

PULSE Chip Antenna Measurement for QSI – [ACA810] Project



Wireless Components
LTCC R&D / Matthew

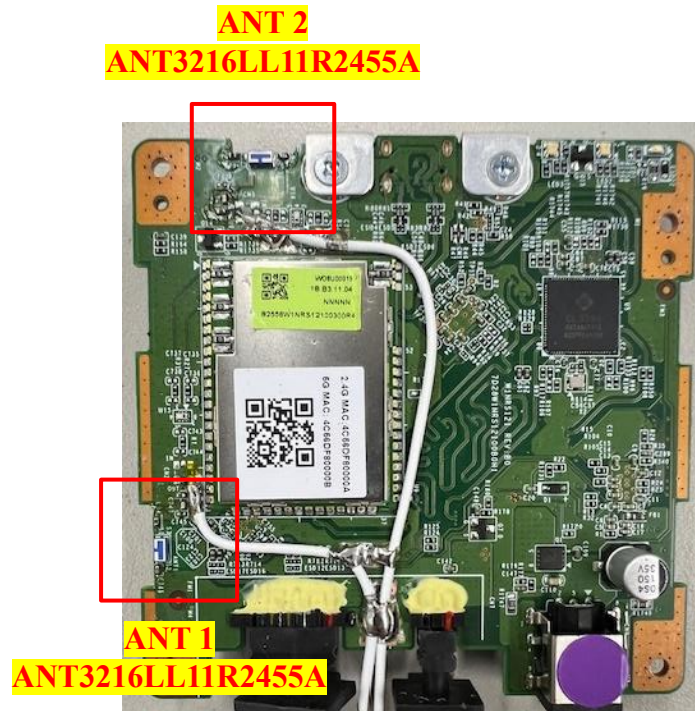
2024/10/15

Project Information

- **Customer : QSI**
- **Project Name : ACA810**
- **Application : Type-C wifi dock**
- **Antenna size :**
3.2x1.6x1.2(mm) WiFi chip antenna([ANT3216LL11R2455A](#)) * 2
- **PCB size : 80 x 80 (mm)**
- **Report date : 2024/10/15**
- **Version : 5**

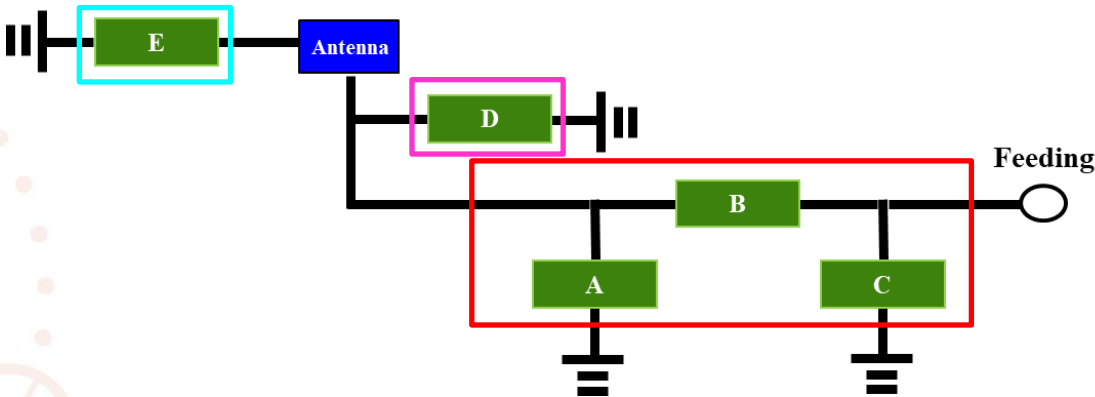
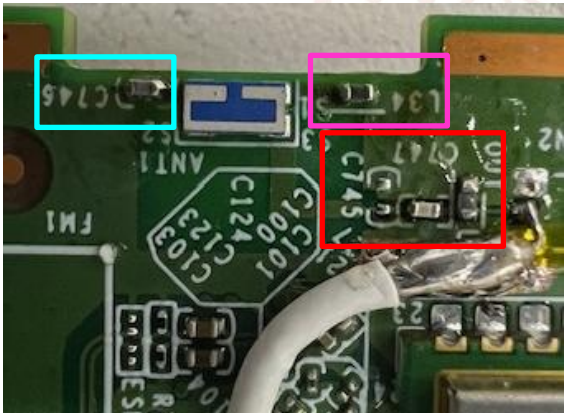
Antenna Placement

