

# TEST REPORT

**Report No.** : KS2206S2706E01

**FCC ID:** 2A54U-DTNOI7MAX

**Applicant** : Shenzhen Xinkeying Technology Co.,Ltd

**Address** : 8/F,Block C, Han's Innovation Building,Xili Road, Nanshan District,Shenzhen,China

**Manufacturer.....:** Shenzhen Xinkeying Technology Co.,Ltd

**Address.....:** 8/F,Block C, Han's Innovation Building,Xili Road, Nanshan District,Shenzhen,China

**Product Name :** Smart Watch

**Trade Mark :** DTNO.I

**Model/Type reference :** DTNO.I 7 Max

**Listed Model(s) :** DTNO.I 7 Pro,DTNO.I 7 Mini,DTNO.I 7 Max+,DTNO.I 7 ProMax

**Standard :** FCC 15.247  
ANSI C63.10: 2013

**Date of Receipt :** June 22, 2022

**Date of Test Date :** June 22, 2022~July 01, 2022

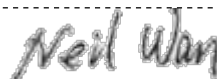
**Date of issue :** July 01, 2022

**Test result :** Pass

Prepared by:  
( Printed Name + Signature ) Sky Dong



Approved by:  
( Printed Name + Signature ) Neil Wan



**Testing Laboratory Name :** K SIGN(Guangdong) Testing Co., Ltd.

**Address :** West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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## 1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB558074 D01 V05r02](#): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

## 2. SUMMARY

### 2.1 Product Description

|                       |                                                                                                                                                                                                                                                                                                                              |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Description:  | Smart Watch                                                                                                                                                                                                                                                                                                                  |
| Model/Type reference: | DTNO.I 7 Max                                                                                                                                                                                                                                                                                                                 |
| Listed Model(s):      | DTNO.I 7Pro,DTNO.I 7Mini,DTNO.I 7+max,DTNO.I 7ProMax                                                                                                                                                                                                                                                                         |
| Model Difference:     | The difference between product models is only that the appearance color is not the same, and the different model names are tailored to the market demand. Other power supply methods, internal structures, circuits and key components are the same, without affecting safety and electromagnetic compatibility performance. |
| Power supply:         | DC 3.7V from battery                                                                                                                                                                                                                                                                                                         |
| Testing sample ID:    | KS2206S2706E-1# (Engineer sample),<br>KS2206S2706E-2# (Normal sample)                                                                                                                                                                                                                                                        |
| Hardware version:     | V1.0                                                                                                                                                                                                                                                                                                                         |
| Software version:     | V1.0.0                                                                                                                                                                                                                                                                                                                       |
| <b>Bluetooth BLE</b>  |                                                                                                                                                                                                                                                                                                                              |
| Supported type:       | Bluetooth low Energy                                                                                                                                                                                                                                                                                                         |
| Modulation:           | GFSK                                                                                                                                                                                                                                                                                                                         |
| Operation frequency:  | 2402MHz to 2480MHz                                                                                                                                                                                                                                                                                                           |
| Channel number:       | 40                                                                                                                                                                                                                                                                                                                           |
| Channel separation:   | 2 MHz                                                                                                                                                                                                                                                                                                                        |
| Antenna type:         | Internal Antenna                                                                                                                                                                                                                                                                                                             |
| Antenna gain:         | -0.7dBi                                                                                                                                                                                                                                                                                                                      |

### 2.2 Equipment Under Test

#### Power supply system utilised

|                      |   |                                                        |                                   |
|----------------------|---|--------------------------------------------------------|-----------------------------------|
| Power supply voltage | : | <input type="radio"/> 230V / 50 Hz                     | <input type="radio"/> 120V / 60Hz |
|                      |   | <input checked="" type="radio"/> 3.7 V DC              | <input type="radio"/> 24 V DC     |
|                      |   | <input type="radio"/> Other (specified in blank below) |                                   |

DC 3.7V From Battery

### 2.3 Short description of the Equipment under Test (EUT)

This is a Smart Watch.

For more details, refer to the user's manual of the EUT.

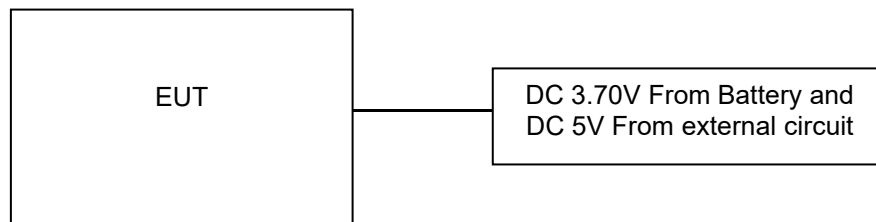
## 2.4 EUT operation mode

The Applicant provides communication tools software(Engineer mode) to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .There are 40 channels provided to the EUT and Channel 00/19/39 were selected to test.

### Operation Frequency:

| Channel   | Frequency (MHz) |
|-----------|-----------------|
| <b>00</b> | <b>2402</b>     |
| 01        | 2404            |
| 02        | 2406            |
| ⋮         | ⋮               |
| <b>19</b> | <b>2440</b>     |
| ⋮         | ⋮               |
| 37        | 2476            |
| 38        | 2478            |
| <b>39</b> | <b>2480</b>     |

## 2.5 Block Diagram of Test Setup



## 2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.7 Modifications

No modifications were implemented to meet testing criteria.

### 3. TEST ENVIRONMENT

#### 3.1 Address of the test laboratory

**KSIGN(Guangdong) Testing Co., Ltd.**

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

#### 3.2 Test Facility

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

##### Laboratory accreditation

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

##### **CNAS-Lab Code: L13261**

KSIGN(Guangdong) Testing Co., Ltd. has been assessed and proved to be in Compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

##### **A2LA-Lab Cert. No.: 5457.01**

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been accredited by A2LA for technical Competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **ISED#: 25693 CAB identifier.: CN0096**

KSIGN(Guangdong) Testing Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

##### **FCC-Registration No.: 294912 Designation Number: CN1328**

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

#### 3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Radiated Emission:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 25 ° C       |
| Humidity:             | 45 %         |
| Atmospheric pressure: | 950-1050mbar |

AC Main Conducted testing:

|              |        |
|--------------|--------|
| Temperature: | 25 ° C |
|--------------|--------|

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|                       |              |
|-----------------------|--------------|
| Humidity:             | 46 %         |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |

Conducted testing:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 25 ° C       |
|                       |              |
| Humidity:             | 44 %         |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |

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### 3.4 Summary of measurement results

| Test Specification clause | Test case                                 | Test Mode           | Test Channel                                                                                                                            | Recorded In Report  |                                                                                                                                         | Test result |
|---------------------------|-------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------|
| §15.247(e)                | Power spectral density                    | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | complies    |
| §15.247(a)(2)             | Spectrum bandwidth<br>– 6 dB bandwidth    | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | complies    |
| §15.247(b)(1)             | Maximum output power                      | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | complies    |
| §15.247(d)                | Band edge compliance conducted            | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Highest                                               | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Highest                                               | complies    |
| §15.205                   | Band edge compliance radiated             | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Highest                                               | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Highest                                               | complies    |
| §15.247(d)                | TX spurious emissions conducted           | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | complies    |
| §15.247(d)                | TX spurious emissions radiated            | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | BLE 1Mbps<br>2 Mbps | <input checked="" type="checkbox"/> Lowest<br><input checked="" type="checkbox"/> Middle<br><input checked="" type="checkbox"/> Highest | complies    |
| §15.209(a)                | TX spurious Emissions radiated Below 1GHz | BLE 1Mbps<br>2 Mbps | -/-                                                                                                                                     | BLE 1Mbps           | -/-                                                                                                                                     | complies    |
| §15.107(a)<br>§15.207     | Conducted Emissions < 30 MHz              | BLE 1Mbps<br>2 Mbps | -/-                                                                                                                                     | BLE 1Mbps           | -/-                                                                                                                                     | complies    |

Remark:

1. The measurement uncertainty is not included in the test result.
2. We tested all test mode and recorded worst case in report

### 3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTA Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTA Testing Technology Co., Ltd. is reported:

| Test Items                                                           | Measurement Uncertainty | Notes |
|----------------------------------------------------------------------|-------------------------|-------|
| Maximum transmit power                                               | ±1.5dB                  | (1)   |
| Power Spectral Density                                               | ±1.5dB                  | (1)   |
| Duty Cycle, Tx-sequence, Tx-gap                                      | ±5%                     | (1)   |
| Accumulated Transmit Time, Frequency Occupation and Hopping Sequence | ±5%                     | (1)   |
| Hopping Frequency Separation                                         | ±5%                     | (1)   |

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|                                                          |        |     |
|----------------------------------------------------------|--------|-----|
| Medium Utilisation (MU) factor                           | ±5%    | (1) |
| Adaptively                                               | ±5%    | (1) |
| Occupied Channel Bandwidth                               | ±5%    | (1) |
| Transmitter unwanted emissions in the out-of-band domain | ±2.8dB | (1) |
| Transmitter unwanted emissions in the spurious domain    | ±2.8dB | (1) |
| Receiver spurious emissions                              | ±2.8dB | (1) |
| Receiver Blocking                                        | ±2.8dB | (1) |

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3.6 Equipments Used during the Test

| Tonscend JS0806-2 Test system |                                     |              |           |            |            |
|-------------------------------|-------------------------------------|--------------|-----------|------------|------------|
| Item                          | Test Equipment                      | Manufacturer | Model No. | Serial No. | Cal. Until |
| 1                             | Spectrum Analyzer                   | R&S          | FSV40-N   | 101798     | 03/04/2023 |
| 2                             | Vector Signal Generator             | Agilent      | N5182A    | MY50142520 | 03/04/2023 |
| 3                             | Analog Signal Generator             | HP           | 83752A    | 3344A00337 | 03/04/2023 |
| 4                             | Power Sensor                        | Agilent      | E9304A    | MY50390009 | 03/04/2023 |
| 5                             | Power Sensor                        | Agilent      | E9300A    | MY41498315 | 03/04/2023 |
| 6                             | Wideband Radio Communication Tester | R&S          | CMW500    | 157282     | 03/04/2023 |
| 7                             | Climate Chamber                     | Angul        | AGNH80L   | 1903042120 | 03/04/2023 |
| 8                             | Dual Output DC Power Supply         | Agilent      | E3646A    | MY40009992 | 03/04/2023 |
| 9                             | RF Control Unit                     | Tonscend     | JS0806-2  | /          | 03/04/2023 |

| Transmitter spurious emissions & Receiver spurious emissions |                                            |                     |              |            |            |
|--------------------------------------------------------------|--------------------------------------------|---------------------|--------------|------------|------------|
| Item                                                         | Test Equipment                             | Manufacturer        | Model No.    | Serial No. | Cal. Until |
| 1                                                            | EMI Test Receiver                          | R&S                 | ESR          | 102525     | 03/04/2023 |
| 2                                                            | High Pass Filter                           | Chengdu E-Microwave | OHF-3-18-S   | 0E01901038 | 03/04/2023 |
| 3                                                            | High Pass Filter                           | Chengdu E-Microwave | OHF-6.5-18-S | 0E01901039 | 03/04/2023 |
| 4                                                            | Spectrum Analyzer                          | HP                  | 8593E        | 3831U02087 | 03/04/2023 |
| 5                                                            | Ultra-Broadband logarithmic period Antenna | Schwarzbeck         | VULB 9163    | 01230      | 12/04/2023 |
| 6                                                            | Loop Antenna                               | Beijin ZHINAN       | ZN30900C     | 18050      | 03/04/2023 |
| 7                                                            | Spectrum Analyzer                          | R&S                 | FSV40-N      | 101798     | 03/04/2023 |
| 8                                                            | Horn Antenna                               | Schwarzbeck         | BBHA 9120 D  | 2023       | 03/29/2023 |
| 9                                                            | Pre-Amplifier                              | Schwarzbeck         | BBV 9745     | 9745#129   | 03/04/2023 |
| 10                                                           | Pre-Amplifier                              | EMCI                | EMC051835SE  | 980662     | 03/04/2023 |

Note: The Cal.Interval was one year.

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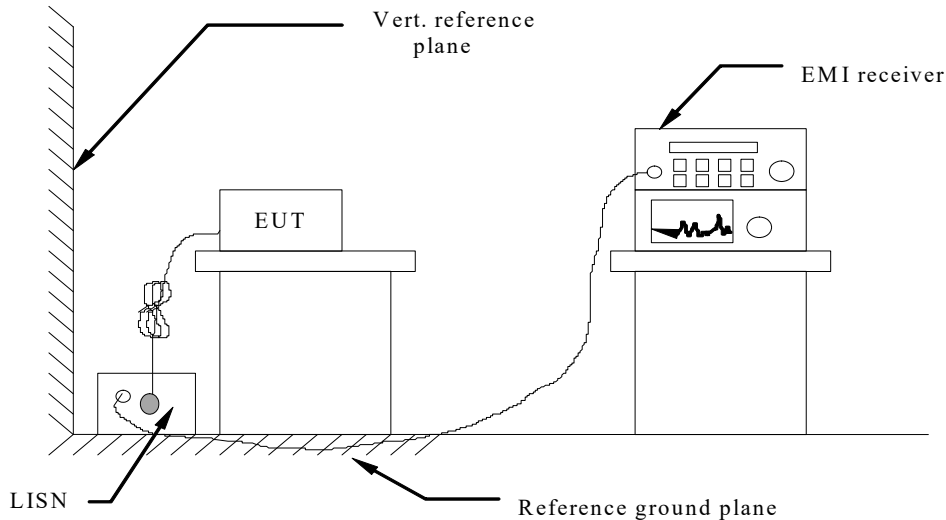
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## 4. TEST CONDITIONS AND RESULTS

### 4.1 AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following:

| 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.

