

## TEST REPORT

**Report No.: 18091162HKG-001**

Application For Original Grant of 47 CFR Part 15 Certification

This report contains the data of Bluetooth 2.1 portion only

WiseCube

**FCC ID: 2AB7X-WISECUBE**

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Date: November 06, 2018

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## TEST REPORT

### GENERAL INFORMATION

|                                    |                                                                                        |
|------------------------------------|----------------------------------------------------------------------------------------|
| <b>Grantee:</b>                    | BBPOS International Limited                                                            |
| <b>Grantee Address:</b>            | Suite 1903-04, Tower 2, Nina Tower,<br>8 Yeung Uk Road, Tsuen Wan,<br>N.T., Hong Kong. |
| <b>FCC Specification Standard:</b> | FCC Part 15, October 1, 2016 Edition                                                   |
| <b>FCC ID:</b>                     | 2AB7X-WISECUBE                                                                         |
| <b>FCC Model(s):</b>               | WiseCube                                                                               |
| <b>Type of EUT:</b>                | Transceiver                                                                            |
| <b>Description of EUT:</b>         | WiseCube                                                                               |
| <b>Serial Number:</b>              | N/A                                                                                    |
| <b>Sample Receipt Date:</b>        | September 27, 2018                                                                     |
| <b>Date of Test:</b>               | September 27, 2018 to November 02, 2018                                                |
| <b>Report Date:</b>                | November 06, 2018                                                                      |
| <b>Environmental Conditions:</b>   | Temperature: +10 to 40°C<br>Humidity: 10 to 90%                                        |

## TEST REPORT

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### 1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

#### 1.1 Summary of Test Results

| Test Items                            | FCC Part 15 Section   | Results | Details See Section |
|---------------------------------------|-----------------------|---------|---------------------|
| Antenna Requirement                   | 15.203                | Pass    | 2.1                 |
| Security Code Information             | 15.214(d)             | Pass    | 2.1                 |
| Radiated Emission                     | 15.249(a), 209, & 109 | Pass    | 4.2                 |
| Radiated Emission on the Bandedge     | 15.249(d)             | Pass    | 4.3                 |
| Radiated Emission in Restricted Bands | 15.205                | Pass    | 4.2                 |
| AC Power Line Conducted Emission      | 15.207 & 15.107       | Pass    | 4.4                 |

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 standards:

FCC Part 15, October 1, 2016 Edition

## TEST REPORT

### 2.0 GENERAL DESCRIPTION

#### 2.1 Product Description

The Equipment Under Test (EUT) is an RFID card reader that can support Bluetooth function. Bluetooth 2.1 is operating at the frequency range of 2402-2480MHz with 1 MHz channel spacing. The EUT is powered by 3.7V internal battery or 5.0V through type-C connector.

The Bluetooth antenna used in base unit is integral, and the test sample is a prototype.

The circuit description is saved with filename: descri.pdf.

#### 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.

#### 2.3 Test Facility

The radiated emission test sites and conducted measurement facility used to collect the radiated data and conducted 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. This test facility and site measurement data have been fully placed on file with the FCC.

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### 3.0 SYSTEM TEST CONFIGURATION

#### 3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit continuously mode 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 is powered by fully charge 3.7V internal battery or 5.0V through type-C connector.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable which is four feet in diameter and approximately 0.8m in height above the ground plane for emission measurement at or below 1GHz and 1.5m in height above the ground plane for emission measurement above 1GHz. If the EUT attached to peripherals, they were connected and operational to simulate typical use.

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.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz. The resolution bandwidth was 2 MHz for frequencies above 1000 MHz.

Radiated emission measurement for transmitter was 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. Digital circuitry used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109 Limits.

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### 3.1 Justification - Cont'd

Detector function for radiated emissions is in peak mode. Average readings, when required, are 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 4.2.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF*. The effective period (Teff) was 625 $\mu$ s. 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 have been tested, and the worst case data was included in this report.