PCBA Photo



Matching Circuit

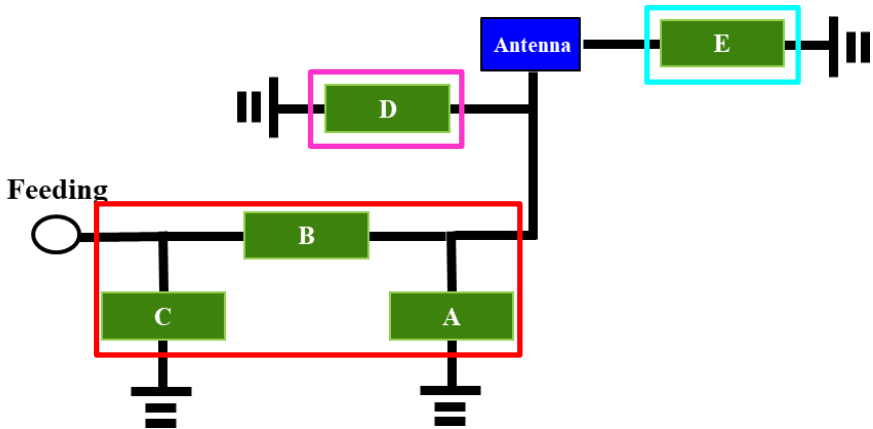
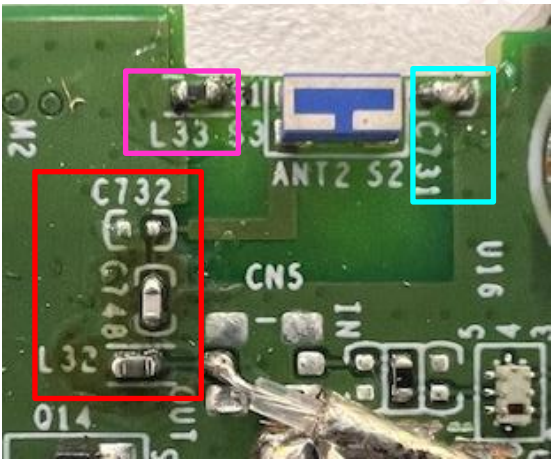
ANT 1



Component		Supplier	Value	PN
E (C746)	Cap._0402	YAGEO	1 pF	CC0402BRNPO9BN1R0
D (L34)	Ind._0402	Chilisin	10 nH	BSCH0010050510NJCP
A (C745)			Open	
B (C747)	Cap._0402	YAGEO	5 pF	CC0402BRNPO9BN5R0
C (L35)	Ind._0402	Chilisin	1.2 nH	BSCH001005051N2SCP

Matching Circuit

ANT 2

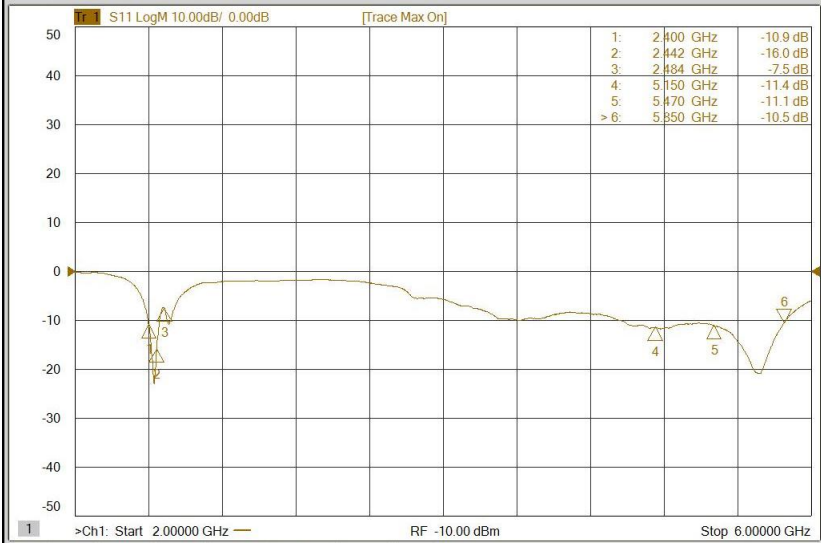


Component		Supplier	Value	PN
E (C731)	Cap._0402	YAGEO	0.8 pF	CC0402BRNPO9BNR80
D (L33)	Ind._0402	Chilisin	15 nH	BSCH0010050515NJCP
A (C732)			Open	
B (C748)	Cap._0402	YAGEO	5 pF	CC0402BRNPO9BN5R0
C (L32)	Ind._0402	Chilisin	1.2 nH	BSCH001005051N2SCP

Measurement Data

ANT 1

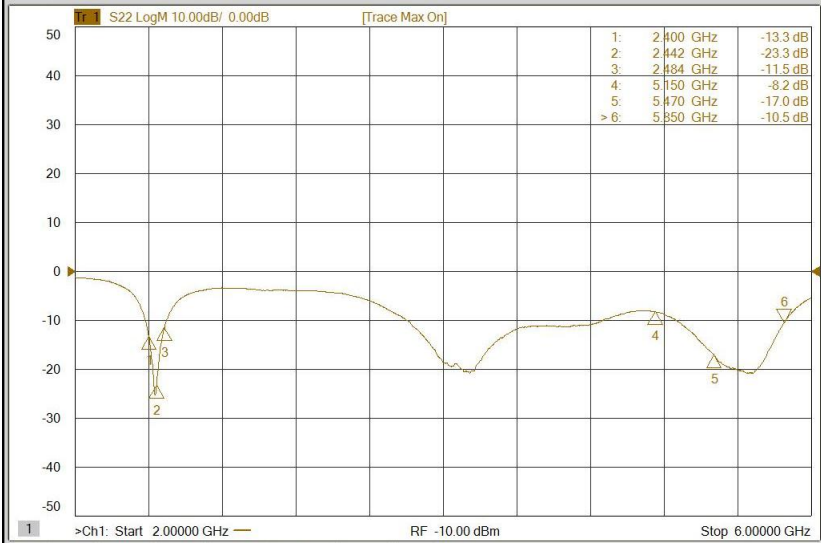
Condition	ACA810_V5_ANT 1					
Antenna	PULSE 3216 WiFi Chip antenna (ANT3216LL1R2455A)					
Frequency (MHz)	2400	2442	2484	5150	5470	5850
R.L. (dB)	-10.9	-16.0	-7.5	-11.4	-11.1	-10.5
Max. Gain (dBi)	1.0	1.9	2.0	4.9	4.7	4.4
Avg. Gain (dB)	-3.4	-3.0	-3.2	-2.1	-1.7	-1.7
Efficiency (%)	45.9	50.2	48.0	61.3	67.2	67.1