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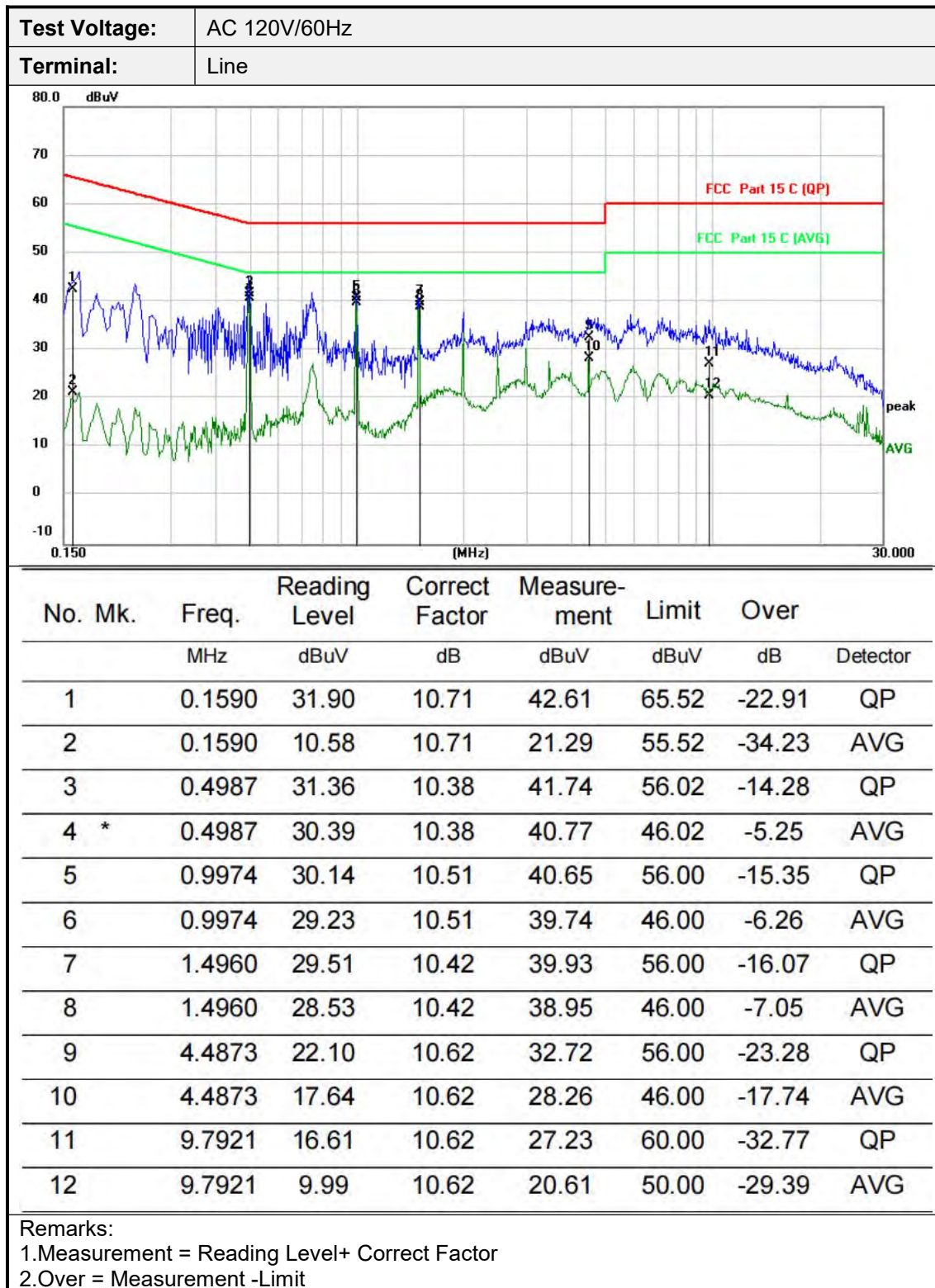
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## TEST RESULTS

Remark:

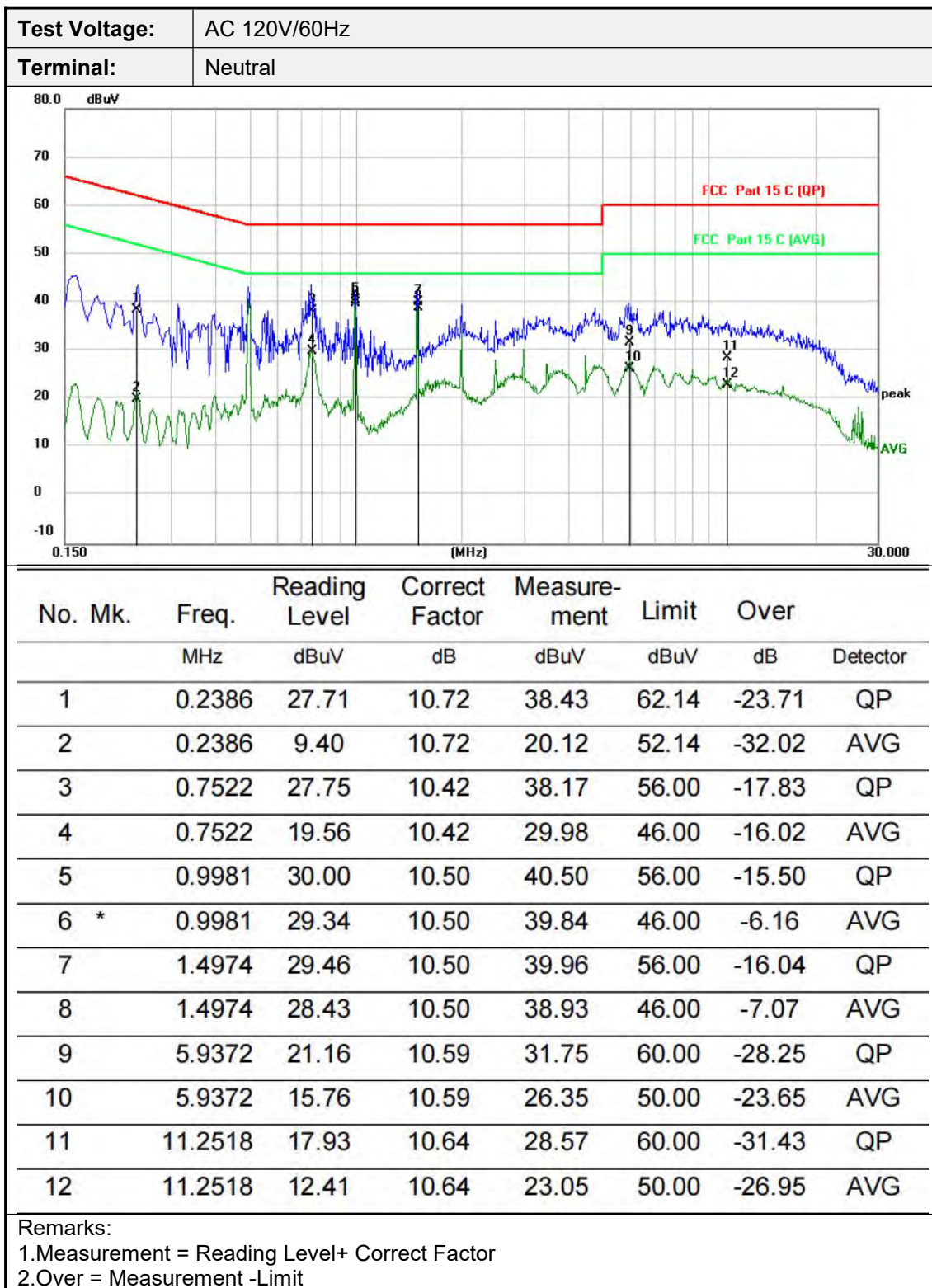
- Both modes of BLE 1Mbps and 2Mbps were tested at Low, Middle, and High channel; only the worst result of BLE 1Mbps was reported as below:



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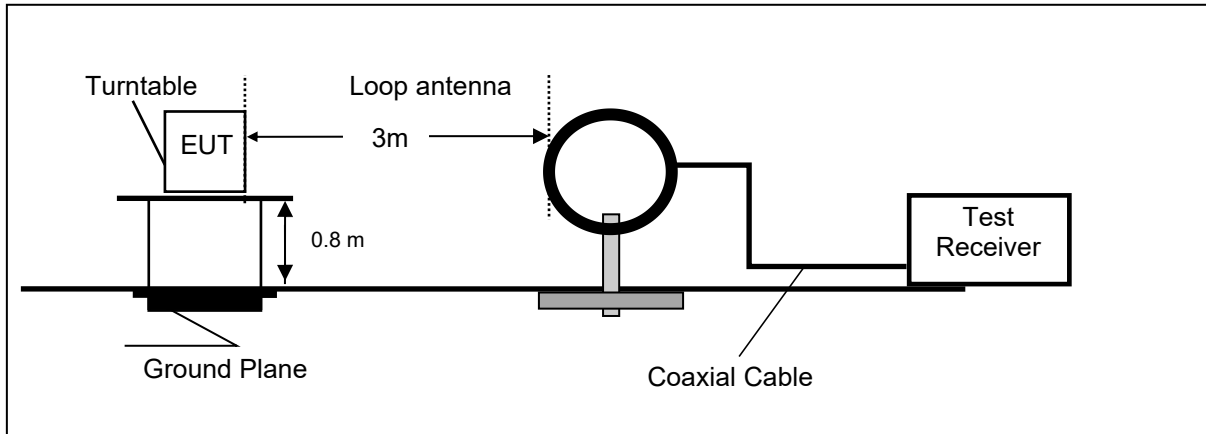
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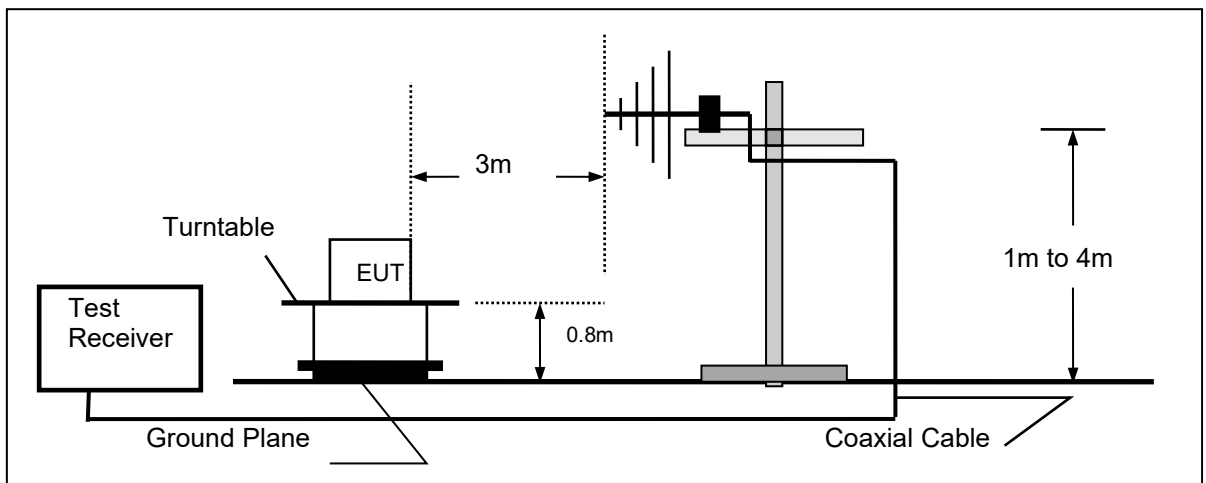
## 4.2 Radiated Emissions and Band Edge

### TEST CONFIGURATION

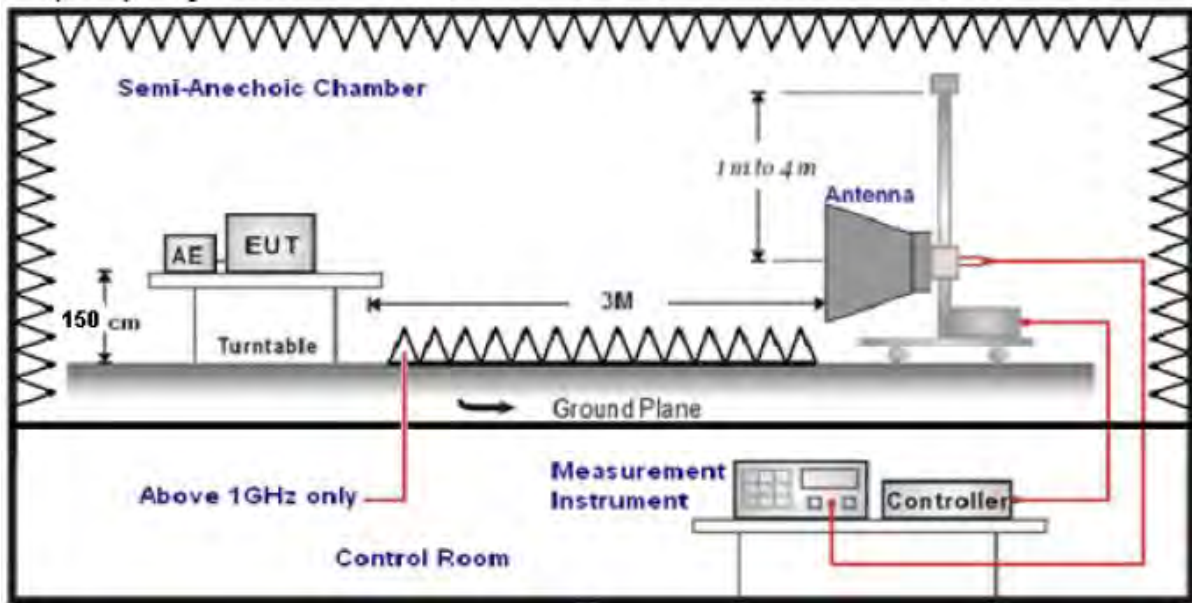
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



### TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

| Test Frequency range | Test Antenna Type          | Test Distance |
|----------------------|----------------------------|---------------|
| 9KHz-30MHz           | Active Loop Antenna        | 3             |
| 30MHz-1GHz           | Ultra-Broadband Antenna    | 3             |
| 1GHz-18GHz           | Double Ridged Horn Antenna | 3             |
| 18GHz-25GHz          | Horn Antenna               | 1             |

7. Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting                                                                            | Detector |
|----------------------|-----------------------------------------------------------------------------------------------------------|----------|
| 9KHz-150KHz          | RBW=200Hz/VBW=3KHz,Sweep time=Auto                                                                        | QP       |
| 150KHz-30MHz         | RBW=9KHz/VBW=100KHz,Sweep time=Auto                                                                       | QP       |
| 30MHz-1GHz           | RBW=120KHz/VBW=1000KHz,Sweep time=Auto                                                                    | QP       |
| 1GHz-40GHz           | Peak Value: RBW=1MHz/VBW=3MHz,<br>Sweep time=Auto<br>Average Value: RBW=1MHz/VBW=10Hz,<br>Sweep time=Auto | Peak     |

### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

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|                           |                                            |
|---------------------------|--------------------------------------------|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |                                            |

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

### **RADIATION LIMIT**

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m)                            | Radiated (μV/m)       |
|-----------------|-------------------|----------------------------------------------|-----------------------|
| 0.009-0.49      | 3                 | $20\log(2400/F(\text{KHz})) + 40\log(300/3)$ | $2400/F(\text{KHz})$  |
| 0.49-1.705      | 3                 | $20\log(24000/F(\text{KHz})) + 40\log(30/3)$ | $24000/F(\text{KHz})$ |
| 1.705-30        | 3                 | $20\log(30) + 40\log(30/3)$                  | 30                    |
| 30-88           | 3                 | 40.0                                         | 100                   |
| 88-216          | 3                 | 43.5                                         | 150                   |
| 216-960         | 3                 | 46.0                                         | 200                   |
| Above 960       | 3                 | 54.0                                         | 500                   |

### **TEST RESULTS**

#### **9 KHz~30 MHz and 18GHz~25GHz**

From 9 KHz~30 MHz and 18GHz~25GHz: Conclusion: PASS

Note:

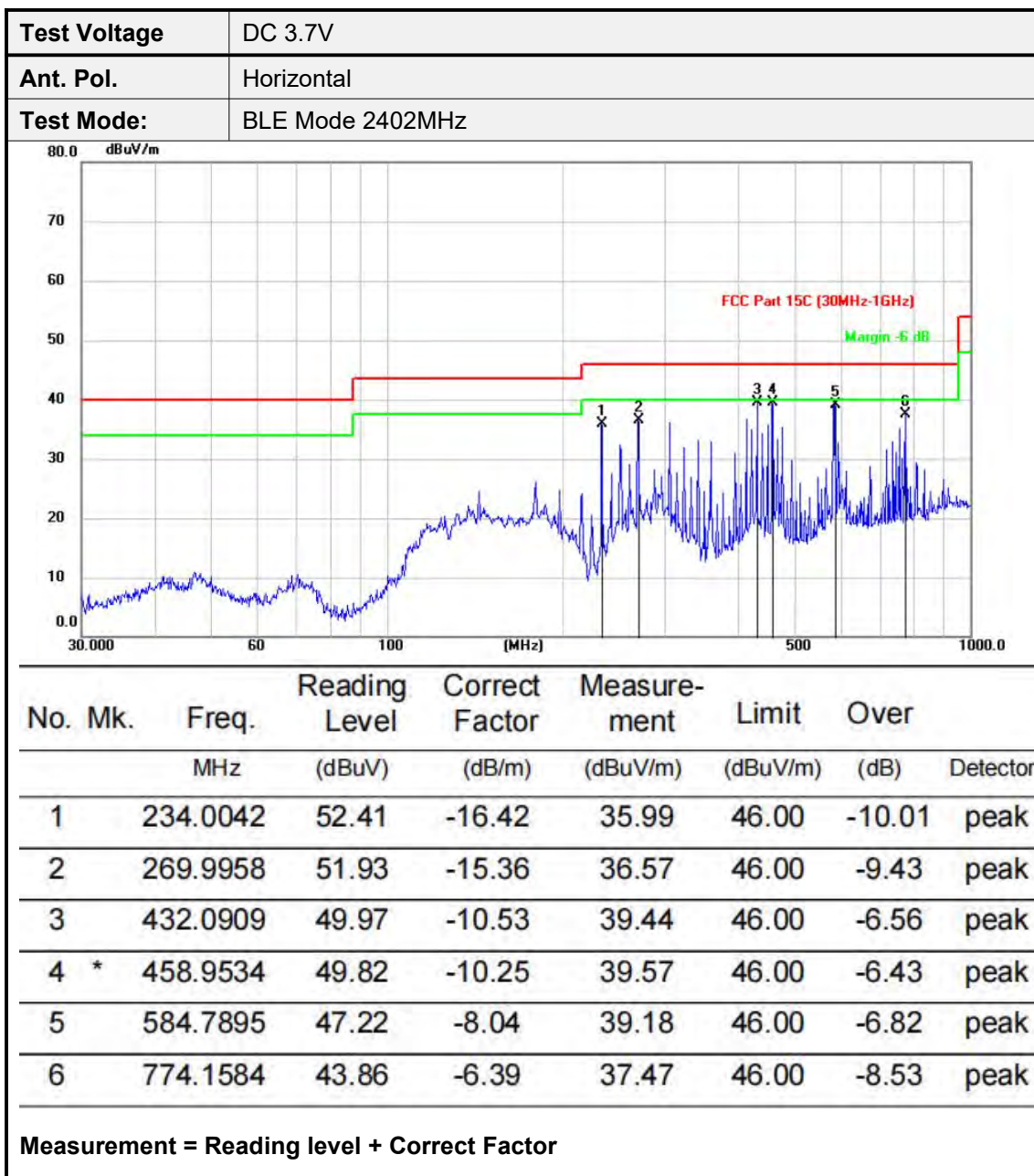
- 1) Measurement = Reading level + Correct Factor  
Correct Factor = Antenna Factor + Cable Loss - Preamplifier Factor
- 2) The peak level is lower than average limit (54 dBuV/m), this data is the too weak instrument of signal is unable to test.
- 3) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4) The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
- 5) Both modes of BLE 1Mbps and 2Mbps were tested at Low, Middle, and High channel and recorded worst mode at BLE 1Mbps.

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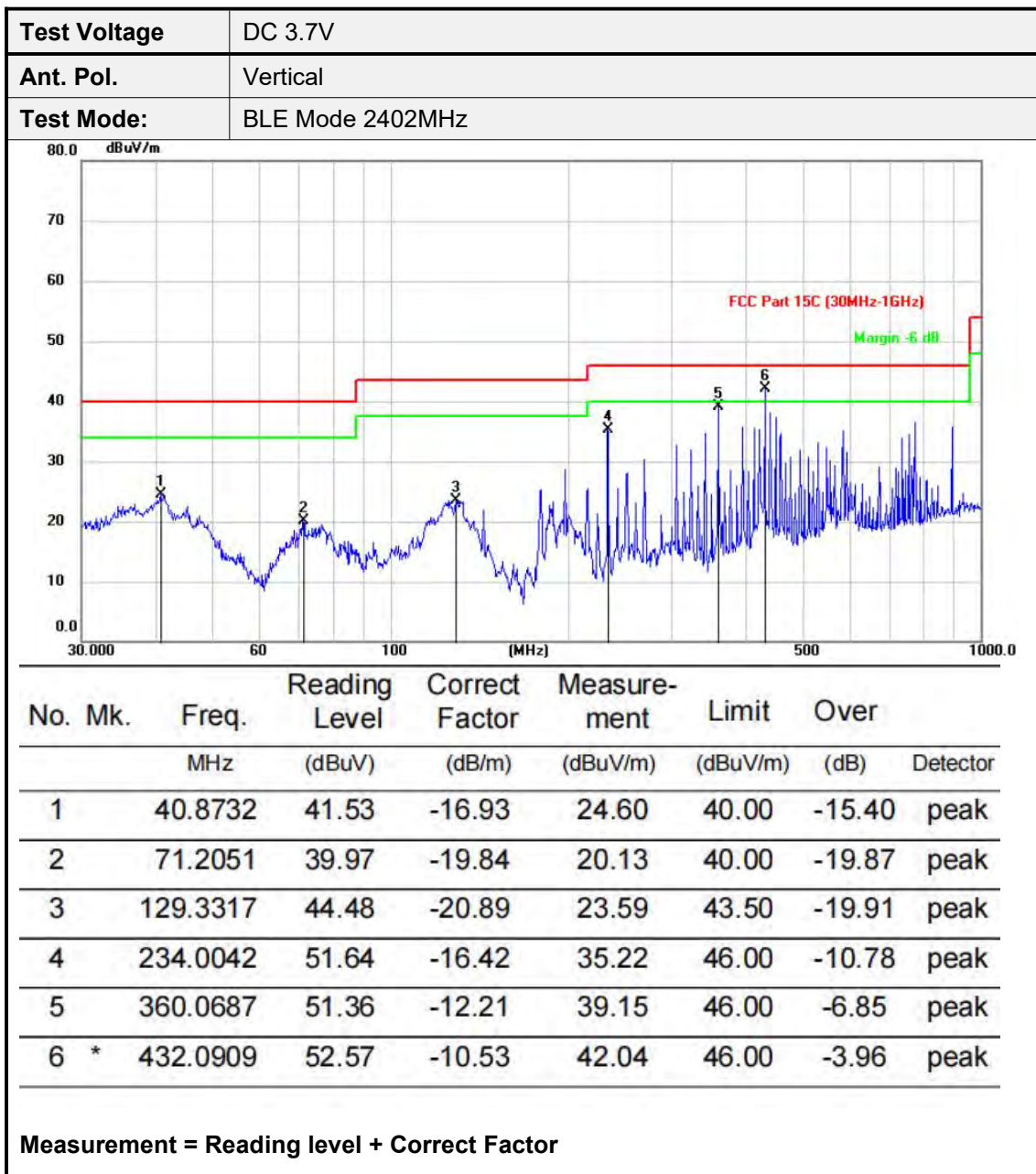
For 30MHz-1GHz



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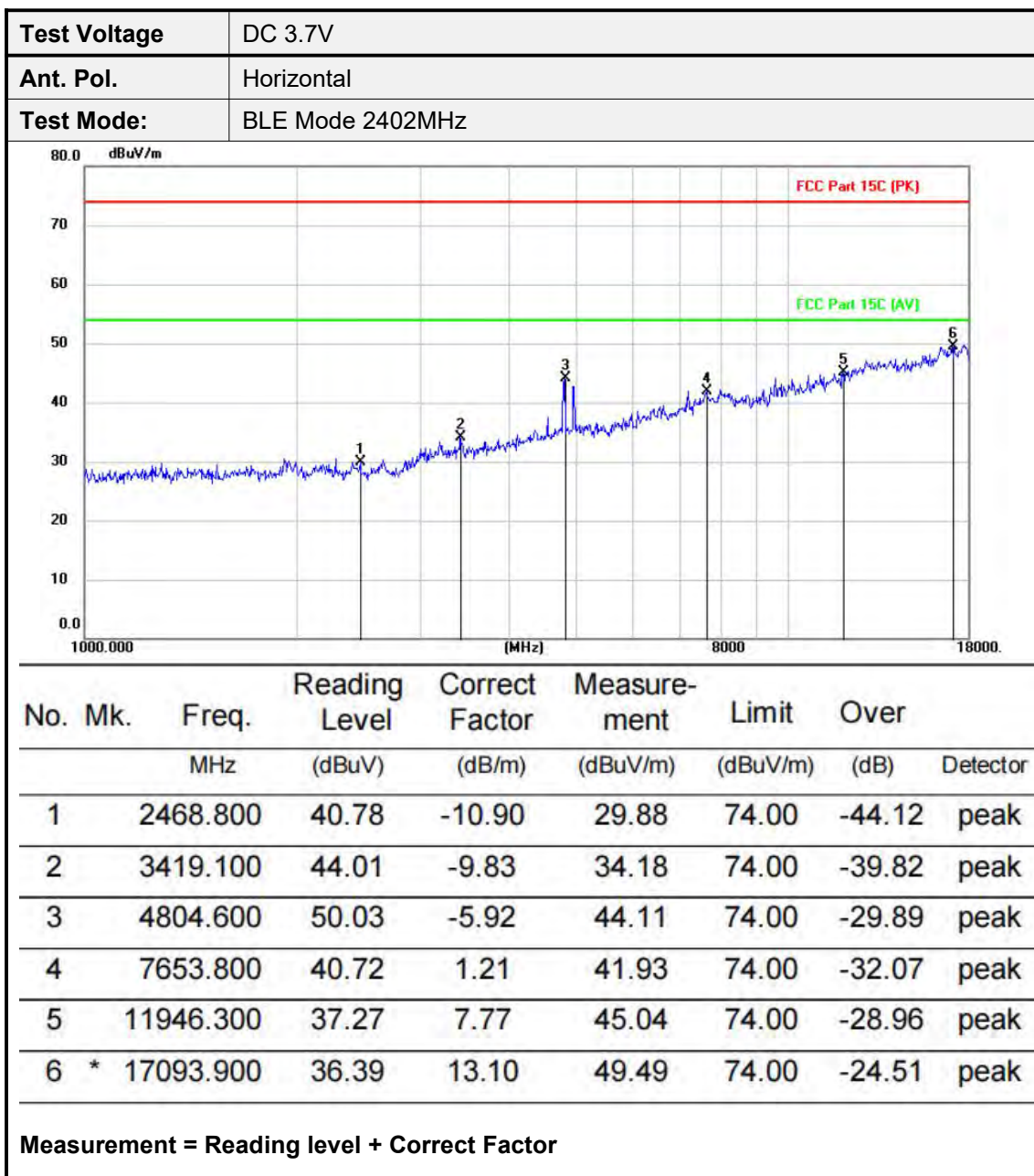


