# Test Report

| | |
|---|---|
| **Applicant:** | SportBak |
| **Address of Applicant:** | 60 avenue Andre Roussin 13016, Marseille, France |
| **Manufacturer:** | SportBak |
| **Address of Manufacturer:** | 60 avenue Andre Roussin 13016, Marseille, France |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | Ankle Wrist |
| Model No.: | FutBak V1 |
| **FCC ID:** | 2AT74-FUTBAK |
| **Applicable standards:** | FCC CFR Title 47 Part 15 Subpart C Section 15.249 |
| **Date of sample receipt:** | November 12, 2019 |
| **Date of Test:** | November 13-December 12, 2019 |
| **Date of report issued:** | December 13, 2019 |
| **Test Result :** | PASS * |

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

Authorized Signature:

**Robinson Lo**
**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

# 2 Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *December 13, 2019* | *Original* |
| | | |
| | | |
| | | |
| | | |

| | | | |
|---|---|---|---|
| ***Prepared By:*** | Tiger. Chen | ***Date:*** | *December 13, 2019* |
| | ***Project Engineer*** | | |
| ***Check By:*** | Robinson Lo | ***Date:*** | *December 13, 2019* |
| | ***Reviewer*** | | |

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# 4 Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| Antenna requirement | 15.203 | Pass |
| AC Power Line Conducted Emission | 15.207 | Pass |
| Field strength of the fundamental signal | 15.249 (a) | Pass |
| Spurious emissions | 15.249 (a) (d)/15.209 | Pass |
| Band edge | 15.249 (d)/15.205 | Pass |
| 20dB Occupied Bandwidth | 15.215 (c) | Pass |

*Remarks：*

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *Test according to ANSI C63.10:2013.*

## 4.1 Measurement Uncertainty

| Test Item | Frequency Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 30MHz-200MHz | 3.8039dB | (1) |
| Radiated Emission | 200MHz-1GHz | 3.9679dB | (1) |
| Radiated Emission | 1GHz-18GHz | 4.29dB | (1) |
| Radiated Emission | 18GHz-40GHz | 3.30dB | (1) |
| AC Power Line Conducted Emission | 0.15MHz ~ 30MHz | 3.44dB | (1) |
| Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. | | | |

# 5 General Information

## 5.1 General Description of EUT

| | |
|---|---|
| Product Name: | Ankle Wrist |
| Model No.: | FutBak V1 |
| Serial No.: | NA |
| Hardware Version: | V1 |
| Software Version: | V1 |
| Test sample(s) ID: | GTS201911000064-1 |
| Sample(s) Status | Engineered sample |
| Operation Frequency: | 2402MHz~2480MHz |
| Channel numbers: | 40 |
| Channel separation: | 2MHz |
| Modulation type: | GFSK |
| Antenna Type: | Inner Antenna |
| Antenna gain: | 1.5dBi(declare by applicant) |
| Power supply: | Battery: DC 3.7V |

| Operation Frequency each of channel | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 1 | 2402MHz | 11 | 2422MHz | 21 | 2442MHz | 31 | 2462MHz |
| 2 | 2404MHz | 12 | 2424MHz | 22 | 2444MHz | 32 | 2464MHz |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 9 | 2418MHz | 19 | 2438MHz | 29 | 2458MHz | 39 | 2478MHz |
| 10 | 2420MHz | 20 | 2440MHz | 30 | 2460MHz | 40 | 2480MHz |

Note:

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 | 2402MHz |
| The middle channel | 2440MHz |
| The Highest channel | 2480MHz |

## 5.2 Test mode

| | |
|---|---|
| Transmitting mode | Keep the EUT in continuously transmitting mode. |
| *Remark: During the test, the dutycycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.* | |

**Per-test mode.**

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

| Axis | X | Y | Z |
|---|---|---|---|
| Field Strength(dBuV/m) | 85.56 | 82.69 | 83.09 |

## 5.3 Description of Support Units

| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| DELTA | ADAPTER | ADP-60ADT | N/A |

## 5.4 Deviation from Standards

None.

## 5.5 Abnormalities from Standard Conditions

None.

## 5.6 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

## 5.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

# 6 Test Instruments list

| Radiated Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.2(L)*6.2(W)* 6.4(H) | GTS250 | July. 03 2015 | July. 02 2020 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | June. 26 2019 | June. 25 2020 |
| 4 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9163 | GTS214 | June. 26 2019 | June. 25 2020 |
| 5 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120 D | GTS208 | June. 26 2019 | June. 25 2020 |
| 6 | Horn Antenna | ETS-LINDGREN | 3160 | GTS217 | June. 26 2019 | June. 25 2020 |
| 7 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 8 | Coaxial Cable | GTS | N/A | GTS213 | June. 26 2019 | June. 25 2020 |
| 9 | Coaxial Cable | GTS | N/A | GTS211 | June. 26 2019 | June. 25 2020 |
| 10 | Coaxial cable | GTS | N/A | GTS210 | June. 26 2019 | June. 25 2020 |
| 11 | Coaxial Cable | GTS | N/A | GTS212 | June. 26 2019 | June. 25 2020 |
| 12 | Amplifier(100kHz-3GHz) | HP | 8347A | GTS204 | June. 26 2019 | June. 25 2020 |
| 13 | Amplifier(2GHz-20GHz) | HP | 84722A | GTS206 | June. 26 2019 | June. 25 2020 |
| 14 | Amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | GTS218 | June. 26 2019 | June. 25 2020 |
| 15 | Band filter | Amindeon | 82346 | GTS219 | June. 26 2019 | June. 25 2020 |
| 16 | Power Meter | Anritsu | ML2495A | GTS540 | June. 26 2019 | June. 25 2020 |
| 17 | Power Sensor | Anritsu | MA2411B | GTS541 | June. 26 2019 | June. 25 2020 |
| 18 | Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | GTS575 | June. 26 2019 | June. 25 2020 |
| 19 | Splitter | Agilent | 11636B | GTS237 | June. 26 2019 | June. 25 2020 |
| 20 | Loop Antenna | ZHINAN | ZN30900A | GTS534 | June. 26 2019 | June. 25 2020 |
| 21 | Breitband hornantenne | SCHWARZBECK | BBHA 9170 | GTS579 | Oct. 19 2019 | Oct. 18 2020 |
| 22 | Amplifier | TDK | PA-02-02 | GTS574 | Oct. 19 2019 | Oct. 18 2020 |
| 23 | Amplifier | TDK | PA-02-03 | GTS576 | Oct. 19 2019 | Oct. 18 2020 |
| 24 | PSA Series Spectrum Analyzer | Rohde & Schwarz | FSP | GTS578 | June. 26 2019 | June. 25 2020 |

| Conducted Emission | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Shielding Room | ZhongYu Electron | 7.3(L)x3.1(W)x2.9(H) | GTS252 | May.15 2019 | May.14 2022 |
| 2 | EMI Test Receiver | R&S | ESCI 7 | GTS552 | June. 26 2019 | June. 25 2020 |
| 3 | Coaxial Switch | ANRITSU CORP | MP59B | GTS225 | June. 26 2019 | June. 25 2020 |
| 4 | Artificial Mains Network | SCHWARZBECK MESS | NSLK8127 | GTS226 | June. 26 2019 | June. 25 2020 |
| 5 | Coaxial Cable | GTS | N/A | GTS227 | N/A | N/A |
| 6 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 7 | Thermo meter | KTJ | TA328 | GTS233 | June. 26 2019 | June. 25 2020 |
| 8 | Absorbing clamp | Elektronik-Feinmechanik | MDS21 | GTS229 | June. 26 2019 | June. 25 2020 |
| 9 | ISN | SCHWARZBECK | NTFM 8158 | GTD565 | June. 26 2019 | June. 25 2020 |

| RF Conducted Test: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | MXA Signal Analyzer | Agilent | N9020A | GTS566 | June. 26 2019 | June. 25 2020 |
| 2 | EMI Test Receiver | R&S | ESCI 7 | GTS552 | June. 26 2019 | June. 25 2020 |
| 3 | Spectrum Analyzer | Agilent | E4440A | GTS533 | June. 26 2019 | June. 25 2020 |
| 4 | MXG vector Signal Generator | Agilent | N5182A | GTS567 | June. 26 2019 | June. 25 2020 |
| 5 | ESG Analog Signal Generator | Agilent | E4428C | GTS568 | June. 26 2019 | June. 25 2020 |
| 6 | USB RF Power Sensor | DARE | RPR3006W | GTS569 | June. 26 2019 | June. 25 2020 |
| 7 | RF Switch Box | Shongyi | RFSW3003328 | GTS571 | June. 26 2019 | June. 25 2020 |
| 8 | Programmable Constant Temp & Humi Test Chamber | WEWON | WHTH-150L-40-880 | GTS572 | June. 26 2019 | June. 25 2020 |

| General used equipment: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Humidity/ Temperature Indicator | KTJ | TA328 | GTS243 | June. 26 2019 | June. 25 2020 |
| 2 | Barometer | ChangChun | DYM3 | GTS255 | June. 26 2019 | June. 25 2020 |

