# CERTIFICATION TEST REPORT

**Report Number. :** 4790577225-FR4V3

| | | |
|---|---|---|
| **Applicant** | : | SAMSUNG ELECTRONICS CO., LTD.<br>129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,<br>GYEONGGI-DO, 16677, KOREA |
| **Model** | : | EP-P9500 |
| **FCC ID** | : | A3LEPP9500 |
| **EUT Description** | : | SmartThings Station with BLE, DTS/UNII a/b/g/n/ac, Zigbee and WPT |
| **Test Standard(s)** | : | FCC 47 CFR PART 15 SUBPART E |

**Date Of Issue:**
2022-11-23

**Prepared by:**
UL Korea, Ltd.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

IAS ACCREDITED Testing Laboratory

Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V1 | 2022-11-10 | Initial issue | Hyunsik(Dexter) Yun |
| V2 | 2022-11-21 | Updated to address TCB's Question | Hyunsik(Dexter) Yun |
| V3 | 2022-11-23 | Updated to address TCB's Question | Hyunsik(Dexter) Yun |


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

# TABLE OF CONTENTS

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

# 1. ATTESTATION OF TEST RESULTS

| | |
|---|---|
| **COMPANY NAME:** | SAMSUNG ELECTRONICS CO., LTD. |
| **EUT DESCRIPTION:** | SmartThings Station with BLE, DTS/UNII a/b/g/n/ac, Zigbee and WPT |
| **MODEL NUMBER:** | EP-P9500 |
| **SERIAL NUMBER:** | R37T9001P1AX3S, 00000000000000 (CONDUCTED); R37TA0004VFX3S (RADIATED); |
| **DATE TESTED:** | 2022-10-16 ~ 2022-11-10; |

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

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

Seokhwan Hong
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Hyunsik(Dexter) Yun
Suwon Lab Engineer
UL Korea, Ltd.

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 789033 D02 General UNII Test Procedures New Rules v02r01
4. KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
5. KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
6. KDB 291071 DR01-44460(Sept 21, 2021)
7. ANSI C63.10-2013.

# 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 218 Maeyeong-ro |
|---|
| ☒ Chamber 1(3m semi-anechoic chamber) |
| ☒ Chamber 2(3m semi-anechoic chamber) |
| ☒ Chamber 3(3m semi-anechoic chamber) |
| ☐ Chamber 4(3m Full-anechoic chamber) |
| ☐ Chamber 5(3m Full-anechoic chamber) |

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf.

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 4.2. SAMPLE CALCULATION

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

## 4.3. MEASUREMENT UNCERTAINTY

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

| PARAMETER | UNCERTAINTY |
|---|---|
| Conducted Disturbance, 0.15 to 30 MHz | 3.02 dB |
| Radiated Disturbance, 30 MHz to 1 GHz | 4.05 dB |
| Radiated Disturbance, 1 GHz to 18 GHz | 5.78 dB |
| Radiated Disturbance, 18 GHz to 40 GHz | 5.58 dB |

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

## 4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2021.


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a SmartThings Station with BLE, DTS/UNII a/b/g/n/ac, Zigbee and WPT.
This test report addresses the NII (WLAN) operational mode.

**WiFi operating mode**

| Frequency rage | Mode | Ant. |
|---|---|---|
| 5GHz (5180 MHz ~ 5825 MHz) | 802.11a SISO | TX/RX |
| | 802.11n SISO | TX/RX |
| | 802.11ac SISO | TX/RX |

**MAXIMUM OUTPUT POWER**

The transmitter has a maximum total conducted average output power as follows:

| Band | Frequency Range [MHz] | Mode | Output Power [dBm] | Output Power [mW] |
|---|---|---|---|---|
| UNII-1 | 5180 - 5240 | 802.11a | 14.86 | 30.62 |
| | | 802.11n(HT20) | 14.44 | 27.80 |
| | 5190 - 5230 | 802.11n(HT40) | 13.86 | 24.32 |
| | 5210 | 802.11ac(VHT80) | 11.07 | 12.79 |
| UNII-2A | 5260 - 5320 | 802.11a | 15.09 | 32.28 |
| | | 802.11n(HT20) | 14.80 | 30.20 |
| | 5190 - 5230 | 802.11n(HT40) | 13.50 | 22.39 |
| | 5270 - 5310 | 802.11ac(VHT80) | 11.50 | 14.13 |
| UNII-2C | 5500 - 5720 | 802.11a | 14.43 | 27.73 |
| | | 802.11n(HT20) | 14.01 | 25.18 |
| | 5510 - 5710 | 802.11n(HT40) | 13.54 | 22.59 |
| | 5530 - 5690 | 802.11ac(VHT80) | 11.80 | 15.14 |
| UNII-3 | 5745 - 5825 | 802.11a | 15.84 | 38.37 |
| | | 802.11n(HT20) | 15.40 | 34.67 |
| | 5755 - 5795 | 802.11n(HT40) | 14.24 | 26.55 |
| | 5775 | 802.11ac(VHT80) | 12.57 | 18.07 |


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

## 5.2. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**The internal antenna was Permanently attached.**
**Therefore this E.U.T Complies with the requirement of §15.203.**

The radio utilizes a internal antenna, with a maximum gain of:

| Frequency Band [MHz] | ANT Gain [dBi] |
|---|---|
| UNII 1 5150 - 5250 | 2.0 |
| UNII 2A 5250 - 5350 | 2.1 |
| UNII 2C 5470 - 5725 | 1.4 |
| UNII 3 5725 - 5850 | 2.2 |

## 5.3. List of test reduction and modes covering other modes:

The output power on covered modes is equal to or less than one referenced.

| Authorized Frequency Band | | | |
|---|---|---|---|
| **Mode** | **Antenna Stream** | **Mode** | **Covered by** |
| **802.11a** | SISO | 802.11a 1TX | |
| **802.11n HT20** | | 802.11n HT20 1TX | |
| **802.11ac VHT20** | | 802.11ac VHT20 1TX | 802.11n HT20 1TX |
| **802.11n HT40** | | 802.11n HT40 1TX | |
| **802.11ac VHT40** | | 802.11ac VHT40 1TX | 802.11n HT40 1TX |
| **802.11ac VHT80** | | 802.11ac VHT80 1TX | |

Note. The target power is the same, and there is no difference in 11ac(VHT20,40) mode and 11n(HT20,40) spot-check data. Test data was reported in 11n(HT20, 40) modes.

## 5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Based on the baseline scan, the worst-case data rates were:

802.11a mode: 6 Mbps 1Tx
802.11n HT20 mode: MCS0 1Tx
802.11n HT40 mode: MCS0 1Tx
802.11ac VHT80 mode: MCS0 1Tx

Note1. Compared to the 802.11a mode, target power is the same or lower and the density is low, so only the spot-check test was performed in the 802.11n & 802.11ac mode. Spot check test was performed in the worst tested band of 802.11a mode.

Note2. All radiated and power line conducted tests were performed connected with charger for evaluation of worst case mode.

## 5.5. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

| Support Equipment List | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Serial Number** | **FCC ID** |
| Charger | SAMSUNG | EP-TA800 | - | N/A |
| Data Cable | SAMSUNG | EP-DN980 | - | N/A |
| Test Zig | - | DJT150701 | - | N/A |

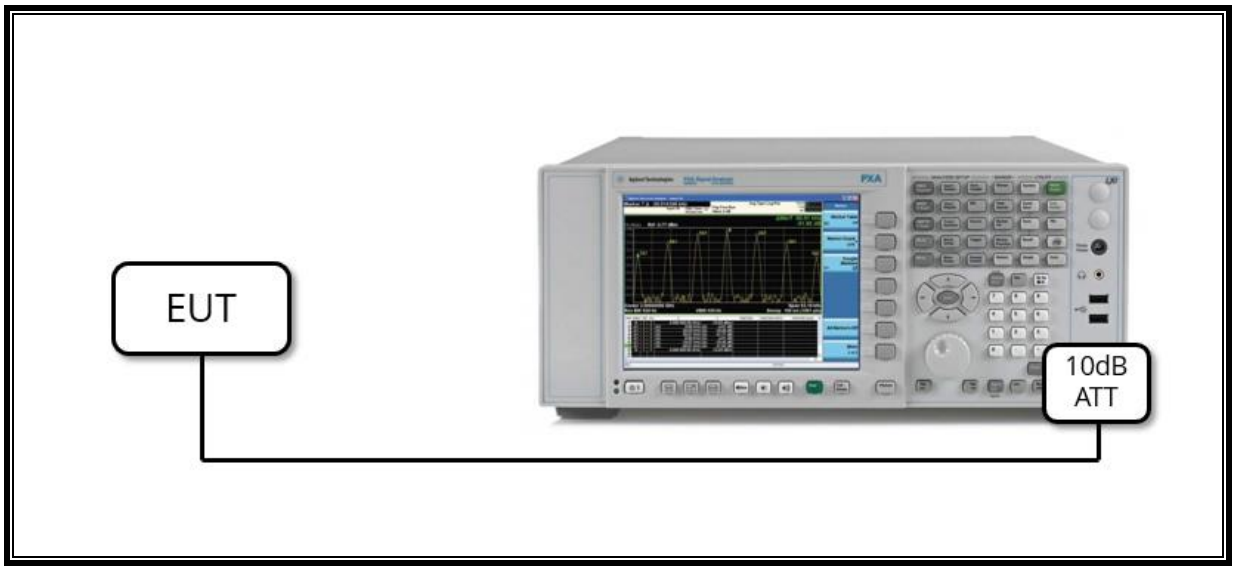
**I/O CABLE**

| I/O Cable List | | | | | | |
|---|---|---|---|---|---|---|
| **Cable No.** | **Port** | **# of identical ports** | **Connector Type** | **Cable Type** | **Cable Length (m)** | **Remarks** |
| 1 | DC Power | 1 | C Type | Shielded | 1.0 m | N/A |

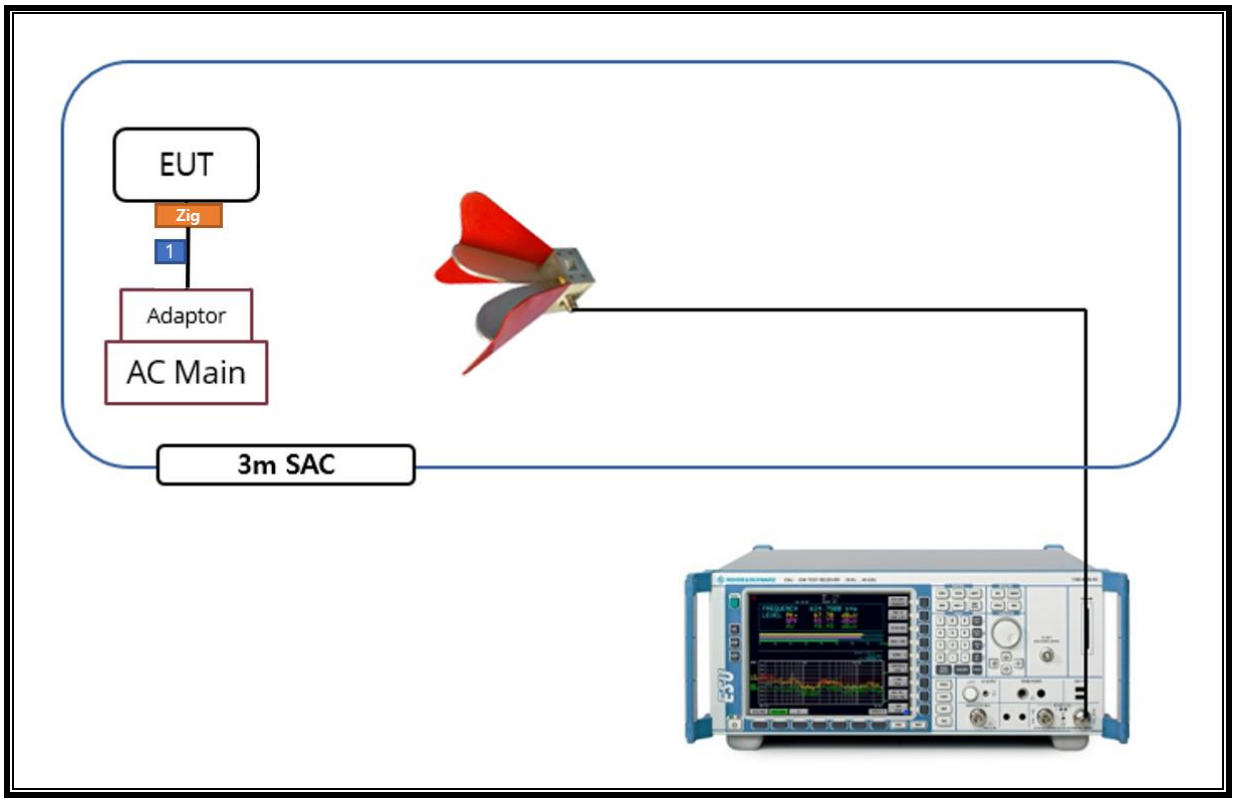
**TEST SETUP**

The EUT is a stand-alone unit during the tests.
Test software exercised the EUT to enable NII mode.

**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**




**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



# 6. 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** | **S/N** | **Cal Due** |
| Antenna, Bilog, 30MHz-1GHz | SCHWARZBECK | VULB9163 | 750 | 2024-08-15 |
| Antenna, Bilog, 30MHz-1GHz | SCHWARZBECK | VULB9163 | 749 | 2024-08-15 |
| Antenna, Bilog, 30MHz-1GHz | SCHWARZBECK | VULB9163 | 845 | 2024-08-15 |
| Antenna, Horn, 18 GHz | ETS | 3115 | 00167211 | 2024-08-04 |
| Antenna, Horn, 18 GHz | ETS | 3115 | 00161451 | 2024-08-21 |
| Antenna, Horn, 18 GHz | ETS | 3117 | 00168724 | 2024-08-04 |
| Antenna, Horn, 18 GHz | ETS | 3117 | 00168717 | 2024-08-21 |
| Antenna, Horn, 18 GHz | ETS | 3117 | 00218957 | 2023-01-15 |
| Antenna, Horn, 40 GHz | ETS | 3116C | 00166155 | 2024-08-02 |
| Antenna, Horn, 40 GHz | ETS | 3116C | 00168645 | 2023-10-13 |
| Preamplifier | ETS | 3116C-PA | 00168841 | 2023-08-04 |
| Preamplifier, 1000 MHz | Sonoma | 310N | 341282 | 2023-08-02 |
| Preamplifier, 1000 MHz | Sonoma | 310N | 351741 | 2023-08-02 |
| Preamplifier, 1000 MHz | Sonoma | 310N | 370599 | 2023-08-02 |
| Preamplifier, 18 GHz | Miteq | AFS42-00101800-25-S-42 | 1876511 | 2023-08-02 |
| Preamplifier, 18 GHz | Miteq | AFS42-00101800-25-S-42 | 1896138 | 2023-08-01 |
| Preamplifier, 18 GHz | Miteq | AFS42-00101800-25-S-42 | 2029169 | 2023-08-01 |
| Spectrum Analyzer, 44 GHz | Agilent / HP | N9030A | MY54170614 | 2023-08-03 |
| Spectrum Analyzer, 44 GHz | Agilent / HP | N9030A | MY54490312 | 2023-08-01 |
| Spectrum Analyzer, 44 GHz | KEYSIGHT | N9030B | MY60070693 | 2023-01-18 |
| Spectrum Analyzer, 44 GHz | KEYSIGHT | N9040B | MY60080268 | 2023-01-19 |
| Average Power Sensor | Agilent / HP | U2000 | MY54270007 | 2023-08-03 |
| Attenuator | PASTERNACK | PE7087-10 | A001 | 2023-08-03 |
| Attenuator | PASTERNACK | PE7087-10 | A008 | 2023-08-03 |
| Attenuator | PASTERNACK | PE7004-10 | 2 | 2023-08-01 |
| Attenuator | PASTERNACK | PE7087-10 | A009 | 2023-08-03 |
| EMI Test Receive, 40 GHz | R&S | ESU40 | 100439 | 2023-08-02 |
| EMI Test Receive, 40 GHz | R&S | ESU40 | 100457 | 2023-07-29 |
| EMI Test Receive, 3 GHz | R&S | ESR3 | 101832 | 2023-08-01 |
| Low Pass Filter 5GHz | Micro-Tronics | LPS17541 | 009 | 2023-08-02 |
| Low Pass Filter 5GHz | Micro-Tronics | LPS17541 | 015 | 2023-08-01 |
| Low Pass Filter 5GHz | Micro-Tronics | LPS17541 | 020 | 2023-08-01 |
| High Pass Filter 3GHz | Micro-Tronics | HPM17543 | 010 | 2023-08-02 |
| High Pass Filter 3GHz | Micro-Tronics | HPM17543 | 015 | 2022-08-02 |
| High Pass Filter 3GHz | Micro-Tronics | HPM17543 | 020 | 2023-08-01 |
| High Pass Filter 6GHz | Micro-Tronics | HPS17542 | 009 | 2023-08-02 |
| High Pass Filter 6GHz | Micro-Tronics | HPS17542 | 021 | 2023-08-01 |
| LISN | R&S | ENV-216 | 101837 | 2023-08-04 |
| Antenna, Loop, 9kHz-30MHz | R&S | HFH2-Z2 | 100418 | 2023-10-06 |
| Termination | WEINSCHEL | M1406A | T09 | 2023-08-03 |
| Attenuator | WEINSCHEL | WA76-30-21 | A015 | 2023-08-03 |
| **UL Software** | | | | |
| **Description** | **Manufacturer** | **Model** | **Version** | |
| Radiated software | UL | UL EMC | Ver 9.5 | |
| AC Line Conducted software | UL | UL EMC | Ver 9.5 | |

# 7. SUMMARY TABLE

| FCC Part Section | Test Description | Test Limit | Test Condition | Test Result |
|---|---|---|---|---|
| 15.407(e) | 6dB Band width (5.8GHz) | > 500kHz | Conducted | Complies |
| 15.407 (a)(1)(iv) | TX Cond. Power (5.150-5.250) | < 24dBm | | Complies |
| 15.407 (a)(2) | TX Cond. Power (5.250-5.350 & 5.470-5.725) | < 24dBm or 11+10Log(26dB BW) | | Complies |
| 15.407 (a)(3)(i) | TX Cond. Power (5.725-5.850) | < 30dBm | | Complies |
| 15.407 (a)(1)(iv) & (a)(2) | PSD (5.150-5.250 5.250-5.350 & 5.470-5.725) | < 11dBm/MHz | | Complies |
| 15.407 (a)(3) | PSD (5.725-5.850) | < 30dBm/500kHz | | Complies |
| 15.207 (a) | AC Power Line conducted emissions | Section 13 | Radiated | Complies |
| 15.407 (b) & 15.209 | Radiated Spurious Emission | < 74dBuV/m PK<br>< 54dBuV/m AV | | Complies |
| 15.407 (h)(2) | Dynamic Frequency Selection | N/A | Condcuted | Complies[Note] |

# 8. MEASUREMENT METHODS

On-Time and Duty Cycle : KDB 789033 D02 v02r01, Section II.B.

6dB Emission BW : KDB 789033 D02 v02r01, Section II.C.2.

26dB Emission BW : KDB 789033 D02 v02r01, Section II.C.1.

99% Occupied BW : KDB 789033 D02 v02r01, Section II.D.

Conducted Output Power : KDB 789033 D02 v02r01, Section II.E.3.b(Method PM-G)

Conducted Output Power for Straddle Channel (ch144/142/138 for 20/40/80MHz BW):

KDB 789033 D02 v02r01, Section II.E.2.b(Method SA-1)

Power Spectral Density : KDB 789033 D02 v02r01, Section II.F.

Unwanted emissions in restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

Unwanted emissions in non-restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

# 9. REFERENCE MEASUREMENTS RESULTS

## 9.1. ON TIME AND DUTY CYCLE RESULTS

| Mode | On Time [ms] | Period [ms] | Duty Cycle X [Linear] | Duty Cycle X [%] | Duty Cycle Correction Factor[dB] |
|---|---|---|---|---|---|
| 802.11a | 1.428 | 1.530 | 0.933 | 93.333 | 0.30 |
| 802.11n(HT20) | 1.336 | 1.438 | 0.929 | 92.907 | 0.32 |
| 802.11n(HT40) | 0.664 | 0.766 | 0.868 | 86.754 | 0.62 |
| 802.11ac(VHT80) | 0.332 | 0.433 | 0.767 | 76.674 | 1.15 |

Note. If the duty cycle is over 98%, compensation is not included in average measurement.

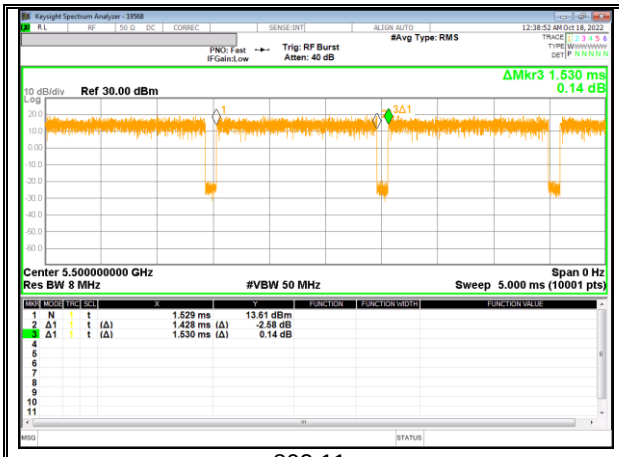
**LIMITS**

None; for reporting purposes only.

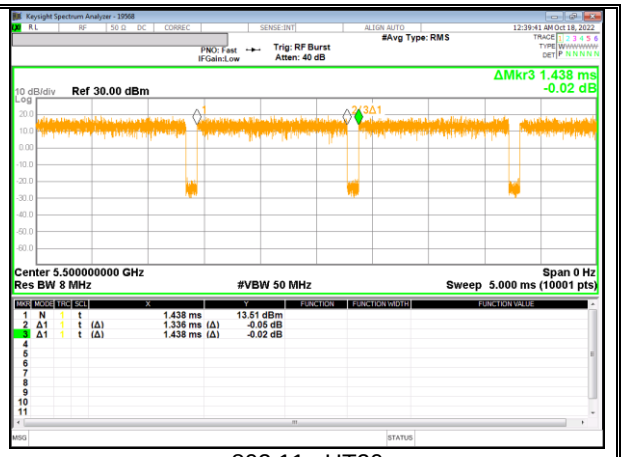
**PROCEDURE**

KDB 789033 D02 v02r01 Zero-Span Spectrum Analyzer Method.

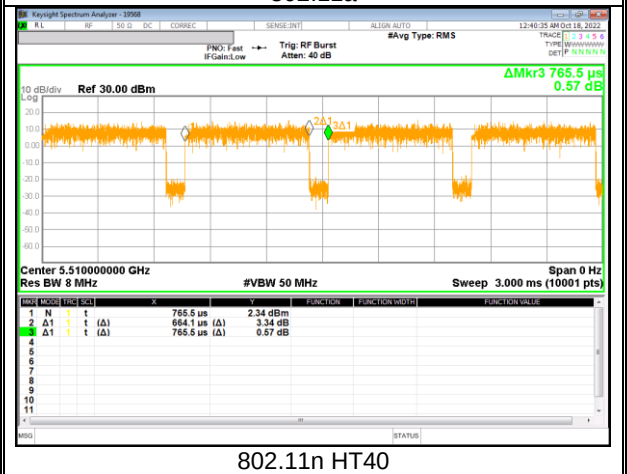
## 9.2. DUTY CYCLE PLOTS



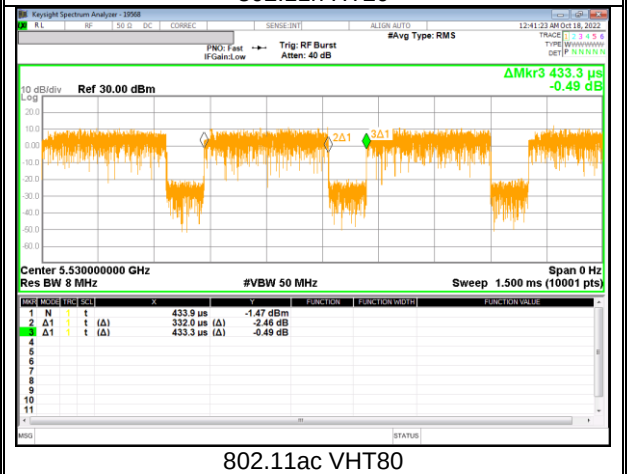

802.11a




802.11n HT20




802.11n HT40




802.11ac VHT80

## 9.3. 26 dB BANDWIDTH

**LIMITS**

None; for reporting purposes only.

**TEST PROCEDURE**

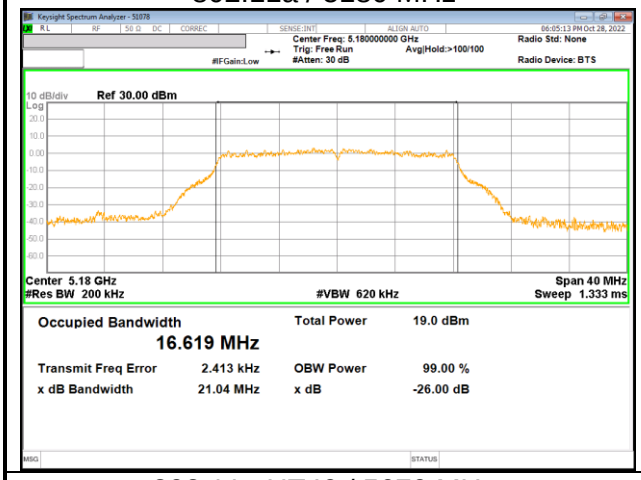
Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to approximately 1% of EBW, the VBW > RBW, peak detector and max hold.

**RESULTS**

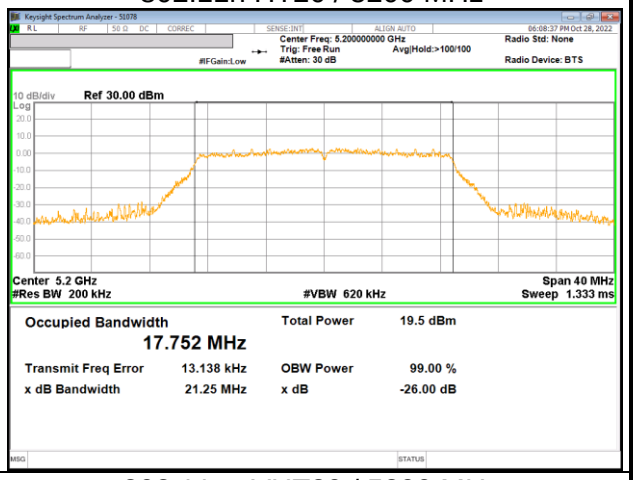
- Please refer to the next page

**WORST CASE TEST PLOTS**

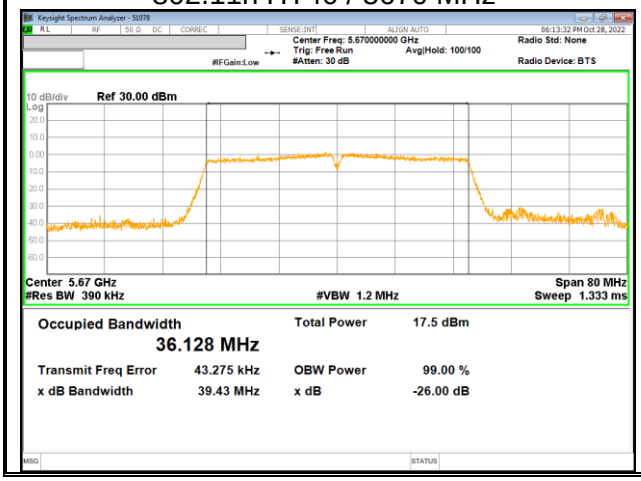
802.11a / 5180 MHz



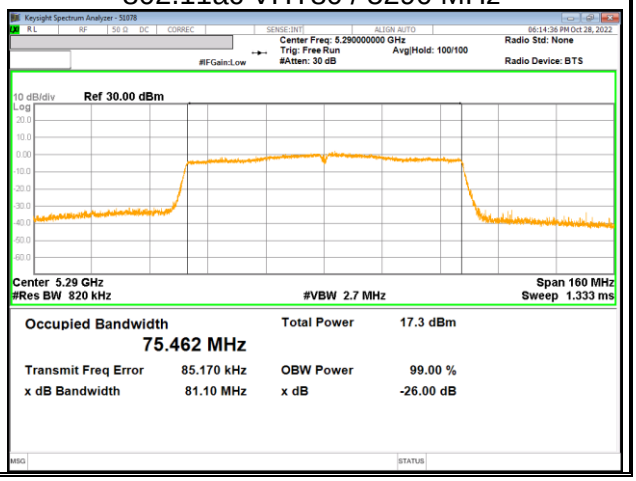

802.11n HT20 / 5200 MHz




802.11n HT40 / 5670 MHz




802.11ac VHT80 / 5290 MHz



### 9.3.1. 802.11a

| Band | Channel | Center Freq. [MHz] | 26 dB BW [MHz] | Worst | 99% BW [MHz] |
|---|---|---|---|---|---|
| UNII-1 Note | 36 | 5180 | 21.04 | 21.04 | 16.62 |
| | 40 | 5200 | 21.05 | | 16.63 |
| | 48 | 5240 | 21.14 | | 16.63 |
| UNII-2A Note | 52 | 5260 | 21.07 | 21.07 | 16.65 |
| | 60 | 5300 | 21.21 | | 16.65 |
| | 64 | 5320 | 21.15 | | 16.64 |
| UNII-2C | 100 | 5500 | 21.04 | 21.04 | |
| | 116 | 5580 | 21.39 | | |
| | 140 | 5700 | 21.09 | | |

Note. As a result of 99% bandwidth test, the bandwidth of UNII-1 does not interfere with UNII-2A.

