

# **RADIO TEST REPORT**

**Product** : HD Wireless Sender & Receiver

**Model Name** : WTR-5500

**FCC ID** : BY4WTR5500

**Test Regulation** : FCC 47 CFR Part 15 Subpart E (Section 15.407)

**Received Date** : 2023/7/13

**Test Date** : 2023/7/24 ~ 2023/8/1

**Issued Date** : 2023/10/24

**Applicant** : Trans Electric Co., Ltd  
771 Sec.2 Chungshan Rd, Huatang, Changhua, Taiwan

**Issued By** : Underwriters Laboratories Taiwan Co., Ltd.  
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd.,  
Zhudong Township, Hsinchu County, Taiwan



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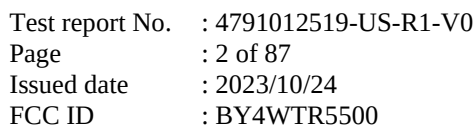
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Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1



**Original Test Report No.: 4791012519-US-R1-V0**

[illegible]

Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

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## 1. Attestation of Test Results

**APPLICANT:** Trans Electric Co., Ltd  
771 Sec.2 Chungshan Rd, Huatang, Changhua, Taiwan

**MANUFACTURER:** Trans Electric Co., Ltd  
771 Sec.2 Chungshan Rd, Huatang, Changhua, Taiwan

**EUT DESCRIPTION:** HD Wireless Sender & Receiver

**BRAND:** PX

**MODEL:** WTR-5500

**SAMPLE STAGE:** Engineering Verification Test sample

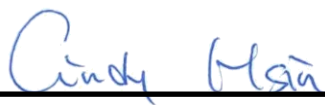
**DATE of TESTED:** 2023/7/24 ~ 2023/8/1

| APPLICABLE STANDARDS                          |              |
|-----------------------------------------------|--------------|
| STANDARD                                      | Test Results |
| FCC 47 CFR PART 15 Subpart E (Section 15.407) | PASS         |

Underwriters Laboratories Taiwan Co., 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 Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. 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 Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., 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 NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

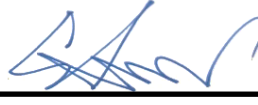
Prepared By:



Cindy Hsin  
Project Handler

Date : 2023/10/24

Approved and Authorized By:



Eric Lee  
Senior Laboratory Engineer

Date : 2023/10/24

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## 2. Summary of Test Results

| Summary of Test Results        |                                                         |            |
|--------------------------------|---------------------------------------------------------|------------|
| FCC Clause                     | Test Items                                              | Result     |
| 15.407(e)                      | 6dB Bandwidth                                           | PASS       |
| 15.403(i)                      | 26dB Bandwidth                                          | PASS       |
| 2.1049                         | Occupied Bandwidth                                      | See Note 1 |
| 15.407(a)(1/2/3)               | Conducted Output Power                                  | PASS       |
| 15.407(a)(1/2/3)               | Power Spectral Density                                  | PASS       |
| 15.407(g)                      | Frequency Stability                                     | PASS       |
| 15.407(b)<br>(1/2/3/4(i/ii)/9) | Radiated Emissions and<br>Band Edge Measurement         | PASS       |
| 15.407(b)(9)                   | AC Power Conducted Emission                             | PASS       |
| 15.203                         | Antenna Requirement                                     | PASS       |
| 15.407(h)                      | Dynamic Frequency Selection & Transmit<br>power control | N/A        |

Note:

1. The Occupied Bandwidth was reference only.

### 3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB 789033 D02 General UNII Test Procedure New Rules v02r01, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013.

### 4. Facilities and Accreditation

|                                  |                                                                                                 |
|----------------------------------|-------------------------------------------------------------------------------------------------|
| <b>Test Location</b>             | Underwriters Laboratories Taiwan Co., Ltd.                                                      |
| <b>Address</b>                   | Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan |
| <b>Accreditation Certificate</b> | Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.          |

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## 5. Measurement Uncertainty

For statement of conformity, simple acceptance (Section 4.3.4 of ISO Guide 115) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k=2$ .

Determining compliance based on the results of the compliance measurement, not considering measurement instrumentation uncertainty.

| Measurement                                    | Frequency      | Uncertainty |
|------------------------------------------------|----------------|-------------|
| Conducted disturbance at mains terminals ports | 150kHz ~ 30MHz | 3.1 dB      |
| RF Conducted                                   | 9 kHz - 40GHz  | 2.3 dB      |
| Radiated disturbance below 30MHz               | 9 kHz - 30 MHz | 3.2 dB      |
| Radiated disturbance below 1 GHz               | 30MHz ~ 1GHz   | 6.1 dB      |
| Radiated disturbance above 1 GHz               | 1GHz ~ 40GHz   | 5.1 dB      |

## 6. Equipment under Test

### 6.1. Description of EUT

|                             |                                                                       |                                                 |
|-----------------------------|-----------------------------------------------------------------------|-------------------------------------------------|
| <b>Product</b>              | HD Wireless Sender & Receiver                                         |                                                 |
| <b>Brand Name</b>           | PX                                                                    |                                                 |
| <b>Model Name</b>           | WTR-5500                                                              |                                                 |
| <b>Operating Frequency</b>  | 5180 ~ 5240 MHz<br>5745 ~ 5825 MHz                                    |                                                 |
| <b>Modulation</b>           | 256QAM, 64QAM, 16QAM, QPSK, BPSK                                      |                                                 |
| <b>Transfer Rate</b>        | 802.11a: up to 54 Mbps<br>802.11n: up to MCS7<br>802.11ac: up to MCS9 |                                                 |
| <b>Number of Channel</b>    | 5180 ~ 5240 MHz                                                       | 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) |
|                             |                                                                       | 2 for 802.11n (HT40), 802.11ac (VHT40)          |
|                             |                                                                       | 1 for 802.11ac (VHT80)                          |
|                             | 5745 ~ 5825 MHz                                                       | 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) |
|                             |                                                                       | 2 for 802.11n (HT40), 802.11ac (VHT40)          |
|                             |                                                                       | 1 for 802.11ac (VHT80)                          |
| <b>Maximum Output Power</b> | 5180 ~ 5240 MHz: 12.87 dBm<br>5745 ~ 5825 MHz: 9.32 dBm               |                                                 |
| <b>Normal Voltage</b>       | 5Vdc from adapter<br>5Vdc from host                                   |                                                 |
| <b>Sample ID</b>            | Conducted Test: 6261654<br>Radiated Test: 6261652                     |                                                 |

**Note:**

1. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitters and one receivers.

| Modulation Mode  | Tx,Rx Function |
|------------------|----------------|
| 802.11a          | 1TX,1RX        |
| 802.11n (HT20)   | 1TX,1RX        |
| 802.11n (HT40)   | 1TX,1RX        |
| 802.11ac (VHT20) | 1TX,1RX        |
| 802.11ac (VHT40) | 1TX,1RX        |
| 802.11ac (VHT80) | 1TX,1RX        |

\* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report.

2. The EUT contains following accessory devices.

| Product              | Brand | Model            | Description                                           |
|----------------------|-------|------------------|-------------------------------------------------------|
| USB cable            | PX    | F1546-02G        | Length: 1 m                                           |
| Adaptor              | AMIGO | AMS195-0502000FU | Input: 100-240Vac ~ 50/60Hz 0.5A<br>Output: 5Vdc 2.0A |
| USB C to HDMI dongle | PX    | B1183G           | -                                                     |

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual, the laboratory shall not be held responsible.

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## 6.2. Channel List

### FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 36      | 5180 MHz  | 44      | 5220 MHz  |
| 40      | 5200 MHz  | 48      | 5240 MHz  |

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 38      | 5190 MHz  | 46      | 5230 MHz  |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 42      | 5210MHz   |

### FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 149     | 5745MHz   | 161     | 5805MHz   |
| 153     | 5765MHz   | 165     | 5825MHz   |
| 157     | 5785MHz   | -       | -         |

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 151     | 5755MHz   | 159     | 5795MHz   |

1 channel is provided for 802.11ac (VHT80):

| Channel | Frequency |
|---------|-----------|
| 155     | 5775MHz   |

### 6.3. Test Condition

| Test Item                          | Test Site No. | Environmental Condition | Input Power     | Test Date                 | Tested by        |
|------------------------------------|---------------|-------------------------|-----------------|---------------------------|------------------|
| Antenna Port Conducted Measurement | SR4           | 22~24°C/<br>60~66%RH    | 5Vdc            | 2023/07/26~<br>2023/07/31 | WaterNil<br>Guan |
| Radiated Spurious Emission         | 966-2         | 22~24°C/<br>59~68%RH    | 5Vdc            | 2023/07/24~<br>2023/08/01 | WaterNil<br>Guan |
| AC power Line Conducted Emission   | SR1           | 24~24°C/<br>67~67%RH    | 110Vac/<br>60Hz | 2023/08/01~<br>2023/08/01 | WaterNil<br>Guan |

FCC Test Firm Registration Number: 498077

#### Sample Calculation:

##### Antenna Port Conducted Measurement:

- Where relevant, the follow sample calculation is provided:  
Result Value (dBm) = Reading Value (dBm) + Attenuator Factor (dB) + Cable Loss (dB).  
Example: Result Value (10dBm) = Reading Value (-2dBm) + Attenuator Factor (10dB) + Cable Loss(2dB).  
\*Test plot only shown the “Result Value”.

##### Radiated Spurious Emission:

- Where relevant, the follow sample calculation is provided:  
Result Value (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m).  
Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) - Preamp Factor (dB).  
Example: Result Value (34.5dBuV/m) = Reading Value (40.1dBuV) + Antenna Factor (18.7dB/m) + Cable Loss (4.2dB) - Preamp Factor (28.5dB).

##### AC power Line Conducted Emission:

- Where relevant, the follow sample calculation is provided:  
Result Value (dBuV) = Reading Value (dBuV) + Correction Factor (dB).  
Correction Factor (dB) = Insertion loss(dB) + Cable loss(dB).  
Example: Result Value (53.7dBuV) = Reading Value (35.1dBuV) + Insertion loss(18.1dB) + Cable loss(0.5dB).

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#### 6.4. Description of Available Antennas

| Ant. No. | Transmitter Circuit | Brand Name | Model Name          | Ant. Type          | Maximum Gain (dBi)                          |
|----------|---------------------|------------|---------------------|--------------------|---------------------------------------------|
| 1        | Chain (0)           | Redbirdtek | RBT-ANT-524-03-A002 | Metal type antenna | 5150-5350 GHz :1.27<br>5710-5850 GHz : 0.67 |

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual, the laboratory shall not be held responsible.

## 6.5. Test Mode Applicability and Tested Channel Detail

- The fundamental of the EUT was investigated in three orthogonal axes X-Y/Y-Z/X-Z, it was determined that Y-Z plane was worst-case. Therefore, all final radiated testing was performed with the EUT in Y-Z plane.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

| Test Item                          | Mode       | Modulation Technology | Modulation Type | Available Channel | Test Channel  | Data Rate |
|------------------------------------|------------|-----------------------|-----------------|-------------------|---------------|-----------|
| Radiated Emissions (Above 1GHz)    | 802.11a    | 5180-5240             | OFDM            | 36 to 48          | 36, 44, 48    | 6Mbps     |
|                                    | 802.11ac20 |                       |                 | 36 to 48          | 36, 44, 48    | MCS0 Nss1 |
|                                    | 802.11ac40 |                       |                 | 38 to 46          | 38, 46        | MCS0 Nss1 |
|                                    | 802.11ac80 |                       |                 | 42                | 42            | MCS0 Nss1 |
|                                    | 802.11a    | 5745-5825             | OFDM            | 149 to 165        | 149, 157, 165 | 6Mbps     |
|                                    | 802.11ac20 |                       |                 | 149 to 165        | 149, 157, 165 | MCS0 Nss1 |
|                                    | 802.11ac40 |                       |                 | 151 to 159        | 151, 159      | MCS0 Nss1 |
|                                    | 802.11ac80 |                       |                 | 155               | 155           | MCS0 Nss1 |
| Radiated Emissions (Below 1GHz)    | 802.11a    | 5180-5240             | OFDM            | 36 to 48          | 48            | 6Mbps     |
| AC Power Line Conducted Emission   | 802.11a    | 5180-5240             | OFDM            | 36 to 48          | 48            | 6Mbps     |
| Antenna Port Conducted Measurement | 802.11a    | 5180-5240             | OFDM            | 36 to 48          | 36, 44, 48    | 6Mbps     |
|                                    | 802.11ac20 |                       |                 | 36 to 48          | 36, 44, 48    | MCS0 Nss1 |
|                                    | 802.11ac40 |                       |                 | 38 to 46          | 38, 46        | MCS0 Nss1 |
|                                    | 802.11ac80 |                       |                 | 42                | 42            | MCS0 Nss1 |
|                                    | 802.11a    | 5745-5825             | OFDM            | 149 to 165        | 149, 157, 165 | 6Mbps     |
|                                    | 802.11ac20 |                       |                 | 149 to 165        | 149, 157, 165 | MCS0 Nss1 |
|                                    | 802.11ac40 |                       |                 | 151 to 159        | 151, 159      | MCS0 Nss1 |
|                                    | 802.11ac80 |                       |                 | 155               | 155           | MCS0 Nss1 |

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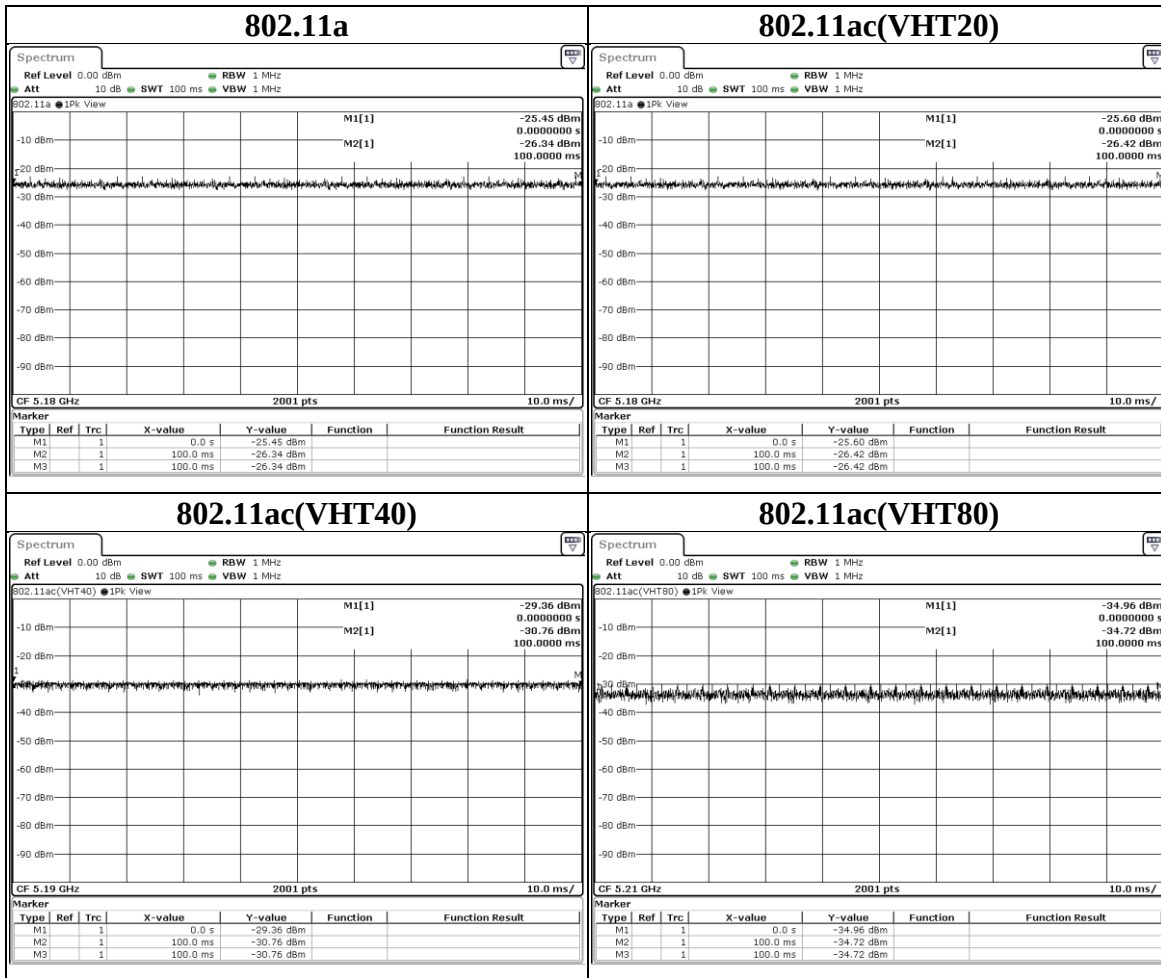
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## 6.6. Duty cycle

| Mode            | On Time (ms) | On+Off Time (ms) | Duty Cycle | Duty Factor (dB) | VBW Set (above 1GHz) |
|-----------------|--------------|------------------|------------|------------------|----------------------|
| 802.11a         | 100.000      | 100.000          | 1.0000     | N/A              | 10Hz                 |
| 802.11ac(VHT20) | 100.000      | 100.000          | 1.0000     | N/A              | 10Hz                 |
| 802.11ac(VHT40) | 100.000      | 100.000          | 1.0000     | N/A              | 10Hz                 |
| 802.11ac(VHT80) | 100.000      | 100.000          | 1.0000     | N/A              | 10Hz                 |



## 7. Test Equipment

| Test Equipment List                          |                    |                         |                     |            |              |
|----------------------------------------------|--------------------|-------------------------|---------------------|------------|--------------|
| Equipment                                    | Manufacturer       | Model No.               | Serial No.          | Cal. Date  | Expired date |
| Radiated Spurious Emission                   |                    |                         |                     |            |              |
| Spectrum Analyzer                            | Keysight           | N9010A                  | MY56070827          | 2023/4/7   | 2024/4/6     |
| EMI Test Receiver                            | Rohde & Schwarz    | ESR7                    | 101754              | 2022/12/13 | 2023/12/12   |
| Loop Antenna                                 | ETS lindgren       | 6502                    | 00213440            | 2023/1/4   | 2024/1/3     |
| Trilog-Broadband Antenna with 5dB Attenuator | Schwarzbeck & EMCI | VULB 9168 & N-6-05      | 774 & AT-N0538      | 2023/2/13  | 2024/2/12    |
| Horn Antenna (1-18 GHz)                      | Schwarzbeck        | BBHA 9120 D             | 01690               | 2022/12/21 | 2023/12/20   |
| Horn Antenna (18-40 GHz)                     | Schwarzbeck        | BBHA 9170               | 781                 | 2022/12/30 | 2023/12/29   |
| Preamplifier (30-1000 MHz)                   | EMCI               | EMC330E                 | 980405              | 2023/6/7   | 2024/6/6     |
| Preamplifier (1-18 GHz)                      | EMCI               | EMC051835BE             | 980406              | 2023/2/17  | 2024/2/16    |
| Preamplifier (18-40GHz)                      | EMCI               | EMC184040SEE            | 980426              | 2023/5/9   | 2024/5/8     |
| Cables                                       | Hanyitek           | K1K50-UP0264-K1K50-2500 | 170214-4 & 170425-2 | 2022/12/1  | 2023/11/30   |
| Cables                                       | Hanyitek           | K1K50-UP0264-K1K50-2500 | 170214-1 & 170214-2 | 2022/12/1  | 2023/11/30   |

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| Test Equipment List                 |                 |                  |                          |            |              |
|-------------------------------------|-----------------|------------------|--------------------------|------------|--------------|
| Equipment                           | Manufacturer    | Model No.        | Serial No.               | Cal. Date  | Expired date |
| Antenna Port Conducted Measurement  |                 |                  |                          |            |              |
| Spectrum Analyzer                   | Keysight        | N9010A           | MY56070834               | 2022/10/24 | 2023/10/23   |
| Attenuator                          | EMCI            | EMC-40ATK2W10    | 17002                    | 2022/12/9  | 2023/12/8    |
| USB Power Sensor                    | Anritsu         | MA24408A         | 12031                    | 2023/7/12  | 2024/7/11    |
| Temperature & Humidity Test Chamber | GIANT FORCE     | GTH-150-40-CP-AR | MAA1701-010              | 2023/3/8   | 2024/3/7     |
| AC power Line Conducted Emission    |                 |                  |                          |            |              |
| EMI Test Receiver                   | Rohde & Schwarz | ESR7             | 101753                   | 2022/11/10 | 2023/11/9    |
| Two-Line V-Network                  | Rohde & Schwarz | ENV216           | 102136                   | 2023/5/24  | 2024/5/23    |
| Impuls-Begrenzer Pulse Limiter      | Rohde & Schwarz | ESH3-Z2          | 102219-Qt                | 2022/8/30  | 2023/8/29    |
| Cables                              | TITAN           | CFD200           | T0732ACFD200<br>20A300-2 | 2023/5/23  | 2024/5/22    |

| UL Software                      |                        |               |
|----------------------------------|------------------------|---------------|
| Description                      | Name                   | Version       |
| Radiated measurement             | e3                     | 6.191211 (V6) |
| Conducted measurement            | RF-Conducted-FCC 15407 | ver 1.1       |
| AC power Line Conducted Emission | EZ_EMC                 | UL-3A1.2      |

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## 8. Description of Test Setup

### Support Equipment

| ID | Equipment                          | Brand Name | Model Name       | S/N     | Remark             |
|----|------------------------------------|------------|------------------|---------|--------------------|
| A  | Adapter                            | AMIGO      | AMS195-0502000FU | N/A     | Provided by Client |
| B  | Laptop                             | DELL       | Latitude E6430   | 2MMN3X1 | Provided by LAB    |
| C  | female HDMI to female HDMI adapter | Benevo     | BHDMICPLR        | N/A     | Provided by LAB    |

### I/O Cables

| ID | Equipment                                | Brand Name | Model Name        | Length (m) | Remark             |
|----|------------------------------------------|------------|-------------------|------------|--------------------|
| 1  | USB cable                                | PX         | F1546-02G         | 1          | Provided by Client |
| 2  | USB Standard Type A Male to Female Cable | I - wiz    | US-44             | 1          | Provided by LAB    |
| 3  | HDMI Cable                               | PX         | HM2-AA120         | 2          | Provided by Client |
| 4  | USB RF Console Cable                     | PX         | USB A to B 4 core | 0.08       | Provided by Client |

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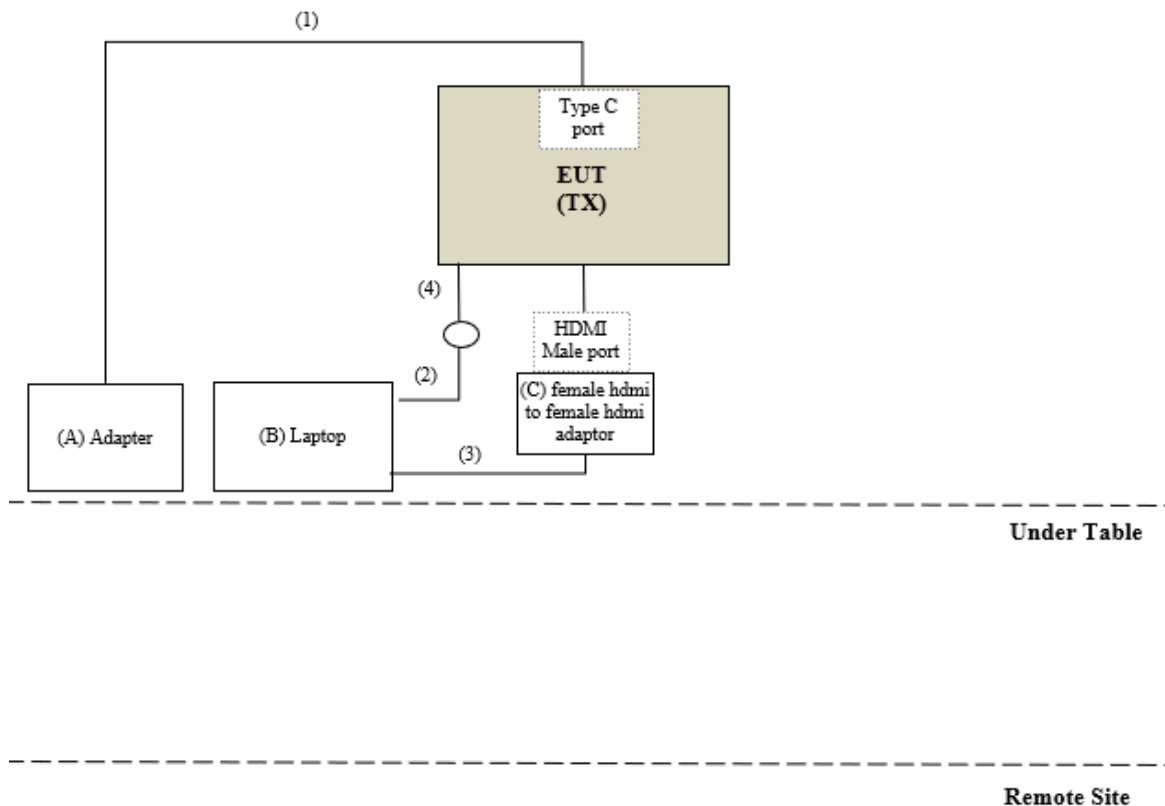
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

## Test Setup

Controlled using a bespoke application (Realtek 11ac 8821C USB WLAN MP Diagnostic Program 0.0003.07.20190211) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

## Setup Diagram for Test



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## 9. Test Results

### 9.1. 6dB Bandwidth

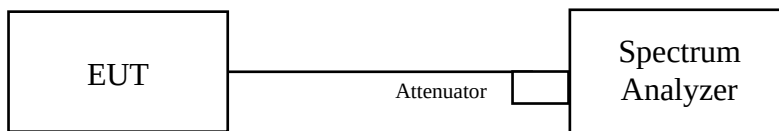
#### Requirements

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

#### Test procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission
- In the plot of the test result, only the worst channel is shown as a representative.

