

## TEST REPORT

**Report Number: 21050203HKG-001R1**

Application for Original Grant of 47 CFR Part 15 Certification

Single New of RSS-247 Issue 2 Equipment

**FCC ID: Q2O-NADM10A**

**IC: 152B-NADM10A**

This report supersedes previous report with report number 21050203HKG-001 dated October 27, 2021.  
Please refer ICT-S21-0025 Letter issued on December 31, 2021 for amendment/ supersede notification.

**Prepared and Checked by:**

Signed On File

Wong Cheuk Ho, Herbert  
Lead Engineer

**Approved by:**

Wong Kwok Yeung, Kenneth  
Assistant Supervisor  
Date: December 31, 2021

## TEST REPORT

### GENERAL INFORMATION

|                                    |   |
|------------------------------------|---|
| <b>Applicant Name:</b>             | Lenbrook Industries Limited   |
| <b>Applicant Address:</b>          | 633 Granite Court,<br>Pickering, ON,<br>L1W 3K1, Canada.  |
| <b>FCC Specification Standard:</b> | FCC Part 15, October 1, 2020 Edition  |
| <b>FCC ID:</b>                     | Q2O-NADM10A   |
| <b>FCC Model(s):</b>               | M10 V2  |
| <b>IC Specification Standard:</b>  | RSS-247 Issue 2, February 2017<br>RSS-Gen Issue 5 Amendment 2, February 2021  |
| <b>IC:</b>                         | 152B-NADM10A  |
| <b>PMN:</b>                        | BluOS STREAMING AMPLIFIER   |
| <b>HVIN:</b>                       | M10 V2  |
| <b>Type of EUT:</b>                | Spread Spectrum Transmitter   |
| <b>Description of EUT:</b>         | BluOS STREAMING AMPLIFIER   |
| <b>Serial Number:</b>              | K214M10V2PP005  |
| <b>Sample Receipt Date:</b>        | May 05, 2021  |
| <b>Date of Test:</b>               | May 05, 2021 to October 20, 2021  |
| <b>Report Date:</b>                | December 31, 2021   |
| <b>Environmental Conditions:</b>   | Temperature: +10 to 40°C<br>Humidity: 10 to 90%   |
| <b>Conclusion:</b>                 | Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 / RSS-247 Issue 2 Certification. |

**TEST REPORT****AMENDMENT HISTORY**

| Report No.        | Issued Date       | Content                  |
|-------------------|-------------------|--------------------------|
| 21050203HKG-001   | October 27, 2021  | Original Report          |
| 21050203HKG-001R1 | December 31, 2021 | P.2: Added serial number |

## TEST REPORT

### TABLE OF CONTENTS

|  |           |
|--|-----------|
| <b>1.0 TEST RESULTS SUMMARY &amp; STATEMENT OF COMPLIANCE .....</b>                | <b>5</b>  |
| 1.1 Summary of Test Results .....  | 5         |
| 1.2 Statement of Compliance .....  | 5         |
| <b>2.0 GENERAL DESCRIPTION.....</b>  | <b>6</b>  |
| 2.1 Product Description.....   | 6         |
| 2.2 Test Methodology .....   | 7         |
| 2.3 Test Facility .....  | 7         |
| 2.4 Related Submittal(s) Grants.....   | 7         |
| <b>3.0 SYSTEM TEST CONFIGURATION.....</b>  | <b>8</b>  |
| 3.1 Justification .....  | 8         |
| 3.2 EUT Exercising Software .....  | 9         |
| 3.3 Details of EUT and Description of Accessories.....                             | 10        |
| 3.4 Measurement Uncertainty .....  | 10        |
| <b>4.0 TEST RESULTS .....</b>  | <b>11</b> |
| 4.1 Maximum Conducted Output Power at Antenna Terminals.....                       | 11        |
| 4.2 Minimum 6dB RF Bandwidth .....   | 12        |
| 4.3 Maximum Power Spectral Density .....   | 15        |
| 4.4 Out of Band Conducted Emissions .....  | 18        |
| 4.5 Field Strength Calculation .....   | 24        |
| 4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions..... | 25        |
| 4.6.1 Radiated Emission Configuration Photograph .....                             | 25        |
| 4.6.2 Radiated Emission Data .....   | 25        |
| 4.6.3 Radiated Emission Test Setup .....   | 30        |
| 4.6.4 Transmitter Duty Cycle Calculation .....                                     | 31        |
| 4.7 AC Power Line Conducted Emission.....  | 32        |
| 4.7.1 AC Power Line Conducted Emission Configuration Photograph .....              | 32        |
| 4.7.2 AC Power Line Conducted Emission Data.....                                   | 32        |
| 4.7.3 Conducted Emission Test Setup .....  | 35        |
| <b>5.0 EQUIPMENT LIST .....</b>  | <b>36</b> |

## TEST REPORT

### 1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

#### 1.1 Summary of Test Results

| Test Items  | FCC Part 15 Section           | RSS-247/<br>RSS-Gen#<br>Section | Results | Details<br>See<br>Section |
|---|-------------------------------|---------------------------------|---------|---------------------------|
| Antenna Requirement   | 15.203                        | 7.1.2#                          | Pass    | 2.1                       |
| Max. Conducted Output Power<br>(Peak)                           | 15.247(b)(3)&(4)              | 5.4(4)                          | Pass    | 4.1                       |
| Min. 6dB RF Bandwidth   | 15.247(a)(2)                  | 5.2(1)                          | Pass    | 4.2                       |
| Max. Power Density (average)                                    | 15.247(e)                     | 5.2(2)                          | Pass    | 4.3                       |
| Out of Band Antenna Conducted<br>Emission                       | 15.247(d)                     | 5.5                             | Pass    | 4.4                       |
| Radiated Emission in Restricted<br>Bands and Spurious Emissions | 15.247(d), 15.209 &<br>15.109 | 5.5                             | Pass    | 4.6                       |
| AC Power Line Conducted Emission                                | 15.207 & 15.107               | 7.2.4#                          | Pass    | 4.7                       |

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

#### 1.2 Statement of Compliance

The equipment under test is found to be complying with the following standard:

FCC Part 15, October 1, 2020 Edition

RSS-247 Issue 2, February 2017

RSS-Gen Issue 5 Amendment 2, February 2021

## TEST REPORT

### 2.0 GENERAL DESCRIPTION

#### 2.1 Product Description

The Equipment-Under-Test (EUT) M10 V2 is BluOS STREAMING AMPLIFIER. The EUT contains both WLAN (WiFi) and Bluetooth modules. The EUT can accept analog audio signal, digital audio signal and wireless audio signal via Bluetooth devices. An iOS/Android apps Bluesound installed in Smartphone can act as the remote control of the EUT. The EUT is powered by 100-120VAC, 200-240VAC 50/60Hz.

This report contains the data of Bluetooth BLE only.

Antenna Type: Internal, Integral

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

## TEST REPORT

### 2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Preliminary radiated scans and all radiated measurements were performed in radiated emission test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013) and KDB Publication No.558074 D01 v05r01 (11-February-2019) All other measurements were made in accordance with the procedures in 47 CFR Part 2 and RSS-Gen Issue 5 Amendment 2, February 2021.

### 2.3 Test Facility

The radiated emission test site and antenna port conducted measurement facility used to collect the radiated data and conductive data are at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong SAR, China. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada No.: 2042H, CABID is "HKAP01".

### 2.4 Related Submittal(s) Grants

This is a single application for certification of a transceiver (Bluetooth BLE portion)

## TEST REPORT

### 3.0 SYSTEM TEST CONFIGURATION

#### 3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by 120VAC.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attached to peripherals, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209 / RSS-247 2.5. Digital circuitries used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109 / RSS-247 Section 5.5 Limits.

## TEST REPORT

### 3.1 Justification – Cont'd

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.8.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF*. The effective period (Teff) was referred to Exhibit 4.8.3. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All relevant operation modes and data rates have been tested, and the worst-case data is included in this report.

For simultaneous transmission, both WiFi and Bluetooth portions are also switched on when taking radiated emission for determining worst-case spurious emission.