### 3.2 EUT Exercising Software

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

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### 3.3 Radiated Emission Test Setup

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

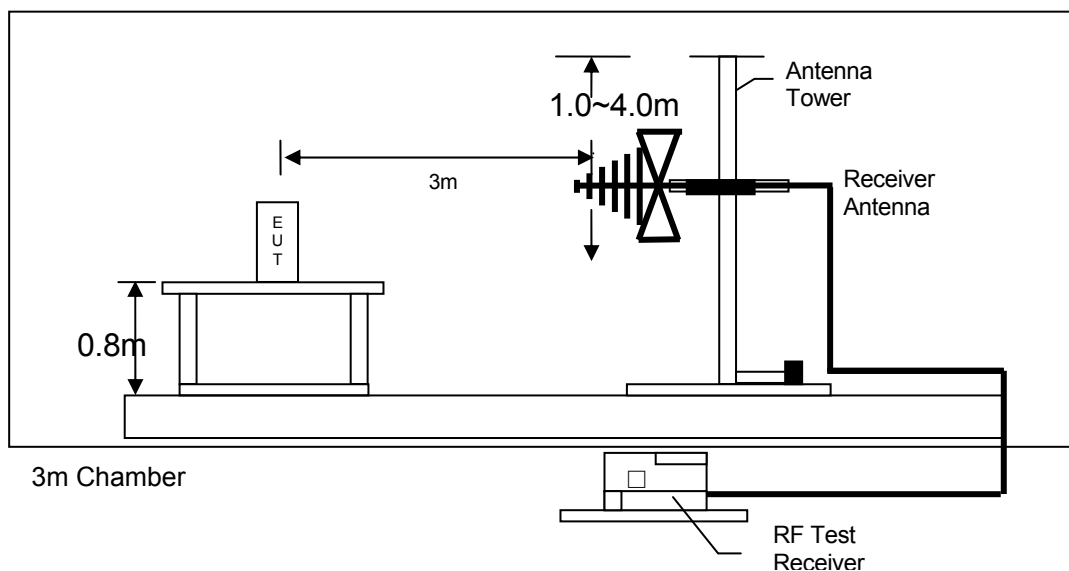


Figure 3.3.1 Test setup of radiated emissions up to 1GHz

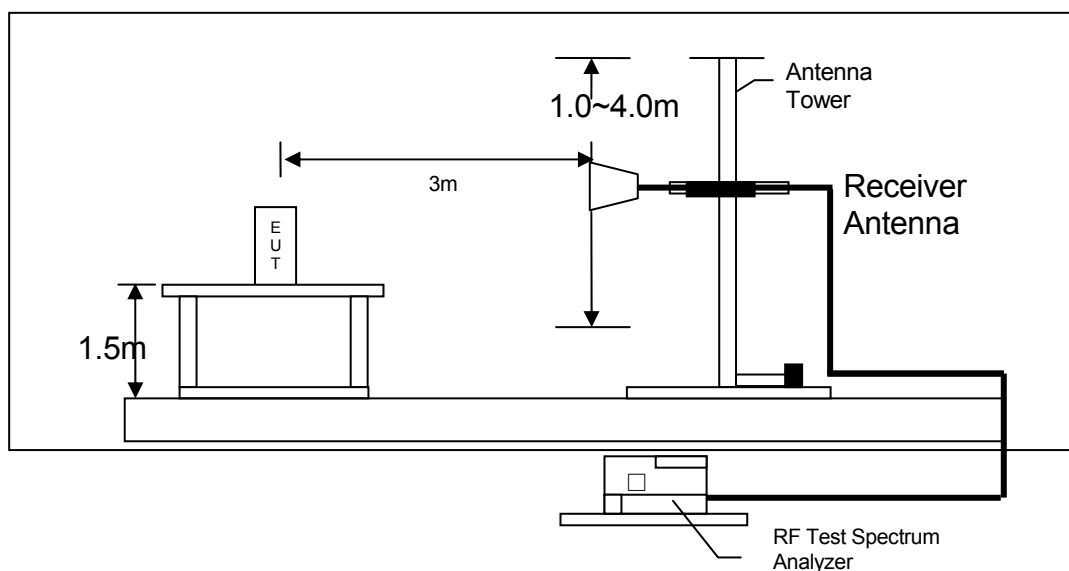


Figure 3.3.2 Test setup of radiated emissions above 1GHz

## TEST REPORT

### 3.4 Conducted Emission Test Setup

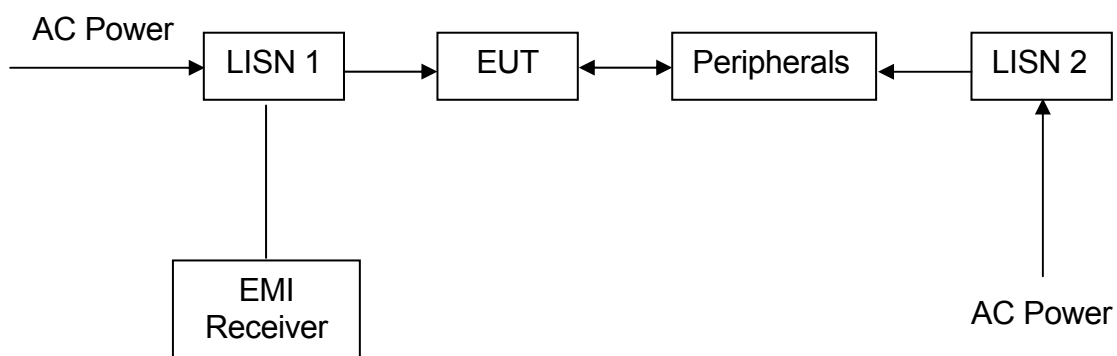


Figure 3.4.1

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### 3.5 Details of EUT and Description of Accessories

#### Details of EUT:

The EUT is powered by 3.7V internal battery or 5.0V through type-C connector.

#### Description of Accessories:

- (1) 0.31m USB to type-C cable (Supplied by Client)
- (2) Adaptor (Brand: Apple, Model: A1399)(Supplied by Intertek)
- (3) Notebook (Model: HP Probook 430 G1) (Supplied by Intertek)
- (4) Adaptor of notebook (Model: PPP009L-E) (Supplied by Intertek)
- (5) Mobile phone (Brand: Samsung, Model: SM-G9287)(Supplied by Client)

### 3.6 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered. The values of the Measurement uncertainty for radiated emission test, AC line conducted emission test and RF conducted test, frequency stability and timing jitter are  $\pm 5.3\text{dB}$ ,  $\pm 4.2\text{dB}$ ,  $\pm 1\text{dB}$ ,  $\pm 23\text{Hz}$ ,  $0.1\mu\text{s}$  respectively.

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.

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### 4.0 TEST RESULTS

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.

#### 4.1 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 dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ 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 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$\begin{aligned} RA &= 62.0 \text{ dB}\mu\text{V} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29 \text{ dB} \\ PD &= 0 \text{ dB} \\ AV &= -10 \text{ dB} \\ FS &= 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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### 4.2 Radiated Emissions

#### 4.2.1 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at

232.279 MHz

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

#### 4.2.2 Radiated Emission Data

The data in tables 1-4 list the significant emission frequencies, the limit and the margin of compliance. Test setup is shown in section 3.3 Figure 3.3.1 and 3.3.2.