### 9.3.2. 802.11n HT20

| Band | Channel | Center Freq. [MHz] | 26 dB BW [MHz] | Worst | 99% BW [MHz] |
|---|---|---|---|---|---|
| UNII-1 Note | 36 | 5180 | 21.31 | 21.25 | 17.75 |
| | 40 | 5200 | 21.25 | | 17.75 |
| | 48 | 5240 | 21.26 | | 17.75 |
| UNII-2A Note | 52 | 5260 | 21.41 | 21.38 | 17.78 |
| | 60 | 5300 | 21.38 | | 17.76 |
| | 64 | 5320 | 21.45 | | 17.76 |
| UNII-2C | 100 | 5500 | 21.49 | 21.36 | |
| | 116 | 5580 | 21.61 | | |
| | 140 | 5700 | 21.36 | | |

Note. As a result of 99% bandwidth test, the bandwidth of UNII-1 does not interfere with UNII-2A.

### 9.3.3. 802.11n HT40

| Band | Channel | Center Freq. [MHz] | 26 dB BW [MHz] | Worst | 99% BW [MHz] |
|---|---|---|---|---|---|
| UNII-1 Note | 38 | 5190 | 39.70 | 39.60 | 36.16 |
| | 46 | 5230 | 39.60 | | 36.15 |
| UNII-2A Note | 54 | 5270 | 39.61 | 39.61 | 36.18 |
| | 62 | 5310 | 39.90 | | 36.15 |
| UNII-2C | 102 | 5510 | 39.61 | 39.43 | |
| | 118 | 5590 | 56.18 | | |
| | 134 | 5670 | 39.43 | | |

Note. As a result of 99% bandwidth test, the bandwidth of UNII-1 does not interfere with UNII-2A.

### 9.3.4. 802.11ac VHT80

| Band | Channel | Center Freq. [MHz] | 26 dB BW [MHz] | Worst | 99% BW [MHz] |
|---|---|---|---|---|---|
| **UNII-1 Note** | 42 | 5210 | 81.72 | 81.72 | 75.47 |
| **UNII-2A Note** | 58 | 5290 | 81.10 | 81.10 | 75.46 |
| **UNII-2C** | 106 | 5530 | 81.15 | 81.15 | |
| | 122 | 5610 | 81.16 | | |

Note. As a result of 99% bandwidth test, the bandwidth of UNII-1 does not interfere with UNII-2A.

### 9.3.5. STRADDLE CHANNEL

| Mode | Channel | Center Freq. [MHz] | 26 dB BW [MHz] | |
|---|---|---|---|---|
| | | | UNII-2C | UNII-3 |
| **802.11a** | Straddle | 5720 | 15.66 | 5.61 |
| **802.11n HT20** | Straddle | 5720 | 15.80 | 5.87 |
| **802.11n HT40** | Straddle | 5710 | 34.91 | 5.16 |
| **802.11ac VHT80** | Straddle | 5690 | 75.10 | 5.61 |

# 10. ANTENNA PORT TEST RESULTS

## 10.1. 6 dB BANDWIDTH

**LIMITS**

FCC §15.407
The minimum 6 dB bandwidth shall be at least 500 kHz.

**TEST PROCEDURE**

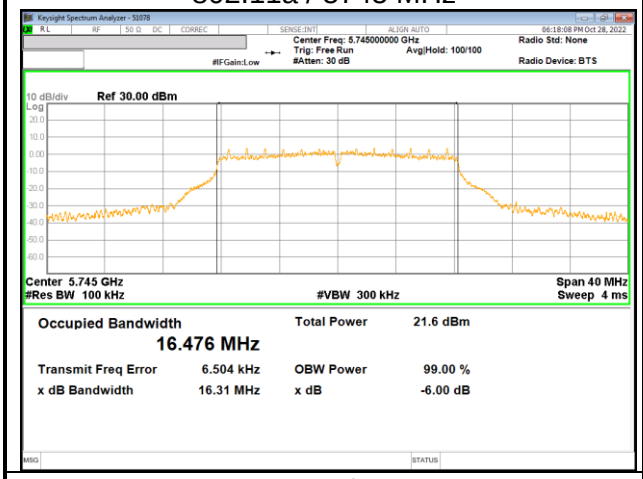
Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

**RESULTS**

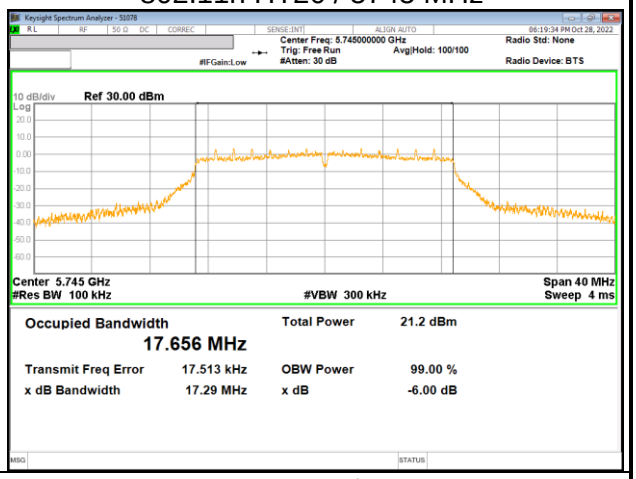
- Please refer to the next page

**WORST CASE TEST PLOTS**

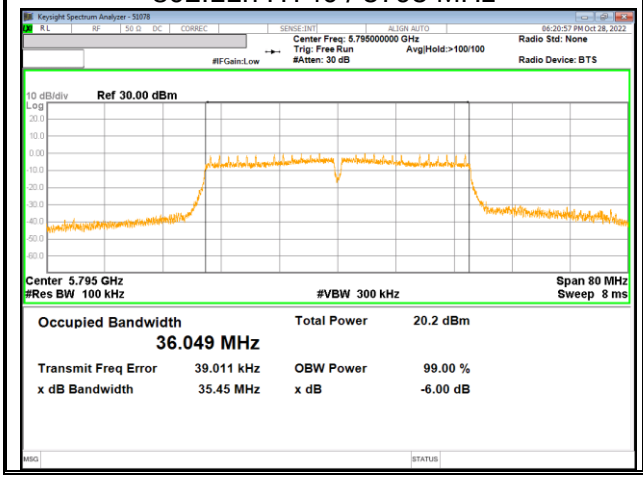
802.11a / 5745 MHz



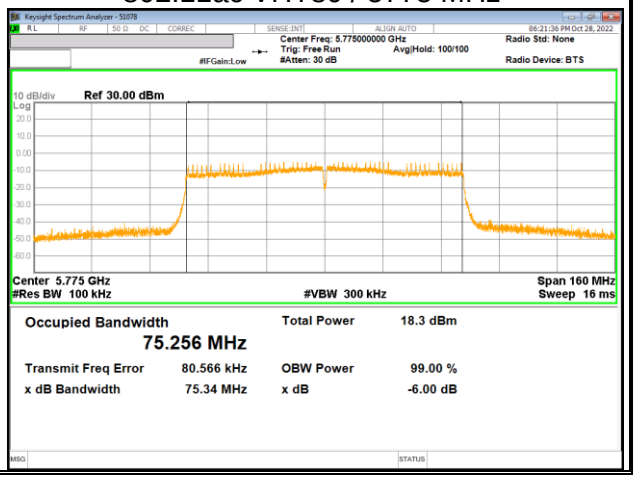

802.11n HT20 / 5745 MHz




802.11n HT40 / 5795 MHz




802.11ac VHT80 / 5775 MHz



### 10.1.1. UNII-3 BAND

| Mode | Channel | Center Freq. [MHz] | 6 dB BW [MHz] | Worst | Minimum Limit [MHz] |
|---|---|---|---|---|---|
| 802.11a | 149 | 5745 | 16.31 | 16.31 | 0.5 |
| | 157 | 5785 | 16.31 | | |
| | 165 | 5825 | 16.31 | | |
| 802.11n HT20 | 149 | 5745 | 17.29 | 17.29 | |
| | 157 | 5785 | 17.52 | | |
| | 165 | 5825 | 17.30 | | |
| 802.11n HT40 | 151 | 5755 | 35.71 | 35.45 | |
| | 159 | 5795 | 35.45 | | |
| 802.11ac VHT80 | 155 | 5775 | 75.34 | 75.34 | |

### 10.1.2. Straddle Channel

| Mode | Channel | Center Freq. [MHz] | 26 dB BW [MHz] |
|---|---|---|---|
| | | | UNII-3 |
| 802.11a | Straddle | 5720 | 3.17 |
| 802.11n HT20 | Straddle | 5720 | 3.78 |
| 802.11n HT40 | Straddle | 5710 | 3.15 |
| 802.11ac VHT80 | Straddle | 5690 | 2.89 |

## 10.2. OUTPUT POWER AND PPSD

**LIMITS**

FCC §15.407 (a)(1)(iv), (a)(2), (a)(3)(i), (a)(3)(iii)

**FCC**

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

**TEST PROCEDURE**

KDB 789033 Method PM is used for output power.

KDB 789033 Method SA-2 is used for only power of straddle Ch. and PPSD. RBW set to 1MHz(500kHz for the band 5.725-5.85 GHz, the VBW >= 3 x RBW, RMS detector and trace averaging). Band power function used for power and peak marker value of the spectrum is used for PSD.

**ANTENNA GAIN**

The antenna gain is:

| Frequency Band [MHz] | ANT Gain [dBi] |
|---|---|
| UNII 1<br>5150 - 5250 | 2.0 |
| UNII 2A<br>5250 - 5350 | 2.1 |
| UNII 2C<br>5470 - 5725 | 1.4 |
| UNII 3<br>5725 - 5850 | 2.2 |

### 10.2.1. 802.11a MODE

**Output Power Results**

| Band | Channel | Center Freq. [MHz] | Burst Power [dBm] | Limit [dBm] |
|---|---|---|---|---|
| UNII-1 | 36 | 5180 | 14.53 | 23.98 |
| | 40 | 5200 | 14.86 | |
| | 48 | 5240 | 14.67 | |
| UNII-2A | 52 | 5260 | 15.09 | 23.98 |
| | 60 | 5300 | 14.97 | |
| | 64 | 5320 | 14.36 | |
| UNII-2C | 100 | 5500 | 13.90 | 23.98 |
| | 116 | 5580 | 14.43 | |
| | 140 | 5700 | 10.64 | |
| UNII-3 | 149 | 5745 | 15.84 | 30.00 |
| | 157 | 5785 | 15.75 | |
| | 165 | 5825 | 15.82 | |

* Calculation of Output Power : Burst Power = Meas Power + Duty CF[dB]

**PSD Results**

| Band | Channel | Center Freq. [MHz] | Meas PSD [dBm/MHz] | DCCF. | Corr'd PSD [dBm] | Limit [dBm/ MHz] |
|---|---|---|---|---|---|---|
| UNII-1 | 36 | 5180 | 3.18 | 0.30 | 3.48 | 11.00 |
| | 40 | 5200 | 3.33 | 0.30 | 3.63 | |
| | 48 | 5240 | 3.20 | 0.30 | 3.50 | |
| UNII-2A | 52 | 5260 | 3.61 | 0.30 | 3.91 | 11.00 |
| | 60 | 5300 | 3.65 | 0.30 | 3.95 | |
| | 64 | 5320 | 3.41 | 0.30 | 3.71 | |
| UNII-2C | 100 | 5500 | 2.79 | 0.30 | 3.09 | 11.00 |
| | 116 | 5580 | 3.39 | 0.30 | 3.69 | |
| | 140 | 5700 | -0.15 | 0.30 | 0.15 | |
| UNII-3 | 149 | 5745 | 2.08 | 0.30 | 2.38 | 30.00/500kHz |
| | 157 | 5785 | 2.82 | 0.30 | 3.12 | |
| | 165 | 5825 | 2.87 | 0.30 | 3.17 | |

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

### 10.2.2. 802.11n HT20 MODE

**Output Power Results**

| Band | Channel | Center Freq. [MHz] | Burst Power [dBm] | Limit [dBm] |
|---|---|---|---|---|
| UNII-1 | 36 | 5180 | 14.09 | 23.98 |
| | 40 | 5200 | 14.44 | |
| | 48 | 5240 | 14.42 | |
| UNII-2A | 52 | 5260 | 14.80 | 23.98 |
| | 60 | 5300 | 14.60 | |
| | 64 | 5320 | 14.08 | |
| UNII-2C | 100 | 5500 | 13.48 | 23.98 |
| | 116 | 5580 | 14.01 | |
| | 140 | 5700 | 9.32 | |
| UNII-3 | 149 | 5745 | 15.40 | 30.00 |
| | 157 | 5785 | 15.38 | |
| | 165 | 5825 | 15.40 | |

* Calculation of Output Power : Burst Power = Meas Power + Duty CF[dB]

**PSD Results**

| Band | Channel | Center Freq. [MHz] | Meas PSD [dBm/MHz] | DCCF. | Corr'd PSD [dBm] | Limit [dBm/ MHz] |
|---|---|---|---|---|---|---|
| UNII-1 | 36 | 5180 | 2.28 | 0.32 | 2.60 | 11.00 |
| | 40 | 5200 | 2.40 | 0.32 | 2.72 | |
| | 48 | 5240 | 2.79 | 0.32 | 3.11 | |
| UNII-2A | 52 | 5260 | 3.48 | 0.32 | 3.80 | 11.00 |
| | 60 | 5300 | 3.31 | 0.32 | 3.63 | |
| | 64 | 5320 | 2.54 | 0.32 | 2.86 | |
| UNII-2C | 100 | 5500 | 1.93 | 0.32 | 2.25 | 11.00 |
| | 116 | 5580 | 2.65 | 0.32 | 2.97 | |
| | 140 | 5700 | -1.61 | 0.32 | -1.29 | |
| UNII-3 | 149 | 5745 | 1.55 | 0.32 | 1.87 | 30.00/500kHz |
| | 157 | 5785 | 1.72 | 0.32 | 2.04 | |
| | 165 | 5825 | 2.63 | 0.32 | 2.95 | |

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

### 10.2.3. 802.11n HT40 MODE

**Output Power Results**

| Band | Channel | Center Freq. [MHz] | Burst Power [dBm] | Limit [dBm] |
|---|---|---|---|---|
| UNII-1 | 38 | 5190 | 12.66 | 23.98 |
| | 46 | 5230 | 13.86 | |
| UNII-2A | 54 | 5270 | 13.50 | 23.98 |
| | 62 | 5310 | 11.95 | |
| UNII-2C | 102 | 5510 | 12.04 | 23.98 |
| | 118 | 5590 | 13.54 | |
| | 134 | 5670 | 11.80 | |
| UNII-3 | 151 | 5755 | 14.20 | 30.00 |
| | 159 | 5795 | 14.24 | |

* Calculation of Output Power : Burst Power = Meas Power + Duty CF[dB]

**PSD Results**

| Band | Channel | Center Freq. [MHz] | Meas PSD [dBm/MHz] | DCCF. | Corr'd PSD [dBm] | Limit [dBm/ MHz] |
|---|---|---|---|---|---|---|
| UNII-1 | 38 | 5190 | -2.41 | 0.62 | -1.79 | 11.00 |
| | 46 | 5230 | -0.87 | 0.62 | -0.25 | |
| UNII-2A | 54 | 5270 | -0.95 | 0.62 | -0.33 | 11.00 |
| | 62 | 5310 | -2.42 | 0.62 | -1.80 | |
| UNII-2C | 102 | 5510 | -2.70 | 0.62 | -2.08 | 11.00 |
| | 118 | 5590 | -1.32 | 0.62 | -0.70 | |
| | 134 | 5670 | -2.33 | 0.62 | -1.71 | |
| UNII-3 | 151 | 5755 | -2.69 | 0.62 | -2.07 | 30.00/500kHz |
| | 159 | 5795 | -2.28 | 0.62 | -1.66 | |

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

### 10.2.4. 802.11ac VHT80 MODE

**Output Power Results**

| Band | Channel | Center Freq. [MHz] | Burst Power [dBm] | Limit [dBm] |
|---|---|---|---|---|
| UNII-1 | 38 | 5190 | 11.07 | 23.98 |
| UNII-2A | 54 | 5270 | 11.50 | 23.98 |
| UNII-2C | 102 | 5510 | 11.65 | 23.98 |
| | 134 | 5670 | 11.80 | |
| UNII-3 | 151 | 5755 | 12.57 | 30.00 |

* Calculation of Output Power : Burst Power = Meas Power + Duty CF[dB]

**PSD Results**

| Band | Channel | Center Freq. [MHz] | Meas PSD [dBm/MHz] | DCCF. | Corr'd PSD [dBm] | Limit [dBm/ MHz] |
|---|---|---|---|---|---|---|
| UNII-1 | 42 | 5210 | -6.92 | 1.15 | -5.77 | 11.00 |
| UNII-2A | 58 | 5290 | -6.35 | 1.15 | -5.20 | 11.00 |
| UNII-2C | 106 | 5530 | -6.57 | 1.15 | -5.42 | 11.00 |
| | 122 | 5610 | -5.98 | 1.15 | -4.83 | |
| UNII-3 | 155 | 5775 | -7.69 | 1.15 | -6.54 | 30.00/500kHz |

* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

### 10.2.5. STRADDLE CHANNEL

**Output Power Results**

| Mode | Band | Center Freq. [MHz] | Meas Power [dBm] | DCCF. | Corr'd Power [dBm] | Limit [dBm] |
|---|---|---|---|---|---|---|
| 802.11a | UNII-2C | 5720 | 13.31 | 0.30 | 13.61 | 22.95 |
| | UNII-3 | | 5.92 | 0.30 | 6.22 | 30.00 |
| 802.11n HT20 | UNII-2C | 5720 | 12.97 | 0.32 | 13.29 | 22.99 |
| | UNII-3 | | 6.28 | 0.32 | 6.60 | 30.00 |
| 802.11n HT40 | UNII-2C | 5710 | 12.69 | 0.62 | 13.31 | 23.98 |
| | UNII-3 | | 1.80 | 0.62 | 2.42 | 30.00 |
| 802.11ac VHT80 | UNII-2C | 5690 | 10.29 | 1.15 | 11.44 | 23.98 |
| | UNII-3 | | -4.07 | 1.15 | -2.92 | 30.00 |

* Calculation of Output Power : Corr'd Power = Meas. Power + Duty CF [dB]

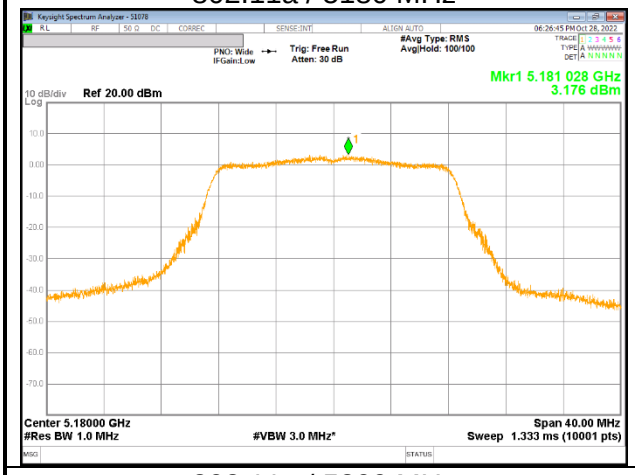
**PSD Results**

| Mode | Band | Center Freq. [MHz] | Meas PSD [dBm/MHz] | DCCF. | Corr'd PSD [dBm] | Limit [dBm/ MHz] |
|---|---|---|---|---|---|---|
| 802.11a | UNII-2C | 5720 | 4.18 | 0.30 | 4.48 | 11.00 |
| | UNII-3 | | -0.84 | 0.30 | -0.54 | 30.00/500kHz |
| 802.11n HT20 | UNII-2C | 5720 | 3.75 | 0.32 | 4.07 | 11.00 |
| | UNII-3 | | -1.69 | 0.32 | -1.37 | 30.00/500kHz |
| 802.11n HT40 | UNII-2C | 5710 | -0.51 | 0.62 | 0.11 | 11.00 |
| | UNII-3 | | -5.47 | 0.62 | -4.85 | 30.00/500kHz |
| 802.11ac VHT80 | UNII-2C | 5690 | -5.21 | 1.15 | -4.06 | 11.00 |
| | UNII-3 | | -11.03 | 1.15 | -9.88 | 30.00/500kHz |

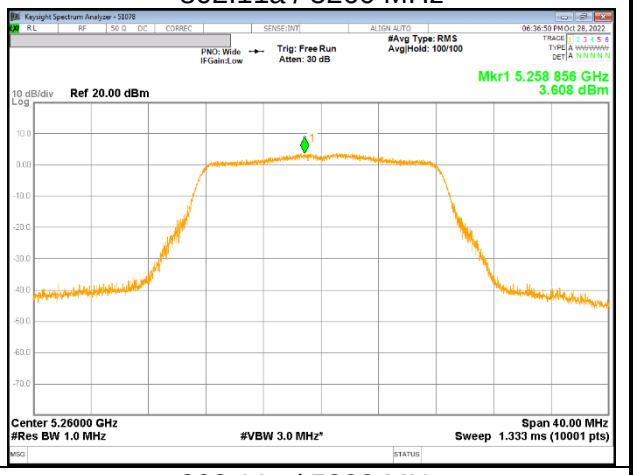
* Calculation of PSD: Corr'd PSD = Meas PSD + Duty CF [dB]

