

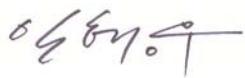
FCC TEST REPORT

EUT **Name** : UMPc
Model : UREN V1
FCC ID : VEOURENV1
Trade Name : Innowell
Applicant : Innowell Co., Ltd.
 : C-303 TechnoPark, 145, Yatap-Dong, Bundang-Gu, Sungnam-City,
 : Kyunggi-Do, Korea
 : Sujun-Bae / R&D Assistant Manager
FCC Classification : DXX Part 15 Low Power Communication Device Transmitter
 : DTS Part 15 Digital Transmission System
FCC Rule Part(s) : FCC Part 15 Subpart C Section 15.239
 : FCC Part 15 Subpart C Section 15.247
FCC Procedure : Certification
Date of Test : May 24 to June 25, 2007
Date of Issue : June 27, 2007
Test Report No. : BWS-07-EF-0032
Test Lab. : BWS TECH Inc. (Registration No. : 553281)

This Digital Transmission System has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 at the BWS TECH/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart C Section 15.239 & 15.247.

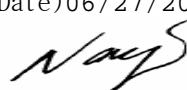
I attest to the accuracy of data. All measurement herein was performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

(Date) 06/27/2007



Tested by HyoungWoo, Ahn

(Date) 06/27/2007



Reviewed by TaeHyun, Nam

BWS TECH Inc.

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#611-1 Maesan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-853, Korea
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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 : Innowell Co., Ltd.
Company Address : C-303 TechnoPark, 145, Yatap-Dong, Bundang-Gu, Sungnam-City, Kyounggi-Do, Korea
Phone/Fax : Phone : 82-031-605-2010 Fax : 82-031-605-2009

Manufacturer

Company Name : Innowell Co., Ltd.
Company Address : C-303 TechnoPark, 145, Yatap-Dong, Bundang-Gu, Sungnam-City, Kyounggi-Do, Korea
Phone/Fax : Phone : 82-031-605-2010 Fax : 82-031-605-2009

- **EUT Type** : UMPC
- **Model Name** : UREN V1
- **FCC ID** : VEOURENV1
- **S/N** : Prototype
- **Freq. Range** : FM (88MHz ~ 108MHz)
Bluetooth & Wireless LAN (2400MHz ~ 2483.5MHz)
- **Number of Channels** : 105 / FM
11 / WLAN
79 / Bluetooth
- **Modulation Method** : FM
DSSS (BPSK, QPSK, CCK), OFDM (QAM)
FHSS (GFSK)
- **FCC Rule Part(s)** : Part 15 Subpart C Section 15.239
Part 15 Subpart C Section 15.247
- **Test Procedure** : ANSI C63.4-2003
- **Dates of Tests** : May 24 to June 25, 2007
- **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-07-EF-0032

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 Innowell Co., Ltd. Model : UREN V1.

3. Product Information

3.1 Equipment Description

The Equipment Under Test (EUT) is RF transmitter by the Innowell Co., Ltd. Model : UREN V1. (FCC ID : VEOURENV1).

The UREN V1 is suitable designed for use with a growing variety of mobile devices. IrDA/Serial or Bluetooth/Serial interfaces make the UREN V1 the perfect comrade for applications such as point of transaction warehousing, distribution, point of sales, hospitality, gaming and healthcare.

3.2 General Specification

Major Component		Description	Remarks
		Mobile Auto PC	
Processor	CPU	VIA Eden V4 Processor (NanoBGA2)	
	CPU Frequency	1GHz	
	L2 Cache	128 Kbytes	
Memory	DRAM Size	256 Mbytes	
	DRAM Type	DDR2 533	
Display	Display Unit	7 inch WVGA TFT LCD (800x480) support Auto scaling(800 x 600, 1024 x 768)	
	Graphics Controller	Integrated UniChrome Pro II gfx in CX700M	Samsung LED
	Video RAM	Shared Memory upto128 Mbytes	
Audio	Codec	High Definition Audio Codec ALC262	
	Speaker	Mono out speaker	
	Ports	Headphone out, Internal Microphone	
FM Transmitter		88.1 MHz ~ 107.9 MHz	
Touch		Touch screen Controller with Stylus pen	
IR		Infrared Remocon	
HDD		30 GB (1.8" HDD)	
Bluetooth		Bluetooth v2.0 + EDR Class II	
WLAN		IEEE 802.11b/g	
Navigation	GPS	SirF III with Internal Antenna	
Button	Power Button	System Power On/Off, LED for power/charge display	
	Mode Button	Windows / NAVI / DMB / Video Player/Audio Player / FM Transmpter mode	
Battery (internal)	Type	Li-ion Battery	
	Capacity	2S1P, 7.4V / 2000mAh (max. 2000mAh)	
	Running Time	2 Hours	
Operating System		Windows XP Home Edition SP2	
Dimension (W x D x H)	System Unit	192 x 120.5 x 25 mm	
Weights	System Unit	695 gram	
AC/DC Adapter		12V, 4A	
Vehicles Cigar Charger		(9~14V, 2A)	

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			
FCC Rule	Description of Test	Limit	Result
15.207	Conducted	Various	Pass
FM Transmitter			
15.239(b)	Radiated Emission of RF Carrier Frequency	250 uV/m at 3m	Pass
15.239(c) & 15.209	Out of Band Radiated Emission	Various	Pass
15.239(a)	Emission Bandwidth	200 kHz	Pass
Wireless LAN			
15.247(a)	6dB Bandwidth	Less than 1MHz	Pass
15.247(b)	Maximum Peak Output Power	Less than 30dBm	Pass
15.247(c)	Conducted Emission & 100kHz Bandwidth of Frequency Band Edges	More than 20dBc	Pass
15.239(c) & 15.209	Radiated Emission	Various	Pass
15.247(d)	Power Spectral Density	Less than 8dBm	Pass
15.203	Antenna Requirement	Less than 6dBi	Pass
1.1307 1.1310 2.1091 2.1093	RF Exposure	1mW/Cm ²	Pass
BlueTooth			
15.247(a)	20dB Bandwidth	Less than 1MHz	Pass
15.247(a)	Average time of occupancy	Less than 0.4 Sec.	Pass
15.247(b)	Maximum Peak Output Power	Less than 30dBm	Pass
15.247(c)	Conducted Emission & 100kHz Bandwidth of Frequency Band Edges	More than 20dBc	Pass
15.239(c) & 15.209	Radiated Emission	Various	Pass
15.247(a)	Minimum Hopping Channels	More than 75Ch.	Pass
15.203	Antenna Requirement	Less than 6dBi	Pass
1.1307 1.1310 2.1091 2.1093	RF Exposure	1mW/Cm ²	Pass

7. Test Procedure & Measurement Data

7.1 Conducted Emissions

EUT	:	UREN V1
Test Standard	:	FCC Part 15 Subpart C Section 15.207
Test Date	:	May 29, 2007
Operating Condition	:	Checked GPS coordinates simulation condition by observing EUT connecting with Monitor, Expansion I/O port and GPS Antenna
Environment Condition	:	Temperature : 26 °C, Humidity Level : 49 %RH
Result	:	Passed by -10.31 dB, -12.81 dB

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

Tabulated Conducted Emission Test Data

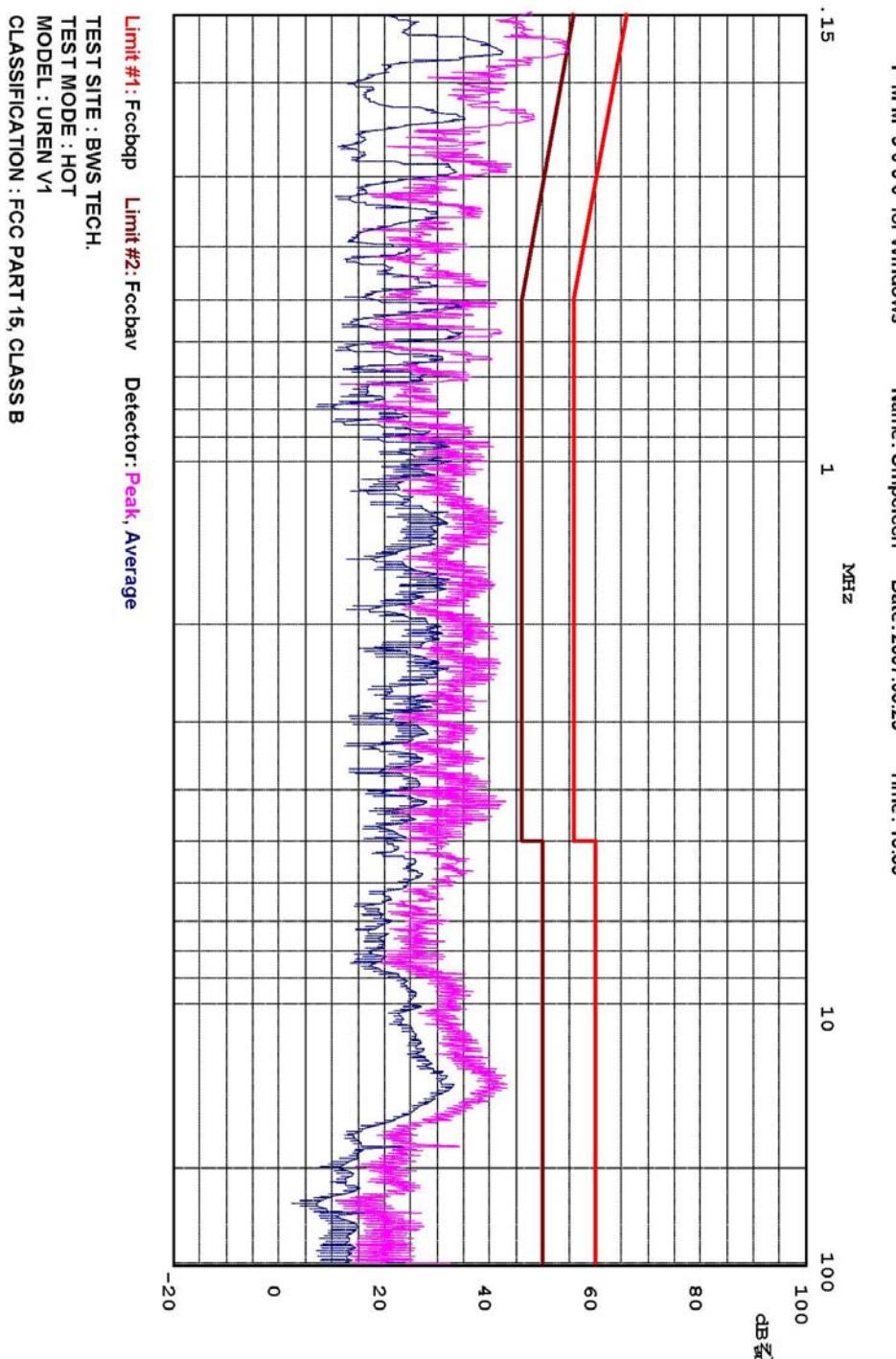
Detector Mode ; CISPR Quasi Peak mode / Average mode (6dB Bandwidth : 9kHz).

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]	
0.167	0.06	0.03	N	65.60	51.70	51.79	13.81	55.60	37.00	37.09	18.51	
0.175	0.06	0.03	H	65.30	54.90	54.99	10.31	55.30	42.40	42.49	12.81	
0.180	0.06	0.03	H	65.10	51.10	51.19	13.91	55.10	34.20	34.29	20.81	
0.233	0.07	0.10	H	63.70	48.50	48.67	15.03	53.70	35.20	35.37	18.33	
0.284	0.07	0.16	H	62.30	43.90	44.13	18.17	52.30	33.60	33.83	18.47	
0.510	0.07	0.30	N		44.10	44.47	11.53					
1.284	0.04	0.44	H		42.50	42.98	13.02					
2.642	0.03	0.58	N	56.00	42.50	43.11	12.89	46.00				
2.390	0.03	0.57	N		43.00	43.60	12.40					
4.255	0.03	0.79	N		43.30	44.12	11.88					
5.14	0.05	0.87	N		37.00	37.92	22.08					
12.73	0.05	1.16	N	60.00	41.30	42.51	17.49	50.00				
14.13	0.07	1.22	H		43.30	44.59	15.41					

NOTES :

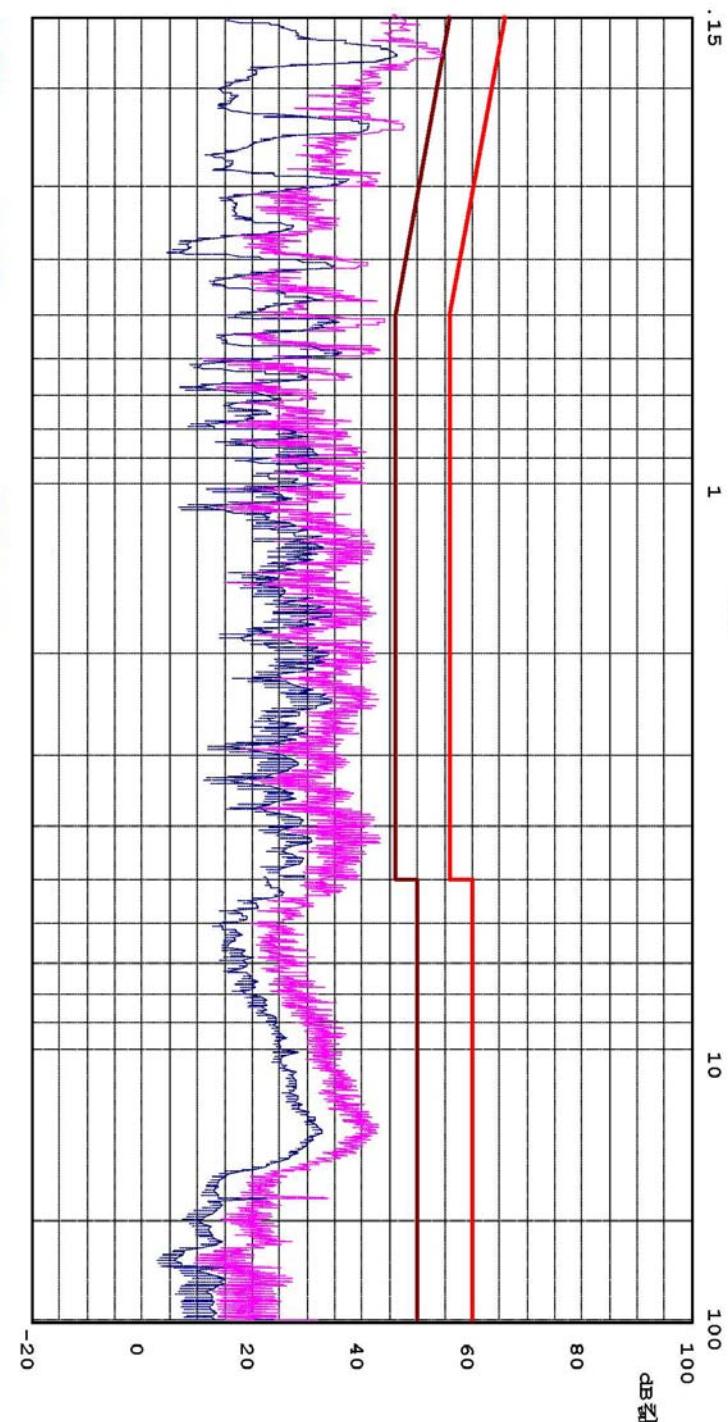
1. H : Hot Line , N :Neutral Line
2. Emission Level = Reading + Correction Factor
3. Measurements were performed at the AC Power Inlet of the host PC with the EUT plugged in the frequency band of 150kHz ~30MHz
4. Margin = Limit - Emission Level
5. Measurement uncertainty estimated at ± 3.56 dB.

The measurement uncertainty is given with a confidence of 95.45 % with the coverage factor, $k=2$.

