CERTIFICATE OF COMPLIANCE
FCC PART 15.247 Certification

Applicant Name:	Date of Testing
UMID Co., Ltd.	November 4 to November 13 ,2009
	Test Site/Location
Address:	BWS TECH Inc. #611-1 Maesna-Ri, Mohyeon-Myeon, Yongin-Si, Gyeonggi-Do 449-853, Korea
#412, 4F, Techcenter, SKn Technopark, 190-1, Sanfdaewon-dong, Joongwon-gu, Sungnam city, Kyunggi-Do, 462-120, KOREA	**Test Report No.:** BWS-RF-0010
	BWS FRN: 00099636881
	IC Recognition NO.: 4963

FCC ID: XFGM1-12
APPLICANT: UMID Co., Ltd.

Model(s):	M1
IC Model(s):	M1
EUT Type:	M-BOOK
Max. RF Output Power:	WLAN: 9.67 dBm(9.27mW) / BT: 2.93dBm(1.96mW)
Frequency Range:	2412-2472 MHz (WLAN) / 2402-2480 MHz (BT)
Modulation Type	CCK,QPSK, GFSK,16PSK,QAM
FCC Classification:	DTS Part 15 Digital Transmission System
FCC Rule Part(s):	Part 15 subpart C Section 15.247
IC Rule:	RSS-210, RSS-GEN
IC Registration No.:	4963

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated. And the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.
BWS TECH Inc. Certifies that no party to this application has been denied FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S C.862

(Date) 11/13/2009

Tested by **HyunSup, Jin**

(Date)11/13/2009

Reviewed by **TaeHyun, Nam**

BWS TECH Inc.
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TABLE OF CONTENTS

FCC TEST REPORT

Scope – *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

1. General Information

Applicant

Company Name	:UMID Co., Ltd.
Company Address	:#412, 4F, Techcenter, SKn Technopark, 190-1, Sangdaewon-dong, Joongwon-gu, Sungnam city, Kyunggi-Do, 462-120, Korea
Phone/Fax	:Phone : 82-31-776-4061 Fax : 82-31-776-4067

Manufacturer

Company Name	:UMID Co., Ltd.
Company Address	:#412, 4F, Techcenter, SKn Technopark, 190-1, Sangdaewon-dong, Joongwon-gu, Sungnam city, Kyunggi-Do, 462-120, Korea
Phone/Fax	: Phone : 82-31-776-4061 Fax : 82-31-776-4067

● **EUT Type**	:M-BOOK
● **Model Name**	:M1
● **FCC ID**	:XFGM1-12
● **S/N**	:Prototype
● **Freq. Range**	:Bluetooth & Wireless LAN (2400MHz ~ 2483.5MHz)
● **Number of Channels**	:13 / WLAN 79 / Bluetooth
● **Modulation Method**	:DSSS (BPSK, QPSK, CCK), OFDM (QAM) FHSS (GFSK,QPSK,16PSK)
● **FCC Rule Part(s)**	:Part 15 Subpart C Section 15.247 RSS-210 Low-power Licence-exempt Radiocommunication Devices
● **Test Procedure**	:ANSI C63.4-2003
● **Dates of Tests**	:November 4 to November 13, 2009
● **Place of Tests**	:BWS TECH Inc.(FCC Registration Number : 553281) #611-1 Maesan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-853, Korea TEL: +82 31 333 5997 FAX: +82 31 333 0017
● **Test Report No.**	:BWS-09-RF-0010

2. Description of Test Facility

The measurement for radiated emission test were practiced at the open area test site of BWS TECH Inc. Measurement for conducted emission test were practiced at the semi EMC Anechoic Chamber test site of BWS TECH Inc. facility located at #611-1 Maesan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-853, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-2000 and CISPR Publication 16. The BWS TECH measurement facility has been filed to the Commission with the FCC for 3 and 10-meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission (Registration Number : 553281).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-2000) was used in determining radiated emissions from the UMID Co., Ltd. Model : M1.

3. Product Information

3.1 Equipment Description

The Equipment Under Test (EUT) is RF transmitter by the UMID Co., Ltd.
Model : M1. (FCC ID : XFGM1-12).
The M1 is suitable designed for use with a growing variety of mobile devices.
IrDA/Serial or Bluetooth/Serial interfaces make the M1 the perfect comrade for applications such as point of transaction warehousing, distribution, point of sales, hospitality, gaming and healthcare.

3.2 General Specification

The system specifications are subject to change without notice. For detailed system specifications, refer to the product catalog.

CPU(Option)	**IntelATOM Processor[Z510.Z515,Z520] 1.1/1.2/1.33GHz**
Cash Memory	**512KB**
Main Memory(Option)	**512MB Type: DDR2**
Main Chipset	**Pulsbo**
SSD(Option)	**NAND Flash 8GB/16GB/32GB/64GB**
Graphic	**Mobile Intel Graphic Media Accelerator 500**
Sound Chipset	**Realtek high Definition Audio Codec(ALC262)**
Networks	**-Wireless LAN:802.11b/g** **-Bluetooth 2.0 + EDR**
Micro SD Card Slot	**SD Card**
Voice Recorder	**0**
Web Camera (Option)	**1.3M Web Camera**
External I/O Interface(Option)	**-Mini USB port x 1,** **-TTA 20Pin x 1 (Earphone Jack, USB Client, TTA recharger)** **-Microphone input port x1,** **-Micro SD Card slot x 1,** **-USIM Card slot x 1,** **-DC-In Jack**
External I/O Package (Option)	**USB 2.0x2**
	VGA Output x 1
LCD	**12.2Cm(4.8")WSVGA(1024x600) TFT Color LCD**
Weight	**315g(include battery)**
AC Adaptor	**Input: AC 100-240V, 50/60Hz Output: DC9.5V, 3A**
	Use only authorized AC Adapter
Battery	**Lithium-Ion smart battery : 2Cell(7.4V, 2,400mAh)**
Operation Environment	**-Operation Temp: 5℃~35℃** **-Operation Humidity: 20%RH~80%RH** **-Keeping Temp: -10℃~60℃** **-Keeping Humidity: 10%RH~80%RH**

4. Description of Tests

4.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-2003. The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1m x 1.5m x 0.8m wooden table, which is placed 40cm away from the vertical wall, and 1.5m away from the sidewall of the chamber room. Two LISNs are bonded to the shielded room. The EUT is powered from the PMM LISN and the support equipment is powered from the LISN. Power to the LISNs is filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling (serpentine fashion) to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the Spectrum Analyzer to determine the frequency producing the max. Emission from the EUT. The frequency producing the max. Level was reexamined using the detector function set to the CISPR Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.45 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was maximized by switching power lines, varying the mode of operation or resolution, clock or data exchange speed, if applicable, whichever determined the worst-case emission. Each emission reported was calibrated using self-calibrating mode.

Photographs of the worst-case emission can be seen in photographs of conducted emission test setup.

4.2 Radiated Emission Measurement

Preliminary measurements were made at indoors 3-meter semi EMC Anechoic Chamber using broadband antennas, broadband amplifier, and spectrum analyzer to determine the emission frequencies producing the maximum EME.

Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configurations, mode of operation, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using bi-log antenna and above 1000MHz, linearly polarized double ridge horn antennas were used. Above 1GHz, linearly polarized double ridge horn antennas were used. The measurements were performed with three frequencies, which were selected as bottom, middle, and top frequency in the operating band. Emission level from the EUT with various configurations was examined on the spectrum analyzer connected with the RF amplifier and plotted graphically.

Final measurements were made outdoors open site at 3-meter test range using biconical and log periodic, Horn antenna. The output from the antenna was connected, via a preselector or a preamplifier, to the input of the EMI Measuring Receiver and Spectrum analyzer (for above 25GHz). The detector function was set to the quasi-peak or peak mode as appropriate. The measurement bandwidth on the Field strength receiver was set to at least 120kHz (1MHz for measurement above 1GHz), with all post-detector filtering no less than 10 times the measurement bandwidth. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during preliminary measurement was examined and investigated as the same set up and configuration which produced the maximum emission The EUT, support equipment and interconnecting cables were configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1m x 1.5 meter table. The turntable containing the system was rotated and the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission.

Varying the mode of operating frequencies of the EUT maximized each emission. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst-case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20dB/decade) as per section 15.31(f).

5. Test Condition

5.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner, which tends to maximize its emission level in a typical application.

Radiated Emission Test

Preliminary radiated emission tests were conducted using the procedure in ANSI C63.4/2000 Clause 8.3.1.1 to determine the worst operating condition. Final radiated emission tests were measured at 3-meter open field test site. To complete the test configuration required by the FCC, the EUT was tested in all three orthogonal planes.

5.2 EUT operation

EUT was tested according to the operation modes provided by the specifications given by the manufacturer, and reported the worst emissions.

6. TEST RESULTS

Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

APPLIED STANDARD : 47 CFR Part 15, Subpart C & RSS-210				
FCC Rule	**IC Rule**	**Description of Test**	**Limit**	**Result**
15.207	-	Conducted	Various	Pass
Wireless LAN				
15.247(a)	A8.2 (a)	6dB Bandwidth	Less than 1MHz	Pass
15.247(b)	A8.4 (4)	Maximum Peak Output Power	Less than 30dBm	Pass
15.247(d)	A8.5	Conducted Emission & 100kHz Bandwidth of Frequency Band Edges	More than 20dBc	Pass
15.209	A8.5	Radiated Emission	Various	Pass
15.247(e)	A8.2 (b)	Power Spectral Density	Less than 8dBm	Pass
15.203	A8.4 (6)	Antenna Requirement	Less than 6dBi	Pass
BlueTooth				
15.247(a)	A8.1 (a)	20dB Bandwidth	N/A	Pass
15.247(a)	A8.1 (d)	Average time of occupancy	Less than 0.4 Sec.	Pass
15.247(b)	A8.4 (2)	Maximum Peak Output Power	Less than 30dBm	Pass
15.247(d)	A8.5	Conducted Emission & 100kHz Bandwidth of Frequency Band Edges	More than 20dBc	Pass
15.209	A8.5	Radiated Emission	Various	Pass
15.247(a)	A8.4 (2)	Minimum Hopping Channels	More than 15Ch.	Pass
15.203	A8.4 (6)	Antenna Requirement	Less than 6dBi	Pass

7. Test Procedure & Measurement Data

7.1 Conducted Emissions

EUT	:	M1
Test Standard	:	FCC Part 15 Subpart C Section 15.207
Test Date	:	November 07, 2009
Operating Condition	:	Worst case mode (MONITORING)
Environment Condition	:	Temperature : 16 ℃, Humidity Level : 42 %RH
Result	:	Passed by – 20.08 dB

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Tabulated Conducted Emission Test Data

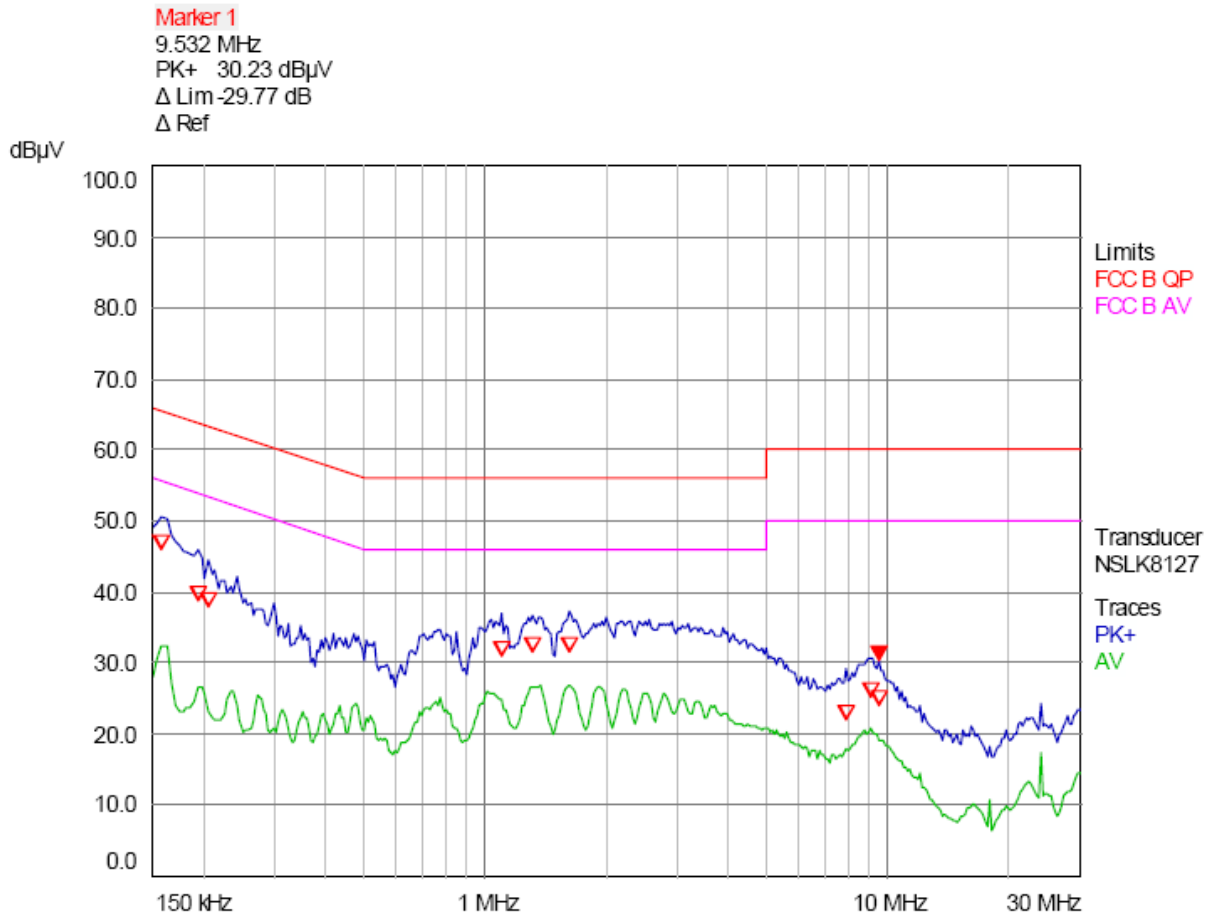
Detector Mode ; CISPR Quasi Peak mode / Average mode (6dB Bandwidth : 9kHz).

