

FCC Test Report

Application No.: HKES141200240601

Applicant: S.E.M. INDUSTRIES

Address: 35/F., Tower A, Billion Centre

No.1 Wang Kwong Road, Kowloon Bay, Kowloon
Hong Kong

Product Information:

Product Description: Mini Speaker System

Model: SP-3000-BTHF, SP-3000-BT, SP-3000, SP3000 ♦

♦ Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.

Brand Name: S.E.M/ S-LOGO/ NIL/ S-DIGITAL/ SDIGITAL/ S.E.M. AUDIO LABORATORIES

Product Class : Low Power Communication Device – Transmitter (2.4 GHz)

FCC ID: 2AANA-SEM-SP3000

Requirement: CFR 47 FCC PART 15 SUBPART C, 2014
- Intentional Radiators (Section 15.249)

Date of Receipt: 2014-12-08

Date of Test: 2014-12-12 to 2014-12-15

Date of Issue: 2014-12-18

| | |
|----------------------|--------------|
| Test Result : | PASS* |
|----------------------|--------------|

In the configuration tested, the EUT complied with the requirements for the relevant clauses of Federal Communications Commission Rules as specified above.

Authorized Signature:



CHEN Jian-feng, Jeffrey

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS IECC Limited or testing done by SGS IECC Limited in connection with, distribution or use of the product described in this report must be approved by SGS IECC Limited in writing.

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FCC ID: 2AANA-SEM-SP3000

Member of the SGS Group (SGS SA)

2 Test Summary

| Test | Test Requirement | Test Method | Result |
|--|---------------------------------|--|--------|
| Conducted Emission (150KHz to 30MHz) | FCC PART 15, SUBPART C: 2014 | ANSI C63.4:2003 | PASS |
| Radiated Emission (9kHz to 1GHz) | FCC PART 15, SUBPART C: 2014 | ANSI C63.4:2003 | PASS |
| Radiated Emission above 1 GHz | FCC PART 15, SUBPART C: 2014 | ANSI C63.4:2003 | PASS |
| Band edge / 20 dB Bandwidth | FCC PART 15, SUBPART C: 2014 | ANSI C63.4:2003 Marker-Delta measurement | PASS |
| <p>♣ Item no.: SP-3000-BTHF, SP-3000-BT, SP-3000, SP3000</p> <p>According to the confirmation from the applicant, the above models are identical in all electrical aspects in relating to the circuit design, PCB layout and construction. The differences are the model no. trade name, color, cosmetic outlook and silkscreen.</p> <p>Therefore only the item SP-3000-BTHF was tested in this report.</p> | | | |

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4 General Information

4.1 General Description of EUT

Product Description: Mini Speaker System
 Model No: SP-3000-BTHF
 Serial No.: --

4.2 Details of EUT

Power Supply: AC 120V 60Hz to DC 5V adaptor: IECC-005
 DC 3.7 (Rechargeable battery x1)
 Operating Frequency 2402-2480MHz
 Antenna Type: Integral antenna
 Bluetooth version V3.0+EDR
 Modulation Type: GFSK, $\pi/4$ -DQPSK and 8DPSK

| Modulation | Packet | Packet Type | Packet Size |
|----------------|--------|-------------|-------------|
| GFSK | DH1 | 4 | 24 |
| | DH3 | 11 | 183 |
| | DH5 | 15 | 339 |
| $\pi/4$ -DQPSK | 2DH1 | 20 | 54 |
| | 2DH3 | 26 | 367 |
| | 2DH5 | 30 | 379 |
| 8DPSK | 3DH1 | 24 | 83 |
| | 3DH3 | 27 | 552 |
| | 3DH5 | 31 | 1021 |

4.3 Conditions of EUT

The received sample was under good condition.

4.4 Description of Support Units

| Description | Manufacturer | Model No. | Serial No. |
|---------------|---------------------|----------------------|----------------|
| Notebook | HP | OmniBook 6000 series | (S) TW22204704 |
| BT test board | Supported by cilent | | |
| Test software | RF Control Kit V1.0 | | |
| Adaptor | Supplied by IECC | | |

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All field strength measures in this test report were done by the aid of test software which places the device in continuous transmission under different package type and the test software above allowed to set the frequency fixed and hopping stopped.

4.5 Standards Applicable for Testing

CFR 47, FCC Part 15, 2014
ANSI C63.4:2003

4.6 Test Location

All tests were performed at:

SGS IECC Limited (Member of the SGS Group (SGS SA))

Units 303-305, 3/F., 31 Lok Yip Road, On Lok Tsuen, Fanling, N.T., Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

4.7 Test Facility

Measurement facility located at Fanling (Hong Kong), placed on file with the FCC Pursuant to Section 2.948 of the FCC Rules (FCC Registration No. : 97774).

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

FCC – CAB Registration No.: 446297

Measurement facility located at Fanling (Hong Kong), accredited as a Conformity Assessment Body (CAB) and was designated by FCC to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification under Part 15 and 18 of the Commission's Rules.

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Declaration of Family Grouping

None.

