



427 West 12800 South
Draper, UT 84020

Test Report Certification

FCC ID	SWX-UX
IC ID	6545A-UX
Equipment Under Test	UX
Test Report Serial Number	TR8074_01
Date of Test(s)	April 20 Through May 1, 2023
Report Issue Date	May 5, 2023

Test Specification	Applicant
47 CFR FCC Part 15, Subpart C RSS-Gen Issue 5	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 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	UBIQUITI
Model Number	UX
FCC ID	SWX-UX
IC ID	6545A-UX

On this 5th day of May 2023, 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: Clay Allred



Reviewed By: Richard L. Winter

Revision History		
Revision	Description	Date
01	Original Report Release	May 5 2023

Table of Contents

1	Client Information.....	5
1.1	Applicant.....	5
1.2	Manufacturer.....	5
2	Equipment Under Test (EUT).....	6
2.1	Identification of EUT.....	6
2.2	Description of EUT.....	6
2.3	EUT and Support Equipment.....	6
2.4	Interface Ports on EUT.....	7
2.5	Operating Environment.....	7
2.6	Operating Modes.....	7
2.7	EUT Exercise Software.....	7
2.8	Block Diagram of Test Configuration.....	7
2.9	Modification Incorporated/Special Accessories on EUT.....	8
2.10	Deviation, Opinions Additional Information or Interpretations from Test Standard.....	8
3	Test Specification, Method and Procedures.....	9
3.1	Test Specification.....	9
3.2	Methods & Procedures.....	9
3.3	FCC Part 15, Subpart C.....	9
3.4	Results.....	10
3.5	Test Location.....	10
4	Test Equipment.....	11
4.1	Conducted Emissions at Mains Ports.....	11
4.2	Direct Connect at the Antenna Port Tests.....	11
4.3	Radiated Emissions.....	12
4.4	Equipment Calibration.....	13
4.5	Measurement Uncertainty.....	13
5	Photographs.....	13
6	Test Results.....	14
6.1	§15.203 Antenna Requirements.....	14
6.2	Conducted Emissions at Mains Ports Data.....	14
6.3	§15.247(a)(2).....	16
6.4	§15.247(b)(3) Maximum Average Output Power.....	20
6.5	§15.247(d) Spurious Emissions.....	21
6.6	§15.247(e) Maximum Average Power Spectral Density.....	28

1 Client Information

1.1 Applicant

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Alex Macon
Title	Compliance

1.2 Manufacturer

Company	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.
Contact Name	Alex Macon
Title	Compliance

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	UBIQUITI
Model Number	UX
Serial Number	N/A
Dimensions (cm)	9.8 x 9.8 x 2.8

2.2 Description of EUT

The UX is a WiFi 6 access point designed for wide-ranging wireless coverage while maintain overall network capacity. The UX delivers and aggregate radio rate of up to 2.7 Gbps with 5 GHz (2x2) and 2.4 GHz (2x2) radios. The UX uses a sophisticated antenna design to offer excellent range. The UX has a Bluetooth management radio for easy in setup and administration of the wireless system. The UX is power from a USB C connector.

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 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: UBIQUITI MN: UX SN: 5 DA	Wireless Access Point	See Section 2.4
BN: UBIQUITI MN: GP-M015-QC SN: N/A	USB C Power Adapter	See Section 2.4
BN: Dell MN: XPS 13 SN: N/A	Laptop Personal Computer	LAN Port / Un-shielded Cat 5e cable (Note 2)

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
RJ45 WAN	1	Cat.6 / 5M
RJ45 LAN	1	Cat.6 / 5M
USBC	1	USBC / 1M

2.5 Operating Environment

Power Supply	120 VAC
AC Mains Frequency	60 Hz
Temperature	22.2 – 24.2 °C
Humidity	23.1 – 28.5 %
Barometric Pressure	1015 mBar

2.6 Operating Modes

The UX was connected to a personal computer laptop and tested using test software in order to enable to constant duty cycle greater or equal to 98% of the Bluetooth transceiver.

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

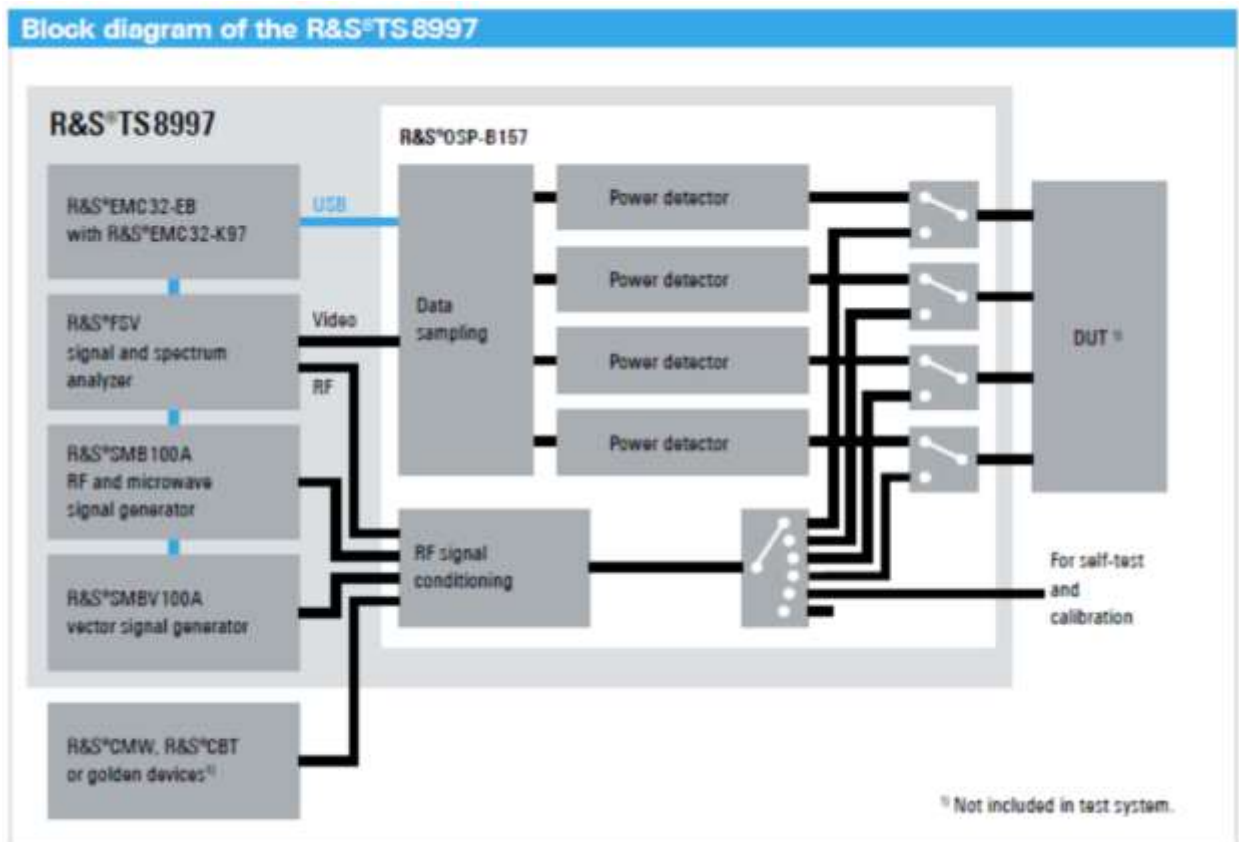


Diagram 1: Test Configuration Block Diagram

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 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	N/A	Antenna requirements	Structural Requirement	Compliant
15.207	RSS-Gen	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 § 5.4	Antenna Conducted Spurious Emissions	0.009 to 40000	N/A
15.247(d)	RSS-247 § 5.4	Radiated Spurious Emissions	0.009 to 40000	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. 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 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 2023. 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 30 June 2023.

