UNIFIED COMPLIANCE LABORATORY

427 West 12800 South
Draper, UT 84020

Test Report

Certification

FCC ID	SWX-U6IW
IC ID	6545A-U6IW
Equipment Under Test	U6-IW
Test Report Serial Number	TR4209_01
Date of Test(s)	28 April and 6 May 2020
Report Issue Date	8 May 2020

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

NVLAP TESTING ilac-MRA

NVLAP LAB CODE 600241-0

Certification of Engineering Report

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Applicant	Ubiquiti Inc.
Manufacturer	Ubiquiti Inc.
Brand Name	UniFi
Model Number	U6-IW
FCC ID	SWX-U6IW
IC ID	6545A-U6IW

On this 8th day of May 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.

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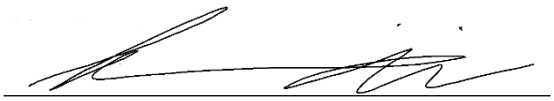
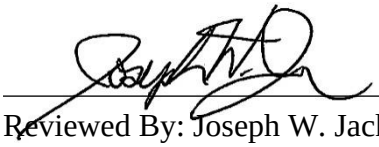
Unified Compliance Laboratory



Written By: Alex Macon



Reviewed By: Joseph W. Jackson

Revision History		
Revision	**Description**	**Date**
01	Original Report Release	8 May 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	U6-IW
Serial Number	NA
Dimensions (cm)	13.3 x 7.6 x 3.2

2.2 Description of EUT

The U6-IW is an in-wall Wi-Fi 6 access point that can be mounted into a standard wall outlet. It includes 4 Gigabit Ethernet ports for wired connectivity, one of which offers PoE passthrough for an 802.3af device. U6-IW delivers an aggregate radio rate of up to 2.7 Gbps with 5 GHz (4x4 MU-MIMO and OFDMA) and 2.4 GHz (2x2 MIMO) radios. U6-IW seamlessly blends into any room with its refined industrial design.

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 and is covered under Unified Compliance Laboratory 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: UniFi MN: U6-IW SN: NA	In-Wall Access point	See Section 2.4

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
POE	1	Ethernet/<3m

2.5 Operating Environment

Power Supply	120 VAC
AC Mains Frequency	60 Hz

Temperature	21.5 – 22.3 °C
Humidity	22.6 – 26.5 %
Barometric Pressure	1014psi

2.6 Operating Modes

The U6-IW was tested using test software in order to enable to constant transmission of over 98% All emission modes of 802.11 b/g/n were investigated.

2.7 EUT Exercise Software

Ubiquiti test software and firmware were used to control the transceivers of the EUT. (ART)