4.11 Abbreviations

N/A: Not Applicable
EUT: Equipment Under Test

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5 Equipments Used during Test

| Conducted Emission | | | | |
|---------------------------------|-----------------|----------------------|------------|---------------|
| Equipment | Manufacturer | Model / Serial No. | Cal. Date | Cal. Due Date |
| Test Receiver | Rohde & Schwarz | ESHS 30 / 839667/002 | 17/10/2014 | 16/10/2015 |
| Artificial Mains Network (LISN) | Schwarzbeck | NSLK 8127 / 8127312 | 8/4/2014 | 7/4/2015 |
| Impulse Limiter | Rohde & Schwarz | ESH-3-Z2 / 375881052 | 21/1/2013 | 20/1/2015 |

| Radiated Emission | | | | |
|-------------------------------------|-----------------|------------------------|------------|---------------|
| Equipment | Manufacturer | Model / Serial No. | Cal. Date | Cal. Due Date |
| 3m Semi-Anechoic Chamber (pre-test) | -- | -- | -- | -- |
| 3m / 10m Open Aera Test Site | -- | -- | 17/3/2012 | 16/3/2015 |
| Test Receiver | Rohde & Schwarz | ESCS 30 / 100388 | 17/10/2014 | 16/10/2015 |
| Spectrum Analyzer | Rohde & Schwarz | FSP 30 / 101474 | 16/6/2014 | 15/6/2015 |
| Loop antenna | Rohde & Schwarz | HFH2-Z2 / 871336/48 | 27/12/2012 | 26/12/2015 |
| Antenna 30-1000MHz | Schaffner | CBL6111C / 2791 | 19/10/2014 | 18/10/2016 |
| Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D / 9120D-1070 | 13/1/2014 | 12/1/2016 |
| Horn Antenna 15-26.5GHz | Schwarzbeck | BBHA9170 / 9170-492 | 24/11/2014 | 23/11/2016 |
| Preamplifier 10MHz – 6GHz | Schwarzbeck | BBV9743 / 9743-052 | 13/1/2014 | 12/1/2015 |
| Preamplifier 1-18GHz | Schwarzbeck | BBV9718 / 9718-223 | 13/1/2014 | 12/1/2015 |
| Preamplifier 18- 26.5GHz | Schwarzbeck | BBV9719 / 9719-019 | 19/11/2014 | 18/11/2016 |
| Coaxial Cable | -- | E167 | 25/6/2014 | 24/6/2015 |
| RF Cable | HUBER+SUHNER | E207 | 17/11/2014 | 16/11/2016 |
| Antenna Mast System | Schwarzbeck | AM9104 / - | -- | -- |

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| | | | | |
|---------------------------|-----------|-----------|----|----|
| Turntable with Controller | Drehtisch | DT312 / - | -- | -- |
|---------------------------|-----------|-----------|----|----|

| General Use Equipment | | | | |
|---------------------------------|--------------|--------------------|------------|---------------|
| Equipment | Manufacturer | Model / Serial No. | Cal. Date | Cal. Due Date |
| Digital Multimeter | Fluke | 189 / 83640020 | 8/4/2014 | 7/4/2015 |
| Temperature / Humidity meter | - | E158 | 14/11/2014 | 13/11/2015 |

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6 Test Results

Conducted Emissions Mains Terminals, 150kHz to 30MHz

Test Requirement: FCC Part15 C
 Test Method: ANSI C63.4
 Test Date: 2014-12-13
 Frequency Range: 150kHz to 30MHz
 Class / Severity: Class B
 Detector: Peak for pre-scan (9kHz Resolution Bandwidth)
 Quasi-Peak if maximised peak within 6dB of Quasi-Peak limit

Limit:

| Frequency range MHz | Class B Limits | |
|------------------------|----------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Note:

- 1) The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
- 2) The lower limit is applicable at the transition frequency.

6.1.1 EUT Operation

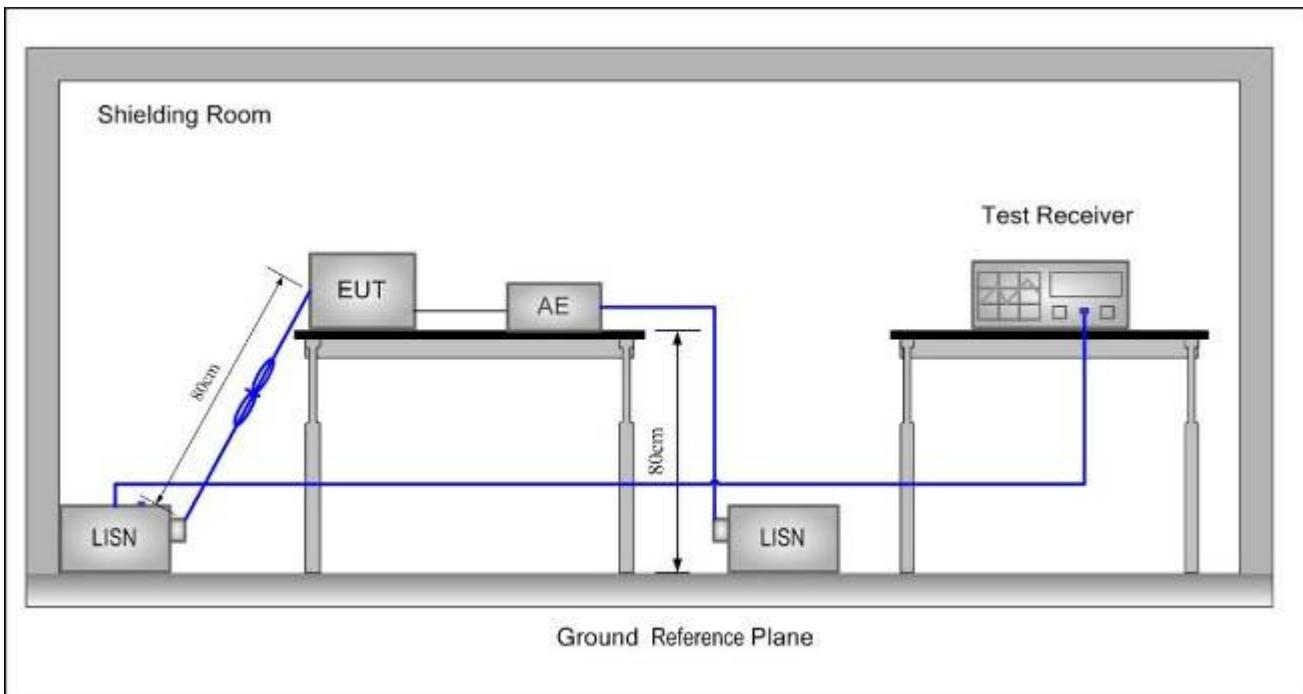
Operating Environment:

