



427 West 12800 South
Draper, UT 84020

Test Report Certification

| | |
|----------------------------------|------------------------------|
| FCC ID | SWX-UAPACLR |
| ISED ID | 6545A-UAPACLR |
| Equipment Under Test | UAP-AC-LR |
| Test Report Serial Number | TR5396_01 |
| Date of Test(s) | 10, 11 and 22 September 2020 |
| Report Issue Date | 22 September 2020 |

| 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

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 | UniFi |
| Model Number | UAP-AC-LR |
| FCC ID | SWX-UAPACLR |
| ISED ID | 6545A-UAPACLR |

On this 22nd day of September 2020, I individually and for Unified Compliance Laboratory certify that the statements made in this engineering report are true, complete and correct to the best of my knowledge and are made in good faith.

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 federal government.

Unified Compliance Laboratory



Written By: Alex Macon



Reviewed By: Joseph W. Jackson

| Revision History | | |
|-------------------------|-------------------------|-------------------|
| Revision | Description | Date |
| 01 | Original Report Release | 22 September 2020 |

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1 Client Information

1.1 Applicant

| | |
|---------------------|---|
| Company | Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A. |
| Contact Name | Mark Feil |
| Title | Compliance Manager |

1.2 Manufacturer

| | |
|---------------------|---|
| Company | Ubiquiti Inc. 685 Third Avenue New York, NY 10017 U.S.A. |
| Contact Name | Mark Feil |
| Title | Compliance Manager |

2 Equipment Under Test (EUT)

2.1 Identification of EUT

| | |
|------------------------|----------------------|
| Brand Name | UniFi |
| Model Number | UAP-AC-LR |
| Serial Number | NA |
| Dimensions (cm) | 17.57 x 17.57 x 4.32 |

2.2 Description of EUT

The UAP-AC-LR is a wireless access points. The UAP-AC-LR has 3, 2 GHz TX paths

This report covers the circuitry of the device subject to FCC Part 15, Subpart C. Firmware version 4.3 (latest public release according to the manufacturer) was tested against select requirements of 15.247, only.

2.3 EUT and Support Equipment

The EUT and support equipment used during the test are listed below.

| Brand Name Model Number Serial Number | Description | Name of Interface Ports / Interface Cables |
|--|------------------------------|---|
| BN: UniFi(1) MN: UAP-AC-LR SN: N/A | 2 port wireless access point | Ethernet/POE |

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 |
|----------------------|-----------------------------------|---|
| Ethernet/POE | 1 | Shielded or Unshielded Cat 5e/<3m Shielded or Unshielded |

2.5 Operating Environment

| | |
|----------------------------|-----------|
| Power Supply | 120VAC |
| AC Mains Frequency | 60 Hz |
| Temperature | 23.3 °C |
| Humidity | 18.1 % |
| Barometric Pressure | 1017 mBar |

2.6 Operating Modes

The EUT were tested in constant transmit mode utilizing the command prompt ART. All modes were investigated with the worst case being reported.

2.7 EUT Exercise Software

The software used for testing is ART

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

This is an abridged test report in response to an FCC Enforcement Bureau investigation: File No. EB-SED-17-00024731

The following deviations, opinions, additional information or interpretations of the test specification were made during testing.

- Following guidance from the FCC, the worst case output power found in the original filling was retested.
- Following guidance from the FCC, Radiated Emissions was tested from 1 – 16 GHz only.

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 15.247

See test standard for details.

3.3 FCC Part 15, Subpart C

3.3.1 Summary of Tests

| FCC Section | Environmental Phenomena | Frequency Range (MHZ) | Result |
|-------------|--------------------------------------|------------------------|-----------|
| 15.203 | Antenna requirements | Structural Requirement | N/A |
| 15.207 | Conducted Disturbance at Mains Port | 0.15 to 30 | N/A |
| 15.247(a) | Bandwidth Requirement | 2400 to 2483.5 | N/A |
| 15.247(b) | Output Power | 2400 to 2483.5 | Compliant |
| 15.247(d) | Antenna Conducted Spurious Emissions | 0.009 to 25000 | N/A |
| 15.247(d) | Radiated Spurious Emissions | 0.009 to 25000 | Compliant |
| 15.247(e) | Peak Power Spectral Density | 2400 to 2483.5 | N/A |

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 following requirements of the specification

- Output Power
- Radiated Spurious Emissions up to 16 GHz as requested by the FCC

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.

