



427 West 12800 South  
Draper, UT 84020

## Test Report Certification

|                                  |               |
|----------------------------------|---------------|
| <b>FCC ID</b>                    | SWX-UMT       |
| <b>IC ID</b>                     | 6545A-UMT     |
| <b>Equipment Under Test</b>      | UMT           |
| <b>Test Report Serial Number</b> | TR8231_01     |
| <b>Date of Tests</b>             | 5-7 June 2023 |
| <b>Report Issue Date</b>         | 9 June 2023   |

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



NVLAP LAB CODE 600241-0

---

## Certification of Engineering Report

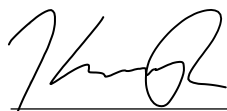
This report has been prepared by Unified Compliance Laboratory (UCL) to document compliance of the device described below with the requirement of Federal Communication Commissions (FCC) Part 15, Subpart C. This report may be reproduced in full. Partial reproduction of this report may only be made with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

|                     |               |
|---------------------|---------------|
| <b>Applicant</b>    | Ubiquiti Inc. |
| <b>Manufacturer</b> | Ubiquiti Inc. |
| <b>Brand Name</b>   | UBIQUITI      |
| <b>Model Number</b> | UMT           |
| <b>FCC ID</b>       | SWX-UMT       |
| <b>IC ID</b>        | 6545A-UMT     |

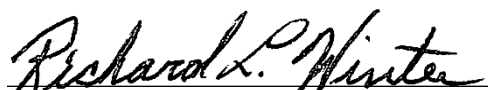
On this 9<sup>th</sup> day of June 2023, I individually and for Unified Compliance Laboratory certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge and are made in good faith.

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: Kimberly Rodriguez



Reviewed By: Richard L. Winter

---

| <b>Revision History</b> |                         |             |
|-------------------------|-------------------------|-------------|
| <b>Revision</b>         | <b>Description</b>      | <b>Date</b> |
| 01                      | Original Report Release | 9 June 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 | Operating Environment.....  | 6  |
| 2.5 | Operating Modes.....  | 7  |
| 2.6 | EUT Exercise Software.....  | 7  |
| 2.7 | Block Diagram of Test Configuration .....   | 7  |
| 2.8 | Modification Incorporated/Special Accessories on EUT.....                             | 7  |
| 2.9 | Deviation, Opinions Additional Information or Interpretations from Test Standard..... | 7  |
| 3   | Test Specification, Method and Procedures.....  | 8  |
| 3.1 | Test Specification.....   | 8  |
| 3.2 | Methods & Procedures.....   | 8  |
| 3.3 | FCC Part 15, Subpart C .....  | 8  |
| 3.4 | Results.....  | 9  |
| 3.5 | Test Location .....   | 9  |
| 4   | Test Equipment.....   | 10 |
| 4.1 | Conducted Emissions at Mains Ports.....   | 10 |
| 4.2 | Direct Connect at the Antenna Port Tests.....   | 10 |
| 4.3 | Radiated Emissions.....   | 11 |
| 4.4 | Equipment Calibration .....   | 12 |
| 4.5 | Measurement Uncertainty.....  | 12 |
| 5   | Test Results.....   | 13 |
| 5.1 | §15.203 Antenna Requirements.....   | 13 |
| 5.2 | §15.247(a)(2) Emissions Bandwidth.....  | 13 |
| 5.3 | §15.247(b)(3) Maximum Average Output Power.....                                       | 13 |
| 5.4 | §15.247(d) Spurious Emissions .....   | 14 |
| 5.5 | §15.247(e) Maximum Average Power Spectral Density .....                               | 17 |

# 1 Client Information

## 1.1 Applicant

|                     |   |
|---------------------|---|
| <b>Company</b>      | Ubiquiti Inc.<br>685 Third Avenue<br>New York, NY 10017<br>U.S.A. |
| <b>Contact Name</b> | Alex Macon  |
| <b>Title</b>        | Compliance  |

## 1.2 Manufacturer

|                     |   |
|---------------------|---|
| <b>Company</b>      | Ubiquiti Inc.<br>685 Third Avenue<br>New York, NY 10017<br>U.S.A. |
| <b>Contact Name</b> | Alex Macon  |
| <b>Title</b>        | Compliance  |