Temperature: 23°C Humidity: 36% RH

EUT Operation: Pre-test with adaptor or battery operate and Peak detector with the following mode(s):
 1: Transmission with GFSK (packet DH1/DH3/DH5)
 2: Transmimssion with II/4-DQPSK (packet 2DH1/2DH3/2DH5)
 3: Transmission with 8DPSK (packet 3DH1/3DH3/3DH5)

Final test with adaptor and Quasi-Peak detector with the following mode(s):
 1: Transmission with GFSK (packet DH5)

6.1.2 Test Setup and Procedure



1. The mains terminal conducted emission test was conducted in a shielded room.
2. The EUT was connected to AC power source through a LISN (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. For Load terminal voltage measurement, a voltage probe was used on the load terminals. Measurement at control terminals were carried out by means of an impedance stabilization network (ISN). The ISN was bounded to ground.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The EUT kept a distance of at least 0.8m from any other earthed conducting surface. The Artificial Mains Network was situated at a distance of 0.8m from the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

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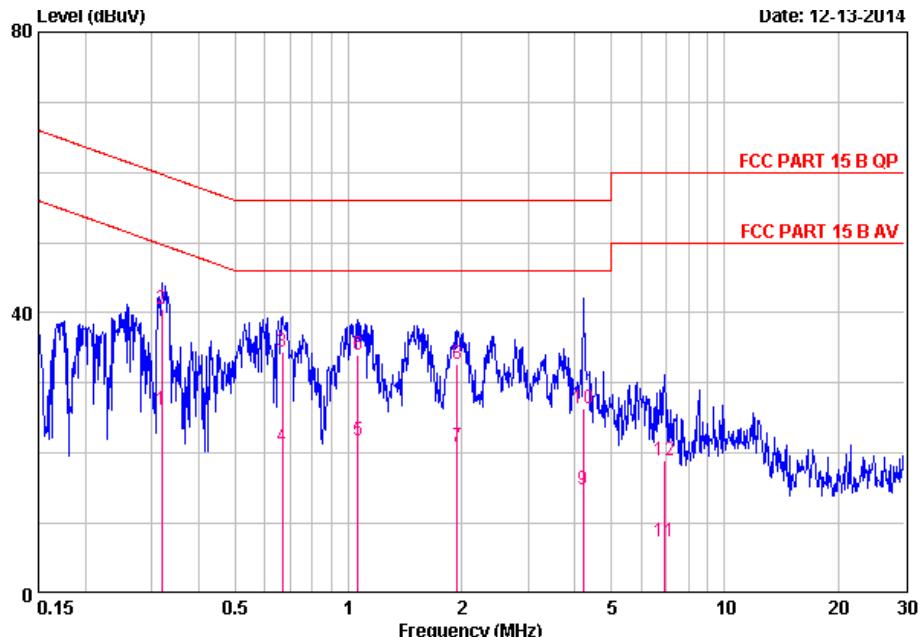
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6.1.3 Measurement Data

Live Line:

BT mode

Quasi-peak/ Average measurement:



| Freq MHz | Read Level dBuV | Cable Loss dB | LISN Factor dB | Level dBuV | Limit Line dBuV | Over Limit dB | Remark |
|-------------|-----------------------|---------------------|----------------------|---------------|-----------------------|---------------------|---------|
| 0.3183 | 25.75 | 0.30 | 0.11 | 26.16 | 49.75 | -23.59 | AVERAGE |
| 0.3183 | 40.11 | 0.30 | 0.11 | 40.52 | 59.75 | -19.23 | QP |
| 0.6683 | 33.87 | 0.30 | 0.18 | 34.35 | 56.00 | -21.65 | QP |
| 0.6683 | 20.38 | 0.30 | 0.18 | 20.86 | 46.00 | -25.14 | AVERAGE |
| 1.0597 | 21.62 | 0.01 | 0.23 | 21.86 | 46.00 | -24.14 | AVERAGE |
| 1.0597 | 33.81 | 0.01 | 0.23 | 34.05 | 56.00 | -21.95 | QP |
| 1.9489 | 20.62 | 0.10 | 0.26 | 20.98 | 46.00 | -25.02 | AVERAGE |
| 1.9489 | 32.37 | 0.10 | 0.26 | 32.73 | 56.00 | -23.27 | QP |
| 4.2018 | 14.38 | 0.10 | 0.41 | 14.89 | 46.00 | -31.11 | AVERAGE |
| 4.2018 | 25.88 | 0.10 | 0.41 | 26.39 | 56.00 | -29.61 | QP |
| 6.9141 | 6.84 | 0.10 | 0.46 | 7.40 | 50.00 | -42.60 | AVERAGE |
| 6.9141 | 18.37 | 0.10 | 0.46 | 18.93 | 60.00 | -41.07 | QP |