Measurement Data

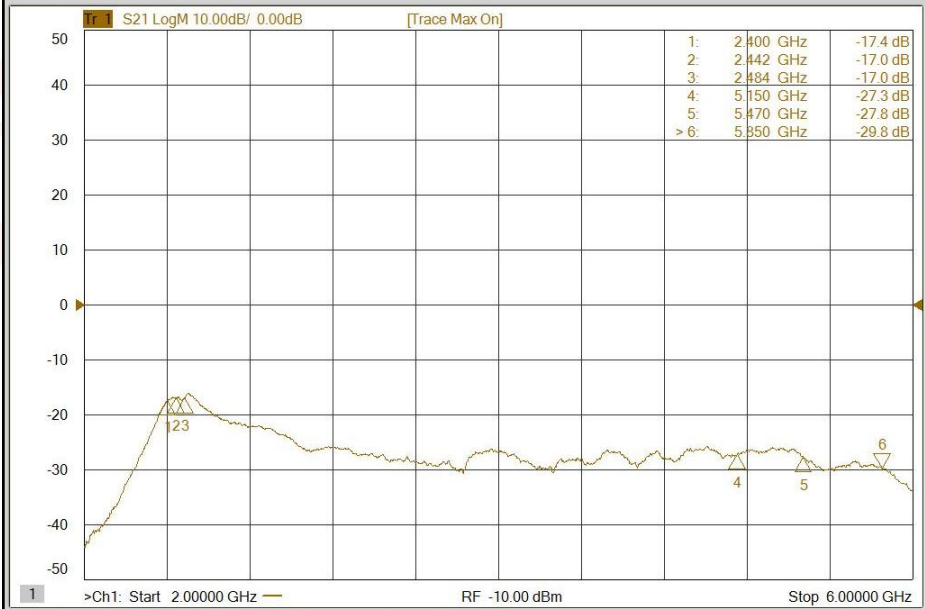
ANT 2

Condition	ACA810_V5_ANT 2					
Antenna	PULSE 3216 WiFi Chip antenna (ANT3216LL1R2455A)					
Frequency (MHz)	2400	2442	2484	5150	5470	5850
R.L. (dB)	-13.3	-23.3	-11.5	-8.2	-17.0	-10.5
Max. Gain (dBi)	1.0	1.7	1.7	1.1	1.7	1.1
Avg. Gain (dB)	-2.5	-2.1	-2.2	-2.7	-1.9	-2.5
Efficiency (%)	56.7	62.3	60.8	53.7	65.0	56.6



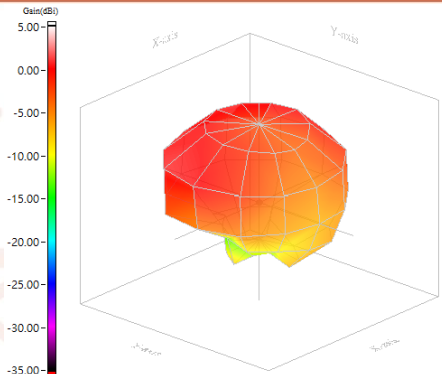
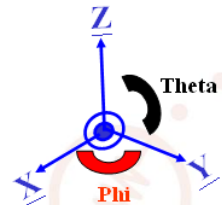
Isolation

Condition	ACA810_V5					
Antenna	PULSE 3216 WiFi Chip antenna (ANT3216LL11R2455A)					
Frequency (MHz)	2400	2442	2484	5150	5470	5850
Isolation (dB)	-17.4	-17.0	-17.0	-27.3	-27.8	-29.8

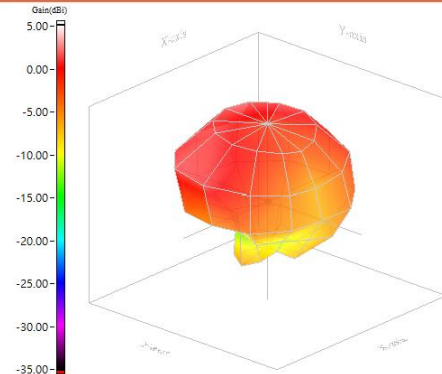


Radiation Pattern (3D)

