

# TEST REPORT



**Dt&C Co., Ltd.**

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1. Report No : DRTFCC2311-0150(1)

2. Customer

- Name (FCC) : DHAUTOWARE Co.,Ltd.
- Address (FCC) : 278, Beotkkot-ro, Geumcheon-gu Seoul South Korea 08511

3. Use of Report : FCC Original Grant

4. Product Name / Model Name : 23MY QXIPe 8inch AVN / DM-N12206A  
FCC ID : 2BDNYJCHQX00AVNC

5. FCC Regulation(s): Part 15.407

Test Method used: KDB789033 D02v02r01, KDB662911 D01v02r01, ANSI C63.10-2013

6. Date of Test : 2023.11.01 ~ 2023.11.22

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

8. Testing Environment : See appended test report.

9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

This test report is not related to KOLAS accreditation.

|             |                                  |                               |
|-------------|----------------------------------|-------------------------------|
| Affirmation | Tested by                        | Technical Manager             |
|             | Name : JaeHyeok Bang (Signature) | Name : JaeJin Lee (Signature) |

2023 . 11 . 30 .

**Dt&C Co., Ltd.**

If this report is required to confirmation of authenticity, please contact to [report@dtnc.net](mailto:report@dtnc.net)

## Test Report Version

| Test Report No.    | Date          | Description                                    | Revised by    | Reviewed by |
|--------------------|---------------|------------------------------------------------|---------------|-------------|
| DRTFCC2311-0150    | Nov. 24, 2023 | Initial issue                                  | JaeHyeok Bang | JaeJin Lee  |
| DRTFCC2311-0150(1) | Nov. 30, 2023 | Add the power verification data(Appendix IIII) | JaeHyeok Bang | JaeJin Lee  |
|                    |               |                                                |               |             |
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## 1. General Information

### 1.1. Description of EUT

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Equipment Class                           | Unlicensed National Information Infrastructure TX(NII)                                                                                                                                                                                                                                                                                                                                                                   |
| Product Name                              | 23MY QXIPE 8inch AVN                                                                                                                                                                                                                                                                                                                                                                                                     |
| Model Name                                | DM-N12206A                                                                                                                                                                                                                                                                                                                                                                                                               |
| Add Model Name                            | JCHQX00AVNC                                                                                                                                                                                                                                                                                                                                                                                                              |
| Firmware Version<br>Identification Number | S2015                                                                                                                                                                                                                                                                                                                                                                                                                    |
| EUT Serial Number                         | No Specified                                                                                                                                                                                                                                                                                                                                                                                                             |
| Power Supply                              | DC 14.4 V                                                                                                                                                                                                                                                                                                                                                                                                                |
| Modulation Technique                      | OFDM                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Antenna Specification                     | Antenna Type: PCB Antenna<br>Gain<br>Antenna 1: 5dBi (5150~5850MHz)<br>Antenna 2: 5dBi (5150~5850MHz)                                                                                                                                                                                                                                                                                                                    |
| Frequency Range                           | U-NII 1(5150 ~ 5250 MHz) <ul style="list-style-type: none"><li>▪ 802.11a/n(HT20)/ac(VHT20): 5180 ~ 5240 MHz</li><li>▪ 802.11n(HT40)/ac(VHT40): 5190 ~ 5230 MHz</li><li>▪ 802.11ac(VHT80): 5210 MHz</li></ul> U-NII 3(5725 ~ 5850MHz) <ul style="list-style-type: none"><li>▪ 802.11a/n(HT20)/ac(VHT20): 5745 ~ 5825 MHz</li><li>▪ 802.11n(HT40)/ac(VHT40): 5755 ~ 5795 MHz</li><li>▪ 802.11ac(VHT80): 5775 MHz</li></ul> |

## 1.2. Declaration by the applicant / manufacturer

N/A

## 1.3. Testing Laboratory

|                                                                                                                                                                                      |   |                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------|
| <b>Dt&amp;C Co., Ltd.</b>                                                                                                                                                            |   |                  |
| The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. |   |                  |
| The test site complies with the requirements of Part 2.948 according to ANSI C63.4-2014.                                                                                             |   |                  |
| - FCC & IC MRA Designation No. : KR0034                                                                                                                                              |   |                  |
| - ISED#: 5740A                                                                                                                                                                       |   |                  |
| <a href="http://www.dtnet.net">www.dtnet.net</a>                                                                                                                                     |   |                  |
| Telephone                                                                                                                                                                            | : | + 82-31-321-2664 |
| FAX                                                                                                                                                                                  | : | + 82-31-321-1664 |

## 1.4. Testing Environment

| Ambient Condition   |                 |
|---------------------|-----------------|
| ▪ Temperature       | +21 °C ~ +24 °C |
| ▪ Relative Humidity | +40 % ~ +43 %   |

## 1.5. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95 % level of confidence.

| Parameter                          | Measurement uncertainty                               |
|------------------------------------|-------------------------------------------------------|
| Antenna-port conducted emission    | 1.0 dB (The confidence level is about 95 %, $k = 2$ ) |
| Radiated emission (1 GHz Below)    | 4.8 dB (The confidence level is about 95 %, $k = 2$ ) |
| Radiated emission (1 GHz ~ 18 GHz) | 4.8 dB (The confidence level is about 95 %, $k = 2$ ) |
| Radiated emission (18 GHz Above)   | 4.9 dB (The confidence level is about 95 %, $k = 2$ ) |

## 1.6. Test Equipment List

| Type                                | Manufacturer           | Model                       | Cal.Date<br>(yy/mm/dd) | Next.Cal.Date<br>(yy/mm/dd) | S/N                  |
|-------------------------------------|------------------------|-----------------------------|------------------------|-----------------------------|----------------------|
| Spectrum Analyzer                   | Agilent Technologies   | N9020A                      | 23/06/23               | 24/06/23                    | MY46471622           |
| Spectrum Analyzer                   | Agilent Technologies   | N9020A                      | 22/12/16               | 23/12/16                    | MY48011700           |
| Spectrum Analyzer                   | Agilent Technologies   | N9020A                      | 23/06/23               | 24/06/23                    | US47360812           |
| Spectrum Analyzer                   | KEYSIGHT               | N9030B                      | 22/12/16               | 23/12/16                    | MY55480168           |
| Receiver                            | Rohde Schwarz          | ESC13                       | 23/06/23               | 24/06/23                    | 100798               |
| DC Power Supply                     | Agilent Technologies   | 66332A                      | 23/06/23               | 24/06/23                    | US37474125           |
| DC Power Supply                     | SM techno              | SDP30-5D                    | 23/06/23               | 24/06/23                    | 305DMG288            |
| Multimeter                          | FLUKE                  | 17B+                        | 22/12/16               | 23/12/16                    | 36390701WS           |
| Signal Generator                    | Rohde Schwarz          | SMBV100A                    | 22/12/16               | 23/12/16                    | 255571               |
| Signal Generator                    | ANRITSU                | MG3695C                     | 22/12/16               | 23/12/16                    | 173501               |
| Thermohygrometer                    | BODYCOM                | BJ5478                      | 22/12/16               | 23/12/16                    | 120612-1             |
| Thermohygrometer                    | BODYCOM                | BJ5478                      | 22/12/16               | 23/12/16                    | 120612-2             |
| Thermohygrometer                    | BODYCOM                | BJ5478                      | 23/06/23               | 24/06/23                    | N/A                  |
| Loop Antenna                        | ETS-Lindgren           | 6502                        | 22/04/22               | 24/04/22                    | 203480               |
| Hybrid Antenna                      | Schwarzbeck            | VULB 9160                   | 22/12/16               | 23/12/16                    | 3362                 |
| Horn Antenna                        | ETS-Lindgren           | 3117                        | 23/06/23               | 24/06/23                    | 00143278             |
| Horn Antenna                        | A.H.Systems Inc.       | SAS-574                     | 23/06/23               | 24/06/23                    | 155                  |
| PreAmplifier                        | tsj                    | MLA-0118-B01-40             | 22/12/16               | 23/12/16                    | 1852267              |
| PreAmplifier                        | tsj                    | MLA-1840-J02-45             | 23/06/23               | 24/06/23                    | 16966-10728          |
| PreAmplifier                        | H.P                    | 8447D                       | 22/12/16               | 23/12/16                    | 2944A07774           |
| High Pass Filter                    | Wainwright Instruments | WHKX12-935-1000-15000-40SS  | 23/06/23               | 24/06/23                    | 8                    |
| High Pass Filter                    | Wainwright Instruments | WHKX10-2838-3300-18000-60SS | 23/06/23               | 24/06/23                    | 1                    |
| High Pass Filter                    | Wainwright Instruments | WHNX8.0/26.5-6SS            | 23/06/23               | 24/06/23                    | 3                    |
| Attenuator                          | Hefei Shunze           | SS5T2.92-10-40              | 23/06/23               | 24/06/23                    | 16012202             |
| Attenuator                          | Aeroflex/Weinschel     | 56-3                        | 23/06/23               | 24/06/23                    | Y2370                |
| Attenuator                          | SMAJK                  | SMAJK-2-3                   | 23/06/23               | 24/06/23                    | 3                    |
| Attenuator                          | SMAJK                  | SMAJK-2-3                   | 23/06/23               | 24/06/23                    | 2                    |
| Attenuator                          | Aeroflex/Weinschel     | 86-10-11                    | 23/06/23               | 24/06/23                    | 408                  |
| Power Meter & Wide Bandwidth Sensor | Anritsu                | ML2496A<br>MA2411B          | 22/12/16               | 23/12/16                    | 1338004<br>1911481   |
| Cable                               | Dt&C                   | Cable                       | 23/01/04               | 24/01/04                    | G-2                  |
| Cable                               | HUBER+SUHNER           | SUCOFLEX 100                | 23/01/04               | 24/01/04                    | G-3                  |
| Cable                               | Dt&C                   | Cable                       | 23/01/04               | 24/01/04                    | G-4                  |
| Cable                               | OMT                    | YSS21S                      | 23/01/04               | 24/01/04                    | G-5                  |
| Cable                               | Junkosha               | MWX241                      | 23/01/03               | 24/01/03                    | mmW-1                |
| Cable                               | Junkosha               | MWX241                      | 23/01/03               | 24/01/03                    | mmW-4                |
| Cable                               | HUBER+SUHNER           | SUCOFLEX100                 | 23/01/04               | 24/01/04                    | M-01                 |
| Cable                               | HUBER+SUHNER           | SUCOFLEX100                 | 23/01/04               | 24/01/04                    | M-02                 |
| Cable                               | JUNKOSHA               | MWX241/B                    | 23/01/04               | 24/01/04                    | M-03                 |
| Cable                               | JUNKOSHA               | J12J101757-00               | 23/01/04               | 24/01/04                    | M-07                 |
| Cable                               | HUBER+SUHNER           | SUCOFLEX106                 | 23/01/04               | 24/01/04                    | M-09                 |
| Cable                               | Radiall                | TESTPRO3                    | 23/01/04               | 24/01/04                    | RFC-70               |
| Test Software<br>(Radiated)         | tsj                    | EMI Measurement             | NA                     | NA                          | Version<br>2.00.0185 |

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.

## 2. Test Methodology

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB789033 D02v02r01 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB789033 D02v02r01. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

### 2.1. EUT Configuration

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

### 2.2. EUT Exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

### 2.3. General Test Procedures

#### Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB789033 D02v02r01.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

#### Radiated Emissions

Basically the radiated tests were performed with KDB789033 D02v02r01. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10-2013 as stated on KDB789033 D02v02r01.

The EUT is placed on a non-conductive table, which is 0.8 m above ground plane. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 1 m or 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axis.

### 2.4. Instrument Calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

## 2.5. Description of Test Modes

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting.

### EUT Operation test setup

- Test Software: Tera Term 4.104.0.0

### Transmitting Configuration of EUT

| Mode            | SISO  |       | MIMO      |
|-----------------|-------|-------|-----------|
|                 | Ant 1 | Ant 2 | Ant 1 & 2 |
| 802.11a         | O     | O     | X         |
| 802.11n(HT20)   | O     | O     | O         |
| 802.11ac(VHT20) | O     | O     | O         |
| 802.11n(HT40)   | O     | O     | O         |
| 802.11ac(VHT40) | O     | O     | O         |
| 802.11ac(VHT80) | O     | O     | O         |

O: Support, X: Not supported

### Worst-case Tested Mode

| Test Mode |                 | ANT configuration | Worst data rate |
|-----------|-----------------|-------------------|-----------------|
| TM 1      | 802.11a         | SISO              | 6Mbps           |
| TM 2      | 802.11ac(VHT20) | SISO / MIMO       | MCS0            |
| TM 3      | 802.11n(HT40)   | SISO              | MCS0            |
| TM 4      | 802.11ac(VHT40) | MIMO              | MCS0            |
| TM 5      | 802.11ac(VHT80) | SISO / MIMO       | MCS0            |

Note1: The worst case configuration was determined based on the certified module report.



### 3. Antenna Requirements

■ **According to Part 15.203**

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

**The antenna is attached on the PCB by means of unique connector.  
Therefore this E.U.T complies with the requirement of Part 15.203**

## 4. Summary of Test Result

| FCC Part Section(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Test Description                            | Limit                                            | Test Condition    | Status<br>Note 1 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------|-------------------|------------------|
| 15.407(a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Emission Bandwidth (26 dB Bandwidth)        | N/A                                              | Conducted         | NT Note 2        |
| 15.407(e)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Minimum Emission Bandwidth (6 dB Bandwidth) | > 500 kHz in 5 725 ~ 5 850 MHz                   |                   | NT Note 2        |
| 15.407(a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Maximum Conducted Output Power              | Part 15.407(a)                                   |                   | NT Note 2        |
| 15.407(a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Peak Power Spectral Density                 | Part 15.407(a)                                   |                   | NT Note 2        |
| 15.407(h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Dynamic Frequency Selection                 | Part 15.407(h)                                   |                   | NA Note 3        |
| 15.205<br>15.209<br>15.407(b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Unwanted Emissions                          | Part 15.209, 15.407(b)<br>(Refer to section 5.1) | Radiated          | C                |
| 15.207                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | AC Conducted Emissions                      | Part 15.207<br>(Refer to section 5.2)            | AC Line Conducted | NA Note 4        |
| 15.203                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Antenna Requirements                        | Part 15.203<br>(Refer to section 3)              | -                 | C                |
| <p>Note 1: <b>C</b> = Comply    <b>NC</b> = Not Comply    <b>NT</b> = Not Tested    <b>NA</b> = Not Applicable</p> <p>Note 2: This device uses the certified module. (FCC ID: 2ADQJ-YSP88459SM)<br/>Please refer to the module test for conducted signal test items.<br/>The conducted output power was verified to be the same as module.</p> <p>Note 3: This device supports U-NII-1, U-NII 3 band only.</p> <p>Note 4: This device is installed in a car. Therefore the power source is a battery of car.</p> |                                             |                                                  |                   |                  |

## 5. TEST RESULT

### 5.1 Unwanted Emissions

#### ■ Test Requirements

##### - Part 15.407(b)

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

- (1) For transmitters operating in the **5.15 GHz - 5.25 GHz band**: all emissions outside of the **5.15 GHz - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
- (2) For transmitters operating in the **5.25 GHz - 5.35 GHz band**: all emissions outside of the **5.15 GHz - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
- (3) For transmitters operating in the **5.47 GHz - 5.725 GHz band**: all emissions outside of the **5.47 GHz - 5.725 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
- (4) For transmitters operating in the **5.725 GHz - 5.85 GHz band**: (i) 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. The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (5) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**.  
Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.

