



# SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Report No.: ZEWM2304000552RG02  
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## TEST REPORT

**Application No.:** ZEWM2304000552RG  
**Applicant:** vivo Mobile Communication Co., Ltd.  
**Address of Applicant:** No.1, vivo Road, Chang'an, Dongguan, Guangdong, China  
**Manufacturer:** vivo Mobile Communication Co., Ltd.  
**Address of Manufacturer:** No.1, vivo Road, Chang'an, Dongguan, Guangdong, China  
**EUT Description:** Mobile Phone  
**Model No.:** V2249  
**Trade Mark:** vivo  
**FCC ID:** 2AUCY-V2249  
**Standards:** FCC 47 CFR Part 2, Subpart J  
FCC 47 CFR Part 15, Subpart C  
**Date of Receipt:** 2023/05/30  
**Date of Test:** 2023/05/31 to 2023/06/06  
**Date of Issue:** 2023/06/09

|                      |               |
|----------------------|---------------|
| <b>Test Result :</b> | <b>PASS *</b> |
|----------------------|---------------|

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

Authorized Signature:

Ervin Li  
Regulatory Manager



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## 1 Version

| Revision Record |         |            |          |          |
|-----------------|---------|------------|----------|----------|
| Version         | Chapter | Date       | Modifier | Remark   |
| 01              |         | 2023/06/09 |          | Original |

|             |                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------|
| Prepared By | <br>(Dee Zheng) / Test Engineer |
| Checked By  | <br>(Daniel Wang) / Reviewer   |



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## 2 Test Summary

| Test Item                                                         | FCC Rule No.                | Test Method                                 | Test Result | Result             | Test Lab <sup>[1]</sup> |
|-------------------------------------------------------------------|-----------------------------|---------------------------------------------|-------------|--------------------|-------------------------|
| Antenna Requirement                                               | 15.203/15.247(b)            | --                                          | Clause 4.1  | PASS               | --                      |
| AC Power Line Conducted Emission                                  | 15.207                      | ANSI C63.10-2020<br>Section 6.2             | Clause 4.3  | PASS               | B                       |
| Conducted Peak Output Power                                       | 15.247 (b)(1)               | ANSI C63.10-2020<br>Section 11.9.1.2        | Clause 4.4  | PASS               | A                       |
| 20dB Emission Bandwidth & 99% Occupied Bandwidth                  | 15.247 (a)(1)               | ANSI C63.10-2020<br>Section 6.9.2/6.9.3     | Clause 4.5  | For Report Purpose | A                       |
| Carrier Frequencies Separation                                    | 15.247 (a)(1)               | ANSI C63.10-2020<br>Section 7.8.2           | Clause 4.6  | PASS               | A                       |
| Hopping Channel Number                                            | 15.247 (a)(1)               | ANSI C63.10-2020<br>Section 7.8.3           | Clause 4.7  | PASS               | A                       |
| Dwell Time                                                        | 15.247 (a)(1)               | ANSI C63.10-2020<br>Section 7.8.4           | Clause 4.8  | PASS               | A                       |
| Band-edge for RF Conducted Emissions                              | 15.247(d)                   | ANSI C63.10-2020<br>Section 7.8.7.2         | Clause 4.9  | PASS               | A                       |
| RF Conducted Spurious Emissions                                   | 15.247(d)                   | ANSI C63.10-2020<br>Section 7.8.7.1         | Clause 4.10 | PASS               | A                       |
| Radiated Spurious emissions                                       | 15.247(d);<br>15.205/15.209 | ANSI C63.10-2020<br>Section 6.4 / 6.5 / 6.6 | Clause 4.11 | PASS               | B                       |
| Restricted bands around fundamental frequency (Radiated Emission) | 15.247(d);<br>15.205/15.209 | ANSI C63.10-2020<br>Section 6.10.5          | Clause 4.12 | PASS               | B                       |

### Remark:

1. Lab A SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch  
Lab B SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd.



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## 3 General Information

### 3.1 Details of Client

|                          |                                                       |
|--------------------------|-------------------------------------------------------|
| Applicant:               | vivo Mobile Communication Co., Ltd.                   |
| Address of Applicant:    | No.1, vivo Road, Chang'an, Dongguan, Guangdong, China |
| Manufacturer:            | vivo Mobile Communication Co., Ltd.                   |
| Address of Manufacturer: | No.1, vivo Road, Chang'an, Dongguan, Guangdong, China |

### 3.2 Test Location

|                |                                                                                                                          |
|----------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Lab A:</b>  |                                                                                                                          |
| Company:       | SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch                                                          |
| Address:       | No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China            |
| Post code:     | 518057                                                                                                                   |
| Test engineer: | Jerry Zeng                                                                                                               |
| <b>Lab B:</b>  |                                                                                                                          |
| Company:       | SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd.                                                                  |
| Address:       | 1/F, Unit D, Building 1, Kanghong Orange Science Park, No.137, Keyuan 3rd Road, Fengdong New Town, Xi' an, Shaanxi China |
| Post code:     | 710086                                                                                                                   |
| Test engineer: | Ken Liu                                                                                                                  |



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## 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 Branch 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.

#### • Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

#### • FCC –Designation Number: CN1336

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

Designation Number: CN1336.

Test Firm Registration Number: 787754

### 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.

#### • Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0095.

IC#: 25613.

#### • FCC –Designation Number: CN1337

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN1337.

Test Firm Registration Number: 917410



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## 3.4 General Description of EUT

|                       |                                                                                                                                                                   |                                                  |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| EUT Description:      | Mobile Phone                                                                                                                                                      |                                                  |
| Model No.:            | V2249                                                                                                                                                             |                                                  |
| Trade Mark:           | vivo                                                                                                                                                              |                                                  |
| Hardware Version:     | MP_0.1                                                                                                                                                            |                                                  |
| Software Version:     | PD2281CF_EX_A_13.0.3.19.W30                                                                                                                                       |                                                  |
| IMEI:                 | RF Conducted                                                                                                                                                      | IMEI1: 860407069993950<br>IMEI2: 860407069993943 |
|                       | RSE & AC power line                                                                                                                                               | 86040769998215                                   |
| Operation Frequency:  | 2400MHz~2483.5MHz<br>fc = 2402 MHz + N * 1 MHz, where:<br>-fc = "Operating Frequency" in MHz,<br>-N = "Channel Number" with the range from 0 to 78.               |                                                  |
| Bluetooth version:    | Bluetooth V5.0                                                                                                                                                    |                                                  |
| Modulation Technique: | Frequency Hopping Spread Spectrum(FHSS)                                                                                                                           |                                                  |
| Modulation Type:      | GFSK, $\pi/4$ DQPSK, 8DPSK                                                                                                                                        |                                                  |
| Number of Channel:    | 79                                                                                                                                                                |                                                  |
| Hopping Channel Type: | Adaptive Frequency Hopping systems                                                                                                                                |                                                  |
| Antenna Type:         | PIFA Antenna                                                                                                                                                      |                                                  |
| Antenna Gain:         | -2.7dBi (Ant22)                                                                                                                                                   |                                                  |
|                       | Note:<br>The antenna gain are derived from the gain information report provided by the manufacturer.                                                              |                                                  |
| RF Cable:             | 2000MHz ~ 3000MHz (1.1dB)                                                                                                                                         |                                                  |
| Remark:               | As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information. |                                                  |



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| Operation Frequency of each channel |           |         |           |         |           |         |           |
|-------------------------------------|-----------|---------|-----------|---------|-----------|---------|-----------|
| Channel                             | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 0                                   | 2402MHz   | 20      | 2422MHz   | 40      | 2442MHz   | 60      | 2462MHz   |
| 1                                   | 2403MHz   | 21      | 2423MHz   | 41      | 2443MHz   | 61      | 2463MHz   |
| 2                                   | 2404MHz   | 22      | 2424MHz   | 42      | 2444MHz   | 62      | 2464MHz   |
| 3                                   | 2405MHz   | 23      | 2425MHz   | 43      | 2445MHz   | 63      | 2465MHz   |
| 4                                   | 2406MHz   | 24      | 2426MHz   | 44      | 2446MHz   | 64      | 2466MHz   |
| 5                                   | 2407MHz   | 25      | 2427MHz   | 45      | 2447MHz   | 65      | 2467MHz   |
| 6                                   | 2408MHz   | 26      | 2428MHz   | 46      | 2448MHz   | 66      | 2468MHz   |
| 7                                   | 2409MHz   | 27      | 2429MHz   | 47      | 2449MHz   | 67      | 2469MHz   |
| 8                                   | 2410MHz   | 28      | 2430MHz   | 48      | 2450MHz   | 68      | 2470MHz   |
| 9                                   | 2411MHz   | 29      | 2431MHz   | 49      | 2451MHz   | 69      | 2471MHz   |
| 10                                  | 2412MHz   | 30      | 2432MHz   | 50      | 2452MHz   | 70      | 2472MHz   |
| 11                                  | 2413MHz   | 31      | 2433MHz   | 51      | 2453MHz   | 71      | 2473MHz   |
| 12                                  | 2414MHz   | 32      | 2434MHz   | 52      | 2454MHz   | 72      | 2474MHz   |
| 13                                  | 2415MHz   | 33      | 2435MHz   | 53      | 2455MHz   | 73      | 2475MHz   |
| 14                                  | 2416MHz   | 34      | 2436MHz   | 54      | 2456MHz   | 74      | 2476MHz   |
| 15                                  | 2417MHz   | 35      | 2437MHz   | 55      | 2457MHz   | 75      | 2477MHz   |
| 16                                  | 2418MHz   | 36      | 2438MHz   | 56      | 2458MHz   | 76      | 2478MHz   |
| 17                                  | 2419MHz   | 37      | 2439MHz   | 57      | 2459MHz   | 77      | 2479MHz   |
| 18                                  | 2420MHz   | 38      | 2440MHz   | 58      | 2460MHz   | 78      | 2480MHz   |
| 19                                  | 2421MHz   | 39      | 2441MHz   | 59      | 2461MHz   |         |           |

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 |
|---------------------------|-----------|
| The Lowest channel(CH0)   | 2402MHz   |
| The Middle channel(CH39)  | 2441MHz   |
| The Highest channel(CH78) | 2480MHz   |



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## 3.5 Test Environment

| Environment Parameter                                   | 96~101 kPa Selected Values During Tests |            |
|---------------------------------------------------------|-----------------------------------------|------------|
| Relative Humidity                                       | 40-60 % RH Ambient                      |            |
| Value                                                   | Temperature(°C)                         | Voltage(V) |
| NTNV                                                    | 22~25                                   | 3.87       |
| Remark:<br>NV: Normal Voltage<br>NT: Normal Temperature |                                         |            |

## 3.6 Description of Support Units

The EUT has been tested as an independent unit.



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## 4 Test results and Measurement Data

### 4.1 Antenna Requirement

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>Standard requirement:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 47 CFR Part 15C Section 15.203 /247(b) |
| <p>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.</p> <p>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.</p> |                                        |
| <p>The antenna is PIFA Antenna and no consideration of replacement.</p> <p>The best case gain of the antenna is -2.7dBi (Ant22). *</p> <p><i>*Note:</i><br/> <i>The antenna gain are derived from the gain information report provided by the manufacturer.</i></p> <p><i>Remark:</i><br/> <i>As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                        |



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## 4.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

### 4.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

### 4.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals. Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudo random sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

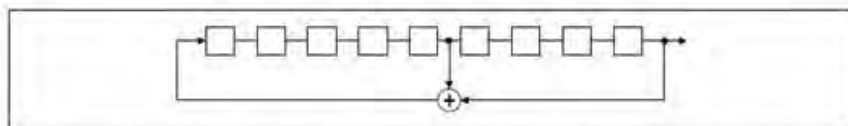
> Number of shift register stages: 9

> Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits

> Longest sequence of zeros: 8 (non-inverted signal)

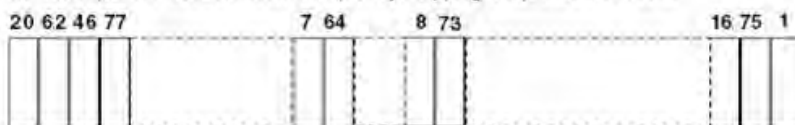
Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.



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According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the RF system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels. The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.



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## 4.3 AC Power Line Conducted Emissions

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |           |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|
| Test Requirement:                                | 47 CFR Part 15C Section 15.207                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |           |
| Test Method:                                     | ANSI C63.10-2020 Section 6.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |           |
| Test Frequency Range:                            | 150kHz to 30MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |           |
| Receiver Setup:                                  | RBW = 9kHz, VBW = 30kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |           |
| Limit:                                           | Frequency range (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Limit (dBuV) |           |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Quasi-peak   | Average   |
|                                                  | 0.15-0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 66 to 56*    | 56 to 46* |
|                                                  | 0.5-5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 56           | 46        |
|                                                  | 5-30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 60           | 50        |
| * Decreases with the logarithm of the frequency. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |           |
| Test Procedure:                                  | <ol style="list-style-type: none"> <li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li> <li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li> <li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.</li> <li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference 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.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10-2020 on conducted measurement.</li> </ol> |              |           |



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|                   |                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Setup:       |                                                                                                                                                                                          |
| Test Mode:        | Non-hopping transmitting mode with all kind of modulation and all kind of data type at the lowest, middle, high channel.<br>Charge + Transmitting mode.                                  |
| Final Test Mode:  | Through Pre-scan, find the DH5 of data type and GFSK modulation at the lowest channel is the worst case.<br>Charge + Transmitting mode<br>Only the worst case is recorded in the report. |
| Instruments Used: | Refer to section 6 for details.                                                                                                                                                          |
| Test Results:     | Pass                                                                                                                                                                                     |



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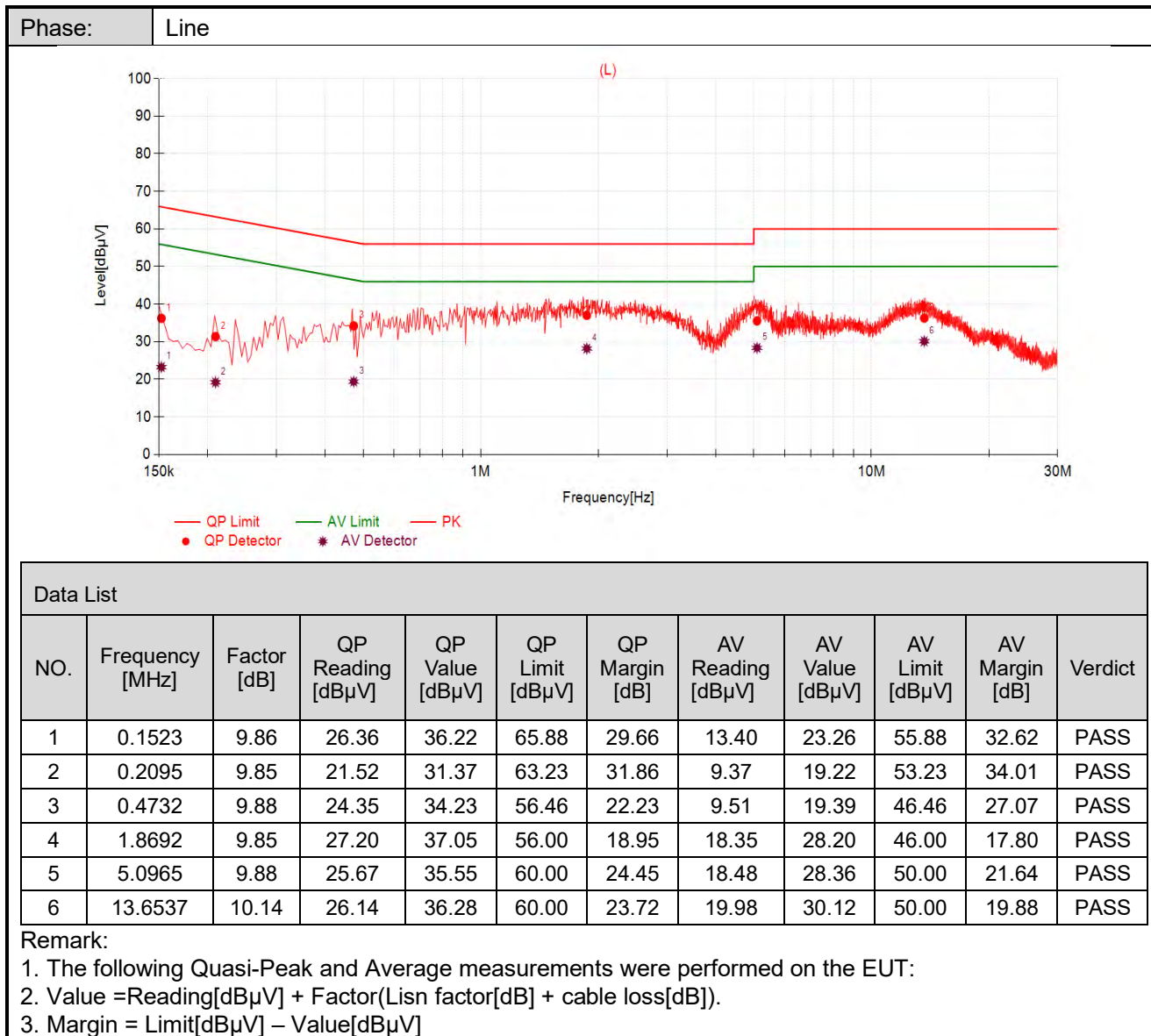


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## Measurement Data

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.



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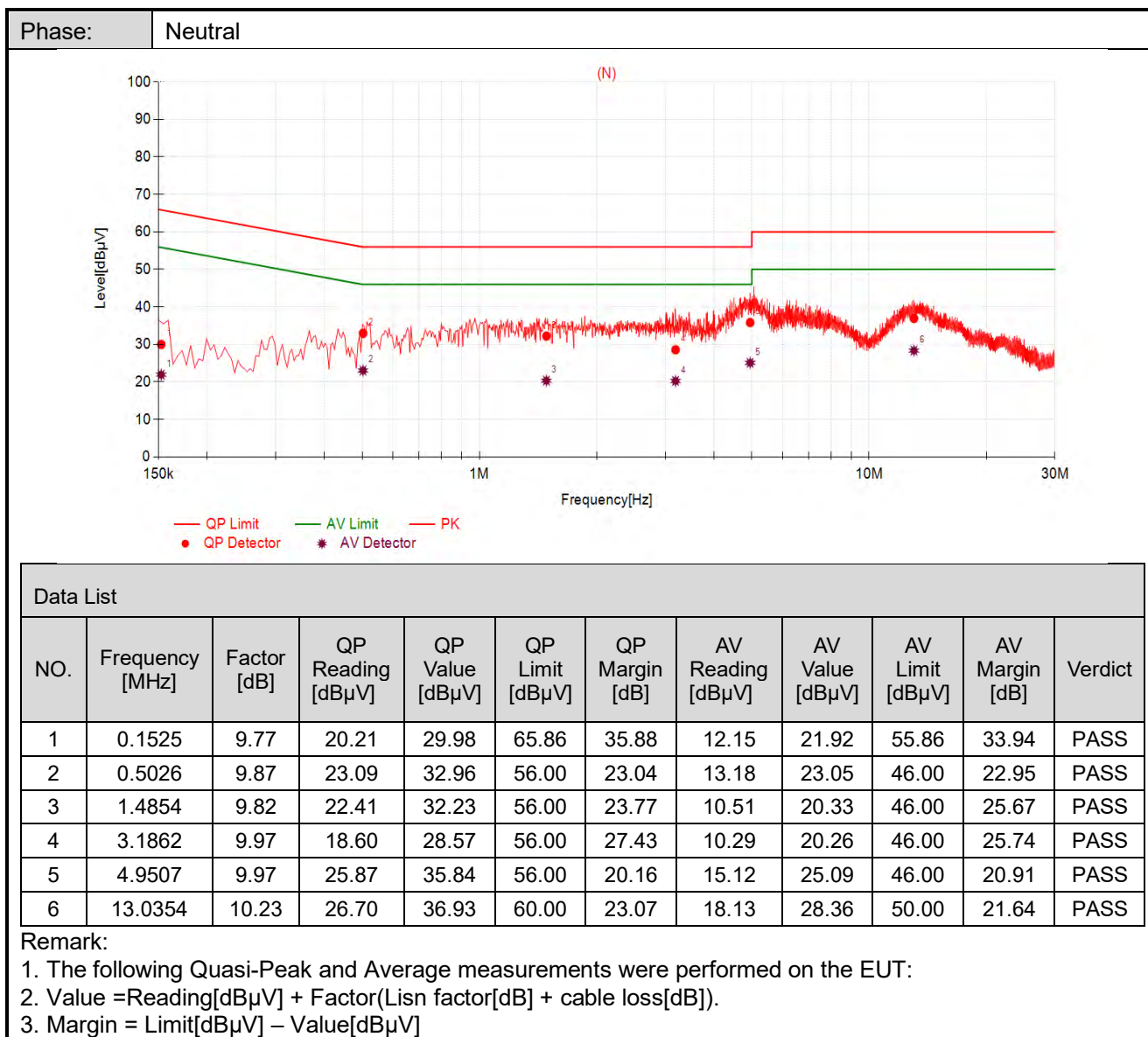
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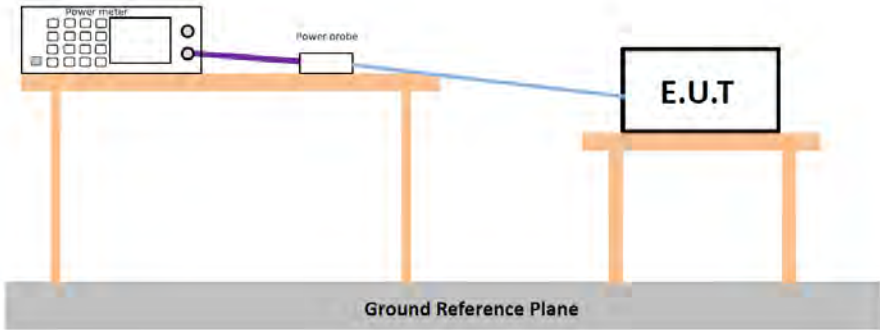
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## 4.4 Conducted Output Power

|                                             |                                                                                                                                                                                                                                       |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement:                           | 47 CFR Part 15C Section 15.247 (a)(1)&15.247 (b)(1)                                                                                                                                                                                   |
| Test Method:                                | ANSI C63.10-2020 Section 11.9.1.2                                                                                                                                                                                                     |
| Test Setup:                                 |  <p>* Test with power meter (Detector function: Peak)</p>                                                                                           |
| Test Instruments:                           | Refer to section 6 for details                                                                                                                                                                                                        |
| Exploratory Test Mode:                      | Non-hopping transmitting with all kind of modulation and all kind of data type.                                                                                                                                                       |
| Final Test Mode:                            | Through Pre-scan, find the<br>DH5 of data type is the worst case of GFSK modulation type,<br>2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type,<br>3-DH5 of data type is the worst case of 8DPSK modulation type. |
| Limit:                                      | 0.125 watts                                                                                                                                                                                                                           |
| Test Results:                               | Pass                                                                                                                                                                                                                                  |
| The detailed test data see: <b>Appendix</b> |                                                                                                                                                                                                                                       |



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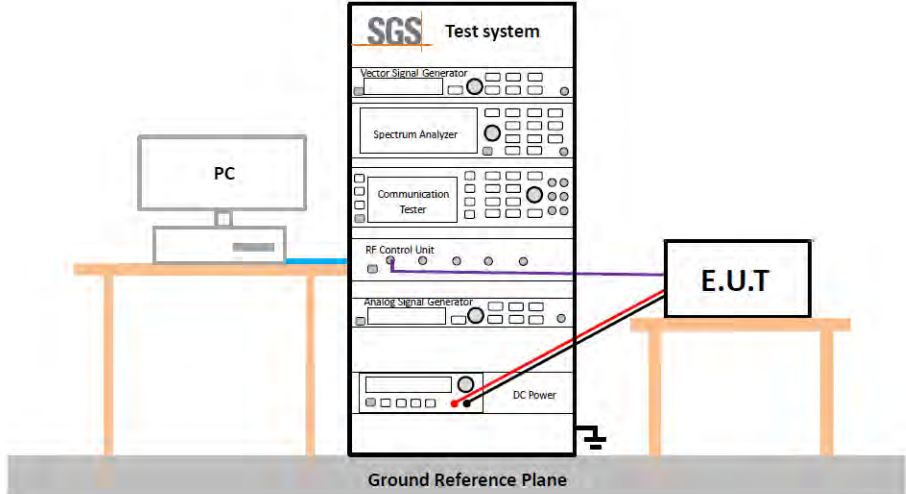
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## 4.5 20dB Emission Bandwidth & 99% Occupied Bandwidth

|                                             |                                                                                                                                                                                                                                       |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement:                           | 47 CFR Part 15C Section 15.247 (a)(1)                                                                                                                                                                                                 |
| Test Method:                                | ANSI C63.10-2020 Section 6.9.2 and 6.9.3                                                                                                                                                                                              |
| Test Setup:                                 |                                                                                                                                                     |
| Instruments Used:                           | Refer to section 6 for details                                                                                                                                                                                                        |
| Exploratory Test Mode:                      | Non-hopping transmitting with all kind of modulation and all kind of data type.                                                                                                                                                       |
| Final Test Mode:                            | Through Pre-scan, find the<br>DH5 of data type is the worst case of GFSK modulation type,<br>2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type,<br>3-DH5 of data type is the worst case of 8DPSK modulation type. |
| Limit:                                      | NA                                                                                                                                                                                                                                    |
| Test Results:                               | Pass                                                                                                                                                                                                                                  |
| The detailed test data see: <b>Appendix</b> |                                                                                                                                                                                                                                       |