Judgement -

Passed by 11.2 dB margin

## TEST REPORT

### RADIATED EMISSION DATA

Lowest Channel

Table 1

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m - Average (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|------------------------------|------------------------------|-------------|
| H            | 2402.000        | 64.1           | 33                | 29.4                | 60.5                         | 94.0                         | -33.5       |
| H            | 4804.000        | 17.7           | 33                | 34.9                | 19.6                         | 54.0                         | -34.4       |
| V            | 7206.000        | 19.4           | 33                | 37.9                | 24.3                         | 54.0                         | -29.7       |
| H            | 9608.000        | 15.4           | 33                | 40.4                | 22.8                         | 54.0                         | -31.2       |
| H            | 12010.000       | 18.4           | 33                | 40.5                | 25.9                         | 54.0                         | -28.1       |
| H            | 14412.000       | 20.1           | 33                | 40.0                | 27.1                         | 54.0                         | -26.9       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m - Peak (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|---------------------------|---------------------------|-------------|
| H            | 2402.000        | 89.4           | 33                | 29.4                | 85.8                      | 114.0                     | -28.2       |
| H            | 4804.000        | 42.5           | 33                | 34.9                | 44.4                      | 74.0                      | -29.6       |
| V            | 7206.000        | 44.9           | 33                | 37.9                | 49.8                      | 74.0                      | -24.2       |
| H            | 9608.000        | 40.6           | 33                | 40.4                | 48.0                      | 74.0                      | -26.0       |
| H            | 12010.000       | 43.6           | 33                | 40.5                | 51.1                      | 74.0                      | -22.9       |
| H            | 14412.000       | 45.5           | 33                | 40.0                | 52.5                      | 74.0                      | -21.5       |