2.8 Block Diagram of Test Configuration

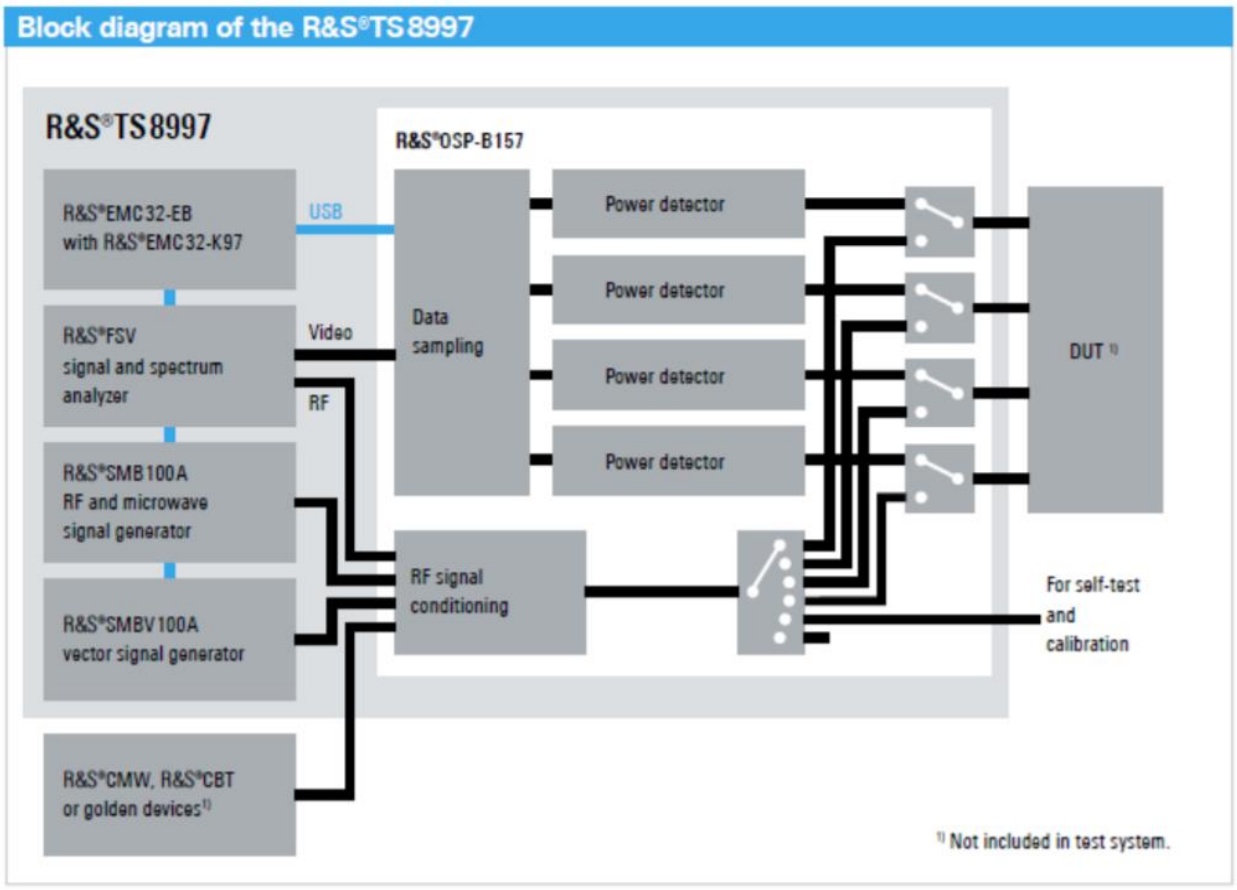


Diagram 1: Test Configuration Block Diagram

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	Environmental Phenomena	Frequency Range (MHZ)	Result
15.203	Antenna requirements	N/A	Compliant
15.207	Conducted Disturbance at Mains Port	0.15 to 30	Compliant
15.247(a)	Bandwidth Requirement	2400 to 2483.5	Compliant
15.247(b)	Peak Output Power	2400 to 2483.5	Compliant
15.247(d)	Radiated Spurious Emissions	0.009 to 25000	Compliant
15.247(e)	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. This site has also been registered with Innovations, Science and Economic Development (ISED) department and was accepted under Appendix B, Phase 1 procedures of the APEC Tel MRA for Canadian recognition. ISED No.: 25346, effective until June 30, 2020. 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	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