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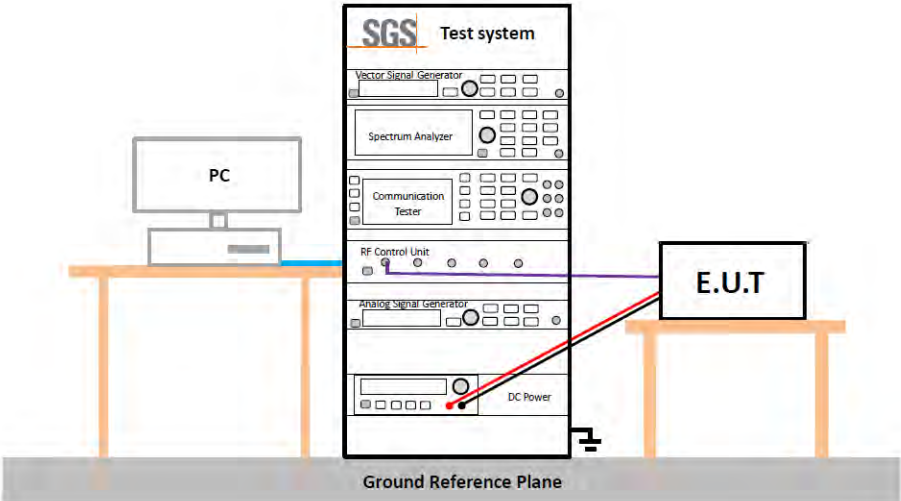
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## 4.6 Carrier Frequencies Separation

|                                             |                                                                                                                                                                                                                                       |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement:                           | 47 CFR Part 15C Section 15.247 (a)(1)                                                                                                                                                                                                 |
| Test Method:                                | ANSI C63.10-2020 Section 7.8.2                                                                                                                                                                                                        |
| Test Setup:                                 |                                                                                                                                                    |
| Test Instruments:                           | Refer to section 6 for details                                                                                                                                                                                                        |
| Exploratory Test Mode:                      | Hopping transmitting with all kind of modulation and all kind of data type.                                                                                                                                                           |
| Final Test Mode:                            | Through Pre-scan, find the<br>DH5 of data type is the worst case of GFSK modulation type,<br>2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type,<br>3-DH5 of data type is the worst case of 8DPSK modulation type. |
| Limit:                                      | 2/3 of the 20dB bandwidth<br>Remark: the transmission power is less than 0.125W.                                                                                                                                                      |
| Test Results:                               | Pass                                                                                                                                                                                                                                  |
| The detailed test data see: <b>Appendix</b> |                                                                                                                                                                                                                                       |



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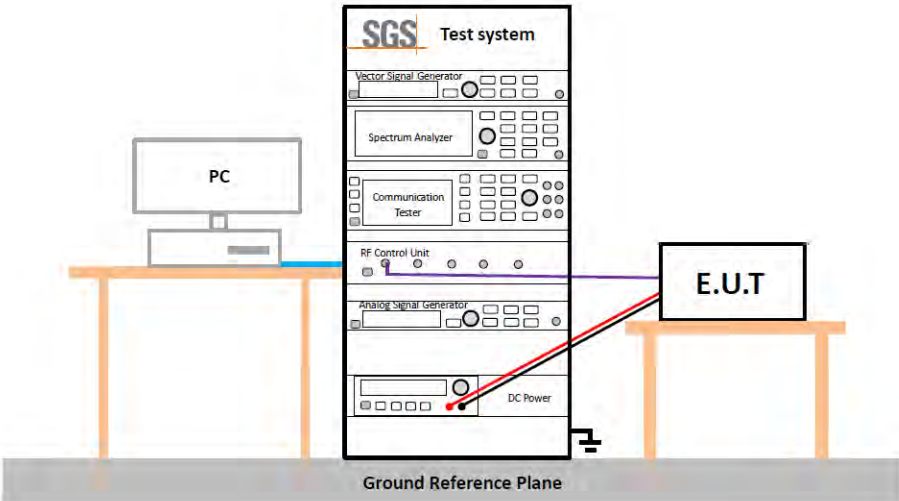
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## 4.7 Hopping Channel Number

|                                             |                                                                                     |
|---------------------------------------------|-------------------------------------------------------------------------------------|
| Test Requirement:                           | 47 CFR Part 15C Section 15.247 (a)(1)                                               |
| Test Method:                                | ANSI C63.10-2020 Section 7.8.3                                                      |
| Test Setup:                                 |  |
| Instruments Used:                           | Refer to section 6 for details                                                      |
| Test Mode:                                  | Hopping transmitting with all kind of modulation                                    |
| Limit:                                      | At least 15 channels                                                                |
| Test Results:                               | Pass                                                                                |
| The detailed test data see: <b>Appendix</b> |                                                                                     |



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## 4.8 Dwell Time

|                                             |                                                                             |
|---------------------------------------------|-----------------------------------------------------------------------------|
| Test Requirement:                           | 47 CFR Part 15C Section 15.247 (a)(1)                                       |
| Test Method:                                | ANSI C63.10-2020 Section 7.8.4                                              |
| Test Setup:                                 |                                                                             |
| Instruments Used:                           | Refer to section 6 for details                                              |
| Test Mode:                                  | Hopping transmitting with all kind of modulation and all kind of data type. |
| Limit:                                      | 0.4 Second                                                                  |
| Test Results:                               | Pass                                                                        |
| The detailed test data see: <b>Appendix</b> |                                                                             |



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## 4.9 Band-edge for RF Conducted Emissions

|                                             |                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement:                           | 47 CFR Part 15C Section 15.247 (d)                                                                                                                                                                                                                                                                                                                                                      |
| Test Method:                                | ANSI C63.10-2020 Section 7.8.7.2                                                                                                                                                                                                                                                                                                                                                        |
| Test Setup:                                 |                                                                                                                                                                                                                                                                                                                                                                                         |
| Instruments Used:                           | Refer to section 6 for details                                                                                                                                                                                                                                                                                                                                                          |
| Exploratory Test Mode:                      | Hopping and Non-hopping transmitting with all kind of modulation and all kind of data type.                                                                                                                                                                                                                                                                                             |
| Final Test Mode:                            | Through Pre-scan, find the<br>DH5 of data type is the worst case of GFSK modulation type,<br>2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type,<br>3-DH5 of data type is the worst case of 8DPSK modulation type.                                                                                                                                                   |
| Limit:                                      | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Test Results:                               | Pass                                                                                                                                                                                                                                                                                                                                                                                    |
| The detailed test data see: <b>Appendix</b> |                                                                                                                                                                                                                                                                                                                                                                                         |



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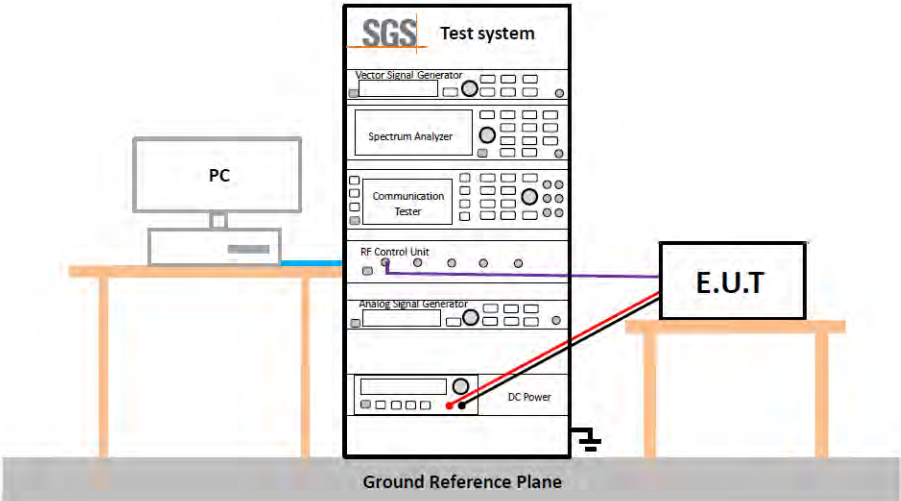
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## 4.10 Spurious RF Conducted Emissions

|                                             |                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement:                           | 47 CFR Part 15C Section 15.247 (d)                                                                                                                                                                                                                                                                                                                                                      |
| Test Method:                                | ANSI C63.10-2020 Section 7.8.7.1                                                                                                                                                                                                                                                                                                                                                        |
| Test Setup:                                 |                                                                                                                                                                                                                                                                                                      |
| Instruments Used:                           | Refer to section 6 for details                                                                                                                                                                                                                                                                                                                                                          |
| Exploratory Test Mode:                      | Non-hopping transmitting with all kind of modulation and all kind of data type.                                                                                                                                                                                                                                                                                                         |
| Final Test Mode:                            | Through Pre-scan, find the<br>DH5 of data type is the worst case of GFSK modulation type,<br>2-DH5 of data type is the worst case of $\pi/4$ DQPSK modulation type,<br>3-DH5 of data type is the worst case of 8DPSK modulation type.                                                                                                                                                   |
| Limit:                                      | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. |
| Test Results:                               | Pass                                                                                                                                                                                                                                                                                                                                                                                    |
| The detailed test data see: <b>Appendix</b> |                                                                                                                                                                                                                                                                                                                                                                                         |



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## 4.11 Radiated Spurious Emissions

|                                                                                                                                                                                                                                                                               |                                                  |                                  |                |            |                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------|----------------|------------|--------------------------|
| Test Requirement:                                                                                                                                                                                                                                                             | 47 CFR Part 15C Section 15.209 and 15.205        |                                  |                |            |                          |
| Test Method:                                                                                                                                                                                                                                                                  | ANSI C63.10-2020 Section 6.4 / 6.5 / 6.6         |                                  |                |            |                          |
| Test Site:                                                                                                                                                                                                                                                                    | Measurement Distance: 3m (Semi-Anechoic Chamber) |                                  |                |            |                          |
| Test Frequency:                                                                                                                                                                                                                                                               | 9kHz ~ 25GHz                                     |                                  |                |            |                          |
| Limit:                                                                                                                                                                                                                                                                        | Frequency                                        | Field strength (microvolt/meter) | Limit (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. |                                                  |                                  |                |            |                          |

### Test Setup:

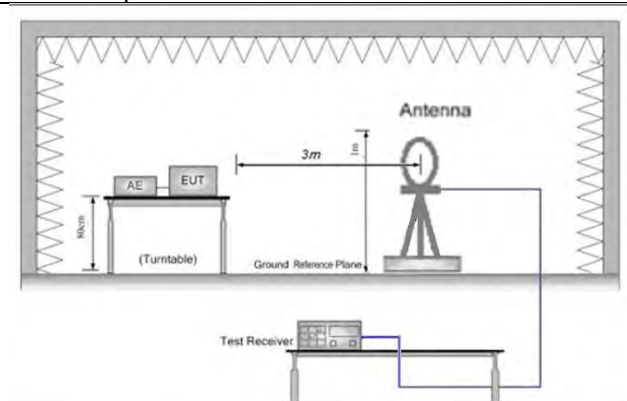


Figure 1. Below 30MHz

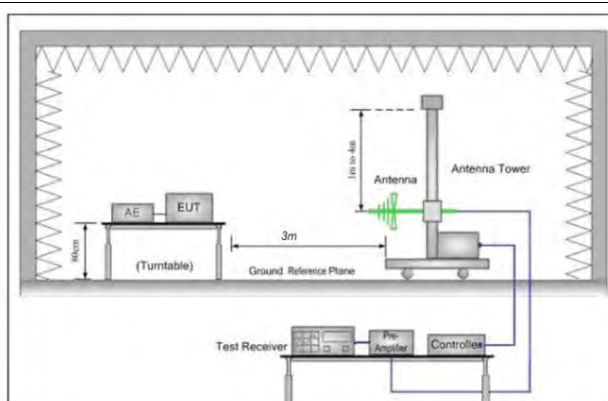


Figure 2. 30MHz to 1GHz



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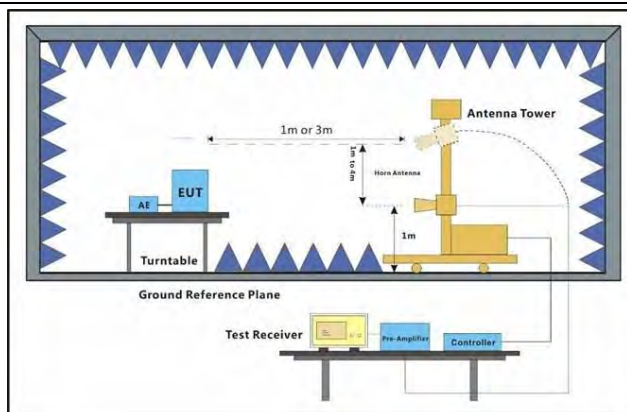


Figure 3. Above 1 GHz

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Procedure:     | <ol style="list-style-type: none"> <li>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 chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>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 chamber. The table was rotated 360 degrees to determine the position of the highest radiation (Distance from antenna to EUT is 1m for measurements &gt;18GHz).</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>Test the EUT in the lowest channel, the middle channel, the Highest channel.</li> <li>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.</li> <li>Repeat above procedures until all frequencies measured was complete.</li> <li>The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported</li> <li>The disturbance above 18GHz was very low, and the harmonics were the highest point could be found when testing, so only the harmonics had been displayed.</li> <li>At a measurement distance of 1 meter the limit line was increased by <math>20 \times \text{LOG}(3/1) = 9.54 \text{ dB}</math>.</li> </ol> |
| Test Configuration: | <p>Measurements below 30MHz</p> <ul style="list-style-type: none"> <li>RBW = 10 kHz</li> <li>VBW = 30 kHz</li> <li>Detector = Peak &amp; Average &amp; Quasi-peak</li> <li>Trace mode = max hold</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |



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|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             | <p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Quasi-peak</li> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW ≥ 3 MHz</li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <p>Use duty cycle correction factor method per 15.35(c).</p> <p>Duty cycle = On time / 100 milliseconds</p> <p>On time = <math>N_1 \cdot L_1 + N_2 \cdot L_2 \dots + N_{N-1} \cdot L_{N-1} + N_N \cdot L_N</math></p> <p>Where <math>N_1</math> is number of type 1 pulse, <math>L_1</math> is length of type 1 pulses, etc.</p> <p>Average Value = Peak Value + 20*log(Duty cycle).</p> |
| Exploratory Test Mode:                      | <p>Non-hopping transmitting mode with all kind of modulation and all kind of data type</p> <p>Charge + Transmitting mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Final Test Mode:                            | <p>Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case.</p> <p>Pretest the EUT at Charge + Transmitting mode</p> <p>For below 1GHz part, through pre-scan, the worst case is the lowest channel.</p> <p>Only the worst case is recorded in the report.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Instruments Used:                           | Refer to section 6 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Test Results:                               | Pass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| The detailed test data see: <b>Appendix</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



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## 4.12 Restricted bands around fundamental frequency

|                   |                                                  |                |               |
|-------------------|--------------------------------------------------|----------------|---------------|
| Test Requirement: | 47 CFR Part 15C Section 15.209 and 15.205        |                |               |
| Test Method:      | ANSI C63.10-2020 Section 6.10.5                  |                |               |
| Test Site:        | Measurement Distance: 3m (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    |
|                   | Above 1GHz                                       | 54.0           | Average Value |
|                   |                                                  | 74.0           | Peak Value    |

### Test Setup:

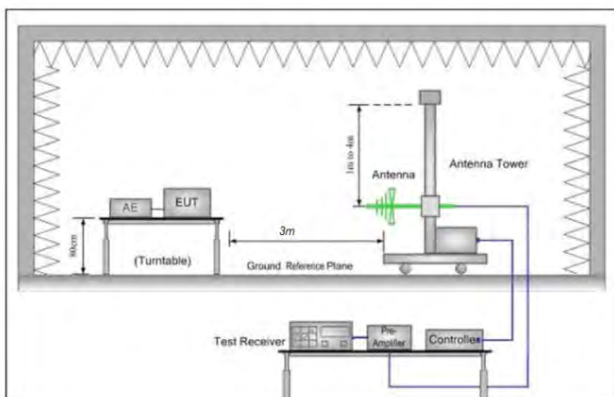


Figure 1. 30MHz to 1GHz

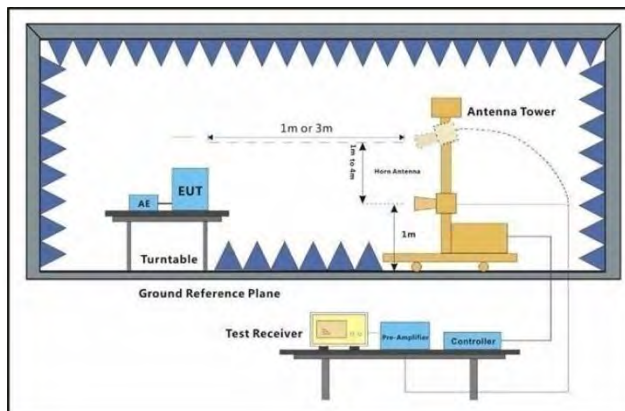


Figure 2. Above 1 GHz

### 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 chamber. 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 chamber. 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.



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|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             | <p>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</p> <p>h. Test the EUT in the lowest channel , the Highest channel</p> <p>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.</p> <p>j. Repeat above procedures until all frequencies measured was complete.</p>                                                                                                                                                                                                                                                                |
| Test Configuration:                         | <p>Measurements Below 1000MHz</p> <ul style="list-style-type: none"> <li>• RBW = 120 kHz</li> <li>• VBW = 300 kHz</li> <li>• Detector = Quasi-peak</li> <li>• Trace mode = max hold</li> </ul> <p>Peak Measurements Above 1000 MHz</p> <ul style="list-style-type: none"> <li>• RBW = 1 MHz</li> <li>• VBW <math>\geq</math> 3 MHz</li> <li>• Detector = Peak</li> <li>• Sweep time = auto</li> <li>• Trace mode = max hold</li> </ul> <p>Average Measurements Above 1000MHz</p> <p>Use duty cycle correction factor method per 15.35(c).</p> <p>Duty cycle = On time / 100 milliseconds</p> <p>On time = <math>N_1 * L_1 + N_2 * L_2 \dots + N_{N-1} * L_{N-1} + N_N * L_N</math></p> <p>Where <math>N_1</math> is number of type 1 pulse, <math>L_1</math> is length of type 1 pulses, etc.</p> <p>Average Value = Peak Value + 20*log(Duty cycle).</p> |
| Exploratory Test Mode:                      | <p>Non-hopping transmitting mode with all kind of modulation and all kind of data type</p> <p>Charge + Transmitting mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Final Test Mode:                            | <p>Through Pre-scan, find the DH5 of data type and GFSK modulation is the worst case.</p> <p>Pretest the EUT at Charge + Transmitting mode,</p> <p>Only the worst case is recorded in the report.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Instruments Used:                           | Refer to section 6 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Test Results:                               | Pass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| The detailed test data see: <b>Appendix</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



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

| Lab A                                                                                                                                                                                                                                                                                                                                           |                              |                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------|
| No.                                                                                                                                                                                                                                                                                                                                             | Item                         | Measurement Uncertainty |
| 1                                                                                                                                                                                                                                                                                                                                               | Radio Frequency              | $\pm 9.84\text{Hz}$     |
| 2                                                                                                                                                                                                                                                                                                                                               | Duty cycle                   | $\pm 0.185\%$           |
| 3                                                                                                                                                                                                                                                                                                                                               | Occupied Bandwidth           | $\pm 0.20\%$            |
| 4                                                                                                                                                                                                                                                                                                                                               | RF conducted power           | $\pm 0.42\text{dB}$     |
| 5                                                                                                                                                                                                                                                                                                                                               | RF power density             | $\pm 1.97\text{dB}$     |
| 6                                                                                                                                                                                                                                                                                                                                               | Conducted Spurious emissions | $\pm 0.42\text{dB}$     |
| Remark:<br>The $U_{\text{lab}}$ (lab Uncertainty) is less than $U_{\text{CISPR/ETSI}}$ (CISPR/ETSI Uncertainty), so the test results<br>– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;<br>– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit. |                              |                         |

| Lab B                                                                                                                                                                                                                                                                                                                                           |                     |                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| No.                                                                                                                                                                                                                                                                                                                                             | Item                | Measurement Uncertainty   |
| 1                                                                                                                                                                                                                                                                                                                                               | Conduction Emission | ± 3.0dB (150kHz to 30MHz) |
| 2                                                                                                                                                                                                                                                                                                                                               | Radiated Emission   | ± 4.6dB (9kHz to 30MHz)   |
|                                                                                                                                                                                                                                                                                                                                                 |                     | ± 4.9dB (30MHz to 1GHz)   |
|                                                                                                                                                                                                                                                                                                                                                 |                     | ± 4.9dB (1GHz to 6GHz)    |
|                                                                                                                                                                                                                                                                                                                                                 |                     | ± 4.7dB (6GHz to 18GHz)   |
|                                                                                                                                                                                                                                                                                                                                                 |                     | ± 5.26dB (Above 18GHz)    |
| Remark:<br>The U <sub>lab</sub> (lab Uncertainty) is less than U <sub>CISPR/ETSI</sub> (CISPR/ETSI Uncertainty), so the test results<br>– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;<br>– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit. |                     |                           |



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## 6 Equipment List

| Lab A<br>RF Test System        |                                          |                |               |                           |                              |
|--------------------------------|------------------------------------------|----------------|---------------|---------------------------|------------------------------|
| Test Equipment                 | Manufacturer                             | Model No.      | Inventory No. | Cal. date<br>(yyyy/mm/dd) | Cal.Due date<br>(yyyy/mm/dd) |
| Spectrum Analyzer              | Keysight                                 | N9020A         | SZ-WRG-M-002  | 2022/11/18                | 2023/11/17                   |
| Signal Generator               | Keysight                                 | N5181A         | SZ-WRG-M-005  | 2022/11/18                | 2023/11/17                   |
| DC power supply                | Tonscend                                 | TS0806-4ADC    | SZ-WRG-A-007  | NCR                       | NCR                          |
| RF Control Unit                | Tonscend                                 | JS0806-2       | SZ-WRG-M-008  | 2022/11/18                | 2023/11/17                   |
| Radio Communication Tester     | Rohde & Schwarz                          | CMW270         | SZ-WRG-M-009  | 2023/02/16                | 2024/02/15                   |
| Radio Communication Tester     | Rohde & Schwarz                          | CMW-Z800A      | SZ-WRG-M-010  | NCR                       | NCR                          |
| Signal Generator               | Rohde & Schwarz                          | SMM100A        | SZ-WRG-M-011  | 2023/02/22                | 2024/02/21                   |
| Test Software                  | Tonscend                                 | JS1120 V3.2.22 | N/A           | NCR                       | NCR                          |
| Humidity/Temperature Indicator | Shanghai Meteorological Industry Factory | HTC-1          | SZ-WRG-M-077  | 2022/07/06                | 2023/07/05                   |
| Spectrum Analyzer              | Rohde & Schwarz                          | FSV            | SZ-WRG-M-012  | 2023/02/16                | 2024/02/15                   |

| Lab B<br>CE Test System        |               |              |               |                           |                              |
|--------------------------------|---------------|--------------|---------------|---------------------------|------------------------------|
| Test Equipment                 | Manufacturer  | Model No.    | Inventory No. | Cal. date<br>(yyyy/mm/dd) | Cal.Due date<br>(yyyy/mm/dd) |
| Shielding Room                 | Brilliant-emc | N/A          | XAW04-03-01   | N/A                       | N/A                          |
| Test receiver                  | ROHDE&SCHWARZ | ESR          | XAW01-08-01   | 2022/09/08                | 2023/09/07                   |
| Artificial network             | ROHDE&SCHWARZ | ENV216       | XAW01-04-01   | 2022/06/30                | 2023/06/29                   |
| Temperature and humidity meter | MingGao       | TH101B       | XAW01-01-02   | 2022/09/18                | 2023/09/17                   |
| Measurement Software           | Tonscend      | TS+ V4.0.0.0 | XAW02-07-01   | NCR                       | NCR                          |
| Radio communication analyzer   | ROHDE&SCHWARZ | CMW 500      | XAW01-03-02   | 2023/02/16                | 2024/02/15                   |
| Artificial network             | ROHDE&SCHWARZ | ENV216       | XAW01-04-02   | 2022/06/30                | 2023/06/29                   |



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| Lab B<br>RSE Test System            |                 |              |               |                           |                              |
|-------------------------------------|-----------------|--------------|---------------|---------------------------|------------------------------|
| Test Equipment                      | Manufacturer    | Model No.    | Inventory No. | Cal. date<br>(yyyy/mm/dd) | Cal.Due date<br>(yyyy/mm/dd) |
| Semi-Anechoic Chamber               | Brilliant-emc   | N/A          | XAW03-35-01   | 2021/09/09                | 2024/09/08                   |
| MXA signal analyzer                 | Keysight        | N9020A       | XAW01-06-01   | 2023/02/16                | 2024/02/15                   |
| Spectrum Analyzer                   | ROHDE & SCHWARZ | FSV3044      | XAW01-13-05   | 2023/05/15                | 2024/05/14                   |
| Test receiver                       | ROHDE & SCHWARZ | ESR          | XAW01-08-01   | 2022/09/08                | 2023/09/07                   |
| Receiving antenna (30MHz-3GHz)      | Schwarzbeck     | VULB 9163    | XAW01-09-01   | 2022/07/28                | 2024/07/27                   |
| Receiving antenna (1GHz~18GHz)      | Schwarzbeck     | BBHA 9120D   | XAW01-09-02   | 2022/07/28                | 2024/07/27                   |
| Receiving antenna (15GHz~40GHz)     | Schwarzbeck     | BBHA 9170    | XAW01-09-03   | 2022/07/23                | 2024/07/22                   |
| 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                           | Tonscend        | TAP9K3G32    | XAW01-41-01   | 2023/05/15                | 2024/05/14                   |
| Amplifier                           | Tonscend        | TAP01018048  | XAW01-41-02   | 2022/09/14                | 2023/09/13                   |
| Amplifier                           | Tonscend        | TAP18040048  | XAW01-41-03   | 2022/09/14                | 2023/09/13                   |
| Amplifier                           | Shanghai Steed  | YX28980930   | XAW01-41-06   | 2022/09/14                | 2023/09/13                   |
| Temperature and humidity meter      | MingGao         | TH101B       | XAW01-01-02   | 2022/09/18                | 2023/09/17                   |
| Radio communication analyzer        | ROHDE&SCHWARZ   | CMW 500      | XAW01-03-02   | 2023/02/16                | 2024/02/15                   |
| Measurement Software                | Tonscend        | TS+ V4.0.0.0 | XAW02-05-01   | NCR                       | NCR                          |
| Loop Antenna                        | Schwarzbeck     | FMZB 1519B   | XAW01-48-02   | 2022/05/26                | 2024/05/25                   |



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## 7 Photographs - Setup Photos

Refer to Appendix A.2 WLAN Setup Photos.