- NOTES: 1. Peak detector and average detector are used for the emission measurement according to ANSI C63.10.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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Middle Channel

Table 2

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m - Average (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|------------------------------|------------------------------|-------------|
| H            | 2441.000        | 63.8           | 33                | 29.4                | 60.2                         | 94.0                         | -33.8       |
| H            | 4882.000        | 17.9           | 33                | 34.9                | 19.8                         | 54.0                         | -34.2       |
| V            | 7323.000        | 19.0           | 33                | 37.9                | 23.9                         | 54.0                         | -30.1       |
| H            | 9764.000        | 15.5           | 33                | 40.4                | 22.9                         | 54.0                         | -31.1       |
| H            | 12205.000       | 18.7           | 33                | 40.5                | 26.2                         | 54.0                         | -27.8       |
| H            | 14646.000       | 21.9           | 33                | 38.4                | 27.3                         | 54.0                         | -26.7       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m - Peak (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|---------------------------|---------------------------|-------------|
| H            | 2441.000        | 89.2           | 33                | 29.4                | 85.6                      | 114.0                     | -28.4       |
| H            | 4882.000        | 42.6           | 33                | 34.9                | 44.5                      | 74.0                      | -29.5       |
| V            | 7323.000        | 44.3           | 33                | 37.9                | 49.2                      | 74.0                      | -24.8       |
| H            | 9764.000        | 40.8           | 33                | 40.4                | 48.2                      | 74.0                      | -25.8       |
| H            | 12205.000       | 43.9           | 33                | 40.5                | 51.4                      | 74.0                      | -22.6       |
| H            | 14646.000       | 47.0           | 33                | 38.4                | 52.4                      | 74.0                      | -21.6       |

- NOTES: 1. Peak detector and average detector are used for the emission measurement according to ANSI C63.10.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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Highest Channel

Table 3

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | 3m - Average (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|-----------------------|------------------------------|-------------|
| H            | 2480.000        | 64.5           | 33                | 29.4                | 60.9                  | 94.0                         | -33.1       |
| H            | 4960.000        | 18.2           | 33                | 34.9                | 20.1                  | 54.0                         | -33.9       |
| V            | 7440.000        | 19.1           | 33                | 37.9                | 24.0                  | 54.0                         | -30.0       |
| H            | 9920.000        | 15.4           | 33                | 40.4                | 22.8                  | 54.0                         | -31.2       |
| H            | 12400.000       | 18.0           | 33                | 40.5                | 25.5                  | 54.0                         | -28.5       |
| H            | 14880.000       | 22.6           | 33                | 38.4                | 28.0                  | 54.0                         | -26.0       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m - Peak (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|---------------------------|---------------------------|-------------|
| H            | 2480.000        | 89.7           | 33                | 29.4                | 86.1                      | 114.0                     | -27.9       |
| H            | 4960.000        | 42.9           | 33                | 34.9                | 44.8                      | 74.0                      | -29.2       |
| V            | 7440.000        | 44.6           | 33                | 37.9                | 49.5                      | 74.0                      | -24.5       |
| H            | 9920.000        | 40.7           | 33                | 40.4                | 48.1                      | 74.0                      | -25.9       |
| H            | 12400.000       | 43.8           | 33                | 40.5                | 51.3                      | 74.0                      | -22.7       |
| H            | 14880.000       | 47.3           | 33                | 38.4                | 52.7                      | 74.0                      | -21.3       |