### 3.2 EUT Exercising Software

The EUT exercise program (if any) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

## TEST REPORT

### 3.3 Details of EUT and Description of Accessories

#### Details of EUT:

The EUT is powered by 120VAC.

#### Description of Accessories:

1. Speaker cable of 2m meter long with 8-ohm load termination
2. Subwoofer Output coaxial cable of 1.5m long with termination
3. Digital Input coaxial cable of 1.5m long with termination
4. Trigger Output cable of 1.5m long with termination
5. IR Input cable of 1.5m long with termination
6. 4GB USB flash drive
7. LAN cable of 1.5m long with termination
8. Analog Input 1 coaxial cable of 1.5m long with termination
9. Analog Input 2 coaxial cable of 1.5m long with termination
10. Audio Preamplifier Output coaxial cable of 1.5m long with termination
11. HDMI cable of 2m long with termination  
(Provided by Intertek)
12. Power Cable of 2m long  
(Provided by Applicant)

### 3.4 Measurement Uncertainty

Decision Rule for compliance: For FCC/IC standard, the measured value must be within the limits of applicable standard without accounting for the measurement uncertainty. For EN/IEC/HKTA/HKTC standard, conformity rules will be used as per standard directly excepted EN/IEC 61000-3-2, EN/IEC 61000-3-3, HKTA1004, HKCA1008, HKTA1019, HKTA1020, HKTA1041 and HKTA1044. For these excepted or not mentioned standards, Cl 4.2.2 of ILAC-G8:09/2019 decision rules will be reference and guard band will be equal to our measurement uncertainty with 95% confidence level (k=2). In case, the measured value is within guard band region, undetermined decision will be used. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are  $\pm 5.3\text{dB}$  and  $\pm 0.99\text{dB}$  respectively. The value of the Measurement uncertainty for conducted emission test is  $\pm 4.2\text{dB}$ .

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

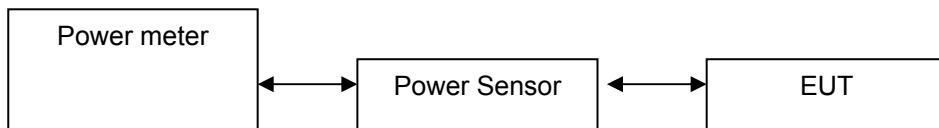
## TEST REPORT

### 4.0 TEST RESULTS

#### 4.1 Maximum Conducted (peak) Output Power at Antenna Terminals

##### RF Conduct Measurement Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



The antenna port of the EUT was connected to the input of a spectrum analyzer.

- The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals. The measurement procedure 9.1.2 was used.
- The EUT should be configured to transmit continuously (at a minimum duty cycle of 98%) at full power over the measurement duration. The measurement procedure AVG1 was used.

Bluetooth 4.0 Antenna Gain = 2.0 dBi

| Frequency (MHz)      | Output in dBm | Output in mWatt |
|----------------------|---------------|-----------------|
| Low Channel: 2402    | 1.0           | 1.3             |
| Middle Channel: 2440 | 3.4           | 2.2             |
| High Channel: 2480   | 1.4           | 1.4             |

Cable loss : 0.5 dB External Attenuation : 0 dB

Cable loss, external attenuation:  included in OFFSET function  
 added to SA raw reading

Bluetooth 4.0

max. conducted (peak) output level = 3.4 dBm

Limits:

1W (30dBm) for antennas with gains of 6dBi or less

 W ( dBm) for antennas with gains more than 6dBi

## TEST REPORT

### 4.2 Minimum 6dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. The EBW measurement procedure was used. A PEAK output reading was taken, a DISPLAY line was drawn 6dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

| Bluetooth 4.0   |                     |       |
|-----------------|---------------------|-------|
| Frequency (MHz) | 6dB Bandwidth (MHz) |       |
| Low Channel:    | 2402                | 0.708 |
| Middle Channel: | 2440                | 0.708 |
| High Channel:   | 2480                | 0.708 |

#### Limits

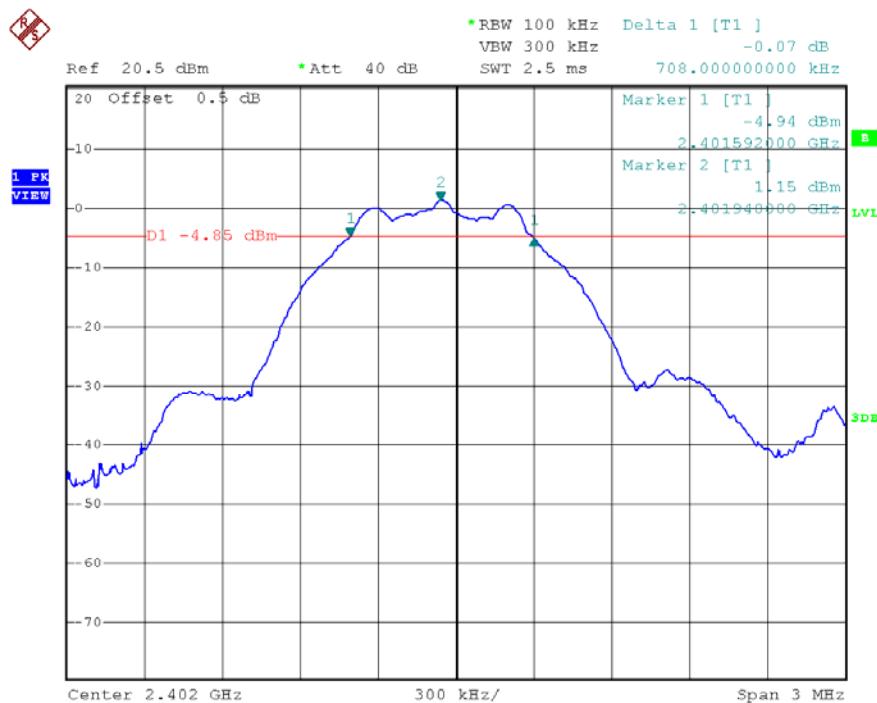
6 dB bandwidth shall be at least 500kHz

The plots of 6dB RF bandwidth are saved as below.

