

FCC Measurement/Technical Report on FHM35A

Contains FCC ID: X02-SPB620
Contains IC: 8713A-SPB620

Test Report Reference: MDE_HDW_2401_FCC_02

Test Laboratory:

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Germany



Deutsche
Akkreditierungsstelle
D-PL-12140-01-00

Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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Group Company*

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1 APPLIED STANDARDS AND TEST SUMMARY

1.1 APPLIED STANDARDS

Type of Authorization

Certification for an Intentional Radiator (Digital Device / Spread Spectrum).

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 and 15 (10-1-23 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.201 Equipment authorization requirement

§ 15.207 Conducted limits

§ 15.209 Radiated emission limits; general requirements

Part 15, Subpart E – Unlicensed National Information Infrastructure Devices

§ 15.403 Definitions

§ 15.407 General technical requirements

Note:

The tests were selected and performed with reference to the FCC KDB "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, 789033 D02 General U-NII Test Procedures New Rules v02r01, 2017-12-14". and

"GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE 6 GHz (U-NII) DEVICES PART 15, SUBPART E, 987594 D02 U-NII 6GHz EMC Measurement v01r01, 2021-02-04".

ANSI C63.10-2013 is applied.

1.2 FCC-IC CORRELATION TABLE

Correlation of measurement requirements for UNII / LE-LAN (e.g. WLAN 5 GHz) equipment from FCC and IC

UNII equipment

Measurement	FCC reference	IC reference
Conducted emissions on AC Mains	§ 15.207	RSS-Gen Issue 5 & AMD 1 & AMD 2: 8.8
Occupied bandwidth	§ 15.403 (26 dB) / § 15.407 (e) (6 dB)	RSS-247 Issue 3: 6.2.1.1, 6.2.2.1, 6.2.3.1 (99%) RSS-247 Issue 3: 6.2.4.2 (6 dB) RSS-248 Issue 2: 4.4
Maximum conducted output power	§ 15.407 (a) (1) to (8), (11)	RSS-247 Issue 3: 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.2 RSS-248 Issue 2: 4.5
Maximum power spectral density	§ 15.407 (a) (1) to (8), (12)	RSS-247 Issue 3: 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.1 RSS-248 Issue 2: 4.5
Transmitter undesirable emissions; General Field Strength Limits, Restricted Bands, In-Band Emissions	§ 15.407 (b) § 15.209 (a)	RSS-Gen Issue 5: 6.13/8.9/8.10; RSS-247 Issue 3: 3.3/6.2 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.2.4.2 RSS-248 Issue 2: 4.6
Frequency stability	§ 15.407 (g)	RSS-Gen Issue 5: 6.11/8.11
Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS)	§ 15.407 (h)	RSS-247 Issue 3: 6.2.2.1, 6.2.3.1, 6.3
Antenna requirement	§ 15.203 / 15.204 § 15.407 (a) (9)	RSS-Gen Issue 5 & AMD 1 & AMD 2: 8.3
Contention Based Protocol	§ 15.407 (d) (6)	RSS-248 Issue 2: 4.7
Receiver spurious emissions	-	-

1.3 MEASUREMENT SUMMARY

Position 6

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407

**FCC §15.407 (b), (1),(2),(3),(4); FCC
§15.205, §15.209, §15.407 (b)
(5),(6)**

Undesirable Emissions; General Field Strength Limits

The measurement was performed according to ANSI C63.10, chapter
6.4, 6.5, 6.6.5

Final Result

OP-Mode

Radio Technology, Operating Frequency,
Measurement range, Subband

Setup

Date

FCC

IC

WLAN a, high, 1GHz - 26GHz, U-NII-1	S06_AC02	2024-12-20	Passed	Passed
WLAN a, mid, 1GHz - 26GHz, U-NII-3	S06_AC02	2024-12-20	Passed	Passed
WLAN a, mid, 30MHz - 1GHz, U-NII-1	S06_AC02	2025-01-12	Passed	Passed
WLAN a, mid, 30MHz - 1GHz, U-NII-3	S06_AC02	2025-01-12	Passed	Passed
WLAN n 20 MHz MIMO, low, 1GHz - 26GHz, U-NII-1	S06_AC02	2024-12-25	Passed	Passed
WLAN n 20 MHz MIMO, low, 1GHz - 26GHz, U-NII-2C	S06_AC02	2024-12-25	Passed	Passed
WLAN n 20 MHz MIMO, mid, 1GHz - 26GHz, U-NII-2A	S06_AC02	2025-01-09	Passed	Passed
WLAN n 20 MHz MIMO, mid, 1GHz - 26GHz, U-NII-3	S06_AC02	2024-12-23	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407

FCC §15.407 (b), (1),(2),(3),(4)

Band Edge

The measurement was performed according to ANSI C63.10, chapter
6.6.5

Final Result

OP-Mode

Radio Technology, Operating Frequency, Subband

Setup

Date

FCC

IC

WLAN ac 20 MHz MIMO, low, U-NII-2C	S06_AC02	2024-12-23	Passed	Passed
WLAN ac 40 MHz MIMO, high, U-NII-2A	S06_AC02	2024-12-23	Passed	Passed
WLAN ac 40 MHz MIMO, high, U-NII-2C	S06_AC02	2025-01-11	Passed	Passed
WLAN ac 40 MHz MIMO, high, U-NII-3	S06_AC02	2025-01-11	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-1	S06_AC02	2024-12-23	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-2C	S06_AC02	2025-01-11	Passed	Passed
WLAN ac 40 MHz MIMO, low, U-NII-3	S06_AC02	2024-12-23	Passed	Passed
WLAN ac 40 MHz, high, U-NII-2A	S06_AC02	2024-12-23	Passed	Passed
WLAN ac 40 MHz, high, U-NII-2C	S06_AC02	2025-01-09	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S06_AC02	2025-01-11	Passed	Passed
WLAN ac 40 MHz, low, U-NII-1	S06_AC02	2025-01-09	Passed	Passed
WLAN ac 40 MHz, low, U-NII-2C	S06_AC02	2024-12-23	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S06_AC02	2024-12-23	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-1	S06_AC02	2024-12-23	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-2C	S06_AC02	2024-12-23	Passed	Passed

Position 2

47 CFR CHAPTER I FCC PART 15 Subpart E FCC §15.407 (b), (1),(2),(3),(4); FCC §15.407 §15.205, §15.209, §15.407 (b) (5),(6)

Undesirable Emissions; General Field Strength Limits

The measurement was performed according to ANSI C63.10, chapter 6.4, 6.5, 6.6.5

Final Result

OP-Mode

Radio Technology, Operating Frequency, Measurement range, Subband

Setup

Date

FCC

IC

WLAN a, high, 1GHz - 26GHz, U-NII-1

S02_AC02

2025-01-01

Passed

Passed

WLAN n 20 MHz MIMO, mid, 1GHz - 26GHz, U-NII-3

S02_AC02

2025-01-13

Passed

Passed

WLAN n 20 MHz MIMO, mid, 30MHz - 1GHz, U-NII-3

S02_AC02

2025-01-23

Passed

Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407

FCC §15.407 (b), (1),(2),(3),(4)

Band Edge

The measurement was performed according to ANSI C63.10, chapter 6.6.5

Final Result

OP-Mode

Radio Technology, Operating Frequency, Subband

Setup

Date

FCC

IC

WLAN a, high, U-NII-2A

S02_AC02

2024-12-25

Passed

Passed

WLAN a, high, U-NII-2C

S02_AC02

2024-12-25

Passed

Passed

WLAN a, high, U-NII-3

S02_AC02

2024-12-25

Passed

Passed

WLAN a, low, U-NII-1

S02_AC02

2024-12-25

Passed

Passed

WLAN a, low, U-NII-2C

S02_AC02

2024-12-25

Passed

Passed

WLAN a, low, U-NII-3

S02_AC02

2024-12-25

Passed

Passed

WLAN ac 20 MHz MIMO, low, U-NII-2C

S02_AC02

2025-01-13

Passed

Passed

WLAN ac 40 MHz MIMO, high, U-NII-2A

S02_AC02

2025-01-13

Passed

Passed

WLAN ac 40 MHz MIMO, low, U-NII-1

S02_AC02

2025-01-13

Passed

Passed

WLAN ac 40 MHz MIMO, low, U-NII-2C

S02_AC02

2025-01-13

Passed

Passed

WLAN ac 40 MHz MIMO, low, U-NII-3

S02_AC02

2025-01-13

Passed

Passed

WLAN ac 40 MHz, high, U-NII-2A

S02_AC02

2025-01-13

Passed

Passed

WLAN ac 40 MHz, low, U-NII-1

S02_AC02

2025-01-13

Passed

Passed

WLAN ac 40 MHz, low, U-NII-2C

S02_AC02

2025-01-13

Passed

Passed

WLAN ac 40 MHz, low, U-NII-3

S02_AC02

2025-01-13

Passed

Passed

WLAN n 20 MHz MIMO, high, U-NII-2A

S02_AC02

2024-12-26

Passed

Passed

WLAN n 20 MHz MIMO, high, U-NII-2C

S02_AC02

2024-12-25

Passed

Passed

WLAN n 20 MHz MIMO, high, U-NII-3

S02_AC02

2024-12-25

Passed

Passed

WLAN n 20 MHz MIMO, low, U-NII-1

S02_AC02

2024-12-26

Passed

Passed

WLAN n 20 MHz MIMO, low, U-NII-2C

S02_AC02

2024-12-26

Passed

Passed

WLAN n 20 MHz MIMO, low, U-NII-3

S02_AC02

2024-12-25

Passed

Passed

WLAN n 40 MHz, low, U-NII-1

S02_AC02

2024-12-25

Passed

Passed

WLAN n 40 MHz, low, U-NII-2C

S02_AC02

2024-12-25

Passed

Passed

Position 3

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407

FCC §15.407 (b), (1),(2),(3),(4); FCC §15.205, §15.209, §15.407 (b) (5),(6)

Undesirable Emissions; General Field Strength Limits

The measurement was performed according to ANSI C63.10, chapter
6.4, 6.5, 6.6.5

Final Result

OP-Mode

Radio Technology, Operating Frequency,
Measurement range, Subband

Setup

Date

FCC

IC

WLAN a, high, 1GHz - 26GHz, U-NII-1

S03_AC02

2025-01-12

Passed

Passed

WLAN a, high, 30MHz - 1GHz, U-NII-1

S03_AC02

2025-01-22

Passed

Passed

WLAN n 20 MHz MIMO, mid, 1GHz - 26GHz,
U-NII-3

S03_AC02

2025-01-11

Passed

Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407

FCC §15.407 (b), (1),(2),(3),(4)

Band Edge

The measurement was performed according to ANSI C63.10, chapter
6.6.5

Final Result

OP-Mode

Radio Technology, Operating Frequency,
Subband

Setup

Date

FCC

IC

WLAN a, high, U-NII-2A

S03_AC02

2025-01-01

Passed

Passed

WLAN a, high, U-NII-2C

S03_AC02

2025-01-01

Passed

Passed

WLAN a, low, U-NII-1

S03_AC02

2025-01-01

Passed

Passed

WLAN a, low, U-NII-3

S03_AC02

2025-01-01

Passed

Passed

WLAN ac 20 MHz MIMO, low, U-NII-2C

S03_AC02

2025-01-11

Passed

Passed

WLAN ac 40 MHz MIMO, high, U-NII-2A

S03_AC02

2025-01-12

Passed

Passed

WLAN ac 40 MHz MIMO, low, U-NII-1

S03_AC02

2025-01-12

Passed

Passed

WLAN ac 40 MHz MIMO, low, U-NII-2C

S03_AC02

2025-01-12

Passed

Passed

WLAN ac 40 MHz MIMO, low, U-NII-3

S03_AC02

2025-01-12

Passed

Passed

WLAN ac 40 MHz, high, U-NII-2A

S03_AC02

2025-01-11

Passed

Passed

WLAN ac 40 MHz, low, U-NII-3

S03_AC02

2025-01-11

Passed

Passed

N/A: Not applicable

N/P: Not performed

2 REVISION HISTORY / SIGNATURES

Report version control			
Version	Release date	Change Description	Version validity
initial	2025-03-28	--	valid
--	--	--	--

COMMENT: -



(responsible for accreditation scope)
Daniel Gall



(responsible for testing and report)
Mohamed Fraitat



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3 ADMINISTRATIVE DATA

3.1 TESTING LABORATORY

Company Name: 7layers GmbH
Address: Borsigstr. 11
40880 Ratingen
Germany

The test facility is accredited by the following accreditation organisation:

Laboratory accreditation no: DAkkS D-PL-12140-01-00
FCC Designation Number: DE0015
FCC Test Firm Registration: 929146
ISED CAB Identifier DE0007; ISED#: 3699A

Responsible for accreditation scope: Daniel Gall
Report Template Version: 2024-11-06

3.2 PROJECT DATA

Responsible for testing and report: Name of the responsible for testing and report
Employees who performed the tests: documented internally at 7Layers
Date of Report: 2025-03-28
Testing Period: 2024-12-20 to 2025-01-12

3.3 APPLICANT DATA

Company Name: H&D Wireless AB
Address: Färögatan 33, Kista Science Tower
164 51 Kista
Sweden
Contact Person: Mikael Olsson

3.4 MANUFACTURER DATA

Company Name: SEW-Eurodrive GmbH & Co KG

Address: Ernst-Blickle-Straße 42
76646 Bruchsal
Germany

Contact Person: Dr. Thomas Schäfer

4 TEST OBJECT DATA

4.1 GENERAL EUT DESCRIPTION

Kind of Device product description	Mobile Network Controller (SEW Eurodrive)
Product name	FHM35A
Type	FHM35A
Declared EUT data by the supplier	
Voltage Type	DC
Voltage Level	24 V
Tested Modulation Type	OFDM
Specific product description	The EUT is a Mobile Network Controller supporting WLAN. For WLAN the EUT is supporting followings bands and modes in the 5 GHz band: - WLAN a-mode 20MHz - WLAN n 20 MHz and n 40 MHz (SISO and MIMO) - WLAN ac 20 MHz, 40 MHz, and 80 MHz (SISO and MIMO) - WLAN ax 20 MHz, 40 MHz, and 80 MHz (SISO and MIMO)
Antenna type	external
Antenna 1	- HnS SWA-2459/360/4/45 (position 6) → 7.5 dBi @ 5 GHz - Leaky wave coupler 5G (position 2) → 3 dBi @ 5 GHz - Wave guide coupler 5G (position 3) → 0 dBi @ 5 GHz
Antenna 2	- HnS SWA-2459/360/4/45 (position 6) → 7.5 dBi @ 5 GHz - Leaky wave coupler 5G (position 2) → 3 dBi @ 5 GHz - Wave guide coupler 5G (position 3) → 0 dBi @ 5 GHz
Tested Data rates	WLAN a: 54 Mbps WLAN n 20, 40: MCS7 WLAN ac 20: MCS8 WLAN ac 40: MCS9 WLAN ax 20, 40: MCS9
Special software used for testing	Labtool on computer board provided by applicant.

4.2 EUT MAIN COMPONENTS

Sample Name	Sample Code	Description
EUT AC02	DE1495003ac02	Radio Labtool sample
Sample Parameter	Value	
Serial No.	28317386.004.24	
HW Version	v57	
SW Version	self-1.1rc8	
Comment		

NOTE: The short description is used to simplify the identification of the EUT in this test report.

4.3 ANCILLARY EQUIPMENT

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

-	-	-
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4.4 AUXILIARY EQUIPMENT

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Auxiliary Equipment can influence the test results.

Device	Details (Manufacturer, Type Model, HW, SW, S/N)	Description
AUX 1	HUBER+SUHNER, 1399-17-0040, -, -, P/N: 84000442	WLAN antenna 1 HnS SWA-2459/360/4/45 (Position 6)
AUX 2	HUBER+SUHNER, 1399-17-0040, -, -, P/N: 84000442	WLAN antenna 1 HnS SWA-2459/360/4/45 (Position 6)
AUX 7	SEW Eurodrive, R-SMA 5 GHz, -, -, S/N: 005.23	WLAN antenna 1 Near field coupler 5G (Position 2)
AUX 8	SEW Eurodrive, R-SMA 5 GHz, -, -, S/N: 013.23	WLAN antenna 2 Near field coupler 5G (Position 2)
AUX 10	SEW Eurodrive, Waveguide Coupler R-SMA 5-6 GHz, -, -, P/N: 18124739.52	WLAN antenna 2 Wave guide coupler 5G (Position 3)

Device	Details (Manufacturer, Type Model, HW, SW, S/N)	Description
AUX 9	SEW Eurodrive, Waveguide Coupler R-SMA 5-6 GHz, -, -, P/N: 18124739.52	WLAN antenna 1 Wave guide coupler 5G (Position 3)

4.5 EUT SETUPS

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup	Combination of EUTs	Description and Rationale
S06_AC02	EUT AC02, AUX 2, AUX 1,	Setup for radiated measurement (Position 6)
S03_AC02	EUT AC02, AUX 7, AUX 8,	Setup for radiated measurement (Position 3)
S02_AC02	EUT AC02, AUX 9, AUX 10,	Setup for radiated measurement (Position 2)

4.6 OPERATING MODES / TEST CHANNELS

This chapter describes the operating modes of the EUTs used for testing.

U-NII-Subband 1 5150 - 5250 MHz			U-NII-Subband 2A 5250 - 5350 MHz			U-NII-Subband 2C 5470 - 5725 MHz			U-NII-Subband 3 5725 - 5850 MHz			Nom. BW
low	mid	high	low	mid	high	low	mid	high	low	mid	high	20 MHz
36	40	48	52	60	64	100	116	140 / 144 ¹⁾	149	157	165	Ch.-No.
5180	5200	5240	5260	5300	5320	5500	5580	5700 / 5720	5745	5785	5825	MHz

low	mid	high	low	mid	high	low	mid	high	low	mid	high	40 MHz
38	-	46	54	-	62	102	110	134 / 142 ¹⁾	151	-	159	Ch.-No.
5190	-	5230	5270	-	5310	5510	5550	5670 / 5710	5755	-	5795	MHz

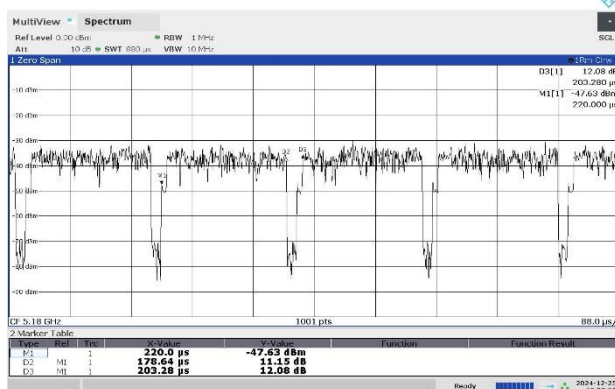
low	mid	high	low	mid	high	low	mid	high	low	mid	high	80 MHz
-	42	-	-	58	-	106	122	138 ¹⁾	155	-	-	Ch.-No.
-	5210	-	-	5290	-	5530	5610	5690	5775	-	-	MHz

- 1) Channels 144, 142 and 138 are straddle channels. Relevant high channels for upper Band Edge of band 2C are CH.140, CH. 134 and Ch 122.

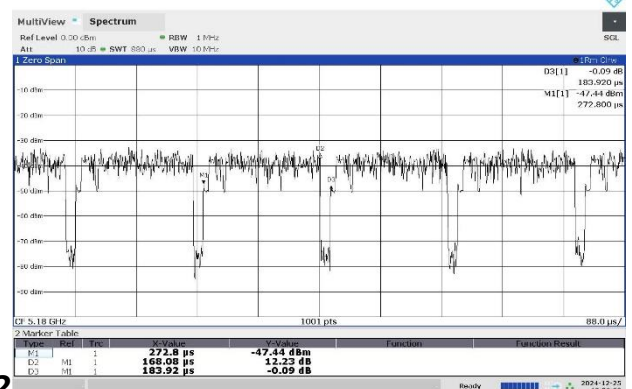
4.7 DUTY CYCLE

Test Mode	T _{on+off} (μs)	T _{on} (μs)	Duty cycle (%)
WLAN a:	203	178	87
WLAN n20:	183	168	91
WLAN n40:	115	100	87
WLAN ac20:	167	151	90
WLAN ac40:	108	92	85

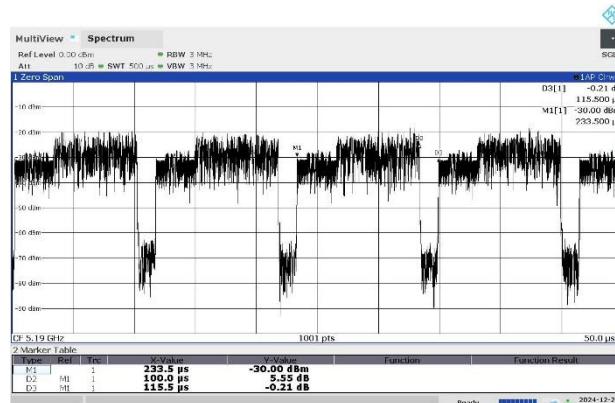
WLAN a



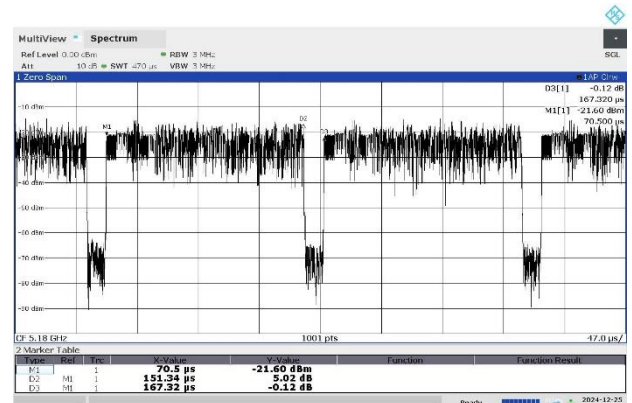
WLAN n20



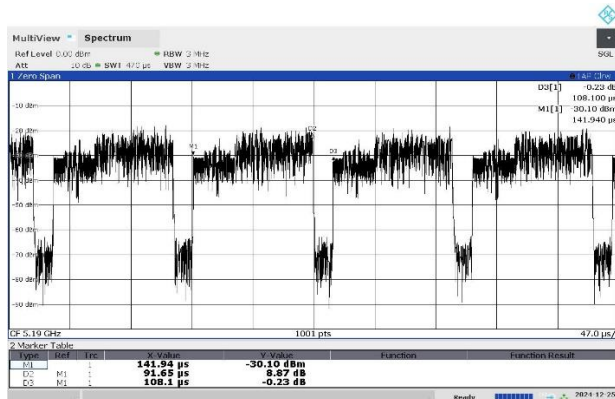
WLAN n40



WLAN ac20



WLAN ac40



4.8 PRODUCT LABELLING

4.8.1 FCC ID LABEL

Please refer to the documentation of the applicant.

4.8.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.

5 TEST RESULTS

5.1 UNDESIRABLE EMISSIONS; GENERAL FIELD STRENGTH LIMITS

Standard **FCC Part 15 Subpart E**

The test was performed according to:

ANSI C63.10, chapter 6.4, 6.5, 6.6.5

5.1.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The measurements were performed according the following sub-chapters of ANSI C63.10:

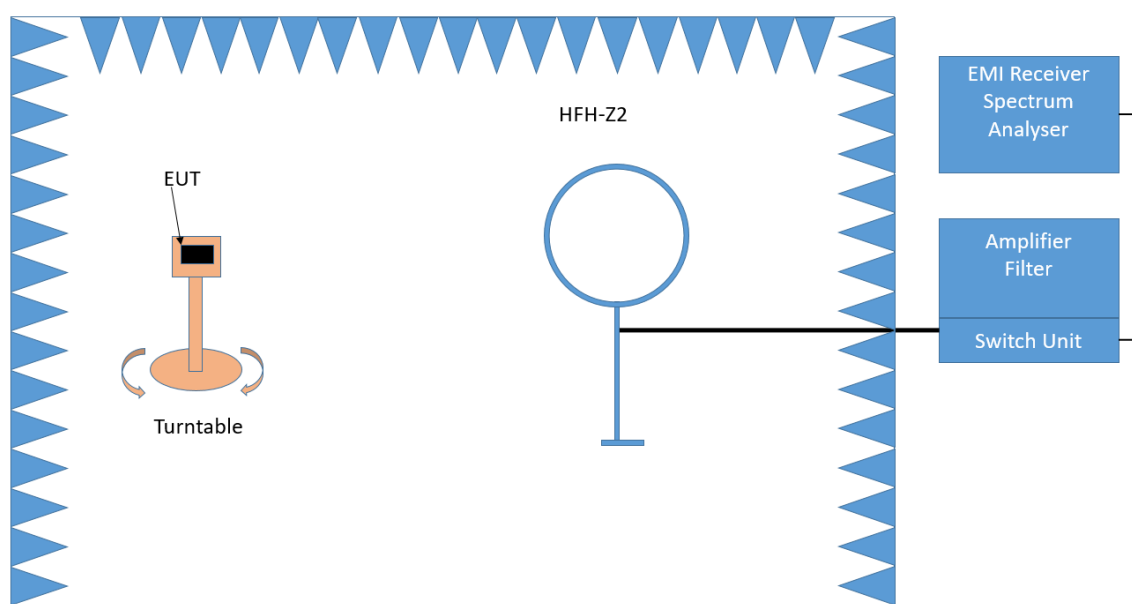
- < 30 MHz: Chapter 6.4
- 30 MHz – 1 GHz: Chapter 6.5
- > 1 GHz: Chapter 6.6 (procedure according 6.6.5 used)

The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered.

Below 1 GHz:

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.

1. Measurement up to 30 MHz



Test Setup; Spurious Emission Radiated (SAC), 9 kHz – 30 MHz

The Loop antenna HFH2-Z2 is used.

Step 1: pre measurement

- Anechoic chamber
- Antenna distance: 3 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 MHz and 0.15 - 30 MHz
- Frequency steps: 0.05 kHz and 2.25 kHz
- IF-Bandwidth: 0.2 kHz and 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)

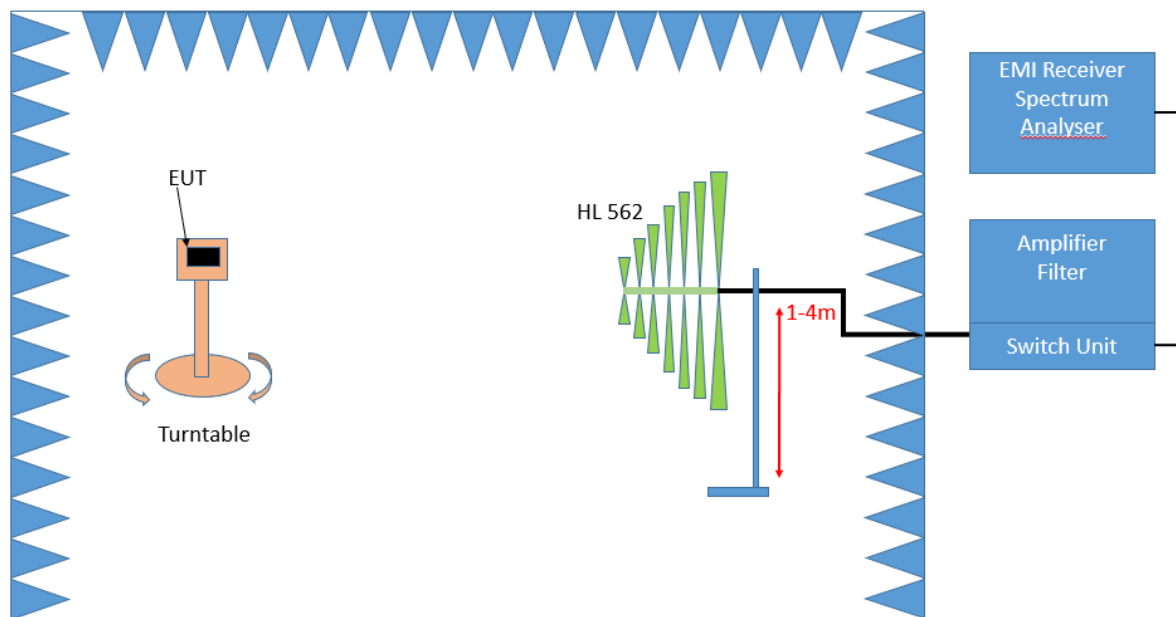
Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: final measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Open area test site
- Antenna distance: according to the Standard
- Detector: Quasi-Peak
- Frequency range: 0.009 - 30 MHz
- Frequency steps: measurement at frequencies detected in step 1
- IF-Bandwidth: 0.2 - 10 kHz
- Measuring time / Frequency step: 1 s

2. Measurement above 30 MHz and up to 1 GHz



Test Setup; Spurious Emission Radiated (SAC), 30 MHz- 1GHz

Step 1: Preliminary scan

This is a preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Antenna distance: 3 m
- Detector: Peak-Maxhold / Quasipeak (FFT-based)
- Frequency range: 30 - 1000 MHz
- Frequency steps: 30 kHz
- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range: -180° to 90°

- Turntable step size: 90°
- Height variation range: 1 – 4 m
- Height variation step size: 1.5 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by 360°. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position, the antenna height will also slowly vary by 1 – 4 meter. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: 360 °
- Height variation range: 1 – 4 m
- Antenna Polarisation: max. value determined in step 1

Step 3: Final measurement with QP detector

With the settings determined in step 2, the final measurement will be performed:

EMI receiver settings for step 3:

- Detector: Quasi-Peak (< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

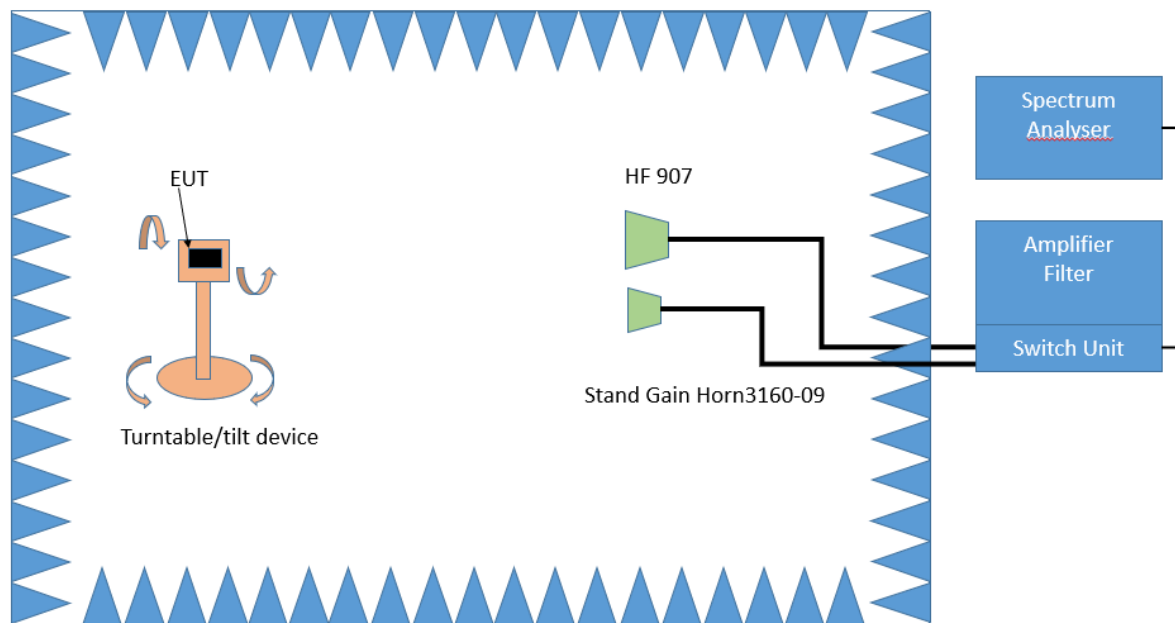
After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

Above 1 GHz:

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.

All steps were performed with one height (1.5 m) of the receiving antenna only.

3. Measurement 1 GHz up to 26.5 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

Step 1:

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.

All steps were performed with one height (1.5 m) of the receiving antenna only.

The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.

The turn table step size (azimuth angle) for the preliminary measurement is 45 °.

Step 2:

Due to the fact, that in this frequency range the test is performed in a fully anechoic room, the height scan of the receiving antenna in step 2 is omitted. Instead of this, a maximum search with a step size $\pm 45^\circ$ for the elevation axis is performed.

The turn table azimuth will slowly vary by $\pm 22.5^\circ$.

The elevation angle will slowly vary by $\pm 45^\circ$

EMI receiver settings (for all steps):

- Detector: Peak, Average
- IF Bandwidth = 1 MHz

Step 3:

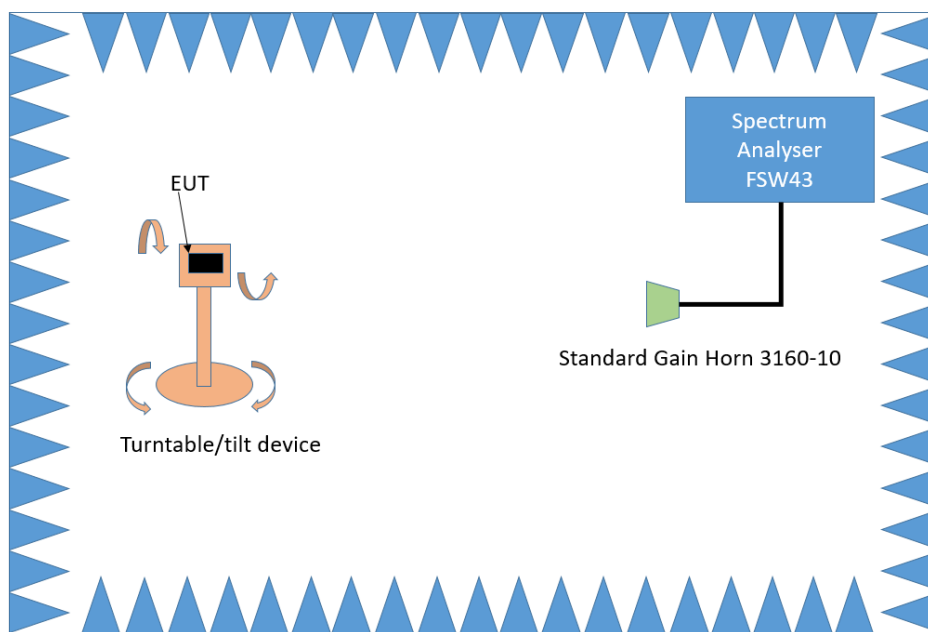
Spectrum analyser settings for step 3:

- Detector: Peak / Average
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 1 MHz
- Measuring time: 1 s

4. Measurement above 26.5 GHz up to 40 GHz

The following modifications, compared to the frequency range 1 GHz – 26.5 GHz, apply to the measurement procedure for the frequency range above 26.5 GHz:

- Measurement distance: 1m



Test Setup; Spurious Emission Radiated (FAC), 26.5 – 40 GHz

5.1.2 TEST REQUIREMENTS / LIMITS

A) FCC

FCC Part 15 Subpart E, §15.407 (b)(1)

For transmitters operating in the 5150–5250 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5150–5350 MHz.

FCC Part 15 Subpart E, §15.407 (b)(2)

For transmitters operating in the 5250–5350 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5150–5350 MHz.

FCC Part 15 Subpart E, §15.407 (b)(3)

For transmitters operating in the 5470–5725 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5470–5725 MHz.

FCC Part 15 Subpart E, §15.407 (b)(4)

For transmitters operating in the 5725–5850 MHz band:

Limit: –27 dBm/MHz at 75 MHz or more above or below the band edge
 increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge
 increasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edge
 increasing linearly to 27 dBm/MHz at the band edge.

FCC Part 15 Subpart E, §15.407 (b) (5)

For transmitters operating within the 5.925–7.125 GHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5.925–7.125 GHz.

FCC Part 15 Subpart E, §15.407 (b) (6)

For transmitters operating within the 5.925-7.125 GHz bands:

Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

B) IC

Different frequency bands and limits apply, as compared to the FCC requirements.

RSS-247, 6.2.1.2, Emissions outside the band 5150-5250 MHz, indoor operation only:
 Limit: -27 dBm/MHz EIRP outside of the band 5150-5250 MHz.

RSS-247, 6.2.2.2, Emissions outside the band 5250-5350 MHz:
 Limit: -27 dBm/MHz EIRP outside of the band 5250-5350 MHz.

RSS-247, 6.2.3.2, Emissions outside the bands 5470-5600 MHz and 5650-5725 MHz:
 Limit: -27 dBm/MHz EIRP outside of the band 5470-5725 MHz.
 However, devices with bandwidth overlapping the band edge of 5725 MHz can meet the emission limit of -27 dBm/MHz e.i.r.p. at 5850 MHz instead of 5725 MHz.
 Note: No operation is permitted for the frequency range 5600-5650 MHz.