## 10.2.6. OUTPUT POWER AND PPSD PLOTS (WORST CASE)

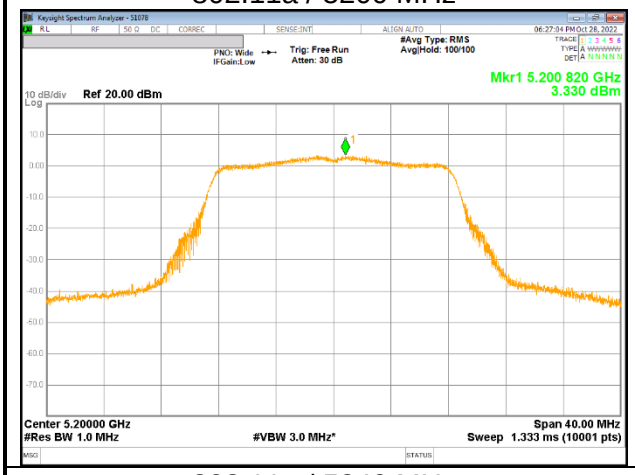
802.11a / 5180 MHz



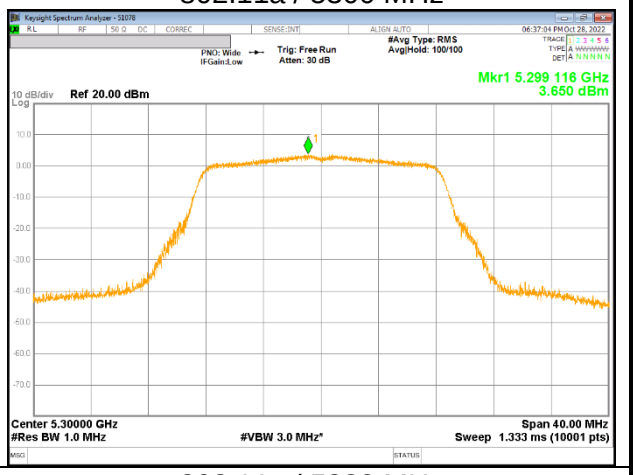

802.11a / 5260 MHz



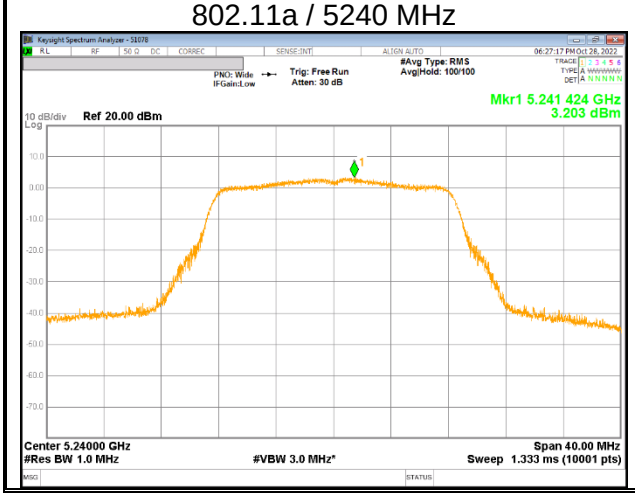

802.11a / 5200 MHz



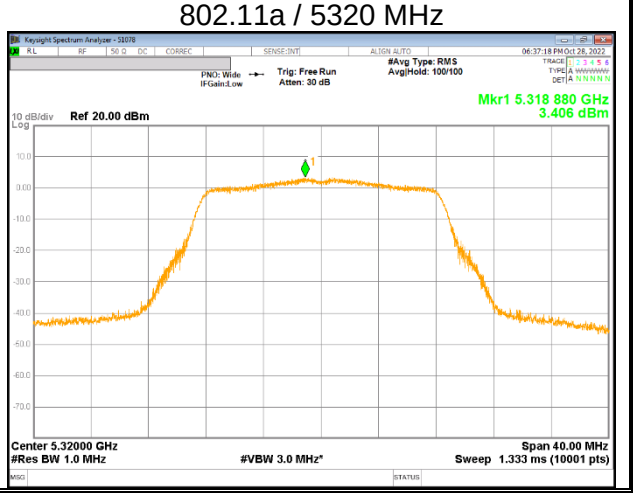

802.11a / 5300 MHz



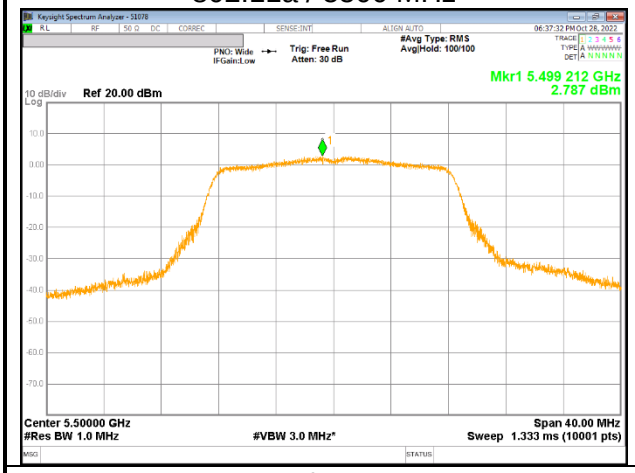

802.11a / 5240 MHz



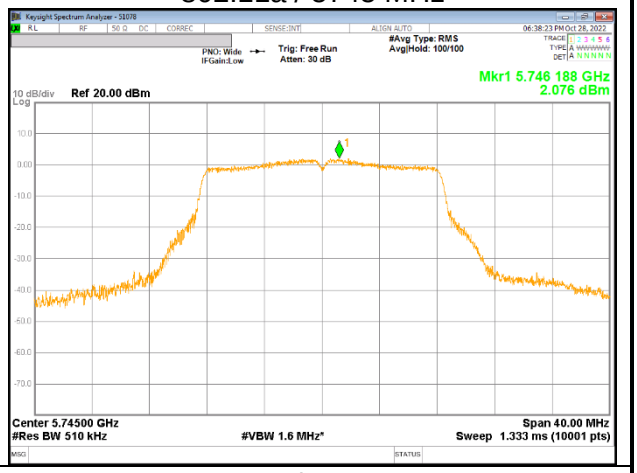

802.11a / 5320 MHz



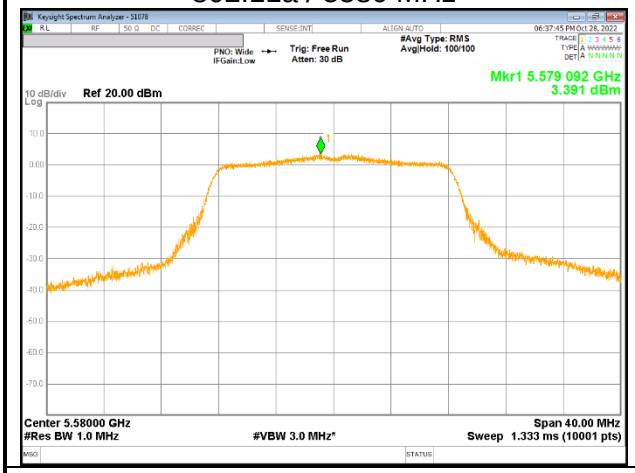
802.11a / 5500 MHz



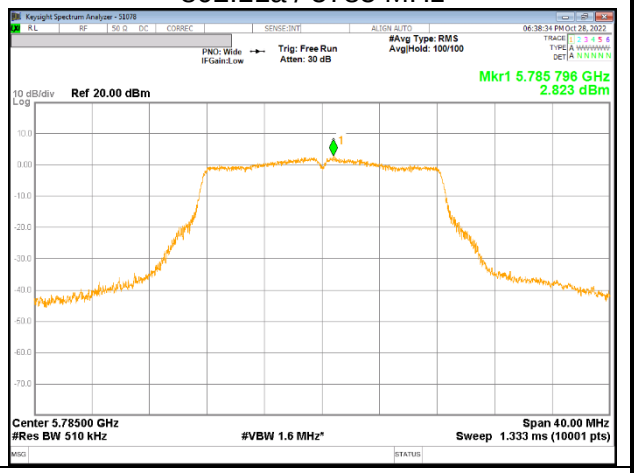

802.11a / 5745 MHz



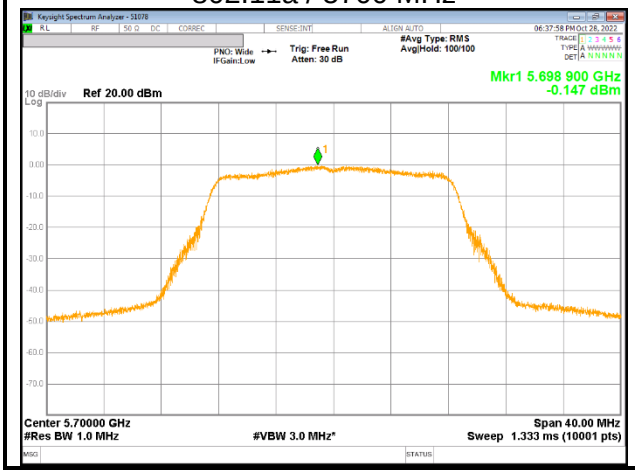

802.11a / 5580 MHz



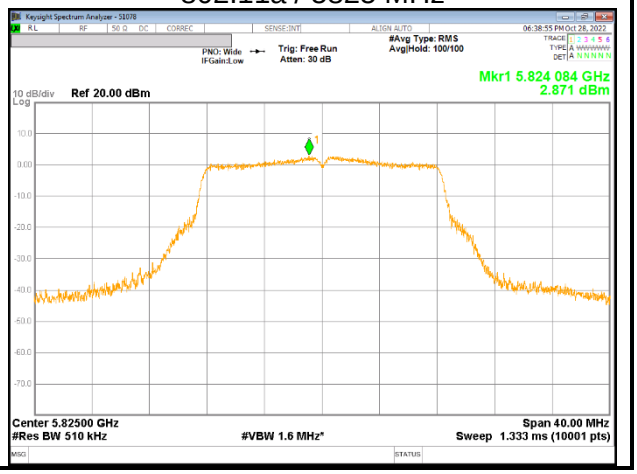

802.11a / 5785 MHz



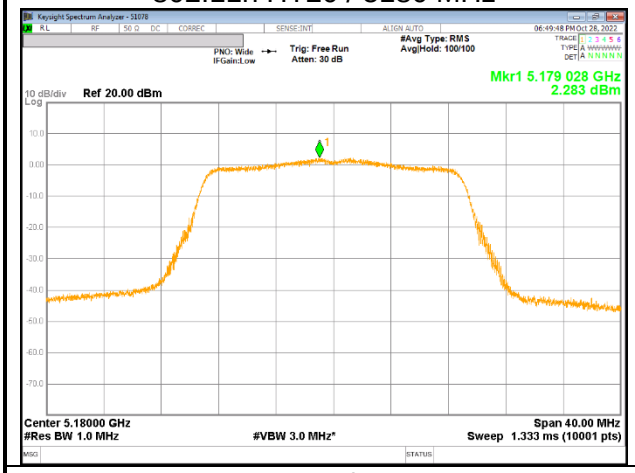

802.11a / 5700 MHz



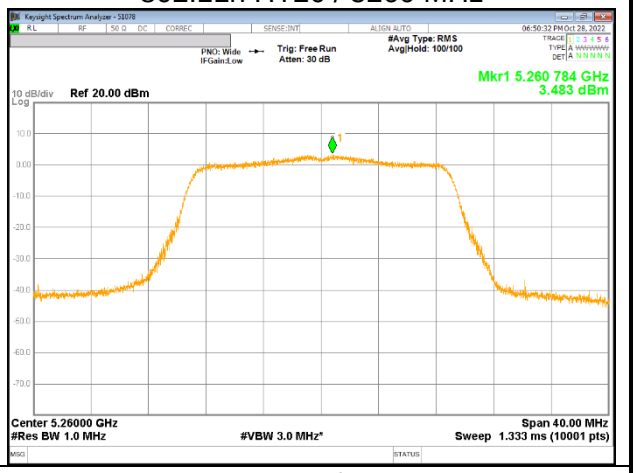

802.11a / 5825 MHz



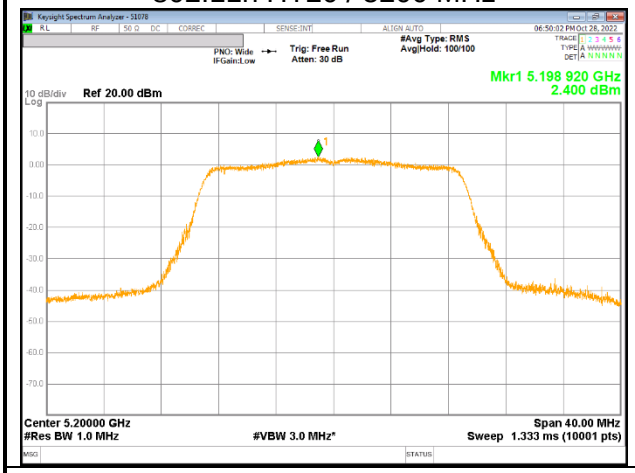
802.11n HT20 / 5180 MHz



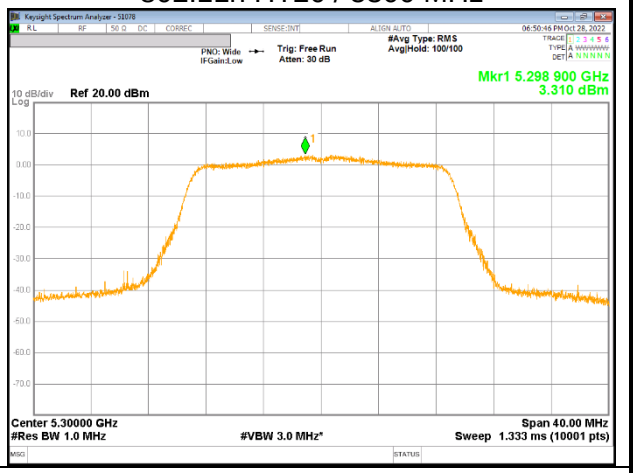

802.11n HT20 / 5260 MHz



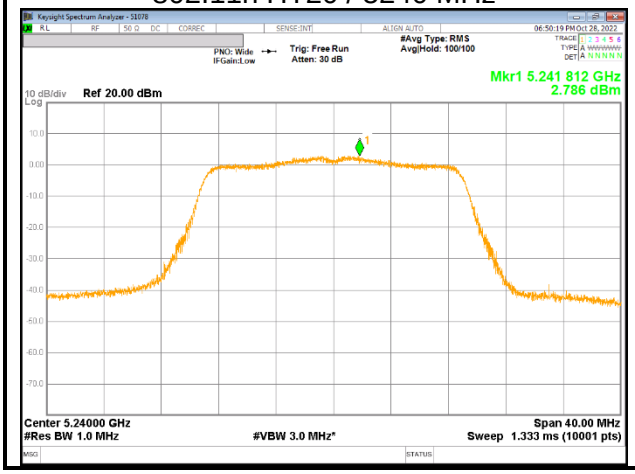

802.11n HT20 / 5200 MHz



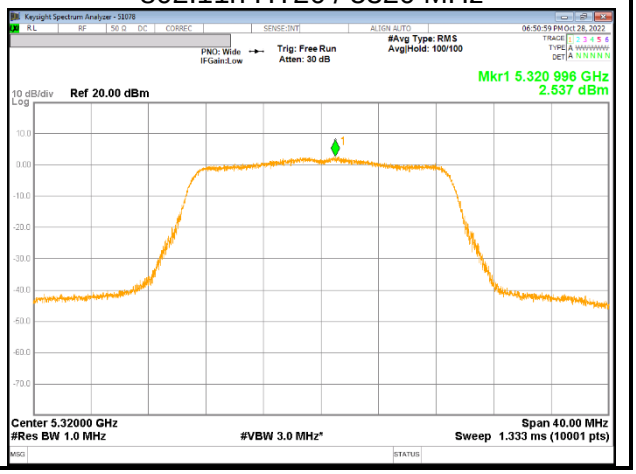

802.11n HT20 / 5300 MHz



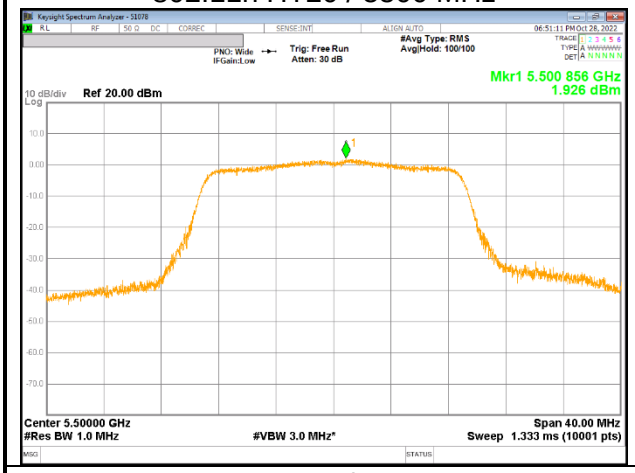

802.11n HT20 / 5240 MHz



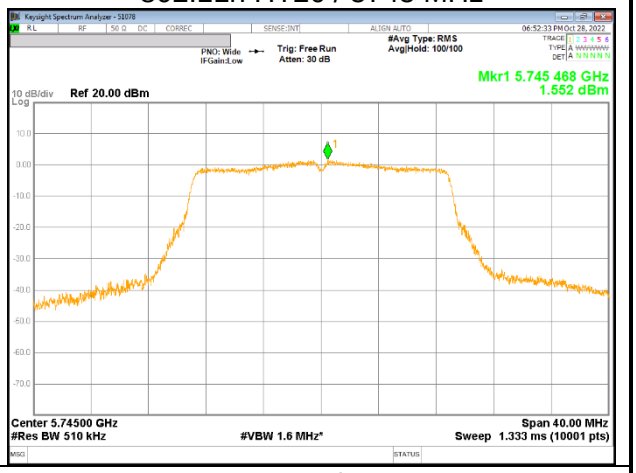

802.11n HT20 / 5320 MHz



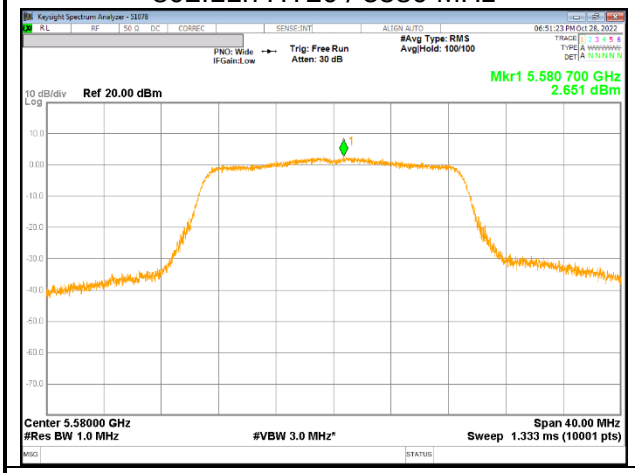
802.11n HT20 / 5500 MHz



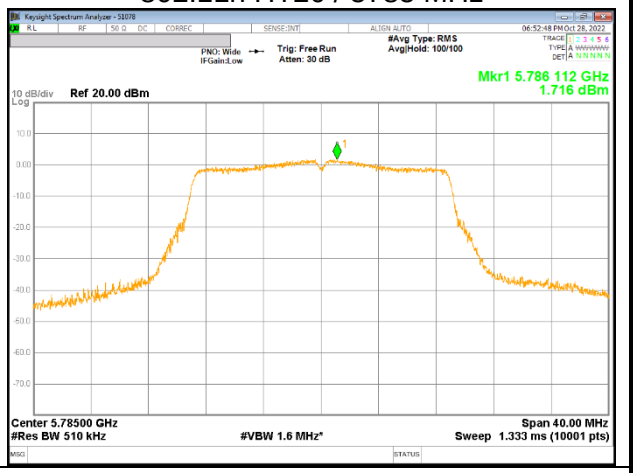

802.11n HT20 / 5745 MHz



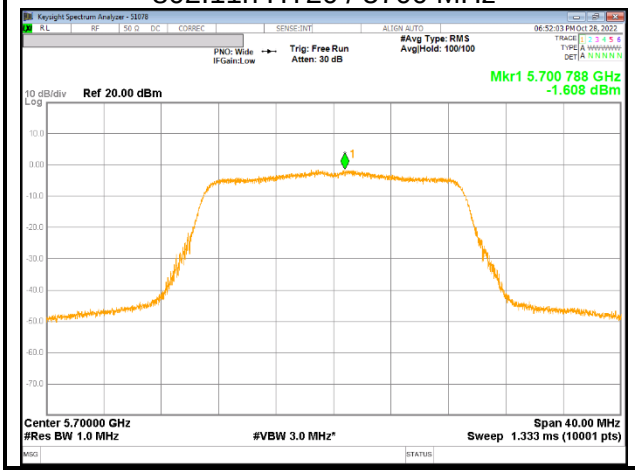

802.11n HT20 / 5580 MHz



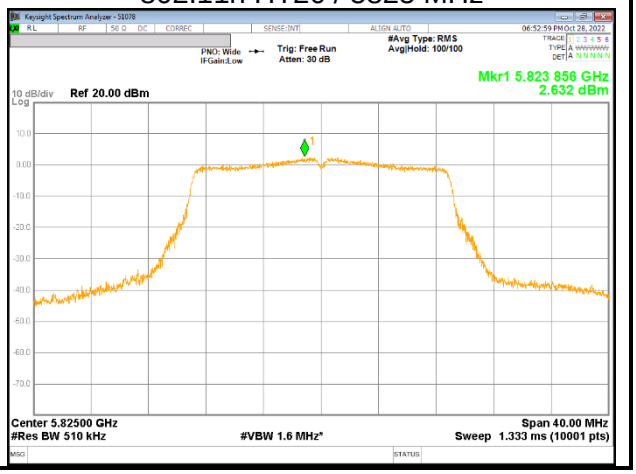

802.11n HT20 / 5785 MHz



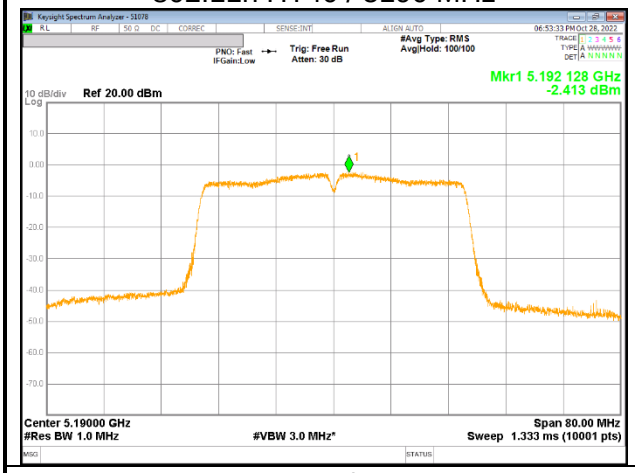

802.11n HT20 / 5700 MHz



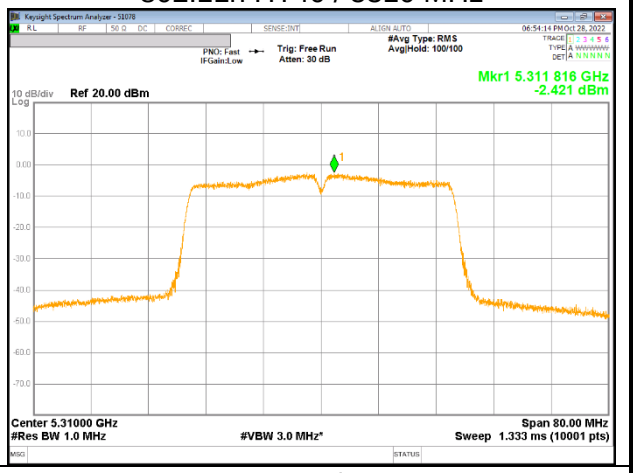

802.11n HT20 / 5825 MHz



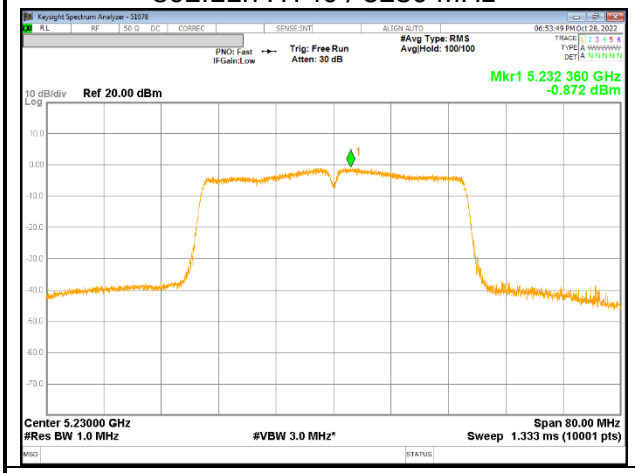
802.11n HT40 / 5190 MHz



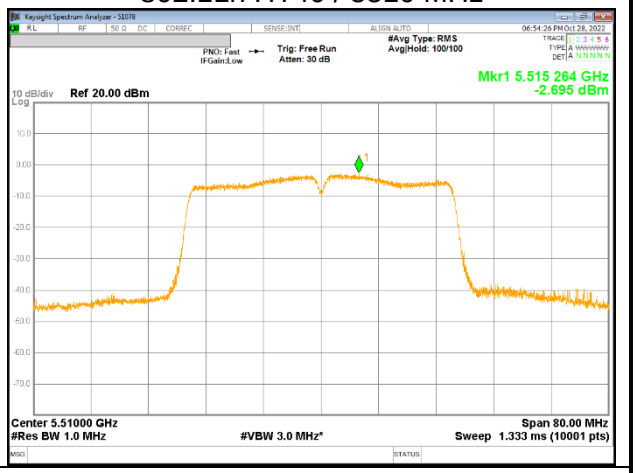

802.11n HT40 / 5310 MHz



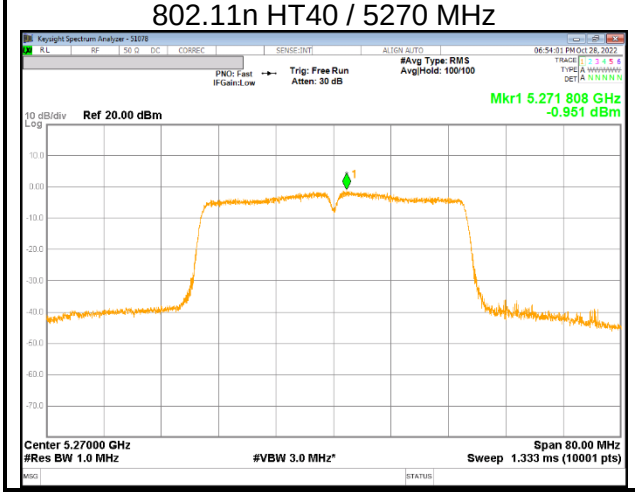

802.11n HT40 / 5230 MHz



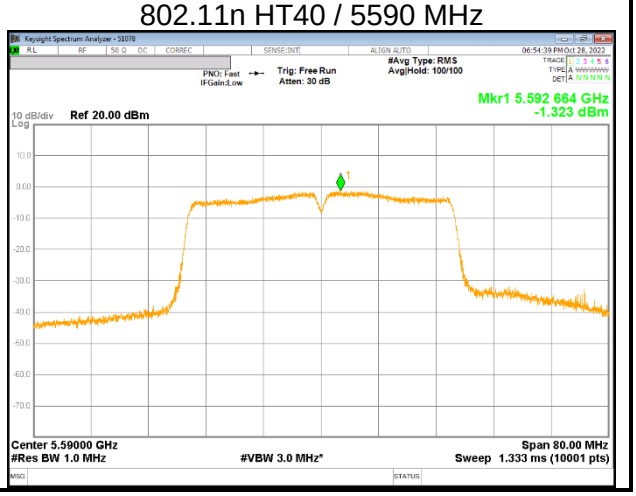

802.11n HT40 / 5510 MHz



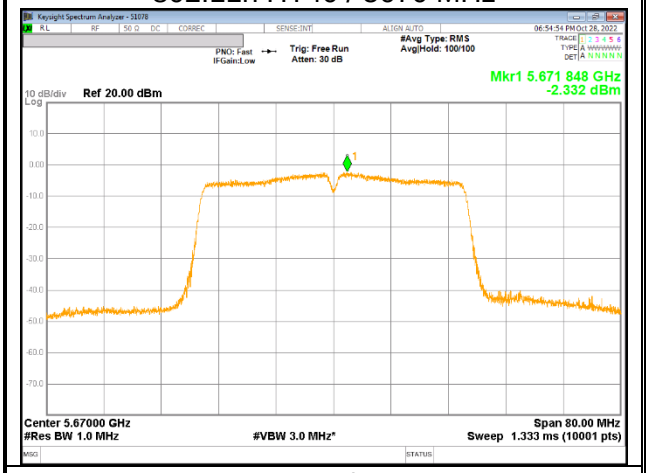

802.11n HT40 / 5270 MHz



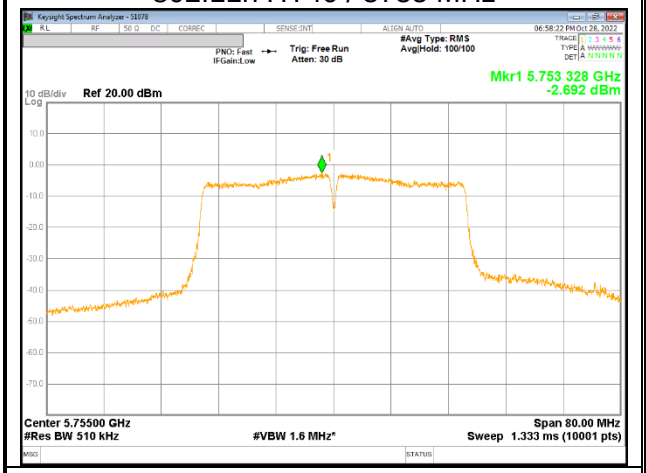

802.11n HT40 / 5590 MHz



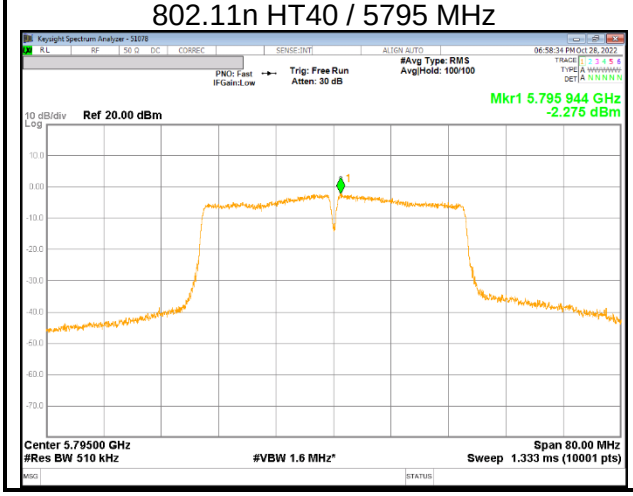
802.11n HT40 / 5670 MHz



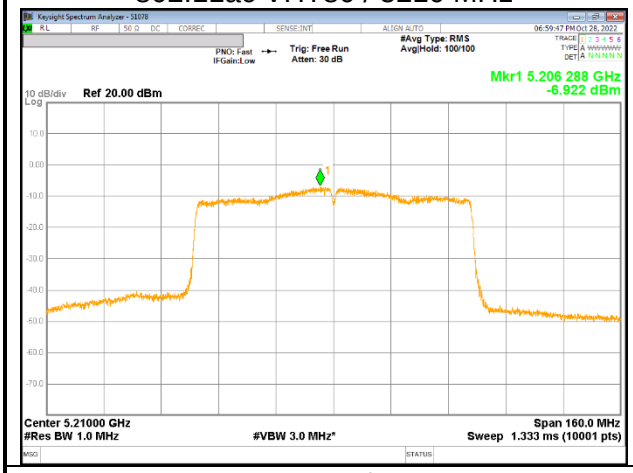

802.11n HT40 / 5755 MHz



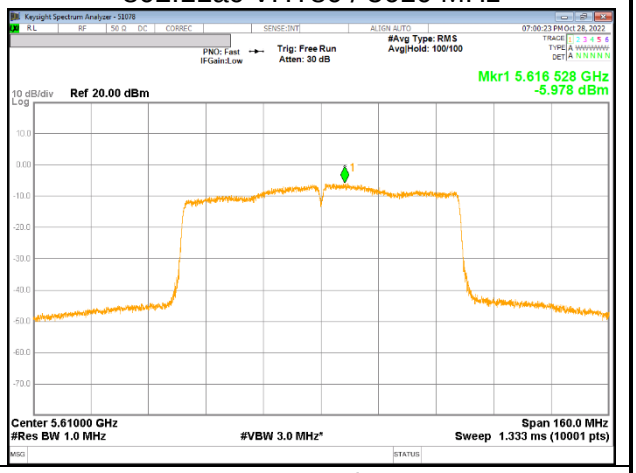

802.11n HT40 / 5795 MHz



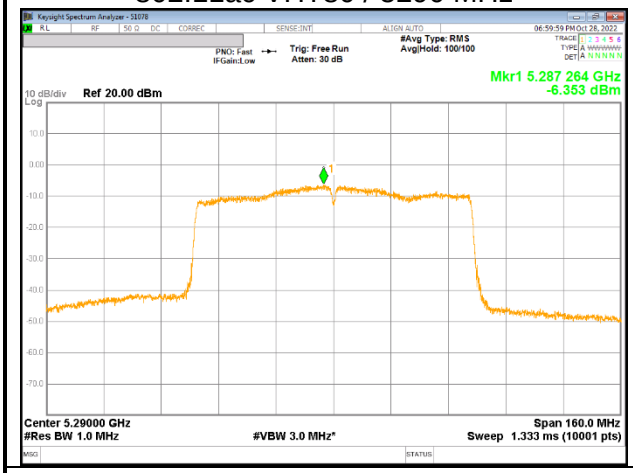
802.11ac VHT80 / 5210 MHz



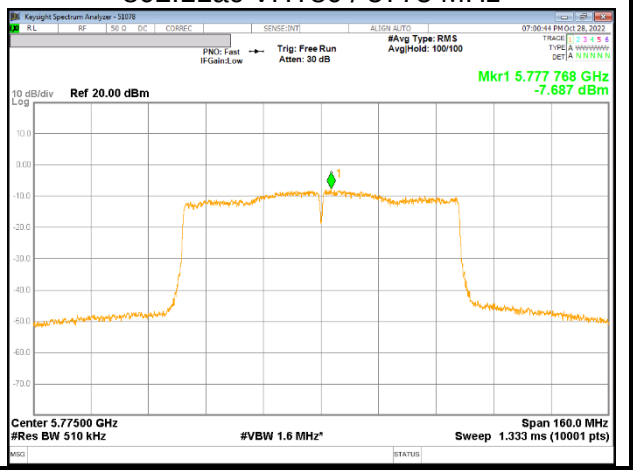

802.11ac VHT80 / 5610 MHz



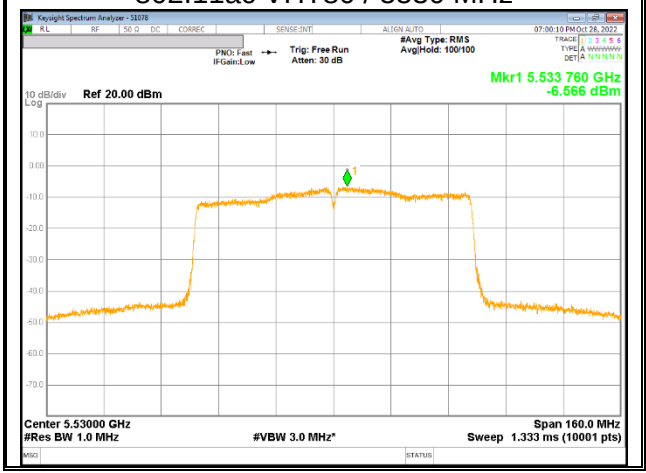

802.11ac VHT80 / 5290 MHz




802.11ac VHT80 / 5775 MHz

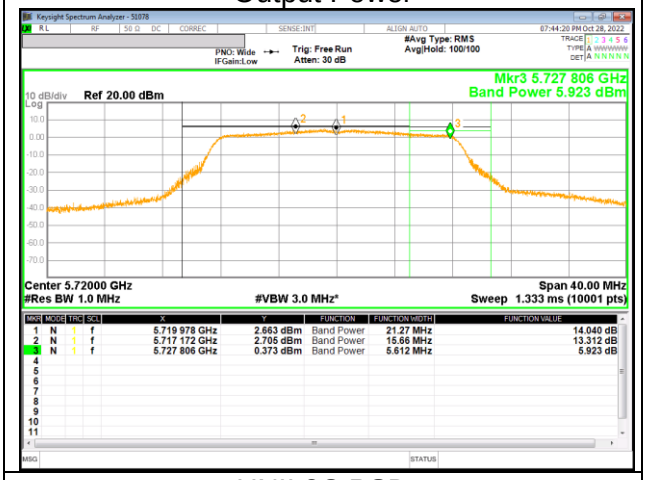



802.11ac VHT80 / 5530 MHz

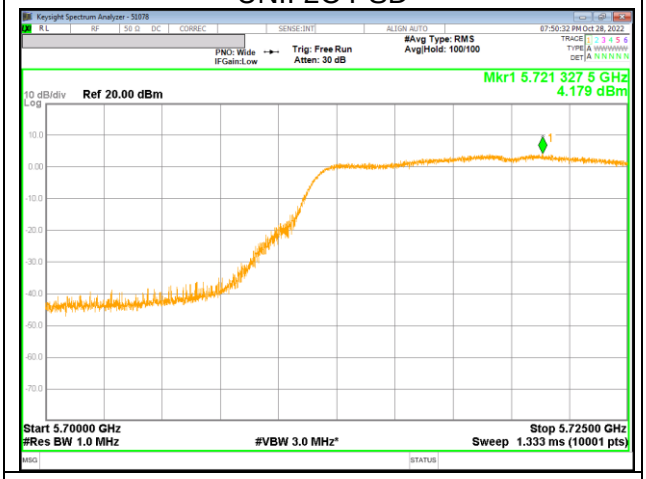


## UNII Straddle Ch. IEEE 802.11a mode Output Power and PSD

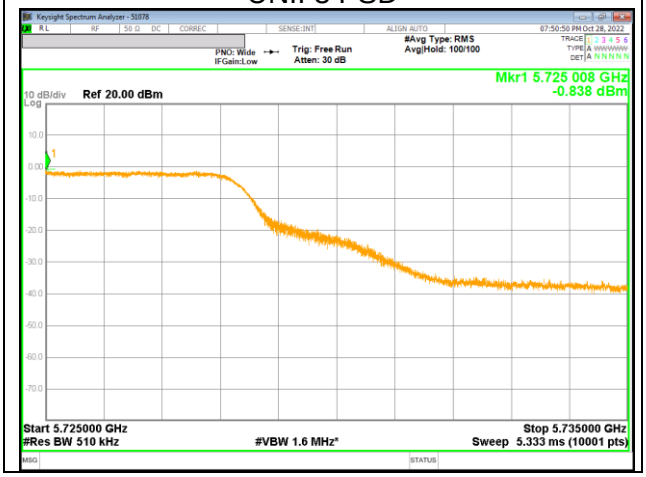
Output Power




UNII 2C PSD

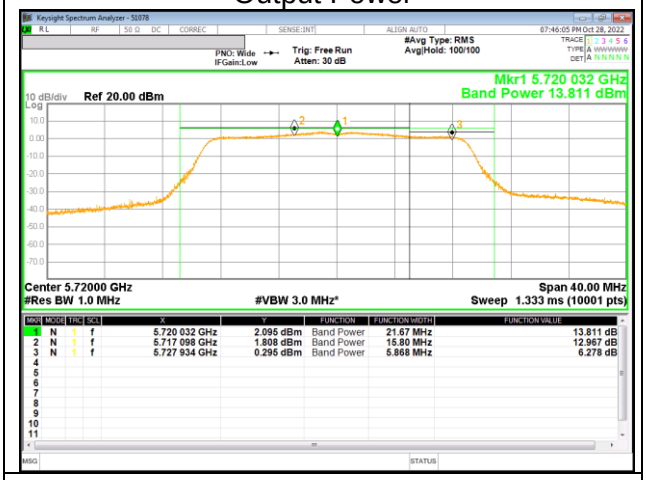



UNII 3 PSD

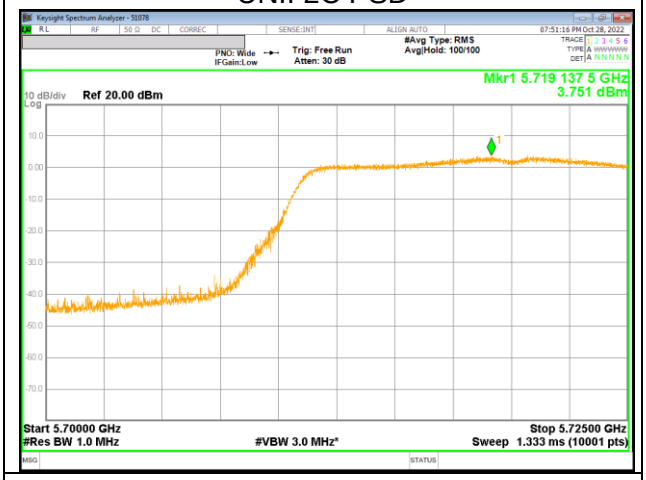


## UNII Straddle Ch. IEEE 802.11n HT20 mode Output Power and PSD

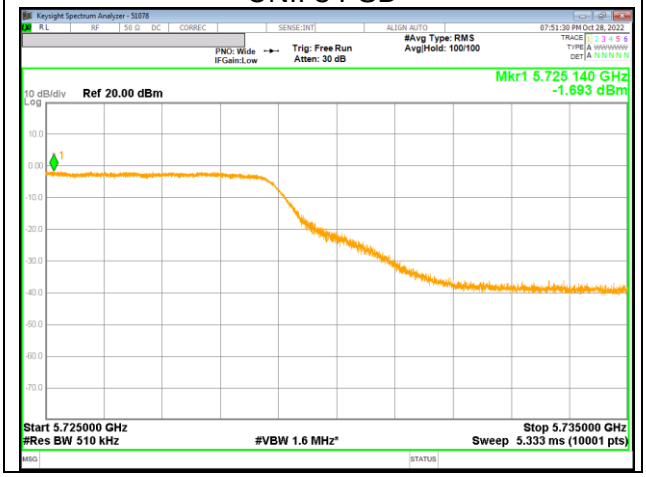
Output Power




UNII 2C PSD

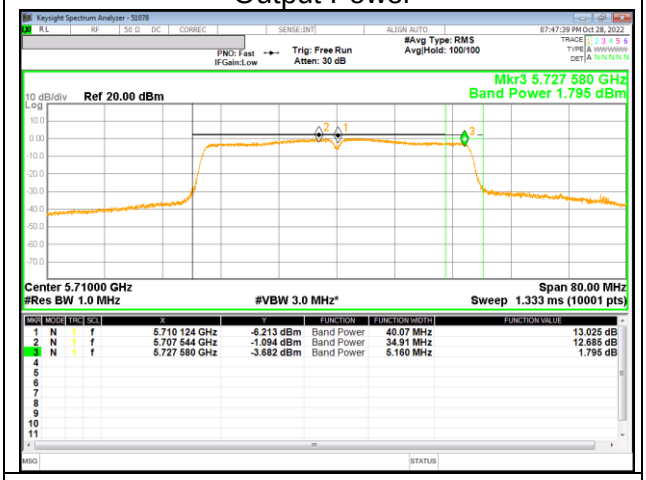



UNII 3 PSD

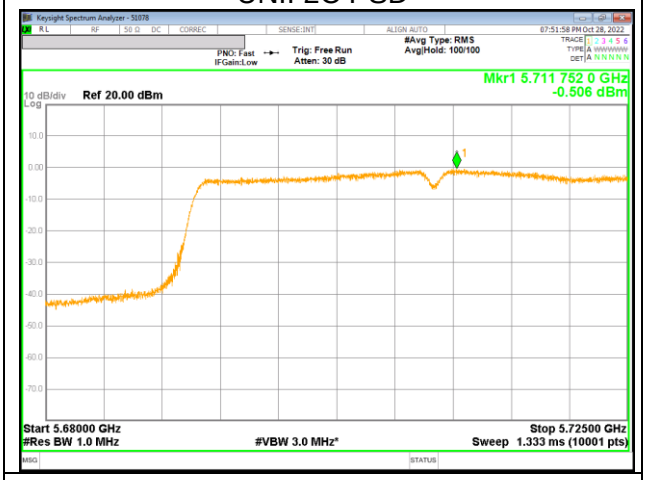


## UNII Straddle Ch. IEEE 802.11n HT40 mode Output Power and PSD

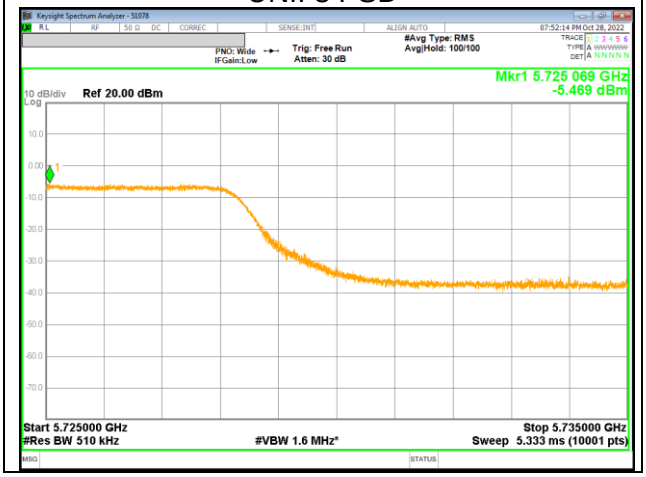
Output Power




UNII 2C PSD

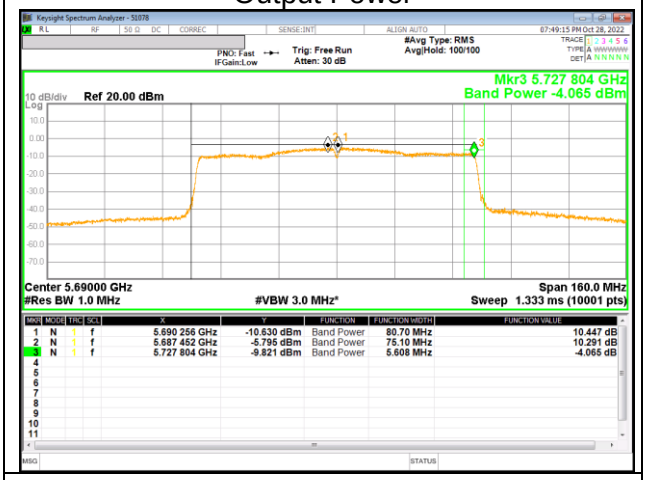



UNII 3 PSD

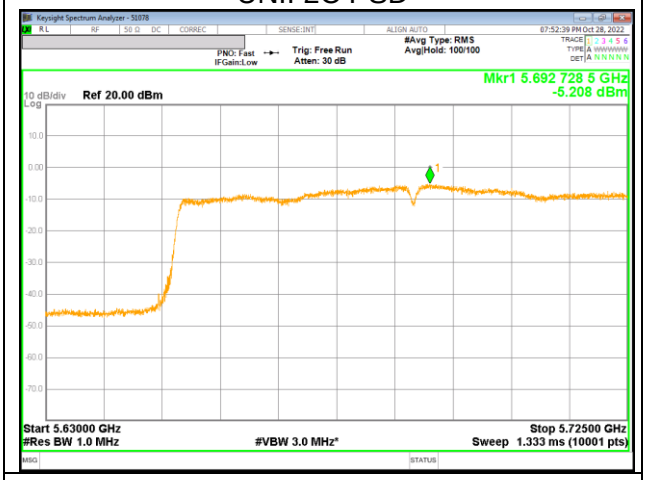


## UNII Straddle Ch. IEEE 802.11ac VHT80 mode Output Power and PSD

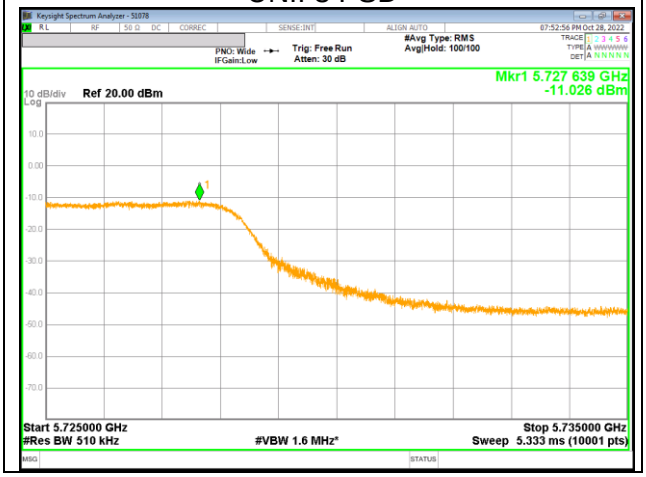
Output Power




UNII 2C PSD




UNII 3 PSD



# 11. TRANSMITTER ABOVE 1 GHz

**LIMITS**

FCC §15.205 and §15.209

| Limits for radiated disturbance of an intentional radiator | | |
|---|---|---|
| Frequency range (MHz) | Limits (μV/m) | Measurement Distance (m) |
| 0.009 – 0.490 | 2400 / F (kHz) | 300 |
| 0.490 – 1.705 | 24000 / F (kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 – 88 | 100** | 3 |
| 88 - 216 | 150** | 3 |
| 216 – 960 | 200** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

| MHz | MHz | MHz | MHz | GHz | GHz |
|---|---|---|---|---|---|
| 0.009 ~ 0.110 | 8.41425 ~ 8.41475 | 108 ~ 121.94 | 1300 ~ 1427 | 4.5 ~ 5.15 | 14.47 ~ 14.5 |
| 0.495 ~ 0.505 | 12.29 ~ 12.293 | 123 ~ 138 | 1435 ~ 1626.5 | 5.35 ~ 5.46 | 15.35 ~ 16.2 |
| 2.1735 ~ 2.1905 | 12.51975 ~ 12.52025 | 149.9 ~ 150.05 | 1645.5 ~ 1646.5 | 7.25 ~ 7.75 | 17.7 ~ 21.4 |
| 4.125 ~ 4.128 | 12.57675 ~ 12.57725 | 156.52475 ~ 156.52525 | 1660 ~ 1710 | 8.025 ~ 8.5 | 22.01 ~ 23.12 |
| 4.17725 ~ 4.17775 | 13.36 ~ 13.41 | 156.7 ~ 156.9 | 1718.8 ~ 1722.2 | 9.0 ~ 9.2 | 23.6 ~ 24.0 |
| 4.20725 ~ 4.20775 | 16.42 ~ 16.423 | 162.0125 ~ 167.17 | 2200 ~ 2300 | 9.3 ~ 9.5 | 31.2 ~ 31.8 |
| 6.215 ~ 6.218 | 16.69475 ~ 16.69525 | 167.72 ~ 173.2 | 2310 ~ 2390 | 10.6 ~ 12.7 | 36.43 ~ 36.5 |
| 6.26775 ~ 6.26825 | 16.80425 ~ 16.80475 | 240 ~ 285 | 2483.5 ~ 2500 | 13.25 ~ 13.4 | Above 38.6 |
| 6.31175 ~ 6.31225 | 25.5 ~ 25.67 | 322 ~ 335.4 | 2655 ~ 2900 | | |
| 8.291 ~ 8.294 | 37.5 ~ 38.25 | 399.90 ~ 410 | 3260 ~ 3267 | | |
| 8.362 ~ 8.366 | 73 ~ 74.6 | 608 ~ 614 | 3332 ~ 3339 | | |
| 8.37625 ~ 8.38675 | 74.8 ~ 75.2 | 960 ~ 1240 | 3345.8 ~ 3358 | | |
| | | | 3600 ~ 4400 | | |

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

**FCC §15.407 (b)**

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(iii) For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of −27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary,
provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
(7) The provisions of §15.205 apply to intentional radiators operating under this section.
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

