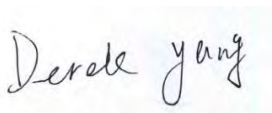
# FCC TEST REPORT

| | |
|---|---|
| **Application No:** | HR/2019/30012 |
| **Applicant:** | Huawei Technologies Co., Ltd. |
| **Address of Applicant** | Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C |
| **Manufacturer:** | Huawei Technologies Co., Ltd. |
| **Address of Manufacturer** | Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C |
| **EUT Description:** | Smart Phone |
| **Model No.:** | VOG-L04m |
| **Trade Mark:** | HUAWEI |
| **FCC ID:** | QISVOG-L04M |
| **Standards:** | 47 CFR FCC Part 2, Subpart J<br>47 CFR Part 15, Subpart C |
| **Test Method** | KDB558074 D01 15.247 Meas Guidance v05<br>ANSI C63.10 (2013) |
| **Date of Receipt:** | 2019/4/17 |
| **Date of Test:** | 2019/4/17to 2019/4/30 |
| **Date of Issue:** | 2019/4/30 |
| **Test Result:** | **PASS *** |

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Derek Yang
Wireless Laboratory Manager



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# 1 Version

| Revision Record | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| 00 | | 2019/4/30 | | Original |
| | | | | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| **Tested By** | | Mike Hu<br>**(Mike Hu) /Project Engineer** | | 2019/4/30<br>**Date** |
| **Checked By** | | David Chen<br>**(David Chen) /Reviewer** | | 2019/4/30<br>**Date** |



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# 2 Test Summary

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

# Contents

# 3 General Information

## 3.1 Client Information

| | |
|---|---|
| Applicant: | Huawei Technologies Co., Ltd. |
| Address of Applicant: | Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C |
| Manufacturer: | Huawei Technologies Co., Ltd. |
| Address of Manufacturer: | Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C |

## 3.2 Test Location

| | |
|---|---|
| Company: | SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch |
| Address: | No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China |
| Post code: | 518057 |
| Telephone: | +86 (0) 755 2601 2053 |
| Fax: | +86 (0) 755 2671 0594 |
| E-mail: | ee.shenzhen@sgs.com |

## 3.3 Test Facility

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

**• CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

**• A2LA (Certificate No. 3816.01)**

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

**• VCCI**

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

**• FCC –Designation Number: CN1178**

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

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

**• Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

## 3.4 General Description of EUT

| | |
|---|---|
| EUT Description:: | Smart Phone |
| Model No.: | VOG-L04m |
| Trade Mark: | HUAWEI |
| Hardware Version: | HL5VOGUEM |
| Software Version: | 9.1.0.130(SP3C792E1R1P5) |
| Operation Frequency: | 2400MHz~2483.5MHz<br>fc = 2402 MHz + N * 2 MHz, where:<br>-fc = "Operating Frequency" in MHz,<br>-N = "Channel Number" with the range from 0 to 39. |
| Bluetooth Version: | Bluetooth V5.0 LE |
| Modulation Type: | GFSK |
| Number of Channel: | 40 |
| Sample Type: | ☒ Portable Device, ☐Module |
| Antenna Type: | ☐ External, ☒ Integrated |
| Antenna Gain: | -1.4dBi |
| Power Supply | ☒ AC/DC Adapter; ☐ Battery;☐ PoE:; ☐ Other: |
| Adapter | Model：HW-100400U00<br>Manufacturer：Huawei Technologies Co.,Ltd.<br>Input Voltage：100-240V ~50/60Hz 1.2A<br>Output Voltage：5V ⎓ 2A OR 9V ⎓ 2A OR 10V ⎓ 4A<br>Model：HW-100400E00<br>Manufacturer：Huawei Technologies Co.,Ltd.<br>Input Voltage：100-240V ~50/60Hz 1.2A<br>Output Voltage：5V ⎓ 2A OR 9V ⎓ 2A OR 10V ⎓ 4A<br>Model：HW-100400B00<br>Manufacturer：Huawei Technologies Co.,Ltd.<br>Input Voltage：100-240V ~50/60Hz 1.2A<br>Output Voltage：5V ⎓ 2A OR 9V ⎓ 2A OR 10V ⎓ 4A<br>Model：HW-100400A00<br>Manufacturer：Huawei Technologies Co.,Ltd.<br>Input Voltage：100-240V ~50/60Hz 1.2A<br>Output Voltage：5V ⎓ 2A OR 9V ⎓ 2A OR 10V ⎓ 4A |
| Rechargeable Li-ion Battery | Model：HB486486ECW<br>Manufacturer：Huawei Technologies Co.,Ltd.<br>Rated capacity: 4100mAh<br>Nominal Voltage: +3.82V<br>Charging Voltage: +4.4V |

| Operation Frequency of each channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 0 | 2402MHz | 10 | 2422MHz | 20 | 2442MHz | 30 | 2462MHz |
| 1 | 2404MHz | 11 | 2424MHz | 21 | 2444MHz | 31 | 2464MHz |
| 2 | 2406MHz | 12 | 2426MHz | 22 | 2446MHz | 32 | 2466MHz |
| 3 | 2408MHz | 13 | 2428MHz | 23 | 2448MHz | 33 | 2468MHz |
| 4 | 2410MHz | 14 | 2430MHz | 24 | 2450MHz | 34 | 2470MHz |
| 5 | 2412MHz | 15 | 2432MHz | 25 | 2452MHz | 35 | 2472MHz |
| 6 | 2414MHz | 16 | 2434MHz | 26 | 2454MHz | 36 | 2474MHz |
| 7 | 2416MHz | 17 | 2436MHz | 27 | 2456MHz | 37 | 2476MHz |
| 8 | 2418MHz | 18 | 2438MHz | 28 | 2458MHz | 38 | 2478MHz |
| 9 | 2420MHz | 19 | 2440MHz | 29 | 2460MHz | 39 | 2480MHz |

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 (CH19) | 2440MHz |
| The highest channel (CH39) | 2480MHz |

## 3.5 Test Environment

| Operating Environment | |
|---|---|
| Temperature: | 25.0 °C |
| Humidity: | 50 % RH |
| Atmospheric Pressure: | 101.32 KPa |

## 3.6 Description of Support Units

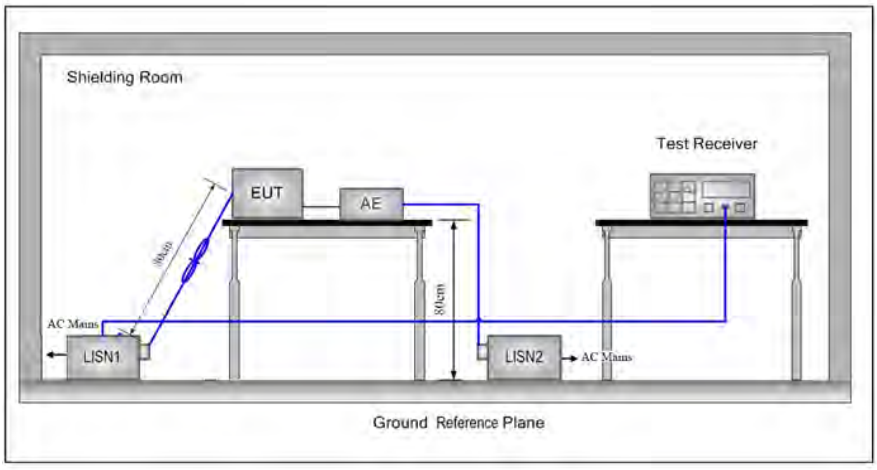
The EUT has been tested independent unit.

# 4 Test results and Measurement Data

## 4.1 Antenna Requirement

| **Standard requirement:** | 47 CFR Part 15C Section 15.203 /247(c) |
|---|---|
| 15.203 requirement:<br>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.<br>15.247(b) (4) requirement:<br>The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi. | |
| The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -1.4dBi. | |

## 4.2 AC Power Line Conducted Emissions

| | | | |
|---|---|---|---|
| Test Requirement: | 47 CFR Part 15C Section 15.207 | | |
| Test Method: | ANSI C63.10: 2013 | | |
| Test Frequency Range: | 150kHz to 30MHz | | |
| 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: | 1) The mains terminal disturbance voltage test was conducted in a shielded room.<br>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.<br>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.<br>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.<br>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to<br>ANSI C63.10: 2013 on conducted measurement. | | |
| Test Setup: |  | | |

| | |
|---|---|
| Test Mode: | Transmitting with GFSK modulation.<br>Charge +Transmitting mode. |
| Instruments Used: | Refer to section 5.10 for details. |
| Test Results: | Pass |



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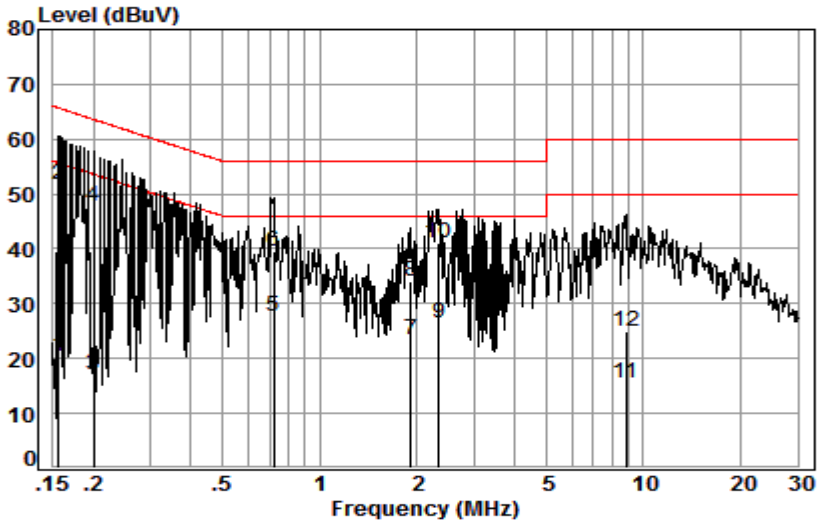
**Measurement Data**

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.

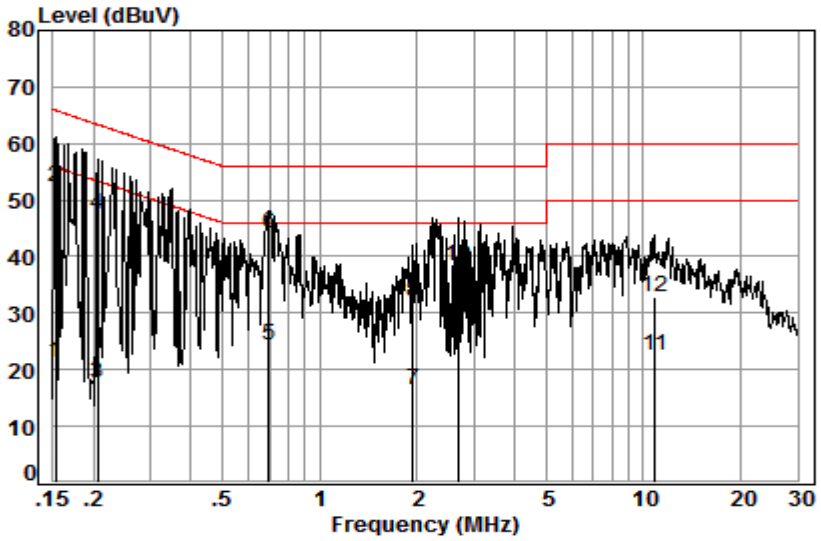
Live line:




Site : Shielding Room
Condition: Line
Job No. : 12967CR
Test mode: c

| | Freq | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB | dBuV | dBuV | dBuV | dB | |
| 1 | 0.16 | 0.01 | 9.66 | 10.76 | 20.43 | 55.69 | -35.26 | Average |
| 2 | 0.16 | 0.01 | 9.66 | 41.91 | 51.58 | 65.69 | -14.11 | QP |
| 3 | 0.20 | 0.02 | 9.66 | 7.28 | 16.96 | 53.58 | -36.62 | Average |
| 4 | 0.20 | 0.02 | 9.66 | 38.00 | 47.68 | 63.58 | -15.90 | QP |
| 5 | 0.72 | 0.08 | 9.69 | 17.80 | 27.57 | 46.00 | -18.43 | Average |
| 6 | 0.72 | 0.08 | 9.69 | 29.86 | 39.63 | 56.00 | -16.37 | QP |
| 7 | 1.91 | 0.15 | 9.72 | 13.52 | 23.39 | 46.00 | -22.61 | Average |
| 8 | 1.91 | 0.15 | 9.72 | 24.29 | 34.16 | 56.00 | -21.84 | QP |
| 9 | 2.33 | 0.16 | 9.71 | 16.73 | 26.60 | 46.00 | -19.40 | Average |
| 10 | 2.33 | 0.16 | 9.71 | 31.16 | 41.03 | 56.00 | -14.97 | QP |
| 11 | 8.87 | 0.17 | 9.83 | 5.61 | 15.61 | 50.00 | -34.39 | Average |
| 12 | 8.87 | 0.17 | 9.83 | 14.80 | 24.80 | 60.00 | -35.20 | QP |

Neutral line:




Site : Shielding Room
Condition: Neutral
Job No. : 12967CR
Test mode: c

| | Freq | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dB | dB | dBuV | dBuV | dBuV | dB | |
| 1 | 0.15 | 0.01 | 9.63 | 11.74 | 21.38 | 55.87 | -34.49 | Average |
| 2 | 0.15 | 0.01 | 9.63 | 42.72 | 52.36 | 65.87 | -13.51 | QP |
| 3 | 0.21 | 0.02 | 9.64 | 8.02 | 17.68 | 53.36 | -35.68 | Average |
| 4 | 0.21 | 0.02 | 9.64 | 37.89 | 47.55 | 63.36 | -15.81 | QP |
| 5 | 0.70 | 0.07 | 9.65 | 14.55 | 24.27 | 46.00 | -21.73 | Average |
| 6 | 0.70 | 0.07 | 9.65 | 34.28 | 44.00 | 56.00 | -12.00 | QP |
| 7 | 1.94 | 0.16 | 9.69 | 6.70 | 16.55 | 46.00 | -29.45 | Average |
| 8 | 1.94 | 0.16 | 9.69 | 22.13 | 31.98 | 56.00 | -24.02 | QP |
| 9 | 2.68 | 0.16 | 9.68 | 16.34 | 26.18 | 46.00 | -19.82 | Average |
| 10 | 2.68 | 0.16 | 9.68 | 28.53 | 38.37 | 56.00 | -17.63 | QP |
| 11 | 10.85 | 0.18 | 9.95 | 12.47 | 22.60 | 50.00 | -27.40 | Average |
| 12 | 10.85 | 0.18 | 9.95 | 22.82 | 32.95 | 60.00 | -27.05 | QP |

*Remarks:*

*1. The following Quasi-Peak and Average measurements were performed on the EUT:*

*2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.*

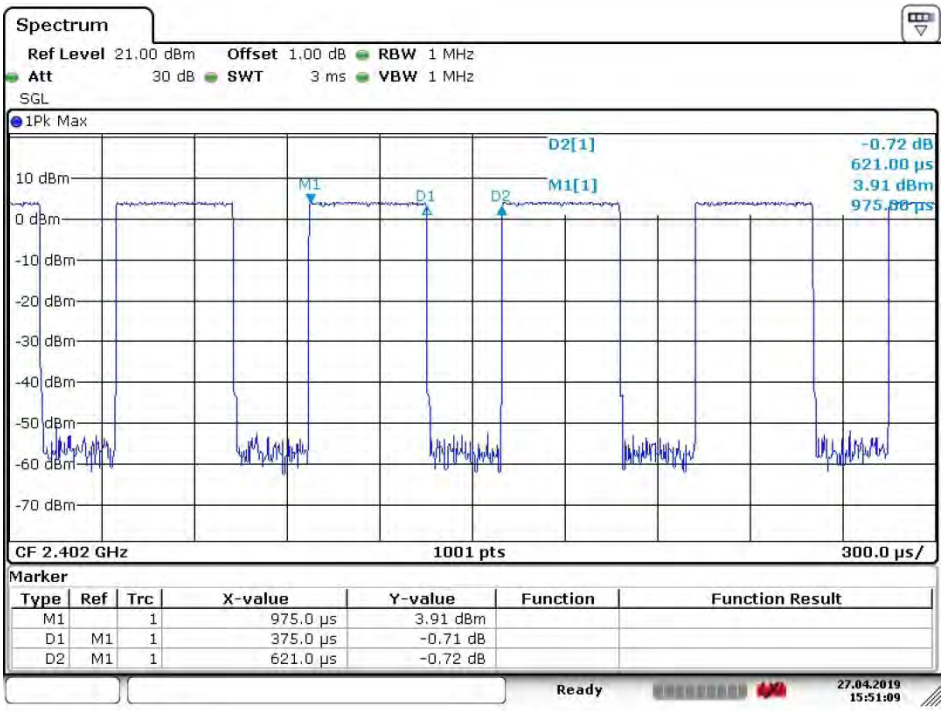
## 4.3 Duty Cycle

### 4.3.1 Test Results

| Test Mode | TX Freq. [MHz] | Duty cycle [%] |
|---|---|---|
| BLE | CH0 | 60.39 |

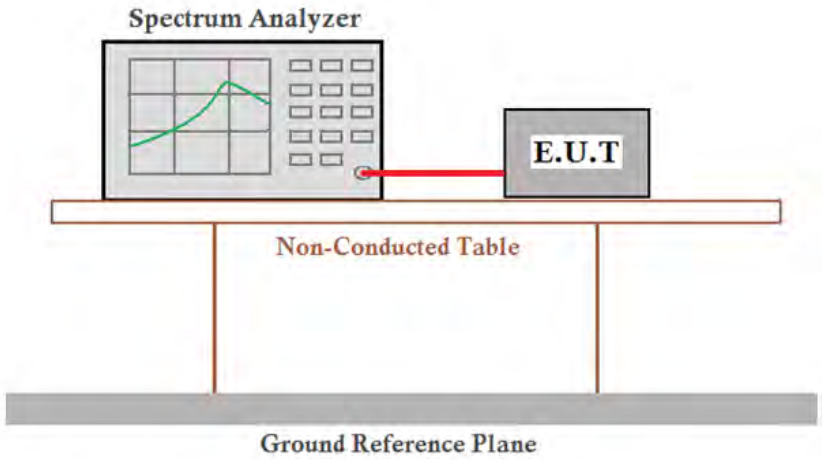
### 4.3.1 Test Plots

#### 4.3.1.1 BLE




Date: 27.APR.2019 15:51:10

## 4.4 Conducted Output Power

| | |
|---|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (b)(3) |
| Test Method: | ANSI C63.10 :2013 Section 11.9.1.1 |
| Test Setup: |  |
| Limit: | 30dBm |
| Test Mode: | Transmitting with GFSK modulation. |
| Instruments Used: | Refer to section 5.10 for details. |
| Test Results: | Pass |

### 4.4.1 Test Results

**Measurement Data of Average Power**

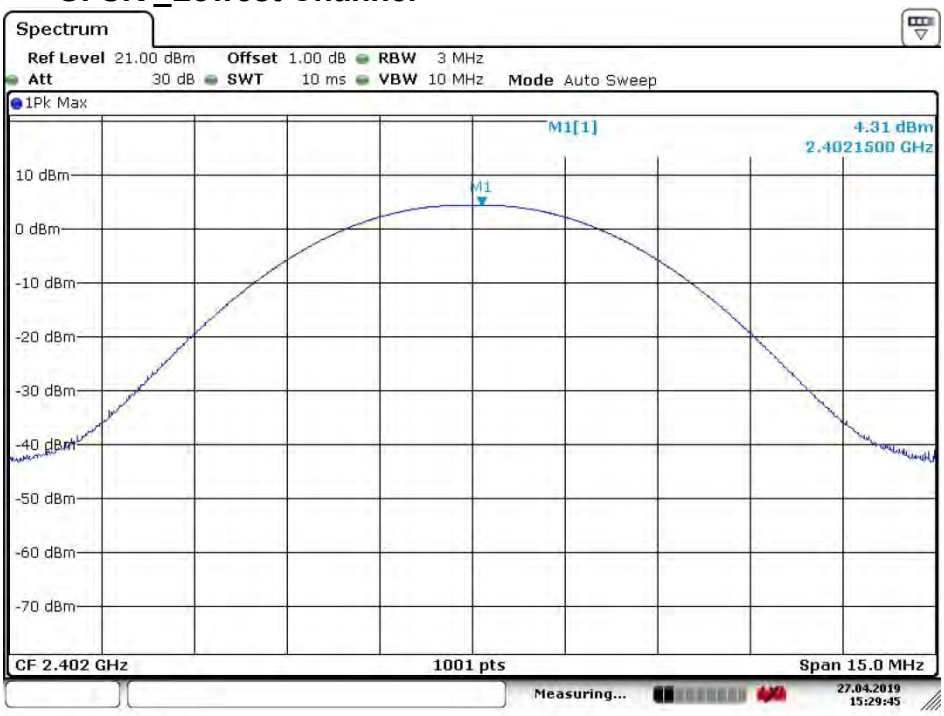
| GFSK mode | | |
|---|---|---|
| Test channel | Average Output Power (dBm) | Result |
| Lowest | 4.00 | Report purpose only |
| Middle | 5.35 | Report purpose only |
| Highest | 4.72 | Report purpose only |

**Measurement Data of Peak Power :**

| GFSK mode | | | |
|---|---|---|---|
| Test channel | Peak Output Power (dBm) | Limit (dBm) | Result |
| Lowest | 4.31 | 30.00 | Pass |
| Middle | 5.63 | 30.00 | Pass |
| Highest | 5.02 | 30.00 | Pass |

### 4.4.2 Test plots:

#### 4.4.2.1 GFSK _Lowest Channel




Date: 27.APR.2019 15:29:45

#### 4.4.2.2 GFSK _Middle Channel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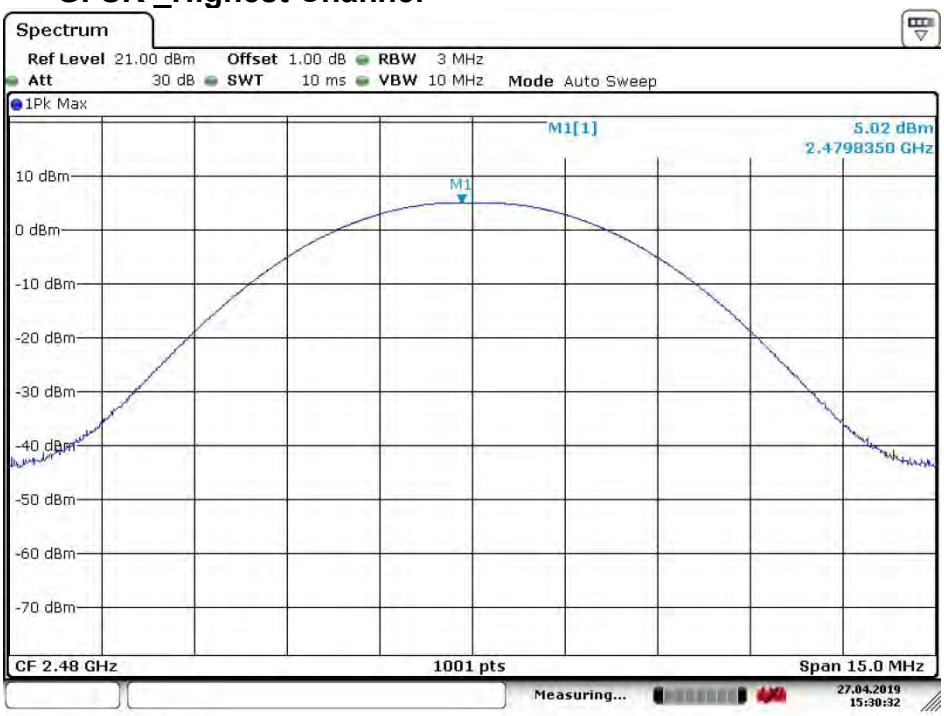
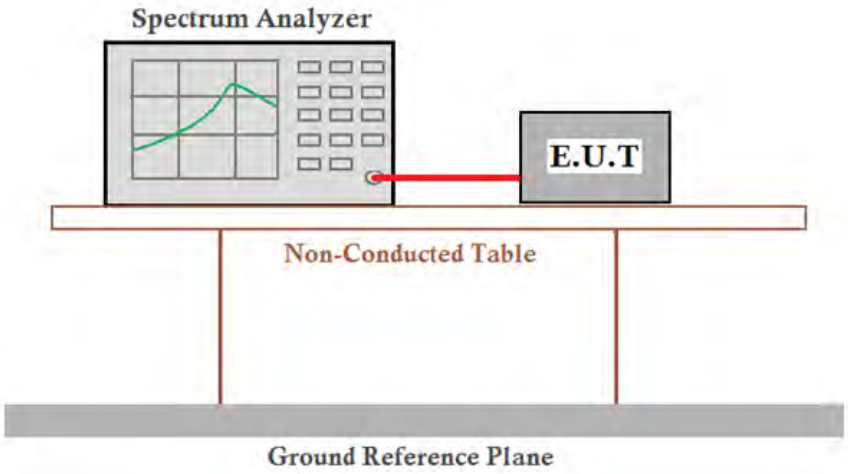
### 4.4.2.3 GFSK _Highest Channel




Date: 27.APR.2019 15:30:33

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

| | |
|---|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (a)(2) |
| Test Method: | ANSI C63.10: 2013 Section 11.8 Option 2 |
| Test Setup: |  |
| Limit: | ≥ 500 kHz |
| Test Mode: | Transmitting with GFSK modulation. |
| Instruments Used: | Refer to section 5.10 for details. |
| Test Results: | Pass |