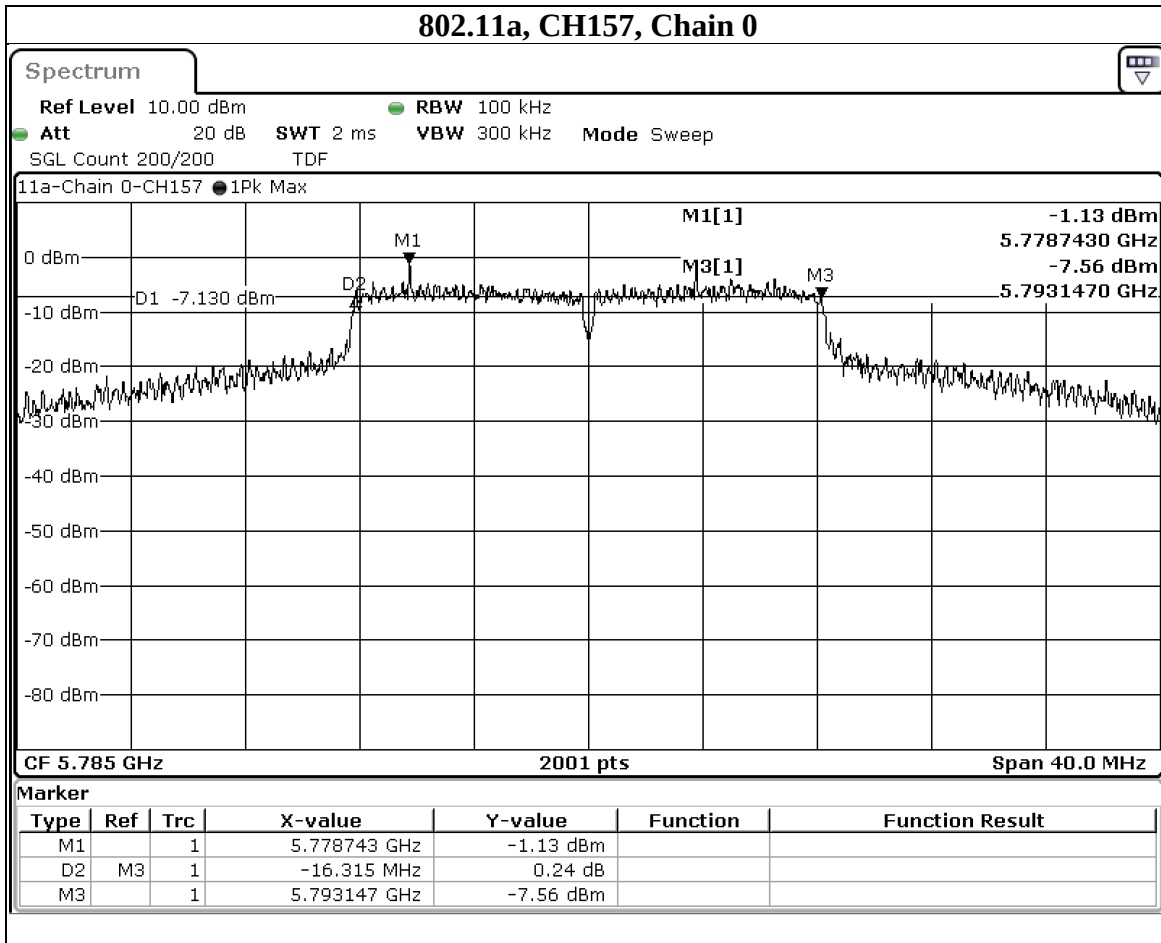
#### Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

### Test Data

| Mode    | CH  | Freq (MHz) | 6dB BW (MHz)<br>Chain 0 | Limit (MHz) | Result |
|---------|-----|------------|-------------------------|-------------|--------|
| 802.11a | 149 | 5745       | 16.331                  | 0.5         | PASS   |
|         | 157 | 5785       | 16.315                  | 0.5         | PASS   |
|         | 165 | 5825       | 16.326                  | 0.5         | PASS   |



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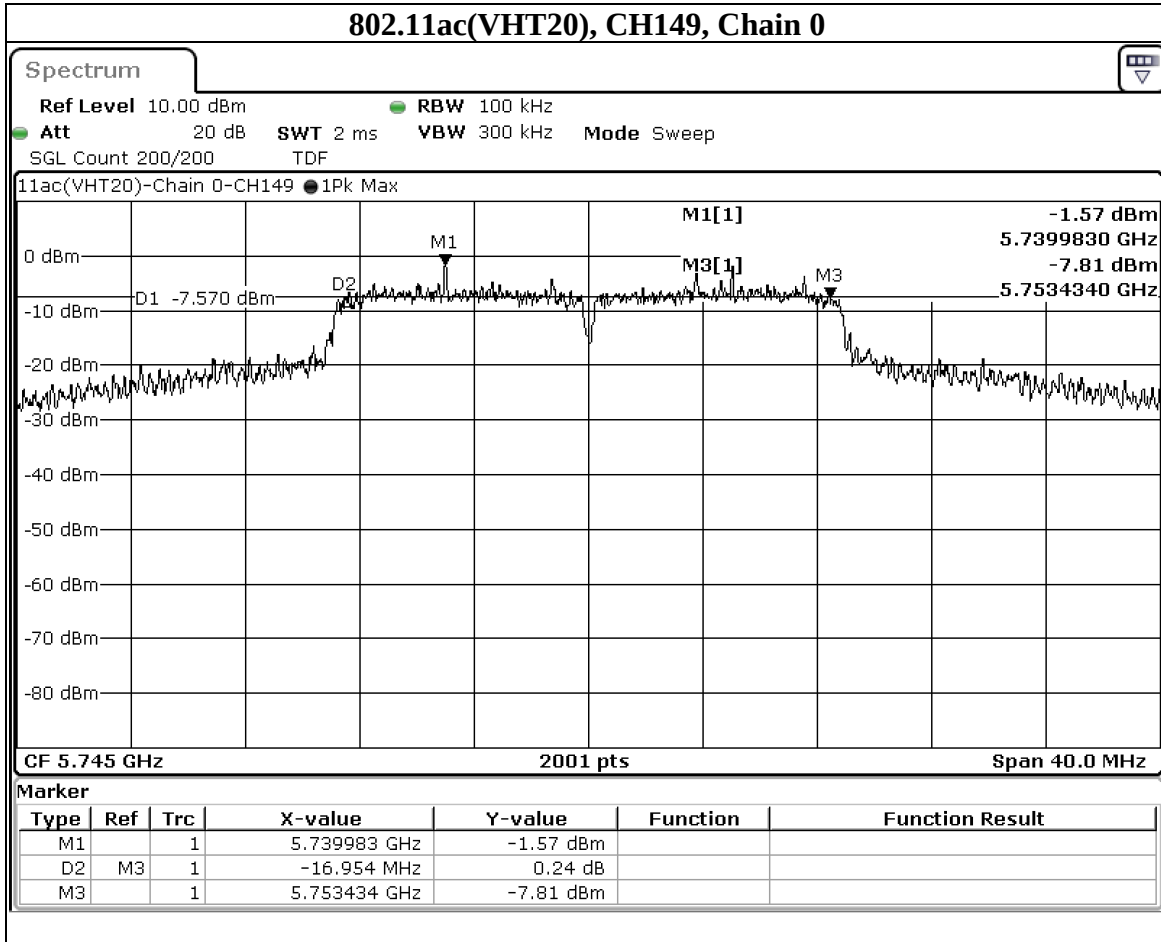
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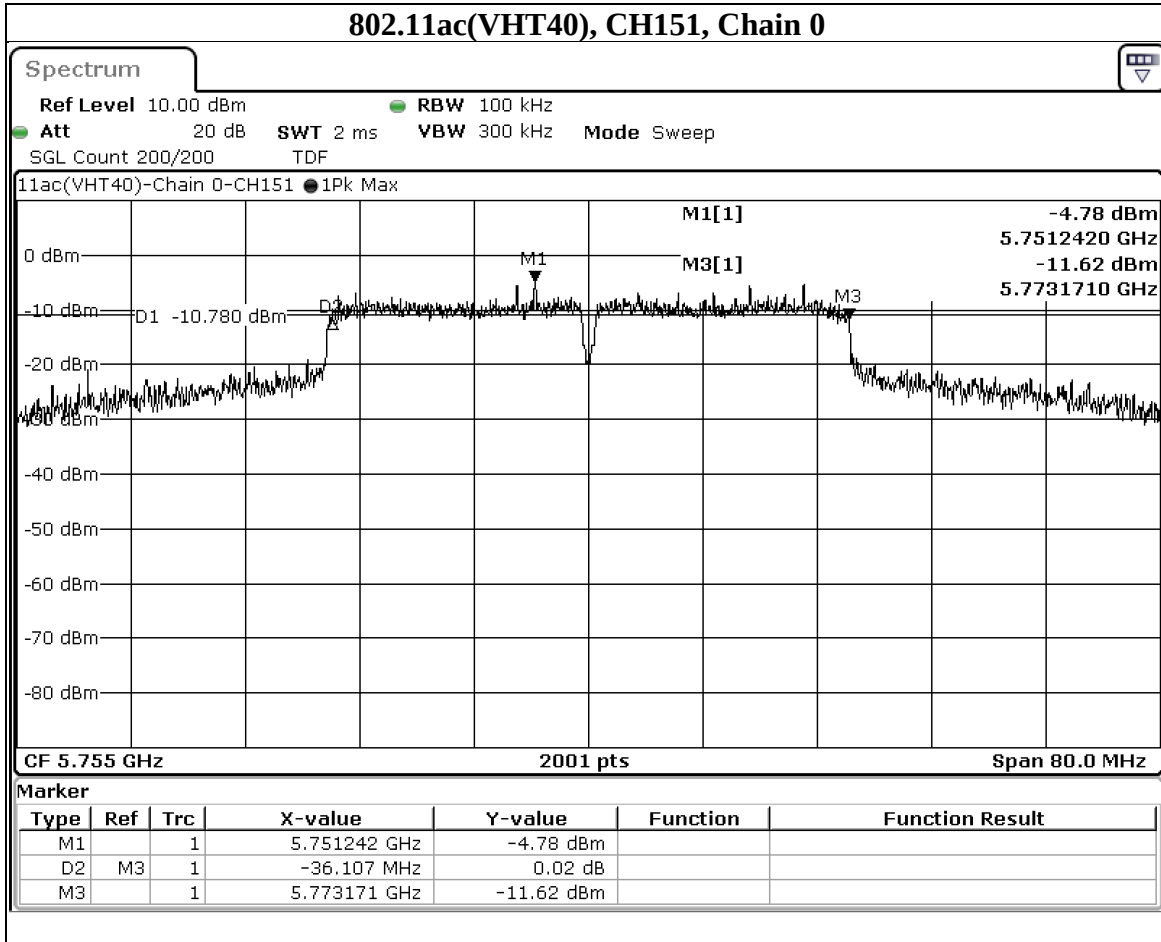
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004739 (DCS:17-EM-F0878) / 6.1

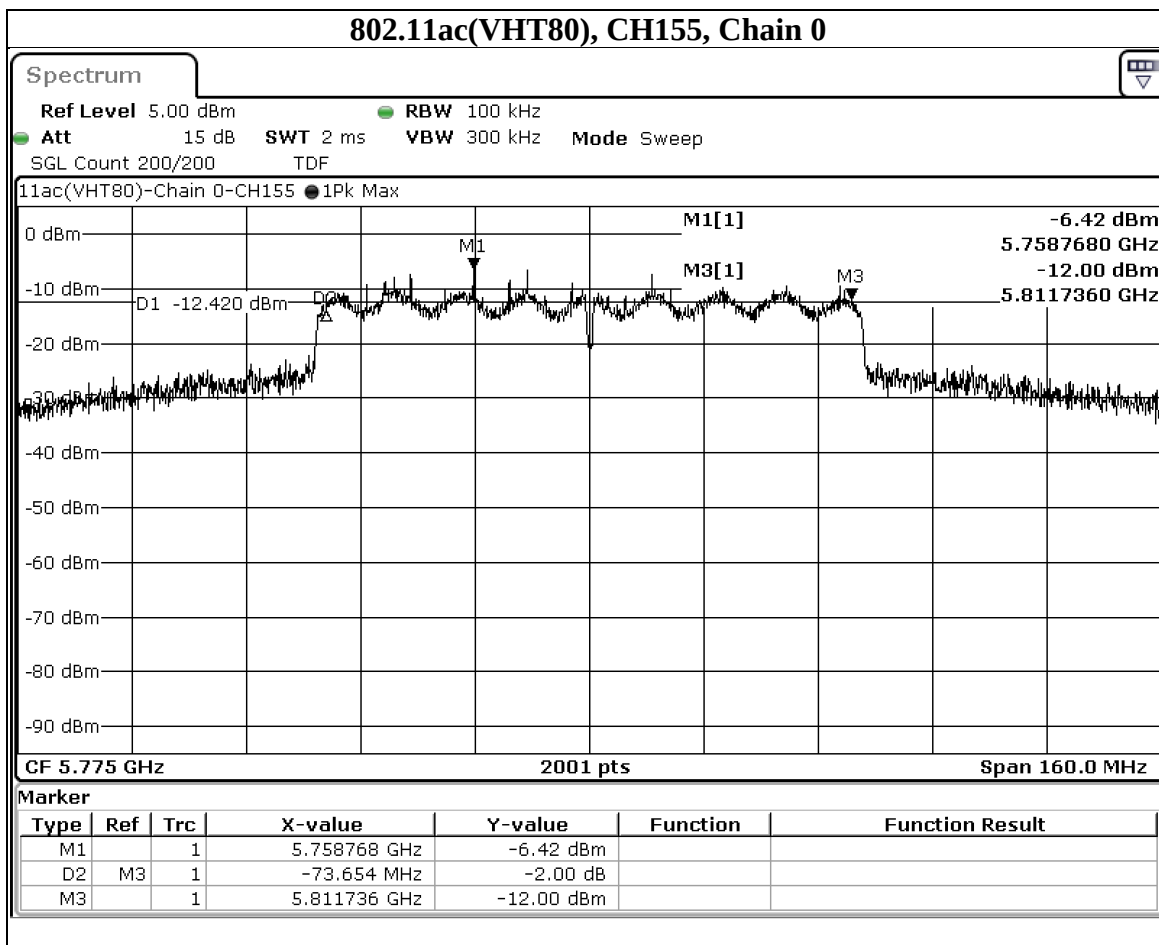
| Mode            | CH  | Freq (MHz) | 6dB BW (MHz) | Limit (MHz) | Result |
|-----------------|-----|------------|--------------|-------------|--------|
|                 |     |            | Chain 0      |             |        |
| 802.11ac(VHT20) | 149 | 5745       | 16.954       | 0.5         | PASS   |
|                 | 157 | 5785       | 17.584       | 0.5         | PASS   |
|                 | 165 | 5825       | 17.438       | 0.5         | PASS   |



| Mode            | CH  | Freq (MHz) | 6dB BW (MHz) | Limit (MHz) | Result |
|-----------------|-----|------------|--------------|-------------|--------|
|                 |     |            | Chain 0      |             |        |
| 802.11ac(VHT40) | 151 | 5755       | 36.107       | 0.5         | PASS   |
|                 | 159 | 5795       | 36.355       | 0.5         | PASS   |



| Mode            | CH  | Freq (MHz) | 6dB BW (MHz) | Limit (MHz) | Result |
|-----------------|-----|------------|--------------|-------------|--------|
|                 |     |            | Chain 0      |             |        |
| 802.11ac(VHT80) | 155 | 5775       | 73.654       | 0.5         | PASS   |

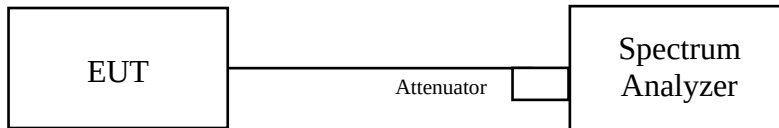


## 9.2. 26dB Bandwidth

### Test procedure

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
- In the plot of the test result, only the worst channel is shown as a representative.

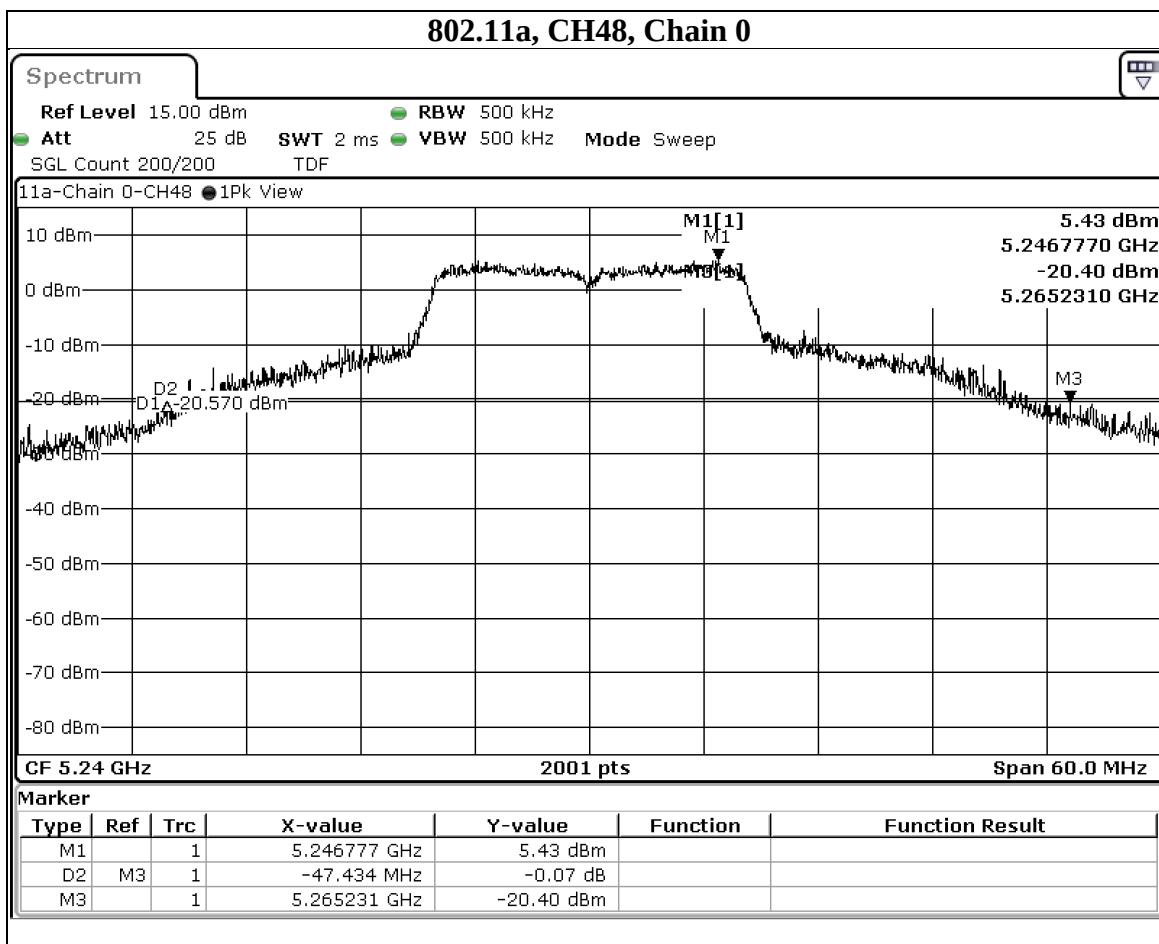
### Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

## Test Data

| Mode    | CH | Freq (MHz) | 26dB BW (MHz)<br>Chain 0 | Limit (MHz) | Result |
|---------|----|------------|--------------------------|-------------|--------|
| 802.11a | 36 | 5180       | 20.524                   | N/A         | PASS   |
|         | 44 | 5220       | 45.005                   | N/A         | PASS   |
|         | 48 | 5240       | 47.434                   | N/A         | PASS   |



