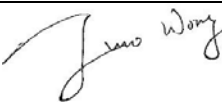
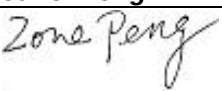


# FCC Test Report

| FCC EVALUATION REPORT FOR CERTIFICATION |                                                                        |
|-----------------------------------------|------------------------------------------------------------------------|
| Project Reference No.                   | 302167                                                                 |
| Product                                 | Portable Bluetooth Speaker                                             |
| Brand Name                              | Brookstone                                                             |
| Model                                   | Big Blue Unplugged                                                     |
| Alternate Model                         | N.A                                                                    |
| Tested according to                     | FCC Rules and Regulations Part 15 Subpart C 15.247,<br>ANSI C63.4-2014 |

|                                    |                                                                                                                                                                                                                                                                                  |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tested in period                   | 2016-01-25 to 2016-02-01                                                                                                                                                                                                                                                         |
| Issued date                        | 2016-02-02                                                                                                                                                                                                                                                                       |
| Name and address of the Test House | <br>Nemko Shanghai Ltd. Shenzhen Branch<br>Unit CD, Floor 10, Tower 2, Kefa Road 8#, Hi-Technology Park, Nanshan District, Shenzhen, China<br>Phone : +86 755 8221 0420 Fax : +86 755 8221 3363 |
| Tested by                          | <br><div style="text-align: right;">2016/2/2</div> <div style="text-align: center;"> <hr/> <b>Juno Wong</b> <hr/> </div> <div style="text-align: right;"><b>date</b></div>                    |
| Verified by                        | <br><div style="text-align: right;">2016/2/2</div> <div style="text-align: center;"> <hr/> <b>Zone Peng</b> <hr/> </div> <div style="text-align: right;"><b>date</b></div>                    |
|                                    | <div style="text-align: center;"> <hr/> <b>Zone Peng</b> <hr/> </div> <div style="text-align: right;"><b>date</b></div>                                                                                                                                                          |

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## Contents of This Report

|                                                     |    |
|-----------------------------------------------------|----|
| 1. Client Information .....                         | 3  |
| 1.1 Applicant .....                                 | 3  |
| 1.2 Manufacturer.....                               | 3  |
| 1.3 Scope.....                                      | 3  |
| 2. Equipment under Test (EUT) .....                 | 4  |
| 2.1 Identification of EUT .....                     | 4  |
| 2.2 Detail spec: .....                              | 4  |
| 2.3 Additional Information Related to Testing ..... | 4  |
| 3. General Test Conditions.....                     | 5  |
| 3.1 Location .....                                  | 5  |
| 3.2 Operating Environment.....                      | 5  |
| 3.3 Operating During Test.....                      | 5  |
| 3.4 Test Equipment .....                            | 5  |
| 4. Measurement Uncertainty .....                    | 5  |
| 5. Radiated Electromagnetic Disturbances.....       | 6  |
| 5.1 Test Procedure .....                            | 6  |
| 5.2 Measurement Equipment.....                      | 6  |
| 5.3 Test Result .....                               | 6  |
| 5.3.1 Diagram 5-1 .....                             | 7  |
| 5.3.2 Diagram 5-2 .....                             | 8  |
| 6 POWER LINE CONDUCTED EMISSION TEST .....          | 9  |
| 6.1 Test Procedure .....                            | 9  |
| 6.2 Measurement Equipment.....                      | 9  |
| 6.3 Test Result .....                               | 9  |
| 6.3.1 Diagram 6-1 .....                             | 10 |
| 6.3.2 Diagram 6-2 .....                             | 11 |



## **1. Client Information**

### **1.1 Applicant**

|                  |                                                                          |
|------------------|--------------------------------------------------------------------------|
| Company Name:    | <b>Plastoform Industries Ltd.</b>                                        |
| Company Address: | <b>Rm. 902-4 Seapower Center, 73 Lei Muk Road, Kwai Chung, Hong Kong</b> |

### **1.2 Manufacturer**

|                  |                                                                          |
|------------------|--------------------------------------------------------------------------|
| Company Name:    | <b>Brookstone Inc.</b>                                                   |
| Company Address: | <b>One Innovation Way, Merrimack, New Hampshire, 03054 United States</b> |

### **1.3 Scope**

●Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.



