# Variant FCC RF Test Report

| | | |
|---|---|---|
| APPLICANT | : | Motorola Mobility LLC |
| EQUIPMENT | : | Mobile Cellular Phone |
| BRAND NAME | : | Motorola |
| MODEL NAME | : | 9370, 9842 |
| FCC ID | : | IHDT56VE2 |
| STANDARD | : | FCC Part 15 Subpart C §15.247 |
| CLASSIFICATION | : | (DTS) Digital Transmission System |

**This is a variant report which is only valid together with the original report. The product testing was completed on Dec. 15, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.**

James Huang

**Prepared by: James Huang / Manager**

**Approved by: Jones Tsai / Manager**

Testing Laboratory 2627

***SPORTON INTERNATIONAL (KUNSHAN) INC.***
***No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China***

# TABLE OF CONTENTS

**SUMMARY OF TEST RESULT** ..... **4**

**1 GENERAL DESCRIPTION** ..... **5**

1.1 Applicant ..... 5
1.2 Manufacturer ..... 5
1.3 Product Feature of Equipment Under Test ..... 5
1.4 Product Specification of Equipment Under Test ..... 6
1.5 Specification of Accessory ..... 6
1.6 Modification of EUT ..... 7
1.7 Testing Location ..... 7
1.8 Applicable Standards ..... 7

**2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST** ..... **8**

2.1 Test Mode ..... 8
2.2 Connection Diagram of Test System ..... 9
2.3 EUT Operation Test Setup ..... 9

**3 TEST RESULT** ..... **10**

3.1 Radiated Band Edges and Spurious Emission Measurement ..... 10

**4 LIST OF MEASURING EQUIPMENT** ..... **14**

**5 UNCERTAINTY OF EVALUATION** ..... **15**

**APPENDIX A. RADIATED TEST RESULTS**

**APPENDIX B. DUTY CYCLE PLOTS**

**APPENDIX C. SETUP PHOTOGRAPHS**

**APPENDIX D. PRODUCT EQUALITY DECLARATION**

**APPENDIX E. ORIGINAL REPORT**

# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FR6O1212-11B | Rev. 01 | This is a variant report for 9370, 9842. The product equality declaration could be referred to Appendix D. Based on the similarity between current and previous, only the worse cases of Radiated Spurious Emission from original test report (Sporton Report Number FR6O1212-02B) were verified for the differences. | Jan. 13, 2017 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# SUMMARY OF TEST RESULT

| Report Section | FCC Rule | Description | Limit | Result | Remark |
|---|---|---|---|---|---|
| 3.1 | 15.247(d) | Radiated Band Edges and Spurious Emission | 15.209(a) & 15.247(d) | Pass | Under limit 3.17 dB at 47.460 MHz |

# 1 General Description

## 1.1 Applicant

**Motorola Mobility LLC**
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

## 1.2 Manufacturer

**Motorola Mobility LLC**
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

## 1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | Mobile Cellular Phone |
| **Brand Name** | Motorola |
| **Model Name** | 9370, 9842 |
| **FCC ID** | IHDT56VE2 |
| **EUT supports Radios application** | GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM uplink is not supported)/LTE/NFC/ WLAN2.4GHz 802.11b/g/n HT20 WLAN5GHz 802.11a/n HT20/HT40/ Bluetooth v3.0+EDR/Bluetooth v4.0 LE/ Bluetooth v4.2 LE |
| **IMEI Code** | Radiation: 351557080038217/351557080038225 |
| **HW Version** | DVT2 |
| **SW Version** | potter_oem_userdebug_7.0_NPN25.124_1787_intcfg-test-keys_oem |
| **EUT Stage** | Identical Prototype |

**Remark:**

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples are only for SIM slot, sample 1 is dual SIM slot, sample 2 is single SIM slot. According to the difference, the sample 1 to perform full RF test.