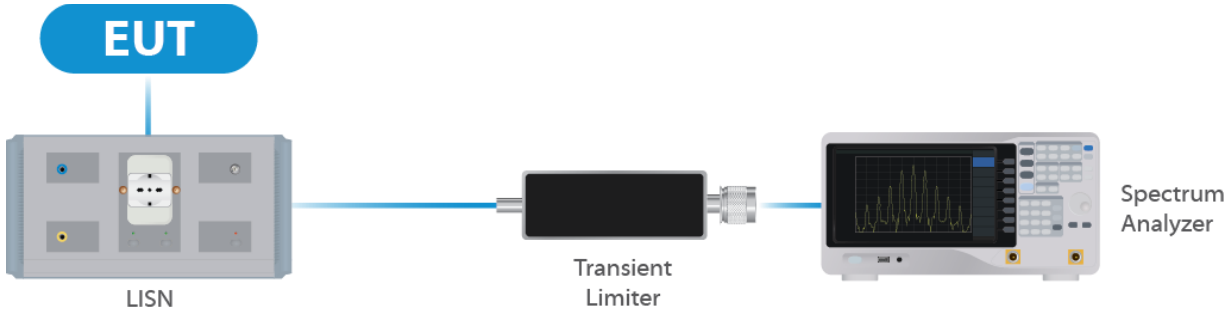


Figure 1: Conducted Emissions Test

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

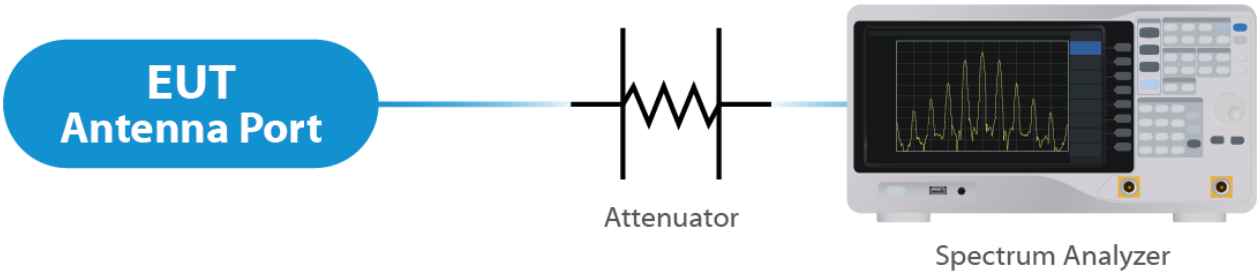


Figure 2: Direct Connect at the Antenna Port Test

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

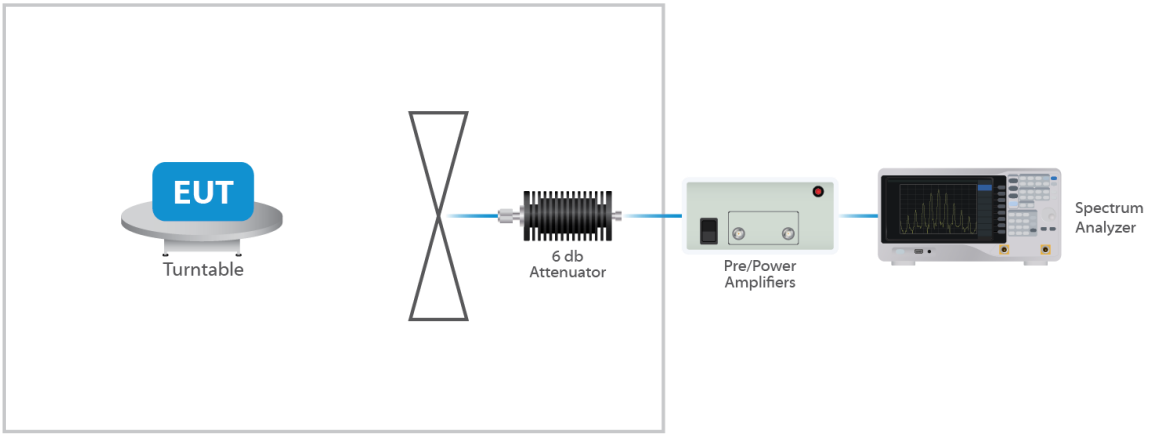


Figure 3: Radiated Emissions Test

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 (± 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

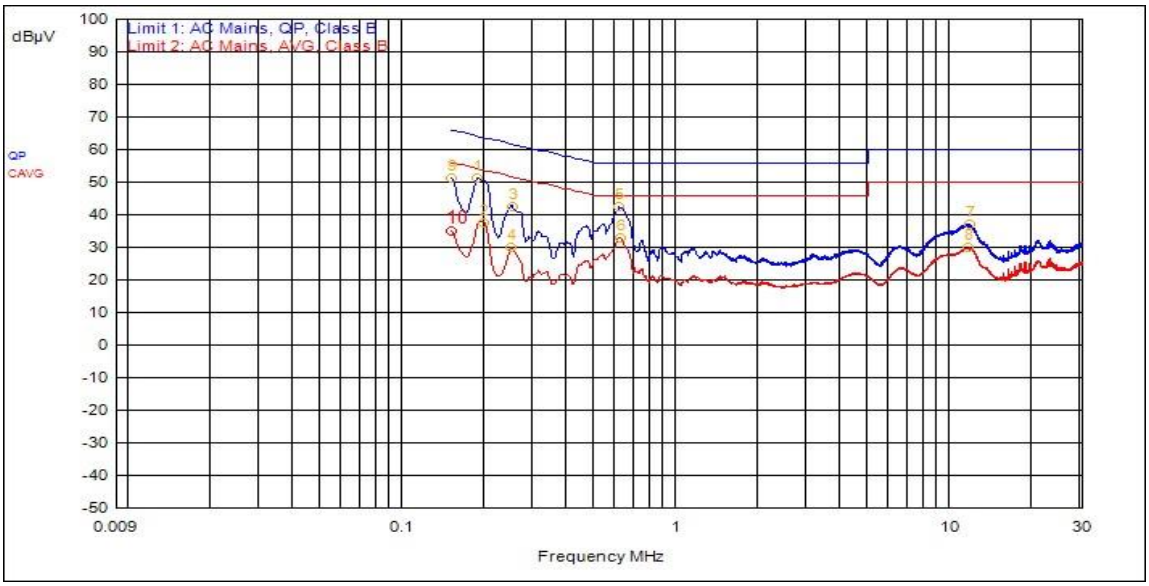
The EUT uses an integral antenna. The Maximum gain of the antenna is 4 dBi. The antenna is not user replaceable.

