



427 West 12800 South  
Draper, UT 84020

## Test Report Certification

<b>FCC ID</b>	SWX-UDW
<b>IC ID</b>	6545A-UDW
<b>Equipment Under Test</b>	UDW
<b>Test Report Serial Number</b>	TR7076_01
<b>Date of Tests</b>	11-14, 25 April 2022
<b>Report Issue Date</b>	27 April 2022

<b>Test Specification</b>	<b>Applicant</b>
47 CFR FCC Part 15, Subpart C	Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A.



NVLAP LAB CODE 600241-0

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## Certification of Engineering Report

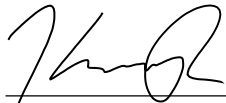
This report has been prepared by Unified Compliance Laboratory (UCL) to document compliance of the device described below with the requirement of Federal Communication Commissions (FCC) Part 15, Subpart C. This report may be reproduced in full. Partial reproduction of this report may only be made with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

<b>Applicant</b>	Ubiquiti Inc.
<b>Manufacturer</b>	Ubiquiti Inc.
<b>Brand Name</b>	UniFi
<b>Model Number</b>	UDW
<b>FCC ID</b>	SWX-UDW
<b>ISED ID</b>	6545A-UDW

On this 27<sup>th</sup> day of April 2022, 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: Kimberly Rodriguez



Reviewed By: Richard L. Winter

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<b>Revision History</b>		
<b>Revision</b>	<b>Description</b>	<b>Date</b>
01	Original Report Release	27 April 2022

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# 1 Client Information

## 1.1 Applicant

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

## 1.2 Manufacturer

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

## 2 Equipment Under Test (EUT)

### 2.1 Identification of EUT

<b>Brand Name</b>	UniFi
<b>Model Number</b>	UDW
<b>Serial Number</b>	2F3AB46NCM9W
<b>Dimensions (cm)</b>	54.9      x    34.2      x    6.2

### 2.2 Description of EUT

The Dream Wall is a standalone UniFi OS gateway controller which facilitates high-density PoE switching with integrated (17) gigabit RJ45 ports [(12x PoE and 5x non-PoE)]. The Dream Wall also promotes high-speed WAN and LAN connection with its (2) 10 GbE SFP ports and dual-band WiFi radio. The 2x2 2.4GHz WiFi radio and 5GHz 4x4 radio delivers a 2.7 Gbps aggregate throughput rate. The Dream Wall is equipped with a built-in Bluetooth for set up, and its 1.3" LCM touchscreen concisely displays critical system and status insights needed for device monitoring and configuration.

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.

<b>Brand Name Model Number Serial Number</b>	<b>Description</b>	<b>Name of Interface Ports / Interface Cables</b>
BN: UniFi MN: UDW (1) SN: 2F3AB46NCM9W	EUT	See Section 2.4
BN: Dell MN: XPS SN: N/A	Laptop Computer	Ethernet Non-Shielded Cat 5e
BN: HP MN: Spectre x360 SN: N/A	Laptop Computer	USB to Serial EUT Connection

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
10 GbE SFP WAN	1	Copper Direct Attach Cable
10 GbE SFP LAN	1	Copper Direct Attach Cable
2.5 GbE RJ45 WAN	1	Un-shielded Cat 5e Cable
PoE, PoE+, PoE++	12 (4, 4, 4)	Un-shielded Cat 5e Cable
Gigabit Ethernet	5	Un-shielded Cat 5e Cable
AC Power	1	3 Conductor Cable NEMA 5-15P (AC)

## 2.5 Operating Environment

<b>Power Supply</b>	120V AC
<b>AC Mains Frequency</b>	60 Hz
<b>Temperature</b>	22.0-23.1 °C
<b>Humidity</b>	18.9-20.8 %
<b>Barometric Pressure</b>	1016 mBar

## 2.6 Operating Modes

The UDW 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.