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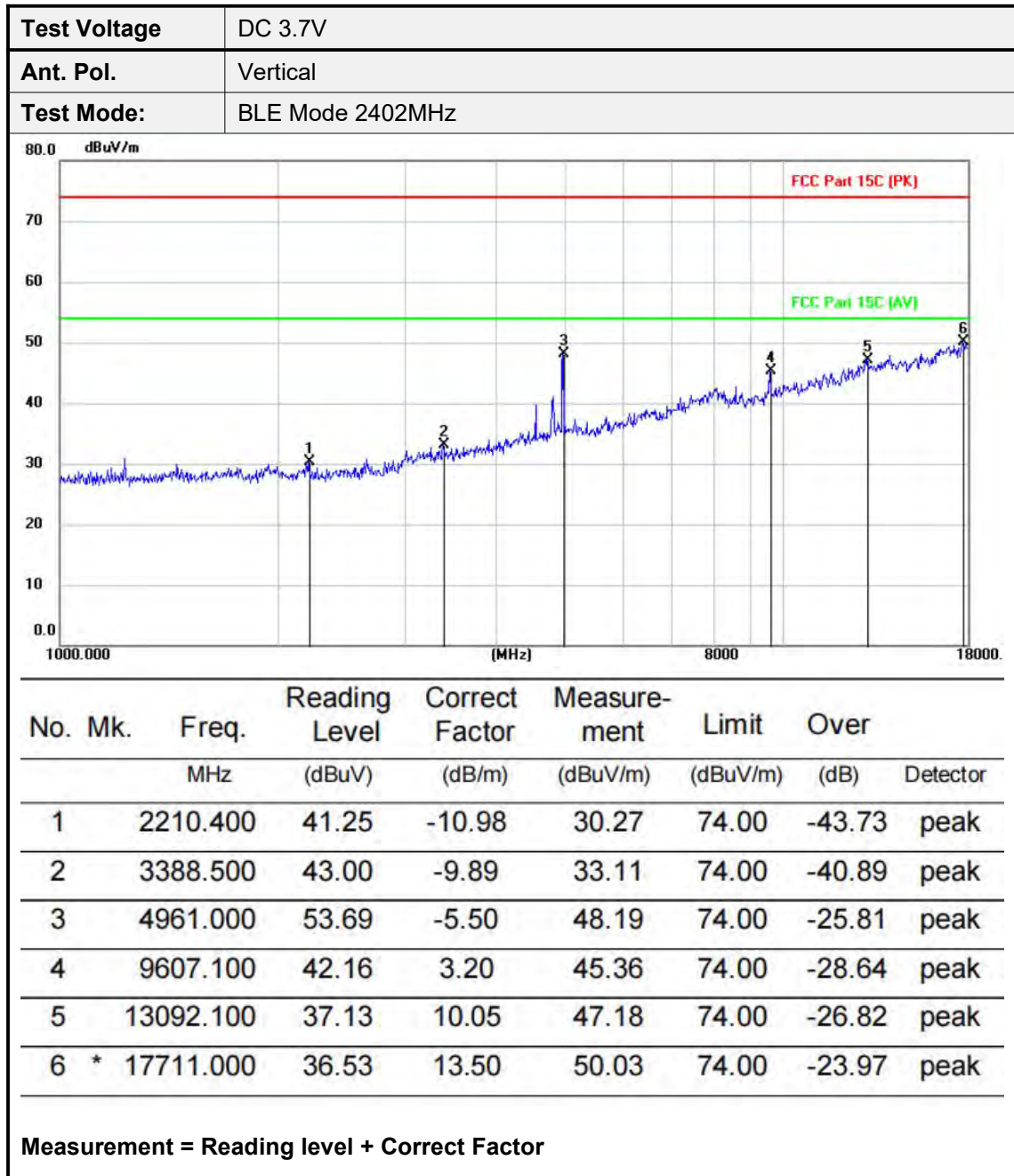
Above 1GHz



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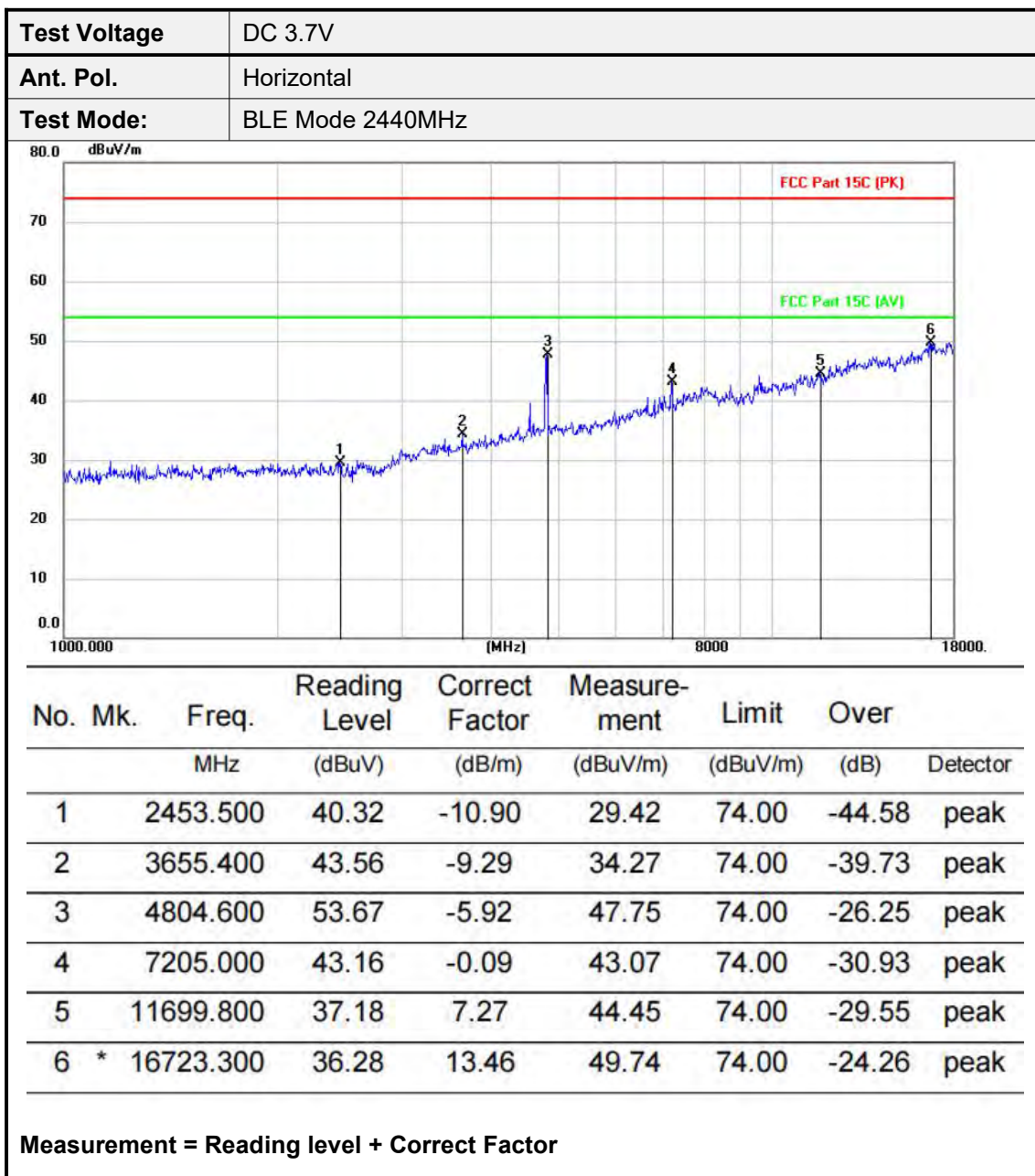
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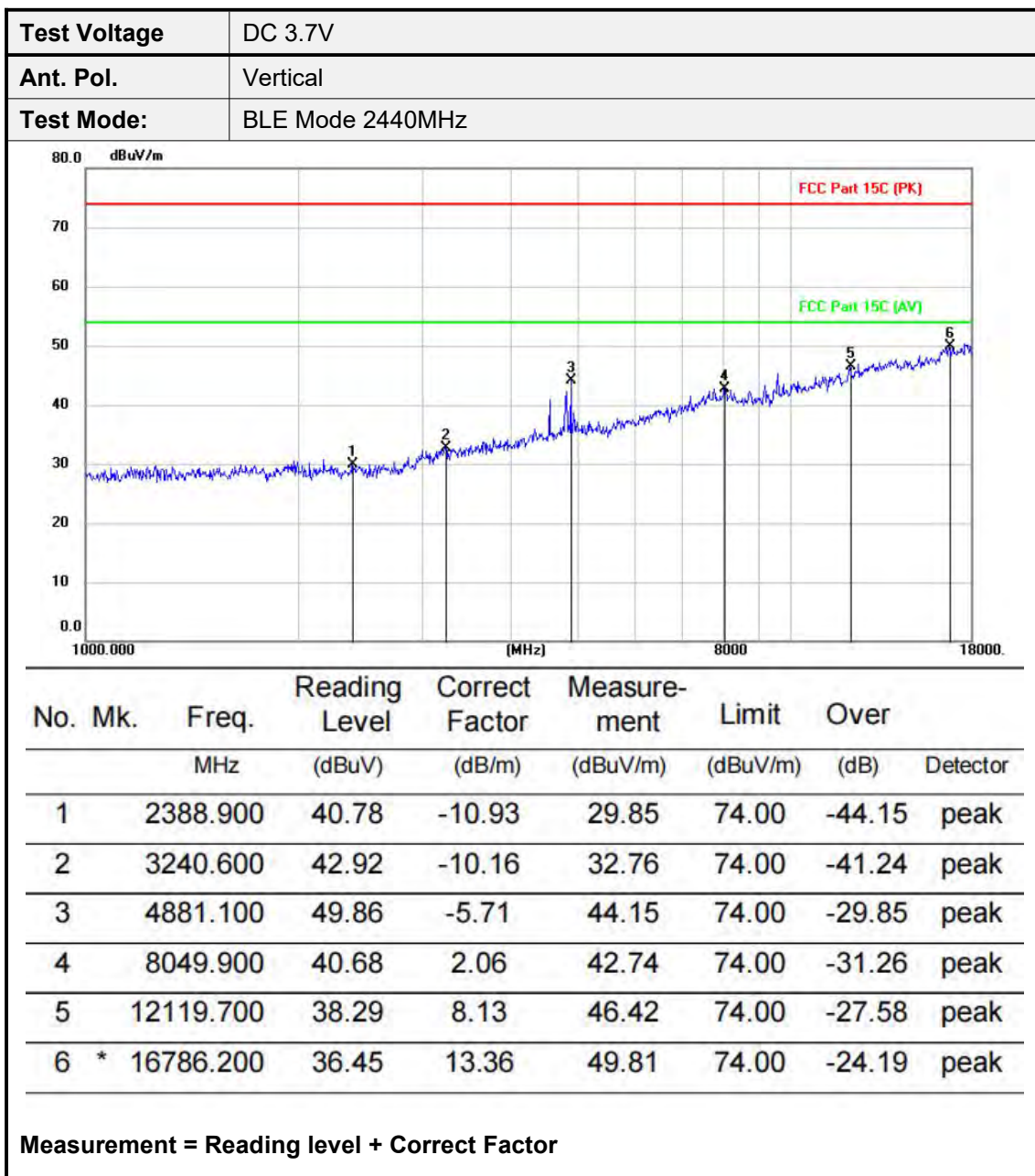
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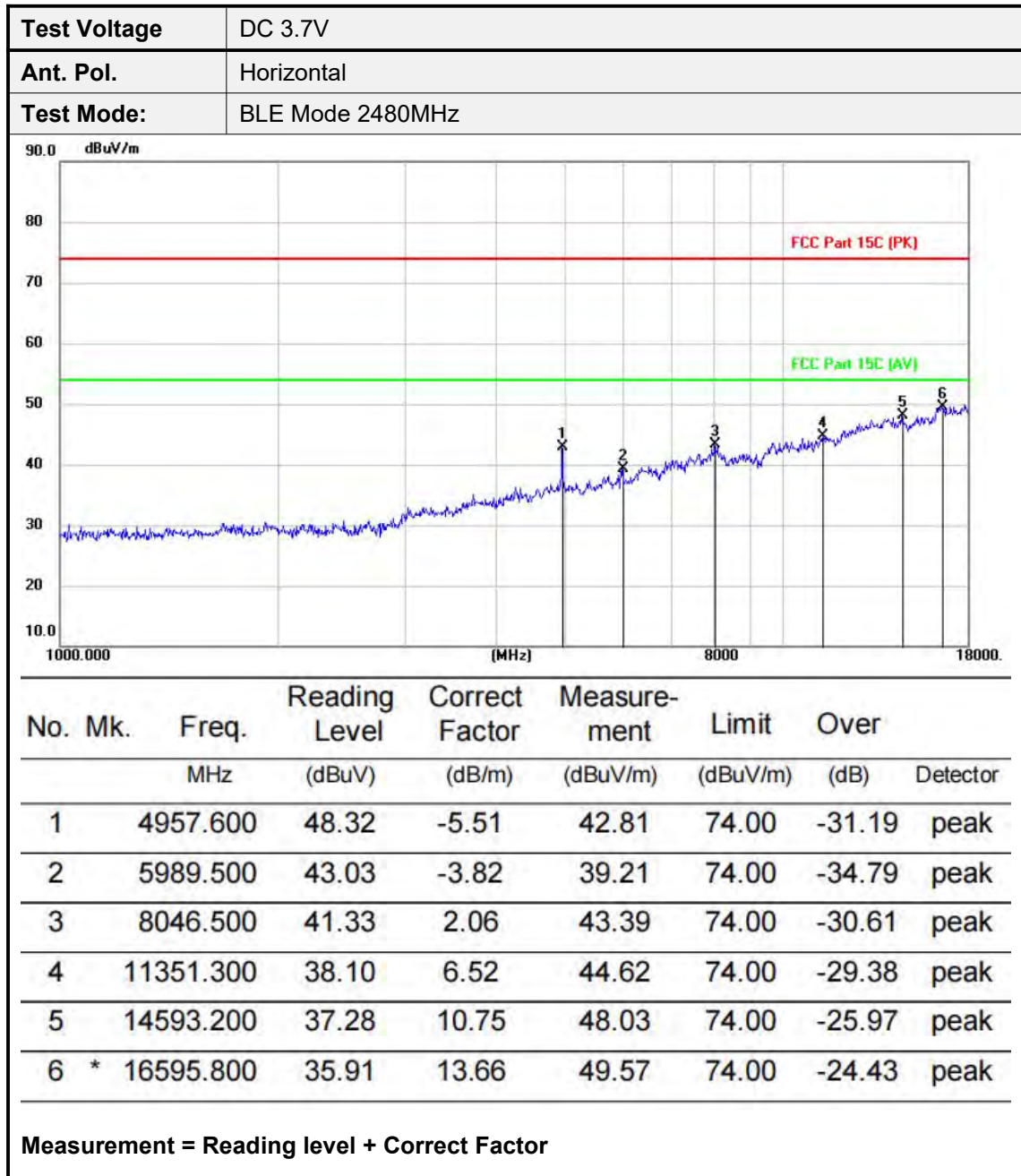
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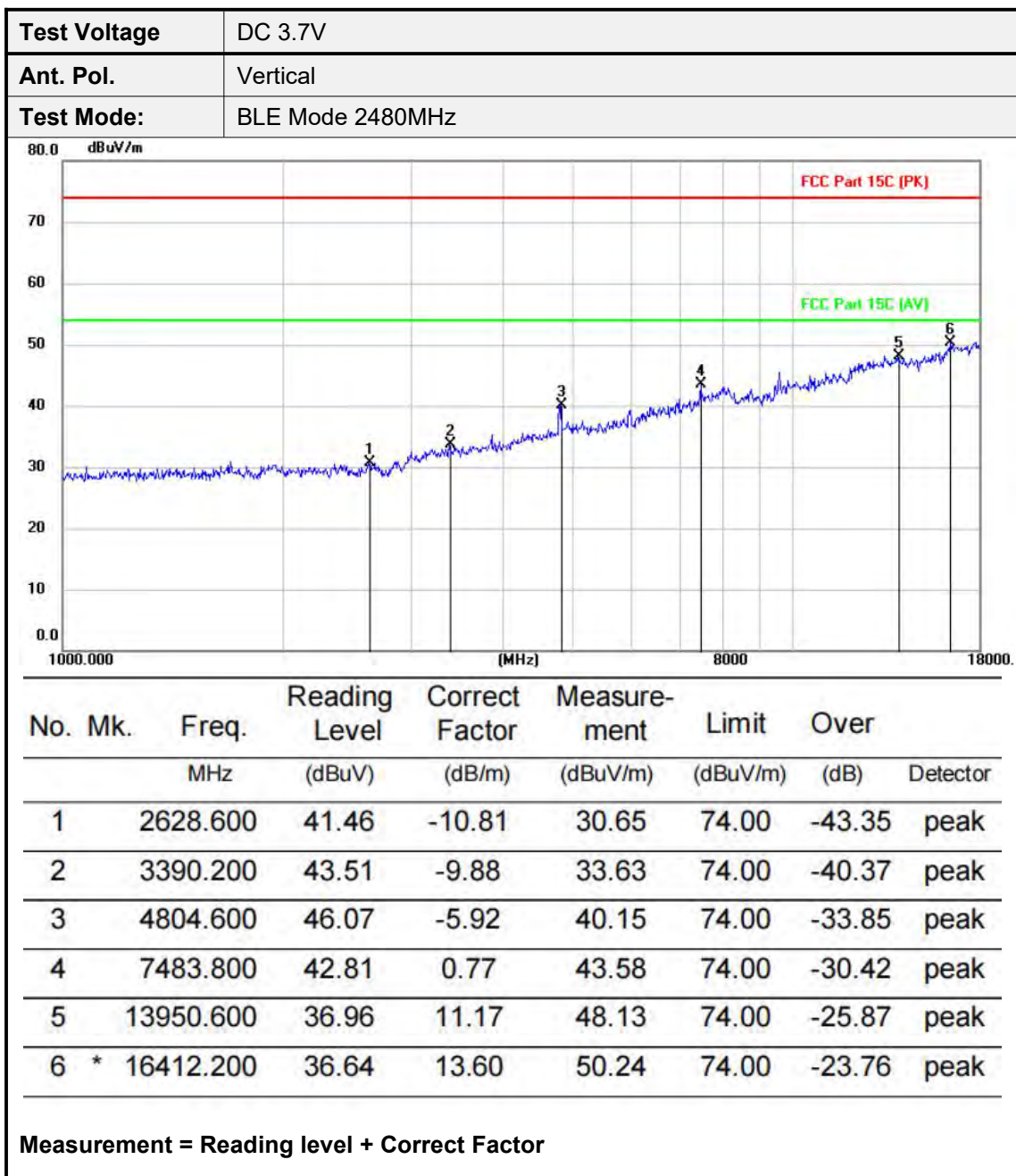
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Note:

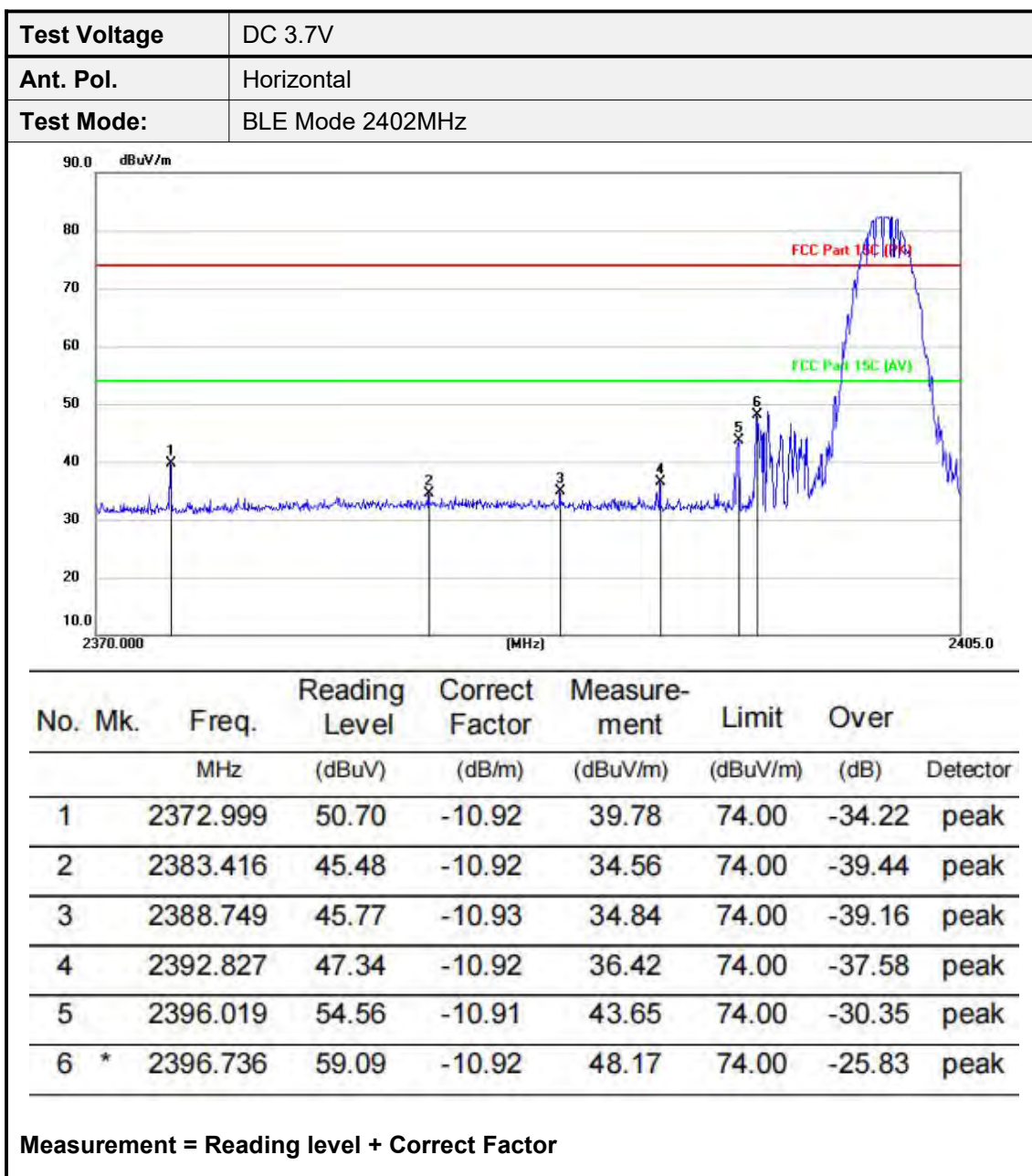
- 1.All test modes had been tested. The GFSK(1M) modulation is the worst case and recorded in the report.
2. 18GHz-26.5GHz is the background of the site, there is no radiated spurious.

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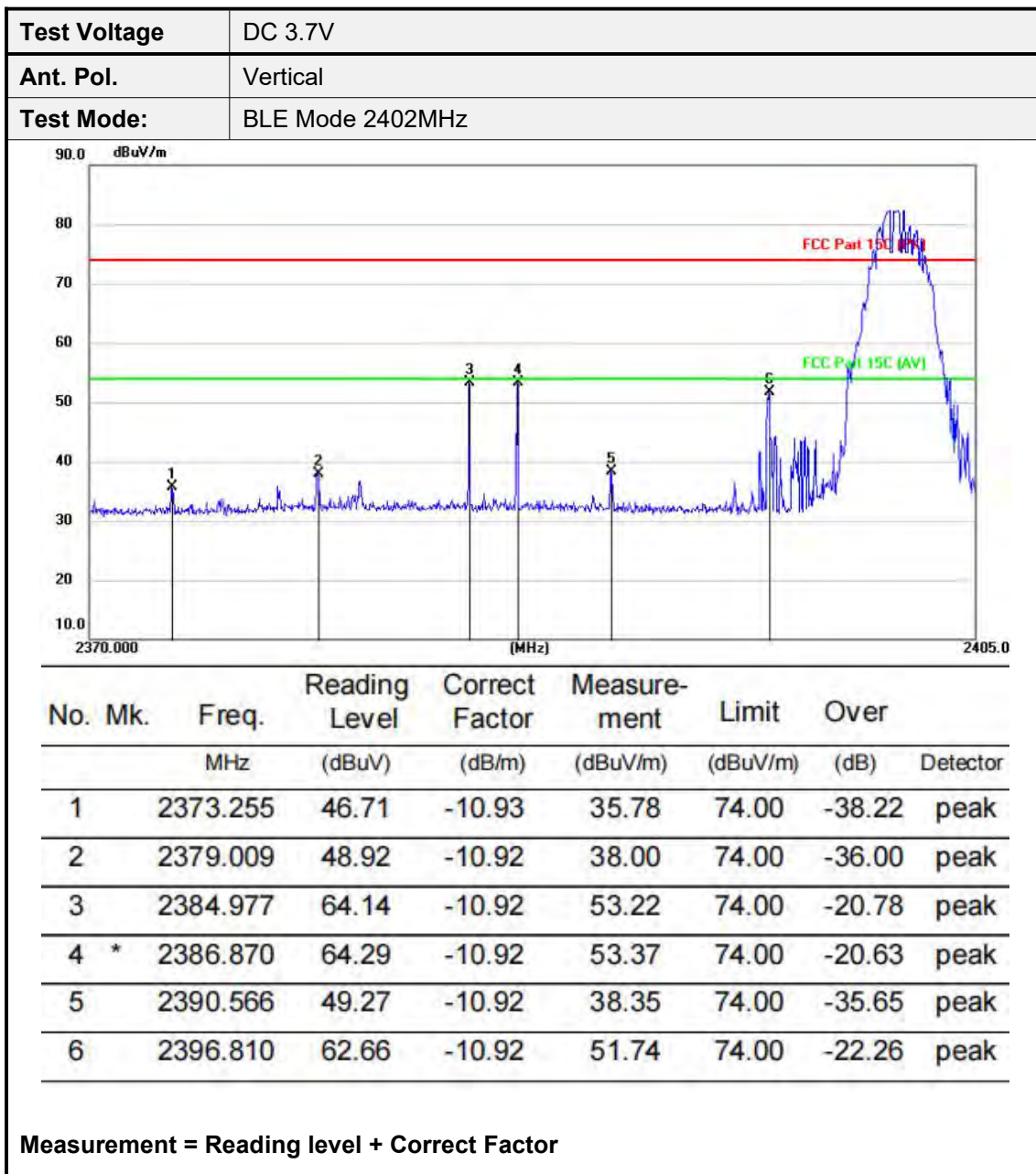
# Band Edge