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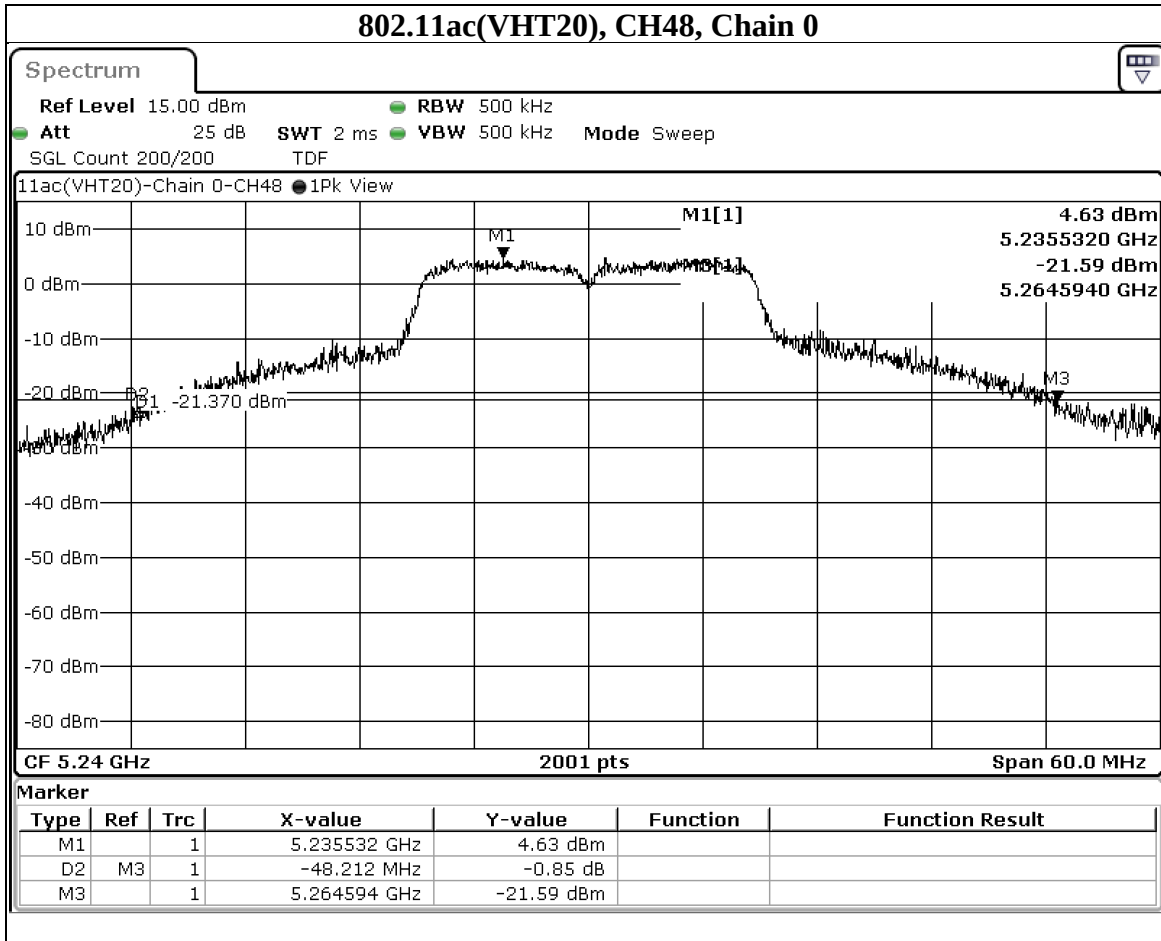
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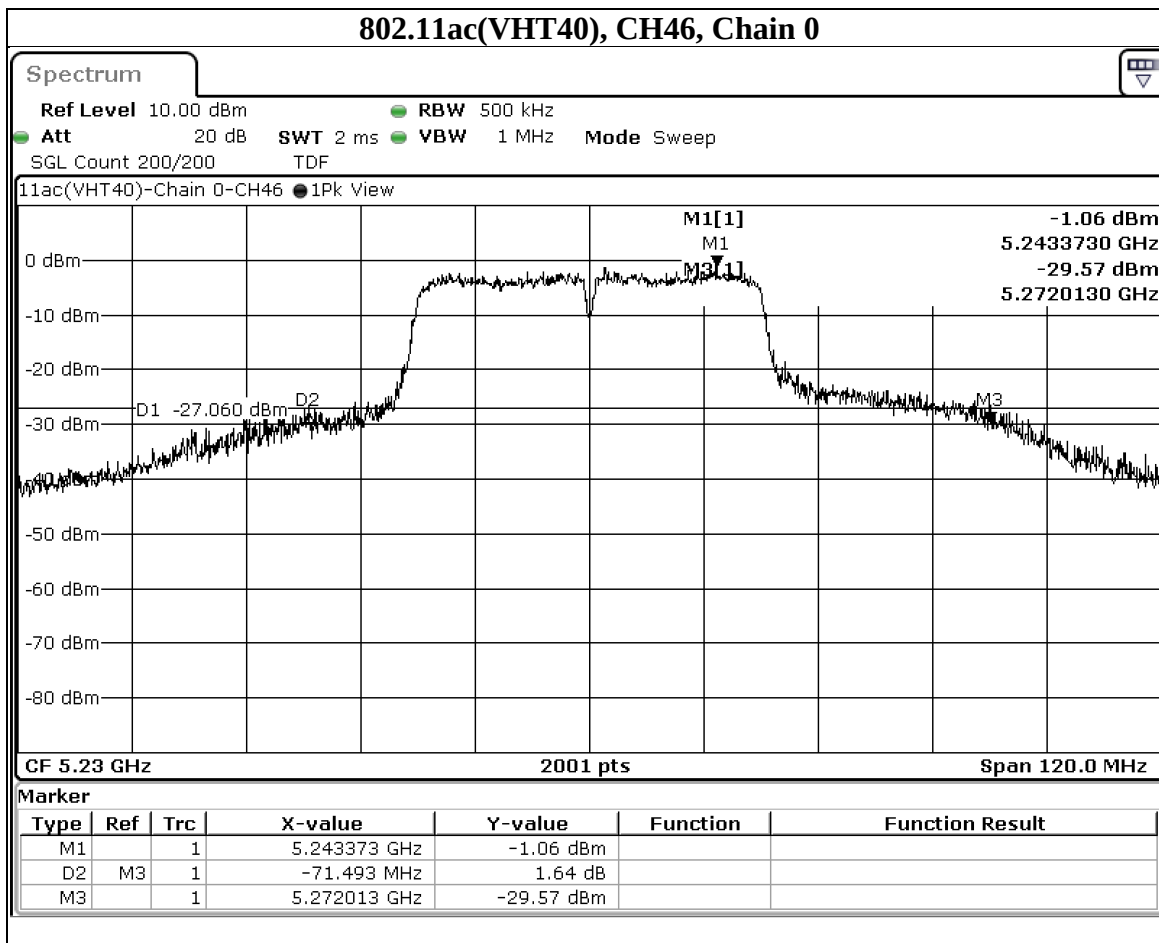
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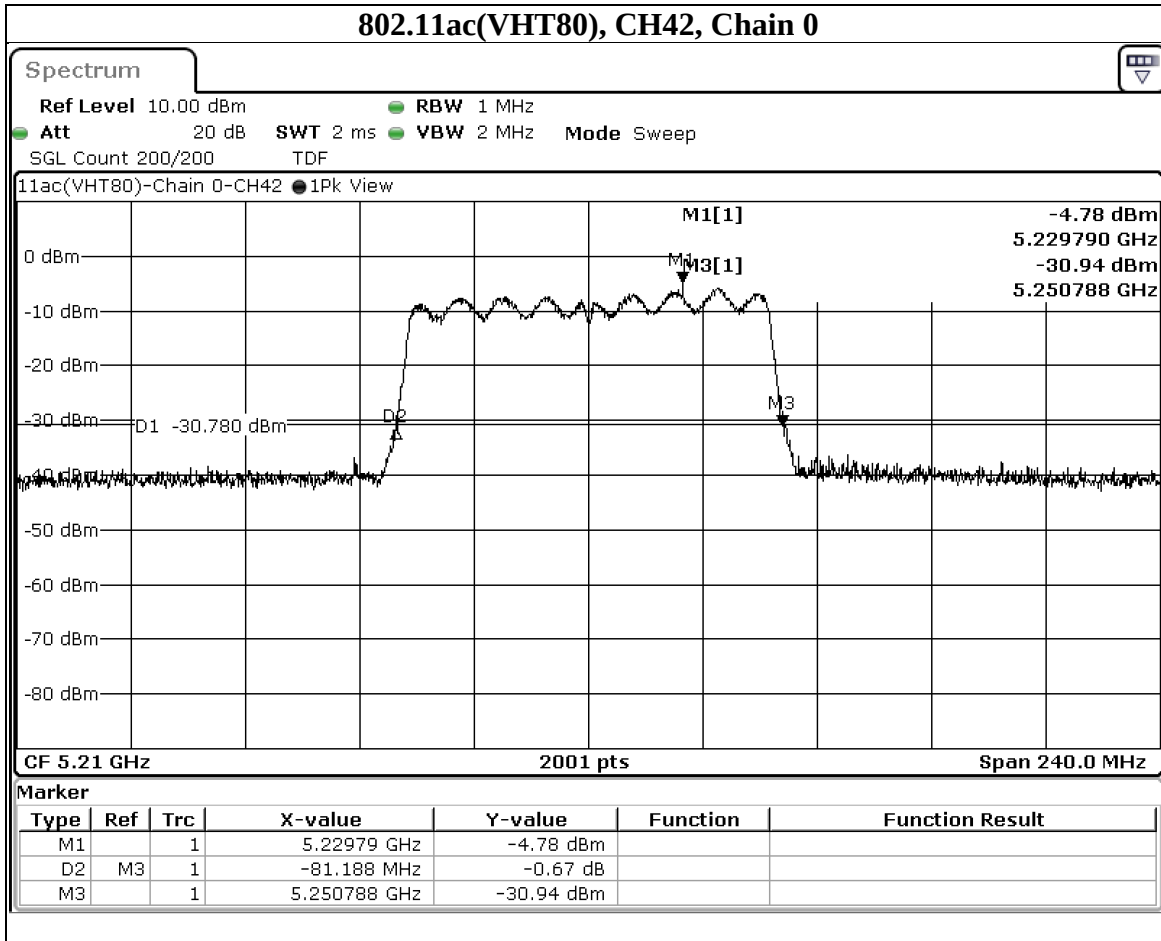
| Mode            | CH | Freq (MHz) | 26dB BW (MHz) | Limit (MHz) | Result |
|-----------------|----|------------|---------------|-------------|--------|
|                 |    |            | Chain 0       |             |        |
| 802.11ac(VHT20) | 36 | 5180       | 21.031        | N/A         | PASS   |
|                 | 44 | 5220       | 47.614        | N/A         | PASS   |
|                 | 48 | 5240       | 48.212        | N/A         | PASS   |



| Mode            | CH | Freq (MHz) | 26dB BW (MHz) | Limit (MHz) | Result |
|-----------------|----|------------|---------------|-------------|--------|
|                 |    |            | Chain 0       |             |        |
| 802.11ac(VHT40) | 38 | 5190       | 42.146        | N/A         | PASS   |
|                 | 46 | 5230       | 71.493        | N/A         | PASS   |



| Mode            | CH | Freq (MHz) | 26dB BW (MHz) | Limit (MHz) | Result |
|-----------------|----|------------|---------------|-------------|--------|
|                 |    |            | Chain 0       |             |        |
| 802.11ac(VHT80) | 42 | 5210       | 81.188        | N/A         | PASS   |

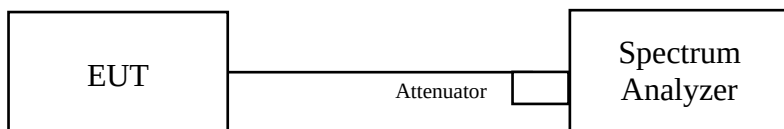


### 9.3. Occupied Bandwidth

#### Test procedure

- a. Set center frequency to the nominal EUT channel center frequency.
- b. Set span = 1.5 times to 5.0 times the OBW.
- c. Set RBW = 1% to 5% of the OBW
- d. Set VBW  $\geq 3 \times$  RBW
- e. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f. Use the 99% power bandwidth function of the instrument (if available).
- g. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.
- h. In the plot of the test result, only the worst channel is shown as a representative.

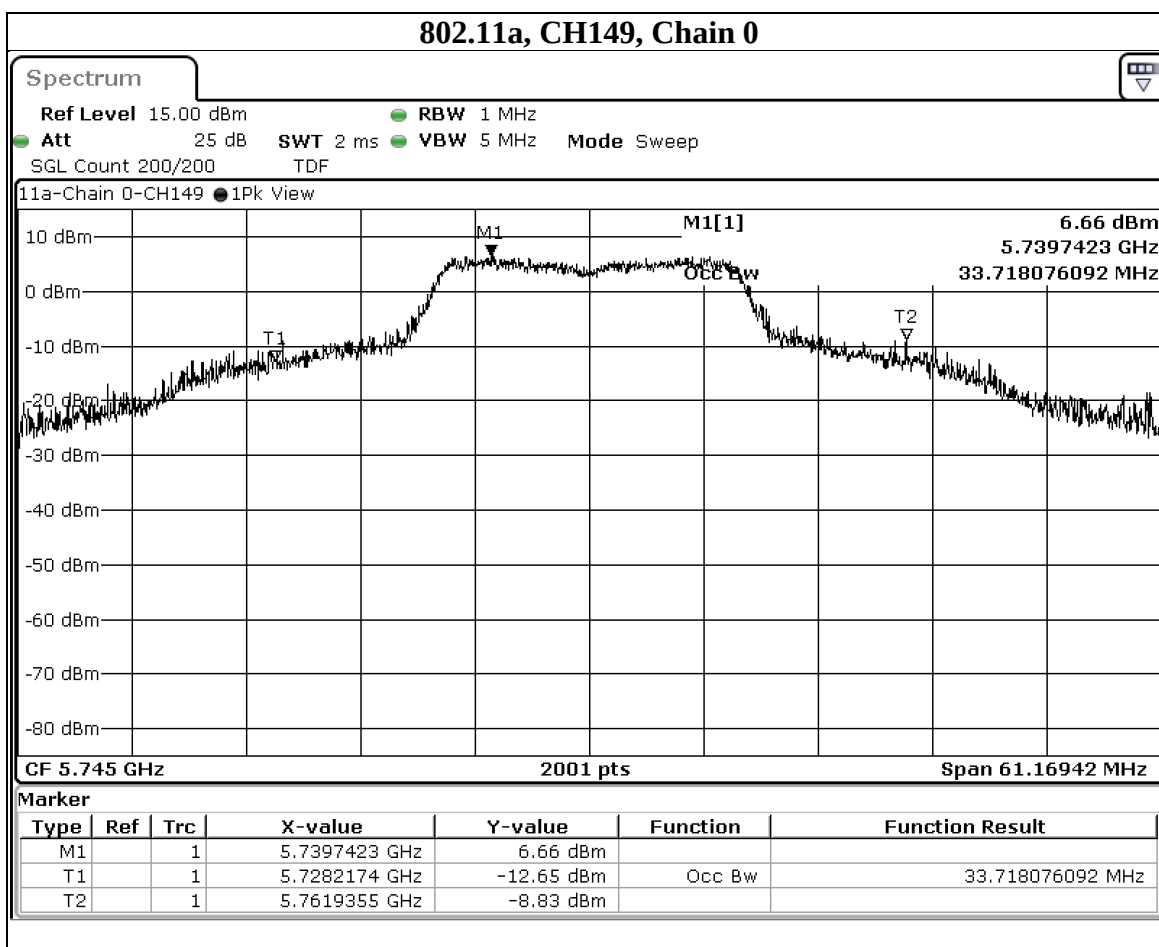
#### Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

## Test Data

| Mode    | CH  | Freq (MHz) | OBW (MHz) | Limit (MHz) | Result |
|---------|-----|------------|-----------|-------------|--------|
|         |     |            | Chain 0   |             |        |
| 802.11a | 36  | 5180       | 17.309    | N/A         | PASS   |
|         | 44  | 5220       | 30.694    | N/A         | PASS   |
|         | 48  | 5240       | 31.335    | N/A         | PASS   |
|         | 149 | 5745       | 33.718    | N/A         | PASS   |
|         | 157 | 5785       | 31.969    | N/A         | PASS   |
|         | 165 | 5825       | 30.13     | N/A         | PASS   |



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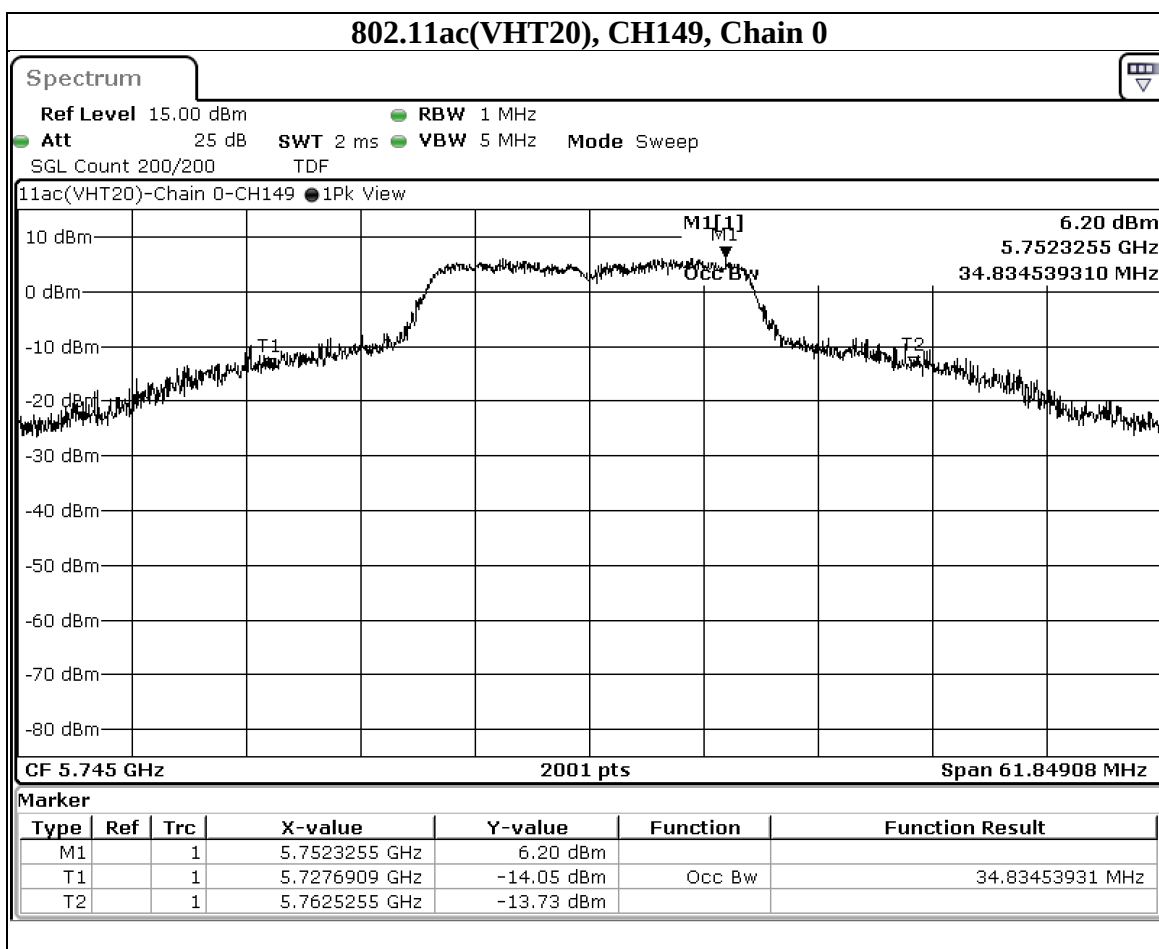
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| Mode             | CH  | Freq (MHz) | OBW (MHz) | Limit (MHz) | Result |
|------------------|-----|------------|-----------|-------------|--------|
|                  |     |            | Chain 0   |             |        |
| 802.11ac(VH T20) | 36  | 5180       | 18.182    | N/A         | PASS   |
|                  | 44  | 5220       | 30.664    | N/A         | PASS   |
|                  | 48  | 5240       | 31.474    | N/A         | PASS   |
|                  | 149 | 5745       | 34.835    | N/A         | PASS   |
|                  | 157 | 5785       | 32.885    | N/A         | PASS   |
|                  | 165 | 5825       | 30.968    | N/A         | PASS   |



