

March 10, 2023

Roku, Inc.
1155 Coleman Ave
San Jose
CA 95110 USA

Dear Thien,

Enclosed is the EMC Wireless test report for compliance testing of the Roku, Inc., WiFi Remote Control as tested to the requirements of Title 47 of the CFR, Part 15 Subpart E/ RSS-247 Issue 2 (2017-02) for Intentional Radiators.

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. If you have any questions regarding these results or if Eurofins Electrical and Electronic Testing NA, Inc. can be of further service to you, please feel free to contact me.

Gary Chou

Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: WIR121849-ROKU_FCC_ISED-WLAN_5GHz_Rev 1.0



IC Test Site(s) Reg. #: 2043C

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FCC/ ISED Test Report

Applicant name: Roku, Inc.

Product: WiFi Remote Control

Report: WIR121849-ROKU_FCC_ISED-WLAN_5GHz_Rev 1.0

Applicant Address:

1155 Coleman Ave., San Jose, CA 95110 USA

Manufacturer Address:

1155 Coleman Ave., San Jose, CA 95110 USA

Prepared By:
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Santa Clara CA, 95054

FCC/ ISED Test Report

Applicant name: Roku, Inc.

Product: WiFi Remote Control

Standard
47 CFR FCC Part 15, Subpart E (Section 15.407)
RSS-247 Issue 2 (2017-02)
RSS-Gen Issue 5 (2019-03)
789033 D02 General UNII Test Procedures New Rules v02r01
ANSI C63.10:2013

Christmas Martin
Christopher Martin Test Engineer, Wireless Laboratory

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements FCC Rules under normal use and maintenance.

Gary Chou
Gary Chou
Wireless Engineering Manager, Wireless Laboratory

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Release Control Record

Issue No.	Description	Date Issued
WIR121849-ROKU_FCC_ISED-WLAN_5GHz	Original release	03/ 01/2023
WIR121849-ROKU_FCC_ISED-WLAN_5GHz_Rev 1.0	Add EUT information	03/ 10/2023

1 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)				
Standard Section		Test Item	Result	Remarks
FCC	ISED			
15.203	-	Antenna Requirement	Pass	Meet the requirement of limit.
15.407 (b)(6)	RSS-Gen 8.8	AC Power Conducted Emissions	Pass	Meet the requirement of limit.
15.407 (b)(1/2/3/4(i/ii)/6)	RSS-247	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit.
15.407 (a)(1/2/3)	RSS-247	Max Average Transmit Power	Pass	Meet the requirement of limit.
-	RSS-Gen 6.6	Occupied Bandwidth	Pass	Meet the requirement of limit.
15.407 (e)	RSS-247	6 dB Emission Bandwidth	Pass	Meet the requirement of limit. (U-NII-3 only)
15.407 (a)(1/2/3)	RSS-247	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(g)	-	Frequency Stability	Pass	Meet the requirement of limit.

Note:

1.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Test Method	Typical Expanded Uncertainty	K	Confidence Level
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

1.2 Modification Record

There were no modifications required for compliance.

2 General Information

2.1 General Description of EUT

Product:	WiFi Remote Control		
Brand:	Roku		
Model(s) Tested:	RC-EL1		
Series Model:	RC-EL5		
Sample Status:	Original		
Series Number:	2326000336		
EUT Specifications:	Primary Power:		3Vdc powered by battery
	Voltage Frequency:		N/A
	Technology / Type of Modulations:		256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
	Operating Frequency :		5180 MHz~5240MHz, 5260 MHz~5320 MHz 5500 MHz~5725 MHz 5745 MHz~5825MHz
	FCC ID:		TC2-R1028
	ISED ID:		5959A-R1026
	Antenna Type:	Chip Antenna	5150-5250 MHz: 2.8dBi 5250-5725 MHz: 2.4 dBi 5745-5825 MHz: 4.4 dBi
	Maximum EIRP		9.157 dBm
	Antenna connector:		N/A
Analysis:	The results obtained relate only to the item(s) tested.		
Environmental Test Conditions:	Temperature: 20.3° C		
	Relative Humidity: 47.5%		
	Barometric Pressure: 860-1060 mbar		
Evaluated by:	Christopher Martin		
Issue Date(s):	March 10, 2023		

NOTE: The following modules can be chosen to be configured in the EUT.

	Model No.	FCC ID	Note
-	-	-	-
-	-	-	-

FCC/IC/ CE RF Testing Units Setting

Model	Hardware (HW) Rev.	Firmware (FW) Rev.	FW operation verification and Instruction
RC-EL1, RC-EL5	1.0	mfg.0114	Verify by Spectrum Analyzer  AmebaD Mptool Userguide (2.0).pdf

2.2 Description of Operation Modes

1TX 1RX

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (20MHz):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

FOR 5260 ~ 5320MHz

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

FOR 5500 ~ 5700MHz

3 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
100	5500 MHz	140	5700 MHz
116	5580 MHz		

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (20MHz):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

Power setting is as below:

802.11a		802.11n, ac(20MHz)	
Channel	Power Setting	Channel	Power Setting
36	-	36	-
40	-	40	-
48	-	48	-
52	82	52	84
56	83	56	83
64	82	64	81
116	85	116	86
120	88	120	92
140	94	140	94
149	-	149	-
157	-	157	-
165	-	165	-
802.11n, ac(40MHz)		802.11ac(80MHz)	
Channel	Power Setting	Channel	Power Setting
38	-	38	-
46	-	155	-
151	-	48	-
159	-	-	-

1. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

2.3 General Description of Applied Standard

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

47 CFR FCC Part 15, Subpart E (Section 15.407)

Canada RSS-247 Issue 2 (2017-02)

Canada RSS-Gen Issue 5 (2019-03)

789033 D02 General UNII Test Procedures New Rules v02r01

ANSI C63.10:2013

All test items have been performed and recorded as per the above standards.

3 Test Types and Results

3.1 Antenna Requirement

Spec	Requirement	Applicable
15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. Antenna requirement must meet at least one of the following: a) Antenna must be permanently attached to the device. b) The antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.	☒
Remark	The EUT uses a Chip Antenna antenna to permanently attach to the device.	
Result	☒ PASS ☐ FAIL	

3.2 Radiated Emission and Bandedge Measurement

3.2.1 Limits of Radiated Emission Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

Applicable To			Limit	
789033 D02 General UNII Test Procedure New Rules v02r01			Field Strength at 3m	
			PK:74 (dBμV/m)	AV:54 (dBμV/m)
Frequency Band	Applicable To		EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)		PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	
*1 beyond 75 MHz or more above of the band edge.			*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.	
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.			*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

3.2.2 Test Instruments

Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2003	EMI Test Receiver	Keysight	N9030B	11/01/2022	11/01/2023
1S2399	Turntable Controller	SUNOL SCIENCE	SC99V	Not Required	Not Required
1S2486	5 Meter Chamber Control Room	Panashield	5 Meter Control Room	Not Required	Not Required
1S2435	Horn Antenna	ETS-LINDGREN	3117	03/03/2021	03/09/2023
1S4802	Preamplifier	EMC Instrument	EMC118A45SE	Note 1	Note 1
1S2668	Preamplifier	Sonoma Instrument	310N	Note 1	Note 1
1S2600	Antenna	TESEQ GmbH	D-12623	05/ 11/ 2021	05/ 11/ 2023
1S3983	Loop Antenna	ETS-LINDGREN	6512	10/ 14 /2021	10/ 14 /2023

Note 1: Verified by calibrated instrumentation at the time of testing

3.2.3 Test Procedure

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

For Band edge Measurement

789033 D02 General U-NII Test Procedures New Rules v02r01, II.F. Method SA-1

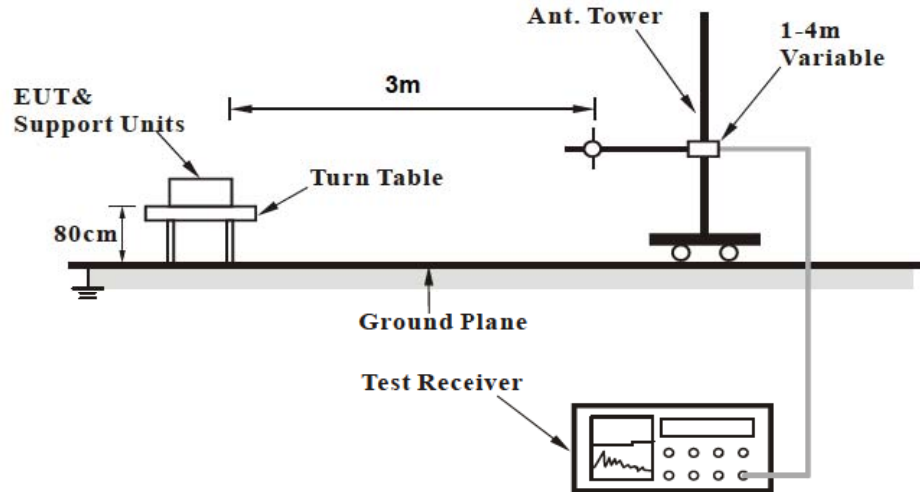
1. For average emissions measurements, follow the procedures described in section II.G.6., "Procedures for Average Unwanted Emissions Measurements above 1000 MHz", except for the following changes:
2. Set RBW=100 kHz
3. Set VBW=300 kHz
4. Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.

3.2.4 Deviation from Test Standard

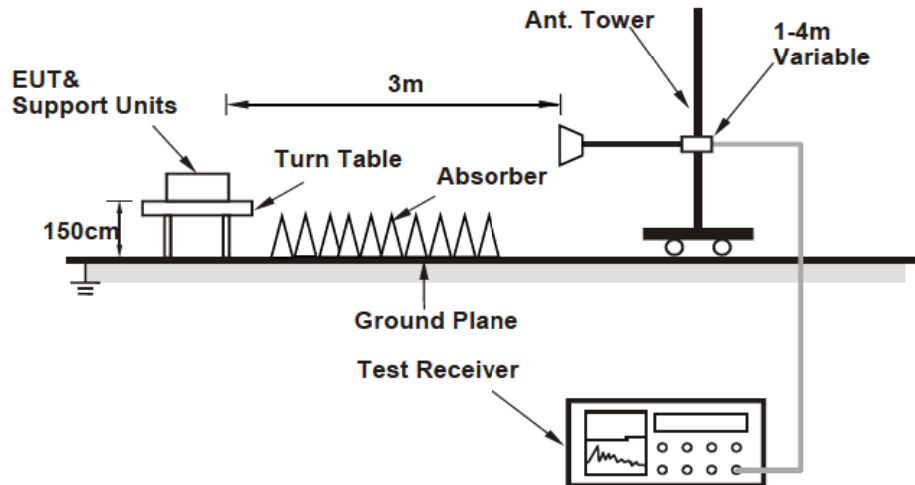
No deviation.