For Conducted emission the device was setup as in normal operation, with the PoE output ports loaded with resistive loads equivalent to 90% (320W) of its max PoE output.

## 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

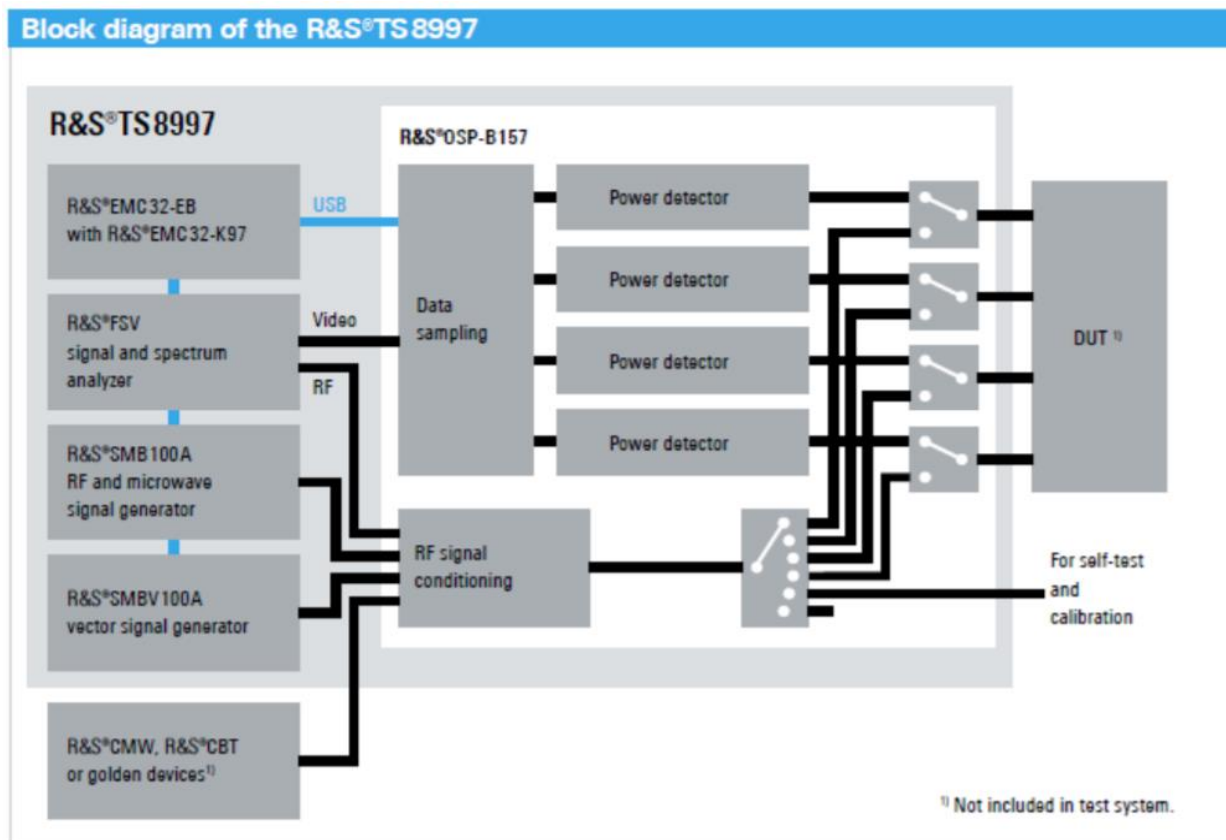


Diagram 1: Test Configuration Block Diagram

## 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

<b>Title</b>	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.
<b>Purpose of Test</b>	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	2402 to 2480	Compliant
15.247(b)	RSS-247 § 5.4	Peak Output Power	2402 to 2480	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	30 to 40000	Compliant
15.247(e)	RSS-247 § 5.2	Peak Power Spectral Density	2402 to 2480	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 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 2022. 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 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-6754	12/8/2021	12/8/2022
LISN	AFJ	LS16C/10	UCL-6749	12/6/2021	12/6/2023
Cat6 ISN	Teseq	ISN T8-Cat6	UCL-2971	1/30/2022	1/30/2023
ISN	Teseq	ISN T800	UCL-2974	6/4/2021	6/4/2022
LISN	Com-Power	LIN-120C	UCL-2612	1/6/2022	1/6/2023
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

