



427 West 12800 South
 Draper, UT 84020

Test Report Certification

FCC ID	SWX-RM2WP
ISED ID	6545A-RM2WP
Equipment Under Test	Rocket M2
Test Report Serial Number	TR4039_01
Date of Test(s)	16 – 30 December 2019, 7 January and 26 March 2020
Report Issue Date	10 April 2020

Test Specification	Applicant
47 CFR FCC Part 15, Subpart C	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 C. 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	Rocket
Model Number	Rocket M2
FCC ID	SWX-RM2WP
ISED ID	6545A-RM2WP

On this 10th day of April 2019, 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.

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Unified Compliance Laboratory



Written By: Alex Macon



Reviewed By: Joseph W. Jackson

Revision History		
Revision	Description	Date
01	Original Report Release	10 April 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	Rocket
Model Number	Rocket M2
Serial Number	N/A
Dimensions (cm)	16 x 8 x 3

2.2 Description of EUT

The Ubiquiti Inc. M2, is a 2GHz, 802.11b/gn MIMO 2X2 Outdoor radio.

This report covers the circuitry of the device subject to FCC Part 15, Subpart C. The circuitry of the device subject to FCC Part 15 Subpart B was found to be compliant.

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: Rocket MN: Rocket M2 SN: None	Point to Point Transceiver	See section 2.4
BN: Ubiquiti Inc. MN: POE-24V-5X-HD SN: None	POE Supply	LAN Port See Section 2.4
BN: Dell MN: XPS SN: None	Laptop PC	LAN port / Shielded Cat 5e cable

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
DATA	1	Shielded Cat 5e cable/8meters
AC (PoE Injector)	1	3 conductor power cord/80cm
LAN (PoE Injector)	1	Un-shielded Cat 5e cable/1 meter

2.5 Operating Environment

Power Supply	120 VAC
AC Mains Frequency	60 Hz
Temperature	22 – 26 °C
Humidity	19 – 36.4 %
Barometric Pressure	1015 mBar

2.6 Operating Modes

The Rocket M2 was tested with 100% duty cycle using the command prompt ART. Modes B, G and N modes were tested.

2.7 EUT Exercise Software

The software used for testing is ART

2.8 Block Diagram of Test Configuration

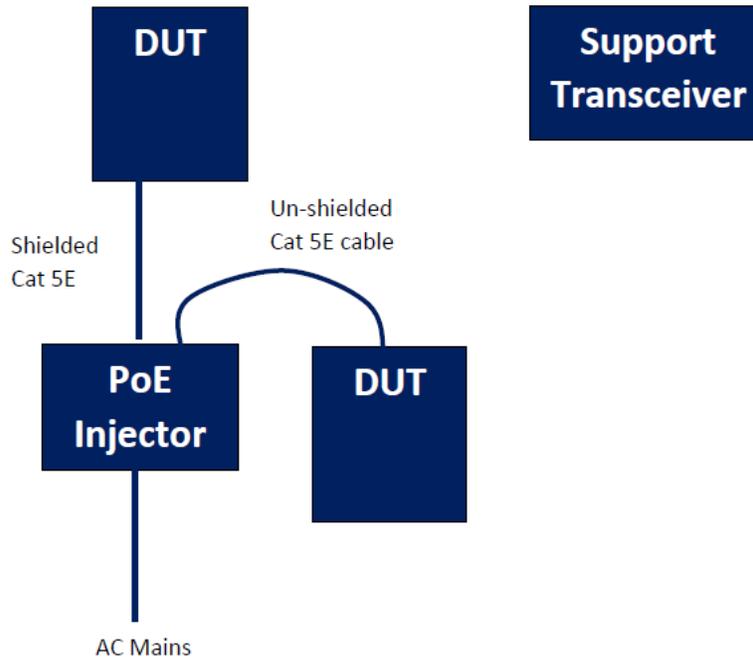


Diagram 1: Test Configuration Block Diagram

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 C 15.203, 15.207 and 15.247 Limits and methods of measurement of radio interference characteristics of radio frequency 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 15.203

See test standard for details.

