# FCC RF Test Report

| | | |
|---|---|---|
| APPLICANT | : | Motorola Mobility LLC |
| EQUIPMENT | : | Mobile Cellular Phone |
| BRAND NAME | : | Motorola |
| MODEL NAME | : | XT2331-1,XT2333-1 |
| FCC ID | : | IHDT56AH6 |
| STANDARD | : | FCC Part 15 Subpart E §15.407 |
| CLASSIFICATION | : | (NII) Unlicensed National Information Infrastructure |
| TEST DATE(S) | : | Aug. 29, 2022 ~ Oct. 22, 2022 |

We, Sporton International Inc. (Kunshan) , would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

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*People's Republic of China*

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# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FR282501D | Rev. 01 | Initial issue of report | Oct. 28, 2022 |
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# SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit for U-NII-1 ~ U-NII-2C | Limit for U-NII-3 | Result | Remark |
|---|---|---|---|---|---|---|
| 3.1 | 2.1049 & 15.403(i) | 6dB, 26dB & 99% Bandwidth | - | > 500kHz | Pass | - |
| 3.2 | 15.407(a) | Maximum Conducted Output Power | ≤ 24 dBm | ≤ 30 dBm | Pass | - |
| 3.3 | 15.407(a) | Power Spectral Density | ≤ 11 dBm | ≤ 30 dBm/500kHz | Pass | - |
| 3.4 | 15.407(b) | Unwanted Emissions | 15.407(b) & 15.209(a) | 15.407(b)(4)(i) &15.209(a) | Pass | Under limit 3.11 dB at 5149.44 MHz |
| 3.5 | 15.207 | AC Conducted Emission | 15.207(a) | 15.207(a) | Pass | Under limit 8.13 dB at 0.165 MHz |
| 3.6 | 15.203 & 15.407(a) | Antenna Requirement | N/A | N/A | Pass | - |

| **Declaration of Conformity:** |
|---|
| The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. |
| **Comments and Explanations:** |
| The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification. |

# 1 General Description

## 1.1 Applicant

**Motorola Mobility LLC**
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

## 1.2 Manufacturer

**Motorola Mobility LLC**
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

## 1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | Mobile Cellular Phone |
| **Brand Name** | Motorola |
| **Model Name** | XT2331-1,XT2333-1 |
| **FCC ID** | IHDT56AH6 |
| **IMEI Code** | Conducted: 355650970011873/355650970011881<br>Conduction: 354696570012499/354696570012507<br>Radiation:<br>355650970026350/355650970026368 for Sample 1<br>354696570018173/354696570018181 for Sample 3 |
| **HW Version** | DVT2 |
| **SW Version** | THA33.23 |
| **EUT Stage** | Identical Prototype |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| **Tx/Rx Frequency Range** | 5180 MHz ~ 5240 MHz<br>5260 MHz ~ 5320 MHz<br>5500 MHz ~ 5720 MHz<br>5745 MHz ~ 5825 MHz |
| **Maximum Output Power to Antenna** | **<5180 MHz ~ 5240 MHz>**<br>802.11a : 17.88 dBm / 0.0614 W<br>802.11n HT20 : 17.75 dBm / 0.0596 W<br>802.11n HT40 : 16.62 dBm / 0.0459 W<br>802.11ac VHT20: 17.81 dBm / 0.0604 W<br>802.11ac VHT40: 16.65 dBm / 0.0462 W<br>802.11ac VHT80: 14.55 dBm / 0.0285 W<br>**<5260 MHz ~ 5320 MHz>**<br>802.11a : 17.97 dBm / 0.0627 W<br>802.11n HT20 : 17.83 dBm / 0.0607 W<br>802.11n HT40 : 16.65 dBm / 0.0462 W<br>802.11ac VHT20: 17.87 dBm / 0.0612 W<br>802.11ac VHT40: 16.70 dBm / 0.0468 W<br>802.11ac VHT80: 14.79 dBm / 0.0301 W<br>**<5500 MHz ~ 5720 MHz >**<br>802.11a : 17.94 dBm / 0.0622 W<br>802.11n HT20 : 17.82 dBm / 0.0605 W<br>802.11n HT40 : 16.73 dBm / 0.0471 W<br>802.11ac VHT20: 17.90 dBm / 0.0617 W<br>802.11ac VHT40: 16.75 dBm / 0.0473 W<br>802.11ac VHT80: 16.09 dBm / 0.0406 W<br>**<5745 MHz ~ 5825 MHz>**<br>802.11a : 18.20 dBm / 0.0661 W<br>802.11n HT20 : 17.99 dBm / 0.0630 W<br>802.11n HT40 : 17.04 dBm / 0.0506 W<br>802.11ac VHT20: 18.05 dBm / 0.0638 W<br>802.11ac VHT40: 17.06 dBm / 0.0508 W<br>802.11ac VHT80: 16.46 dBm / 0.0443 W |

| | |
|---|---|
| **99% Occupied Bandwidth** | **<5180 MHz ~ 5240 MHz>**<br>802.11a : 17.542 MHz<br>802.11ac VHT20 : 18.262 MHz<br>802.11ac VHT40 : 36.444 MHz<br>802.11ac VHT80 : 75.764 MHz<br>**<5260 MHz ~ 5320 MHz>**<br>802.11a : 17.502 MHz<br>802.11ac VHT20 : 18.262 MHz<br>802.11ac VHT40 : 36.444 MHz<br>802.11ac VHT80 : 75.764 MHz<br>**<5500 MHz ~ 5720 MHz>**<br>802.11a : 17.542 MHz<br>802.11ac VHT20 : 18.262 MHz<br>802.11ac VHT40 : 36.444 MHz<br>802.11ac VHT80 : 75.764 MHz<br>**<5745 MHz ~ 5825 MHz>**<br>802.11a : 17.622 MHz<br>802.11ac VHT20 : 18.382 MHz<br>802.11ac VHT40 : 36.444 MHz<br>802.11ac VHT80 : 75.924 MHz |
| **Antenna Type / Gain** | **<5180 MHz ~ 5240 MHz>**<br>IFA Antenna with gain -3.0 dBi<br>**<5260 MHz ~ 5320 MHz>**<br>IFA Antenna with gain -2.3 dBi<br>**<5500 MHz ~ 5720 MHz>**<br>IFA Antenna with gain -1.0 dBi<br>**<5745 MHz ~ 5825 MHz>**<br>IFA Antenna with gain -5.7 dBi |
| **Type of Modulation** | 802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)<br>802.11ac:OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM ) |

**Note:** For 802.11n HT20 / ac VHT20 and 802.11n HT40 / ac VHT40 mode, the whole testing has assessed only 802.11ac VHT20/ VHT40 by referring to their higher conducted power.

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Specification of Accessory

| Accessories Information | | | | |
|---|---|---|---|---|
| For XT2331-1 | | | | |
| **AC Adapter 1(US)** | **Brand Name** | Motorola(AOHAI) | **Model Name** | MC-101 |
| **AC Adapter 1(EU)** | **Brand Name** | Motorola(AOHAI) | **Model Name** | MC-102 |
| **AC Adapter 1(UK)** | **Brand Name** | Motorola(AOHAI) | **Model Name** | MC-103 |
| **AC Adapter 1(IN)** | **Brand Name** | Motorola(AOHAI) | **Model Name** | MC-104 |
| **AC Adapter 1(AU)** | **Brand Name** | Motorola(AOHAI) | **Model Name** | MC-105 |
| **AC Adapter 2(US)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-101 |
| **AC Adapter 2(EU)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-102 |
| **AC Adapter 2(UK)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-103 |
| **AC Adapter 2(AU)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-105 |
| **AC Adapter 3(US)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-101 |
| **AC Adapter 3(EU)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-102 |
| **AC Adapter 3(UK)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-103 |
| **AC Adapter 3(AU)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-105 |
| **AC Adapter 4(US)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-201L |
| **AC Adapter 4(EU)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-202L |
| **AC Adapter 4(AR)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-206L |
| **AC Adapter 4(BR)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-207L |
| **AC Adapter 4(CHILE)** | **Brand Name** | Motorola(Salcomp) | **Model Name** | MC-209L |
| **AC Adapter 5(US)** | **Brand Name** | Motorola (AOHAI) | **Model Name** | MC-201L |
| **AC Adapter 5(EU)** | **Brand Name** | Motorola (AOHAI) | **Model Name** | MC-202L |
| **AC Adapter 5(AR)** | **Brand Name** | Motorola (AOHAI) | **Model Name** | MC-206L |
| **AC Adapter 5(CHILE)** | **Brand Name** | Motorola (AOHAI) | **Model Name** | MC-209L |
| **AC Adapter 6(BR)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-207 |
| **Battery 1** | **Brand Name** | Motorola(SUNWODA) | **Model Name** | NH50 |
| **Battery 2** | **Brand Name** | Motorola(ATL) | **Model Name** | NH50 |
| **Earphone 1** | **Brand Name** | Motorola(Xinlide) | **Model Name** | MH202 |
| **Earphone 2** | **Brand Name** | Motorola(Lianyun) | **Model Name** | MH202 |
| **USB Cable 1** | **Brand Name** | Motorola(KingPower) | **Model Name** | K235-08073-H0 |
| **USB Cable 2** | **Brand Name** | Motorola(Broad) | **Model Name** | HO0004 |
| **USB Cable 3** | **Brand Name** | Motorola(KINGHOME) | **Model Name** | 4G data cable |
| For XT2333-1 | | | | |
| **AC Adapter 7(US)** | **Brand Name** | Motorola (Salcomp) | **Model Name** | MC-331 |
| **AC Adapter 7(EU)** | **Brand Name** | Motorola (Salcomp) | **Model Name** | MC-332 |
| **AC Adapter 7(UK)** | **Brand Name** | Motorola (Salcomp) | **Model Name** | MC-333 |
| **AC Adapter 7(IN)** | **Brand Name** | Motorola (Salcomp) | **Model Name** | MC-334 |
| **AC Adapter 7(AU)** | **Brand Name** | Motorola (Salcomp) | **Model Name** | MC-335 |
| **AC Adapter 7(BR)** | **Brand Name** | Motorola (Salcomp) | **Model Name** | MC-337 |
| **AC Adapter 7(CHILE)** | **Brand Name** | Motorola (Salcomp) | **Model Name** | MC-339 |
| **AC Adapter 8(US)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-331 |
| **AC Adapter 8(EU)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-332 |
| **AC Adapter 8(AU)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-335 |
| **AC Adapter 8(AR)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-336 |

| | | | | |
|---|---|---|---|---|
| **AC Adapter 8(BR)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-337 |
| **AC Adapter 8(PRC)** | **Brand Name** | Motorola(Chenyang) | **Model Name** | MC-338 |
| **AC Adapter 9(US)** | **Brand Name** | Motorola(Acbel) | **Model Name** | MC-331 |
| **AC Adapter 9(EU)** | **Brand Name** | Motorola(Acbel) | **Model Name** | MC-332 |
| **AC Adapter 9(UK)** | **Brand Name** | Motorola(Acbel) | **Model Name** | MC-333 |
| **Battery 3** | **Brand Name** | Motorola(ATL) | **Model Name** | PH50 |
| **Battery 4** | **Brand Name** | Motorola(SUNWODA) | **Model Name** | PH50 |
| **USB Cable 4** | **Brand Name** | Motorola(KingPower) | **Model Name** | K235-08074-H0 |
| **USB Cable 5** | **Brand Name** | Motorola(Broad) | **Model Name** | HO0003 |
| **USB Cable 6** | **Brand Name** | Motorola(KINGHOME) | **Model Name** | 5G data cable |

## 1.7 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

<table>
<tr><td>Test Firm</td><td colspan="3">Sporton International Inc. (Kunshan)</td></tr>
<tr><td>Test Site Location</td><td colspan="3">No. 1098, Pengxi North Road, Kunshan Economic Development Zone<br>Jiangsu Province 215300 People’s Republic of China<br>TEL : +86-512-57900158<br>FAX : +86-512-57900958</td></tr>
<tr><td rowspan="2">Test Site No.</td><td>Sporton Site No.</td><td>FCC Designation No.</td><td>FCC Test Firm Registration No.</td></tr>
<tr><td>CO01-KS<br>03CH05-KS<br>TH01-KS</td><td>CN1257</td><td>314309</td></tr>
</table>

## 1.8 Test Software

| Item | Site | Manufacturer | Name | Version |
|---|---|---|---|---|
| 1. | 03CH05-KS | AUDIX | E3 | 6.2009-8-24 |
| 2. | CO01-KS | AUDIX | E3 | 6.2009-8-24 |

## 1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

## 2.1 Carrier Frequency and Channel

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| 5180-5240 MHz U-NII-1 | 36 | 5180 | 44 | 5220 |
| | 38* | 5190 | 46* | 5230 |
| | 40 | 5200 | 48 | 5240 |
| | 42# | 5210 | | |

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| 5260-5320 MHz U-NII-2A | 52 | 5260 | 60 | 5300 |
| | 54* | 5270 | 62* | 5310 |
| | 56 | 5280 | 64 | 5320 |
| | 58# | 5290 | | |

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| 5500-5720MHz U-NII-2C | 100 | 5500 | 112 | 5560 |
| | 102* | 5510 | 116 | 5580 |
| | 104 | 5520 | 132 | 5660 |
| | 106# | 5530 | 134* | 5670 |
| | 108 | 5540 | 136 | 5680 |
| | 110* | 5550 | 140 | 5700 |

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| 5745-5825 MHz U-NII-3 | 149 | 5745 | 157 | 5785 |
| | 151* | 5755 | 159* | 5795 |
| | 153 | 5765 | 161 | 5805 |
| | 155# | 5775 | 165 | 5825 |

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| TDWR Channel | 118* | 5590 | 124 | 5620 |
| | 120 | 5600 | 126* | 5630 |
| | 122# | 5610 | 128 | 5640 |

| Frequency Band | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---|---|---|---|---|
| Straddle Channel | 138# | 5690 | 144 | 5720 |
| | 142* | 5710 | | |

**Note:**

1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "#" were 802.11ac VHT80.