4 Test Equipment

4.1 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 | 8/24/2020 | 9/8/2021 |
| Switch Extension | R&S | OSP-150W | UCL-2870 | 8/21/2020 | 8/21/2021 |

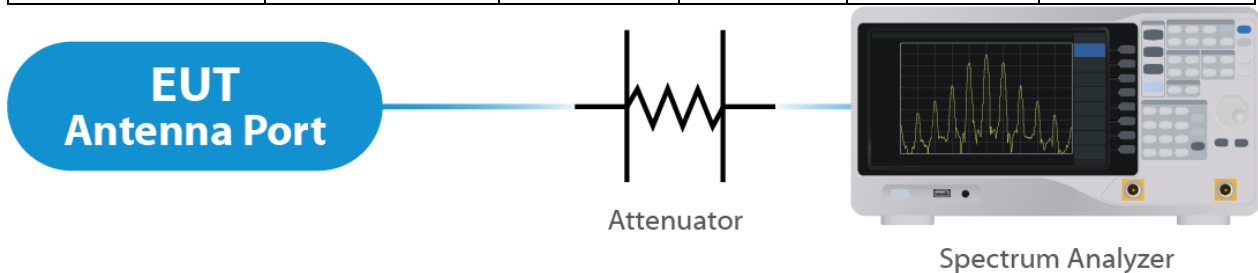


Figure 1: Direct Connect at the Antenna Port Test

4.2 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 |

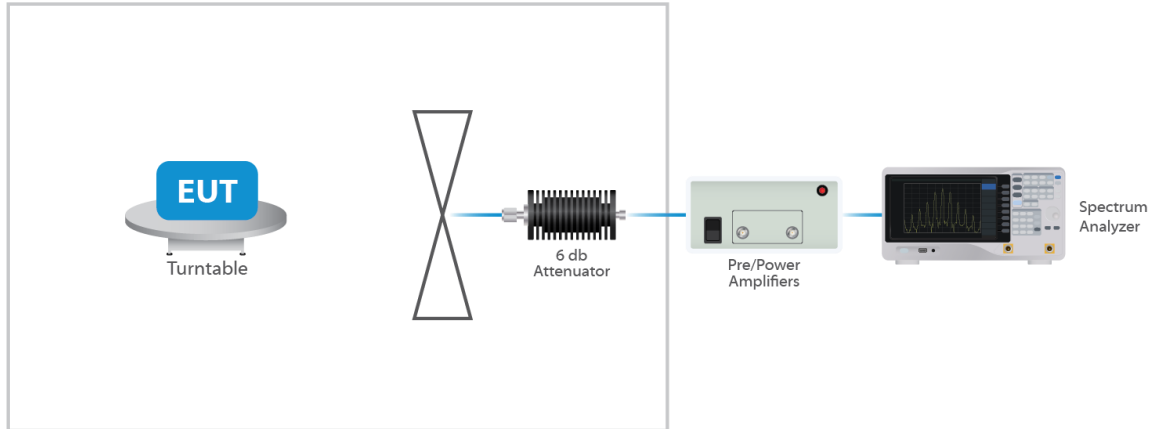


Figure 2: Radiated Emissions Test

4.3 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.

4.4 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) | 3.95 | 95 |
| Radiated Emissions (1 GHz to 18 GHz) | 5.56 | 95 |
| Radiated Emissions (18 GHz to 40 GHz) | 5.16 | 95 |
| Direct Connect Tests | K Factor | Value |
| Emissions Bandwidth | 2 | 2.0% |
| Output Power | 2 | 1.0 dB |
| Peak Power Spectral Density | 2 | 1.3 dB |
| Band Edge | 2 | 0.8 dB |
| Transmitter Spurious Emissions | 2 | 1.8 dB |

5 Test Results

5.1 §15.203 Antenna Requirements

The EUT uses an integral antenna. The Maximum gain of the antenna is 3.0 dBi. The antenna is not user replaceable.