# 7 Test results and Measurement Data

## 7.1 Antenna requirement

| **Standard requirement:** | FCC Part15 C Section 15.203 |
|---|---|
| **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. | |
| **EUT Antenna:** | |
| The antenna is inner antenna, the best case gain of the antenna is 1.5dBi, reference to the appendix II for details | |

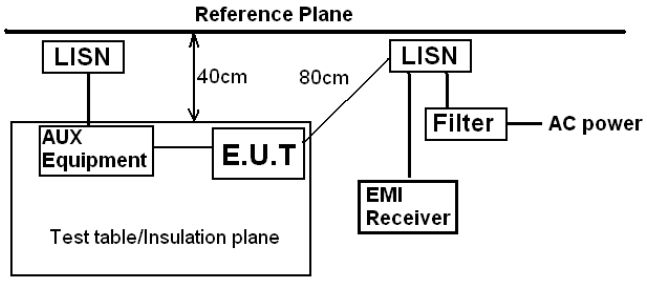
## 7.2 Conducted Emissions

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.207 |
| Test Method: | ANSI C63.10:2013 |
| Test Frequency Range: | 150KHz to 30MHz |
| Class / Severity: | Class B |
| Receiver setup: | RBW=9KHz, VBW=30KHz, Sweep time=auto |
| 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 setup:




*Remark:*
*E.U.T: Equipment Under Test*
*LISN: Line Impedence Stabilization Network*
*Test table height=0.8m*

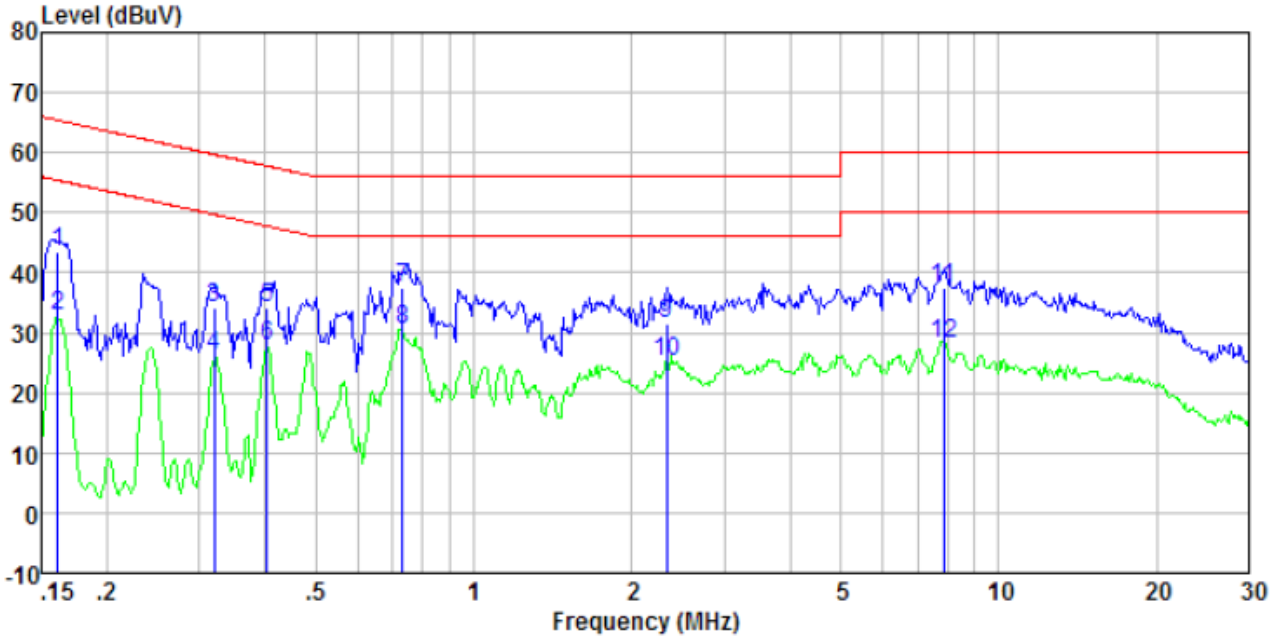
Test procedure:

1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.

| | | | | | | |
|---|---|---|---|---|---|---|
| Test Instruments: | Refer to section 6.0 for details | | | | | |
| Test mode: | Refer to section 5.2 for details | | | | | |
| Test environment: | Temp.: | 25 °C | Humid.: | 52% | Press.: | 1012mbar |
| Test results: | Pass | | | | | |

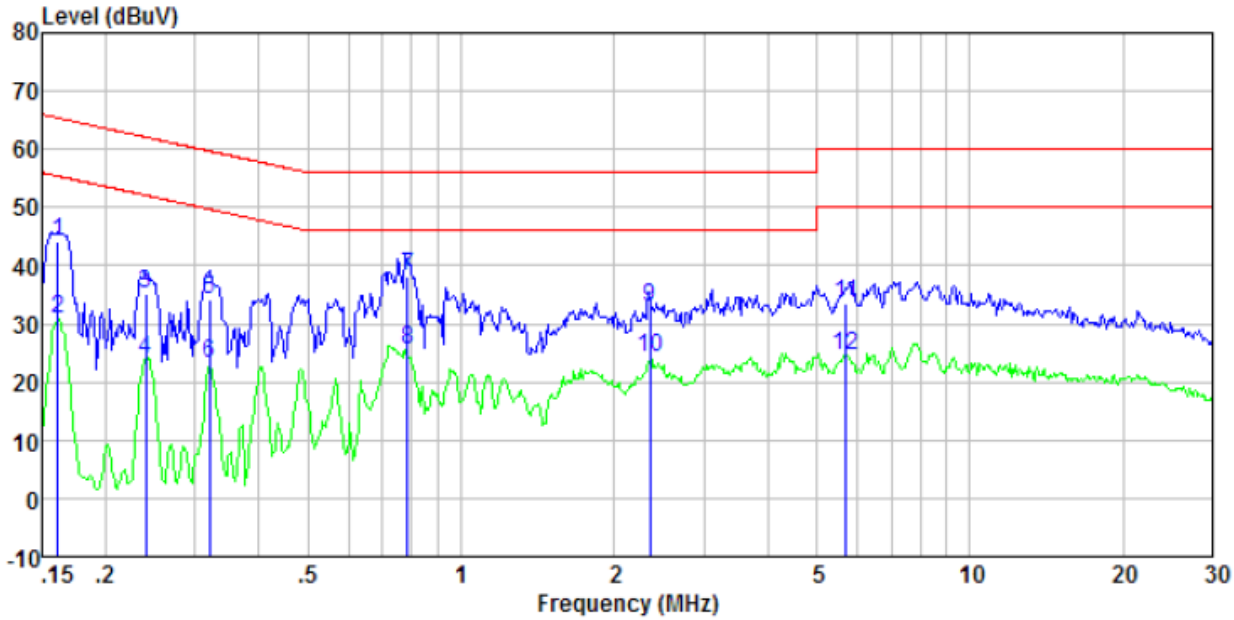
**Measurement data:**

**Line:**




| Freq MHz | Reading level dBuV | LISN/ISN factor dB/m | Cable loss dB | Level dBuV | Limit level dBuV | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|
| 0.16 | 43.11 | 0.40 | 0.08 | 43.59 | 65.38 | -21.79 | QP |
| 0.16 | 32.34 | 0.40 | 0.08 | 32.82 | 55.38 | -22.56 | Average |
| 0.32 | 33.74 | 0.39 | 0.10 | 34.23 | 59.71 | -25.48 | QP |
| 0.32 | 25.65 | 0.39 | 0.10 | 26.14 | 49.71 | -23.57 | Average |
| 0.40 | 33.81 | 0.35 | 0.11 | 34.27 | 57.77 | -23.50 | QP |
| 0.40 | 27.27 | 0.35 | 0.11 | 27.73 | 47.77 | -20.04 | Average |
| 0.73 | 36.96 | 0.25 | 0.13 | 37.34 | 56.00 | -18.66 | QP |
| 0.73 | 30.27 | 0.25 | 0.13 | 30.65 | 46.00 | -15.35 | Average |
| 2.33 | 31.18 | 0.20 | 0.18 | 31.56 | 56.00 | -24.44 | QP |
| 2.33 | 24.86 | 0.20 | 0.18 | 25.24 | 46.00 | -20.76 | Average |
| 7.85 | 37.20 | 0.20 | 0.19 | 37.59 | 60.00 | -22.41 | QP |
| 7.85 | 27.96 | 0.20 | 0.19 | 28.35 | 50.00 | -21.65 | Average |

