



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Applicant : Link Concept (Macao Commercial Offshore) Limited

**Address : Avn. Da Praia Grande, 762 Edf. Chino Plaza, 12 And. (H)
Macao**

Product Name : GPS

Model Name : NAV-4303

Brand Name : N/A

FCC ID : XNQ-NAV-4303

Report No. : SZSTS090802F2

Date of Issue : August 28, 2009

Issued by : Shenzhen Super Test Service Technology Co., Ltd.

**Address : No. 813 Unit A, HuaMeiJu Business Center, Xinhua Road,
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1. VERIFICATION OF CONFORMITY

Equipment Under Test: GPS
Brand Name: N/A
Model Number: NAV-4303
FCC ID: XNQ-NAV-4303
Applicant: Link Concept (Macao Commercial Offshore) Limited
Avn. Da Praia Grande, 762 Edf. Chino Plaza, 12 And. (H) Macau
Manufacturer: Intech Electronics (HK) CO., LTD.
Shengwu Industrial Park, Changzhen Village, GongMing Town,
Bao'an District, Shenzhen, China
Technical Standards: 47 CFR Part 15 Subpart C
File Number: SZSTS090802F2
Date of test: August 17 - August 28, 2009
Deviation: None
Condition of Test Sample: Normal
Test Result: PASS

The above equipment was tested by Shenzhen Super Test Service Technology 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): Petter Ping 2009. 8. 28
Petter Ping August 28, 2009
Review by (+ signature): July Wen 2009. 8. 28
July Wen August 28, 2009
Approved by (+ signature): Terry Yang 2009. 8. 28
Terry Yang August 28, 2009

2. GENERAL INFORMATION

2.1 Product Information

EUT- Bluetooth headset	
Description:	GPS
Model Name:	NAV-4303
Series Number:	N/A
Model Difference description:	N/A
Power Supply:	DC 5.0V by Battery or charge
Frequency Range:	2402 MHz -2480 MHz
Channel Number:	79
Channel Spacing:	1 MHz
Antenna Gain:	5.0 dBi
Modulation Technique:	GFSK
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	2009-8-27
2	15.247(b)	Peak Output Power	PASS	2009-8-27
3	15.247(a)	20dB Bandwidth	PASS	2009-8-27
4	15.247(d)	Peak Power Spectral Density	Not Applicable	2009-8-27
5	15.247(a)	Carrier Frequency Separation	PASS	2009-8-27
6	15.247(a)	Time of Occupancy (Dwell time)	PASS	2009-8-27
7	15.247(c)	Conducted Spurious Emission	PASS	2009-8-27
8	15.247(c)	Band Edge	PASS	2009-8-27
9	15.247(b)	Radio Frequency Exposure	PASS	2009-8-27
10	15.247(c)	Radiated Spurious Emission	PASS	2009-8-27
11	15.207	Conducted Emission	Not Applicable	2009-8-27
12	15.203	Antenna Requirement	PASS	2009-8-27

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: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3. TEST FACILITY

Test Site:	Most Technology Service Co.,ltd
Location:	Add: No.5, Nangshan 2nd Rd., North Hi-Tech Industrial park , Nanshan Shenzhen, Guangdong ,China
Description:	<p>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.</p> <p>The FCC Registration Number is 490827.</p>
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 Impedence Network	Kikusui	LIN40MA-PCR-L	LM002352	2010/03/14
22	ESD Tester	Kikusui	KES4021	LM003537	2010/03/14
23	EMC PRO 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

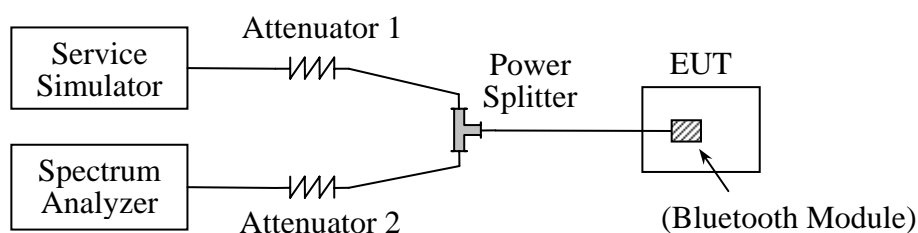
5.1 Number of Hopping Frequency

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.

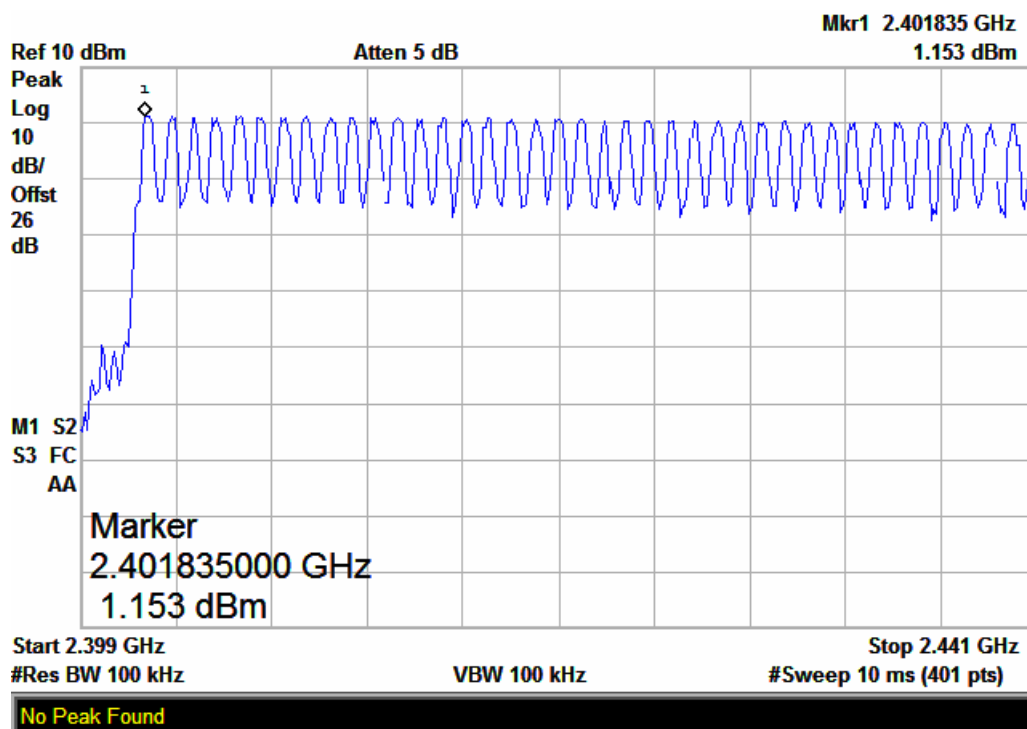
5.1.3 Test Result

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.

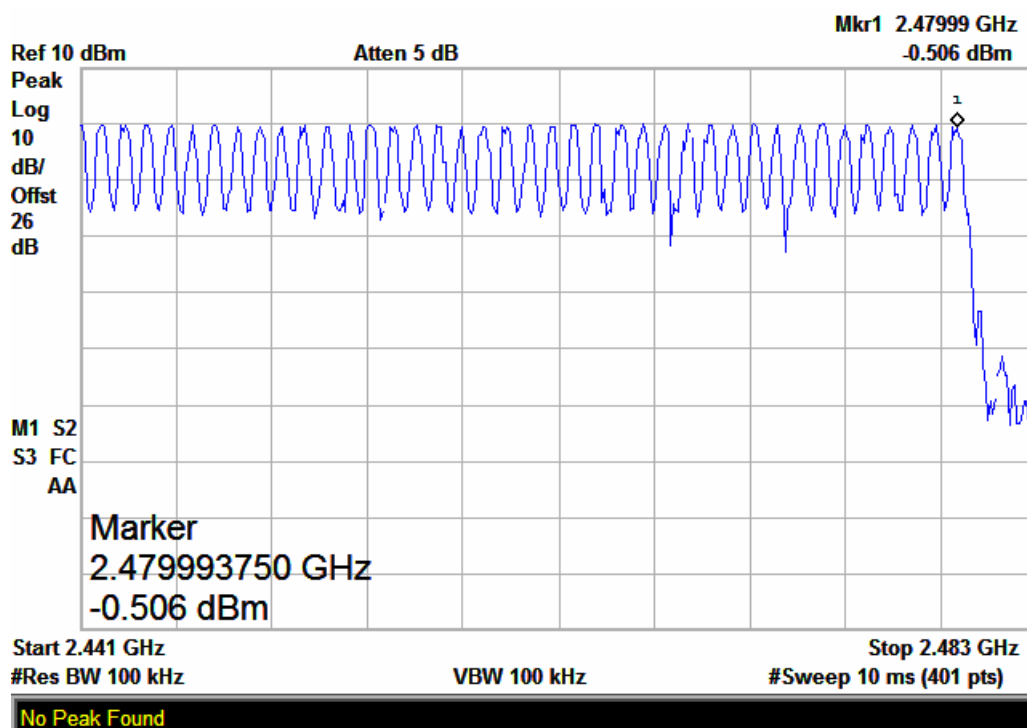
B. Test Verdict:

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

5.2.1 Requirement

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	-2.090	0.618 mW	21	125	PASS
39	2441	-4.165	0.383 mW			PASS
78	2480	-3.508	0.446 mW			PASS

5.3 20dB Bandwidth

5.3.1 Definition

The 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth ($10 \cdot \log 1\% = 20\text{dB}$) taking the total RF output power.