## 2 Equipment Under Test (EUT)

### 2.1 Identification of EUT

|                        |                                    |
|------------------------|------------------------------------|
| <b>Brand Name</b>      | UBIQUITI                           |
| <b>Model Number</b>    | UMT                                |
| <b>Serial Number</b>   | Q14N03                             |
| <b>Dimensions (cm)</b> | 1.04      x    9.25      x    3.27 |

### 2.2 Description of EUT

The UniFi Mobility Tracker is a weatherproof asset tracking device which integrates LTE Cam-M1 technology to GPS tracking solution for location tracking and reporting. It uses a data only SIM card and is set up and controlled using a cloud monitoring application. The UMT is powered by six CR123A batteries.

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<br/>Model Number<br/>Serial Number</b> | <b>Description</b>   | <b>Name of Interface Ports /<br/>Interface Cables</b> |
|--|----------------------|---|
| BN: UBIQUITI<br>MN: UMT<br>SN: Q14N03                | EUT                  | See section 2.4                                       |
| BN: Dell<br>MN: XPS 13<br>SN: N/A                    | Laptop Computer      | USB-C Cable (Note 2)                                  |
| BN: nRF<br>MN: Console Board<br>SN: N/A              | Direct Test Mode App | USB-C 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 Operating Environment

|                     |                                |
|---------------------|--------------------------------|
| <b>Power Supply</b> | 18V, CR123A 6x Battery-powered |
| <b>Temperature</b>  | 21.04-24.72 °C                 |

|                            |               |
|----------------------------|---------------|
| <b>Humidity</b>            | 33.21-36.05 % |
| <b>Barometric Pressure</b> | 1009 mBar     |

## 2.5 Operating Modes

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

## 2.6 EUT Exercise Software

EUT firmware version 2.1.0 was used to operate the transmitter using a constant transmit mode.