## 2.2 Test Mode

**Final test modes are considering the modulation and worse data rates as below table.**

| Modulation | Data Rate |
|---|---|
| **802.11a** | **6 Mbps** |
| **802.11ac VHT20** | **MCS0** |
| **802.11ac VHT40** | **MCS0** |
| **802.11ac VHT80** | **MCS0** |

| | |
|---|---|
| **AC Conducted Emission** | Mode 1 : GSM850 Idle+ Bluetooth Link+ WLAN Link(5G)+ Adaptor(8 ) + Earphone(1)+ USB Cable( 5) for Sample 3 |
| **Remark:** For Radiated Test Cases, The tests were performance with Adapter 1, Earphone 1, and USB Cable 1 | |

| CO-location |
|---|
| WIFI 802.11ac VHT80 CH42 TX + LTE Band 13 BW 5M Link |

| Ch. # | | U-NII-1<br>5180-5240 MHz | U-NII-2A<br>5260-5320 MHz | U-NII-2C<br>5500-5720MHz | U-NII-3<br>5745-5825 MHz |
|---|---|---|---|---|---|
| | | 802.11a | 802.11a | 802.11a | 802.11a |
| L | Low | 36 | 52 | 100 | 149 |
| M | Middle | 44 | 60 | 116 | 157 |
| H | High | 48 | 64 | 140 | 165 |
| Straddle | | - | - | 144 | - |

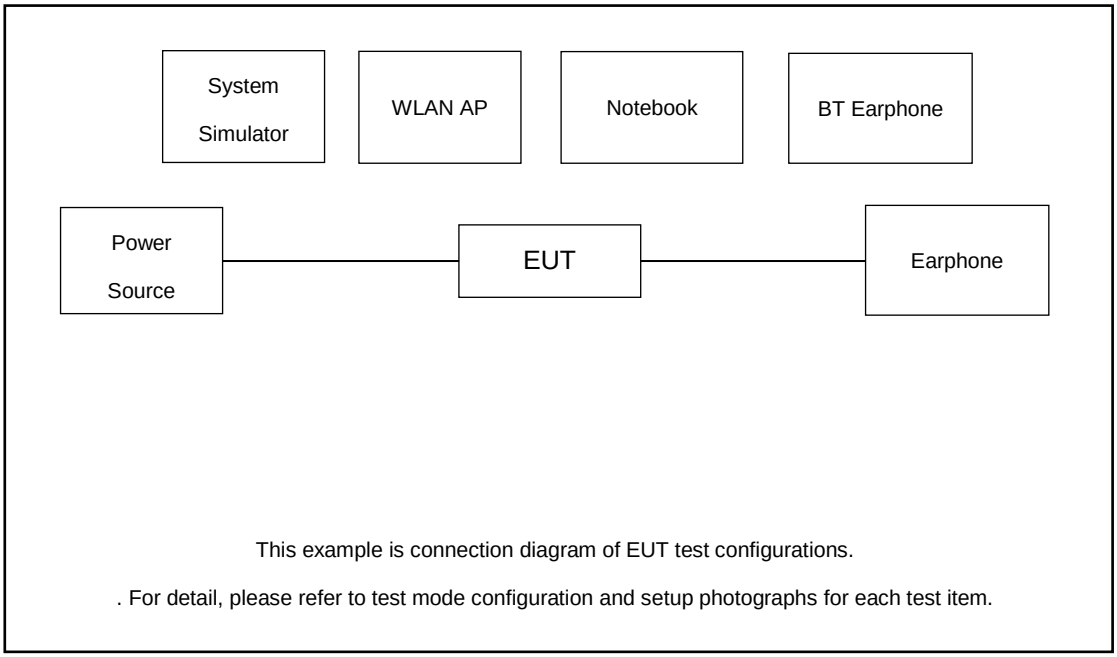
| Ch. # | | U-NII-1<br>5180-5240 MHz | U-NII-2A<br>5260-5320 MHz | U-NII-2C<br>5500-5720MHz | U-NII-3<br>5745-5825 MHz |
|---|---|---|---|---|---|
| | | 802.11ac VHT20 | 802.11ac VHT20 | 802.11ac VHT20 | 802.11ac VHT20 |
| L | Low | 36 | 52 | 100 | 149 |
| M | Middle | 44 | 60 | 116 | 157 |
| H | High | 48 | 64 | 140 | 165 |
| Straddle | | - | - | 144 | - |

| Ch. # | | U-NII-1<br>5180-5240 MHz | U-NII-2A<br>5260-5320 MHz | U-NII-2C<br>5500-5720MHz | U-NII-3<br>5745-5825 MHz |
|---|---|---|---|---|---|
| | | 802.11ac VHT40 | 802.11ac VHT40 | 802.11ac VHT40 | 802.11ac VHT40 |
| L | Low | 38 | 54 | 102 | 151 |
| M | Middle | - | - | 110 | - |
| H | High | 46 | 62 | 134 | 159 |
| Straddle | | - | - | 142 | - |

| Ch. # | | U-NII-1<br>5180-5240 MHz | U-NII-2A<br>5260-5320 MHz | U-NII-2C<br>5500-5720MHz | U-NII-3<br>5745-5825 MHz |
|---|---|---|---|---|---|
| | | 802.11ac VHT80 | 802.11ac VHT80 | 802.11ac VHT80 | 802.11ac VHT80 |
| L | Low | - | - | 106 | - |
| M | Middle | 42 | 58 | - | 155 |
| H | High | - | - | - | - |
| Straddle | | - | - | 138 | - |

## 2.3 Connection Diagram of Test System

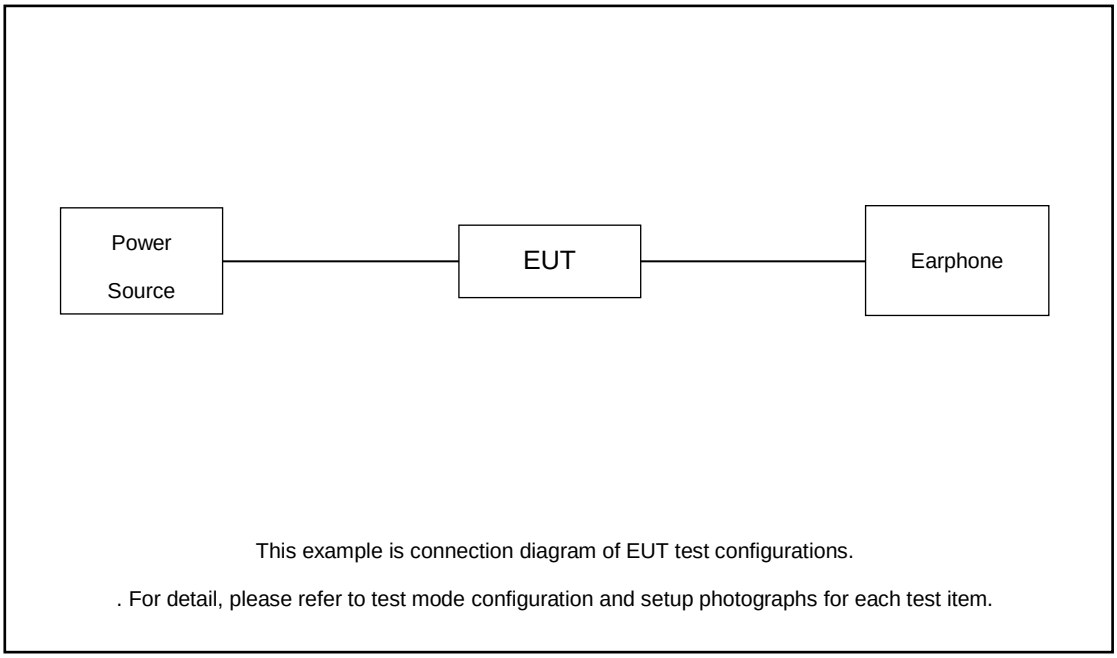
AC Conducted Emission:




This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

Radiated Emission:




This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

## 2.4 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | WLAN AP | D-Link | DIR-655 | KA21R655B1 | N/A | Unshielded, 1.8 m |
| 2. | Notebook | Lenovo | G480 | QDS-BRCM1050I | N/A | shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m |
| 3. | Bluetooth Earphone | Lenovo | LBH308 | N/A | N/A | N/A |
| 4. | SD Card | Kingston | 8GB | N/A | N/A | N/A |
| 5. | LTE Base Station | Anritus | MT8820C | N/A | N/A | Unshielded,1.8m |

## 2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

.

## 2.6 Measurement Results Explanation Example

**For all conducted test items:**

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

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 1.50 dB and 10dB attenuator.

*Offset(dB) = RF cable loss(dB) + attenuator factor(dB).*

= 1.50 + 10 = 11.50(dB)

# 3 Test Result

## 3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

### 3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

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

26dB and 99% Occupied bandwidth are reporting only.

### 3.1.2 Measuring Instruments

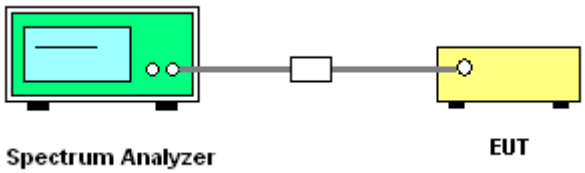
The measuring equipment is listed in the section 4 of this test report.

### 3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

| | |
|---|---|
| ☒ | Section C) Bandwidth Measurement<br>1. Emission Bandwidth (EBW) |
| | **1.** Set RBW = approximately 1% of the emission bandwidth.<br>**2.** Set the VBW > RBW.<br>**3.** Detector = Peak.<br>**4.** Trace mode = max hold<br>**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 analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.<br>**6.** For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) ≥ 3 * RBW.<br>**7.** Measure and record the results in the test report. |
| ☒ | Section C) Bandwidth Measurement<br>2. Minimum Emission Bandwidth for the band 5.725 - 5.85 GHz |
| | **1.** Set RBW = 100kHz.<br>**2.** Set the VBW ≥ 3 x RBW.<br>**3.** Detector = Peak.<br>**4.** Trace mode = max hold<br>**5.** Measure the maximum width of the emission that is 6 dB down from the peak of the emission.<br>**6.** Measure and record the results in the test report. |

### 3.1.4 Test Setup




### 3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A.

## 3.2 Maximum Conducted Output Power Measurement

### 3.2.1 Limit of Maximum Conducted Output Power

**<FCC 14-30 CFR 15.407>**

For mobile and portable 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.

For the 5.25–5.725 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.

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

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

### 3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

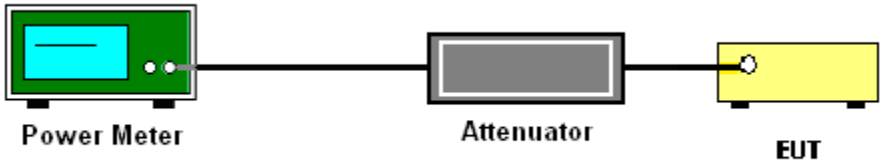
Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for

the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

### 3.2.4 Test Setup




### 3.2.5 Test Result of Maximum Conducted Output Power

| FCC U-NII-1 single antenna | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Average Conducted Power with duty factor (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) | Pass/Fail |
| | | | | | Ant 1 | Ant 1 | Ant 1 | |
| 11a | 6Mbps | 1 | 36 | 5180 | 17.37 | 24.00 | -3.00 | Pass |
| 11a | 6Mbps | 1 | 44 | 5220 | 17.81 | 24.00 | -3.00 | Pass |
| 11a | 6Mbps | 1 | 48 | 5240 | 17.88 | 24.00 | -3.00 | Pass |
| HT20 | MCS0 | 1 | 36 | 5180 | 16.06 | 24.00 | -3.00 | Pass |
| HT20 | MCS0 | 1 | 44 | 5220 | 17.74 | 24.00 | -3.00 | Pass |
| HT20 | MCS0 | 1 | 48 | 5240 | 17.75 | 24.00 | -3.00 | Pass |
| HT40 | MCS0 | 1 | 38 | 5190 | 16.61 | 24.00 | -3.00 | Pass |
| HT40 | MCS0 | 1 | 46 | 5230 | 16.62 | 24.00 | -3.00 | Pass |
| VHT20 | MCS0 | 1 | 36 | 5180 | 16.13 | 24.00 | -3.00 | Pass |
| VHT20 | MCS0 | 1 | 44 | 5220 | 17.79 | 24.00 | -3.00 | Pass |
| VHT20 | MCS0 | 1 | 48 | 5240 | 17.81 | 24.00 | -3.00 | Pass |
| VHT40 | MCS0 | 1 | 38 | 5190 | 16.63 | 24.00 | -3.00 | Pass |
| VHT40 | MCS0 | 1 | 46 | 5230 | 16.65 | 24.00 | -3.00 | Pass |
| VHT80 | MCS0 | 1 | 42 | 5210 | 14.55 | 24.00 | -3.00 | Pass |

| FCC U-NII-2A single antenna | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Average Conducted Power with duty factor (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) | EIRP Power Limit (dBm) | Pass/Fail |
| | | | | | Ant 1 | Ant 1 | Ant 1 | | |
| 11a | 6Mbps | 1 | 52 | 5260 | 17.80 | 23.94 | -2.30 | 26.99 | Pass |
| 11a | 6Mbps | 1 | 60 | 5300 | 17.95 | 23.96 | -2.30 | 26.99 | Pass |
| 11a | 6Mbps | 1 | 64 | 5320 | 17.97 | 23.96 | -2.30 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 52 | 5260 | 17.82 | 23.98 | -2.30 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 60 | 5300 | 17.83 | 23.98 | -2.30 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 64 | 5320 | 17.30 | 23.98 | -2.30 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 54 | 5270 | 16.65 | 23.98 | -2.30 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 62 | 5310 | 16.17 | 23.98 | -2.30 | 26.99 | Pass |
| VHT20 | MCS0 | 1 | 52 | 5260 | 17.85 | 23.98 | -2.30 | 26.99 | Pass |
| VHT20 | MCS0 | 1 | 60 | 5300 | 17.87 | 23.98 | -2.30 | 26.99 | Pass |
| VHT20 | MCS0 | 1 | 64 | 5320 | 17.35 | 23.98 | -2.30 | 26.99 | Pass |
| VHT40 | MCS0 | 1 | 54 | 5270 | 16.70 | 23.98 | -2.30 | 26.99 | Pass |
| VHT40 | MCS0 | 1 | 62 | 5310 | 16.23 | 23.98 | -2.30 | 26.99 | Pass |
| VHT80 | MCS0 | 1 | 58 | 5290 | 14.79 | 23.98 | -2.30 | 26.99 | Pass |

| FCC U-NII-2C single antenna | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Average Conducted Power with duty factor (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) | EIRP Power Limit (dBm) | Pass/Fail |
| | | | | | Ant 1 | Ant 1 | Ant 1 | | |
| 11a | 6Mbps | 1 | 100 | 5500 | 17.94 | 23.96 | -1.00 | 26.99 | Pass |
| 11a | 6Mbps | 1 | 116 | 5580 | 17.82 | 23.94 | -1.00 | 26.99 | Pass |
| 11a | 6Mbps | 1 | 140 | 5700 | 17.78 | 23.94 | -1.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 100 | 5500 | 17.82 | 23.98 | -1.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 116 | 5580 | 17.74 | 23.98 | -1.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 140 | 5700 | 16.20 | 23.98 | -1.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 102 | 5510 | 16.73 | 23.98 | -1.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 110 | 5550 | 16.70 | 23.98 | -1.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 134 | 5670 | 16.50 | 23.98 | -1.00 | 26.99 | Pass |
| VHT20 | MCS0 | 1 | 100 | 5500 | 17.90 | 23.98 | -1.00 | 26.99 | Pass |
| VHT20 | MCS0 | 1 | 116 | 5580 | 17.76 | 23.98 | -1.00 | 26.99 | Pass |
| VHT20 | MCS0 | 1 | 140 | 5700 | 16.26 | 23.98 | -1.00 | 26.99 | Pass |
| VHT40 | MCS0 | 1 | 102 | 5510 | 16.75 | 23.98 | -1.00 | 26.99 | Pass |
| VHT40 | MCS0 | 1 | 110 | 5550 | 16.72 | 23.98 | -1.00 | 26.99 | Pass |
| VHT40 | MCS0 | 1 | 134 | 5670 | 16.53 | 23.98 | -1.00 | 26.99 | Pass |
| VHT80 | MCS0 | 1 | 106 | 5530 | 16.18 | 23.98 | -1.00 | 26.99 | Pass |
| VHT80 | MCS0 | 1 | 122 | 5610 | 16.09 | 23.98 | -1.00 | 26.99 | Pass |

| FCC U-NII-2C straddle channel single antenna | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Average Conducted Power with duty factor (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) | EIRP Power Limit (dBm) | Pass/Fail |
| | | | | | Ant 1 | Ant 1 | Ant 1 | | |
| 11a | 6Mbps | 1 | 144 | 5720 | 17.81 | 23.96 | -1.00 | 26.99 | Pass |
| HT20 | MCS0 | 1 | 144 | 5720 | 17.65 | 23.98 | -1.00 | 26.99 | Pass |
| HT40 | MCS0 | 1 | 142 | 5710 | 16.59 | 23.98 | -1.00 | 26.99 | Pass |
| VHT20 | MCS0 | 1 | 144 | 5720 | 17.73 | 23.98 | -1.00 | 26.99 | Pass |
| VHT40 | MCS0 | 1 | 142 | 5710 | 16.62 | 23.98 | -1.00 | 26.99 | Pass |
| VHT80 | MCS0 | 1 | 138 | 5690 | 16.08 | 23.98 | -1.00 | 26.99 | Pass |

| U-NII-3 single antenna | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | Average Conducted Power with duty factor (dBm) | FCC Conducted Power Limit (dBm) | DG (dBi) | Pass/Fail |
| | | | | | Ant 1 | Ant 1 | Ant 1 | |
| 11a | 6Mbps | 1 | 149 | 5745 | 18.15 | 30.00 | -5.70 | Pass |
| 11a | 6Mbps | 1 | 157 | 5785 | 18.20 | 30.00 | -5.70 | Pass |
| 11a | 6Mbps | 1 | 165 | 5825 | 18.14 | 30.00 | -5.70 | Pass |
| HT20 | MCS0 | 1 | 149 | 5745 | 17.99 | 30.00 | -5.70 | Pass |
| HT20 | MCS0 | 1 | 157 | 5785 | 17.95 | 30.00 | -5.70 | Pass |
| HT20 | MCS0 | 1 | 165 | 5825 | 17.93 | 30.00 | -5.70 | Pass |
| HT40 | MCS0 | 1 | 151 | 5755 | 16.96 | 30.00 | -5.70 | Pass |
| HT40 | MCS0 | 1 | 159 | 5795 | 17.04 | 30.00 | -5.70 | Pass |
| VHT20 | MCS0 | 1 | 149 | 5745 | 18.05 | 30.00 | -5.70 | Pass |
| VHT20 | MCS0 | 1 | 157 | 5785 | 18.00 | 30.00 | -5.70 | Pass |
| VHT20 | MCS0 | 1 | 165 | 5825 | 17.99 | 30.00 | -5.70 | Pass |
| VHT40 | MCS0 | 1 | 151 | 5755 | 17.00 | 30.00 | -5.70 | Pass |
| VHT40 | MCS0 | 1 | 159 | 5795 | 17.06 | 30.00 | -5.70 | Pass |
| VHT80 | MCS0 | 1 | 155 | 5775 | 16.46 | 30.00 | -5.70 | Pass |

# 3.3 Power Spectral Density Measurement

## 3.3.1 Limit of Power Spectral Density

**<FCC 14-30 CFR 15.407>**

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band.

