



427 West 12800 South
 Draper, UT 84020

Test Report Certification

FCC ID	SWX-AFAR and SXW-AFAP
ISED ID	6545A-AFAR and 6545A-AFAP
Equipment Under Test	AFi-ALN-R and AFi-ALN-P
Test Report Serial Number	TR6320_01
Date of Test(s)	27 August, 9, 29 December 2020 21 – 22 June and 28 – 29 July 2021
Report Issue Date	30 July 2021

Test Specification	Applicant
47 CFR FCC Part 15, Subpart E	Ubiquiti Inc. 685 Third Avenue New York, NY 10019 U.S.A.



NVLAP LAB CODE 600241-0

Certification of Engineering Report

This report has been prepared by Unified Compliance Laboratory (UCL) to document compliance of the device described below with the requirement of Federal Communication Commissions (FCC) Part 15, Subpart E. This report may be reproduced in full. Partial reproduction of this report may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

Applicant	Ubiquiti Inc.
Manufacturer	Ubiquiti Inc.
Brand Name	AmpliFi
Model Number	AFi-ALN-R and AFi-ALN-P
FCC ID	SWX-AFAR and SWX-AFAP
ISED ID	6545A-AFAR and 6545A-AFAP

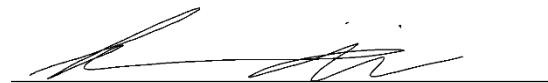
On this 30th day of July 2021, I individually and for Unified Compliance Laboratory certify that the statements made in this engineering report are true, complete and correct to the best of my knowledge and are made in good faith.

Although NVLAP has accredited the Unified Compliance Laboratory testing facilities, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. federal government.

Unified Compliance Laboratory



Written By: Joseph W. Jackson



Reviewed By: Alex Macon

Revision History		
Revision	Description	Date
01	Original Report Release	30 July 2021

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1 Client Information

1.1 Applicant

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Mark Feil
Title	Compliance Manager

1.2 Manufacturer

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Mark Feil
Title	Compliance Manager

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	AmpliFi
Model Number	AFi-ALN-R and AFi-ALN-P
Serial Number	68D79A2C678B
Dimensions (cm)	11.0 x 11.0 x 25.0

2.2 Description of EUT

The AFi-ALN-R (SWX-AFAR and 6545A-AFAR) is a 4x4 WiFi 6 Router, intended for indoor use. A Bluetooth LE transceiver is included for device management. The AFi-ALN-R has one Wide Area Network (WAN) port and four Local Area Network (LAN) Ethernet ports.

The AFi-ALN-P (SWX-AFAP and 6545A-AFAP) is a companion Mesh Point intended for indoor use, is paired with the AFi-ALN-R, and includes a Bluetooth LE transceiver for device management. The AFi-ALN-P has one Local Area Network (LAN) Ethernet Port.

Band	Modulation Bandwidth	Frequency (MHz)
UNII-2A	20 MHz	5260, 5265, 5270, 5275, 5280, 5285, 5290, 5295, 5300, 5305, 5310, 5315, 5320
	40 MHz	5270, 5275, 5280, 5285, 5290, 5295, 5300, 5305, 5310
	80 MHz	5290
	160 MHz	5250
UNII-2C	20 MHz	5500, 5505, 5510, 5515, 5520, 5525, 5530, 5535, 5540, 5545, 5550, 5555, 5560, 5565, 5570, 5575, 5580, 5585, 5590, 5595, 5600, 5605*, 5610*, 5615*, 5620*, 5625*, 5630*, 5635*, 5640*, 5645*, 5650, 5655, 5660, 5665, 5670, 5675, 5680, 5685, 5690, 5695, 5700, 5705, 5710, 5715, 5720
	40 MHz	5510, 5515, 5520, 5525, 5530, 5535, 5540, 5545, 5550, 5555, 5560, 5565, 5570, 5575, 5580, 5585, 5590, 5595, 5600, 5605*, 5610*, 5615*, 5620*, 5625*, 5630*, 5635*, 5640*, 5645*, 5650, 5655, 5660, 5665, 5670, 5675, 5680, 5685, 5690, 5695, 5700, 5705, 5710
	80 MHz	5530, 5535, 5540, 5545, 5550, 5555, 5560, 5565, 5570, 5575, 5580, 5585, 5590, 5595, 5600, 5605*, 5610*, 5615*, 5620*, 5625*, 5630*, 5635*, 5640*, 5645*, 5650, 5655, 5660, 5665, 5670, 5675, 5680, 5685, 5690
	160 MHz	5570
* Frequency not applicable in Canada		

Table 1: UNII-2A and UNII-2C Channel Settings

This report covers the circuitry of the device subject to FCC Part 15, Subpart E. The AFi-ALN-R and AFi-ALN-P utilize a pre-certified (SWX-M445GL) module for the UNII-2C band. This band was spot checked to confirm compliant operation within the host. The circuitry of the device subject to FCC Part 15 Subpart B was found to be compliant and is covered under a separate Unified Compliance Laboratory test report.

2.3 EUT and Support Equipment

The EUT and support equipment used during the test are listed below.

Brand Name Model Number Serial Number	Description	Name of Interface Ports / Interface Cables
BN: AmpliFi MN: AFi-ALN-R (Note 1) SN: 68D79A2C678B	Network Router	See Section 2.4
BN: AmpliFi MN: AFi-ALN-P SN: N/A	Mesh Point	Un-shielded Cat 5e cable/4 meters
BN: Dell MN: XPS 13 SN: N/A	Laptop PC	Un-shielded Cat 5e cable/4 meters

Notes: (1) EUT

(2) Interface port connected to EUT (See Section 2.4)

The support equipment listed above was not modified in order to achieve compliance with this standard.

2.4 Interface Ports on EUT

Name of Ports	No. of Ports Fitted to EUT	Cable Description/Length
AC Mains	1	2 conductor power cord/ 200 cm
LAN	1	Un-shielded Cat 5e cable/ 4 meters

2.5 Operating Environment

Power Supply	120 VAC
AC Mains Frequency	60 Hz
Temperature	21.9 – 26.2 °C
Humidity	21.3 – 29.8 %
Barometric Pressure	1011 mBar

2.6 Operating Modes

The AFi-ALN-R was tested using test software in order to enable to constant transmission of over 98%. All emission modes of 802.11 n/ac/ax were investigated. All measurements are reported with the worst-case mode (802.11ax) unless otherwise stated.

2.7 EUT Exercise Software

EUT firmware version 1.0 was used to operate the transmitter using a constant transmit mode.