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| **Tx/Rx Frequency Range** | 2402 MHz ~ 2480 MHz |
| **Number of Channels** | 40 |
| **Carrier Frequency of Each Channel** | 40 Channel(37 hopping + 3 advertising channel) |
| **Antenna Type** | Loop Antenna |
| **Type of Modulation** | GFSK |

## 1.5 Specification of Accessory

| Specification of Accessory | | | | |
|---|---|---|---|---|
| **AC Adapter** | **Brand Name** | Motorola(Salom) | **Model Name** | SSW-2680US/SSW-2680UK/ SSW-2680EU/SSW-2680MX/ SSW-2680AR |
| | **Power Rating** | I/P: 100-240 Vac, 500mA, O/P: 5 Vdc,1600mA or 9Vdc,1600mA or 12Vdc,1200mA | | |
| **Battery 1** | **Brand Name** | motorola(SUNWODA) | **Model Name** | HG40 |
| | **Power Rating** | 3.8Vdc,2810/3000mAh (Min/Typ) | **Type** | Li-ion |
| **Battery 2** | **Brand Name** | motorola(Amperex) | **Model Name** | HG40 |
| | **Power Rating** | 3.8Vdc,2810/3000mAh (Min/Typ) | **Type** | Li-ion |
| **USB Cable** | **Brand Name** | Motorola | **Model Name** | SKN6461A |
| | **Signal Line Type** | 1.0 meter, non-shielded cable, without ferrite core | | |
| **Earphone** | **Brand Name** | Motorola(Jiangxi Lianchuang) | **Model Name** | MEMD1532B080008 |
| | **Signal Line Type** | 1.2 meter, non-shielded cable, without ferrite core | | |

## 1.6 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.7 Testing Location

| | | |
|---|---|---|
| **Test Site** | SPORTON INTERNATIONAL (KUNSHAN) INC. | |
| **Test Site Location** | No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China<br>TEL: +86-0512-5790-0158<br>FAX: +86-0512-5790-0958 | |
| **Test Site No.** | **Sporton Site No.** | **FCC Registration No.** |
| | 03CH03-KS | 306251 |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

## 1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
- ANSI C63.10-2013

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 2 Test Configuration of Equipment Under Test

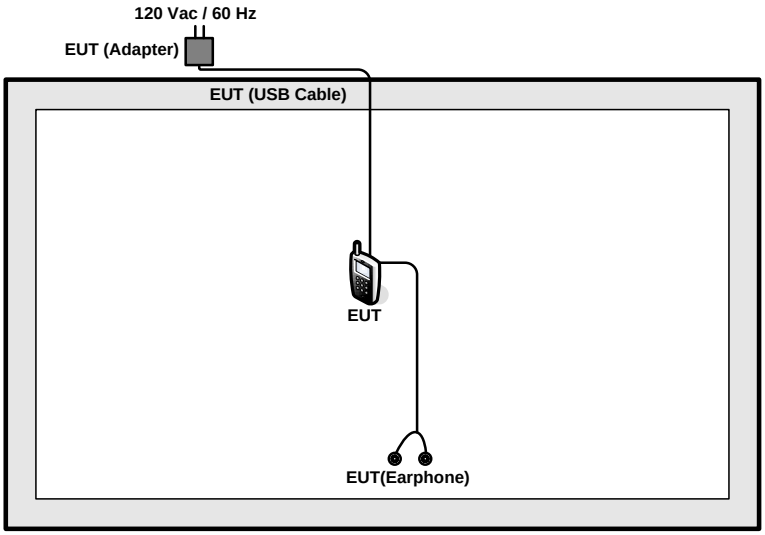
## 2.1 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

| Summary table of Test Cases | |
|---|---|
| **Test Item** | **Data Rate / Modulation** |
| | **Bluetooth LE / GFSK** |
| **Radiated TCs** | Mode 1: Bluetooth Tx CH39_2480 MHz_1Mbps |
| **Remark:** For radiated test cases, the tests were performance with adapter, earphone and USB cable. | |