5.3.2 Test Description

See section 5.1.2 of this report.

5.3.3 Test Result

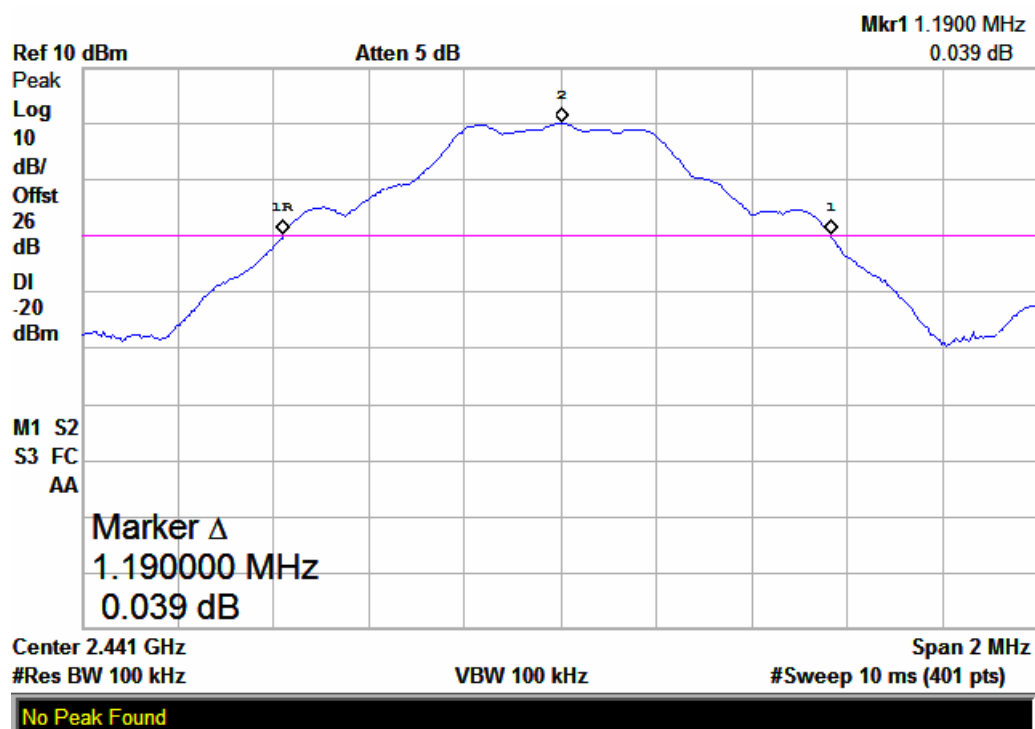
The EUT operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth.

A. Test Verdict:

The maximum 20dB bandwidth measured is 1.19MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
79	2441	1.19	Plot 3

B. Test Plot:



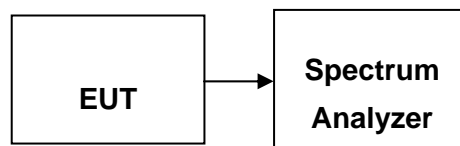
(Plot 3: Channel = 39)

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

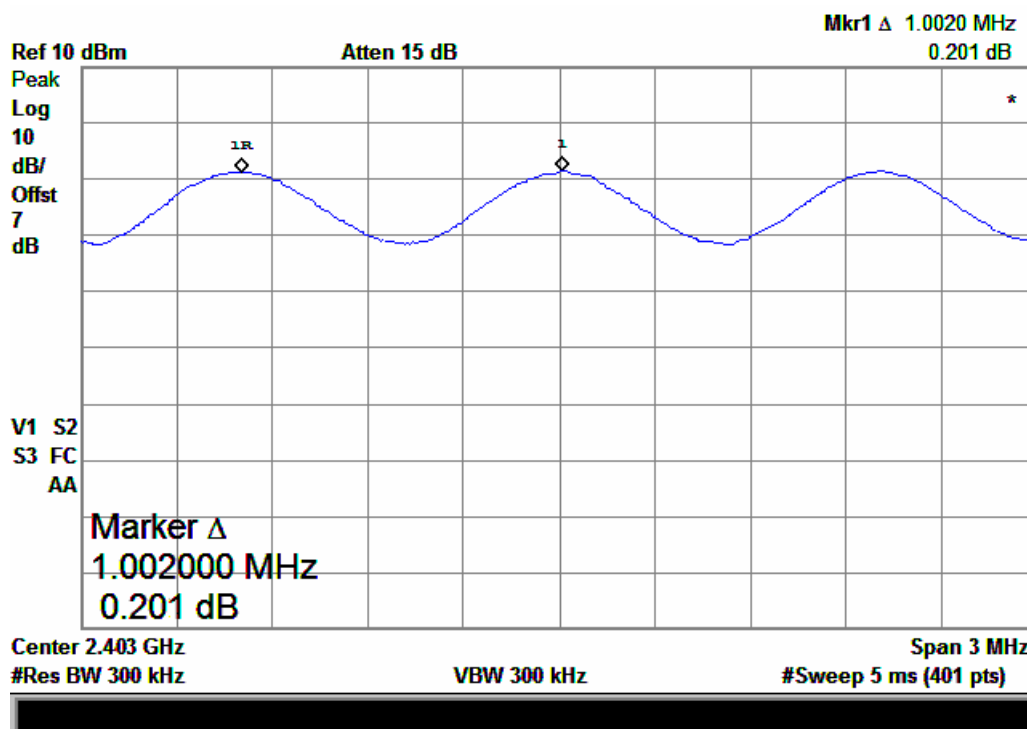
See section 5.1.2 of this report.

5.5.3 Test Result

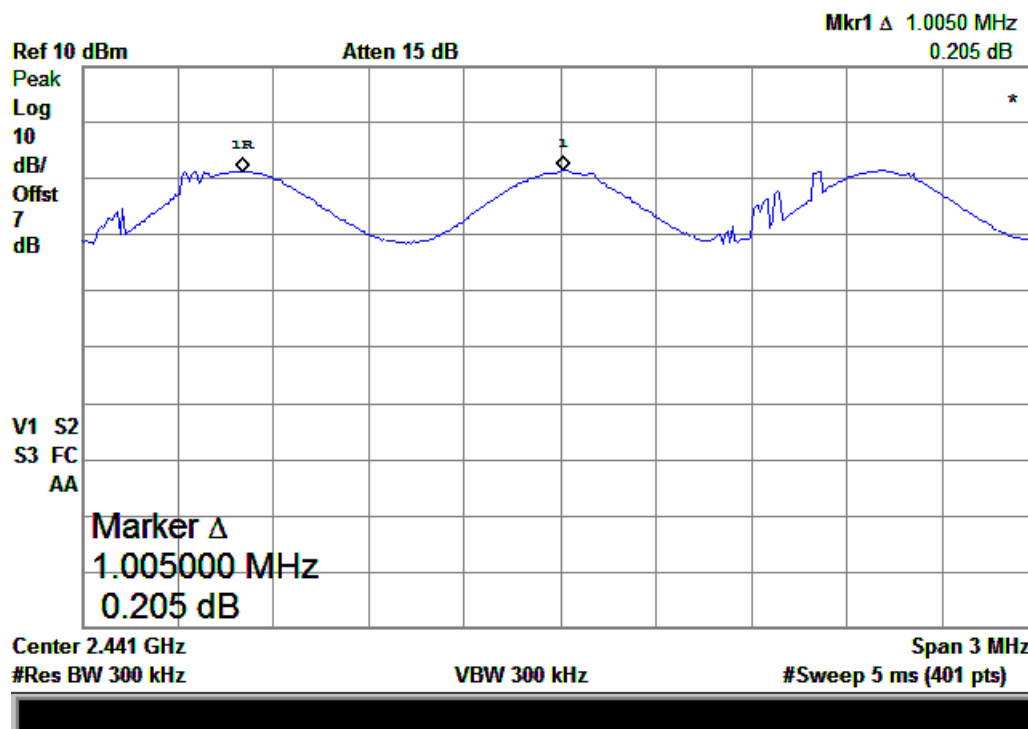
The EUT operates at hopping-on test mode.

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.