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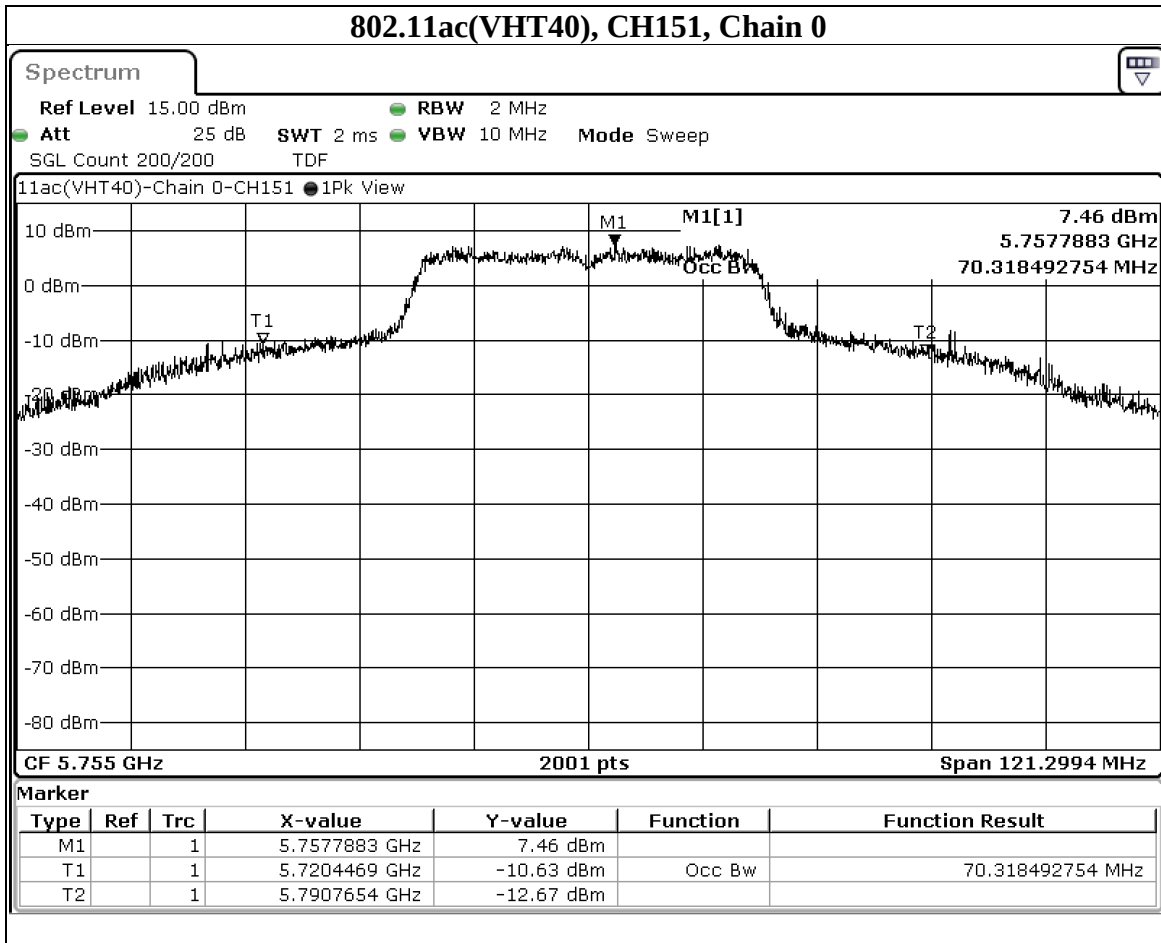
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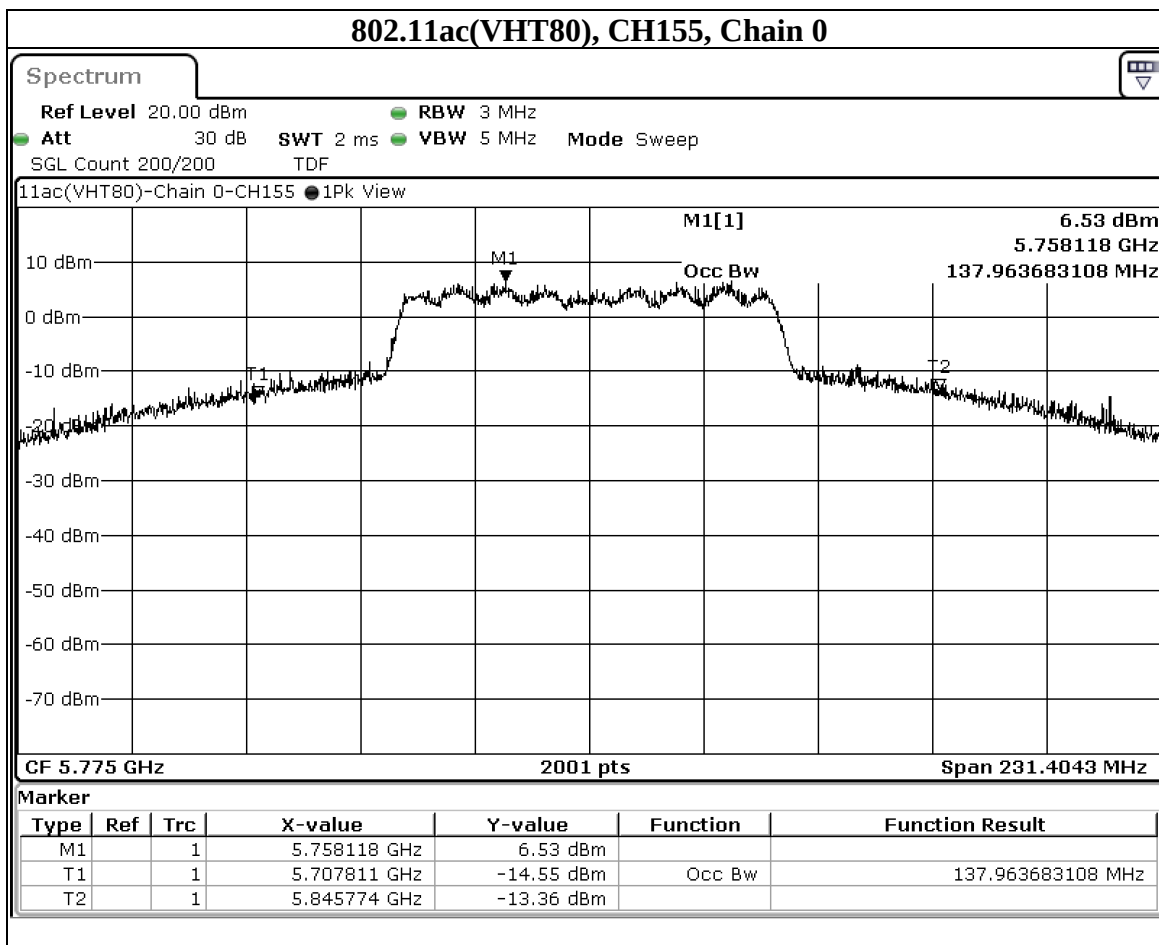
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| Mode             | CH  | Freq (MHz) | OBW (MHz) | Limit (MHz) | Result |
|------------------|-----|------------|-----------|-------------|--------|
|                  |     |            | Chain 0   |             |        |
| 802.11ac(VH T40) | 38  | 5190       | 36.673    | N/A         | PASS   |
|                  | 46  | 5230       | 38.115    | N/A         | PASS   |
|                  | 151 | 5755       | 70.318    | N/A         | PASS   |
|                  | 159 | 5795       | 67.356    | N/A         | PASS   |



| Mode             | CH  | Freq (MHz) | OBW (MHz) | Limit (MHz) | Result |
|------------------|-----|------------|-----------|-------------|--------|
|                  |     |            | Chain 0   |             |        |
| 802.11ac(VH T80) | 42  | 5210       | 76.842    | N/A         | PASS   |
|                  | 155 | 5775       | 137.964   | N/A         | PASS   |



## 9.4. Conducted output power

### Requirements

| Operation Band | EUT Category |                                   | Limit                                                                                                                                                                                |
|----------------|--------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| U-NII-1        |              | Outdoor Access Point              | 1 Watt (30 dBm)<br>Max. e.i.r.p $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon<br>If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ |
|                |              | Fixed point-to-point Access Point | 1 Watt (30 dBm)<br>If $G_{TX} > 23$ dBi, then $P_{Out} = 30 - (G_{TX} - 23)$                                                                                                         |
|                |              | Indoor Access Point               | 1 Watt (30 dBm)<br>If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$                                                                                                           |
|                | √            | Client device                     | 250mW (24 dBm)<br>If $G_{TX} > 6$ dBi, then $P_{Out} = 23.98 - (G_{TX} - 6)$                                                                                                         |
| U-NII-2A       | ---          |                                   | 250mW (24 dBm) or 11 dBm+10 log B*<br>If $G_{TX} > 6$ dBi, then $P_{Out} = 23.98 - (G_{TX} - 6)$                                                                                     |
| U-NII-2C       | ---          |                                   | 250mW (24 dBm) or 11 dBm+10 log B*<br>If $G_{TX} > 6$ dBi, then $P_{Out} = 23.98 - (G_{TX} - 6)$                                                                                     |
| U-NII-3        | √            |                                   | For Point-to-multipoint systems (P2M): 1 Watt (30 dBm). If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$<br>For Point-to-point systems (P2P): 1 Watt (30 dBm)                 |

Note:

- $P_{Out}$  = maximum conducted output power in dBm,  $G_{TX}$  = the maximum transmitting antenna directional gain in dBi, B is the 26 dB emission bandwidth in megahertz

## **Test Procedure**

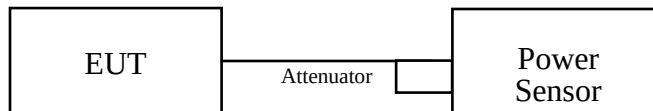
### **For Average Power Measurement**

#### **Test method PM**

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst and set the detector to AVERAGE. Duty factor is not added to measured value.

## **Test Setup**

### **For Average Power Measurement**



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.

## Test Data

### 802.11a

| Channel | Channel Frequency (MHz) | Maximum Conducted Power (mW) | Maximum Conducted Power (dBm) | Power Limit (dBm) | Pass/Fail |
|---------|-------------------------|------------------------------|-------------------------------|-------------------|-----------|
| 36      | 5180                    | 3.177                        | 5.02                          | 24                | PASS      |
| 44      | 5220                    | 18.578                       | 12.69                         | 24                | PASS      |
| 48      | 5240                    | 19.364                       | 12.87                         | 24                | PASS      |
| 149     | 5745                    | 8.279                        | 9.18                          | 30                | PASS      |
| 157     | 5785                    | 8.551                        | 9.32                          | 30                | PASS      |
| 165     | 5825                    | 8.472                        | 9.28                          | 30                | PASS      |

### 802.11ac (VHT20)

| Channel | Channel Frequency (MHz) | Maximum Conducted Power (mW) | Maximum Conducted Power (dBm) | Power Limit (dBm) | Pass/Fail |
|---------|-------------------------|------------------------------|-------------------------------|-------------------|-----------|
| 36      | 5180                    | 2.825                        | 4.51                          | 24                | PASS      |
| 44      | 5220                    | 18.967                       | 12.78                         | 24                | PASS      |
| 48      | 5240                    | 18.836                       | 12.75                         | 24                | PASS      |
| 149     | 5745                    | 7.998                        | 9.03                          | 30                | PASS      |
| 157     | 5785                    | 8.166                        | 9.12                          | 30                | PASS      |
| 165     | 5825                    | 8.375                        | 9.23                          | 30                | PASS      |

### 802.11ac (VHT40)

| Channel | Channel Frequency (MHz) | Maximum Conducted Power (mW) | Maximum Conducted Power (dBm) | Power Limit (dBm) | Pass/Fail |
|---------|-------------------------|------------------------------|-------------------------------|-------------------|-----------|
| 38      | 5190                    | 2.158                        | 3.34                          | 24                | PASS      |
| 46      | 5230                    | 7.261                        | 8.61                          | 24                | PASS      |
| 151     | 5755                    | 8.375                        | 9.23                          | 30                | PASS      |
| 159     | 5795                    | 8.204                        | 9.14                          | 30                | PASS      |

### 802.11ac (VHT80)

| Channel | Channel Frequency (MHz) | Maximum Conducted Power (mW) | Maximum Conducted Power (dBm) | Power Limit (dBm) | Pass/Fail |
|---------|-------------------------|------------------------------|-------------------------------|-------------------|-----------|
| 42      | 5210                    | 1.702                        | 2.31                          | 24                | PASS      |
| 155     | 5775                    | 7.727                        | 8.88                          | 30                | PASS      |

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## 9.5. Power Spectral Density

### Requirements

| Operation Band | EUT Category |                                   | Limit                                                                                                                                                           |
|----------------|--------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| U-NII-1        |              | Outdoor Access Point              | 17dBm/ MHz<br>If $G_{TX} > 6$ dBi, then $PSD = 17 - (G_{TX} - 6)$                                                                                               |
|                |              | Fixed point-to-point Access Point | 17dBm/ MHz<br>If $G_{TX} > 23$ dBi, then $PSD = 17 - (G_{TX} - 23)$                                                                                             |
|                |              | Indoor Access Point               | 17dBm/ MHz<br>If $G_{TX} > 6$ dBi, then $PSD = 17 - (G_{TX} - 6)$                                                                                               |
|                | √            | Client device                     | 11dBm/ MHz<br>If $G_{TX} > 6$ dBi, then $PSD = 11 - (G_{TX} - 6)$                                                                                               |
| U-NII-2A       | ---          |                                   | 11dBm/ MHz<br>If $G_{TX} > 6$ dBi, then $PSD = 11 - (G_{TX} - 6)$                                                                                               |
| U-NII-2C       | ---          |                                   | 11dBm/ MHz<br>If $G_{TX} > 6$ dBi, then $PSD = 11 - (G_{TX} - 6)$                                                                                               |
| U-NII-3        | √            |                                   | For Point-to-multipoint systems (P2M):<br>30dBm/ 500kHz. If $G_{TX} > 6$ dBi, then $PSD = 30 - (G_{TX} - 6)$<br>For Point-to-point systems (P2P): 30dBm/ 500kHz |

Note:

1. PSD = power spectral density that he same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz
2.  $G_{TX}$  = the maximum transmitting antenna directional gain in dBi.
3. Refer to section 6.6 for duty cycle spectrum plot. (If duty cycle<98%)

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## Test procedure

### For U-NII-1 band:

#### Using method as below:

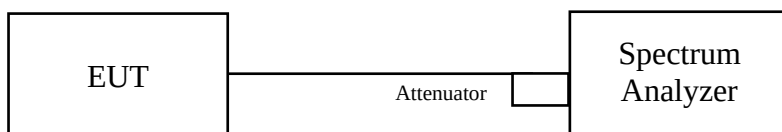
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz, Set VBW  $\geq$  3 RBW, Detector = RMS
- Sweep time = auto, trigger set to “free run”.
- Trace average at least 100 traces in power averaging mode.
- Record the max value. (if Duty cycle <98 %, add 10 log (1/duty cycle))

### For U-NII-3 band:

#### Using method as below:

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz, Set VBW  $\geq$  1 MHz, Detector = RMS
- Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
- Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10 \log (500 \text{ kHz}/300\text{kHz})$
- Sweep time = auto, trigger set to “free run”.
- Trace average at least 100 traces in power averaging mode.
- Record the max value. (if Duty cycle <98 %, add 10 log (1/duty cycle))

## Test Setup

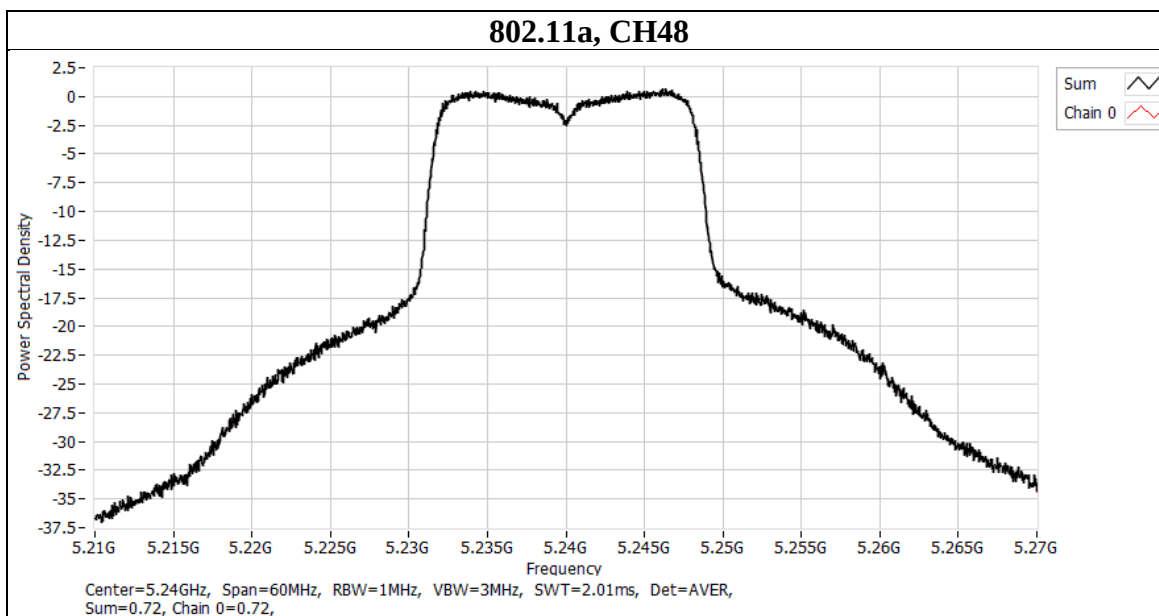


The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

## Test Data

| Mode (U-NII-1) | CH | Freq (MHz) | Directional Gain (dBi) | Total PSD (dBm/MHz) | Limit (dBm/MHz) | Result |
|----------------|----|------------|------------------------|---------------------|-----------------|--------|
| 802.11a        | 36 | 5180       | 1.27                   | -6.84               | 11              | PASS   |
|                | 44 | 5220       | 1.27                   | 0.55                | 11              | PASS   |
|                | 48 | 5240       | 1.27                   | 0.72                | 11              | PASS   |

| Mode (U-NII-1) | CH | Freq (MHz) | PSD per Chain (dBm/MHz) |
|----------------|----|------------|-------------------------|
|                |    |            | Chain 0                 |
| 802.11a        | 36 | 5180       | -6.836                  |
|                | 44 | 5220       | 0.547                   |
|                | 48 | 5240       | 0.715                   |



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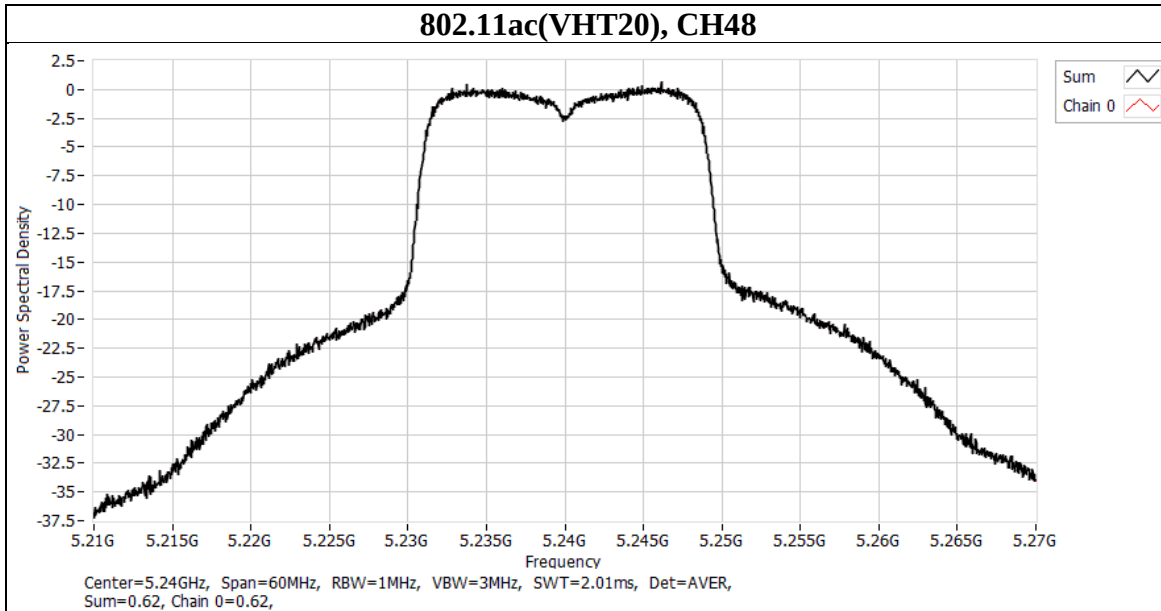
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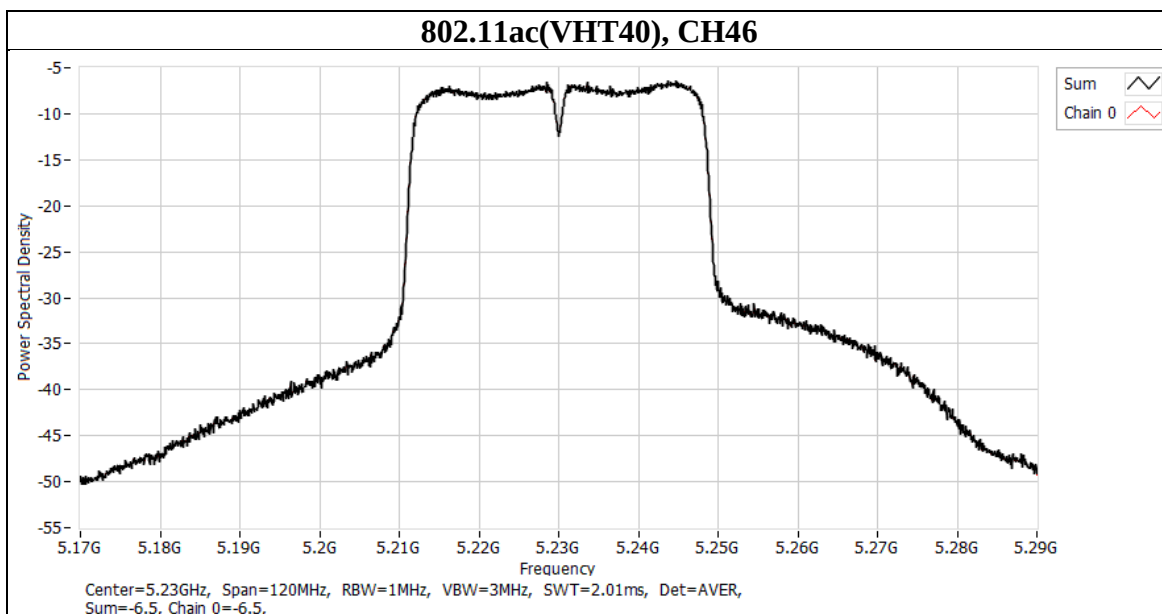
| Mode<br>(U-NII-1) | CH | Freq<br>(MHz) | Directional<br>Gain<br>(dBi) | Total PSD<br>(dBm/MHz) | Limit<br>(dBm/MHz) | Result |
|-------------------|----|---------------|------------------------------|------------------------|--------------------|--------|
| 802.11ac(VHT20)   | 36 | 5180          | 1.27                         | -7.28                  | 11                 | PASS   |
|                   | 44 | 5220          | 1.27                         | 0.32                   | 11                 | PASS   |
|                   | 48 | 5240          | 1.27                         | 0.62                   | 11                 | PASS   |

| Mode<br>(U-NII-1) | CH | Freq<br>(MHz) | PSD per Chain<br>(dBm/MHz) |
|-------------------|----|---------------|----------------------------|
|                   |    |               | Chain 0                    |
| 802.11ac(VHT20)   | 36 | 5180          | -7.283                     |
|                   | 44 | 5220          | 0.315                      |
|                   | 48 | 5240          | 0.624                      |



