# FCC REPORT

## (BLE)

| | |
|---|---|
| **Applicant:** | Shenzhen RodinBell Technology Co., Ltd. |
| **Address of Applicant:** | 905#, Tower B, Xinghe WORLD, Wuhe Avenue, Longgang District, Shenzhen City, PRC |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | ORCA-50 Handheld Data Terminal |
| Model No.: | ORCA-50 |
| **FCC ID:** | 2AKQD-ORCA-50 |
| **Applicable standards:** | FCC CFR Title 47 Part 15 Subpart C Section 15.247 |
| **Date of sample receipt:** | 19 Dec., 2016 |
| **Date of Test:** | 19 Dec., 2016 to 03 Jan., 2017 |
| **Date of report issued:** | 04 Jan., 2017 |
| **Test Result:** | PASS * |

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

Authorized Signature:

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

# 2 Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *04 Jan., 2017* | *Original* |
| | | |
| | | |
| | | |
| | | |

***Tested by:*** Casey Chen ***Date:*** *04 Jan., 2017*

***Test Engineer***

***Reviewed by:*** R.Yan.Lee ***Date:*** *04 Jan., 2017*

***Project Engineer***

# 3 Contents

Page

# 4 Test Summary

| Test Item | Section in CFR 47 | Result |
|---|---|---|
| Antenna requirement | 15.203/15.247 (c) | Pass |
| AC Power Line Conducted Emission | 15.207 | Pass |
| Conducted Peak Output Power | 15.247 (b)(3) | Pass |
| 6dB Emission Bandwidth | 15.247 (a)(2) | Pass |
| Power Spectral Density | 15.247 (e) | Pass |
| Band Edge | 15.247(d) | Pass |
| Spurious Emission | 15.205/15.209 | Pass |

*Pass: The EUT complies with the essential requirements in the standard.*

# 5 General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | Shenzhen RodinBell Technology Co., Ltd. |
| Address of Applicant: | 905#, Tower B, Xinghe WORLD, Wuhe Avenue, Longgang District, Shenzhen City, PRC |
| Manufacturer | Shenzhen RodinBell Technology Co., Ltd. |
| Address of Manufacturer: | 905#, Tower B, Xinghe WORLD, Wuhe Avenue, Longgang District, Shenzhen City, PRC |

## 5.2 General Description of E.U.T.

| | |
|---|---|
| Product Name: | ORCA-50 Handheld Data Terminal |
| Model No.: | ORCA-50 |
| Operation Frequency: | 2402-2480 MHz |
| Channel numbers: | 40 |
| Channel separation: | 2 MHz |
| Modulation technology: | GFSK |
| Data speed : | 1Mbps |
| Antenna Type: | Internal Antenna |
| Antenna gain: | 0 dBi |
| Power supply: | Rechargeable Li-ion Battery DC3.7V-6000mAh |
| AC adapter: | Model: HKC0115020-2B<br>Input: AC100-240V 50/60Hz 0.5A<br>Output: DC 5.0V, 2A |

| Operation Frequency each of 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 |

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 | 2442MHz |
| The Highest channel | 2480MHz |

## 5.3 Test environment and mode

| | |
|---|---|
| **Operating Environment:** | |
| Temperature: | 24.0 °C |
| Humidity: | 54 % RH |
| Atmospheric Pressure: | 1010 mbar |
| **Test mode:** | |
| Operation mode | Keep the EUT in continuous transmitting with modulation |
| The sample was placed 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. Duty cycle setting during the transmission is 100% with maximum power setting for all modulations. | |

## 5.4 Measurement Uncertainty

| Items | Expanded Uncertainty (Confidence of 95%) |
|---|---|
| Conducted Emission (9kHz ~ 30MHz) | 2.14 dB (k=2) |
| Radiated Emission (9kHz ~ 30MHz) | 4.24 dB (k=2) |
| Radiated Emission (30MHz ~ 1000MHz) | 4.35 dB (k=2) |
| Radiated Emission (1GHz ~ 18GHz) | 4.44 dB (k=2) |
| Radiated Emission (18GHz ~ 26.5GHz) | 4.56 dB (k=2) |

## 5.5 Laboratory Facility

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

- **FCC - Registration No.: 817957**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. 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 out files. Registration 817957, February 27, 2012.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

## 5.6 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282
Fax: +86-755-23116366

## 5.7 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 SAC | SAEMC | 9(L)*6(W)* 6(H) | CCIS0001 | 08-23-2014 | 08-22-2017 |
| 2 | BiConiLog Antenna | SCHWARZBECK | VULB9163 | CCIS0005 | 03-25-2016 | 03-25-2017 |
| 3 | Horn Antenna | SCHWARZBECK | BBHA9120D | CCIS0006 | 03-25-2016 | 03-25-2017 |
| 4 | Pre-amplifier (10kHz-1.3GHz) | HP | 8447D | CCIS0003 | 04-01-2016 | 03-31-2017 |
| 5 | Pre-amplifier (1GHz-18GHz) | Compliance Direction Systems Inc. | PAP-1G18 | CCIS0011 | 04-01-2016 | 03-31-2017 |
| 6 | Pre-amplifier (18-26GHz) | Rohde & Schwarz | AFS33-18002 650-30-8P-44 | GTS218 | 04-01-2016 | 03-31-2017 |
| 7 | Horn Antenna | ETS-LINDGREN | 3160 | GTS217 | 04-01-2016 | 03-31-2017 |
| 8 | Spectrum analyzer 9k-30GHz | Rohde & Schwarz | FSP30 | CCIS0023 | 03-28-2016 | 03-28-2017 |
| 9 | EMI Test Receiver | Rohde & Schwarz | ESRP7 | CCIS0167 | 03-28-2016 | 03-28-2017 |
| 10 | Loop antenna | Laplace instrument | RF300 | EMC0701 | 04-01-2016 | 03-31-2017 |
| 11 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 12 | Coaxial Cable | N/A | N/A | CCIS0018 | 04-01-2016 | 03-31-2017 |
| 13 | Coaxial Cable | N/A | N/A | CCIS0020 | 04-01-2016 | 03-31-2017 |

| Conducted Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal. Date (mm-dd-yy)** | **Cal. Due date (mm-dd-yy)** |
| 1 | Shielding Room | ZhongShuo Electron | 11.0(L)x4.0(W)x3.0(H) | CCIS0061 | 08-23-2014 | 08-22-2017 |
| 2 | EMI Test Receiver | Rohde & Schwarz | ESCI | CCIS0002 | 03-24-2016 | 03-24-2017 |
| 3 | LISN | CHASE | MN2050D | CCIS0074 | 03-26-2016 | 03-26-2017 |
| 4 | Coaxial Cable | CCIS | N/A | CCIS0086 | 04-01-2016 | 03-31-2017 |
| 5 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |

# 6 Test results and Measurement Data

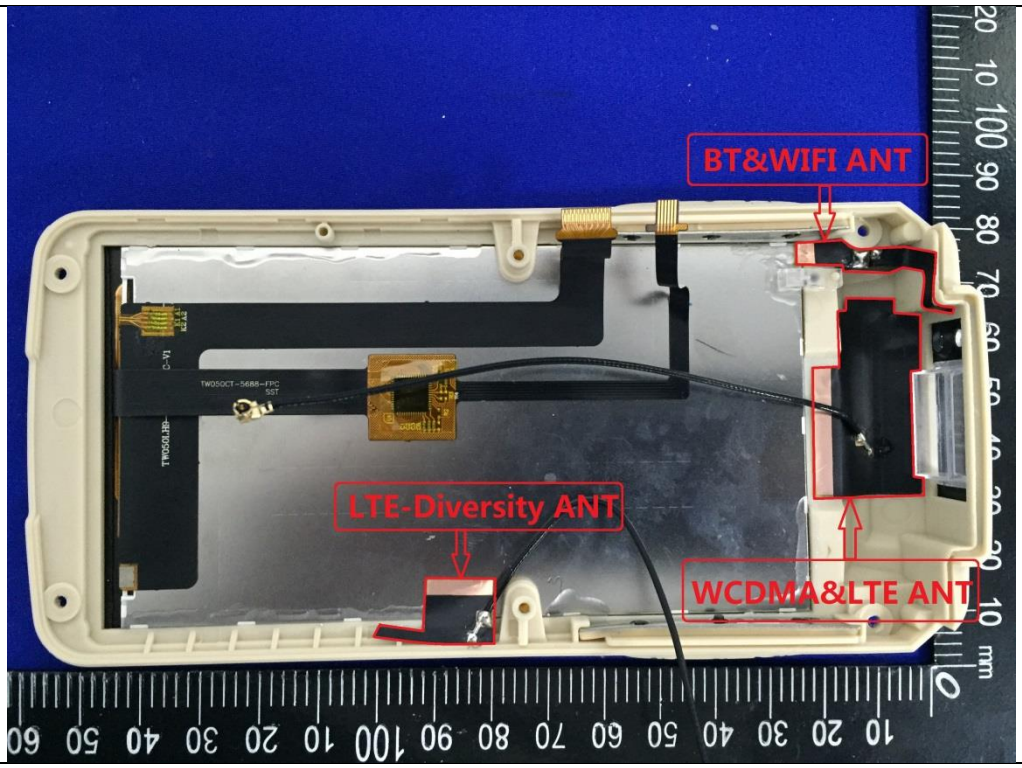
## 6.1 Antenna requirement:

