



427 West 12800 South
Draper, UT 84020

Test Report Certification

FCC ID	SWX-UAPACLR
ISED ID	6545A-UAPACLR
Equipment Under Test	UAP-AC-LR
Test Report Serial Number	TR4534_03
Date of Test(s)	5 June 2020
Report Issue Date	12 June 2020

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

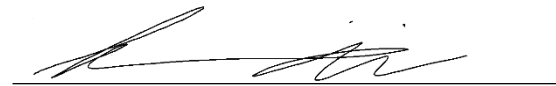
This report has been prepared by Unified Compliance Laboratory (UCL) to document compliance of the device described below with the requirement of Federal Communication Commissions (FCC) Part 15, Subpart E. This report may be reproduced in full. Partial reproduction of this report may only be made with 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	UniFi
Model Number	UAP-AC-LR
FCC ID	SWX-UAPACLR
ISED ID	6545A-UAPACLR

On this 12th day of June 2020, 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 federal government.

Unified Compliance Laboratory



Written By: Alex Macon



Reviewed By: Joseph W. Jackson

Revision History		
Revision	Description	Date
01	Original Report Release	12 June 2020
02	Updated Summary of Test frequency ranges Added Spurious results from 1 – 16 GHz	15 June 2020
03	Updated Section 2.9	07 August 2020

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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	UniFi
Model Number	UAP-AC-LR
Serial Number	NA
Dimensions (cm)	17.57 x 17.57 x 4.32

2.2 Description of EUT

The UAP-AC-LR is a wireless access points. The UAP-AC-LR has 2, 5 GHz TX paths

Band	Modulation Bandwidth	Frequency (MHz)
UNII-1	20 MHz	5180, 5200, 5220, 5240
	40 MHz	5190, 5230
	80 MHz	5210
UNII-2A	20 MHz	5260, 5280, 5300, 5320
	40 MHz	5270, 5310
	80 MHz	5290
UNII-2C	20 MHz	5500, 5520, 5540, 5560, 5580, *5600, *5620, *5640, 5660, 5680, 5700
	40 MHz	5510, 5550, *5590, *5630, 5670
	80 MHz	5530, *5610
UNII-3	20 MHz	5745, 5765, 5785, 5805, 5825
	40 MHz	5755, 5795,
	80 MHz	5775

*Frequencies are not supported in Canada

This report covers the circuitry of the device subject to FCC Part 15, Subpart E. Firmware version 4.3 was tested against select requirements of UNII 1, only.

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: UniFi(1) MN: UAP-AC-LR SN: N/A	2 port wireless access point	Ethernet/POE

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
Ethernet/POE	1	Shielded or Unshielded Cat 5e/<3m Shielded or Unshielded

2.5 Operating Environment

Power Supply	120VAC
AC Mains Frequency	60 Hz
Temperature	23.3 °C
Humidity	18.1 %
Barometric Pressure	1017 mBar

2.6 Operating Modes

The EUT were tested in constant transmit mode utilizing the command prompt ART. All modes were investigated with the worst case being reported.

2.7 EUT Exercise Software

The software used for testing is ART

2.8 Modification Incorporated/Special Accessories on EUT

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

2.9 Deviation, Opinions Additional Information or Interpretations from Test Standard

This is an abridged test report in response to an FCC Enforcement Bureau investigation: File No. EB-SED-17-00024731

The following deviations, opinions, additional information or interpretations of the test specification were made during testing.

- Following guidance from the FCC, the worst case output power found in the original filling was retested
- Following guidance from the FCC, Radiated Emissions was tested from 1 – 16 GHz only.

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	N/A
15.407(b)	RSS-Gen	Conducted Disturbance at Mains Port	0.15 to 30	N/A
15.407(c)	RSS-247 §6.2.2, §6.2.3	Bandwidth Requirement	5150 to 5250	N/A
15.407(e)	RSS-247 §6.2.2, §6.2.3	Peak Output Power	5150 to 5250	Compliant
15.407(f)	RSS-247 §6.2.2, §6.2.3	Antenna Conducted Spurious Emissions	0.009 to 40000	N/A
15.407(g)	RSS-247 §6.2.2, §6.2.3	Radiated Spurious Emissions	*1000 to 16000	Compliant
15.407(h)	RSS-247 §6.2.2, §6.2.3	Peak Power Spectral Density	5150 to 5250	N/A

The testing was performed according to the procedures in ANSI C63.10-2013, KDB 789033 and 47 CFR Part 15.