RSS-247, 6.2.4.2, Emissions outside the band 5725-5850 MHz:

- 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 Bm/MHz at 5 MHz above or below the band edges;
- 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
- 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
- 27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

C) FCC & IC

FCC Part 15 Subpart E, §15.405

The provisions of §§ 15.203 and 15.205 are included.

§15.407 (b)(6)

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.

§15.407 (b)(7)

The provisions of §15.205 apply to intentional radiators operating under this section

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
0.009 – 0.49	2400/F(kHz)@300m	3	(48.5 – 13.8)@300m

0.49 – 1.705	24000/F(kHz)@30m	3	(33.8 – 23.0)@30m
1.705 – 30	30@30m	3	29.5@30m

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (2).

Frequency in MHz	Limit (μV/m)	Measurement distance (m)	Limits (dBμV/m)
30 – 88	100@3m	3	40.0@3m
88 – 216	150@3m	3	43.5@3m
216 – 960	200@3m	3	46.0@3m
960 – 26000	500@3m	3	54.0@3m
26000 – 40000	500@3m	1	54.0@3m

The measured values above 26 GHz are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor:

- Limit (dBμV/m) = 20 log (Limit (μV/m)/1μV/m)
- Limit (dBμV/m) = EIRP [dBm] – 20 log (d [m]) + 104.8

Limit types (in result tables):

RB – Emissions falls into a “Restricted Band” according FCC §§15.205 and 15.209 *)

UE – “Undesirable Emission Limit” according FCC §15.407

BE-RB – Band Edge Limit basing on “Restricted Band Limits”

BE-UE – Band Edge Limit basing on “Undesirable Emission Limit”

*) Below 1 GHz the limits of §15.209 are applied for all frequencies.

5.1.3 TEST PROTOCOL

Ambient temperature: 22–25 °C
 Air Pressure: 1002–1023 hPa
 Humidity: 38–43 %

Position 6

WLAN a-Mode; 20 MHz; 6 Mbit/s
 Applied duty cycle correction (AV): 1.1 dB

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type
40	5200	35.0	21.7	QP	120	40.0	18.3	RB
40	5200	39.0	19.1	QP	120	40.0	20.9	RB
40	5200	84.6	30.0	QP	120	40.0	10.0	RB
40	5200	104.3	25.1	QP	120	43.5	18.4	RB
40	5200	110.4	28.2	QP	120	43.5	15.3	RB
40	5200	147.5	28.8	QP	120	43.5	14.7	RB
40	5200	169.9	31.1	QP	120	43.5	12.4	RB
40	5200	300.0	31.7	QP	120	46.0	14.3	RB
40	5200	375.0	29.3	QP	120	46.0	16.8	RB
40	5200	400.0	27.7	QP	120	46.0	18.3	RB
40	5200	416.7	34.6	QP	120	46.0	11.4	RB
40	5200	471.4	32.0	QP	120	46.0	14.0	RB
40	5200	525.0	31.9	QP	120	46.0	14.1	RB
40	5200	600.0	39.4	QP	120	46.0	6.6	RB
40	5200	800.0	41.2	QP	120	46.0	4.8	RB
48	5240	1200.2	50.4	PEAK	1000	74.0	23.6	RB
48	5240	1200.2	41.6	AV	1000	54.0	12.4	RB
48	5240	2836.0	52.0	PEAK	1000	74.0	22.0	RB
48	5240	2836.0	40.4	AV	1000	54.0	13.6	RB
157	5785	35.0	20.8	QP	120	40.0	19.2	RB
157	5785	42.6	11.0	QP	120	40.0	29.0	RB
157	5785	84.6	30.8	QP	120	40.0	9.2	RB
157	5785	86.1	25.7	QP	120	40.0	14.3	RB
157	5785	115.5	28.7	QP	120	43.5	14.8	RB
157	5785	171.8	28.7	QP	120	43.5	14.8	RB
157	5785	173.2	27.0	QP	120	43.5	16.5	RB
157	5785	300.0	29.2	QP	120	46.0	16.8	RB
157	5785	375.0	28.6	QP	120	46.0	17.4	RB
157	5785	416.7	33.8	QP	120	46.0	12.2	RB
157	5785	525.0	34.0	QP	120	46.0	12.0	RB
157	5785	600.0	37.0	QP	120	46.0	9.0	RB
157	5785	800.0	40.5	QP	120	46.0	5.5	RB
157	5785	1200.0	49.6	PEAK	1000	74.0	24.4	RB
157	5785	1200.0	40.4	AV	1000	54.0	13.6	RB
157	5785	2867.9	51.8	PEAK	1000	74.0	22.2	RB
157	5785	2867.9	40.1	AV	1000	54.0	13.9	RB
157	5785	17983.4	54.2	PEAK	1000	74.0	19.8	RB
157	5785	17983.4	42.1	AV	1000	54.0	11.9	RB

WLAN n-Mode; 20 MHz; MCS 8; MIMO
Applied duty cycle correction (AV): 0.8 dB

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type
36	5180	1200.0	36.0	AV	1000	54.0	18.0	RB
36	5180	1200.0	47.6	PEAK	1000	74.0	26.4	RB
36	5180	1200.0	48.6	PEAK	1000	74.0	25.4	RB
100	5500	1200.0	40.2	AV	1000	54.0	13.8	RB
100	5500	1200.0	50.1	PEAK	1000	74.0	23.9	RB
157	5785	1200.3	50.2	PEAK	1000	74.0	23.8	RB
157	5785	1200.3	41.2	AV	1000	54.0	12.8	RB
157	5785	4934.5	58.8	PEAK	1000	74.0	15.2	RB
157	5785	4934.5	46.6	AV	1000	54.0	7.4	RB

Position 2

WLAN a-Mode; 20 MHz; 6 Mbit/s
Applied duty cycle correction (AV): 1.1 dB

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type
48	5240	1200.0	40.7	AV	1000	54.0	13.3	RB
48	5240	1200.0	50.0	PEAK	1000	74.0	24.0	RB

WLAN n-Mode; 20 MHz; MCS 8; MIMO
Applied duty cycle correction (AV): 0.8 dB

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type
157	5785	30.2	15.0	QP	120	40.0	25.0	RB
157	5785	43.6	24.2	QP	120	40.0	15.8	RB
157	5785	85.1	27.9	QP	120	40.0	12.1	RB
157	5785	86.7	26.2	QP	120	40.0	13.8	RB
157	5785	109.5	27.5	QP	120	43.5	16.0	RB
157	5785	150.0	31.0	QP	120	43.5	12.5	RB
157	5785	180.4	27.2	QP	120	43.5	16.4	RB
157	5785	300.0	30.3	QP	120	46.0	15.7	RB
157	5785	416.7	35.6	QP	120	46.0	10.5	RB
157	5785	525.0	37.1	QP	120	46.0	8.9	RB
157	5785	600.0	36.9	QP	120	46.0	9.1	RB
157	5785	800.0	40.0	QP	120	46.0	6.0	RB
157	5785	1199.9	42.2	AV	1000	54.0	11.8	RB
157	5785	1199.9	51.1	PEAK	1000	74.0	22.9	RB
157	5785	15627.0	39.8	AV	1000	54.0	14.2	RB
157	5785	15627.0	51.7	PEAK	1000	74.0	22.3	RB

Position 3

WLAN a-Mode; 20 MHz; 6 Mbit/s

Applied duty cycle correction (AV): 1.1 dB

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type
48	5240	44.1	24.8	QP	120	40.0	15.2	RB
48	5240	84.8	29.0	QP	120	40.0	11.0	RB
48	5240	164.1	29.6	QP	120	43.5	14.0	RB
48	5240	300.0	27.2	QP	120	46.0	18.8	RB
48	5240	350.0	26.2	QP	120	46.0	19.8	RB
48	5240	416.7	35.5	QP	120	46.0	10.5	RB
48	5240	525.0	37.8	QP	120	46.0	8.2	RB
48	5240	600.0	38.7	QP	120	46.0	7.3	RB
48	5240	800.0	41.1	QP	120	46.0	4.9	RB
48	5240	1200.0	52.4	PEAK	1000	74.0	21.6	RB
48	5240	1200.0	44.8	AV	1000	54.0	9.2	RB
48	5240	4000.0	57.6	PEAK	1000	74.0	16.4	RB
48	5240	4000.0	46.6	AV	1000	54.0	7.4	RB

WLAN n-Mode; 20 MHz; MCS 8; MIMO

Applied duty cycle correction (AV): 0.8 dB

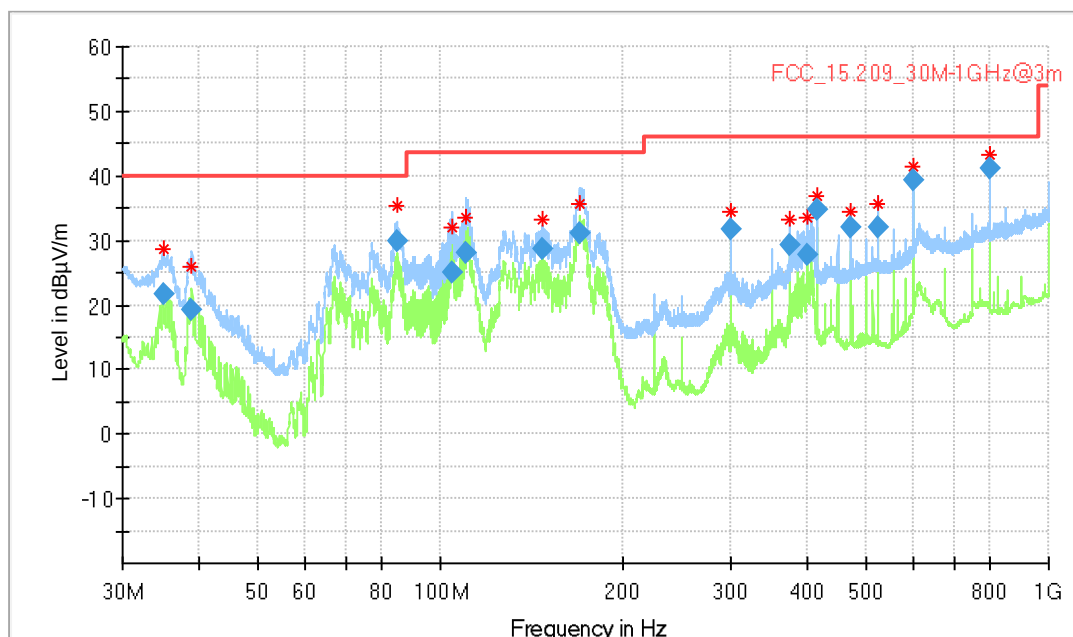
Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type
157	5785	1200.0	52.7	PEAK	1000	74.0	21.3	RB
157	5785	1200.0	44.6	AV	1000	54.0	9.4	RB
157	5785	1958.7	54.8	PEAK	1000	68.2	13.4	UE

Remark: Please see next sub-clause for the measurement plot.

5.1.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Position 6

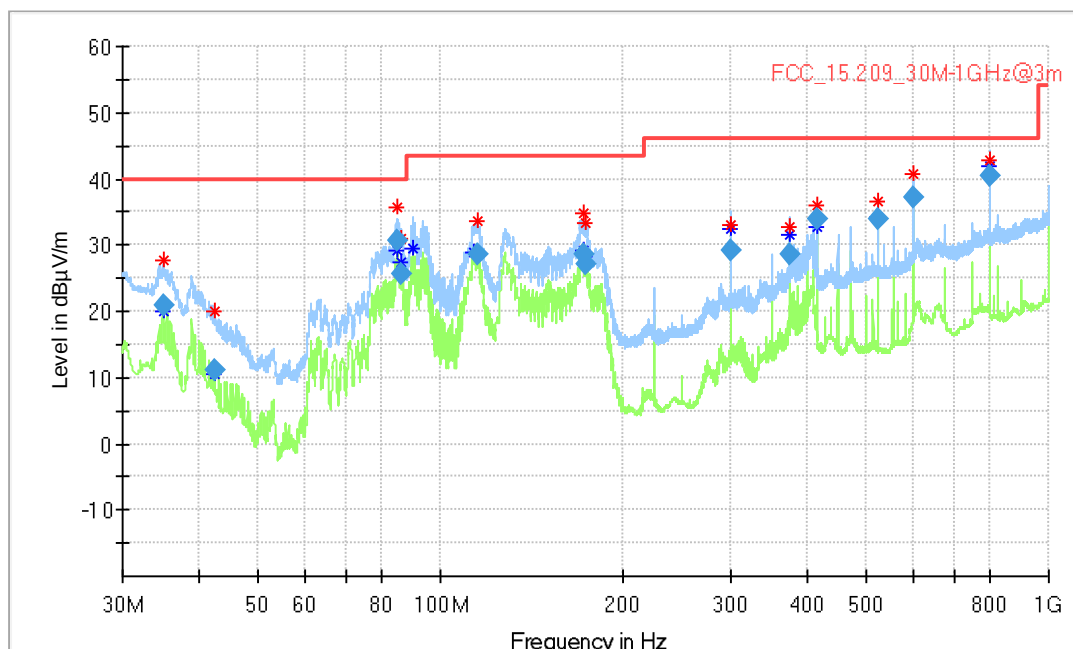
Radio Technology = WLAN a, Operating Frequency = low, Measurement range = 30MHz - 1GHz, Subband = U-NII-1
(S06_AC02)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
34.950000	21.67	40.00	18.33	1000.0	120.000	103.0	V	-198.0	16.8
39.030000	19.13	40.00	20.87	1000.0	120.000	108.0	V	-9.0	14.4
84.570000	29.97	40.00	10.03	1000.0	120.000	132.0	V	-8.0	10.9
104.340000	25.10	43.50	18.40	1000.0	120.000	100.0	V	-82.0	11.9
110.400000	28.18	43.50	15.32	1000.0	120.000	106.0	V	50.0	12.1
147.480000	28.79	43.50	14.71	1000.0	120.000	106.0	V	-160.0	10.1
169.860000	31.09	43.50	12.41	1000.0	120.000	109.0	V	137.0	10.3
300.000000	31.74	46.00	14.26	1000.0	120.000	106.0	H	-197.0	14.6
375.000000	29.25	46.00	16.75	1000.0	120.000	100.0	H	33.0	17.2
400.020000	27.69	46.00	18.31	1000.0	120.000	100.0	H	-29.0	18.1
416.670000	34.63	46.00	11.37	1000.0	120.000	103.0	V	-187.0	18.6
471.420000	31.98	46.00	14.02	1000.0	120.000	106.0	V	16.0	20.2
525.000000	31.92	46.00	14.08	1000.0	120.000	129.0	V	-96.0	21.3
600.000000	39.43	46.00	6.57	1000.0	120.000	105.0	V	-69.0	22.9
800.010000	41.17	46.00	4.83	1000.0	120.000	103.0	V	-2.0	26.3

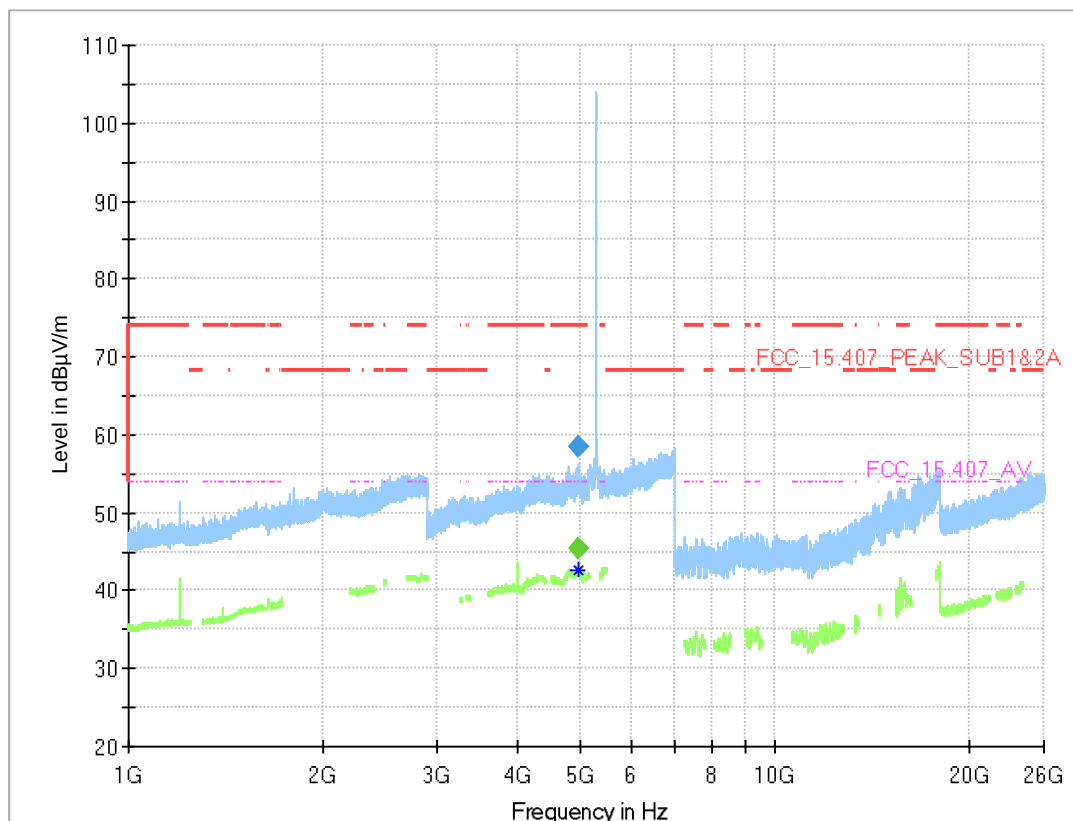
Radio Technology = WLAN a, Operating Frequency = high, Measurement range = 30MHz - 1GHz, Subband = U-NII-2A
(S06_AC02)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
34.950000	20.84	40.00	19.16	1000.0	120.000	104.0	V	-194.0	16.8
42.600000	11.00	40.00	29.00	1000.0	120.000	119.0	V	-161.0	12.2
84.630000	30.81	40.00	9.19	1000.0	120.000	115.0	V	-143.0	10.9
86.130000	25.67	40.00	14.33	1000.0	120.000	123.0	V	-129.0	11.0
115.500000	28.70	43.50	14.80	1000.0	120.000	112.0	V	89.0	12.0
171.750000	28.71	43.50	14.79	1000.0	120.000	103.0	V	-94.0	10.5
173.220000	27.01	43.50	16.49	1000.0	120.000	123.0	V	-103.0	10.6
300.000000	29.17	46.00	16.83	1000.0	120.000	103.0	V	-170.0	14.6
375.000000	28.64	46.00	17.36	1000.0	120.000	105.0	H	0.0	17.2
416.670000	33.79	46.00	12.21	1000.0	120.000	105.0	V	-196.0	18.6
525.000000	34.03	46.00	11.97	1000.0	120.000	105.0	V	-151.0	21.3
600.000000	37.04	46.00	8.96	1000.0	120.000	103.0	V	-72.0	22.9
800.010000	40.48	46.00	5.52	1000.0	120.000	108.0	V	6.0	26.3

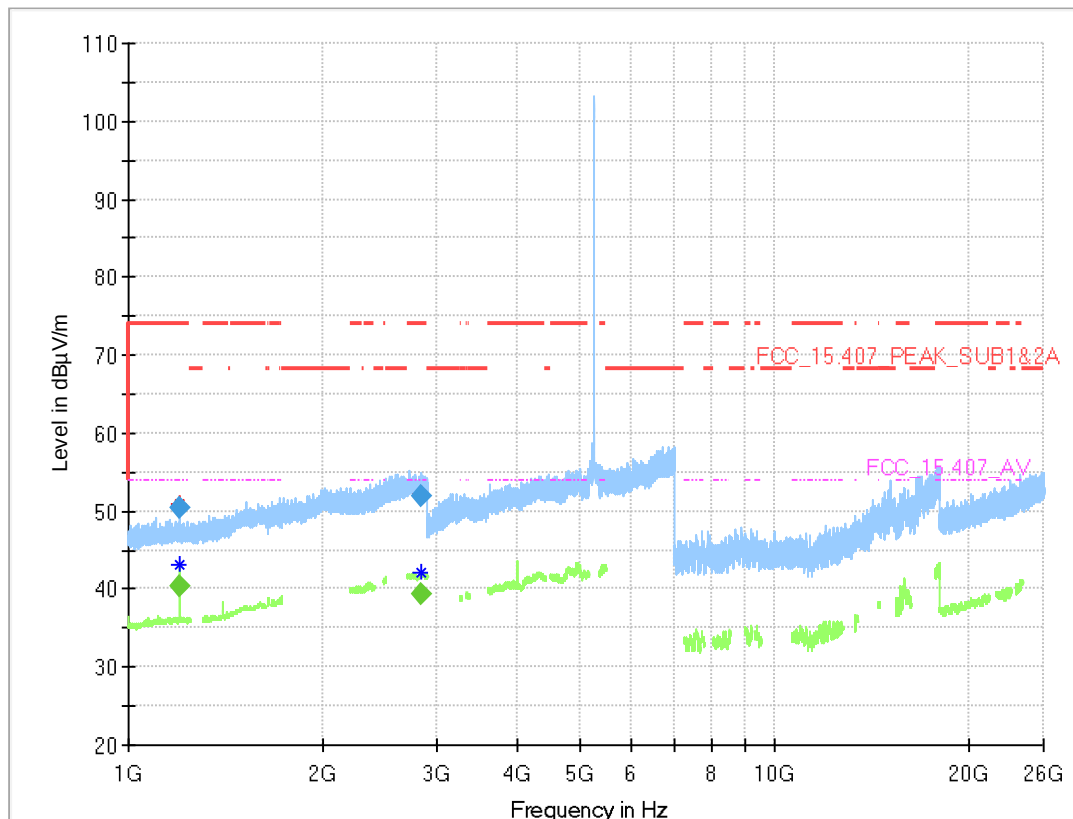
Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-1
 Measurement range = 1GHz - 26GHz,



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
4946.388	---	45.5	54.00	8.49	1000.0	1000.000	150.0	H	-49.0	100.0	15.6
4946.388	58.6	---	74.00	15.44	1000.0	1000.000	150.0	H	-49.0	100.0	15.6

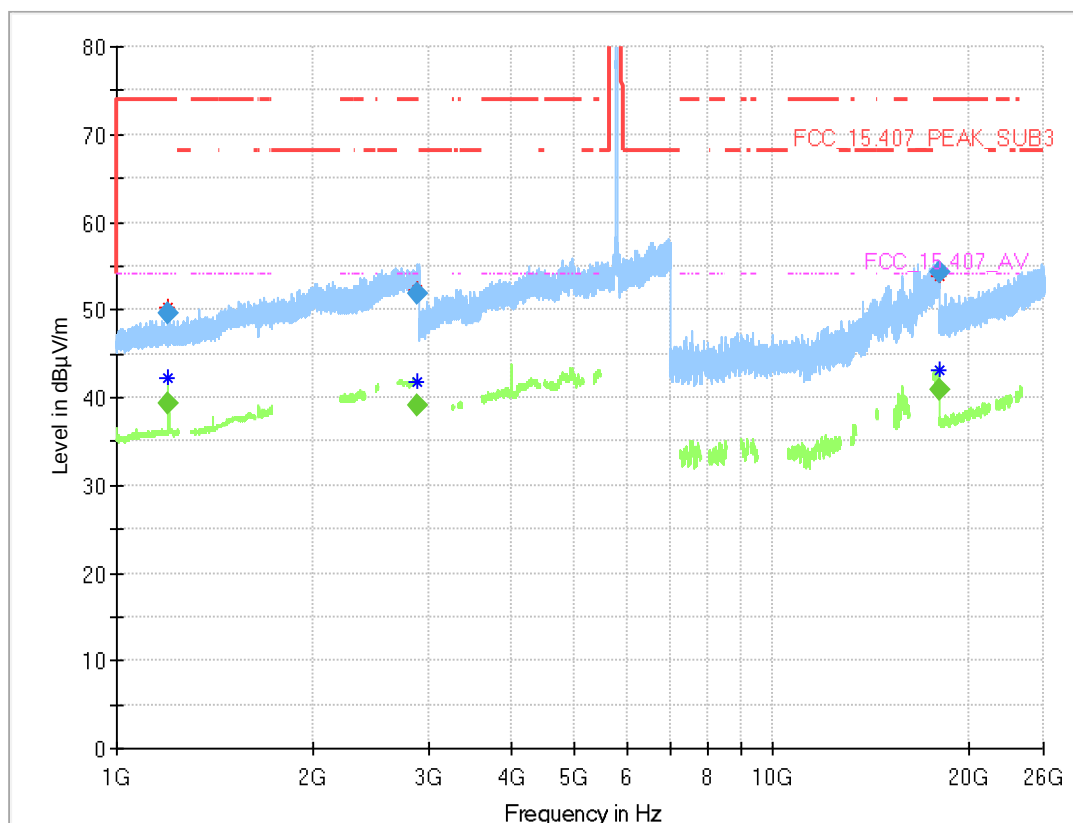
Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-2A
Measurement range = 1GHz - 26GHz,



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1200.160	---	40.5	54.00	13.53	1000.0	1000.000	150.0	V	81.0	6.0	3.2
1200.160	50.4	---	74.00	23.57	1000.0	1000.000	150.0	V	81.0	6.0	3.2
2835.950	---	39.3	54.00	14.70	1000.0	1000.000	150.0	V	-139.0	78.0	9.1
2835.950	52.0	---	74.00	21.96	1000.0	1000.000	150.0	V	-139.0	78.0	9.1

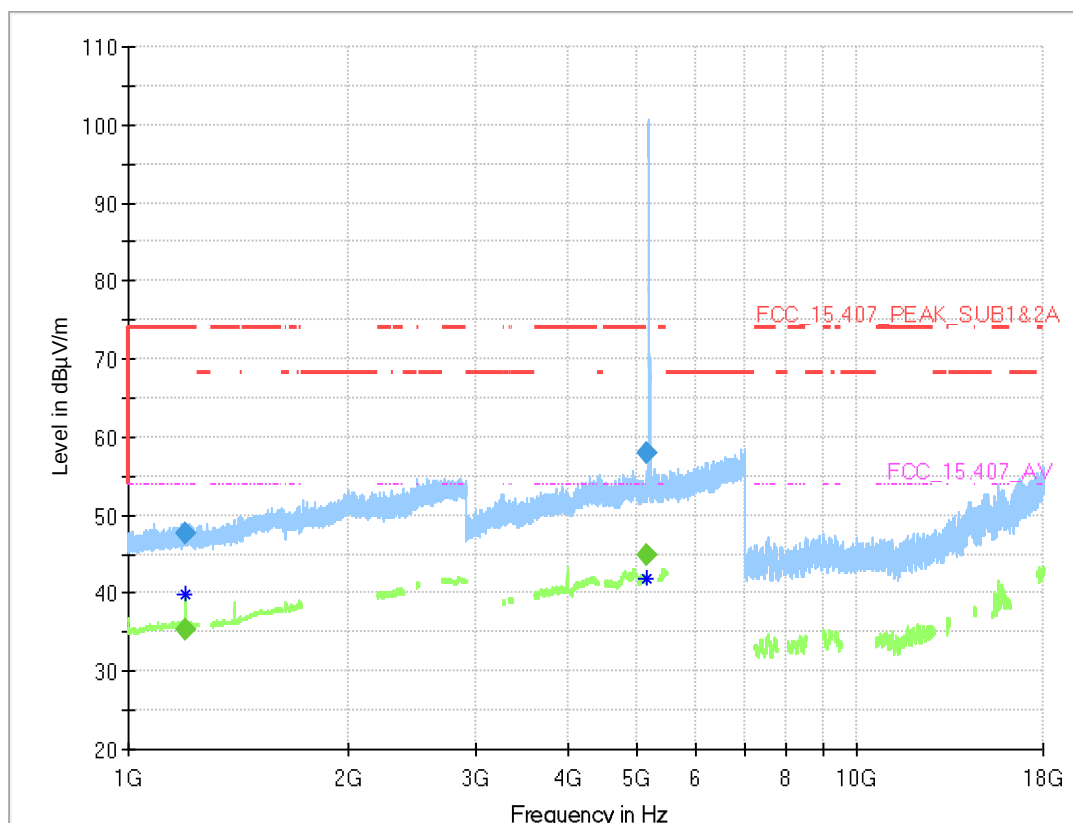
Radio Technology = WLAN a, Operating Frequency = mid, Subband = U-NII-3
Measurement range = 1GHz - 26GHz,



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1200.040	---	39.3	54.00	14.66	1000.0	1000.000	150.0	H	-5.0	103.0	3.2
1200.040	49.6	---	74.00	24.41	1000.0	1000.000	150.0	H	-5.0	103.0	3.2
2867.870	---	39.0	54.00	15.00	1000.0	1000.000	150.0	V	-177.0	-4.0	9.0
2867.870	51.8	---	74.00	22.18	1000.0	1000.000	150.0	V	-177.0	-4.0	9.0
17983.350	---	41.0	54.00	13.01	1000.0	1000.000	150.0	H	-90.0	4.0	16.6
17983.350	54.2	---	74.00	19.79	1000.0	1000.000	150.0	H	-90.0	4.0	16.6

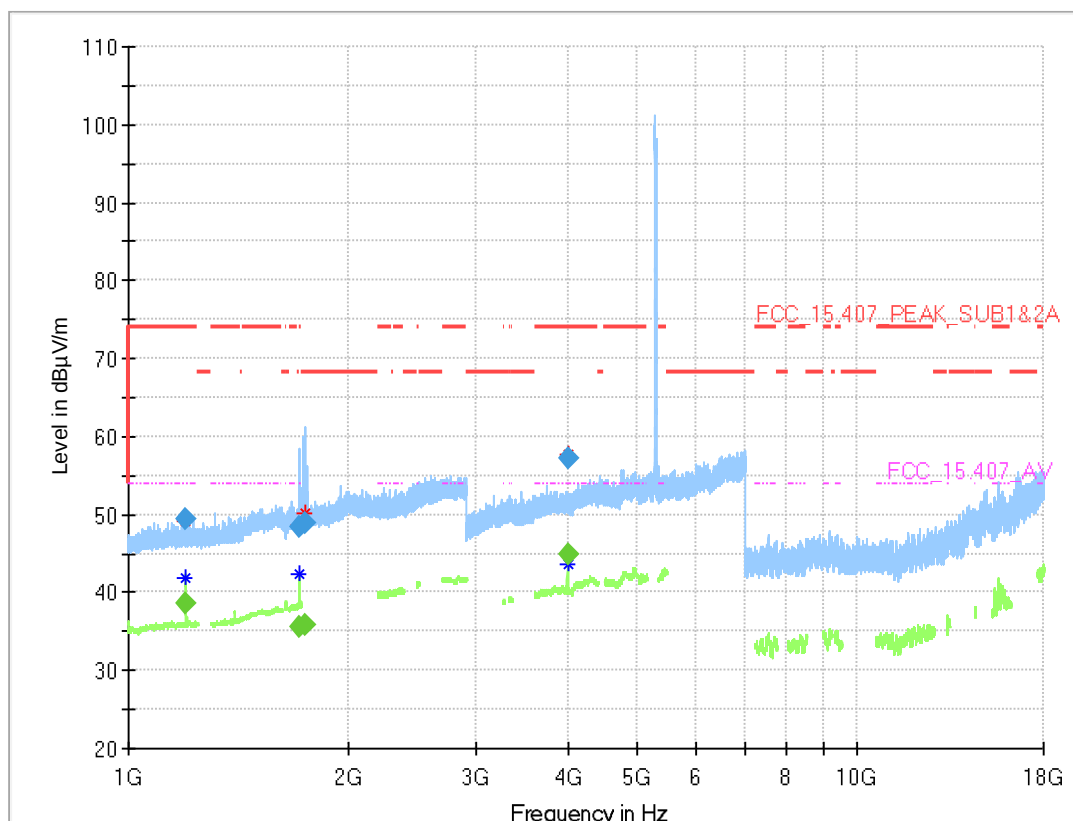
Radio Technology = WLAN n 20 MIMO, Operating Frequency = low, Subband = U-NII-1
Measurement range = 1GHz - 18 GHz,



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1200.160	47.6	---	74.00	26.39	1000.0	1000.000	150.0	V	51.0	5.0	3.2
1200.160	---	35.2	54.00	18.78	1000.0	1000.000	150.0	V	51.0	5.0	3.2
5148.050	---	44.8	54.00	9.22	1000.0	1000.000	150.0	V	-51.0	105.0	15.0
5148.050	57.9	---	74.00	16.09	1000.0	1000.000	150.0	V	-51.0	105.0	15.0

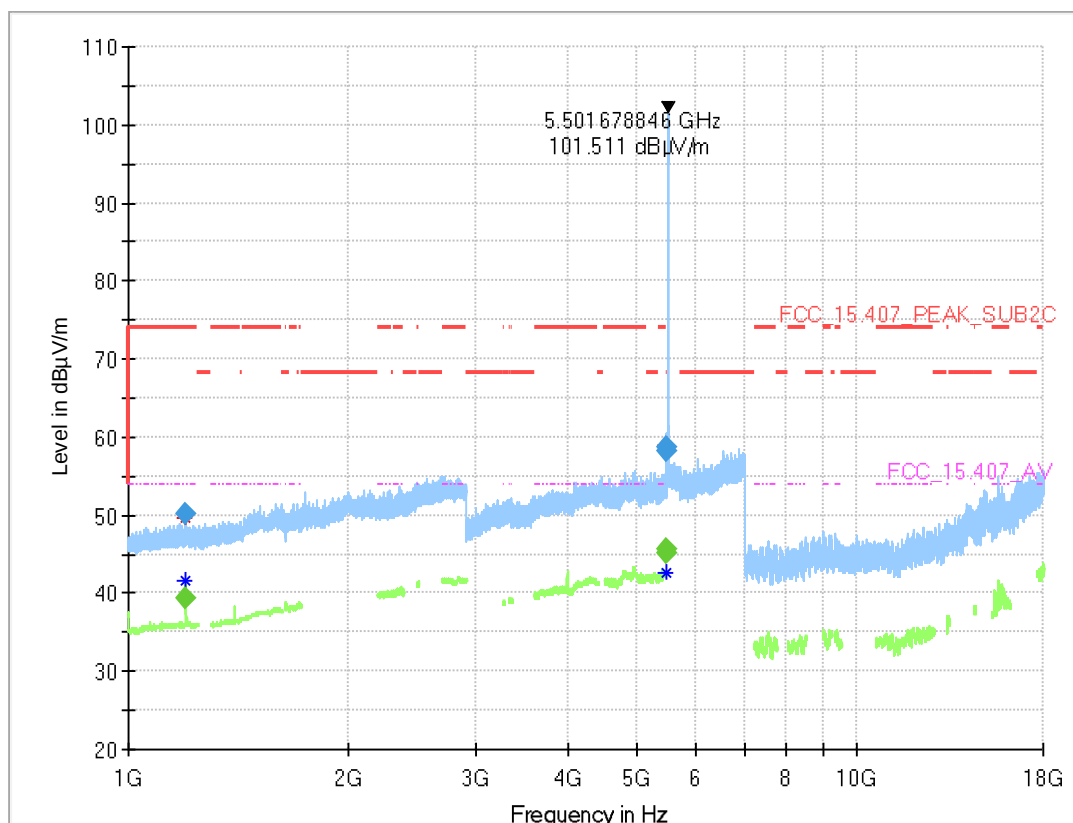
Radio Technology = WLAN n 20 MIMO, Operating Frequency = mid, Subband = U-NII-2A
Measurement range = 1GHz - 18 GHz,



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1200.040	---	38.6	54.00	15.37	1000.0	1000.000	150.0	V	-46.0	15.0	3.2
1200.040	49.3	---	74.00	24.68	1000.0	1000.000	150.0	V	-46.0	15.0	3.2
1719.752	---	35.6	54.00	18.36	1000.0	1000.000	150.0	V	132.0	7.0	5.4
1719.752	48.3	---	74.00	25.65	1000.0	1000.000	150.0	V	132.0	7.0	5.4
1745.015	---	35.9	---	---	1000.0	1000.000	150.0	V	-53.0	4.0	5.8
1745.015	48.9	---	68.20	19.32	1000.0	1000.000	150.0	V	-53.0	4.0	5.8
4000.000	---	44.8	54.00	9.16	1000.0	1000.000	150.0	V	8.0	102.0	13.3
4000.000	57.2	---	74.00	16.80	1000.0	1000.000	150.0	V	8.0	102.0	13.3