| Standard requirement: | FCC Part 15 C Section 15.203 /247(c) |
|---|---|

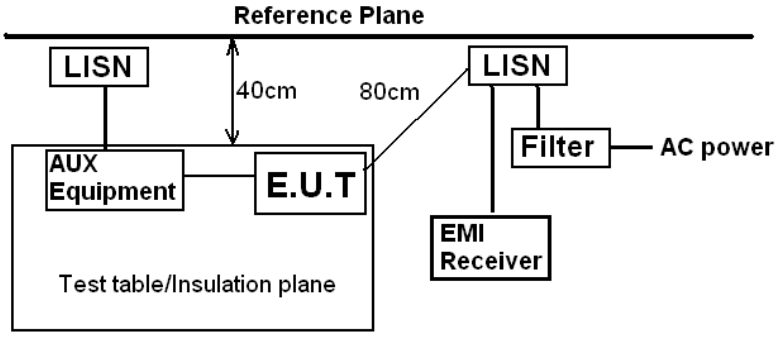
*15.203 requirement:*
*An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.*
*15.247(c) (1)(i) requirement:*
*(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.*

| E.U.T Antenna: | |
|---|---|

*The BLE antenna is an internal antenna which cannot replace by end-user, the best case gain of the antenna is 0 dBi.*



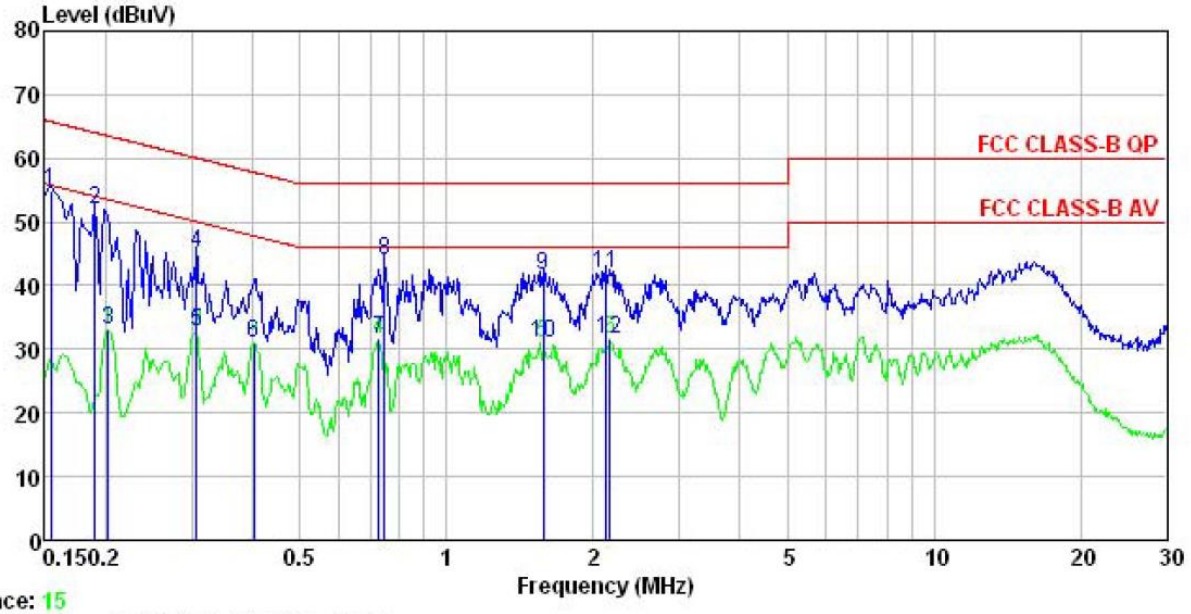
## 6.2 Conducted Emission

<table>
<tr><td>Test Requirement:</td><td colspan="3">FCC Part 15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td colspan="3">ANSI C63.4: 2014</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="3">150 kHz to 30 MHz</td></tr>
<tr><td>Class / Severity:</td><td colspan="3">Class B</td></tr>
<tr><td>Receiver setup:</td><td colspan="3">RBW=9kHz, VBW=30kHz</td></tr>
<tr><td rowspan="6">Limit:</td><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
<tr><td colspan="3">* Decreases with the logarithm of the frequency.</td></tr>
<tr><td>Test procedure</td><td colspan="3">1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment.<br>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).<br>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 C63.4: 2014 on conducted measurement.</td></tr>
<tr><td>Test setup:</td><td colspan="3"> 

Remark:<br>E.U.T: Equipment Under Test<br>LISN: Line Impedence Stabilization Network<br>Test table height=0.8m</td></tr>
<tr><td>Test Instruments:</td><td colspan="3">Refer to section 5.7 for details</td></tr>
<tr><td>Test mode:</td><td colspan="3">Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td colspan="3">Passed</td></tr>
</table>

**Measurement Data:**

**Neutral:**




Trace: 15

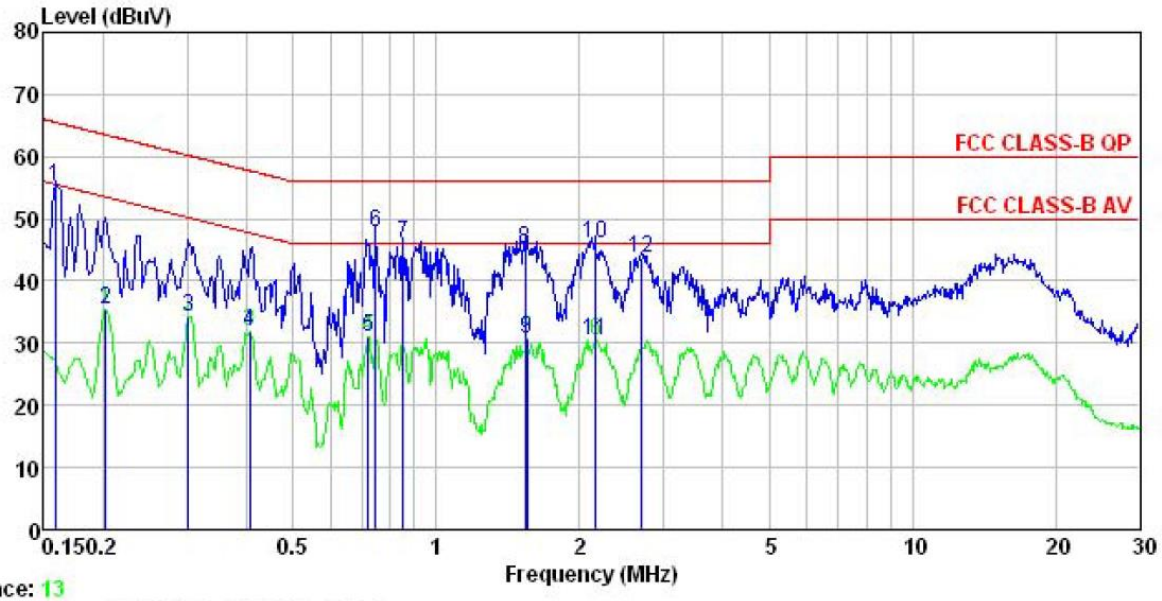
```
Site          : CCIS Shielding Room
Condition     : FCC CLASS-B QP LISN NEUTRAL
EUT           : ORCA-50 Handheld Data Terminal
Model         : ORCA-50
Test Mode     : BLE Mode
Power Rating  : AC 120V/60Hz
Environment   : Temp: 23 'C Huni:56%  Atmos:101KPa
Test Engineer: Carey
Remark        :
```

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.154 | 44.04 | 0.12 | 10.78 | 54.94 | 65.78 | -10.84 | QP |
| 2 | 0.190 | 40.97 | 0.14 | 10.76 | 51.87 | 64.02 | -12.15 | QP |
| 3 | 0.202 | 22.01 | 0.15 | 10.76 | 32.92 | 53.54 | -20.62 | Average |
| 4 | 0.307 | 34.14 | 0.19 | 10.74 | 45.07 | 60.06 | -14.99 | QP |
| 5 | 0.307 | 21.91 | 0.19 | 10.74 | 32.84 | 50.06 | -17.22 | Average |
| 6 | 0.402 | 19.92 | 0.23 | 10.72 | 30.87 | 47.81 | -16.94 | Average |
| 7 | 0.727 | 20.43 | 0.32 | 10.78 | 31.53 | 46.00 | -14.47 | Average |
| 8 | 0.747 | 32.93 | 0.32 | 10.79 | 44.04 | 56.00 | -11.96 | QP |
| 9 | 1.577 | 30.34 | 0.26 | 10.93 | 41.53 | 56.00 | -14.47 | QP |
| 10 | 1.577 | 19.78 | 0.26 | 10.93 | 30.97 | 46.00 | -15.03 | Average |
| 11 | 2.121 | 30.79 | 0.27 | 10.95 | 42.01 | 56.00 | -13.99 | QP |
| 12 | 2.167 | 20.27 | 0.27 | 10.95 | 31.49 | 46.00 | -14.51 | Average |