Unified Compliance Laboratory has been assigned Designation Number US5037 by the FCC and 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	6/27/2022	6/27/2023
LISN	AFJ	LS16C/10	UCL-6749	12/6/2021	12/6/2023
ISN	Teseq	ISN T800	UCL-2974	6/27/2022	6/27/2023
LISN	Com-Power	LIN-120C	UCL-2612	1/24/2023	1/24/2024
AC Power Source	Laplace Instruments	AC1000A	UCL-2857	N/A	N/A
Test Software	UCL	Revision 1	UCL-3107	N/A	N/A

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

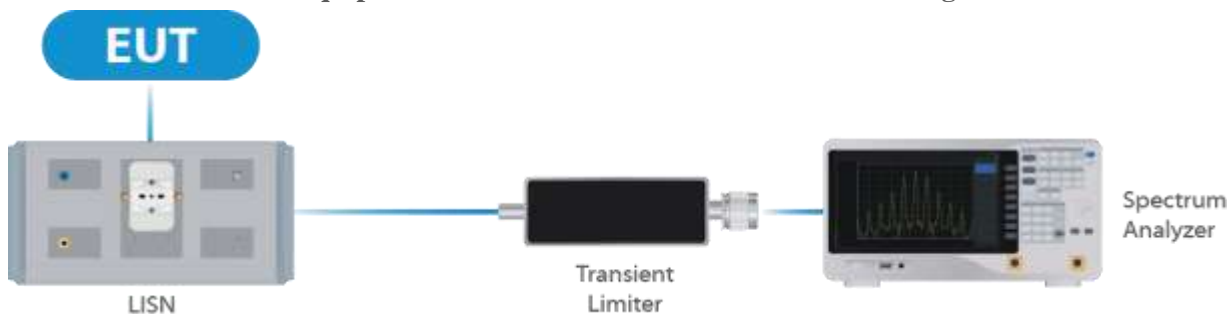


Figure 1: Conducted Emissions Test

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	11/7/2022	11/7/2023
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	2/22/2023	2/22/2024
Switch Extension	R&S	OSP-150W	UCL-2870	2/22/2023	2/22/2024

Table 2: List of equipment used for Direct Connect at the Antenna Port

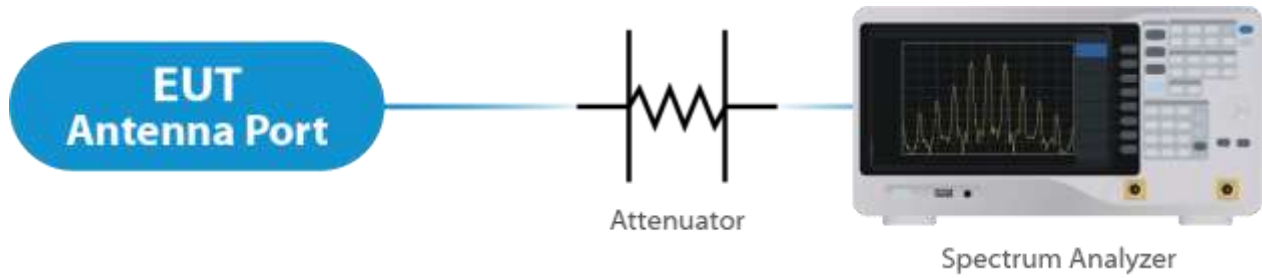


Figure 2: Direct Connect at the Antenna Port Test

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	1/27/2023	1/27/2024
Pre-Amplifier 9 kHz – 1 GHz	Sonoma Instruments	310N	UCL-2889	10/7/2021	10/7/2023
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3062	2/22/2023	2/22/2025
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3071	1/11/2023	1/11/2025
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	9/22/2022	9/22/2024
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	1/27/2023	1/27/2025
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	6/09/2022	6/09/2024
1 – 18 GHz Amplifier	Com-Power	PAM 118A	UCL-3833	12/9/2022	12/9/2023
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

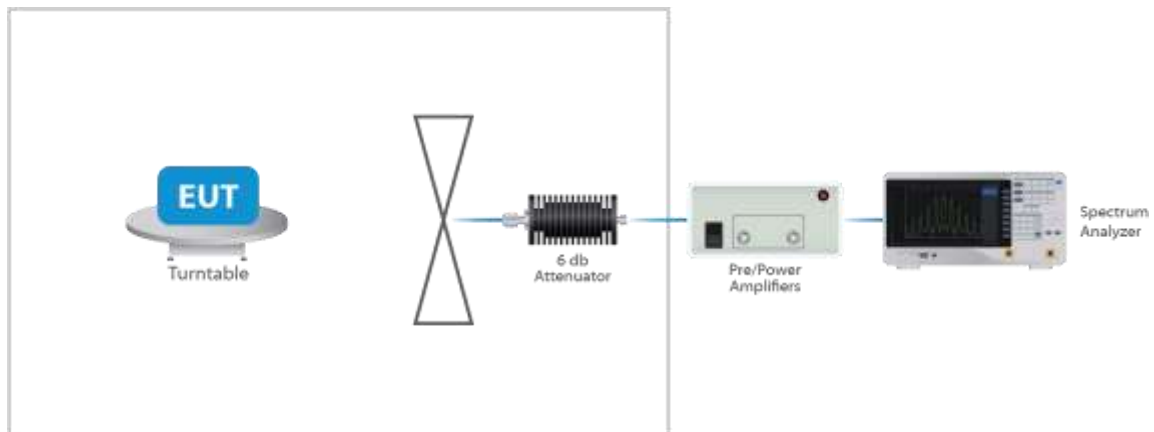


Figure 3: Radiated Emissions Test

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)	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