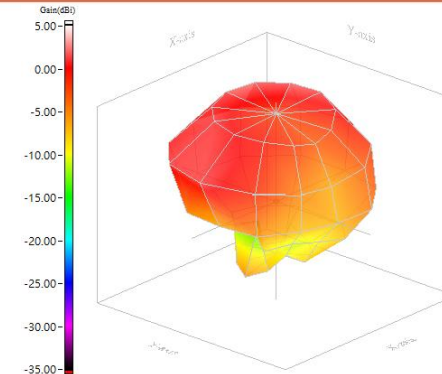
ANT 1



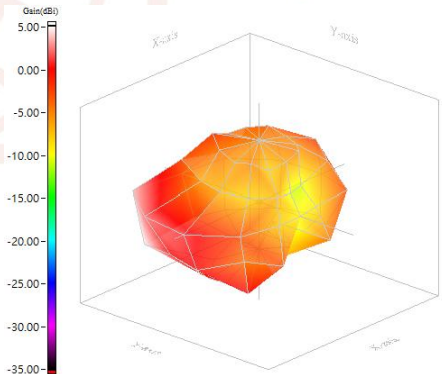
2400MHz



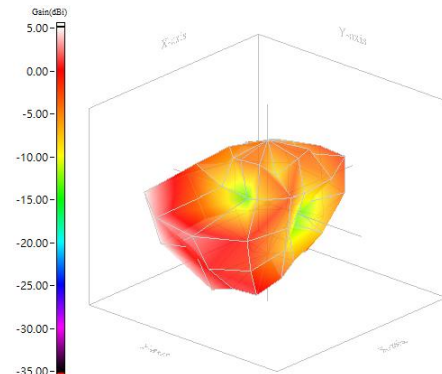
2442MHz



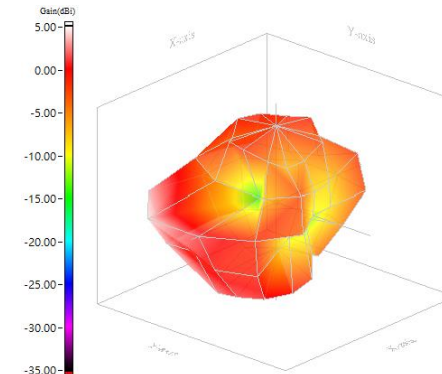
2484MHz



5150MHz



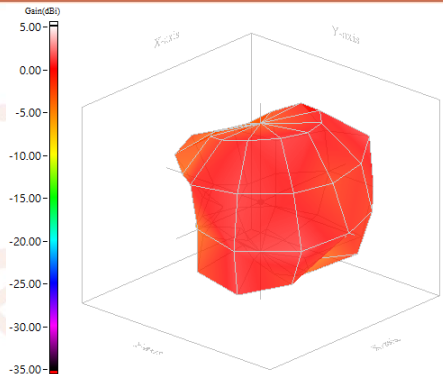
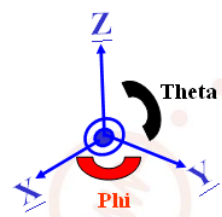
5470MHz



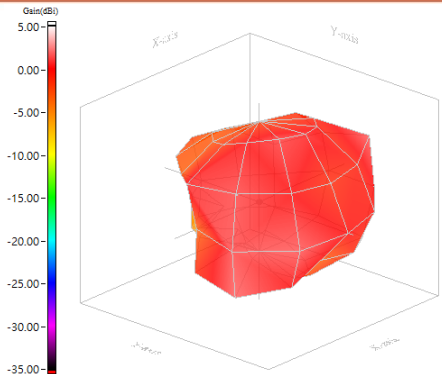
5850MHz

Radiation Pattern (3D)

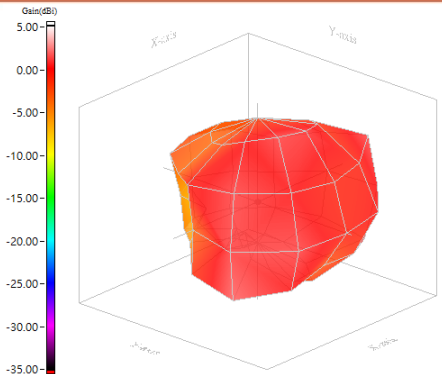
ANT 2



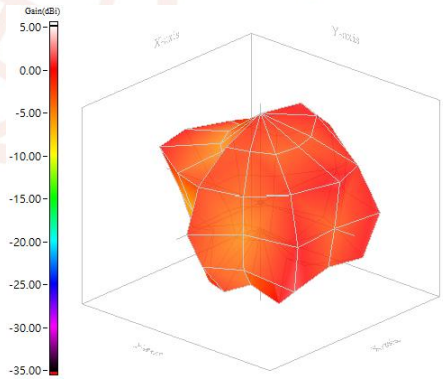
2400MHz



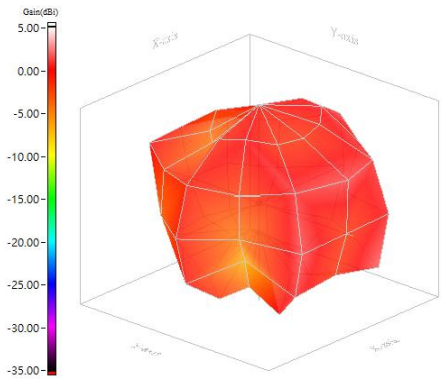
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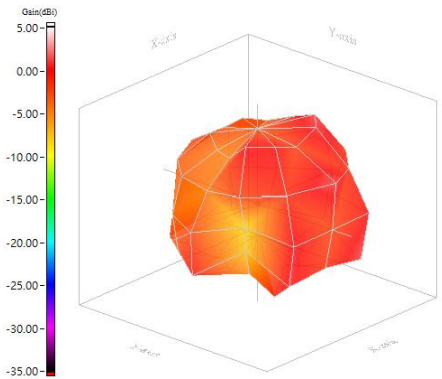
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5150MHz