*Notes:*

1. *An initial pre-scan was performed on the live 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.*

**Line:**




Trace: 13

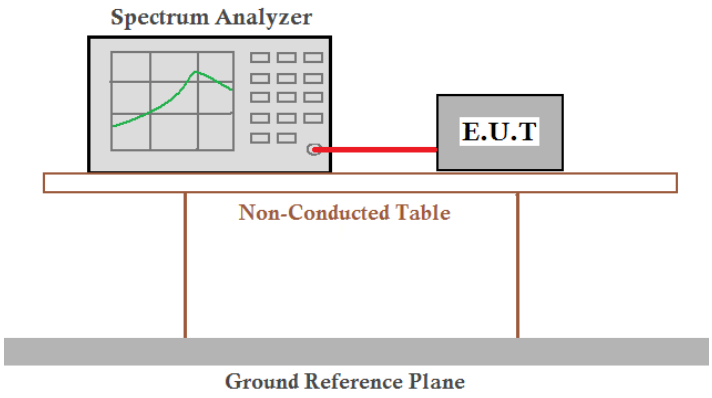
Site : CCIS Shielding Room
Condition : FCC CLASS-B QP LISN LINE
EUT : ORCA-50 Handheld Data Terminal
Model : ORCA-50
Test Mode : BLE Mode
Power Rating : AC 120V/60Hz
Environment : Temp: 23 'C Huni:56% Atmos:101KPa
Test Engineer: Carey
Remark :

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.158 | 44.30 | 0.14 | 10.78 | 55.22 | 65.56 | -10.34 | QP |
| 2 | 0.202 | 24.44 | 0.15 | 10.76 | 35.35 | 53.54 | -18.19 | Average |
| 3 | 0.302 | 23.32 | 0.16 | 10.74 | 34.22 | 50.19 | -15.97 | Average |
| 4 | 0.406 | 20.90 | 0.24 | 10.72 | 31.86 | 47.73 | -15.87 | Average |
| 5 | 0.720 | 19.86 | 0.32 | 10.78 | 30.96 | 46.00 | -15.04 | Average |
| 6 | 0.747 | 36.65 | 0.31 | 10.79 | 47.75 | 56.00 | -8.25 | QP |
| 7 | 0.853 | 34.93 | 0.29 | 10.83 | 46.05 | 56.00 | -9.95 | QP |
| 8 | 1.535 | 33.99 | 0.30 | 10.93 | 45.22 | 56.00 | -10.78 | QP |
| 9 | 1.552 | 19.40 | 0.30 | 10.93 | 30.63 | 46.00 | -15.37 | Average |
| 10 | 2.155 | 34.84 | 0.32 | 10.95 | 46.11 | 56.00 | -9.89 | QP |
| 11 | 2.167 | 19.15 | 0.32 | 10.95 | 30.42 | 46.00 | -15.58 | Average |
| 12 | 2.707 | 32.35 | 0.33 | 10.93 | 43.61 | 56.00 | -12.39 | QP |

*Notes:*

1. *An initial pre-scan was performed on the live 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.*

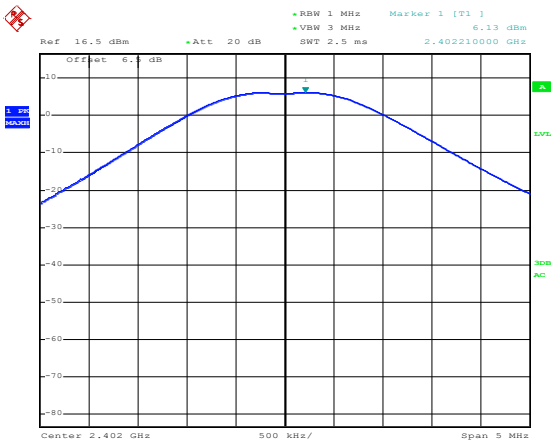
## 6.3 Conducted Output Power

| | |
|---|---|
| Test Requirement: | FCC Part 15 C Section 15.247 (b)(3) |
| Test Method: | ANSI C63.10:2013 and KDB558074v03r05 section 9.1.1 |
| Limit: | 30dBm |
| Test setup: |  |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data:**

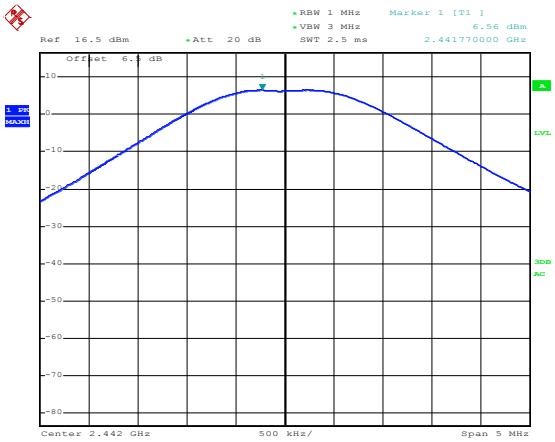
| Test CH | Maximum Conducted Output Power (dBm) | Limit(dBm) | Result |
|---|---|---|---|
| Lowest | 6.13 | 30.00 | Pass |
| Middle | 6.56 | | |
| Highest | 6.69 | | |

**Test plot as follows:**



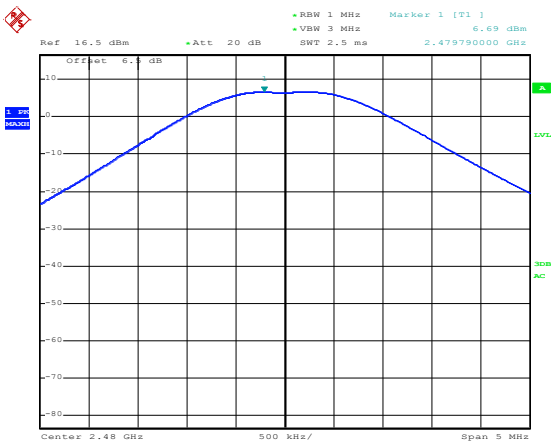

Date: 30.DEC.2016 15:37:01

Lowest channel




Date: 30.DEC.2016 15:37:25

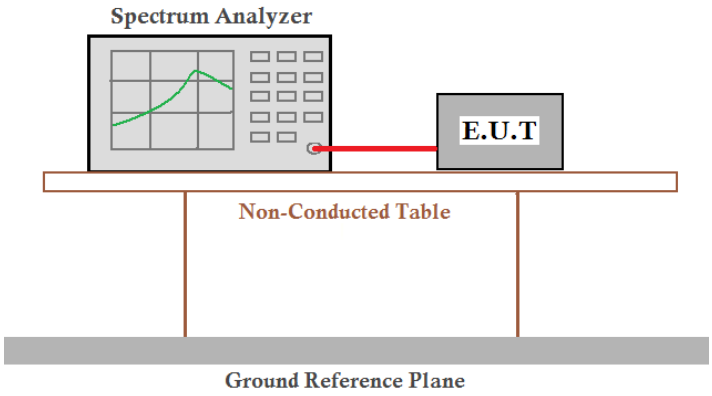
Middle channel




Date: 30.DEC.2016 15:37:36

Highest channel

## 6.4 Occupy Bandwidth

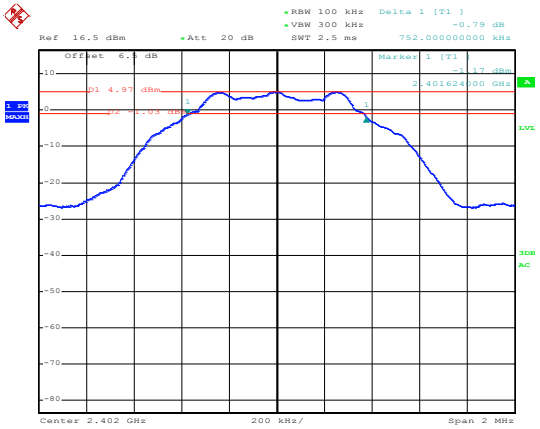
| | |
|---|---|
| Test Requirement: | FCC Part 15 C Section 15.247 (a)(2) |
| Test Method: | ANSI C63.10:2013 and KDB558074v03r05 section 8.1 |
| Limit: | >500kHz |
| Test setup: |  |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Measurement Data:**

| Test CH | 6dB Emission Bandwidth (MHz) | Limit(kHz) | Result |
|---|---|---|---|
| Lowest | 0.752 | >500 | Pass |
| Middle | 0.744 | | |
| Highest | 0.740 | | |
| Test CH | 99% Occupy Bandwidth (MHz) | Limit(kHz) | Result |
| Lowest | 1.068 | N/A | N/A |
| Middle | 1.072 | | |
| Highest | 1.072 | | |

