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, Kyounggi-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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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 : 82-031-605-2010Fax : 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 : 82-031-605-2010Fax : 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 Transmiter 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	:	URENV1
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 ℃, 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

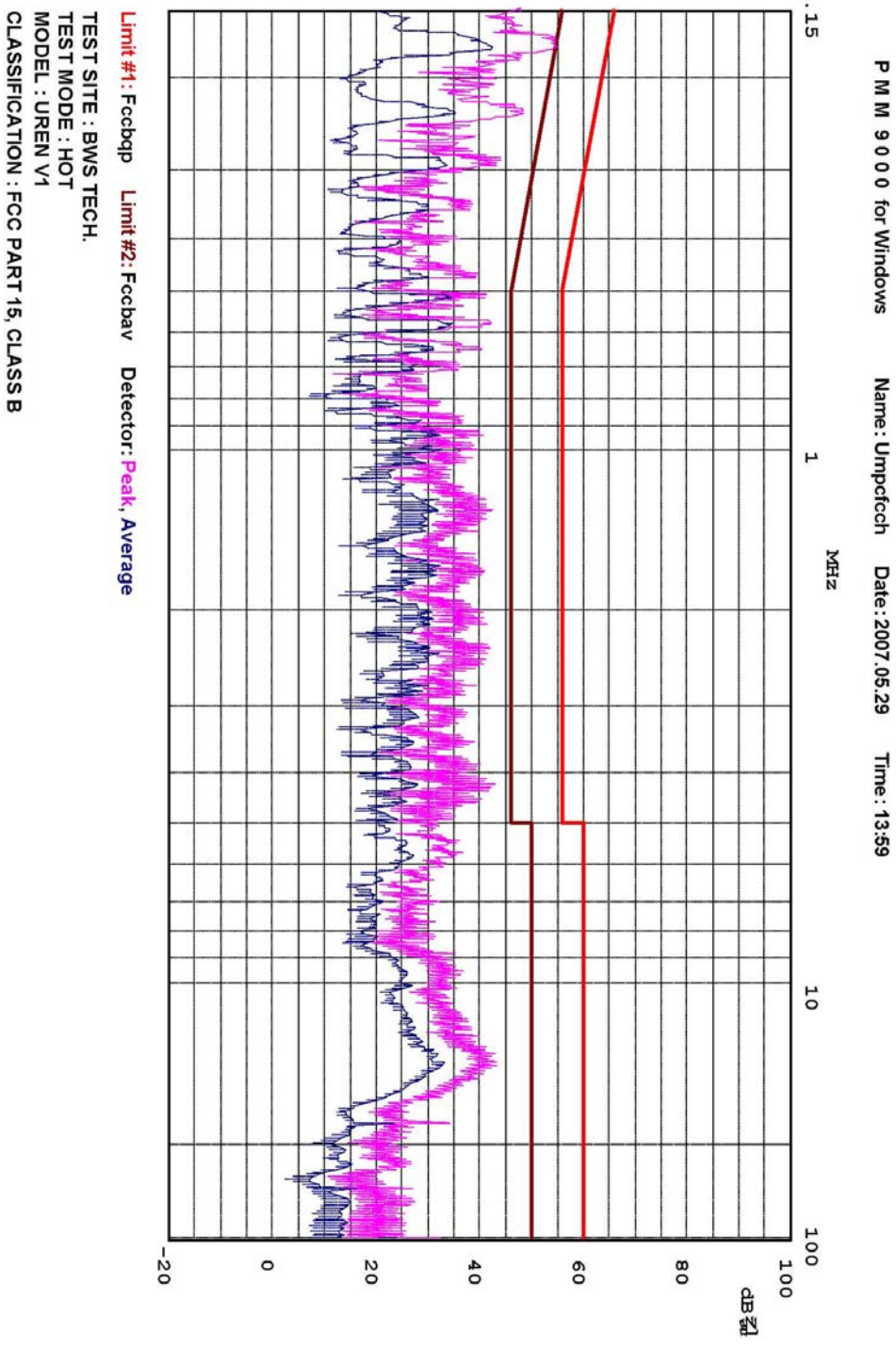
Detector Mode ; CISPR Quasi Peak mode / Average mode (6dB Bandwidth : 9kHz).