##### - Part 15.209: General requirements

| Frequency (MHz) | FCC Limit (uV/m) | Measurement Distance (m) |
|-----------------|------------------|--------------------------|
| 0.009 – 0.490   | 2 400 / F (kHz)  | 300                      |
| 0.490 – 1.705   | 2 4000 / F (kHz) | 30                       |
| 1.705 – 30.0    | 30               | 30                       |

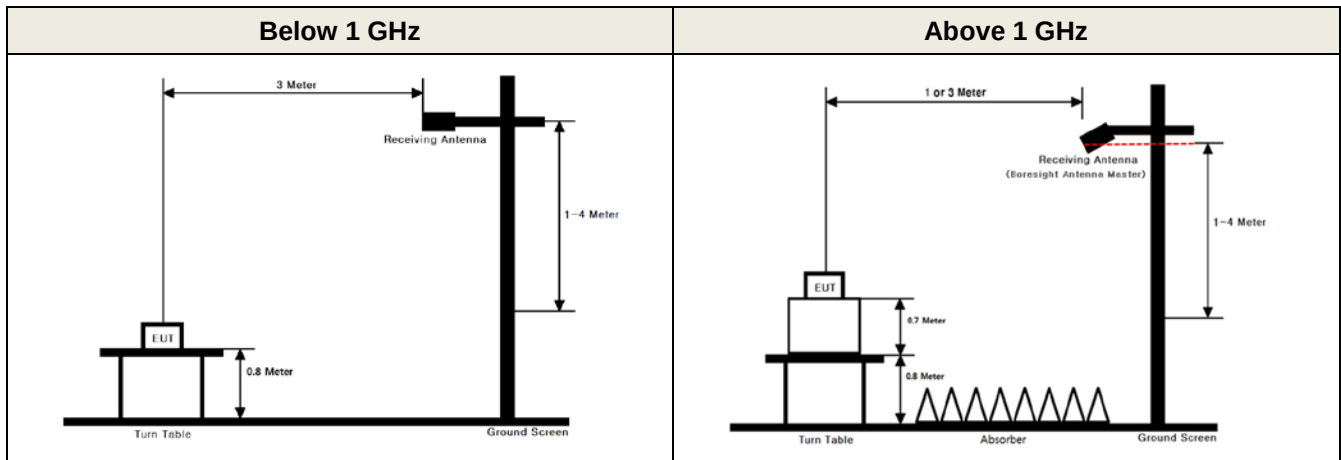
| Frequency (MHz) | FCC Limit (uV/m) | Measurement Distance (m) |
|-----------------|------------------|--------------------------|
| 30 ~ 88         | 100 **           | 3                        |
| 88 ~ 216        | 150 **           | 3                        |
| 216 ~ 960       | 200 **           | 3                        |
| Above 960       | 500              | 3                        |

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

##### - Part 15.205(a): Restricted band of operation

| MHz                 | MHz                   | MHz                     | MHz               | GHz          | GHz           |
|---------------------|-----------------------|-------------------------|-------------------|--------------|---------------|
| 0.009 ~ 0.110       | 8.414 25 ~ 8.414 75   | 108 ~ 121.94            | 1 300 ~ 1 427     | 4.5 ~ 5.15   | 14.47 ~ 14.5  |
| 0.495 ~ 0.505       | 12.29 ~ 12.293        | 123 ~ 138               | 1 435 ~ 1 626.5   | 5.35 ~ 5.46  | 15.35 ~ 16.2  |
| 2.173 5 ~ 2.190 5   | 12.519 75 ~ 12.520 25 | 149.9 ~ 150.05          | 1 645.5 ~ 1 646.5 | 7.25 ~ 7.75  | 17.7 ~ 21.4   |
| 4.125 ~ 4.128       | 12.576 75 ~ 12.577 25 | 156.524 75 ~ 156.525 25 | 1 660 ~ 1 710     | 8.025 ~ 8.5  | 22.01 ~ 23.12 |
| 4.177 25 ~ 4.177 75 | 13.36 ~ 13.41         | 156.7 ~ 156.9           | 1 718.8 ~ 1 722.2 | 9.0 ~ 9.2    | 23.6 ~ 24.0   |
| 4.207 25 ~ 4.207 75 | 16.42 ~ 16.423        | 162.012 5 ~ 167.17      | 2 200 ~ 2 300     | 9.3 ~ 9.5    | 31.2 ~ 31.8   |
| 6.215 ~ 6.218       | 16.694 75 ~ 16.695 25 | 167.72 ~ 173.2          | 2 310 ~ 2 390     | 10.6 ~ 12.7  | 36.43 ~ 36.5  |
| 6.267 75 ~ 6.268 25 | 16.804 25 ~ 16.804 75 | 240 ~ 285               | 2 483.5 ~ 2 500   | 13.25 ~ 13.4 | Above 38.6    |
| 6.311 75 ~ 6.312 25 | 25.5 ~ 25.67          | 322 ~ 335.4             | 2 655 ~ 2 900     |              |               |
| 8.291 ~ 8.294       | 37.5 ~ 38.25          | 399.90 ~ 410            | 3 260 ~ 3 267     |              |               |
| 8.362 ~ 8.366       | 73 ~ 74.6             | 608 ~ 614               | 3 332 ~ 3 339     |              |               |
| 8.376 25 ~ 8.386 75 | 74.8 ~ 75.2           | 960 ~ 1240              | 3 345.8 ~ 3 358   |              |               |
|                     |                       |                         | 3 600 ~ 4 400     |              |               |

## ■ Test Configuration



## ■ Test Procedure

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1 m or 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Radiated spurious emission measured using following Measurement Procedure of KDB789033 D02v02r01

### ► General Requirements for Unwanted Emissions Measurements

The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

#### ▪ EUT Duty Cycle

- (1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.
- (2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:
  - The EUT shall be configured to operate at the maximum achievable duty cycle.
  - Measure the duty cycle, x, of the transmitter output signal.
  - Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
  - The test report shall include the following additional information:
    - The reason for the duty cycle limitation.
    - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
    - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.
- (3) Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.

### ► Measurements below 1 000 MHz

- a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".
- b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

### ► Measurements Above 1 000 MHz (Peak)

- a) Follow the requirements in section II.G.3, "General Requirements for Unwanted Emissions Measurements".
- b) Peak emission levels are measured by setting the analyzer as follows:
  - (i) **RBW = 1 MHz.**
  - (ii) **VBW ≥ 3 MHz.**
  - (iii) **Detector = Peak.**
  - (iv) Sweep time = Auto.
  - (v) Trace mode = Max hold.
  - (vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

### ► Measurements Above 1000 MHz (Method AD)

- (i) **RBW = 1 MHz.**
- (ii) **VBW ≥ 3 MHz.**
- (iii) **Detector = RMS**, if  $\text{span} / (\# \text{ of points in sweep}) \leq \text{RBW} / 2$ . Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
- (iv) Averaging type = power (i.e., RMS)
  - As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
- (v) Sweep time = Auto.
- (vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.
- (vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
  - **If power averaging (RMS) mode was used in step (iv) above, the correction factor is  $10 \log(1/x)$ , where x is the duty cycle.** For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
  - If linear voltage averaging mode was used in step (iv) above, the correction factor is  $20 \log(1/x)$ , where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
  - If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

**Duty Cycle Correction factor**

| Test Mode | Date rate | T <sub>on</sub> (ms) | T <sub>on+off</sub> (ms) | $x = T_{on} / (T_{on+off})$ | DCCF = $10 \log(1/x)$ (dB) |
|-----------|-----------|----------------------|--------------------------|-----------------------------|----------------------------|
| TM 1      | 6 Mbps    | 2.064                | 2.165                    | 0.953 3                     | 0.21                       |
| TM 2      | MCS 0     | 1.930                | 2.033                    | 0.949 3                     | 0.23                       |
| TM 3      | MCS 0     | 0.943                | 1.045                    | 0.902 4                     | 0.45                       |
| TM 4      | MCS 0     | 0.952                | 1.053                    | 0.903 7                     | 0.44                       |
| TM 5      | MCS 0     | 0.460                | 0.561                    | 0.819 3                     | 0.87                       |

Note1: Where, T = Transmission duration / x = Duty cycle

Note2: Please refer to the appendix II for duty cycle plots.

## Test Results

### Test Notes

- The radiated emissions were investigated 9 kHz to 40 GHz. All EUT antenna configuration were investigated and the worst case data were reported.
- Information of Distance Correction Factor  
For finding emissions, measurements may be performed at a distance closer than that specified in the regulations.  
In this case, the distance factor is applied to the result.  
- Calculation of distance correction factor  
At frequencies below 30 MHz =  $40 \log(\text{tested distance} / \text{specified distance})$   
At frequencies at or above 30 MHz =  $20 \log(\text{tested distance} / \text{specified distance})$   
When distance factor is "N/A", the measurements were performed at the specified distance and distance factor is not applied.
- Sample Calculation.  
 $\text{Margin} = \text{Limit} - \text{Result} / \text{Result} = \text{Reading} + \text{TF} + \text{DCCF} + \text{DCF} / \text{TF} = \text{AF} + \text{CL} + \text{HL} + \text{AL} - \text{AG}$   
Where, TF = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, HL = High pass filter Loss, AL = Attenuator Loss, DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
- The limit is converted to field strength.  
 $E(\text{dBuV/m}) = \text{EIRP}(\text{dBm}) + 95.2 \text{ dB} = -27 \text{ dBm} + 95.2 = 68.2 \text{ dBuV/m}$

### Unwanted Emissions data(9 kHz ~ 40 GHz) : TM1 ANT1

| Band    | Tested Frequency (MHz) | Freq. (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | TF (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---------|------------------------|-------------|---------|---------------------|---------------|----------------|-----------|-----------|----------|-----------------|----------------|-------------|
| U-NII 1 | 5 180                  | 5 149.16    | H       | X                   | PK            | 53.35          | 2.67      | N/A       | N/A      | 56.02           | 74.00          | 17.98       |
|         |                        | 5 149.72    | H       | X                   | AV            | 43.42          | 2.67      | 0.21      | N/A      | 46.30           | 54.00          | 7.70        |
|         |                        | 10 360.16   | H       | X                   | PK            | 43.09          | 8.48      | N/A       | N/A      | 51.57           | 68.20          | 16.63       |
|         | 5 200                  | 10 399.65   | H       | X                   | PK            | 43.91          | 8.44      | N/A       | N/A      | 52.35           | 68.20          | 15.85       |
|         | 5 240                  | 10 479.73   | H       | X                   | PK            | 43.24          | 8.56      | N/A       | N/A      | 51.80           | 68.20          | 16.40       |
| U-NII 3 | 5 745                  | 5 643.48    | H       | X                   | PK            | 51.56          | 3.23      | N/A       | N/A      | 54.79           | 68.20          | 13.41       |
|         |                        | 5 692.98    | H       | X                   | PK            | 54.59          | 3.24      | N/A       | N/A      | 57.83           | 100.00         | 42.17       |
|         |                        | 11 490.37   | H       | X                   | PK            | 46.06          | 8.56      | N/A       | N/A      | 54.62           | 74.00          | 19.38       |
|         |                        | 11 490.10   | H       | X                   | AV            | 36.05          | 8.56      | 0.21      | N/A      | 44.82           | 54.00          | 9.18        |
|         | 5 785                  | 11 570.13   | H       | X                   | PK            | 44.86          | 8.60      | N/A       | N/A      | 53.46           | 74.00          | 20.54       |
|         |                        | 11 570.07   | H       | X                   | AV            | 34.60          | 8.60      | 0.21      | N/A      | 43.41           | 54.00          | 10.59       |
|         | 5 825                  | 5 889.70    | H       | X                   | PK            | 53.32          | 3.44      | N/A       | N/A      | 56.76           | 94.32          | 37.56       |
|         |                        | 5 974.12    | H       | X                   | PK            | 51.18          | 4.14      | N/A       | N/A      | 55.32           | 68.20          | 12.88       |
|         |                        | 11 650.59   | H       | X                   | PK            | 45.40          | 8.85      | N/A       | N/A      | 54.25           | 74.00          | 19.75       |
|         |                        | 11 650.05   | H       | X                   | AV            | 35.71          | 8.84      | 0.21      | N/A      | 44.76           | 54.00          | 9.24        |

Unwanted Emissions data(9 kHz ~ 40 GHz) : **TM1 ANT2**

| Band    | Tested Frequency (MHz) | Freq. (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | TF (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---------|------------------------|-------------|---------|---------------------|---------------|----------------|-----------|-----------|----------|-----------------|----------------|-------------|
| U-NII 1 | 5 180                  | 5 147.84    | H       | X                   | PK            | 55.18          | 2.67      | N/A       | N/A      | 57.85           | 74.00          | 16.15       |
|         |                        | 5 148.75    | H       | X                   | AV            | 44.56          | 2.67      | 0.21      | N/A      | 47.44           | 54.00          | 6.56        |
|         |                        | 10 360.33   | V       | X                   | PK            | 42.80          | 8.48      | N/A       | N/A      | 51.28           | 68.20          | 16.92       |
|         | 5 200                  | 10 399.34   | V       | X                   | PK            | 44.34          | 8.44      | N/A       | N/A      | 52.78           | 68.20          | 15.42       |
|         | 5 240                  | 10 479.99   | V       | X                   | PK            | 44.09          | 8.56      | N/A       | N/A      | 52.65           | 68.20          | 15.55       |
| U-NII 3 | 5 745                  | 5 647.30    | H       | X                   | PK            | 51.92          | 3.23      | N/A       | N/A      | 55.15           | 68.20          | 13.05       |
|         |                        | 5 693.38    | H       | X                   | PK            | 55.32          | 3.24      | N/A       | N/A      | 58.56           | 100.30         | 41.74       |
|         |                        | 11 489.60   | V       | X                   | PK            | 45.24          | 8.56      | N/A       | N/A      | 53.80           | 74.00          | 20.20       |
|         |                        | 11 489.91   | V       | X                   | AV            | 36.17          | 8.56      | 0.21      | N/A      | 44.94           | 54.00          | 9.06        |
|         | 5 785                  | 11 569.97   | V       | X                   | PK            | 45.45          | 8.60      | N/A       | N/A      | 54.05           | 74.00          | 19.95       |
|         |                        | 11 569.98   | V       | X                   | AV            | 36.22          | 8.60      | 0.21      | N/A      | 45.03           | 54.00          | 8.97        |
|         | 5 825                  | 5 894.41    | H       | X                   | PK            | 53.25          | 3.48      | N/A       | N/A      | 56.73           | 90.84          | 34.11       |
|         |                        | 5 929.37    | H       | X                   | PK            | 52.54          | 3.77      | N/A       | N/A      | 56.31           | 68.20          | 11.89       |
|         |                        | 11 650.01   | V       | X                   | PK            | 45.68          | 8.84      | N/A       | N/A      | 54.52           | 74.00          | 19.48       |
|         |                        | 11 650.12   | V       | X                   | AV            | 36.78          | 8.84      | 0.21      | N/A      | 45.83           | 54.00          | 8.17        |