Plots of Conducted Emission Test

Plots of Conducted Emission Test

P M M 9 0 0 0 for Windows Name: Umpcfcen Date: 2007.05.29 Time: 14:14



Limit #1: Fcccbqp Limit #2: Fcccbav Detector: Peak, Average

TEST SITE : BWS TECH.
TEST MODE : NEUTRAL
MODEL : UREN V1

CLASSIFICATION : FCC PART 15, CLASS B

7.2 FM TRANSMITTER

7.2.1 Field Strength of FM Transmitter

EUT : UREN V1
Test Standard : FCC Part15 Subpart C Section 15.239(b)
Test Date : May 29, 2007
FM TX (Bluetooth and WLAN are not operation)
Test in transmitting mode:
Operating Condition : 1. For lowest channel : 88.1MHz
2. For lowest channel : 97.9MHz
3. For lowest channel : 107.9MHz
Environment Condition : 26 °C/ 39 %
Result : Passed by 4.1 dB

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector Mode : Peak Mode

Measurement Distance : 3 meters

Frequency (MHz)	Reading (dBuV)	Polari-zation (*H/**V)	Antenna Factor (dB)	Cable Loss (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
88.1	34.5	V	7.9	2.1	44.5	68.0	23.5
97.9	34.8	V	9.2	2.2	46.2	68.0	21.8
107.9	34.1	V	10.0	2.3	46.4	68.0	21.6

Detector Mode : Average Mode

Measurement Distance : 3 meters

Frequency (MHz)	Reading (dBuV)	Polari-zation (*H/**V)	Antenna Factor (dB)	Cable Loss (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
88.1	32.1	V	7.9	2.1	42.1	48.0	5.9
97.9	32.2	V	9.2	2.2	43.6	48.0	4.4
107.9	31.6	V	10.0	2.3	43.9	48.0	4.1

NOTES:

- *H : Horizontal polarization, **V : Vertical polarization
- Emission Level = Reading + Antenna Factor + Cable Loss
- Margin Value = Limit - Emission Level
- Measurement were performed at each channel operating frequency.
- The EUT was tested in all the three orthogonal planes and the worst case emissions was vertical axes.

7.2.2 Out of Band Radiation Emission

EUT : UREN V1
 Test Standard : FCC Part15 Subpart C Section 15.239(c) / 15.209
 Test Date : May 29, 2007
 FM TX (Bluetooth and WLAN are not operation)
 Test in transmitting mode:
 Operating Condition : 1. For lowest channel : 88.1MHz
 2. For lowest channel : 97.9MHz
 3. For lowest channel : 107.9MHz
 Environment Condition : 26 °C/ 39 %
 Result : Passed by 12.4 dB

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector Mode : CISPR Quasi-Peak Mode (6dB Bandwidth : 120 kHz)

Measurement Distance : 3 meters

Frequency (MHz)	Reading (dBuV)	Polari-zation (*H/**V)	Antenna Factor (dB)	Cable Loss (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
176.2	16.8	H	11.0	3.0	30.8	43.5	12.7
195.8	18.8	H	9.1	3.2	31.0	43.5	12.5
215.8	17.9	H	9.9	3.3	31.1	43.5	12.4
264.3	17.1	H	11.4	3.5	32.0	46.0	14.0
293.7	15.4	H	12.8	3.9	32.1	46.0	13.9
323.7	14.4	H	13.4	4.0	31.8	46.0	14.2
352.4	5.7	H	14.0	4.2	23.9	46.0	22.1
391.6	4.8	H	15.1	4.6	24.5	46.0	21.5
431.6	3.7	H	15.8	4.7	24.2	46.0	21.8
440.5	2.5	H	16.3	4.8	23.6	46.0	22.4
489.5	1.7	H	16.9	5.0	23.6	46.0	22.4
539.5	0.9	H	17.8	5.3	24.0	46.0	22.0

NOTES:

- *H : Horizontal polarization, **V : Vertical polarization
- Emission Level = Reading + Antenna Factor + Cable Loss
- Margin Value = Limit - Emission Level
- All other emission not reported were more than 25dB below the permitted limit.
- The EUT was tested in all the three orthogonal planes and the worst case emissions was vertical axes.

7.2.3 Emission Bandwidth

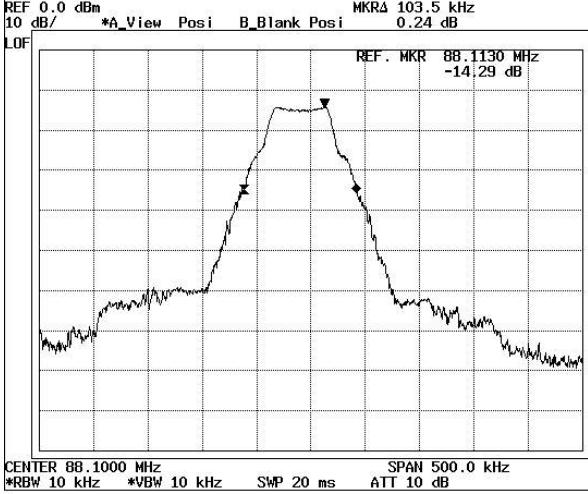
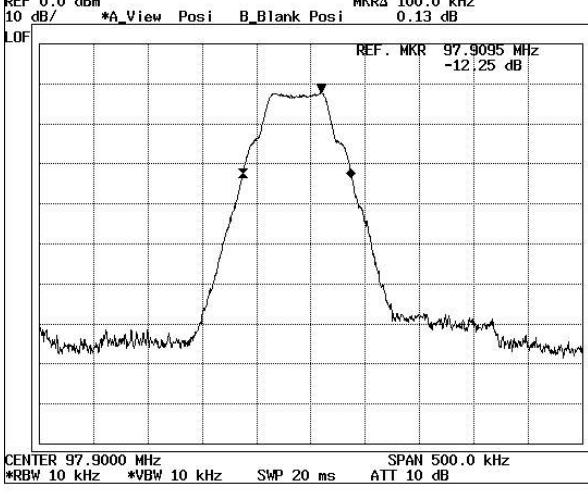
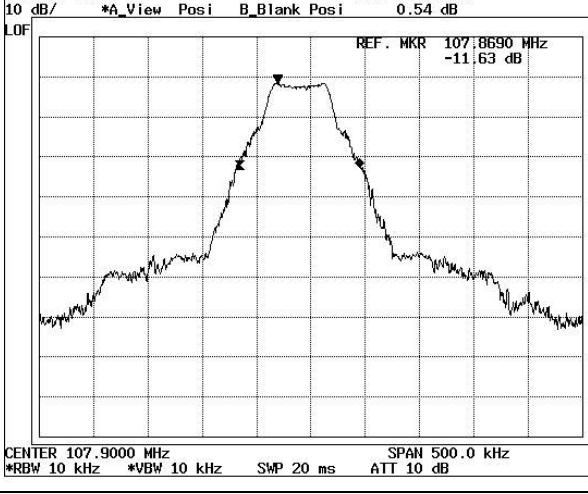
EUT : UREN V1
Test Standard : FCC Part15 Subpart C Section 15.239(a) / 15.209
Test Date : May 29, 2007
FM TX (Bluetooth and WLAN are not operation)
Test in transmitting mode:
Operating Condition : 3. For lowest channel : 88.1MHz
4. For lowest channel : 97.9MHz
3. For lowest channel : 107.9MHz
Environment Condition : 26 °C/ 39 %
Result : Passed

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Remark
88.1	103.5	200	
97.9	100.0	200	
107.9	110.5	200	

NOTES:

1. Please see the measured bandwidth plot in next page.
2. The emission bandwidth shall be no wider than 200kHz of the center frequency of equipment operating channel 88.1MHz, 97.9MHz and 107.9MHz.
3. The bandwidth is determined at the points 20dB down from the modulated carrier.
4. Spectrum Analyzer Setting
Resolution Bandwidth : 10 kHz
Video Bandwidth : 10 kHz
Frequency Span : 500 kHz

Plots of Bandwidth

Frequency	6 dB Bandwidth measured conducted
88.1 MHz 103.5 kHz	
97.9 MHz 100.0 kHz	
107.9 MHz 110.5 kHz	

7.3 Wireless LAN

7.3.1 6 dB Bandwidth

EUT : UREN V1
 Test Standard : FCC Part15 Subpart C Section 15.247(a)(2)
 Test Date : June 6, 2007
 Operating Condition : Wireless LAN.
 Environment Condition : The EUT was operated at transmitting condition continuously during the test.
 Environment Condition : 24 °C/ 43 %
 Result : Passed

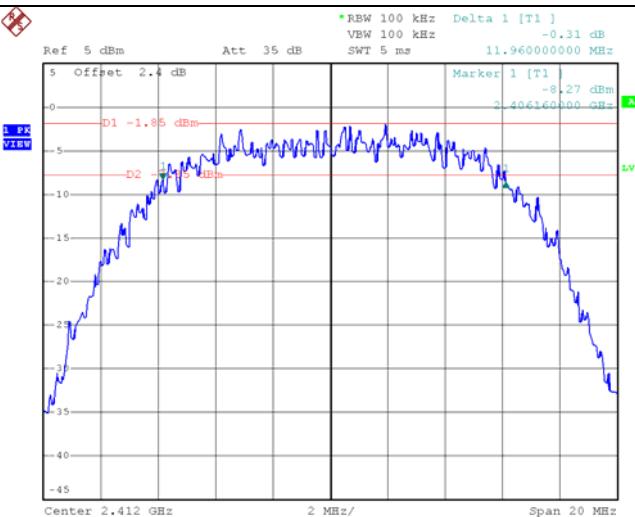
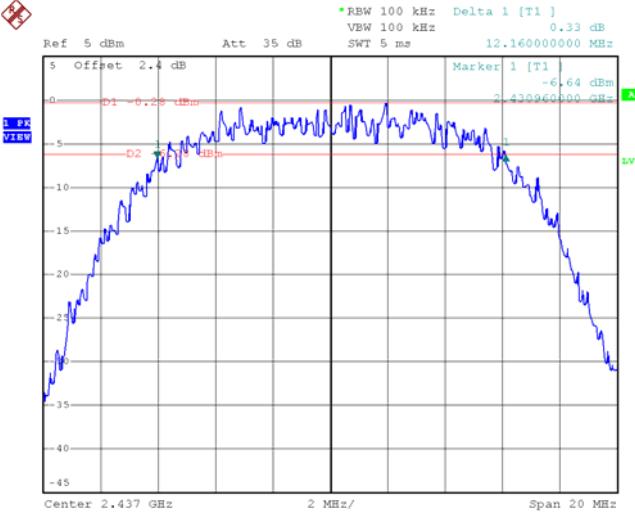
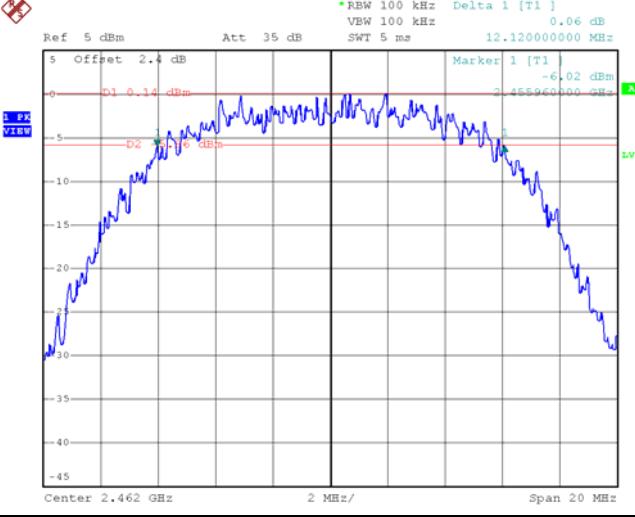
6 dB Bandwidth Test Data

Mode	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit
802.11b	2412	11.96	More than 500 kHz
	2437	12.16	
	2462	12.12	
802.11g	2412	16.56	
	2437	16.60	
	2462	16.60	

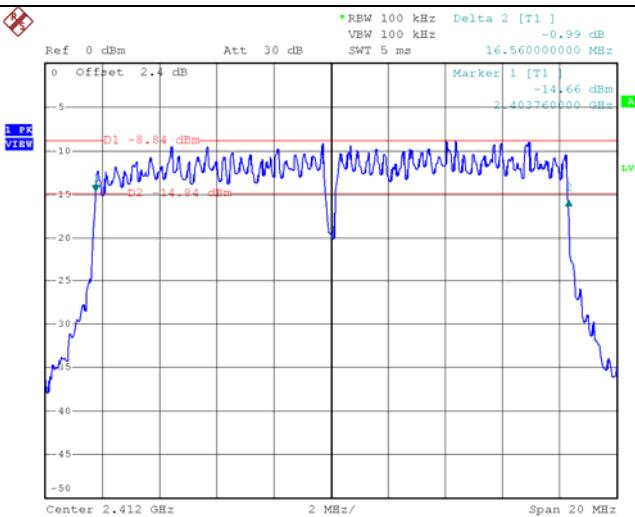
NOTES:

1. Measure conducted 6 dB bandwidth of relevant channel using Spectrum Analyzer.
2. RBW 100kHz, VBW 100kHz, Sweep Time 5ms.
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 11.96 MHz	
2437 MHz 12.16 MHz	
2462 MHz 12.12 MHz	

Plots of 6 dB Bandwidth (802.11g)

