DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:
80539RRF.007A1

Partial Test Report

USA FCC Part 15.407, 15.209
CANADA RSS-247, RSS-Gen

(*) Identification of item tested	ASOH
(*) Trademark	Nokia
(*) Model and /or type reference	ASOH 476255A
Other identification of the product	FCC ID: 2AD8UASOHWIFI-01 IC: 109D-ASOHWIFI01
(*) Features	Wi-Fi IEEE 802.11B/G/N/A/AC HW version: ASOH A102 SW version: MB_PS_REL_2024_07_0021
Applicant	Nokia Nokia Headquarter Karakaari 7, 02610 Espoo
Test method requested, standard	USA FCC Part 15.407 (10-1-23) Edition: Unlicensed National Information Infrastructure (U-NII) Devices. General technical requirements. USA FCC Part 15.209 (10-1-23) Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 3 (August 2023). CANADA RSS-Gen Issue 5 Amendment 2 (February 2021). Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)
Date of issue	2024-11-22
Report template No	FDT08_25 (*) “Data provided by the client”

Index

INDEX 2
ACRONYMS 3
COMPETENCES AND GUARANTEES 3
GENERAL CONDITIONS 3
UNCERTAINTY 4
DATA PROVIDED BY THE CLIENT 4
USAGE OF SAMPLES 4
TEST SAMPLE DESCRIPTION 5
IDENTIFICATION OF THE CLIENT 7
TESTING PERIOD AND PLACE 7
DOCUMENT HISTORY 7
ENVIRONMENTAL CONDITIONS 7
REMARKS AND COMMENTS 8
TESTING VERDICTS 9
SUMMARY 10
APPENDIX A: TESTS RESULTS FOR THE U-NII-1 BAND 5.15–5.25 GHZ 11

Acronyms

Acronym ID	Acronym Description
Detector	Detector used
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Mode	MIMO Mode
Operation Band	Operation Band
Pol	Polarization
Port	Active Port
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA Testing and Certification S.A.U.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is: Measurement uncertainty ≤ ± 5,35 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 17 GHz is: Measurement uncertainty ≤ ± 4,32 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 40 GHz is: Measurement uncertainty ≤ ± 5,55 dB with factor (k = 2).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample consists of a ASOH. -.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results. The laboratory is not responsible for such information and it is not covered by accreditation.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	80539B_1	Mobile Network Equipment	ASOH 476255A	L1243307851	2024-10-03	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Samples used for Conducted and radiated tests.

Test sample description

Ports…… :	**Port name and description**	**Cable**			
		Specified max length [m]	**Attached during test**	**Shielded**	**Coupled to patient(3)**
	LMP RJ45	100m	[X]	[X]	[ ]
	-48V PSU connector	-	[X]	[X]	[ ]
	EIF1-2 SFP	optical	[ ]	[X]	[ ]
	EIF3 RJ45	100m	[ ]	[X]	[ ]
	SEI SFP	optical	[ ]	[X]	[ ]
	RF1-12 SFP	optical	[ ]	[X]	[ ]
	EAC 19-pin	-	[ ]	[X]	[ ]
	SIN 19-pin	-	[ ]	[X]	[ ]
	SOUT 19-pin	-	[ ]	[X]	[ ]
Supplementary information to the ports…… :	.....				

Rated power supply .....:	**Voltage and Frequency**		**Reference poles**				
			L1	**L2**	**L3**	**N**	**PE**
	[ ]	AC: -	[ ]	[ ]	[ ]	[ ]	[ ]
	[ ]	AC: -	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: -49V					
	[ ]	DC: --					

Rated Power .....:	248.55 W	
Clock frequencies.....:	-	
Other parameters .....:	-	
Software version .....:	MB_PS_REL_2024_07_0021	
Hardware version .....:	ASOH A102	
Dimensions in cm (W x H x D) ....:	440mm x 365mm x 43.5mm (1U)	
Mounting position .....:	[X]	Table top equipment
	[X]	Wall/Ceiling mounted equipment

	[ ]	Floor standing equipment
	[ ]	Hand-held equipment
	[X]	Other: Server rack, mobile tower

Modules/parts.....:	**Module/parts of test item**	**Type**	**Manufacturer**
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
Accessories (not part of the test item) .....:	**Description**	**Type**	**Manufacturer**
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
Documents as provided by the applicant.....:	**Description**	**File name**	**Issue date**
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....