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# Appendix



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## 20dB Emission Bandwidth Test Result

| TestMode | Antenna | Frequency[MHz] | 20dB EBW[MHz] | FL[MHz] | FH[MHz] | Verdict            |
|----------|---------|----------------|---------------|---------|---------|--------------------|
| DH5      | Ant22   | 2402           | 0.86          | 2401.55 | 2402.41 | For Report Purpose |
|          |         | 2441           | 0.86          | 2440.55 | 2441.41 |                    |
|          |         | 2480           | 0.87          | 2479.55 | 2480.41 |                    |
| 2DH5     | Ant22   | 2402           | 1.26          | 2401.37 | 2402.63 |                    |
|          |         | 2441           | 1.26          | 2440.37 | 2441.63 |                    |
|          |         | 2480           | 1.26          | 2479.37 | 2480.63 |                    |
| 3DH5     | Ant22   | 2402           | 1.26          | 2401.36 | 2402.62 |                    |
|          |         | 2441           | 1.26          | 2440.36 | 2441.62 |                    |
|          |         | 2480           | 1.26          | 2479.36 | 2480.62 |                    |



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## Test Graphs



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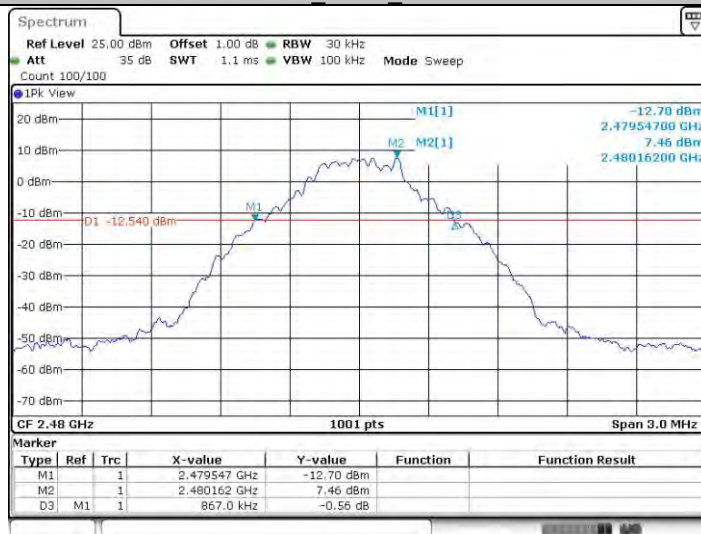
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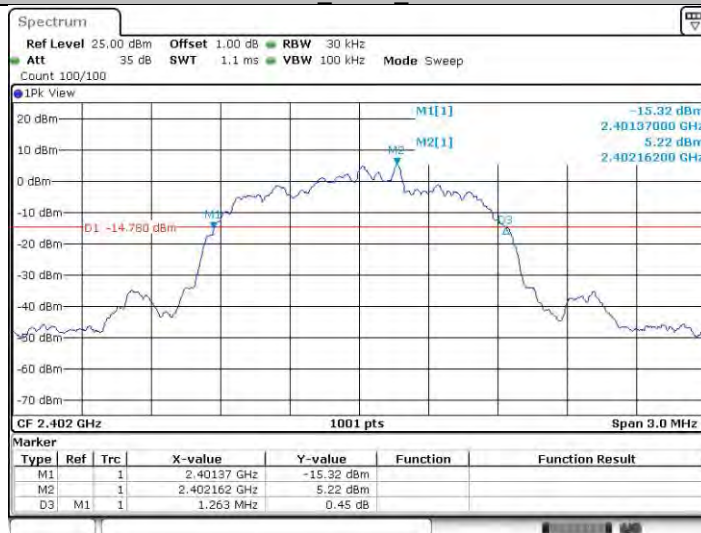
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## DH5\_Ant22\_2480



Date: 1 JUN 2023 09:08:00

## 2DH5\_Ant22\_2402



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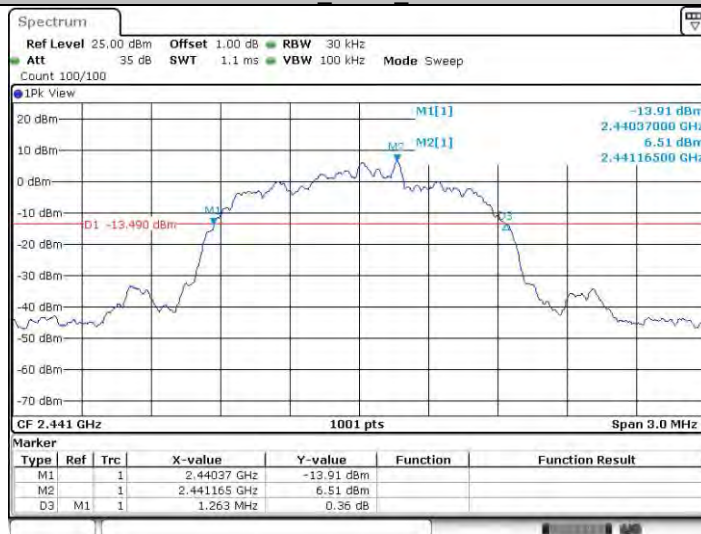
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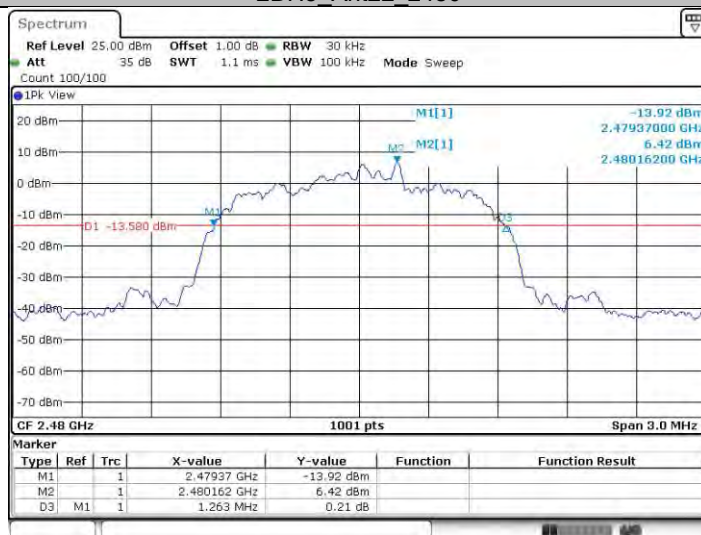
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## 2DH5\_Ant22\_2441



Date: 1 JUN 2023 09:11:42

## 2DH5\_Ant22\_2480



Date: 1 JUN 2023 09:13:22



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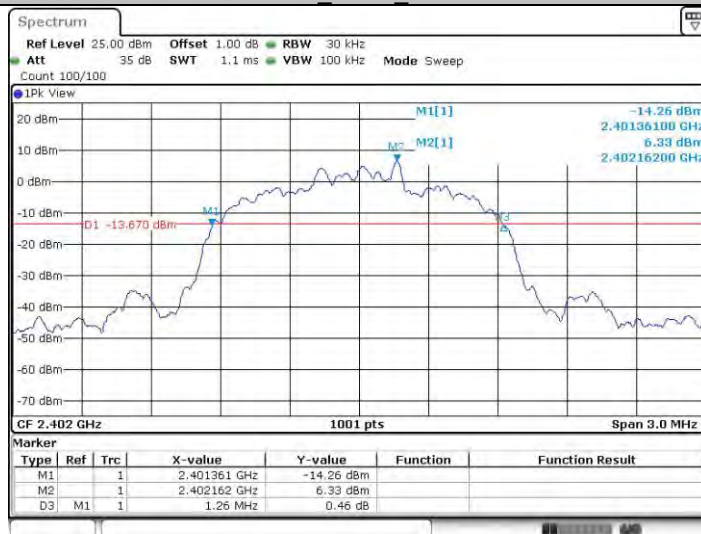
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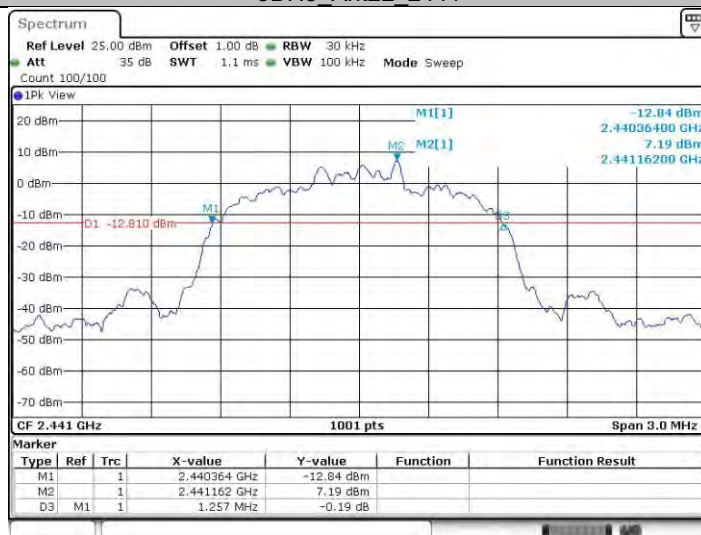
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## 3DH5\_Ant22\_2402



Date: 1 JUN 2023 09:15:22

## 3DH5\_Ant22\_2441



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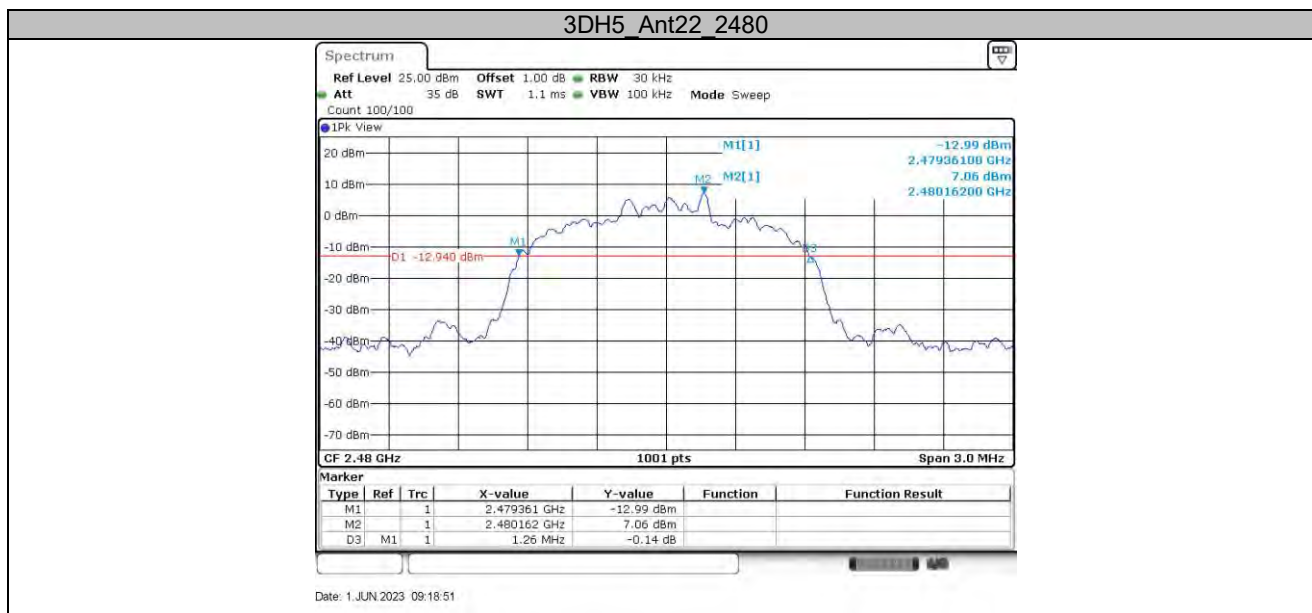
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# SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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## Occupied Channel Bandwidth Test Result

| TestMode | Antenna | Frequency[MHz] | OCB [MHz] | FL[MHz]   | FH[MHz]   | Verdict            |
|----------|---------|----------------|-----------|-----------|-----------|--------------------|
| DH5      | Ant22   | 2402           | 0.758     | 2401.6254 | 2402.3836 | For Report Purpose |
|          |         | 2441           | 0.755     | 2440.6254 | 2441.3806 |                    |
|          |         | 2480           | 0.758     | 2479.6224 | 2480.3806 |                    |
| 2DH5     | Ant22   | 2402           | 1.148     | 2401.4216 | 2402.5694 |                    |
|          |         | 2441           | 1.148     | 2440.4216 | 2441.5694 |                    |
|          |         | 2480           | 1.151     | 2479.4186 | 2480.5694 |                    |
| 3DH5     | Ant22   | 2402           | 1.148     | 2401.4276 | 2402.5754 |                    |
|          |         | 2441           | 1.145     | 2440.4276 | 2441.5724 |                    |
|          |         | 2480           | 1.148     | 2479.4246 | 2480.5724 |                    |



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## Test Graphs



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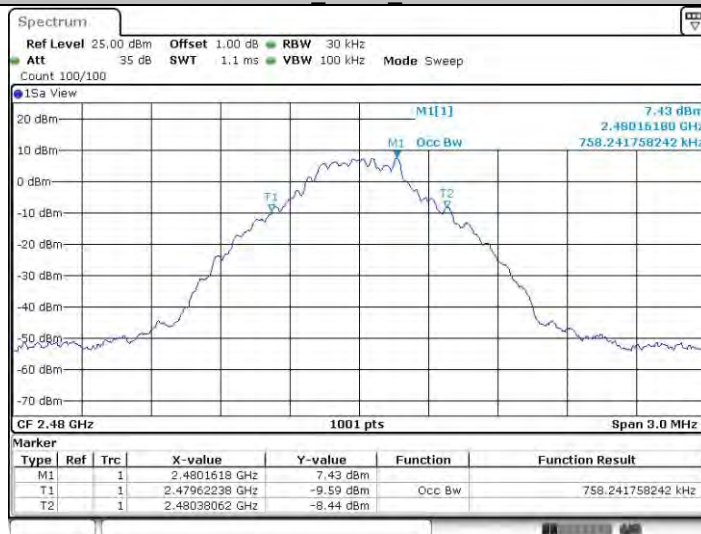
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## DH5\_Ant22\_2480



Date: 1 JUN 2023 09:08:13

## 2DH5\_Ant22\_2402



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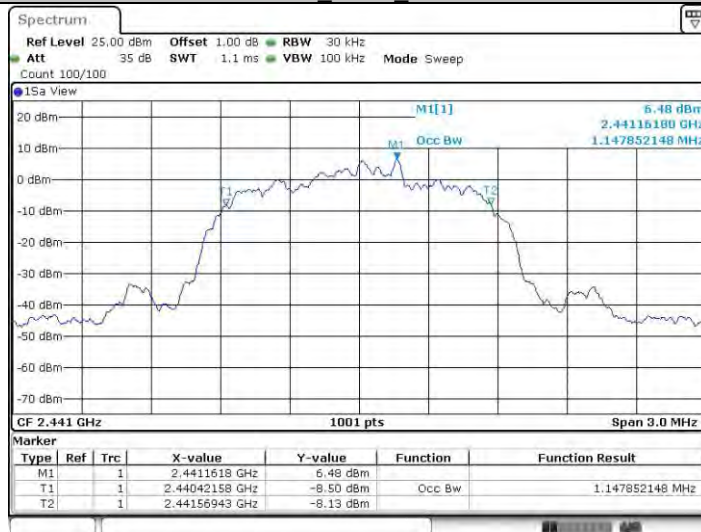
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## 2DH5\_Ant22\_2441



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## 2DH5\_Ant22\_2480



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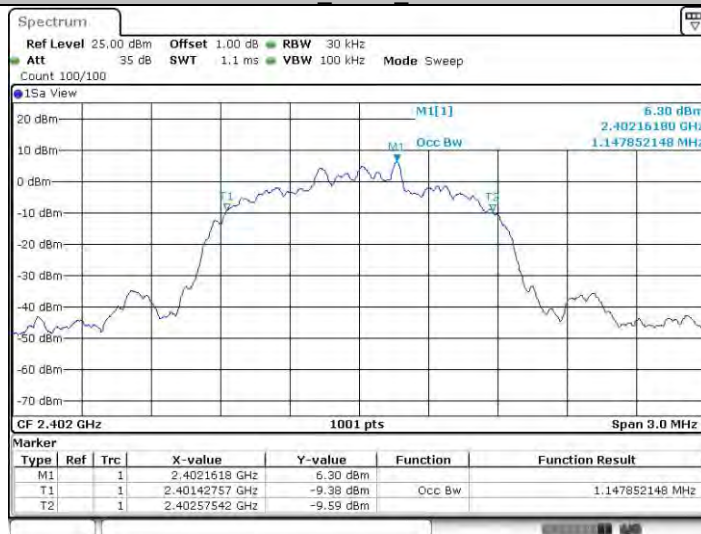
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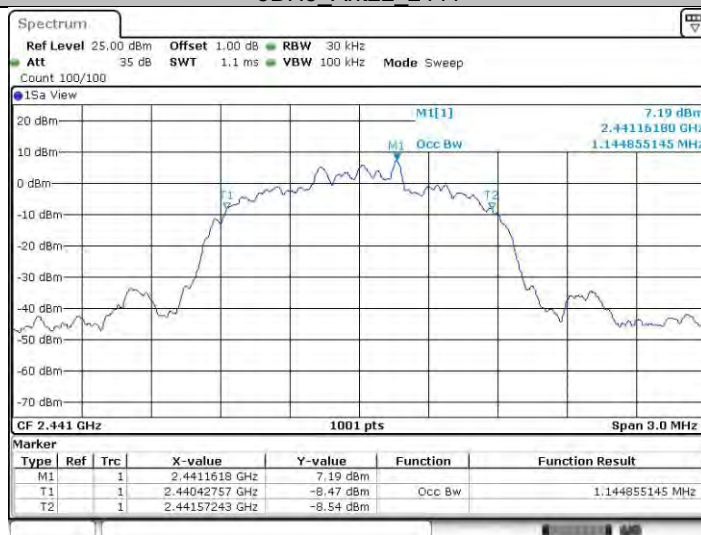
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## 3DH5\_Ant22\_2402



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## 3DH5\_Ant22\_2441



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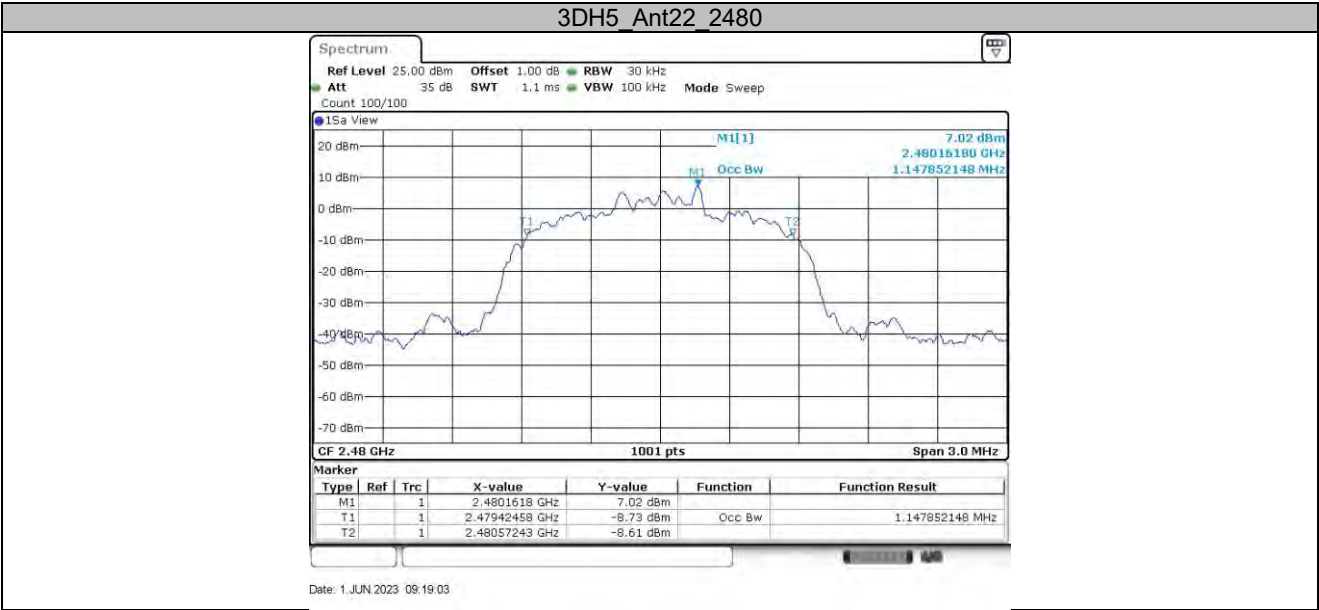
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# SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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## Maximum conducted output power Test Result Peak

| Test Mode | Antenna | Frequency[MHz] | Conducted Peak Power[dBm] | Conducted Limit[dBm] | Verdict |
|-----------|---------|----------------|---------------------------|----------------------|---------|
| DH5       | Ant22   | 2402           | 9.58                      | ≤20.97               | PASS    |
|           |         | 2441           | 9.79                      | ≤20.97               | PASS    |
|           |         | 2480           | 10.38                     | ≤20.97               | PASS    |
| 2DH5      | Ant22   | 2402           | 8.88                      | ≤20.97               | PASS    |
|           |         | 2441           | 9.63                      | ≤20.97               | PASS    |
|           |         | 2480           | 10.16                     | ≤20.97               | PASS    |
| 3DH5      | Ant22   | 2402           | 8.4                       | ≤20.97               | PASS    |
|           |         | 2441           | 9.63                      | ≤20.97               | PASS    |
|           |         | 2480           | 9.74                      | ≤20.97               | PASS    |



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## Carrier frequency separation Test Result

| TestMode | Antenna | Hop/No-Hop | Result[dBm] | Limit[dBm] | Verdict |
|----------|---------|------------|-------------|------------|---------|
| DH5      | Ant22   | Hop        | 1.006       | ≥0.870     | PASS    |
| 2DH5     | Ant22   | Hop        | 1.003       | ≥0.840     | PASS    |
| 3DH5     | Ant22   | Hop        | 1.012       | ≥0.840     | PASS    |