Frequency	6 dB Bandwidth measured conducted of 802.11g
2412 MHz 16.56 MHz	 <p>RBW 100 kHz Delta 2 [T1] VBW 100 kHz -0.99 dB SWT 5 ms 16.560000000 MHz Ref 0 dBm Att 30 dB Marker 1 [T1] 0 Offset 2.4 dB D1 -8.84 dBm -14.84 dBm 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 1235 1240 1245 1250 1255 1260 1265 1270 1275 1280 1285 1290 1295 1300 1305 1310 1315 1320 1325 1330 1335 1340 1345 1350 1355 1360 1365 1370 1375 1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435 1440 1445 1450 1455 1460 1465 1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520 1525 1530 1535 1540 1545 1550 1555 1560 1565 1570 1575 1580 1585 1590 1595 1600 1605 1610 1615 1620 1625 1630 1635 1640 1645 1650 1655 1660 1665 1670 1675 1680 1685 1690 1695 1700 1705 1710 1715 1720 1725 1730 1735 1740 1745 1750 1755 1760 1765 1770 1775 1780 1785 1790 1795 1800 1805 1810 1815 1820 1825 1830 1835 1840 1845 1850 1855 1860 1865 1870 1875 1880 1885 1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020 2025 2030 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085 2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150 2155 2160 2165 2170 2175 2180 2185 2190 2195 2200 2205 2210 2215 2220 2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285 2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355 2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420 2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 2490 2495 2500 2505 2510 2515 2520 2525 2530 2535 2540 2545 2550 2555 2560 2565 2570 2575 2580 2585 2590 2595 2600 2605 2610 2615 2620 2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690 2695 2700 2705 2710 2715 2720 2725 2730 2735 2740 2745 2750 2755 2760 2765 2770 2775 2780 2785 2790 2795 2800 2805 2810 2815 2820 2825 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890 2895 2900 2905 2910 2915 2920 2925 2930 2935 2940 2945 2950 2955 2960 2965 2970 2975 2980 2985 2990 2995 3000 3005 3010 3015 3020 3025 3030 3035 3040 3045 3050 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7055 7060 7065 7070 7075 7080 7085 7090 7095 7100 7105 7110 7115 7120 7125 7130 7135 7140 7145 7150 7155 7160 7165 7170 7175 7180 7185 7190 7195 7200 7205 7210 7215 7220 7225 7230 7235 7240 7245 7250 7255 7260 7265 7270 7275 7280 7285 7290 7295 7300 7305 7310 7315 7320 7325 7330 7335 7340 7345 7350 7355 7360 7365 7370 7375 7380 7385 7390 7395 7400 7405 7410 7415 7420 7425 7430 7435 7440 7445 7450 7455 7460 7465 7470 7475 7480 7485 7490 7495 7500 7505 7510 7515 7520 7525 7530 7535 7540 7545 7550 7555 7560 7565 7570 7575 7580 7585 7590 7595 7600 7605 7610 7615 7620 7625 7630 7635 7640 7645 7650 7655 7660 7665 7670 7675 7680 7685 7690 7695 7700 7705 7710 7715 7720 7725 7730 7735 7740 7745 7750 7755 7760 7765 7770 7775 7780 7785 7790 7795 7800 7805 7810 7815 7820 7825 7830 7835 7840 7845 7850 7855 7860 7865 7870 7875 7880 7885 7890 7895 7900 7905 7910 7915 7920 7925 7930 7935 7940 7945 7950 7955 7960 7965 7970 7975 7980 7985 7990 7995 8000 8005 8010 8015 8020 8025 8030 8035 8040 8045 8050 8055 8060 8065 8070 8075 8080 8085 8090 8095 8100 8105 8110 8115 8120 8125 8130 8135 8140 8145 8150 8155 8160 8165 8170 8175 8180 8185 8190 8195 8200 8205 8210 8215 8220 8225 8230 8235 8240 8245 8250 8255 8260 8265 8270 8275 8280 8285 8290 8295 8300 8305 8310 8315 8320 8325 8330 8335 8340 8345 8350 8355 8360 8365 8370 8375 8380 8385 8390 8395 8400 8405 8410 8415 8420 8425 8430 8435 8440 8445 8450 8455 8460 8465 8470 8475 8480 8485 8490 8495 8500 8505 8510 8515 8520 8525 8530 8535 8540 8545 8550 8555 8560 8565 8570 8575 8580 8585 8590 8595 8600 8605 8610 8615 8620 8625 8630 8635 8640 8645 8650 8655 8660 8665 8670 8675 8680 8685 8690 8695 8700 8705 8710 8715 8720 8725 8730 8735 8740 8745 8750 8755 8760 8765 8770 8775 8780 8785 8790 8795 8800 8805 8810 8815 8820 8825 8830 8835 8840 8845 8850 8855 8860 8865 8870 8875 8880 8885 8890 8895 8900 8905 8910 8915 8920 8925 8930 8935 8940 8945 8950 8955 8960 8965 8970 8975 8980 8985 8990 8995 9000 9005 9010 9015 9020 9025 9030 9035 9040 9045 9050 9055 9060 9065 9070 9075 9080 9085 9090 9095 9100 9105 9110 9115 9120 9125 9130 9135 9140 9145 9150 9155 9160 9165 9170 9175 9180 9185 9190 9195 9200 9205 9210 9215 9220 9225 9230 9235 9240 9245 9250 9255 9260 9265 9270 9275 9280 9285 9290 9295 9300 9305 9310 9315 9320 9325 9330 9335 9340 9345 9350 9355 9360 9365 9370 9375 9380 9385 9390 9395 9400 9405 9410 9415 9420 9425 9430 9435 9440 9445 9450 9455 9460 9465 9470 9475 9480 9485 9490 9495 9500 9505 9510 9515 9520 9525 9530 9535 9540 9545 9550 9555 9560 9565 9570 9575 9580 9585 9590 9595 9600 9605 9610 9615 9620 9625 9630 9635 9640 9645 9650 9655 9660 9665 9670 9675 9680 9685 9690 9695 9700 9705 9710 9715 9720 9725 9730 9735 9740 9745 9750 9755 9760 9765 9770 9775 9780 9785 9790 9795 9800 9805 9810 9815 9820 9825 9830 9835 9840 9845 9850 9855 9860 9865 9870 9875 9880 9885 9890 9895 9900 9905 9910 9915 9920 9925 9930 9935 9940 9945 9950 9955 9960 9965 9970 9975 9980 9985 9990 9995 10000 10005 10010 10015 10020 10025 10030 10035 10040 10045 10050 10055 10060 10065 10070 10075 10080 10085 10090 10095 10100 10105 10110 10115 10120 10125 10130 10135 10140 10145 10150 10155 10160 10165 10170 10175 10180 10185 10190 10195 10200 10205 10210 10215 10220 10225 10230 10235 10240 10245 10250 10255 10260 10265 10270 10275 10280 10285 10290 10295 10300 10305 10310 10315 10320 10325 10330 10335 10340 10345 10350 10355 10360 10365 10370 10375 10380 10385 10390 10395 10400 10405 10410 10415 10420 10425 10430 10435 10440 10445 10450 10455 10460 10465 10470 10475 10480 10485 10490 10495 10500 10505 10510 10515 10520 10525 10530 10535 10540 10545 10550 10555 10560 10565 10570 10575 10580 10585 10590 10595 10600 10605 10610 10615 10620 10625</p>

7.3.2 Maximum Peak Output Power

EUT : UREN V1
 Test Standard : FCC Part15 Subpart C Section 15.247(b)(3)
 Test Date : June 6, 2007
 Operating Condition : Wireless LAN.
 Environment Condition : The EUT was operated at transmitting condition continuously during the test.
 Result : 24 °C/ 43 %
 Result : Passed

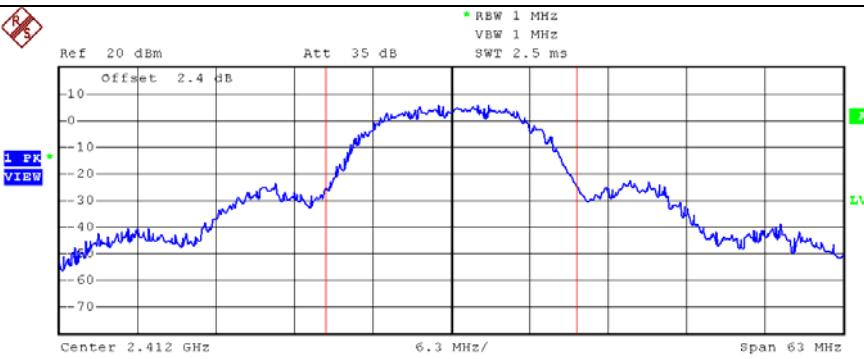
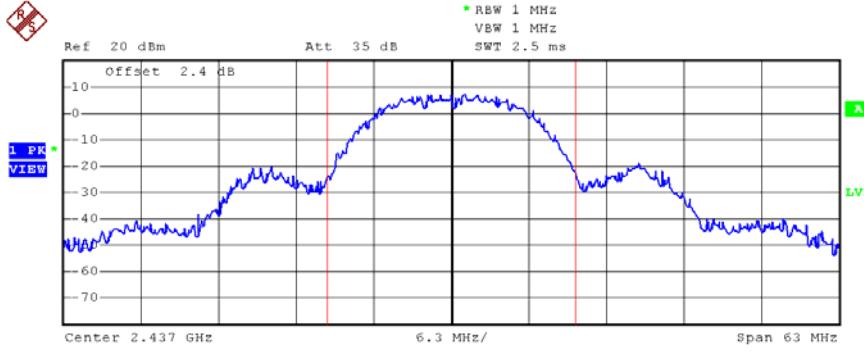
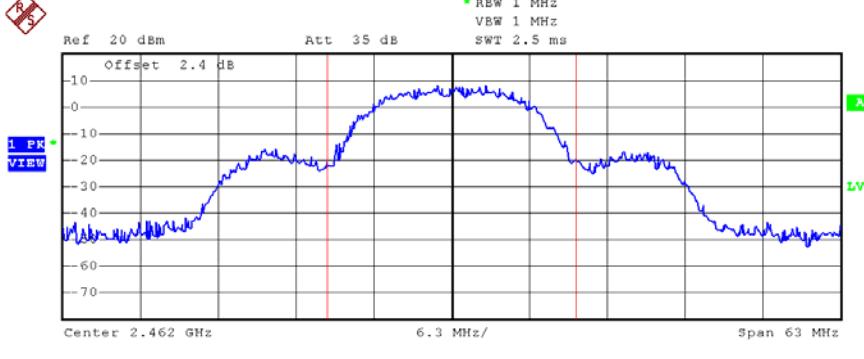
Maximum Peak Output Power Test Data

Mode	Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
802.11b	2412	13.56	30 dBm
	2437	15.06	
	2462	15.61	
802.11g	2412	8.78	30 dBm
	2437	9.83	
	2462	11.02	

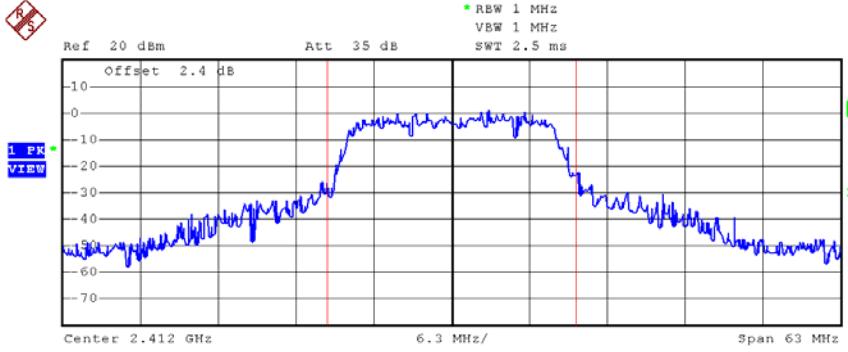
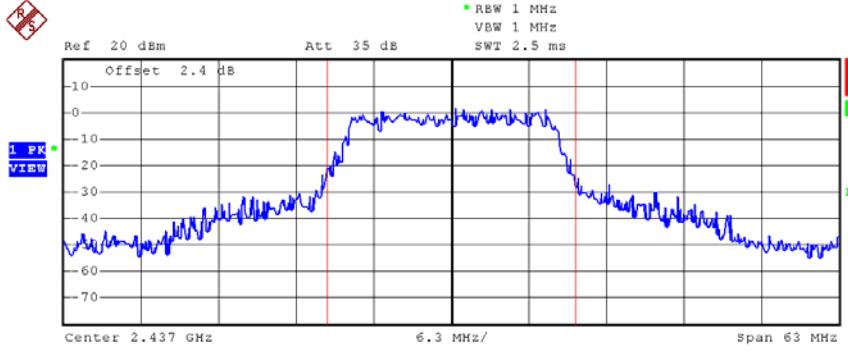
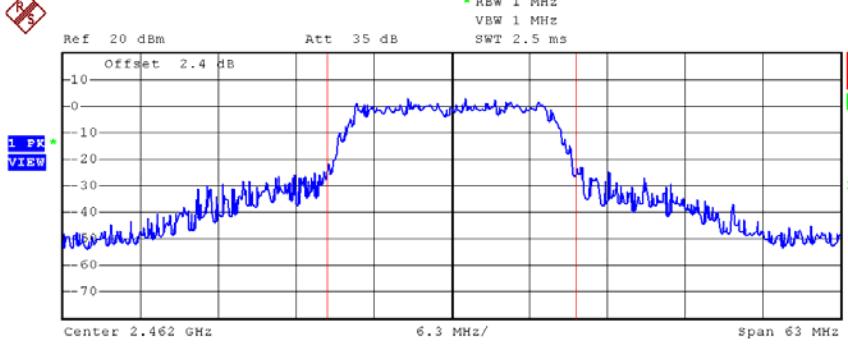
NOTES:

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 13.56 dBm	 <p>Ref 20 dBm Att 35 dB</p> <p>Offset 2.4 dB</p> <p>Center 2.412 GHz 6.3 MHz/ Span 63 MHz</p> <p>Tx Channel Bandwidth 20 MHz Power 13.56 dBm</p>
2437 MHz 15.06 dBm	 <p>Ref 20 dBm Att 35 dB</p> <p>Offset 2.4 dB</p> <p>Center 2.437 GHz 6.3 MHz/ Span 63 MHz</p> <p>Tx Channel Bandwidth 20 MHz Power 15.06 dBm</p>
2462 MHz 15.61 dBm	 <p>Ref 20 dBm Att 35 dB</p> <p>Offset 2.4 dB</p> <p>Center 2.462 GHz 6.3 MHz/ Span 63 MHz</p> <p>Tx Channel Bandwidth 20 MHz Power 15.61 dBm</p>

Plots of Maximum Peak Output Power (802.11g)

Frequency	Maximum Peak Output Power measured conducted of 802.11g
2412 MHz 8.78 dBm	 <p>Ref 20 dBm Att 35 dB Offset 2.4 dB SWT 2.5 ms</p> <p>1 PK VIEW</p> <p>Center 2.412 GHz 6.3 MHz/ Span 63 MHz</p> <p>Tx Channel Bandwidth 20 MHz Power 8.78 dBm</p>
2437 MHz 9.83 dBm	 <p>Ref 20 dBm Att 35 dB Offset 2.4 dB SWT 2.5 ms</p> <p>1 PK VIEW</p> <p>Center 2.437 GHz 6.3 MHz/ Span 63 MHz</p> <p>Tx Channel Bandwidth 20 MHz Power 9.83 dBm</p>
2462 MHz 11.02 dBm	 <p>Ref 20 dBm Att 35 dB Offset 2.4 dB SWT 2.5 ms</p> <p>1 PK VIEW</p> <p>Center 2.462 GHz 6.3 MHz/ Span 63 MHz</p> <p>Tx Channel Bandwidth 20 MHz Power 11.02 dBm</p>

7.3.3 Conducted Emission

& 100 kHz Bandwidth of Frequency Band Edges

EUT : UREN V1
Test Standard : FCC Part15 Subpart C Section 15.247(c)
Test Date : June 6, 2007
Operating Condition : Wireless LAN.
Environment Condition : The EUT was operated at transmitting condition continuously during the test.
Environment Condition : 24 °C/ 43 %
Result : Passed

7.3.3.1 Conducted Emission Test

Result : Please refer to the attached Plots for details :

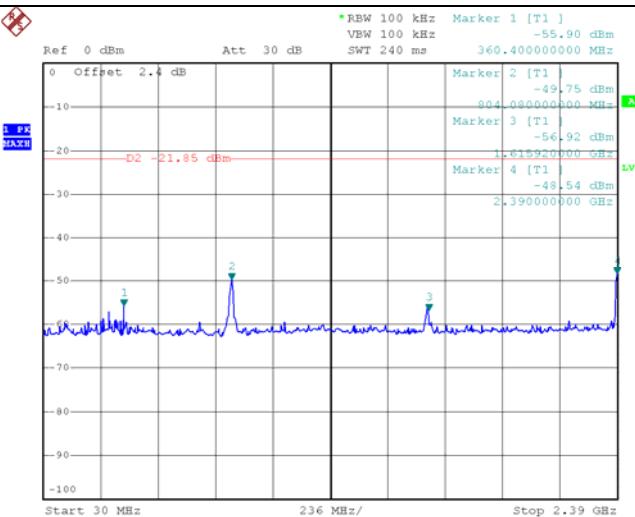
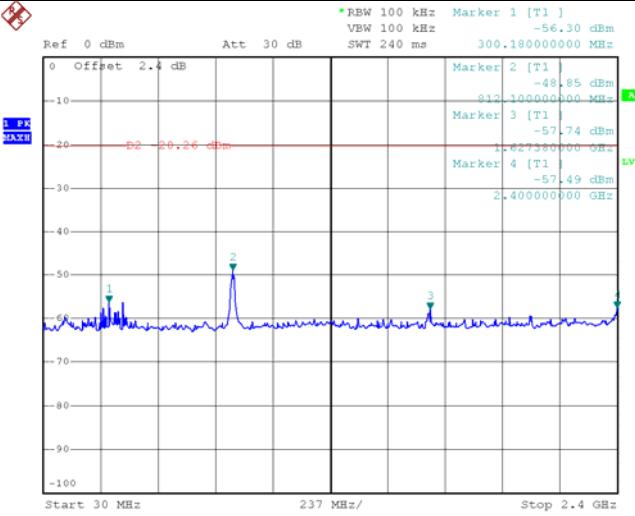
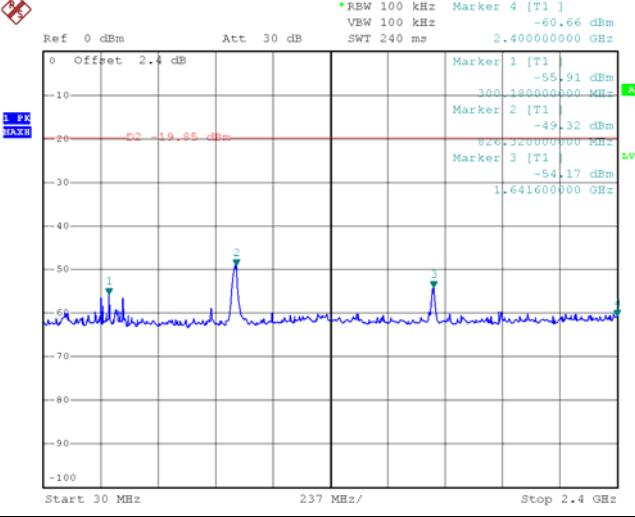
7.3.3.2 100 kHz Bandwidth of Frequency Band Edges