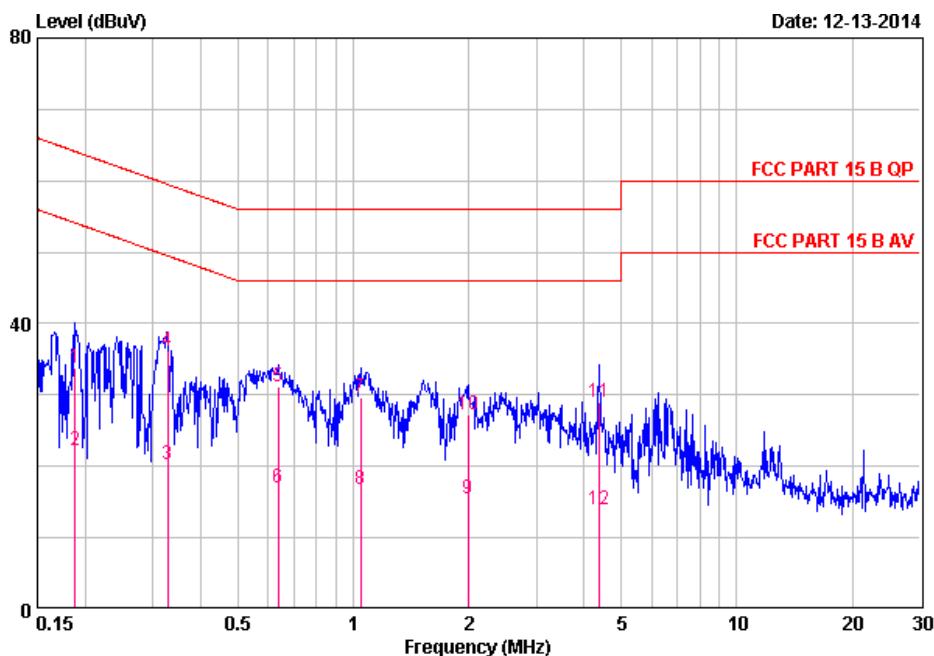
Level = Read Level + LISN Factor + Cable Loss.

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Neutral Line:

Quasi-peak/ Average measurement:



| Freq MHz | Read Level dBuV | Cable Loss dB | LISN Factor dB | Level dBuV | Limit Line dBuV | Over Line Limit dB | Remark |
|-------------|-----------------------|---------------------|----------------------|---------------|-----------------------|-----------------------------|---------|
| | | | | | | | |
| 0.1884 | 33.42 | 0.30 | 0.14 | 33.86 | 64.11 | -30.25 | QP |
| 0.1884 | 21.82 | 0.30 | 0.14 | 22.26 | 54.11 | -31.85 | AVERAGE |
| 0.3286 | 19.78 | 0.30 | 0.19 | 20.27 | 49.49 | -29.22 | AVERAGE |
| 0.3286 | 35.70 | 0.30 | 0.19 | 36.19 | 59.49 | -23.30 | QP |
| 0.6372 | 30.70 | 0.30 | 0.23 | 31.23 | 56.00 | -24.77 | QP |
| 0.6372 | 16.46 | 0.30 | 0.23 | 16.99 | 46.00 | -29.01 | AVERAGE |
| 1.0430 | 29.44 | 0.01 | 0.27 | 29.72 | 56.00 | -26.28 | QP |
| 1.0430 | 16.59 | 0.01 | 0.27 | 16.87 | 46.00 | -29.13 | AVERAGE |
| 1.9906 | 15.01 | 0.10 | 0.29 | 15.40 | 46.00 | -30.60 | AVERAGE |
| 1.9906 | 26.87 | 0.10 | 0.29 | 27.26 | 56.00 | -28.74 | QP |
| 4.3606 | 28.44 | 0.10 | 0.42 | 28.96 | 56.00 | -27.04 | QP |
| 4.3606 | 13.37 | 0.10 | 0.42 | 13.89 | 46.00 | -32.11 | AVERAGE |

Level = Read Level + LISN Factor + Cable Loss.

Remarks: The Aux in input port is the auto switch between Aux in and Bluetooth mode.
 No termination or plug-in is need during test.