Results

The EUT complied with the specification

5.2 §15.247(b)(3) Maximum Average Output Power

The maximum average RF conducted output power measured for this device was 13.43 dBm or 22.0 mW. The limit is 30 dBm or 1 Watt when using antennas with 6 dBi or less gain. The antenna has a gain of 3.0 dBi.

| Mode | Frequency (MHz) | Measured Output Power (dBm) | Output Power (mW) |
|------|-----------------|-----------------------------|-------------------|
| b | 2412 | 13.43 | 22.0 |
| | 2417 | 13.13 | 20.6 |
| | 2462 | 13.36 | 21.7 |
| g | 2412 | 11.59 | 14.4 |
| | 2417 | 10.94 | 12.4 |
| | 2462 | 11.72 | 14.9 |
| n 20 | 2412 | 11.75 | 15.0 |
| | 2417 | 11.96 | 15.7 |
| | 2462 | 11.65 | 14.6 |
| n 40 | 2422 | 9.71 | 9.35 |
| | 2452 | 9.83 | 9.62 |

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.

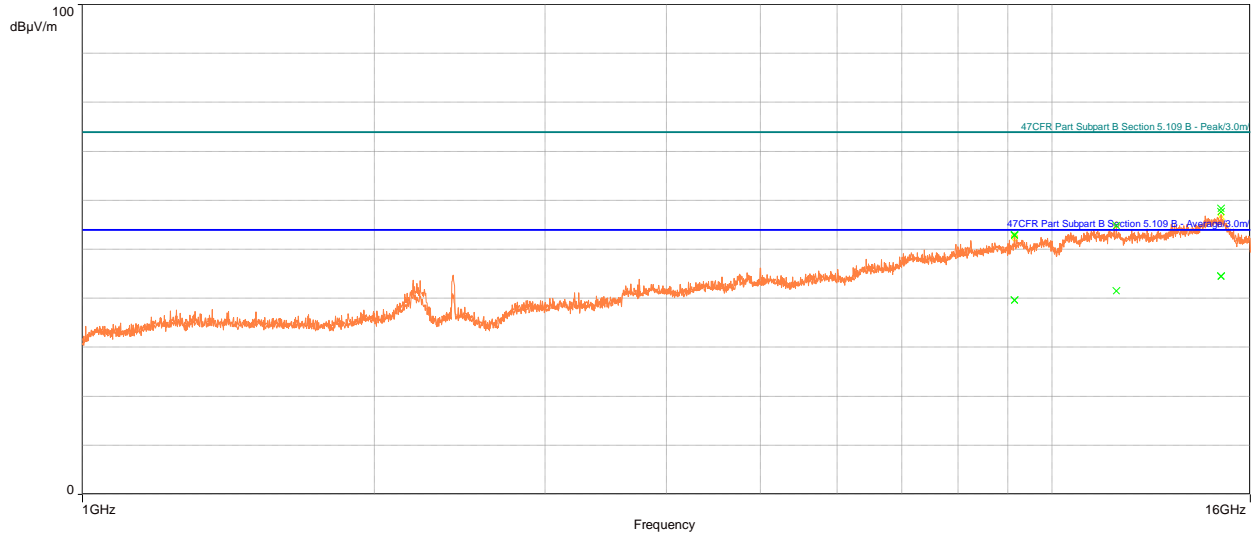
5.3 §15.247(d) Spurious Emissions

5.3.1 Radiated Spurious Emissions in the Restricted Bands of §15.205

The frequency range from the lowest frequency generated or used in the device to the tenth harmonic of the highest fundamental emissions was investigated to measure any radiated emissions in the restricted bands. The following tables show measurements of any emissions that fell into the restricted bands of §15.205. The tables show the worst-case emissions measured from the EUT. For frequencies above 18.0 GHz, a measurement distance of 1 meter was used. The noise floor was a minimum of 6 dB below the limits. The emissions in the restricted bands must meet the limits specified in §15.209. Tabular data for each of the spurious emissions is shown below for each of the units. Plots of the band edges are also shown.