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## Test Graphs



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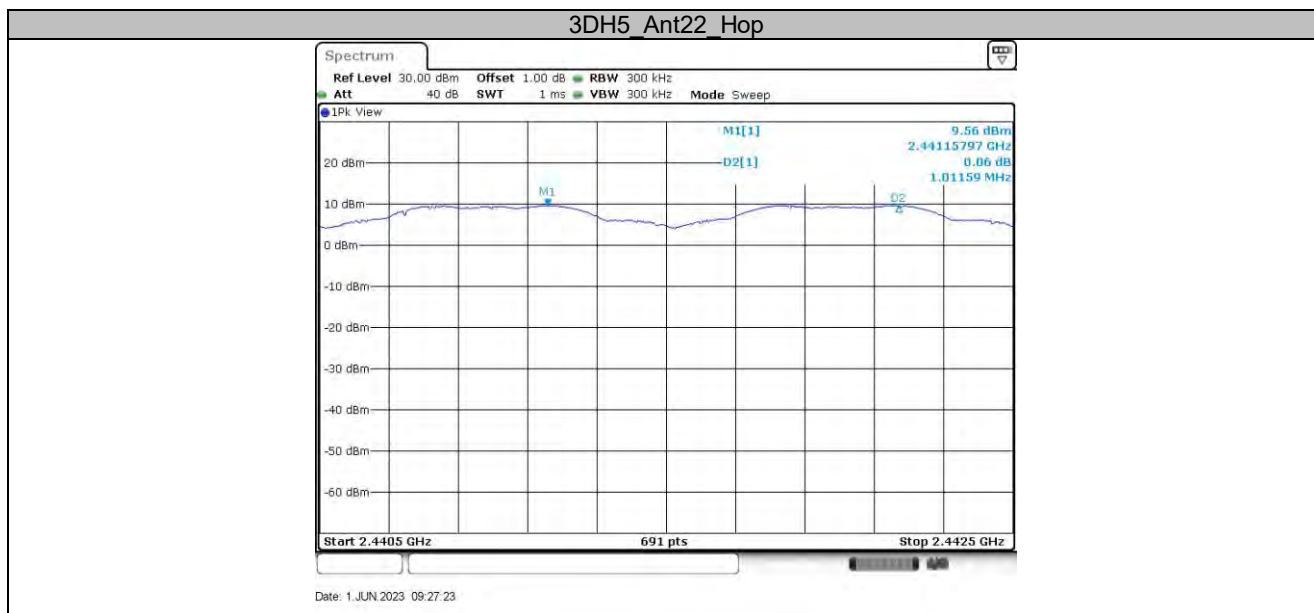
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## Time of occupancy Test Result

| TestMode | Antenna | Hop/No-Hop | BurstWidth [ms] | TotalHops [Num] | Result[s] | Limit[s] | Verdict |
|----------|---------|------------|-----------------|-----------------|-----------|----------|---------|
| DH1      | Ant22   | Hop        | 0.360           | 320             | 0.115     | ≤0.4     | PASS    |
| DH3      | Ant22   | Hop        | 1.610           | 160             | 0.258     | ≤0.4     | PASS    |
| DH5      | Ant22   | Hop        | 2.870           | 106.67          | 0.306     | ≤0.4     | PASS    |
| 2DH1     | Ant22   | Hop        | 0.370           | 320             | 0.118     | ≤0.4     | PASS    |
| 2DH3     | Ant22   | Hop        | 1.620           | 160             | 0.259     | ≤0.4     | PASS    |
| 2DH5     | Ant22   | Hop        | 2.860           | 106.67          | 0.305     | ≤0.4     | PASS    |
| 3DH1     | Ant22   | Hop        | 0.370           | 320             | 0.118     | ≤0.4     | PASS    |
| 3DH3     | Ant22   | Hop        | 1.620           | 160             | 0.259     | ≤0.4     | PASS    |
| 3DH5     | Ant22   | Hop        | 2.870           | 106.67          | 0.306     | ≤0.4     | PASS    |



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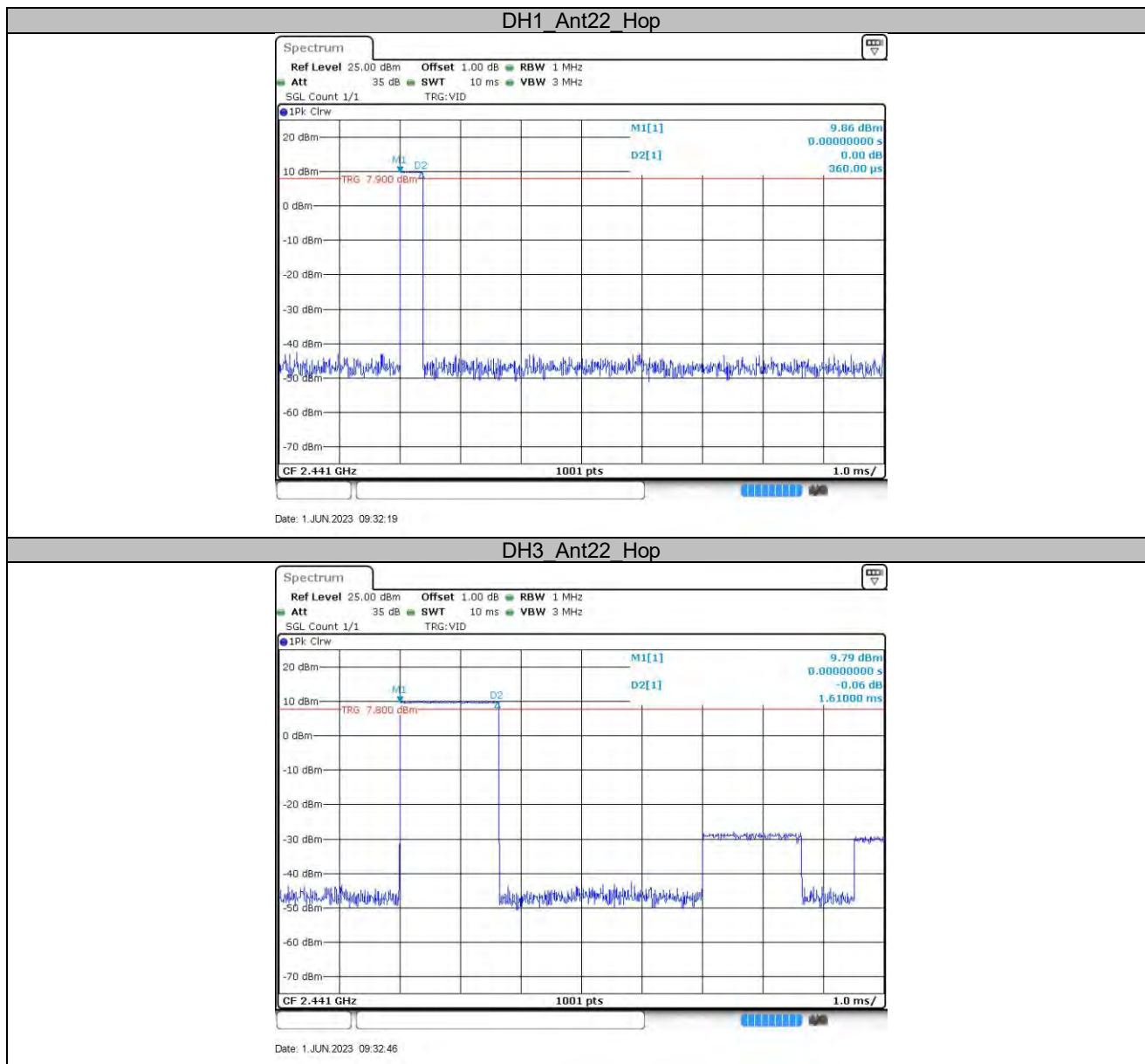
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## Test Graphs



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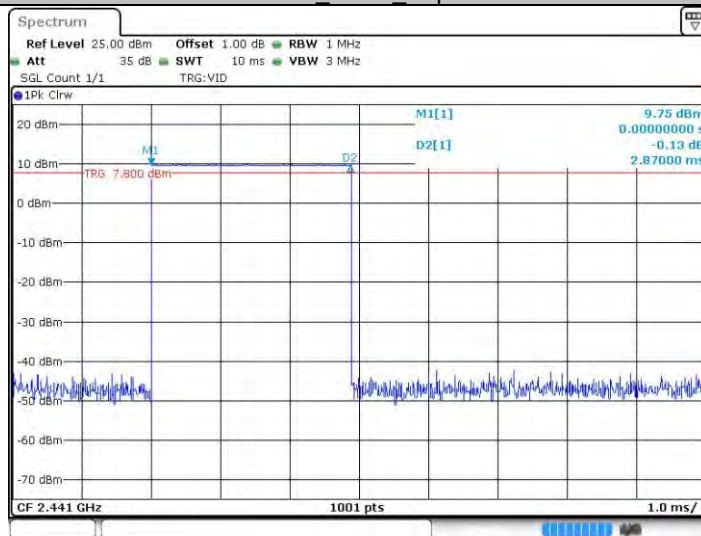
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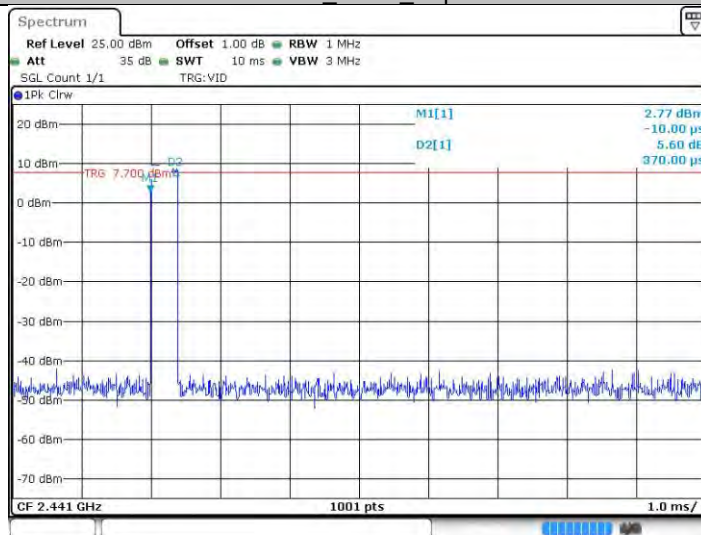
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## DH5\_Ant22\_Hop



Date: 1 JUN 2023 09:31:13

## 2DH1\_Ant22\_Hop



Date: 1 JUN 2023 09:33:51



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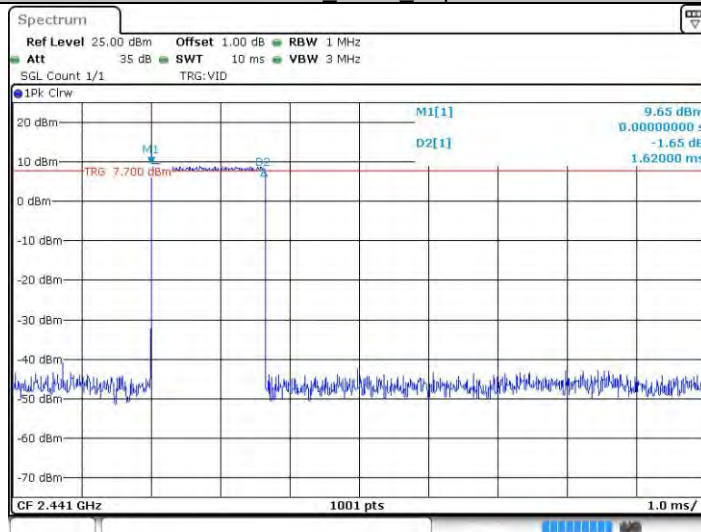
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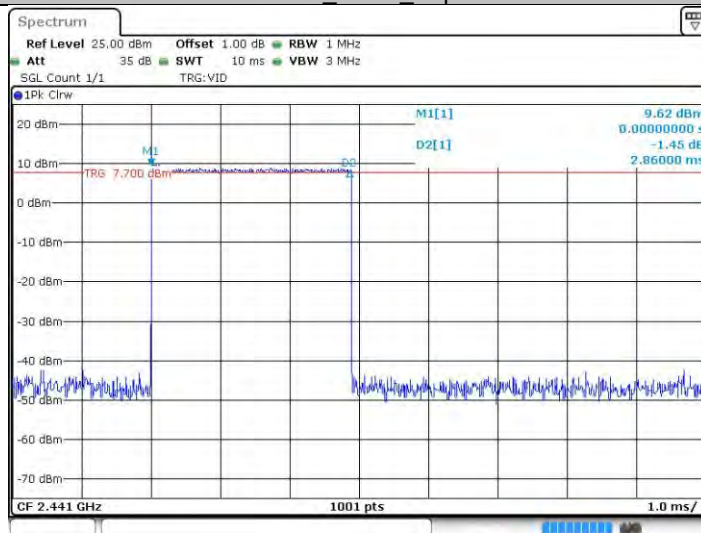
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## 2DH3\_Ant22\_Hop



Date: 1 JUN 2023 09:34:18

## 2DH5\_Ant22\_Hop



Date: 1 JUN 2023 09:33:16



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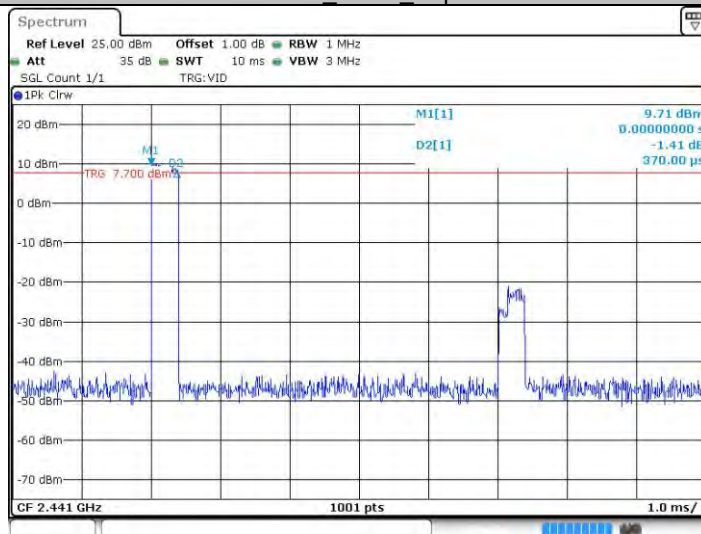
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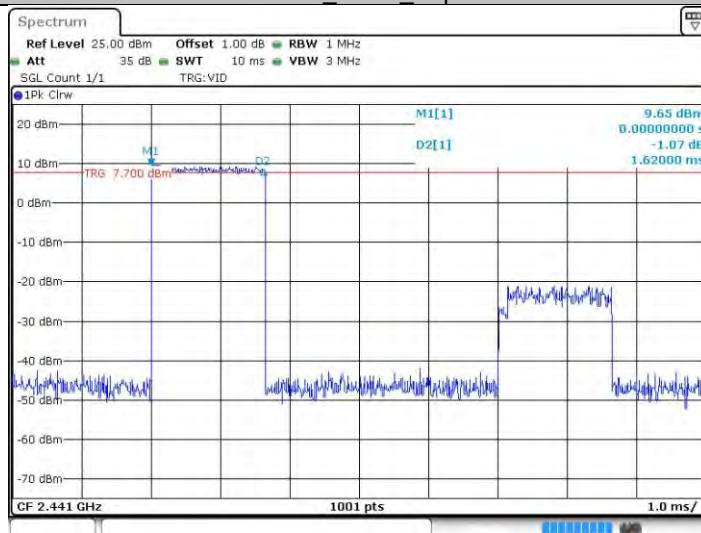
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## 3DH1\_Ant22\_Hop



Date: 1 JUN.2023 09:35:08

## 3DH3\_Ant22\_Hop



Date: 1 JUN.2023 09:35:51



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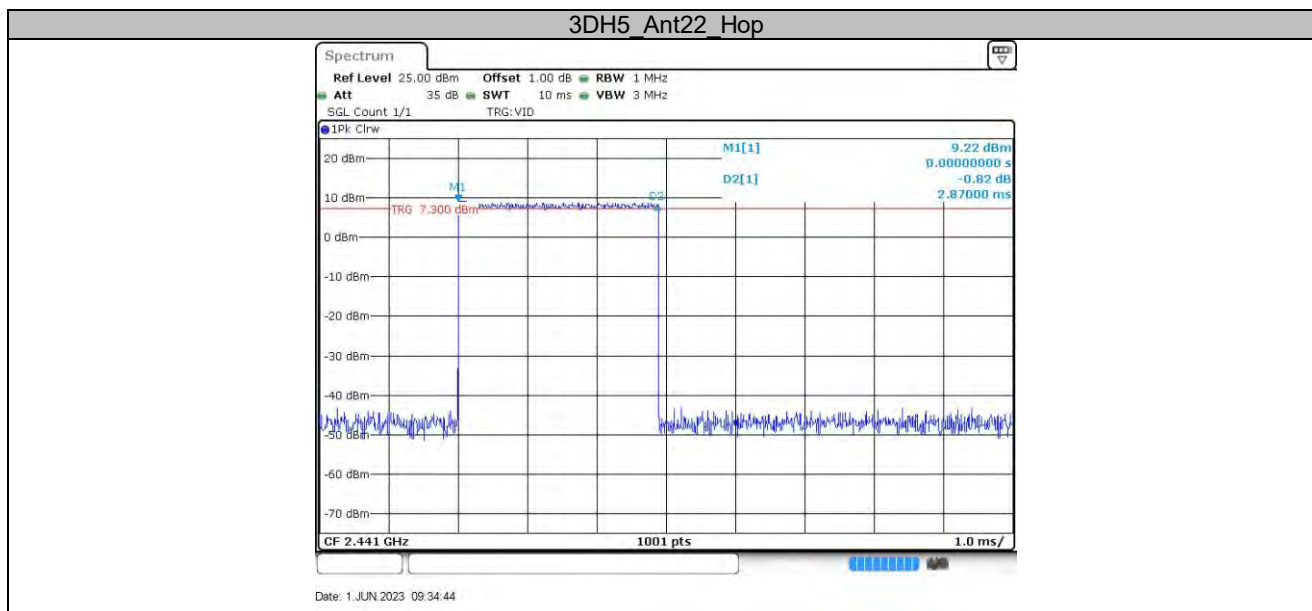
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# SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

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## Number of hopping channels Test Result

| TestMode | Antenna | Hop/No-Hop | Result[Num] | Limit[Num] | Verdict |
|----------|---------|------------|-------------|------------|---------|
| DH5      | Ant22   | Hop        | 79          | ≥15        | PASS    |
| 2DH5     | Ant22   | Hop        | 79          | ≥15        | PASS    |
| 3DH5     | Ant22   | Hop        | 79          | ≥15        | PASS    |



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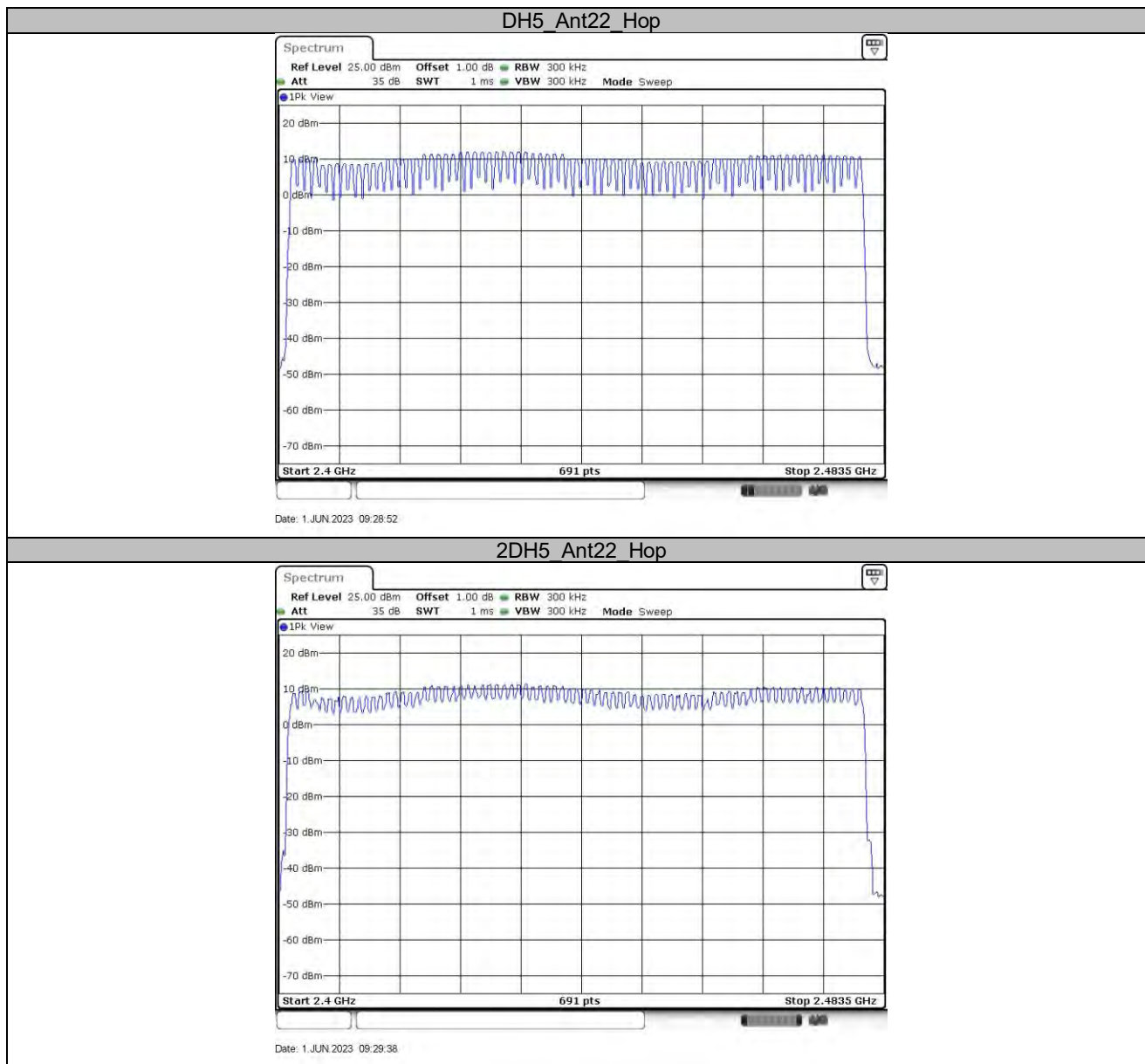
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## Test Graphs



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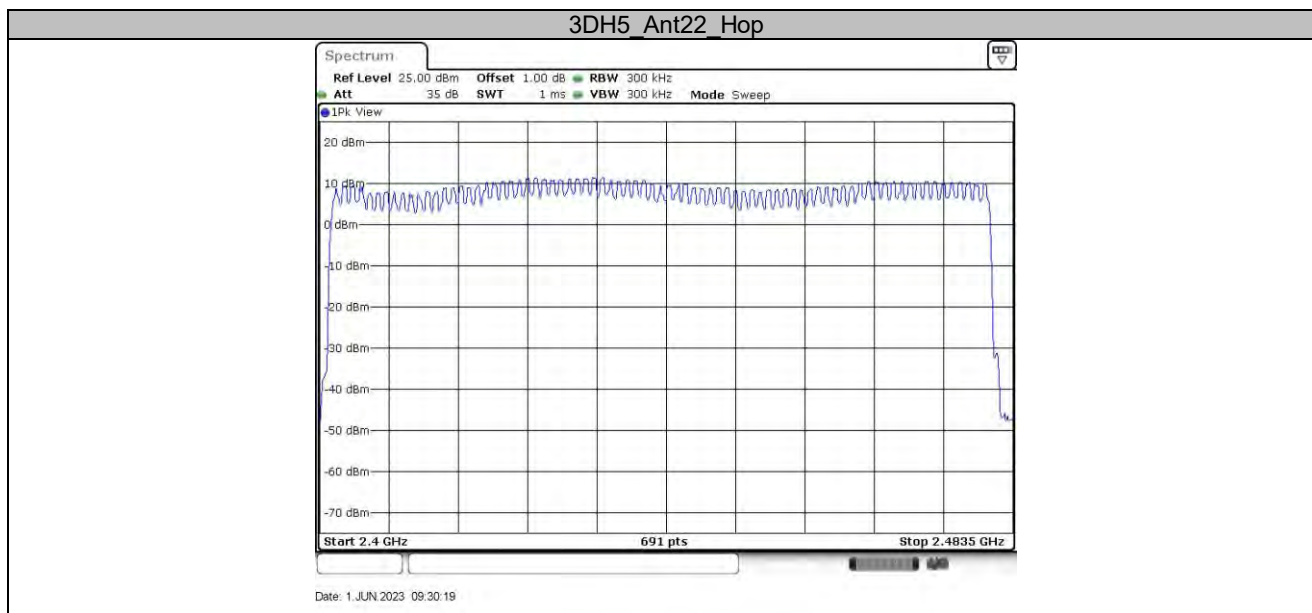
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## Band edge measurements Test Graphs