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	56.00	44.10	44.47	11.53	46.00			
1.284	0.04	0.44	H		42.50	42.98	13.02				
2.642	0.03	0.58	N		42.50	43.11	12.89				
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	60.00	37.00	37.92	22.08	50.00			
12.73	0.05	1.16	N		41.30	42.51	17.49				
14.13	0.07	1.22	H		43.30	44.59	15.41				

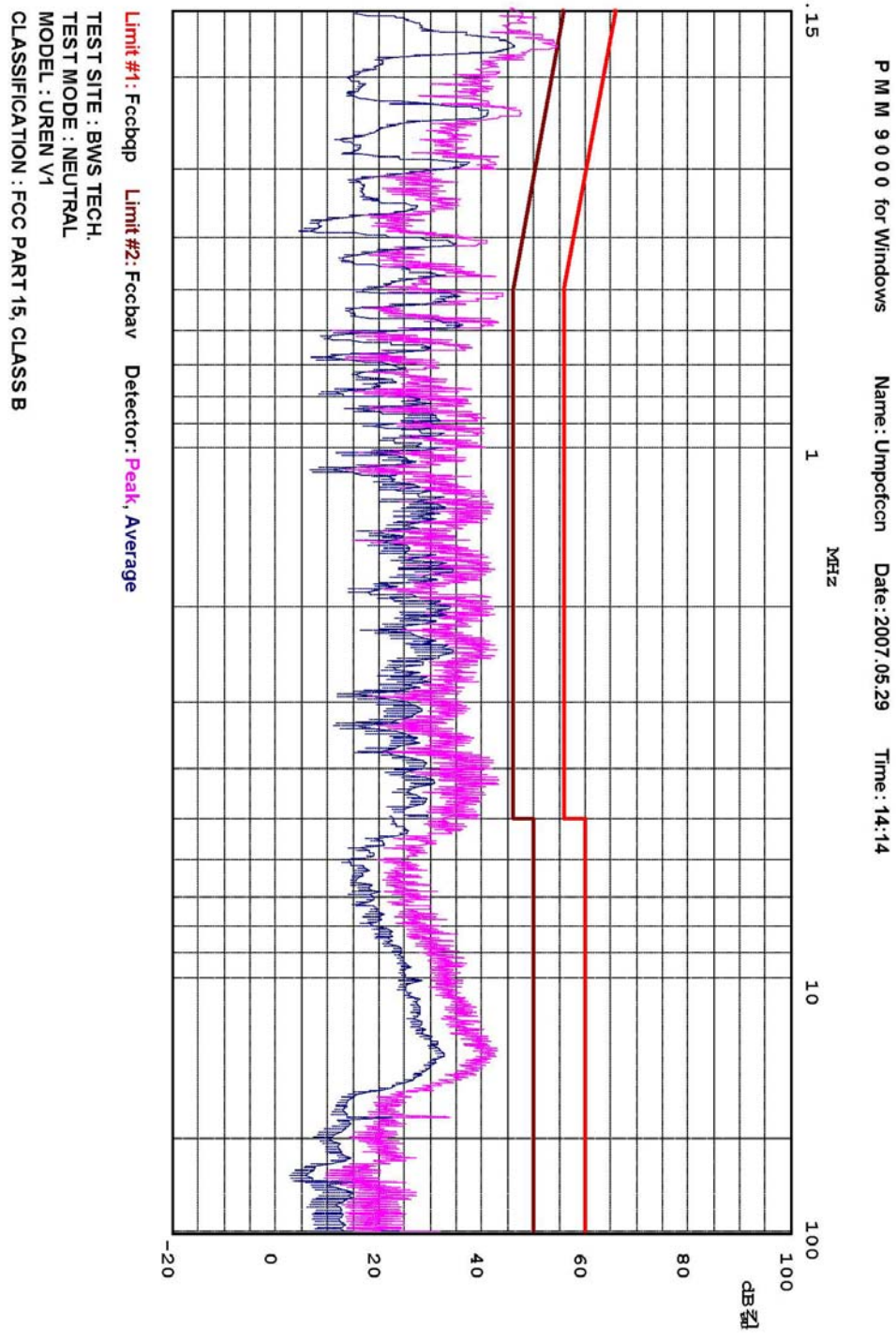
NOTES :

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



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
Operating Condition	:	FM TX (Bluetooth and WLAN are not operation) Test in transmitting mode: 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:
1. *H : Horizontal polarization, **V : Vertical polarization
2. Emission Level = Reading + Antenna Factor + Cable Loss
3. Margin Value = Limit – Emission Level
4. Measurement were performed at each channel operating frequency.
5. 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
Operating Condition	:	FM TX (Bluetooth and WLAN are not operation) Test in transmitting mode: 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:
1. *H : Horizontal polarization, **V : Vertical polarization
2. Emission Level = Reading + Antenna Factor + Cable Loss
3. Margin Value = Limit – Emission Level
4. All other emission not reported were more than 25dB below the permitted limit.
5. The EUT was tested in all the three orthogonal planes and the worst case emissions was vertical axes.