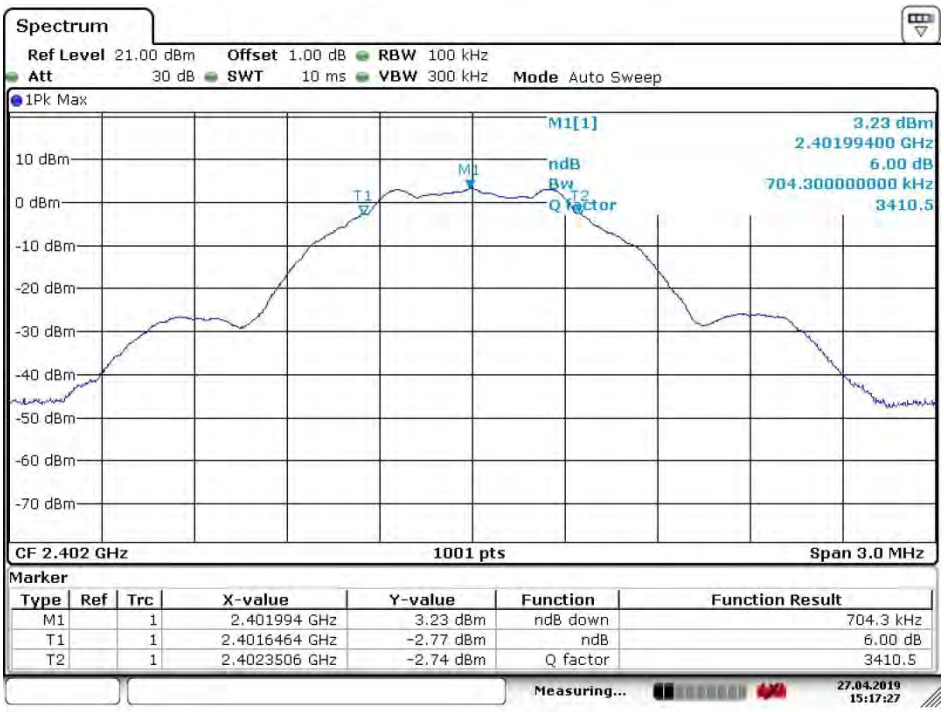
### 4.5.1 Test Results

| Mode | Test Channel | 99% Occupied Bandwidth (MHz) | 6dB Emission Bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|---|---|
| GFSK | Lowest | 1.03 | 0.70 | ≥500 | Pass |
| | Middle | 1.03 | 0.70 | ≥500 | Pass |
| | Highest | 1.03 | 0.71 | ≥500 | Pass |

### 4.5.2 Test plots

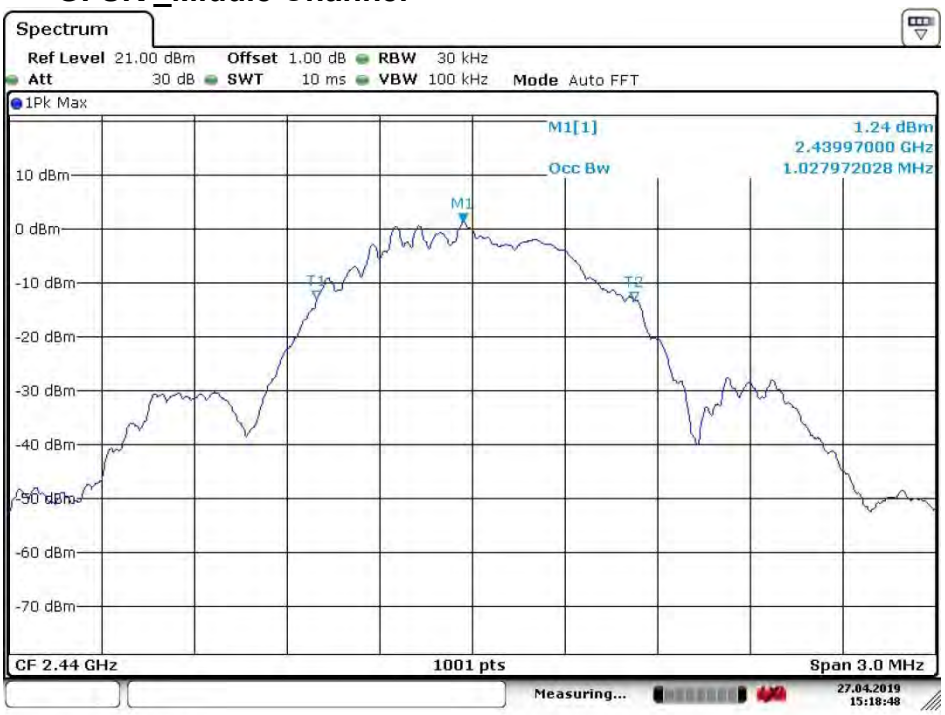
#### 4.5.2.1 GFSK _Lowest Channel


Date: 27.APR.2019 15:19:00

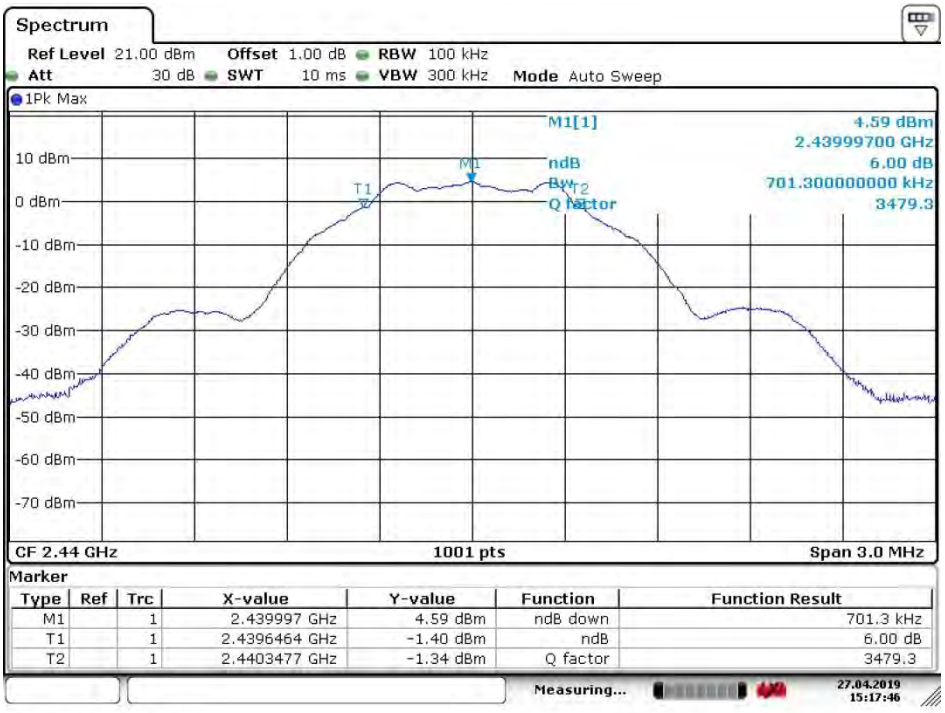



Date: 27.APR.2019 15:17:28

### 4.5.2.2 GFSK _Middle Channel




Date: 27.APR.2019 15:18:49



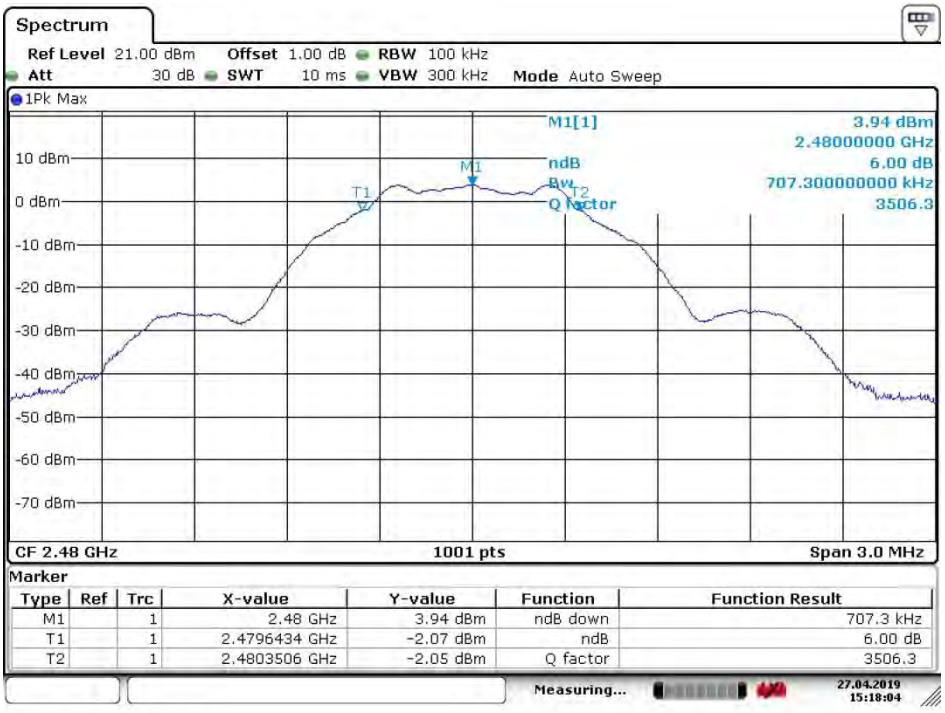

Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.439997 GHz | 4.59 dBm | ndB down | 701.3 kHz |
| T1 | | 1 | 2.4396464 GHz | -1.40 dBm | ndB | 6.00 dB |
| T2 | | 1 | 2.4403477 GHz | -1.34 dBm | Q factor | 3479.3 |

Date: 27.APR.2019 15:17:46

### 4.5.2.3 GFSK _Highest Channel


Date: 27.APR.2019 15:18:31

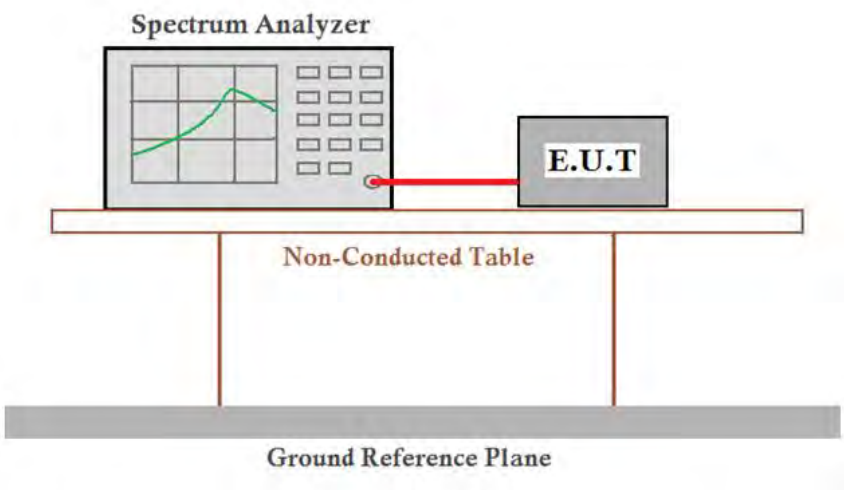



Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.48 GHz | 3.94 dBm | ndB down | 707.3 kHz |
| T1 | | 1 | 2.4796434 GHz | -2.07 dBm | ndB | 6.00 dB |
| T2 | | 1 | 2.4803506 GHz | -2.05 dBm | Q factor | 3506.3 |

Date: 27.APR.2019 15:18:04

## 4.6 Power Spectral Density

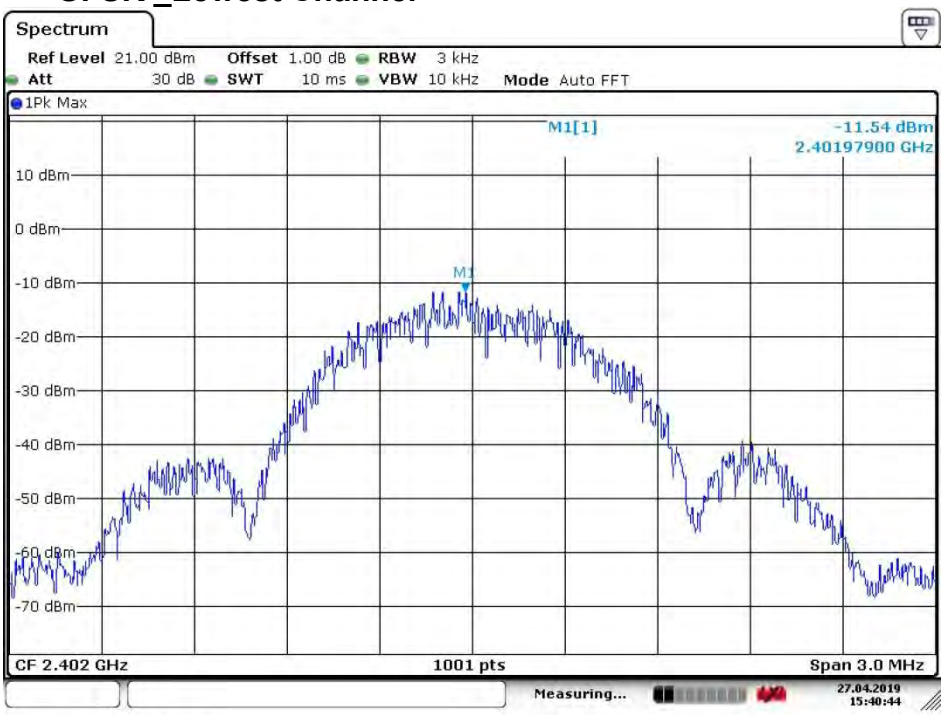
| | |
|---|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (e) |
| Test Method: | ANSI C63.10 :2013 Section 11.10.2 |
| Test Setup: |  |
| Limit: | ≤8.00dBm/3kHz |
| Test Mode: | Transmitting with GFSK modulation. |
| Instruments Used: | Refer to section 5.10 for details. |
| Test Results: | Pass |

### 4.6.1 Test Results

| Mode | Test Channel | Power Spectral Density (dBm/3kHz) | Limit (dBm/3kHz) | Result |
|---|---|---|---|---|
| GFSK | Lowest | -11.54 | ≤8.00 | Pass |
| | Middle | -10.18 | ≤8.00 | Pass |
| | Highest | -10.80 | ≤8.00 | Pass |