2.8 Block Diagram of Test Configuration

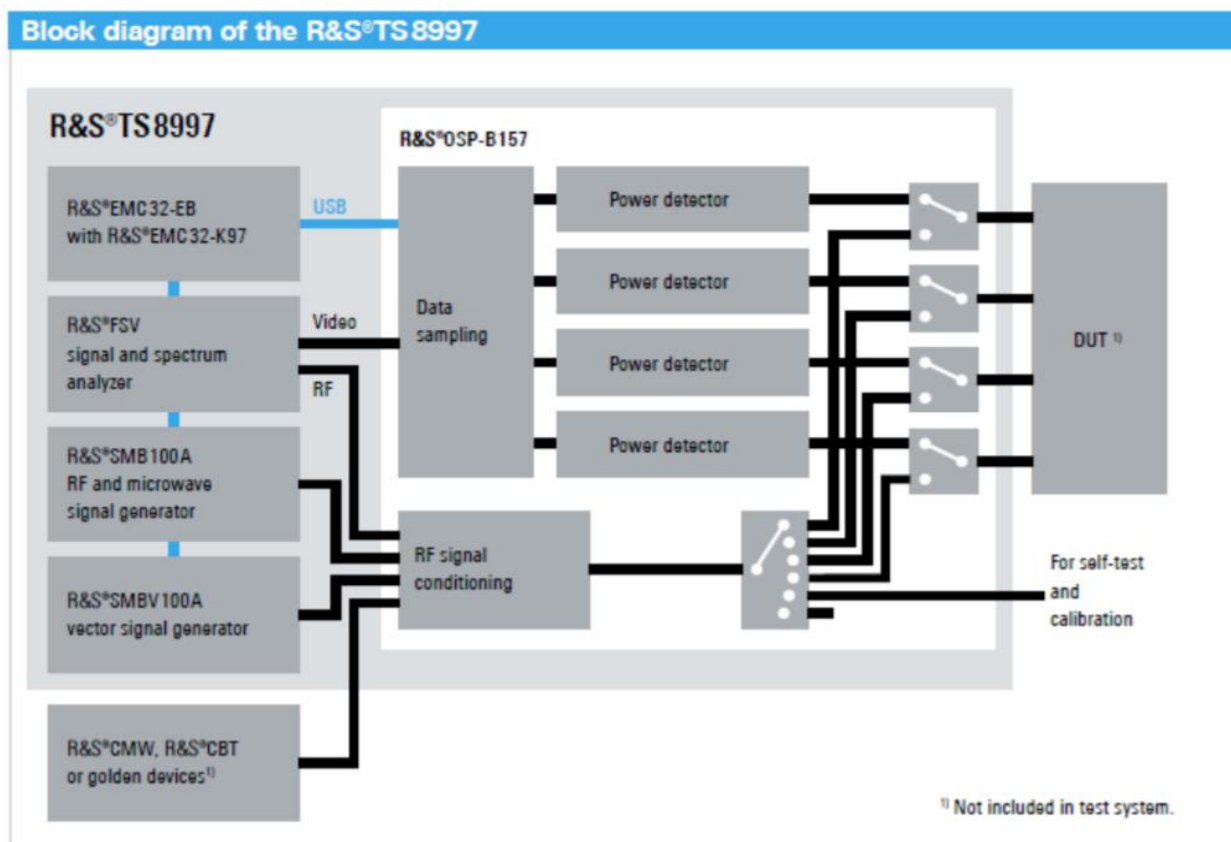


Diagram 1: Test Configuration Block Diagram

2.9 Modification Incorporated/Special Accessories on EUT

There were no modifications made to the EUT during testing to comply with the specification.

2.10 Deviation, Opinions Additional Information or Interpretations from Test Standard

There were no deviations, opinions, additional information or interpretations from the test specification.

3 Test Specification, Method and Procedures

3.1 Test Specification

Title	47 CFR FCC Part 15, Subpart E, Section 15.407 Limits and methods of measurement of radio interference characteristics of Unlicensed National Information Infrastructure Devices
Purpose of Test	The tests were performed to demonstrate initial compliance

3.2 Methods & Procedures

3.2.1 47 CFR FCC Part 15 Section 15.407

See test standard for details.

3.3 FCC Part 15, Subpart E

3.3.1 Summary of Tests

FCC Section	ISED Section	Environmental Phenomena	Frequency Range (MHZ)	Result
15.407(a)	N/A	Antenna requirements	Structural Requirement	Compliant
15.407(b)	RSS-Gen	Conducted Disturbance at Mains Port	0.15 to 30	Compliant
15.407(a)	RSS-247 §6.2.2, §6.2.3	Bandwidth Requirement	5260 to 5570	Compliant
15.407(a)	RSS-247 §6.2.2, §6.2.3	Peak Output Power	5260 to 5570	Compliant
15.407(b)	RSS-247 §6.2.2, §6.2.3	Antenna Conducted Spurious Emissions	0.009 to 40000	Compliant
15.407(b)	RSS-247 §6.2.2, §6.2.3	Radiated Spurious Emissions	0.009 to 40000	Compliant
15.407(a)	RSS-247 §6.2.2, §6.2.3	Peak Power Spectral Density	5260 to 5570	Compliant
15.407(h)	RSS-247 §6.3	DFS Requirements	5260 to 5570	Compliant

The testing was performed according to the procedures in ANSI C63.10-2013, KDB 558074 and 47 CFR Part 15. Where applicable, KDB 662911 was followed to sum required measurements.

3.4 Results

In the configuration tested, the EUT complied with the requirements of the specification.

3.5 Test Location

Testing was performed at the Unified Compliance Laboratory 3-Meter and 10-Meter chambers located at 427 West 12800 South, Draper, UT 84020. Unified Compliance Laboratory is accredited by National

Voluntary Laboratory Accreditation Program (NVLAP); NVLAP Code 600241-0 which is effective until 30 June 2022. This site has also been registered with Innovations, Science and Economic Development (ISED) department as was accepted under Appendix B, Phase 1 procedures of the APEC Tel MRA for Canadian recognition. ISED No.: 25346, effective until 30 June 2022. Unified Compliance Laboratory has been assigned Conformity Assessment Number US0223 by ISED.

4 Test Equipment

4.1 Conducted Emissions at Mains Ports

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	AFJ	FFT3010	UCL-2500	9/18/2020	9/17/2021
LISN	AFJ	LS16C/10	UCL-2512	5/26/2020	5/26/2022
Cat6 ISN	Teseq	ISN T8-Cat6	UCL-2971	5/18/2020	5/18/2022
ISN	Teseq	ISN T800	UCL-2974	6/4/2021	6/4/2022
LISN	Com-Power	LIN-120C	UCL-2612	5/19/2021	5/19/2022
AC Power Source	Laplace Instruments	AC1000A	UCL-2857	N/A	N/A
Test Software	UCL	Revision 1	UCL-3107	N/A	N/A

Table 2: List of equipment used for Conducted Emissions Testing at Mains Port

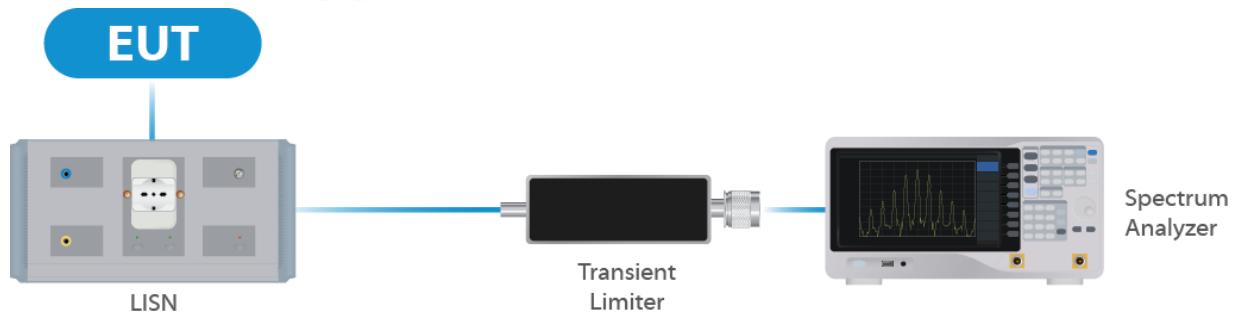


Figure 1: Conducted Emissions Test

4.2 Direct Connect at the Antenna Port Tests

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer	R&S	FSV40	UCL-2861	8/24/2020	8/24/2021
Signal Generator	R&S	SMB100A	UCL-2864	N/A	N/A
Vector Signal Generator	R&S	SMBV100A	UCL-2873	N/A	N/A
Switch Extension	R&S	OSP-B157WX	UCL-2867	9/8/2020	9/8/2021
Switch Extension	R&S	OSP-150W	UCL-2870	3/3/2021	3/3/2022