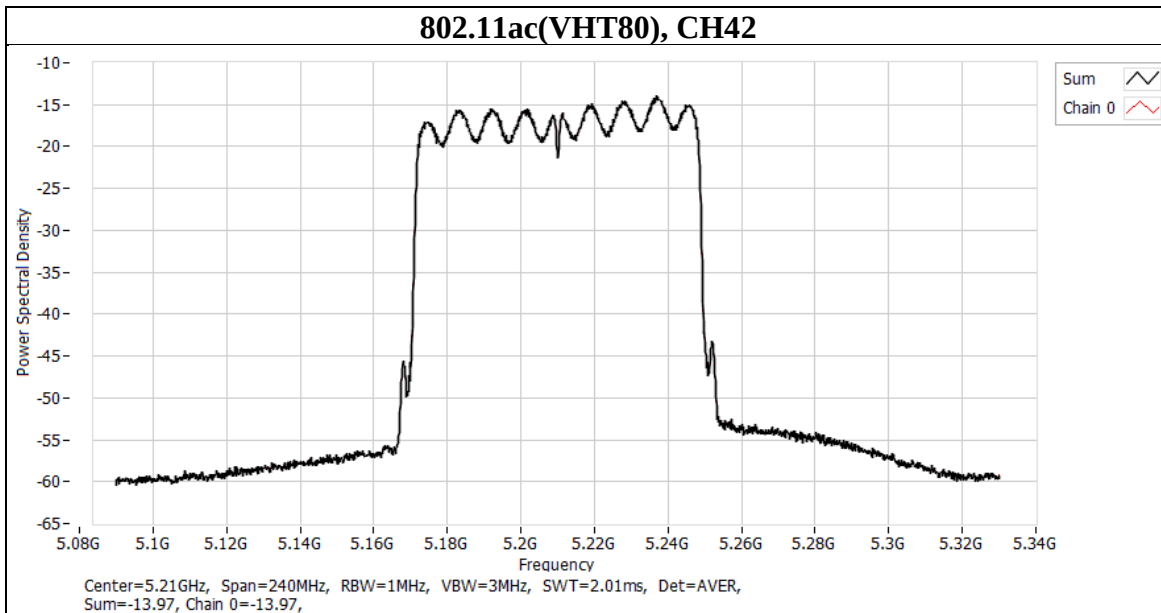
| Mode<br>(U-NII-1) | CH | Freq<br>(MHz) | Directional<br>Gain<br>(dBi) | Total PSD<br>(dBm/MHz) | Limit<br>(dBm/MHz) | Result |
|-------------------|----|---------------|------------------------------|------------------------|--------------------|--------|
| 802.11ac(VHT40)   | 38 | 5190          | 1.27                         | -12.99                 | 11                 | PASS   |
|                   | 46 | 5230          | 1.27                         | -6.5                   | 11                 | PASS   |

| Mode<br>(U-NII-1) | CH | Freq<br>(MHz) | PSD per Chain<br>(dBm/MHz) |
|-------------------|----|---------------|----------------------------|
|                   |    |               | Chain 0                    |
| 802.11ac(VHT40)   | 38 | 5190          | -12.991                    |
|                   | 46 | 5230          | -6.496                     |



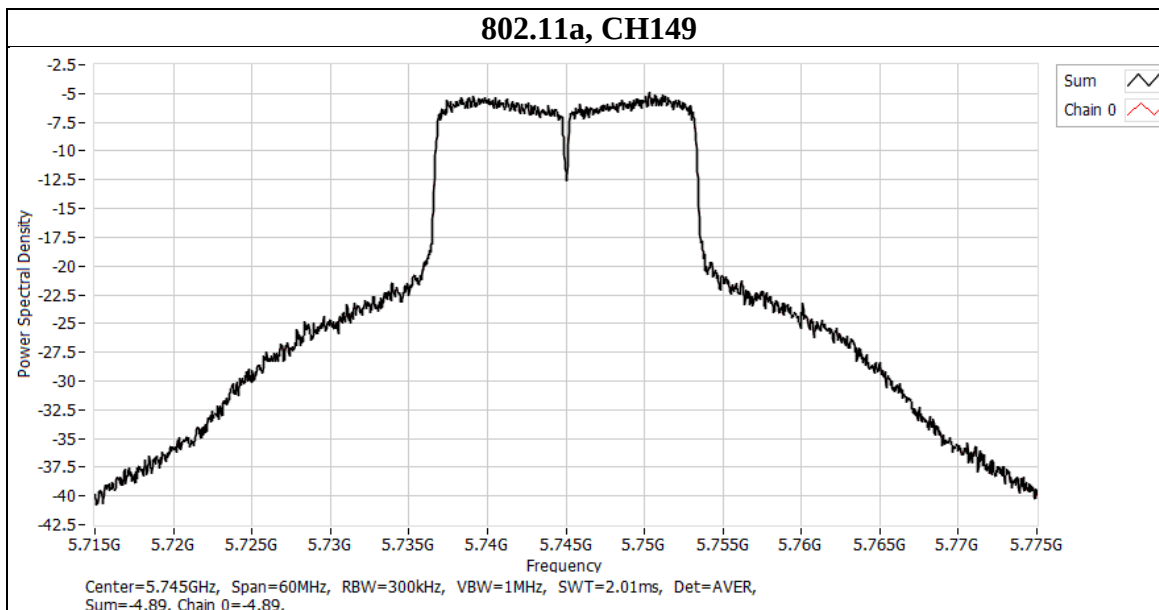
| Mode<br>(U-NII-1) | CH | Freq<br>(MHz) | Directional<br>Gain<br>(dBi) | Total PSD<br>(dBm/MHz) | Limit<br>(dBm/MHz) | Result |
|-------------------|----|---------------|------------------------------|------------------------|--------------------|--------|
| 802.11ac(VHT80)   | 42 | 5210          | 1.27                         | -13.97                 | 11                 | PASS   |

| Mode<br>(U-NII-1) | CH | Freq<br>(MHz) | PSD per Chain<br>(dBm/MHz) |
|-------------------|----|---------------|----------------------------|
|                   |    |               | Chain 0                    |
| 802.11ac(VHT80)   | 42 | 5210          | -13.974                    |



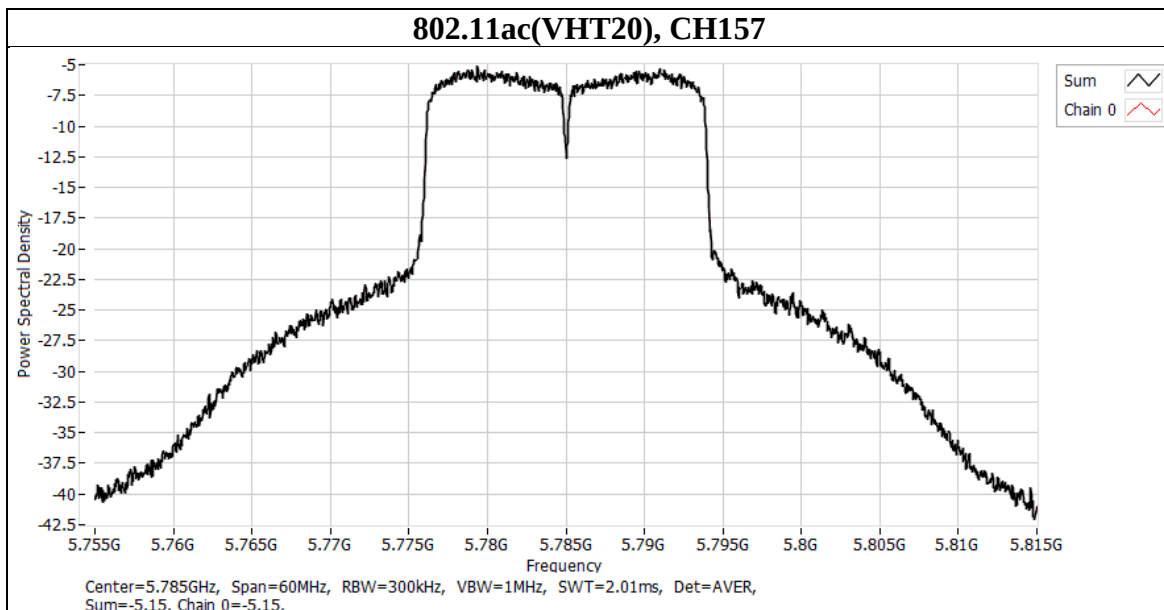
| Mode (U-NII-3) | CH  | Freq (MHz) | BWCF | Directional Gain (dBi) | Total PSD (dBm/500kHz) | Limit (dBm/500kHz) | Result |
|----------------|-----|------------|------|------------------------|------------------------|--------------------|--------|
| 802.11a        | 149 | 5745       | 2.22 | 1.27                   | -2.67                  | 30                 | PASS   |
|                | 157 | 5785       | 2.22 | 1.27                   | -2.81                  | 30                 | PASS   |
|                | 165 | 5825       | 2.22 | 1.27                   | -2.84                  | 30                 | PASS   |

| Mode (U-NII-3) | CH  | Freq (MHz) | PSD per Chain (dBm/500kHz) |
|----------------|-----|------------|----------------------------|
|                |     |            | Chain 0                    |
| 802.11a        | 149 | 5745       | -4.892                     |
|                | 157 | 5785       | -5.031                     |
|                | 165 | 5825       | -5.062                     |



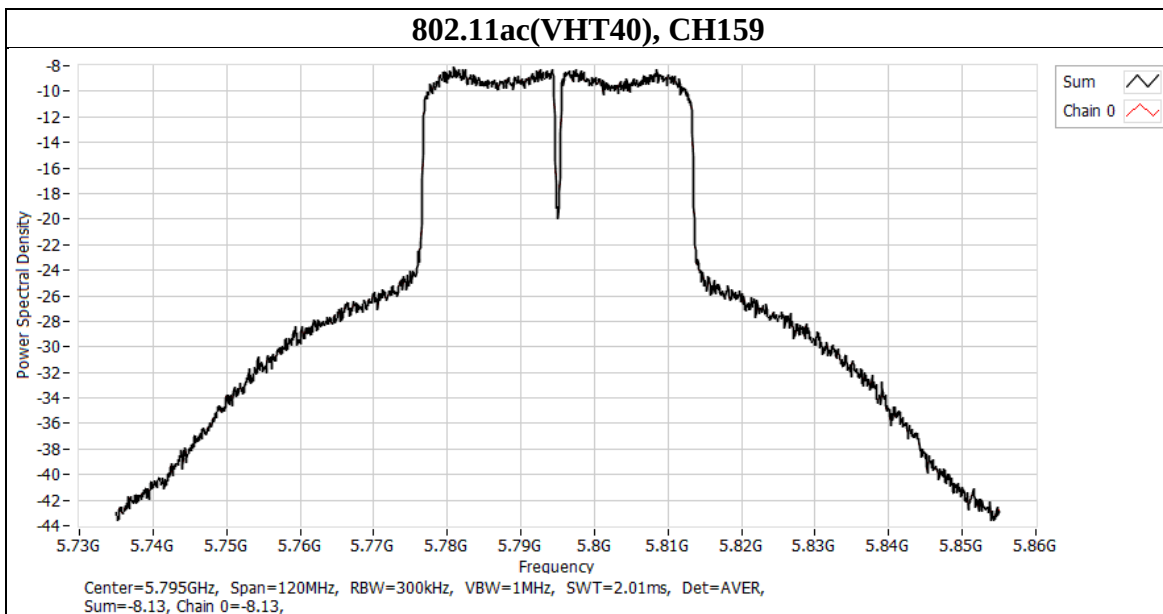
| Mode<br>(U-NII-3) | CH  | Freq<br>(MHz) | BWCF | Directional<br>Gain<br>(dBi) | Total PSD<br>(dBm/500kHz) | Limit<br>(dBm/500kHz) | Result |
|-------------------|-----|---------------|------|------------------------------|---------------------------|-----------------------|--------|
| 802.11ac(VHT20)   | 149 | 5745          | 2.22 | 1.27                         | -3.2                      | 30                    | PASS   |
|                   | 157 | 5785          | 2.22 | 1.27                         | -2.93                     | 30                    | PASS   |
|                   | 165 | 5825          | 2.22 | 1.27                         | -3.22                     | 30                    | PASS   |

| Mode<br>(U-NII-3) | CH  | Freq<br>(MHz) | PSD per Chain<br>(dBm/500kHz) |
|-------------------|-----|---------------|-------------------------------|
|                   |     |               | Chain 0                       |
| 802.11ac(VHT20)   | 149 | 5745          | -5.422                        |
|                   | 157 | 5785          | -5.153                        |
|                   | 165 | 5825          | -5.443                        |



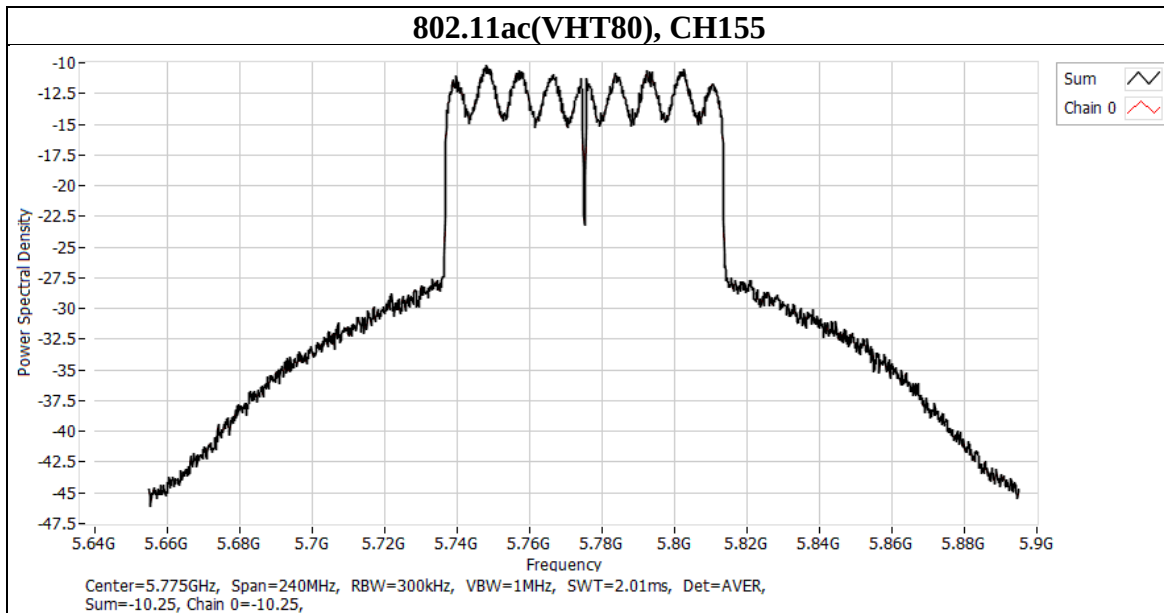
| Mode<br>(U-NII-3) | CH  | Freq<br>(MHz) | BWCF | Directional<br>Gain<br>(dBi) | Total PSD<br>(dBm/500kHz) | Limit<br>(dBm/500kHz) | Result |
|-------------------|-----|---------------|------|------------------------------|---------------------------|-----------------------|--------|
| 802.11ac(VHT40)   | 151 | 5755          | 2.22 | 1.27                         | -6                        | 30                    | PASS   |
|                   | 159 | 5795          | 2.22 | 1.27                         | -5.91                     | 30                    | PASS   |

| Mode<br>(U-NII-3) | CH  | Freq<br>(MHz) | PSD per Chain<br>(dBm/500kHz) |
|-------------------|-----|---------------|-------------------------------|
|                   |     |               | Chain 0                       |
| 802.11ac(VHT40)   | 151 | 5755          | -8.217                        |
|                   | 159 | 5795          | -8.131                        |



| Mode<br>(U-NII-3) | CH  | Freq<br>(MHz) | BWCF | Directional<br>Gain<br>(dBi) | Total PSD<br>(dBm/500kHz) | Limit<br>(dBm/500kHz) | Result |
|-------------------|-----|---------------|------|------------------------------|---------------------------|-----------------------|--------|
| 802.11ac(VHT80)   | 155 | 5775          | 2.22 | 1.27                         | -8.03                     | 30                    | PASS   |

| Mode<br>(U-NII-3) | CH  | Freq<br>(MHz) | PSD per Chain<br>(dBm/500kHz) |
|-------------------|-----|---------------|-------------------------------|
|                   |     |               | Chain 0                       |
| 802.11ac(VHT80)   | 155 | 5775          | -10.248                       |



## 9.6. Frequency Stability

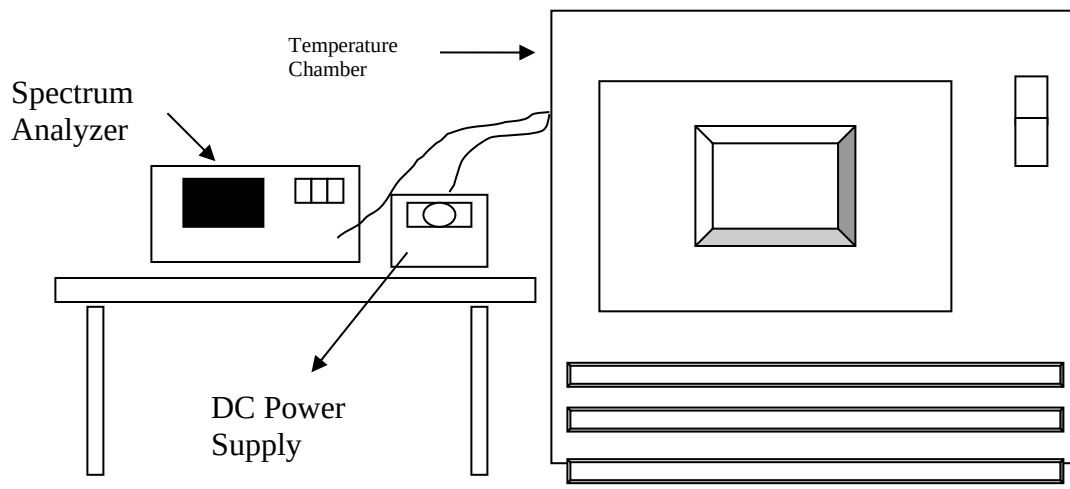
### Requirements

The frequency of the carrier signal shall be maintained within band of operation.

### Test procedure

- The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

### Test Setup



## Test Data

| Frequency Stability Versus Temp. |                          |                                |                      |                                |                      |                                |                      |                                |                      |
|----------------------------------|--------------------------|--------------------------------|----------------------|--------------------------------|----------------------|--------------------------------|----------------------|--------------------------------|----------------------|
| Operating Frequency: 5180 MHz    |                          |                                |                      |                                |                      |                                |                      |                                |                      |
| TEMP.<br>(°C)                    | Power<br>Supply<br>(Vdc) | 0 Minute                       |                      | 2 Minute                       |                      | 5 Minute                       |                      | 10 Minute                      |                      |
|                                  |                          | Measured<br>Frequency<br>(MHz) | Freq. Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Freq. Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Freq. Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Freq. Drift<br>(ppm) |
| 75                               | 5                        | 5180.0147                      | 2.84                 | 5180.0162                      | 3.13                 | 5180.0123                      | 2.37                 | 5180.0126                      | 2.43                 |
| 70                               | 5                        | 5179.9772                      | -4.40                | 5179.9789                      | -4.07                | 5179.9764                      | -4.56                | 5179.9783                      | -4.19                |
| 60                               | 5                        | 5179.9944                      | -1.08                | 5179.9964                      | -0.69                | 5179.9918                      | -1.58                | 5179.994                       | -1.16                |
| 50                               | 5                        | 5180.0193                      | 3.73                 | 5180.0168                      | 3.24                 | 5180.0171                      | 3.30                 | 5180.0173                      | 3.34                 |
| 40                               | 5                        | 5180.01                        | 1.93                 | 5180.0125                      | 2.41                 | 5180.011                       | 2.12                 | 5180.0088                      | 1.70                 |
| 30                               | 5                        | 5180.01                        | 1.93                 | 5180.0119                      | 2.30                 | 5180.013                       | 2.51                 | 5180.0123                      | 2.37                 |
| 20                               | 5                        | 5179.9979                      | -0.41                | 5179.9977                      | -0.44                | 5179.998                       | -0.39                | 5179.9967                      | -0.64                |
| 10                               | 5                        | 5179.9923                      | -1.49                | 5179.9945                      | -1.06                | 5179.9962                      | -0.73                | 5179.9923                      | -1.49                |
| 0                                | 5                        | 5180.0226                      | 4.36                 | 5180.0209                      | 4.03                 | 5180.0182                      | 3.51                 | 5180.0194                      | 3.75                 |
| -10                              | 5                        | 5179.9764                      | -4.56                | 5179.9782                      | -4.21                | 5179.9778                      | -4.29                | 5179.9765                      | -4.54                |
| -20                              | 5                        | 5179.977                       | -4.44                | 5179.9777                      | -4.31                | 5179.979                       | -4.05                | 5179.9785                      | -4.15                |
| -30                              | 5                        | 5180.0084                      | 1.62                 | 5180.0098                      | 1.89                 | 5180.0098                      | 1.89                 | 5180.0123                      | 2.37                 |
| -40                              | 5                        | 5179.9841                      | -3.07                | 5179.9821                      | -3.46                | 5179.9823                      | -3.42                | 5179.9844                      | -3.01                |
| TEMP.<br>(°C)                    | Power<br>Supply<br>(Vdc) | 0 Minute                       |                      | 2 Minute                       |                      | 5 Minute                       |                      | 10 Minute                      |                      |
|                                  |                          | Measured<br>Frequency<br>(MHz) | Freq. Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Freq. Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Freq. Drift<br>(ppm) | Measured<br>Frequency<br>(MHz) | Freq. Drift<br>(ppm) |
| 20                               | 5.75                     | 5179.9973                      | -0.52                | 5179.9975                      | -0.48                | 5179.9983                      | -0.33                | 5179.9961                      | -0.75                |
| 20                               | 5                        | 5179.9979                      | -0.41                | 5179.9977                      | -0.44                | 5179.998                       | -0.39                | 5179.9967                      | -0.64                |
| 20                               | 4.25                     | 5179.997                       | -0.58                | 5179.998                       | -0.39                | 5179.9972                      | -0.54                | 5179.997                       | -0.58                |

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## 9.7. Radiated Spurious Emission

### Requirements

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

| Frequency(MHz) | Field strength<br>(microvolts/meter) | Measurement distance<br>(meters) |
|----------------|--------------------------------------|----------------------------------|
| 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                                |

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

**Limits of unwanted emission out of the restricted bands**

| Applicable To                                                                                                                                                                                                                                                                                                                       |                 | Limit                                                                                                                               |                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 789033 D02 General UNII Test Procedure New Rules v02r01                                                                                                                                                                                                                                                                             |                 | Field Strength at 3m                                                                                                                |                                                                                                                                         |
|                                                                                                                                                                                                                                                                                                                                     |                 | PK:74 (dBμV/m)                                                                                                                      | AV:54 (dBμV/m)                                                                                                                          |
| Frequency Band                                                                                                                                                                                                                                                                                                                      | Applicable To   | EIRP Limit                                                                                                                          | Equivalent Field Strength at 3m                                                                                                         |
| 5150~5250 MHz                                                                                                                                                                                                                                                                                                                       | 15.407(b)(1)    | PK:-27 (dBm/MHz)                                                                                                                    | PK:68.2(dBμV/m)                                                                                                                         |
| 5250~5350 MHz                                                                                                                                                                                                                                                                                                                       | 15.407(b)(2)    |                                                                                                                                     |                                                                                                                                         |
| 5470~5725 MHz                                                                                                                                                                                                                                                                                                                       | 15.407(b)(3)    |                                                                                                                                     |                                                                                                                                         |
| 5725~5850 MHz                                                                                                                                                                                                                                                                                                                       | 15.407(b)(4)(i) | PK:-27 (dBm/MHz) <sup>*1</sup><br>PK:10 (dBm/MHz) <sup>*2</sup><br>PK:15.6 (dBm/MHz) <sup>*3</sup><br>PK:27 (dBm/MHz) <sup>*4</sup> | PK: 68.2(dBμV/m) <sup>*1</sup><br>PK:105.2 (dBμV/m) <sup>*2</sup><br>PK: 110.8(dBμV/m) <sup>*3</sup><br>PK:122.2 (dBμV/m) <sup>*4</sup> |
| *1 beyond 75 MHz or more above of the band edge.<br>*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.<br>*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.<br>*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. |                 |                                                                                                                                     |                                                                                                                                         |

**Note:**

The following formula is used to convert the effective isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

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## **Test Procedures**

[For 9 kHz ~ 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

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**Note:**

- a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- b. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.

| Configuration    | Average |                                      |
|------------------|---------|--------------------------------------|
|                  | RBW     | VBW                                  |
| 802.11a          | 1MHz    | Refer to section 6.6 for duty cycle. |
| 802.11ac (VHT20) |         |                                      |
| 802.11ac (VHT40) |         |                                      |
| 802.11ac (VHT80) |         |                                      |

- d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported, the other emission levels were low against the limit.
- e. Test data of Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
- f. Test data of Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
- g. Test data of Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
- h. Test data of Notation "@" = Fundamental Frequency
- i. Test data of Notation "\*" = Only required peak limit or the peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.

