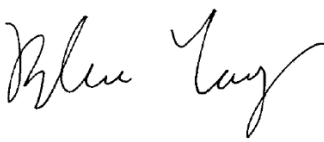


**ELECTROMAGNETIC EMISSIONS**  
**CLASS II PERMISSIVE CHANGE TEST REPORT**



**Applicant:** Cisco Systems Inc.  
125 West Tasman Dr, Bldg. P, San Jose, California, 95134  
USA  
**Manufacturer:** Cisco Systems Inc.  
125 West Tasman Dr, Bldg. P, San Jose, California, 95134  
USA  
**Product Name:** FM4500EMB-HW  
**Brand Name:** Cisco Fluidmesh FM4500 EMBEDDED  
**Model No.:** FM4500EMB  
**Model Difference:** N/A  
**Report Number:** ER/2021/A0113  
**FCC ID** R5SX500E  
**Date of EUT Received:** October 28, 2021  
**Date of Test:** March 1, 2022 ~ April 8, 2022  
**Issue Date:** May 19, 2022

  
**Approved By** \_\_\_\_\_  
**Blue Yang**

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.407.

The results of this report relate only to the sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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## Revision History

| Report Number | Revision | Description                                      | Issue Date   | Revised By    | Remark |
|---------------|----------|--------------------------------------------------|--------------|---------------|--------|
| ER/2021/A0113 | 00       | Original                                         | May 5, 2022  | Violetta Tang | *      |
| ER/2021/A0113 | 01       | Revise typo of the product description on page 4 | May 19, 2022 | Violetta Tang |        |
|               |          |                                                  |              |               |        |
|               |          |                                                  |              |               |        |
|               |          |                                                  |              |               |        |
|               |          |                                                  |              |               |        |
|               |          |                                                  |              |               |        |

**Note:**

- 1、The remark "\*" indicates modification of the report upon requests from certification body.

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## Contents

|    |                                                  |     |
|----|--------------------------------------------------|-----|
| 1  | GENERAL INFORMATION .....                        | 4   |
| 2  | SYSTEM TEST CONFIGURATION .....                  | 8   |
| 3  | SUMMARY OF TEST RESULT .....                     | 11  |
| 4  | DESCRIPTION OF TEST MODES .....                  | 13  |
| 5  | MEASUREMENT UNCERTAINTY .....                    | 16  |
| 6  | MEASUREMENT EQUIPMENT USED .....                 | 17  |
| 7  | CONDUCTED EMISSION TEST .....                    | 19  |
| 8  | EMISSION BANDWIDTH MEASUREMENT .....             | 24  |
| 9  | MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT ..... | 40  |
| 10 | MAXIMUM POWER SPECTRAL DENSITY .....             | 48  |
| 11 | UNDESIRABLE RADIATED EMISSION MEASUREMENT .....  | 62  |
| 12 | TRANSMISSION IN THE ABSENCE OF DATA.....         | 258 |
| 13 | ANTENNA REQUIREMENT .....                        | 259 |

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## 1 GENERAL INFORMATION

### 1.1 Product Description

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:                  | FM4500EMB-HW                                                                                                                                                                                                                                                                                                                                                                                                        |
| Brand Name:                    | Cisco Fluidmesh FM4500 EMBEDDED                                                                                                                                                                                                                                                                                                                                                                                     |
| Model No.:                     | FM4500EMB                                                                                                                                                                                                                                                                                                                                                                                                           |
| Model Difference:              | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Hardware Version:              | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Firmware Version:              | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 |
| EUT Series No.:                | 3500170840 / 3500171248                                                                                                                                                                                                                                                                                                                                                                                             |
| Class II<br>Permissive Change: | FM4500EMB module INSTALLED IN FM3500, FM4500                                                                                                                                                                                                                                                                                                                                                                        |
| Host Information:              | Product Name: FM3500ENDO-HW<br>Brand Name: Cisco Fluidmesh FM3500 ENDO<br>Model Name: FM3500, FM4500<br>Model Differences as below.<br>1. Some passive components of the DCIN circuit are mounted on PCB in FM4500 model.<br>2. Antenna connectors are different: RPSMA on FM3500, QMA on FM4500.<br>3. Bottom part of FM4500 enclosure has M12 connectors instead of RJ45 ports: M12 DCIN port is added on FM4500. |
| Power Supply:                  | 56Vdc                                                                                                                                                                                                                                                                                                                                                                                                               |

### 1.2 Modulation & Data Rate

|                  |                                    |
|------------------|------------------------------------|
| Modulation type: | 64QAM, 16QAM, QPSK, BPSK for OFDM  |
|                  | 256QAM for OFDM in 802.11ac only   |
|                  | 802.11 n_20MHz: 6.5 - 144.4 Mbps   |
| Transition Rate: | 802.11 n_40MHz: 13.5 - 300 Mbps    |
|                  | 802.11 ac_20MHz: 6.5 - 173.4 Mbps  |
|                  | 802.11 ac_40MHz: 13.5 - 400 Mbps   |
|                  | 802.11 ac_80MHz: 29.3 - 866.6 Mbps |

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### 1.3 Antenna Designation

| Antenna Type  | Supplier        | Antenna Part No. | Freq. (MHz) | Peak Antenna Gain (dBi) | Directional Gain (dBi) |  |
|---------------|-----------------|------------------|-------------|-------------------------|------------------------|--|
| Direction     | Fluidmesh       | FM-TUBE          | 5150~5250   | 14.60                   | 17.61                  |  |
|               |                 |                  | 5250~5350   |                         |                        |  |
|               |                 |                  | 5470~5725   |                         |                        |  |
|               |                 |                  | 5725~5850   |                         |                        |  |
| Omnidirection | Fluidmesh       | FM-SHARK-DUAL    | 5150~5250   | 13.00                   | 16.01                  |  |
|               |                 |                  | 5250~5350   |                         |                        |  |
|               |                 |                  | 5470~5725   |                         |                        |  |
|               |                 |                  | 5725~5850   |                         |                        |  |
| Direction     | Fluidmesh       | FM-HORN-90       | 5150~5250   | 10.00                   | 13.01                  |  |
|               |                 |                  | 5250~5350   |                         |                        |  |
|               |                 |                  | 5470~5725   |                         |                        |  |
|               |                 |                  | 5725~5850   |                         |                        |  |
| Omnidirection | Fluidmesh       | FM-OMNI-5-V      | 5150~5250   | 4.00                    | 7.52                   |  |
|               |                 |                  | 5250~5350   |                         |                        |  |
|               |                 |                  | 5470~5725   |                         |                        |  |
|               |                 |                  | 5725~5850   |                         |                        |  |
| Omnidirection | Fluidmesh       | FM-OMNI-5-H      | 5150~5250   | 5.00                    |                        |  |
|               |                 |                  | 5250~5350   |                         |                        |  |
|               |                 |                  | 5470~5725   |                         |                        |  |
|               |                 |                  | 5725~5850   |                         |                        |  |
| Omnidirection | MP Antenna LTD. | 08-ANT-0985      | 5150~5250   | 3.00                    | 6.01                   |  |
|               |                 |                  | 5250~5350   |                         |                        |  |
|               |                 |                  | 5470~5725   |                         |                        |  |
|               |                 |                  | 5725~5850   |                         |                        |  |

#### Note:

1. Pre-scanned was done on the above antennas, measurements were demonstrated by using the antenna with the highest gain as the worst case scenarios.
2. Antenna information is provided by the applicant.

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#### 1.4 FCC WLAN 5GHz:

| Wi-Fi                  | Frequency Range | Channels | Rated Power(Avg)<br>(dBm) (Worst Case) | Modulation<br>Technology |
|------------------------|-----------------|----------|----------------------------------------|--------------------------|
| n_HT/<br>ac_VHT<br>20M | 5180~5240       | 4        | 9.46 dBm                               | OFDM                     |
|                        | 5260~5320       | 4        | 9.26 dBm                               | OFDM                     |
|                        | 5500~5700       | 11       | 9.64 dBm                               | OFDM                     |
|                        | 5745~5825       | 5        | 17.55 dBm                              | OFDM                     |
| n_HT/<br>ac_VHT<br>40M | 5190~5230       | 2        | 9.44 dBm                               | OFDM                     |
|                        | 5270~5310       | 2        | 12.18 dBm                              | OFDM                     |
|                        | 5510~5670       | 5        | 12.29 dBm                              | OFDM                     |
|                        | 5755~5795       | 2        | 17.42 dBm                              | OFDM                     |
| ac_VHT<br>80M          | 5210            | 1        | 7.46 dBm                               | OFDM                     |
|                        | 5290            | 1        | 7.17 dBm                               | OFDM                     |
|                        | 5530~5610       | 2        | 12.27 dBm                              | OFDM                     |
|                        | 5775            | 1        | 16.42 dBm                              | OFDM                     |

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## 1.5 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10:2013

## 1.6 Test Facility

| Laboratory                                            | Test Site Address                                                                         | Test Site Name | FCC Designation number | IC CAB identifier |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------|------------------------|-------------------|
| SGS Taiwan Ltd.<br>Central RF Lab.<br>(TAF code 3702) | No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan. | SAC 1          | TW0027                 | TW3702            |
|                                                       |                                                                                           | SAC 3          |                        |                   |
|                                                       |                                                                                           | Conduction 1   |                        |                   |
|                                                       |                                                                                           | Conducted 1    |                        |                   |
|                                                       |                                                                                           | Conducted 2    |                        |                   |
|                                                       |                                                                                           | Conducted 3    |                        |                   |
|                                                       |                                                                                           | Conducted 4    |                        |                   |
|                                                       |                                                                                           | Conducted 5    |                        |                   |
|                                                       |                                                                                           | Conducted 6    |                        |                   |
|                                                       | No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333                            | Conduction C   | TW0028                 |                   |
|                                                       |                                                                                           | SAC C          |                        |                   |
|                                                       |                                                                                           | SAC D          |                        |                   |
|                                                       |                                                                                           | SAC G          |                        |                   |
|                                                       |                                                                                           | Conducted A    |                        |                   |
|                                                       |                                                                                           | Conducted B    |                        |                   |
|                                                       |                                                                                           | Conducted C    |                        |                   |
|                                                       |                                                                                           | Conducted D    |                        |                   |
|                                                       |                                                                                           | Conducted E    |                        |                   |
|                                                       |                                                                                           | Conducted F    |                        |                   |
|                                                       |                                                                                           | Conducted G    |                        |                   |

**Note:** Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

## 1.7 Special Accessories

There are no special accessories used while test was conducted.

## 1.8 Equipment Modifications

There was no modification incorporated into the EUT.

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## 2 SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.3 Radiated Emissions

The EUT is placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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## 2.4 Measurement Results Explanation Example

### 2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

### 2.4.2 For all conducted test items:

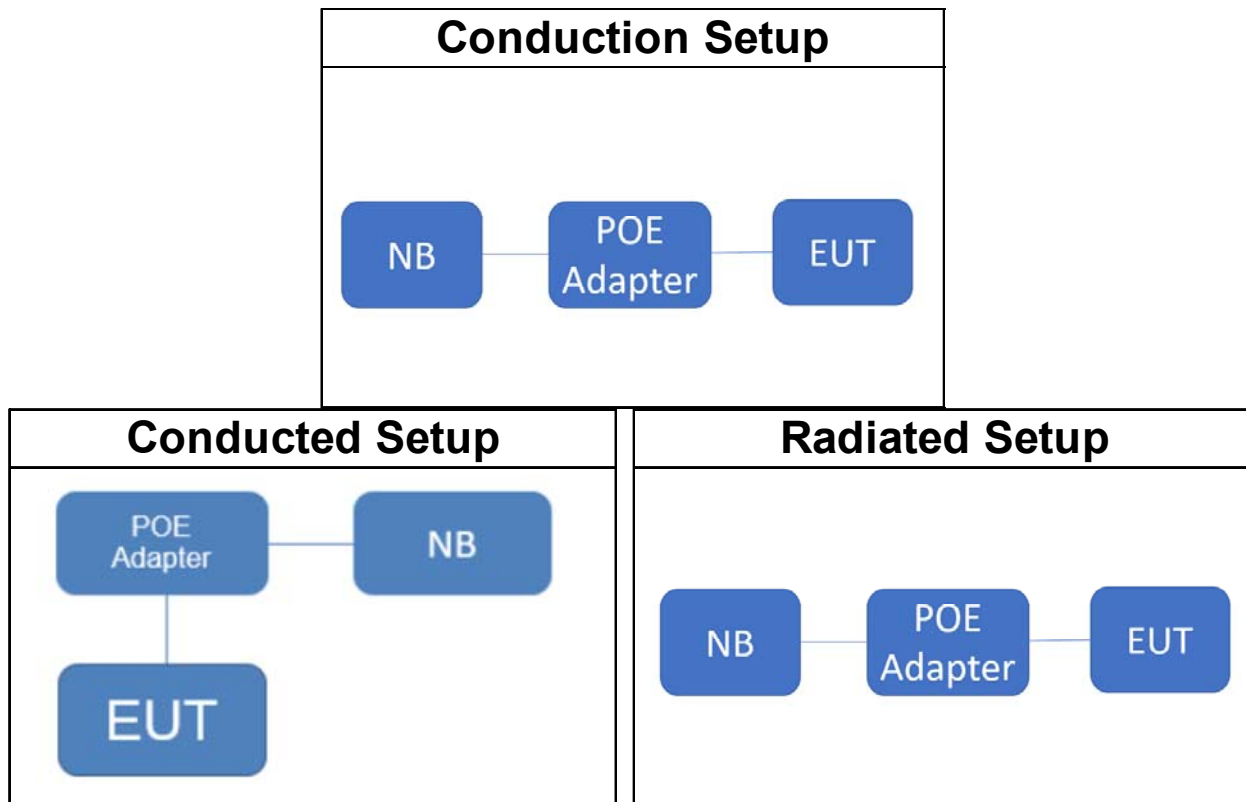
The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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## 2.5 Test Configuration



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## 2.6 Control Unit(s)

| Conducted Emission Test Site: Conduction 1 |         |               |                |           |          |
|--------------------------------------------|---------|---------------|----------------|-----------|----------|
| EQUIPMENT TYPE                             | MFR     | MODEL NUMBER  | SERIAL NUMBER  | LAST CAL. | CAL DUE. |
| Test Software                              | audix   | e3            | Ver. 9 210322  | N.C.R     | N.C.R    |
| Notebook                                   | Lenovo  | L430          | R9-WGNK5 13/01 | N/A       | N/A      |
| POE Adapter                                | PHIHONG | POE29U1AT(PL) | PHI242904KM    | N/A       | N/A      |

| Conducted Emission Test Site: Conducted 2 |         |                     |               |           |          |
|-------------------------------------------|---------|---------------------|---------------|-----------|----------|
| EQUIPMENT TYPE                            | MFR     | MODEL NUMBER        | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| Test Software                             | SGS     | Radio Test Software | Ver. 21       | N.C.R     | N.C.R    |
| Notebook                                  | Lenovo  | X250                | PC-06A4E7     | N/A       | N/A      |
| POE Adapter                               | PHIHONG | POE29U1AT(PL)       | PHI242904KM   | N/A       | N/A      |

| Radiated Emission Test Site: SAC 3 |         |               |                |           |          |
|------------------------------------|---------|---------------|----------------|-----------|----------|
| EQUIPMENT TYPE                     | MFR     | MODEL NUMBER  | SERIAL NUMBER  | LAST CAL. | CAL DUE. |
| Test Software                      | audix   | e3            | Ver. 9 210322  | N.C.R     | N.C.R    |
| Notebook                           | Lenovo  | L430          | R9-WGNK5 13/01 | N/A       | N/A      |
| POE Adapter                        | PHIHONG | POE29U1AT(PL) | PHI242904KM    | N/A       | N/A      |