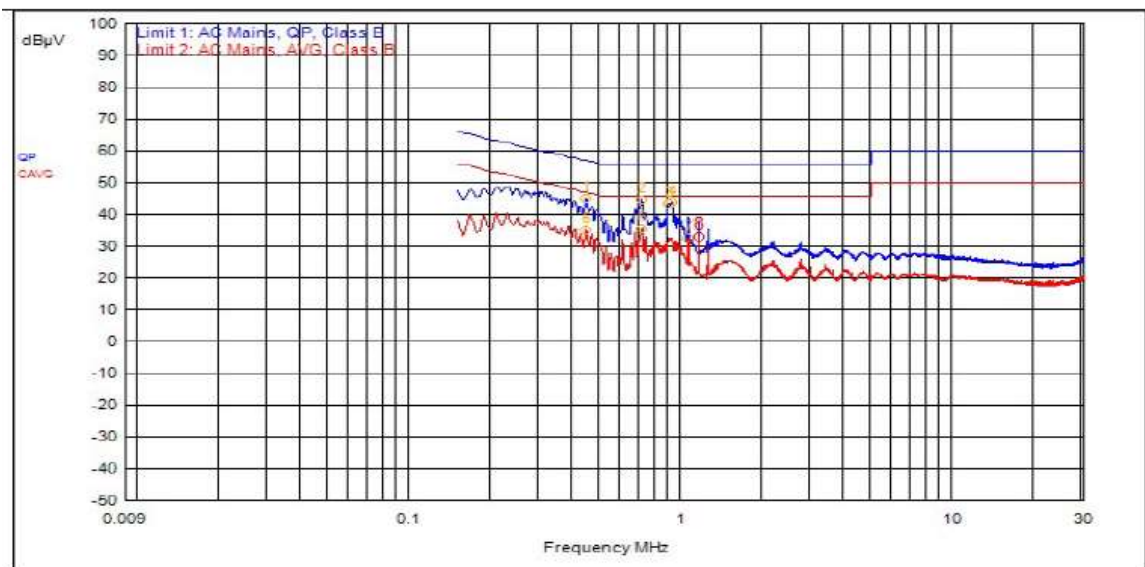
The EUT uses an integral antenna as per the manufacturer, the Maximum gain of the antenna is 1.8 dBi. The antenna is not user replaceable.

Results

The EUT complied with the specification

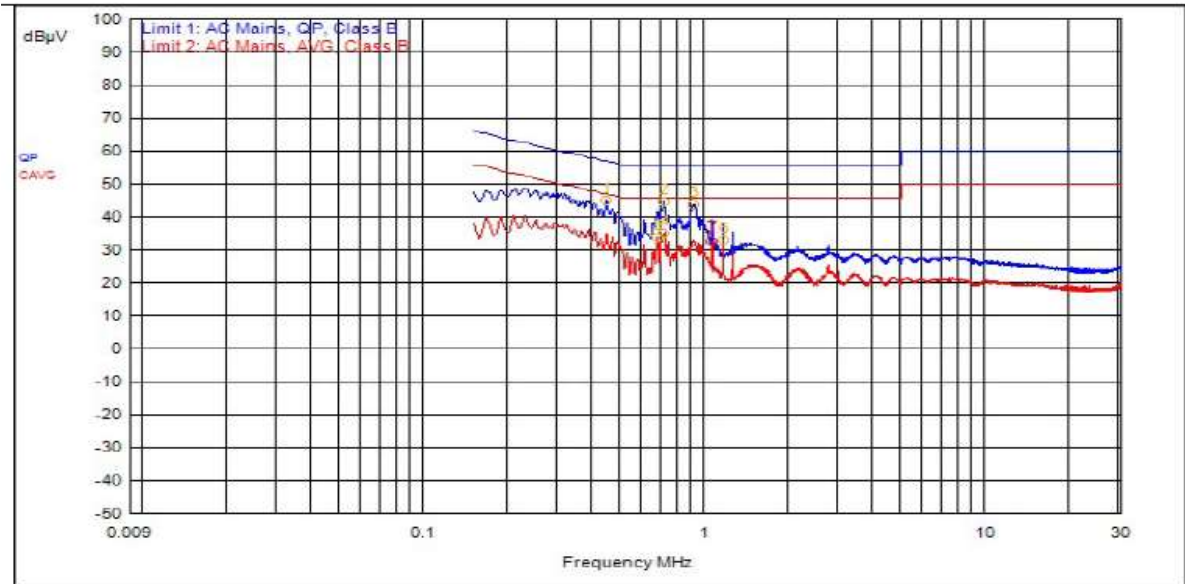
5.2 Conducted Emissions at Mains Ports Data

5.2.1 Line



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.
2	708,000kHz	12.4	0.0		QPeak	32.0	44.4	56.0	-11.6		
1	444,000kHz	12.4	0.0		QPeak	32.7	45.1	57.0	-11.9		
4	921,000kHz	12.4	0.1		QPeak	31.1	43.6	56.0	-12.4		
3	891,000kHz	12.4	0.1		QPeak	30.9	43.4	56.0	-12.6		
5	444,000kHz	12.4	0.0		C_AVG	22.8	35.2			47.0	-11.8
6	711,000kHz	12.4	0.0		C_AVG	22.9	35.3			46.0	-10.7
7	1.056MHz	12.4	0.1		C_AVG	20.2	32.7			46.0	-13.3
8	1.152MHz	12.4	0.1		C_AVG	20.3	32.8			46.0	-13.2

5.2.2 Neutral



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit 1	Limit 1 Dist.	Limit 2	Limit 2 Dist.
2	708,000kHz	12.4	0.0		QPeak	32.3	44.7	56.0	-11.3		
1	444,000kHz	12.4	0.0		QPeak	32.6	45.0	57.0	-12.0		
3	909,000kHz	12.4	0.1		QPeak	31.1	43.7	56.0	-12.3		
4	708,000kHz	12.4	0.0		C_AVG	22.8	35.2			46.0	-10.8
5	672,000kHz	12.4	0.0		C_AVG	21.3	33.8			46.0	-12.2
6	1.152MHz	12.4	0.1		C_AVG	20.3	32.8			46.0	-13.2
7	1.056MHz	12.4	0.1		C_AVG	20.1	32.6			46.0	-13.4

Result

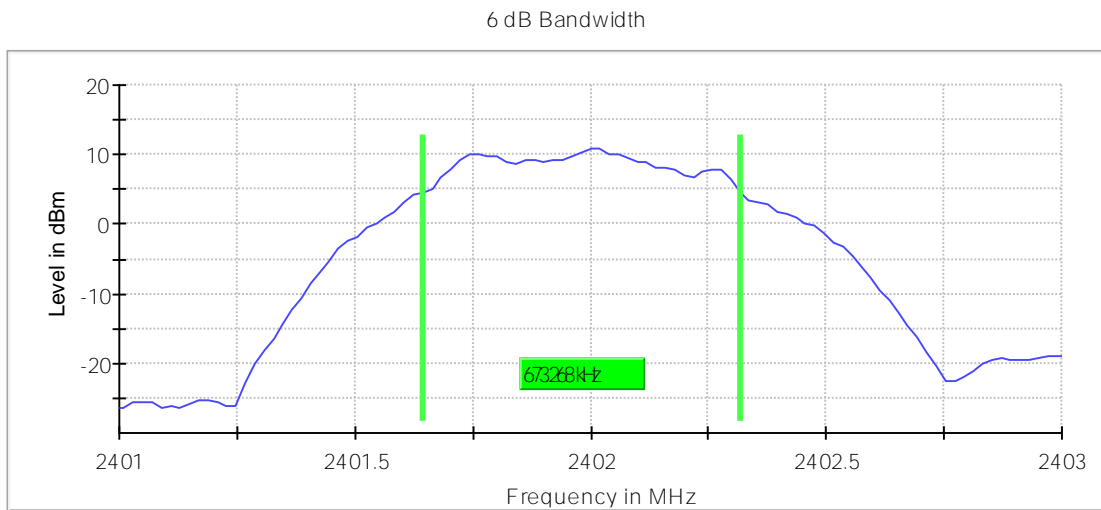
The EUT complied with the specification limit.