- NOTES: 1. Peak detector and average detector are used for the emission measurement according to ANSI C63.10.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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Mode: Bluetooth TX and charging by PC

Table 4

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-amp (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|--------------|---------------------|--------------------|----------------------|-------------|
| V            | 40.661          | 28.2           | 16           | 10.0                | 22.2               | 40.0                 | -17.8       |
| V            | 54.250          | 26.0           | 16           | 11.0                | 21.0               | 40.0                 | -19.0       |
| H            | 67.809          | 24.6           | 16           | 8.0                 | 16.6               | 40.0                 | -23.4       |
| V            | 81.367          | 30.0           | 16           | 7.0                 | 21.0               | 40.0                 | -19.0       |
| V            | 94.956          | 19.9           | 16           | 11.0                | 14.9               | 43.5                 | -28.6       |
| H            | 108.484         | 23.6           | 16           | 14.0                | 21.6               | 43.5                 | -21.9       |
| H            | 122.073         | 19.4           | 16           | 14.0                | 17.4               | 43.5                 | -26.1       |
| H            | 135.602         | 27.6           | 16           | 14.0                | 25.6               | 43.5                 | -17.9       |
| H            | 151.354         | 28.6           | 16           | 15.0                | 27.6               | 43.5                 | -15.9       |
| H            | 165.948         | 30.2           | 16           | 17.0                | 31.2               | 43.5                 | -12.3       |
| H            | 199.830         | 27.7           | 16           | 16.0                | 27.7               | 43.5                 | -15.8       |
| H            | 232.279         | 32.8           | 16           | 18.0                | 34.8               | 46.0                 | -11.2       |
| H            | 265.490         | 24.0           | 16           | 21.0                | 29.0               | 46.0                 | -17.0       |
| H            | 345.013         | 24.9           | 16           | 24.0                | 32.9               | 46.0                 | -13.1       |

- NOTES:
1. Peak Detector Data is used for the emission measurement.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna is used for the emission over 1000MHz.
  5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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### 4.3 Radiated Emission on the Bandedge

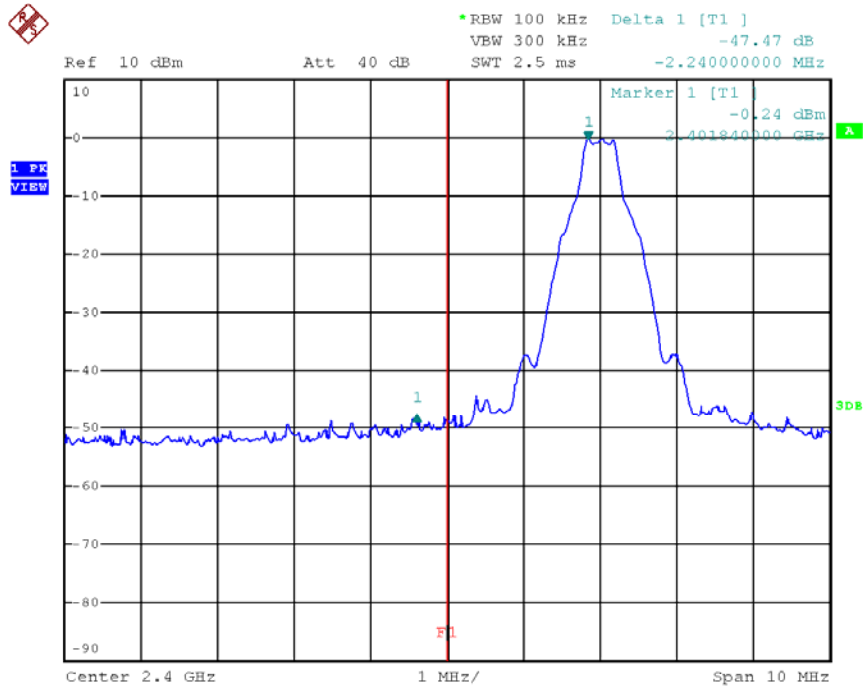
From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.10 (2013) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in FCC Part 15 Section 15.209, whichever is the lesser attenuation, which meet the requirement of FCC Part 15 Section 15.249(d).