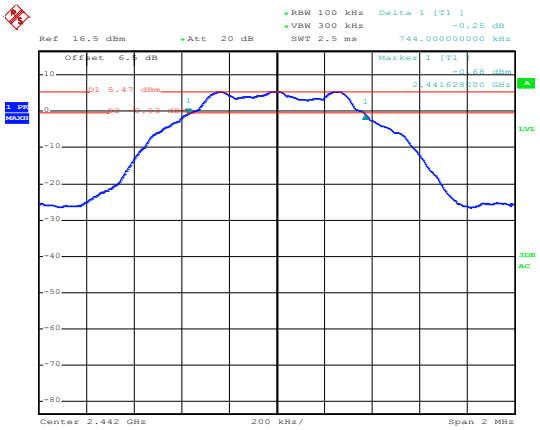
**Test plot as follows:**

**6dB EBW**



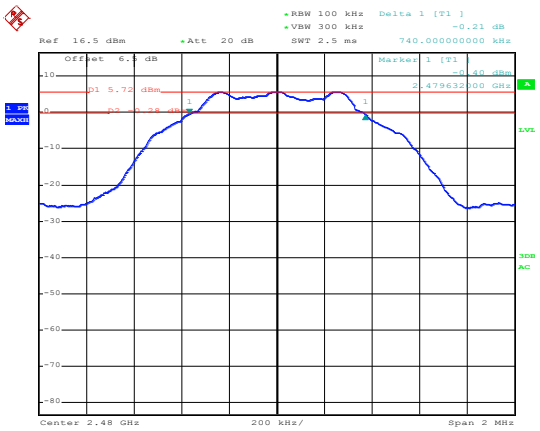

Date: 30.DEC.2016 15:39:52

Lowest channel




Date: 30.DEC.2016 15:40:31

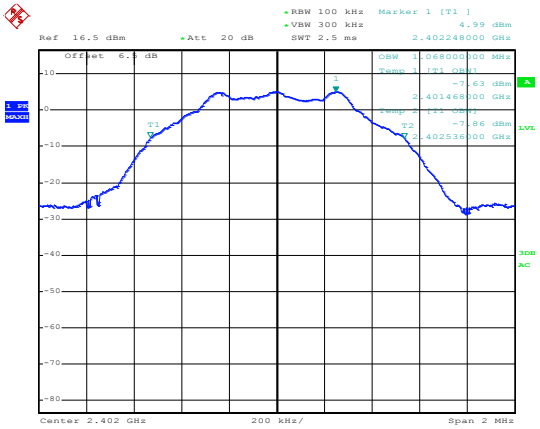
Middle channel




Date: 30.DEC.2016 15:41:01

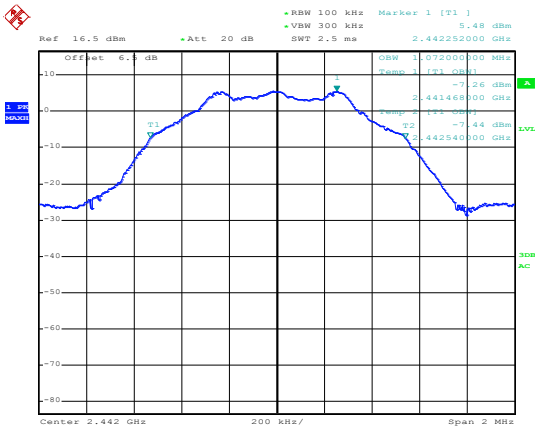
Highest channel

**99% OBW**



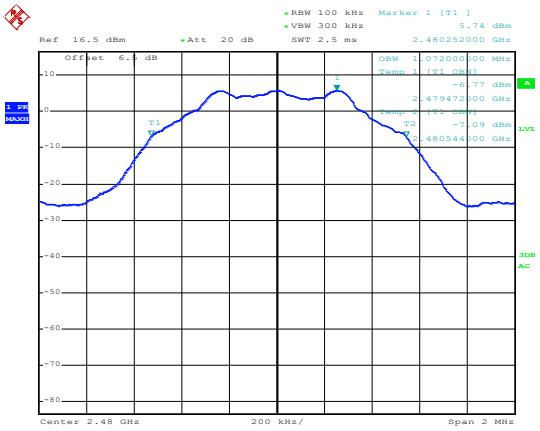

Date: 30.DEC.2016 15:39:21

Lowest channel




Date: 30.DEC.2016 15:39:10

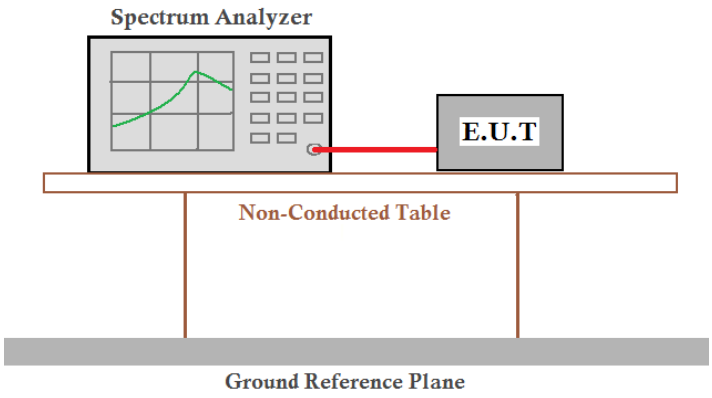
Middle channel




Date: 30.DEC.2016 15:38:55

Highest channel

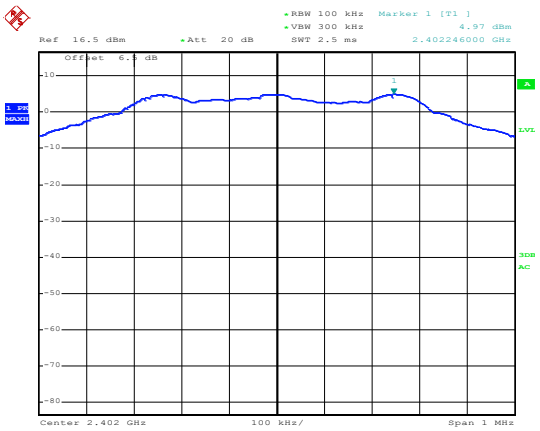
## 6.5 Power Spectral Density

| | |
|---|---|
| Test Requirement: | FCC Part 15 C Section 15.247 (e) |
| Test Method: | ANSI C63.10:2013 and KDB558074v03r05 section 10.2 |
| Limit: | 8 dBm |
| Test setup: |  |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

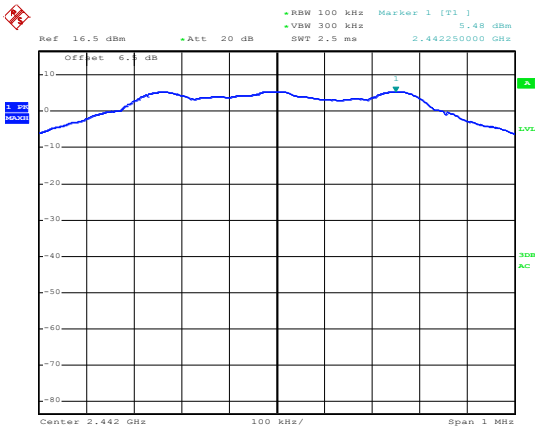
**Measurement Data:**

| Test CH | Power Spectral Density (dBm) | Limit(dBm) | Result |
|---|---|---|---|
| Lowest | 4.97 | 8.00 | Pass |
| Middle | 5.48 | | |
| Highest | 5.87 | | |

