



427 West 12800 South  
 Draper, UT 84020

## Test Report Certification

<b>FCC ID</b>	SWX-UISPLTE
<b>IC ID</b>	6545A-UISPLTE
<b>Equipment Under Test</b>	UISP-LTE
<b>Test Report Serial Number</b>	TR5621_01
<b>Date of Test(s)</b>	18, 20, 23 and 30 November 2020
<b>Report Issue Date</b>	March 22, 2021

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

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## Certification of Engineering Report

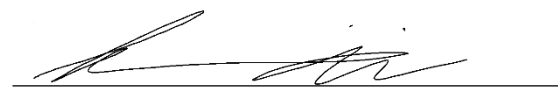
This report has been prepared by Unified Compliance Laboratory (UCL) to document compliance of the device described below with the requirement of Federal Communication Commissions (FCC) Part 15, Subpart C. This report may be reproduced in full. Partial reproduction of this report may only be made with 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>	UISP
<b>Model Number</b>	UISP-LTE
<b>FCC ID</b>	SWX-UISPLTE
<b>IC ID</b>	6545A-UISPLTE

On this 22nd day of March 2021, 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: Alex Macon



Reviewed By: Joseph W. Jackson

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<b>Revision History</b>		
<b>Revision</b>	<b>Description</b>	<b>Date</b>
01	Original Report Release	March 22, 2021

## 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 .....	6
2.5	Operating Environment.....	7
2.6	Operating Modes.....	7
2.7	EUT Exercise Software.....	7
2.8	Block Diagram of Test Configuration .....	8
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	Test Results.....	14
5.1	§15.203 Antenna Requirements.....	14
5.2	Conducted Emissions at Mains Ports Data .....	15
5.3	§15.247(a)(2) Occupied Bandwidth.....	17
5.4	§15.247(b)(3) Maximum Average Output Power.....	17
5.5	§15.247(d) Spurious Emissions .....	18
5.6	§15.247(e) Maximum Average Power Spectral Density .....	23

# 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>	UISP
<b>Model Number</b>	UISP-LTE
<b>Serial Number</b>	FCECDAFF78AB
<b>Dimensions (cm)</b>	11.45 x 11.45 x 24.24

### 2.2 Description of EUT

The UISP-LTE is a Fanless Layer 2 PoE switch featuring (8) Gigabit RJ45 ports with 24V passive PoE output and (2) SFP ports. Optimized for WISP deployments. It incorporates an LTE module for cellular access.

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 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: UISP MN: UISP-LTE (Note 1) SN: FCECDAFF78AB	LTE Cellular Switch	See Section 2.4
BN: Ubiquiti MN: POE-24-24W-G-WH SN: N/A	PoE Power Adapter	Un-shielded or Shielded CAT 5e cable/1 - 8 meters
BN: Dell MN: Latitude SN: N/A	Laptop PC	Un-shielded or Shielded CAT 5e cable/3 meter

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

<b>Name of Ports</b>	<b>No. of Ports Fitted to EUT</b>	<b>Cable Description/Length</b>
AC Mains (PoE Injector)	1	3 conductor power cord/80cm

PoE	1	Un-shielded or Shielded CAT 5e cable/1 meter
LAN	1	Un-shielded or Shielded CAT 5e cable/8 meter

## 2.5 Operating Environment

<b>Power Supply</b>	120 VAC
<b>AC Mains Frequency</b>	60 Hz
<b>Temperature</b>	21.6 – 22.4 °C
<b>Humidity</b>	17.0 – 23.8 %
<b>Barometric Pressure</b>	1019 psi

## 2.6 Operating Modes

The UISP-LTE was connected to a personal computer laptop and tested using test software in order to enable to constant transmission of the Bluetooth receiver. The EUT was checked with the LTE radio activated using a microcell.

## 2.7 EUT Exercise Software

DUT firmware version 1.0 was used to operate the transmitter using a constant transmit mode.