The plots of radiated emission on the bandedge are saved as below.

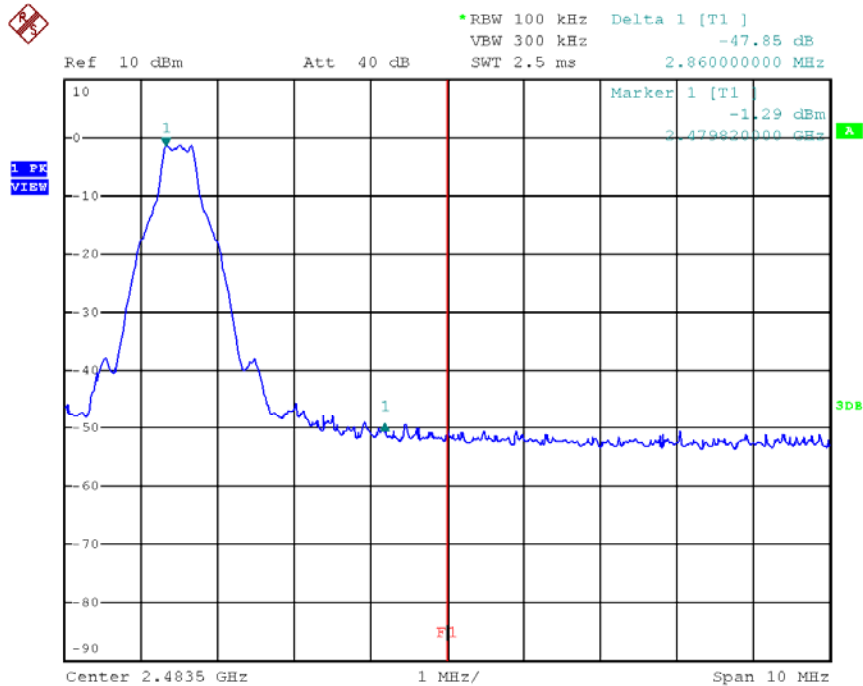
## TEST REPORT

### LOWEST CHANNEL



Date: 4.OCT.2018 03:27:34

### HIGHEST CHANNEL



Date: 4.OCT.2018 03:30:46

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### Peak Measurement

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 85.80 \text{ dB}\mu\text{V/m} - 47.47 \text{ dB} \\ &= 38.33 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 60.50 \text{ dB}\mu\text{V/m} - 47.47 \text{ dB} \\ &= 13.03 \text{ dB}\mu\text{V/m} \end{aligned}$$

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

$$\begin{aligned} &= 86.10 \text{ dB}\mu\text{V/m} - 47.85 \text{ dB} \\ &= 38.25 \text{ dB}\mu\text{V/m} \end{aligned}$$

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

$$\begin{aligned} &= 60.90 \text{ dB}\mu\text{V/m} - 47.85 \text{ dB} \\ &= 13.05 \text{ dB}\mu\text{V/m} \end{aligned}$$

The resultant field strength meets the general radiated emission limit in Section 15.209, which does not exceed 74 dB $\mu$ V/m (Peak Limit) and 54 dB $\mu$ V/m (Average Limit).

## TEST REPORT

### 4.4 AC Power Line Conducted Emission

- [ ] Not applicable – EUT is only powered by battery for operation.
- [x] 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.

Test setup is shown in section 3.4 Figure 3.4.1.

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

Worst Case Line-Conducted Configuration  
at

0.8025 MHz

The worst case line conducted configuration photographs are saved with filename: config photos.pdf.