(3) Only for Medical Equipment

Identification of the client

Nokia Solutions and Networks GmbH & Co. KG
Lise-Meitner-Straße 7/1-2, 89081 Ulm, Germany

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2024-11-08
Date (finish)	2024-11-08

Document history

Report number	Date	Description
80539RRF.007	2024-11-142024-11-22	First release.
80539RRF.007A1	2024-11-22	Second release. Modification due to typos. This modification test report cancels and replaces the test report 80539RRF.007.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Sergio Carrasco.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
07445	DC POWER SUPPLY 30V/5A	U8002A	KEYSIGHT TECHNOLOGIES	N/A
07760	DIGITAL MULTIMETER	175	FLUKE	2025-11-07
07817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2026-07-01
06615	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2025-04-04
06609	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2025-04-22
04953	HIGH PASS FILTER 1.1-8GHz	WHK10-990-1100-8000-40SS	WAINWRIGHT INSTRUMENTS	2025-02-14
09029	HIGH PASS FILTER 17-40 GHZ	STHP-17-40G-92	TEMSTRON/TEMWELL	2025-03-29
08770	HIGH PASS FILTER 3-18 GHZ	ST-3GA2833-HS	TEMSTRON/TEMWELL	2025-08-02
06496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2026-12-01
04657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2026-06-12
06143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2027-01-22
07656	LOW PASS FILTER TEMSTRON/TEMWELL DC - 1 GHZ	ST-1GA3250-LS	TEMSTRON/TEMWELL	2025-02-02
07193	MULTI-DEVICE CONTROLLER	CO3000	INNCO	N/A
08856	PRE-AMPLIFIER G>30dB 18-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2025-02-27
03783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2025-03-15
06142	PRE-AMPLIFIER G>38dB 30MHz-6GHz	BLNA 0360-01N	BONN ELEKTRONIK	2025-07-25
06144	PRE-AMPLIFIER G>40dB 10MHz-6GHz	BLNA 0160-01N	BONN ELEKTRONIK	2025-07-22
06791	SEMIANECHOIC ABSORBER LINED CHAMBER IV	FACT 3 200 STP	ETS LINDGREN	N/A
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

U-NII-1 Band: 5.15 - 5.25 GHz

FCC PART 15 PARAGRAPH / RSS-247			
Requirement – Test case		**Verdict**	**Remark**
FCC 15.407 (a)(1)(iv)	Transmitter Maximum conducted Output Power	N/M	
RSS-247 6.2.1.1	Transmitter Maximum Equivalent Isotropically Radiated Power EIRP	N/M	
FCC 15.407 (a)(1)(iv)	Transmitter Maximum Power Spectral Density	N/M	
RSS-247 6.2.1.1	Transmitter EIRP Spectral Density	N/M	
FCC 15.407 (b)(1)(6) / RSS-247 6.2.1.2	Transmitter Out of Band Radiated Emissions	P*	(1)
FCC 15.407 (b)(1) / RSS-247 6.2.1.2	Transmitter Band Edge Radiated Emissions	P*	(1)
Supplementary information and remarks: 1- Spot-check of Radiated Spurious Emission has been requested for worst modulation and channel.			

Appendix A: Tests results for the U-NII-1 Band 5.15–5.25 GHz

INDEX

TEST CONDITIONS 13

TEST CASES DETAILS 18

FCC 47 CFR PART 15.407 / RSS-247 / RSS-248 18

RSS-247 6.2.1.2 / FCC 15.407 (b) (1) (6) [Rse] Transmitter Out of Band Radiated Emissions For transmitters operating in the 5.15–5.25 GHz 18

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	-48V
Type of Power Supply:	-48V

ANTENNA (*):

Type of Antenna:	Rod Antenna
Maximum Declared Antenna Gain:	2 dBi

TEST FREQUENCIES (*):

Technology Tested:	WLAN (IEEE 802.11 a,n,ac) / U-NII-1	
Modes:	802.11a20: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps	
	802.11n HT20: MCS0 to MCS7	
	802.11n HT40: MCS0 to MCS7	
	802.11ac VHT20: MCS0 to MCS9	
	802.11ac VHT40: MCS0 to MCS9	
	802.11ac VHT80: MCS0 to MCS9	
Setting of cores / ports:	One port.	
Beamforming:	No.	
Frequency Range:	5150 MHz to 5250 MHz	
Channel Spacing:	20 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 36	5180
	Middle: 40	5200
	High: 48	5240
Channel Spacing:	40 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 38	5190
	High: 46	5230
Channel Spacing:	80 MHz	
Transmit Channels	Middle: 42	5210

POWER SETTING (*):

For all modes, the EUT was configured in test mode using a software application. The application was used to enable a continuous transmission and to select the test channels as required. The client supplied instructions to configure the EUT. The customer supplied a power setting table with the maximum level for each mode and band:

Mode	Ch.36
802.11a	14

The test set-up was made in accordance to the general provisions of FCC Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017.

The EUT was tested in the following operating mode:

- Continuously transmitting with a modulated carrier at maximum power in all required channels using the supported data rates/modulations types.

The field strength at the band edges was evaluated for each mode on the lowest and highest channels at the rated power for the channel under test.

For all modes, the EUT was configured in test mode using a software application. The application was used to enable a continuous transmission and to select the test channels as required. The client supplied instructions to configure the EUT. The customer supplied a document containing the setup instructions.