## 2.8 Block Diagram of Test Configuration

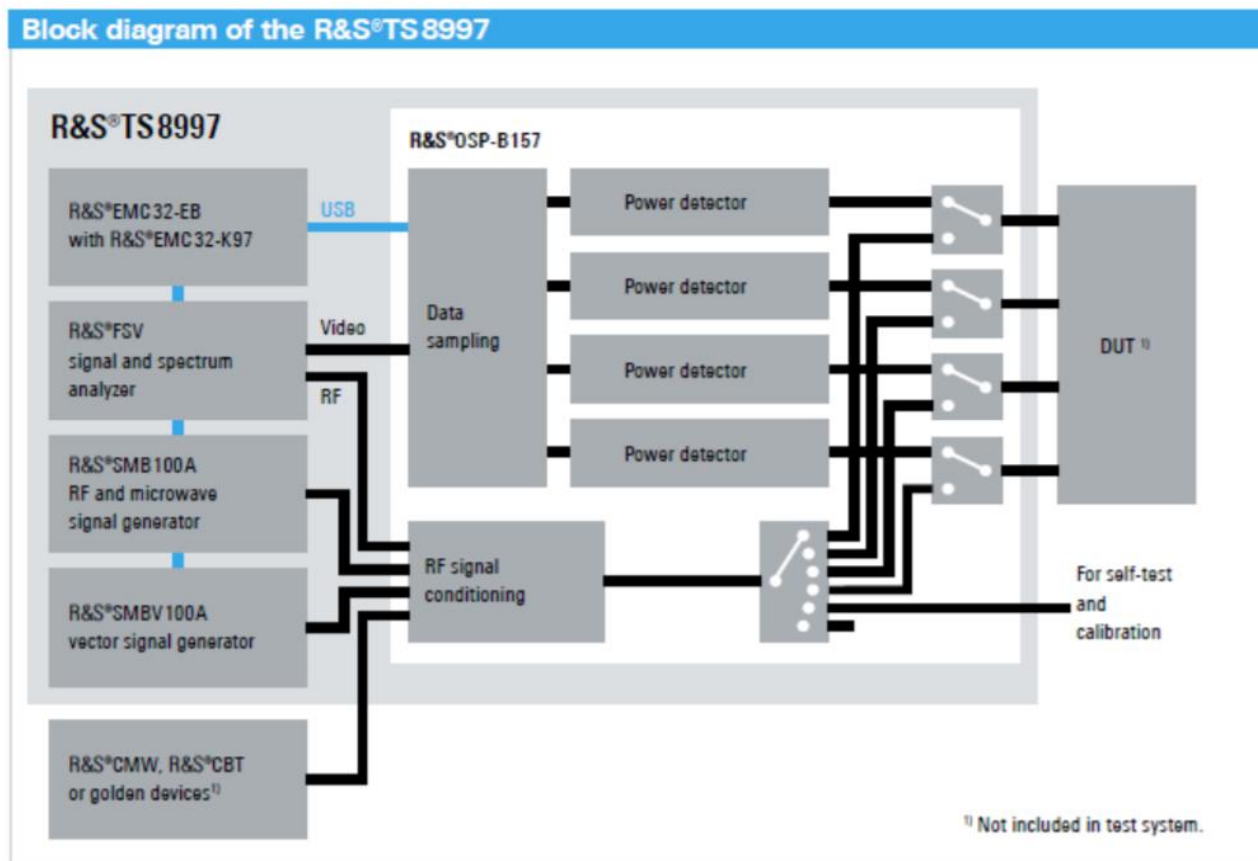


Diagram 1: Test Configuration Block Diagram

## 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	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 25000	Compliant
15.247(d)	RSS-247 § 5.4	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 2021. 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, 2021. 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	9/18/2020	9/18/2021
LISN	AFJ	LS16C/10	UCL-2512	5/26/2020	5/26/2021
Cat6 ISN	Teseq	ISN T8-Cat6	UCL-2971	5/18/2020	5/18/2021
ISN	Teseq	ISN T800	UCL-2974	6/1/2020	6/1/2021
LISN	Com-Power	LIN-120C	UCL-2612	5/19/2020	5/19/2021
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

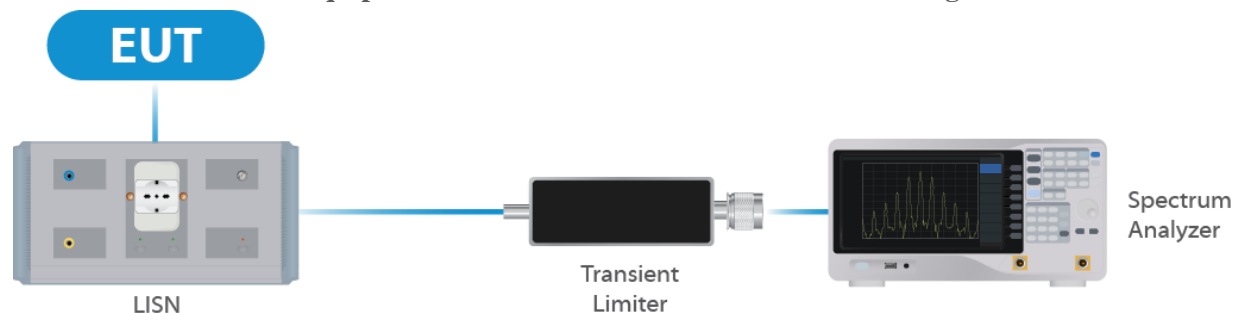


Figure 1: Conducted Emissions Test

### 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	8/24/2020	8/24/2021
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	8/25/2020	8/25/2021
Switch Extension	R&S	OSP-150W	UCL-2870	8/21/2020	8/21/2021