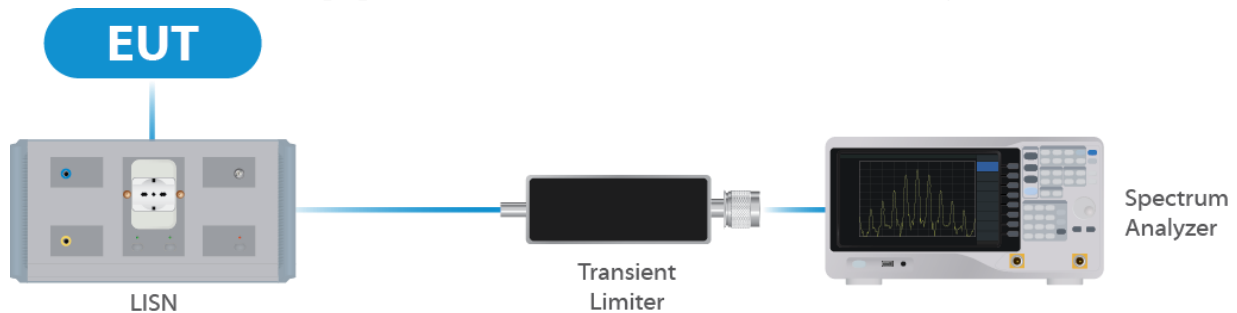


Figure 1: Conducted Emissions Test

### 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	1/03/2022	1/03/2023
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	1/03/2022	1/03/2023
Switch Extension	R&S	OSP-150W	UCL-2870	1/03/2022	1/03/2023

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

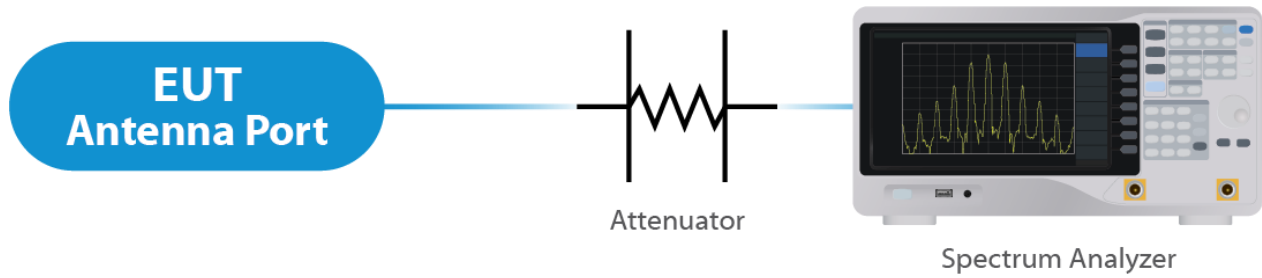


Figure 2: Direct Connect at the Antenna Port Test

### 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	6/21/2021	6/21/2022
Pre-Amplifier 9 kHz – 1 GHz	Sonoma Instruments	310N	UCL-2889	10/7/2021	10/7/2022
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3062	8/28/2020	8/27/2022
Broadband Antenna	Scwarzbeck	VULB 9163	UCL-3071	5/19/2020	5/19/2022
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	11/16/2022
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	10/7/2021	10/7/2022
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