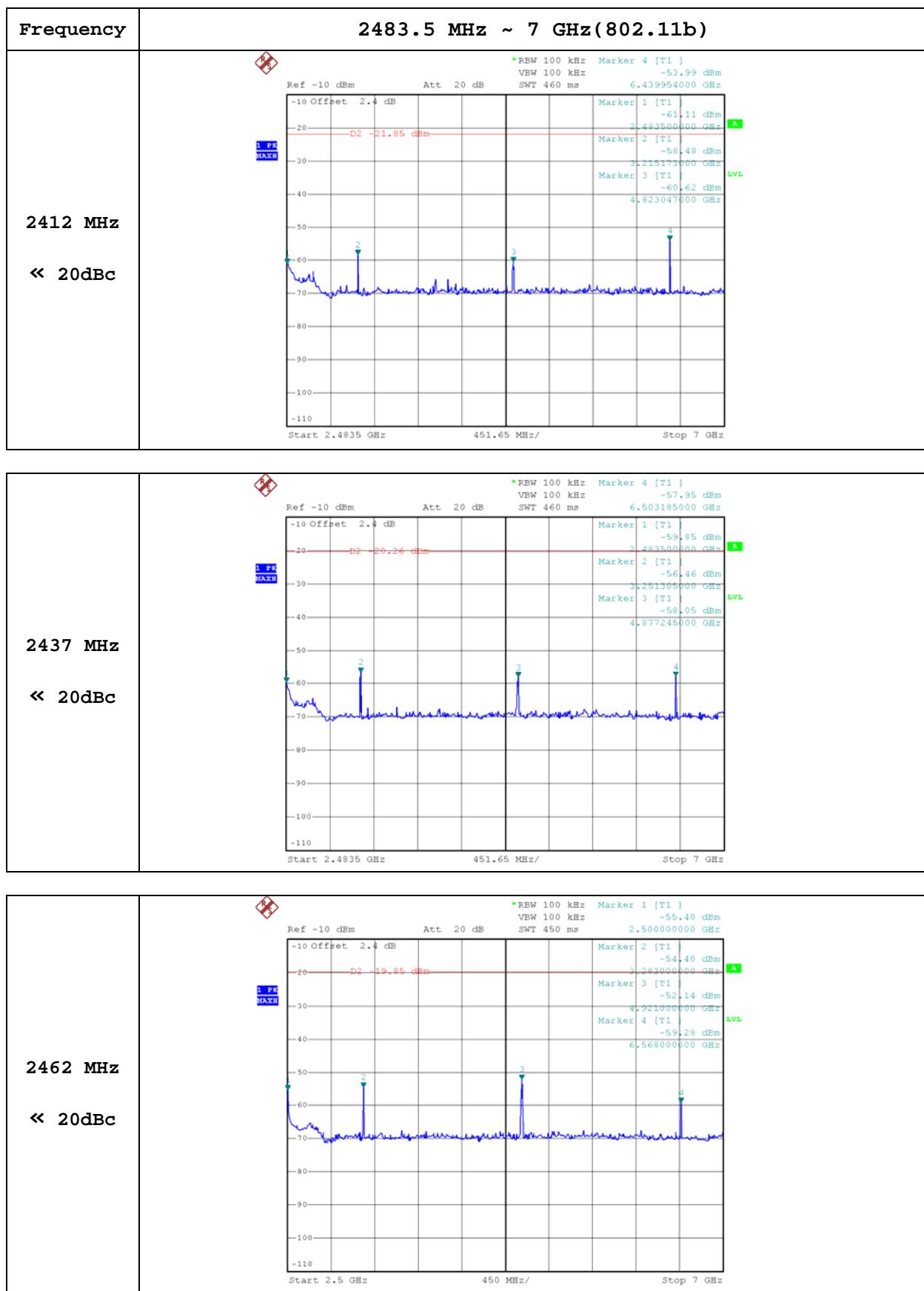
The test was performed to make a direct field strength measurement at the bandedge frequencies.

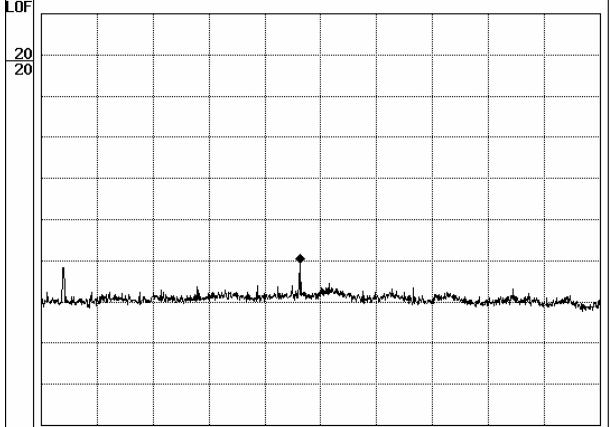
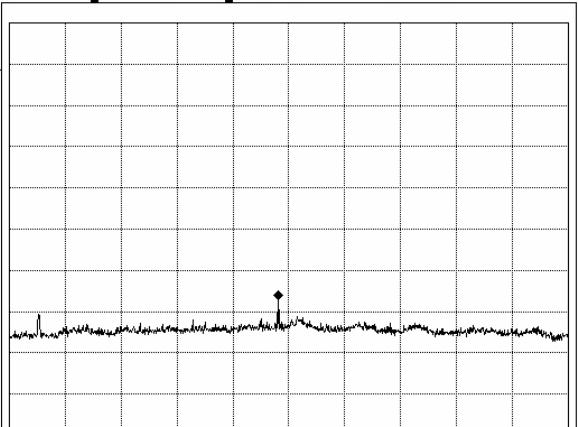
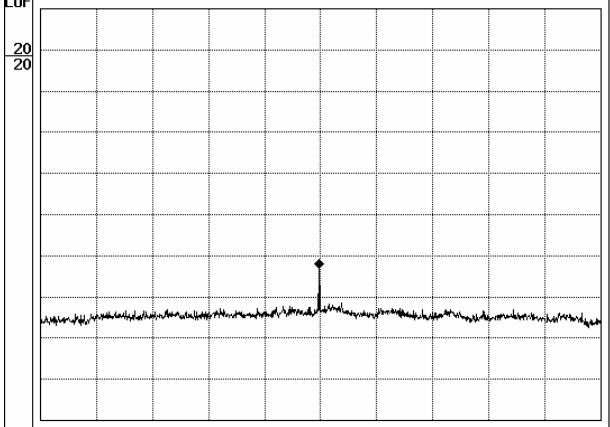
Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209. There is a restricted band starting at 2483.5 MHz and another restricted band from 2310 - 2390 MHz.

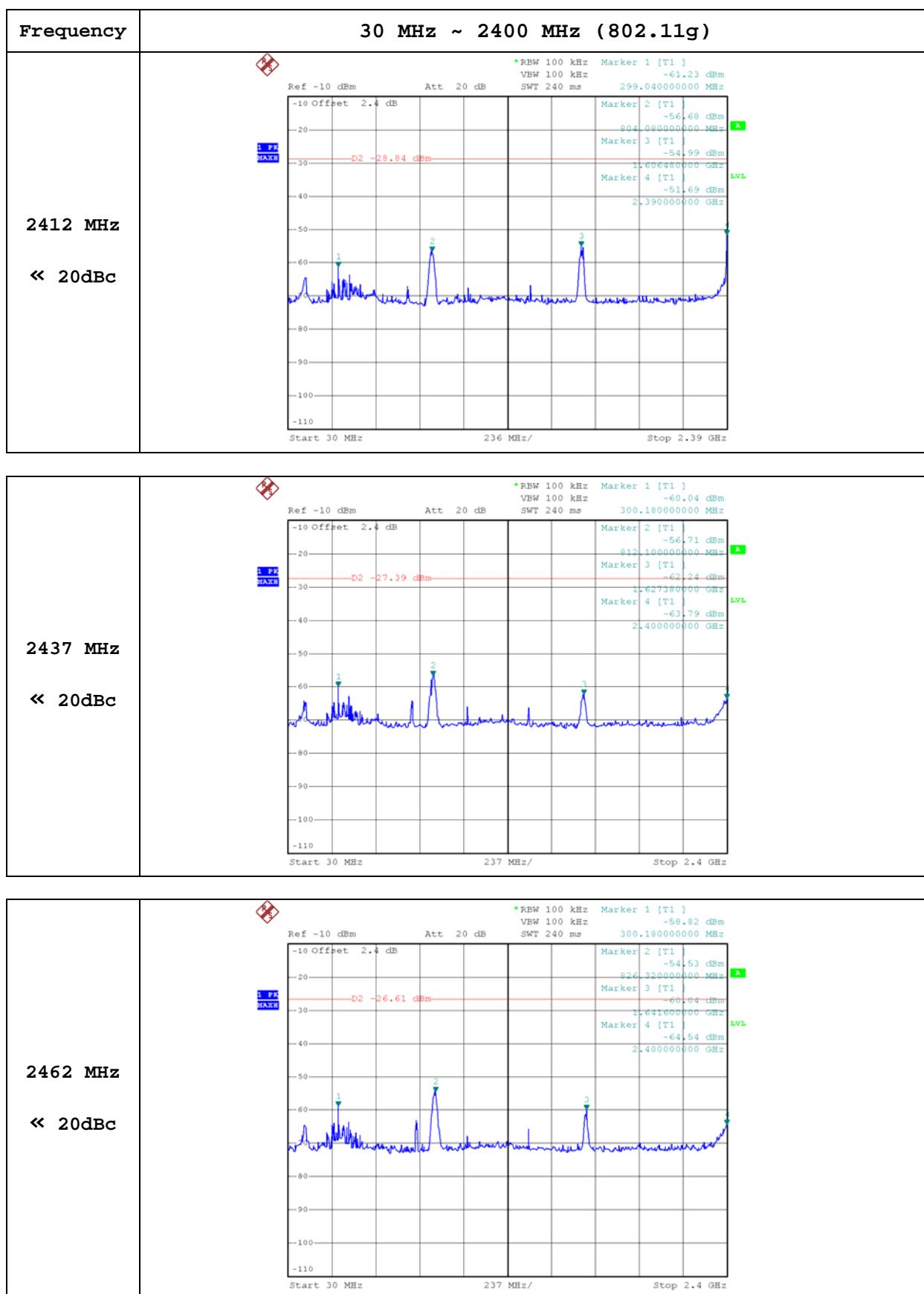
All emissions below noise floor of 7 dBuV/m.