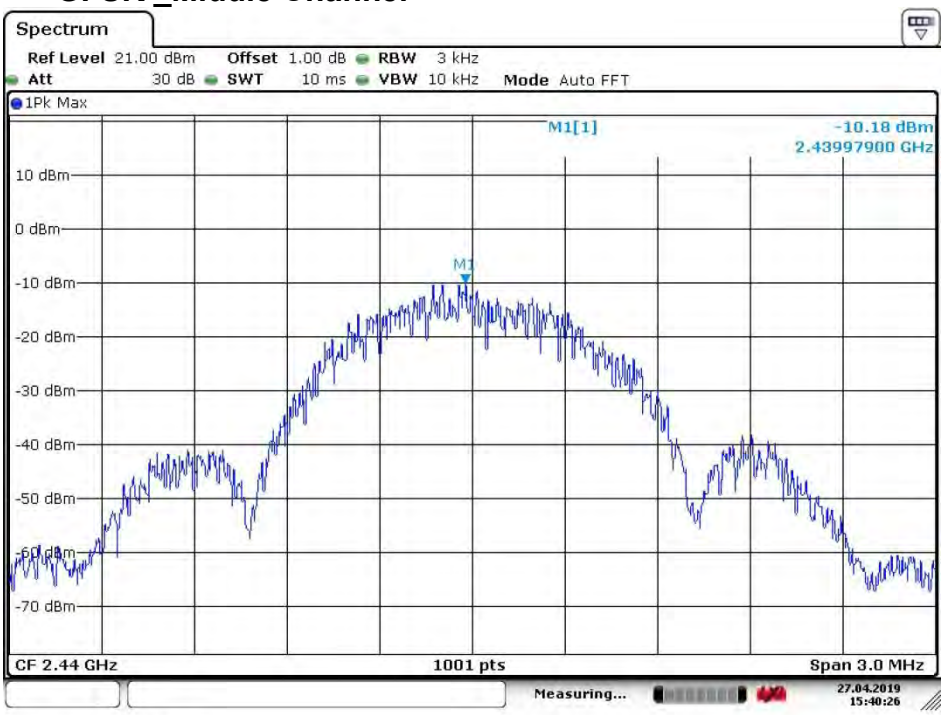
### 4.6.2 Test plots

#### 4.6.2.1 GFSK _Lowest Channel



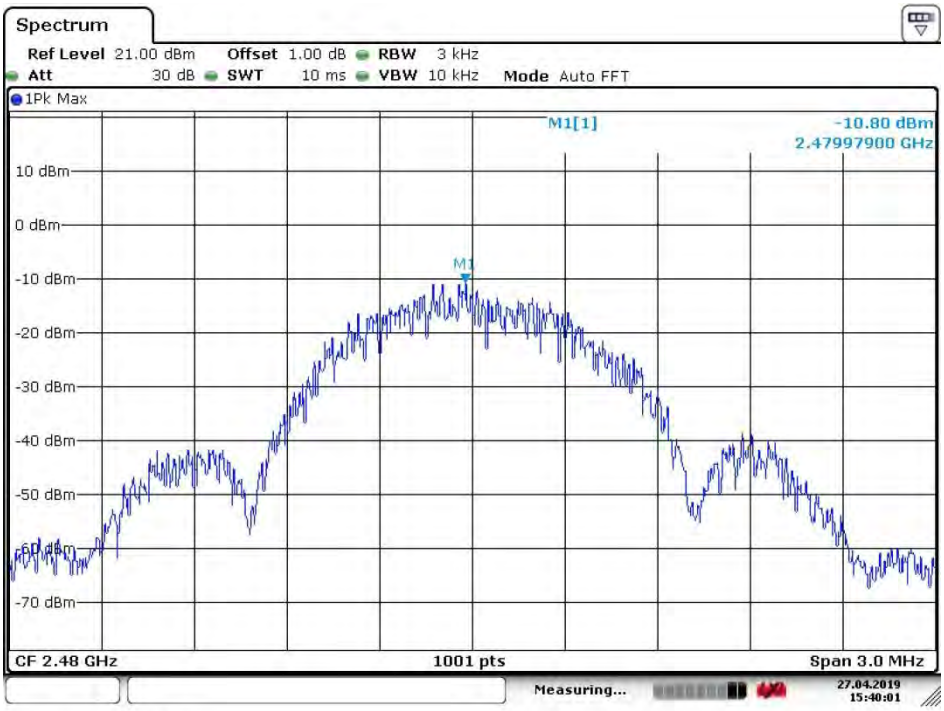

Date: 27.APR.2019 15:40:44

#### 4.6.2.2 GFSK _Middle Channel



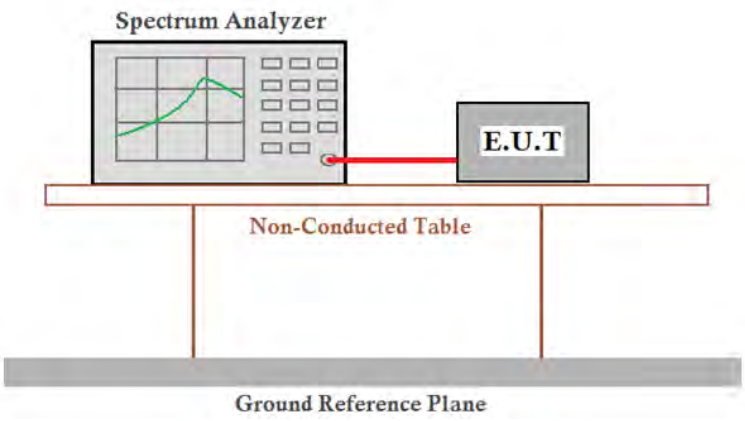

Date: 27.APR.2019 15:40:26

### 4.6.2.3 GFSK _Highest Channel



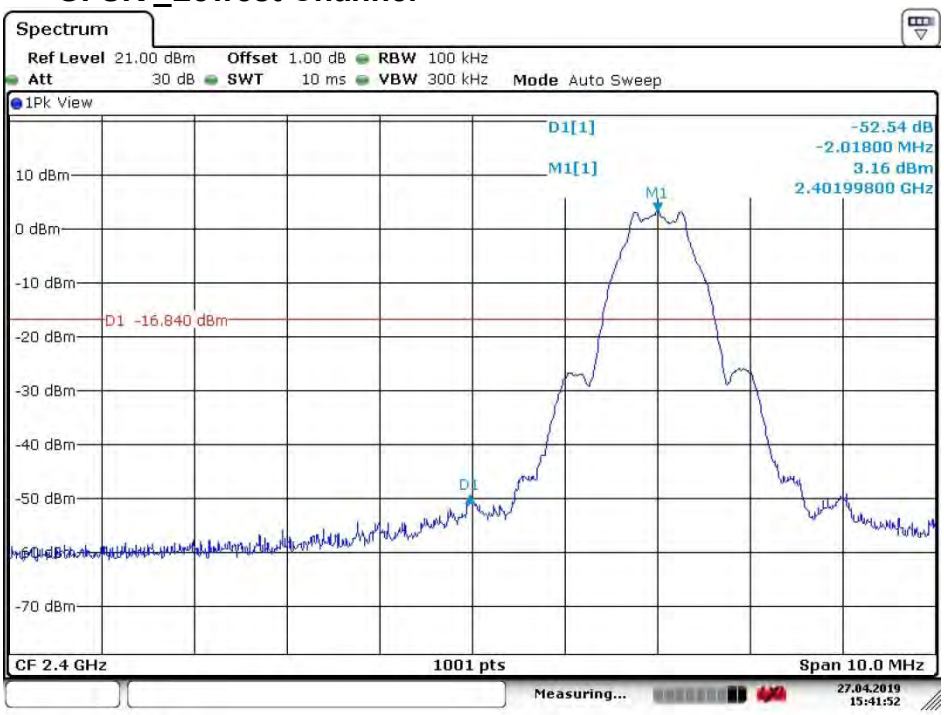

Date: 27.APR.2019 15:40:02

## 4.7 Band-edge for RF Conducted Emissions

| | |
|---|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (d) |
| Test Method: | ANSI C63.10: 2013 Section 11.13 |
| Test Setup: |  |
| 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 Mode: | Transmitting with GFSK modulation. |
| Instruments Used: | Refer to section 5.10 for details. |
| Test Results: | Pass |

### 4.7.1 Test plots

#### 4.7.1.1 GFSK _Lowest Channel

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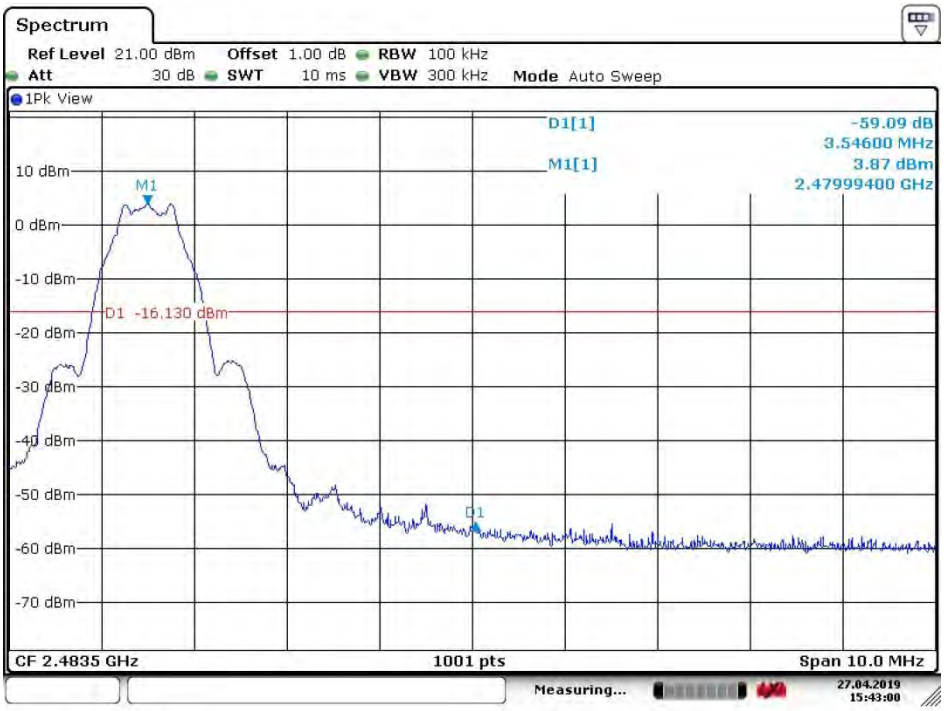
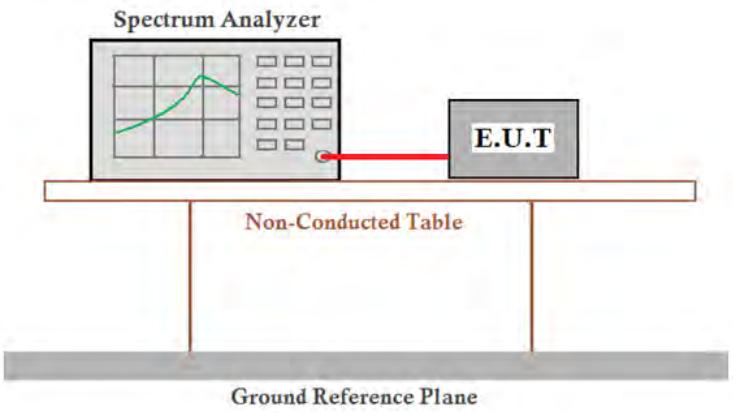
#### 4.7.1.2 GFSK _Highest Channel



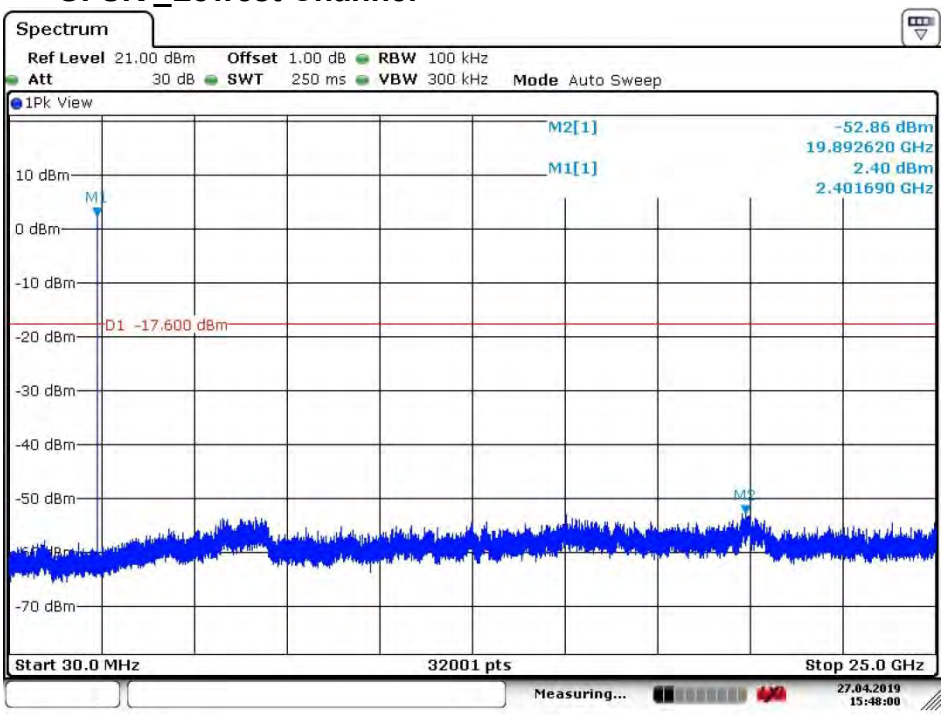

Date: 27.APR.2019 15:43:00

## 4.8 Spurious RF Conducted Emissions

| | |
|---|---|
| Test Requirement: | 47 CFR Part 15C Section 15.247 (d) |
| Test Method: | ANSI C63.10: 2013 Section 11.11 |
| Test Setup: |  |
| 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 Mode: | Transmitting with GFSK modulation. |
| Instruments Used: | Refer to section 5.10 for details. |
| Test Results: | Pass |