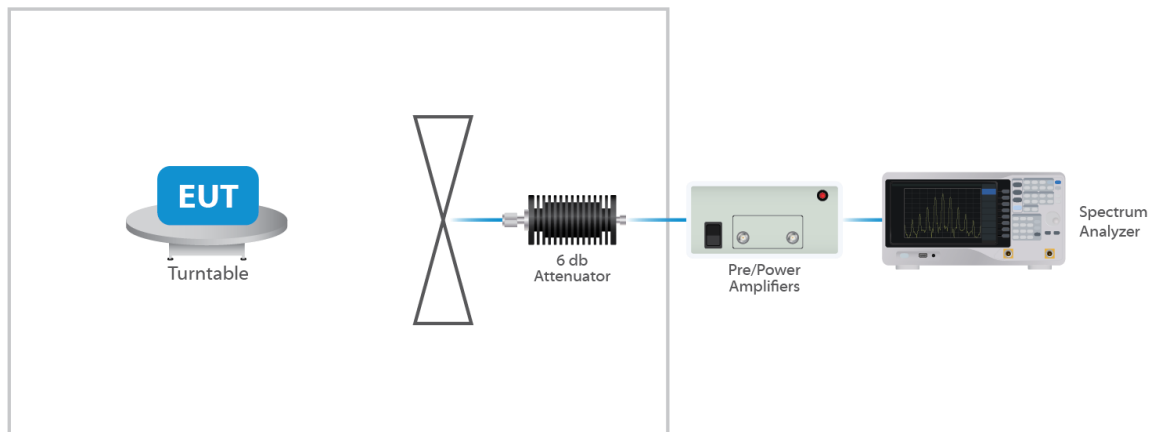


Figure 3: Radiated Emissions Test

## 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
<b>Direct Connect Tests</b>	<b>K Factor</b>	<b>Value</b>
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

Frequency (MHZ)	AC Mains Lead	Detector	Measured Level (dBµV)	Limit (dBµV)	Margin (dB)
2.451	Hot Lead	Quasi-Peak (Note 2)	46.4	56	- 9.60
3.474	Hot Lead	Quasi-Peak (Note 2)	46.3	56	- 9.70
3.882	Hot Lead	Quasi-Peak (Note 2)	45.9	56	- 10.10
3.066	Hot Lead	Quasi-Peak (Note 2)	45.9	56	- 10.10
240,000	Hot Lead	Quasi-Peak (Note 2)	52.0	66.0	- 14.00
2.043	Hot Lead	Quasi-Peak (Note 2)	45.3	56	- 10.70
2.376	Hot Lead	Quasi-Peak (Note 2)	43.4	56	- 12.60
2.247	Hot Lead	Quasi-Peak (Note 2)	42.9	56	- 13.10
3.882	Hot Lead	Average (Note 2)	45.1	46.0	- 0.90
3.4474	Hot Lead	Average (Note 2)	45.5	46.0	- 0.50
3.066	Hot Lead	Average (Note 2)	44.4	46.0	- 1.6
2.451	Hot Lead	Average (Note 2)	44.4	46.0	- 1.6
2.376	Hot Lead	Average (Note 2)	42.2	46.0	- 3.8
2.043	Hot Lead	Average (Note 2)	44.4	46.0	- 1.6
2.451	Neutral Lead	Quasi-Peak (Note 2)	46.3	56	- 9.70
3.474	Neutral Lead	Quasi-Peak (Note 2)	46.2	56	- 9.80
3.066	Neutral Lead	Quasi-Peak (Note 2)	46.1	56	- 9.90
240,000	Neutral Lead	Quasi-Peak (Note 2)	52.1	62.1	- 10.00
3.882	Neutral Lead	Quasi-Peak (Note 2)	45.6	56	- 10.40
3.474	Neutral Lead	Average (Note 2)	45.6	46	- 0.40
3.882	Neutral Lead	Average (Note 2)	45.0	46	- 1.00
3.066	Neutral Lead	Average (Note 2)	44.6	46	- 1.40
2.451	Neutral Lead	Average (Note 2)	44.2	46	- 1.80

Note 1: The reference detector used for the measurements was Quasi-Peak or Peak and the data was compared to the average limit: therefore, the EUT was deemed to meet both the average and quasi-peak limits.