5470MHz

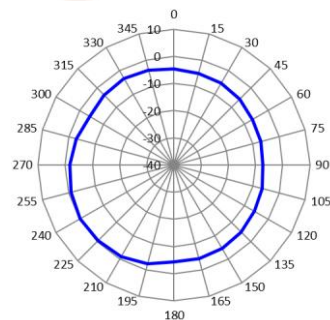


5850MHz

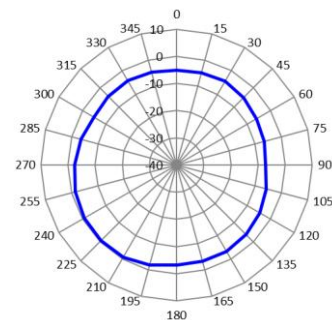
Radiation Pattern (2D)_XY-plane

ANT 1

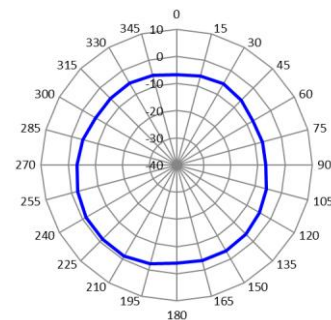
XY-plane:



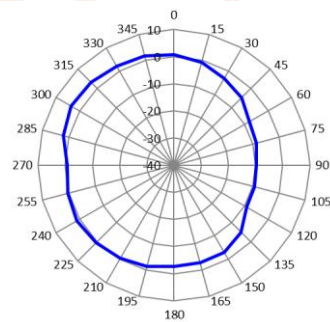
2400 MHz



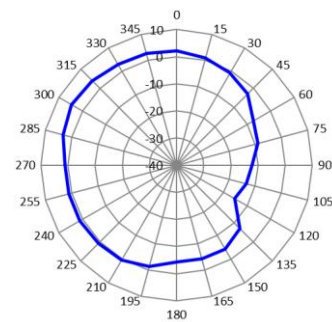
2442 MHz



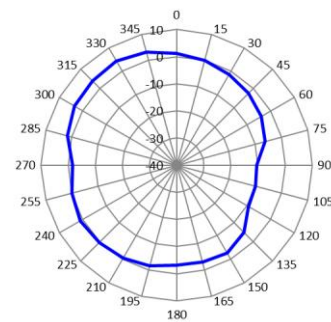
2484 MHz



5150 MHz



5470 MHz

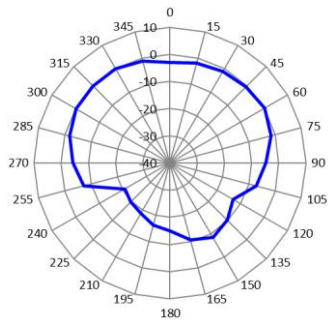


5850 MHz

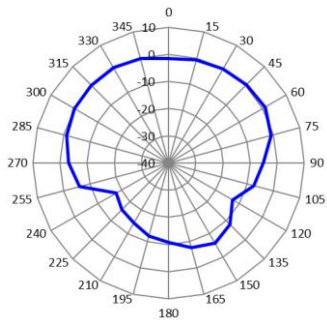
Radiation Pattern (2D)_XZ-plane

ANT 1

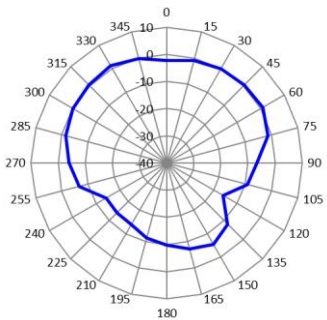
ZX-plane:



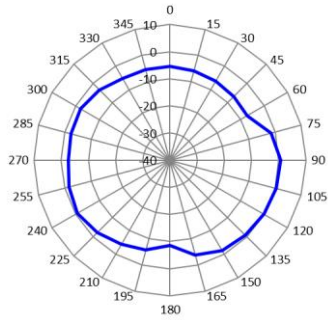
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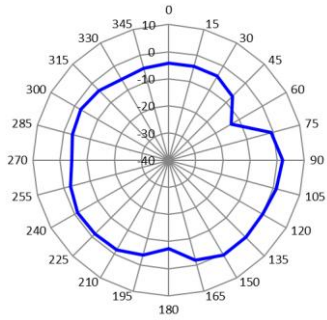
2442 MHz