Results

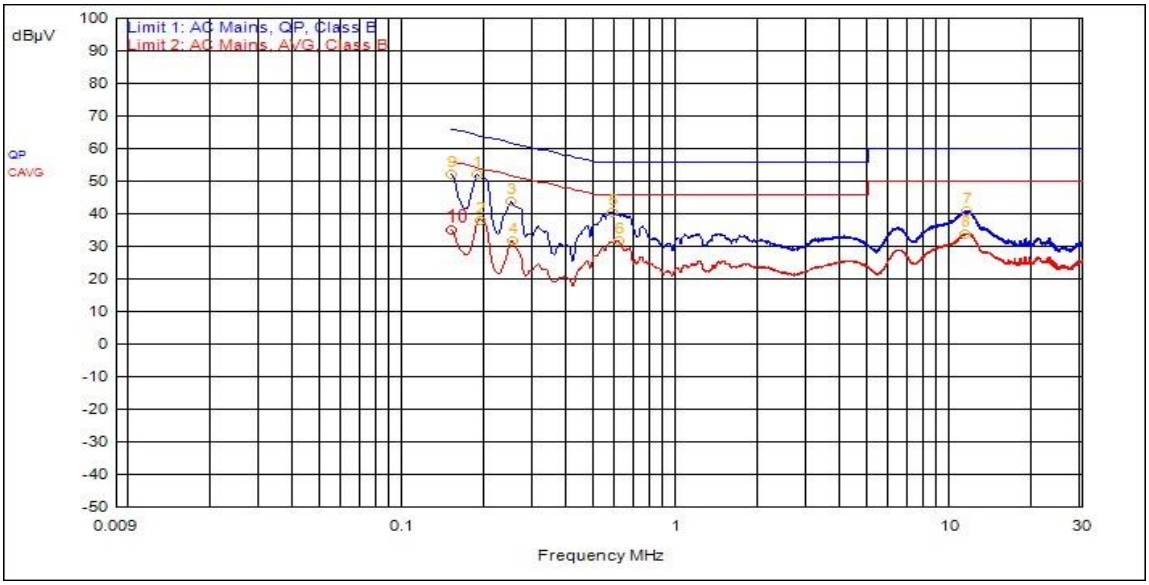
The EUT complied with the specification

5.2 Conducted Emissions at Mains Ports Data

5.2.1 Line



5.2.2



Result

The EUT complied with the specification limit.

5.3 §15.247(a)(2) Emission Bandwidth

Mode	Frequency (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth (MHz)
b	2412	14.8	10.2
	2437	16.0	10.2
	2462	14.8	9.6
g	2412	16.4	16.1
	2437	20.0	16.5
	2462	16.5	16.4
n 20	2412	17.5	17.0
	2437	22.2	13.9
	2462	17.5	16.8
n 40	2422	36.0	31.4
	2437	36.3	34.7
	2452	36.0	23.9

Result

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

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

The maximum average RF conducted output power measured for this device was 25.0 dBm or 316 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 4dBi.