3.4 Results

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

- Output Power
- Radiated Spurious Emissions up to 16 GHz as requested by the FCC*

3.5 Test Location

Testing was performed at the Unified Compliance Laboratory 10-Meter chamber 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 2021.

4 Test Equipment

4.1 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	06/12/2019	06/12/2020
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	06/13/2019	06/13/2020
Switch Extension	R&S	OSP-150W	UCL-2870	06/14/2019	06/14/2020

Table 1: List of equipment used for Direct Connect at the Antenna Port

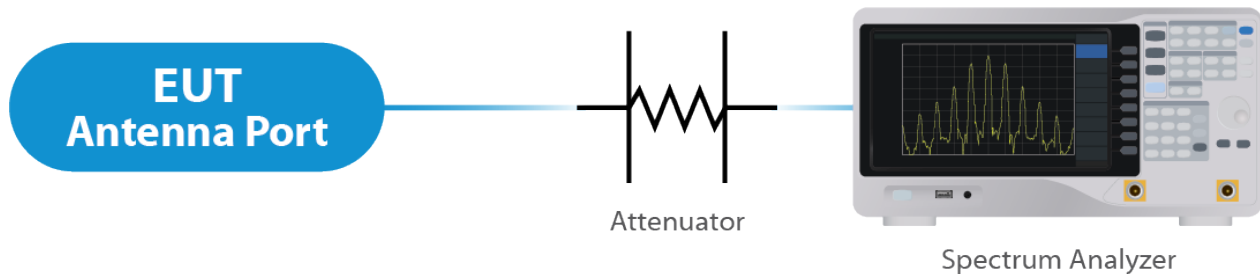
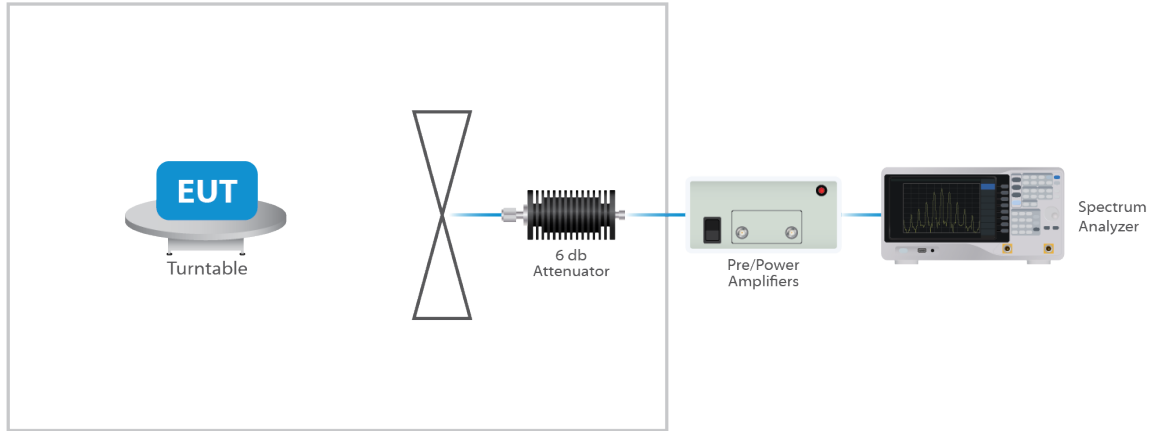


Figure 1: Direct Connect at the Antenna Port Test

4.2 Radiated Emissions

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
EMI Receiver	Keysight	N9038A	UCL-2778	11/26/2018	7/3/2020
Pre-Amplifier	Sonoma Instruments	310N	UCL-2889	9/13/2018	7/16/2020
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	4/11/2019	8/3/2020
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	4/11/2019	8/3/2020
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	2/15/2017	6/16/2020
18 - 40 GHz Amplifier	Scwarzbeck	BBV 9721	UCL-2490	4/1/2019	6/1/2020
0.5 - 18 GHz Amplifier	Scwarzbeck	BBV 9718C	UCL-2493	4/1/2019	6/1/2020
Loop Antenna	Com-Power	AL-130R	UCL-2596	10/26/2018	6/23/2020

Test Software	UCL	Revision 1	UCL-3108	N/A	N/A
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Table 2: List of equipment used for Radiated Emissions

Figure 2: Radiated Emissions Test

4.3 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.