#### 4.4.2 AC Power Line Conducted Emission Data

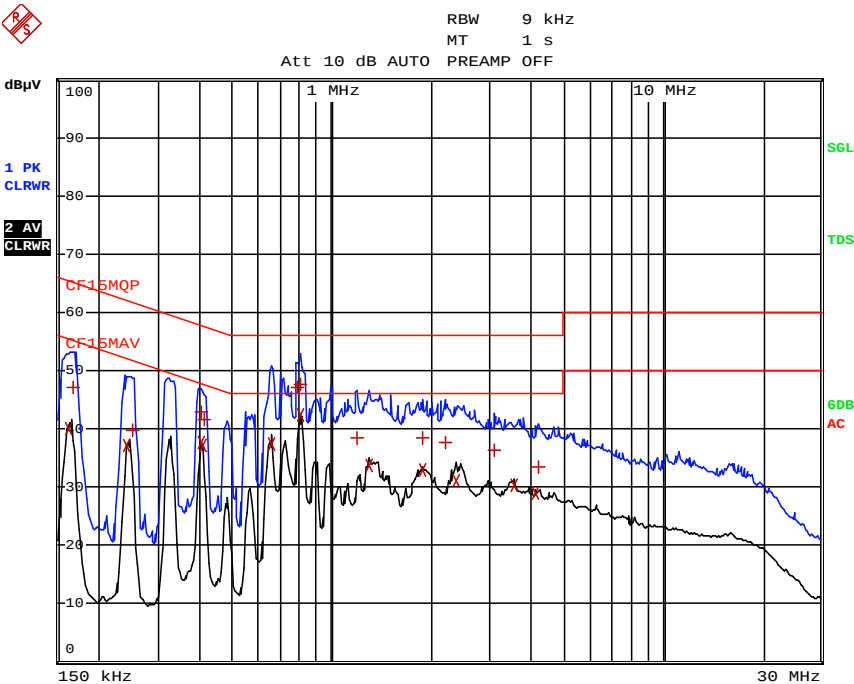
The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

Passed by 3.51 dB margin compared with CISPR average limit

TEST REPORT

CONDUCTED EMISSION DATA

Worst Case: Bluetooth TX and charging by adaptor



## TEST REPORT

Worst Case: Bluetooth TX and charging by adaptor

| EDIT PEAK LIST (Final Measurement Results) |            |            |  |                |
|--------------------------------------------|------------|------------|--|----------------|
| Trace1:                                    | CF15MQP    |            |  |                |
| Trace2:                                    | CF15MAV    |            |  |                |
| Trace3:                                    | ---        |            |  |                |
| TRACE                                      | FREQUENCY  | LEVEL dBμV |  | DELTA LIMIT dB |
| 2 CISPR Average                            | 163.5 kHz  | 40.11 N    |  | -15.16         |
| 1 Quasi Peak                               | 168 kHz    | 47.20 L1   |  | -17.85         |
| 2 CISPR Average                            | 244.5 kHz  | 37.11 N    |  | -14.82         |
| 1 Quasi Peak                               | 253.5 kHz  | 39.67 L1   |  | -21.96         |
| 1 Quasi Peak                               | 402 kHz    | 42.92 L1   |  | -14.88         |
| 2 CISPR Average                            | 402 kHz    | 37.61 L1   |  | -10.19         |
| 2 CISPR Average                            | 406.5 kHz  | 37.05 N    |  | -10.66         |
| 1 Quasi Peak                               | 411 kHz    | 41.49 L1   |  | -16.13         |
| 2 CISPR Average                            | 654 kHz    | 37.39 L1   |  | -8.60          |
| 1 Quasi Peak                               | 784.5 kHz  | 47.22 N    |  | -8.77          |
| 2 CISPR Average                            | 802.5 kHz  | 42.48 L1   |  | -3.51          |
| 1 Quasi Peak                               | 807 kHz    | 47.62 N    |  | -8.37          |
| 1 Quasi Peak                               | 1.1985 MHz | 38.40 L1   |  | -17.60         |
| 2 CISPR Average                            | 1.2975 MHz | 33.68 L1   |  | -12.31         |
| 1 Quasi Peak                               | 1.8735 MHz | 38.51 L1   |  | -17.48         |
| 2 CISPR Average                            | 1.8915 MHz | 33.06 L1   |  | -12.93         |
| 1 Quasi Peak                               | 2.2155 MHz | 37.75 N    |  | -18.24         |
| 2 CISPR Average                            | 2.3865 MHz | 31.15 L1   |  | -14.84         |
| 1 Quasi Peak                               | 3.1065 MHz | 36.22 L1   |  | -19.77         |
| 2 CISPR Average                            | 3.543 MHz  | 30.29 L1   |  | -15.70         |

| EDIT PEAK LIST (Final Measurement Results) |            |            |  |                |
|--------------------------------------------|------------|------------|--|----------------|
| Trace1:                                    | CF15MQP    |            |  |                |
| Trace2:                                    | CF15MAV    |            |  |                |
| Trace3:                                    | ---        |            |  |                |
| TRACE                                      | FREQUENCY  | LEVEL dBμV |  | DELTA LIMIT dB |
| 2 CISPR Average                            | 4.1145 MHz | 29.08 N    |  | -16.91         |
| 1 Quasi Peak                               | 4.2045 MHz | 33.52 N    |  | -22.47         |

## TEST REPORT

### 5.0 EQUIPMENT LIST

#### 1) Radiated Emissions Test

| Equipment            | EMI Test Receiver | Spectrum Analyzer | Biconical Antenna |
|----------------------|-------------------|-------------------|-------------------|
| Registration No.     | EW-3156           | EW-3281           | EW-0571           |
| Manufacturer         | ROHDESCHWARZ      | ROHDESCHWARZ      | EMCO              |
| Model No.            | ESR26             | FSV40             | 3104C             |
| Calibration Date     | November 10, 2017 | January 02, 2018  | February 27, 2018 |
| Calibration Due Date | November 10, 2018 | January 02, 2019  | August 27, 2019   |

| Equipment            | Log Periodic Antenna | Double Ridged Guide Antenna | Log Periodic Antenna |
|----------------------|----------------------|-----------------------------|----------------------|
| Registration No.     | EW-1042              | EW-1133                     | EW-0447              |
| Manufacturer         | EMCO                 | EMCO                        | EMCO                 |
| Model No.            | 3148                 | 3115                        | 3146                 |
| Calibration Date     | June 19, 2017        | May 24, 2017                | January 17, 2018     |
| Calibration Due Date | December 19, 2018    | November 24, 2018           | July 17, 2019        |

| Equipment            | BiConiLog Antenna | Double Ridged Guide Antenna | Biconical Antenna |
|----------------------|-------------------|-----------------------------|-------------------|
| Registration No.     | EW-3061           | EW-0194                     | EW-2512           |
| Manufacturer         | EMCO              | EMCO                        | EMCO              |
| Model No.            | 3142E             | 3115                        | 3104C             |
| Calibration Date     | November 02, 2017 | March 14, 2018              | August 06, 2018   |
| Calibration Due Date | November 02, 2018 | September 14, 2019          | February 06, 2020 |

| Equipment            | Pyramidal Horn Antenna (18.0 - 26.5)GHz | RF Cable (up to 40GHz) | Notch Filter |
|----------------------|-----------------------------------------|------------------------|--------------|
| Registration No.     | EW-0905                                 | EW-3155                | EW-2213      |
| Manufacturer         | EMCO                                    | N/A                    | MICROTRONICS |
| Model No.            | 3160-09                                 | N/A                    | BRM50701-02  |
| Calibration Date     | August 18, 2017                         | January 29, 2018       | May 24, 2018 |
| Calibration Due Date | February 18, 2019                       | January 29, 2019       | May 24, 2019 |

## TEST REPORT

### 2) Conducted Emissions Test

| Equipment            | EMI Test Receiver | Artificial Mains Network | RF Cable       |
|----------------------|-------------------|--------------------------|----------------|
| Registration No.     | EW-3095           | EW-2501                  | EW-3272        |
| Manufacturer         | R&S               | ROHDESCHWARZ             | GREATBILLION   |
| Model No.            | ESCI              | ENV-216                  | N/A            |
| Calibration Date     | February 15, 2018 | February 14, 2018        | March 27, 2018 |
| Calibration Due Date | February 15, 2019 | February 14, 2019        | March 27, 2019 |

### 3) Bandwidth Measurement

| Equipment            | Spectrum Analyzer |
|----------------------|-------------------|
| Registration No.     | EW-3281           |
| Manufacturer         | ROHDESCHWARZ      |
| Model No.            | FSV40             |
| Calibration Date     | January 02, 2018  |
| Calibration Due Date | January 02, 2019  |

**END OF TEST REPORT**