Modulation (BW)	Frequency (MHz)	Data Rate	TP Setting	Conducted Output Power	Measured EIRP
CCK 20	2412	Mcs0	19	22.9	26.9
	2417	Mcs0	18.5	22.3	26.3
	2422	Mcs0	20	23.8	27.8
	2437	Mcs0	20.5	25	29
	2462	Mcs0	19.5	22.7	26.7
OFDM 20	2412	Mcs0	14	18.1	22.1
	2417	Mcs0	17.5	21.5	25.5
	2437	Mcs0	20.5	24.1	28.1
	2452	Mcs0	20.5	24.2	28.2
	2457	Mcs0	18.5	22.3	26.3
	2462	Mcs0	14.5	18.6	22.6
HT 20	2412	Mcs0	14	18	22
	2417	Mcs0	17.5	21.4	25.4
	2422	Mcs0	19	22.6	26.6
	2437	Mcs0	21	24.2	28.2
	2457	Mcs0	18.5	22.2	26.2
	2462	Mcs0	13.5	17.5	21.5
HT 40	2422	Mcs0	10.5	14.7	18.7
	2427	Mcs0	12	16.2	20.2
	2432	Mcs0	14	18.3	22.3
	2437	Mcs0	16	20.1	24.1
	2442	Mcs0	15	19.3	23.3
	2447	Mcs0	14	18.3	22.3
	2452	Mcs0	12	16.2	20.2

Result

In the configuration tested, the maximum summed average RF output power was less than 1 watt; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plots below).

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 annex 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. All results are within the associated annex

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. 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 each of the spurious emissions is shown below for each of the units. Plots of the band edges are also shown.

Result

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

Frequency (MHZ)	Detector	Antenna Polarity	Correction Factor (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2411.43	Average	Vertical	-9.09	46.77	54.0	-7.23
14353.65	Average	Vertical	8.55	33.67	54.0	-20.33
2410.67	Average	Horizontal	-9.09	43.76	54.0	-10.24
10352.79	Average	Horizontal	5.65	33.58	54.0	-20.42
12414.82	Average	Horizontal	6.11	33.20	54.0	-20.80
13888.64	Average	Horizontal	8.13	32.19	54.0	-21.81
2411.43	Peak	Vertical	-9.09	56.50	74.0	-17.50
14353.65	Peak	Vertical	8.55	46.61	74.0	-27.39
2410.67	Peak	Horizontal	-9.09	52.95	74.0	-21.05
10352.79	Peak	Horizontal	5.65	48.33	74.0	-25.67
12414.82	Peak	Horizontal	6.11	46.01	74.0	-27.99
13888.64	Peak	Horizontal	8.13	45.46	74.0	-28.54

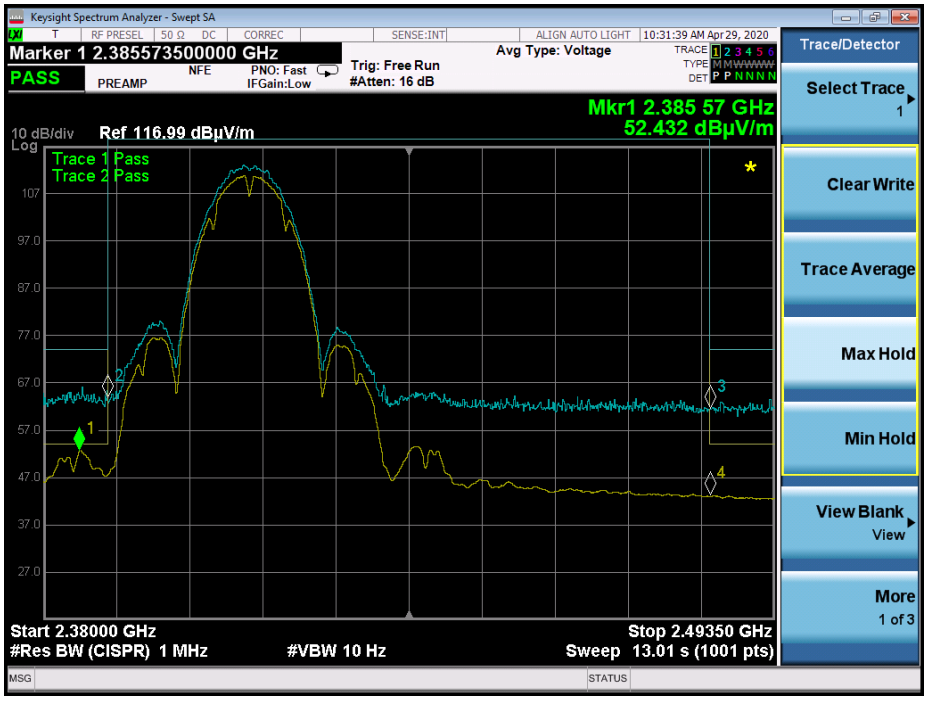
Table 2: Transmitting at the Lowest Frequency