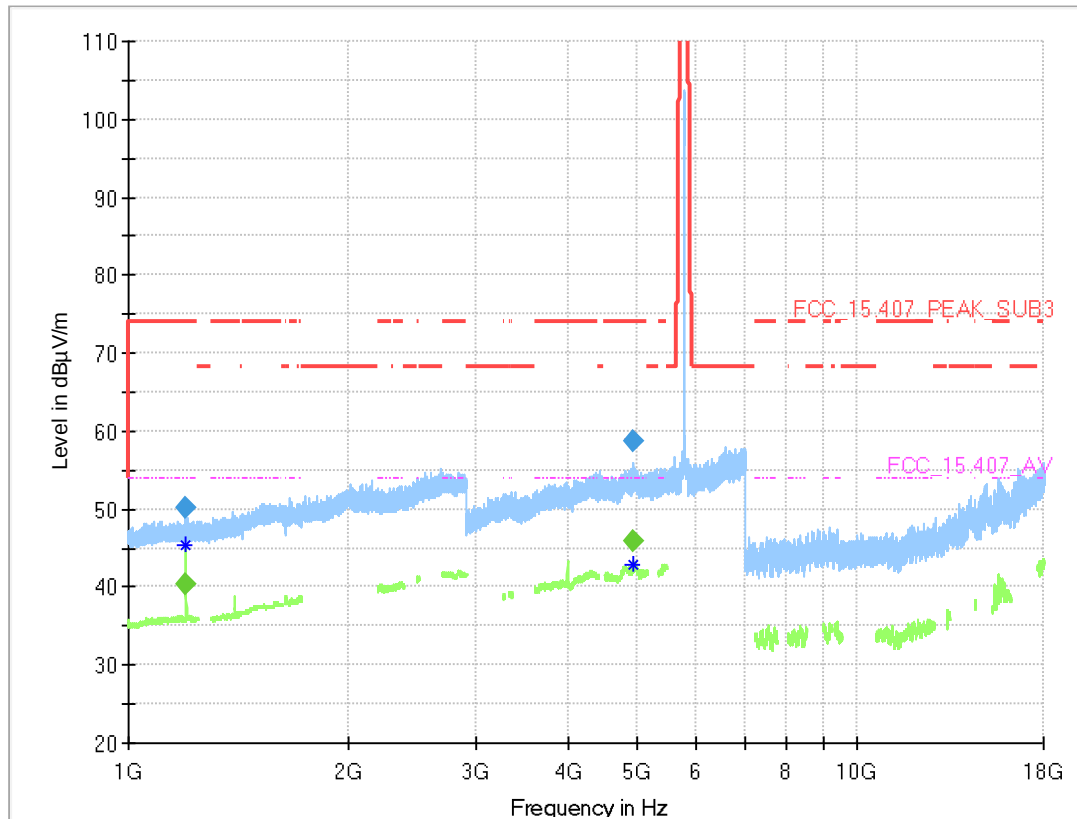
Radio Technology = WLAN n 20 MIMO, Operating Frequency = low, Subband = U-NII-2C
Measurement range = 1GHz - 18 GHz,



Final Result

Frequency (MHz)	MaxPeak (dB μ V/m)	CAverage (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1199.920	---	39.4	54.00	14.61	1000.0	1000.000	150.0	V	101.0	105.0	3.2
1199.920	50.1	---	74.00	23.90	1000.0	1000.000	150.0	V	101.0	105.0	3.2
5459.780	---	45.5	54.00	8.47	1000.0	1000.000	150.0	V	-37.0	105.0	15.9
5459.780	58.8	---	74.00	15.19	1000.0	1000.000	150.0	V	-37.0	105.0	15.9
5469.800	---	45.1	---	---	1000.0	1000.000	150.0	H	91.0	97.0	15.7
5469.800	58.1	---	68.20	10.10	1000.0	1000.000	150.0	H	91.0	97.0	15.7

Radio Technology = WLAN n 20 MIMO, Operating Frequency = mid, Subband = U-NII-3
Measurement range = 1GHz - 18 GHz,

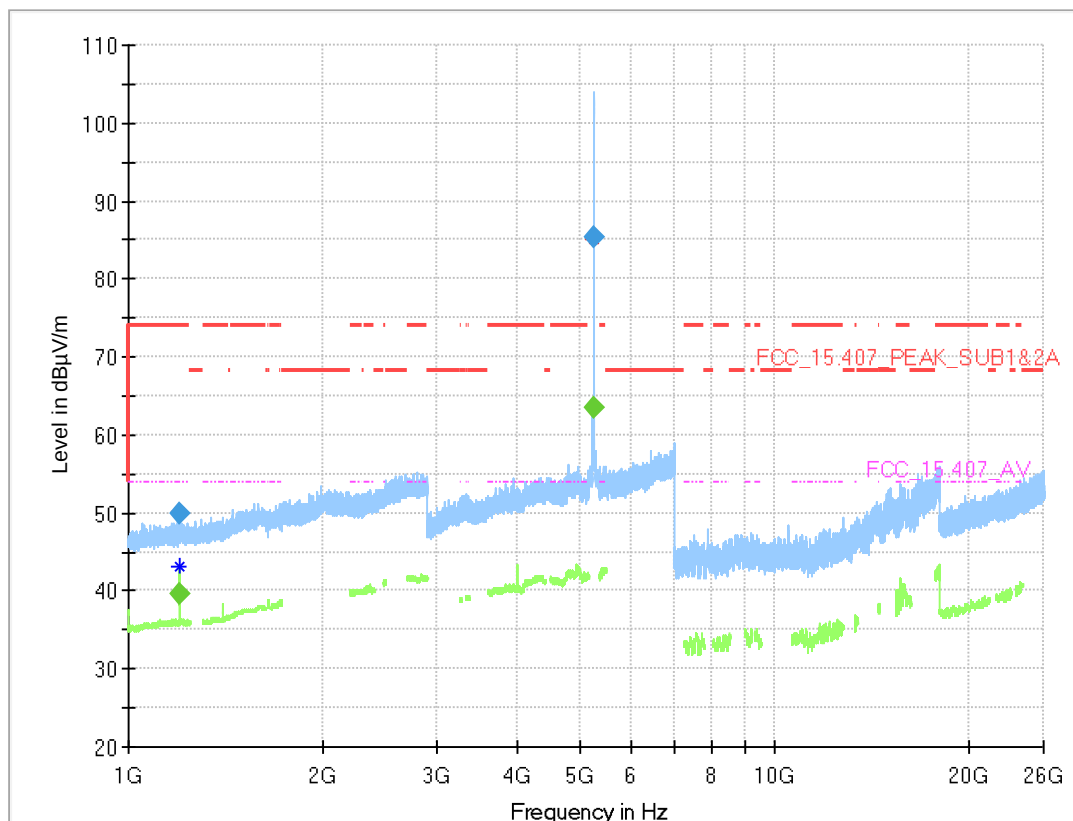


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1200.280	---	40.4	54.00	13.62	1000.0	1000.000	150.0	H	-1.0	95.0	3.2
1200.280	50.2	---	74.00	23.76	1000.0	1000.000	150.0	H	-1.0	95.0	3.2
4934.525	---	45.8	54.00	8.22	1000.0	1000.000	150.0	H	49.0	15.0	15.7
4934.525	58.8	---	74.00	15.20	1000.0	1000.000	150.0	H	49.0	15.0	15.7

Position 2

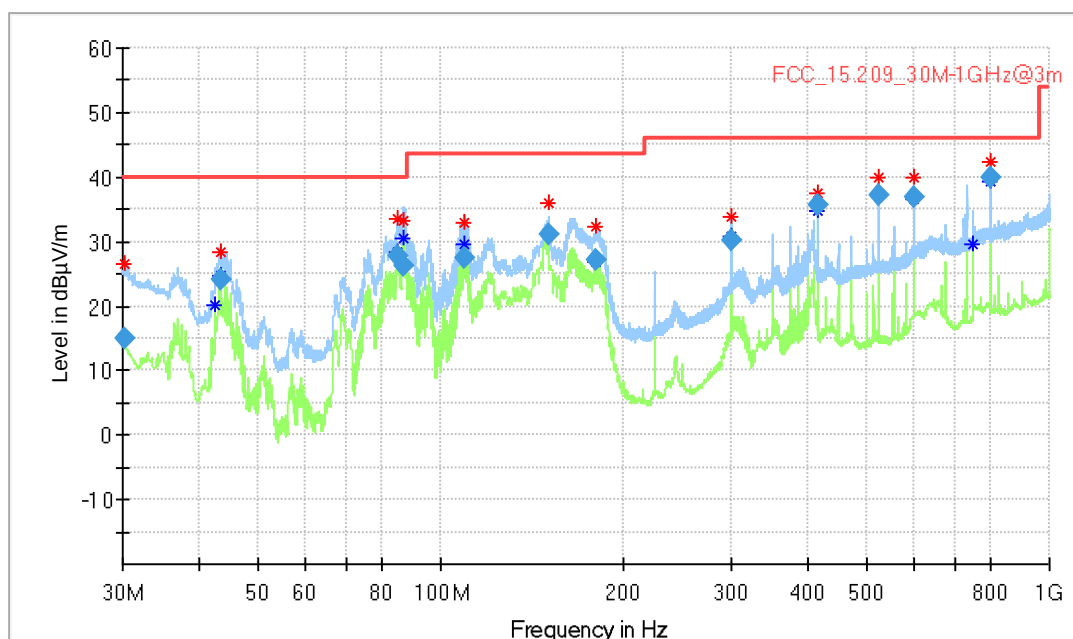
Radio Technology = WLAN a, Operating Frequency = high, Measurement range = 1 GHz – 26 GHz , Subband = U-NII-1 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1200.280	---	39.6	54.00	14.44	1000.0	1000.000	150.0	H	-89.0	82.0	3.2
1200.280	50.0	---	74.00	23.97	1000.0	1000.000	150.0	H	-89.0	82.0	3.2
5250.000	---	63.4	---	---	1000.0	1000.000	150.0	V	79.0	-15.0	14.9
5250.000	85.4	---	---	---	1000.0	1000.000	150.0	V	79.0	-15.0	14.9

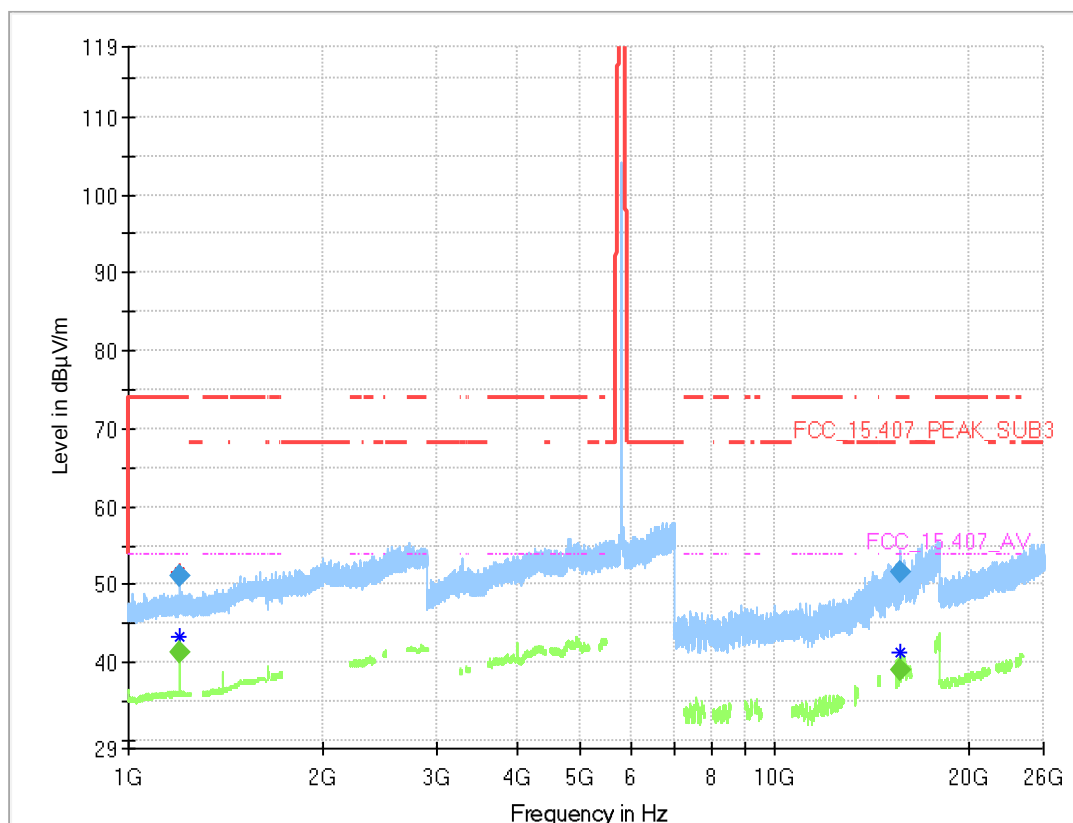
Radio Technology = WLAN n mode 20 MHz MIMO, Operating Frequency = mid, Measurement range = 30MHz - 1GHz, Subband = U-NII-3 (S02_AC02)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.150000	15.04	40.00	24.96	1000.0	120.000	103.0	V	-199.0	19.5
43.590000	24.16	40.00	15.84	1000.0	120.000	105.0	V	-49.0	11.6
85.140000	27.87	40.00	12.13	1000.0	120.000	120.0	V	23.0	11.0
86.730000	26.17	40.00	13.83	1000.0	120.000	115.0	V	105.0	11.0
109.530000	27.46	43.50	16.04	1000.0	120.000	113.0	V	134.0	12.1
150.000000	30.97	43.50	12.53	1000.0	120.000	100.0	V	70.0	9.9
180.420000	27.15	43.50	16.35	1000.0	120.000	100.0	V	-200.0	11.0
300.000000	30.33	46.00	15.67	1000.0	120.000	105.0	V	72.0	14.6
416.670000	35.55	46.00	10.45	1000.0	120.000	104.0	H	-162.0	18.6
525.000000	37.14	46.00	8.86	1000.0	120.000	102.0	V	136.0	21.3
600.000000	36.92	46.00	9.08	1000.0	120.000	106.0	H	-161.0	22.9
800.010000	40.02	46.00	5.98	1000.0	120.000	100.0	H	-190.0	26.3

Radio Technology = WLAN a, Operating Frequency = mid, Measurement range = 1 GHz – 26 GHz, Subband = U-NII-3 (S02_AC02)

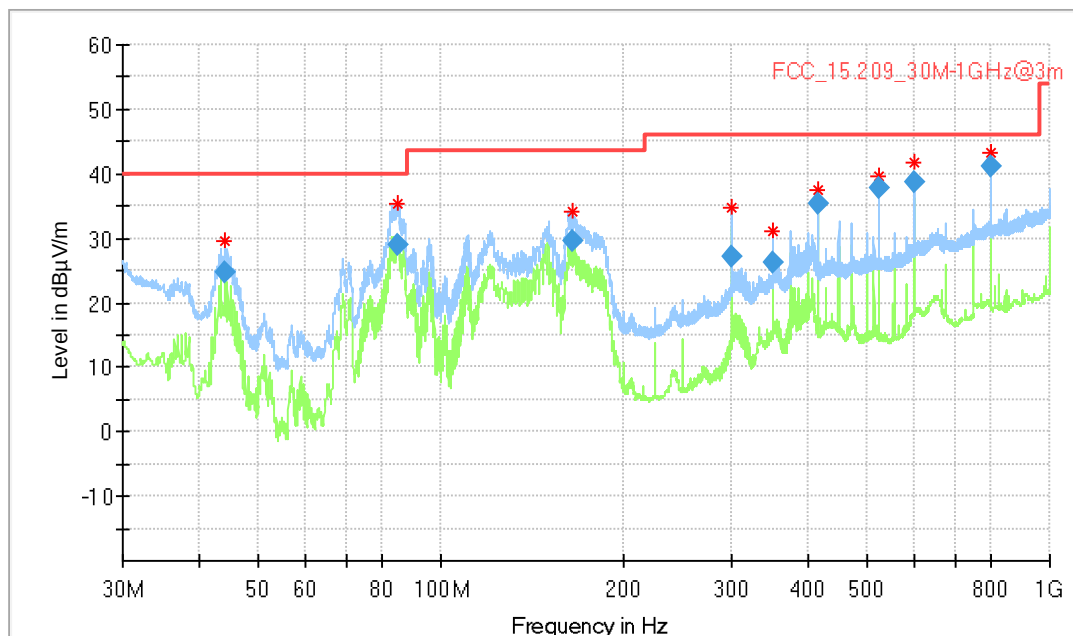


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1199.920	---	41.4	54.00	12.61	1000.0	1000.000	150.0	H	-89.0	105.0	3.2
1199.920	51.1	---	74.00	22.91	1000.0	1000.000	150.0	H	-89.0	105.0	3.2
15626.958	---	39.0	54.00	14.96	1000.0	1000.000	150.0	V	37.0	102.0	11.5
15626.958	51.7	---	74.00	22.30	1000.0	1000.000	150.0	V	37.0	102.0	11.5

Position 3

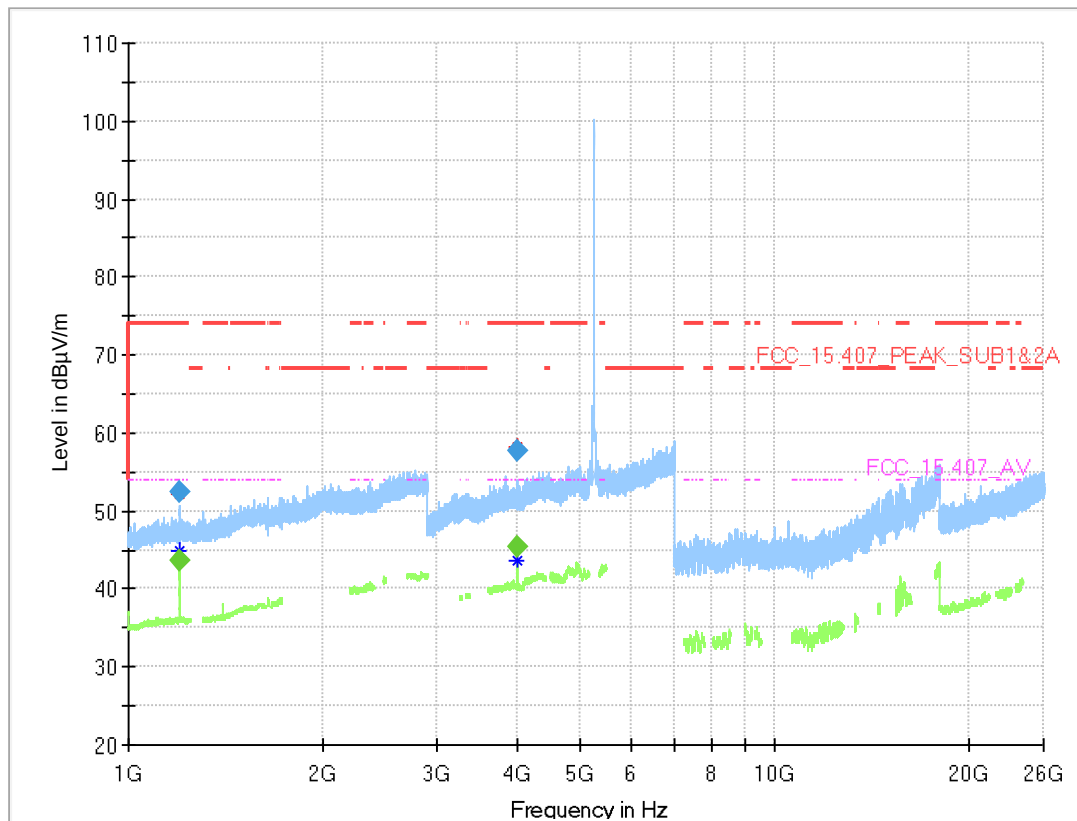
Radio Technology = WLAN a, Operating Frequency = high, Measurement range = 30MHz - 1GHz, Subband = U-NII-1
(S03_AC02)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
44.100000	24.83	40.00	15.17	1000.0	120.000	100.0	V	-167.0	11.3
84.780000	29.04	40.00	10.96	1000.0	120.000	126.0	V	11.0	10.9
164.130000	29.55	43.50	13.95	1000.0	120.000	102.0	V	-189.0	9.9
300.000000	27.19	46.00	18.81	1000.0	120.000	100.0	H	20.0	14.6
349.980000	26.17	46.00	19.83	1000.0	120.000	105.0	V	88.0	16.3
416.670000	35.48	46.00	10.52	1000.0	120.000	139.0	V	-184.0	18.6
525.000000	37.81	46.00	8.19	1000.0	120.000	100.0	V	-178.0	21.3
600.000000	38.71	46.00	7.29	1000.0	120.000	127.0	H	-158.0	22.9
799.980000	41.09	46.00	4.91	1000.0	120.000	100.0	H	206.0	26.3

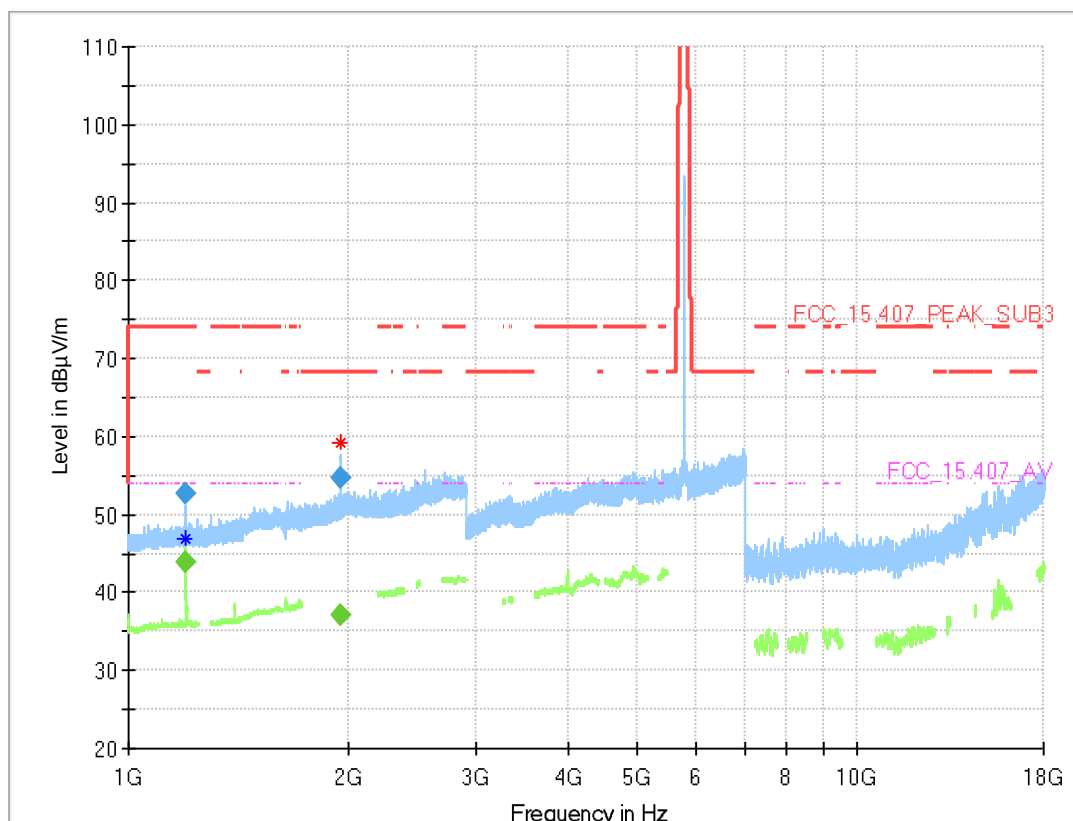
Radio Technology = WLAN a, Operating Frequency = high, Measurement range = 1GHz-
26GHz, Subband = U-NII-1
(S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1200.040	---	43.7	54.00	10.26	1000.0	1000.000	150.0	V	-95.0	90.0	3.2
1200.040	52.4	---	74.00	21.63	1000.0	1000.000	150.0	V	-95.0	90.0	3.2
4000.000	---	45.5	54.00	8.55	1000.0	1000.000	150.0	V	6.0	102.0	13.3
4000.000	57.6	---	74.00	16.39	1000.0	1000.000	150.0	V	6.0	102.0	13.3

Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = high, Measurement range = 1GHz-18GHz, Subband = U-NII-3
(S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1200.040	---	43.8	54.00	10.19	1000.0	1000.000	150.0	V	-88.0	88.0	3.2
1200.040	52.7	---	74.00	21.31	1000.0	1000.000	150.0	V	-88.0	88.0	3.2
1958.711	---	37.2	---	---	1000.0	1000.000	150.0	H	-144.0	78.0	6.7
1958.711	54.8	---	68.20	13.39	1000.0	1000.000	150.0	H	-144.0	78.0	6.7

5.1.5 TEST EQUIPMENT USED

- Radiated Emissions FAR 5 GHz FCC
- Radiated Emissions SAC up to 1 GHz

5.2 BAND EDGE

Standard **FCC Part 15 Subpart E**

The test was performed according to:

ANSI C63.10, chapter 6.6.5

5.2.1 TEST DESCRIPTION

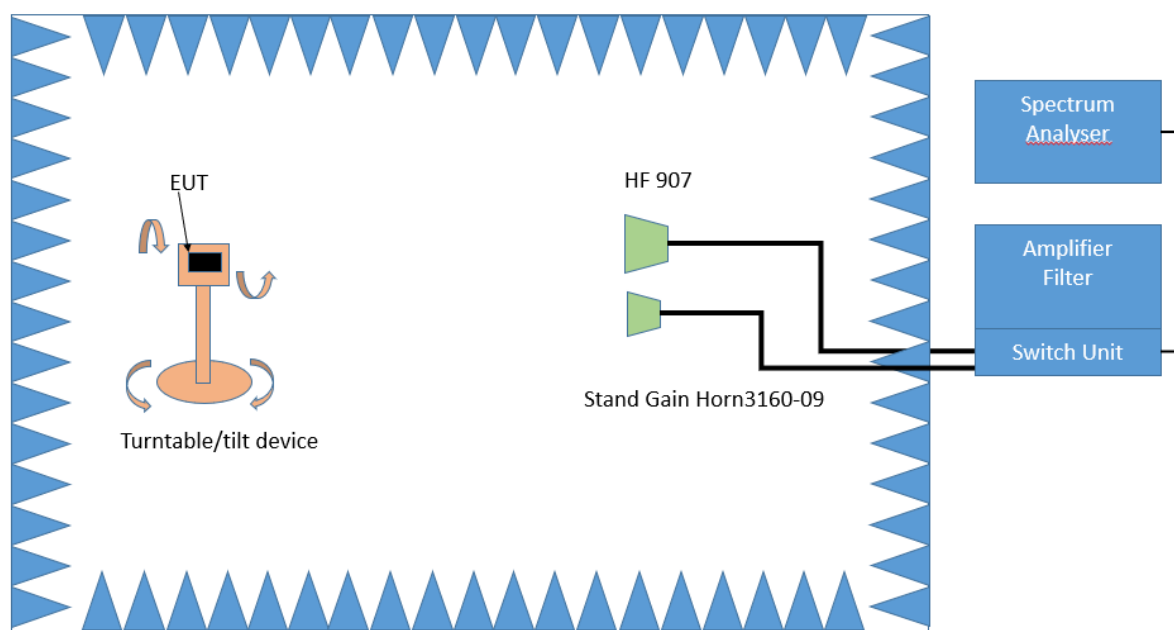
The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The measurements were performed according the following sub-chapter of ANSI C63.10:

- Chapter 6.10.5

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.

All steps were performed with one height (1.5 m) of the receiving antenna only (procedure according ANSI C63.10, chapter 6.6.5).

3. Measurement above 1 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

Step 1:

The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.

The turn table step size (azimuth angle) for the preliminary measurement is 45 °.

Spectrum analyser settings:

- Detector: Peak, Average
- RBW = 1 MHz
- VBW = 3 MHz

Step 2:

The turn table azimuth will slowly vary by $\pm 22.5^\circ$.

The elevation angle will slowly vary by $\pm 45^\circ$

Spectrum analyser settings:

- Detector: Peak

Step 3:

Spectrum analyser settings for step 3:

- Detector: Peak / CISPR Average
- Measured frequencies: in step 1 determined frequencies
- RBW = 1 MHz
- VBW = 3 MHz
- Measuring time: 1 s

5.2.2 TEST REQUIREMENTS / LIMITS

A) FCC

FCC Part 15 Subpart E, §15.407 (b)(1)

For transmitters operating in the 5150–5250 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5150–5350 MHz.

FCC Part 15 Subpart E, §15.407 (b)(2)

For transmitters operating in the 5250–5350 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5150–5350 MHz.

FCC Part 15 Subpart E, §15.407 (b)(3)

For transmitters operating in the 5470–5725 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5470–5725 MHz.

FCC Part 15 Subpart E, §15.407 (b)(4)

For transmitters operating in the 5725–5850 MHz band:

Limit: –27 dBm/MHz at 75 MHz or more above or below the band edge
increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge
increasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edge
increasing linearly to 27 dBm/MHz at the band edge.

FCC Part 15 Subpart E, §15.407 (b) (5)

For transmitters operating within the 5.925–7.125 GHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5.925–7.125 GHz.

FCC Part 15 Subpart E, §15.407 (b) (6)

For transmitters operating within the 5.925–7.125 GHz bands:

Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

B) IC

Different frequency bands and limits apply, as compared to the FCC requirements.

RSS-247, 6.2.1.2, Emissions outside the band 5150–5250 MHz, indoor operation only:

Limit: –27 dBm/MHz EIRP outside of the band 5150–5250 MHz.

RSS-247, 6.2.2.2, Emissions outside the band 5250-5350 MHz:
 Limit: -27 dBm/MHz EIRP outside of the band 5250-5350 MHz.

RSS-247, 6.2.3.2, Emissions outside the bands 5470-5600 MHz and 5650-5725 MHz:
 Limit: -27 dBm/MHz EIRP outside of the band 5470-5725 MHz.
 However, devices with bandwidth overlapping the band edge of 5725 MHz can meet the emission limit of -27 dBm/MHz e.i.r.p. at 5850 MHz instead of 5725 MHz.
 Note: No operation is permitted for the frequency range 5600-5650 MHz.

RSS-247, 6.2.4.2, Emissions outside the band 5725-5850 MHz:

- 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;
- 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
- 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
- 27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

C) FCC & IC

For band edges connected to a restricted band, the limits are specified in Section 15.209(a)

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
0.009 – 0.49	2400/F(kHz)@300m	3	(48.5 – 13.8)@300m
0.49 – 1.705	24000/F(kHz)@30m	3	(33.8 – 23.0)@30m
1.705 – 30	30@30m	3	29.5@30m

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (2).

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
30 – 88	100@3m	3	40.0@3m
88 – 216	150@3m	3	43.5@3m
216 – 960	200@3m	3	46.0@3m
960 – 26000	500@3m	3	54.0@3m
26000 – 40000	500@3m	1	54.0@3m

The measured values above 26 GHz are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: $\text{Limit (dBµV/m)} = 20 \log (\text{Limit (µV/m)}/1\mu\text{V/m})$

5.2.3 TEST PROTOCOL

Position 6

WLAN ac-Mode; 40 MHz; MCS 0; SISO

Applied duty cycle correction (AV): 1.4 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	57.5	PEAK	1000	74.0	16.5	BE-RB	FCC&IC
1	38	5190	5150.0	45.9	AV	1000	54.0	8.1	BE-RB	FCC&IC
2A	62	5310	5350.0	62.0	PEAK	1000	74.0	12.0	BE-RB	FCC&IC
2A	62	5310	5350.0	48.3	AV	1000	54.0	5.7	BE-RB	FCC&IC
2C	102	5510	5460.0	58.4	PEAK	1000	74.0	15.6	BE-RB	FCC&IC
2C	102	5510	5460.0	47.3	AV	1000	54.0	6.7	BE-RB	FCC&IC
2C	102	5510	5470.0	63.1	PEAK	1000	68.2	5.1	BE-UE	FCC&IC
2C	134	5670	5725.0	57.7	PEAK	1000	68.2	10.5	BE-UE	FCC&IC
3	151	5755	5725.0	64.4	PEAK	1000	121.0	56.6	BE-UE	FCC&IC
3	159	5795	5850.0	58.1	PEAK	1000	118.8	60.7	BE-UE	FCC&IC

WLAN n-Mode; 20 MHz; MCS 8; MIMO

Applied duty cycle correction (AV): 0.8 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	58.4	PEAK	1000	74.0	15.6	BE-RB	FCC&IC
1	36	5180	5150.0	45.5	AV	1000	54.0	8.5	BE-RB	FCC&IC
2C	100	5500	5460.0	58.5	PEAK	1000	74.0	15.5	BE-RB	FCC&IC
2C	100	5500	5460.0	46.4	AV	1000	54.0	7.6	BE-RB	FCC&IC
2C	100	5500	5470.0	58.6	PEAK	1000	68.2	9.6	BE-UE	FCC&IC

WLAN ac-Mode; 20 MHz; MCS 0; MIMO

Applied duty cycle correction (AV): 0.9 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
2C	100	5500	5460.0	58.4	PEAK	1000	74.0	15.6	BE-RB	FCC&IC
2C	100	5500	5460.0	46.2	AV	1000	54.0	7.8	BE-RB	FCC&IC
2C	100	5500	5470.0	58.3	PEAK	1000	68.2	9.9	BE-UE	FCC&IC

WLAN ac-Mode; 40 MHz; MCS 0; MIMO

Applied duty cycle correction (AV): 1.3 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	57.6	PEAK	1000	74.0	16.4	BE-RB	FCC&IC
1	38	5190	5150.0	45.9	AV	1000	54.0	8.1	BE-RB	FCC&IC
2A	62	5310	5350.0	58.9	PEAK	1000	74.0	15.1	BE-RB	FCC&IC
2A	62	5310	5350.0	46.7	AV	1000	54.0	7.3	BE-RB	FCC&IC
2C	102	5510	5460.0	58.5	PEAK	1000	74.0	15.5	BE-RB	FCC&IC
2C	102	5510	5460.0	46.9	AV	1000	54.0	7.1	BE-RB	FCC&IC
2C	102	5510	5470.0	58.4	PEAK	1000	68.2	9.8	BE-UE	FCC&IC
2C	134	5670	5725.0	57.9	PEAK	1000	68.2	10.3	BE-UE	FCC&IC
3	151	5755	5725.0	59.3	PEAK	1000	121.7	62.4	BE-UE	FCC&IC
3	159	5795	5850.0	58.0	PEAK	1000	122.2	64.2	BE-UE	FCC&IC

Position 2

WLAN a-Mode; 20 MHz; 6 Mbit/s

Applied duty cycle correction (AV): 1.1 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	61.5	PEAK	1000	74.0	12.5	BE-RB	FCC&IC
1	36	5180	5150.0	48.0	AV	1000	54.0	6.0	BE-RB	FCC&IC
2A	64	5320	5350.0	63.5	PEAK	1000	74.0	10.5	BE-RB	FCC&IC
2A	64	5320	5350.0	47.3	AV	1000	54.0	6.7	BE-RB	FCC&IC
2C	100	5500	5460.0	60.2	PEAK	1000	74.0	13.8	BE-RB	FCC&IC
2C	100	5500	5460.0	47.5	AV	1000	54.0	6.5	BE-RB	FCC&IC
2C	100	5500	5470.0	62.7	PEAK	1000	68.2	5.5	BE-UE	FCC&IC
2C	140	5700	5725.0	60.4	PEAK	1000	68.2	7.8	BE-UE	FCC&IC
3	149	5745	5725.0	64.0	PEAK	1000	118.3	54.3	BE-UE	FCC&IC
3	165	5825	5850.0	60.2	PEAK	1000	121.3	61.1	BE-UE	FCC&IC

WLAN n-Mode; 40 MHz; MCS 0; SISO

Applied duty cycle correction (AV): 1.2 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	59.2	PEAK	1000	74.0	14.8	BE-RB	FCC&IC
1	38	5190	5150.0	46.9	AV	1000	54.0	7.1	BE-RB	FCC&IC
2C	102	5510	5460.0	60.3	PEAK	1000	74.0	13.7	BE-RB	FCC&IC
2C	102	5510	5460.0	47.1	AV	1000	54.0	6.9	BE-RB	FCC&IC
2C	102	5510	5470.0	60.8	PEAK	1000	68.2	7.4	BE-UE	FCC&IC