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6.2 Radiated Emissions, 9kHz to 1GHz

Test Requirement: FCC Part15 Subpart C Section 15.209 and 15.249(d)
 Test Method: ANSI C63.4:2003
 Test Date: 2014-12-12
 Frequency Range: The lowest frequency generated by EUT, 16MHz to 1GHz
 Measurement Distance: 3m
 Detector: Peak for pre-scan
 (200Hz resolution bandwidth and 1kHz video bandwidth for measurement between 9kHz – 150kHz)
 (9kHz resolution bandwidth and 100kHz video bandwidth for measurement between 150kHz – 30MHz)
 (120kHz resolution bandwidth and 1MHz video bandwidth for measurement between 30MHz to 1GHz)
 Quasi-Peak if maximised peak within 6dB of limit

Limit :

| Frequency range MHz | Quasi-peak limits dB (μ V/m) |
|------------------------|--------------------------------------|
| 0.009 – 0.490 | -72.4 – 20logF(MHz) |
| 0.490 – 1.705 | -12.4 – 20logF(MHz) |
| 1.705 – 30.0 | -10.5 |
| 30 to 88 | 40 |
| 88 to 216 | 43.5 |
| 216 to 960 | 46 |
| Above 960 | 54 |

Note: 1) At transitional frequencies the lower limit applies.
 2) F is the frequency of the spurious emission measured in MHz.
 3) Limit from 0.009 – 30 MHz is converted from measuring distance 300m or 30m to 3m with the formula provided in FCC Part 15, section 15.31(f)(2)

6.2.1 EUT Operation

Operating Environment:

Temperature: 24 °C Humidity: 55%

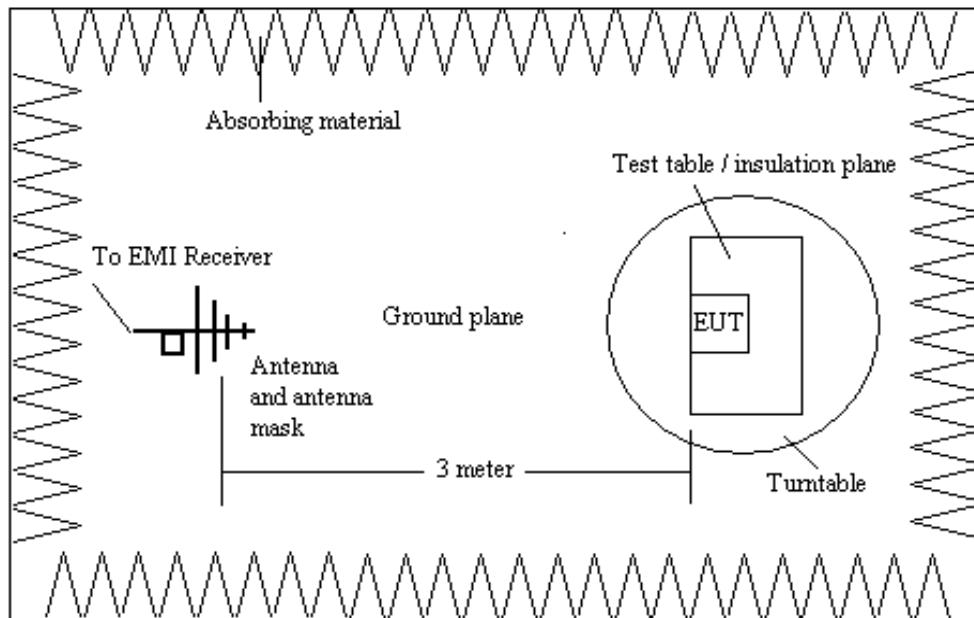
EUT Operation: Pre-test with adaptor or battery operate and Peak detector with the following mode(s):
 1: Transmission with GFSK (packet DH1/DH3/DH5)
 2: Transmimission with II/4-DQPSK (packet 2DH1/2DH3/2DH5)
 3: Transmission with 8DPSK (packet 3DH1/3DH3/3DH5)

Final test with adaptor and Quasi-Peak detector with the following mode(s):

1: Transmission with GFSK (packet DH5)

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6.2.2 Test Setup and Procedure



1. The pre-test of the radiated emissions test was conducted in a semi-anechoic chamber and the final measurement was conducted in the open area test site.
2. The EUT was connected to AC power source through a mains power outlet which was bonded to the ground reference plane. The EUT was placed upon a non-metallic table 0.8m above the ground reference plane.
3. Loop antennat and Bilog antenna was used for the frequency range from the lowest generated frequency to 30MHz and 30MHz to 1GHz respectively
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT with located frequencies.
5. The actual frequencies of maximum emission were confirmed in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters for Bilog antenna (Loop antenna is still maintain in 1m hight) in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

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6.2.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. The EUT was measured by Bilog antenna with 2 orthogonal polarities and frequencies of peak emissions from the EUT were detected within 6dB of the limit line. Final measurement was conducted in the open area test site with data as follows:

Test results:

(1) Operation Frequency : 2402MHz

| Frequency (MHz) | Antenna Polarization | Correction Factor (dB/m) | Receiver QP Reading (dB μ V) | Emission Level (dB μ V/m) | Limit (dB μ V/m) | Over Limit (dB) |
|-----------------|----------------------|--------------------------|----------------------------------|-------------------------------|----------------------|-----------------|
| 30.313 | V | 19.0 | 2.7 | 21.7 | 40.0 | -18.3 |
| 60.000 | V | 9.7 | 25.0 | 34.7 | 40.0 | -5.3 |
| 109.601 | H | 10.7 | 29.2 | 39.9 | 43.5 | -3.6 |
| 208.000 | H | 9.6 | 23.3 | 32.9 | 43.5 | -10.6 |
| 288.000 | H | 13.7 | 20.5 | 34.2 | 46.0 | -11.8 |
| 472.000 | H | 18.2 | 5.3 | 23.5 | 46.0 | -22.5 |