**Neutral:**




| Freq MHz | Reading level dBuV | LISN/ISN factor dB/m | Cable loss dB | Level dBuV | Limit level dBuV | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|
| 0.16 | 43.53 | 0.40 | 0.08 | 44.01 | 65.38 | -21.37 | QP |
| 0.16 | 30.32 | 0.40 | 0.08 | 30.80 | 55.38 | -24.58 | Average |
| 0.24 | 34.60 | 0.40 | 0.11 | 35.11 | 62.08 | -26.97 | QP |
| 0.24 | 23.37 | 0.40 | 0.11 | 23.88 | 52.08 | -28.20 | Average |
| 0.32 | 33.77 | 0.39 | 0.10 | 34.26 | 59.71 | -25.45 | QP |
| 0.32 | 22.58 | 0.39 | 0.10 | 23.07 | 49.71 | -26.64 | Average |
| 0.78 | 37.76 | 0.24 | 0.14 | 38.14 | 56.00 | -17.86 | QP |
| 0.78 | 25.22 | 0.24 | 0.14 | 25.60 | 46.00 | -20.40 | Average |
| 2.35 | 32.40 | 0.20 | 0.18 | 32.78 | 56.00 | -23.22 | QP |
| 2.35 | 23.69 | 0.20 | 0.18 | 24.07 | 46.00 | -21.93 | Average |
| 5.71 | 33.00 | 0.20 | 0.18 | 33.38 | 60.00 | -26.62 | QP |
| 5.71 | 24.22 | 0.20 | 0.18 | 24.60 | 50.00 | -25.40 | Average |

*Notes:*

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

## 7.3 Radiated Emission Method

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.209 |
| Test Method: | ANSI C63.10:2013 |
| Test Frequency Range: | 9kHz to 25GHz |
| Test site: | Measurement Distance: 3m |

**Receiver setup:**

| Frequency | Detector | RBW | VBW | Remark |
|---|---|---|---|---|
| 9kHz-150kHz | Quasi-peak | 200Hz | 300Hz | Quasi-peak Value |
| 150kHz-30MHz | Quasi-peak | 9kHz | 10kHz | Quasi-peak Value |
| 30MHz-1GHz | Quasi-peak | 120KHz | 300KHz | Quasi-peak Value |
| Above 1GHz | Peak | 1MHz | 3MHz | Peak Value |
| | Peak | 1MHz | 10Hz | Average Value |

**Limit: (Field strength of the fundamental signal)**

| Frequency | Limit (dBuV/m @3m) | Remark |
|---|---|---|
| 2400MHz-2483.5MHz | 94.00 | Average Value |
| | 114.00 | Peak Value |

**Limit: (Spurious Emissions)**

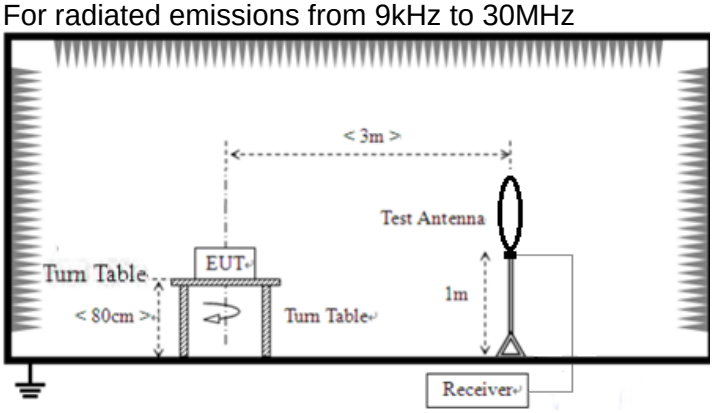
| Frequency | Limit (uV/m) | Remark |
|---|---|---|
| 0.009MHz-0.490MHz | 2400/F(kHz) @300m | Quasi-peak Value |
| 0.490MHz-1.705MHz | 24000/F(kHz) @30m | Quasi-peak Value |
| 1.705MHz-30.0MHz | 30 @30m | Quasi-peak Value |
| 30MHz-88MHz | 100 @3m | Quasi-peak Value |
| 88MHz-216MHz | 150 @3m | Quasi-peak Value |
| 216MHz-960MHz | 200 @3m | Quasi-peak Value |
| 960MHz-1GHz | 500 @3m | Quasi-peak Value |
| Above 1GHz | 500 @3m | Average Value |
| | 5000 @3m | Peak Value |

**Limit: (band edge)**

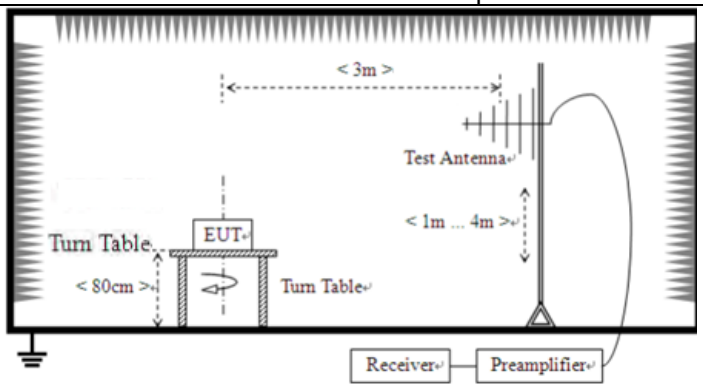
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

**Test setup:**

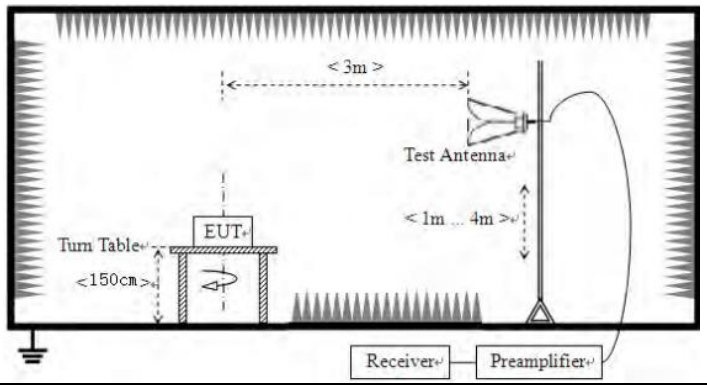
For radiated emissions from 9kHz to 30MHz




For radiated emissions from 30MHz to1GHz




For radiated emissions above 1GHz




| | | | | | | |
|---|---|---|---|---|---|---|
| Test Procedure: | 1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.<br>3. 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>4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.<br>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>6. 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. | | | | | |
| Test Instruments: | Refer to section 6.0 for details | | | | | |
| Test mode: | Refer to section 5.2 for details | | | | | |
| Test environment: | Temp.: | 25 °C | Humid.: | 52% | Press.: | 1012mbar |
| Test results: | Pass | | | | | |

**Measurement data:**

### 7.3.1 Field Strength of The Fundamental Signal

**Peak value:**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|---|---|
| 2402.00 | 82.77 | 27.58 | 5.39 | 30.18 | 85.56 | 114 | -28.44 | Vertical |
| 2402.00 | 79.35 | 27.58 | 5.39 | 30.18 | 82.14 | 114 | -31.86 | Horizontal |
| 2440.00 | 81.75 | 27.55 | 5.43 | 30.06 | 84.67 | 114 | -29.33 | Vertical |
| 2440.00 | 78.52 | 27.55 | 5.43 | 30.06 | 81.44 | 114 | -32.56 | Horizontal |
| 2480.00 | 81.02 | 27.52 | 5.47 | 29.93 | 84.08 | 114 | -29.92 | Vertical |
| 2480.00 | 78.11 | 27.52 | 5.47 | 29.93 | 81.17 | 114 | -32.83 | Horizontal |

**Average value:**

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|---|---|---|---|---|---|---|---|---|
| 2402.00 | 74.10 | 27.58 | 5.39 | 30.18 | 76.89 | 94 | -17.11 | Vertical |
| 2402.00 | 71.50 | 27.58 | 5.39 | 30.18 | 74.29 | 94 | -19.71 | Horizontal |
| 2440.00 | 72.17 | 27.55 | 5.43 | 30.06 | 75.09 | 94 | -18.91 | Vertical |
| 2440.00 | 69.56 | 27.55 | 5.43 | 30.06 | 72.48 | 94 | -21.52 | Horizontal |
| 2480.00 | 71.39 | 27.52 | 5.47 | 29.93 | 74.45 | 94 | -19.55 | Vertical |
| 2480.00 | 69.28 | 27.52 | 5.47 | 29.93 | 72.34 | 94 | -21.66 | Horizontal |

Note: RBW 3MHz VBW 3MHz PK detector is for PK value， RMS detector is for AV value