3.2.2 47 CFR FCC Part 15 Section 15.207

See test standard for details.

3.2.3 47 CFR FCC Part 15 Section 15.247

See test standard for details.

3.3 FCC Part 15, Subpart C

3.3.1 Summary of Tests

FCC Section	ISED Section	Environmental Phenomena	Frequency Range (MHZ)	Result
15.203	RSS-Gen 6.8	Antenna requirements	Structural Requirement	Compliant
15.207	RSS-Gen 6.8	Conducted Disturbance at Mains Port	0.15 to 30	Compliant
15.247(a)	RSS-247 – 5.2	Bandwidth Requirement	2400 to 2483.5	Compliant
15.247(b)	RSS-247 – 5.4	Peak Output Power	2400 to 2483.5	Compliant
15.247(d)	RSS-247 – 5.5	Antenna Conducted Spurious Emissions	0.009 to 25000	Compliant
15.247(d)	RSS-247 – 5.5	Radiated Spurious Emissions	0.009 to 25000	Compliant
15.247(e)	RSS-247 – 5.2	Peak Power Spectral Density	2400 to 2483.5	Compliant
The testing was performed according to the procedures in ANSI C63.10-2013, KDB 558074 and 47 CFR Part 15.				

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 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 2020.

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	12/14/2018	4/17/2020
Transient Limiter	Com-Power	LIT-930A	UCL-2496	2/11/2019	2/11/2020
LISN	AFJ	LS16C/10	UCL-2512	12/14/2018	4/17/2020
Cat6 ISN	Teseq	ISN T8-Cat6	UCL-2971	2/11/2019	5/21/2020
ISN	Teseq	ISN T800	UCL-2974	2/19/2019	5/21/2020
LISN	Com-Power	LIN-120C	UCL-2612	2/11/2019	2/11/2020
AC Power Source	Laplace Instruments	AC1000A	UCL-2857	N/A	N/A
Monitoring Probe	Teseq	MD 4070A	UCL-2980	3/16/2019	5/21/2020
Test Software	UCL	Revision 1	UCL-3107	N/A	N/A

Table 1: List of equipment used for Conducted Emissions Testing at Mains Port

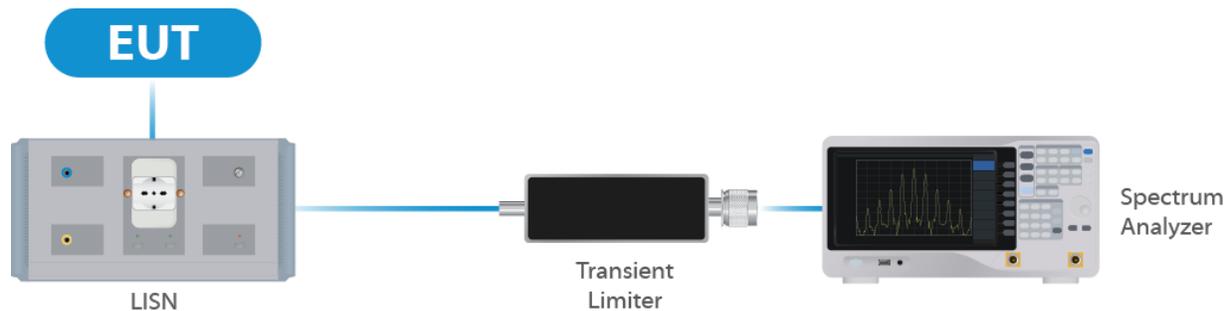


Figure 1: Conducted Emissions Test

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	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
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	4/11/2019	6/3/2020