3.2.5 Test Setup

For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

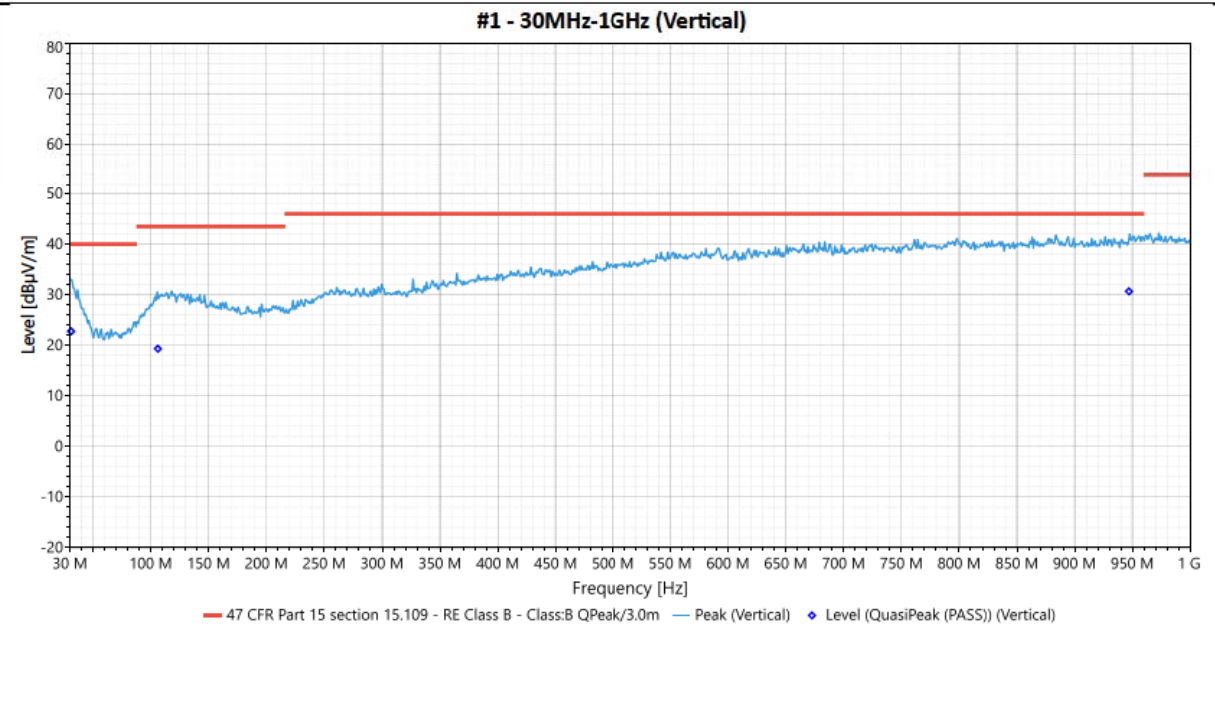
3.2.6 EUT Operating Condition

- Placed the EUT on the testing table.
- Prepared notebooks to act as communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a USB cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the system in full functions.

3.2.7 Test Results

Below 1GHz Worst-Case Data:

CHANNEL	802.11n Channel 52	DETECTOR FUNCTION	Quasi Peak
FREQUENCY RANGE	30MHz – 1GHz		



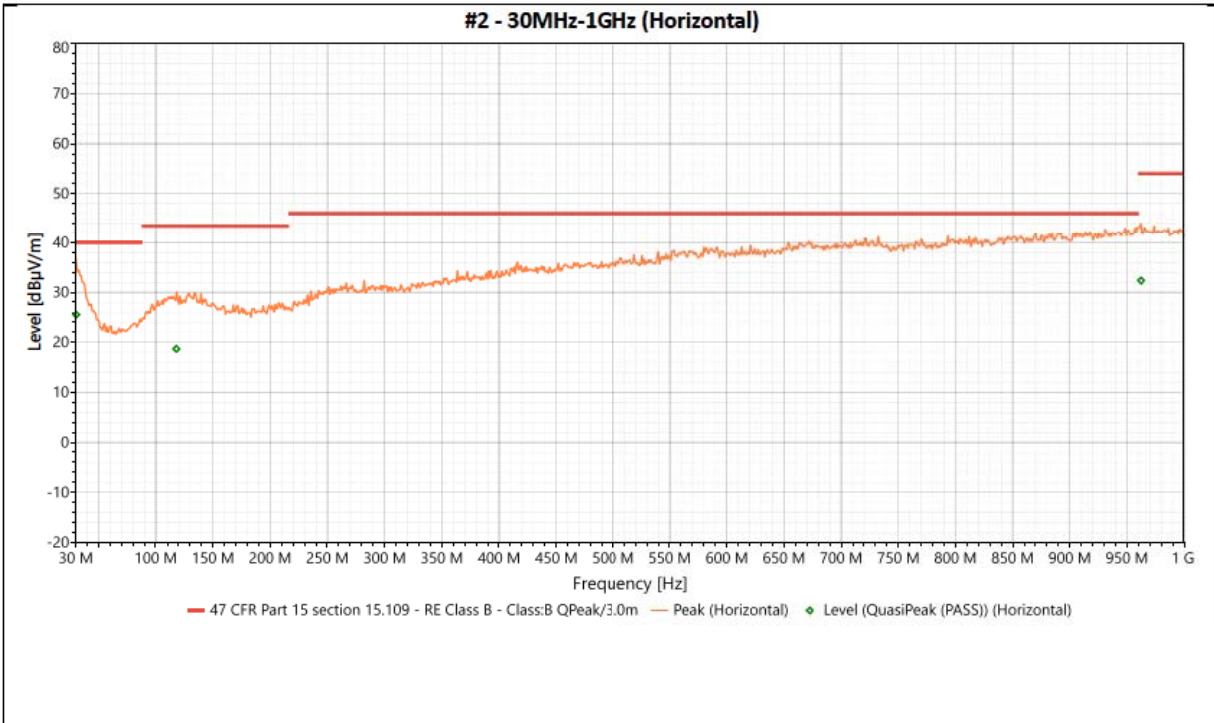
Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	31.176	Vertical	22.754	40	-17.246	2.99	138	21.32	Pass
2	106.2	Vertical	19.301	43.5	-24.199	2.99	355	18.29	Pass
3	947.044	Vertical	30.636	46	-15.364	2.5	123	27.44	Pass

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Cable Loss (dB) + AF (dB)
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB).
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Below 1GHz Worst-Case Data:

CHANNEL	802.11n Channel 40	DETECTOR FUNCTION	Quasi Peak
FREQUENCY RANGE	30MHz – 1GHz		



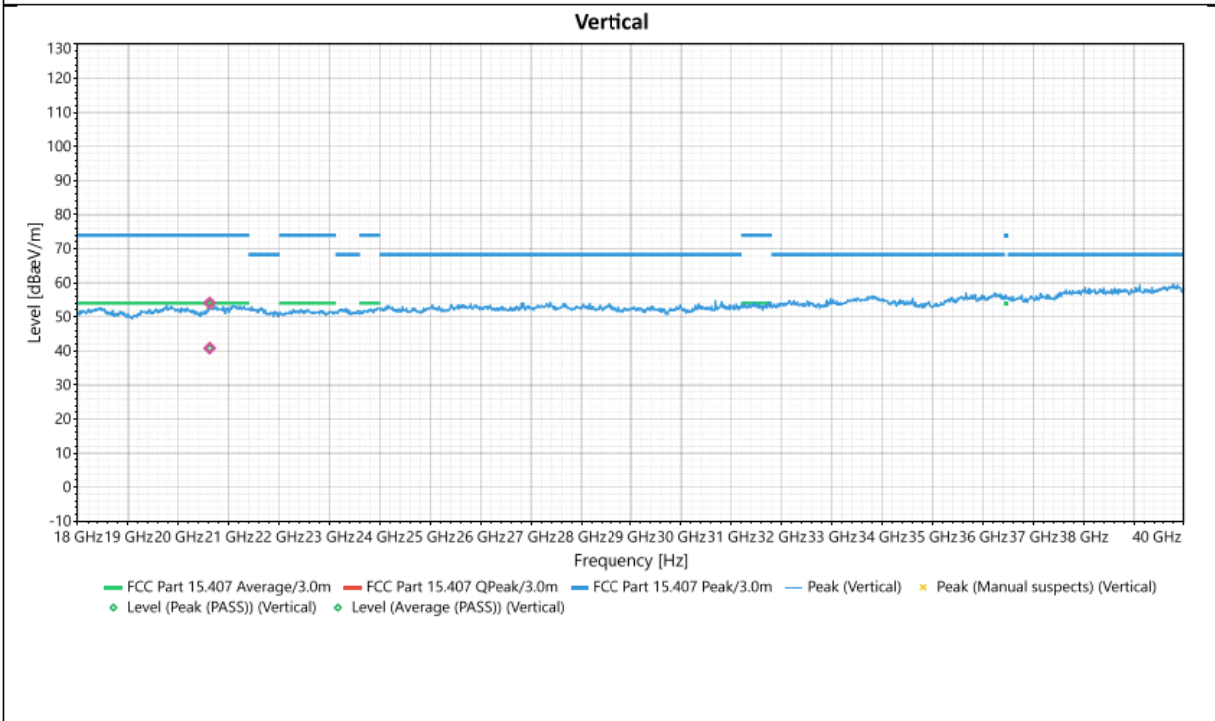
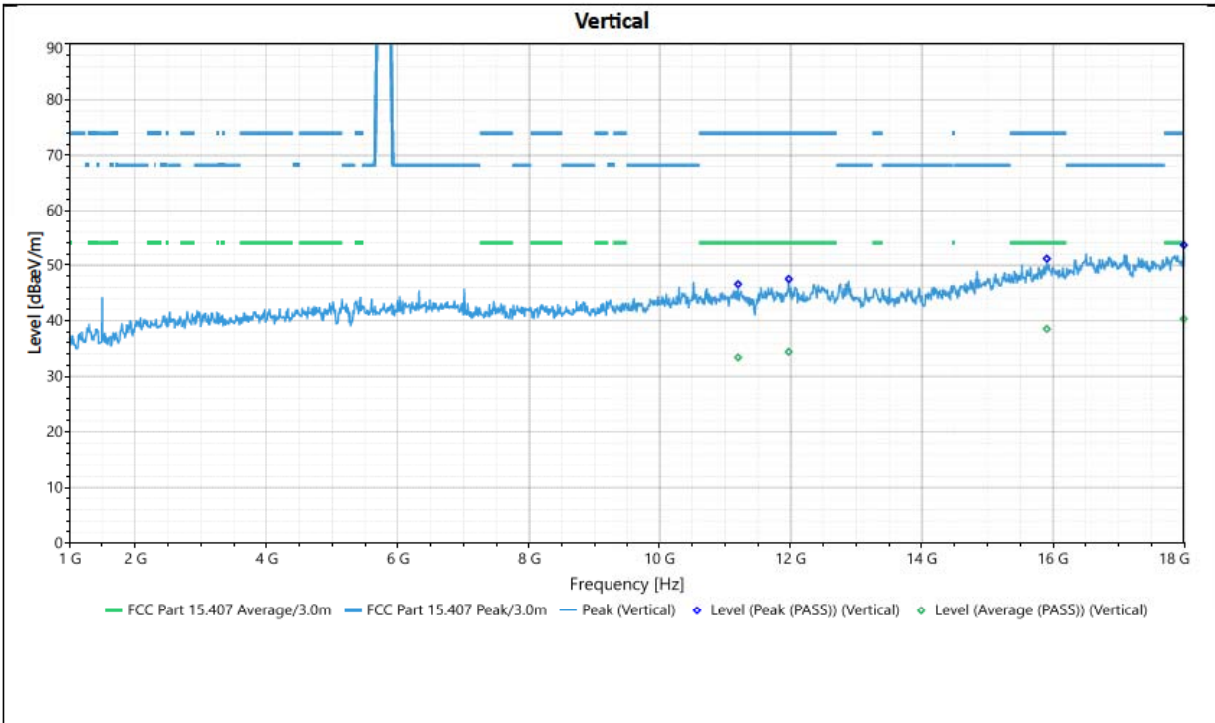
Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	30.516	Horizontal	25.532	40	-14.468	1.5	234	23.9	Pass
2	118.042	Horizontal	18.688	43.5	-24.812	2.5	0	17.6	Pass
3	962.374	Horizontal	32.346	54	-21.654	1.5	89	29.5	Pass

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Cable Loss (dB) + AF (dB)
2. AF (dB/m) = Antenna Factor (dB/m) – Pre-amplifier Gain (dB).
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Above 1GHz Test Data:

CHANNEL	802.11a 5260 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

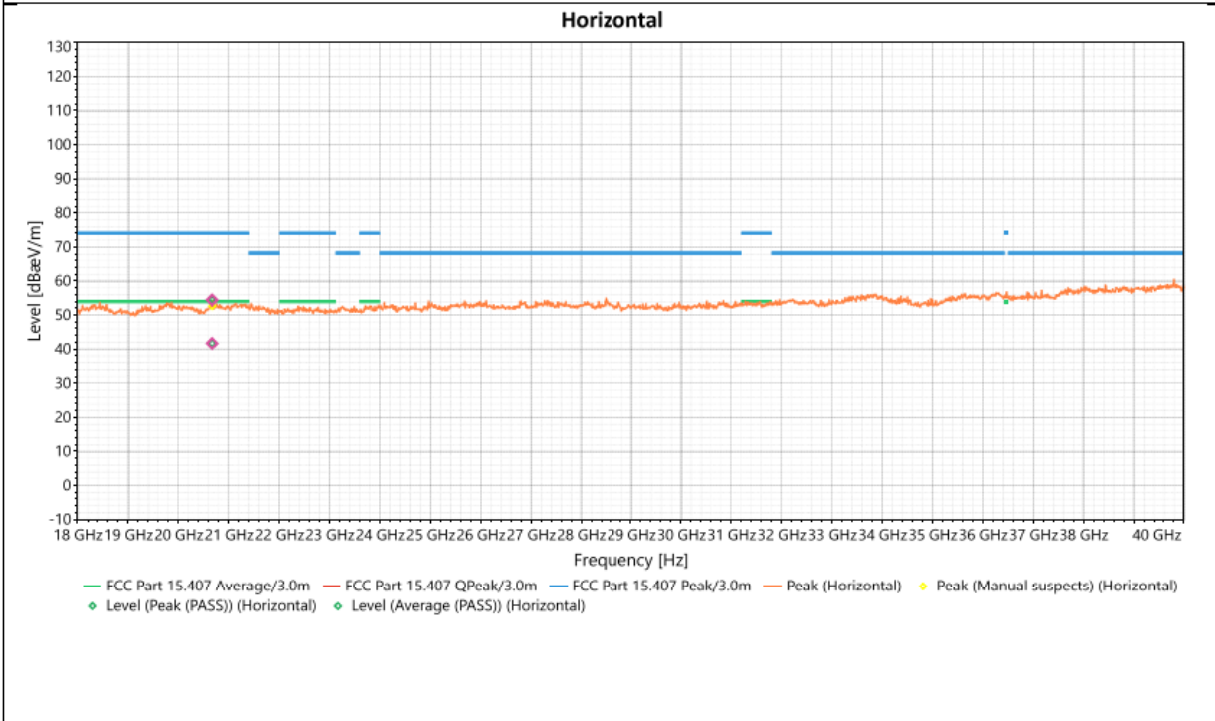
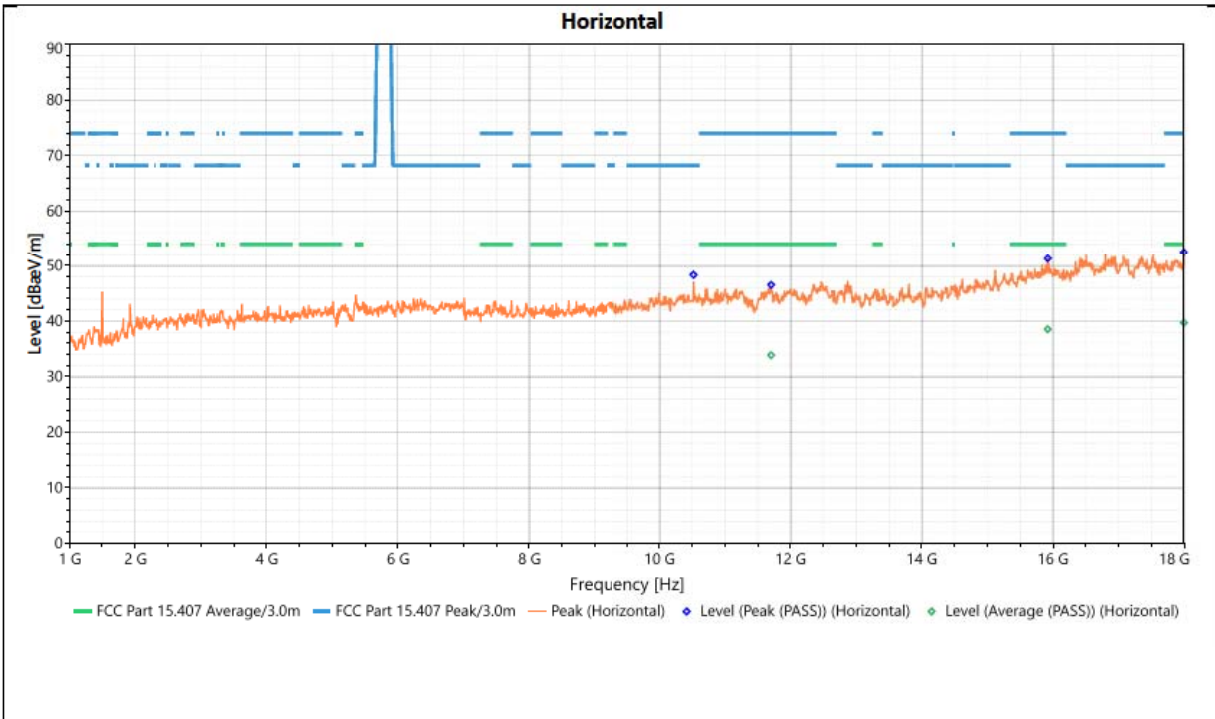


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	11199.97	Vertical	46.546	74	-27.454	3.14	228	5.47	Peak (PASS)
2	11199.97	Vertical	33.406	54	-20.594	3.14	228	5.47	Average (PASS)
3	11973.41	Vertical	47.491	74	-26.509	2.61	125	6.39	Peak (PASS)
4	11973.41	Vertical	34.412	54	-19.588	2.61	125	6.39	Average (PASS)
5	15907.26	Vertical	51.165	74	-22.835	2.33	268	8.02	Peak (PASS)
6	15907.26	Vertical	38.509	54	-15.491	2.33	268	8.02	Average (PASS)
7	20618.05	Vertical	54.072	74	-19.928	1.14	160	8.4	Peak (PASS)
8	20618.05	Vertical	40.807	54	-13.193	1.14	160	8.4	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against

Frequency	802.11a 5260 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

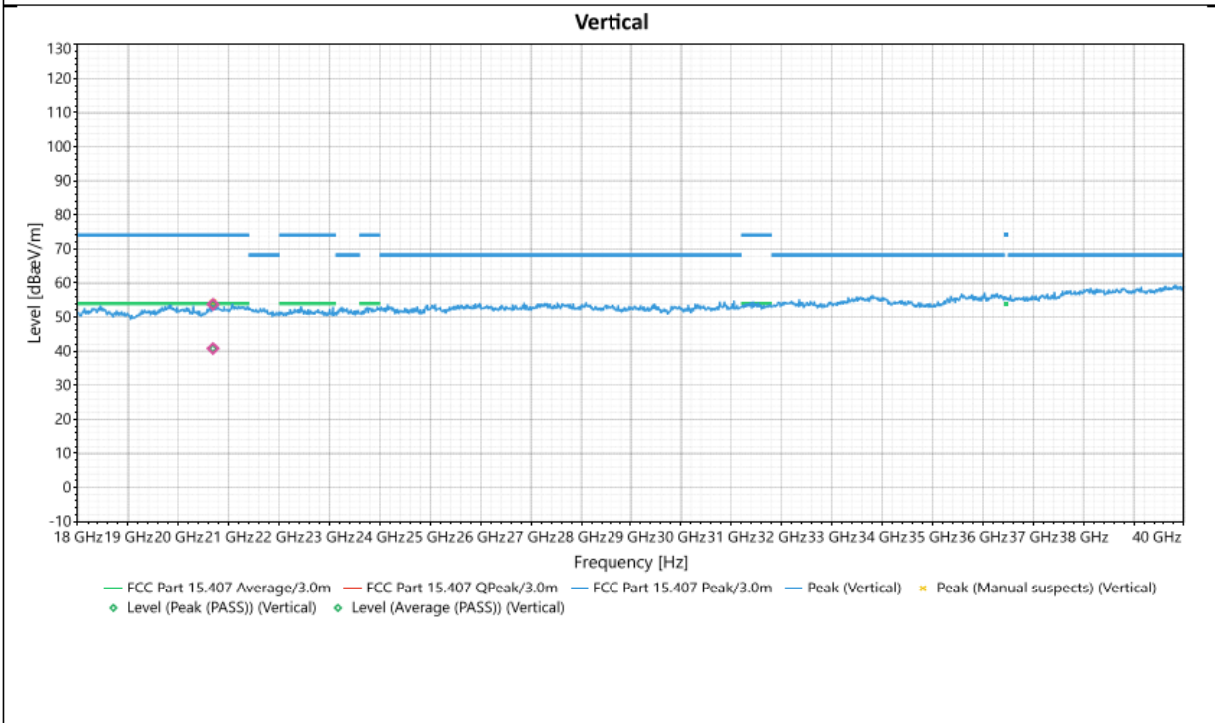
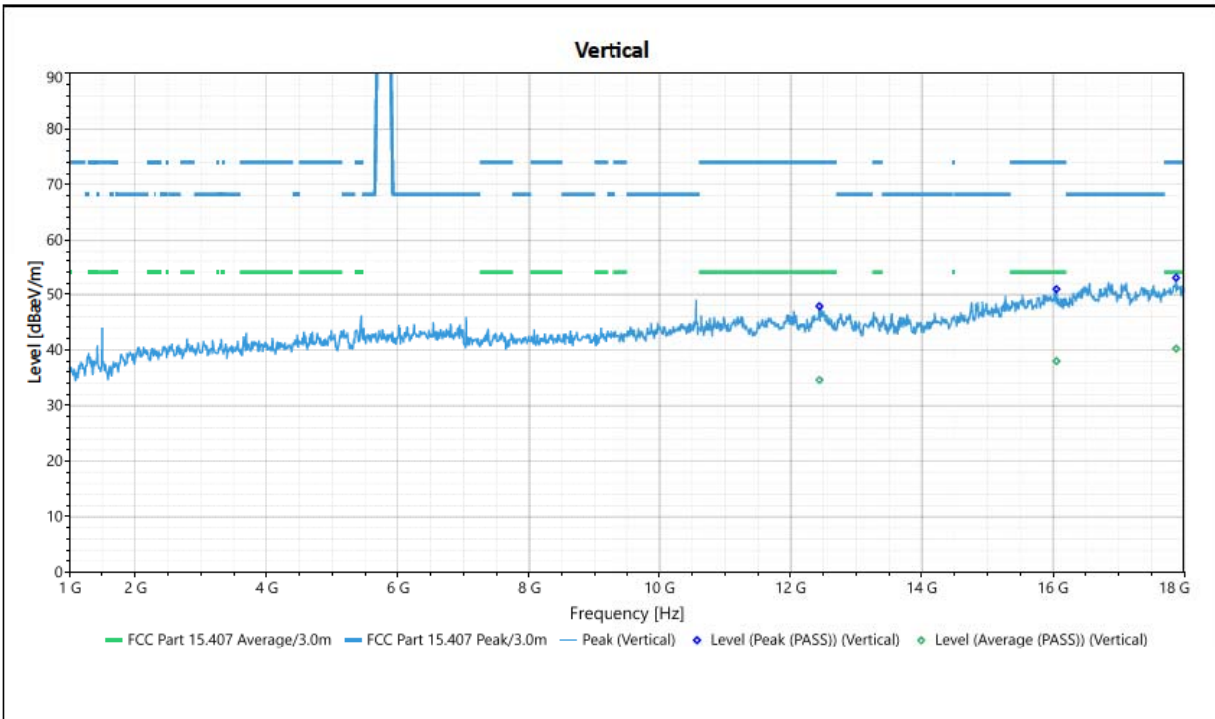