**Note**

- Limit translation to field strength level (FCC §15.407)

E[dBuV/m] = EIRP[dBm] + 95.2 = -27dBm + 95.2 = 68.2dBuV/m

E[dBuV/m] = EIRP[dBm] + 95.2 = -17dBm + 95.2 = 78.2dBuV/m


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

**TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 100 cm for 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. Peak detection is used unless otherwise noted as quasi-peak.

Reference to KDB 789033 D02 v02r01 UNII part G) 6) c) Method AD:
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor to the reading offset for average measurements.In UNII-4, unwanted emissions outside of restricted bands are measured with an RMS detector.

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

The spectrum from 1GHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

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.

Note : Emission was pre-scanned from 9kHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

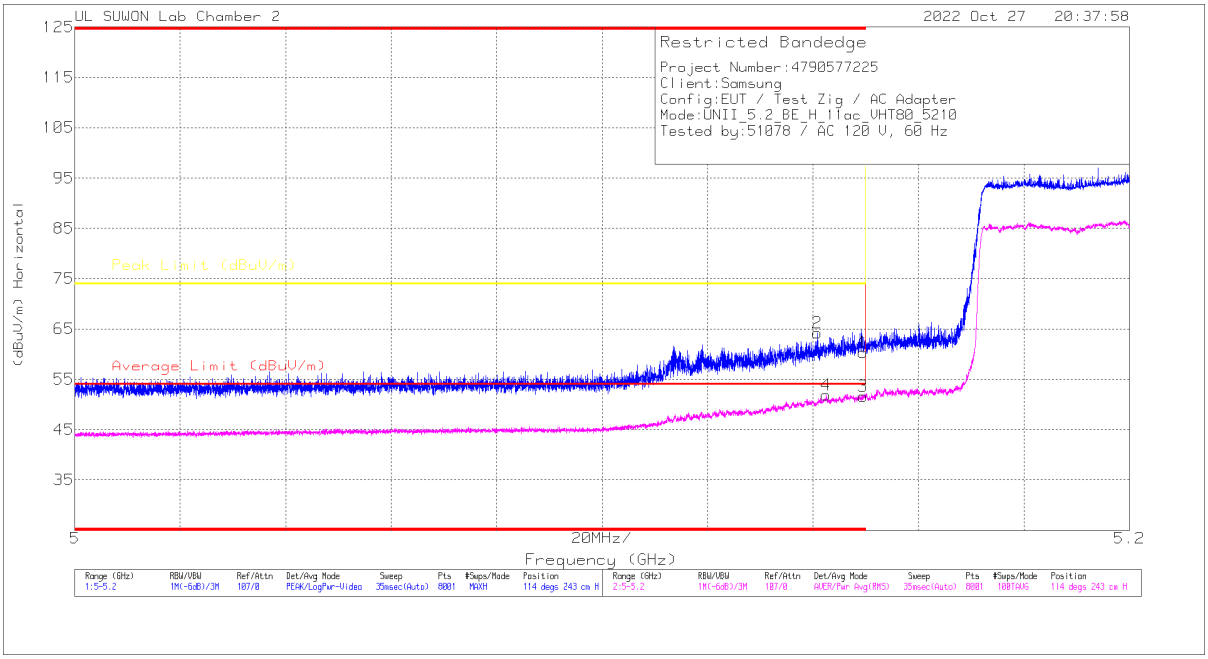
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

# 11.1. TX ABOVE 1GHz 1Tx MODE IN THE 5.2GHz BAND

**BANDEDGE (WORST CASE: 802.11ac VHT80 / 5210 MHz)**

**HORIZONTAL PEAK AND AVERAGE DATA**




Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[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 | * 5.1495 | 43.36 | Pk | 34.2 | -17.2 | 0 | 60.36 | - | - | 74 | -13.64 | 114 | 243 | H |
| 2 | * 5.14078 | 47.09 | Pk | 34.2 | -17.1 | 0 | 64.19 | - | - | 74 | -9.81 | 114 | 243 | H |
| 3 | * 5.1495 | 33.42 | RMS | 34.2 | -17.2 | 1.15 | 51.57 | 54 | -2.43 | - | - | 114 | 243 | H |
| 4 | * 5.1425 | 33.63 | RMS | 34.2 | -17.1 | 1.15 | 51.88 | 54 | -2.12 | - | - | 114 | 243 | H |

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

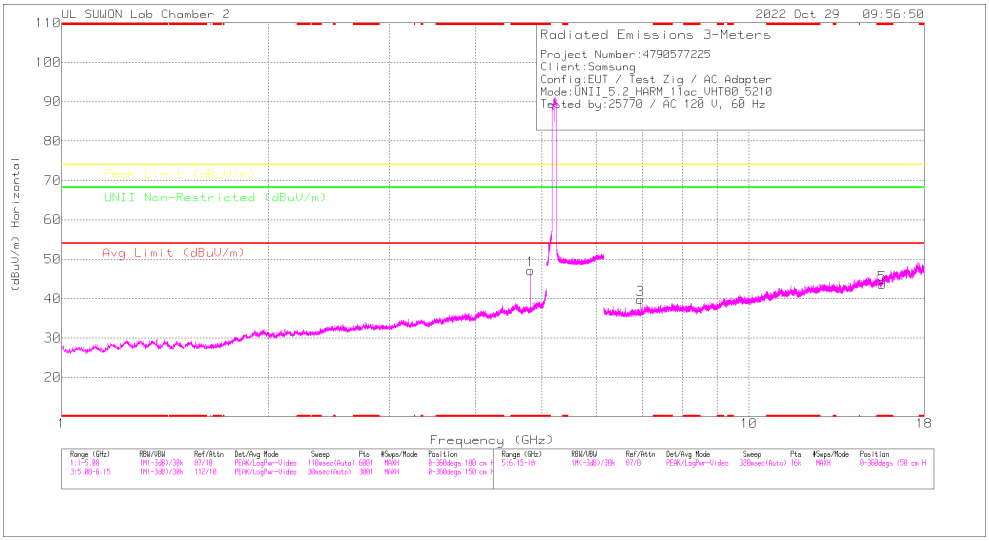
## BANDEDGE TEST DATA

| Mode | Freq. [MHz] | Antenna | Frequency [GHz ] | Reading [ dBuV ] | Detector Mode | ANT Factor | Loss [dB] | DC Corr [ dB ] | Result [ dBuV/m ] | AV Limit [ dBuV/m ] | AV Margin [ dB ] | PK Limit [ dBuV/m ] | PK Margin [ dB ] | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11a | 5180 | ANT1 | * 5.15 | 42.96 | Pk | 34.20 | -17.20 | 0.00 | 59.96 | - | - | 74.00 | -14.04 | 61 | 381 | H |
| | | | * 5.14998 | 48.10 | Pk | 34.20 | -17.20 | 0.00 | 65.10 | - | - | 74.00 | -8.90 | 61 | 381 | H |
| | | | * 5.15 | 31.92 | RMS | 34.20 | -17.20 | 0.30 | 49.22 | 54.00 | -4.78 | - | - | 61 | 381 | H |
| | | | * 5.14888 | 32.18 | RMS | 34.20 | -17.20 | 0.30 | 49.48 | 54.00 | -4.52 | - | - | 61 | 381 | H |
| | | | * 5.15 | 39.69 | Pk | 34.20 | -17.20 | 0.00 | 56.69 | - | - | 74.00 | -17.31 | 179 | 371 | V |
| | | | * 5.14913 | 44.62 | Pk | 34.20 | -17.20 | 0.00 | 61.62 | - | - | 74.00 | -12.38 | 179 | 371 | V |
| | | | * 5.15 | 29.60 | RMS | 34.20 | -17.20 | 0.30 | 46.90 | 54.00 | -7.10 | - | - | 179 | 371 | V |
| | | | * 5.1499 | 29.86 | RMS | 34.20 | -17.20 | 0.30 | 47.16 | 54.00 | -6.84 | - | - | 179 | 371 | V |
| 802.11n (HT20) | 5180 | ANT1 | * 5.15 | 49.18 | Pk | 34.20 | -17.20 | 0.00 | 66.18 | - | - | 74.00 | -7.82 | 81 | 232 | H |
| | | | * 5.14818 | 51.06 | Pk | 34.20 | -17.20 | 0.00 | 68.06 | - | - | 74.00 | **-5.94** | 81 | 232 | H |
| | | | * 5.15 | 33.46 | RMS | 34.20 | -17.20 | 0.32 | 50.78 | 54.00 | -3.22 | - | - | 81 | 232 | H |
| | | | * 5.14995 | 34.08 | RMS | 34.20 | -17.20 | 0.32 | 51.40 | 54.00 | -2.60 | - | - | 81 | 232 | H |
| | | | * 5.15 | 41.04 | Pk | 34.20 | -17.20 | 0.00 | 58.04 | - | - | 74.00 | -15.96 | 270 | 103 | V |
| | | | * 5.1498 | 46.17 | Pk | 34.20 | -17.20 | 0.00 | 63.17 | - | - | 74.00 | -10.83 | 270 | 103 | V |
| | | | * 5.15 | 28.91 | RMS | 34.20 | -17.20 | 0.30 | 46.21 | 54.00 | -7.79 | - | - | 270 | 103 | V |
| | | | * 5.14873 | 29.43 | RMS | 34.20 | -17.20 | 0.30 | 46.73 | 54.00 | -7.27 | - | - | 270 | 103 | V |
| 802.11n (HT40) | 5190 | ANT1 | * 5.15 | 43.83 | Pk | 34.20 | -17.20 | 0.00 | 60.83 | - | - | 74.00 | -13.17 | 79 | 384 | H |
| | | | * 5.14588 | 48.50 | Pk | 34.20 | -17.20 | 0.00 | 65.50 | - | - | 74.00 | -8.50 | 79 | 384 | H |
| | | | * 5.15 | 33.72 | RMS | 34.20 | -17.20 | 0.62 | 51.34 | 54.00 | -2.66 | - | - | 79 | 384 | H |
| | | | * 5.14995 | 34.11 | RMS | 34.20 | -17.20 | 0.62 | 51.73 | 54.00 | -2.27 | - | - | 79 | 384 | H |
| | | | * 5.15 | 40.45 | Pk | 34.20 | -17.20 | 0.00 | 57.45 | - | - | 74.00 | -16.55 | 262 | 104 | V |
| | | | * 5.14505 | 43.54 | Pk | 34.20 | -17.20 | 0.00 | 60.54 | - | - | 74.00 | -13.46 | 262 | 104 | V |
| | | | * 5.15 | 30.05 | RMS | 34.20 | -17.20 | 0.62 | 47.67 | 54.00 | -6.33 | - | - | 262 | 104 | V |
| | | | * 5.14968 | 30.33 | RMS | 34.20 | -17.20 | 0.62 | 47.95 | 54.00 | -6.05 | - | - | 262 | 104 | V |
| 802.11ac (VHT80) | 5210 | ANT1 | * 5.1495 | 43.36 | Pk | 34.20 | -17.20 | 0.00 | 60.36 | - | - | 74.00 | -13.64 | 114 | 243 | H |
| | | | * 5.14078 | 47.09 | Pk | 34.20 | -17.10 | 0.00 | 64.19 | - | - | 74.00 | -9.81 | 114 | 243 | H |
| | | | * 5.1495 | 33.42 | RMS | 34.20 | -17.20 | 1.15 | 51.57 | 54.00 | -2.43 | - | - | 114 | 243 | H |
| | | | * 5.1425 | 33.63 | RMS | 34.20 | -17.10 | 1.15 | 51.88 | 54.00 | **-2.12** | - | - | 114 | 243 | H |
| | | | * 5.15 | 41.67 | Pk | 34.20 | -17.20 | 0.00 | 58.67 | - | - | 74.00 | -15.33 | 179 | 335 | V |
| | | | * 5.14918 | 44.93 | Pk | 34.20 | -17.20 | 0.00 | 61.93 | - | - | 74.00 | -12.07 | 179 | 335 | V |
| | | | * 5.15 | 31.27 | RMS | 34.20 | -17.20 | 1.15 | 49.42 | 54.00 | -4.58 | - | - | 179 | 335 | V |
| | | | * 5.1499 | 31.77 | RMS | 34.20 | -17.20 | 1.15 | 49.92 | 54.00 | -4.08 | - | - | 179 | 335 | V |