## 2. Equipment under Test (EUT)

### 2.1 Identification of EUT

|                                   |                                                                                                                                                                                                                                                                     |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category:                         | DSS                                                                                                                                                                                                                                                                 |
| Model Name:                       | Big Blue Unplugged                                                                                                                                                                                                                                                  |
| Alternate model:                  | N/A                                                                                                                                                                                                                                                                 |
| Brand name:                       | Brookstone                                                                                                                                                                                                                                                          |
| Technical data<br>(Rating, etc.): | As below                                                                                                                                                                                                                                                            |
| Remark:                           | This report is on the basis of the original report 289647, change the charger from Mass power (model: SHF1500200A1WA) to Brookstone (model: NBS30D150200HU), except the adapter, all others are identical.<br>Conducted emission and radiated emission are re-test. |

### 2.2 Detail spec:

Carrier Frequency: 2402MHz~2480MHz

Number of Channel: 79

Modulation Type: Bluetooth V3.0 ( GFSK,  $\pi/4$  DQPSK, 8DPSK )

Mode of operation (duplex, simplex, half duplex) : duplex

Antenna Type: Intergral Antenna

Antenna gain: 0 dBi

Rating(s): Li-ion Rechargeable Battery: 7.4V, 2600mAh

Adapter: AC ADAPTER

Model : NBS30D150200HU

Input: 100V-240VAC 50/60Hz 0.8A

Output: 15.0VDC 2.0A

### 2.3 Additional Information Related to Testing

CHL : CH 1 2402MHz

CHM : CH 40 2441MHz

CHH : CH 79 2480MHz

### 3. General Test Conditions

#### 3.1 Location

CENTRE TESTING INTERNATIONAL CORPORATION – ELA 503

Build C, Hongwei Industrial Zone, Baoan 70 District, Shenzhen, China

FCC-Registration No.: 510007

Note: all test are witnessed by NEMKO engineer

#### 3.2 Operating Environment

All tests and measurements were performed in a shielded enclosure or a controlled environment suitable for the tests conducted. The climatic conditions in the test area are automatically controlled and recorded continuously.

| Parameters           | Recording during test | Accepted deviation |
|----------------------|-----------------------|--------------------|
| Ambient temperature  | 20-25°C               | 15 – 35 °C         |
| Relative humidity    | 45-55%                | 30 - 60%           |
| Atmospheric pressure | 101.2 kPa -101.3kPa   | 86-106kPa          |

#### 3.3 Operating During Test

Test mode: 120V 60Hz

TM1 : continuance TX MODE

**Remark : When measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, have been performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. No findable change appear.**

**And only choose the worse mode to be the representative test mode**

#### 3.4 Test Equipment

The test equipments used in testing are calibrated on a regular basis. For most of the testing equipments accredited calibration is conducted once a year. For certain equipment the calibration interval is longer. Between the calibrations all test equipment are controlled and verified on a regular basis. The test equipments used are defined in each test section of this report.

### 4. Measurement Uncertainty

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95 %.

|                                  |        |
|----------------------------------|--------|
| Conducted Emission : 0.15~30MHz  | 3.45dB |
| Radiated Emission: 30MHz~1000MHz | 4.50dB |
| 1GHz-18GHz                       | 4.70dB |

## 5. Radiated Electromagnetic Disturbances

### 5.1 Test Procedure

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast.

The EUT were rotated 0 to 360 degree and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. The test result are reported as below.

For below 1GHz

RBW=120 kHz; VBW=300KHz. The frequency range from 30MHz to 1000MHz is checked using QP detector .

For above 1GHz. The frequency range from 1GHz to 25GHz(10<sup>th</sup> harmonics) is checked.

RBW=1MHz ; VBW=1MHz, PK detector for peak emissions measurement above 1GHz

RBW=1MHz ; VBW=10Hz, PK detector for average emissions measure above 1GHz .