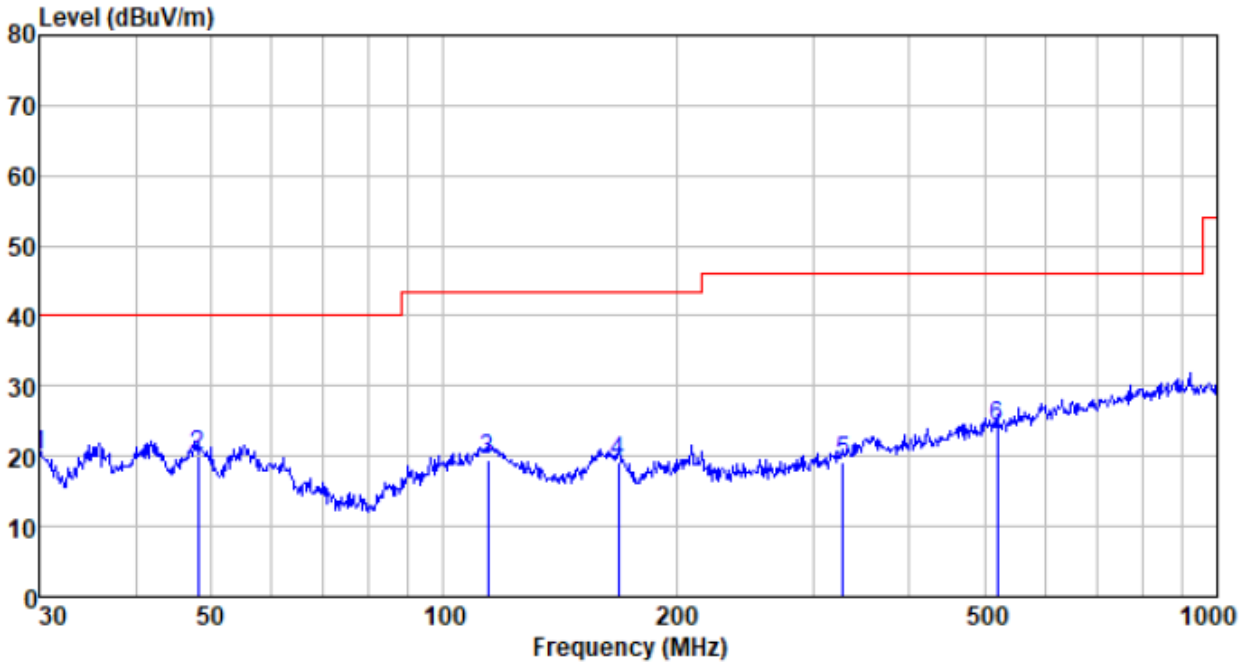
### 7.3.2 Spurious emissions

- Below 30MHz

  The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

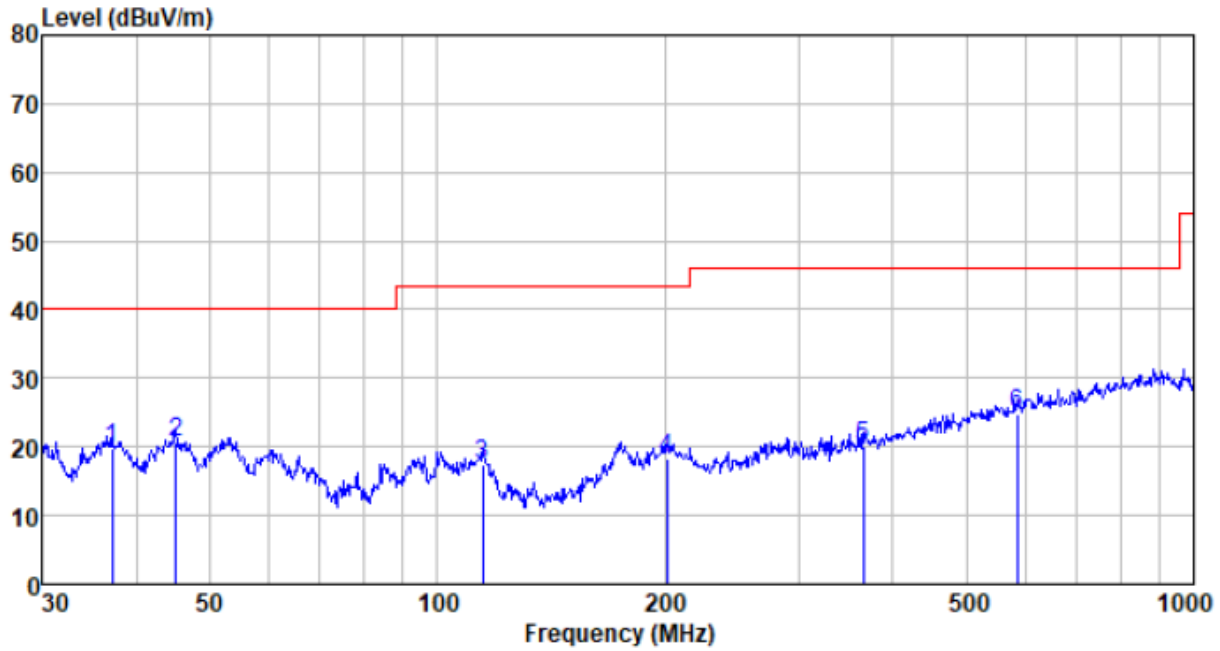
- Below 1GHz

**Horizontal:**




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 30.000 | 38.81 | 11.20 | 0.12 | 30.20 | 19.93 | 40.00 | -20.07 | QP |
| 48.163 | 37.35 | 12.28 | 0.51 | 30.01 | 20.13 | 40.00 | -19.87 | QP |
| 114.114 | 38.01 | 10.43 | 0.96 | 29.82 | 19.58 | 43.50 | -23.92 | QP |
| 168.414 | 39.14 | 8.47 | 1.14 | 29.60 | 19.15 | 43.50 | -24.35 | QP |
| 327.887 | 33.39 | 14.12 | 1.62 | 30.05 | 19.08 | 46.00 | -26.92 | QP |
| 519.065 | 33.62 | 17.74 | 2.18 | 29.42 | 24.12 | 46.00 | -21.88 | QP |

**Vertical:**

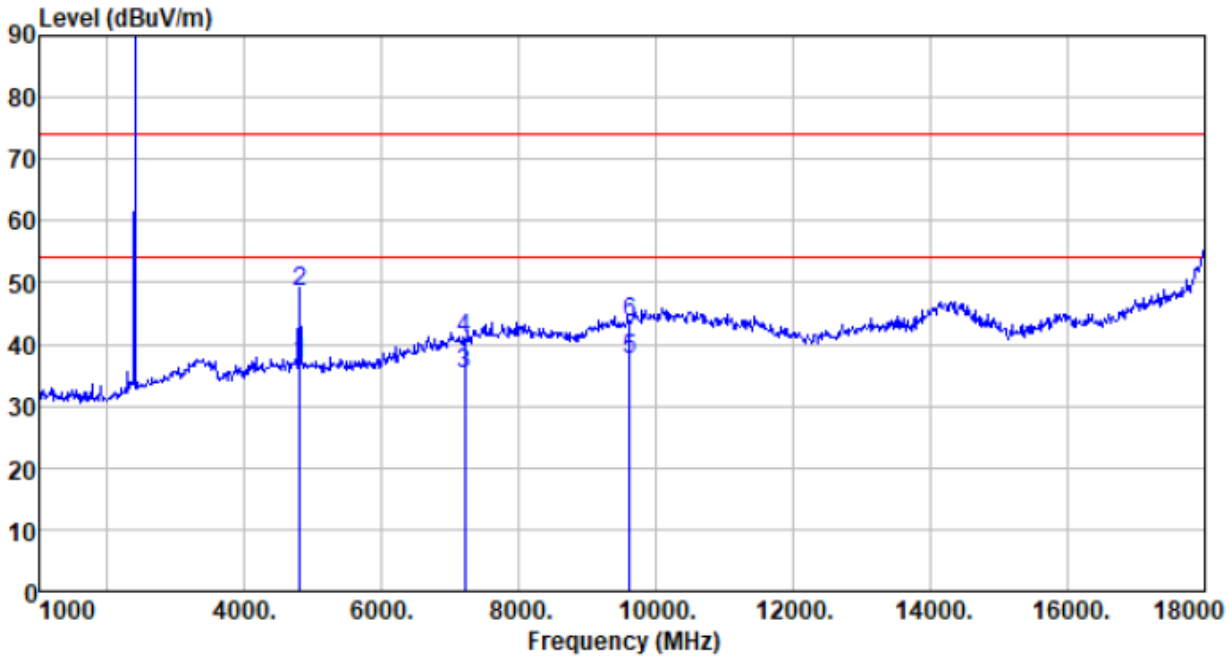



| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 37.155 | 37.97 | 11.70 | 0.14 | 30.12 | 19.69 | 40.00 | -20.31 | QP |
| 45.058 | 37.99 | 12.25 | 0.38 | 30.04 | 20.58 | 40.00 | -19.42 | QP |
| 114.917 | 36.03 | 10.26 | 0.96 | 29.82 | 17.43 | 43.50 | -26.07 | QP |
| 201.393 | 36.21 | 10.44 | 1.23 | 29.51 | 18.37 | 43.50 | -25.13 | QP |
| 365.539 | 33.40 | 14.78 | 1.71 | 29.75 | 20.14 | 46.00 | -25.86 | QP |
| 584.790 | 32.84 | 19.17 | 2.39 | 29.48 | 24.92 | 46.00 | -21.08 | QP |