Table 3: List of equipment used for Direct Connect at the Antenna Port

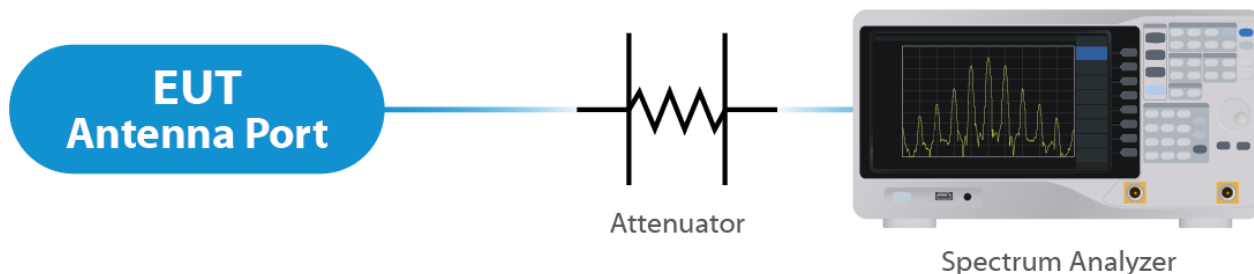


Figure 2: Direct Connect at the Antenna Port Test

4.3 Radiated Emissions

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	Keysight	N9038A	UCL-2778	6/21/2021	6/21/2022
Pre-Amplifier 9 kHz – 1 GHz	Sonoma Instruments	310N	UCL-2889	9/10/2020	9/10/2021
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	7/8/2021	7/8/2022
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	11/16/2020	11/16/2021
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	5/21/2020	5/21/2022
1 – 18 GHz Amplifier	Com-Power	PAM 118A	UCL-3833	9/29/2020	9/29/2021
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 4: List of equipment used for Radiated Emissions

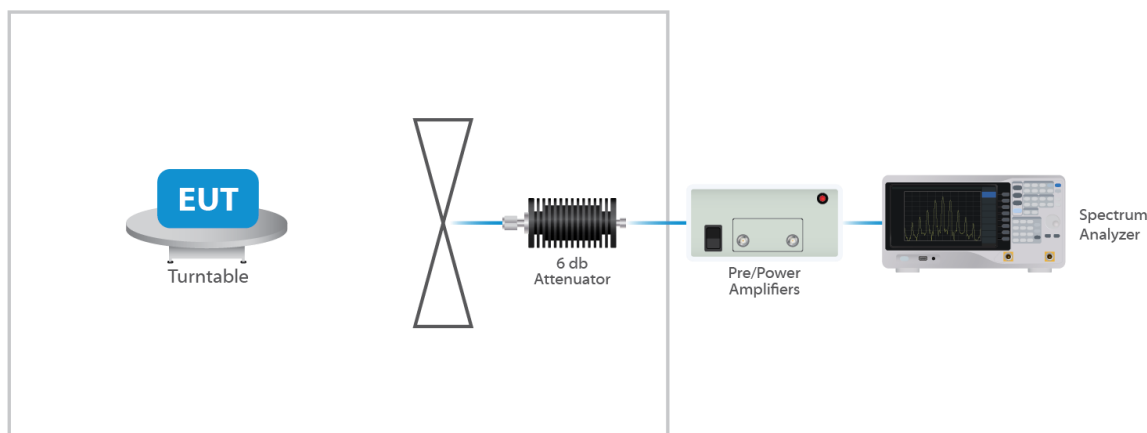


Figure 3: Radiated Emissions Test

4.4 DFS Testing

4.4.1 Master Test Set Up

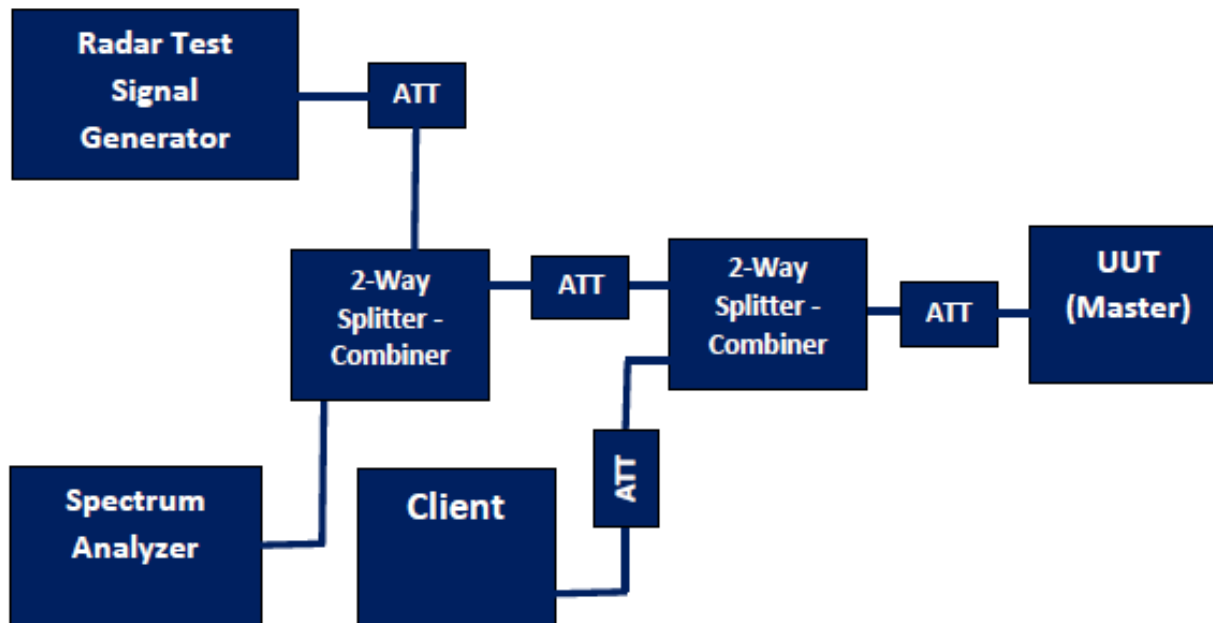


Figure 4: DFS Test Set Up - Master

4.5 Equipment Calibration

All applicable equipment is calibrated using either an independent calibration laboratory or Unified Compliance Laboratory personnel at intervals defined in ANSI C63.4:2014 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to traceability is on file and is available for examination upon request.

4.6 Measurement Uncertainty

Test	Uncertainty (\pm dB)	Confidence (%)
Conducted Emissions	1.44	95
Radiated Emissions (9 kHz to 30 MHz)	2.50	95
Radiated Emissions (30 MHz to 1 GHz)	4.38	95
Radiated Emissions (1 GHz to 18 GHz)	4.37	95
Radiated Emissions (18 GHz to 40 GHz)	3.93	95
Direct Connect Tests	K Factor	Value
Emissions Bandwidth	2	2.0%
Output Power	2	1.0 dB
Peak Power Spectral Density	2	1.3 dB
Band Edge	2	0.8 dB
Transmitter Spurious Emissions	2	1.8 dB