### 5.2 Measurement Equipment

|                                     | Equipment               | Calibration Due | Type        | Serial No. | Manufacturer |
|-------------------------------------|-------------------------|-----------------|-------------|------------|--------------|
| <input checked="" type="checkbox"/> | Spectrum Analyzer       | 07/06/2016      | E4440A      | MY46185649 | Agilent      |
| <input checked="" type="checkbox"/> | Biconilog Antenna       | 07/06/2016      | 3142C       | 00044562   | ETS-LINGREN  |
| <input checked="" type="checkbox"/> | Multi device Controller | 07/06/2016      | 2090        | 00057230   | ETS-LINGREN  |
| <input checked="" type="checkbox"/> | Microwave Preamplifier  | 07/06/2016      | 8449B       | 3008A02425 | Agilent      |
| <input checked="" type="checkbox"/> | Log.-per. Antenna       | 07/06/2016      | VUSLP 9111B | 9111B-088  | schwarzbeck  |

### 5.3 Test Result

**Spurious emission worse case:**

**Below 1G:**

| Mode    | Freq range  | Channel | Test ANT polarity | Diagram | Test Result |
|---------|-------------|---------|-------------------|---------|-------------|
| TX MODE | 30MHz-1GHz: | CH LOW  | H                 | 5-1     | Pass        |
|         | 30MHz-1GHz: | CH LOW  | V                 | 5-2     | Pass        |

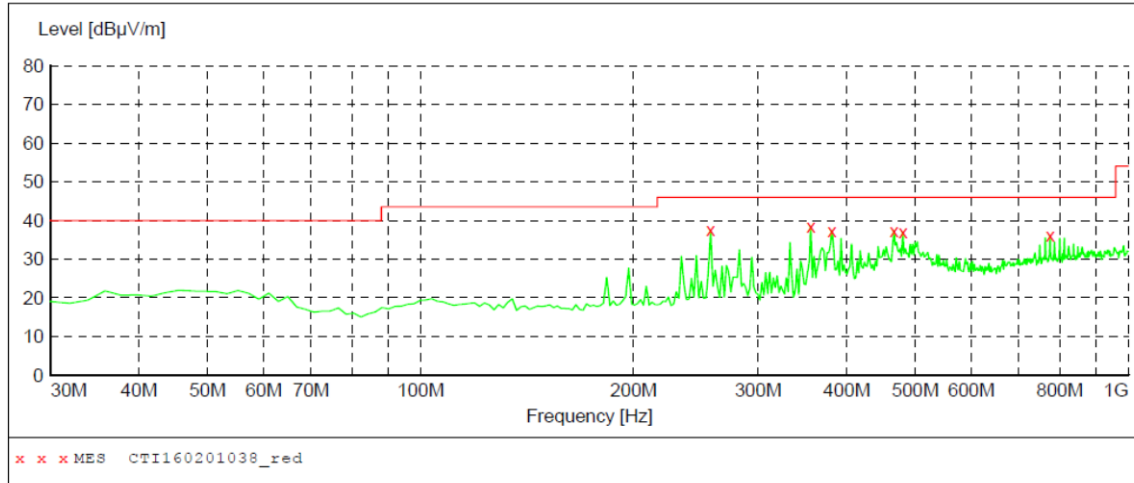
Remark:

1. If PK value is lower than AV limit , then Both PK and AV deem to comply their own limit, and then only list the peak result in the report.
2. All modes of operation were investigated and the worst -case emission mode are reported.

NOTES:

1. All modes were measured and the worst case emission was reported.
2. H =Horizontal V=Vertical
3. Emission = Reading +Antenna Factor + Cable Loss –Amp Factor(if exist)
4. Emission level dBμV = 20 log Emission level μV/m
5. The lower limit shall apply at the transition frequencies