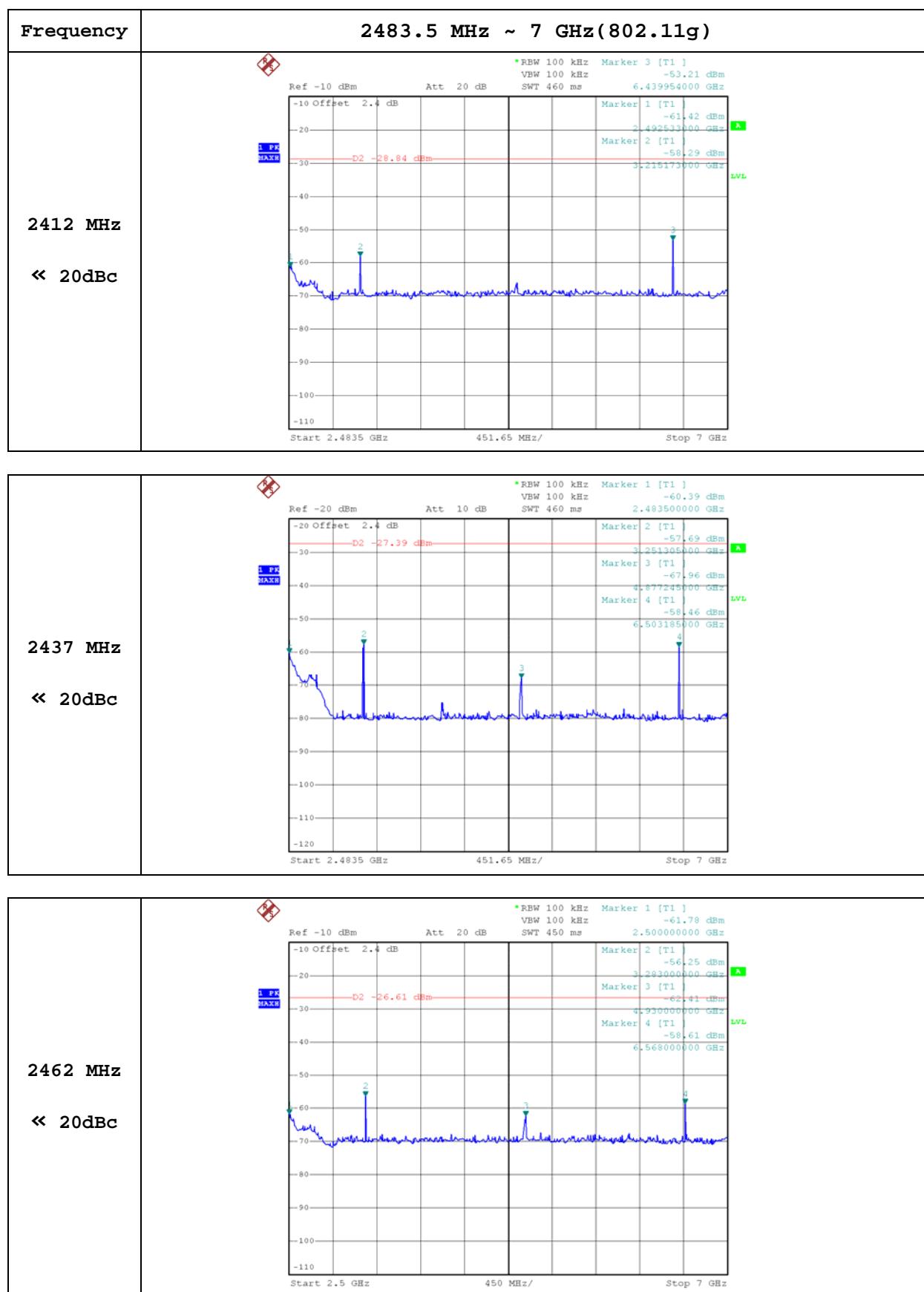
Plots of Conducted Emission

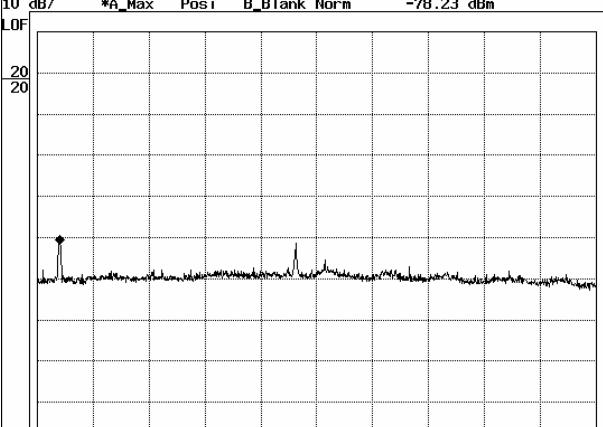
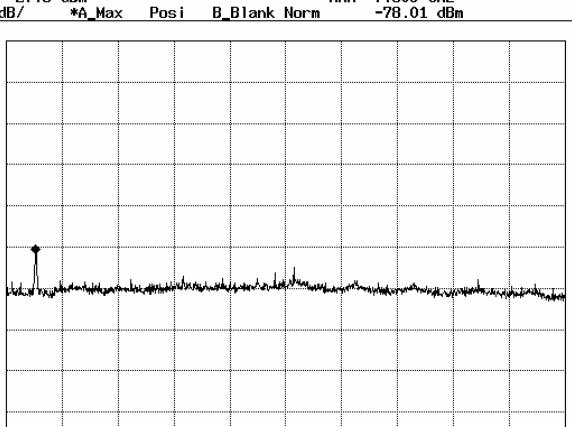
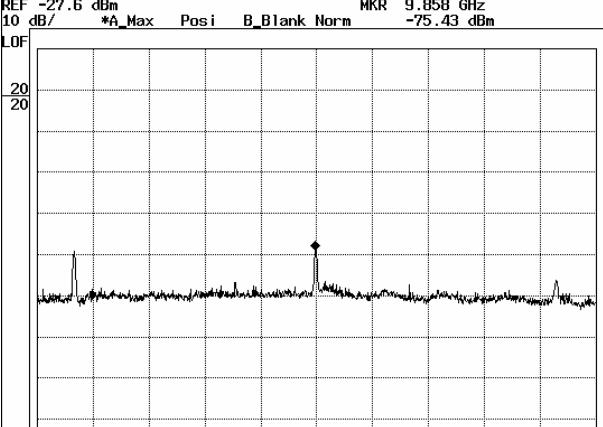
Frequency	30 MHz ~ 2400 MHz (802.11b)
2412 MHz « 20dBc	 <p>• RBW 100 kHz Marker 1 [T1] -55.90 dBm VBW 100 kHz 360.400000000 MHz SWT 240 ms Ref 0 dBm Att 30 dB Marker 2 [T1] -49.75 dBm Marker 3 [T1] -56.92 dBm Marker 4 [T1] -48.54 dBm D2 -21.85 dBm 804.080000000 MHz 1.61592000000 GHz 2.39000000000 GHz LVL</p>
2437 MHz « 20dBc	 <p>• RBW 100 kHz Marker 1 [T1] -56.30 dBm VBW 100 kHz 300.180000000 MHz SWT 240 ms Ref 0 dBm Att 30 dB Marker 2 [T1] -48.85 dBm Marker 3 [T1] -57.74 dBm Marker 4 [T1] -57.49 dBm D2 -20.26 dBm 812.100000000 MHz 1.62738000000 GHz 2.40000000000 GHz LVL</p>
2462 MHz « 20dBc	 <p>• RBW 100 kHz Marker 4 [T1] -60.66 dBm VBW 100 kHz 2.400000000 GHz SWT 240 ms Ref 0 dBm Att 30 dB Marker 1 [T1] -55.91 dBm Marker 2 [T1] -49.32 dBm Marker 3 [T1] -54.17 dBm D2 -19.85 dBm 300.180000000 MHz 826.220000000 MHz 1.64160000000 GHz LVL</p>



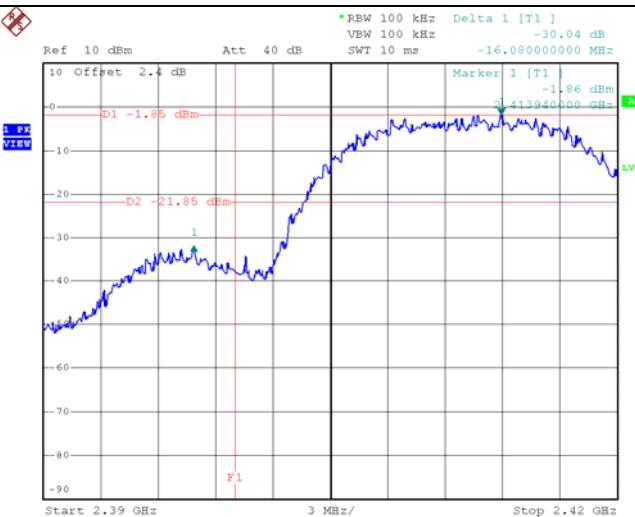
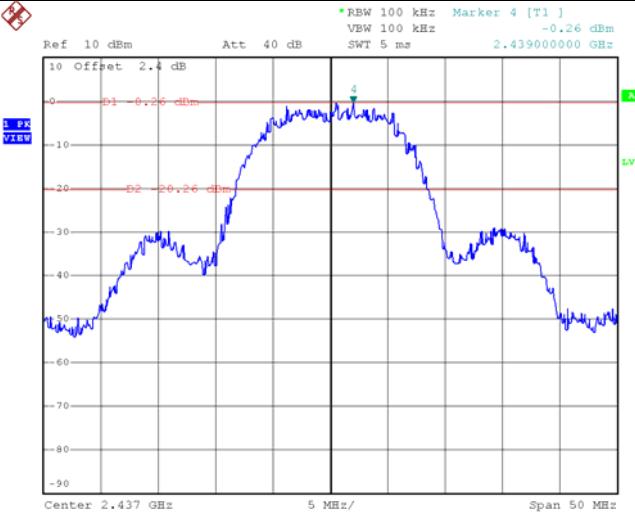
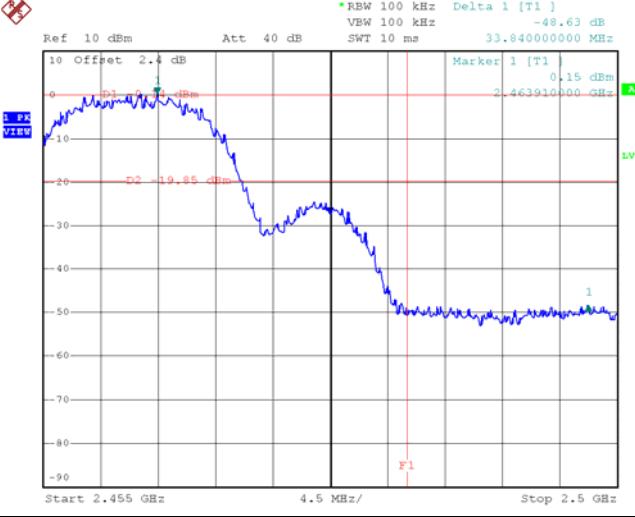
Frequency	7 GHz ~ 12.75 GHz (802.11b)
2412 MHz « 20dBc	<p>REF -7.6 dBm MKR 9.656 GHz 10 dB/ *A_Max Posi B_Blk Norm -67.16 dBm</p> <p>LOF</p>  <p>20 20</p> <p>START 7.000 GHz STOP 12.750 GHz *RBW 100 kHz VBW 100 kHz SWP 1.2 s ATT 10 dB</p>
2437 MHz « 20dBc	<p>REF 2.4 dBm MKR 9.760 GHz 10 dB/ *A_Max Posi B_Blk Norm -63.75 dBm</p> <p>LOF</p>  <p>20 20</p> <p>START 7.000 GHz STOP 12.750 GHz *RBW 100 kHz VBW 100 kHz SWP 1.2 s ATT 10 dB</p>
2462 MHz « 20dBc	<p>REF 12.4 dBm MKR 9.858 GHz 10 dB/ *A_Max Posi B_Blk Norm -49.67 dBm</p> <p>LOF</p>  <p>20 20</p> <p>START 7.000 GHz STOP 12.750 GHz *RBW 100 kHz VBW 100 kHz SWP 1.2 s ATT 20 dB</p>

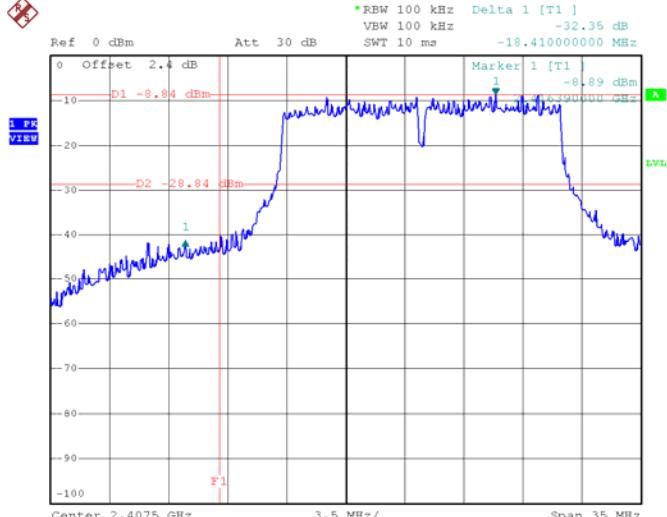
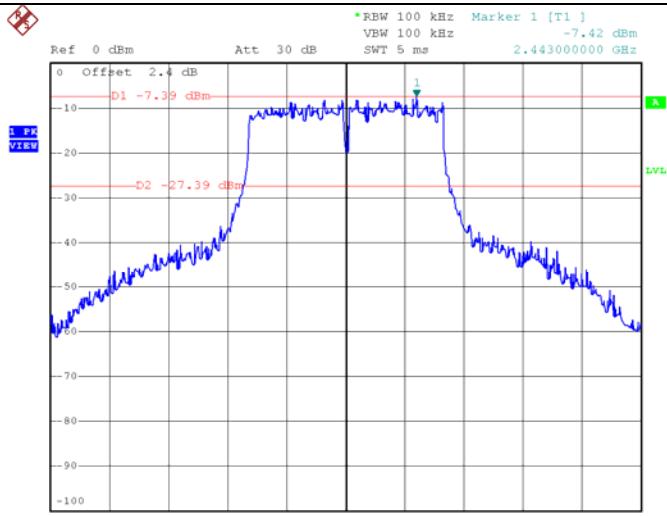
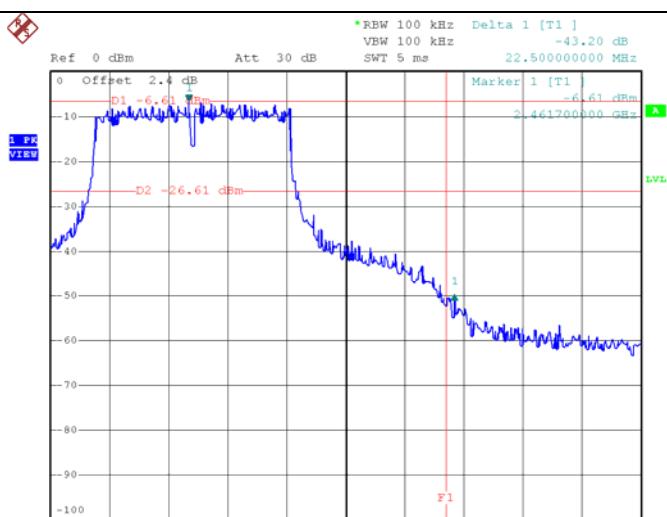




Frequency	7 GHz ~ 12.75 GHz (802.11g)
2412 MHz « 20dBc	<p>REF -27.6 dBm MKR 7.230 GHz 10 dB/ *A_Max Posi B_Blk Norm -78.23 dBm</p> <p>LOF</p>  <p>20 20</p> <p>START 7.000 GHz STOP 12.750 GHz *RBW 100 kHz VBW 100 kHz SWP 1.2 s *ATT 0 dB</p>
2437 MHz « 20dBc	<p>REF -27.6 dBm MKR 7.305 GHz 10 dB/ *A_Max Posi B_Blk Norm -78.01 dBm</p> <p>LOF</p>  <p>20 20</p> <p>START 7.000 GHz STOP 12.750 GHz *RBW 100 kHz VBW 100 kHz SWP 1.2 s *ATT 0 dB</p>
2462 MHz « 20dBc	<p>REF -27.6 dBm MKR 9.858 GHz 10 dB/ *A_Max Posi B_Blk Norm -75.43 dBm</p> <p>LOF</p>  <p>20 20</p> <p>START 7.000 GHz STOP 12.750 GHz *RBW 100 kHz VBW 100 kHz SWP 1.2 s *ATT 0 dB</p>

Plots of 100 kHz Bandwidth of Frequency Band Edges

Frequency	802.11b
2412 MHz « 20dBc	 <p>RBW 100 kHz Delta 1 [T1] VBW 100 kHz -30.04 dB SWT 10 ms -16.080000000 MHz Ref 10 dBm Att 40 dB Marker 1 [T1] 10 Offset 2.4 dB D1 -1.85 dBm -1.86 dBm 2.413940000 GHz -0 D2 -21.85 dBm LVL -10 -20 -30 -40 -50 -60 -70 -80 -90 F1 Start 2.39 GHz 3 MHz/ Stop 2.42 GHz</p>
2437 MHz N/A	 <p>RBW 100 kHz Marker 4 [T1] VBW 100 kHz -0.26 dBm SWT 5 ms 2.439000000 GHz Ref 10 dBm Att 40 dB 10 Offset 2.4 dB D1 -0.26 dBm -0.26 dBm 2.439000000 GHz -0 D2 -20.26 dBm LVL -10 -20 -30 -40 -50 -60 -70 -80 -90 Center 2.437 GHz 5 MHz/ Span 50 MHz</p>
2462 MHz « 20dBc	 <p>RBW 100 kHz Delta 1 [T1] VBW 100 kHz -48.63 dB SWT 10 ms 33.840000000 MHz Ref 10 dBm Att 40 dB Marker 1 [T1] 10 Offset 2.4 dB D1 -0.15 dBm -0.15 dBm 2.463910000 GHz -0 D2 -19.85 dBm LVL -10 -20 -30 -40 -50 -60 -70 -80 -90 F1 Start 2.455 GHz 4.5 MHz/ Stop 2.5 GHz</p>

Frequency	802.11g
2412 MHz « 20dBc	 <p>Ref 0 dBm Att 30 dB</p> <p>RBW 100 kHz Delta 1 [T1] -32.35 dB VBW 100 kHz SWT 10 ms -18.4100000000 MHz</p> <p>Marker 1 [T1] -8.89 dBm 2.4090000000 GHz</p> <p>D1 -8.84 dBm D2 -28.84 dBm</p> <p>1 F1</p> <p>Center 2.4075 GHz 3.5 MHz/ Span 35 MHz</p>
2437 MHz N/A	 <p>Ref 0 dBm Att 30 dB</p> <p>RBW 100 kHz Marker 1 [T1] -7.42 dBm VBW 100 kHz SWT 5 ms 2.4430000000 GHz</p> <p>D1 -7.39 dBm D2 -27.39 dBm</p> <p>1 F1</p> <p>Center 2.437 GHz 5 MHz/ Span 50 MHz</p>
2462 MHz « 20dBc	 <p>Ref 0 dBm Att 30 dB</p> <p>RBW 100 kHz Delta 1 [T1] -43.20 dB VBW 100 kHz SWT 5 ms 22.5000000000 MHz</p> <p>Marker 1 [T1] -6.61 dBm 2.4617000000 GHz</p> <p>D1 -6.61 dBm D2 -26.61 dBm</p> <p>1 F1</p> <p>Start 2.45 GHz 5 MHz/ Stop 2.5 GHz</p>

7.3.4 Radiated Emission

EUT : UREN V1
 Test Standard : FCC Part15 Subpart C Section 15.247(c)
 Test Date : June 8, 2007
 Operating Condition : Wireless LAN.
 Environment Condition : The EUT was operated at transmitting condition continuously during the test.
 Environment Condition : 25 °C/ 41 %
 Result : Passed

Radiated Emission Test Data(below 1 GHz)

Frequency [MHz]	Reading [dB μ V]	Polarization [*H/**V]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dB μ V/m]	Emission Level [dB μ V/m]	Margin [dB]
60.01	22.28	H	12.27	1.75	40.00	36.30	3.70
60.86	21.57	H	12.31	1.42	40.00	35.30	4.70
73.02	21.80	V	9.92	1.88	40.00	33.60	6.40
80.59	16.93	H	8.40	1.97	40.00	27.30	12.70
85.19	26.64	H	8.64	2.02	40.00	37.30	2.70
109.54	24.62	H	10.69	2.30	43.50	37.60	5.90
121.71	22.86	V	11.73	2.41	43.50	37.00	6.50
798.03	8.66	H	22.62	6.72	46.00	38.00	8.00

Radiated Emission Test Data (above 1 GHz)

Frequency [MHz]	Reading [dB μ V]	Pre-Amp Gain [dB]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dB μ V/m]	Emission Level [dB μ V/m]	Margin [dB]
Low Channel (2412 MHz)							
3216.00	22.69	30.00	28.49	13.00	53.98	34.18	19.80
4824.00	12.34	30.00	31.11	16.88	53.98	30.33	23.65
6432.00	9.15	30.00	33.63	24.31	53.98	38.29	15.69
Middle Channel (2437 MHz)							
3249.33	24.88	30.00	28.22	13.01	53.98	36.11	17.87
4874.00	18.23	30.00	31.25	16.96	53.98	36.44	17.54
6498.67	7.54	30.00	33.95	24.60	53.98	36.09	17.89
High Channel (2462 MHz)							
3282.67	27.77	30.00	28.12	13.02	53.98	38.91	15.07
4924.00	20.77	30.00	31.40	16.98	53.98	39.15	14.83
6565.33	4.90	30.00	34.08	24.85	53.98	33.83	20.15

The other emissions below noise floor.