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

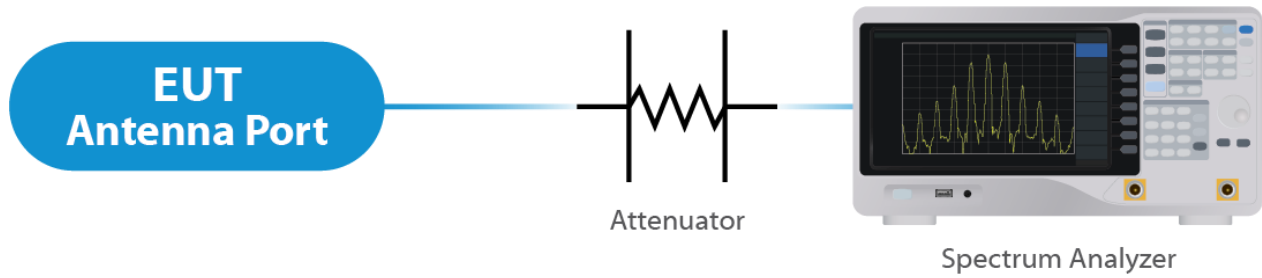


Figure 2: Direct Connect at the Antenna Port Test

### 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	6/1/2020	6/1/2021
Pre-Amplifier	Sonoma Instruments	310N	UCL-2889	9/10/2020	9/10/2021
Double Ridge Horn Antenna	Scwarzbeck	BBHA 9120D	UCL-3065	7/8/2020	7/8/2021
Log Periodic	Scwarzbeck	STLP 9129	UCL-3068	5/20/2020	5/20/2021
15 - 40 GHz Horn Antenna	Scwarzbeck	BBHA 9170	UCL-2487	5/21/2020	5/21/2021
18 – 40 GHz Amplifier	Com-Power	PAM 118A	UCL-3833	1/28/2020	1/28/2021
0.5 – 18 GHz Amplifier	Scwarzbeck	BBV 9718C	UCL-2493	1/24/2020	1/24/2021
Test Software	UCL	Revision 1	UCL-3108	N/A	N/A