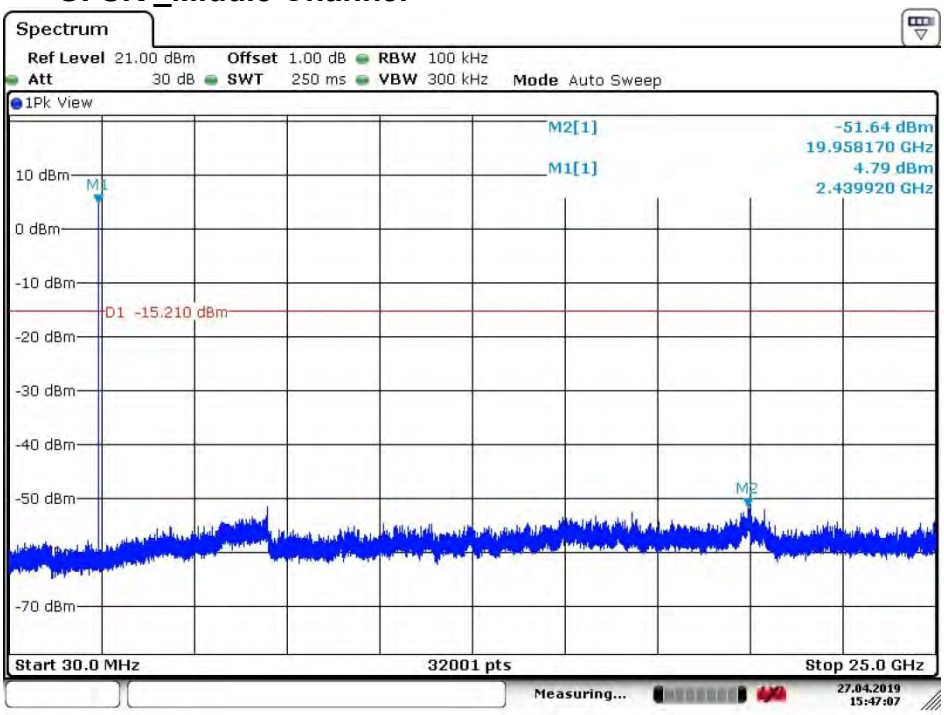
### 4.8.1 Test plots:

#### 4.8.1.1 GFSK _Lowest Channel



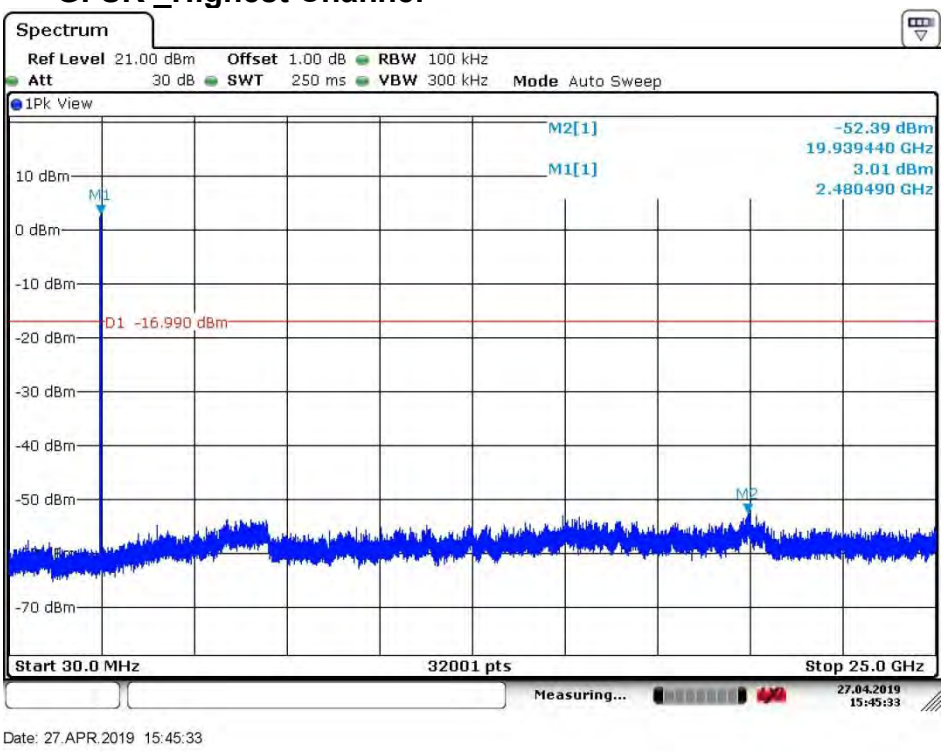

Date: 27.APR.2019 15:48:00

#### 4.8.1.2 GFSK _Middle Channel




Date: 27.APR.2019 15:47:08

### 4.8.1.3 GFSK _Highest Channel




Remark:
Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

## 4.9 Radiated Spurious Emission

| | | | | | |
|---|---|---|---|---|---|
| Test Requirement: | 47 CFR Part 15C Section 15.209 and 15.205 | | | | |
| Test Method: | ANSI C63.10 :2013 Section 11.12 | | | | |
| Test Site: | Measurement Distance: 3m or 10m (Semi-Anechoic Chamber) | | | | |
| Receiver Setup: | Frequency | Detector | RBW | VBW | Remark |
| | 0.009MHz-0.090MHz | Peak | 10kHz | 30kHz | Peak |
| | 0.009MHz-0.090MHz | Average | 10kHz | 30kHz | Average |
| | 0.090MHz-0.110MHz | Quasi-peak | 10kHz | 30kHz | Quasi-peak |
| | 0.110MHz-0.490MHz | Peak | 10kHz | 30kHz | Peak |
| | 0.110MHz-0.490MHz | Average | 10kHz | 30kHz | Average |
| | 0.490MHz -30MHz | Quasi-peak | 10kHz | 30kHz | Quasi-peak |
| | 30MHz-1GHz | Quasi-peak | 100 kHz | 300kHz | Quasi-peak |
| | Above 1GHz | Peak | 1MHz | 3MHz | Peak |
| | | Peak | 1MHz | 10Hz | Average |
| 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: | |
|---|---|

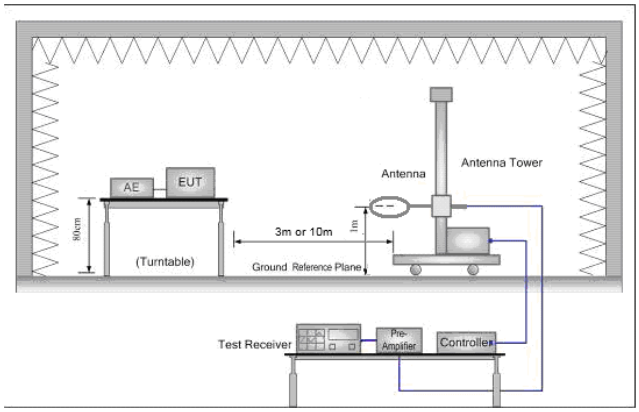



Figure 1. Below 30MHz

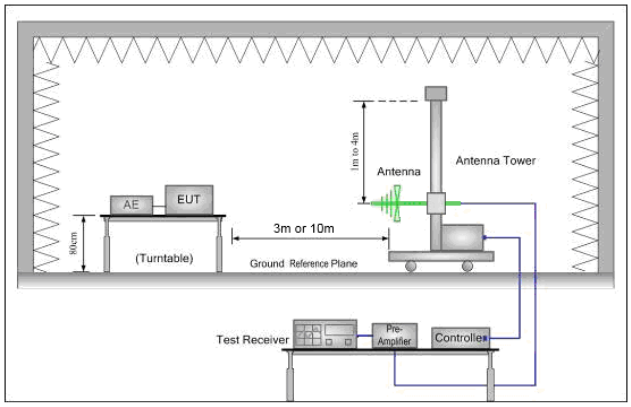



Figure 2. 30MHz to 1GHz

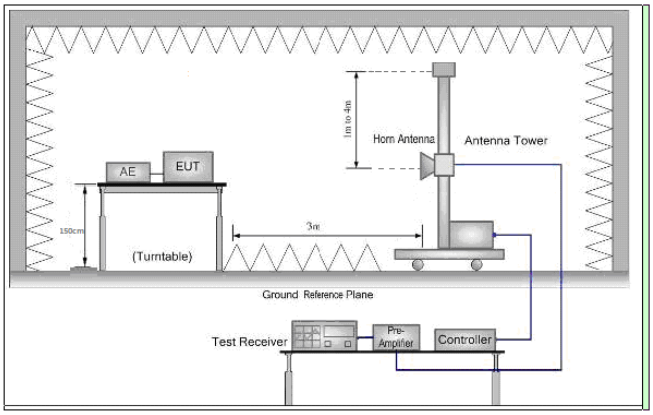


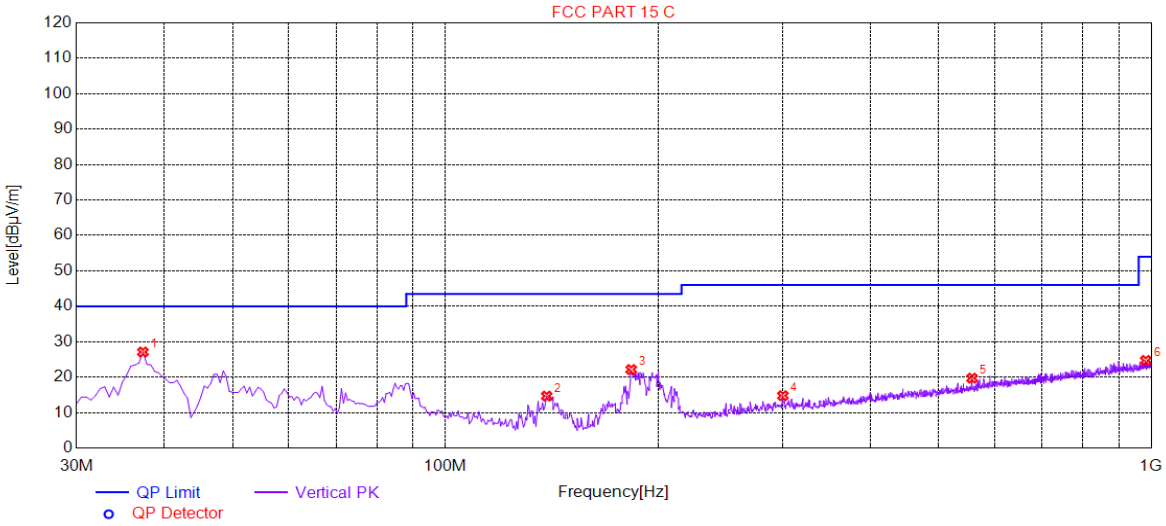

Figure 3. Above 1 GHz

| Test Procedure: | a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (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.<br>f. The test-receiver system was set to Peak Detect Function and Specified |
|---|---|

| | |
|---|---|
| | Bandwidth with Maximum Hold Mode.<br>g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.<br>h. Test the EUT in the lowest channel (2402MHz),the middle channel (2440MHz),the Highest channel (2480MHz)<br>i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.<br>j. Repeat above procedures until all frequencies measured was complete. |
| Exploratory Test Mode: | Transmitting with GFSK modulation.<br>Charge + Transmitting mode. |
| Final Test Mode: | Transmitting with GFSK modulation.<br>Pretest the EUT at Charge + Transmitting mode,<br>For below 1GHz part, through pre-scan, the worst case is the lowest channel.Only the worst case is recorded in the report. |
| Instruments Used: | Refer to section 5.10 for details. |
| Test Results: | Pass |