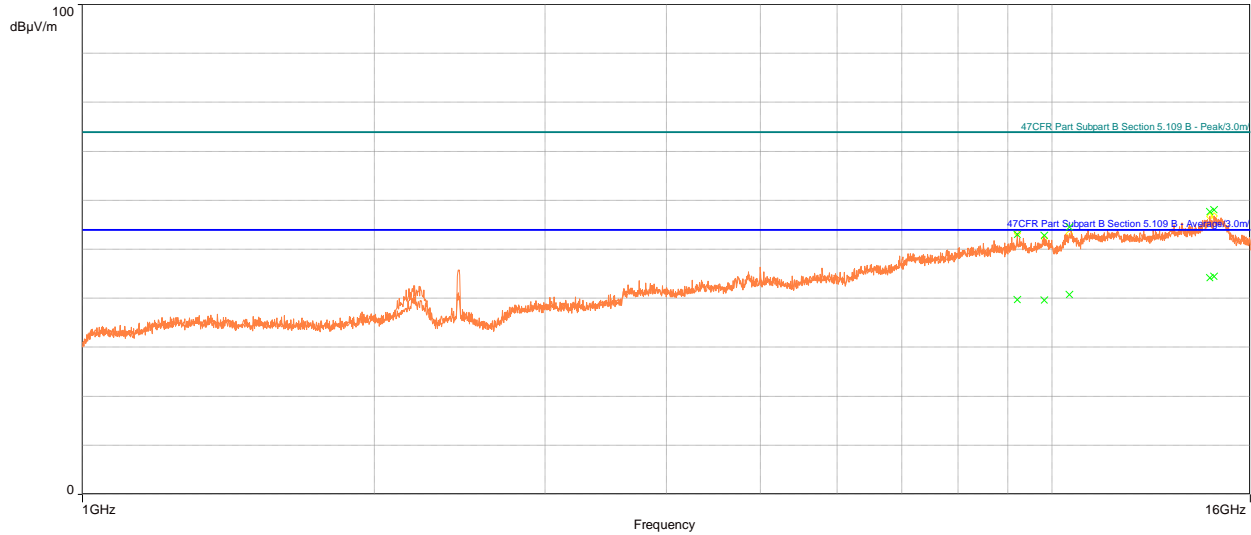
Result

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



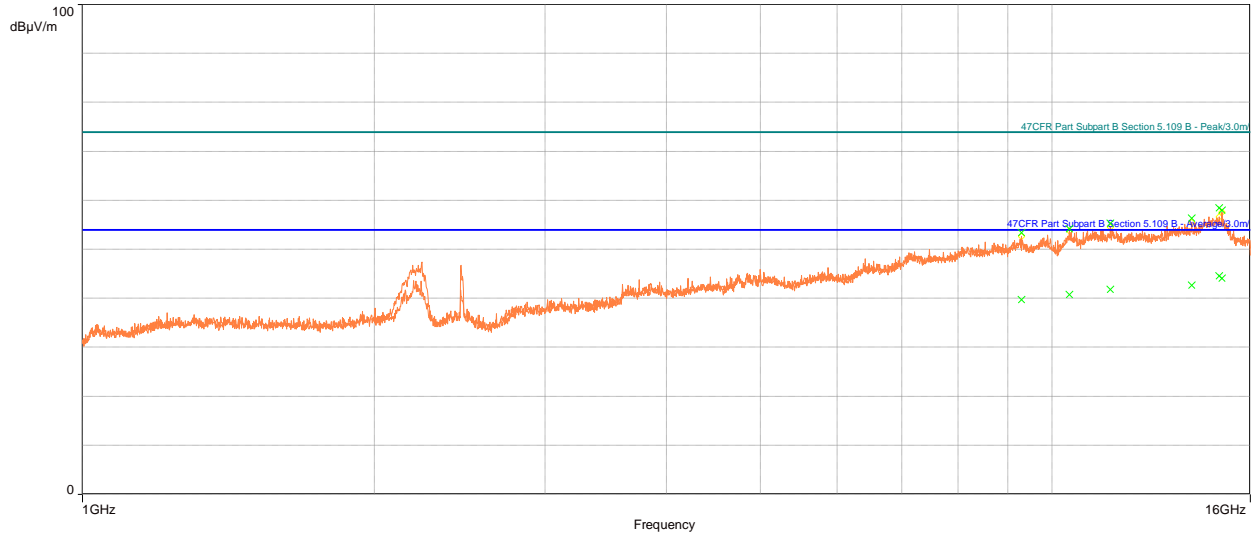
| Frequency (MHz) | Det. | Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol. | Correction (dB) |
|-----------------|------|----------------|----------------|-------------|-------------|------------|------------|-----------------|
| 9141.7 | A | 39.69 | 54.00 | -14.31 | 34.00 | 2.64 | Vertical | 9.80 |
| 11642 | A | 41.54 | 54.00 | -12.46 | 356.00 | 3.21 | Vertical | 12.14 |
| 14925 | A | 44.53 | 54.00 | -9.47 | 38.00 | 3.09 | Vertical | 14.85 |
| 9138.7 | A | 39.64 | 54.00 | -14.36 | 100.00 | 1.51 | Horizontal | 9.79 |
| 14918 | A | 44.54 | 54.00 | -9.46 | 95.00 | 2.75 | Horizontal | 14.91 |
| 9141.7 | P | 53.01 | 74.00 | -20.99 | 34.00 | 2.64 | Vertical | 9.80 |
| 11642 | P | 54.88 | 74.00 | -19.12 | 356.00 | 3.21 | Vertical | 12.14 |
| 14925 | P | 57.68 | 74.00 | -16.32 | 38.00 | 3.09 | Vertical | 14.85 |
| 9138.7 | P | 52.81 | 74.00 | -21.19 | 100.00 | 1.51 | Horizontal | 9.79 |
| 14918 | P | 58.36 | 74.00 | -15.64 | 95.00 | 2.75 | Horizontal | 14.91 |