WLAN ac-Mode; 40 MHz; MCS 0; SISO

Applied duty cycle correction (AV): 1.4 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	59.6	PEAK	1000	74.0	14.4	BE-RB	FCC&IC
1	38	5190	5150.0	46.8	AV	1000	54.0	7.2	BE-RB	FCC&IC
2A	62	5310	5350.0	60.9	PEAK	1000	74.0	13.1	BE-RB	FCC&IC
2A	62	5310	5350.0	47.5	AV	1000	54.0	6.5	BE-RB	FCC&IC
2C	102	5510	5460.0	58.7	PEAK	1000	74.0	15.3	BE-RB	FCC&IC
2C	102	5510	5460.0	47.0	AV	1000	54.0	7.0	BE-RB	FCC&IC
2C	102	5510	5470.0	59.7	PEAK	1000	68.2	8.5	BE-UE	FCC&IC
3	151	5755	5725.0	61.7	PEAK	1000	122.2	60.5	BE-UE	FCC&IC

WLAN n-Mode; 20 MHz; MCS 8; MIMO

Applied duty cycle correction (AV): 0.8 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	57.6	PEAK	1000	74.0	16.4	BE-RB	FCC&IC
1	36	5180	5150.0	45.7	AV	1000	54.0	8.3	BE-RB	FCC&IC
2A	64	5320	5350.0	58.7	PEAK	1000	74.0	15.3	BE-RB	FCC&IC
2A	64	5320	5350.0	46.0	AV	1000	54.0	8.0	BE-RB	FCC&IC
2C	100	5500	5460.0	59.1	PEAK	1000	74.0	14.9	BE-RB	FCC&IC
2C	100	5500	5460.0	46.8	AV	1000	54.0	7.2	BE-RB	FCC&IC
2C	100	5500	5470.0	58.1	PEAK	1000	68.2	10.1	BE-UE	FCC&IC
2C	140	5700	5725.0	60.1	PEAK	1000	68.2	8.1	BE-UE	FCC&IC
3	149	5745	5725.0	61.6	PEAK	1000	121.3	59.7	BE-UE	FCC&IC
3	165	5825	5850.0	58.7	PEAK	1000	122.0	63.3	BE-UE	FCC&IC

WLAN ac-Mode; 20 MHz; MCS 0; MIMO
 Applied duty cycle correction (AV): 0.9 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
2C	100	5500	5460.0	58.5	PEAK	1000	74.0	15.5	BE-RB	FCC&IC
2C	100	5500	5460.0	46.5	AV	1000	54.0	7.5	BE-RB	FCC&IC
2C	100	5500	5470.0	58.8	PEAK	1000	68.2	9.4	BE-UE	FCC&IC

WLAN ac-Mode; 40 MHz; MCS 0; MIMO
 Applied duty cycle correction (AV): 1.3 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Marg in [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	58.2	PEAK	1000	74.0	15.8	BE-RB	FCC&IC
1	38	5190	5150.0	46.5	AV	1000	54.0	7.5	BE-RB	FCC&IC
2A	62	5310	5350.0	57.7	PEAK	1000	74.0	16.3	BE-RB	FCC&IC
2A	62	5310	5350.0	45.7	AV	1000	54.0	8.3	BE-RB	FCC&IC
2C	102	5510	5460.0	58.1	PEAK	1000	74.0	15.9	BE-RB	FCC&IC
2C	102	5510	5460.0	46.8	AV	1000	54.0	7.2	BE-RB	FCC&IC
2C	102	5510	5470.0	57.8	PEAK	1000	68.2	10.4	BE-UE	FCC&IC
3	151	5755	5725.0	58.3	PEAK	1000	122.2	63.9	BE-UE	FCC&IC

Position 3

WLAN a-Mode; 20 MHz; 6 Mbit/s

Applied duty cycle correction (AV): 1.1 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	62.3	PEAK	1000	74.0	11.7	BE-RB	FCC&IC
1	36	5180	5150.0	46.9	AV	1000	54.0	7.1	BE-RB	FCC&IC
2A	64	5320	5350.0	65.1	PEAK	1000	74.0	8.9	BE-RB	FCC&IC
2A	64	5320	5350.0	46.5	AV	1000	54.0	7.5	BE-RB	FCC&IC
2C	140	5700	5725.0	59.1	PEAK	1000	68.2	9.1	BE-UE	FCC&IC
3	149	5745	5725.0	60.3	PEAK	1000	122.0	61.7	BE-UE	FCC&IC

WLAN ac-Mode; 40 MHz; MCS 0; SISO

Applied duty cycle correction (AV): 1.4 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type	FCC /IC?
2A	62	5310	5350.0	59.8	PEAK	1000	74.0	14.2	BE-RB	FCC&IC
2A	62	5310	5350.0	46.7	AV	1000	54.0	7.3	BE-RB	FCC&IC
3	151	5755	5725.0	61.2	PEAK	1000	120.4	59.2	BE-UE	FCC&IC

WLAN ac-Mode; 20 MHz; MCS 0; MIMO

Applied duty cycle correction (AV): 0.9 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type	FCC /IC?
2C	100	5500	5460.0	58.6	PEAK	1000	74.0	15.4	BE-RB	FCC&IC
2C	100	5500	5460.0	46.3	AV	1000	54.0	7.7	BE-RB	FCC&IC
2C	100	5500	5470.0	58.2	PEAK	1000	68.2	10.0	BE-UE	FCC&IC

WLAN ac-Mode; 40 MHz; MCS 0; MIMO

Applied duty cycle correction (AV): 1.3 dB

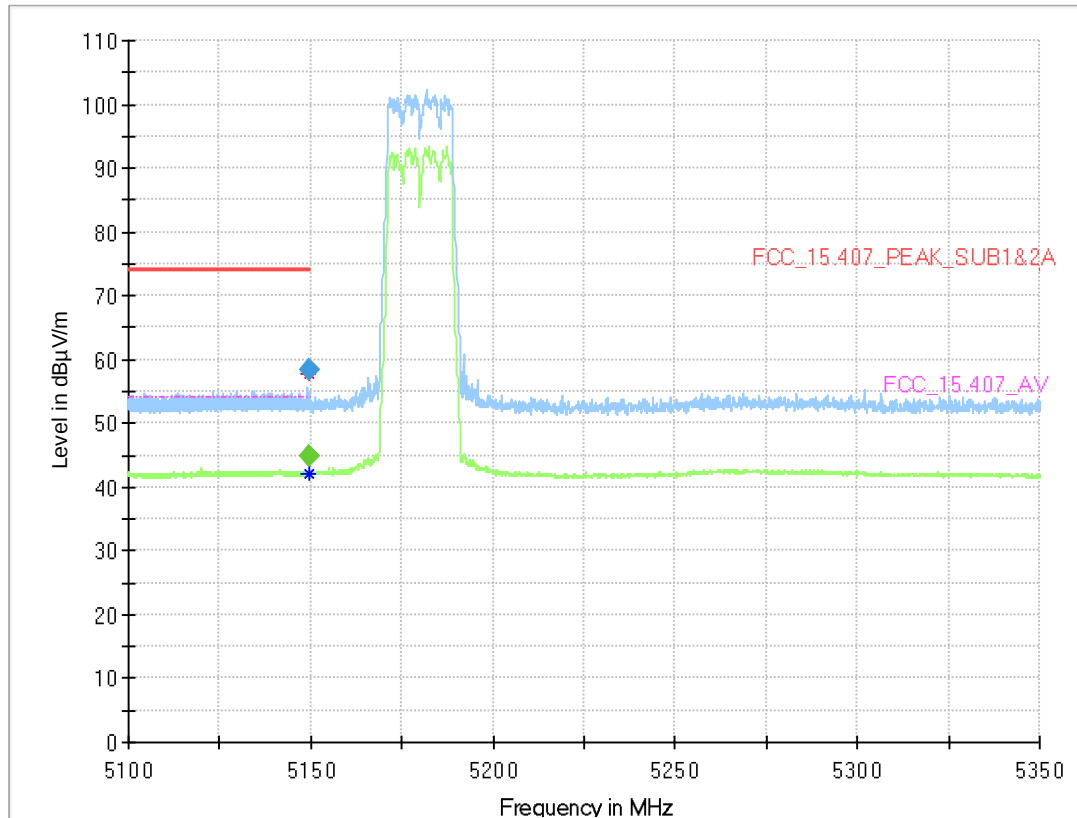
U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	58.3	PEAK	1000	74.0	15.7	BE-RB	FCC&IC
1	38	5190	5150.0	46.0	AV	1000	54.0	8.0	BE-RB	FCC&IC
2A	62	5310	5350.0	57.8	PEAK	1000	74.0	16.2	BE-RB	FCC&IC
2A	62	5310	5350.0	45.8	AV	1000	54.0	8.2	BE-RB	FCC&IC
2C	102	5510	5460.0	58.7	PEAK	1000	74.0	15.3	BE-RB	FCC&IC
2C	102	5510	5460.0	46.8	AV	1000	54.0	7.2	BE-RB	FCC&IC
2C	102	5510	5470.0	57.9	PEAK	1000	68.2	10.3	BE-UE	FCC&IC
3	151	5755	5725.0	58.5	PEAK	1000	122.0	63.5	BE-UE	FCC&IC

Remark: Please see next sub-clause for the measurement plot.

5.2.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Position 6

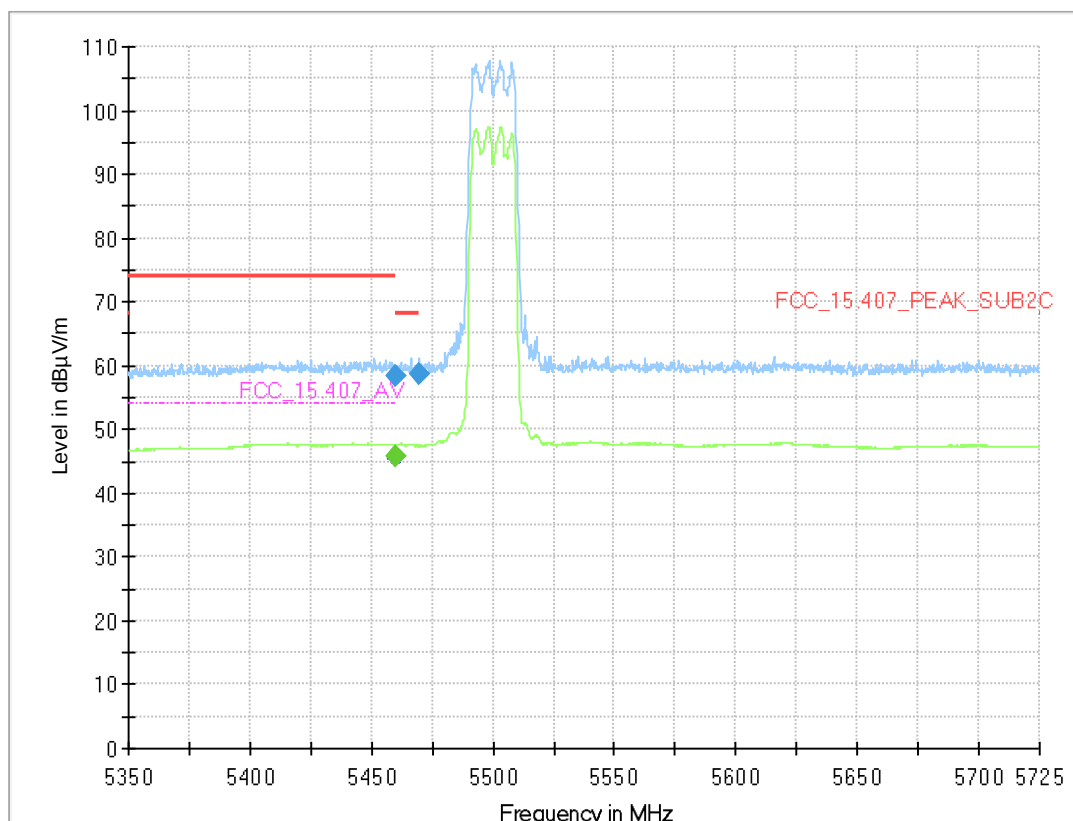
Radio Technology = WLAN n 20 MIMO, Operating Frequency = low, Subband = U-NII-1 (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5149.838	---	44.7	54.00	9.29	1000.0	1000.000	150.0	V	-96.0	15.0	15.0
5149.838	58.4	---	74.00	15.59	1000.0	1000.000	150.0	V	-96.0	15.0	15.0

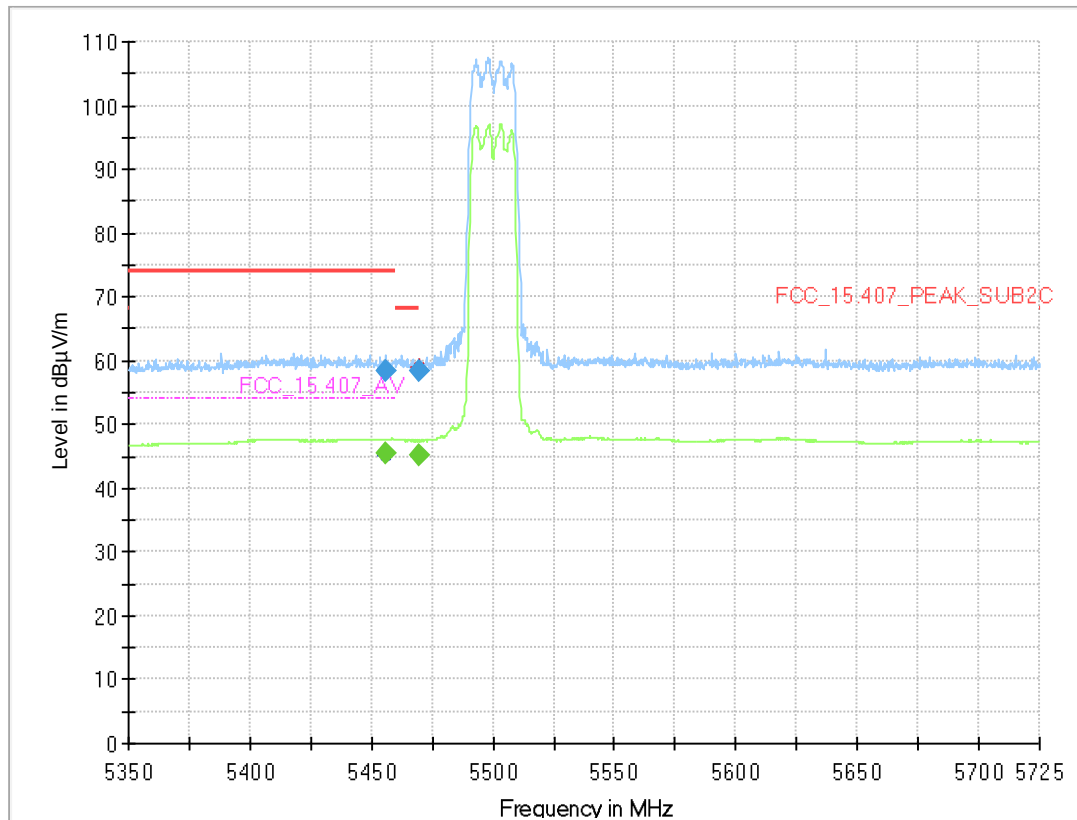
Radio Technology = WLAN n 20 MIMO, Operating Frequency = low, Subband = U-NII-2C (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.922	---	45.6	54.00	8.36	1000.0	1000.000	150.0	H	-34.0	88.0	15.9
5459.922	58.5	---	74.00	15.47	1000.0	1000.000	150.0	H	-131.0	-15.0	15.9
5469.766	58.6	---	68.20	9.62	1000.0	1000.000	150.0	V	42.0	15.0	15.7

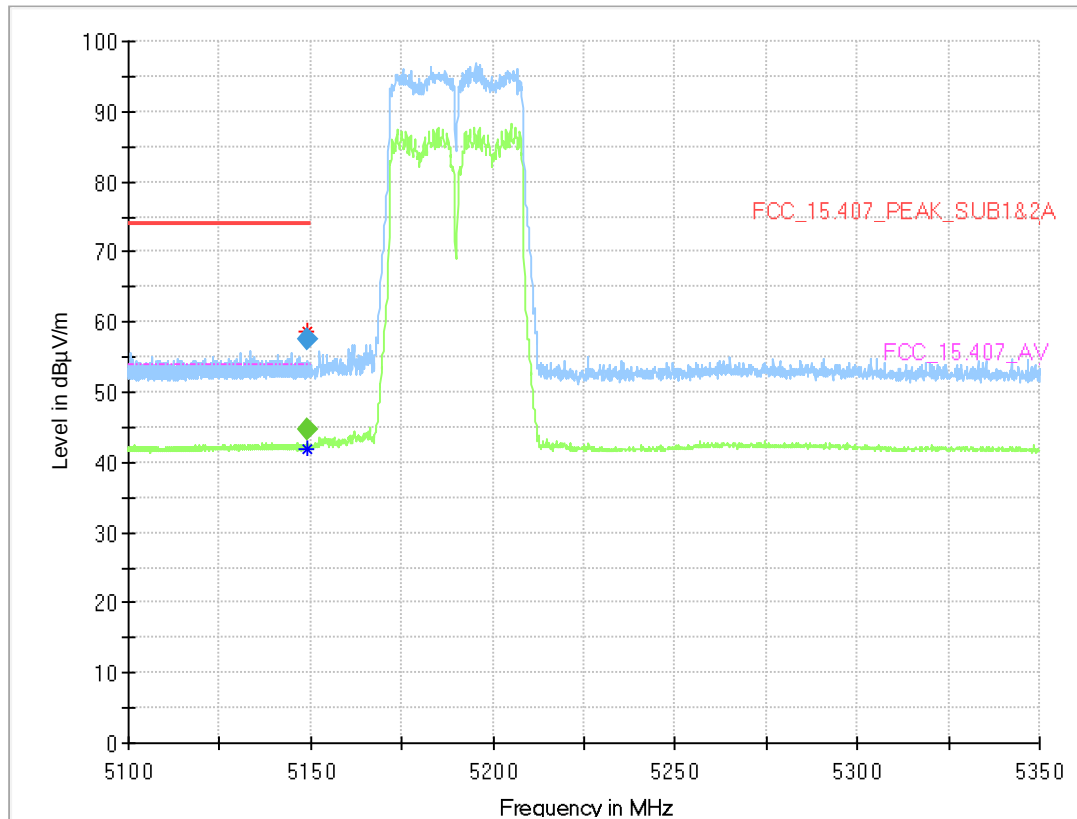
Radio Technology = WLAN ac 20 MIMO, Operating Frequency = low, Subband = U-NII-2C (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5455.703	---	45.4	54.00	8.62	1000.0	1000.000	150.0	H	44.0	82.0	15.9
5455.703	58.4	---	74.00	15.63	1000.0	1000.000	150.0	H	-82.0	105.0	15.9
5469.531	---	45.1	---	---	1000.0	1000.000	150.0	V	-43.0	93.0	15.7
5469.531	58.3	---	68.20	9.91	1000.0	1000.000	150.0	V	-94.0	92.0	15.7

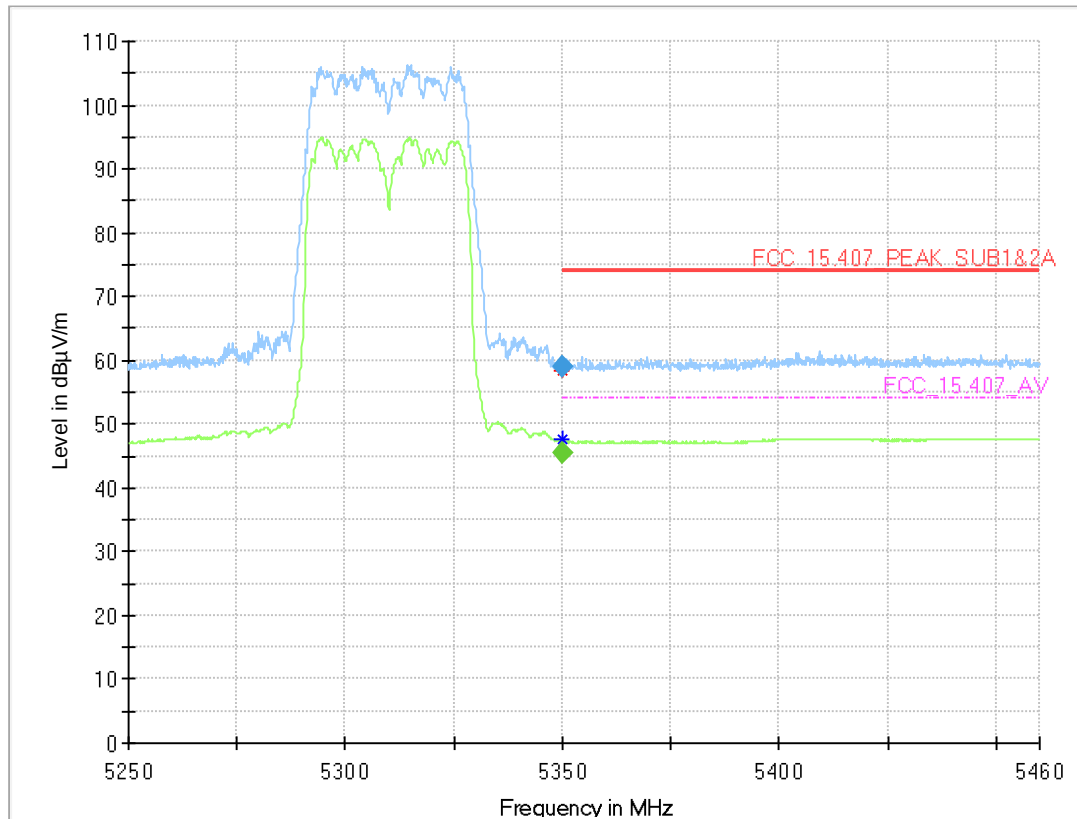
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = low, Subband = U-NII-I
(S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5149.225	---	44.7	54.00	9.27	1000.0	1000.000	150.0	V	-34.0	105.0	15.0
5149.225	57.6	---	74.00	16.45	1000.0	1000.000	150.0	V	-34.0	105.0	15.0

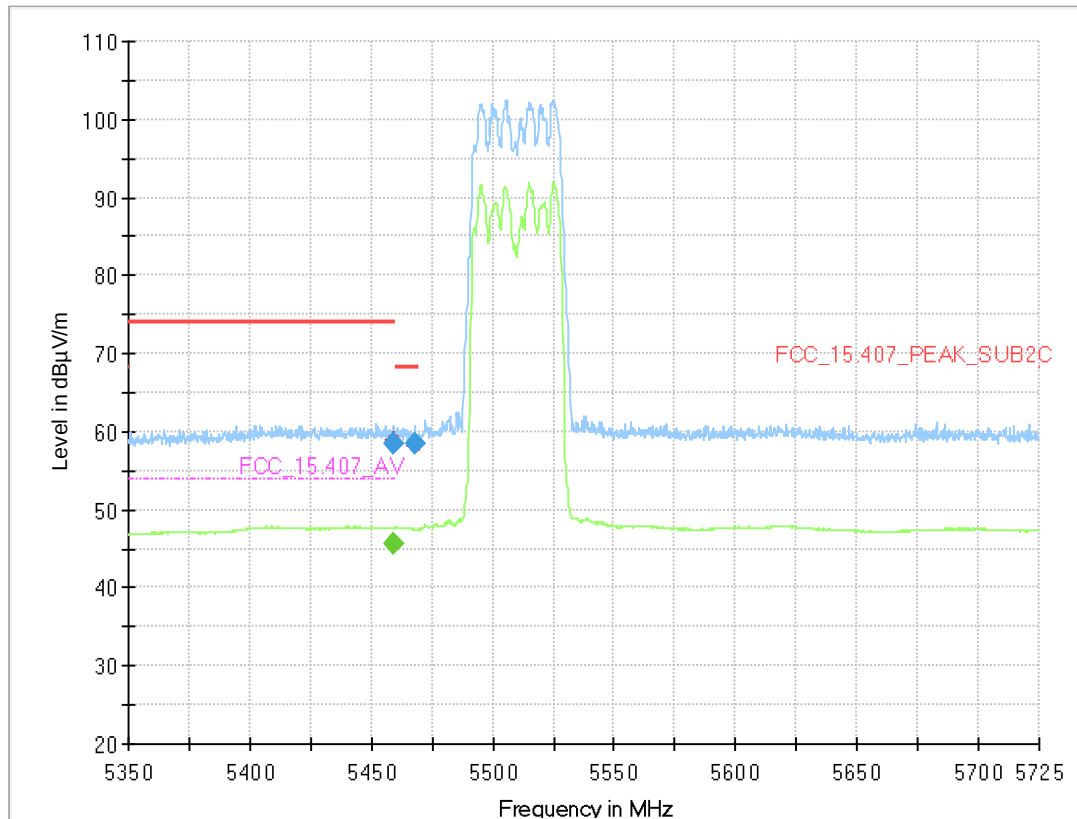
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = high, Subband = U-NII-2A
 (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5350.013	---	45.5	54.00	8.48	1000.0	1000.000	150.0	H	-50.0	88.0	15.2
5350.013	58.9	---	74.00	15.08	1000.0	1000.000	150.0	H	-50.0	88.0	15.2

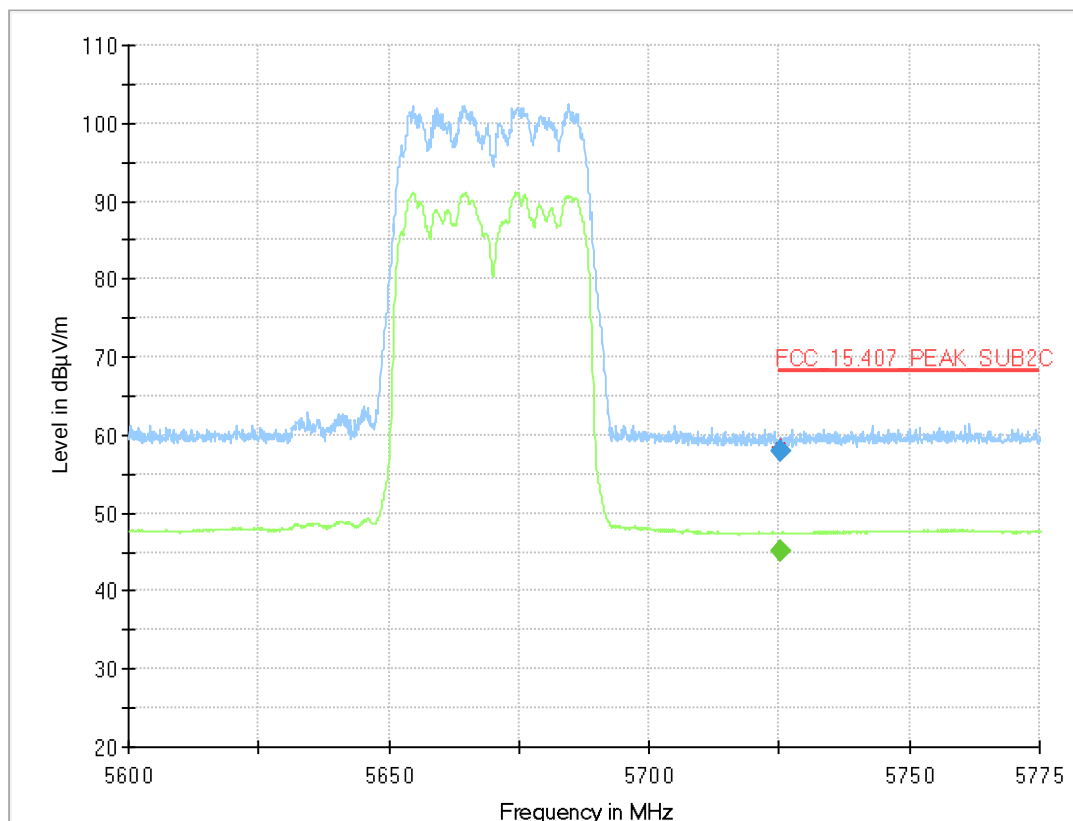
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = low, Subband = U-NII-2C (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5458.984	---	45.7	54.00	8.27	1000.0	1000.000	150.0	V	-92.0	-3.0	15.9
5458.984	58.5	---	74.00	15.50	1000.0	1000.000	150.0	H	-146.0	105.0	15.9
5468.125	58.4	---	68.20	9.83	1000.0	1000.000	150.0	V	88.0	88.0	15.7

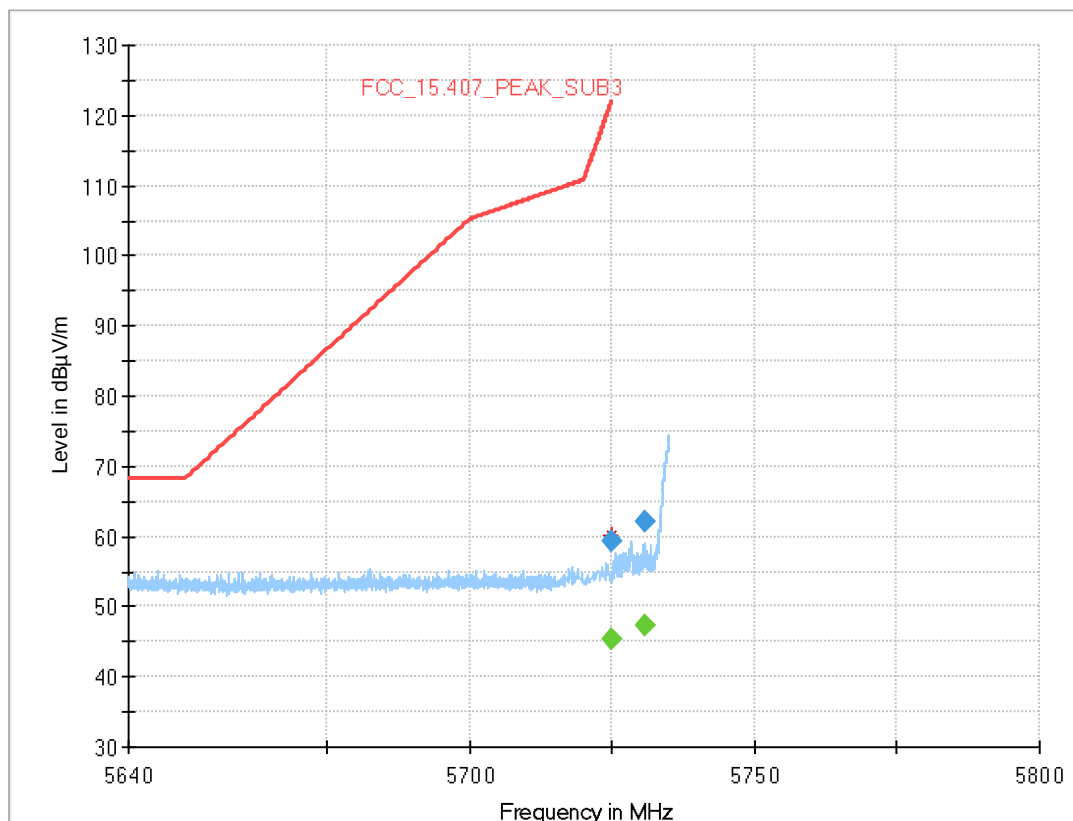
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = high, Subband = U-NII-2C (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5725.300	---	45.2	---	---	1000.0	1000.000	150.0	H	125.0	-10.0	15.7
5725.300	57.9	---	68.20	10.26	1000.0	1000.000	150.0	H	125.0	-10.0	15.7

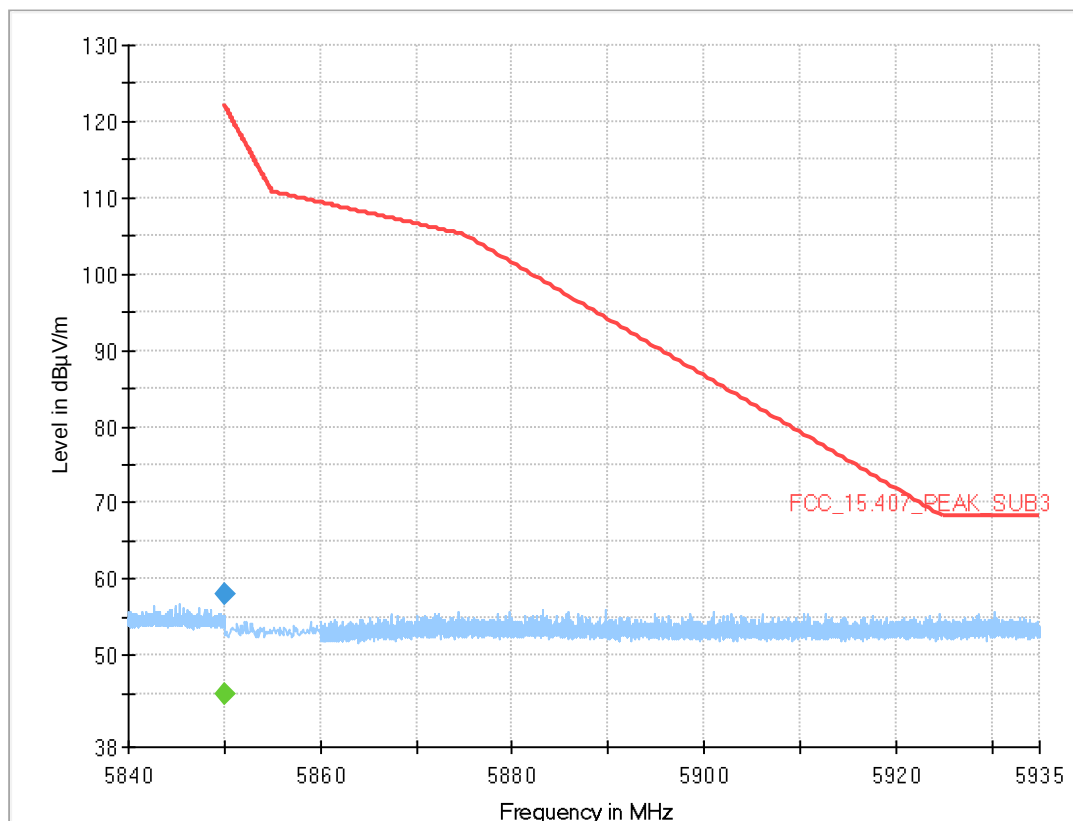
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = low, Subband = U-NII-3
(S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5724.800	---	45.4	---	---	1000.0	1000.000	150.0	H	-91.0	15.0	15.7
5724.800	59.3	---	121.7	62.44	1000.0	1000.000	150.0	H	-91.0	15.0	15.7
5730.575	---	47.3	---	---	1000.0	1000.000	150.0	V	-45.0	99.0	15.7
5730.575	62.1	---	---	---	1000.0	1000.000	150.0	V	-45.0	99.0	15.7

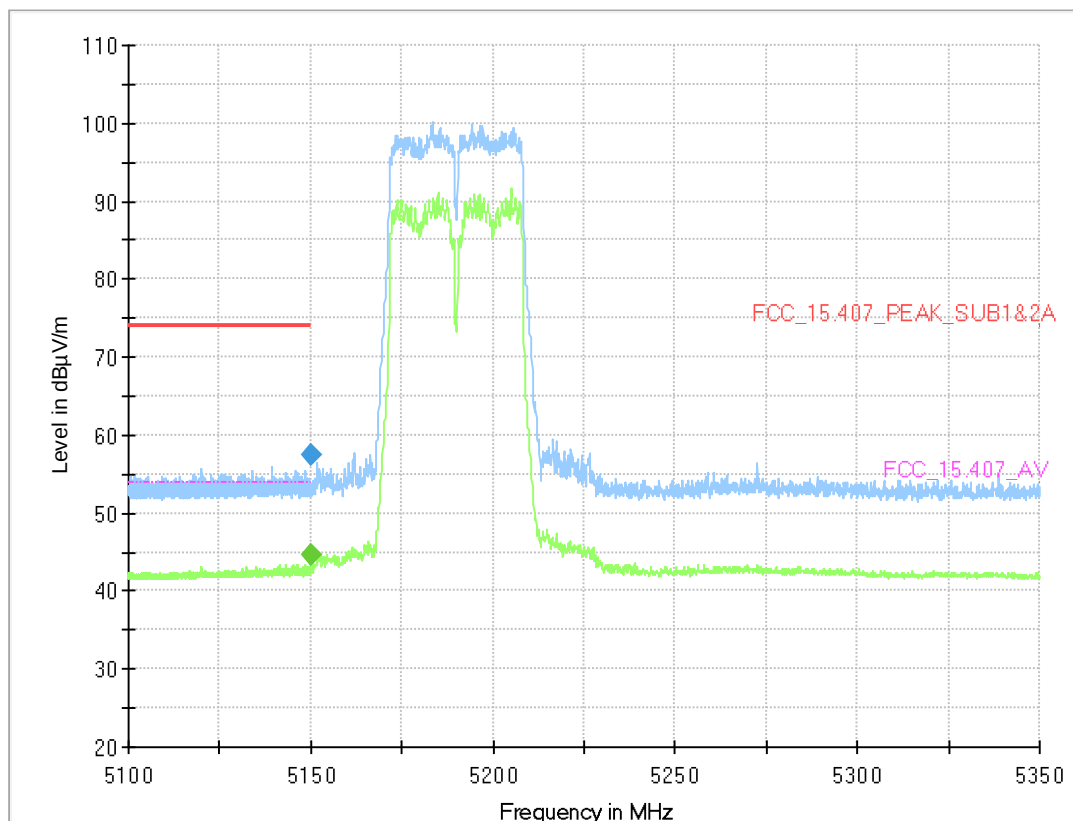
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = high, Subband = U-NII-3
(S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5850.000	---	45.0	---	---	1000.0	1000.000	150.0	H	98.0	0.0	15.8
5850.000	58.0	---	122.2	64.23	1000.0	1000.000	150.0	H	98.0	0.0	15.8