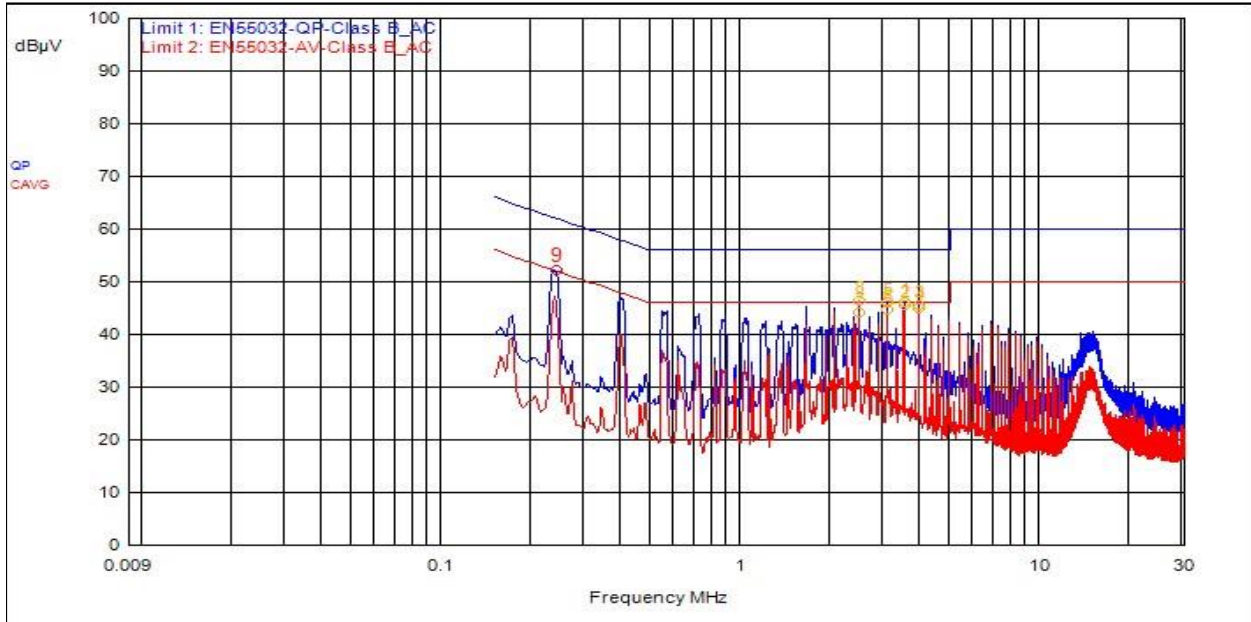
Note 2: The reference detector used for the measurements was quasi-peak and average and the data was compared to the respective limits.

Note 3: The device the transceiver is in is a Class A device and the limits shown are from §15.207 which are the same as the limits for a Class B device under §15.107. These emissions were investigated and were found to be at the same level regardless of whether the transceivers of the device were not powered, powered and idle, or