■ Above 1GHz

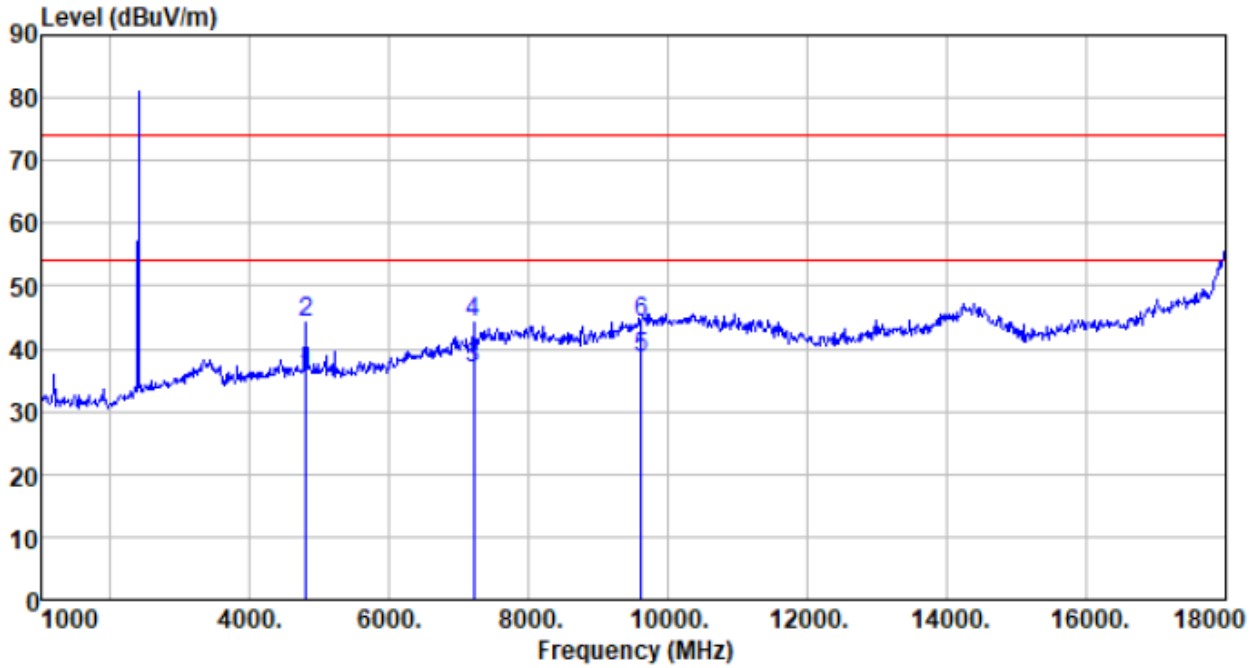
| Test channel: | Lowest channel |
|---|---|

Horizontal:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 4804.000 | 33.22 | 31.20 | 4.61 | 32.09 | 36.94 | 54.00 | -17.06 | Average |
| 4804.000 | 44.62 | 31.20 | 4.61 | 32.09 | 48.34 | 74.00 | -25.66 | Peak |
| 7206.000 | 24.59 | 36.16 | 6.48 | 32.00 | 35.23 | 54.00 | -18.77 | Average |
| 7206.000 | 30.16 | 36.16 | 6.48 | 32.00 | 40.80 | 74.00 | -33.20 | Peak |
| 9608.000 | 23.24 | 37.93 | 7.97 | 31.62 | 37.52 | 54.00 | -16.48 | Average |
| 9608.000 | 29.23 | 37.93 | 7.97 | 31.62 | 43.51 | 74.00 | -30.49 | Peak |

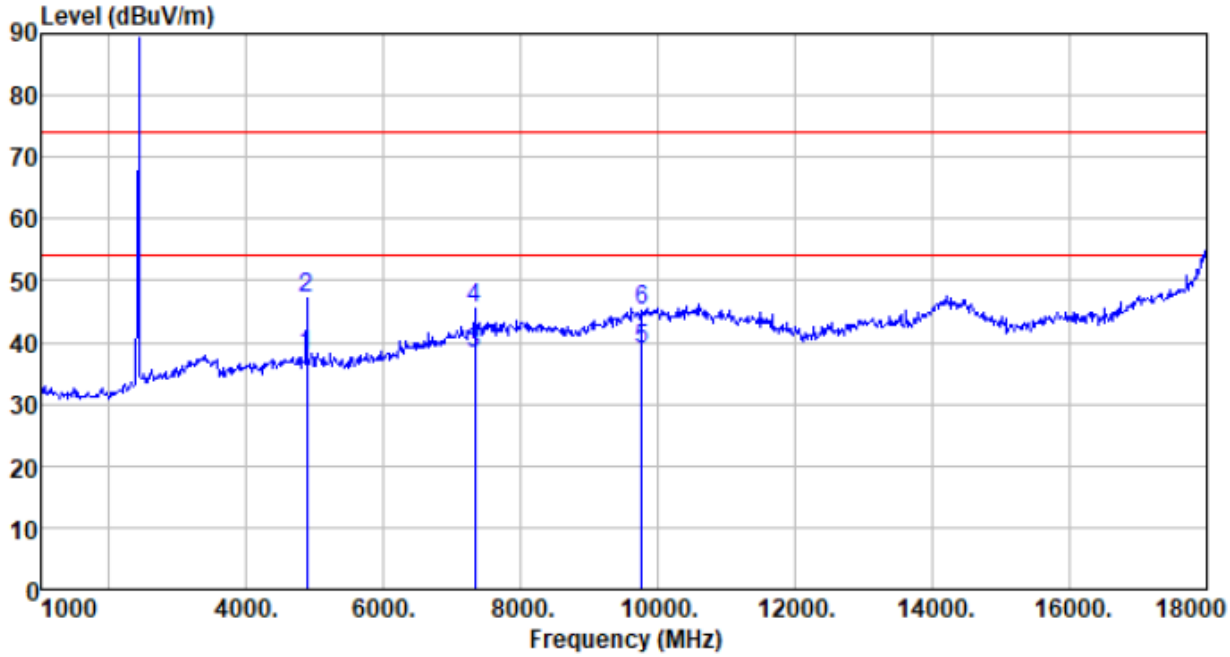
Vertical:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 4804.000 | 31.70 | 31.20 | 4.61 | 32.09 | 35.42 | 54.00 | -18.58 | Average |
| 4804.000 | 40.58 | 31.20 | 4.61 | 32.09 | 44.30 | 74.00 | -29.70 | Peak |
| 7206.000 | 26.08 | 36.16 | 6.48 | 32.00 | 36.72 | 54.00 | -17.28 | Average |
| 7206.000 | 33.41 | 36.16 | 6.48 | 32.00 | 44.05 | 74.00 | -29.95 | Peak |
| 9608.000 | 24.34 | 37.93 | 7.97 | 31.62 | 38.62 | 54.00 | -15.38 | Average |
| 9608.000 | 30.04 | 37.93 | 7.97 | 31.62 | 44.32 | 74.00 | -29.68 | Peak |

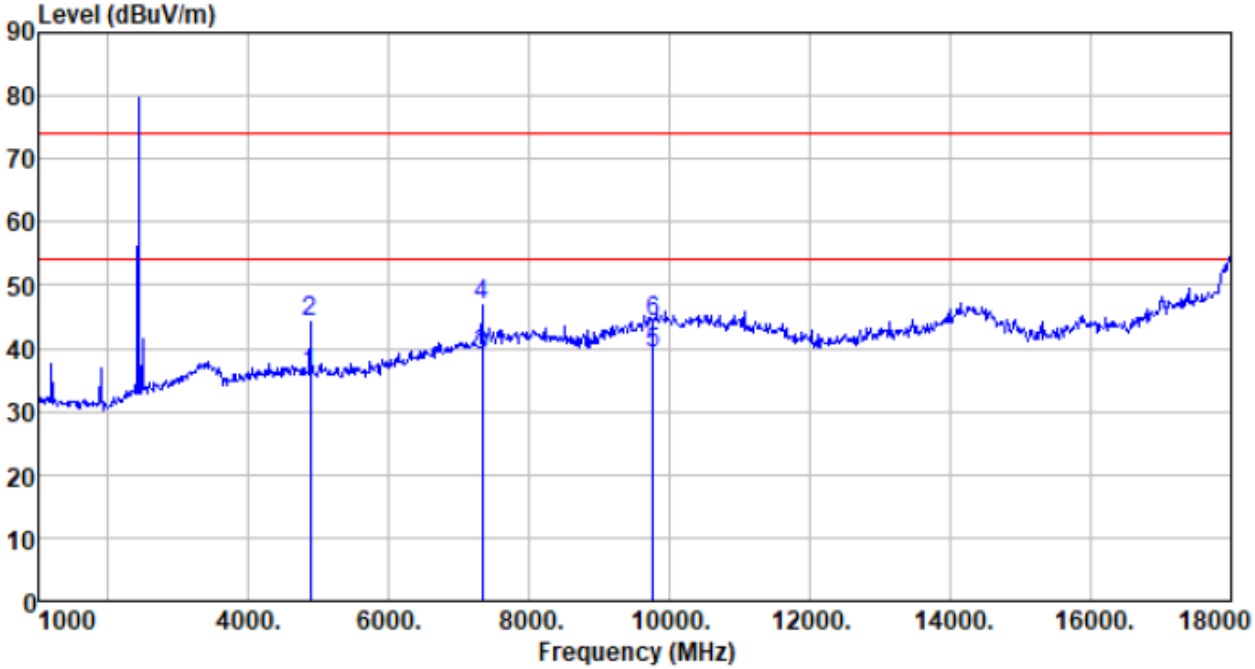
| Test channel: | Middle |
|---|---|

Horizontal:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 4880.000 | 33.99 | 31.31 | 4.69 | 32.12 | 37.87 | 54.00 | -16.13 | Average |
| 4880.000 | 43.39 | 31.31 | 4.69 | 32.12 | 47.27 | 74.00 | -26.73 | Peak |
| 7320.000 | 26.92 | 36.43 | 6.63 | 31.89 | 38.09 | 54.00 | -15.91 | Average |
| 7320.000 | 34.39 | 36.43 | 6.63 | 31.89 | 45.56 | 74.00 | -28.44 | Peak |
| 9760.000 | 24.30 | 38.10 | 8.03 | 31.59 | 38.84 | 54.00 | -15.16 | Average |
| 9760.000 | 30.53 | 38.10 | 8.03 | 31.59 | 45.07 | 74.00 | -28.93 | Peak |