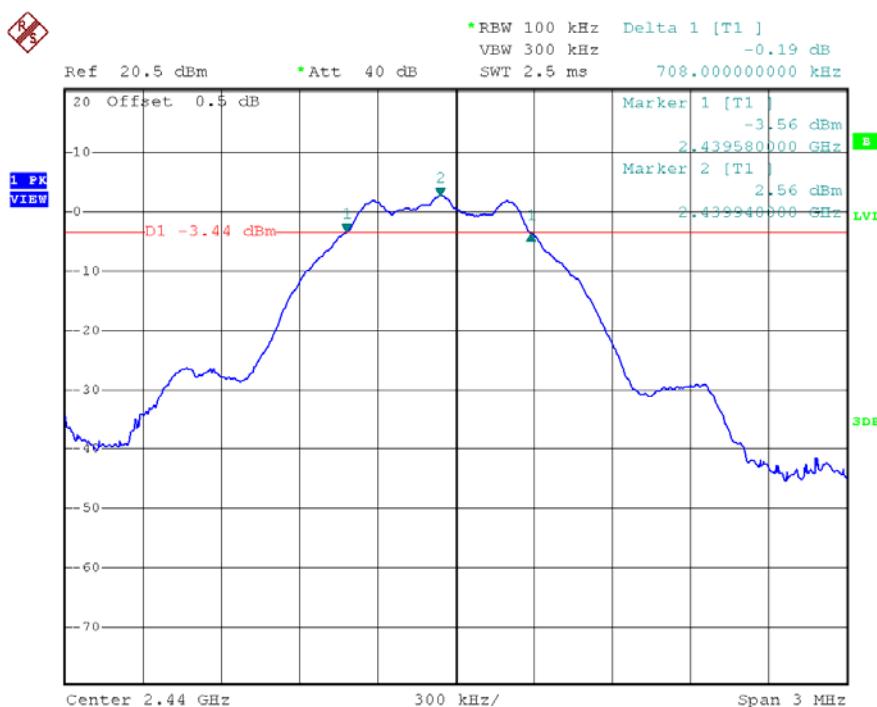
## TEST REPORT

### PLOTS OF 6dB RF BANDWIDTH

Bluetooth 4.0, Lowest Channel

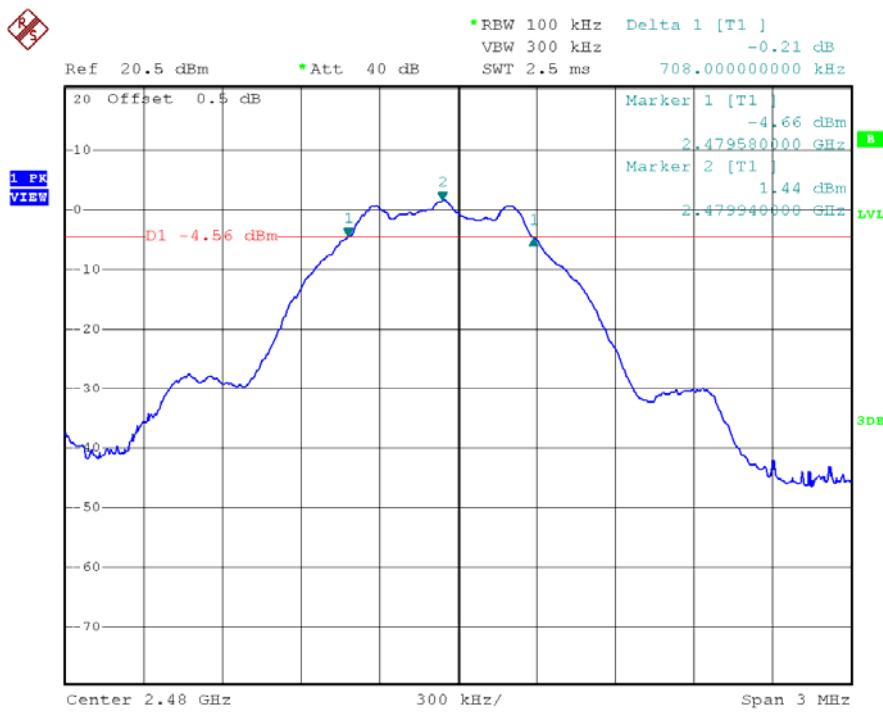


Bluetooth 4.0, Middle Channel



**TEST REPORT****PLOTS OF 6dB RF BANDWIDTH**

Bluetooth 4.0, Highest Channel



## TEST REPORT

### 4.3 Maximum Power Spectral Density

Antenna output of the EUT was coupled directly to spectrum analyzer. The measurement procedure 10.2 PKPSD was used. If an external attenuator and/or cable was used, these losses are compensated for using the OFFSET function of the analyser.

| Bluetooth 4.0        |                     |      |
|----------------------|---------------------|------|
| Frequency (MHz)      | PSD in 100kHz (dBm) |      |
| Low Channel: 2402    |                     | 1.10 |
| Middle Channel: 2440 |                     | 3.00 |
| High Channel: 2480   |                     | 1.65 |

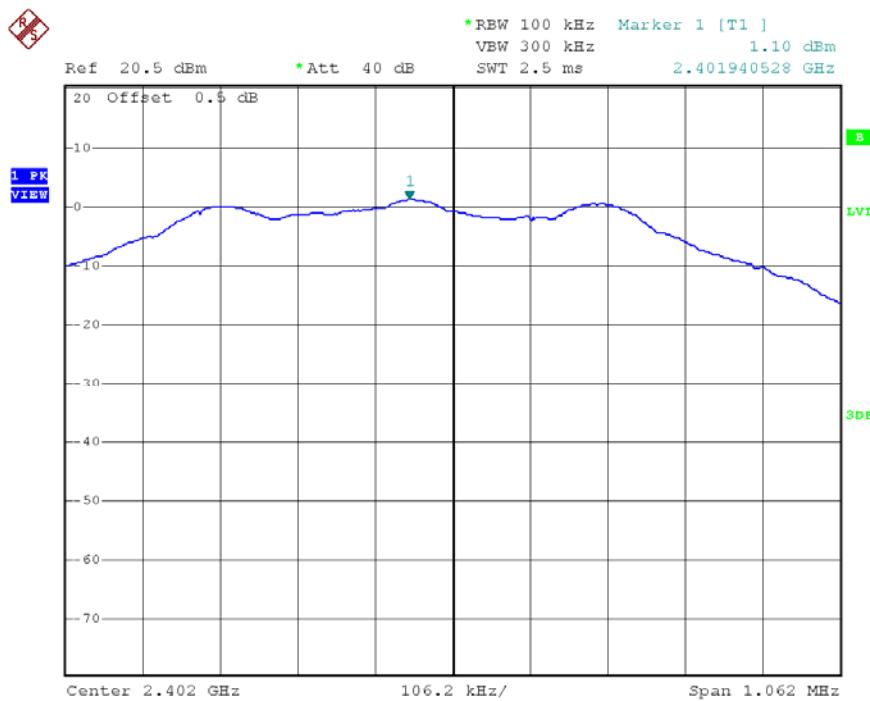
Cable Loss: 0.5 dB

Limit:  
8dBm

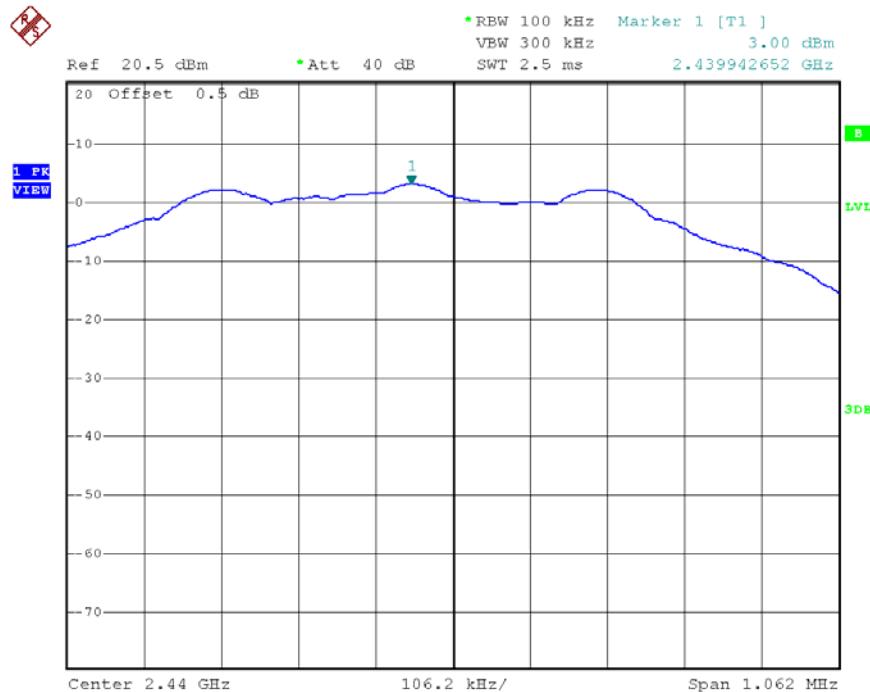
The plots of power spectral density are as below.