Freq [MHz]	Correcton		Phase [H/N]	Quasi-Peak Mode				Average Mode			
	AMN	C.L		Limit	Reading	Emission Level	Margin	Limit	Reading	Emission Level	Margin
				[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.158	0.06	0.03	H	65.90	45.73	45.82	20.08	55.90			
0.194	0.06	0.03	H	64.90	38.61	38.70	26.20	54.90			
0.206	0.07	0.10	H	64.40	37.83	38.00	26.40	54.40			
0.774	0.08	0.30	N	56.00	30.48	30.86	25.14	46.00			
1.314	0.03	0.45	H		31.09	31.57	24.43				
1.618	0.03	0.49	H		31.02	31.54	24.46				
7.892	0.06	1.00	H	60.00	21.02	22.08	37.92	50.00			
9.072	0.06	1.00	H		24.13	25.19	34.81				
9.532	0.07	1.02	H		22.81	23.90	36.10				

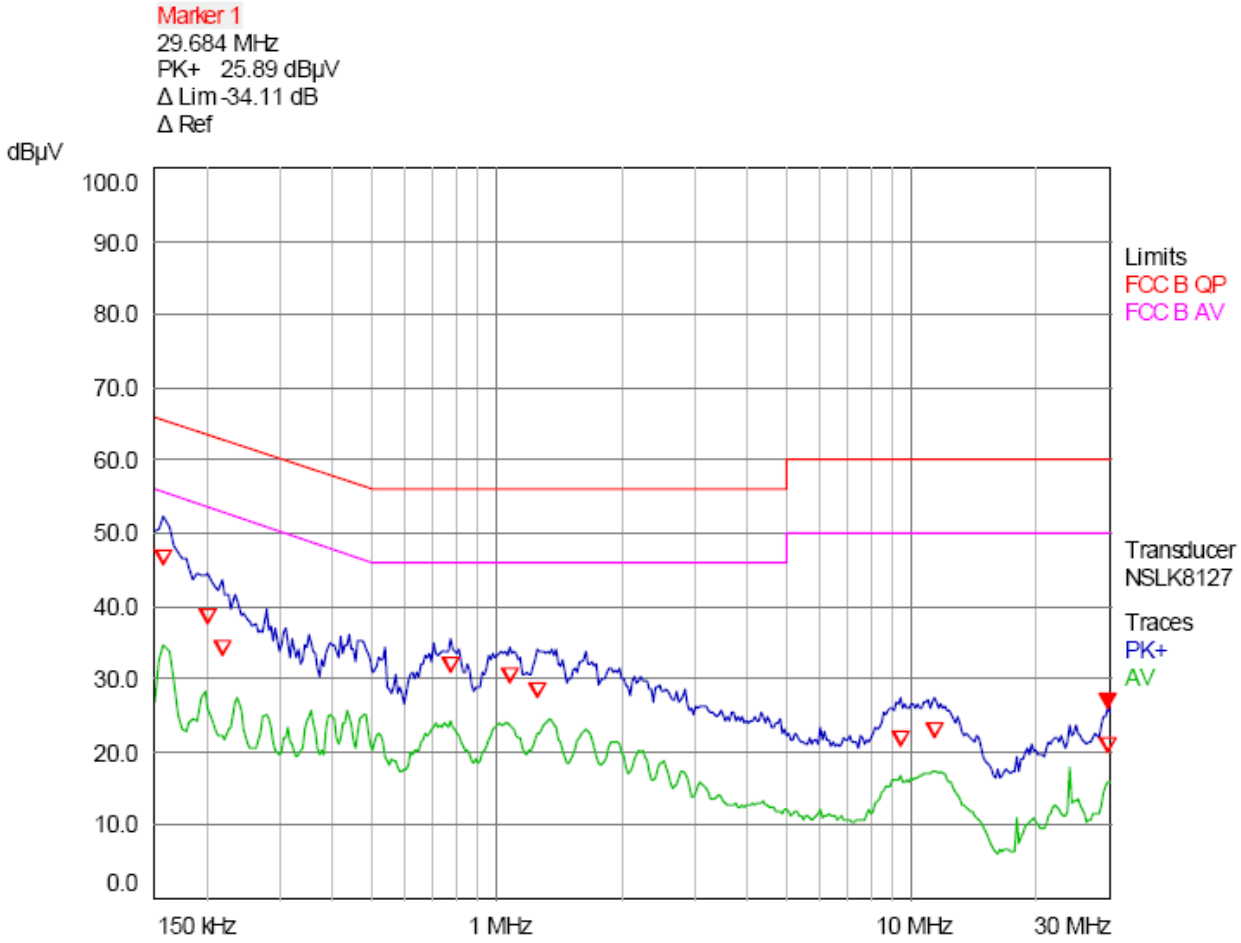
NOTES :

1. H : Hot Line , N :Neutral Line
2. Emission Level = Reading + Correction Factor
3. Measurements were performed at the AC Power Inlet of the host PC with the EUT plugged in the frequency band of 150kHz ~30MHz
4. Margin = Limit - Emission Level
5. Measurement uncertainty estimated at ±3.788 dB.
   The measurement uncertainty is given with a confidence of 95.00 % with the coverage factor, k=2.

Plots of Conducted Emission Test(HOT)



Plots of Conducted Emission Test(NEUTRAL)



7.2 Wireless LAN

7.2.1 6 dB Bandwidth

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(a)(2) RSS-210 Annex 8.2 (a)
Test Date	:	November 7, 2009
Operating Condition	:	Wireless LAN. The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

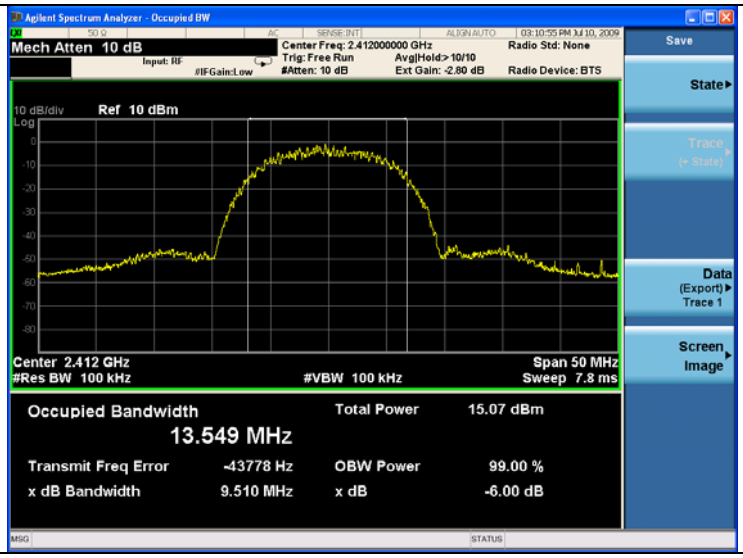
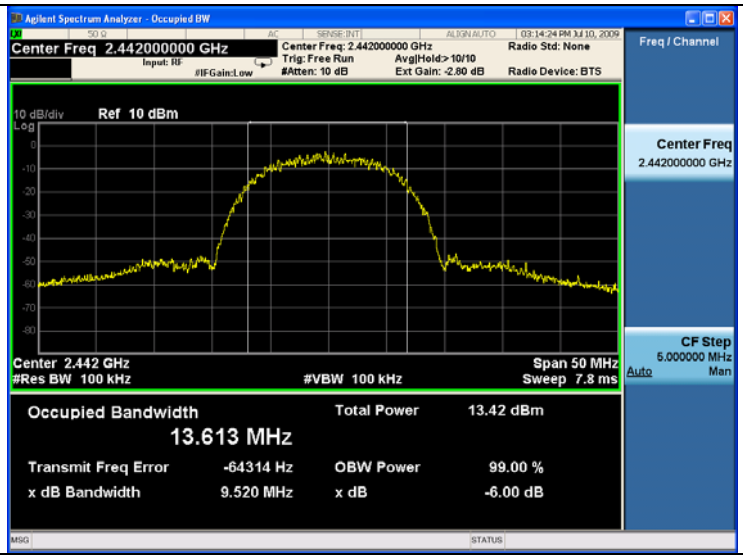
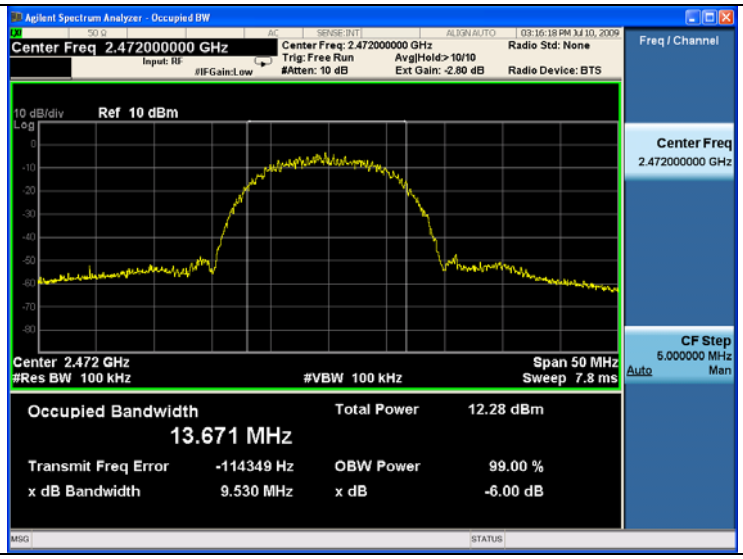
6 dB Bandwidth Test Data

Mode	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit
802.11b	2412	9.51	More than 500 kHz
	2442	9.52	
	2472	9.53	
802.11g	2412	16.50	
	2442	16.51	
	2472	16.51	

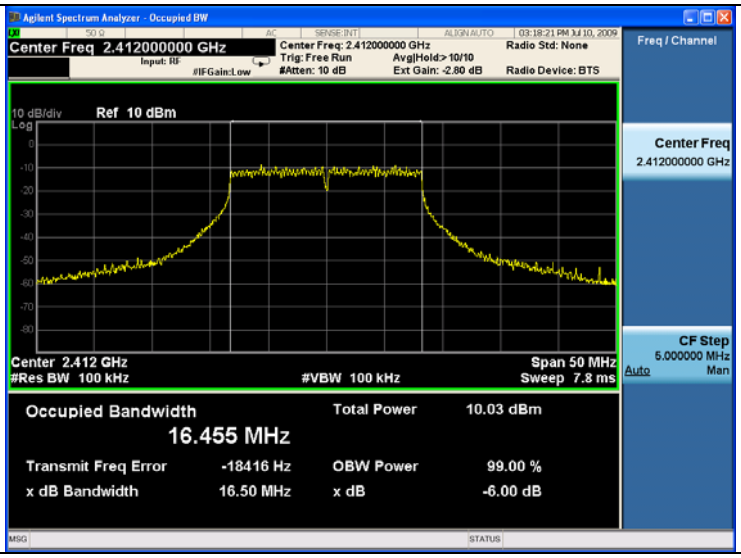
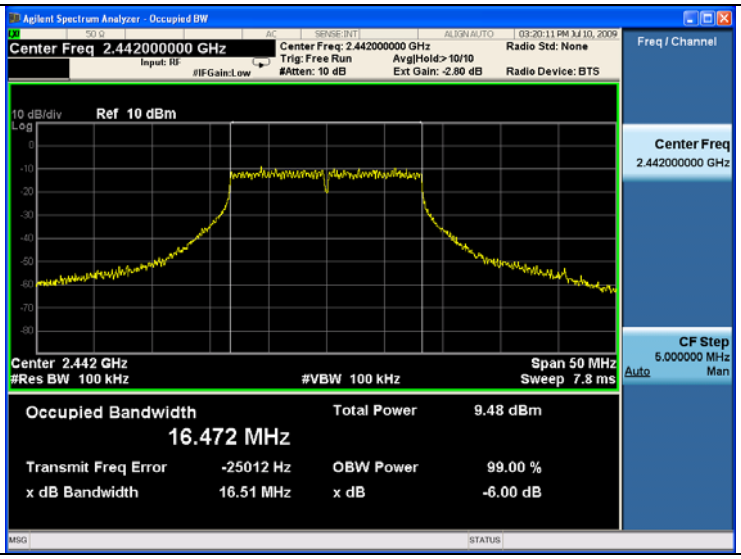
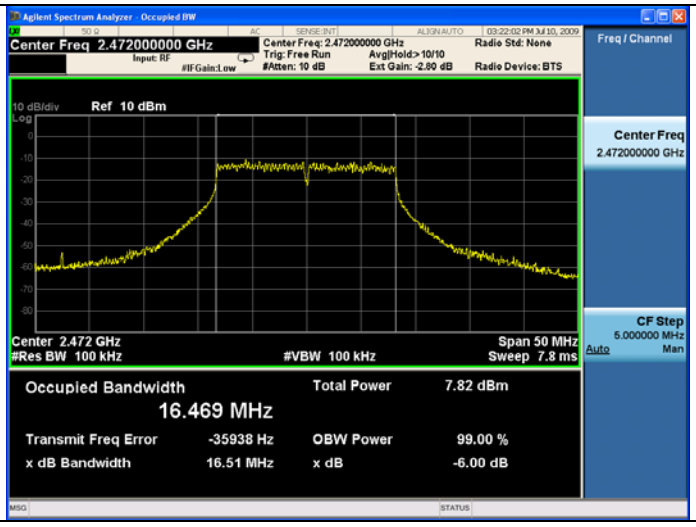
NOTES:

1. Measure conducted 6 dB bandwidth of relevant channel using Spectrum Analyzer.
2. RBW 100kHz, VBW 100kHz.
3. 6 dB less than both bandwidth than maximum peak power.

Plots of 6 dB Bandwidth (802.11b)

Frequency	6 dB Bandwidth measured conducted of 802.11b
2412 MHz 9.51 MHz	
2442 MHz 9.52 MHz	
2472 MHz 9.53 MHz	

Plots of 6 dB Bandwidth (802.11g)

Frequency	6 dB Bandwidth measured conducted of 802.11g
2412 MHz 16.50 MHz	
2442 MHz 16.51 MHz	
2472 MHz 16.51 MHz	

7.2.2 Maximum Peak Output Power

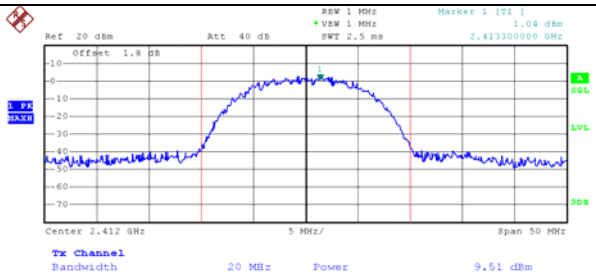
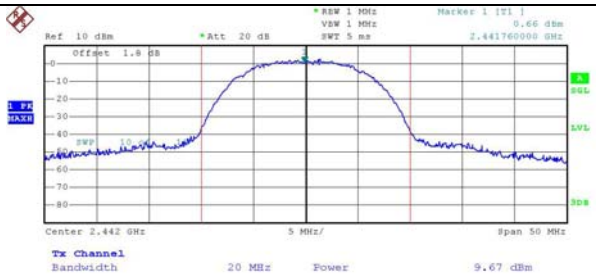
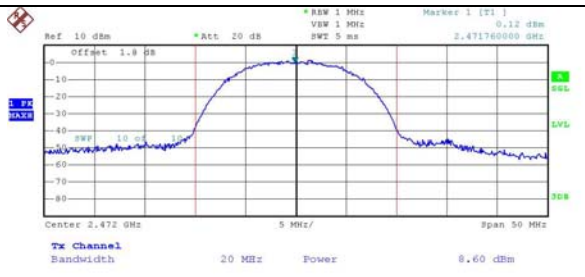
EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(b)(3) RSS-210 Annex 8.4 (4)
Test Date	:	November 7, 2009
Operating Condition	:	Wireless LAN. The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

Maximum Peak Output Power Test Data

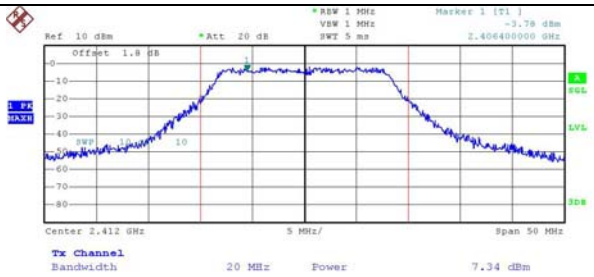
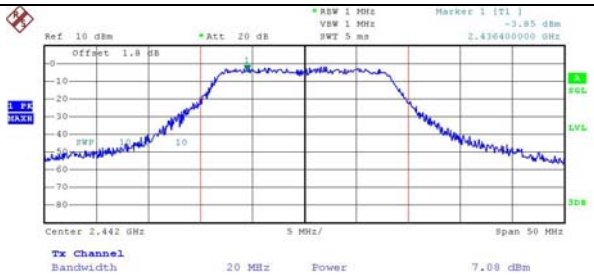
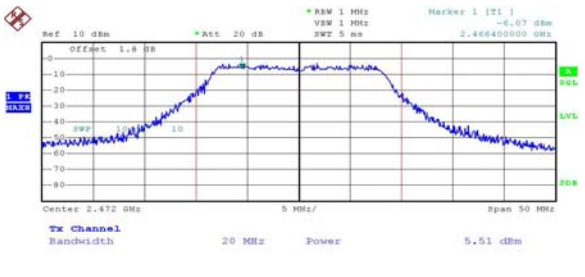
Mode	Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
802.11b	2412	9.51	30 dBm
	2442	9.67	
	2472	8.60	
802.11g	2412	7.34	
	2442	7.08	
	2472	5.51	

NOTES:
1. Measure conducted Maximum Peak Output of relevant channel using Spectrum analyzer.
2. RBW 1MHz, VBW 1MHz, Channel Power.

Plots of Maximum Peak Output Power (802.11b)

Frequency	Maximum Peak Output Power measured conducted of 802.11b
2412 MHz 11.29 dBm	
2442 MHz 9.67 dBm	
2472 MHz 8.60 dBm	

Plots of Maximum Peak Output Power (802.11g)

Frequency	Maximum Peak Output Power measured conducted of 802.11g
2412 MHz 7.34 dBm	
2442 MHz 7.08 dBm	
2472 MHz 5.51 dBm	

7.2.3 Conducted Emission

& 100 kHz Bandwidth of Frequency Band Edges

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(d) RSS-210 Annex 8.5
Test Date	:	November 7, 2009
Operating Condition	:	Wireless LAN. The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

7.2.3.1 Conducted Emission Test

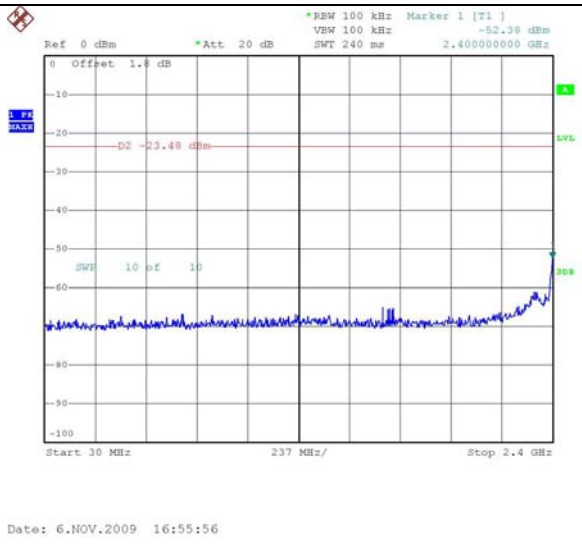
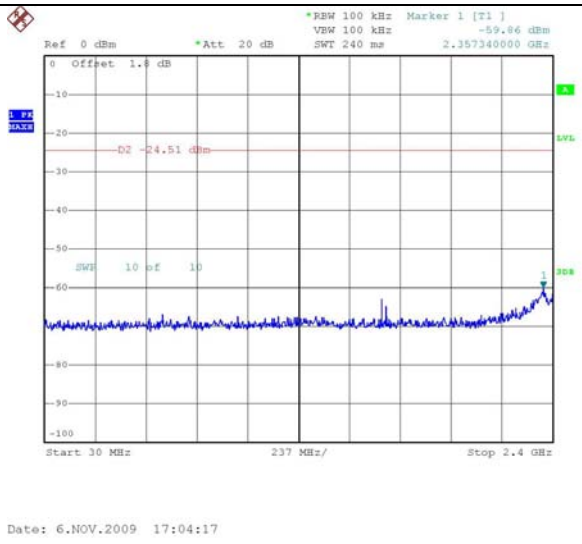
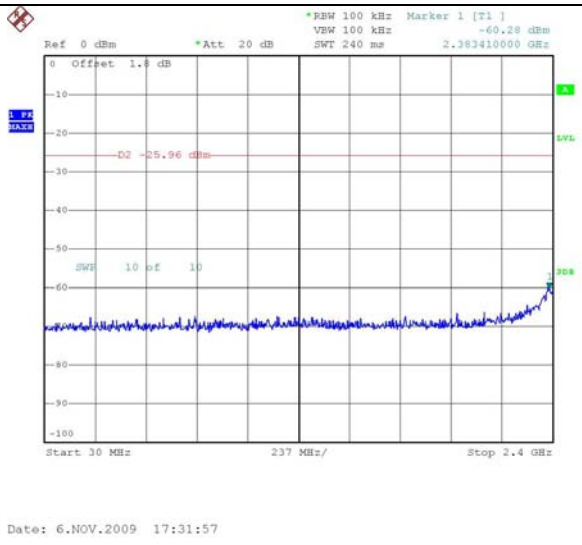
Result : Please refer to the attached Plots for details :

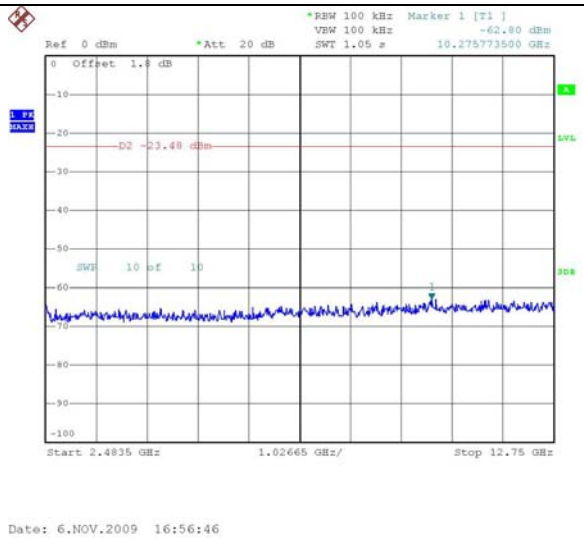
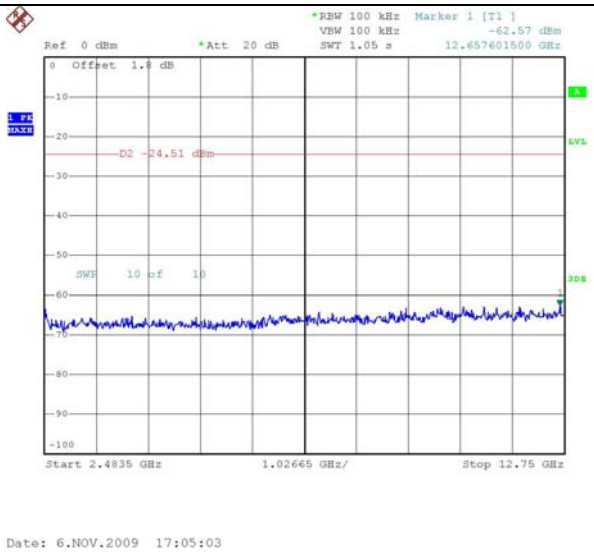
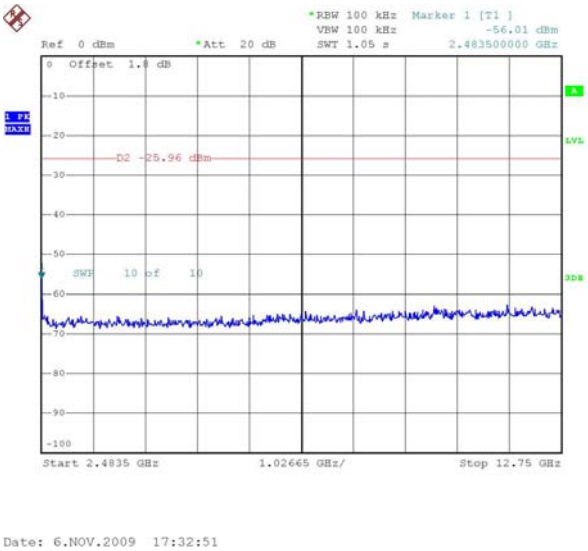
7.2.3.2 100 kHz Bandwidth of Frequency Band Edges

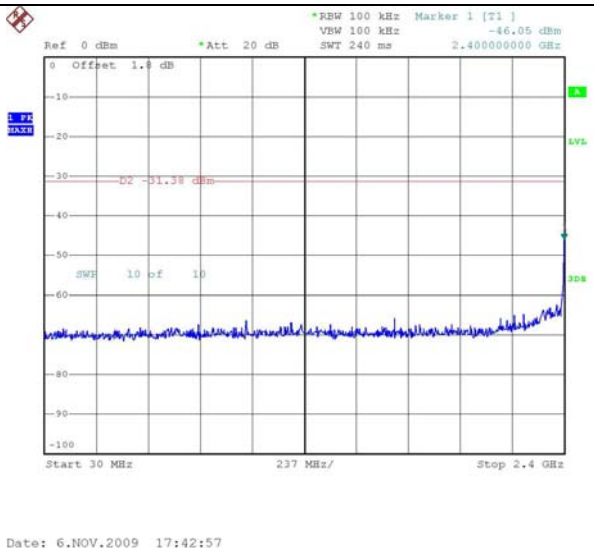
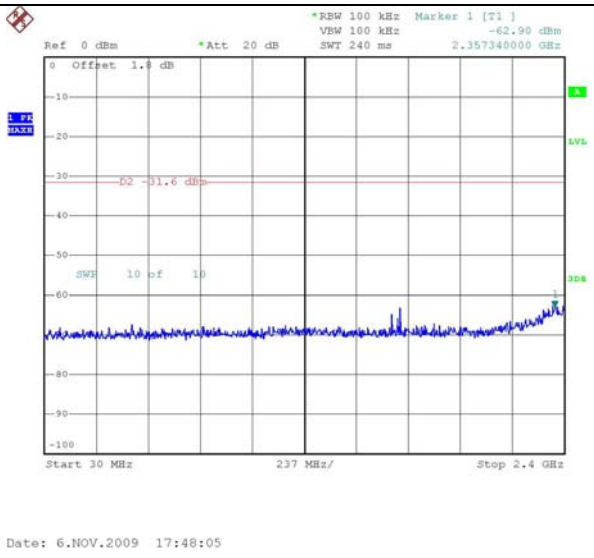
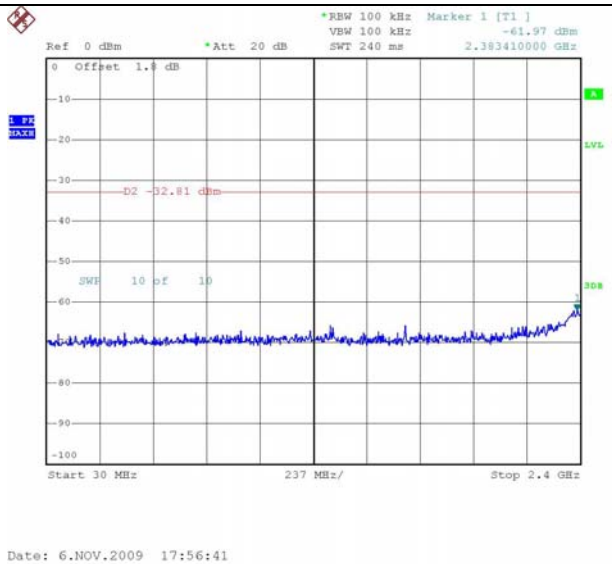
The test was performed to make a direct field strength measurement at the bandedge frequencies. Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209. There is a restricted band starting at 2483.5 MHz and another restricted band from 2310 - 2390 MHz.

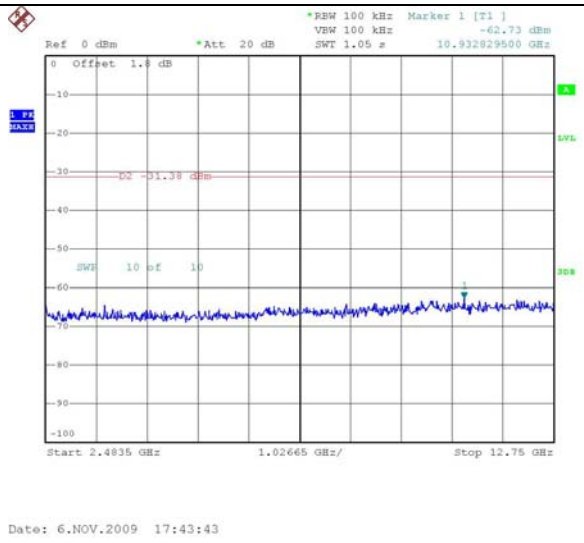
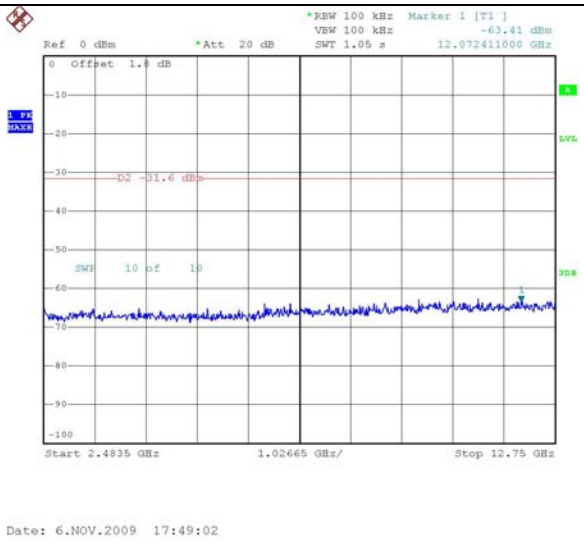
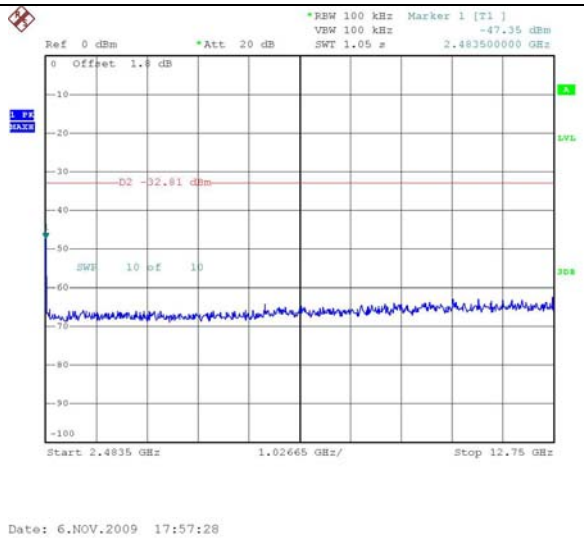
All emissions below noise floor of 7 dBuV/m.

Plots of Conducted Emission

Frequency	30 MHz ~ 2400 MHz (802.11b)
2412 MHz « 20dBc	
2442 MHz « 20dBc	
2472 MHz « 20dBc	

Frequency	2483.5 MHz ~ 12.75 GHz(802.11b)
2412 MHz « 20dBc	
2442 MHz « 20dBc	
2472 MHz « 20dBc	

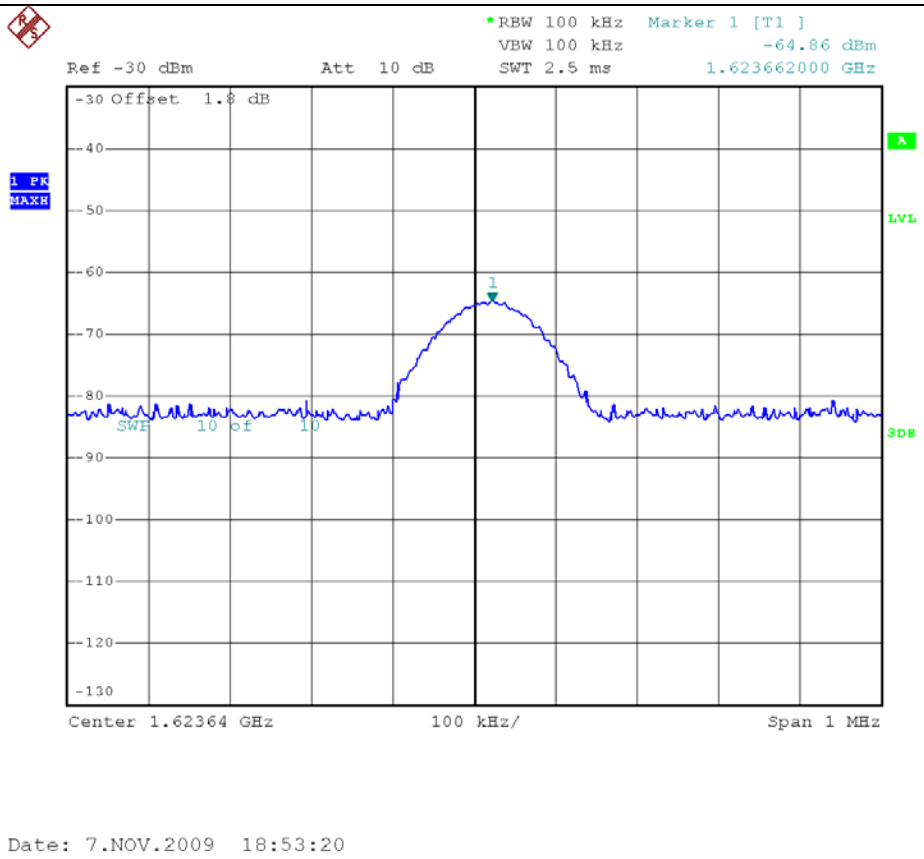
Frequency	30 MHz ~ 2400 MHz (802.11g)
2412 MHz « 20dBc	
2442 MHz « 20dBc	
2472 MHz « 20dBc	

Frequency	2483.5 MHz ~ 12.75 GHz(802.11g)
2412 MHz « 20dBc	
2442 MHz « 20dBc	
2472 MHz « 20dBc	

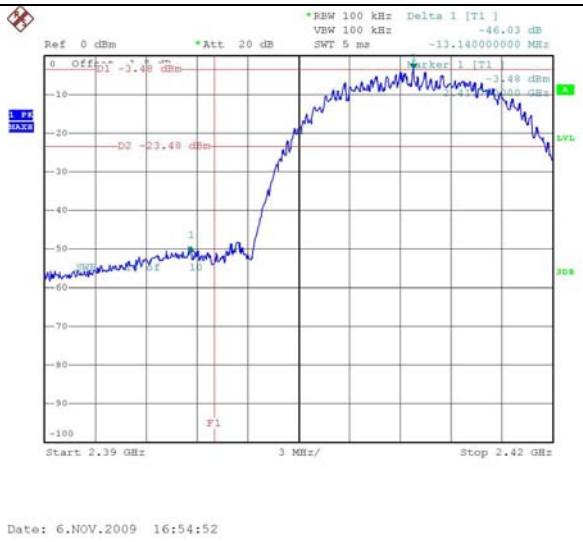
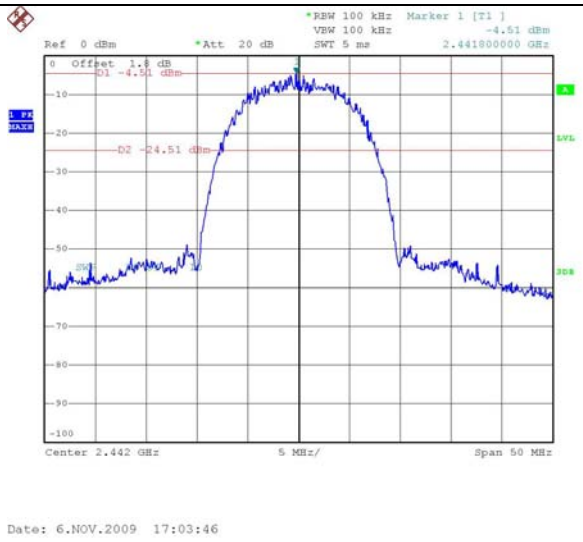
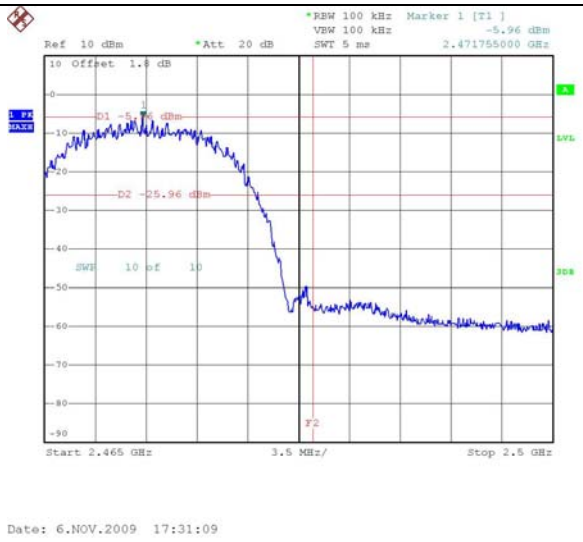
Frequency	12.75 GHz ~ 26.5 GHz(802.11b)
2412 MHz « 20dBc	
2442 MHz « 20dBc	
2472 MHz « 20dBc	

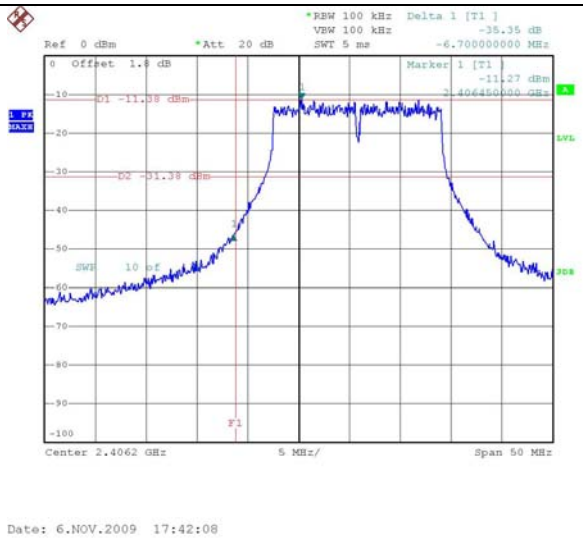
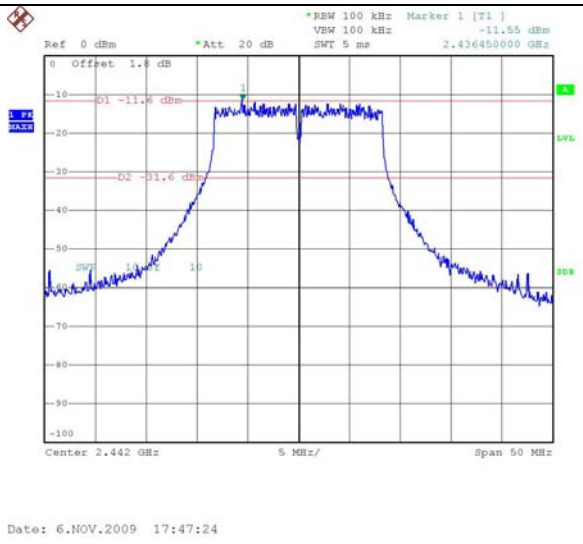
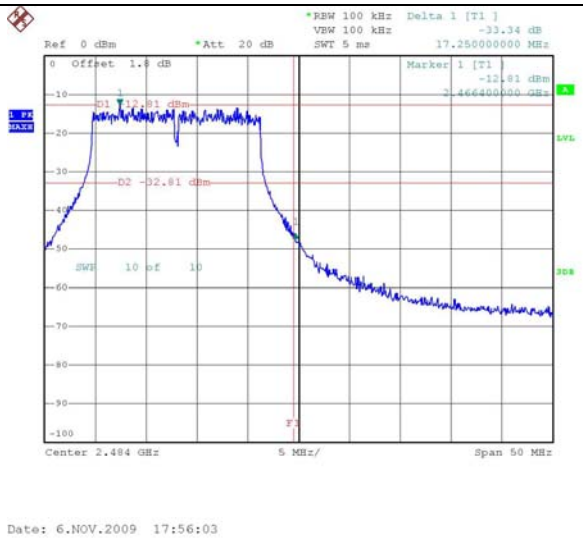
Frequency	12.75 GHz ~ 26.5 GHz(802.11g)
2412 MHz « 20dBc	
2442 MHz « 20dBc	
2472 MHz « 20dBc	

Plots of Conducted Emission

Frequency	Receive Mode / worst case
1.600 GHz -62.53 dBm	

Plots of 100 kHz Bandwidth of Frequency Band Edges

Frequency	802.11b
2412 MHz « 20dBc	
2442 MHz N/A	
2472 MHz « 20dBc	

Frequency	802.11g
2412 MHz « 20dBc	
2442 MHz N/A	
2472 MHz « 20dBc	

7.2.4 Radiated Emission

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(c), 15.209 RSS-210 Annex 8.5
Test Date	:	November 07, 2009
Operating Condition	:	Wireless LAN. The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	19 °C/ 36 %
Result	:	Passed

Radiated Emission Test Data(below 1 GHz)

Frequency [MHz]	Reading [dBμV]	Polarization [*H/**V]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dBμV/m]	Emission Level [dBμV/m]	Margin [dB]
70.38	18.45	V	10.51	1.84	40.00	30.80	9.20
101.88	16.14	H	12.31	1.42	43.50	29.87	13.63
172.02	20.08	H	12.61	2.91	43.50	35.60	7.90
245.77	20.05	H	11.59	3.48	46.00	35.12	10.88
489.97	14.85	V	17.53	5.03	46.00	37.40	8.60
533.13	17.34	V	18.30	5.26	46.00	40.90	5.10
599.86	17.38	H	19.89	5.58	46.00	42.85	3.15

Radiated Emission Test Data (above 1 GHz)

Frequency [MHz]	Reading [dBμV]	Pre-Amp Gain [dB]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dBμV/m]	Emission Level [dBμV/m]	Margin [dB]
Low Channel (2412 MHz)							
5024.00	35.87	30.00	31.71	13.01	53.98	50.59	3.39
Middle Channel (2442 MHz)							
4884.21	32.43	30.00	31.71	13.01	53.98	47.15	6.84
High Channel (2472 MHz)							
4944.00	33.20	30.00	31.71	13.02	53.98	47.93	6.05

Radiated Restricted Band Edge Test Data

Frequency [MHz]	Reading [dBuV]	Pre-Amp Gain[dB]	Ant Factor [dB/m]	Cable Loss [dB]	Limit [dBuV/m]	Emission Level [dBuV/m]	Margin [dB]	Detect
Low Channel(2412MHz)								
2342.85	29.65	30.00	26.29	11.12	74	37.06	36.94	PK
2342.85	20.82	30.00	26.29	11.12	54	29.28	25.77	AV
2335.70	30.52	30.00	26.29	11.13	74	37.94	36.06	PK
2335.70	21.19	30.00	26.29	11.13	54	28.61	25.39	AV
High Channel(2472MHz)43.15								
2496.48	33.69	30.00	26.29	11.14	74	41.12	32.88	PK
2496.48	21.18	30.00	26.29	11.14	54	28.61	25.39	AV
2494.12	35.72	30.00	26.29	11.14	74	43.15	30.85	PK
2494.12	22.07	30.00	26.29	11.14	54	29.50	24.50	AV

NOTES:

1. All modes of operation were investigated and the worst-case emissions are reported.
2. This test being a result which used RF amplifier.
3. AF = Antenna Factor CL = Cable Loss F/S = Field Strength
4. POL H = Horizontal POL V = Vertical

7.2.5 Power Spectral Density

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(e) RSS-210 Annex 8.2 (b)
Test Date	:	November 7, 2009
Operating Condition	:	Wireless LAN. The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	25 °C/ 41 %
Result	:	Passed

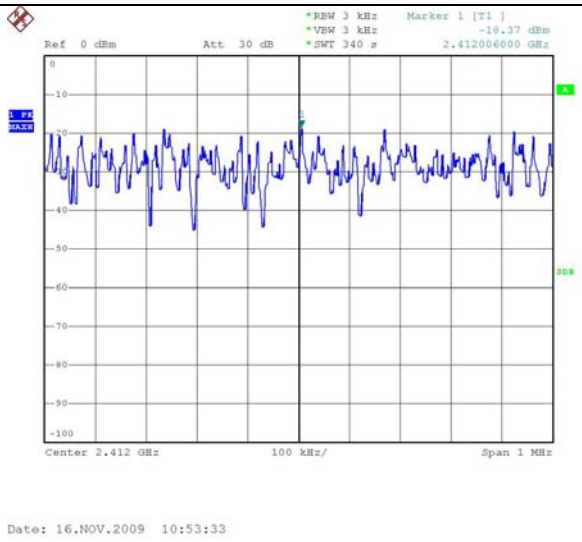
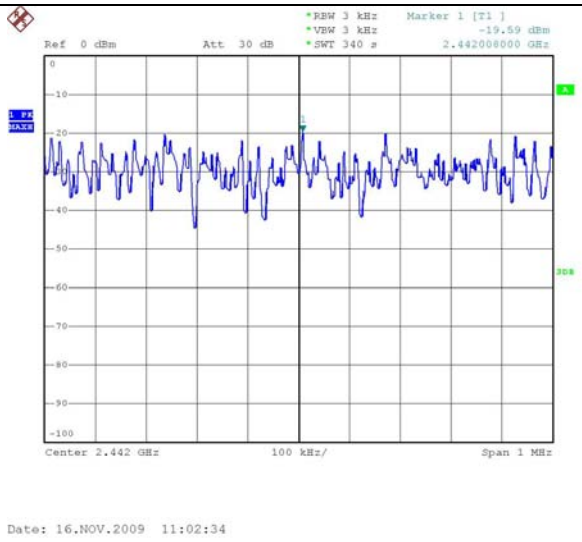
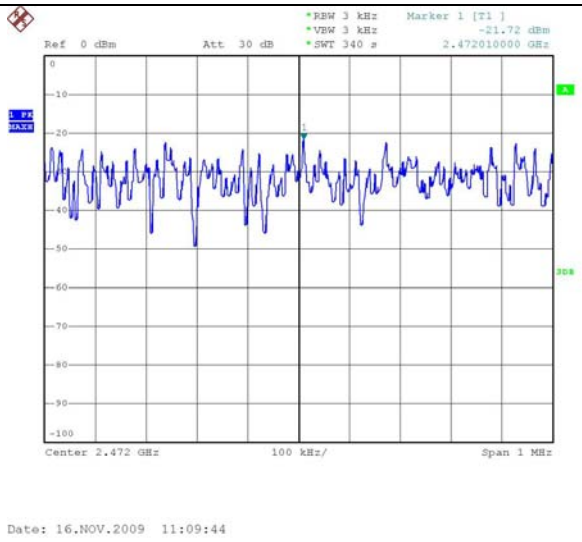
Power Spectral Density Test Data

Mode	Frequency (MHz)	Power Spectral Density (dBm)	Limit
802.11b	2412	-18.37	8 dBm
	2442	-19.59	
	2472	-21.72	
802.11g	2412	-27.10	
	2442	-27.46	
	2472	-29.33	

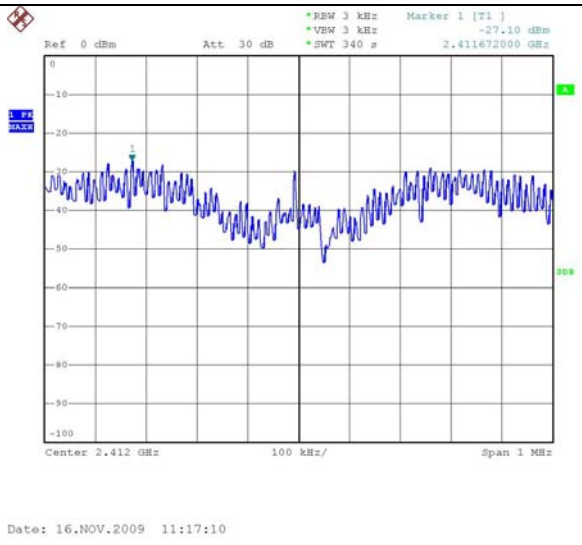
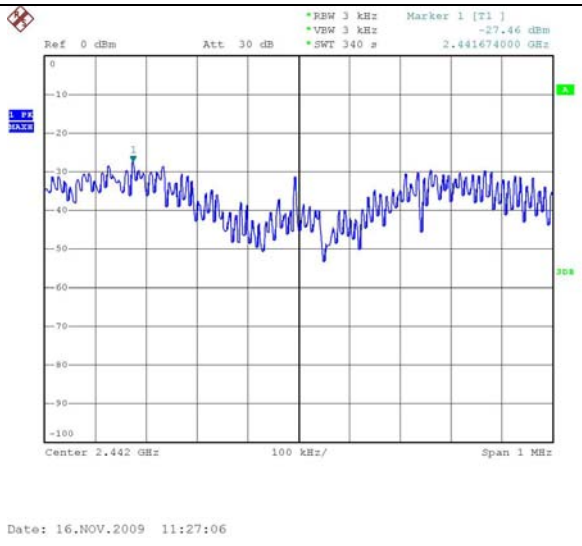
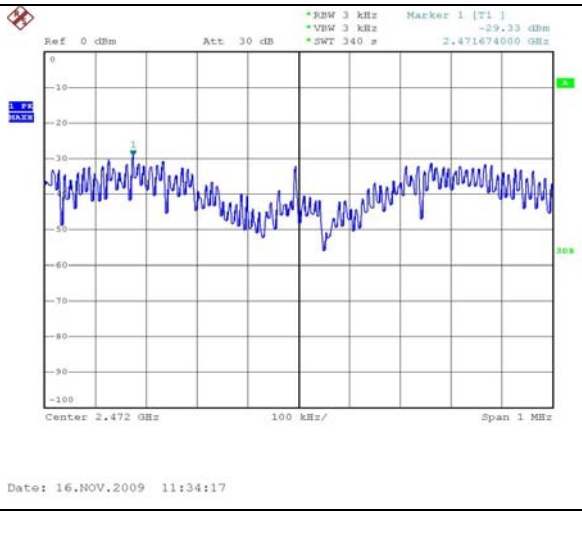
NOTES:

1. Measure conducted Maximum Peak Output of relevant channel using Spectrum analyzer.
2. RBW 3kHz, VBW 3kHz

Plots of Power Spectral Density (802.11b)

Frequency	Power Spectral Density measured conducted of 802.11b
2412 MHz -18.37 dBm	
2442 MHz -19.59 dBm	
2472 MHz -21.72 dBm	

Plots of Power Spectral Density (802.11g)

Frequency	Power Spectral Density measured conducted of 802.11g
2412 MHz -27.10 dBm	
2442 MHz -27.46 dBm	
2472 MHz -29.33 dBm	

7.2.6 Antenna Requirement

Products	Dielectric Chip Antenna
Manufacturer	Patron
Model	ACS2450ICAMEB
Frequency Range [MHz]	2400~2485
Polarization	Linear
Max Gain	-0.9 dBi

Structure

7.3 Bluetooth

7.3.1 Channel Separation

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(a)(1) RSS-210 Annex 8.1 (a)
Test Date	:	November 6, 2009
Operating Condition	:	Bluetooth The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

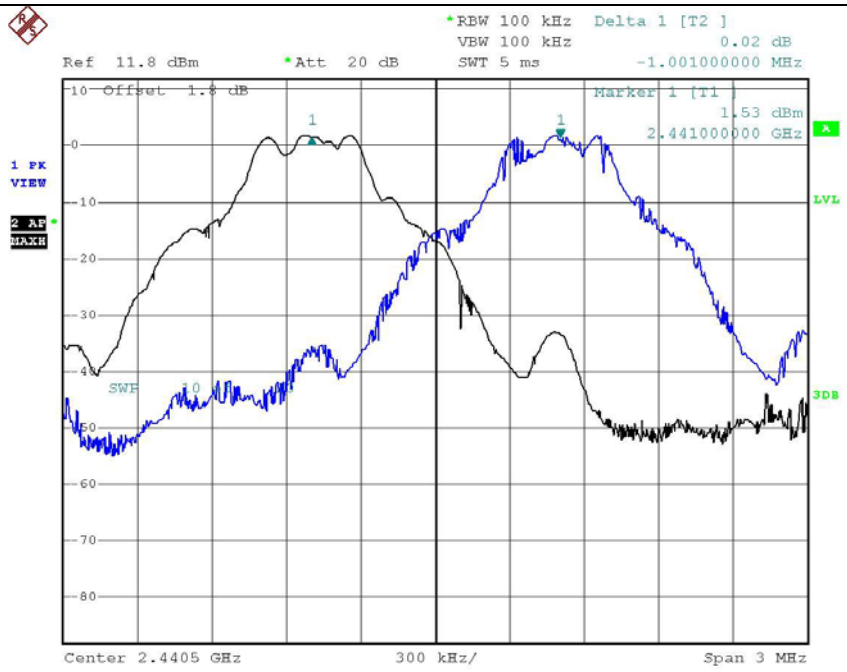
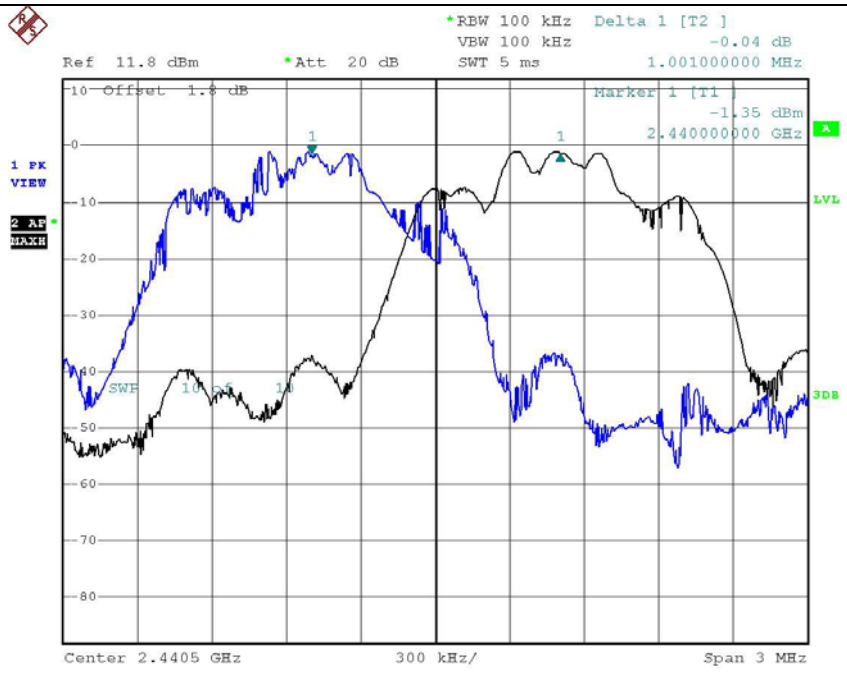
Channel Separation Test Data

Mode	Channel Separation	Limit
Basic	1 MHz	N/A
EDR	1 MHz	

NOTES:

1. Measure conducted channel sepzration of relevant channel using Spectrum Analyzer.
2. RBW 100kHz, VBW 100kHz, Sweep Time 2.5mS.
3. Compare with two channels.

Plots of Channel Separation

Mode	Channel Separation
Basic	
EDR	

7.3.2 20 dB Bandwidth

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(a)(1) RSS-210 Annex 8.1 (a)
Test Date	:	November 6, 2009
Operating Condition	:	Bluetooth The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

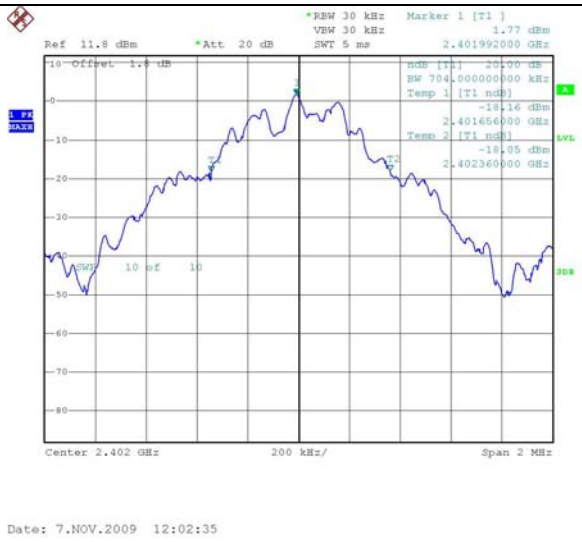
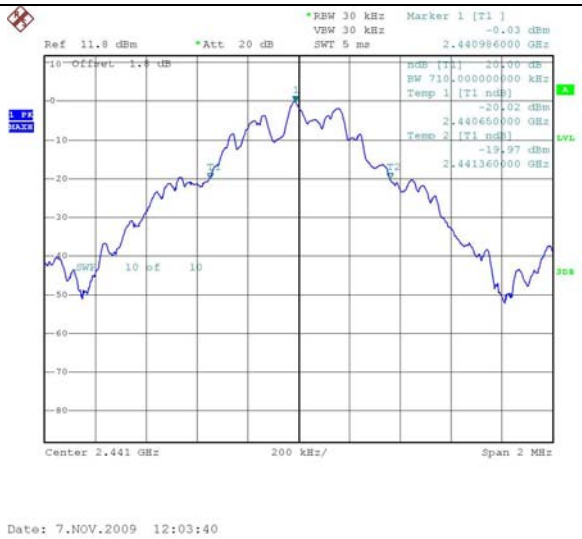
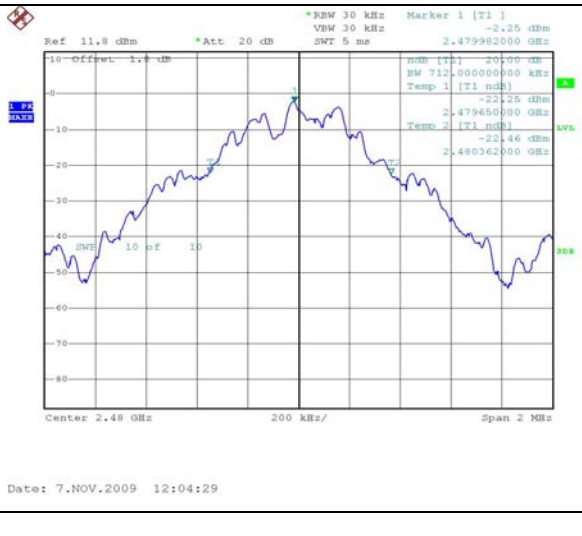
20 dB Bandwidth Test Data

Frequency (MHz)	20 dB Bandwidth (kHz)		Limit
2402	Basic (GFSK)	704	N/A
	EDR (8PSK)	1106	
2441	Basic (GFSK)	756	
	EDR (8PSK)	1112	
2480	Basic (GFSK)	712	
	EDR (8PSK)	1110	

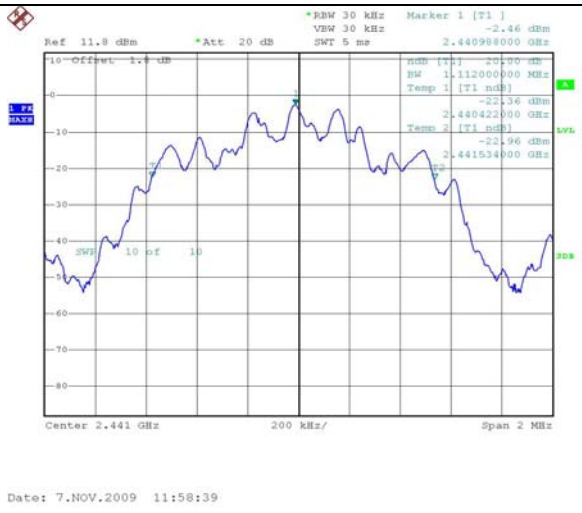
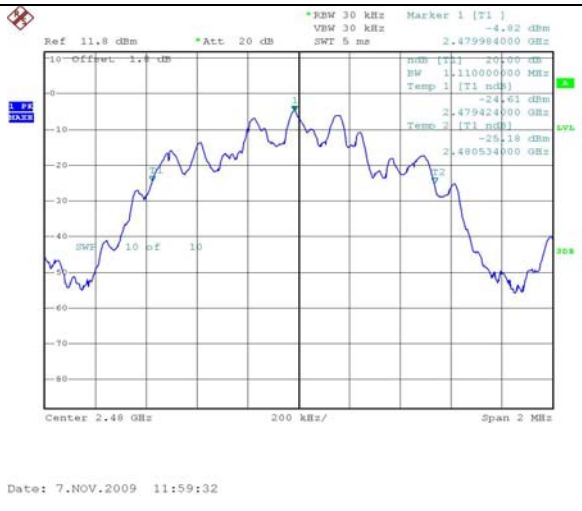
NOTES:

4. Measure conducted 20 dB bandwidth of relevant channel using Spectrum Analyzer.
5. RBW 30kHz, VBW 30kHz, Sweep Time 50mS.
6. 20 dB less than both bandwidth than maximum peak power.

Plots of 20 dB Bandwidth (Basic / GFSK)

Frequency	20 dB Bandwidth (Basic / GFSK)
2402 MHz 704 kHz	
2441 MHz 756 kHz	
2480 MHz 712 kHz	

Plots of 20 dB Bandwidth (EDR / 16PSK)

Frequency	20 dB Bandwidth (EDR / 16PSK)
2402 MHz 1106 kHz	
2441 MHz 1112 kHz	
2480 MHz 1110 kHz	

7.3.3 Average time of occupancy

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(a)(1) RSS-210 Annex 8.1 (d)
Test Date	:	November 6, 2009
Operating Condition	:	Bluetooth The EUT was operated in normal operation.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

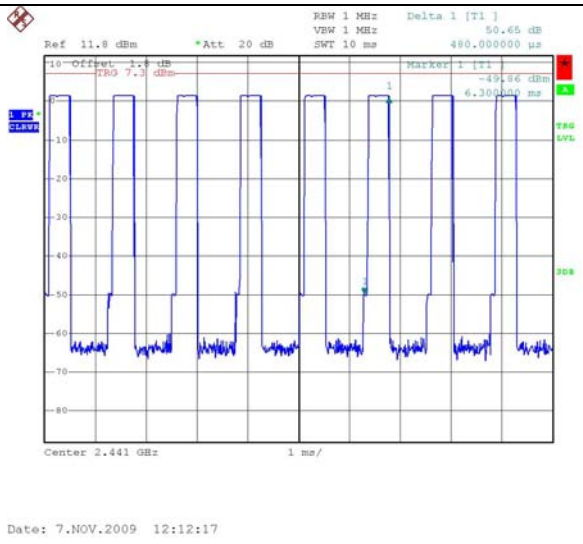
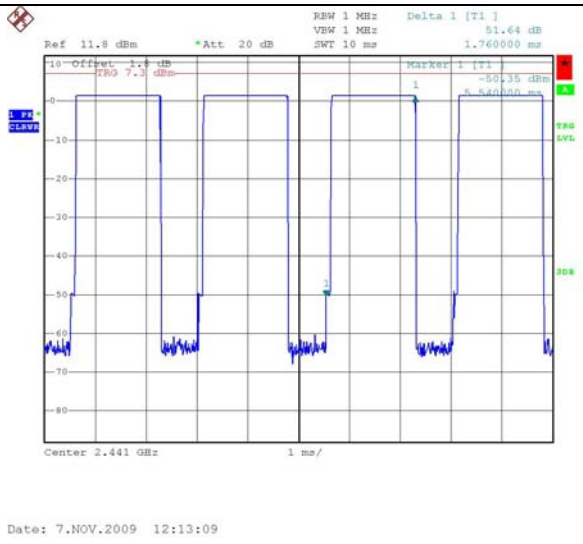
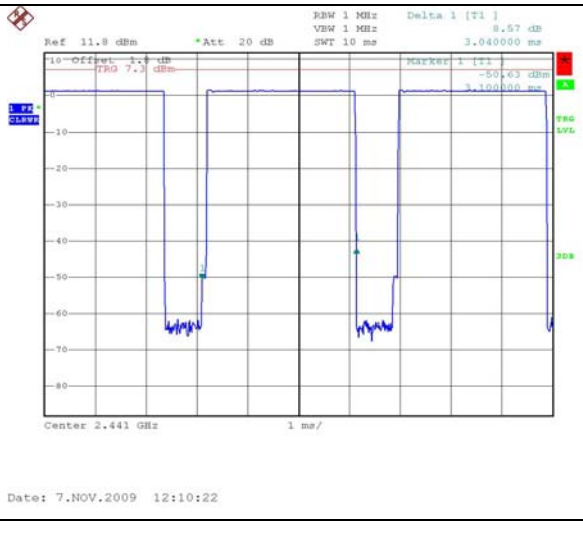
Average time of occupancy Test Data

Mode	Packet Type	Slot	Duration Time	Occupancy Time	Limit
Basic (GFSK)	DH1	1	0.480	51.20	400 ms
	DH3	3	1.760	187.73	
	DH5	5	3.040	324.27	
EDR (8PSK)	DH1	1	0.520	55.47	
	DH3	3	1.760	187.73	
	DH5	5	2.960	315.73	

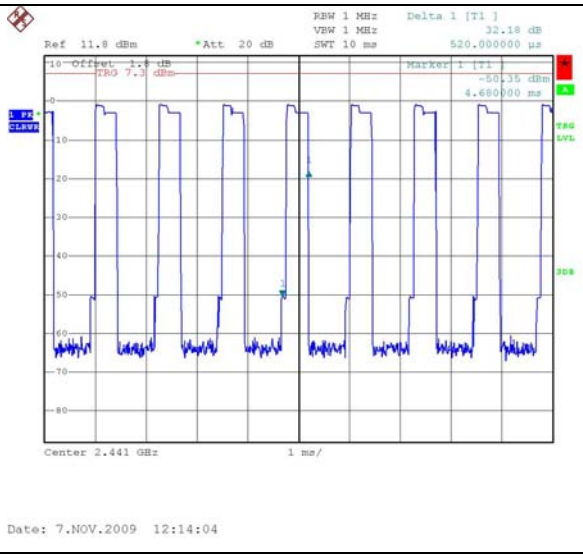
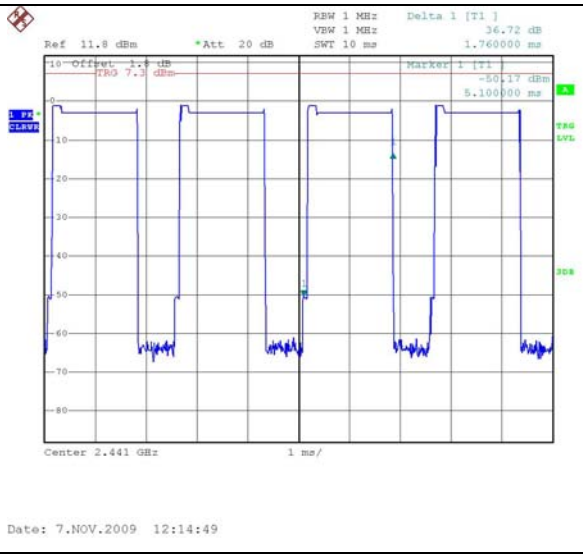
NOTES:

1. According to Section 15.247(a)(1)(iii) 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.
2. The time period to be observed is “0.4 s x 79 = 31.6 seconds”.
3. According to the Bluetooth specification the system transmits at a rate of 1600 hops per second. For DH5 packet five time slot is used for TX and one time slot for RX.
4. That means a total of (1600 / 6) transmissions occurs in one second. The average time of occupancy is calculated as following:
   “[{(1600 / 6) x 2.926 ms} x (0.4 x 79)] / 79 = 312.11 ms”

Plots of Duration Time (Basic / GFSK)

Frequency	Duration (Basic / GFSK)
DH1 0.480 ms	
DH3 1.760 ms	
DH5 3.040 ms	

Plots of Duration Time (EDR / 16PSK)

Frequency	Duration (EDR / 16PSK)
DH1 0.520 ms	
DH3 1.760 ms	
DH5 2.960 ms	

7.3.4 Maximum Peak Output Power

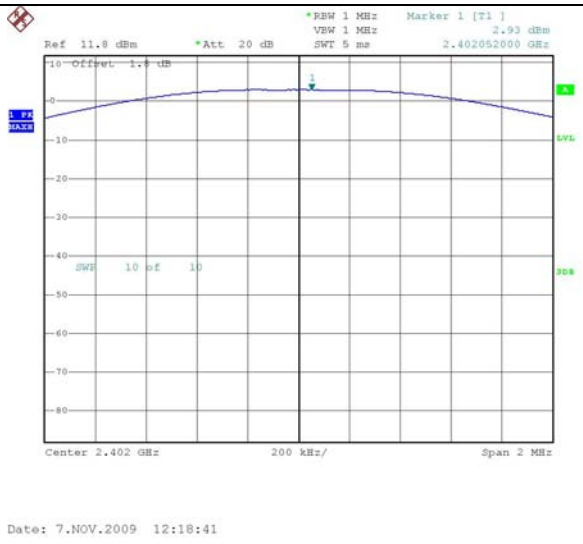
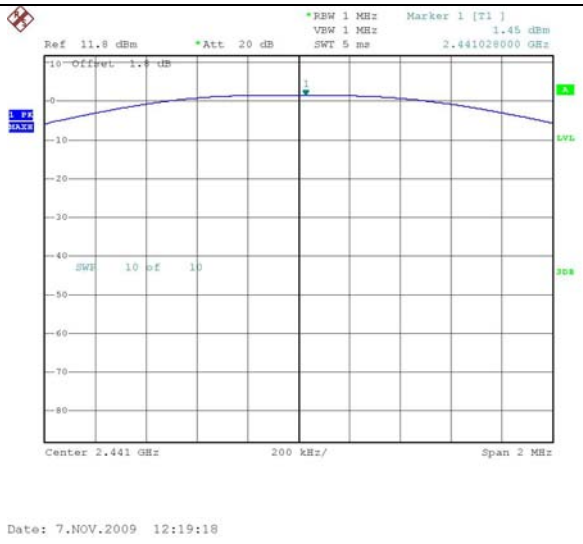
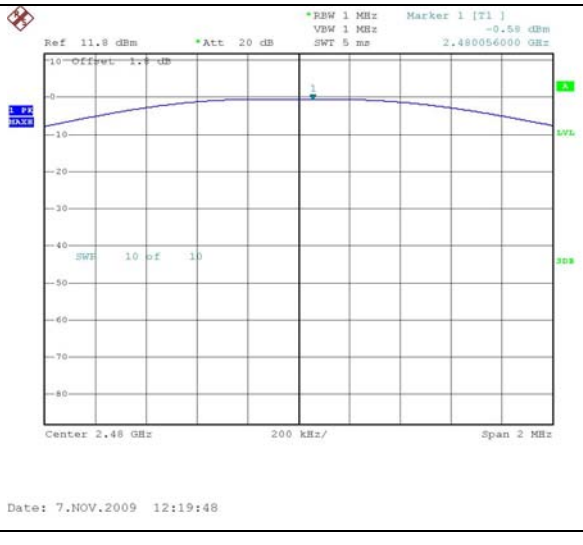
EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(b)(1) RSS-210 Annex 8.4 (2)
Test Date	:	November 6, 2009
Operating Condition	:	Bluetooth The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

Maximum Peak Output Power Test Data

Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
2402	2.93	Less than 125 mW
2440	1.45	
2480	-0.58	

NOTES:
1. Measure conducted Maximum Peak Output of relevant channel using Spectrum analyzer.

Plots of Maximum Peak Output Power

Frequency	Maximum Peak Output Power
2402 MHz 2.93 dBm	
2441 MHz 1.45 dBm	
2480 MHz -0.58 dBm	

7.3.5 Conducted Emission

& 100 kHz Bandwidth of Frequency Band Edges

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247(c) RSS-210 Annex 8.5
Test Date	:	November 6, 2009
Operating Condition	:	Bluetooth The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

7.3.4.1 Conducted Emission Test

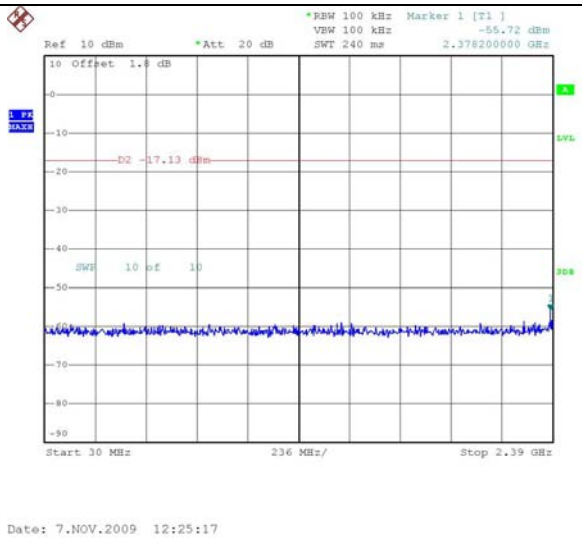
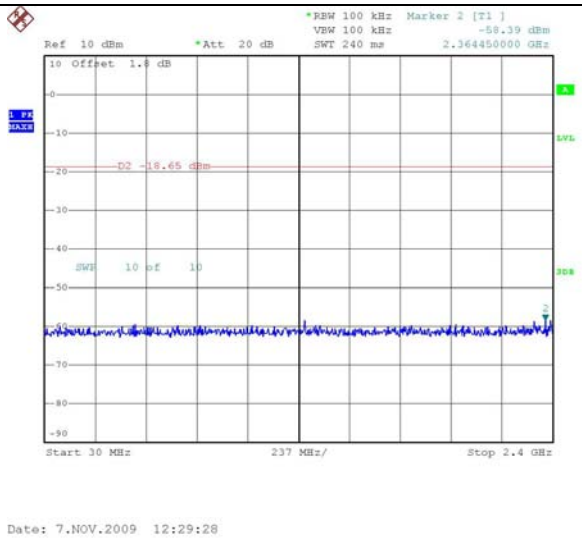
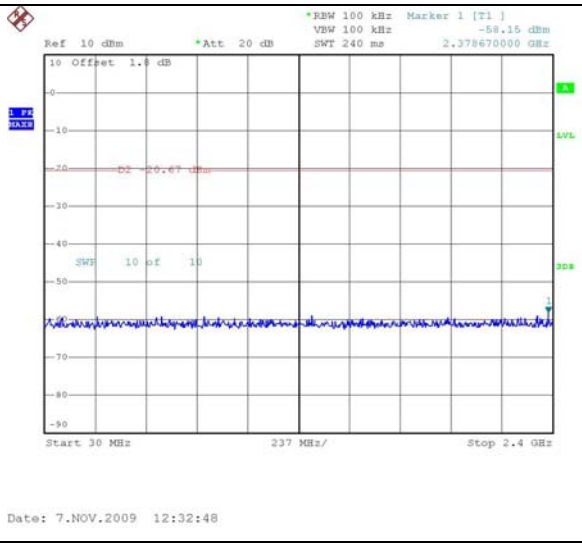
Result : Please refer to the attached Plots for details :

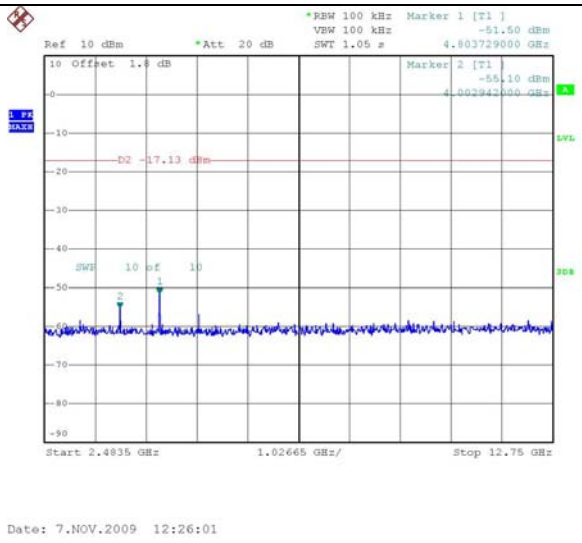
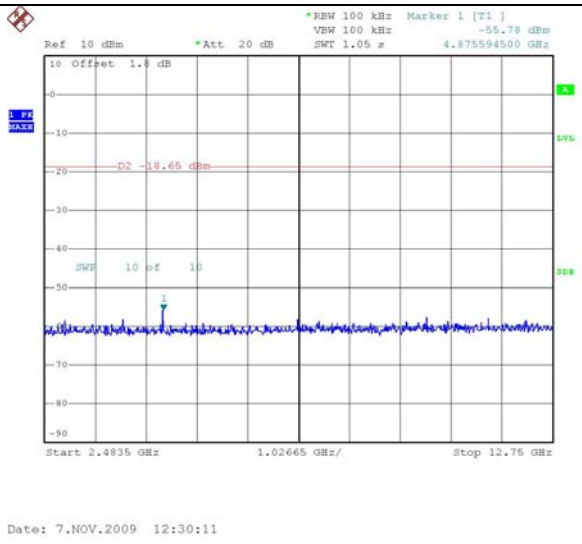
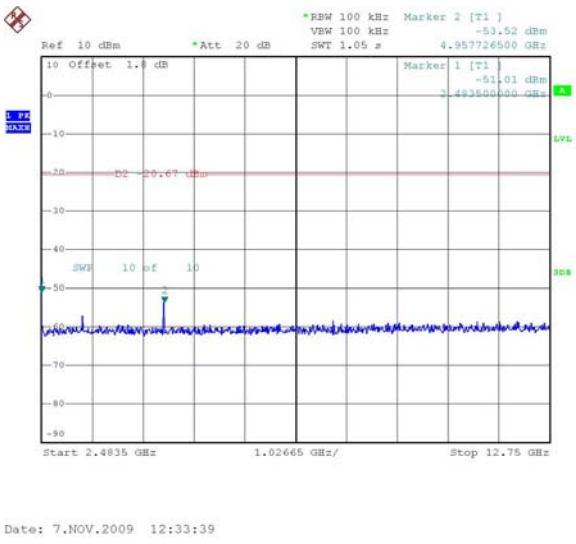
7.3.4.2 100 kHz Bandwidth of Frequency Band Edges

The test was performed to make a direct field strength measurement at the bandedge frequencies. Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209. There is a restricted band starting at 2483.5 MHz and another restricted band from 2310 - 2390 MHz.

All emissions below noise floor of 7 dBuV/m.

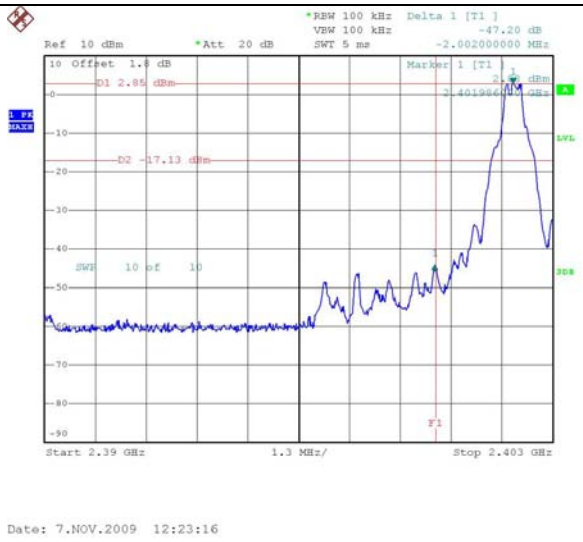
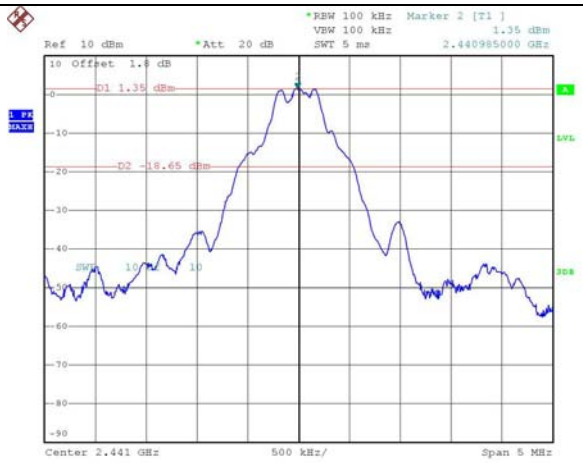
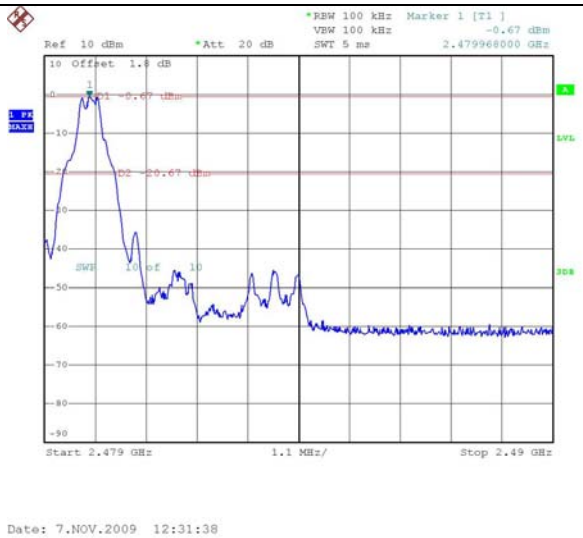
Plots of Conducted Emission

Frequency	30 MHz ~ 2400 MHz
2402 MHz « 20dBc	
2441 MHz « 20dBc	
2480 MHz « 20dBc	

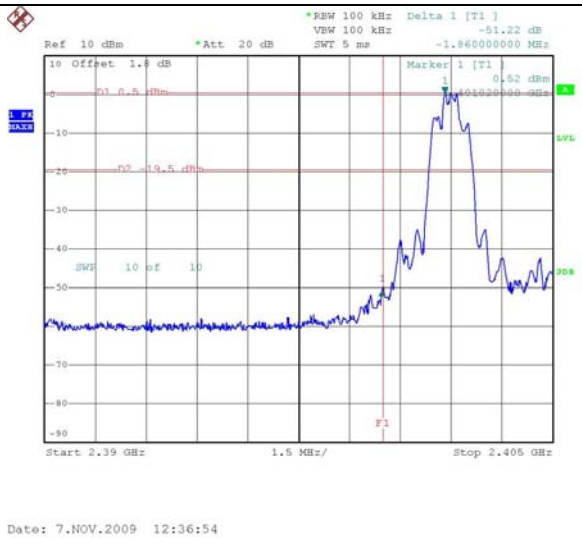
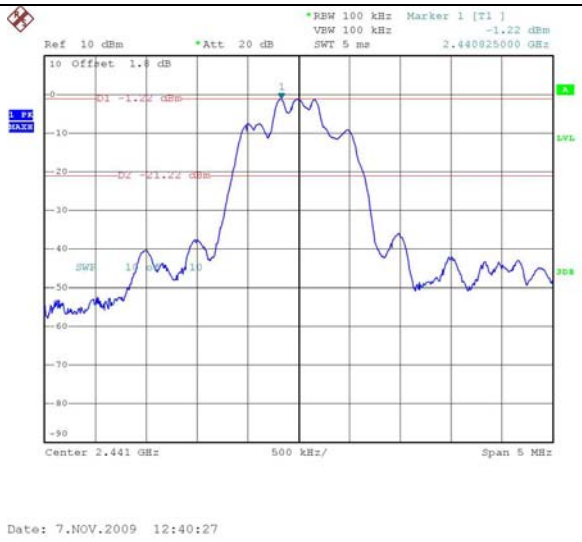
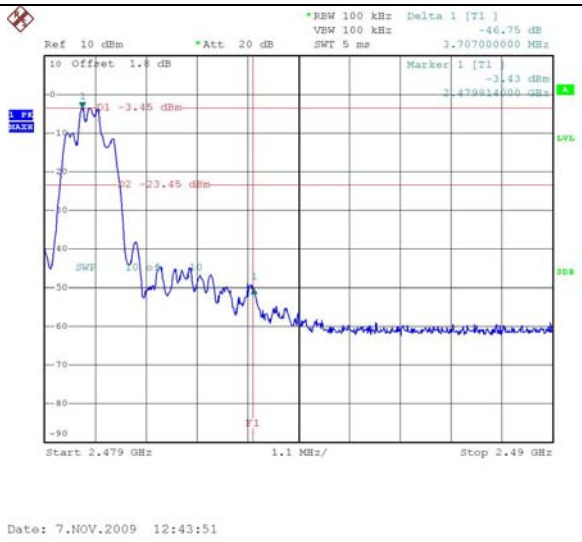
Frequency	2483.5 MHz ~ 12.75 GHz
2402 MHz « 20dBc	
2441 MHz « 20dBc	
2480 MHz « 20dBc	

Frequency	12.75 GHz ~ 26.5 GHz
2412 MHz « 20dBc	
2442 MHz « 20dBc	
2472 MHz « 20dBc	

Plots of 100 kHz Bandwidth of Frequency Band Edges(Basic / GFSK)

Frequency	100 kHz Bandwidth of Frequency Band Edges
2402 MHz « 20dBc	
2441 MHz N/A	
2480 MHz « 20dBc	

Plots of 100 kHz Bandwidth of Frequency Band Edges(EDR / 16PSK)

Frequency	100 kHz Bandwidth of Frequency Band Edges
2402 MHz « 20dBc	
2441 MHz N/A	
2480 MHz « 20dBc	

7.3.6 Radiated Emission

EUT	:	M1
Test Standard	:	FCC Part15 Subpart C Section 15.247©, 15.209 RSS-210 Annex 8.5
Test Date	:	November 07, 2009
Operating Condition	:	Blutooth The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	19 °C/ 36 %
Result	:	Passed

Radiated Emission Test Data(below 1 GHz)

Frequency [MHz]	Reading [dBμV]	Polarization [*H/**V]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dBμV/m]	Emission Level [dBμV/m]	Margin [dB]
70.38	18.45	V	10.51	1.84	40.00	30.80	9.20
101.88	16.14	H	12.31	1.42	43.50	29.87	13.63
172.02	20.08	H	12.61	2.91	43.50	35.60	7.90
245.77	20.05	H	11.59	3.48	46.00	35.12	10.88
489.97	14.85	V	17.53	5.03	46.00	37.40	8.60
533.13	17.34	V	18.30	5.26	46.00	40.90	5.10
599.86	17.38	H	19.89	5.58	46.00	42.85	3.15

Radiated Emission Test Data (above 1 GHz)

Frequency [MHz]	Reading [dBμV]	Pre-Amp Gain [dB]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dBμV/m]	Emission Level [dBμV/m]	Margin [dB]
Low Channel (2402 MHz)							
4804.00	32.85	30.00	31.71	13.01	53.98	47.57	6.41
Middle Channel (2441 MHz)							
4882.00	33.37	30.00	31.71	13.01	53.98	48.09	5.89
High Channel (2480 MHz)							
5007.00	35.53	30.00	31.71	13.02	53.98	50.26	3.72

Radiated Restricted Band Edge Test Data

Frequency [MHz]	Reading [dBuV]	Pre-Amp Gain[dB]	Ant Factor [dB/m]	Cable Loss [dB]	Limit [dBuV/m]	Emission Level [dBuV/m]	Margin [dB]	Detect
Low Channel(2412MHz)								
2355.64	33.89	30.00	26.29	11.12	74	41.3	32.7	PK
2355.64	22.16	30.00	26.29	11.12	54	29.57	24.43	AV
2342.50	34.19	30.00	26.29	11.12	74	41.6	32.4	PK
2342.50	22.51	30.00	26.29	11.12	54	29.92	24.08	AV
High Channel(2472MHz)								
2493.52	34.99	30.00	26.29	11.14	74	42.42	31.58	PK
2493.52	23.86	30.00	26.29	11.14	54	31.29	22.71	AV
2490.26	34.12	30.00	26.29	11.14	74	41.55	32.45	PK
2490.26	23.85	30.00	26.29	11.14	54	31.28	22.72	AV

NOTES:

1. All modes of operation were investigated and the worst-case emissions are reported.
2. This test being a result which used RF amplifier.
3. AF = Antenna Factor CL = Cable Loss F/S = Field Strength
4. POL H = Horizontal POL V = Vertical

7.3.7 Minimum Hopping Channels

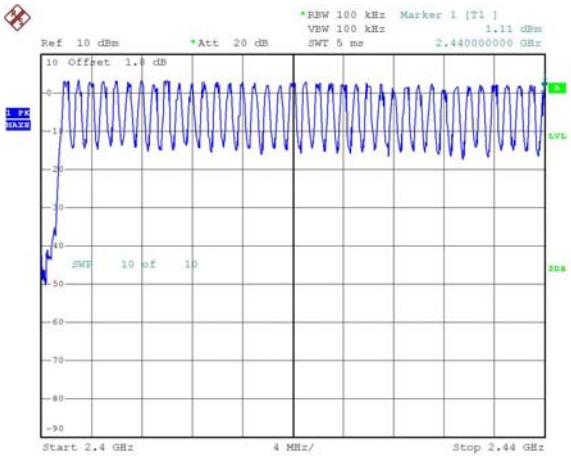
Test Standard	:	FCC Part15 Subpart C Section 15.247(a)(1) RSS-210 Annex 8.4 (2)
Operating Condition	:	The EUT was operated at transmitting condition continuously during the test.
Temperature/Humidity	:	22.0 °C/ 41 %

Minimum Hopping Channels Test Data

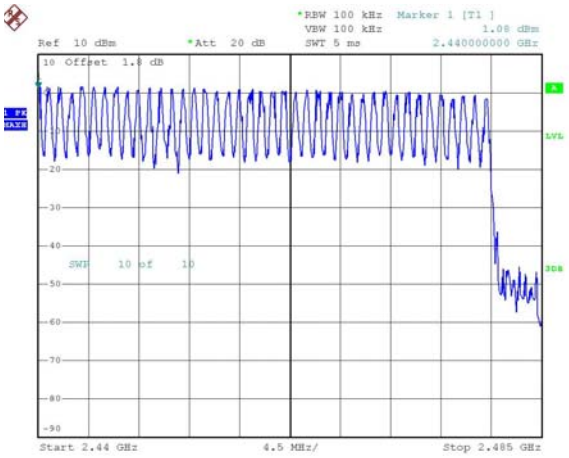
Number of hopping channels	Limit
79	More than 15 channels

NOTES:

1. Minimum Hopping Channels using Spectrum Analyzer.
2. With the analyzer set to MAX HOLD readings were taken for 1 ~ 2 minutes in each band.



Date: 7.NOV.2009 15:16:05



Date: 7.NOV.2009 15:17:56

7.3.8 Antenna Requirement

Products	Dielectric Chip Antenna
Manufacturer	Patron
Model	ACS2450ICAMEB
Frequency Range [MHz]	2400~2485
Polarization	Linear
Max Gain	-0.9 dBi

Structure

8. TEST EQUIPMENTS LIST

The listing below denotes the test equipments utilized for the test(s).

EQUIPMENT		MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date
1	Test Receiver	ESPI	Rohde & Schwarz	10012	10/10/30
2	Spectrum analyzer	FSP13SE	Rohde & Schwarz	15892	10/07/07
3	Spectrum analyzer	N9020A	Agilent	US46220101	10/09/30
4	Signal Generator	GT9000	Gigatronics	9604010	10/10/30
5	Frequency Counter	R5372	Advantest	41855204	10/10/29
6	Shield Room (7m x 4m x 3m)	N/A	SJEMC	0004	N/A
7	Turn Table	OSC-30	N/A	BWS-01	N/A
8	Antenna Mast	JAC-3	Dail EMC	N/A	N/A
9	Temperature & Humidity chanber	EN-GLMP-54	Enex	N/A	10/10/30
10	Bilog Antenna	VULB9160	Schwarzbeck	VULB9160-3122	10/01/24
11	Bilog Antenna	VULB9161	Schwarzbeck	VULB9161-4067	09/11/19
12	Bilog Antenna	VULB9161	Schwarzbeck	VULB9161-4068	09/12/11
13	Horn Antenna	BBHA 9120 D	Schwarzbeck	BBHA 9120 D 234	11/03/16
14	Horn Antenna	BBHA 9170	Schwarzbeck	BBHA9170157	10/03/15
15	Power Meter	E4418A	Agilent	GB38272621	10/10/29
16	Power Sensor	E9301B	Agilent	US40010238	10/10/29
17	Power supply	IPS-30B03DD	Interact	42052	10/10/29
18	Bandreject filter	3TNF-800/1000-0.2 N/N	K&L Microwave	441	10/02/06
19	RF Amplifier	8447E	HP	2945A02712	10/10/30
20	LISN	L1-115	Com-Power	241018	10/01/20
21	EMI Receiver	ESVN30	Rohde & Schwarz	832854/010	10/07/25
22	Open Site Cable	N/A	N/A	N/A	N/A
23	Antenna Turntable Controller	JAC-2	JAEMC	N/A	N/A