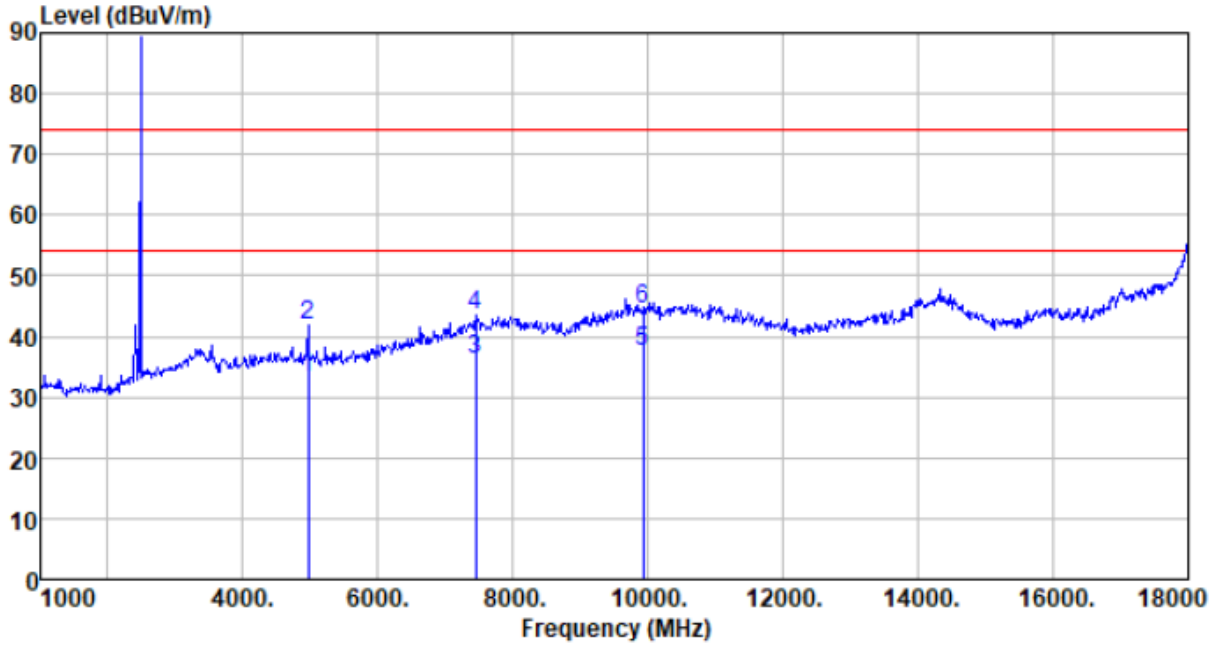
Vertical:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 4880.000 | 32.09 | 31.31 | 4.69 | 32.12 | 35.97 | 54.00 | -18.03 | Average |
| 4880.000 | 40.30 | 31.31 | 4.69 | 32.12 | 44.18 | 74.00 | -29.82 | Peak |
| 7320.000 | 27.58 | 36.43 | 6.63 | 31.89 | 38.75 | 54.00 | -15.25 | Average |
| 7320.000 | 35.66 | 36.43 | 6.63 | 31.89 | 46.83 | 74.00 | -27.17 | Peak |
| 9760.000 | 24.74 | 38.10 | 8.03 | 31.59 | 39.28 | 54.00 | -14.72 | Average |
| 9760.000 | 29.77 | 38.10 | 8.03 | 31.59 | 44.31 | 74.00 | -29.69 | Peak |

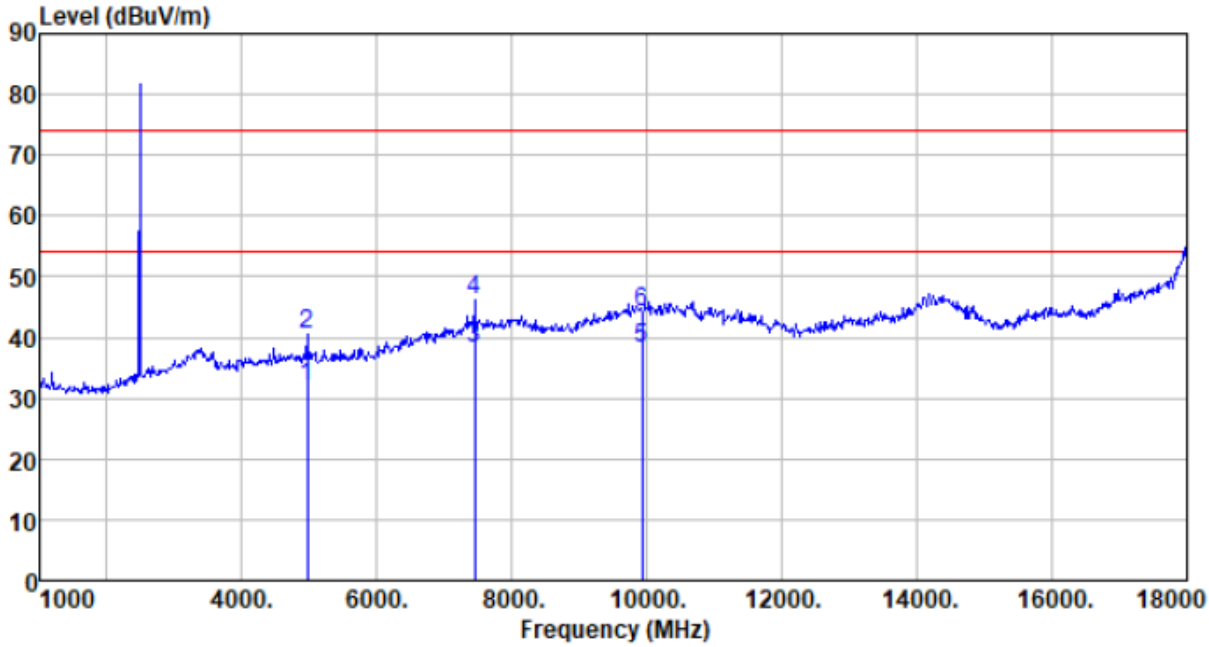
| Test channel: | Highest |
|---|---|

Horizontal:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 4960.000 | 29.07 | 31.44 | 4.79 | 32.16 | 33.14 | 54.00 | -20.86 | Average |
| 4960.000 | 37.70 | 31.44 | 4.79 | 32.16 | 41.77 | 74.00 | -32.23 | Peak |
| 7440.000 | 24.52 | 36.66 | 6.77 | 31.78 | 36.17 | 54.00 | -17.83 | Average |
| 7440.000 | 31.75 | 36.66 | 6.77 | 31.78 | 43.40 | 74.00 | -30.60 | Peak |
| 9920.000 | 22.95 | 38.30 | 8.09 | 31.88 | 37.46 | 54.00 | -16.54 | Average |
| 9920.000 | 29.89 | 38.30 | 8.09 | 31.88 | 44.40 | 74.00 | -29.60 | Peak |

Vertical:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 4960.000 | 27.88 | 31.44 | 4.79 | 32.16 | 31.95 | 54.00 | -22.05 | Average |
| 4960.000 | 36.38 | 31.44 | 4.79 | 32.16 | 40.45 | 74.00 | -33.55 | Peak |
| 7440.000 | 26.58 | 36.66 | 6.77 | 31.78 | 38.23 | 54.00 | -15.77 | Average |
| 7440.000 | 34.36 | 36.66 | 6.77 | 31.78 | 46.01 | 74.00 | -27.99 | Peak |
| 9920.000 | 23.58 | 38.30 | 8.09 | 31.88 | 38.09 | 54.00 | -15.91 | Average |
| 9920.000 | 29.82 | 38.30 | 8.09 | 31.88 | 44.33 | 74.00 | -29.67 | Peak |