Unwanted Emissions data(9 kHz ~ 40 GHz) : **TM2 ANT1**

| Band    | Tested Frequency (MHz) | Freq. (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | TF (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---------|------------------------|-------------|---------|---------------------|---------------|----------------|-----------|-----------|----------|-----------------|----------------|-------------|
| U-NII 1 | 5 180                  | 5 149.47    | H       | X                   | PK            | 54.47          | 2.67      | N/A       | N/A      | 57.14           | 74.00          | 16.86       |
|         |                        | 5 148.59    | H       | X                   | AV            | 44.62          | 2.67      | 0.23      | N/A      | 47.52           | 54.00          | 6.48        |
|         |                        | 10 359.95   | H       | X                   | PK            | 43.41          | 8.48      | N/A       | N/A      | 51.89           | 68.20          | 16.31       |
|         | 5 200                  | 10 400.11   | H       | X                   | PK            | 44.35          | 8.44      | N/A       | N/A      | 52.79           | 68.20          | 15.41       |
|         | 5 240                  | 10 479.10   | H       | X                   | PK            | 43.05          | 8.56      | N/A       | N/A      | 51.61           | 68.20          | 16.59       |
| U-NII 3 | 5 745                  | 5 648.95    | H       | X                   | PK            | 51.48          | 3.23      | N/A       | N/A      | 54.71           | 68.20          | 13.49       |
|         |                        | 5 699.18    | H       | X                   | PK            | 53.81          | 3.24      | N/A       | N/A      | 57.05           | 104.59         | 47.54       |
|         |                        | 11 490.09   | H       | X                   | PK            | 45.38          | 8.56      | N/A       | N/A      | 53.94           | 74.00          | 20.06       |
|         |                        | 11 490.07   | H       | X                   | AV            | 35.82          | 8.56      | 0.23      | N/A      | 44.61           | 54.00          | 9.39        |
|         | 5 785                  | 11 569.91   | H       | X                   | PK            | 45.23          | 8.60      | N/A       | N/A      | 53.83           | 74.00          | 20.17       |
|         |                        | 11 569.96   | H       | X                   | AV            | 34.52          | 8.60      | 0.23      | N/A      | 43.35           | 54.00          | 10.65       |
|         | 5 825                  | 5 875.01    | H       | X                   | PK            | 52.50          | 3.31      | N/A       | N/A      | 55.81           | 105.19         | 49.38       |
|         |                        | 5 961.91    | H       | X                   | PK            | 52.54          | 4.04      | N/A       | N/A      | 56.58           | 68.20          | 11.62       |
|         |                        | 11 650.46   | H       | X                   | PK            | 45.48          | 8.84      | N/A       | N/A      | 54.32           | 74.00          | 19.68       |
|         |                        | 11 650.03   | H       | X                   | AV            | 35.64          | 8.84      | 0.23      | N/A      | 44.71           | 54.00          | 9.29        |

Unwanted Emissions data(9 kHz ~ 40 GHz) : **TM2 MIMO**

| Band    | Tested Frequency (MHz) | Freq. (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | TF (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---------|------------------------|-------------|---------|---------------------|---------------|----------------|-----------|-----------|----------|-----------------|----------------|-------------|
| U-NII 1 | 5 180                  | 5 148.75    | H       | X                   | PK            | 54.74          | 2.67      | N/A       | N/A      | 57.41           | 74.00          | 16.59       |
|         |                        | 5 149.48    | H       | X                   | AV            | 44.27          | 2.67      | 0.23      | N/A      | 47.17           | 54.00          | 6.83        |
|         |                        | 10 361.41   | H       | X                   | PK            | 42.56          | 8.48      | N/A       | N/A      | 51.04           | 68.20          | 17.16       |
|         | 5 200                  | 10 399.52   | H       | X                   | PK            | 44.47          | 8.44      | N/A       | N/A      | 52.91           | 68.20          | 15.29       |
|         | 5 240                  | 10 480.37   | H       | X                   | PK            | 42.58          | 8.56      | N/A       | N/A      | 51.14           | 68.20          | 17.06       |
| U-NII 3 | 5 745                  | 5 642.60    | H       | X                   | PK            | 52.56          | 3.23      | N/A       | N/A      | 55.79           | 68.20          | 12.41       |
|         |                        | 5 692.50    | H       | X                   | PK            | 55.68          | 3.24      | N/A       | N/A      | 58.92           | 99.65          | 40.73       |
|         |                        | 11 490.10   | H       | X                   | PK            | 46.08          | 8.56      | N/A       | N/A      | 54.64           | 74.00          | 19.36       |
|         |                        | 11 490.15   | H       | X                   | AV            | 35.84          | 8.56      | 0.23      | N/A      | 44.63           | 54.00          | 9.37        |
|         | 5 785                  | 11 570.36   | H       | X                   | PK            | 43.93          | 8.60      | N/A       | N/A      | 52.53           | 74.00          | 21.47       |
|         |                        | 11 570.20   | H       | X                   | AV            | 34.06          | 8.60      | 0.23      | N/A      | 42.89           | 54.00          | 11.11       |
|         | 5 825                  | 5 881.45    | H       | X                   | PK            | 53.58          | 3.37      | N/A       | N/A      | 56.95           | 100.43         | 43.48       |
|         |                        | 5 936.93    | H       | X                   | PK            | 51.11          | 3.83      | N/A       | N/A      | 54.94           | 68.20          | 13.26       |
|         |                        | 11 650.85   | H       | X                   | PK            | 45.10          | 8.85      | N/A       | N/A      | 53.95           | 74.00          | 20.05       |
|         |                        | 11 650.32   | H       | X                   | AV            | 35.04          | 8.84      | 0.23      | N/A      | 44.11           | 54.00          | 9.89        |

Unwanted Emissions data(9 kHz ~ 40 GHz) : **TM3 ANT1**

| Band    | Tested Frequency (MHz) | Freq. (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | TF (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---------|------------------------|-------------|---------|---------------------|---------------|----------------|-----------|-----------|----------|-----------------|----------------|-------------|
| U-NII 1 | 5 190                  | 5 149.37    | H       | X                   | PK            | 51.59          | 2.67      | N/A       | N/A      | 54.26           | 74.00          | 19.74       |
|         |                        | 5 149.62    | H       | X                   | AV            | 41.78          | 2.67      | 0.45      | N/A      | 44.90           | 54.00          | 9.10        |
|         |                        | 10 380.64   | H       | X                   | PK            | 43.04          | 8.46      | N/A       | N/A      | 51.50           | 68.20          | 16.70       |
|         | 5 230                  | 10 460.16   | H       | X                   | PK            | 45.61          | 8.51      | N/A       | N/A      | 54.12           | 68.20          | 14.08       |
| U-NII 3 | 5 755                  | 5 644.90    | H       | X                   | PK            | 51.47          | 3.23      | N/A       | N/A      | 54.70           | 68.20          | 13.50       |
|         |                        | 5 683.05    | H       | X                   | PK            | 54.32          | 3.24      | N/A       | N/A      | 57.56           | 92.66          | 35.10       |
|         |                        | 11 509.43   | H       | X                   | PK            | 45.70          | 8.58      | N/A       | N/A      | 54.28           | 74.00          | 19.72       |
|         |                        | 11 509.83   | H       | X                   | AV            | 36.03          | 8.58      | 0.45      | N/A      | 45.06           | 54.00          | 8.94        |
|         | 5 795                  | 5 876.12    | H       | X                   | PK            | 53.78          | 3.32      | N/A       | N/A      | 57.10           | 104.37         | 47.27       |
|         |                        | 5 934.96    | H       | X                   | PK            | 51.83          | 3.82      | N/A       | N/A      | 55.65           | 68.20          | 12.55       |
|         |                        | 11 590.38   | H       | X                   | PK            | 45.33          | 8.64      | N/A       | N/A      | 53.97           | 74.00          | 20.03       |
|         |                        | 11 590.08   | H       | X                   | AV            | 34.69          | 8.64      | 0.45      | N/A      | 43.78           | 54.00          | 10.22       |



**Unwanted Emissions data(9 kHz ~ 40 GHz) : TM4 MIMO**

| Band    | Tested Frequency (MHz) | Freq. (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | TF (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---------|------------------------|-------------|---------|---------------------|---------------|----------------|-----------|-----------|----------|-----------------|----------------|-------------|
| U-NII 1 | 5 190                  | 5 148.95    | H       | X                   | PK            | 54.15          | 2.67      | N/A       | N/A      | 56.82           | 74.00          | 17.18       |
|         |                        | 5 149.54    | H       | X                   | AV            | 42.89          | 2.67      | 0.44      | N/A      | 46.00           | 54.00          | 8.00        |
|         |                        | 10 380.72   | H       | X                   | PK            | 42.49          | 8.46      | N/A       | N/A      | 50.95           | 68.20          | 17.25       |
|         | 5 230                  | 10 460.02   | H       | X                   | PK            | 44.11          | 8.51      | N/A       | N/A      | 52.62           | 68.20          | 15.58       |
| U-NII 3 | 5 755                  | 5 645.90    | H       | X                   | PK            | 51.55          | 3.23      | N/A       | N/A      | 54.78           | 68.20          | 13.42       |
|         |                        | 5 687.18    | H       | X                   | PK            | 53.85          | 3.24      | N/A       | N/A      | 57.09           | 95.71          | 38.62       |
|         |                        | 11 510.11   | H       | X                   | PK            | 45.11          | 8.58      | N/A       | N/A      | 53.69           | 74.00          | 20.31       |
|         |                        | 11 510.02   | H       | X                   | AV            | 35.62          | 8.58      | 0.44      | N/A      | 44.64           | 54.00          | 9.36        |
|         | 5 795                  | 5 885.84    | H       | X                   | PK            | 51.07          | 3.40      | N/A       | N/A      | 54.47           | 97.18          | 42.71       |
|         |                        | 5 948.00    | H       | X                   | PK            | 50.04          | 3.93      | N/A       | N/A      | 53.97           | 68.20          | 14.23       |
|         |                        | 11 589.98   | H       | X                   | PK            | 44.46          | 8.64      | N/A       | N/A      | 53.10           | 74.00          | 20.90       |
|         |                        | 11 589.86   | H       | X                   | AV            | 34.40          | 8.64      | 0.44      | N/A      | 43.48           | 54.00          | 10.52       |

**Unwanted Emissions data(9 kHz ~ 40 GHz) : TM5 ANT1**

| Band    | Tested Frequency (MHz) | Freq. (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | TF (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---------|------------------------|-------------|---------|---------------------|---------------|----------------|-----------|-----------|----------|-----------------|----------------|-------------|
| U-NII 1 | 5 210                  | 5 146.43    | H       | X                   | PK            | 54.24          | 2.66      | N/A       | N/A      | 56.90           | 74.00          | 17.10       |
|         |                        | 5 146.95    | H       | X                   | AV            | 42.47          | 2.66      | 0.87      | N/A      | 46.00           | 54.00          | 8.00        |
|         |                        | 10 420.00   | H       | X                   | PK            | 44.01          | 8.45      | N/A       | N/A      | 52.46           | 68.20          | 15.74       |
|         | 5 775                  | 5 645.10    | H       | X                   | PK            | 53.36          | 3.23      | N/A       | N/A      | 56.59           | 68.20          | 11.61       |
|         |                        | 5 692.90    | H       | X                   | PK            | 55.21          | 3.24      | N/A       | N/A      | 58.45           | 99.95          | 41.50       |
|         |                        | 5 875.96    | H       | X                   | PK            | 52.03          | 3.32      | N/A       | N/A      | 55.35           | 104.49         | 49.14       |
|         |                        | 5 937.60    | H       | X                   | PK            | 51.12          | 3.84      | N/A       | N/A      | 54.96           | 68.20          | 13.24       |
|         |                        | 11 549.45   | H       | X                   | PK            | 44.77          | 8.57      | N/A       | N/A      | 53.34           | 74.00          | 20.66       |
|         |                        | 11 549.96   | H       | X                   | AV            | 35.21          | 8.57      | 0.87      | N/A      | 44.65           | 54.00          | 9.35        |

**Unwanted Emissions data(9 kHz ~ 40 GHz) : TM5 MIMO**

| Band    | Tested Frequency (MHz) | Freq. (MHz) | ANT Pol | EUT Position (Axis) | Detector Mode | Reading (dBuV) | TF (dB/m) | DCCF (dB) | DCF (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---------|------------------------|-------------|---------|---------------------|---------------|----------------|-----------|-----------|----------|-----------------|----------------|-------------|
| U-NII 1 | 5 210                  | 5 148.68    | H       | X                   | PK            | 53.61          | 2.67      | N/A       | N/A      | 56.28           | 74.00          | 17.72       |
|         |                        | 5 148.80    | H       | X                   | AV            | 42.83          | 2.67      | 0.87      | N/A      | 46.37           | 54.00          | 7.63        |
|         |                        | 10 419.74   | H       | X                   | PK            | 44.47          | 8.45      | N/A       | N/A      | 52.92           | 68.20          | 15.28       |
|         | 5 775                  | 5 640.05    | H       | X                   | PK            | 51.89          | 3.23      | N/A       | N/A      | 55.12           | 68.20          | 13.08       |
|         |                        | 5 654.65    | H       | X                   | PK            | 53.91          | 3.24      | N/A       | N/A      | 57.15           | 71.64          | 14.49       |
|         |                        | 5 894.84    | H       | X                   | PK            | 51.71          | 3.48      | N/A       | N/A      | 55.19           | 90.52          | 35.33       |
|         |                        | 5 928.44    | H       | X                   | PK            | 50.40          | 3.76      | N/A       | N/A      | 54.16           | 68.20          | 14.04       |
|         |                        | 11 550.60   | H       | X                   | PK            | 44.32          | 8.57      | N/A       | N/A      | 52.89           | 74.00          | 21.11       |
|         |                        | 11 550.06   | H       | X                   | AV            | 34.66          | 8.57      | 0.87      | N/A      | 44.10           | 54.00          | 9.90        |

## 5.2 AC Power-Line Conducted Emissions

### ■ Test Requirements, §15.207

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 uH/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

| Frequency Range (MHz) | Conducted Limit (dBuV) |            |
|-----------------------|------------------------|------------|
|                       | Quasi-Peak             | Average    |
| 0.15 ~ 0.5            | 66 to 56 *             | 56 to 46 * |
| 0.5 ~ 5.0             | 56                     | 46         |
| 5 ~ 30                | 60                     | 50         |

\* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### ■ Test Configuration

NA

### ■ Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10-2013.

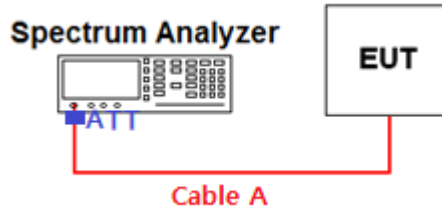
1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

### ■ Test Results: NA

## APPENDIX I

### Conducted Test set up Diagram

#### ▪ Conducted Measurement



## APPENDIX II

### Duty Cycle Information

#### ■ Test Procedure

**Duty Cycle** [ $X = \text{On Time} / (\text{On} + \text{Off time})$ ] is measured using Measurement Procedure of KDB789033 D02v02r01

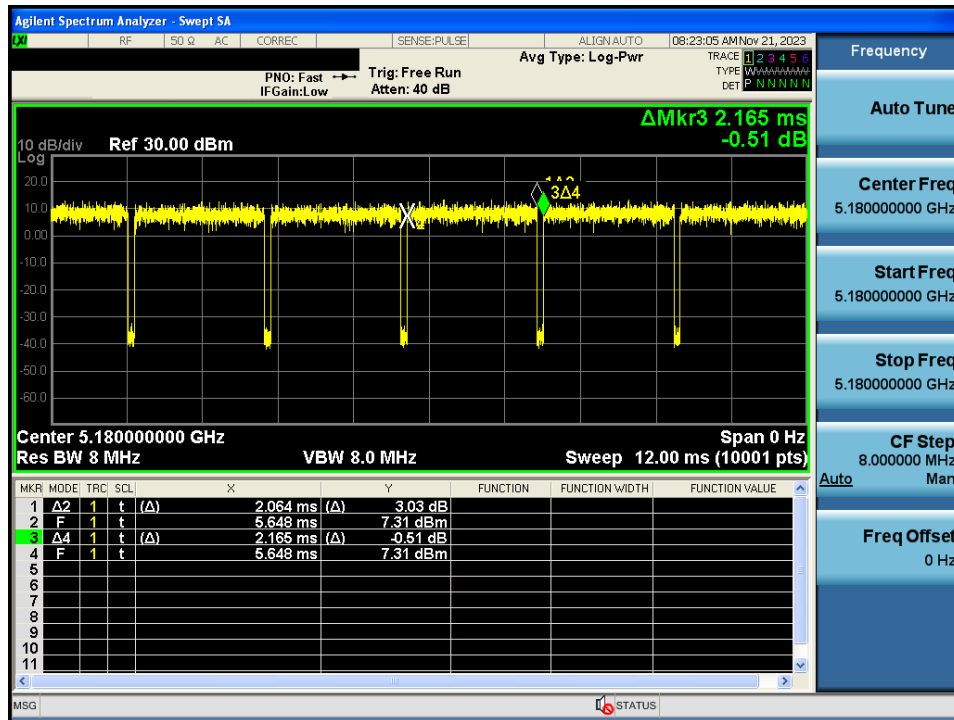
1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW  $\geq$  EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW  $\geq$  RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are  $> 50 / T$** , where  $T$  is defined in section II.B.1.a), and **the number of sweep points across duration  $T$  exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if  $T \leq 16.7$  microseconds.)