Table 1: Transmitting at the Lowest Frequency



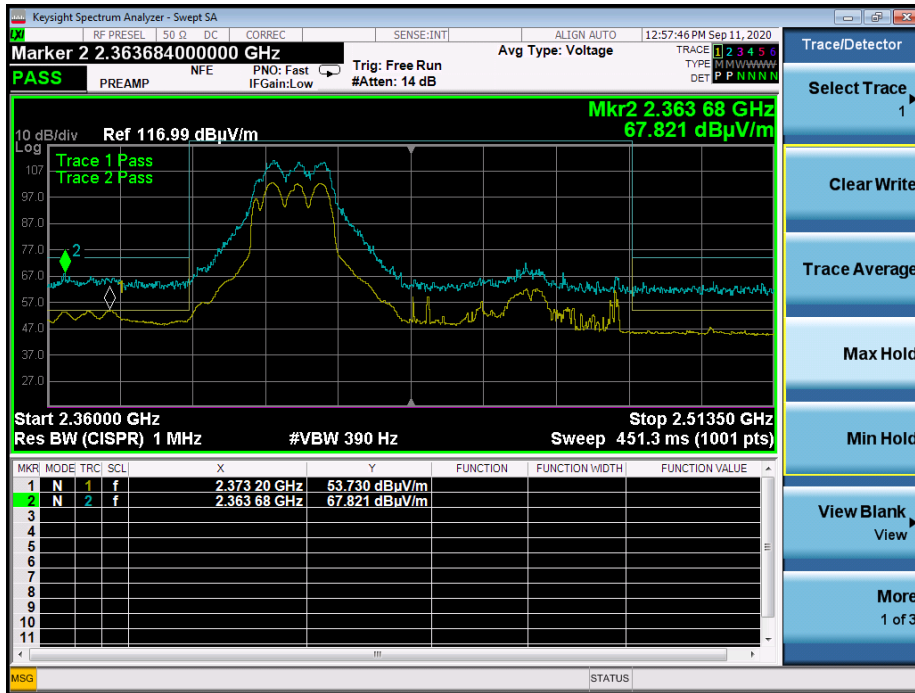
| Frequency (MHz) | Det. | Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol. | Correction (dB) |
|-----------------|------|----------------|----------------|-------------|-------------|------------|------------|-----------------|
| 9810.2 | A | 39.61 | 54.00 | -14.39 | 303.00 | 2.39 | Vertical | 9.01 |
| 10416 | A | 40.82 | 54.00 | -13.18 | 294.00 | 1.75 | Vertical | 10.57 |
| 14534 | A | 44.24 | 54.00 | -9.76 | 6.00 | 2.72 | Vertical | 14.73 |
| 9199.2 | A | 39.71 | 54.00 | -14.29 | 271.00 | 1.50 | Horizontal | 9.87 |
| 14682 | A | 44.52 | 54.00 | -9.48 | 130.00 | 3.39 | Horizontal | 15.12 |
| 9810.2 | P | 52.85 | 74.00 | -21.15 | 303.00 | 2.39 | Vertical | 9.01 |
| 10416 | P | 54.53 | 74.00 | -19.47 | 294.00 | 1.75 | Vertical | 10.57 |
| 14534 | P | 57.72 | 74.00 | -16.28 | 6.00 | 2.72 | Vertical | 14.73 |
| 9199.2 | P | 53.07 | 74.00 | -20.93 | 271.00 | 1.50 | Horizontal | 9.87 |
| 14682 | P | 58.09 | 74.00 | -15.91 | 130.00 | 3.39 | Horizontal | 15.12 |

