

Report No.: ZR/2021/3001411

Page: 1 of 108

## **FCC TEST REPORT**

Application No.: ZR/2021/30014

Applicant: vivo Mobile Communication Co., Ltd.

Address of Applicant No.168 Jinghai East Rd., Chang'an, Dongguan, Guangdong, China

Manufacturer: vivo Mobile Communication Co., Ltd.

Address of Manufacturer No.168 Jinghai East Rd., Chang'an, Dongguan, Guangdong, China

**EUT Description:** Mobile Phone

Model No.: V2050 **Trade Mark:** vivo

FCC ID: 2AUCY-V2066

47 CFR FCC Part 2, Subpart J Standards:

47 CFR Part 15, Subpart C

Date of Receipt: 2021/3/29

Date of Test: 2021/3/29 to 2021/4/28

2020/4/30(for original report ZR/2021/3001404) Date of Issue:

2020/5/10(for report ZR/2021/3001411)

**Test Result:** PASS \*

In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Derele yang

Derek Yang Wireless Laboratory Manager





Report No.: ZR/2021/3001411

Page: 2 of 108

#### Version 1

| Revision Record |         |            |          |          |
|-----------------|---------|------------|----------|----------|
| Version         | Chapter | Date       | Modifier | Remark   |
| 01              |         | 2021-05-10 |          | Original |
|                 |         |            |          |          |
|                 |         |            |          |          |

| Authorized for issue by: |                        |
|--------------------------|------------------------|
| Prepared By              | Dee.Zheng              |
|                          | (Dee Zheng) / Engineer |
| Checked By               | Jun Hug                |
|                          | (Jim Huang) / Reviewer |





Report No.: ZR/2021/3001411

Page: 3 of 108

**Test Summary** 2

| Test Item                                                         | Test Requirement        | Test Method      | Test<br>Result | Result | Test<br>Lab* |
|-------------------------------------------------------------------|-------------------------|------------------|----------------|--------|--------------|
| AC Power Line Conducted Emission                                  | 15.207                  | ANSI C63.10 2013 | Clause 4.2     | PASS   | В            |
| Duty Cycle                                                        |                         |                  | Clause 4.3     | PASS   | Α            |
| Conducted Output Power                                            | 15.247 (b)(3)           | ANSI C63.10 2013 | Clause 4.4     | PASS   | Α            |
| DTS (6 dB) Bandwidth & 99%<br>Occupied Bandwidth                  | 15.247 (a)(2)           | ANSI C63.10 2013 | Clause 4.5     | PASS   | Α            |
| Power Spectral Density                                            | 15.247 (e)              | ANSI C63.10 2013 | Clause 4.6     | PASS   | Α            |
| Band-edge for RF<br>Conducted Emissions                           | 15.247(d)               | ANSI C63.10 2013 | Clause 4.7     | PASS   | Α            |
| RF Conducted Spurious<br>Emissions                                | 15.247(d)               | ANSI C63.10 2013 | Clause 4.8     | PASS   | Α            |
| Radiated Spurious Emissions                                       | 15.247(d);15.205/15.209 | ANSI C63.10 2013 | Clause 4.9     | PASS   | В            |
| Restricted bands around fundamental frequency (Radiated Emission) | 15.247(d);15.205/15.209 | ANSI C63.10 2013 | Clause 4.10    | PASS   | В            |

Remark: All test were performed by Lab A and B.

Lab A SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch Lab B SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.





Report No.: ZR/2021/3001411

4 of 108 Page:

Remark:

Model No.: V2050, V2066

This test report (Ref. No.: ZR/2021/3001411) is based on the original test report (Ref. No.:

ZR/2021/3001404).

Review this report and original report, this report just changing the parts according to the declaration letter from client.

| NO | Initial | Variant | Difference Description                                           |
|----|---------|---------|------------------------------------------------------------------|
| 1  | V2066   | V2050   | The hardware is the same, V2050 the software turn on the 5G band |

Considering to the difference, pre-scan was performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report all items do not need to retest and all test data in this report are base on the previous report with report number ZR/2021/3001404.





Report No.: ZR/2021/3001411

Page: 5 of 108

### **Contents**

| 1 | versi  | on                                               | 2  |
|---|--------|--------------------------------------------------|----|
| 2 | Test S | Summary                                          | 3  |
| 3 | Gene   | ral Information                                  | 6  |
|   | 3.1    | Details of Client                                | 6  |
|   | 3.2    | Test Location                                    | 6  |
|   | 3.3    | Test Facility                                    | 7  |
|   | 3.4    | General Description of EUT                       | 8  |
|   | 3.5    | Test Environment and Mode                        | 9  |
|   | 3.6    | Description of Support Units                     | 9  |
| 4 | Test r | results and Measurement Data                     | 10 |
|   | 4.1    | Antenna Requirement                              | 10 |
|   | 4.2    | AC Power Line Conducted Emissions                | 11 |
|   | 4.3    | Duty Cycle                                       | 15 |
|   | 4.4    | Conducted Output Power                           | 16 |
|   | 4.5    | DTS (6 dB) Bandwidth & 99% Occupied Bandwidth    | 17 |
|   | 4.6    | Power Spectral Density                           | 18 |
|   | 4.7    | Band-edge for RF Conducted Emissions             | 19 |
|   | 4.8    | RF Conducted Spurious Emissions                  | 20 |
|   | 4.9    | Radiated Spurious Emissions                      | 21 |
|   | 4      | 4.9.1 Radiated emission below 1GHz               | 24 |
|   | 4      | 4.9.2 Transmitter emission above 1GHz            | 26 |
|   | 4.10   | Restricted bands around fundamental frequency    | 44 |
|   | 4      | 4.10.1 Test Plots                                | 46 |
| 5 | Meas   | urement Uncertainty (95% confidence levels, k=2) | 58 |
| 6 |        | oment List                                       |    |
| 7 | Photo  | ographs - EUT Constructional Details             | 61 |





Report No.: ZR/2021/3001411

6 of 108 Page:

#### **General Information** 3

### 3.1 Details of Client

| Applicant:              | vivo Mobile Communication Co., Ltd.                            |
|-------------------------|----------------------------------------------------------------|
| Address of Applicant    | No.168 Jinghai East Rd., Chang'an, Dongguan, Guangdong , China |
| Manufacturer:           | vivo Mobile Communication Co., Ltd.                            |
| Address of Manufacturer | No.168 Jinghai East Rd., Chang'an, Dongguan, Guangdong , China |

### 3.2 Test Location

#### Lab A:

| Company:       | SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch                             |
|----------------|---------------------------------------------------------------------------------------------|
| Address:       | No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China |
| Post code:     | 518057                                                                                      |
| Test engineer: | Dee Zheng,Swing Hu,Habit Zeng                                                               |

#### I ab B:

| Eud D.                                                       |                                                                                                                            |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Company: SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., |                                                                                                                            |
| Address:                                                     | 1/F, Unit D, Building 1, Kanghong Orange Technology Park, No.137, Keyuan 3rd Road, Fengdong New City, Xi'an, Shaanxi China |
| Post code:                                                   | 710086                                                                                                                     |
| Test engineer:                                               | Leah Chen,Ken Liu,Andy Yao                                                                                                 |





Report No.: ZR/2021/3001411

7 of 108 Page:

### 3.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### Lab A:

#### • A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

#### VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

#### • FCC -Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

#### Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

#### Lab B:

#### • A2LA (Certificate No. 4854.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

• FCC-Designation Number: CN1271.





Report No.: ZR/2021/3001411

8 of 108 Page:

### 3.4 General Description of EUT

| EUT Description:                   | Mobile Phone                                                                                                                                                                                                              |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Model No.:                         | V2050                                                                                                                                                                                                                     |
| Trade Mark:                        | vivo                                                                                                                                                                                                                      |
| Hardware Version:                  | MP_0.1                                                                                                                                                                                                                    |
| Software Version:                  | PD2083CF_EX_A_3.6.2                                                                                                                                                                                                       |
| IEEE 802.11 WLAN Mode<br>Supported | <ul> <li>⋈ 802.11B (20 MHz channel bandwidth),</li> <li>⋈ 802.11G (20 MHz channel bandwidth)</li> <li>⋈ 802.11N (20 MHz channel bandwidth),</li> <li>⋈ 802.11N (40 MHz channel bandwidth)</li> </ul>                      |
| Operation Frequency:               | 2400 MHz -2483.5MHz fc = 2407 MHz + N * 5 MHz, where: -fc = "Operating Frequency" in MHz, -N = "Channel Number" with the range from 1 to 11 for the 20 MHz channel bandwidth, or 3 to 9 for the 40 MHz channel bandwidth. |
| Type of Modulation:                | IEEE for 802.11B: DSSS<br>IEEE for 802.11G: OFDM<br>IEEE for 802.11N(HT20): OFDM                                                                                                                                          |
| Sample Type:                       | ⊠ Portable Device, ☐Module                                                                                                                                                                                                |
| Antenna Type:                      | ☐ External, ☑ Integrated                                                                                                                                                                                                  |
| Antenna Ports                      | ⊠ Ant 1, ☐ Ant 2, ☐ Ant 3                                                                                                                                                                                                 |
| Smart System                       | <ul><li>SISO (for 802.11B/G/N),</li><li>☐ MIMO (for 802.11N): 2 Tx &amp; 2 Rx,</li><li>☐ Diversity (for 802.11B/G): Tx &amp; Rx</li></ul>                                                                                 |
| Antenna Gain:                      | -3.1dBi                                                                                                                                                                                                                   |

|         | Operation Frequency of each channel (802.11B/G/N HT20) |         |           |         |           |         |           |
|---------|--------------------------------------------------------|---------|-----------|---------|-----------|---------|-----------|
| Channel | Frequency                                              | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1       | 2412MHz                                                | 4       | 2427MHz   | 7       | 2442MHz   | 10      | 2457MHz   |
| 2       | 2417MHz                                                | 5       | 2432MHz   | 8       | 2447MHz   | 11      | 2462MHz   |
| 3       | 2422MHz                                                | 6       | 2437MHz   | 9       | 2452MHz   |         |           |



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Report No.: ZR/2021/3001411

9 of 108 Page:

#### Remark:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

| Channel             | Frequency for 802.11B/G/N (HT20) |
|---------------------|----------------------------------|
| The Lowest channel  | 2412MHz                          |
| The Middle channel  | 2437MHz                          |
| The Highest channel | 2462MHz                          |

### 3.5 Test Environment and Mode

| Operating Environment: |                                                                                          |  |  |  |
|------------------------|------------------------------------------------------------------------------------------|--|--|--|
| Temperature:           | 25.0 °C                                                                                  |  |  |  |
| Humidity:              | 50 % RH                                                                                  |  |  |  |
| Atmospheric Pressure:  | 101.30 KPa                                                                               |  |  |  |
| Test mode:             |                                                                                          |  |  |  |
| Transmitting mode:     | Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate. |  |  |  |

### 3.6 Description of Support Units

The EUT has been tested independent unit.





Report No.: ZR/2021/3001411

10 of 108 Page:

#### **Test results and Measurement Data** 4

### 4.1 Antenna Requirement

Standard requirement: 47 CFR Part 15C Section 15.203 /247(c)

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -3.1dBi.





Report No.: ZR/2021/3001411

Page: 11 of 108

### 4.2 AC Power Line Conducted Emissions

| Test Requirement:     | 47 CFR Part 15C Section                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 47 CFR Part 15C Section 15.207                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                  |  |  |  |  |  |  |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
| Test Method:          | ANSI C63.10: 2013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                  |  |  |  |  |  |  |
| Test Frequency Range: | 150kHz to 30MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                  |  |  |  |  |  |  |
| Limit:                | Frague pour range (MIII)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Limit (dBuV)                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                  |  |  |  |  |  |  |
|                       | Frequency range (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 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 log                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | arithm of the frequency.                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                  |  |  |  |  |  |  |
| Test Procedure:       | room.  2) The EUT was connect Impedance Stabilization impedance. The power of a second LISN 2, which plane in the same way a multiple socket outlet straingle LISN provided the 3) The tabletop EUT was ground reference plane. placed on the horizontal 4) The test was perform of the EUT shall be 0.4 reference.                                                                                                                                                                                                                                                                                          | cted to AC power source throuse Network) which provides a 50 cables of all other units of the was bonded to the ground refuse the LISN 1 for the unit being ip was used to connect multipe rating of the LISN was not explaced upon a non-metallic And for floor-standing arrang ground reference plane, and with a vertical ground reference plane was bonded to the home | ugh a LISN 1 (Line<br>0Ω/50μH + 5Ω linear<br>EUT were connected to<br>ference<br>g measured. A<br>ble power cables to a<br>exceeded.<br>table 0.8m above the<br>ement, the EUT was<br>rence plane. The rear<br>erence plane. The |  |  |  |  |  |  |
|                       | vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement. |                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                  |  |  |  |  |  |  |



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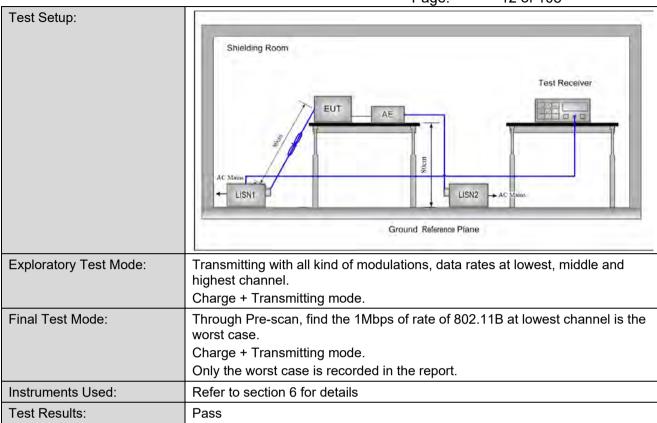
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Report No.: ZR/2021/3001411

12 of 108 Page:





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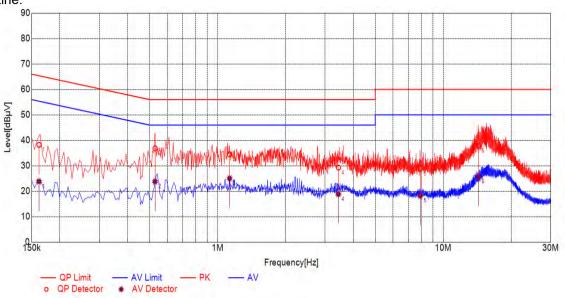
Report No.: ZR/2021/3001411

13 of 108 Page:

#### Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

#### Live Line:



#### **Test Graph**

| Final | Final Data List |                |                       |                       |                      |                       |                       |                      |  |  |  |
|-------|-----------------|----------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|----------------------|--|--|--|
| NO.   | Freq.<br>[MHz]  | Factor<br>[dB] | QP<br>Value<br>[dBµV] | QP<br>Limit<br>[dBµV] | QP<br>Margin<br>[dB] | AV<br>Value<br>[dBµV] | AV<br>Limit<br>[dBµV] | AV<br>Margin<br>[dB] |  |  |  |
| 1     | 0.1617          | 10.10          | 38.22                 | 65.37                 | 27.15                | 23.83                 | 55.37                 | 31.54                |  |  |  |
| 2     | 0.5284          | 10.10          | 36.82                 | 56.00                 | 19.18                | 23.82                 | 46.00                 | 22.18                |  |  |  |
| 3     | 1.1311          | 10.10          | 34.43                 | 56.00                 | 21.57                | 25.05                 | 46.00                 | 20.95                |  |  |  |
| 4     | 3.4331          | 10.10          | 29.29                 | 56.00                 | 26.71                | 18.87                 | 46.00                 | 27.13                |  |  |  |
| 5     | 7.9159          | 10.10          | 28.82                 | 60.00                 | 31.18                | 18.18                 | 50.00                 | 31.82                |  |  |  |
| 6     | 14.3719         | 10.11          | 37.84                 | 60.00                 | 22.16                | 25.65                 | 50.00                 | 24.35                |  |  |  |



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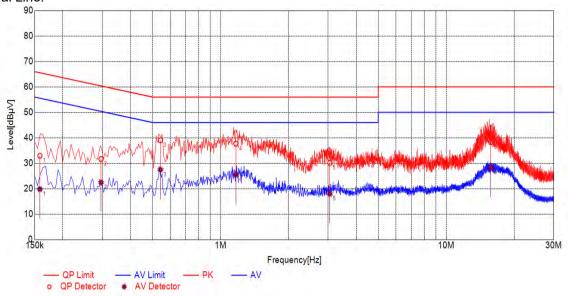
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Report No.: ZR/2021/3001411

Page: 14 of 108

#### Neutral Line:



#### **Test Graph**

| Final | Final Data List |                |                       |                       |                      |                       |                       |                      |  |  |  |  |
|-------|-----------------|----------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|----------------------|--|--|--|--|
| NO.   | Freq.<br>[MHz]  | Factor<br>[dB] | QP<br>Value<br>[dBµV] | QP<br>Limit<br>[dBµV] | QP<br>Margin<br>[dB] | AV<br>Value<br>[dBµV] | AV<br>Limit<br>[dBµV] | AV<br>Margin<br>[dB] |  |  |  |  |
| 1     | 0.1583          | 10.10          | 32.96                 | 65.55                 | 32.59                | 19.83                 | 55.55                 | 35.72                |  |  |  |  |
| 2     | 0.2954          | 10.10          | 31.63                 | 60.37                 | 28.74                | 22.51                 | 50.37                 | 27.86                |  |  |  |  |
| 3     | 0.5415          | 10.10          | 39.04                 | 56.00                 | 16.96                | 27.46                 | 46.00                 | 18.54                |  |  |  |  |
| 4     | 1.1687          | 10.10          | 37.69                 | 56.00                 | 18.31                | 25.46                 | 46.00                 | 20.54                |  |  |  |  |
| 5     | 3.0500          | 10.10          | 30.11                 | 56.00                 | 25.89                | 17.97                 | 46.00                 | 28.03                |  |  |  |  |
| 6     | 15.7628         | 10.11          | 38.24                 | 60.00                 | 21.76                | 28.39                 | 50.00                 | 21.61                |  |  |  |  |

#### Remark1:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.



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Report No.: ZR/2021/3001411

Page: 15 of 108

### 4.3 Duty Cycle

The detailed test data see: Appendix

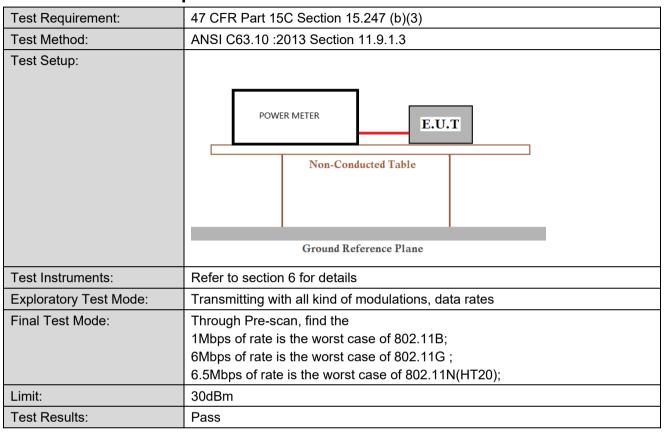




Report No.: ZR/2021/3001411

16 of 108 Page:

### 4.4 Conducted Output Power



The detailed test data see: Appendix





Report No.: ZR/2021/3001411

17 of 108 Page:

### 4.5 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

| Test Requirement:      | 47 CFR Part 15C Section 15.247 (a)(2)                                                                                                                                     |  |  |  |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| Test Method:           | ANSI C63.10: 2013 Section 11.8.1 Option 1                                                                                                                                 |  |  |  |
| Test Setup:            | Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane                                                                                                     |  |  |  |
| Instruments Used:      | Refer to section 6 for details                                                                                                                                            |  |  |  |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates                                                                                                                     |  |  |  |
| Final Test Mode:       | Through Pre-scan, find the  1Mbps of rate is the worst case of 802.11B;  6Mbps of rate is the worst case of 802.11G;  6.5Mbps of rate is the worst case of 802.11N(HT20); |  |  |  |
| Limit:                 | ≥ 500 kHz                                                                                                                                                                 |  |  |  |
| Test Results:          | Pass                                                                                                                                                                      |  |  |  |

The detailed test data see: Appendix

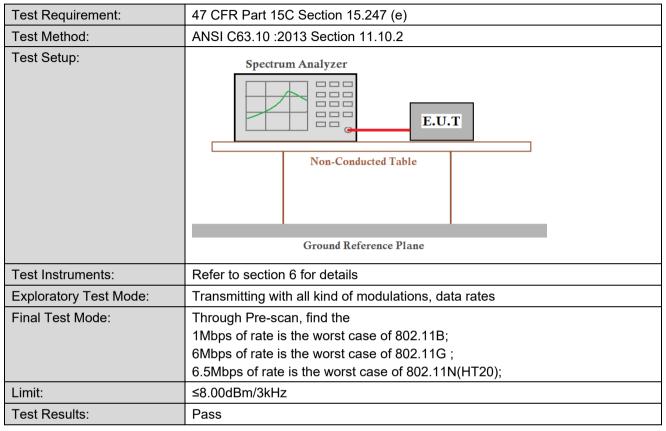




Report No.: ZR/2021/3001411

18 of 108 Page:

### 4.6 Power Spectral Density



The detailed test data see: Appendix

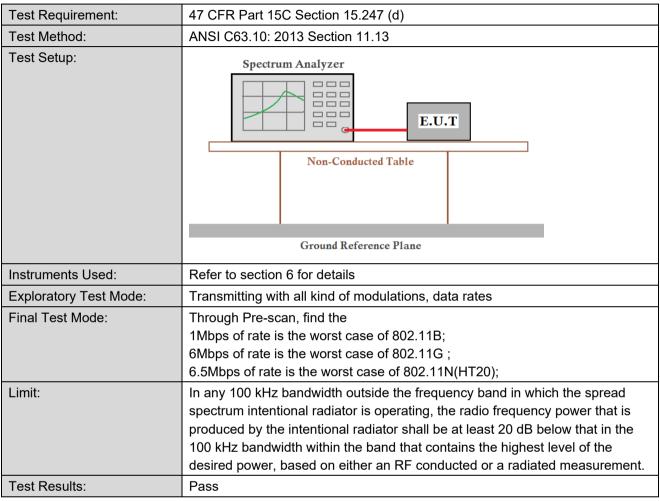




Report No.: ZR/2021/3001411

19 of 108 Page:

### 4.7 Band-edge for RF Conducted Emissions



The detailed test data see: Appendix

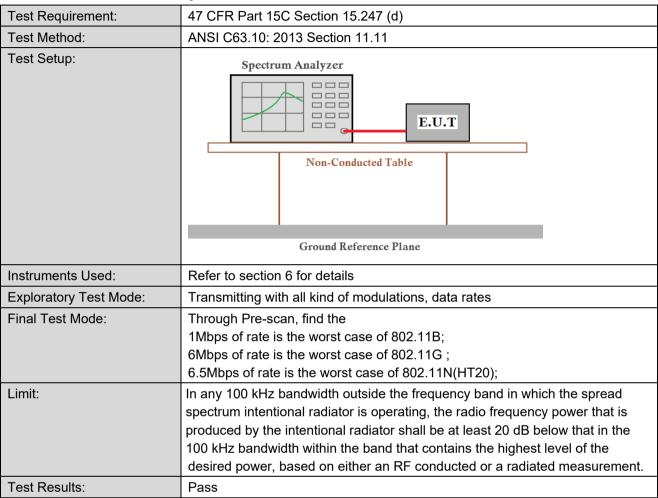




Report No.: ZR/2021/3001411

20 of 108 Page:

### 4.8 RF Conducted Spurious Emissions



The detailed test data see: Appendix





Report No.: ZR/2021/3001411

Page: 21 of 108

### 4.9 Radiated Spurious Emissions

| Test Requirement: | 47 CFR Part 15C Section                                                                                                                                                                                                                                                      | n 15.209 and 15.2                | 05                |                                        |                          |  |  |  |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------|----------------------------------------|--------------------------|--|--|--|
| Test Method:      | ANSI C63.10 :2013 Sect                                                                                                                                                                                                                                                       | tion 11.12                       |                   |                                        |                          |  |  |  |
| Test Site:        | Measurement Distance:                                                                                                                                                                                                                                                        | 3m or 10m (Semi-                 | Anechoic Ch       | amber)                                 |                          |  |  |  |
| Receiver Setup:   | Frequency                                                                                                                                                                                                                                                                    | Detector                         | RBW               | VBW                                    | Remark                   |  |  |  |
|                   | 0.009MHz-0.090MHz                                                                                                                                                                                                                                                            | Peak                             | 10kHz             | 30kHz                                  | Peak                     |  |  |  |
|                   | 0.009MHz-0.090MHz                                                                                                                                                                                                                                                            | Average                          | 10kHz             | 30kHz                                  | Average                  |  |  |  |
|                   | 0.090MHz-0.110MHz                                                                                                                                                                                                                                                            | Quasi-peak                       | 10kHz             | 30kHz                                  | Quasi-peak               |  |  |  |
|                   | 0.110MHz-0.490MHz                                                                                                                                                                                                                                                            | Peak                             | 10kHz             | 30kHz                                  | Peak                     |  |  |  |
|                   | 0.110MHz-0.490MHz                                                                                                                                                                                                                                                            | Average                          | 10kHz             | 30kHz                                  | Average                  |  |  |  |
|                   | 0.490MHz -30MHz                                                                                                                                                                                                                                                              | Quasi-peak                       | 10kHz             | 30kHz                                  | Quasi-peak               |  |  |  |
|                   | 30MHz-1GHz                                                                                                                                                                                                                                                                   | Quasi-peak                       | 120kHz            | 300kHz                                 | Quasi-peak               |  |  |  |
|                   |                                                                                                                                                                                                                                                                              | Peak                             | 1MHz              | 3MHz                                   | Peak                     |  |  |  |
|                   | Above 1GHz                                                                                                                                                                                                                                                                   | Peak                             | 1MHz              | 10Hz<br>(DC≥0.98)<br>≥1/T<br>(DC<0.98) | Average                  |  |  |  |
| Limit:            | Frequency                                                                                                                                                                                                                                                                    | Field strength (microvolt/meter) | Limit<br>(dBuV/m) | Remark                                 | Measurement distance (m) |  |  |  |
|                   | 0.009MHz-0.490MHz                                                                                                                                                                                                                                                            | 2400/F(kHz)                      | -                 | -                                      | 300                      |  |  |  |
|                   | 0.490MHz-1.705MHz                                                                                                                                                                                                                                                            | 24000/F(kHz)                     | -                 | -                                      | 30                       |  |  |  |
|                   | 1.705MHz-30MHz                                                                                                                                                                                                                                                               | 30                               | -                 | -                                      | 30                       |  |  |  |
|                   | 30MHz-88MHz                                                                                                                                                                                                                                                                  | 100                              | 40.0              | Quasi-peak                             | 3                        |  |  |  |
|                   | 88MHz-216MHz                                                                                                                                                                                                                                                                 | 150                              | 43.5              | Quasi-peak                             | 3                        |  |  |  |
|                   | 216MHz-960MHz                                                                                                                                                                                                                                                                | 200                              | 46.0              | Quasi-peak                             | 3                        |  |  |  |
|                   | 960MHz-1GHz                                                                                                                                                                                                                                                                  | 500                              | 54.0              | Quasi-peak                             | 3                        |  |  |  |
|                   | Above 1GHz                                                                                                                                                                                                                                                                   | 500                              | 54.0              | Average                                | 3                        |  |  |  |
|                   | Remark: 15.35(b),Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device. |                                  |                   |                                        |                          |  |  |  |



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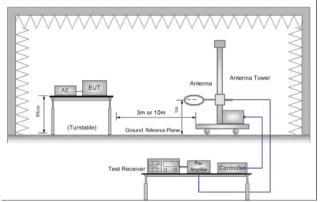
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Report No.: ZR/2021/3001411

22 of 108 Page:

#### Test Setup:



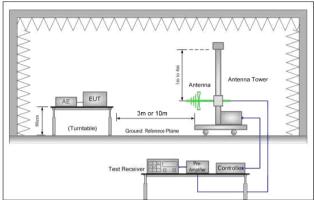


Figure 1. Below 30MHz

Figure 2. 30MHz to 1GHz

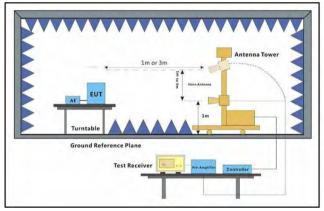


Figure 3. Above 1 GHz

#### Test Procedure:

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- Use the following spectrum analyzer settings:
  - Span shall wide enough to fully capture the emission being (1) measured;
  - Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz; (2)VBW ≥ RBW; Sweep = auto;
    - Detector function = peak; Trace = max hold for peak
  - For average measurement: use duty cycle correction factor method per 15.35(c).

Duty cycle = On time/100 milliseconds



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Report No.: ZR/2021/3001411 23 of 108 Page:

| 1 ago. 20 of 100                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On time = N 1 *L 1 +N 2 *L 2 ++N n-1 *LN n-1 +N n *L n                                                                                                                                                                                                                                                                                                 |
| Where N 1 is number of type 1 pulses, L 1 is length of type 1 pulses, etc.                                                                                                                                                                                                                                                                             |
| Average Emission Level = Peak Emission Level + 20*log(Duty cycle)                                                                                                                                                                                                                                                                                      |
| f. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.                               |
| g. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.                                                                                                                                                                                                                                            |
| h. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. |
| i. Test the EUT in the lowest channel, the middle channel ,the Highest channel.                                                                                                                                                                                                                                                                        |
| j. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.                                                                                                                                                                                                |
| k. Repeat above procedures until all frequencies measured was complete.                                                                                                                                                                                                                                                                                |
| R. Repeat above procedures until all frequencies measured was complete.                                                                                                                                                                                                                                                                                |
| Transmitting with all kind of modulations, data rates.                                                                                                                                                                                                                                                                                                 |
| Charge + Transmitting mode.                                                                                                                                                                                                                                                                                                                            |
| Pretest the EUT at Charge + Transmitting mode.                                                                                                                                                                                                                                                                                                         |
| Through Pre-scan, find the                                                                                                                                                                                                                                                                                                                             |
| 1Mbps of rate is the worst case of 802.11B;                                                                                                                                                                                                                                                                                                            |
| 6Mbps of rate is the worst case of 802.11G;                                                                                                                                                                                                                                                                                                            |
| 6.5Mbps of rate is the worst case of 802.11N(HT20);                                                                                                                                                                                                                                                                                                    |
| For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case. Only the worst case is recorded in the report.                                                                                                                                                                                                |
| Refer to section 6 for details                                                                                                                                                                                                                                                                                                                         |
| Pass                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                        |



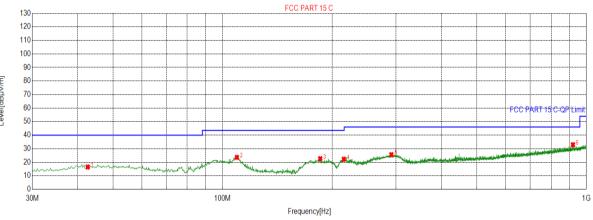


Report No.: ZR/2021/3001411

Page: 24 of 108

#### 4.9.1 Radiated emission below 1GHz **Charge + Transmitting** 4.9.1.1 **Test Graph**





- QP Limit - Horizontal PK QP Detector

**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |
| 1     | 42.6125        | 16.49             | -26.96         | 40.00             | 23.51          | 205            | 114          | Horizontal |  |  |  |
| 2     | 109.555        | 23.62             | -28.12         | 43.50             | 19.88          | 390            | 86           | Horizontal |  |  |  |
| 3     | 185.619        | 22.65             | -29.25         | 43.50             | 20.85          | 264            | 207          | Horizontal |  |  |  |
| 4     | 215.501        | 22.27             | -27.63         | 43.50             | 21.23          | 194            | 284          | Horizontal |  |  |  |
| 5     | 291.176        | 25.62             | -26.05         | 46.00             | 20.38          | 105            | 44           | Horizontal |  |  |  |
| 6     | 918.697        | 32.94             | -14.14         | 46.00             | 13.06          | 200            | 358          | Horizontal |  |  |  |

**Final Data List** 



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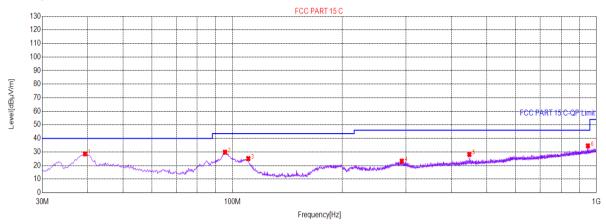
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Report No.: ZR/2021/3001411

Page: 25 of 108

#### **Test Graph**



QP Detector

- Vertical PK

**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |          |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |
| 1     | 39.3139        | 28.59             | -27.70         | 40.00             | 11.41          | 164            | 299          | Vertical |  |  |  |
| 2     | 95.3911        | 29.86             | -28.92         | 43.50             | 13.64          | 289            | 263          | Vertical |  |  |  |
| 3     | 110.526        | 25.15             | -28.20         | 43.50             | 18.35          | 341            | 121          | Vertical |  |  |  |
| 4     | 291.952        | 23.31             | -26.04         | 46.00             | 22.69          | 265            | 360          | Vertical |  |  |  |
| 5     | 447.765        | 28.21             | -22.05         | 46.00             | 17.79          | 102            | 40           | Vertical |  |  |  |
| 6     | 948.191        | 34.51             | -13.89         | 46.00             | 11.49          | 100            | 111          | Vertical |  |  |  |

**Final Data List** 



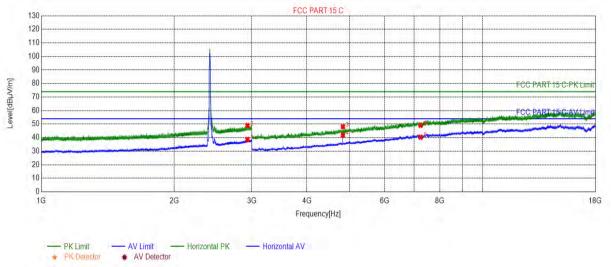


Report No.: ZR/2021/3001411

Page: 26 of 108

#### 4.9.2 Transmitter emission above 1GHz 802.11B Channel 1 4.9.2.1

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |
| 1     | 2930.99        | 38.74             | 10.55          | 54.00             | 15.26          | 184            | 254          | Horizontal |  |  |  |
| 2     | 2933.09        | 49.01             | 10.54          | 74.00             | 24.99          | 196            | 48           | Horizontal |  |  |  |
| 3     | 4824.00        | 48.07             | -15.31         | 74.00             | 25.93          | 196            | 314          | Horizontal |  |  |  |
| 4     | 4824.00        | 41.81             | -15.31         | 54.00             | 12.19          | 187            | 359          | Horizontal |  |  |  |
| 5     | 7236.00        | 40.37             | -8.82          | 54.00             | 13.63          | 168            | 57           | Horizontal |  |  |  |
| 6     | 7236.00        | 49.15             | -8.82          | 74.00             | 24.85          | 188            | 102          | Horizontal |  |  |  |

**Final Data List** 



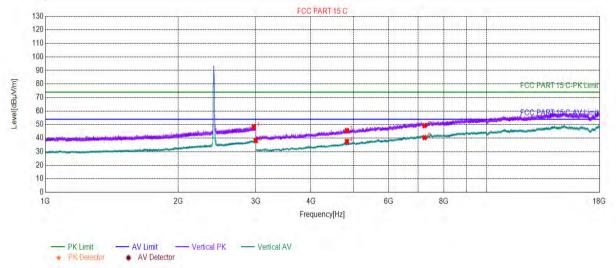


Report No.: ZR/2021/3001411

Page: 27 of 108

#### 802.11B Channel 1 4.9.2.2

#### **Test Graph**



**Suspected List** 

| Suspe | ected List     |                   |                |                   |                |                |              |          |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |
| 1     | 2968.29        | 48.36             | 10.36          | 74.00             | 25.64          | 225            | 269          | Vertical |
| 2     | 2998.09        | 38.21             | 10.75          | 54.00             | 15.79          | 224            | 125          | Vertical |
| 3     | 4824.00        | 45.67             | -15.31         | 74.00             | 28.33          | 248            | 34           | Vertical |
| 4     | 4824.00        | 37.62             | -15.31         | 54.00             | 16.38          | 197            | 188          | Vertical |
| 5     | 7236.00        | 40.46             | -8.82          | 54.00             | 13.54          | 187            | 304          | Vertical |
| 6     | 7236.00        | 49.29             | -8.82          | 74.00             | 24.71          | 224            | 199          | Vertical |

**Final Data List** 



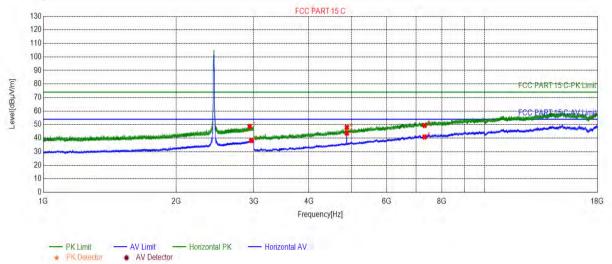


Report No.: ZR/2021/3001411

Page: 28 of 108

#### 802.11B Channel 6 4.9.2.3

#### **Test Graph**



Suspected List

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |
| 1     | 2935.39        | 48.68             | 10.53          | 74.00             | 25.32          | 155            | 98           | Horizontal |  |  |  |
| 2     | 2959.69        | 38.34             | 10.52          | 54.00             | 15.66          | 174            | 308          | Horizontal |  |  |  |
| 3     | 4873.87        | 43.71             | -15.09         | 54.00             | 10.29          | 198            | 299          | Horizontal |  |  |  |
| 4     | 4874.00        | 48.00             | -15.09         | 74.00             | 26.00          | 165            | 345          | Horizontal |  |  |  |
| 5     | 7311.00        | 49.39             | -8.93          | 74.00             | 24.61          | 174            | 140          | Horizontal |  |  |  |
| 6     | 7311.00        | 40.91             | -8.93          | 54.00             | 13.09          | 228            | 157          | Horizontal |  |  |  |

**Final Data List** 



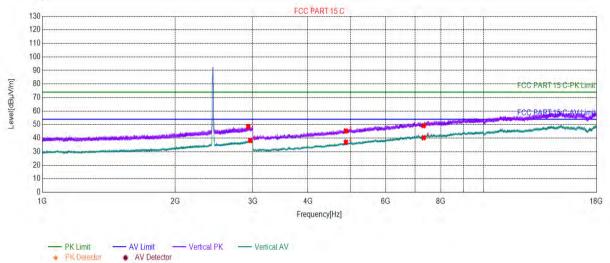


Report No.: ZR/2021/3001411

Page: 29 of 108

#### 802.11B Channel 6 4.9.2.4

#### **Test Graph**



Suspected List

| Suspe | Suspected List |                   |                |                   |                |                |              |          |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |
| 1     | 2927.99        | 48.48             | 10.52          | 74.00             | 25.52          | 189            | 311          | Vertical |  |  |  |
| 2     | 2958.79        | 38.32             | 10.52          | 54.00             | 15.68          | 188            | 184          | Vertical |  |  |  |
| 3     | 4874.00        | 45.33             | -15.09         | 74.00             | 28.67          | 174            | 35           | Vertical |  |  |  |
| 4     | 4874.00        | 36.96             | -15.09         | 54.00             | 17.04          | 165            | 18           | Vertical |  |  |  |
| 5     | 7311.00        | 40.36             | -8.93          | 54.00             | 13.64          | 174            | 57           | Vertical |  |  |  |
| 6     | 7311.00        | 49.24             | -8.93          | 74.00             | 24.76          | 198            | 126          | Vertical |  |  |  |

**Final Data List** 



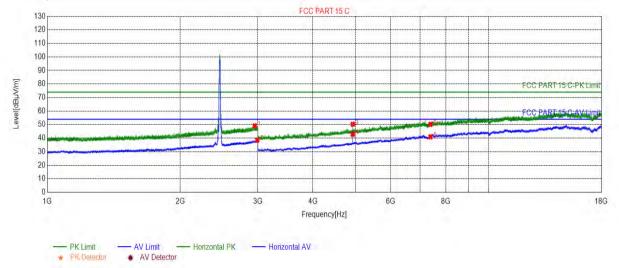


Report No.: ZR/2021/3001411

Page: 30 of 108

#### 802.11B Channel 11 4.9.2.5

#### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |
| 1     | 2951.49        | 49.11             | 10.56          | 74.00             | 24.89          | 184            | 199          | Horizontal |  |  |
| 2     | 2991.89        | 38.59             | 10.55          | 54.00             | 15.41          | 194            | 189          | Horizontal |  |  |
| 3     | 4924.00        | 50.32             | -14.74         | 74.00             | 23.68          | 178            | 327          | Horizontal |  |  |
| 4     | 4924.00        | 42.90             | -14.74         | 54.00             | 11.10          | 168            | 309          | Horizontal |  |  |
| 5     | 7386.00        | 40.99             | -7.78          | 54.00             | 13.01          | 184            | 152          | Horizontal |  |  |
| 6     | 7386.00        | 50.20             | -7.78          | 74.00             | 23.80          | 189            | 344          | Horizontal |  |  |

**Final Data List** 



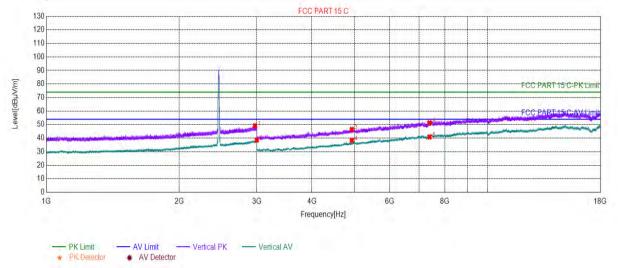


Report No.: ZR/2021/3001411

Page: 31 of 108

#### 802.11B Channel 11 4.9.2.6

#### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |          |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |
| 1     | 2971.39        | 49.12             | 10.36          | 74.00             | 24.88          | 225            | 201          | Vertical |  |  |
| 2     | 2998.19        | 38.64             | 10.75          | 54.00             | 15.36          | 241            | 106          | Vertical |  |  |
| 3     | 4924.00        | 46.50             | -14.74         | 74.00             | 27.50          | 262            | 270          | Vertical |  |  |
| 4     | 4924.00        | 38.31             | -14.74         | 54.00             | 15.69          | 241            | 12           | Vertical |  |  |
| 5     | 7386.00        | 40.89             | -7.78          | 54.00             | 13.11          | 212            | 292          | Vertical |  |  |
| 6     | 7386.00        | 51.29             | -7.78          | 74.00             | 22.71          | 210            | 252          | Vertical |  |  |

**Final Data List** 



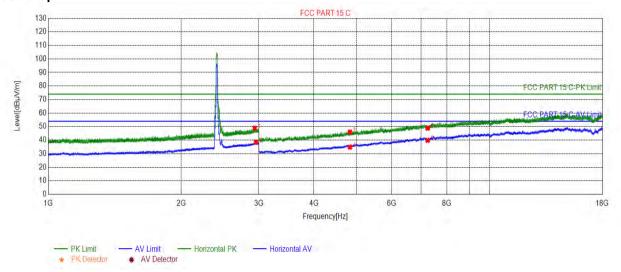


Report No.: ZR/2021/3001411

Page: 32 of 108

#### 802.11G Channel 1 4.9.2.7

#### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |
| 1     | 2936.39        | 48.85             | 10.52          | 74.00             | 25.15          | 188            | 349          | Horizontal |  |  |
| 2     | 2955.29        | 38.52             | 10.54          | 54.00             | 15.48          | 174            | 4            | Horizontal |  |  |
| 3     | 4824.00        | 45.96             | -15.31         | 74.00             | 28.04          | 165            | 255          | Horizontal |  |  |
| 4     | 4824.00        | 34.88             | -15.31         | 54.00             | 19.12          | 149            | 17           | Horizontal |  |  |
| 5     | 7236.00        | 39.89             | -8.82          | 54.00             | 14.11          | 198            | 324          | Horizontal |  |  |
| 6     | 7236.00        | 48.87             | -8.82          | 74.00             | 25.13          | 156            | 301          | Horizontal |  |  |

**Final Data List** 



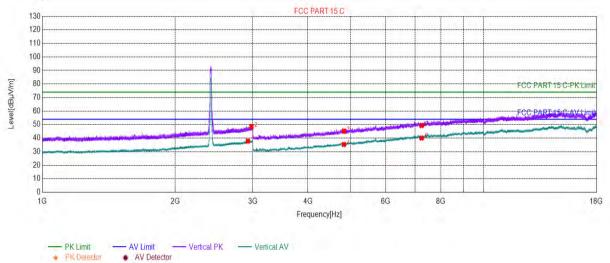


Report No.: ZR/2021/3001411

Page: 33 of 108

#### 802.11G Channel 1 4.9.2.8

#### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |          |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |
| 1    | 2923.09        | 37.82             | 10.43          | 54.00             | 16.18          | 225            | 180          | Vertical |  |  |  |
| 2    | 2977.89        | 48.54             | 10.50          | 74.00             | 25.46          | 211            | 201          | Vertical |  |  |  |
| 3    | 4824.00        | 45.27             | -15.31         | 74.00             | 28.73          | 219            | 111          | Vertical |  |  |  |
| 4    | 4824.00        | 35.36             | -15.31         | 54.00             | 18.64          | 210            | 111          | Vertical |  |  |  |
| 5    | 7236.00        | 40.10             | -8.82          | 54.00             | 13.90          | 198            | 141          | Vertical |  |  |  |
| 6    | 7236.00        | 49.37             | -8.82          | 74.00             | 24.63          | 187            | 320          | Vertical |  |  |  |

**Final Data List** 



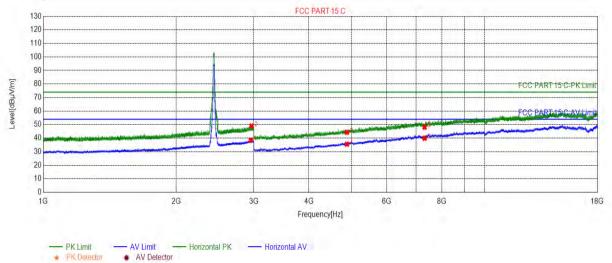


Report No.: ZR/2021/3001411

Page: 34 of 108

#### 802.11G Channel 6 4.9.2.9

#### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |
| 1     | 2953.19        | 38.52             | 10.55          | 54.00             | 15.48          | 151            | 34           | Horizontal |  |  |
| 2     | 2961.79        | 49.01             | 10.48          | 74.00             | 24.99          | 197            | 334          | Horizontal |  |  |
| 3     | 4874.00        | 44.32             | -15.09         | 74.00             | 29.68          | 187            | 310          | Horizontal |  |  |
| 4     | 4874.00        | 35.55             | -15.09         | 54.00             | 18.45          | 199            | 332          | Horizontal |  |  |
| 5     | 7311.00        | 39.93             | -8.93          | 54.00             | 14.07          | 176            | 320          | Horizontal |  |  |
| 6     | 7311.00        | 48.11             | -8.93          | 74.00             | 25.89          | 159            | 19           | Horizontal |  |  |

**Final Data List** 



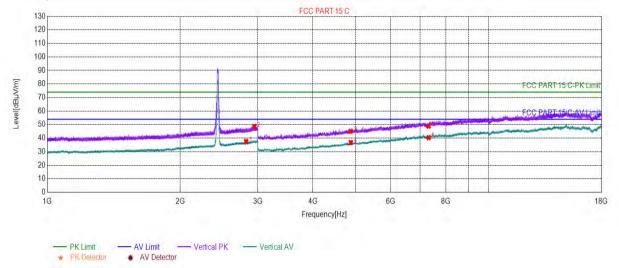


Report No.: ZR/2021/3001411

Page: 35 of 108

#### 802.11G Channel 6 4.9.2.10

#### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |          |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |
| 1     | 2822.39        | 37.56             | 9.71           | 54.00             | 16.44          | 296            | 3            | Vertical |  |  |
| 2     | 2945.29        | 48.53             | 10.54          | 74.00             | 25.47          | 235            | 276          | Vertical |  |  |
| 3     | 4874.00        | 45.07             | -15.09         | 74.00             | 28.93          | 213            | 283          | Vertical |  |  |
| 4     | 4874.00        | 36.78             | -15.09         | 54.00             | 17.22          | 201            | 98           | Vertical |  |  |
| 5     | 7311.00        | 40.41             | -8.93          | 54.00             | 13.59          | 245            | 317          | Vertical |  |  |
| 6     | 7311.00        | 48.92             | -8.93          | 74.00             | 25.08          | 222            | 185          | Vertical |  |  |

**Final Data List** 



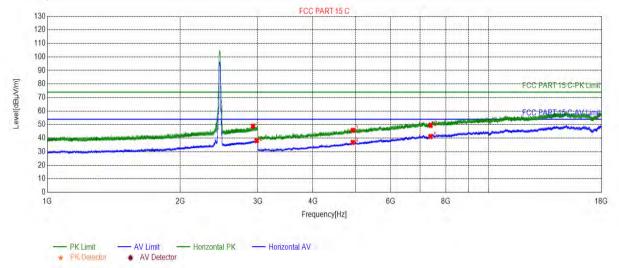


Report No.: ZR/2021/3001411

Page: 36 of 108

#### 802.11G Channel 11 4.9.2.11

#### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |
| 1     | 2925.39        | 48.92             | 10.47          | 74.00             | 25.08          | 174            | 75           | Horizontal |  |  |
| 2     | 2981.59        | 38.18             | 10.54          | 54.00             | 15.82          | 165            | 291          | Horizontal |  |  |
| 3     | 4924.00        | 45.81             | -14.74         | 74.00             | 28.19          | 174            | 360          | Horizontal |  |  |
| 4     | 4924.00        | 36.84             | -14.74         | 54.00             | 17.16          | 195            | 353          | Horizontal |  |  |
| 5     | 7386.00        | 41.23             | -7.78          | 54.00             | 12.77          | 184            | 110          | Horizontal |  |  |
| 6     | 7386.00        | 49.42             | -7.78          | 74.00             | 24.58          | 165            | 196          | Horizontal |  |  |

**Final Data List** 



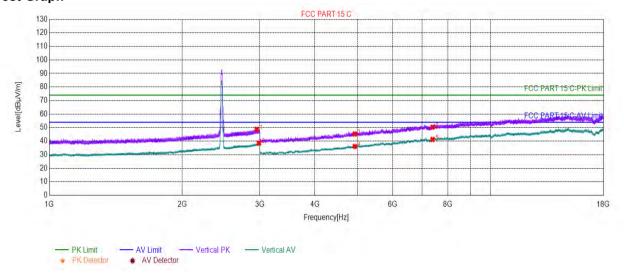


Report No.: ZR/2021/3001411

Page: 37 of 108

#### 802.11G Channel 11 4.9.2.12

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |          |  |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |  |
| 1     | 2952.09        | 48.78             | 10.55          | 74.00             | 25.22          | 199            | 103          | Vertical |  |  |  |  |
| 2     | 2986.49        | 38.57             | 10.51          | 54.00             | 15.43          | 220            | 236          | Vertical |  |  |  |  |
| 3     | 4924.00        | 45.32             | -14.74         | 74.00             | 28.68          | 241            | 360          | Vertical |  |  |  |  |
| 4     | 4924.00        | 36.11             | -14.74         | 54.00             | 17.89          | 216            | 360          | Vertical |  |  |  |  |
| 5     | 7386.00        | 41.23             | -7.78          | 54.00             | 12.77          | 211            | 110          | Vertical |  |  |  |  |
| 6     | 7386.00        | 50.30             | -7.78          | 74.00             | 23.70          | 231            | 59           | Vertical |  |  |  |  |

**Final Data List** 



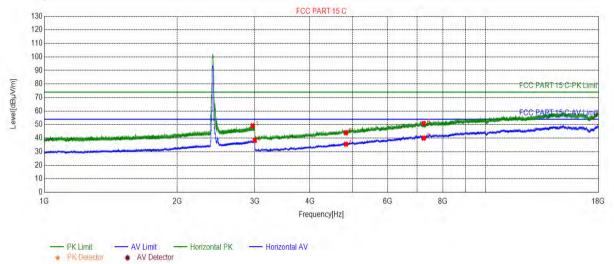


Report No.: ZR/2021/3001411

Page: 38 of 108

#### 802.11N20 Channel 1 4.9.2.13

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |            |  |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |  |
| 1    | 2964.19        | 49.17             | 10.44          | 74.00             | 24.83          | 199            | 296          | Horizontal |  |  |  |  |
| 2    | 2999.10        | 38.46             | 10.78          | 54.00             | 15.54          | 178            | 108          | Horizontal |  |  |  |  |
| 3    | 4824.00        | 44.01             | -15.31         | 74.00             | 29.99          | 165            | 230          | Horizontal |  |  |  |  |
| 4    | 4824.00        | 35.56             | -15.31         | 54.00             | 18.44          | 174            | 291          | Horizontal |  |  |  |  |
| 5    | 7236.00        | 40.03             | -8.82          | 54.00             | 13.97          | 168            | 279          | Horizontal |  |  |  |  |
| 6    | 7236.00        | 50.88             | -8.82          | 74.00             | 23.12          | 194            | 126          | Horizontal |  |  |  |  |

**Final Data List** 



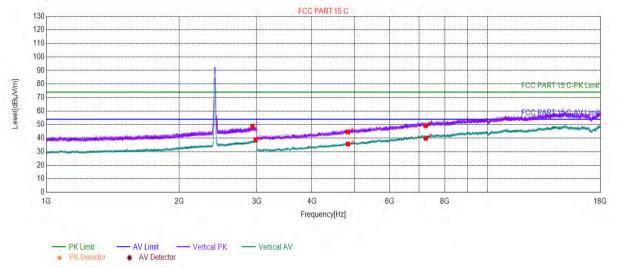


Report No.: ZR/2021/3001411

Page: 39 of 108

#### 802.11N20 Channel 1 4.9.2.14

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |          |  |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |  |
| 1     | 2931.29        | 48.75             | 10.55          | 74.00             | 25.25          | 225            | 332          | Vertical |  |  |  |  |
| 2     | 2981.09        | 38.73             | 10.54          | 54.00             | 15.27          | 221            | 8            | Vertical |  |  |  |  |
| 3     | 4824.00        | 44.64             | -15.31         | 74.00             | 29.36          | 231            | 341          | Vertical |  |  |  |  |
| 4     | 4824.00        | 35.65             | -15.31         | 54.00             | 18.35          | 241            | 265          | Vertical |  |  |  |  |
| 5     | 7236.00        | 39.90             | -8.82          | 54.00             | 14.10          | 226            | 276          | Vertical |  |  |  |  |
| 6     | 7236.00        | 49.30             | -8.82          | 74.00             | 24.70          | 241            | 341          | Vertical |  |  |  |  |

**Final Data List** 



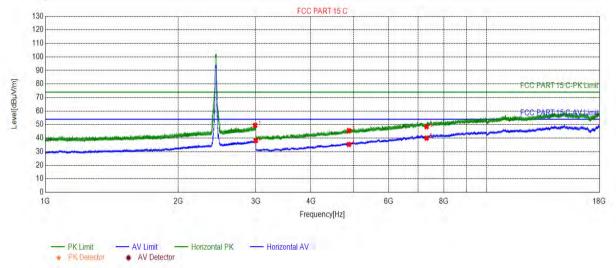


Report No.: ZR/2021/3001411

Page: 40 of 108

#### 802.11N20 Channel 6 4.9.2.15

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |            |  |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |  |
| 1    | 2989.19        | 49.48             | 10.49          | 74.00             | 24.52          | 184            | 34           | Horizontal |  |  |  |  |
| 2    | 2998.69        | 38.25             | 10.77          | 54.00             | 15.75          | 197            | 305          | Horizontal |  |  |  |  |
| 3    | 4874.00        | 45.52             | -15.09         | 74.00             | 28.48          | 184            | 67           | Horizontal |  |  |  |  |
| 4    | 4874.00        | 35.39             | -15.09         | 54.00             | 18.61          | 195            | 56           | Horizontal |  |  |  |  |
| 5    | 7311.00        | 40.06             | -8.93          | 54.00             | 13.94          | 184            | 181          | Horizontal |  |  |  |  |
| 6    | 7311.00        | 48.46             | -8.93          | 74.00             | 25.54          | 175            | 323          | Horizontal |  |  |  |  |

**Final Data List** 



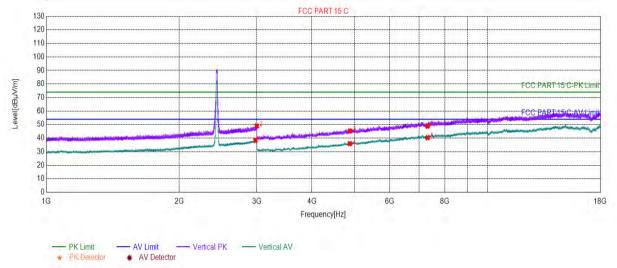


Report No.: ZR/2021/3001411

Page: 41 of 108

#### 802.11N20 Channel 6 4.9.2.16

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |          |  |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |  |
| 1     | 2977.89        | 38.35             | 10.50          | 54.00             | 15.65          | 225            | 186          | Vertical |  |  |  |  |
| 2     | 2998.09        | 48.99             | 10.75          | 74.00             | 25.01          | 241            | 311          | Vertical |  |  |  |  |
| 3     | 4874.00        | 45.34             | -15.09         | 74.00             | 28.66          | 236            | 49           | Vertical |  |  |  |  |
| 4     | 4874.00        | 35.98             | -15.09         | 54.00             | 18.02          | 221            | 104          | Vertical |  |  |  |  |
| 5     | 7311.00        | 40.38             | -8.93          | 54.00             | 13.62          | 224            | 187          | Vertical |  |  |  |  |
| 6     | 7311.00        | 48.89             | -8.93          | 74.00             | 25.11          | 222            | 12           | Vertical |  |  |  |  |

**Final Data List** 



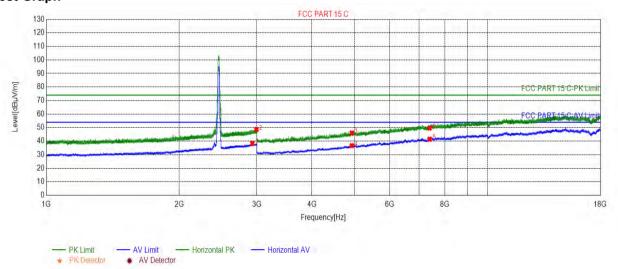


Report No.: ZR/2021/3001411

Page: 42 of 108

#### 802.11N20 Channel 11 4.9.2.17

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |            |  |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |  |
| 1    | 2930.89        | 38.39             | 10.55          | 54.00             | 15.61          | 188            | 265          | Horizontal |  |  |  |  |
| 2    | 2993.59        | 48.61             | 10.60          | 74.00             | 25.39          | 174            | 178          | Horizontal |  |  |  |  |
| 3    | 4924.00        | 46.04             | -14.74         | 74.00             | 27.96          | 196            | 2            | Horizontal |  |  |  |  |
| 4    | 4924.00        | 36.69             | -14.74         | 54.00             | 17.31          | 194            | 339          | Horizontal |  |  |  |  |
| 5    | 7386.00        | 41.45             | -7.78          | 54.00             | 12.55          | 175            | 328          | Horizontal |  |  |  |  |
| 6    | 7386.00        | 49.70             | -7.78          | 74.00             | 24.30          | 163            | 125          | Horizontal |  |  |  |  |

**Final Data List** 



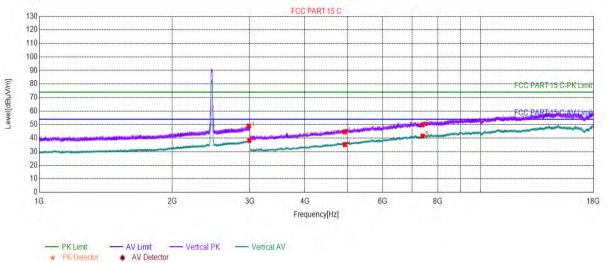


Report No.: ZR/2021/3001411

43 of 108 Page:

#### 802.11N20 Channel 11 4.9.2.18

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |          |  |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |  |
| 1    | 2982.99        | 48.92             | 10.53          | 74.00             | 25.08          | 225            | 85           | Vertical |  |  |  |  |
| 2    | 2992.69        | 38.34             | 10.58          | 54.00             | 15.66          | 241            | 316          | Vertical |  |  |  |  |
| 3    | 4924.00        | 44.58             | -14.74         | 74.00             | 29.42          | 263            | 324          | Vertical |  |  |  |  |
| 4    | 4924.00        | 35.26             | -14.74         | 54.00             | 18.74          | 241            | 317          | Vertical |  |  |  |  |
| 5    | 7386.00        | 41.56             | -7.78          | 54.00             | 12.44          | 242            | 2            | Vertical |  |  |  |  |
| 6    | 7386.00        | 49.88             | -7.78          | 74.00             | 24.12          | 227            | 73           | Vertical |  |  |  |  |

### **Final Data List**

### Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
  - Final Test Level =Receiver Reading + Antenna Factor + Cable Factor Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz and 18GHz to 25GHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
- 4) All Modes have been tested, but only the worst case data displayed in this report.



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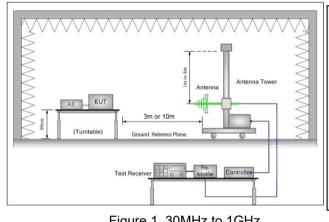


Report No.: ZR/2021/3001411

Page: 44 of 108

### 4.10Restricted bands around fundamental frequency

| Test Requirement: | 47 CFR Part 15C Section   | 15.209 and 15.205                                       |               |  |  |  |  |  |  |  |  |
|-------------------|---------------------------|---------------------------------------------------------|---------------|--|--|--|--|--|--|--|--|
| Test Method:      | ANSI C63.10: 2013 Section | ANSI C63.10: 2013 Section 11.12                         |               |  |  |  |  |  |  |  |  |
| Test Site:        | Measurement Distance: 3n  | Measurement Distance: 3m or 10m (Semi-Anechoic Chamber) |               |  |  |  |  |  |  |  |  |
| Limit:            | Frequency                 | Limit (dBuV/m)                                          | Remark        |  |  |  |  |  |  |  |  |
|                   | 30MHz-88MHz               | 40.0                                                    | Quasi-peak    |  |  |  |  |  |  |  |  |
|                   | 88MHz-216MHz              | 43.5                                                    | Quasi-peak    |  |  |  |  |  |  |  |  |
|                   | 216MHz-960MHz             | 46.0                                                    | Quasi-peak    |  |  |  |  |  |  |  |  |
|                   | 960MHz-1GHz               | 54.0                                                    | Quasi-peak    |  |  |  |  |  |  |  |  |
|                   | Al- 21/2 401  -           | 54.0                                                    | Average Value |  |  |  |  |  |  |  |  |
|                   | Above 1GHz                | Above 1GHz 74.0 Peak Value                              |               |  |  |  |  |  |  |  |  |
| Test Setup:       |                           | <u>.                                      </u>          |               |  |  |  |  |  |  |  |  |



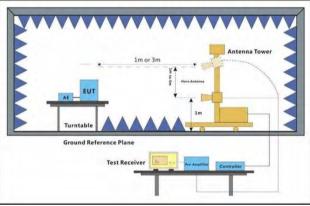


Figure 1. 30MHz to 1GHz

Figure 2. Above 1 GHz





Report No.: ZR/2021/3001411 Page: 45 of 108

|                        | 1 agc. +3 01 100                                                                                                                                                                                                                                                   |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Procedure:        | a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.                                    |
|                        | b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.                                          |
|                        | c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.                                                                                                                   |
|                        | d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.                                    |
|                        | e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.                            |
|                        | f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.                                                                                                                                                        |
|                        | g. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel |
|                        | h. Test the EUT in the lowest channel , the Highest channel                                                                                                                                                                                                        |
|                        | i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.                                                                                                            |
|                        | j. Repeat above procedures until all frequencies measured was complete.                                                                                                                                                                                            |
| Exploratory Test Mode: | Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.                                                                                                                                                                                 |
| Final Test Mode:       | Pretest the EUT at Charge + Transmitting mode.                                                                                                                                                                                                                     |
|                        | Through Pre-scan, find the                                                                                                                                                                                                                                         |
|                        | 1Mbps of rate is the worst case of 802.11B;                                                                                                                                                                                                                        |
|                        | 6Mbps of rate is the worst case of 802.11G;                                                                                                                                                                                                                        |
|                        | 6.5Mbps of rate is the worst case of 802.11N(HT20);                                                                                                                                                                                                                |
|                        | Only the worst case is recorded in the report.                                                                                                                                                                                                                     |
| Instruments Used:      | Refer to section 6 for details                                                                                                                                                                                                                                     |
| Test Results:          | Pass                                                                                                                                                                                                                                                               |





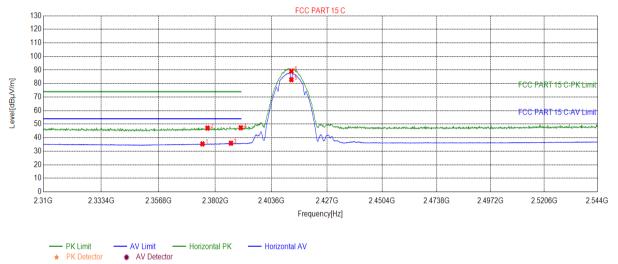
Report No.: ZR/2021/3001411

Page: 46 of 108

**Test Plots** 4.10.1

802.11B\_Channel 1 4.10.1.1

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |            |  |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |  |
| 1    | 2374.93        | 35.39             | 9.20           | 54.00             | 18.61          | 165            | 199          | Horizontal |  |  |  |  |
| 2    | 2377.04        | 47.09             | 9.25           | 74.00             | 26.91          | 135            | 184          | Horizontal |  |  |  |  |
| 3    | 2386.75        | 35.91             | 9.51           | 54.00             | 18.09          | 142            | 39           | Horizontal |  |  |  |  |
| 4    | 2390.84        | 47.37             | 9.63           | 74.00             | 26.63          | 168            | 146          | Horizontal |  |  |  |  |
| 5    | 2412.00        | 82.83             | 9.85           | 0.00              | -82.83         | 148            | 54           | Horizontal |  |  |  |  |
| 6    | 2412.00        | 89.09             | 9.85           | 0.00              | -89.09         | 150            | 54           | Horizontal |  |  |  |  |

**Final Data List** 



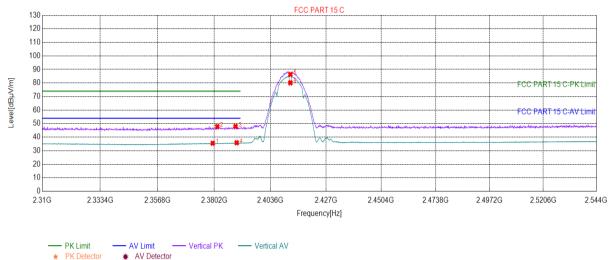


Report No.: ZR/2021/3001411

Page: 47 of 108

#### 802.11B Channel 1 4.10.1.2

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |          |  |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |  |
| 1    | 2379.61        | 35.52             | 9.32           | 54.00             | 18.48          | 256            | 31           | Vertical |  |  |  |  |
| 2    | 2381.48        | 47.80             | 9.37           | 74.00             | 26.20          | 247            | 199          | Vertical |  |  |  |  |
| 3    | 2389.09        | 47.90             | 9.58           | 74.00             | 26.10          | 268            | 108          | Vertical |  |  |  |  |
| 4    | 2389.56        | 35.85             | 9.59           | 54.00             | 18.15          | 234            | 344          | Vertical |  |  |  |  |
| 5    | 2412.00        | 86.31             | 9.85           | 0.00              | -86.31         | 278            | 153          | Vertical |  |  |  |  |
| 6    | 2412.00        | 80.14             | 9.85           | 0.00              | -80.14         | 245            | 153          | Vertical |  |  |  |  |

**Final Data List** 



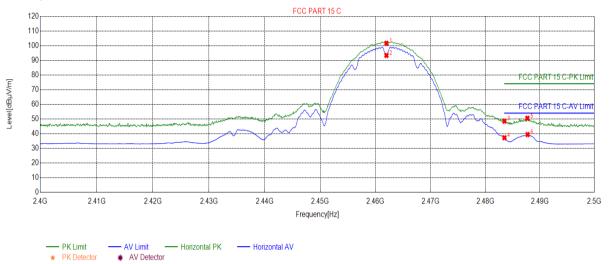


Report No.: ZR/2021/3001411

Page: 48 of 108

#### 802.11B Channel 11 4.10.1.3

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |  |
| 1     | 2462.00        | 101.60            | 8.25           | 0.00              | -101.60        | 187            | 3            | Horizontal |  |  |  |  |
| 2     | 2462.00        | 93.33             | 8.25           | 0.00              | -93.33         | 198            | 250          | Horizontal |  |  |  |  |
| 3     | 2483.50        | 48.52             | 8.48           | 74.00             | 25.48          | 187            | 187          | Horizontal |  |  |  |  |
| 4     | 2483.50        | 37.20             | 8.48           | 54.00             | 16.80          | 168            | 198          | Horizontal |  |  |  |  |
| 5     | 2487.69        | 50.51             | 8.50           | 74.00             | 23.49          | 195            | 260          | Horizontal |  |  |  |  |
| 6     | 2487.74        | 39.37             | 8.50           | 54.00             | 14.63          | 177            | 177          | Horizontal |  |  |  |  |

**Final Data List** 



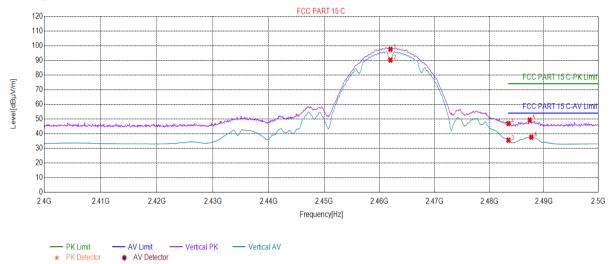


Report No.: ZR/2021/3001411

Page: 49 of 108

#### 802.11B Channel 11 4.10.1.4

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |          |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |
| 1    | 2462.00        | 97.53             | 8.25           | 0.00              | -97.53         | 258            | 258          | Vertical |  |  |
| 2    | 2462.00        | 90.17             | 8.25           | 0.00              | -90.17         | 296            | 36           | Vertical |  |  |
| 3    | 2483.50        | 35.53             | 8.48           | 54.00             | 18.47          | 274            | 78           | Vertical |  |  |
| 4    | 2483.50        | 46.90             | 8.48           | 74.00             | 27.10          | 289            | 154          | Vertical |  |  |
| 5    | 2487.39        | 49.25             | 8.49           | 74.00             | 24.75          | 300            | 187          | Vertical |  |  |
| 6    | 2487.69        | 37.59             | 8.50           | 54.00             | 16.41          | 265            | 265          | Vertical |  |  |

**Final Data List** 



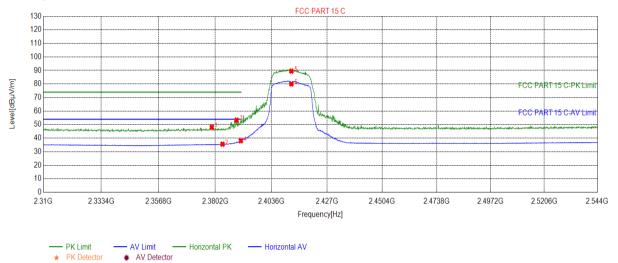


Report No.: ZR/2021/3001411

Page: 50 of 108

#### 802.11B Channel 1 4.10.1.5

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |
| 1     | 2378.79        | 48.11             | 9.30           | 74.00             | 25.89          | 159            | 328          | Horizontal |  |  |
| 2     | 2383.24        | 35.59             | 9.42           | 54.00             | 18.41          | 160            | 275          | Horizontal |  |  |
| 3     | 2389.09        | 53.34             | 9.58           | 74.00             | 20.66          | 165            | 55           | Horizontal |  |  |
| 4     | 2390.84        | 38.07             | 9.63           | 54.00             | 15.93          | 160            | 55           | Horizontal |  |  |
| 5     | 2412.00        | 89.52             | 9.85           | 0.00              | -89.52         | 151            | 47           | Horizontal |  |  |
| 6     | 2412.00        | 80.03             | 9.85           | 0.00              | -80.03         | 134            | 55           | Horizontal |  |  |

**Final Data List** 



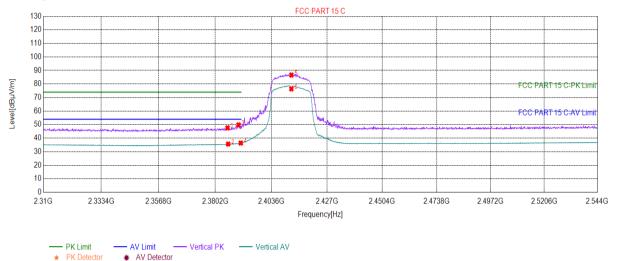


Report No.: ZR/2021/3001411

Page: 51 of 108

#### 802.11G Channel 1 4.10.1.6

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |          |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |
| 1    | 2385.34        | 47.62             | 9.48           | 74.00             | 26.38          | 230            | 282          | Vertical |  |  |
| 2    | 2385.58        | 35.67             | 9.48           | 54.00             | 18.33          | 235            | 31           | Vertical |  |  |
| 3    | 2389.91        | 49.79             | 9.60           | 74.00             | 24.21          | 230            | 131          | Vertical |  |  |
| 4    | 2390.84        | 36.41             | 9.63           | 54.00             | 17.59          | 210            | 131          | Vertical |  |  |
| 5    | 2412.00        | 86.64             | 9.85           | 0.00              | -86.64         | 265            | 124          | Vertical |  |  |
| 6    | 2412.00        | 76.38             | 9.85           | 0.00              | -76.38         | 275            | 154          | Vertical |  |  |

**Final Data List** 



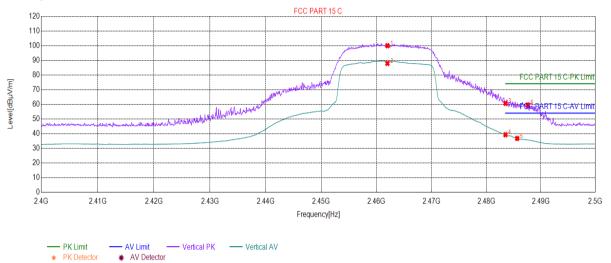


Report No.: ZR/2021/3001411

Page: 52 of 108

#### 802.11G Channel 11 4.10.1.7

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |          |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |
| 1    | 2462.00        | 99.94             | 8.25           | 0.00              | -99.94         | 369            | 58           | Vertical |  |  |  |
| 2    | 2462.00        | 87.90             | 8.25           | 0.00              | -87.90         | 256            | 147          | Vertical |  |  |  |
| 3    | 2483.50        | 60.67             | 8.48           | 74.00             | 13.33          | 263            | 158          | Vertical |  |  |  |
| 4    | 2483.50        | 39.25             | 8.48           | 54.00             | 14.75          | 247            | 256          | Vertical |  |  |  |
| 5    | 2485.64        | 36.74             | 8.49           | 54.00             | 17.26          | 256            | 285          | Vertical |  |  |  |
| 6    | 2487.59        | 59.61             | 8.50           | 74.00             | 14.39          | 258            | 142          | Vertical |  |  |  |

**Final Data List** 



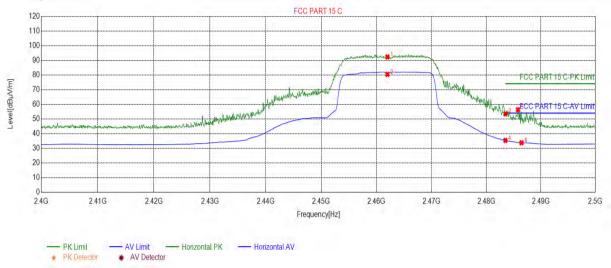


Report No.: ZR/2021/3001411

Page: 53 of 108

#### 802.11G Channel 11 4.10.1.8

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |            |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |
| 1    | 2462.00        | 92.27             | 8.25           | 0.00              | -92.27         | 256            | 26           | Horizontal |  |  |  |
| 2    | 2462.00        | 80.40             | 8.25           | 0.00              | -80.40         | 247            | 158          | Horizontal |  |  |  |
| 3    | 2483.50        | 53.53             | 8.48           | 74.00             | 20.47          | 278            | 169          | Horizontal |  |  |  |
| 4    | 2483.50        | 35.37             | 8.48           | 54.00             | 18.63          | 289            | 254          | Horizontal |  |  |  |
| 5    | 2485.79        | 56.31             | 8.49           | 74.00             | 17.69          | 256            | 256          | Horizontal |  |  |  |
| 6    | 2486.44        | 33.77             | 8.49           | 54.00             | 20.23          | 247            | 188          | Horizontal |  |  |  |

**Final Data List** 



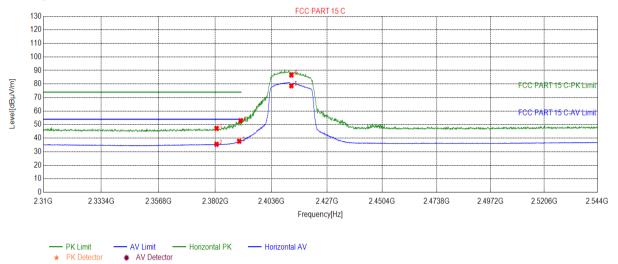


Report No.: ZR/2021/3001411

Page: 54 of 108

#### 802.11N20 Channel 1 4.10.1.9

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |
| 1     | 2380.78        | 47.24             | 9.35           | 74.00             | 26.76          | 156            | 255          | Horizontal |  |  |
| 2     | 2380.78        | 35.50             | 9.35           | 54.00             | 18.50          | 143            | 162          | Horizontal |  |  |
| 3     | 2390.14        | 37.73             | 9.61           | 54.00             | 16.27          | 168            | 54           | Horizontal |  |  |
| 4     | 2390.73        | 52.88             | 9.62           | 74.00             | 21.12          | 134            | 195          | Horizontal |  |  |
| 5     | 2412.00        | 78.69             | 9.85           | 0.00              | -78.69         | 185            | 54           | Horizontal |  |  |
| 6     | 2412.00        | 86.60             | 9.85           | 0.00              | -86.60         | 169            | 25           | Horizontal |  |  |

**Final Data List** 



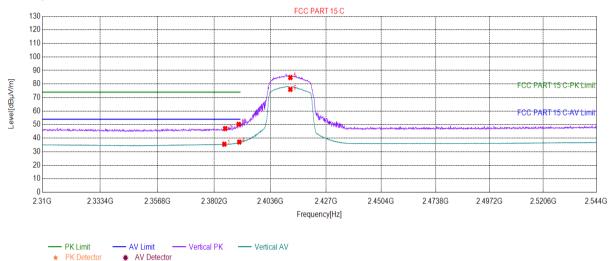


Report No.: ZR/2021/3001411

Page: 55 of 108

#### 802.11N20 Channel 1 4.10.1.10

### **Test Graph**



**Suspected List** 

| Susp | Suspected List |                   |                |                   |                |                |              |          |  |  |  |
|------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|----------|--|--|--|
| NO.  | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |  |  |  |
| 1    | 2384.41        | 35.55             | 9.45           | 54.00             | 18.45          | 248            | 206          | Vertical |  |  |  |
| 2    | 2384.76        | 47.07             | 9.46           | 74.00             | 26.93          | 236            | 138          | Vertical |  |  |  |
| 3    | 2390.37        | 50.24             | 9.61           | 74.00             | 23.76          | 254            | 131          | Vertical |  |  |  |
| 4    | 2390.61        | 37.15             | 9.62           | 54.00             | 16.85          | 278            | 123          | Vertical |  |  |  |
| 5    | 2412.00        | 84.78             | 9.85           | 0.00              | -84.78         | 245            | 161          | Vertical |  |  |  |
| 6    | 2412.00        | 76.05             | 9.85           | 0.00              | -76.05         | 214            | 154          | Vertical |  |  |  |

**Final Data List** 



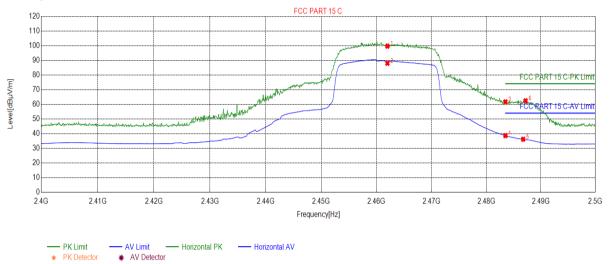


Report No.: ZR/2021/3001411

Page: 56 of 108

#### 802.11N20 Channel 11 4.10.1.11

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |  |
| 1     | 2462.00        | 99.67             | 8.25           | 0.00              | -99.67         | 265            | 36           | Horizontal |  |  |  |
| 2     | 2462.00        | 88.00             | 8.25           | 0.00              | -88.00         | 285            | 39           | Horizontal |  |  |  |
| 3     | 2483.50        | 61.65             | 8.48           | 74.00             | 12.35          | 296            | 152          | Horizontal |  |  |  |
| 4     | 2483.50        | 38.61             | 8.48           | 54.00             | 15.39          | 287            | 256          | Horizontal |  |  |  |
| 5     | 2486.74        | 36.18             | 8.49           | 54.00             | 17.82          | 235            | 65           | Horizontal |  |  |  |
| 6     | 2487.19        | 62.39             | 8.49           | 74.00             | 11.61          | 245            | 147          | Horizontal |  |  |  |

**Final Data List** 



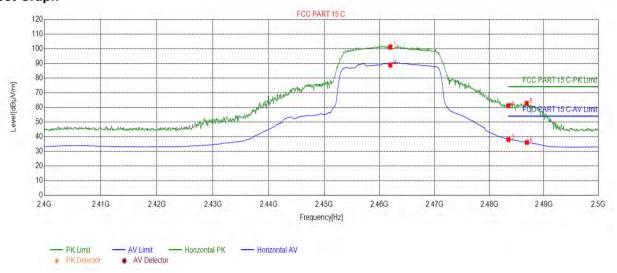


Report No.: ZR/2021/3001411

57 of 108 Page:

#### 802.11N20 Channel 11 4.10.1.12

### **Test Graph**



**Suspected List** 

| Suspe | Suspected List |                   |                |                   |                |                |              |            |  |  |
|-------|----------------|-------------------|----------------|-------------------|----------------|----------------|--------------|------------|--|--|
| NO.   | Freq.<br>[MHz] | Level<br>[dBµV/m] | Factor<br>[dB] | Limit<br>[dBµV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |  |  |
| 1     | 2462.00        | 101.15            | 8.25           | 0.00              | -101.15        | 265            | 59           | Horizontal |  |  |
| 2     | 2462.00        | 88.81             | 8.25           | 0.00              | -88.81         | 289            | 265          | Horizontal |  |  |
| 3     | 2483.50        | 38.01             | 8.48           | 54.00             | 15.99          | 298            | 123          | Horizontal |  |  |
| 4     | 2483.50        | 61.11             | 8.48           | 74.00             | 12.89          | 247            | 254          | Horizontal |  |  |
| 5     | 2486.84        | 62.68             | 8.49           | 74.00             | 11.32          | 256            | 147          | Horizontal |  |  |
| 6     | 2486.89        | 36.07             | 8.49           | 54.00             | 17.93          | 298            | 189          | Horizontal |  |  |

### **Final Data List**

### Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor All Modes have been tested, but only the worst case data displayed in this report.





Report No.: ZR/2021/3001411

Page: 58 of 108

# Measurement Uncertainty (95% confidence levels, k=2)

### Lab A:

| No. | Item                          | Measurement Uncertainty  |  |  |
|-----|-------------------------------|--------------------------|--|--|
| 1   | Total RF power, conducted     | ±0.41dB                  |  |  |
| 2   | RF power density, conducted   | ±1.96dB                  |  |  |
| 3   | Spurious emissions, conducted | ±0.41dB                  |  |  |
| 4   | Radio Frequency               | ±7.10 x 10 <sup>-8</sup> |  |  |
| 5   | Duty Cycle                    | ±0.49%                   |  |  |
| 6   | Occupied Bandwidth            | ±0.2%                    |  |  |

### Lab B:

| No. | Item                | Measurement Uncertainty   |
|-----|---------------------|---------------------------|
| 1   | Conduction Emission | ± 3.0dB (150kHz to 30MHz) |
|     |                     | ± 4.8dB (Below 1GHz)      |
| 2   | Radiated Emission   | ± 4.8dB (1GHz to 6GHz)    |
|     |                     | ± 4.5dB (6GHz to 18GHz)   |
|     |                     | ± 5.02dB (Above 18GHz)    |





Report No.: ZR/2021/3001411

Page: 59 of 108

**Equipment List** 

|                       |                                    | RF conducted |               |                        |                            |
|-----------------------|------------------------------------|--------------|---------------|------------------------|----------------------------|
| Test Equipment        | Manufacturer                       | Model No.    | Inventory No. | Cal. Date (yyyy-mm-dd) | Cal. Due date (yyyy-mm-dd) |
| Signal Analyzor       | Rohde & Schwarz                    | FSV          | W025-05       | 2020/4/16              | 2021/4/15                  |
| Signal Analyzer       | Rollue & Schwarz                   | F3V          | VV025-05      | 2021/4/14              | 2022/4/13                  |
| DC Power Supply       | Rohde & Schwarz                    | HMP2020      | W009-08       | 2020/7/15              | 2021/7/15                  |
| Power Meter           | Rohde & Schwarz                    | NRVS         | SEM014-02     | 2020/7/14              | 2021/7/13                  |
| Humidity/ Temperature | Shanghai                           |              |               | 2020/4/21              | 2021/4/20                  |
| Indicator             | Meteorological<br>Industry Factory | HTC-1        | W006-17       | 2021/4/14              | 2022/4/13                  |

| CE Test System                 |               |             |               |            |                 |  |  |
|--------------------------------|---------------|-------------|---------------|------------|-----------------|--|--|
| Equipment                      | Manufacturer  | Model No.   | Inventory No. | Cal Date   | Cal Due<br>Date |  |  |
| Shielding Room                 | Brilliant-emc | N/A         | XAW03-35-01   | 2019-09-11 | 2022-09-10      |  |  |
| Test receiver                  | ROHDE&SCHWARZ | ESR         | XAW01-08-01   | 2020-09-11 | 2021-09-10      |  |  |
| Artificial network             | ROHDE&SCHWARZ | ENV216      | XAW01-04-01   | 2020-08-04 | 2021-08-03      |  |  |
| Temperature and humidity meter | MingGao       | TH101B      | XAW01-01-01   | 2020-11-06 | 2021-11-05      |  |  |
| Measurement<br>Software        | Tonscend      | TS+ CE V2.5 | XAW02-05-02   | NCR        | NCR             |  |  |





Report No.: ZR/2021/3001411

Page: 60 of 108

| RSE Test System                     |                    |                     |               |            |              |  |  |  |
|-------------------------------------|--------------------|---------------------|---------------|------------|--------------|--|--|--|
| Equipment                           | Manufacturer       | Model No.           | Inventory No. | Cal Date   | Cal Due Date |  |  |  |
| Semi-Anechoic<br>Chamber            | Brilliant-emc      | N/A                 | XAW03-35-01   | 2019-09-11 | 2022-09-10   |  |  |  |
| MXA signal analyzer                 | Keysight           | N9020A              | XAW01-06-01   | 2021-04-01 | 2022-03-31   |  |  |  |
| WINA Signal analyzer                |                    |                     |               | 2020-04-02 | 2021-04-01   |  |  |  |
| Test receiver                       | ROHDE&SCHWARZ      | ESR                 | XAW01-08-01   | 2020-09-11 | 2021-09-10   |  |  |  |
| Receiving antenna<br>(30MHz-3GHz)   | Schwarzbeck        | VULB 9163           | XAW01-09-01   | 2019-10-13 | 2021-10-12   |  |  |  |
| Receiving antenna<br>(1GHz~18GHz)   | Schwarzbeck        | BBHA 9120D          | XAW01-09-02   | 2019-10-13 | 2021-10-12   |  |  |  |
| Receiving antenna<br>(15GHz~40GHz)  | Schwarzbeck        | BBHA 9170           | XAW01-09-03   | 2019-10-13 | 2021-10-12   |  |  |  |
| Directional antenna rack controller | Max-Full           | MF-7802BS           | XAW03-03-01   | NCR        | NCR          |  |  |  |
| High-speed antenna rack controller  | Max-Full           | MF-7802             | XAW03-04-01   | NCR        | NCR          |  |  |  |
| Filter bank                         | Tonscend           | JS0806-F            | XAW03-05-01   | NCR        | NCR          |  |  |  |
| Filter bank                         | Tonscend           | JS0806s             | XAW03-05-02   | NCR        | NCR          |  |  |  |
| Amplifier                           | Amplifier Tonscend |                     | XAW01-41-01   | 2020-10-26 | 2021-10-25   |  |  |  |
| Amplifier                           | olifier Tonscend   |                     | XAW01-41-02   | 2020-10-26 | 2021-10-25   |  |  |  |
| Amplifier                           | Tonscend           | TAP18040048         | XAW01-41-03   | 2020-10-27 | 2021-10-26   |  |  |  |
| Amplifier                           | Shanghai Steed     | YX28980930          | XAW01-41-06   | 2020-10-26 | 2021-10-25   |  |  |  |
| Temperature and humidity meter      | MingGao            | TH101B              | XAW01-01-01   | 2020-11-06 | 2021-11-05   |  |  |  |
| Measurement Software Tonscend       |                    | TS+ RSE<br>V3.0.0.2 | XAW02-05-01   | NCR        | NCR          |  |  |  |



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Report No.: ZR/2021/3001411

Page: 61 of 108

#### 7 **Photographs - EUT Constructional Details**

Refer to Appendix A Setup Photos.





Report No.: ZR/2021/3001411

62 of 108 Page:

# **Appendix**



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Report No.: ZR/2021/3001411

Page: 63 of 108

### **DTS Bandwidth Test Result**

| TestMode  | Antenna | Channel | DTS BW [MHz] | FL[MHz]  | FH[MHz]  | Limit[MHz] | Verdict |
|-----------|---------|---------|--------------|----------|----------|------------|---------|
| 11B       | Ant1    | 2412    | 8.160        | 2407.920 | 2416.080 | 0.5        | PASS    |
|           |         | 2437    | 8.130        | 2432.950 | 2441.080 | 0.5        | PASS    |
|           |         | 2462    | 8.130        | 2457.920 | 2466.050 | 0.5        | PASS    |
| 11G       | Ant1    | 2412    | 15.180       | 2404.410 | 2419.590 | 0.5        | PASS    |
|           |         | 2437    | 15.180       | 2429.410 | 2444.590 | 0.5        | PASS    |
|           |         | 2462    | 15.510       | 2454.080 | 2469.590 | 0.5        | PASS    |
| 11N20SISO | Ant1    | 2412    | 15.180       | 2404.410 | 2419.590 | 0.5        | PASS    |
|           |         | 2437    | 15.180       | 2429.410 | 2444.590 | 0.5        | PASS    |
|           |         | 2462    | 15.750       | 2453.840 | 2469.590 | 0.5        | PASS    |

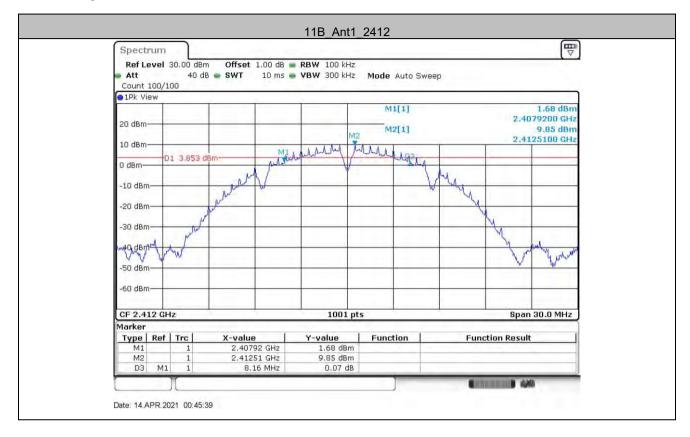




Report No.: ZR/2021/3001411

64 of 108 Page:

### **Test Graphs**

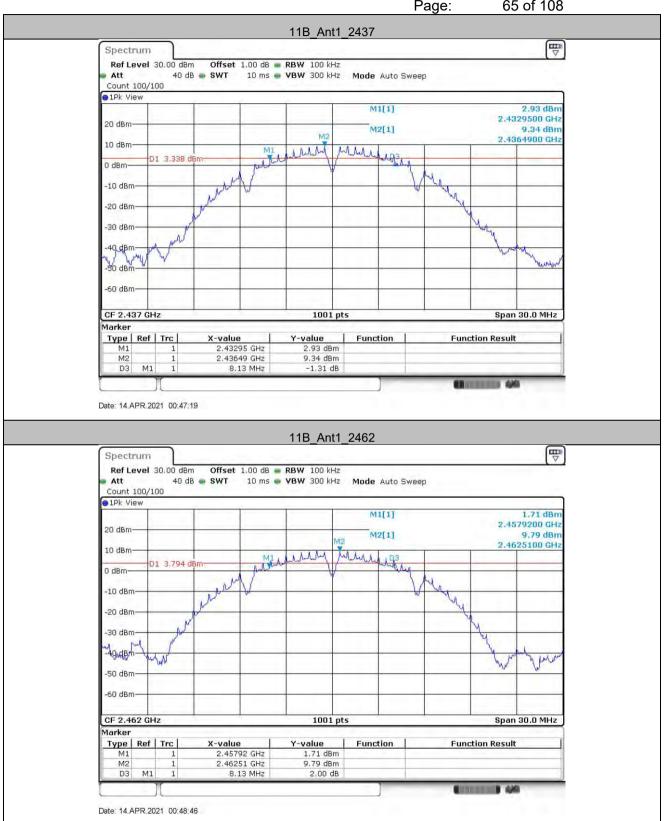






Report No.: ZR/2021/3001411

65 of 108 Page:





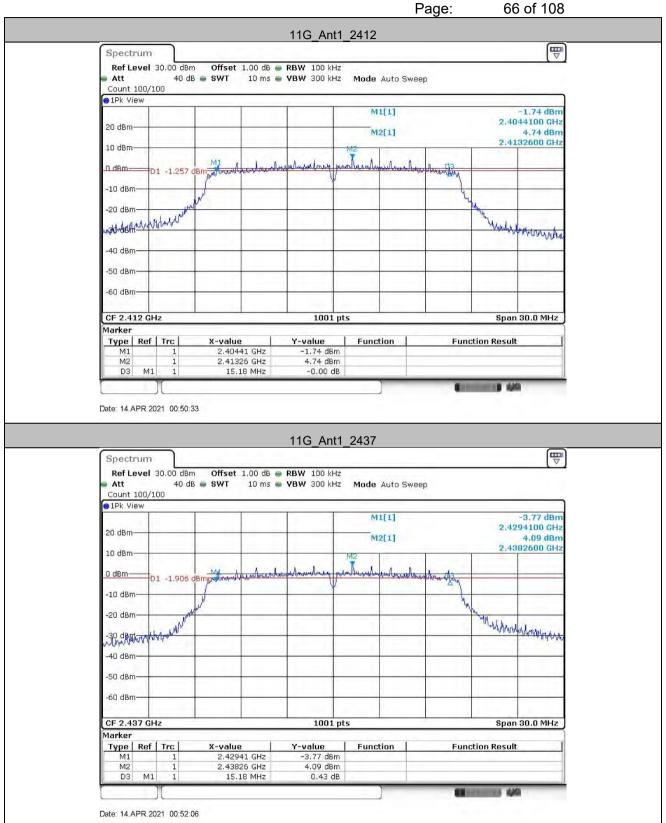
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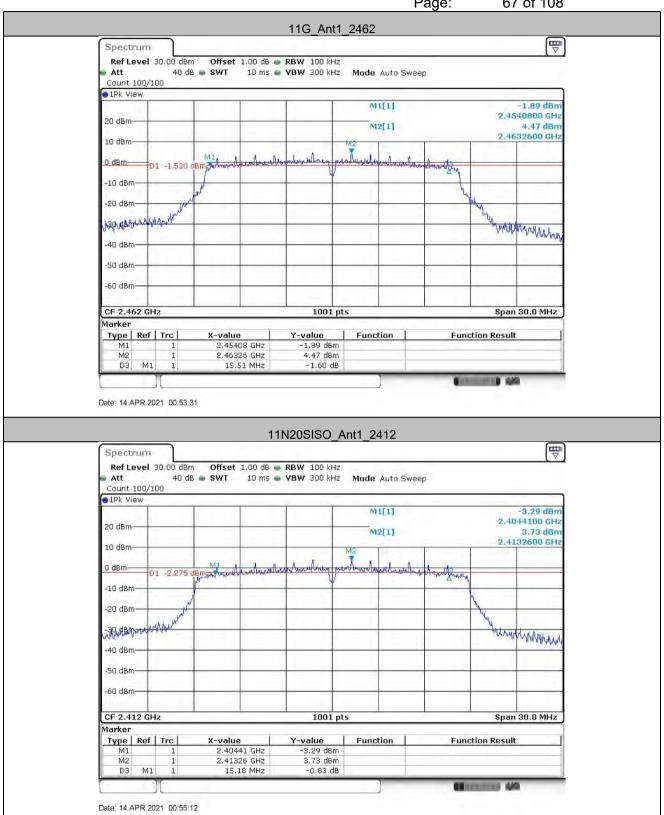
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67 of 108 Page:





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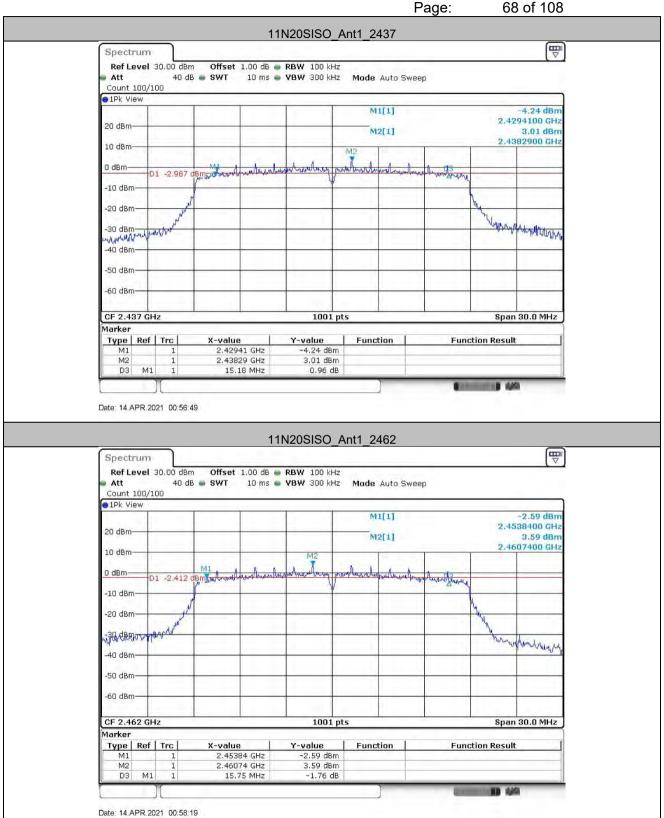
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68 of 108





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Page: 69 of 108

### **Occupied Channel Bandwidth Test Result**

| TestMode  | Antenna | Channel | OCB [MHz] | FL[MHz]  | FH[MHz]  | Limit[MHz] | Verdict |
|-----------|---------|---------|-----------|----------|----------|------------|---------|
| 11B       | Ant1    | 2412    | 13.037    | 2405.467 | 2418.503 |            | PASS    |
|           |         | 2437    | 12.827    | 2430.706 | 2443.533 |            | PASS    |
|           |         | 2462    | 13.157    | 2455.377 | 2468.533 |            | PASS    |
| 11G       | Ant1    | 2412    | 16.843    | 2403.578 | 2420.422 |            | PASS    |
|           |         | 2437    | 16.903    | 2428.578 | 2445.482 |            | PASS    |
|           |         | 2462    | 16.843    | 2453.518 | 2470.362 |            | PASS    |
| 11N20SISO | Ant1    | 2412    | 17.802    | 2403.099 | 2420.901 |            | PASS    |
|           |         | 2437    | 17.862    | 2428.099 | 2445.961 |            | PASS    |
|           |         | 2462    | 17.862    | 2453.039 | 2470.901 |            | PASS    |

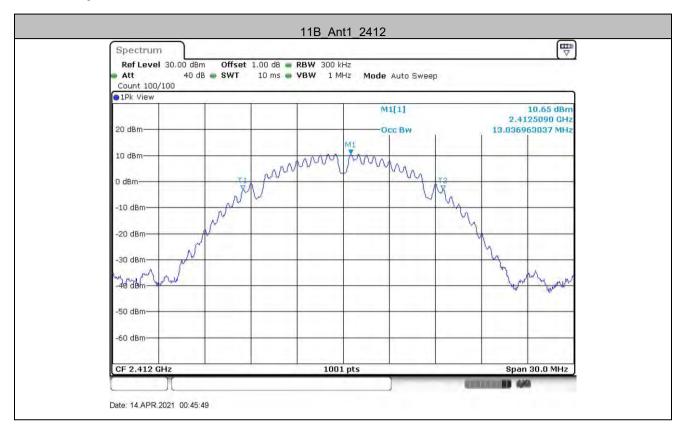




Report No.: ZR/2021/3001411

70 of 108 Page:

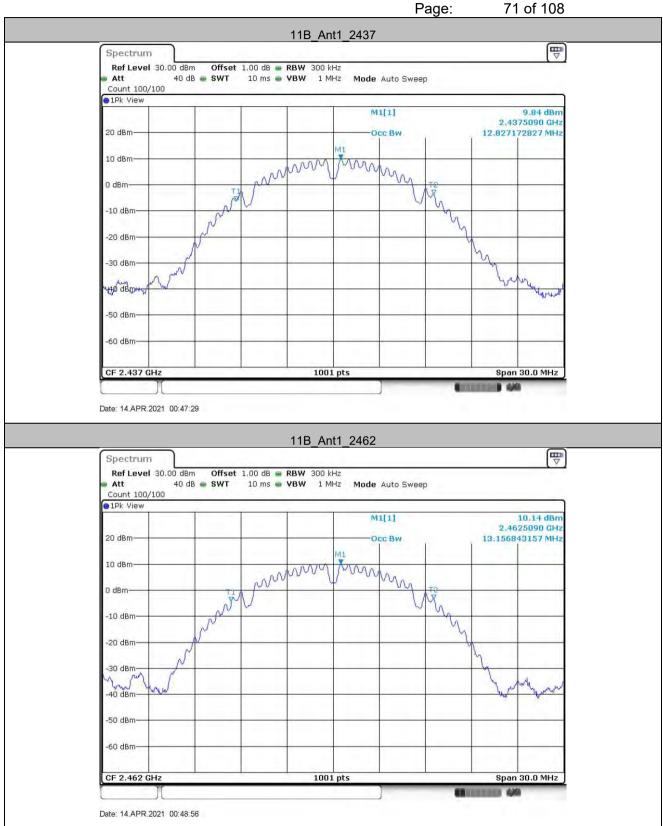
### **Test Graphs**







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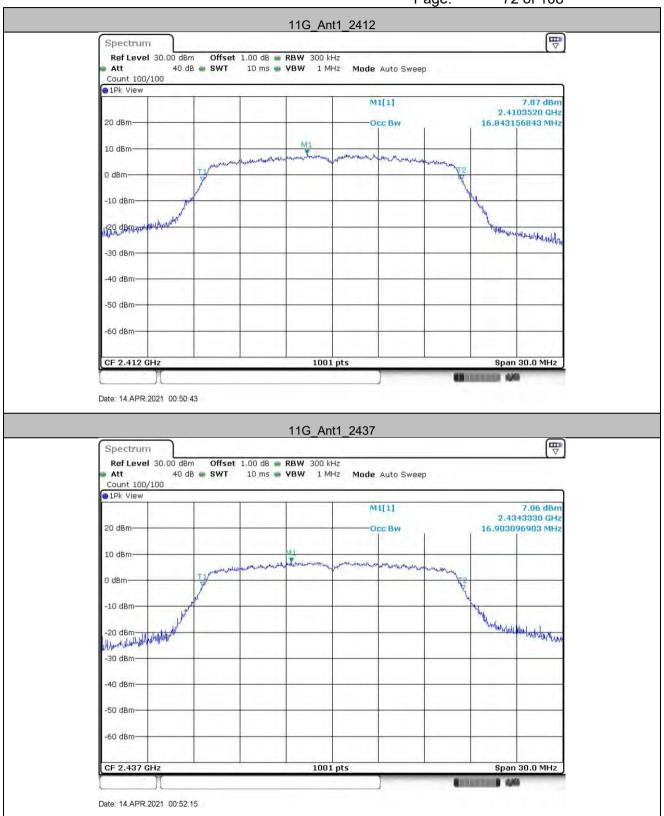
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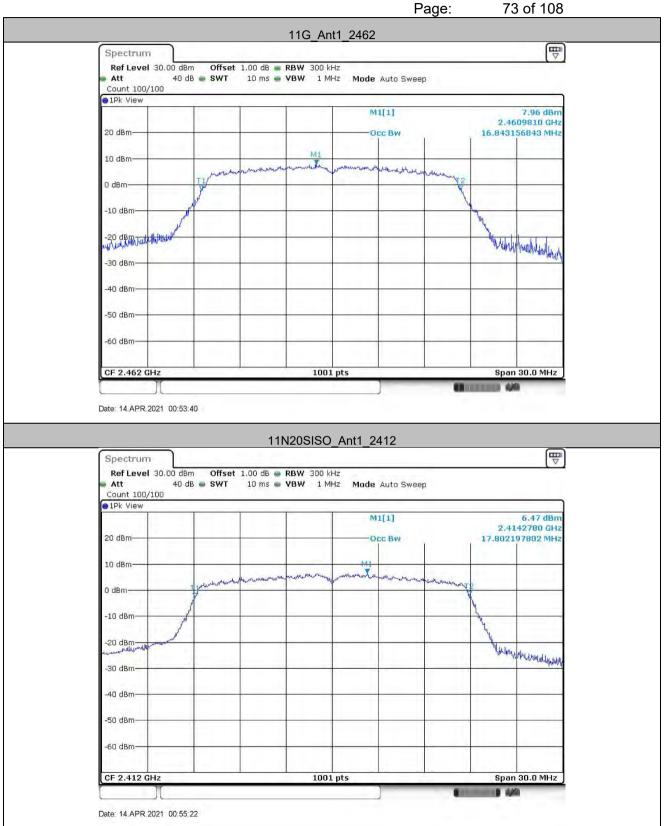
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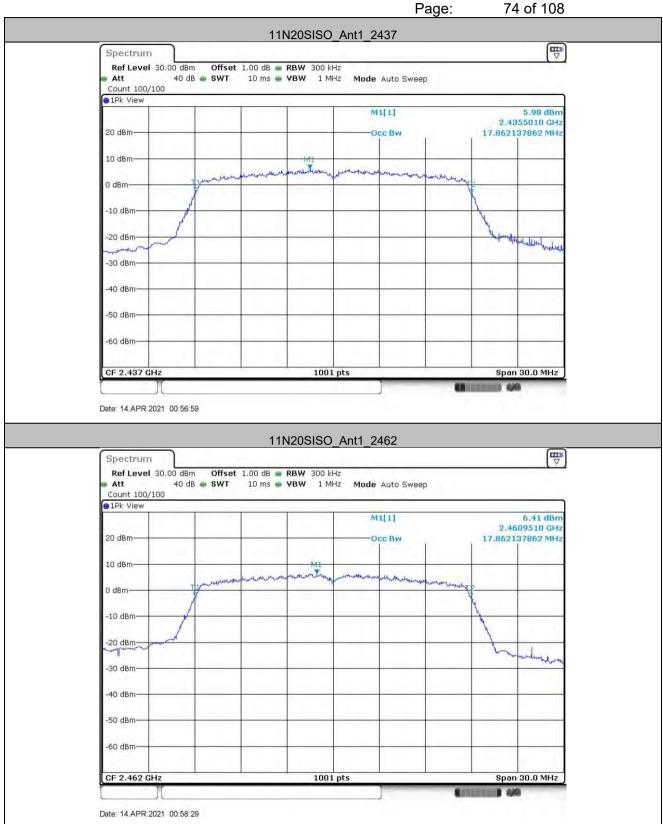
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Report No.: ZR/2021/3001411

Page: 75 of 108

#### **Maximum conducted output power Test Result**

| TestMode  | Antenna | Channel | Result[dBm] | Limit[dBm] | Verdict |
|-----------|---------|---------|-------------|------------|---------|
| 11B       | Ant1    | 2412    | 20.69       | <=30       | PASS    |
|           |         | 2437    | 20.07       | <=30       | PASS    |
|           |         | 2462    | 20.49       | <=30       | PASS    |
| 11G       | Ant1    | 2412    | 23.10       | <=30       | PASS    |
|           |         | 2437    | 22.67       | <=30       | PASS    |
|           |         | 2462    | 23.01       | <=30       | PASS    |
| 11N20SISO | Ant1    | 2412    | 21.90       | <=30       | PASS    |
|           |         | 2437    | 21.41       | <=30       | PASS    |
|           |         | 2462    | 21.87       | <=30       | PASS    |

**Measurement Data of Average Power:** 

| Mode      | Test Channel | Average Output Power<br>(dBm)<br>[Duty Cycle Considered]<br>ANT1 | Result              |  |
|-----------|--------------|------------------------------------------------------------------|---------------------|--|
|           | 2412         | 18.77                                                            | Report purpose only |  |
| 802.11B   | 2437         | 18.59                                                            | Report purpose only |  |
|           | 2462         | 18.78                                                            | Report purpose only |  |
|           | 2412         | 15.80                                                            | Report purpose only |  |
| 802.11G   | 2437         | 15.56                                                            | Report purpose only |  |
|           | 2462         | 15.73                                                            | Report purpose only |  |
|           | 2412         | 14.68                                                            | Report purpose only |  |
| 802.11N20 | 2437         | 14.54                                                            | Report purpose only |  |
|           | 2462         | 14.64                                                            | Report purpose only |  |



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Page: 76 of 108

#### **Maximum power spectral density Test Result**

| TestMode  | Antenna | Channel | Result[dBm/3-100kHz] | Limit[dBm/3kHz] | Verdict |
|-----------|---------|---------|----------------------|-----------------|---------|
|           |         | 2412    | -3.49                | <=8             | PASS    |
| 11B       | Ant1    | 2437    | -3.81                | <=8             | PASS    |
|           |         | 2462    | -3.66                | <=8             | PASS    |
|           |         | 2412    | -7.86                | <=8             | PASS    |
| 11G       | Ant1    | 2437    | -8.06                | <=8             | PASS    |
|           |         | 2462    | -8.46                | <=8             | PASS    |
|           |         | 2412    | -9.18                | <=8             | PASS    |
| 11N20SISO | Ant1    | 2437    | -10.13               | <=8             | PASS    |
|           |         | 2462    | -9.37                | <=8             | PASS    |



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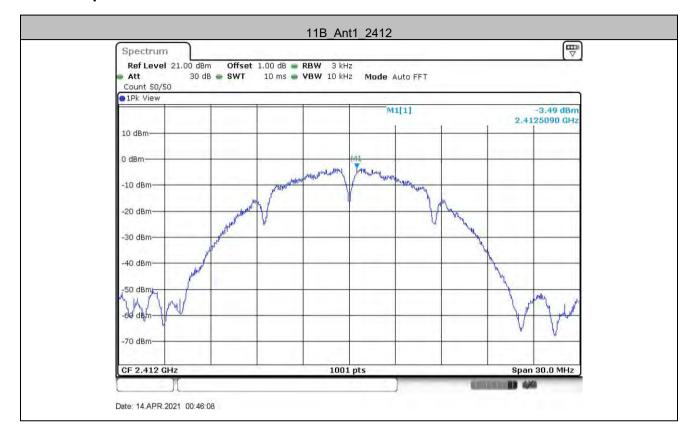
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77 of 108 Page:

#### **Test Graphs**





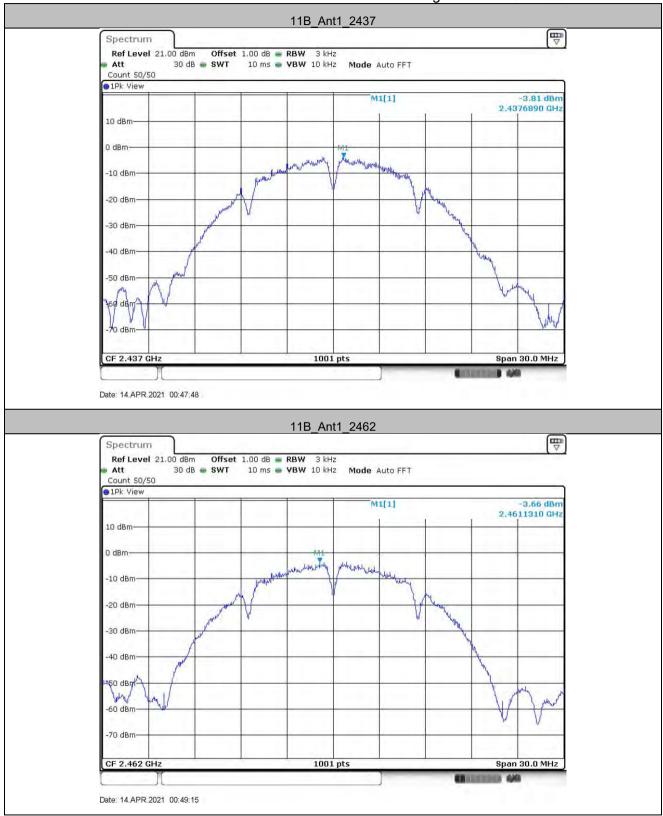
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80 of 108 Page:





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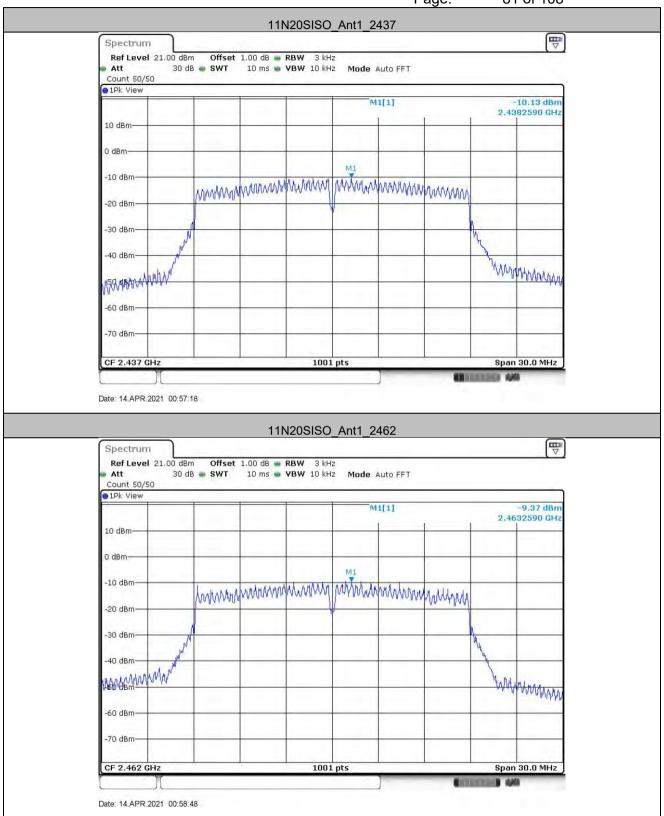
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Report No.: ZR/2021/3001411

Page: 82 of 108

#### **Band edge measurements Test Result**

| TestMode  | Antenna | ChName | Channel | RefLevel[dBm] | Result[dBm] | Limit[dBm] | Verdict |
|-----------|---------|--------|---------|---------------|-------------|------------|---------|
| 11B       |         | Low    | 2412    | 10.06         | -37.5       | <=-9.94    | PASS    |
|           | Ant1    | High   | 2462    | 10.09         | -49.63      | <=-9.91    | PASS    |
|           |         | Low    | 2412    | 4.67          | -26.26      | <=-15.33   | PASS    |
| 11G       | Ant1    | High   | 2462    | 4.51          | -45.2       | <=-15.49   | PASS    |
|           |         | Low    | 2412    | 3.77          | -29.6       | <=-16.23   | PASS    |
| 11N20SISO | Ant1    | High   | 2462    | 3.59          | -46.31      | <=-16.41   | PASS    |

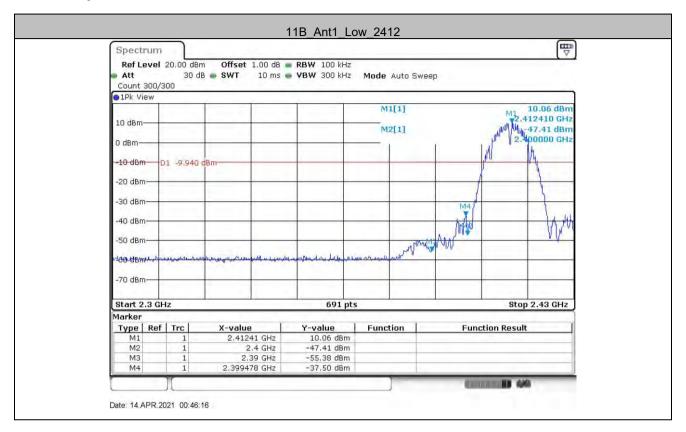




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83 of 108 Page:

#### **Test Graphs**



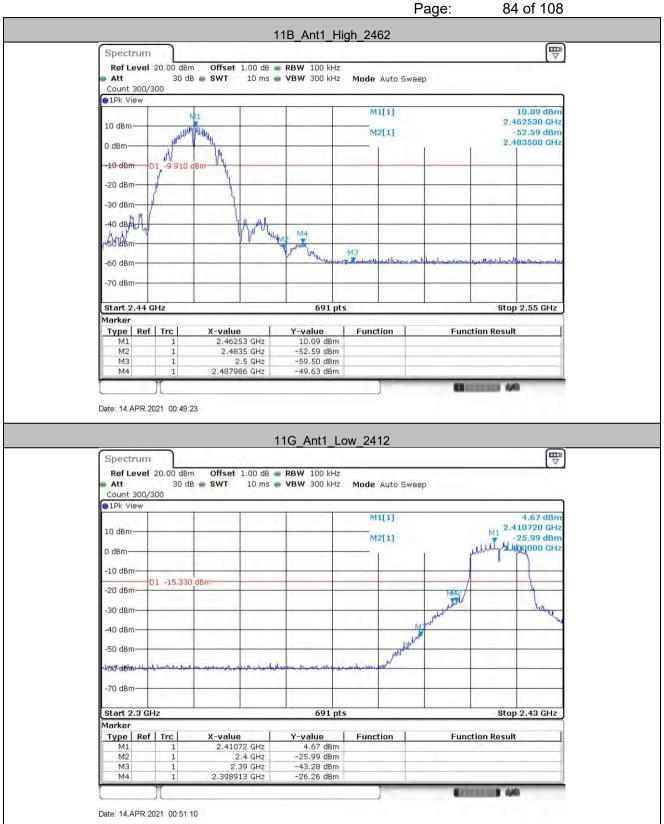


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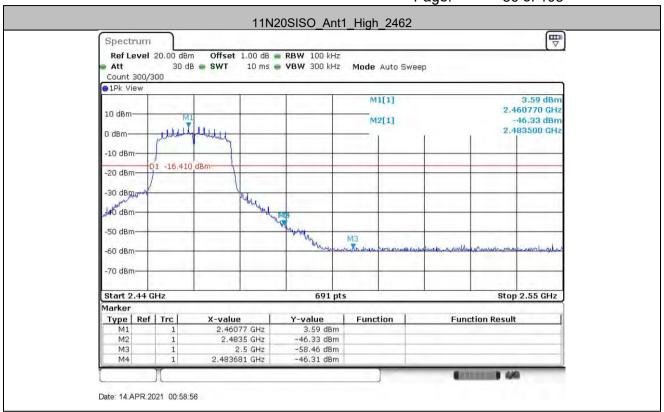
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86 of 108 Page:





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Page: 87 of 108

#### **Conducted Spurious Emission Test Result**

|           | Antenna | Channel | FreqRange  | RefLevel | Result    | Limit    | Verdict |  |      |
|-----------|---------|---------|------------|----------|-----------|----------|---------|--|------|
| TestMode  |         |         | [Mhz]      | [dBm]    | [dBm]     | [dBm]    |         |  |      |
|           |         | 2412    | Reference  | 9.95     | 9.95      |          | PASS    |  |      |
|           |         |         | 30~1000    | 9.95     | -46.15    | <=-10.05 | PASS    |  |      |
|           |         |         | 1000~26500 | 9.95     | -31.06    | <=-10.05 | PASS    |  |      |
|           |         |         | Reference  | 9.13     | 9.13      |          | PASS    |  |      |
| 11B       | Ant1    | 2437    | 30~1000    | 9.13     | -46.48    | <=-10.87 | PASS    |  |      |
|           |         |         | 1000~26500 | 9.13     | -31.16    | <=-10.87 | PASS    |  |      |
|           |         |         | Reference  | 9.68     | 9.68      |          | PASS    |  |      |
|           |         | 2462    | 30~1000    | 9.68     | -44.92    | <=-10.32 | PASS    |  |      |
|           |         |         | 1000~26500 | 9.68     | -30.57    | <=-10.32 | PASS    |  |      |
|           | Ant1    | 2412    | Reference  | 4.70     | 4.70      |          | PASS    |  |      |
|           |         |         | 30~1000    | 4.70     | -46.05    | <=-15.3  | PASS    |  |      |
|           |         |         | 1000~26500 | 4.70     | -30.71    | <=-15.3  | PASS    |  |      |
|           |         | 2437    | Reference  | 4.21     | 4.21      |          | PASS    |  |      |
| 11G       |         |         | 30~1000    | 4.21     | -45.93    | <=-15.79 | PASS    |  |      |
|           |         |         | 1000~26500 | 4.21     | -31       | <=-15.79 | PASS    |  |      |
|           |         |         | Reference  | 4.64     | 4.64      |          | PASS    |  |      |
|           |         |         | 30~1000    | 4.64     | -46.14    | <=-15.36 | PASS    |  |      |
|           |         |         | 1000~26500 | 4.64     | -31.07    | <=-15.36 | PASS    |  |      |
|           |         |         |            |          | Reference | 3.54     | 3.54    |  | PASS |
|           |         | 2412    | 30~1000    | 3.54     | -44.84    | <=-16.46 | PASS    |  |      |
|           |         |         | 1000~26500 | 3.54     | -30.6     | <=-16.46 | PASS    |  |      |
| 11N20SISO | Ant1    | 2437    | Reference  | 3.23     | 3.23      |          | PASS    |  |      |
|           |         |         | 30~1000    | 3.23     | -45.75    | <=-16.77 | PASS    |  |      |
|           |         |         | 1000~26500 | 3.23     | -30.79    | <=-16.77 | PASS    |  |      |
|           |         | 2462    | Reference  | 3.68     | 3.68      |          | PASS    |  |      |
|           |         |         | 30~1000    | 3.68     | -44.23    | <=-16.32 | PASS    |  |      |
|           |         |         | 1000~26500 | 3.68     | -31.13    | <=-16.32 | PASS    |  |      |



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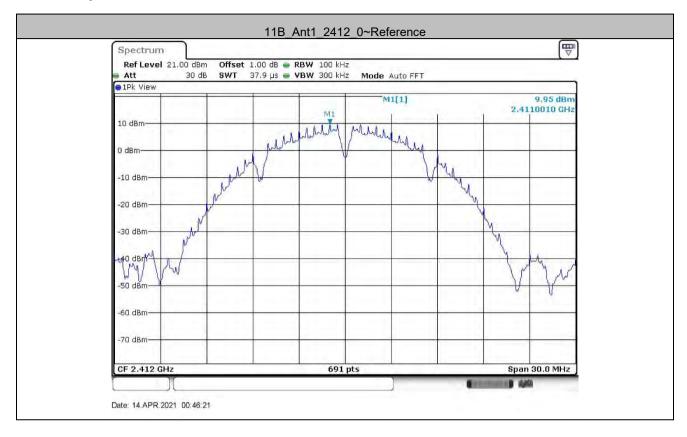
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88 of 108 Page:

#### **Test Graphs**





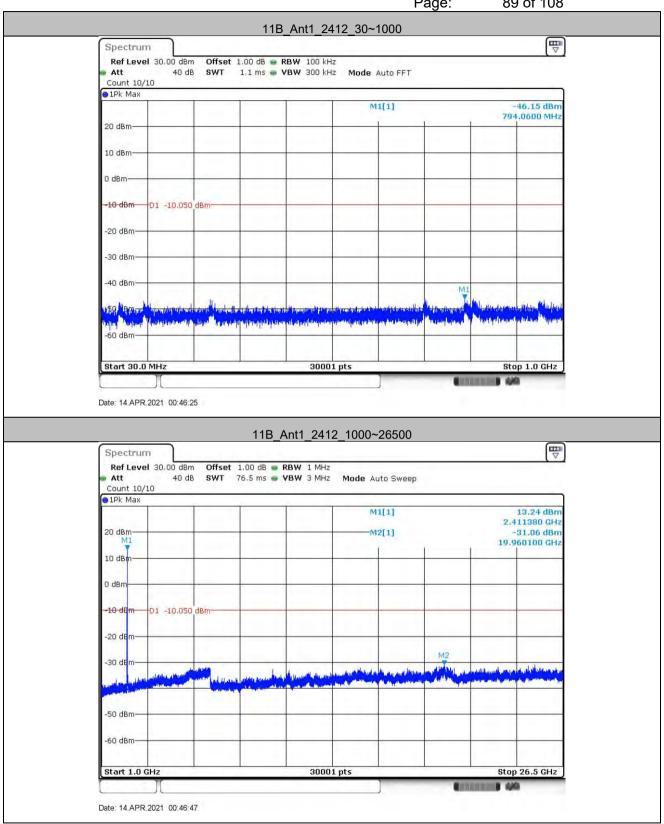
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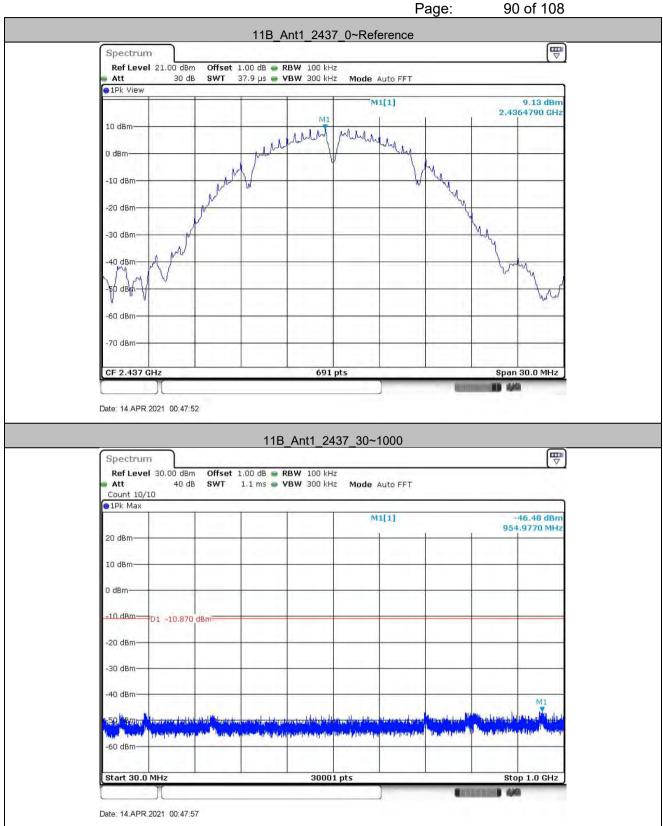
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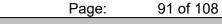
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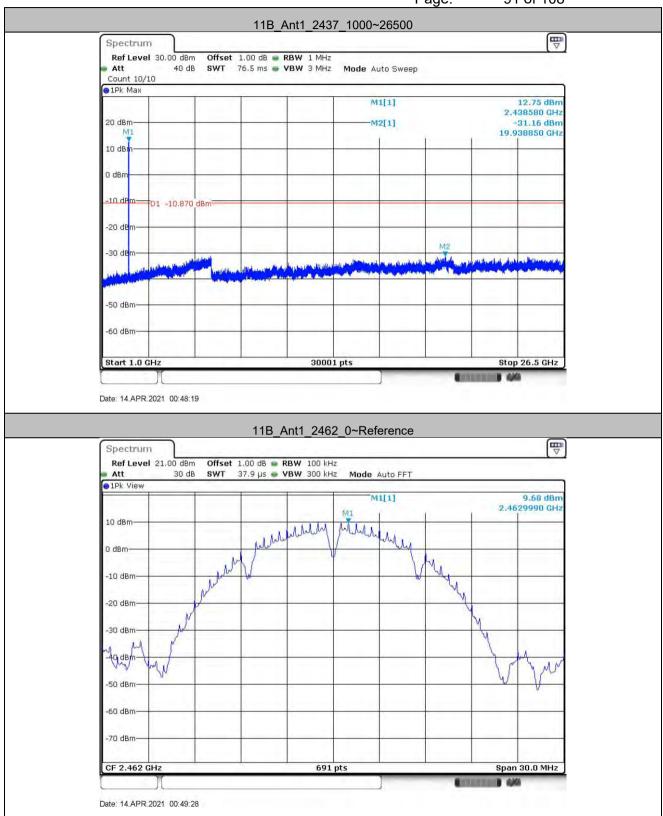
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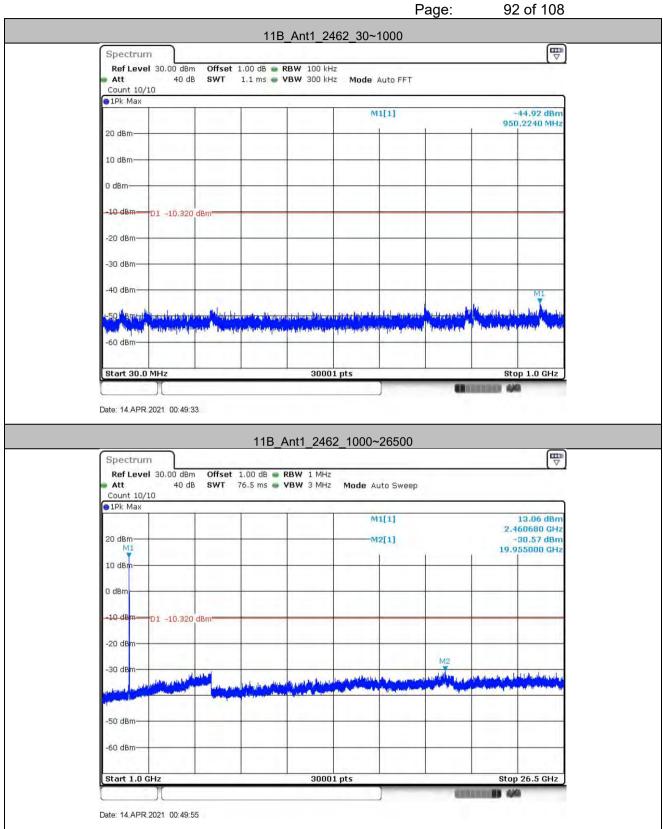
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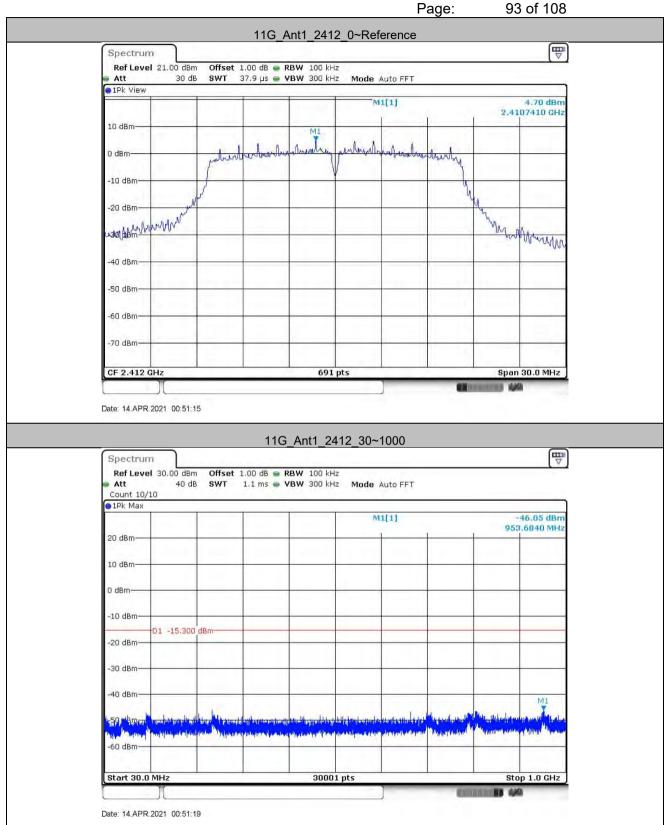
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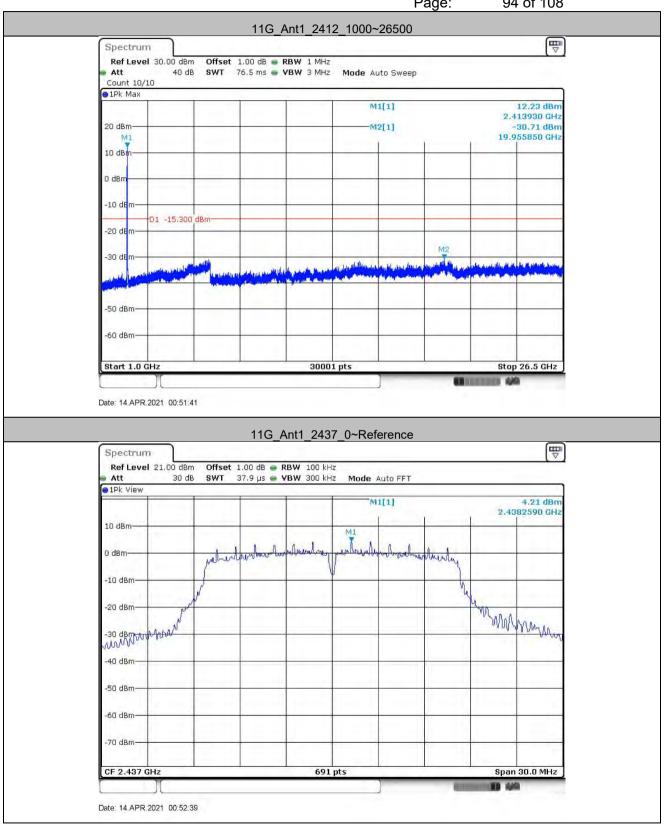
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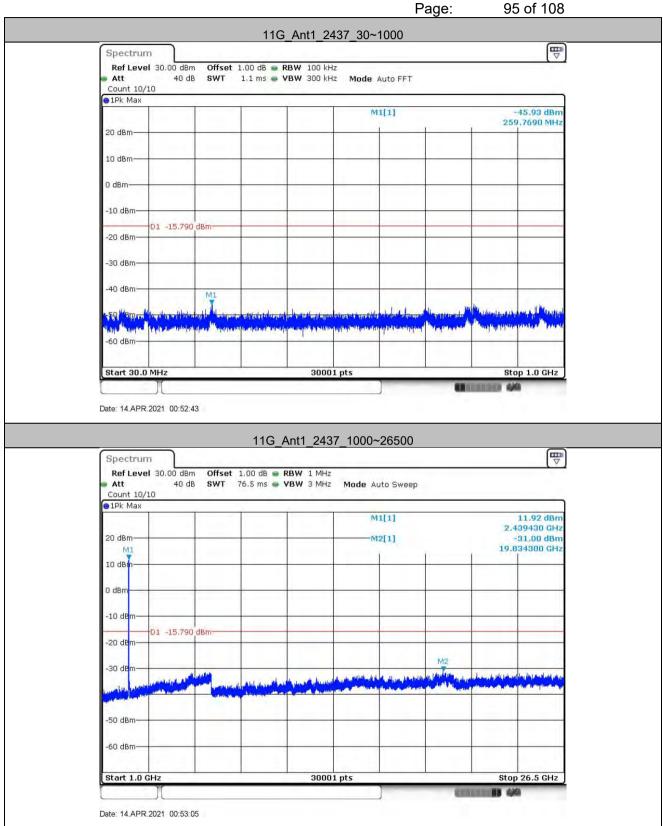
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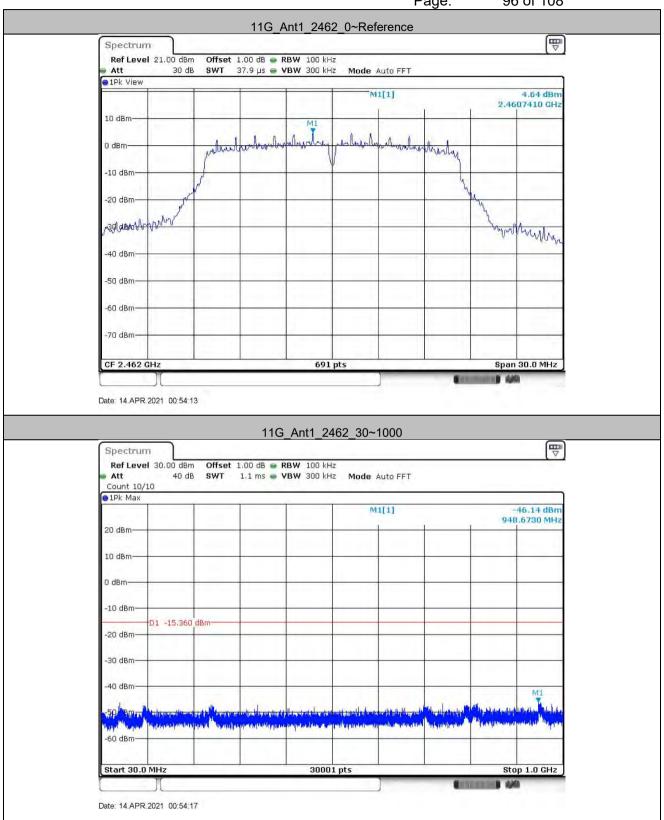
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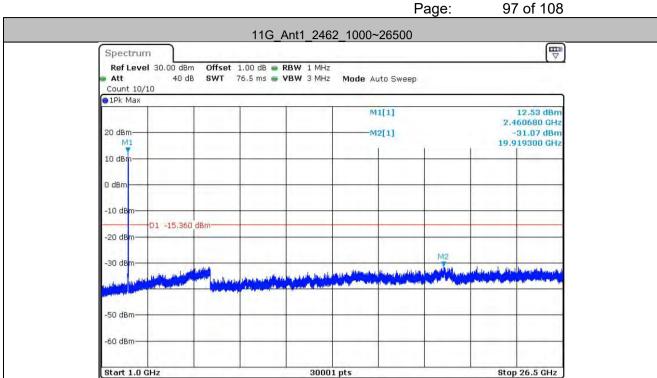
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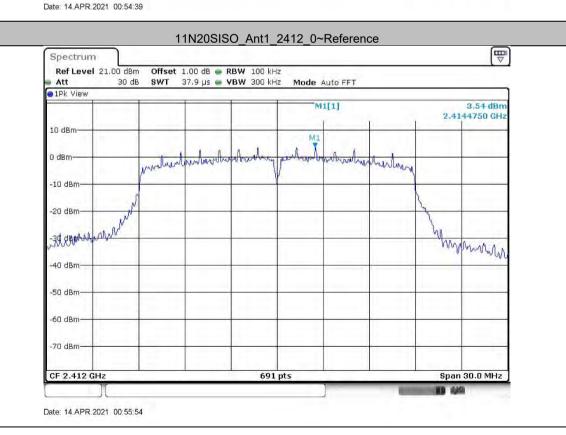
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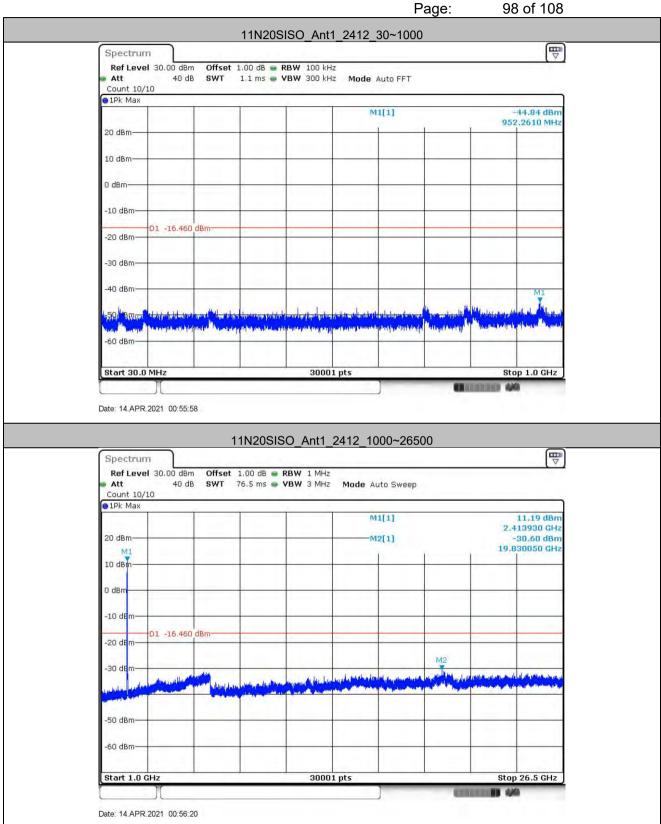
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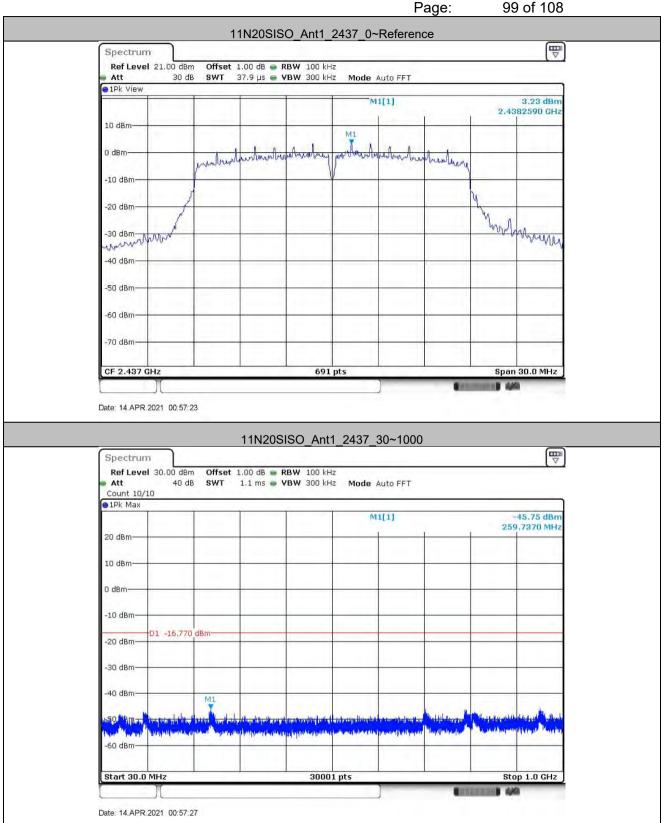
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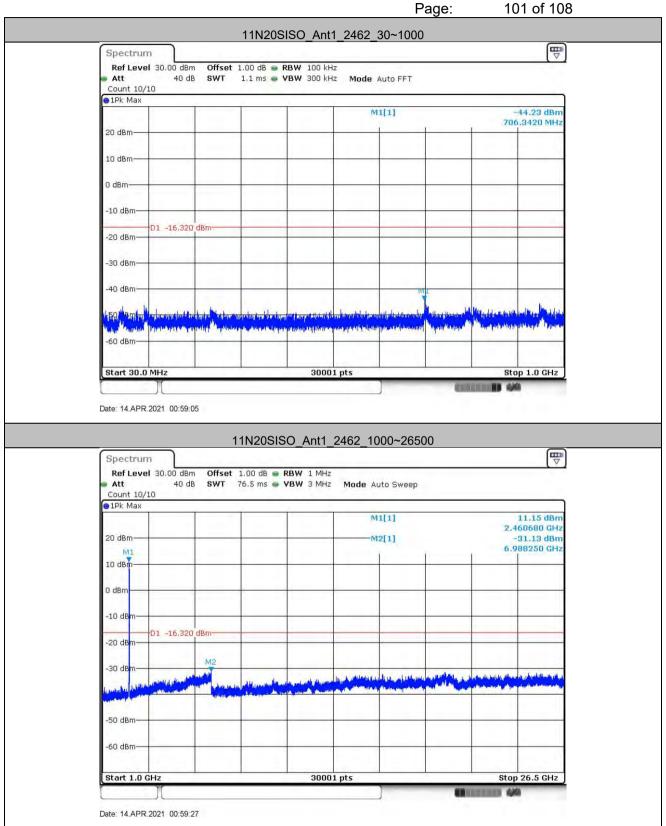
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Report No.: ZR/2021/3001411

Page: 102 of 108

#### **Duty Cycle Test Result**

| TestMode  | Antenna | Channel | Transmission  Duration [ms] | Transmission Period [ms] | Duty<br>Cycle [%] | Limit | Verdict |
|-----------|---------|---------|-----------------------------|--------------------------|-------------------|-------|---------|
|           | Ant1    | 2412    | 8.36                        | 8.39                     | 99.64             |       | PASS    |
| 11B       |         | 2437    | 8.35                        | 8.39                     | 99.52             |       | PASS    |
|           |         | 2462    | 8.36                        | 8.39                     | 99.64             |       | PASS    |
|           | Ant1    | 2412    | 1.38                        | 1.42                     | 97.18             |       | PASS    |
| 11G       |         | 2437    | 1.38                        | 1.42                     | 97.18             |       | PASS    |
|           |         | 2462    | 1.38                        | 1.42                     | 97.18             |       | PASS    |
| 11N20SISO | Ant1    | 2412    | 1.29                        | 1.33                     | 96.99             |       | PASS    |
|           |         | 2437    | 1.29                        | 1.33                     | 96.99             |       | PASS    |
|           |         | 2462    | 1.29                        | 1.33                     | 96.99             |       | PASS    |



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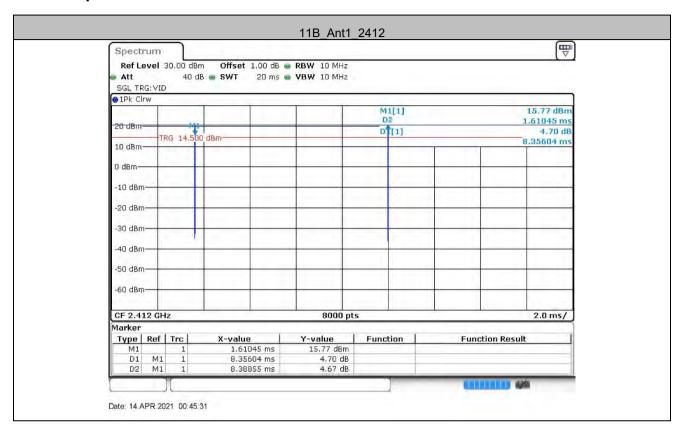
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103 of 108 Page:

#### **Test Graphs**





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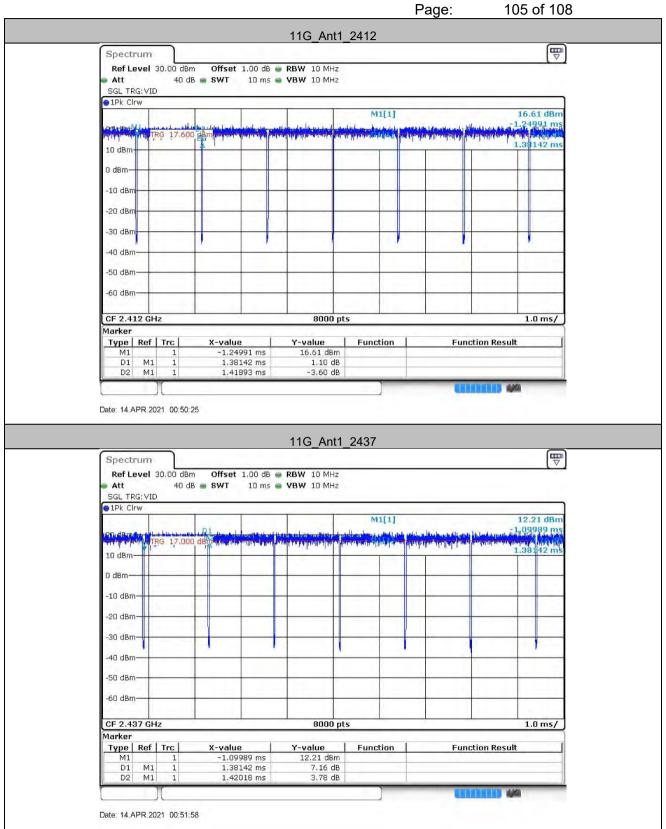
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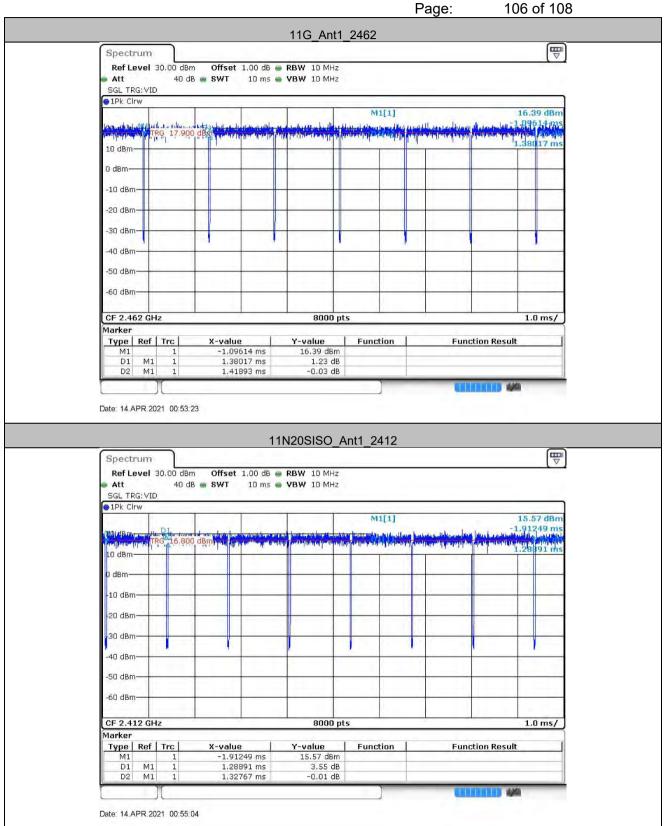
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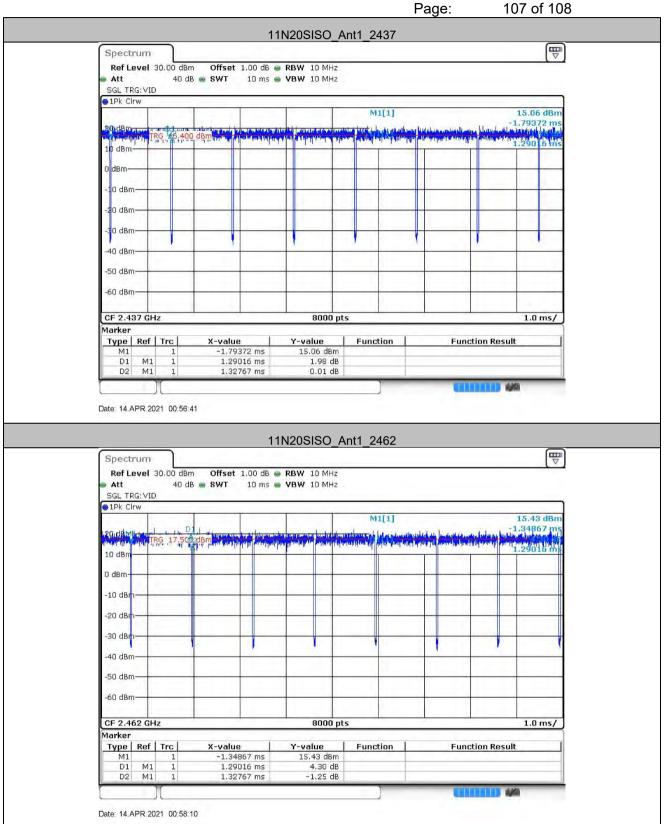
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Page: 108 of 108

The End



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