

# FCC AND IC CERTIFICATION TEST REPORT

| Applicant            | : | Harman International Industries, Inc.                         |  |  |  |
|----------------------|---|---------------------------------------------------------------|--|--|--|
| Address              | : | 8500 Balboa Boulevard, Northridge, CA 91329,<br>UNITED STATES |  |  |  |
| Equipment under Test | : | ORTABLE BLUETOOTH SPEAKER                                     |  |  |  |
| Model No.            | : | ELIP5                                                         |  |  |  |
| Trade Mark           | : | JBL                                                           |  |  |  |
| FCC ID               | : | APIJBLFLIP5                                                   |  |  |  |
| IC                   | : | 6132A-JBLFLIP5                                                |  |  |  |
| Manufacturer         | : | Harman International Industries, Inc.                         |  |  |  |
| Address              | : | 8500 Balboa Boulevard, Northridge, CA 91329,<br>UNITED STATES |  |  |  |

## FOR

## Issued By: Dongguan Dongdian Testing Service Co., Ltd.

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## **Test Report Declare**

| Applicant            | :  | Harman International Industries, Inc.                      |
|----------------------|----|------------------------------------------------------------|
| Address              | :  | 8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES |
| Equipment under Test | :  | PORTABLE BLUETOOTH SPEAKER                                 |
| Model No.            | :  | FLIP5                                                      |
| Trade mark           | :  | JBL                                                        |
| Manufacturer         | -  | Harman International Industries, Inc.                      |
| Address              |    | 8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES |
|                      | 11 |                                                            |

#### Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C, RSS-210 Issue 9 August 2016.

### Test procedure used:

ANSI C63.10:2013, RSS-Gen Issue 5, Apr. 2018.

### We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC&IC standards.

| Report No.:      | DDT-R21022016-1E6 |               |                               |
|------------------|-------------------|---------------|-------------------------------|
| Date of Receipt: | Feb. 22, 2021     | Date of Test: | Feb. 27, 2021 ~ Apr. 03, 2021 |

Prepared By:

Talent Zhan

Talent Zhang/Engineer



### Damon Hu/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

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|           | Rev. | Revisions      |         | ls         | sue Date     | Revised By  |      |
|           |      | Initial issue® | /       | ® Ap       | or. 03, 2021 | 8           |      |
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## 1. Summary of test results

| Description of Test Item                    | Standard                         | Results       |
|---------------------------------------------|----------------------------------|---------------|
|                                             | FCC Part 15: 15.209              |               |
|                                             | FCC Part 15: 15.249              |               |
| Radiated Emission                           | ANSI C63.10:2013                 | PASS          |
|                                             | RSS-210 Issue 9                  |               |
|                                             | RSS-Gen Issue 5                  |               |
|                                             | FCC Part 15: 15.207              |               |
| Power Line Conducted Emission               | ANSI C63.10:2013                 | PASS®         |
|                                             | RSS-Gen Issue 5                  |               |
| ote: This report added battery cell factory | based on the original report DDT | -R18112311-9E |

radiated emission (below 1GHz) were tested and updated in this report.

## 2. General test information

## 2.1. Description of EUT

| EUT* Name                  | :  | PORTABLE BLUETOOTH SPEAKER                                                        |
|----------------------------|----|-----------------------------------------------------------------------------------|
| Model Number               | :  | FLIP5                                                                             |
| EUT function description   | :  | Please reference user manual of this device                                       |
| Power supply               | :  | DC 5V from external AC Adapter<br>DC 3.6V 4800mAh Polymer Li-ion built-in battery |
| Operation frequency        | :  | 2407MHz-2475MHz 💿 💿                                                               |
| Modulation                 |    | GFSK, π/4-DQPSK, 8DPSK                                                            |
| Antenna Type               |    | FPC antenna, maximum PK gain: 2.12 dBi                                            |
| Sample Type                | 1  | Series production                                                                 |
| Note: EUT is the ab. of ed | au | ipment under test.                                                                |