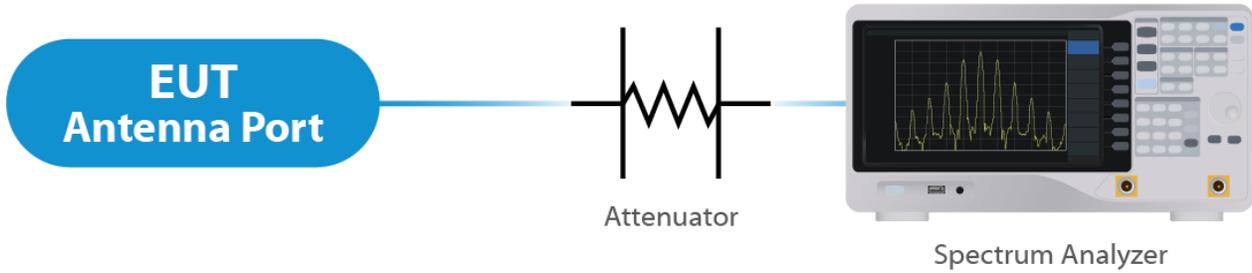


Figure 2: Direct Connect at the Antenna Port Test

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	11/26/2018	5/3/2020
Pre-Amplifier	Sonoma Instruments	310N	UCL-2889	9/13/2018	5/16/2020
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	4/11/2019	6/3/2020
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	4/11/2019	6/3/2020
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	2/15/2017	4/16/2020
18 – 40 GHz Amplifier	Scwarzbeck	BBV 9721	UCL-2490	4/1/2019	4/1/2020
0.5 – 18 GHz Amplifier	Scwarzbeck	BBV 9718C	UCL-2493	4/1/2019	4/1/2020
Loop Antenna	Com-Power	AL-130R	UCL-2596	10/26/2018	4/23/2020
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

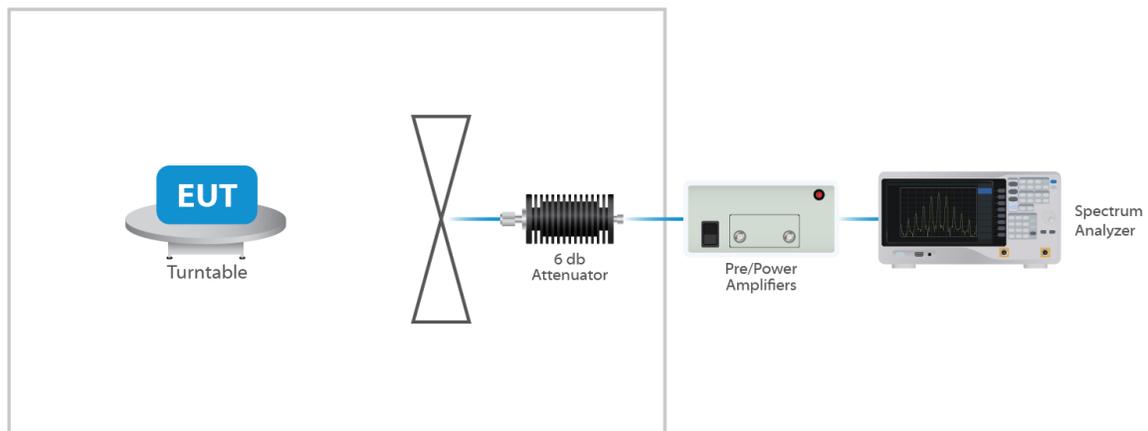


Figure 3: Radiated Emissions Test

4.4 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.