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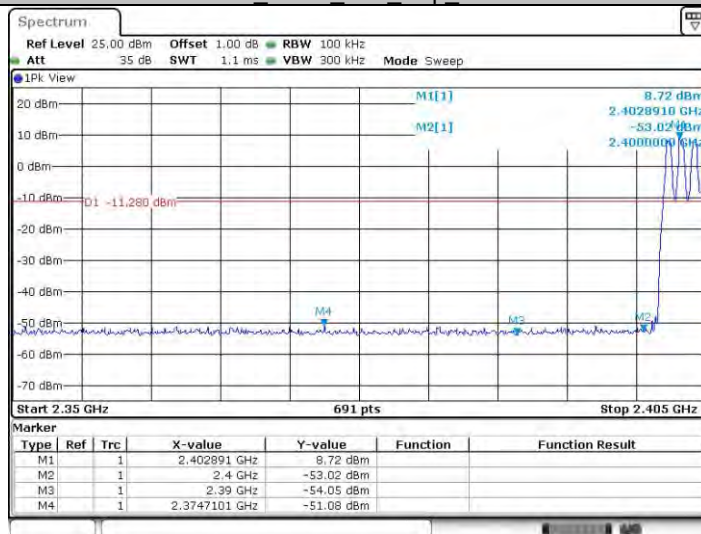
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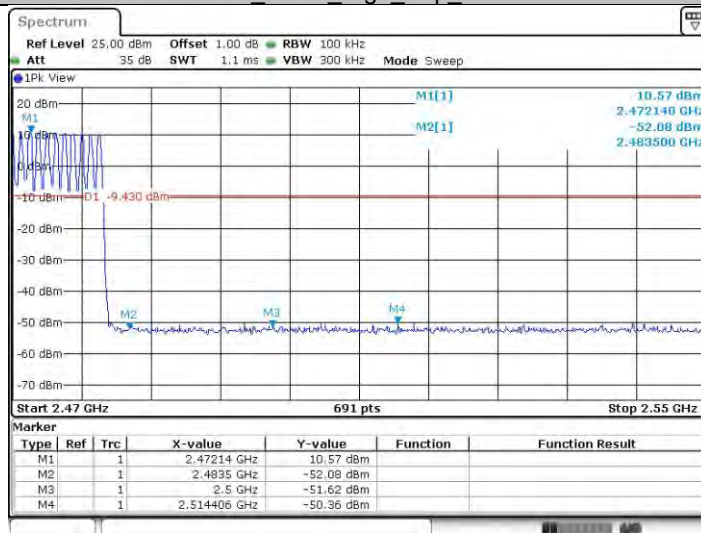
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## DH5\_Ant22\_Low Hop\_2402



Date: 1 JUN 2023 09:21:07

## DH5\_Ant22\_High Hop\_2480



Date: 1 JUN 2023 09:21:26



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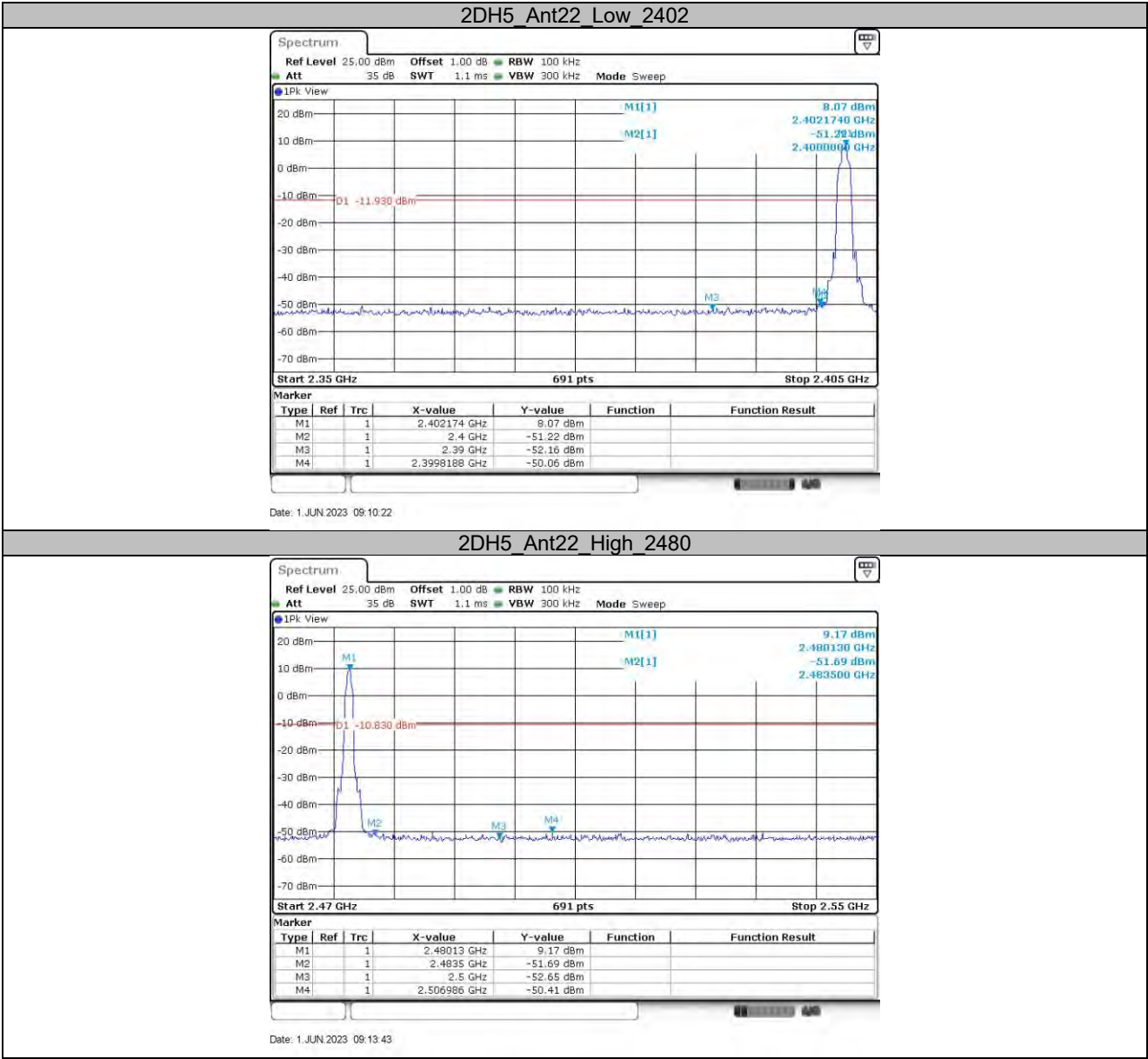
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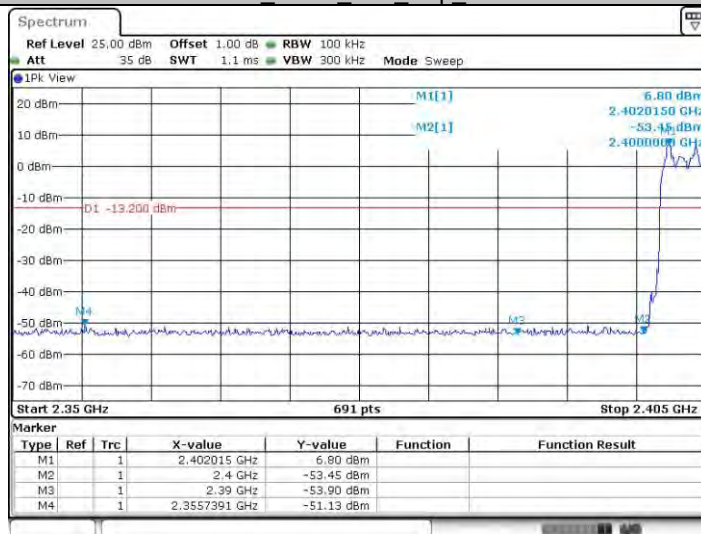
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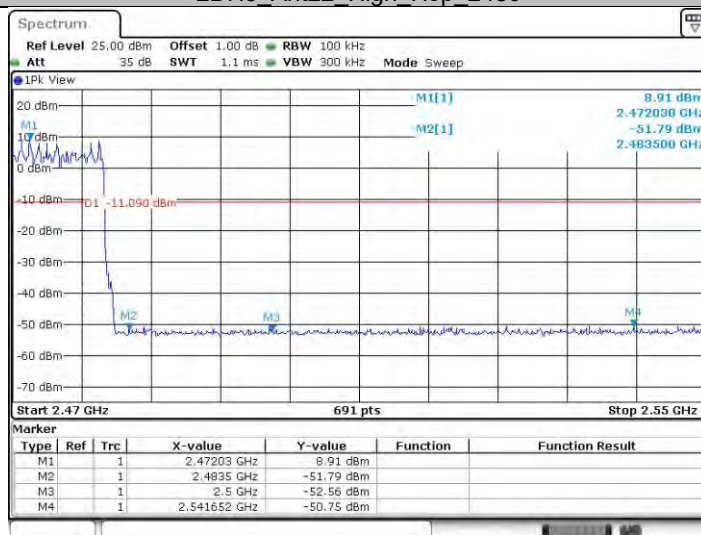
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## 2DH5\_Ant22\_Low\_Hop\_2402



Date: 1 JUN 2023 09:21:48

## 2DH5\_Ant22\_High\_Hop\_2480



Date: 1 JUN 2023 09:22:02



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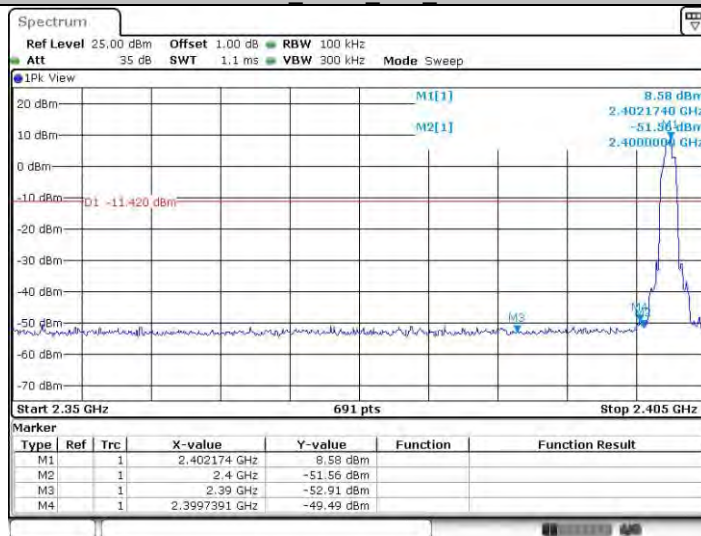
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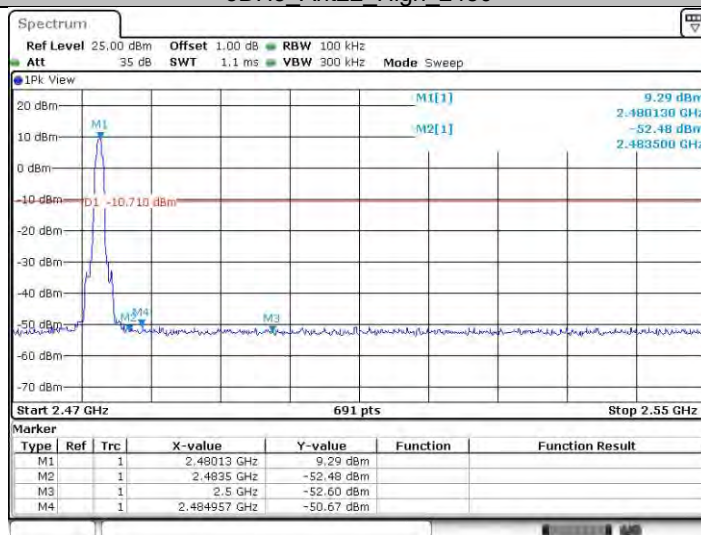
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## 3DH5\_Ant22\_Low\_2402



Date: 1 JUN 2023 09:15:44

## 3DH5\_Ant22\_High\_2480



Date: 1 JUN 2023 09:19:12



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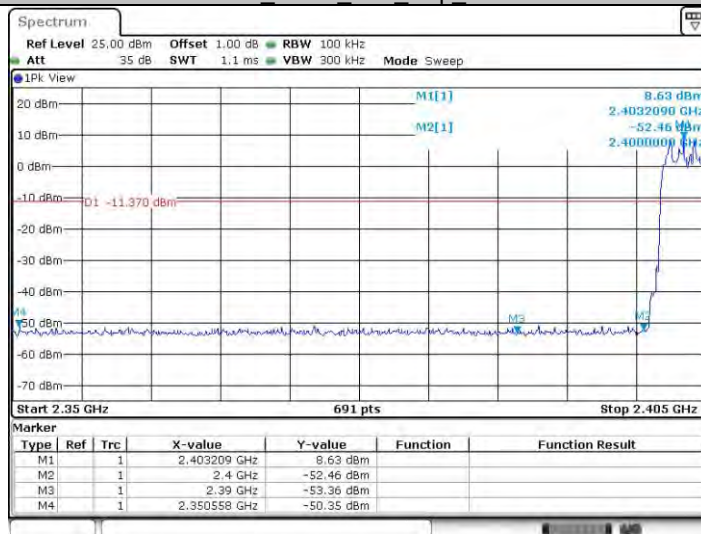
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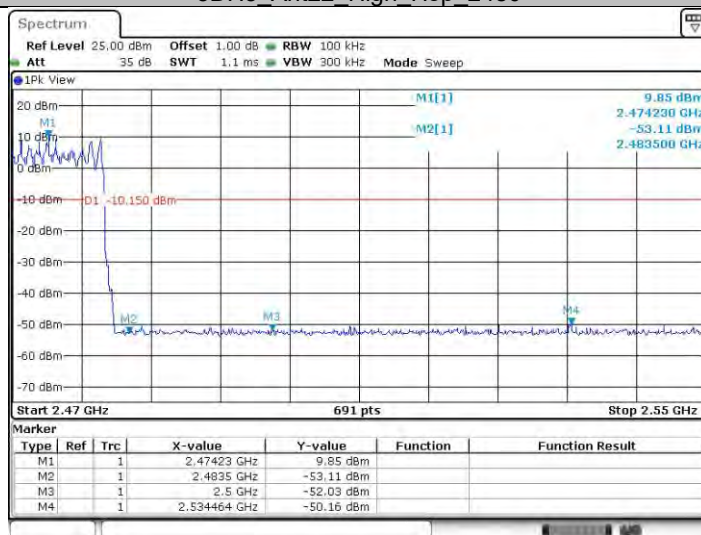
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## 3DH5\_Ant22\_Low\_Hop\_2402



Date: 1 JUN 2023 09:22:26

## 3DH5\_Ant22\_High\_Hop\_2480



Date: 1 JUN 2023 09:22:41



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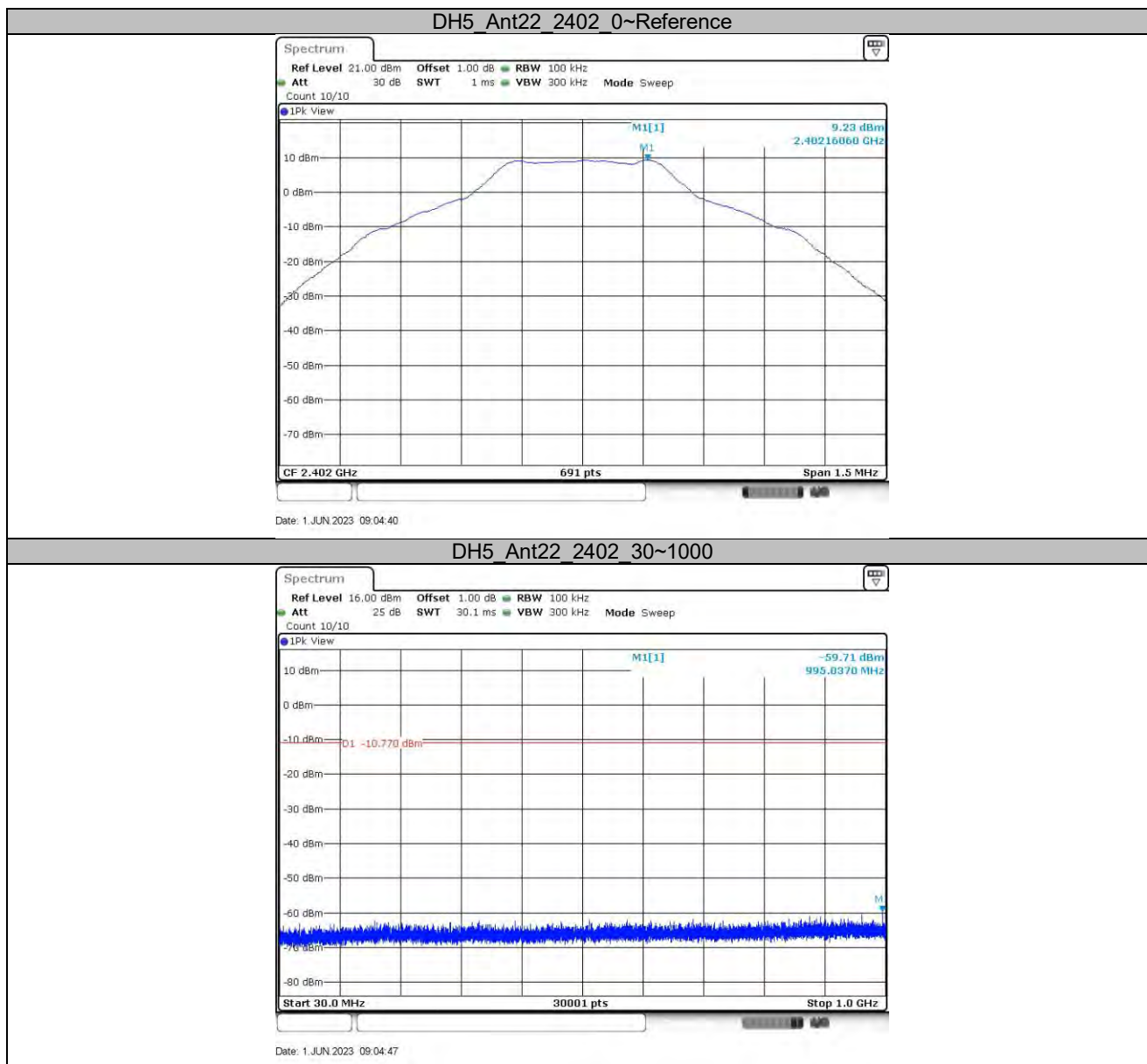
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## Conducted Spurious Emission Test Graphs



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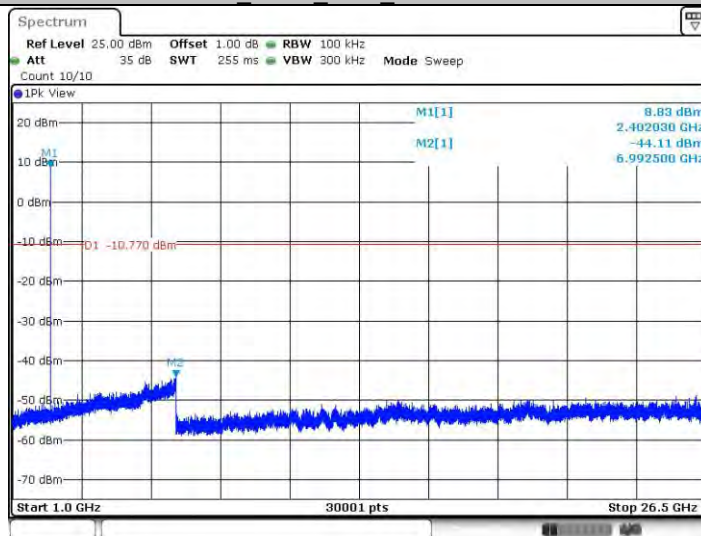
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Date: 1 JUN 2023 09:05:23