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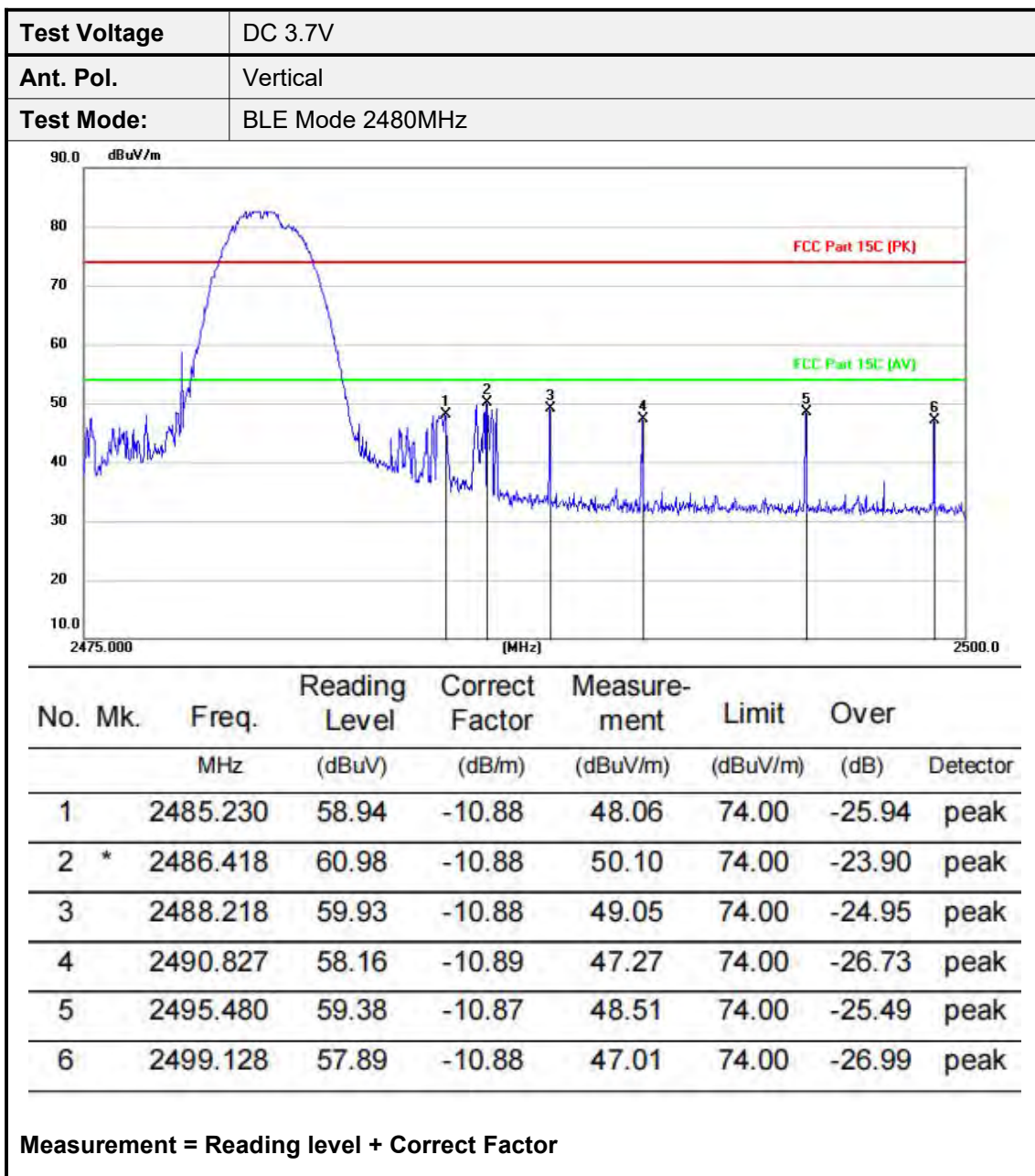
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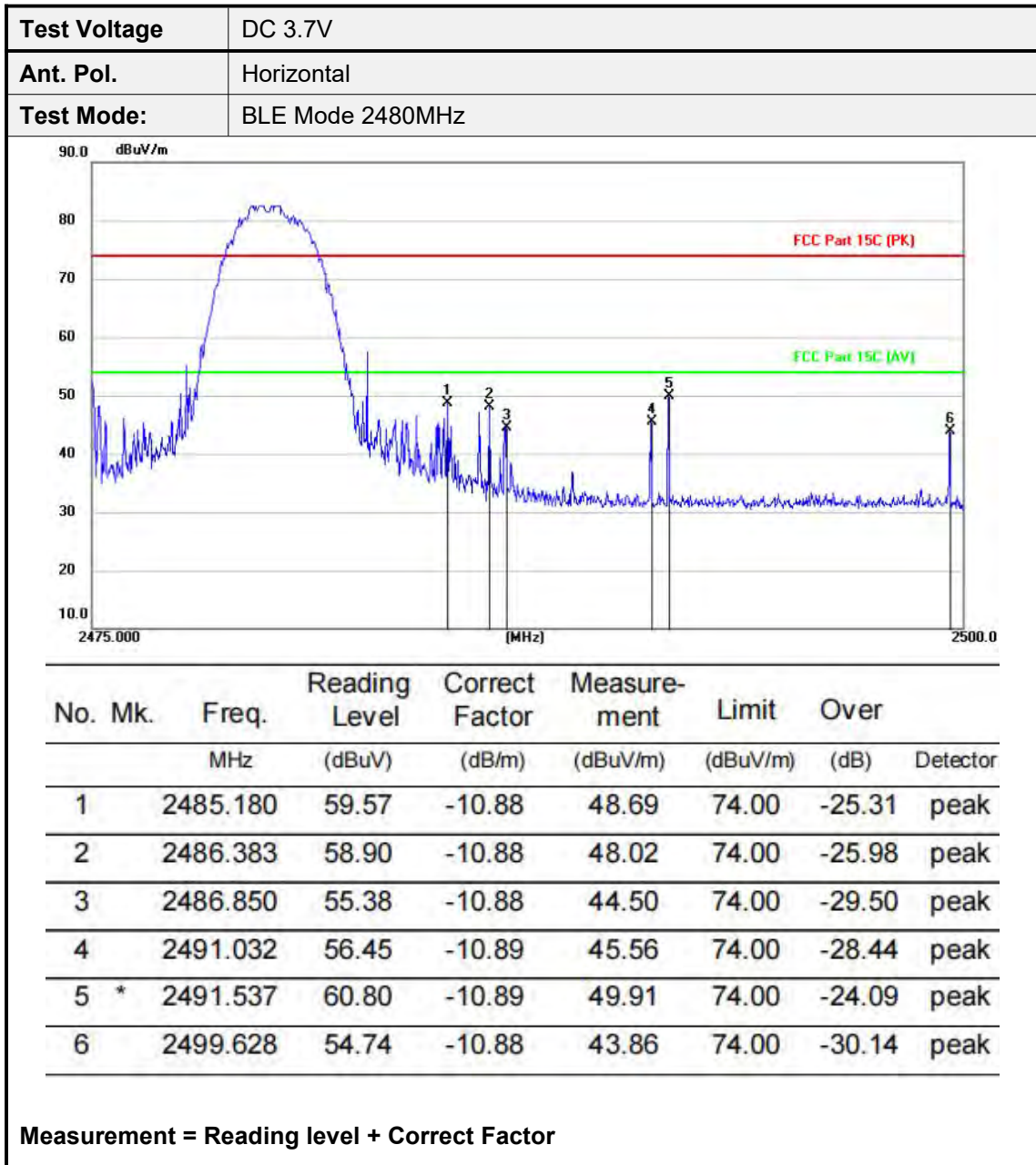
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### 4.3 Maximum Peak Output Power

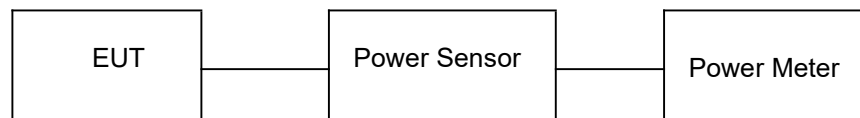
#### Limit

The Maximum Peak Output Power Measurement is 30dBm.

#### Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

#### Test Configuration



#### Test Results

| Type       | Channel | Output power (dBm) | Limit (dBm) | Result |
|------------|---------|--------------------|-------------|--------|
| GFSK 1Mbps | 00      | 3.43               | 30.00       | Pass   |
|            | 19      | 3.06               |             |        |
|            | 39      | 3.19               |             |        |
| GFSK 2Mbps | 00      | 3.46               | 30.00       | Pass   |
|            | 19      | 3.07               |             |        |
|            | 39      | 3.21               |             |        |

Note: 1.The test results including the cable lose.

## 4.4 Power Spectral Density

### Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW  $\geq 3$  kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

### Test Configuration

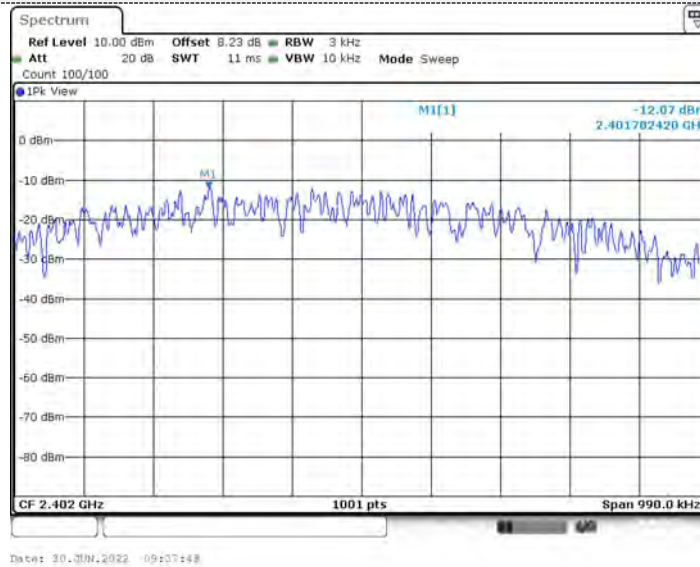


### Test Results

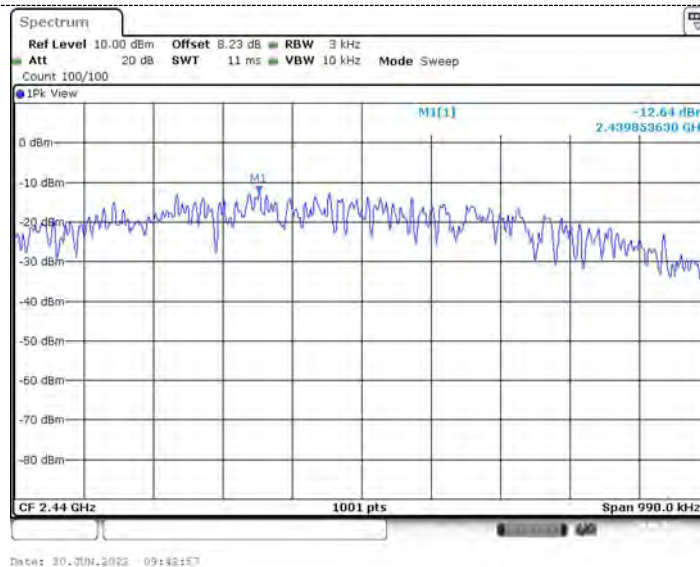
| Type       | Channel | Power Spectral Density (dBm/3KHz) | Limit (dBm/3KHz) | Result |
|------------|---------|-----------------------------------|------------------|--------|
| GFSK 1Mbps | 00      | -12.07                            | 8.00             | Pass   |
|            | 19      | -12.64                            |                  |        |
|            | 39      | -12.19                            |                  |        |
| GFSK 2Mbps | 00      | -11.73                            | 8.00             | Pass   |
|            | 19      | -12.61                            |                  |        |
|            | 39      | -12.67                            |                  |        |

Test plot as follows:

### BLE GFSK 1Mbps



### CH00

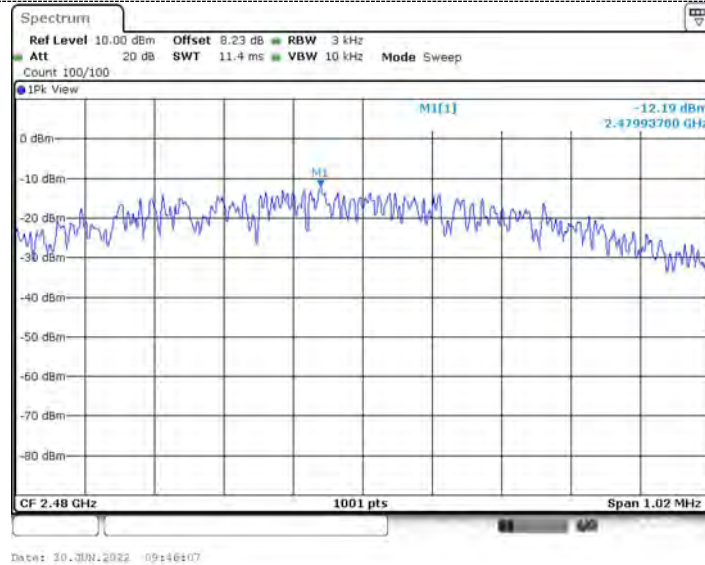


### CH19

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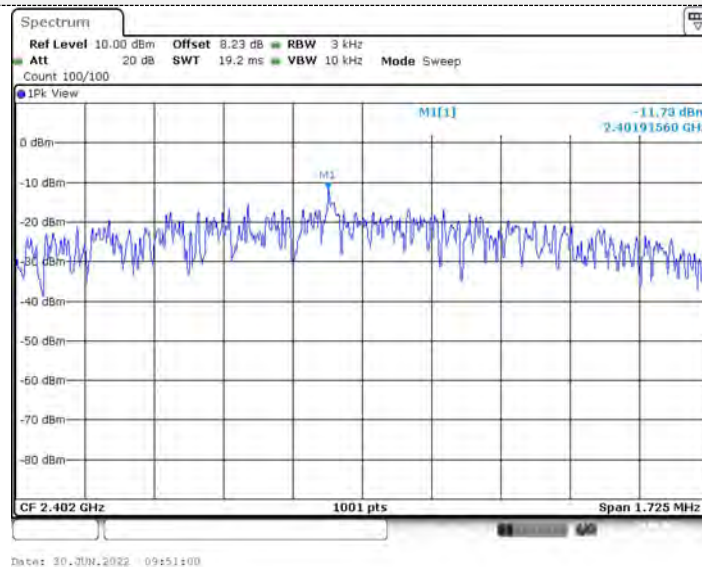
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CH39

BLE GFSK 2Mbps

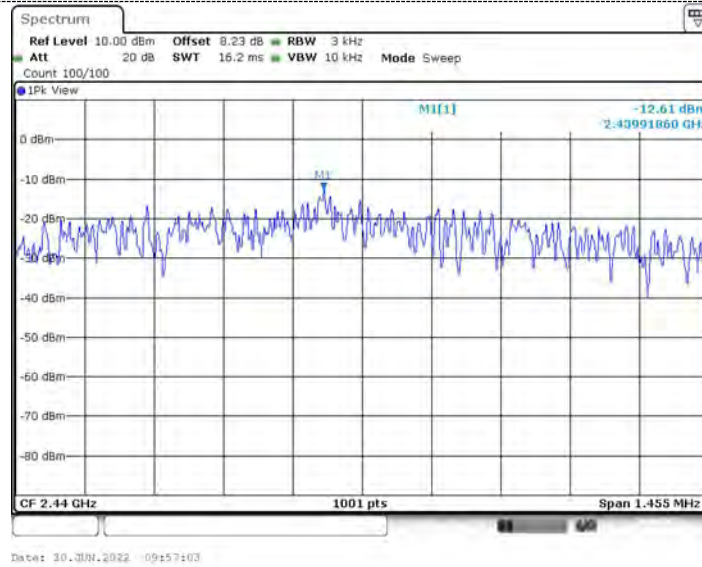


CH00

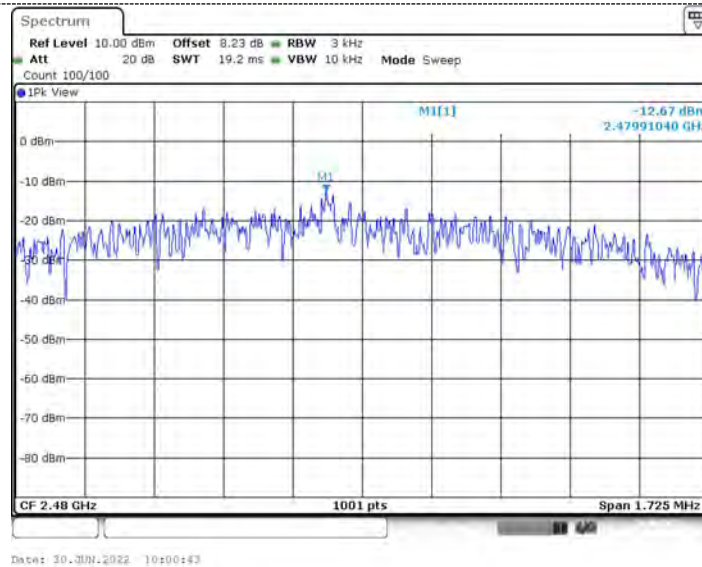
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CH19