Test results:

(2) Operation Frequency : 2441MHz

| Frequency (MHz) | Antenna Polarization | Correction Factor (dB/m) | Receiver QP Reading (dB μ V) | Emission Level (dB μ V/m) | Limit (dB μ V/m) | Over Limit (dB) |
|-----------------|----------------------|--------------------------|----------------------------------|-------------------------------|----------------------|-----------------|
| 32.250 | H | 18.2 | 3.4 | 21.6 | 40.0 | -18.4 |
| 60.000 | V | 9.7 | 23.4 | 33.1 | 40.0 | -6.9 |
| 112.000 | V | 10.8 | 30.2 | 41.0 | 43.5 | -2.5 |
| 148.800 | V | 11.2 | 20.7 | 31.9 | 43.5 | -11.6 |
| 216.000 | H | 9.9 | 24.2 | 34.1 | 46.0 | -11.9 |
| 360.000 | H | 14.2 | 23.7 | 37.9 | 46.0 | -8.1 |

Test results:
(3) Operation Frequency : 2480MHz

| Frequency (MHz) | Antenna Polarization | Correction Factor (dB/m) | Receiver QP Reading (dB μ V) | Emission Level (dB μ V/m) | Limit (dB μ V/m) | Over Limit (dB) |
|-----------------|----------------------|--------------------------|----------------------------------|-------------------------------|----------------------|-----------------|
| 31.125 | V | 18.6 | 3.3 | 21.9 | 40.0 | -18.1 |
| 61.600 | V | 9.6 | 25.5 | 35.1 | 40.0 | -4.9 |
| 112.000 | V | 10.8 | 31.6 | 42.4 | 43.5 | -1.1 |
| 128.800 | V | 11.4 | 29.3 | 40.7 | 43.5 | -2.8 |
| 244.801 | H | 11.7 | 29.3 | 41.0 | 46.0 | -5.0 |
| 312.000 | H | 13.8 | 23.1 | 36.9 | 46.0 | -9.1 |

Note:

- 1) All readings are Quasi-Peak values.
- 2) Correction Factor = Antenna Factor + Cable Loss.
- 3) The above results were the worst case results with the EUT positioned in all 3 axis during the test. The EUT was positioned vertically and horizontally on the table for vertical and horizontal measurement respectively.
- 4) Other emissions more than 20dB below the limit are not shown on the above table and only worst six emissions below 1GHz are listed.
- 5) The Aux in input port is the auto switch between Aux in and Bluetooth mode. No termination or plug-in is need during test.

6.3 Radiated Emissions above 1 GHz

Test Requirement: FCC Part15 Subpart C Section 15.209 & 15.249(a) & (d)
Test Method: ANSI C63.4:2003
Test Date: 2014-12-15
Frequency Range: 1GHz – 26GHz
Measurement Distance: 3m
Detector: Peak for pre-scan (1MHz resolution bandwidth, 1MHz video bandwidth)
Average and Peak detector for final test

Limit:

Fundamental Frequency :

| Frequency range MHz | Limits (Peak) dB (μ V/m) | Limits (Average) dB (μ V/m) |
|------------------------|----------------------------------|-------------------------------------|
| 2400 to 2483.5 | 114 | 94 |

Spurious Emission :

| Frequency range MHz | Limits (Peak) dB (μ V/m) | Limits (Average) dB (μ V/m) |
|------------------------|----------------------------------|-------------------------------------|
| Over 1000 | 74 | 54 |

6.3.1 EUT Operation

Operating Environment:

Temperature: 22.6 °C

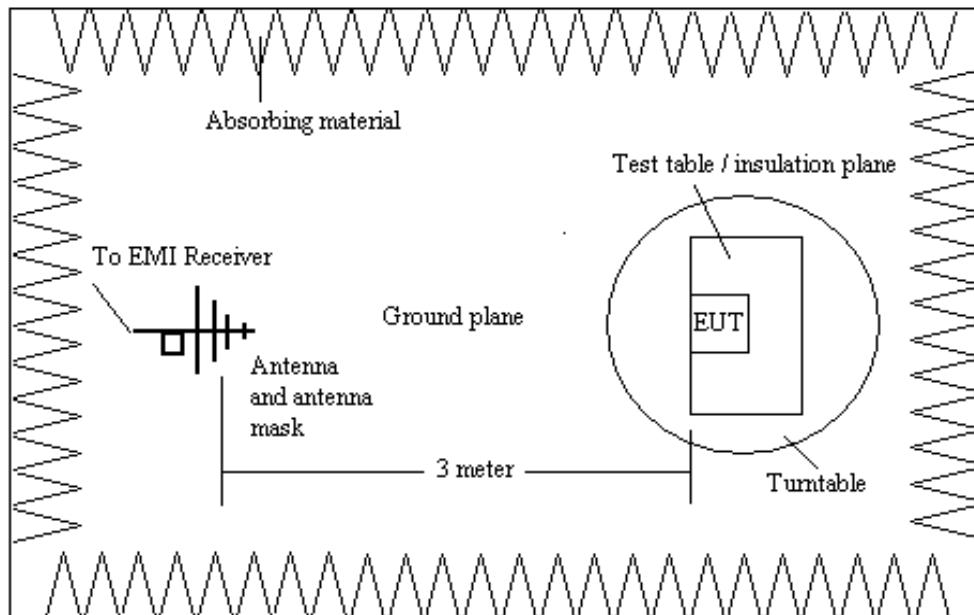
EUT Operation: Pre-test with adaptor or battery operate and Peak detector with the following mode(s):