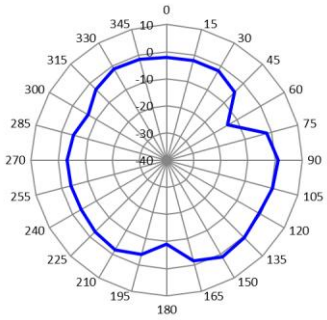
2484 MHz



5150 MHz



5470 MHz

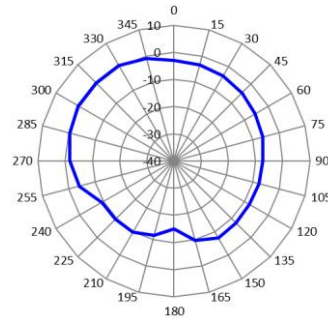


5850 MHz

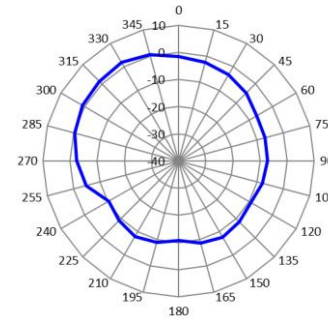
Radiation Pattern (2D)_YZ-plane

ANT 1

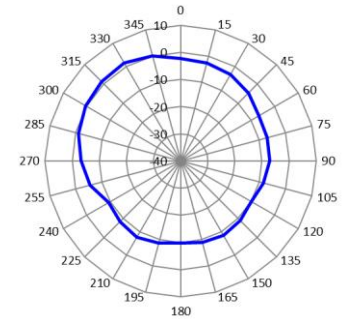
ZY-plane:



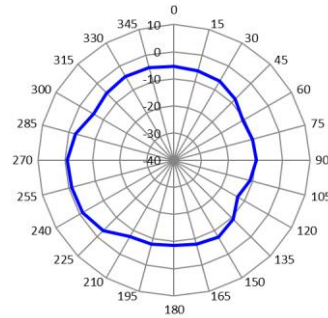
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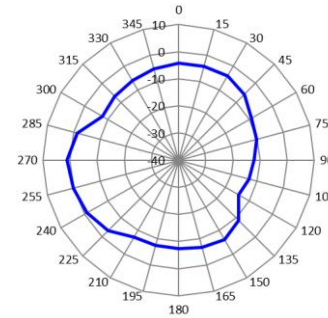
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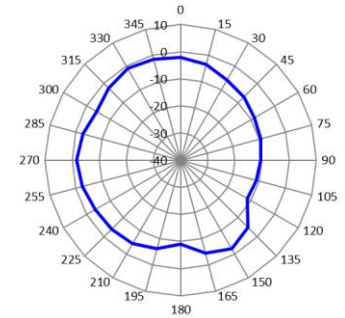
2484 MHz



5150 MHz



5470 MHz

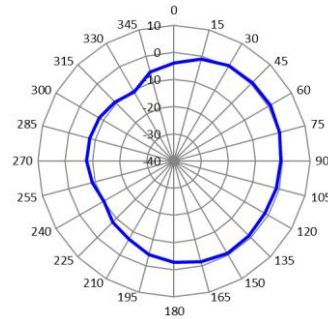


5850 MHz

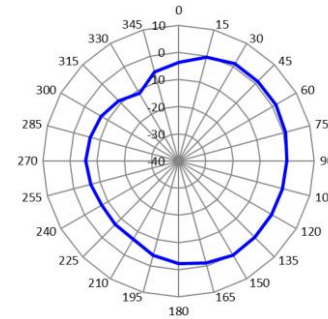
Radiation Pattern (2D)_XY-plane

ANT 2

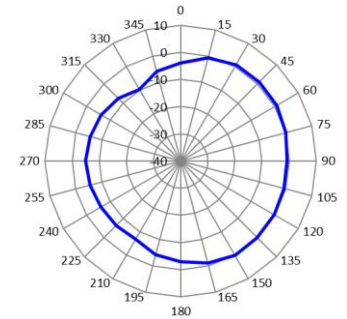
XY-plane:



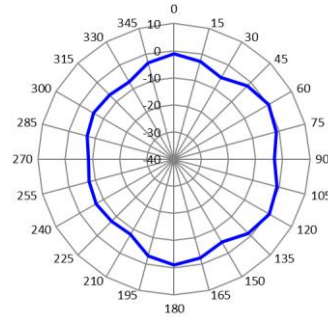
2400 MHz



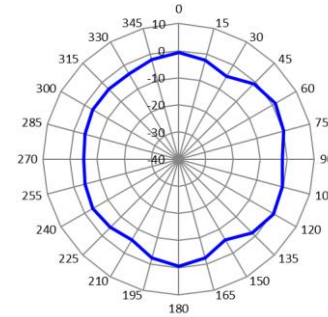
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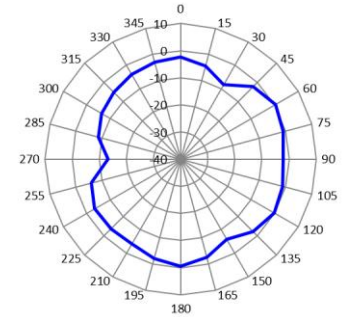
2484 MHz



5150 MHz



5470 MHz

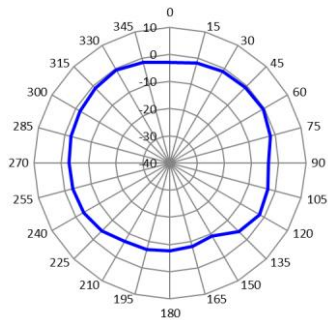


5850 MHz

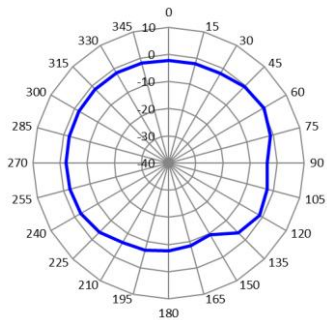
Radiation Pattern (2D)_XZ-plane

ANT 2

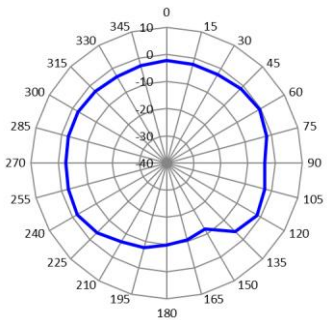
ZX-plane:



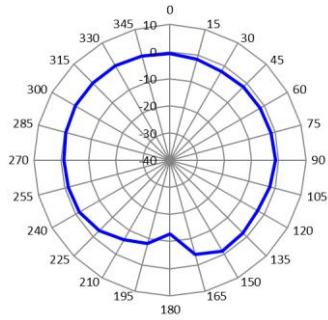
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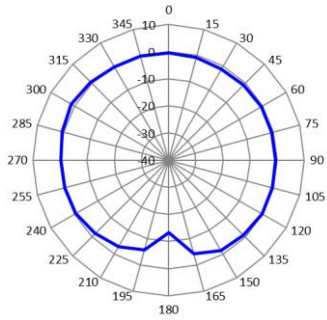
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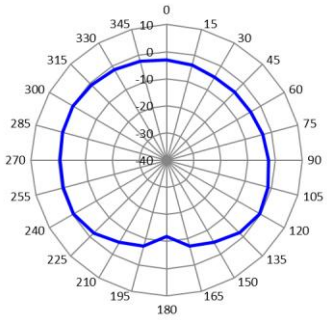
2484 MHz



5150 MHz



5470 MHz

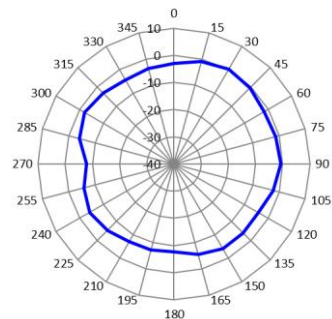


5850 MHz

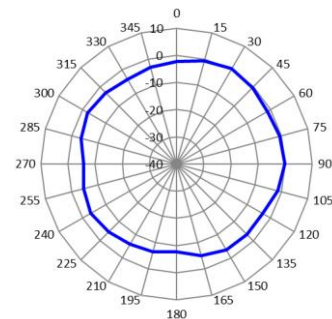
Radiation Pattern (2D)_YZ-plane

ANT 2

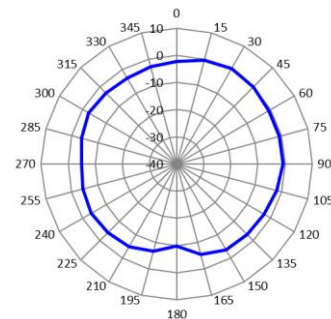
ZY-plane:



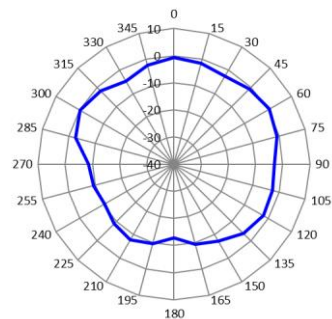
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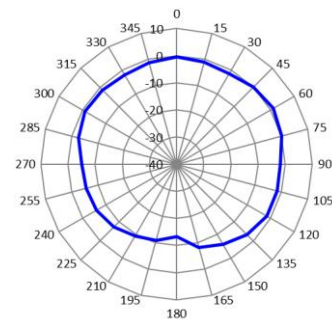
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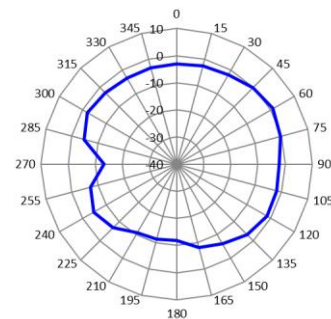
2484 MHz