NOTES :

1. All modes of operation were investigated and the worst-case emissions are reported.
2. AF = Antenna Factor CL = Cable Loss F/S = Field Strength
3. POL H = Horizontal POL V = Vertical

7.3.5 Power Spectral Density

EUT : UREN V1
Test Standard : FCC Part15 Subpart C Section 15.247(d)
Test Date : June 8, 2007
Operating Condition : Wireless LAN.
Environment Condition : The EUT was operated at transmitting condition continuously during the test.
Environment Condition : 25 °C/ 41 %
Result : Passed

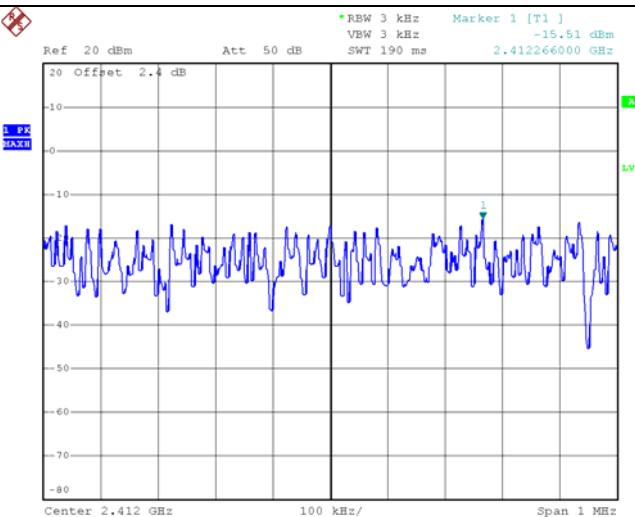
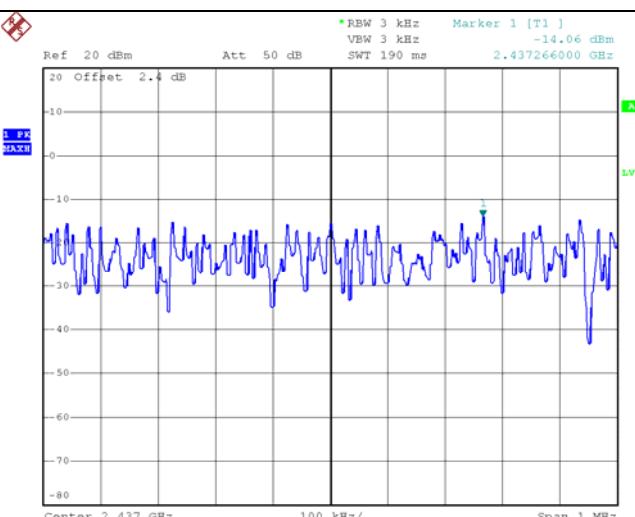
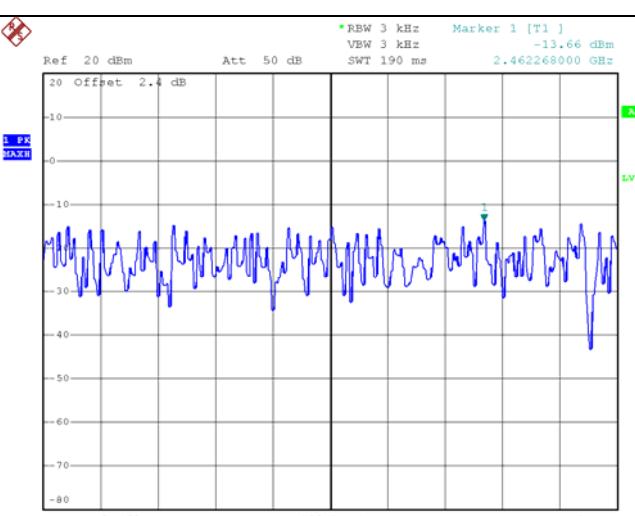
Power Spectral Density Test Data

Mode	Frequency (MHz)	Power Spectral Density (dBm)	Limit
802.11b	2412	-15.51	8 dBm
	2437	-14.06	
	2462	-13.66	
802.11g	2412	-22.64	8 dBm
	2437	-21.01	
	2462	-20.80	

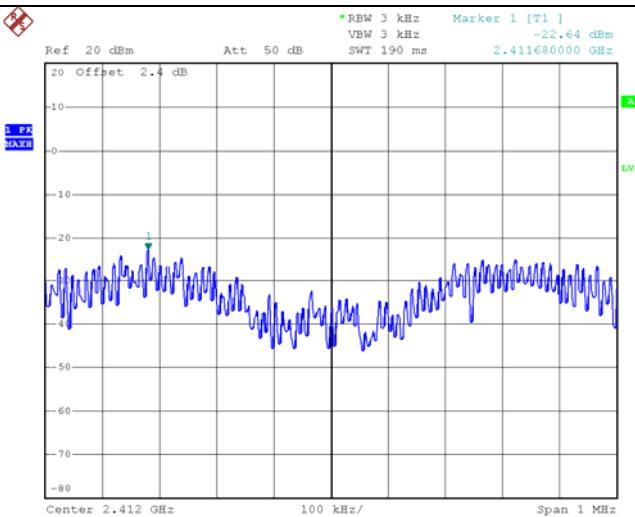
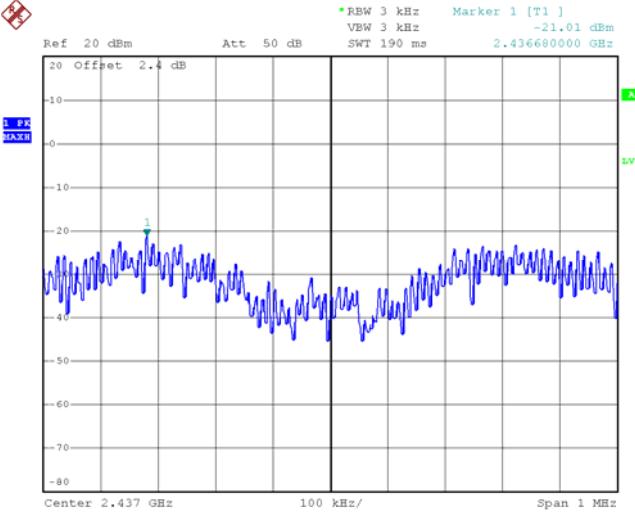
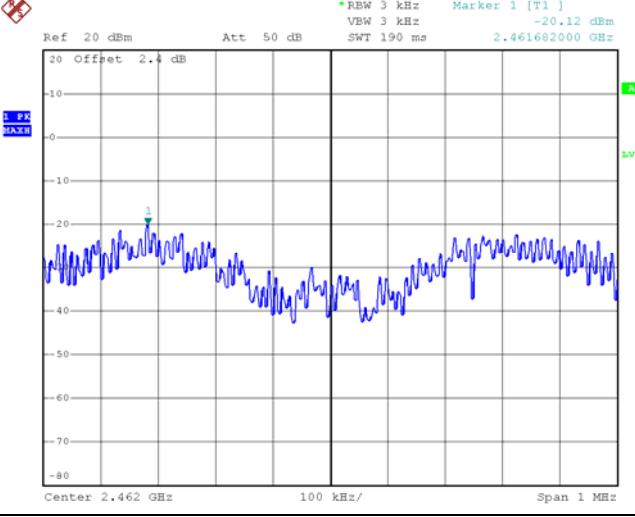
NOTES :

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 -15.51 dBm	 <p>RBW 3 kHz Marker 1 [T1] VBW 3 kHz -15.51 dBm SWT 190 ms 2.412266000 GHz Ref 20 dBm Att 50 dB 20 Offset 2.4 kHz L.PK MAXH L.VL Center 2.412 GHz 100 kHz Span 1 MHz</p>
2437 MHz -14.06 dBm	 <p>RBW 3 kHz Marker 1 [T1] -14.06 dBm VBW 3 kHz 2.437266000 GHz SWT 190 ms Ref 20 dBm Att 50 dB 20 Offset 2.4 kHz L.PK MAXH L.VL Center 2.437 GHz 100 kHz Span 1 MHz</p>
2462 MHz -13.66 dBm	 <p>RBW 3 kHz Marker 1 [T1] -13.66 dBm VBW 3 kHz 2.462268000 GHz SWT 190 ms Ref 20 dBm Att 50 dB 20 Offset 2.4 kHz L.PK MAXH L.VL Center 2.462 GHz 100 kHz Span 1 MHz</p>

Plots of Power Spectral Density (802.11g)

Frequency	Power Spectral Density measured conducted of 802.11g
2412 MHz -22.64 dBm	
2437 MHz -21.01 dBm	
2462 MHz -20.12 dBm	

7.4 Bluetooth

7.4.1 20 dB Bandwidth

EUT : UREN V1
Test Standard : FCC Part15 Subpart C Section 15.247(a)(1)
Test Date : June 6, 2007
Operating Condition : Bluetooth
Operating Condition : The EUT was operated at transmitting condition continuously during the test.
Environment Condition : 24 °C/ 43 %
Result : Passed

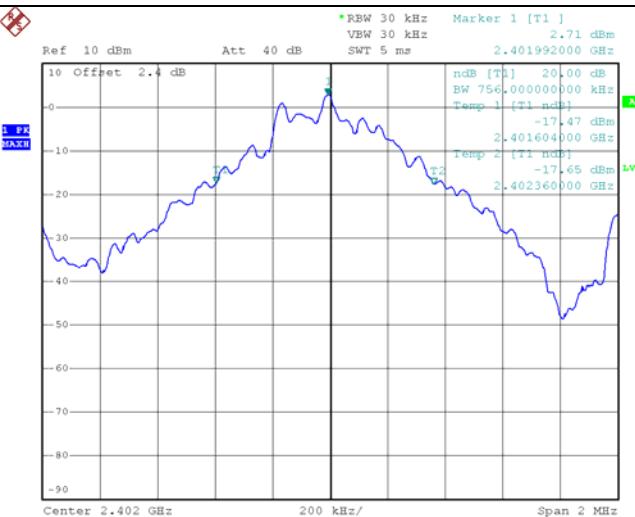
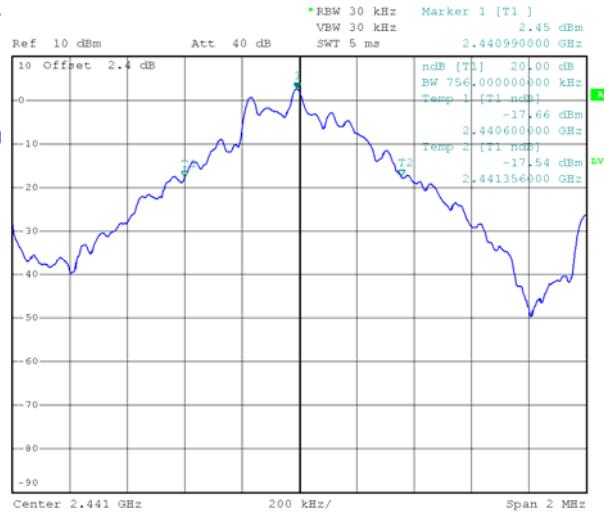
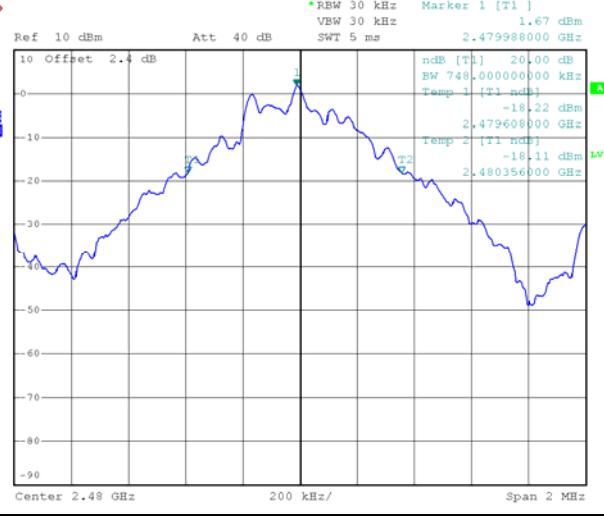
20 dB Bandwidth Test Data

Frequency (MHz)	20 dB Bandwidth (kHz)	Limit
2402	756	Less than 1 MHz
2441	756	
2480	748	

NOTES:

1. Measure conducted 20 dB bandwidth of relevant channel using Spectrum Analyzer.
2. RBW 30kHz, VBW 30kHz, Sweep Time 50mS.
3. 20 dB less than both bandwidth than maximum peak power.