Table 2: Transmitting at the Middle Frequency

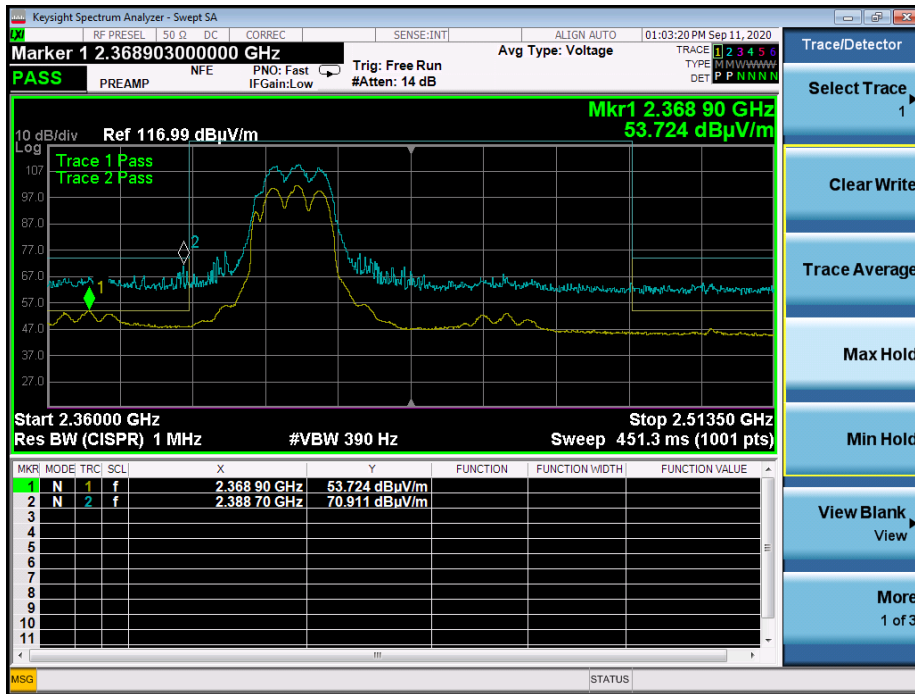


| Frequency (MHz) | Det. | Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol. | Correction (dB) |
|-----------------|------|----------------|----------------|-------------|-------------|------------|------------|-----------------|
| 10410 | A | 40.79 | 54.00 | -13.21 | 220.00 | 2.11 | Vertical | 10.56 |
| 11473 | A | 41.84 | 54.00 | -12.16 | 67.00 | 1.62 | Vertical | 12.45 |
| 13930 | A | 42.73 | 54.00 | -11.27 | 169.00 | 3.57 | Vertical | 13.45 |
| 14953 | A | 44.09 | 54.00 | -9.91 | 80.00 | 3.23 | Vertical | 14.67 |
| 9294.3 | A | 39.73 | 54.00 | -14.27 | 356.00 | 2.49 | Horizontal | 10.01 |
| 14854 | A | 44.59 | 54.00 | -9.41 | 308.00 | 3.50 | Horizontal | 14.96 |
| 10410 | P | 54.19 | 74.00 | -19.81 | 220.00 | 2.11 | Vertical | 10.56 |
| 11473 | P | 55.34 | 74.00 | -18.66 | 67.00 | 1.62 | Vertical | 12.45 |
| 13930 | P | 56.34 | 74.00 | -17.66 | 169.00 | 3.57 | Vertical | 13.45 |
| 14953 | P | 57.96 | 74.00 | -16.04 | 80.00 | 3.23 | Vertical | 14.67 |
| 9294.3 | P | 53.41 | 74.00 | -20.59 | 356.00 | 2.49 | Horizontal | 10.01 |
| 14854 | P | 58.48 | 74.00 | -15.52 | 308.00 | 3.50 | Horizontal | 14.96 |