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	10519.97	Horizontal	48.322	68.23	-19.908	1.91	309	5.46	Peak (PASS)
2	11704.88	Horizontal	46.495	74	-27.505	1	125	5.98	Average (PASS)
3	11704.88	Horizontal	33.842	54	-20.158	1	125	5.98	Peak (PASS)
4	15920.86	Horizontal	51.309	74	-22.691	3.5	29	7.87	Average (PASS)
5	15920.86	Horizontal	38.53	54	-15.47	3.5	29	7.87	Peak (PASS)
6	17996.57	Horizontal	52.55	74	-21.45	3.18	125	5.87	Average (PASS)
7	20668.5	Horizontal	54.423	74	-19.577	1.89	50	8.33	Peak (PASS)
8	20668.5	Horizontal	41.655	54	-12.345	1.89	50	8.33	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

CHANNEL	802.11a 5280 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

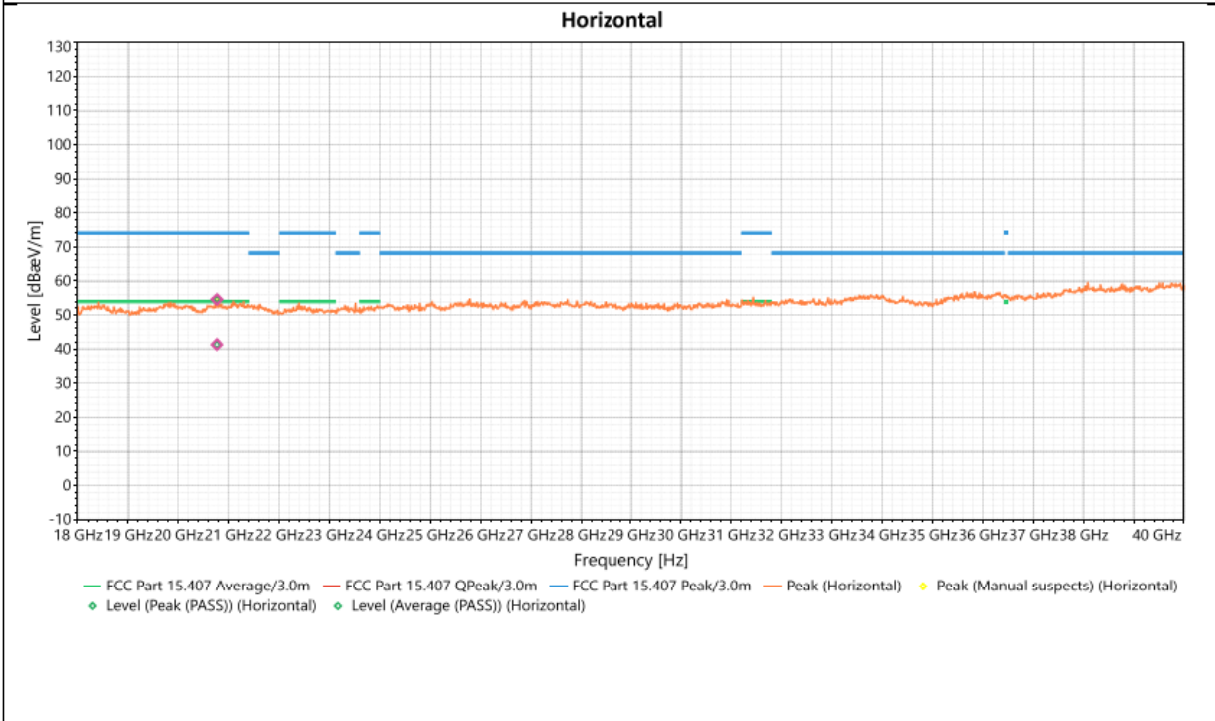
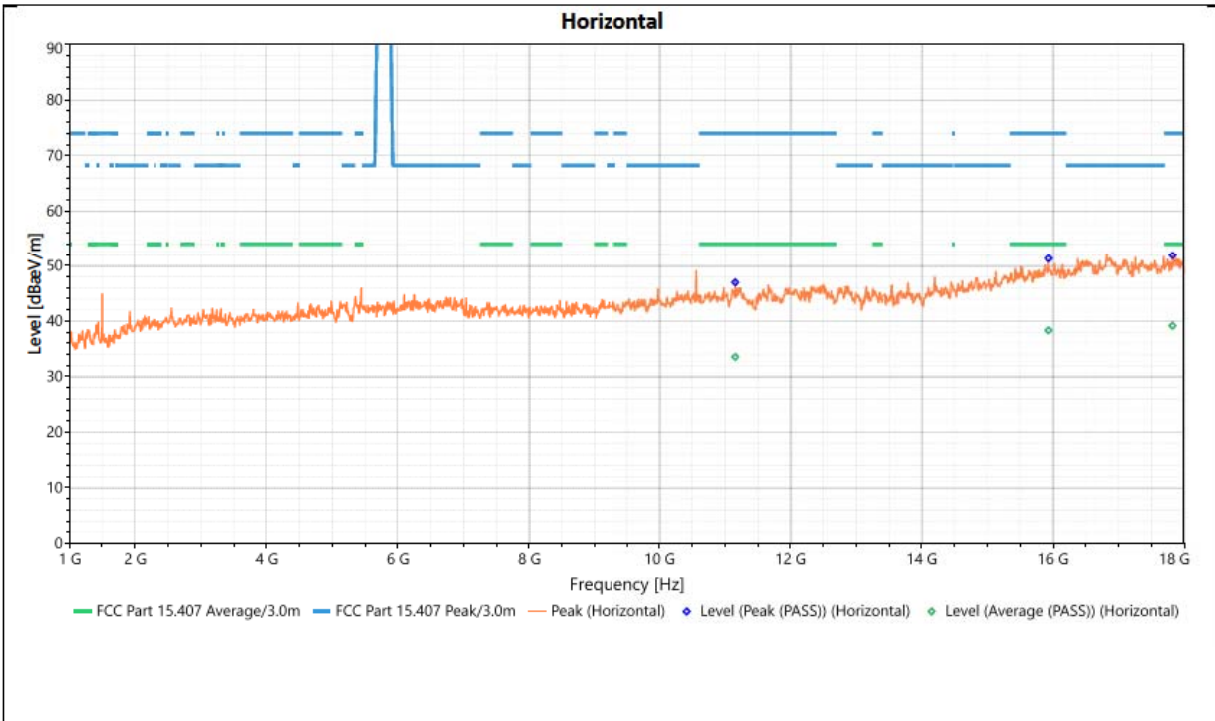


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	12439.33	Vertical	47.844	74	-26.156	1.99	266	6.56	Peak (PASS)
2	12439.33	Vertical	34.602	54	-19.398	1.99	266	6.56	Average (PASS)
3	16055.18	Vertical	50.923	74	-23.077	1.99	171	8.01	Peak (PASS)
4	16055.18	Vertical	37.984	54	-16.016	1.99	171	8.01	Average (PASS)
5	17879.34	Vertical	52.985	74	-21.015	1	327	6.24	Peak (PASS)
6	17879.34	Vertical	40.216	54	-13.784	1	327	6.24	Average (PASS)
7	20686.24	Vertical	53.707	74	-20.293	1.49	314	8.45	Peak (PASS)
8	20686.24	Vertical	40.773	54	-13.227	1.49	314	8.45	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

Frequency	802.11a 5280 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

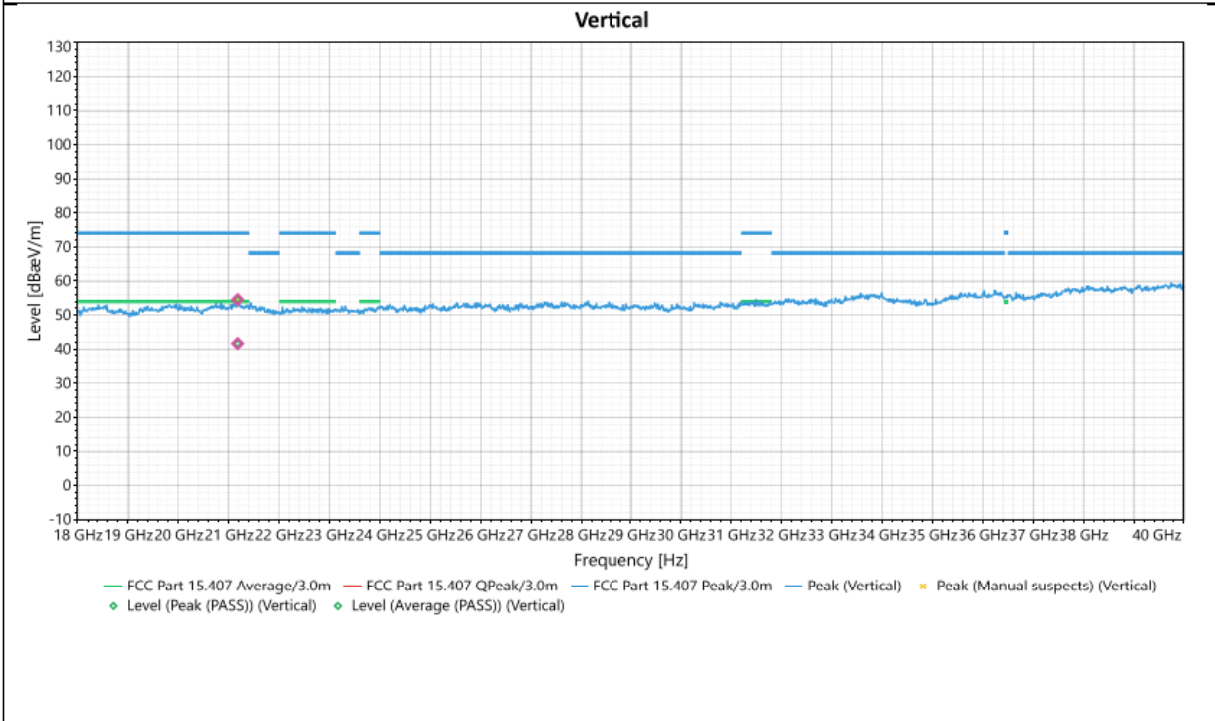
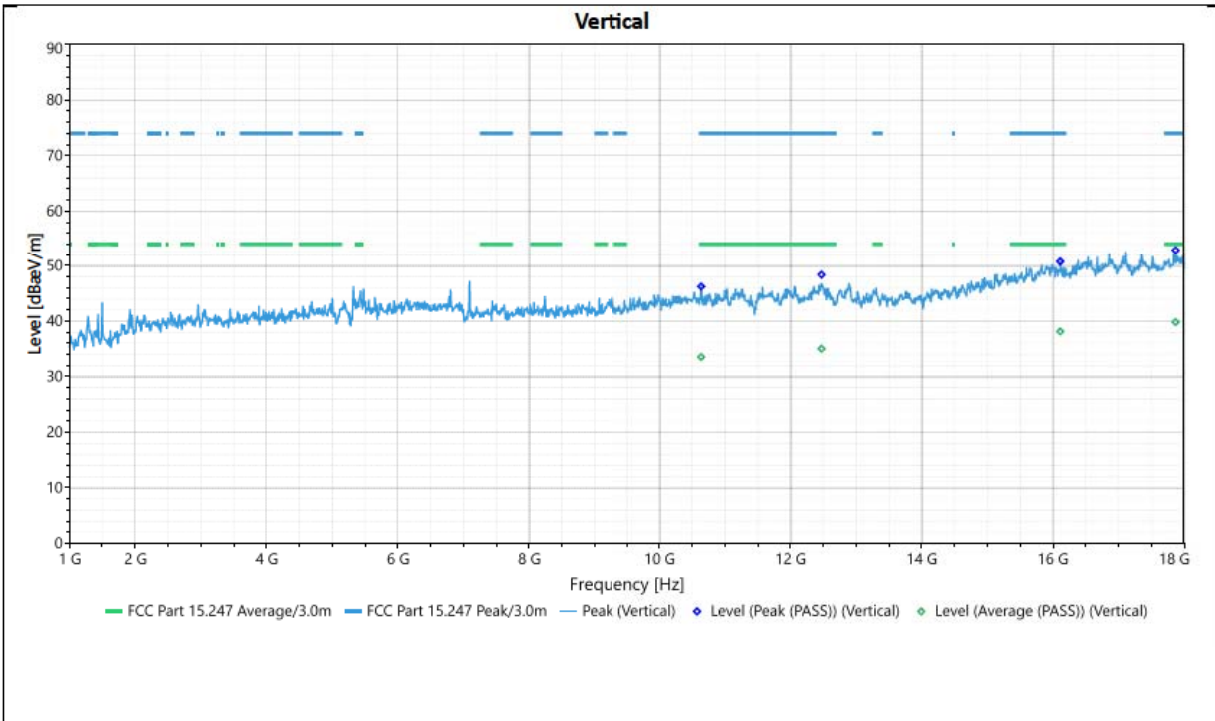