EUT channels and frequencies list:

| Channel inform | nation    |         |           |         |                      |
|----------------|-----------|---------|-----------|---------|----------------------|
| Channel        | Frequency | Channel | Frequency | Channel | Frequency            |
| 5              | 2407MHz   | 28      | 2430MHz   | 51      | 2453MHz              |
| 6              | 2408MHz   | 29      | 2431MHz   | 52      | 2454MHz              |
| 7              | 2409MHz   | 30      | 2432MHz   | 53      | 2455MHz              |
| 8              | 2410MHz   | 31 🔊    | 2433MHz   | 54 👝    | 2456MHz              |
| 9              | 2411MHz   | 32      | 2434MHz   | 55      | 2457MHz              |
| 10             | 2412MHz   | 33      | 2435MHz   | 56      | 2458MHz              |
| 11             | 2413MHz   | 34      | 2436MHz   | 57      | 2459MHz              |
| 12             | 2414MHz   | 35      | 2437MHz   | 58      | 2460MHz              |
| 13             | 2415MHz   | 36      | 2438MHz   | 59      | 2461MHz              |
| 14             | 2416MHz   | 37      | 2439MHz   | 60      | 2462MHz              |
| 15             | 2417MHz   | 38      | 2440MHz   | 61      | <sup>©</sup> 2463MHz |
| 16 🔰           | 2418MHz   | 39 🛸    | 2441MHz   | 62      | 2464MHz              |
| 17             | 2419MHz   | 40      | 2442MHz   | 63      | 2465MHz              |
| 18             | 2420MHz   | 41      | 2443MHz   | 64      | 2466MHz              |
| 19             | 2421MHz   | 42      | 2444MHz   | 65      | 2467MHz              |
| 20             | 2422MHz   | 43      | 2445MHz   | 66      | 2468MHz              |
| 21             | 2423MHz   | 44      | 2446MHz   | 67      | 2469MHz              |
| 22             | 2424MHz   | 45      | 2447MHz   | 68      | 2470MHz              |
| 23             | 2425MHz   | 46      | 2448MHz   | 69      | 2471MHz              |
| 24             | 2426MHz   | 47      | 2449MHz   | 70      | 2472MHz              |
| 25             | 2427MHz   | 48      | 2450MHz   | 71      | 2473MHz              |
| 26             | 2428MHz   | 49      | 2451MHz   | 72      | 2474MHz              |
| 27             | 2429MHz   | ® 50    | 2452MHz   | ® 73    | 2475MHz              |

### 2.2. Accessories of EUT

New Battery information:

| Description of<br>Accessories | Manufacturer                                                    | Model number     | Serial No.                      | Other                       |
|-------------------------------|-----------------------------------------------------------------|------------------|---------------------------------|-----------------------------|
| USB cable                     | Harman                                                          | N/A <sup>®</sup> | N/A                             | Length: 1.2m,<br>unshielded |
| Built-in Battery              | Guangzhou<br>Great Power<br>Energy &<br>Technology Co.,<br>Ltd. | GSP-1S2P-F5D     | DC 3.6V,<br>4800mAh,<br>17.28Wh | N/A                         |

### 2.3. Assistant equipment used for test

| Assistant<br>equipment | Manufacturer | cturer Model number Se     |         | Other             |
|------------------------|--------------|----------------------------|---------|-------------------|
| Notebook               | DELL         | <sup>®</sup> Latitude D610 | FCC DOC | 00045-534-136-300 |

### 2.4. Block diagram of EUT configuration for test

Tx Mode:

| AC Mains | AC Adapter | EUT |
|----------|------------|-----|
|          |            |     |

### Test software: FCCTool.exe

The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

| Channel | Frequency<br>(MHz)                                                                                                                                                                                                                                                 |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CH5 💿   | 2407 🛞                                                                                                                                                                                                                                                             |
| CH39    | 2441                                                                                                                                                                                                                                                               |
| CH73    | 2475                                                                                                                                                                                                                                                               |
| CH5     | 2407                                                                                                                                                                                                                                                               |
| CH39    | 2441                                                                                                                                                                                                                                                               |
| CH73    | 2475                                                                                                                                                                                                                                                               |
| CH5     | 2407                                                                                                                                                                                                                                                               |
| CH39    | 2441                                                                                                                                                                                                                                                               |
| CH73    | 2475                                                                                                                                                                                                                                                               |
|         | Channel           CH5           CH39           CH73           CH5           CH39           CH73           CH5           CH39           CH39           CH5           CH39           CH39           CH39           CH39           CH73           CH39           CH39 |

## 2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

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| × Jr               | × Jr      |  |
|--------------------|-----------|--|
| Temperature range: | 21-25°C   |  |
| Humidity range:    | 40-75%    |  |
| Pressure range:    | 86-106kPa |  |

### 2.6. Deviations of test standard

No Deviation.