4.4 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)	3.95	95
Radiated Emissions (1 GHz to 18 GHz)	5.56	95
Radiated Emissions (18 GHz to 40 GHz)	5.16	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 3.0 dBi. The antenna is not user replaceable.

Results

The EUT complied with the specification.

5.2 §15.403(a)(1) Maximum Average Output Power

The maximum average RF conducted output power measured for this device was 18.6 dBm. The limit is 30 dBm, or 1 Watt when using antennas with 23 dBi or less gain. The antenna has a gain of 3 dBi.

Modulation (BW)	Frequency (MHz)	Data Rate	Conducted Output Power	Measured EIRP
20 a mode	5180	Mcs0	17.2	20.2
20 n mode	5180	Mcs0	18.6	21.6
40 n mode	5190	Mcs0	16.3	19.3
VHT 80	5210	Mcs0	16.1	19.1

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. The data points taken were determined by investigating the worst case cases in the original test report.

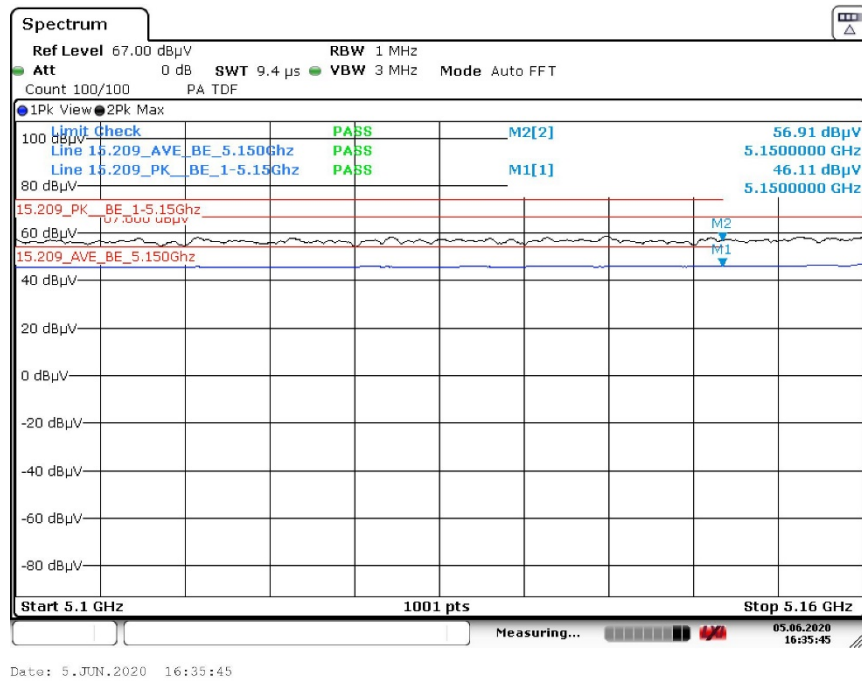
5.3 §15.407(b) Spurious Emissions

5.3.1 Radiated Spurious Emissions in the Restricted Band of § 15.205

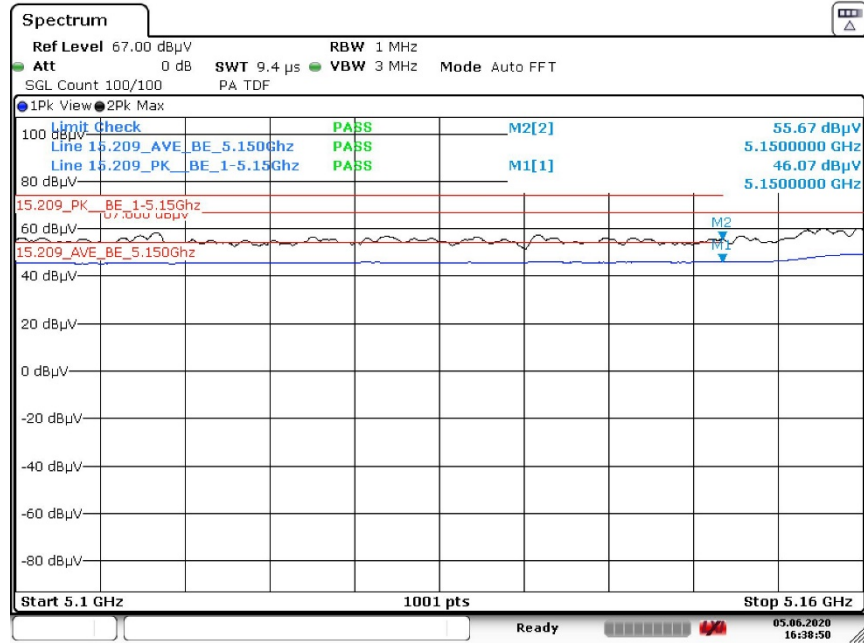
The band edge at the restricted band ending at 5150 MHz was measured using radiated measurement. The worse-case band edge at 5150 MHz is shown for each BW

Result

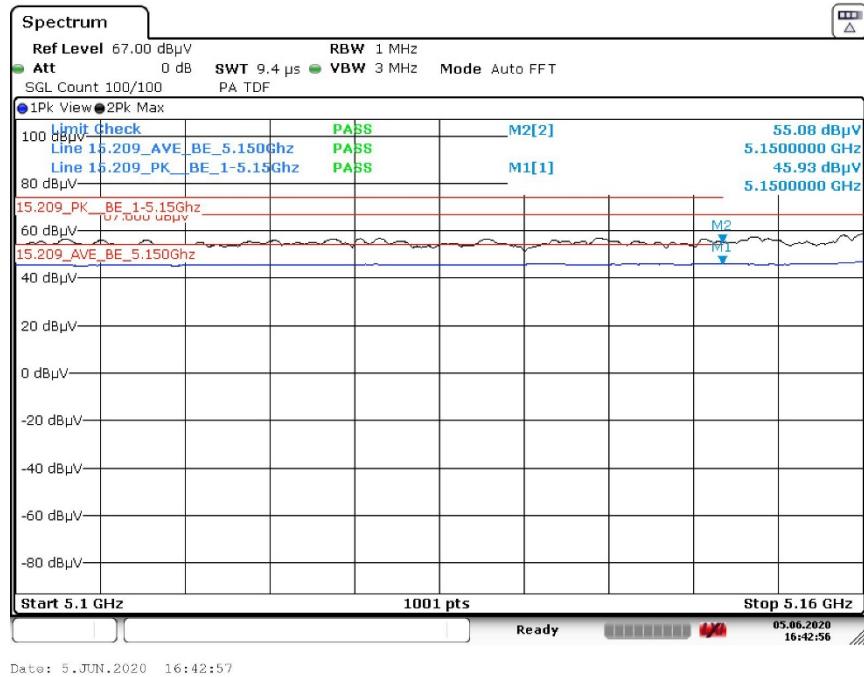
All emissions in the restricted bands of § 15.205 met the limits specified in § 15.209; therefore, the EUT complies with the specification. See Below for Radiated Band edge plots.