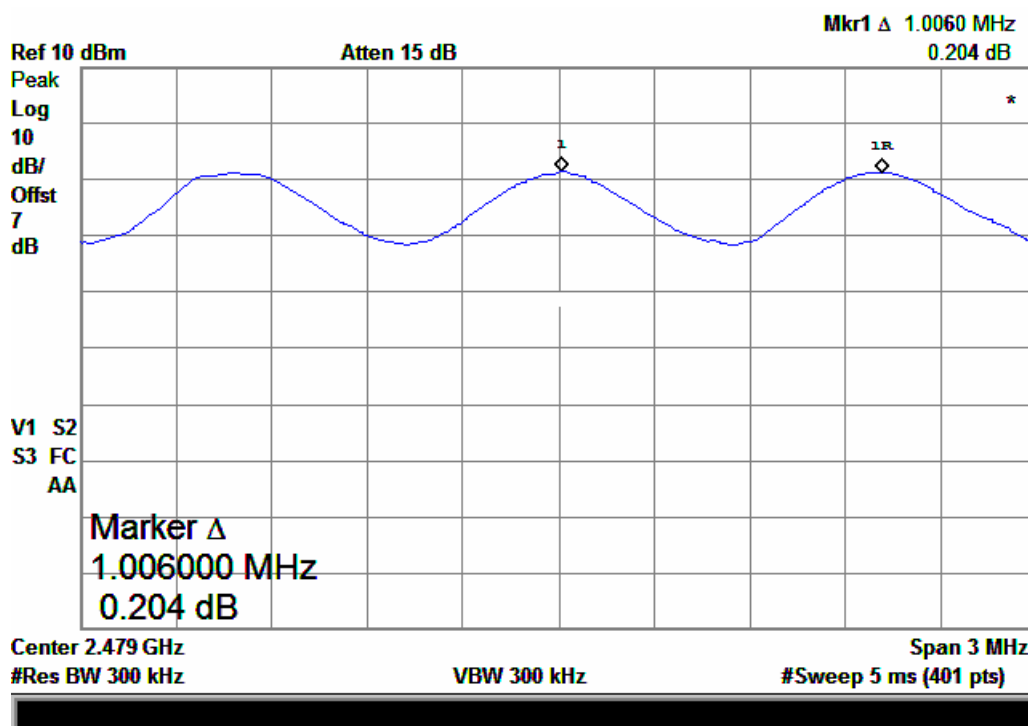
Refer to the Plot 4A-4C.



(Plot 4A: Low Channel Separation)



(Plot 4B: Middle Channel Separation)



(Plot 4C: High 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

A. Test Verdict:

DH 1

CH Low: $0.368 * (1600/2)/79 * 31.60 = 117.76$ (ms)

CH Mid: $0.365 * (1600/2)/79 * 31.60 = 116.80$ (ms)

CH High: $0.362 * (1600/2)/79 * 31.60 = 115.84$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.368	117.76	31.60	400.00	PASS
Mid	0.365	116.80	31.60		PASS
High	0.362	115.84	31.60		PASS

DH 3

CH Low: $1.585 * (1600/4)/79 * 31.60 = 253.60$ (ms)

CH Mid: $1.581 * (1600/4)/79 * 31.60 = 252.96$ (ms)

CH High: $1.580 * (1600/4)/79 * 31.60 = 252.80$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.585	253.60	31.60	400.00	PASS
Mid	1.581	252.96	31.60		PASS
High	1.580	252.80	31.60		PASS

DH 5

CH Low: $2.910 * (1600/6)/79 * 31.60 = 310.41$ (ms)

CH Mid: $2.912 * (1600/6)/79 * 31.60 = 310.62$ (ms)

CH High: $2.910 * (1600/6)/79 * 31.60 = 310.41$ (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.910	310.41	31.60	400.00	PASS
Mid	2.912	310.62	31.60		PASS
High	2.910	310.41	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.

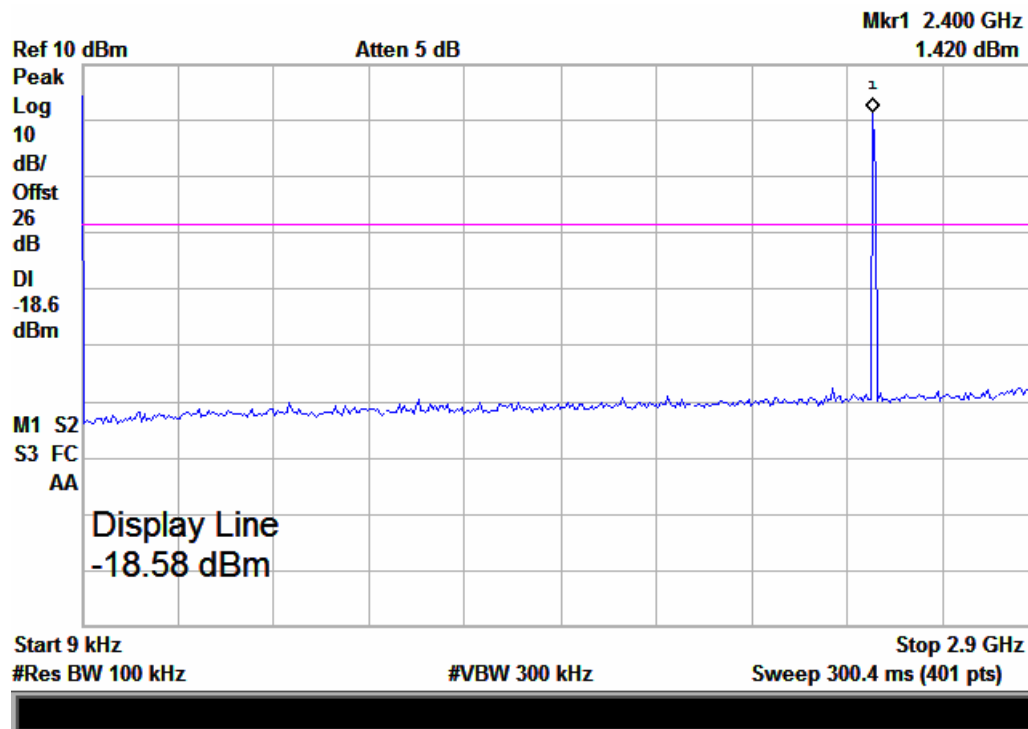
5.7.3 Test Result

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

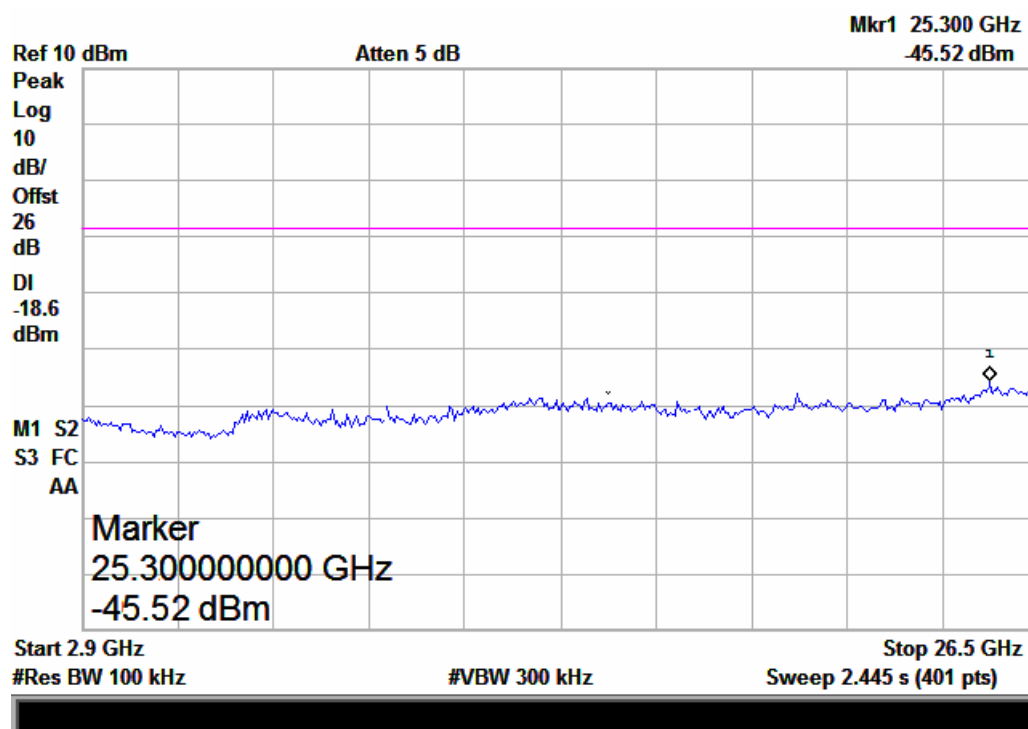
Test Verdict:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated -20dBm Limit	
0	2402	-45.52	1.420	-18.580	PASS
39	2441	-45.88	-0.005	-20.005	PASS
78	2480	-47.16	-0.077	-20.077	PASS