5.3 §15.247(a)(2) Emissions Bandwidth

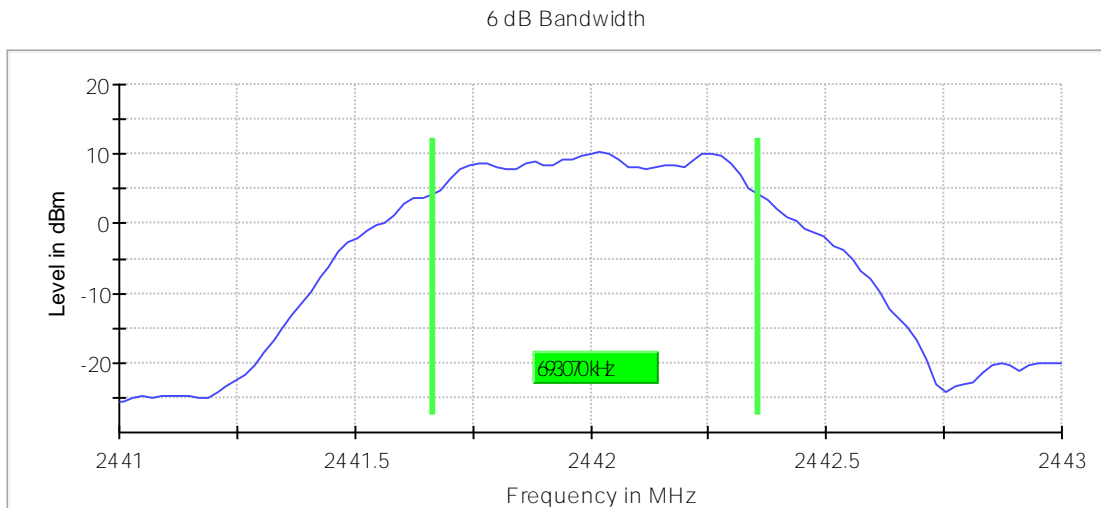
Frequency (MHz)	Emissions 6 dB Bandwidth (MHz)	Emissions 99% Bandwidth (MHz)
2402	0.67	1.02
2442	0.69	1.02
2480	0.73	1.03

Result

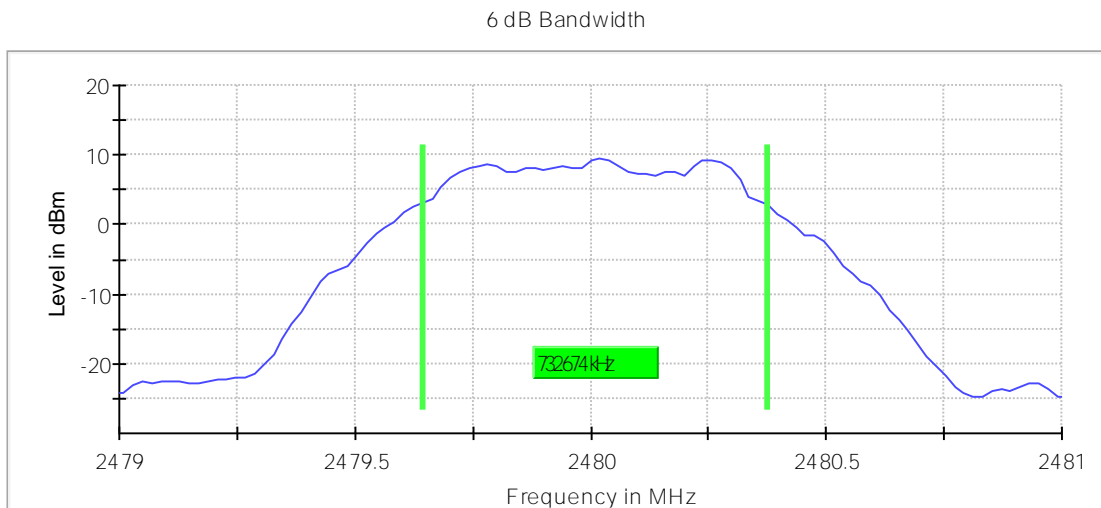
In the configuration tested, the 6 dB bandwidth was greater than 500 kHz; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plot below).



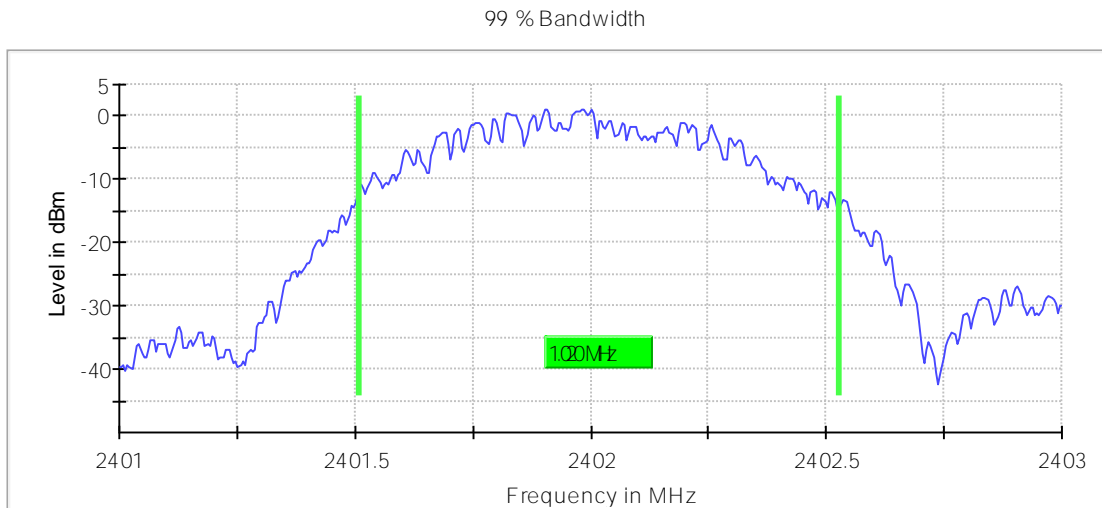
Graph 1: 2402MHz 6dB Emissions Bandwidth