Table 3: List of equipment used for Radiated Emissions

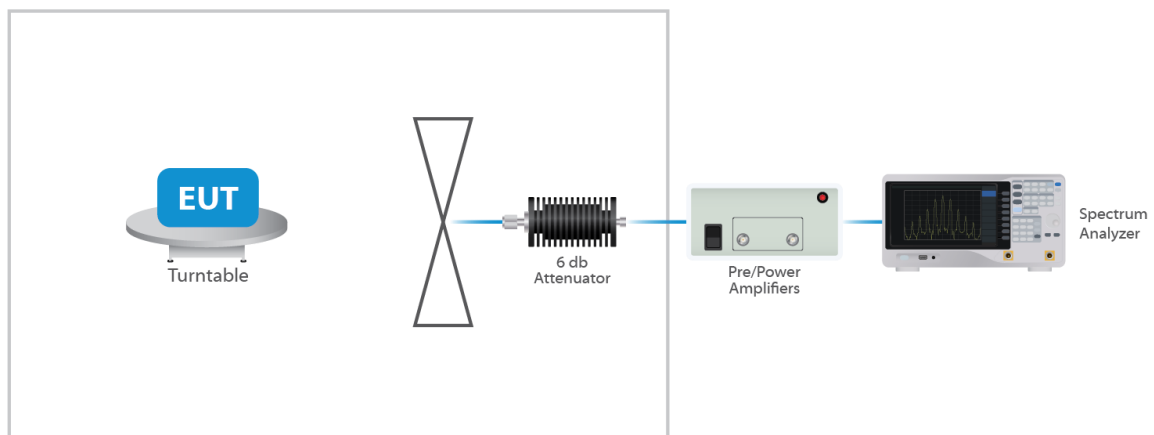


Figure 3: Radiated Emissions Test

## 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 3.0 dBi. The antenna is not user replaceable.

#### **Results**

The EUT complied with the specification

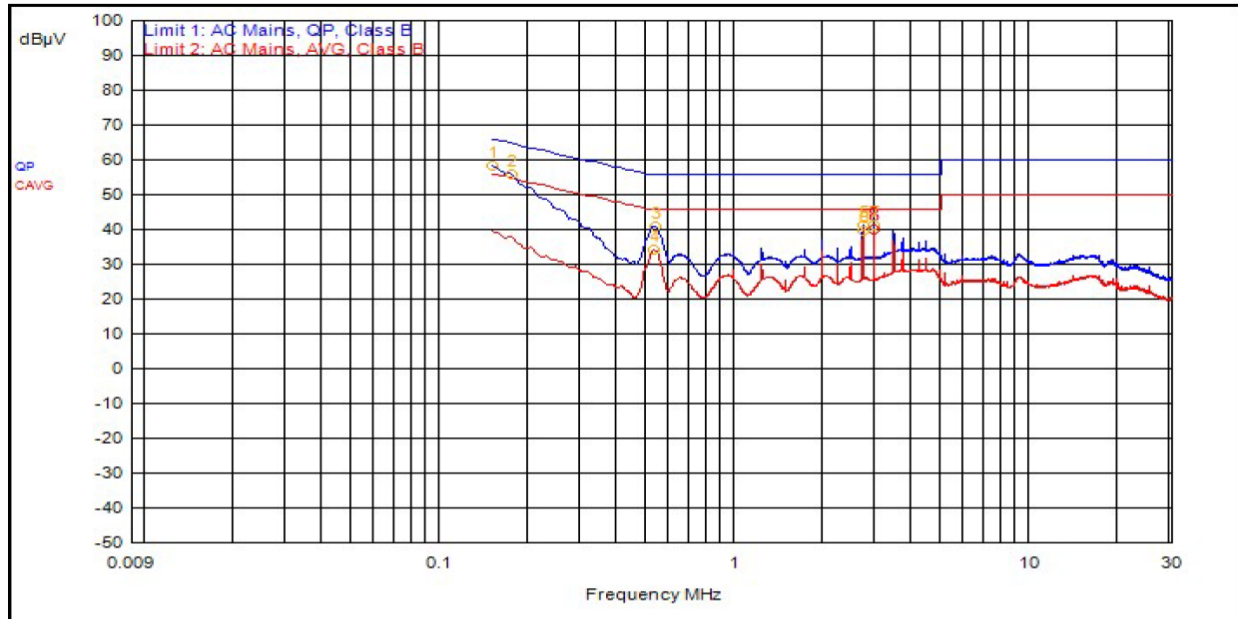
## 5.2 Conducted Emissions at Mains Ports Data