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### 3 SUMMARY OF TEST RESULT

| FCC Rules                        | Description Of Test                            | Result    |
|----------------------------------|------------------------------------------------|-----------|
| §15.207                          | AC Power Line Conducted Emission               | Compliant |
| §15.407(e)                       | Emission Bandwidth                             | Compliant |
| §15.407(a)                       | Maximum Conducted Output Power                 | Compliant |
| §15.407(a)                       | Power Spectral Density                         | Compliant |
| §15.205<br>§15.209<br>§15.407(b) | Undesirable Radiated Emissions                 | Compliant |
| §15.407(c)                       | Transmission in case of Absence of Information | Compliant |
| §15.203                          | Antenna Requirement                            | Compliant |

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## 4 DESCRIPTION OF TEST MODES

### 4.1 Operating Frequencies

Operated band in 5150 MHz ~5250 MHz:

| 20 M |            | 40 M |            | 80 M |            |
|------|------------|------|------------|------|------------|
| CH   | Freq (MHz) | CH   | Freq (MHz) | CH   | Freq (MHz) |
| 36   | 5180       | 38   | 5190       | 42   | 5210       |
| 40   | 5200       | 46   | 5230       |      |            |
| 44   | 5220       |      |            |      |            |
| 48   | 5240       |      |            |      |            |

Operated band in 5250 MHz ~5350 MHz:

| 20 M |            | 40 M |            | 80 M |            |
|------|------------|------|------------|------|------------|
| CH   | Freq (MHz) | CH   | Freq (MHz) | CH   | Freq (MHz) |
| 52   | 5260       | 54   | 5270       | 58   | 5290       |
| 56   | 5280       | 62   | 5310       |      |            |
| 60   | 5300       |      |            |      |            |
| 64   | 5320       |      |            |      |            |

Operated band in 5470 MHz ~5725 MHz:

| 20 M |            | 40 M |            | 80 M |            |
|------|------------|------|------------|------|------------|
| CH   | Freq (MHz) | CH   | Freq (MHz) | CH   | Freq (MHz) |
| 100  | 5500       | 102  | 5510       | 106  | 5530       |
| 104  | 5520       | 110  | 5550       | 122  | 5610       |
| 108  | 5540       | 118  | 5590       |      |            |
| 112  | 5560       | 126  | 5630       |      |            |
| 116  | 5580       | 134  | 5670       |      |            |
| 120  | 5600       |      |            |      |            |
| 124  | 5620       |      |            |      |            |
| 128  | 5640       |      |            |      |            |
| 132  | 5660       |      |            |      |            |
| 136  | 5680       |      |            |      |            |
| 140  | 5700       |      |            |      |            |

Operated band in 5725 MHz ~5850 MHz:

| 20 M |            | 40 M |            | 80 M |            |
|------|------------|------|------------|------|------------|
| CH   | Freq (MHz) | CH   | Freq (MHz) | CH   | Freq (MHz) |
| 149  | 5745       | 151  | 5755       | 155  | 5775       |
| 153  | 5765       | 159  | 5795       |      |            |
| 157  | 5785       |      |            |      |            |
| 161  | 5805       |      |            |      |            |
| 165  | 5825       |      |            |      |            |

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## 4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
3. Investigation has been done on all the possible configurations for searching the worst case. The given UE is pre-scanned among below modes.

| Modulation |           | Transmission Chain |     |   |     |  |     |  |     | Single Transmission Spatial | Multiple Transmission Spatial |
|------------|-----------|--------------------|-----|---|-----|--|-----|--|-----|-----------------------------|-------------------------------|
|            | 802.11 a  |                    | Ch0 |   | Ch1 |  | Ch2 |  | Ch3 | 1TX                         | 2TX                           |
| v          | 802.11 n  | v                  | Ch0 | v | Ch1 |  | Ch2 |  | Ch3 | SISO                        | MIMO                          |
| v          | 802.11 ac | v                  | Ch0 | v | Ch1 |  | Ch2 |  | Ch3 | SISO                        | MIMO                          |
|            | 802.11 ax |                    | Ch0 |   | Ch1 |  | Ch2 |  | Ch3 | SISO                        | MIMO                          |

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

| RADIATED EMISSION TEST (BELOW 1 GHz) |                      |                   |                |            |                  |              |
|--------------------------------------|----------------------|-------------------|----------------|------------|------------------|--------------|
| MODE                                 | FREQUENCY BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Mbps) | ANTENNA PORT |
| 802.11_HT20                          | 5180~5240            | 36 to 48          | 44             | OFDM       | MCS8             | MIMO         |
|                                      | 5260~5320            | 52 to 64          | 60             |            |                  |              |
|                                      | 5500~5700            | 100 to 140        | 116            |            |                  |              |
|                                      | 5745~5825            | 149 to 165        | 157            |            |                  |              |
| RADIATED EMISSION TEST (ABOVE 1 GHz) |                      |                   |                |            |                  |              |
| MODE                                 | FREQUENCY BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Mbps) | ANTENNA PORT |
| 802.11n_HT20                         | 5180~5240            | 36 to 48          | 36,44,48       | OFDM       | MCS8             | MIMO         |
|                                      | 5260~5320            | 52 to 64          | 52,60,64       |            |                  |              |
|                                      | 5500~5700            | 100 to 140        | 100,116,140    |            |                  |              |
|                                      | 5745~5825            | 149 to 165        | 149,157,165    |            |                  |              |
| 802.11n_HT40                         | 5190~5230            | 38 to 46          | 38,46          | OFDM       | MCS8             | MIMO         |
|                                      | 5270~5310            | 54 to 62          | 54,62          |            |                  |              |
|                                      | 5510~5670            | 102 to 134        | 102,110,134    |            |                  |              |
|                                      | 5755~5795            | 151 to 159        | 151,159        |            |                  |              |
| 802.11ac_VHT80                       | 5210                 | 42                | 42             | OFDM       | MCS0             | MIMO         |
|                                      | 5290                 | 58                | 58             |            |                  |              |
|                                      | 5530~5610            | 106 to 122        | 106,122        |            |                  |              |
|                                      | 5775                 | 155               | 155            |            |                  |              |

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| CONDUCTED TEST |                      |                   |                |            |                  |              |
|----------------|----------------------|-------------------|----------------|------------|------------------|--------------|
| MODE           | FREQUENCY BAND (MHz) | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION | DATA RATE (Mbps) | ANTENNA PORT |
| 802.11n_HT20   | 5180~5240            | 36 to 48          | 36,44,48       | OFDM       | MCS8             | MIMO         |
|                | 5260~5320            | 52 to 64          | 52,60,64       |            |                  |              |
|                | 5500~5700            | 100 to 140        | 100,116,140    |            |                  |              |
|                | 5745~5825            | 149 to 165        | 149,157,165    |            |                  |              |
| 802.11n_HT40   | 5190~5230            | 38 to 46          | 38,46          | OFDM       | MCS8             | MIMO         |
|                | 5270~5310            | 54 to 62          | 54,62          |            |                  |              |
|                | 5510~5670            | 102 to 134        | 102,110,134    |            |                  |              |
|                | 5755~5795            | 151 to 159        | 151,159        |            |                  |              |
| 802.11ac_VHT80 | 5210                 | 42                | 42             | OFDM       | MCS0             | MIMO         |
|                | 5290                 | 58                | 58             |            |                  |              |
|                | 5530~5610            | 106 to 122        | 106,122        |            |                  |              |
|                | 5775                 | 155               | 155            |            |                  |              |

**Note:**

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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## 5 MEASUREMENT UNCERTAINTY

| Test Items                                 | Uncertainty |
|--------------------------------------------|-------------|
| AC Power Line Conducted Emission           | +/- 2.34 dB |
| Output Power measurement                   | +/- 1 dB    |
| Emission Bandwidth                         | +/- 1.53 Hz |
| Undesignable radiated emission measurement | +/- 1.68 dB |
| Peak Power Density                         | +/- 1.62 dB |
| Temperature                                | +/- 0.4 °C  |
| Humidity                                   | +/- 3.5 %   |
| DC / AC Power Source                       | +/- 1 %     |

| Radiated Spurious Emission Measurement Uncertainty |     |         |                 |
|----------------------------------------------------|-----|---------|-----------------|
| Polarization: Vertical                             | +/- | 2.57 dB | 9kHz~30MHz      |
|                                                    | +/- | 4.85 dB | 30MHz - 1000MHz |
|                                                    | +/- | 4.45 dB | 1GHz - 18GHz    |
|                                                    | +/- | 4.24 dB | 18GHz - 40GHz   |
| Polarization: Horizontal                           | +/- | 2.57 dB | 9kHz~30MHz      |
|                                                    | +/- | 4.37 dB | 30MHz - 1000MHz |
|                                                    | +/- | 4.45 dB | 1GHz - 18GHz    |
|                                                    | +/- | 4.24 dB | 18GHz - 40GHz   |

### Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## 6 MEASUREMENT EQUIPMENT USED

### 6.1 Emission from AC power line

| Conducted Emission Test Site: Conduction 1 |             |               |               |            |            |
|--------------------------------------------|-------------|---------------|---------------|------------|------------|
| EQUIPMENT TYPE                             | MFR         | MODEL NUMBER  | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| EMI Test Receiver                          | R&S         | ESCI 7        | 100759        | 08/26/2021 | 08/25/2022 |
| LISN                                       | SCHWARZBECK | NSLK 8127     | 01040         | 08/10/2021 | 08/09/2022 |
| Coaxial Cables                             | N/A         | Coaxial Cable | 161207        | 12/07/2021 | 12/06/2022 |

### 6.2 Conducted Measurement

| Conducted Emission Test Site: Conducted 2 |               |              |               |            |            |
|-------------------------------------------|---------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE                            | MFR           | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| EXA Spectrum Analyzer                     | KEYSIGHT      | N9010B       | MY60240503    | 12/09/2021 | 12/08/2022 |
| Power Meter                               | Anritsu       | ML2496A      | 1242004       | 11/02/2021 | 11/01/2022 |
| Power Sensor                              | Anritsu       | MA2411B      | 1207365       | 11/02/2021 | 11/01/2022 |
| Power Sensor                              | Anritsu       | MA2411B      | 1207368       | 11/02/2021 | 11/01/2022 |
| Attenuator                                | Mini-Circuit  | BW-S10W2+    | 2             | 12/14/2021 | 12/13/2022 |
| DC Block                                  | Mini-Circuits | BLK-18-S+    | 1             | 12/14/2021 | 12/13/2022 |

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### 6.3 Radiated Measurement

| Radiated Emission Test Site: SAC 3 |                 |                  |               |            |            |
|------------------------------------|-----------------|------------------|---------------|------------|------------|
| EQUIPMENT TYPE                     | MFR             | MODEL NUMBER     | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Horn Antenna                       | SCHWARZBECK     | BBHA9170         | 184           | 12/16/2021 | 12/15/2022 |
| Horn Antenna                       | SCHWARZBECK     | BBHA9120D        | 1441          | 09/27/2021 | 09/26/2022 |
| Bi-log Antenna                     | SCHWARZBECK     | VULB9168         | 378           | 08/20/2021 | 08/19/2022 |
| Loop Antenna                       | ETS.LINDGREN    | 6502             | 148045        | 09/29/2021 | 09/28/2022 |
| PXA Spectrum Analyzer              | Agilent         | N9030A           | MY53120760    | 04/27/2021 | 04/26/2022 |
| EMI Test Receiver                  | R&S             | ESCI 7           | 100759        | 08/26/2021 | 08/25/2022 |
| Pre-Amplifier                      | HP              | 8449B            | 3008A00578    | 12/16/2021 | 12/15/2022 |
| Pre-Amplifier                      | EMC Instruments | EMC184045 B      | 980135        | 10/27/2021 | 10/26/2022 |
| Pre-Amplifier                      | HP              | 8447D            | 2944A07676    | 12/16/2021 | 12/15/2022 |
| Attenuator                         | Mini-Circuit    | BW-S10W2+        | 4             | 12/14/2021 | 12/13/2022 |
| Filter 5150-5350 MHz               | Micro-Tronics   | BRM50703         | 1             | 12/14/2021 | 12/13/2022 |
| Filter 5470-5725 MHz               | Micro-Tronics   | BRM50704         | 1             | 12/14/2021 | 12/13/2022 |
| Filter 5725-5875 MHz               | Micro-Tronics   | BRM50705         | 1             | 12/14/2021 | 12/13/2022 |
| High Pass Filter                   | WI              | WHKX7.0/18 G-8SS | 45            | 12/14/2021 | 12/13/2022 |
| Coaxial Cable                      | Huber Suhner    | SUCOFLEX 102     | MY2636/2      | 12/16/2021 | 12/15/2022 |
| Coaxial Cable                      | Huber Suhner    | SUCOFLEX 104     | 340057/4      | 12/16/2021 | 12/15/2022 |
| Coaxial Cable                      | Huber Suhner    | SUCOFLEX 104PEA  | 800052/2      | 12/16/2021 | 12/15/2022 |
| Coaxial Cable                      | Huber Suhner    | SUCOFLEX 102     | MY2621/2      | 12/16/2021 | 12/15/2022 |
| Coaxial Cable                      | Huber Suhner    | SUCOFLEX 102     | MY2617/2      | 12/16/2021 | 12/15/2022 |
| Site Cal                           | SGS             | SAC 3            | N/A           | 01/01/2022 | 12/31/2022 |

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## 7 CONDUCTED EMISSION TEST

### 7.1 Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

| Frequency range<br>MHz | Limits<br>(dBuV) |          |
|------------------------|------------------|----------|
|                        | Quasi-peak       | Average  |
| 0.15 to 0.50           | 66 to 56         | 56 to 46 |
| 0.50 to 5              | 56               | 46       |
| 5 to 30                | 60               | 50       |

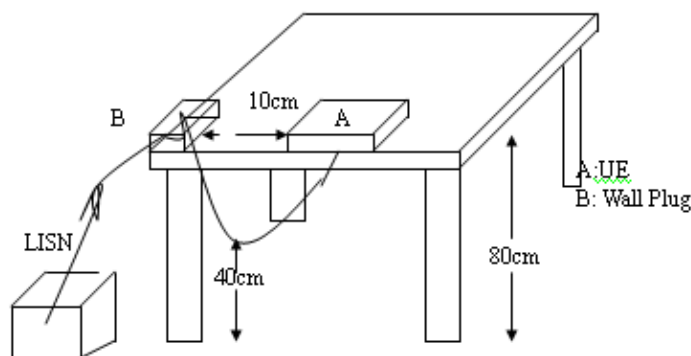
Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 7.2 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

### 7.3 Test SET-UP



### 7.4 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

### 7.5 Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closet to the limit.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Antenna: FM-SHARK-DUAL

Report Number :ER/2021/A0113

Test Site :Conduction 1

Test Mode :WLAN 5G

Test Date :2022-03-01

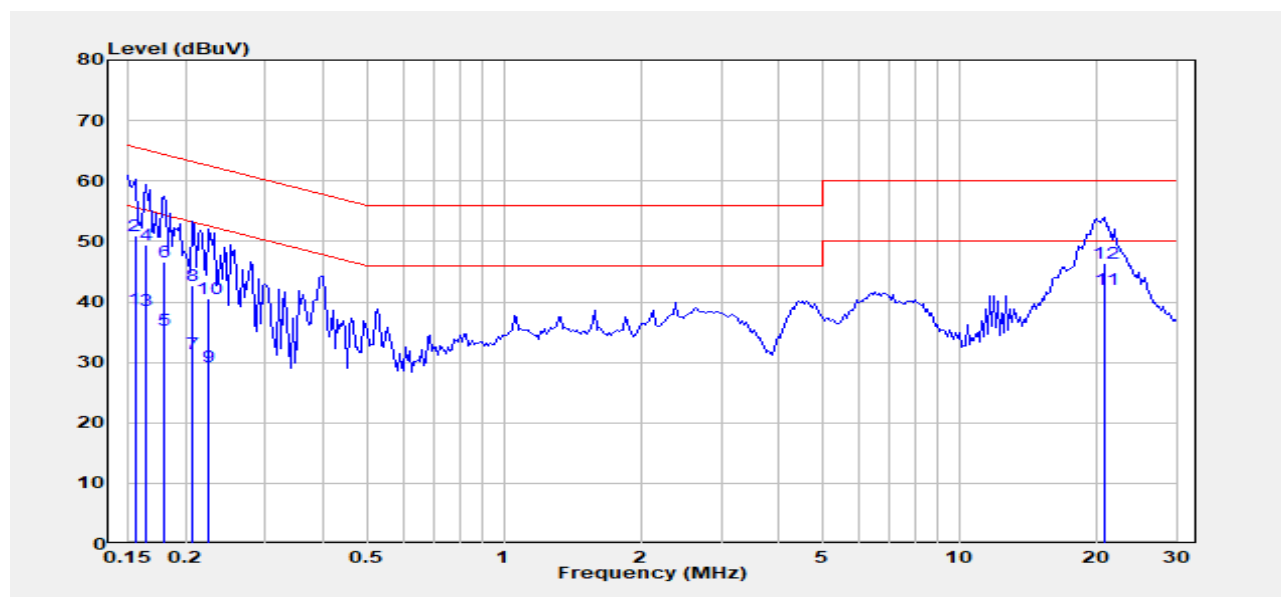
Power :120V/60Hz

Temp./Humi. :22.3/50

Probe :L

Engineer :Jack Liu

Note: :



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|----------------------|---------------|--------------|
| 0.155        | Average                      | 36.61                             | 2.12         | 38.73                | 55.74         | -17.01       |
| 0.155        | QP                           | 48.73                             | 2.12         | 50.85                | 65.74         | -14.89       |
| 0.163        | Average                      | 36.57                             | 2.12         | 38.69                | 55.30         | -16.61       |
| 0.163        | QP                           | 47.22                             | 2.12         | 49.34                | 65.30         | -15.96       |
| 0.180        | Average                      | 33.15                             | 2.12         | 35.27                | 54.50         | -19.23       |
| 0.180        | QP                           | 44.42                             | 2.12         | 46.54                | 64.50         | -17.96       |
| 0.206        | Average                      | 29.36                             | 2.12         | 31.48                | 53.36         | -21.88       |
| 0.206        | QP                           | 40.58                             | 2.12         | 42.70                | 63.36         | -20.66       |
| 0.224        | Average                      | 27.16                             | 2.12         | 29.28                | 52.66         | -23.38       |
| 0.224        | QP                           | 38.42                             | 2.12         | 40.54                | 62.66         | -22.12       |
| 20.924       | Average                      | 39.65                             | 2.32         | 41.97                | 50.00         | -8.03        |
| 20.924       | QP                           | 44.02                             | 2.32         | 46.34                | 60.00         | -13.66       |

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Report Number :ER/2021/A0113

Test Site :Conduction 1

Test Mode :WLAN 5G

Test Date :2022-03-01

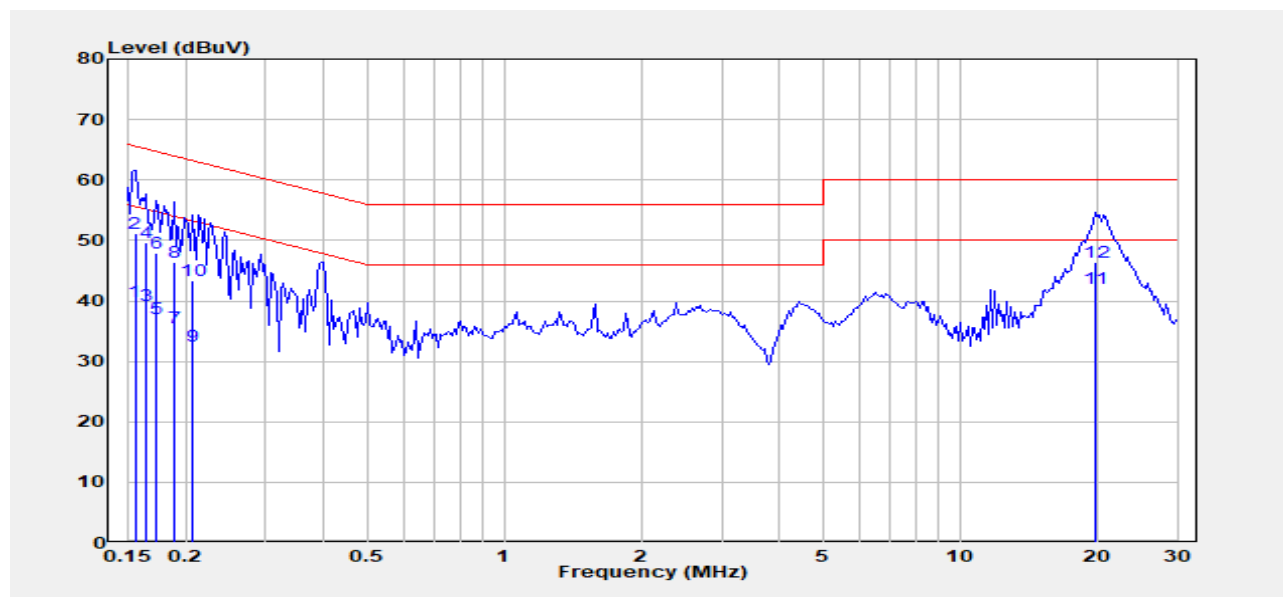
Power :120V/60Hz

Temp./Humi. :22.3/50

Probe :N

Engineer :Jack Liu

Note: :



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|----------------------|---------------|--------------|
| 0.155        | Average                      | 37.65                             | 2.14         | 39.79                | 55.74         | -15.95       |
| 0.155        | QP                           | 49.12                             | 2.14         | 51.26                | 65.74         | -14.48       |
| 0.163        | Average                      | 37.12                             | 2.17         | 39.29                | 55.30         | -16.00       |
| 0.163        | QP                           | 47.42                             | 2.17         | 49.59                | 65.30         | -15.70       |
| 0.172        | Average                      | 34.89                             | 2.21         | 37.10                | 54.86         | -17.76       |
| 0.172        | QP                           | 45.73                             | 2.21         | 47.94                | 64.86         | -16.92       |
| 0.189        | Average                      | 33.36                             | 2.27         | 35.63                | 54.06         | -18.44       |
| 0.189        | QP                           | 44.15                             | 2.27         | 46.42                | 64.06         | -17.65       |
| 0.206        | Average                      | 30.22                             | 2.29         | 32.51                | 53.36         | -20.85       |
| 0.206        | QP                           | 41.13                             | 2.29         | 43.42                | 63.36         | -19.94       |
| 19.845       | Average                      | 39.82                             | 2.33         | 42.15                | 50.00         | -7.85        |
| 19.845       | QP                           | 44.05                             | 2.33         | 46.38                | 60.00         | -13.62       |

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Antenna: FM-TUBE

Report Number :ER/2021/A0113

Test Site :Conduction 1

Test Mode :WLAN 5G

Test Date :2022-03-01

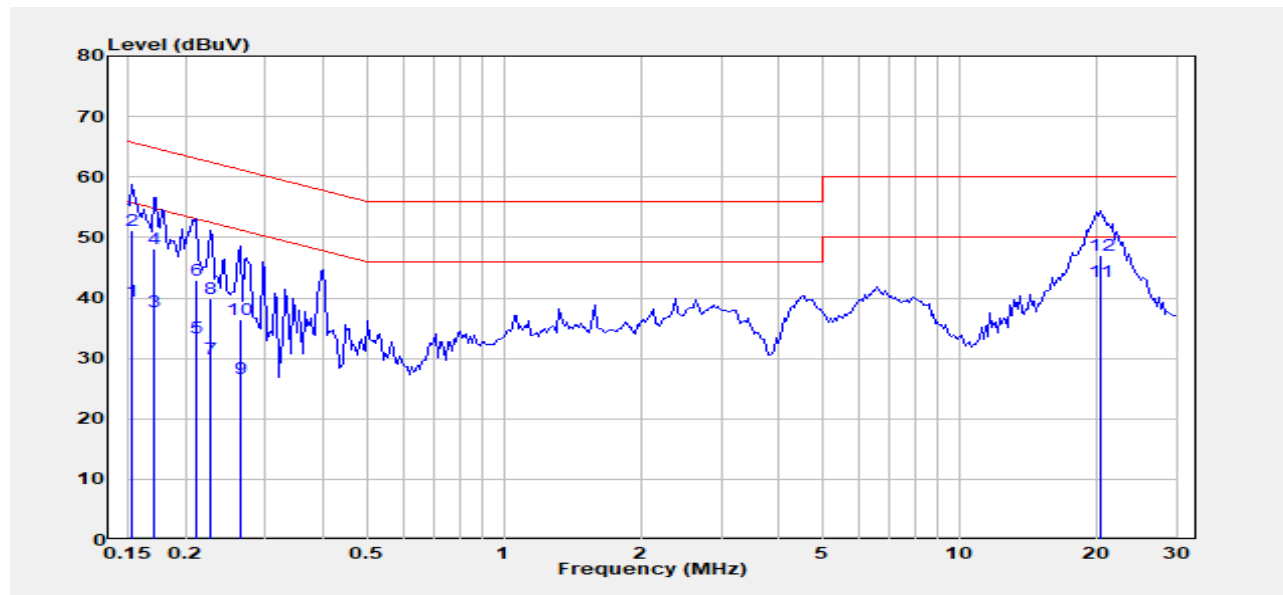
Power :120V/60Hz

Temp./Humi. :22.3/50

Probe :L

Engineer :Jack Liu

Note:



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|----------------------|---------------|--------------|
| 0.153        | Average                      | 37.33                             | 2.12         | 39.45                | 55.82         | -16.37       |
| 0.153        | QP                           | 49.15                             | 2.12         | 51.27                | 65.82         | -14.55       |
| 0.170        | Average                      | 35.62                             | 2.12         | 37.74                | 54.94         | -17.20       |
| 0.170        | QP                           | 46.03                             | 2.12         | 48.15                | 64.94         | -16.79       |
| 0.211        | Average                      | 31.27                             | 2.12         | 33.39                | 53.18         | -19.79       |
| 0.211        | QP                           | 40.91                             | 2.12         | 43.03                | 63.18         | -20.15       |
| 0.227        | Average                      | 27.86                             | 2.12         | 29.98                | 52.57         | -22.59       |
| 0.227        | QP                           | 37.85                             | 2.12         | 39.97                | 62.57         | -22.60       |
| 0.263        | Average                      | 24.58                             | 2.12         | 26.70                | 51.34         | -24.64       |
| 0.263        | QP                           | 34.33                             | 2.12         | 36.45                | 61.34         | -24.89       |
| 20.486       | Average                      | 40.45                             | 2.32         | 42.77                | 50.00         | -7.23        |
| 20.486       | QP                           | 44.62                             | 2.32         | 46.94                | 60.00         | -13.06       |

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Report Number :ER/2021/A0113

Test Mode :WLAN 5G

Power :120V/60Hz

Probe :N

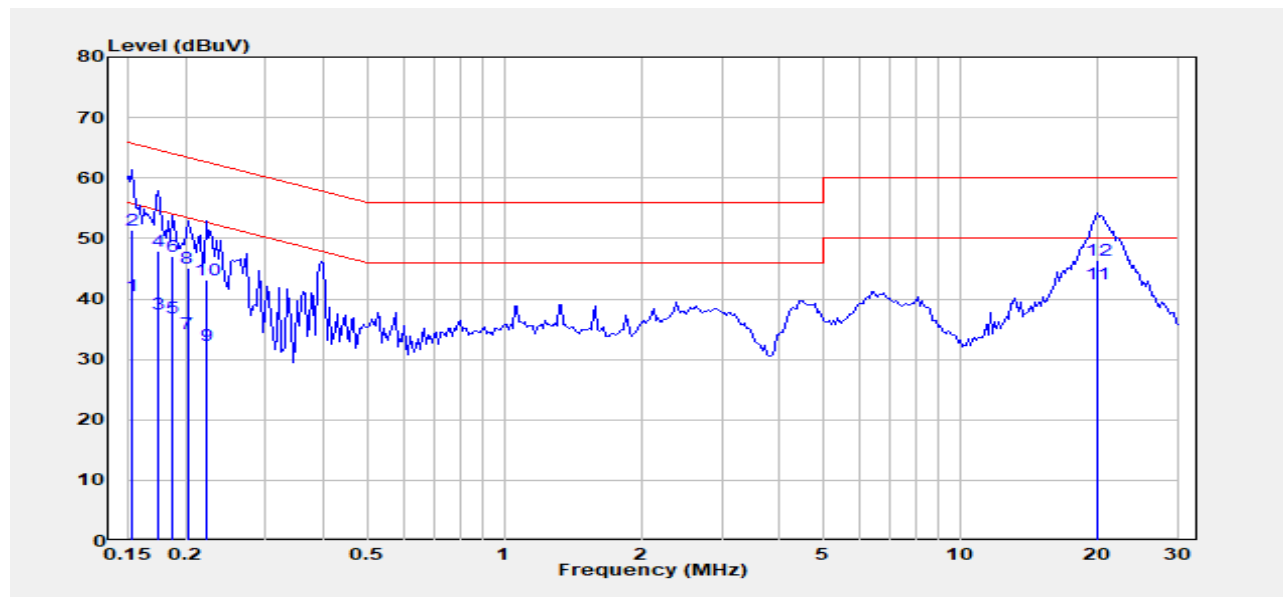
Note: :

Test Site :Conduction 1

Test Date :2022-03-01

Temp./Humi. :22.3/50

Engineer :Jack Liu



| Freq.<br>MHz | Detector<br>Mode<br>PK/QP/AV | Spectrum<br>Reading Level<br>dBμV | Factor<br>dB | Actual<br>FS<br>dBμV | Limit<br>dBμV | Margin<br>dB |
|--------------|------------------------------|-----------------------------------|--------------|----------------------|---------------|--------------|
| 0.153        | Average                      | 38.35                             | 2.13         | 40.48                | 55.82         | -15.34       |
| 0.153        | QP                           | 49.22                             | 2.13         | 51.35                | 65.82         | -14.47       |
| 0.174        | Average                      | 35.23                             | 2.21         | 37.44                | 54.77         | -17.32       |
| 0.174        | QP                           | 45.72                             | 2.21         | 47.93                | 64.77         | -16.83       |
| 0.187        | Average                      | 34.55                             | 2.26         | 36.81                | 54.15         | -17.34       |
| 0.187        | QP                           | 44.84                             | 2.26         | 47.10                | 64.15         | -17.05       |
| 0.202        | Average                      | 31.85                             | 2.30         | 34.15                | 53.54         | -19.39       |
| 0.202        | QP                           | 42.83                             | 2.30         | 45.13                | 63.54         | -18.41       |
| 0.222        | Average                      | 30.12                             | 2.27         | 32.39                | 52.74         | -20.35       |
| 0.222        | QP                           | 40.97                             | 2.27         | 43.24                | 62.74         | -19.50       |
| 20.056       | Average                      | 40.25                             | 2.33         | 42.58                | 50.00         | -7.42        |
| 20.056       | QP                           | 44.12                             | 2.33         | 46.45                | 60.00         | -13.55       |

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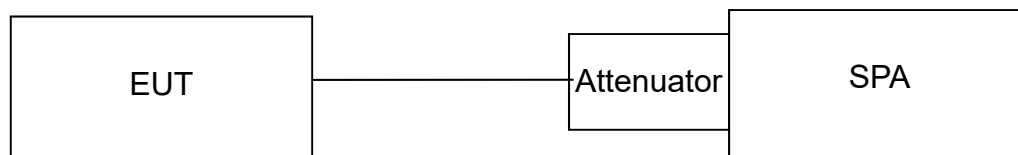
## 8 EMISSION BANDWIDTH MEASUREMENT

### 8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3.

### 8.2 Test Setup



### 8.3 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
  - 3.a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW  
Sweep=auto,  
Detector = Peak,  
Trace Mode = Max Hold,  
Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
  - 3.b. Mark the peak frequency and -26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
  - a. Set the spectrum analyzer as  
RBW = 100 kHz,  
VBW = 3\*RBW,  
Span = large enough to capture all products of the modulation process,  
Detector=Peak,  
Sweep=auto
  - b. Mark the peak frequency and -6dB (upper and lower) frequency.
6. Repeat above procedures until all frequency of interest measured was complete.

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## 8.4 Measurement Result

### 8.4.1 FCC Occupied Bandwidth

802.11n\_HT20\_Ch0

| Freq.<br>(MHz) | 26dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|---------------------|--------------------|
| 5180           | 20.17               | 13.050             |
| 5220           | 19.80               | 12.970             |
| 5240           | 20.20               | 13.050             |
| 5260           | 19.97               | 13.000             |
| 5300           | 20.17               | 13.050             |
| 5320           | 19.92               | 12.990             |
| 5500           | 19.90               | 12.990             |
| 5580           | 20.12               | 13.040             |
| 5700           | 20.07               | 13.030             |

802.11n\_HT20\_Ch0

| Freq.<br>(MHz) | 6dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|--------------------|--------------------|
| 5745           | 17.65              | 12.470             |
| 5785           | 17.68              | 12.470             |
| 5825           | 17.67              | 12.470             |

802.11n\_HT20\_Ch0

| Freq.<br>(MHz) | Measured<br>Freq.<br>(MHz) | Limit<br>(MHz) |
|----------------|----------------------------|----------------|
| 5240           | 5248.83                    | < 5250         |
| 5745           | 5736.21                    | > 5725         |

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802.11n\_HT20\_Ch1

| Freq.<br>(MHz) | 26dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|---------------------|--------------------|
| 5180           | 20.18               | 13.050             |
| 5220           | 20.00               | 13.010             |
| 5240           | 19.96               | 13.000             |
| 5260           | 20.05               | 13.020             |
| 5300           | 19.91               | 12.990             |
| 5320           | 19.95               | 13.000             |
| 5500           | 19.98               | 13.010             |
| 5580           | 19.95               | 13.000             |
| 5700           | 19.95               | 13.000             |

802.11n\_HT20\_Ch1

| Freq.<br>(MHz) | 6dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|--------------------|--------------------|
| 5745           | 17.71              | 12.480             |
| 5785           | 17.65              | 12.470             |
| 5825           | 17.72              | 12.480             |

802.11n\_HT20\_Ch1

| Freq.<br>(MHz) | Measured<br>Freq.<br>(MHz) | Limit<br>(MHz) |
|----------------|----------------------------|----------------|
| 5240           | 5248.83                    | < 5250         |
| 5745           | 5736.19                    | > 5725         |

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802.11n\_HT40\_Ch0

| Freq.<br>(MHz) | 26dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|---------------------|--------------------|
| 5190           | 40.25               | 16.050             |
| 5230           | 40.59               | 16.080             |
| 5270           | 40.81               | 16.110             |
| 5310           | 40.52               | 16.080             |
| 5510           | 39.94               | 16.010             |
| 5550           | 40.48               | 16.070             |
| 5670           | 40.10               | 16.030             |

802.11n\_HT40\_Ch0

| Freq.<br>(MHz) | 6dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|--------------------|--------------------|
| 5755           | 36.37              | 15.610             |
| 5795           | 36.40              | 15.610             |

802.11n\_HT40\_Ch0

| Freq.<br>(MHz) | Measured<br>Freq.<br>(MHz) | Limit<br>(MHz) |
|----------------|----------------------------|----------------|
| 5230           | 5248.01                    | < 5250         |
| 5755           | 5737.00                    | > 5725         |

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802.11n\_HT40\_Ch1

| Freq.<br>(MHz) | 26dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|---------------------|--------------------|
| 5190           | 40.29               | 16.050             |
| 5230           | 40.47               | 16.070             |
| 5270           | 39.88               | 16.010             |
| 5310           | 40.32               | 16.060             |
| 5510           | 40.47               | 16.070             |
| 5550           | 40.62               | 16.090             |
| 5670           | 40.49               | 16.070             |

802.11n\_HT40\_Ch1

| Freq.<br>(MHz) | 6dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|--------------------|--------------------|
| 5755           | 36.41              | 15.610             |
| 5795           | 36.14              | 15.580             |

802.11n\_HT40\_Ch1

| Freq.<br>(MHz) | Measured<br>Freq.<br>(MHz) | Limit<br>(MHz) |
|----------------|----------------------------|----------------|
| 5230           | 5248.04                    | < 5250         |
| 5755           | 5736.98                    | > 5725         |

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## 802.11ac\_VHT80\_Ch0

| Freq.<br>(MHz) | 26dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|---------------------|--------------------|
| 5210           | 80.65               | 19.070             |
| 5290           | 80.20               | 19.040             |
| 5530           | 80.67               | 19.070             |
| 5610           | 80.43               | 19.050             |

## 802.11ac\_VHT80\_Ch0

| Freq.<br>(MHz) | 6dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|--------------------|--------------------|
| 5775           | 75.26              | 18.770             |

## 802.11ac\_VHT80\_Ch0

| Freq.<br>(MHz) | Measured<br>Freq.<br>(MHz) | Limit<br>(MHz) |
|----------------|----------------------------|----------------|
| 5210           | 5247.48                    | < 5250         |
| 5775           | 5737.48                    | > 5725         |

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## 802.11ac\_VHT80\_Ch1

| Freq.<br>(MHz) | 26dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|---------------------|--------------------|
| 5210           | 80.84               | 19.080             |
| 5290           | 80.28               | 19.050             |
| 5530           | 80.79               | 19.070             |
| 5610           | 80.31               | 19.050             |

## 802.11ac\_VHT80\_Ch1

| Freq.<br>(MHz) | 6dB<br>BW<br>(MHz) | 10 Log (B)<br>(dB) |
|----------------|--------------------|--------------------|
| 5775           | 75.03              | 18.750             |

## 802.11ac\_VHT80\_Ch1

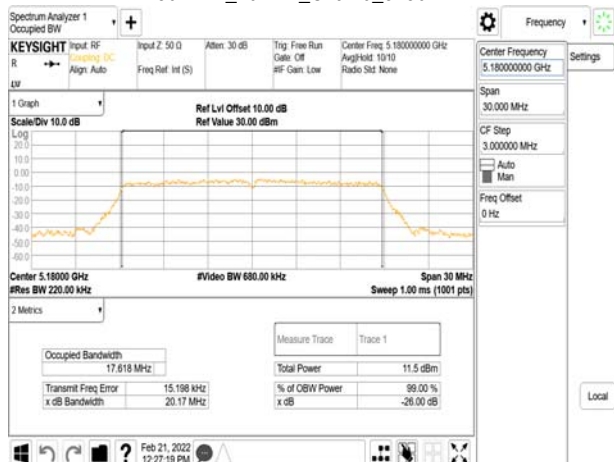
| Freq.<br>(MHz) | Measured<br>Freq.<br>(MHz) | Limit<br>(MHz) |
|----------------|----------------------------|----------------|
| 5210           | 5247.42                    | < 5250         |
| 5775           | 5737.38                    | > 5725         |

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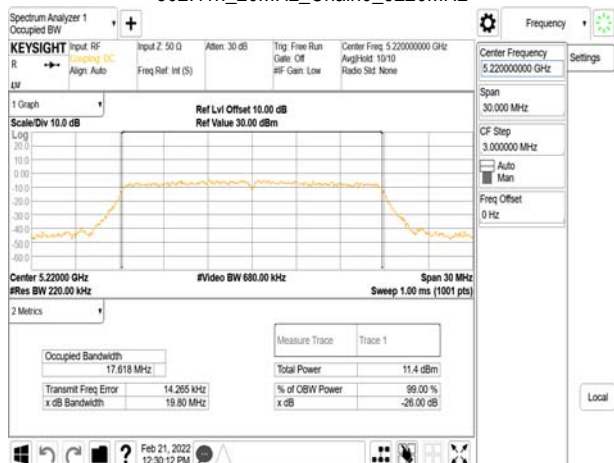
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802.11n\_20MHz\_Chain0\_5260MHz



802.11n\_20MHz\_Chain0\_5220MHz



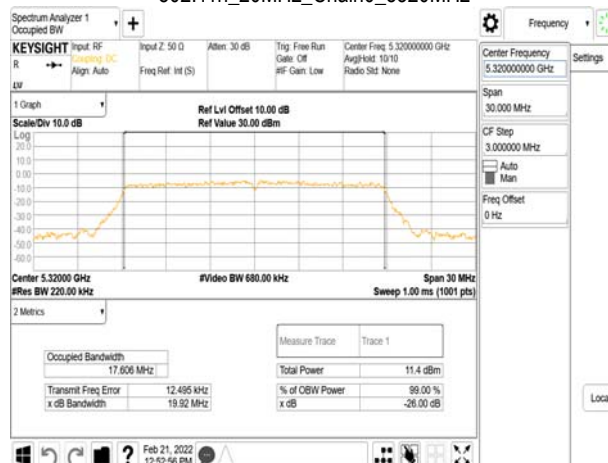
802.11n\_20MHz\_Chain0\_5300MHz



802.11n\_20MHz\_Chain0\_5240MHz



802.11n\_20MHz\_Chain0\_5320MHz

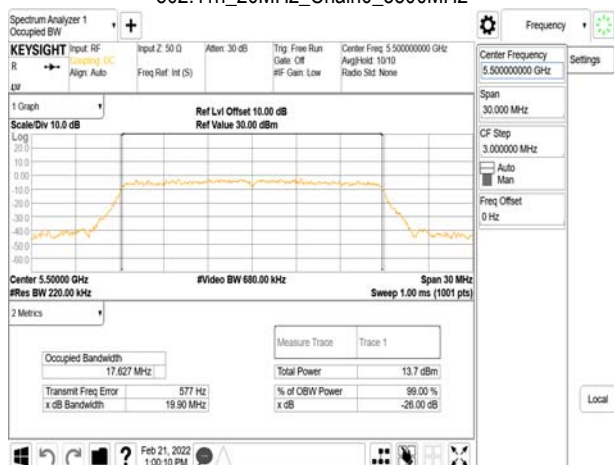


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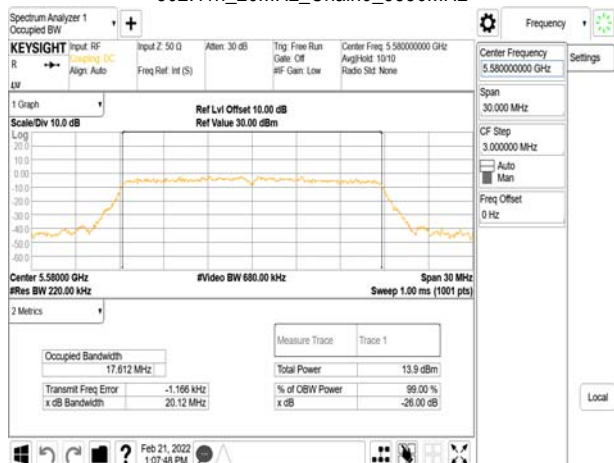
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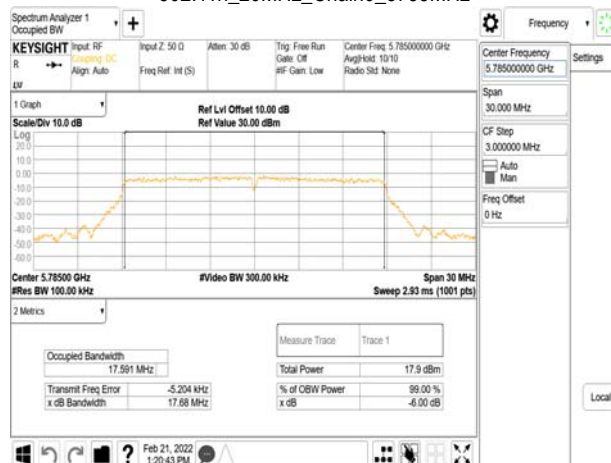
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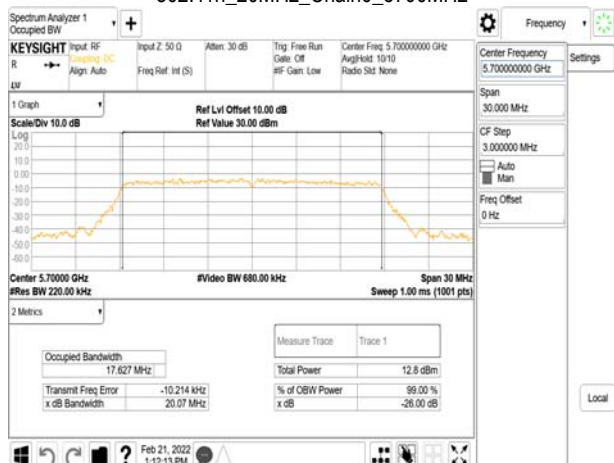
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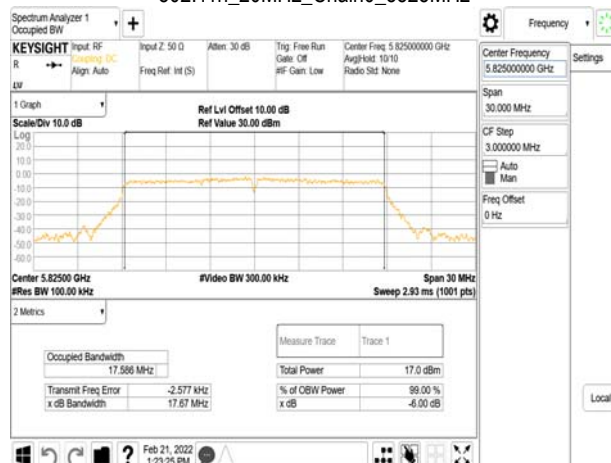
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802.11n\_20MHz\_Chain0\_5700MHz



802.11n\_20MHz\_Chain0\_5825MHz

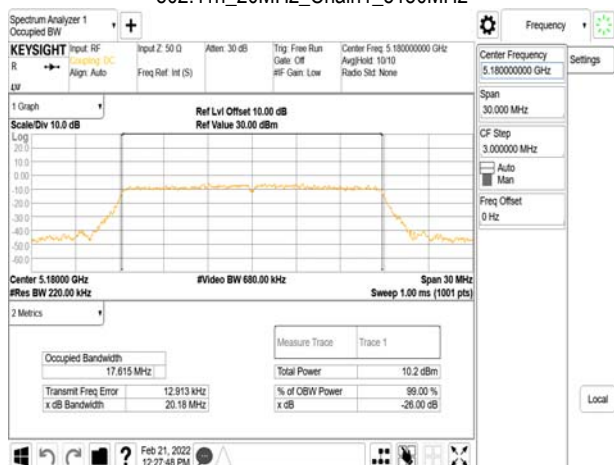


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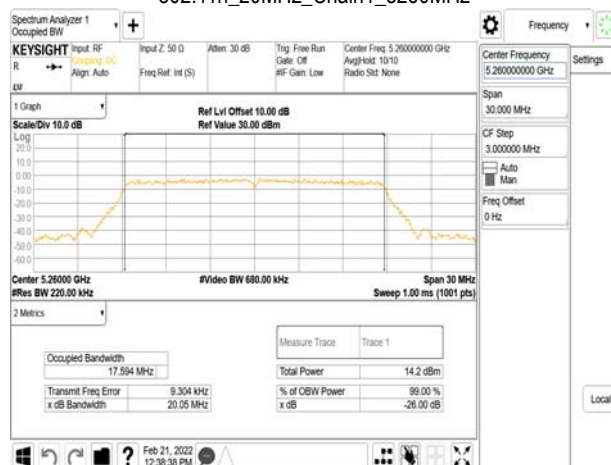
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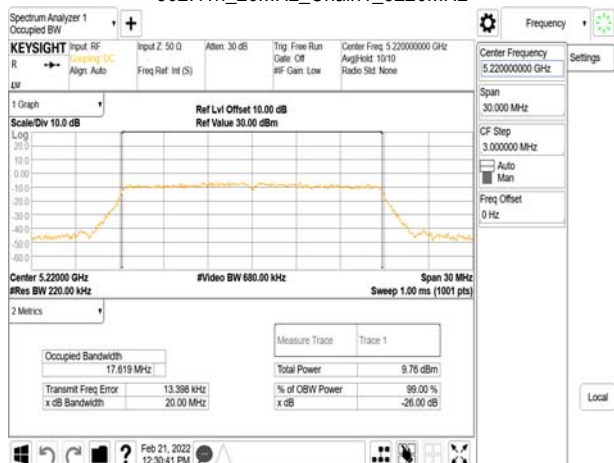
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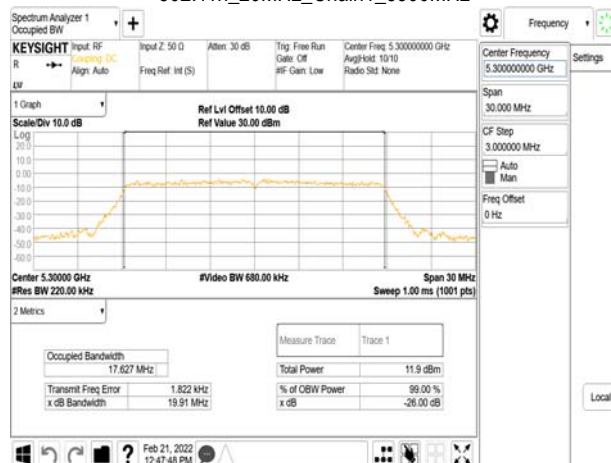
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802.11n\_20MHz\_Chain1\_5220MHz



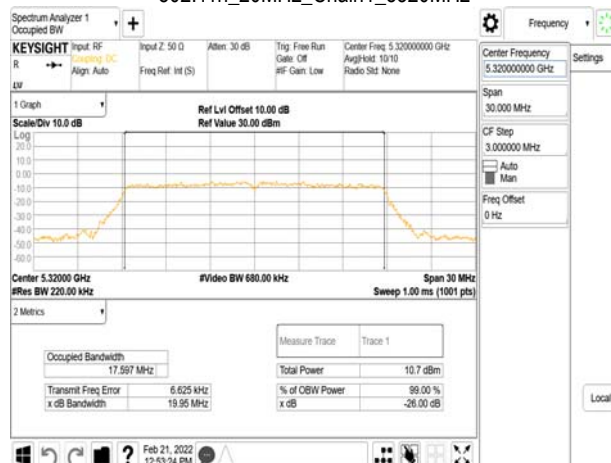
802.11n\_20MHz\_Chain1\_5300MHz



802.11n\_20MHz\_Chain1\_5240MHz



802.11n\_20MHz\_Chain1\_5320MHz

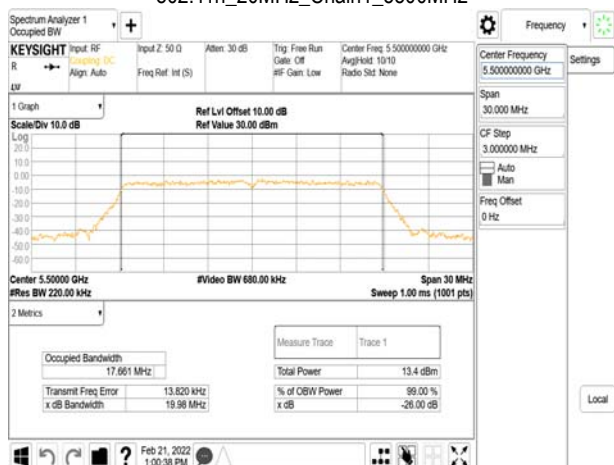


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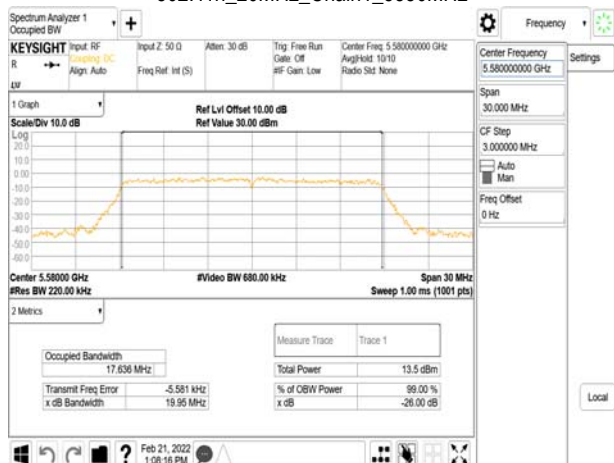
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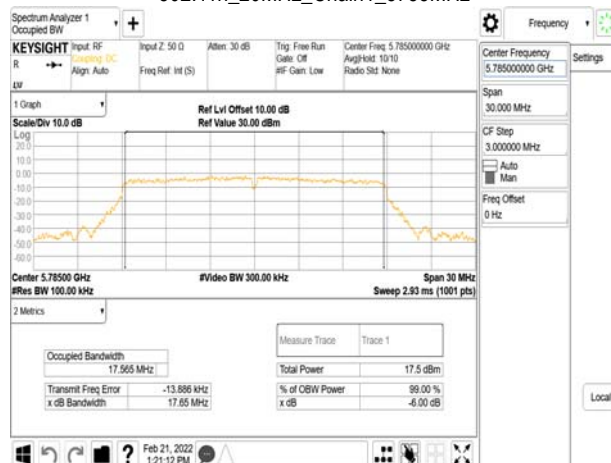
802.11n\_20MHz\_Chain1\_5745MHz



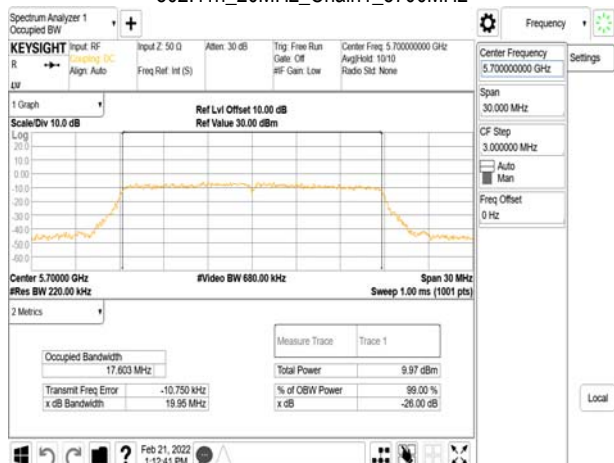
802.11n\_20MHz\_Chain1\_5580MHz



802.11n\_20MHz\_Chain1\_5785MHz



802.11n\_20MHz\_Chain1\_5700MHz



802.11n\_20MHz\_Chain1\_5825MHz



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802.11n\_40MHz\_Chain0\_5190MHz



802.11n\_40MHz\_Chain0\_5310MHz



802.11n\_40MHz\_Chain0\_5230MHz



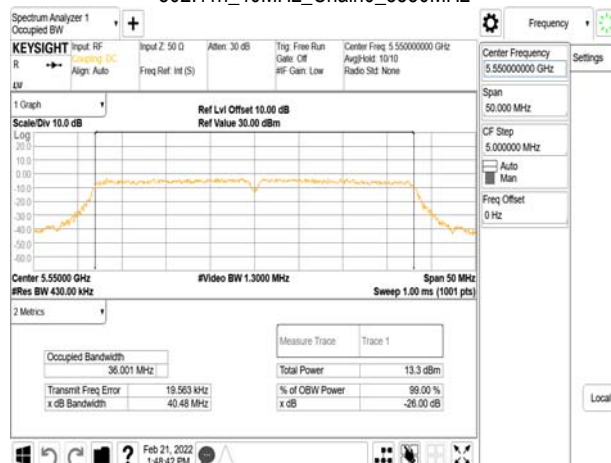
802.11n\_40MHz\_Chain0\_5510MHz



802.11n\_40MHz\_Chain0\_5270MHz



802.11n\_40MHz\_Chain0\_5550MHz



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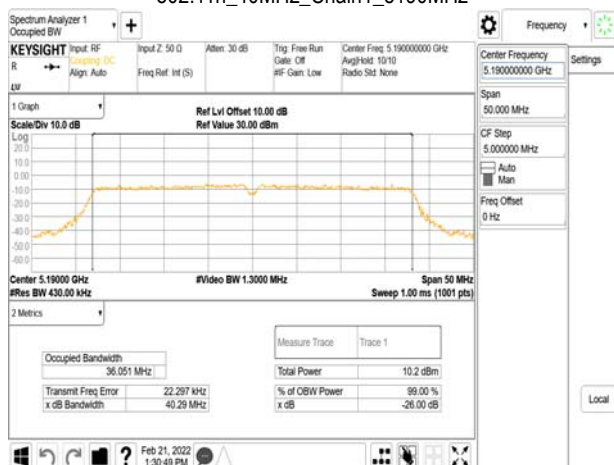
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802.11n\_40MHz\_Chain0\_5670MHz



802.11n\_40MHz\_Chain1\_5190MHz



802.11n\_40MHz\_Chain0\_5755MHz



802.11n\_40MHz\_Chain1\_5230MHz



802.11n\_40MHz\_Chain0\_5795MHz



802.11n\_40MHz\_Chain1\_5270MHz

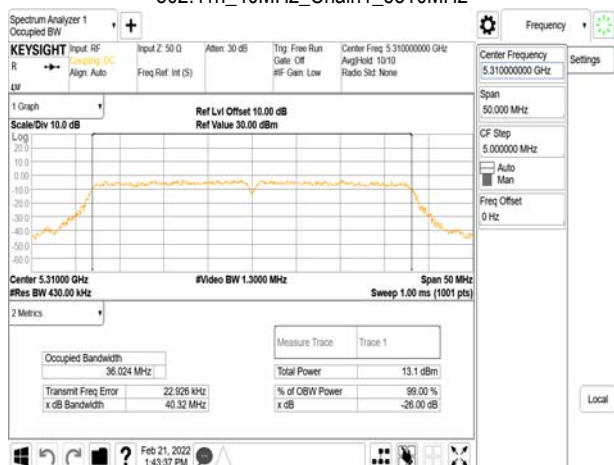


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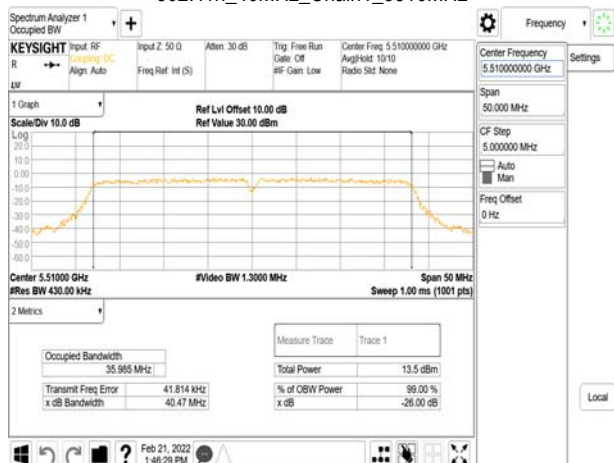
802.11n\_40MHz\_Chain1\_5310MHz



802.11n\_40MHz\_Chain1\_5670MHz



802.11n\_40MHz\_Chain1\_5510MHz



802.11n\_40MHz\_Chain1\_5755MHz



802.11n\_40MHz\_Chain1\_5550MHz



802.11n\_40MHz\_Chain1\_5795MHz



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802.11ac\_80MHz\_Chain0\_5210MHz



802.11ac\_80MHz\_Chain0\_5610MHz



802.11ac\_80MHz\_Chain0\_5290MHz



802.11ac\_80MHz\_Chain0\_5775MHz



802.11ac\_80MHz\_Chain0\_5530MHz



802.11ac\_80MHz\_Chain1\_5210MHz



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802.11ac\_80MHz\_Chain1\_5290MHz



802.11ac\_80MHz\_Chain1\_5775MHz



802.11ac\_80MHz\_Chain1\_5530MHz



802.11ac\_80MHz\_Chain1\_5610MHz



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## 9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

### 9.1 Standard Applicable

#### 9.1.1 Duty Cycle

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

#### 9.1.2 Output Power

| Band     | EUT CATEGORY |                      | e-CRF Title 47 §15.407            |                                                |                                                           |                                       |
|----------|--------------|----------------------|-----------------------------------|------------------------------------------------|-----------------------------------------------------------|---------------------------------------|
|          |              |                      | Conducted Output Power            | EIRP                                           | TPC                                                       | Antenna Directional Gain Requirements |
| U-NII-1  |              | Fixed point-to-point | 1 Watt(30dBm)                     | Not required                                   | Not required                                              | 23dBi                                 |
|          | V            | Out door AP          | 1 Watt(30dBm)                     | Elevation angle above 30 degrees 125mW (21dBm) | Not required                                              | 6dBi                                  |
|          |              | Indoor AP            | 1 Watt(30dBm)                     | Not required                                   | Not required                                              | 6dBi                                  |
|          |              | Other                | 250mW(23.98dBm)                   | Not required                                   | Not required                                              | 6dBi                                  |
| U-NII-2A | V            | Other                | 250mW(23.98dBm) or 11dBm+10 log B | Not required                                   | When EIRP >500mW<br>At least 6dB below EIRP<br>1W (30dBm) | 6dBi                                  |
| U-NII-2C | V            | Other                | 250mW(23.98dBm) or 11dBm+10 log B | Not required                                   |                                                           | 6dBi                                  |
| U-NII-3  | V            | Other                | 1 Watt(30dBm)                     | Not required                                   | Not required                                              | 6dBi                                  |
|          |              | Fixed point-to-point | 1 Watt(30dBm)                     | Not required                                   | Not required                                              | Not required                          |

1. If transmitting antennas of directional gain greater than the antenna requirements column, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna.
2. For the 10 log B, B is the 26 dB emission bandwidth.

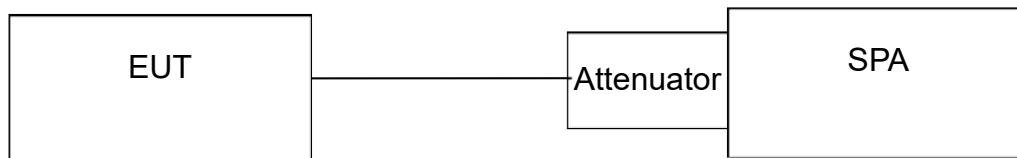
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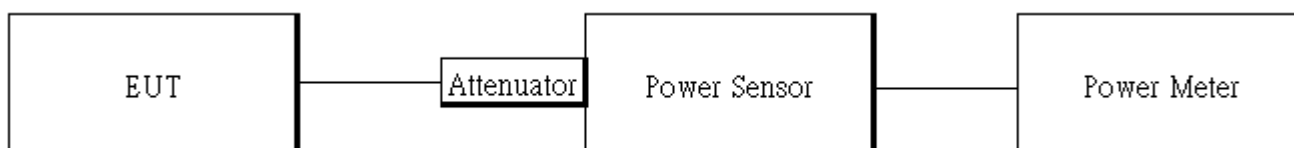
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## 9.2 Test Setup

### 9.2.1 Duty Cycle



### 9.2.2 Output Power



## 9.3 Measurement Procedure

### 9.3.1 Duty Cycle Measurements

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

### 9.3.2 Output Power Measurements

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add  $10 \log(1/\text{duty cycle})$ .
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.
7. MIMO mode: offset is set with “measure and add 10 Log (N)” to measurement for MIMO mode. Offset = cable loss +  $10 \log (N)$ , where N is number of transmitting antenna.

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### Note:

As per section F. 2). e). (ii) of FCC KDB 662911 D01

If antenna gains are not equal and each transmit antenna is driven by only one spatial stream, directional gain may be calculated by either of the following formulas.

$$\bullet \quad \text{Directional Gain} = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

NSS = the number of independent spatial streams of data;

NANT = the total number of antennas

$g_{j,k}$  = / 20 10Gk if the kth antenna is being fed by spatial stream j, or zero if it is not;

$G_k$  is the gain in dBi of the kth antenna.

The antenna gain is greater than 6 dBi in MIMO mode, therefore the the power density limit attenuation has been applied in the test results.

## 9.4 Duty Cycle Measurement Result

| Mode        | Duty Cycle (%)<br>=Ton / (Ton+Toff) | Duty Factor (dB)<br>=10*log ( 1/Duty Cycle ) | 1/T<br>(kHz) | VBW<br>setting<br>(kHz) |
|-------------|-------------------------------------|----------------------------------------------|--------------|-------------------------|
| 802.11n_20  | 100.00                              | 0.00                                         | 0.00         | 0.01                    |
| 802.11ac_20 | 100.00                              | 0.00                                         | 0.00         | 0.01                    |
| 802.11n_40  | 100.00                              | 0.00                                         | 0.00         | 0.01                    |
| 802.11ac_40 | 100.00                              | 0.00                                         | 0.00         | 0.01                    |
| 802.11ac_80 | 100.00                              | 0.00                                         | 0.00         | 0.01                    |

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802.11n\_20MHz\_Chain0\_5180MHz



802.11ac\_40MHz\_Chain0\_5190MHz



802.11n\_40MHz\_Chain0\_5190MHz



802.11ac\_80MHz\_Chain0\_5210MHz



802.11ac\_20MHz\_Chain0\_5180MHz



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## 9.5 Output Power Measurement Result

### 9.5.1 FCC Output power

#### 802.11n\_HT20\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 36  | 5180            | MCS8      | 7.01             | 5.81  | <b>9.46</b>       | 8.831            | 18.39                | PASS   |
| 44  | 5220            | MCS8      | 7.01             | 5.58  | 9.36              | 8.630            | 18.39                | PASS   |
| 48  | 5240            | MCS8      | 7.17             | 5.52  | 9.43              | 8.770            | 18.39                | PASS   |
| 52  | 5260            | MCS8      | 6.39             | 6.07  | 9.24              | 8.395            | 12.37                | PASS   |
| 60  | 5300            | MCS8      | 6.49             | 5.99  | <b>9.26</b>       | 8.433            | 12.37                | PASS   |
| 64  | 5320            | MCS8      | 6.57             | 5.87  | 9.24              | 8.395            | 12.37                | PASS   |
| 100 | 5500            | MCS8      | 6.72             | 6.53  | <b>9.64</b>       | 9.204            | 12.37                | PASS   |
| 116 | 5580            | MCS8      | 6.74             | 6.45  | 9.61              | 9.141            | 12.37                | PASS   |
| 140 | 5700            | MCS8      | 7.24             | 4.55  | 9.11              | 8.147            | 12.37                | PASS   |
| 149 | 5745            | MCS8      | 14.48            | 14.59 | <b>17.55</b>      | 56.885           | 18.39                | PASS   |
| 157 | 5785            | MCS8      | 13.66            | 13.51 | 16.60             | 45.709           | 18.39                | PASS   |
| 165 | 5825            | MCS8      | 13.08            | 12    | 15.58             | 36.141           | 18.39                | PASS   |

#### 802.11n\_HT40\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 38  | 5190            | MCS8      | 6.97             | 5.76  | 9.42              | 8.750            | 18.39                | PASS   |
| 46  | 5230            | MCS8      | 7.13             | 5.59  | <b>9.44</b>       | 8.790            | 18.39                | PASS   |
| 54  | 5270            | MCS8      | 9.34             | 8.99  | <b>12.18</b>      | 16.520           | 12.37                | PASS   |
| 62  | 5310            | MCS8      | 8.51             | 7.95  | 11.25             | 13.335           | 12.37                | PASS   |
| 102 | 5510            | MCS8      | 7.11             | 6.76  | 9.95              | 9.886            | 12.37                | PASS   |
| 110 | 5550            | MCS8      | 8.89             | 8.81  | 11.86             | 15.346           | 12.37                | PASS   |
| 134 | 5670            | MCS8      | 10.39            | 7.78  | <b>12.29</b>      | 16.943           | 12.37                | PASS   |
| 151 | 5755            | MCS8      | 14.36            | 14.45 | <b>17.42</b>      | 55.208           | 18.39                | PASS   |
| 159 | 5795            | MCS8      | 13.51            | 13.03 | 16.29             | 42.560           | 18.39                | PASS   |

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## 802.11ac\_VHT20\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 36  | 5180            | MCS0      | 6.89             | 5.71  | 9.35              | 8.610            | 18.39                | PASS   |
| 44  | 5220            | MCS0      | 6.92             | 5.5   | 9.28              | 8.472            | 18.39                | PASS   |
| 48  | 5240            | MCS0      | 7.09             | 5.42  | 9.35              | 8.610            | 18.39                | PASS   |
| 52  | 5260            | MCS0      | 6.37             | 6.05  | 9.22              | 8.356            | 12.37                | PASS   |
| 60  | 5300            | MCS0      | 6.46             | 5.92  | 9.21              | 8.337            | 12.37                | PASS   |
| 64  | 5320            | MCS0      | 6.53             | 5.82  | 9.20              | 8.318            | 12.37                | PASS   |
| 100 | 5500            | MCS0      | 6.69             | 6.51  | 9.61              | 9.141            | 12.37                | PASS   |
| 116 | 5580            | MCS0      | 6.72             | 6.43  | 9.59              | 9.099            | 12.37                | PASS   |
| 140 | 5700            | MCS0      | 7.21             | 4.53  | 9.08              | 8.091            | 12.37                | PASS   |
| 149 | 5745            | MCS0      | 14.46            | 14.53 | 17.51             | 56.364           | 18.39                | PASS   |
| 157 | 5785            | MCS0      | 13.62            | 13.47 | 16.56             | 45.290           | 18.39                | PASS   |
| 165 | 5825            | MCS0      | 13.03            | 11.96 | 15.54             | 35.810           | 18.39                | PASS   |

## 802.11ac\_VHT40\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 38  | 5190            | MCS0      | 6.92             | 5.71  | 9.37              | 8.650            | 18.39                | PASS   |
| 46  | 5230            | MCS0      | 7.06             | 5.49  | 9.36              | 8.630            | 18.39                | PASS   |
| 54  | 5270            | MCS0      | 9.31             | 8.95  | 12.14             | 16.368           | 12.37                | PASS   |
| 62  | 5310            | MCS0      | 8.44             | 7.9   | 11.19             | 13.152           | 12.37                | PASS   |
| 102 | 5510            | MCS0      | 7.02             | 6.71  | 9.88              | 9.727            | 12.37                | PASS   |
| 110 | 5550            | MCS0      | 8.84             | 8.77  | 11.82             | 15.205           | 12.37                | PASS   |
| 134 | 5670            | MCS0      | 10.03            | 7.44  | 11.94             | 15.631           | 12.37                | PASS   |
| 151 | 5755            | MCS0      | 14.32            | 14.43 | 17.39             | 54.828           | 18.39                | PASS   |
| 159 | 5795            | MCS0      | 13.48            | 12.93 | 16.22             | 41.879           | 18.39                | PASS   |

## 802.11ac\_VHT80\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 42  | 5210            | MCS0      | 5.28             | 3.42  | 7.46              | 5.572            | 18.39                | PASS   |
| 58  | 5290            | MCS0      | 4.43             | 3.88  | 7.17              | 5.212            | 12.37                | PASS   |
| 106 | 5530            | MCS0      | 0.7              | 0.48  | 3.60              | 2.291            | 12.37                | PASS   |
| 122 | 5610            | MCS0      | 9.15             | 9.36  | 12.27             | 16.866           | 12.37                | PASS   |
| 138 | 5690            | MCS0      | 0.00             | 0.00  | 3.01              | 2.000            | 12.37                | PASS   |
| 155 | 5775            | MCS0      | 13.52            | 13.29 | 16.42             | 43.853           | 18.39                | PASS   |

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## Transmit Power Control (TPC) Power

## 802.11n\_HT20\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 100 | 5500            | MCS8      | -0.39            | -0.05 | 2.79              | 1.901            | 12.37                | PASS   |
| 116 | 5580            | MCS8      | -2.51            | 0.05  | 1.97              | 1.574            | 12.37                | PASS   |

## 802.11n\_HT40\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 54  | 5270            | MCS8      | -2.75            | -3.76 | -0.22             | 0.951            | 12.37                | PASS   |
| 62  | 5310            | MCS8      | 2.06             | 1.47  | <b>4.79</b>       | 3.013            | 12.37                | PASS   |
| 102 | 5510            | MCS8      | 1.05             | 0.81  | <b>3.94</b>       | 2.477            | 12.37                | PASS   |
| 110 | 5550            | MCS8      | -1.67            | 0.49  | 2.55              | 1.799            | 12.37                | PASS   |
| 134 | 5670            | MCS8      | -3.23            | -0.04 | 1.66              | 1.466            | 12.37                | PASS   |

## 802.11ac\_VHT20\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 100 | 5500            | MCS0      | -0.66            | -0.29 | 2.54              | 1.795            | 12.37                | PASS   |
| 116 | 5580            | MCS0      | -2.93            | -0.42 | 1.51              | 1.416            | 12.37                | PASS   |

## 802.11ac\_VHT40\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |       | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|-------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1   |                   |                  |                      |        |
| 54  | 5270            | MCS0      | -3.15            | -3.81 | -0.46             | 0.899            | 12.37                | PASS   |
| 62  | 5310            | MCS0      | 1.96             | 1.33  | <b>4.67</b>       | 2.931            | 12.37                | PASS   |
| 102 | 5510            | MCS0      | 0.94             | 0.73  | <b>3.85</b>       | 2.427            | 12.37                | PASS   |
| 110 | 5550            | MCS0      | -1.92            | 0.24  | 2.30              | 1.698            | 12.37                | PASS   |
| 134 | 5670            | MCS0      | -3.74            | -0.28 | 1.34              | 1.361            | 12.37                | PASS   |

## 802.11ac\_VHT80\_MIMO

| CH  | Frequency (MHz) | Data Rate | Avg. POWER (dBm) |      | TOTAL POWER (dBm) | TOTAL POWER (mW) | REQUIRED LIMIT (dBm) | RESULT |
|-----|-----------------|-----------|------------------|------|-------------------|------------------|----------------------|--------|
|     |                 |           | Ch0              | Ch1  |                   |                  |                      |        |
| 122 | 5610            | MCS0      | -1.41            | 1.71 | 3.43              | 2.203            | 12.37                | PASS   |

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## Outdoor AP U-NII-1 EIRP

## 802.11n\_HT20\_MIMO

| CH | Frequency (MHz) | TOTAL POWER (dBm) | ELEVATION ABOVE 30° MAX GAIN (dBi) | ELEVATION ABOVE 30° MAX EIRP (dBm) | EIRP LIMIT (dBm) | RESULT |
|----|-----------------|-------------------|------------------------------------|------------------------------------|------------------|--------|
| 36 | 5180            | 9.46              | 11.01                              | 20.47                              | 21.00            | PASS   |
| 44 | 5220            | 9.36              | 11.01                              | 20.37                              | 21.00            | PASS   |
| 48 | 5240            | 9.43              | 11.01                              | 20.44                              | 21.00            | PASS   |

## 802.11n\_HT40\_MIMO

| CH | Frequency (MHz) | TOTAL POWER (dBm) | ELEVATION ABOVE 30° MAX GAIN (dBi) | ELEVATION ABOVE 30° MAX EIRP (dBm) | EIRP LIMIT (dBm) | RESULT |
|----|-----------------|-------------------|------------------------------------|------------------------------------|------------------|--------|
| 38 | 5190            | 9.42              | 11.01                              | 20.43                              | 21.00            | PASS   |
| 46 | 5210            | 9.44              | 11.01                              | 20.45                              | 21.00            | PASS   |

## 802.11ac\_VHT20\_MIMO

| CH | Frequency (MHz) | TOTAL POWER (dBm) | ELEVATION ABOVE 30° MAX GAIN (dBi) | ELEVATION ABOVE 30° MAX EIRP (dBm) | EIRP LIMIT (dBm) | RESULT |
|----|-----------------|-------------------|------------------------------------|------------------------------------|------------------|--------|
| 36 | 5180            | 9.35              | 11.01                              | 20.36                              | 21.00            | PASS   |
| 44 | 5220            | 9.28              | 11.01                              | 20.29                              | 21.00            | PASS   |
| 48 | 5240            | 9.35              | 11.01                              | 20.36                              | 21.00            | PASS   |

## 802.11ac\_VHT40\_MIMO

| CH | Frequency (MHz) | TOTAL POWER (dBm) | ELEVATION ABOVE 30° MAX GAIN (dBi) | ELEVATION ABOVE 30° MAX EIRP (dBm) | EIRP LIMIT (dBm) | RESULT |
|----|-----------------|-------------------|------------------------------------|------------------------------------|------------------|--------|
| 38 | 5190            | 9.37              | 11.01                              | 20.38                              | 21.00            | PASS   |
| 46 | 5210            | 9.36              | 11.01                              | 20.37                              | 21.00            | PASS   |

## 802.11ac\_VHT80\_MIMO

| CH | Frequency (MHz) | TOTAL POWER (dBm) | ELEVATION ABOVE 30° MAX GAIN (dBi) | ELEVATION ABOVE 30° MAX EIRP (dBm) | EIRP LIMIT (dBm) | RESULT |
|----|-----------------|-------------------|------------------------------------|------------------------------------|------------------|--------|
| 42 | 5210            | 7.46              | 11.01                              | 18.47                              | 21.00            | PASS   |

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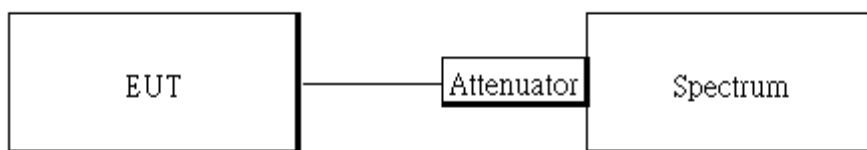
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## 10 MAXIMUM POWER SPECTRAL DENSITY

### 10.1 Standard Applicable

| Operation Bands                                                                                                                                                                                       | EUT CATEGORY |                                   | e-CRF Title 47 §15.407<br>Power Spectral Density                    | Antenna<br>Directional Gain<br>Requirements |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------------------|---------------------------------------------------------------------|---------------------------------------------|
| U-NII-1                                                                                                                                                                                               | V            | Outdoor Access Point (Master)     | 1. 17dBm/ MHz<br>2. EIRP<=125mW(21dBm) at any elevation angle > 30° | 6dBi                                        |
|                                                                                                                                                                                                       |              | Indoor Access Point (Master)      | 17dBm/ MHz                                                          | 6dBi                                        |
|                                                                                                                                                                                                       |              | Fixed point-to-point Access Point | 17dBm/ MHz                                                          | 23dBi                                       |
|                                                                                                                                                                                                       |              | Client device                     | 11dBm/ MHz                                                          | 6dBi                                        |
| U-NII-2A                                                                                                                                                                                              | V            | All                               | 11dBm/ MHz                                                          | 6dBi                                        |
| U-NII-2C                                                                                                                                                                                              | V            | All                               | 11dBm/ MHz                                                          | 6dBi                                        |
| U-NII-3                                                                                                                                                                                               | V            | All                               | 30dBm/ 500kHz                                                       | 6dBi                                        |
| If transmitting antennas of directional gain greater than the antenna requirements column, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna. |              |                                   |                                                                     |                                             |

### 10.2 Test Setup



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### 10.3 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
4. **For U-NII1, U-NII-2A, U-NII-2C Band:**  
Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (1001 pts), Detector = power averaging (rms), if available. Otherwise, use sample detector mode, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)  
**For U-NII-3 Band:**  
Set RBW=300kHz, VBW=1MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto, detector = RMS or sample, traces 100 sweeps of video averaging. In addition, measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result.
5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).
7. Repeat above procedures until all default test channel (low, middle, and high) was complete.
8. MIMO mode: offset is set with "measure and add 10 Log (N)" to measurement for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna.

*Note: For the test of PSD at MIMO mode, the highest emission of worst case employing Measure and add 10 log (N) technical is reported after the comparison between Main Antenna at single transmitting mode and Aux that yields the higher value. The MIMO transmitting mode produces higher value of outcome.*

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**Note:**

As per section F. 2). e). (ii) of FCC KDB 662911 D01

If antenna gains are not equal and each transmit antenna is driven by only one spatial stream, directional gain may be calculated by either of the following formulas.

$$\bullet \quad \text{DirectionalGain} = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

NSS = the number of independent spatial streams of data;

NANT = the total number of antennas

$g_{j,k}$  = / 20 10Gk if the kth antenna is being fed by spatial stream j, or zero if it is not;

$G_k$  is the gain in dBi of the kth antenna.

The antenna gain is greater than 6 dBi in MIMO mode, therefore the power density limit attenuation has been applied in the test results.

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## 10.4 Measurement Result

| POWER DENSITY 802.11n HT20 MODE |                           |                           |                  |                               |                                 |                  |             |
|---------------------------------|---------------------------|---------------------------|------------------|-------------------------------|---------------------------------|------------------|-------------|
| Frequency (MHz)                 | Ch0 meas PSD (dBm/MHz)    | Ch1 meas PSD (dBm/MHz)    | Duty Factor (dB) | Maximum Corr'd PSD(dBm/MHz)   |                                 | Limit            | Margin (dB) |
| 5180                            | -3.629                    | -5.166                    | 0.00             | -1.32                         |                                 | 5.39 dBm/MHz     | -6.71       |
| 5220                            | -4.051                    | -5.584                    | 0.00             | -1.74                         |                                 | 5.39 dBm/MHz     | -7.13       |
| 5240                            | -3.790                    | -5.882                    | 0.00             | -1.70                         |                                 | 5.39 dBm/MHz     | -7.09       |
| 5260                            | -4.263                    | -4.722                    | 0.00             | -1.48                         |                                 | -0.61 dBm/MHz    | -0.87       |
| 5300                            | -4.186                    | -4.471                    | 0.00             | -1.32                         |                                 | -0.61 dBm/MHz    | -0.71       |
| 5320                            | -4.606                    | -5.109                    | 0.00             | -1.84                         |                                 | -0.61 dBm/MHz    | -1.23       |
| 5500                            | -4.351                    | -5.069                    | 0.00             | -1.68                         |                                 | -0.61 dBm/MHz    | -1.07       |
| 5580                            | -3.982                    | -4.783                    | 0.00             | -1.35                         |                                 | -0.61 dBm/MHz    | -0.74       |
| 5700                            | -3.719                    | -5.920                    | 0.00             | -1.67                         |                                 | -0.61 dBm/MHz    | -1.06       |
| Frequency (MHz)                 | Ch0 meas PSD (dBm/300kHz) | Ch1 meas PSD (dBm/300kHz) | Duty Factor (dB) | 10log (500kHz/RBW) Factor(dB) | Maximum Corr'd PSD (dBm/500kHz) | Limit            | Margin (dB) |
| 5745                            | -1.448                    | -1.476                    | 0.00             | 2.22                          | 3.77                            | 18.39 dBm/500kHz | -14.62      |
| 5785                            | -2.261                    | -2.548                    | 0.00             | 2.22                          | 2.83                            | 18.39 dBm/500kHz | -15.56      |
| 5825                            | -3.396                    | -4.661                    | 0.00             | 2.22                          | 1.25                            | 18.39 dBm/500kHz | -17.14      |
| POWER DENSITY 802.11n HT40 MODE |                           |                           |                  |                               |                                 |                  |             |
| Frequency (MHz)                 | Ch0 meas PSD (dBm/MHz)    | Ch1 meas PSD (dBm/MHz)    | Duty Factor (dB) | Maximum Corr'd PSD(dBm/MHz)   |                                 | Limit            | Margin (dB) |
| 5190                            | -7.847                    | -9.174                    | 0.00             | -5.45                         |                                 | 5.39 dBm/MHz     | -10.84      |
| 5230                            | -7.612                    | -9.593                    | 0.00             | -5.48                         |                                 | 5.39 dBm/MHz     | -10.87      |
| 5270                            | -4.520                    | -4.526                    | 0.00             | -1.51                         |                                 | -0.61 dBm/MHz    | -0.90       |
| 5310                            | -5.126                    | -5.948                    | 0.00             | -2.51                         |                                 | -0.61 dBm/MHz    | -1.90       |
| 5510                            | -6.455                    | -6.664                    | 0.00             | -3.55                         |                                 | -0.61 dBm/MHz    | -2.94       |
| 5550                            | -6.103                    | -5.428                    | 0.00             | -2.74                         |                                 | -0.61 dBm/MHz    | -2.13       |
| 5670                            | -3.326                    | -6.864                    | 0.00             | -1.73                         |                                 | -0.61 dBm/MHz    | -1.12       |
| Frequency (MHz)                 | Ch0 meas PSD (dBm/300kHz) | Ch1 meas PSD (dBm/300kHz) | Duty Factor (dB) | 10log (500kHz/RBW) Factor(dB) | Maximum Corr'd PSD (dBm/500kHz) | Limit            | Margin (dB) |
| 5755                            | -5.117                    | -5.124                    | 0.00             | 2.22                          | 0.11                            | 18.39 dBm/500kHz | -18.28      |
| 5795                            | -6.056                    | -5.871                    | 0.00             | 2.22                          | -0.73                           | 18.39 dBm/500kHz | -19.12      |

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| POWER DENSITY 802.11ac VHT80 MODE |                           |                           |                  |                               |                                 |                  |             |
|-----------------------------------|---------------------------|---------------------------|------------------|-------------------------------|---------------------------------|------------------|-------------|
| Frequency (MHz)                   | Ch0 meas PSD (dBm/MHz)    | Ch1 meas PSD (dBm/MHz)    | Duty Factor (dB) | Maximum Corr'd PSD(dBm/MHz)   |                                 | Limit            | Margin (dB) |
| 5210                              | -10.515                   | -12.236                   | 0.00             | -8.28                         |                                 | 5.39 dBm/MHz     | -13.67      |
| 5290                              | -11.579                   | -11.974                   | 0.00             | -8.76                         |                                 | -0.61 dBm/MHz    | -8.15       |
| 5530                              | -15.859                   | -15.991                   | 0.00             | -12.91                        |                                 | -0.61 dBm/MHz    | -12.30      |
| 5610                              | -9.290                    | -8.932                    | 0.00             | -6.10                         |                                 | -0.61 dBm/MHz    | -5.49       |
| Frequency (MHz)                   | Ch0 meas PSD (dBm/300kHz) | Ch1 meas PSD (dBm/300kHz) | Duty Factor (dB) | 10log (500kHz/RBW) Factor(dB) | Maximum Corr'd PSD (dBm/500kHz) | Limit            | Margin (dB) |
| 5775                              | -8.636                    | -9.395                    | 0.00             | 2.22                          | -3.77                           | 18.39 dBm/500kHz | -22.16      |

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802.11n\_20MHz\_Chain0\_5180MHz



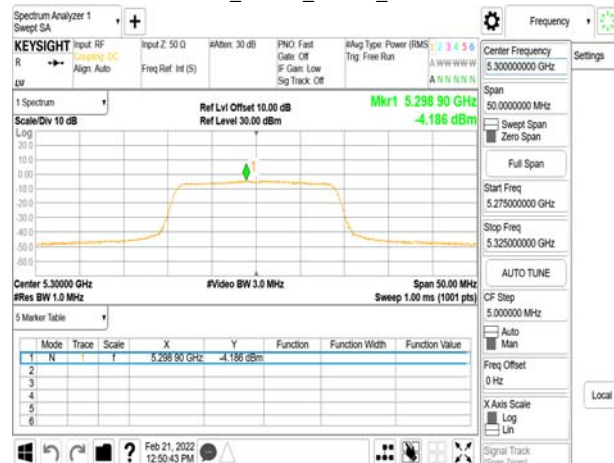
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802.11n\_20MHz\_Chain0\_5220MHz