The worst cases for testing were identified for output power and spurious levels at the band edges which were selected based on preliminary testing that correspond to next data rates:

- 802.11 a20: 6 Mbps

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

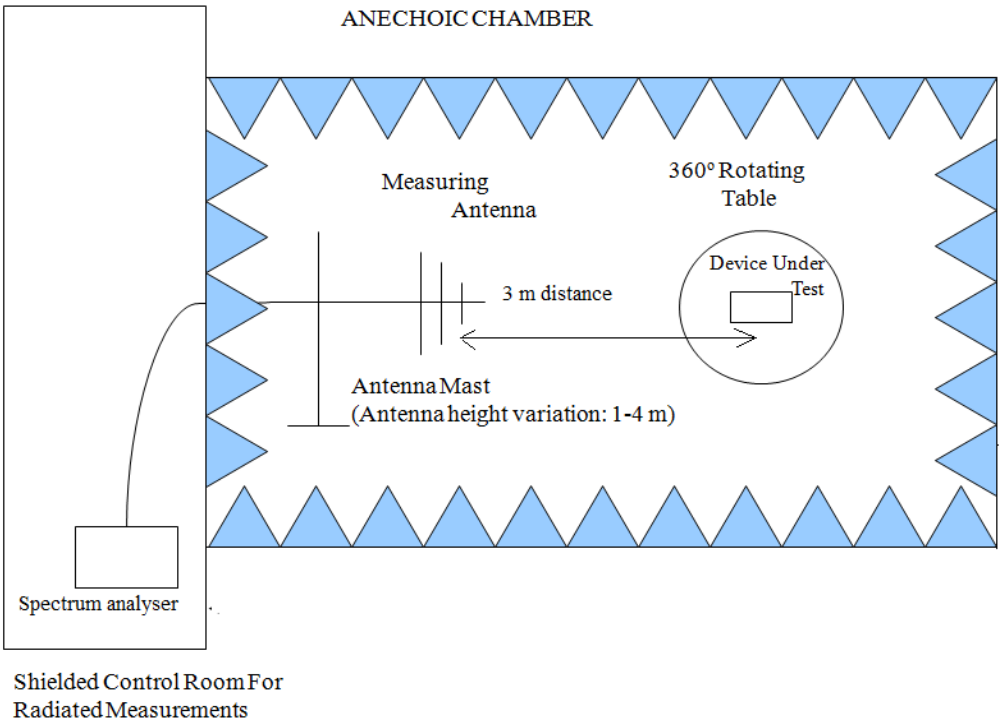
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

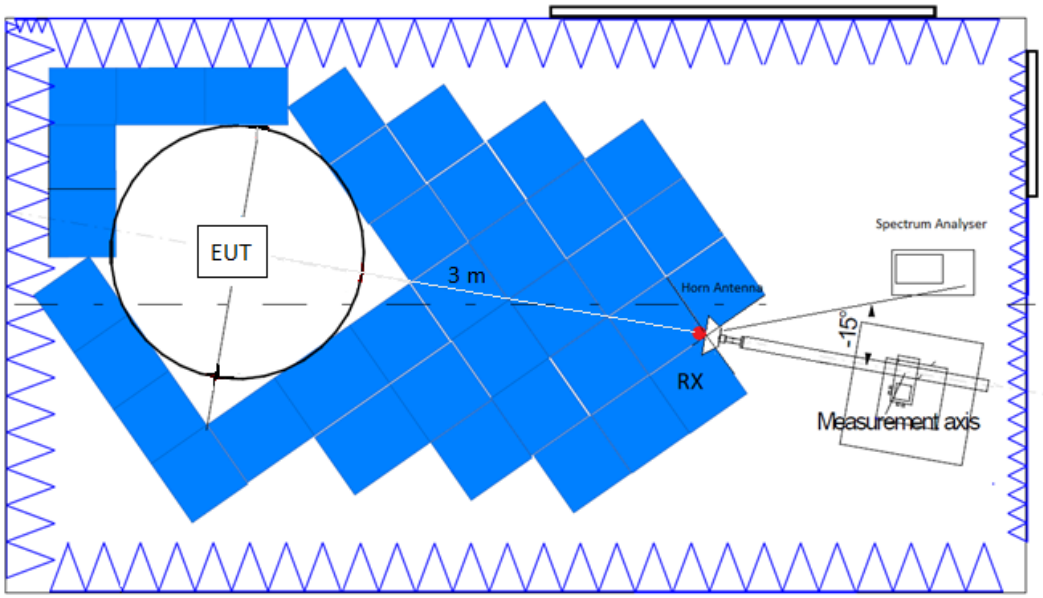
The final measured value, for the given emission, in the tables below incorporates the calibrated antenna factor and cable loss.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