For the 5.25–5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

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

## 3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

## 3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.
Section F) Maximum power spectral density.

**# Method SA-2 #**

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.

- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

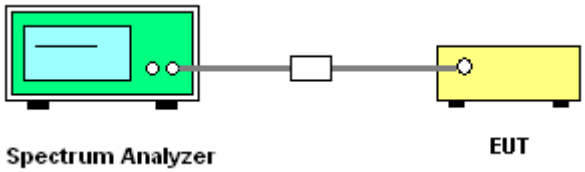
**For devices operating in the band 5.725 - 5.85 GHz**

**# Method SA-2 #**

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz.
- Set VBW ≥ 1 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(500kHz/RBW) to the test result.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

### 3.3.4 Test Setup




### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

## 3.4 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

### 3.4.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5600 MHz and 5650-5725MHz band: all emissions outside of the 5470-5600 MHz and 5650-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.725-5.85 GHz band:
15.407(b)(4)(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.

(3) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

| (4) EIRP (dBm) | Field Strength at 3m (dBμV/m) |
|---|---|
| - 27 | 68.3 |

**Note:** The following formula is used to convert the EIRP to field strength.

$$EIRP = E_{Meas} + 20\log(d_{Meas}) - 104.7$$

where

EIRP is the equivalent isotropically radiated power, in dBm

$E_{Meas}$ is the field strength of the emission at the measurement distance, in dBμV/m

$d_{Meas}$ is the measurement distance, in m

(4) ANSI C63.10-2013 clause 12.7.3 note 97

As specified by regulatory requirements, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit. However, an out-of-band emission that complies with both the average and peak general regulatory limits is not required to satisfy the peak emission limit.

### 3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is 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.

   (4) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - RBW = 1 MHz
   - VBW = 3 MHz
   - Detector = power averaging (rms), set span/(# of points in sweep) ≥ RBW/2.
   - Averaging type = power averaging(RMS)
   - The correction factor shall be offset is 10 log (1/x), where x is the duty cycle.

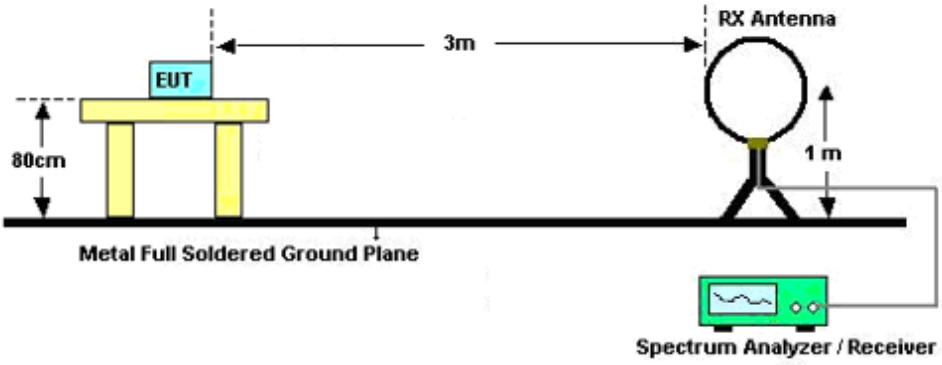
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal

polarization and vertical polarization of the antenna.

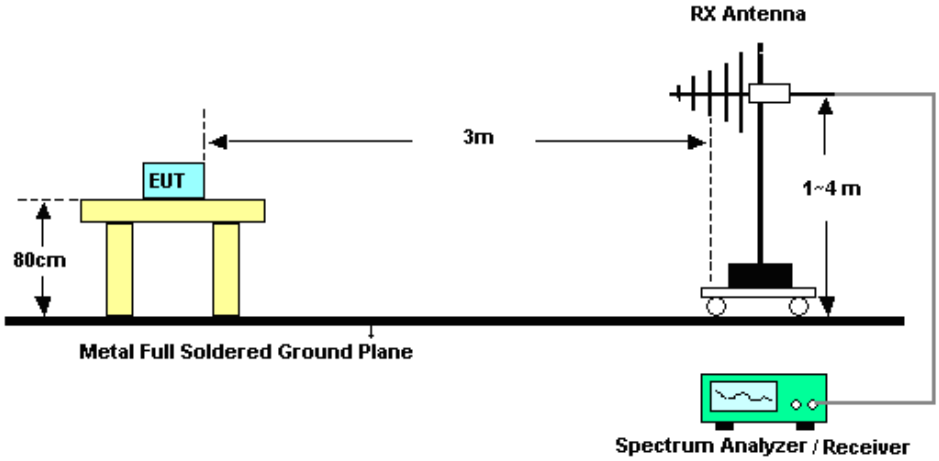
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

### 3.4.4 Test Setup

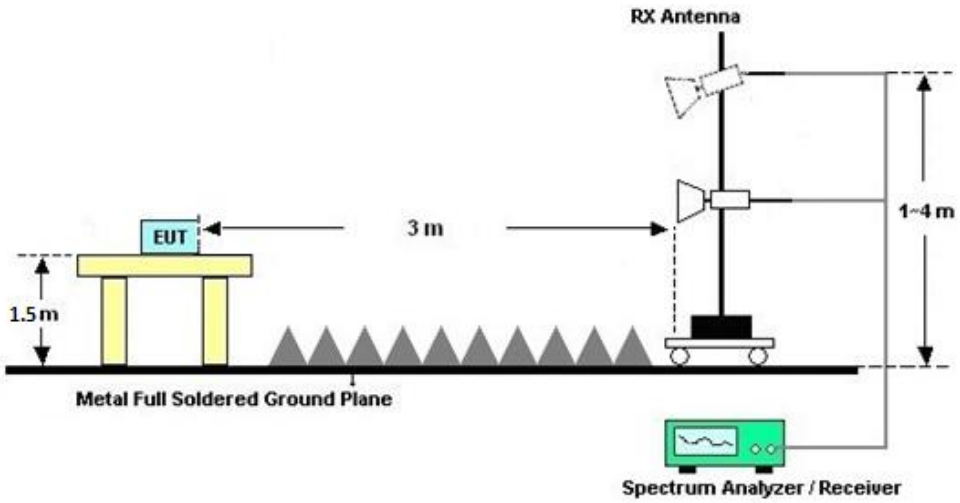
**For radiated emissions below 30MHz**




**For radiated emissions from 30MHz to 1GHz**



**For radiated emissions above 1GHz**




### 3.4.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

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

### 3.4.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

### 3.4.7 Duty Cycle

Please refer to Appendix D.

### 3.4.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix C.

# 3.5 AC Conducted Emission Measurement

## 3.5.1 Limit of AC Conducted Emission

For equipment 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.

| Frequency of emission (MHz) | Conducted limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

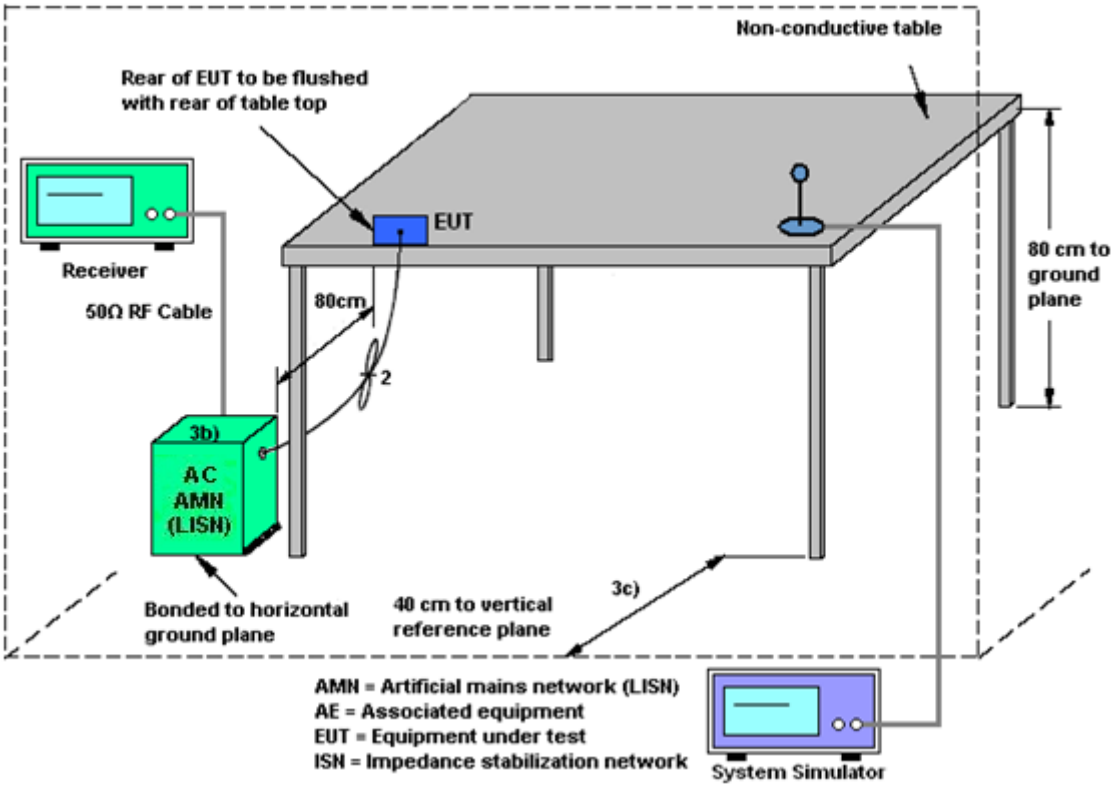
## 3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

## 3.5.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

### 3.5.4 Test Setup




### 3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

# 3.6 Antenna Requirements

## 3.6.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## 3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

## 3.6.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

# 4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSV40 | 101040 | 10Hz~40GHz | Oct. 14, 2021 | Aug. 29, 2022~ Oct. 09, 2022 | Oc. 13, 2022 | Conducted (TH01-KS) |
| Pulse Power Senor | Anritsu | MA2411B | 0917070 | 300MHz~40GHz | Jan. 05, 2022 | Aug. 29, 2022~ Oct. 09, 2022 | Jan. 04, 2023 | Conducted (TH01-KS) |
| Power Meter | Anritsu | ML2495A | 1005002 | 50MHz Bandwidth | Jan. 05, 2022 | Aug. 29, 2022~ Oct. 09, 2022 | Jan. 04, 2023 | Conducted (TH01-KS) |
| EMI Test Receiver | Keysight | N9038A | MY56400004 | 3Hz~8.5GHz;Max 30dBm | Oct. 13, 2022 | Oct. 22, 2022 | Oct. 12, 2023 | Radiation (03CH05-KS) |
| EXA Spectrum Analyzer | Keysight | N9010A | MY55150244 | 10Hz-44G,MAX 30dB | Mar. 24, 2022 | Oct. 22, 2022 | Mar. 23, 2023 | Radiation (03CH05-KS) |
| Loop Antenna | R&S | HFH2-Z2 | 100321 | 9kHz~30MHz | Oct. 16, 2022 | Oct. 22, 2022 | Oct. 15, 2023 | Radiation (03CH05-KS) |
| Bilog Antenna | TeseQ | CBL6111D | 49922 | 30MHz-1GHz | May. 24 ,2022 | Oct. 22, 2022 | May. 23, 2023 | Radiation (03CH05-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 3117 | 75957 | 1GHz~18GHz | Nov. 08, 2021 | Oct. 22, 2022 | Nov. 07, 2022 | Radiation (03CH05-KS) |
| SHF-EHF Horn | Com-power | AH-840 | 101070 | 18GHz~40GHz | Jan. 05, 2022 | Oct. 22, 2022 | Jan. 04, 2023 | Radiation (03CH05-KS) |
| Amplifier | SONOMA | 310N | 380826 | 9KHz-1GHz | Jul. 11, 2022 | Oct. 22, 2022 | Jul. 10, 2023 | Radiation (03CH05-KS) |
| Amplifier | MITEQ | EM18G40GGA | 060728 | 18~40GHz | Jan. 05, 2022 | Oct. 22, 2022 | Jan. 04, 2023 | Radiation (03CH05-KS) |
| high gain Amplifier | EM | EM01G18GA | 060839 | 1Ghz-18Ghz | Oct. 12, 2022 | Oct. 22, 2022 | Oct. 11, 2023 | Radiation (03CH05-KS) |
| Amplifier | EM | EM01G18GA | 060833 | 1Ghz-18Ghz | Jan. 05, 2022 | Oct. 22, 2022 | Jan. 04, 2023 | Radiation (03CH05-KS) |
| AC Power Source | Chroma | 61601 | F104090004 | N/A | NCR | Oct. 22, 2022 | NCR | Radiation (03CH05-KS) |
| Turn Table | ChamPro | EM 1000-T | 060762-T | 0~360 degree | NCR | Oct. 22, 2022 | NCR | Radiation (03CH05-KS) |
| Antenna Mast | ChamPro | EM 1000-A | 060762-A | 1 m~4 m | NCR | Oct. 22, 2022 | NCR | Radiation (03CH05-KS) |
| EMI Receiver | R&S | ESCI7 | 100768 | 9kHz~7GHz; | May. 24, 2022 | Oct. 18, 2022 | May. 23, 2023 | Conduction (CO01-KS) |
| AC LISN (for auxiliary equipment) | MessTec | AN3016 | 060103 | 9kHz~30MHz | Oct. 13, 2022 | Oct. 18, 2022 | Oct. 12, 2023 | Conduction (CO01-KS) |
| AC LISN | MessTec | AN3016 | 060105 | 9kHz~30MHz | May. 24, 2022 | Oct. 18, 2022 | May. 23, 2023 | Conduction (CO01-KS) |
| AC Power Source | Chroma | 61602 | ABP000000811 | AC 0V~300V, 45Hz~1000Hz | Oct. 12, 2022 | Oct. 18, 2022 | Oct. 11, 2023 | Conduction (CO01-KS) |

NCR: No Calibration Required

# 5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

**Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **2.78 dB** |

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.0dB** |

**Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.0dB** |

**Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.0dB** |

# Appendix A. Conducted Test Results

| | |
|---|---|
| **Case No. :** FR282501D | |
| **Ambient Condition**: 25 ℃, 45 %RH, | |
| **Test Date:** 2022.8.29 ~2022.10.09 | **Test Engineer:** Jiang Jun |

# Emission Bandwidth

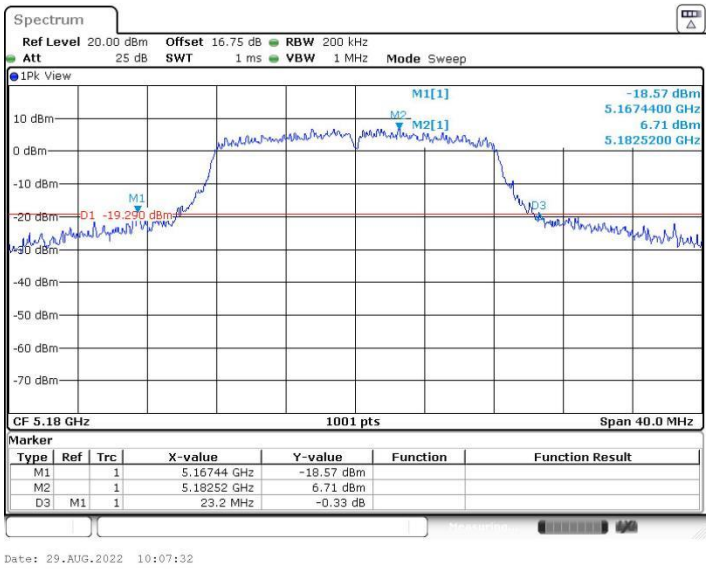
## Test Result

| TestMode | Antenna | Frequency[MHz] | 26db EBW [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|---|
| 11A | Ant1 | 5180 | 23.20 | 5167.44 | 5190.64 | --- | --- |
| | | 5220 | 22.40 | 5209.00 | 5231.40 | --- | --- |
| | | 5240 | 21.96 | 5230.16 | 5252.12 | --- | --- |
| | | 5260 | 20.04 | 5250.04 | 5270.08 | --- | --- |
| | | 5300 | 21.08 | 5288.96 | 5310.04 | --- | --- |
| | | 5320 | 23.76 | 5308.76 | 5332.52 | --- | --- |
| | | 5500 | 21.36 | 5488.84 | 5510.20 | --- | --- |
| | | 5580 | 20.40 | 5570.12 | 5590.52 | --- | --- |
| | | 5700 | 20.44 | 5689.32 | 5709.76 | --- | --- |
| | | 5720 | 21.76 | 5708.96 | 5730.72 | --- | --- |
| | | 5745 | 20.20 | 5734.88 | 5755.08 | --- | --- |
| | | 5785 | 20.80 | 5774.24 | 5795.04 | --- | --- |
| | | 5825 | 20.40 | 5814.56 | 5834.96 | --- | --- |
| 11AC20SISO | Ant1 | 5180 | 20.76 | 5169.20 | 5189.96 | --- | --- |
| | | 5220 | 19.88 | 5210.08 | 5229.96 | --- | --- |
| | | 5240 | 19.88 | 5230.08 | 5249.96 | --- | --- |
| | | 5260 | 23.80 | 5249.04 | 5272.84 | --- | --- |
| | | 5300 | 21.04 | 5289.80 | 5310.84 | --- | --- |
| | | 5320 | 20.36 | 5310.00 | 5330.36 | --- | --- |
| | | 5500 | 20.40 | 5489.84 | 5510.24 | --- | --- |
| | | 5580 | 20.20 | 5569.80 | 5590.00 | --- | --- |
| | | 5700 | 20.16 | 5690.00 | 5710.16 | --- | --- |
| | | 5720 | 20.20 | 5710.08 | 5730.28 | --- | --- |
| | | 5745 | 20.40 | 5734.96 | 5755.36 | --- | --- |
| | | 5785 | 20.72 | 5774.88 | 5795.60 | --- | --- |
| | | 5825 | 21.28 | 5814.92 | 5836.20 | --- | --- |
| 11AC40SISO | Ant1 | 5190 | 40.64 | 5169.76 | 5210.40 | --- | --- |

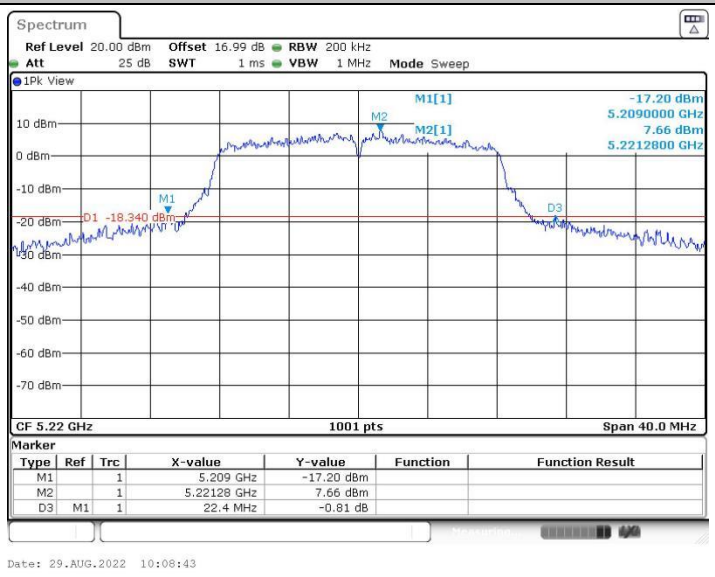
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5230 | 43.44 | 5209.68 | 5253.12 | --- | --- |
| | | 5270 | 44.24 | 5246.56 | 5290.80 | --- | --- |
| | | 5310 | 41.12 | 5289.52 | 5330.64 | --- | --- |
| | | 5510 | 40.80 | 5489.68 | 5530.48 | --- | --- |
| | | 5550 | 43.84 | 5526.64 | 5570.48 | --- | --- |
| | | 5670 | 40.96 | 5649.52 | 5690.48 | --- | --- |
| | | 5710 | 42.00 | 5689.52 | 5731.52 | --- | --- |
| | | 5755 | 41.28 | 5734.36 | 5775.64 | --- | --- |
| | | 5795 | 47.92 | 5767.80 | 5815.72 | --- | --- |
| 11AC80SISO | Ant1 | 5210 | 81.28 | 5169.52 | 5250.80 | --- | --- |
| | | 5290 | 92.16 | 5248.24 | 5340.40 | --- | --- |
| | | 5530 | 81.44 | 5489.52 | 5570.96 | --- | --- |
| | | 5610 | 97.28 | 5553.20 | 5650.48 | --- | --- |
| | | 5690 | 81.28 | 5649.52 | 5730.80 | --- | --- |
| | | 5775 | 93.28 | 5722.52 | 5815.80 | --- | --- |

## Test Graphs

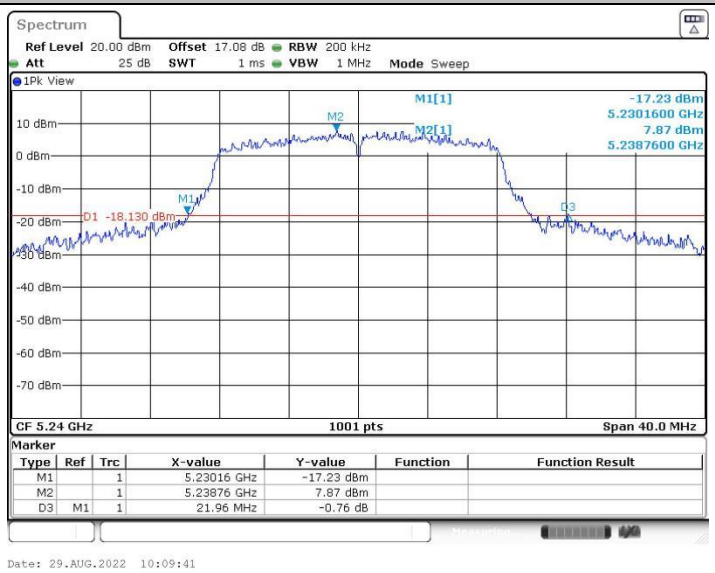
11A_Ant1_5180



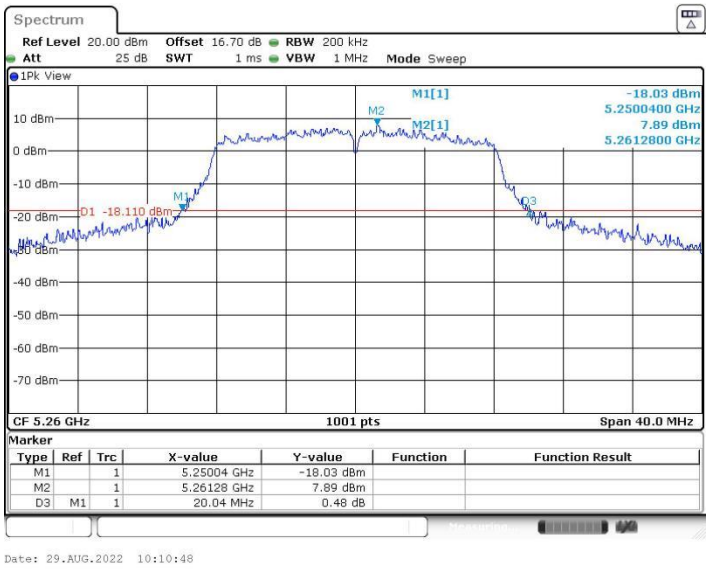

11A_Ant1_5220

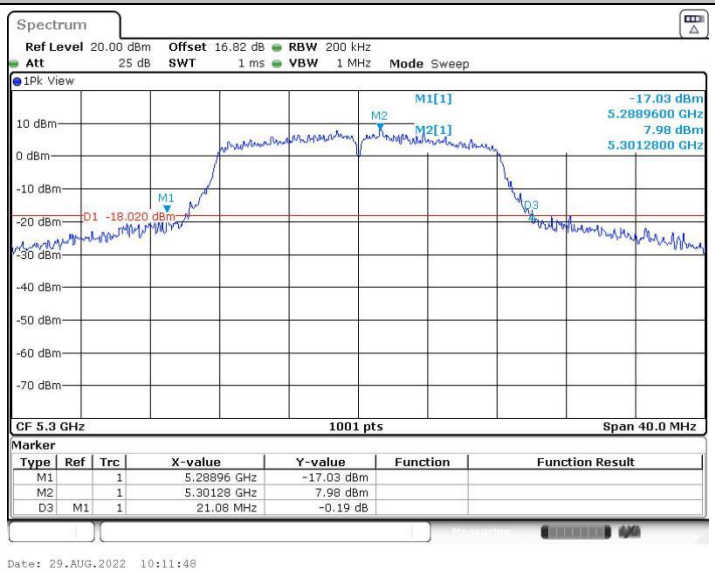


11A_Ant1_5240

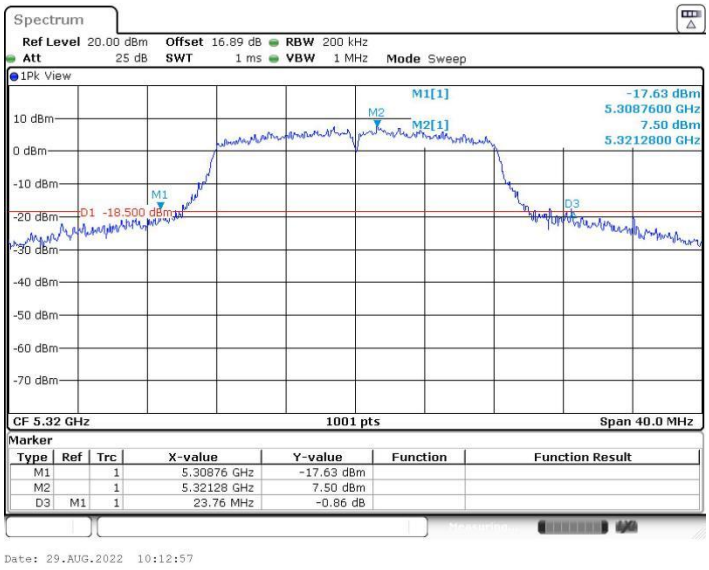



11A_Ant1_5260

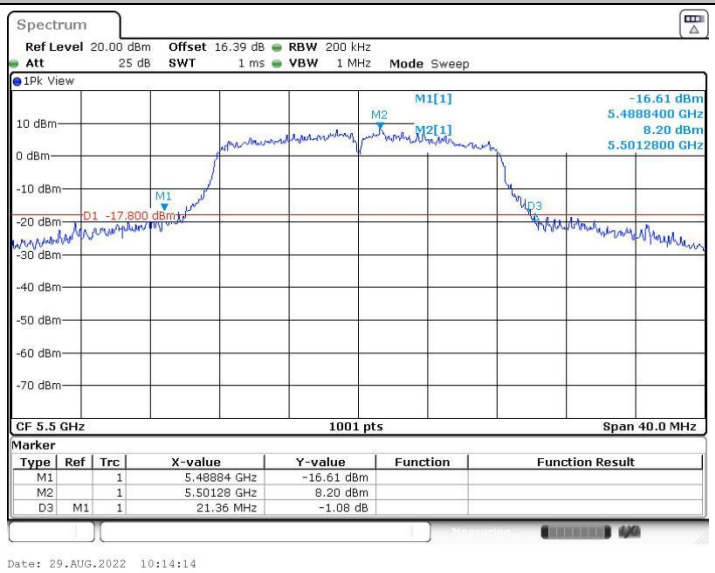


| 11A_Ant1_5300 |
|---|
|  |

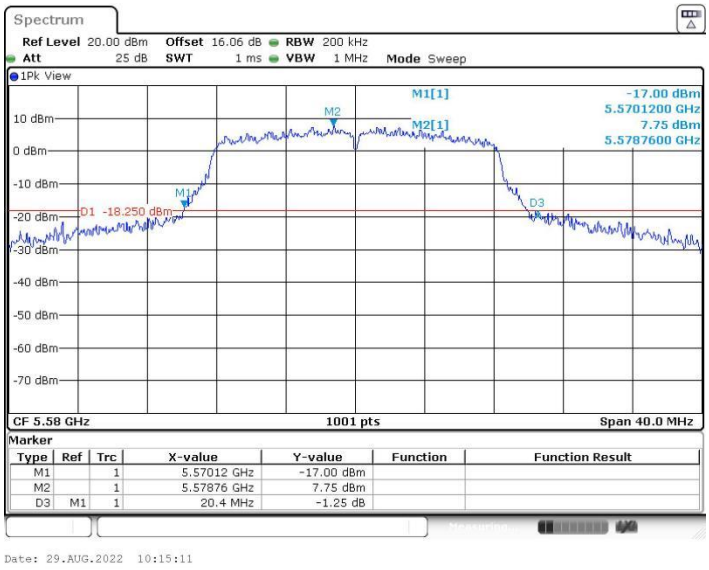


| 11A_Ant1_5320 |
|---|
|  |

11A_Ant1_5500




11A_Ant1_5580



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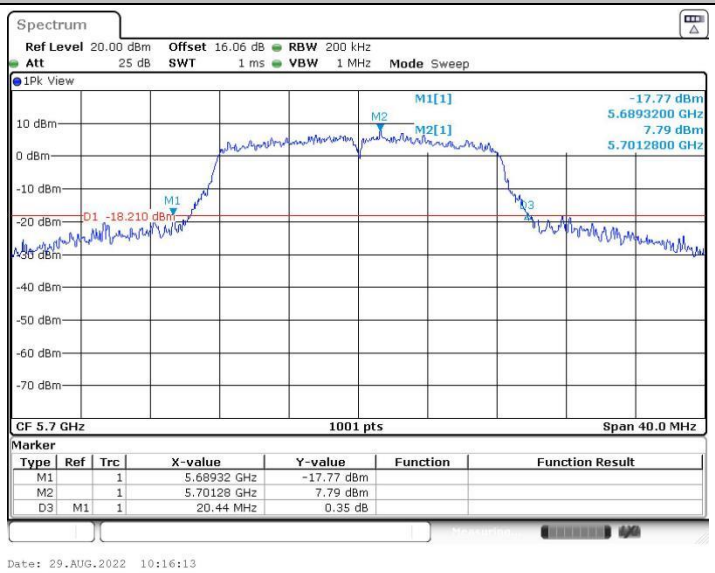
|  |



| 11A_Ant1_5720 |
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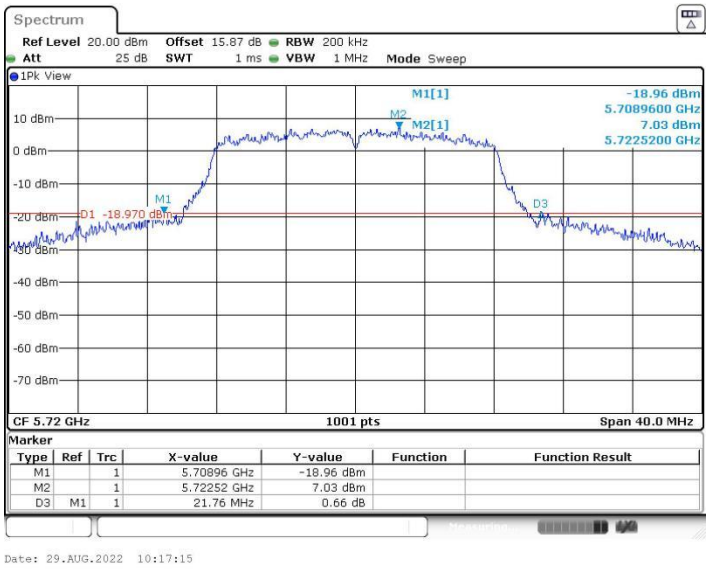
|  |

| 11A_Ant1_5745 |
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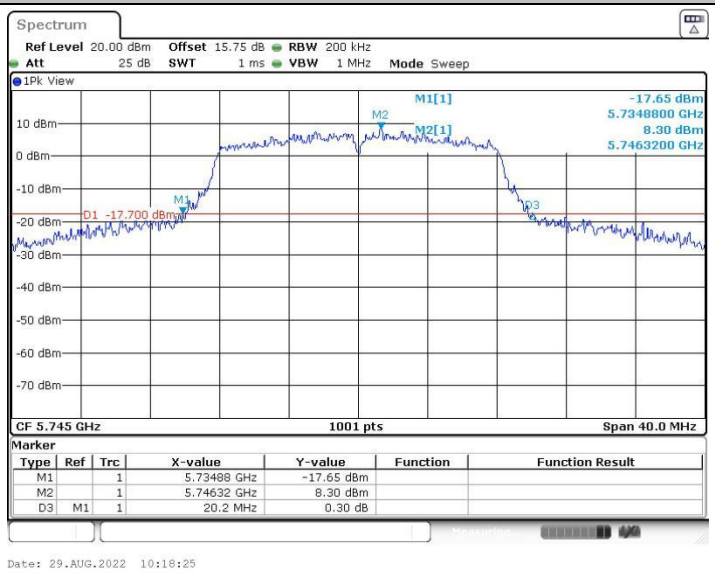
|  |



| 11A_Ant1_5785 |
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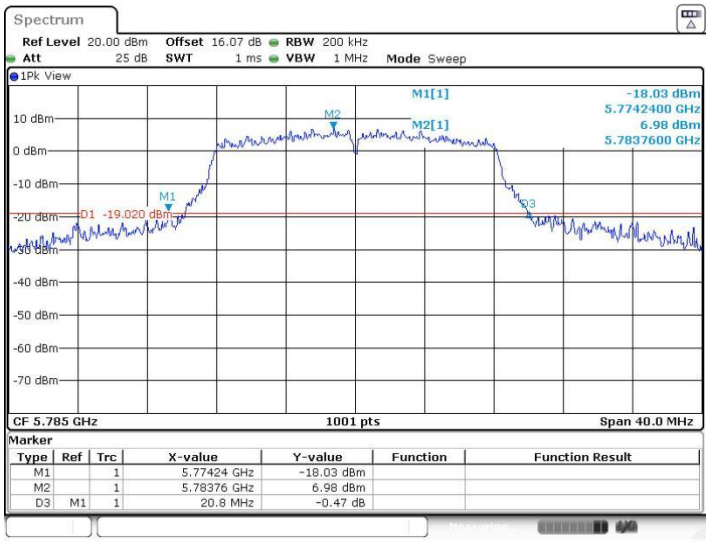
|  |

| 11A_Ant1_5825 |
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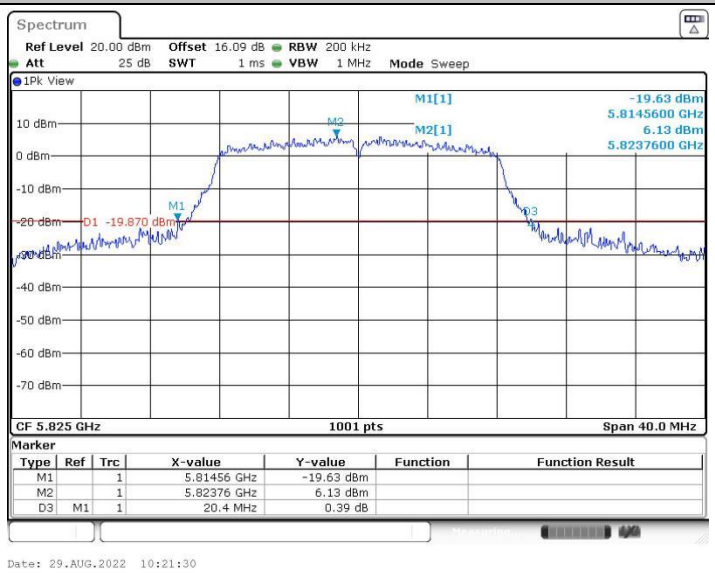
|  |



| 11AC20SISO_Ant1_5180 |
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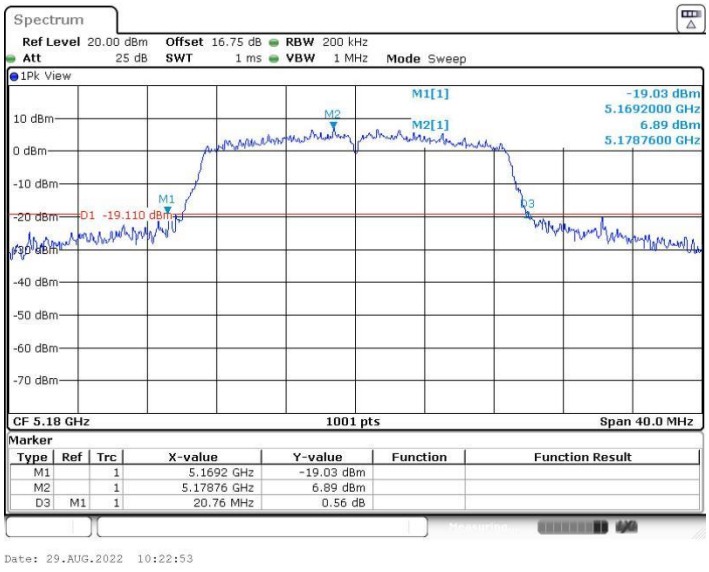
|  |

| 11AC20SISO_Ant1_5220 |
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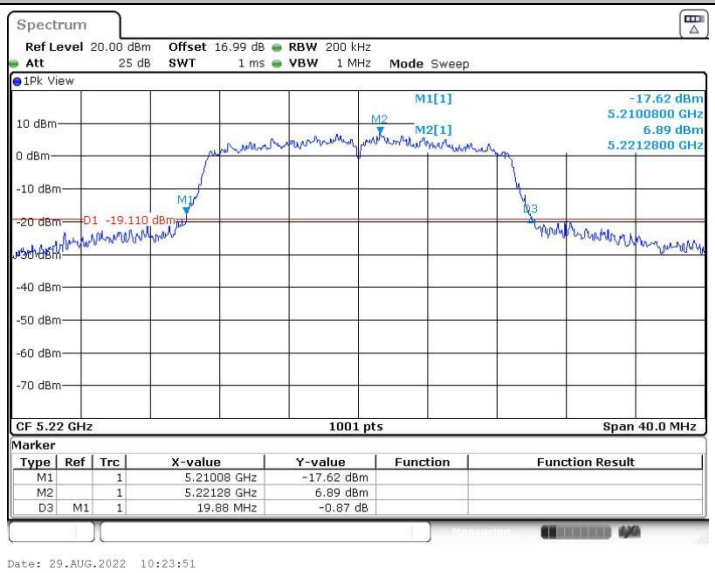
|  |



| 11AC20SISO_Ant1_5240 |
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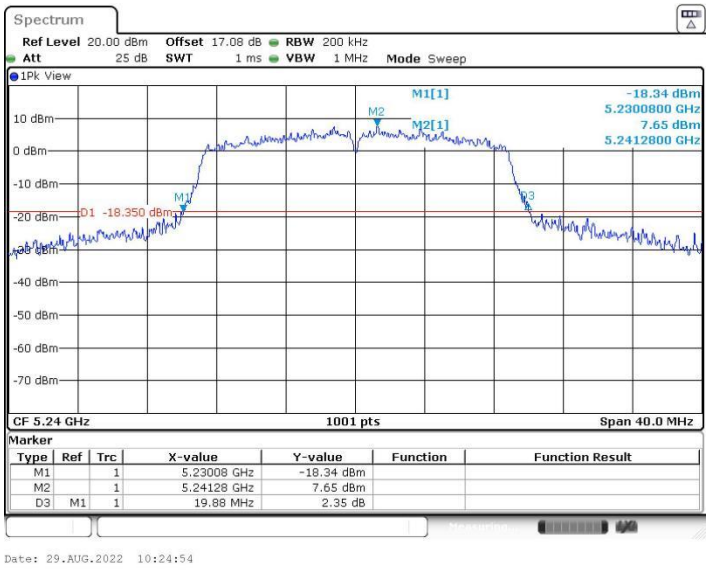
|  |

| 11AC20SISO_Ant1_5260 |
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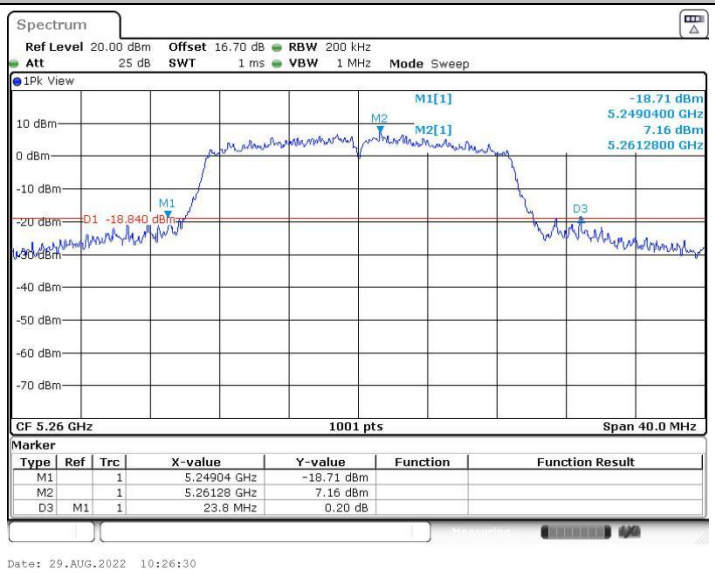
|  |



| 11AC20SISO_Ant1_5300 |
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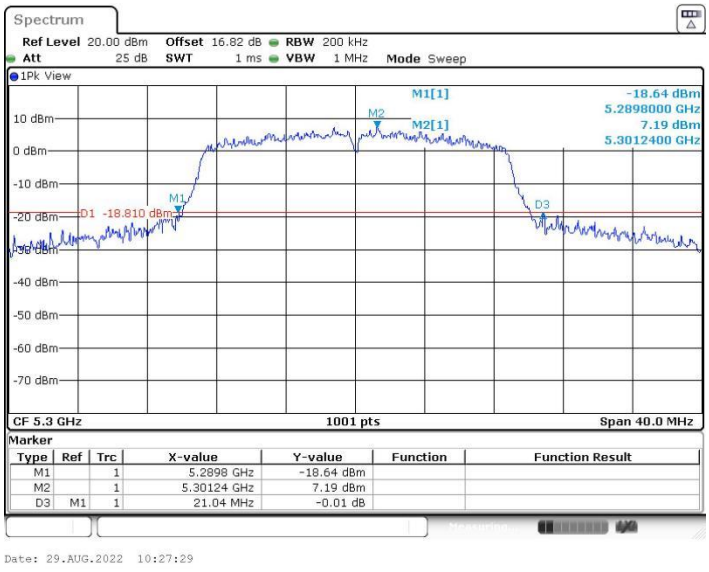
|  |

| 11AC20SISO_Ant1_5320 |
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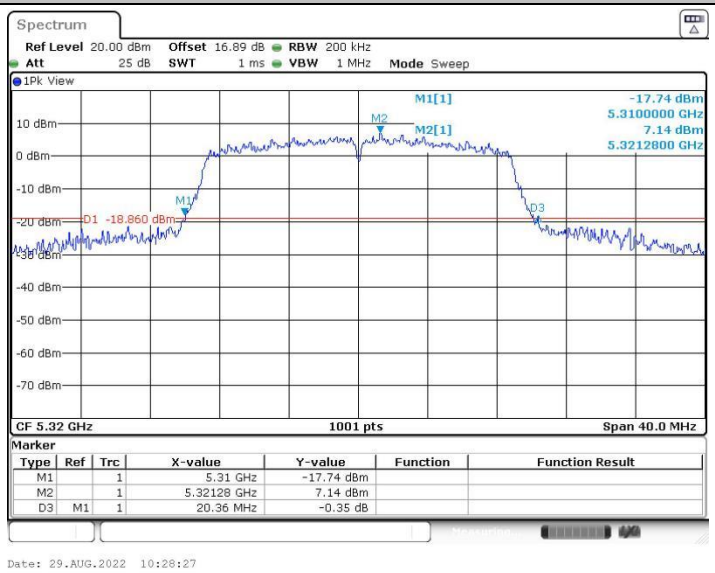
|  |



| 11AC20SISO_Ant1_5500 |
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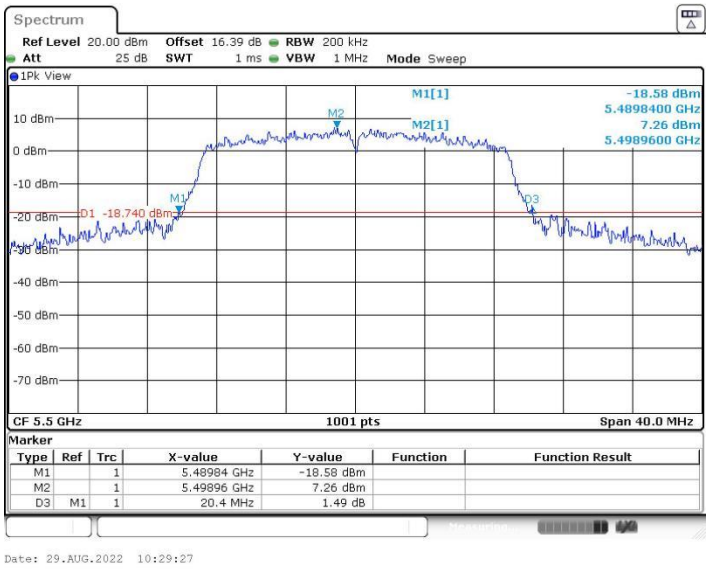
|  |

| 11AC20SISO_Ant1_5580 |
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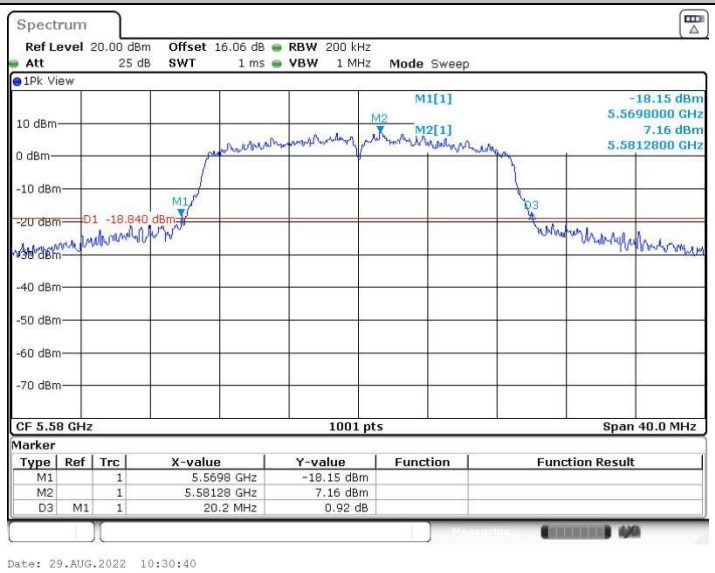
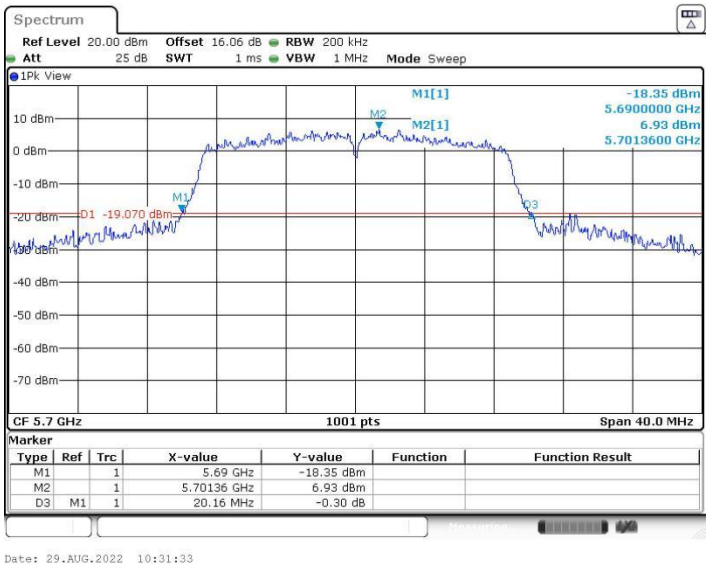
|  |



| 11AC20SISO_Ant1_5700 |
|---|
|  |

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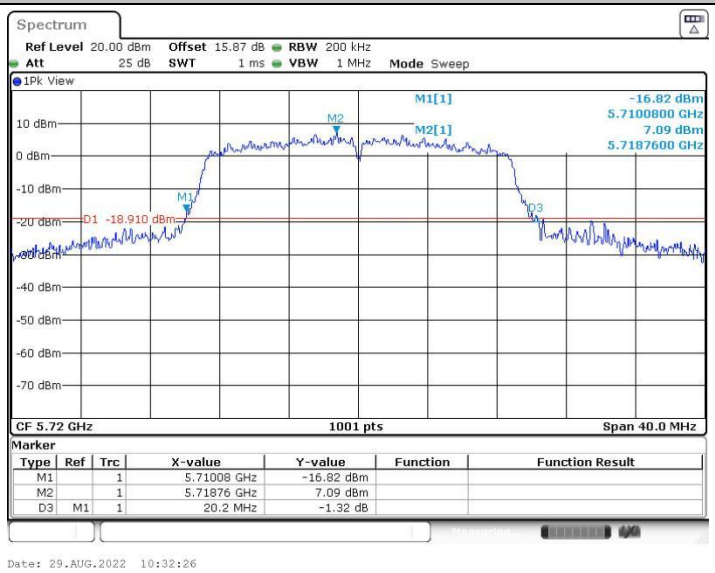
|  |



| 11AC20SISO_Ant1_5745 |
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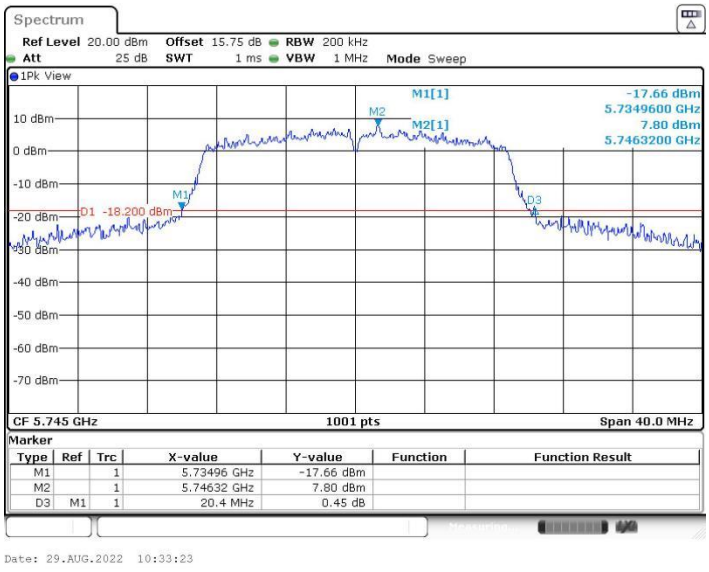
|  |

| 11AC20SISO_Ant1_5785 |
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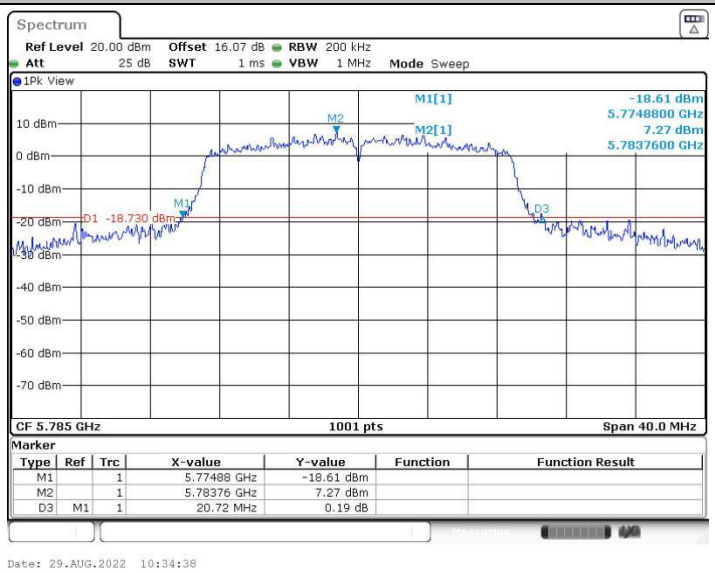
|  |



| 11AC20SISO_Ant1_5825 |
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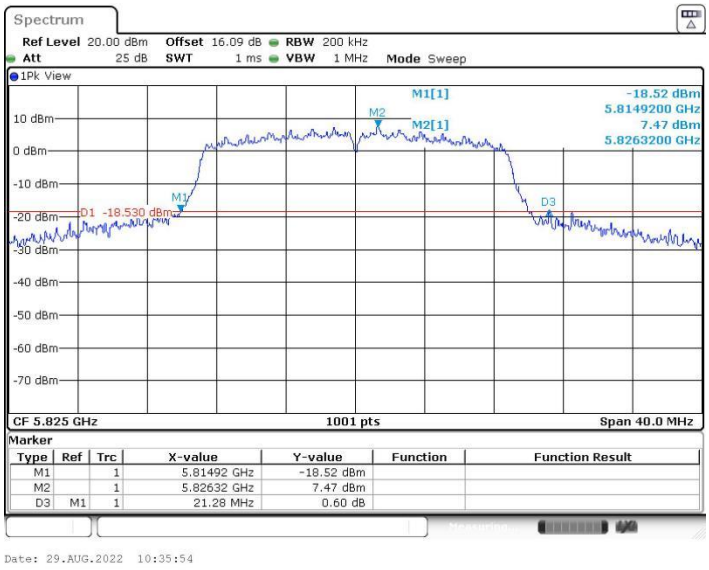
|  |

| 11AC40SISO_Ant1_5190 |
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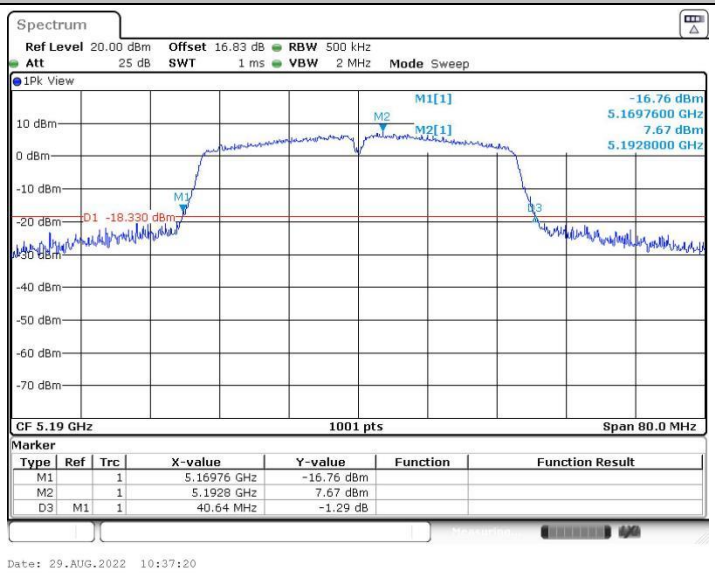
|  |



| 11AC40SISO_Ant1_5230 |
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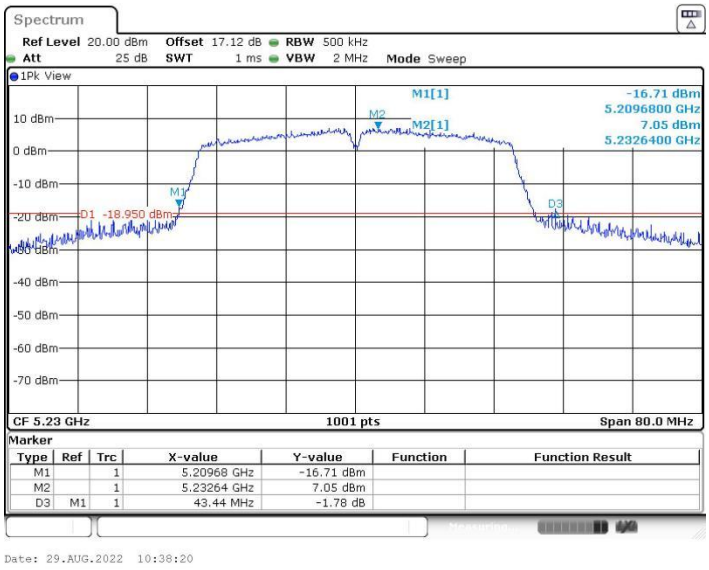
|  |

| 11AC40SISO_Ant1_5270 |
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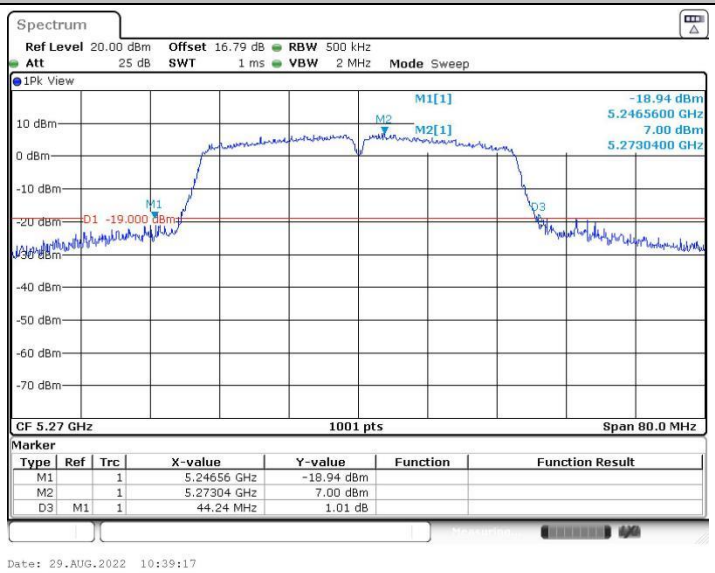
|  |



| 11AC40SISO_Ant1_5310 |
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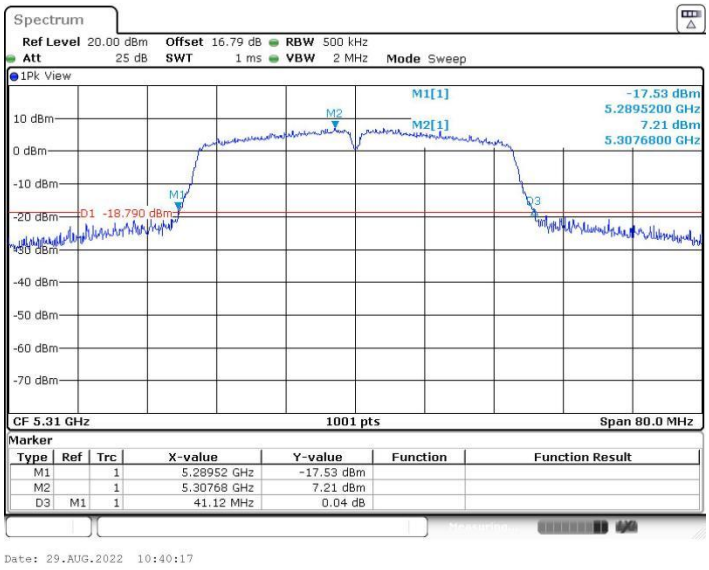
|  |

| 11AC40SISO_Ant1_5510 |
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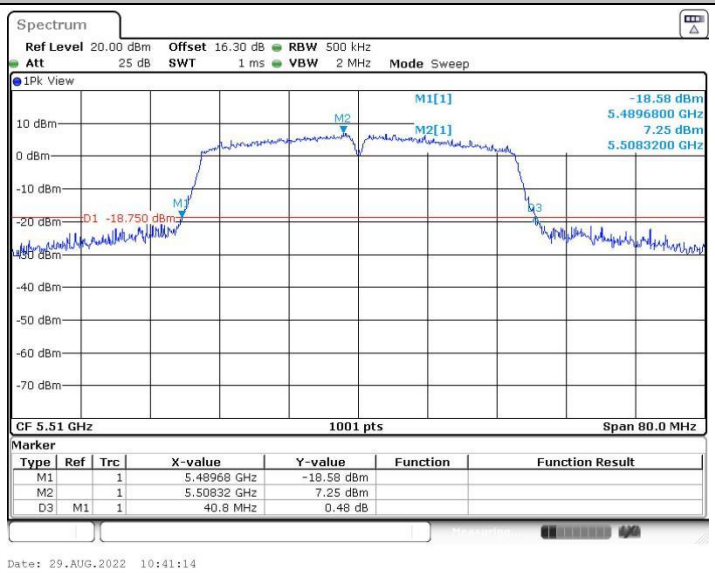
|  |



| 11AC40SISO_Ant1_5550 |
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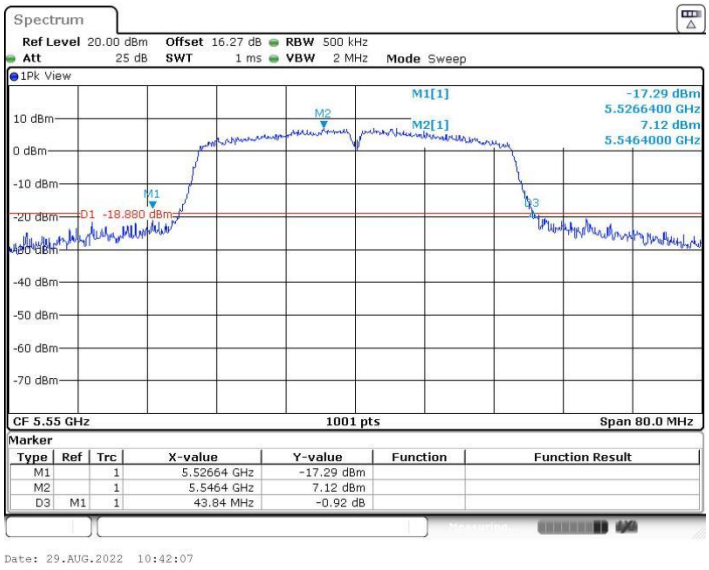
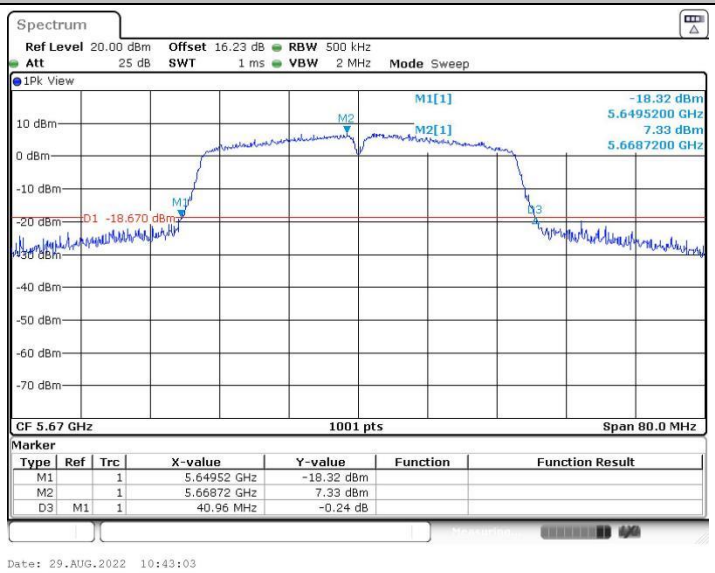
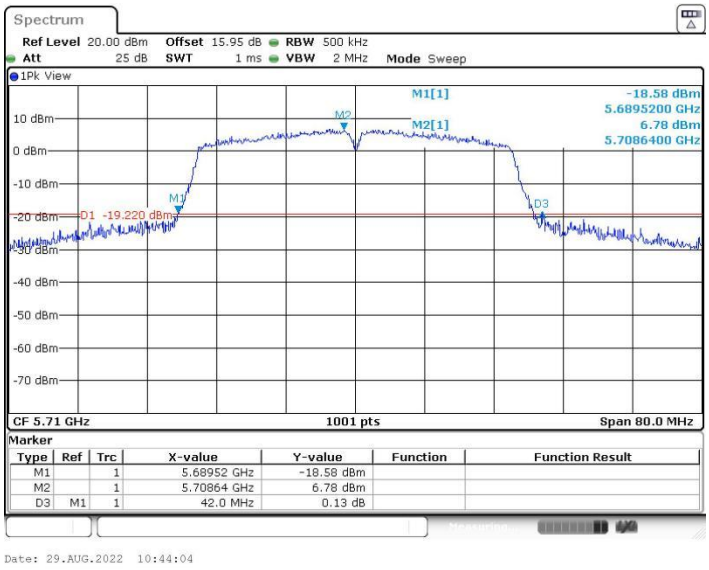
|  |

| 11AC40SISO_Ant1_5670 |
|---|
|  |



| 11AC40SISO_Ant1_5710 |
|---|
|  |

| 11AC40SISO_Ant1_5755 |
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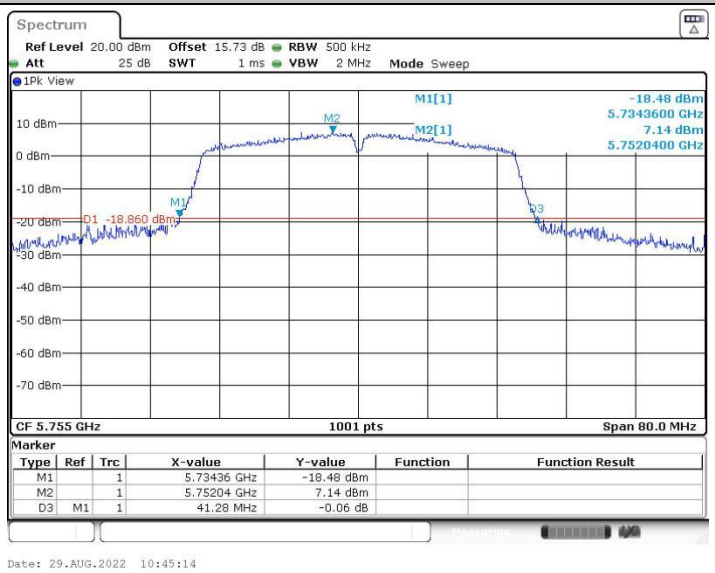
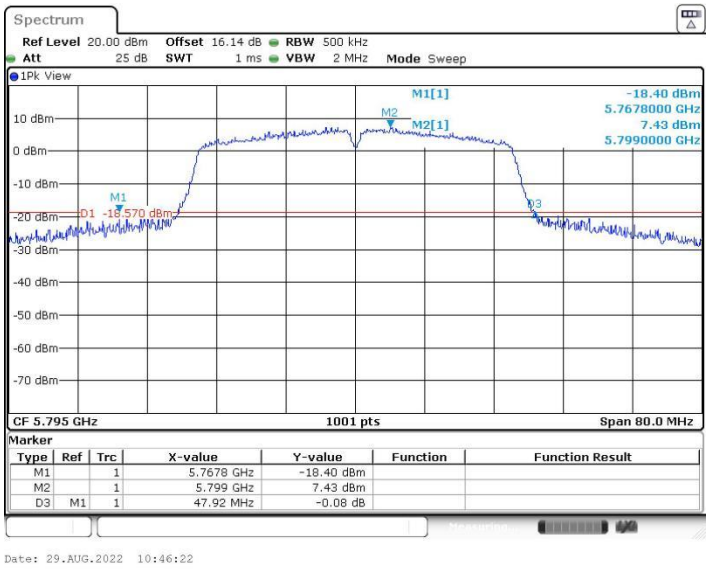
|  |



| 11AC40SISO_Ant1_5795 |
|---|
|  |

| 11AC80SISO_Ant1_5210 |
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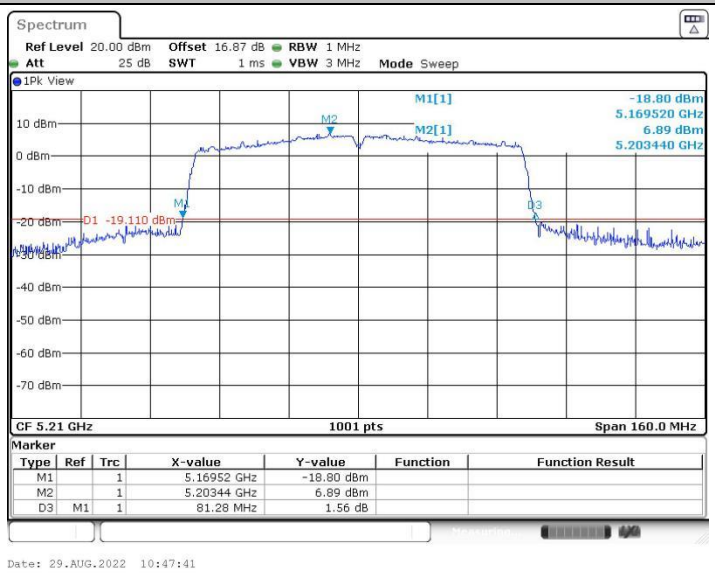
|  |



| 11AC80SISO_Ant1_5290 |
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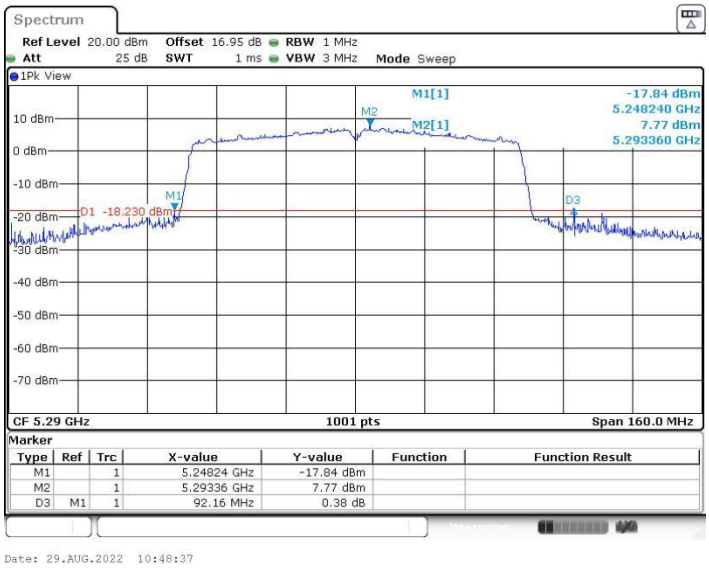
|  |

| 11AC80SISO_Ant1_5530 |
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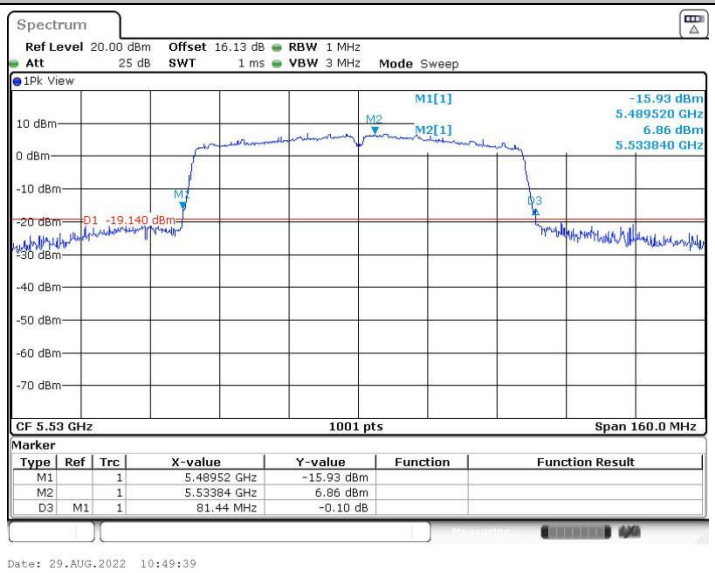
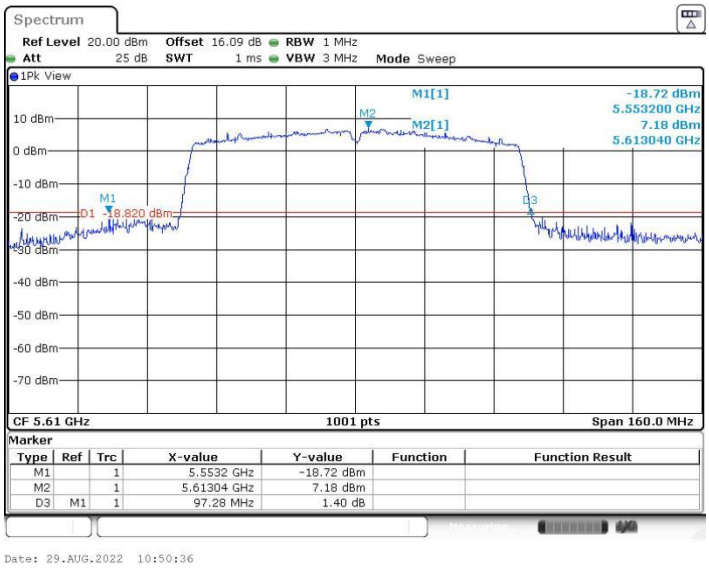
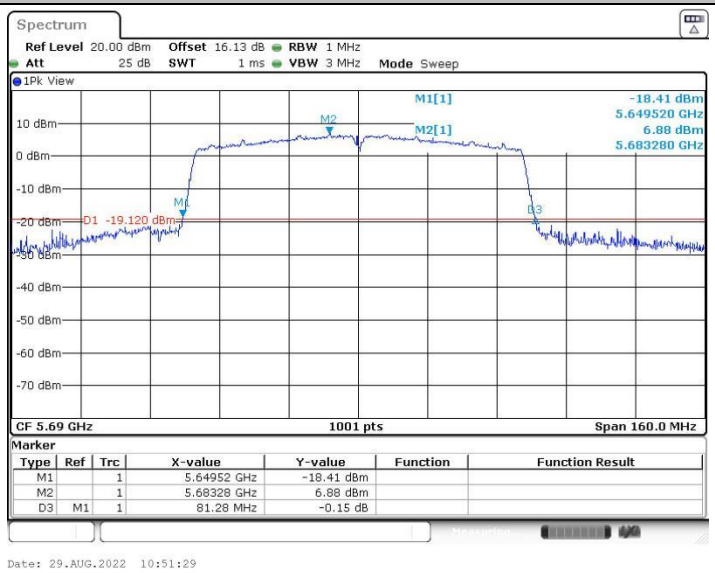
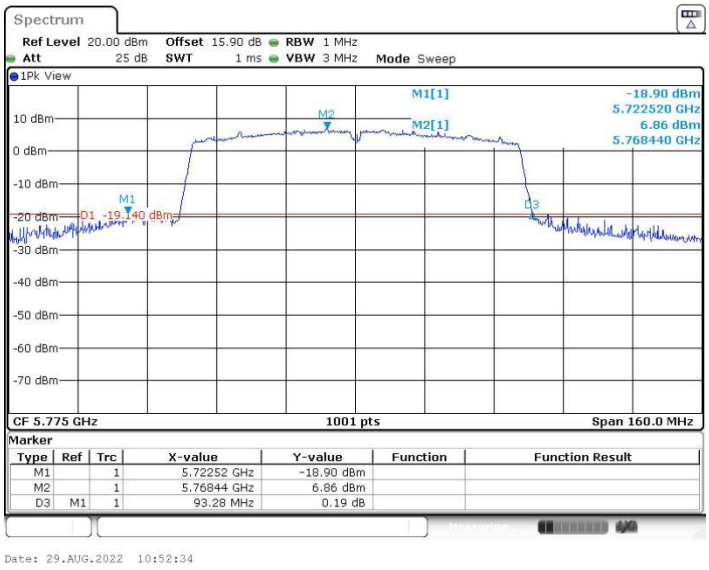
|  |



| 11AC80SISO_Ant1_5610 |
|---|
|  |

| 11AC80SISO_Ant1_5690 |
|---|
|  |



| 11AC80SISO_Ant1_5775 |
|---|
|  |

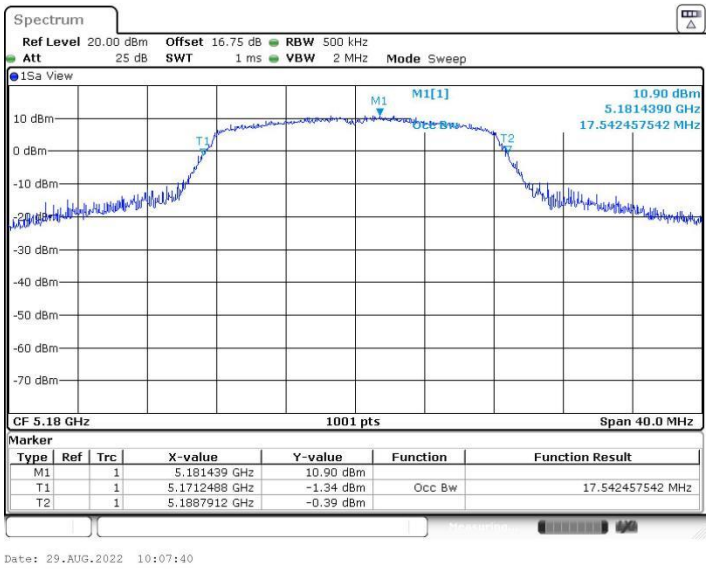
# Occupied channel bandwidth

## Test Result

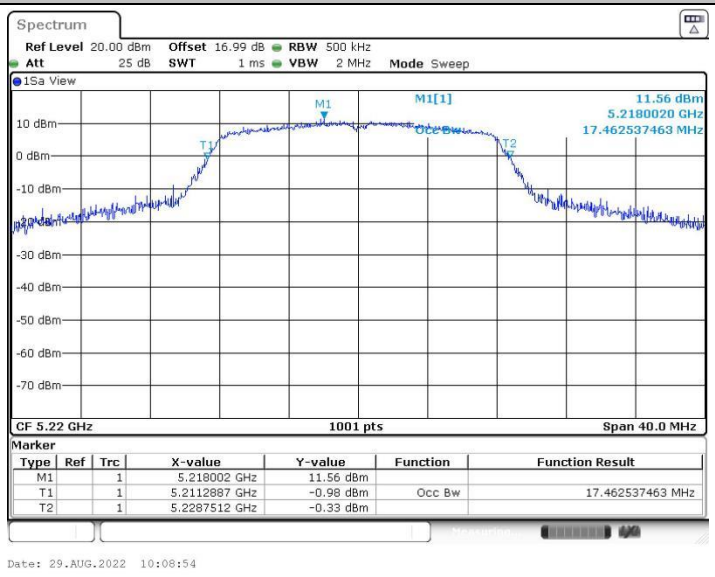
| TestMode | Antenna | Frequency[MHz] | OCB [MHz] | FL[MHz] | FH[MHz] | Limit[MHz] | Verdict |
|---|---|---|---|---|---|---|---|
| 11A | Ant1 | 5180 | 17.542 | 5171.249 | 5188.791 | --- | --- |
| | | 5220 | 17.463 | 5211.289 | 5228.751 | --- | --- |
| | | 5240 | 17.463 | 5231.329 | 5248.791 | --- | --- |
| | | 5260 | 17.343 | 5251.289 | 5268.631 | --- | --- |
| | | 5300 | 17.463 | 5291.289 | 5308.751 | --- | --- |
| | | 5320 | 17.502 | 5311.289 | 5328.791 | --- | --- |
| | | 5500 | 17.383 | 5491.289 | 5508.671 | --- | --- |
| | | 5580 | 17.383 | 5571.289 | 5588.671 | --- | --- |
| | | 5700 | 17.542 | 5691.249 | 5708.791 | --- | --- |
| | | 5720 | 17.542 | 5711.209 | 5728.751 | --- | --- |
| | | 5745 | 17.622 | 5736.209 | 5753.831 | --- | --- |
| | | 5785 | 17.582 | 5776.209 | 5793.791 | --- | --- |
| | | 5825 | 17.383 | 5816.249 | 5833.631 | --- | --- |
| 11AC20SISO | Ant1 | 5180 | 18.222 | 5170.929 | 5189.151 | --- | --- |
| | | 5220 | 18.262 | 5210.889 | 5229.151 | --- | --- |
| | | 5240 | 18.222 | 5230.929 | 5249.151 | --- | --- |
| | | 5260 | 18.222 | 5250.889 | 5269.111 | --- | --- |
| | | 5300 | 18.182 | 5290.929 | 5309.111 | --- | --- |
| | | 5320 | 18.262 | 5310.889 | 5329.151 | --- | --- |
| | | 5500 | 18.182 | 5490.889 | 5509.071 | --- | --- |
| | | 5580 | 18.222 | 5570.889 | 5589.111 | --- | --- |
| | | 5700 | 18.262 | 5690.889 | 5709.151 | --- | --- |
| | | 5720 | 18.222 | 5710.889 | 5729.111 | --- | --- |
| | | 5745 | 18.342 | 5735.849 | 5754.191 | --- | --- |
| | | 5785 | 18.382 | 5775.849 | 5794.231 | --- | --- |
| | | 5825 | 18.302 | 5815.809 | 5834.111 | --- | --- |
| 11AC40SISO | Ant1 | 5190 | 36.364 | 5171.858 | 5208.222 | --- | --- |
| | | 5230 | 36.444 | 5211.858 | 5248.302 | --- | --- |
| | | 5270 | 36.364 | 5251.778 | 5288.142 | --- | --- |
| | | 5310 | 36.444 | 5291.858 | 5328.302 | --- | --- |
| | | 5510 | 36.284 | 5491.858 | 5528.142 | --- | --- |
| | | 5550 | 36.204 | 5531.938 | 5568.142 | --- | --- |

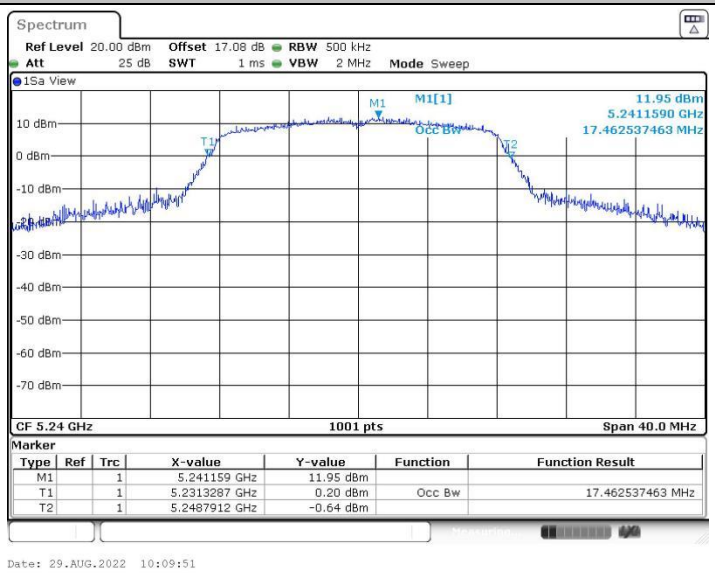
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5670 | 36.364 | 5651.858 | 5688.222 | --- | --- |
| | | 5710 | 36.444 | 5691.778 | 5728.222 | --- | --- |
| | | 5755 | 36.364 | 5736.778 | 5773.142 | --- | --- |
| | | 5795 | 36.444 | 5776.778 | 5813.222 | --- | --- |
| 11AC80SISO | Ant1 | 5210 | 75.764 | 5172.278 | 5248.042 | --- | --- |
| | | 5290 | 75.764 | 5252.118 | 5327.882 | --- | --- |
| | | 5530 | 75.764 | 5492.118 | 5567.882 | --- | --- |
| | | 5610 | 75.604 | 5572.118 | 5647.722 | --- | --- |
| | | 5690 | 75.445 | 5652.278 | 5727.722 | --- | --- |
| | | 5775 | 75.924 | 5736.958 | 5812.882 | --- | --- |

## Test Graphs

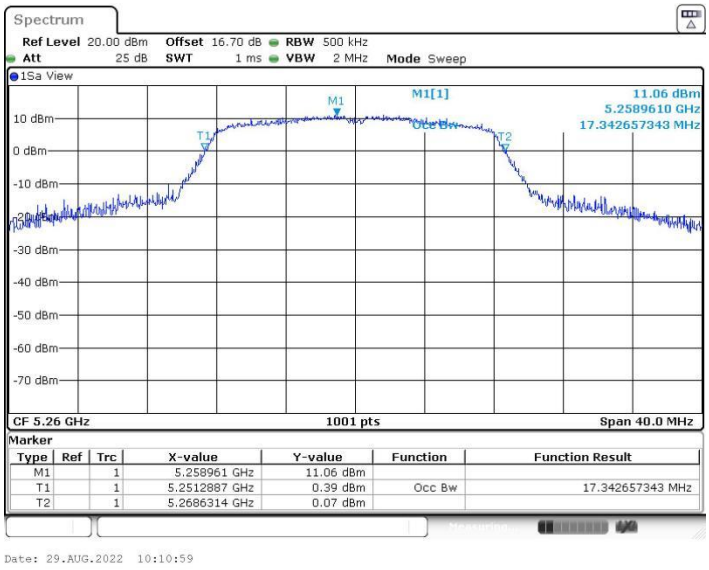
| 11A_Ant1_5180 |
|---|
|  |

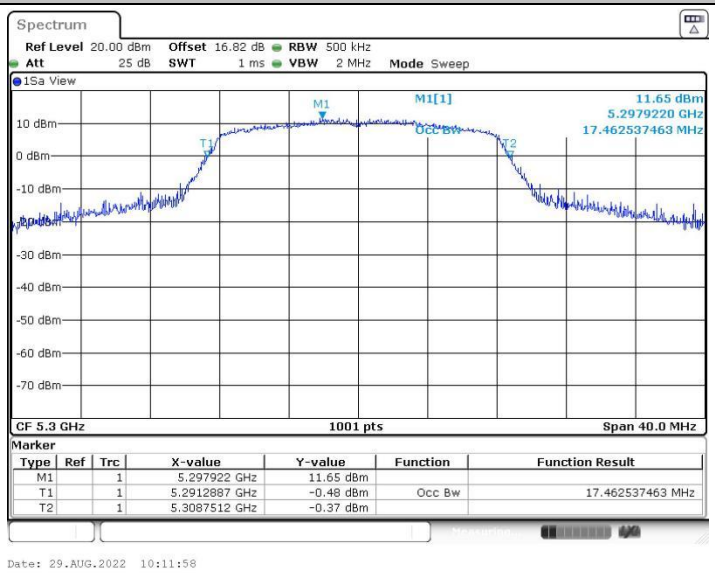


| 11A_Ant1_5220 |
|---|
|  |

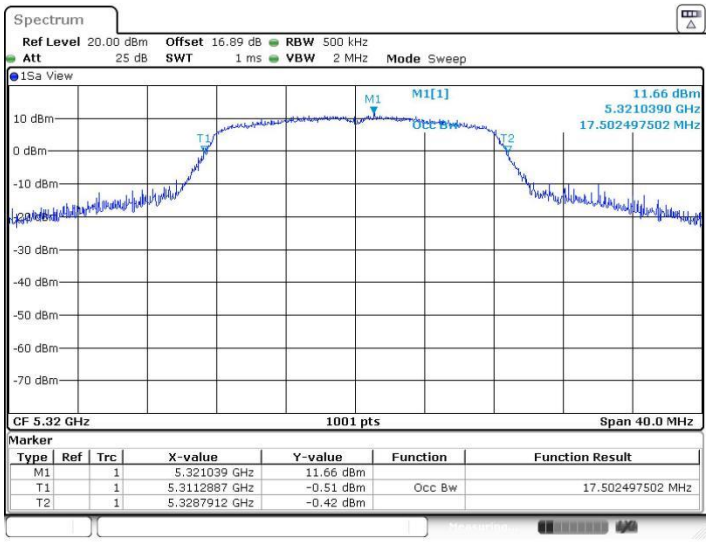
| 11A_Ant1_5240 |
|---|
|  |

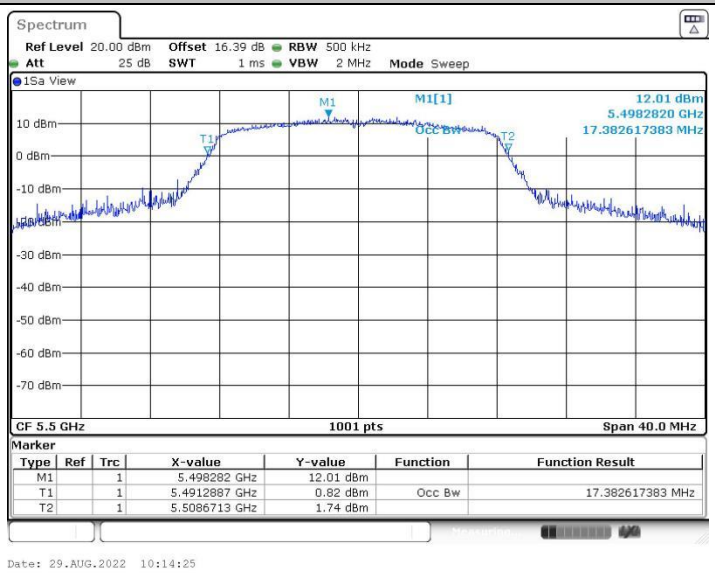


| 11A_Ant1_5260 |
|---|
|  |

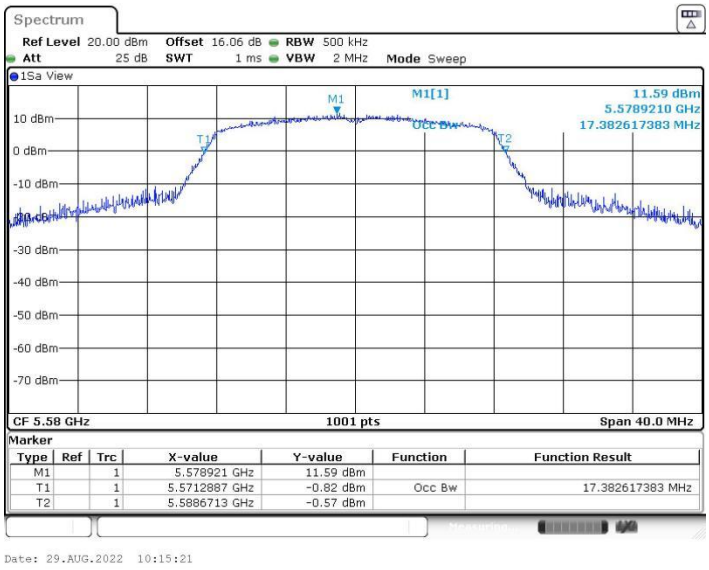
| 11A_Ant1_5300 |
|---|
|  |

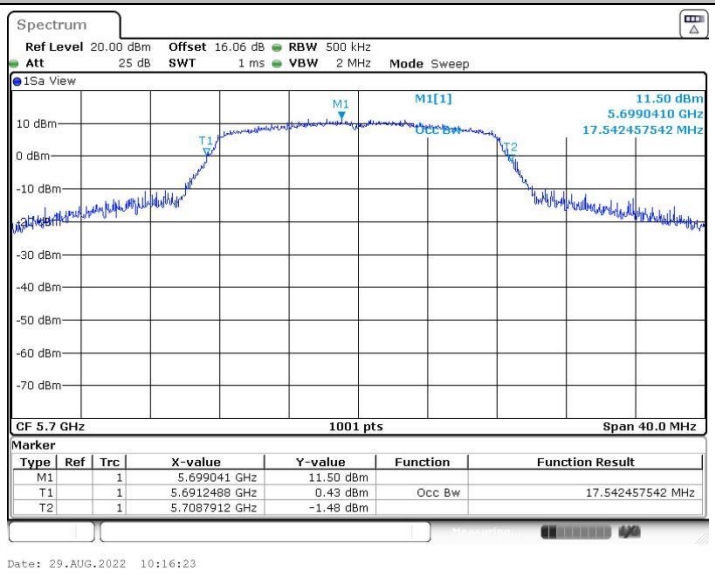


| 11A_Ant1_5320 |
|---|
|  |

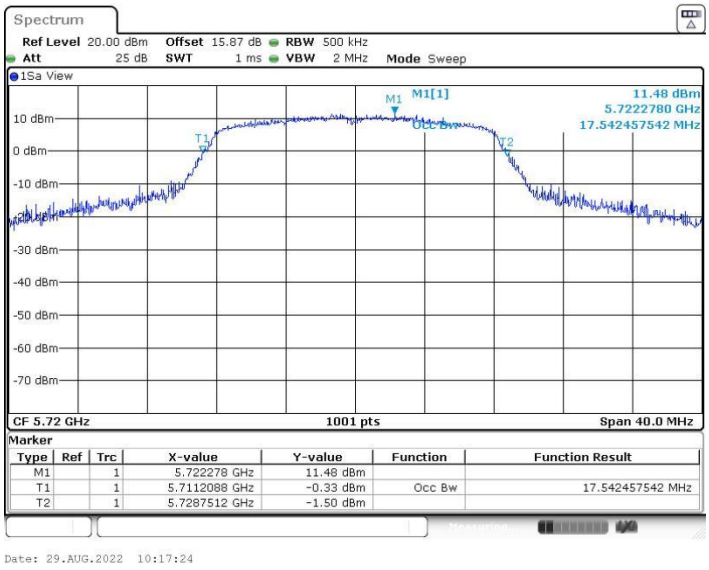
| 11A_Ant1_5500 |
|---|
|  |



| 11A_Ant1_5580 |
|---|
|  |

| 11A_Ant1_5700 |
|---|
|  |



| 11A_Ant1_5720 |
|---|
|  |