## 2.7 Block Diagram of Test Configuration

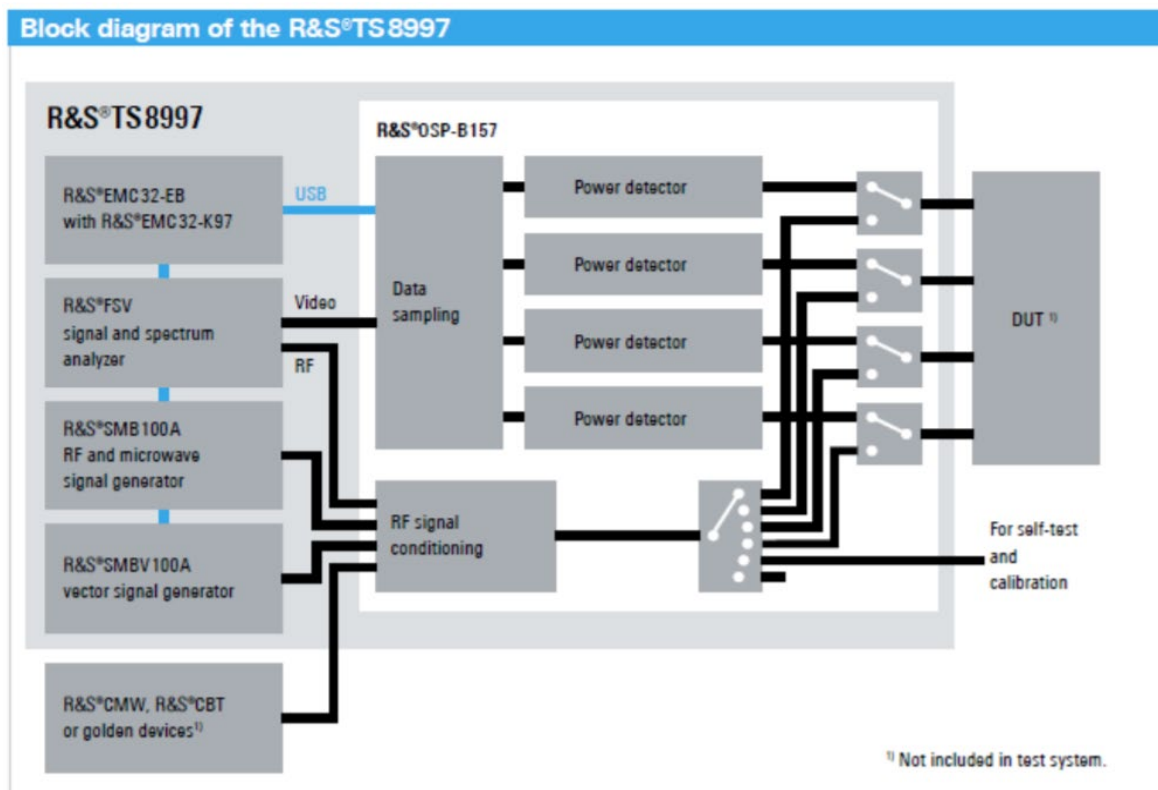


Diagram 1: Test Configuration Block Diagram

## 2.8 Modification Incorporated/Special Accessories on EUT

There were no modifications made to the EUT during testing to comply with the specification.

## 2.9 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<br>15.203, 15.207 and 15.247<br>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             | N/A       |
| 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 26000         | N/A       |
| 15.247(d)   | RSS-247 § 5.4 | Radiated Spurious Emissions          | 0.009 to 26000         | 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 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 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 2024.

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

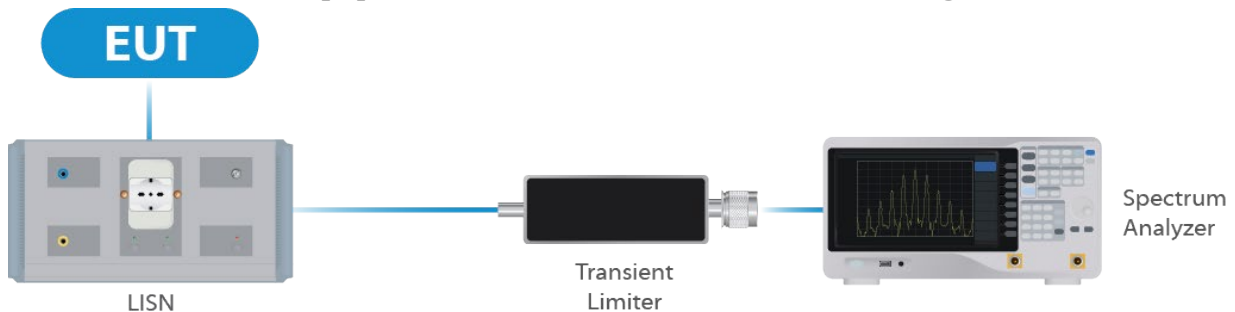
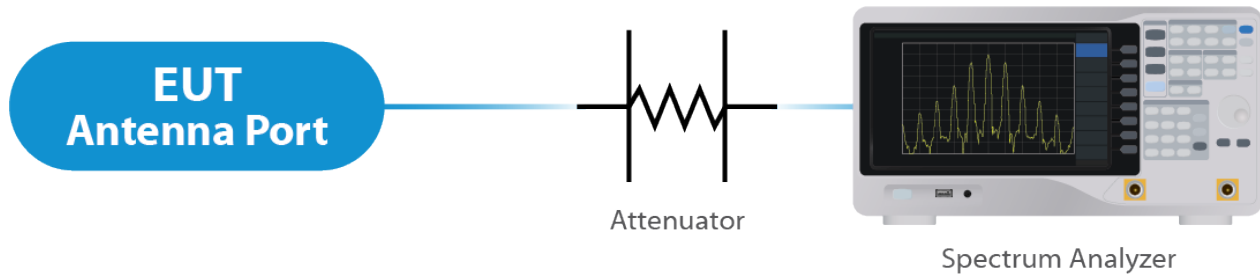