### 2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd. Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808 Tel: +86-0769-38826678, http://www.dgddt.com, Email: ddt@dgddt.com CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01 Designation Number: CN1182; Test Firm Registration Number: 540522 Industry Canada site registration number: 10288A

### 2.8. Measurement uncertainty

| Test Item                                                                                                   | Uncertainty                       |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Bandwidth                                                                                                   | 1.1%                              |
|                                                                                                             | 0.86dB (10 MHz ≤ f < 3.6GHz);     |
| Peak Output Power (Conducted) (Spectrum analyzer)                                                           | 1.38dB (3.6GHz≤ f < 8GHz)         |
| Peak Output Power (Conducted) (Power Sensor)                                                                | 0.74dB                            |
| Power Spectral Density                                                                                      | 0.74dB (10 MHz ≤ f < 3.6GHz);     |
| Power Spectral Density                                                                                      | 1.38dB (3.6GHz≤ f < 8GHz)         |
|                                                                                                             | 0.86dB (10 MHz ≤ f < 3.6GHz);     |
| Conducted spurious emissions                                                                                | 1.40dB (3.6GHz≤ f < 8GHz)         |
| R                                                                                                           | 1.66dB (8GHz≤ f < 22GHz)          |
| Uncertainty for radio frequency (RBW<20kHz)                                                                 | 3×10 <sup>-8</sup>                |
| Temperature                                                                                                 | 0.4°C                             |
| Humidity                                                                                                    | 2%                                |
| Uncertainty for Radiation Emission test                                                                     | 4.70 dB (Antenna Polarize: V)     |
| (30MHz-1GHz)                                                                                                | 4.84 dB (Antenna Polarize: H)     |
| Uncertainty for Radiation Emission test                                                                     | ® 4.10dB(1-6GHz)                  |
| (1GHz-18GHz)                                                                                                | 4.40dB (6GHz-18Gz)                |
| Uncertainty for Power line conduction emission test                                                         | 3.32dB (150kHz-30MHz)             |
| lote: This uncertainty represents an expanded uncertair 5% confidence level using a coverage factor of k=2. | ty expressed at approximately the |

## 3. Equipment used during test

| Equipment                     | Manufacturer   | Model No.        | Serial No.           | Last Cal.     | Cal. Interval |
|-------------------------------|----------------|------------------|----------------------|---------------|---------------|
| Radiation 1#cham              | ber            |                  | 8                    |               | 8             |
| EMI Test Receiver             | R&S            | ESU8             | 100316               | Sep. 24, 2020 | 1 Year        |
| Spectrum analyzer             | Agilent        | E4447A           | MY50180031           | Jul. 01, 2020 |               |
| Trilog Broadband<br>Antenna   | Schwarzbeck    | VULB9163         | 9163-462             | Nov. 13, 2020 |               |
| Active Loop antenna           | Schwarzbeck    | FMZB-1519        | 1519-038             | Nov. 18, 2020 | 1 Year        |
| Double Ridged Horn<br>Antenna | R&S            | HF907            | 100276               | Nov. 13, 2020 | 1 Year        |
| Broad Band Horn<br>Antenna    | Schwarzbeck    | BBHA 9170        | 790                  | Apr. 11, 2020 | 1 Year        |
| Pre-amplifier                 | A.H.           | PAM-0118         | 360                  | Sep. 28, 2020 | 1 Year        |
| RF Cable                      | HUBSER         | CP-X2+<br>CP-X1  | W11.03+<br>W12.02    | Sep. 24, 2020 | 1 Year        |
| RF Cable                      | N/A            | 5m+6m+1m         | 06270619             | Sep. 30, 2020 | 1 Year        |
| MI Cable                      | HUBSER         | C10-01-01-1<br>M | 1091629              | Sep. 30, 2020 | 1 Year        |
| Test software                 | Audix          | E3               | V 6.11111b           | N/A           | N/A           |
| Radiation 2#cham              | ber            |                  |                      |               |               |
| EMI Test Receiver             | R&S            | ESCI             | 101364               | Sep. 28, 2020 | 1 Year        |
| Spectrum analyzer             | Agilent        | E4447A           | MY50180031           | Jul. 01, 2020 | 1 Year        |
| Trilog Broadband<br>Antenna   | Schwarzbeck    | VULB 9163        | 9163-994             | Nov. 13, 2020 | 1 Year        |
| Active Loop antenna           | Schwarzbeck    | FMZB-1519        | 1519-038             | Nov. 18, 2020 | 1 Year        |
| Double Ridged Horn<br>Antenna | Schwarzbeck    | BBHA9120         | 02108                | Jul. 11, 2020 | 1 Year        |
| Broad Band Horn<br>Antenna    | Schwarzbeck    | BBHA 9170        | 790                  | Apr. 11, 2020 | 1 Year        |
| Pre-amplifier                 | TERA-MW        | TRLA-0040<br>G35 | 1013<br>03           | Sep. 28, 2020 | 1 Year        |
| RF Cable                      | N/A            | 14+1.5m          | 06270619             | Sep. 28, 2020 | 1 Year        |
| Test software                 | Audix®         | E3               | V 6.11111b           | N/A           | N/A           |
| Power Line Condu              | icted Emission | s Test 1#        | × Jr                 |               |               |
| EMI Test Receiver             | R&S            | ESU8             | 100316               | Sep. 24, 2020 | 1 Year        |
| LISN 1                        | R&S            | ENV216           | 101109               | Sep. 28, 2020 | 1 Year        |
| LISN 2                        | R&S            | ESH2-Z5          | 100309               | Sep. 28, 2020 | 1 Year        |
| Pulse Limiter                 | R&S            | ESH3-Z2          | 101242               | Sep. 24, 2020 | 1 Year        |
| CE Cable 1                    | HUBSER         | N/A              | W10.01               | Sep. 24, 2020 | 1 Year        |
| Test software                 | Audix          | E3               | V 6.11111b           | N/A           | N/A           |
| Power Line Condu              | icted Emission | s Test 2#        | AUT.                 |               |               |
| Test Receiver                 | R&S            | ESPI             | 101761               | Sep. 24, 2020 | 1 Year        |
| LISN 1                        | R&S            | ENV216           | 101170               | Sep. 28, 2020 | 1 Year        |
| LISN 2 📃 🛞                    | R&S            | ESH2-Z5          | 100309               | Sep. 28, 2020 | 1 Year        |
| Pulse Limiter                 | R&S            | KH43101          | 43101180156<br>8-12# | Jul. 01, 2020 | 1 Year        |