7.2.3 Emission Bandwidth

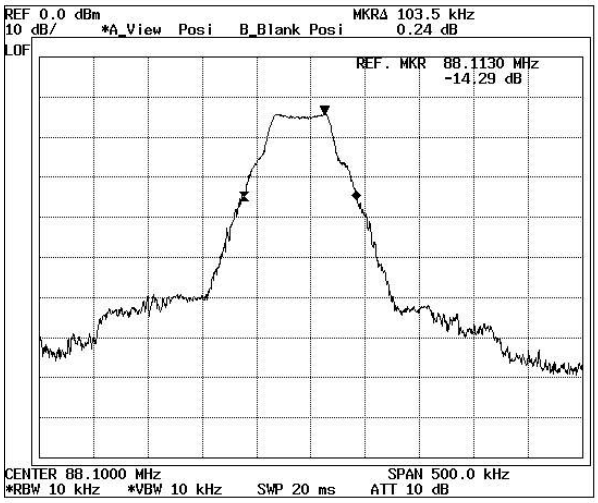
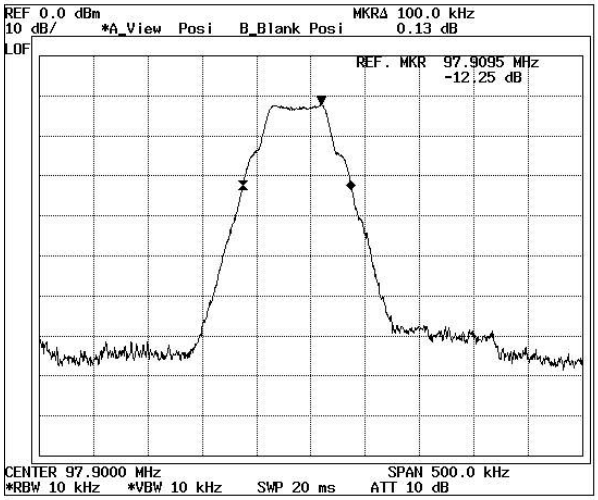
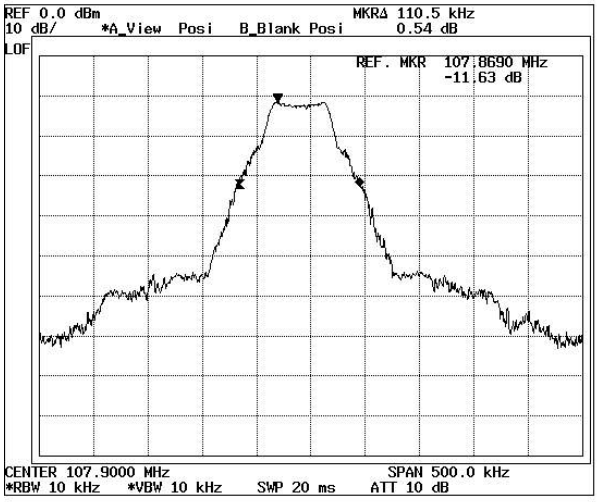
EUT	:	UREN V1
Test Standard	:	FCC Part15 Subpart C Section 15.239(a) / 15.209
Test Date	:	May 29, 2007
Operating Condition	:	FM TX (Bluetooth and WLAN are not operation) Test in transmitting mode: 3. For lowest channel : 88.1MHz 4. For lowest channel : 97.9MHz 3. For lowest channel : 107.9MHz
Environment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