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	11155.78	Horizontal	46.972	74	-27.028	1.5	128	5.52	Peak (PASS)
2	11155.78	Horizontal	33.521	54	-20.479	1.5	128	5.52	Average (PASS)
3	15932.77	Horizontal	51.331	74	-22.669	1.99	127	7.87	Peak (PASS)
4	15932.77	Horizontal	38.314	54	-15.686	1.99	127	7.87	Average (PASS)
5	17823.19	Horizontal	51.899	74	-22.101	1.5	33	5.81	Peak (PASS)
6	17823.19	Horizontal	39.148	54	-14.852	1.5	33	5.81	Average (PASS)
7	20765.3	Horizontal	54.571	74	-19.429	1.55	262	8.44	Peak (PASS)
8	20765.3	Horizontal	41.306	54	-12.694	1.55	262	8.44	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

CHANNEL	802.11a 5320 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

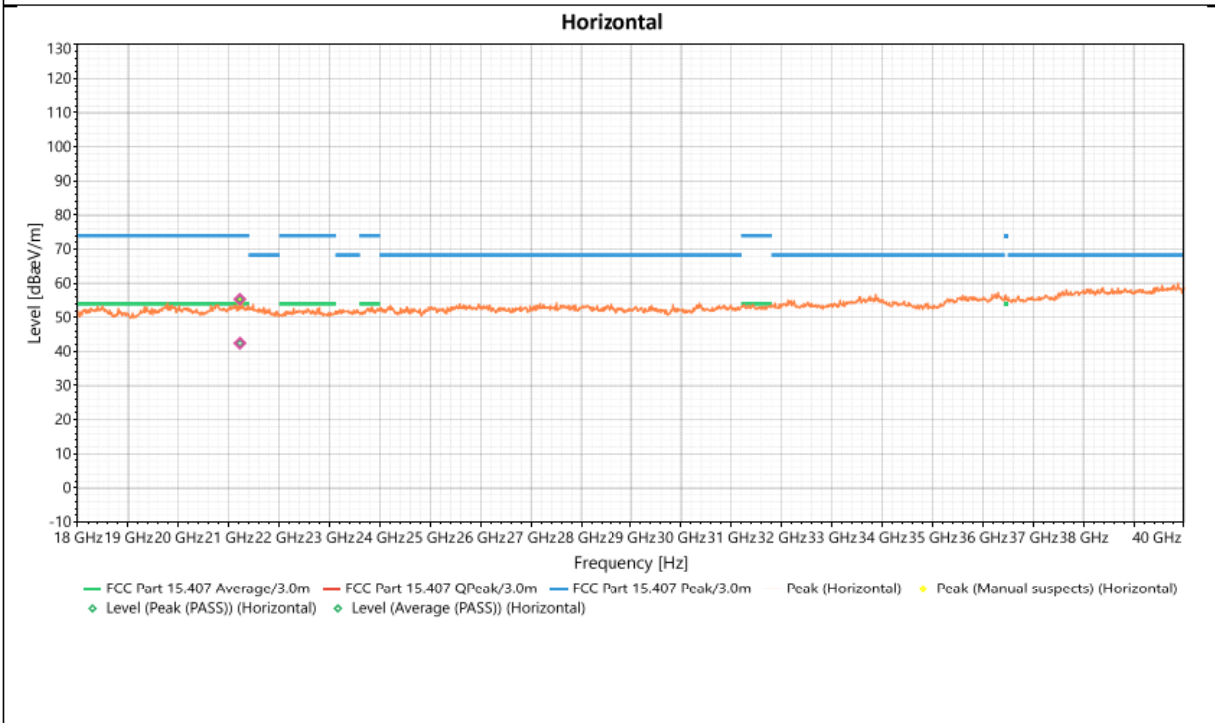
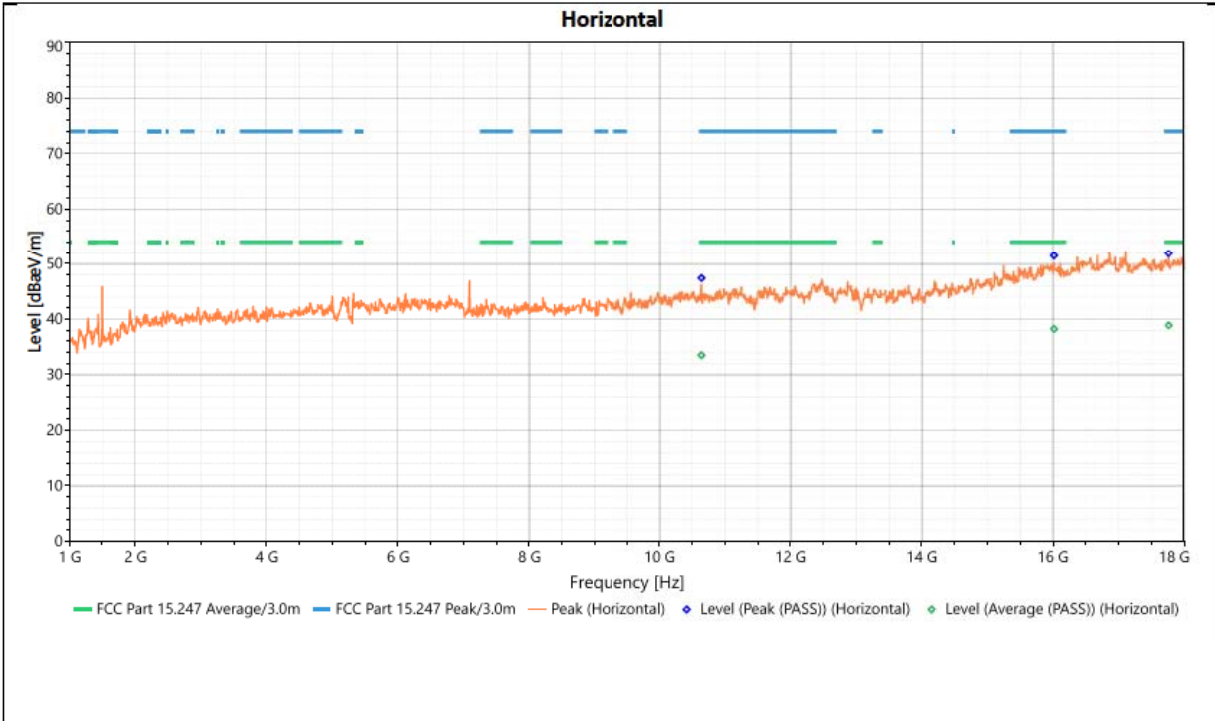


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	10637.33	Vertical	46.225	74	-27.775	1	157	5.46	Peak (PASS)
2	10637.33	Vertical	33.536	54	-20.464	1	157	5.46	Average (PASS)
3	12473.33	Vertical	48.352	74	-25.648	2.99	0	6.6	Peak (PASS)
4	12473.33	Vertical	35.006	54	-18.994	2.99	0	6.6	Average (PASS)
5	16112.99	Vertical	50.749	74	-23.251	3.49	347	7.99	Peak (PASS)
6	16112.99	Vertical	38.111	54	-15.889	3.49	347	7.99	Average (PASS)
7	21176.78	Vertical	54.549	74	-19.451	2	74	8.5	Peak (PASS)
8	21176.78	Vertical	41.622	54	-12.378	2	74	8.5	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

Frequency	802.11a 5320 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

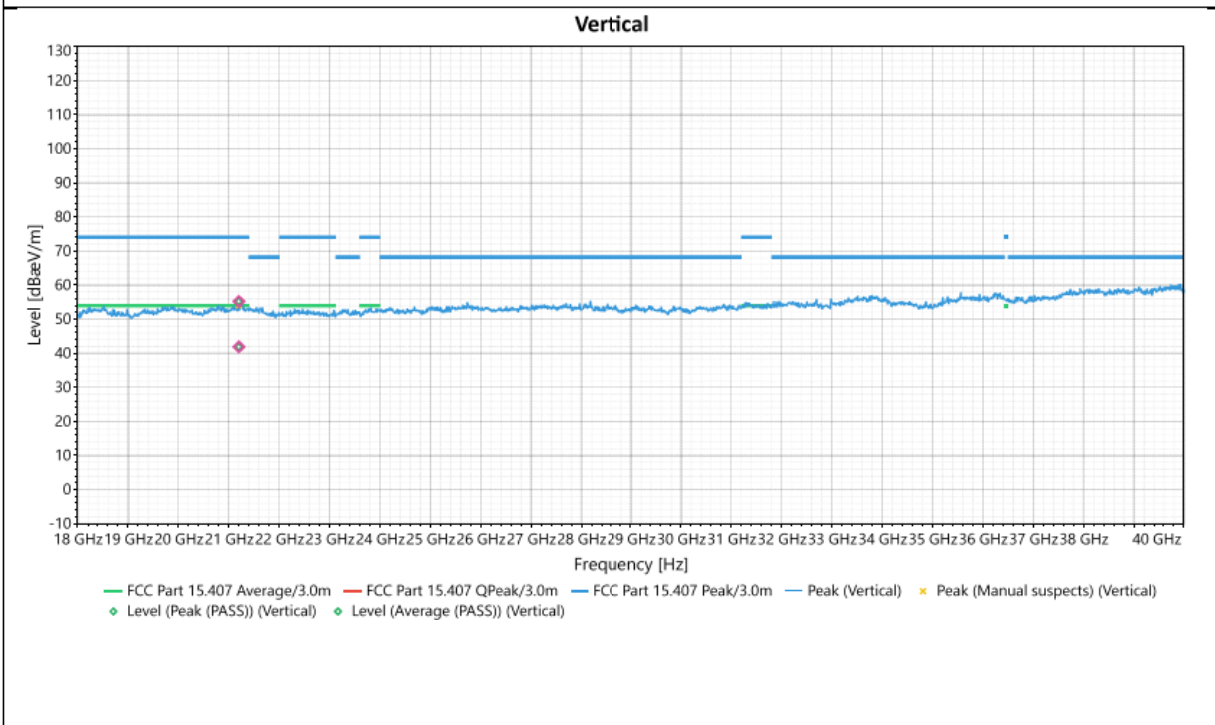
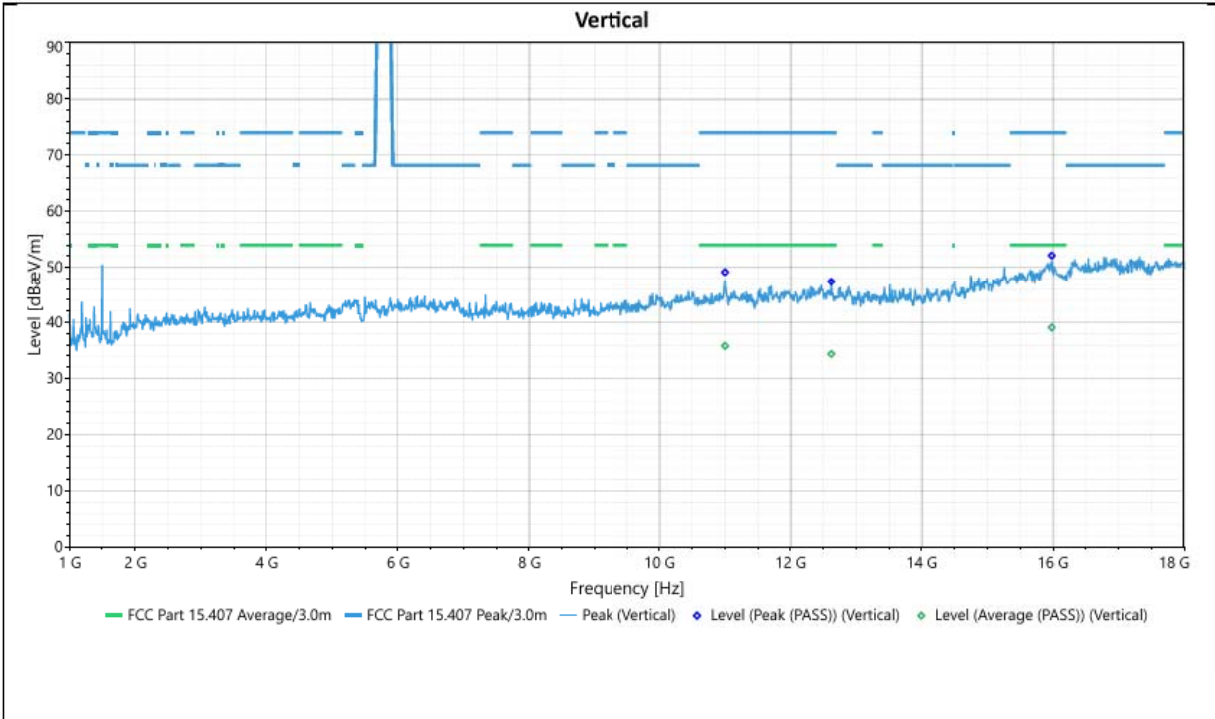