Report Test: UISP-LTE\_120V\_FCC\_Line\_1 Workspace: UISP-LTE-EU

Report Comment 1

Report Comment 2

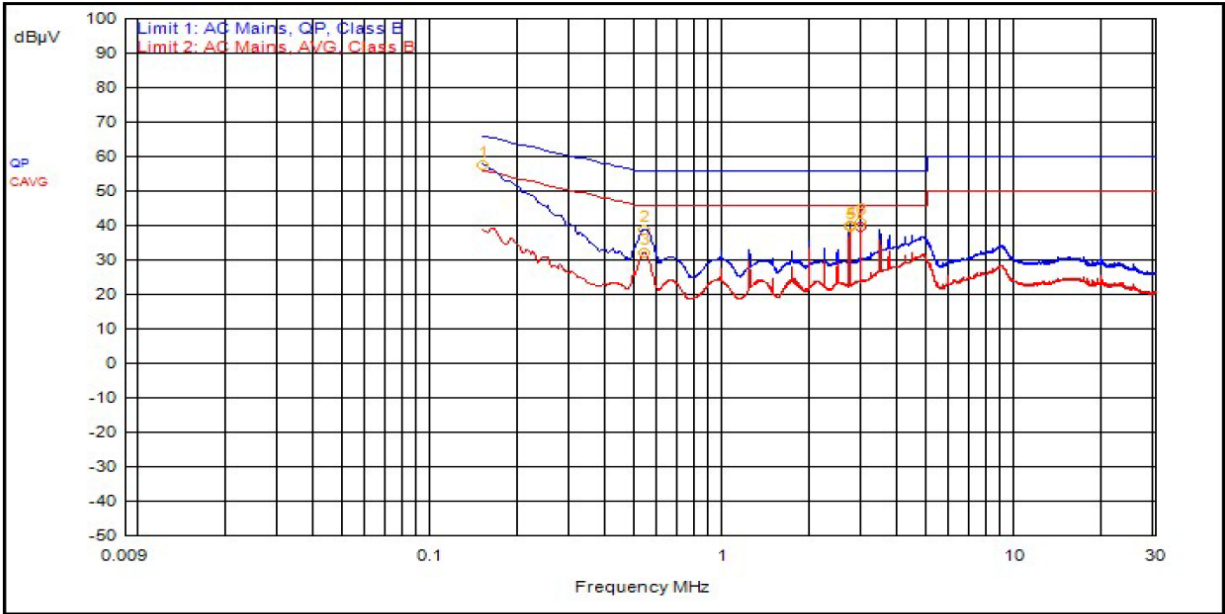
Report Comment 3



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
8	2.934MHz	12.3	0.1		C_AVG	27.6	40.0	46.0	-6.0
6	2.691MHz	12.3	0.1		C_AVG	27.3	39.7	46.0	-6.3
1	150.000kHz	12.4	0.0		QPeak	46.1	58.5	66.0	-7.5
2	174.000kHz	12.4	0.0		QPeak	43.5	55.9	64.8	-8.8
4	528.000kHz	12.4	0.0		C_AVG	21.6	34.0	46.0	-12.0
7	2.934MHz	12.3	0.1		QPeak	29.0	41.4	56.0	-14.6
5	2.688MHz	12.3	0.1		QPeak	28.9	41.3	56.0	-14.7
3	531.000kHz	12.4	0.0		QPeak	28.3	40.7	56.0	-15.3

**Report Test: UISP-LTE\_120V\_FCC\_Neutral Workspace: UISP-LTE-EU**

Report Comment 1  
 Report Comment 2  
 Report Comment 3



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
7	2.934MHz	12.3	0.1		C_AVG	27.2	39.5	46.0	-6.5
5	2.688MHz	12.3	0.1		C_AVG	27.0	39.4	46.0	-6.6
1	150.000kHz	12.4	0.0		QPeak	45.3	57.7	66.0	-8.3
3	531.000kHz	12.4	0.0		C_AVG	19.8	32.2	46.0	-13.8
6	2.934MHz	12.3	0.1		QPeak	28.3	40.7	56.0	-15.3
4	2.691MHz	12.3	0.1		QPeak	27.8	40.2	56.0	-15.8
2	534.000kHz	12.4	0.0		QPeak	26.4	38.8	56.0	-17.2

**Result**

The EUT complied with the specification limit.



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

Frequency (MHz)	Emissions 99% Bandwidth (MHz)	Emissions 6 dB Bandwidth (MHz)
2402	0.99	0.594
2442	0.995	0.653
2480	0.995	0.633

#### 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 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 -2.7 dBm or 0.537 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 3.08 dBi. A wideband power meter was utilized.

Frequency (MHz)	Measured Output Power (dBm)	Output Power (mW)
2402	-4.7	0.338
2442	-4.6	0.346
2480	-2.7	0.537

#### 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 with 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**

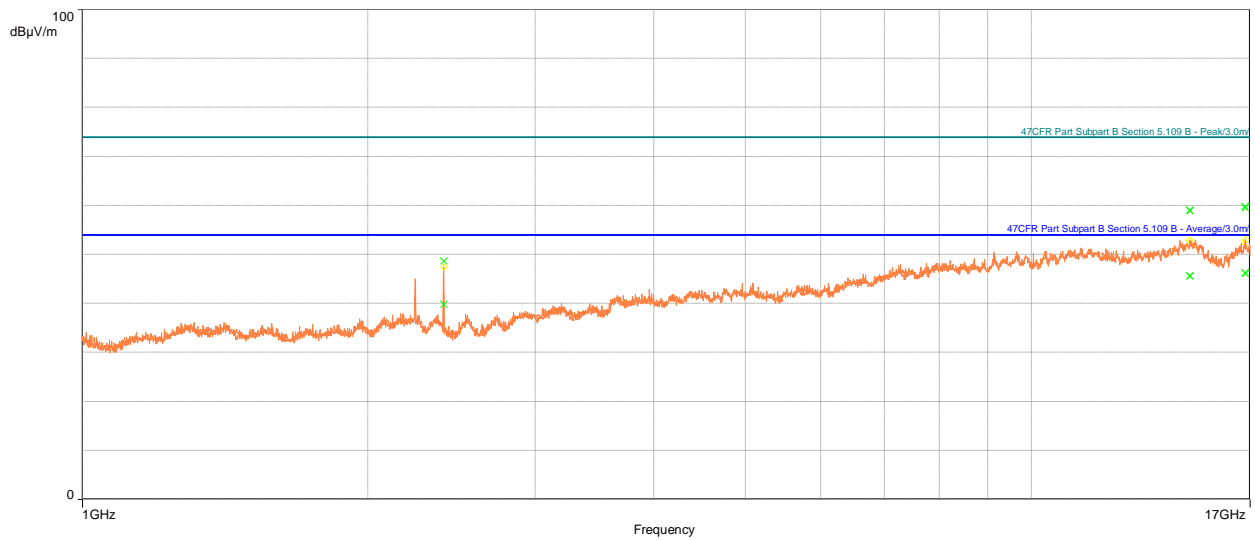
Conducted spurious emissions were attenuated 30 dB or more below the fundamental; therefore, the EUT complies with the specification.