4.5 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

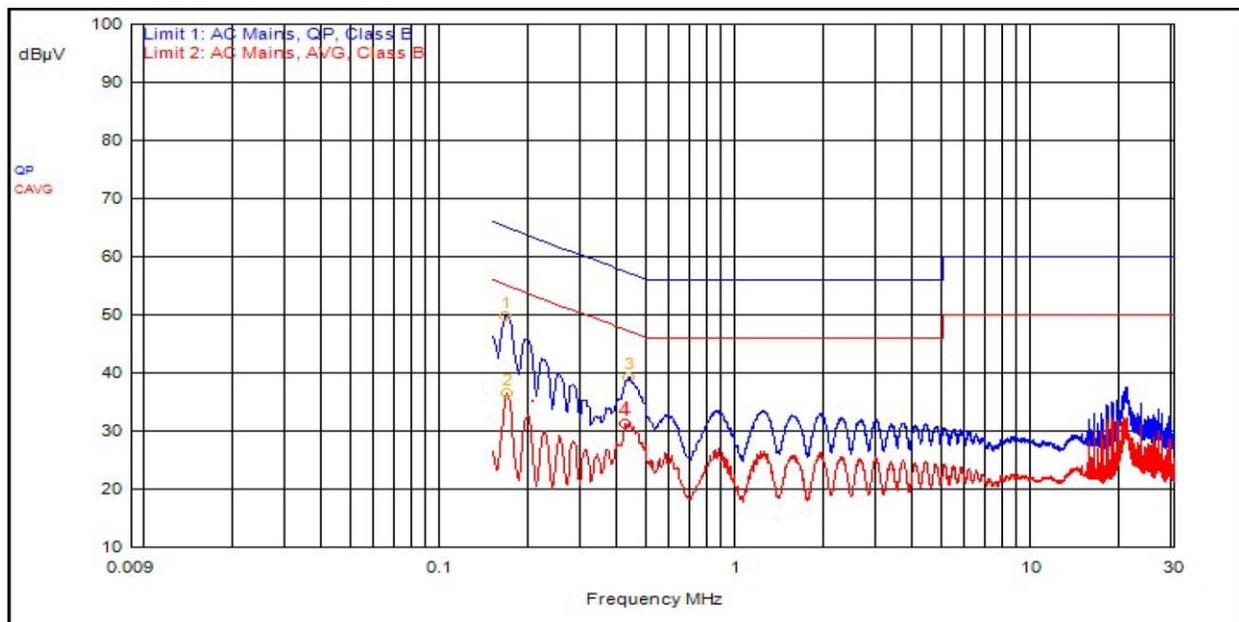
The EUT uses multiple antennas that must be professionally installed

Gain/Type	Model	Manufacturer
6dBi Omni	O-2G-6	Ubiquiti Inc.
13dBi Omni	AMO-2G13	Ubiquiti Inc.
16dBi Sector	AMS-2G-16	Ubiquiti Inc.
18dBi Panel	RP-2G-18	Ubiquiti Inc.
25dBi Grid	AG-2G-25	Ubiquiti Inc.