$T$  : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

( $T = \text{On time}$  of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

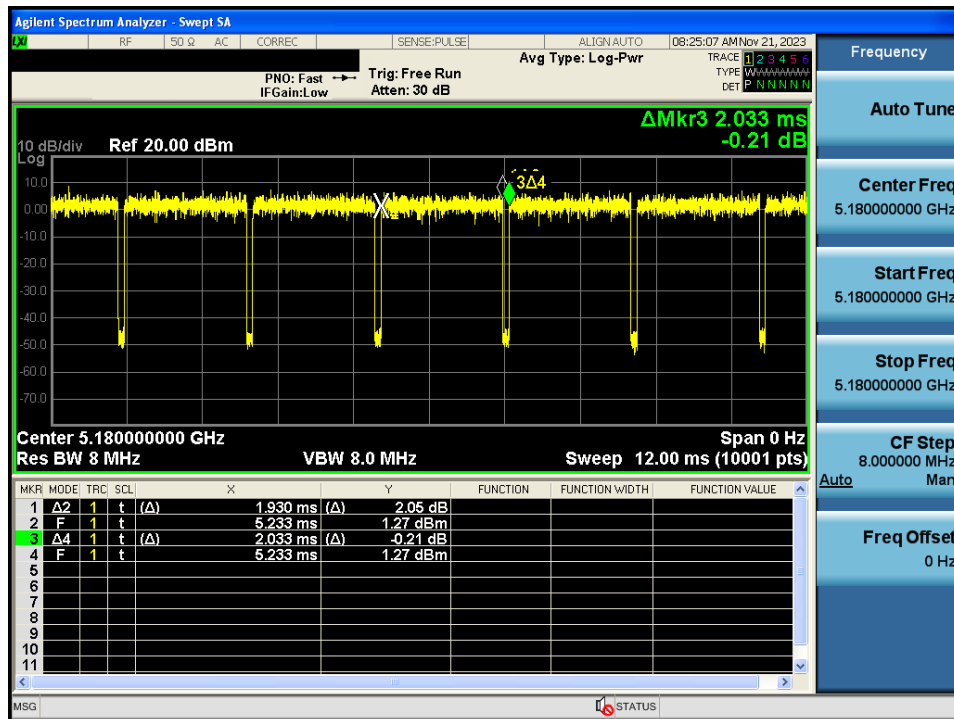
## Duty Cycle

Test Mode: TM 1 & Ch.36



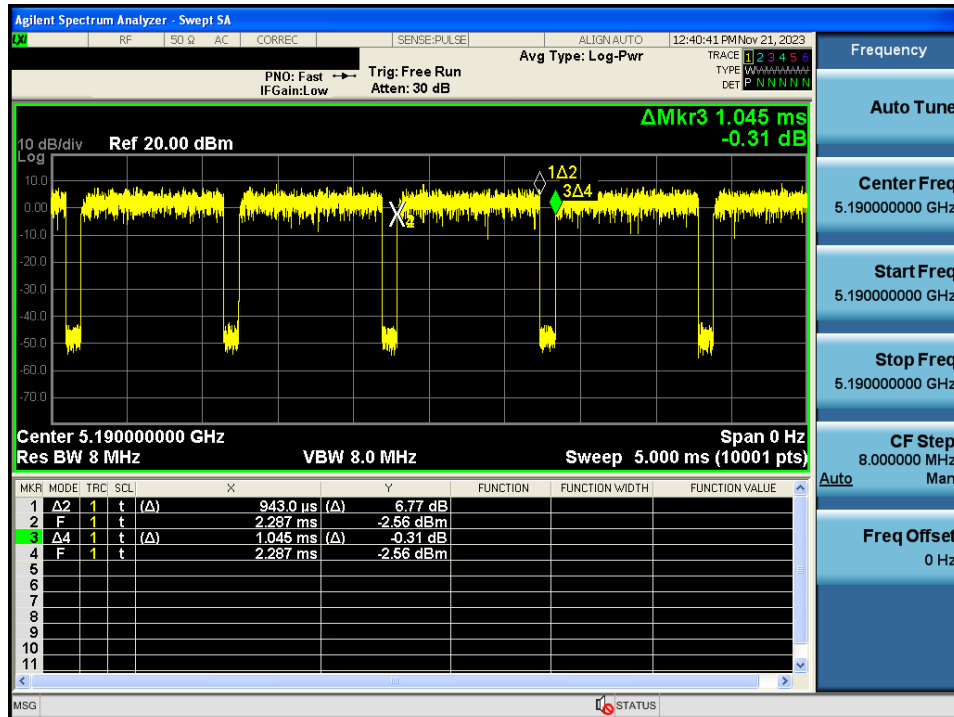
## Duty Cycle

Test Mode: TM 2 & Ch.36



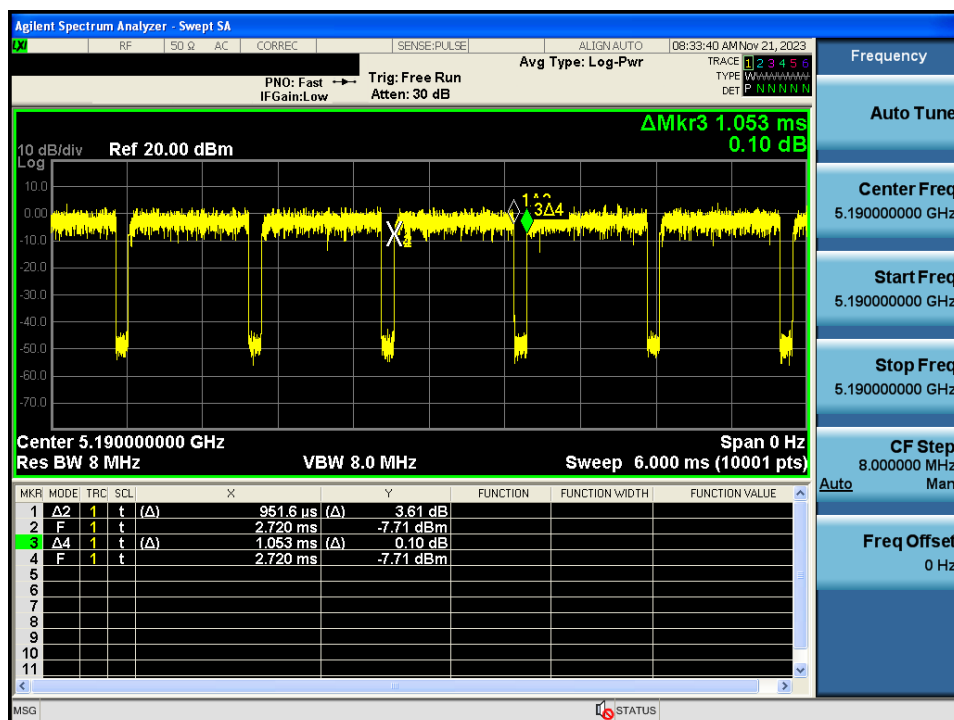
## Duty Cycle

Test Mode: TM 3 & Ch.38



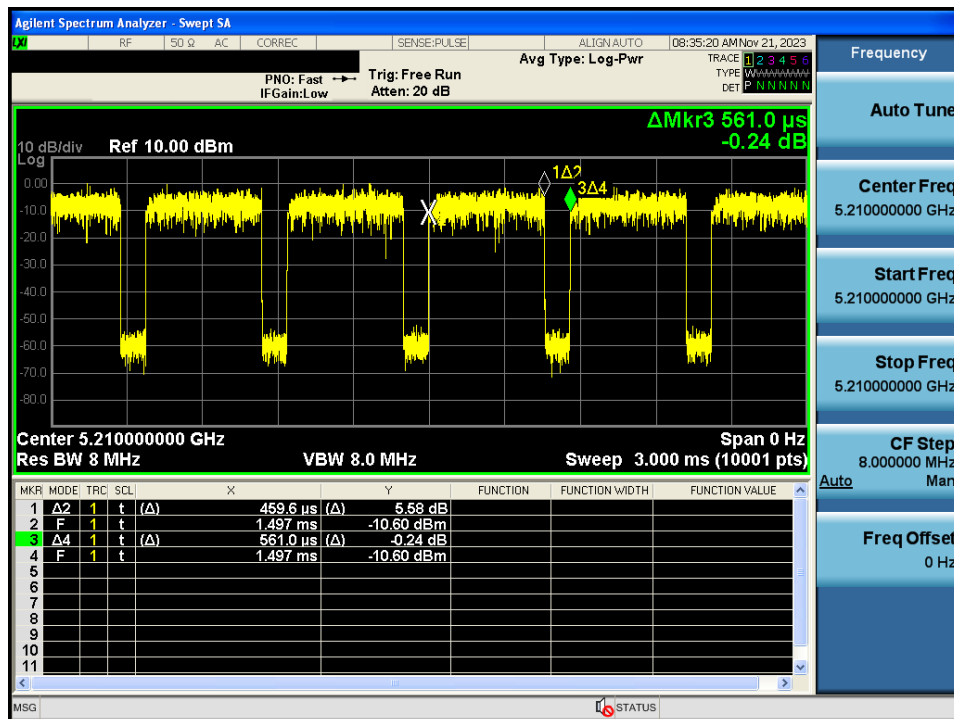
## Duty Cycle

Test Mode: TM 4 & Ch.38



## Duty Cycle

Test Mode: TM 5 &amp; Ch.42

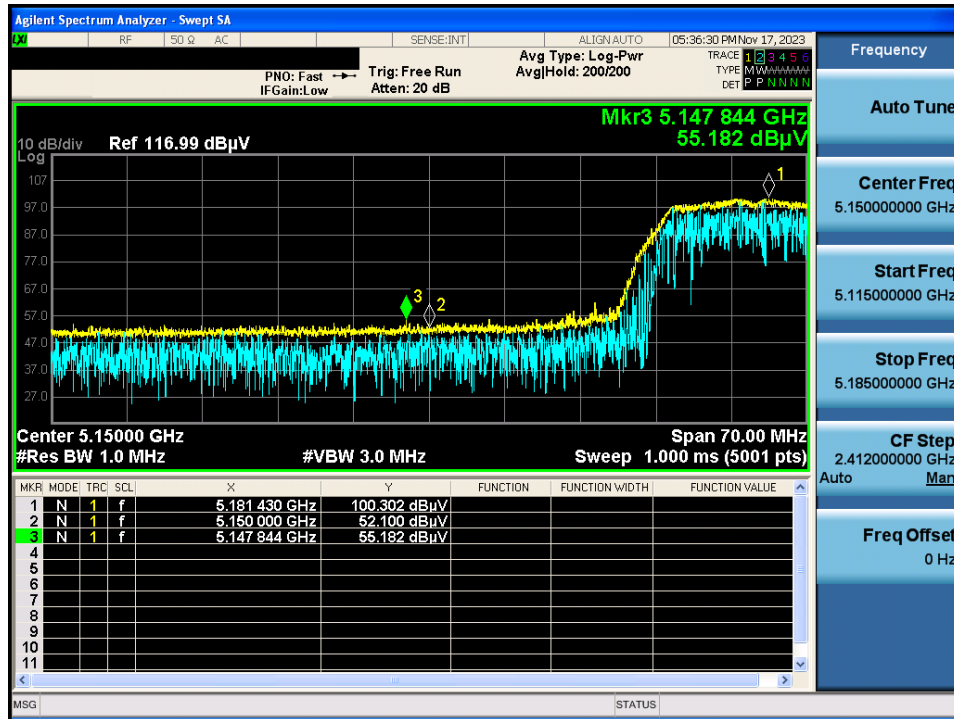


## APPENDIX III

### Unwanted Emissions (Radiated) Test Plot

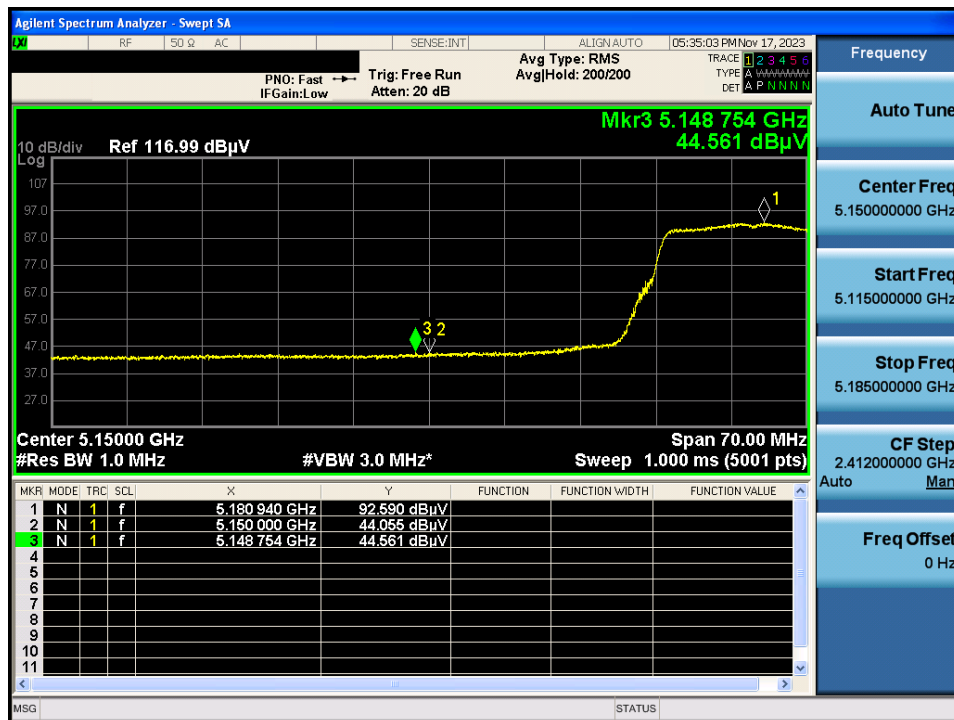
TM 1 & ANT 2 & U-NII 1 & 5 180 & X axis & Hor