5 Test Results

5.1 §15.203 Antenna Requirements

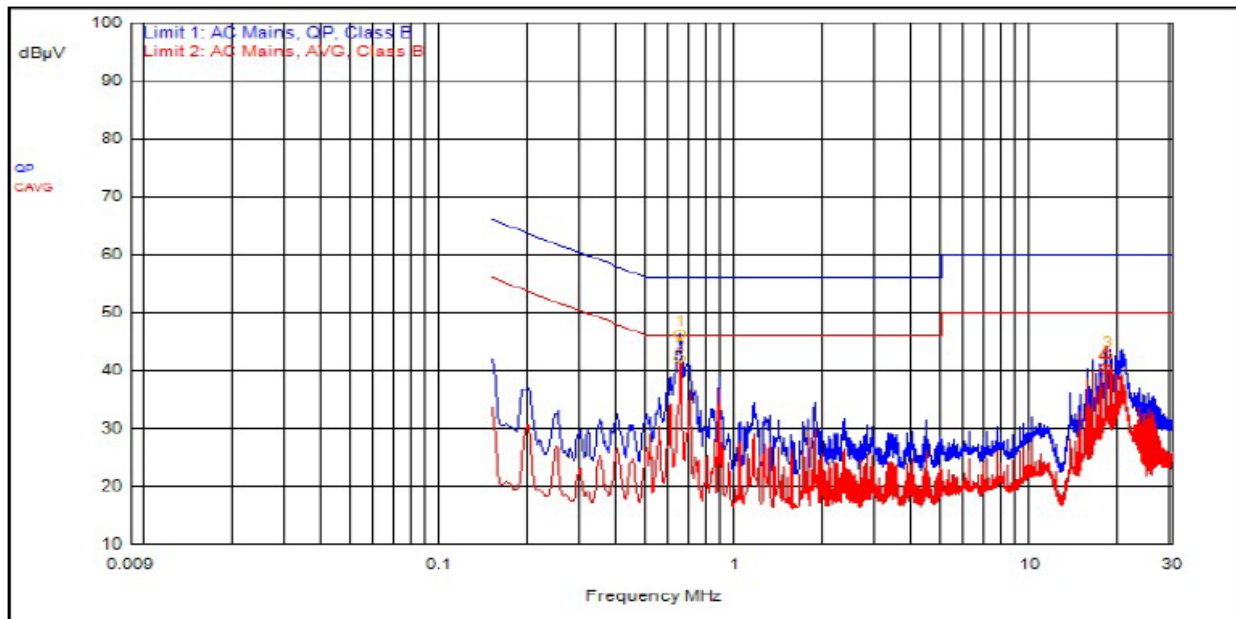
The EUT uses an integral antenna. The Maximum gain of the antenna is 3.5 dBi. The antenna is not user replaceable.

Results

The EUT complied with the specification

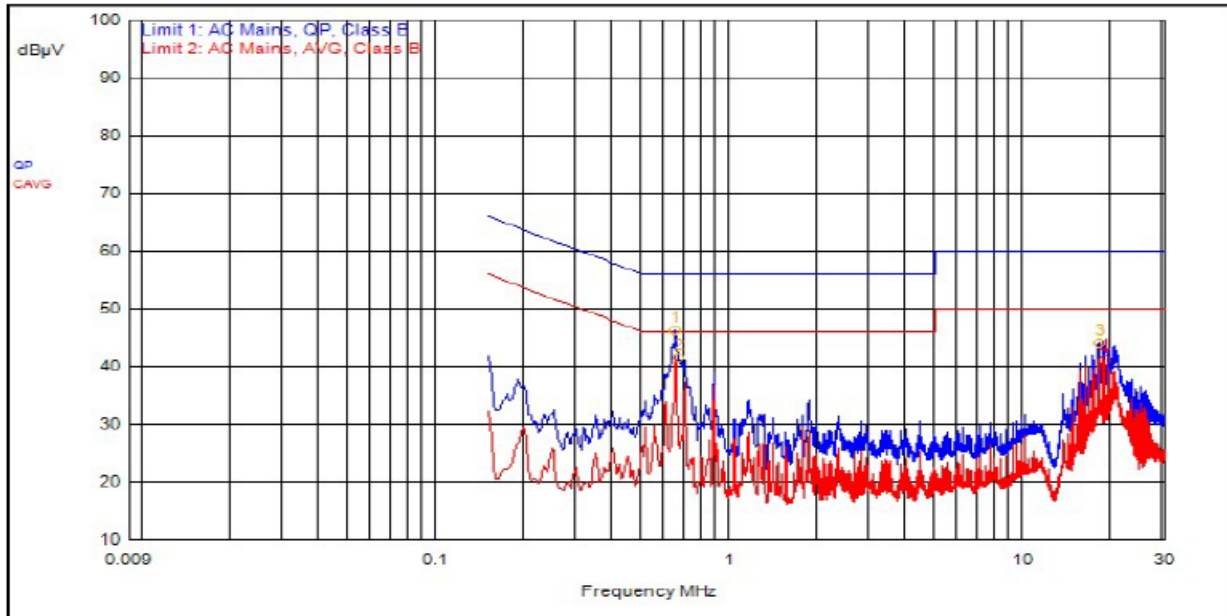
5.2 Conducted Emissions at Mains Ports Data

5.2.1 Line



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
2	648.000kHz	12.3	0.0		C_AVG	29.6	41.9	46.0	-4.1
1	648.000kHz	12.3	0.0		QPeak	34.1	46.3	56.0	-9.7
3	17.931MHz	12.1	0.2		QPeak	30.3	42.6	60.0	-17.4
4	17.688MHz	12.1	0.2		QPeak	28.0	40.3	60.0	-19.7

5.2.2 Neutral



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
4	18.666MHz	12.1	0.2		C_AVG	28.8	41.1	50.0	-8.9
1	648.000kHz	12.3	0.0		QPeak	34.0	46.3	56.0	-9.7
2	663.000kHz	12.3	0.0		QPeak	29.1	41.4	56.0	-14.6
3	17.928MHz	12.1	0.2		QPeak	31.8	44.1	60.0	-15.9

Result

The EUT complied with the specification limit.

5.3 §15.403(i) 26 dB Emissions Bandwidth

5.3.1 UNII-2A

See accompanying Sporton International Inc. test report FR661623-13 FCC RF Test Report for FCC ID: SWX-M445GL and IC ID: 6545A-M445GH

5.3.2 UNII-2C

Frequency (MHz)	99% Bandwidth (MHz)	Emissions 26 dB Bandwidth (MHz)
5500	18.9	21.4
5600	19.0	21.2
5700	18.9	21.1
5510	37.75	40.8
5590	38.0	40.08
5670	37.75	40.38
5530	77.50	81.5
5610	77.0	82.0
5690	77.5	82.5
5570	157.0	165.0

Result

The 26 dB bandwidths are reported for information purposes. Please see Annex for all bandwidth measurements.

5.4 §15.403(a)(1) Maximum Average Output Power

The maximum average RF conducted output power measured for this device was 23.9 dBm or 245.47 mW. The limit is 24 dBm or 250 mW when using antennas with 6 dBi or less gain. The antenna has a maximum gain of 3.5 dBi.

5.4.1 UNII-2A

See Sporton International Inc. test report FR661623-13 FCC RF Test Report for FCC ID: SWX-M445GL and IC ID:6545A-M445GH. Below are spot checks with module contained in the host.