Figure 1: Conducted Emissions Test

### 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

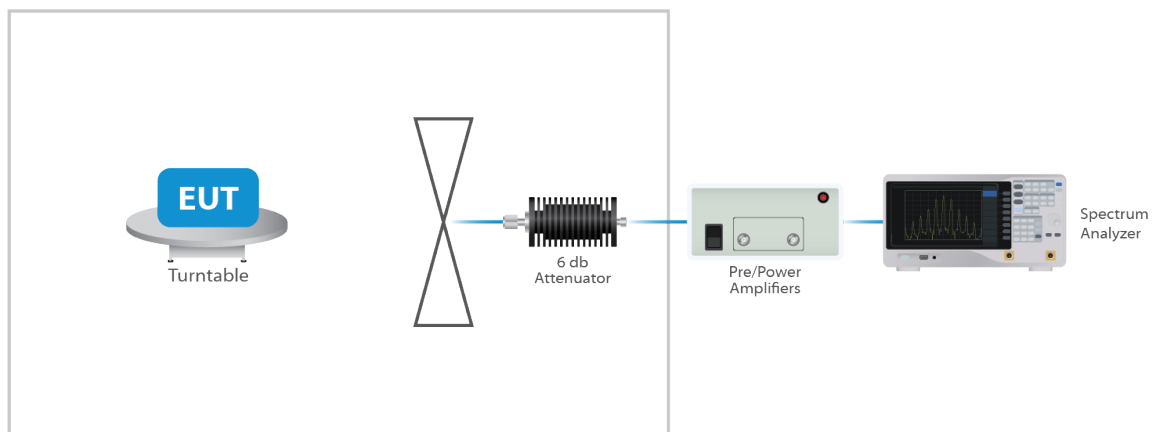


**Figure 2: Direct Connect at the Antenna Port Test**

### 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<br>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             |
| <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. As per the manufacturer, the Maximum gain of the antenna is 3.2 dBi. The antenna is not user replaceable.

#### Results

The EUT complied with the specification

### 5.2 §15.247(a)(2) Emissions Bandwidth

| Frequency (MHz) | Emissions 6 dB Bandwidth (MHz) | Emissions 99% Bandwidth (MHz) |
|-----------------|--------------------------------|-------------------------------|
| 2402            | 0.73                           | 1.05                          |
| 2442            | 0.77                           | 1.05                          |
| 2480            | 0.71                           | 1.05                          |

#### 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).

### 5.3 §15.247(b)(3) Maximum Average Output Power

The maximum average RF conducted output power measured for this device was 6.31 dBm or 4.28 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 3.2 dBi.

| Frequency (MHz) | Measured Output Power (dBm) | Output Power (mW) |
|-----------------|-----------------------------|-------------------|
| 2402            | 6.13                        | 4.10              |
| 2442            | 6.19                        | 4.16              |
| 2480            | 6.31                        | 4.28              |

#### 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).

## **5.4 §15.247(d) Spurious Emissions**

### **5.4.1 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**

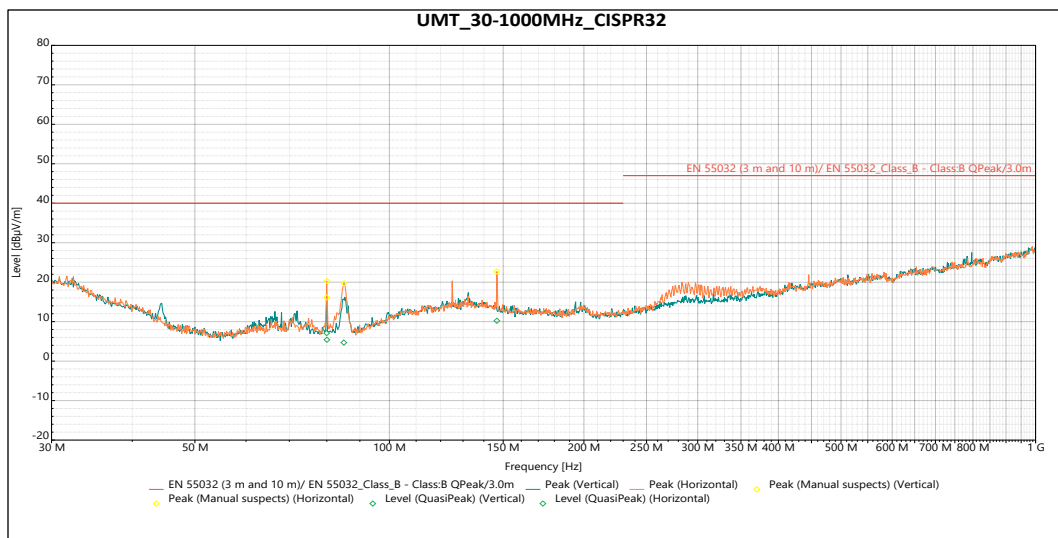
Conducted spurious emissions were attenuated 30 dB or more below the fundamental; therefore, the EUT complies with the specification.