## 2.2 Connection Diagram of Test System

**<Bluetooth LE Tx Mode>**




## 2.3 EUT Operation Test Setup

For Bluetooth LE function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

# 3 Test Result

## 3.1 Radiated Band Edges and Spurious Emission Measurement

### 3.1.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

### 3.1.2 Measuring Instruments

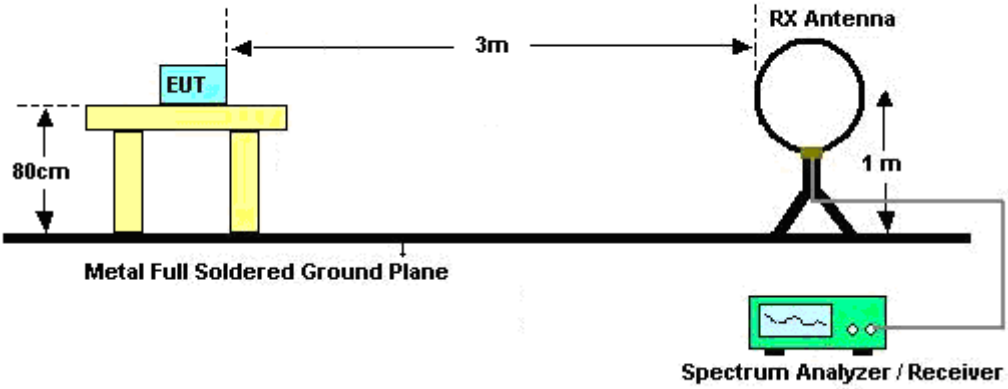
The section 4.0 of List of Measuring Equipment of this test report is used for test.

### 3.1.3 Test Procedures

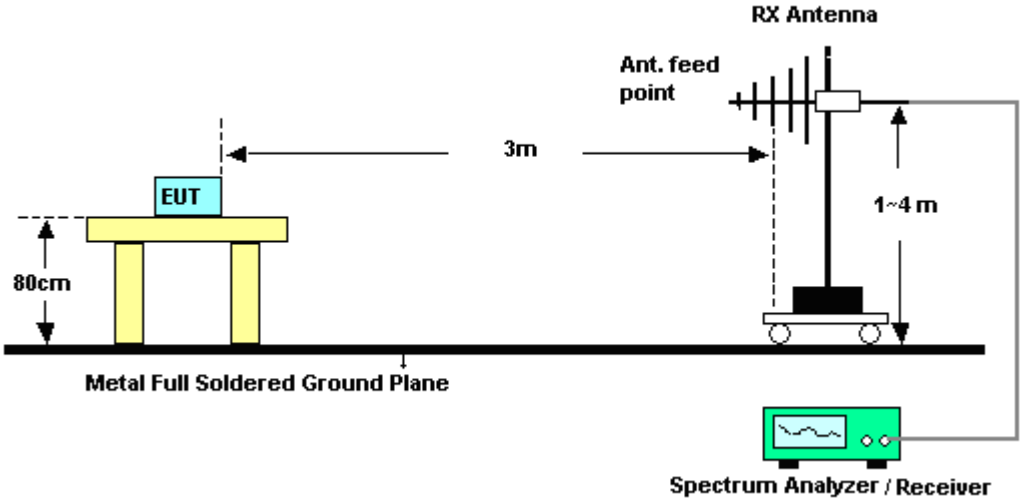
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

### 3.1.4 Test Setup

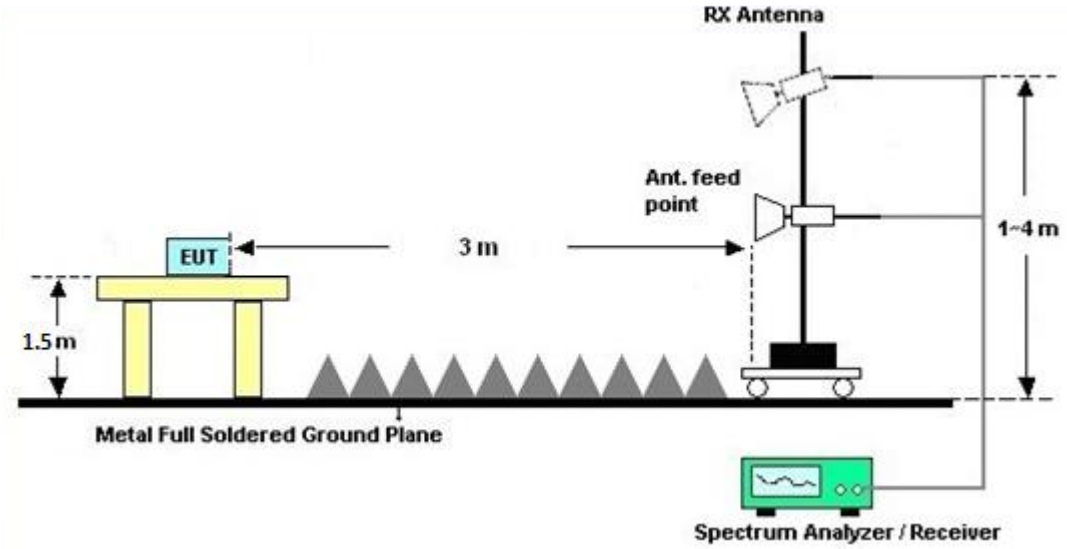
**For radiated emissions below 30MHz**




**For radiated emissions from 30MHz to 1GHz**



**For radiated emissions above 1GHz**




### 3.1.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

### 3.1.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

### 3.1.7 Duty Cycle

Please refer to Appendix B.

### 3.1.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix A.

# 4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI | 100534 | 9kHz~3GHz | Oct. 13, 2016 | Dec. 15, 2016 | Oct. 12, 2017 | Radiation (03CH03-KS) |
| EXA Spectrum Analyzer | Keysight | N9010A | MY55150244 | 10Hz~44GHz | Apr. 22, 2016 | Dec. 15, 2016 | Apr. 21, 2017 | Radiation (03CH03-KS) |
| Loop Antenna | R&S | HFH2-Z2 | 100321 | 9kHz~30MHz | Nov. 23, 2016 | Dec. 15, 2016 | Nov. 22, 2017 | Radiation (03CH03-KS) |
| Bilog Antenna | TeseQ | CBL6112D | 35406 | 25MHz~2GHz | Apr. 16, 2016 | Dec. 15, 2016 | Apr. 15, 2017 | Radiation (03CH03-KS) |
| Horn Antenna | Schwarzbeck | BBHA9120D | 9120D-1356 | 1GHz~18GHz | Apr. 16, 2016 | Dec. 15, 2016 | Apr. 15, 2017 | Radiation (03CH03-KS) |
| SHF-EHF Horn | Schwarzbeck | BBHA 9170 | BBHA170249 | 15GHz~40GHz | Mar. 03, 2016 | Dec. 15, 2016 | Mar. 02, 2017 | Radiation (03CH03-KS) |
| Amplifier | SONOMA | 310N | 187289 | 9kHz~1GHz | Aug. 09, 2016 | Dec. 15, 2016 | Aug. 08, 2017 | Radiation (03CH03-KS) |
| High Gain Amplifier | MITEQ | AMF-7D-00101800-30-10P | 1943529 | 1GHz~18GHz | Jan. 20, 2016 | Dec. 15, 2016 | Jan. 19, 2017 | Radiation (03CH03-KS) |
| Amplifier | Agilent | 8449B | 3008A02370 | 1GHz~26.5GHz | Oct. 13, 2016 | Dec. 15, 2016 | Oct. 12, 2017 | Radiation (03CH03-KS) |
| AC Power Source | Chroma | 61601 | F104090004 | N/A | NCR | Dec. 15, 2016 | NCR | Radiation (03CH03-KS) |
| Turn Table | ChamPro | EM 1000-T | 060762-T | 0~360 degree | NCR | Dec. 15, 2016 | NCR | Radiation (03CH03-KS) |
| Antenna Mast | ChamPro | EM 1000-A | 060762-A | 1 m~4 m | NCR | Dec. 15, 2016 | NCR | Radiation (03CH03-KS) |