Frequency (MHZ)	Detector	Antenna Polarity	Correction Factor (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2438.73	Average	Vertical	-9.11	51.73	54.0	-2.27
14384.25	Average	Vertical	8.66	33.93	54.0	-20.07
2440.48	Average	Horizontal	-9.10	47.28	54.0	-6.72
10468.05	Average	Horizontal	5.98	33.14	54.0	-20.86
14336.80	Average	Horizontal	8.66	34.28	54.0	-19.72
2438.73	Peak	Vertical	-9.11	62.48	74.0	-11.52
14384.25	Peak	Vertical	8.66	47.16	74.0	-26.84
2440.48	Peak	Horizontal	-9.10	57.09	74.0	-16.91
10468.05	Peak	Horizontal	5.98	47.47	74.0	-26.53
14336.80	Peak	Horizontal	8.66	47.51	74.0	-26.49

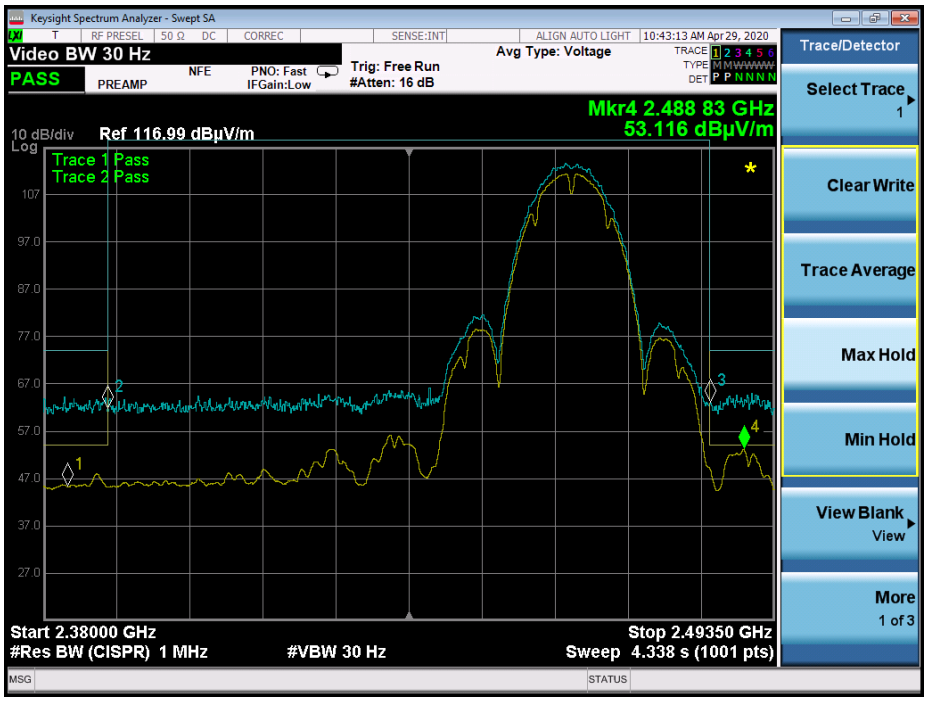
Table 3:Transmitting at the Middle Frequency