**TEST REPORT****PLOTS OF POWER SPECTRAL DENSITY**

Bluetooth 4.0, Lowest channel

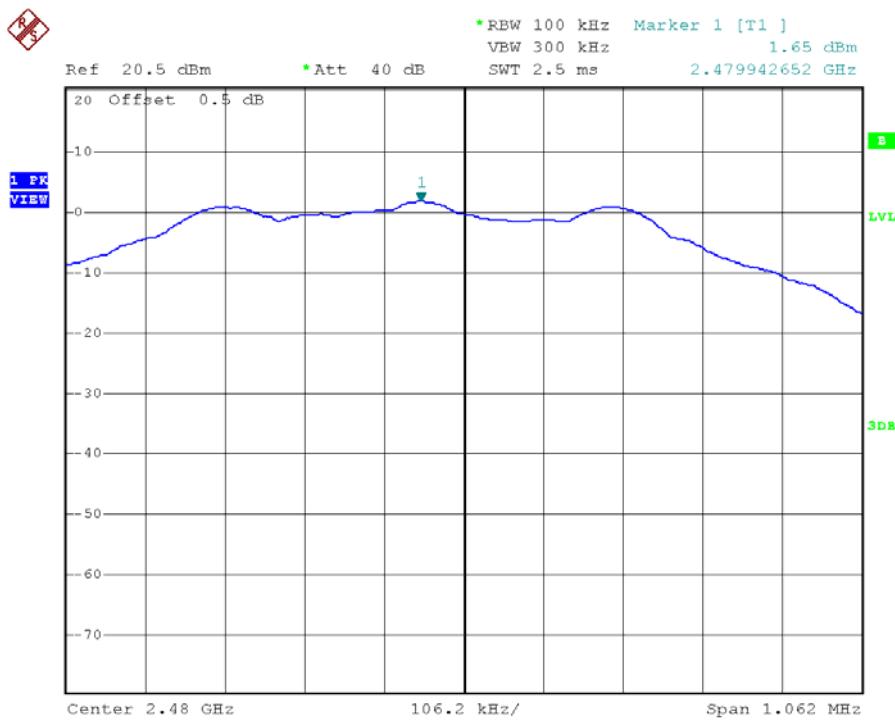


Bluetooth 4.0, Middle channel



**TEST REPORT****PLOTS OF POWER SPECTRAL DENSITY**

Bluetooth 4.0, Highest channel



## TEST REPORT

### 4.4 Out of Band Conducted Emissions

For Bluetooth 4.0, the maximum conducted (peak) output power was used to demonstrate compliance as described in 9.1. Then the display line (in red) shown in the following plots denotes the limit at 20dB below maximum measured in-band peak PSD level in 100 KHz bandwidth for Bluetooth 4.0.

The measurement procedures under sections 11 of KDB558074 D01 v05r01 (11-February-2019) were used.

Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

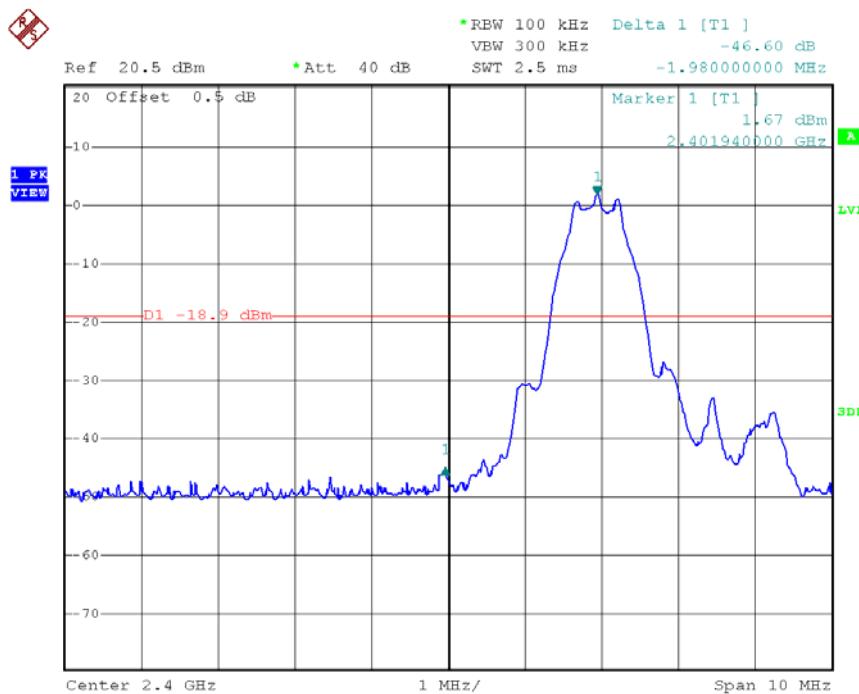
Limits:

All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the maximum measured in-band peak PSD level.

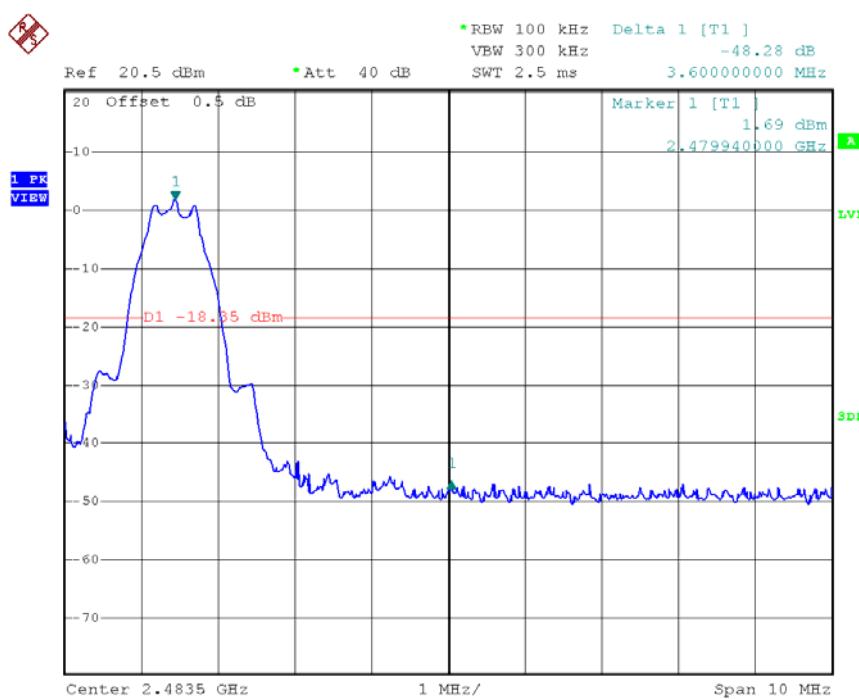
## TEST REPORT

### PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Lowest Channel, Bandedge



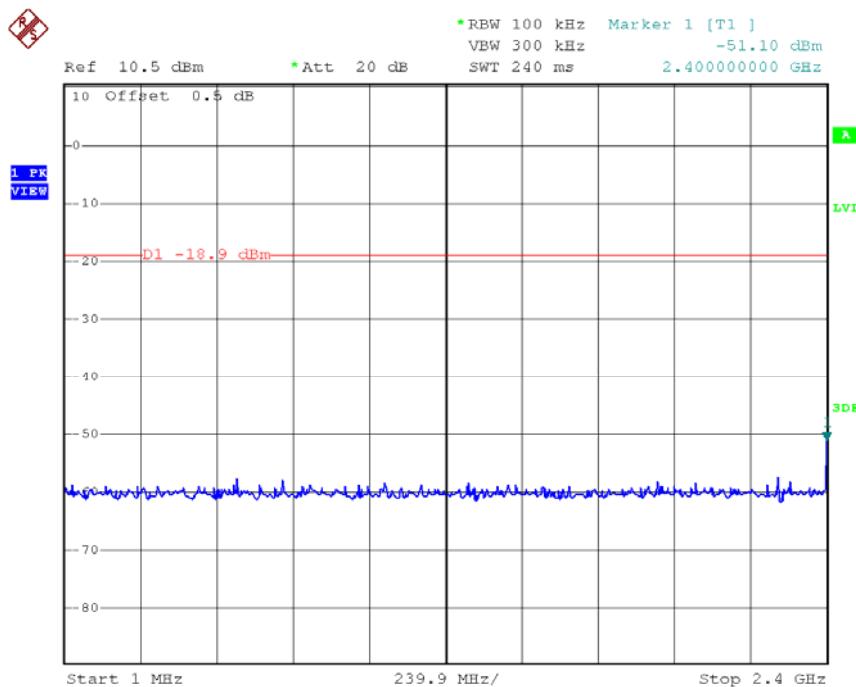
Bluetooth 4.0, Highest Channel, Bandedge