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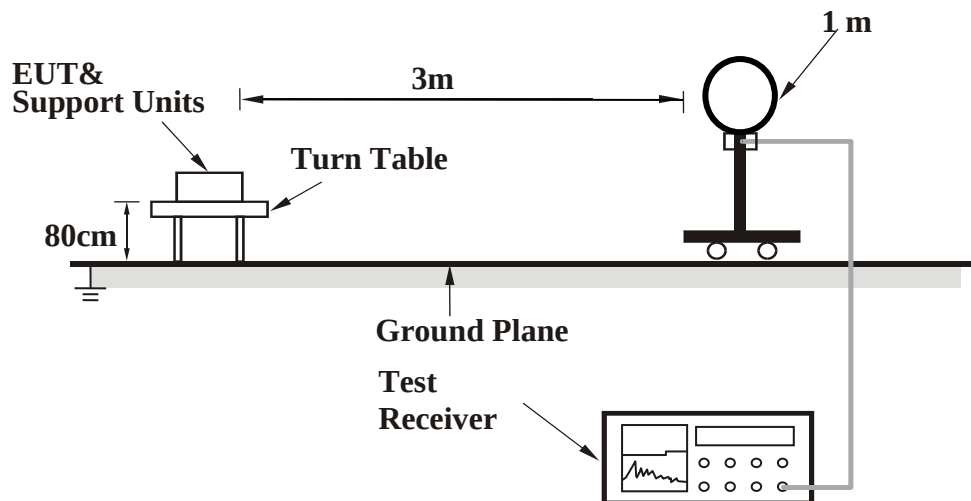
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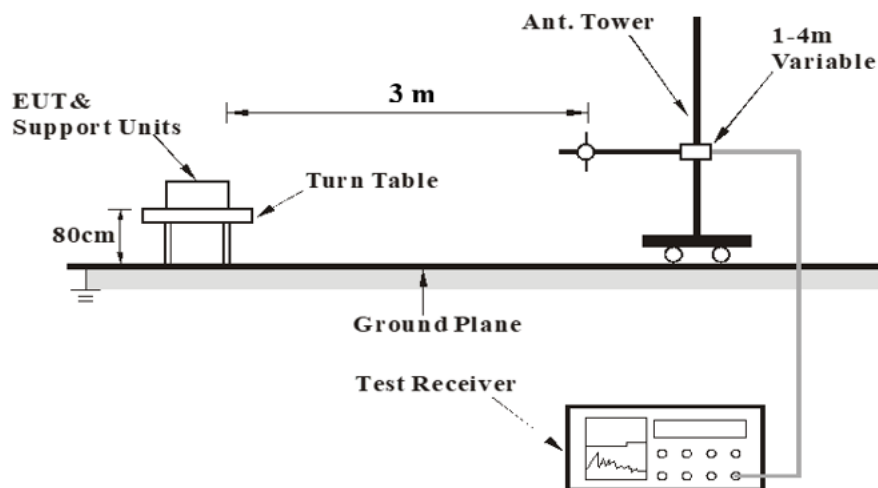
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## Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



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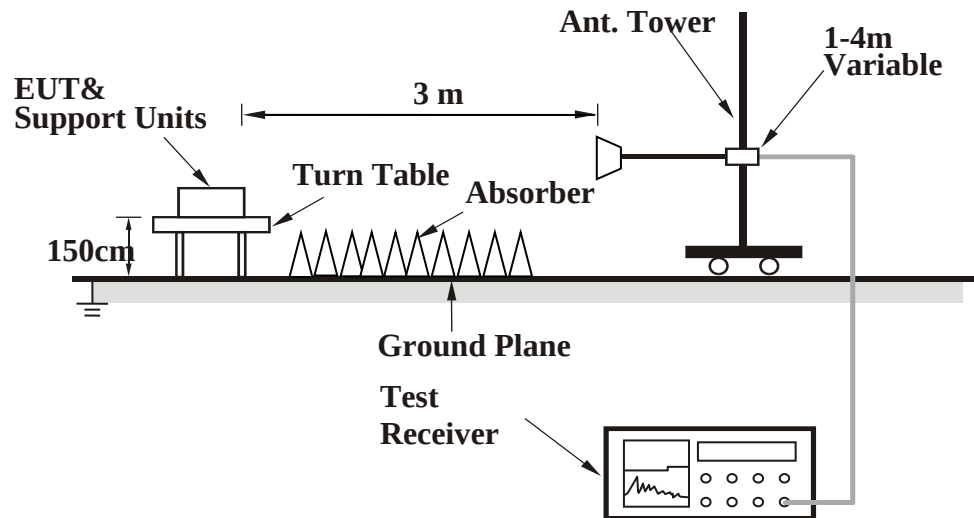
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<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

## Test Data

### **Above 1 GHz**

|      |         |         |    |
|------|---------|---------|----|
| Mode | 802.11a | Channel | 36 |
|------|---------|---------|----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   |          | 5140.35            | 43.89             | 19.23             | 63.12              | 74                | -10.88         | PK     |
|              |          | 5149.1             | 34.27             | 19.22             | 53.49              | 54                | -0.51          | AVG    |
|              | @        | 5180               | 82.07             | 19.14             | 101.21             | N/A               | N/A            | PK     |
|              | @        | 5180               | 75.83             | 19.14             | 94.97              | N/A               | N/A            | AVG    |
|              | *        | 10360              | 32                | 17.03             | 49.03              | 68.2              | -19.17         | PK     |
| Vertical     |          | 5147               | 46.52             | 19.23             | 65.75              | 74                | -8.25          | PK     |
|              |          | 5149.8             | 33.82             | 19.22             | 53.04              | 54                | -0.96          | AVG    |
|              | @        | 5180               | 82.43             | 19.14             | 101.57             | N/A               | N/A            | PK     |
|              | @        | 5180               | 74.2              | 19.14             | 93.34              | N/A               | N/A            | AVG    |
|              | *        | 10360              | 32.28             | 17.03             | 49.31              | 68.2              | -18.89         | PK     |

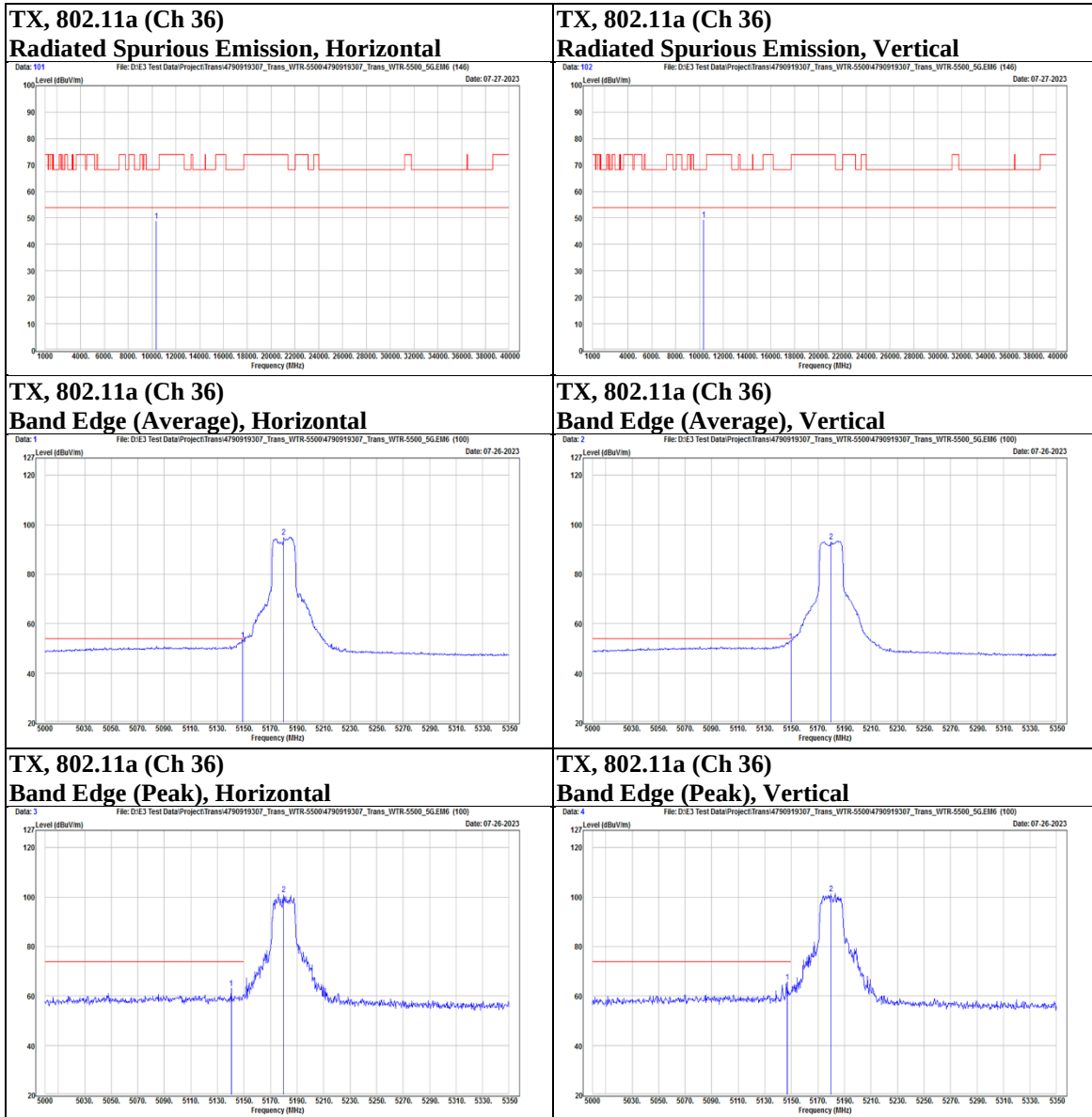
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|      |         |         |    |
|------|---------|---------|----|
| Mode | 802.11a | Channel | 44 |
|------|---------|---------|----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   |          | 5139.65            | 42.08             | 19.22             | 61.3               | 74                | -12.7          | PK     |
|              |          | 5149.45            | 32.93             | 19.22             | 52.15              | 54                | -1.85          | AVG    |
|              | @        | 5220               | 88.71             | 19.04             | 107.75             | N/A               | N/A            | PK     |
|              | @        | 5220               | 81.4              | 19.04             | 100.44             | N/A               | N/A            | AVG    |
|              | *        | 10440              | 42.81             | 17.45             | 60.26              | 68.2              | -7.94          | PK     |
| Vertical     |          | 5123.9             | 42.64             | 19.24             | 61.88              | 74                | -12.12         | PK     |
|              |          | 5147.35            | 32.78             | 19.23             | 52.01              | 54                | -1.99          | AVG    |
|              | @        | 5220               | 88.55             | 19.04             | 107.59             | N/A               | N/A            | PK     |
|              | @        | 5220               | 80.46             | 19.04             | 99.5               | N/A               | N/A            | AVG    |
|              | *        | 10440              | 41.78             | 17.45             | 59.23              | 68.2              | -8.97          | PK     |

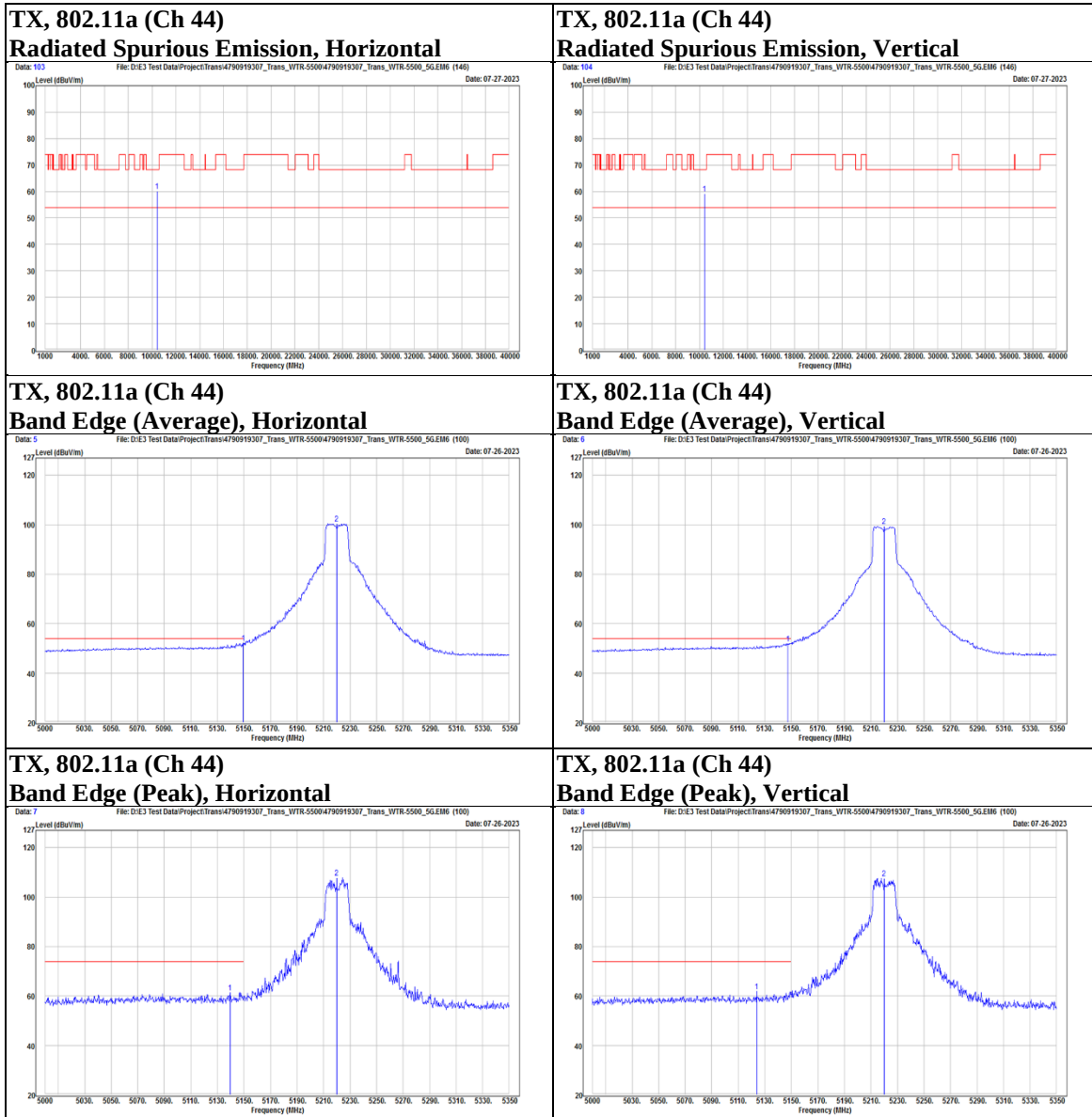
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|      |         |         |    |
|------|---------|---------|----|
| Mode | 802.11a | Channel | 48 |
|------|---------|---------|----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   |          | 5118.65            | 41.59             | 19.24             | 60.83              | 74                | -13.17         | PK     |
|              |          | 5146.65            | 31.85             | 19.23             | 51.08              | 54                | -2.92          | AVG    |
|              | @        | 5240               | 89.25             | 18.99             | 108.24             | N/A               | N/A            | PK     |
|              | @        | 5240               | 81.23             | 18.99             | 100.22             | N/A               | N/A            | AVG    |
|              | *        | 10480              | 41.11             | 17.55             | 58.66              | 68.2              | -9.54          | PK     |
| Vertical     |          | 5078.75            | 42.02             | 19.13             | 61.15              | 74                | -12.85         | PK     |
|              |          | 5149.45            | 31.49             | 19.22             | 50.71              | 54                | -3.29          | AVG    |
|              | @        | 5240               | 88.85             | 18.99             | 107.84             | N/A               | N/A            | PK     |
|              | @        | 5240               | 80.66             | 18.99             | 99.65              | N/A               | N/A            | AVG    |
|              | *        | 10480              | 41.24             | 17.55             | 58.79              | 68.2              | -9.41          | PK     |

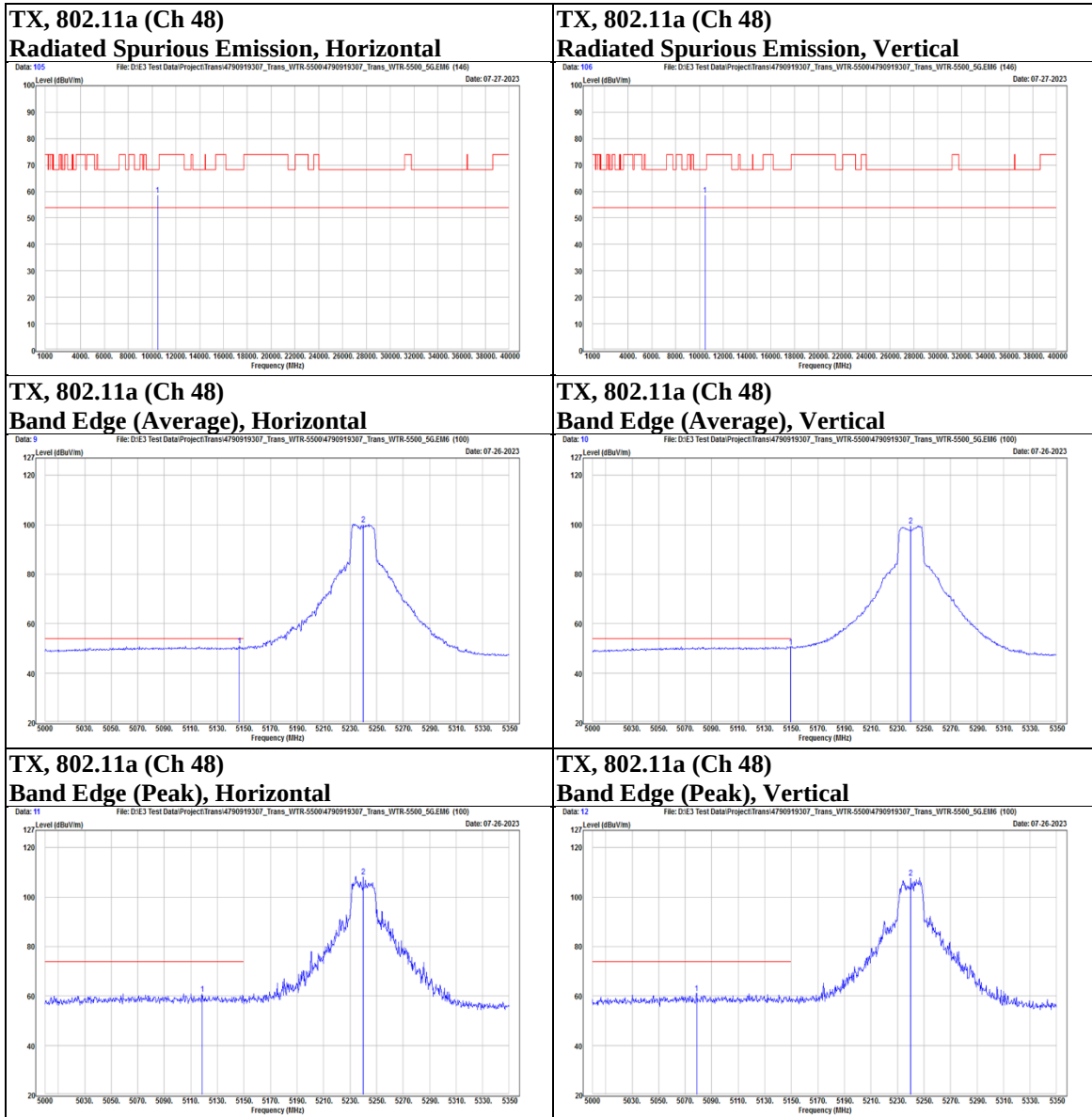
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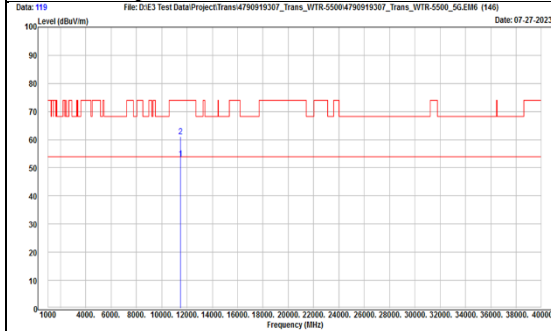
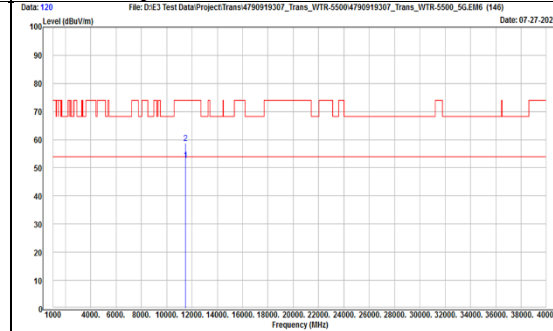
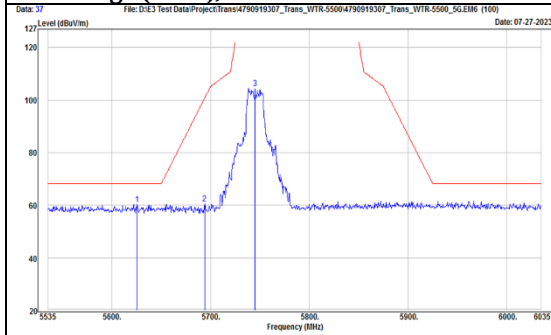
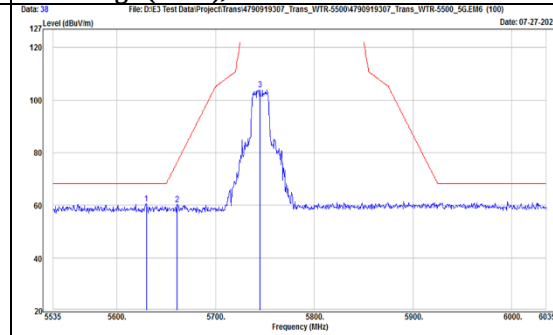
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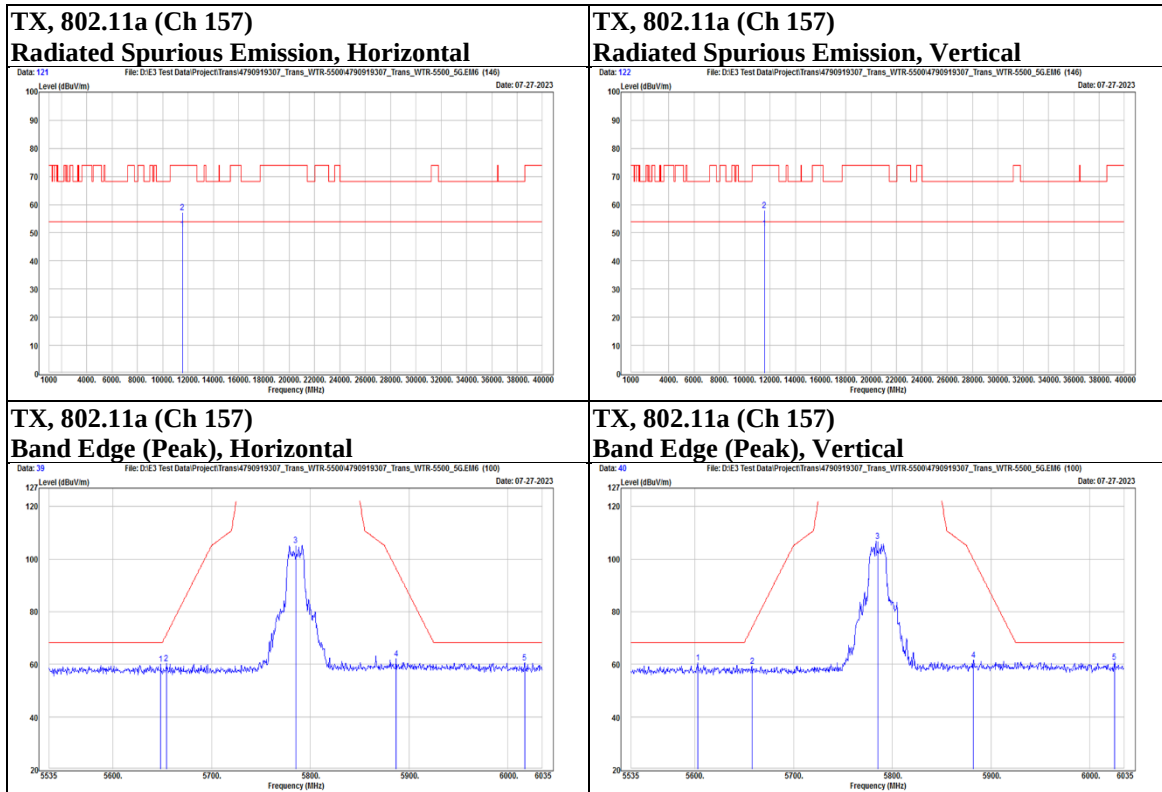
|      |         |         |     |
|------|---------|---------|-----|
| Mode | 802.11a | Channel | 149 |
|------|---------|---------|-----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   | @        | 5625.5             | 40.83             | 19.62             | 60.45              | 68.2              | -7.75          | PK     |
|              |          | 5694               | 40.9              | 19.6              | 60.5               | 100.78            | -40.28         | PK     |
|              |          | 5745               | 84.63             | 20.01             | 104.64             | N/A               | N/A            | PK     |
|              |          | 11490              | 42.29             | 18.86             | 61.15              | 74                | -12.85         | PK     |
|              |          | 11490              | 34.39             | 18.86             | 53.25              | 54                | -0.75          | AVG    |
| Vertical     | @        | 5630               | 41.08             | 19.63             | 60.71              | 68.2              | -7.49          | PK     |
|              |          | 5661               | 40.82             | 19.64             | 60.46              | 76.37             | -15.91         | PK     |
|              |          | 5745               | 84.11             | 20.01             | 104.12             | N/A               | N/A            | PK     |
|              |          | 11490              | 39.88             | 18.86             | 58.74              | 74                | -15.26         | PK     |
|              |          | 11490              | 33.78             | 18.86             | 52.64              | 54                | -1.36          | AVG    |