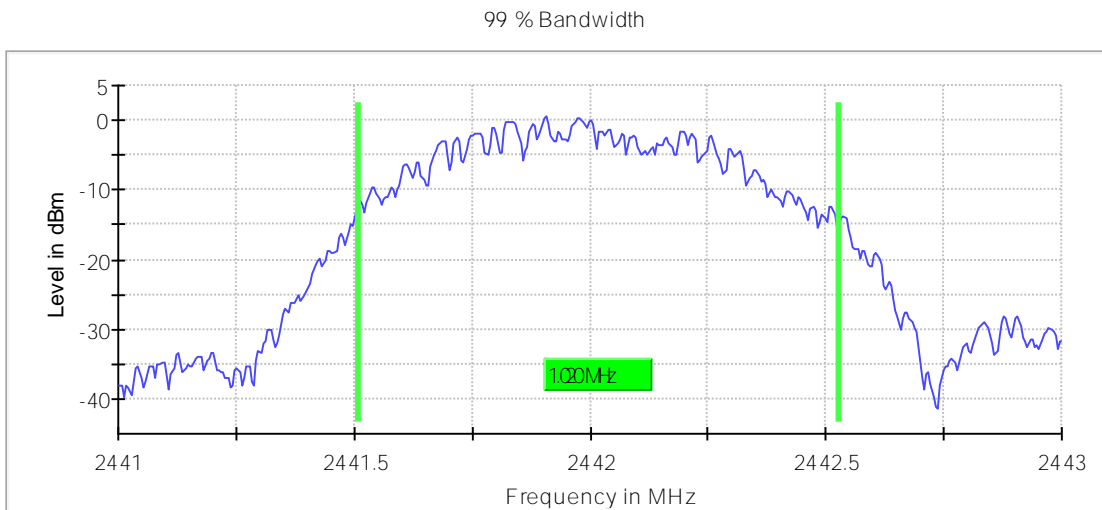
Graph 2: 2442MHz 6dB Emissions Bandwidth



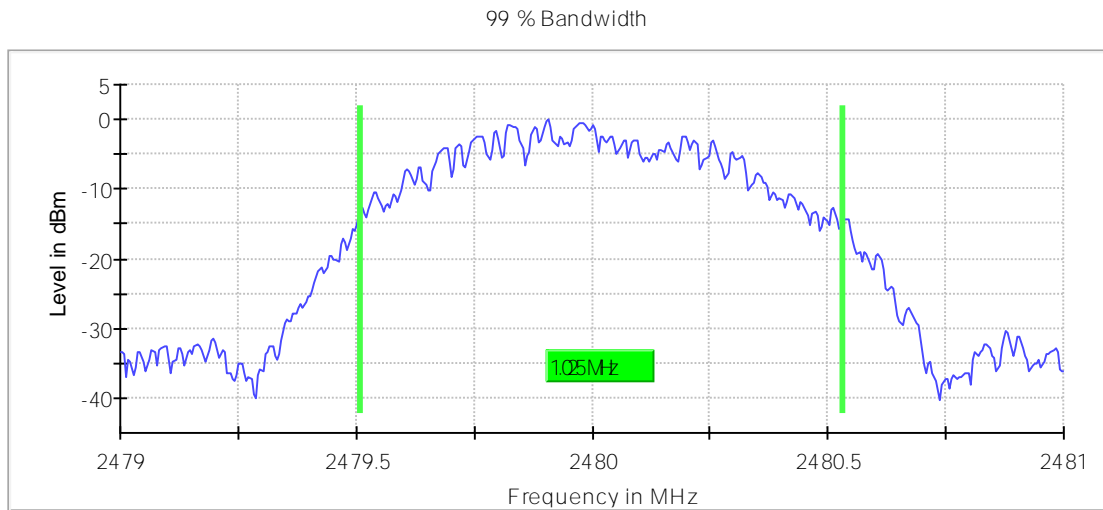
Graph 3: 2480MHz 6dB Emissions Bandwidth



Graph 4: 2402MHz 99% Emissions Bandwidth



Graph 5: 2442MHz 99% Emissions Bandwidth



Graph 6: 2480MHz 99% Emissions Bandwidth

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

The maximum average RF conducted output power measured for this device was 12.28 dBm or 16.9mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 1.8 dBi.

Frequency (MHz)	TP Setting	Measured Output Power (dBm)	Output Power (mW)
2402	9	12.28	16.9
2442	9	11.50	14.1
2480	9	10.84	12.1

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 §15.247(d) Spurious Emissions

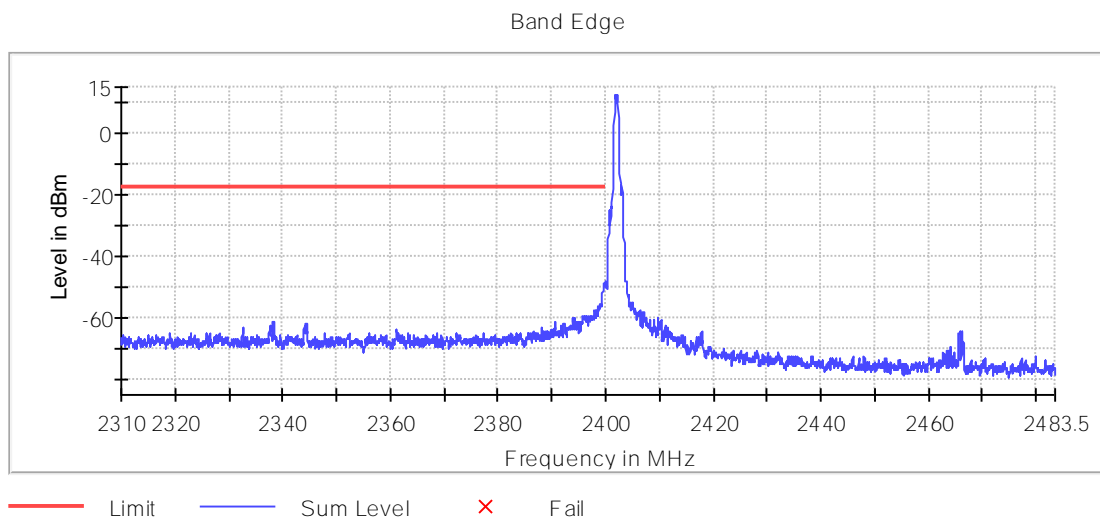
5.5.1 Conducted Spurious Emissions

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 below are plot(s) 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.