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	10640.74	Horizontal	47.393	74	-26.607	1.99	0	5.59	Peak (PASS)
2	10640.74	Horizontal	33.482	54	-20.518	1.99	0	5.59	Average (PASS)
3	16017.76	Horizontal	51.503	74	-22.497	1	44	7.92	Peak (PASS)
4	16017.76	Horizontal	38.203	54	-15.797	1	44	7.92	Average (PASS)
5	17763.7	Horizontal	51.895	74	-22.105	1.99	171	5.74	Peak (PASS)
6	17763.7	Horizontal	38.847	54	-15.153	1.99	171	5.74	Average (PASS)
7	21220.7	Horizontal	55.297	74	-18.703	1	119	8.34	Peak (PASS)
8	21220.7	Horizontal	42.416	54	-11.584	1	119	8.34	Average (PASS)

REMARKS:

1. Level (dBuV) – Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

CHANNEL	802.11a 5500 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

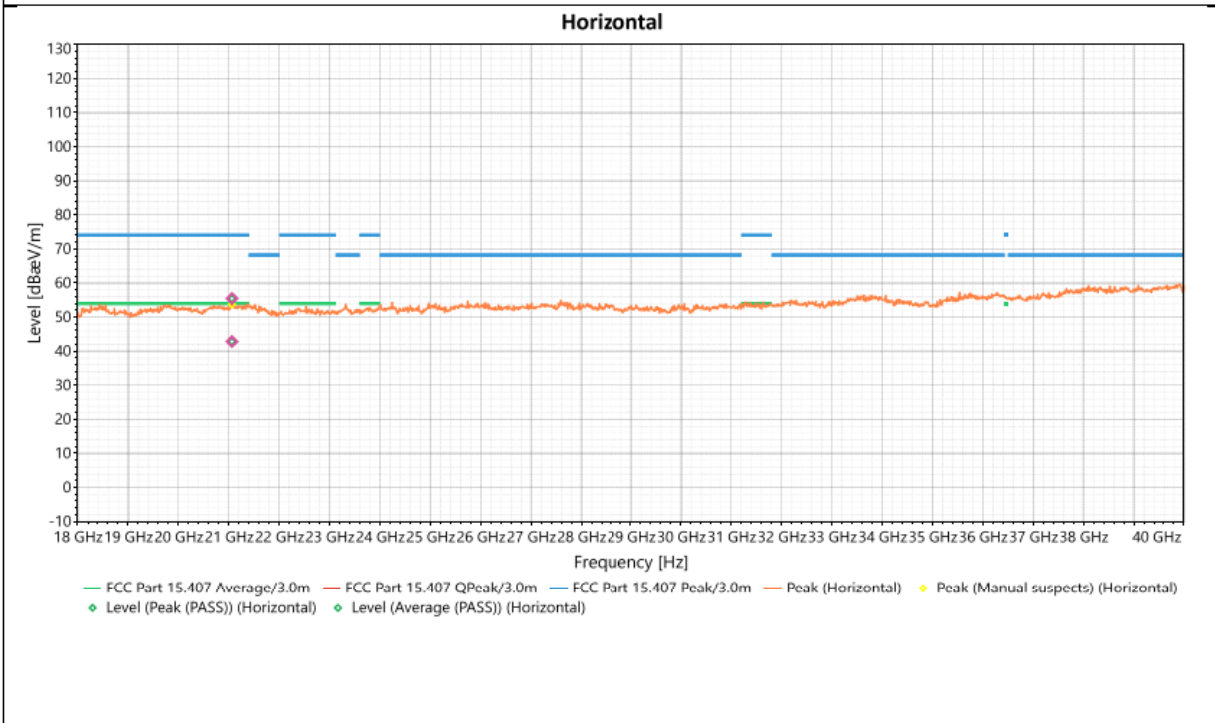
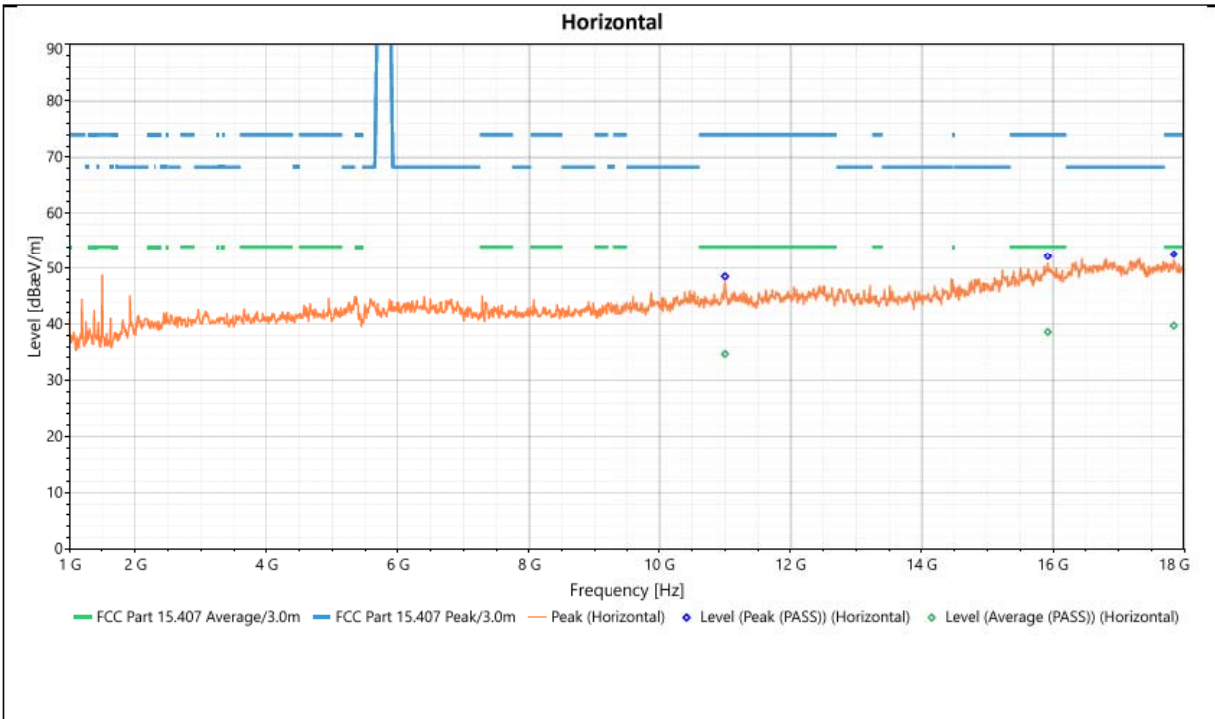


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	11001.15	Vertical	49.125	74	-24.875	1	296	5.52	Peak (PASS)
2	11001.15	Vertical	35.822	54	-18.178	1	296	5.52	Average (PASS)
3	12621.17	Vertical	47.371	74	-26.629	3.49	201	6.67	Peak (PASS)
4	12621.17	Vertical	34.371	54	-19.629	3.49	201	6.67	Average (PASS)
5	15982.08	Vertical	52.125	74	-21.875	3.49	354	8.02	Peak (PASS)
6	15982.08	Vertical	39.097	54	-14.903	3.49	354	8.02	Average (PASS)
7	21198.8	Vertical	55.204	74	-18.796	1.64	188	8.46	Peak (PASS)
8	21198.8	Vertical	41.871	54	-12.129	1.64	188	8.46	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

Frequency	802.11a 5500 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

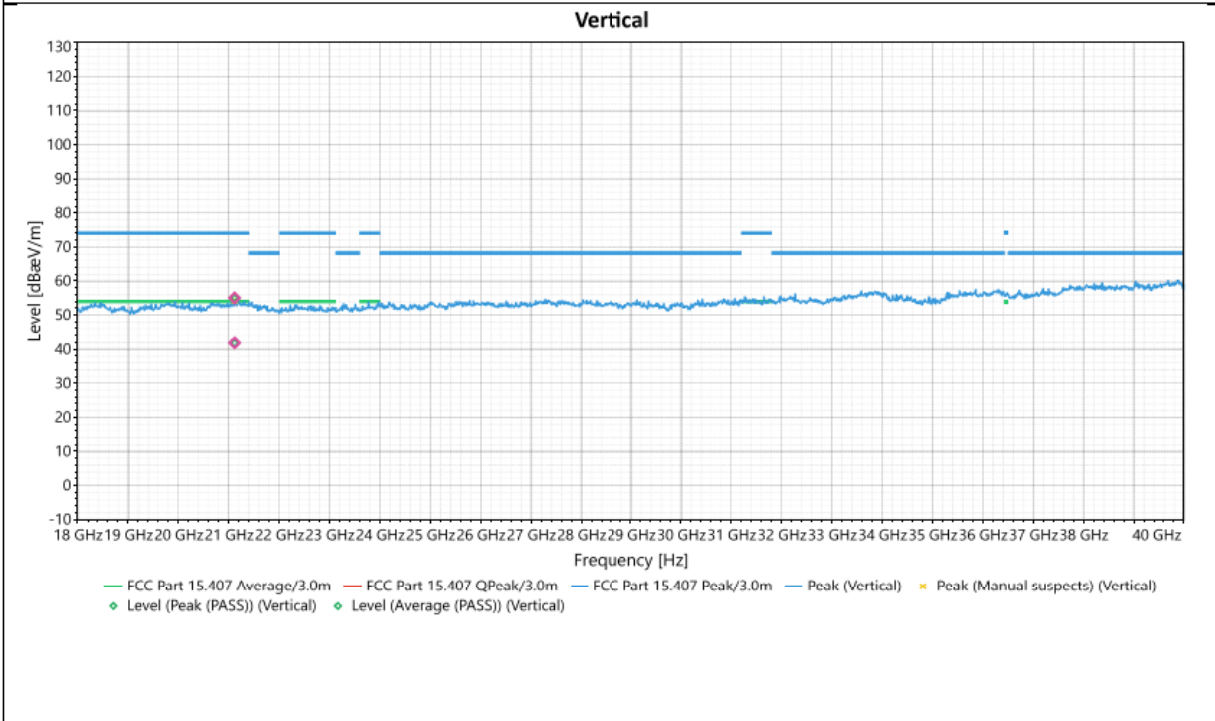
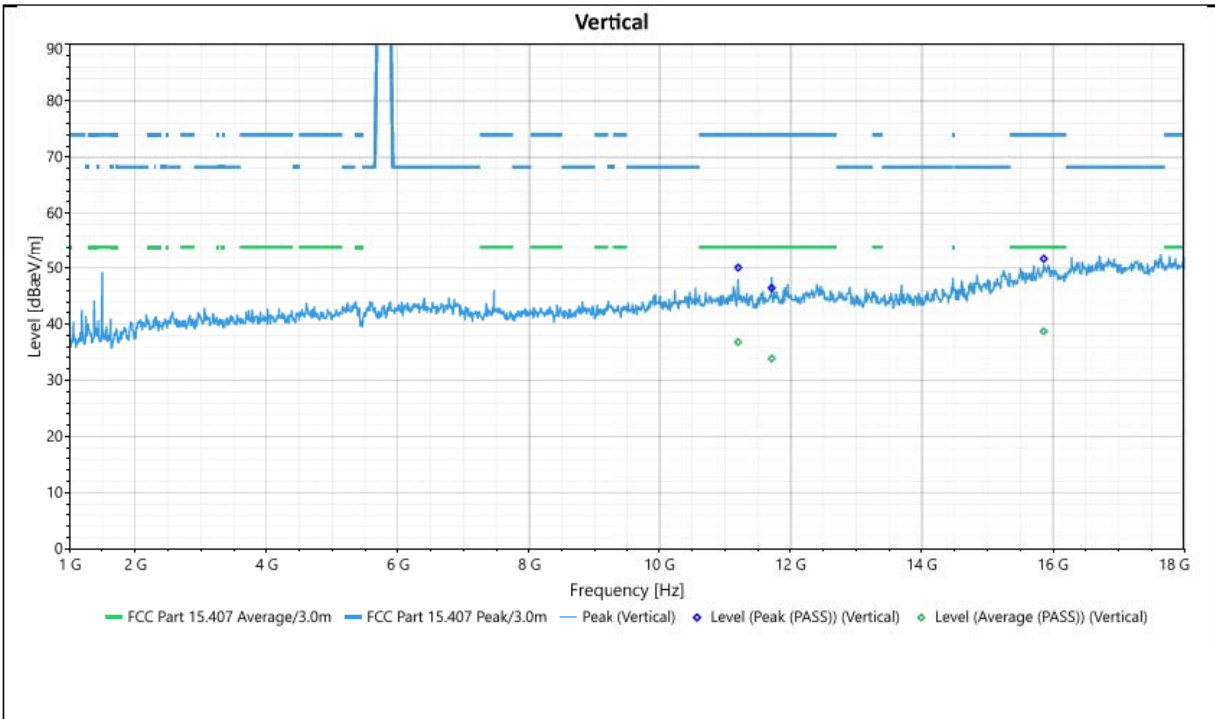