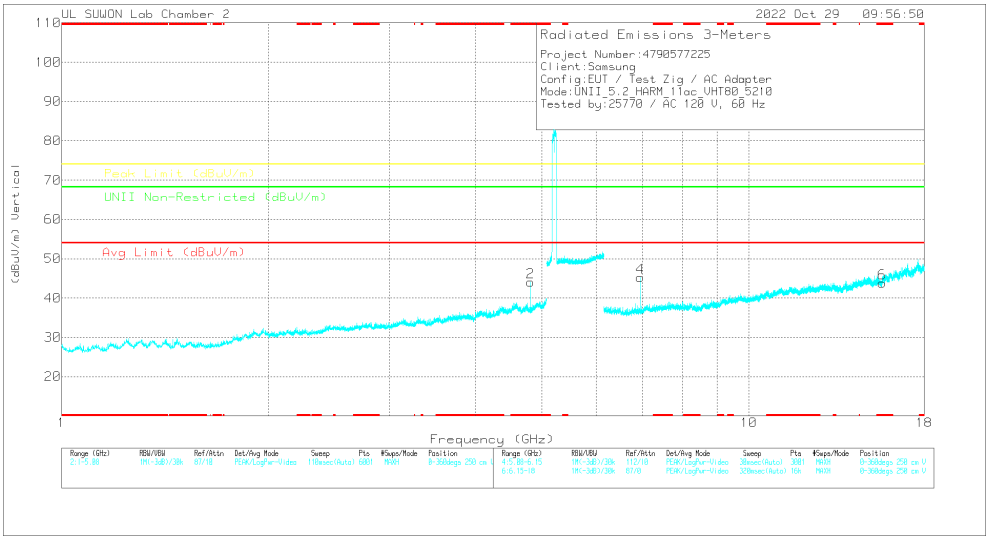
Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

## HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11ac VHT80 / 5210 MHz )

### 5210 MHz HORIZONTAL




### 5210 MHz VERTICAL




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## Radiated Emissions

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 5GHz_LP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | UNII Non-Restricted (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.81262 | 45.71 | PK-U | 34 | -27.5 | 0 | 52.21 | - | - | 74 | -21.79 | - | - | 27 | 162 | H |
| * 4.81262 | 39.98 | ADR | 34 | -27.5 | 1.15 | 47.63 | 54 | -6.37 | - | - | - | - | 27 | 162 | H |
| * 4.81257 | 44.85 | PK-U | 34 | -27.5 | 0 | 51.35 | - | - | 74 | -22.65 | - | - | 124 | 386 | V |
| * 4.81257 | 38.31 | ADR | 34 | -27.5 | 1.15 | 45.96 | 54 | -8.04 | - | - | - | - | 124 | 386 | V |
| 6.9465 | 38.42 | PK-U | 35.6 | -25.2 | 0 | 48.82 | - | - | - | - | 68.2 | -19.38 | 36 | 279 | H |
| 6.94694 | 40.64 | PK-U | 35.6 | -25.2 | 0 | 51.04 | - | - | - | - | 68.2 | -17.16 | 206 | 120 | V |
| * 15.6244 | 35.2 | PK-U | 40 | -20 | 0 | 55.2 | - | - | 74 | -18.8 | - | - | 0 | 100 | H |
| * 15.63813 | 34.62 | PK-U | 40 | -19.7 | 0 | 54.92 | - | - | 74 | -19.08 | - | - | 0 | 100 | 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

## HARMONICS AND SPURIOUS EMISSIONS TEST DATA

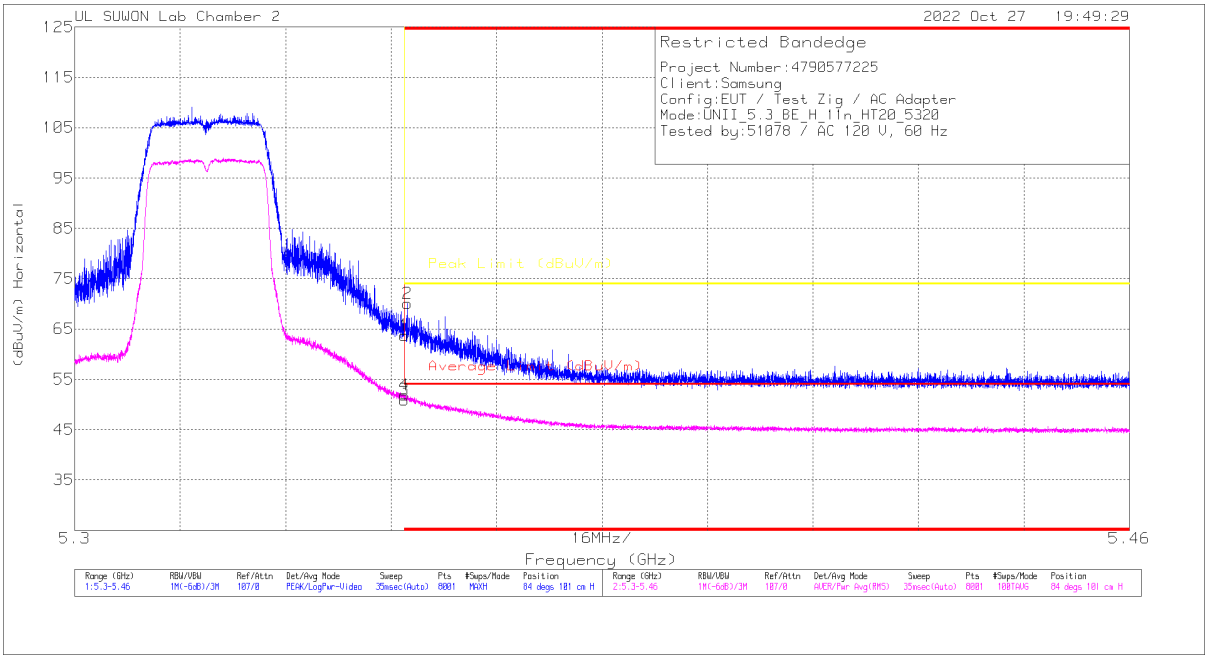
| Mode | Freq. [MHz] | Antenna | Frequency [GHz ] | Reading [ dBuV ] | Detector Mode | ANT Factor | Loss [dB] | DC Corr [ dB ] | Result [ dBuV/m ] | AV Limit [ dBuV/m ] | AV Margin [ dB ] | PK Limit [ dBuV/m ] | PK Margin [ dB ] | Non-Restricted [ dBuV/m ] | Margin [ dB ] | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11a | 5180 | ANT1 | * 4.81253 | 46.36 | PK-U | 34.00 | -27.50 | 0.00 | 52.86 | - | - | 74.00 | -21.14 | - | - | 28 | 115 | H |
| | | | * 4.81266 | 40.19 | ADR | 34.00 | -27.50 | 0.30 | 46.99 | 54.00 | -7.01 | - | - | - | - | 28 | 115 | H |
| | | | * 4.8128 | 43.78 | PK-U | 34.00 | -27.60 | 0.00 | 50.18 | - | - | 74.00 | -23.82 | - | - | 41 | 132 | V |
| | | | * 4.81266 | 35.83 | ADR | 34.00 | -27.50 | 0.30 | 42.63 | 54.00 | -11.37 | - | - | - | - | 41 | 132 | V |
| | | | 6.920 | 38.91 | PK-U | 35.60 | -25.00 | 0.00 | 49.51 | - | - | - | - | 68.20 | -18.69 | 78 | 107 | H |
| | | | 6.920 | 41.51 | PK-U | 35.60 | -25.00 | 0.00 | 52.11 | - | - | - | - | 68.20 | -16.09 | 202 | 104 | V |
| | | | * 15.53306 | 34.29 | PK-U | 39.90 | -19.30 | 0.00 | 54.89 | - | - | 74.00 | -19.11 | - | - | 0 | 100 | H |
| | | | * 15.54534 | 34.51 | PK-U | 39.90 | -19.40 | 0.00 | 55.01 | - | - | 74.00 | -18.99 | - | - | 0 | 100 | V |
| | 5200 | ANT1 | * 4.81247 | 46.07 | PK-U | 34.00 | -27.50 | 0.00 | 52.57 | - | - | 74.00 | -21.43 | - | - | 33 | 137 | H |
| | | | * 4.81261 | 39.91 | ADR | 34.00 | -27.50 | 0.30 | 46.71 | 54.00 | -7.29 | - | - | - | - | 33 | 137 | H |
| | | | * 4.81238 | 44.42 | PK-U | 34.00 | -27.50 | 0.00 | 50.92 | - | - | 74.00 | -23.08 | - | - | 46 | 101 | V |
| | | | * 4.81267 | 36.18 | ADR | 34.00 | -27.50 | 0.30 | 42.98 | 54.00 | -11.02 | - | - | - | - | 46 | 101 | V |
| | | | 6.933 | 40.61 | PK-U | 35.60 | -25.10 | 0.00 | 51.11 | - | - | - | - | 68.20 | -17.09 | 140 | 101 | H |
| | | | 6.933 | 42.84 | PK-U | 35.60 | -25.10 | 0.00 | 53.34 | - | - | - | - | 68.20 | **-14.86** | 210 | 123 | V |
| | | | * 15.5984 | 35.18 | PK-U | 40.00 | -19.80 | 0.00 | 55.38 | - | - | 74.00 | -18.62 | - | - | 0 | 101 | H |
| | | | * 15.60161 | 34.93 | PK-U | 40.00 | -19.80 | 0.00 | 55.13 | - | - | 74.00 | -18.87 | - | - | 0 | 100 | V |
| | 5240 | ANT1 | * 4.81256 | 45.89 | PK-U | 34.00 | -27.50 | 0.00 | 52.39 | - | - | 74.00 | -21.61 | - | - | 33 | 150 | H |
| | | | * 4.8127 | 39.77 | ADR | 34.00 | -27.50 | 0.30 | 46.57 | 54.00 | -7.43 | - | - | - | - | 33 | 150 | H |
| | | | * 4.81269 | 44.58 | PK-U | 34.00 | -27.50 | 0.00 | 51.08 | - | - | 74.00 | -22.92 | - | - | 46 | 102 | V |
| | | | * 4.81265 | 36.29 | ADR | 34.00 | -27.50 | 0.30 | 43.09 | 54.00 | -10.91 | - | - | - | - | 46 | 102 | V |
| | | | 6.987 | 39.55 | PK-U | 35.60 | -25.40 | 0.00 | 49.75 | - | - | - | - | 68.20 | -18.45 | 135 | 109 | H |
| | | | 6.987 | 42.00 | PK-U | 35.60 | -25.40 | 0.00 | 52.20 | - | - | - | - | 68.20 | -16.00 | 212 | 136 | V |
| | | | * 15.71895 | 34.26 | PK-U | 40.10 | -18.70 | 0.00 | 55.66 | - | - | 74.00 | -18.34 | - | - | 0 | 100 | H |
| | | | * 15.72019 | 34.82 | PK-U | 40.10 | -18.70 | 0.00 | 56.22 | - | - | 74.00 | **-17.78** | - | - | 212 | 136 | V |
| 802.11n (HT20) Spot-Check | 5180 | ANT1 | * 4.81268 | 46.79 | PK-U | 34.00 | -27.50 | 0.00 | 53.29 | - | - | 74.00 | -20.71 | - | - | 32 | 162 | H |
| | | | * 4.81262 | 40.78 | ADR | 34.00 | -27.50 | 0.32 | 47.60 | 54.00 | -6.40 | - | - | - | - | 32 | 162 | H |
| | | | * 4.81266 | 45.07 | PK-U | 34.00 | -27.50 | 0.00 | 51.57 | - | - | 74.00 | -22.43 | - | - | 133 | 388 | V |
| | | | * 4.81268 | 38.39 | ADR | 34.00 | -27.50 | 0.32 | 45.21 | 54.00 | -8.79 | - | - | - | - | 133 | 388 | V |
| | | | 6.906 | 38.69 | PK-U | 35.50 | -24.90 | 0.00 | 49.29 | - | - | - | - | 68.20 | -18.91 | 120 | 275 | H |
| | | | 6.907 | 40.81 | PK-U | 35.50 | -24.90 | 0.00 | 51.41 | - | - | - | - | 68.20 | -16.79 | 209 | 116 | V |
| | | | * 15.54935 | 34.61 | PK-U | 39.90 | -19.40 | 0.00 | 55.11 | - | - | 74.00 | -18.89 | - | - | 0 | 100 | H |
| | | | * 15.5494 | 34.85 | PK-U | 39.90 | -19.40 | 0.00 | 55.35 | - | - | 74.00 | -18.65 | - | - | 0 | 100 | V |
| 802.11n (HT40) Spot-Check | 5190 | ANT1 | * 4.81264 | 46.23 | PK-U | 34.00 | -27.50 | 0.00 | 52.73 | - | - | 74.00 | -21.27 | - | - | 32 | 162 | H |
| | | | * 4.81264 | 40.03 | ADR | 34.00 | -27.50 | 0.62 | 47.15 | 54.00 | -6.85 | - | - | - | - | 32 | 162 | H |
| | | | * 4.81273 | 44.98 | PK-U | 34.00 | -27.50 | 0.00 | 51.48 | - | - | 74.00 | -22.52 | - | - | 126 | 341 | V |
| | | | * 4.81255 | 38.34 | ADR | 34.00 | -27.50 | 0.62 | 45.46 | 54.00 | -8.54 | - | - | - | - | 126 | 341 | V |
| | | | 6.920 | 38.58 | PK-U | 35.60 | -25.00 | 0.00 | 49.18 | - | - | - | - | 68.20 | -19.02 | 77 | 154 | H |
| | | | 6.920 | 41.36 | PK-U | 35.60 | -25.00 | 0.00 | 51.96 | - | - | - | - | 68.20 | -16.24 | 207 | 104 | V |
| | | | * 15.57193 | 33.90 | PK-U | 40.00 | -19.80 | 0.00 | 54.10 | - | - | 74.00 | -19.90 | - | - | 0 | 100 | H |
| | | | * 15.56069 | 34.94 | PK-U | 39.90 | -19.60 | 0.00 | 55.24 | - | - | 74.00 | -18.76 | - | - | 0 | 100 | V |
| 802.11ac (VHT80) Spot-Check | 5210 | ANT1 | * 4.81262 | 45.71 | PK-U | 34.00 | -27.50 | 0.00 | 52.21 | - | - | 74.00 | -21.79 | - | - | 27 | 162 | H |
| | | | * 4.81262 | 39.98 | ADR | 34.00 | -27.50 | 1.15 | 47.63 | 54.00 | **-6.37** | - | - | - | - | 27 | 162 | H |
| | | | * 4.81257 | 44.85 | PK-U | 34.00 | -27.50 | 0.00 | 51.35 | - | - | 74.00 | -22.65 | - | - | 124 | 386 | V |
| | | | * 4.81257 | 38.31 | ADR | 34.00 | -27.50 | 1.15 | 45.96 | 54.00 | -8.04 | - | - | - | - | 124 | 386 | V |
| | | | 6.947 | 38.42 | PK-U | 35.60 | -25.20 | 0.00 | 48.82 | - | - | - | - | 68.20 | -19.38 | 36 | 279 | H |
| | | | 6.947 | 40.64 | PK-U | 35.60 | -25.20 | 0.00 | 51.04 | - | - | - | - | 68.20 | -17.16 | 206 | 120 | V |
| | | | * 15.6244 | 35.20 | PK-U | 40.00 | -20.00 | 0.00 | 55.20 | - | - | 74.00 | -18.80 | - | - | 0 | 100 | H |
| | | | * 15.63813 | 34.62 | PK-U | 40.00 | -19.70 | 0.00 | 54.92 | - | - | 74.00 | -19.08 | - | - | 0 | 100 | V |

Note1. PK-U - U-NII: Maximum Peak
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

# 11.2. TX ABOVE 1GHz 1Tx MODE IN THE 5.3GHz BAND

**BANDEDGE (WORST CASE: 802.11n HT20 / 5320 MHz)**

**HORIZONTAL PEAK AND AVERAGE DATA**




Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[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 | * 5.35002 | 46.09 | Pk | 34.4 | -16.8 | 0 | 63.69 | - | - | 74 | -10.31 | 84 | 101 | H |
| 2 | * 5.35044 | 52.47 | Pk | 34.4 | -16.8 | 0 | 70.07 | - | - | 74 | -3.93 | 84 | 101 | H |
| 3 | * 5.35002 | 33.02 | RMS | 34.4 | -16.8 | .32 | 50.94 | 54 | -3.06 | - | - | 84 | 101 | H |
| 4 | * 5.35004 | 34 | RMS | 34.4 | -16.8 | .32 | 51.92 | 54 | -2.08 | - | - | 84 | 101 | H |

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

## BANDEDGE TEST DATA

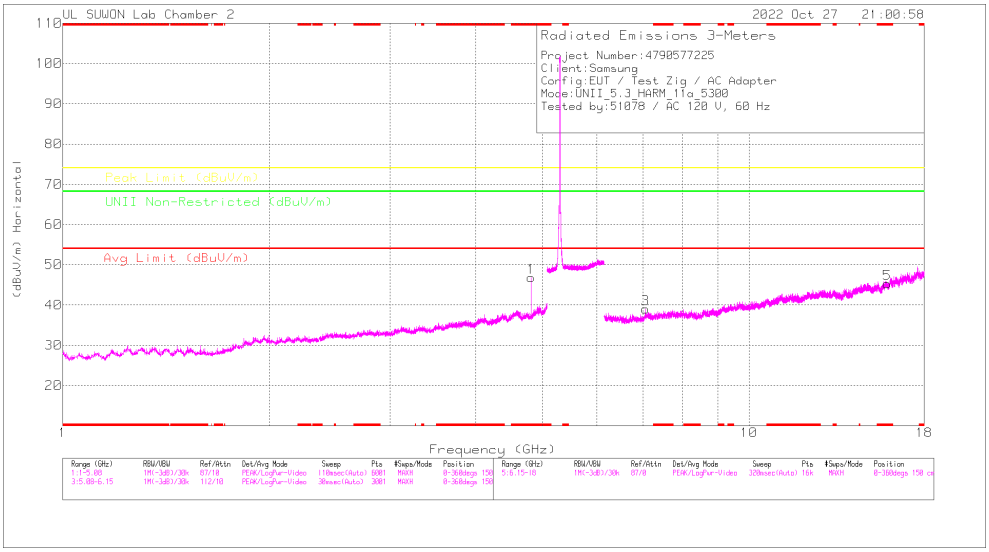
| Mode | Freq. [MHz] | Antenna | Frequency [GHz ] | Reading [ dBuV ] | Detector Mode | ANT Factor | Loss [dB] | DC Corr [ dB ] | Result [ dBuV/m ] | AV Limit [ dBuV/m ] | AV Margin [ dB ] | PK Limit [ dBuV/m ] | PK Margin [ dB ] | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11a | 5320 | ANT1 | * 5.35002 | 45.56 | Pk | 34.40 | -16.80 | 0.00 | 63.16 | - | - | 74.00 | -10.84 | 82 | 100 | H |
| | | | * 5.35286 | 48.40 | Pk | 34.40 | -16.90 | 0.00 | 65.90 | - | - | 74.00 | -8.10 | 82 | 100 | H |
| | | | * 5.35002 | 33.00 | RMS | 34.40 | -16.80 | 0.30 | 50.90 | 54.00 | -3.10 | - | - | 82 | 100 | H |
| | | | * 5.35004 | 33.21 | RMS | 34.40 | -16.80 | 0.30 | 51.11 | 54.00 | -2.89 | - | - | 82 | 100 | H |
| | | | * 5.35002 | 42.00 | Pk | 34.40 | -16.80 | 0.00 | 59.60 | - | - | 74.00 | -14.40 | 277 | 106 | V |
| | | | * 5.35074 | 44.05 | Pk | 34.40 | -16.80 | 0.00 | 61.65 | - | - | 74.00 | -12.35 | 277 | 106 | V |
| | | | * 5.35002 | 28.95 | RMS | 34.40 | -16.80 | 0.30 | 46.85 | 54.00 | -7.15 | - | - | 277 | 106 | V |
| | | | * 5.3511 | 29.63 | RMS | 34.40 | -16.80 | 0.30 | 47.53 | 54.00 | -6.47 | - | - | 277 | 106 | V |
| 802.11n (HT20) | 5320 | ANT1 | * 5.35002 | 46.09 | Pk | 34.40 | -16.80 | 0.00 | 63.69 | - | - | 74.00 | -10.31 | 84 | 101 | H |
| | | | * 5.35044 | 52.47 | Pk | 34.40 | -16.80 | 0.00 | 70.07 | - | - | 74.00 | -3.93 | 84 | 101 | H |
| | | | * 5.35002 | 33.02 | RMS | 34.40 | -16.80 | 0.32 | 50.94 | 54.00 | -3.06 | - | - | 84 | 101 | H |
| | | | * 5.35004 | 34.00 | RMS | 34.40 | -16.80 | 0.32 | 51.92 | 54.00 | **-2.08** | - | - | 84 | 101 | H |
| | | | * 5.35002 | 39.00 | Pk | 34.40 | -16.80 | 0.00 | 56.60 | - | - | 74.00 | -17.40 | 278 | 100 | V |
| | | | * 5.35032 | 43.91 | Pk | 34.40 | -16.80 | 0.00 | 61.51 | - | - | 74.00 | -12.49 | 278 | 100 | V |
| | | | * 5.35002 | 28.12 | RMS | 34.40 | -16.80 | 0.32 | 46.04 | 54.00 | -7.96 | - | - | 278 | 100 | V |
| | | | * 5.35216 | 28.63 | RMS | 34.40 | -16.80 | 0.32 | 46.55 | 54.00 | -7.45 | - | - | 278 | 100 | V |
| 802.11n (HT40) | 5310 | ANT1 | * 5.35002 | 48.80 | Pk | 34.40 | -16.80 | 0.00 | 66.40 | - | - | 74.00 | -7.60 | 79 | 260 | H |
| | | | * 5.35022 | 54.13 | Pk | 34.40 | -16.80 | 0.00 | 71.73 | - | - | 74.00 | **-2.27** | 79 | 260 | H |
| | | | * 5.35002 | 33.00 | RMS | 34.40 | -16.80 | 0.62 | 51.22 | 54.00 | -2.78 | - | - | 79 | 260 | H |
| | | | * 5.35032 | 33.41 | RMS | 34.40 | -16.80 | 0.62 | 51.63 | 54.00 | -2.37 | - | - | 79 | 260 | H |
| | | | * 5.35002 | 37.85 | Pk | 34.40 | -16.80 | 0.00 | 55.45 | - | - | 74.00 | -18.55 | 279 | 100 | V |
| | | | * 5.35008 | 43.33 | Pk | 34.40 | -16.80 | 0.00 | 60.93 | - | - | 74.00 | -13.07 | 279 | 100 | V |
| | | | * 5.35002 | 27.54 | RMS | 34.40 | -16.80 | 0.62 | 45.76 | 54.00 | -8.24 | - | - | 279 | 100 | V |
| | | | * 5.3522 | 28.36 | RMS | 34.40 | -16.80 | 0.62 | 46.58 | 54.00 | -7.42 | - | - | 279 | 100 | V |
| 802.11ac (VHT80) | 5290 | ANT1 | * 5.35002 | 39.94 | Pk | 34.40 | -16.80 | 0.00 | 57.54 | - | - | 74.00 | -16.46 | 88 | 260 | H |
| | | | * 5.35392 | 50.18 | Pk | 34.40 | -16.90 | 0.00 | 67.68 | - | - | 74.00 | -6.32 | 88 | 260 | H |
| | | | * 5.35002 | 29.56 | RMS | 34.40 | -16.80 | 1.15 | 48.31 | 54.00 | -5.69 | - | - | 88 | 260 | H |
| | | | * 5.35022 | 30.17 | RMS | 34.40 | -16.80 | 1.15 | 48.92 | 54.00 | -5.08 | - | - | 88 | 260 | H |
| | | | * 5.35002 | 37.06 | Pk | 34.40 | -16.80 | 0.00 | 54.66 | - | - | 74.00 | -19.34 | 279 | 100 | V |
| | | | * 5.3761 | 40.38 | Pk | 34.40 | -16.90 | 0.00 | 57.88 | - | - | 74.00 | -16.12 | 279 | 100 | V |
| | | | * 5.35002 | 27.37 | RMS | 34.40 | -16.80 | 1.15 | 46.12 | 54.00 | -7.88 | - | - | 279 | 100 | V |
| | | | * 5.35606 | 28.14 | RMS | 34.40 | -16.90 | 1.15 | 46.79 | 54.00 | -7.21 | - | - | 279 | 100 | V |

Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

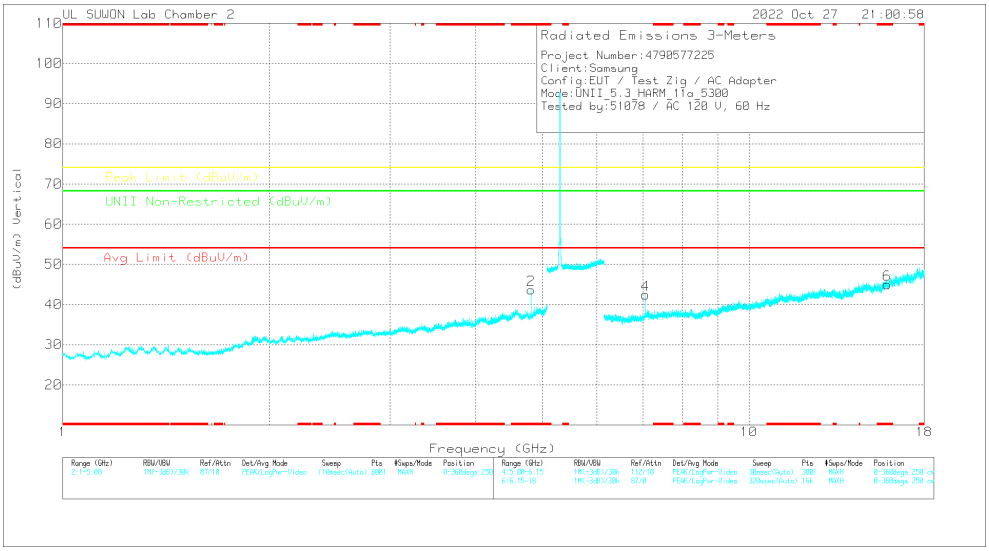

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

## HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5300 MHz)

### 5300 MHz HORIZONTAL




### 5300 MHz VERTICAL




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## Radiated Emissions

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 5GHz_LP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | UNII Non-Restricted (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.81255 | 46.59 | PK-U | 34 | -27.5 | 0 | 53.09 | - | - | 74 | -20.91 | - | - | 32 | 269 | H |
| * 4.81259 | 39.97 | ADR | 34 | -27.5 | .3 | 46.77 | 54 | -7.23 | - | - | - | - | 32 | 269 | H |
| * 4.81283 | 44.5 | PK-U | 34 | -27.6 | 0 | 50.9 | - | - | 74 | -23.1 | - | - | 45 | 103 | V |
| * 4.8127 | 35.97 | ADR | 34 | -27.5 | .3 | 42.77 | 54 | -11.23 | - | - | - | - | 45 | 103 | V |