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP	Measured PSD
HT 20	5260	Mcs0	14	18.0	21.50	3.1
HE 80	5290	Mcs0	13	17.5	21	-3.5

5.4.2 UNII-2C

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP	Measured PSD
HT 20	5500	Mcs0	31	23.4	26.90	9.2
HT 20	5600	Mcs0	32	23.5	27.00	9.5
HT 20	5700	Mcs0	32	23.7	27.20	9.3
HT 40	5500	Mcs0	31	23.8	27.30	8.1
HT 40	5600	Mcs0	32	23.9	27.40	8.4
HT 40	5700	Mcs0	31	23.5	27.00	7.6
VHT 20	5500	Mcs0	31	23.6	27.10	9.2
VHT 20	5600	Mcs0	32	23.6	27.10	9.3
VHT 20	5700	Mcs0	32	23.7	27.20	9.5
VHT 40	5510	Mcs0	31.5	23.8	27.30	7.3
VHT 40	5590	Mcs0	32	23.8	27.30	7.6
VHT 40	5670	Mcs0	31.5	23.5	27.00	6.9
VHT 80	5530	Mcs0	31.5	23.6	27.10	4.3
VHT 80	5610	Mcs0	32	23.7	27.20	4.3
VHT 80	5690	Mcs0	32	23.8	27.30	4.3
VHT 160	5570	Mcs0	31.5	23.8	27.30	2.1
HE 20	5500	Mcs0	31.5	23.8	27.30	9.0
HE 20	5600	Mcs0	32	23.8	27.30	9.2

HE 20	5700	Mcs0	31.5	23.6	27.10	8.8
HE 40	5510	Mcs0	31.5	23.9	27.40	7.2
HE 40	5590	Mcs0	31.5	23.5	27.00	6.7
HE 40	5670	Mcs0	31.5	23.7	27.20	6.9
HE 80	5530	Mcs0	31.5	23.9	27.40	4.5
HE 80	5610	Mcs0	31.5	23.5	27.00	4.0
HE 80	5690	Mcs0	31.5	23.6	27.10	4.0
HE 160	5570	Mcs0	31.5	23.9	27.40	2.1

Result

In the configuration tested, the maximum average RF output power was less than 1 watt; therefore, the EUT complied with the requirements of the specification.

5.5 §15.407(b) Spurious Emissions

5.5.1 Conducted Spurious Emissions

The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental frequency was investigated to measure any antenna-conducted emissions. The graphs show the measurement data from spurious emissions noted across the frequency range when transmitting at the lowest frequency, middle frequency and upper frequency. Shown below are plots with the EUT turned to the upper and lower channels with the antenna gain of 3.5 dBi accounted for. These demonstrate compliance with the provisions of this section at the band edges.

The emissions must be below -27 dBm EIRP.

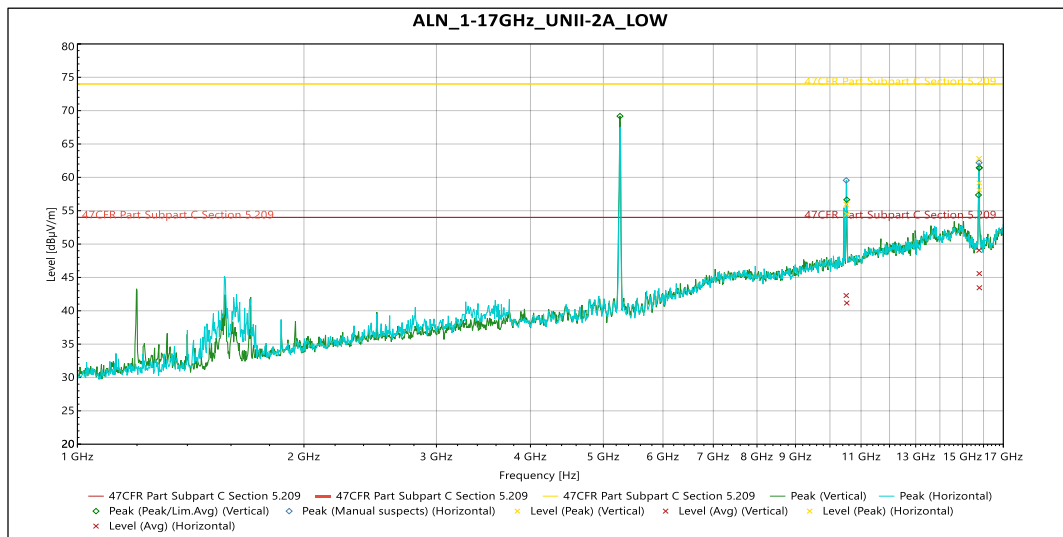
Result

Conducted spurious emissions were below -27 dBm; therefore, the EUT complies with the specification. See Annex for results.

5.5.2 Radiated Spurious Emissions in the Restricted Bands of § 15.205

The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental emissions was investigated to measure any radiated emissions in the restricted bands. For frequencies above 18.0 GHz. The emissions in the restricted bans must meet the limits specified in § 15.209. Conducted measurement results are included in the Annex. Radiated data with the EUT transmitting into a load is included below. All emissions between the required frequencies were investigated, the following plots represent the worst case. The “fail” is the transmitted signal exceeding the spurious limit.

5.5.3 UNII-2A



Vertical

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	10.529 GHz	54.495	74	-19.505	51	3.455	Vertical	10.224
Peak	15.794 GHz	59.163	74	-14.837	325	3.629	Vertical	12.162
Peak	15.799 GHz	58.096	74	-15.904	152	3.806	Vertical	12.154

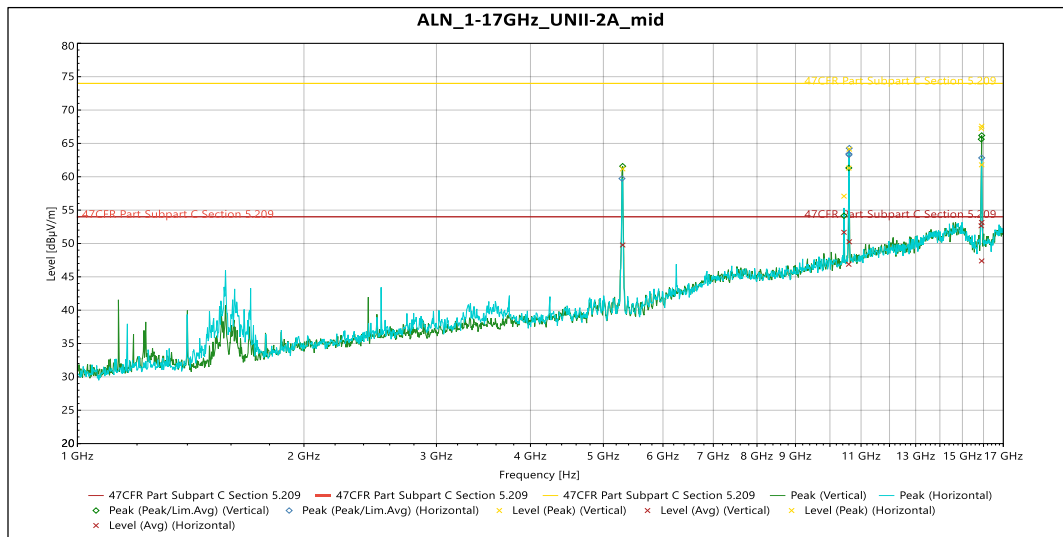
Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	10.529 GHz	41.156	54	-12.844	51	3.455	Vertical	10.224
Avg	15.794 GHz	45.576	54	-8.424	325	3.629	Vertical	12.162
Avg	15.799 GHz	43.453	54	-10.547	152	3.806	Vertical	12.154

Horizontal

Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	10.513 GHz	55.96	74	-18.04	102	3.452	Horizontal	10.1
Peak	15.785 GHz	62.816	74	-11.184	93	3.273	Horizontal	12.176

Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	10.513 GHz	42.284	54	-11.716	102	3.452	Horizontal	10.1
Avg	15.785 GHz	49.068	54	-4.932	93	3.273	Horizontal	12.176

Table 5: Radiated Emissions at the Lowest Frequency 1 – 17 GHz



Vertical

Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	10.44 GHz	57.089	74	-16.911	245	2.025	Vertical	10.189
Peak	10.594 GHz	61.297	74	-12.703	120	2.715	Vertical	10.609
Peak	15.89 GHz	67.238	74	-6.762	57	2.569	Vertical	12.484
Peak	15.912 GHz	67.592	74	-6.408	58	2.552	Vertical	12.577