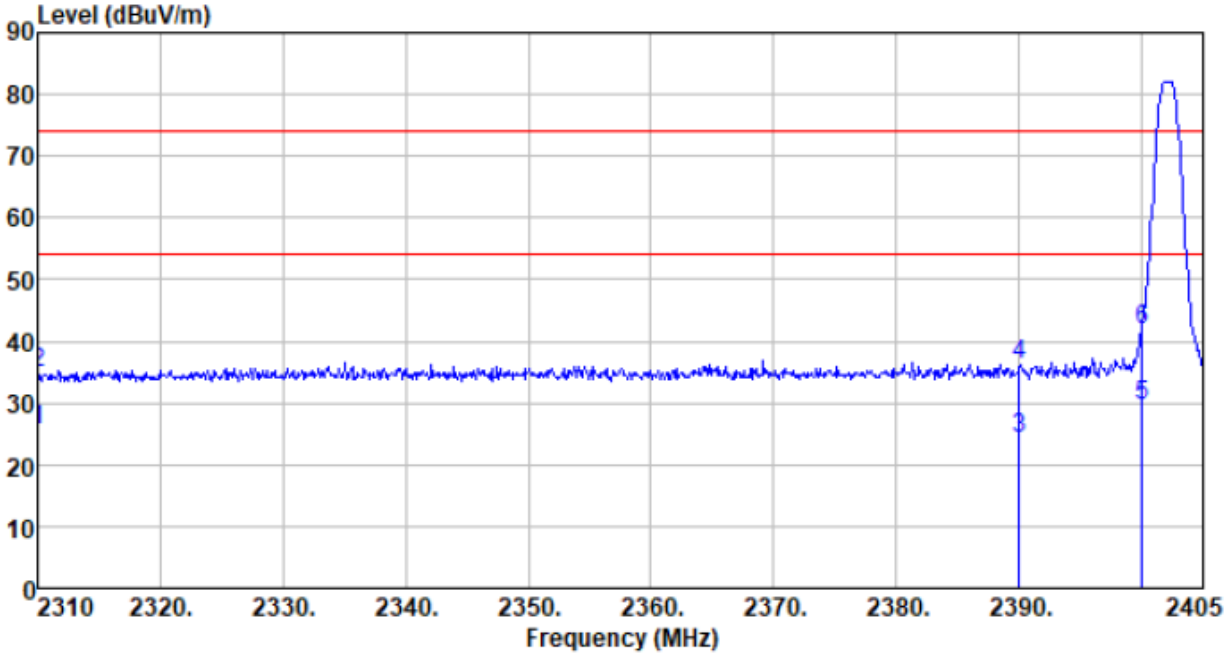
*Remarks:*

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

### 7.3.3 Bandedge emissions

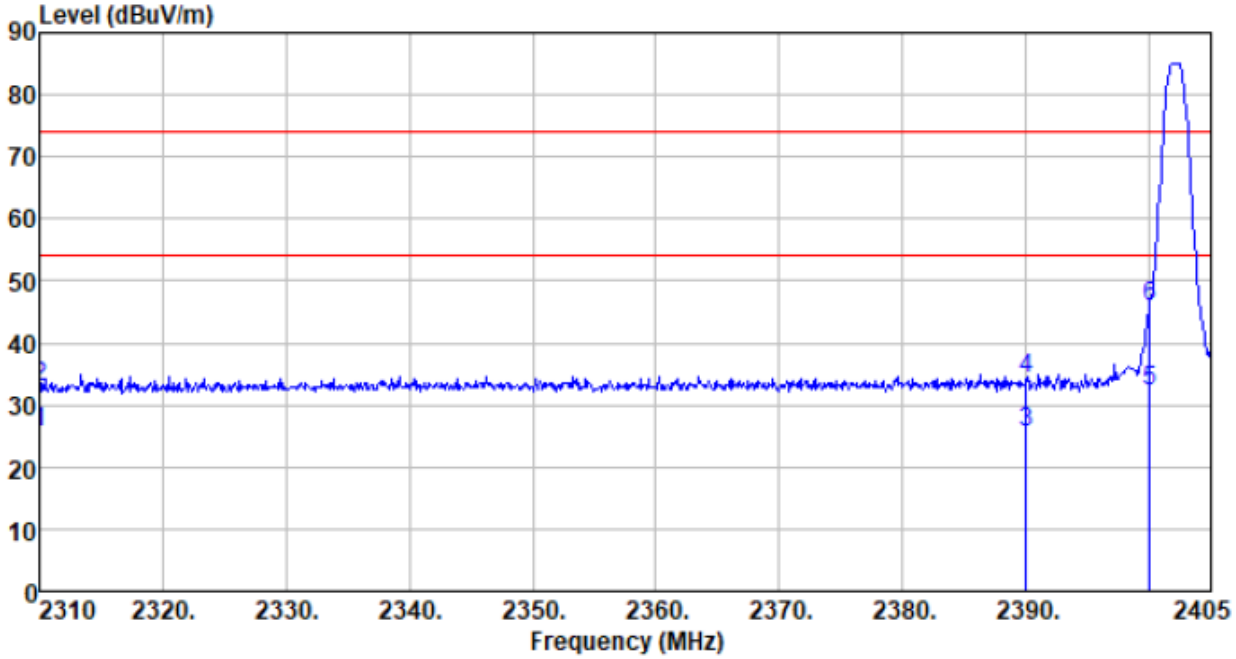
| Test channel: | Lowest channel |
|---|---|

Vertical:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 2310.000 | 29.64 | 27.14 | 2.81 | 34.11 | 25.48 | 54.00 | -28.52 | Average |
| 2310.000 | 38.93 | 27.14 | 2.81 | 34.11 | 34.77 | 74.00 | -39.23 | Peak |
| 2390.000 | 28.03 | 27.37 | 2.91 | 34.01 | 24.30 | 54.00 | -29.70 | Average |
| 2390.000 | 39.81 | 27.37 | 2.91 | 34.01 | 36.08 | 74.00 | -37.92 | Peak |
| 2400.000 | 33.18 | 27.41 | 2.91 | 34.01 | 29.49 | 54.00 | -24.51 | Average |
| 2400.000 | 45.48 | 27.41 | 2.91 | 34.01 | 41.79 | 74.00 | -32.21 | Peak |

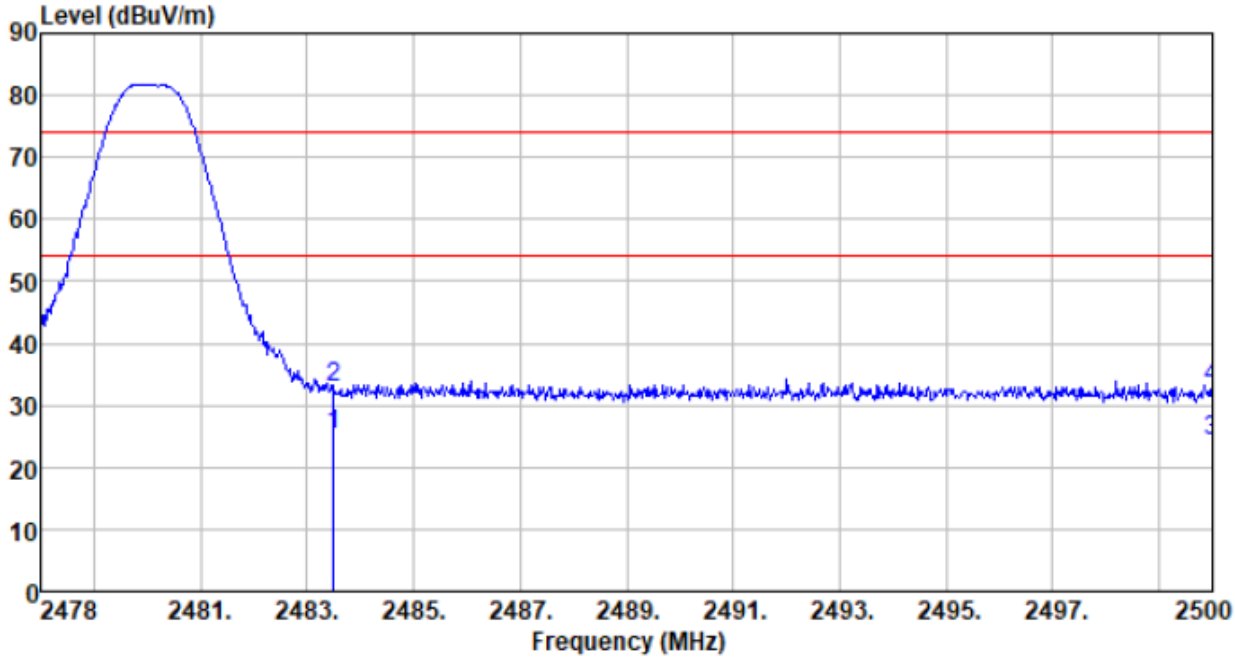
Horizontal:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 2310.000 | 29.67 | 27.14 | 2.81 | 34.11 | 25.51 | 54.00 | -28.49 | Average |
| 2310.000 | 37.08 | 27.14 | 2.81 | 34.11 | 32.92 | 74.00 | -41.08 | Peak |
| 2390.000 | 29.45 | 27.37 | 2.91 | 34.01 | 25.72 | 54.00 | -28.28 | Average |
| 2390.000 | 37.77 | 27.37 | 2.91 | 34.01 | 34.04 | 74.00 | -39.96 | Peak |
| 2400.000 | 35.76 | 27.41 | 2.91 | 34.01 | 32.07 | 54.00 | -21.93 | Average |
| 2400.000 | 49.47 | 27.41 | 2.91 | 34.01 | 45.78 | 74.00 | -28.22 | Peak |