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 6GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | UNII Non-Restricted (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7.06696 | 37.67 | PK-U | 35.6 | -23.9 | 0 | 49.37 | - | - | - | - | 68.2 | -18.83 | 94 | 107 | H |
| 7.06626 | 39.51 | PK-U | 35.6 | -23.9 | 0 | 51.21 | - | - | - | - | 68.2 | -16.99 | 210 | 115 | V |
| * 15.89375 | 34.52 | PK-U | 40.3 | -18.7 | 0 | 56.12 | - | - | 74 | -17.88 | - | - | 0 | 100 | H |
| * 15.89683 | 34.91 | PK-U | 40.3 | -18.8 | 0 | 56.41 | - | - | 74 | -17.59 | - | - | 0 | 100 | 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

## HARMONICS AND SPURIOUS EMISSIONS TEST DATA

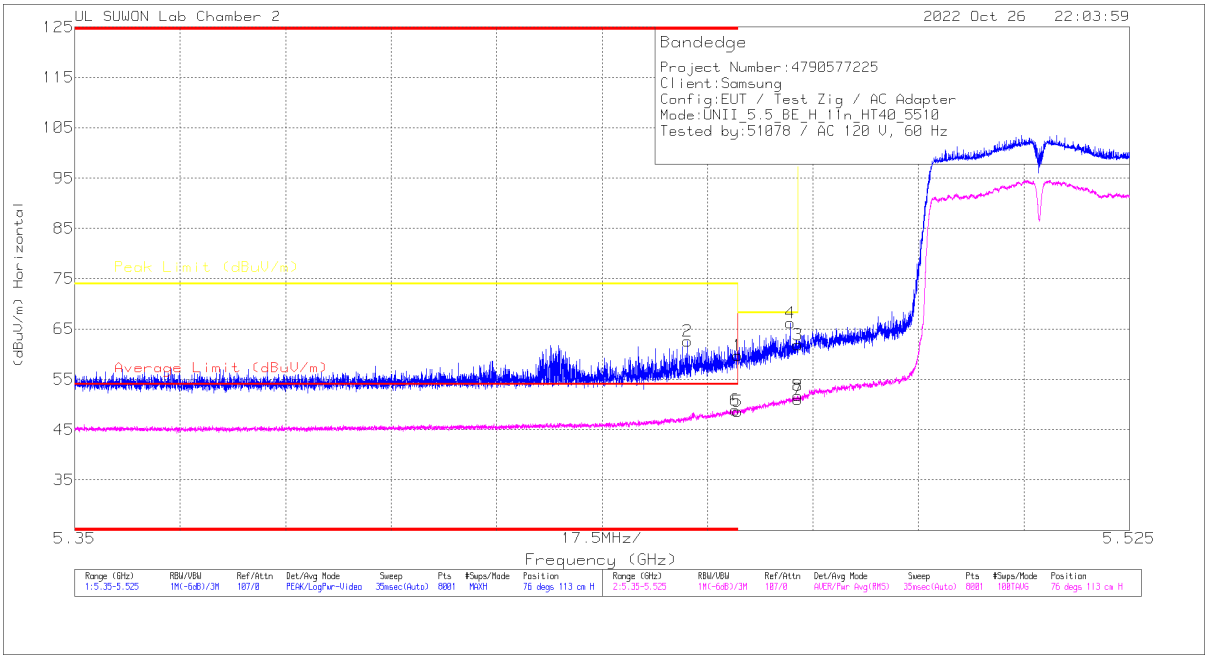
| Mode | Freq. [MHz] | Antenna | Frequency [GHz ] | Reading [ dBuV ] | Detector Mode | ANT Factor | Loss [dB] | DC Corr [ dB ] | Result [ dBuV/m ] | AV Limit [ dBuV/m ] | AV Margin [ dB ] | PK Limit [ dBuV/m ] | PK Margin [ dB ] | Non-Restricted [ dBuV/m ] | Margin [ dB ] | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11a | 5260 | ANT1 | * 4.81274 | 46.40 | PK-U | 34.00 | -27.50 | 0.00 | 52.90 | - | - | 74.00 | -21.10 | - | - | 30 | 139 | H |
| | | | * 4.81264 | 39.98 | ADR | 34.00 | -27.50 | 0.00 | 46.48 | 54.00 | -7.52 | - | - | - | - | 30 | 139 | H |
| | | | * 4.81232 | 44.57 | PK-U | 34.00 | -27.50 | 0.00 | 51.07 | - | - | 74.00 | -22.93 | - | - | 113 | 257 | V |
| | | | * 4.81265 | 37.07 | ADR | 34.00 | -27.50 | 0.00 | 43.57 | 54.00 | -10.43 | - | - | - | - | 113 | 257 | V |
| | | | 7.013 | 38.92 | PK-U | 35.60 | -25.20 | 0.00 | 49.32 | - | - | - | - | 68.20 | -18.88 | 87 | 129 | H |
| | | | 7.013 | 41.37 | PK-U | 35.60 | -25.20 | 0.00 | 51.77 | - | - | - | - | 68.20 | **-16.43** | 201 | 118 | V |
| | | | * 15.77816 | 34.97 | PK-U | 40.20 | -19.00 | 0.00 | 56.17 | - | - | 74.00 | -17.83 | - | - | 0 | 100 | H |
| | | | * 15.78114 | 35.07 | PK-U | 40.20 | -19.00 | 0.00 | 56.27 | - | - | 74.00 | -17.73 | - | - | 0 | 100 | V |
| | 5300 | ANT1 | * 4.81255 | 46.59 | PK-U | 34.00 | -27.50 | 0.00 | 53.09 | - | - | 74.00 | -20.91 | - | - | 32 | 269 | H |
| | | | * 4.81259 | 39.97 | ADR | 34.00 | -27.50 | 0.30 | 46.77 | 54.00 | **-7.23** | - | - | - | - | 32 | 269 | H |
| | | | * 4.81283 | 44.50 | PK-U | 34.00 | -27.60 | 0.00 | 50.90 | - | - | 74.00 | -23.10 | - | - | 45 | 103 | V |
| | | | * 4.8127 | 35.97 | ADR | 34.00 | -27.50 | 0.30 | 42.77 | 54.00 | -11.23 | - | - | - | - | 45 | 103 | V |
| | | | 7.067 | 37.67 | PK-U | 35.60 | -23.90 | 0.00 | 49.37 | - | - | - | - | 68.20 | -18.83 | 94 | 107 | H |
| | | | 7.066 | 39.51 | PK-U | 35.60 | -23.90 | 0.00 | 51.21 | - | - | - | - | 68.20 | -16.99 | 210 | 115 | V |
| | | | * 15.89375 | 34.52 | PK-U | 40.30 | -18.70 | 0.00 | 56.12 | - | - | 74.00 | -17.88 | - | - | 0 | 100 | H |
| | | | * 15.89683 | 34.91 | PK-U | 40.30 | -18.80 | 0.00 | 56.41 | - | - | 74.00 | -17.59 | - | - | 0 | 100 | V |
| | 5320 | ANT1 | * 4.81262 | 46.32 | PK-U | 34.00 | -27.50 | 0.00 | 52.82 | - | - | 74.00 | -21.18 | - | - | 34 | 125 | H |
| | | | * 4.81261 | 39.77 | ADR | 34.00 | -27.50 | 0.30 | 46.57 | 54.00 | -7.43 | - | - | - | - | 34 | 125 | H |
| | | | * 4.81265 | 44.45 | PK-U | 34.00 | -27.50 | 0.00 | 50.95 | - | - | 74.00 | -23.05 | - | - | 48 | 103 | V |
| | | | * 4.81266 | 36.36 | ADR | 34.00 | -27.50 | 0.30 | 43.16 | 54.00 | -10.84 | - | - | - | - | 48 | 103 | V |
| | | | 7.093 | 37.38 | PK-U | 35.60 | -23.50 | 0.00 | 49.48 | - | - | - | - | 68.20 | -18.72 | 19 | 103 | H |
| | | | 7.094 | 39.47 | PK-U | 35.60 | -23.50 | 0.00 | 51.57 | - | - | - | - | 68.20 | -16.63 | 221 | 125 | V |
| | | | * 15.95875 | 34.72 | PK-U | 40.40 | -19.00 | 0.00 | 56.12 | - | - | 74.00 | -17.88 | - | - | 0 | 100 | H |
| | | | * 15.95544 | 35.11 | PK-U | 40.40 | -18.90 | 0.00 | 56.61 | - | - | 74.00 | **-17.39** | - | - | 0 | 100 | V |

Note1. PK-U - U-NII: Maximum Peak / ADR - U-NII AD primary method, RMS average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

# 11.3. TX ABOVE 1GHz 1Tx MODE IN THE 5.5 GHz BAND

**BANDEDGE (WORST CASE: 802.11n HT40 / 5510 MHz)**

**HORIZONTAL PEAK AND AVERAGE DATA**




Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 10dB_ATT[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 | * 5.45999 | 42.41 | Pk | 34.4 | -17.1 | 0 | 59.71 | - | - | 74 | -14.29 | 76 | 113 | H |
| 2 | * 5.4517 | 45.33 | Pk | 34.4 | -17.1 | 0 | 62.63 | - | - | 74 | -11.37 | 76 | 113 | H |
| 3 | 5.46998 | 44.44 | Pk | 34.4 | -17 | 0 | 61.84 | - | - | 68.2 | -6.36 | 76 | 113 | H |
| 4 | 5.46869 | 48.87 | Pk | 34.4 | -17.1 | 0 | 66.17 | - | - | 68.2 | -2.03 | 76 | 113 | H |
| 5 | * 5.45999 | 30.68 | RMS | 34.4 | -17.1 | .62 | 48.6 | 54 | -5.4 | - | - | 76 | 113 | H |
| 6 | * 5.45964 | 30.94 | RMS | 34.4 | -17.1 | .62 | 48.86 | 54 | -5.14 | - | - | 76 | 113 | H |
| 7 | 5.46998 | 32.98 | RMS | 34.4 | -17 | .62 | 51 | - | - | - | - | 76 | 113 | H |
| 8 | 5.46996 | 33.7 | RMS | 34.4 | -17 | .62 | 51.72 | - | - | - | - | 76 | 113 | H |

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

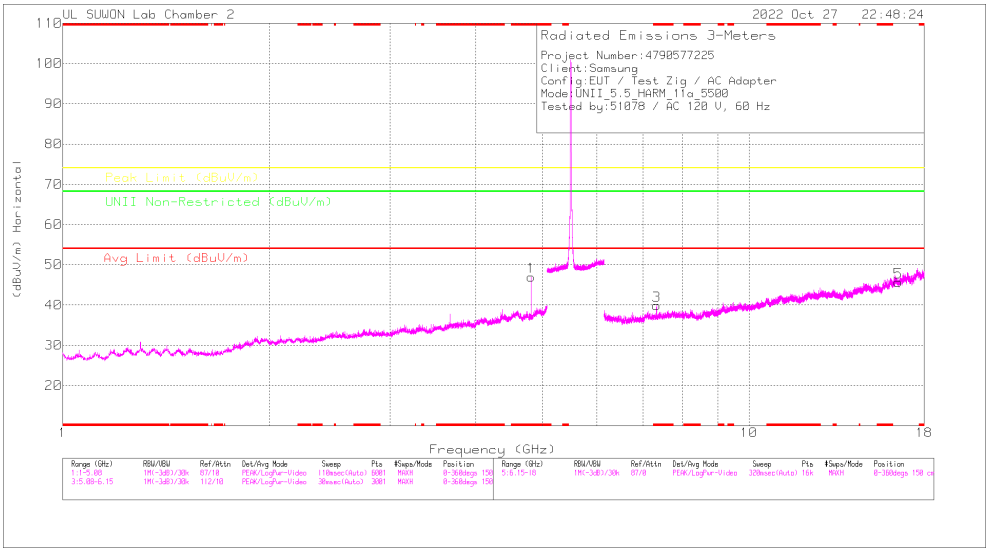
## BANDEDGE TEST DATA

| Mode | Freq. [MHz] | Antenna | Frequency [GHz ] | Reading [ dBuV ] | Detector Mode | ANT Factor | Loss [dB] | DC Corr [ dB ] | Result [ dBuV/m ] | AV Limit [ dBuV/m ] | AV Margin [ dB ] | PK Limit [ dBuV/m ] | PK Margin [ dB ] | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11a | 5500 | ANT1 | * 5.45999 | 41.61 | Pk | 34.40 | -17.10 | 0.00 | 58.91 | - | - | 74.00 | -15.09 | 79 | 109 | H |
| | | | * 5.45933 | 45.75 | Pk | 34.40 | -17.00 | 0.00 | 63.15 | - | - | 74.00 | -10.85 | 79 | 109 | H |
| | | | 5.46998 | 45.76 | Pk | 34.40 | -17.00 | 0.00 | 63.16 | - | - | 68.20 | -5.04 | 79 | 109 | H |
| | | | 5.46902 | 48.62 | Pk | 34.40 | -17.10 | 0.00 | 65.92 | - | - | 68.20 | -2.28 | 79 | 109 | H |
| | | | * 5.45999 | 29.96 | RMS | 34.40 | -17.10 | 0.30 | 47.56 | 54.00 | -6.44 | - | - | 79 | 109 | H |
| | | | * 5.45979 | 30.69 | RMS | 34.40 | -17.10 | 0.30 | 48.29 | 54.00 | -5.71 | - | - | 79 | 109 | H |
| | | | 5.46998 | 33.80 | RMS | 34.40 | -17.00 | 0.30 | 51.50 | - | - | - | - | 79 | 109 | H |
| | | | 5.46983 | 34.03 | RMS | 34.40 | -17.00 | 0.30 | 51.73 | - | - | - | - | 79 | 109 | H |
| | | | * 5.45999 | 39.27 | Pk | 34.40 | -17.10 | 0.00 | 56.57 | - | - | 74.00 | -17.43 | 280 | 104 | V |
| | | | * 5.459 | 43.54 | Pk | 34.40 | -17.00 | 0.00 | 60.94 | - | - | 74.00 | -13.06 | 280 | 104 | V |
| | | | 5.46998 | 46.30 | Pk | 34.40 | -17.00 | 0.00 | 63.70 | - | - | 68.20 | -4.50 | 280 | 104 | V |
| | | | 5.46946 | 46.65 | Pk | 34.40 | -17.00 | 0.00 | 64.05 | - | - | 68.20 | -4.15 | 280 | 104 | V |
| | | | * 5.45999 | 29.07 | RMS | 34.40 | -17.10 | 0.30 | 46.67 | 54.00 | -7.33 | - | - | 280 | 104 | V |
| | | | * 5.45944 | 29.14 | RMS | 34.40 | -17.10 | 0.30 | 46.74 | 54.00 | -7.26 | - | - | 280 | 104 | V |
| | | | 5.46998 | 31.24 | RMS | 34.40 | -17.00 | 0.30 | 48.94 | - | - | - | - | 280 | 104 | V |
| | | | 5.46955 | 32.20 | RMS | 34.40 | -17.00 | 0.30 | 49.90 | - | - | - | - | 280 | 104 | V |
| | 5700 | ANT1 | 5.72502 | 40.49 | Pk | 34.60 | -16.80 | 0.00 | 58.29 | - | - | 68.20 | -9.91 | 79 | 128 | H |
| | | | 5.72550 | 46.94 | Pk | 34.60 | -16.80 | 0.00 | 64.74 | - | - | 68.20 | -3.46 | 79 | 128 | H |
| | | | 5.72502 | 36.20 | Pk | 34.60 | -16.80 | 0.00 | 54.00 | - | - | 68.20 | -14.20 | 313 | 392 | V |
| | | | 5.72636 | 41.13 | Pk | 34.60 | -16.80 | 0.00 | 58.93 | - | - | 68.20 | -9.27 | 313 | 392 | V |
| 802.11n (HT20) | 5500 | ANT1 | * 5.45999 | 40.79 | Pk | 34.40 | -17.10 | 0.00 | 58.09 | - | - | 74.00 | -15.91 | 82 | 271 | H |
| | | | * 5.45933 | 44.01 | Pk | 34.40 | -17.00 | 0.00 | 61.41 | - | - | 74.00 | -12.59 | 82 | 271 | H |
| | | | 5.46998 | 46.13 | Pk | 34.40 | -17.00 | 0.00 | 63.53 | - | - | 68.20 | -4.67 | 82 | 271 | H |
| | | | 5.46977 | 47.65 | Pk | 34.40 | -17.00 | 0.00 | 65.05 | - | - | 68.20 | -3.15 | 82 | 271 | H |
| | | | * 5.45999 | 28.64 | RMS | 34.40 | -17.10 | 0.32 | 46.26 | 54.00 | -7.74 | - | - | 82 | 271 | H |
| | | | * 5.45878 | 28.96 | RMS | 34.40 | -17.00 | 0.32 | 46.68 | 54.00 | -7.32 | - | - | 82 | 271 | H |
| | | | 5.46998 | 31.93 | RMS | 34.40 | -17.00 | 0.32 | 49.65 | - | - | - | - | 82 | 271 | H |
| | | | 5.46990 | 32.58 | RMS | 34.40 | -17.00 | 0.32 | 50.30 | - | - | - | - | 82 | 271 | H |
| | | | * 5.45999 | 38.36 | Pk | 34.40 | -17.10 | 0.00 | 55.66 | - | - | 74.00 | -18.34 | 332 | 383 | V |
| | | | * 5.4597 | 43.65 | Pk | 34.40 | -17.10 | 0.00 | 60.95 | - | - | 74.00 | -13.05 | 332 | 383 | V |
| | | | 5.46998 | 43.45 | Pk | 34.40 | -17.00 | 0.00 | 60.85 | - | - | 68.20 | -7.35 | 332 | 383 | V |
| | | | 5.46946 | 48.23 | Pk | 34.40 | -17.00 | 0.00 | 65.63 | - | - | 68.20 | -2.57 | 332 | 383 | V |
| | | | * 5.45999 | 28.46 | RMS | 34.40 | -17.10 | 0.32 | 46.08 | 54.00 | -7.92 | - | - | 332 | 383 | V |
| | | | * 5.45964 | 28.92 | RMS | 34.40 | -17.10 | 0.32 | 46.54 | 54.00 | -7.46 | - | - | 332 | 383 | V |
| | | | 5.46998 | 30.94 | RMS | 34.40 | -17.00 | 0.32 | 48.66 | - | - | - | - | 332 | 383 | V |
| | | | 5.46990 | 31.49 | RMS | 34.40 | -17.00 | 0.32 | 49.21 | - | - | - | - | 332 | 383 | V |
| | 5700 | ANT1 | 5.72502 | 37.76 | Pk | 34.60 | -16.80 | 0.00 | 55.56 | - | - | 68.20 | -12.64 | 77 | 116 | H |
| | | | 5.73000 | 41.90 | Pk | 34.60 | -16.80 | 0.00 | 59.70 | - | - | 68.20 | -8.50 | 77 | 116 | H |
| | | | 5.72502 | 38.28 | Pk | 34.60 | -16.80 | 0.00 | 56.08 | - | - | 68.20 | -12.12 | 140 | 100 | V |
| | | | 5.81839 | 39.86 | Pk | 34.70 | -16.60 | 0.00 | 57.96 | - | - | 68.20 | -10.24 | 140 | 100 | V |
| 802.11n (HT40) | 5510 | ANT1 | * 5.45999 | 42.41 | Pk | 34.40 | -17.10 | 0.00 | 59.71 | - | - | 74.00 | -14.29 | 76 | 113 | H |
| | | | * 5.4517 | 45.33 | Pk | 34.40 | -17.10 | 0.00 | 62.63 | - | - | 74.00 | -11.37 | 76 | 113 | H |
| | | | 5.46998 | 44.44 | Pk | 34.40 | -17.00 | 0.00 | 61.84 | - | - | 68.20 | -6.36 | 76 | 113 | H |
| | | | 5.46869 | 48.87 | Pk | 34.40 | -17.10 | 0.00 | 66.17 | - | - | 68.20 | **-2.03** | 76 | 113 | H |
| | | | * 5.45999 | 30.68 | RMS | 34.40 | -17.10 | 0.62 | 48.60 | 54.00 | -5.40 | - | - | 76 | 113 | H |
| | | | * 5.45964 | 30.94 | RMS | 34.40 | -17.10 | 0.62 | 48.86 | 54.00 | -5.14 | - | - | 76 | 113 | H |
| | | | 5.46998 | 32.98 | RMS | 34.40 | -17.00 | 0.62 | 51.00 | - | - | - | - | 76 | 113 | H |
| | | | 5.46996 | 33.70 | RMS | 34.40 | -17.00 | 0.62 | 51.72 | - | - | - | - | 76 | 113 | H |
| | | | * 5.45999 | 36.42 | Pk | 34.40 | -17.10 | 0.00 | 53.72 | - | - | 74.00 | -20.28 | 277 | 106 | V |
| | | | * 5.45964 | 40.62 | Pk | 34.40 | -17.10 | 0.00 | 57.92 | - | - | 74.00 | -16.08 | 277 | 106 | V |
| | | | 5.46998 | 38.80 | Pk | 34.40 | -17.00 | 0.00 | 56.20 | - | - | 68.20 | -12.00 | 277 | 106 | V |
| | | | 5.46664 | 42.93 | Pk | 34.40 | -17.00 | 0.00 | 60.33 | - | - | 68.20 | -7.87 | 277 | 106 | V |
| | | | * 5.45999 | 28.18 | RMS | 34.40 | -17.10 | 0.62 | 46.10 | 54.00 | -7.90 | - | - | 277 | 106 | V |
| | | | * 5.45859 | 28.49 | RMS | 34.40 | -17.00 | 0.62 | 46.51 | 54.00 | -7.49 | - | - | 277 | 106 | V |
| | | | 5.46998 | 29.70 | RMS | 34.40 | -17.00 | 0.62 | 47.72 | - | - | - | - | 277 | 106 | V |
| | | | 5.46992 | 29.82 | RMS | 34.40 | -17.00 | 0.62 | 47.84 | - | - | - | - | 277 | 106 | V |
| | 5670 | ANT1 | 5.72502 | 41.87 | Pk | 34.60 | -16.80 | 0.00 | 59.67 | - | - | 68.20 | -8.53 | 69 | 209 | H |
| | | | 5.72627 | 45.86 | Pk | 34.60 | -16.80 | 0.00 | 63.66 | - | - | 68.20 | -4.54 | 69 | 209 | H |
| | | | 5.72502 | 39.61 | Pk | 34.60 | -16.80 | 0.00 | 57.41 | - | - | 68.20 | -10.79 | 203 | 116 | V |
| | | | 5.72619 | 42.25 | Pk | 34.60 | -16.80 | 0.00 | 60.05 | - | - | 68.20 | -8.15 | 203 | 116 | V |
| 802.11ac (VHT80) | 5530 | ANT1 | * 5.45999 | 42.35 | Pk | 34.40 | -17.10 | 0.00 | 59.65 | - | - | 74.00 | -14.35 | 75 | 113 | H |
| | | | * 5.45172 | 45.06 | Pk | 34.40 | -17.10 | 0.00 | 62.36 | - | - | 74.00 | -11.64 | 75 | 113 | H |
| | | | 5.46998 | 42.77 | Pk | 34.40 | -17.00 | 0.00 | 60.17 | - | - | 68.20 | -8.03 | 75 | 113 | H |
| | | | 5.46611 | 45.91 | Pk | 34.40 | -17.00 | 0.00 | 63.31 | - | - | 68.20 | -4.89 | 75 | 113 | H |
| | | | * 5.45999 | 31.79 | RMS | 34.40 | -17.10 | 1.15 | 50.24 | 54.00 | -3.76 | - | - | 75 | 113 | H |
| | | | * 5.45894 | 32.64 | RMS | 34.40 | -17.00 | 1.15 | 51.19 | 54.00 | **-2.81** | - | - | 75 | 113 | H |
| | | | 5.46998 | 32.72 | RMS | 34.40 | -17.00 | 1.15 | 51.27 | - | - | - | - | 75 | 113 | H |
| | | | 5.46624 | 33.55 | RMS | 34.40 | -17.00 | 1.15 | 52.10 | - | - | - | - | 75 | 113 | H |
| | | | * 5.45999 | 37.18 | Pk | 34.40 | -17.10 | 0.00 | 54.48 | - | - | 74.00 | -19.52 | 278 | 107 | V |
| | | | * 5.45955 | 41.54 | Pk | 34.40 | -17.10 | 0.00 | 58.84 | - | - | 74.00 | -15.16 | 278 | 107 | V |
| | | | 5.46998 | 37.14 | Pk | 34.40 | -17.00 | 0.00 | 54.54 | - | - | 68.20 | -13.66 | 278 | 107 | V |
| | | | 5.46115 | 41.28 | Pk | 34.40 | -17.00 | 0.00 | 58.68 | - | - | 68.20 | -9.52 | 278 | 107 | V |
| | | | * 5.45999 | 28.72 | RMS | 34.40 | -17.10 | 1.15 | 47.17 | 54.00 | -6.83 | - | - | 278 | 107 | V |
| | | | * 5.45898 | 29.12 | RMS | 34.40 | -17.00 | 1.15 | 47.67 | 54.00 | -6.33 | - | - | 278 | 107 | V |
| | | | 5.46998 | 28.71 | RMS | 34.40 | -17.00 | 1.15 | 47.26 | - | - | - | - | 278 | 107 | V |
| | | | 5.46648 | 29.56 | RMS | 34.40 | -17.00 | 1.15 | 48.11 | - | - | - | - | 278 | 107 | V |
| | 5610 | ANT1 | 5.72502 | 40.92 | Pk | 34.60 | -16.80 | 0.00 | 58.72 | - | - | 68.20 | -9.48 | 72 | 124 | H |
| | | | 5.72898 | 43.18 | Pk | 34.60 | -16.80 | 0.00 | 60.98 | - | - | 68.20 | -7.22 | 72 | 124 | H |
| | | | 5.72502 | 36.32 | Pk | 34.60 | -16.80 | 0.00 | 54.12 | - | - | 68.20 | -14.08 | 203 | 103 | V |
| | | | 5.73536 | 40.06 | Pk | 34.60 | -16.80 | 0.00 | 57.86 | - | - | 68.20 | -10.34 | 203 | 103 | V |

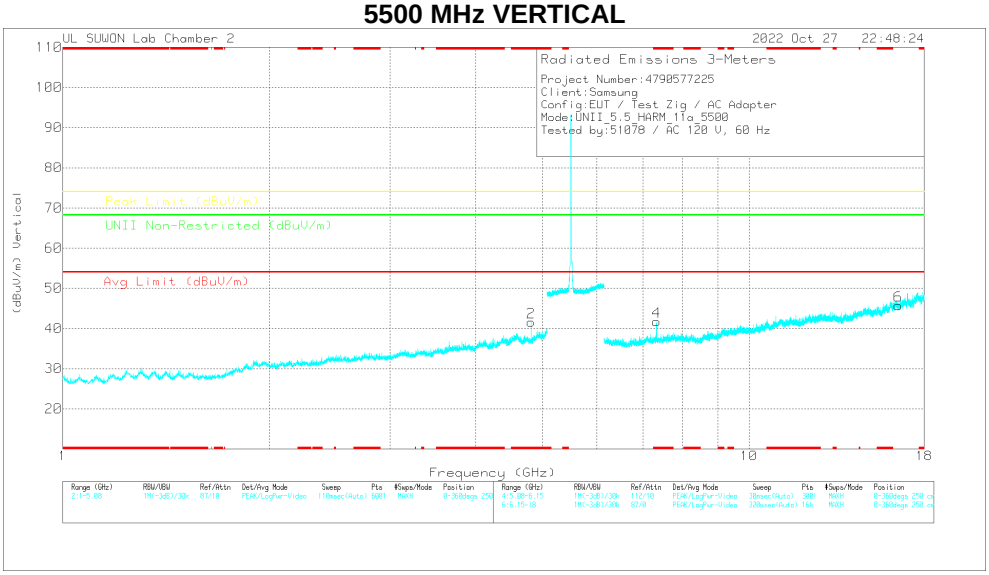
Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

## HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5500 MHz)

### 5500 MHz HORIZONTAL




### 5500 MHz VERTICAL




Note. Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## Radiated Emissions

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 5GHz_LP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | UNII Non-Restricted (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.81272 | 46.02 | PK-U | 34 | -27.5 | 0 | 52.52 | - | - | 74 | -21.48 | - | - | 35 | 125 | H |
| * 4.81265 | 39.68 | ADR | 34 | -27.5 | .3 | 46.48 | 54 | -7.52 | - | - | - | - | 35 | 125 | H |
| * 4.81278 | 43.91 | PK-U | 34 | -27.6 | 0 | 50.31 | - | - | 74 | -23.69 | - | - | 47 | 100 | V |
| * 4.81266 | 35.91 | ADR | 34 | -27.5 | .3 | 42.71 | 54 | -11.29 | - | - | - | - | 47 | 100 | V |

