# TEST REPORT

**Report Number. :** 14441108-E9V2

| | | |
|---|---|---|
| **Applicant** | : | DISH TECHNOLOGIES LLC<br>90 INVERNESS CIRCLE EAST<br>ENGLEWOOD, CO 80112, UNITED STATES |
| **Model** | : | D45 |
| **Brand** | : | DISH |
| **FCC ID** | : | DKNQ65V |
| **EUT Description** | : | TV SET TOP BOX |
| **Test Standard(s)** | : | FCC 47 CFR PART 15 SUBPART C<br>FCC 47 CFR PART 15 SUBPART E |

**Date Of Issue:**
2022-12-12

**Prepared by:**
UL VERIFICATION SERVICES INC.
47173 Benicia Street
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CERT #0751.05

# REPORT REVISION HISTORY

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V1 | 2022-10-12 | Initial Issue | --- |
| V2 | 2022-12-12 | Updated equipment class of RF4CE Zigbee on page 10 | Tina Chu |



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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** DISH TECHNOLOGIES LLC
90 INVERNESS CIRCLE EAST
ENGLEWOOD, CO 80112, UNITED STATES

**EUT DESCRIPTION:** TV SET TOP BOX

**MODEL:** D45

**BRAND:** DISH

**SERIAL NUMBER:** RADIATED: E4XUJ03002G, CONDUCTED: E4EXUJ03012G

**SAMPLE RECEIPT DATE:** 2022-09-08

**DATE TESTED:** 2022-09-14 TO 2022-09-27, 2022-10-10

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| CFR 47 Part 15 Subpart C | Complies |
| CFR 47 Part 15 Subpart E | Complies |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.



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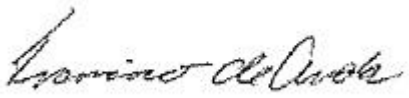
Approved & Released For
UL Verification Services Inc. By:



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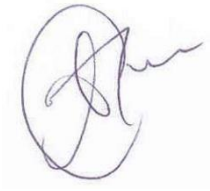

Tina Chu
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# 2. TEST RESULT SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

Below is a list of the data provided by the customer:
1. Antenna gain and type (see section 6.4)

BT

| FCC Clause | Requirement | Result | Comment |
|---|---|---|---|
| See Comment | Duty Cycle | Not performed | Per ANSI C63.10, Section 11.6. |
| See Comment | 20dB BW | Not performed | ANSI C63.10 Sections 6.9.2 and 6.9.3 |
| 15.247 (a)(1) | Hopping Frequency Separation | Not performed | None. |
| 15.247 (a)(1)(iii) | Number of Hopping Channels | Not performed | None. |
| 15.247 (a)(1)(iii) | Average Time of Occupancy | Not performed | None. |
| 15.247 (b)(1) | Output Power | Partial testing performed and complies | None. |
| See Comment | Average Power | Partial testing performed and complies | Per ANSI C63.10, Section 11.9.2.3.2. |
| 15.247 (d) | Conducted Spurious Emissions | Not performed | None. |
| 15.209, 15.205 | Radiated Emissions | Partial testing performed and complies | None. |
| 15.207 | AC Mains Conducted Emissions | Not performed | None. |

BLE/RF4CE Zigbee

| FCC Clause | Requirement | Result | Comment |
|---|---|---|---|
| See Comment | Duty Cycle | Not performed | ANSI C63.10 Section 11.6. |
| - | 99% OBW | Not performed | ANSI C63.10 Section 6.9.3. |
| 15.247 (a) (2) | 6dB BW | Not performed | None. |
| 15.247 (b) (3) | Output Power | Partial testing performed and complies | None. |
| See Comment | Average power | Partial testing performed and complies | Per ANSI C63.10, Section 11.9.2.3.2. |
| 15.247 (e) | PSD | Not performed | None. |
| 15.247 (d) | Conducted Spurious Emissions | Not performed | None. |
| 15.209, 15.205 | Radiated Emissions | Partial testing performed and complies | None. |
| 15.207 | AC Mains Conducted Emissions | Not performed | None. |


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UNII

| FCC Clause | Requirement | Result | Comment |
|---|---|---|---|
| See Comment | Duty Cycle | Not performed | Per ANSI C63.10, Section 12.2. |
| See Comment | 26dB BW/99% OBW | Not performed | Per ANSI C63.10 Sections 6.9.2 and 6.9.3 |
| 15.407 (e) | 6 dB BW | Not performed | None. |
| 15.407 (a) (1-3), (h) (1) | Output Power | Partial testing performed and complies | None. |
| 15.407 (a) (1-3) | PSD | Not performed | None. |
| 15.209, 15.205, 15.407 (b) | Radiated Emissions | Partial testing performed and complies | None. |
| 15.207 | AC Mains Conducted Emissions | Not performed | None. |

# 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with;

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- KDB 558074 D01 15.247 Meas Guidance v05r02
- FCC KDB 662911 D01 v02r01,D03 v01
- FCC KDB 905462 D02 v02/D03 v01r02/D06 v02
- FCC KDB 789033 D02 v02r01,
- KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013
- KDB 484596 D01

# 4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

| | Address | ISED CABID | ISED Company Number | FCC Registration |
|---|---|---|---|---|
| ☒ | Building 1: 47173 Benicia Street, Fremont, CA 94538 | US0104 | 2324A | 550739 |
| ☐ | Building 2: 47266 Benicia Street, Fremont, CA 94538 | US0104 | 2324A | 550739 |
| ☒ | Building 4: 47658 Kato Rd, Fremont, CA 94538 | US0104 | 2324A | 550739 |



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# 5. DECISION RULES AND MEASUREMENT UNCERTAINTY

## 5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

## 5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

## 5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER | $U_{Lab}$ |
|---|---|
| Worst Case Radiated Disturbance, 30 to 1000 MHz | 6.01 dB |
| Worst Case Radiated Disturbance, 1000 to 18000 MHz | 4.73 dB |

Uncertainty figures are valid to a confidence level of 95%.

## 5.4. SAMPLE CALCULATION

**RADIATED EMISSIONS**

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

**MAINS CONDUCTED EMISSIONS**

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV



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# 6. EQUIPMENT UNDER TEST

## 6.1. EUT DESCRIPTION

The EUT is a TV Set Top Box with RF4CE Zigbee, BLE (1Mbps), BT and 5GHz 802.11a/n/ac/ax radios.

## 6.2. INTRODUCTION OF TEST DATA REUSE

This application for certification is leveraging the data reuse procedures from KDB 484596 D01 based on reference FCC ID: DKNHR44, and RF4CE Zigbee of FCC ID: DKNU49F to covers FCC ID: DKNQ65V.

The major difference between two FCC IDs is FCC ID: DKNQ65V is using a new RF4CE Zigbee radio, all other circuitry and features are identical.

This report covers the BT/BLE/UNII and RF4CE Zigbee radios portion for FCC ID: DKNQ65V, where referenced FCC IDs for BT/BLE/UNII and RF4CE Zigbee data is reused. Verification testing was performed on worst-case modes for colocation and radiated emissions(BE/RSE) from BT/BLE/UNII's previous FCC ID: DKNHR44 and RF4CE Zigbee's previous FCC ID: DKNU49F to ensure the EUT remains compliant with new RF4CE Zigbee radio, FCC ID: DKNQ65V. See reference information as below

Reference application that contains the reused reference data which is attached to this report in Appendix A.

| Equipment Class | Reference FCC ID | Frequency Range (MHz) | Reference Report | Report Title/Section |
|---|---|---|---|---|
| DTS | DKNHR44 | 2402 to 2480 MHz | 14160419-E5V2 | BLE Report / All sections |
| DSS | DKNHR44 | 2402 to 2480 MHz | 14160419-E6V2 | BT Report / All sections |
| NII | DKNHR44 | 5180 to 5720 MHz | 13619076-E4V3 | UNII_802.11n_ac modes/All sections |
| NII | DKNHR44 | 5180 to 5720 MHz | 13619076-E5V3 | UNII_802.11ax/ All sections |
| NII | DKNHR44 | 5250-5350 MHz, 5470-5725 MHz | 13619076-E8V2 | UNII WLAN DFS/ All sections |
| DTS | DKNU49F | 2425 to 2475 | 14441108-E6 | RF4CE Zigbee / All sections |


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## 6.3. SPOT CHECK VERIFICATION RESULTS SUMMARY

| Test Engineer: 12485 GA | | | | Test Date: 2022-10-10 | | | |
|---|---|---|---|---|---|---|---|
| FCC ID: DKNQ65V SPOT CHECK RESULTS | | | | | | | |
| Technology | Mode | Test Item | Channel | Original model Output power (dBm) | | Spot check model Output power (dBm) | |
| | | | | D45 | | D45 | |
| | | | | DKNHR44 | | DKNQ65V | |
| | | | | Peak | Avg | Peak | Avg |
| BLE | BLE | Output power | 2480MHz, High | 8.84 | 6.33 | 9.01 | 6.72 |
| BT | GFSK | | 2441MHz, Mid | 7.96 | 7.74 | 8.97 | 8.48 |
| | | | 2480MHz, High | 7.97 | 7.76 | 9 | 8.5 |
| UNII | 802.11n HT40 CDD 3TX | | High (Channel 62, 5310MHz) | -- | 18.93 | -- | 18.64 |
| | 802.11n HT40 CDD 3TX | | Low (Channel 151, 5755MHz) | -- | 23.97 | -- | 21.76 |
| | 802.11ac VHT80 3TX | | Channel 155, 5775MHz | -- | 26.53 | -- | 23.67 |
| | 802.11ax HE80 OFDMA 3TX | | Low (Channel 106, 5530MHz, 26T, index 0) | -- | 9.96 | -- | 7.89 |
| | 802.11ax HE20 OFDMA 3TX | | High (Channel 165, 5825MHz, 26T, index 8) | -- | 11.34 | -- | 12.27 |
| Technology | Mode | Test Item | Channel | D45 | | D45 | |
| | | | | DKNU49F | | DKNQ65V | |
| RF4CE Zigbee | O-QPSK | Output power | 2425MHz, Low | 12.27 | 11.89 | 12.22 | 11.89 |
| | | | 2450MHz, Mid | 12.15 | 11.81 | 12.19 | 11.85 |
| | | | 2475MHz, High | 12.09 | 11.76 | 12.18 | 11.82 |



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| FCC ID: DKNQ65V SPOT CHECK RESULTS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Technology | Mode | Test Item | Channel | Original model (Worst margin dB) | | Spot check model (Worst margin dB) | | Delta (dB) | |
| | | | | D45 | | D45 | | | |
| | | | | DKNHR44 | | DKNQ65V | | | |
| | | | | H | V | H | V | H | V |
| BLE | BLE | RBE | 2480MHz, High | -9.27 | -10.4 | -11.85 | -12.01 | -2.58 | -1.61 |
| BT | GFSK | | 2480MHz, High | -9.57 | -12.26 | -13.45 | -13.67 | -3.88 | -1.41 |
| UNII | 802.11n HT40 CDD 3TX | | High (Channel 62, 5310MHz) | -1.08 | -0.51 | -0.84 | -1.63 | 0.24 | -1.12 |
| UNII | 802.11ax HE80 OFDMA 3TX | | Low (Channel 106, 5530MHz, 26T, index 0) | -1.53 | -0.48 | -2.79 | -0.63 | -1.26 | -0.15 |
| | | | | Worst margin (dB) | | Worst margin (dB) | | Delta (dB) | |
| BLE | BLE | RSE | 2480MHz, High | -8.08 | | -15 | | -6.92 | |
| BT | GFSK | | 2480MHz, High | -5.69 | | -17.72 | | -12.03 | |
| UNII | 802.11n HT40 CDD 3TX | | Low (Channel 151, 5755MHz) | -0.96 | | -1.83 | | -0.87 | |
| UNII | 802.11ax HE20 OFDMA 3TX | | High (Channel 165, 5825MHz, 26T, index 8) | -0.1 | | -0.33 | | -0.23 | |
| BT/Zigbee/UNII simultaneous RSE above 1G | | | | -3.84 | | -1.54 | | 2.3 | |

| FCC ID: DKNQ65V SPOT CHECK RESULTS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Technology | Mode | Test Item | Channel | Original model (Worst margin dB) | | Spot check model (Worst margin dB) | | Delta (dB) | |
| | | | | D45 | | D45 | | | |
| | | | | DKNU49F | | DKNQ65V | | | |
| | | | | H | V | H | V | H | V |
| RF4CE Zigbee | O-QPSK | RBE | 2475MHz, High | -3.69 | -6.55 | -3.6 | -4.74 | 0.09 | 1.81 |
| | | | | Worst margin (dB) | | Worst margin (dB) | | Delta (dB) | |
| RF4CE Zigbee | O-QPSK | RSE | 2425MHz, Low | -4.1 | | -5.33 | | -1.23 | |

Comparison of the models, tests show EUT meets FCC Technical Limits.



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## 6.4. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

The BT/BLE radio utilizes a PCB Inverted F antenna, with a maximum gain of 4.2 dBi.
The RF4CE Zigbee radio utilizes a PCB Inverted F antenna, with a maximum gain of 4.1 dBi

According to FCC KDB 662911 D03 v01, a measurement of directional gain of multi-antenna systems is allowed for compliance verification. Antenna gains are approved through manufacturers KDB. KDB reference can be found as part of the original certification.

EUT uses three antennas for 5GHz 3TX MIMO operation.The radio utilizes PCB Inverted F antennas. Below is total gain per operational band;

| Frequency Band | Uncorrelated Total Gain | Correlated Total Gain |
|---|---|---|
| 5.15 to 5.25 GHz | 2.5 | 6.9 |
| 5.25 to 5.35 GHz | 3.2 | 7.7 |
| 5.47 to 5.725 GHz | 3.2 | 7.8 |
| 5.725 to 5.85 GHz | 2.9 | 7.6 |

## 6.5. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was:
Zigbee FW: TL8656_V0008
BT/BLE FW: BCM 02.011.0330.0000
Wifi FW: Linux with MFG Driver

The test utility software used during testing was :
Wifi FW: Linux with MFG Driver
BT/BLE Utility: cybluetool 0.1.55.1
Wifi Utility: BRDCM MTool 3.2.1.3

## 6.6. WORST-CASE CONFIGURATION AND MODE

The EUT is a desktop device, therefore, all final radiated testing was performed with the EUT in X orientation.