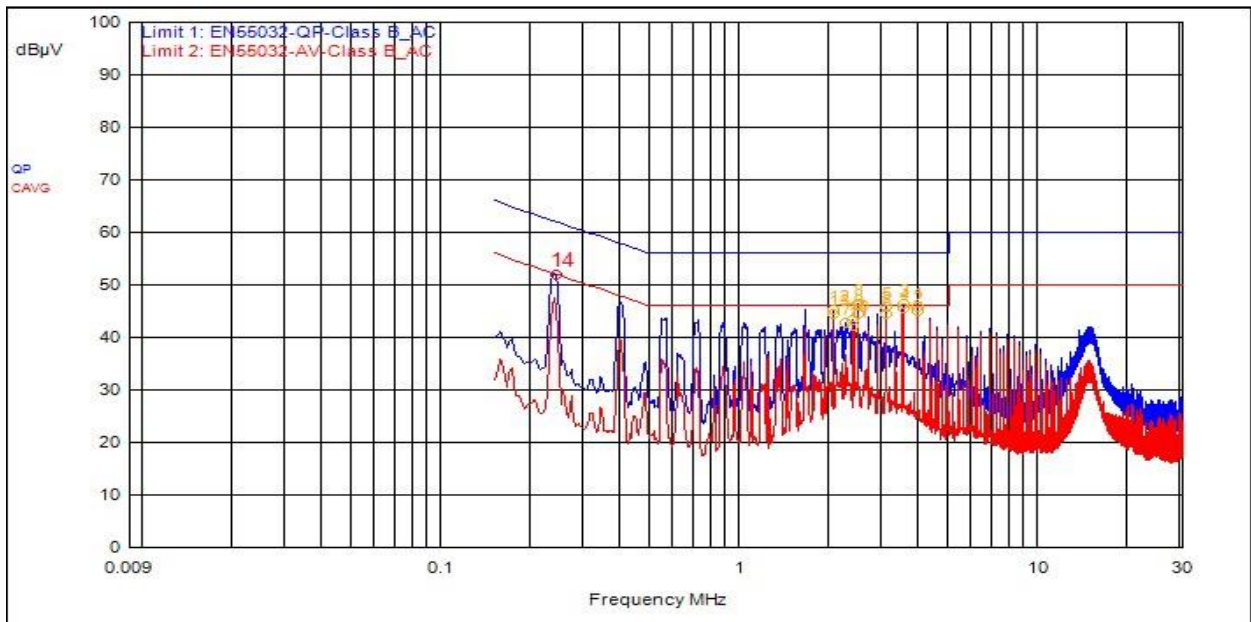
powered and active, therefore, the conducted emissions of the transceivers were deemed compliant with the requirements of the standard.

**Result**

The EUT complied with the specification limit.



**Graph 1: Conducted Emissions Plot - Neutral**



**Graph 2: Conducted Emissions Plot - Line 1**

### 5.3 §15.247(a)(2) Emissions Bandwidth

Frequency (MHz)	Emissions 6 dB Bandwidth (MHz)	Emissions 99% Bandwidth (MHz)
2402	0.693	1.035
2442	0.693	1.030
2480	0.733	1.040

#### 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 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 10.09 dBm or 10.21 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 4 dBi.

Frequency (MHz)	Measured Output Power (dBm)	Output Power (mW)
2402	10.09	10.21
2442	10.04	10.09
2480	5.88	3.87

#### 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 (see spectrum analyzer plot within the Annex).

### 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

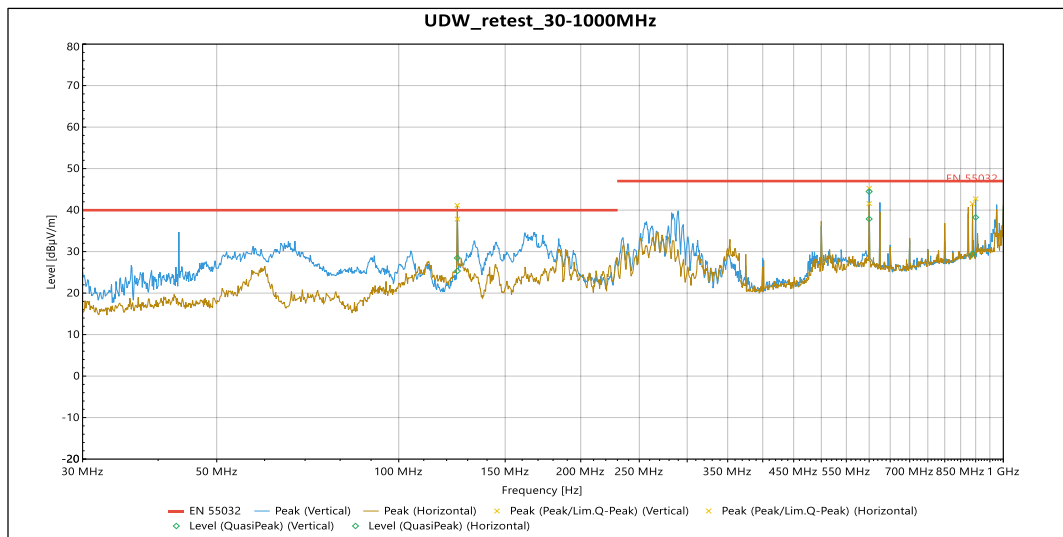
Conducted spurious emissions were attenuated 30 dB or more below the fundamental; therefore, the EUT complies with the specification.