CH39

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## 4.56dB Bandwidth

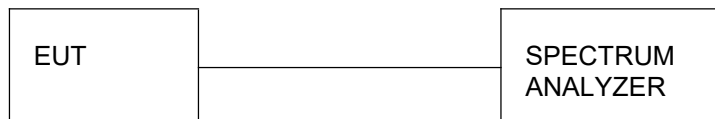
### Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

### Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

### Test Configuration

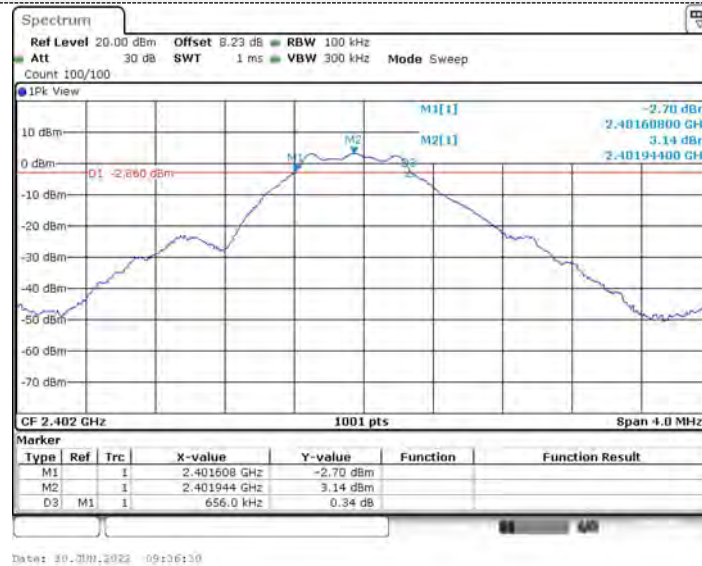


### Test Results

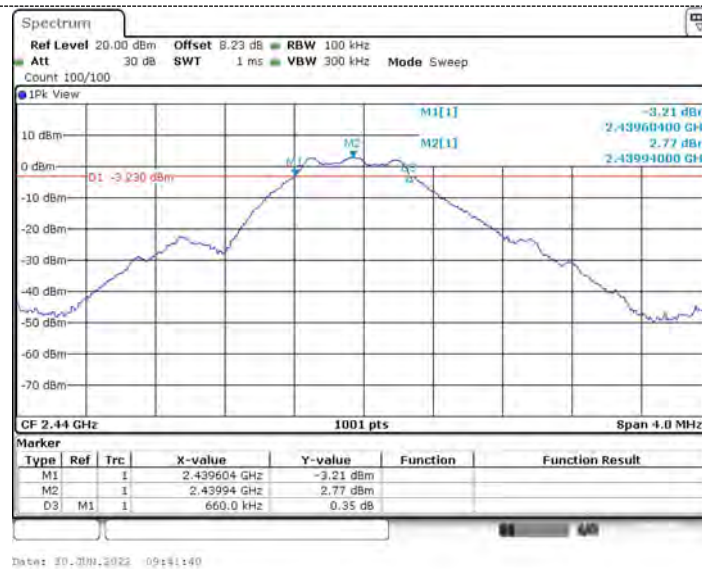
| Type       | Channel | 6dB Bandwidth (MHz) | Limit (KHz) | Result |
|------------|---------|---------------------|-------------|--------|
| GFSK 1Mbps | 00      | 0.656               | ≥500        | Pass   |
|            | 19      | 0.660               |             |        |
|            | 39      | 0.684               |             |        |
| GFSK 2Mbps | 00      | 1.148               | ≥500        | Pass   |
|            | 19      | 0.972               |             |        |
|            | 39      | 1.152               |             |        |

Test plot as follows:

### BLE GFSK 1Mbps



### CH00

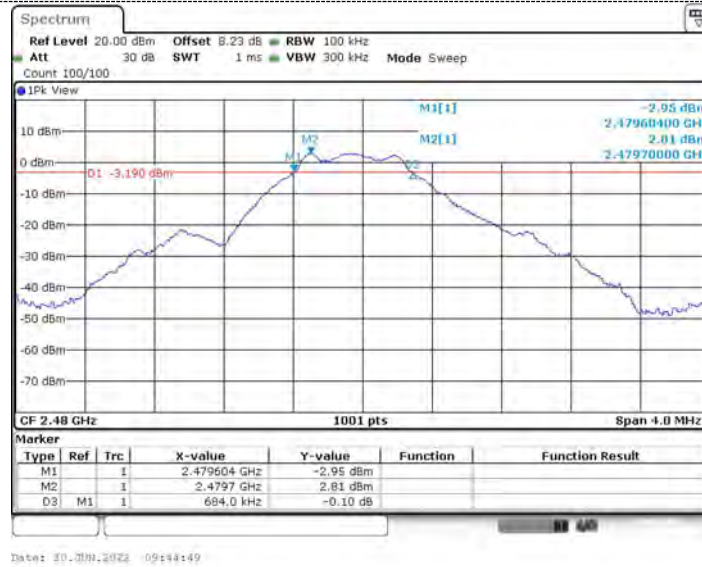


### CH19

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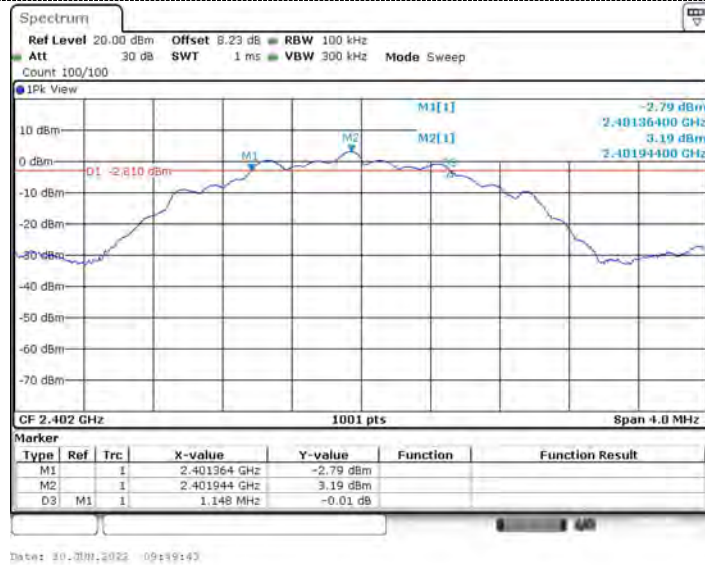
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CH39

BLE GFSK 2Mbps

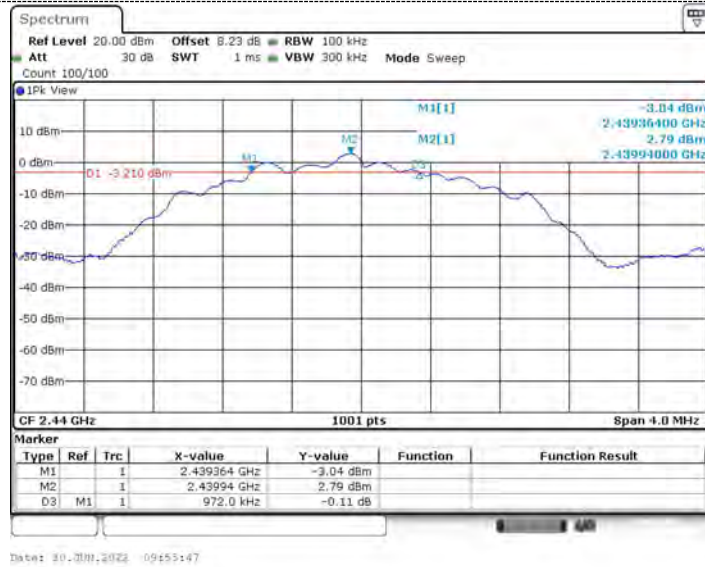


CH00

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CH19



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## 4.6 Out-of-band Emissions

### Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

### Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, band edge and out-of-band emissions.