DH5\_Ant22\_2441\_0~Reference



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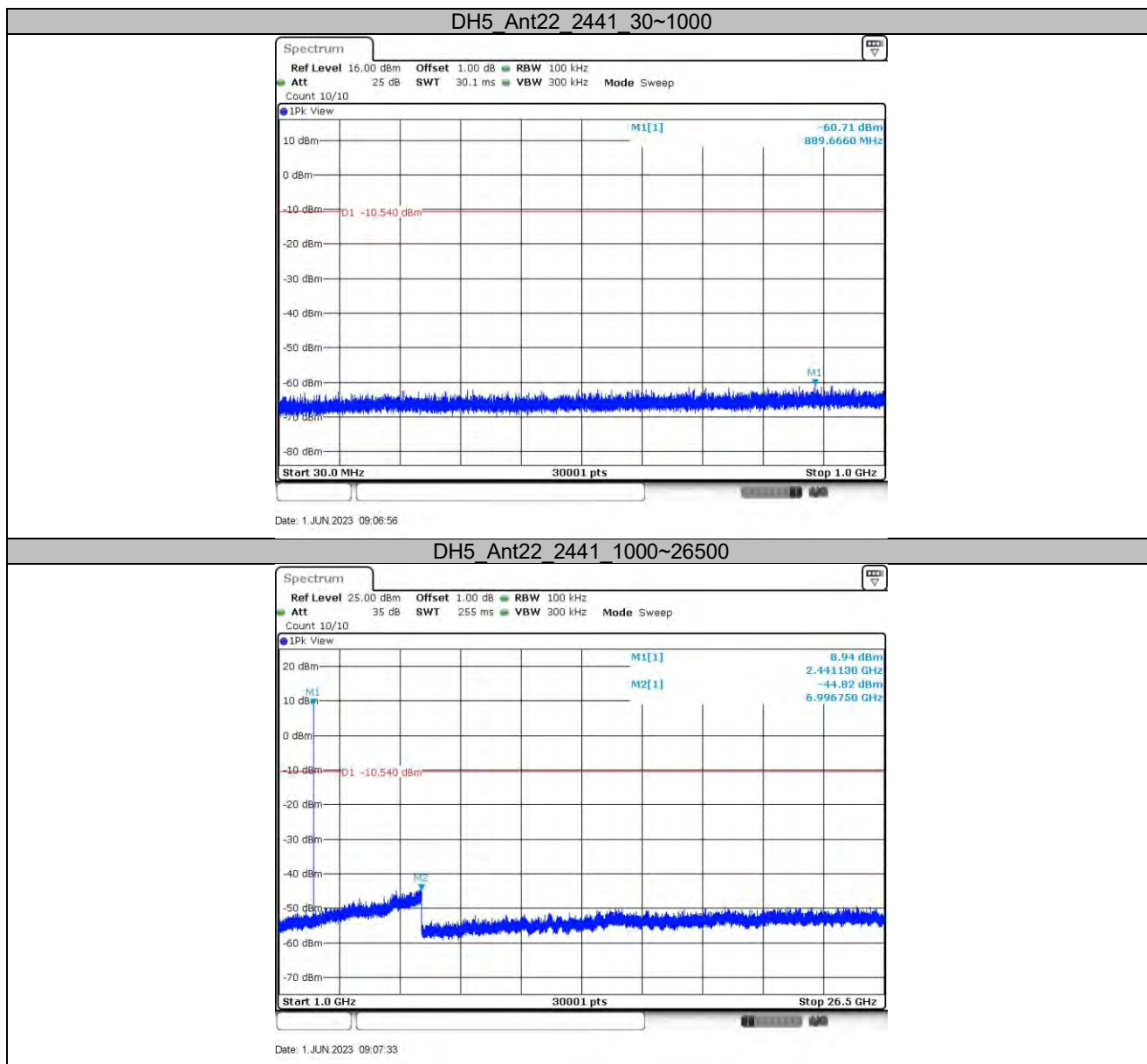
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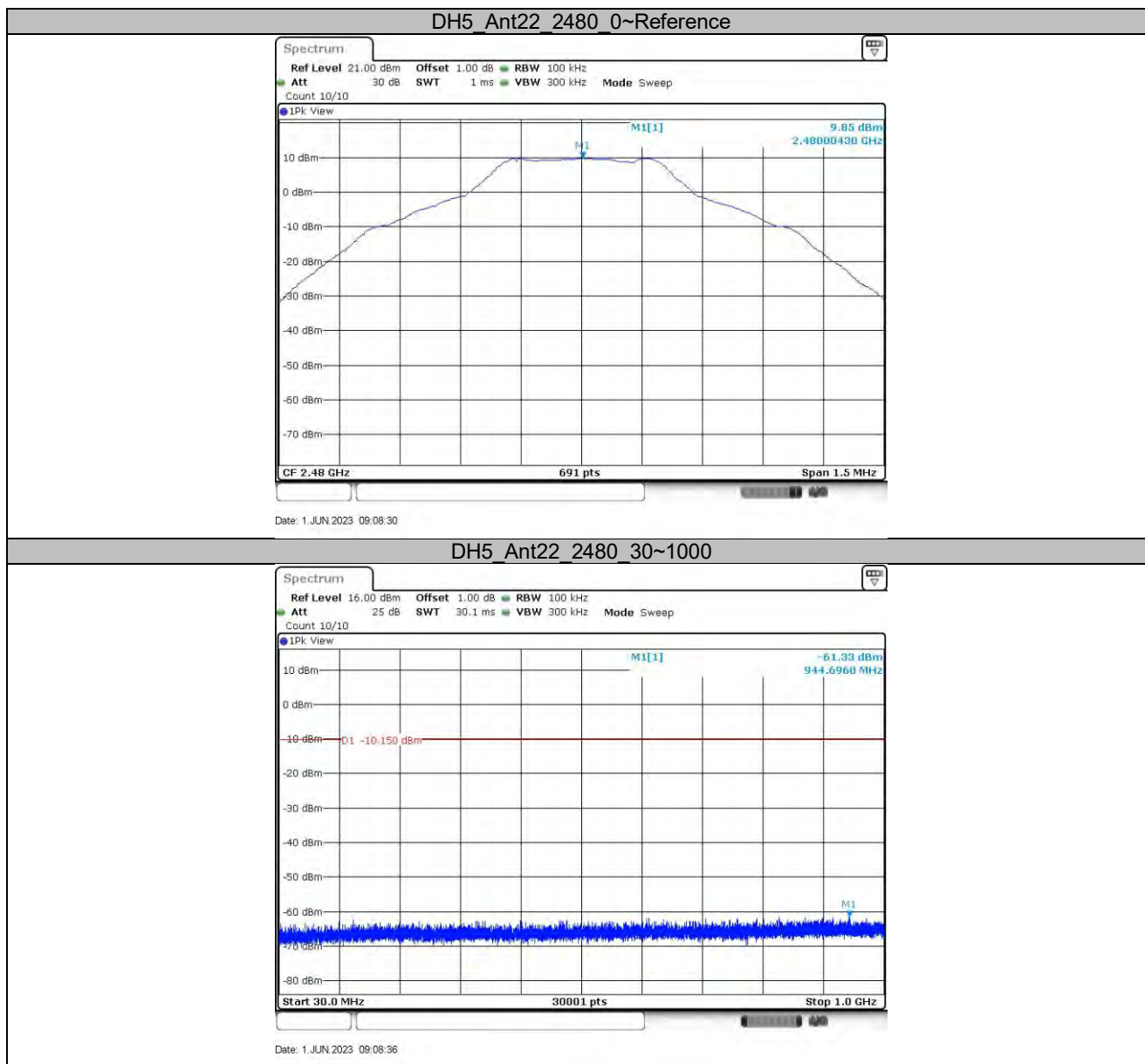
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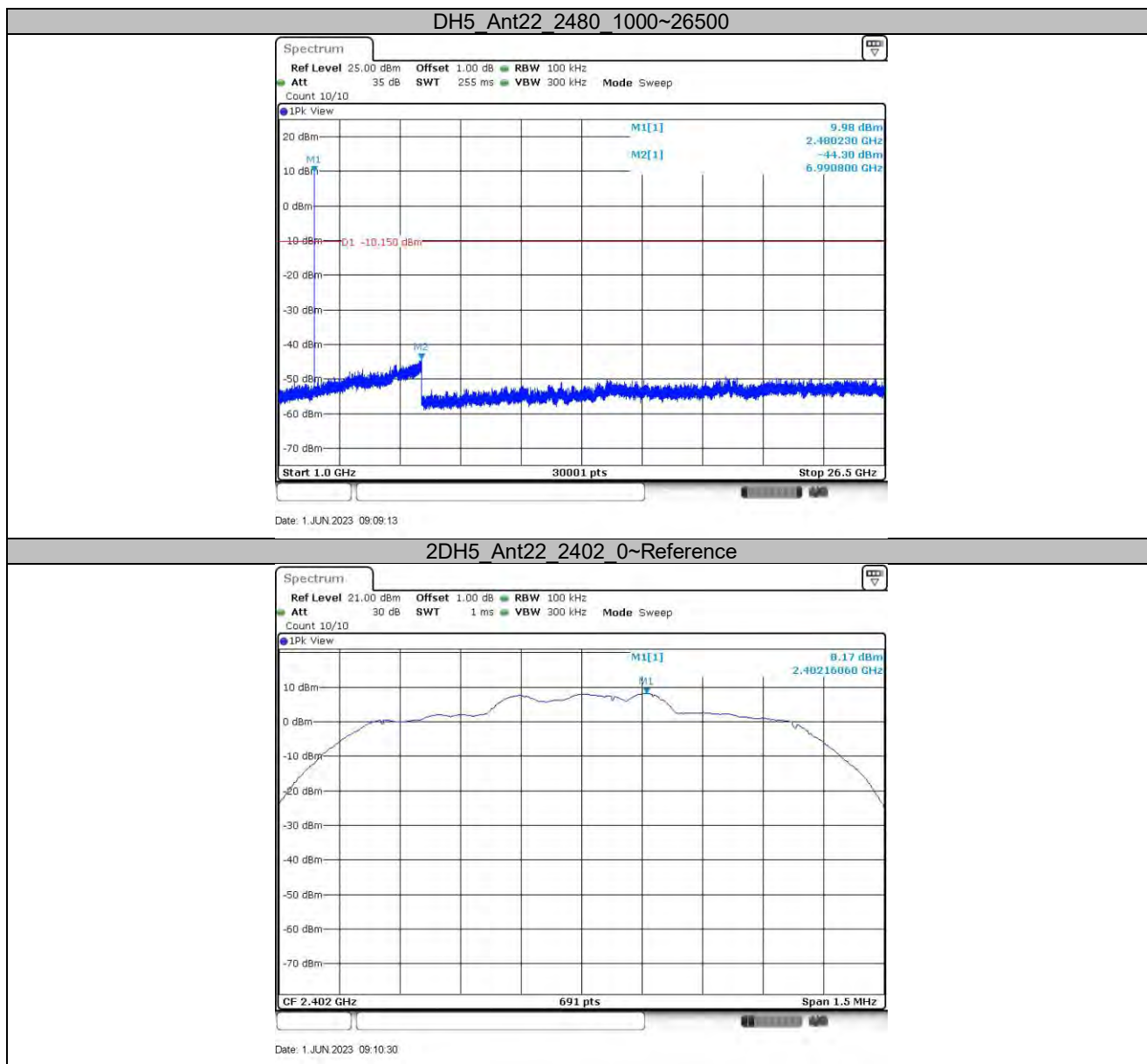
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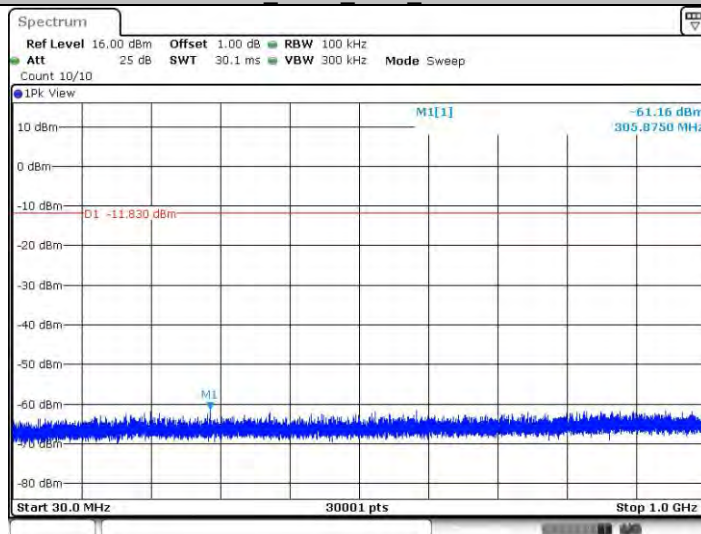
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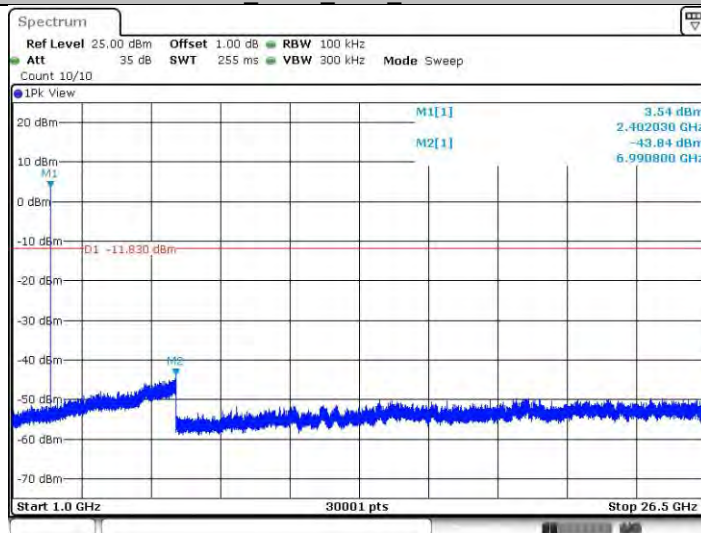
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## 2DH5\_Ant22\_2402\_30~1000



Date: 1 JUN.2023 09:10:36

## 2DH5\_Ant22\_2402\_1000~26500



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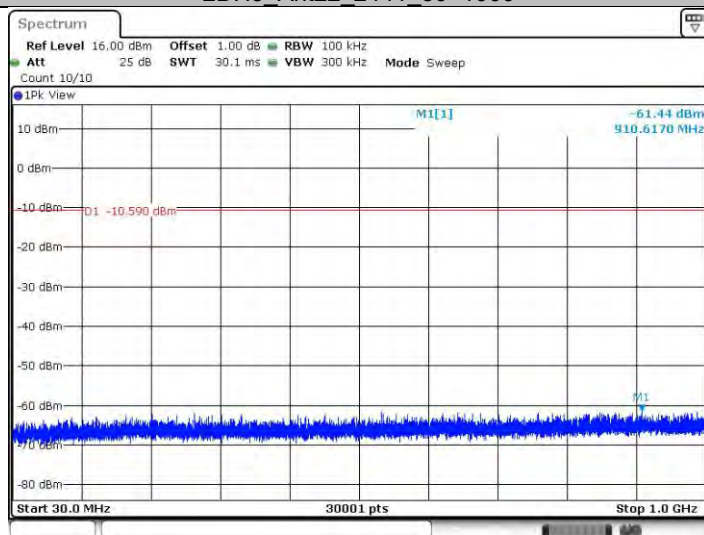
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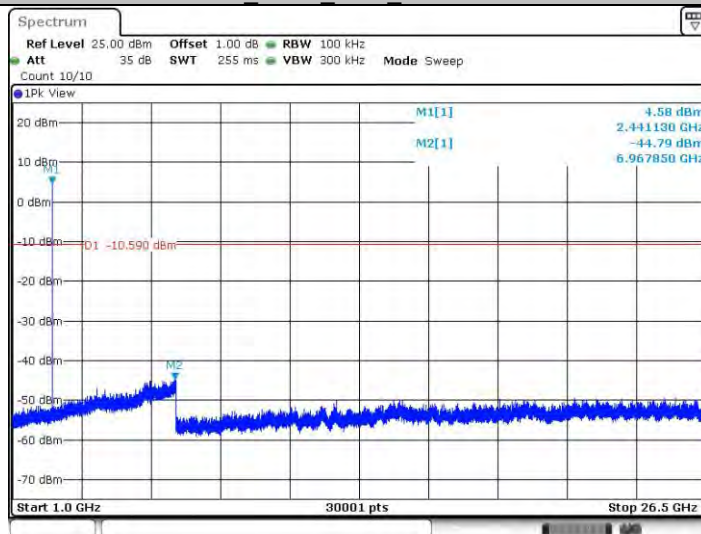
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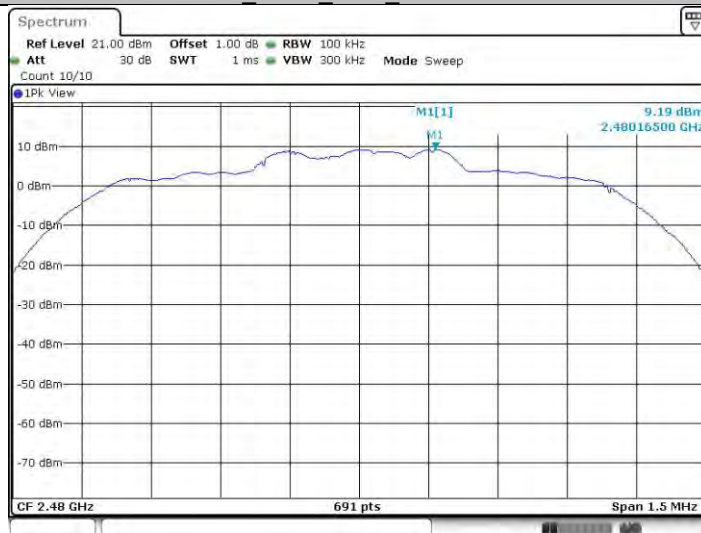
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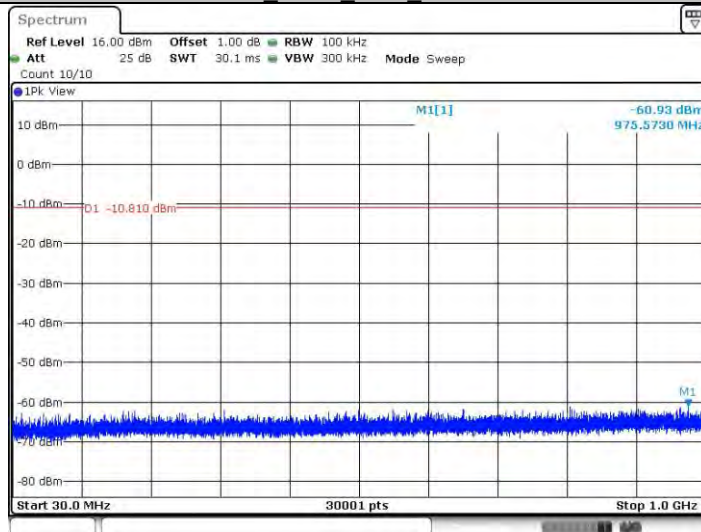
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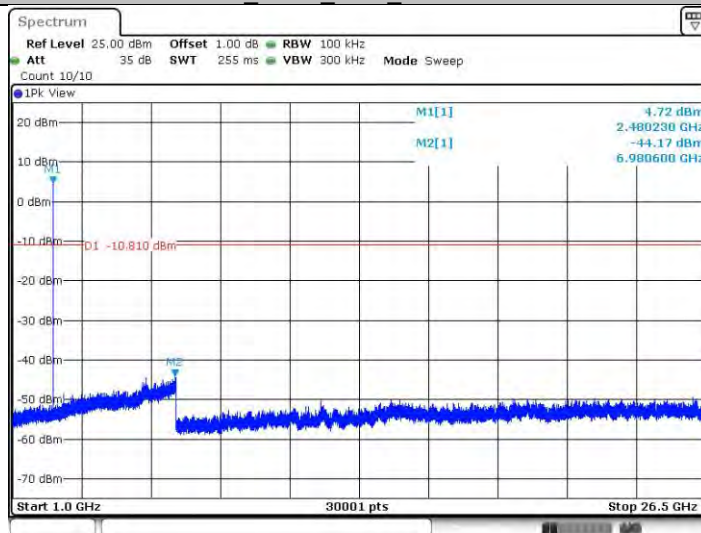
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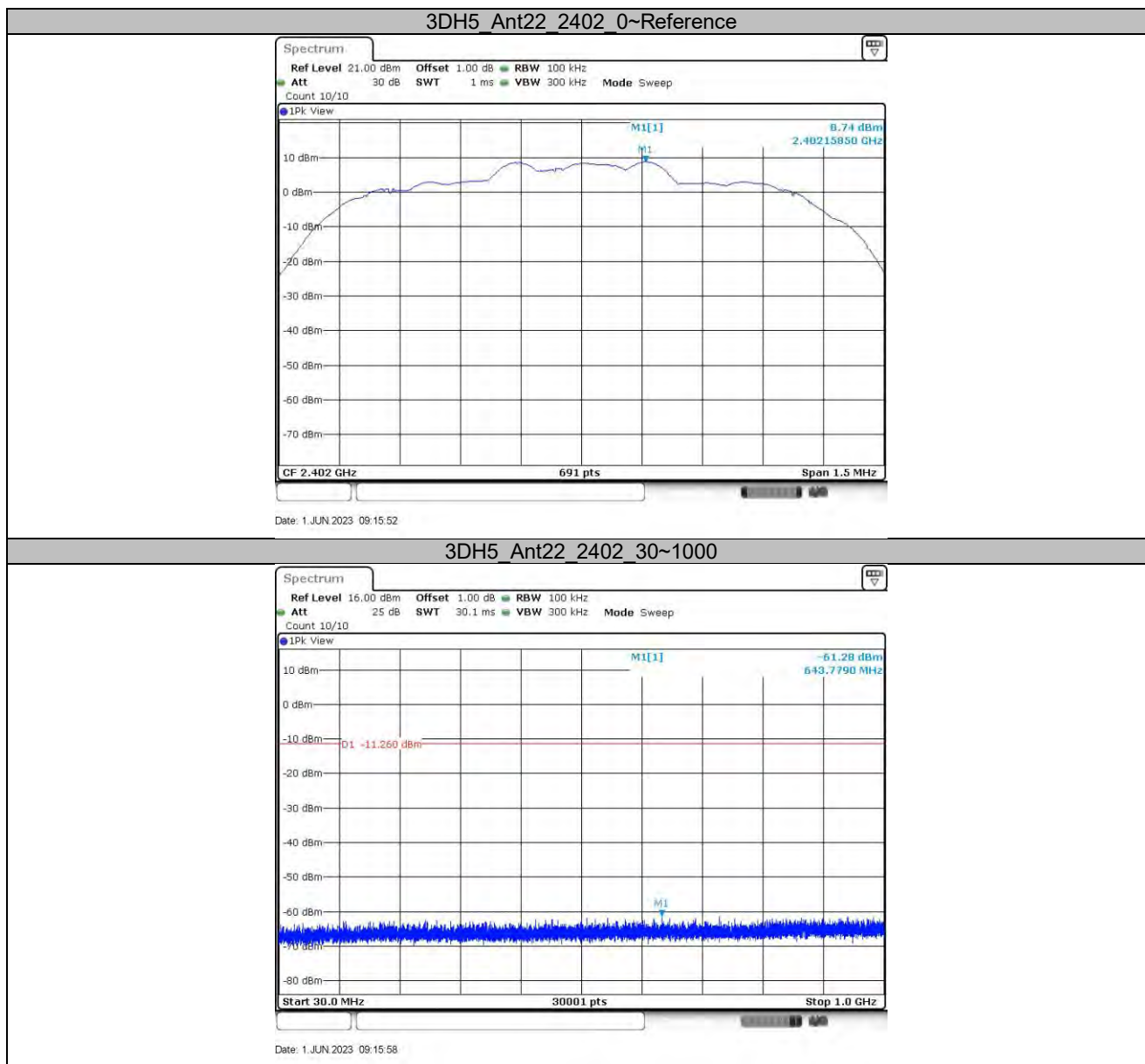
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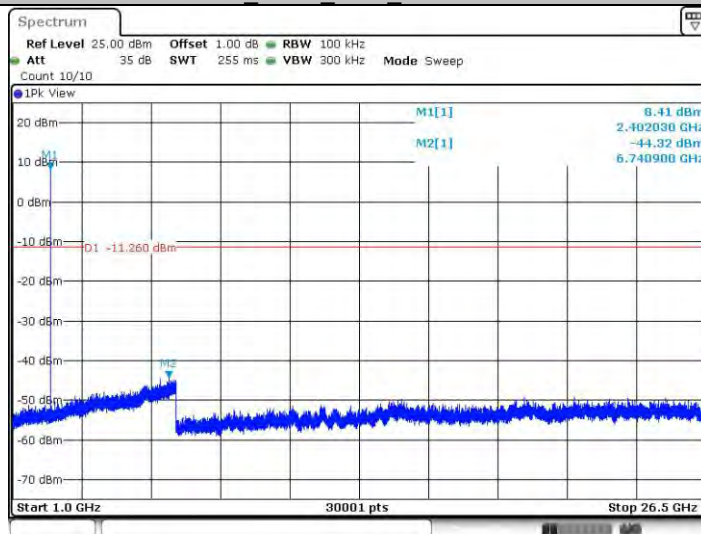
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## 3DH5\_Ant22\_2402\_1000~26500



Date: 1 JUN 2023 09:16:35

## 3DH5\_Ant22\_2441\_0~Reference



Date: 1 JUN 2023 09:17:27



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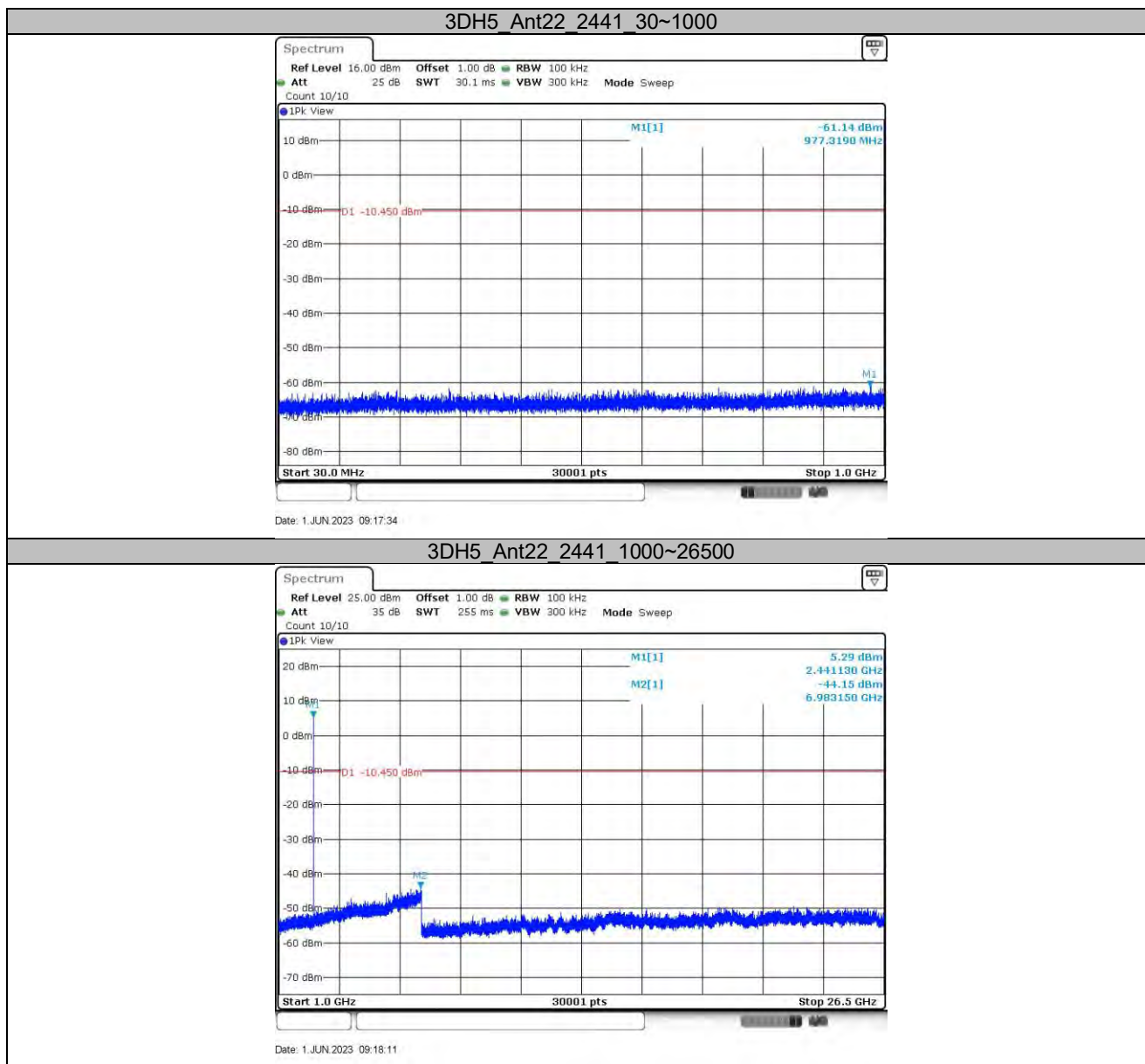
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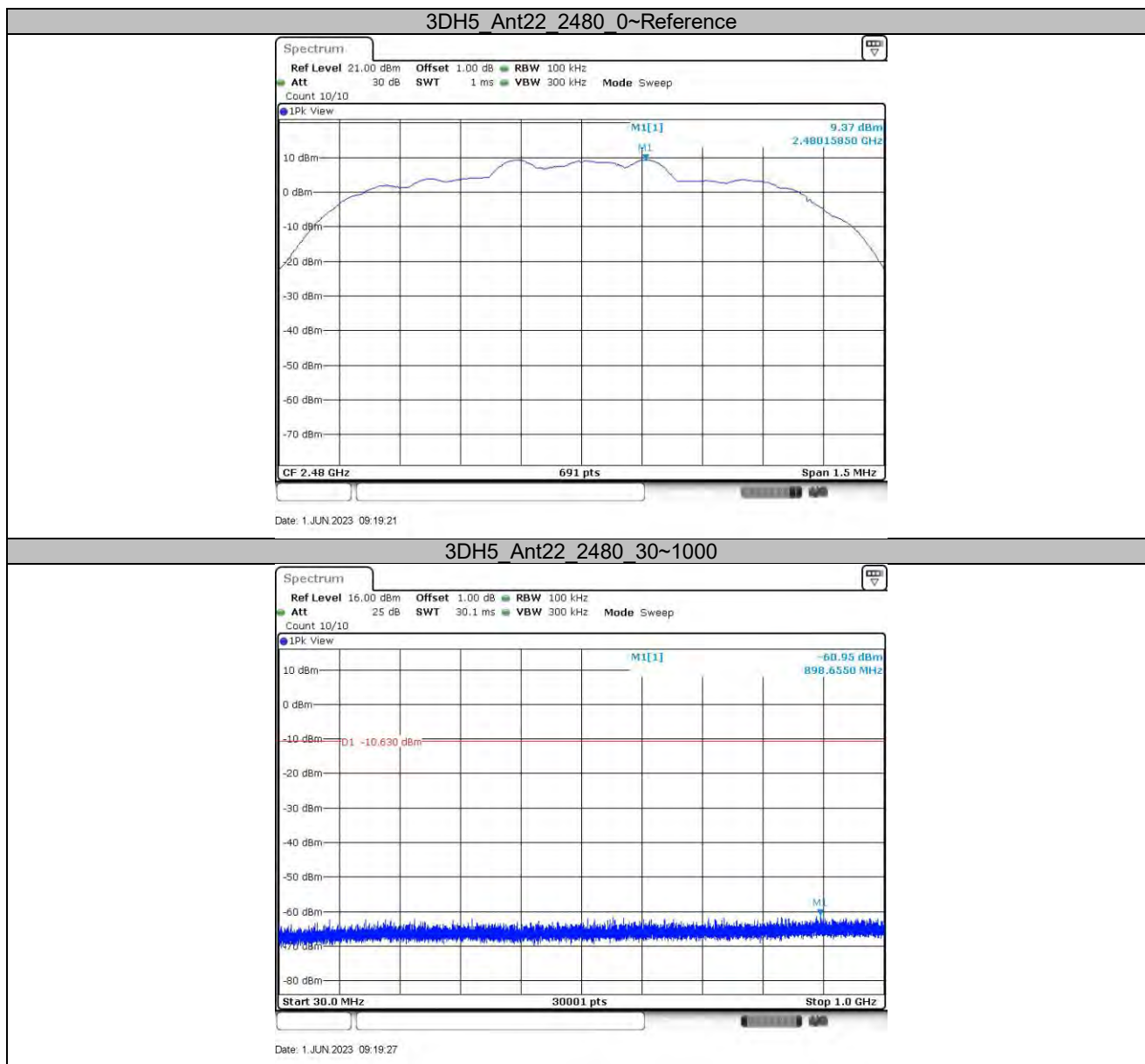
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## Duty Cycle Test Result

| TestMode | Antenna | Frequency[MHz] | ON Time<br>[ms] | Period<br>[ms] | Duty Cycle<br>[%] | Duty Cycle<br>Factor[dB] |
|----------|---------|----------------|-----------------|----------------|-------------------|--------------------------|
| DH5      | Ant22   | 2402           | 2.88            | 3.75           | 76.80             | 1.15                     |
| 2DH5     | Ant22   | 2402           | 2.89            | 3.75           | 77.07             | 1.13                     |
| 3DH5     | Ant22   | 2402           | 2.89            | 3.75           | 77.07             | 1.13                     |