Plots of 20 dB Bandwidth

Frequency	20 dB Bandwidth
2402 MHz 756 kHz	 <p>RBW 30 kHz Marker 1 [T1] 2.71 dBm VBW 30 kHz 2.401992000 GHz SWT 5 ms Ref 10 dBm Att 40 dB 10 Offset 2.4 dB Temp 1 [T1 dBm] -17.47 dBm Temp 2 [T1 dBm] -17.65 dBm ndB [T1] 20.00 dB BW 756.000000000 kHz LVL</p>
2441 MHz 756 kHz	 <p>RBW 30 kHz Marker 1 [T1] 2.45 dBm VBW 30 kHz 2.440990000 GHz SWT 5 ms Ref 10 dBm Att 40 dB 10 Offset 2.4 dB Temp 1 [T1 dBm] -17.66 dBm Temp 2 [T1 dBm] -17.54 dBm ndB [T1] 20.00 dB BW 756.000000000 kHz LVL</p>
2480 MHz 748 kHz	 <p>RBW 30 kHz Marker 1 [T1] 1.67 dBm VBW 30 kHz 2.479980000 GHz SWT 5 ms Ref 10 dBm Att 40 dB 10 Offset 2.4 dB Temp 1 [T1 dBm] -18.22 dBm Temp 2 [T1 dBm] -18.11 dBm ndB [T1] 20.00 dB BW 748.000000000 kHz LVL</p>

7.4.2 Average time of occupancy

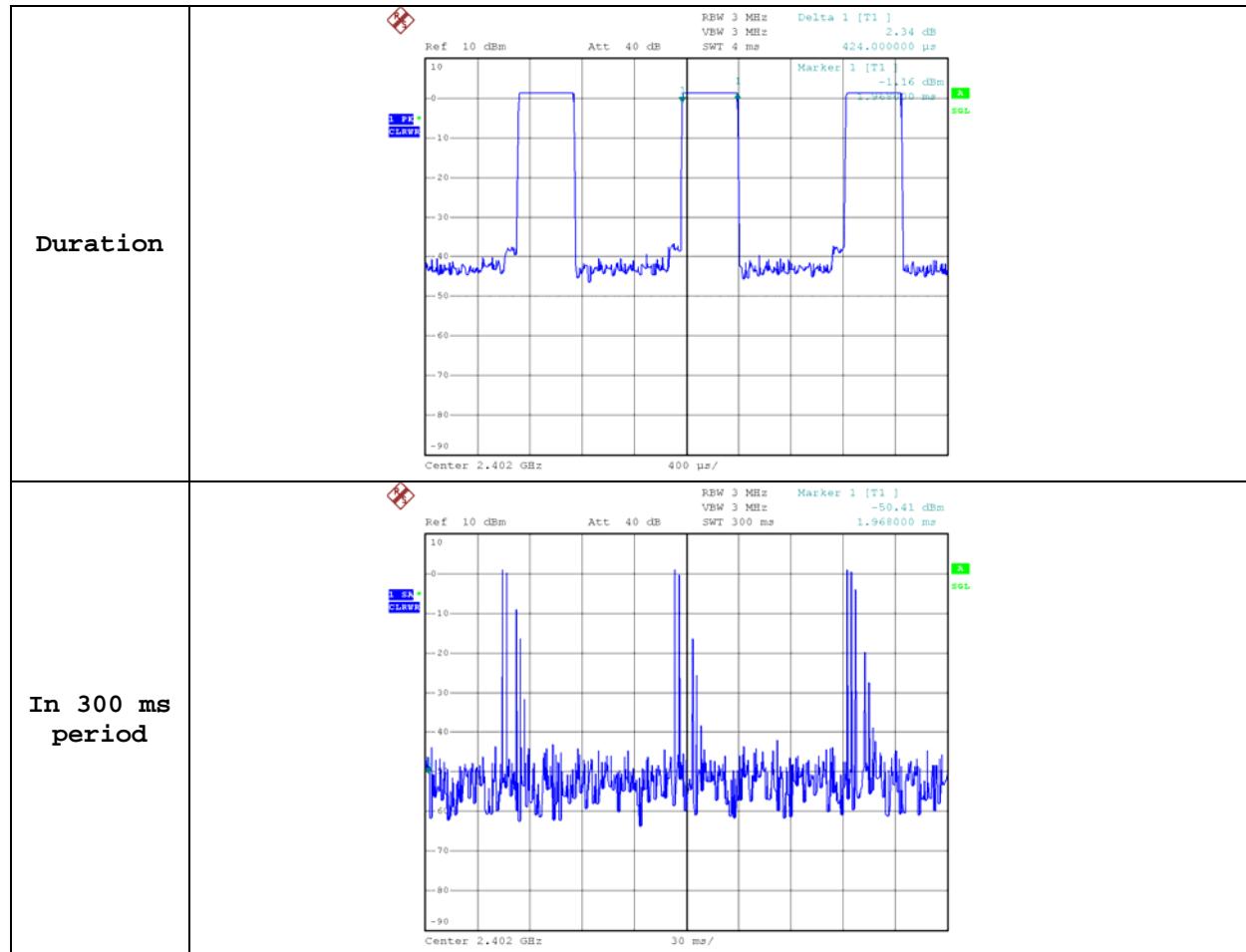
EUT : UREN V1
 Test Standard : FCC Part15 Subpart C Section 15.247(a)(1)
 Test Date : June 6, 2007
 Operating Condition : Bluetooth
 The EUT was operated in normal operation.
 Environment Condition : 24 °C/ 43 %
 Result : Passed

The average time of occupancy is $((800 \times 0.42) \times 31.6) / 79 = 134.4$ ms.

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 DH1 packet one time slot is used for TX and one time slot for RX.
4. That means a total of 800 transmissions occurs in one second. The average time of occupancy is calculated as following:

$$(800 \times 0.42 \text{ ms}) \times 31.6 \text{ s} / 79 = 134.4 \text{ ms}$$



7.4.3 Maximum Peak Output Power

EUT : UREN V1
Test Standard : FCC Part15 Subpart C Section 15.247(b)(1)
Test Date : June 6, 2007
Operating Condition : Bluetooth
Operating Condition : The EUT was operated at transmitting condition continuously during the test.
Environment Condition : 24 °C/ 43 %
Result : Passed

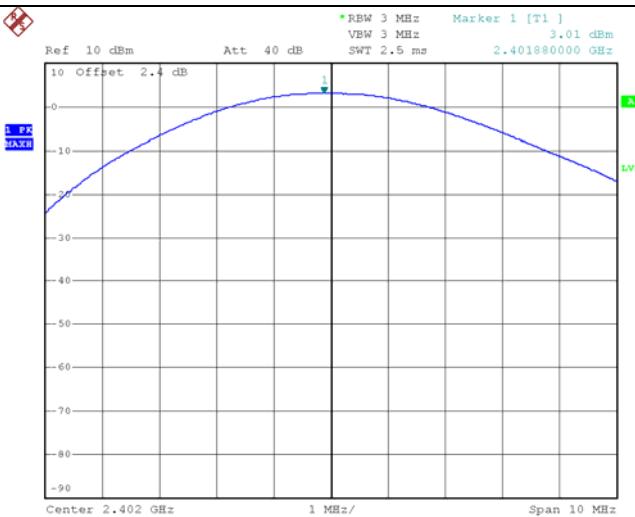
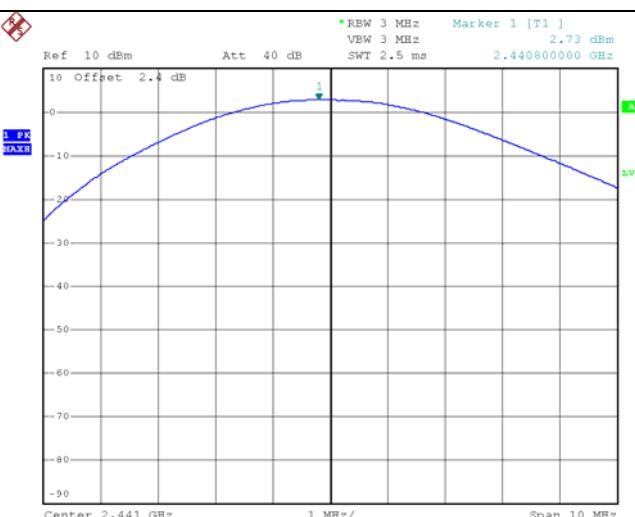
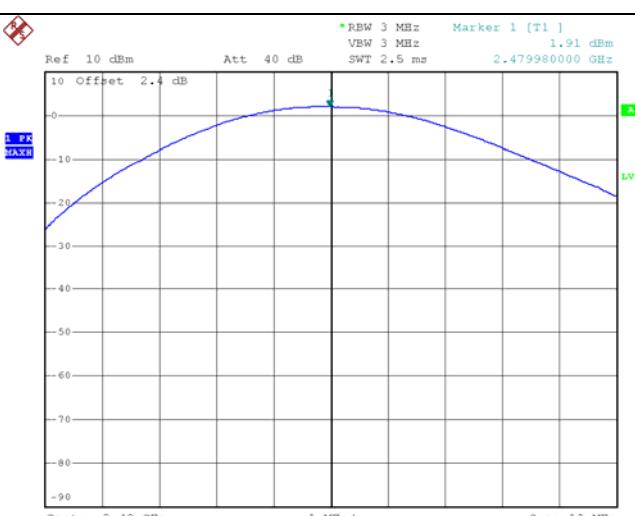
Maximum Peak Output Power Test Data

Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
2402	3.01	Less than 30 dBm
2440	2.73	
2480	1.91	

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 3.01 dBm	
2441 MHz 2.73 dBm	
2480 MHz 1.91 dBm	

7.4.4 Conducted Emission

& 100 kHz Bandwidth of Frequency Band Edges

EUT : UREN V1
Test Standard : FCC Part15 Subpart C Section 15.247(c)
Test Date : June 6, 2007
Operating Condition : Bluetooth
Operating Condition : The EUT was operated at transmitting condition continuously during the test.
Environment Condition : 24 °C/ 43 %
Result : Passed

7.4.4.1 Conducted Emission Test

Result : Please refer to the attached Plots for details :

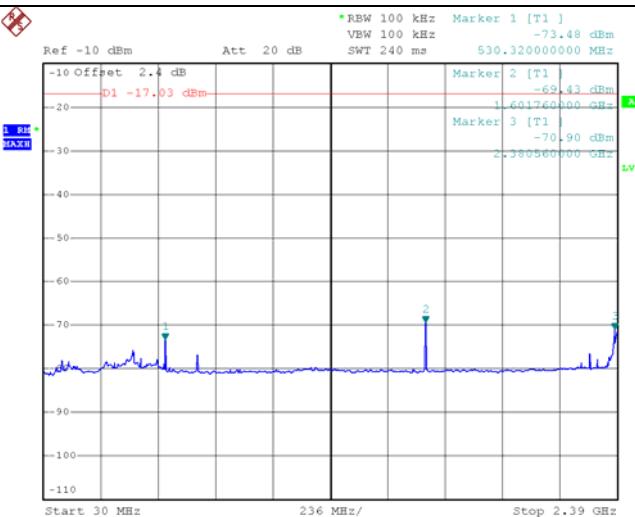
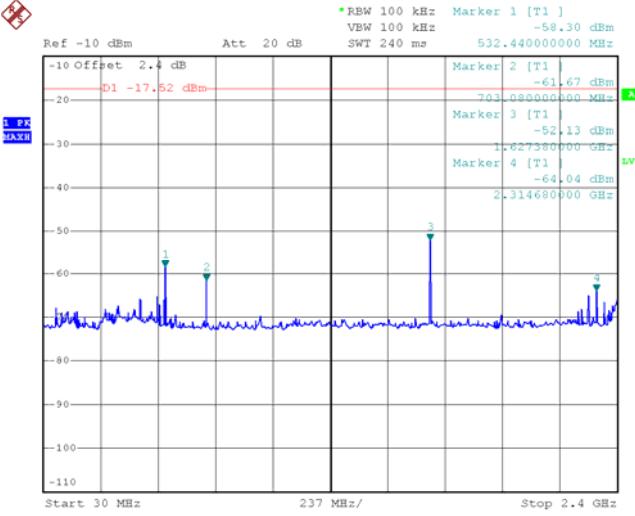
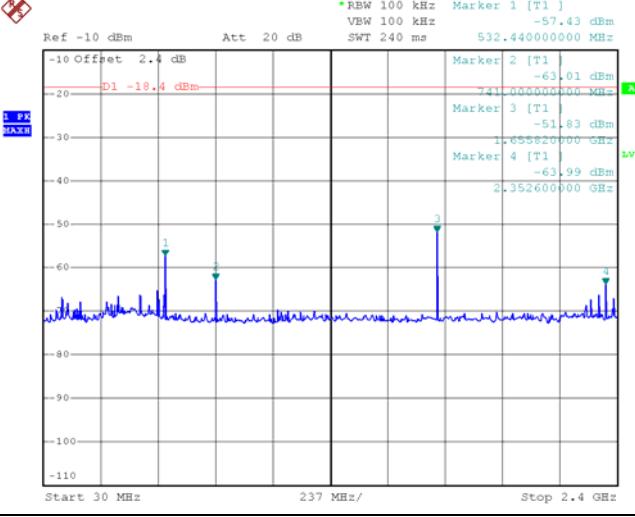
7.4.4.2 100 kHz Bandwidth of Frequency Band Edges

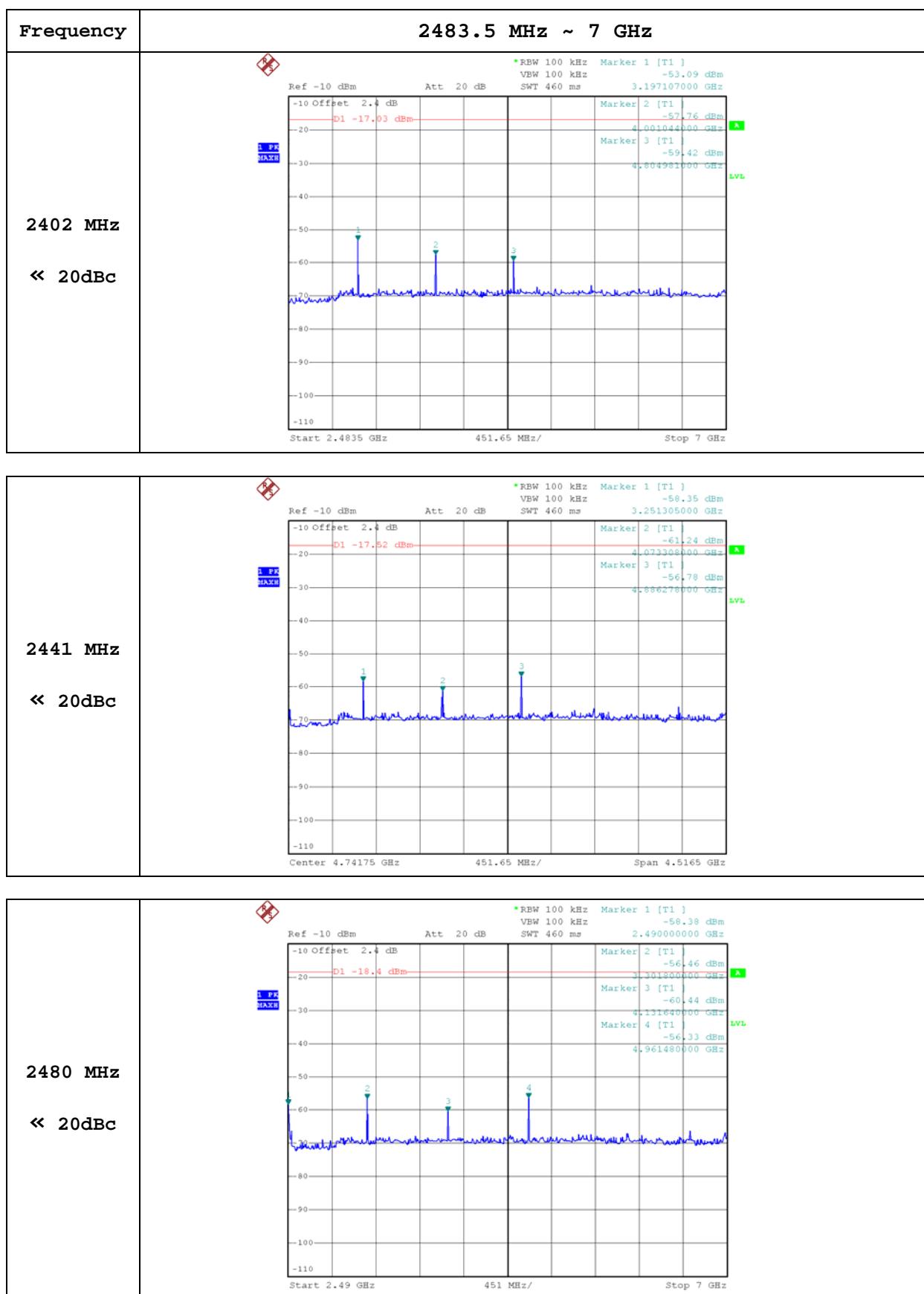
The test was performed to make a direct field strength measurement at the bandedge frequencies.