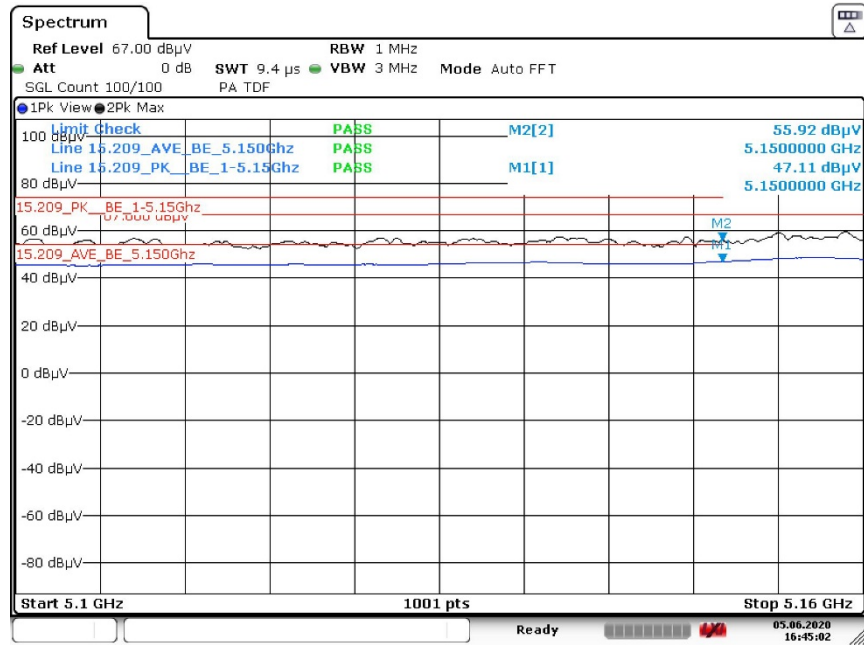
Plot 1: Transmitting on 5180 MHz a mode



Plot 2: Transmitting on 5180 MHz n mode

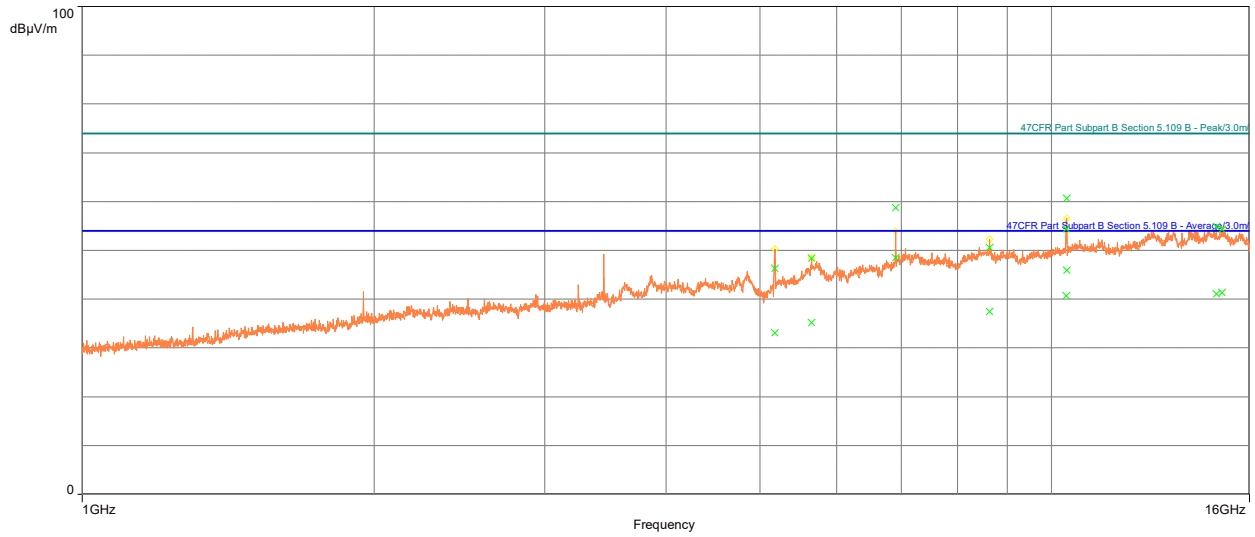


Plot 3 Transmitting on 5190 MHz n mode



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Plot 4 Transmitting on 5210 MHz ac mode