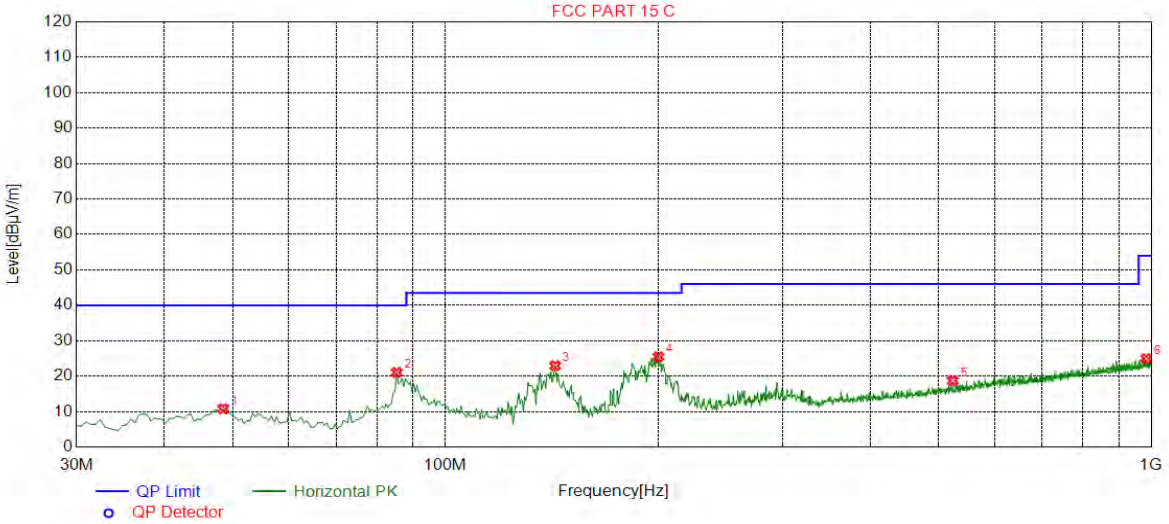
## 4.9.1 Radiated Emission below 1GHz

### 4.9.1.1 Charge + Transmitting, Vertical




| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 37.2786 | 27.09 | -32.03 | 40.00 | 12.91 | 100 | 335 | Vertical |
| 2 | 139.179 | 14.66 | -35.17 | 43.50 | 28.84 | 200 | 341 | Vertical |
| 3 | 183.336 | 22.15 | -32.57 | 43.50 | 21.35 | 100 | 0 | Vertical |
| 4 | 300.765 | 14.77 | -27.84 | 46.00 | 31.23 | 100 | 105 | Vertical |
| 5 | 557.458 | 19.73 | -21.25 | 46.00 | 26.27 | 100 | 25 | Vertical |
| 6 | 982.531 | 24.72 | -14.08 | 54.00 | 29.28 | 100 | 145 | Vertical |

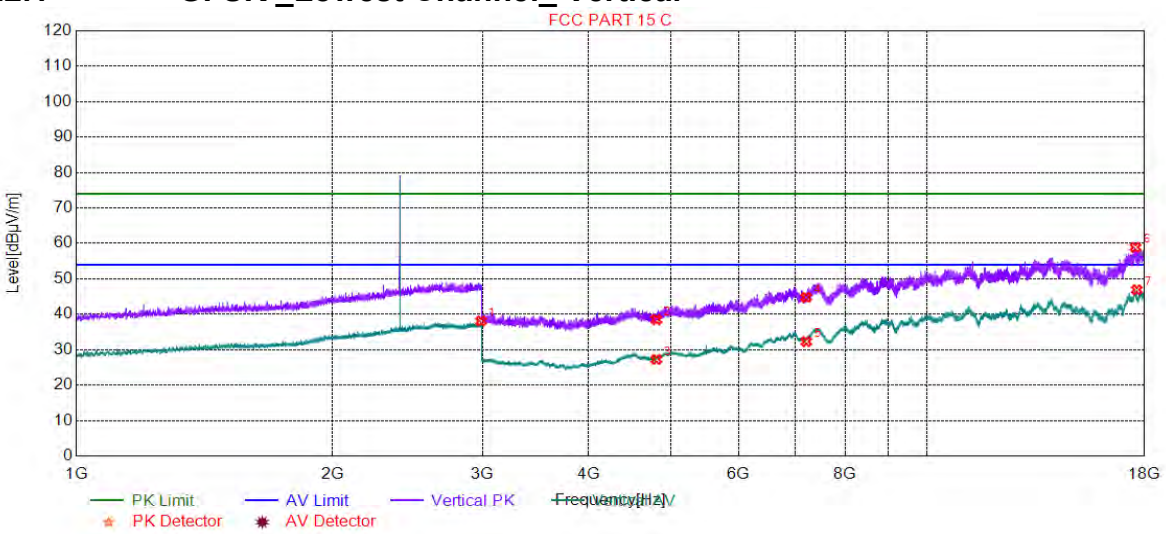
### 4.9.1.2 Charge + Transmitting, Horizontal




| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 48.4392 | 10.81 | -30.19 | 40.00 | 29.19 | 200 | 142 | Horizontal |
| 2 | 85.3177 | 21.04 | -34.55 | 40.00 | 18.96 | 200 | 170 | Horizontal |
| 3 | 143.061 | 22.96 | -35.08 | 43.50 | 20.54 | 200 | 254 | Horizontal |
| 4 | 200.320 | 25.45 | -30.80 | 43.50 | 18.05 | 200 | 232 | Horizontal |
| 5 | 523.491 | 18.70 | -22.10 | 46.00 | 27.30 | 200 | 321 | Horizontal |
| 6 | 983.501 | 24.93 | -14.07 | 54.00 | 29.07 | 100 | 199 | Horizontal |

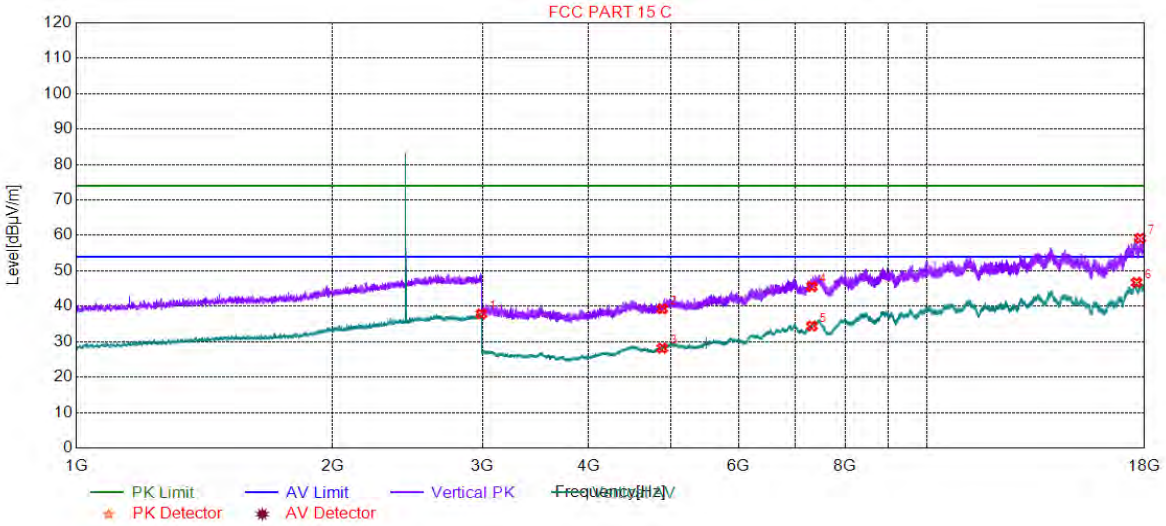
### 4.9.2 Transmitter Emission above 1GHz

#### 4.9.2.1 GFSK _Lowest Channel_ Vertical



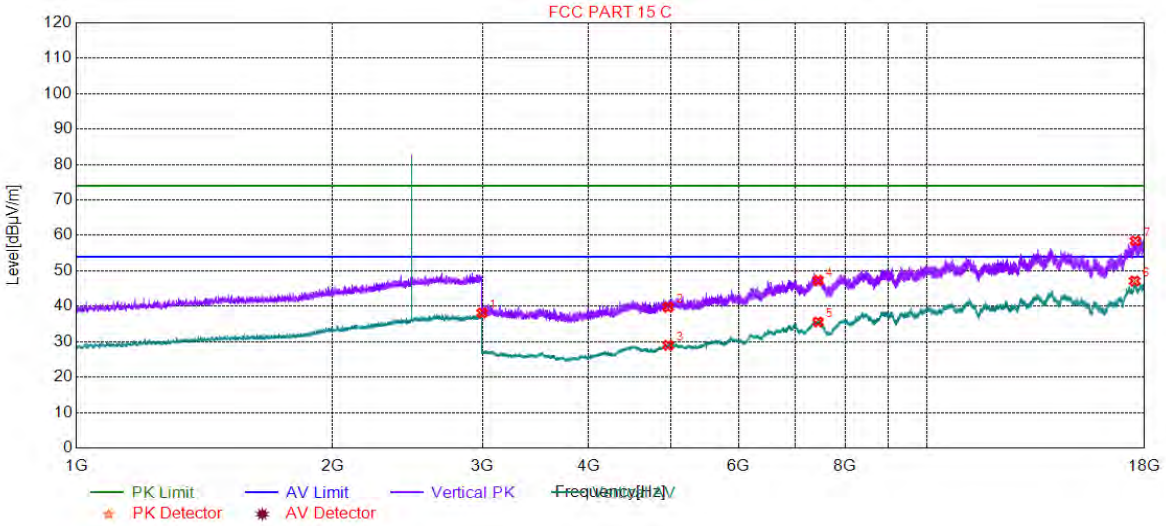

| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2988.99 | 38.09 | 2.32 | 54.00 | 15.91 | 150 | 240 | Vertical |
| 2 | 4804.00 | 38.50 | -20.38 | 74.00 | 35.50 | 150 | 180 | Vertical |
| 3 | 4804.00 | 27.25 | -20.38 | 54.00 | 26.75 | 150 | 132 | Vertical |
| 4 | 7206.00 | 44.78 | -12.76 | 74.00 | 29.22 | 150 | 4 | Vertical |
| 5 | 7206.00 | 32.29 | -12.76 | 54.00 | 21.71 | 150 | 100 | Vertical |
| 6 | 17555.4 | 58.90 | 1.06 | 74.00 | 15.10 | 150 | 230 | Vertical |
| 7 | 17622.4 | 46.90 | 1.05 | 54.00 | 7.10 | 150 | 316 | Vertical |

### 4.9.2.2 GFSK _Middle Channel_ Vertical



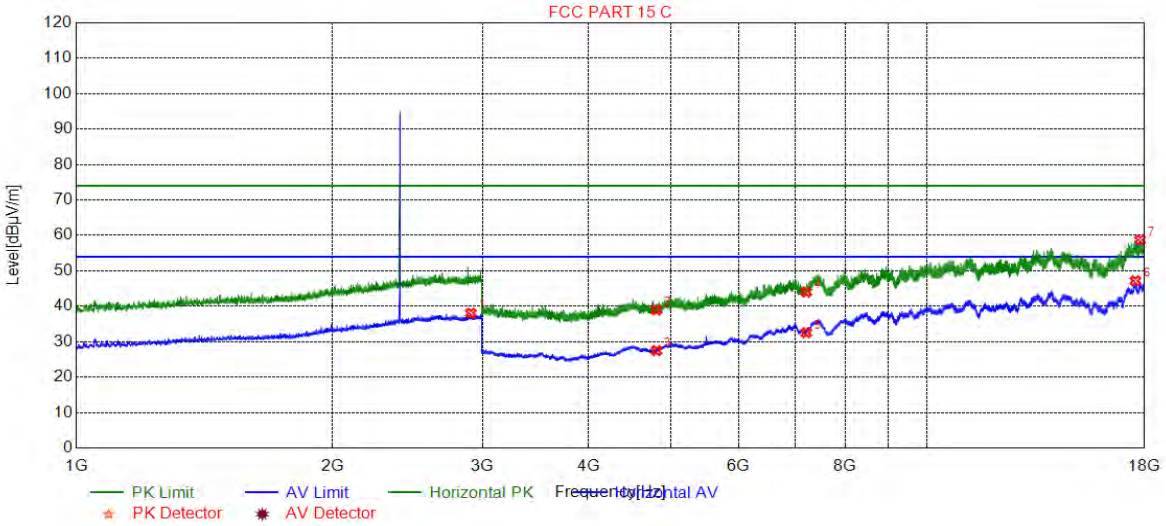

| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2991.49 | 37.84 | 2.32 | 54.00 | 16.16 | 150 | 119 | Vertical |
| 2 | 4880.00 | 39.26 | -19.29 | 74.00 | 34.74 | 150 | 0 | Vertical |
| 3 | 4880.00 | 28.17 | -19.29 | 54.00 | 25.83 | 150 | 196 | Vertical |
| 4 | 7320.00 | 45.56 | -11.41 | 74.00 | 28.44 | 150 | 19 | Vertical |
| 5 | 7320.00 | 34.43 | -11.41 | 54.00 | 19.57 | 150 | 164 | Vertical |
| 6 | 17615.9 | 46.71 | 1.21 | 54.00 | 7.29 | 150 | 18 | Vertical |
| 7 | 17785.4 | 59.19 | -0.80 | 74.00 | 14.81 | 150 | 75 | Vertical |