Detector Mode : PK



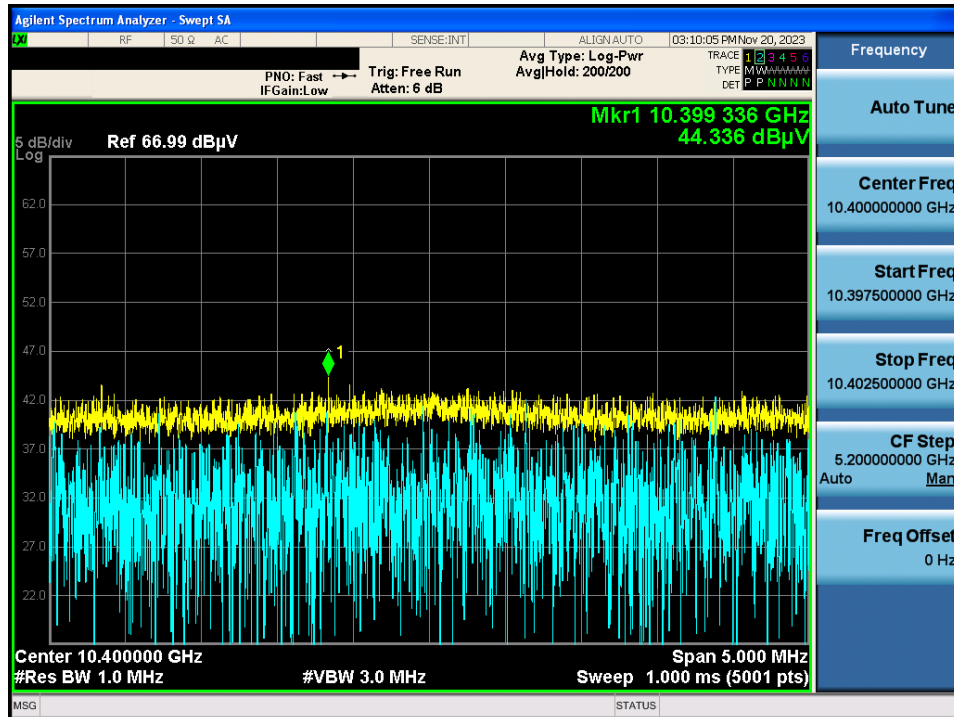
TM 1 & ANT 2 & U-NII 1 & 5 180 & X axis & Hor

Detector Mode : AV



TM 1 & ANT 2 & U-NII 1 & 5 200 & X axis & Ver

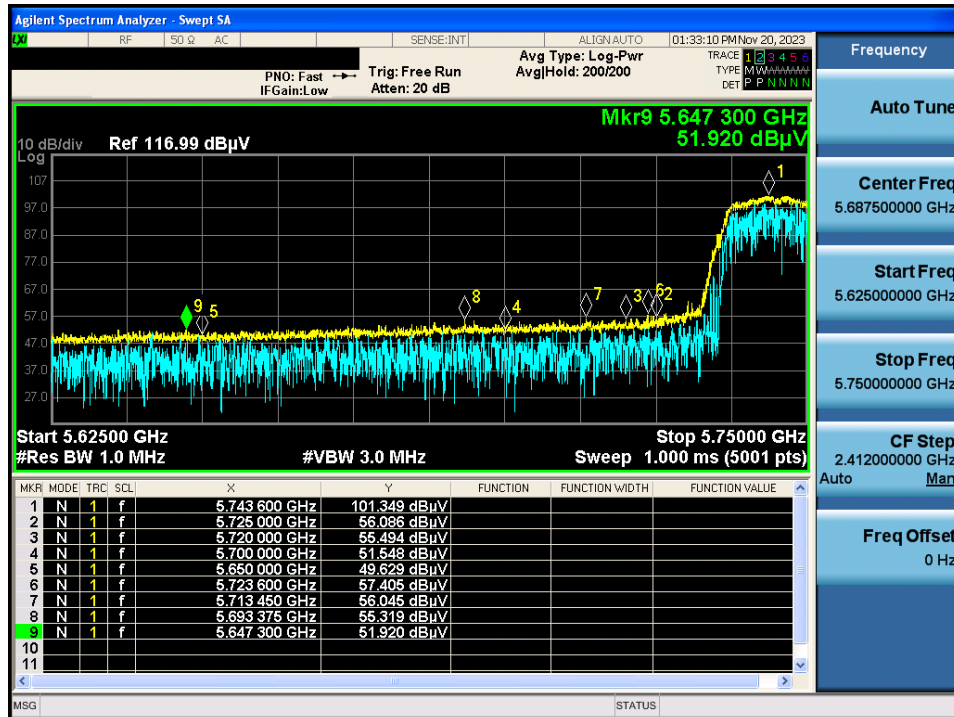
Detector Mode : PK





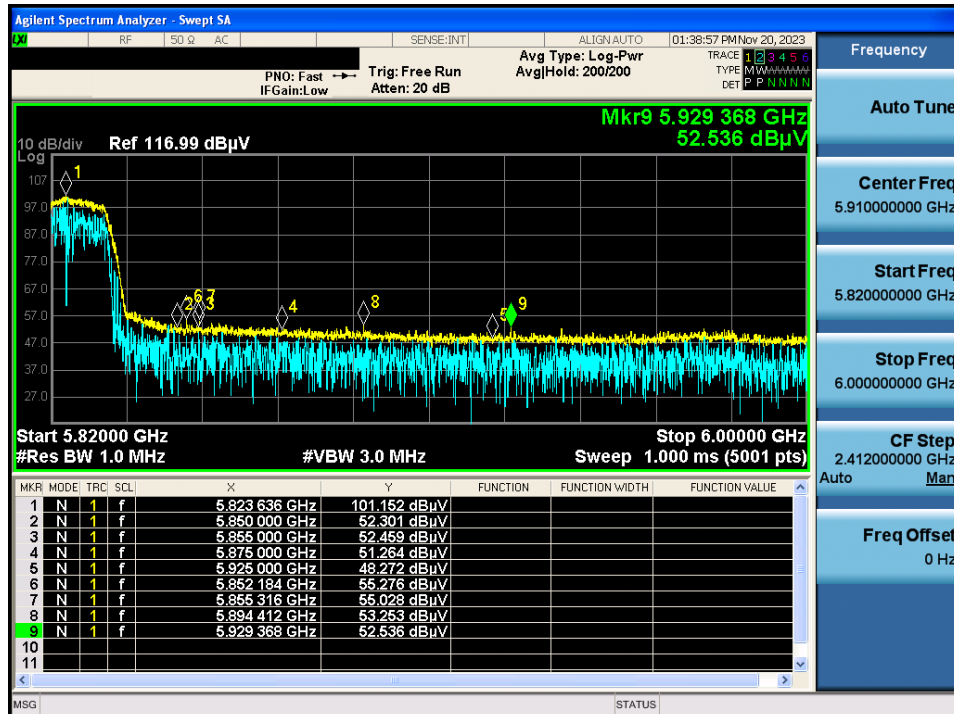
TM 1 & ANT 2 & U-NII 3 & 5 745 & X axis & Hor

Detector Mode : PK



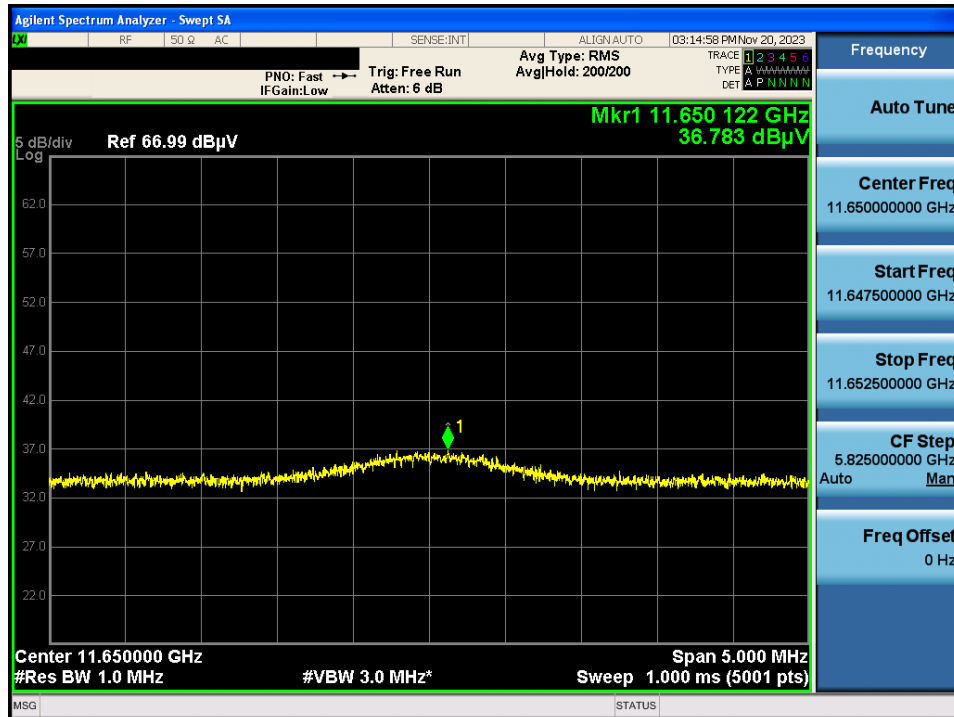
TM 1 & ANT 2 & U-NII 3 & 5 825 & X axis & Hor

Detector Mode : PK



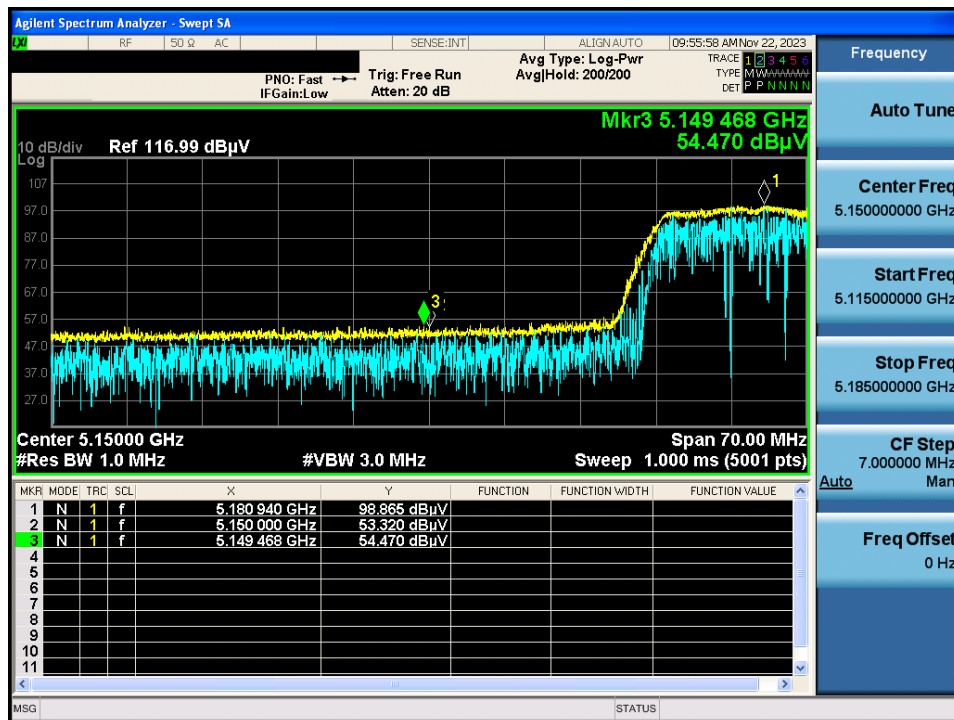
TM 1 & ANT 2 & U-NII 3 & 5 825 & X axis & Ver

Detector Mode : AV



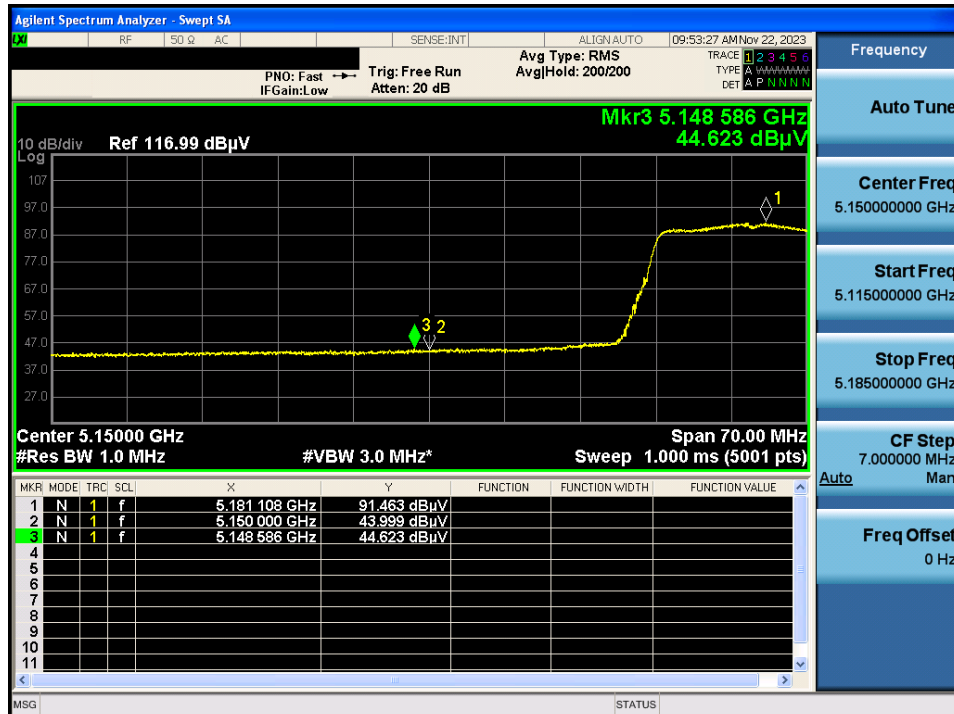
TM 2 & ANT 1 & U-NII 1 & 5 180 & X axis & Hor

Detector Mode : PK



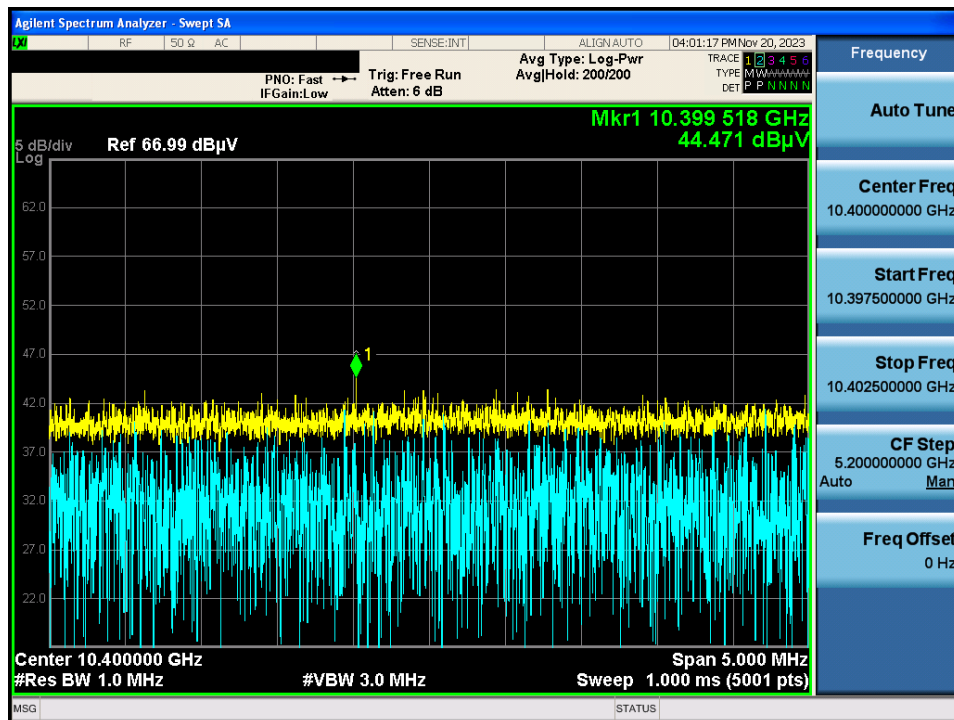
TM 2 & ANT 1 & U-NII 1 & 5 180 & X axis & Hor