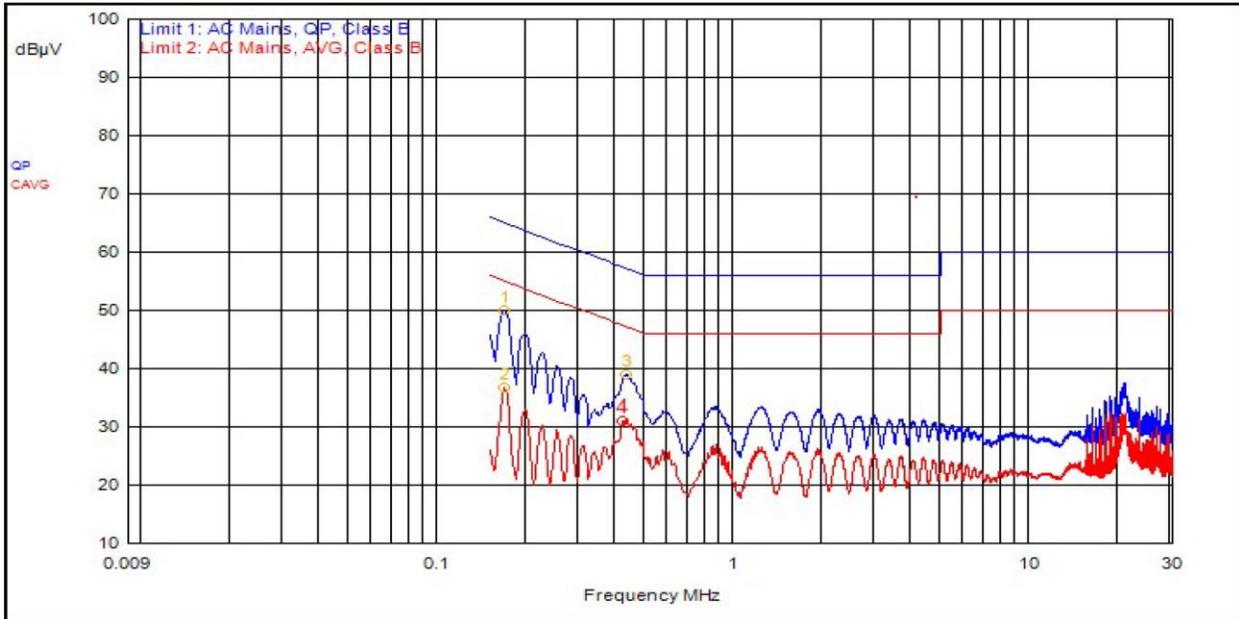
Results

The EUT complied with the specification

5.2 Conducted Emissions at Mains Ports Data



Line



Neutral

Result

The EUT complied with the specification limit.

5.3 §15.247(a)(2) Measured Bandwidth

Mode	Frequency (MHz)	Emissions 99% Bandwidth (MHz)	Emissions 6 dB Bandwidth (MHz)
b	2412	3.52	2.65
	2437	3.5	2.65
	2462	3.5	2.65
g	2412	4.32	4.15
	2437	4.1	4.25
	2462	4.15	4.2
n	2412	4.45	4.55
	2437	4.42	4.55
	2462	4.45	4.55

Result

In the configuration tested, the worst case 6 dB bandwidth was greater than 500 kHz; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plots within the annex).

5.4 §15.247(b)(3) Maximum Average Output Power

The maximum average RF conducted output power measured for this device was 30.0 dBm or 1.0 W. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 4.0 dBi.

b Mode

Bandwidth	Test Frequency	TP setting	Measured EIRP	Conducted Output Power
MHz	MHz		dBm	dBm
5	2412	19	33.4	29.4
5	2437	14	28.9	24.9
5	2462	15	28.8	24.8
8	2412	19	33.2	29.4
8	2437	16	30.8	26.8
8	2462	17	31.6	27.6
10	2412	19	33.3	29.3
10	2437	17	31.5	27.5
10	2462	17	31.1	27.1
20	2412	19	33.5	29.5
20	2437	19	33.3	29.3
20	2462	19	32.9	28.9

g Mode

Bandwidth	Test Frequency	TP setting	Measured EIRP	Conducted Output Power
MHz	MHz		dBm	dBm
5	2412	19	32.5	28.5
5	2437	14	28.8	24.8
5	2462	15	29.3	25.3
8	2412	19	32.8	28.8
8	2437	16	30.7	26.7
8	2462	17	31.5	27.5
10	2412	19	32.8	28.8
10	2437	17	31.8	27.8
10	2462	17	31.3	27.3
20	2412	19	33.1	29.1
20	2437	19	33.3	29.3
20	2462	19	33.1	29.1

n Mode

Bandwidth	Test Frequency	TP setting	Measured EIRP	Conducted Output Power
MHz	MHz		dBm	dBm
5	2412	13	28.2	24.2
5	2437	13	28.4	25.5
5	2462	12	27.1	26.5
8	2412	13	28.1	29.7
8	2437	13	28.3	24.3
8	2462	12	26.9	22.9
10	2412	13	28.5	24.5
10	2437	13	28.5	24.5
10	2462	12	27.0	23.0
20	2412	7	22.7	18.7
20	2437	14	29.7	25.7
20	2462	10	25.5	21.5
30	2417	4	20.1	16.1
30	2437	12	28.0	24.0
30	2457	7	22.7	18.7
40	2422	3	18.8	14.8
40	2437	7	22.7	18.7
40	2452	4	19.3	15.3