Frequency (MHZ)	Detector	Antenna Polarity	Correction Factor (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2457.60	Average	Vertical	-9.14	46.86	54.0	-7.14
9307.12	Average	Vertical	5.22	31.89	54.0	-22.11
11033.70	Average	Vertical	6.34	33.08	54.0	-20.92
14406.01	Average	Vertical	8.67	33.57	54.0	-20.43
2458.20	Average	Horizontal	-9.14	43.77	54.0	-10.23
11544.71	Average	Horizontal	6.50	32.80	54.0	-21.20
14250.66	Average	Horizontal	8.58	33.59	54.0	-20.41
2457.60	Peak	Vertical	-9.09	58.62	74.0	-15.38
9307.12	Peak	Vertical	8.55	45.50	74.0	-28.50
11033.70	Peak	Horizontal	-9.09	47.32	74.0	-26.68
14406.01	Peak	Horizontal	5.65	47.57	74.0	-26.43
2458.20	Peak	Horizontal	6.11	53.86	74.0	-20.14
11544.71	Peak	Horizontal	8.13	47.35	74.0	-26.65
14250.66	Peak	Horizontal	8.58	46.69	54.0	-27.31

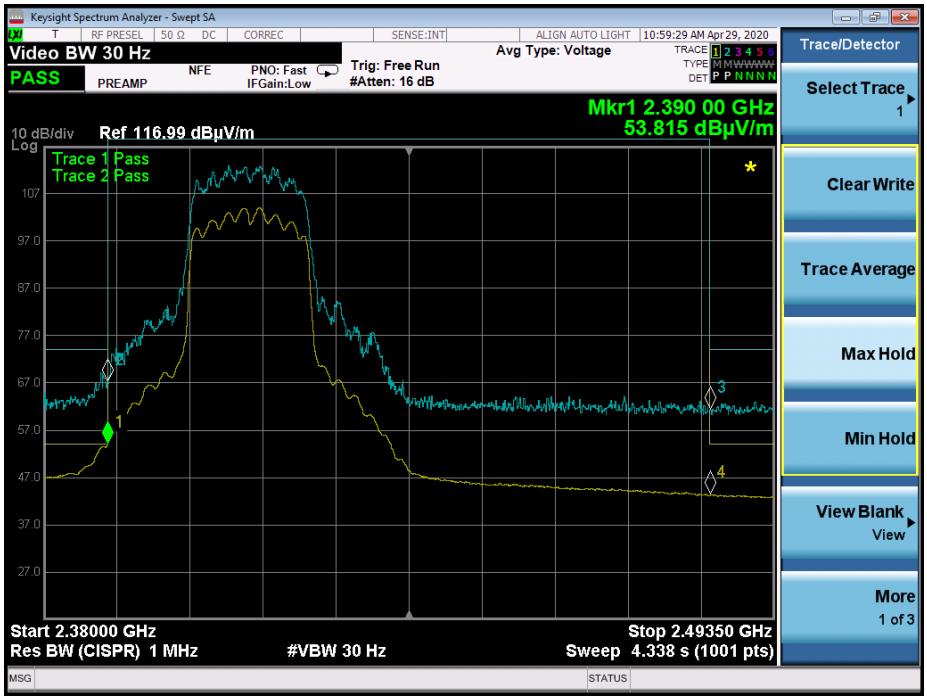
Table 4: Transmitting at the Highest Frequency