### **5.5.2 Radiated Spurious Emissions in the Restricted Bands of §15.205**

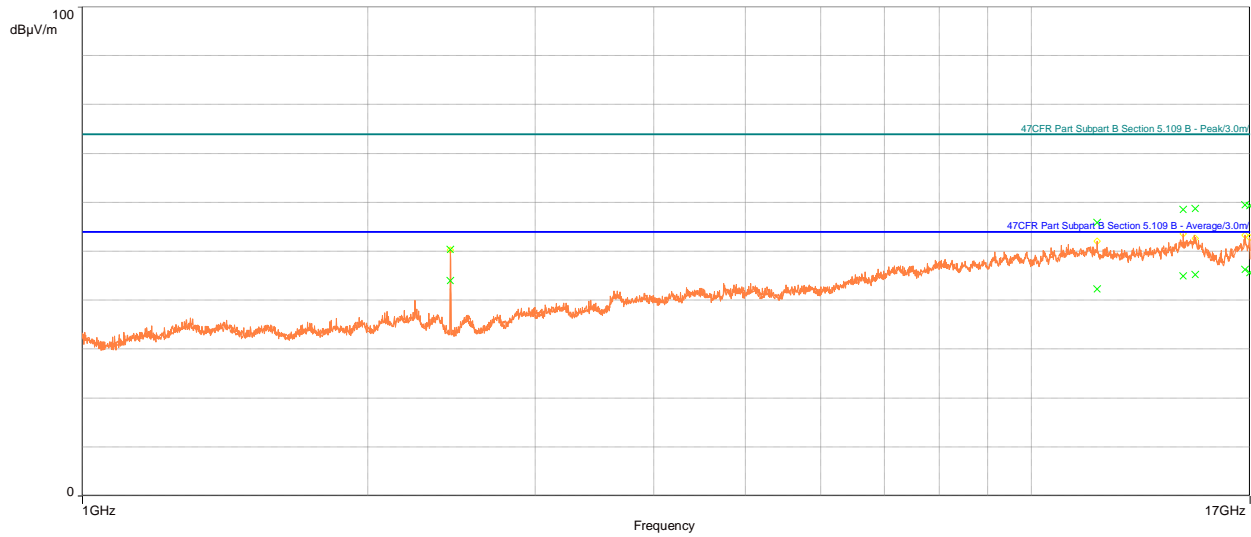
The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental emissions was investigated to measure any radiated emissions in the restricted bands. The following tables show measurements of any emissions that fell into the restricted bands 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.

#### **Result**

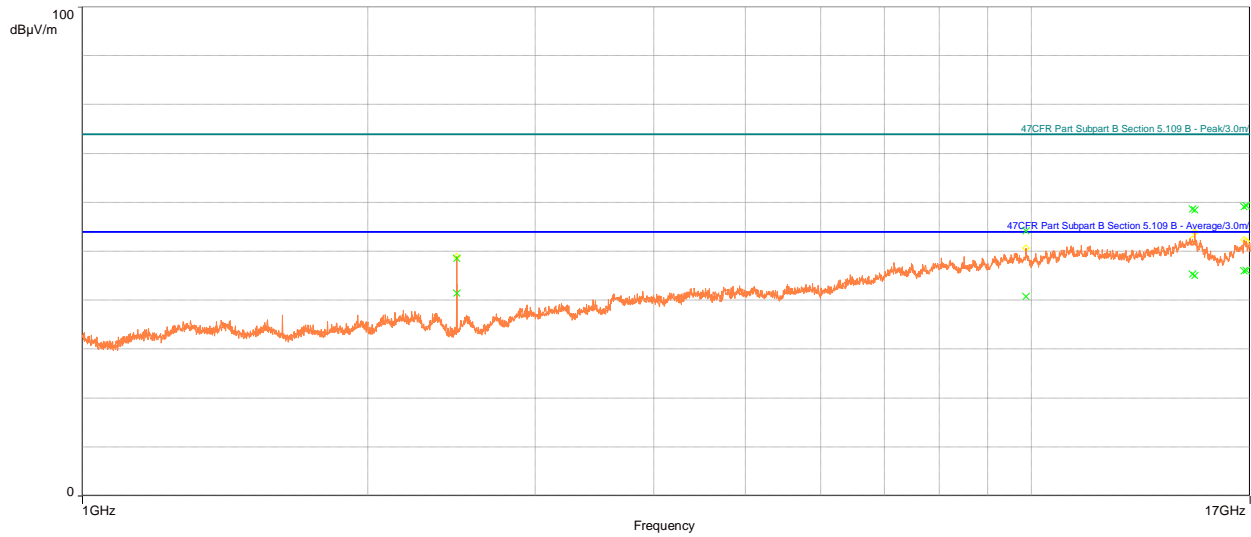
All emissions in the restricted bands of §15.205 met the limits specified in §15.209; therefore, the EUT complies with the specification.