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 6GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | UNII Non-Restricted (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 7.33341 | 38.65 | PK-U | 35.7 | -24.7 | 0 | 49.65 | - | - | 74 | -24.35 | - | - | 7 | 113 | H |
| * 7.33329 | 27.51 | ADR | 35.7 | -24.7 | .3 | 38.81 | 54 | -15.19 | - | - | - | - | 7 | 113 | H |
| * 7.33354 | 39.94 | PK-U | 35.7 | -24.7 | 0 | 50.94 | - | - | 74 | -23.06 | - | - | 111 | 104 | V |
| * 7.33336 | 30.57 | ADR | 35.7 | -24.7 | .3 | 41.87 | 54 | -12.13 | - | - | - | - | 111 | 104 | V |
| 16.50591 | 34.11 | PK-U | 40.9 | -19.1 | 0 | 55.91 | - | - | - | - | 68.2 | -12.29 | 0 | 100 | H |
| 16.49458 | 34.34 | PK-U | 40.9 | -19 | 0 | 56.24 | - | - | - | - | 68.2 | -11.96 | 0 | 100 | 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

## HARMONICS AND SPURIOUS EMISSIONS TEST DATA

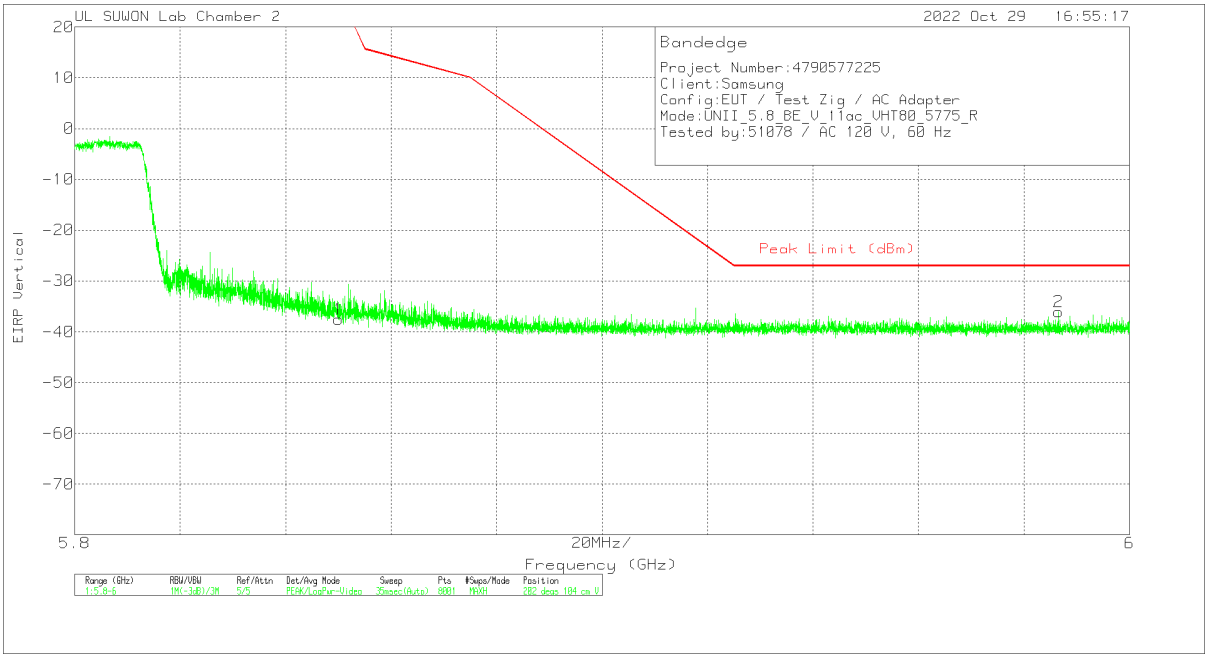
| Mode | Freq. [MHz] | Antenna | Frequency [GHz ] | Reading [ dBuV ] | Detector Mode | ANT Factor | Loss [dB] | DC Corr [ dB ] | Result [ dBuV/m ] | AV Limit [ dBuV/m ] | AV Margin [ dB ] | PK Limit [ dBuV/m ] | PK Margin [ dB ] | Non-Restricted [ dBuV/m ] | Margin [ dB ] | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11a | 5500 | ANT1 | * 4.81272 | 46.02 | PK-U | 34.00 | -27.50 | 0.00 | 52.52 | - | - | 74.00 | -21.48 | - | - | 35 | 125 | H |
| | | | * 4.81265 | 39.68 | ADR | 34.00 | -27.50 | 0.30 | 46.48 | 54.00 | **-7.52** | - | - | - | - | 35 | 125 | H |
| | | | * 4.81278 | 43.91 | PK-U | 34.00 | -27.60 | 0.00 | 50.31 | - | - | 74.00 | -23.69 | - | - | 47 | 100 | V |
| | | | * 4.81266 | 35.91 | ADR | 34.00 | -27.50 | 0.30 | 42.71 | 54.00 | -11.29 | - | - | - | - | 47 | 100 | V |
| | | | * 7.33341 | 38.65 | PK-U | 35.70 | -24.70 | 0.00 | 49.65 | - | - | 74.00 | -24.35 | - | - | 7 | 113 | H |
| | | | * 7.33329 | 27.51 | ADR | 35.70 | -24.70 | 0.30 | 38.81 | 54.00 | -15.19 | - | - | - | - | 7 | 113 | H |
| | | | * 7.33354 | 39.94 | PK-U | 35.70 | -24.70 | 0.00 | 50.94 | - | - | 74.00 | -23.06 | - | - | 111 | 104 | V |
| | | | * 7.33336 | 30.57 | ADR | 35.70 | -24.70 | 0.30 | 41.87 | 54.00 | -12.13 | - | - | - | - | 111 | 104 | V |
| | | | 16.506 | 34.11 | PK-U | 40.90 | -19.10 | 0.00 | 55.91 | - | - | - | - | 68.20 | -12.29 | 0 | 100 | H |
| | | | 16.495 | 34.34 | PK-U | 40.90 | -19.00 | 0.00 | 56.24 | - | - | - | - | 68.20 | -11.96 | 0 | 100 | V |
| | 5580 | ANT1 | * 4.81268 | 45.90 | PK-U | 34.00 | -27.50 | 0.00 | 52.40 | - | - | 74.00 | -21.60 | - | - | 35 | 125 | H |
| | | | * 4.81258 | 39.64 | ADR | 34.00 | -27.50 | 0.30 | 46.44 | 54.00 | -7.56 | - | - | - | - | 35 | 125 | H |
| | | | * 4.81282 | 43.92 | PK-U | 34.00 | -27.60 | 0.00 | 50.32 | - | - | 74.00 | -23.68 | - | - | 47 | 100 | V |
| | | | * 4.81268 | 35.86 | ADR | 34.00 | -27.50 | 0.30 | 42.66 | 54.00 | -11.34 | - | - | - | - | 47 | 100 | V |
| | | | * 7.44244 | 37.36 | PK-U | 35.70 | -24.00 | 0.00 | 49.06 | - | - | 74.00 | -24.94 | - | - | 82 | 100 | H |
| | | | * 7.44004 | 25.41 | ADR | 35.70 | -24.00 | 0.30 | 37.41 | 54.00 | -16.59 | - | - | - | - | 82 | 100 | H |
| | | | * 7.44023 | 38.45 | PK-U | 35.70 | -24.00 | 0.00 | 50.15 | - | - | 74.00 | -23.85 | - | - | 106 | 101 | V |
| | | | * 7.43999 | 27.36 | ADR | 35.70 | -24.00 | 0.30 | 39.36 | 54.00 | -14.64 | - | - | - | - | 106 | 101 | V |
| | | | 16.735 | 34.48 | PK-U | 41.20 | -18.50 | 0.00 | 57.18 | - | - | - | - | 68.20 | -11.02 | 0 | 100 | H |
| | | | 16.739 | 34.53 | PK-U | 41.20 | -18.20 | 0.00 | 57.53 | - | - | - | - | 68.20 | -10.67 | 0 | 100 | V |
| | 5700 | ANT1 | * 4.81264 | 45.68 | PK-U | 34.00 | -27.50 | 0.00 | 52.18 | - | - | 74.00 | -21.82 | - | - | 36 | 114 | H |
| | | | * 4.8126 | 39.58 | ADR | 34.00 | -27.50 | 0.30 | 46.38 | 54.00 | -7.62 | - | - | - | - | 36 | 114 | H |
| | | | * 4.81278 | 44.35 | PK-U | 34.00 | -27.60 | 0.00 | 50.75 | - | - | 74.00 | -23.25 | - | - | 48 | 245 | V |
| | | | * 4.8126 | 36.07 | ADR | 34.00 | -27.50 | 0.30 | 42.87 | 54.00 | -11.13 | - | - | - | - | 48 | 245 | V |
| | | | 8.526 | 35.36 | PK-U | 36.00 | -22.70 | 0.00 | 48.66 | - | - | - | - | 68.20 | -19.54 | 0 | 100 | H |
| | | | 8.542 | 35.16 | PK-U | 36.00 | -22.30 | 0.00 | 48.86 | - | - | - | - | 68.20 | -19.34 | 0 | 100 | V |
| | | | * 11.39583 | 34.37 | PK-U | 38.10 | -20.20 | 0.00 | 52.27 | - | - | 74.00 | -21.73 | - | - | 0 | 100 | H |
| | | | * 11.39832 | 33.94 | PK-U | 38.10 | -20.00 | 0.00 | 52.04 | - | - | 74.00 | -21.96 | - | - | 0 | 100 | V |
| | | | 17.075 | 34.69 | PK-U | 41.20 | -18.00 | 0.00 | 57.89 | - | - | - | - | 68.20 | **-10.31** | 0 | 100 | H |
| | | | 17.104 | 34.57 | PK-U | 41.20 | -18.40 | 0.00 | 57.37 | - | - | - | - | 68.20 | -10.83 | 0 | 100 | V |
| | 5720 | ANT1 | * 4.81244 | 45.68 | PK-U | 34.00 | -27.50 | 0.00 | 52.18 | - | - | 74.00 | -21.82 | - | - | 36 | 113 | H |
| | | | * 4.81264 | 39.56 | ADR | 34.00 | -27.50 | 0.30 | 46.36 | 54.00 | -7.64 | - | - | - | - | 36 | 113 | H |
| | | | * 4.81278 | 43.92 | PK-U | 34.00 | -27.60 | 0.00 | 50.32 | - | - | 74.00 | -23.68 | - | - | 48 | 244 | V |
| | | | * 4.81268 | 35.93 | ADR | 34.00 | -27.50 | 0.30 | 42.73 | 54.00 | -11.27 | - | - | - | - | 48 | 244 | V |
| | | | 8.589 | 34.20 | PK-U | 36.00 | -21.50 | 0.00 | 48.70 | - | - | - | - | 68.20 | -19.50 | 0 | 100 | H |
| | | | 8.558 | 34.60 | PK-U | 36.00 | -21.90 | 0.00 | 48.70 | - | - | - | - | 68.20 | -19.50 | 0 | 100 | V |
| | | | * 11.44231 | 34.27 | PK-U | 38.10 | -19.80 | 0.00 | 52.57 | - | - | 74.00 | -21.43 | - | - | 0 | 100 | H |
| | | | * 11.42521 | 34.99 | PK-U | 38.10 | -20.00 | 0.00 | 53.09 | - | - | 74.00 | **-20.91** | - | - | 0 | 100 | V |
| | | | 17.153 | 33.74 | PK-U | 41.20 | -17.80 | 0.00 | 57.14 | - | - | - | - | 68.20 | -11.06 | 0 | 100 | H |
| | | | 17.186 | 33.84 | PK-U | 41.20 | -18.30 | 0.00 | 56.74 | - | - | - | - | 68.20 | -11.46 | 0 | 100 | V |

Note1. PK-U - U-NII: Maximum Peak / ADR - U-NII AD primary method, RMS average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

## 11.4. TX ABOVE 1GHz 1Tx MODE IN THE 5.8 GHz BAND

**BANDEDGE (WORST CASE: 802.11ac VHT80 / 5775 Upper side MHz)**

**VERTICAL PEAK DATA**




Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBm) | Det | 3117_00168724 | 10dB_ATT[dB] | Conversion Factor (dB) | DC Corr (dB) | Corrected Reading EIRP | Peak Limit (dBm) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.85003 | -67.55 | Pk | 34.8 | -16.6 | 11.8 | 0 | -37.55 | 26.94 | -64.49 | 202 | 104 | V |
| 2 | 5.98658 | -66.53 | Pk | 35 | -16.3 | 11.8 | 0 | -36.03 | -27 | -9.03 | 202 | 104 | V |

Pk - Peak detector

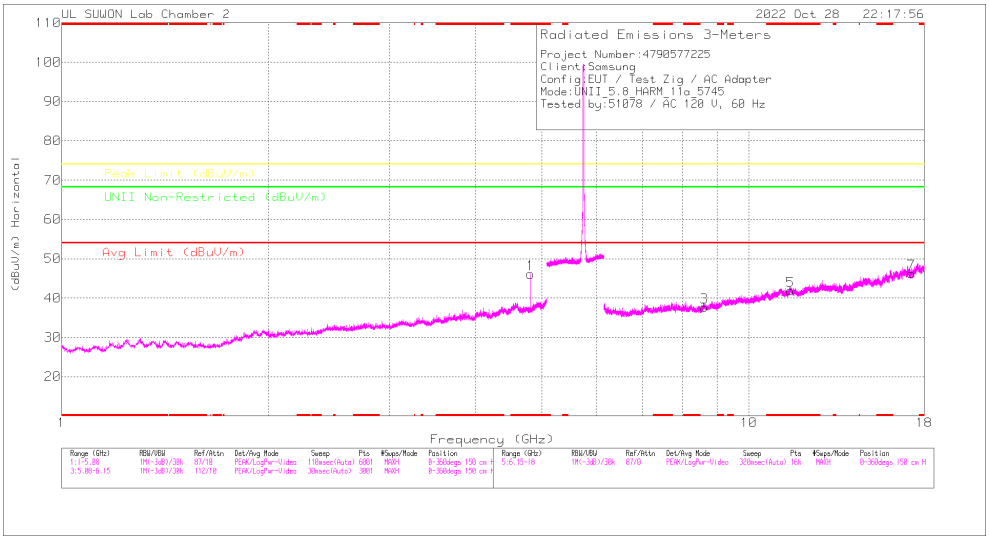
## BANDEDGE TEST DATA

| Mode | Freq. [MHz] | Antenna | Frequency [GHz ] | Reading [ dBm ] | Detector Mode | ANT Factor | Loss [dB] | Conv. F [dB] | DC Corr [dB] | Result [ dBm ] | PK Limit [ dBm ] | PK Margin [ dB ] | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11a | 5745 | ANT1 | 5.72499 | -49.21 | Pk | 34.60 | -16.80 | 11.80 | 0.00 | -19.61 | 26.97 | -46.58 | 78 | 113 | H |
| | | | 5.64905 | -66.49 | Pk | 34.50 | -16.90 | 11.80 | 0.00 | -37.09 | -27.00 | -10.09 | 78 | 113 | H |
| | | | 5.72499 | -53.97 | Pk | 34.60 | -16.80 | 11.80 | 0.00 | -24.37 | 26.97 | -51.34 | 306 | 391 | V |
| | | | 5.64686 | -66.62 | Pk | 34.50 | -16.90 | 11.80 | 0.00 | -37.22 | -27.00 | -10.22 | 306 | 391 | V |
| | 5825 | ANT1 | 5.85003 | -59.53 | Pk | 34.80 | -16.60 | 11.80 | 0.00 | -29.53 | 26.94 | -56.47 | 79 | 118 | H |
| | | | 5.99820 | -67.37 | Pk | 35.00 | -16.20 | 11.80 | 0.00 | -36.77 | -27.00 | -9.77 | 79 | 118 | H |
| | | | 5.85003 | -60.37 | Pk | 34.80 | -16.60 | 11.80 | 0.00 | -30.37 | 26.94 | -57.31 | 297 | 391 | V |
| | | | 5.95948 | -67.40 | Pk | 35.00 | -16.40 | 11.80 | 0.00 | -37.00 | -27.00 | -10.00 | 297 | 391 | V |
| 802.11n (HT20) | 5745 | ANT1 | 5.72499 | -44.99 | Pk | 34.60 | -16.80 | 11.80 | 0.00 | -15.39 | 26.97 | -42.36 | 76 | 125 | H |
| | | | 5.64471 | -66.92 | Pk | 34.50 | -16.80 | 11.80 | 0.00 | -37.42 | -27.00 | -10.42 | 76 | 125 | H |
| | | | 5.72499 | -53.77 | Pk | 34.60 | -16.80 | 11.80 | 0.00 | -24.17 | 26.97 | -51.14 | 345 | 364 | V |
| | | | 5.64291 | -66.92 | Pk | 34.50 | -16.80 | 11.80 | 0.00 | -37.42 | -27.00 | -10.42 | 345 | 364 | V |
| | 5825 | ANT1 | 5.85003 | -56.04 | Pk | 34.80 | -16.60 | 11.80 | 0.00 | -26.04 | 26.94 | -52.98 | 84 | 109 | H |
| | | | 5.99560 | -67.34 | Pk | 35.00 | -16.20 | 11.80 | 0.00 | -36.74 | -27.00 | -9.74 | 84 | 109 | H |
| | | | 5.85003 | -62.20 | Pk | 34.80 | -16.60 | 11.80 | 0.00 | -32.20 | 26.94 | -59.14 | 335 | 389 | V |
| | | | 5.93918 | -66.94 | Pk | 34.90 | -16.40 | 11.80 | 0.00 | -36.64 | -27.00 | -9.64 | 335 | 389 | V |
| 802.11n (HT40) | 5755 | ANT1 | 5.72499 | -52.85 | Pk | 34.60 | -16.80 | 11.80 | 0.00 | -23.25 | 26.97 | -50.22 | 73 | 393 | H |
| | | | 5.64652 | -65.92 | Pk | 34.50 | -16.90 | 11.80 | 0.00 | -36.52 | -27.00 | -9.52 | 73 | 393 | H |
| | | | 5.72499 | -61.69 | Pk | 34.60 | -16.80 | 11.80 | 0.00 | -32.09 | 26.97 | -59.06 | 200 | 104 | V |
| | | | 5.63220 | -65.81 | Pk | 34.50 | -16.90 | 11.80 | 0.00 | -36.41 | -27.00 | -9.41 | 200 | 104 | V |
| | 5795 | ANT1 | 5.85003 | -60.77 | Pk | 34.80 | -16.60 | 11.80 | 0.00 | -30.77 | 26.94 | -57.71 | 78 | 267 | H |
| | | | 5.94648 | -67.32 | Pk | 34.90 | -16.40 | 11.80 | 0.00 | -37.02 | -27.00 | -10.02 | 78 | 267 | H |
| | | | 5.85003 | -67.19 | Pk | 34.80 | -16.60 | 11.80 | 0.00 | -37.19 | 26.94 | -64.13 | 200 | 104 | V |
| | | | 5.93708 | -67.46 | Pk | 34.90 | -16.40 | 11.80 | 0.00 | -37.16 | -27.00 | -10.16 | 200 | 104 | V |
| 802.11ac (VHT80) | 5775 (Lower side) | ANT1 | 5.72499 | -52.85 | Pk | 34.60 | -16.80 | 11.80 | 0.00 | -23.25 | 26.97 | -50.22 | 73 | 393 | H |
| | | | 5.64652 | -65.92 | Pk | 34.50 | -16.90 | 11.80 | 0.00 | -36.52 | -27.00 | -9.52 | 73 | 393 | H |
| | | | 5.72499 | -69.80 | Pk | 34.60 | -16.80 | 11.80 | 0.00 | -40.20 | 26.97 | -67.17 | 203 | 104 | V |
| | | | 5.64551 | -67.00 | Pk | 34.50 | -16.90 | 11.80 | 0.00 | -37.60 | -27.00 | -10.60 | 203 | 104 | V |
| | 5775 (Upper Side) | ANT1 | 5.85003 | -60.49 | Pk | 34.80 | -16.60 | 11.80 | 0.00 | -30.49 | 26.94 | -57.43 | 73 | 269 | H |
| | | | 5.96088 | -67.02 | Pk | 35.00 | -16.30 | 11.80 | 0.00 | -36.52 | -27.00 | -9.52 | 73 | 269 | H |
| | | | 5.85003 | -67.55 | Pk | 34.80 | -16.60 | 11.80 | 0.00 | -37.55 | 26.94 | -64.49 | 202 | 104 | V |
| | | | 5.98658 | -66.53 | Pk | 35.00 | -16.30 | 11.80 | 0.00 | -36.03 | -27.00 | **-9.03** | 202 | 104 | V |

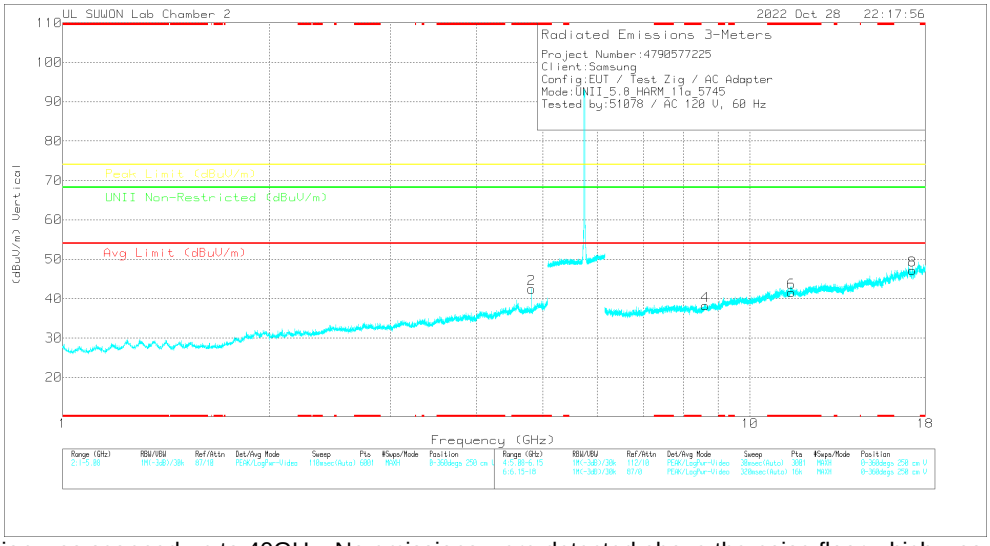
Note. Pk - Peak detector

## HARMONICS AND SPURIOUS EMISSIONS(WORST CASE: 802.11a / 5745 MHz)

### 5745 MHz HORIZONTAL




### 5745 MHz VERTICAL




Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## Radiated Emissions

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 5GHz_LP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | UNII Non-Restricted (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 4.81258 | 45.66 | PK-U | 34 | -27.5 | 0 | 52.16 | - | - | 74 | -21.84 | - | - | 37 | 115 | H |
| * 4.81264 | 39.77 | ADR | 34 | -27.5 | .3 | 46.57 | 54 | -7.43 | - | - | - | - | 37 | 115 | H |
| * 4.81243 | 44.23 | PK-U | 34 | -27.5 | 0 | 50.73 | - | - | 74 | -23.27 | - | - | 125 | 243 | V |
| * 4.81269 | 35.88 | ADR | 34 | -27.5 | .3 | 42.68 | 54 | -11.32 | - | - | - | - | 125 | 243 | V |

| Frequency (GHz) | Meter Reading (dBuV) | Det | 3117_00168724 | 6GHz_HP[dB] | DC Corr (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | UNII Non-Restricted (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8.6037 | 33.91 | PK-U | 36 | -21.3 | 0 | 48.61 | - | - | - | - | 68.2 | -19.59 | 0 | 100 | H |
| 8.6363 | 33.91 | PK-U | 36 | -21.6 | 0 | 48.31 | - | - | - | - | 68.2 | -19.89 | 0 | 100 | V |
| * 11.49685 | 33.9 | PK-U | 38.2 | -19.4 | 0 | 52.7 | - | - | 74 | -21.3 | - | - | 0 | 100 | H |
| * 11.51478 | 34.23 | PK-U | 38.2 | -19.5 | 0 | 52.93 | - | - | 74 | -21.07 | - | - | 0 | 100 | V |
| 17.25503 | 34.01 | PK-U | 41.2 | -17.8 | 0 | 57.41 | - | - | - | - | 68.2 | -10.79 | 0 | 100 | H |
| 17.23722 | 33.81 | PK-U | 41.2 | -17.5 | 0 | 57.51 | - | - | - | - | 68.2 | -10.69 | 0 | 100 | 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