This EUT supports BLE/BT + Zigbee + WLAN 5GHz simultaneous transmission. Radiated emission test 1GHz to 18GHz , BT/BLE and UNII's previous FCC ID: DKNHR44 worst-case modes were performed on this FCC ID: DKNQ65V to ensure the EUT remains compliant with new RF4CE Zigbee radio.



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## 6.7. DESCRIPTION OF TEST SETUP

| SUPPORT TEST EQUIPMENT | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Serial Number** | **FCC ID/ DoC** |
| AC/DC Adapter(EUT) | NetBit | NBC25A120210VU | 222109 | DoC |
| Router | D-Link | EBR-2310 | F311388010596 | DoC |
| Router Adapter | D-Link | AF0605 | LF4R07082717180 | DoC |
| TV Emulator | DISH | TV Emulator | D52-12 | |
| Laptop: Radiated test | HP | Elitebook 740 | N/A | DoC |
| AC/DC Adapter(Laptop): Radiated test | HP | N/A | N/A | DoC |
| USB Flash Drive | Sandisk | Cruzer Glide 16GB | SDCZ60-016G | DoC |

| I/O CABLES (RADIATED TEST) | | | | | | |
|---|---|---|---|---|---|---|
| **Cable No.** | **Port** | **# of Identical Ports** | **Connector Type** | **Cable Type** | **Cable Length (m)** | **Remarks** |
| 1 | DC | 1 | Barrel | Un-shielded | 1.5 | EUT to AC/DC adapter Mains |
| 2 | HDMI | 1 | HDMI | shielded | 2.5 | EUT to Emulator |
| 3 | RJ45 | 1 | RJ45 | Un-shielded | More than 3 | EUT to Ethernet Router |
| 4 | DC | 1 | Barrel | Un-shielded | 1.8 | Ethernet router to AC/DC Adapter |
| 5 | RJ45 | 1 | RJ45 | Un-shielded | More than 3 | EUT to Ethernet Router |
| 6 | AC | 1 | Two Prong | Un-shielded | 2 | AC adapter to AC Mains |
| 7 | DC | 1 | DC | Un-shielded | 1 | AC Adapter Laptop |


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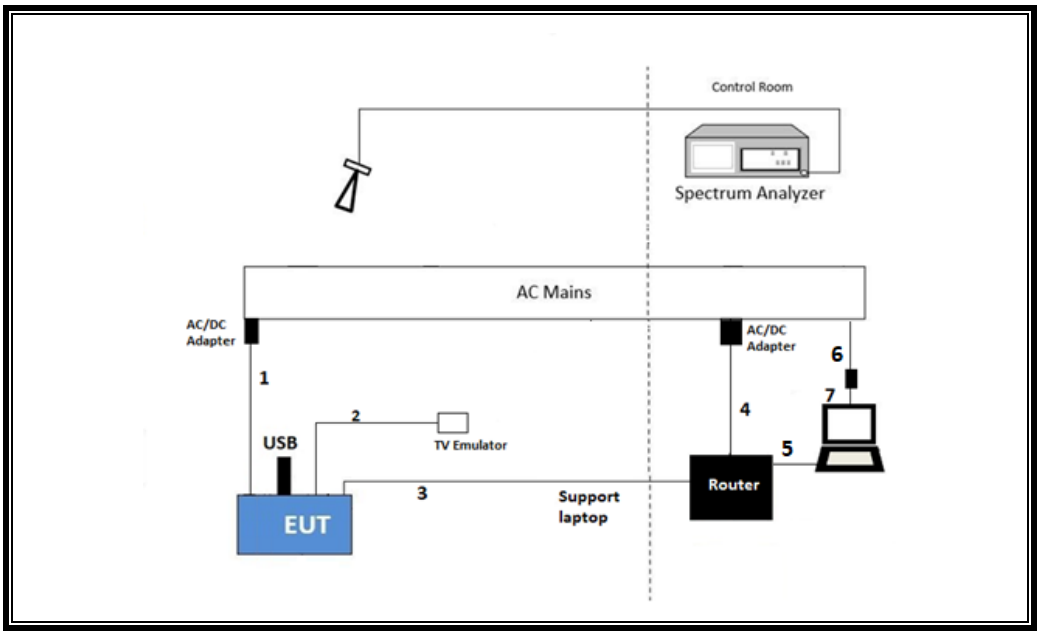
**RF RADIATED TEST SETUP DIAGRAM**




**TEST SETUP**

The EUT is connected to a test laptop by RJ45 cable, support equipment and powered by AC/DC adapter during the tests. BT/BLE/WIFI using test software exercised the radio. Zigbee is using power cycle to switch the test mode.



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# 7. MEASUREMENT METHOD

Unwanted emissions in restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, and G.5.

# 8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUIPMENT LIST | | | | | |
|---|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **ID Num** | **Cal Due** | **Last Cal** |
| Antenna, Horn 1-18GHz | ETS-Lindgren | 3117 | 80403 | 2023-06-08 | 2022-06-08 |
| RF Filter Box, 1-18GHz | UL-FR1 | NA | 171389 | 2023-05-31 | 2022-05-31 |
| EMI TEST RECEIVER | Rohde & Schwarz | ESW44 | 201497 | 2023-02-18 | 2022-02-18 |
| Antenna, Horn 1-18GHz | ETS-Lindgren (Cedar Park, Texas) | 3117 | 80402 | 2023-07-05 | 2022-07-05 |
| RF Filter Box, 8 port, 1-18GHz | UL-FR1 | SAC 8 port rf box 1 | 197920 | 2023-04-19 | 2022-04-19 |
| Antenna, Broadband Hybrid, 30MHz to 2000MHz | Sunol Sciences Corp. | JB1 | 80813 | 2023-06-08 | 2022-06-08 |
| Amplifier, 9KHz to 1GHz, 32dB | SONOMA INSTRUMENT | 310 | 175953 | 2023-02-08 | 2022-02-08 |
| EMI TEST RECEIVER | Rohde & Schwarz | ESW44 | 169927 | 2023-02-16 | 2022-02-16 |
| Power Sensor, P - series, 50MHz to 18GHz, Wideband | Keysight Technologies Inc | N1921A | 90388 | 2023-01-24 | 2022-01-24 |
| Power Meter, P-series single channel | Keysight Technologies Inc | N1911A | 90733 | 2023-01-24 | 2022-01-24 |
| **Test Software List** | | | | | |
| **Description** | **Manufacturer** | **Model** | **Version** | | |
| Radiated Software | UL | UL EMC | Sept 15 2022, Dec 29 2015, Jun 4 2020, Aug 23 2016, Dec 16 2020 | | |



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# 9. RADIATED TEST RESULTS

**LIMITS**

FCC §15.205 and §15.209 -Restriced bands

FCC §15.407(b)(1-3) -Un-Restriced bands

**After January 01, 2019 for Outside of the Restricted Bands Emissions**

| Frequency Range (MHz) | Field Strength Limit (uV/m) at 3 m | Field Strength Limit (dBuV/m) at 3 m |
|---|---|---|
| 30 - 88 | 100 | 40 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46 |
| Above 960 | 500 | 54 |

**TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 30 MHz to 1GHz and 18GHz to 40 GHz is investigated with the transmitter set to transmit at the channel with highest output power as worst-case scenario. 1GHz to 18GHz was set to the lowest, middle, and highest channels in the 5 GHz bands.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.



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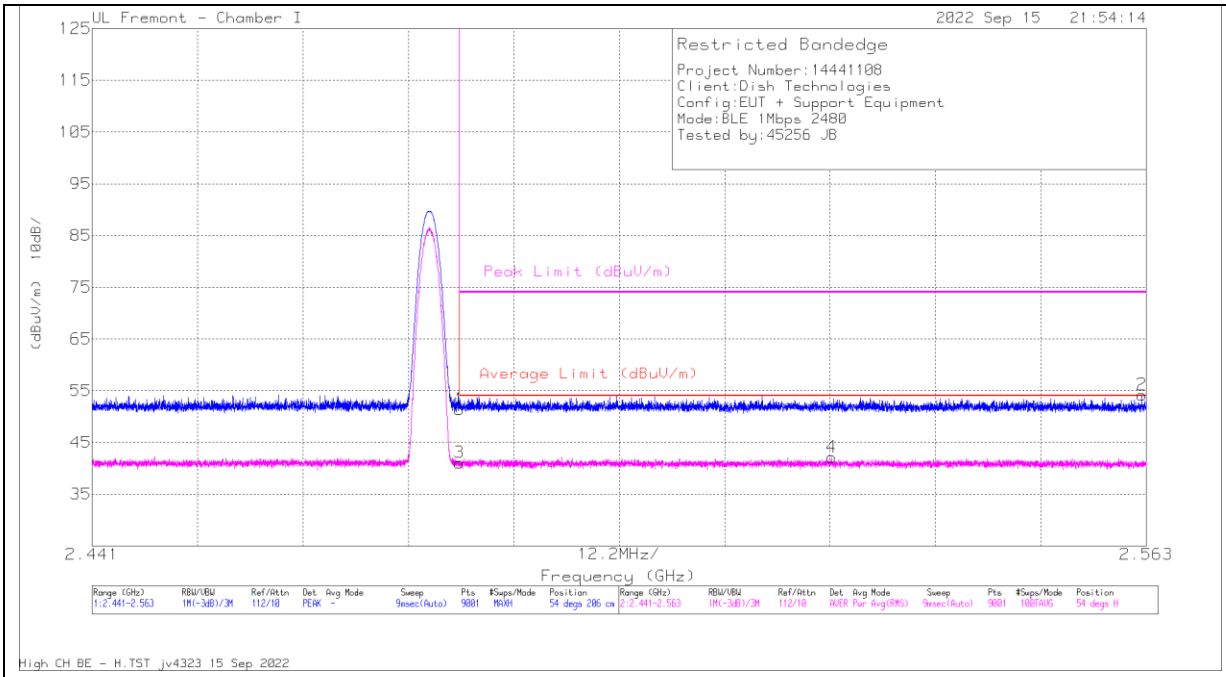
## 9.1. TRANSMITTER ABOVE 1 GHz (BLE)

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Pad (dB) | DC factor (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.4835 | 39.92 | Pk | 32.6 | -21.1 | - | 51.42 | - | - | 74 | -22.58 | 54 | 206 | H |
| 2 | 2.562502 | 42.71 | Pk | 32.6 | -21.1 | - | 54.21 | - | - | 74 | -19.79 | 54 | 206 | H |
| 3 | * 2.4835 | 29.58 | RMS | 32.6 | -21.1 | 0 | 41.08 | 54 | -12.92 | - | - | 54 | 206 | H |
| 4 | 2.526593 | 30.65 | RMS | 32.6 | -21.1 | 0 | 42.15 | 54 | -11.85 | - | - | 54 | 206 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



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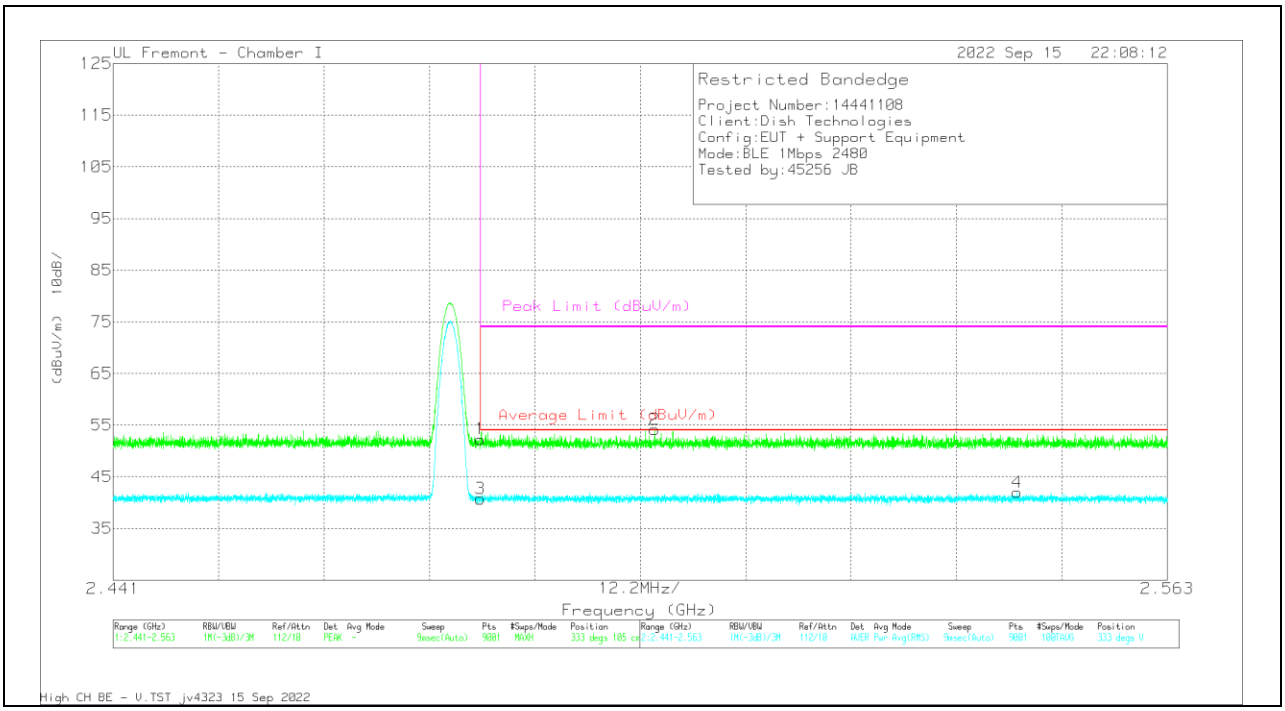
## VERTICAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Pad (dB) | DC factor (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.4835 | 40.78 | Pk | 32.6 | -21.1 | - | 52.28 | - | - | 74 | -21.72 | 333 | 105 | V |
| 2 | 2.503656 | 42.67 | Pk | 32.6 | -21.1 | - | 54.17 | - | - | 74 | -19.83 | 333 | 105 | V |
| 3 | * 2.4835 | 29.25 | RMS | 32.6 | -21.1 | 0 | 40.75 | 54 | -13.25 | - | - | 333 | 105 | V |
| 4 | 2.545625 | 30.49 | RMS | 32.7 | -21.2 | 0 | 41.99 | 54 | -12.01 | - | - | 333 | 105 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