Table 3: Transmitting at the Highest Frequency



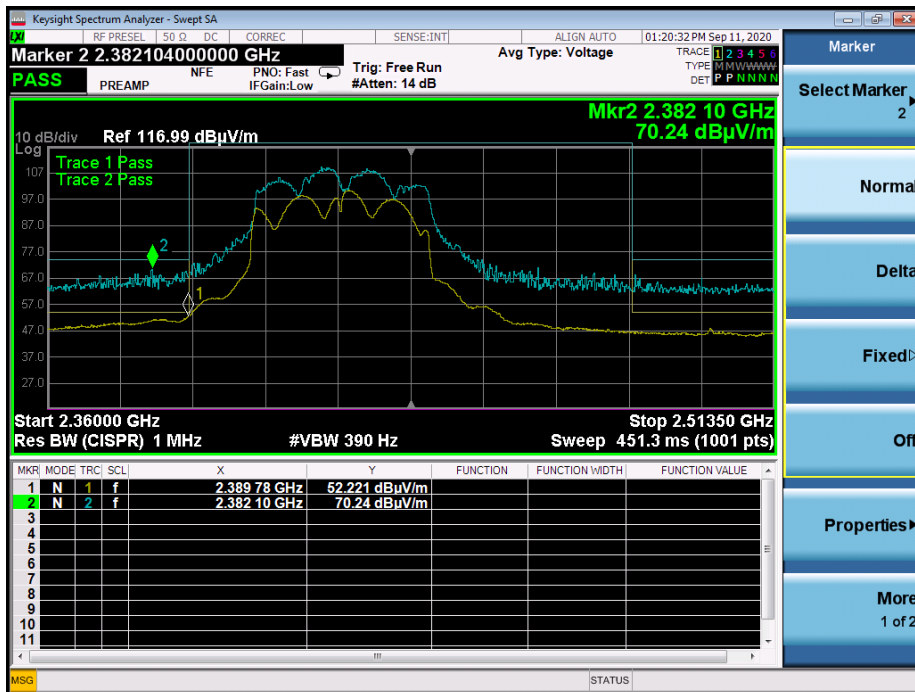
Graph 1: Radiated Lower Band Edge Plot b mode



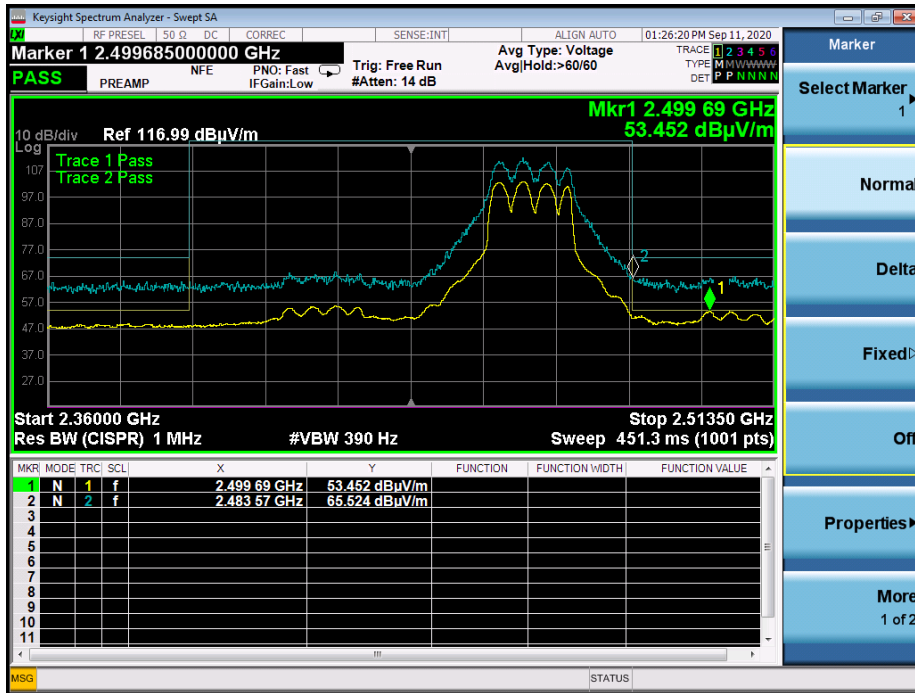
Graph 2: Radiated Lower Band Edge Plot g mode