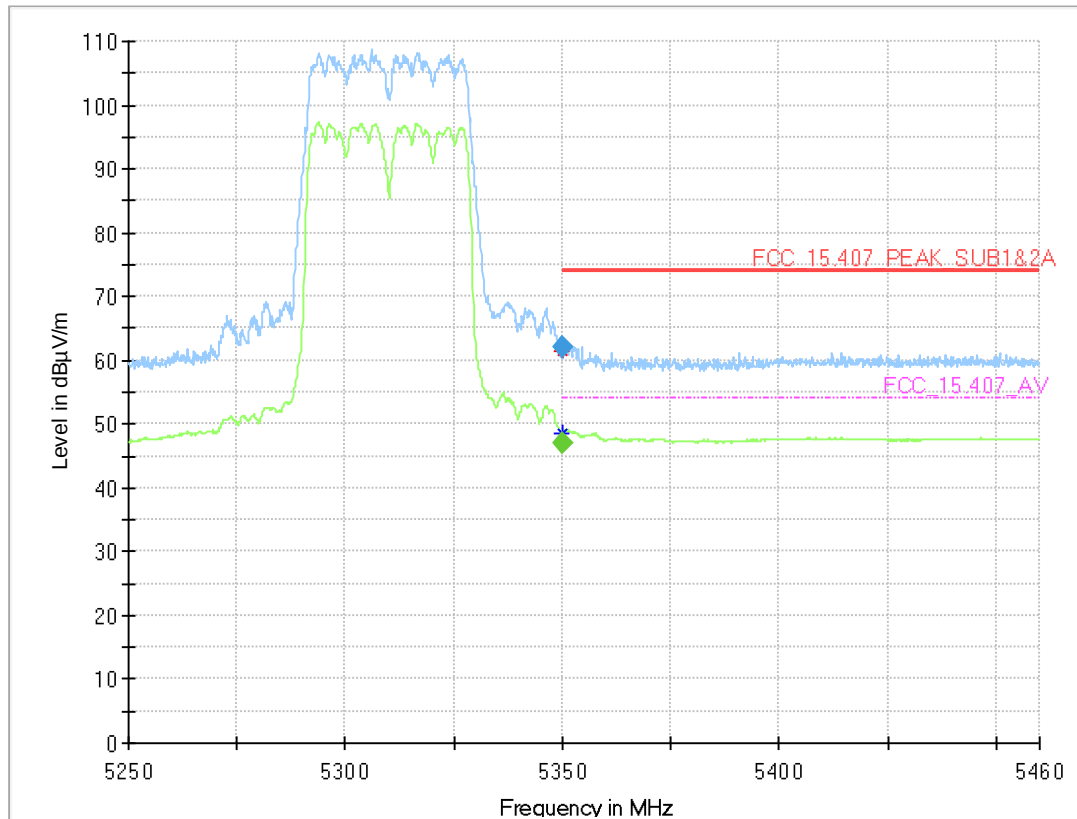
Radio Technology = WLAN ac 40 SISO, Operating Frequency = low, Subband = U-NII-I
 (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5149.925	---	44.7	54.00	9.30	1000.0	1000.000	150.0	V	-182.0	105.0	15.0
5149.925	57.5	---	74.00	16.54	1000.0	1000.000	150.0	V	-182.0	105.0	15.0

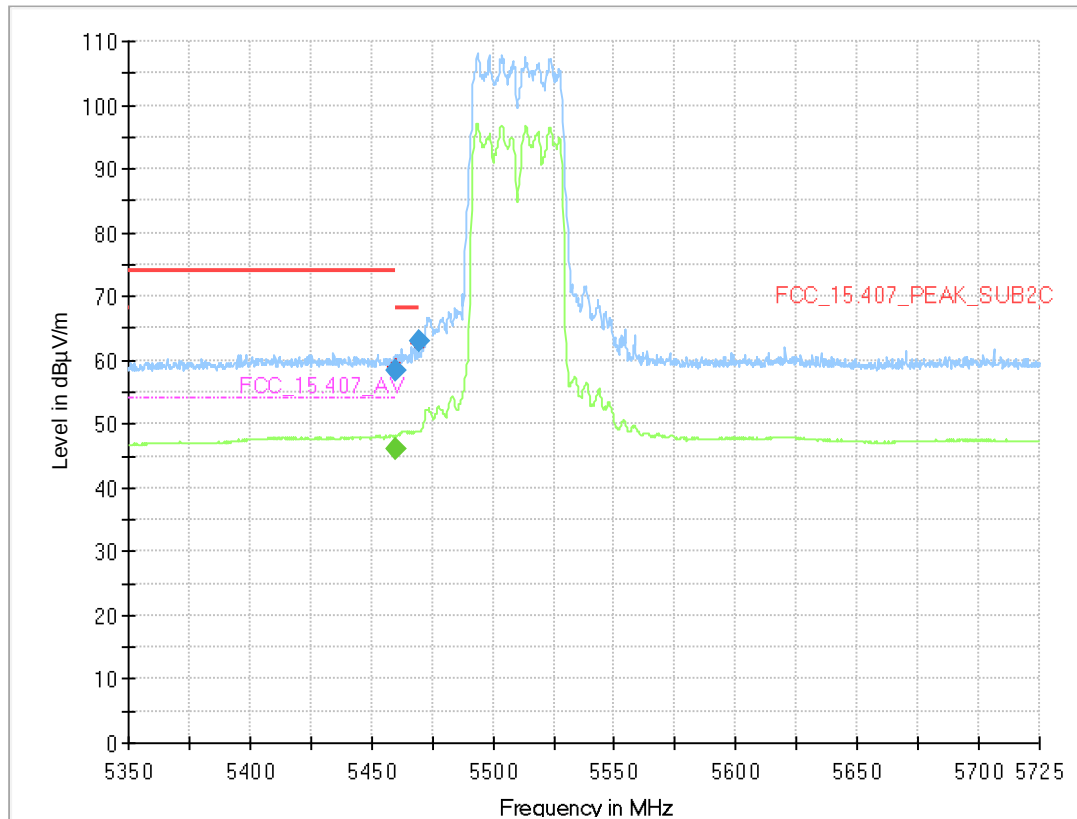
Radio Technology = WLAN ac 40 SISO, Operating Frequency = high, Subband = U-NII-2A (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5350.013	---	47.1	54.00	6.85	1000.0	1000.000	150.0	H	-126.0	82.0	15.2
5350.013	62.0	---	74.00	12.05	1000.0	1000.000	150.0	H	-126.0	82.0	15.2

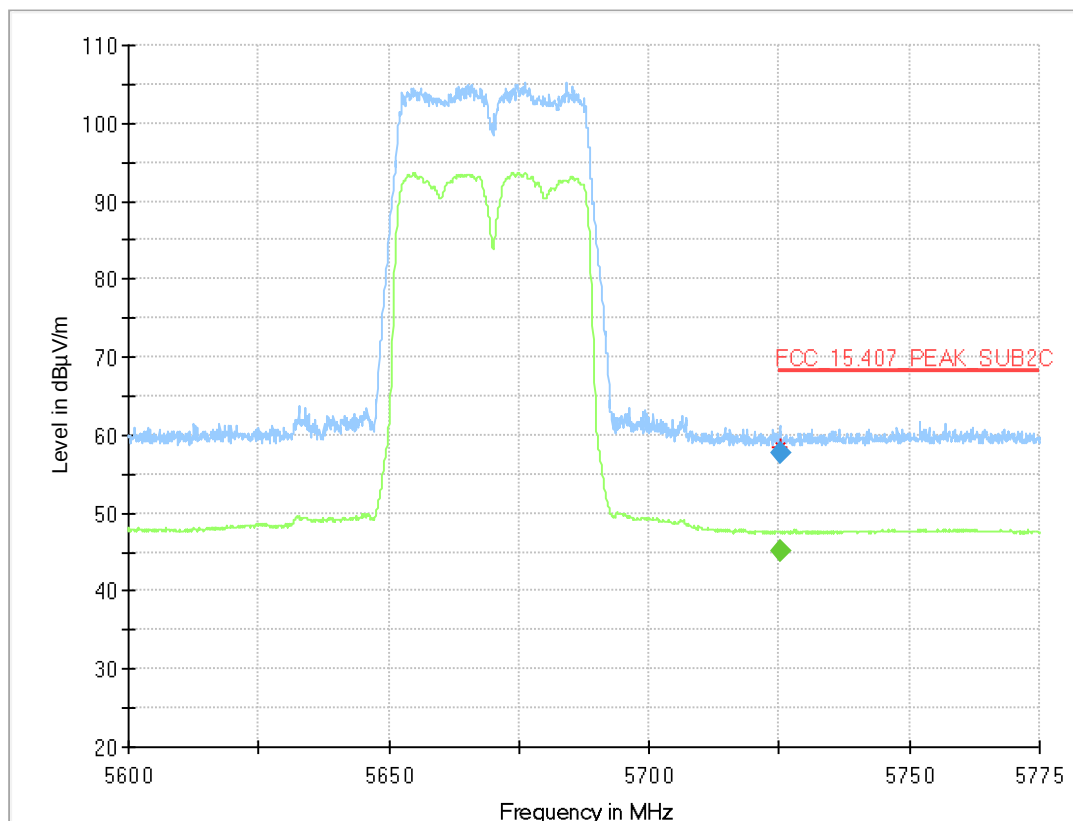
Radio Technology = WLAN ac 40 SISO, Operating Frequency = low, Subband = U-NII-2C
(S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.922	---	46.1	54.00	7.87	1000.0	1000.000	150.0	H	-52.0	83.0	15.9
5459.922	58.4	---	74.00	15.59	1000.0	1000.000	150.0	V	-94.0	2.0	15.9
5470.000	63.1	---	68.20	5.15	1000.0	1000.000	150.0	H	-48.0	92.0	15.7

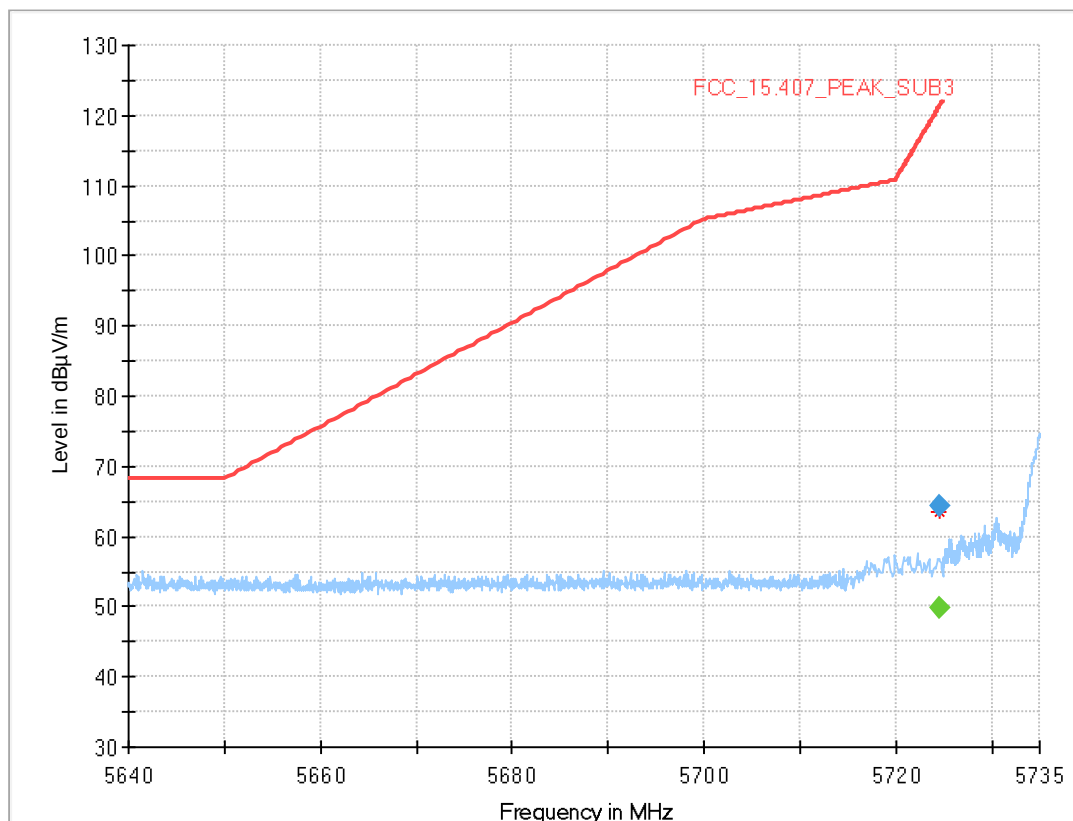
Radio Technology = WLAN ac 40 SISO, Operating Frequency = high, Subband = U-NII-2C (S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5725.038	---	45.2	---	---	1000.0	1000.000	150.0	V	-2.0	105.0	15.7
5725.038	57.7	---	68.20	10.51	1000.0	1000.000	150.0	V	-2.0	105.0	15.7

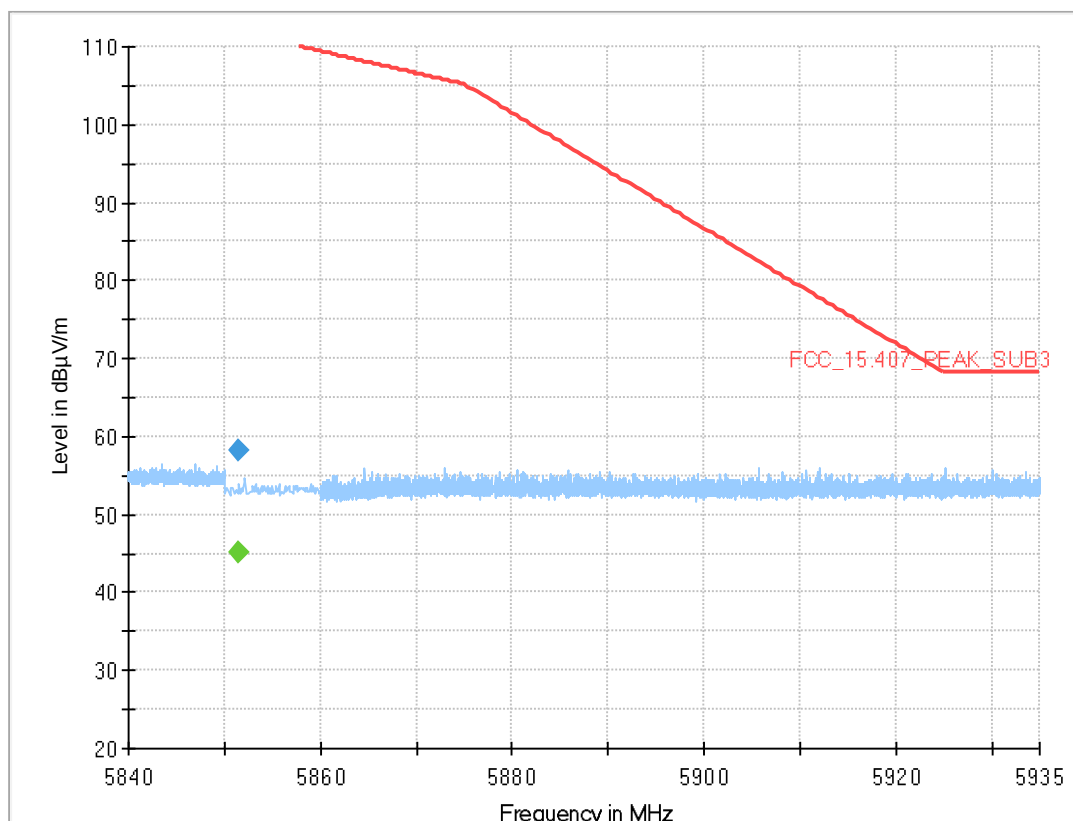
Radio Technology = WLAN ac 40 SISO, Operating Frequency = low, Subband = U-NII-3
(S06_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5724.500	---	49.9	---	---	1000.0	1000.000	150.0	H	-47.0	75.0	15.7
5724.500	64.4	---	121.0	56.67	1000.0	1000.000	150.0	H	-47.0	75.0	15.7

Radio Technology = WLAN ac 40 SISO, Operating Frequency = high, Subband = U-NII-3 (S06_AC02)

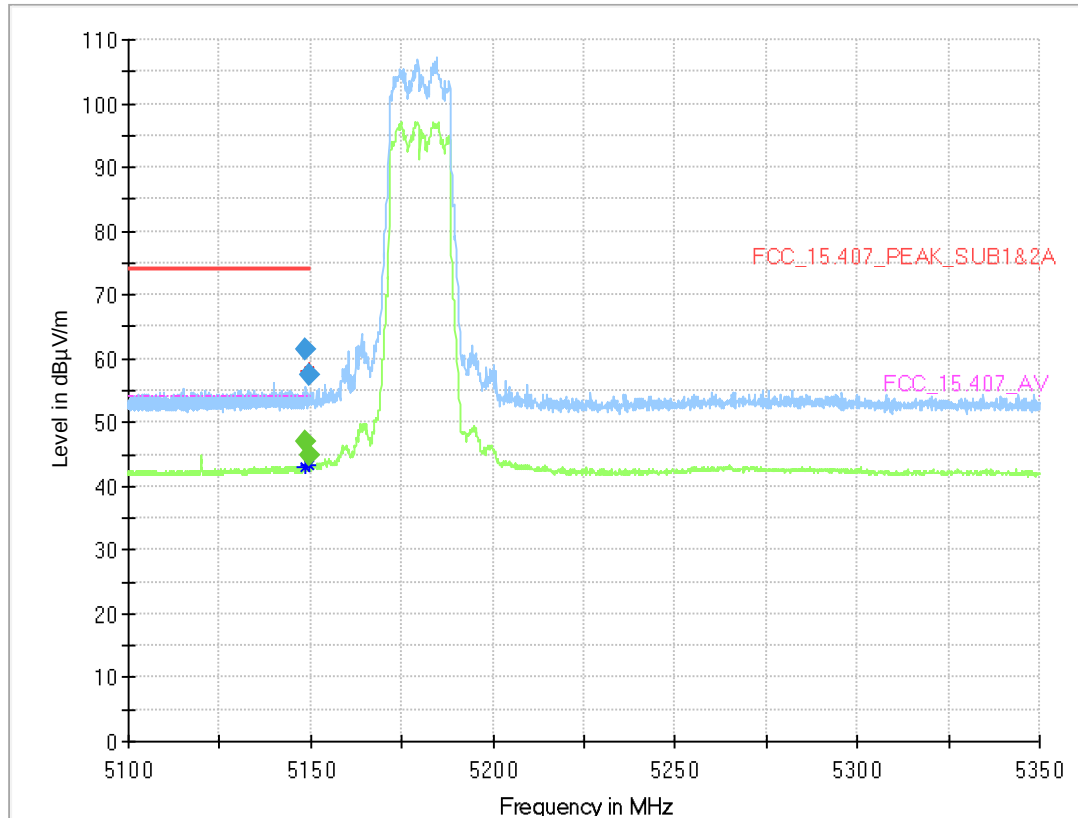


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5851.500	---	45.1	---	---	1000.0	1000.000	150.0	H	4.0	78.0	15.8
5851.500	58.1	---	118.7	60.67	1000.0	1000.000	150.0	H	4.0	78.0	15.8

Position 2

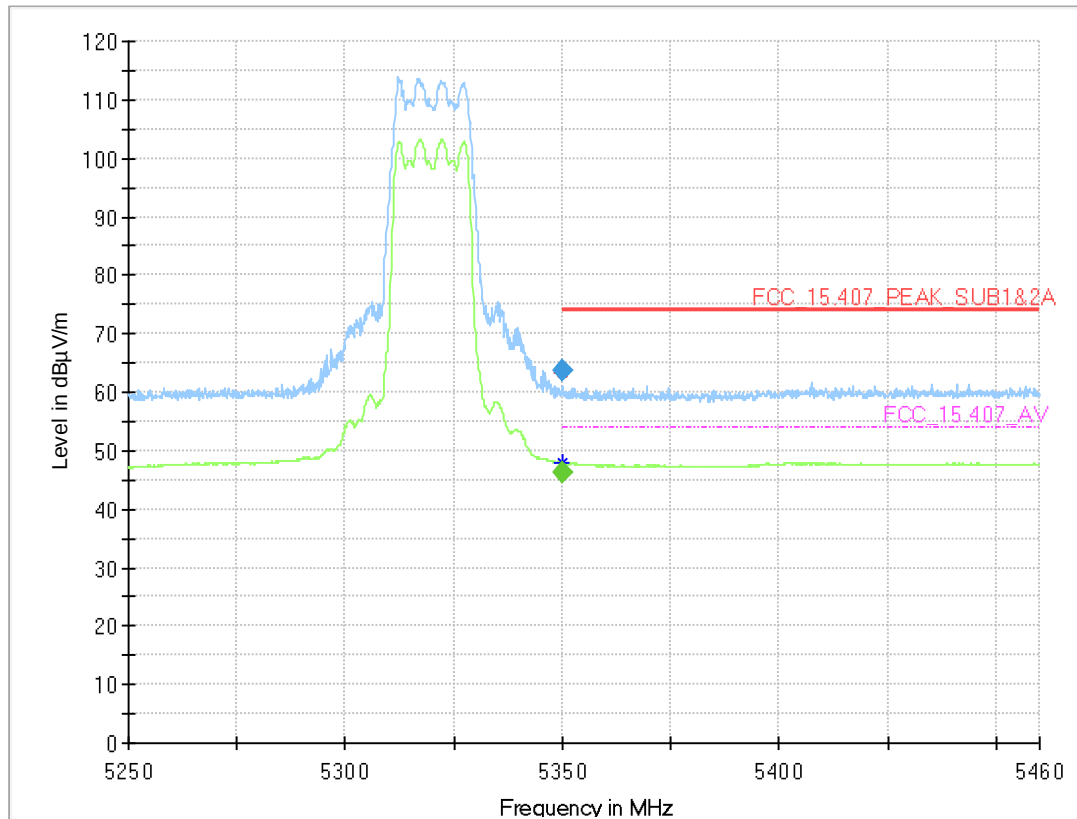
Radio Technology = WLAN a, Operating Frequency = low, Subband = U-NII-I
 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5148.750	---	46.9	54.00	7.07	1000.0	1000.000	150.0	H	56.0	100.0	15.0
5148.750	61.5	---	74.00	12.52	1000.0	1000.000	150.0	H	56.0	100.0	15.0
5149.813	---	44.8	54.00	9.21	1000.0	1000.000	150.0	V	52.0	15.0	15.0
5149.813	57.5	---	74.00	16.49	1000.0	1000.000	150.0	V	52.0	15.0	15.0

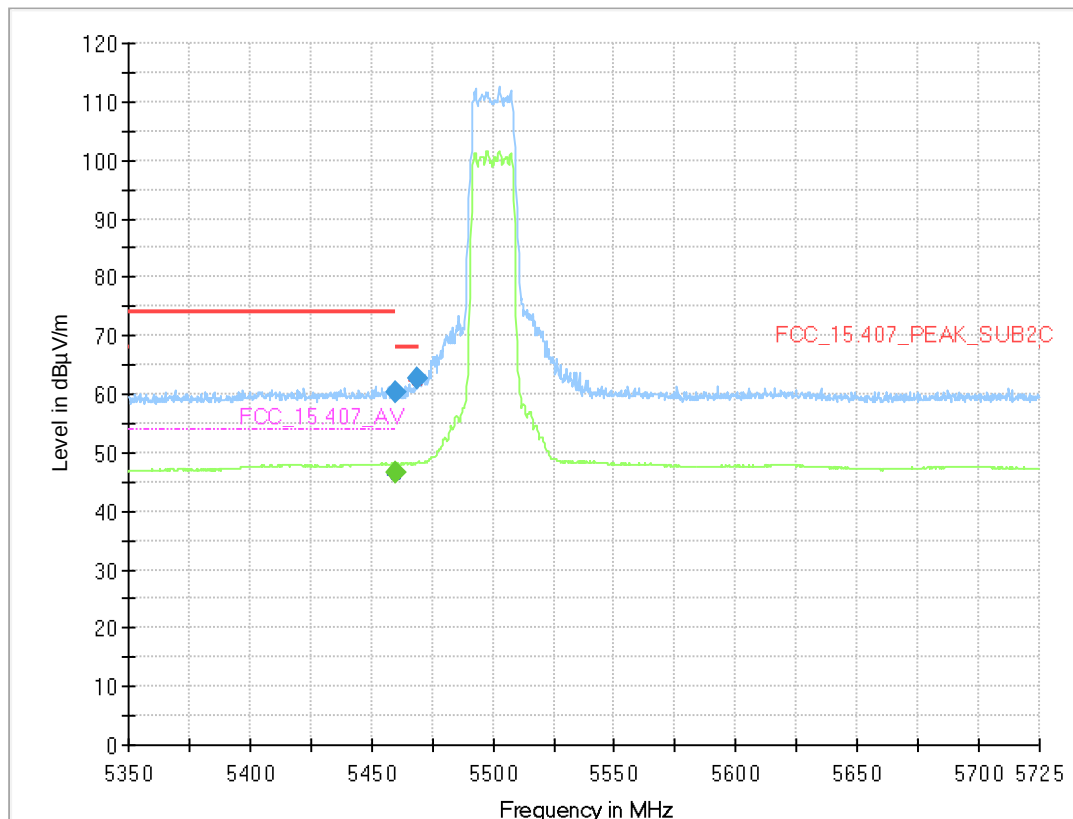
Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-2A
 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5350.013	---	46.2	54.00	7.82	1000.0	1000.000	150.0	H	56.0	85.0	15.2
5350.013	63.5	---	74.00	10.47	1000.0	1000.000	150.0	H	56.0	85.0	15.2

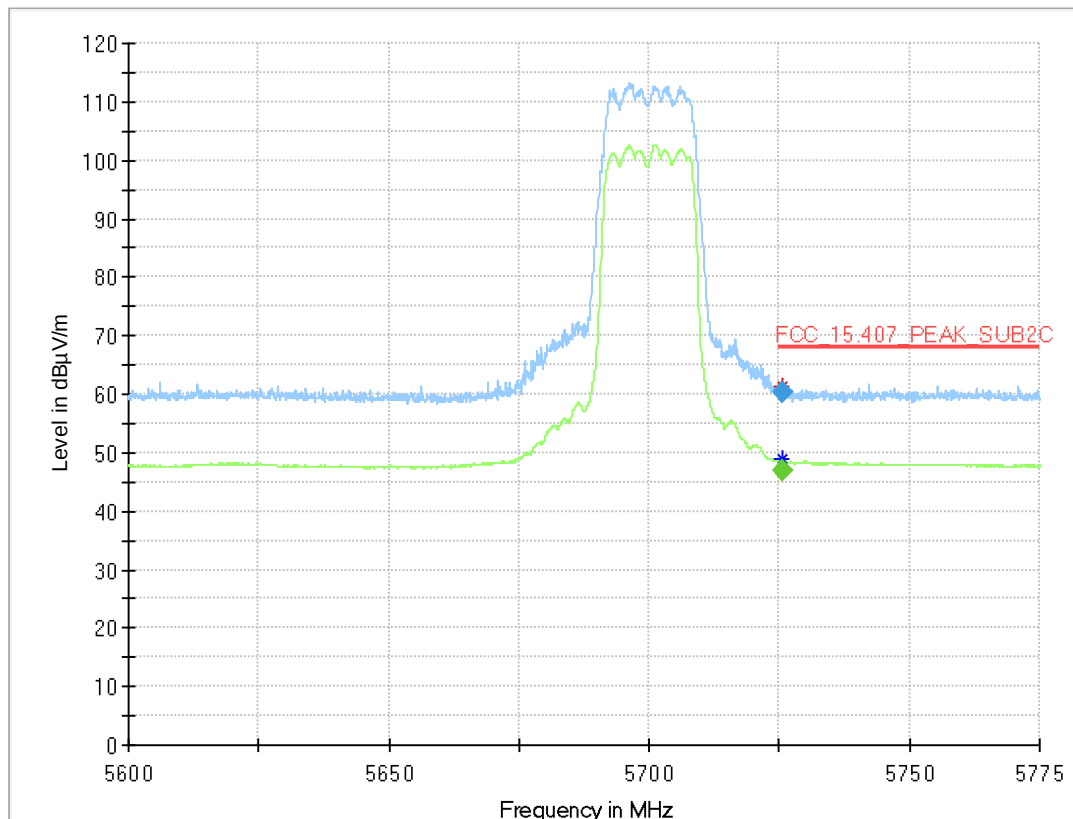
Radio Technology = WLAN a, Operating Frequency = low, Subband = U-NII-2C
(S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.688	---	46.4	54.00	7.57	1000.0	1000.000	150.0	H	56.0	98.0	15.9
5459.688	60.2	---	74.00	13.80	1000.0	1000.000	150.0	H	-34.0	105.0	15.9
5469.063	62.7	---	68.20	5.53	1000.0	1000.000	150.0	H	-44.0	105.0	15.7

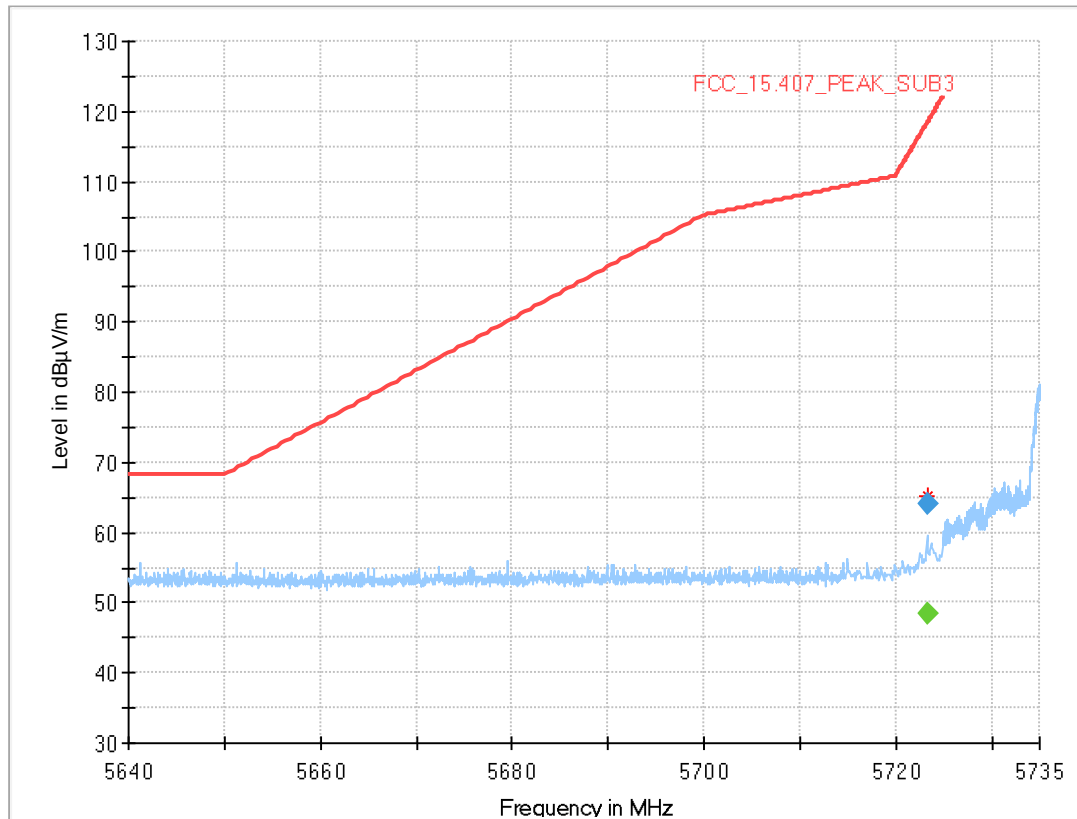
Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-2C
(S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5725.650	---	47.0	---	---	1000.0	1000.000	150.0	H	-56.0	81.0	15.7
5725.650	60.4	---	68.20	7.79	1000.0	1000.000	150.0	H	-56.0	81.0	15.7

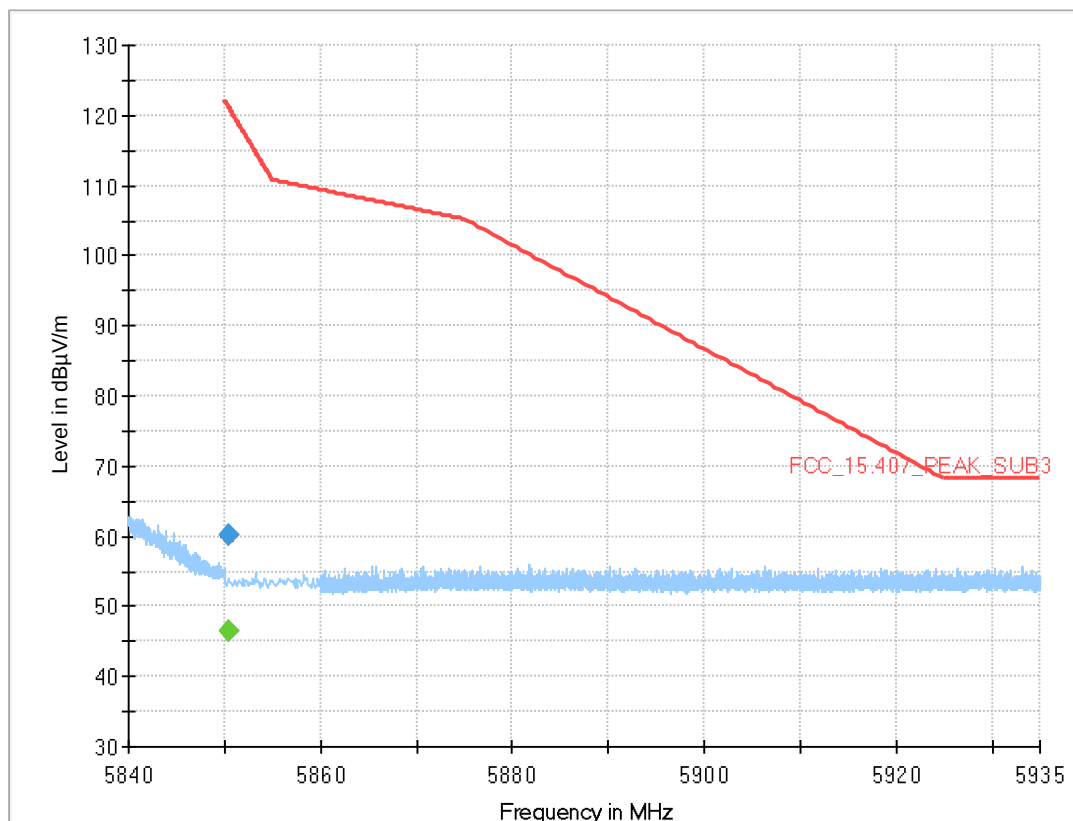
Radio Technology = WLAN a, Operating Frequency = low, Subband = U-NII-3
(S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5723.300	---	48.5	---	---	1000.0	1000.000	150.0	H	2.0	80.0	15.7
5723.300	64.0	---	118.3	54.30	1000.0	1000.000	150.0	H	2.0	80.0	15.7