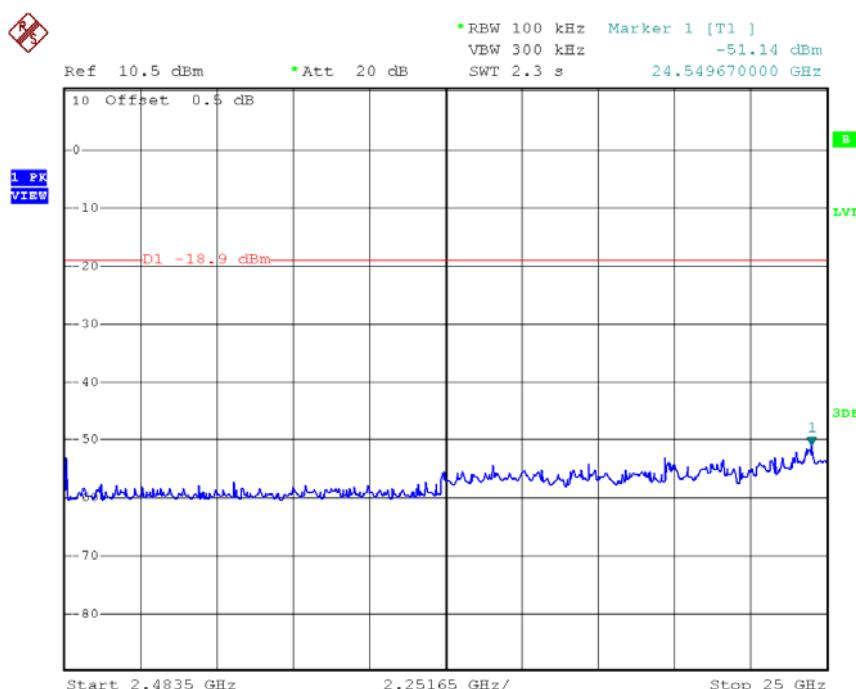
## TEST REPORT

### PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Lowest Channel, Plot A



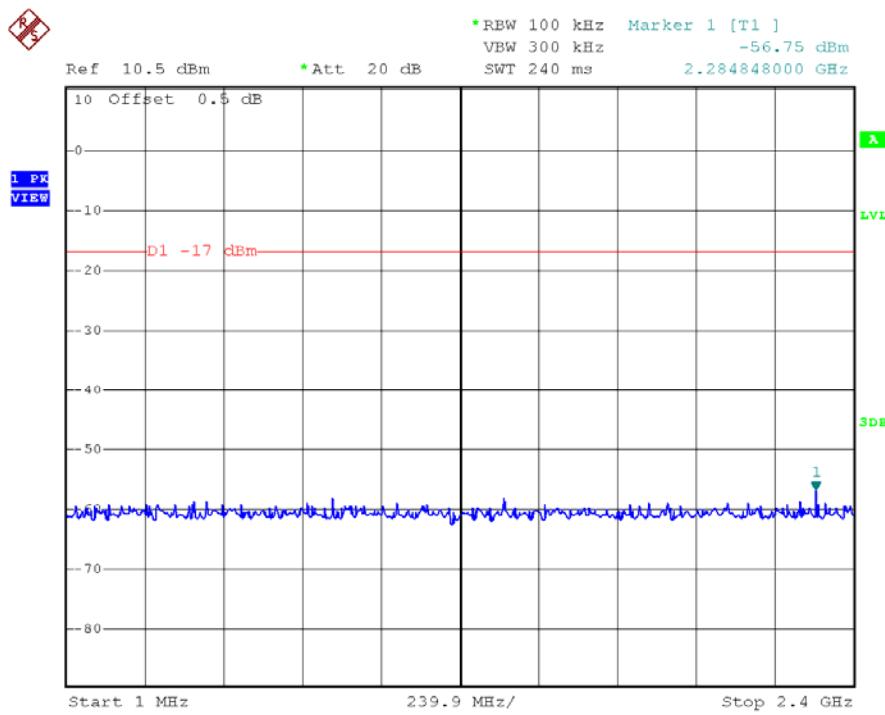
Bluetooth 4.0, Lowest Channel, Plot B



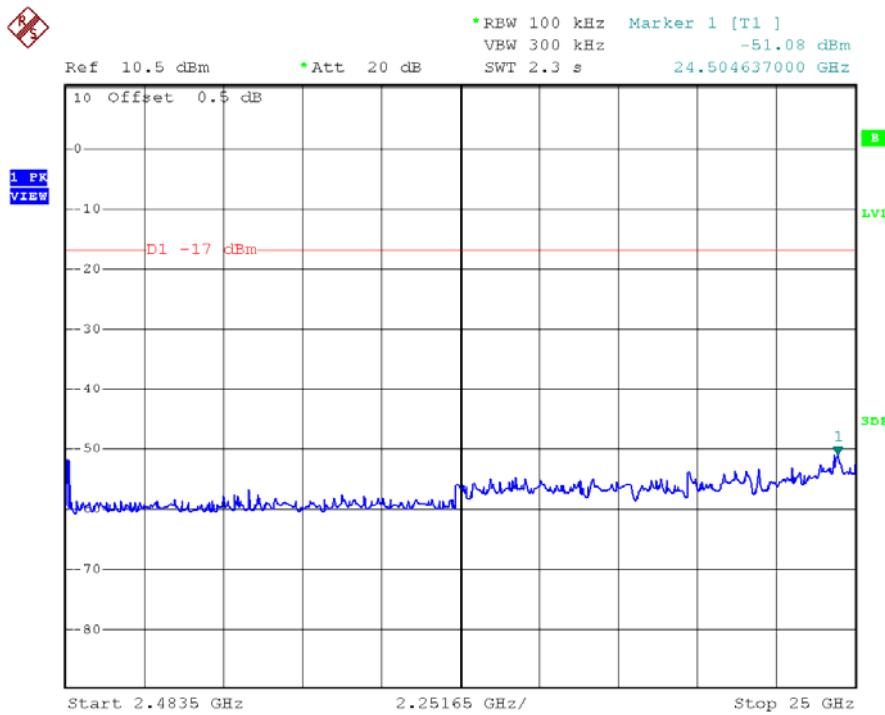
## TEST REPORT

### PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Middle Channel, Plot A



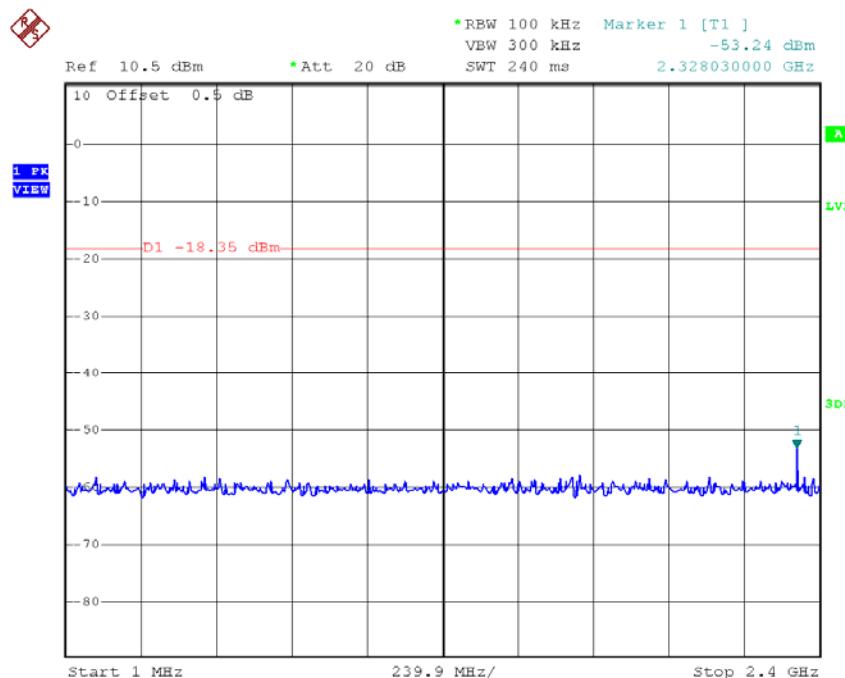
Bluetooth 4.0, Middle Channel, Plot B



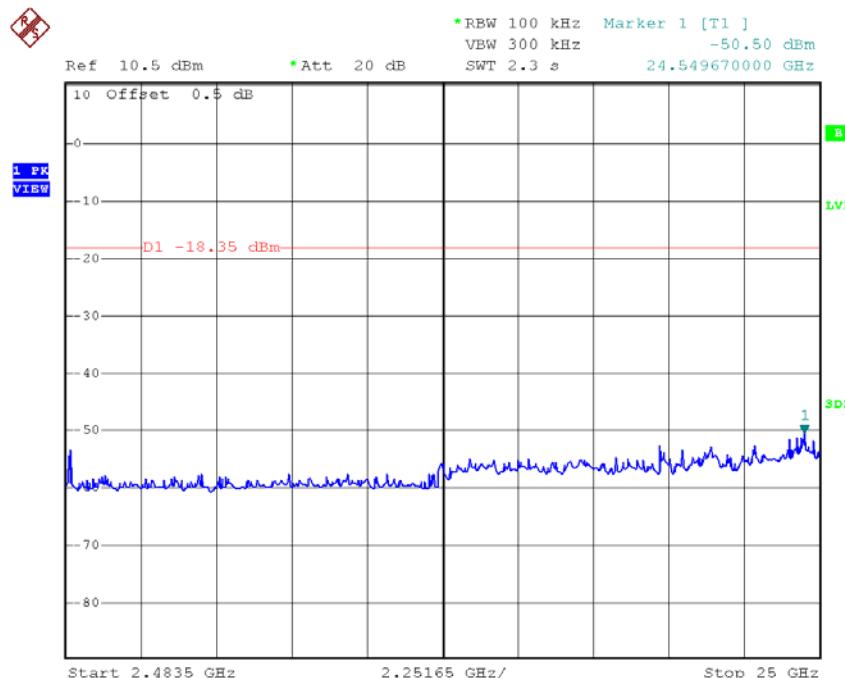
## TEST REPORT

### PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Highest Channel, Plot A



Bluetooth 4.0, Highest Channel, Plot B



## TEST REPORT

### Occupied Bandwidth Results: Bluetooth

| (Bluetooth 4.0)      | Occupied Bandwidth (MHz) |
|----------------------|--------------------------|
| Low Channel: 2402    | 1.038                    |
| Middle Channel: 2440 | 1.038                    |
| High Channel: 2480   | 1.032                    |

The worst case is shown as below



## TEST REPORT

### 4.5 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

Where FS = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$

RA = Receiver Amplitude (including preamplifier) in  $\text{dB}\mu\text{V}$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

#### Example

Assume a receiver reading of 62.0  $\text{dB}\mu\text{V}$  is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted. The pulse desensitization factor of the spectrum analyzer is 0.0 dB, and the resultant average factor is -10.0 dB. The net field strength for comparison to the appropriate emission limit is 32.0  $\text{dB}\mu\text{V}/\text{m}$ . This value in  $\text{dB}\mu\text{V}/\text{m}$  is converted to its corresponding level in  $\mu\text{V}/\text{m}$ .

RA = 62.0  $\text{dB}\mu\text{V}$

AF = 7.4 dB

CF = 1.6 dB

AG = 29.0 dB

PD = 0.0 dB

AV = -10 dB

$$FS = 62.0 + 7.4 + 1.6 - 29.0 + 0.0 + (-10.0) = 32.0 \text{ dB}\mu\text{V}/\text{m}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(32.0 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

## TEST REPORT

### 4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

#### 4.6.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission  
at

749.982 MHz

The worst-case radiated emission configuration photographs are saved with filename: config photos.pdf

#### 4.6.2 Radiated Emission Data

The data in tables 1-4 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 2.2 dB margin

## TEST REPORT

### RADIATED EMISSION DATA

Mode: TX-Channel 01

Table 1  
 Bluetooth 4.0

| Polarization | Frequency (MHz) | Reading (dB $\mu$ V) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (Average) (dB $\mu$ V/m) | Average Limit at 3m (dB $\mu$ V/m) | Margin (dB) |
|--------------|-----------------|----------------------|-------------------|---------------------|------------------------------------|------------------------------------|-------------|
| V            | 2390.000        | 43.0                 | 33                | 29.4                | 39.4                               | 54.0                               | -14.6       |
| V            | 4804.000        | 34.5                 | 33                | 34.9                | 36.4                               | 54.0                               | -17.6       |
| H            | 12010.000       | 23.3                 | 33                | 40.5                | 30.8                               | 54.0                               | -23.2       |

| Polarization | Frequency (MHz) | Reading (dB $\mu$ V) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m - Peak (dB $\mu$ V/m) | Peak Limit at 3m (dB $\mu$ V/m) | Margin (dB) |
|--------------|-----------------|----------------------|-------------------|---------------------|---------------------------------|---------------------------------|-------------|
| V            | 2390.000        | 56.0                 | 33                | 29.4                | 52.4                            | 74.0                            | -21.6       |
| V            | 4804.000        | 45.7                 | 33                | 34.9                | 47.6                            | 74.0                            | -26.4       |
| H            | 12010.000       | 30.9                 | 33                | 40.5                | 38.4                            | 74.0                            | -35.6       |

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is applied according to ANSI C63.10.