Detector Mode : AV



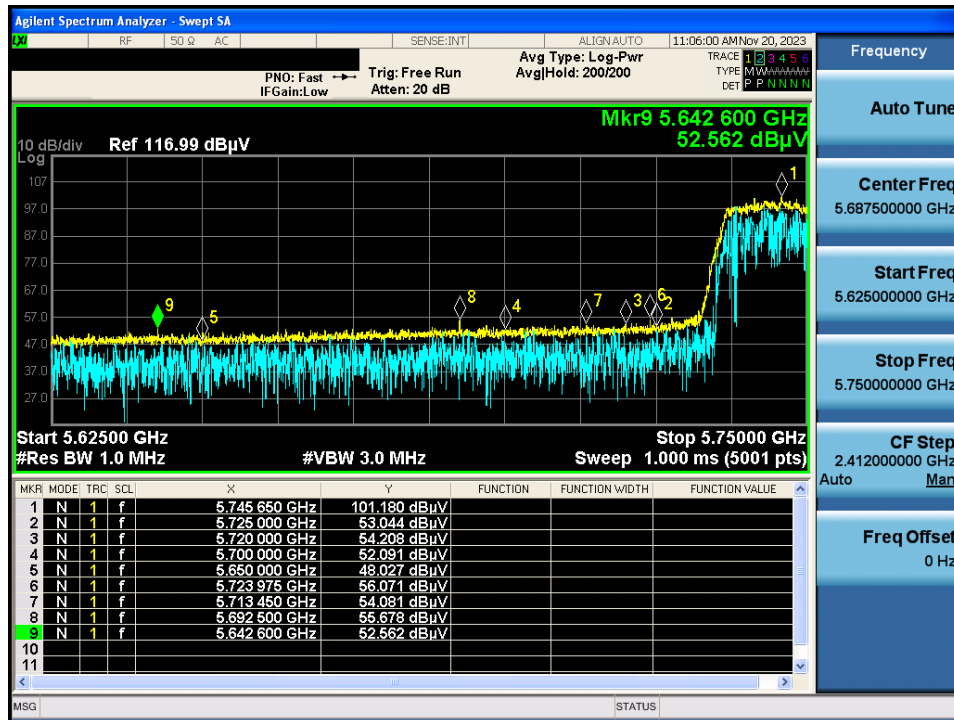
TM 2 & MIMO & U-NII 1 & 5 200 & X axis & Hor

Detector Mode : PK



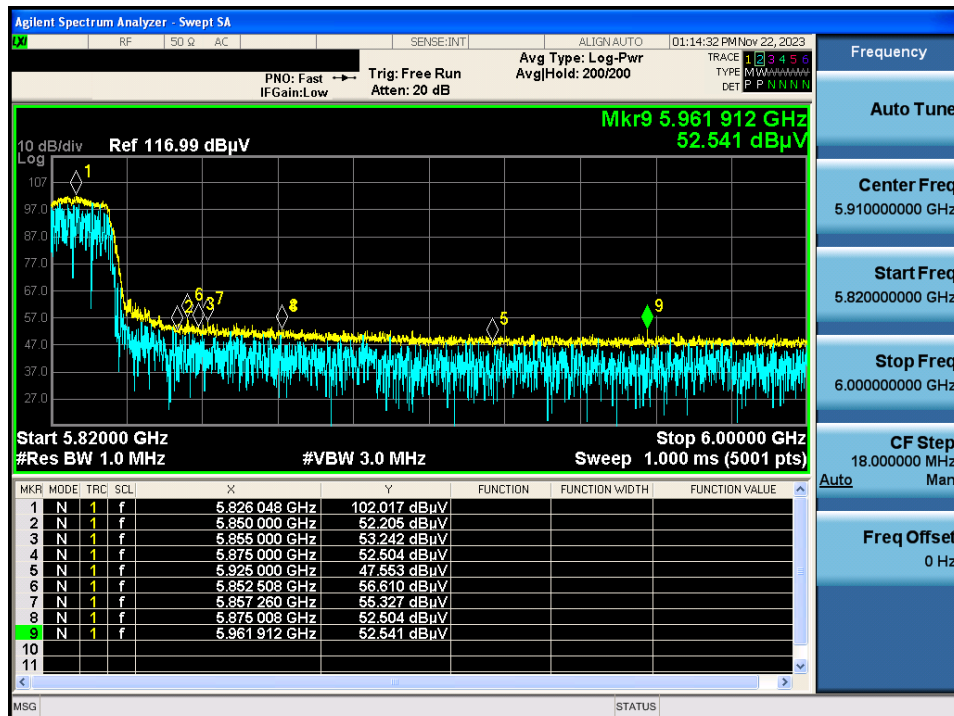
TM 2 & MIMO & U-NII 3 & 5745 & X axis & Hor

Detector Mode : PK



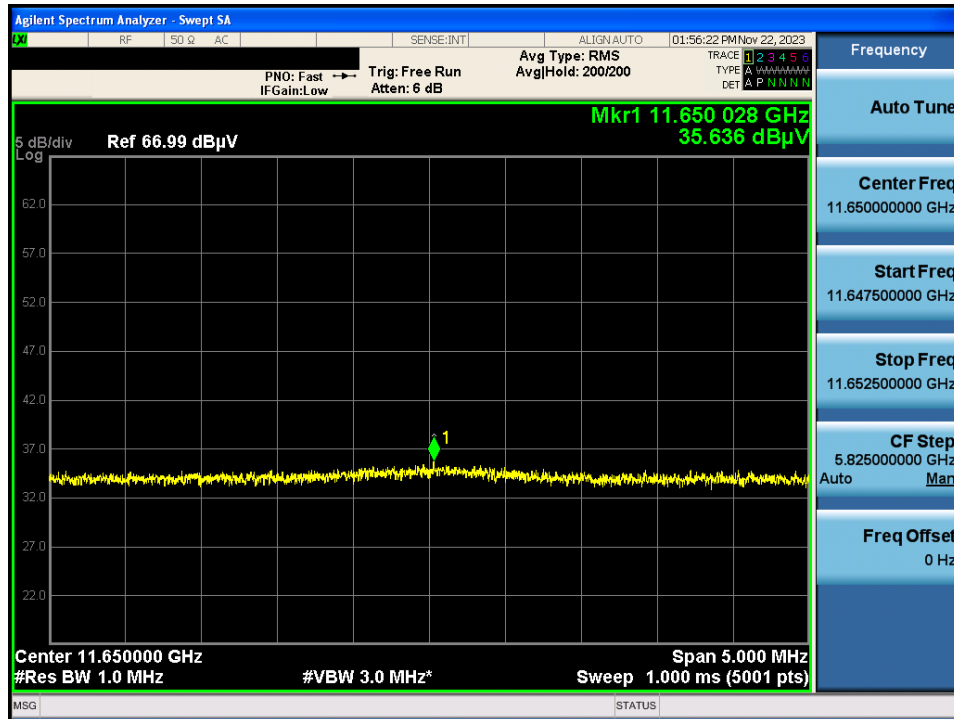
TM 2 & ANT 1 & U-NII 3 & 5825 & X axis & Hor

Detector Mode : PK



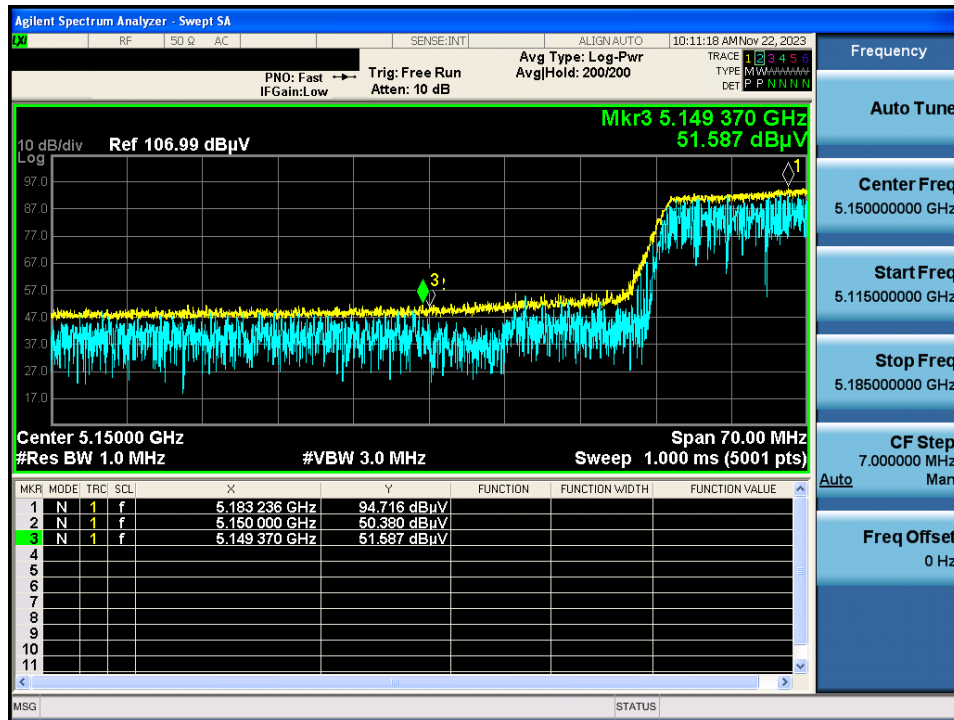
TM 2 & ANT 1 & U-NII 3 & 5 825 & X axis & Hor

Detector Mode : AV



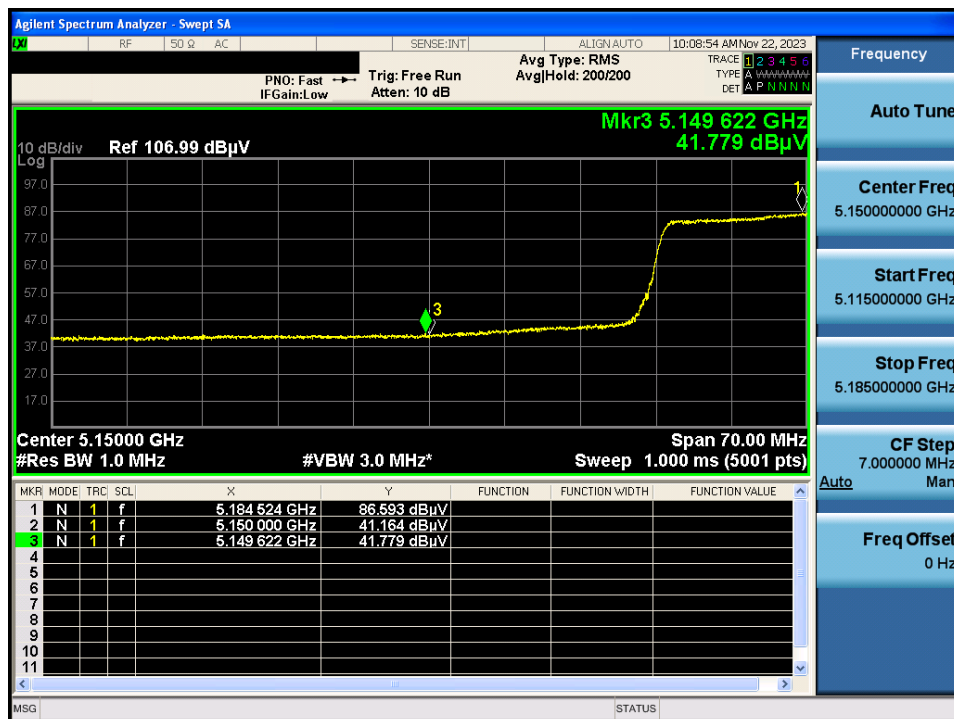
TM 3 & ANT 1 & U-NII 1 & 5 190 & X axis & Hor

Detector Mode : PK

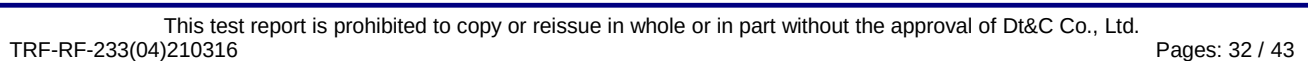


TM 3 & ANT 1 & U-NII 1 & 5 190 & X axis & Hor

Detector Mode : AV



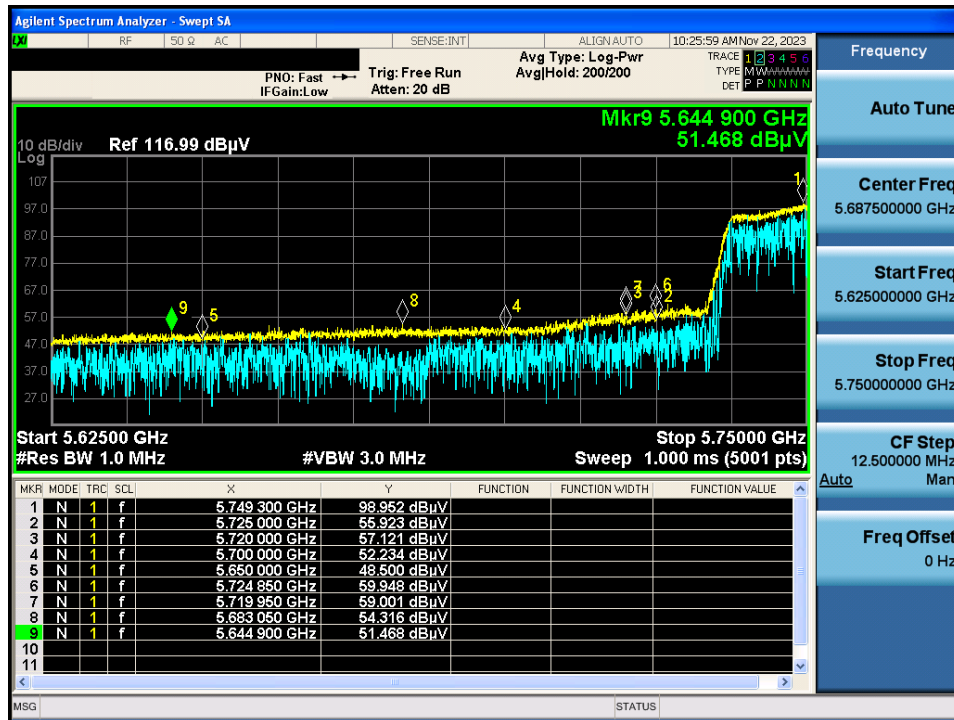
**Detector Mode : PK**





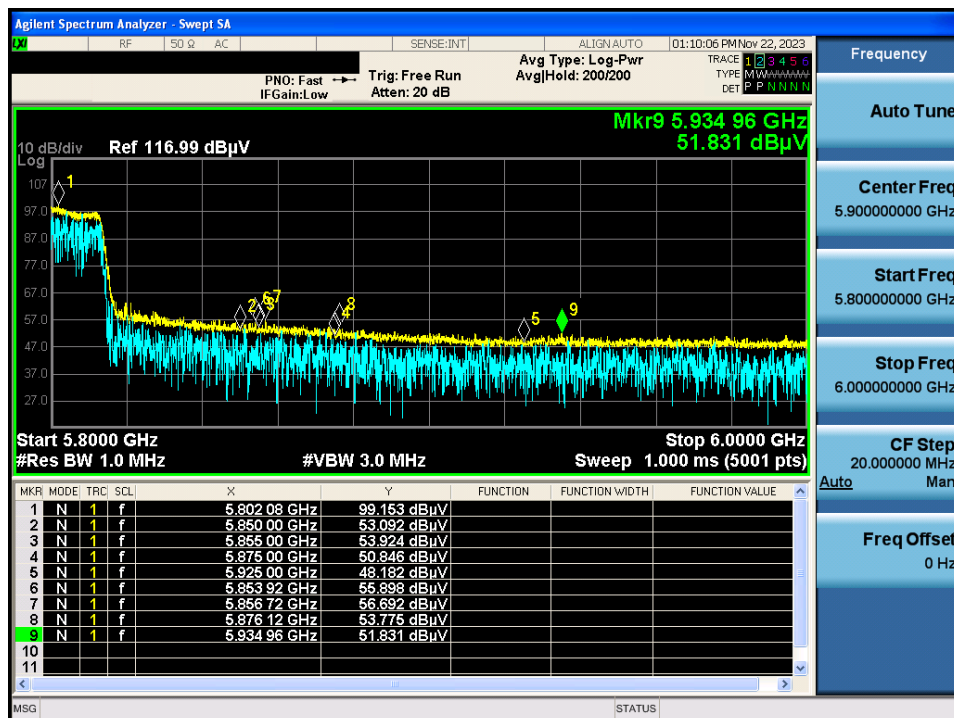
TM 3 & ANT 1 & U-NII 3 & 5 755 & X axis & Hor