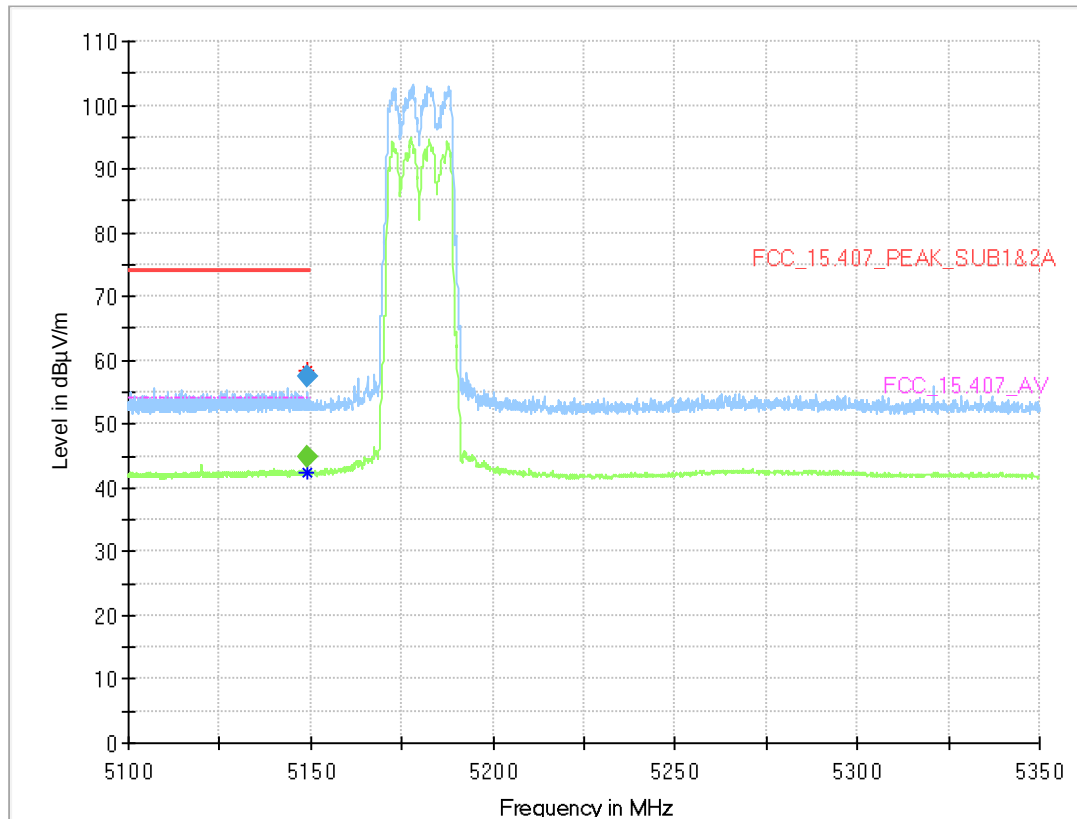
Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-3
(S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5850.400	---	46.4	---	---	1000.0	1000.000	150.0	H	-49.0	105.0	15.8
5850.400	60.2	---	121.2	61.09	1000.0	1000.000	150.0	H	-49.0	105.0	15.8

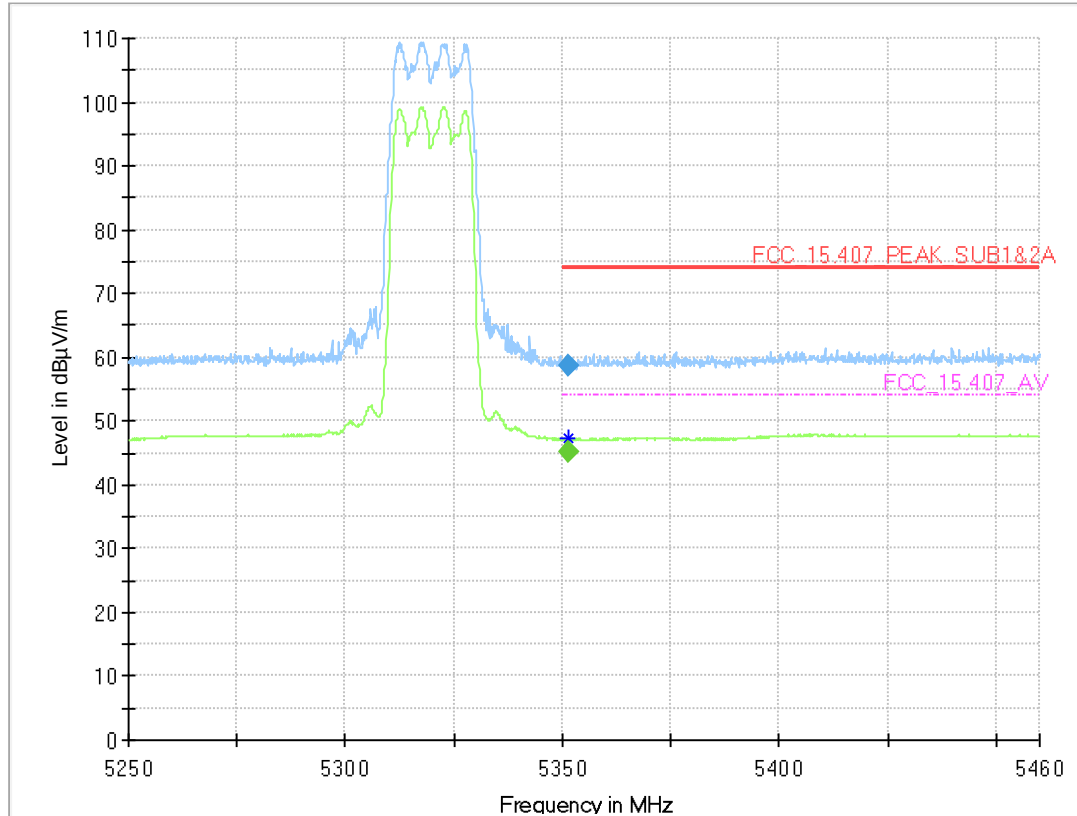
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = low, Subband = U-NII-I (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5148.775	---	44.9	54.00	9.07	1000.0	1000.000	150.0	V	93.0	15.0	15.0
5148.775	57.6	---	74.00	16.39	1000.0	1000.000	150.0	V	93.0	15.0	15.0

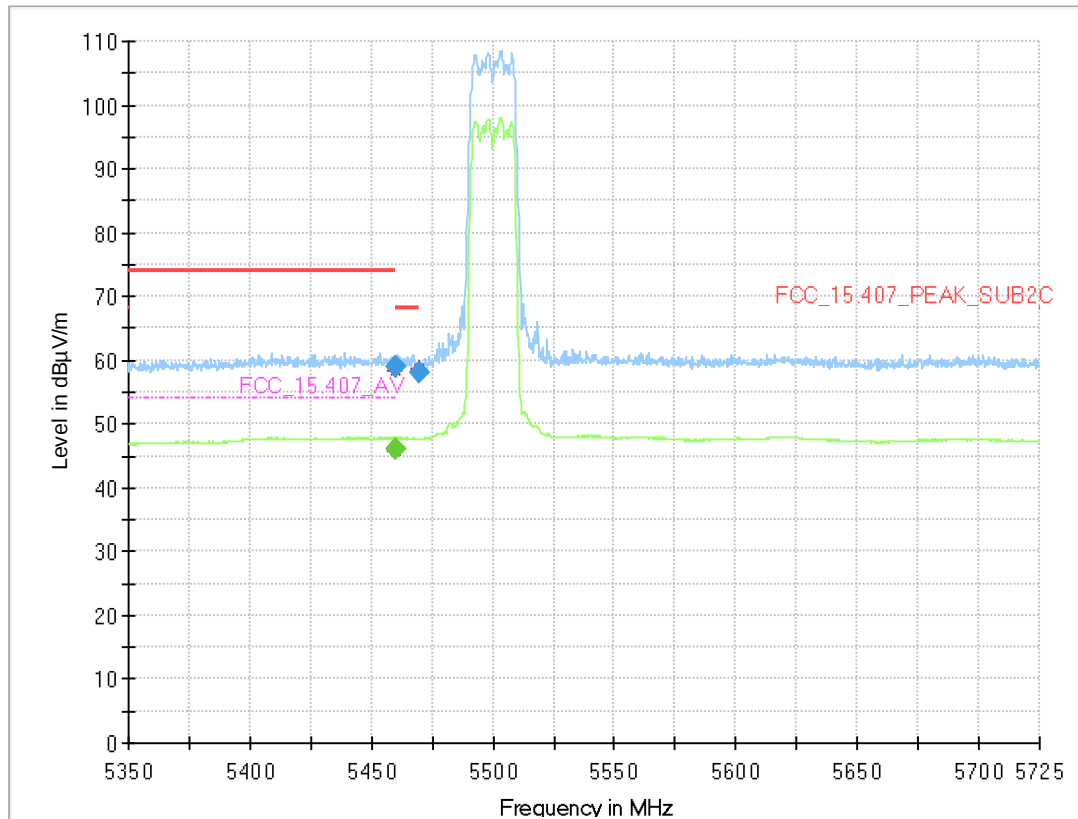
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = high, Subband = U-NII-2A (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5351.456	---	45.2	54.00	8.79	1000.0	1000.000	150.0	H	56.0	82.0	15.2
5351.456	58.7	---	74.00	15.31	1000.0	1000.000	150.0	H	56.0	82.0	15.2

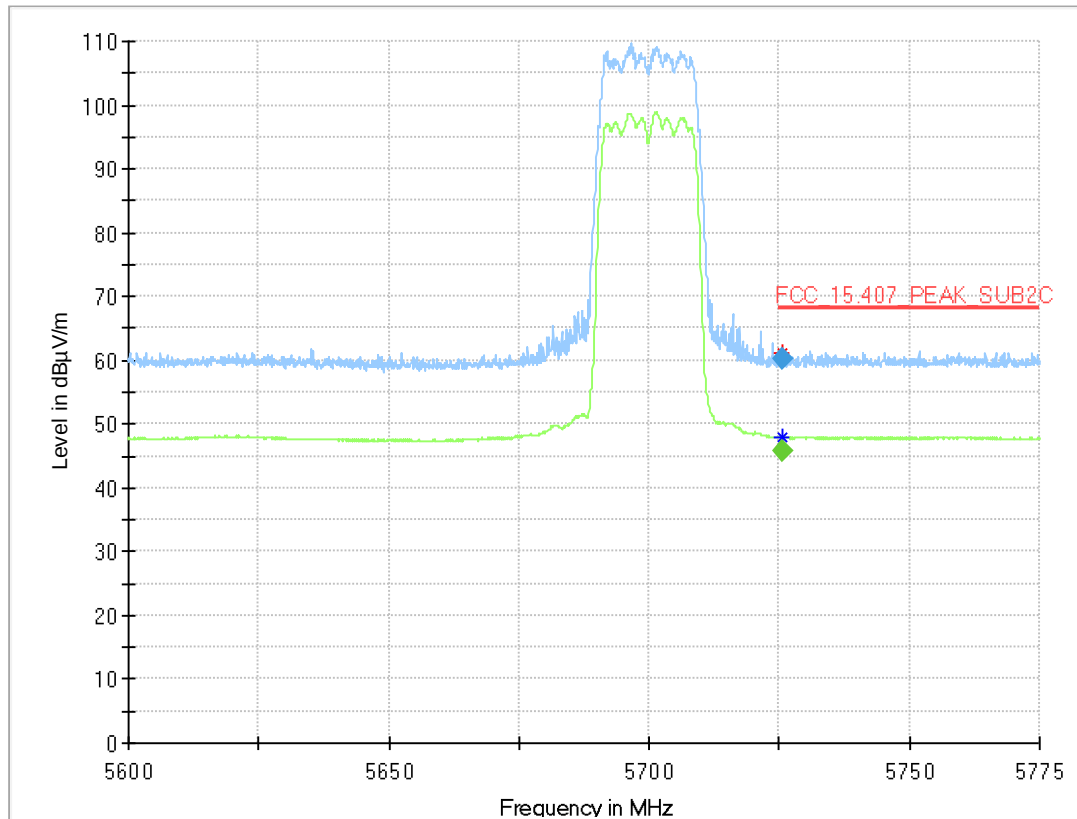
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = low, Subband = U-NII-2C (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.688	---	46.0	54.00	7.97	1000.0	1000.000	150.0	H	56.0	75.0	15.9
5459.688	59.1	---	74.00	14.87	1000.0	1000.000	150.0	V	92.0	75.0	15.9
5469.766	58.1	---	68.20	10.13	1000.0	1000.000	150.0	V	127.0	105.0	15.7

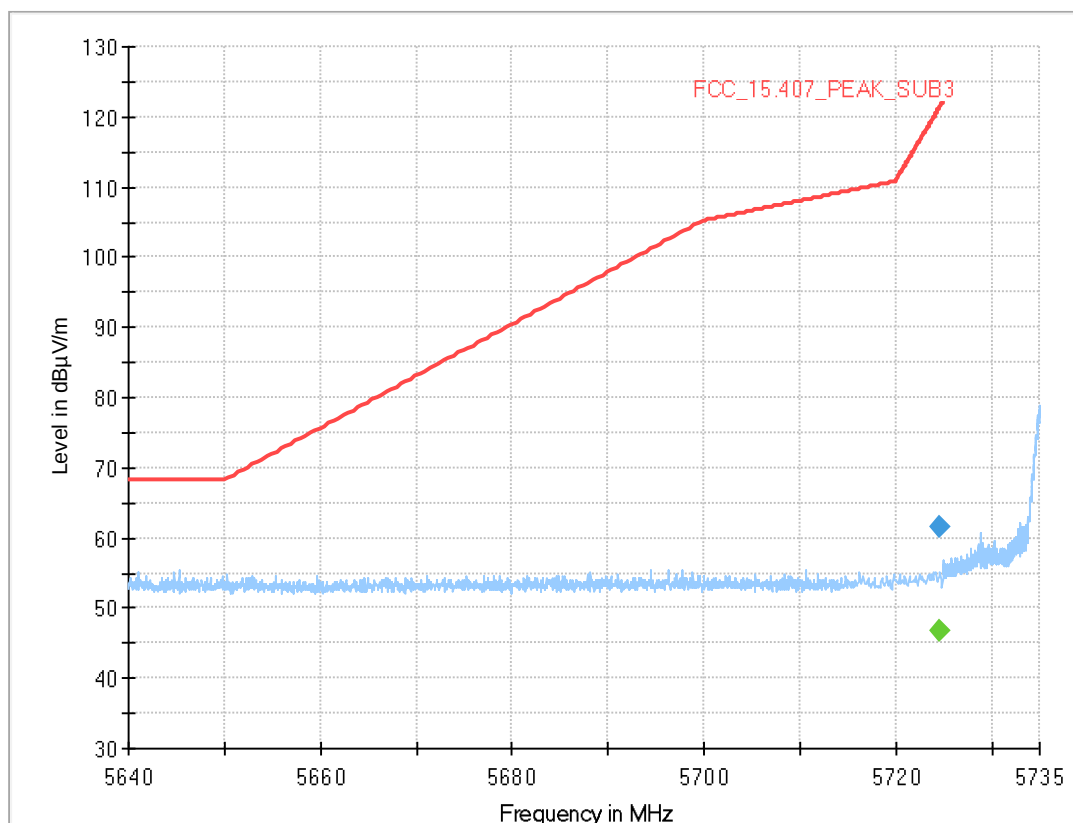
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = high, Subband = U-NII-2C (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5725.738	---	45.8	---	---	1000.0	1000.000	150.0	H	-50.0	96.0	15.7
5725.738	60.1	---	68.20	8.08	1000.0	1000.000	150.0	H	-50.0	96.0	15.7

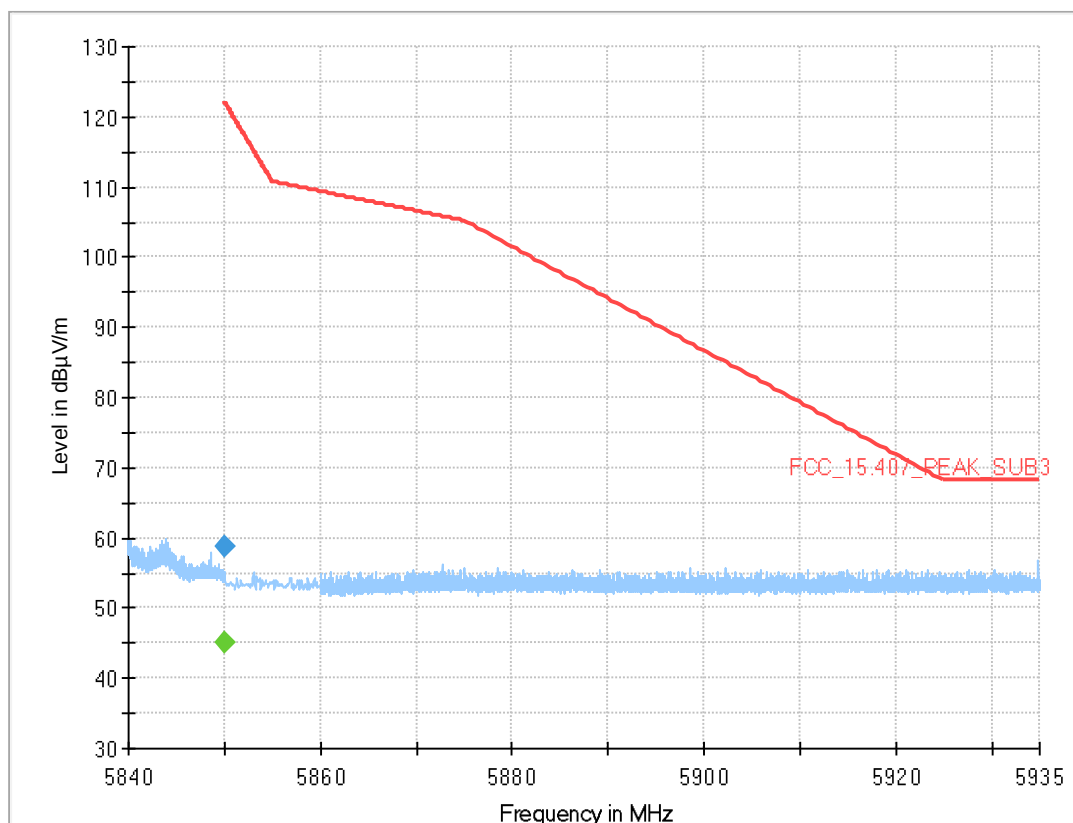
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = low, Subband = U-NII-3 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5724.600	---	46.9	---	---	1000.0	1000.000	150.0	H	5.0	105.0	15.7
5724.600	61.6	---	121.2	59.68	1000.0	1000.000	150.0	H	5.0	105.0	15.7

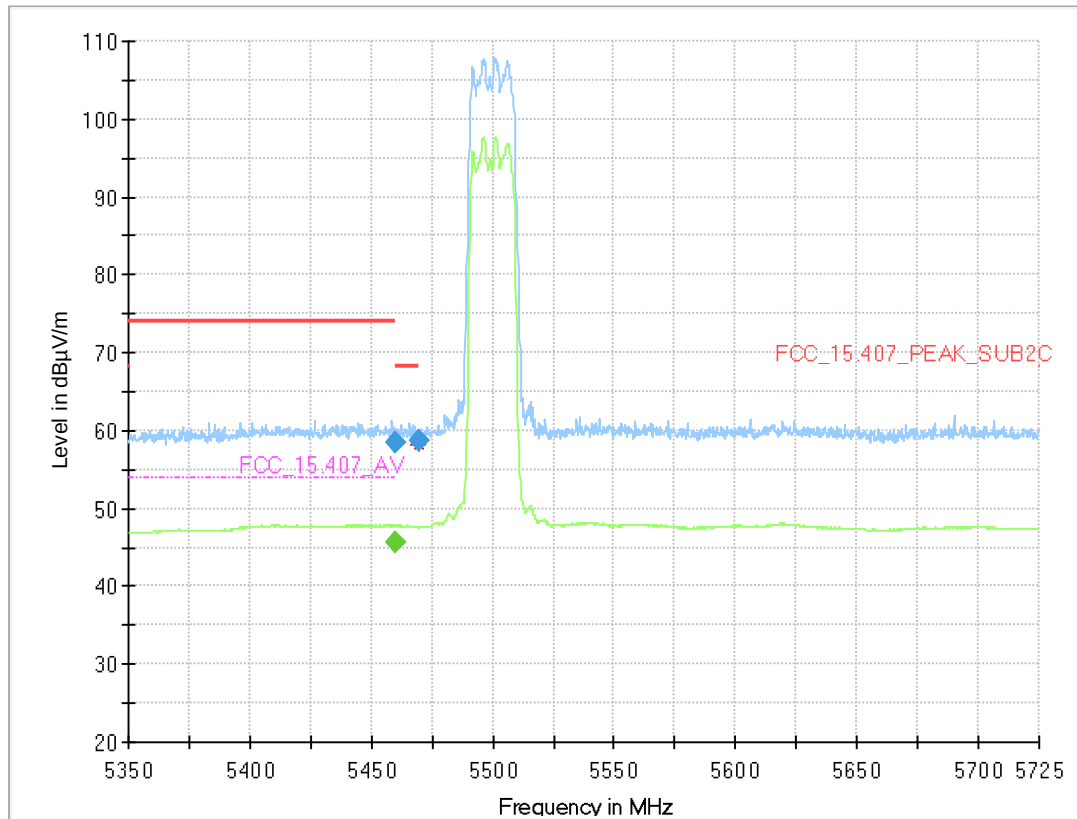
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = high, Subband = U-NII-3 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5850.100	---	45.1	---	---	1000.0	1000.000	150.0	V	-124.0	88.0	15.8
5850.100	58.7	---	121.9	63.25	1000.0	1000.000	150.0	V	-124.0	88.0	15.8

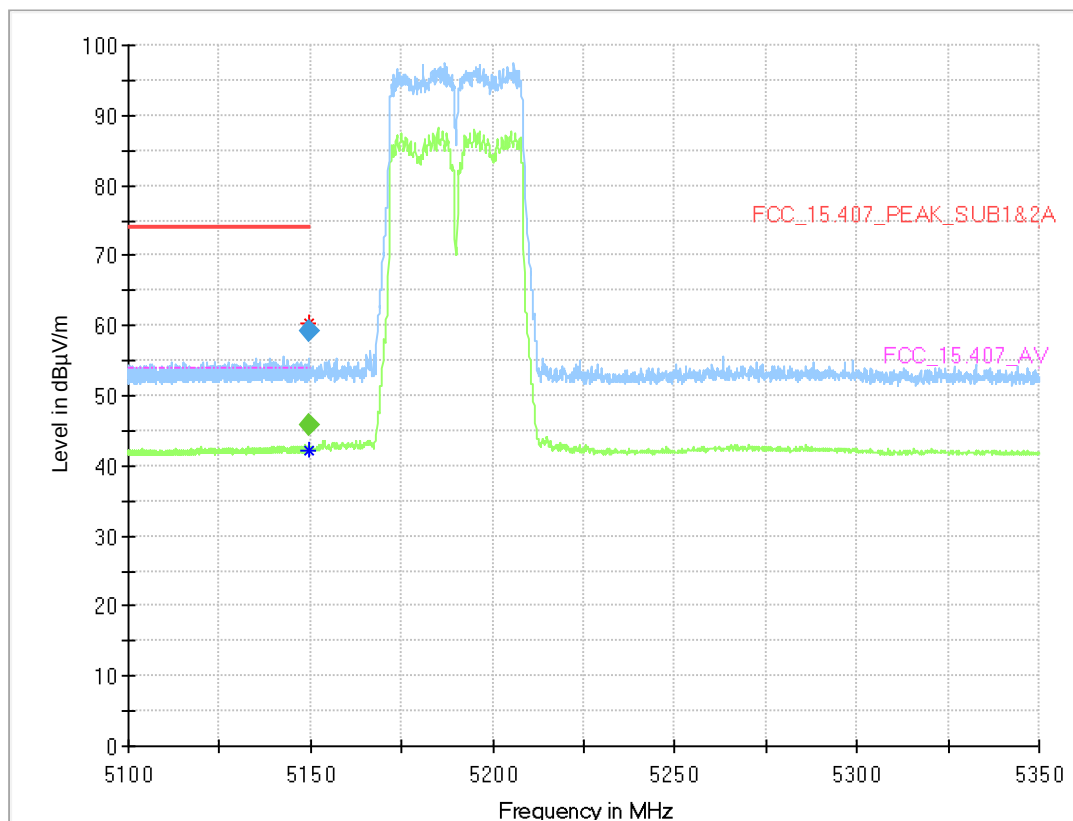
Radio Technology = WLAN ac 20 MHz MIMO, Operating Frequency = low, Subband = U-NII-2C (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.922	---	45.7	54.00	8.32	1000.0	1000.000	150.0	V	-5.0	88.0	15.9
5459.922	58.5	---	74.00	15.50	1000.0	1000.000	150.0	H	-91.0	0.0	15.9
5470.000	58.8	---	68.20	9.41	1000.0	1000.000	150.0	V	11.0	84.0	15.7

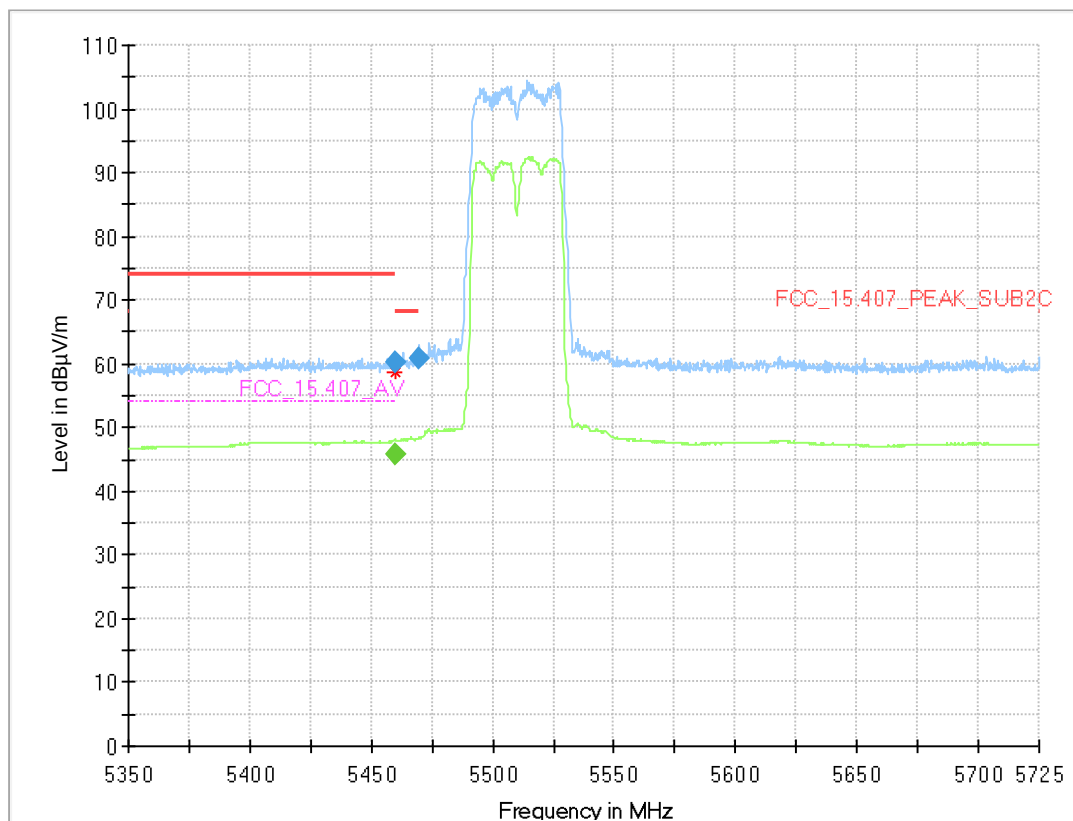
Radio Technology = WLAN n 40 MHz SISO, Operating Frequency = low, Subband = U-NII-1 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5149.313	---	45.7	54.00	8.27	1000.0	1000.000	150.0	H	82.0	98.0	15.0
5149.313	59.2	---	74.00	14.76	1000.0	1000.000	150.0	H	82.0	98.0	15.0

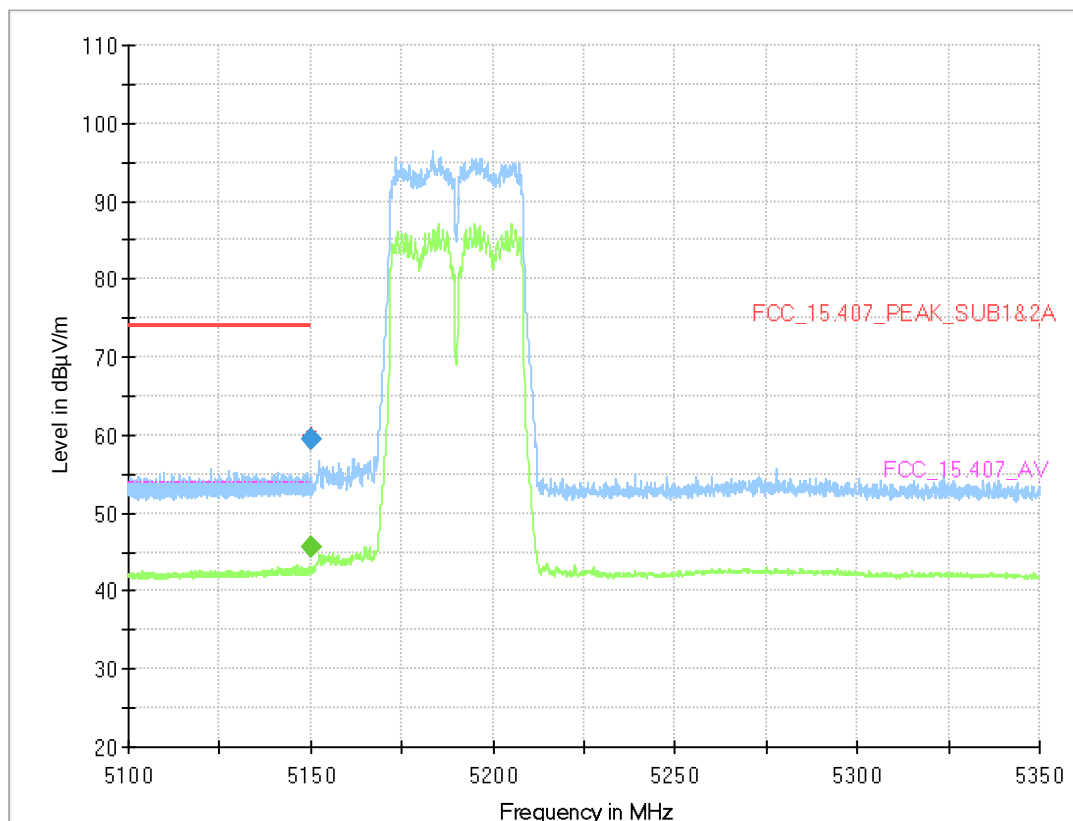
Radio Technology = WLAN n 40 MHz SISO, Operating Frequency = low, Subband = U-NII-2C (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.688	---	45.9	54.00	8.13	1000.0	1000.000	150.0	V	88.0	-12.0	15.9
5459.688	60.3	---	74.00	13.73	1000.0	1000.000	150.0	V	90.0	-10.0	15.9
5470.000	60.8	---	68.20	7.39	1000.0	1000.000	150.0	H	81.0	78.0	15.7

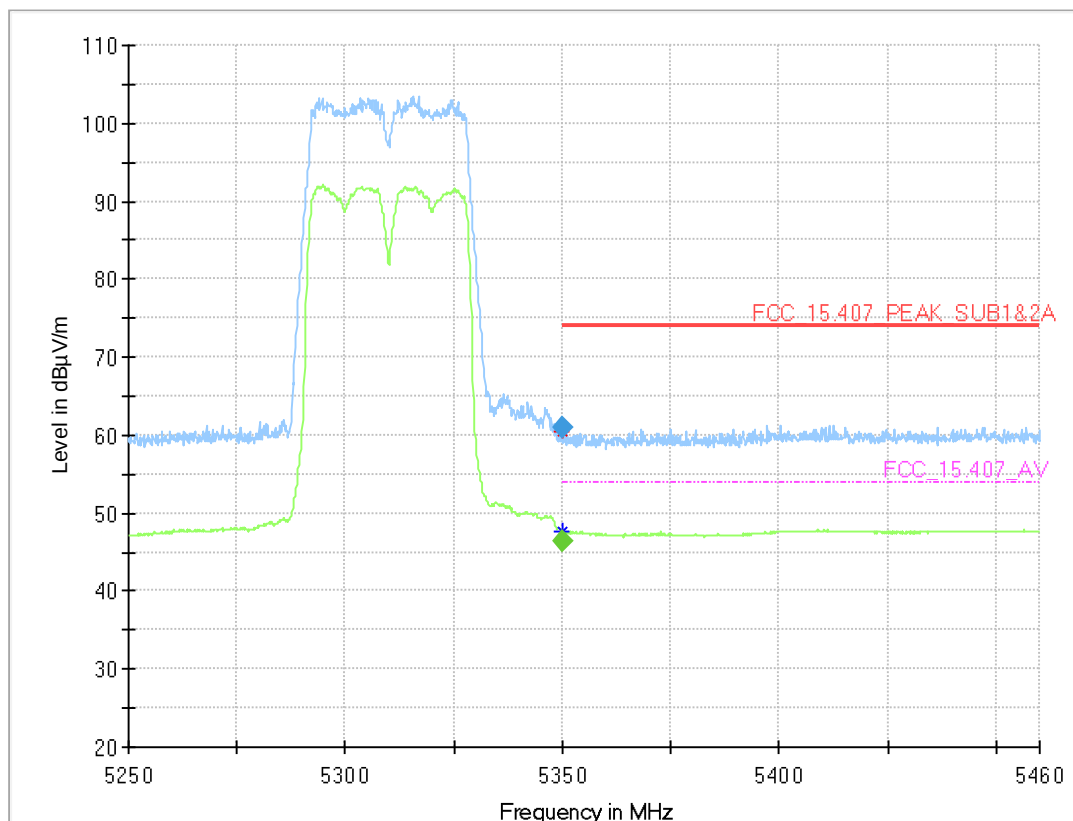
Radio Technology = WLAN ac 40 MHz SISO, Operating Frequency = low, Subband = U-NII-1 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dB μ V/m)	CAverage (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5149.963	---	45.6	54.00	8.36	1000.0	1000.000	150.0	V	38.0	102.0	15.0
5149.963	59.6	---	74.00	14.42	1000.0	1000.000	150.0	V	38.0	102.0	15.0

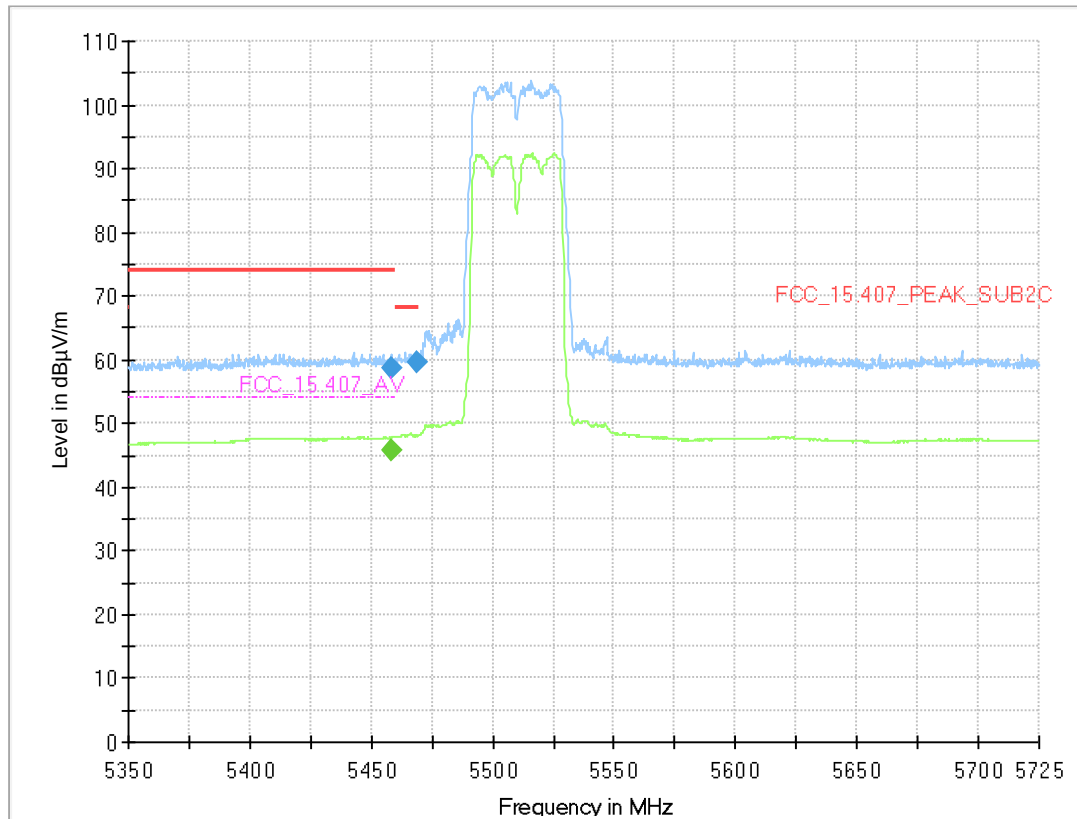
Radio Technology = WLAN ac 40 MHz SISO, Operating Frequency = high, Subband = U-NII-2A (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5350.013	---	46.3	54.00	7.68	1000.0	1000.000	150.0	V	7.0	15.0	15.2
5350.013	60.9	---	74.00	13.09	1000.0	1000.000	150.0	V	7.0	15.0	15.2