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|   | CE Cable 2    | HUBSER | N/A | W11.02     | Sep. 24, 2020 | 1 Year        |            |
|---|---------------|--------|-----|------------|---------------|---------------|------------|
|   | Test software | Audix  | E3  | V 6.11111b | N/A           | N/A           |            |
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| r |               | 6      |     | 1          |               | Page 10 of 21 |            |
|   |               |        |     |            |               |               |            |

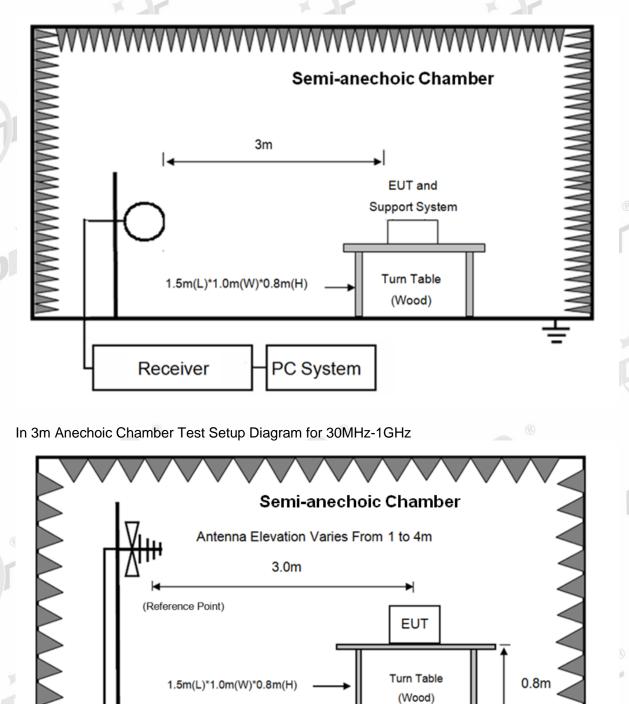
## 4. Radiated emission

AMP

Receiver

### 4.1. Block diagram of test setup

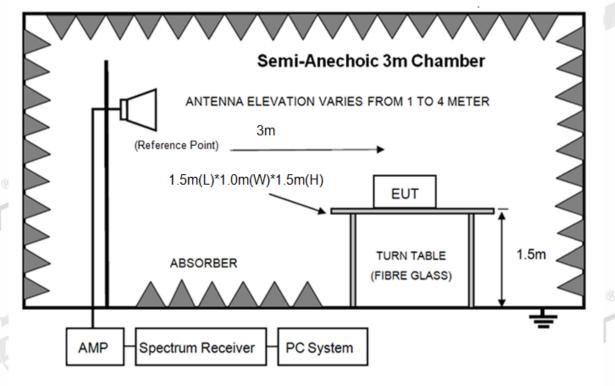
In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz



PC System

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In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

#### 4.2. Limit

| FREQUENCY                                                         | DISTANCE | FIELD STREE                                     | NGTHS LIMIT                  |  |
|-------------------------------------------------------------------|----------|-------------------------------------------------|------------------------------|--|
| MHz                                                               | Meters   | μV/m                                            | dB(µV)/m                     |  |
| 30 ~ 88                                                           | 3        | 100                                             | 40.0                         |  |
| 88 ~ 216                                                          | 3        | 150                                             | 43.5                         |  |
| 216 ~ 960                                                         | 3        | 200                                             | 46.0                         |  |
| 960 ~ 1000                                                        | 3        | 500                                             | 54.0                         |  |
| Above 1000MHz                                                     | 3        | 74.0 dB(μV)/m (Peak)<br>54.0 dB(μV)/m (Average) |                              |  |
| Field Strength of<br>Fundamental emission for<br>2.4GHz-2.4835GHz | 3        |                                                 | /m (Average) 💿<br>V)/m(Peak) |  |
| Field Strength of<br>Harmonics                                    | 3        | 74.0 dB(μ\<br>54.0 dB(μV)                       | /)/m (Peak)<br>/m (Average)  |  |
| na a ulu                                                          |          |                                                 |                              |  |

#### Remark:

(1) Emission level dB $\mu$ V = 20 log Emission level  $\mu$ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000MHz, radiated emission limits in these three bands are based on measurements employing an average detector.

#### 4.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.3 and 4.2

(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.

- (a) Change work frequency or channel of device if practicable.
- (b) Change modulation type of device if practicable.
- (c) Change power supply range from 85% to 115% of the rated supply voltage

(d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

- (4) Spectrum frequency from 9kHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9kHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated 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. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.
- (6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 kHz.
- (7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure. Peak detector is used for both PK and AV test.
- (8) For fundamental frequency test, set spectrum analyzer's RBW=3MHz, VBW=10MHz. peak detector for PK, RMS detector for AV, Read the Level in spectrum analyzer and record.

### 4.4. Test result

### PASS. (See below detailed test result)

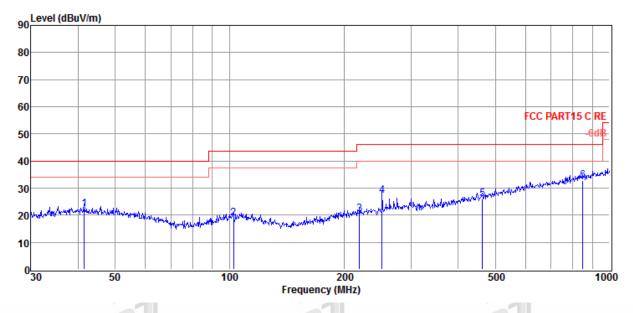
All the emissions except fundamental emission from 9kHz to 25GHz were comply with 15.209 limit. Note1: According exploratory test no any obvious emission was detected from 9kHz to 30MHz and 18GHz to 25GHz, so the final test was performed with frequency range from 30MHz to 18GHz and recorded in below.

Note2: For emissions below 1GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1GHz, the final test was only performed with EUT working in GFSK, Tx 2407MHz mode.

Note3: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

## Radiated Emission test (below 1GHz) TR-4-E-009 Radiated Emission Test Result

| ® | est Site    | : DDT 3m Chamber 2#                   | D:\2021 RE2# Rep<br>BELOW1G.EM6 | oort Data\Q21022016-1E FLIP5\RF\FCC |  |
|---|-------------|---------------------------------------|---------------------------------|-------------------------------------|--|
| T | est Date    | : 2021-03-02                          | Tested By                       | : Kennys                            |  |
| E | UT          | : PORTABLE BLUETOOTH SPEAKER          | Model Number                    | : FLIP5                             |  |
| P | ower Supply | : Battery                             | Test Mode                       | : Tx mode                           |  |
| С | ondition    | : Temp:24.5°C,Humi:55%,Press:100.1kPa | Antenna/Distance                | e : 2019 VULB 9163 2#/3m/VERTICAL   |  |
| м | emo         | e sar                                 |                                 |                                     |  |
|   |             |                                       |                                 |                                     |  |