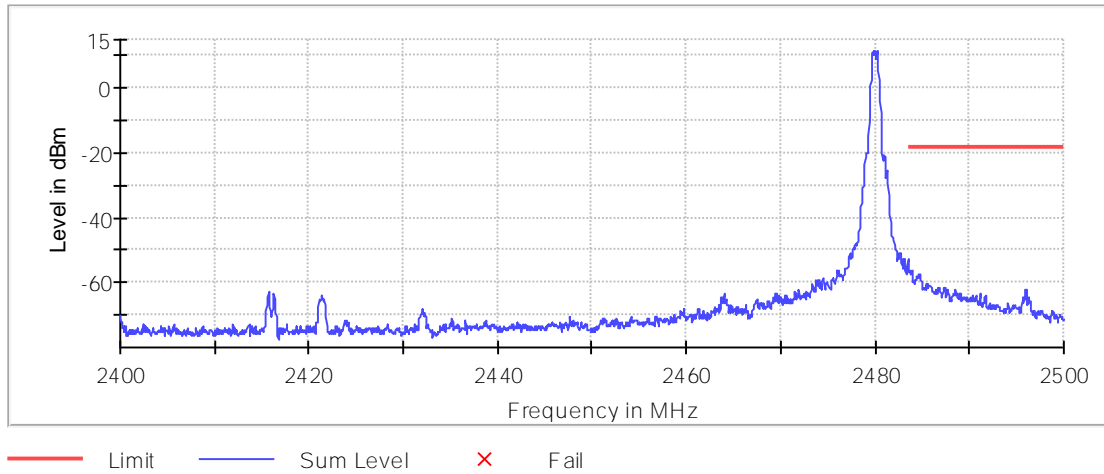
Result

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



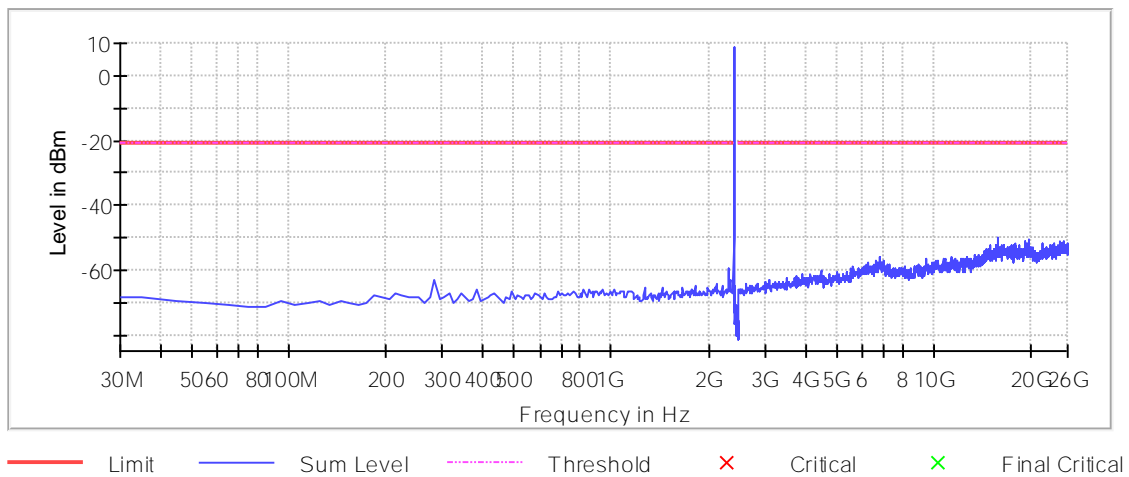
Graph 7: Lower Band Edge Plot

Band Edge

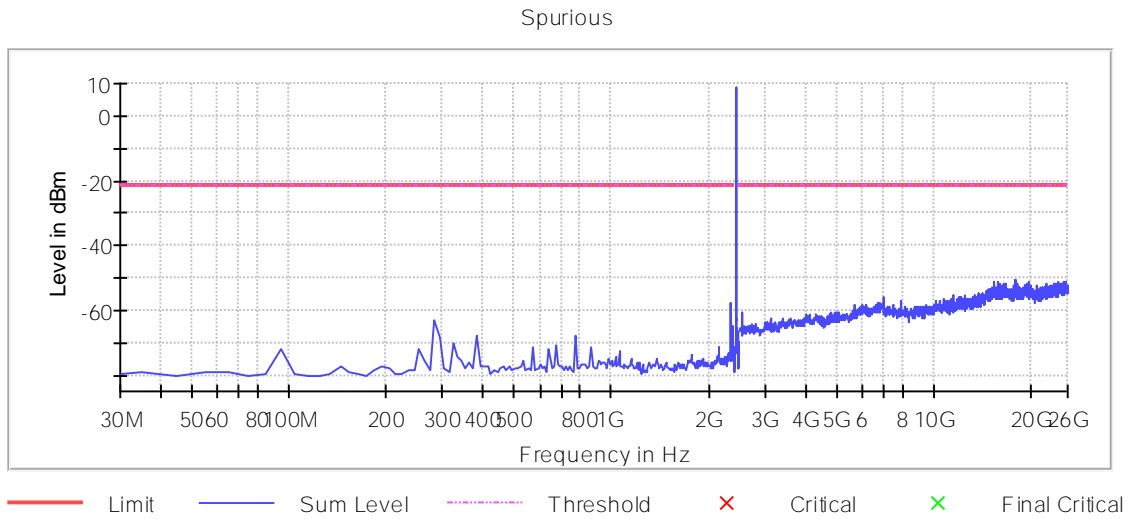


Graph 8: Upper Band Edge Plot

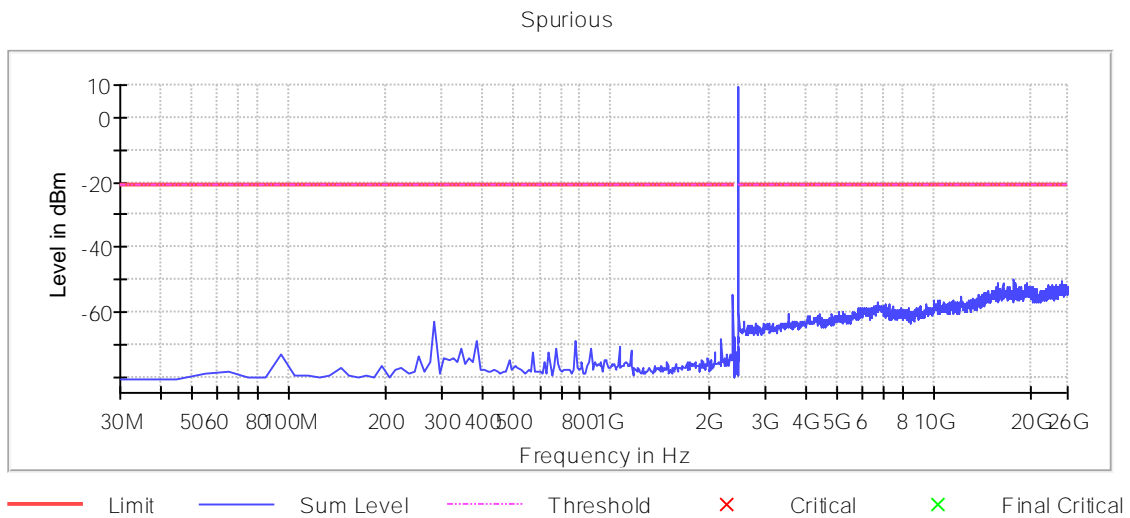
Spurious



Graph 9: TX Spurious 2442MHz

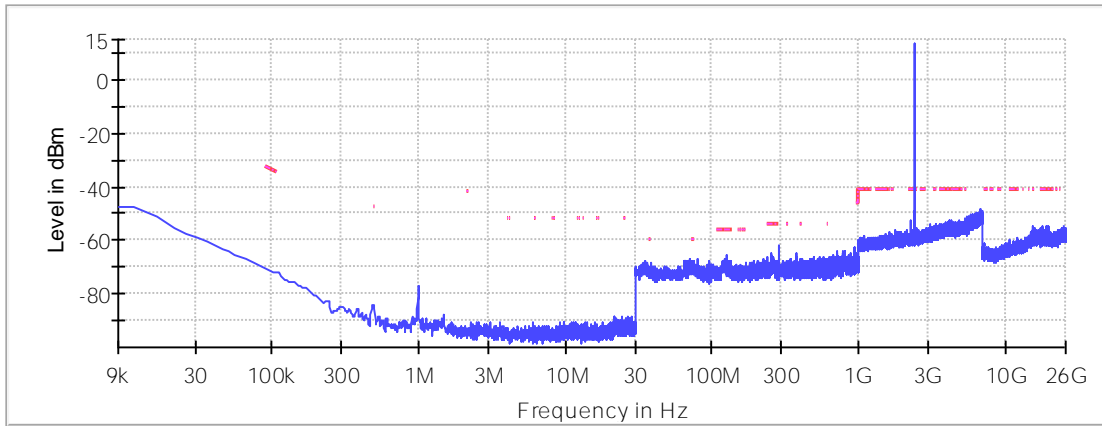


Graph 10: TX Spurious 2442MHz



Graph 11: TX Spurious 280MHz

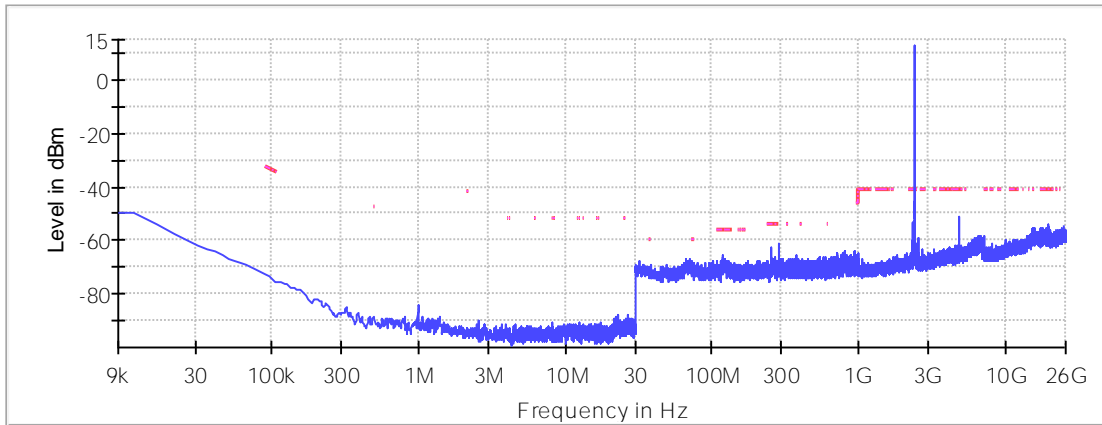
Restricted Band



— Limit - - - - Threshold x Critical — Sum Level x Final Critical

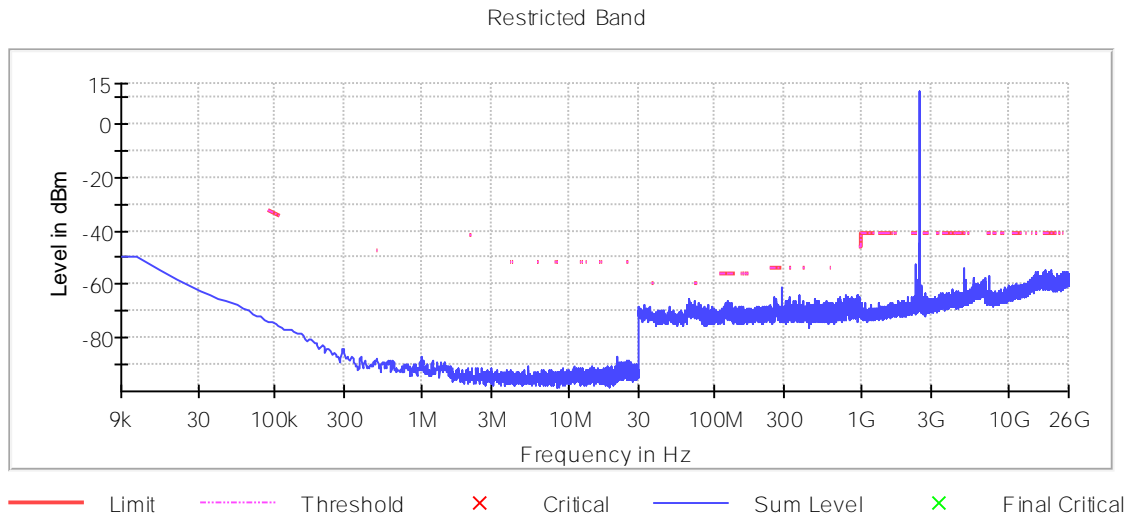
Graph 12: Restricted band Spurious 2402MHz

Restricted Band



— Limit - - - - Threshold x Critical — Sum Level x Final Critical

Graph 13: Restricted band Spurious 2442MHz



Graph 14: Restricted band Spurious 2480MHz

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	Det.	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