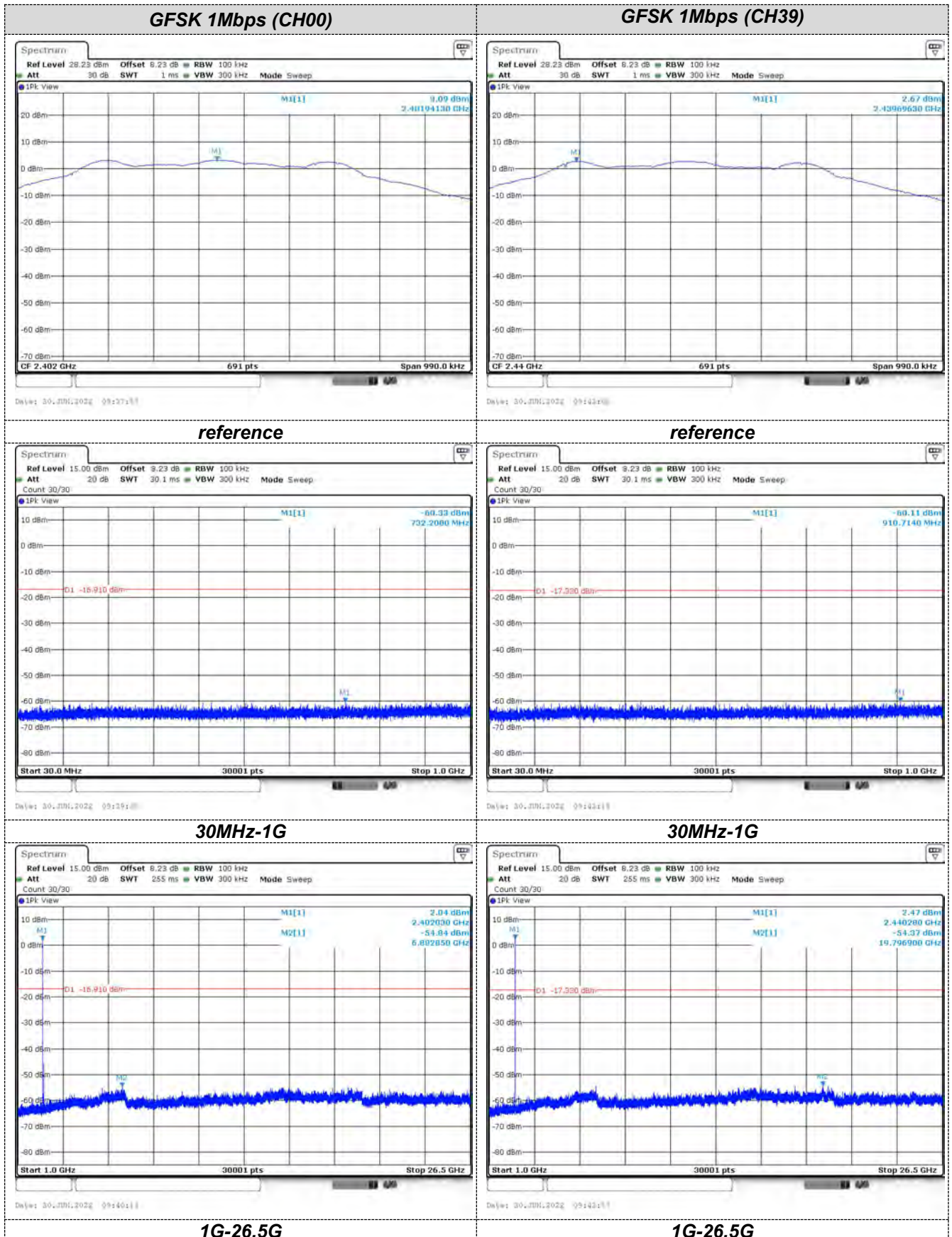
### Test Configuration



### Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

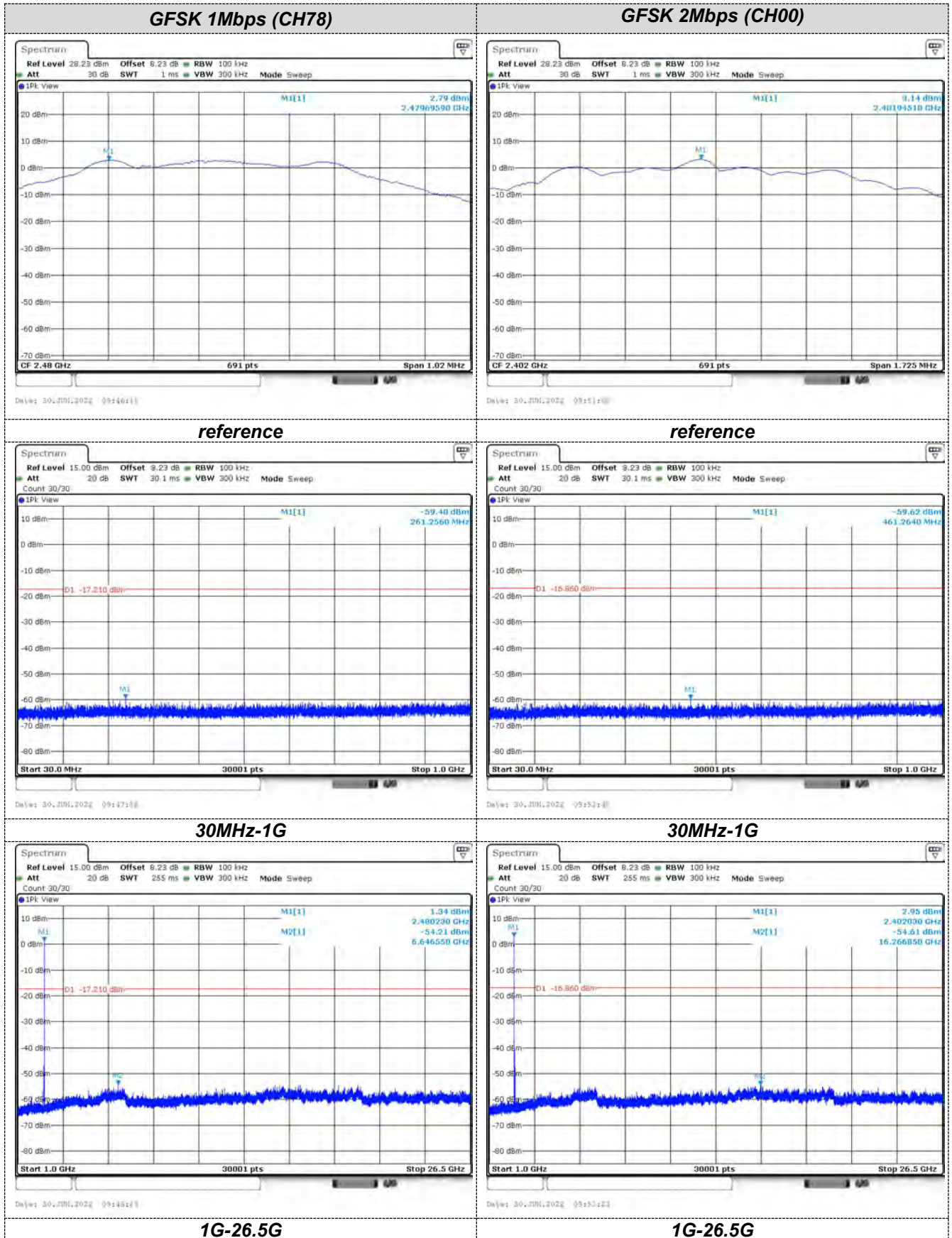
Test plot as follows:



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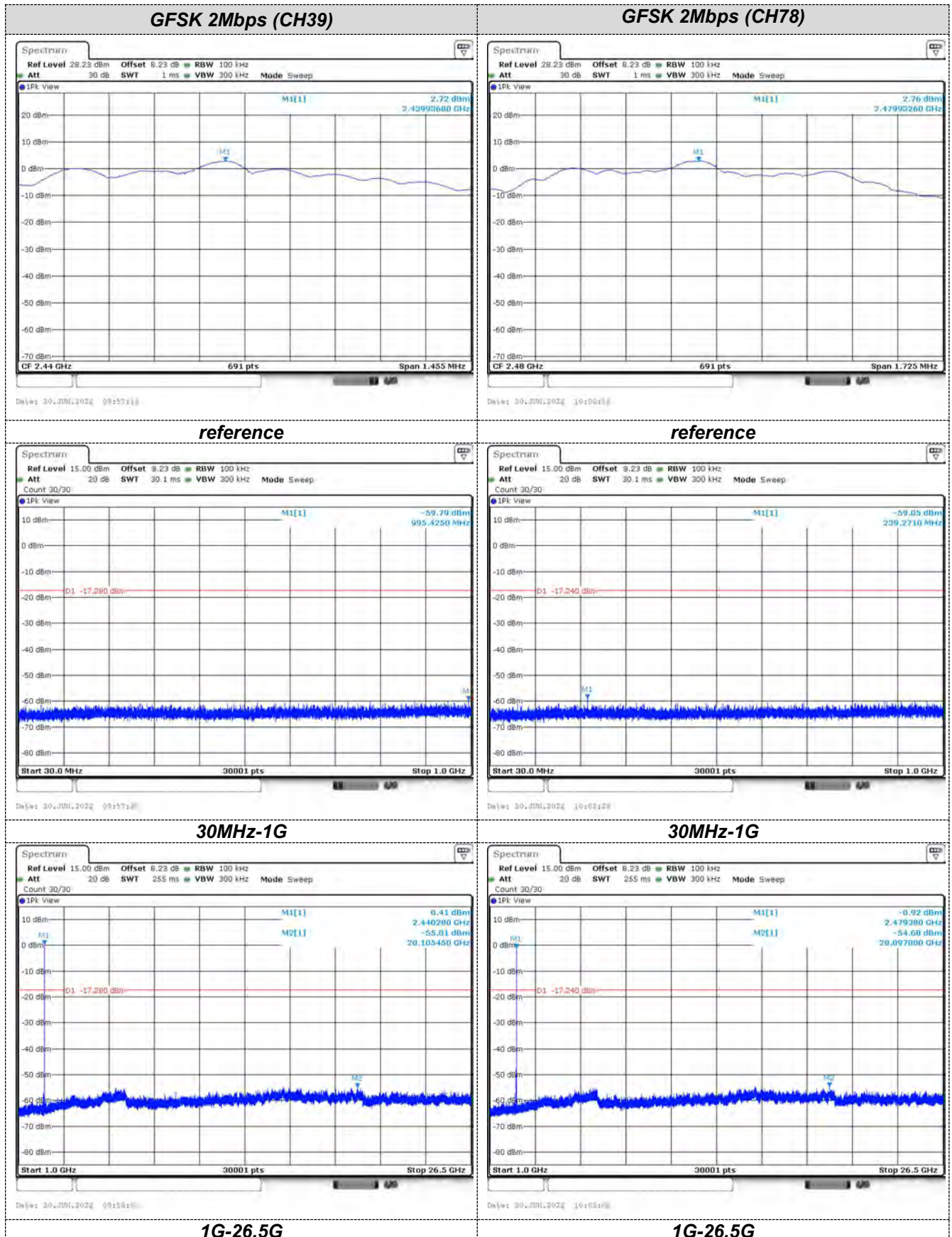
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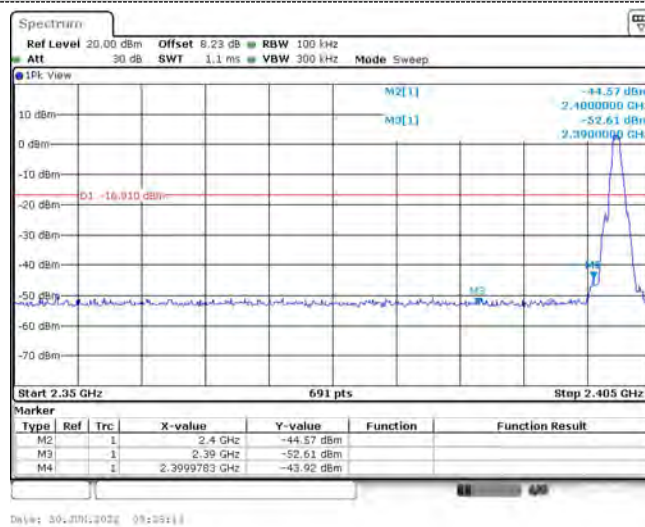
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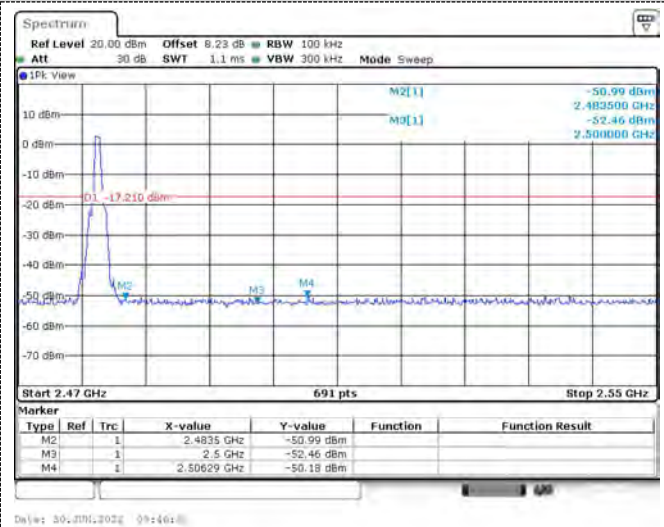
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### Band-edge Measurements for RF Conducted Emissions:

#### BLE GFSK 1Mbps

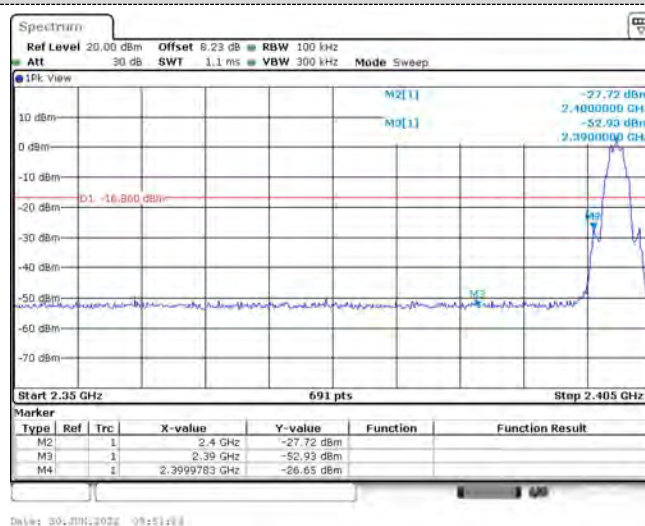


Left bandedge

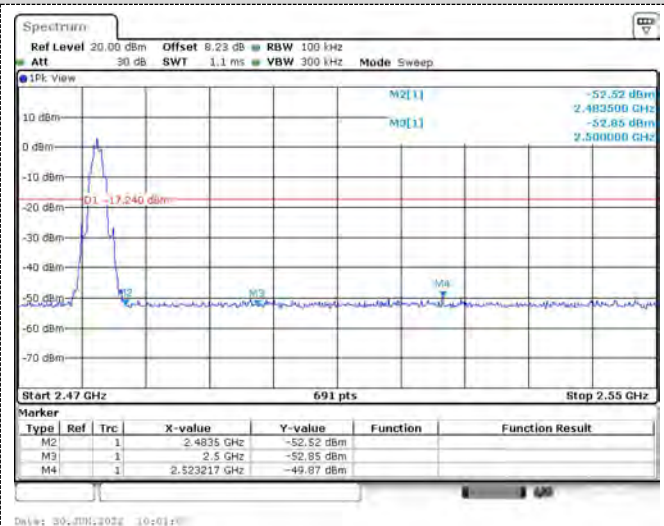


Right bandedge

#### BLE GFSK 2Mbps



Left bandedge



Right bandedge

TRF No. FCC Part 15.247\_R1

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## 4.7 Antenna Requirement

### Standard Applicable

**For intentional device, according to FCC 47 CFR Section 15.203:**

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

**FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):**

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

### Antenna Connected Construction

The maximum gain of antenna was -0.7 dBi.

## 5. Test Setup Photos of the EUT

Radiated Measurement (Below 1GHz)



Radiated Measurement (Above 1GHz)

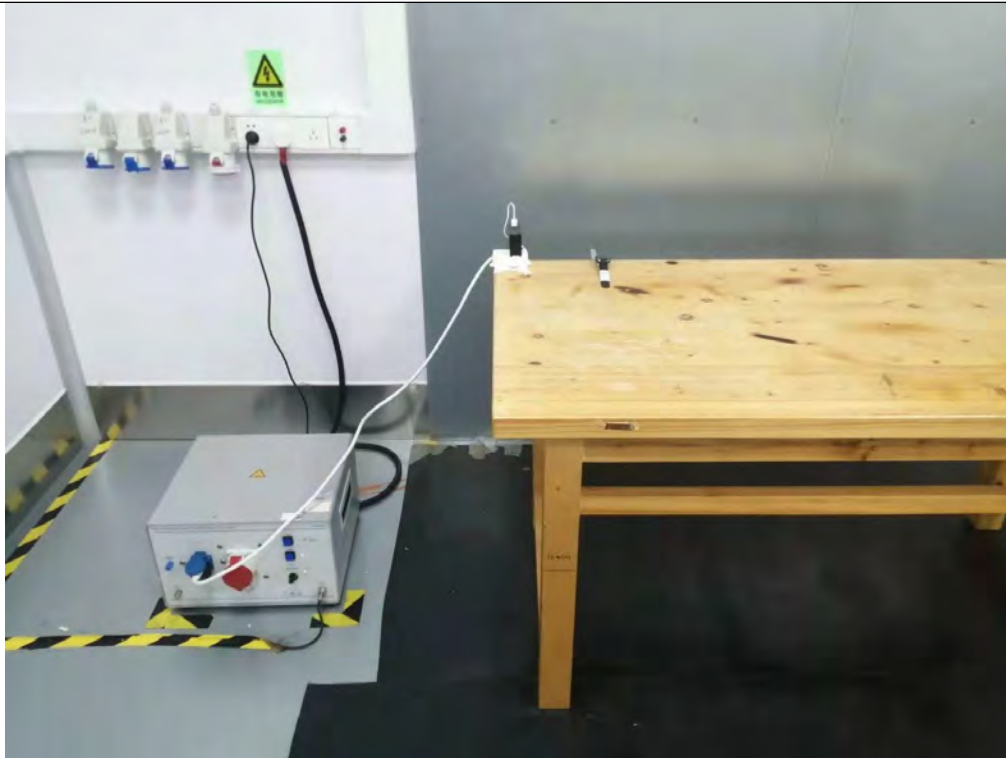


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## Conducted Emission



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## 6. Photos of the EUT

Reference to the test report No. KS2206S2706E02

\*\*\*\*\* End of Report \*\*\*\*\*