Graph 1: Lower Band Edge Plot B mode



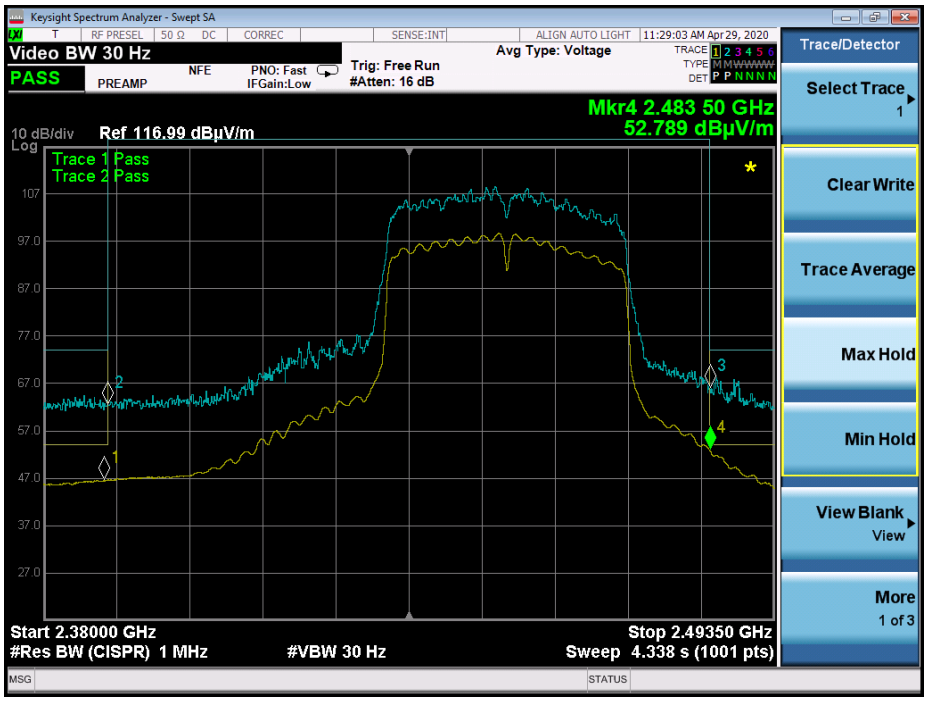
Graph 2: Upper Band Edge Plot B mode



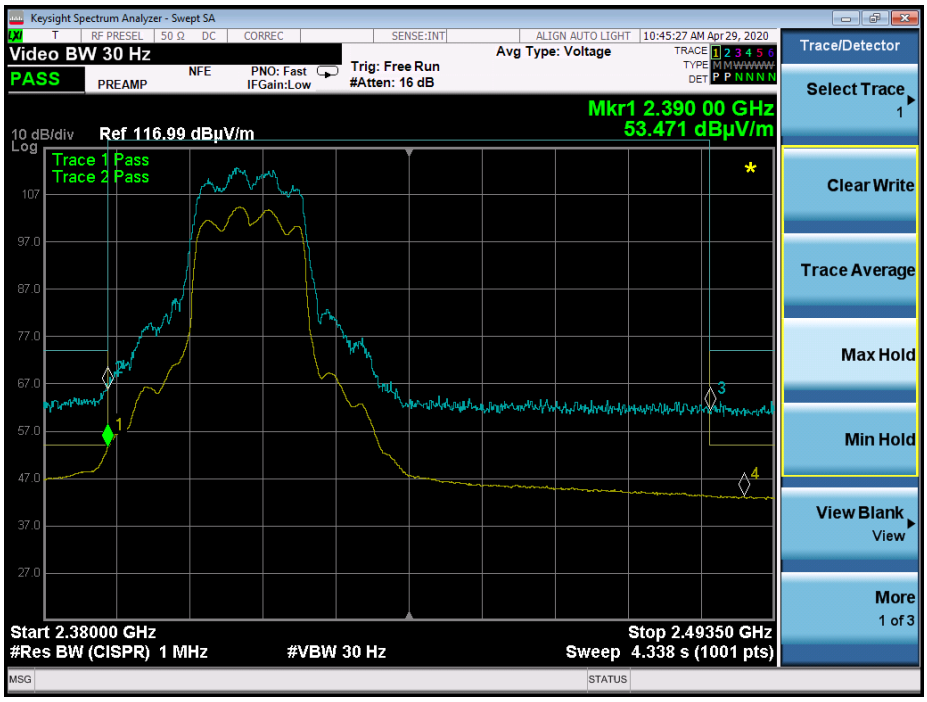
Graph 9: Lower Band Edge Plot N mode 20 MHz

Graph 10: Upper Band Edge Plot N mode 20 MHz

Graph 11: Lower Band Edge Plot N mode 40 MHz



Graph 12: Upper Band Edge Plot N mode 40 MHz



Graph 13: Upper Band Edge Plot G mode

Graph 14: Upper Band Edge Plot G mode

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.

Mode	Frequency (MHz)	Measurement (dBm)	Criteria (dBm)
B	2412	4	8.0
	2437	5.9	8.0
	2462	3.8	8.0
G	2412	-2.8	8.0
	2437	3.6	8.0
	2462	-2.2	8.0
N 20	2412	-2.2	8.0
	2437	3.8	8.0
	2462	-2.8	8.0
N 40	2422	-8.8	8.0
	2437	-3.4	8.0
	2452	-7	8.0

Result

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

-- End of Test Report --