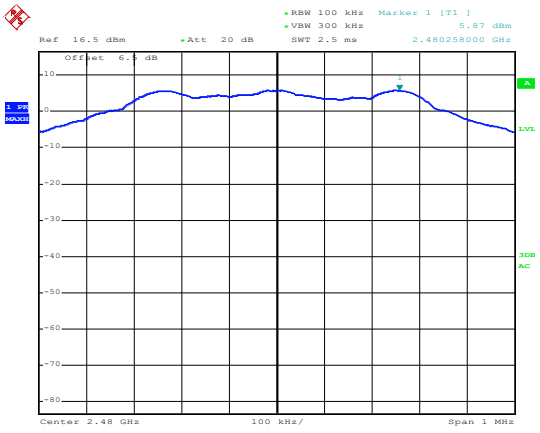
**Test plots as follow:**




Lowest channel



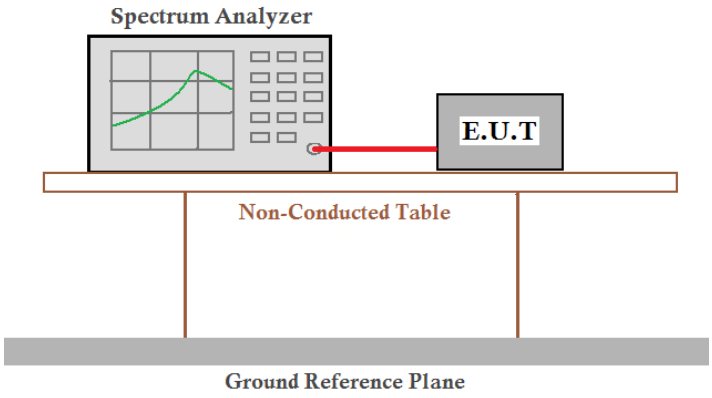

Middle channel



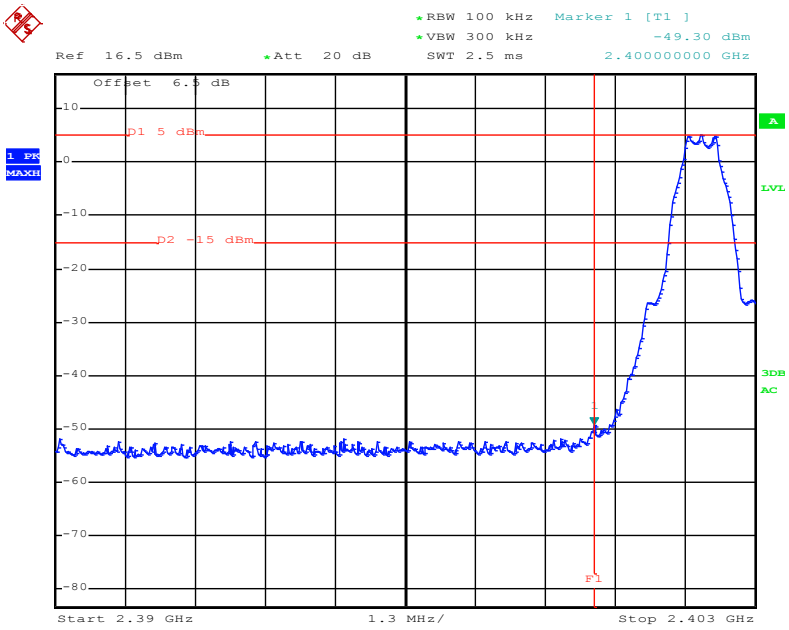

Highest channel

## 6.6 Band Edge

### 6.6.1 Conducted Emission Method

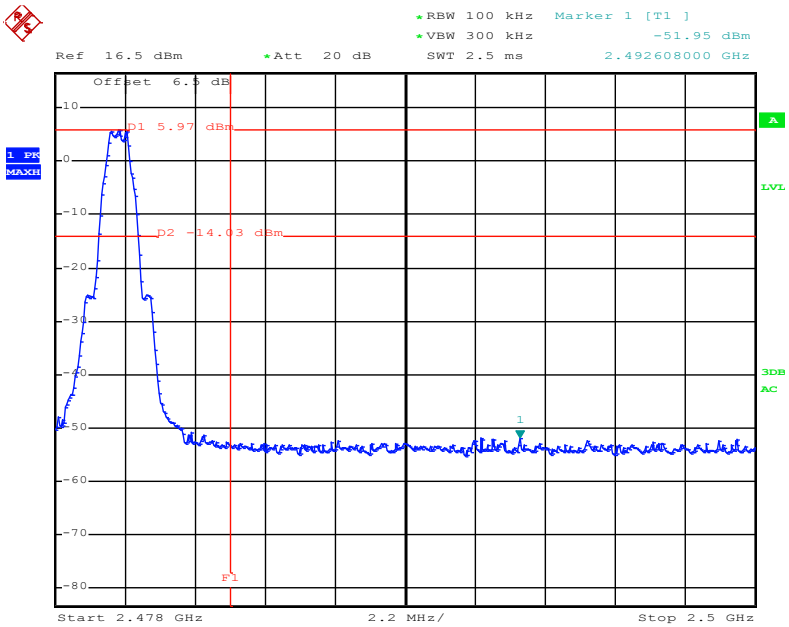
| | |
|---|---|
| Test Requirement: | FCC Part 15 C Section 15.247 (d) |
| Test Method: | ANSI C63.10:2013 and KDB558074v03r05 section 13 |
| Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is 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 setup: |  |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Test plots as follow:**




Date: 30.DEC.2016 15:44:00

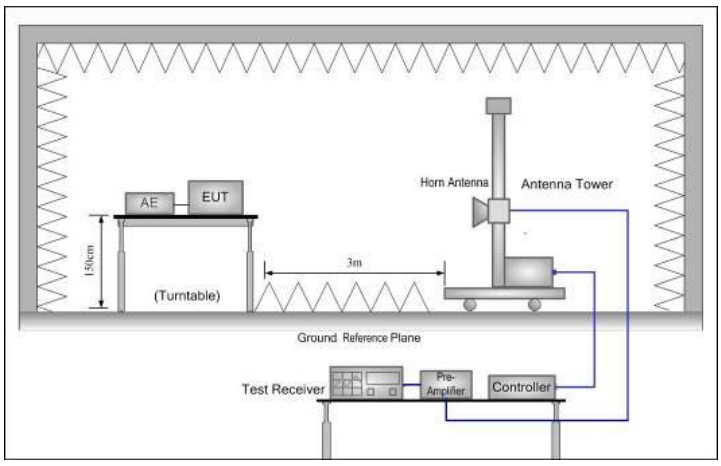
Lowest channel




Date: 30.DEC.2016 15:43:32

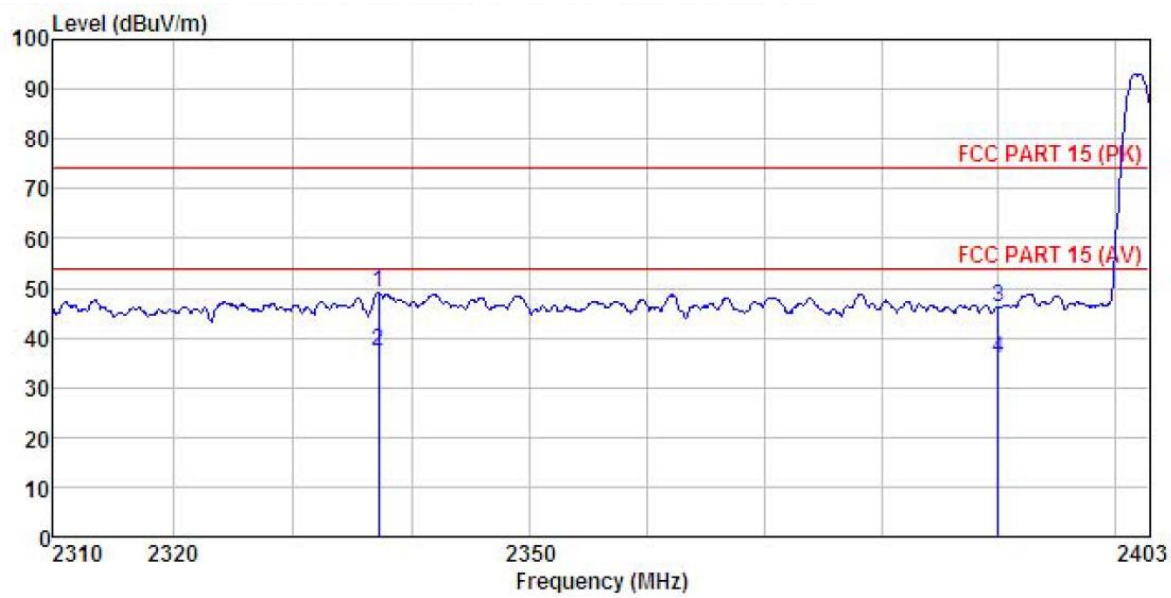
Highest channel

### 6.6.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td colspan="5">FCC Part 15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td colspan="5">ANSI C63.10: 2013 and KDB 558074v03r05 section 12.1</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="5">2.3GHz to 2.5GHz</td></tr>
<tr><td>Test site:</td><td colspan="5">Measurement Distance: 3m</td></tr>
<tr><td rowspan="3">Receiver setup:</td><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>RMS</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
<tr><td rowspan="3">Limit:</td><td colspan="2">Frequency</td><td colspan="2">Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td colspan="2" rowspan="2">Above 1GHz</td><td colspan="2">54.00</td><td>Average Value</td></tr>
<tr><td colspan="2">74.00</td><td>Peak Value</td></tr>
<tr><td>Test Procedure:</td><td colspan="5">1. The EUT was placed on the top of a rotating table 1.5 meters 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 10 dB 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 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
<tr><td>Test setup:</td><td colspan="5"> 
</td></tr>
<tr><td>Test Instruments:</td><td colspan="5">Refer to section 5.7 for details</td></tr>
<tr><td>Test mode:</td><td colspan="5">Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td colspan="5">Passed</td></tr>
</table>