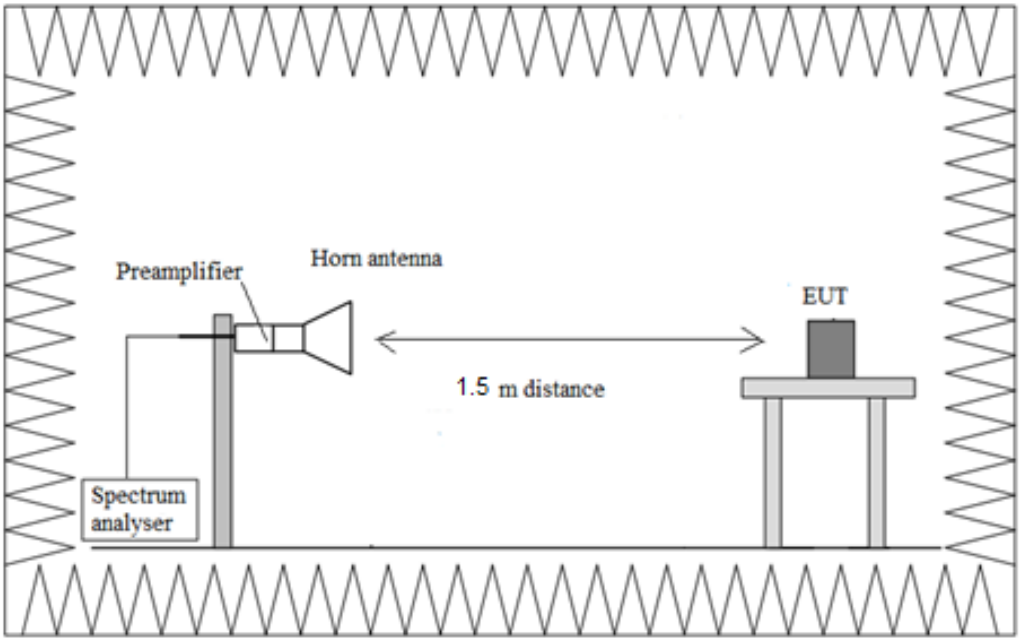
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



TEST CASES DETAILS

FCC 47 CFR Part 15.407 / RSS-247 / RSS-248

RSS-247 6.2.1.2 / FCC 15.407 (b) (1) (6) [Rse] Transmitter Out of Band Radiated Emissions For transmitters operating in the 5.15–5.25 GHz

Limits

For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz (68.23 dBµV/m at 3 m distance).

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)):

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 40000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

Results

Modulation: 802.11a (OFDM 6 Mbit/s)

MIMO Mode: SISO

Operation Band (MHz)	Port	Freq Rng (GHz)	Freq (MHz)	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
[5150, 5250]	1	[0.03, 1]	5180.00000	33.201	35.77	V	PK
				33.201	33.62	V	QP
				43.289	28.39	V	QP
				43.289	29.77	V	PK
				56.336	28.97	V	PK
				56.336	27.45	V	QP
				124.963	25.66	V	PK
				124.963	23.46	V	QP
				187.480	30.80	V	QP
				187.480	31.75	V	PK
				462.959	33.25	H	PK
				462.959	27.21	H	QP
				696.633	35.50	H	PK
				696.633	29.94	H	QP

Verdict

Pass

Attachments

Spectrum Analyzer Parameters

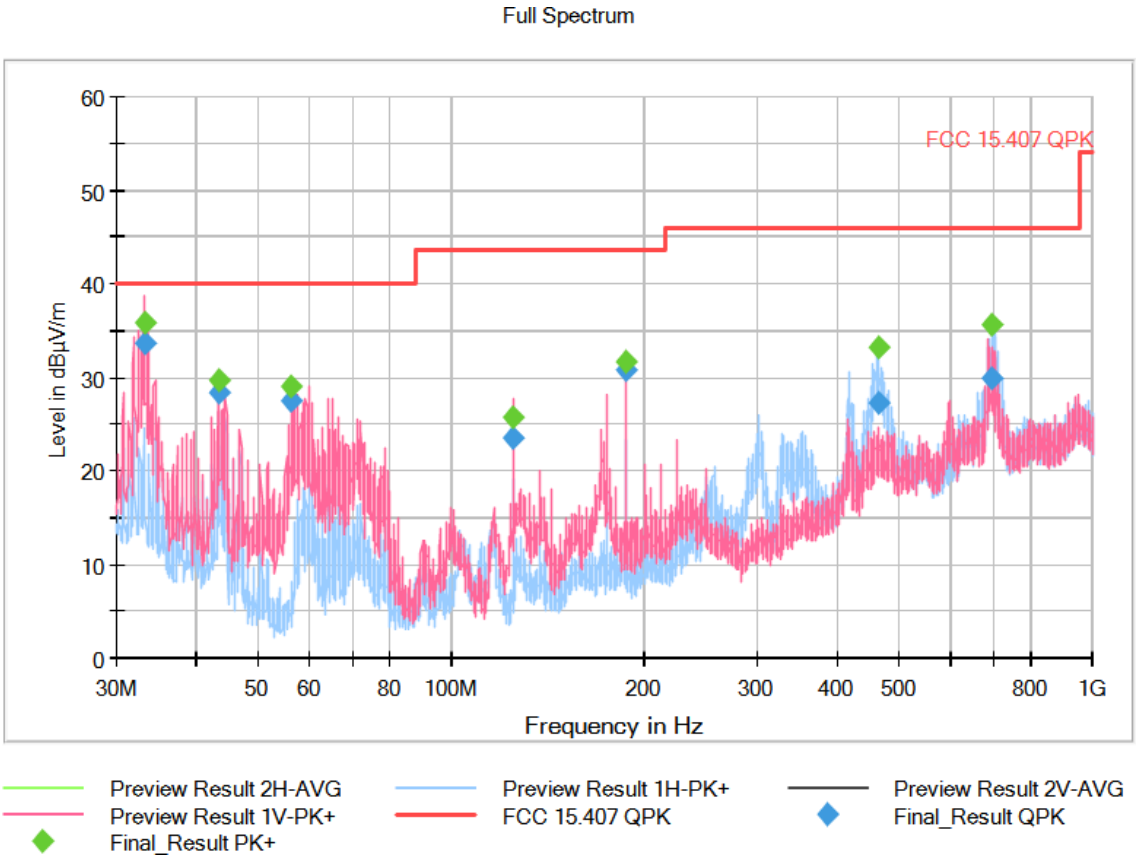
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
Receiver: [ESW 44]					
30 MHz - 1 GHz	40 kHz	PK+	100 kHz	0,01 s	0 dB