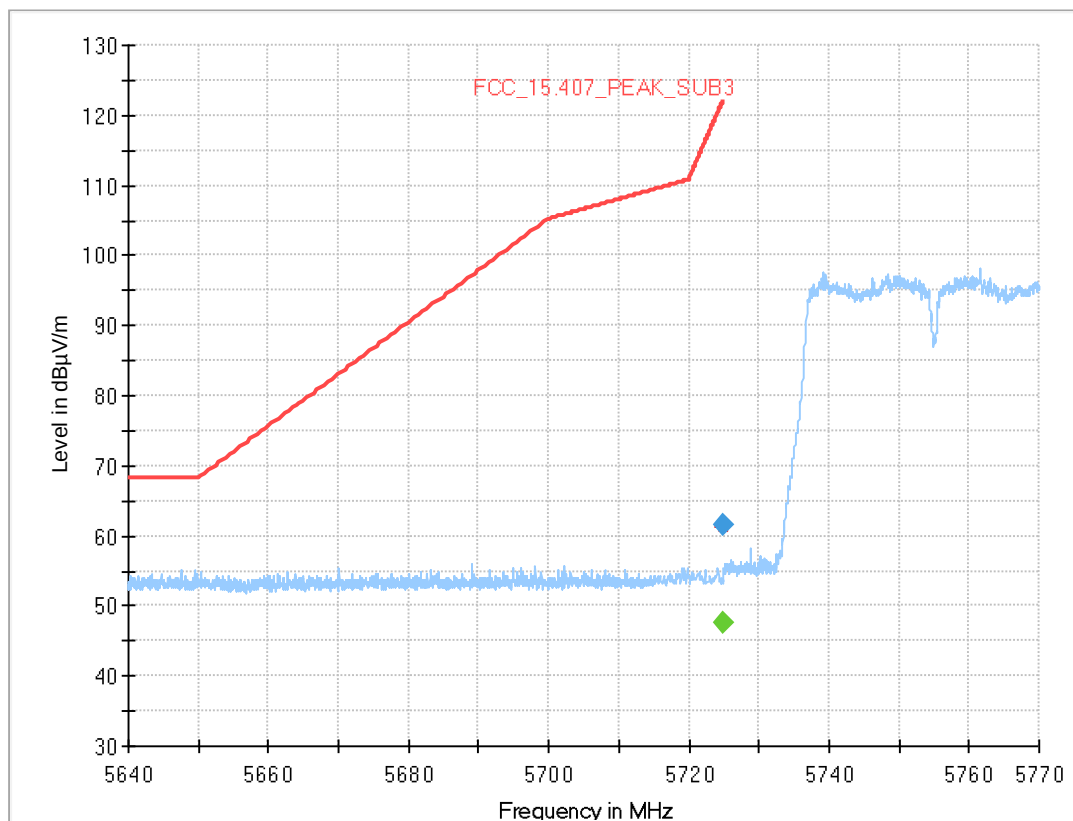
Radio Technology = WLAN ac 40 MHz SISO, Operating Frequency = low, Subband = U-NII-2C (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5458.281	---	45.8	54.00	8.18	1000.0	1000.000	150.0	V	89.0	8.0	15.9
5458.281	58.7	---	74.00	15.26	1000.0	1000.000	150.0	H	-124.0	105.0	15.9
5468.828	59.7	---	68.20	8.46	1000.0	1000.000	150.0	V	86.0	15.0	15.7

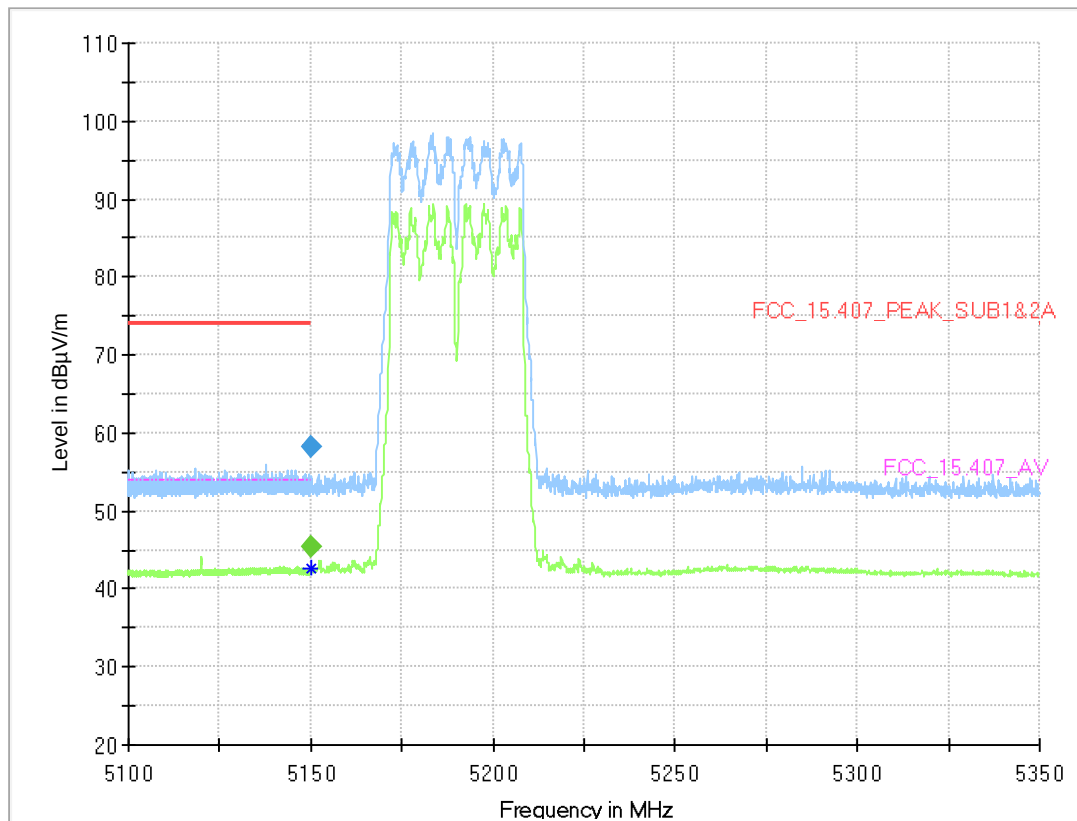
Radio Technology = WLAN ac 40 MHz SISO, Operating Frequency = low, Subband = U-NII-3 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5725.000	61.7	---	122.2	60.50	1000.0	1000.000	150.0	V	4.0	15.0	15.7
5725.000	---	47.5	---	---	1000.0	1000.000	150.0	V	4.0	15.0	15.7

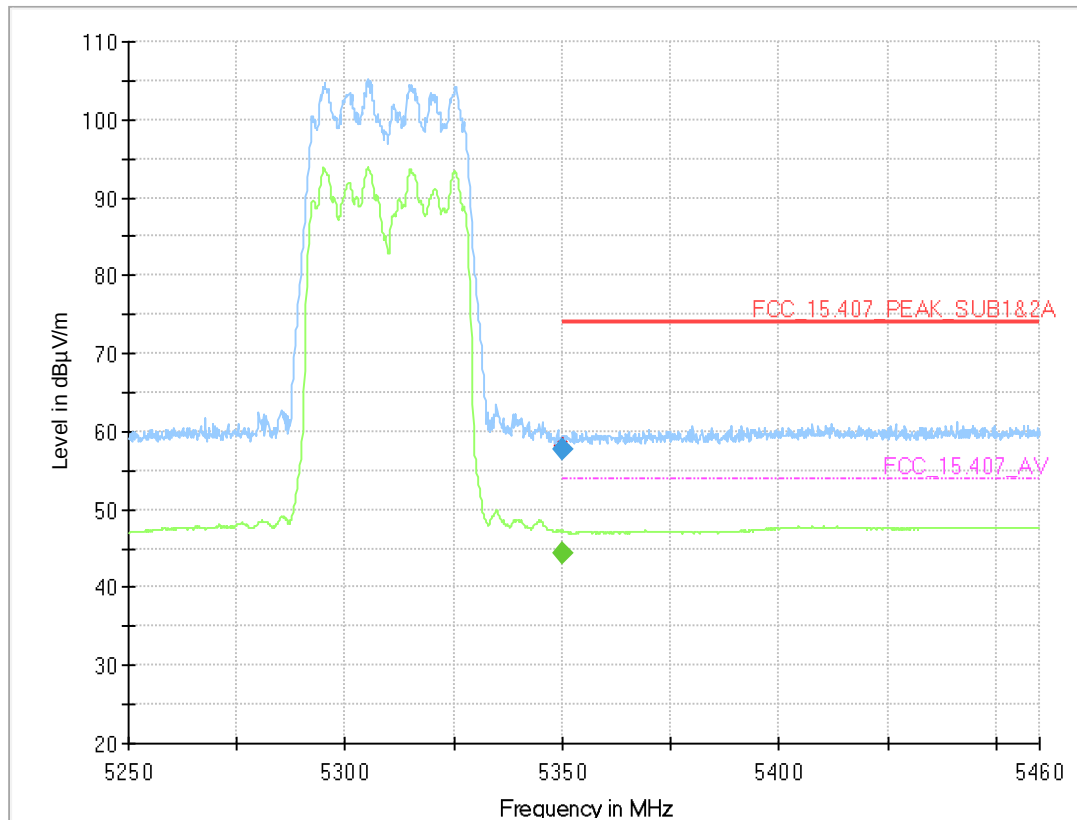
Radio Technology = WLAN ac 40 MHz MIMO, Operating Frequency = low, Subband = U-NII-1 (S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5150.000	---	45.3	---	---	1000.0	1000.000	150.0	V	-3.0	15.0	15.0
5150.000	58.2	---	---	---	1000.0	1000.000	150.0	V	-3.0	15.0	15.0

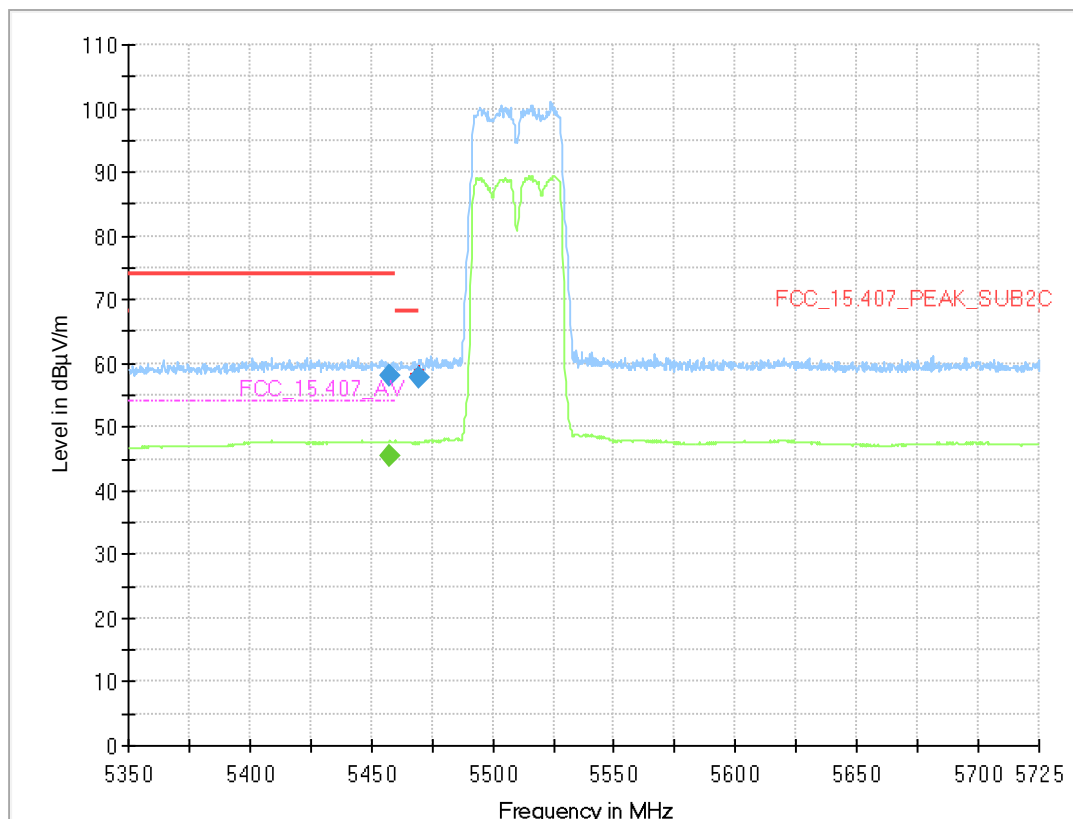
Radio Technology = WLAN ac 40 MHz MIMO, Operating Frequency = high, Subband = U-NII-2A
(S02_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5350.013	---	44.5	54.00	9.50	1000.0	1000.000	150.0	H	-38.0	88.0	15.2
5350.013	57.7	---	74.00	16.31	1000.0	1000.000	150.0	H	-38.0	88.0	15.2

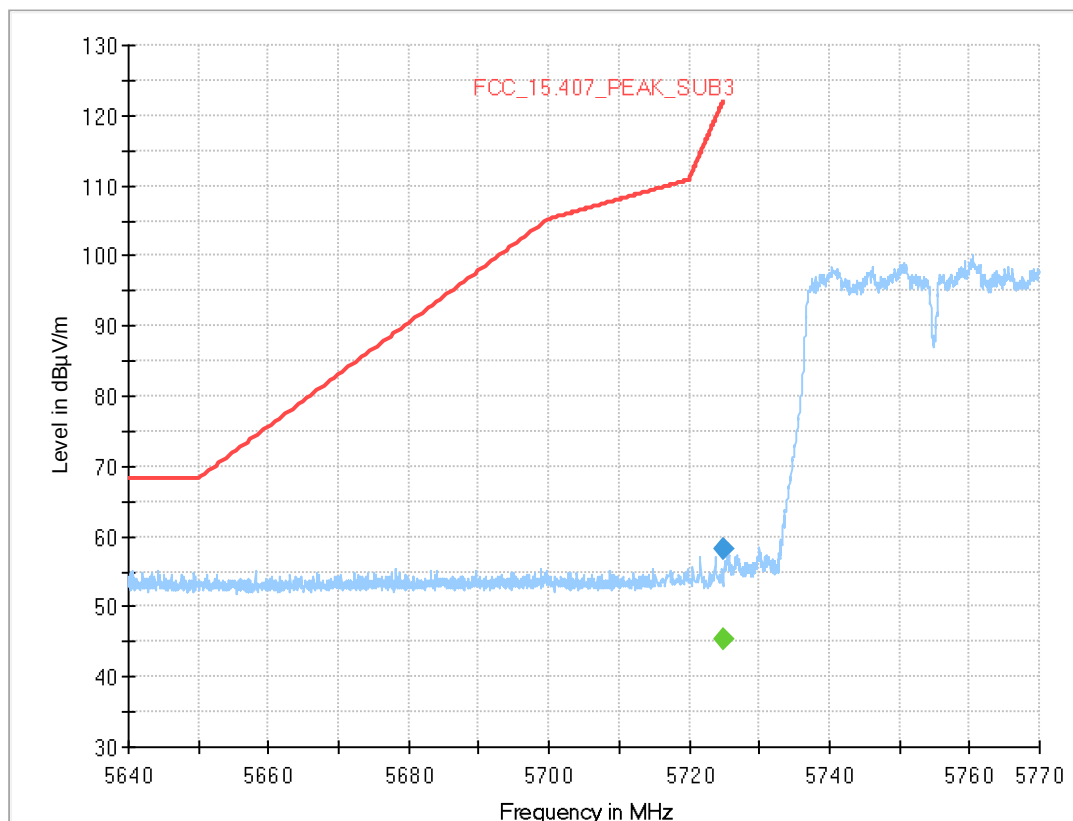
Radio Technology = WLAN ac 40 MHz MIMO, Operating Frequency = low, Subband = U-NII-2C



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5457.813	---	45.6	54.00	8.39	1000.0	1000.000	150.0	V	90.0	-12.0	15.9
5457.813	58.1	---	74.00	15.94	1000.0	1000.000	150.0	V	-174.0	-10.0	15.9
5469.531	57.8	---	68.20	10.36	1000.0	1000.000	150.0	V	-81.0	99.0	15.7

Radio Technology = WLAN ac 40 MHz SISO, Operating Frequency = low, Subband = U-NII-3 (S02_AC02)

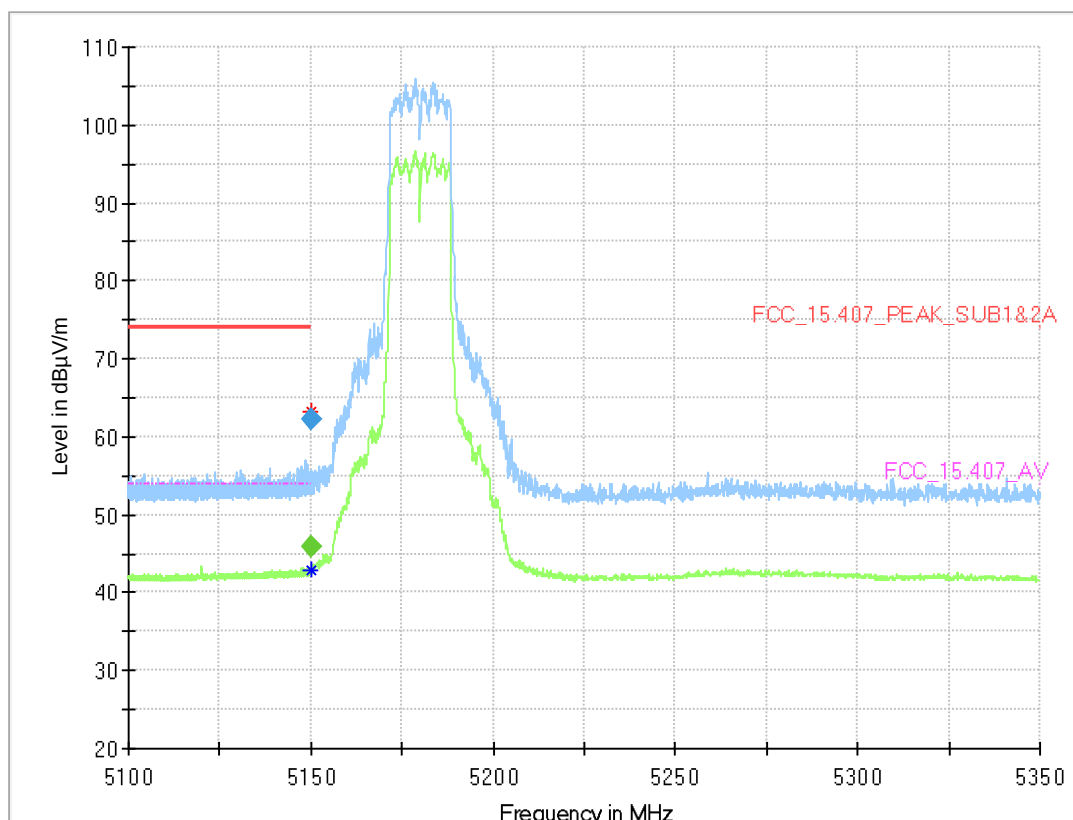


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5725.000	---	45.4	---	---	1000.0	1000.000	150.0	H	54.0	105.0	15.7
5725.000	58.3	---	122.2	63.86	1000.0	1000.000	150.0	H	54.0	105.0	15.7

Position 3

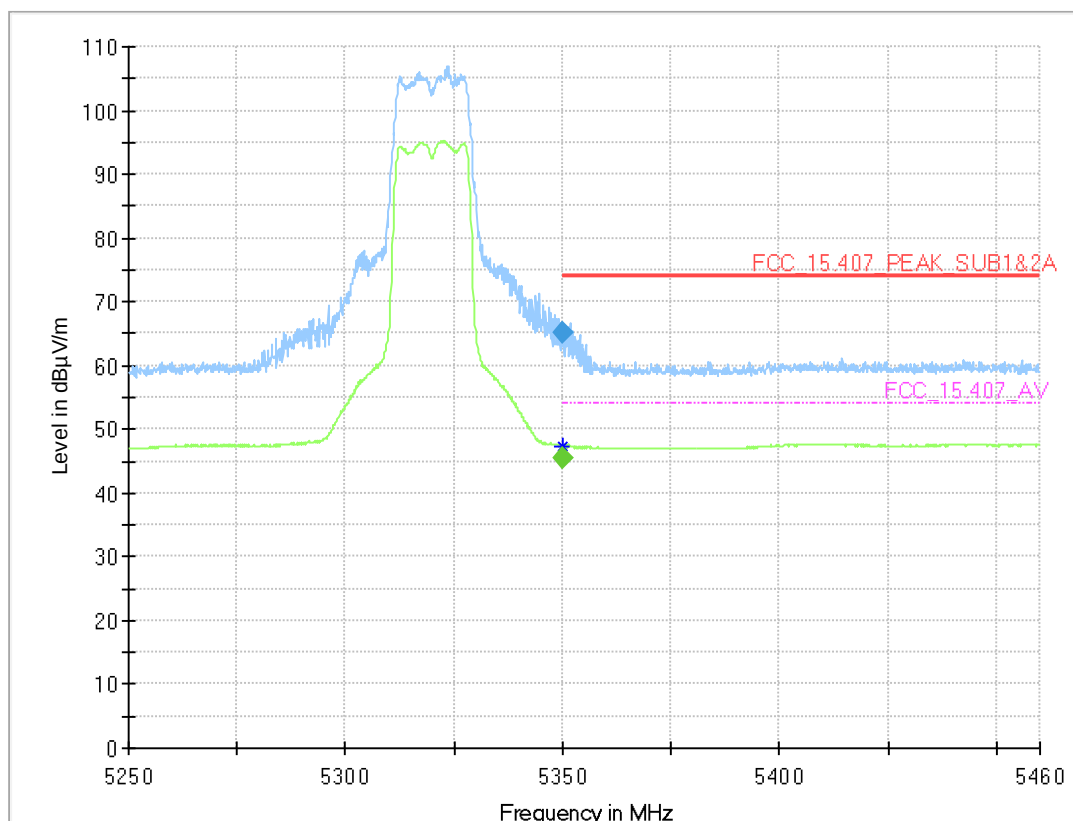
Radio Technology = WLAN a, Operating Frequency = low, Subband = U-NII-I
(S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5149.975	---	45.8	54.00	8.16	1000.0	1000.000	150.0	H	-181.0	105.0	15.0
5149.975	62.3	---	74.00	11.72	1000.0	1000.000	150.0	H	-181.0	105.0	15.0

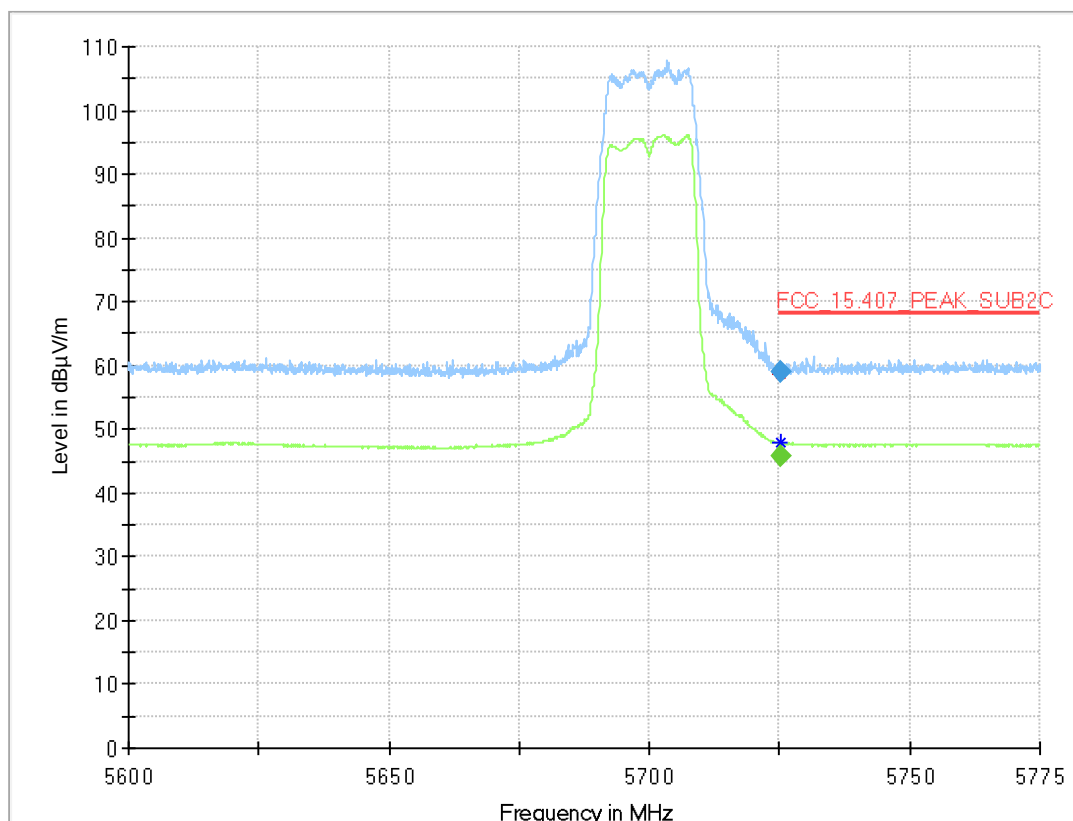
Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-2A
 (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5350.013	---	45.4	54.00	8.60	1000.0	1000.000	150.0	H	-180.0	0.0	15.2
5350.013	65.1	---	74.00	8.94	1000.0	1000.000	150.0	H	-180.0	0.0	15.2

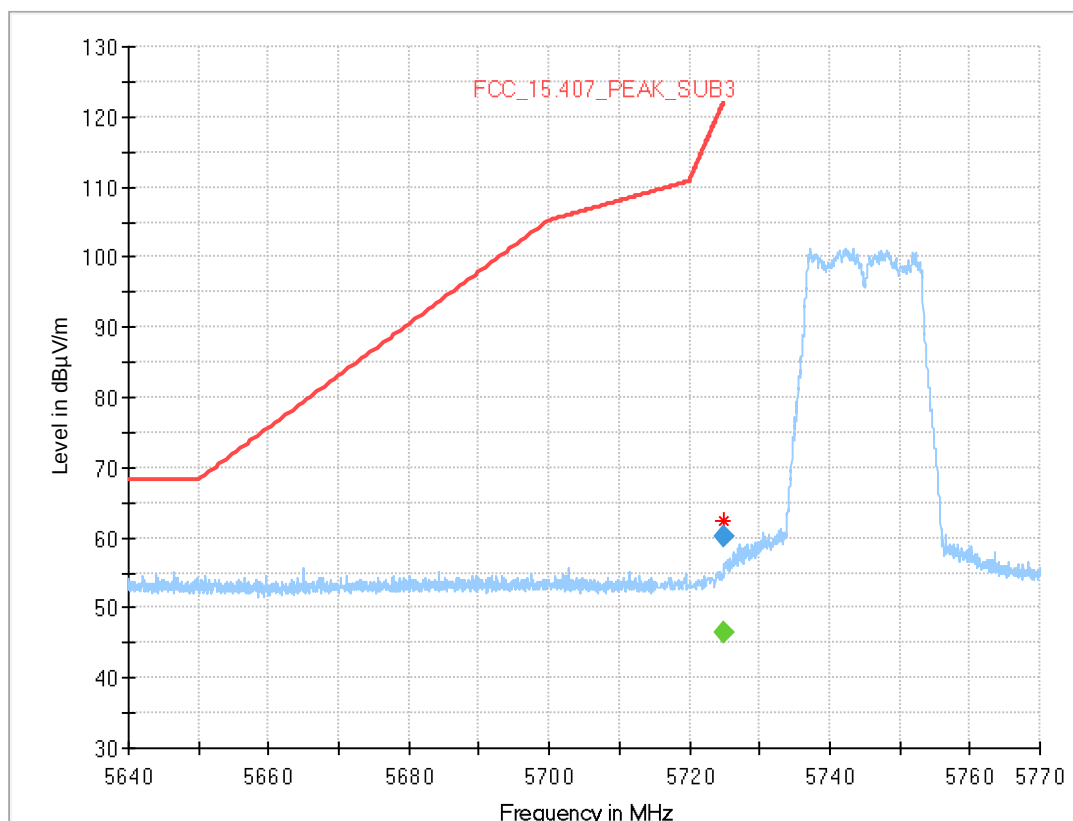
Radio Technology = WLAN a, Operating Frequency = high, Subband = U-NII-2C
 (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5725.300	---	45.6	---	---	1000.0	1000.000	150.0	H	-6.0	104.0	15.7
5725.300	59.1	---	68.20	9.07	1000.0	1000.000	150.0	H	-6.0	104.0	15.7

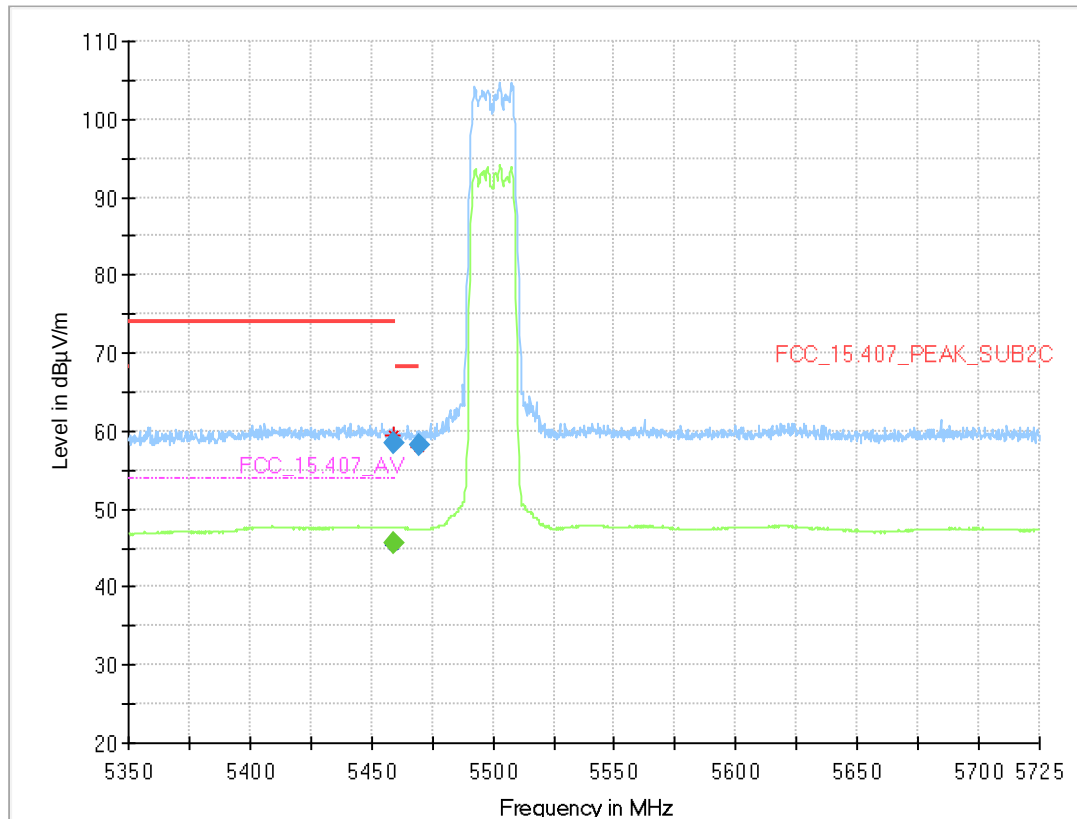
Radio Technology = WLAN a, Operating Frequency = low, Subband = U-NII-3
(S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5724.900	---	46.5	---	---	1000.0	1000.000	150.0	H	0.0	96.0	15.7
5724.900	60.3	---	121.9	61.70	1000.0	1000.000	150.0	H	0.0	96.0	15.7

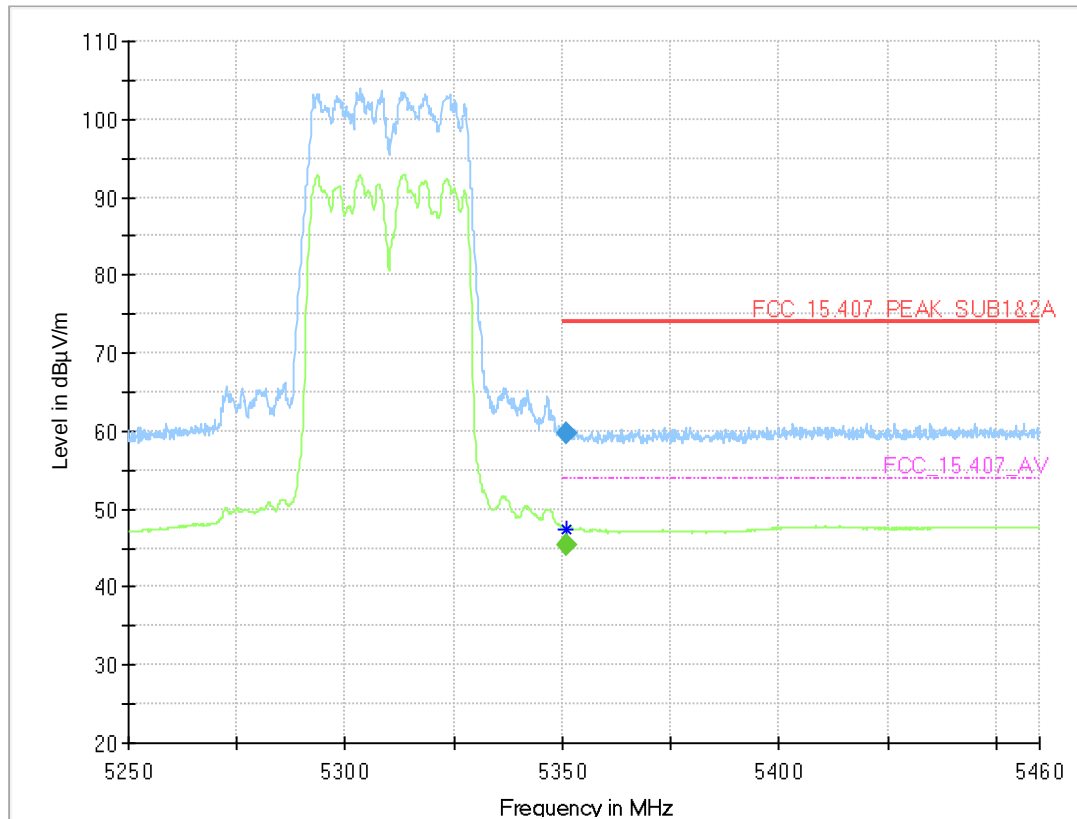
Radio Technology = WLAN ac 20 MIMO, Operating Frequency = low, Subband = U-NII-2C (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.219	---	45.5	54.00	8.48	1000.0	1000.000	150.0	V	46.0	-11.0	15.9
5459.219	58.6	---	74.00	15.44	1000.0	1000.000	150.0	H	3.0	88.0	15.9
5470.000	58.2	---	68.20	10.03	1000.0	1000.000	150.0	H	-144.0	-6.0	15.7