### 4.9.2.3 GFSK _High Channel_ Vertical



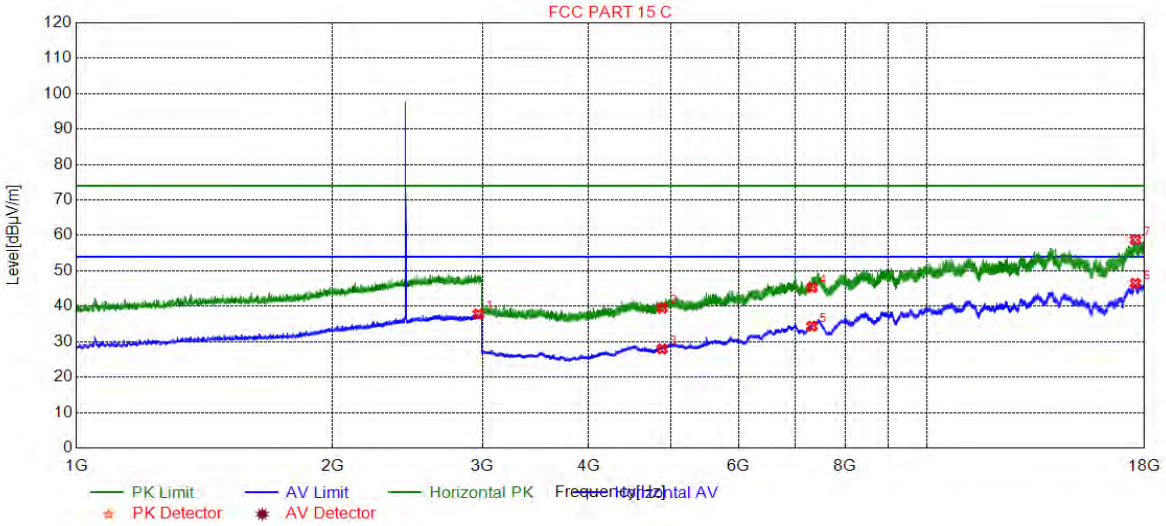

| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2997.49 | 38.10 | 2.33 | 54.00 | 15.90 | 150 | 150 | Vertical |
| 2 | 4960.00 | 39.73 | -18.67 | 74.00 | 34.27 | 150 | 14 | Vertical |
| 3 | 4960.00 | 28.99 | -18.67 | 54.00 | 25.01 | 150 | 86 | Vertical |
| 4 | 7440.00 | 47.29 | -10.72 | 74.00 | 26.71 | 150 | 1 | Vertical |
| 5 | 7440.00 | 35.57 | -10.72 | 54.00 | 18.43 | 150 | 49 | Vertical |
| 6 | 17522.9 | 47.16 | 0.64 | 54.00 | 6.84 | 150 | 125 | Vertical |
| 7 | 17557.4 | 58.46 | 1.09 | 74.00 | 15.54 | 150 | 182 | Vertical |

### 4.9.2.4 GFSK _Lowest Channel_ Horizontal



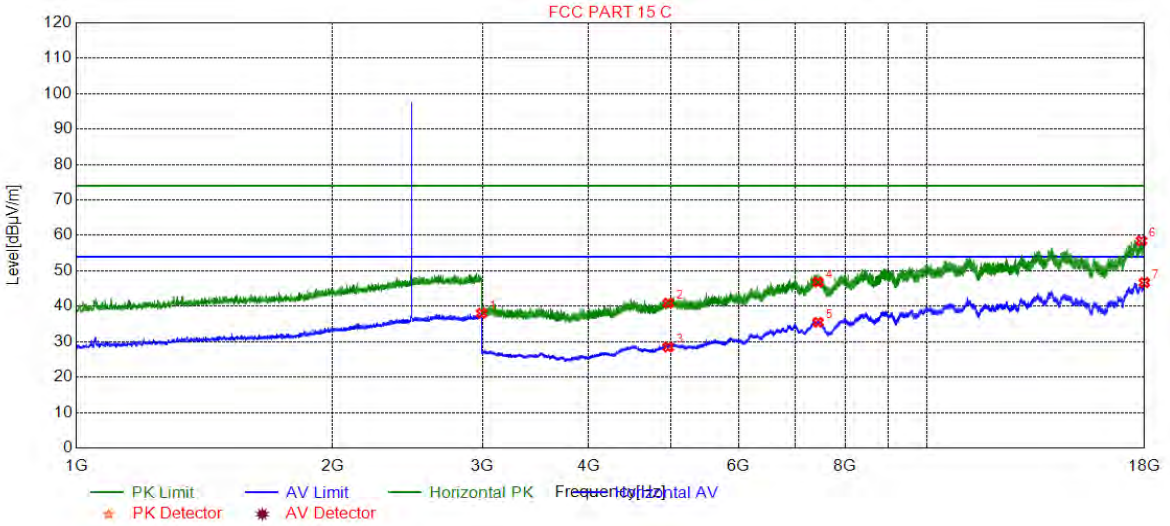

| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2907.97 | 38.05 | 2.27 | 54.00 | 15.95 | 150 | 343 | Horizontal |
| 2 | 4804.00 | 38.97 | -20.38 | 74.00 | 35.03 | 150 | 36 | Horizontal |
| 3 | 4804.00 | 27.49 | -20.38 | 54.00 | 26.51 | 150 | 260 | Horizontal |
| 4 | 7206.00 | 44.01 | -12.76 | 74.00 | 29.99 | 150 | 342 | Horizontal |
| 5 | 7206.00 | 32.52 | -12.76 | 54.00 | 21.48 | 150 | 223 | Horizontal |
| 6 | 17555.4 | 47.18 | 1.06 | 54.00 | 6.82 | 150 | 252 | Horizontal |
| 7 | 17783.4 | 58.75 | -0.80 | 74.00 | 15.25 | 150 | 281 | Horizontal |

### 4.9.2.5 GFSK _Middle Channel_ Horizontal




| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2967.49 | 37.81 | 2.31 | 54.00 | 16.19 | 150 | 146 | Horizontal |
| 2 | 4880.00 | 39.53 | -19.29 | 74.00 | 34.47 | 150 | 326 | Horizontal |
| 3 | 4880.00 | 27.97 | -19.29 | 54.00 | 26.03 | 150 | 194 | Horizontal |
| 4 | 7320.00 | 45.28 | -11.41 | 74.00 | 28.72 | 150 | 210 | Horizontal |
| 5 | 7320.00 | 34.40 | -11.41 | 54.00 | 19.60 | 150 | 342 | Horizontal |
| 6 | 17555.4 | 46.47 | 1.06 | 54.00 | 7.53 | 150 | 302 | Horizontal |
| 7 | 17557.9 | 58.76 | 1.09 | 74.00 | 15.24 | 150 | 189 | Horizontal |

### 4.9.2.6 GFSK _High Channel_ Horizontal




| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2993.99 | 38.02 | 2.33 | 54.00 | 15.98 | 150 | 187 | Horizontal |
| 2 | 4960.00 | 40.89 | -18.67 | 74.00 | 33.11 | 150 | 51 | Horizontal |
| 3 | 4960.00 | 28.50 | -18.67 | 54.00 | 25.50 | 150 | 148 | Horizontal |
| 4 | 7440.00 | 46.79 | -10.72 | 74.00 | 27.21 | 150 | 342 | Horizontal |
| 5 | 7440.00 | 35.49 | -10.72 | 54.00 | 18.51 | 150 | 196 | Horizontal |
| 6 | 17844.9 | 58.47 | -0.92 | 74.00 | 15.53 | 150 | 76 | Horizontal |
| 7 | 17986.9 | 46.68 | -0.45 | 54.00 | 7.32 | 150 | 304 | Horizontal |

Remark:

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

## 4.10 Restricted bands around fundamental frequency

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

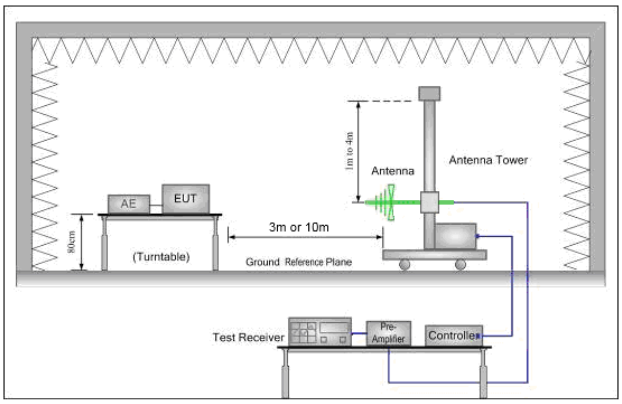



Figure 1. 30MHz to 1GHz

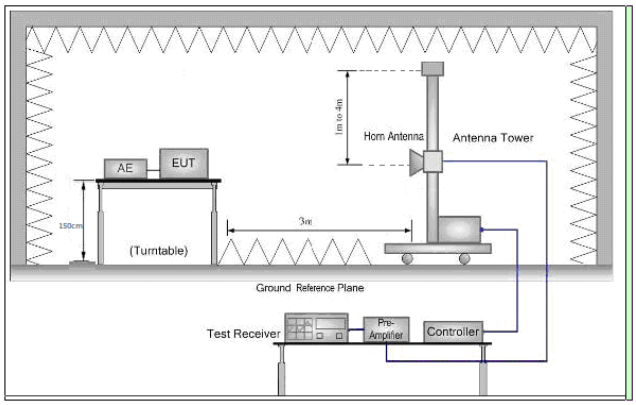


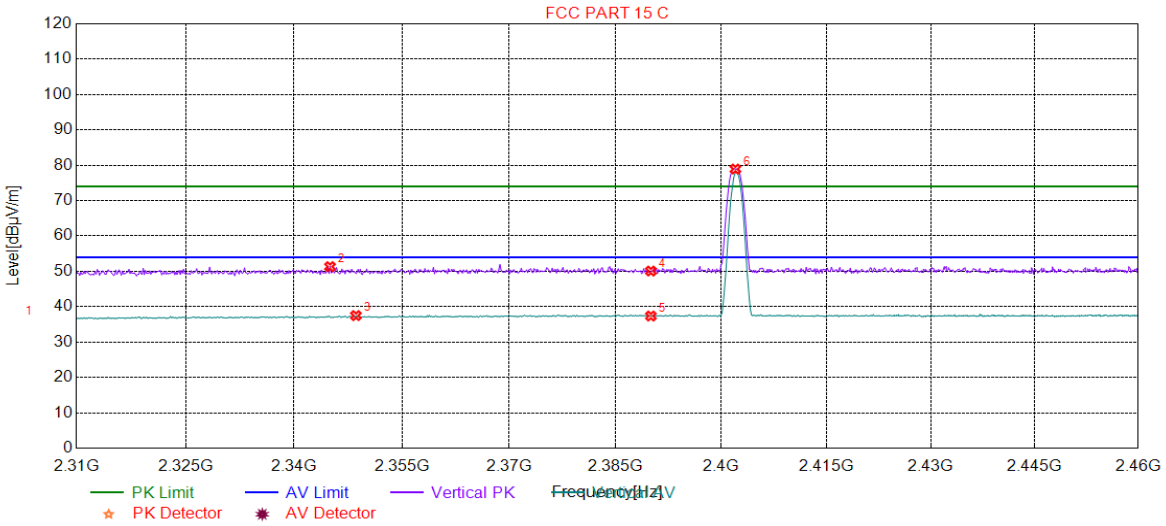

Figure 2. Above 1 GHz

| | |
|---|---|
| Test Procedure: | a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.<br>e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>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<br>h. Test the EUT in the lowest channel, the Highest channel |

| | |
|---|---|
| | i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.<br>j. Repeat above procedures until all frequencies measured was complete. |
| Exploratory Test Mode: | Transmitting with GFSK modulation.<br>Charge + Transmitting mode. |
| Final Test Mode: | Transmitting with GFSK modulation.<br>Pretest the EUT at Charge + Transmitting mode.<br>Only the worst case is recorded in the report. |
| Instruments Used: | Refer to section 5.10 for details. |
| Test Results: | Pass |