5150 MHz



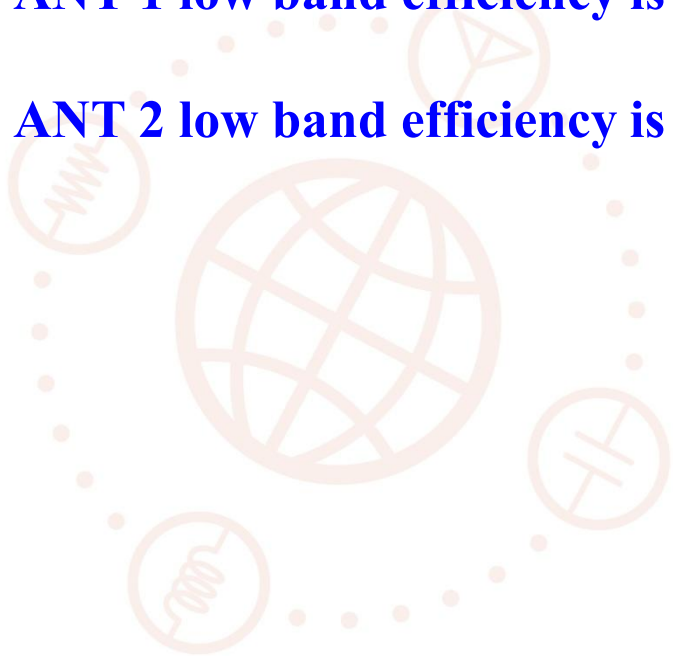
5470 MHz



5850 MHz

Summary

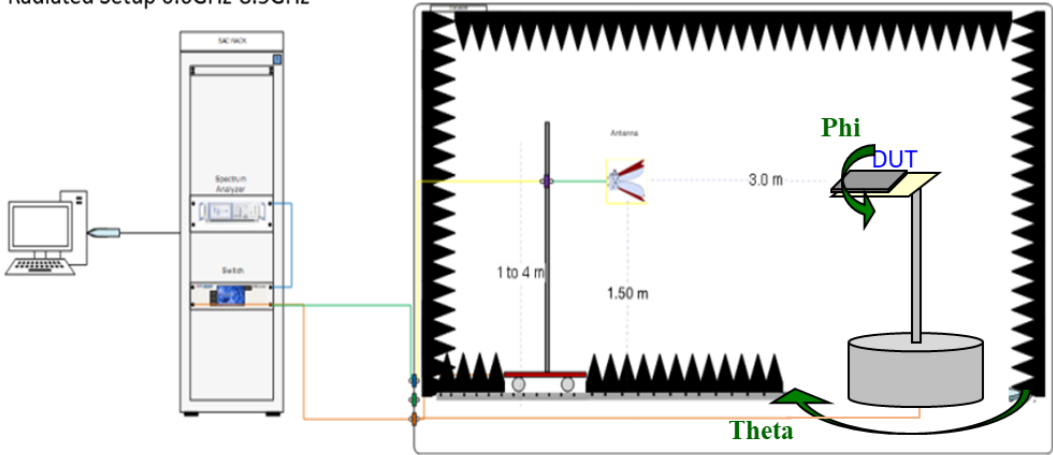
- **ANT 1 low band efficiency is 45% ~ 50%, high band efficiency is 61% ~ 67%.**
- **ANT 2 low band efficiency is 56% ~ 62%, high band efficiency is 53% ~ 65%.**



Antenna Vendor Info & Measurement Setup

- Antenna Vendor: **YAGEO**
- Test Date: **20241015**
- Test Engineer :**MATTHEW KUNG**
- Measurement Setup:

Radiated Setup 0.6GHz-8.5GHz



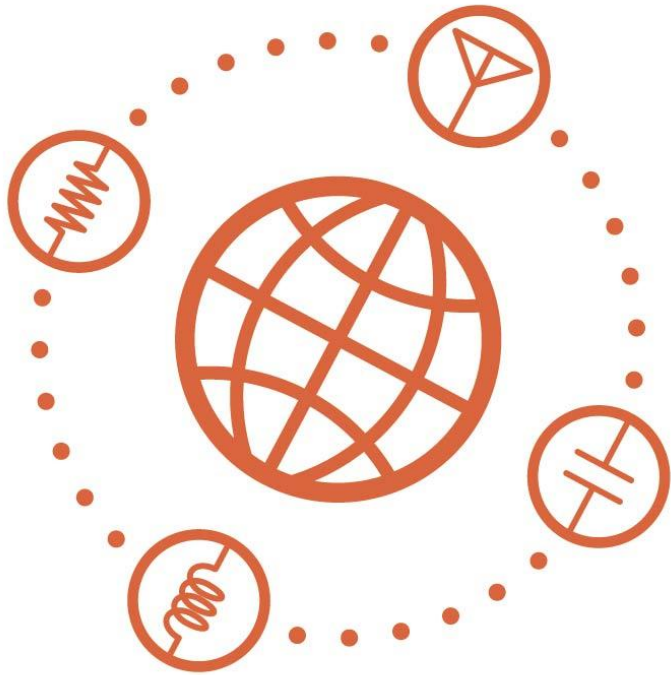
ID#	Device	Type/Model	Serial#	Manufacturer	Cal. Date	Estimated Next Cal. Date
1	Anechoic Chamber	AMS8500	-	ETS-Lindgren	2024-07-13	2025-07-13
2	Turn Table	ETS	-	ETS-Lindgren	N/A	N/A
3	Switch & Positioning system	2090	-	ETS-Lindgren	N/A	N/A
4	Horn Antenna	3164-08	99210	ETS-Lindgren	N/A	N/A
5	Network Analyzer	E5071C	MY46103999	Agilent	2024-07-13	2025-07-13
6	Commercial test software	EMQuest	Version 1.14 Build 10265 SN:1156	ETS-Lindgren	2024-07-13	2025-07-13
7	Test Operator	Matthew Kung		YAGEO		

N/A: Not Applicable

Test Procedure

ETS-Lindgren AMS-8500 system is 3D fully anechoic chamber, it is applied to the “Conical Cut test method”, the detail description is described as below :

- The Conical Cut method requires the ability of the Measurement Antenna to be physically rotated in the theta plane (overhead) of the EUT for implementations using a single Measurement Antenna, thirteen conical cuts are required to capture data at every 15 degrees from the EUT.
- Typically, the EUT will remain affixed to a turntable during the entire measurement process.
- The Measurement Antenna will be positioned at a starting theta angle.
- The EUT will then be rotated around the full 360 degrees of phi rotation.
- The Measurement Antenna will then be positioned at the next theta angle, and the process repeated.
- Finally, the measurement data of all angles are calculated through the EMQuest software to obtain the Peak gain, Average gain, Efficiency... and other data we need.



Thank you!