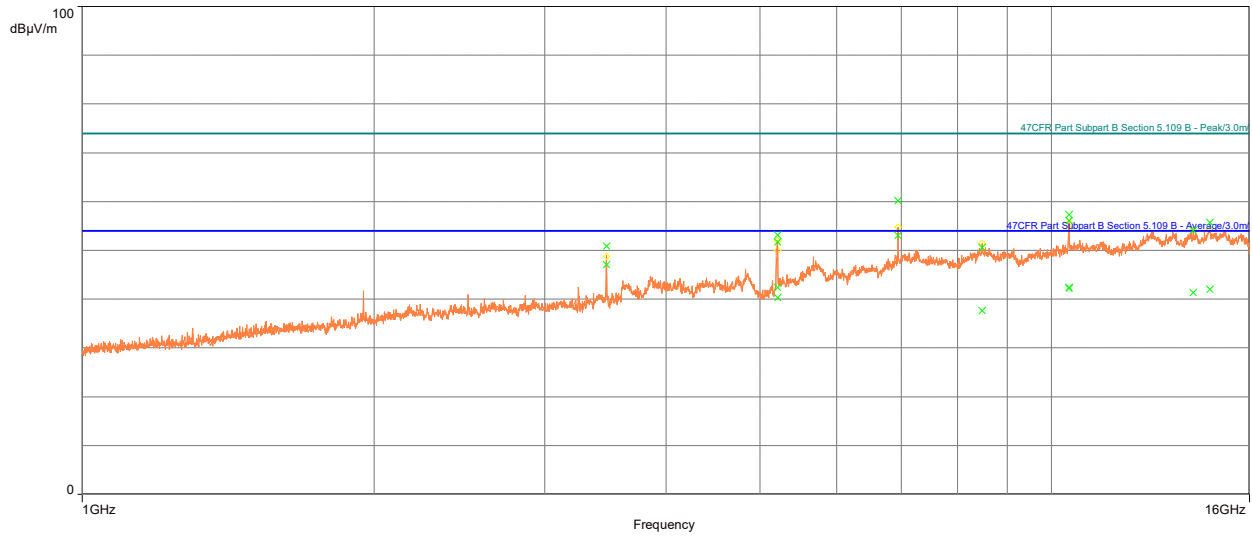

Plot 5 Transmitting on 5180 MHz ac mode

Average Results:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
5657.4	35.21	54.00	-18.79	62.00	2.04	Vertical	6.69
6906.3	48.52	54.00	-5.48	89.00	2.11	Vertical	7.95
10363	45.95	54.00	-8.05	124.00	2.11	Vertical	11.32
14787	41.06	54.00	-12.94	345.00	2.23	Vertical	14.78
8627.8	37.43	54.00	-16.57	279.00	0.58	Horizontal	10.89
10353	40.71	54.00	-13.29	40.00	1.86	Horizontal	11.27
14995	41.37	54.00	-12.63	257.00	3.94	Horizontal	15.21

Peak Results:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
5657.4	48.36	74.00	-25.64	62.00	2.04	Vertical	6.69
6906.3	58.74	74.00	-15.26	89.00	2.11	Vertical	7.95
10363	60.65	74.00	-13.35	124.00	2.11	Vertical	11.32
14787	54.81	74.00	-19.19	345.00	2.23	Vertical	14.78
8627.8	50.55	74.00	-23.45	279.00	0.58	Horizontal	10.89
10353	54.39	74.00	-19.61	40.00	1.86	Horizontal	11.27
14995	54.25	74.00	-19.75	257.00	3.94	Horizontal	15.21