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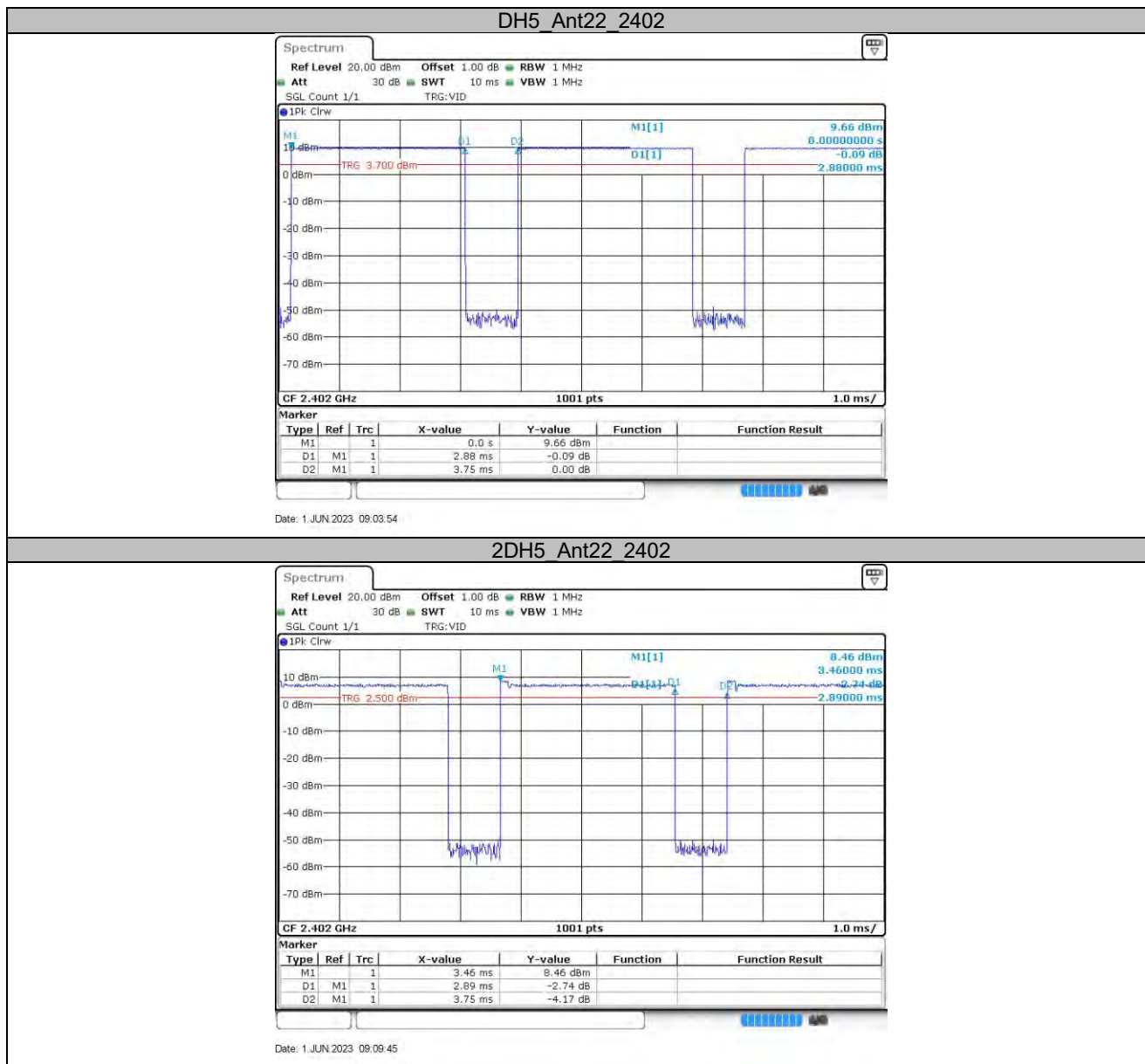
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## Test Graphs



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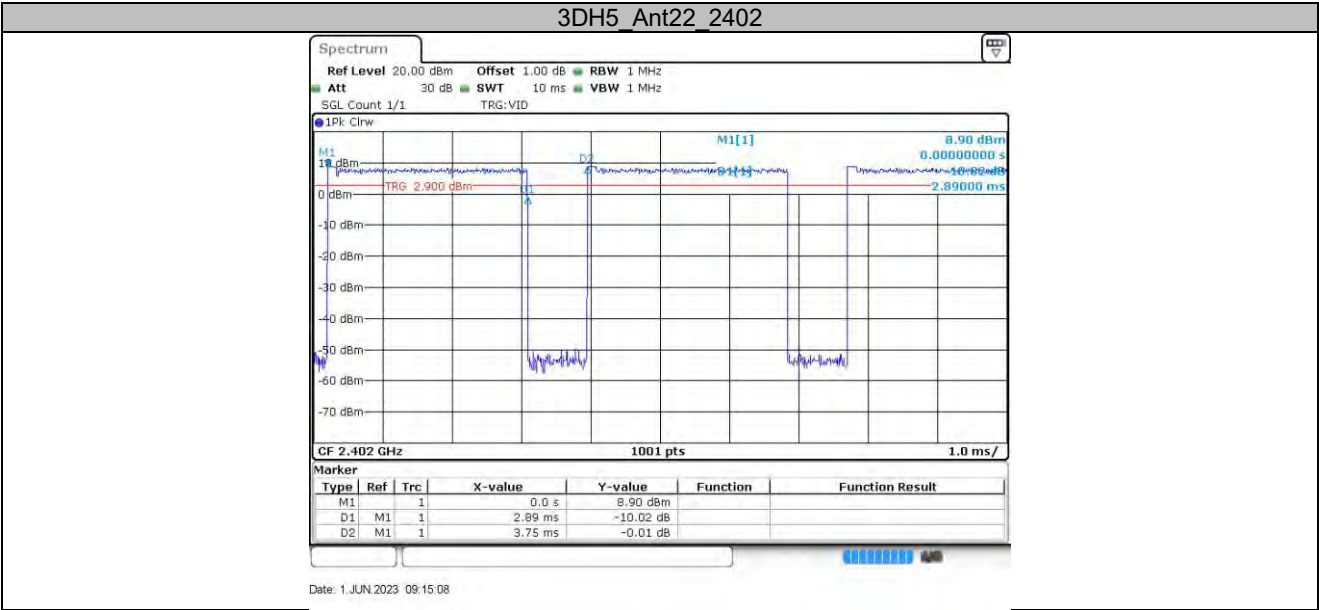
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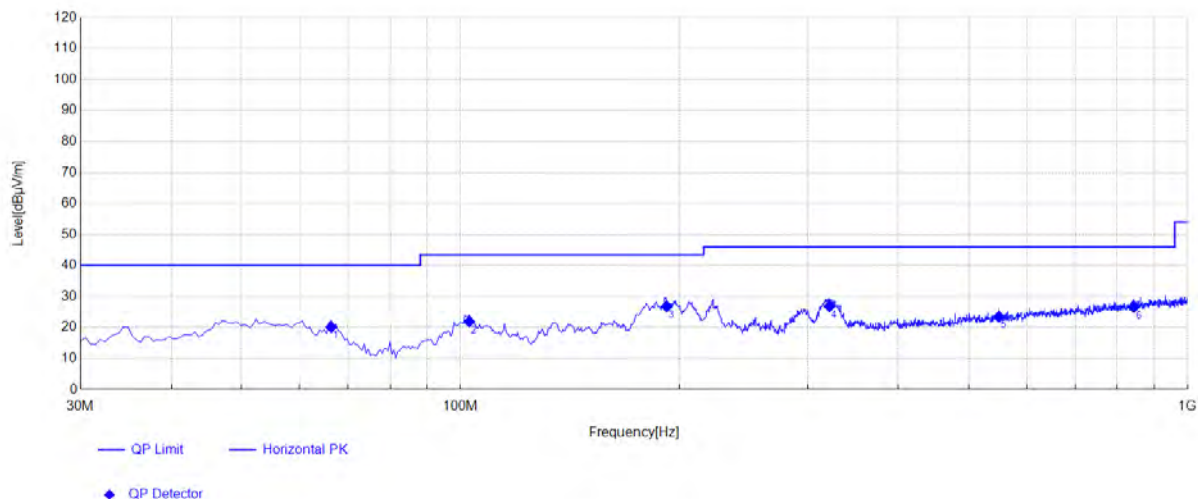
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## Radiated Spurious Emissions

### Radiated emission below 1GHz

Worst case Mode: GFSK\_Channel 0



Data List

| NO. | Freq. [MHz] | AF[dB/m] | Factor [dB] | QP Reading[dBμV] | QP Value [dBμV/m] | QP Limit [dBμV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Polarity   |
|-----|-------------|----------|-------------|------------------|-------------------|-------------------|----------------|-------------|-----------|------------|
| 1   | 66.3932     | 11.43    | -27.57      | 36.26            | 20.12             | 40.00             | 19.88          | 318         | 174       | Horizontal |
| 2   | 102.7864    | 11.72    | -27.12      | 37.28            | 21.88             | 43.50             | 21.62          | 245         | 103       | Horizontal |
| 3   | 192.071     | 10.47    | -26.62      | 42.95            | 26.80             | 43.50             | 16.70          | 384         | 252       | Horizontal |
| 4   | 321.6308    | 13.53    | -25.71      | 39.05            | 26.87             | 46.00             | 19.13          | 154         | 231       | Horizontal |
| 5   | 550.1801    | 18.00    | -24.87      | 30.36            | 23.49             | 46.00             | 22.51          | 226         | 109       | Horizontal |
| 6   | 843.2666    | 21.37    | -24.00      | 29.22            | 26.59             | 46.00             | 19.41          | 201         | 339       | Horizontal |



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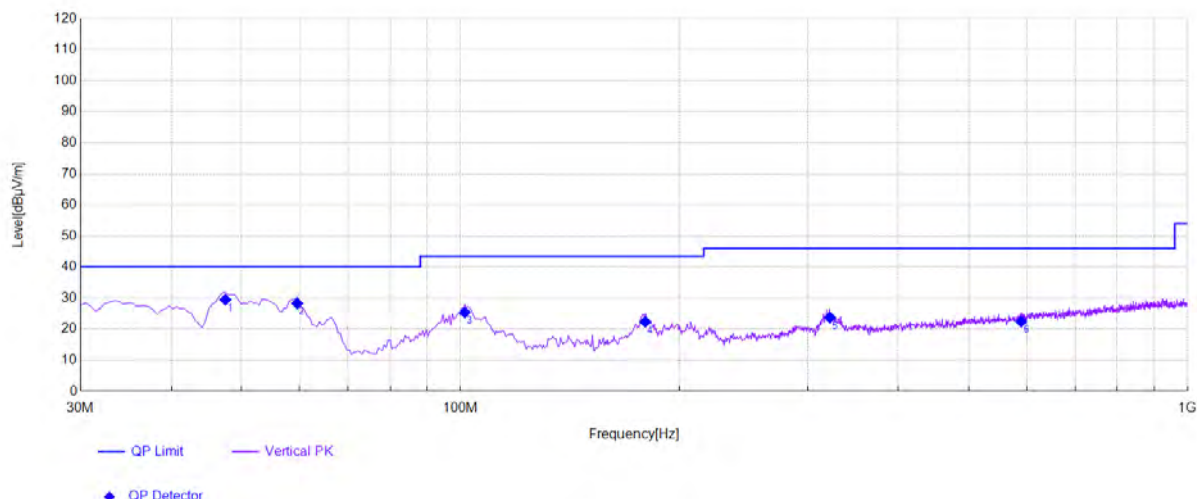
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| Data List |             |          |             |                  |                   |                   |                |             |           |          |
|-----------|-------------|----------|-------------|------------------|-------------------|-------------------|----------------|-------------|-----------|----------|
| NO.       | Freq. [MHz] | AF[dB/m] | Factor [dB] | QP Reading[dBμV] | QP Value [dBμV/m] | QP Limit [dBμV/m] | QP Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1         | 47.4687     | 14.07    | -27.77      | 43.21            | 29.51             | 40.00             | 10.49          | 325         | 5         | Vertical |
| 2         | 59.5998     | 12.44    | -27.96      | 43.83            | 28.31             | 40.00             | 11.69          | 195         | 287       | Vertical |
| 3         | 101.3307    | 11.73    | -27.12      | 40.78            | 25.39             | 43.50             | 18.11          | 319         | 89        | Vertical |
| 4         | 179.4547    | 9.09     | -26.45      | 39.71            | 22.35             | 43.50             | 21.15          | 260         | 293       | Vertical |
| 5         | 322.1161    | 13.54    | -25.72      | 35.92            | 23.74             | 46.00             | 22.26          | 221         | 29        | Vertical |
| 6         | 590.4552    | 18.46    | -24.44      | 28.42            | 22.44             | 46.00             | 23.56          | 263         | 161       | Vertical |

## Remark:

- The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier gain. The basic equation with a sample calculation is as follows:  
 Value = Reading(dBμV) + AF(dB/m) + Factor(dB):  
 AF = Antenna Factor(dB/m)  
 Factor = Cable Factor(dB) - Preamplifier gain(dB)  
 Margin = Limit(dBμV/m) – Value(dBμV/m)
- All channels have been tested, but only the worst case data displayed in this report.



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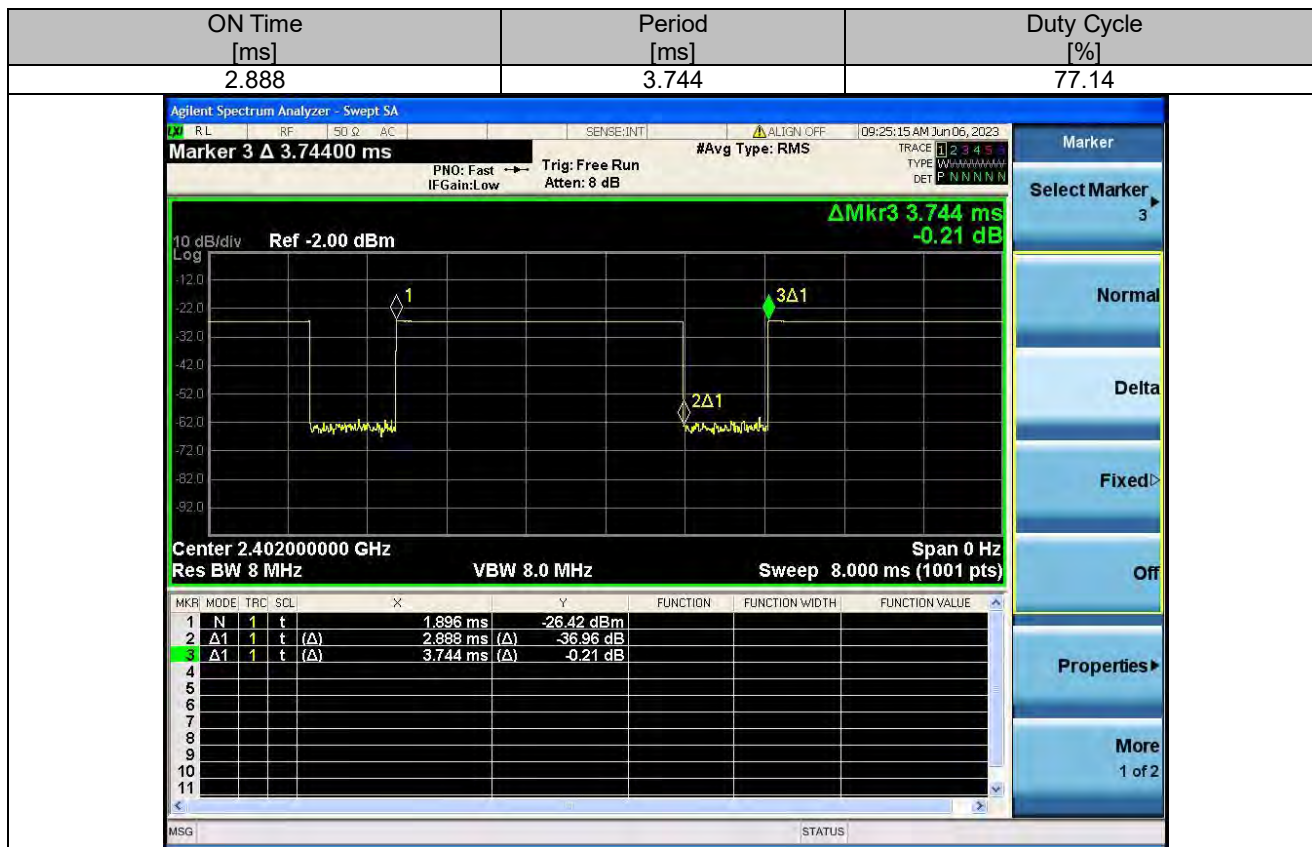
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## Transmitter emission Above 1GHz Duty cycle



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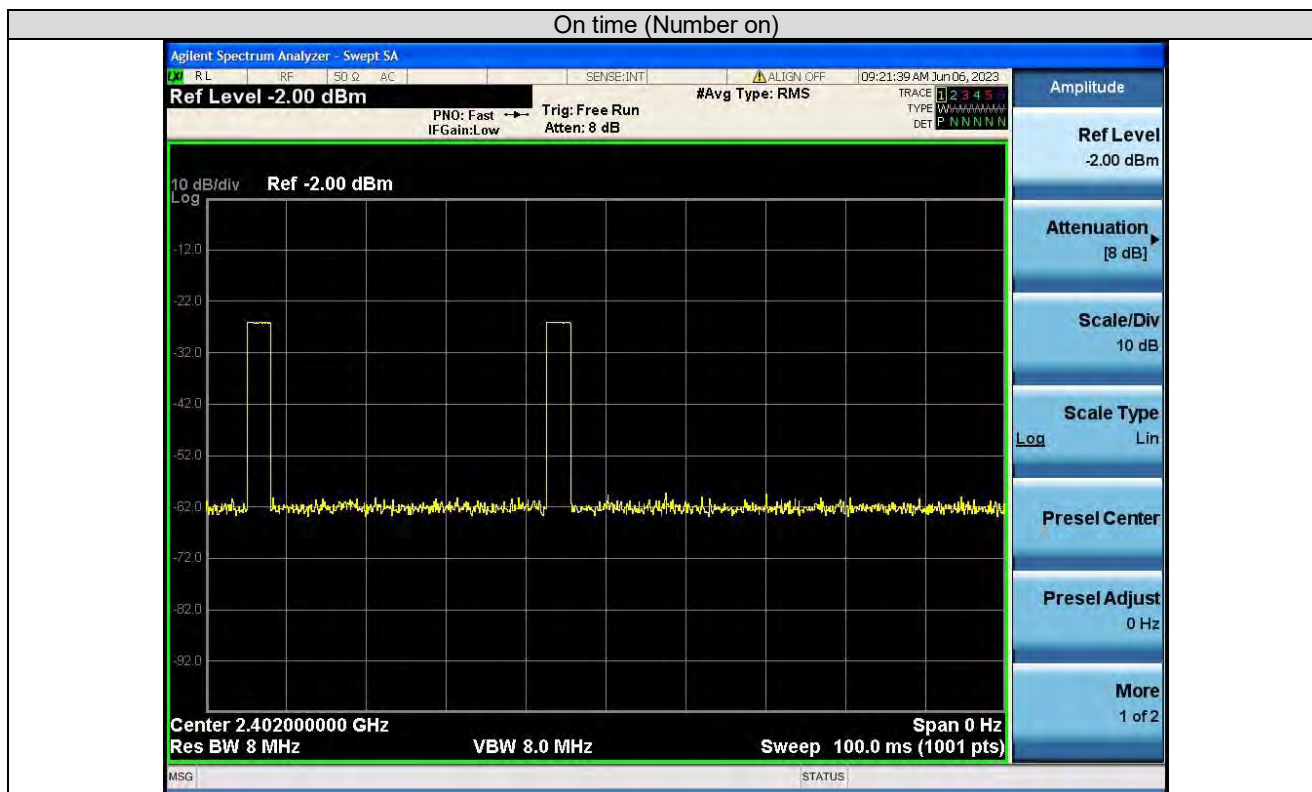
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Note:

1. Duty cycle = on time / 100 ms = 2 \* 2.888 / 100 = 5.776%
2. Duty cycle Correction factor =  $20 \cdot \log(\text{Duty cycle}) = -24.77\text{dB}$



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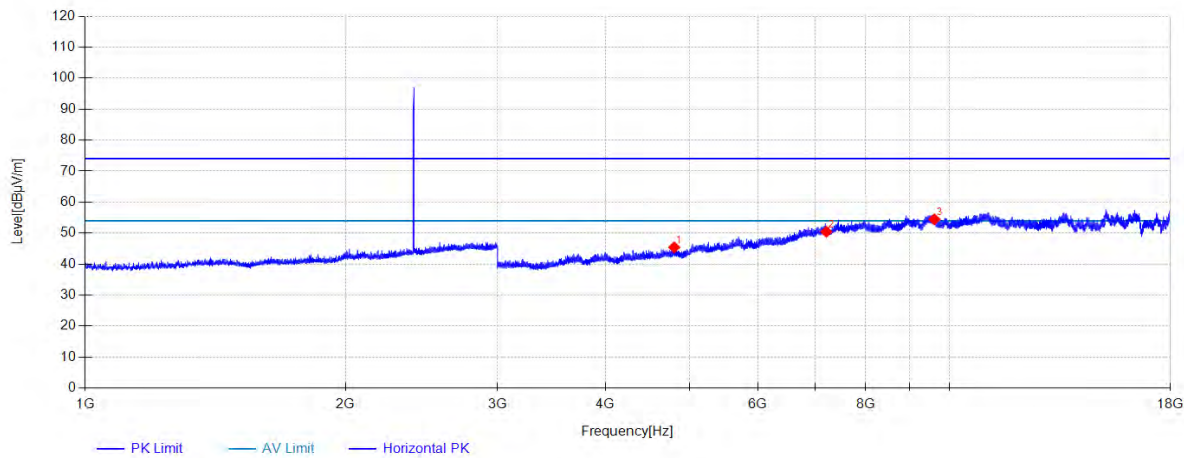
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GFSK\_Channel 0



| Data List |                 |                |          |             |                |                |             |             |           |            |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|------------|
| NO.       | Frequency [MHz] | Reading [dBµV] | AF[dB/m] | Factor [dB] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
| 1         | 4804            | 57.60          | 30.78    | -42.95      | 45.43          | 74.00          | 28.57       | 243         | 344       | Horizontal |
| 2         | 4804            | -              | -        | -           | 20.66          | 54.00          | 33.34       | -           | -         | -          |
| 3         | 7206            | 52.59          | 36.56    | -38.71      | 50.44          | 74.00          | 23.56       | 125         | 286       | Horizontal |
| 4         | 7206            | -              | -        | -           | 25.67          | 54.00          | 28.33       | -           | -         | -          |
| 5         | 9608            | 52.32          | 37.85    | -35.70      | 54.47          | 74.00          | 19.53       | 315         | 78        | Horizontal |
| 6         | 9608            | -              | -        | -           | 29.70          | 54.00          | 24.30       | -           | --        | -          |