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	11001.06	Horizontal	48.522	74	-25.478	2.49	95	5.59	Peak (PASS)
2	11001.06	Horizontal	34.675	54	-19.325	2.49	95	5.59	Average (PASS)
3	15922.62	Horizontal	52.177	74	-21.823	1.99	316	7.87	Peak (PASS)
4	15922.62	Horizontal	38.62	54	-15.38	1.99	316	7.87	Average (PASS)
5	17843.6	Horizontal	52.606	74	-21.394	1	4	5.82	Peak (PASS)
6	17843.6	Horizontal	39.722	54	-14.278	1	4	5.82	Average (PASS)
7	21062.3	Horizontal	55.454	74	-18.546	1.14	247	8.5	Peak (PASS)
8	21062.3	Horizontal	42.81	54	-11.19	1.14	247	8.5	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

CHANNEL	802.11a 5580 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

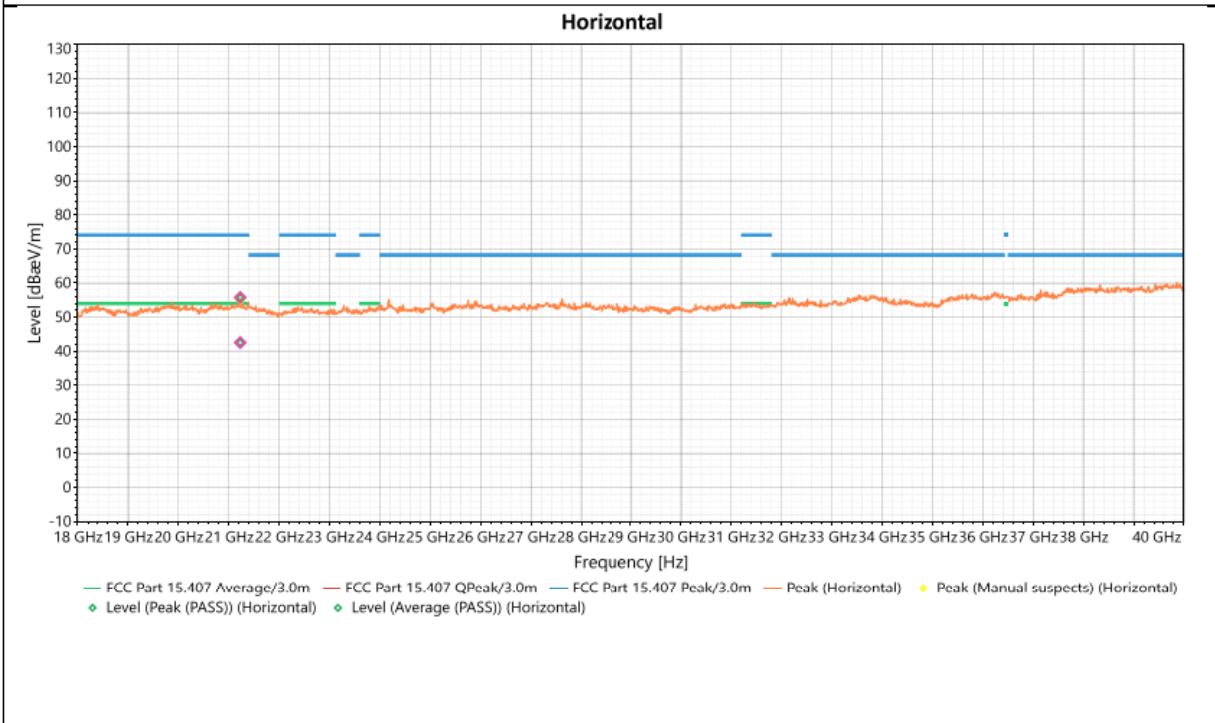
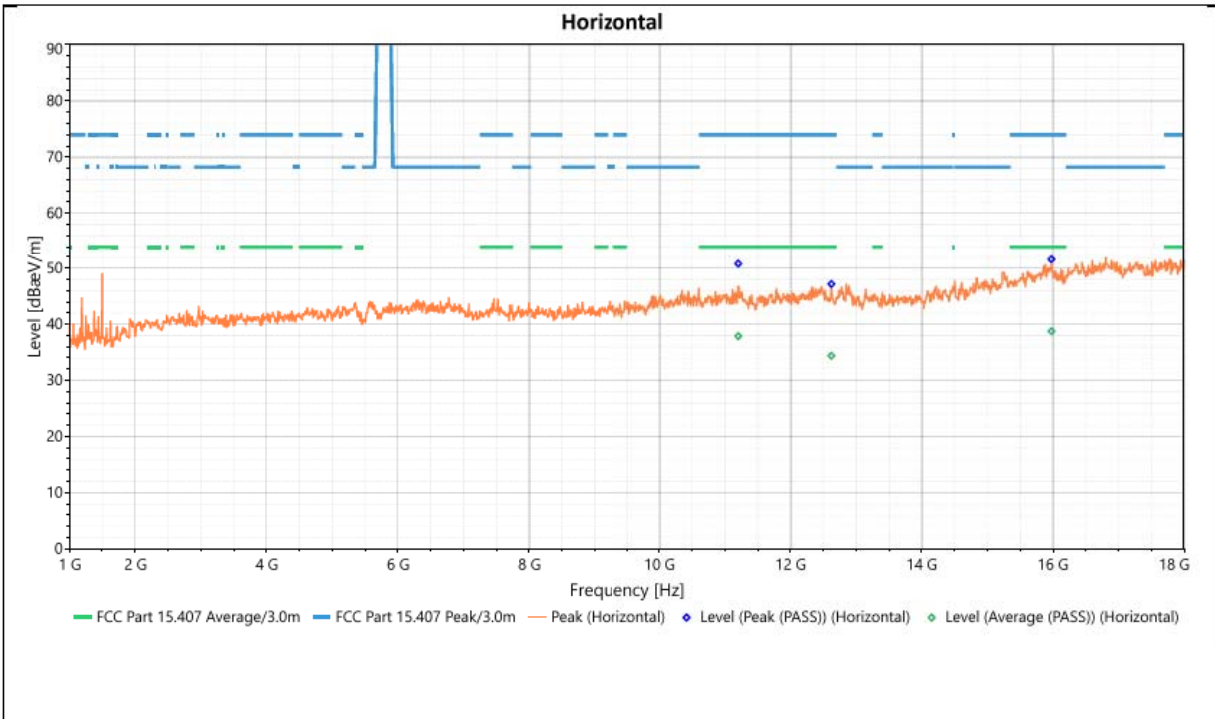


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	11201.69	Vertical	50.078	74	-23.922	1	253	5.47	Peak (PASS)
2	11201.69	Vertical	36.807	54	-17.193	1	253	5.47	Average (PASS)
3	11711.74	Vertical	46.453	74	-27.547	2	347	6.07	Peak (PASS)
4	11711.74	Vertical	33.878	54	-20.122	2	347	6.07	Average (PASS)
5	15861.4	Vertical	51.634	74	-22.366	3	0	8.02	Peak (PASS)
6	15861.4	Vertical	38.721	54	-15.279	3	0	8.02	Average (PASS)
7	21115.2	Vertical	55.021	74	-18.979	1.73	0	8.6	Peak (PASS)
8	21115.2	Vertical	41.857	54	-12.143	1.73	0	8.6	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