124.74MHz	QP	42.32	44	-1.68	56	1.13	Vertical	120 kHz	-13.79
34.558 MHz	QP	37.08	40	-2.92	206	1.13	Vertical	120 kHz	-9.98
131.8 MHz	QP	40.52	44	-3.48	358	1.13	Vertical	120 kHz	-13.65
35.971 MHz	QP	36.48	40	-3.52	214	1.13	Vertical	120 kHz	-11.12
124.21 MHz	QP	39.66	44	-4.34	192	2.57	Horizontal	120 kHz	-13.79
31.954 MHz	QP	35.3	40	-4.7	161	1.13	Horizontal	120 kHz	-8.25
40.218 MHz	QP	34.36	40	-5.64	295	1.13	Vertical	120 kHz	-14.21
1.632 GHz	PK	40.389	74	-33.611	289	1.808	Vertical	1 MHz	-8.807
10.36 GHz	PK	51.928	74	-22.072	44	2.35	Vertical	1 MHz	13.198
1.632 GHz	AV	34.412	54	-19.588	289	1.808	Vertical	1 MHz	-8.807
10.36 GHz	AV	38.545	54	-15.455	44	2.35	Vertical	1 MHz	13.198
1.056 GHz	PK	40.593	74	-33.407	102	1.631	Horizontal	1 MHz	-11.047
12.57 GHz	PK	53.392	74	-20.608	180	4	Horizontal	1 MHz	14.582
1.056 GHz	AV	35.938	54	-18.062	102	1.631	Horizontal	1 MHz	-11.047
12.57 GHz	AV	36.072	54	-17.928	180	4	Horizontal	1 MHz	14.582