**TX, 802.11a (Ch 149)**
**Radiated Spurious Emission, Horizontal**

**TX, 802.11a (Ch 149)**
**Radiated Spurious Emission, Vertical**

**TX, 802.11a (Ch 149)**
**Band Edge (Peak), Horizontal**

**TX, 802.11a (Ch 149)**
**Band Edge (Peak), Vertical**


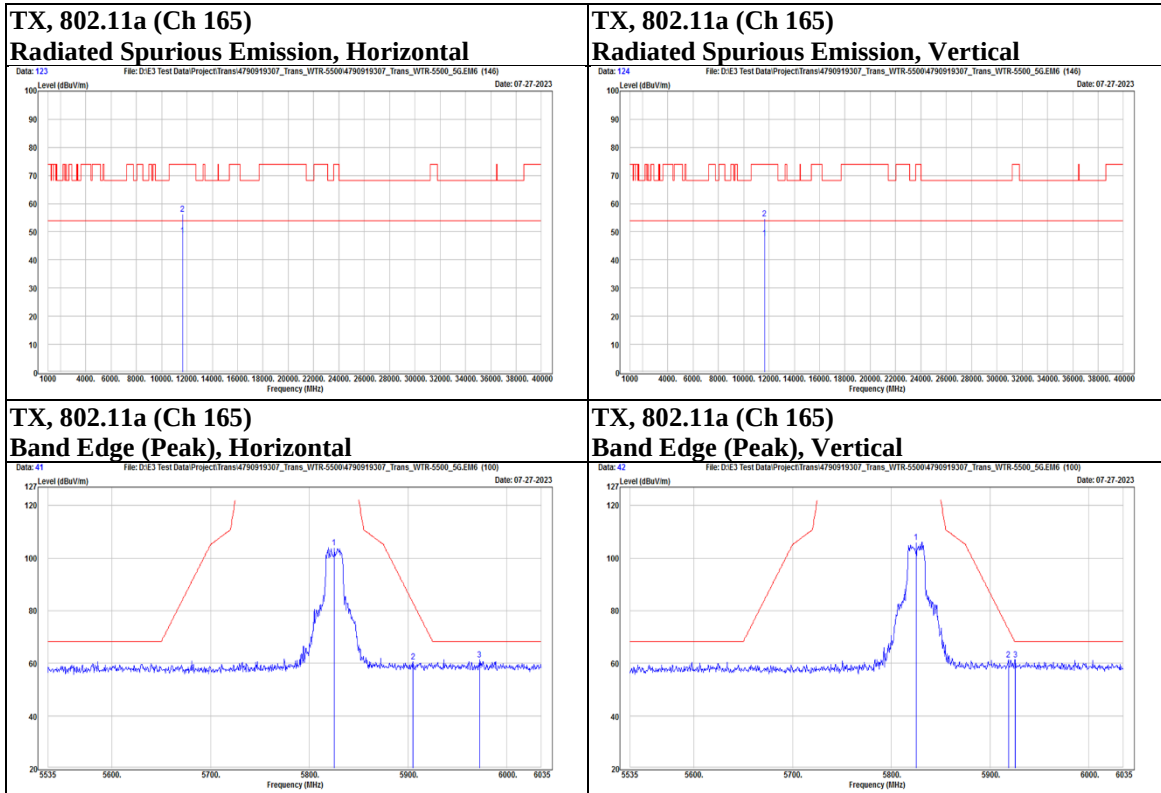
|      |         |         |     |
|------|---------|---------|-----|
| Mode | 802.11a | Channel | 157 |
|------|---------|---------|-----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   | @        | 5648.5             | 40.32             | 19.65             | 59.97              | 68.2              | -8.23          | PK     |
|              |          | 5654               | 40.73             | 19.64             | 60.37              | 71.17             | -10.8          | PK     |
|              |          | 5785               | 84.85             | 20.37             | 105.22             | N/A               | N/A            | PK     |
|              |          | 5887               | 41.39             | 20.69             | 62.08              | 96.29             | -34.21         | PK     |
|              |          | 6017               | 39.65             | 20.86             | 60.51              | 68.2              | -7.69          | PK     |
|              |          | 11570              | 38.74             | 18.65             | 57.39              | 74                | -16.61         | PK     |
|              |          | 11570              | 32.76             | 18.65             | 51.41              | 54                | -2.59          | AVG    |
| Vertical     | @        | 5603               | 40.99             | 19.6              | 60.59              | 68.2              | -7.61          | PK     |
|              |          | 5658               | 39.72             | 19.64             | 59.36              | 74.14             | -14.78         | PK     |
|              |          | 5785               | 86.53             | 20.37             | 106.9              | N/A               | N/A            | PK     |
|              |          | 5882               | 40.95             | 20.69             | 61.64              | 100               | -38.36         | PK     |
|              |          | 6025               | 40.04             | 20.89             | 60.93              | 68.2              | -7.27          | PK     |
|              |          | 11570              | 39.43             | 18.65             | 58.08              | 74                | -15.92         | PK     |
|              |          | 11570              | 32.84             | 18.65             | 51.49              | 54                | -2.51          | AVG    |



|      |         |         |     |
|------|---------|---------|-----|
| Mode | 802.11a | Channel | 165 |
|------|---------|---------|-----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   | @        | 5825               | 83.4              | 20.57             | 103.97             | N/A               | N/A            | PK     |
|              |          | 5905               | 39.85             | 20.7              | 60.55              | 82.96             | -22.41         | PK     |
|              |          | 5972.5             | 40.68             | 20.77             | 61.45              | 68.2              | -6.75          | PK     |
|              |          | 11650              | 37.94             | 18.38             | 56.32              | 74                | -17.68         | PK     |
|              |          | 11650              | 30.42             | 18.38             | 48.8               | 54                | -5.2           | AVG    |
| Vertical     | @        | 5825               | 85.59             | 20.57             | 106.16             | N/A               | N/A            | PK     |
|              |          | 5918.5             | 40.62             | 20.72             | 61.34              | 72.99             | -11.65         | PK     |
|              |          | 5925.5             | 40.57             | 20.73             | 61.3               | 68.2              | -6.9           | PK     |
|              |          | 11650              | 36.19             | 18.38             | 54.57              | 74                | -19.43         | PK     |
|              |          | 11650              | 29.3              | 18.38             | 47.68              | 54                | -6.32          | AVG    |



|      |                 |         |    |
|------|-----------------|---------|----|
| Mode | 802.11ac(VHT20) | Channel | 36 |
|------|-----------------|---------|----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   |          | 5143.5             | 45.07             | 19.22             | 64.29              | 74                | -9.71          | PK     |
|              |          | 5149.1             | 33.61             | 19.22             | 52.83              | 54                | -1.17          | AVG    |
|              | @        | 5180               | 81.7              | 19.14             | 100.84             | N/A               | N/A            | PK     |
|              | @        | 5180               | 74.78             | 19.14             | 93.92              | N/A               | N/A            | AVG    |
|              | *        | 10360              | 31.56             | 17.03             | 48.59              | 68.2              | -19.61         | PK     |
| Vertical     |          | 5147.7             | 44.43             | 19.22             | 63.65              | 74                | -10.35         | PK     |
|              |          | 5149.45            | 34.27             | 19.22             | 53.49              | 54                | -0.51          | AVG    |
|              | @        | 5180               | 81.99             | 19.14             | 101.13             | N/A               | N/A            | PK     |
|              | @        | 5180               | 73.34             | 19.14             | 92.48              | N/A               | N/A            | AVG    |
|              | *        | 10360              | 31.6              | 17.03             | 48.63              | 68.2              | -19.57         | PK     |

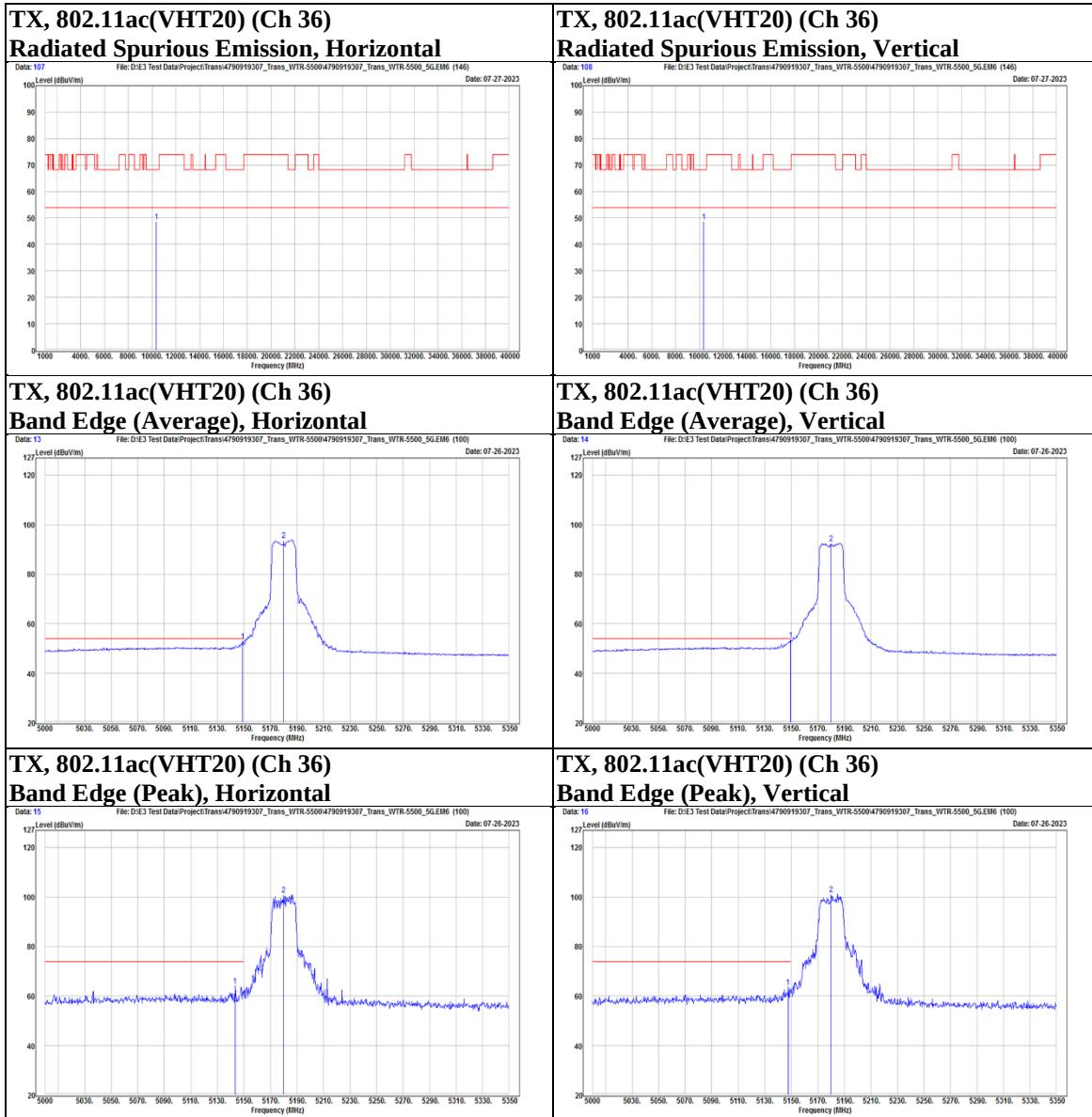
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|      |                 |         |    |
|------|-----------------|---------|----|
| Mode | 802.11ac(VHT20) | Channel | 44 |
|------|-----------------|---------|----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   |          | 5138.6             | 43.06             | 19.22             | 62.28              | 74                | -11.72         | PK     |
|              |          | 5147               | 32.8              | 19.23             | 52.03              | 54                | -1.97          | AVG    |
|              | @        | 5220               | 89                | 19.04             | 108.04             | N/A               | N/A            | PK     |
|              | @        | 5220               | 81.35             | 19.04             | 100.39             | N/A               | N/A            | AVG    |
|              | *        | 10440              | 40.78             | 17.45             | 58.23              | 68.2              | -9.97          | PK     |
| Vertical     |          | 5147.35            | 44.5              | 19.23             | 63.73              | 74                | -10.27         | PK     |
|              |          | 5148.4             | 33.12             | 19.22             | 52.34              | 54                | -1.66          | AVG    |
|              | @        | 5220               | 87.77             | 19.04             | 106.81             | N/A               | N/A            | PK     |
|              | @        | 5220               | 79.83             | 19.04             | 98.87              | N/A               | N/A            | AVG    |
|              | *        | 10440              | 41.87             | 17.45             | 59.32              | 68.2              | -8.88          | PK     |

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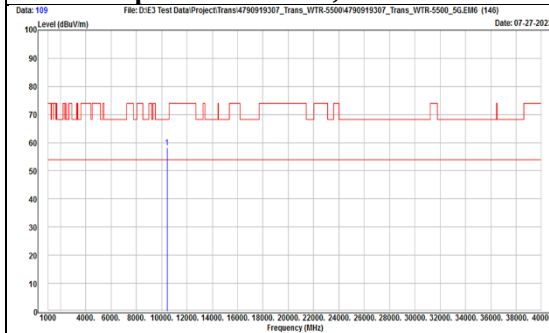
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

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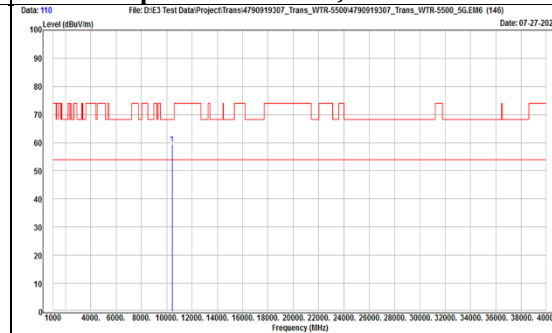
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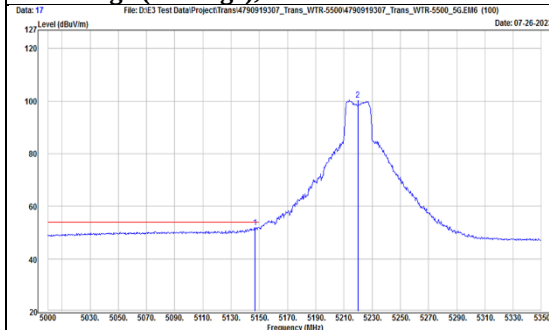
**TX, 802.11ac(VHT20) (Ch 44)**  
**Radiated Spurious Emission, Horizontal**



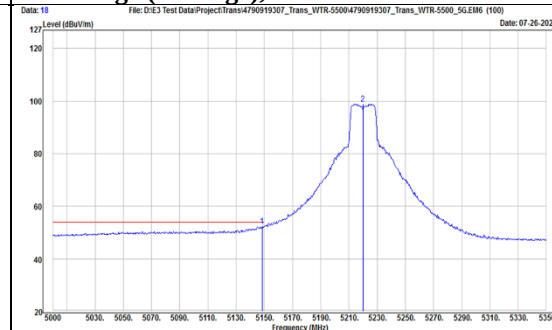
**TX, 802.11ac(VHT20) (Ch 44)**  
**Radiated Spurious Emission, Vertical**



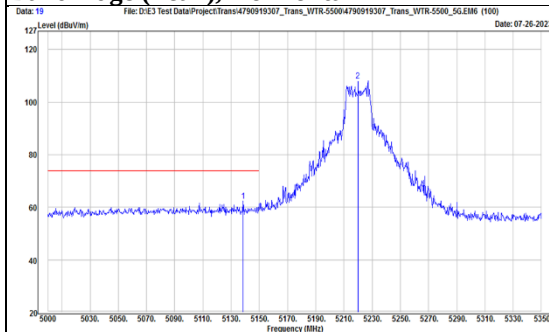
**TX, 802.11ac(VHT20) (Ch 44)**  
**Band Edge (Average), Horizontal**



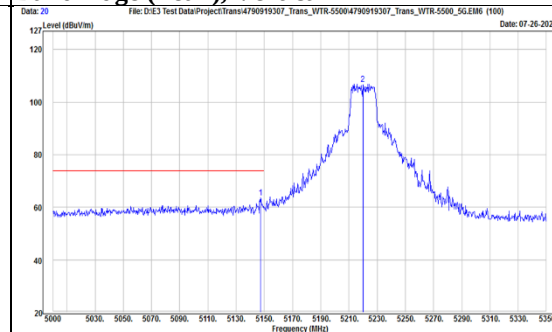
**TX, 802.11ac(VHT20) (Ch 44)**  
**Band Edge (Average), Vertical**



**TX, 802.11ac(VHT20) (Ch 44)**  
**Band Edge (Peak), Horizontal**



**TX, 802.11ac(VHT20) (Ch 44)**  
**Band Edge (Peak), Vertical**



|      |                 |         |    |
|------|-----------------|---------|----|
| Mode | 802.11ac(VHT20) | Channel | 48 |
|------|-----------------|---------|----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   |          | 5109.9             | 31.34             | 19.24             | 50.58              | 54                | -3.42          | AVG    |
|              |          | 5136.5             | 41.98             | 19.23             | 61.21              | 74                | -12.79         | PK     |
|              | @        | 5240               | 88.3              | 18.99             | 107.29             | N/A               | N/A            | PK     |
|              | @        | 5240               | 81.43             | 18.99             | 100.42             | N/A               | N/A            | AVG    |
|              | *        | 10480              | 40.63             | 17.55             | 58.18              | 68.2              | -10.02         | PK     |
| Vertical     |          | 5145.95            | 31.32             | 19.22             | 50.54              | 54                | -3.46          | AVG    |
|              |          | 5148.75            | 41.45             | 19.22             | 60.67              | 74                | -13.33         | PK     |
|              | @        | 5240               | 87.81             | 18.99             | 106.8              | N/A               | N/A            | PK     |
|              | @        | 5240               | 80.07             | 18.99             | 99.06              | N/A               | N/A            | AVG    |
|              | *        | 10480              | 41.19             | 17.55             | 58.74              | 68.2              | -9.46          | PK     |