### 5.3.1 Diagram 5-1



#### MEASUREMENT RESULT: "CTI160201038\_red"

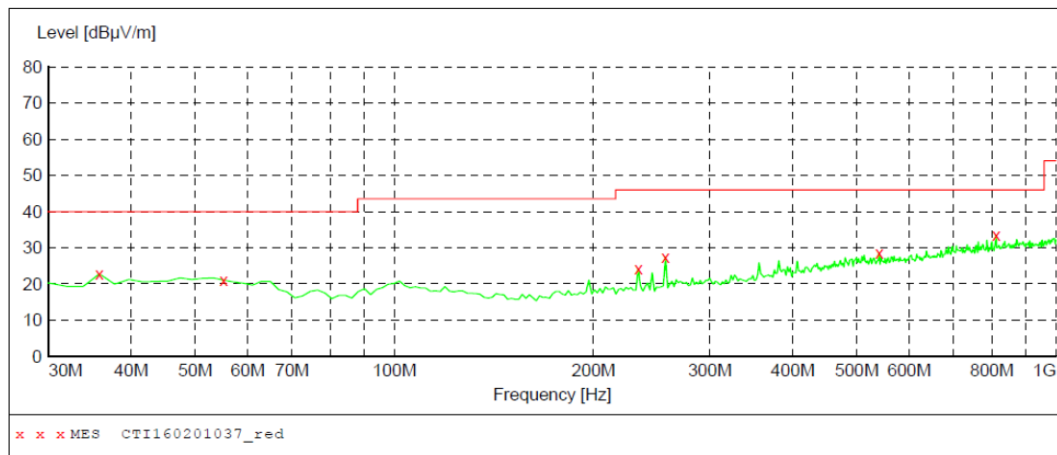
2/1/2016 4:53PM

| Frequency<br>MHz | Level<br>dBµV/m | Transd<br>dB | Limit<br>dBµV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 256.980000       | 37.50           | 14.9         | 46.0            | 8.5          | ---  | 100.0        | 361.00         | HORIZONTAL   |
| 355.920000       | 38.50           | 17.7         | 46.0            | 7.5          | ---  | 100.0        | 196.00         | HORIZONTAL   |
| 381.140000       | 37.40           | 18.5         | 46.0            | 8.6          | ---  | 100.0        | 185.00         | HORIZONTAL   |
| 466.500000       | 37.40           | 20.6         | 46.0            | 8.6          | ---  | 100.0        | 163.00         | HORIZONTAL   |
| 480.080000       | 37.00           | 21.0         | 46.0            | 9.0          | ---  | 200.0        | 31.00          | HORIZONTAL   |
| 774.960000       | 36.00           | 25.2         | 46.0            | 10.0         | ---  | 100.0        | 10.00          | HORIZONTAL   |

### 5.3.2 Diagram 5-2

***SWEEP TABLE: "test (30M-1G)"***

| Short Description: |                   | Field Strength |            |           |              |
|--------------------|-------------------|----------------|------------|-----------|--------------|
| Start              | Stop              | Detector       | Meas. Time | IF Bandw. | Transducer   |
| Frequency 30.0 MHz | Frequency 1.0 GHz | MaxPeak        | Coupled    | 100 kHz   | VULB9163-484 |



***MEASUREMENT RESULT: "CTI160201037\_red"***

2/1/2016 4:49PM

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Det. | Height cm | Azimuth deg | Polarization |
|---------------|--------------|-----------|--------------|-----------|------|-----------|-------------|--------------|
| 35.820000     | 22.80        | 14.9      | 40.0         | 17.2      | ---  | 100.0     | 26.00       | VERTICAL     |
| 55.220000     | 21.10        | 15.8      | 40.0         | 18.9      | ---  | 100.0     | 335.00      | VERTICAL     |
| 233.700000    | 24.10        | 14.4      | 46.0         | 21.9      | ---  | 200.0     | 299.00      | VERTICAL     |
| 256.980000    | 27.50        | 14.9      | 46.0         | 18.5      | ---  | 200.0     | 278.00      | VERTICAL     |
| 540.220000    | 28.70        | 21.8      | 46.0         | 17.3      | ---  | 200.0     | 66.00       | VERTICAL     |
| 811.820000    | 33.50        | 25.6      | 46.0         | 12.5      | ---  | 100.0     | 109.00      | VERTICAL     |

## 6 POWER LINE CONDUCTED EMISSION TEST

### 6.1 Test Procedure

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50  $\Omega$  line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency of emission (MHz)                      | Conducted limit (dB $\mu$ V) |           |
|--------------------------------------------------|------------------------------|-----------|
|                                                  | Quasi-peak                   | Average   |
| 0.15–0.5                                         | 66 to 56*                    | 56 to 46* |
| 0.5–5                                            | 56                           | 46        |
| 5–30                                             | 60                           | 50        |
| *-Decreases with the logarithm of the frequency. |                              |           |

### 6.2 Measurement Equipment

|                                     | Equipment | Last Calibration | Type   | Serial No. | Manufacturer |
|-------------------------------------|-----------|------------------|--------|------------|--------------|
| <input checked="" type="checkbox"/> | Receiver  | 07/06/2012       | ESCI   | 100009     | R&S          |
| <input checked="" type="checkbox"/> | LISN      | 07/06/2012       | ENV216 | 100098     | R&S          |

### 6.3 Test Result

The EUT was placed on a non-metallic table, 80cm above the ground plane. The other peripheral devices power cord connected to the power mains through another line impedance stabilization network. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4-2014 on conducted Emission test.