| i      |        |               |                   |               |                 |               |               |          |              |
|--------|--------|---------------|-------------------|---------------|-----------------|---------------|---------------|----------|--------------|
| ltem   | Freq.  | Read<br>Level | Antenna<br>Factor | Cable<br>Loss | Result<br>Level | Limit<br>Line | Over<br>Limit | Detector | Polarization |
| (Mark) | (MHz)  | (dBµV)        | (dB/m)            | dB            | (dBµV/m)        | (dBµV/m)      | (dB)          |          |              |
| ® 1    | 41.42  | 4.22          | 14.31             | 3.72          | 22.25           | 40.00         | -17.75        | QP       | VERTICAL     |
| 2      | 102.36 | 2.83          | 11.68             | 4.22          | 18.73           | 43.50         | -24.77        | QP 🚽     | VERTICAL     |
| 3      | 219.85 | 3.46          | 12.01             | 4.96          | 20.43           | 46.00         | -25.57        | QP       | VERTICAL     |
| 4      | 252.06 | 9.13          | 12.88             | 5.14          | 27.15           | 46.00         | -18.85        | QP       | VERTICAL     |
| 5      | 462.35 | 3.03          | 16.93             | 6.12          | 26.08           | 46.00         | -19.92        | QP       | VERTICAL     |
| 6      | 851.04 | 3.49          | 21.67             | 7.74          | 32.90           | 46.00         | -13.10        | QP       | VERTICAL     |

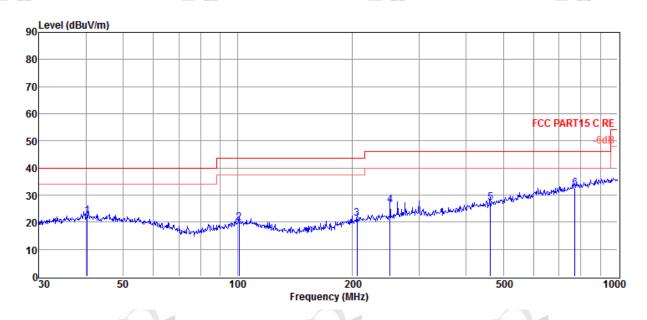
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

# **TR-4-E-009 Radiated Emission Test Result**

| Test Site    | : DDT 3m Chamber 2#                   | D:\2021 RE2# Rep<br>BELOW1G.EM6 | bort Data\Q21022016-1E FLIP5\RF\FCC |
|--------------|---------------------------------------|---------------------------------|-------------------------------------|
| Test Date    | : 2021-03-02                          | Tested By                       | : Kennys                            |
| EUT          | : PORTABLE BLUETOOTH SPEAKER          | Model Number                    | : FLIP5                             |
| Power Supply | : Battery                             | Test Mode                       | : Tx mode                           |
| Condition    | : Temp:24.5°C,Humi:55%,Press:100.1kPa | Antenna/Distance                | e:2019 VULB 9163 2#/3m/HORIZONTAL   |
| Memo         |                                       | â                               | ß                                   |



| ltem   | Freq.  | Read<br>Level | Antenna<br>Factor | Cable<br>Loss | Result<br>Level | Limit<br>Line | Over<br>Limit | Detector | Polarization |
|--------|--------|---------------|-------------------|---------------|-----------------|---------------|---------------|----------|--------------|
| (Mark) | (MHz)  | (dBµV)        | (dB/m)            | dB            | (dBµV/m)        | (dBµV/m)      | (dB)          |          |              |
| 1      | 40.28  | 3.97          | 14.46             | 3.71          | 22.14           | 40.00         | -17.86        | QP       | HORIZONTAL   |
| ® 2    | 100.93 | 3.96          | 11.69             | 4.21          | 19.86           | 43.50         | -23.64        | QP       | HORIZONTAL   |
| 3      | 206.40 | 4.77          | 11.60             | 4.88          | 21.25           | 43.50         | -22.25        | QP       | HORIZONTAL   |
| 4      | 252.06 | 8.29          | 12.88             | 5.14          | 26.31           | 46.00         | -19.69        | QP       | HORIZONTAL   |
| 5      | 462.35 | 4.24          | 16.93             | 6.12          | 27.29           | 46.00         | -18.71        | QP       | HORIZONTAL   |
| 6      | 771.45 | 4.12          | 20.85             | 7.44          | 32.41           | 46.00         | -13.59        | QP       | HORIZONTAL   |

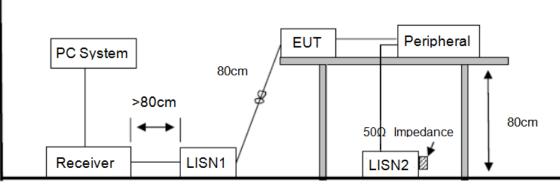
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