Table 4: Transmitting at the Lowest Frequency

Frequency	Det.	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
124.74MHz	QP	42.32	44	-1.68	56	1.13	Vertical	120 kHz	-13.79
34.558 MHz	QP	37.08	40	-2.92	206	1.13	Vertical	120 kHz	-9.98
131.8 MHz	QP	40.52	44	-3.48	358	1.13	Vertical	120 kHz	-13.65
35.971 MHz	QP	36.48	40	-3.52	214	1.13	Vertical	120 kHz	-11.12
124.21 MHz	QP	39.66	44	-4.34	192	2.57	Horizontal	120 kHz	-13.79
31.954 MHz	QP	35.3	40	-4.7	161	1.13	Horizontal	120 kHz	-8.25
40.218 MHz	QP	34.36	40	-5.64	295	1.13	Vertical	120 kHz	-14.21
1.6319 GHz	1	41.301	74	-32.699	279	1.809	Vertical	1 MHz	-8.807
1.6319 GHz	1	35.573	54	-18.427	279	1.809	Vertical	1 MHz	-8.807
11.041 GHz	2	52.721	74	-21.279	189	3.97	Horizontal	1 MHz	15.258
11.041 GHz	2	34.64	54	-19.36	189	3.97	Horizontal	1 MHz	15.258

Table 5: Transmitting at the Middle Frequency

Frequency	Det.	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
124.74MHz	QP	42.32	44	-1.68	56	1.13	Vertical	120 kHz	-13.79
34.558 MHz	QP	37.08	40	-2.92	206	1.13	Vertical	120 kHz	-9.98
131.8 MHz	QP	40.52	44	-3.48	358	1.13	Vertical	120 kHz	-13.65
35.971 MHz	QP	36.48	40	-3.52	214	1.13	Vertical	120 kHz	-11.12
124.21 MHz	QP	39.66	44	-4.34	192	2.57	Horizontal	120 kHz	-13.79
31.954 MHz	QP	35.3	40	-4.7	161	1.13	Horizontal	120 kHz	-8.25
40.218 MHz	QP	34.36	40	-5.64	295	1.13	Vertical	120 kHz	-14.21
1.632 GHz	PK	41.966	74	-32.034	270	1.812	Vertical	1 MHz	-8.807
1.632 GHz	AV	36.865	54	-17.135	270	1.812	Vertical	1 MHz	-8.807
1.05609 GHz	PK	42.569	74	-31.431	308	1.991	Horizontal	1 MHz	-11.046
1.05609 GHz	AV	39.143	54	-14.857	308	1.991	Horizontal	1 MHz	-11.046

Table 6: Transmitting at the Highest Frequency

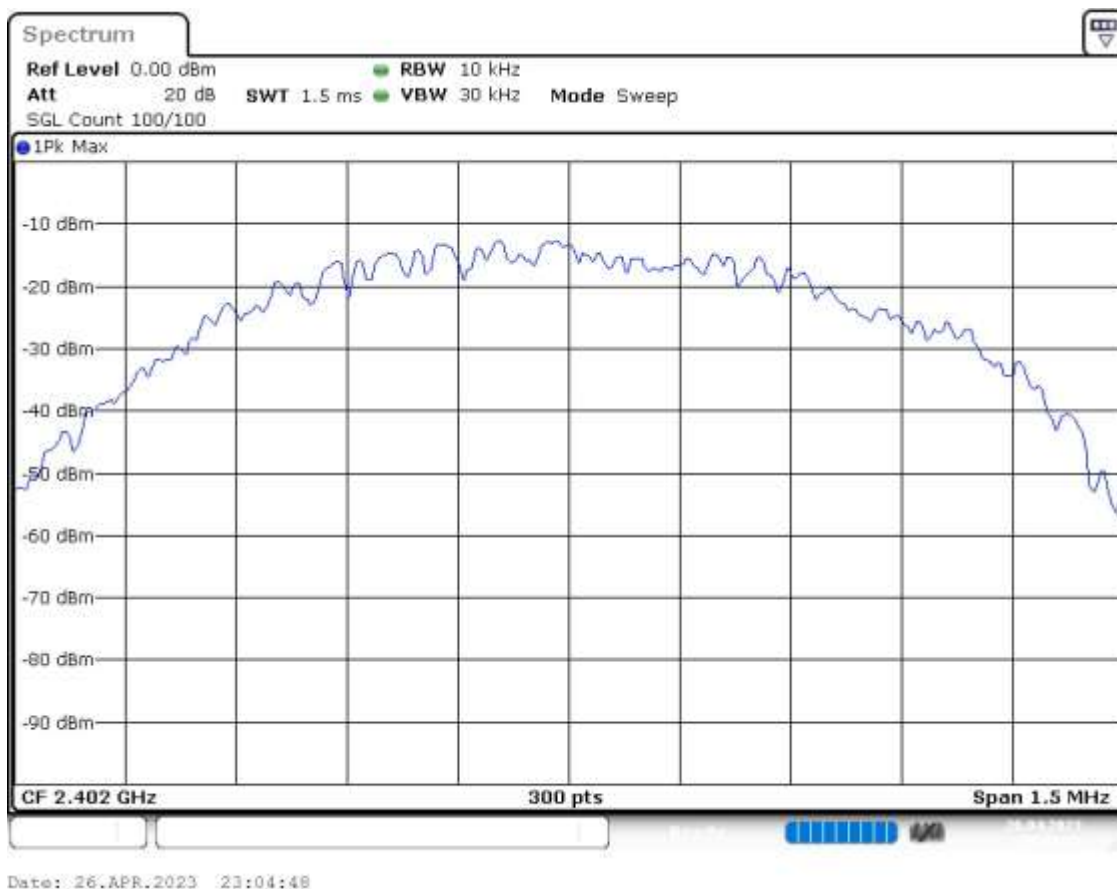
5.6 §15.247(e) Maximum Average Power Spectral Density

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.

Frequency (MHz)	Measurement (dBm)	Criteria (dBm)
2402	1.38	8.0
2442	0.72	8.0
2480	-0.34	8.0

Result

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



Graph 15: 2402MHz Lowest Channel 3 kHz PSD Plot – Worst Case representative of all channels.

-- End of Test Report --