- 1: Transmission with GFSK (packet DH1/DH3/DH5)
- 2: Transmimssion with $\Pi/4$ -DQPSK (packet 2DH1/2DH3/2DH5)
- 3: Transmission with 8DPSK (packet 3DH1/3DH3/3DH5)

Final test with adaptor and Peak and Avearge detector with the following mode(s):

1: Transmission with GFSK (packet DH5)

6.3.2 Test Setup and Procedure



1. The pre-test of the radiated emissions test was conducted in a semi-anechoic chamber and the final measurement was conducted in the open area test site.
2. The EUT was connected to AC power source through a mains power outlet which was bonded to the ground reference plane. The EUT was placed upon a non-metallic table 0.8m above the ground reference plane.
3. Horn antenna was used for the frequency over 1GHz
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT with located frequencies.
5. The actual frequencies of maximum emission were confirmed in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

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6.3.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. The EUT was measured with 2 orthogonal polarities and frequencies of average emissions from the EUT were measured as follows:

Test results :

(1) Fundamental Frequency

| Frequency (MHz) | Antenna Polarization | Emission Level (dB μ V/m) | | Limit (dB μ V/m) | | Remark |
|-----------------|----------------------|-------------------------------|---------|----------------------|---------|--------|
| | | Peak | Average | Peak | Average | |
| 2402.0 | H | 90.87 | 89.88 | 114 | 94 | Pass |
| 2402.0 | V | 92.70 | 91.74 | 114 | 94 | Pass |
| 2441.0 | H | 92.09 | 90.81 | 114 | 94 | Pass |
| 2441.0 | V | 94.44 | 93.45 | 114 | 94 | Pass |
| 2480.0 | H | 91.31 | 90.23 | 114 | 94 | Pass |
| 2480.0 | V | 91.19 | 89.77 | 114 | 94 | Pass |

(2) Spurious Emission

Operation Frequency : 2402.0 MHz

| Frequency (MHz) | Antenna Polarization | Emission Level (dB μ V/m) | | Limit (dB μ V/m) | | Remark |
|-----------------|----------------------|-------------------------------|---------|----------------------|---------|--------|
| | | Peak | Average | Peak | Average | |
| 4804 | H | 53.86 | 46.98 | 74 | 54 | Pass |
| 5817 | H | 52.29 | 40.97 | 74 | 54 | Pass |
| 7382 | H | 52.50 | 42.39 | 74 | 54 | Pass |
| 9608 | H | 54.90 | 43.27 | 74 | 54 | Pass |
| 10880 | H | 62.42 | 51.13 | 74 | 54 | Pass |
| 12010 | H | 57.50 | 46.51 | 74 | 54 | Pass |

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Operation Frequency : 2441.0 MHz

| Frequency (MHz) | Antenna Polarization | Emission Level (dB μ V/m) | | Limit (dB μ V/m) | | Remark |
|-----------------|----------------------|-------------------------------|---------|----------------------|---------|--------|
| | | Peak | Average | Peak | Average | |
| 4882 | V | 53.62 | 46.70 | 74 | 54 | Pass |
| 6015 | H | 53.26 | 41.58 | 74 | 54 | Pass |
| 7590 | H | 53.73 | 42.95 | 74 | 54 | Pass |
| 8730 | H | 57.52 | 45.71 | 74 | 54 | Pass |
| 10890 | H | 61.11 | 50.92 | 74 | 54 | Pass |
| 12205 | H | 57.81 | 46.37 | 74 | 54 | Pass |

Operation Frequency : 2480.0 MHz

| Frequency (MHz) | Antenna Polarization | Emission Level (dB μ V/m) | | Limit (dB μ V/m) | | Remark |
|-----------------|----------------------|-------------------------------|---------|----------------------|---------|--------|
| | | Peak | Average | Peak | Average | |
| 1897 | H | 49.84 | 49.46 | 74 | 54 | Pass |
| 4960 | V | 51.90 | 45.06 | 74 | 54 | Pass |
| 6110 | H | 52.53 | 39.96 | 74 | 54 | Pass |
| 7440 | H | 52.93 | 40.63 | 74 | 54 | Pass |
| 9390 | H | 55.30 | 43.14 | 74 | 54 | Pass |
| 12400 | H | 57.46 | 45.54 | 74 | 54 | Pass |

Note:

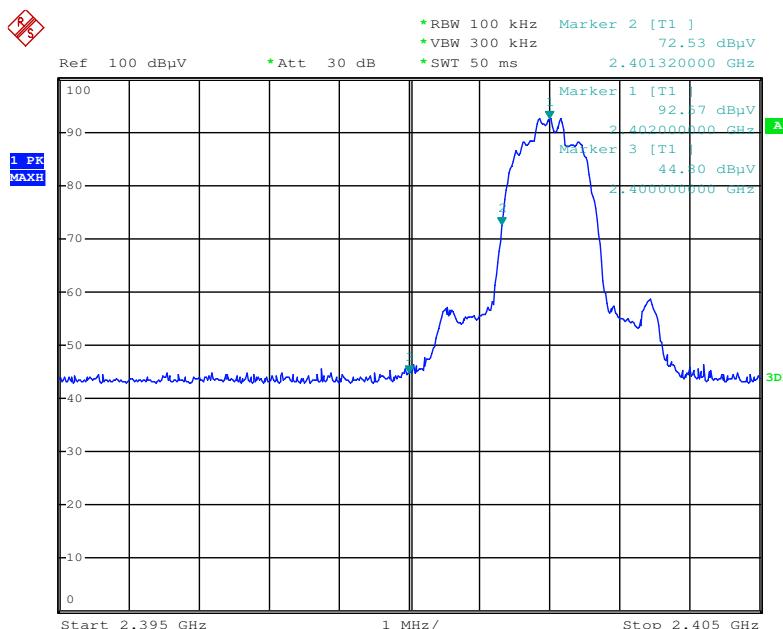
- 1) The above results were the worst case results with the EUT positioned in all 3 axis during the test. The EUT was positioned vertically and horizontally on the table for vertical and horizontal measurement respectively.
- 2) Other emissions more than 20dB below the limit are not shown on the above table and only worst six emissions below 1GHz are listed.
- 3) The Aux in input port is the auto switch between Aux in and Bluetooth mode. No termination or plug-in is need during test.

6.4 Band Edge / 20 dB Bandwidth

Test Requirement: FCC Part15 Subpart C Section 15.215, 15.249(d)
 Test Method: ANSI C63.4:2003 and Marker-Delta Method
 Test Date: 2014-12-13
 EUT Operation: 1: Transmission with GFSK
 2: Transmission with II/4-DQPSK;
 3: Transmission with 8DPSK;
 Result: Pass

Test Plot : (Worst case: Transmission with 8DPSK)

Operation frequency : 2402.0 MHz



Date: 16.DEC.2014 09:35:57

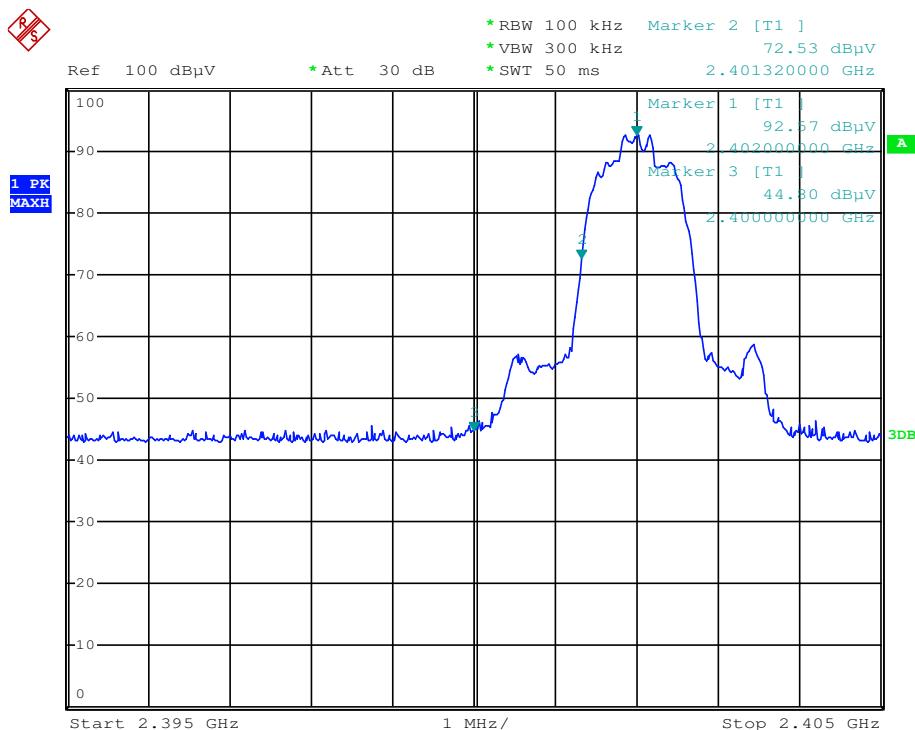
According to the page 21 of this report, the emission of the fundamental frequency 2402MHz is 92.7dB_{uV}/m and 91.74dB_{uV}/m for peak and average level respectively. Based on the delta method, the emission at the bandedge, 2400MHz, is more than 40dB below the fundamental and 20dB bandwidth falls in assigned band. It is deemed to comply with section 15.215. Besides, it is below the limit of 74dB_{uV}/m and 54dB_{uV}/m for peak and average level under 15.209. It is deemed to comply with section 15.249(d).

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Test Plot : (Worst case: Transmission with 8DPSK)

Operation frequency : 2480.0 MHz



Date: 16.DEC.2014 09:35:57

According to the page 21 of this report, the emission of the fundamental frequency 2480MHz is 91.31dB μ V/m and 90.21dB μ V/m for peak and average level respectively. Based on the delta method, the emission at the bandedge, 2483.5MHz, is more than 40dB below the fundamental and 20dB bandwidth falls in the assigned band. It is deemed to comply with section 15.215. Besides, it is below the limit of 74dB μ V/m and 54dB μ V/m for peak and average level under 15.209. It is deemed to comply with section 15.249(d).

7 Photographs

7.1 Conduct Emission Test Setup



7.2 Radiatd Emission Test Setup



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EUT Constructional Details



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