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 §15.247(d) 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 table show the measurement data from spurious emissions noted across the frequency range when transmitting at the lowest frequency, middle frequency and upper frequency. Shown within the annexes are plots with the EUT tuned to the upper and lower channels. These demonstrate compliance with the provisions of this section at the band edges.

The emissions must be attenuated 30 dB below the highest power spectral density level measured within the authorized band as measured with a 100 kHz RBW.

Result

Conducted spurious emissions were attenuated 30 dB or more below the fundamental; therefore, the EUT complies with the specification.

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. The following tables show measurements of any emissions that fell into the restricted bands of §15.205. The tables show the worst-case emissions measured from the EUT while terminated into a load. For frequencies above 18.0 GHz, a measurement distance of 1 meter was used. The noise floor was a minimum of 6 dB below the limits. The emissions in the restricted bands must meet the limits specified in §15.209. Tabular data for the worst spurious emissions is shown below. Plots of the band edges are also shown in the annex

Frequency (MHz)	Corrected Level (dBuV)	Criteria (dBuV)	Margin (dB)
4822.0	41.82	54	-12.18
4822.0	59.89	74	-14.11
7239.4	48.57	54	-5.43
7239.4	65.58	74	-8.42

Table 2: Transmitting on the Low Channel

Frequency (MHz)	Corrected Level (dBuV)	Criteria (dBuV)	Margin (dB)
4872.4	42.66	54	-11.34
4872.4	57.11	74	-16.89
7315.7	47.89	54	-6.11
7306.7	66.62	74	-7.38

Table 3: Transmitting on the Middle Channel

Frequency (MHz)	Corrected Level (dBuV)	Criteria (dBuV)	Margin (dB)
4923.5	41.61	54	-12.39
4923.5	55.02	74	-18.98
7388.2	46.32	54	-7.68
7388.2	65.09	74	-8.91

Table 4: Transmitting on the High Channel

Result

All emissions in the restricted bands of §15.205 met the limits specified in §15.209; therefore, the EUT complies with the specification.

5.6 §15.247(e) Maximum Average Power Spectral Density

The maximum average power spectral density conducted from the intentional radiator of the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. Results of this testing are summarized.

b Mode

Bandwidth	Test Frequency	Conducted Aggregate PSD
MHz	MHz	dBm
5	2412	5.388
5	2437	4.15
5	2462	5.622
8	2412	4.036
8	2437	5.959
8	2462	5.504
10	2412	7.559
10	2437	5.231
10	2462	4.925
20	2412	0.261
20	2437	-0.653
20	2462	-0.771

g Mode

Bandwidth	Test Frequency	Conducted Aggregate PSD
MHz	MHz	dBm
5	2412	6.53
5	2437	3.907
5	2462	4.542
8	2412	6.089
8	2437	3.583
8	2462	3.702
10	2412	5.03
10	2437	3.578
10	2462	3.626
20	2412	-2.938
20	2437	-2.718
20	2462	7.954

n Mode

Bandwidth	Test Frequency	Conducted Aggregate PSD
MHz	MHz	dBm
5	2412	2.35
5	2437	1.72
5	2462	1.82
8	2412	0.84
8	2437	0.79
8	2462	0.17
10	2412	0.67
10	2437	-0.35
10	2462	-0.71
20	2412	-2.16
20	2437	4.93
20	2462	1.15
30	2417	-5.0
30	2437	2.37
30	2457	-2.78
40	2422	-7.36
40	2437	-3.59
40	2452	-7.75

Result

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

-- End of Test Report --