### 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.

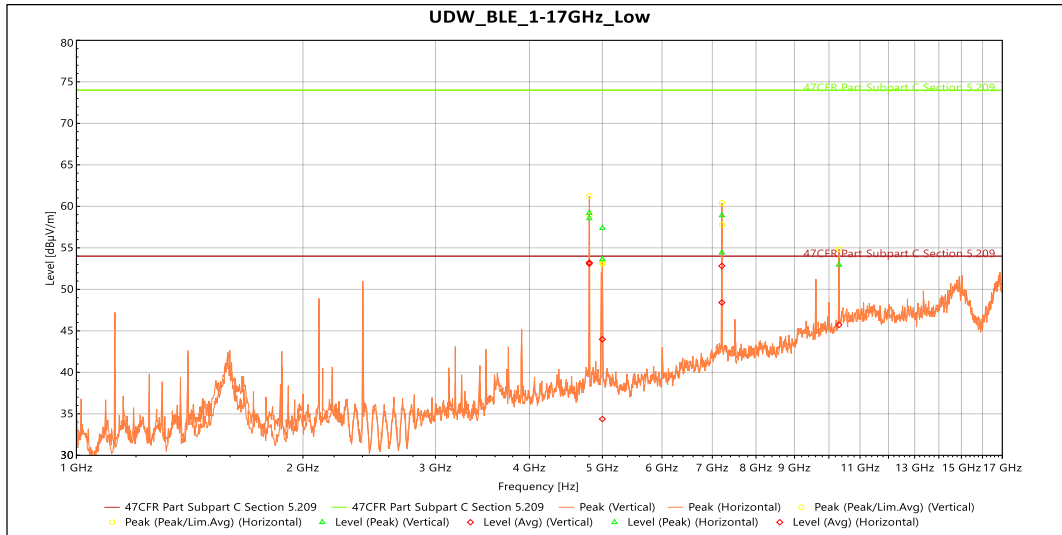
## Result

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

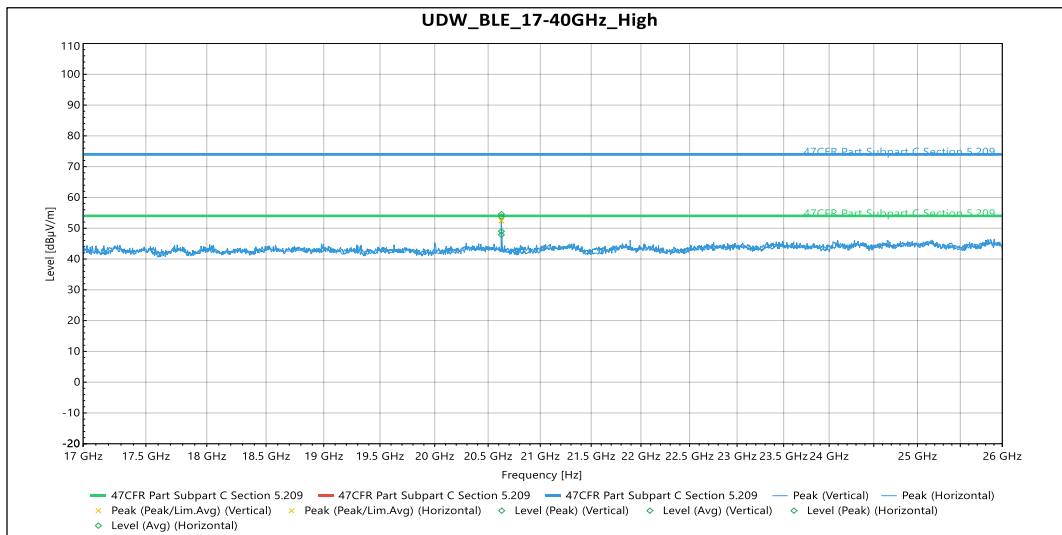


Frequency	SR #	Level (dBµV/m)	Limit (dBµV/m)	Margin	Azimuth (°)	Height	Pol.	Correction (dB)
125 MHz	QP	28.455	40	-11.545	182	1.151	Vertical	-15.927
600 MHz	QP	44.461	47	-2.539	341	3.635	Vertical	-4.383
899.95 MHz	QP	38.246	47	-8.754	219	2.161	Vertical	-0.127
125.05 MHz	QP	25.335	40	-14.665	330	2.853	Horizontal	-15.931
600 MHz	QP	37.868	47	-9.132	77	1.331	Horizontal	-4.383
889.34 MHz	QP	29.449	47	-17.551	358	1.132	Horizontal	-0.575

**Table 4: Radiated Emissions within 30MHz - 1GHz**



Frequency	SR #	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	Correction (dB)
4.8038 GHz	Peak	59.21	74	-14.79	212	2.822	Vertical	-11.915
5 GHz	Peak	57.377	74	-16.623	231	2.644	Vertical	-11.371
7.207 GHz	Peak	58.915	74	-15.085	305	2.331	Vertical	-5.53
4.8038 GHz	AVG	53.083	54	-0.917	212	2.822	Vertical	-11.915
5 GHz	AVG	43.978	54	-10.022	231	2.644	Vertical	-11.371
7.207 GHz	AVG	52.817	54	-1.183	305	2.331	Vertical	-5.53