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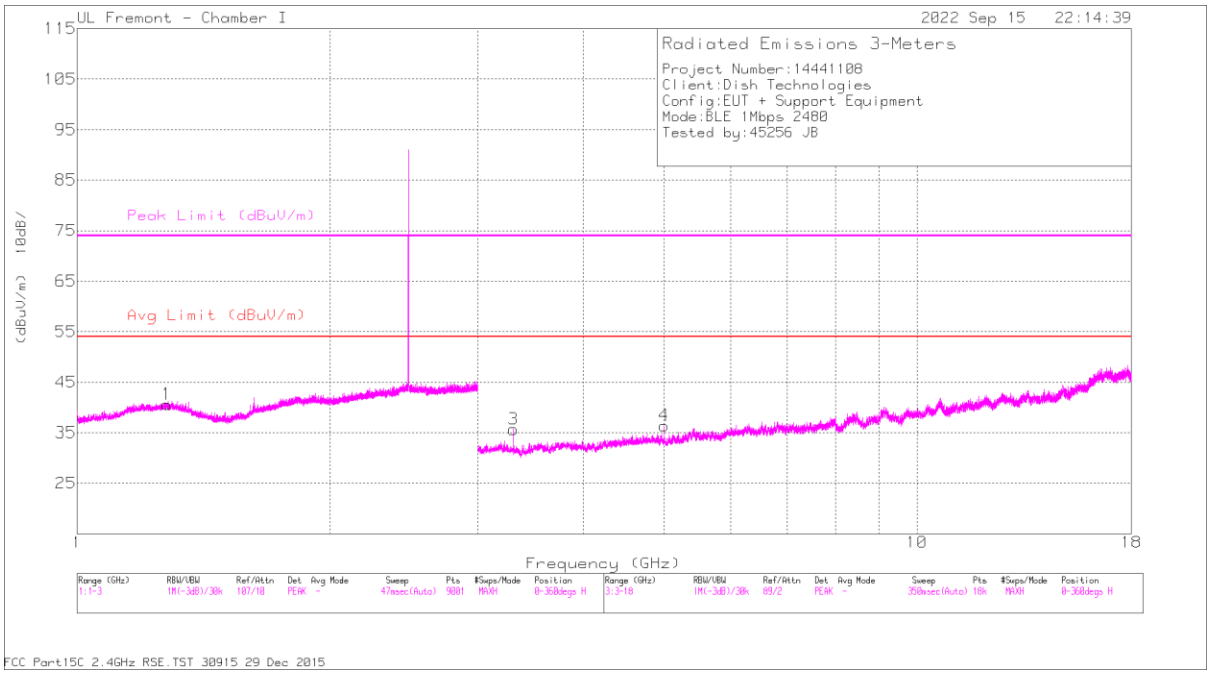
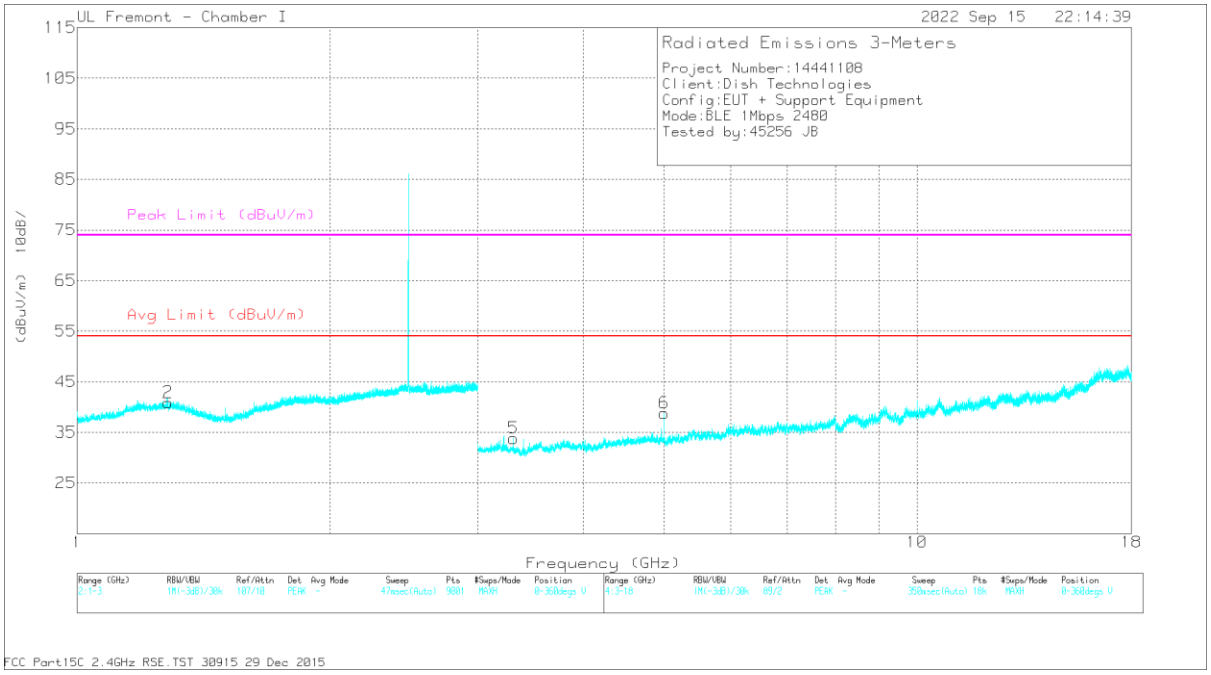
## HARMONICS AND SPURIOUS EMISSIONS

### HIGH CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



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## RADIATED EMISSIONS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Pad (dB) | DC factor (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.27787 | 43.38 | PK2 | 29.2 | -21.2 | - | 51.38 | - | - | 74 | -22.62 | 278 | 177 | H |
| | * 1.278265 | 31 | MAv1 | 29.2 | -21.2 | 0 | 39 | 54 | -15 | - | - | 278 | 177 | H |
| 2 | * 1.283921 | 42.53 | PK2 | 29 | -21.2 | - | 50.33 | - | - | 74 | -23.67 | 265 | 164 | V |
| | * 1.282914 | 30.91 | MAv1 | 29.1 | -21.2 | 0 | 38.81 | 54 | -15.19 | - | - | 265 | 164 | V |
| 3 | 3.30585 | 32.6 | Pk | 33 | -29.9 | - | 35.7 | - | - | - | - | 0-360 | 200 | H |
| 4 | * 4.999984 | 39.45 | PK2 | 34.4 | -28.5 | - | 45.35 | - | - | 74 | -28.65 | 227 | 217 | H |
| | * 5.000004 | 29.52 | MAv1 | 34.4 | -28.5 | 0 | 35.42 | 54 | -18.58 | - | - | 227 | 217 | H |
| 5 | 3.306684 | 30.84 | Pk | 33 | -30 | 0 | 33.84 | - | - | - | - | 0-360 | 101 | V |
| 6 | * 4.999808 | 40.02 | PK2 | 34.4 | -28.5 | - | 45.92 | - | - | 74 | -28.08 | 190 | 105 | V |
| | * 5.000092 | 32.45 | MAv1 | 34.4 | -28.5 | 0 | 38.35 | 54 | -15.65 | - | - | 190 | 105 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average



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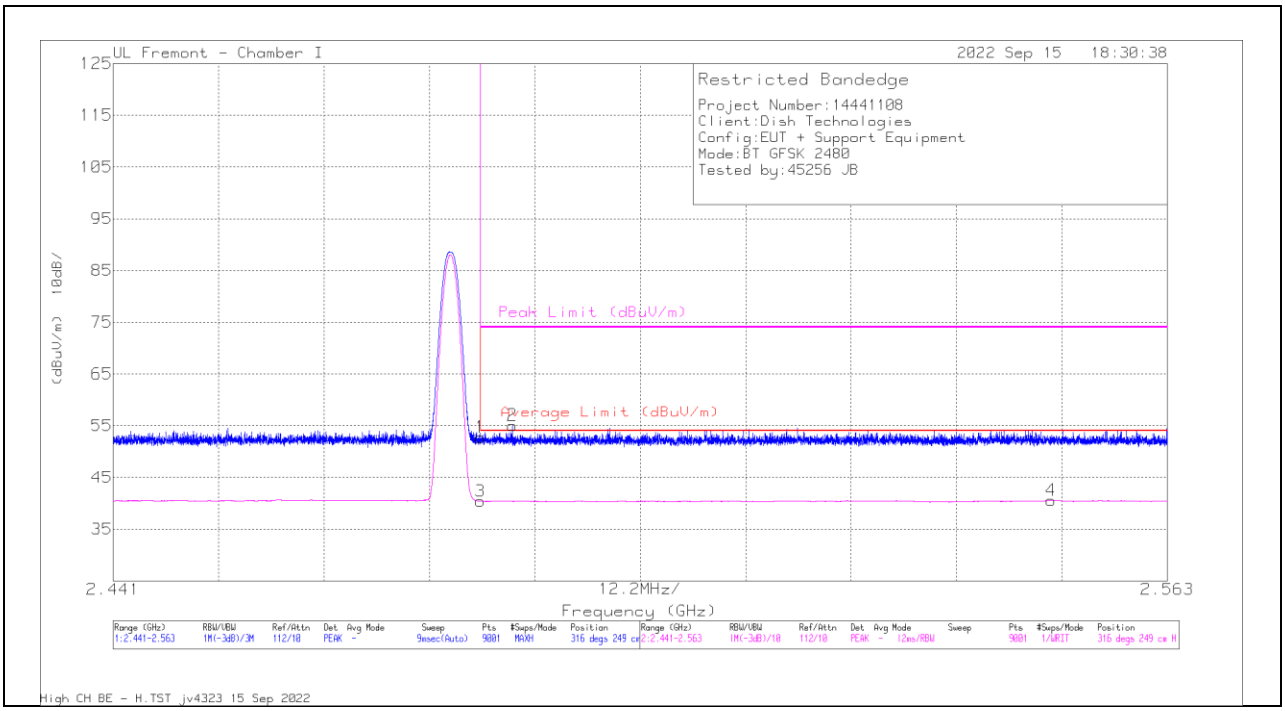
## 9.1. TRANSMITTER ABOVE 1 GHz (BT)

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.4835 | 41.26 | Pk | 32.6 | -21.1 | 52.76 | - | - | 74 | -21.24 | 316 | 249 | H |
| 2 | * 2.487172 | 43.46 | Pk | 32.6 | -21 | 55.06 | - | - | 74 | -18.94 | 316 | 249 | H |
| 3 | * 2.4835 | 28.9 | VA1T | 32.6 | -21.1 | 40.4 | 54 | -13.6 | - | - | 316 | 249 | H |
| 4 | 2.54957 | 28.95 | VA1T | 32.7 | -21.1 | 40.55 | 54 | -13.45 | - | - | 316 | 249 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration



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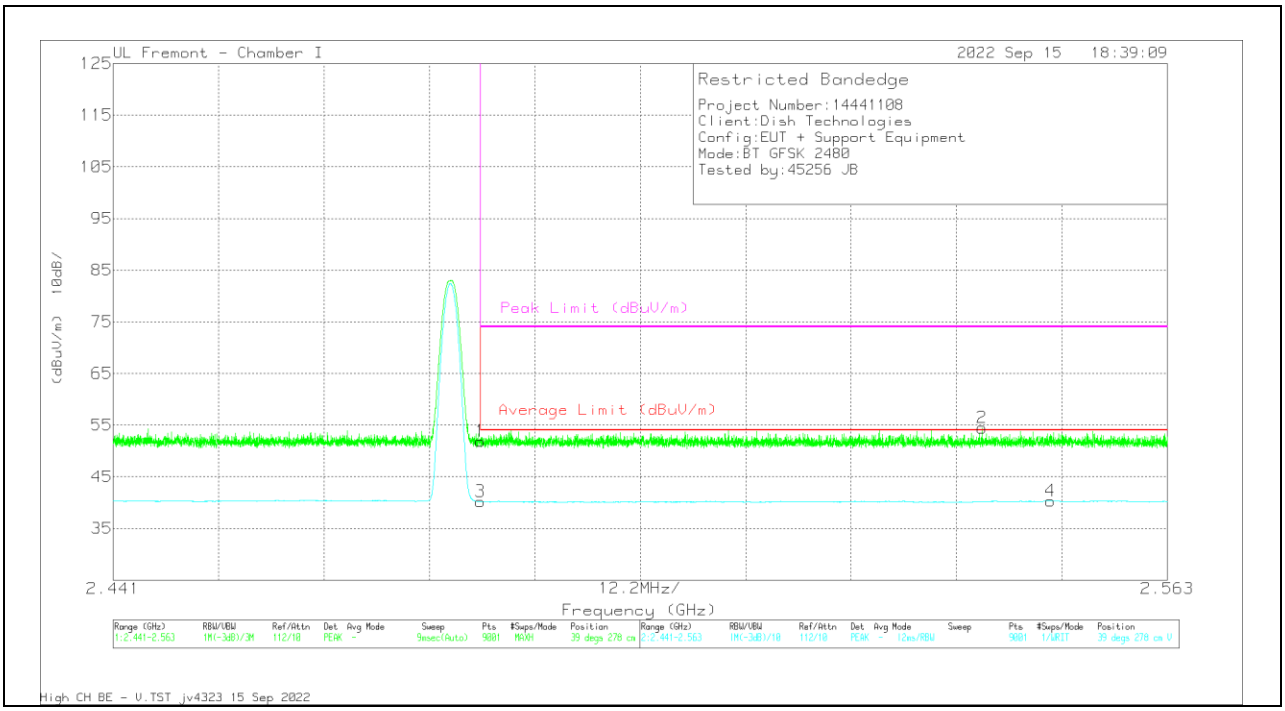
## VERTICAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.4835 | 40.37 | Pk | 32.6 | -21.1 | 51.87 | - | - | 74 | -22.13 | 39 | 278 | V |
| 2 | 2.541558 | 42.88 | Pk | 32.7 | -21.1 | 54.48 | - | - | 74 | -19.52 | 39 | 278 | V |
| 3 | * 2.4835 | 28.7 | VA1T | 32.6 | -21.1 | 40.2 | 54 | -13.8 | - | - | 39 | 278 | V |
| 4 | 2.549462 | 28.73 | VA1T | 32.7 | -21.1 | 40.33 | 54 | -13.67 | - | - | 39 | 278 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration



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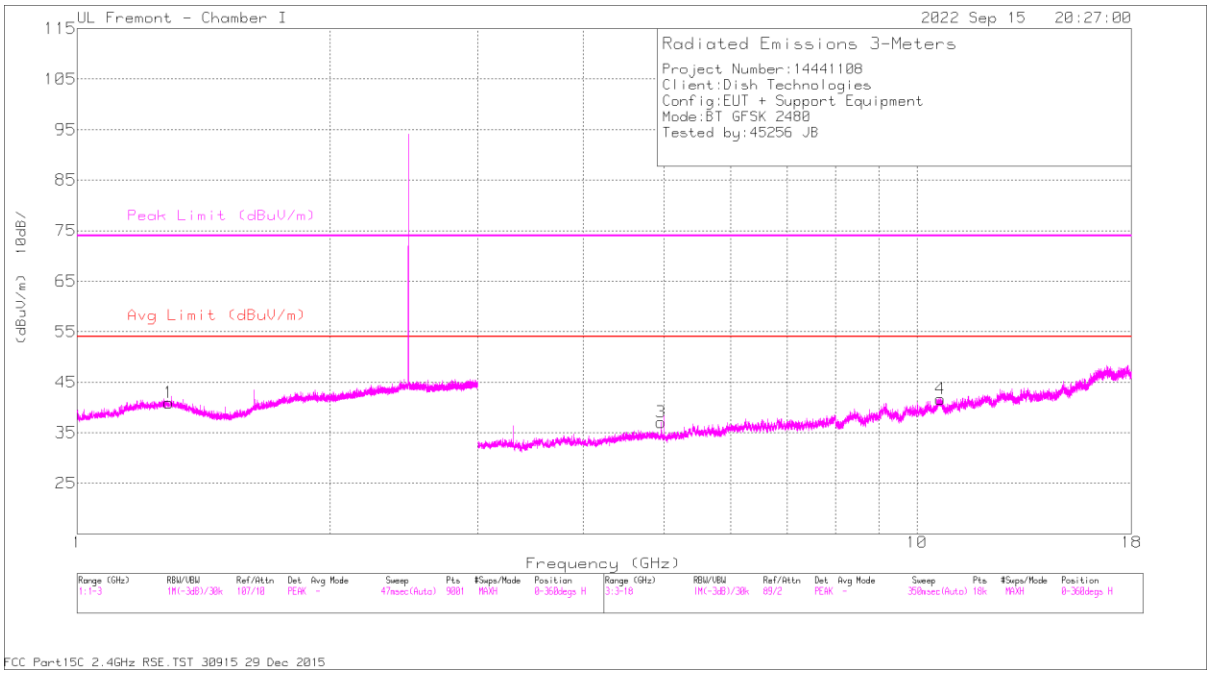
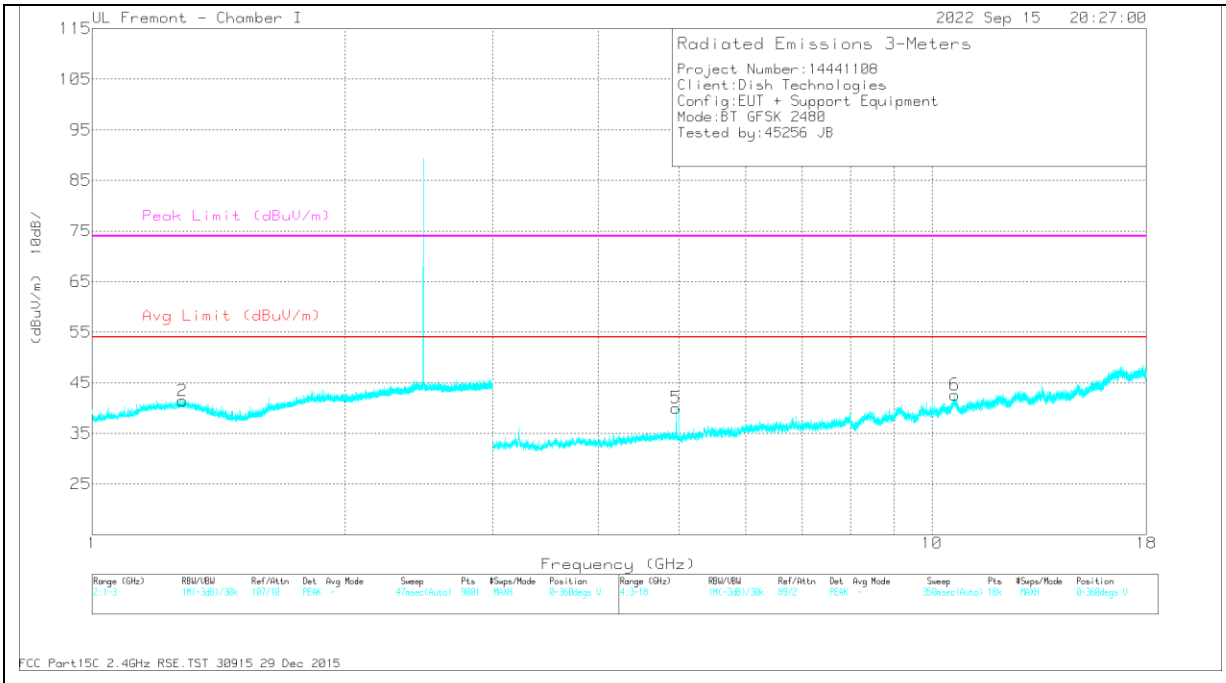
## HARMONICS AND SPURIOUS EMISSIONS

### HIGH CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



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## RADIATED EMISSIONS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 1.284283 | 40.88 | PKFH | 29 | -21.2 | 48.68 | - | - | 74 | -25.32 | 238 | 271 | H |
| | * 1.284974 | 28.06 | VA1T | 29 | -21.2 | 35.86 | 54 | -18.14 | - | - | 238 | 271 | H |
| 2 | * 1.279773 | 41.75 | PKFH | 29.1 | -21.2 | 49.65 | - | - | 74 | -24.35 | 275 | 385 | V |
| | * 1.279129 | 28.13 | VA1T | 29.2 | -21.2 | 36.13 | 54 | -17.87 | - | - | 275 | 385 | V |
| 3 | * 4.9599 | 40.54 | PKFH | 34.5 | -28.6 | 46.44 | - | - | 74 | -27.56 | 332 | 130 | H |
| | * 4.96004 | 28.48 | VA1T | 34.5 | -28.6 | 34.38 | 54 | -19.62 | - | - | 332 | 130 | H |
| 4 | * 10.667084 | 32.08 | PKFH | 38 | -21.4 | 48.68 | - | - | 74 | -25.32 | 324 | 181 | H |
| | * 10.667276 | 19.06 | VA1T | 38 | -21.5 | 35.56 | 54 | -18.44 | - | - | 324 | 181 | H |
| 5 | * 4.960467 | 39.36 | PKFH | 34.5 | -28.6 | 45.26 | - | - | 74 | -28.74 | 254 | 125 | V |
| | * 4.960016 | 30.38 | VA1T | 34.5 | -28.6 | 36.28 | 54 | -17.72 | - | - | 254 | 125 | V |
| 6 | * 10.644887 | 32.46 | PKFH | 38.1 | -21.3 | 49.26 | - | - | 74 | -24.74 | 74 | 102 | V |
| | * 10.647097 | 18.97 | VA1T | 38.1 | -21.3 | 35.77 | 54 | -18.23 | - | - | 74 | 102 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration



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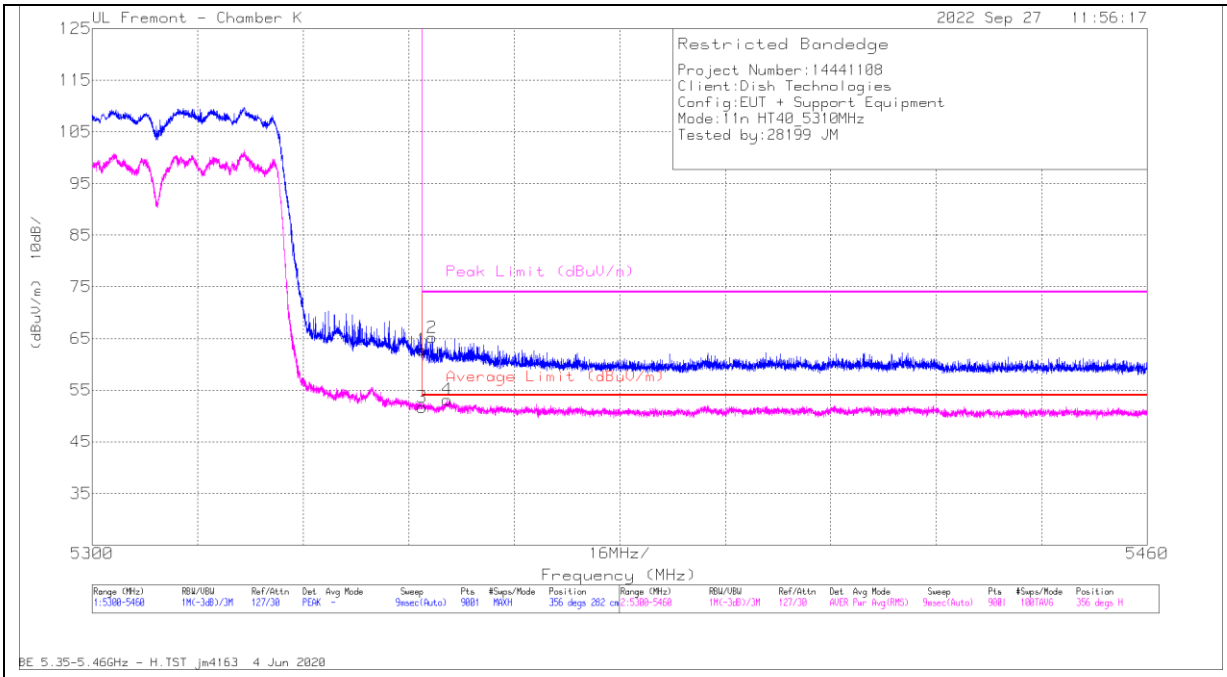
## 9.2. TRANSMITTER ABOVE 1 GHz (UNII 802.11ac)

### BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 80402 ACF(dB) - 3mH | Amp/Cbl/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 5350 | 58.77 | Pk | 34.7 | -30.7 | 0 | 62.77 | - | - | 74 | -11.23 | 356 | 282 | H |
| 2 | * 5351.574 | 61.16 | Pk | 34.7 | -30.7 | 0 | 65.16 | - | - | 74 | -8.84 | 356 | 282 | H |
| 3 | * 5350 | 45.04 | RMS | 34.7 | -30.7 | 2.63 | 51.67 | 54 | -2.33 | - | - | 356 | 282 | H |
| 4 | * 5353.832 | 46.53 | RMS | 34.7 | -30.7 | 2.63 | 53.16 | 54 | -.84 | - | - | 356 | 282 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



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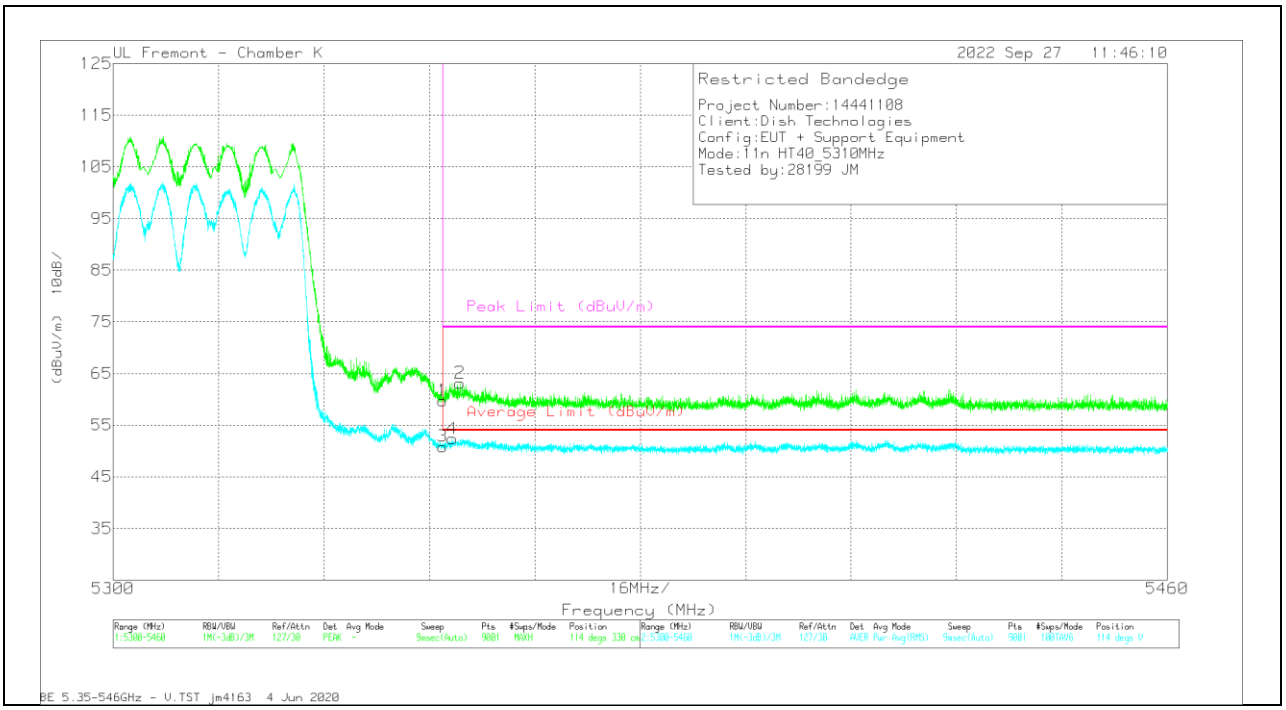
## VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 80402 ACF(dB) - 3mH | AmpCblPad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 5350 | 55.74 | Pk | 34.7 | -30.7 | 0 | 59.74 | - | - | 74 | -14.26 | 114 | 330 | V |
| 2 | * 5352.641 | 59.14 | Pk | 34.7 | -30.7 | 0 | 63.14 | - | - | 74 | -10.86 | 114 | 330 | V |
| 3 | * 5350 | 44.24 | RMS | 34.7 | -30.7 | 2.63 | 50.87 | 54 | -3.13 | - | - | 114 | 330 | V |
| 4 | * 5351.485 | 45.74 | RMS | 34.7 | -30.7 | 2.63 | 52.37 | 54 | -1.63 | - | - | 114 | 330 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