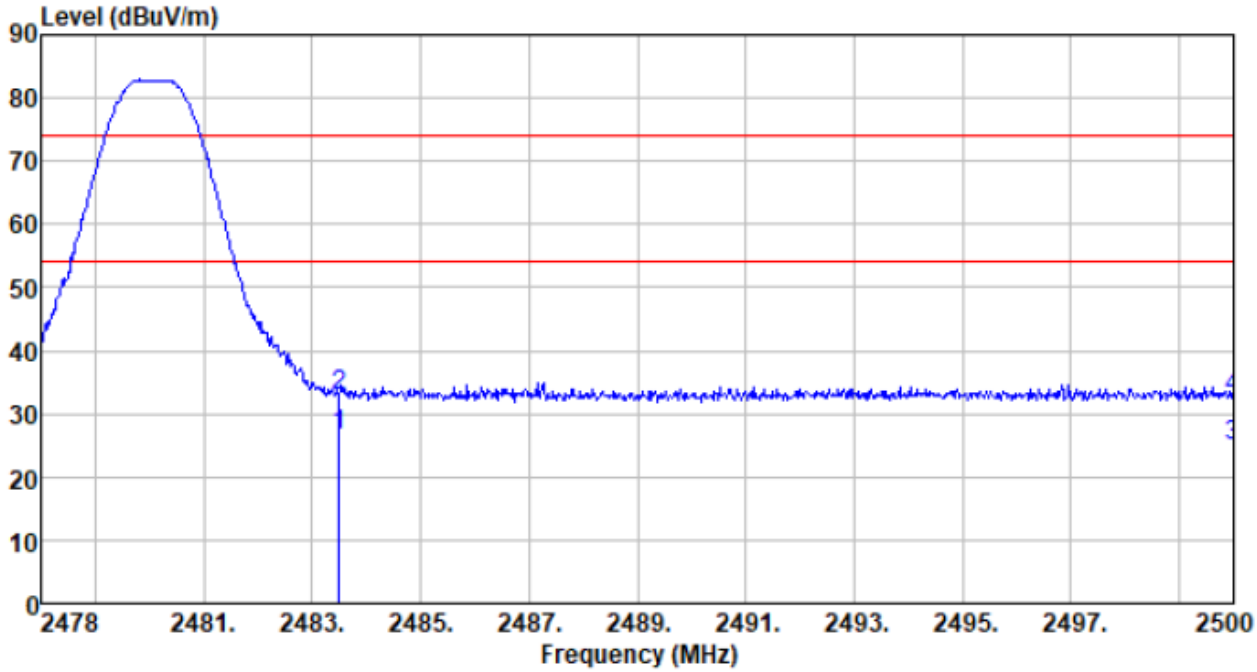
| Test channel: | Highest channel |
|---|---|

Horizontal:




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 2483.500 | 28.38 | 27.66 | 2.99 | 33.92 | 25.11 | 54.00 | -28.89 | Average |
| 2483.500 | 36.29 | 27.66 | 2.99 | 33.92 | 33.02 | 74.00 | -40.98 | Peak |
| 2500.000 | 27.54 | 27.70 | 3.01 | 33.90 | 24.35 | 54.00 | -29.65 | Average |
| 2500.000 | 35.97 | 27.70 | 3.01 | 33.90 | 32.78 | 74.00 | -41.22 | Peak |

Vertical:

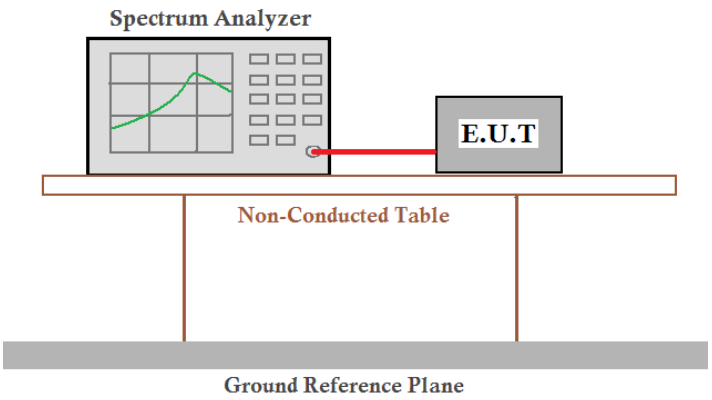



| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 2483.500 | 29.79 | 27.66 | 2.99 | 33.92 | 26.52 | 54.00 | -27.48 | Average |
| 2483.500 | 36.31 | 27.66 | 2.99 | 33.92 | 33.04 | 74.00 | -40.96 | Peak |
| 2500.000 | 28.17 | 27.70 | 3.01 | 33.90 | 24.98 | 54.00 | -29.02 | Average |
| 2500.000 | 35.86 | 27.70 | 3.01 | 33.90 | 32.67 | 74.00 | -41.33 | Peak |

*Remark:*

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

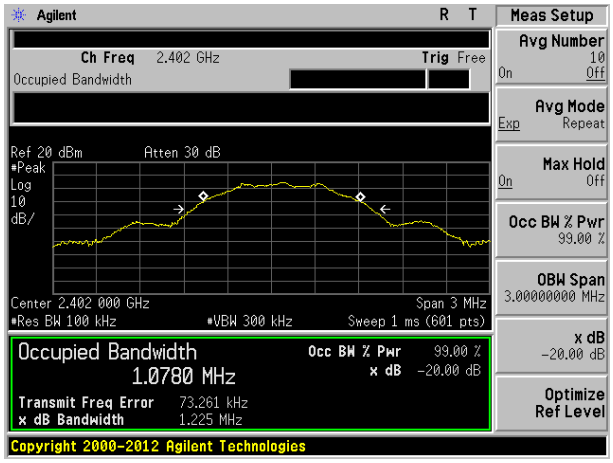
## 7.4 20dB Occupy Bandwidth

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.249/15.215 |
| Test Method: | ANSI C63.10:2013 |
| Limit: | Operation Frequency range 2400MHz~2483.5MHz |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

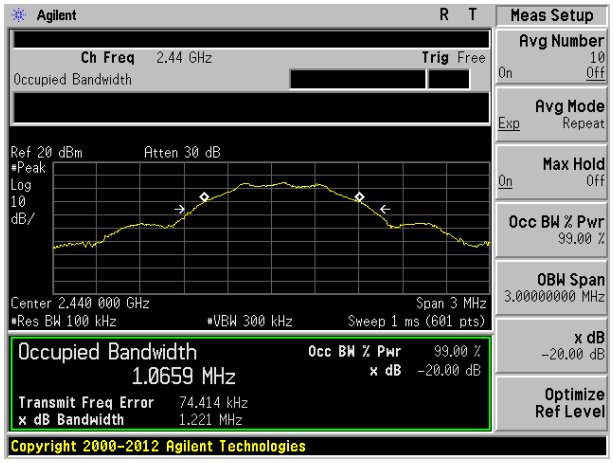
**Measurement Data**

| Test channel | 20dB bandwidth(MHz) | Result |
|---|---|---|
| Lowest | 1.225 | Pass |
| Middle | 1.221 | Pass |
| Highest | 1.235 | Pass |

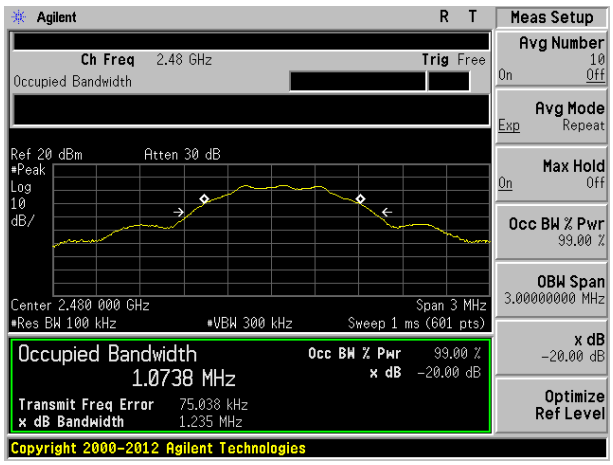
Test plot as follows:




Lowest channel




Middle channel




Highest channel

# 8 Test Setup Photo

Reference to the **appendix I** for details.

# 9 EUT Constructional Details

Reference to the **appendix II** for details.

------End------