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

## TEST REPORT

Mode: TX-Channel 19

 Table 2  
 Bluetooth 4.0

| Polari-zation | Frequency (MHz) | Reading (dB $\mu$ V) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (Average) (dB $\mu$ V/m) | Average Limit at 3m (dB $\mu$ V/m) | Margin (dB) |
|---------------|-----------------|----------------------|-------------------|---------------------|------------------------------------|------------------------------------|-------------|
| V             | 4880.000        | 40.3                 | 33                | 34.9                | 42.2                               | 54.0                               | -11.8       |
| H             | 7320.000        | 24.9                 | 33                | 37.9                | 29.8                               | 54.0                               | -24.2       |
| H             | 12200.000       | 21.9                 | 33                | 40.5                | 29.4                               | 54.0                               | -24.6       |

| Polari-zation | Frequency (MHz) | Reading (dB $\mu$ V) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m - Peak (dB $\mu$ V/m) | Peak Limit at 3m (dB $\mu$ V/m) | Margin (dB) |
|---------------|-----------------|----------------------|-------------------|---------------------|---------------------------------|---------------------------------|-------------|
| V             | 4880.000        | 50.7                 | 33                | 34.9                | 52.6                            | 74.0                            | -21.4       |
| H             | 7320.000        | 33.6                 | 33                | 37.9                | 38.5                            | 74.0                            | -35.5       |
| H             | 12200.000       | 31.3                 | 33                | 40.5                | 38.8                            | 74.0                            | -35.2       |

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is applied according to ANSI C63.10
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

## TEST REPORT

Mode: TX-Channel 39

 Table 3  
 Bluetooth 4.0

| Polari-zation | Frequency (MHz) | Reading (dB $\mu$ V) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (Average) (dB $\mu$ V/m) | Average Limit at 3m (dB $\mu$ V/m) | Margin (dB) |
|---------------|-----------------|----------------------|-------------------|---------------------|------------------------------------|------------------------------------|-------------|
| V             | 2483.500        | 44.1                 | 33                | 29.4                | 40.5                               | 54.0                               | -13.5       |
| V             | 4960.000        | 37.7                 | 33                | 34.9                | 39.6                               | 54.0                               | -14.4       |
| H             | 7440.000        | 25.5                 | 33                | 37.9                | 30.4                               | 54.0                               | -23.6       |
| H             | 12400.000       | 22.9                 | 33                | 40.5                | 30.4                               | 54.0                               | -23.6       |

| Polari-zation | Frequency (MHz) | Reading (dB $\mu$ V) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m - Peak (dB $\mu$ V/m) | Peak Limit at 3m (dB $\mu$ V/m) | Margin (dB) |
|---------------|-----------------|----------------------|-------------------|---------------------|---------------------------------|---------------------------------|-------------|
| V             | 2483.500        | 59.1                 | 33                | 29.4                | 55.5                            | 74.0                            | -18.5       |
| V             | 4960.000        | 48.9                 | 33                | 34.9                | 50.8                            | 74.0                            | -23.2       |
| H             | 7440.000        | 33.5                 | 33                | 37.9                | 38.4                            | 74.0                            | -35.6       |
| H             | 12400.000       | 30.7                 | 33                | 40.5                | 38.2                            | 74.0                            | -35.8       |