### 5. Power Line Conducted Emission

### 5.1. Block diagram of test setup



### 5.2. Power Line Conducted Emission Limits

| Frequency        | Quasi-Peak Level<br>dB(μV) | Average Level<br>dB(μV) |
|------------------|----------------------------|-------------------------|
| 150kHz ©~ 500kHz | ® 66 ~ 56*                 | ® 56 ~ 46*              |
| 500kHz ~ 5MHz    | 56                         | 46                      |
| 5MHz ~ 30MHz     | 60                         | 50                      |

Note 1: \* Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

### 5.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level. The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

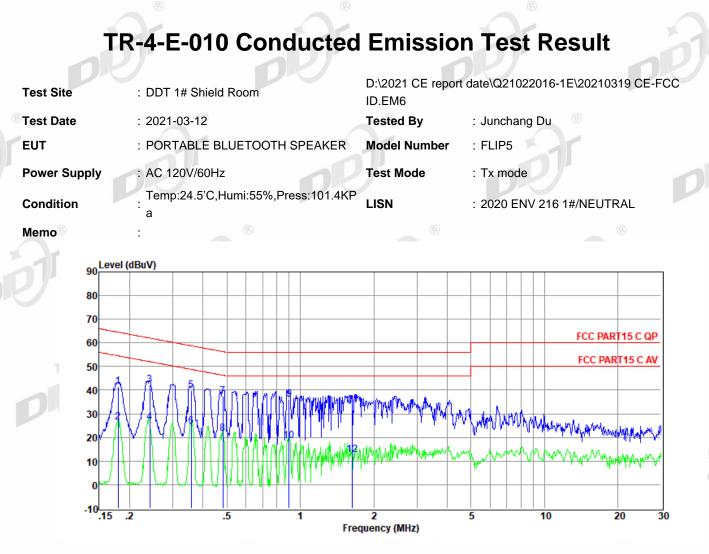
The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

#### 5.4. Test Result

### PASS. (See below detailed test result)

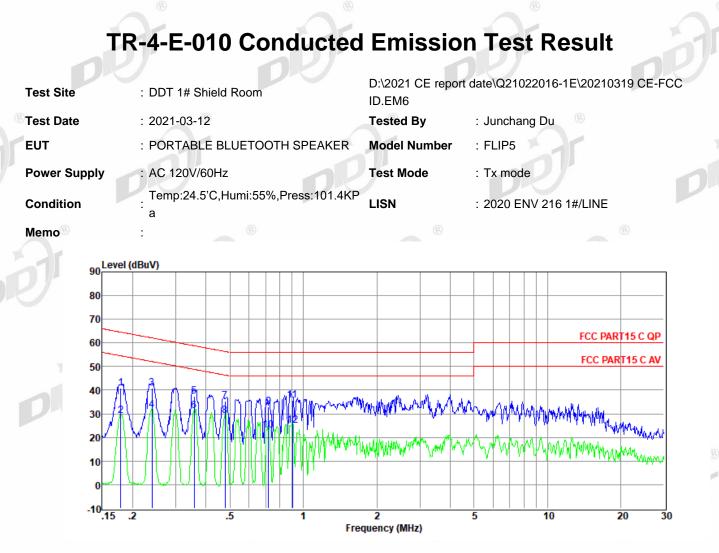
Note1: All emissions not reported below are too low against the prescribed limits. Note2: "-----" means Peak detection; "-----" means Average detection. Note3: Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worst case.