Operation Band MHz = [5150, 5250] Active Port = 1

Frequency Range GHz = [0.03, 1] Frequency MHz = 5180.00000

Modulation = 802.11a (OFDM 6 Mbit/s) MIMO Mode = SISO

Images:



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44]					
1 GHz - 6,5 GHz	100 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44]					
6,5 GHz - 17 GHz	105 kHz	PK+ ; AVG	1 MHz	1 s	30 dB

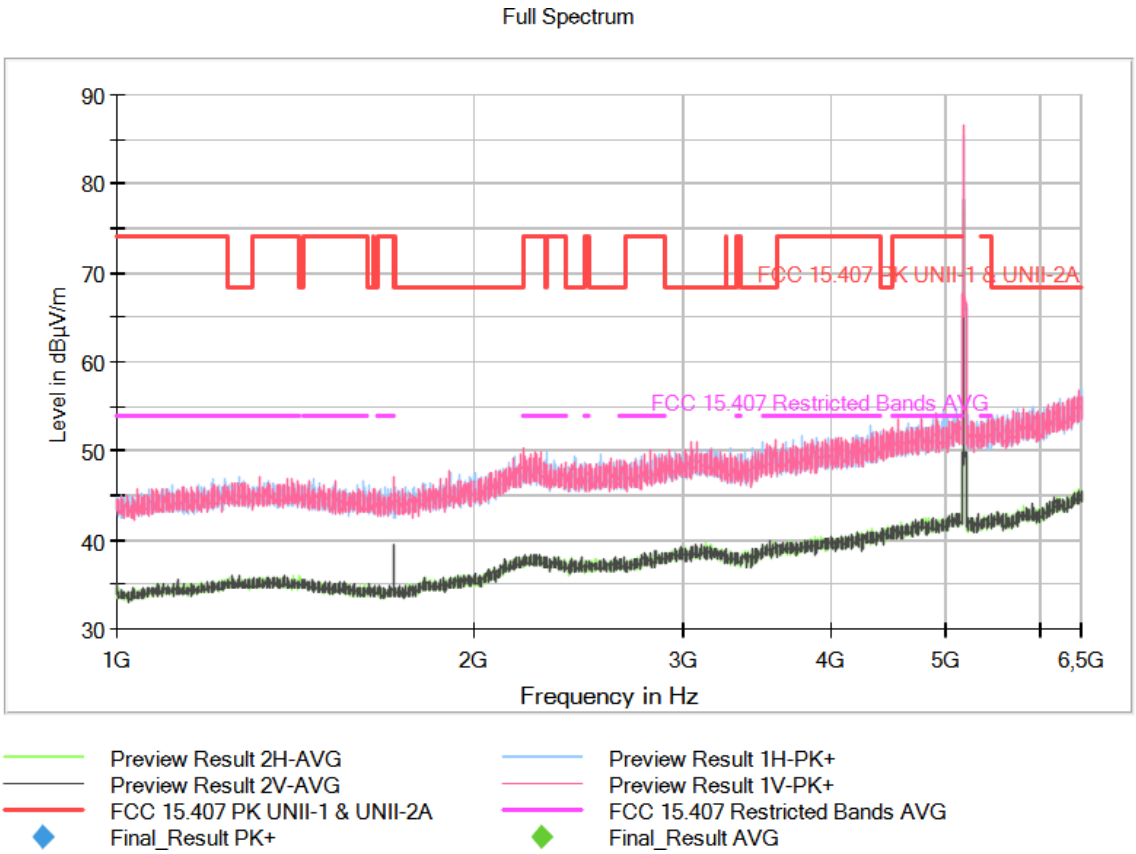
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44]					
17 GHz - 40 GHz	766,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