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is applied according to ANSI C63.10
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

## TEST REPORT

Mode: Bluetooth and WiFi Operating

Table 4

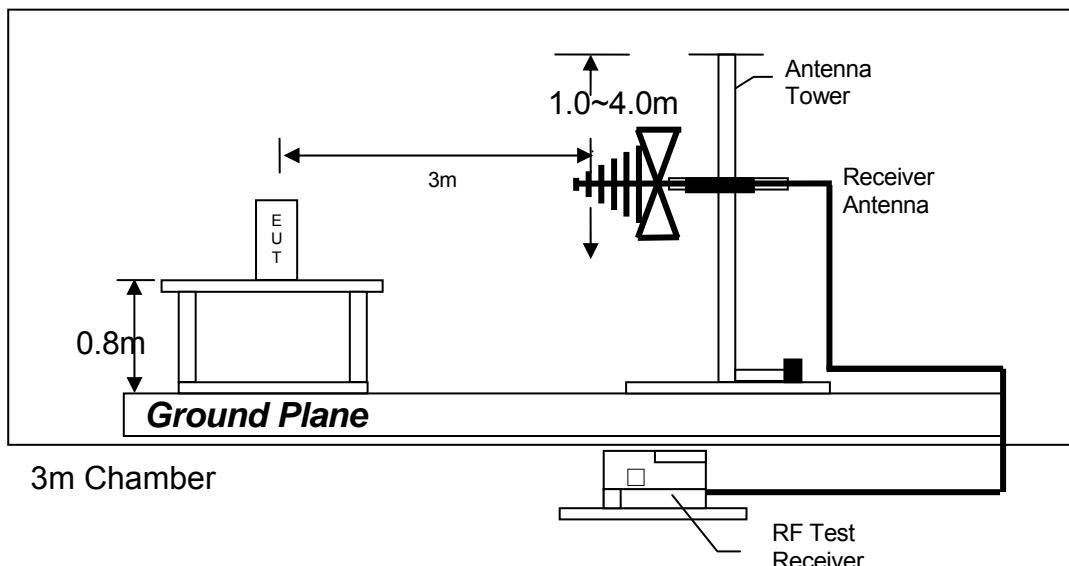
| Polarization | Frequency (MHz) | Reading (dB $\mu$ V) | Pre-amp (dB) | Antenna Factor (dB) | Net at 3m (dB $\mu$ V/m) | Limit at 3m (dB $\mu$ V/m) | Margin (dB) |
|--------------|-----------------|----------------------|--------------|---------------------|--------------------------|----------------------------|-------------|
| V            | 78.974          | 38.8                 | 16           | 6.0                 | 28.8                     | 40.0                       | -11.2       |
| V            | 124.994         | 37.4                 | 16           | 14.0                | 35.4                     | 43.5                       | -8.1        |
| H            | 607.514         | 29.2                 | 16           | 29.0                | 42.2                     | 46.0                       | -3.8        |
| H            | 668.260         | 28.8                 | 16           | 29.0                | 41.8                     | 46.0                       | -4.2        |
| H            | 749.982         | 29.8                 | 16           | 30.0                | 43.8                     | 46.0                       | -2.2        |
| H            | 874.992         | 24.6                 | 16           | 32.0                | 40.6                     | 46.0                       | -5.4        |

NOTES:

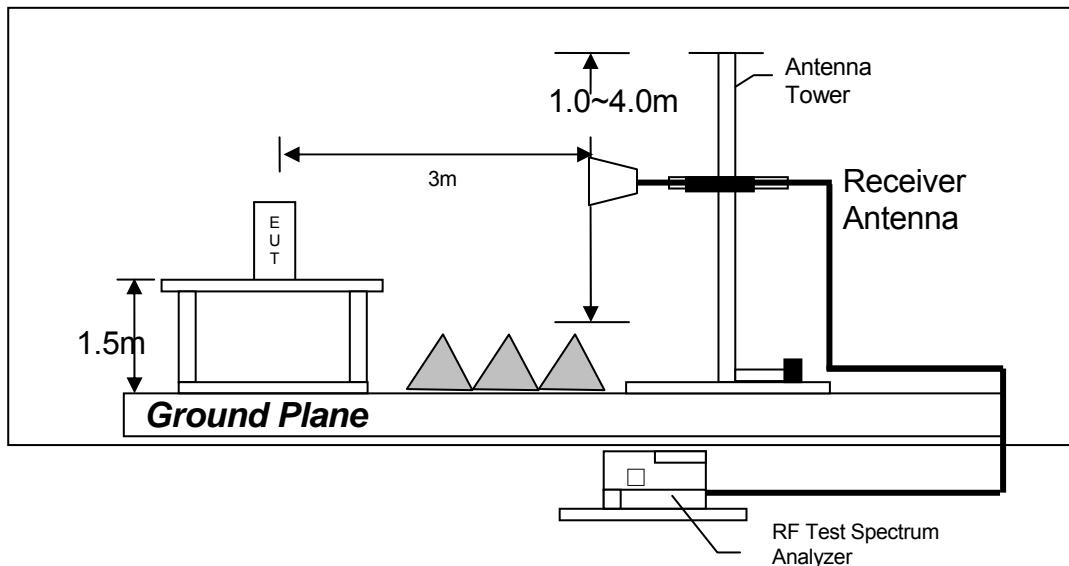
1. Quasi-Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

**TEST REPORT****4.6.3 Radiated Emission Test Setup**

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

## TEST REPORT

### 4.6.4 Transmitter Duty Cycle Calculation

Not applicable – No average factor is required.

## TEST REPORT

### 4.7 AC Power Line Conducted Emission

- Not applicable – EUT is only powered by battery for operation.
- EUT connects to AC power line. Emission Data is listed in following pages.
- Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

#### 4.7.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration

at

0.150 MHz

The worst-case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

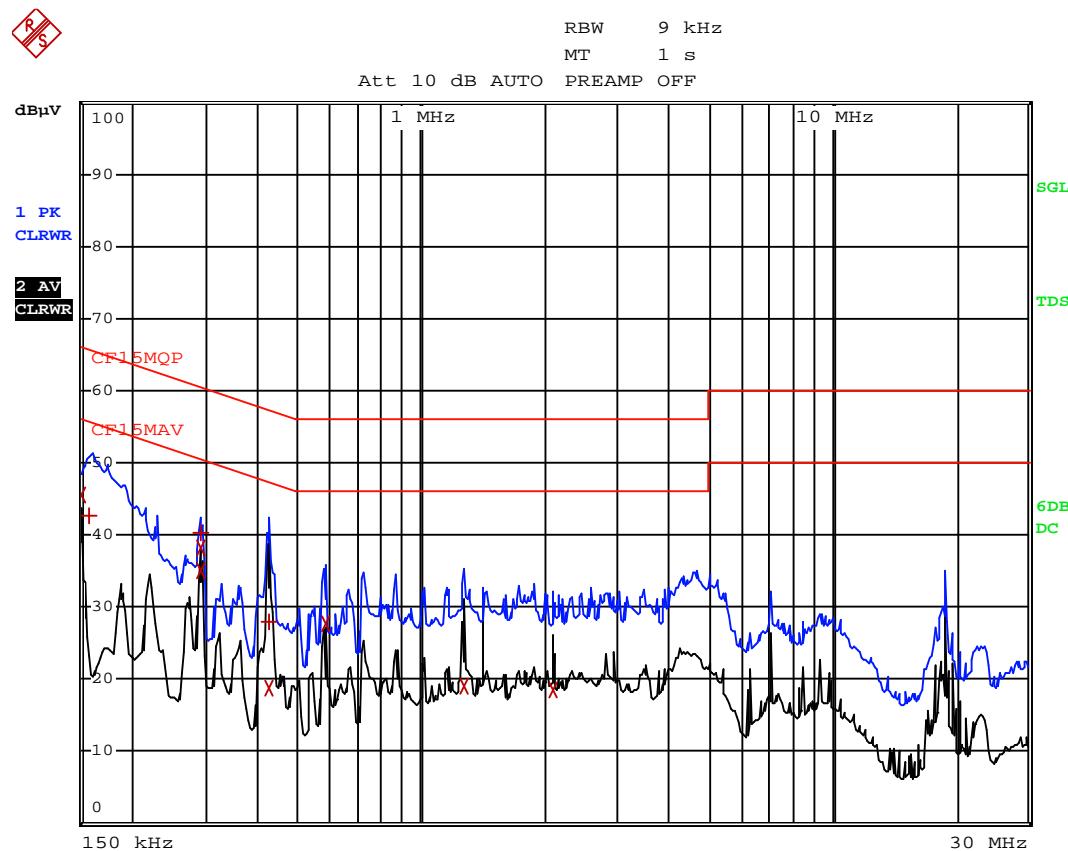
#### 4.7.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