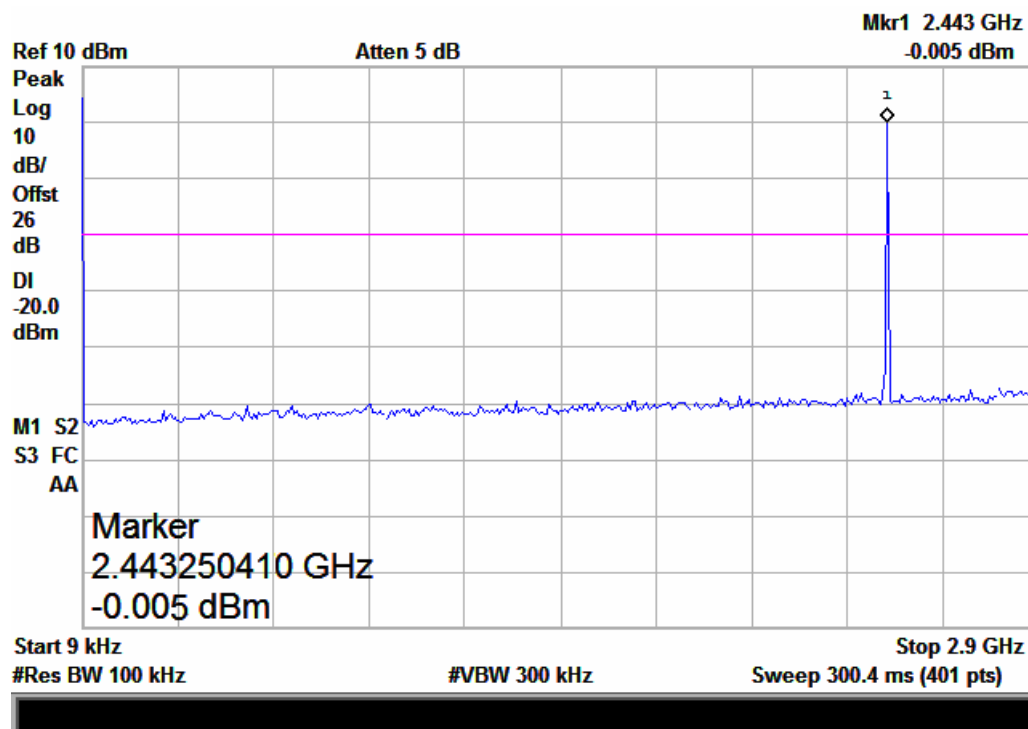
Please refer to the Plot 5-Plot 10:



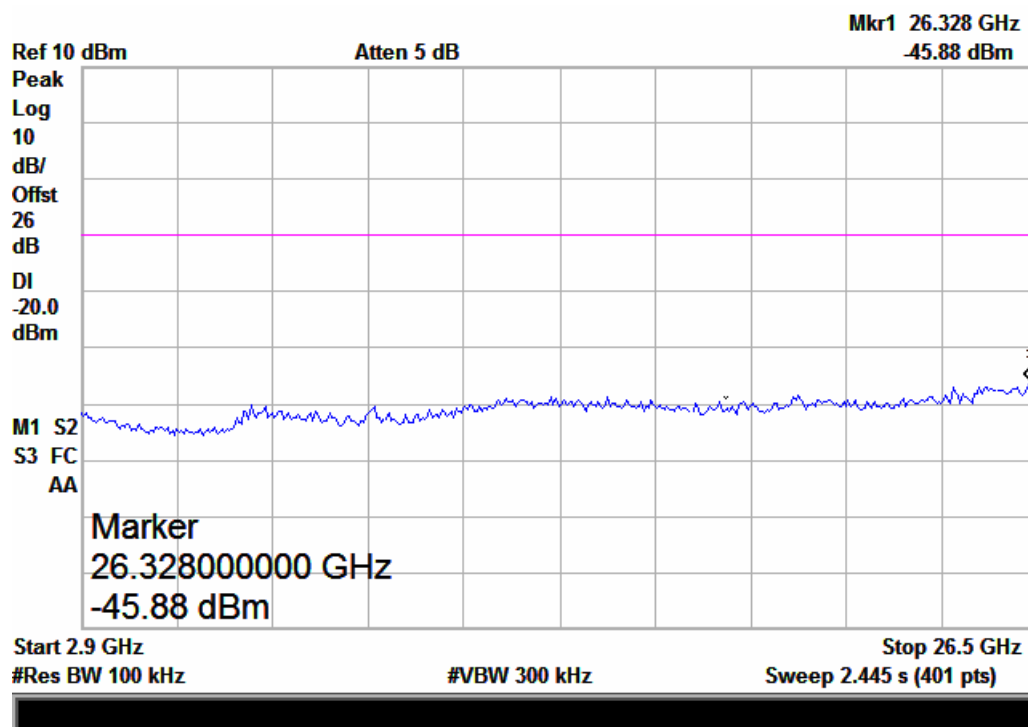
(Plot 5 Channel 0: 9K-2.9GHz)



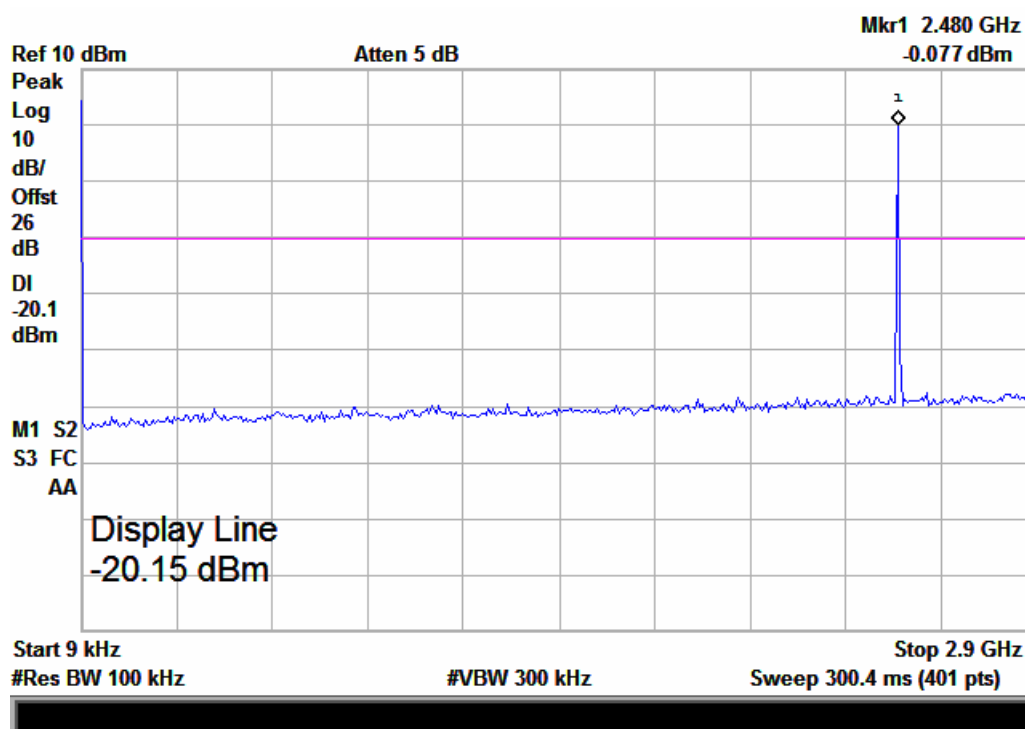
(Plot 6 Channel 0: 2.9 GHz -26.5 GHz)



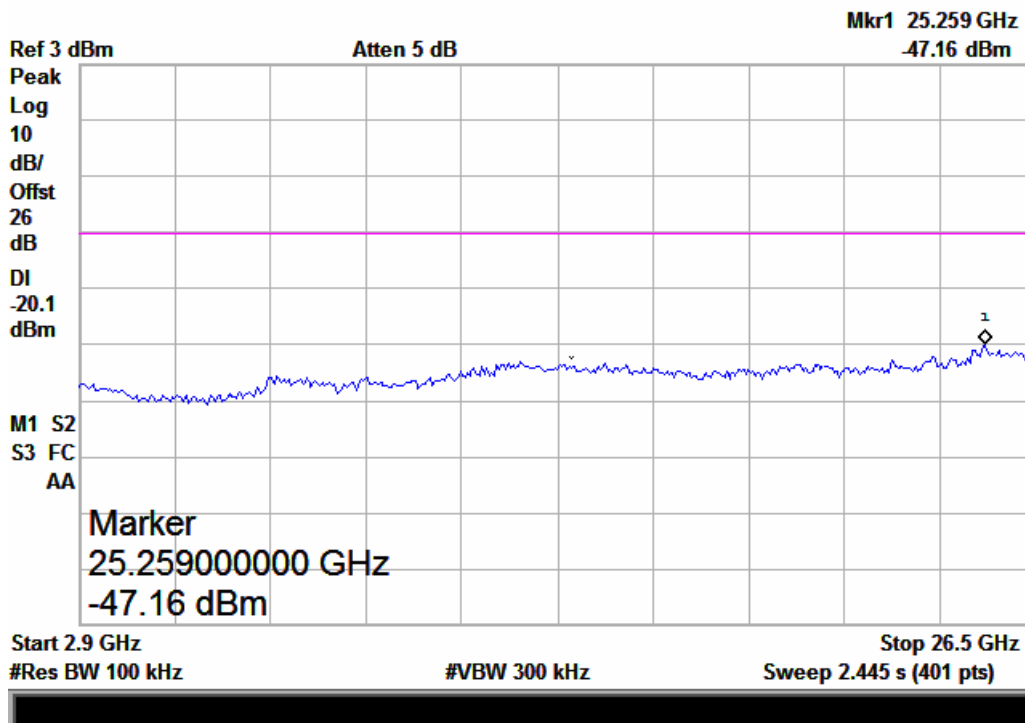
(Plot 7 Channel 39: 9K-2.9GHz)



(Plot 8 Channel 39: 2.9 GHz -2.6.5 GHz)



(Plot 9 Channel 78: 9K-2.9GHz)



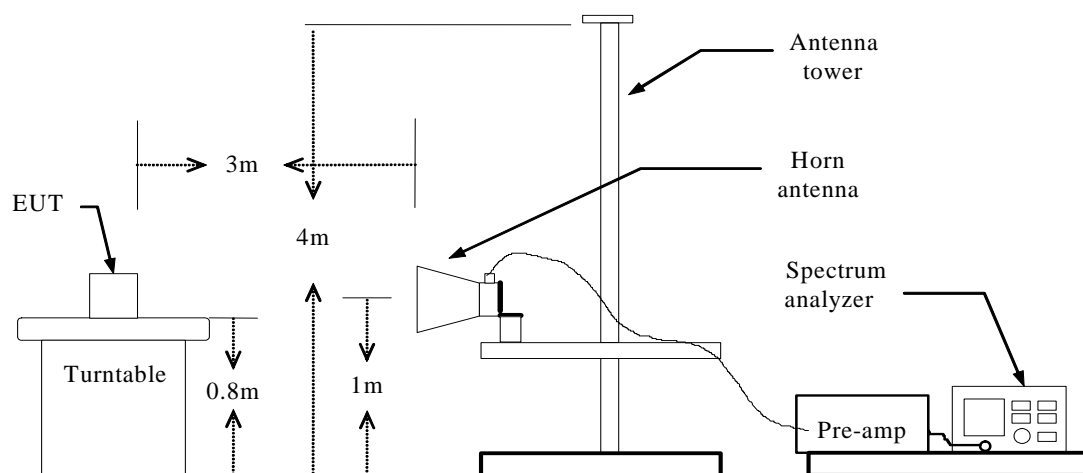
(Plot 10 Channel 78: 9K-2.9GHz)

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.

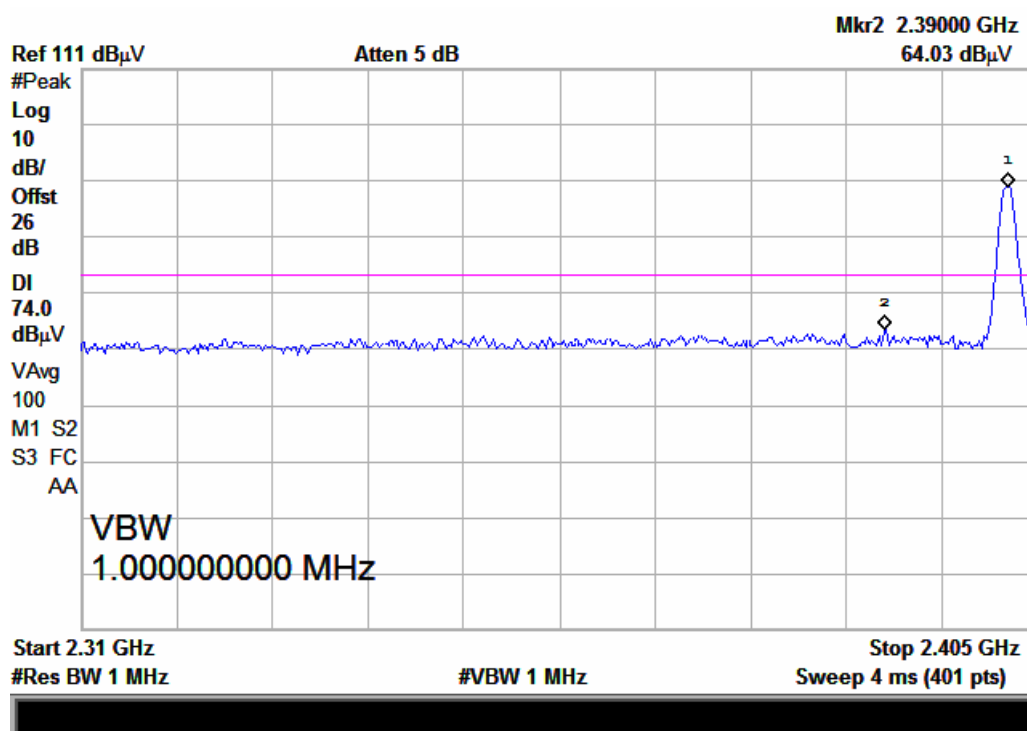
5.8.2 Test Description



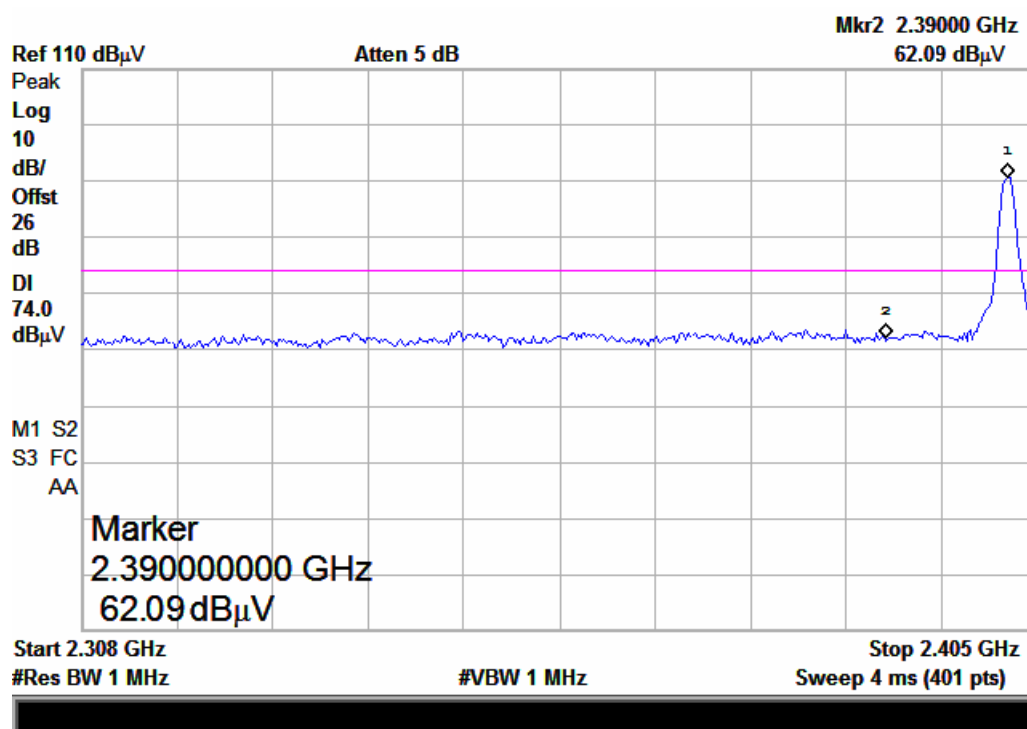
5.8.3 Test Result

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

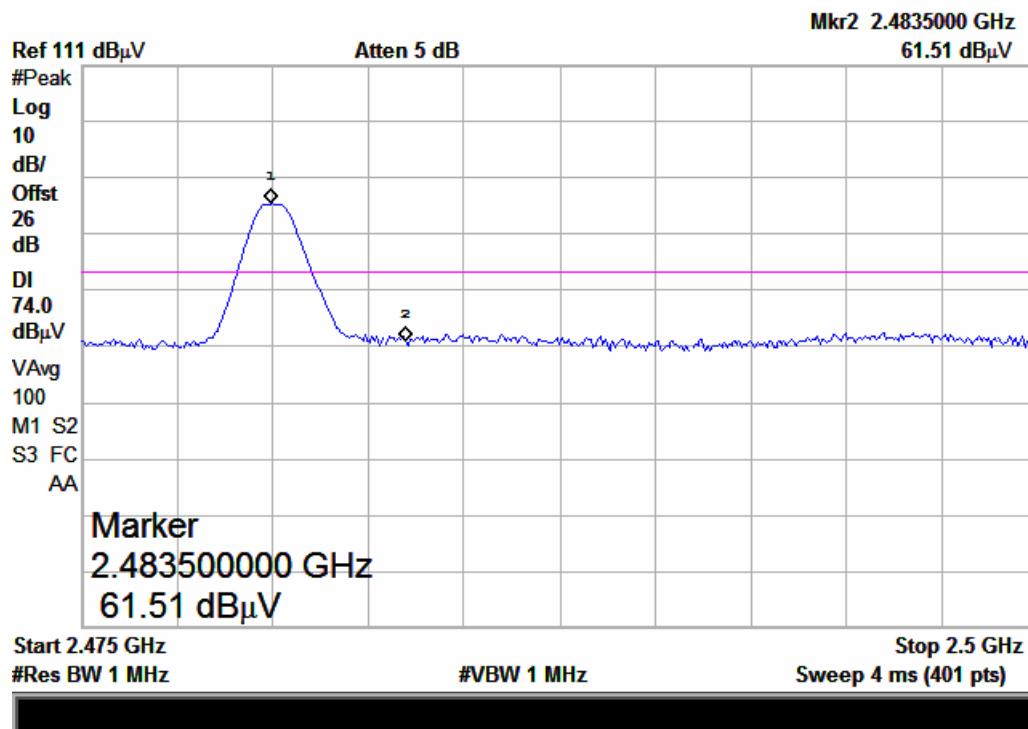
Test Plot:



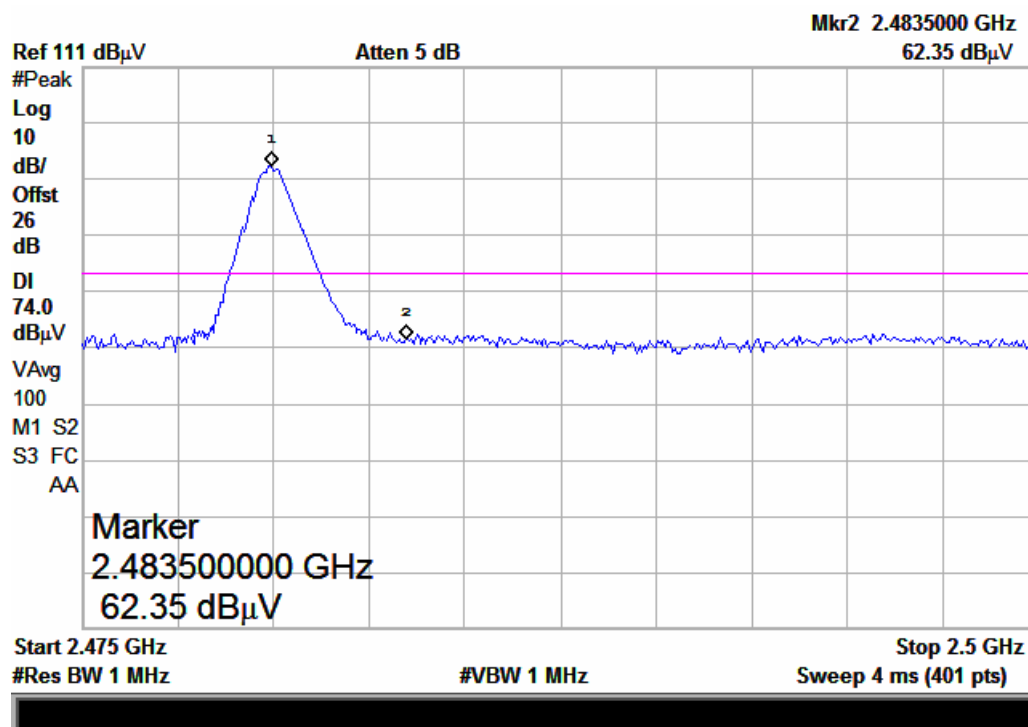
(Plot 11: Channel = 0, Detector Mode: Peak, Polarity: Horizontal)



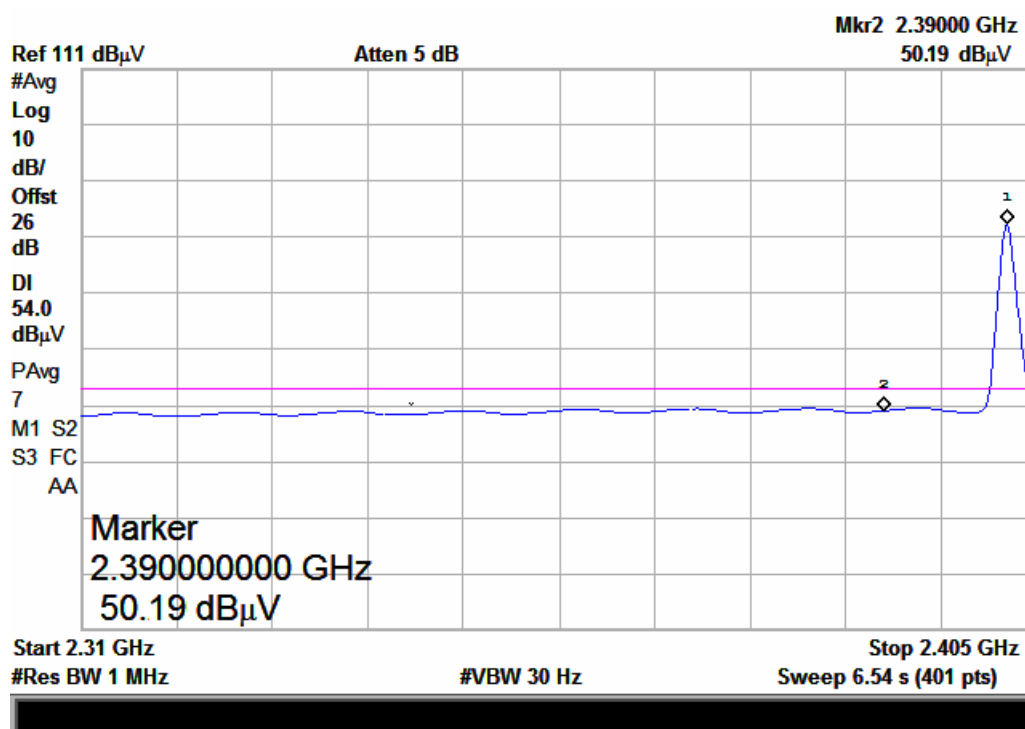
(Plot 12: Channel = 0, Detector Mode: Peak, Polarity: Vertical)



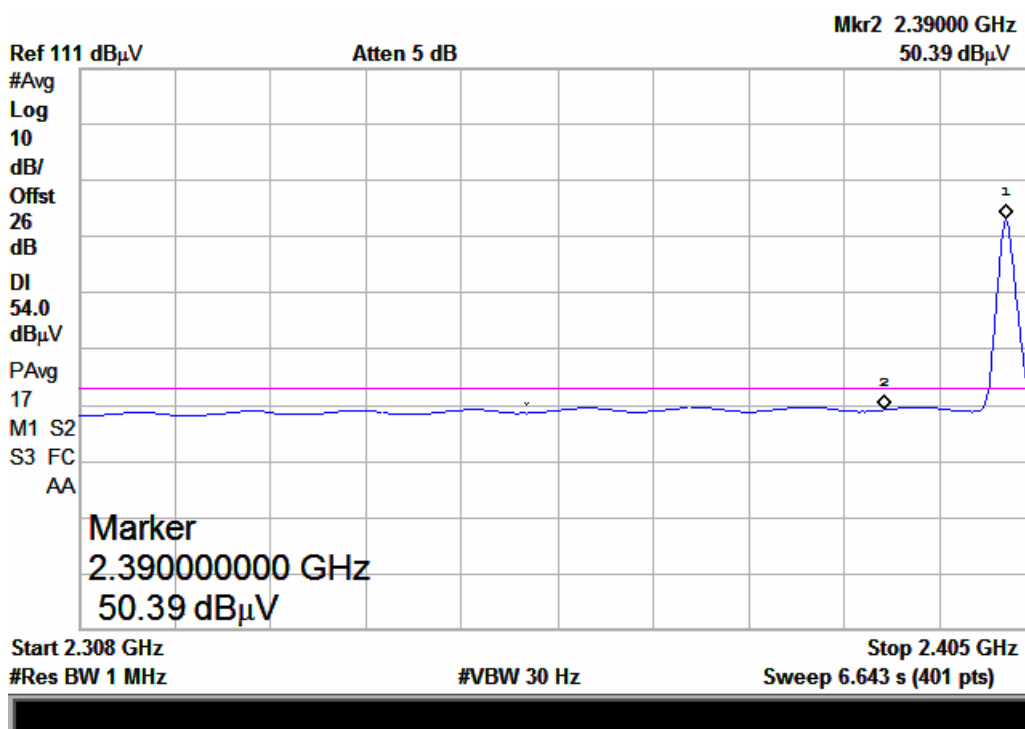
(Plot 13: Channel = 78, Detector Mode: Peak, Polarity: Horizontal)