#### Preview measurements:

0.15 MHz to 30 MHz

Receiver settings: PK&AV detector

RBW:9 kHz

TX MODE

#### Final measurement:

0.15 MHz to 30 MHz

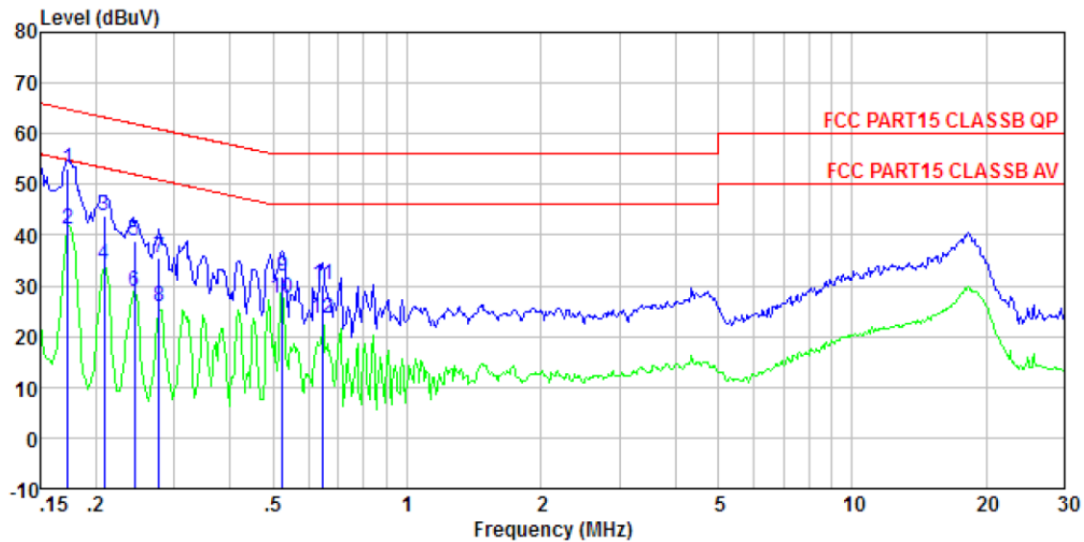
Receiver settings:QP&AV detector

| Power Line | Test Data   | Test Result |
|------------|-------------|-------------|
| Line       | Diagram 6-1 | Pass        |
| Neutral    | Diagram 6-2 | Pass        |

#### NOTES:

- Measurements using CISPR quasi-peak mode & average mode.
- All modes of operation were investigated and the worst -case emission are reported.
- If PK value is lower than AV limit then no reading value listed in report .If QP value is Lower than AV limit ,then AV value don't listed in report.

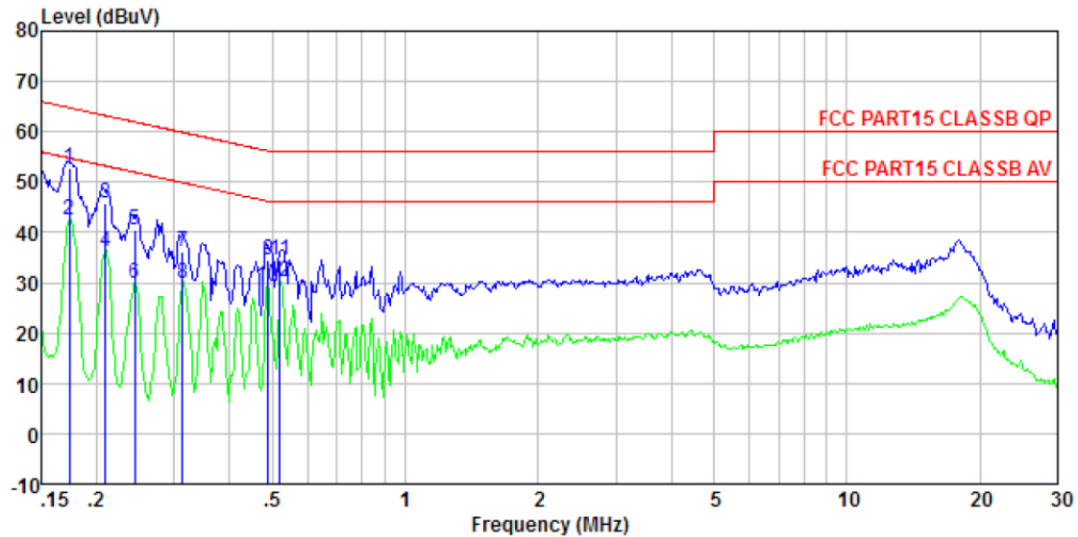
### 6.3.1 Diagram 6-1



Site : Shielded room  
Condition : FCC PART15 CLASSB QP LISN-2013 LINE  
EUT : Bluetooth speaker  
Test mode : Bluetooth 3.0 mode  
Test Engineer: Arslan