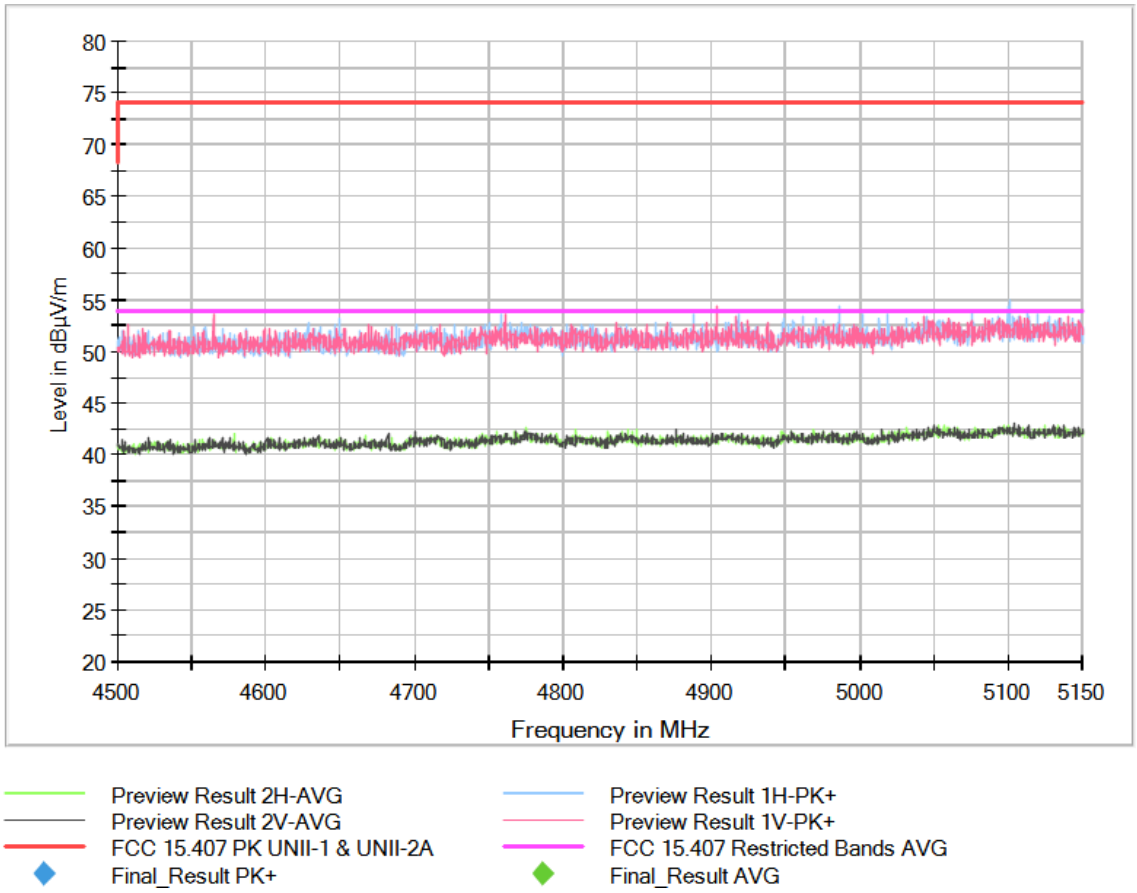
Operation Band MHz = [5150, 5250] Active Port = 1

