# FCC 47 CFR PART 15 SUBPART C

# TEST REPORT

*For*

| | |
|---|---|
| **Applicant :** | **YF International Limited** |
| **Address :** | **17th Floor, Zhongke Building, China Academy of Science& Tech Development, High Tech South Street 1, Shenzhen, China, 518057** |
| **Product Name :** | **GPS Portable Navigation Device** |
| **Model Name :** | **84A-53, 84A-1, 84A-2, 84A-3, 84A-4, 84A-5, 84A-6, 84A-7, 84A-8, 84A-9, 84A-54, 84A-56, 84A-57, 84A-58, 84A-59, PA08-6001, HD5001, KMG 2902, KMG 2907** |
| **Brand Name :** | **N/A** |
| **FCC ID :** | **VUP-G08001** |
| **Report No. :** | **MOST/STS091207F1** |
| **Date of Issue :** | **January 18, 2010** |


| | |
|---|---|
| **Issued by :** | **Most Technology Service Co., Ltd.** |
| **Address :** | **No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China** |
| **Tel :** | **86-755-8617 0306** |
| **Fax :** | **86-755-8617 0310** |

# TABLE OF CONTENTS

# 1. VERIFICATION OF CONFORMITY

| | |
|---|---|
| **Equipment Under Test:** | GPS Portable Navigation Device |
| **Brand Name:** | N/A |
| **Model Number:** | 84A-53, 84A-1, 84A-2, 84A-3, 84A-4, 84A-5, 84A-6, 84A-7, 84A-8, 84A-9, 84A-54, 84A-56, 84A-57, 84A-58, 84A-59, PA08-6001, HD5001, KMG 2902, KMG 2907 |
| **FCC ID：** | VUP-G08001 |
| **Applicant:** | YF International Limited<br>17th Floor, Zhongke Building, China Academy of Science& Tech Development, High Tech South Street 1, Shenzhen, China, 518057 |
| **Manufacturer:** | YF International Limited<br>17th Floor, Zhongke Building, China Academy of Science& Tech Development, High Tech South Street 1, Shenzhen, China, 518057 |
| **Technical Standards:** | 47 CFR Part 15 Subpart C |
| **File Number:** | MOST/STS091207F1 |
| **Date of test:** | December 25,2009- January 18, 2010 |
| **Deviation:** | None |
| **Condition of Test Sample:** | Normal |
| **Test Result:** | PASS |

The above equipment was tested by Most Technology Service Co., Ltd. for compliance with the requirements set forth in FCC rules and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Tested by (+ signature): Candy

Candy Zhang January 18, 2010

Review by (+ signature):

MOST TECHNOLOGY SERVICE CO., LTD. APPROVED EMC & SAFETY

Sam Zhong January 18, 2010

Approved by (+ signature):

Yvette Zhou January 18, 2010

# 2. GENERAL INFORMATION

## 2.1 Product Information

| **EUT- GPS Portable Navigation Device** | |
|---|---|
| Description: | GPS Portable Navigation Device |
| Model Name: | 84A-53 |
| Power Supply: | DC 3.7V by Battery<br>DC 5V supply by Adaptor, Car Adaptor or USB cable |
| Frequency Range: | 2402 MHz -2480 MHz |
| Channel Number: | 79 |
| Channel Spacing: | 1 MHz |
| Antenna Gain: | 1.0 dBi |
| Modulation Technique: | FHSS |
| Temperature Range: | -10°C ~ +55°C |

***NOTE:***

1. *Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.*
2. *The EUT antenna is an internal and unique coupling to the intentional radiator shall be considered sufficient to comply with section 15.203 of the FCC Part 15.*

## 2.2 Objective

The objective of the report is to perform tests according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

| No. | Identity | Document Title |
|---|---|---|
| 1 | 47 CFR Part 15 (10-1-05 Edition) | Radio Frequency Devices |

## 2.3 Test Standards and Results

Test items and the results are as bellow:

| No. | Section | Description | Result | Date of Test |
|---|---|---|---|---|
| 1 | 15.247(a) | Number of Hopping Frequency | PASS | 2010-01-17 |
| 2 | 15.247(b) | Peak Output Power | PASS | 2010-01-17 |
| 3 | 15.247(a) | 20dB Bandwidth | PASS | 2010-01-17 |
| 4 | 15.247(d) | Peak Power Spectral Density | Not Applicable | -- |
| 5 | 15.247(a) | Carrier Frequency Separation | PASS | 2010-01-17 |
| 6 | 15.247(a) | Time of Occupancy (Dwell time) | PASS | 2010-01-17 |
| 7 | 15.247(c) | Conducted Spurious Emission | PASS | 2010-01-17 |
| 8 | 15.247(c) | Band Edge | PASS | 2010-01-17 |
| 9 | 15.247(b) | Radio Frequency Exposure | PASS | 2010-01-17 |
| 10 | 15.247(c) | Radiated Spurious Emission | PASS | 2010-01-17 |
| 11 | 15.207 | Conducted Emission | PASS | 2009-12-16 |
| 12 | *15.203* | Antenna Requirement | PASS | 2010-01-17 |

*Note: 1. The test result judgment is decided by the limit of measurement standard*
*2. The information of measurement uncertainty is available upon the customer's request.*

## 2.4 Environmental Conditions

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

- Temperature: 15-35ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

## 3. TEST FACILITY

| | |
|---|---|
| Test Site: | Most Technology Service Co.,ltd |
| Location: | No.5, Nangshan 2nd Rd., North Hi-Tech Industrial park , Nanshan Shenzhen, Guangdong ,China |
| Description: | There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 and CISPR 16 requirements.<br>The FCC Registration Number is **490827.** |
| Site Filing: | The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046. |
| Instrument Tolerance: | All measuring equipment is in accord with ANSI C63.4 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement. |
| Ground Plane: | Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz. |

## 4. TEST EQUIPMENT LIST

**Instrumentation:** The following list contains equipment used at Most for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

| No. | Equipment | Manufacturer | Model No. | S/N | Calculator due date |
|---|---|---|---|---|---|
| 1 | Test Receiver | Rohde & Schwarz | ESCI | 100492 | 2010/03/14 |
| 2 | Spectrum Analyzer | Agilent | E7405A | US44210471 | 2010/03/14 |
| 3 | L.I.S.N. | Rohde & Schwarz | ENV216 | 100093 | 2010/03/14 |
| 4 | Coaxial Switch | Anritsu Corp | MP59B | 6200283933 | 2010/03/14 |
| 5 | Terminator | Hubersuhner | 50Ω | No.1 | 2010/03/14 |
| 6 | RF Cable | SchwarzBeck | N/A | No.1 | 2010/03/14 |
| 7 | Test Receiver | Rohde & Schwarz | ESPI | 101202 | 2010/03/14 |
| 8 | Bilog Antenna | Sunol | JB3 | A121206 | 2010/03/14 |
| 9 | Horn Antenna | TRC | N/A | N/A | 2010/03/14 |
| 10 | Cable | Resenberger | N/A | NO.1 | 2010/03/14 |
| 11 | Cable | SchwarzBeck | N/A | NO.2 | 2010/03/14 |
| 12 | Cable | SchwarzBeck | N/A | NO.3 | 2010/03/14 |
| 13 | DC Power Filter | DuoJi | DL2×30B | N/A | 2010/03/14 |
| 14 | Single Phase Power Line Filter | DuoJi | FNF 202B30 | N/A | 2010/03/14 |
| 15 | 3 Phase Power Line Filter | DuoJi | FNF 402B30 | N/A | 2010/03/14 |
| 16 | Test Receiver | Rohde & Schwarz | ESCI | 100492 | 2010/03/14 |
| 17 | Absorbing Clamp | Luthi | MDS21 | 3635 | 2010/03/14 |
| 18 | Coaxial Switch | Anritsu Corp | MP59B | 6200283933 | 2010/03/14 |
| 19 | AC Power Source | Kikusui | AC40MA | LM003232 | 2010/03/14 |
| 20 | Test Analyzer | Kikusui | KHA1000 | LM003720 | 2010/03/14 |
| 21 | Line Impendence Network | Kikusui | LIN40MA-PCR-L | LM002352 | 2010/03/14 |
| 22 | ESD Tester | Kikusui | KES4021 | LM003537 | 2010/03/14 |
| 23 | EMCPRO System | EM Test | UCS-500-M4 | V0648102026 | 2010/03/14 |
| 24 | Signal Generator | IFR | 2032 | 203002/100 | 2010/03/14 |
| 25 | Amplifier | A&R | 150W1000 | 301584 | 2010/03/14 |
| 26 | CDN | FCC | FCC-801-M2-25 | 47 | 2010/03/14 |
| 27 | CDN | FCC | FCC-801-M3-25 | 107 | 2010/03/14 |
| 28 | EM Injection Clamp | FCC | F-203I-23mm | 403 | 2010/03/14 |
| 29 | RF Cable | MIYAZAKI | N/A | No.1/No.2 | 2010/03/14 |
| 30 | Universal Radio Communication Tester | ROHDE&SCHWARZ | CMU200 | 0304789 | 2010/03/14 |
| 31 | Telecommunication Antenna | European Antennas | PSA 75301R/170 | 0304213 | 2010/03/14 |

***NOTE:*** *Equipments listed above have been calibrated and are in the period of validation.*

# 5. 47 CFR Part 15 C Requirements

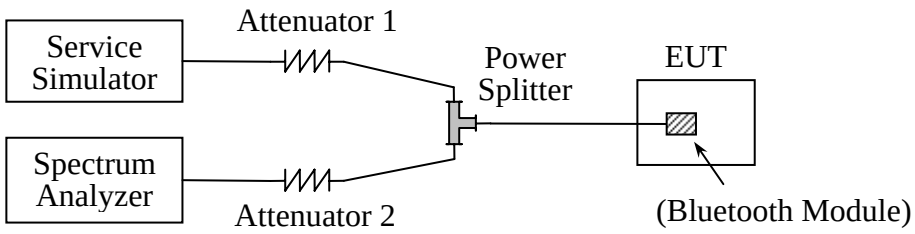
## 5.1 Number of Hopping Frequency

### 5.1.1 Requirement

According to FCC section 15.247(a) (1) (iii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

### 5.1.2 Test Description

**A. Test Setup:**




The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

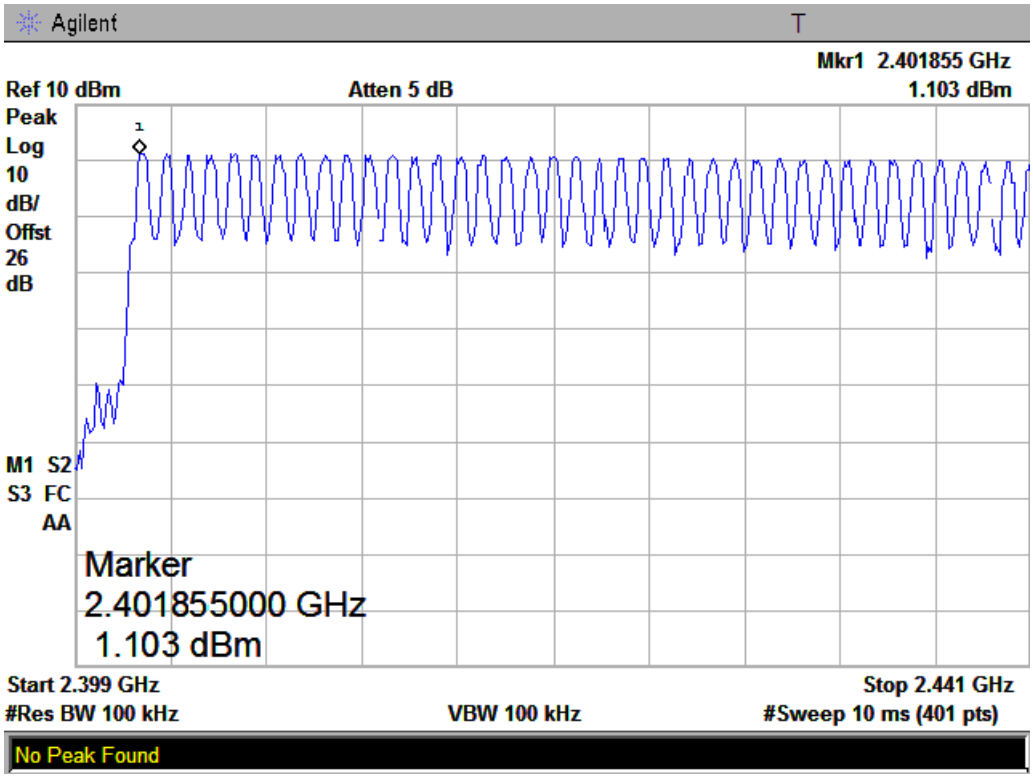
### 5.1.3 Test Result

The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

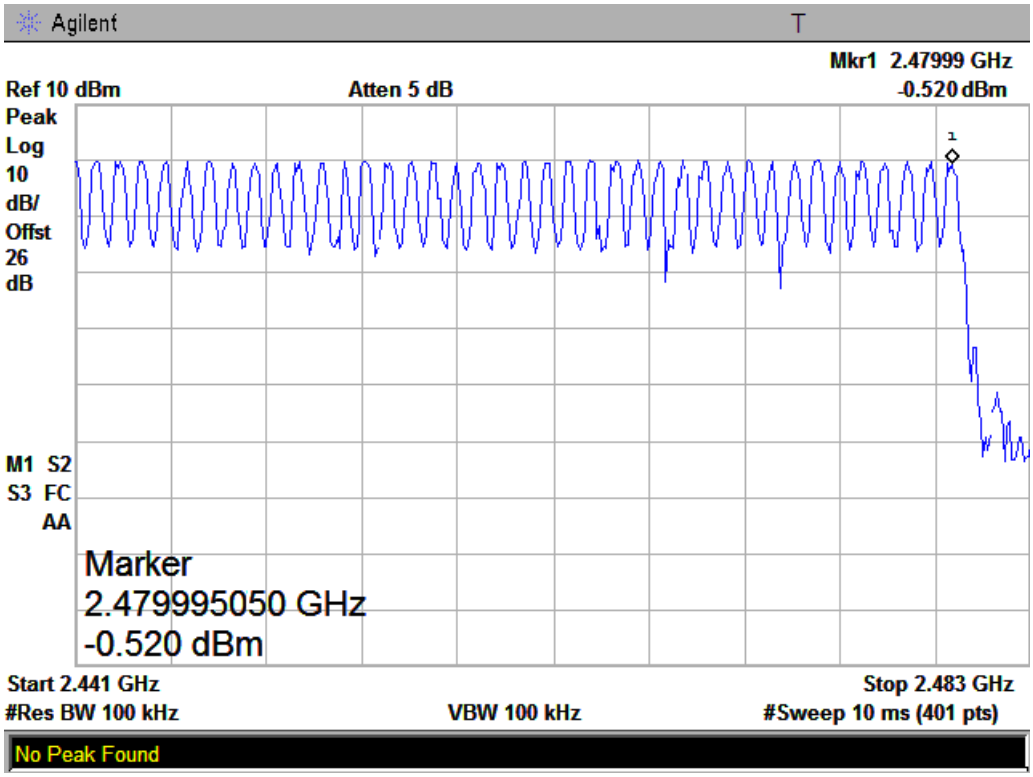
**B. Test Verdict:**

| Frequency Block (MHz) | Measured Channel Numbers | Min. Limit | Refer to Plot | Verdict |
|---|---|---|---|---|
| 2400 - 2483.5 | 79 | 15 | Plot 1/ 2 | PASS |

**C. Test Plot:**




(Plot 1: 2402MHz to 2441MHz)




(Plot 2: 2441MHz to 2483.5MHz)

## 5.2 Peak Output Power

### 5.2.1Requirement

According to FCC section 15.247(b)(1), for frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

### 5.2.2 Test Description

See section 5.1.2 of this report.

### 5.2.3 Test Result

The EUT operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power.

**Test Verdict:**

| Channel | Frequency (MHz) | Measured Output Peak Power | | Limit | | Verdict |
|---|---|---|---|---|---|---|
| | | dBm | mW | dBm | mW | |
| 0 | 2402 | -4.160 | 0.384 mW | 21 | 125 | PASS |
| 39 | 2441 | -4.892 | 0.324 mW | | | PASS |
| 78 | 2480 | -5.025 | 0.314 mW | | | PASS |

## 5.3 20dB Bandwidth

### 5.3.1 Definition

The 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

### 5.3.2 Test Description

See section 5.1.2 of this report.

### 5.3.3 Test Result

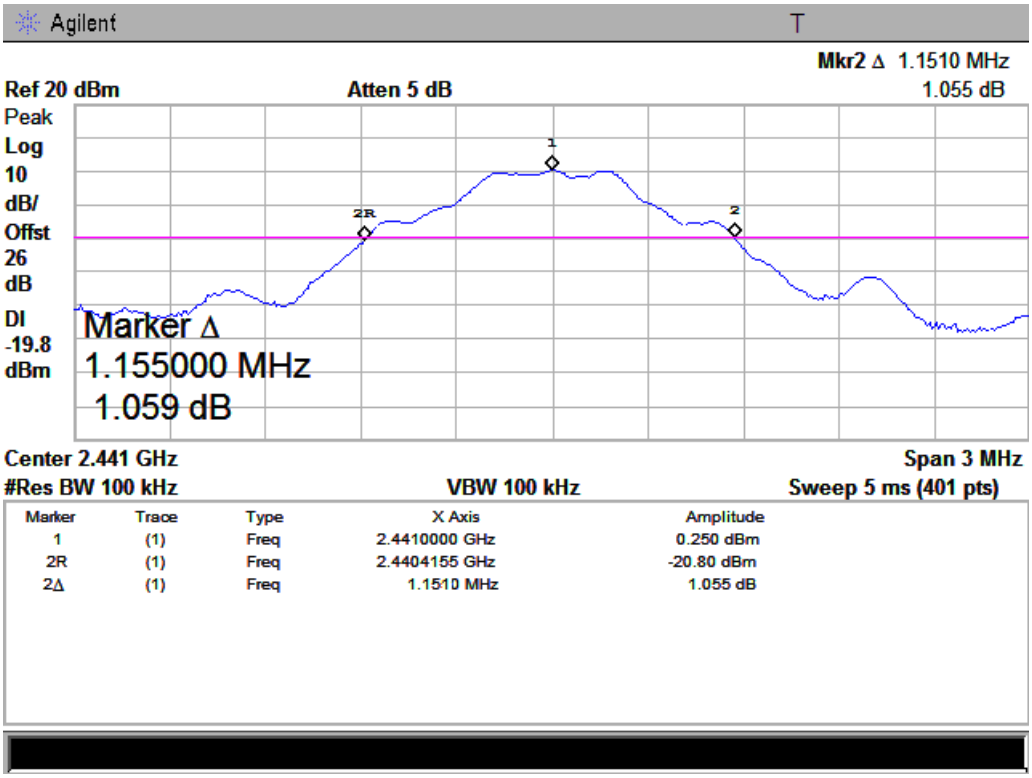
The EUT operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth.

**A. Test Verdict:**

The maximum 20dB bandwidth measured is 1.151MHz according to the table below.

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) | Refer to Plot |
|---|---|---|---|
| 39 | 2441 | 1.151 | Plot 3 |

**B. Test Plot:**



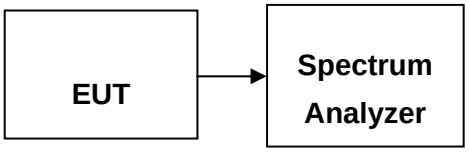

(Plot 3: Channel = 39)

## 5.4 Peak Power Spectral Density (Not Applicable)

### 5.4.1 Definition

1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

### 5.4.2 Test Configuration




### 5.4.3 Test procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
4. Record the max reading.
5. Repeat the above procedure until the measurements for all frequencies are completed.

### 5.4.4 Test results

Not Applicable (The EUT is FHSS modulation).

## 5.5 Carried Frequency Separation

### 5.5.1 Definition

According to FCC section 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

### 5.5.2 Test Description

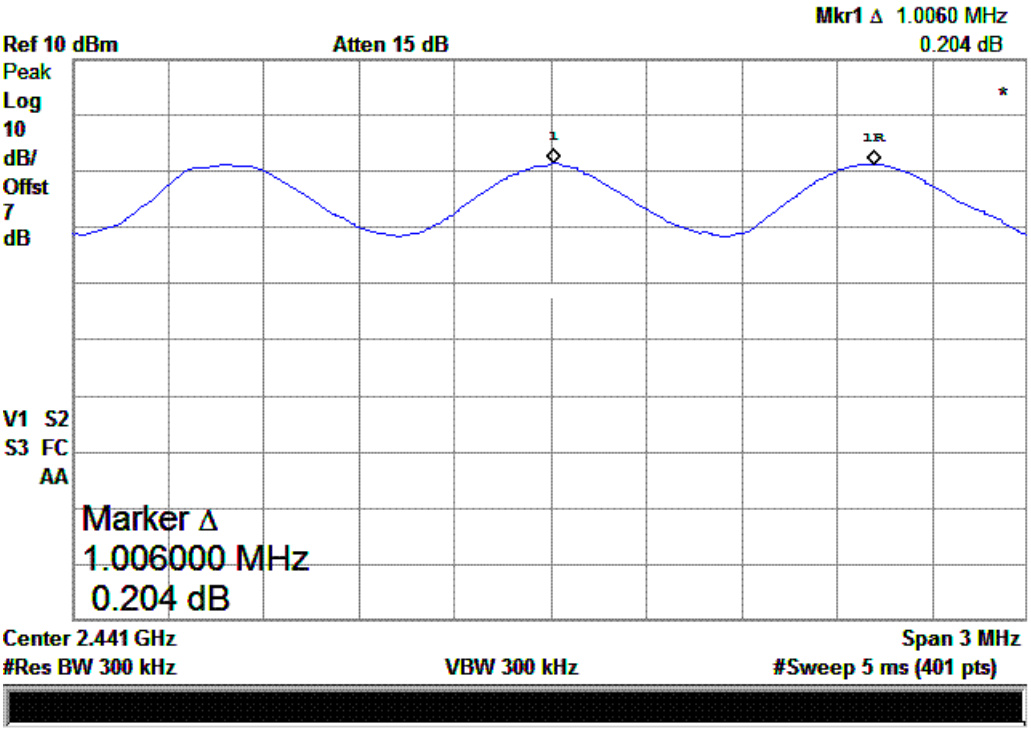
See section 5.1.2 of this report.

### 5.5.3 Test Result

The EUT operates at hopping-on test mode.

For any adjacent channels, the Module does have hopping channel carrier frequencies separated is less than 20dB Bandwidth, then it needs to be greater than 2/3 of 20dB bandwidth.

Refer to the Plot 4.




(Plot 4: Middle Channel Separation)

## 5.6 Time of Occupancy (Dwell time)

### 5.6.1 Requirement

According to FCC section 15.247(a) (1) (iii), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### 5.6.2 Test Description

See section 5.1.2 of this report.

### 5.6.3 Test Result

**DH 1**

CH Low: 0.380 * (1600/2)/79 * 31.60 = 121.60 (ms)

CH Mid: 0.381 * (1600/2)/79 * 31.60 = 121.92 (ms)

CH High: 0.381 * (1600/2)/79 * 31.60 = 121.92 (ms)

| CH | Pulse Time (ms) | Total of Dwell (ms) | Period Time (s) | Limit (ms) | Result |
|---|---|---|---|---|---|
| Low | 0.380 | 121.60 | 31.60 | 400.00 | PASS |
| Mid | 0.381 | 121.92 | 31.60 | | PASS |
| High | 0.381 | 121.92 | 31.60 | | PASS |

**DH 3**

CH Low: 1.602 * (1600/4)/79 * 31.60 = 256.32 (ms)

CH Mid: 1.602 * (1600/4)/79 * 31.60 = 256.32 (ms)

CH High: 1.602 * (1600/4)/79 * 31.60 = 256.32 (ms)

| CH | Pulse Time (ms) | Total of Dwell (ms) | Period Time (s) | Limit (ms) | Result |
|---|---|---|---|---|---|
| Low | 1.602 | 256.32 | 31.60 | 400.00 | PASS |
| Mid | 1.602 | 256.32 | 31.60 | | PASS |
| High | 1.602 | 256.32 | 31.60 | | PASS |

**DH 5**

CH Low: 2.901 * (1600/6)/79 * 31.60 = 309.45 (ms)

CH Mid: 2.901 * (1600/6)/79 * 31.60 = 309.45 (ms)

CH High: 2.902 * (1600/6)/79 * 31.60 = 309.55 (ms)

| CH | Pulse Time (ms) | Total of Dwell (ms) | Period Time (s) | Limit (ms) | Result |
|---|---|---|---|---|---|
| Low | 2.901 | 309.45 | 31.60 | 400.00 | PASS |
| Mid | 2.901 | 309.45 | 31.60 | | PASS |
| High | 2.902 | 309.55 | 31.60 | | PASS |

## 5.7 Conducted Spurious Emissions

### 5.7.1 Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

### 5.7.2 Test Description

See section 0 of this report.

### 5.7.3 Test Result

The EUT operates at hopping-off test mode. The measurement frequency range is from 9 KHz to the 10$^{th}$ harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

**Test Verdict:**

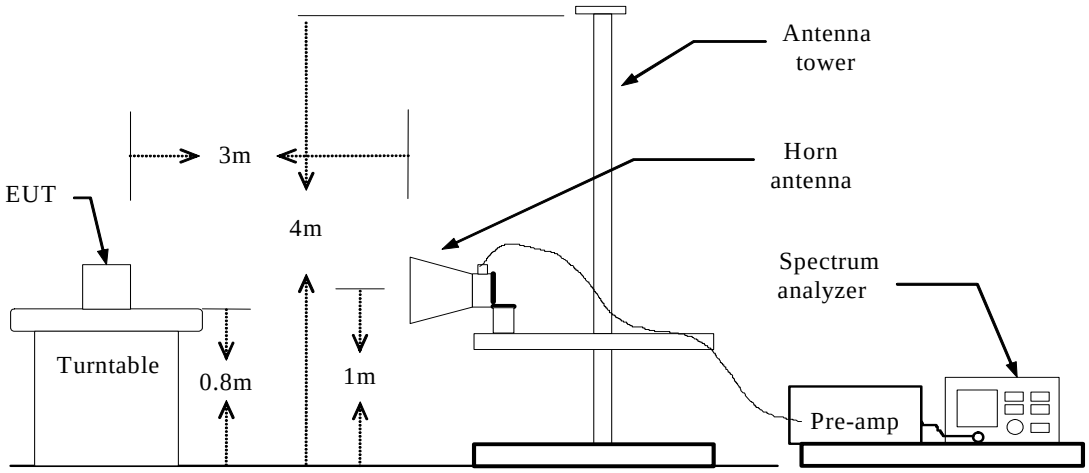
| Channel | Frequency (MHz) | Measured Max. Out of Band Emission (dBm) | Limit (dBm) | | Verdict |
|---|---|---|---|---|---|
| | | | Carrier Level | Calculated -20dBm Limit | |
| 0 | 2402 | -49.10 | -0.058 | -20.058 | PASS |
| 39 | 2441 | -46.53 | -0.065 | -20.065 | PASS |
| 78 | 2480 | -48.69 | -0.092 | -20.092 | PASS |

## 5.8 Band Edge

### 5.8.1 Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

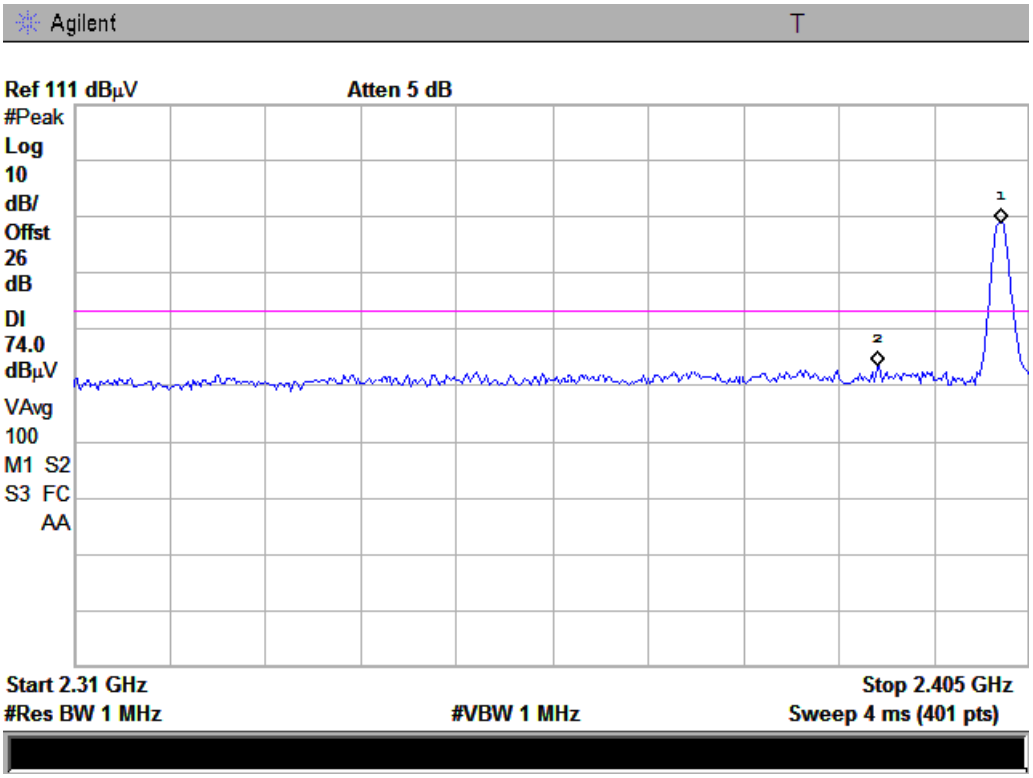
### 5.8.2 Test Description



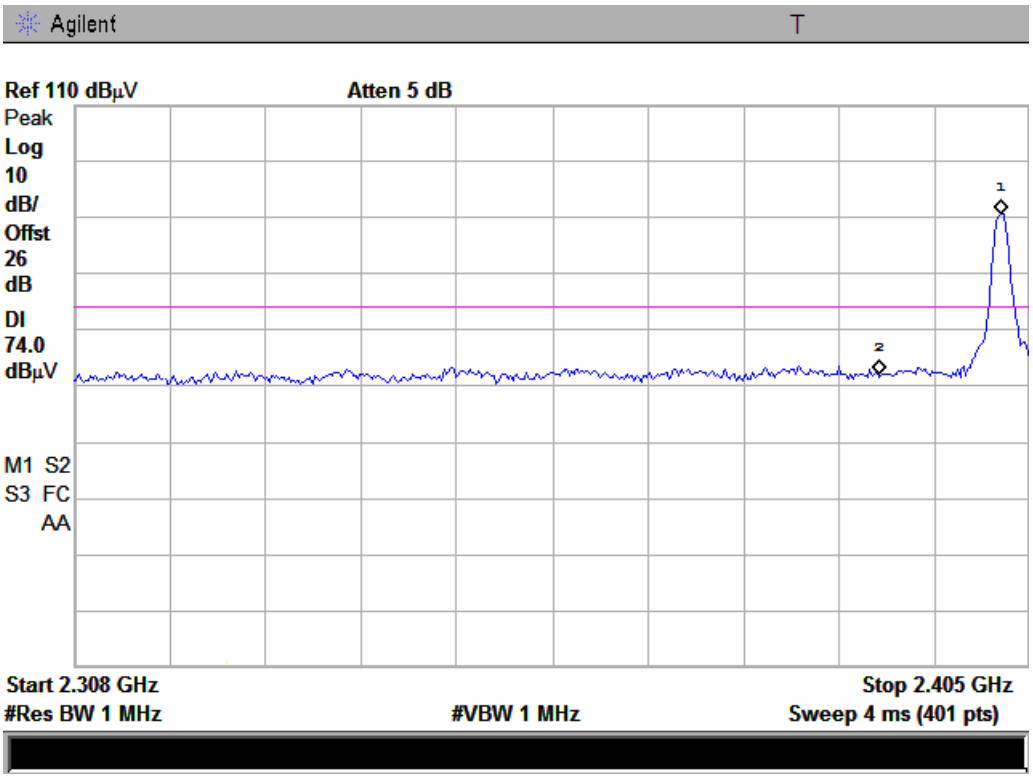

### 5.8.3Test Result

The EUT operates at hopping-off test mode. The lowest and highest channels are tested to verify the band edge emissions.

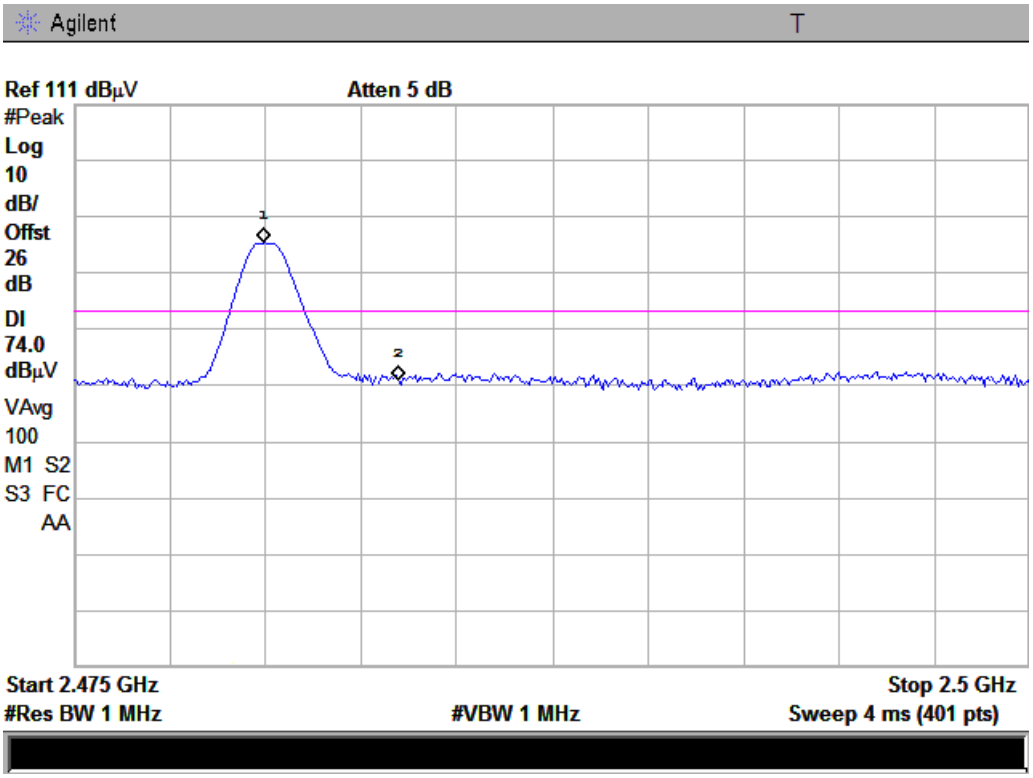
**Test Plot:**



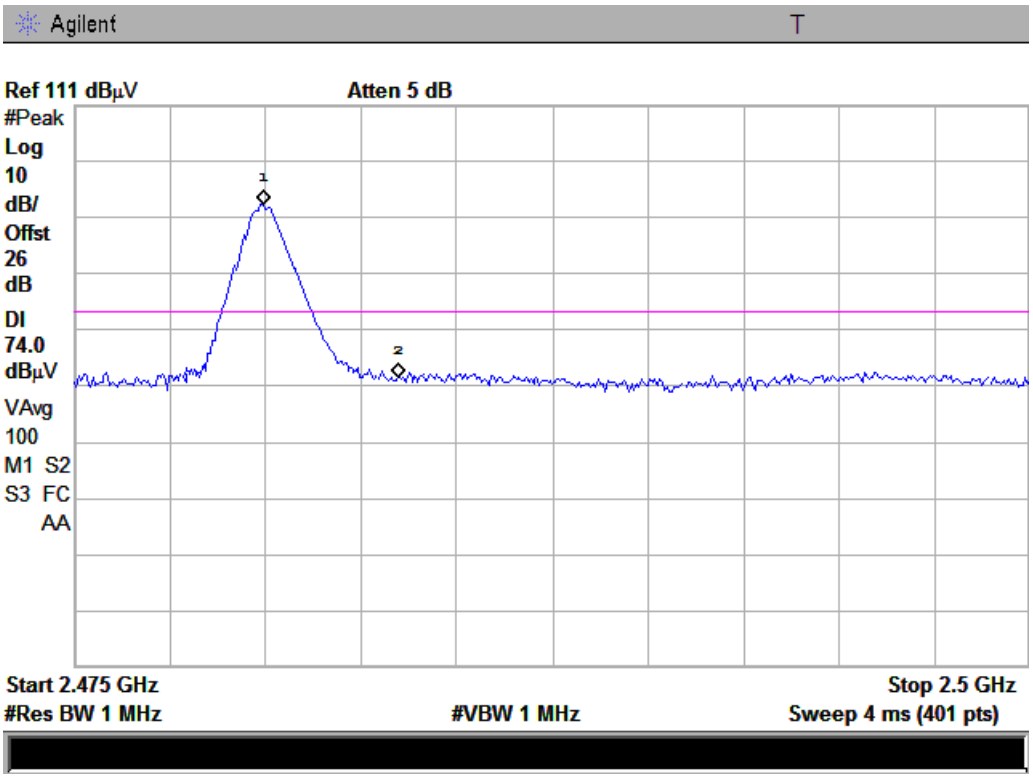

(Plot 5: Channel = 0, Detector Mode: Peak, Polarity: Horizontal)



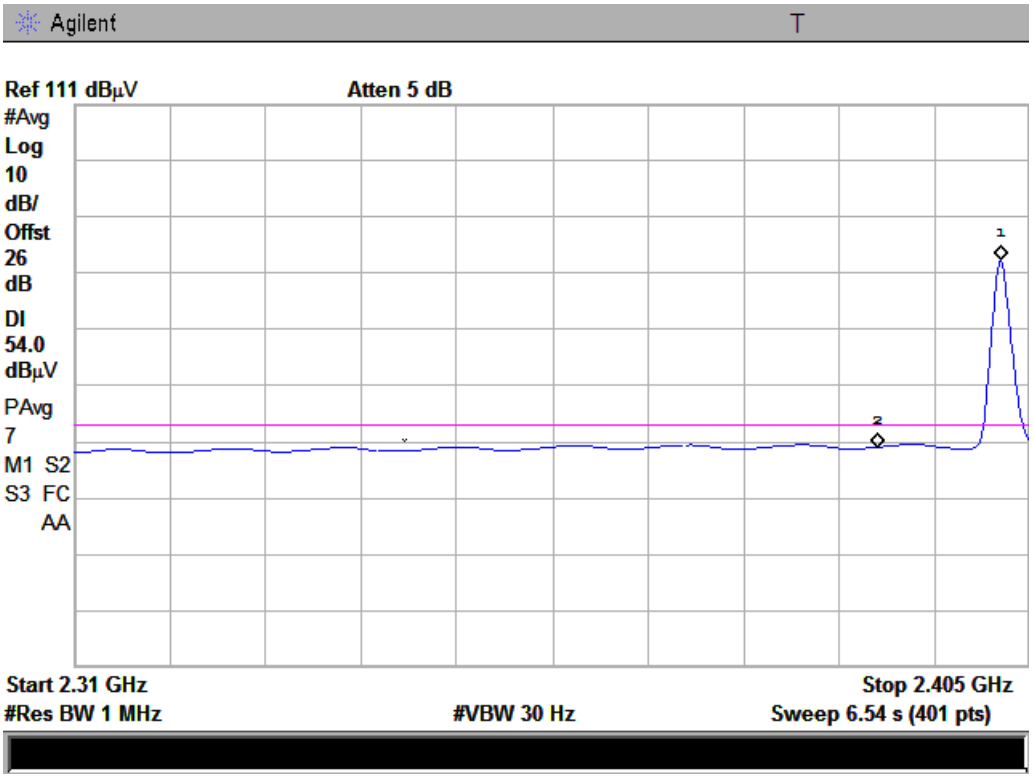

(Plot 6: Channel = 0, Detector Mode: Peak, Polarity: Vertical)



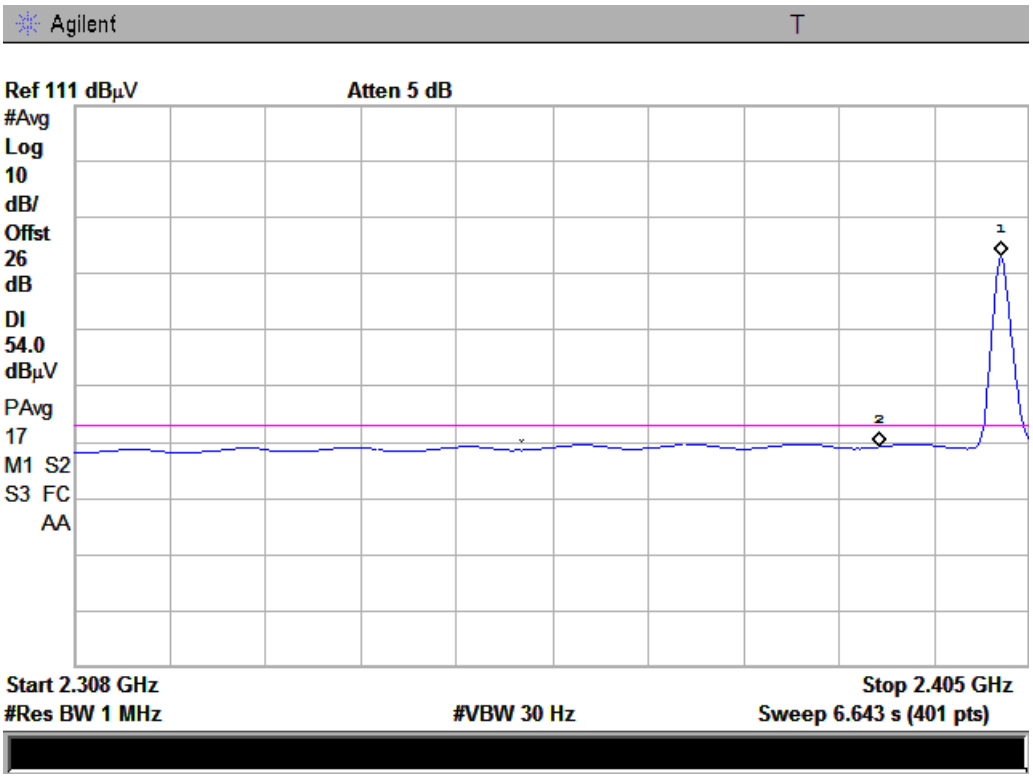

(Plot 7: Channel = 78, Detector Mode: Peak, Polarity: Horizontal)



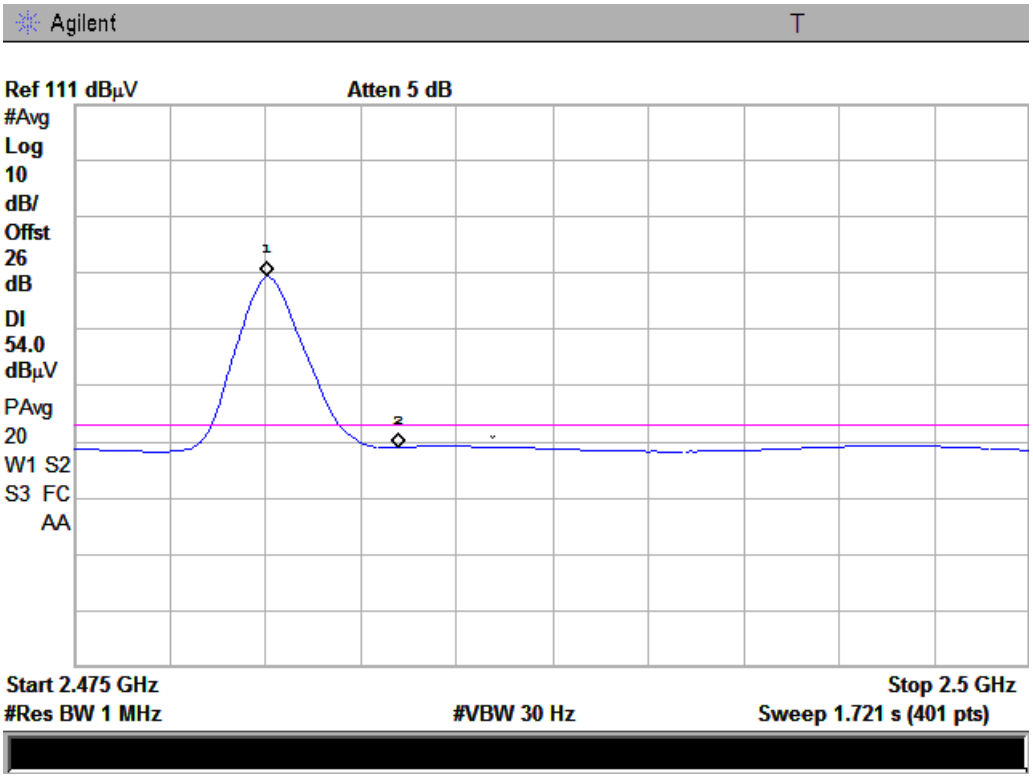

(Plot 8: Channel = 78, Detector Mode: Peak, Polarity: Vertical)



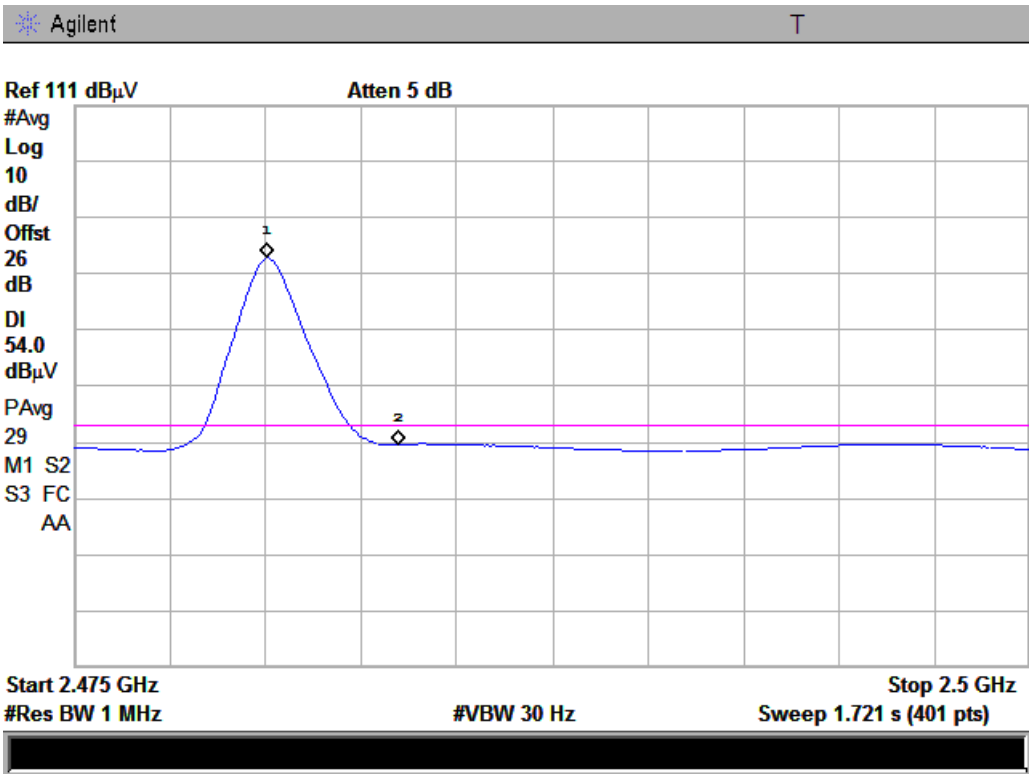

(Plot 9: Channel = 0, Detector Mode: Average, Polarity: Horizontal)




(Plot 10: Channel = 0, Detector Mode: Average, Polarity: Vertical)




(Plot 11: Channel = 78, Detector Mode: Average, Polarity: Horizontal)




(Plot 12: Channel = 78, Detector Mode: Average, Polarity: Vertical)

## 5.9Radio Frequency Exposure

### 5.9.1 limit

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §15.247(b)(4) and §1.1307(b)(1) of this chapter.

### 5.9.2 EUT Specification

| | |
|---|---|
| **EUT** | GPS Portable Navigation Device |
| **Frequency band (Operating)** | ☐ WLAN: 2.412GHz ~ 2.462GHz<br>☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz<br>☐ WLAN: 5.745GHz ~ 5825GHz<br>☒ Others Bluetooth: 2.402GHz ~ 2.480GHz |
| **Device category** | ☒ Portable (<20cm separation)<br>☐ Mobile (>20cm separation)<br>☐ Others _____ |
| **Exposure classification** | ☐ Occupational/Controlled exposure *(S = 5mW/cm$^2$)*<br>☒ General Population/Uncontrolled exposure *(S=1mW/cm$^2$)* |
| **Antenna diversity** | ☒ Single antenna<br>☐ Multiple antennas<br>☐ Tx diversity<br>☐ Rx diversity<br>☐ Tx/Rx diversity |
| **Max. output power** | -4.16dBm (0.384mW) |
| **Antenna gain (Max)** | 1.0 dBi |
| **Evaluation applied** | ☒ MPE Evaluation<br>☐ SAR Evaluation |
| ***Note:***<br>*1. The maximum output power is -4.16dBm (0.384mW) at 2402MHz.*<br>*2. The Bluetooth and FM cannot be used at the same time.*<br>*3. DSS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*<br>*4. For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.* | |

### 5.9.3 Test Results

No non-compliance noted.

*(SAR evaluation is not required for the PORTABLE device while its maximum output power is lower than the general population low threshold: 60/f (GHz)=60/2.441=24.58mW)*

### 5.9.4 MPE evaluation

PASS

## 5.10 Radiated Spurious Emission

According to FCC section 15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

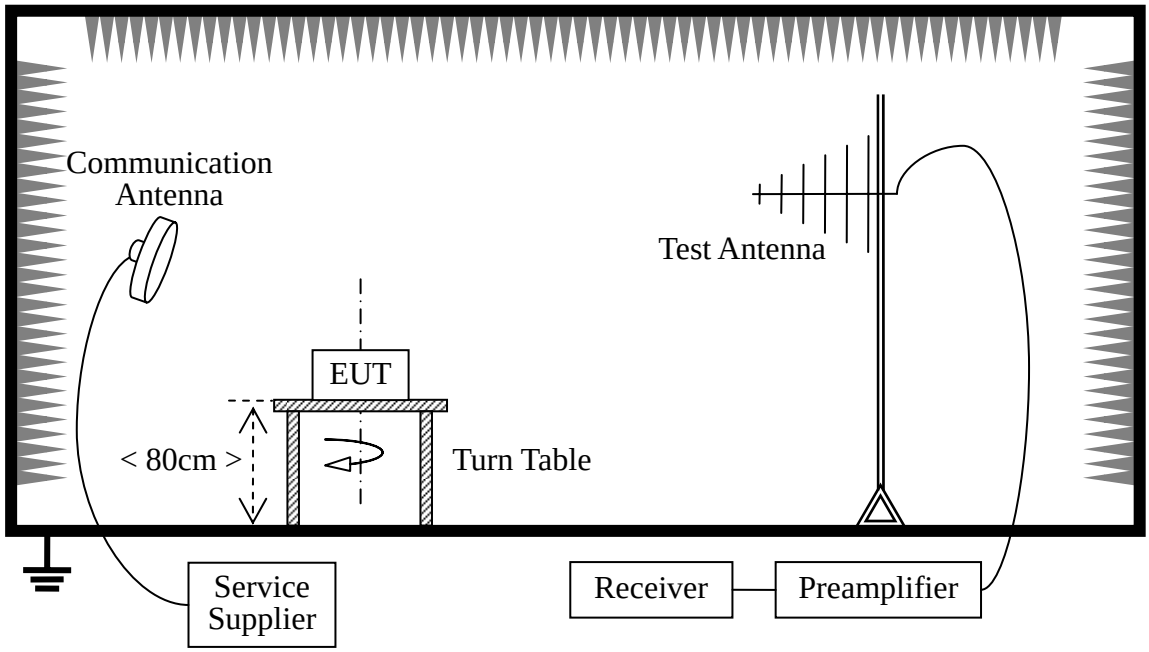
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (μV/m) | Measurement Distance (m) |
|---|---|---|
| 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 |

As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

### 5.10.1 Test Description

A. Test Setup:




The EUT is powered by the Battery charged with the AC Adapter which is powered by 120V, 60Hz AC mains supply. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the EUT is activated and transmitting with the other Bluetooth device (Supply by the Applicant) during the test.

For the Test Antenna:

(a) In the frequency range of 9 kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.

(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

## 5.10.2 Test Result

**Below 1 GHz**

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH Low | **Test Date:** | 2010-01-17 |
| **Temperature:** | 20°C | **Tested by:** | Petter Ping |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant.Pol. H/V | Detector Mode (PK/QP) | Reading (dBuV) | Factor (dB) | Actual FS (dBuV/m) | Limit 3m (dBuV/m) | Safe Margin (dB) |
|---|---|---|---|---|---|---|---|
| 482.67 | V | Peak | 20.72 | 20.30 | 41.02 | 46.00 | -4.98 |
| -- | | | | | | | >10 |
| 482.67 | H | Peak | 20.40 | 20.30 | 40.70 | 43.50 | -5.30 |
| -- | | | | | | | >10 |

***Notes:***

*1. Measuring frequencies from 30 MHz to the 1GHz.*

*2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.*

*3. Data of measurement within this frequency range shown "--- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

*4. The IF bandwidth of SPA between 30MHz to 1GHz was 100 kHz.*

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH Middle | **Test Date:** | 2010-01-17 |
| **Temperature:** | 20°C | **Tested by:** | Petter Ping |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant.Pol. H/V | Detector Mode (PK/QP) | Reading (dBuV) | Factor (dB) | Actual FS (dBuV/m) | Limit 3m (dBuV/m) | Safe Margin (dB) |
|---|---|---|---|---|---|---|---|
| 500.45 | V | Peak | 20.42 | 21.40 | 41.82 | 46.00 | -4.18 |
| -- | | | | | | | >10 |
| 500.45 | H | Peak | 20.37 | 21.40 | 41.77 | 43.50 | -4.23 |
| -- | | | | | | | >10 |

***Notes:***

*1. Measuring frequencies from 30 MHz to the 1GHz.*

2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.

*3. Data of measurement within this frequency range shown "--- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

*4. The IF bandwidth of SPA between 30MHz to 1GHz was 100 kHz.*

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH High | **Test Date:** | 2010-01-17 |
| **Temperature:** | 20°C | **Tested by:** | Petter Ping |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant.Pol. H/V | Detector Mode (PK/QP) | Reading (dBuV) | Factor (dB) | Actual FS (dBuV/m) | Limit 3m (dBuV/m) | Safe Margin (dB) |
|---|---|---|---|---|---|---|---|
| 498.51 | V | Peak | 16.35 | 21.43 | 37.78 | 46.00 | -8.22 |
| -- | | | | | | | >10 |
| 498.51 | H | Peak | 14.98 | 21.43 | 36.41 | 43.50 | -9.59 |
| -- | | | | | | | >10 |

***Notes:***

*1. Measuring frequencies from 30 MHz to the 1GHz.*

*2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.*

*3. Data of measurement within this frequency range shown "--- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

*4. The IF bandwidth of SPA between 30MHz to 1GHz was 100 kHz.*

**Above 1 GHz**

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH Low | **Test Date:** | 2010-01-17 |
| **Temperature:** | 20°C | **Tested by:** | Petter Ping |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| 4804.46 | V | 35.16 | --- | 5.95 | 41.11 | --- | 74.00 | 54.00 | -32.89 | Peak |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 4804.46 | H | 35.09 | --- | 5.95 | 41.04 | --- | 74.00 | 54.00 | -32.96 | Peak |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |

***Notes:***

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
3. *Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.*
4. *Spectrum setting:*
   a. *Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.*
   b. *AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH Mid | **Test Date:** | 2010-01-17 |
| **Temperature:** | 20°C | **Tested by:** | Petter Ping |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| -- | | | | | | | | | >20 | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| -- | | | | | | | | | >20 | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |

***Notes:***

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
   a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
   b. AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

| | | | |
|---|---|---|---|
| **Operation Mode:** | CH High | **Test Date:** | 2010-01-17 |
| **Temperature:** | 20°C | **Tested by:** | Petter Ping |
| **Humidity:** | 70 % RH | **Polarity:** | Ver. / Hor. |

| Freq. (MHz) | Ant. Pol H/V | Peak Reading (dBuV) | AV Reading (dBuV) | Ant. / CL CF (dB) | Actual Fs | | Peak Limit (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak (dBuV/m) | AV (dBuV/m) | | | | |
| -- | | | | | | | | | >20 | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| -- | | | | | | | | | >20 | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |
| N/A | | | | | | | | | | |

***Notes:***

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
   a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
   b. AV Setting 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

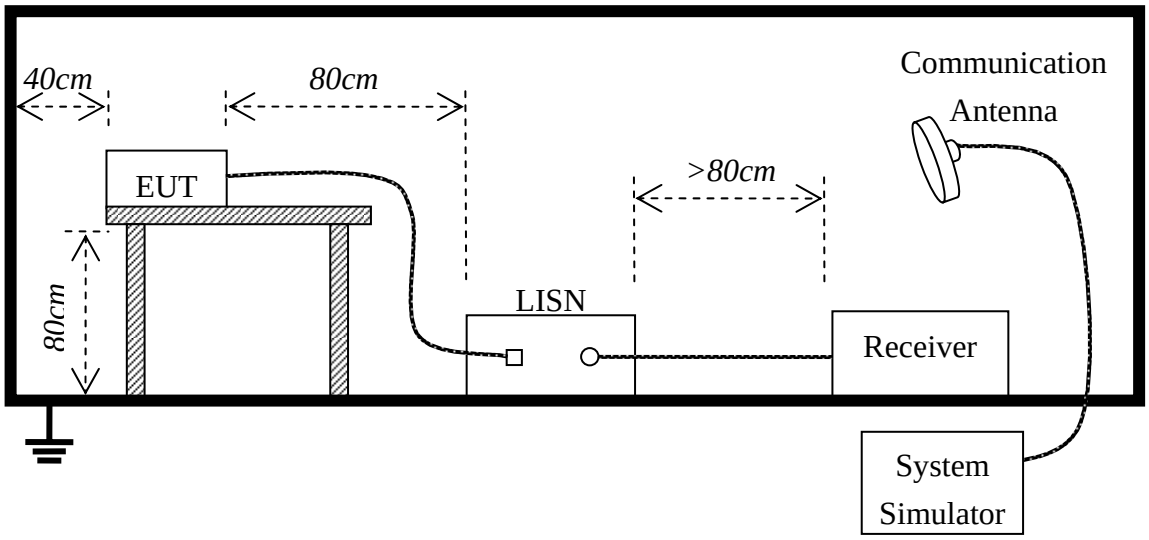
## 5.11 Conducted Emission

| Frequency | Maximum RF Line Voltage | |
|---|---|---|
| | Q.P.( dBuV) | Average( dBuV) |
| 150kHz-500kHz | 66-56 | 56-46 |
| 500kHz-5MHz | 56 | 46 |
| 5MHz-30MHz | 60 | 50 |

***Note:** 1. the lower limit shall apply at the transition frequency.*

*2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz*

## 5.11. 1 Block Diagram of Test Setup



## 5.11. 2 Preliminary Procedure of Line Conducted Emission Test

1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per FCC Part 15 (see Test Facility for the dimensions of the ground plane used). When the EUT is floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2) Support equipment, if needed, was placed as per FCC Part 15.
3) All I/O cables were positioned to simulate typical actual usage as per FCC Part 15.
4) The EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5) All support equipments received power from a second LISN supplying power of AC 120V/60Hz, if any.
6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7) Analyzer / Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.
8) During the above scans, the emissions were maximized by cable manipulation.
9) The following test mode(s) were scanned during the preliminary test:

| **Preliminary Conducted Emission Test** | | | | |
|---|---|---|---|---|
| **Frequency Range Investigated** | | **150KHz TO 30 MHz** | | |
| **Mode of operation** | **Date** | **Report No.** | **Data#** | **Worst Mode** |
| FM Mode | December 26, 2009 | MOST/STS091207F1 | 1_ (L,N) | |
| SD Card | December 26, 2009 | MOST/STS091207F1 | 2_ (L,N) | |
| Bluetooth Mode | December 26, 2009 | MOST/STS091207F1 | 3_ (L,N) | |
| MP3/MP4 Mode | December 26, 2009 | MOST/STS091207F1 | 4_ (L,N) | |
| GPS Mode | December 26, 2009 | MOST/STS091207F1 | 5_ (L,N) | ▲ |

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

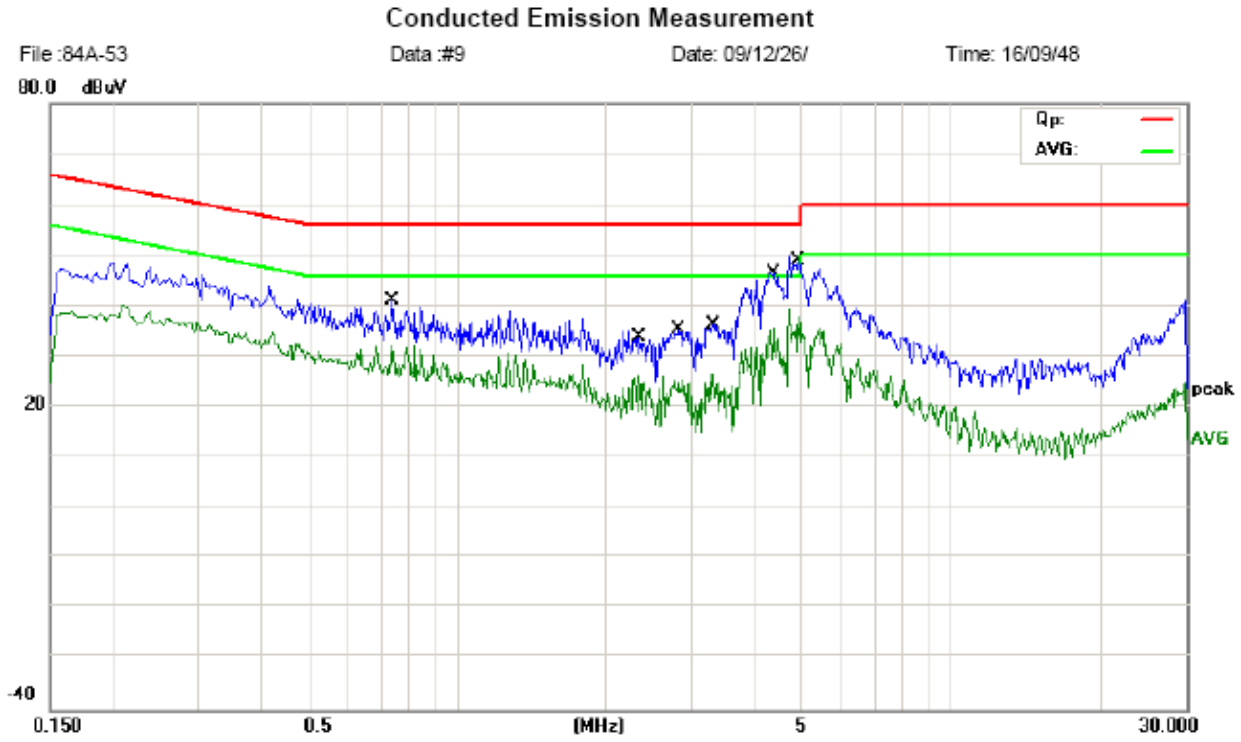
## 5.11.3 Final Procedure Of Line Conducted Emission Test

EUT and support equipment was set up on the test bench as per step 9 of the preliminary test.

A scan was taken on both power lines, Line 1 and Line 2, 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. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

The test data of the worst case condition(s) was reported on the Summary Data page.

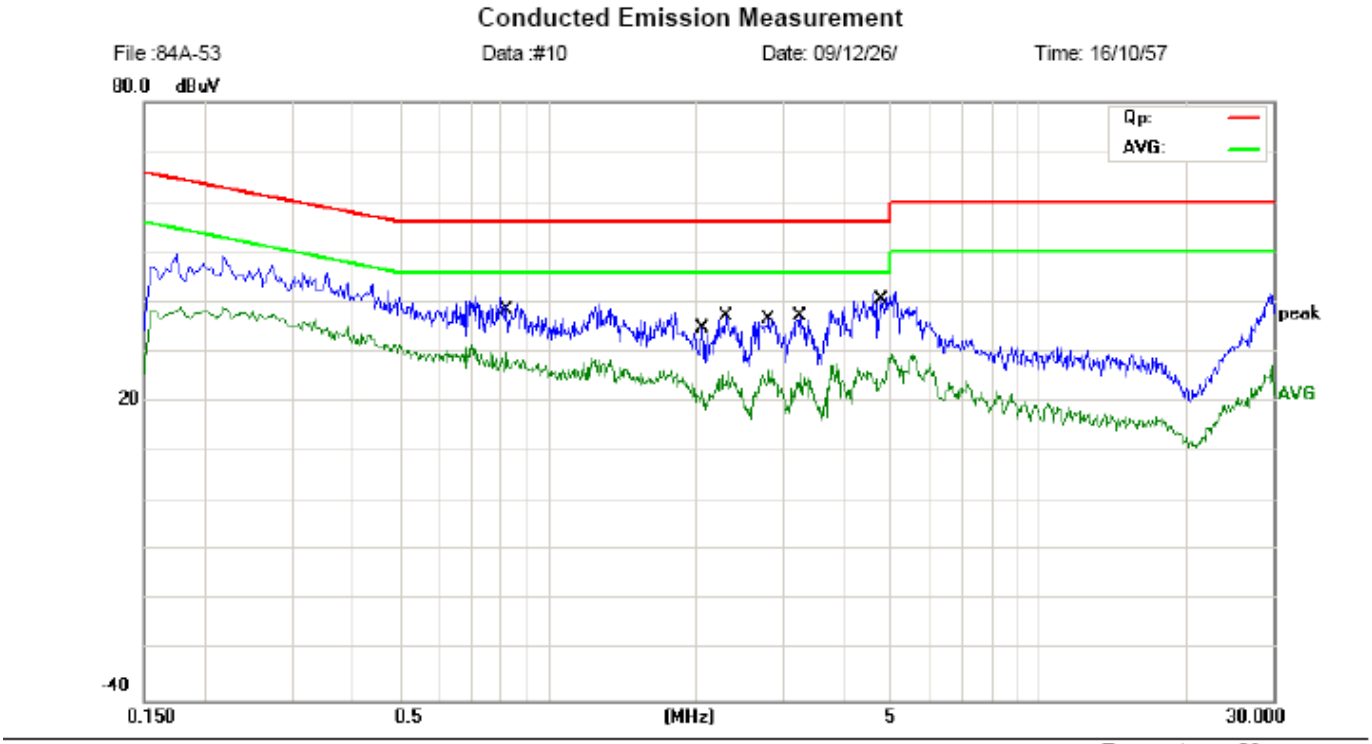
## 5.11.4 Test Result of Line Conducted Emission Test




Site site #1 Phase: *L1* Temperature: 26

EUT: GPS Portable Navigation Device
M/N: 84A-53
Mode: GPS Navigating
Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.7420 | 28.01 | 10.00 | 38.01 | 56.00 | -17.99 | QP | |
| 2 | | 0.7420 | 18.37 | 10.00 | 28.37 | 46.00 | -17.63 | AVG | |
| 3 | | 2.3260 | 24.64 | 9.33 | 33.97 | 56.00 | -22.03 | QP | |
| 4 | | 2.3260 | 16.72 | 9.33 | 26.05 | 46.00 | -19.95 | AVG | |
| 5 | | 2.8180 | 25.72 | 9.82 | 35.54 | 56.00 | -20.46 | QP | |
| 6 | | 2.8180 | 14.99 | 9.82 | 24.81 | 46.00 | -21.19 | AVG | |
| 7 | | 3.2860 | 25.01 | 10.29 | 35.30 | 56.00 | -20.70 | QP | |
| 8 | | 3.2860 | 13.49 | 10.29 | 23.78 | 46.00 | -22.22 | AVG | |
| 9 | | 4.3220 | 35.10 | 11.32 | 46.42 | 56.00 | -9.58 | QP | |
| 10 | | 4.3220 | 24.21 | 11.32 | 35.53 | 46.00 | -10.47 | AVG | |
| 11 | * | 4.9020 | 37.18 | 11.90 | 49.08 | 56.00 | -6.92 | QP | |
| 12 | | 4.9020 | 26.05 | 11.90 | 37.95 | 46.00 | -8.05 | AVG | |




Site site #1 Phase: N Temperature: 26

M/N: 84A-53

Mode: GPS Navigating

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.8300 | 27.89 | 10.00 | 37.89 | 56.00 | -18.11 | QP | |
| 2 | | 0.8300 | 17.35 | 10.00 | 27.35 | 46.00 | -18.65 | AVG | |
| 3 | | 2.0500 | 21.48 | 9.05 | 30.53 | 56.00 | -25.47 | QP | |
| 4 | | 2.0500 | 11.15 | 9.05 | 20.20 | 46.00 | -25.80 | AVG | |
| 5 | | 2.2980 | 27.80 | 9.30 | 37.10 | 56.00 | -18.90 | QP | |
| 6 | | 2.2980 | 14.23 | 9.30 | 23.53 | 46.00 | -22.47 | AVG | |
| 7 | | 2.8220 | 26.93 | 9.82 | 36.75 | 56.00 | -19.25 | QP | |
| 8 | | 2.8220 | 16.61 | 9.82 | 26.43 | 46.00 | -19.57 | AVG | |
| 9 | | 3.2740 | 27.09 | 10.27 | 37.36 | 56.00 | -18.64 | QP | |
| 10 | | 3.2740 | 15.65 | 10.27 | 25.92 | 46.00 | -20.08 | AVG | |
| 11 | * | 4.7820 | 26.79 | 11.78 | 38.57 | 56.00 | -17.43 | QP | |
| 12 | | 4.7820 | 12.03 | 11.78 | 23.81 | 46.00 | -22.19 | AVG | |

## 5.12 Antenna Requirement

### 5.12.1 Definition

An analysis of the 84A-53 was performed to determine compliance with FCC Section 15.203. This section requires specific handling and control of antennas used for devices subject to regulations.

### 5.12.2 Evaluation Procedure

The structure and application of the 84A-53 was analyzed with respect to the rules. The antenna is an internal antenna, and is not accessible to the user. An auxiliary antenna port is not present.

### 5.12.3 Evaluation Criteria

Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:

(a) Antenna must be permanently attached to the unit.

(b) Antenna must use a unique type of connector to attach to the EUT.

(c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

### 5.12.4 Evaluation Results

The 84A-53 meets the criteria of this rule by virtue of having an internal antenna inaccessible to the user. The EUT is therefore compliant.

------END OF REPORT------