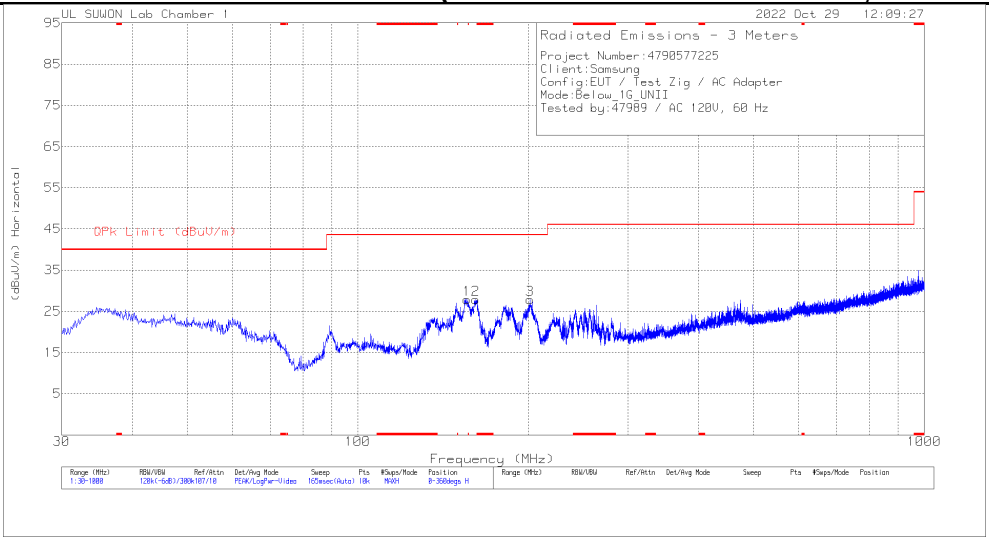
## HARMONICS AND SPURIOUS EMISSIONS TEST DATA

| Mode | Freq. [MHz] | Antenna | Frequency [GHz ] | Reading [ dBuV ] | Detector Mode | ANT Factor | Loss [dB] | DC Corr [ dB ] | Result [ dBuV/m ] | AV Limit [ dBuV/m ] | AV Margin [ dB ] | PK Limit [ dBuV/m ] | PK Margin [ dB ] | Non-Restricted [ dBuV/m ] | Margin [ dB ] | Azimuth [Degs] | Height [cm] | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 802.11a | 5745 | ANT1 | * 4.81258 | 45.66 | PK-U | 34.00 | -27.50 | 0.00 | 52.16 | - | - | 74.00 | -21.84 | - | - | 37 | 115 | H |
| | | | * 4.81264 | 39.77 | ADR | 34.00 | -27.50 | 0.30 | 46.57 | 54.00 | **-7.43** | - | - | - | - | 37 | 115 | H |
| | | | * 4.81243 | 44.23 | PK-U | 34.00 | -27.50 | 0.00 | 50.73 | - | - | 74.00 | -23.27 | - | - | 125 | 243 | V |
| | | | * 4.81269 | 35.88 | ADR | 34.00 | -27.50 | 0.30 | 42.68 | 54.00 | -11.32 | - | - | - | - | 125 | 243 | V |
| | | | 8.604 | 33.91 | PK-U | 36.00 | -21.30 | 0.00 | 48.61 | - | - | - | - | 68.20 | -19.59 | 0 | 100 | H |
| | | | 8.636 | 33.91 | PK-U | 36.00 | -21.60 | 0.00 | 48.31 | - | - | - | - | 68.20 | -19.89 | 0 | 100 | V |
| | | | * 11.49685 | 33.90 | PK-U | 38.20 | -19.40 | 0.00 | 52.70 | - | - | 74.00 | -21.30 | - | - | 0 | 100 | H |
| | | | * 11.51478 | 34.23 | PK-U | 38.20 | -19.50 | 0.00 | 52.93 | - | - | 74.00 | **-21.07** | - | - | 0 | 100 | V |
| | | | 17.255 | 34.01 | PK-U | 41.20 | -17.80 | 0.00 | 57.41 | - | - | - | - | 68.20 | -10.79 | 0 | 100 | H |
| | | | 17.237 | 33.81 | PK-U | 41.20 | -17.50 | 0.00 | 57.51 | - | - | - | - | 68.20 | -10.69 | 0 | 100 | V |
| | 5785 | ANT1 | * 4.81271 | 45.29 | PK-U | 34.00 | -27.50 | 0.00 | 51.79 | - | - | 74.00 | -22.21 | - | - | 35 | 114 | H |
| | | | * 4.81257 | 39.29 | ADR | 34.00 | -27.50 | 0.30 | 46.09 | 54.00 | -7.91 | - | - | - | - | 35 | 114 | H |
| | | | * 4.81257 | 43.93 | PK-U | 34.00 | -27.50 | 0.00 | 50.43 | - | - | 74.00 | -23.57 | - | - | 127 | 242 | V |
| | | | * 4.81259 | 36.16 | ADR | 34.00 | -27.50 | 0.30 | 42.96 | 54.00 | -11.04 | - | - | - | - | 127 | 242 | V |
| | | | 8.680 | 34.99 | PK-U | 36.10 | -22.40 | 0.00 | 48.69 | - | - | - | - | 68.20 | -19.51 | 0 | 100 | H |
| | | | 8.689 | 34.47 | PK-U | 36.10 | -22.60 | 0.00 | 47.97 | - | - | - | - | 68.20 | -20.23 | 0 | 100 | V |
| | | | * 11.55723 | 33.57 | PK-U | 38.20 | -19.60 | 0.00 | 52.17 | - | - | 74.00 | -21.83 | - | - | 0 | 100 | H |
| | | | * 11.57499 | 33.59 | PK-U | 38.20 | -19.80 | 0.00 | 51.99 | - | - | 74.00 | -22.01 | - | - | 0 | 100 | V |
| | | | 17.314 | 34.29 | PK-U | 41.30 | -18.20 | 0.00 | 57.39 | - | - | - | - | 68.20 | -10.81 | 0 | 100 | H |
| | | | 17.354 | 34.13 | PK-U | 41.30 | -17.80 | 0.00 | 57.63 | - | - | - | - | 68.20 | -10.57 | 0 | 100 | V |
| | 5825 | ANT1 | * 4.81262 | 45.63 | PK-U | 34.00 | -27.50 | 0.00 | 52.13 | - | - | 74.00 | -21.87 | - | - | 37 | 115 | H |
| | | | * 4.81266 | 39.70 | ADR | 34.00 | -27.50 | 0.30 | 46.50 | 54.00 | -7.50 | - | - | - | - | 37 | 115 | H |
| | | | * 4.81258 | 43.89 | PK-U | 34.00 | -27.50 | 0.00 | 50.39 | - | - | 74.00 | -23.61 | - | - | 126 | 242 | V |
| | | | * 4.81268 | 35.99 | ADR | 34.00 | -27.50 | 0.30 | 42.79 | 54.00 | -11.21 | - | - | - | - | 126 | 242 | V |
| | | | 8.739 | 35.58 | PK-U | 36.10 | -23.00 | 0.00 | 48.68 | - | - | - | - | 68.20 | -19.52 | 0 | 100 | H |
| | | | 8.750 | 35.51 | PK-U | 36.20 | -23.00 | 0.00 | 48.71 | - | - | - | - | 68.20 | -19.49 | 0 | 100 | V |
| | | | * 11.64722 | 33.64 | PK-U | 38.30 | -19.60 | 0.00 | 52.34 | - | - | 74.00 | -21.66 | - | - | 0 | 100 | H |
| | | | * 11.67004 | 33.93 | PK-U | 38.30 | -19.40 | 0.00 | 52.83 | - | - | 74.00 | -21.17 | - | - | 0 | 100 | V |
| | | | 17.494 | 33.99 | PK-U | 41.50 | -17.80 | 0.00 | 57.69 | - | - | - | - | 68.20 | -10.51 | 0 | 100 | H |
| | | | 17.498 | 34.06 | PK-U | 41.50 | -17.70 | 0.00 | 57.86 | - | - | - | - | 68.20 | **-10.34** | 0 | 100 | V |

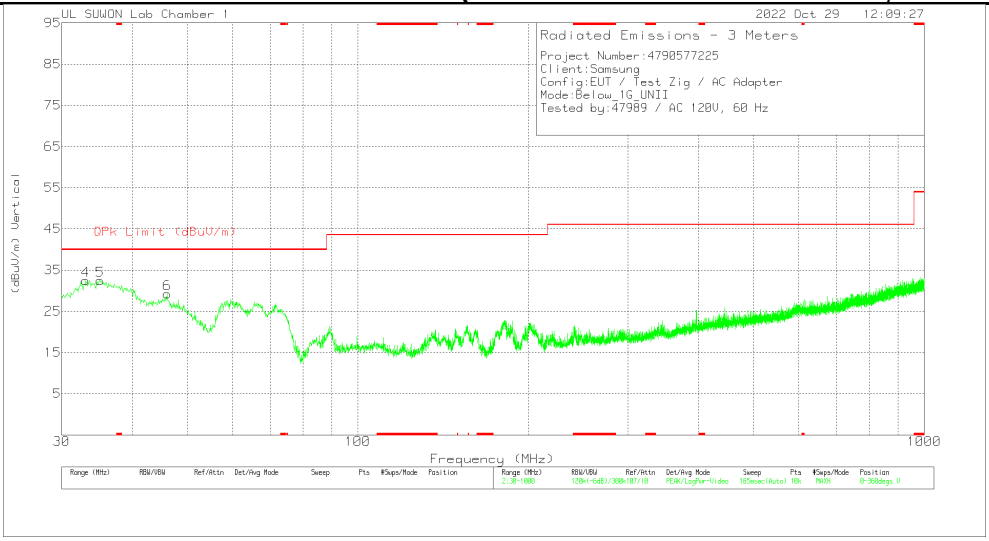
Note1. PK-U - U-NII: Maximum Peak / ADR - U-NII AD primary method, RMS average
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

# 12. WORST-CASE BELOW 1 GHz

## SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)




## SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)




## Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | VULB9163_750 | Below_1G[dB] | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 155.906 | 43.36 | Pk | 14.1 | -29.6 | 27.86 | 43.52 | -15.66 | 0-360 | 100 | H |
| 2 | 161.532 | 43.06 | Pk | 14.3 | -29.5 | 27.86 | 43.52 | -15.66 | 0-360 | 100 | H |
| 3 | 201.399 | 40.89 | Pk | 16.3 | -29.3 | 27.89 | 43.52 | -15.63 | 0-360 | 100 | H |
| 4 | 33.104 | 47.64 | Pk | 15.8 | -31 | 32.44 | 40 | -7.56 | 0-360 | 200 | V |
| 5 | 35.044 | 47.1 | Pk | 16.5 | -31.1 | 32.5 | 40 | -7.5 | 0-360 | 200 | V |
| 6 | 46.102 | 40.7 | Pk | 19.6 | -31.1 | 29.2 | 40 | -10.8 | 0-360 | 200 | V |

Pk - Peak detector

# 13. AC POWER LINE CONDUCTED EMISSIONS

**LIMITS**

FCC §15.207 (a)
IC RSS-GEN Clause 8.8

| Frequency of Emission (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* Decreases with the logarithm of the frequency.

**TEST PROCEDURE**

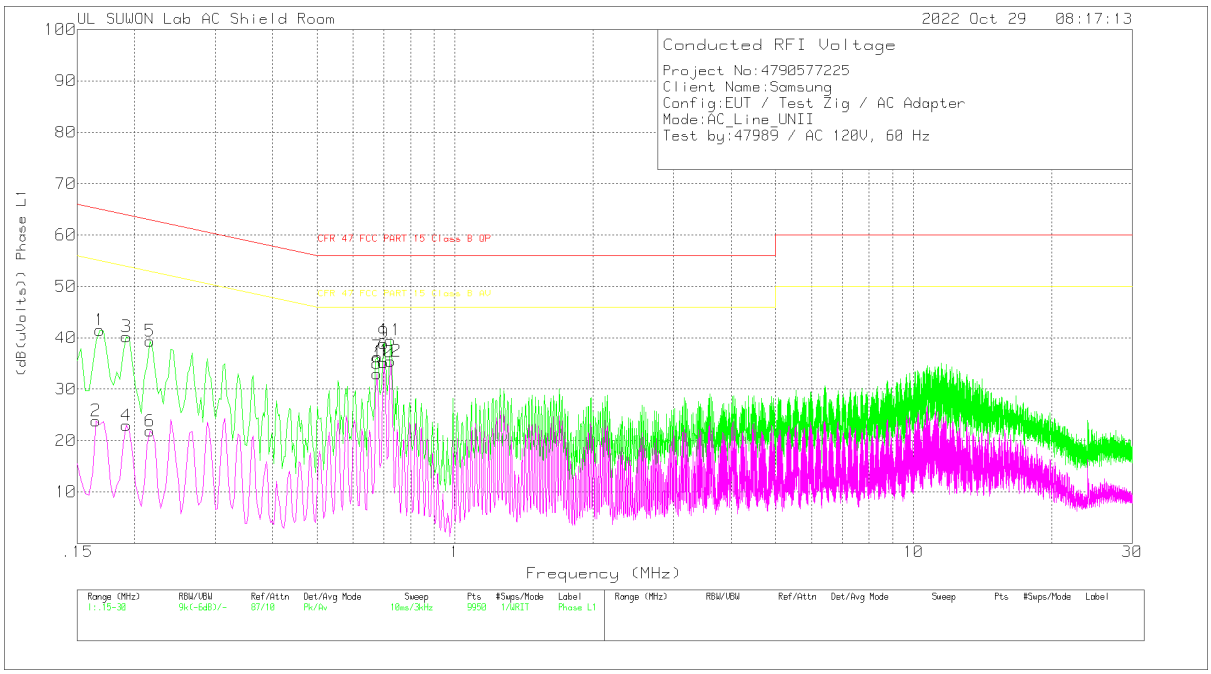
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

**RESULTS**

## LINE 1 DATA



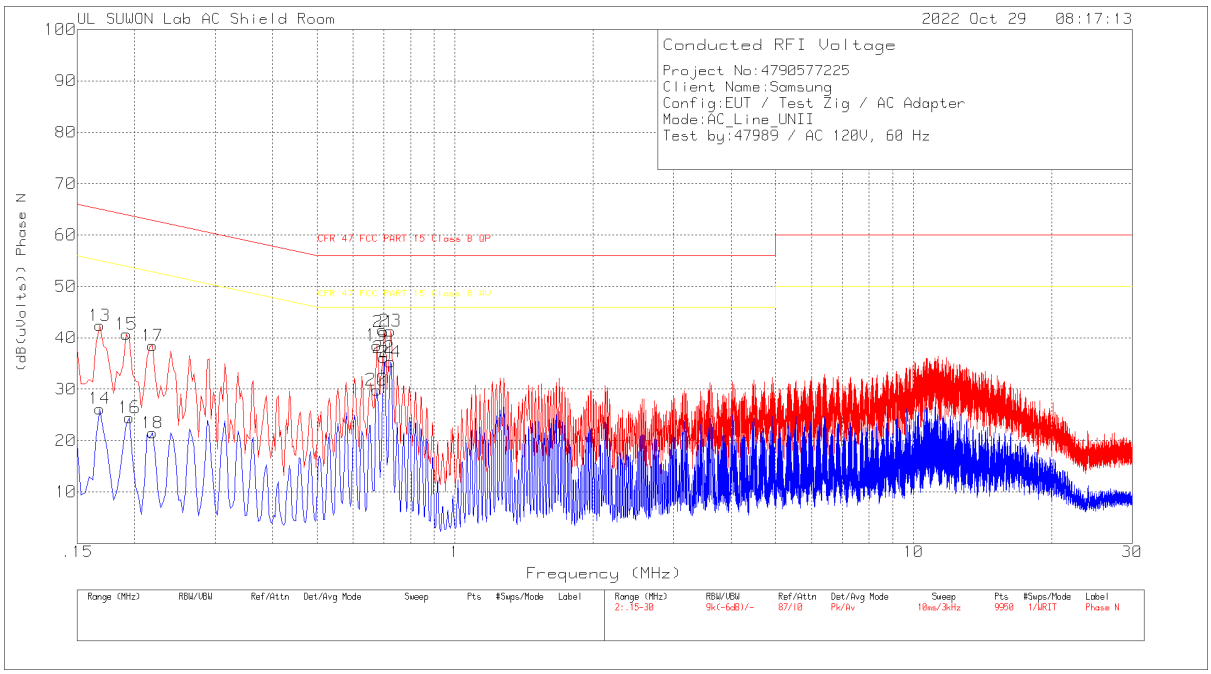

## Trace Markers

Range 1: Phase L1 .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 101836_With EX_L1[dB] | CABLELOSS(dB) | Corrected Reading (dB(uVolts)) | CFR 47 FCC PART 15 Class B QP | Margin (dB) | CFR 47 FCC PART 15 Class B AV | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .168 | 31.39 | Pk | 10 | .1 | 41.49 | 65.06 | -23.57 | - | - |
| 2 | .165 | 13.83 | Av | 9.9 | .1 | 23.83 | - | - | 55.21 | -31.38 |
| 3 | .192 | 30.12 | Pk | 9.9 | .2 | 40.22 | 63.95 | -23.73 | - | - |
| 4 | .192 | 12.83 | Av | 9.9 | .2 | 22.93 | - | - | 53.95 | -31.02 |
| 5 | .216 | 29.36 | Pk | 9.8 | .2 | 39.36 | 62.97 | -23.61 | - | - |
| 6 | .216 | 11.86 | Av | 9.8 | .2 | 21.86 | - | - | 52.97 | -31.11 |
| 7 | .678 | 26.33 | Pk | 9.8 | .2 | 36.33 | 56 | -19.67 | - | - |
| 8 | .675 | 23.02 | Av | 9.8 | .2 | 33.02 | - | - | 46 | -12.98 |
| 9 | .699 | 28.9 | Pk | 9.8 | .2 | 38.9 | 56 | -17.1 | - | - |
| 10 | .699 | 25.24 | Av | 9.8 | .2 | 35.24 | - | - | 46 | -10.76 |
| 11 | .723 | 29.53 | Pk | 9.8 | .2 | 39.53 | 56 | -16.47 | - | - |
| 12 | .723 | 25.46 | Av | 9.8 | .2 | 35.46 | - | - | 46 | -10.54 |

Pk - Peak detector
Av - Average detection

## LINE 2 DATA




Trace Markers

Range 2: Phase N .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 101836_With EX_N[dB] | CABLELOSS(dB) | Corrected Reading (dB(uVolts)) | CFR 47 FCC PART 15 Class B QP | Margin (dB) | CFR 47 FCC PART 15 Class B AV | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 | .168 | 32.3 | Pk | 10 | .1 | 42.4 | 65.06 | -22.66 | - | - |
| 14 | .168 | 16.1 | Av | 10 | .1 | 26.2 | - | - | 55.06 | -28.86 |
| 15 | .192 | 30.6 | Pk | 9.9 | .2 | 40.7 | 63.95 | -23.25 | - | - |
| 16 | .195 | 14.34 | Av | 9.9 | .2 | 24.44 | - | - | 53.82 | -29.38 |
| 17 | .219 | 28.46 | Pk | 9.8 | .2 | 38.46 | 62.86 | -24.4 | - | - |
| 18 | .219 | 11.49 | Av | 9.8 | .2 | 21.49 | - | - | 52.86 | -31.37 |
| 19 | .675 | 28.52 | Pk | 9.8 | .2 | 38.52 | 56 | -17.48 | - | - |
| 20 | .675 | 19.84 | Av | 9.8 | .2 | 29.84 | - | - | 46 | -16.16 |
| 21 | .699 | 31.16 | Pk | 9.8 | .2 | 41.16 | 56 | -14.84 | - | - |
| 22 | .699 | 26.17 | Av | 9.8 | .2 | 36.17 | - | - | 46 | -9.83 |
| 23 | .723 | 31.34 | Pk | 9.8 | .2 | 41.34 | 56 | -14.66 | - | - |
| 24 | .723 | 25.28 | Av | 9.8 | .2 | 35.28 | - | - | 46 | -10.72 |

Pk - Peak detector
Av - Average detection

# 14. DYNAMIC FREQUENCY SELECTION

## 14.1. OVERVIEW

### 14.1.1. LIMITS

**FCC**

§15.407 (h), FCC KDB 905462 D02 “COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION” and KDB 905462 D03 “U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY”.

**Table 1: Applicability of DFS requirements prior to use of a channel**

| Requirement | Operational Mode | | |
|---|---|---|---|
| | Master | Client (without radar detection) | Client (with radar detection) |
| Non-Occupancy Period | Yes | Not required | Yes |
| DFS Detection Threshold | Yes | Not required | Yes |
| Channel Availability Check Time | Yes | Not required | Not required |
| U-NII Detection Bandwidth | Yes | Not required | Yes |

**Table 2: Applicability of DFS requirements during normal operation**

| Requirement | Operational Mode | | |
|---|---|---|---|
| | Master | Client **(without DFS)** | Client **(with DFS)** |
| DFS Detection Threshold | Yes | Not required | Yes |
| Channel Closing Transmission Time | Yes | Yes | Yes |
| Channel Move Time | Yes | Yes | Yes |
| U-NII Detection Bandwidth | Yes | Not required | Yes |

| Additional requirements for devices with multiple bandwidth modes | Master Device or Client with Radar DFS | Client (without DFS) |
|---|---|---|
| U-NII Detection Bandwidth and Statistical Performance Check | All BW modes must be tested | Not required |
| Channel Move Time and Channel Closing Transmission Time | Test using widest BW mode available | Test using the widest BW mode available for the link |
| All other tests | Any single BW mode | Not required |
| **Note**: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in all 20 MHz channel blocks and a null frequency between the bonded 20 MHz channel blocks. | | |

**Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring**

| Maximum Transmit Power | Value (see notes) |
|---|---|
| E.I.R.P. ≥ 200 mill watt | -64 dBm |
| E.I.R.P. < 200 mill watt and power spectral density < 10 dBm/MHz | -62 dBm |
| E.I.R.P. < 200 mill watt that do not meet power spectral density requirement | -64 dBm |

**Note 1:** This is the level at the input of the receiver assuming a 0 dBi receive antenna
**Note 2:** Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
**Note 3:** E.I.R.P. is based on the highest antenna gain. For MIMO devices refer to KDB publication 662911 D01.

**Table 4: DFS Response requirement values**

| Parameter | Value |
|---|---|
| *Non-occupancy period* | 30 minutes |
| *Channel Availability Check Time* | 60 seconds |
| *Channel Move Time* | 10 seconds (See Note 1) |
| *Channel Closing Transmission Time* | 200 milliseconds + approx. 60 milliseconds over remaining 10 second period. (See Notes 1 and 2) |
| *U-NII Detection Bandwidth* | Minimum 100% of the U-NII 99% transmission power bandwidth. (See Note 3) |

**Note 1:** *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
**Note 2:** The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
**Note 3:** During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

**Table 5 – Short Pulse Radar Test Waveforms**

| Radar Type | Pulse Width (usec) | PRI (usec) | Pulses | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|
| 0 | 1 | 1428 | 18 | See Note 1 | See Note 1 |
| 1 | 1 | Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in table 5a | Roundup: {(1/360) x (19 x $10^6$ $PRI_{usec}$)} | 60% | 30 |
| | | Test B: 15 unique PRI values randomly selected within the range of 518-3066 usec. With a minimum increment of 1 usec, excluding PRI values selected in Test A | | | |
| 2 | 1-5 | 150-230 | 23-29 | 60% | 30 |
| 3 | 6-10 | 200-500 | 16-18 | 60% | 30 |
| 4 | 11-20 | 200-500 | 12-16 | 60% | 30 |
| Aggregate (Radar Types 1-4) | | | | 80% | 120 |

**Note 1:** Short Pulse Radar Type 0 should be used for the *Detection Bandwidth* test, *Channel Move Time*, and *Channel Closing Time* tests.

**Table 6 – Long Pulse Radar Test Signal**

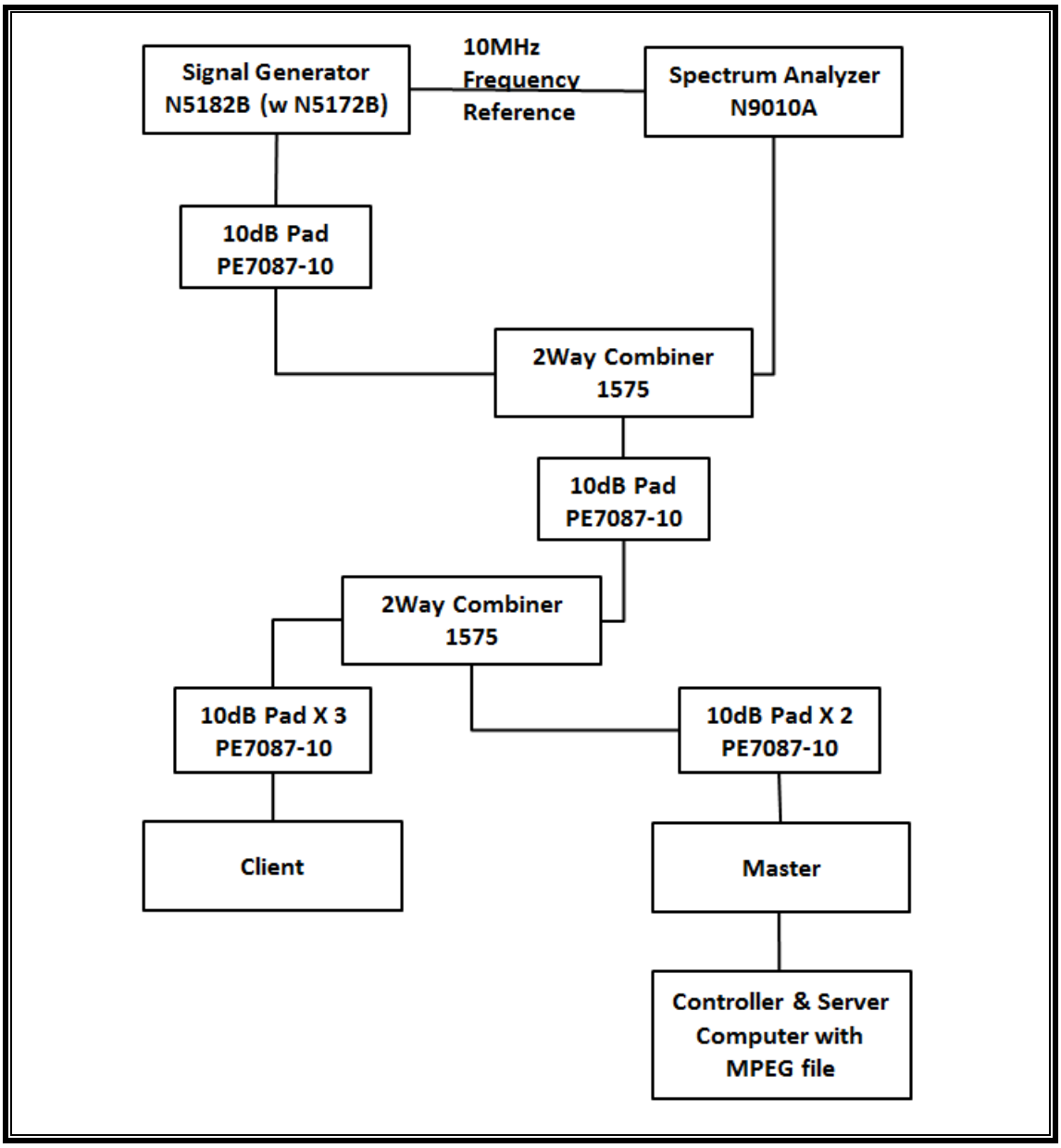
| Radar Waveform Type | Pulse Width (µsec) | Chirp Width (MHz) | PRI (µsec) | Pulses per Burst | Number of Bursts | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 5 | 50-100 | 5-20 | 1000-2000 | 1-3 | 8-20 | 80% | 30 |

**Table 7 – Frequency Hopping Radar Test Signal**

| Radar Waveform Type | Pulse Width (µsec) | PRI (µsec) | Pulses per Hop | Hopping Rate (kHz) | Hopping Sequence Length (msec) | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|---|---|
| 6 | 1 | 333 | 9 | 0.333 | 300 | 70% | 30 |

### 14.1.2. TEST AND MEASUREMENT SYSTEM

**CONDUCTED METHOD SYSTEM BLOCK DIAGRAM**



**SYSTEM OVERVIEW**

The short pulse and long pulse signal generating system utilizes the Keysite Signal Studio for Pulse Building as N5172B. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 1, 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of KDB 905462 D02. The frequency of the signal generator is incremented in 1 MHz steps from $F_L$ to $F_H$ for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

**SYSTEM CALIBRATION**

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.


UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15E(04)
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

## ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

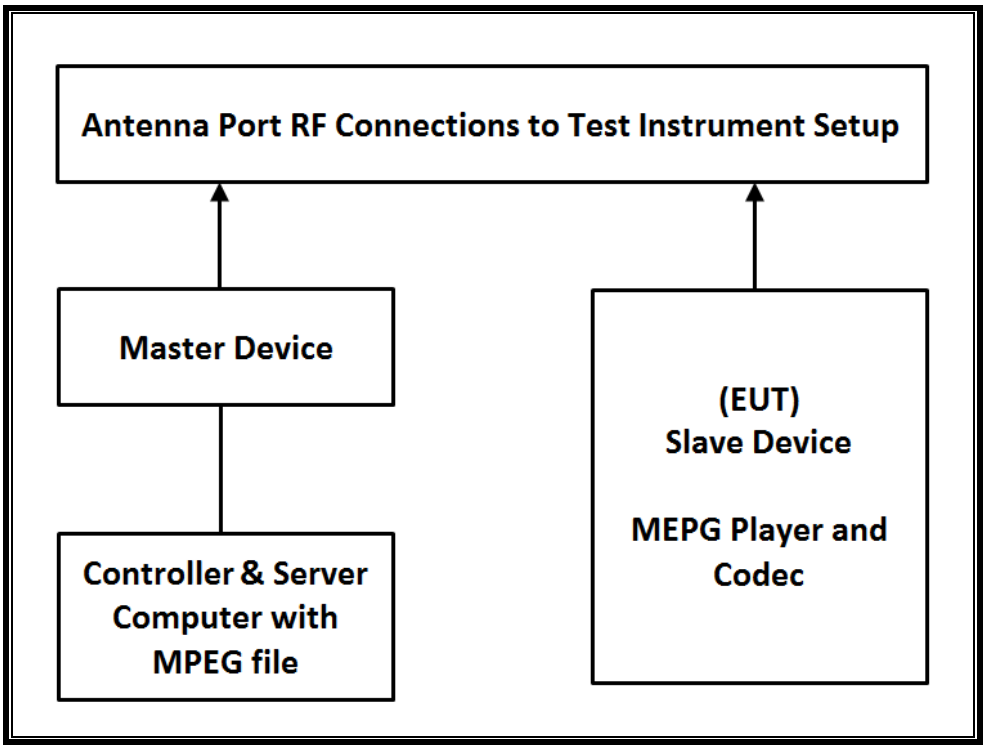
## TEST AND MEASUREMENT EQUIPMENT

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

| TEST EQUIPMENT LIST | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **S/N** | **Next Cal Due** |
| Spectrum Analyzer, 7 GHz | Agilent / HP | N9010A | MY54200580 | 08-01-23 |
| Vector Signal Generator, 6GHz | Agilent / HP | N5182B | MY53051241 | 08-01-23 |
| Combiner | WEINSCHEL | WA1534 | UL001 | 01-20-23 |
| Combiner | WEINSCHEL | WA1534 | UL003 | 01-11-23 |

### 14.1.3. SETUP OF EUT

**CONDUCTED METHOD EUT TEST SETUP**




**SUPPORT EQUIPMENT**

The following support equipment was utilized for the DFS tests documented in this report:

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Serial Number** | **FCC ID** |
| Wireless Access Point | Cisco | AIR-CAP3702E-A-K9 | FTX182276QX | LDK102087 |
| Notebook PC (Controller/Server) | HP | HP EliteDesk 800 G1 TWR | CZC4125J25 | DoC |