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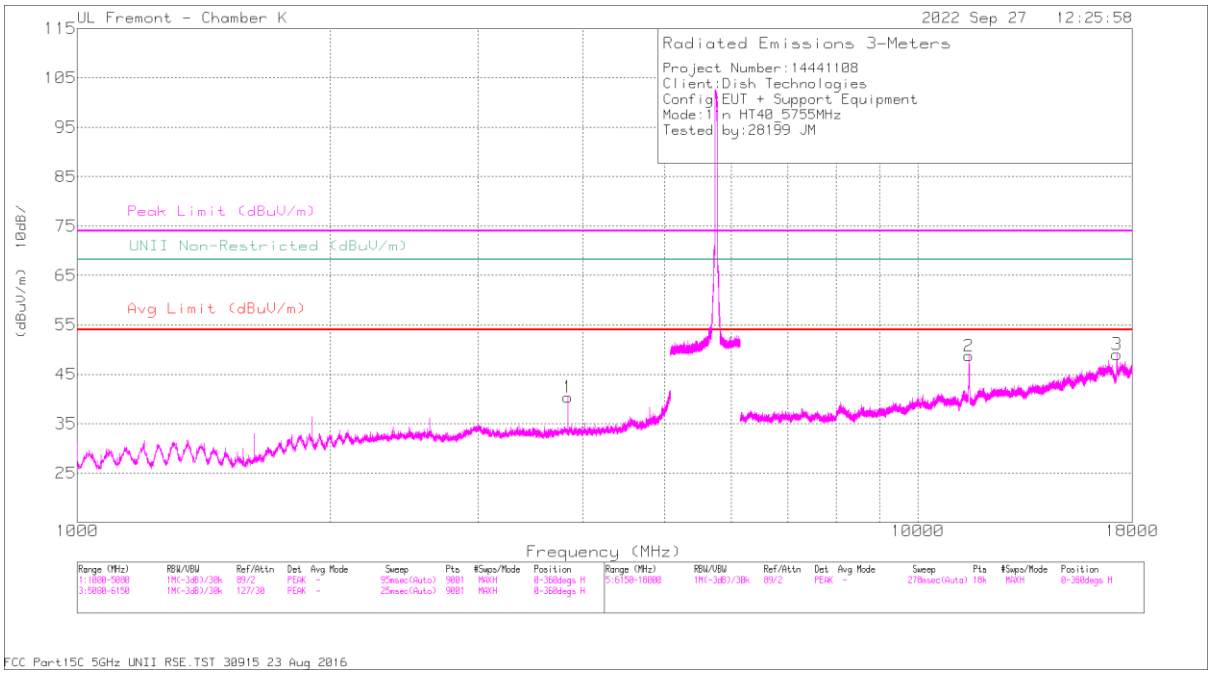
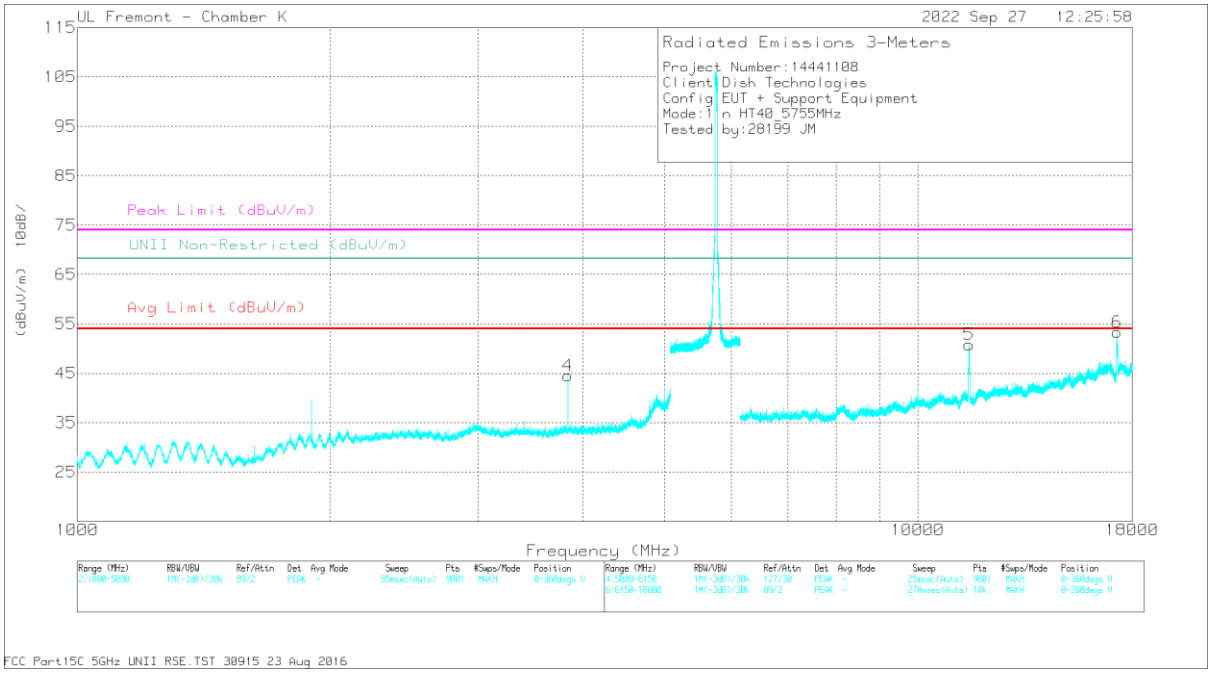
## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



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## RADIATED EMISSIONS

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 80402 ACF(dB) - 3mH | Amp/Cbl/Fltr (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 3836.756 | 55.95 | PK-U | 33.5 | -41.7 | 0 | 47.75 | - | - | 74 | -26.25 | - | - | 350 | 298 | H |
| | * 3836.68 | 49.8 | ADR | 33.5 | -41.7 | 2.63 | 44.23 | 54 | -9.77 | - | - | - | - | 350 | 298 | H |
| 2 | * 11509.509 | 58.2 | PK-U | 38.3 | -35.8 | 0 | 60.7 | - | - | 74 | -13.3 | - | - | 259 | 100 | H |
| | * 11509.042 | 43.47 | ADR | 38.3 | -35.8 | 2.63 | 48.6 | 54 | -5.4 | - | - | - | - | 259 | 100 | H |
| 3 | 17255.158 | 49.19 | PK-U | 41.5 | -31.5 | 0 | 59.19 | - | - | - | - | 68.2 | -9.01 | 68 | 114 | H |
| | 17255.15 | 36.93 | ADR | 41.5 | -31.5 | 2.63 | 49.56 | - | - | - | - | - | - | 68 | 114 | H |
| 4 | * 3836.634 | 57.87 | PK-U | 33.5 | -41.7 | 0 | 49.67 | - | - | 74 | -24.33 | - | - | 71 | 108 | V |
| | * 3836.758 | 53.27 | ADR | 33.5 | -41.7 | 2.63 | 47.7 | 54 | -6.3 | - | - | - | - | 71 | 108 | V |
| 5 | * 11509.56 | 61.02 | PK-U | 38.3 | -35.8 | 0 | 63.52 | - | - | 74 | -10.48 | - | - | 220 | 120 | V |
| | * 11508.785 | 47.04 | ADR | 38.3 | -35.8 | 2.63 | 52.17 | 54 | -1.83 | - | - | - | - | 220 | 120 | V |
| 6 | 17257.629 | 53.89 | PK-U | 41.5 | -31.5 | 0 | 63.89 | - | - | - | - | 68.2 | -4.31 | 67 | 106 | V |
| | 17258.456 | 41.08 | ADR | 41.5 | -31.5 | 2.63 | 53.71 | - | - | - | - | - | - | 67 | 106 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average



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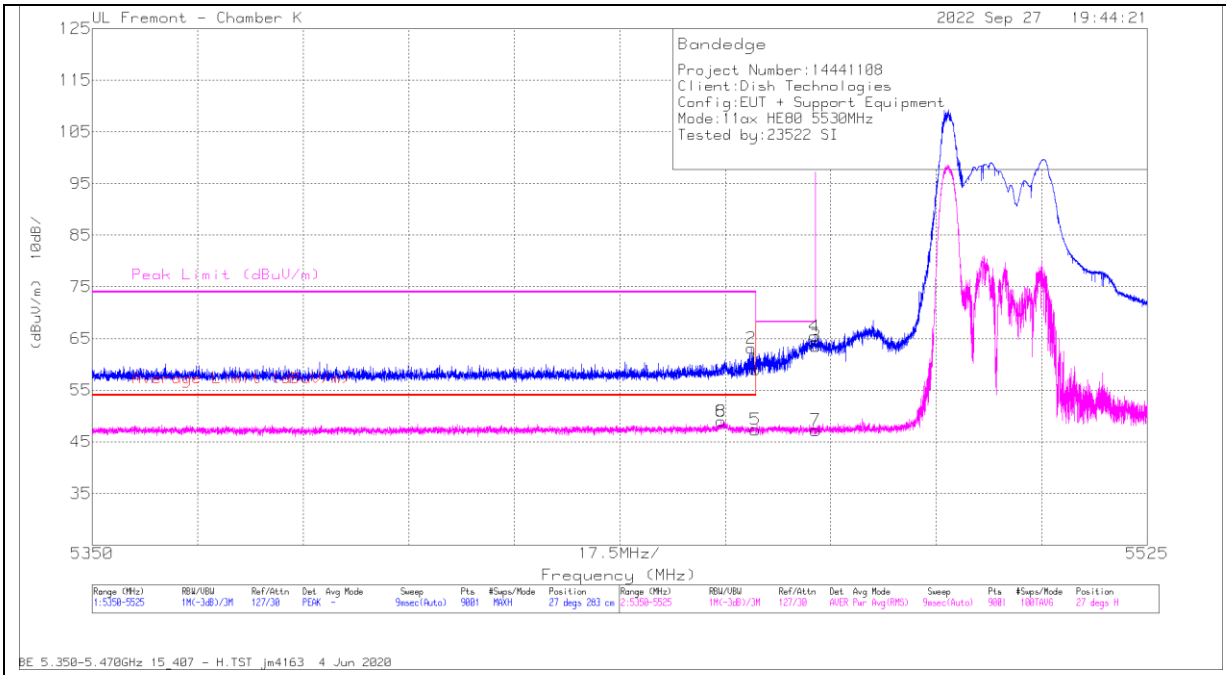
## 9.3. TRANSMITTER ABOVE 1 GHz (UNII 802.11ax)

### BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT




| Marker | Frequency(MHz) | MeterReading(dBuV) | Det | 80402 ACF(dB) - 3mH | Amp/Cbl/Pad (dB) | DC Corr (dB) | CorrectedReading(dBuV/m) | Average Limit (dBuV/m) | Margin(dB) | Peak Limit (dBuV/m) | PK Margin(dB) | Azimuth(Degs) | Height(cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 5460 | 54.88 | Pk | 34.7 | -30.6 | 0 | 58.98 | - | - | 68.2 | -9.22 | 27 | 283 | H |
| 2 | * 5459.353 | 58.98 | Pk | 34.7 | -30.6 | 0 | 63.08 | - | - | 74 | -10.92 | 27 | 283 | H |
| 3 | 5470 | 59.45 | Pk | 34.7 | -30.6 | 0 | 63.55 | - | - | 68.2 | -4.65 | 27 | 283 | H |
| 4 | 5469.794 | 61.31 | Pk | 34.7 | -30.6 | 0 | 65.41 | - | - | 68.2 | -2.79 | 27 | 283 | H |
| 5 | * 5460 | 43.25 | RMS | 34.7 | -30.6 | 0.26 | 47.61 | 54 | -6.39 | - | - | 27 | 283 | H |
| 6 | * 5454.317 | 44.85 | RMS | 34.7 | -30.6 | 0.26 | 49.21 | 54 | -4.79 | - | - | 27 | 283 | H |
| 7 | 5470 | 43.12 | RMS | 34.7 | -30.6 | 0 | 47.22 | - | - | - | - | 27 | 283 | H |
| 8 | * 5454.317 | 44.85 | RMS | 34.7 | -30.6 | 0.26 | 49.21 | 54 | -4.79 | - | - | 27 | 283 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