**Test channel: Lowest**

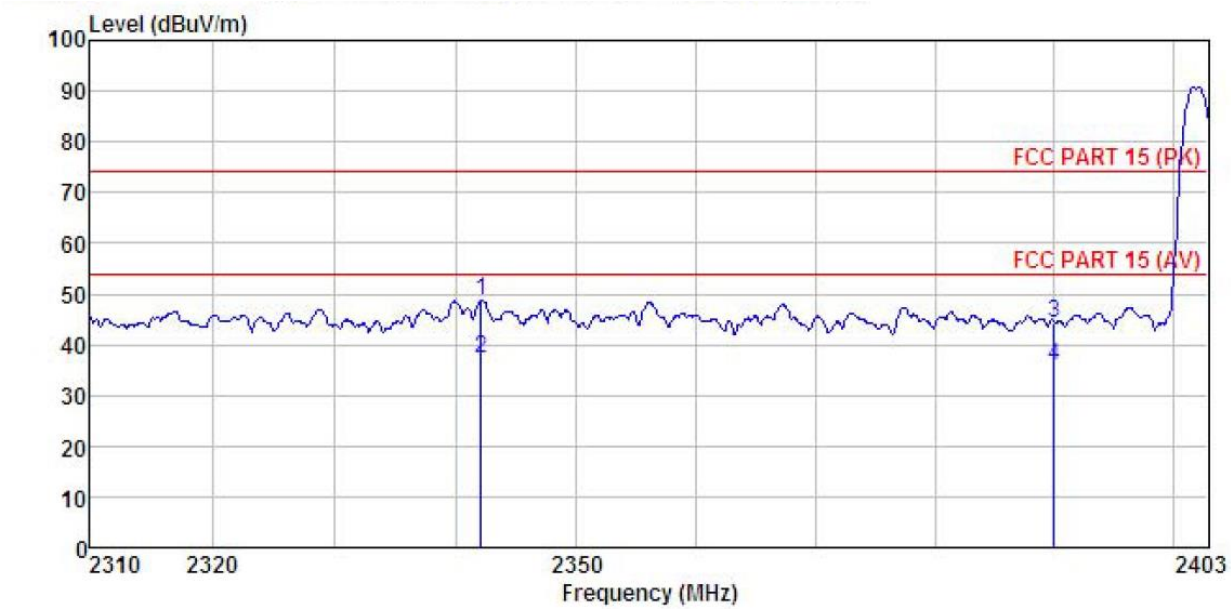
Horizontal:




Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
EUT : ORCA-50 Handheld Data Terminal)
Model : ORCA-50
Test mode : BLE-L Mode
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Carey
REMARK :

| | Freq | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 2337.239 | 20.95 | 23.67 | 4.64 | 0.00 | 49.26 | 74.00 | -24.74 | Peak |
| 2 | 2337.239 | 8.96 | 23.67 | 4.64 | 0.00 | 37.27 | 54.00 | -16.73 | Average |
| 3 | 2390.000 | 17.94 | 23.68 | 4.69 | 0.00 | 46.31 | 74.00 | -27.69 | Peak |
| 4 | 2390.000 | 7.36 | 23.68 | 4.69 | 0.00 | 35.73 | 54.00 | -18.27 | Average |

Vertical:

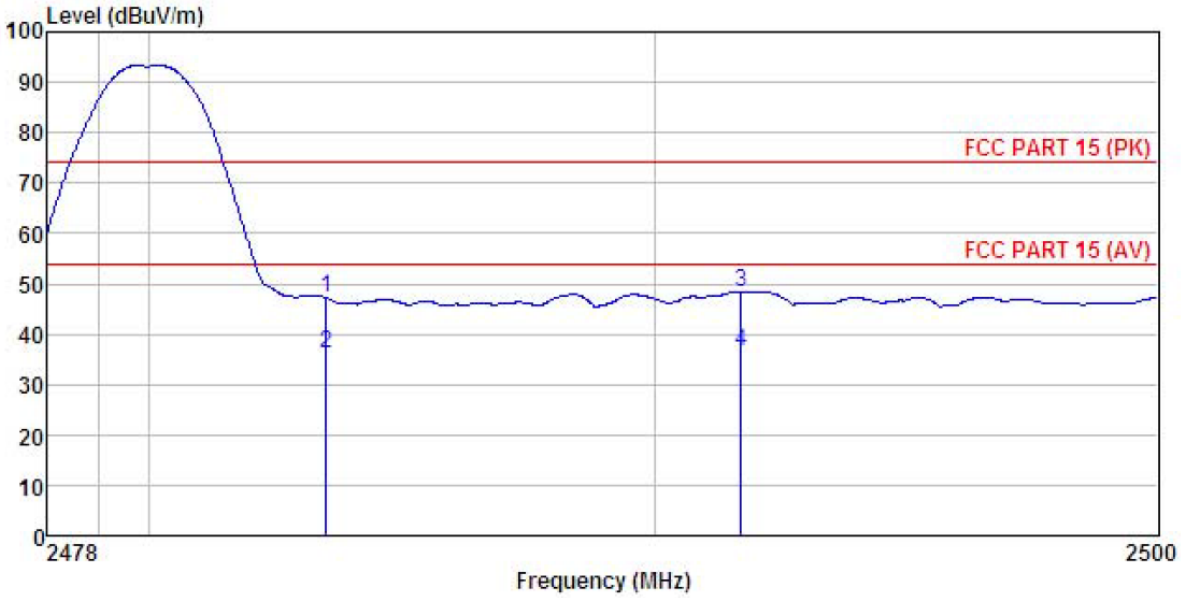



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
EUT : ORCA-50 Handheld Data Terminal)
Model : ORCA-50
Test mode : BLE-L Mode
Power Rating : AC120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey
REMARK :

| | Freq | ReadAntenna Level | Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 2342.133 | 20.36 | 23.67 | 4.64 | 0.00 | 48.67 | 74.00 | -25.33 | Peak |
| 2 | 2342.133 | 9.03 | 23.67 | 4.64 | 0.00 | 37.34 | 54.00 | -16.66 | Average |
| 3 | 2390.000 | 15.83 | 23.68 | 4.69 | 0.00 | 44.20 | 74.00 | -29.80 | Peak |
| 4 | 2390.000 | 7.36 | 23.68 | 4.69 | 0.00 | 35.73 | 54.00 | -18.27 | Average |

**Test channel: Highest**

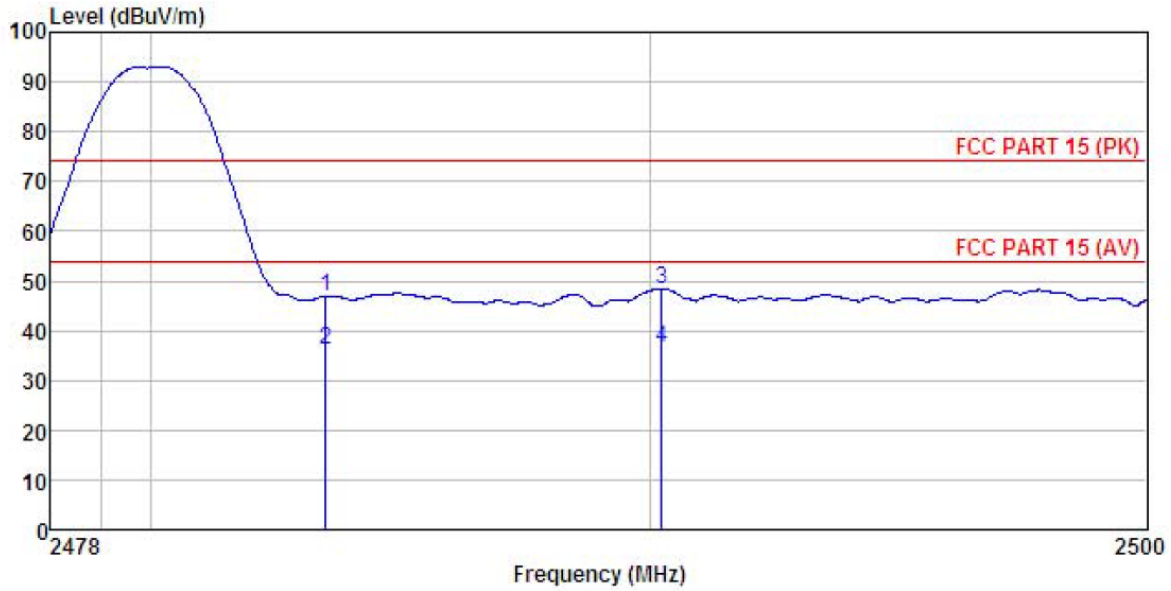
Horizontal:




```
Site          : 3m chamber
Condition     : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
EUT           : ORCA-50 Handheld Data Terminal)
Model         : ORCA-50
Test mode     : BLE-H Mode
Power Rating  : AC120V/60Hz
Environment   : Temp:25.5'C  Huni:55%
Test Engineer: Carey
REMARK        :
```

| | Freq | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 2483.500 | 18.65 | 23.70 | 4.81 | 0.00 | 47.16 | 74.00 | -26.84 | Peak |
| 2 | 2483.500 | 7.68 | 23.70 | 4.81 | 0.00 | 36.19 | 54.00 | -17.81 | Average |
| 3 | 2491.705 | 19.88 | 23.70 | 4.82 | 0.00 | 48.40 | 74.00 | -25.60 | Peak |
| 4 | 2491.705 | 8.05 | 23.70 | 4.82 | 0.00 | 36.57 | 54.00 | -17.43 | Average |

Vertical:

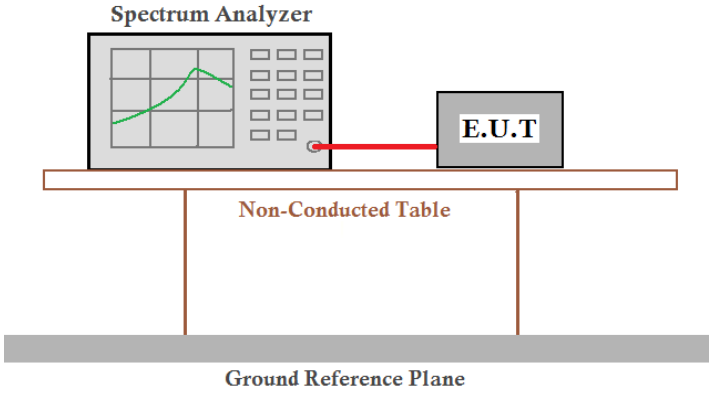



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
EUT : ORCA-50 Handheld Data Terminal)
Model : ORCA-50
Test mode : BLE-H Mode
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Carey
REMARK :

| | Freq | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 2483.500 | 18.44 | 23.70 | 4.81 | 0.00 | 46.95 | 74.00 | -27.05 | Peak |
| 2 | 2483.500 | 7.74 | 23.70 | 4.81 | 0.00 | 36.25 | 54.00 | -17.75 | Average |
| 3 | 2490.230 | 19.91 | 23.70 | 4.82 | 0.00 | 48.43 | 74.00 | -25.57 | Peak |
| 4 | 2490.230 | 8.18 | 23.70 | 4.82 | 0.00 | 36.70 | 54.00 | -17.30 | Average |

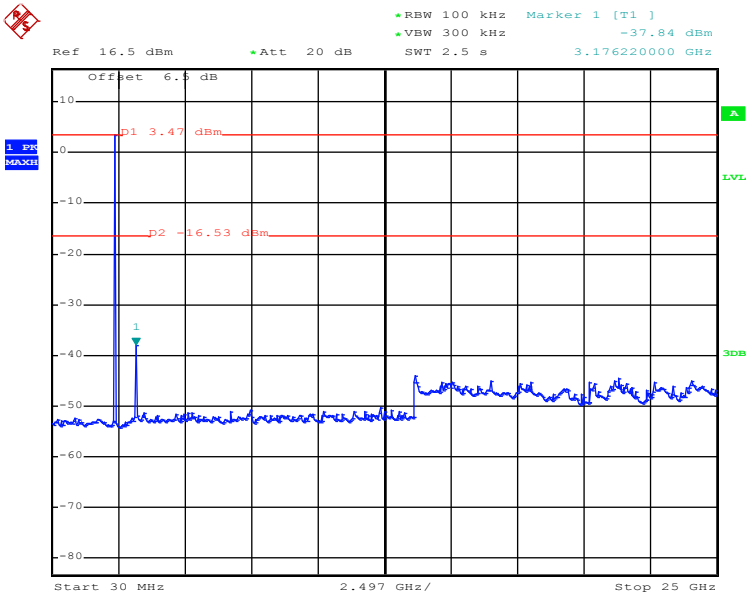
## 6.7 Spurious Emission

### 6.7.1 Conducted Emission Method

| | |
|---|---|
| Test Requirement: | FCC Part 15 C Section 15.247 (d) |
| Test Method: | ANSI C63.10:2013 and KDB558074v03r05 section 11 |
| 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 setup: |  |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |

**Test plot as follows:**

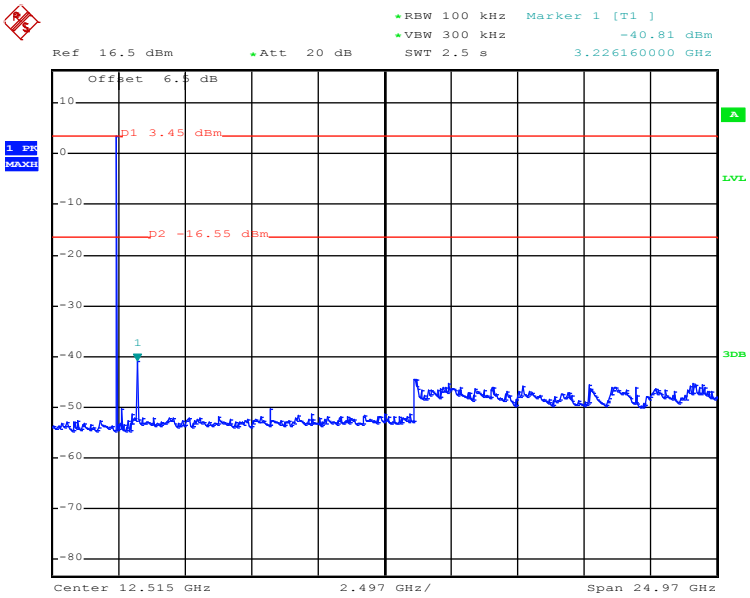
Lowest channel




Date: 2.JAN.2017 05:53:27

30MHz~25GHz

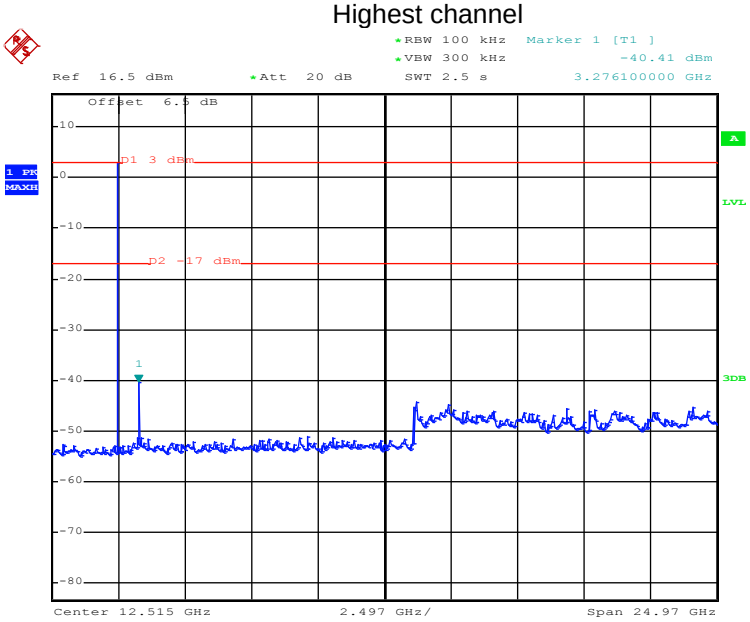
Middle channel




Date: 2.JAN.2017 05:53:57

30MHz~25GHz

Highest channel

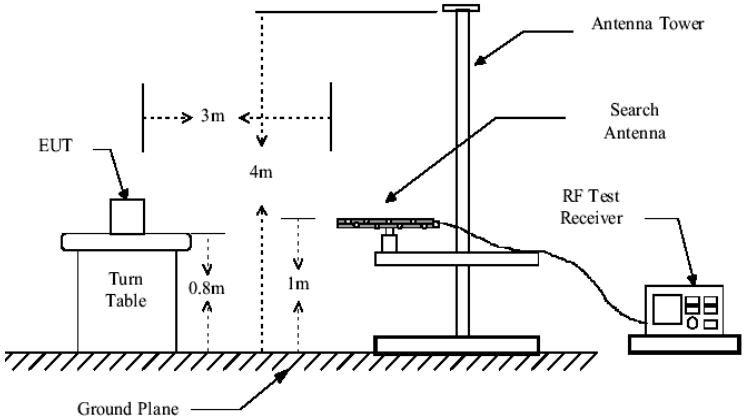
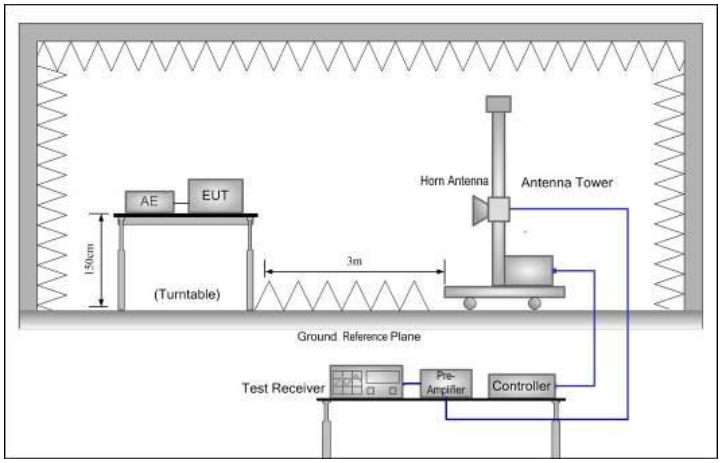