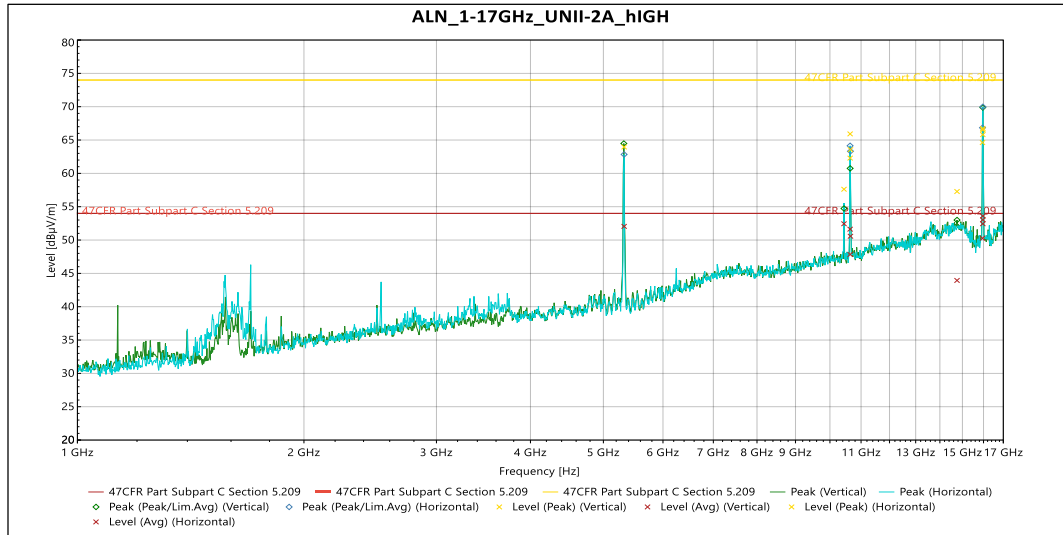
Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	10.44 GHz	51.674	54	-2.326	245	2.025	Vertical	10.189
Avg	10.594 GHz	46.881	54	-7.119	120	2.715	Vertical	10.609
Avg	15.89 GHz	52.651	54	-1.349	57	2.569	Vertical	12.484
Avg	15.912 GHz	53.145	54	-0.855	58	2.552	Vertical	12.577

Horizontal

Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	10.61 GHz	64.144	74	-9.856	110	2.926	Horizontal	10.689

Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	15.91 GHz	61.786	74	-12.214	334	2.926	Horizontal	12.572

Source	Frequency	Level dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	10.61 GHz	50.253	54	-3.747	110	2.926	Horizontal	10.689
Avg	15.91 GHz	47.381	54	-6.619	334	2.926	Horizontal	12.572

Table 6: Radiated Emissions at the Middle Frequency 1 – 17 GHz

Vertical

Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	10.44 GHz	57.624	74	-16.376	161	3.102	Vertical	10.189
Peak	10.639 GHz	62.294	74	-11.706	95	3.277	Vertical	10.501
Peak	14.754 GHz	57.283	74	-16.717	48	3.801	Vertical	14.694
Peak	15.966 GHz	65.813	74	-8.187	56	3.803	Vertical	12.477

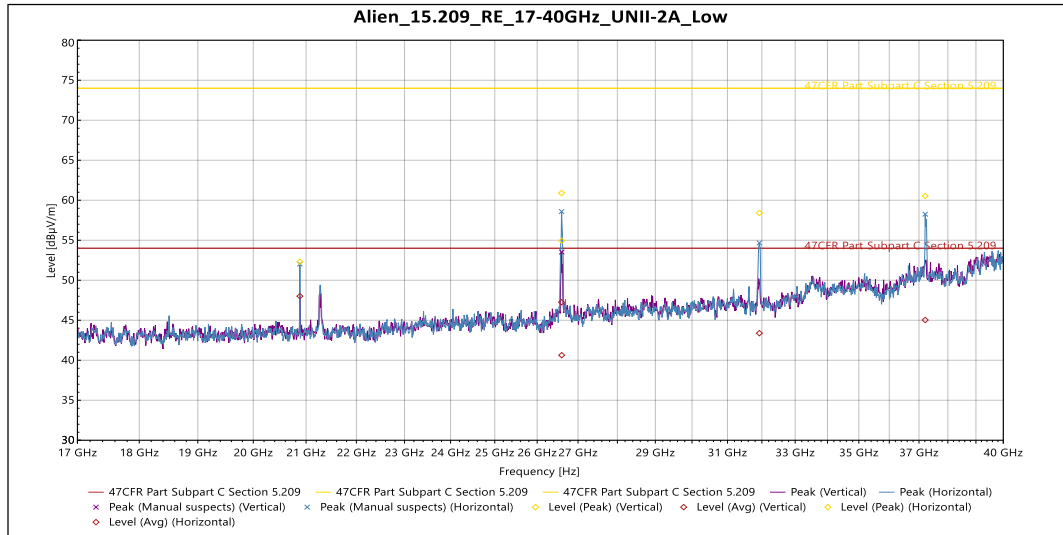
Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	10.44 GHz	52.439	54	-1.561	161	3.102	Vertical	10.189
Avg	10.639 GHz	47.844	54	-6.156	95	3.277	Vertical	10.501
Avg	14.754 GHz	43.94	54	-10.06	48	3.801	Vertical	14.694
Avg	15.966 GHz	52.438	54	-1.562	56	3.803	Vertical	12.477

Horizontal

Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	10.638 GHz	65.916	74	-8.084	100	3.632	Horizontal	10.491
Peak	10.649 GHz	63.545	74	-10.455	108	3.805	Horizontal	10.613
Peak	15.95 GHz	64.62	74	-9.38	356	1.5	Horizontal	12.625
Peak	15.967 GHz	66.743	74	-7.257	177	1.999	Horizontal	12.486
Peak	15.968 GHz	66.515	74	-7.485	167	1.99	Horizontal	12.496

Source	Frequency	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	10.638 GHz	51.626	54	-2.374	100	3.632	Horizontal	10.491
Avg	10.649 GHz	50.569	54	-3.431	108	3.805	Horizontal	10.613

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	15.95 GHz	50.27	54	-3.73	356	1.5	Horizontal	12.625
Avg	15.967 GHz	53.603	54	-0.397	177	1.999	Horizontal	12.486
Avg	15.968 GHz	53.035	54	-0.965	167	1.99	Horizontal	12.496

Table 7: Radiated Emissions at the Highest Frequency 1 – 17 GHz

Vertical

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
Peak	26.596 GHz	54.93	74	-19.07	47	Vertical	-5.049

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
Avg	26.596 GHz	40.628	54	-13.372	47	Vertical	-5.049