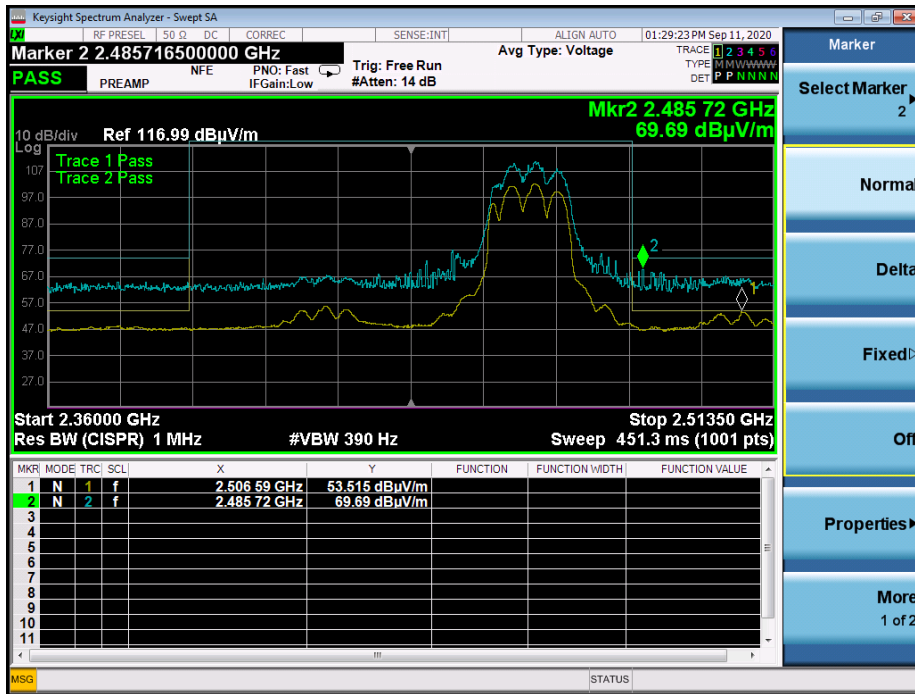
Graph 3: Radiated Lower Band Edge Plot n mode



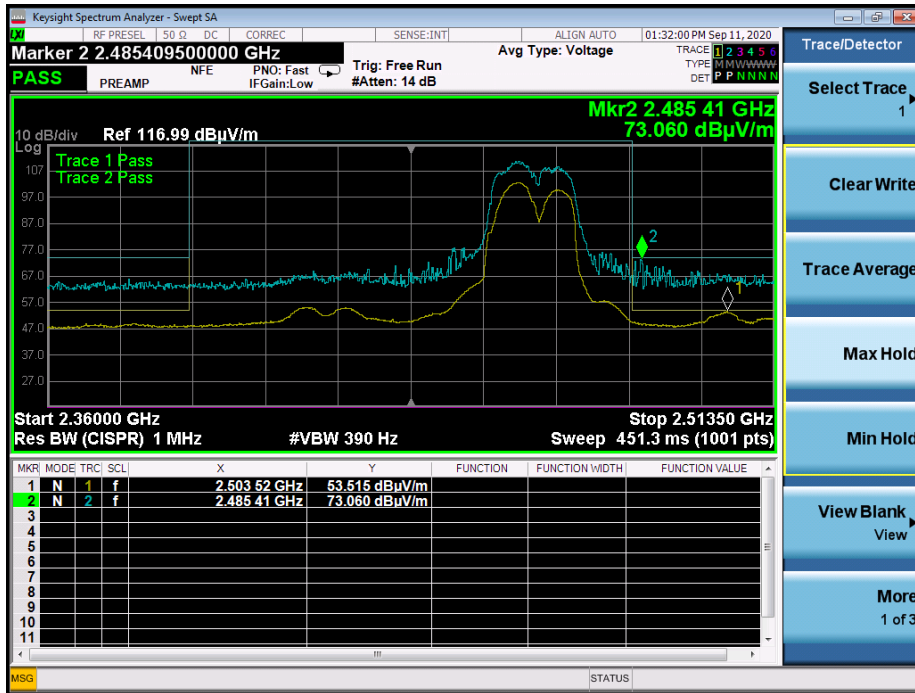
Graph 4: Radiated Lower Band Edge Plot n mode (40)



Graph 5: Radiated Upper Band Edge Plot b mode



Graph 6: Radiated Upper Band Edge Plot g mode



Graph 7: Radiated Upper Band Edge Plot n mode



Graph 8: Radiated Upper Band Edge Plot n mode (40)

-- End of Test Report --