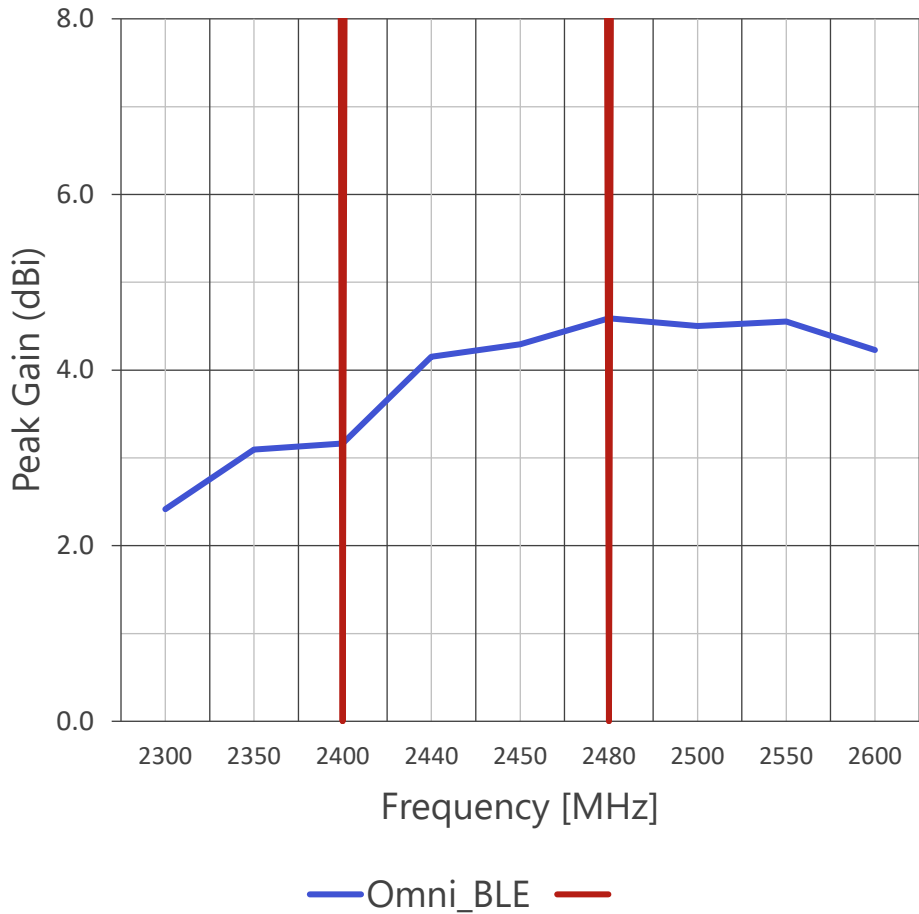
2.4GHz	Max	Mean	Min
Omni_BLE	1.8	1.6	1.4

Efficiency Omni_BLE



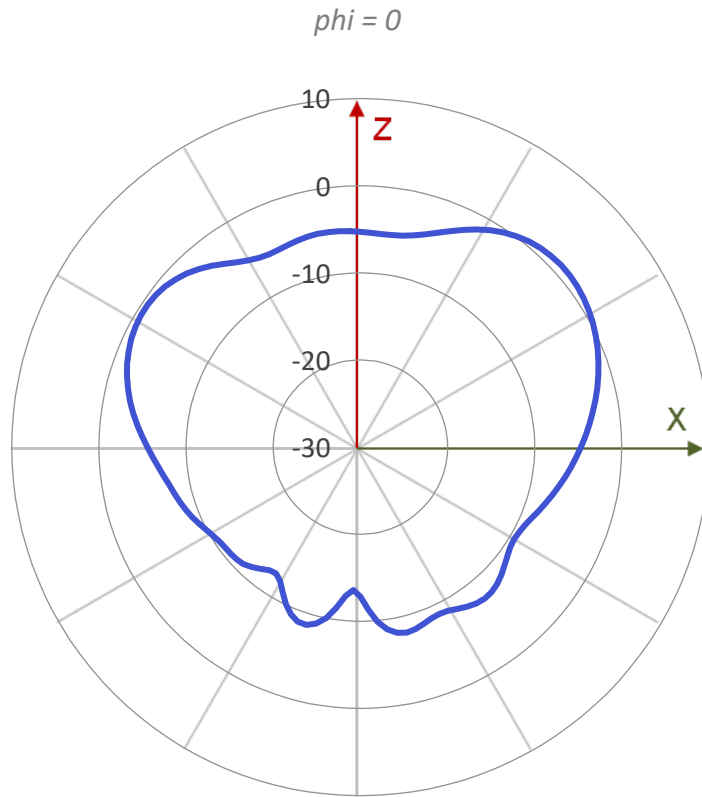
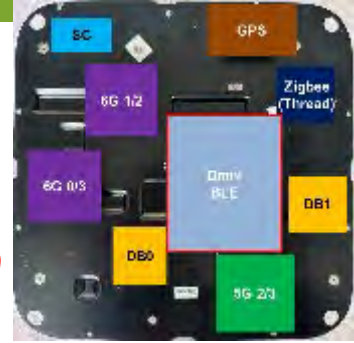
2.4GHz	Max	Mean	Min
Omni_BLE	63 %	60 %	54 %