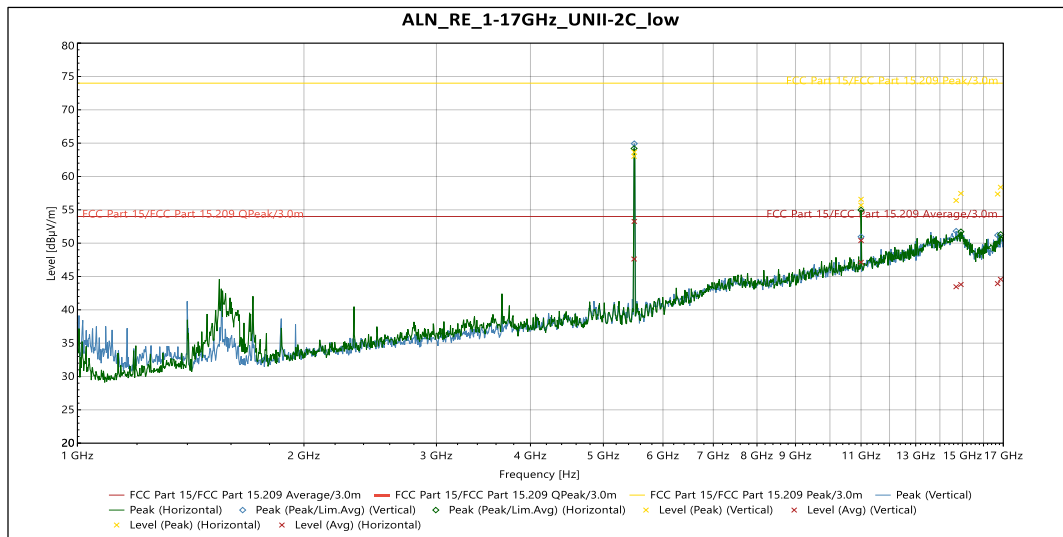
Horizontal

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
Peak	20.88 GHz	52.308	74	-21.692	319	Horizontal	-5.808
Peak	26.592 GHz	60.905	74	-13.095	68	Horizontal	-5.049
Peak	31.926 GHz	58.409	74	-15.591	20	Horizontal	-0.244
Peak	37.215 GHz	60.53	74	-13.47	81	Horizontal	1.425

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
Avg	20.88 GHz	48.009	54	-5.991	319	Horizontal	-5.808
Avg	26.592 GHz	47.249	54	-6.751	68	Horizontal	-5.049
Avg	31.926 GHz	43.376	54	-10.624	20	Horizontal	-0.244
Avg	37.215 GHz	45.034	54	-8.966	81	Horizontal	1.425

Table 8: Radiated Emissions at the Highest Frequency 17 – 40 GHz (worse case)

5.5.4 NII-2C



Vertical

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	11 GHz	55.694	74	-18.306	341	2.327	Vertical	10.428
Peak	14.715 GHz	56.401	74	-17.599	239	2.202	Vertical	14.195
Peak	16.707 GHz	57.374	74	-16.626	209	1.703	Vertical	15.575

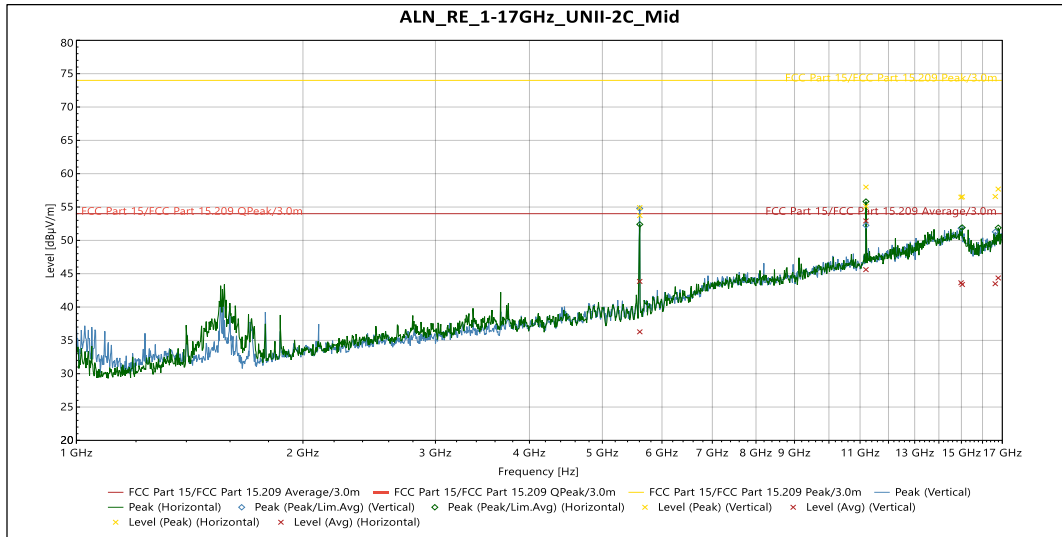
Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	11 GHz	47.129	54	-6.871	341	2.327	Vertical	10.428
Avg	14.715 GHz	43.46	54	-10.54	239	2.202	Vertical	14.195
Avg	16.707 GHz	43.929	54	-10.071	209	1.703	Vertical	15.575

Horizontal

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	11 GHz	56.58	74	-17.42	151	1.632	Horizontal	10.428
Peak	14.931 GHz	57.462	74	-16.538	42	4	Horizontal	14.653
Peak	16.861 GHz	58.388	74	-15.612	148	2.822	Horizontal	16.375

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	11 GHz	50.397	54	-3.603	151	1.632	Horizontal	10.428
Avg	14.931 GHz	43.802	54	-10.198	42	4	Horizontal	14.653
Avg	16.861 GHz	44.576	54	-9.424	148	2.822	Horizontal	16.375

Table 9: Radiated Emissions at the Lowest Frequency 1 – 17 GHz


Vertical

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	11.2 GHz	55.1	74	-18.9	212	2.827	Vertical	10.543
Peak	14.983 GHz	56.47	74	-17.53	328	3.803	Vertical	14.42
Peak	16.637 GHz	56.567	74	-17.433	269	2.32	Vertical	15.119

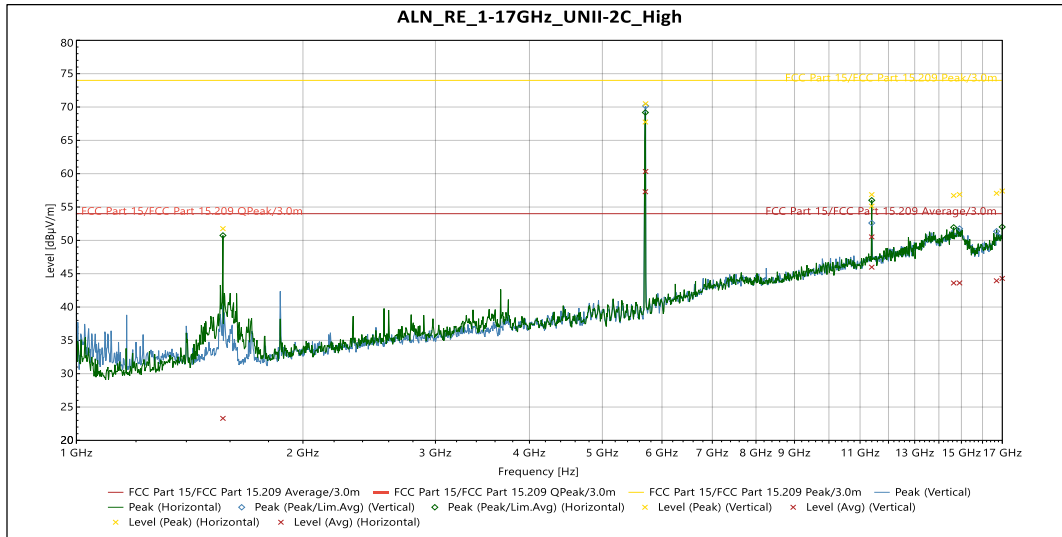
Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	11.2 GHz	45.608	54	-8.392	212	2.827	Vertical	10.543
Avg	14.983 GHz	43.641	54	-10.359	328	3.803	Vertical	14.42
Avg	16.637 GHz	43.495	54	-10.505	269	2.32	Vertical	15.119

Horizontal

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	11.2 GHz	57.994	74	-16.006	276	3.313	Horizontal	10.543
Peak	15.037 GHz	56.533	74	-17.467	273	1.5	Horizontal	14.439
Peak	16.789 GHz	57.691	74	-16.309	308	2.167	Horizontal	16.074

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	11.2 GHz	52.922	54	-1.078	276	3.313	Horizontal	10.543
Avg	15.037 GHz	43.385	54	-10.615	273	1.5	Horizontal	14.439
Avg	16.789 GHz	44.363	54	-9.637	308	2.167	Horizontal	16.074