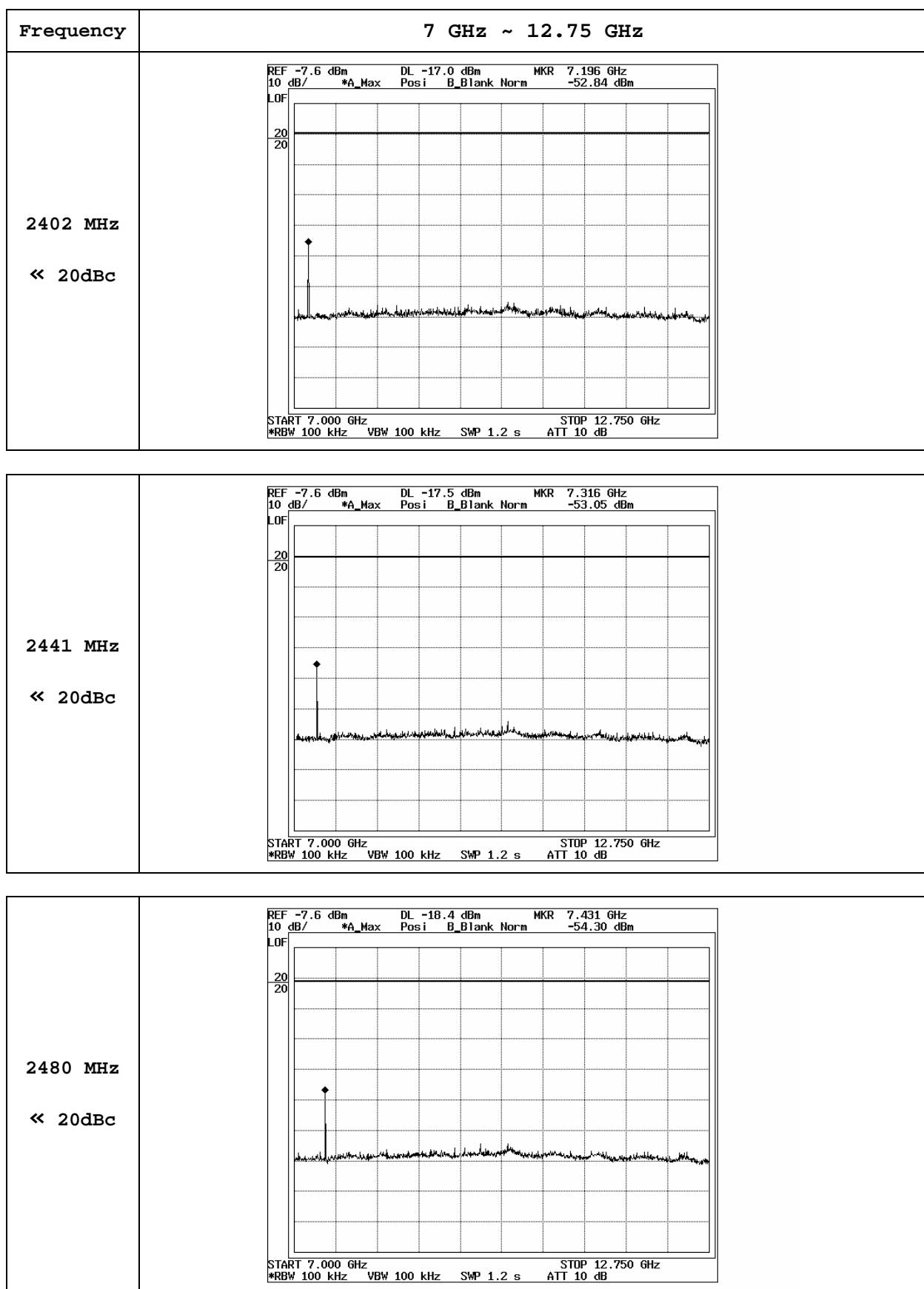
Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209. There is a restricted band starting at 2483.5 MHz and another restricted band from 2310 - 2390 MHz.

All emissions below noise floor of 7 dBuV/m.

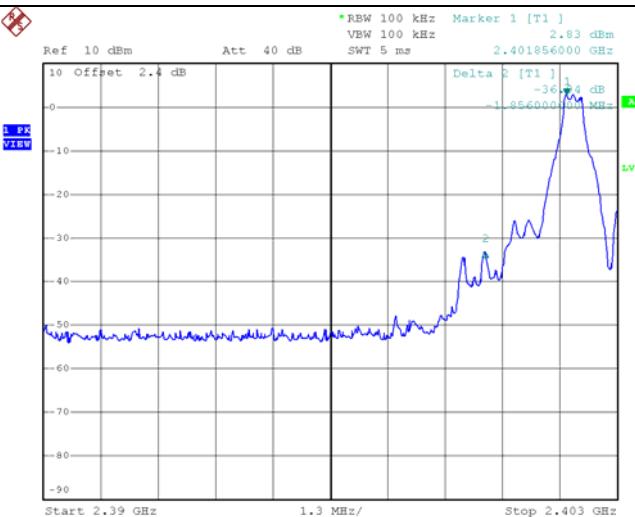
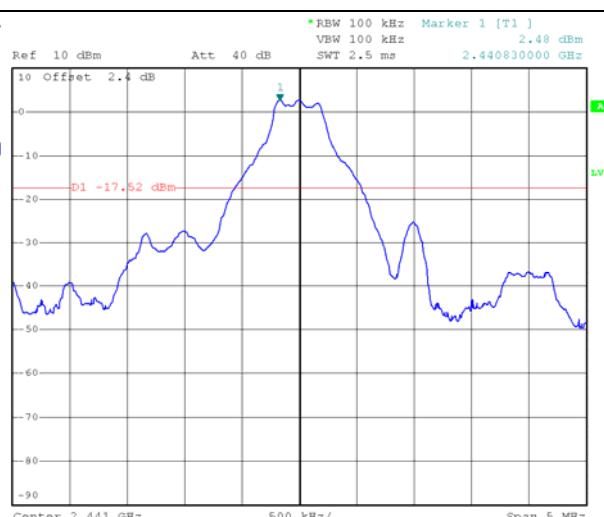
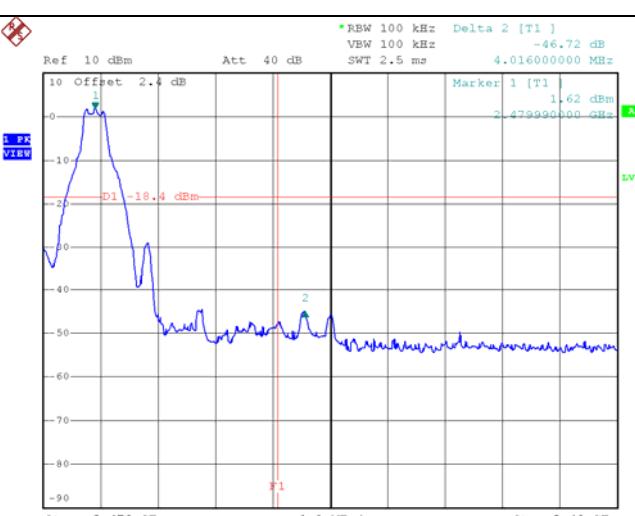
Plots of Conducted Emission

Frequency	30 MHz ~ 2400 MHz
2402 MHz « 20dBc	 <p>Ref -10 dBm Att 20 dB SWT 240 ms 530.320000000 MHz</p> <p>Marker 1 [T1] -73.48 dBm Marker 2 [T1] -69.43 dBm Marker 3 [T1] -70.90 dBm</p> <p>Start 30 MHz 236 MHz/ Stop 2.39 GHz</p>
2441 MHz « 20dBc	 <p>Ref -10 dBm Att 20 dB SWT 240 ms 532.440000000 MHz</p> <p>Marker 1 [T1] -58.30 dBm Marker 2 [T1] -61.67 dBm Marker 3 [T1] -52.13 dBm Marker 4 [T1] -64.04 dBm</p> <p>Start 30 MHz 237 MHz/ Stop 2.4 GHz</p>
2480 MHz « 20dBc	 <p>Ref -10 dBm Att 20 dB SWT 240 ms 532.440000000 MHz</p> <p>Marker 1 [T1] -57.43 dBm Marker 2 [T1] -63.01 dBm Marker 3 [T1] -51.83 dBm Marker 4 [T1] -63.99 dBm</p> <p>Start 30 MHz 237 MHz/ Stop 2.4 GHz</p>





Plots of 100 kHz Bandwidth of Frequency Band Edges

Frequency	30 MHz ~ 2400 MHz
2402 MHz « 20dBc	 <p>RBW 100 kHz Marker 1 [T1] VBW 100 kHz 2.83 dBm SWT 5 ms 2.401856000 GHz Ref 10 dBm Att 40 dB Offset 2.4 dB Delta 2 [T1] -36.4 dB -1.856000 dBm</p>
2441 MHz N/A	 <p>RBW 100 kHz Marker 1 [T1] VBW 100 kHz 2.48 dBm SWT 2.5 ms 2.440830000 GHz Ref 10 dBm Att 40 dB Offset 2.4 dB D1 -17.52 dBm</p>
2480 MHz « 20dBc	 <p>RBW 100 kHz Delta 2 [T1] VBW 100 kHz -46.72 dB SWT 2.5 ms 4.016000000 GHz Ref 10 dBm Att 40 dB Offset 2.4 dB Marker 1 [T1] 1.62 dBm 2.479990000 GHz D1 -18.4 dBm</p>

7.4.5 Radiated Emission

EUT : UREN V1
 Test Standard : FCC Part15 Subpart C Section 15.247(c)
 Test Date : June 8, 2007
 Operating Condition : Bluetooth
 The EUT was operated at transmitting condition continuously during the test.
 Environment Condition : 25 °C/ 41 %
 Result : Passed

Radiated Emission Test Data(below 1 GHz)

Frequency [MHz]	Reading [dB μ V]	Polarization [*H/**V]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dB μ V/m]	Emission Level [dB μ V/m]	Margin [dB]
60.01	22.28	H	12.27	1.75	40.00	36.30	3.70
60.86	21.57	H	12.31	1.42	40.00	35.30	4.70
73.02	21.80	V	9.92	1.88	40.00	33.60	6.40
80.59	16.93	H	8.40	1.97	40.00	27.30	12.70
85.19	26.64	H	8.64	2.02	40.00	37.30	2.70
109.54	24.62	H	10.69	2.30	43.50	37.60	5.90
121.71	22.86	V	11.73	2.41	43.50	37.00	6.50
798.03	8.66	H	22.62	6.72	46.00	38.00	8.00

Radiated Emission Test Data (above 1 GHz)

Frequency [MHz]	Reading [dB μ V]	Pre-Amp Gain [dB]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dB μ V/m]	Emission Level [dB μ V/m]	Margin [dB]
Low Channel (2402 MHz)							
3202.67	27.75	30.00	28.50	12.96	53.98	39.21	14.77
4003.33	21.57	30.00	29.53	13.06	53.98	34.16	19.82
7206.00	9.15	30.00	35.90	25.55	53.98	40.05	13.93
Middle Channel (2441 MHz)							
3254.67	24.30	30.00	28.20	13.01	53.98	35.51	18.47
4882.00	18.56	30.00	31.30	16.97	53.98	36.83	17.15
7323.00	8.09	30.00	36.08	25.71	53.98	39.88	14.10
High Channel (2480 MHz)							
3306.67	26.68	30.00	27.92	13.02	53.98	37.62	16.36
4960.00	18.98	30.00	31.44	17.03	53.98	37.45	16.53
7440.00	7.26	30.00	36.20	25.89	53.98	39.35	14.63

The other emissions below noise floor.

NOTES :

1. All modes of operation were investigated and the worst-case emissions are reported.
2. AF = Antenna Factor CL = Cable Loss F/S = Field Strength
3. POL H = Horizontal POL V = Vertical

7.4.6 Minimum Hopping Channels

Test Standard : FCC Part15 Subpart C Section 15.247(a)(1)

Operating Condition : The EUT was operated at transmitting condition continuously during the test.

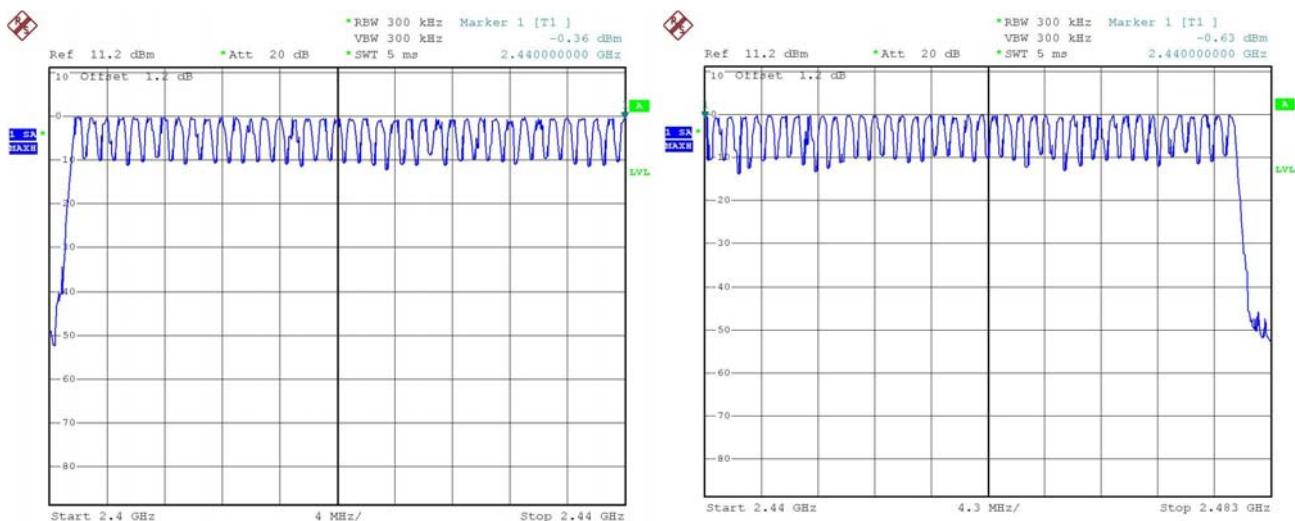
Temperature/Humidity : 22.0 °C/ 41 %

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.



AAA
Date: 26.JUN.2007 16:07:11

AAA
Date: 26.JUN.2007 16:05:51

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	Receiver	FSPI	ROHDE & SCHWARZ	100012	02/23/07
2	Receiver	8594E	HP	3911A08040	11/15/06
3	Spectrum analyzer	FSP7	ROHDE & SCHWARZ	100001	11/15/06
4	Spectrum analyzer	R3273	ADVANTEST	150100195	12/18/06
5	Shield Room (7m x 4m x 3m)	N/A	SJEMC	0004	N/A
6	Turn Table	OSC-30	N/A	BWS-01	N/A
7	ANTENNA MAST	JAC-3	DAIL EMC	N/A	N/A
8	Bilog Antenna	VULB9161	SCHWARZBECK	VULB9161-4067	11/14/06
9	Bilog Antenna	VULB9161	SCHWARZBECK	VULB9161-4068	11/14/06
10	HORN ANTENNA	BBHA 9120 D	SCHWARZBECK	BBHA 9120 D 234	02/07/07
11	HORN ANTENNA	BBHA 9170	SCHWARZBECK	BBHA9170157	02/07/07
12	POWER METER	E4418A	HP	GB38272621	02/22/07
13	POWER SENSOR	E9301B	HP	US40010238	12/15/06
14	Power supply	IPS-30B03DD	INTERACT	42052	03/10/07