Peak Gain Omni_BLE

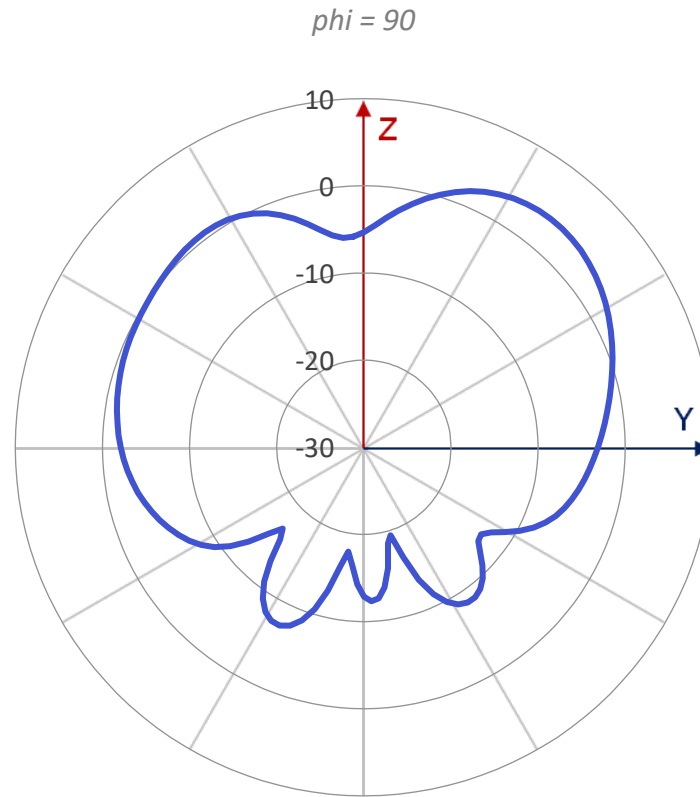


2.4GHz	Max	Mean	Min
Omni_BLE	4.6 dBi	4.0 dBi	3.2 dBi

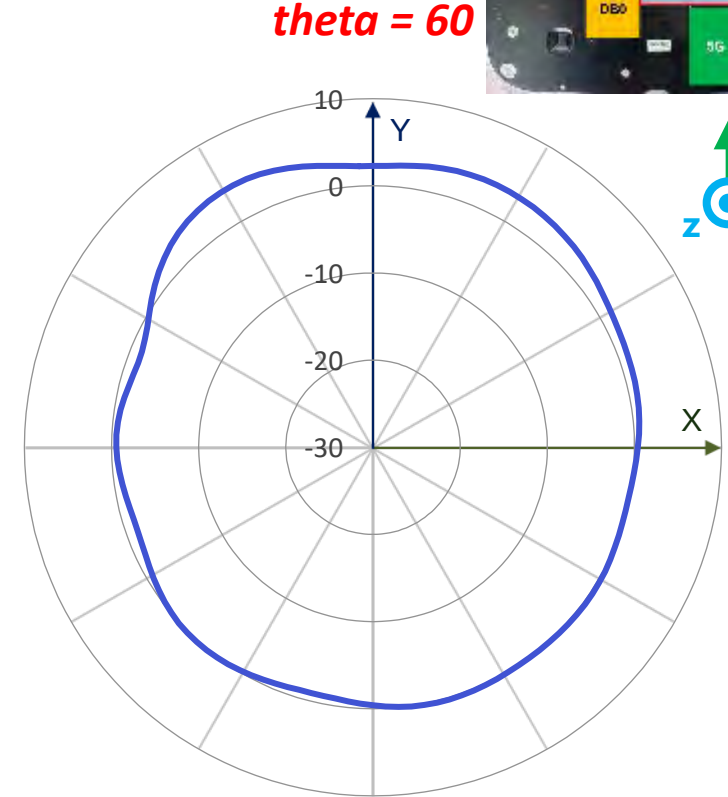
Realized Gain Pattern Omni BLE @2450MHz V+H



— Omni_BLE



— Omni_BLE



— Omni_BLE