Table 10: Radiated Emissions at the Middle Frequency 1 – 17 GHz


Vertical

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	11.4 GHz	55.131	74	-18.869	89	2.824	Vertical	11.17
Peak	14.915 GHz	56.893	74	-17.107	308	2.77	Vertical	14.51
Peak	16.704 GHz	57.056	74	-16.944	199	1.5	Vertical	15.582

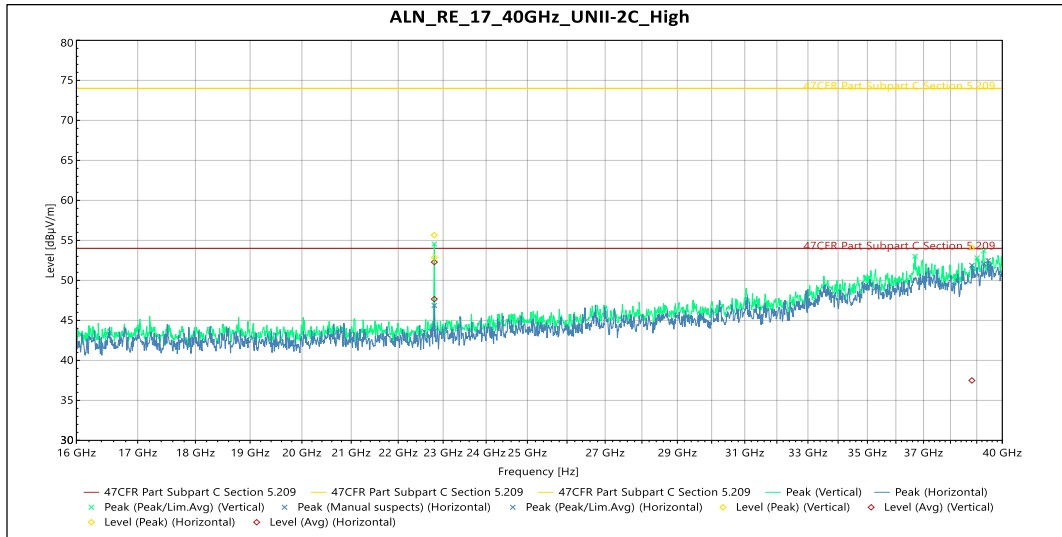
Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	11.4 GHz	45.978	54	-8.022	89	2.824	Vertical	11.17
Avg	14.915 GHz	43.611	54	-10.389	308	2.77	Vertical	14.51
Avg	16.704 GHz	43.935	54	-10.065	199	1.5	Vertical	15.582

Horizontal

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Peak	1.5657 GHz	51.763	74	-22.237	106	1.5	Horizontal	-10.744
Peak	11.4 GHz	56.865	74	-17.135	134	3.768	Horizontal	11.17
Peak	14.65 GHz	56.718	74	-17.282	331	3.806	Horizontal	14.455
Peak	16.994 GHz	57.403	74	-16.597	279	3.793	Horizontal	16.187

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
Avg	1.5657 GHz	23.297	54	-30.703	106	1.5	Horizontal	-10.744
Avg	11.4 GHz	50.516	54	-3.484	134	3.768	Horizontal	11.17
Avg	14.65 GHz	43.605	54	-10.395	331	3.806	Horizontal	14.455
Avg	16.994 GHz	44.295	54	-9.705	279	3.793	Horizontal	16.187

Table 11: Radiated Emissions at the Highest Frequency 1 – 17 GHz



Vertical

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
Peak	22.8 GHz	55.65	74	-18.35	278	Vertical	-4.946

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
Avg	22.8 GHz	52.277	54	-1.723	278	Vertical	-4.946

Horizontal

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
Peak	22.8 GHz	52.846	74	-21.154	265	Horizontal	-4.946
Peak	38.813 GHz	54.116	74	-19.884	82	Horizontal	2.236

Source	Frequency	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
Avg	22.8 GHz	47.662	54	-6.338	265	Horizontal	-4.946
Avg	38.813 GHz	37.494	54	-16.506	82	Horizontal	2.236

Table 12: Radiated Emissions at the Highest Frequency 17 – 40 GHz (worse case)

5.6 §15.407(a) Maximum Power Spectral Density

The maximum average power spectral density conducted from the intentional radiator of the antenna shall not be greater than 11 dBm in any 1 MHz band during any time interval of continuous transmission. Results of this testing are summarized. With a 3.5 dBi antenna, the conducted limit for power spectral density is 11 dBm.

5.6.1 UNII-2A

See Sporton International Inc. test report FR661623-13 FCC RF Test Report for FCC ID: SWX-M445GL and IC ID:6545A-M445GH

5.6.2 UNII-2C

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power *	Measured EIRP	Measured PSD
HT 20	5500	Mcs0	31	23.4	26.90	9.2
HT 20	5600	Mcs0	32	23.5	27.00	9.5
HT 20	5700	Mcs0	32	23.7	27.20	9.3
HT 40	5500	Mcs0	31	23.8	27.30	8.1
HT 40	5600	Mcs0	32	23.9	27.40	8.4
HT 40	5700	Mcs0	31	23.5	27.00	7.6
VHT 20	5500	Mcs0	31	23.6	27.10	9.2
VHT 20	5600	Mcs0	32	23.6	27.10	9.3
VHT 20	5700	Mcs0	32	23.7	27.20	9.5
VHT 40	5510	Mcs0	31.5	23.8	27.30	7.3
VHT 40	5590	Mcs0	32	23.8	27.30	7.6
VHT 40	5670	Mcs0	31.5	23.5	27.00	6.9
VHT 80	5530	Mcs0	31.5	23.6	27.10	4.3
VHT 80	5610	Mcs0	32	23.7	27.20	4.3
VHT 80	5690	Mcs0	32	23.8	27.30	4.3
VHT 160	5570	Mcs0	31.5	23.8	27.30	2.1
HE 20	5500	Mcs0	31.5	23.8	27.30	9.0
HE 20	5600	Mcs0	32	23.8	27.30	9.2
HE 20	5700	Mcs0	31.5	23.6	27.10	8.8
HE 40	5510	Mcs0	31.5	23.9	27.40	7.2
HE 40	5590	Mcs0	31.5	23.5	27.00	6.7
HE 40	5670	Mcs0	31.5	23.7	27.20	6.9
HE 80	5530	Mcs0	31.5	23.9	27.40	4.5
HE 80	5610	Mcs0	31.5	23.5	27.00	4.0
HE 80	5690	Mcs0	31.5	23.6	27.10	4.0
HE 160	5570	Mcs0	31.5	23.9	27.40	2.1

Result

The maximum average power spectral density was less than the limit of 8 dBm; therefore, the EUT complies with the specification.

5.7 DFS Requirement

This product is a client without radar detection. The outcome of the required DFS tests is located in the DFS Annex. The product passes all required DFS tests for a client without radar detection.

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
<i>Non-Occupancy Period</i>	Yes	Not Required	Yes
<i>DFS Detection Threshold</i>	Yes	Not Required	Yes
<i>Channel Availability Check Time</i>	Yes	Not Required	Not Required
<i>U-NII Detection Bandwidth</i>	Yes	Not Required	Yes

Requirement	Operational Mode	
	Master Client Without Radar Detection	Client With Radar Detection
<i>DFS Detection Threshold</i>	Yes	Not Required
<i>Channel Closing Transmission Time</i>	Yes	Yes
<i>Channel Move Time</i>	Yes	Yes
<i>U-NII Detection Bandwidth</i>	Yes	Not Required

-- End of Test Report --