NCR: No Calibration Required

# 5 Uncertainty of Evaluation

**Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **4.5dB** |

**Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **4.5dB** |

**Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **4.6dB** |

# Appendix A. Radiated Spurious Emission

**2.4GHz 2400~2483.5MHz**

**BLE (Band Edge @ 3m)**

| BLE | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| BLE CH 39 2480MHz | * | 2480 | 92.88 | - | - | 96.67 | 27.64 | 5.51 | 36.94 | 100 | 175 | P | H |
| | * | 2480 | 92.22 | - | - | 96.01 | 27.64 | 5.51 | 36.94 | 100 | 175 | A | H |
| | | 2483.68 | 51.68 | -22.32 | 74 | 55.47 | 27.64 | 5.51 | 36.94 | 100 | 175 | P | H |
| | | 2483.56 | 41.93 | -12.07 | 54 | 45.72 | 27.64 | 5.51 | 36.94 | 100 | 175 | A | H |
| | * | 2480 | 96.39 | - | - | 100.18 | 27.64 | 5.51 | 36.94 | 100 | 64 | P | V |
| | * | 2480 | 95.23 | - | - | 99.02 | 27.64 | 5.51 | 36.94 | 100 | 64 | A | V |
| | | 2483.56 | 51.35 | -22.65 | 74 | 55.14 | 27.64 | 5.51 | 36.94 | 100 | 64 | P | V |
| | | 2483.5 | 42.7 | -11.3 | 54 | 46.49 | 27.64 | 5.51 | 36.94 | 100 | 64 | A | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## 2.4GHz 2400~2483.5MHz

## BLE (Harmonic @ 3m)

| BLE | Note | Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level ( dBμV ) | Antenna Factor ( dB/m ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Peak Avg. (P/A) | Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BLE CH 39 2480MHz | | 4962 | 41.98 | -32.02 | 74 | 39.07 | 31.72 | 7.82 | 36.63 | 100 | 360 | P | H |
| | | 7440 | 45.97 | -28.03 | 74 | 38.43 | 34.44 | 9.87 | 36.77 | 100 | 360 | P | H |
| | | 4962 | 41.74 | -32.26 | 74 | 38.83 | 31.72 | 7.82 | 36.63 | 100 | 360 | P | V |
| | | 7440 | 45.5 | -28.5 | 74 | 37.96 | 34.44 | 9.87 | 36.77 | 100 | 360 | P | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against Peak and Average limit line. | | | | | | | | | | | | |

## Emission below 1GHz

## 2.4GHz BLE (LF)

| BLE | Note | Frequency | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Ant Pos | Table Pos | Peak Avg. | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | (dBμV) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 2.4GHz BLE LF | | 30 | 35.34 | -4.66 | 40 | 38.76 | 27.2 | 0.65 | 31.27 | - | - | P | H |
| | | 47.46 | 32.68 | -7.32 | 40 | 45.56 | 17.7 | 0.84 | 31.42 | - | - | P | H |
| | | 87.23 | 26.29 | -13.71 | 40 | 39.5 | 17.2 | 1.13 | 31.54 | - | - | P | H |
| | | 139.61 | 24.88 | -18.62 | 43.5 | 36.88 | 18.1 | 1.43 | 31.53 | - | - | P | H |
| | | 156.1 | 39.88 | -3.62 | 43.5 | 52.26 | 17.65 | 1.51 | 31.54 | 100 | 87 | P | H |
| | | 418.97 | 34.36 | -11.64 | 46 | 39.02 | 24.06 | 2.53 | 31.25 | - | - | P | H |
| | | 30 | 36.7 | -3.3 | 40 | 40.12 | 27.2 | 0.65 | 31.27 | - | - | P | V |
| | | 37.76 | 29.48 | -10.52 | 40 | 36.58 | 23.52 | 0.74 | 31.36 | - | - | P | V |
| | | 47.46 | 36.83 | -3.17 | 40 | 49.71 | 17.7 | 0.84 | 31.42 | 100 | 288 | P | V |
| | | 86.26 | 30.38 | -9.62 | 40 | 43.72 | 17.1 | 1.13 | 31.57 | - | - | P | V |
| | | 428.67 | 28.54 | -17.46 | 46 | 32.71 | 24.51 | 2.57 | 31.25 | - | - | P | V |
| | | 569.32 | 29.99 | -16.01 | 46 | 33.72 | 24.68 | 2.98 | 31.39 | - | - | P | V |
| **Remark** | 1. No other spurious found.<br>2. All results are PASS against limit line. | | | | | | | | | | | | |

## Note symbol

| | |
|---|---|
| * | **Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency. |
| ! | Test result is **over limit** line. |
| P/A | **P**eak or **A**verage |
| H/V | **H**orizontal or **V**ertical |

## A calculation example for radiated spurious emission is shown as below:

| WIFI | Note | Frequency | Level | Over | Limit | Read | Antenna | Cable | Preamp | Ant | Table | Peak | Pol. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ant. | | | | Limit | Line | Level | Factor | Loss | Factor | Pos | Pos | Avg. | |
| 1+2 | | ( MHz ) | ( dBμV/m ) | ( dB ) | ( dBμV/m ) | ( dBμV ) | ( dB/m ) | ( dB ) | ( dB ) | ( cm ) | ( deg ) | (P/A) | (H/V) |
| 802.11b CH 01 2412MHz | | 2390 | 55.45 | -18.55 | 74 | 54.51 | 32.22 | 4.58 | 35.86 | 103 | 308 | P | H |
| | | 2390 | 43.54 | -10.46 | 54 | 42.6 | 32.22 | 4.58 | 35.86 | 103 | 308 | A | H |

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

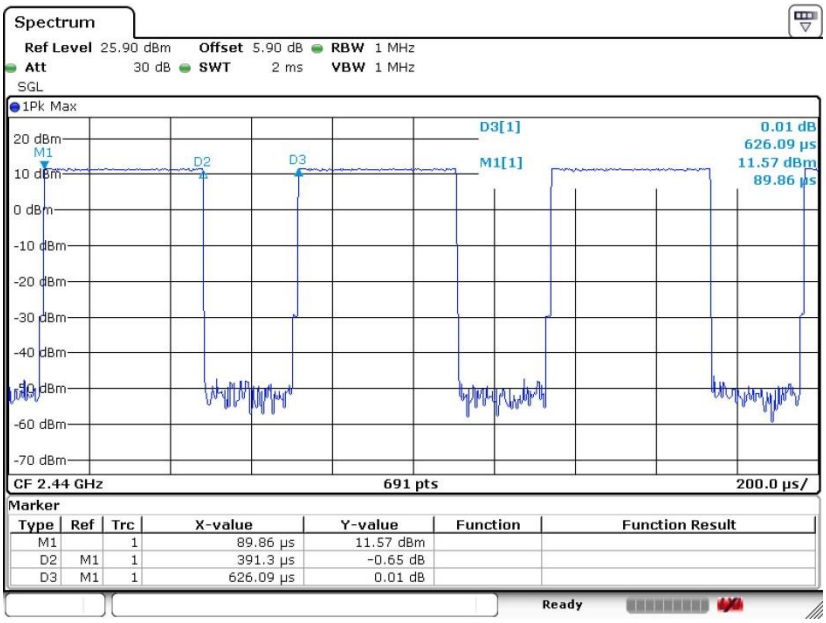
= -10.46(dB)

**Both peak and average measured complies with the limit line, so test result is “PASS”.**

# Appendix B. Duty Cycle Plots

| Band | Duty Cycle(%) | T(ms) | 1/T(kHz) | VBW Setting |
|---|---|---|---|---|
| Bluetooth LE | 62.50 | 0.39 | 2.56 | 3kHz |

**Bluetooth LE**



# Appendix D. Product Equality Declaration

# Appendix E. Original Report

Please refer to Sporton report number FR6O1212-02B which is issued separately.