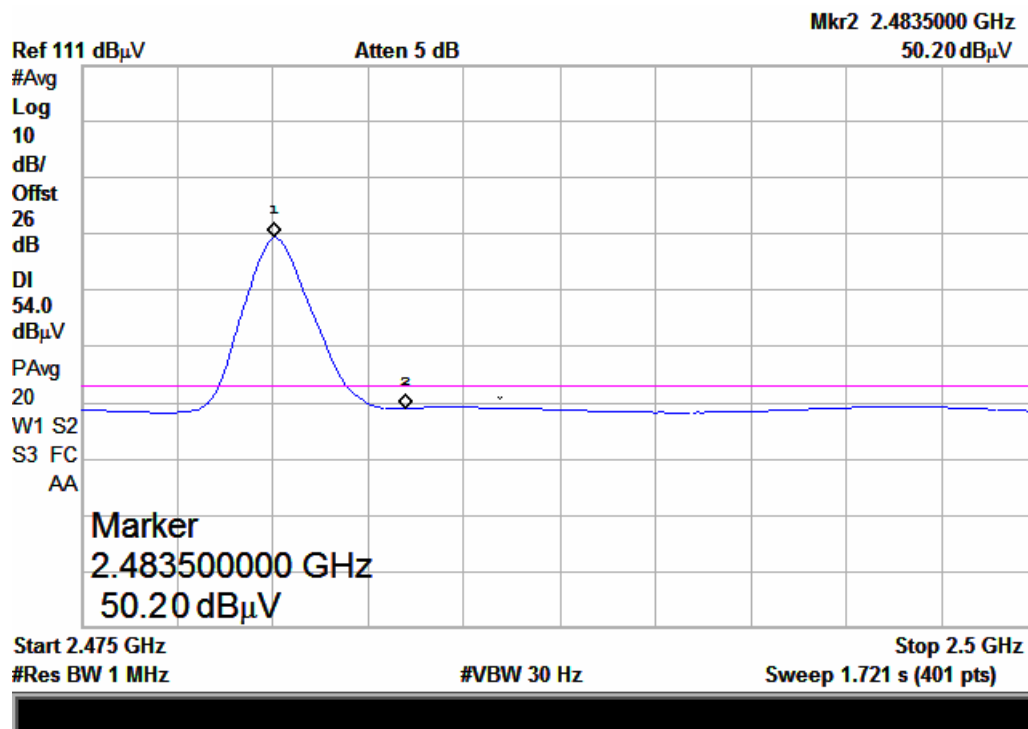
(Plot 14: Channel = 78, Detector Mode: Peak, Polarity: Vertical)



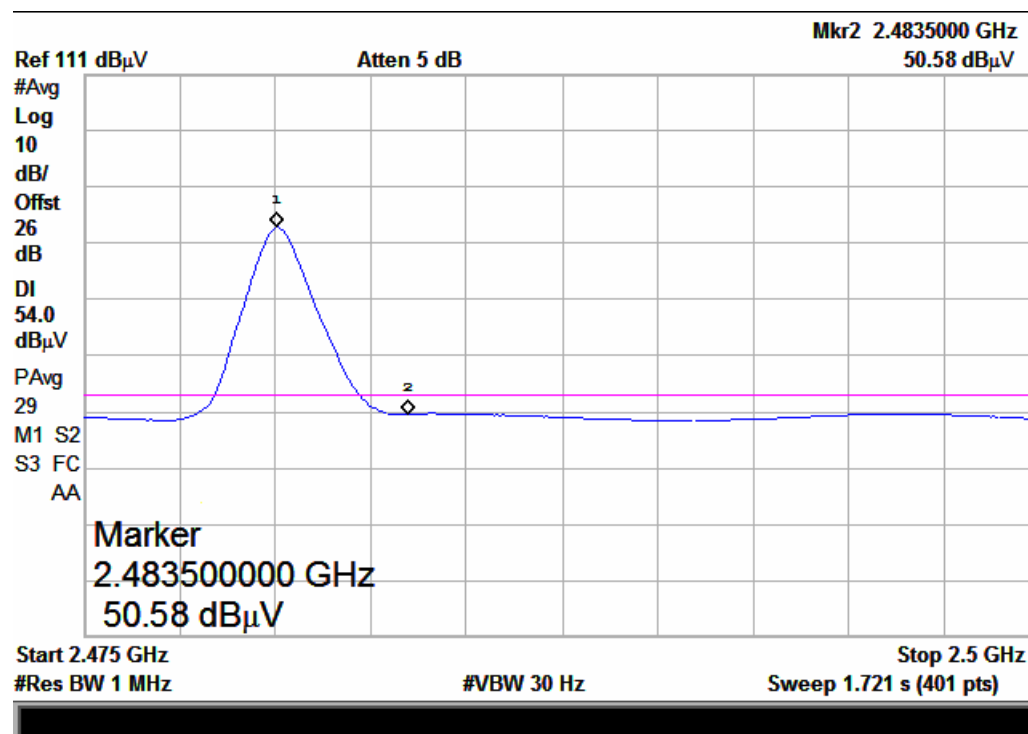
(Plot 15: Channel = 0, Detector Mode: Average, Polarity: Horizontal)



(Plot 16: Channel = 0, Detector Mode: Average, Polarity: Vertical)



(Plot 17: Channel = 78, Detector Mode: Average, Polarity: Horizontal)



(Plot 18: Channel = 78, Detector Mode: Average, Polarity: Vertical)

5.9 Radio 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
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input checked="" type="checkbox"/> Others <u>Bluetooth: 2402GHz ~ 2480GHz</u>
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others _____
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure ($S = 5mW/cm^2$) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ($S=1mW/cm^2$)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	-2.09dBm (0.618mW)
Antenna gain (Max)	5.0 dBi
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation
Note: 1. The maximum output power is <u>-2.09dBm (0.618mW) at 2402MHz.</u> 2. The Bluetooth and FM cannot be used at the same time. 3. DSS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance. 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: $60/f \text{ (GHz)} = 60/2.441 = 24.58mW$)

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).

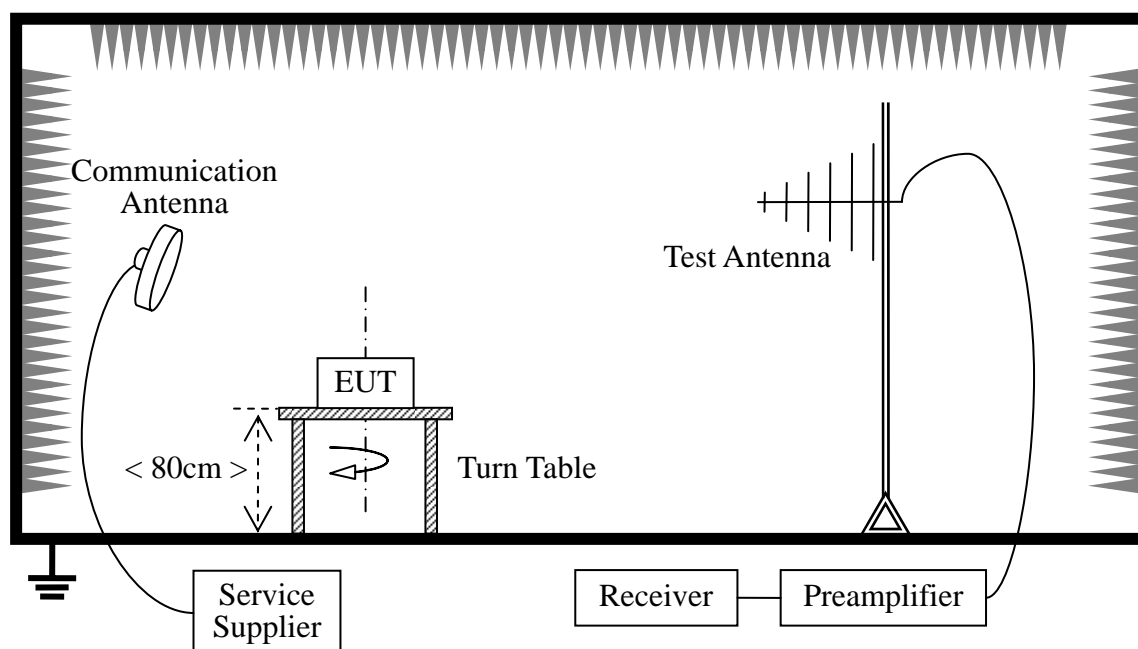
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	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: August 27, 2009

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)
132.15	V	Peak	33.90	3.79	37.69	43.50	-5.81
178.27	V	Peak	28.36	4.53	32.89	43.50	-10.61
603.09	V	Peak	19.85	15.06	34.91	46.00	-11.09
176.28	H	Peak	25.52	4.52	30.02	43.50	-13.48
603.03	H	Peak	22.11	15.06	37.17	46.00	-8.83
793.15	H	Peak	26.51	16.98	43.49	46.00	-2.51
845.80	H	Peak	25.26	17.85	43.11	46.00	-2.89

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:** August 27, 2009**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)
113.23	V	Peak	31.65	6.40	38.05	43.50	-5.45
176.27	V	Peak	34.32	4.51	38.83	43.50	-4.67
239.70	V	Peak	32.64	5.15	37.79	46.00	-8.21
176.28	H	Peak	34.02	4.51	38.53	43.50	-4.97
219.90	H	Peak	20.56	5.07	25.63	43.50	-17.87
261.75	H	Peak	31.54	5.29	36.83	46.00	-9.17
602.93	H	Peak	28.08	15.04	43.12	46.00	-2.88

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:** August 27, 2009**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)
45.41	V	Peak	29.76	7.97	37.73	40.00	-2.27
140.78	V	Peak	35.10	3.23	38.33	43.50	-5.17
213.10	V	Peak	21.34	6.11	27.45	43.50	-16.05
147.88	H	Peak	29.61	3.29	32.90	43.50	-10.60
602.93	H	Peak	21.33	15.04	36.37	46.00	-9.63
844.80	H	Peak	24.29	17.83	42.12	46.00	-3.88

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:** August 27, 2009**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	36.21	---	5.95	42.16	---	74.00	54.00	-31.84	Peak
N/A										
N/A										
N/A										
N/A										
4804.46	H	39.82	---	5.95	45.77	---	74.00	54.00	-28.23	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 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

Operation Mode: CH Mid
Temperature: 20°C
Humidity: 70 % RH

Test Date: August 27, 2009
Tested by: Petter Ping
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)				
4882.13	V	37.15	---	6.72	43.87	---	74.00	54.00	-30.13	Peak
N/A										
N/A										
N/A										
N/A										
4882.13	H	40.15	---	6.72	46.87	---	74.00	54.00	-27.13	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 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.

Operation Mode: CH High**Test Date:** August 27, 2009**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				
4960.26	V	38.61	---	7.55	46.16	---	74.00	54.00	-27.84	Peak
N/A										
N/A										
N/A										
N/A										
4960.26	H	40.89	---	7.55	48.44	---	74.00	54.00	-25.56	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.

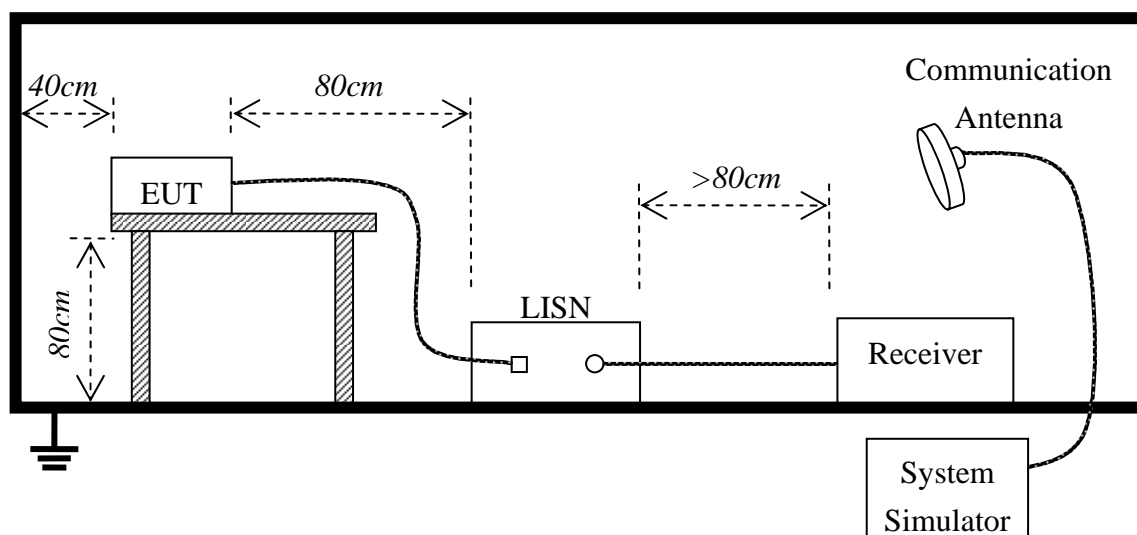
5.11 Conducted Emission

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	August 27, 2009	SZSTS090802F2	4_ (L,N)	
SD Card	August 27, 2009	SZSTS090802F2	5_ (L,N)	▲
Bluetooth Mode	August 27, 2009	SZSTS090802F2	6_ (L,N)	

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

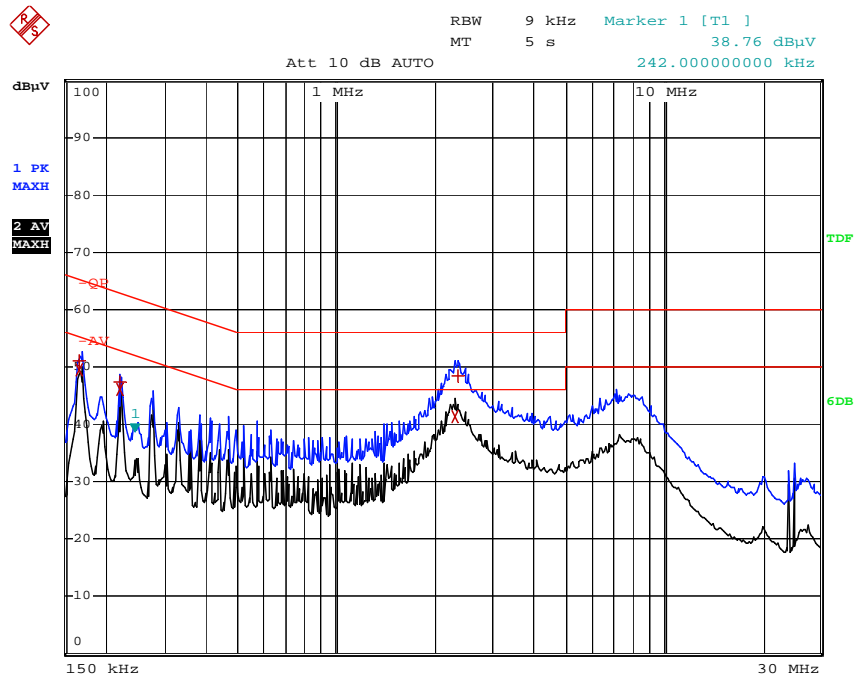
5.11.3 Final Procedure Of Line Conducted Emission Test

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

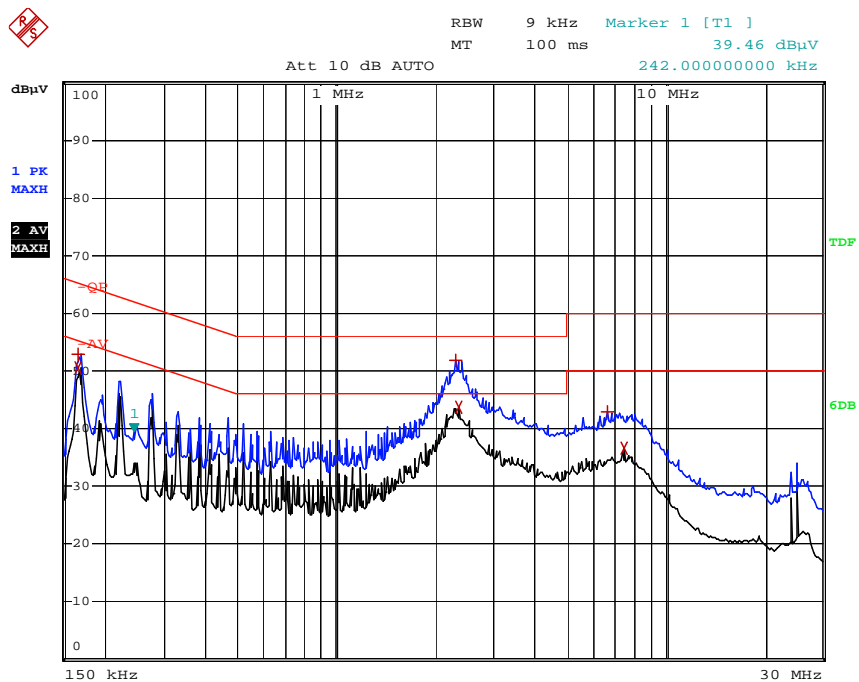
A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level 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



Date: 26.AUG.2009 16:06:37



Date: 26.AUG.2009 16:08:46

5.12 Antenna Requirement

5.12.1 Definition

An analysis of the NAV-4303 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 NAV-4303 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 NAV-4303 meets the criteria of this rule by virtue of having an internal antenna inaccessible to the user. The EUT is therefore compliant.