**Table 4: Transmitting at the Lowest Frequency**

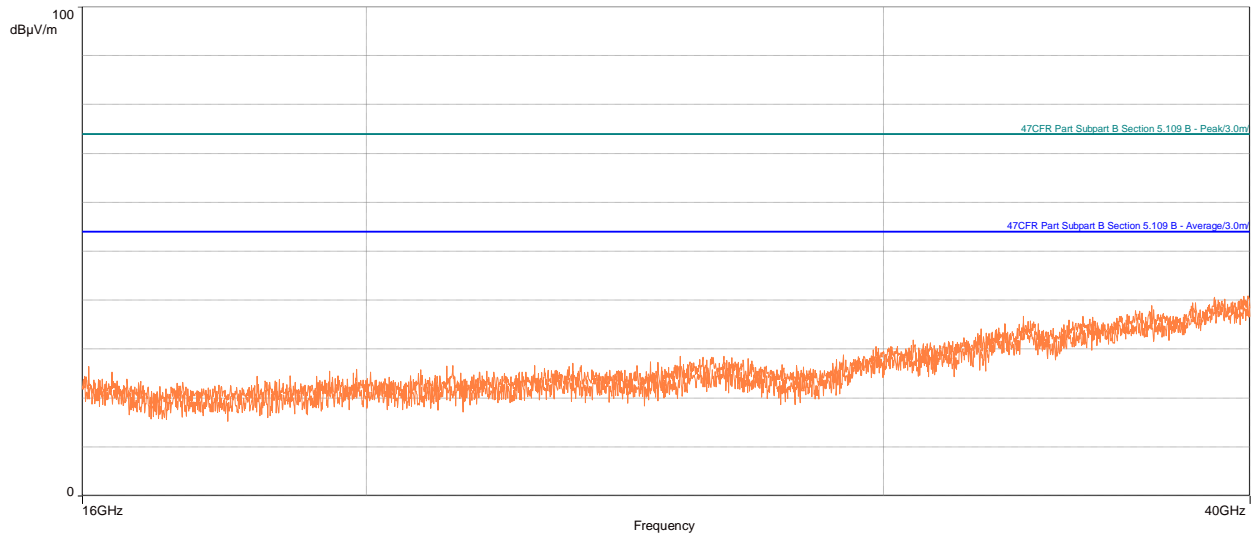
Frequency (MHz)	Det.	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
2402.4	Avg	39.88	54.00	-14.12	359.00	1.98	Vertical	-5.90
14703	Avg	45.65	54.00	-8.35	147.00	1.50	Vertical	17.75
16782	Avg	46.30	54.00	-7.70	155.00	3.11	Vertical	18.72
14686	Avg	45.60	54.00	-8.40	199.00	3.45	Horizontal	17.77
16813	Avg	46.08	54.00	-7.92	192.00	1.93	Horizontal	18.66
2402.4	Peak	48.63	74.00	-25.37	359.00	1.98	Vertical	-5.90
14703	Peak	58.98	74.00	-15.02	147.00	1.50	Vertical	17.75
16782	Peak	59.76	74.00	-14.24	155.00	3.11	Vertical	18.72
14686	Peak	59.07	74.00	-14.93	199.00	3.45	Horizontal	17.77
16813	Peak	59.53	74.00	-14.47	192.00	1.93	Horizontal	18.66