Detector Mode : PK



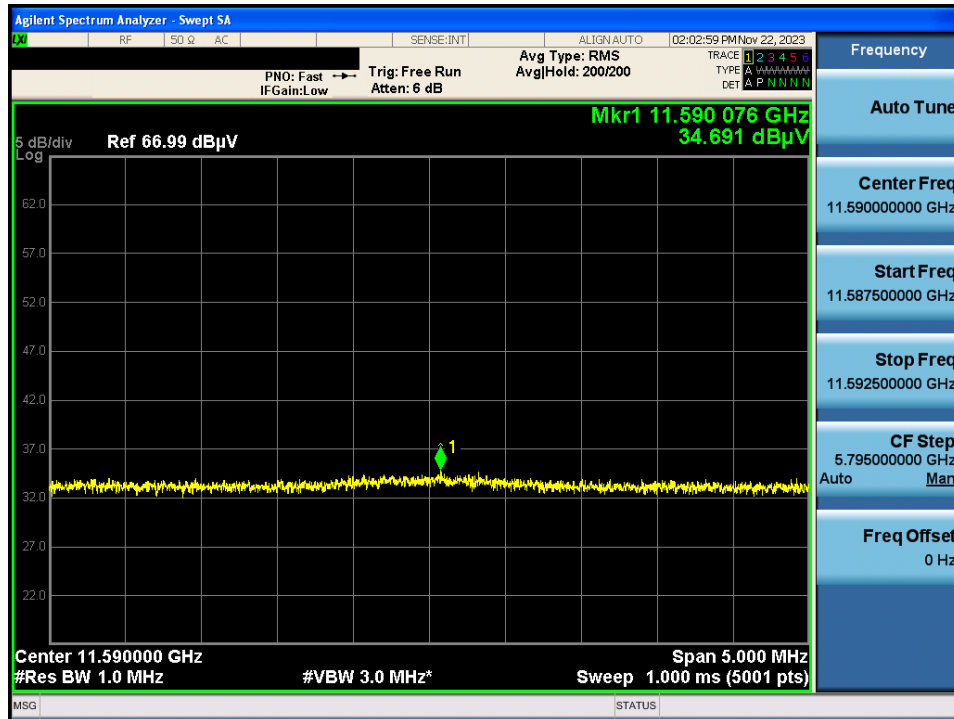
TM 3 & ANT 1 & U-NII 3 & 5 795 & X axis & Hor

Detector Mode : PK



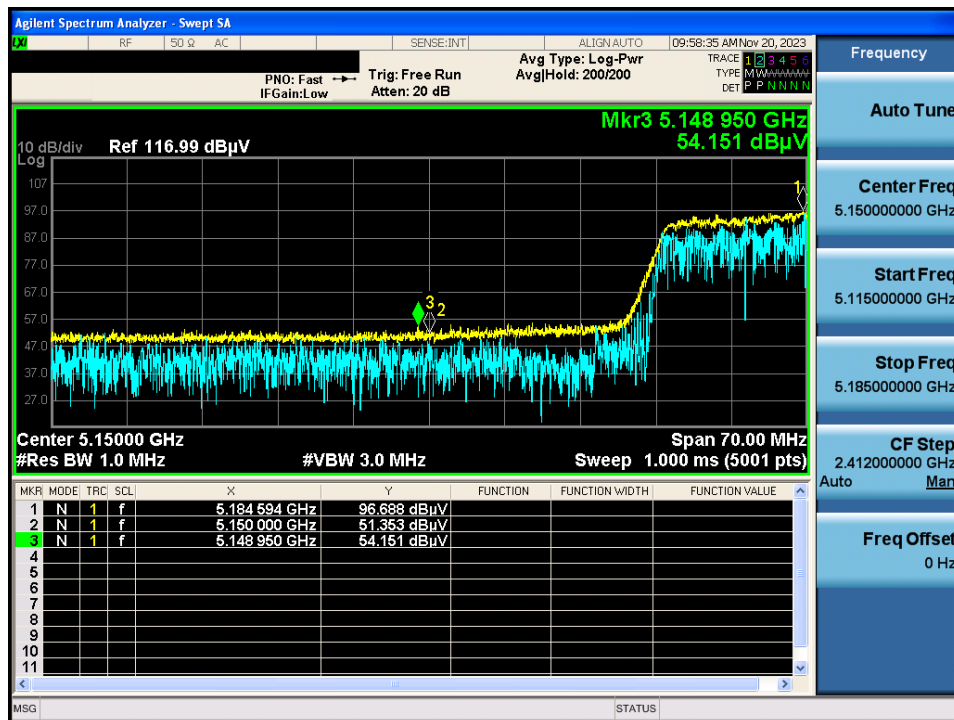
TM 3 & ANT 1 & U-NII 3 & 5 755 & X axis & Hor

Detector Mode : AV



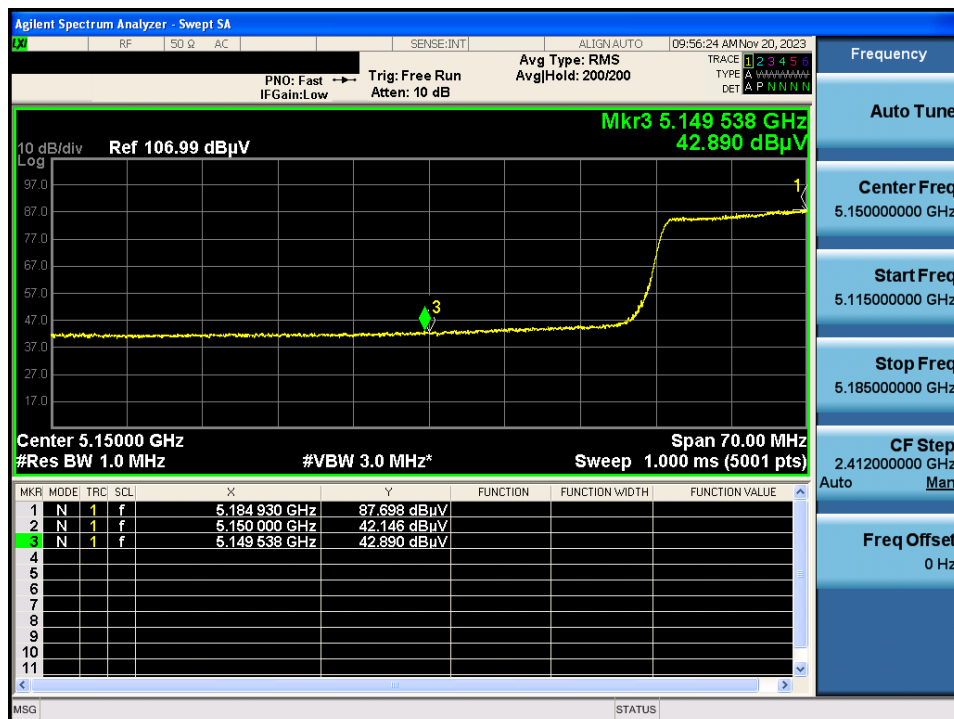
TM 4 & MIMO & U-NII 1 & 5 190 & X axis & Hor

Detector Mode : PK



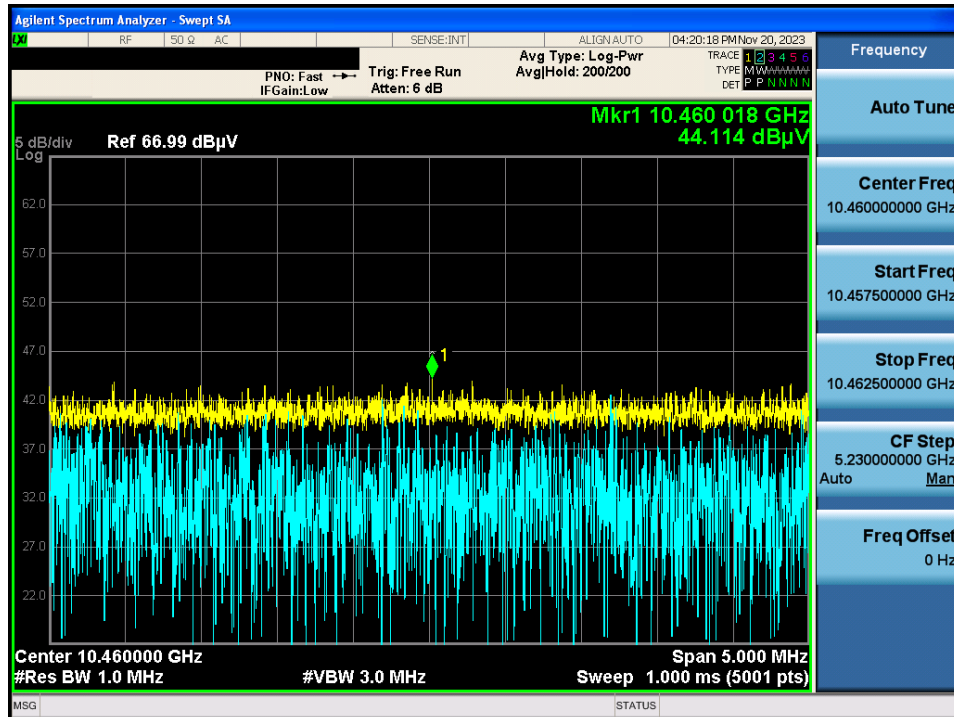
TM 4 & MIMO & U-NII 1 & 5 190 & X axis & Hor

Detector Mode : AV

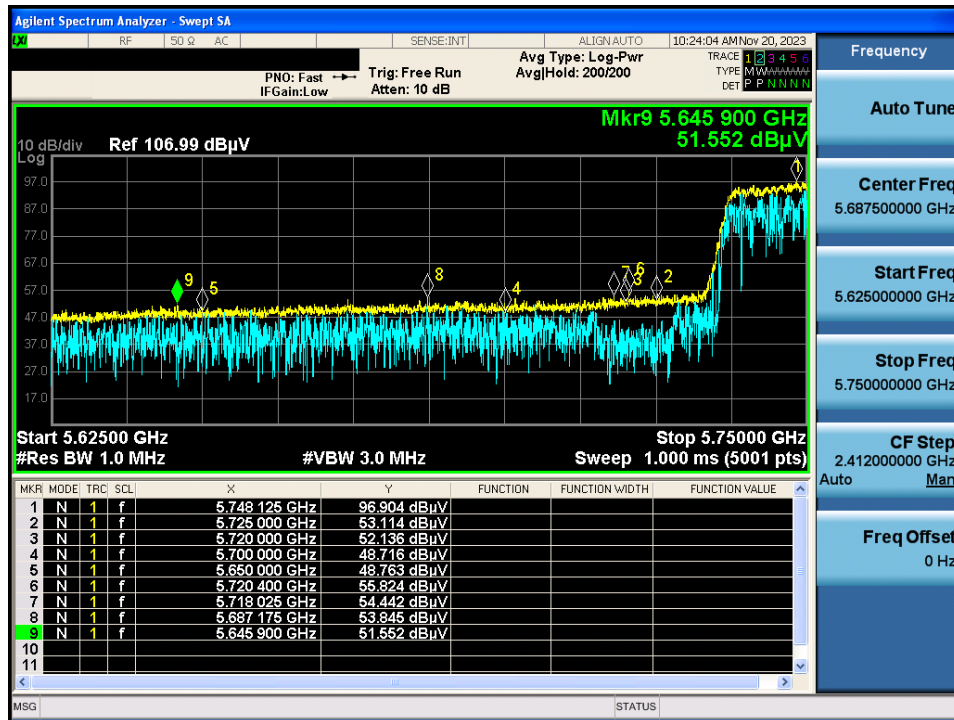


TM 4 & MIMO & U-NII 1 & 5 230 & X axis & Hor

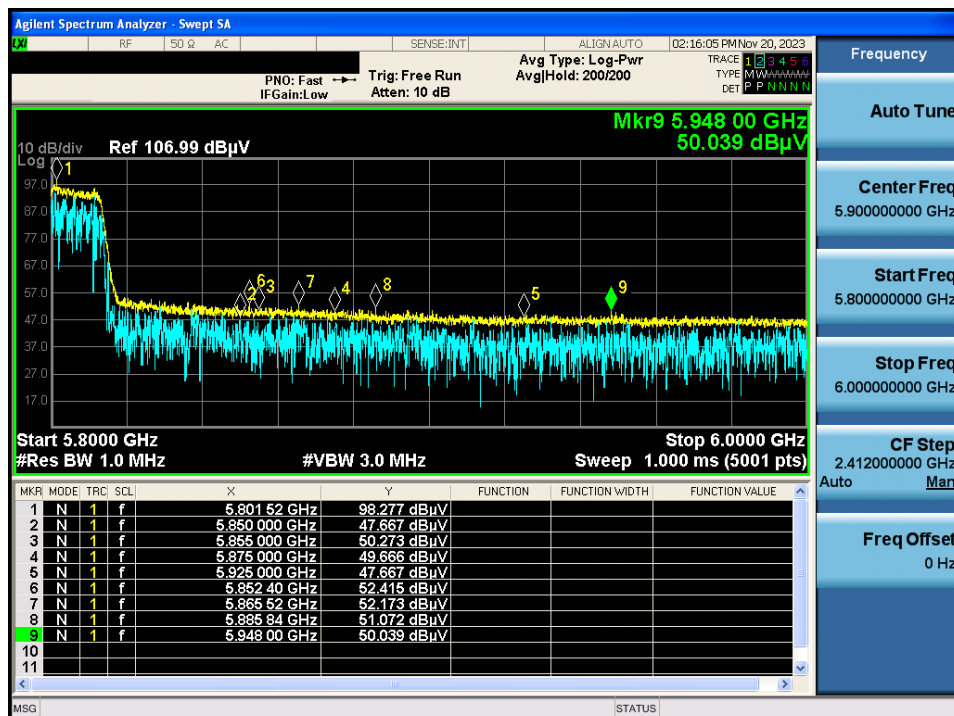
Detector Mode : PK



**Detector Mode : PK**

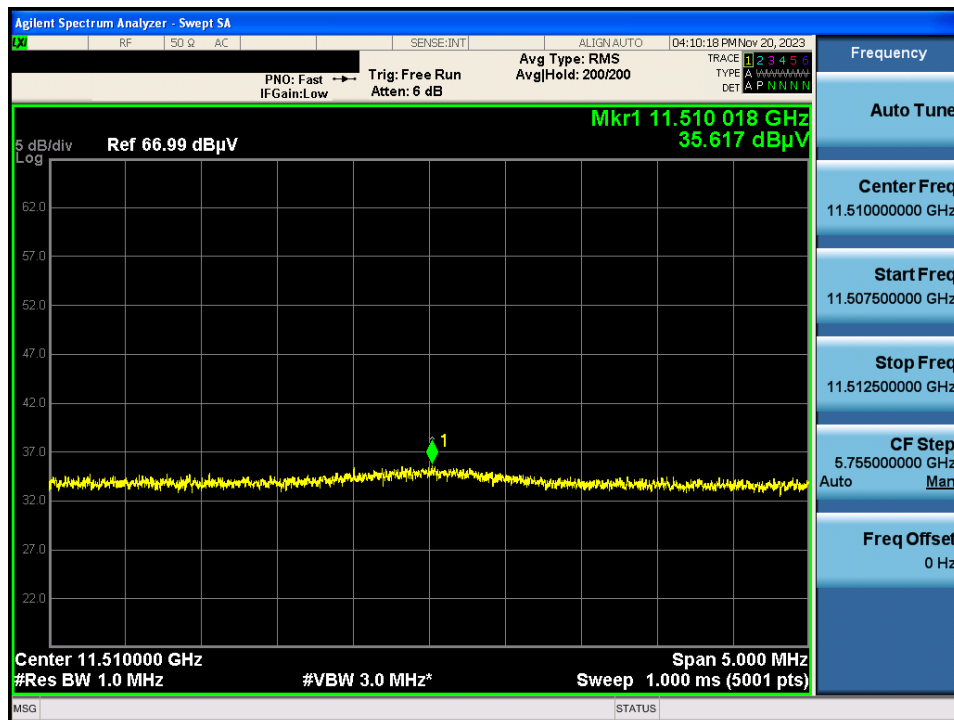


**Detector Mode : PK**



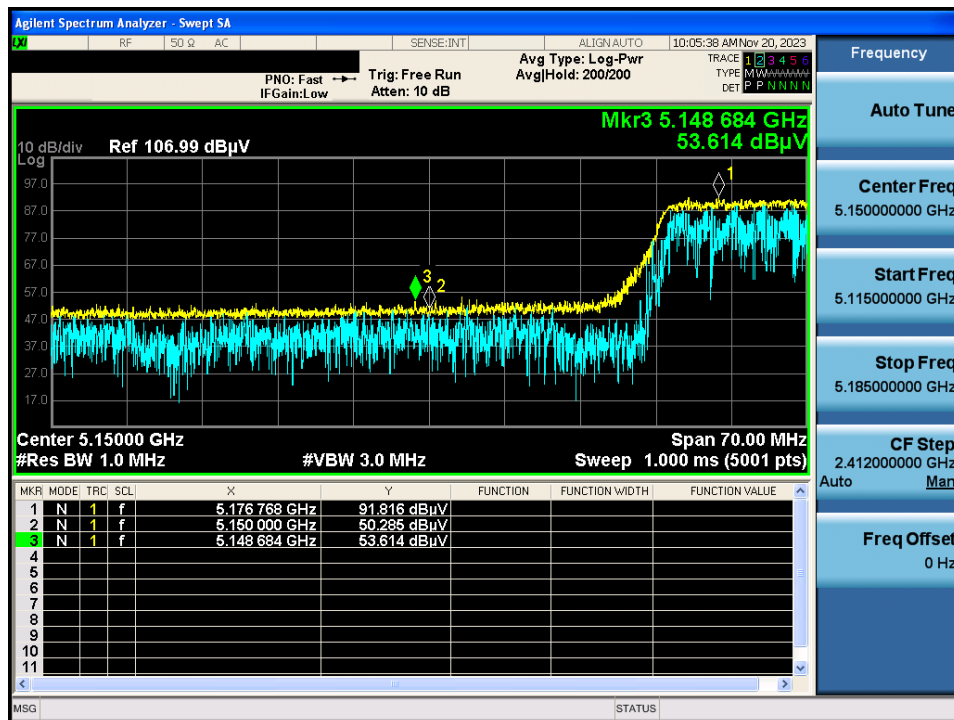
TM 4 & MIMO & U-NII 3 & 5 755 & X axis & Hor

Detector Mode : AV



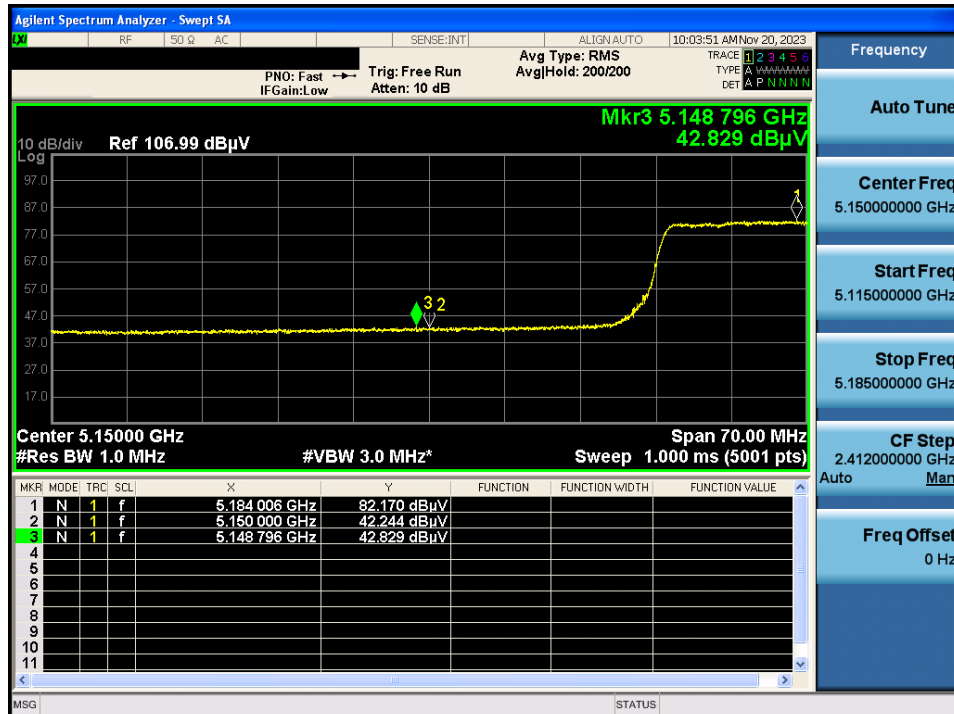
TM 5 & MIMO & U-NII 1 & 5 210 & X axis & Hor

Detector Mode : PK



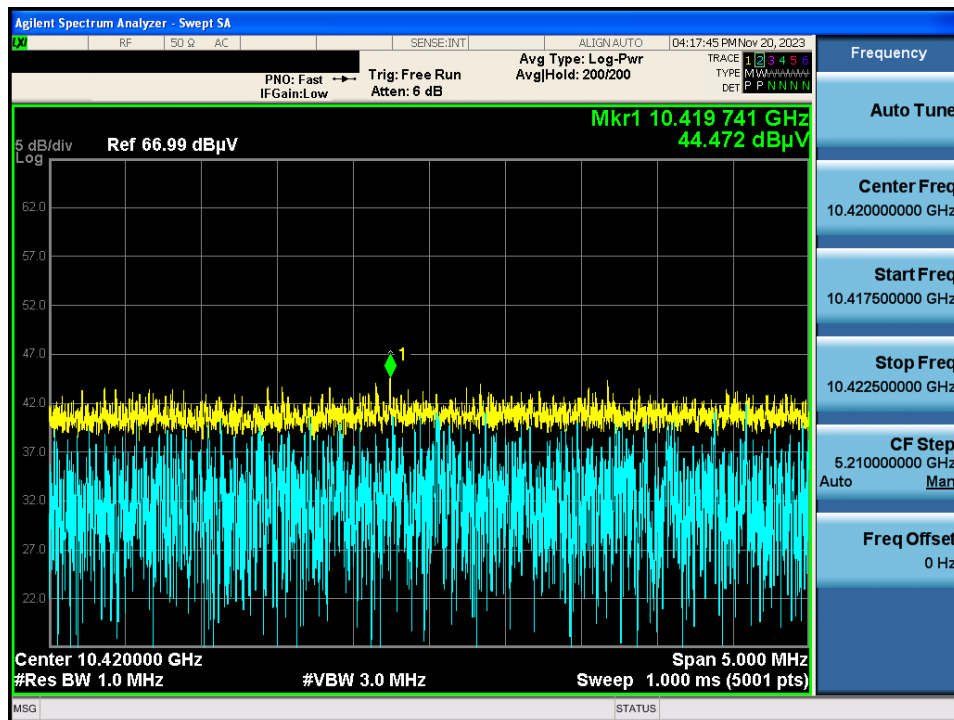
TM 5 & MIMO & U-NII 1 & 5 210 & X axis & Hor

Detector Mode : AV



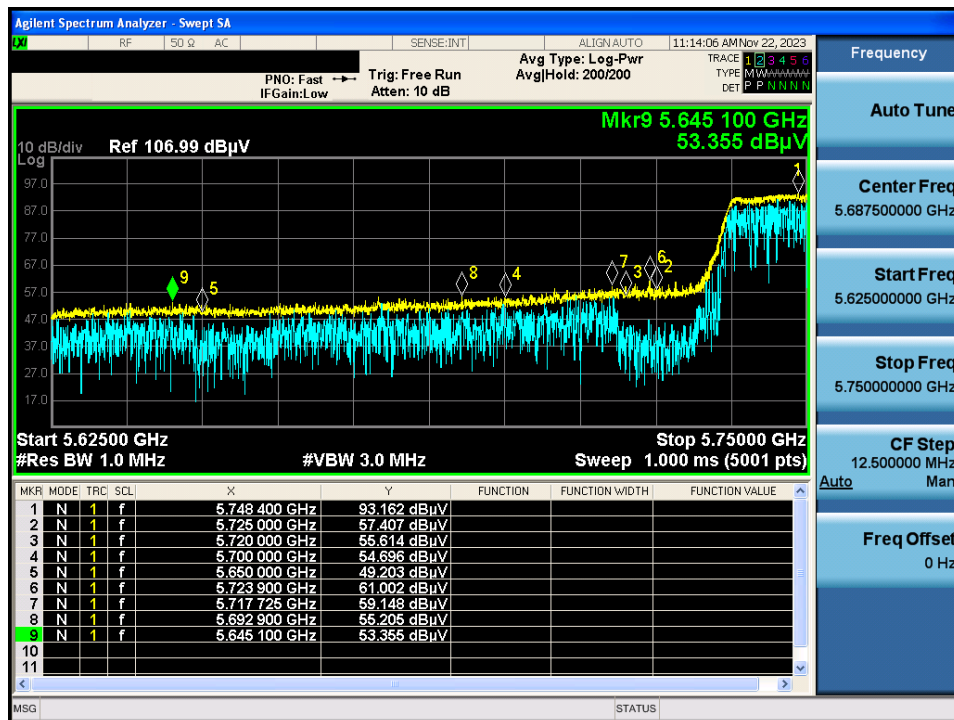
TM 5 & MIMO & U-NII 1 & 5 210 & X axis & Hor

Detector Mode : PK

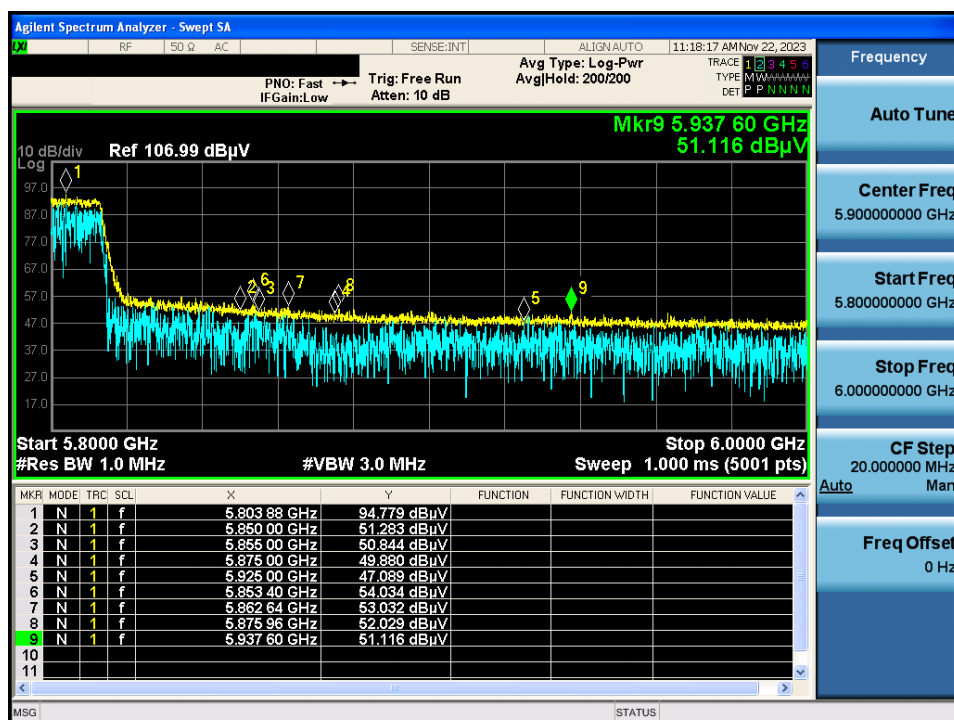




**Detector Mode : PK**

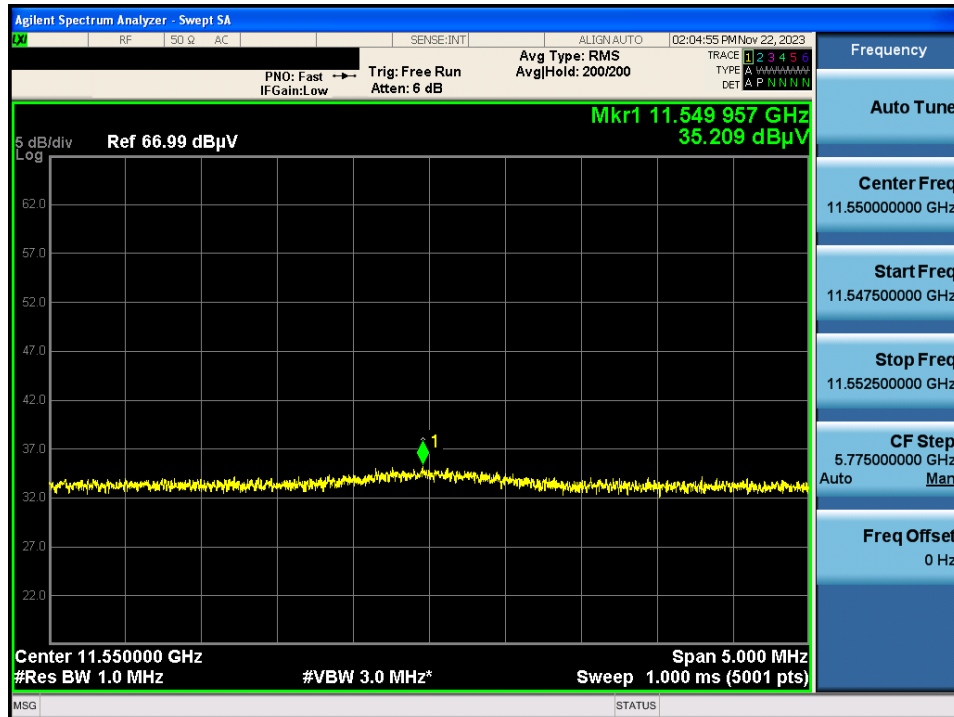


**Detector Mode : PK**



TM 5 & ANT 1 & U-NII 3 & 5 775 & X axis & Hor

Detector Mode : AV



## APPENDIX III

### Output power verification

#### ■ Test Configuration



Method PM-G

#### ■ Test Procedure

##### Method PM-G of KDB789033 D02v02r01

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

| Mode             | Band    | Channel | Frequency (MHz) | Conducted Output Power(dBm) Antenna 1 | Conducted Output Power(dBm) Antenna 2 |
|------------------|---------|---------|-----------------|---------------------------------------|---------------------------------------|
| 802.11a          | U-NII 1 | 36      | 5 180           | 8.01                                  | 6.03                                  |
|                  |         | 40      | 5 200           | 7.74                                  | 5.98                                  |
|                  |         | 48      | 5 240           | 7.27                                  | 5.92                                  |
| 802.11ac (VHT20) | U-NII 3 | 149     | 5 745           | 7.56                                  | 5.69                                  |
|                  |         | 157     | 5 785           | 7.43                                  | 5.46                                  |
|                  |         | 165     | 5 825           | 7.52                                  | 4.96                                  |

All mode were measured and the worst-case results are reported.

NII-1: SISO, 802.11a, NII-3: SISO, 802.11ac(VTH20)