Frequency	802.11a 5580 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

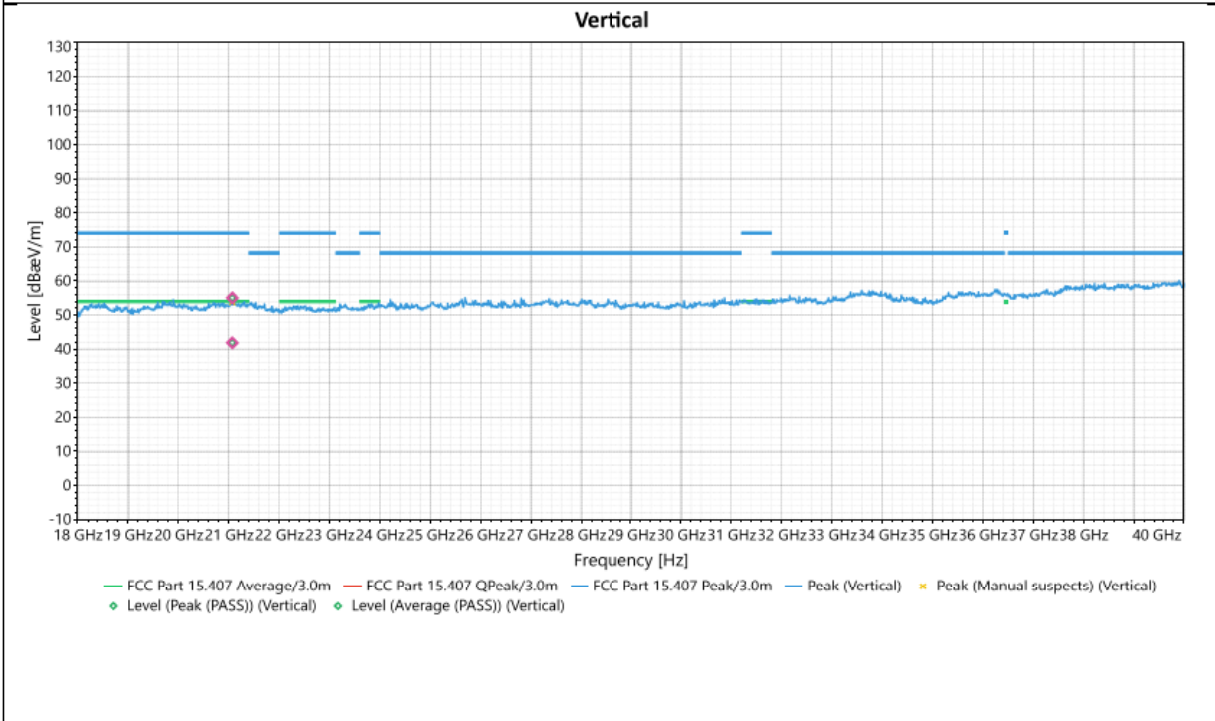
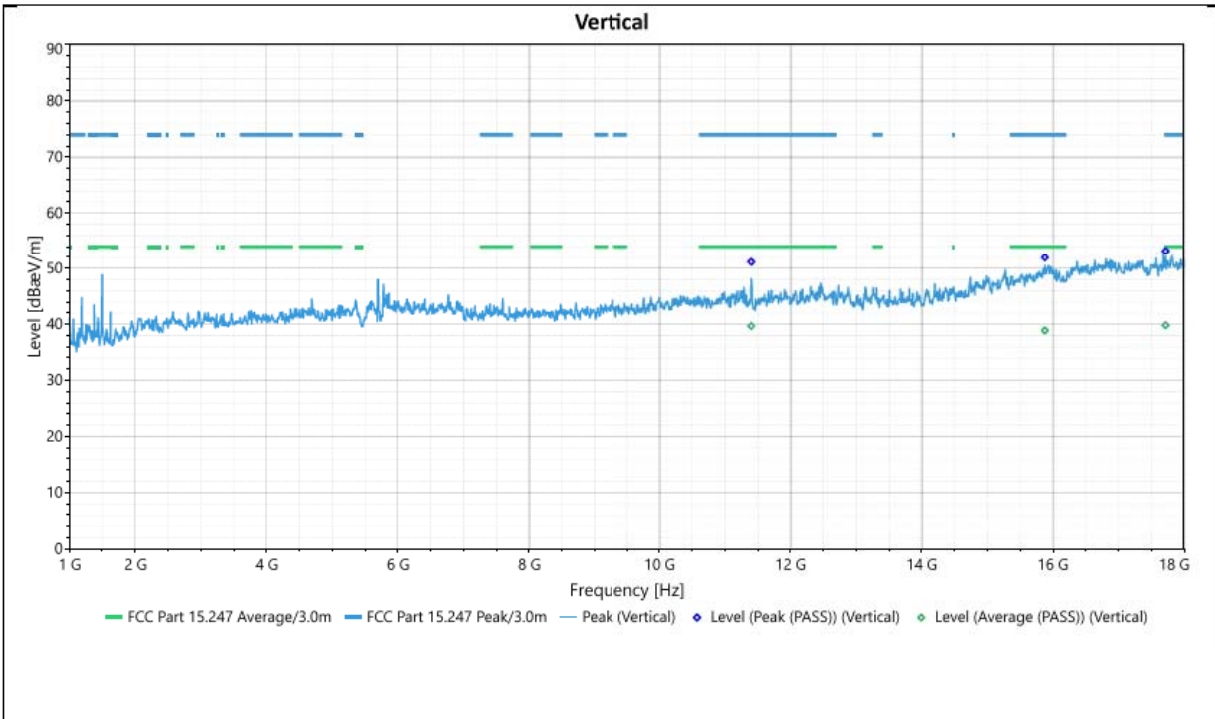


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	11201.68	Horizontal	50.821	74	-23.179	2	328	5.46	Peak (PASS)
2	11201.68	Horizontal	37.865	54	-16.135	2	328	5.46	Average (PASS)
3	12622.93	Horizontal	47.169	74	-26.831	3.49	170	6.72	Peak (PASS)
4	12622.93	Horizontal	34.378	54	-19.622	3.49	170	6.72	Average (PASS)
5	15977	Horizontal	51.572	74	-22.428	3	354	7.89	Peak (PASS)
6	15977	Horizontal	38.752	54	-15.248	3	354	7.89	Average (PASS)
7	21225.1	Horizontal	55.738	74	-18.262	1.73	306	8.34	Peak (PASS)
8	21225.1	Horizontal	42.522	54	-11.478	1.73	306	8.34	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

CHANNEL	802.11a 5700 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

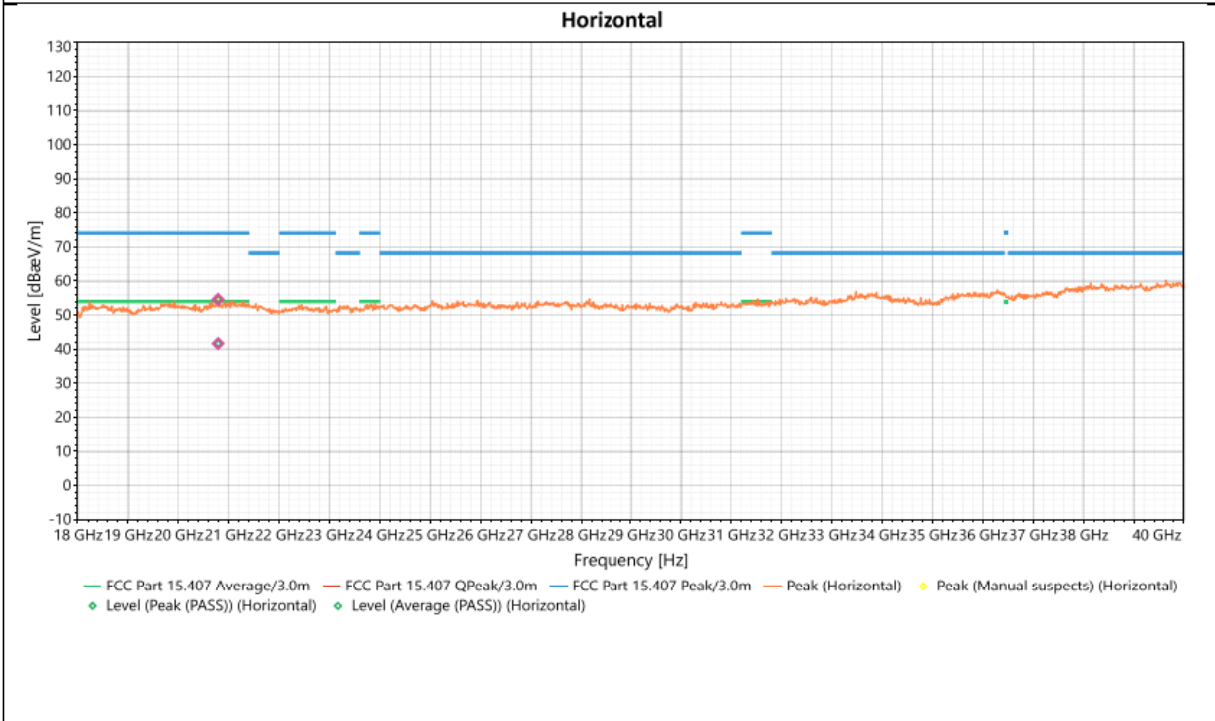
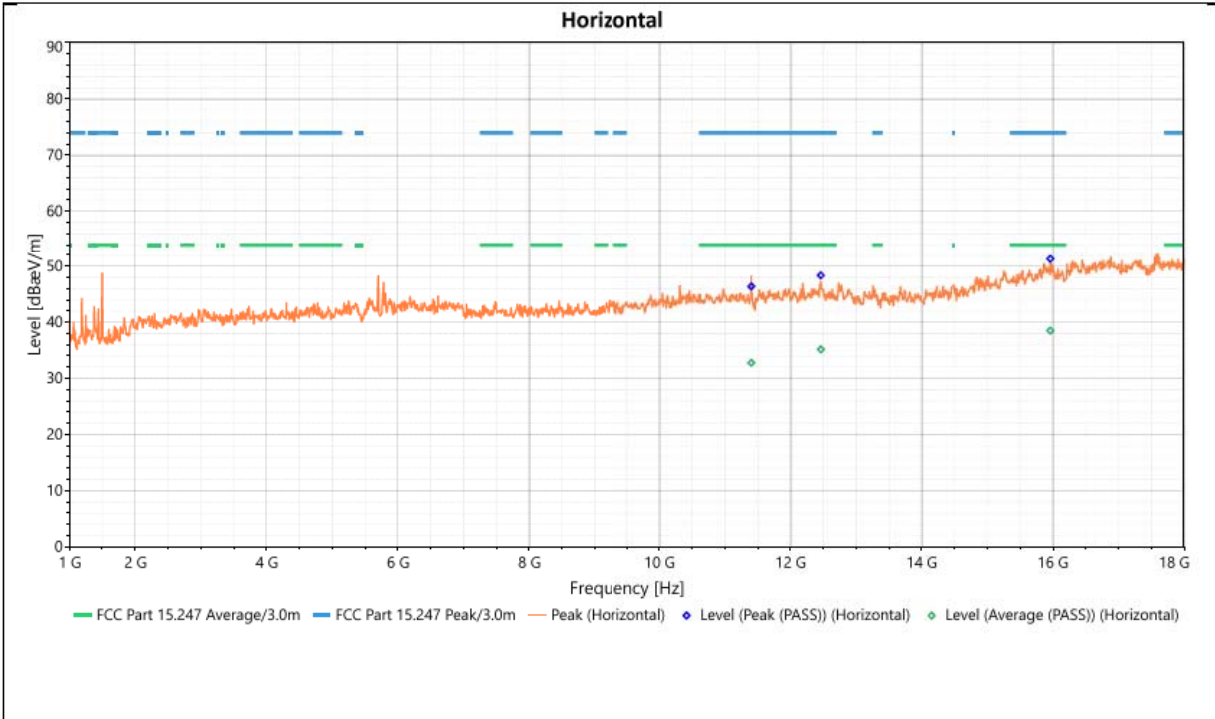


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	11400.62	Vertical	51.145	74	-22.855	1.5	359	5.49	Peak (PASS)
2	11400.62	Vertical	39.667	54	-14.333	1.5	359	5.49	Average (PASS)
3	15876.72	Vertical	51.952	74	-22.048	3.49	171	8.02	Peak (PASS)
4	15876.72	Vertical	38.871	54	-15.129	3.49	171	8.02	Average (PASS)
5	17716.15	Vertical	53.205	74	-20.795	3.49	75	6.08	Peak (PASS)
6	17716.15	Vertical	39.806	54	-14.194	3.49	75	6.08	Average (PASS)
7	21071.21	Vertical	55.013	74	-18.987	1.14	322	8.64	Peak (PASS)
8	21071.21	Vertical	41.869	54	-12.131	1.14	322	8.64	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

Frequency	802.11a 5700 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		



Antenna Polarity & Test Distance: Vertical at 3m

No.	Frequency (MHz)	Polarization	Level [dB(uV/m)]	Limit dB(uV/m)	Margin [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	11400.57	Horizontal	46.376	74	-27.624	1.5	359	5.53	Peak (PASS)
2	11400.57	Horizontal	32.779	54	-21.221	1.5	359	5.53	Average (PASS)
3	12461.38	Horizontal	48.363	74	-25.637	3.49	0	6.6	Peak (PASS)
4	12461.38	Horizontal	35.168	54	-18.832	3.49	0	6.6	Average (PASS)
5	15961.7	Horizontal	51.307	74	-22.693	2.5	347	7.87	Peak (PASS)
6	15961.7	Horizontal	38.509	54	-15.491	2.5	347	7.87	Average (PASS)
7	20787.3	Horizontal	54.598	74	-19.402	1.02	232	8.46	Peak (PASS)
8	20787.3	Horizontal	41.651	54	-12.349	1.02	232	8.46	Average (PASS)

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin agains

CHANNEL	802.11N HT20 5260 MHz	DETECTOR FUNCTION	Prak/Average
FREQUENCY RANGE	1GHz-40GHz		