Date: 2.JAN.2017 05:54:15

30MHz~25GHz

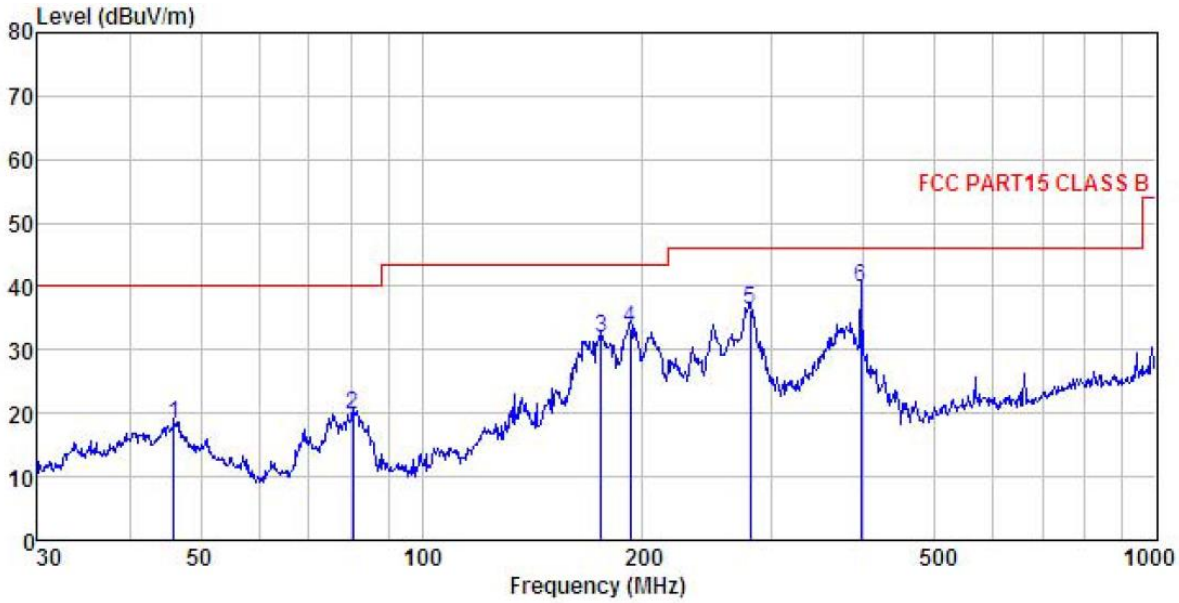
### 6.7.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td colspan="5">FCC Part 15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td colspan="5">ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="5">9KHz to 25GHz</td></tr>
<tr><td>Test site:</td><td colspan="5">Measurement Distance: 3m</td></tr>
<tr><td rowspan="4">Receiver setup:</td><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>RMS</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
<tr><td rowspan="7">Limit:</td><td colspan="2">Frequency</td><td colspan="2">Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td colspan="2">30MHz-88MHz</td><td colspan="2">40.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">88MHz-216MHz</td><td colspan="2">43.5</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">216MHz-960MHz</td><td colspan="2">46.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">960MHz-1GHz</td><td colspan="2">54.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2" rowspan="2">Above 1GHz</td><td colspan="2">54.0</td><td>Average Value</td></tr>
<tr><td colspan="2">74.0</td><td>Peak Value</td></tr>
<tr><td>Test Procedure:</td><td colspan="5">1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(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 10 dB 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 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
</table>

| | |
|---|---|
| Test setup: | Below 1GHz<br>  <br><br>Above 1GHz<br>  <br> |
| Test Instruments: | Refer to section 5.7 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Passed |
| Remark: | 1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.<br>2. 9 kHz to 30MHz is too low, so only shows the data of above 30MHz in this report. |

**Below 1GHz:**

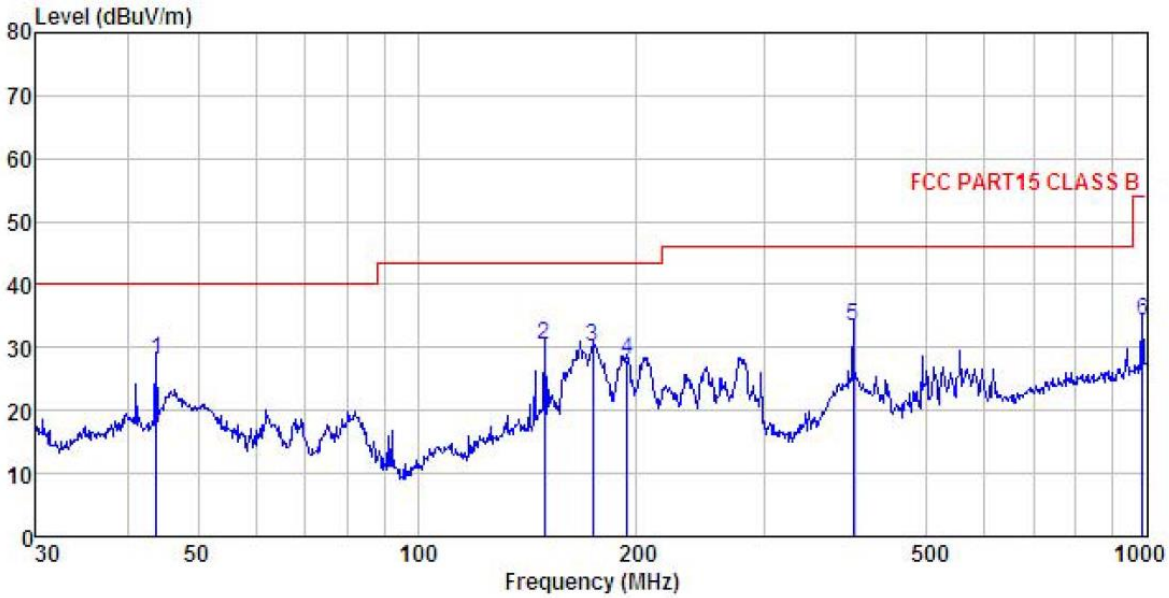
Horizontal:




Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) HORIZONTAL
EUT : ORCA-50 Handheld Data Terminal)
Model : ORCA-50
Test mode : BLE Mode
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Carey
REMARK :

| | Freq | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 46.016 | 29.66 | 17.20 | 1.28 | 29.85 | 18.29 | 40.00 | -21.71 | QP |
| 2 | 80.644 | 41.19 | 6.65 | 1.69 | 29.64 | 19.89 | 40.00 | -20.11 | QP |
| 3 | 175.652 | 48.76 | 9.45 | 2.70 | 29.01 | 31.90 | 43.50 | -11.60 | QP |
| 4 | 192.419 | 49.65 | 9.84 | 2.82 | 28.88 | 33.43 | 43.50 | -10.07 | QP |
| 5 | 280.024 | 49.75 | 12.20 | 2.89 | 28.48 | 36.36 | 46.00 | -9.64 | QP |
| 6 | 396.242 | 49.61 | 15.78 | 3.08 | 28.76 | 39.71 | 46.00 | -6.29 | QP |

Vertical:




Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M3G) VERTICAL
EUT : ORCA-50 Handheld Data Terminal)
Model : ORCA-50
Test mode : BLE Mode
Power Rating : AC120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Carey
REMARK :

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 43.812 | 39.22 | 17.56 | 1.26 | 29.87 | 28.17 | 40.00 | -11.83 | QP |
| 2 | 149.486 | 46.46 | 10.70 | 2.51 | 29.22 | 30.45 | 43.50 | -13.05 | QP |
| 3 | 173.814 | 46.79 | 9.60 | 2.68 | 29.02 | 30.05 | 43.50 | -13.45 | QP |
| 4 | 193.773 | 44.20 | 9.88 | 2.82 | 28.87 | 28.03 | 43.50 | -15.47 | QP |
| 5 | 396.242 | 43.33 | 15.78 | 3.08 | 28.76 | 33.43 | 46.00 | -12.57 | QP |
| 6 | 986.072 | 34.75 | 22.65 | 4.40 | 27.51 | 34.29 | 54.00 | -19.71 | QP |

**Above 1GHz**

| Test channel: | | | Lowest | | Level: | | Peak | |
|---|---|---|---|---|---|---|---|---|
| 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 |
| 4804.00 | 48.24 | 35.99 | 6.80 | 41.81 | 49.22 | 74.00 | -24.78 | Vertical |
| 4804.00 | 47.79 | 35.99 | 6.80 | 41.81 | 48.77 | 74.00 | -25.23 | Horizontal |
| Test channel: | | | Lowest | | Level: | | Average | |
| 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 |
| 4804.00 | 39.52 | 35.99 | 6.80 | 41.81 | 40.50 | 54.00 | -13.50 | Vertical |
| 4804.00 | 38.51 | 35.99 | 6.80 | 41.81 | 39.49 | 54.00 | -14.51 | Horizontal |

| Test channel: | | | Middle | | Level: | | Peak | |
|---|---|---|---|---|---|---|---|---|
| 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 |
| 4884.00 | 47.62 | 36.38 | 6.86 | 41.84 | 49.02 | 74.00 | -24.98 | Vertical |
| 4884.00 | 48.05 | 36.38 | 6.86 | 41.84 | 49.45 | 74.00 | -24.55 | Horizontal |
| Test channel: | | | Middle | | Level: | | Average | |
| 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 |
| 4884.00 | 38.64 | 36.38 | 6.86 | 41.84 | 40.04 | 54.00 | -13.96 | Vertical |
| 4884.00 | 39.12 | 36.38 | 6.86 | 41.84 | 40.52 | 54.00 | -13.48 | Horizontal |

| Test channel: | | | Highest | | Level: | | Peak | |
|---|---|---|---|---|---|---|---|---|
| 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 |
| 4960.00 | 49.02 | 36.71 | 6.91 | 41.87 | 50.77 | 74.00 | -23.23 | Vertical |
| 4960.00 | 47.95 | 36.71 | 6.91 | 41.87 | 49.70 | 74.00 | -24.30 | Horizontal |
| Test channel: | | | Highest | | Level: | | Average | |
| 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 |
| 4960.00 | 40.22 | 36.71 | 6.91 | 41.87 | 41.97 | 54.00 | -12.03 | Vertical |
| 4960.00 | 38.93 | 36.71 | 6.91 | 41.87 | 40.68 | 54.00 | -13.32 | Horizontal |

*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.*