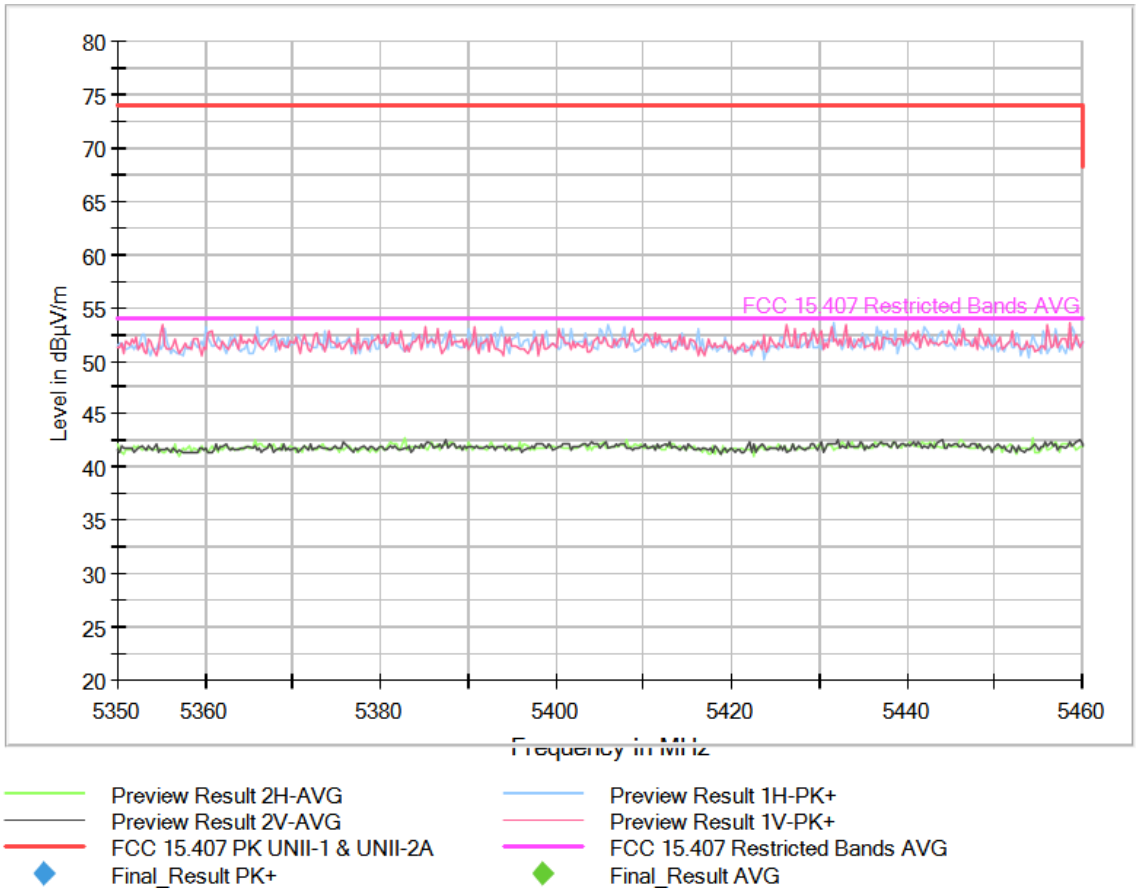
Frequency Range GHz = [1, 6.5] Frequency MHz = 5180.00000

Modulation = 802.11a (OFDM 6 Mbit/s) MIMO Mode = SISO

Images:




Level in dBµV/m
80
75
70
65
60
55
50
45
40
35
30
25
20
4500
4600
4700
4800
4900
5000
5100
5150
Frequency in MHz
Preview Result 2H-AVG
Preview Result 2V-AVG
FCC 15.407 PK UNII-1 & UNII-2A
Final_Result PK+
Preview Result 1H-PK+
Preview Result 1V-PK+
FCC 15.407 Restricted Bands AVG
Final_Result AVG