**Table 5: Transmitting at the Middle Frequency**

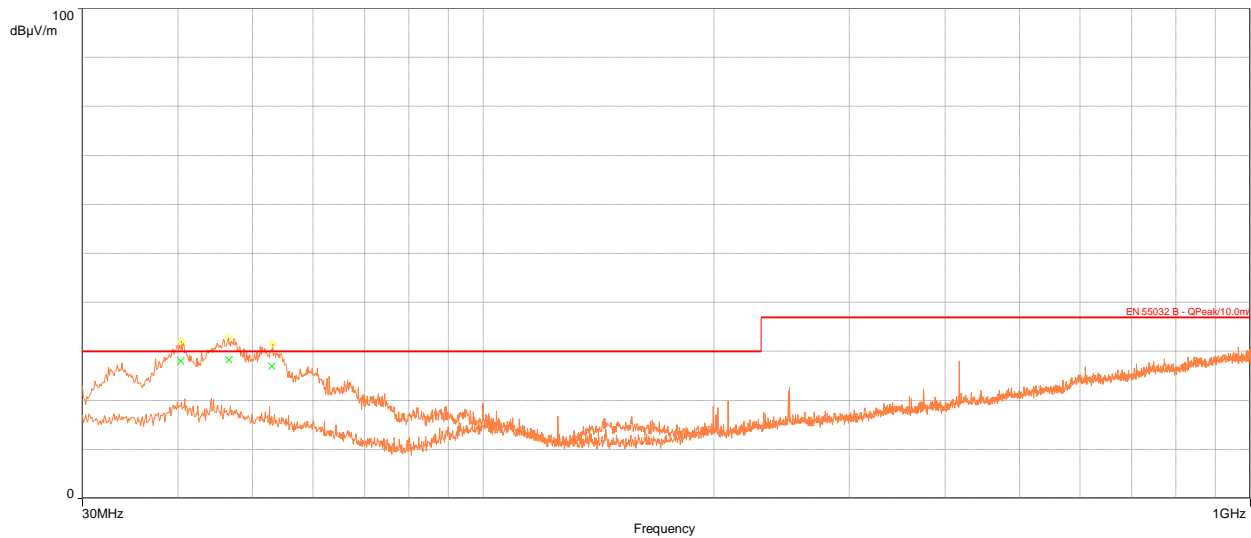
Frequency (MHz)	Det.	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
2442.2	Avg	43.99	54.00	-10.01	2.00	1.50	Vertical	-6.17
11723	Avg	42.26	54.00	-11.74	1.00	1.97	Vertical	14.64
14886	Avg	45.27	54.00	-8.73	196.00	1.98	Vertical	17.49
16793	Avg	46.33	54.00	-7.67	106.00	2.10	Vertical	18.77
14459	Avg	44.95	54.00	-9.05	14.00	1.81	Horizontal	17.10
16990	Avg	45.61	54.00	-8.39	81.00	1.67	Horizontal	18.75
2442.2	Peak	50.42	74.00	-23.58	2.00	1.50	Vertical	-6.17
11723	Peak	55.95	74.00	-18.05	1.00	1.97	Vertical	14.64
14886	Peak	58.77	74.00	-15.23	196.00	1.98	Vertical	17.49
16793	Peak	59.52	74.00	-14.48	106.00	2.10	Vertical	18.77
14459	Peak	58.59	74.00	-15.41	14.00	1.81	Horizontal	17.10
16990	Peak	59.28	74.00	-14.72	81.00	1.67	Horizontal	18.75


**Table 6: Transmitting at the Highest Frequency**

Frequency (MHz)	Det.	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
2479.8	Avg	41.43	54.00	-12.57	3.00	1.50	Vertical	-6.30
9872.7	Avg	40.77	54.00	-13.23	321.00	2.60	Vertical	12.19
14774	Avg	45.36	54.00	-8.64	335.00	3.96	Vertical	17.70
16856	Avg	46.11	54.00	-7.89	53.00	2.02	Vertical	19.16
14868	Avg	45.08	54.00	-8.92	215.00	3.66	Horizontal	17.33
16759	Avg	46.04	54.00	-7.96	125.00	3.48	Horizontal	18.55
2479.8	Peak	48.62	74.00	-25.38	3.00	1.50	Vertical	-6.30
9872.7	Peak	54.21	74.00	-19.79	321.00	2.60	Vertical	12.19
14774	Peak	58.68	74.00	-15.32	335.00	3.96	Vertical	17.70
16856	Peak	59.33	74.00	-14.67	53.00	2.02	Vertical	19.16
14868	Peak	58.48	74.00	-15.52	215.00	3.66	Horizontal	17.33
16759	Peak	59.18	74.00	-14.82	125.00	3.48	Horizontal	18.55



16 GHz – 40 GHz example



30 MHz – 1 GHz example

Frequency (MHz)	Det.	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Polarization	Correction (dB)
40.269	QP	28.03	30.00	-1.97	359.00	2.72	Vertical	-11.25
46.592	QP	28.29	30.00	-1.71	49.00	1.91	Vertical	-11.21
53.021	QP	26.99	30.00	-3.01	63.00	3.64	Vertical	-12.05

## 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>Frequency (MHz)</b>	<b>Measurement (dBm)</b>	<b>Criteria (dBm)</b>
2402	-10.9	8.0
2442	-10.2	8.0
2480	-9	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 --