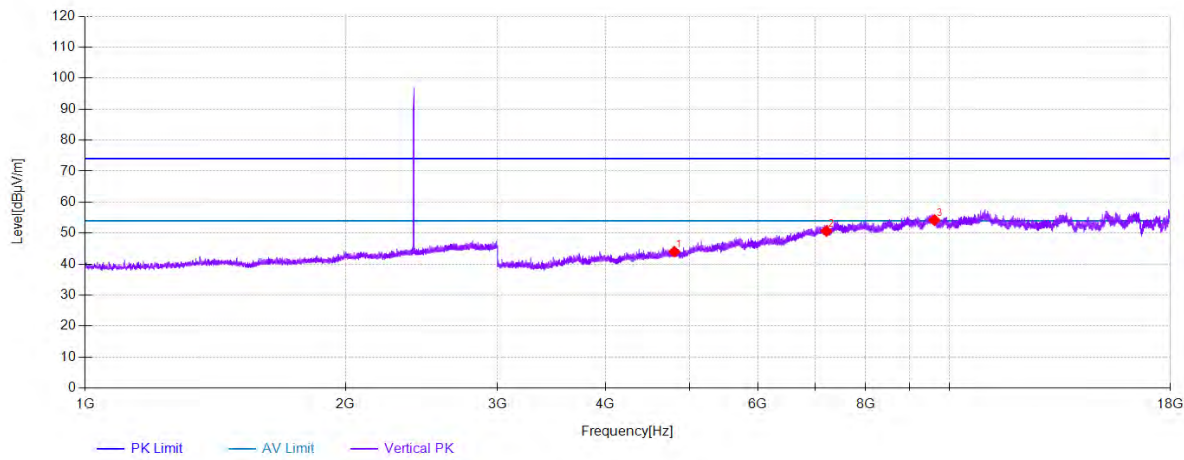
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GFSK\_Channel 0



| Data List |                 |                |          |             |                |                |             |             |           |          |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|----------|
| NO.       | Frequency [MHz] | Reading [dBµV] | AF[dB/m] | Factor [dB] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1         | 4804            | 56.15          | 30.78    | -42.95      | 43.98          | 74.00          | 30.02       | 231         | 127       | Vertical |
| 2         | 4804            | -              | -        | -           | 19.21          | 54.00          | 34.79       | -           | -         | -        |
| 3         | 7206            | 52.81          | 36.56    | -38.71      | 50.66          | 74.00          | 23.34       | 286         | 244       | Vertical |
| 4         | 7206            | -              | -        | -           | 28.89          | 54.00          | 28.11       | -           | -         | -        |
| 5         | 9608            | 52.05          | 37.85    | -35.70      | 54.20          | 74.00          | 19.80       | 153         | 233       | Vertical |
| 6         | 9608            | -              | -        | -           | 29.43          | 54.00          | 24.57       | -           | -         | -        |



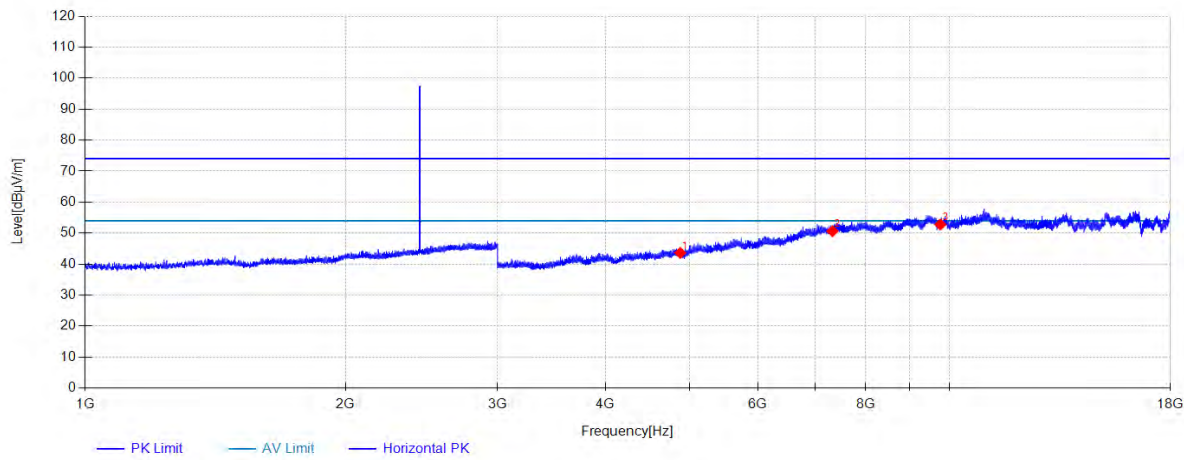
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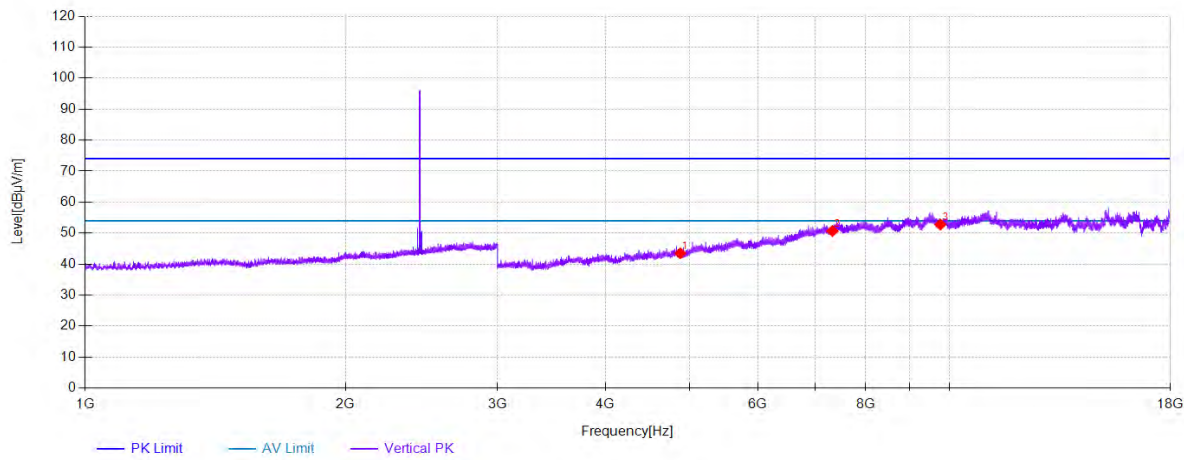
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|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|------------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF[dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
| 1         | 4882            | 55.72          | 30.79    | -42.89      | 43.62          | 74.00          | 30.38       | 354         | 320       | Horizontal |
| 2         | 4882            | -              | -        | -           | 18.85          | 54.00          | 35.15       | -           | -         | -          |
| 3         | 7323            | 52.92          | 36.45    | -38.74      | 50.63          | 74.00          | 23.37       | 265         | 204       | Horizontal |
| 4         | 7323            | -              | -        | -           | 25.86          | 54.00          | 28.14       | -           | -         | -          |
| 5         | 9764            | 50.36          | 38.36    | -35.95      | 52.77          | 74.00          | 21.23       | 315         | 242       | Horizontal |
| 6         | 9764            | -              | -        | -           | 28.00          | 54.00          | 26.00       | -           | -         | -          |



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GFSK\_Channel 39



| Data List |                 |                |          |             |                |                |             |             |           |          |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|----------|
| NO.       | Frequency [MHz] | Reading [dBµV] | AF[dB/m] | Factor [dB] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1         | 4882            | 55.60          | 30.79    | -42.89      | 43.50          | 74.00          | 30.50       | 360         | 146       | Vertical |
| 2         | 4882            | -              | -        | -           | 18.73          | 54.00          | 35.27       | -           | -         | -        |
| 3         | 7323            | 52.98          | 36.45    | -38.74      | 50.69          | 74.00          | 23.31       | 288         | 155       | Vertical |
| 4         | 7323            | -              | -        | -           | 25.92          | 54.00          | 28.08       | -           | -         | -        |
| 5         | 9764            | 50.36          | 38.36    | -35.95      | 52.77          | 74.00          | 21.23       | 236         | 107       | Vertical |
| 6         | 9764            | -              | -        | -           | 28.00          | 54.00          | 26.00       | -           | -         | -        |

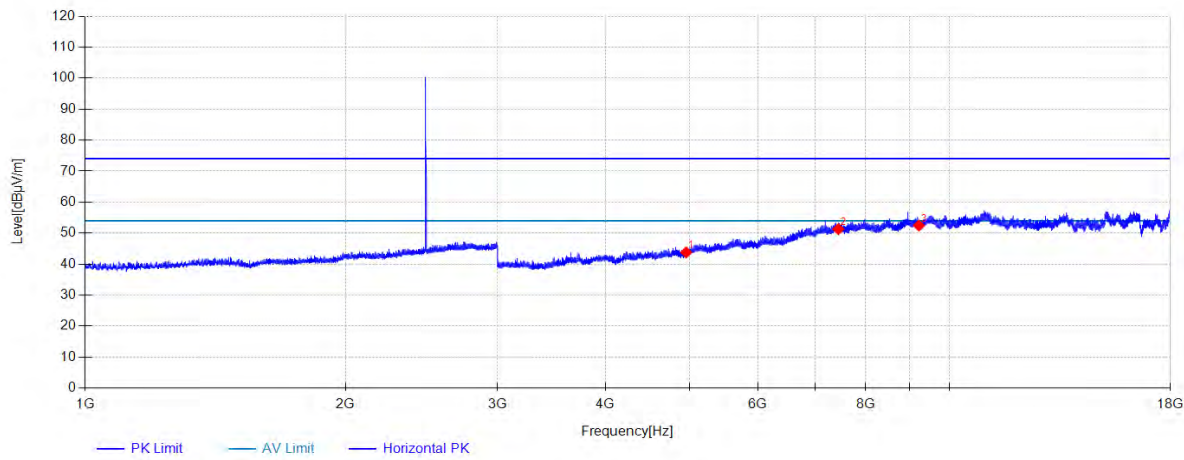




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| Data List |                 |                |          |             |                |                |             |             |           |            |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|------------|
| NO.       | Frequency [MHz] | Reading [dBµV] | AF[dB/m] | Factor [dB] | Level [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
| 1         | 4960            | 55.53          | 31.04    | -42.78      | 43.79          | 74.00          | 30.21       | 224         | 340       | Horizontal |
| 2         | 4960            | -              | -        | -           | 19.02          | 54.00          | 34.98       | -           | -         | -          |
| 3         | 7440            | 52.79          | 36.78    | -38.28      | 51.29          | 74.00          | 22.71       | 315         | 146       | Horizontal |
| 4         | 7440            | -              | -        | -           | 26.52          | 54.00          | 27.48       | -           | -         | -          |
| 5         | 9220            | 51.00          | 37.50    | -36.04      | 52.46          | 74.00          | 21.54       | 278         | 165       | Horizontal |
| 6         | 9220            | -              | -        | -           | 27.69          | 54.00          | 26.31       | -           | -         | -          |



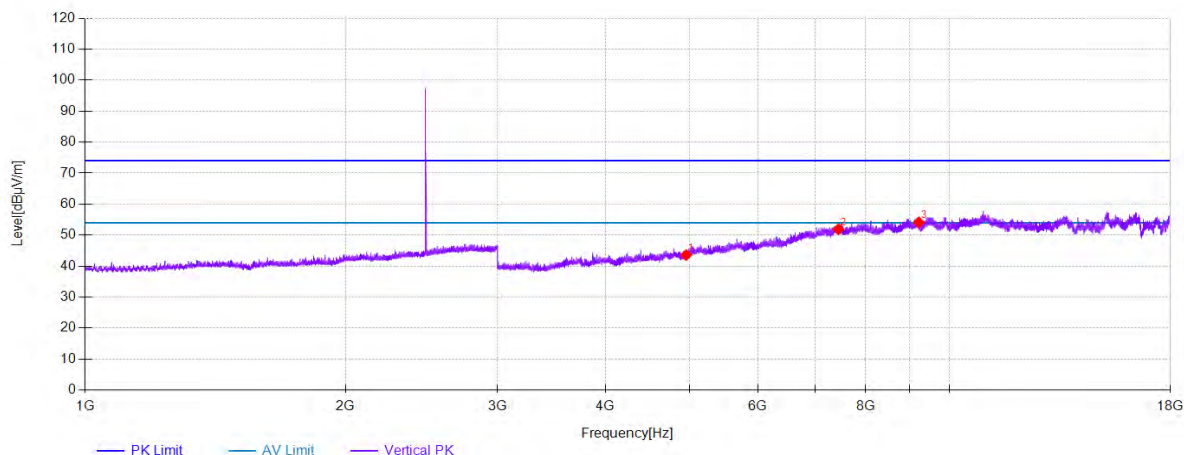
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## GFSK\_Channel 78



| Data List |                 |                |          |             |                |                |             |             |           |          |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|----------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF[dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1         | 4960            | 55.32          | 31.04    | -42.78      | 43.58          | 74.00          | 30.42       | 286         | 328       | Vertical |
| 2         | 4960            | -              | -        | -           | 18.81          | 54.00          | 35.19       | -           | -         | -        |
| 3         | 7440            | 53.42          | 36.78    | -38.28      | 51.92          | 74.00          | 22.08       | 364         | 164       | Vertical |
| 4         | 7440            | -              | -        | -           | 37.15          | 54.00          | 26.85       | -           | -         | -        |
| 5         | 9220            | 52.68          | 37.50    | -36.04      | 54.14          | 74.00          | 19.86       | 231         | 223       | Vertical |
| 6         | 9220            | -              | -        | -           | 29.37          | 54.00          | 24.63       | -           | -         | -        |

### Remark:

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

$$\text{Level} = \text{Reading}(\text{dB}\mu\text{V}) + \text{AF}(\text{dB}/\text{m}) + \text{Factor}(\text{dB})$$

$$\text{AF} = \text{Antenna Factor}(\text{dB}/\text{m})$$

$$\text{Factor} = \text{Cable Factor}(\text{dB}) - \text{Preamplifier gain}(\text{dB})$$

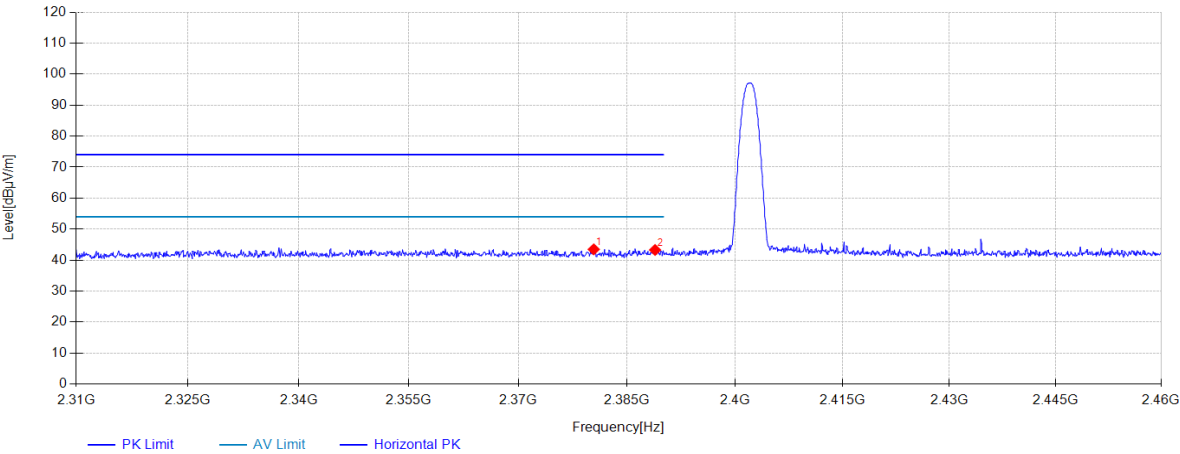
$$\text{Margin} = \text{Limit}(\text{dB}\mu\text{V}/\text{m}) - \text{Level}(\text{dB}\mu\text{V}/\text{m})$$
- All channels have been tested, but only the worst case data displayed in this report.



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Restricted bands around fundamental frequency  
GFSK\_Channel 0



| Data List |                 |                |          |             |                |                |             |             |           |            |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|------------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF[dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
| 1         | 2380.3852       | 39.02          | 27.48    | -23.03      | 43.47          | 74.00          | 30.53       | 127         | 145       | Horizontal |
| 2         | 2380.3852       | -              | -        | -           | 18.70          | 54.00          | 35.30       | -           | -         | -          |
| 3         | 2388.8644       | 38.87          | 27.44    | -23.02      | 43.29          | 74.00          | 30.71       | 127         | 145       | Horizontal |
| 4         | 2388.8644       | -              | -        | -           | 18.52          | 54.00          | 35.48       | -           | -         | -          |

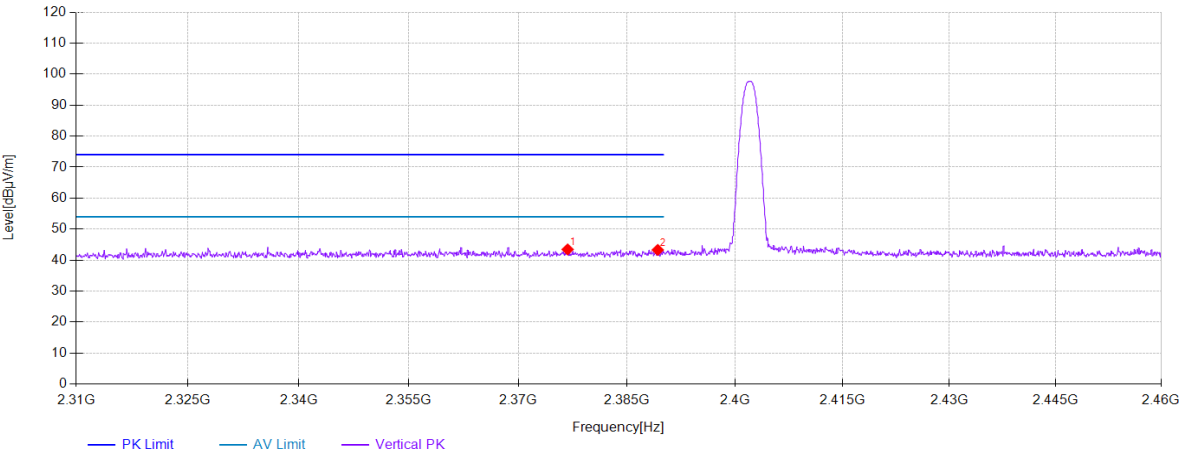




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GFSK\_Channel 0



| Data List |                 |                |          |             |                |                |             |             |           |          |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|----------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF[dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1         | 2376.7834       | 39.00          | 27.49    | -23.04      | 43.45          | 74.00          | 30.55       | 324         | 178       | Vertical |
| 2         | 2376.7834       | -              | -        | -           | 18.68          | 54.00          | 35.32       | -           | -         | -        |
| 3         | 2389.2396       | 38.88          | 27.44    | -23.02      | 43.30          | 74.00          | 30.70       | 324         | 178       | Vertical |
| 4         | 2389.2396       | -              | -        | -           | 18.53          | 54.00          | 35.47       | -           | -         | -        |



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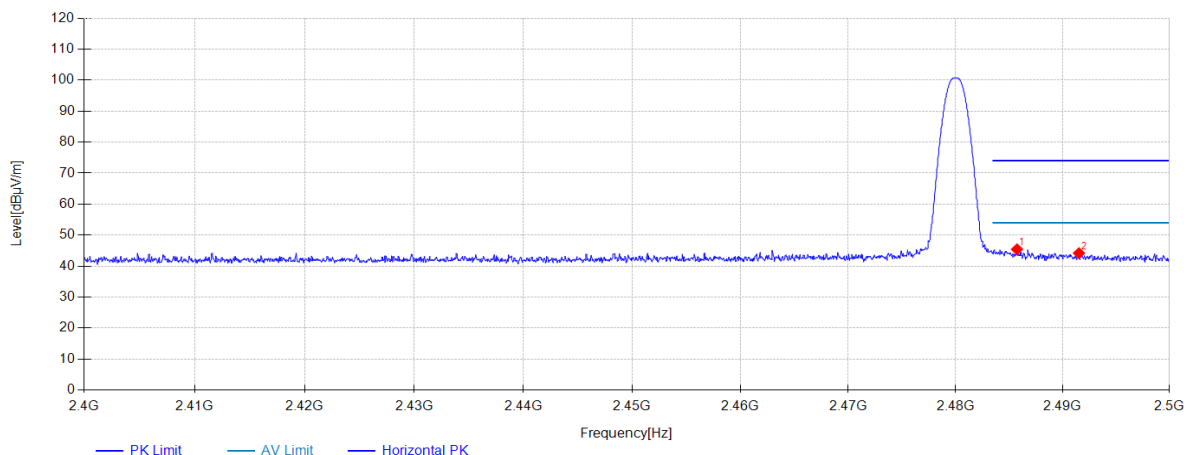
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## GFSK\_Channel 78



| Data List |                 |                |          |             |                |                |             |             |           |            |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|------------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF[dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity   |
| 1         | 2485.7429       | 40.81          | 27.74    | -23.12      | 45.43          | 74.00          | 28.57       | 136         | 63        | Horizontal |
| 2         | 2485.7429       | -              | -        | -           | 20.66          | 54.00          | 33.34       | -           | -         | -          |
| 3         | 2491.5458       | 39.54          | 27.77    | -23.13      | 44.18          | 74.00          | 29.82       | 136         | 63        | Horizontal |
| 4         | 2491.5458       | -              | -        | -           | 19.41          | 54.00          | 34.59       | -           | -         | -          |



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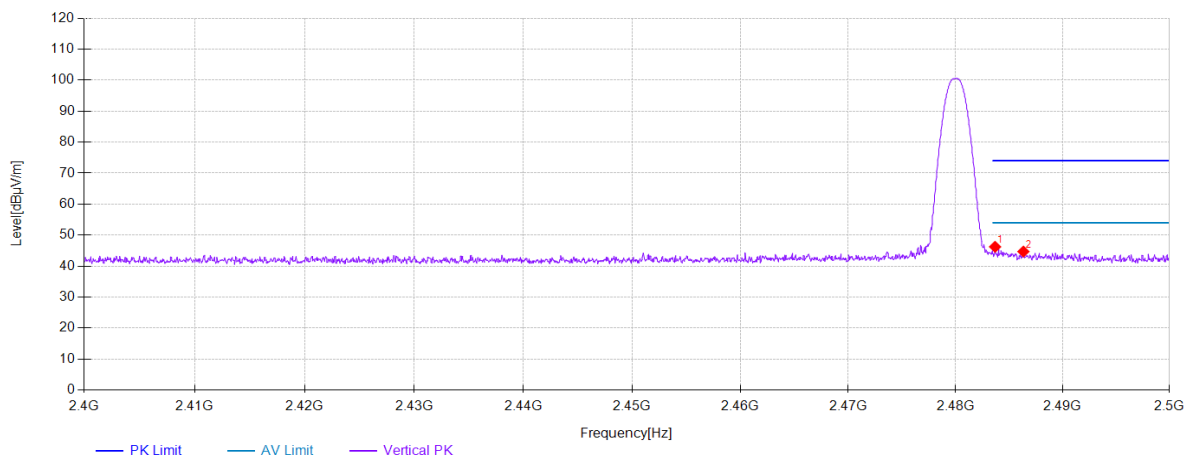
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## GFSK\_Channel 78



| Data List |                 |                |          |             |                |                |             |             |           |          |
|-----------|-----------------|----------------|----------|-------------|----------------|----------------|-------------|-------------|-----------|----------|
| NO.       | Frequency [MHz] | Reading [dBμV] | AF[dB/m] | Factor [dB] | Level [dBμV/m] | Limit [dBμV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1         | 2483.6918       | 41.62          | 27.73    | -23.12      | 46.23          | 74.00          | 27.77       | 387         | 170       | Vertical |
| 2         | 2483.6918       | -              | -        | -           | 21.46          | 54.00          | 32.54       | -           | -         | -        |
| 3         | 2486.3432       | 40.07          | 27.75    | -23.12      | 44.70          | 74.00          | 29.30       | 387         | 170       | Vertical |
| 4         | 2486.3432       | -              | -        | -           | 19.93          | 54.00          | 34.07       | -           | -         | -        |

### Remark:

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

Level = Reading(dBμV) + AF(dB/m) + Factor(dB):

AF = Antenna Factor(dB/m)

Factor = Cable Factor(dB) - Preamplifier gain(dB)

Margin = Limit(dBμV/m) – Level(dBμV/m)

---End of Report---



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