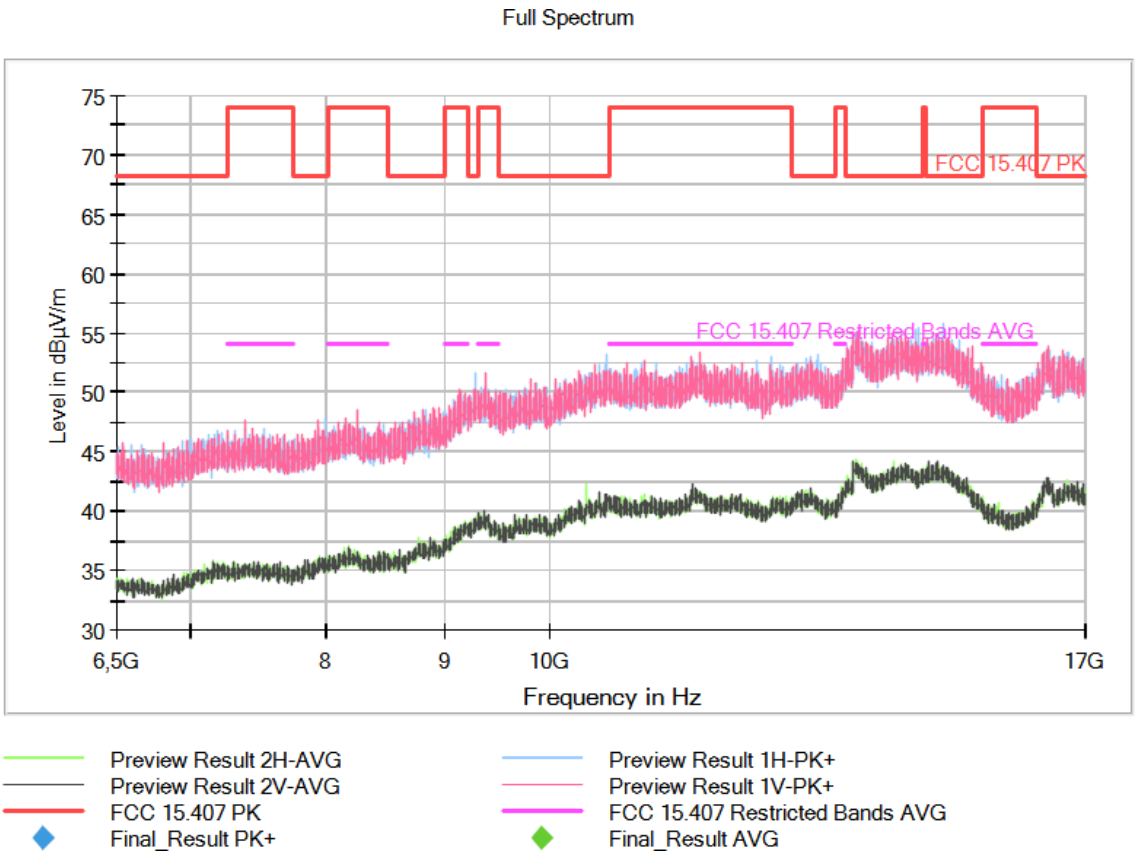

Level in dBµV/m
80
75
70
65
60
55
50
45
40
35
30
25
20
5350
5360
5380
5400
5420
5440
5460
FCC 15.407 Restricted Bands AVG
Preview Result 2H-AVG
Preview Result 2V-AVG
FCC 15.407 PK UNII-1 & UNII-2A
Final_Result PK+
Preview Result 1H-PK+
Preview Result 1V-PK+
FCC 15.407 Restricted Bands AVG
Final_Result AVG

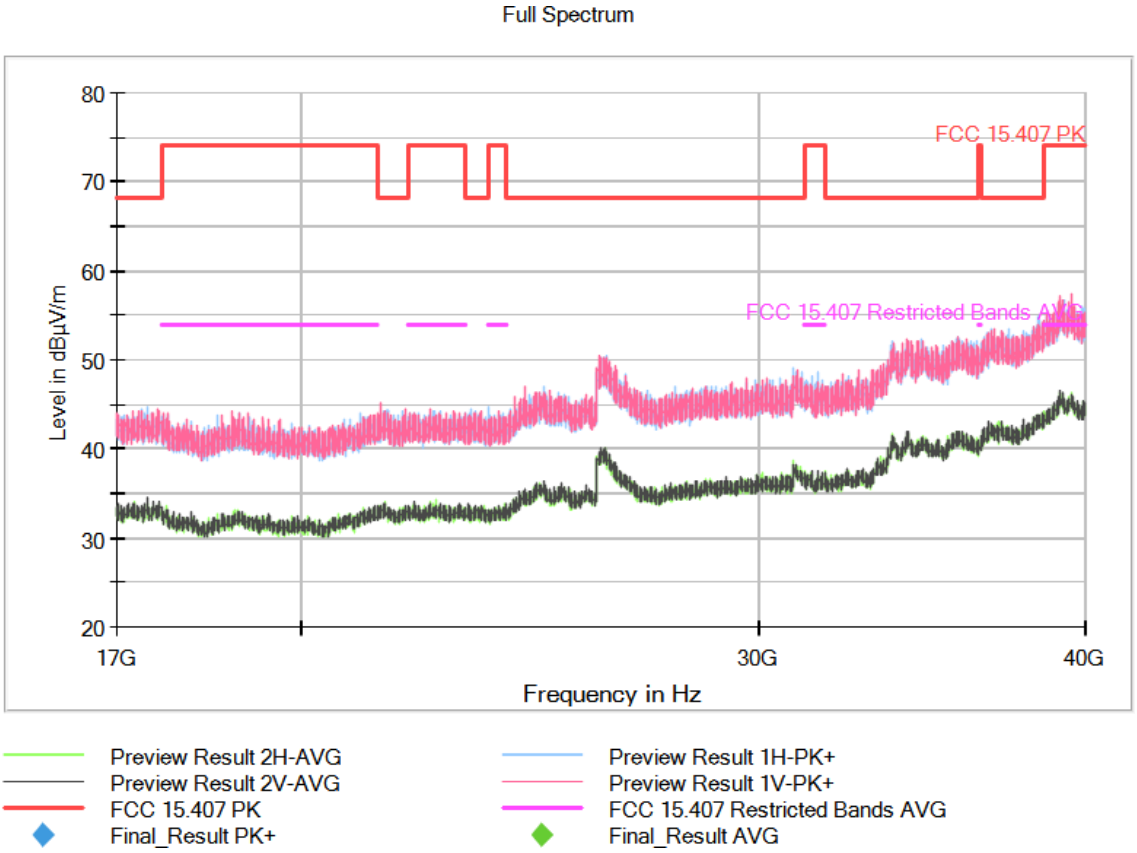
Operation Band MHz = [5150, 5250] Active Port = 1

Frequency Range GHz = [6.5, 17] Frequency MHz = 5180.00000

Modulation = 802.11a (OFDM 6 Mbit/s) MIMO Mode = SISO

Images:



Operation Band MHz = [5150, 5250]	Active Port = 1
Frequency Range GHz = [17, 40]	Frequency MHz = 5180.00000
Modulation = 802.11a (OFDM 6 Mbit/s)	MIMO Mode = SISO

Images: