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**Phone: +1 (949) 393-1123**
**Web: www.vista-compliance.com**
**Email: info@vista-compliance.com**

# RF Test Report

| | |
|---|---|
| **Test Report Number** | HID-24050731-LC-FCC-IC-RF-WLAN5G |
| **FCC ID** | JQ6-BLUFIAC01 |
| **IC** | 2236B-BLUFIAC01 |
| **Applicant** | HID Global Corporation |
| **Applicant Address** | 611 Center Ridge Drive, Austin, TX, 78753, USA |
| **Product Name** | BLE and WiFi Gateway |
| **Model (s)** | BluFi-AC01 |
| **Date of Receipt** | 06/21/2024 |
| **Date of Test** | 06/21/2024- 07/10/2024 |
| **Report Issue Date** | 07/17/2024 |
| **Test Standards** | 47CFR Part 15.407<br>RSS 247 Issue 3, Aug 2023<br>RSS-Gen Issue 5, Feb 2021 |
| **Test Result** | **PASS** |

Issued by:

**Vista Compliance Laboratories**
1261 Puerta Del Sol, San Clemente, CA 92673 USA
www.vista-compliance.com

| | |
|---|---|
| Lining | |
| **Lining Li (Test Engineer)** | **David Zhang (Technical Manager)** |

## REVISION HISTORY

| Report Number | Version | Description | Issued Date |
|---|---|---|---|
| HID-24050731-LC-FCC-IC-RF-WLAN5G | Original | Initial report | 07/17/2024 |
| | | | |
| | | | |
| | | | |
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# 1 Test Summary

| Test Item | Test Requirement | Test Method | Result |
|---|---|---|---|
| Antenna Requirement | 47CFR Part 15.203 | N/A | Pass |
| 26 dB Bandwidth | 47CFR Part 15.407 (a)<br>RSS-247 Issue 3, Aug 2023 | ANSI C63.10 (2020) | Pass |
| Occupied Bandwidth | 47CFR Part 15.407 (a)<br>RSS-Gen Issue 5, Feb 2021 | ANSI C63.10 (2020)<br>RSS-Gen Issue 5, Feb 2021 | Pass |
| Maximum Conducted Output Power | 47CFR Part 15.407 (a)<br>RSS-247 Issue 3, Aug 2023 | ANSI C63.10 (2020) | Pass |
| Power Spectral Density | 47CFR Part 15.407 (a)<br>RSS-247 Issue 3, Aug 2023 | ANSI C63.10 (2020) | Pass |
| Radiated Spurious Emission | 47CFR Part 15.407 (b)<br>RSS-247 Issue 3, Aug 2023 | ANSI C63.10 (2020) | Pass |
| Radiated Band-Edge into Restricted Frequency Bands | 47CFR Part 15.205, 15.209<br>47CFR Part 15.407 (b)<br>RSS-247 Issue 3, Aug 2023 | ANSI C63.10 (2020) | Pass |
| AC Power Line Conducted Emissions | 47CFR Part 15.207<br>RSS-Gen Issue 5, Feb 2021 | ANSI C63.10 (2020)<br>RSS-Gen Issue 5, Feb 2021 | Pass |

# 2 General Information

## 2.1 Applicant

| | |
|---|---|
| **Applicant** | HID Global Corporation |
| **Applicant address** | 611 Center Ridge Drive, Austin, TX, 78753, USA |
| **Manufacturer** | HID Global Corporation |
| **Manufacturer Address** | 611 Center Ridge Drive, Austin, TX, 78753, USA |

## 2.2 Product information

| | |
|---|---|
| **Product Name** | BLE and WiFi Gateway |
| **Product Description** | BluFi-ACUS BLE and WiFi Gateway |
| **Model Number** | BluFi-AC01 |
| **Family Models** | N/A |
| **Serial Number** | HID-21050342-LC-E001 (WIFI RF conducted test sample)<br>HID-21050342-LC-E002 (WIFI RF Radiated test sample)<br>HID-21050342-LC-E003 (WIFI DFS test sample) |
| **Frequency Band** | BLE: 2402-2480MHz<br>2.4G: 2412-2462MHz<br>5G: U-NII-1: 5150-5250MHz<br>U-NII-2A: 5250-5350MHz<br>U-NII-2C: 5470-5725MHz<br>U-NII-3: 5725-5850MHz |
| **Type of modulation** | BT_LE: GFSK<br>2.4G 11b/g/n: CCK, DQPSK, DBPSK for DSSS<br>64QAM, 16QAM, QPSK, BPSK for OFDM<br>5G 11a/n/ac: 256QAM, 64QAM, 16QAM, QPSK, BPSK |
| **Equipment Class** | NII |
| **Antenna Information** | PCB trace antenna,<br>Antenna Gain: 2.4GHz, 3 dBi<br>5GHz, 2.5dBi |
| **Clock Frequencies** | N/A |
| **Input Power** | 120VAC, 60Hz |
| **Power Adapter Manufacturer/Model** | N/A |
| **Power Adapter SN** | N/A |
| **Hardware version** | N/A |
| **Software version** | N/A |
| **Additional Info** | Test sample is modified with external SMA connector for direct RF conducted measurement |

## 2.3 Test standard and method

| | |
|---|---|
| **Test standard** | 47CFR Part 15.407<br>RSS-247 Issue 3, Aug 2023<br>RSS-Gen Issue 5, Mar 2019 |
| **Test method** | ANSI C63.10 (2020)<br>789033 D02 General UNII Test Procedures New Rules v02r01 |

# 3 Test Site Information

| | |
|---|---|
| **Lab performing tests** | Vista Laboratories, Inc. |
| **Lab Address** | 1261 Puerta Del Sol, San Clemente, CA 92673 USA |
| **Phone Number** | +1 (949) 393-1123 |
| **Website** | www.vista-compliance.com |

| Test Condition | Temperature | Humidity | Atmospheric Pressure |
|---|---|---|---|
| RF Testing | 25.6°C | 65.3% | 996.3 mbar |
| Radiated Emission Testing | 25.6°C | 65.3% | 996.3 mbar |

# 4 Modification of EUT / Deviations from Standards

EUT test sample has external SMA connector for direct RF conducted measurement.
It also has a USB to UART cable for programming purpose, to set EUT into test mode. No deviation from standards.

# 5 Test Configuration and Operation

## 5.1 EUT Test Configuration

The EUT is an engineering test sample loaded with RF testing firmware specifically designed to support the RF TX/RX measurement in different aspects.

The following software was used for testing and to monitor EUT performance

| Software | Description |
|---|---|
| EMISoft Vasona | EMC/RF Spurious emission test software used during testing |
| Dmtest.exe | dmtest rev1 |
| Linux console | To set WLAN into continuous TX and RX mode under different modulation, data rate and channel, etc. |
| iPerf.exe | To establish data traffice between access point and EUT in 5GHz WLAN DFS test |

## 5.2 Supporting Equipment

| Description | Manufacturer | Model # | Serial # | Remark |
|---|---|---|---|---|
| Laptop | Dell | XPS13-9333 | G1H5102 | N/A |
| USB to UART adapter | DSD TECH | SH-U09C5 | N/A | Provided by client |

## 5.3 Duty cycle Measurement

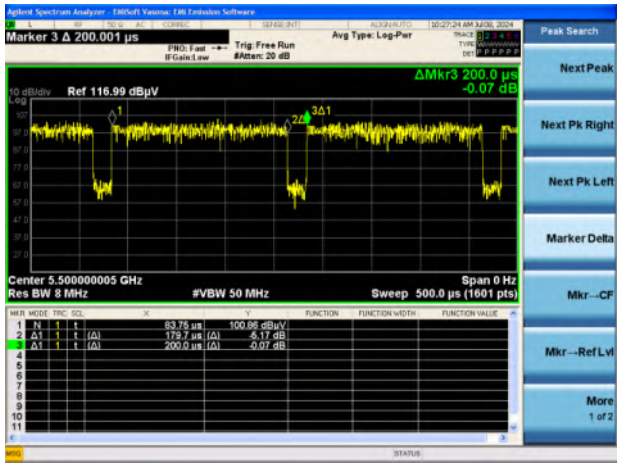
If Duty cycle of test signal is < 98 %, duty factor is required.

| Mode | Duty Cycle (%) | DCF (dB) |
|---|---|---|
| 802.11a | 89.85% | 0.465 |
| 802.11n (HT20) | 98.02% | 0 |
| 802.11ac (VHT20) | 93.07% | 0.312 |

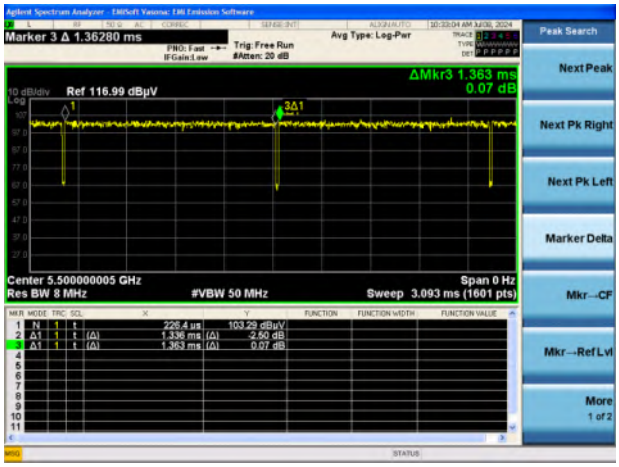
Note: Duty cycle = $T_{on}/T_{period}$*100%

DCF = 10*log(1/D)

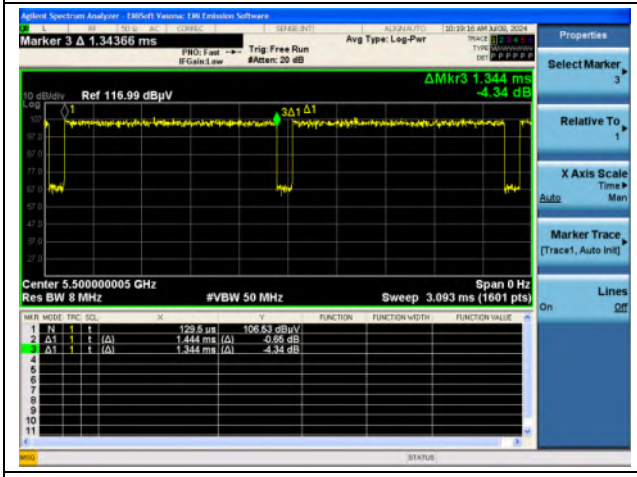
Where, D = $T_{on}/T_{period}$




Duty cycle_802.11a




Duty cycle_802.11n




Duty cycle_802.11ac

# 6 Uncertainty of Measurement

| Test item | Measurement Uncertainty (dB) |
|---|---|
| RF Output Power (Conducted) | ±1.2 dB |
| Power Spectral Density | ±0.9 dB |
| Unwanted Emission (conducted) | ±2.6 dB |
| Occupied Channel Bandwidth | ±5 % |
| Radiated Emission (9KHz-30MHz) | ±3.5 dB |
| Radiated Emission (30MHz-1GHz) | ±4.6 dB |
| Radiated Emission (1-18GHz) | ±4.9 dB |
| Radiated Emission (18-40GHz) | ±3.5 dB |

# 7 Test Results

## 7.1 Antenna Requirements

### *7.1.1 Requirement*

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna requirement must meet at least one of the following:

a) Antenna must be permanently attached to the device.

b) The antenna must use a unique type of connector to attach to the device.

c) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.

### *7.1.2 Conclusion*

Analysis:

- EUT has a PCB trace antenna which is soldered onto the main board. The antenna gain is 3.0 dBi for 2.4GHz band, 2.5dBi for 5GHz band. This meets the requirement of permanent attachment.
-

Conclusion:

- EUT complies with antenna requirement in § 15.203.

## 7.2 26 dB Bandwidth & 6 dB Bandwidth

### *7.2.1 Requirement*

§ 15.407 (a) (2); RSS-247 §6.2.1.2

26 dB Bandwidth: This section is for reporting purpose only. There are no restriction limits for bandwidth.

§ 15.407 (e); RSS-247 §6.2.4.1

6 dB Bandwidth: Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### *7.2.2 Test Setup*


### *7.2.3 Test Procedure*

26 dB Bandwidth:
According to subclause 12.4.1 of ANSI C63.10-2020:
subclause C.1 of 789033 D02 General UNII Test Procedures New Rules v02r01

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 26 dB, if the functionality described above (i.e., RBW, VBW ≥ 3 x RBW, peak detector with maximum hold) is implemented by the instrumentation function.

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

According to subclause C.2 of 789033 D02 General UNII Test Procedures New Rules v02r01
6 dB Bandwidth:

1) Set RBW = 100 kHz.
2) Set the video bandwidth (VBW) ≥ 3 x RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Sweep = auto couple.
6) Allow the trace to stabilize.
7) Use automatic bandwidth measurement capability on instrument to obtain BW result.

### 7.2.4 Test Result

U-NII-1 Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured 26dB Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | 6Mbps | 21.68 | N/A | N/A |
| | 44 | 5220 | 6Mbps | 21.92 | N/A | N/A |
| | 48 | 5240 | 6Mbps | 22.28 | N/A | N/A |
| 802.11n | 36 | 5180 | MCS0 | 23.35 | N/A | N/A |
| | 44 | 5220 | MCS0 | 22.40 | N/A | N/A |
| | 48 | 5240 | MCS0 | 22.28 | N/A | N/A |
| 802.11ac | 36 | 5180 | MCS0 | 24.31 | N/A | N/A |
| | 44 | 5220 | MCS0 | 22.16 | N/A | N/A |
| | 48 | 5240 | MCS0 | 22.63 | N/A | N/A |

U-NII-2A Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured 26dB Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 52 | 5260 | 6Mbps | 21.80 | N/A | N/A |
| | 60 | 5300 | 6Mbps | 21.80 | N/A | N/A |
| | 64 | 5320 | 6Mbps | 21.80 | N/A | N/A |
| 802.11n | 52 | 5260 | MCS0 | 22.04 | N/A | N/A |
| | 60 | 5300 | MCS0 | 22.16 | N/A | N/A |
| | 64 | 5320 | MCS0 | 21.80 | N/A | N/A |
| 802.11ac | 52 | 5260 | MCS0 | 21.92 | N/A | N/A |
| | 60 | 5300 | MCS0 | 22.04 | N/A | N/A |
| | 64 | 5320 | MCS0 | 22.16 | N/A | N/A |

U-NII-2C Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured 26dB Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 100 | 5500 | 6Mbps | 21.68 | N/A | N/A |
| | 116 | 5580 | 6Mbps | 21.44 | N/A | N/A |
| | 140 | 5700 | 6Mbps | 21.56 | N/A | N/A |
| 802.11n | 100 | 5500 | MCS0 | 21.92 | N/A | N/A |
| | 116 | 5580 | MCS0 | 21.92 | N/A | N/A |
| | 140 | 5700 | MCS0 | 21.80 | N/A | N/A |
| 802.11ac | 100 | 5500 | MCS0 | 21.92 | N/A | N/A |
| | 116 | 5580 | MCS0 | 21.80 | N/A | N/A |
| | 140 | 5700 | MCS0 | 21.80 | N/A | N/A |

U-NII-3 Band

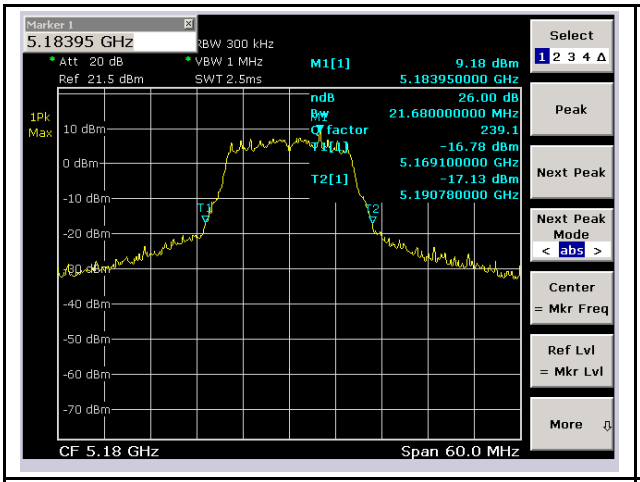
| Mode | Channel | Frequency (MHz) | Data rate | Measured 6dB Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 149 | 5745 | 6Mbps | 15.41 | 0.5 | PASS |
| | 157 | 5785 | 6Mbps | 15.38 | 0.5 | PASS |
| | 165 | 5825 | 6Mbps | 15.44 | 0.5 | PASS |
| 802.11n | 149 | 5745 | MCS0 | 15.41 | 0.5 | PASS |
| | 157 | 5785 | MCS0 | 15.5 | 0.5 | PASS |
| | 165 | 5825 | MCS0 | 15.44 | 0.5 | PASS |
| 802.11ac | 149 | 5745 | MCS0 | 15.29 | 0.5 | PASS |
| | 157 | 5785 | MCS0 | 15.50 | 0.5 | PASS |
| | 165 | 5825 | MCS0 | 15.32 | 0.5 | PASS |

Cross Band

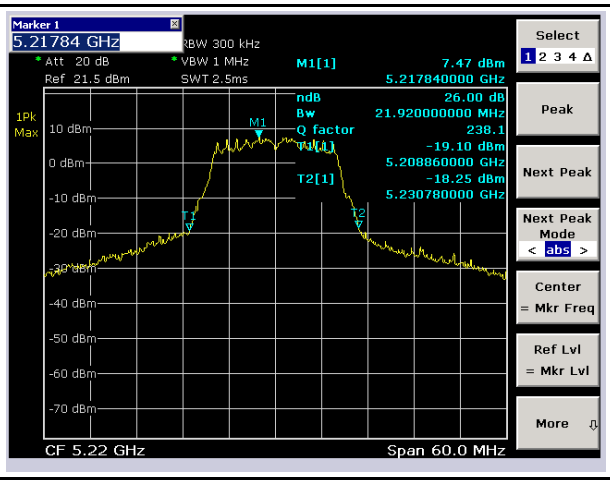
| Mode | Channel | Frequency (MHz) | Data rate | Measured 26dB Bandwidth (MHz) | Measured 6dB Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 144 | 5720 | 6Mbps | 21.56 | 15.29 | 0.5 | PASS |
| 802.11n | 144 | 5720 | MCS0 | 21.80 | 15.29 | 0.5 | PASS |
| 802.11ac | 144 | 5720 | MCS0 | 21.92 | 15.29 | 0.5 | PASS |

### *7.2.5 Test Plots*

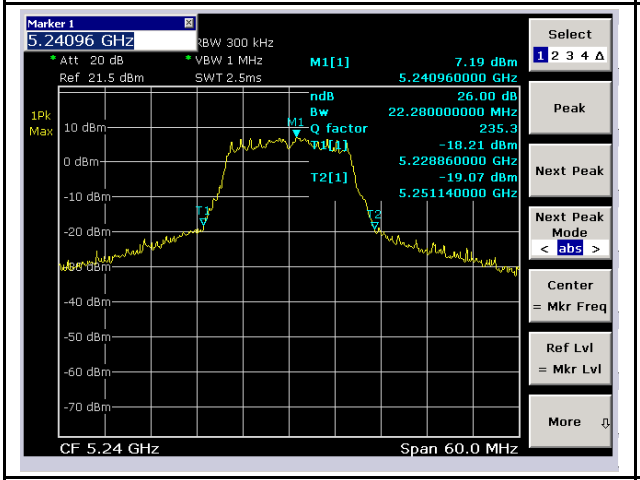
26 dB Bandwidth of U-NII-1 Band



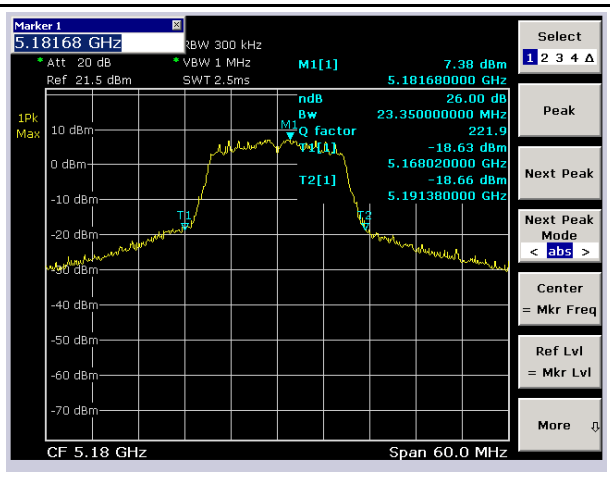

26 dB BW_U-NII-1_802.11a_5180



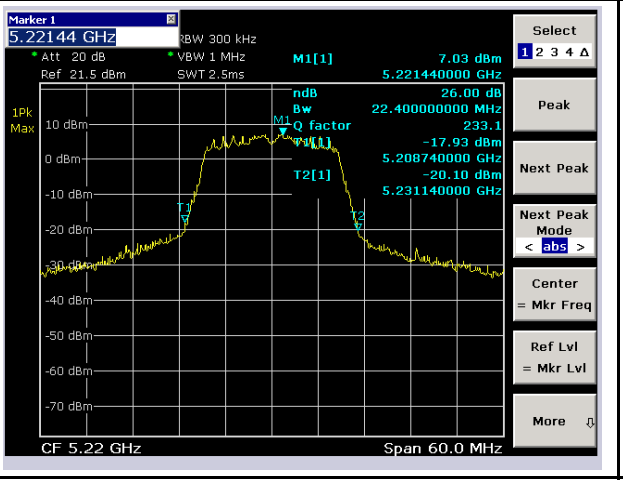

26 dB BW_U-NII-1_802.11a_5220




26 dB BW_U-NII-1_802.11a_5240




26 dB BW_U-NII-1_802.11n_5180

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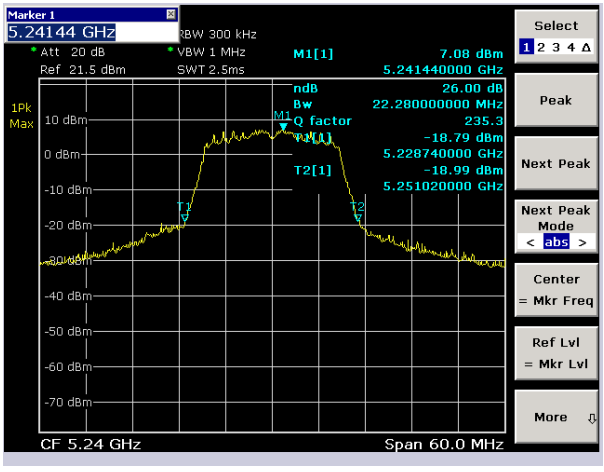
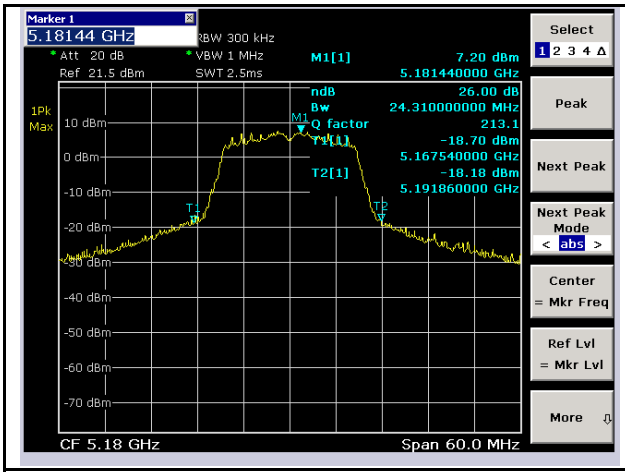
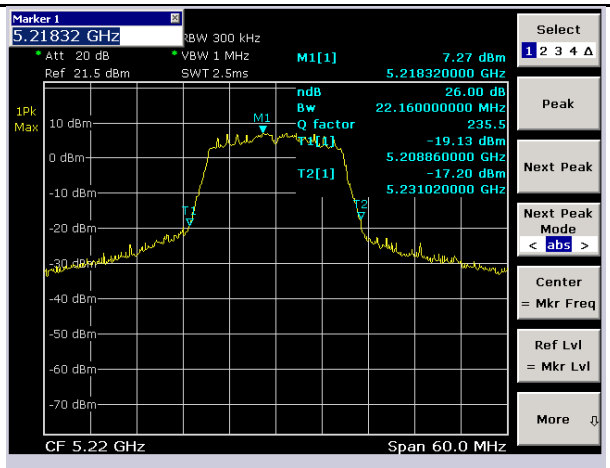


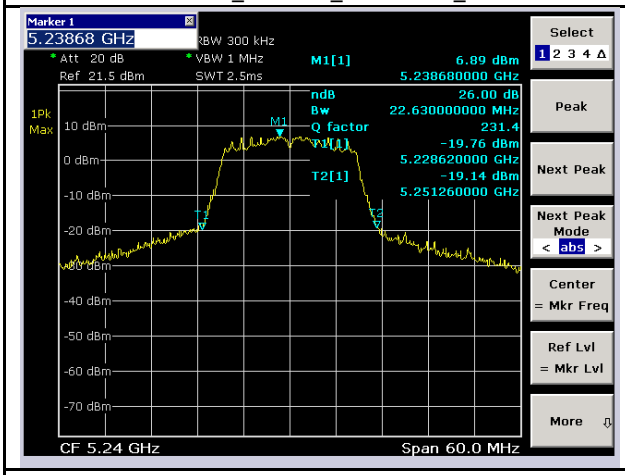

26 dB BW_U-NII-1_802.11n_5240




26 dB BW_U-NII-1_802.11ac_5180

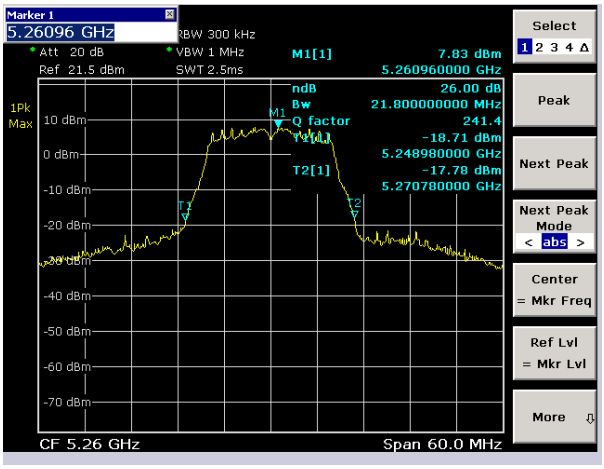



26 dB BW_U-NII-1_802.11ac_5220

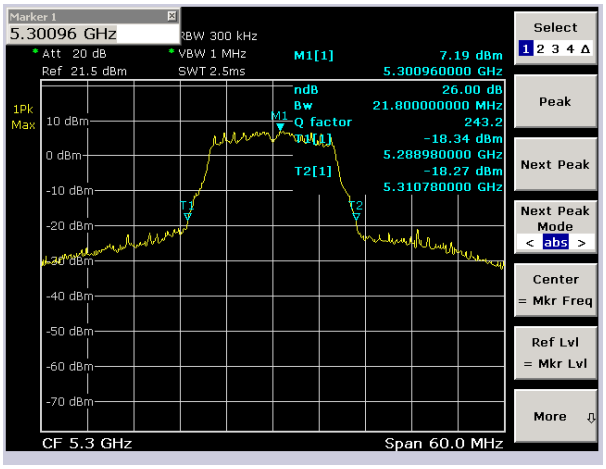



26 dB BW_U-NII-1_802.11ac_5240

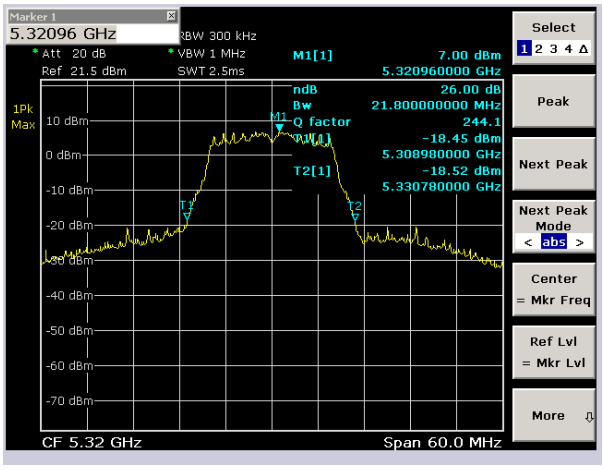
## 26 dB Bandwidth of U-NII-2A Band



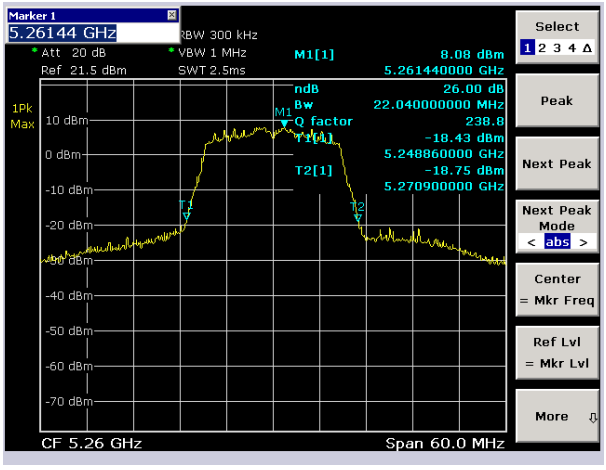

26 dB BW_U-NII-2A_802.11a_5260



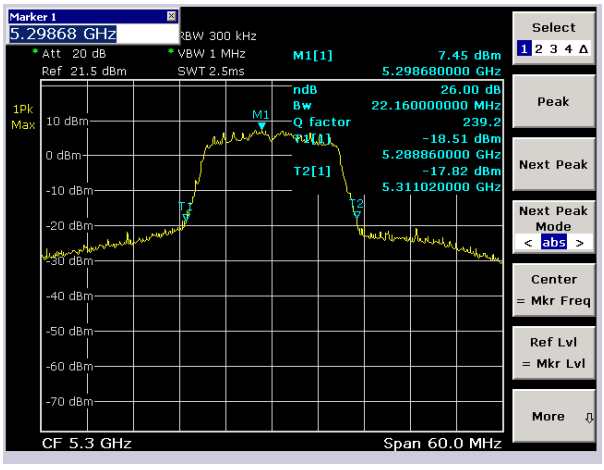

26 dB BW_U-NII-2A_802.11a_5300



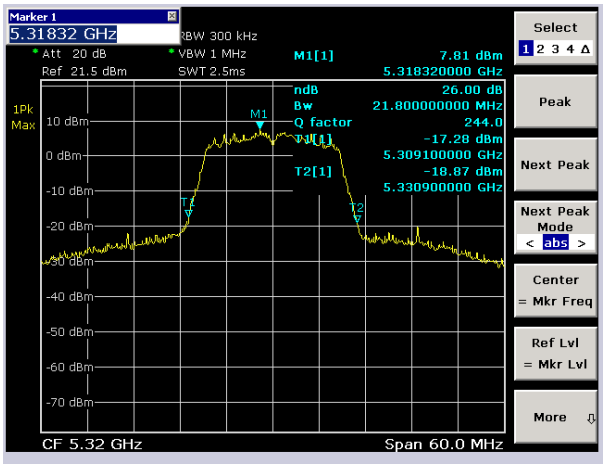

26 dB BW_U-NII-2A_802.11a_5320



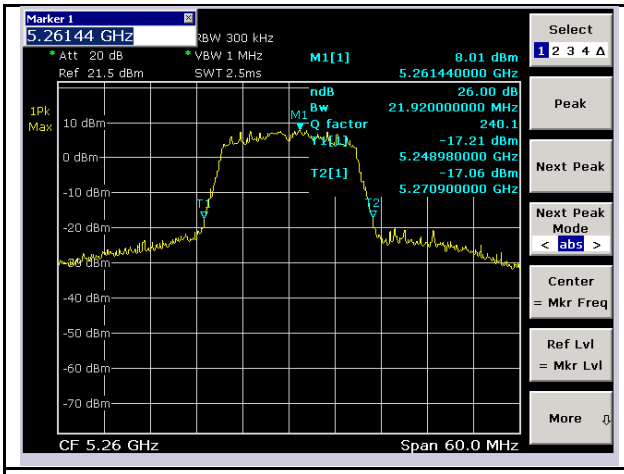

26 dB BW_U-NII-2A_802.11n_5260



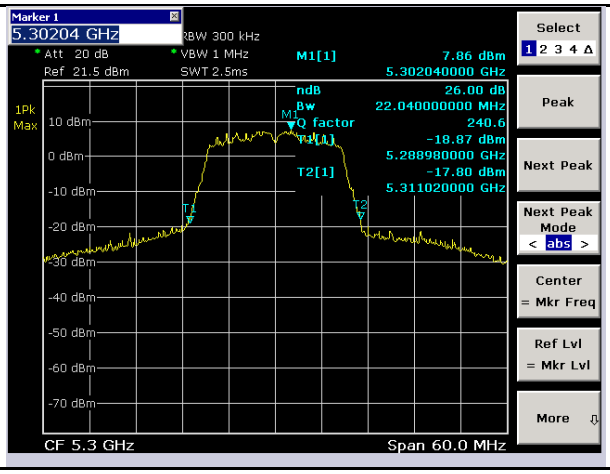

26 dB BW_U-NII-2A_802.11n_5300



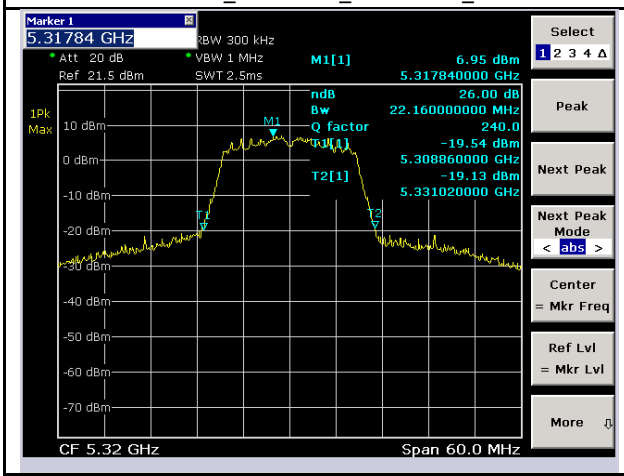

26 dB BW_U-NII-2A_802.11n_5320




26 dB BW_U-NII-2A_802.11ac_5260

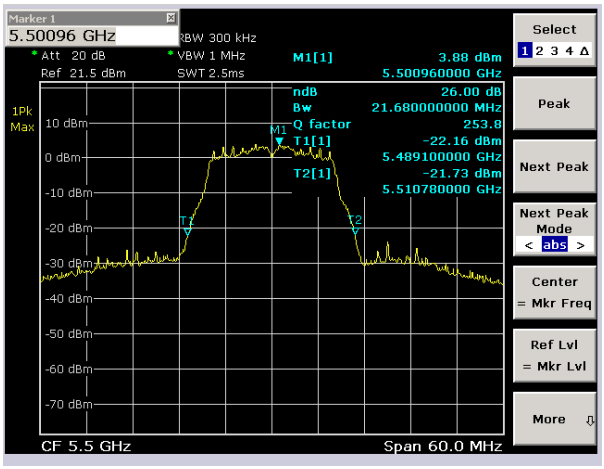



26 dB BW_U-NII-2A_802.11ac_5300

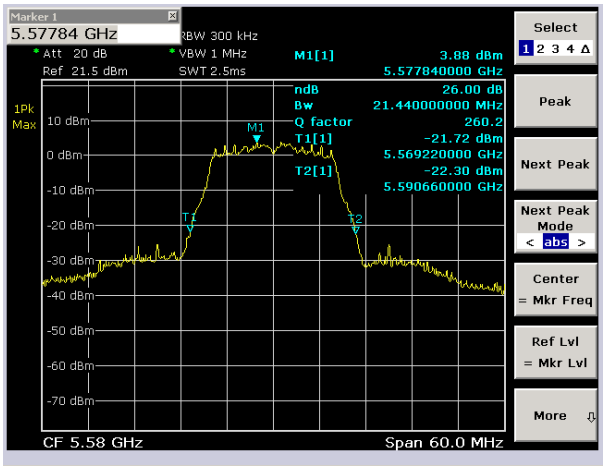



26 dB BW_U-NII-2A_802.11ac_5320

## 26 dB Bandwidth of U-NII-2C Band




26 dB BW_U-NII-2C_802.11a_5500

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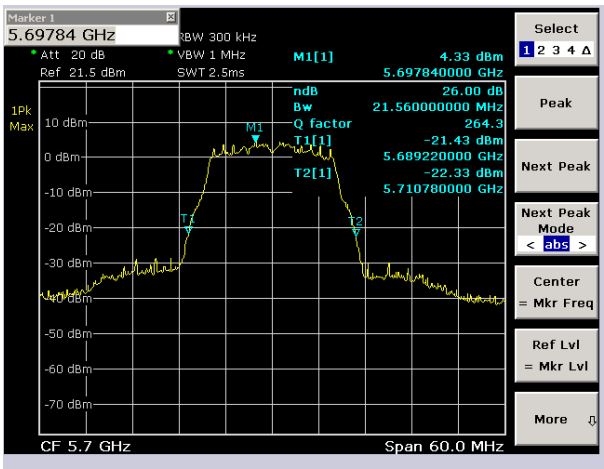
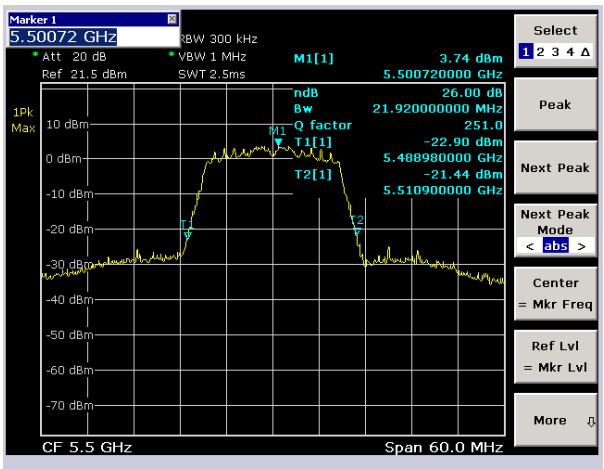
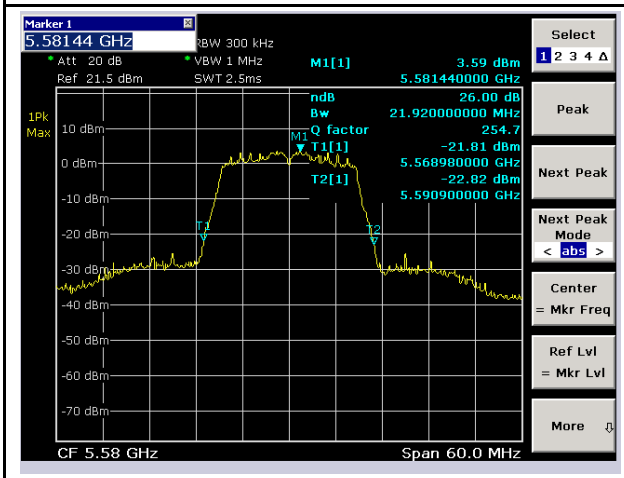


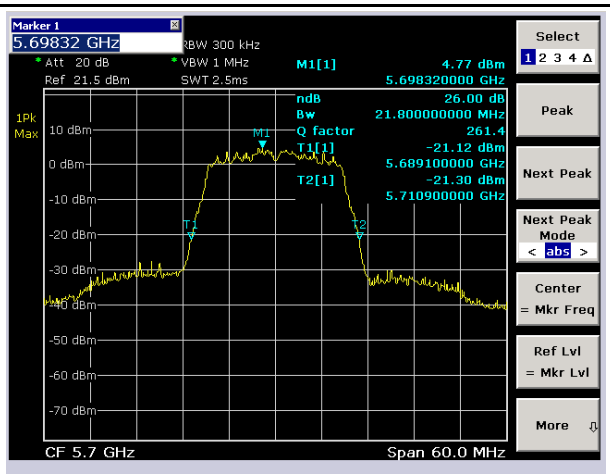

26 dB BW_U-NII-2C_802.11a_5700



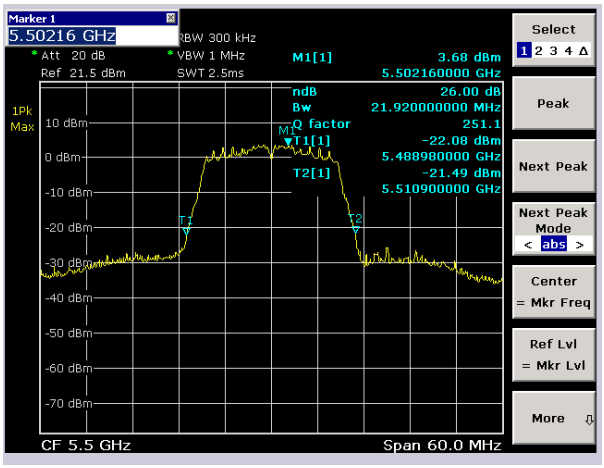

26 dB BW_U-NII-2C_802.11n_5500



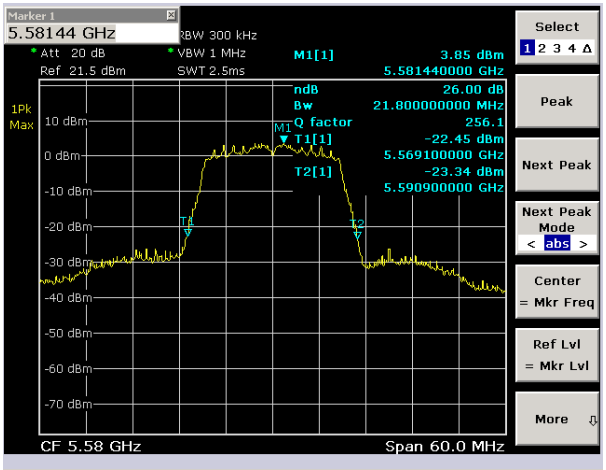

26 dB BW_U-NII-2C_802.11n_5580



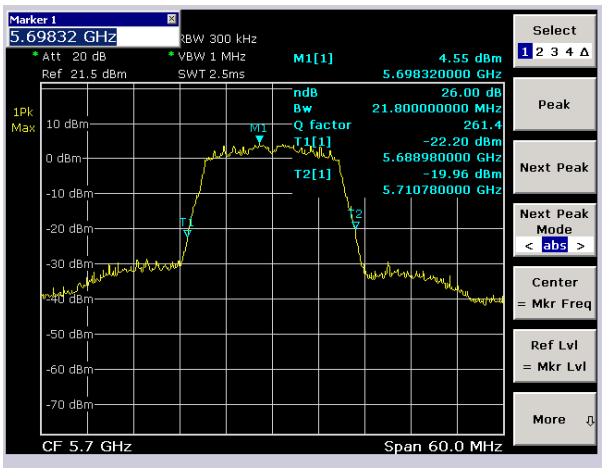

26 dB BW_U-NII-2C_802.11n_5700



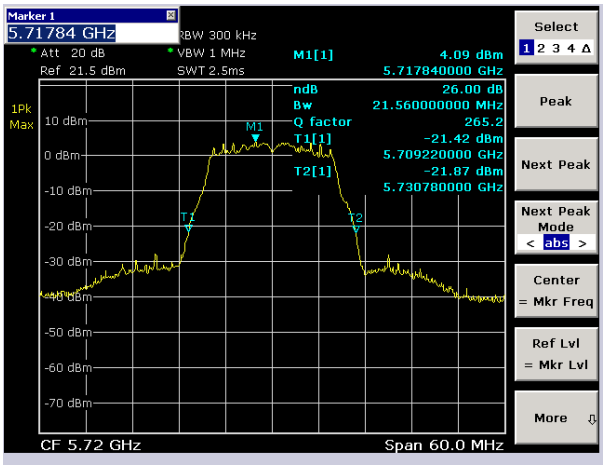

26 dB BW_U-NII-2C_802.11ac_5500



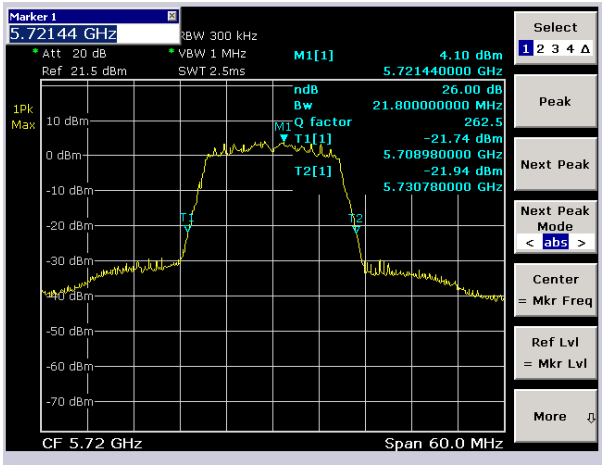

26 dB BW_U-NII-2C_802.11ac_5580



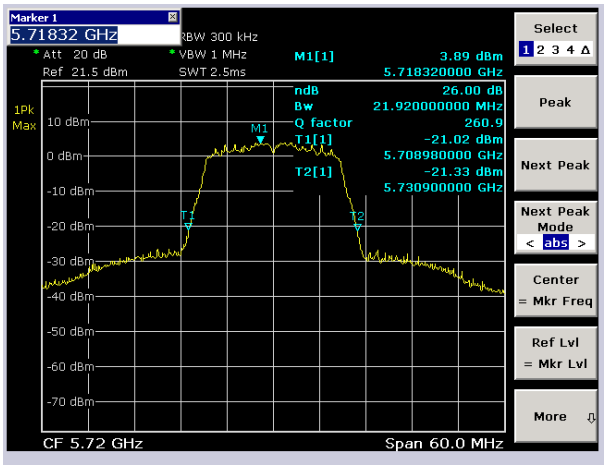

26 dB BW_U-NII-2C_802.11ac_5700




26 dB BW_U-NII-2C_802.11a_5720

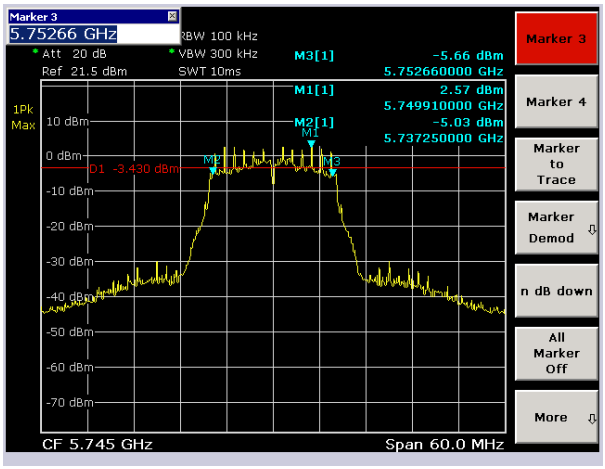



26 dB BW_U-NII-2C_802.11n_5720

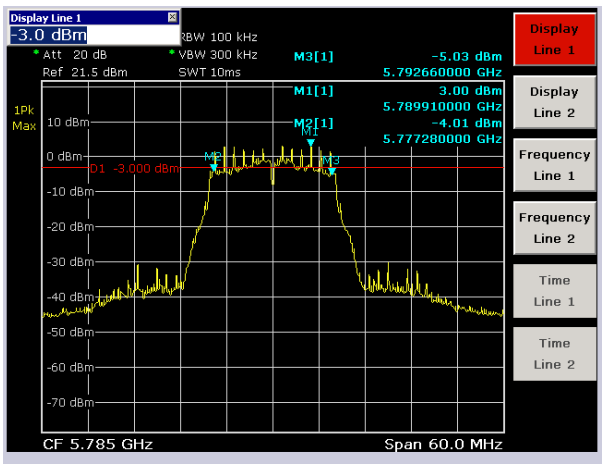



26 dB BW_U-NII-2C_802.11ac_5720

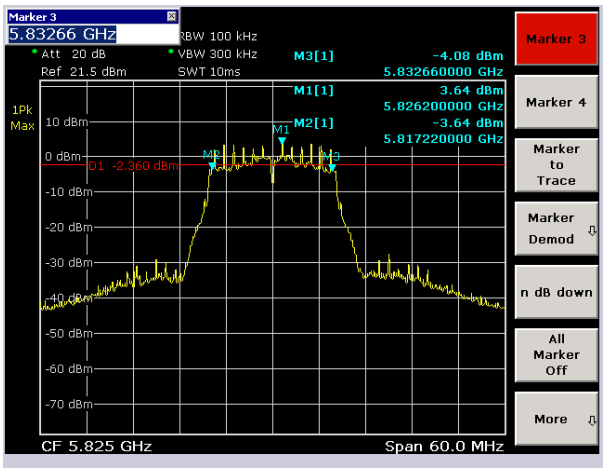
## 6 dB  Bandwidth of U-NII-3 Band



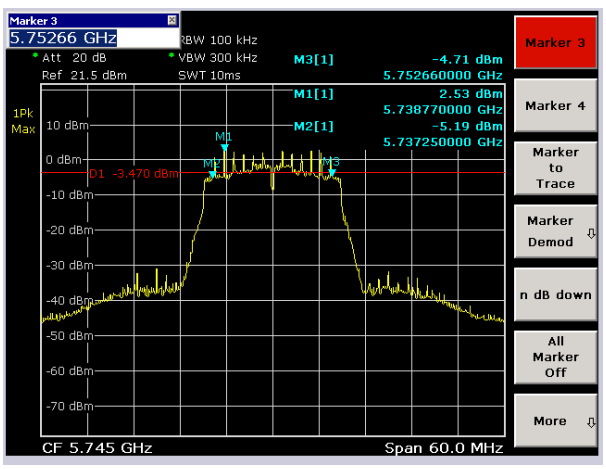

6 dB BW_U-NII-3_802.11a_5745



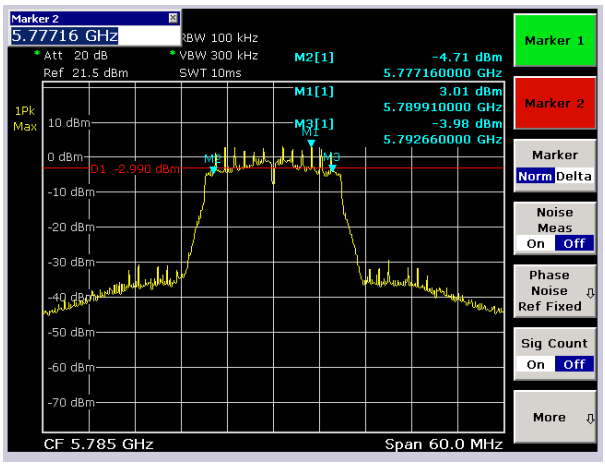

6 dB BW_U-NII-3_802.11a_5785



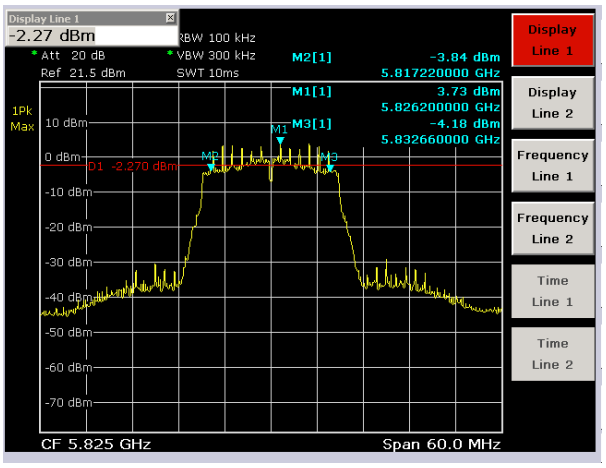

6 dB BW_U-NII-3_802.11a_5825



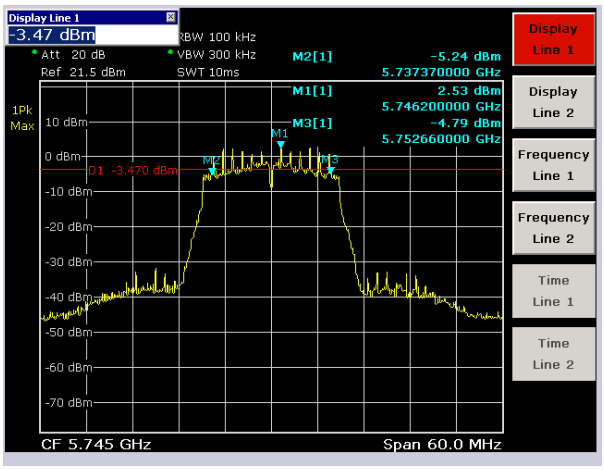

6 dB BW_U-NII-3_802.11n_5745



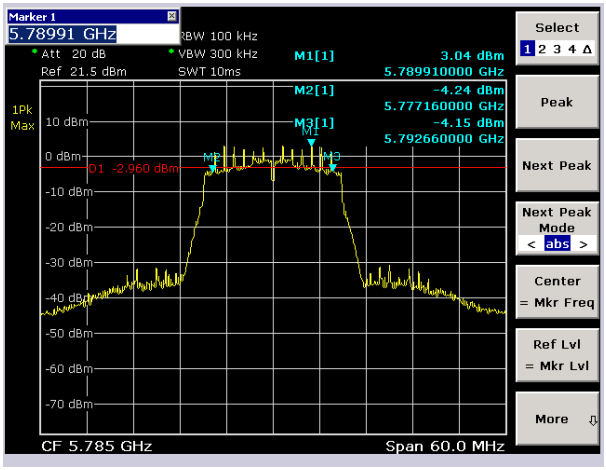

6 dB BW_U-NII-3_802.11n_5785



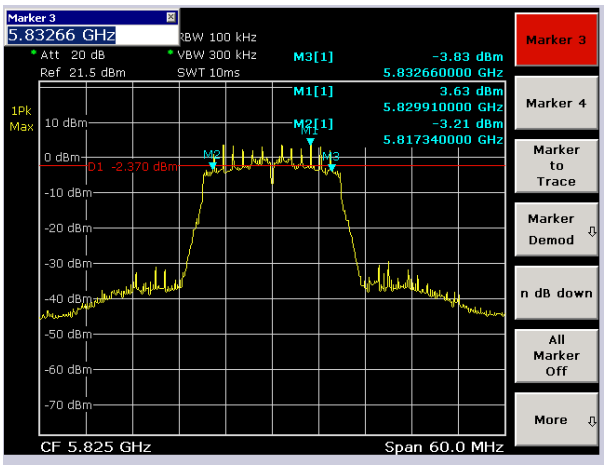

6 dB BW_U-NII-3_802.11n_5825



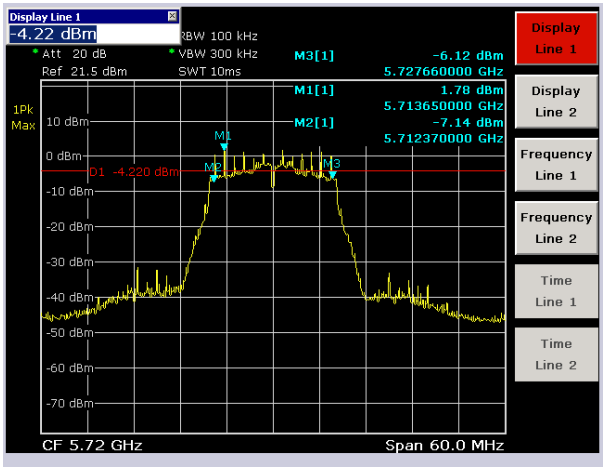

6 dB BW_U-NII-3_802.11ac_5745



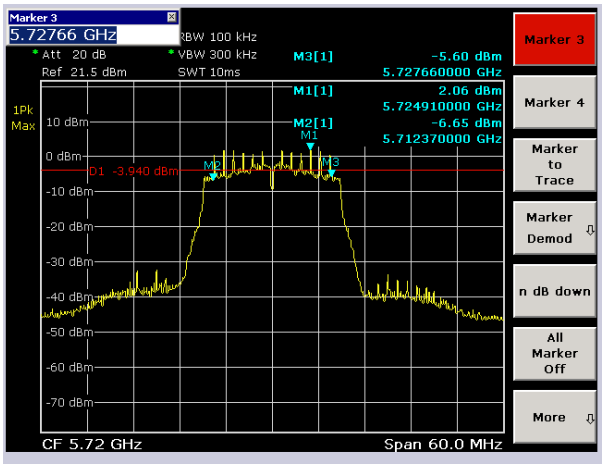

6 dB BW_U-NII-3_802.11ac_5785



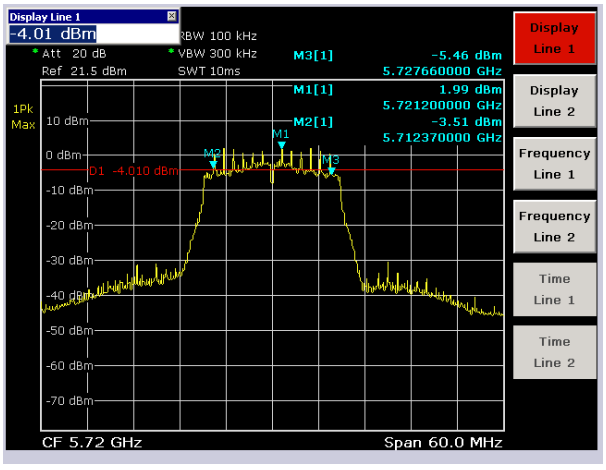

6 dB BW_U-NII-3_802.11ac_5825




6 dB BW_U-NII-3_802.11a_5720




6 dB BW_U-NII-3_802.11n_5720




6 dB BW_U-NII-3_802.11ac_5720

## 7.3 Occupied Bandwidth (99%)

### *7.3.1 Requirement*

RSS-Gen §6.7

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

### *7.3.2 Test Procedure*

According to RSS-Gen §6.7 and subclause 6.9.3 of ANSI C63.10-2020:

1. Set RBW = 1% to 5% of the actual occupied BW.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Span = large enough to capture all products of the modulation process
7. Allow the trace to stabilize.
8. Use automatic bandwidth measurement capability on instrument to obtain BW result.

### *7.3.3 Test Setup*

### 7.3.4 Test Result

U-NII-1 Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | 6Mbps | 17.844 | N/A | N/A |
| | 44 | 5220 | 6Mbps | 17.365 | N/A | N/A |
| | 48 | 5240 | 6Mbps | 17.485 | N/A | N/A |
| 802.11n | 36 | 5180 | MCS0 | 18.443 | N/A | N/A |
| | 44 | 5220 | MCS0 | 18.323 | N/A | N/A |
| | 48 | 5240 | MCS0 | 18.443 | N/A | N/A |
| 802.11ac | 36 | 5180 | MCS0 | 18.323 | N/A | N/A |
| | 44 | 5220 | MCS0 | 18.323 | N/A | N/A |
| | 48 | 5240 | MCS0 | 18.323 | N/A | N/A |

U-NII-2A Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 52 | 5260 | 6Mbps | 17.605 | N/A | N/A |
| | 60 | 5300 | 6Mbps | 17.605 | N/A | N/A |
| | 64 | 5320 | 6Mbps | 17.605 | N/A | N/A |
| 802.11n | 52 | 5260 | MCS0 | 18.683 | N/A | N/A |
| | 60 | 5300 | MCS0 | 18.563 | N/A | N/A |
| | 64 | 5320 | MCS0 | 18.683 | N/A | N/A |
| 802.11ac | 52 | 5260 | MCS0 | 18.563 | N/A | N/A |
| | 60 | 5300 | MCS0 | 18.323 | N/A | N/A |
| | 64 | 5320 | MCS0 | 18.563 | N/A | N/A |

U-NII-2C Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 100 | 5500 | 6Mbps | 17.126 | N/A | N/A |
| | 116 | 5580 | 6Mbps | 17.246 | N/A | N/A |
| | 140 | 5700 | 6Mbps | 17.126 | N/A | N/A |
| 802.11n | 100 | 5500 | MCS0 | 18.284 | N/A | N/A |
| | 116 | 5580 | MCS0 | 18.284 | N/A | N/A |
| | 140 | 5700 | MCS0 | 18.323 | N/A | N/A |
| 802.11ac | 100 | 5500 | MCS0 | 18.084 | N/A | N/A |
| | 116 | 5580 | MCS0 | 18.084 | N/A | N/A |
| | 140 | 5700 | MCS0 | 18.204 | N/A | N/A |

U-NII-3 Band

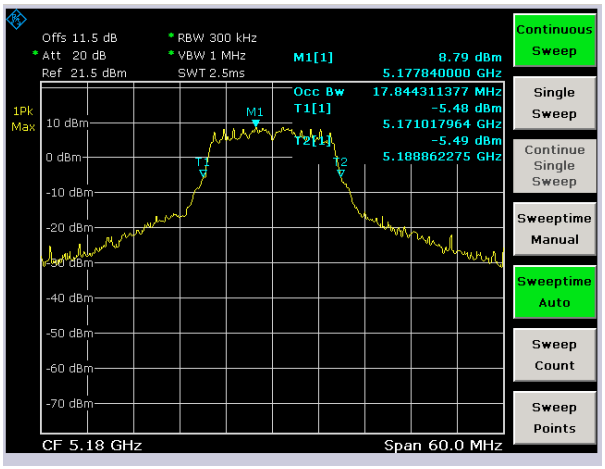
| Mode | Channel | Frequency (MHz) | Data rate | Measured Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 149 | 5745 | 6Mbps | 17.126 | N/A | N/A |
| | 157 | 5785 | 6Mbps | 17.006 | N/A | N/A |
| | 165 | 5825 | 6Mbps | 16.886 | N/A | N/A |
| 802.11n | 149 | 5745 | MCS0 | 18.084 | N/A | N/A |
| | 157 | 5785 | MCS0 | 18.084 | N/A | N/A |
| | 165 | 5825 | MCS0 | 18.084 | N/A | N/A |
| 802.11ac | 149 | 5745 | MCS0 | 18.084 | N/A | N/A |
| | 157 | 5785 | MCS0 | 18.084 | N/A | N/A |
| | 165 | 5825 | MCS0 | 18.084 | N/A | N/A |

Cross Band

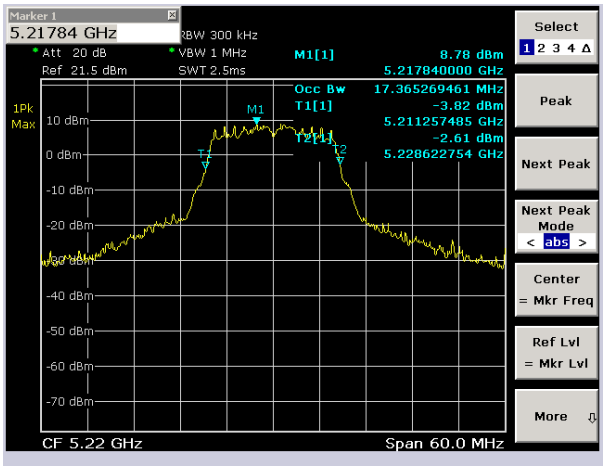
| Mode | Channel | Frequency (MHz) | Data rate | Measured Bandwidth (MHz) | Minimum Bandwidth (MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 144 | 5720 | 6Mbps | 17.126 | N/A | PASS |
| 802.11n | 144 | 5720 | MCS0 | 18.084 | N/A | PASS |
| 802.11ac | 144 | 5720 | MCS0 | 18.084 | N/A | PASS |

### *7.3.5 Test Plots*

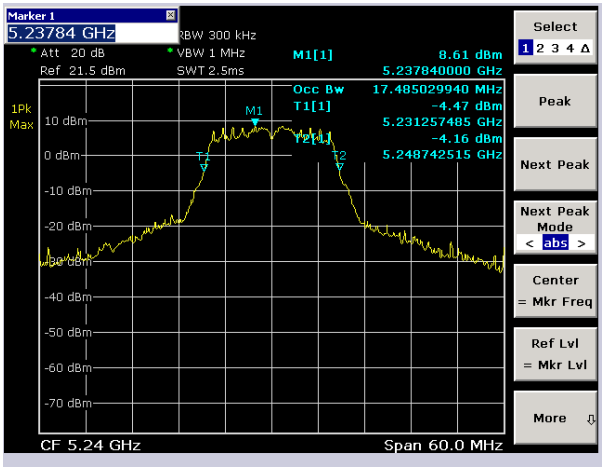
99% Bandwidth of U-NII-1 Band



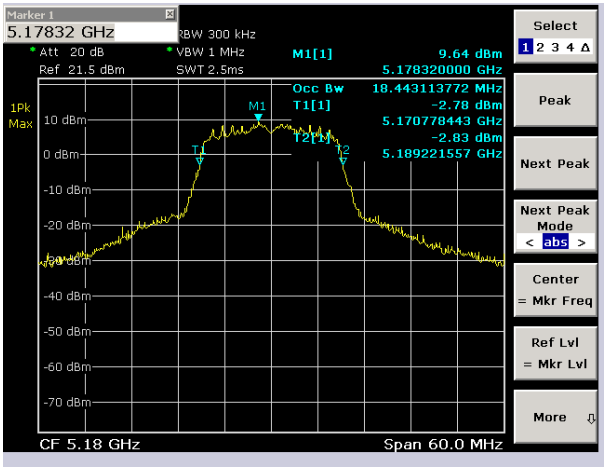

99% BW_U-NII-1_802.11a_5180



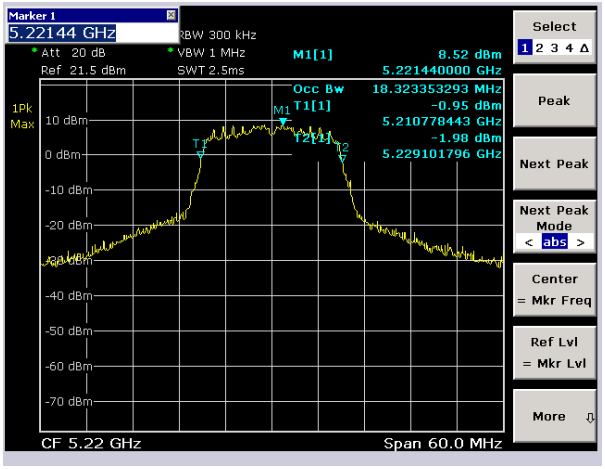

99% BW_U-NII-1_802.11a_5220



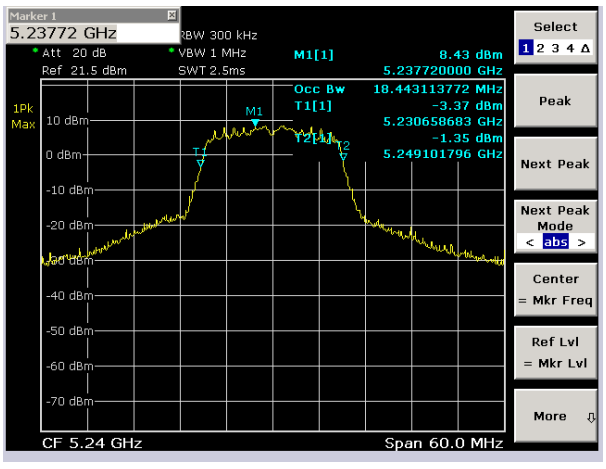

99% BW_U-NII-1_802.11a_5240



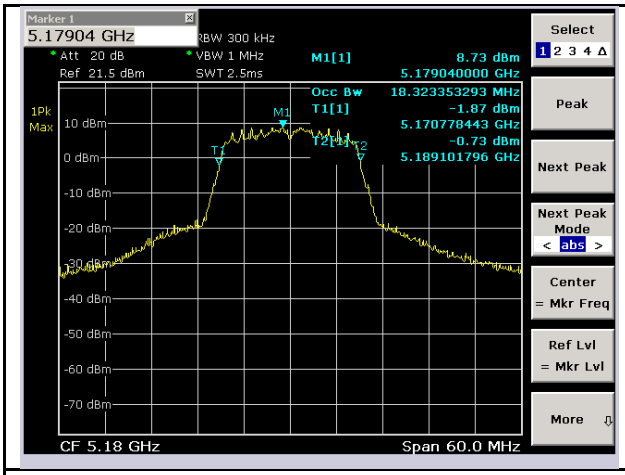

99% BW_U-NII-1_802.11n_5180



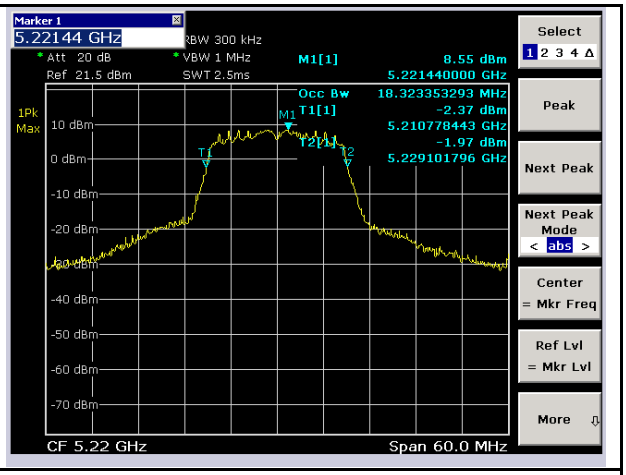

99% BW_U-NII-1_802.11n_5220



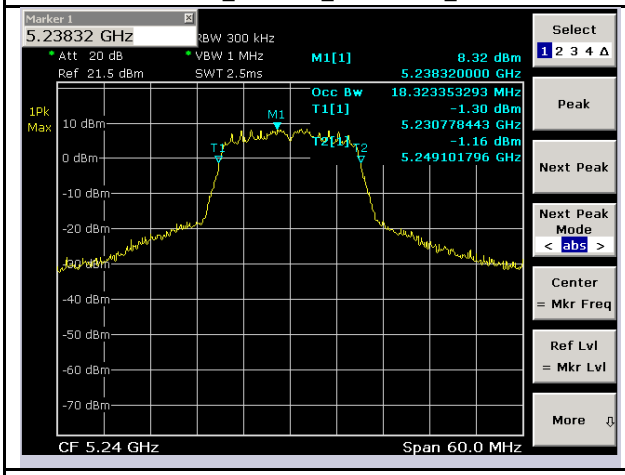

99% BW_U-NII-1_802.11n_5240




99% BW_U-NII-1_802.11ac_5180

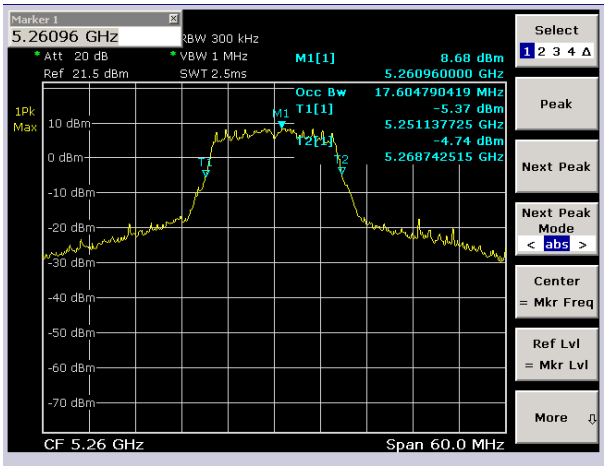



99% BW_U-NII-1_802.11ac_5220

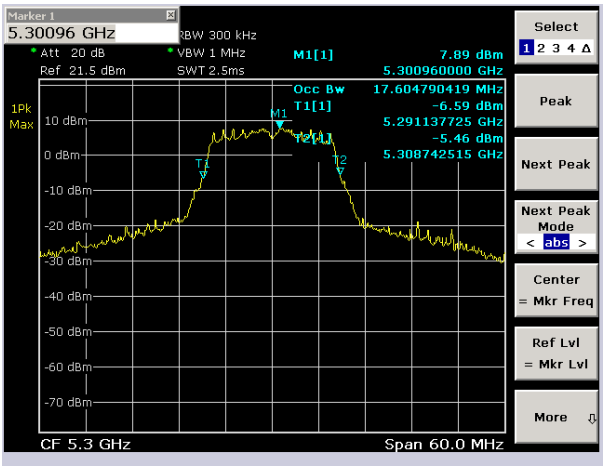



99% BW_U-NII-1_802.11ac_5240

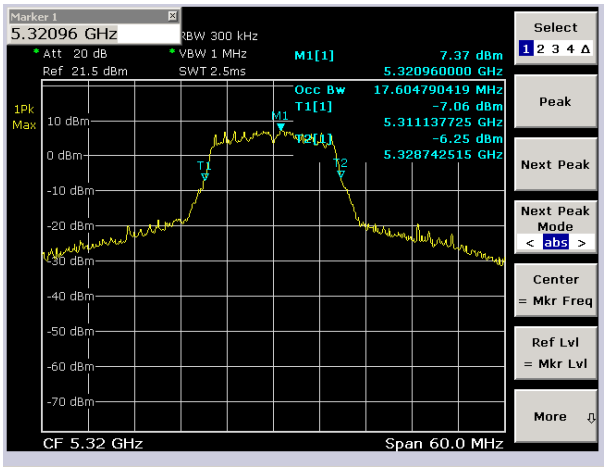
## 99% Bandwidth of U-NII-2A Band



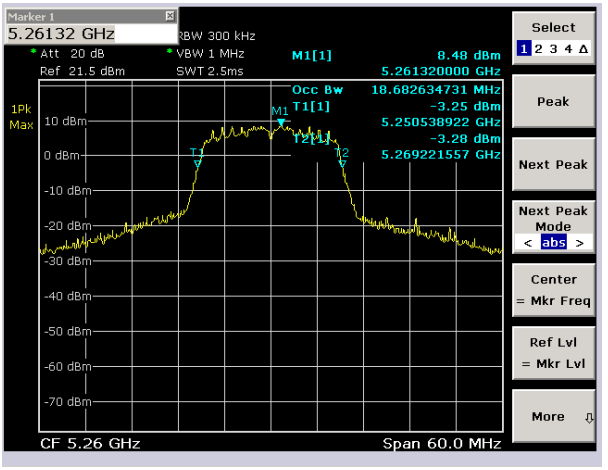

99% BW_U-NII-2A_802.11a_5260



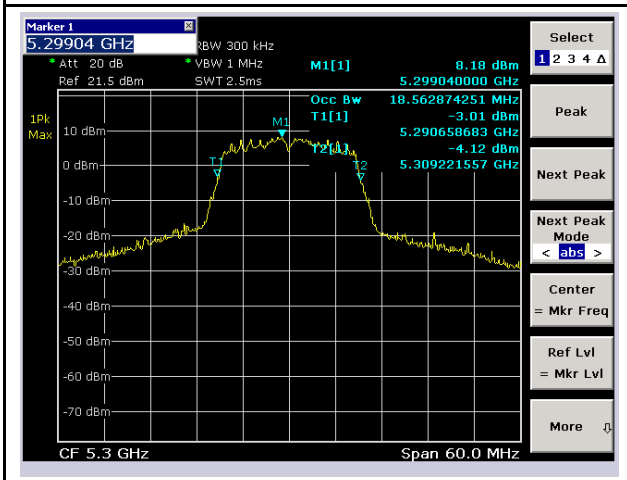

99% BW_U-NII-2A_802.11a_5300



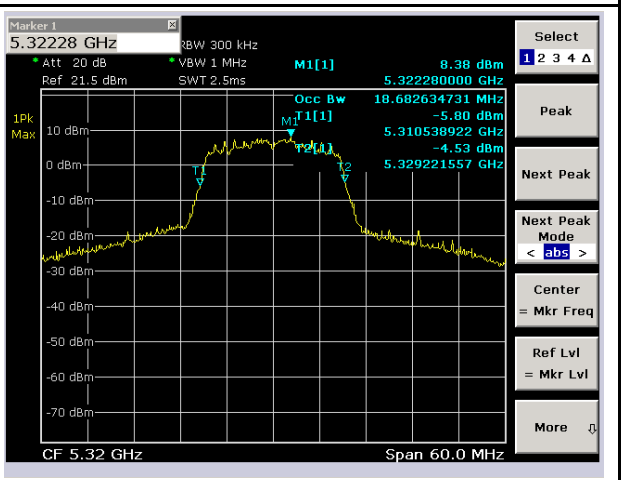

99% BW_U-NII-2A_802.11a_5320



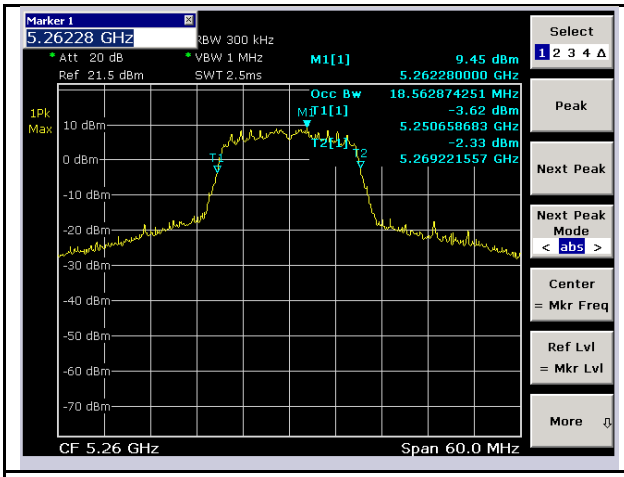

99% BW_U-NII-2A_802.11n_5260



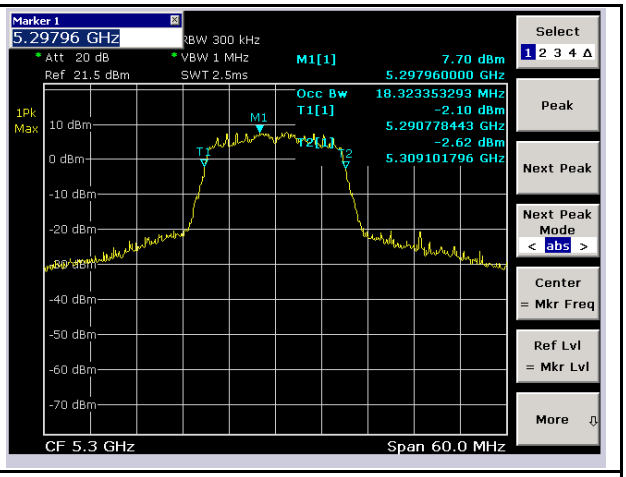

99% BW_U-NII-2A_802.11n_5300



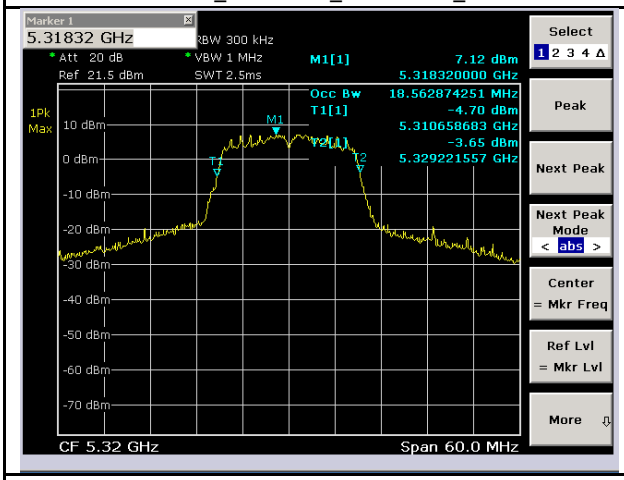

99% BW_U-NII-2A_802.11n_5320




99% BW_U-NII-2A_802.11ac_5260

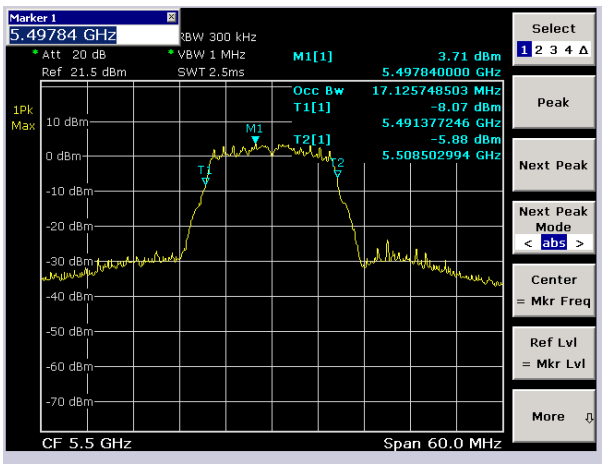



99% BW_U-NII-2A_802.11ac_5300

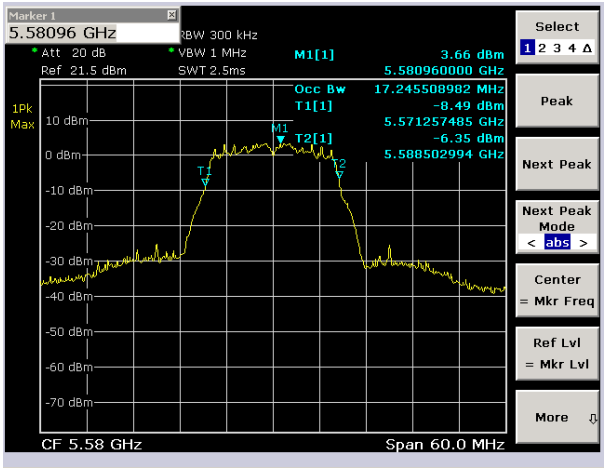



99% BW_U-NII-2A_802.11ac_5320

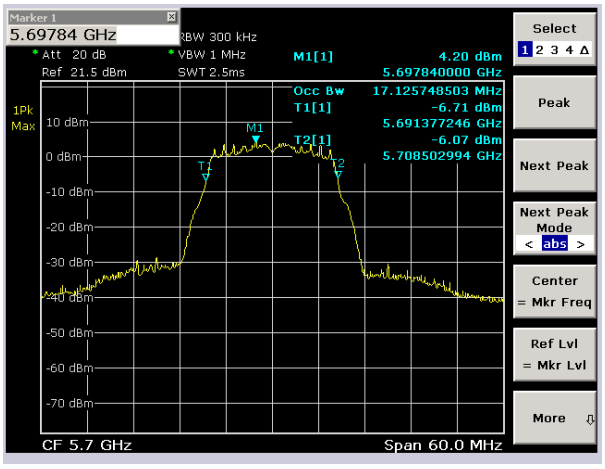
## 99% Bandwidth of U-NII-2C Band



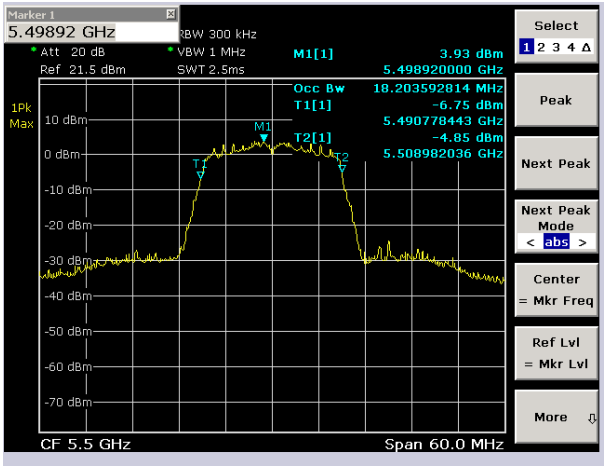

99% BW_U-NII-2C_802.11a_5500



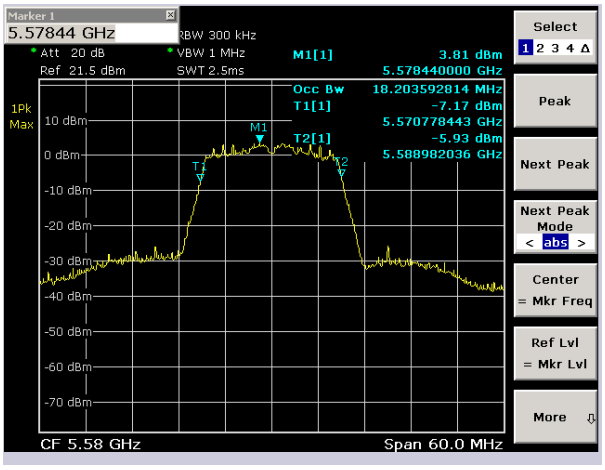

99% BW_U-NII-2C_802.11a_5580



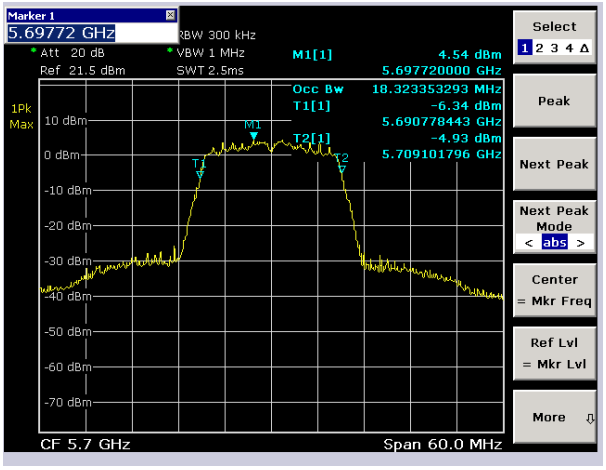

99% BW_U-NII-2C_802.11a_5700



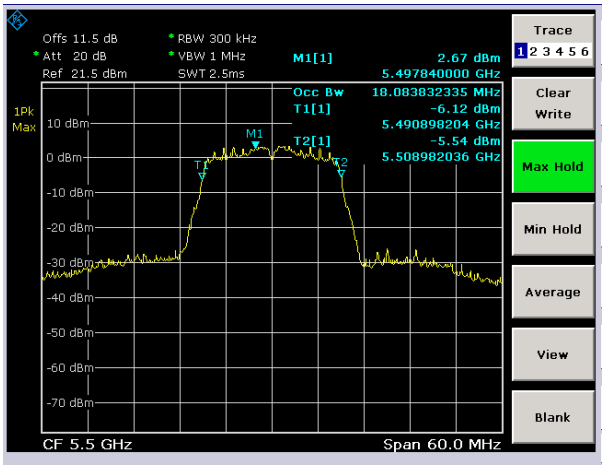

99% BW_U-NII-2C_802.11n_5500



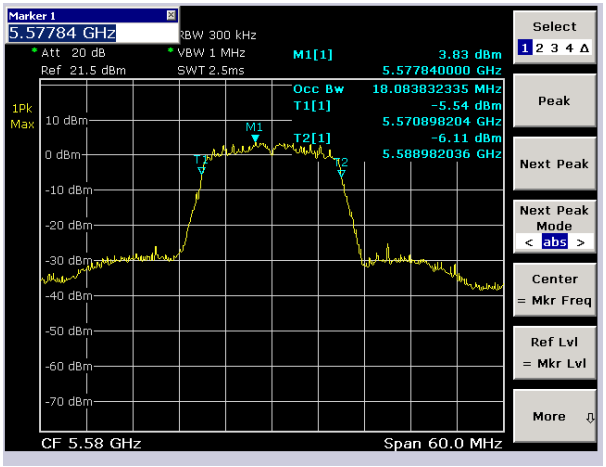

99% BW_U-NII-2C_802.11n_5580



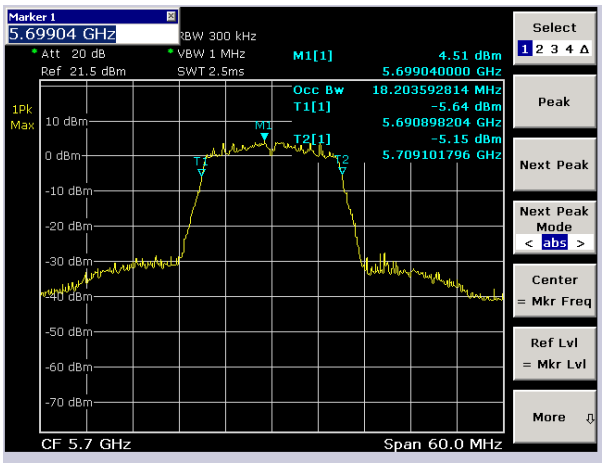

99% BW_U-NII-2C_802.11n_5700




99% BW_U-NII-2C_802.11ac_5500

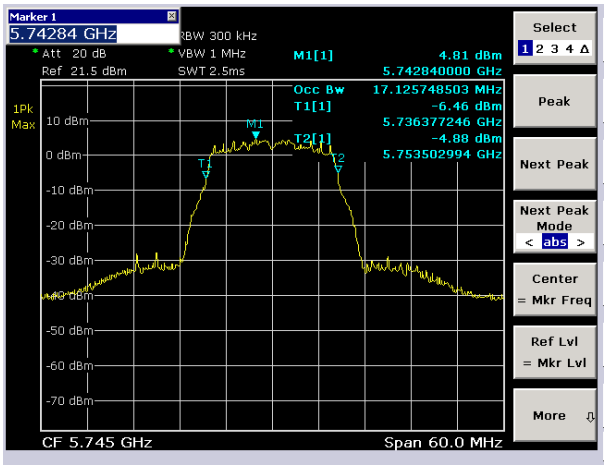



99% BW_U-NII-2C_802.11ac_5580

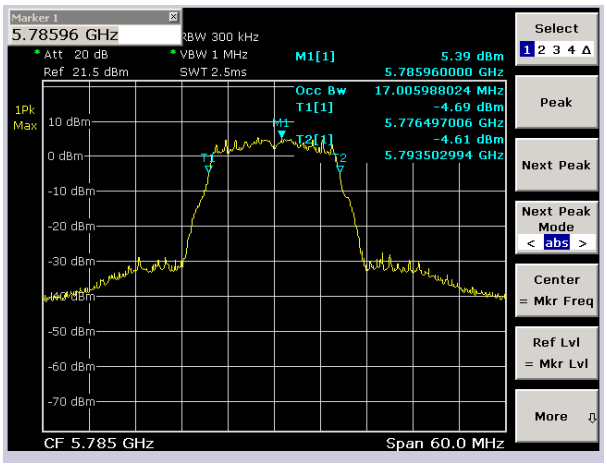



99% BW_U-NII-2C_802.11ac_5700

## 99% Bandwidth of U-NII-3 Band




99% BW_U-NII-3_802.11a_5745

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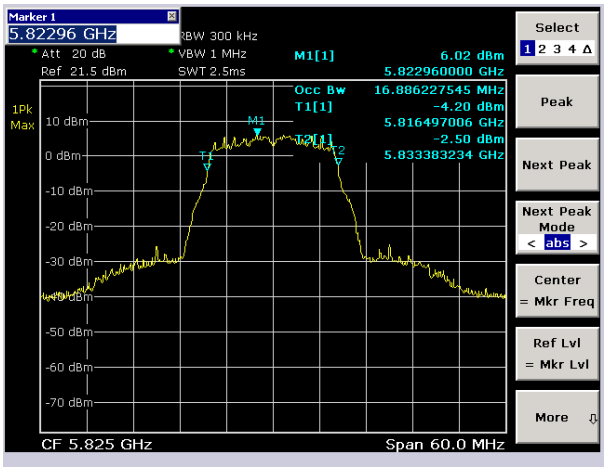
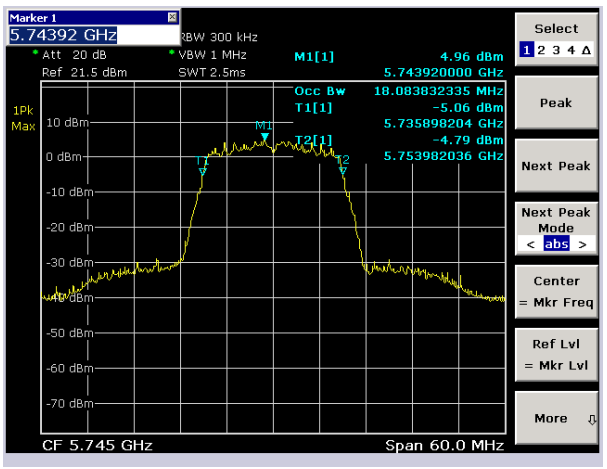
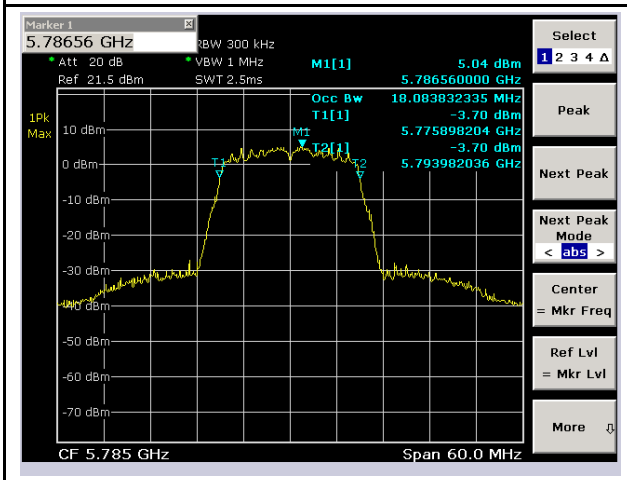


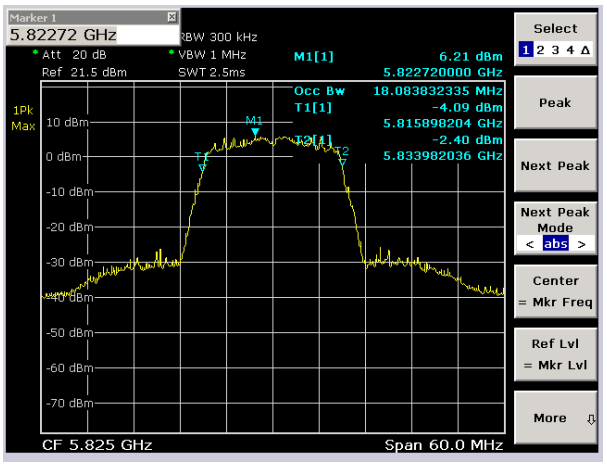

99% BW_U-NII-3_802.11a_5825



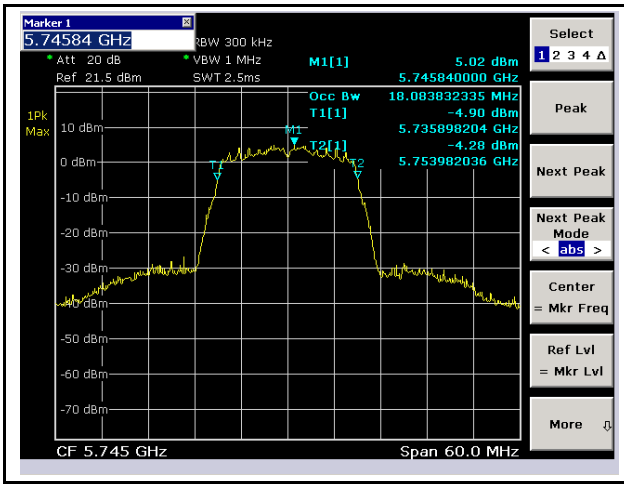

99% BW_U-NII-3_802.11n_5745



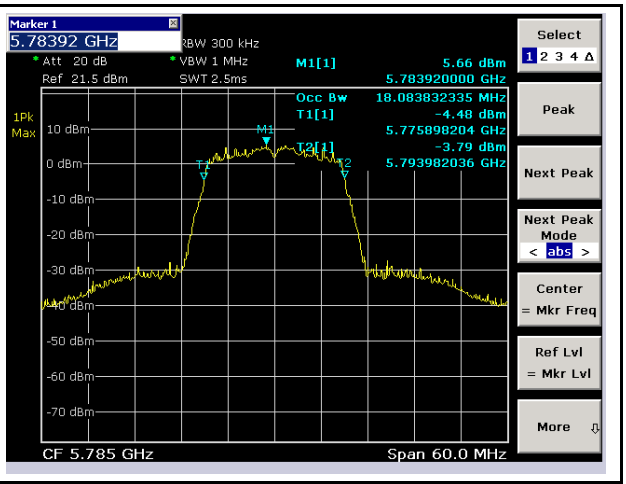

99% BW_U-NII-3_802.11n_5785



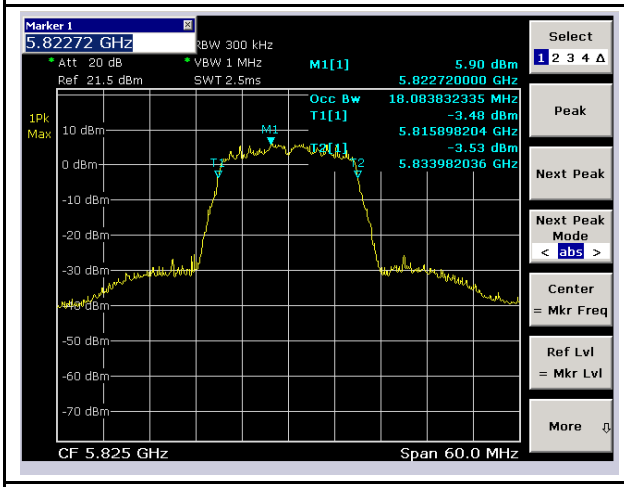

99% BW_U-NII-3_802.11n_5825



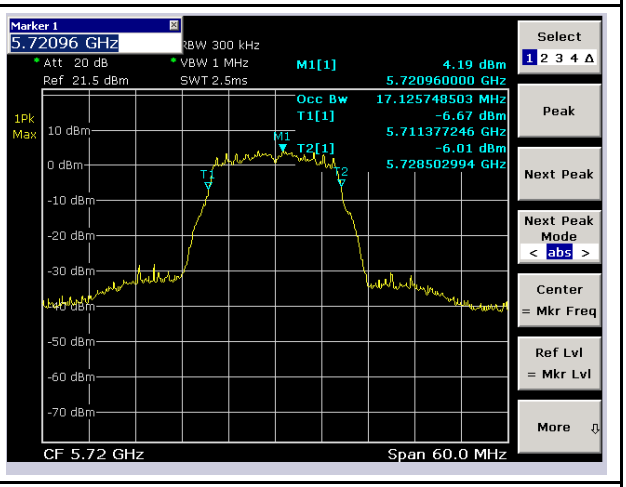

99% BW_U-NII-3_802.11ac_5745



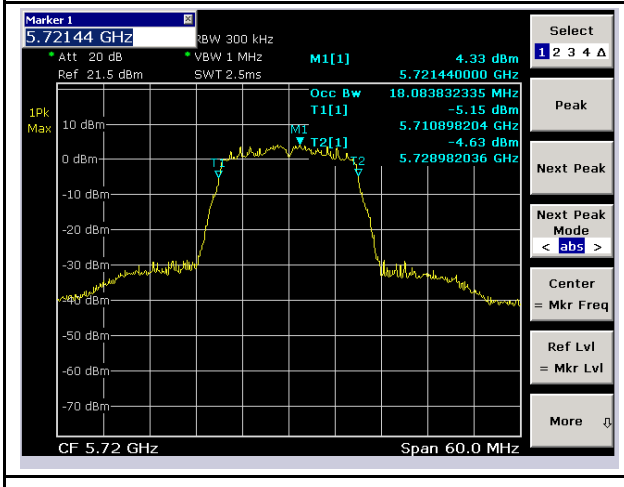

99% BW_U-NII-3_802.11ac_5785



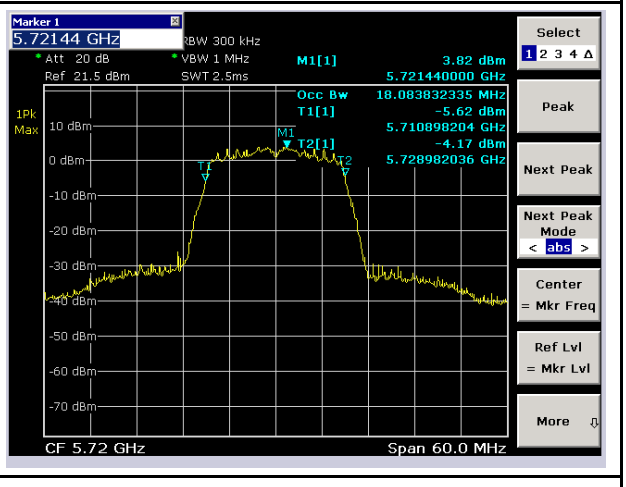

99% BW_U-NII-3_802.11ac_5825




99% BW_U-NII-3_802.11a_5720




99% BW_U-NII-3_802.11n_5720




99% BW_U-NII-3_802.11ac_5720

## 7.4 Maximum Conducted Output Power

### *7.4.1 Requirement*

**§ 15.407 (a)**

(iv) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

(3) (i) For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

**RSS-247**

6.2.1 Frequency band 5150-5250 MHz:

For other than devices installed in vehicles, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

6.2.2 Frequency band 5250-5350 MHz:

For other than devices installed in vehicles, shall comply with the following:

a) The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less.

b) The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in MHz.

6.2.3 Frequency bands 5470-5600 MHz and 5650-5725 MHz

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less.

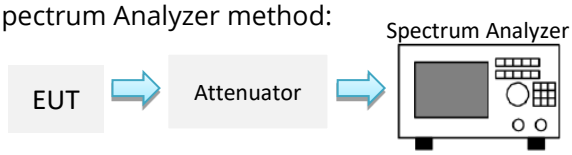
The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in mMHz.

6.2.4 Frequency band 5725-5850 MHz

The maximum conducted output power shall not exceed 1 W.

### 7.4.2 Test Setup

Spectrum Analyzer method:




### 7.4.3 Test Procedure

Spectrum Analyzer method:

According to subclause 12.3.2.2 of ANSI C63.10-2020:

subclause E.2.b of 789033 D02 General UNII Test Procedures New Rules v02r01

1) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal.
2) Set RBW = 1MHz
3) Set VBW ≥ 3 MHz.
4) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrow band signals are not lost between frequency bins.)
5) Sweep time = auto
6) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
7) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
8) Trace average at least 100 traces in power averaging (rms) mode.
9) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

### *7.4.4 Test Result*

**Output power measurement result**

U-NII-1 Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured Output Power (dBm) | Corrected Output Power with DCF (dBm) | Output Power Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | 6Mbps | 16.12 | 16.585 | 24 | PASS |
| | 44 | 5220 | 6Mbps | 15.26 | 15.725 | 24 | PASS |
| | 48 | 5240 | 6Mbps | 15.95 | 16.415 | 24 | PASS |
| 802.11n | 36 | 5180 | MCS0 | 15.27 | 15.270 | 24 | PASS |
| | 44 | 5220 | MCS0 | 15.15 | 15.150 | 24 | PASS |
| | 48 | 5240 | MCS0 | 14.80 | 14.800 | 24 | PASS |
| 802.11ac | 36 | 5180 | MCS0 | 15.54 | 15.852 | 24 | PASS |
| | 44 | 5220 | MCS0 | 16.39 | 16.702 | 24 | PASS |
| | 48 | 5240 | MCS0 | 15.84 | 16.152 | 24 | PASS |

U-NII-2A Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured Output Power (dBm) | Corrected Output Power with DCF (dBm) | Output Power Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 52 | 5260 | 6Mbps | 14.38 | 14.845 | 24 | PASS |
| | 60 | 5300 | 6Mbps | 12.86 | 13.325 | 24 | PASS |
| | 64 | 5320 | 6Mbps | 12.38 | 12.845 | 24 | PASS |
| 802.11n | 52 | 5260 | MCS0 | 13.31 | 13.310 | 24 | PASS |
| | 60 | 5300 | MCS0 | 12.61 | 12.610 | 24 | PASS |
| | 64 | 5320 | MCS0 | 12.06 | 12.060 | 24 | PASS |
| 802.11ac | 52 | 5260 | MCS0 | 14.73 | 15.042 | 24 | PASS |
| | 60 | 5300 | MCS0 | 13.54 | 13.852 | 24 | PASS |
| | 64 | 5320 | MCS0 | 12.23 | 12.542 | 24 | PASS |

U-NII-2C Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured Output Power (dBm) | Corrected Output Power with DCF (dBm) | Output Power Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 100 | 5500 | 6Mbps | 11.82 | 12.285 | 24 | PASS |
| | 116 | 5580 | 6Mbps | 12.77 | 13.235 | 24 | PASS |
| | 140 | 5700 | 6Mbps | 13.36 | 13.825 | 24 | PASS |
| 802.11n | 100 | 5500 | MCS0 | 11.74 | 11.740 | 24 | PASS |
| | 116 | 5580 | MCS0 | 12.72 | 12.720 | 24 | PASS |
| | 140 | 5700 | MCS0 | 13.37 | 13.370 | 24 | PASS |
| 802.11ac | 100 | 5500 | MCS0 | 11.61 | 11.922 | 24 | PASS |
| | 116 | 5580 | MCS0 | 12.85 | 13.162 | 24 | PASS |
| | 140 | 5700 | MCS0 | 13.42 | 13.732 | 24 | PASS |

U-NII-3 Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured Output Power (dBm) | Corrected Output Power with DCF (dBm) | Output Power Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 149 | 5745 | 6Mbps | 13.40 | 13.865 | 30 | PASS |
| | 157 | 5785 | 6Mbps | 13.37 | 13.835 | 30 | PASS |
| | 165 | 5825 | 6Mbps | 14.85 | 15.315 | 30 | PASS |
| 802.11n | 149 | 5745 | MCS0 | 14.08 | 14.080 | 30 | PASS |
| | 157 | 5785 | MCS0 | 14.24 | 14.240 | 30 | PASS |
| | 165 | 5825 | MCS0 | 14.34 | 14.340 | 30 | PASS |
| 802.11ac | 149 | 5745 | MCS0 | 13.72 | 14.032 | 30 | PASS |
| | 157 | 5785 | MCS0 | 13.96 | 14.272 | 30 | PASS |
| | 165 | 5825 | MCS0 | 14.78 | 15.092 | 30 | PASS |

Cross Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured Output Power (dBm) | Corrected Output Power with DCF (dBm) | Output Power Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 144 | 5720 | 6Mbps | 12.48 | 12.945 | 24 | PASS |
| 802.11n | 144 | 5720 | MCS0 | 12.26 | 12.260 | 24 | PASS |
| 802.11ac | 144 | 5720 | MCS0 | 12.53 | 12.842 | 24 | PASS |

**EIRP measurement result**

U-NII-1 Band

| Mode | Channel | Frequency (MHz) | Data rate | Corrected Output Power with DCF (dBm) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | 6Mbps | 16.585 | 2.5 | 19.085 | 22.515 | PASS |
| | 44 | 5220 | 6Mbps | 15.725 | 2.5 | 18.225 | 22.397 | PASS |
| | 48 | 5240 | 6Mbps | 16.415 | 2.5 | 18.915 | 22.427 | PASS |
| 802.11n | 36 | 5180 | MCS0 | 15.270 | 2.5 | 17.770 | 22.658 | PASS |
| | 44 | 5220 | MCS0 | 15.150 | 2.5 | 17.650 | 22.630 | PASS |
| | 48 | 5240 | MCS0 | 14.800 | 2.5 | 17.300 | 22.658 | PASS |
| 802.11ac | 36 | 5180 | MCS0 | 15.852 | 2.5 | 18.352 | 22.630 | PASS |
| | 44 | 5220 | MCS0 | 16.702 | 2.5 | 19.202 | 22.630 | PASS |
| | 48 | 5240 | MCS0 | 16.152 | 2.5 | 18.652 | 22.630 | PASS |

Note:
EIRP Limit: 200 mW (23dBm) or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth.

U-NII-2A Band

| Mode | Channel | Frequency (MHz) | Data rate | Corrected Output Power with DCF (dBm) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| 802.11a | 52 | 5260 | 6Mbps | 14.845 | 2.5 | 17.345 | 29.456 | PASS |
| | 60 | 5300 | 6Mbps | 13.325 | 2.5 | 15.825 | 29.456 | PASS |
| | 64 | 5320 | 6Mbps | 12.845 | 2.5 | 15.345 | 29.456 | PASS |
| 802.11n | 52 | 5260 | MCS0 | 13.310 | 2.5 | 15.810 | 29.714 | PASS |
| | 60 | 5300 | MCS0 | 12.610 | 2.5 | 15.110 | 29.686 | PASS |
| | 64 | 5320 | MCS0 | 12.060 | 2.5 | 14.560 | 29.714 | PASS |
| 802.11ac | 52 | 5260 | MCS0 | 15.042 | 2.5 | 17.542 | 29.686 | PASS |
| | 60 | 5300 | MCS0 | 13.852 | 2.5 | 16.352 | 29.630 | PASS |
| | 64 | 5320 | MCS0 | 12.542 | 2.5 | 15.042 | 29.686 | PASS |

Note:
EIRP Limit: 1W (30dBm) or 17 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth.

U-NII-2C Band

| Mode | Channel | Frequency (MHz) | Data rate | Corrected Output Power with DCF (dBm) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| 802.11a | 100 | 5500 | 6Mbps | 12.285 | 2.5 | 14.785 | 29.337 | PASS |
| | 116 | 5580 | 6Mbps | 13.235 | 2.5 | 15.735 | 29.367 | PASS |
| | 140 | 5700 | 6Mbps | 13.825 | 2.5 | 16.325 | 29.337 | PASS |
| 802.11n | 100 | 5500 | MCS0 | 11.740 | 2.5 | 14.240 | 29.621 | PASS |
| | 116 | 5580 | MCS0 | 12.720 | 2.5 | 15.220 | 29.621 | PASS |
| | 140 | 5700 | MCS0 | 13.370 | 2.5 | 15.870 | 29.630 | PASS |
| 802.11ac | 100 | 5500 | MCS0 | 11.922 | 2.5 | 14.422 | 29.573 | PASS |
| | 116 | 5580 | MCS0 | 13.162 | 2.5 | 15.662 | 29.573 | PASS |
| | 140 | 5700 | MCS0 | 13.732 | 2.5 | 16.232 | 29.602 | PASS |

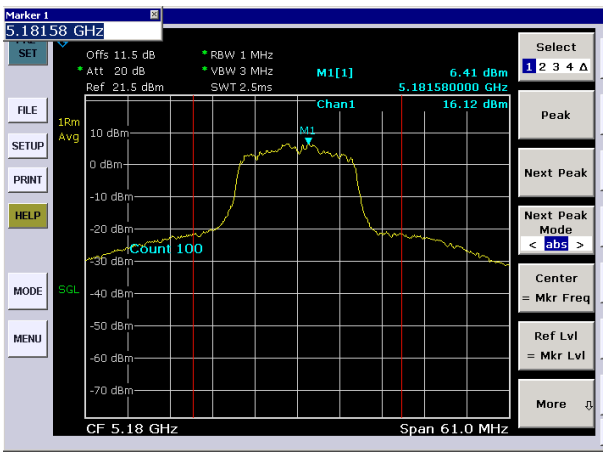
Note:
EIRP Limit: 1W (30dBm) or 17 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth.

Cross Band

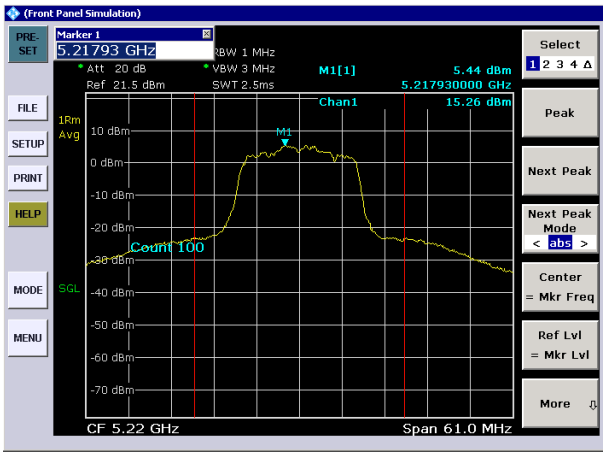
| Mode | Channel | Frequency (MHz) | Data rate | Corrected Output Power with DCF (dBm) | Antenna Gain (dBi) | EIRP (dBm) | EIRP Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| 802.11a | 144 | 5720 | 6Mbps | 12.945 | 2.5 | 15.445 | 29.337 | PASS |
| 802.11n | 144 | 5720 | MCS0 | 12.260 | 2.5 | 14.760 | 29.573 | PASS |
| 802.11ac | 144 | 5720 | MCS0 | 12.842 | 2.5 | 15.342 | 29.573 | PASS |

Note:
EIRP Limit: 1W (30dBm) or 17 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth.

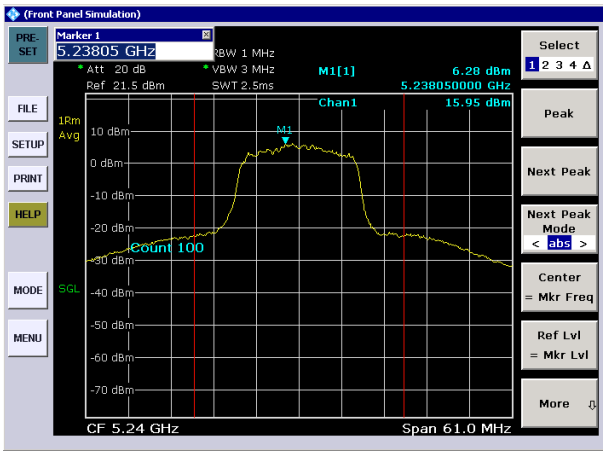
### *7.4.5 Test Plots*



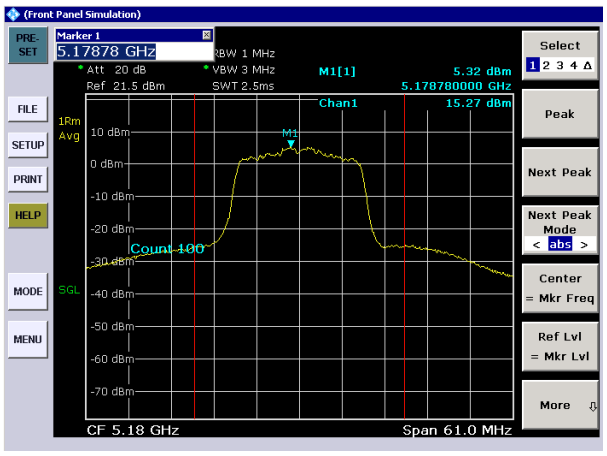

Output Power_U-NII-1_802.11a_5180



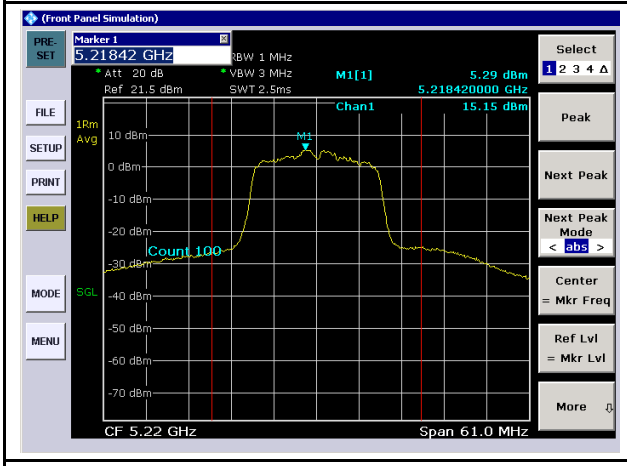

Output Power _U-NII-1_802.11a_5220



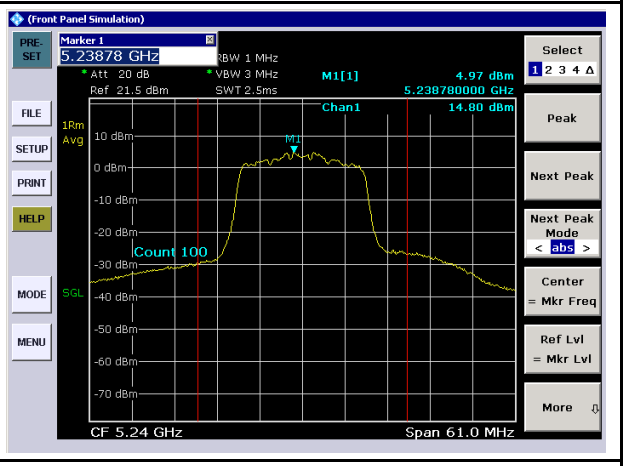

Output Power _U-NII-1_802.11a_5240



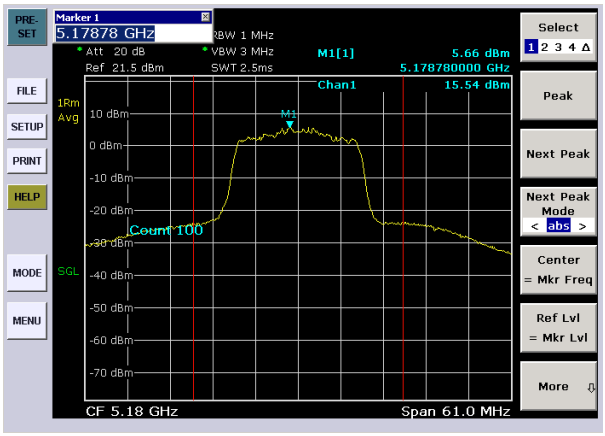

Output Power _U-NII-1_802.11n_5180



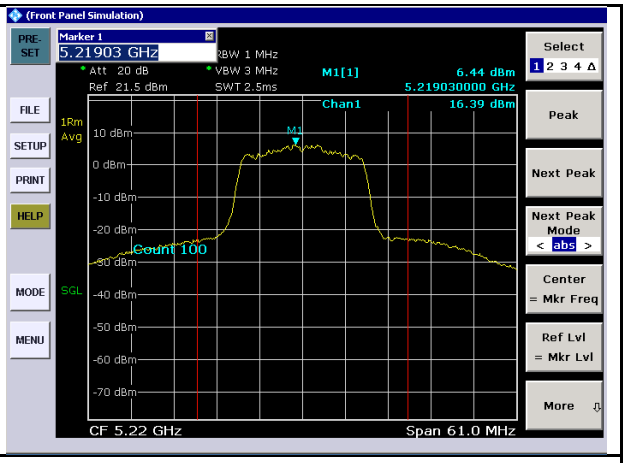

Output Power _U-NII-1_802.11n_5220



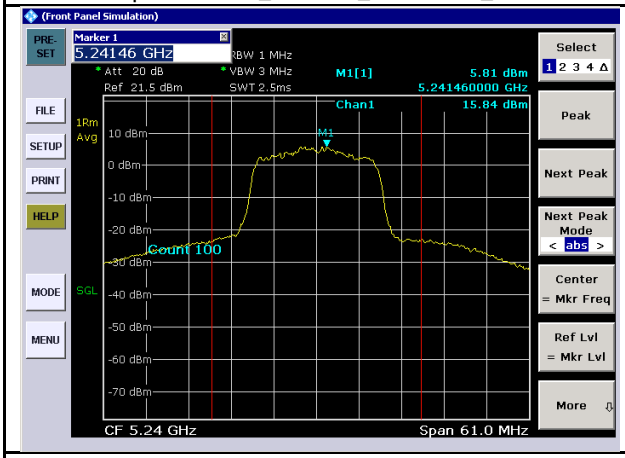

Output Power _U-NII-1_802.11n_5240



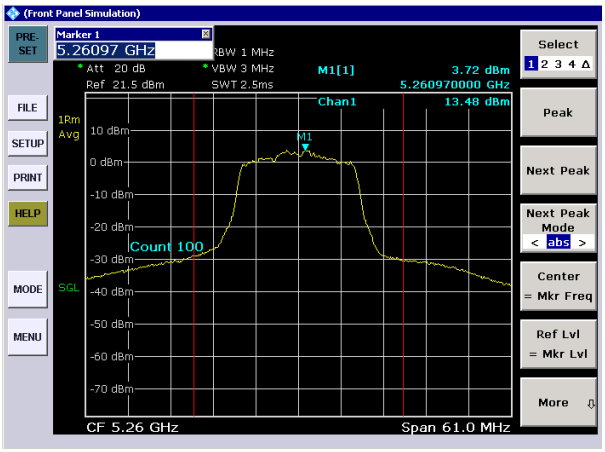

Output Power_U-NII-1_802.11ac_5180



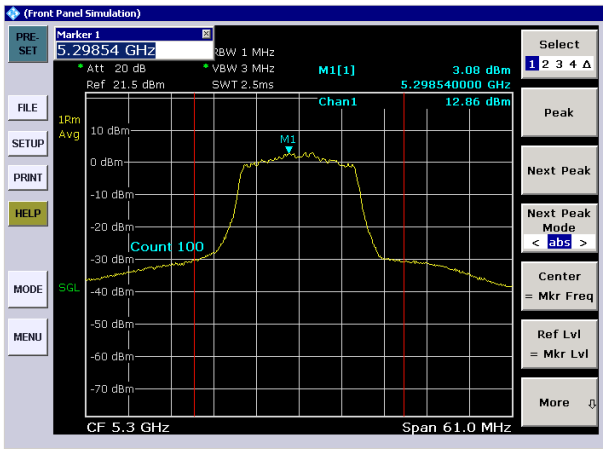

Output Power _U-NII-1_802.11ac_5220



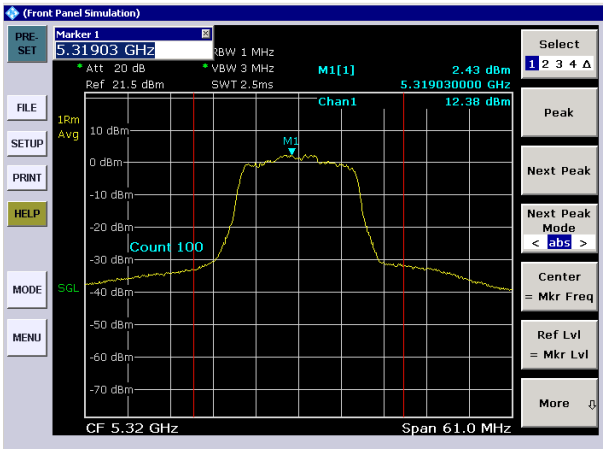

Output Power _U-NII-1_802.11ac_5240



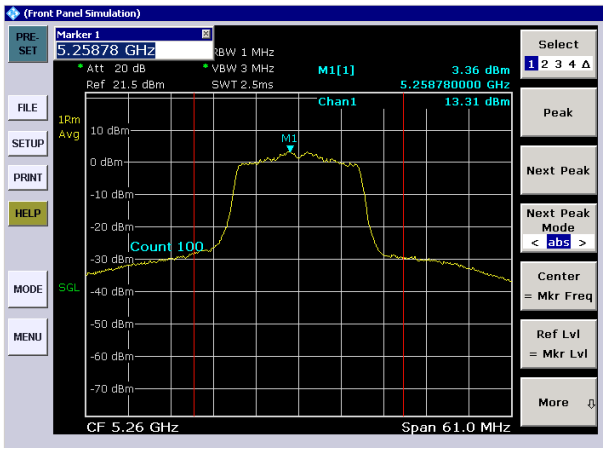

Output Power _U-NII-2A_802.11a_5260



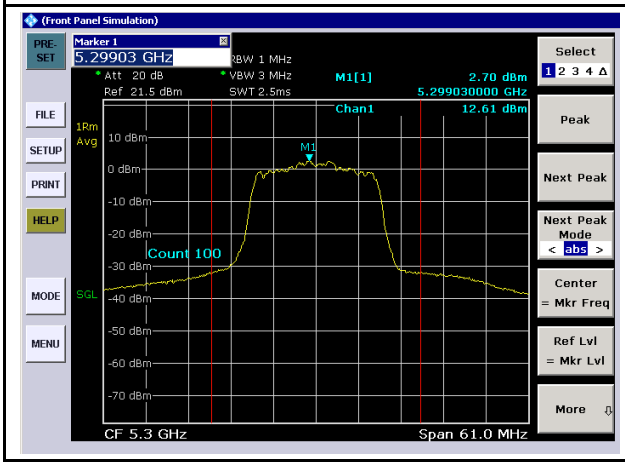

Output Power _U-NII-2A_802.11a_5300



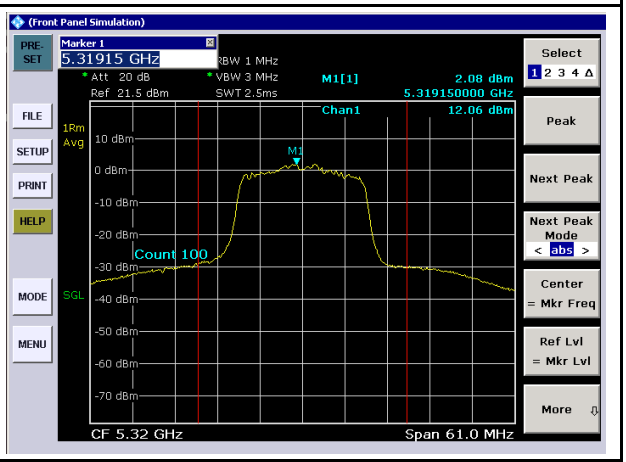

Output Power _U-NII-2A_802.11a_5320



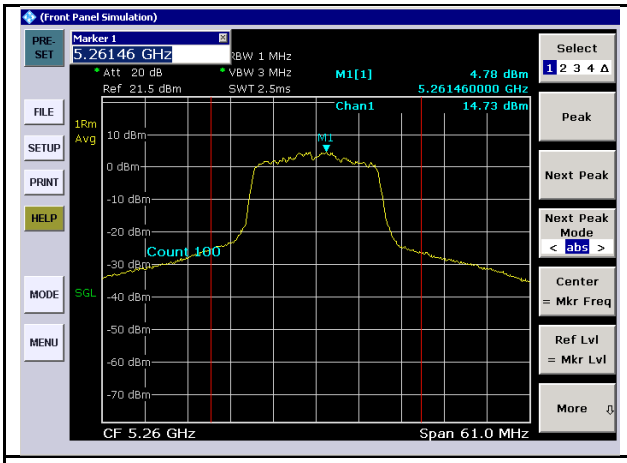

Output Power _U-NII-2A_802.11n_5260



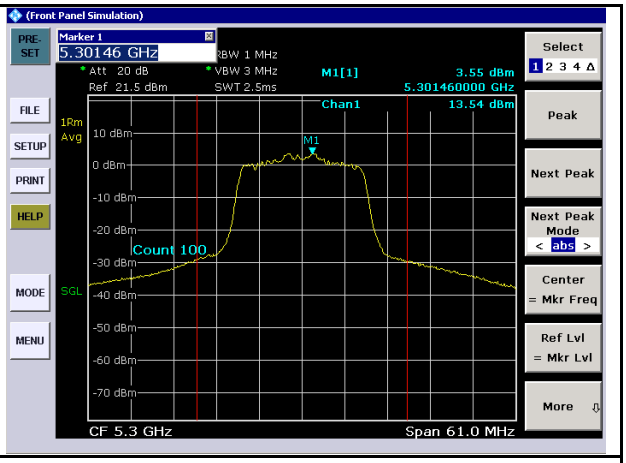

Output Power _U-NII-2A_802.11n_5300



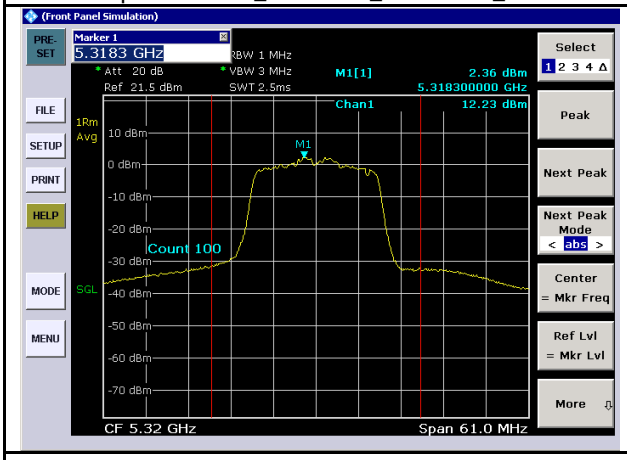

Output Power _U-NII-2A_802.11n_5320



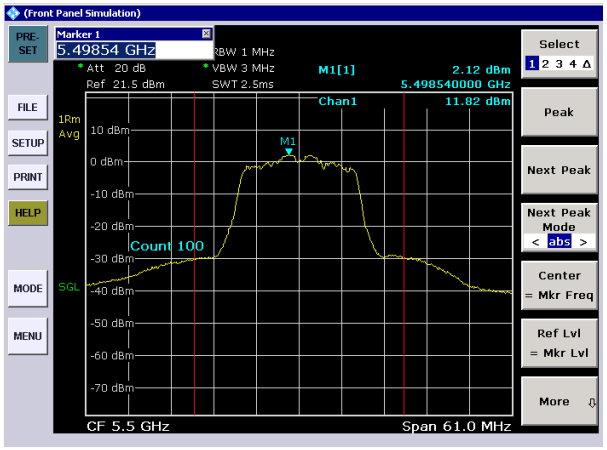

Output Power _U-NII-2A_802.11ac_5260



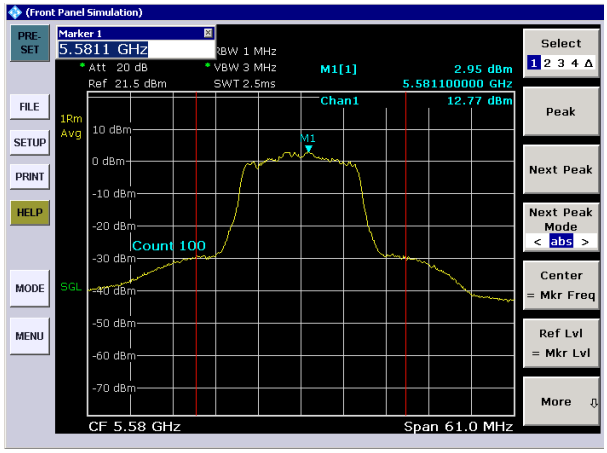

Output Power _U-NII-2A_802.11ac_5300



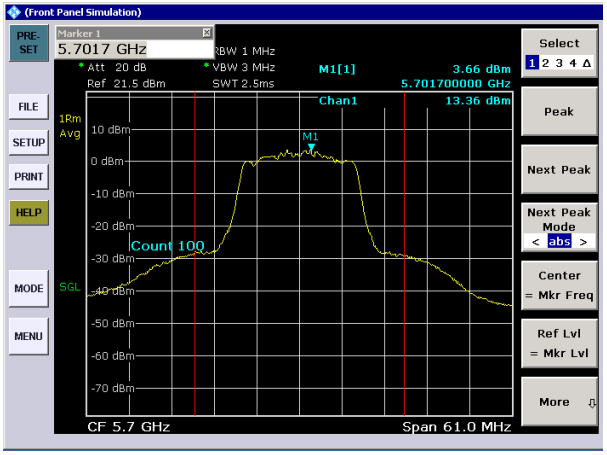

Output Power _U-NII-2A_802.11ac_5320



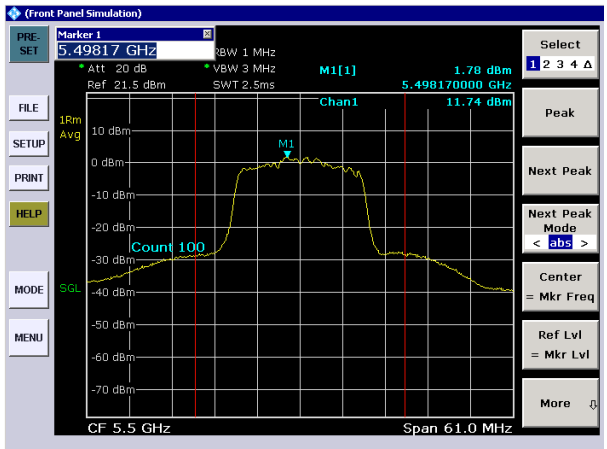

Output Power _U-NII-2C_802.11a_5500



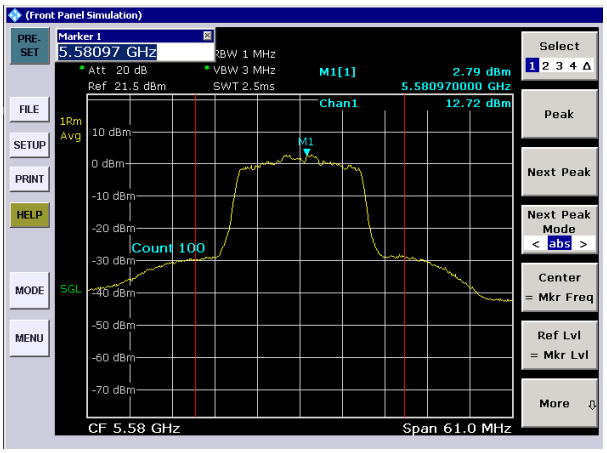

Output Power _U-NII-2C_802.11a_5580



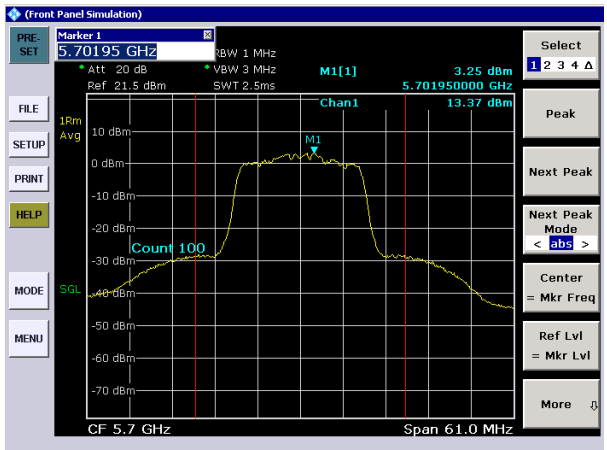

Output Power _U-NII-2C_802.11a_5700



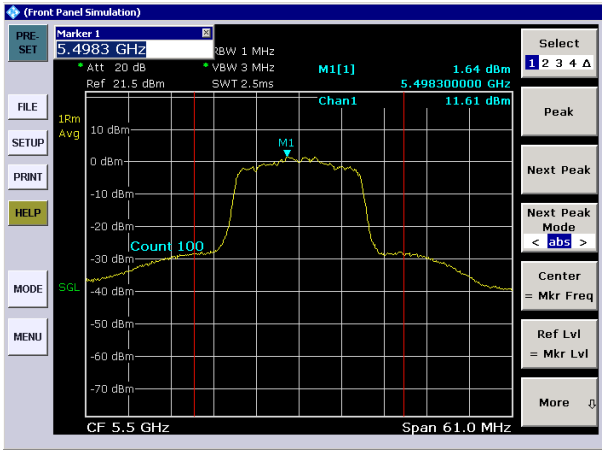

Output Power _U-NII-2C_802.11n_5500



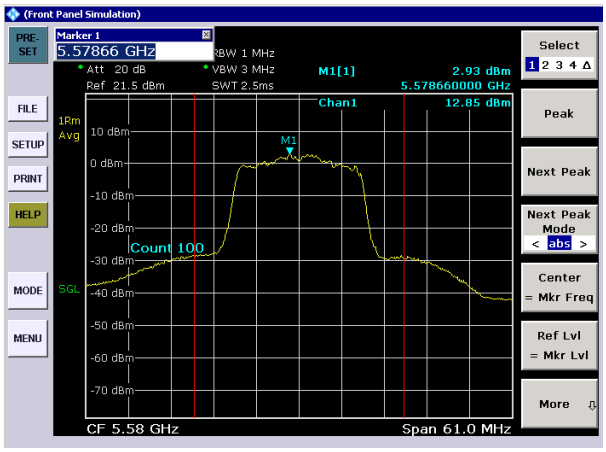

Output Power _U-NII-2C_802.11n_5580



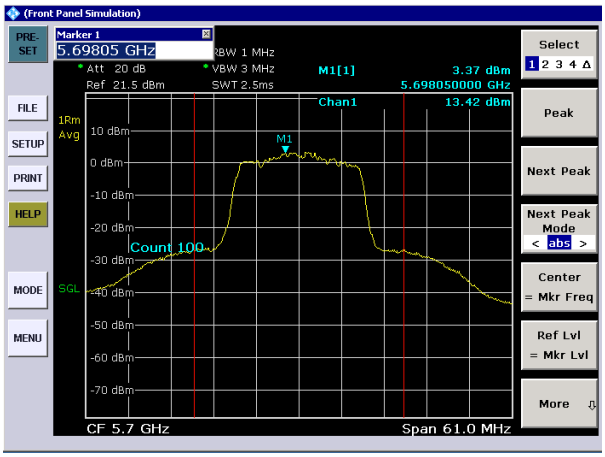

Output Power _U-NII-2C_802.11n_5700



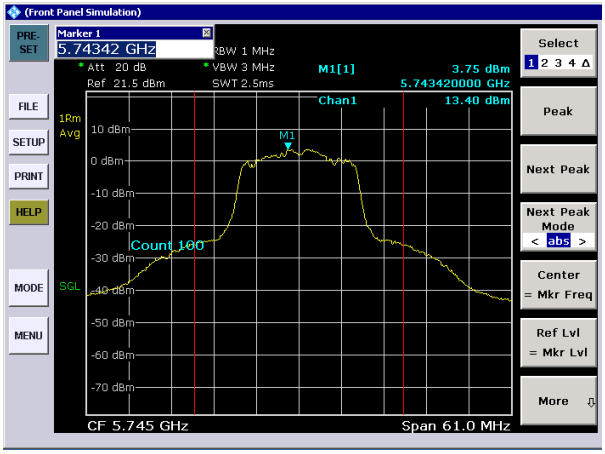

Output Power _U-NII-2C_802.11ac_5500



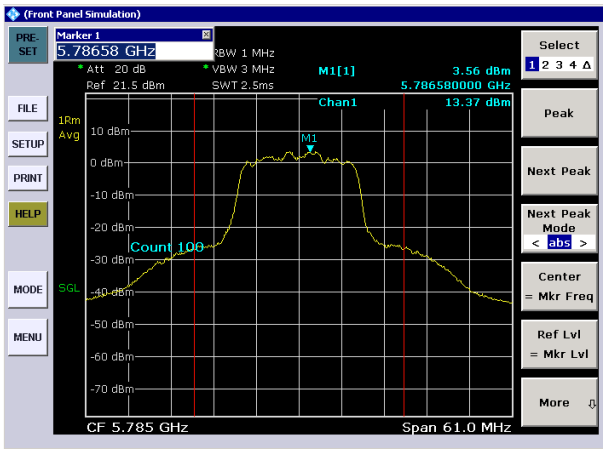

Output Power _U-NII-2C_802.11ac_5580



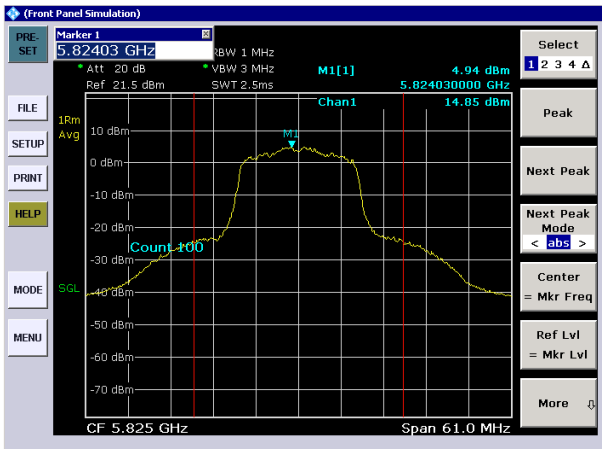

Output Power _U-NII-2C_802.11ac_5700



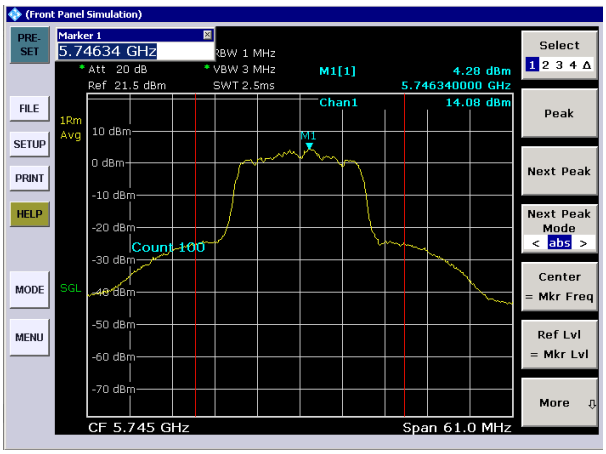

Output Power _U-NII-3_802.11a_5745



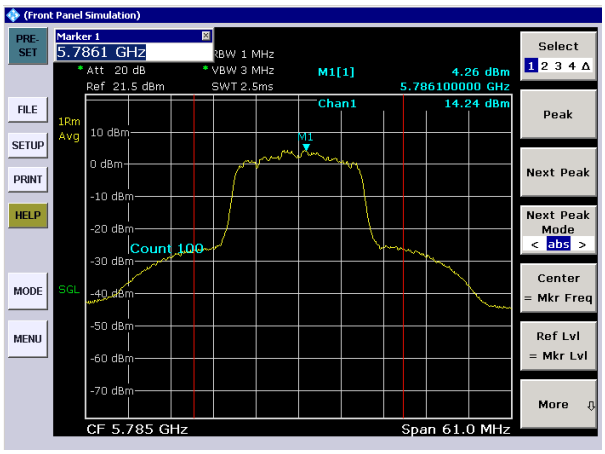

Output Power _U-NII-3_802.11a_5785



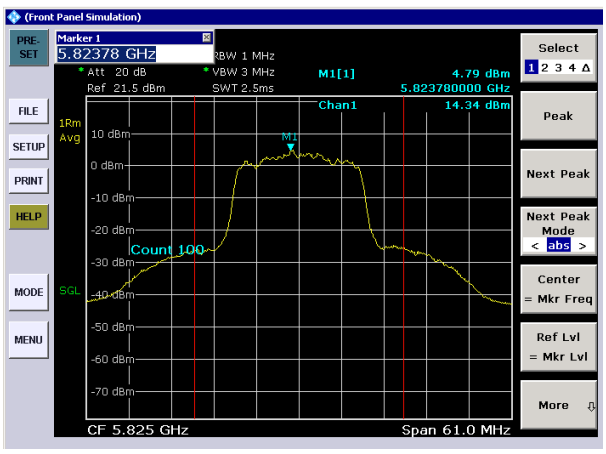

Output Power _U-NII-3_802.11a_5825



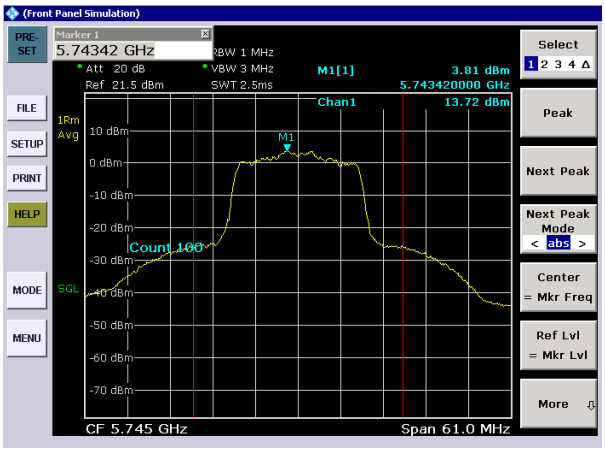

Output Power _U-NII-3_802.11n_5745



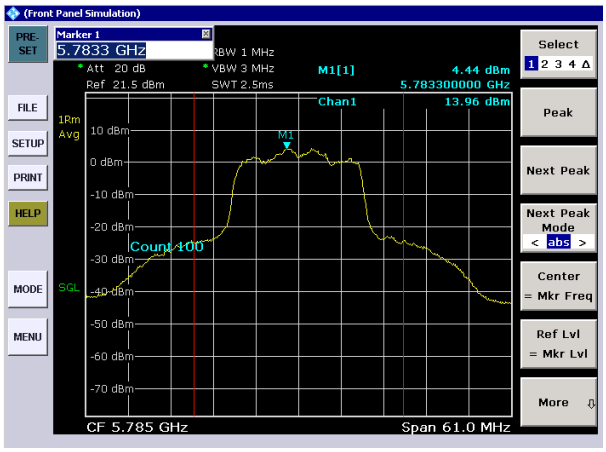

Output Power _U-NII-3_802.11n_5785



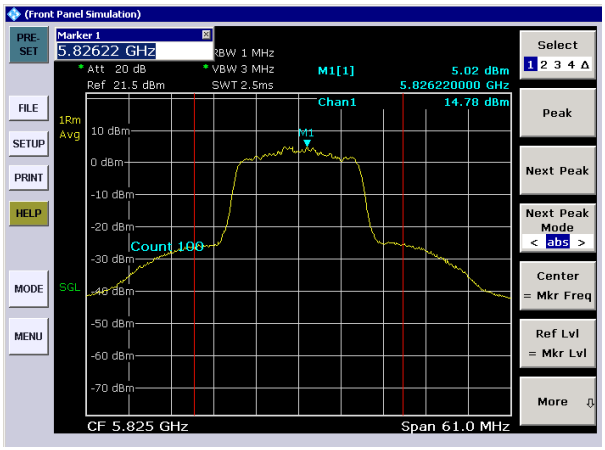

Output Power _U-NII-3_802.11n_5825



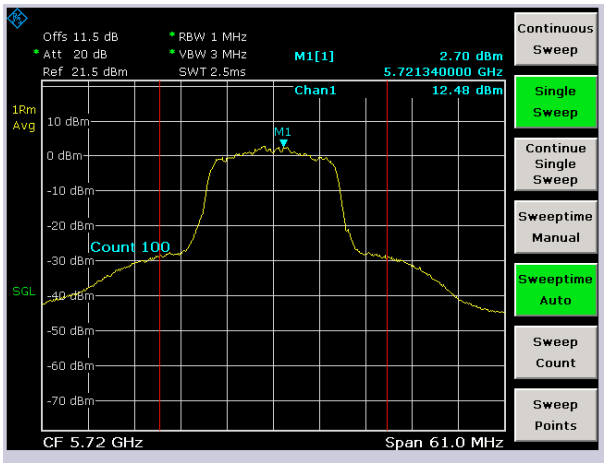

Output Power _U-NII-3_802.11ac_5745



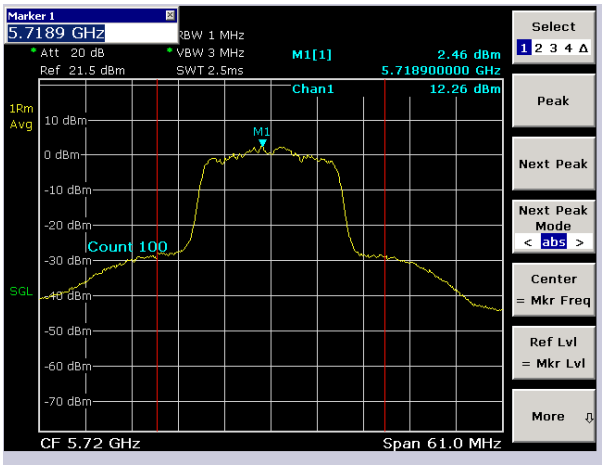

Output Power _U-NII-3_802.11ac_5785



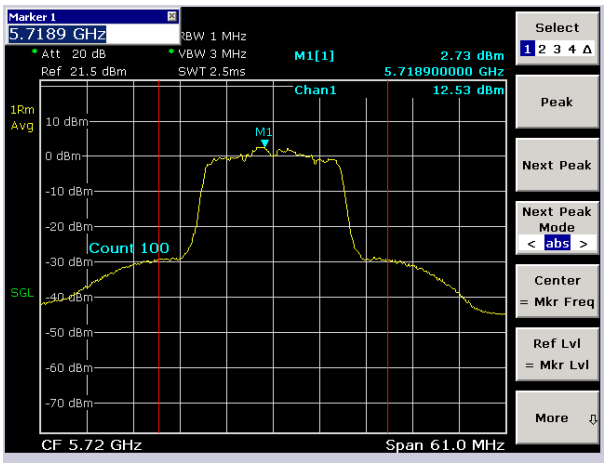

Output Power _U-NII-3_802.11ac_5825




Output Power _U-NII-2C_802.11a_5720




Output Power _U-NII-2C_802.11n_5720




Output Power _U-NII-2C_802.11ac_5720

## 7.5 Power Spectral Density

### *7.5.1 Requirement*

**§ 15.407 (a)**

(iv) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1MHz band.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands. The maximum power spectral density shall not exceed 11 dBm in any 1MHz band.

(3) (i) For the band 5.725-5.850 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**RSS-247**

6.2.1 Frequency band 5150-5250 MHz:

The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

6.2.2 Frequency band 5250-5350 MHz:

The power spectral density shall not exceed 11 dBm in any 1.0 MHz band

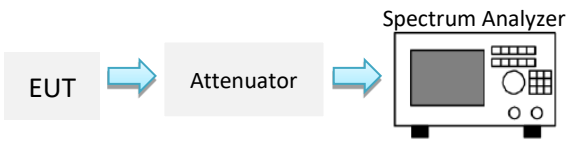
6.2.3 Frequency bands 5470-5600 MHz and 5650-5725 MHz

The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

6.2.4 Frequency band 5725-5850 MHz

The output power spectral density shall not exceed 30 dBm in any 500 kHz band.

### *7.5.2 Test Setup*



### *7.5.3 Test Procedure*

According to subclause 12.5 of ANSI C63.10-2020:
subclause F of 789033 D02 General UNII Test Procedures New Rules v02r01

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in 12.3.2 for measuring maximum conducted output power using a spectrum analyzer or EMI receiver; that is, select the appropriate test method (SA-1, SA-2, SA-3, or their respective alternatives) and apply it up to, but not including, the step labeled, “Compute power….” (This procedure is required even if the maximum conducted output power measurement was performed using the power meter method PM.)
2) Use the peak search function on the instrument to find the peak of the spectrum.
3) Make the following adjustments to the peak value of the spectrum, if applicable:
    a. If method SA-2 or SA-2A was used, then add [10 log (1 / *D*)], where *D* is the duty cycle, to the peak of the spectrum.
    b. If method SA-3A was used and the linear mode was used in step h) of 12.3.2.7, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4) The result is the PPSD.
5) The procedure in item a) through item c) requires the use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified by some regulatory authorities.95 This requirement also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, the following adjustments to the procedures apply:
    a. Set RBW ≥ 1 / *T*, where *T* is defined in 12.2 a).
    b. Set VBW ≥ [3 × RBW].
    c. If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (<500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
    d. If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
    e. Care shall be taken such that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

### *7.5.4 Test Result*

U-NII-1 Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured PSD (dBm/MHz) | Corrected PSD with DCF (dBm/MHz) | PSD Limit (dBm/MHz) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | 6Mbps | 6.41 | 6.875 | 11 | PASS |
| | 44 | 5220 | 6Mbps | 5.44 | 5.905 | 11 | PASS |
| | 48 | 5240 | 6Mbps | 6.28 | 6.745 | 11 | PASS |
| 802.11n | 36 | 5180 | MCS0 | 5.32 | 5.320 | 11 | PASS |
| | 44 | 5220 | MCS0 | 5.29 | 5.290 | 11 | PASS |
| | 48 | 5240 | MCS0 | 4.97 | 4.970 | 11 | PASS |
| 802.11ac | 36 | 5180 | MCS0 | 5.66 | 5.972 | 11 | PASS |
| | 44 | 5220 | MCS0 | 6.44 | 6.752 | 11 | PASS |
| | 48 | 5240 | MCS0 | 5.81 | 6.122 | 11 | PASS |

U-NII-1 Band (EIRP PSD)

| Mode | Channel | Frequency (MHz) | Data rate | Corrected PSD with DCF (dBm/MHz) | Antenna Gain (dBi) | EIRP PSD (dBi) | ERIP PSD Limit (dBm/MHz) | Result |
|---|---|---|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | 6Mbps | 6.41 | 2.5 | 8.910 | 10 | PASS |
| | 44 | 5220 | 6Mbps | 5.44 | 2.5 | 7.940 | 10 | PASS |
| | 48 | 5240 | 6Mbps | 6.28 | 2.5 | 8.780 | 10 | PASS |
| 802.11n | 36 | 5180 | MCS0 | 5.32 | 2.5 | 7.820 | 10 | PASS |
| | 44 | 5220 | MCS0 | 5.29 | 2.5 | 7.790 | 10 | PASS |
| | 48 | 5240 | MCS0 | 4.97 | 2.5 | 7.470 | 10 | PASS |
| 802.11ac | 36 | 5180 | MCS0 | 5.66 | 2.5 | 8.160 | 10 | PASS |
| | 44 | 5220 | MCS0 | 6.44 | 2.5 | 8.940 | 10 | PASS |
| | 48 | 5240 | MCS0 | 5.81 | 2.5 | 8.310 | 10 | PASS |

U-NII-2A Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured PSD (dBm/MHz) | Corrected PSD with DCF (dBm/MHz) | PSD Limit (dBm/MHz) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 52 | 5260 | 6Mbps | 3.72 | 4.185 | 11 | PASS |
| | 60 | 5300 | 6Mbps | 3.08 | 3.545 | 11 | PASS |
| | 64 | 5320 | 6Mbps | 2.43 | 2.895 | 11 | PASS |
| 802.11n | 52 | 5260 | MCS0 | 3.36 | 3.360 | 11 | PASS |
| | 60 | 5300 | MCS0 | 2.70 | 2.700 | 11 | PASS |
| | 64 | 5320 | MCS0 | 2.08 | 2.080 | 11 | PASS |
| 802.11ac | 52 | 5260 | MCS0 | 4.78 | 5.092 | 11 | PASS |
| | 60 | 5300 | MCS0 | 3.55 | 3.862 | 11 | PASS |
| | 64 | 5320 | MCS0 | 2.36 | 2.672 | 11 | PASS |

U-NII-2C Band

| Mode | Channel | Frequency (MHz) | Data rate | Measured PSD (dBm/MHz) | Corrected PSD with DCF (dBm/MHz) | PSD Limit (dBm/MHz) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 100 | 5500 | 6Mbps | 2.12 | 2.585 | 11 | PASS |
| | 116 | 5580 | 6Mbps | 2.95 | 3.415 | 11 | PASS |
| | 140 | 5700 | 6Mbps | 3.66 | 4.125 | 11 | PASS |
| 802.11n | 100 | 5500 | MCS0 | 1.78 | 1.780 | 11 | PASS |
| | 116 | 5580 | MCS0 | 2.79 | 2.790 | 11 | PASS |
| | 140 | 5700 | MCS0 | 3.25 | 3.250 | 11 | PASS |
| 802.11ac | 100 | 5500 | MCS0 | 1.64 | 1.952 | 11 | PASS |
| | 116 | 5580 | MCS0 | 2.93 | 3.242 | 11 | PASS |
| | 140 | 5700 | MCS0 | 3.37 | 3.682 | 11 | PASS |

Cross Band (in band 5470-5725MHz)

| Mode | Channel | Frequency (MHz) | Data rate | Measured PSD (dBm/MHz) | Corrected PSD with DCF (dBm/MHz) | PSD Limit (dBm/MHz) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 144 | 5720 | 6Mbps | 2.70 | 3.165 | 11 | PASS |
| 802.11n | 144 | 5720 | MCS0 | 2.46 | 2.460 | 11 | PASS |
| 802.11ac | 144 | 5720 | MCS0 | 2.73 | 3.042 | 11 | PASS |

Cross Band (in band 5725-5850MHz)

| Mode | Channel | Frequency (MHz) | Data rate | Measured PSD (dBm/100kHz) | Corrected PSD (dBm/500kHz) * | PSD Limit (dBm/500kHz) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 144 | 5720 | 6Mbps | 6.59 | 13.58 | 30 | PASS |
| 802.11n | 144 | 5720 | MCS0 | 6.46 | 13.45 | 30 | PASS |
| 802.11ac | 144 | 5720 | MCS0 | 6.47 | 13.46 | 30 | PASS |

U-NII-3 Band in 500kHz band

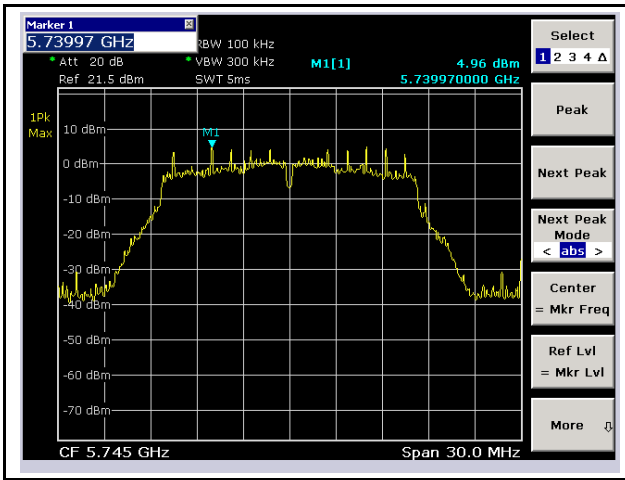
| Mode | Channel | Frequency (MHz) | Data rate | Measured PSD (dBm/100kHz) | Corrected PSD (dBm/500kHz) * | PSD Limit (dBm/500kHz) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 149 | 5745 | 6Mbps | 4.96 | 11.95 | 30 | PASS |
| | 157 | 5785 | 6Mbps | 4.85 | 11.84 | 30 | PASS |
| | 165 | 5825 | 6Mbps | 4.89 | 11.88 | 30 | PASS |
| 802.11n | 149 | 5745 | MCS0 | 5.05 | 12.04 | 30 | PASS |
| | 157 | 5785 | MCS0 | 5.83 | 12.82 | 30 | PASS |
| | 165 | 5825 | MCS0 | 4.94 | 11.93 | 30 | PASS |
| 802.11ac | 149 | 5745 | MCS0 | 5.12 | 12.11 | 30 | PASS |
| | 157 | 5785 | MCS0 | 4.94 | 11.93 | 30 | PASS |
| | 165 | 5825 | MCS0 | 4.98 | 11.97 | 30 | PASS |

Note: Corrected PSD (dBm/500kHz) * = Measured PSD (dBm/100kHz) + Correction Factor[10*log(500/RBW)]
= Measured PSD (dBm/100kHz) + 10*Log (500/100)
= Measured PSD (dBm/100kHz) + 6.99

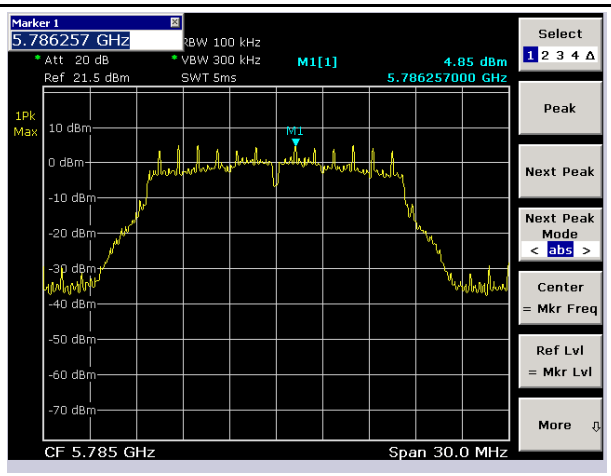
### *7.5.5 Test Plots*

For non- U-NII-3 band, please Refer to test plots in 7.4.5

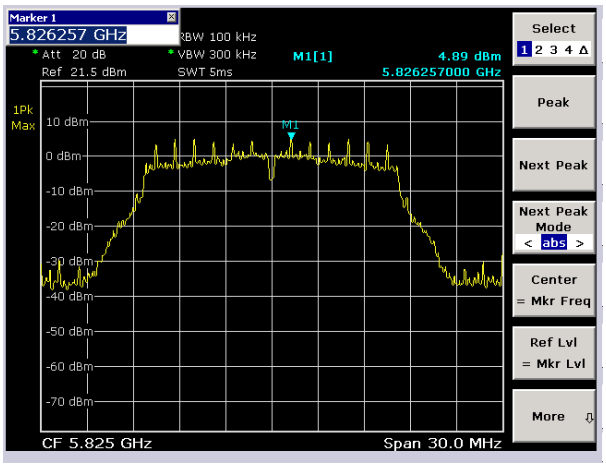
S



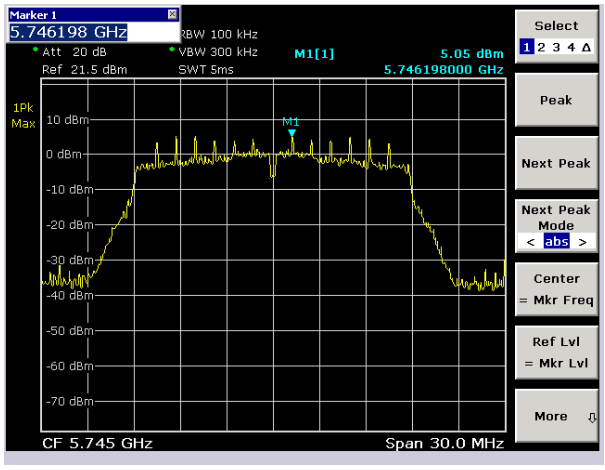

PSD _U-NII-3_802.11a_5745



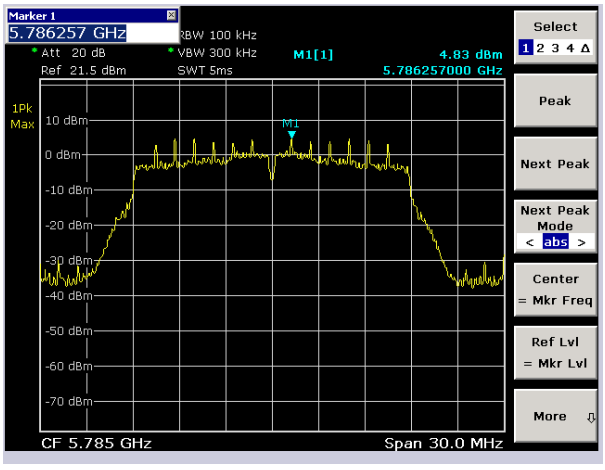

PSD _U-NII-3_802.11a_5785



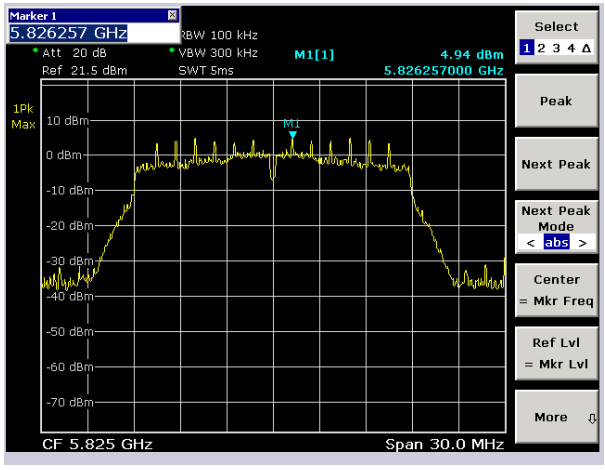

PSD _U-NII-3_802.11a_5825



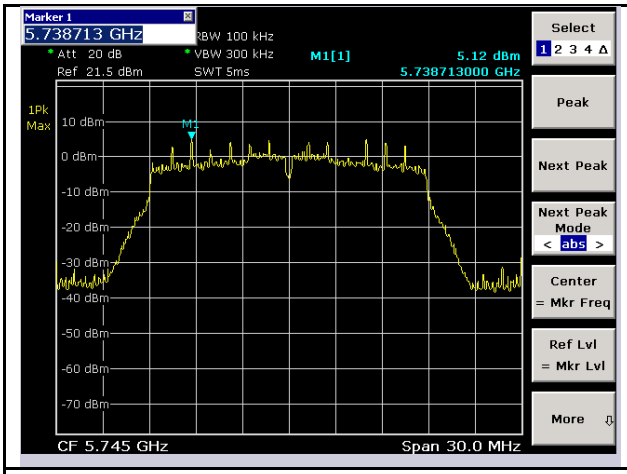

PSD _U-NII-3_802.11n_5745



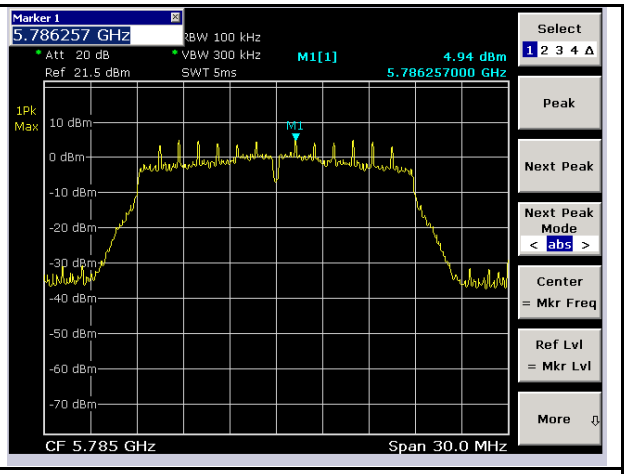

PSD _U-NII-3_802.11n_5785



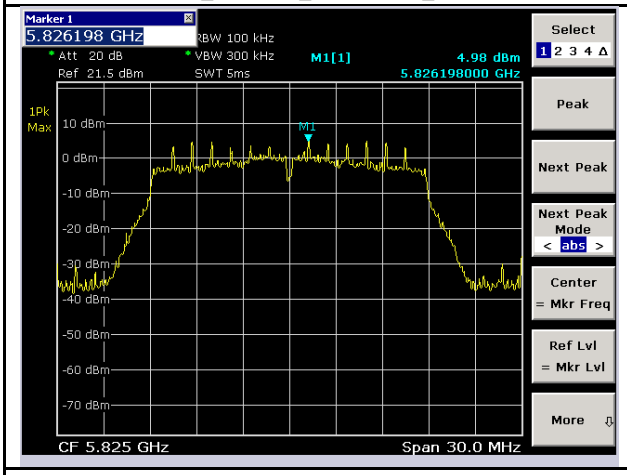

PSD _U-NII-3_802.11n_5825



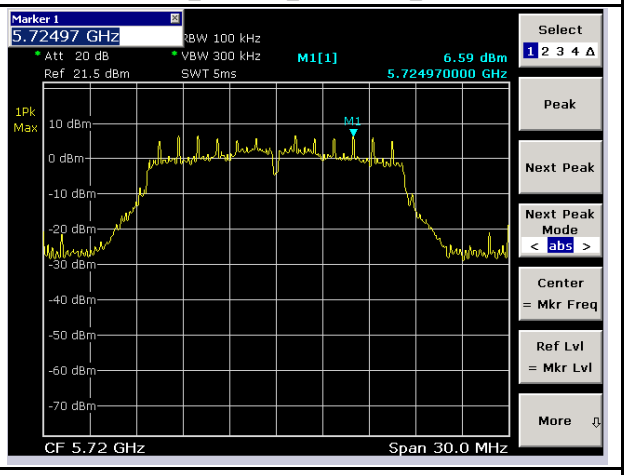

PSD _U-NII-3_802.11ac_5745



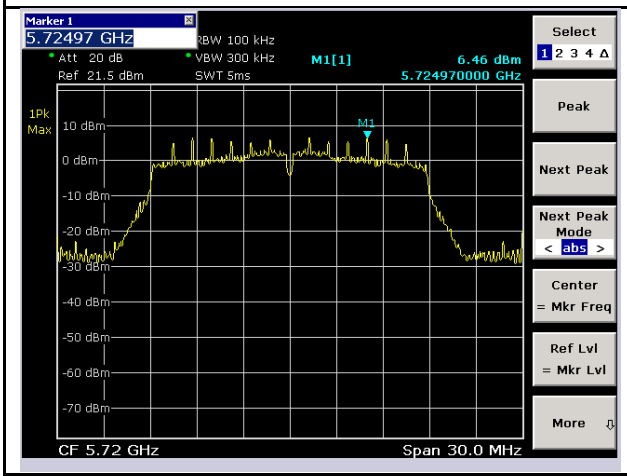

PSD _U-NII-3_802.11ac_5785



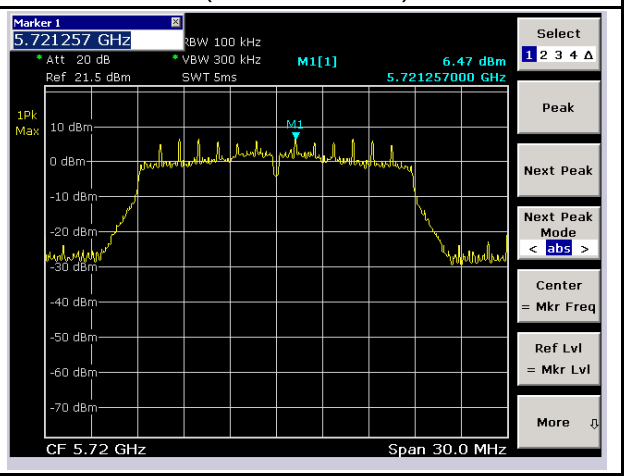

PSD _U-NII-3_802.11ac_5825




PSD _Cross channel_802.11a_5720
(In U-NII-3 Band)




PSD _Cross channel_802.11n_5720
(In U-NII-3 Band)




PSD _ Cross channel _802.11ac_5720
(In U-NII-3 Band)

## 7.6 Dynamic Frequency Selection (DFS)

### *7.6.1 Requirement*

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

| Maximum Transmit Power | Value (see note) |
|---|---|
| ≥ 200 milliwatt | -64 dBm |
| EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz | -62 dBm |
| EIRP < 200 milliwatt that do not meet the power spectra density requirement | -64 dBm |
| Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.<br>Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.<br>Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01. | |

**DFS Response requirement values**

| Parameter | Value |
|---|---|
| Non-occupancy period | Minimum 30 minutes |
| Channel Availability Check Time | 60 seconds |
| Channel Move Time | 10 seconds See Note 1. |
| Channel Closing Transmission Time | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2. |
| U-NII Detection Bandwidth | Minimum 100% of the UNII 99% transmission power bandwidth See Note 3. |
| Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.<br>Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.<br>Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic. | |

### *7.6.2 Radar type and test waveforms*

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms

***Short Pulse Radar Test Waveforms***

| Radar Type | Pulse Width (µsec) | PRI (µsec) | Number of Pulses | Minimum Percentage of Successful Detection | Minimum Trials |
|---|---|---|---|---|---|
| 0 | 1 | 1428 | 18 | See Note 1 | See Note 1 |
| 1 | 1 | Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a | Roundup { (1/360) * (19*$10^6$/ $PRI_{usec}$ | 60% | 30 |
| | | Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A | - | | |
| 2 | 1-5 | 150-230 | 23-29 | 60% | 30 |
| 3 | 6-10 | 200-500 | 16-18 | 60% | 30 |
| 4 | 11-20 | 200-500 | 12-16 | 60% | 30 |
| Aggregate (Radar Types 1-4) | | | | 80% | 120 |
| Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests. | | | | | |

***Long Pulse Radar Test Waveform***

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

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse radar test signal. If more than 30 waveforms are used for the Long Pulse radar test signal, then each additional waveform must also be unique and not repeated from the previous

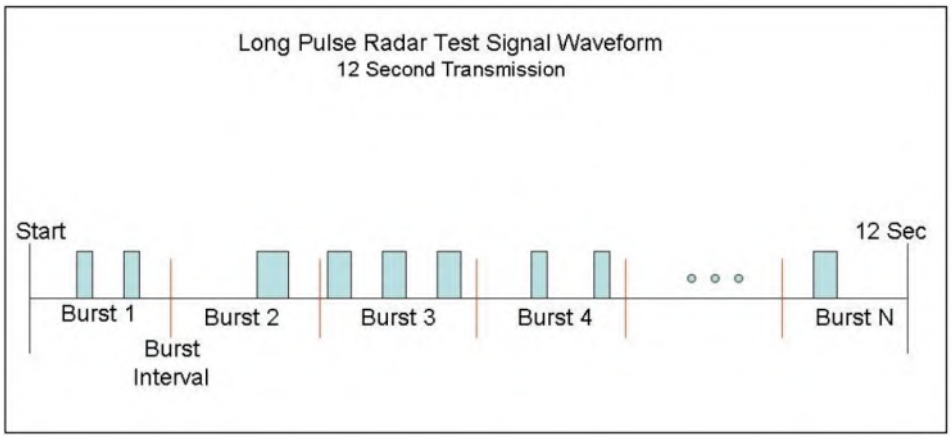
waveforms.

Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear FM chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the time between the first and second pulses is chosen independently of the time between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst Count. Each interval is of length (12,000,000 / Burst Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The s9tart time for each Burst is chosen independently.

**A representative example of a Long Pulse radar test waveform:**

1) The total test signal length is 12 seconds.
2) 8 Bursts are randomly generated for the Burst Count.
3) Burst 1 has 2 randomly generated pulses.
4) The pulse width (for both pulses) is randomly selected to be 75 microseconds.
5) The PRI is randomly selected to be at 1213 microseconds.
6) Bursts 2 through 8 are generated using steps 3 – 5.
7) Each Burst is contained in even intervals of 1,500,000 microseconds. The starting location for Pulse 1, Burst 1 is randomly generated (1 to 1,500,000 minus the total Burst 1 length + 1 random PRI interval) at the 325,001 microsecond step. Bursts 2 through 8 randomly fall in successive 1,500,000 microsecond intervals (i.e. Burst 2 falls in the 1,500,001 – 3,000,000 microsecond range).




***Frequency Hopping Radar Type***

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

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected 1 from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

### 7.6.3 Dynamic Frequency Selection (DFS) Applicability

#### 7.6.3.1 Requirement

A U-NII network will employ a DFS function to detect signals from radar systems and to avoid co-channel operation with these systems. This applies to the 5250-5350 MHz and/or 5470-5725 MHz bands.1

Within the context of the operation of the DFS function, a U-NII device will operate in either Master Mode or Client Mode. U-NII devices operating in Client Mode can only operate in a network controlled by a UNII device operating in Master Mode.

Following tables shown below summarize the DFS testing applicability.

**Applicability of DFS Requirements Prior to Use of a Channel**

| Requirement | Operational Mode | | |
|---|---|---|---|
| | Master | Client Without Radar Detection | Client With Radar Detection |
| *Non-Occupancy Period* | Yes | Not required | Yes |
| *DFS Detection Threshold* | Yes | Not required | Yes |
| *Channel Availability Check Time* | Yes | Not required | Not required |
| *U-NII Detection Bandwidth* | Yes | Not required | Yes |

**Applicability of DFS requirements during normal operation**

| Requirement | Operational Mode | |
|---|---|---|
| | Master Device or Client with Radar Detection | Client Without Radar Detection |
| *DFS Detection Threshold* | Yes | Not required |
| *Channel Closing Transmission Time* | Yes | Yes |
| *Channel Move Time* | Yes | Yes |
| *U-NII Detection Bandwidth* | Yes | Not required |

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

### 7.6.4 Conclusion

EUT is client device without radar detection function. Only the Channel Closing Transmission Time, Channel Move time and Non-Occupancy period testing are required. EUT only support 20MHz bandwidth.

### *7.6.5 Dynamic Frequency Selection (DFS) Testing*

#### 7.6.5.1 Requirement

**Channel Closing Transmission Time**

The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

The channel closing transmission time shall be less than (200 milliseconds + an aggregate of 60 milliseconds) over remaining 10 second period

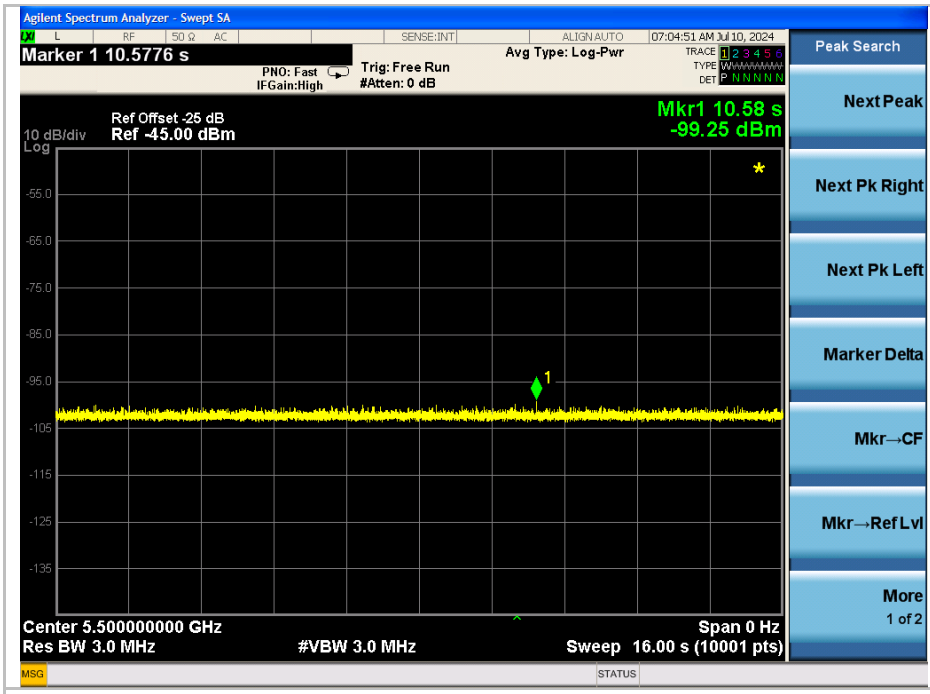
**Channel Move Time**

After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.

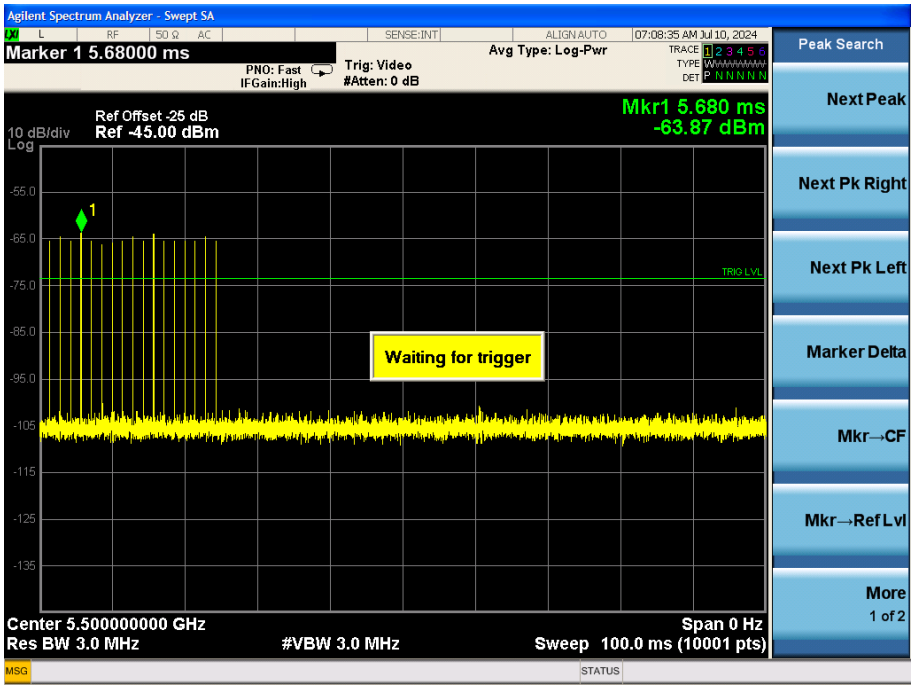
#### 7.6.5.2 Radar Waveform Calibration

The following equipment setup was used to calibrate the conducted Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized.

***Calibration Test Plots***




**System Noise Floor @ 5500MHz**




**Radar Type 0 @ 5500MHz**

### 7.6.5.3 DFS Test Procedure

**In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period**

These tests define how the following DFS parameters are verified during In-Service Monitoring; Channel Closing Transmission Time, Channel Move Time, and Non-Occupancy Period.

The steps below define the procedure to determine the above-mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the U-NII device.

UUT operating as a Client Device will associate with the Master at test Channel. DFS testing was performed while EUT is associated with the HME master device (Remote Transceiver) that it's designed to use with. EUT communicates with master device through the unique frame structure with fixed data rate and duty cycle.

At time T0 the Radar Waveform generator sends a Burst of pulses for each of the radar types.

Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Compare the Channel Move Time and Channel Closing Transmission Time results to the limits defined in the DFS Response requirement values table.

**Channel Closing Transmission Time- Measurement**

A type 1 waveform was introduced to the EUT and the Spectrum Analyzer sweep time was set to 1s for monitoring and capturing the plot. A LabVIEW program was created to collect trace data and capturing the plot. The program will calculate the channel closing time base on the spectrum analyzer result. The result will be calculated based on FCC procedure.

C= N*Dwell

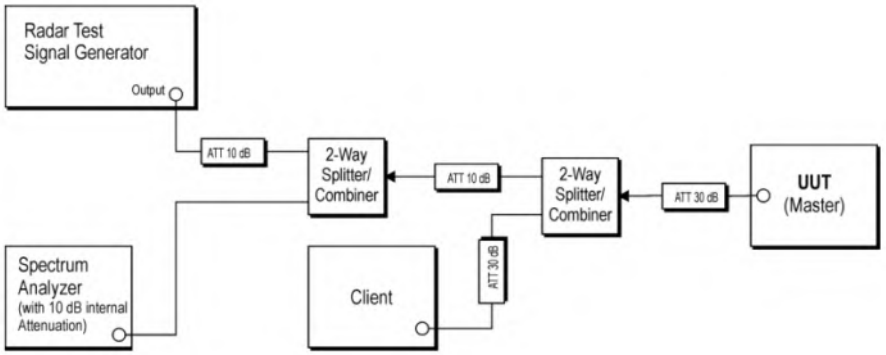
C is the closing time, N is the number of spectrum analyzer sampling bins showing a U-NII transmission and dwell is the dwell time per bin.

Dwell= S/B

Where Dwell is the dwell time per spectrum analyzer sampling bin, S is the sweep time and B is the number 0f spectrum analyzer sampling bins.

### *7.6.5.4* DFS Test Setup

Conducted measurement setup was used for full DFS testing.
Test Setup Block Diagram for conducted measurement is as below,




The radio was set at the center channel frequency of tested Channel.
An FCC approved Master device – (FCC ID: Q87-EA8300) AP was used to establish link with DUT device.

Iperf.exe program is used to set the AP as data server, and DUT as client for establishing the data traffice between AP and DUT.

The master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

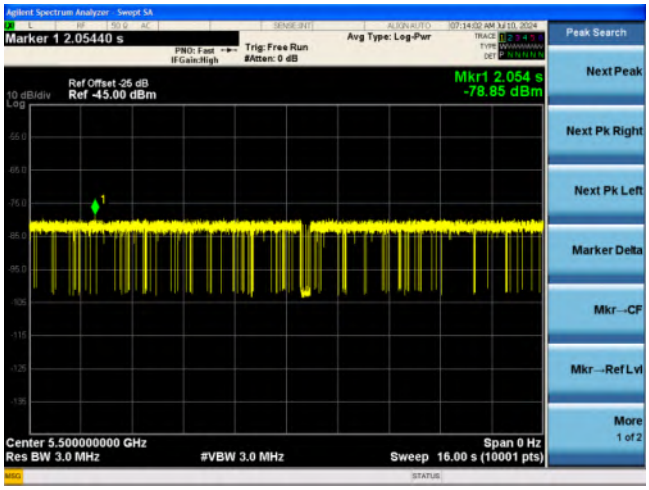
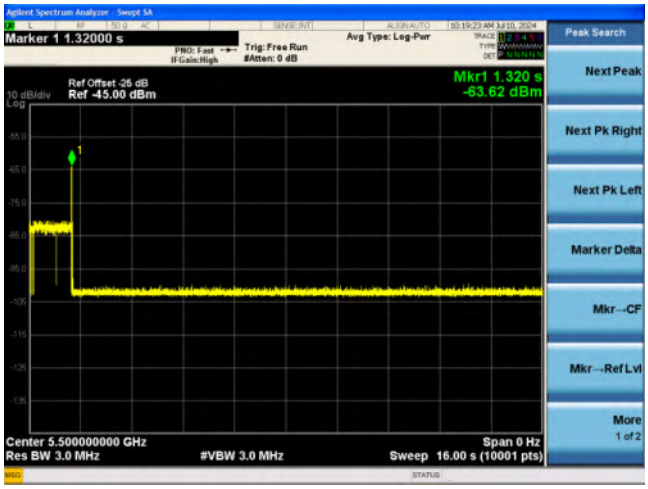
The rated output power of the Master unit is > 23 dBm (EIRP). Therefore, the required interference threshold is – 64 dBm. After correction for procedural adjustment, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS detection threshold level is set to -63 dBm. The tested level is lower than the required level hence it provides margining to the limit.

### 7.6.5.5 DFS Test Results

| BW / Channel | Test Item | Test Result | Limit | Verdict |
|---|---|---|---|---|
| 11n-5500MHz | Channel Move Time | < 10s | < 10s | Pass |
| 11n-5500MHz | Channel Closing Transmission Time | 0ms | < 260ms | Pass |
| 11n-5500MHz | Non-Occupancy Period | > 30min (1800 s) | ≥ 30 min (1800 s) | Pass |

### 7.6.5.6 DFS Test Plots

| | |
|---|---|
|  |  |
| **WLAN Traffic – 5300MHz** | **Channel Move Time & Closing Time – 5500MHz** |
|  | **s** |
| **Non-occupancy period - 5500MHz** | |

## 7.7 Radiated Spurious Emission

### *7.7.1 Requirement*

§ 15.407 (b) RSS-247 6.2

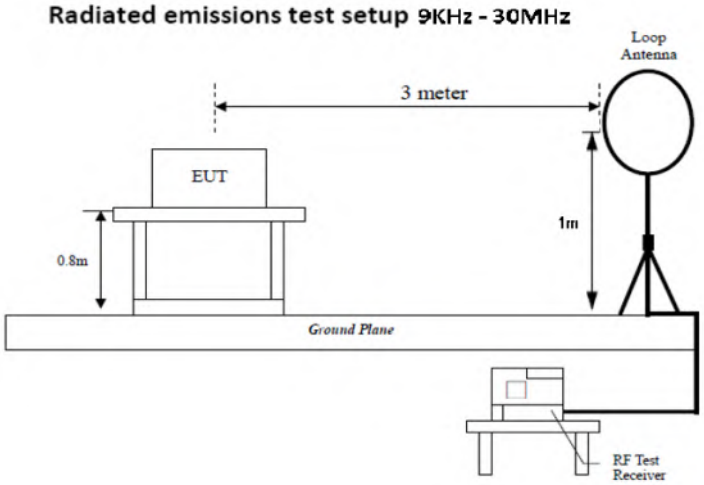
1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.
4) For transmitters operating in the 5.725-5.825 GHz band: all emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
5) Restricted band, emission must also comply with the radiated emission limits specified in 15.209

Attenuation below the general limits specified in §15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

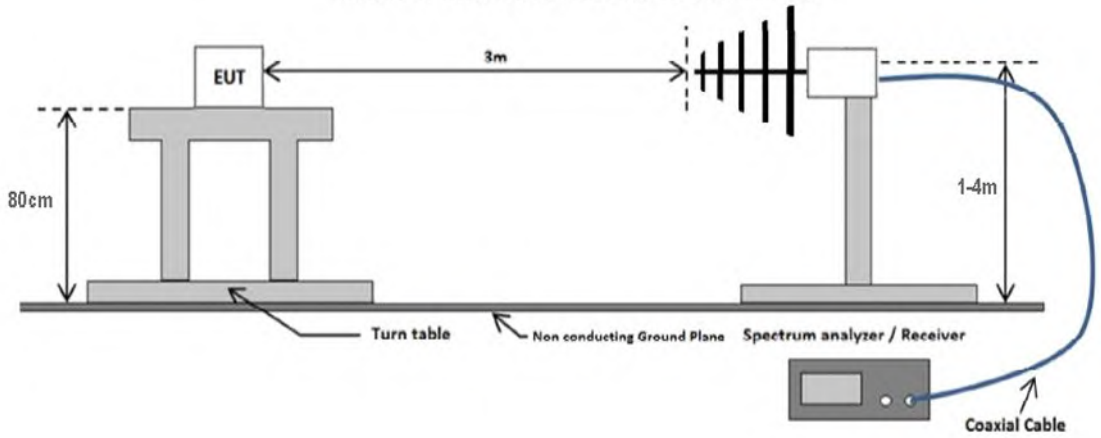
| Frequency Range (MHZ) | Field Strength (μV/m) | Measurement Distance (m) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 960 | 200 | 3 |
| Above 960 | 500 | 3 |

### *7.7.2 Test Setup*

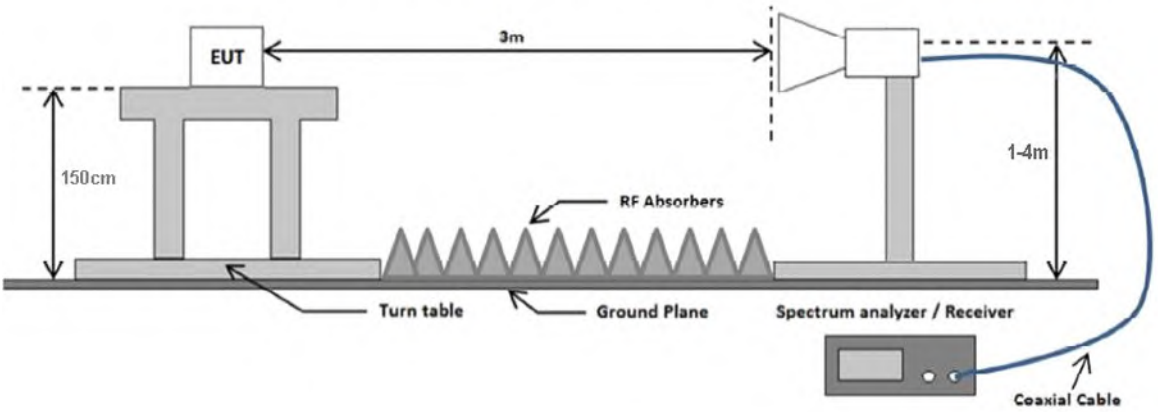
Radiated emissions test setup 9KHz - 30MHz




Radiated emissions test setup 30 MHz - 1 GHz




Radiated emissions test setup above 1 GHz



### 7.7.3 Test Procedure

According to subclause 12.7, radiated spurious emission measurements, in ANSI C63.10-2020:

1) The EUT was switched on and allowed to warm up to its normal operating condition.
2) The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
    a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT was chosen.
    b. The EUT was then rotated to the direction that gave the maximum emission.
    c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3) The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300Hz for frequencies below 150kHz.
4) The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10kHz for frequency between 150kHz-30MHz.
5) The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection at frequency between 30MHz-1GHz.
6) The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with peak detection for peak and average measurement at frequency above 1GHz.
7) Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

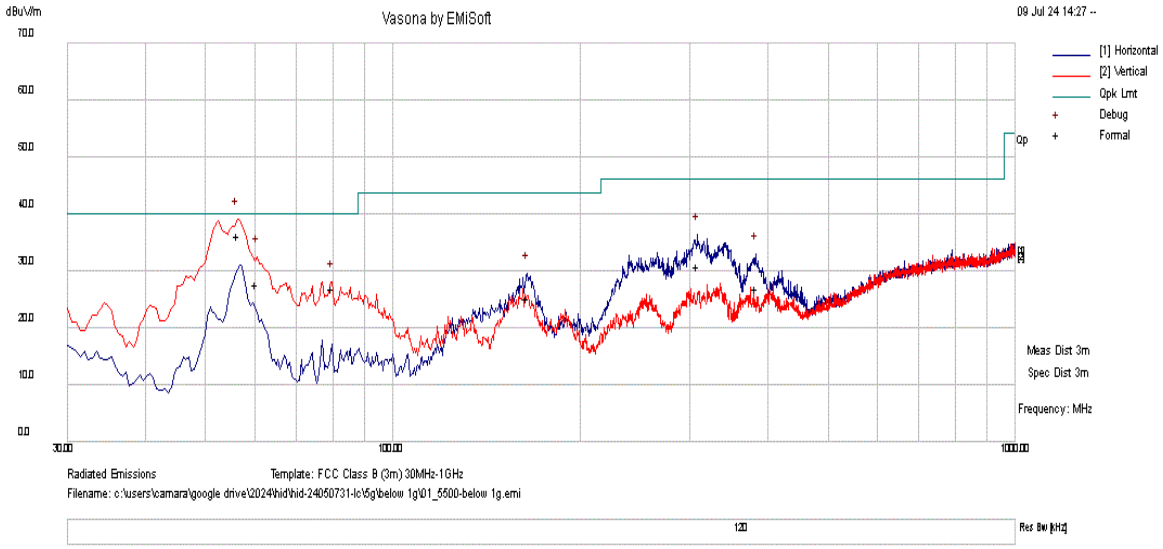
### 7.7.4 Test Result

**Radiated Emission between 9KHz – 30MHz test result**

Note: between 9KHz - 30MHz, no substantial emission close to limits. Different modes have been verified.

# RADIATED SPURIOUS EMISSION BELOW 1GHZ

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5500MHz |
|---|---|---|---|
| Frequency Range: | 30 MHz - 1 GHz | Test Date: | 06/25/2024 |
| Antenna Type/Polarity: | Bi-Log/Hor & Ver | Test Personnel: | Lining |
| Remark: | N/A | Test Result: | Pass |



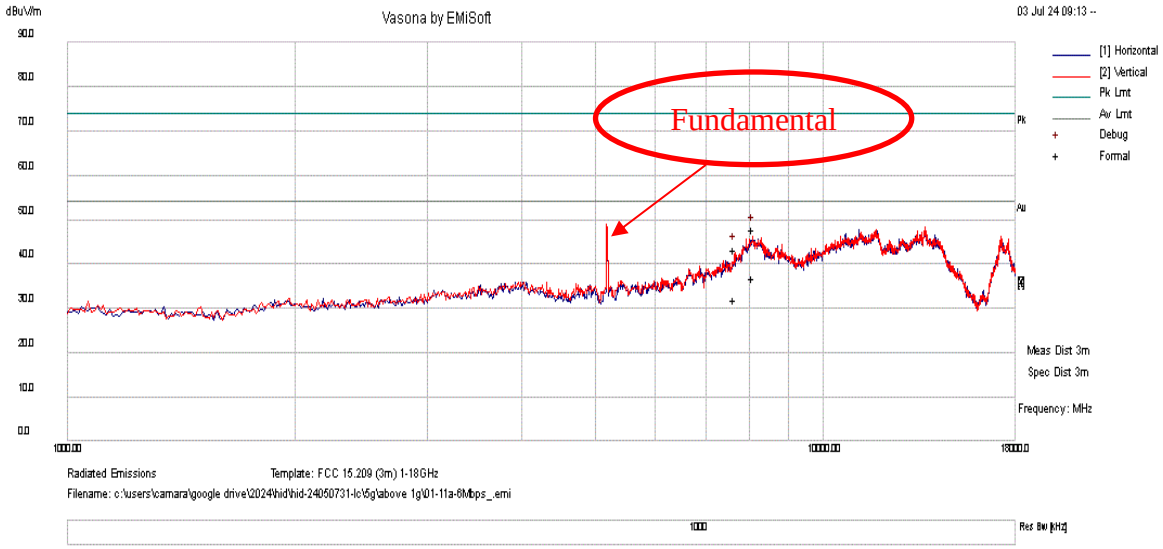

| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 56.36 | 54.30 | 2.93 | -21.12 | 36.11 | Quasi Max | V | 100 | 158 | 40.00 | -3.89 | Pass |
| 2 | 60.38 | 45.75 | 3.00 | -21.02 | 27.73 | Quasi Max | V | 160 | 126 | 40.00 | -12.27 | Pass |
| 3 | 308.28 | 37.73 | 5.74 | -12.68 | 30.79 | Quasi Max | H | 112 | 326 | 46.00 | -15.21 | Pass |
| 4 | 80.0 | 44.40 | 3.32 | -20.74 | 26.98 | Quasi Max | V | 155 | 190 | 40.00 | -13.02 | Pass |
| 5 | 383.09 | 29.03 | 6.27 | -8.44 | 26.86 | Quasi Max | H | 120 | 219 | 46.00 | -19.14 | Pass |
| 6 | 164.5 | 38.14 | 4.40 | -17.45 | 25.09 | Quasi Max | H | 161 | 294 | 43.50 | -18.41 | Pass |

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF (dB/m) = Antenna Factor (dB/m) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

# RADIATED SPURIOUS EMISSION ABOVE 1GHZ

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5180MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

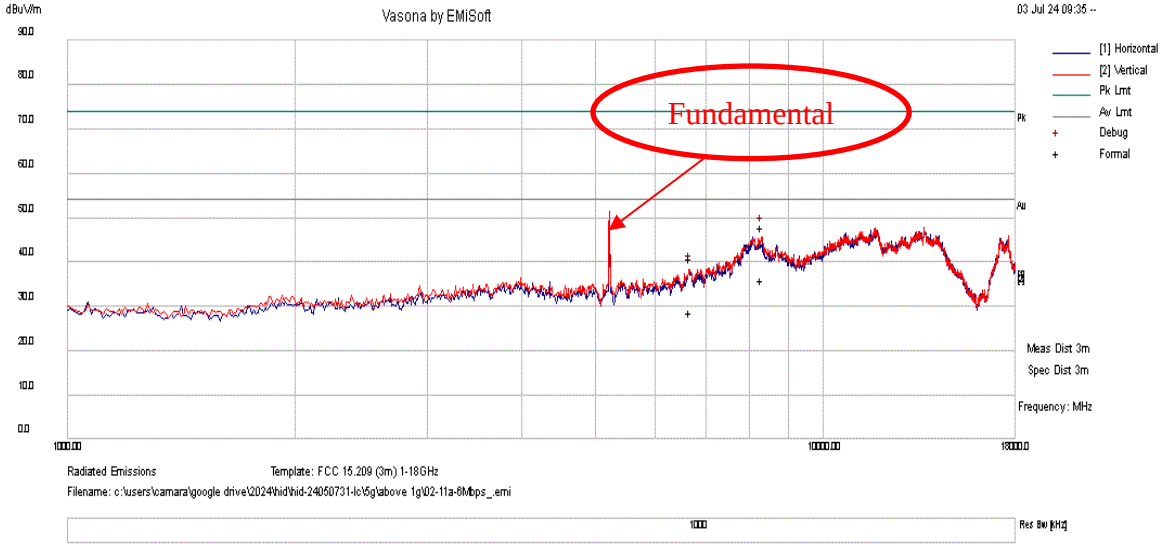



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8088.31 | 17.95 | 14.23 | 15.74 | 47.92 | Peak Max | V | 159 | 96 | 74.00 | -26.08 | Pass |
| 2 | 7651.62 | 18.30 | 13.56 | 11.32 | 43.18 | Peak Max | H | 132 | 68 | 74.00 | -30.82 | Pass |
| 3 | 8088.31 | 6.86 | 14.23 | 15.74 | 36.83 | Average Max | V | 159 | 96 | 54.00 | -17.17 | Pass |
| 4 | 7651.62 | 7.17 | 13.56 | 11.32 | 32.05 | Average Max | H | 132 | 68 | 54.00 | -21.95 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5220MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

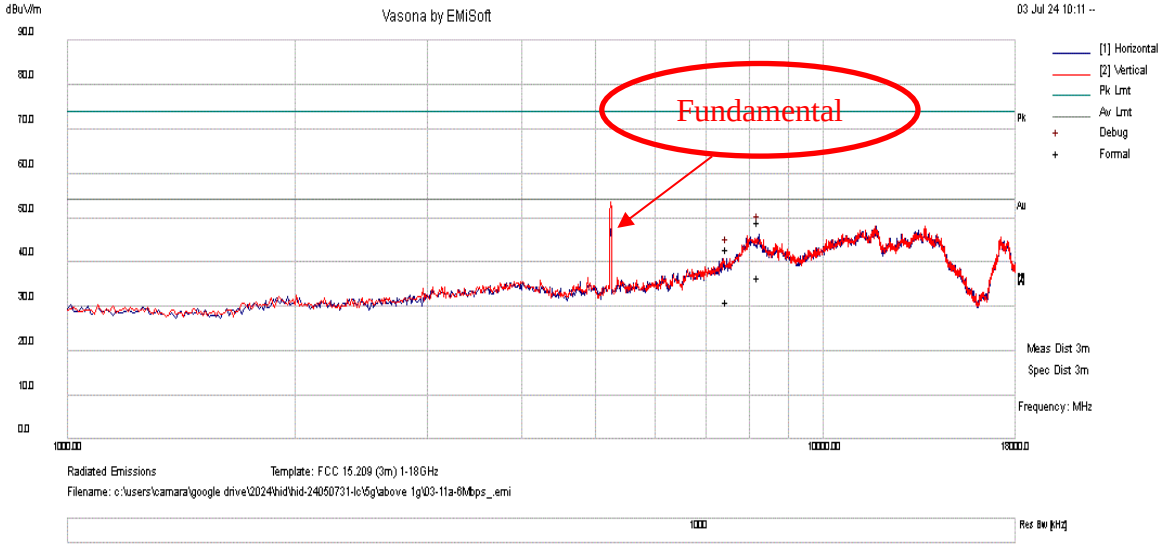



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8309.61 | 18.64 | 14.17 | 15.00 | 47.81 | Peak Max | V | 136 | 158 | 74.00 | -26.19 | Pass |
| 2 | 6680.38 | 20.89 | 12.07 | 7.99 | 40.95 | Peak Max | V | 126 | 120 | 74.00 | -33.05 | Pass |
| 3 | 8309.61 | 6.85 | 14.17 | 15.00 | 36.02 | Average Max | V | 136 | 158 | 54.00 | -17.98 | Pass |
| 4 | 6680.38 | 8.68 | 12.07 | 7.99 | 28.74 | Average Max | V | 126 | 120 | 54.00 | -25.26 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5240MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

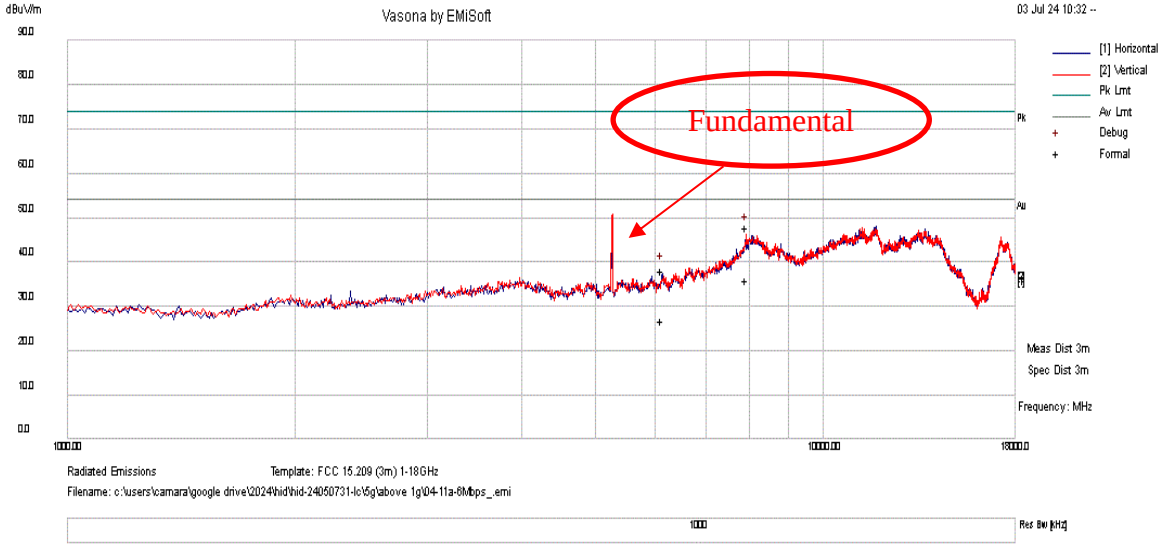



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8234.78 | 19.40 | 14.16 | 15.62 | 49.18 | Peak Max | H | 137 | 106 | 74.00 | -24.82 | Pass |
| 2 | 7470.77 | 19.63 | 13.26 | 10.05 | 42.94 | Peak Max | H | 180 | 26 | 74.00 | -31.06 | Pass |
| 3 | 8234.78 | 6.98 | 14.16 | 15.62 | 36.76 | Average Max | H | 137 | 106 | 54.00 | -17.24 | Pass |
| 4 | 7470.77 | 7.68 | 13.26 | 10.05 | 30.99 | Average Max | H | 180 | 26 | 54.00 | -23.01 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5260MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

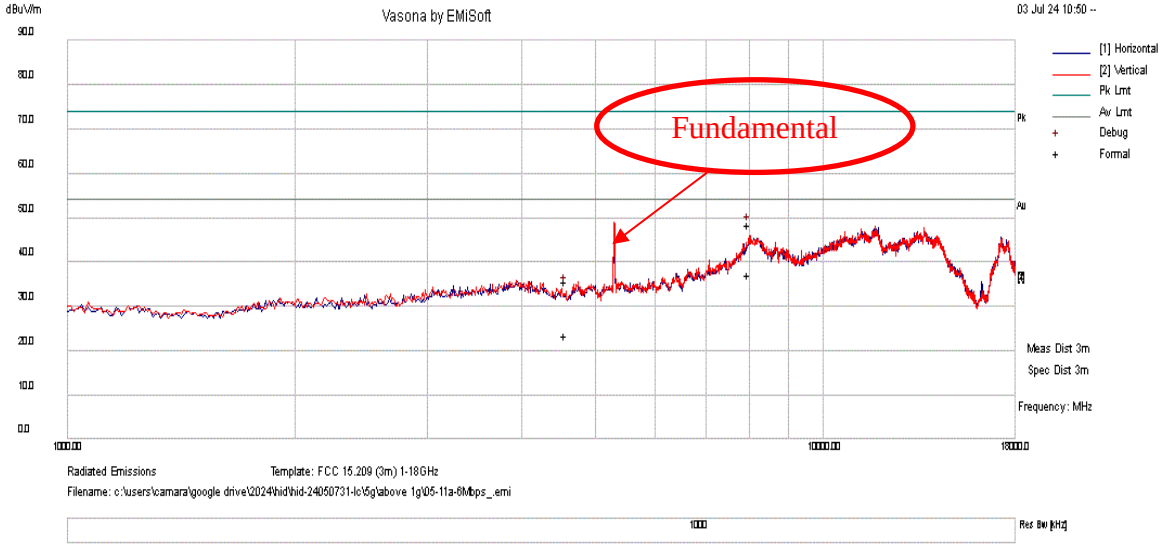



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7926.23 | 18.98 | 14.11 | 14.81 | 47.90 | Peak Max | V | 180 | 116 | 74.00 | -26.10 | Pass |
| 2 | 6133.06 | 19.60 | 11.83 | 6.76 | 38.19 | Peak Max | H | 169 | 66 | 74.00 | -35.81 | Pass |
| 3 | 7926.23 | 7.17 | 14.11 | 14.81 | 36.09 | Average Max | V | 180 | 116 | 54.00 | -17.91 | Pass |
| 4 | 6133.06 | 8.35 | 11.83 | 6.76 | 26.94 | Average Max | H | 169 | 66 | 54.00 | -27.06 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5300MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

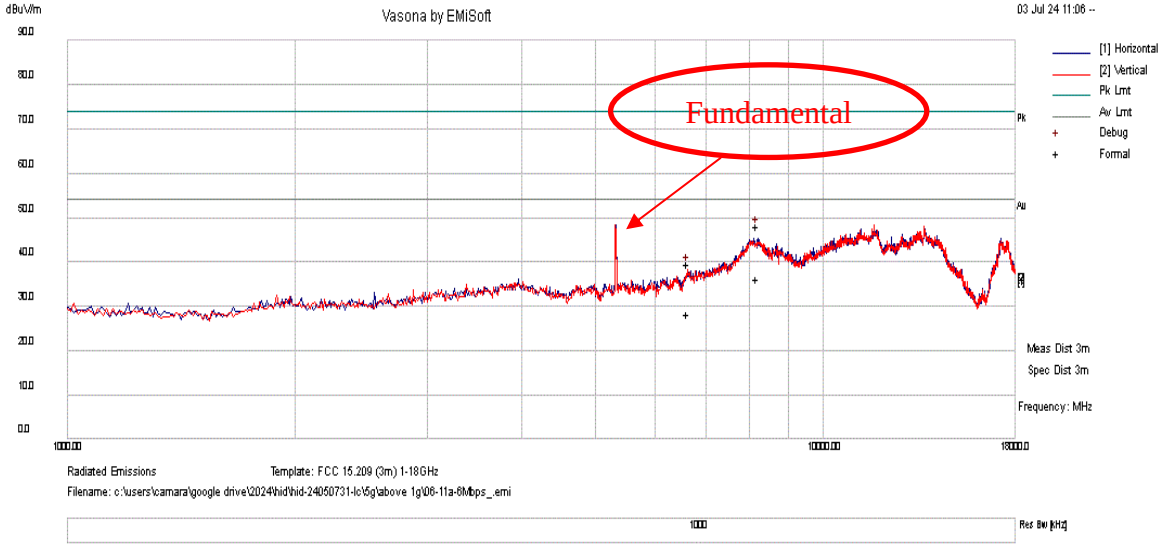



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7989.99 | 18.68 | 14.25 | 15.72 | 48.65 | Peak Max | V | 140 | 0 | 74.00 | -25.35 | Pass |
| 2 | 4569.42 | 21.46 | 8.68 | 5.53 | 35.67 | Peak Max | H | 114 | 66 | 74.00 | -38.33 | Pass |
| 3 | 7989.99 | 7.15 | 14.25 | 15.72 | 37.12 | Average Max | V | 140 | 0 | 54.00 | -16.88 | Pass |
| 4 | 4569.42 | 9.23 | 8.68 | 5.53 | 23.44 | Average Max | H | 114 | 66 | 54.00 | -30.56 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5320MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

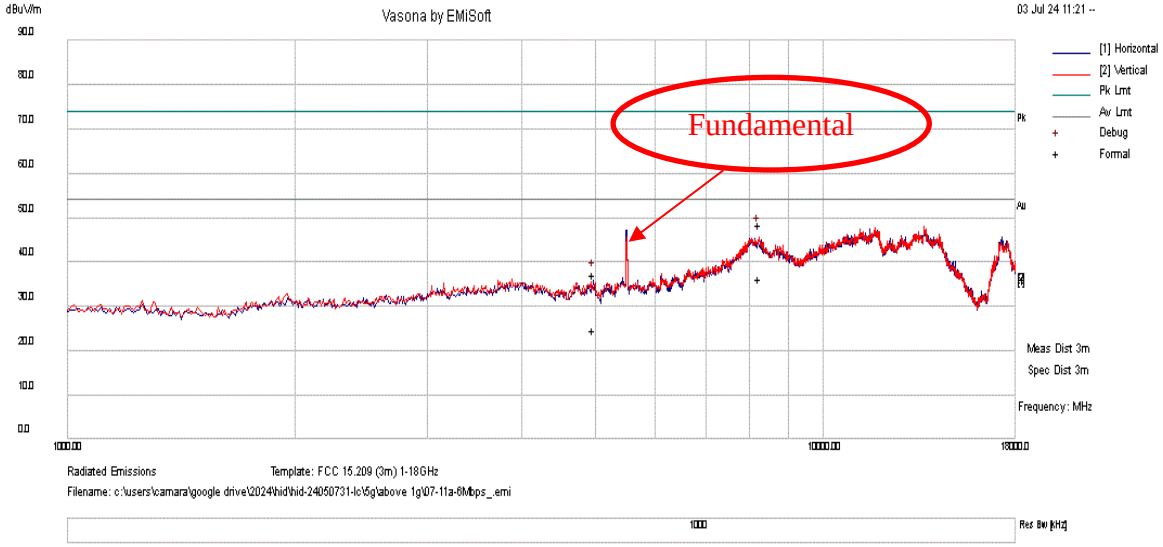



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8202.05 | 18.48 | 14.18 | 15.60 | 48.26 | Peak Max | H | 144 | 80 | 74.00 | -25.74 | Pass |
| 2 | 6625.4 | 19.77 | 12.13 | 7.79 | 39.69 | Peak Max | V | 112 | 125 | 74.00 | -34.31 | Pass |
| 3 | 8202.05 | 6.60 | 14.18 | 15.60 | 36.38 | Average Max | H | 144 | 80 | 54.00 | -17.62 | Pass |
| 4 | 6625.4 | 8.43 | 12.13 | 7.79 | 28.35 | Average Max | V | 112 | 125 | 54.00 | -25.65 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5500MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

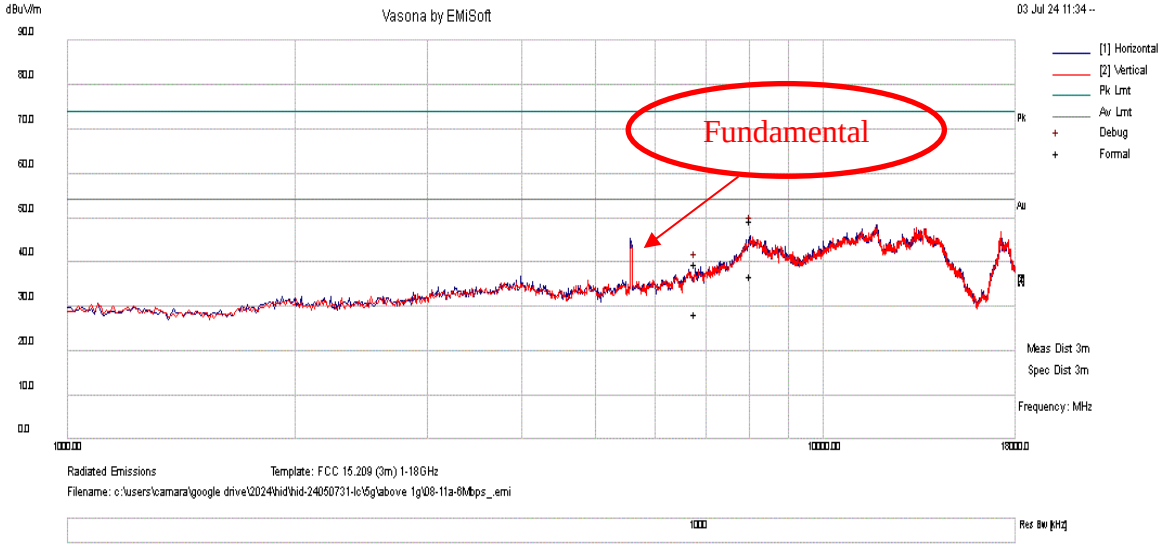



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8235.78 | 18.74 | 14.16 | 15.62 | 48.52 | Peak Max | V | 169 | 0 | 74.00 | -25.48 | Pass |
| 2 | 4975.21 | 22.20 | 9.48 | 5.59 | 37.27 | Peak Max | H | 122 | 56 | 74.00 | -36.73 | Pass |
| 3 | 8235.78 | 6.69 | 14.16 | 15.62 | 36.47 | Average Max | V | 169 | 0 | 54.00 | -17.53 | Pass |
| 4 | 4975.21 | 9.58 | 9.48 | 5.59 | 24.65 | Average Max | H | 122 | 56 | 54.00 | -29.35 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5580MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

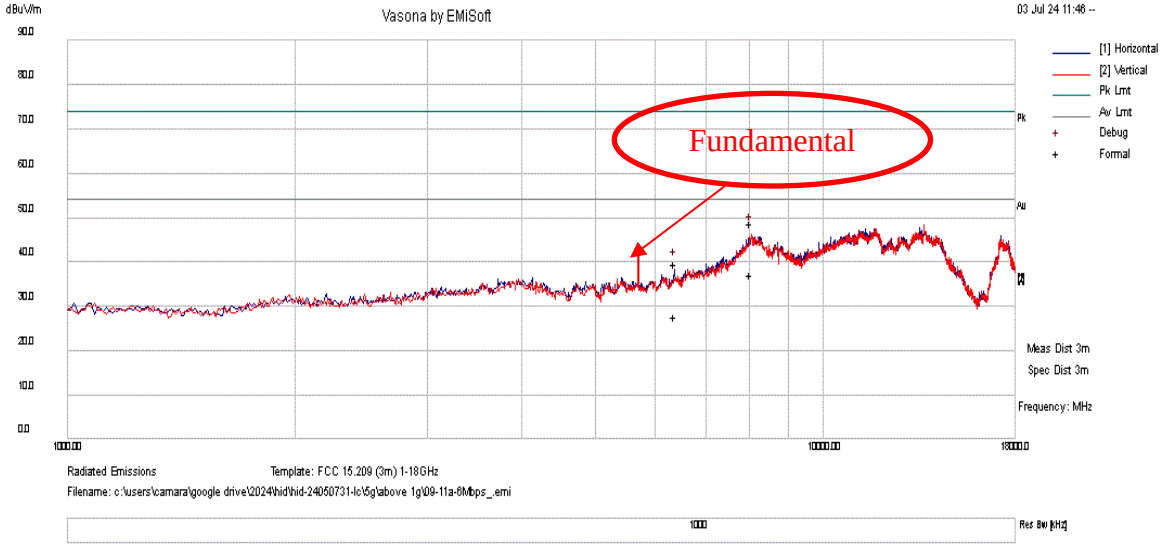



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8031.98 | 19.45 | 14.26 | 15.84 | 49.55 | Peak Max | H | 193 | 181 | 74.00 | -24.45 | Pass |
| 2 | 6784.18 | 19.04 | 12.07 | 8.46 | 39.57 | Peak Max | H | 122 | 172 | 74.00 | -34.43 | Pass |
| 3 | 8031.98 | 6.98 | 14.26 | 15.84 | 37.08 | Average Max | H | 193 | 181 | 54.00 | -16.92 | Pass |
| 4 | 6784.18 | 7.99 | 12.07 | 8.46 | 28.52 | Average Max | H | 122 | 172 | 54.00 | -25.48 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5700MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

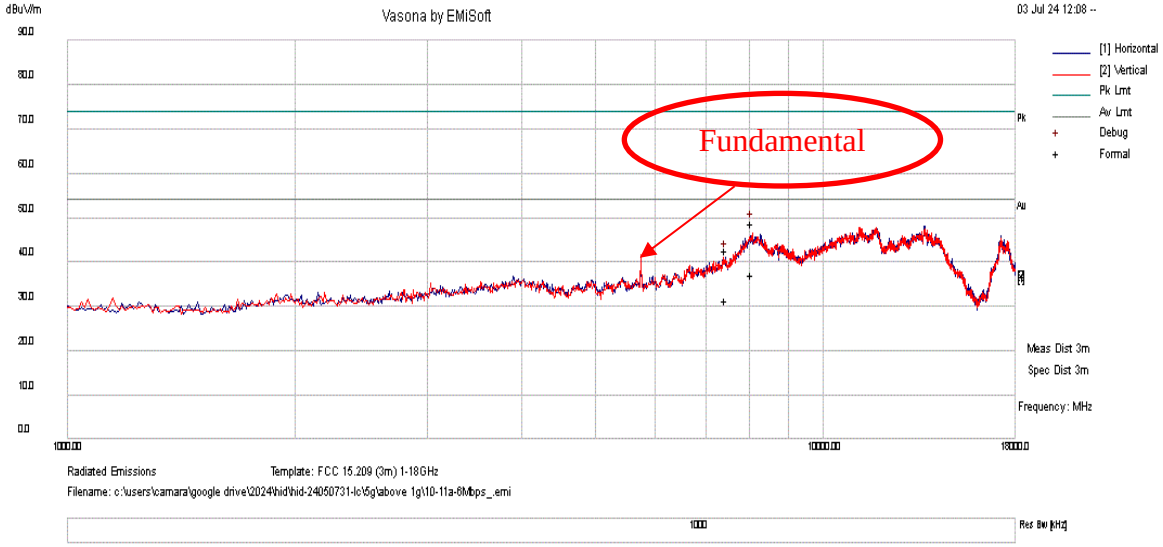



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8046.1 | 18.70 | 14.25 | 15.83 | 48.78 | Peak Max | V | 111 | 39 | 74.00 | -25.22 | Pass |
| 2 | 6365.84 | 20.83 | 12.04 | 6.78 | 39.65 | Peak Max | H | 114 | 123 | 74.00 | -34.35 | Pass |
| 3 | 8046.1 | 7.06 | 14.25 | 15.83 | 37.14 | Average Max | V | 111 | 39 | 54.00 | -16.86 | Pass |
| 4 | 6365.84 | 9.11 | 12.04 | 6.78 | 27.93 | Average Max | H | 114 | 123 | 54.00 | -26.07 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5745MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

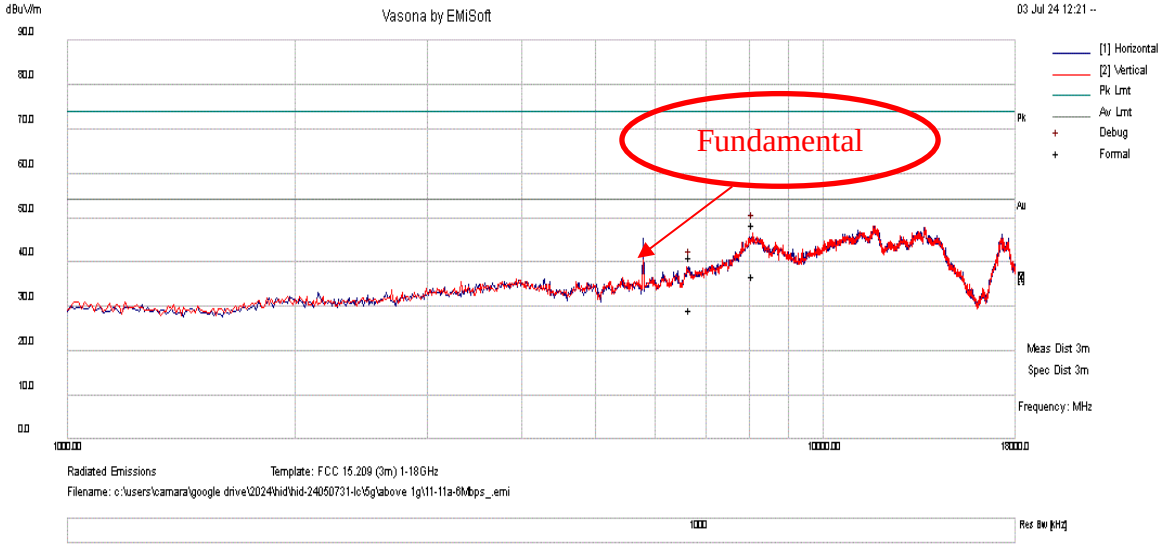



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8063.91 | 18.82 | 14.24 | 15.79 | 48.85 | Peak Max | V | 180 | 0 | 74.00 | -25.15 | Pass |
| 2 | 7433.92 | 19.49 | 13.17 | 9.99 | 42.65 | Peak Max | H | 153 | 137 | 74.00 | -31.35 | Pass |
| 3 | 8063.91 | 7.12 | 14.24 | 15.79 | 37.15 | Average Max | V | 180 | 0 | 54.00 | -16.85 | Pass |
| 4 | 7433.92 | 8.37 | 13.17 | 9.99 | 31.53 | Average Max | H | 153 | 137 | 54.00 | -22.47 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5785MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

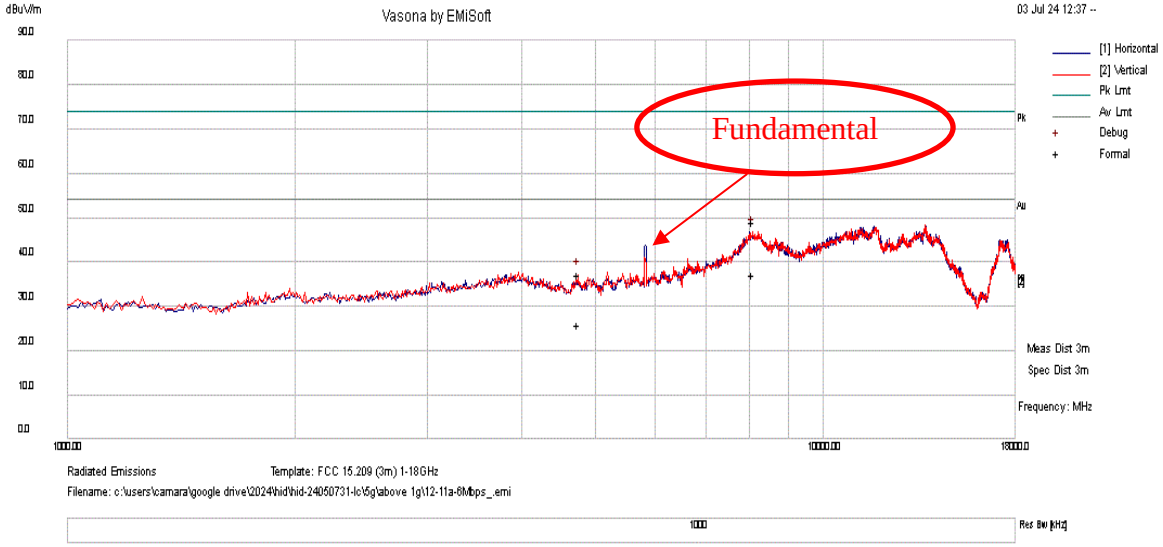



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8087.05 | 18.46 | 14.23 | 15.74 | 48.43 | Peak Max | V | 112 | 6 | 74.00 | -25.57 | Pass |
| 2 | 6678.91 | 21.23 | 12.07 | 7.99 | 41.29 | Peak Max | H | 114 | 82 | 74.00 | -32.71 | Pass |
| 3 | 8087.05 | 6.84 | 14.23 | 15.74 | 36.81 | Average Max | V | 112 | 6 | 54.00 | -17.19 | Pass |
| 4 | 6678.91 | 9.15 | 12.07 | 7.99 | 29.21 | Average Max | H | 114 | 82 | 54.00 | -24.79 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11a, 5825MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

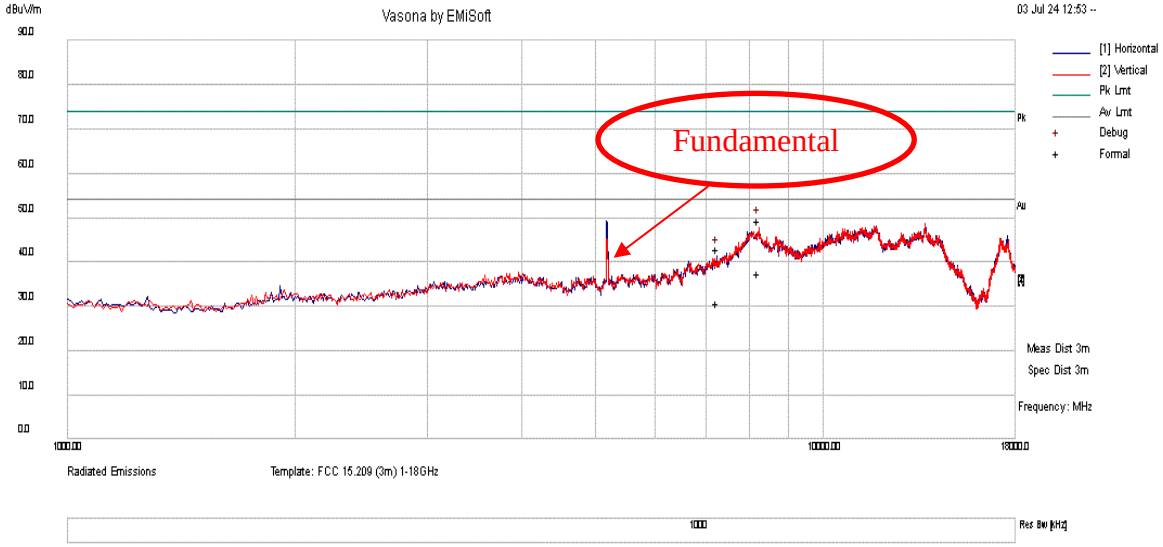



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8076.65 | 19.22 | 14.24 | 15.77 | 49.23 | Peak Max | H | 102 | 111 | 74.00 | -24.77 | Pass |
| 2 | 4749.47 | 22.45 | 9.02 | 5.92 | 37.39 | Peak Max | V | 142 | 76 | 74.00 | -36.61 | Pass |
| 3 | 8076.65 | 7.38 | 14.24 | 15.77 | 37.39 | Average Max | H | 102 | 111 | 54.00 | -16.61 | Pass |
| 4 | 4749.47 | 11.15 | 9.02 | 5.92 | 26.09 | Average Max | V | 142 | 76 | 54.00 | -27.91 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5180MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

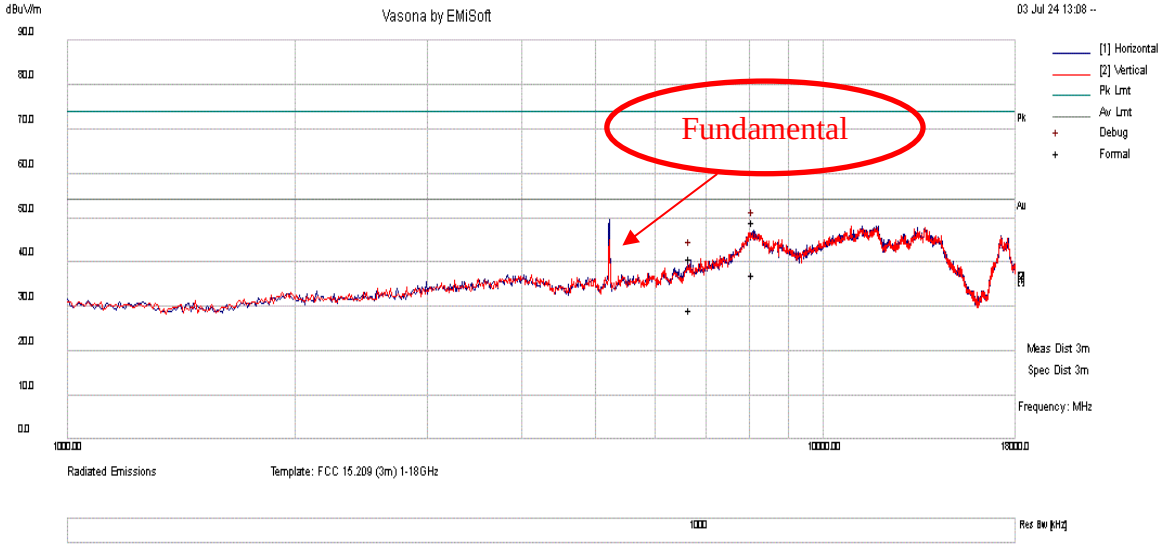



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8235.09 | 19.75 | 14.16 | 15.62 | 49.53 | Peak Max | V | 152 | 102 | 74.00 | -24.47 | Pass |
| 2 | 7249.8 | 21.03 | 12.70 | 9.42 | 43.15 | Peak Max | H | 135 | 95 | 74.00 | -30.85 | Pass |
| 3 | 8235.09 | 7.64 | 14.16 | 15.62 | 37.42 | Average Max | V | 152 | 102 | 54.00 | -16.58 | Pass |
| 4 | 7249.8 | 8.66 | 12.70 | 9.42 | 30.78 | Average Max | H | 135 | 95 | 54.00 | -23.22 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5220MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

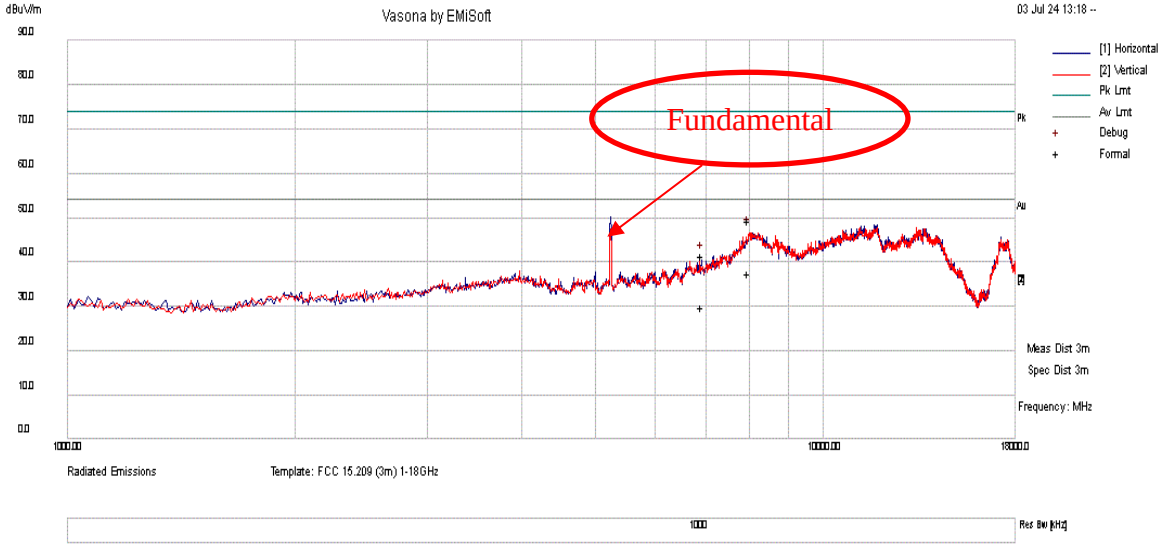



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8097.99 | 19.17 | 14.23 | 15.72 | 49.12 | Peak Max | H | 159 | 158 | 74.00 | -24.88 | Pass |
| 2 | 6680.88 | 20.90 | 12.07 | 7.99 | 40.96 | Peak Max | H | 100 | 97 | 74.00 | -33.04 | Pass |
| 3 | 8097.99 | 7.26 | 14.23 | 15.72 | 37.21 | Average Max | H | 159 | 158 | 54.00 | -16.79 | Pass |
| 4 | 6680.88 | 9.17 | 12.07 | 7.99 | 29.23 | Average Max | H | 100 | 97 | 54.00 | -24.77 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5240MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

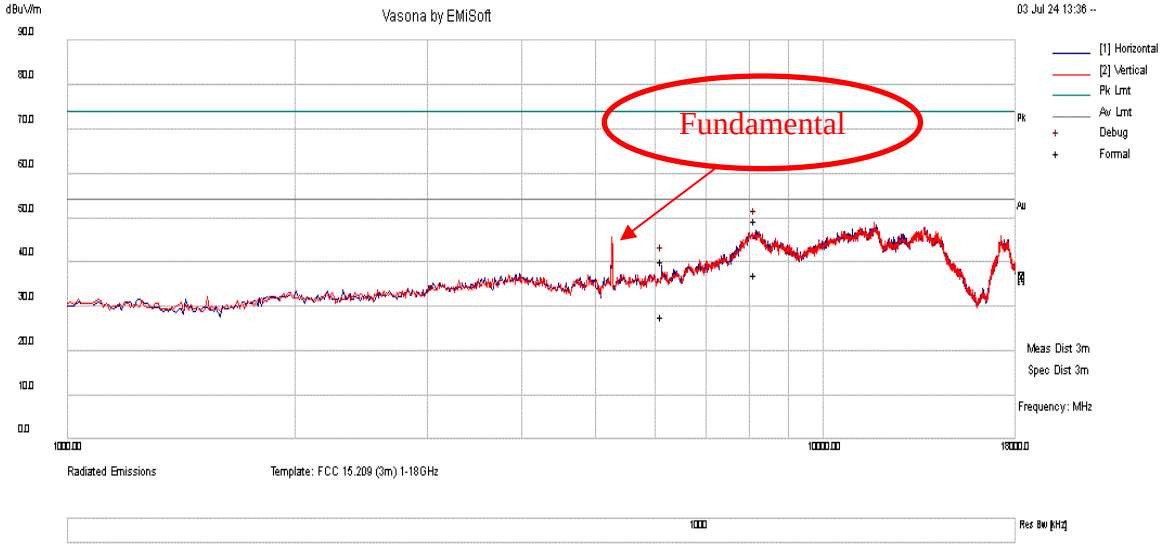



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7978.17 | 19.61 | 14.22 | 15.54 | 49.37 | Peak Max | H | 137 | 162 | 74.00 | -24.63 | Pass |
| 2 | 6914.7 | 20.47 | 12.40 | 8.76 | 41.63 | Peak Max | H | 107 | 172 | 74.00 | -32.37 | Pass |
| 3 | 7978.17 | 7.73 | 14.22 | 15.54 | 37.49 | Average Max | H | 137 | 162 | 54.00 | -16.51 | Pass |
| 4 | 6914.7 | 8.64 | 12.40 | 8.76 | 29.80 | Average Max | H | 107 | 172 | 54.00 | -24.20 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5260MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

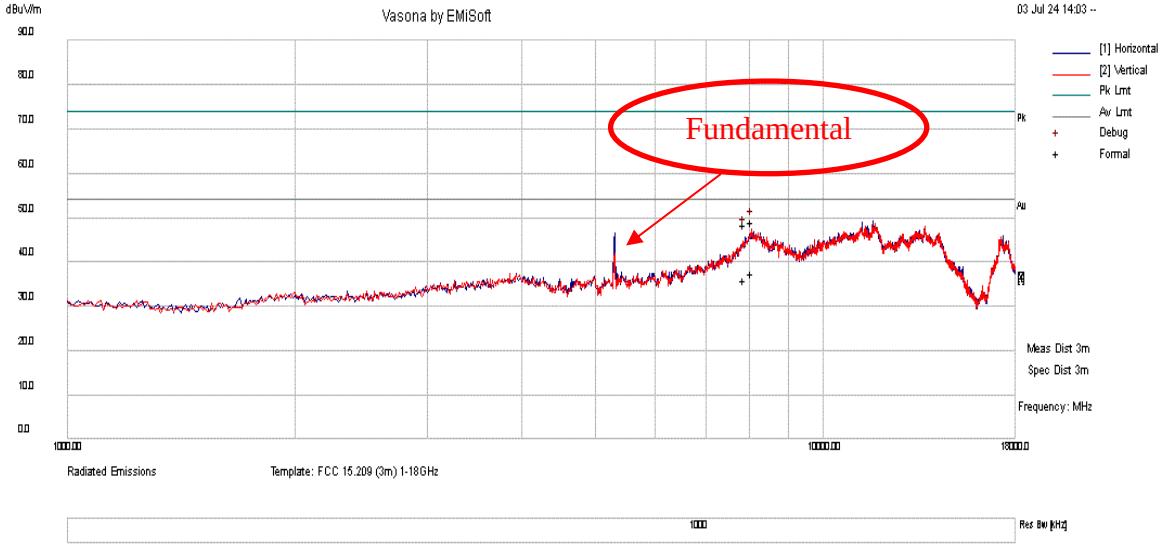



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8150.84 | 19.65 | 14.20 | 15.64 | 49.49 | Peak Max | H | 160 | 138 | 74.00 | -24.51 | Pass |
| 2 | 6119.58 | 21.66 | 11.83 | 6.73 | 40.22 | Peak Max | H | 129 | 111 | 74.00 | -33.78 | Pass |
| 3 | 8150.84 | 7.27 | 14.20 | 15.64 | 37.11 | Average Max | H | 160 | 138 | 54.00 | -16.89 | Pass |
| 4 | 6119.58 | 9.25 | 11.83 | 6.73 | 27.81 | Average Max | H | 129 | 111 | 54.00 | -26.19 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5300MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

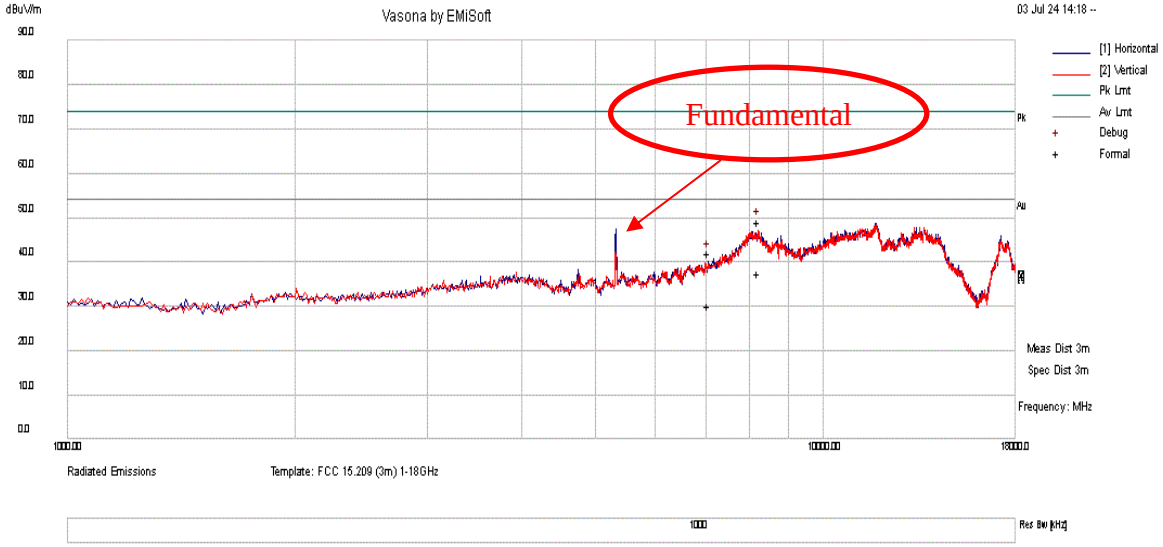



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8053.47 | 18.94 | 14.25 | 15.82 | 49.01 | Peak Max | V | 118 | 68 | 74.00 | -24.99 | Pass |
| 2 | 7884.48 | 20.24 | 14.01 | 14.21 | 48.46 | Peak Max | H | 153 | 161 | 74.00 | -25.54 | Pass |
| 3 | 8053.47 | 7.59 | 14.25 | 15.82 | 37.66 | Average Max | V | 118 | 68 | 54.00 | -16.34 | Pass |
| 4 | 7884.48 | 7.92 | 14.01 | 14.21 | 36.14 | Average Max | H | 153 | 161 | 54.00 | -17.86 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5320MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

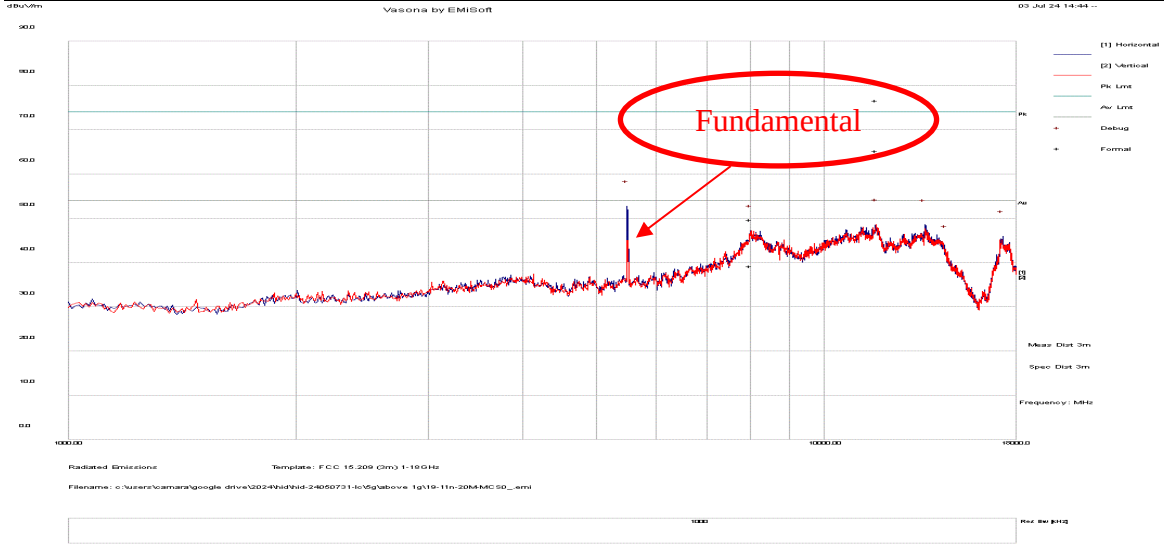



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8226.17 | 19.23 | 14.17 | 15.61 | 49.01 | Peak Max | V | 132 | 11 | 74.00 | -24.99 | Pass |
| 2 | 7053.22 | 20.46 | 12.62 | 9.14 | 42.22 | Peak Max | H | 122 | 21 | 74.00 | -31.78 | Pass |
| 3 | 8226.17 | 7.62 | 14.17 | 15.61 | 37.40 | Average Max | V | 132 | 11 | 54.00 | -16.60 | Pass |
| 4 | 7053.22 | 8.47 | 12.62 | 9.14 | 30.23 | Average Max | H | 122 | 21 | 54.00 | -23.77 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5500MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

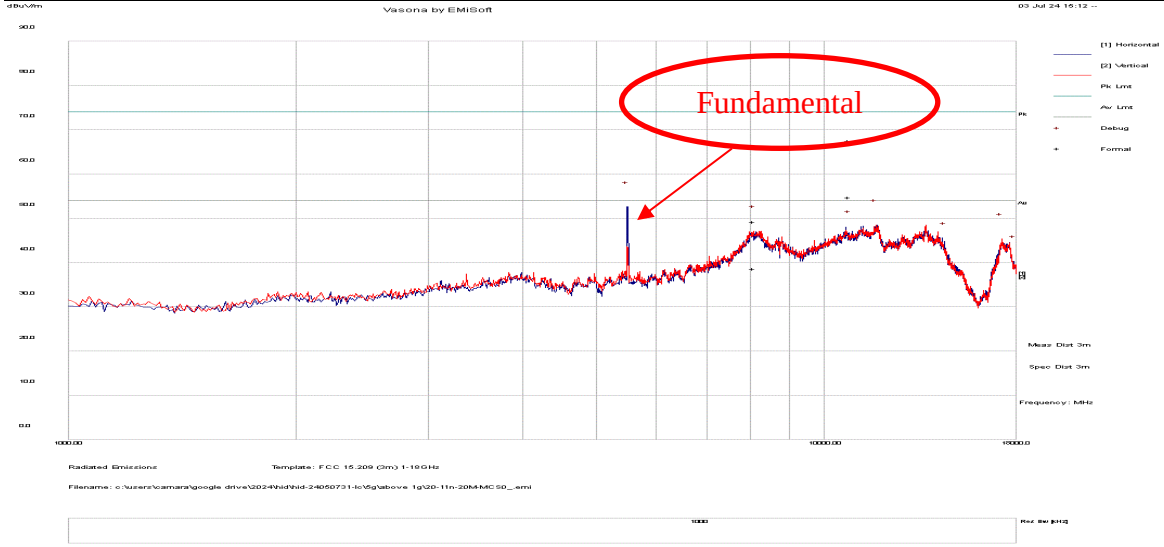



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11741.56 | 22.19 | 18.34 | 16.15 | 56.68 | Peak Max | V | 132 | 84 | 74.00 | -17.32 | Pass |
| 2 | 8011.57 | 19.61 | 14.26 | 15.85 | 49.72 | Peak Max | V | 171 | 122 | 74.00 | -24.28 | Pass |
| 3 | 11741.56 | 0.80 | 18.30 | 16.10 | 35.20 | Average Max | V | 132 | 84 | 54.00 | -18.80 | Pass |
| 4 | 8011.57 | 9.13 | 14.26 | 15.85 | 39.24 | Average Max | V | 171 | 122 | 54.00 | -14.76 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5580MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

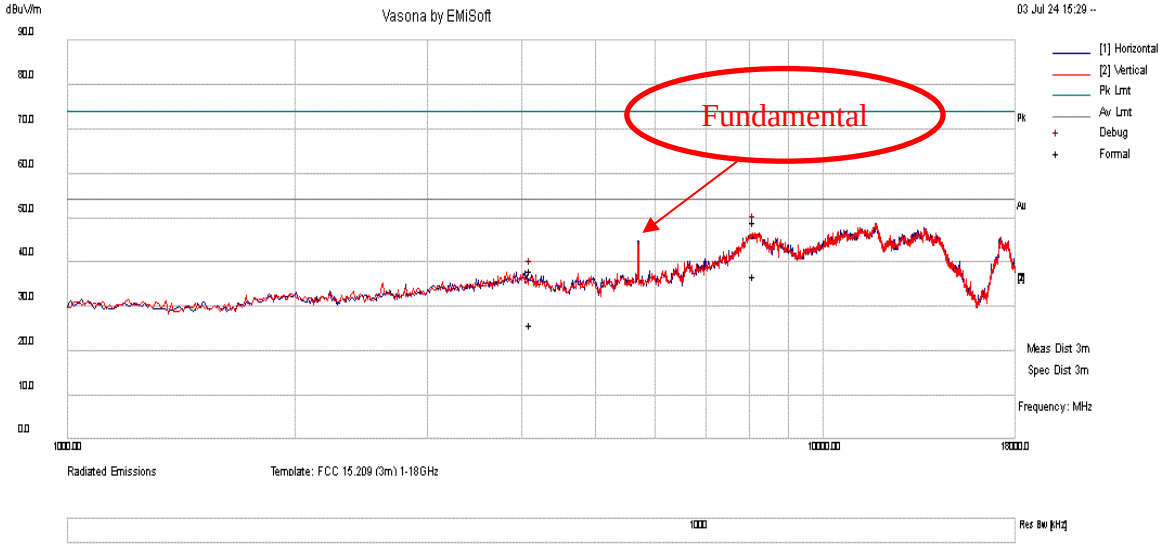



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8074.28 | 19.28 | 14.24 | 15.77 | 49.29 | Peak Max | V | 173 | 39 | 74.00 | -24.71 | Pass |
| 2 | 10806.35 | 35.27 | 17.27 | 15.02 | 67.56 | Peak Max | H | 108 | 249 | 74.00 | -6.44 | Pass |
| 3 | 8074.28 | 8.70 | 14.24 | 15.77 | 38.71 | Average Max | V | 173 | 39 | 54.00 | -15.29 | Pass |
| 4 | 10806.35 | 12.50 | 17.30 | 15.00 | 44.80 | Average Max | H | 108 | 249 | 54.00 | -9.20 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5700MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

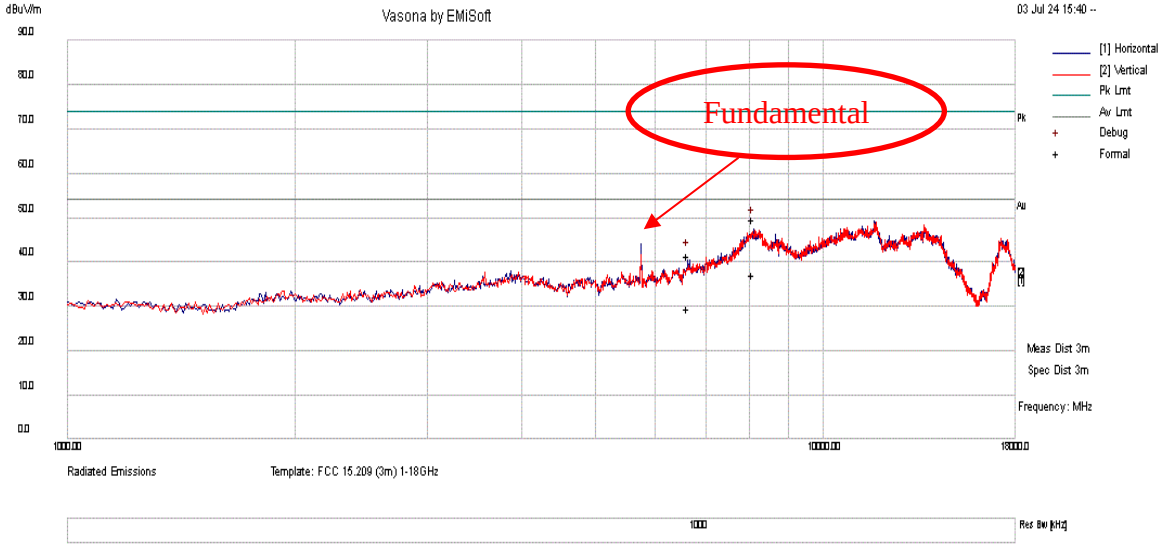



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8106.283 | 19.30 | 14.20 | 15.70 | 49.20 | Peak Max | H | 163 | 112 | 74 | -24.80 | Pass |
| 2 | 4102.076 | 23.30 | 9.80 | 5.00 | 38.10 | Peak Max | H | 151 | 1 | 74 | -35.90 | Pass |
| 3 | 8106.283 | 7.10 | 14.20 | 15.70 | 37.00 | Average Max | H | 163 | 112 | 54 | -17.00 | Pass |
| 4 | 4102.076 | 11.10 | 9.80 | 5.00 | 25.90 | Average Max | H | 151 | 1 | 54 | -28.10 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5745MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

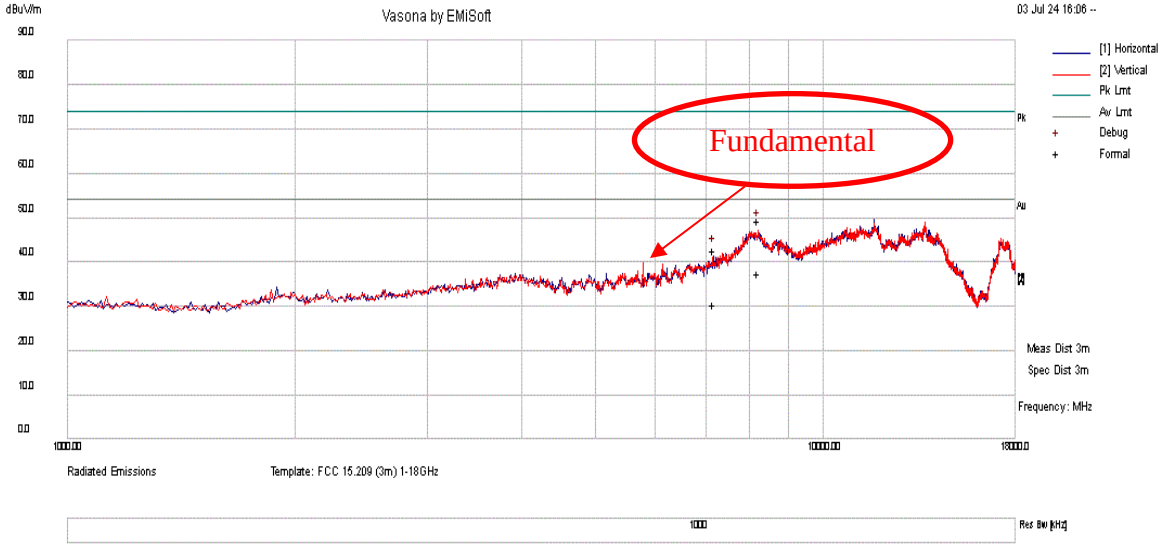



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8098.3 | 19.84 | 14.23 | 15.72 | 49.79 | Peak Max | H | 191 | 131 | 74.00 | -24.21 | Pass |
| 2 | 6631.18 | 21.66 | 12.13 | 7.81 | 41.60 | Peak Max | H | 154 | 6 | 74.00 | -32.40 | Pass |
| 3 | 8098.3 | 7.26 | 14.23 | 15.72 | 37.21 | Average Max | H | 191 | 131 | 54.00 | -16.79 | Pass |
| 4 | 6631.18 | 9.58 | 12.13 | 7.81 | 29.52 | Average Max | H | 154 | 6 | 54.00 | -24.48 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5785MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

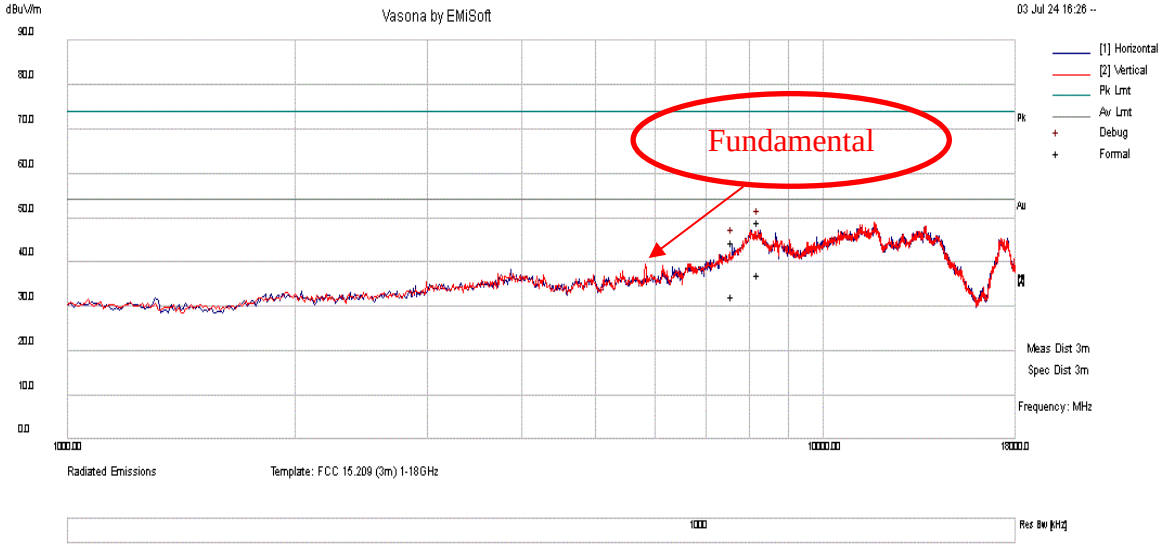



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8223.55 | 19.59 | 14.17 | 15.61 | 49.37 | Peak Max | V | 168 | 96 | 74.00 | -24.63 | Pass |
| 2 | 7171.65 | 20.63 | 12.67 | 9.34 | 42.64 | Peak Max | H | 168 | 162 | 74.00 | -31.36 | Pass |
| 3 | 8223.55 | 7.64 | 14.17 | 15.61 | 37.42 | Average Max | V | 168 | 96 | 54.00 | -16.58 | Pass |
| 4 | 7171.65 | 8.57 | 12.67 | 9.34 | 30.58 | Average Max | H | 168 | 162 | 54.00 | -23.42 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11ac, 5825MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

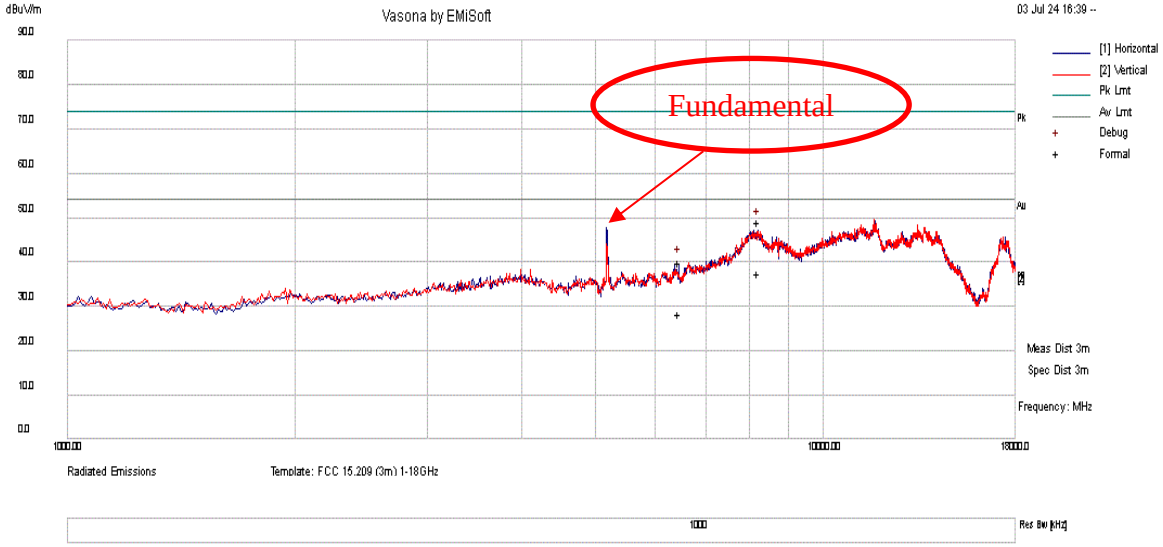



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8223.95 | 19.48 | 14.17 | 15.61 | 49.26 | Peak Max | V | 131 | 27 | 74.00 | -24.74 | Pass |
| 2 | 7601.61 | 20.11 | 13.49 | 10.84 | 44.44 | Peak Max | H | 100 | 0 | 74.00 | -29.56 | Pass |
| 3 | 8223.95 | 7.57 | 14.17 | 15.61 | 37.35 | Average Max | V | 131 | 27 | 54.00 | -16.65 | Pass |
| 4 | 7601.61 | 7.98 | 13.49 | 10.84 | 32.31 | Average Max | H | 100 | 0 | 54.00 | -21.69 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5180MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

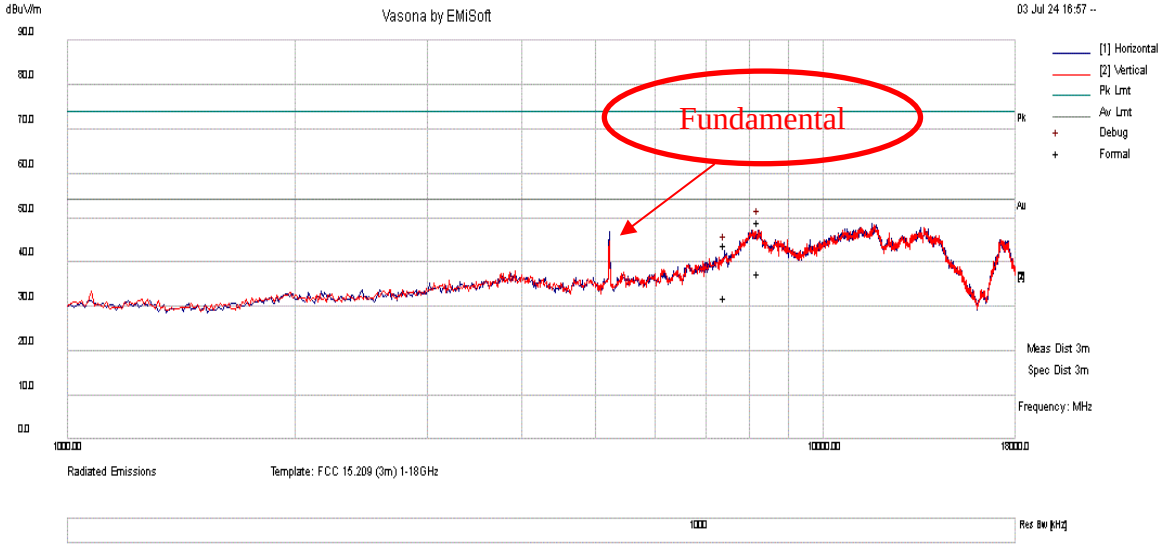



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8225.51 | 19.46 | 14.17 | 15.61 | 49.24 | Peak Max | H | 122 | 74 | 74.00 | -24.76 | Pass |
| 2 | 6450.53 | 20.64 | 12.19 | 7.00 | 39.83 | Peak Max | H | 126 | 25 | 74.00 | -34.17 | Pass |
| 3 | 8225.51 | 7.64 | 14.17 | 15.61 | 37.42 | Average Max | H | 122 | 74 | 54.00 | -16.58 | Pass |
| 4 | 6450.53 | 9.19 | 12.19 | 7.00 | 28.38 | Average Max | H | 126 | 25 | 54.00 | -25.62 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5220MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/03/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

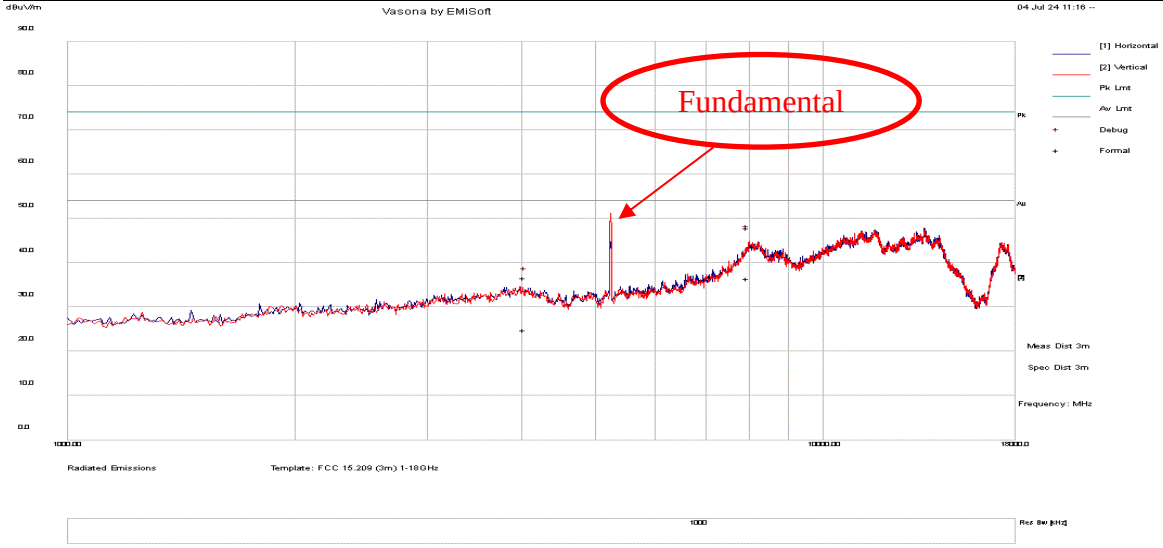



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8224.03 | 19.41 | 14.17 | 15.61 | 49.19 | Peak Max | H | 154 | 159 | 74.00 | -24.81 | Pass |
| 2 | 7428.07 | 20.73 | 13.15 | 9.98 | 43.86 | Peak Max | H | 162 | 20 | 74.00 | -30.14 | Pass |
| 3 | 8224.03 | 7.62 | 14.17 | 15.61 | 37.40 | Average Max | H | 154 | 159 | 54.00 | -16.60 | Pass |
| 4 | 7428.07 | 8.82 | 13.15 | 9.98 | 31.95 | Average Max | H | 162 | 20 | 54.00 | -22.05 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5240MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

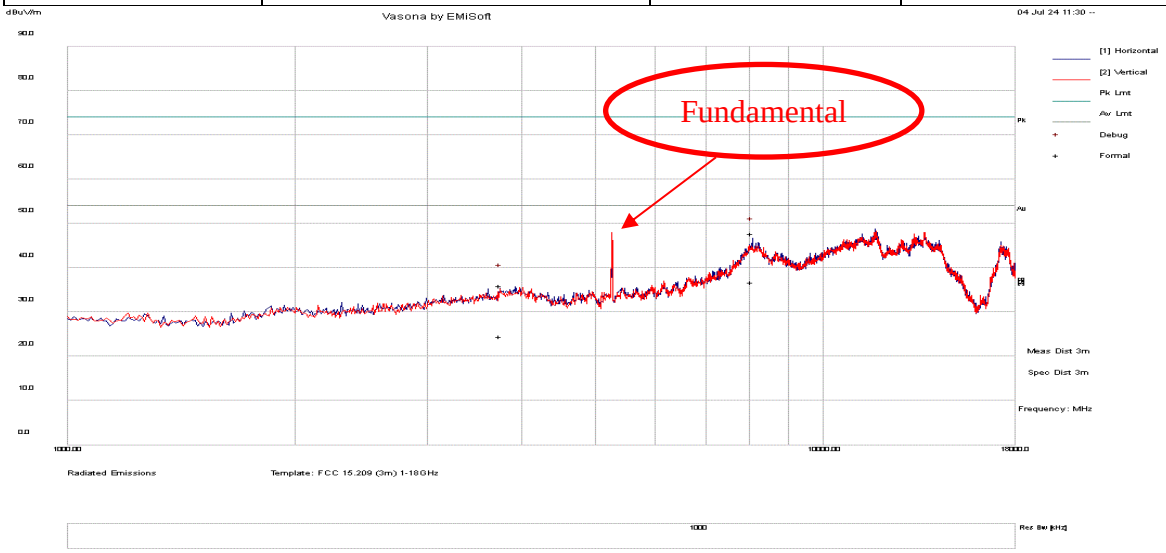



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7965.44 | 18.34 | 14.19 | 15.36 | 47.89 | Peak Max | H | 130 | 181 | 74.00 | -26.11 | Pass |
| 2 | 4031.61 | 21.61 | 9.91 | 5.09 | 36.61 | Peak Max | H | 181 | 121 | 74.00 | -37.39 | Pass |
| 3 | 7965.44 | 6.93 | 14.19 | 15.36 | 36.48 | Average Max | H | 130 | 181 | 54.00 | -17.52 | Pass |
| 4 | 4031.61 | 9.90 | 9.91 | 5.09 | 24.90 | Average Max | H | 181 | 121 | 54.00 | -29.10 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5260MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

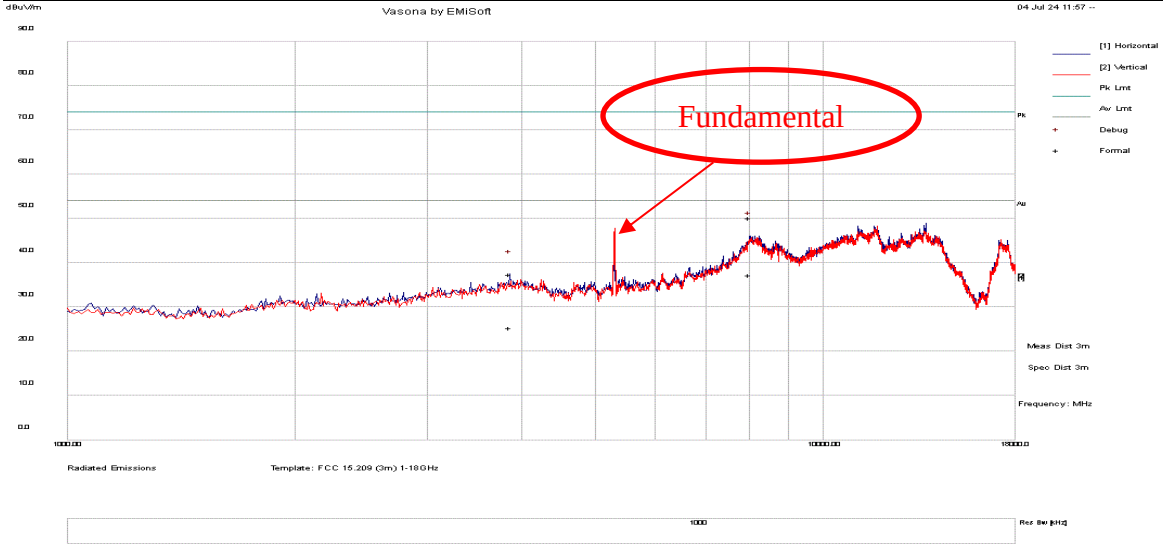



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8067.762 | 17.80 | 14.20 | 15.80 | 47.80 | Peak Max | H | 166 | 142 | 74 | -26.20 | Pass |
| 2 | 3742.642 | 22.30 | 8.80 | 5.00 | 36.10 | Peak Max | H | 129 | 162 | 74 | -37.90 | Pass |
| 3 | 8067.762 | 6.80 | 14.20 | 15.80 | 36.80 | Average Max | H | 166 | 142 | 54 | -17.20 | Pass |
| 4 | 3742.642 | 10.90 | 8.80 | 5.00 | 24.70 | Average Max | H | 129 | 162 | 54 | -29.30 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5300MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

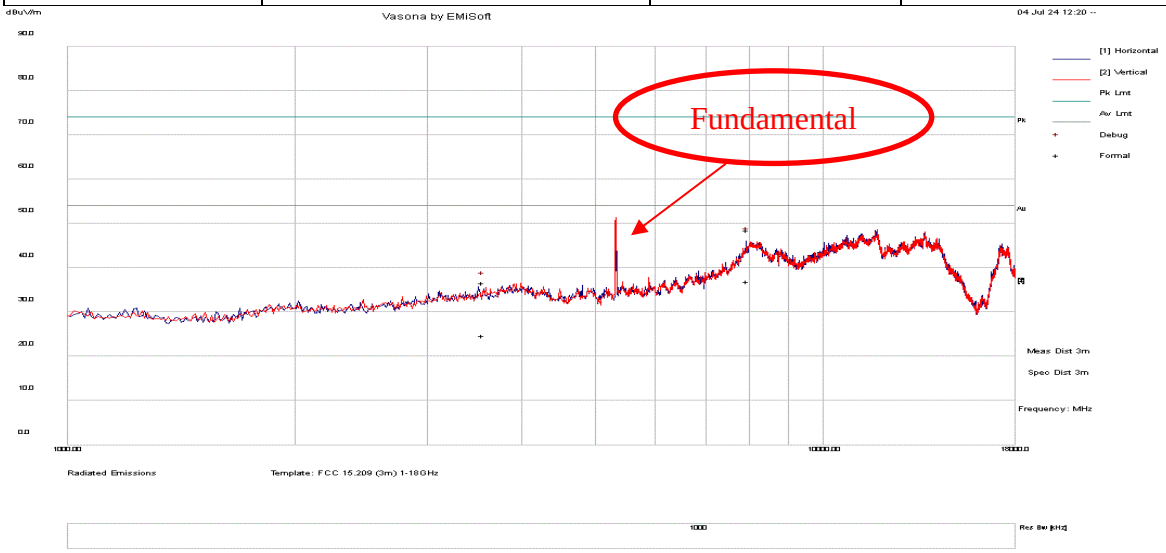



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8012.517 | 20.10 | 14.30 | 15.90 | 50.30 | Peak Max | H | 156 | 39 | 74 | -23.70 | Pass |
| 2 | 3851.703 | 22.70 | 9.30 | 5.50 | 37.50 | Peak Max | H | 184 | 0 | 74 | -36.50 | Pass |
| 3 | 8012.517 | 7.20 | 14.30 | 15.90 | 37.40 | Average Max | H | 156 | 39 | 54 | -16.60 | Pass |
| 4 | 3851.703 | 10.50 | 9.30 | 5.50 | 25.30 | Average Max | H | 184 | 0 | 54 | -28.70 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5320MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

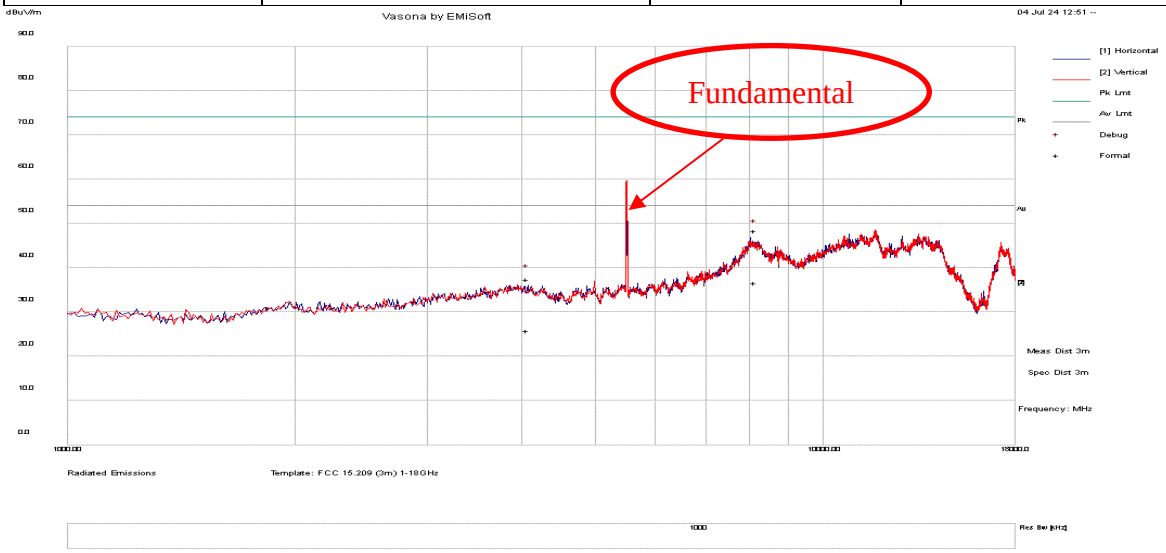



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7965.34 | 19.00 | 14.20 | 15.40 | 48.60 | Peak Max | H | 155 | 135 | 74 | -25.40 | Pass |
| 2 | 3547.177 | 23.90 | 8.30 | 4.40 | 36.60 | Peak Max | H | 156 | 52 | 74 | -37.40 | Pass |
| 3 | 7965.34 | 7.40 | 14.20 | 15.40 | 37.00 | Average Max | H | 155 | 135 | 54 | -17.00 | Pass |
| 4 | 3547.177 | 12.00 | 8.30 | 4.40 | 24.70 | Average Max | H | 156 | 52 | 54 | -29.30 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5500MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

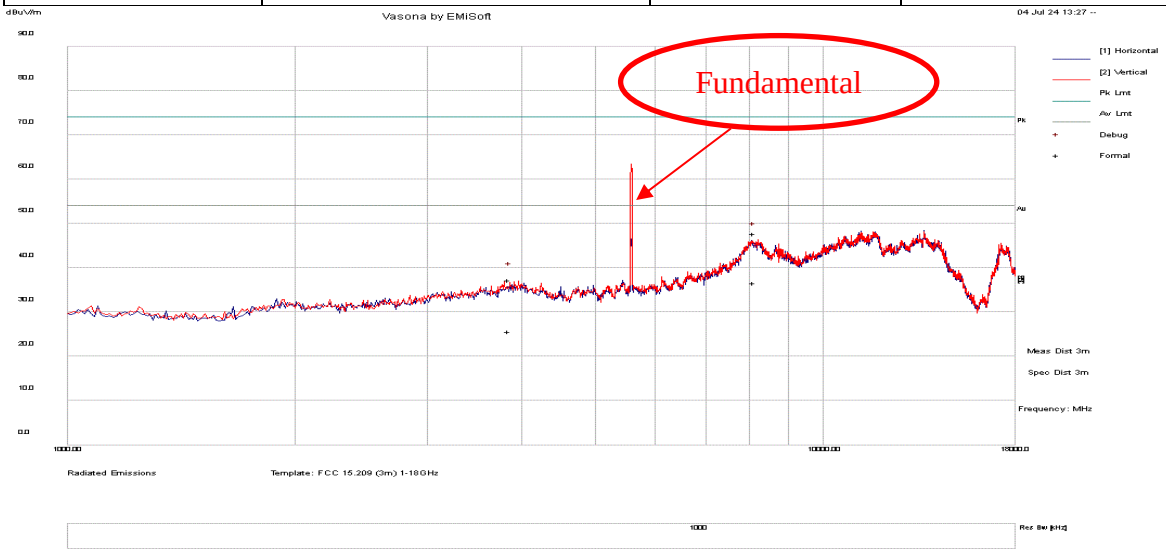



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8151.605 | 18.60 | 14.20 | 15.60 | 48.40 | Peak Max | H | 160 | 147 | 74 | -25.60 | Pass |
| 2 | 4062.139 | 22.60 | 9.90 | 5.00 | 37.50 | Peak Max | H | 100 | 53 | 74 | -36.50 | Pass |
| 3 | 8151.605 | 6.80 | 14.20 | 15.60 | 36.60 | Average Max | H | 160 | 147 | 54 | -17.40 | Pass |
| 4 | 4062.139 | 10.90 | 9.90 | 5.00 | 25.80 | Average Max | H | 100 | 53 | 54 | -28.20 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5580MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

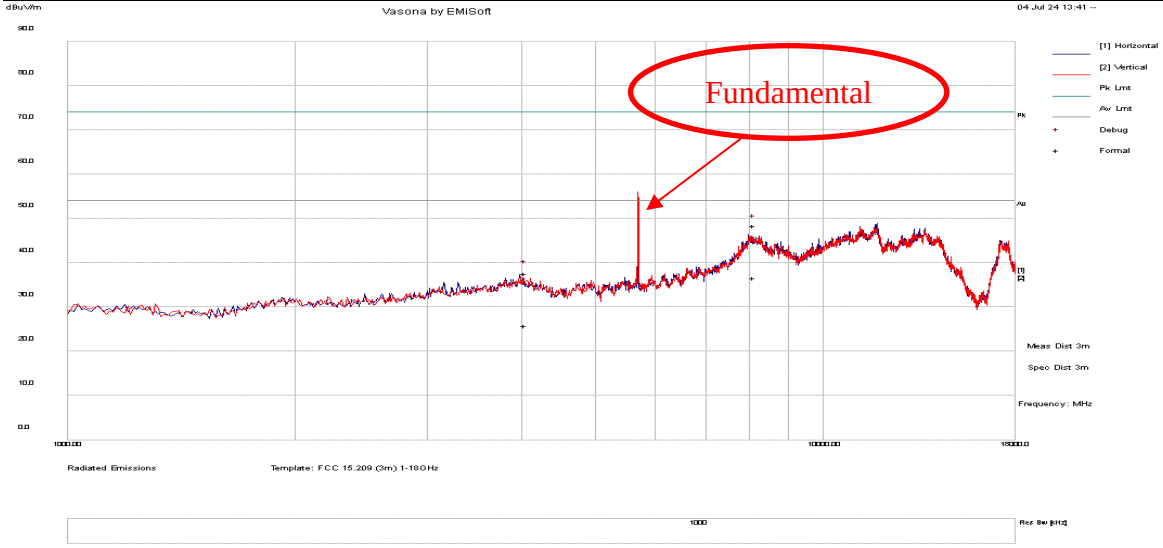



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8104.338 | 17.90 | 14.20 | 15.70 | 47.80 | Peak Max | H | 130 | 108 | 74 | -26.20 | Pass |
| 2 | 3849.386 | 22.60 | 9.30 | 5.50 | 37.40 | Peak Max | H | 100 | 124 | 74 | -36.60 | Pass |
| 3 | 8104.338 | 6.70 | 14.20 | 15.70 | 36.60 | Average Max | H | 130 | 108 | 54 | -17.40 | Pass |
| 4 | 3849.386 | 10.90 | 9.30 | 5.50 | 25.70 | Average Max | H | 100 | 124 | 54 | -28.30 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5700MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

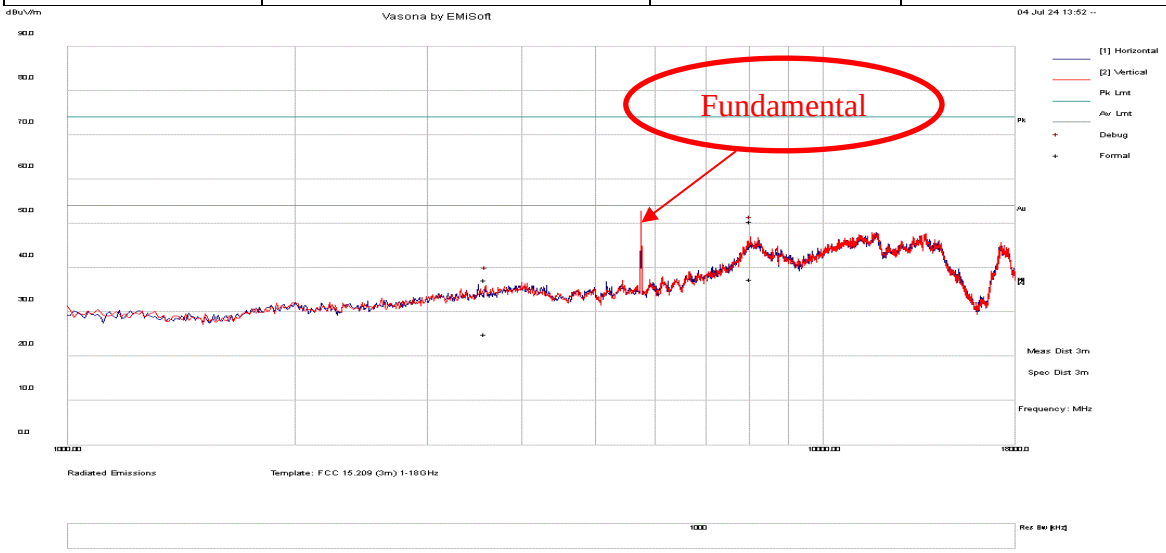



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8106.605 | 18.50 | 14.20 | 15.70 | 48.40 | Peak Max | H | 178 | 120 | 74 | -25.60 | Pass |
| 2 | 4044.121 | 22.70 | 9.90 | 5.10 | 37.70 | Peak Max | H | 165 | 0 | 74 | -36.30 | Pass |
| 3 | 8106.605 | 6.70 | 14.20 | 15.70 | 36.60 | Average Max | H | 178 | 120 | 54 | -17.40 | Pass |
| 4 | 4044.121 | 10.80 | 9.90 | 5.10 | 25.80 | Average Max | H | 165 | 0 | 54 | -28.20 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5745MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

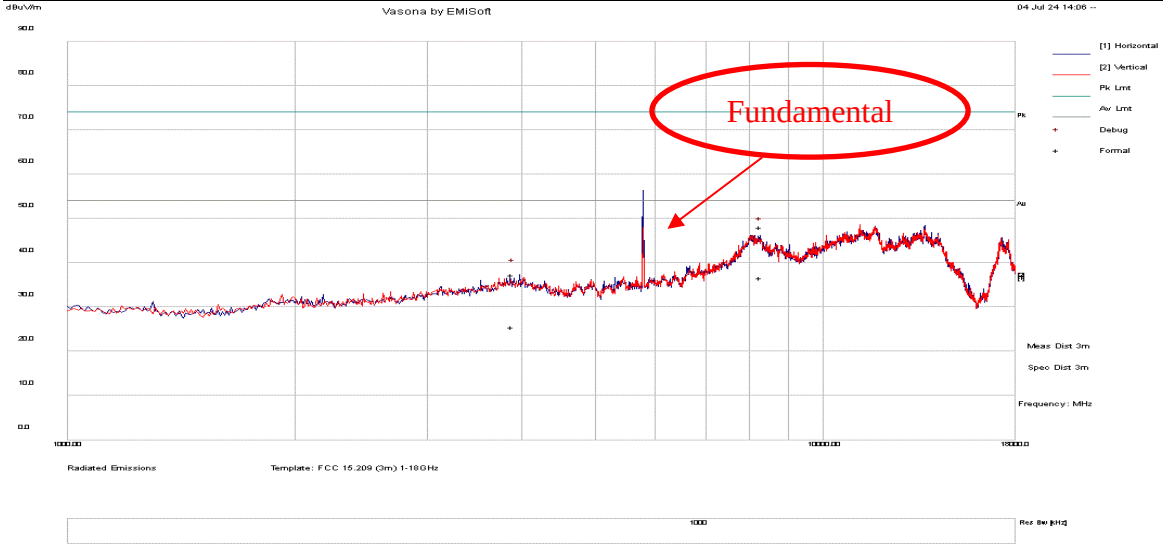



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8021.947 | 20.30 | 14.30 | 15.80 | 50.40 | Peak Max | H | 201 | 0 | 74 | -23.60 | Pass |
| 2 | 3580.155 | 24.40 | 8.40 | 4.50 | 37.30 | Peak Max | H | 150 | 42 | 74 | -36.70 | Pass |
| 3 | 8021.947 | 7.40 | 14.30 | 15.80 | 37.50 | Average Max | H | 201 | 0 | 54 | -16.50 | Pass |
| 4 | 3580.155 | 12.10 | 8.40 | 4.50 | 25.00 | Average Max | H | 150 | 42 | 54 | -29.00 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5785MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |

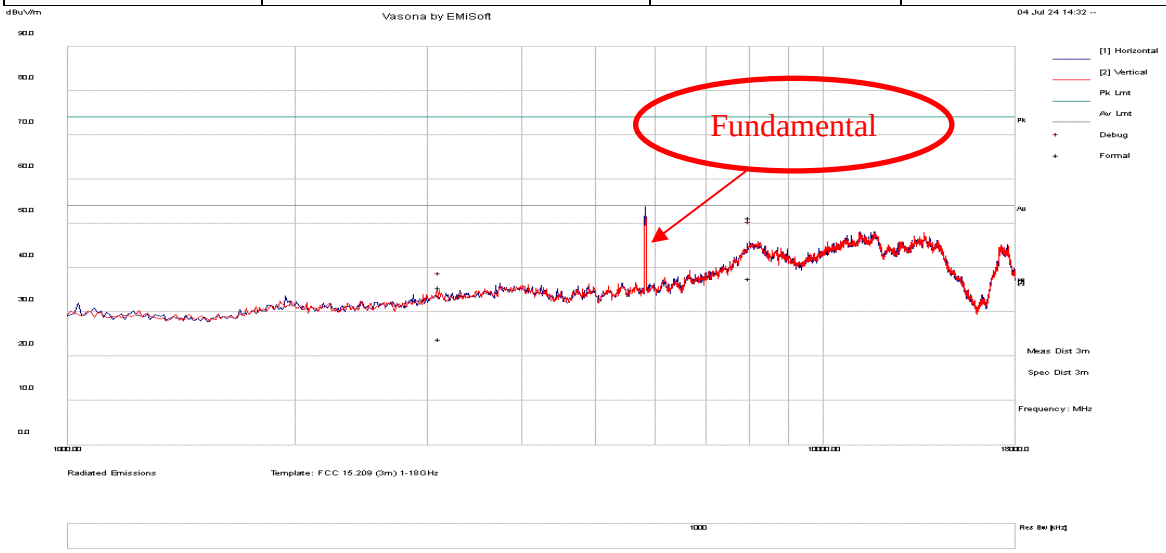



| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8269.913 | 18.50 | 14.20 | 15.40 | 48.10 | Peak Max | H | 167 | 79 | 74 | -25.90 | Pass |
| 2 | 3888.485 | 22.30 | 9.50 | 5.50 | 37.30 | Peak Max | H | 182 | 170 | 74 | -36.70 | Pass |
| 3 | 8269.913 | 7.10 | 14.20 | 15.40 | 36.70 | Average Max | H | 167 | 79 | 54 | -17.30 | Pass |
| 4 | 3888.485 | 10.50 | 9.50 | 5.50 | 25.50 | Average Max | H | 182 | 170 | 54 | -28.50 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

| Test Standard: | FCC15.407, 15.209, RSS-247 | Mode: | 11n, 5825MHz |
|---|---|---|---|
| Frequency Range: | 1 GHz - 18 GHz | Test Date: | 07/04/2024 |
| Antenna Type/Polarity: | Horn/Hor & Ver | Test Personnel: | Minoush |
| Remark: | N/A | Test Result: | Pass |




| No. | Frequency MHz | Raw dBuV | Cable Loss | AF dB/m | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8000.391 | 21.20 | 14.30 | 15.90 | 51.40 | Peak Max | H | 176 | 51 | 74 | -22.60 | Pass |
| 2 | 3108.846 | 24.60 | 7.70 | 3.20 | 35.50 | Peak Max | H | 134 | 0 | 74 | -38.50 | Pass |
| 3 | 8000.391 | 7.50 | 14.30 | 15.90 | 37.70 | Average Max | H | 176 | 51 | 54 | -16.30 | Pass |
| 4 | 3108.846 | 13.00 | 7.70 | 3.20 | 23.90 | Average Max | H | 134 | 0 | 54 | -30.10 | Pass |

**Remarks:**

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
2. AF(dB/m) = Antenna Factor (dB/m) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

## 18GHz – 40GHz test result

Note: no substantial emission close to limits.

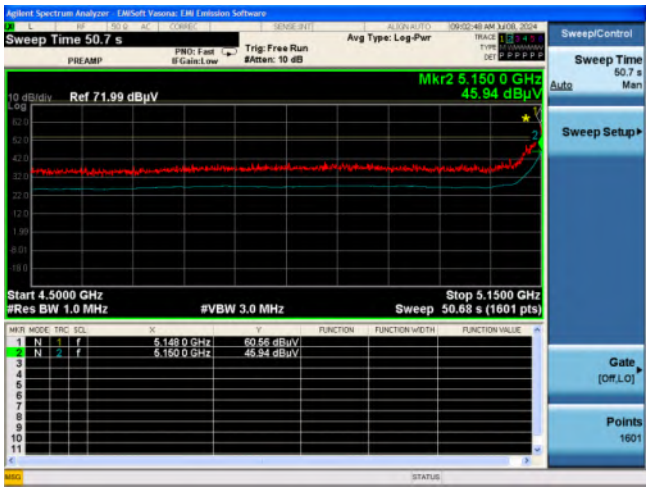
## Restricted Band measurement result

| Mode | Data rate | Channel | Frequency (MHz) | Level (dBuV/m) | Measurement Type | Limit (dBuV/m) | Margin (dB) | Pass/Fail |
|---|---|---|---|---|---|---|---|---|
| 802.11a | 6Mbps | 36 | 5149.2 | 55.61 | Peak Max | 74 | -18.39 | Pass |
| | | | 5150.0 | 41.07 | Average Max | 54 | -12.93 | Pass |
| | | 64 | 5353.09 | 57.62 | Peak Max | 74 | -16.38 | Pass |
| | | | 5350.00 | 37.05 | Average Max | 54 | -16.95 | Pass |
| | | 100 | 5450.58 | 54.69 | Peak Max | 74 | -19.31 | Pass |
| | | | 5459.86 | 34.41 | Average Max | 54 | -19.59 | Pass |
| 802.11n | MCS0 | 36 | 5148.0 | 60.56 | Peak Max | 74 | -13.44 | Pass |
| | | | 5150.0 | 45.94 | Average Max | 54 | -8.06 | Pass |
| | | 64 | 5353.16 | 62.65 | Peak Max | 74 | -11.35 | Pass |
| | | | 5350.00 | 45.72 | Average Max | 54 | -8.28 | Pass |
| | | 100 | 5459.66 | 58.55 | Peak Max | 74 | -15.45 | Pass |
| | | | 5460.00 | 41.65 | Average Max | 54 | -12.35 | Pass |
| 802.11ac | MCS0 | 36 | 5150.00 | 59.62 | Peak Max | 74 | -14.38 | Pass |
| | | | 5150.00 | 49.30 | Average Max | 54 | -4.70 | Pass |
| | | 64 | 5350.76 | 65.94 | Peak Max | 74 | -8.06 | Pass |
| | | | 5350.00 | 50.00 | Average Max | 54 | -4.00 | Pass |
| | | 100 | 5458.63 | 58.97 | Peak Max | 74 | -15.03 | Pass |
| | | | 5460.00 | 42.20 | Average Max | 54 | -11.80 | Pass |

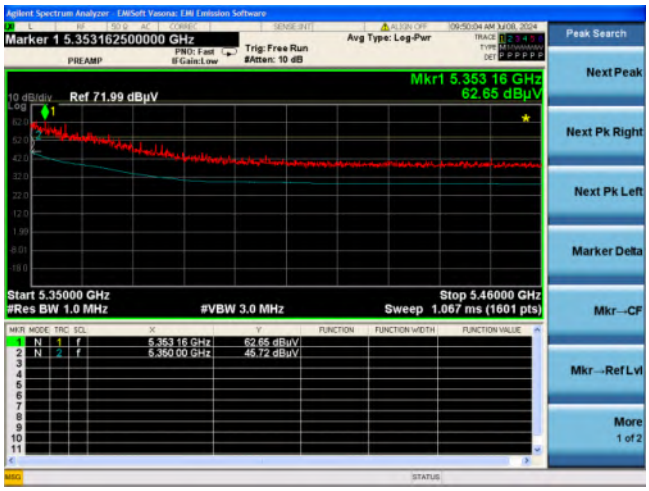
## Test plots


Restricted Band -11a-5180MHz


Restricted Band -11a-5320MHz




Restricted Band -11n-5180MHz




Restricted Band -11n-5320MHz


Restricted Band -11ac-5180MHz


Restricted Band -11ac-5320MHz


Restricted Band -11a-5500MHz


Restricted Band -11n-5500MHz


Restricted Band -11ac-5500MHz

## 7.8 Conducted Emissions

### *7.8.1 Requirement*

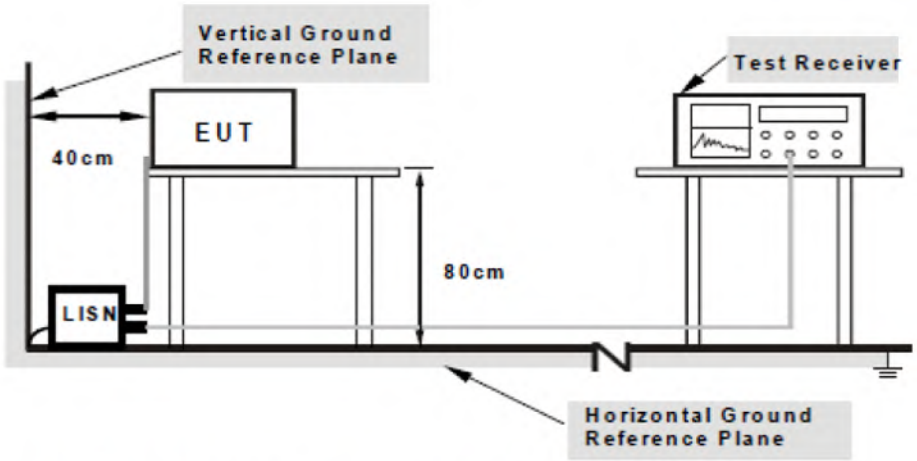
Per § 15.207 (a), RSS Gen 8.8

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

**Limits for Conducted Emissions at the Mains Ports**

| Section | Frequency ranges (MHz) | Limit (dBuV) | |
|---|---|---|---|
| | | QP | Average |
| Class B devices | 0.15 – 0.5 | 66 – 56 | 56 – 46 |
| | 0.5 – 5 | 56 | 46 |
| | 5 - 30 | 60 | 50 |
| NOTE 1 The lower limit shall apply at the transition frequencies. | | | |

### *7.8.2 Test setup*



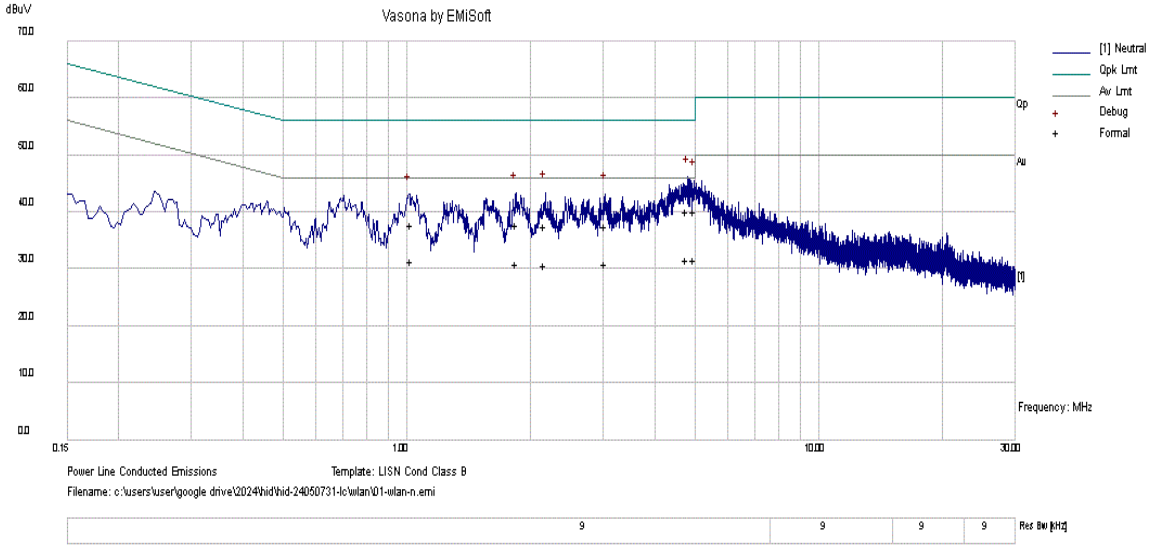

Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

### *7.8.3 Test Procedure*

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. The LISN bonded to the reference ground plane used has a direct current (dc) resistance of less than 2.5 mΩ.
4. All other supporting equipment was powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the Live / Neutral line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, were then selected.
8. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made
9. All possible modes of operation were investigated. Only the worst case emissions were measured and reported. All other emissions were relatively insignificant.

### *7.8.4 Test Result*

| Test Standard: | Part 15.207, RSS Gen | Mode: | WLAN |
|---|---|---|---|
| Frequency Range: | 0.15-30MHz | Test Date: | 07/01/2024 |
| Line: | Neutral | Test Personnel: | Lining |
| Remark: | 120VAC, 60Hz | Test Result: | Pass |

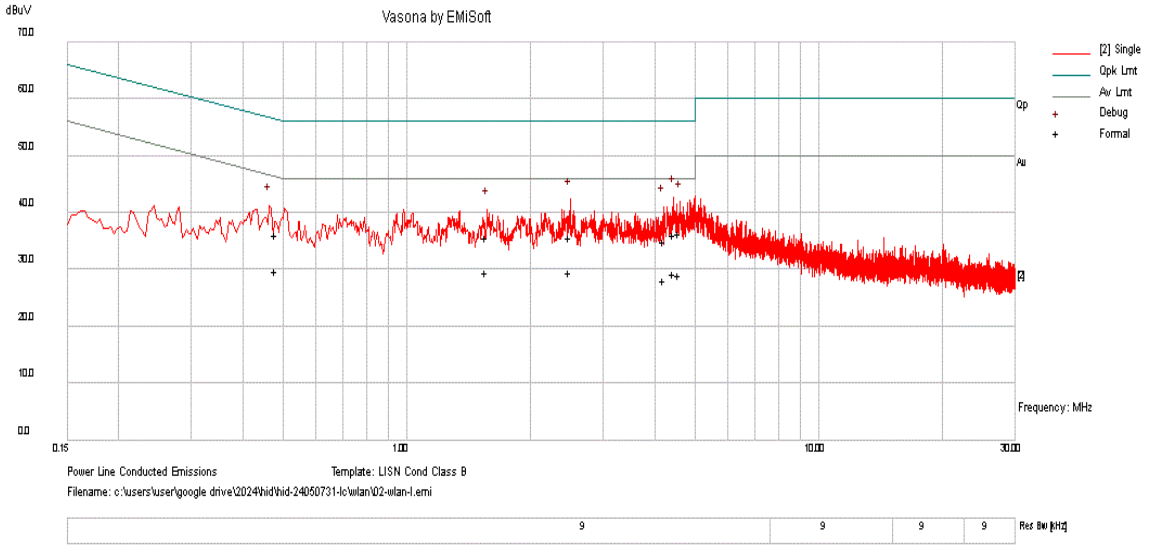



| No. | Frequency (MHz) | Raw (dBuV) | Cable Loss (dB) | Factors (dB) | Level (dBuV) | Meas. Type | Line | Limit (dBuV) | Margin (dB) | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.8 | 29.52 | 10.38 | 0.15 | 40.05 | Quasi Peak | Neutral | 56.00 | -15.95 | Pass |
| 2 | 4.98 | 29.66 | 10.39 | 0.14 | 40.19 | Quasi Peak | Neutral | 56.00 | -15.81 | Pass |
| 3 | 2.17 | 27.12 | 10.23 | 0.10 | 37.45 | Quasi Peak | Neutral | 56.00 | -18.55 | Pass |
| 4 | 1.85 | 27.36 | 10.21 | 0.10 | 37.67 | Quasi Peak | Neutral | 56.00 | -18.33 | Pass |
| 5 | 3.03 | 27.23 | 10.28 | 0.12 | 37.63 | Quasi Peak | Neutral | 56.00 | -18.37 | Pass |
| 6 | 1.03 | 27.61 | 10.15 | 0.10 | 37.86 | Quasi Peak | Neutral | 56.00 | -18.14 | Pass |
| 7 | 4.8 | 21.25 | 10.38 | 0.15 | 31.78 | Average | Neutral | 46.00 | -14.22 | Pass |
| 8 | 4.98 | 21.25 | 10.39 | 0.14 | 31.78 | Average | Neutral | 46.00 | -14.22 | Pass |
| 9 | 2.17 | 20.49 | 10.23 | 0.10 | 30.82 | Average | Neutral | 46.00 | -15.18 | Pass |
| 10 | 1.85 | 20.70 | 10.21 | 0.10 | 31.01 | Average | Neutral | 46.00 | -14.99 | Pass |
| 11 | 3.03 | 20.45 | 10.28 | 0.12 | 30.85 | Average | Neutral | 46.00 | -15.15 | Pass |
| 12 | 1.03 | 21.16 | 10.15 | 0.10 | 31.41 | Average | Neutral | 46.00 | -14.59 | Pass |

**REMARKS:**

1. The emission levels of other frequencies were very low against the limit.
2. Factor = Inert loss of LISN
3. Margin value = Emission level - Limit value
4. Emission Level = Raw Value + Cable loss + Factors Value.

| Test Standard: | Part 15.207, RSS Gen | Mode: | WLAN |
|---|---|---|---|
| Frequency Range: | 0.15 - 30MHz | Test Date: | 07/01/2024 |
| Line: | Live | Test Personnel: | Lining |
| Remark: | 120VAC, 60Hz | Test Result: | Pass |




| No. | Frequency (MHz) | Raw (dBuV) | Cable Loss (dB) | Factors (dB) | Level (dBuV) | Meas. Type | Line | Limit (dBuV) | Margin (dB) | Pass /Fail |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.45 | 25.68 | 10.36 | 0.14 | 36.18 | Quasi Peak | Live | 56.00 | -19.82 | Pass |
| 2 | 2.49 | 25.31 | 10.25 | 0.11 | 35.67 | Quasi Peak | Live | 56.00 | -20.33 | Pass |
| 3 | 4.59 | 25.81 | 10.37 | 0.14 | 36.32 | Quasi Peak | Live | 56.00 | -19.68 | Pass |
| 4 | 4.2 | 24.42 | 10.35 | 0.14 | 34.91 | Quasi Peak | Live | 56.00 | -21.09 | Pass |
| 5 | 0.48 | 25.86 | 10.11 | 0.11 | 36.08 | Quasi Peak | Live | 56.32 | -20.24 | Pass |
| 6 | 1.56 | 25.40 | 10.19 | 0.10 | 35.69 | Quasi Peak | Live | 56.00 | -20.31 | Pass |
| 7 | 4.45 | 18.84 | 10.36 | 0.14 | 29.34 | Average | Live | 46.00 | -16.66 | Pass |
| 8 | 2.49 | 19.11 | 10.25 | 0.11 | 29.47 | Average | Live | 46.00 | -16.53 | Pass |
| 9 | 4.59 | 18.61 | 10.37 | 0.14 | 29.12 | Average | Live | 46.00 | -16.88 | Pass |
| 10 | 4.2 | 17.74 | 10.35 | 0.14 | 28.23 | Average | Live | 46.00 | -17.77 | Pass |
| 11 | 0.48 | 19.60 | 10.11 | 0.11 | 29.82 | Average | Live | 46.32 | -16.50 | Pass |
| 12 | 1.56 | 19.30 | 10.19 | 0.10 | 29.59 | Average | Live | 46.00 | -16.41 | Pass |

**REMARKS:**

1. The emission levels of other frequencies were very low against the limit.
2. Factor = Inert loss of LISN
3. Margin value = Emission level - Limit value
4. Emission Level = Raw Value + Cable loss + Factors Value.

# 8 EUT and Test Setup Photos

Refer to FCC exhibits

# 9 Test Instrument List

| Eqsuipment | Manufacturer | Model | Instrument Number | Cal. Date | Cal. Due |
|---|---|---|---|---|---|
| Semi-Anechoic Chamber | ETS-Lindgren | 10M | VL001 | 10/18/2023 | 10/18/2024 |
| Shielding Control Room | ETS-Lindgren | Series 81 | VL006 | N/A1) | N/A1) |
| Spectrum Analyzer | Keysight | N9020A | MY50110074 | 05/15/2024 | 05/15/2025 |
| Spectrum Analyser (9kHz-43GHz) | Anritsu | MS2830A | 6201145210 | 05/16/2024 | 05/16/2025 |
| EMC Test Receiver | R&S | ESL6 | 100230 | 05/14/2024 | 05/14/2025 |
| LISN (9KHz – 30MHz) | EMCO | 3816/2 | 9705-1066 | 05/28/2024 | 05/28/2025 |
| Bi-Log Antenna | ETS-Lindgren | 3142E | 217921 | 07/19/2023 | 07/19/2024 |
| Horn Antenna (1-18GHz) | Electro-Metrics | EM-6961 | 6292 | 07/21/2023 | 07/21/2024 |
| Horn Antenna (18-40GHz) | Com-Power | AH-840 | 101109 | 07/21/2023 | 07/21/2024 |
| Preamplifier | RF Bay, Inc. | LPA-10-20 | 11180621 | 07/16/2023 | 07/16/2024 |
| True RMS Multi-meter | UNI-T | UT181A | C173014829 | 05/15/2024 | 05/15/2025 |
| Temp / Humidity / Pressure Meter | PCE Instruments | PCE-THB 40 | R062028 | 05/17/2024 | 05/17/2025 |
| RF Attenuator | Pasternack | PE7005-3 | VL061 | N/A2) | N/A2) |
| EM Center Control | ETS-Lindgren | 7006-001 | 160136 | N/A1) | N/A1) |
| Turn Table | ETS-Lindgren | 2181-3.03 | VL002 | N/A1) | N/A1) |
| Boresight Antenna Tower | ETS-Lindgren | 2171B | VL003 | N/A1) | N/A1) |
| Loop Antenna (9k-30MHz) | Com-Power | AL-130 | 121012 | 05/17/2024 | 05/17/2025 |
| RE test cable (below 6GHz) | Vista | RE-6GHz-01 | RE-6GHz-01 | 07/16/2023 | 07/16/2024 |
| RE test cable (1-18GHz) | PhaseTrack | II-240 | RE-18GHz-01 | 07/16/2023 | 07/16/2024 |
| RE test cable (>18GHz) | Sucoflex | 104 | 344903/4 | 07/16/2023 | 07/16/2024 |
| Pulse limiter | Com-Power | LIT-930A | 531727 | 07/16/2023 | 07/16/2024 |
| CE test cable #1 | FIRST RF | FRF-C-1002-001 | CE-6GHz-01 | 07/16/2023 | 07/16/2024 |
| CE test cable#2 | FIRST RF | FRF-C-1002-001 | CE-6GHz-02 | 07/16/2023 | 07/16/2024 |
| Agilent Signal Generator | MXG N5182A | N5182A | US47080548 | 05/15/2024 | 05/15/2025 |
| Power Splitter/Combiner | Mini-Circuits | ZFSC-2-9G+ | VL052 | N/A1) | N/A1) |
| Power Splitter/Combiner | Mini-Circuits | ZFSC-2-9G+ | VL053 | N/A1) | N/A1) |
| Power Splitter/Combiner | Mini-Circuits | ZFSC-2-9G+ | VL054 | N/A1) | N/A1) |
| Power Splitter/Combiner | Mini-Circuits | ZFSC-2-9G+ | VL055 | N/A1) | N/A1) |

Note:

1) This equipment is not for measurement purpose and only require functional verification. Calibration is not required.
2) his equipment is part of test system that to be calibrated as a system. It's verified together with the test system prior to testing.

**---END---**