| ltem   | Freq.             | Read<br>Level | LISN<br>Factor | Cable<br>Loss | Pulse<br>Limiter<br>Factor | Result<br>Level | Limit<br>Line | Over<br>Limit       | Detector | Phase   |
|--------|-------------------|---------------|----------------|---------------|----------------------------|-----------------|---------------|---------------------|----------|---------|
| (Mark) | (MHz)             | (dBµV)        | (dB)           | (dB)          | (dB)                       | (dBµV)          | (dBµV)        | (dB)                | Ur.      |         |
| 1      | 0.18              | 22.17         | 9.37           | 0.02          | 9.86                       | 41.42           | 64.50         | -23.08              | QP       | NEUTRAL |
| 2      | 0.18              | 7.07          | 9.37           | 0.02          | 9.86                       | 26.32           | 54.50         | -28.18              | Average  | NEUTRAL |
| ® 3    | 0.24              | 22.96         | 9.37           | 0.02          | 9.86                       | 42.21           | 62.04         | -19.83              | QP       | NEUTRAL |
| 4      | 0.24              | 7.26          | 9.37           | 0.02          | 9.86                       | 26.51           | 52.04         | -25.53              | Average  | NEUTRAL |
| 5      | 0.36              | 20.48         | 9.38           | 0.02          | 9.86                       | 39.74           | 58.78         | -19.04              | QP       | NEUTRAL |
| 6      | 0.36              | 5.42          | 9.38           | 0.02          | 9.86                       | 24.68           | 48.78         | -24.10              | Average  | NEUTRAL |
| 7      | 0.48              | 18.13         | 9.39           | 0.02          | 9.86                       | 37.40           | 56.32         | -18.92              | QP       | NEUTRAL |
| 8      | 0.48              | 2.45          | 9.39           | 0.02          | 9.86                       | 21.72           | 46.32         | -24.60              | Average  | NEUTRAL |
| 9      | <sup>®</sup> 0.90 | 16.77         | 9.39           | 0.03          | 9.86                       | 36.05           | 56.00         | <sup>®</sup> -19.95 | QP       | NEUTRAL |
| 10     | 0.90              | -0.85         | 9.39           | 0.03          | 9.86                       | 18.43           | 46.00         | -27.57              | Average  | NEUTRAL |
| 11     | 1.64              | 14.39         | 9.40           | 0.04          | 9.86                       | 33.69           | 56.00         | -22.31              | QP       | NEUTRAL |
| 12     | 1.64              | -6.55         | 9.40           | 0.04          | 9.86                       | 12.75           | 46.00         | -33.25              | Average  | NEUTRAL |

#### Note:

- 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
- 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
- 3. Test setup: RBW: 200 Hz (9 kHz-150 kHz), 9 kHz (150 kHz-30 MHz).
- 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.



| ltem   | Freq.             | Read<br>Level | LISN<br>Factor | Cable<br>Loss | Pulse<br>Limiter<br>Factor | Result<br>Level | Limit<br>Line | Over<br>Limit       | Detector | Phase |
|--------|-------------------|---------------|----------------|---------------|----------------------------|-----------------|---------------|---------------------|----------|-------|
| (Mark) | (MHz)             | (dBµV)        | (dB)           | (dB)          | (dB)                       | (dBµV)          | (dBµV)        | (dB)                |          |       |
| 1      | 0.18              | 21.41         | 9.40           | 0.02          | 9.86                       | 40.69           | 64.55         | -23.86              | QP       | LINE  |
| 2      | 0.18              | 9.86          | 9.40           | 0.02          | 9.86                       | 29.14           | 54.55         | -25.41              | Average  | LINE  |
| ® 3    | 0.24              | 21.72         | 9.40           | 0.02          | 9.86                       | 41.00           | 62.08         | -21.08              | QP       | LINE  |
| 4      | 0.24              | 12.27         | 9.40           | 0.02          | 9.86                       | 31.55           | 52.08         | -20.53              | Average  | LINE  |
| 5      | 0.36              | 18.12         | 9.41           | 0.02          | 9.86                       | 37.41           | 58.78         | -21.37              | QP       | LINE  |
| 6      | 0.36              | 11.88         | 9.41           | 0.02          | 9.86                       | 31.17           | 48.78         | -17.61              | Average  | LINE  |
| 7      | 0.48              | 16.07         | 9.41           | 0.02          | 9.86                       | 35.36           | 56.36         | -21.00              | QP       | LINE  |
| 8      | 0.48              | 9.86          | 9.41           | 0.02          | 9.86                       | 29.15           | 46.36         | -17.21              | Average  | LINE  |
| 9      | <sup>®</sup> 0.72 | 13.54         | 9.42           | 0.03          | 9.86                       | 32.85           | 56.00         | <sup>®</sup> -23.15 | QP       |       |
| 10     | 0.72              | 3.64          | 9.42           | 0.03          | 9.86                       | 22.95           | 46.00         | -23.05              | Average  | LINE  |
| 11     | 0.90              | 16.52         | 9.42           | 0.03          | 9.86                       | 35.83           | 56.00         | -20.17              | QP       | LINE  |
| 12     | 0.90              | 5.62          | 9.42           | 0.03          | 9.86                       | 24.93           | 46.00         | -21.07              | Average  | LINE  |

#### Note:

- 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
- 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
- 3. Test setup: RBW: 200 Hz (9 kHz-150 kHz), 9 kHz (150 kHz-30 MHz).
- 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