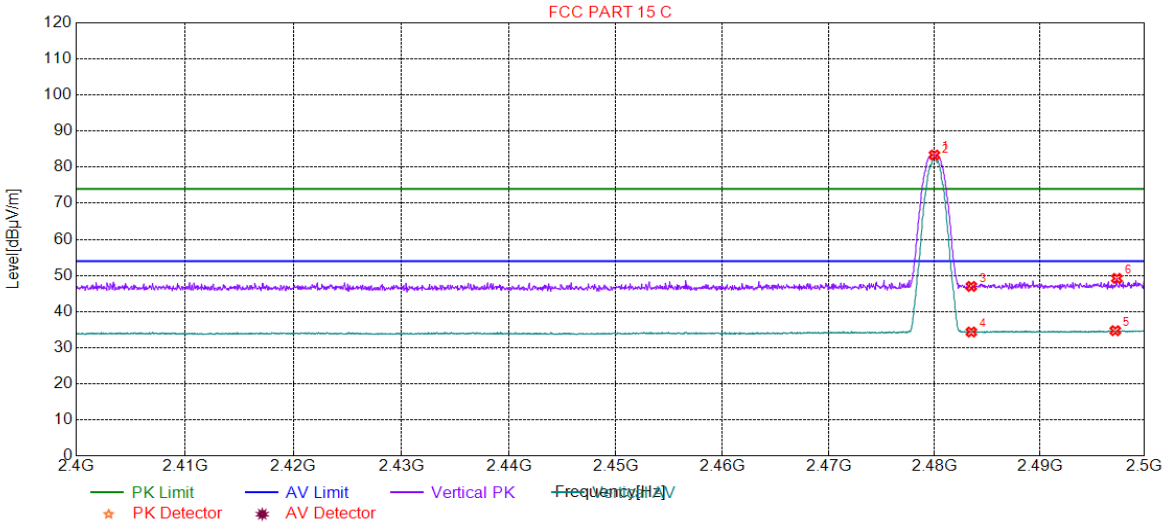
## 4.10.1 Test plots

### 4.10.1.1 Worst Case Mode(GFSK) Lowest Channel_ Vertical



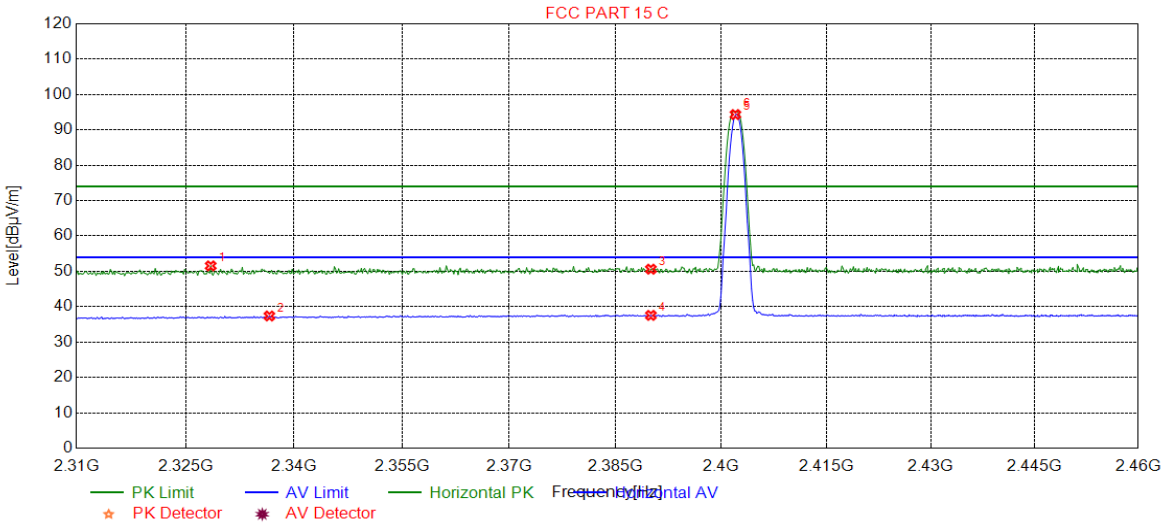

| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2302.00 | 36.64 | 0.89 | 54.00 | 17.36 | 150 | 35 | Vertical |
| 2 | 2344.98 | 51.33 | 1.05 | 74.00 | 22.67 | 150 | 142 | Vertical |
| 3 | 2348.58 | 37.49 | 1.06 | 54.00 | 16.51 | 150 | 280 | Vertical |
| 4 | 2390.00 | 50.09 | 1.25 | 74.00 | 23.91 | 150 | 238 | Vertical |
| 5 | 2390.00 | 37.37 | 1.25 | 54.00 | 16.63 | 150 | 160 | Vertical |
| 6 | 2402.00 | 78.92 | 1.30 | 74.00 | -4.92 | 150 | 148 | Vertical |

### 4.10.1.2 Worst Case Mode(GFSK) Highest Channel_ Vertical



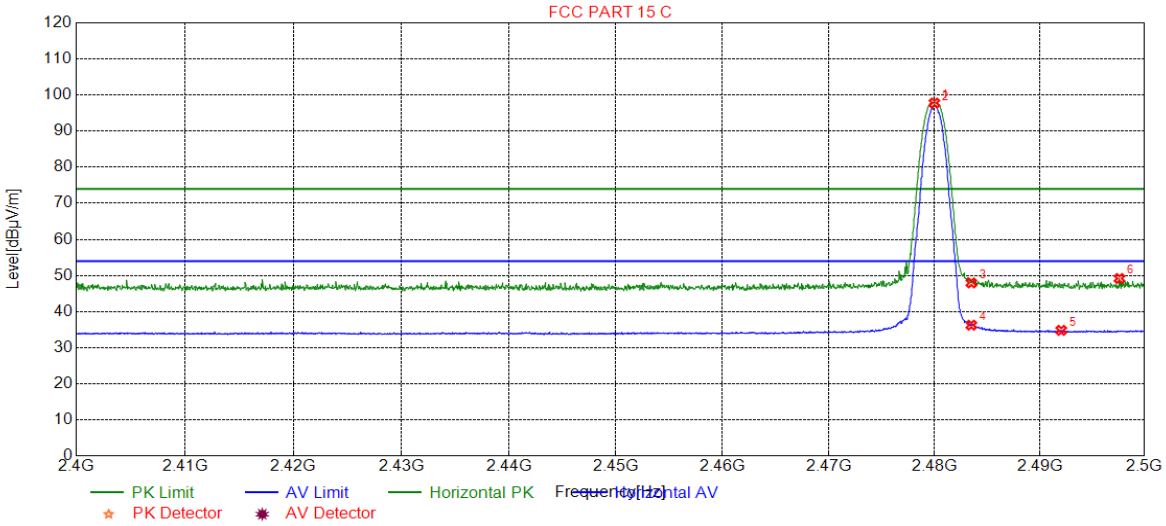

| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2480.00 | 83.37 | 1.51 | 74.00 | -9.37 | 150 | 266 | Vertical |
| 2 | 2480.00 | 82.75 | 1.51 | 54.00 | -28.75 | 150 | 266 | Vertical |
| 3 | 2483.50 | 46.97 | 1.52 | 74.00 | 27.03 | 150 | 289 | Vertical |
| 4 | 2483.50 | 34.35 | 1.52 | 54.00 | 19.65 | 150 | 17 | Vertical |
| 5 | 2497.19 | 34.70 | 1.56 | 54.00 | 19.30 | 150 | 225 | Vertical |
| 6 | 2497.34 | 49.20 | 1.56 | 74.00 | 24.80 | 150 | 346 | Vertical |

### 4.10.1.3 Worst Case Mode(GFSK) Lowest Channel_ Horizontal




| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2328.46 | 51.55 | 0.98 | 74.00 | 22.45 | 150 | 346 | Horizontal |
| 2 | 2336.57 | 37.38 | 1.01 | 54.00 | 16.62 | 150 | 227 | Horizontal |
| 3 | 2390.00 | 50.61 | 1.25 | 74.00 | 23.39 | 150 | 68 | Horizontal |
| 4 | 2390.00 | 37.55 | 1.25 | 54.00 | 16.45 | 150 | 212 | Horizontal |
| 5 | 2402.00 | 94.34 | 1.30 | 54.00 | -40.34 | 150 | 54 | Horizontal |
| 6 | 2402.00 | 95.17 | 1.30 | 74.00 | -21.17 | 150 | 54 | Horizontal |

### 4.10.1.4 Worst Case Mode(GFSK) Highest Channel_ Horizontal




| Suspected List | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Polarity |
| 1 | 2480.00 | 97.77 | 1.51 | 74.00 | -23.77 | 150 | 51 | Horizontal |
| 2 | 2480.00 | 97.12 | 1.51 | 54.00 | -43.12 | 150 | 51 | Horizontal |
| 3 | 2483.50 | 47.95 | 1.52 | 74.00 | 26.05 | 150 | 59 | Horizontal |
| 4 | 2483.50 | 36.24 | 1.52 | 54.00 | 17.76 | 150 | 62 | Horizontal |
| 5 | 2492.04 | 34.80 | 1.55 | 54.00 | 19.20 | 150 | 47 | Horizontal |
| 6 | 2497.59 | 49.17 | 1.56 | 74.00 | 24.83 | 150 | 40 | Horizontal |

*Remark:*
*The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:*
*Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor*
All Modes have been tested, but only the worst case data displayed in this report.

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

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Total RF power, conducted | ±0.75dB |
| 2 | RF power density, conducted | ±2.84dB |
| 3 | Spurious emissions, conducted | ±0.75dB |
| 4 | Radiated Spurious emission test | ±4.5dB (30MHz-1GHz) |
| | | ±4.8dB (1GHz-25GHz) |
| 5 | Conduct emission test | ±3.12 dB(9KHz- 30MHz) |
| 6 | Temperature test | ±1°C |
| 7 | Humidity test | ±3% |
| 8 | DC and low frequency voltages | ±0.5% |

# 6 Equipment List

| Conducted Emission | | | | | |
|---|---|---|---|---|---|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. date (yyyy-mm-dd) | Cal.Duedate (yyyy-mm-dd) |
| Shielding Room | ZhongYu Electron | GB-88 | SEM001-06 | 2017/5/10 | 2020/5/9 |
| LISN | Rohde & Schwarz | ENV216 | SEM007-01 | 2018/9/2 | 2019/9/2 |
| LISN | ETS-LINDGREN | Feb-16 | SEM007-02 | 2019/3/2 | 2020/3/1 |
| Measurement Software | AUDIX | e3 V5.4.1221d | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM024-01 | 2018/7/12 | 2019/7/11 |
| 2 Line ISN | Fischer Custom Communications Inc. | FCC-TLISN-T2-02 | EMC0122 | 2019/2/11 | 2020/2/10 |
| EMI Test Receiver | Rohde & Schwarz | ESCI | SEM004-02 | 2019/3/2 | 2020/3/1 |

| RF conducted test | | | | | |
|---|---|---|---|---|---|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. date (yyyy-mm-dd) | Cal.Duedate (yyyy-mm-dd) |
| DC Power Supply | Agilent Technologies Inc | 66311B | W009-09 | 2018/9/15 | 2019/9/15 |
| Signal Analyzer | Rohde & Schwarz | FSV | W025-05 | 2019/1/13 | 2020/1/12 |
| Coaxial Cable | SGS | N/A | SEM031-01 | 2018/7/13 | 2019/7/12 |
| Attenuator | Weinschel Associates | WA41 | SEM021-09 | N/A | N/A |
| Signal Generator | KEYSIGHT | N5173B | SEM006-05 | 2018/9/2 | 2019/9/2 |
| Temperature Chamber | GIANT FORCE | ICT-150-40-CP-AR | W027-03 | 2018/11/27 | 2019/11/27 |
| Power Meter | Rohde & Schwarz | NRVS | SEM014-02 | 2018/9/2 | 2019/9/2 |

| RE in Chamber | | | | | |
|---|---|---|---|---|---|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. date (yyyy-mm-dd) | Cal.Due date (yyyy-mm-dd) |
| 3m Semi-Anechoic Chamber | ETS-LINDGREN | N/A | SEM001-01 | 2017/8/5 | 2020/8/4 |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM025-01 | 2018/7/12 | 2019/7/11 |
| MXE EMI Receiver (20Hz-8.4GHz) | Agilent Technologies | N9038A | SEM004-05 | 2018/9/2 | 2019/9/2 |
| BiConiLog Antenna (26-3000MHz) | ETS-LINDGREN | 3142C | SEM003-01 | 2017/6/27 | 2020/6/26 |
| Pre-amplifier (0.1-1.3GHz) | Agilent Technologies | 8447D | SEM005-01 | 2019/3/2 | 2020/3/1 |

| RE in Chamber | | | | | |
|---|---|---|---|---|---|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. date (yyyy-mm-dd) | Cal.Due date (yyyy-mm-dd) |
| 3m Semi-Anechoic Chamber | AUDIX | N/A | SEM001-02 | 2018/3/13 | 2021/3/12 |
| Measurement Software | AUDIX | e3V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM026-01 | 2018/7/12 | 2019/7/11 |
| EXA Signal Analyzer (10Hz-26.5GHz) | Agilent Technologies Inc | N9010A | SEM004-09 | 2019/4/12 | 2020/4/11 |
| BiConiLog Antenna (26-3000MHz) | ETS-Lindgren | 3142C | SEM003-01 | 2017/6/27 | 2020/6/26 |
| Horn Antenna (0.8-18GHz) | Rohde & Schwarz | HF907 | SEM003-07 | 2018/4/13 | 2021/4/12 |
| Pre-amplifier(0.1-1.3GHz) | HP | 8447D | SEM005-02 | 2018/9/2 | 2019/9/2 |
| Low Noise Amplifier(100MHz-18GHz) | Black Diamond Series | BDLNA-0118-352810 | SEM005-05 | 2018/9/27 | 2019/9/27 |
| Horn Antenna (15-40GHz) | Schwarzbeck | BBHA 9170 | SEM003-15 | 2017/10/17 | 2020/10/16 |
| Pre-amplifier(18-26GHz) | Rohde & Schwarz | CH14-H052 | SEM005-17 | 2019/3/2 | 2020/3/1 |
| Band filter | N/A | N/A | SEM023-01 | N/A | N/A |

| RE in Chamber | | | | | |
|---|---|---|---|---|---|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. Date (yyyy-mm-dd) | Cal. Due date (yyyy-mm-dd) |
| 10m Semi-Anechoic Chamber | SAEMC | FSAC1018 | SEM001-03 | 2018/3/31 | 2021/3/30 |
| EMI Test Receiver (9k-7GHz) | Rohde & Schwarz | ESR | SEM004-03 | 2019/3/2 | 2020/3/1 |
| Trilog-Broadband Antenna(25M-2GHz) | Schwarzbeck | VULB9168 | SEM003-18 | 2016/6/29 | 2019/6/28 |
| Pre-amplifier (9k-1GHz) | Sonoma | 310N | SEM005-03 | 2019/4/12 | 2020/4/11 |
| Loop Antenna (9kHz-30MHz) | ETS-Lindgren | 6502 | SEM003-08 | 2017/8/22 | 2020/8/21 |
| Measurement Software | AUDIX | e3 V8.2014-6-27 | N/A | N/A | N/A |
| Coaxial Cable | SGS | N/A | SEM029-01 | 2018/7/12 | 2019/7/11 |

# 7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for HR/2019/30012

The End