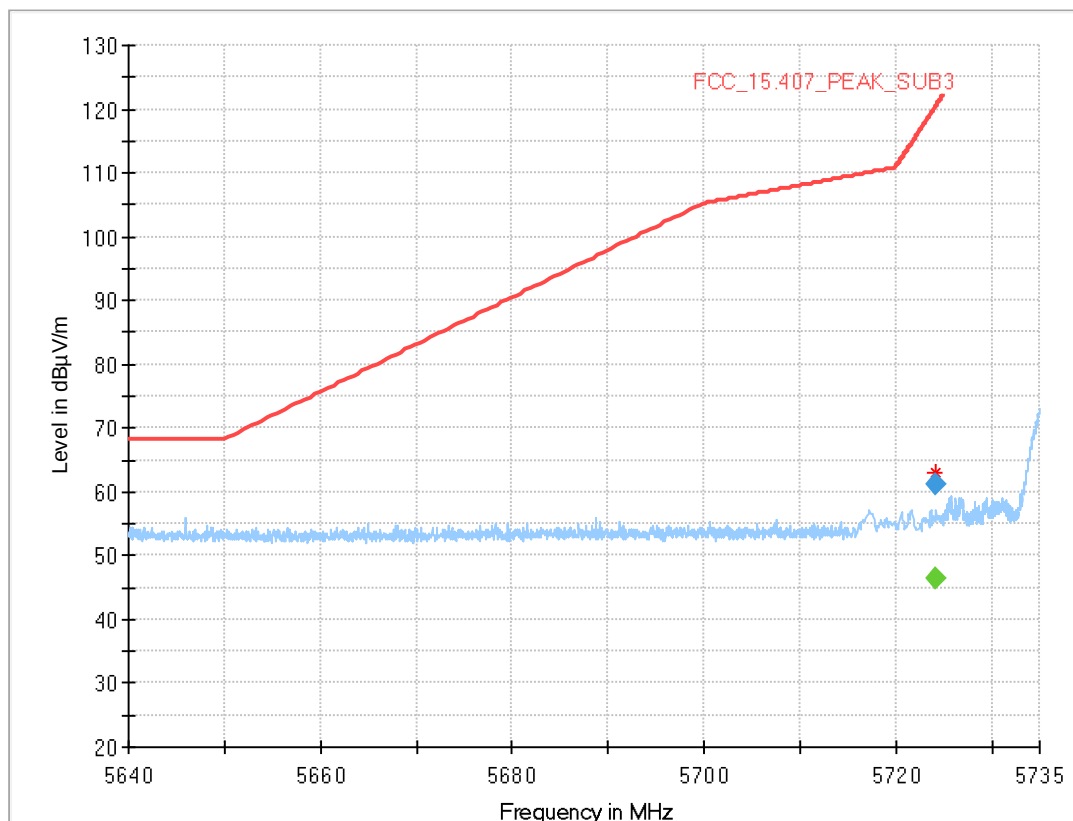
Radio Technology = WLAN ac 40 SISO, Operating Frequency = high, Subband = U-NII-2A (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5350.800	---	45.5	54.00	8.49	1000.0	1000.000	150.0	V	-34.0	90.0	15.2
5350.800	59.8	---	74.00	14.19	1000.0	1000.000	150.0	V	-34.0	90.0	15.2

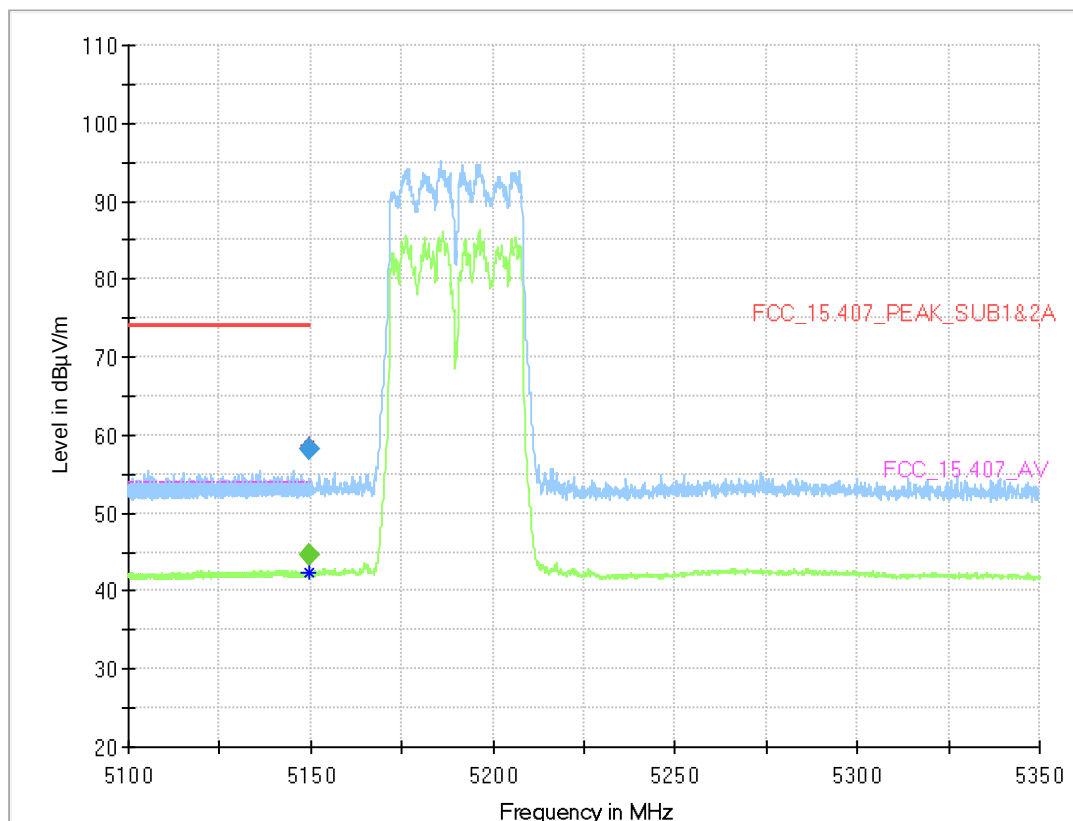
Radio Technology = WLAN ac 40 SISO, Operating Frequency = low, Subband = U-NII-3 (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5724.200	---	46.4	---	---	1000.0	1000.000	150.0	V	-6.0	88.0	15.7
5724.200	61.2	---	120.3	59.19	1000.0	1000.000	150.0	V	-6.0	88.0	15.7

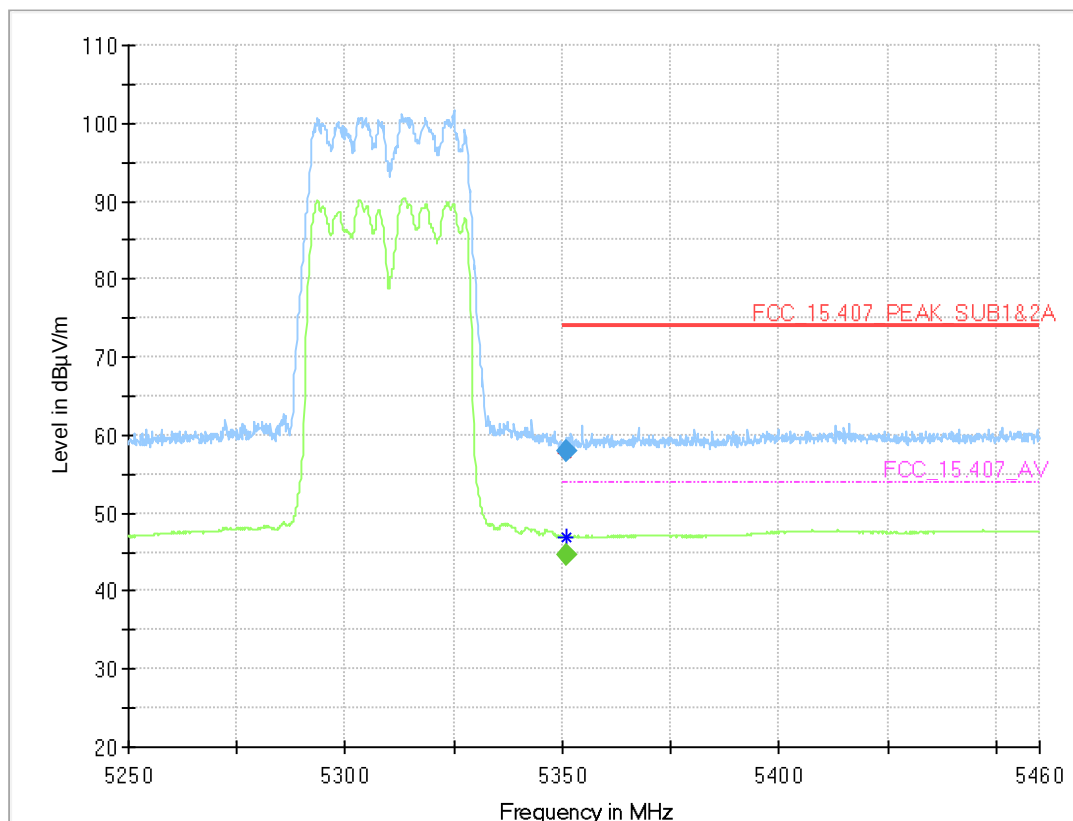
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = low, Subband = U-NII-I
 (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5149.713	---	44.8	54.00	9.25	1000.0	1000.000	150.0	H	146.0	0.0	15.0
5149.713	58.3	---	74.00	15.68	1000.0	1000.000	150.0	H	146.0	0.0	15.0

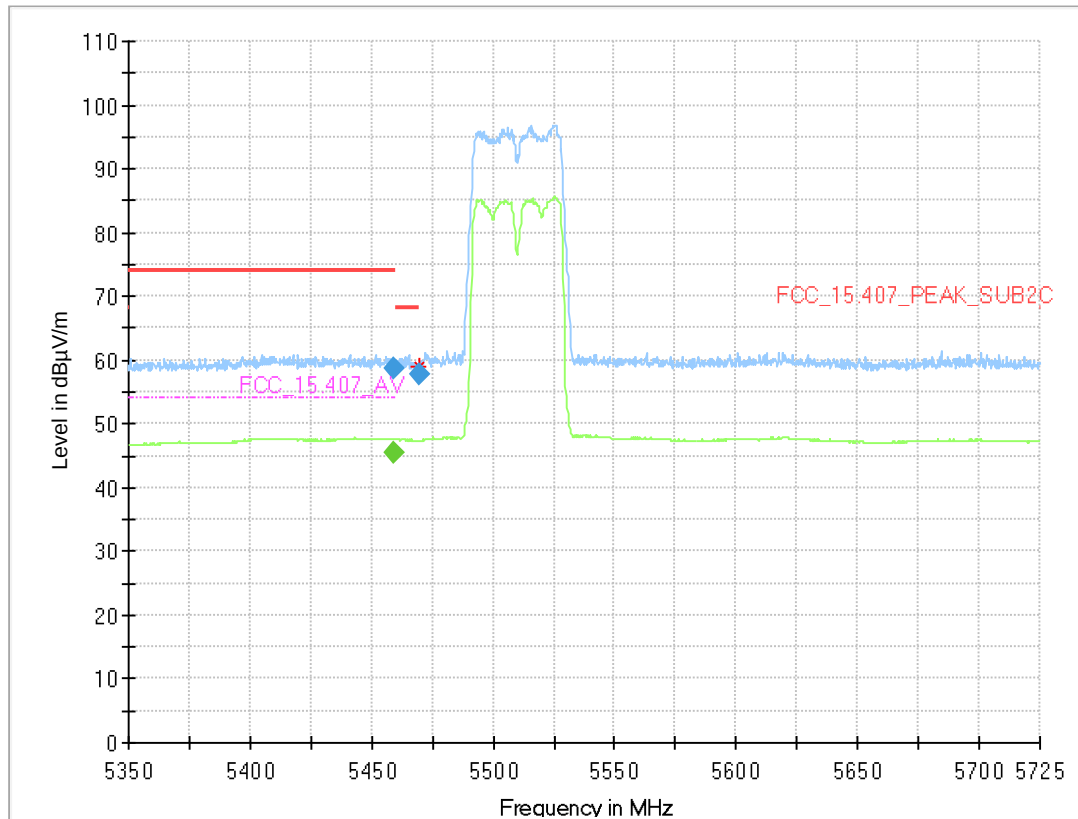
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = high, Subband = U-NII-2A (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5351.063	---	44.6	54.00	9.41	1000.0	1000.000	150.0	H	40.0	-6.0	15.2
5351.063	57.8	---	74.00	16.15	1000.0	1000.000	150.0	H	40.0	-6.0	15.2

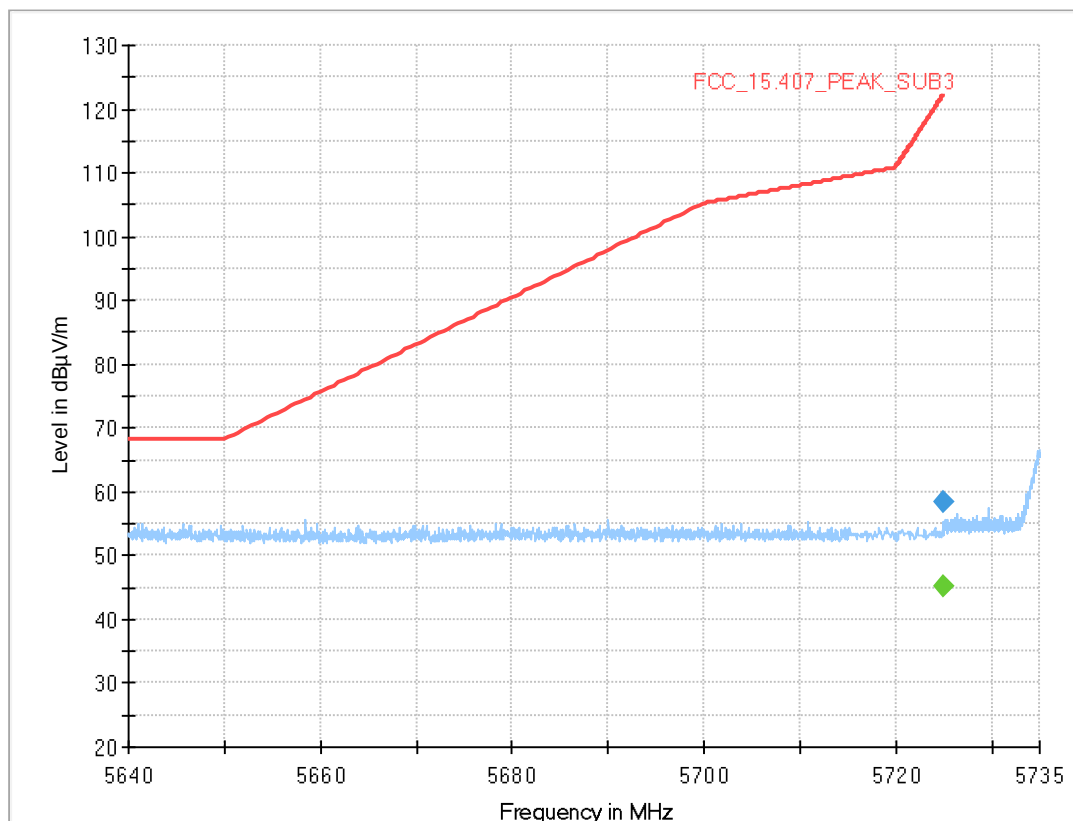
Radio Technology = WLAN ac 40 MIMO, Operating Frequency = low, Subband = U-NII-2C (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.219	---	45.6	54.00	8.42	1000.0	1000.000	150.0	H	-188.0	12.0	15.9
5459.219	58.7	---	74.00	15.26	1000.0	1000.000	150.0	H	-79.0	10.0	15.9
5469.766	57.9	---	68.20	10.28	1000.0	1000.000	150.0	H	9.0	88.0	15.7

Radio Technology = WLAN ac 40 MIMO, Operating Frequency = low, Subband = U-NII-3 (S03_AC02)



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5724.900	---	45.1	---	---	1000.0	1000.000	150.0	V	-83.0	98.0	15.7
5724.900	58.5	---	121.9	63.45	1000.0	1000.000	150.0	V	-83.0	98.0	15.7

5.2.5 TEST EQUIPMENT USED

- Radiated Emissions FAR 5 GHz FCC

6 TEST EQUIPMENT

6.1 TEST EQUIPMENT HARDWARE

- 1 Radiated Emissions FAR 5 GHz FCC
Radiated Emissions Tests for 5 GHz bands in a fully anechoic room

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
1.1	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2023-12	2025-12
1.2	Innco Systems CO3000	Controller for bore sight mast FAC	innco systems GmbH	CO3000/1460/54740522/P	N/A	N/A
1.3	AMF-7D00101800-30-10P-R	Broadband Amplifier 100 MHz - 18 GHz	Miteq		N/A	N/A
1.4	Anechoic Chamber 03	FAR, 8.80m x 4.60m x 4.05m (l x w x h)	Albatross Projects	P26971-647-001-PRB	N/A	N/A
1.5	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2023-08	2025-08
1.6	JS4-18002600-32-5P	Broadband Amplifier 18 GHz - 26 GHz	Miteq	849785	N/A	N/A
1.7	FSW43	Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	103779	2023-04	2025-04
1.8	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	N/A	N/A
1.9	3160-09	Standard Gain / Pyramidal Horn Antenna 26.5 GHz	EMCO Elektronik GmbH	00083069	N/A	N/A
1.10	WHKX 7.0/18G-8SS	High Pass Filter	Wainwright Instruments GmbH	09	N/A	N/A
1.11	MA3000/0800-XP-ET-compact	Bore Sight Antenna Mast	innco systems GmbH	9210522	N/A	N/A
1.12	TT 1.5 WI	Turn Table	Maturo GmbH	-	N/A	N/A
1.13	3160-10	Standard Gain / Pyramidal Horn Antenna 40 GHz	EMCO Elektronik GmbH	00086675	N/A	N/A
1.14	Opus 20 THI (8120.00)	ThermoHygro Datalogger	Lufft Mess- und Regeltechnik GmbH	115.0318.0802.033	2023-08	2025-08
1.15	TD1.5-10kg	EUT Tilt Device (Rohacell)	Maturo GmbH	TD1.5-10kg/024/3790709	N/A	N/A
1.16	AFS42-00101800-25-S-42	Broadband Amplifier 25 MHz - 18 GHz	Miteq	2035324	N/A	N/A
1.17	HF 907	Double-ridged horn	Rohde & Schwarz	102444	2024-10	2027-10

2 Radiated Emissions SAC up to 1 GHz
 Radiated emission tests up to 1 GHz in a semi anechoic room

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.1	N5000/NP	Filter for EUT, 2 Lines, 250 V, 16 A	ETS-LINDGREN	241515	N/A	N/A
2.2	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2023-12	2025-12
2.3	ESW44	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	101603	2024-03	2026-03
2.4	Anechoic Chamber 01	SAC/FAR, 10.58 m x 6.38 m x 6.00 m	Frankonia Germany EMC Solution GmbH	none	N/A	N/A
2.5	HL 562 ULTRALOG	Biconical-log-per antenna (30 MHz - 3 GHz) with HL 562E biconicals	Rohde & Schwarz GmbH & Co. KG	830547/003		
2.6	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2023-08	2025-08
2.7	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2023-12	2025-12
2.8	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	N/A	N/A
2.9	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99	N/A	N/A
2.10	HL562E ULTRALOG	Biconical-log-per Antenna (30 MHz - 6 GHz)	Rohde & Schwarz GmbH & Co. KG	102299	2024-07	2027-07
2.11	Chase CBL6111C + INMET 64671 18N-6dB	Hybrid Antenna with 6dB Attenuator		2624 Kartei-Nr E-003226/K1026	2023-03	2026-03
2.12	CS-RUB6	Rubidium Frequency Standard	Rohde & Schwarz GmbH & Co. KG	100321	2023-10	2025-10
2.13	AM 4.0	Antenna Mast 4 m	Maturo GmbH	AM4.0/180/1192 0513	N/A	N/A

The calibration interval is the time interval between "Last Calibration" and "Calibration Due"

6.2 TEST EQUIPMENT SOFTWARE

Semi-Anechoic Chamber:	
Software	Version
EMC32 Measurement Software	10.60.10
INNCO Mast Controller	1.02.62
INNCO Mast Height	34.10
INNCO Mast Elevation	36.11
MATURO Controller	1.24
MATURO Mast	12.19
MATURO Turn-Table	30.10
Fully-Anechoic Chamber:	
Software	Version
EMC32 Measurement Software	10.60.10
MATURO Controller	1.30
MATURO Turn-Unit	11.10
MATURO Mast	12.10
MATURO Turntable	12.11
INNCO Controller	1.03.02
INNCO Mast Height	34.10
INNCO Mast Elevation	36.11
TS 8997	
WMS32 Measurement Software	11.60.00 (till 2024-03-19), 11.70.00 + Hotfix 01
Conducted AC Emissions:	
Software	Version
EMC32 Measurement Software	10.60.20

7 ANTENNA FACTORS, CABLE LOSS AND SAMPLE CALCULATIONS

This chapter contains the antenna factors with their corresponding path loss of the used measurement path for all antennas as well as the insertion loss of the LISN.

7.1 LISN R&S ESH3-Z5 (150 KHZ – 30 MHZ)

Frequency		Corr.	LISN insertion loss ESH3-Z5	cable loss (incl. 10 dB atten- uator)
MHz		dB	dB	dB
0.15		10.1	0.1	10.0
5		10.3	0.1	10.2
7		10.5	0.2	10.3
10		10.5	0.2	10.3
12		10.7	0.3	10.4
14		10.7	0.3	10.4
16		10.8	0.4	10.4
18		10.9	0.4	10.5
20		10.9	0.4	10.5
22		11.1	0.5	10.6
24		11.1	0.5	10.6
26		11.2	0.5	10.7
28		11.2	0.5	10.7
30		11.3	0.5	10.8

Sample calculation

$$U_{\text{LISN}} (\text{dB } \mu\text{V}) = U (\text{dB } \mu\text{V}) + \text{Corr. (dB)}$$

U = Receiver reading

LISN Insertion loss = Voltage Division Factor of LISN

Corr. = sum of single correction factors of used LISN, cables, switch units (if used)

Linear interpolation will be used for frequencies in between the values in the table.

7.2 ANTENNA R&S HFH2-Z2 (9 KHZ – 30 MHZ)

Frequency	AF HFH- Z2)	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-40 dB/ decade)	d _{Limit} (meas. distance (limit)	d _{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
0.009	20.50	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.01	20.45	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.015	20.37	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.02	20.36	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.025	20.38	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.03	20.32	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.05	20.35	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.08	20.30	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.1	20.20	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.2	20.17	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.3	20.14	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.49	20.12	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.490001	20.12	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.5	20.11	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.8	20.10	-39.6	0.1	0.1	0.1	0.1	-40	30	3
1	20.09	-39.6	0.1	0.1	0.1	0.1	-40	30	3
2	20.08	-39.6	0.1	0.1	0.1	0.1	-40	30	3
3	20.06	-39.6	0.1	0.1	0.1	0.1	-40	30	3
4	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
5	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
6	20.02	-39.5	0.2	0.1	0.1	0.1	-40	30	3
8	19.95	-39.5	0.2	0.1	0.1	0.1	-40	30	3
10	19.83	-39.4	0.2	0.1	0.2	0.1	-40	30	3
12	19.71	-39.4	0.2	0.1	0.2	0.1	-40	30	3
14	19.54	-39.4	0.2	0.1	0.2	0.1	-40	30	3
16	19.53	-39.3	0.3	0.1	0.2	0.1	-40	30	3
18	19.50	-39.3	0.3	0.1	0.2	0.1	-40	30	3
20	19.57	-39.3	0.3	0.1	0.2	0.1	-40	30	3
22	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
24	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
26	19.54	-39.3	0.3	0.1	0.2	0.1	-40	30	3
28	19.46	-39.2	0.3	0.1	0.3	0.1	-40	30	3
30	19.73	-39.1	0.4	0.1	0.3	0.1	-40	30	3

Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

distance correction = $-40 * \text{LOG} (d_{\text{Limit}} / d_{\text{used}})$

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values

7.3 ANTENNA R&S HL562 (30 MHz – 1 GHz)

($d_{\text{Limit}} = 3 \text{ m}$)

Frequency	AF R&S HL562	Corr.
MHz	dB (1/m)	dB
30	18.6	0.6
50	6.0	0.9
100	9.7	1.2
150	7.9	1.6
200	7.6	1.9
250	9.5	2.1
300	11.0	2.3
350	12.4	2.6
400	13.6	2.9
450	14.7	3.1
500	15.6	3.2
550	16.3	3.5
600	17.2	3.5
650	18.1	3.6
700	18.5	3.6
750	19.1	4.1
800	19.6	4.1
850	20.1	4.4
900	20.8	4.7
950	21.1	4.8
1000	21.6	4.9

cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-20 dB/ decade)	d_{Limit} (meas. distance (limit))	d_{used} (meas. distance (used))
dB	dB	dB	dB	dB	m	m
0.29	0.04	0.23	0.02	0.0	3	3
0.39	0.09	0.32	0.08	0.0	3	3
0.56	0.14	0.47	0.08	0.0	3	3
0.73	0.20	0.59	0.12	0.0	3	3
0.84	0.21	0.70	0.11	0.0	3	3
0.98	0.24	0.80	0.13	0.0	3	3
1.04	0.26	0.89	0.15	0.0	3	3
1.18	0.31	0.96	0.13	0.0	3	3
1.28	0.35	1.03	0.19	0.0	3	3
1.39	0.38	1.11	0.22	0.0	3	3
1.44	0.39	1.20	0.19	0.0	3	3
1.55	0.46	1.24	0.23	0.0	3	3
1.59	0.43	1.29	0.23	0.0	3	3
1.67	0.34	1.35	0.22	0.0	3	3
1.67	0.42	1.41	0.15	0.0	3	3
1.87	0.54	1.46	0.25	0.0	3	3
1.90	0.46	1.51	0.25	0.0	3	3
1.99	0.60	1.56	0.27	0.0	3	3
2.14	0.60	1.63	0.29	0.0	3	3
2.22	0.60	1.66	0.33	0.0	3	3
2.23	0.61	1.71	0.30	0.0	3	3

($d_{\text{Limit}} = 10 \text{ m}$)

30	18.6	-9.9
50	6.0	-9.6
100	9.7	-9.2
150	7.9	-8.8
200	7.6	-8.6
250	9.5	-8.3
300	11.0	-8.1
350	12.4	-7.9
400	13.6	-7.6
450	14.7	-7.4
500	15.6	-7.2
550	16.3	-7.0
600	17.2	-6.9
650	18.1	-6.9
700	18.5	-6.8
750	19.1	-6.3
800	19.6	-6.3
850	20.1	-6.0
900	20.8	-5.8
950	21.1	-5.6
1000	21.6	-5.6

0.29	0.04	0.23	0.02	-10.5	10	3
0.39	0.09	0.32	0.08	-10.5	10	3
0.56	0.14	0.47	0.08	-10.5	10	3
0.73	0.20	0.59	0.12	-10.5	10	3
0.84	0.21	0.70	0.11	-10.5	10	3
0.98	0.24	0.80	0.13	-10.5	10	3
1.04	0.26	0.89	0.15	-10.5	10	3
1.18	0.31	0.96	0.13	-10.5	10	3
1.28	0.35	1.03	0.19	-10.5	10	3
1.39	0.38	1.11	0.22	-10.5	10	3
1.44	0.39	1.20	0.19	-10.5	10	3
1.55	0.46	1.24	0.23	-10.5	10	3
1.59	0.43	1.29	0.23	-10.5	10	3
1.67	0.34	1.35	0.22	-10.5	10	3
1.67	0.42	1.41	0.15	-10.5	10	3
1.87	0.54	1.46	0.25	-10.5	10	3
1.90	0.46	1.51	0.25	-10.5	10	3
1.99	0.60	1.56	0.27	-10.5	10	3
2.14	0.60	1.63	0.29	-10.5	10	3
2.22	0.60	1.66	0.33	-10.5	10	3
2.23	0.61	1.71	0.30	-10.5	10	3

Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + \text{AF (dB 1/m)} + \text{Corr. (dB)}$
 U = Receiver reading
 AF = Antenna factor
 Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
 $\text{distance correction} = -20 * \text{LOG} (d_{\text{Limit}} / d_{\text{used}})$
 Linear interpolation will be used for frequencies in between the values in the table.
 Tables show an extract of values.

7.4 ANTENNA R&S HF907 (1 GHZ – 18 GHZ)

Frequency	AF R&S HF907	Corr.
MHz	dB (1/m)	dB
1000	24.4	-19.4
2000	28.5	-17.4
3000	31.0	-16.1
4000	33.1	-14.7
5000	34.4	-13.7
6000	34.7	-12.7
7000	35.6	-11.0

cable loss 1 (relay + cable inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit, atten- uator & pre-amp)	cable loss 4 (to receiver)		
dB	dB	dB	dB		
0.99	0.31	-21.51	0.79		
1.44	0.44	-20.63	1.38		
1.87	0.53	-19.85	1.33		
2.41	0.67	-19.13	1.31		
2.78	0.86	-18.71	1.40		
2.74	0.90	-17.83	1.47		
2.82	0.86	-16.19	1.46		

Frequency	AF R&S HF907	Corr.
MHz	dB (1/m)	dB
3000	31.0	-23.4
4000	33.1	-23.3
5000	34.4	-21.7
6000	34.7	-21.2
7000	35.6	-19.8

cable loss 1 (relay inside chamber)	cable loss 2 (inside chamber)	cable loss 3 (outside chamber)	cable loss 4 (switch unit, atten- uator & pre-amp)	cable loss 5 (to receiver)	used for FCC 15.247
dB	dB	dB	dB	dB	
0.47	1.87	0.53	-27.58	1.33	
0.56	2.41	0.67	-28.23	1.31	
0.61	2.78	0.86	-27.35	1.40	
0.58	2.74	0.90	-26.89	1.47	
0.66	2.82	0.86	-25.58	1.46	

Frequency	AF R&S HF907	Corr.
MHz	dB (1/m)	dB
7000	35.6	-57.3
8000	36.3	-56.3
9000	37.1	-55.3
10000	37.5	-56.2
11000	37.5	-55.3
12000	37.6	-53.7
13000	38.2	-53.5
14000	39.9	-56.3
15000	40.9	-54.1
16000	41.3	-54.1
17000	42.8	-54.4
18000	44.2	-54.7

cable loss 1 (relay inside chamber)	cable loss 2 (High Pass)	cable loss 3 (pre- amp)	cable loss 4 (inside chamber)	cable loss 5 (outside chamber)	cable loss 6 (to receiver)
dB	dB	dB	dB	dB	dB
0.56	1.28	-62.72	2.66	0.94	1.46
0.69	0.71	-61.49	2.84	1.00	1.53
0.68	0.65	-60.80	3.06	1.09	1.60
0.70	0.54	-61.91	3.28	1.20	1.67
0.80	0.61	-61.40	3.43	1.27	1.70
0.84	0.42	-59.70	3.53	1.26	1.73
0.83	0.44	-59.81	3.75	1.32	1.83
0.91	0.53	-63.03	3.91	1.40	1.77
0.98	0.54	-61.05	4.02	1.44	1.83
1.23	0.49	-61.51	4.17	1.51	1.85
1.36	0.76	-62.36	4.34	1.53	2.00
1.70	0.53	-62.88	4.41	1.55	1.91

Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

Linear interpolation will be used for frequencies in between the values in the table.

Tables show an extract of values.

7.5 ANTENNA EMCO 3160-09 (18 GHZ – 26.5 GHZ)

Frequency	AF EMCO 3160-09	Corr.	cable loss 1 (inside chamber)	cable loss 2 (pre- amp)	cable loss 3 (inside chamber)	cable loss 4 (switch unit)	cable loss 5 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB
18000	40.2	-23.5	0.72	-35.85	6.20	2.81	2.65
18500	40.2	-23.2	0.69	-35.71	6.46	2.76	2.59
19000	40.2	-22.0	0.76	-35.44	6.69	3.15	2.79
19500	40.3	-21.3	0.74	-35.07	7.04	3.11	2.91
20000	40.3	-20.3	0.72	-34.49	7.30	3.07	3.05
20500	40.3	-19.9	0.78	-34.46	7.48	3.12	3.15
21000	40.3	-19.1	0.87	-34.07	7.61	3.20	3.33
21500	40.3	-19.1	0.90	-33.96	7.47	3.28	3.19
22000	40.3	-18.7	0.89	-33.57	7.34	3.35	3.28
22500	40.4	-19.0	0.87	-33.66	7.06	3.75	2.94
23000	40.4	-19.5	0.88	-33.75	6.92	3.77	2.70
23500	40.4	-19.3	0.90	-33.35	6.99	3.52	2.66
24000	40.4	-19.8	0.88	-33.99	6.88	3.88	2.58
24500	40.4	-19.5	0.91	-33.89	7.01	3.93	2.51
25000	40.4	-19.3	0.88	-33.00	6.72	3.96	2.14
25500	40.5	-20.4	0.89	-34.07	6.90	3.66	2.22
26000	40.5	-21.3	0.86	-35.11	7.02	3.69	2.28
26500	40.5	-21.1	0.90	-35.20	7.15	3.91	2.36

Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values.

7.6 ANTENNA EMCO 3160-10 (26.5 GHZ – 40 GHZ)

Frequency GHz	AF EMCO 3160-10 dB (1/m)	Corr. dB	cable loss 1 (inside chamber) dB	cable loss 2 (outside chamber) dB	cable loss 3 (switch unit) dB	cable loss 4 (to receiver) dB	distance corr. (-20 dB/ decade) dB	d _{Limit} (meas. distance (limit) m	d _{used} (meas. distance (used) m
26.5	43.4	-11.2	4.4				-9.5	3	1.0
27.0	43.4	-11.2	4.4				-9.5	3	1.0
28.0	43.4	-11.1	4.5				-9.5	3	1.0
29.0	43.5	-11.0	4.6				-9.5	3	1.0
30.0	43.5	-10.9	4.7				-9.5	3	1.0
31.0	43.5	-10.8	4.7				-9.5	3	1.0
32.0	43.5	-10.7	4.8				-9.5	3	1.0
33.0	43.6	-10.7	4.9				-9.5	3	1.0
34.0	43.6	-10.6	5.0				-9.5	3	1.0
35.0	43.6	-10.5	5.1				-9.5	3	1.0
36.0	43.6	-10.4	5.1				-9.5	3	1.0
37.0	43.7	-10.3	5.2				-9.5	3	1.0
38.0	43.7	-10.2	5.3				-9.5	3	1.0
39.0	43.7	-10.2	5.4				-9.5	3	1.0
40.0	43.8	-10.1	5.5				-9.5	3	1.0

Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

Linear interpolation will be used for frequencies in between the values in the table.

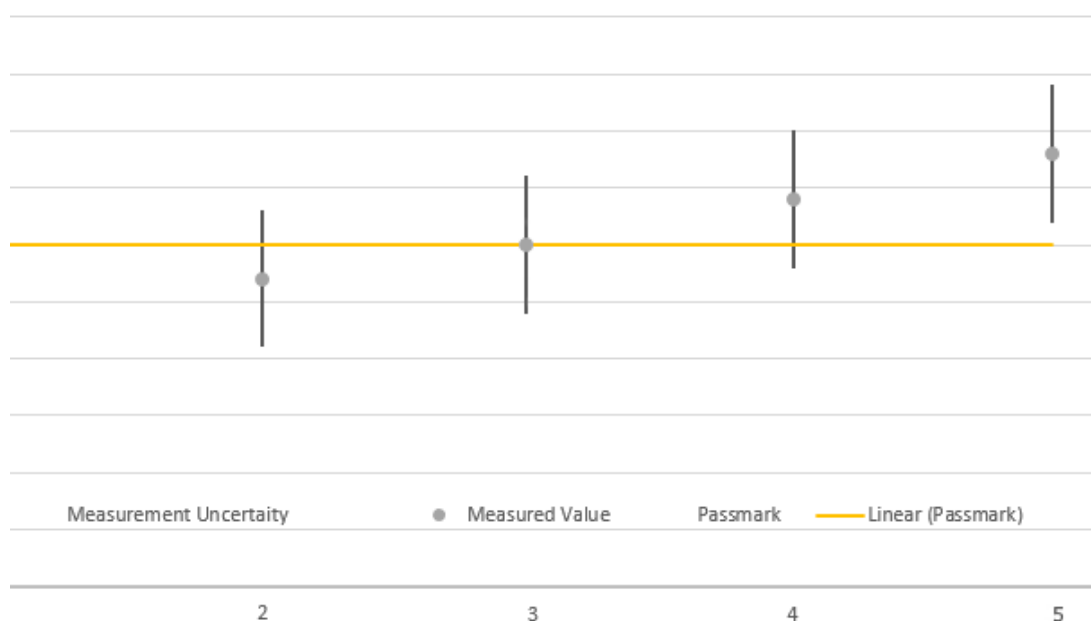
distance correction = $-20 * \text{LOG} (d_{\text{Limit}} / d_{\text{used}})$

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values.

8 MEASUREMENT UNCERTAINTIES

Test Case	Parameter	Uncertainty
AC Power Line	Power	± 3.4 dB
Field Strength of spurious radiation	Power	± 5.5 dB
6 dB / 26 dB / 99% Bandwidth	Power Frequency	± 2.9 dB ± 11.2 kHz
Conducted Output Power	Power	± 2.2 dB
Band Edge Compliance	Power Frequency	± 2.2 dB ± 11.2 kHz
Frequency Stability	Frequency	± 25 Hz
Power Spectral Density	Power	± 2.2 dB



icts in this test report are given according the above diagram:

	Measured Value	Uncertainty Range	Verdict
	below pass mark	below pass mark	Passed
	below pass mark	within pass mark	Passed
	on pass mark	within pass mark	Passed
	above pass mark	within pass mark	Failed
	above pass mark	above pass mark	Failed

ans, the laboratory applies, as decision rule (see ISO/IEC 17025:2017), the so-called sk principle.

9 PHOTO REPORT

Please see separate photo report.

*****END OF TEST REPORT*****