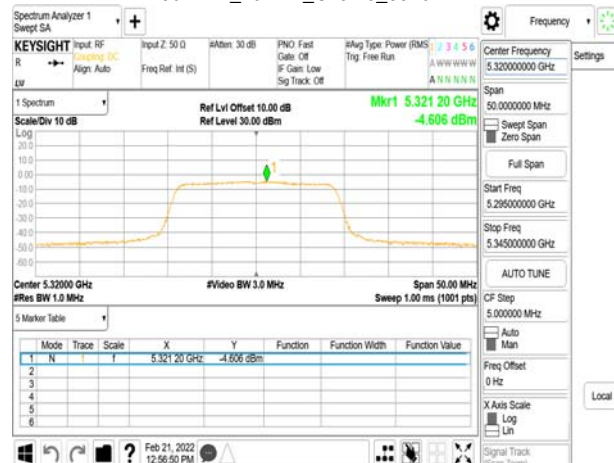
802.11n\_20MHz\_Chain0\_5300MHz



802.11n\_20MHz\_Chain0\_5240MHz



802.11n\_20MHz\_Chain0\_5320MHz

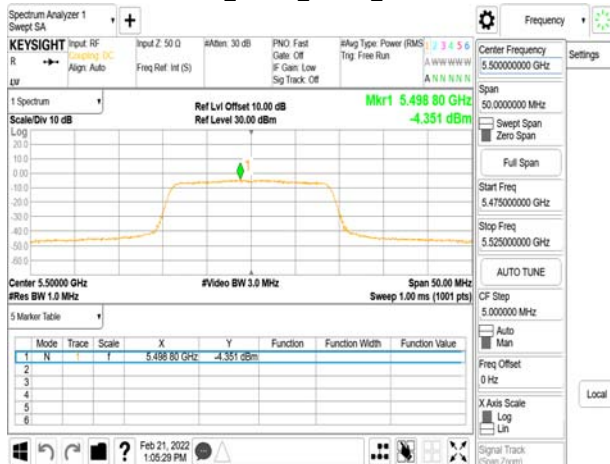


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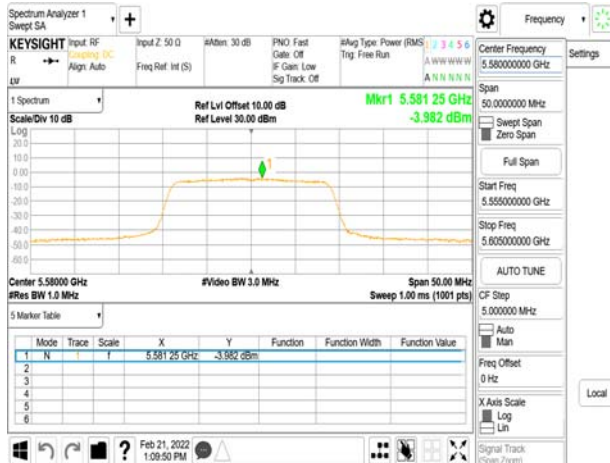
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802.11n\_20MHz\_Chain0\_5745MHz



802.11n\_20MHz\_Chain0\_5580MHz



802.11n\_20MHz\_Chain0\_5785MHz



802.11n\_20MHz\_Chain0\_5700MHz



802.11n\_20MHz\_Chain0\_5825MHz

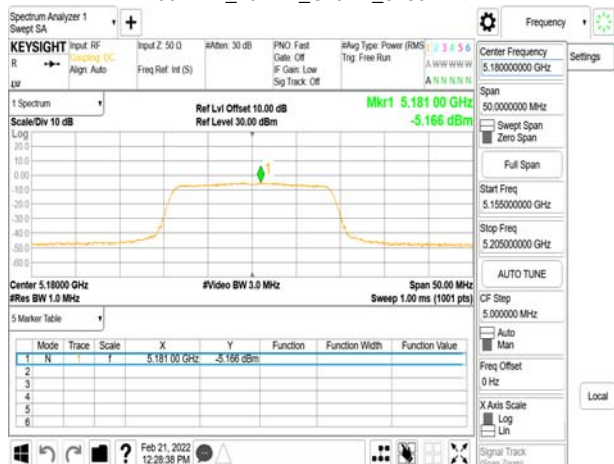


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802.11n\_20MHz\_Chain1\_5180MHz



802.11n\_20MHz\_Chain1\_5260MHz



802.11n\_20MHz\_Chain1\_5220MHz



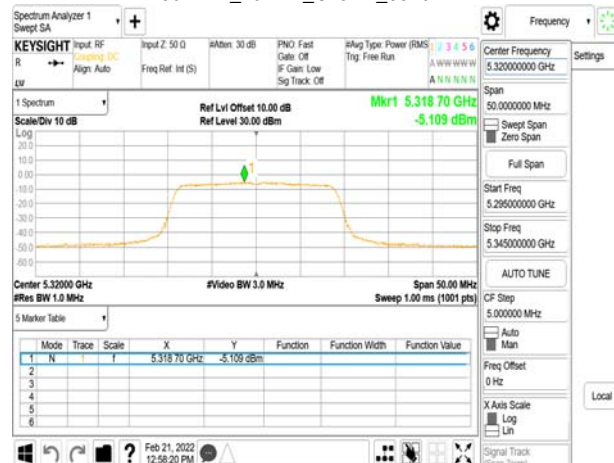
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802.11n\_20MHz\_Chain1\_5240MHz



802.11n\_20MHz\_Chain1\_5320MHz

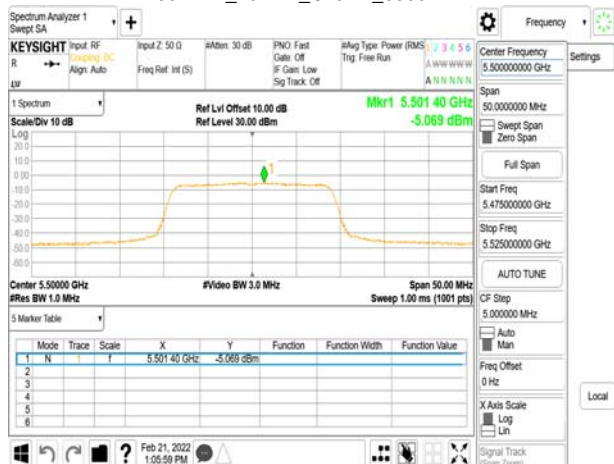


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802.11n\_20MHz\_Chain1\_5500MHz



802.11n\_20MHz\_Chain1\_5745MHz



802.11n\_20MHz\_Chain1\_5580MHz



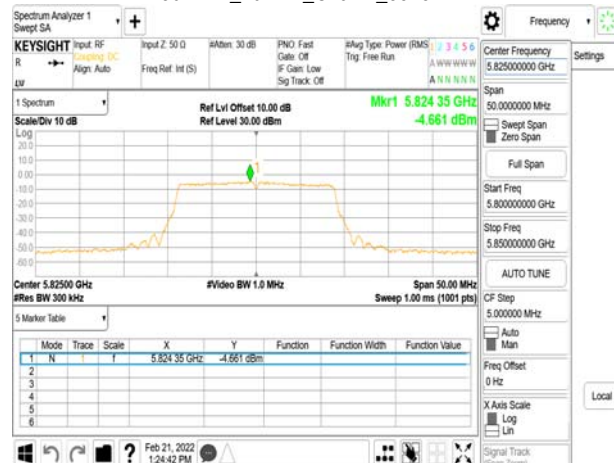
802.11n\_20MHz\_Chain1\_5785MHz



802.11n\_20MHz\_Chain1\_5700MHz



802.11n\_20MHz\_Chain1\_5825MHz



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802.11n\_40MHz\_Chain0\_5190MHz



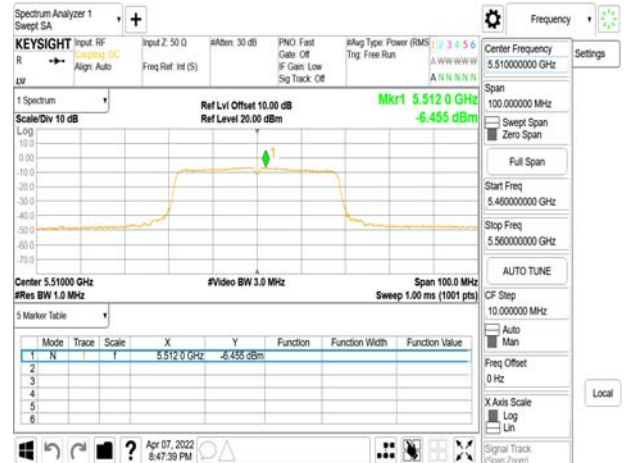
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802.11n\_40MHz\_Chain0\_5230MHz



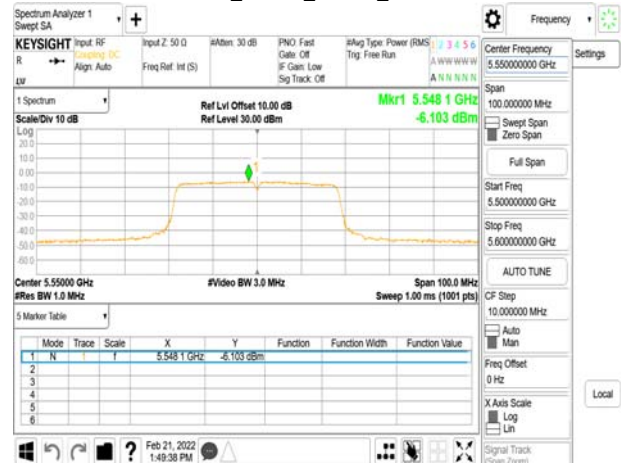
802.11n\_40MHz\_Chain0\_5510MHz



802.11n\_40MHz\_Chain0\_5270MHz



802.11n\_40MHz\_Chain0\_5550MHz



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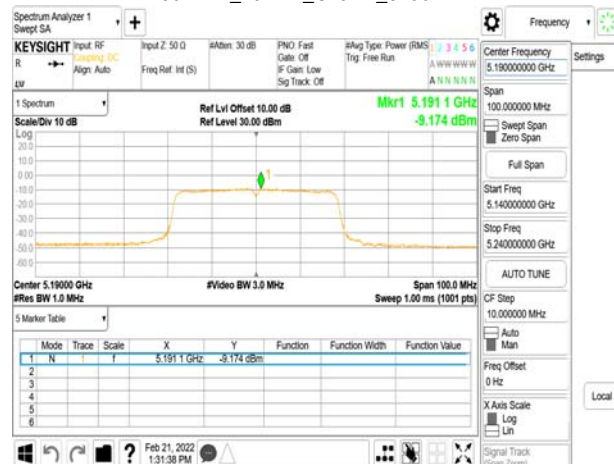
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802.11n\_40MHz\_Chain0\_5670MHz



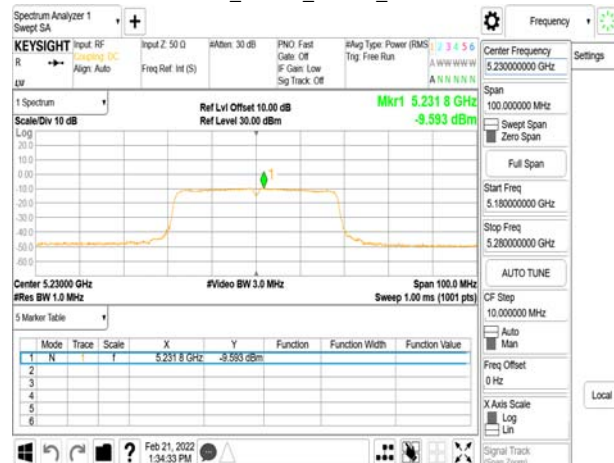
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802.11n\_40MHz\_Chain0\_5755MHz



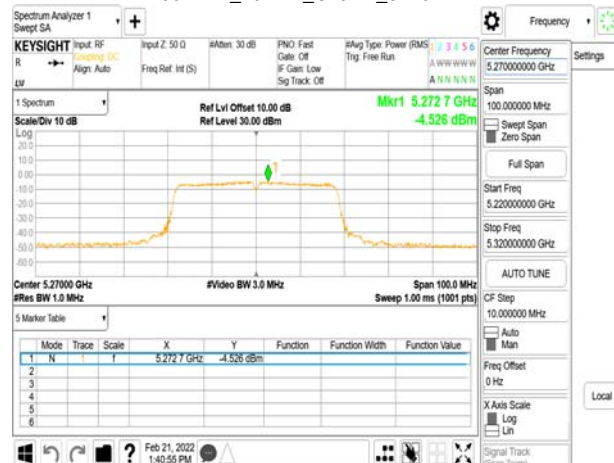
802.11n\_40MHz\_Chain1\_5230MHz



802.11n\_40MHz\_Chain0\_5795MHz



802.11n\_40MHz\_Chain1\_5270MHz



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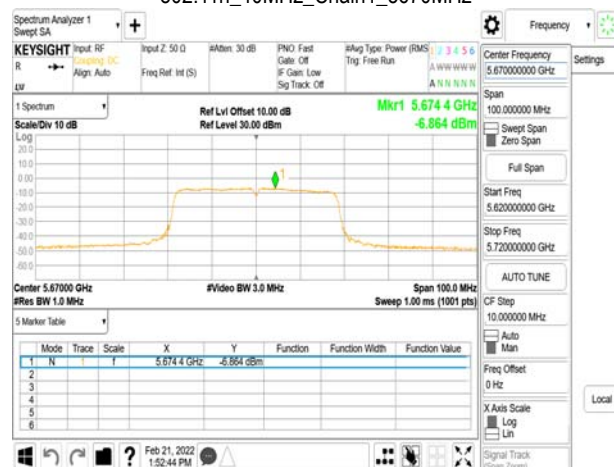
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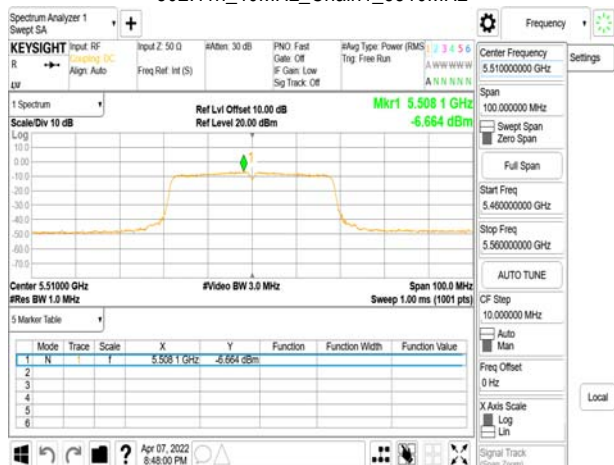
802.11n\_40MHz\_Chain1\_5310MHz



802.11n\_40MHz\_Chain1\_5670MHz



802.11n\_40MHz\_Chain1\_5510MHz



802.11n\_40MHz\_Chain1\_5755MHz



802.11n\_40MHz\_Chain1\_5550MHz



802.11n\_40MHz\_Chain1\_5795MHz



Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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