Passed by 10.5 dB margin

**TEST REPORT****AC POWER LINE CONDUCTED EMISSION**

Worst Case: Bluetooth and WiFi Operating

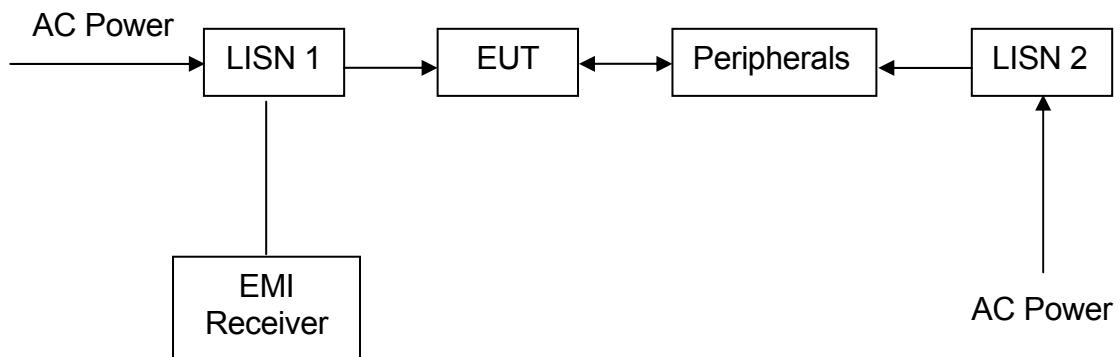


**TEST REPORT****Worst Case: Bluetooth and WiFi Operating**

| EDIT PEAK LIST (Final Measurement Results) |           |                  |        |          |
|--|-----------|------------------|--------|----------|
| TRACE                                      | FREQUENCY | LEVEL dB $\mu$ V | DELTA  | LIMIT dB |
| 2 CISPR Average                            | 150 kHz   | 45.49 N          | -10.50 |          |
| 1 Quasi Peak                               | 159 kHz   | 42.68 L1         | -22.83 |          |
| 1 Quasi Peak                               | 289.5 kHz | 40.23 N          | -20.30 |          |
| 2 CISPR Average                            | 289.5 kHz | 38.19 N          | -12.34 |          |
| 2 CISPR Average                            | 294 kHz   | 35.13 L1         | -15.27 |          |
| 1 Quasi Peak                               | 424.5 kHz | 27.92 L1         | -29.43 |          |
| 2 CISPR Average                            | 424.5 kHz | 18.89 L1         | -28.46 |          |
| 2 CISPR Average                            | 582 kHz   | 27.65 N          | -18.35 |          |
| 2 CISPR Average                            | 1.266 MHz | 19.07 L1         | -26.92 |          |
| 2 CISPR Average                            | 2.103 MHz | 18.57 N          | -27.42 |          |

## TEST REPORT

### 4.7.3 Conducted Emission Test Setup



## TEST REPORT

### 5.0 EQUIPMENT LIST

#### 1) Radiated Emissions Test

| Equipment            | EMI Test Receiver                 | Spectrum Analyzer           | Biconical Antenna<br>(20MHz to 200MHz)     |
|----------------------|-----------------------------------|-----------------------------|--|
| Registration No.     | EW-3156                           | EW-2466                     | EW-2512                                    |
| Manufacturer         | ROHDE SCHWARZ                     | ROHDE SCHWARZ               | EMCO                                       |
| Model No.            | ESR26                             | FSP30                       | 3104C                                      |
| Calibration Date     | January 25, 2021                  | November 18, 2019           | June 03, 2020                              |
| Calibration Due Date | January 25, 2022                  | August 18, 2022             | December 03, 2021                          |
| Equipment            | Log Periodic Antenna              | Double Ridged Guide Antenna | Active Loop H-field<br>(9kHz to 30MHz)     |
| Registration No.     | EW-3243                           | EW-1133                     | EW-2313                                    |
| Manufacturer         | EMCO                              | EMCO                        | ELECTROMETRI                               |
| Model No.            | 3148B                             | 3115                        | EM-6876                                    |
| Calibration Date     | June 30, 2021                     | June 03, 2021               | December 17, 2019                          |
| Calibration Due Date | December 30, 2022                 | June 03, 2022               | December 17, 2021                          |
| Equipment            | RF Preamplifier (9kHz to 6000MHz) | 2.4GHz Notch Filter         | 14m Double Shield RF Cable (20MHz to 6GHz) |
| Registration No.     | EW-3006b                          | EW-3435                     | EW-2074                                    |
| Manufacturer         | SCHWARZBECK                       | MICROWAVE                   | RADIALL                                    |
| Model No.            | BBV9718                           | N0324413                    | N(m)-RG142-BNC(m)<br>L=14M                 |
| Calibration Date     | November 25, 2019                 | November 16, 2019           | November 14, 2019                          |
| Calibration Due Date | June 25, 2022                     | June 16, 2022               | August 14, 2022                            |
| Equipment            | RF Cable 14m (1GHz to 26.5GHz)    | Pyramidal Horn Antenna      |  |
| Registration No.     | EW-2781                           | EW-0905                     |  |
| Manufacturer         | GREATBILLION                      | EMCO                        |  |
| Model No.            | SMA m/SHF5MPU /SMA<br>m ra14m,26G | 3160-09                     |  |
| Calibration Date     | November 24, 2020                 | July 20, 2021               |  |
| Calibration Due Date | November 24, 2021                 | January 20, 2023            |  |

## TEST REPORT

### 2) Conducted Emissions Test

| Equipment            | RF Cable 240cm (RG142)<br>(9kHz to 30MHz) | Artificial Mains Network | EMI Test Receiver |
|----------------------|---|--------------------------|-------------------|
| Registration No.     | EW-2454                                   | EW-3360                  | EW-2500           |
| Manufacturer         | RADIALL                                   | ROHDE SCHWARZ            | ROHDE SCHWARZ     |
| Model No.            | bnc m st / 142 /bnc m<br>ra 240cm         | ENV-216                  | ESCI              |
| Calibration Date     | November 10, 2020                         | October 20, 2020         | March 29, 2021    |
| Calibration Due Date | November 10, 2021                         | October 20, 2021         | March 29, 2022    |

### 3) Conductive Measurement Test

| Equipment            | 5m RF Cable (40GHz) | RF Power Meter with<br>Power Sensor (N1921A) | Spectrum Analyzer  |
|----------------------|---------------------|--|--------------------|
| Registration No.     | EW-2701             | EW-2270                                      | EW-2466            |
| Manufacturer         | RADIALL             | N/A  | ROHDE SCHWARZ      |
| Model No.            | sma m-m 5m 40G      | AGILENTTECH                                  | FSP30              |
| Calibration Date     | November 24, 2020   | September 03, 2020                           | September 05, 2020 |
| Calibration Due Date | November 24, 2021   | December 03, 2021                            | December 05, 2021  |

### 4) Bandedge & Bandwidth Measurement

| Equipment            | 5m RF Cable (40GHz) | Spectrum Analyzer  |
|----------------------|---------------------|--------------------|
| Registration No.     | EW-2701             | EW-2466            |
| Manufacturer         | RADIALL             | ROHDE SCHWARZ      |
| Model No.            | sma m-m 5m 40G      | FSP30              |
| Calibration Date     | November 24, 2020   | September 05, 2020 |
| Calibration Due Date | November 24, 2021   | December 05, 2021  |

**END OF TEST REPORT**