4.8042 GHz	Peak	58.548	74	-15.452	285	3.317	Horizontal	-11.921
4.9995 GHz	Peak	53.617	74	-20.383	132	3.808	Horizontal	-11.361
7.2067 GHz	Peak	54.418	74	-19.582	255	3.313	Horizontal	-5.543
10.313 GHz	Peak	52.954	74	-21.046	220	2.824	Horizontal	0.873
4.8042 GHz	AVG	53.23	54	-0.77	285	3.317	Horizontal	-11.921
4.9995 GHz	AVG	34.377	54	-19.623	132	3.808	Horizontal	-11.361
7.2067 GHz	AVG	48.406	54	-5.594	255	3.313	Horizontal	-5.543
10.313 GHz	AVG	45.72	54	-8.28	220	2.824	Horizontal	0.873

**Table 5: Radiated Emissions within 1-17GHz Transmitting at Low Frequency**


Frequency	SR #	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Azimuth (°)	Pol.	Correction (dB)
20.626 GHz	Peak	54.587	74	-19.413	179	Vertical	-5.625
20.626 GHz	AVG	47.884	54	-6.116	179	Vertical	-5.625
20.626 GHz	Peak	53.787	74	-20.213	217	Horizontal	-5.625
20.626 GHz	AVG	49.016	54	-4.984	217	Horizontal	-5.625

**Table 6: Radiated Emissions within 17-40GHz 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	-1.55	8.0
2442	-1.77	8.0
2480	-5.99	8.0

### 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 --