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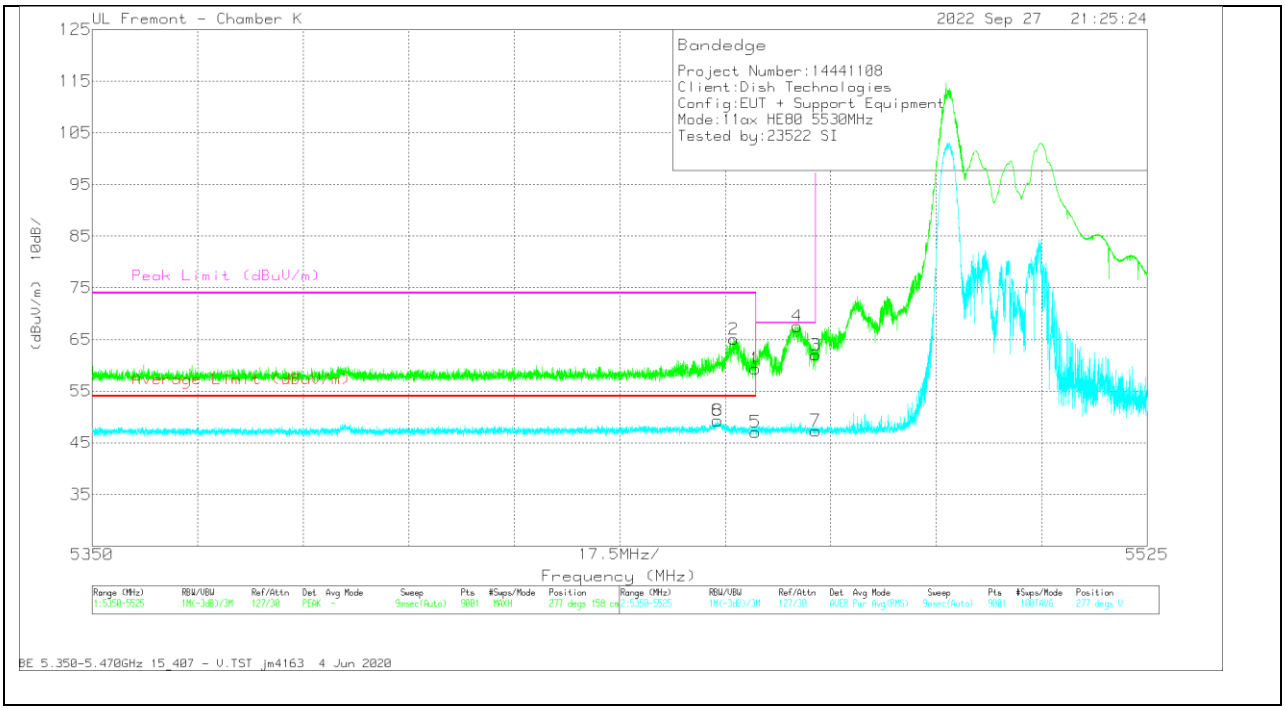
## VERTICAL RESULT




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 80402 ACF(dB) - 3mH | Amp/Cbl/Pad (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 5460 | 55.24 | Pk | 34.7 | -30.6 | 0 | 59.34 | - | - | 68.2 | -8.86 | 277 | 158 | V |
| 2 | * 5456.378 | 60.96 | Pk | 34.7 | -30.6 | 0 | 65.06 | - | - | 74 | -8.94 | 277 | 158 | V |
| 3 | 5470 | 57.9 | Pk | 34.7 | -30.6 | 0 | 62 | - | - | 68.2 | -6.2 | 277 | 158 | V |
| 4 | 5466.936 | 63.57 | Pk | 34.7 | -30.7 | 0 | 67.57 | - | - | 68.2 | -.63 | 277 | 158 | V |
| 5 | * 5460 | 42.97 | RMS | 34.7 | -30.6 | 0.26 | 47.33 | 54 | -6.67 | - | - | 277 | 158 | V |
| 6 | * 5453.734 | 45.2 | RMS | 34.7 | -30.6 | 0.26 | 49.56 | 54 | -4.34 | - | - | 277 | 158 | V |
| 7 | 5470 | 43.19 | RMS | 34.7 | -30.6 | 0 | 47.29 | - | - | - | - | 277 | 158 | V |
| 8 | * 5453.734 | 45.2 | RMS | 34.7 | -30.6 | 0.26 | 49.56 | 54 | -4.34 | - | - | 277 | 158 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



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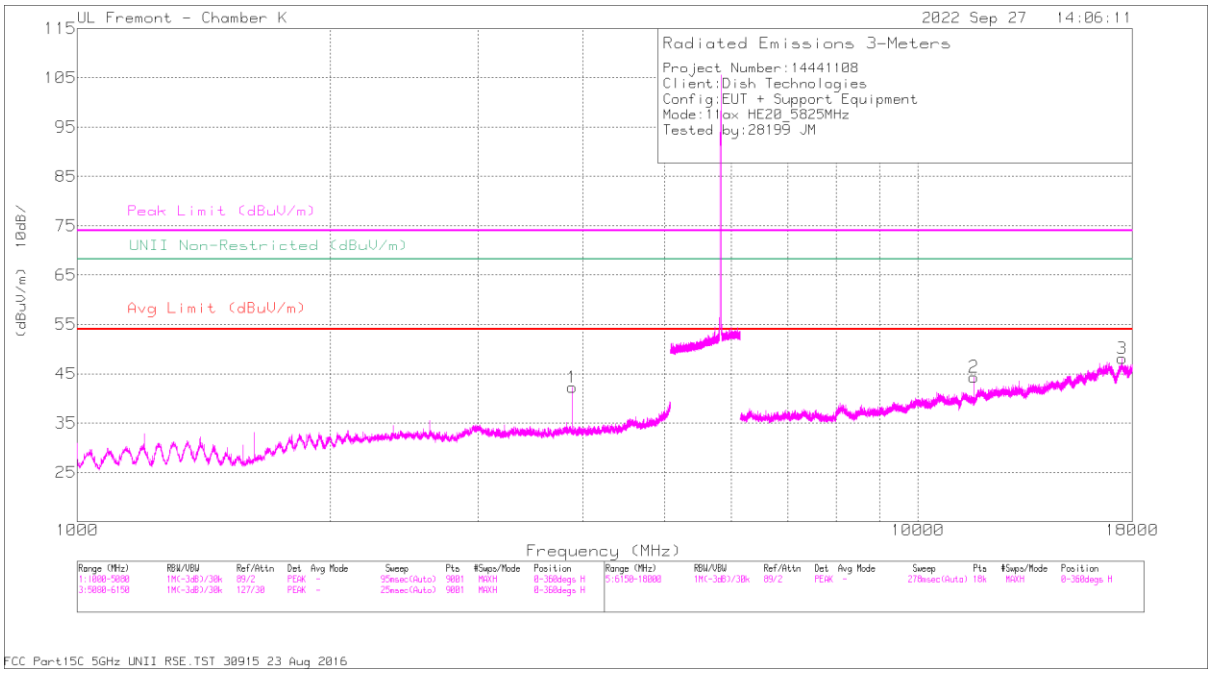
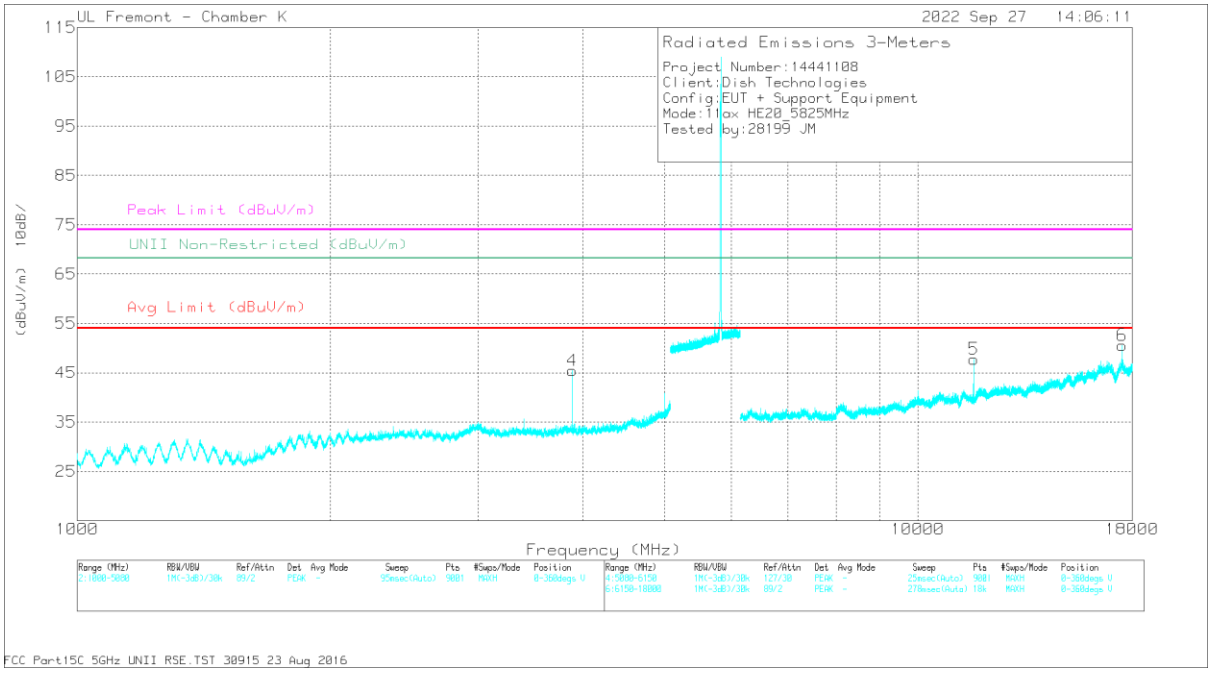
## HARMONICS AND SPURIOUS EMISSIONS

### HIGH CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



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## RADIATED EMISSIONS

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 80402 ACF(dB) - 3mH | Amp/Cbl/Fltr (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | UNII Non-Restricted (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 3883.426 | 57.02 | PK-U | 33.5 | -41.7 | 0 | 48.82 | - | - | 74 | -25.18 | - | - | 356 | 311 | H |
| | * 3883.302 | 51.74 | ADR | 33.5 | -41.7 | .13 | 43.67 | 54 | -10.33 | - | - | - | - | 356 | 311 | H |
| 2 | * 11666.574 | 58.93 | PK-U | 38.4 | -35.4 | 0 | 61.93 | - | - | 74 | -12.07 | - | - | 306 | 106 | H |
| | * 11667.019 | 43.05 | ADR | 38.4 | -35.5 | .13 | 46.08 | 54 | -7.92 | - | - | - | - | 306 | 106 | H |
| 3 | 17501.185 | 51.69 | PK-U | 41.4 | -31.1 | 0 | 61.99 | - | - | - | - | 68.2 | -6.21 | 67 | 247 | H |
| | 17500.241 | 36.89 | ADR | 41.4 | -31 | .13 | 47.42 | - | - | - | - | - | - | 67 | 247 | H |
| 4 | * 3883.202 | 57.5 | PK-U | 33.5 | -41.7 | 0 | 49.3 | - | - | 74 | -24.7 | - | - | 295 | 225 | V |
| | * 3883.29 | 52.98 | ADR | 33.5 | -41.7 | .13 | 44.91 | 54 | -9.09 | - | - | - | - | 295 | 225 | V |
| 5 | * 11667.348 | 61.36 | PK-U | 38.4 | -35.4 | 0 | 64.36 | - | - | 74 | -9.64 | - | - | 349 | 112 | V |
| | * 11666.704 | 45.79 | ADR | 38.4 | -35.4 | .13 | 48.92 | 54 | -5.08 | - | - | - | - | 349 | 112 | V |
| 6 | 17500.38 | 57.47 | PK-U | 41.4 | -31 | 0 | 67.87 | - | - | - | - | 68.2 | -.33 | 67 | 103 | V |
| | 17500.26 | 40.86 | ADR | 41.4 | -31 | .13 | 51.39 | - | - | - | - | - | - | 67 | 103 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average



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## 9.4. SPURIOUS EMISSIONS FOR CO-LOCATION

**TEST-CASE CONDITIONS**

| Mode | Frequency (MHz) |
|---|---|
| BT GFSK | 2480 |
| Zigbee | 2475 |
| UNII | VHT80 5775MHz |



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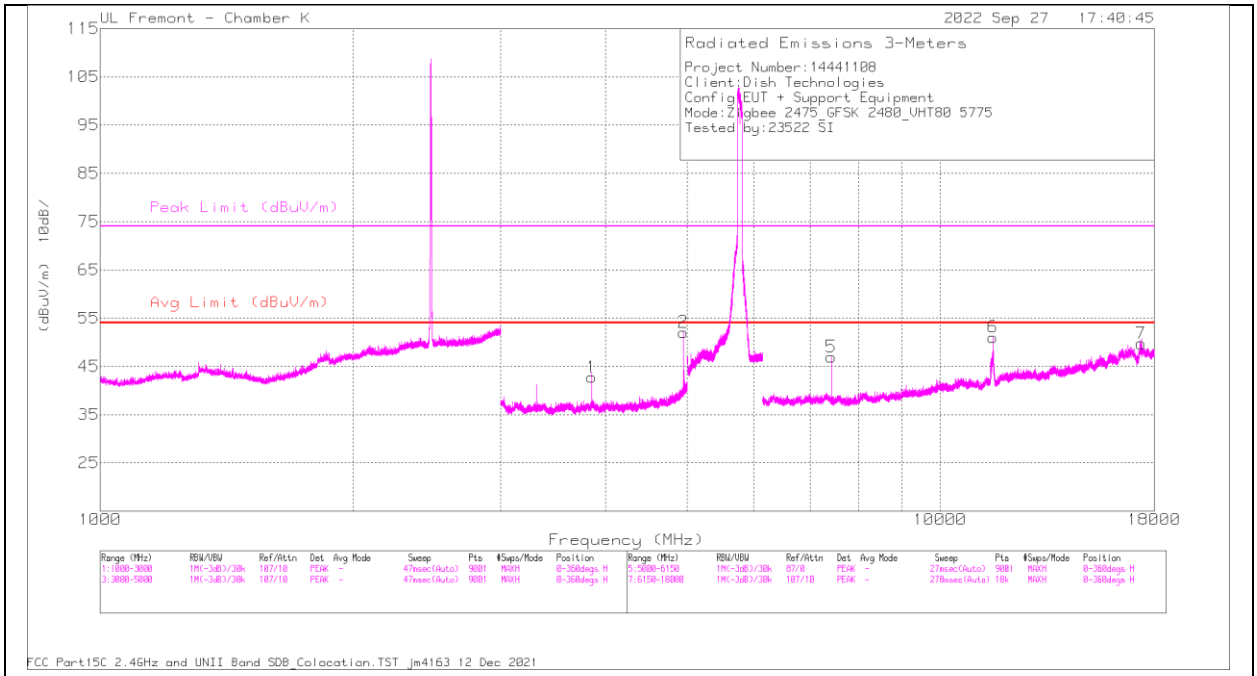
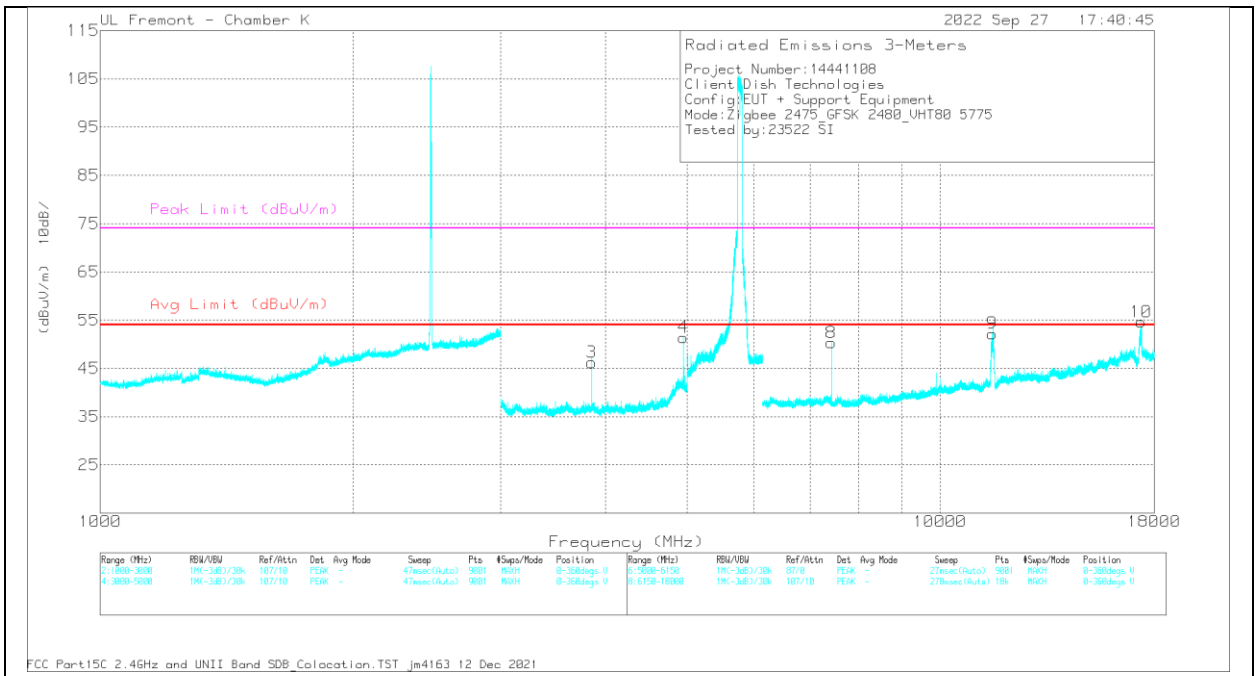
## HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz




**HORIZONTAL**




**VERTICAL**



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## Radiated Emissions

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 80402 ACF(dB) - 3mH | Amp/Cbl/Fltr (dB) | Filter (dB) | Fixture Corr (dB) | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 3850.102 | 56.54 | PK-U | 33.5 | -41.5 | 2 | 1 | 0 | 51.54 | - | - | 74 | -22.46 | 354 | 297 | H |
| | * 3850.114 | 50 | ADR | 33.5 | -41.5 | 2 | 1 | 0.96 | 45 | 54 | -8.04 | - | - | 354 | 297 | H |
| 2 | * 4950.815 | 61.22 | PK-U | 34.2 | -40.5 | 2 | 1 | 0 | 57.92 | - | - | 74 | -16.08 | 335 | 168 | H |
| | * 4951.023 | 54.33 | ADR | 34.2 | -40.5 | 2 | 1 | 0.96 | 51.03 | 54 | -1.93 | - | - | 335 | 168 | H |
| 3 | * 3849.978 | 57.73 | PK-U | 33.5 | -41.5 | 2 | 1 | 0 | 52.73 | - | - | 74 | -21.27 | 71 | 102 | V |
| | * 3850.018 | 52.12 | ADR | 33.5 | -41.5 | 2 | 1 | 0.96 | 47.12 | 54 | -5.84 | - | - | 71 | 102 | V |
| 4 | * 4950.951 | 59.92 | PK-U | 34.2 | -40.5 | 2 | 1 | 0 | 56.62 | - | - | 74 | -17.38 | 360 | 318 | V |
| | * 4949.213 | 53.18 | ADR | 34.2 | -40.4 | 2 | 1 | 0.96 | 49.98 | 54 | -2.98 | - | - | 360 | 318 | V |
| 5 | * 7423.75 | 55.91 | PK-U | 35.8 | -38.1 | .5 | 1 | 0 | 55.11 | - | - | 74 | -18.89 | 213 | 111 | H |
| | * 7423.654 | 48.84 | ADR | 35.8 | -38.1 | .5 | 1 | 0.96 | 48.04 | 54 | -4.92 | - | - | 213 | 111 | H |
| 6 | * 11560.581 | 55.33 | PK-U | 38.3 | -35.5 | .5 | 1 | 0 | 59.63 | - | - | 74 | -14.37 | 259 | 105 | H |
| | * 11559.071 | 44.13 | ADR | 38.3 | -35.7 | .5 | 1 | 0.96 | 48.23 | 54 | -4.73 | - | - | 259 | 105 | H |
| 7 | 17357.874 | 49.16 | PK-U | 41.4 | -31.3 | .5 | 1 | 0 | 60.76 | - | - | 74 | -13.24 | 325 | 274 | H |
| | 17357.826 | 38.22 | ADR | 41.4 | -31.3 | .5 | 1 | 0.96 | 49.82 | 54 | -4.14 | - | - | 325 | 274 | H |
| 8 | * 7423.334 | 57.09 | PK-U | 35.8 | -38.1 | .5 | 1 | 0 | 56.29 | - | - | 74 | -17.71 | 158 | 147 | V |
| | * 7423.526 | 50.38 | ADR | 35.8 | -38.1 | .5 | 1 | 0.96 | 49.58 | 54 | -3.38 | - | - | 158 | 147 | V |
| 9 | * 11541.007 | 58.42 | PK-U | 38.3 | -35.8 | .5 | 1 | 0 | 62.42 | - | - | 74 | -11.58 | 1 | 114 | V |
| | * 11540.891 | 44.67 | ADR | 38.3 | -35.8 | .5 | 1 | 0.96 | 48.67 | 54 | -4.29 | - | - | 1 | 114 | V |
| 10 | 17358.446 | 50.53 | PK-U | 41.4 | -31.3 | .5 | 1 | 0 | 62.13 | - | - | 74 | -11.87 | 311 | 103 | V |
| | 17358.206 | 39.82 | ADR | 41.4 | -31.3 | .5 | 1 | 0.96 | 51.42 | 54 | -1.54 | - | - | 311 | 103 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average



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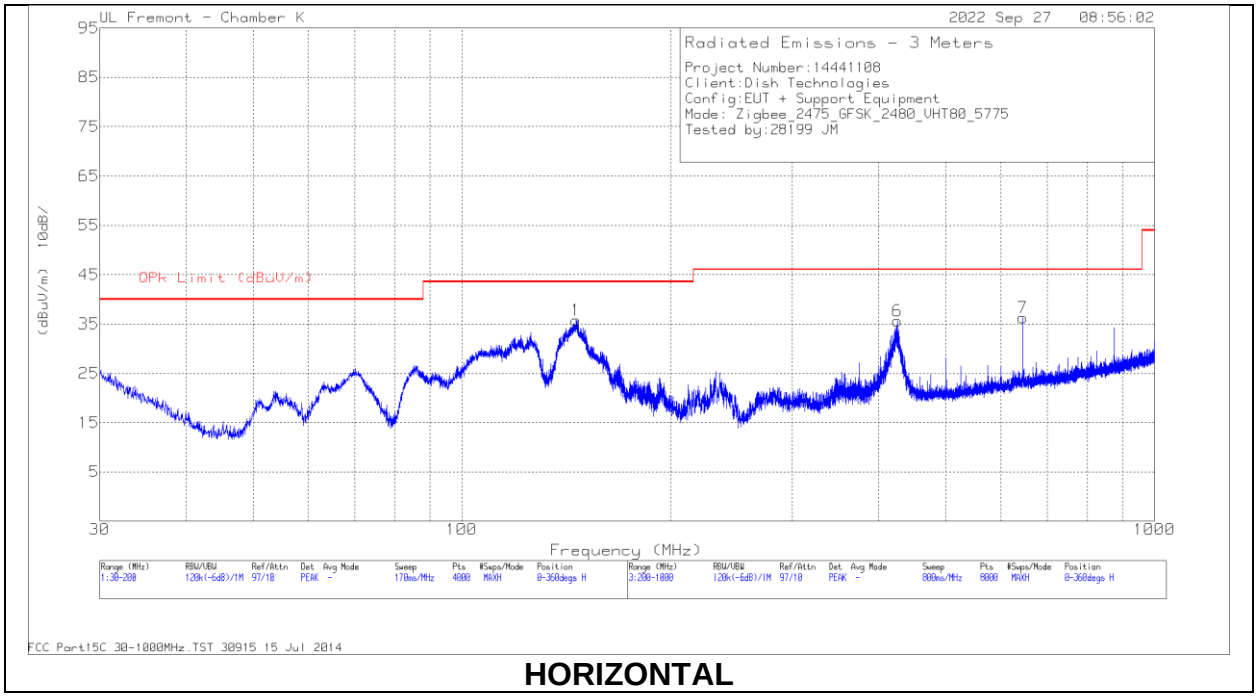
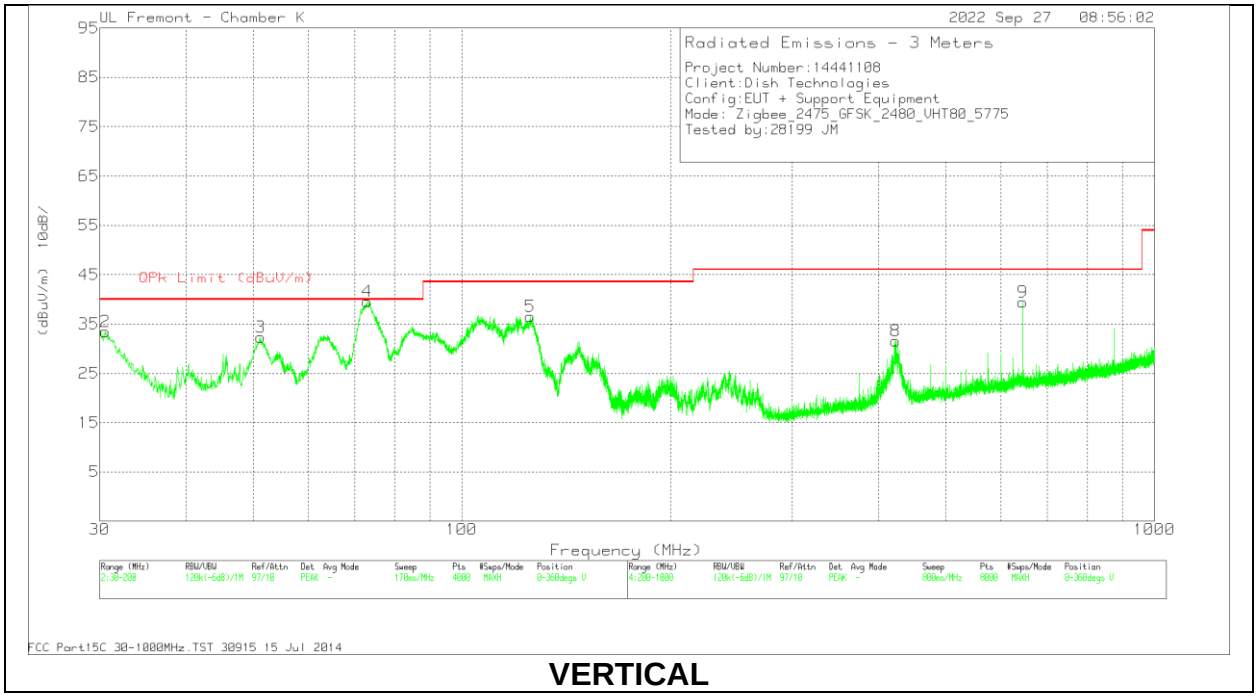
## HARMONICS AND SPURIOUS EMISSIONS 30MHz TO 1GHz




**HORIZONTAL**




**VERTICAL**



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## Radiated Emissions

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 82258 ACF (dB) | Amp/Cbl (dB) | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 146.268 | 47.45 | Pk | 18.9 | -30.6 | 35.75 | 43.52 | -7.77 | 0-360 | 197 | H |
| 2 | 30.5952 | 37.57 | Pk | 27.4 | -31.5 | 33.47 | 40 | -6.53 | 0-360 | 100 | V |
| 3 | 51.213 | 49.59 | Pk | 14 | -31.3 | 32.29 | 40 | -7.71 | 0-360 | 100 | V |
| 4 | 72.9311 | 53.26 | Qp | 14.2 | -31.1 | 36.36 | 40 | -3.64 | 229 | 98 | V |
| 5 | * 125.65 | 46.9 | Pk | 20.3 | -30.7 | 36.5 | 43.52 | -7.02 | 0-360 | 100 | V |
| 6 | 425.529 | 42.25 | Pk | 22.7 | -29.3 | 35.65 | 46.02 | -10.37 | 0-360 | 100 | H |
| 7 | 646.058 | 38.71 | Pk | 26 | -28.5 | 36.21 | 46.02 | -9.81 | 0-360 | 100 | H |
| 8 | 422.529 | 38.19 | Pk | 22.7 | -29.3 | 31.59 | 46.02 | -14.43 | 0-360 | 101 | V |
| 9 | 645.958 | 41.99 | Pk | 26 | -28.5 | 39.49 | 46.02 | -6.53 | 0-360 | 101 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector



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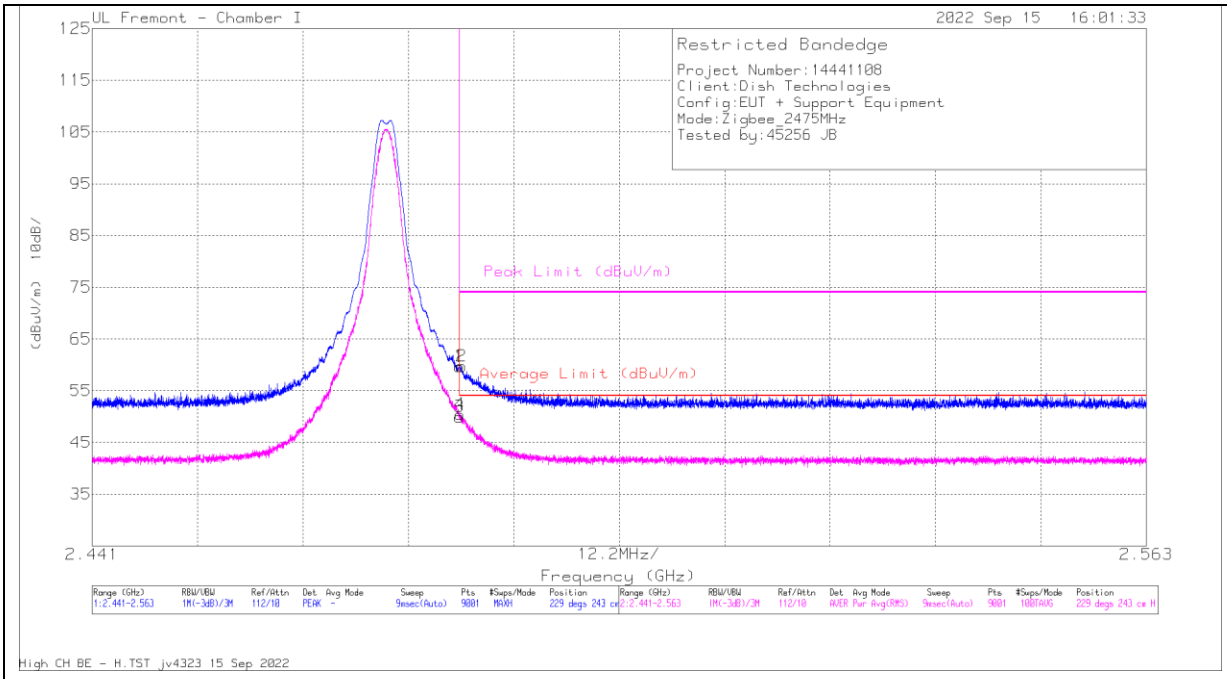
## 9.5. TRANSMITTER ABOVE 1 GHz (RF4CE Zigbee)

## BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.4835 | 48.14 | Pk | 32.6 | -21.1 | 59.64 | - | - | 74 | -14.36 | 229 | 243 | H |
| 2 | * 2.483742 | 48.23 | Pk | 32.6 | -21.1 | 59.73 | - | - | 74 | -14.27 | 229 | 243 | H |
| 3 | * 2.4835 | 38.46 | RMS | 32.6 | -21.1 | 49.96 | 54 | -4.04 | - | - | 229 | 243 | H |
| 4 | * 2.483552 | 38.9 | RMS | 32.6 | -21.1 | 50.4 | 54 | -3.6 | - | - | 229 | 243 | H |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



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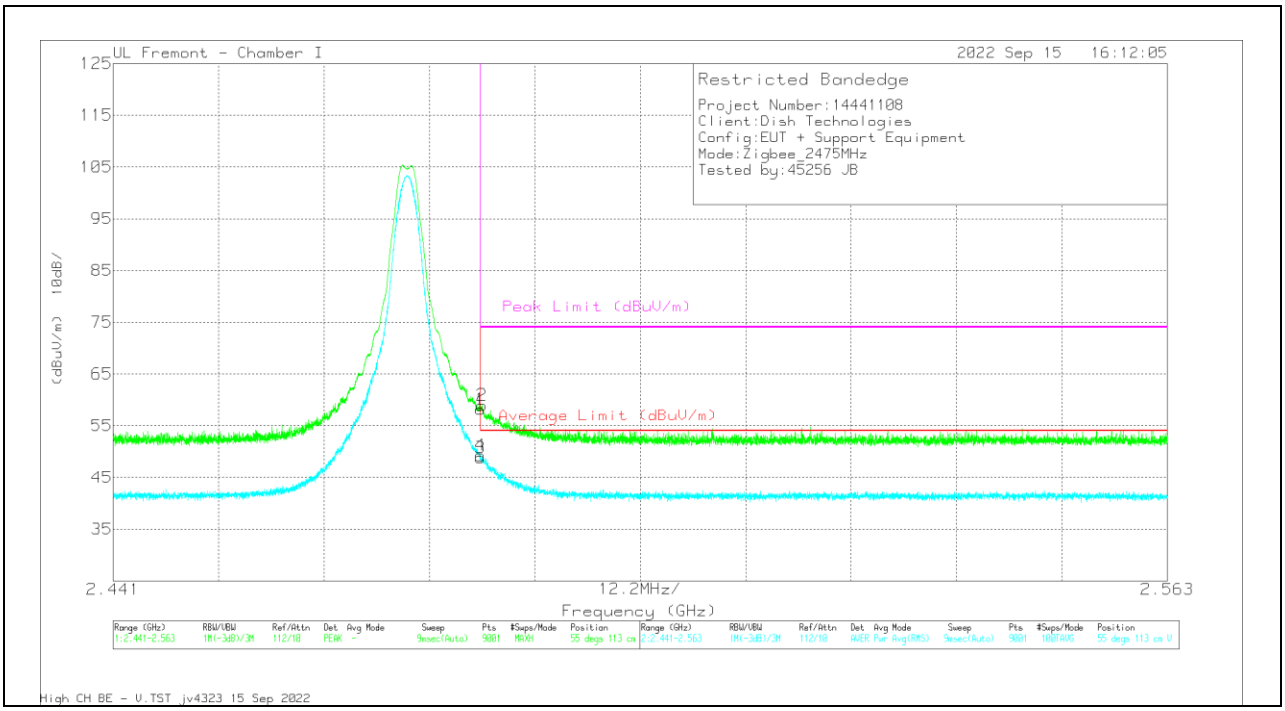
## VERTICAL RESULT




| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Pad (dB) | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 2.4835 | 46.66 | Pk | 32.6 | -21.1 | 58.16 | - | - | 74 | -15.84 | 55 | 113 | V |
| 2 | * 2.483674 | 47.42 | Pk | 32.6 | -21.1 | 58.92 | - | - | 74 | -15.08 | 55 | 113 | V |
| 3 | * 2.4835 | 37.31 | RMS | 32.6 | -21.1 | 48.81 | 54 | -5.19 | - | - | 55 | 113 | V |
| 4 | * 2.483512 | 37.76 | RMS | 32.6 | -21.1 | 49.26 | 54 | -4.74 | - | - | 55 | 113 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection



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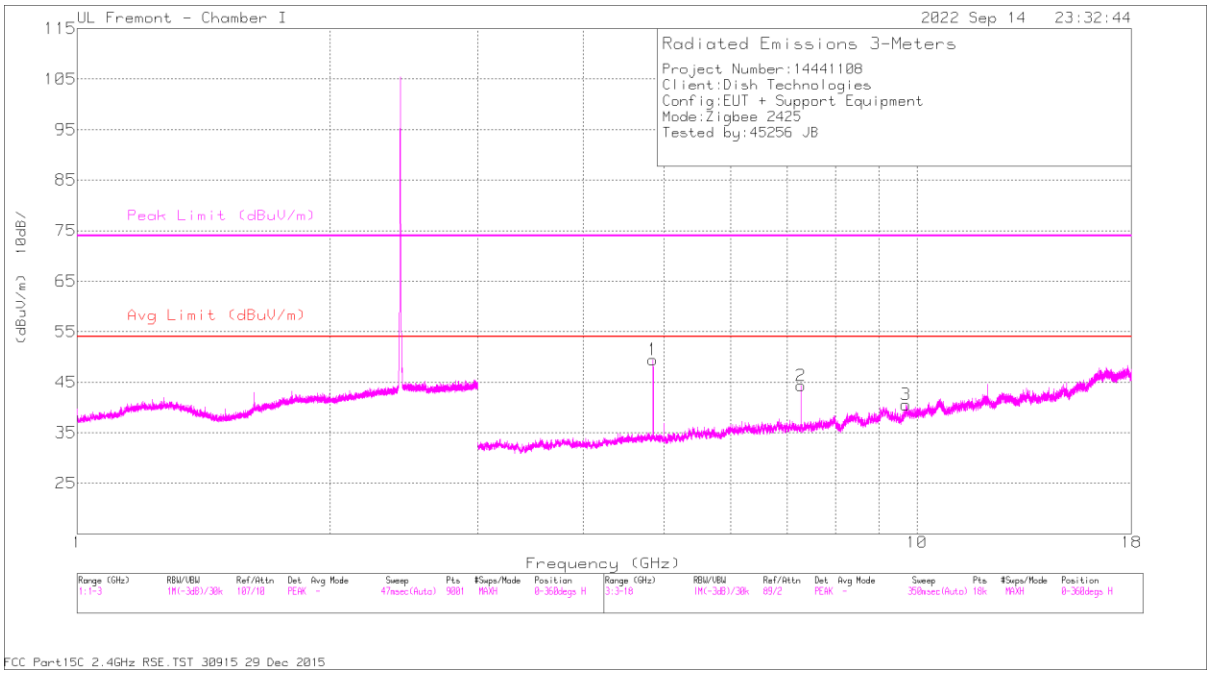
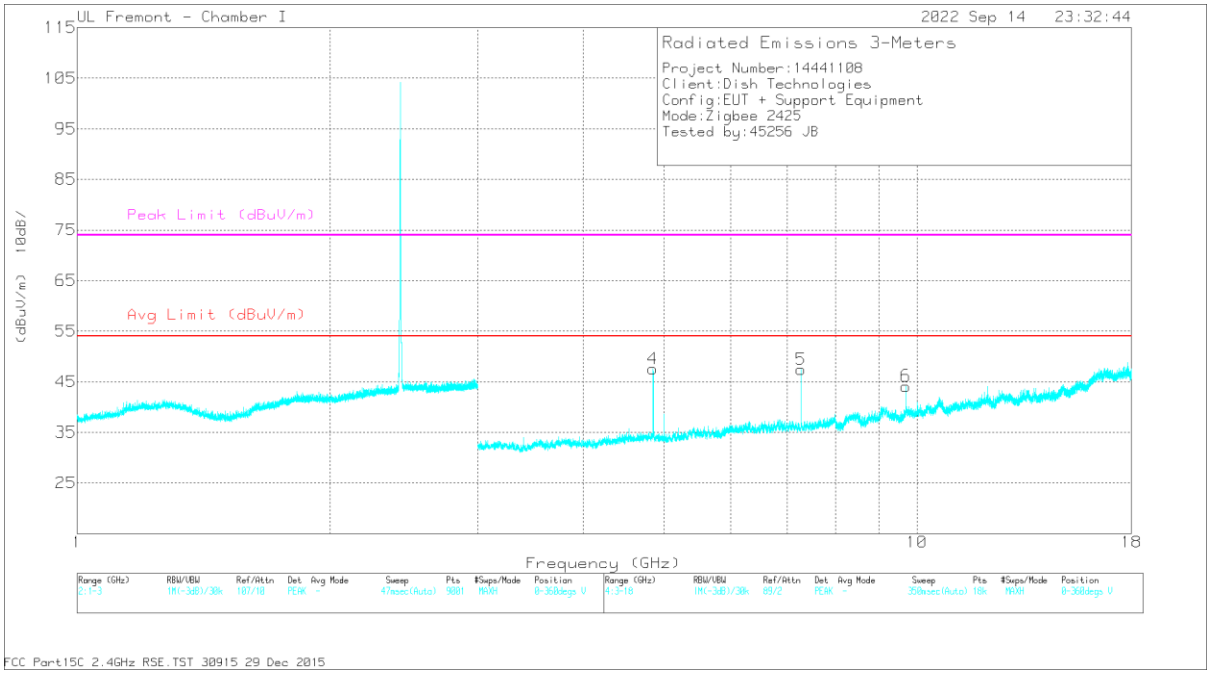
## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL RESULTS




**HORIZONTAL**




**VERTICAL**



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## RADIATED EMISSIONS

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | Horn Antenna ACF(dB) | Amp/Cbl/Fltr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | * 4.848992 | 47.65 | PK2 | 34.5 | -27.8 | 54.35 | - | - | 74 | -19.65 | 242 | 196 | H |
| | * 4.849012 | 41.97 | MAv1 | 34.5 | -27.8 | 48.67 | 54 | -5.33 | - | - | 242 | 196 | H |
| 2 | * 7.273427 | 40.91 | PK2 | 36 | -25.9 | 51.01 | - | - | 74 | -22.99 | 308 | 159 | H |
| | * 7.273502 | 31.61 | MAv1 | 36 | -25.9 | 41.71 | 54 | -12.29 | - | - | 308 | 159 | H |
| 3 | 9.697895 | 35.28 | PK2 | 37.2 | -21.5 | 50.98 | - | - | - | - | 230 | 226 | H |
| | 9.697959 | 24.83 | MAv1 | 37.2 | -21.5 | 40.53 | - | - | - | - | 230 | 226 | H |
| 4 | * 4.84886 | 47.8 | PK2 | 34.5 | -27.8 | 54.5 | - | - | 74 | -19.5 | 74 | 106 | V |
| | * 4.848968 | 41.96 | MAv1 | 34.5 | -27.8 | 48.66 | 54 | -5.34 | - | - | 74 | 106 | V |
| 5 | * 7.27656 | 43.99 | PK2 | 36 | -25.9 | 54.09 | - | - | 74 | -19.91 | 241 | 107 | V |
| | * 7.276404 | 37.37 | MAv1 | 36 | -25.9 | 47.47 | 54 | -6.53 | - | - | 241 | 107 | V |
| 6 | 9.698115 | 36.85 | PK2 | 37.2 | -21.5 | 52.55 | - | - | - | - | 244 | 127 | V |
| | 9.698131 | 27.94 | MAv1 | 37.2 | -21.5 | 43.64 | - | - | - | - | 244 | 127 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average



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