|    | Freq  | Read Level | Cable Loss | LISN Factor | Limit Line | Over Limit | Remark         |
|----|-------|------------|------------|-------------|------------|------------|----------------|
|    | MHz   | dBuV       | dB         | dB          | dBuV       | dB         |                |
| 1  | 0.173 | 52.79      | 53.06      | 0.12        | 0.15       | 64.81      | -11.75 QP      |
| 2  | 0.173 | 40.95      | 41.22      | 0.12        | 0.15       | 54.81      | -13.59 Average |
| 3  | 0.208 | 43.38      | 43.64      | 0.13        | 0.13       | 63.27      | -19.63 QP      |
| 4  | 0.208 | 34.05      | 34.31      | 0.13        | 0.13       | 53.27      | -18.96 Average |
| 5  | 0.244 | 38.49      | 38.72      | 0.11        | 0.12       | 61.95      | -23.23 QP      |
| 6  | 0.244 | 28.65      | 28.88      | 0.11        | 0.12       | 51.95      | -23.07 Average |
| 7  | 0.277 | 35.14      | 35.35      | 0.10        | 0.11       | 60.90      | -25.55 QP      |
| 8  | 0.277 | 25.61      | 25.82      | 0.10        | 0.11       | 50.90      | -25.08 Average |
| 9  | 0.524 | 31.51      | 31.75      | 0.11        | 0.13       | 56.00      | -24.25 QP      |
| 10 | 0.524 | 27.27      | 27.51      | 0.11        | 0.13       | 46.00      | -18.49 Average |
| 11 | 0.647 | 29.89      | 30.15      | 0.13        | 0.13       | 56.00      | -25.85 QP      |
| 12 | 0.647 | 23.21      | 23.47      | 0.13        | 0.13       | 46.00      | -22.53 Average |

### 6.3.2 Diagram 6-2



Site : Shielded room  
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL  
EUT : Bluetooth speaker  
Test mode : Bluetooth 3.0 mode  
Test Engineer: Arslan

|    | Freq  | Read Level | Cable Level | Cable Loss | LISN Factor | Limit Line | Over Limit | Remark  |
|----|-------|------------|-------------|------------|-------------|------------|------------|---------|
|    | MHz   | dBuV       | dBuV        | dB         | dB          | dBuV       | dB         |         |
| 1  | 0.174 | 52.62      | 52.82       | 0.13       | 0.07        | 64.77      | -11.95     | QP      |
| 2  | 0.174 | 42.25      | 42.45       | 0.13       | 0.07        | 54.77      | -12.32     | Average |
| 3  | 0.209 | 45.59      | 45.79       | 0.13       | 0.07        | 63.23      | -17.44     | QP      |
| 4  | 0.209 | 36.11      | 36.31       | 0.13       | 0.07        | 53.23      | -16.92     | Average |
| 5  | 0.244 | 40.44      | 40.61       | 0.11       | 0.06        | 61.95      | -21.34     | QP      |
| 6  | 0.244 | 29.63      | 29.80       | 0.11       | 0.06        | 51.95      | -22.15     | Average |
| 7  | 0.313 | 36.03      | 36.19       | 0.10       | 0.06        | 59.88      | -23.69     | QP      |
| 8  | 0.313 | 29.72      | 29.88       | 0.10       | 0.06        | 49.88      | -20.00     | Average |
| 9  | 0.489 | 34.24      | 34.41       | 0.11       | 0.06        | 56.19      | -21.78     | QP      |
| 10 | 0.489 | 28.99      | 29.16       | 0.11       | 0.06        | 46.19      | -17.03     | Average |
| 11 | 0.521 | 34.34      | 34.51       | 0.11       | 0.06        | 56.00      | -21.49     | QP      |
| 12 | 0.521 | 29.97      | 30.14       | 0.11       | 0.06        | 46.00      | -15.86     | Average |

\*\*\*\*\*END OF REPORT\*\*\*\*\*