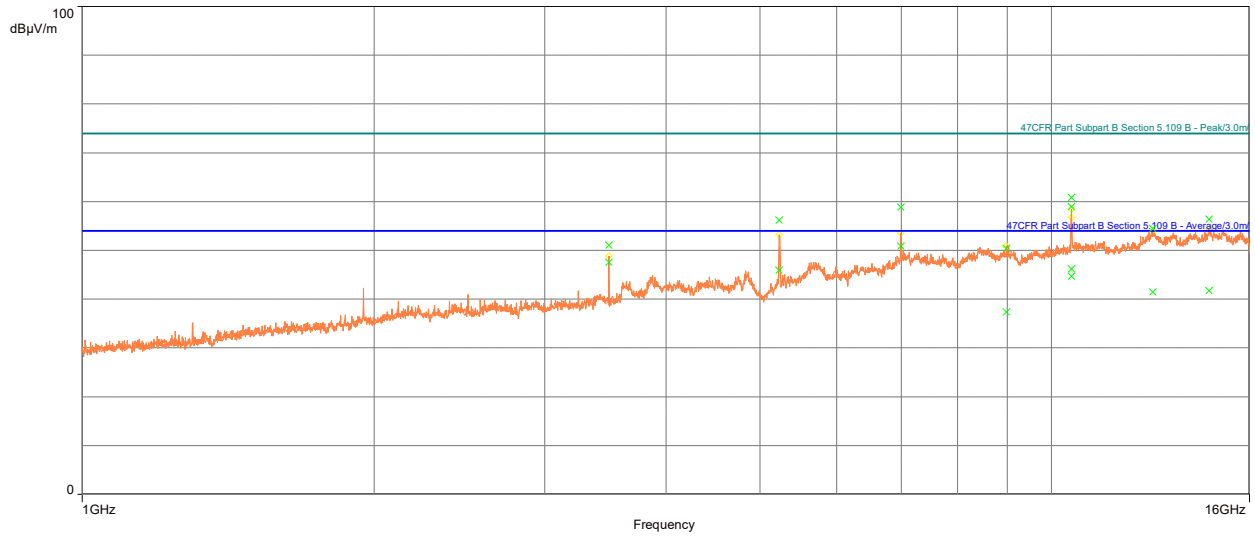
Plot 6 Transmitting on 5210 MHz ac mode

Average Results:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
6946.6	53.06	54.00	-0.94	75.00	1.86	Vertical	8.16
10419	42.41	54.00	-11.59	127.00	2.11	Vertical	11.62
13997	41.37	54.00	-12.63	305.00	3.44	Vertical	14.77
3473.6	47.07	54.00	-6.93	32.00	1.50	Horizontal	-2.36
8482.1	37.64	54.00	-16.36	21.00	3.34	Horizontal	10.66
10427	42.21	54.00	-11.79	45.00	3.11	Horizontal	11.66
14562	42.05	54.00	-11.95	212.00	3.23	Horizontal	15.44

Peak Results:

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
6946.6	60.15	74.00	-13.85	75.00	1.86	Vertical	8.16
10419	56.09	74.00	-17.91	127.00	2.11	Vertical	11.62
13997	54.06	74.00	-19.94	305.00	3.44	Vertical	14.77
3473.6	50.90	74.00	-23.10	32.00	1.50	Horizontal	-2.36
8482.1	50.58	74.00	-23.42	21.00	3.34	Horizontal	10.66
10427	57.34	74.00	-16.66	45.00	3.11	Horizontal	11.66
14562	55.76	74.00	-18.24	212.00	3.23	Horizontal	15.44


Plot 6 Transmitting on 5240 MHz ac mode
Average Results

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
6986.8	50.82	54.00	-3.18	70.00	1.92	Vertical	8.62
8979.3	37.36	54.00	-16.64	120.00	2.35	Vertical	10.16
10483	46.21	54.00	-7.79	26.00	2.59	Vertical	11.75
14533	41.74	54.00	-12.26	71.00	2.84	Vertical	15.68
3493.2	47.49	54.00	-6.51	28.00	2.23	Horizontal	-2.38
10479	44.69	54.00	-9.31	78.00	1.51	Horizontal	11.75
12712	41.42	54.00	-12.58	1.00	2.61	Horizontal	14.95

Peak Results

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
6986.8	58.82	74.00	-15.18	70.00	1.92	Vertical	8.62
8979.3	50.36	74.00	-23.64	120.00	2.35	Vertical	10.16
10483	60.81	74.00	-13.19	26.00	2.59	Vertical	11.75
14533	56.37	74.00	-17.63	71.00	2.84	Vertical	15.68
3493.2	51.10	74.00	-22.90	28.00	2.23	Horizontal	-2.38
10479	58.96	74.00	-15.04	78.00	1.51	Horizontal	11.75
12712	54.43	74.00	-19.57	1.00	2.61	Horizontal	14.95

-- End of Test Report --