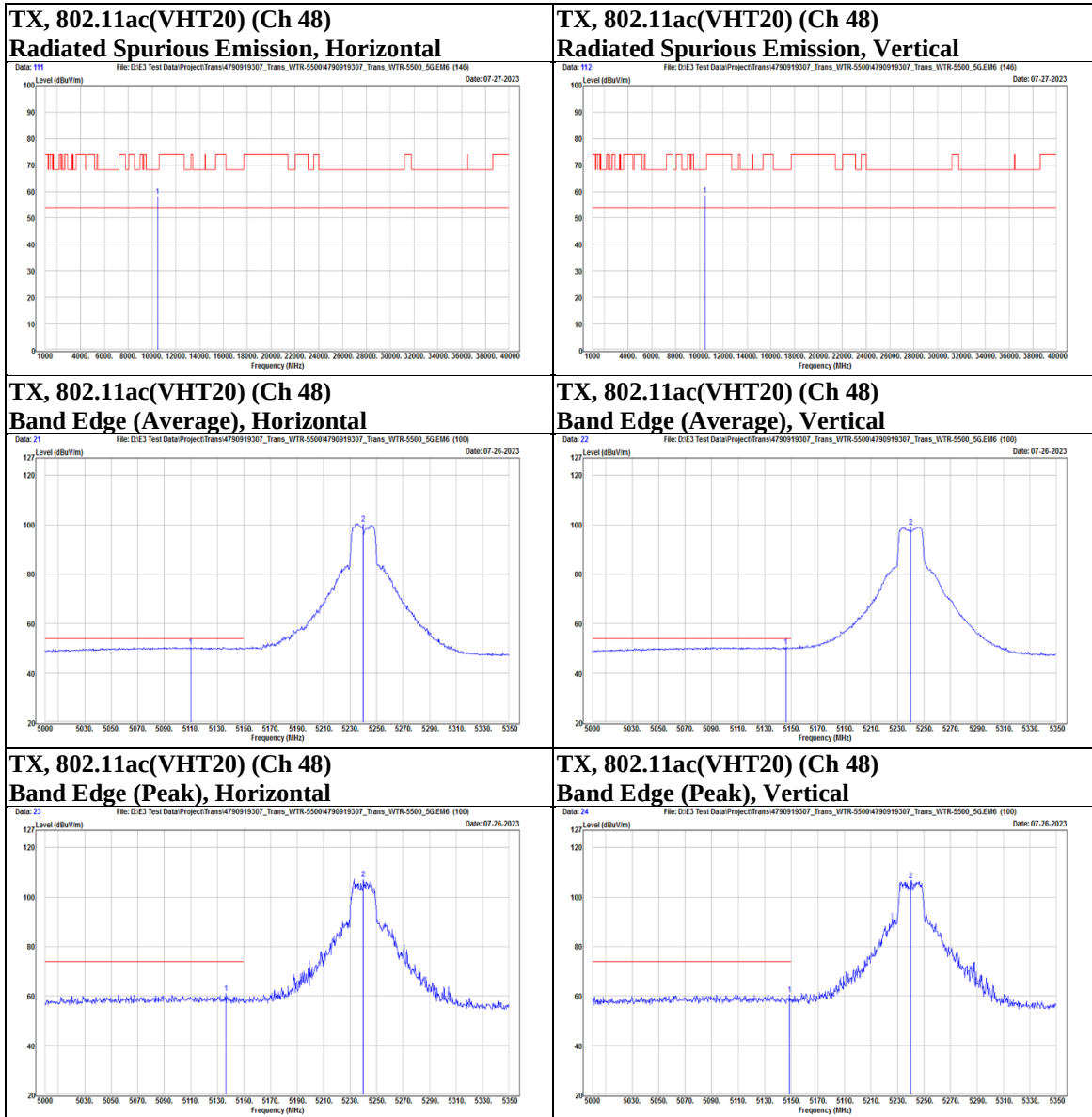
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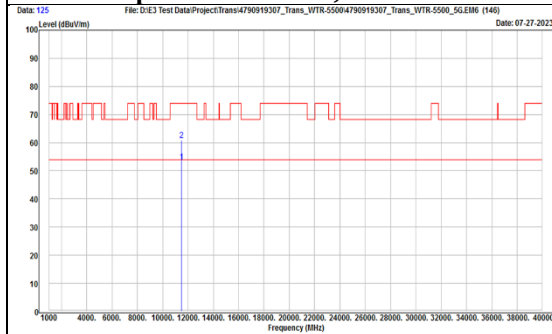
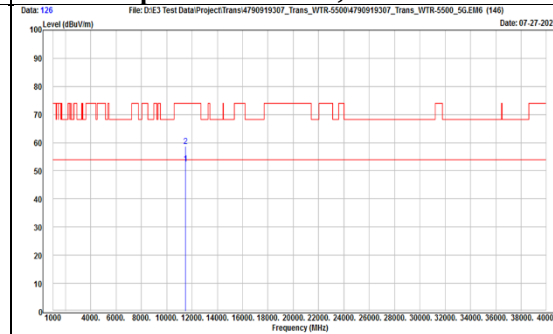
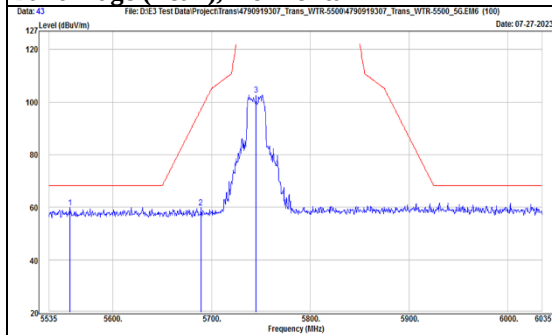
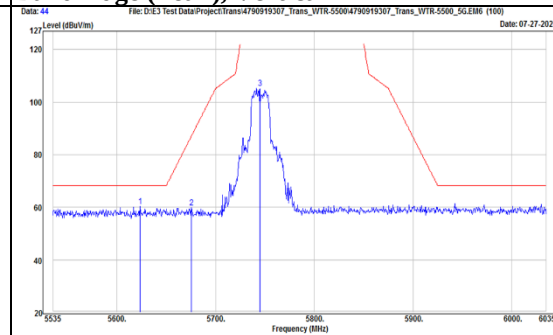
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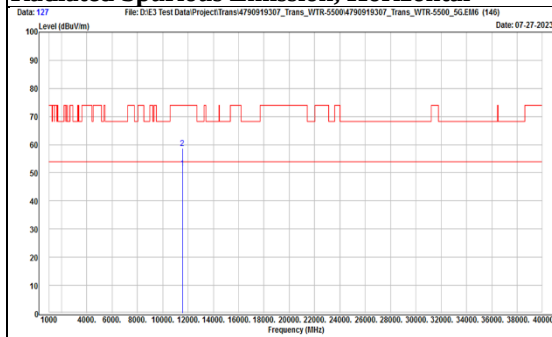
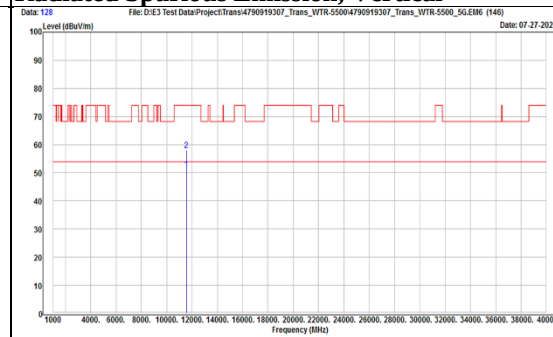
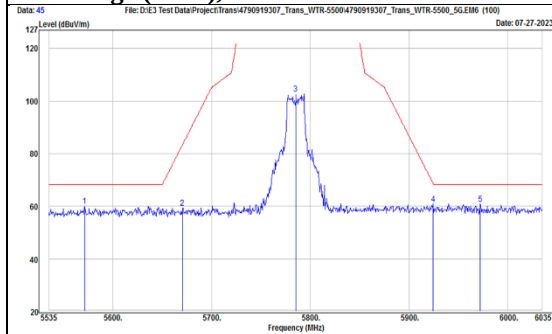
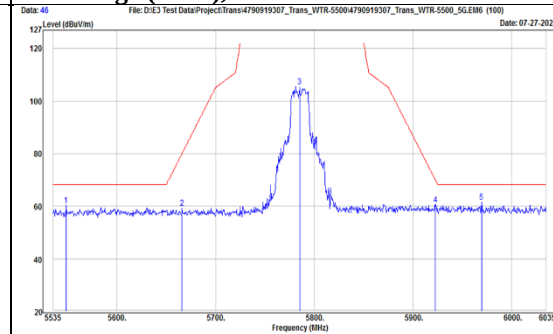
|      |                 |         |     |
|------|-----------------|---------|-----|
| Mode | 802.11ac(VHT20) | Channel | 149 |
|------|-----------------|---------|-----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   | @        | 5556.5             | 40.41             | 19.55             | 59.96              | 68.2              | -8.24          | PK     |
|              |          | 5689               | 40.34             | 19.61             | 59.95              | 97.09             | -37.14         | PK     |
|              |          | 5745               | 82.73             | 20.01             | 102.74             | N/A               | N/A            | PK     |
|              |          | 11490              | 41.92             | 18.86             | 60.78              | 74                | -13.22         | PK     |
|              |          | 11490              | 34.32             | 18.86             | 53.18              | 54                | -0.82          | AVG    |
| Vertical     | @        | 5623.5             | 40.6              | 19.62             | 60.22              | 68.2              | -7.98          | PK     |
|              |          | 5675.5             | 40.09             | 19.63             | 59.72              | 87.11             | -27.39         | PK     |
|              |          | 5745               | 85.17             | 20.01             | 105.18             | N/A               | N/A            | PK     |
|              |          | 11490              | 39.75             | 18.86             | 58.61              | 74                | -15.39         | PK     |
|              |          | 11490              | 33.71             | 18.86             | 52.57              | 54                | -1.43          | AVG    |

**TX, 802.11ac(VHT20) (Ch 149)**
**Radiated Spurious Emission, Horizontal**

**TX, 802.11ac(VHT20) (Ch 149)**
**Radiated Spurious Emission, Vertical**

**TX, 802.11ac(VHT20) (Ch 149)**
**Band Edge (Peak), Horizontal**

**TX, 802.11ac(VHT20) (Ch 149)**
**Band Edge (Peak), Vertical**


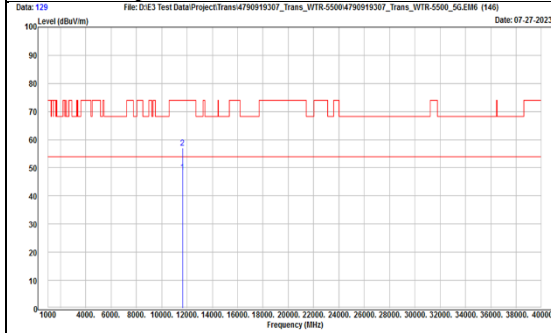
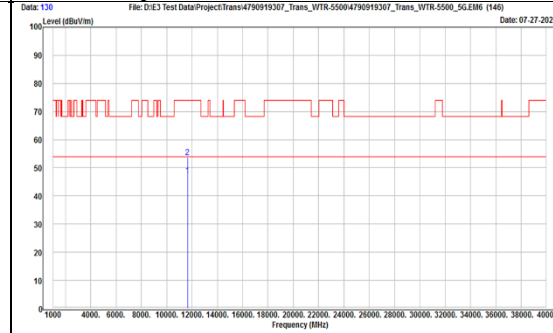
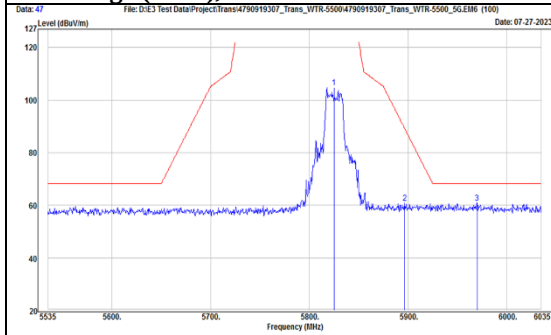
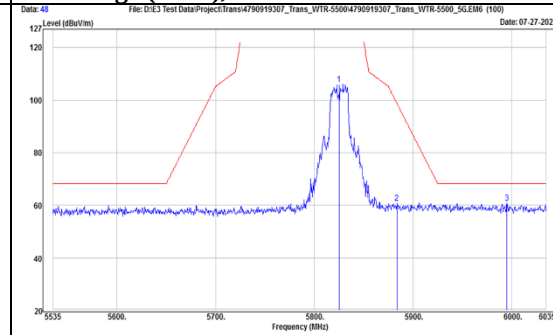
|      |                 |         |     |
|------|-----------------|---------|-----|
| Mode | 802.11ac(VHT20) | Channel | 157 |
|------|-----------------|---------|-----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   | @        | 5571.5             | 40.5              | 19.57             | 60.07              | 68.2              | -8.13          | PK     |
|              |          | 5670.5             | 39.77             | 19.63             | 59.4               | 83.41             | -24.01         | PK     |
|              |          | 5785               | 82.45             | 20.37             | 102.82             | N/A               | N/A            | PK     |
|              |          | 5924.5             | 40.01             | 20.73             | 60.74              | 68.57             | -7.83          | PK     |
|              |          | 5972               | 40.21             | 20.77             | 60.98              | 68.2              | -7.22          | PK     |
|              |          | 11570              | 40                | 18.65             | 58.65              | 74                | -15.35         | PK     |
|              |          | 11570              | 32.79             | 18.65             | 51.44              | 54                | -2.56          | AVG    |
| Vertical     | @        | 5548.5             | 40.69             | 19.55             | 60.24              | 68.2              | -7.96          | PK     |
|              |          | 5666               | 39.81             | 19.64             | 59.45              | 80.08             | -20.63         | PK     |
|              |          | 5785               | 85.1              | 20.37             | 105.47             | N/A               | N/A            | PK     |
|              |          | 5922.5             | 39.87             | 20.72             | 60.59              | 70.04             | -9.45          | PK     |
|              |          | 5969.5             | 40.92             | 20.77             | 61.69              | 68.2              | -6.51          | PK     |
|              |          | 11570              | 39.3              | 18.65             | 57.95              | 74                | -16.05         | PK     |
|              |          | 11570              | 32.62             | 18.65             | 51.27              | 54                | -2.73          | AVG    |

**TX, 802.11ac(VHT20) (Ch 157)**
**Radiated Spurious Emission, Horizontal**

**TX, 802.11ac(VHT20) (Ch 157)**
**Radiated Spurious Emission, Vertical**

**TX, 802.11ac(VHT20) (Ch 157)**
**Band Edge (Peak), Horizontal**

**TX, 802.11ac(VHT20) (Ch 157)**
**Band Edge (Peak), Vertical**


|      |                 |         |     |
|------|-----------------|---------|-----|
| Mode | 802.11ac(VHT20) | Channel | 165 |
|------|-----------------|---------|-----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   | @        | 5825               | 84.26             | 20.57             | 104.83             | N/A               | N/A            | PK     |
|              |          | 5896.5             | 40.19             | 20.69             | 60.88              | 89.25             | -28.37         | PK     |
|              |          | 5970               | 40.16             | 20.77             | 60.93              | 68.2              | -7.27          | PK     |
|              |          | 11650              | 38.6              | 18.38             | 56.98              | 74                | -17.02         | PK     |
|              |          | 11650              | 29.99             | 18.38             | 48.37              | 54                | -5.63          | AVG    |
| Vertical     | @        | 5825               | 85.37             | 20.57             | 105.94             | N/A               | N/A            | PK     |
|              |          | 5883.5             | 40.23             | 20.69             | 60.92              | 98.89             | -37.97         | PK     |
|              |          | 5995               | 39.99             | 20.79             | 60.78              | 68.2              | -7.42          | PK     |
|              |          | 11650              | 35.38             | 18.38             | 53.76              | 74                | -20.24         | PK     |
|              |          | 11650              | 28.78             | 18.38             | 47.16              | 54                | -6.84          | AVG    |

**TX, 802.11ac(VHT20) (Ch 165)**
**Radiated Spurious Emission, Horizontal**

**TX, 802.11ac(VHT20) (Ch 165)**
**Radiated Spurious Emission, Vertical**

**TX, 802.11ac(VHT20) (Ch 165)**
**Band Edge (Peak), Horizontal**

**TX, 802.11ac(VHT20) (Ch 165)**
**Band Edge (Peak), Vertical**


|      |                 |         |    |
|------|-----------------|---------|----|
| Mode | 802.11ac(VHT40) | Channel | 38 |
|------|-----------------|---------|----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   |          | 5149.1             | 43.25             | 19.22             | 62.47              | 74                | -11.53         | PK     |
|              |          | 5149.1             | 33.97             | 19.22             | 53.19              | 54                | -0.81          | AVG    |
|              | @        | 5190               | 77.79             | 19.12             | 96.91              | N/A               | N/A            | PK     |
|              | @        | 5190               | 69.77             | 19.12             | 88.89              | N/A               | N/A            | AVG    |
|              | *        | 10380              | 31.53             | 17.19             | 48.72              | 68.2              | -19.48         | PK     |
| Vertical     |          | 5149.8             | 46.9              | 19.22             | 66.12              | 74                | -7.88          | PK     |
|              |          | 5149.8             | 33.57             | 19.22             | 52.79              | 54                | -1.21          | AVG    |
|              | @        | 5190               | 76.25             | 19.12             | 95.37              | N/A               | N/A            | PK     |
|              | @        | 5190               | 68.57             | 19.12             | 87.69              | N/A               | N/A            | AVG    |
|              | *        | 10380              | 30.86             | 17.19             | 48.05              | 68.2              | -20.15         | PK     |

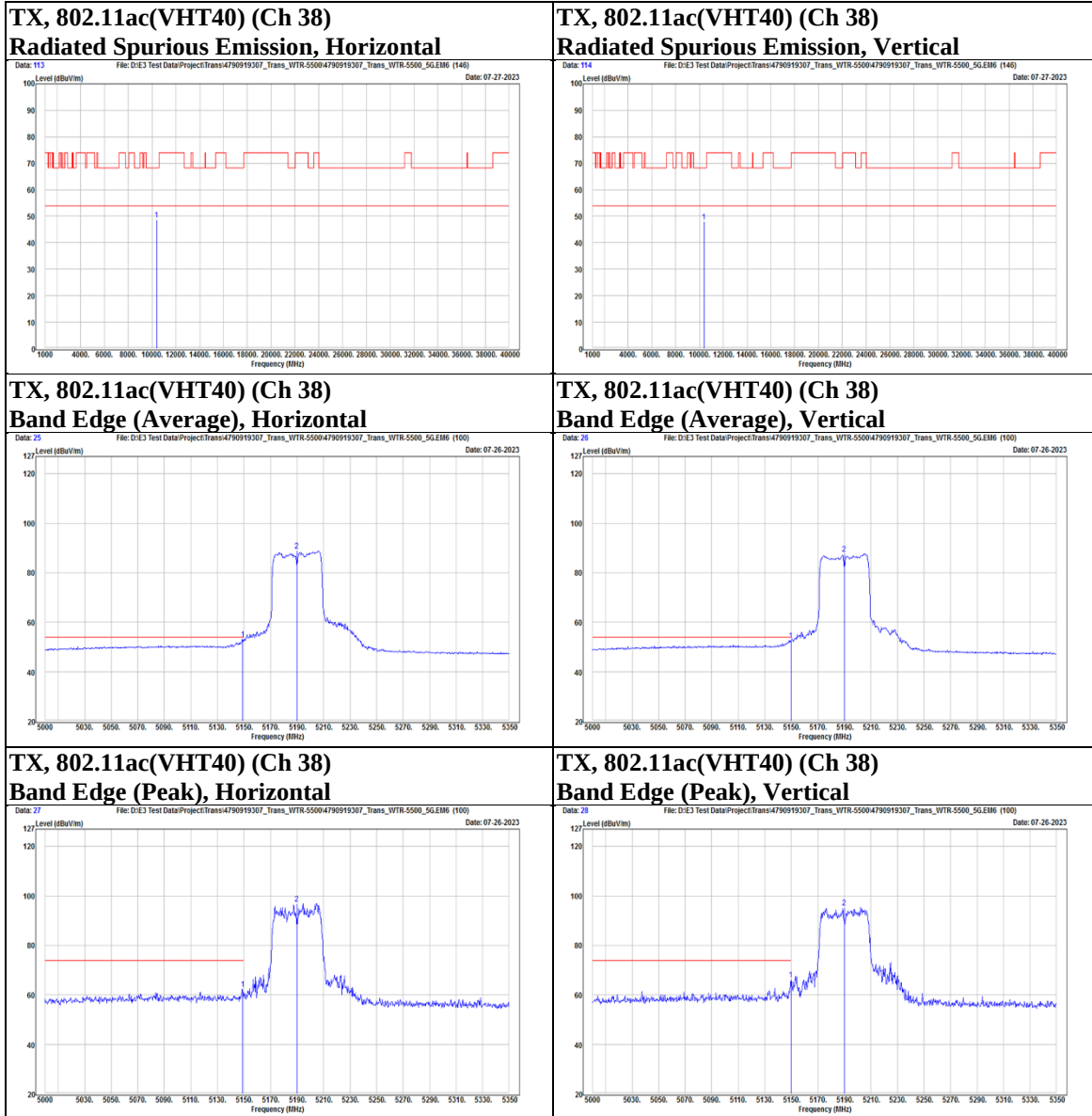
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|      |                 |         |    |
|------|-----------------|---------|----|
| Mode | 802.11ac(VHT40) | Channel | 46 |
|------|-----------------|---------|----|

| Polarization | Notation | Frequency<br>(MHz) | Reading<br>(dBuV) | Correct<br>(dB/m) | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|--------------|----------|--------------------|-------------------|-------------------|--------------------|-------------------|----------------|--------|
| Horizontal   |          | 5117.6             | 42.39             | 19.24             | 61.63              | 74                | -12.37         | PK     |
|              |          | 5149.8             | 33.91             | 19.22             | 53.13              | 54                | -0.87          | AVG    |
|              | @        | 5230               | 84.22             | 19.01             | 103.23             | N/A               | N/A            | PK     |
|              | @        | 5230               | 75.86             | 19.01             | 94.87              | N/A               | N/A            | AVG    |
|              | *        | 10460              | 33.58             | 17.5              | 51.08              | 68.2              | -17.12         | PK     |
| Vertical     |          | 5126.35            | 42.46             | 19.24             | 61.7               | 74                | -12.3          | PK     |
|              |          | 5149.8             | 33.65             | 19.22             | 52.87              | 54                | -1.13          | AVG    |
|              | @        | 5230               | 81.71             | 19.01             | 100.72             | N/A               | N/A            | PK     |
|              | @        | 5230               | 74.03             | 19.01             | 93.04              | N/A               | N/A            | AVG    |
|              | *        | 10460              | 33.04             | 17.5              | 50.54              | 68.2              | -17.66         | PK     |

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