### **5.4.2 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 bans 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.

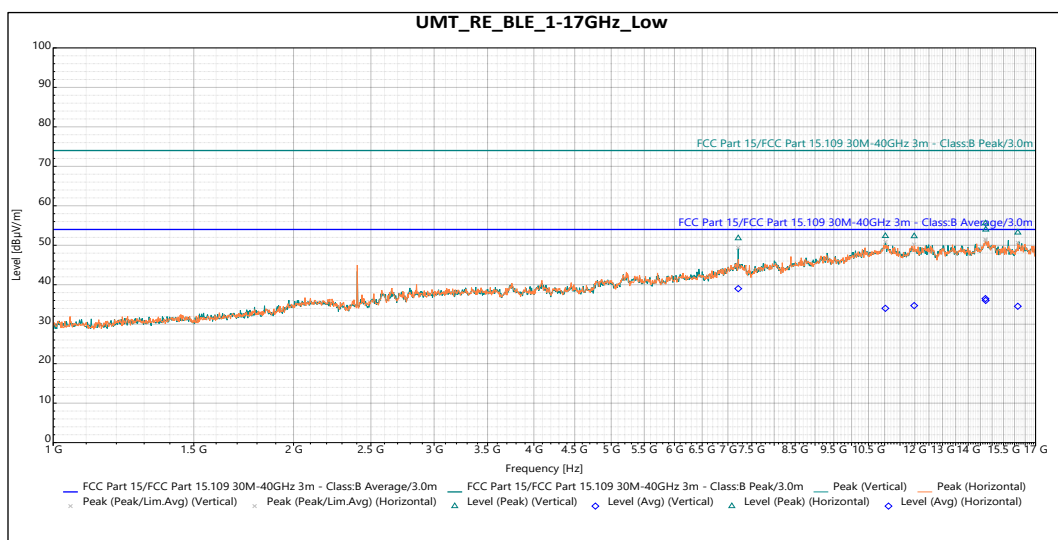
#### **Result**

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



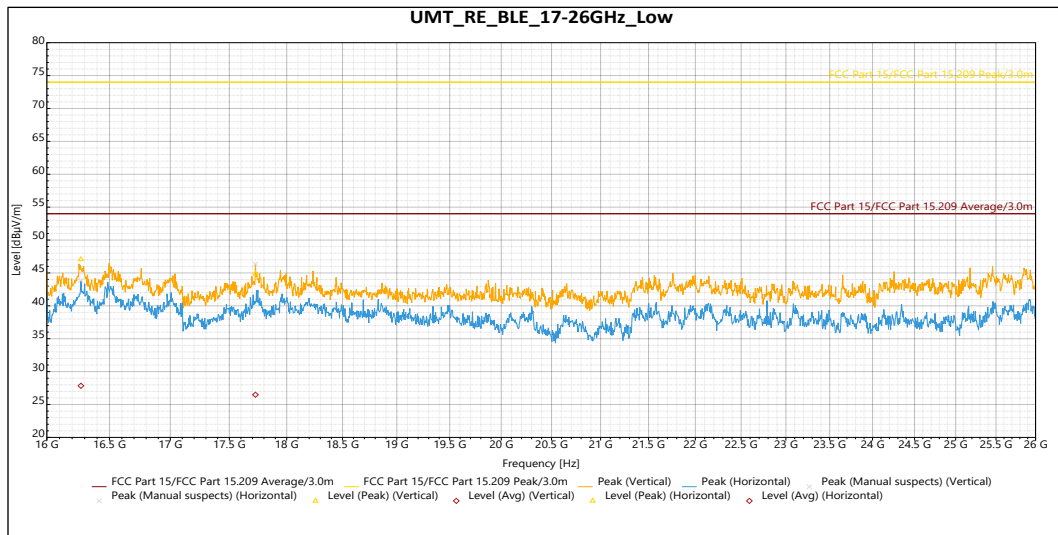
| Frequency  | SR # | Level (dBμV/m) | Limit (dBμV/m) | Margin  | Azimuth (°) | Height | Pol.       | Correction (dB) |
|------------|------|----------------|----------------|---------|-------------|--------|------------|-----------------|
| 80.036 MHz | QP   | 5.421          | 40             | -34.579 | 110         | 1.492  | Vertical   | -20.101         |
| 79.972 MHz | QP   | 7.111          | 40             | -32.889 | 218         | 4      | Horizontal | -20.094         |
| 85.018 MHz | QP   | 4.705          | 40             | -35.295 | 1           | 3.867  | Horizontal | -20.361         |
| 146.67 MHz | QP   | 10.228         | 40             | -29.772 | 151         | 3.871  | Horizontal | -14.62          |

**Table 4: Radiated Emissions within 30-1000MHz Transmitting at the Lowest Frequency**



| Frequency  | SR # | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | Correction (dB) |
|------------|------|----------------|----------------|-------------|-------------|------------|------------|-----------------|
| 7.2116 GHz | Peak | 51.781         | 74             | -22.219     | 87          | 2.757      | Vertical   | 9.32            |
| 11.024 GHz | Peak | 52.343         | 74             | -21.657     | 299         | 1.5        | Vertical   | 15.29           |
| 14.725 GHz | Peak | 53.978         | 74             | -20.022     | 87          | 3.787      | Vertical   | 15.427          |
| 7.2116 GHz | AVG  | 39.014         | 54             | -14.986     | 87          | 2.757      | Vertical   | 9.32            |
| 11.024 GHz | AVG  | 34.017         | 54             | -19.983     | 299         | 1.5        | Vertical   | 15.29           |
| 14.725 GHz | AVG  | 36.02          | 54             | -17.98      | 87          | 3.787      | Vertical   | 15.427          |
| 11.979 GHz | Peak | 52.302         | 74             | -21.698     | 274         | 1.882      | Horizontal | 14.439          |
| 14.711 GHz | Peak | 55.547         | 74             | -18.453     | 343         | 2.172      | Horizontal | 15.578          |
| 16.152 GHz | Peak | 53.226         | 74             | -20.774     | 107         | 3.427      | Horizontal | 14.76           |
| 11.979 GHz | AVG  | 34.706         | 54             | -19.294     | 274         | 1.882      | Horizontal | 14.439          |
| 14.711 GHz | AVG  | 36.484         | 54             | -17.516     | 343         | 2.172      | Horizontal | 15.578          |
| 16.152 GHz | AVG  | 34.543         | 54             | -19.457     | 107         | 3.427      | Horizontal | 14.76           |

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



| Frequency  | SR # | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Pol.       | Correction (dB) |
|------------|------|----------------|----------------|-------------|-------------|------------|-----------------|
| 17.726 GHz | Peak | 44.881         | 74             | -29.119     | 222         | Vertical   | -1.985          |
| 17.726 GHz | AVG  | 26.484         | 54             | -27.516     | 222         | Vertical   | -1.985          |
| 16.27 GHz  | Peak | 47.065         | 74             | -26.935     | 359         | Horizontal | 1.818           |
| 16.27 GHz  | AVG  | 27.842         | 54             | -26.158     | 359         | Horizontal | 1.818           |

**Table 6: Radiated Emissions within 17-26Ghz Transmitting at the Lowest Frequency**



## 5.5 §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<br>(MHz) | Measurement<br>(dBm) | Criteria<br>(dBm) |
|--------------------|----------------------|-------------------|
| 2402               | -5.06                | 8.0               |
| 2442               | -5.08                | 8.0               |
| 2480               | -4.85                | 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 --