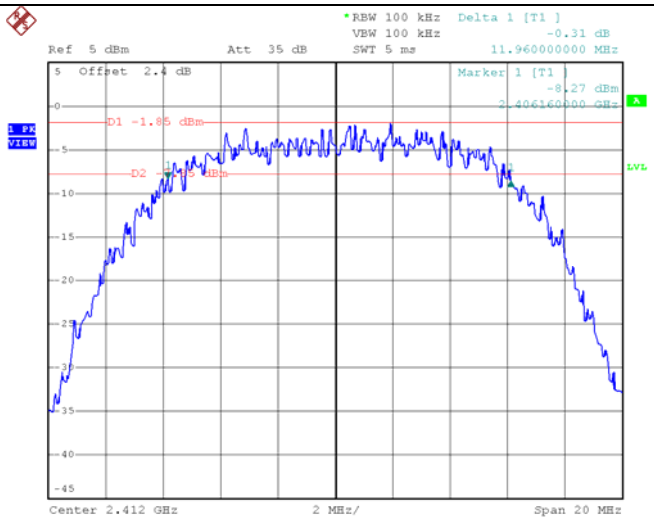
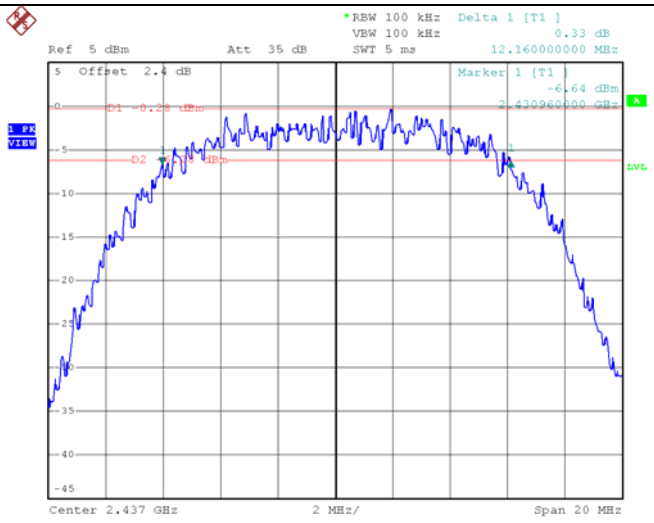
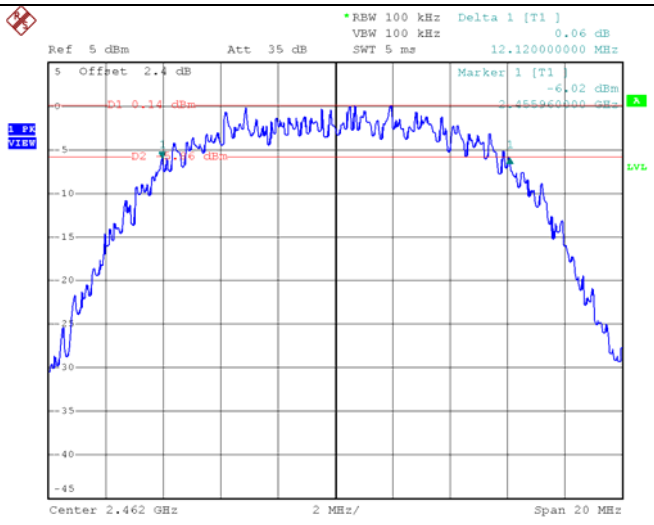
EUT	:	UREN V1
Test Standard	:	FCC Part15 Subpart C Section 15.247(a)(2)
Test Date	:	June 6, 2007
Operating Condition	:	Wireless LAN. The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

6 dB Bandwidth Test Data

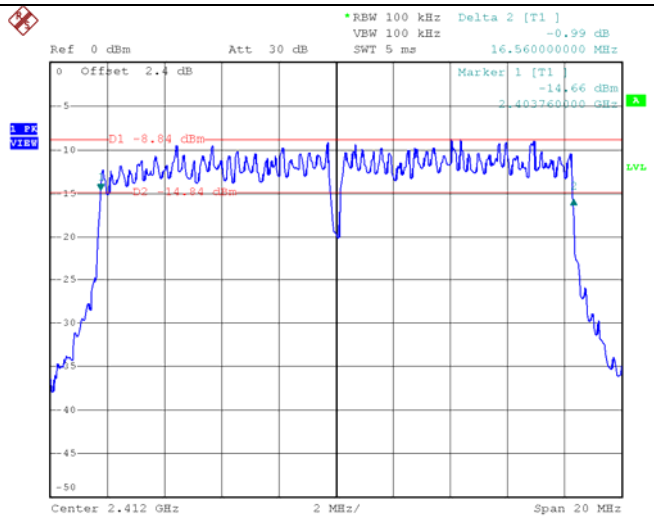
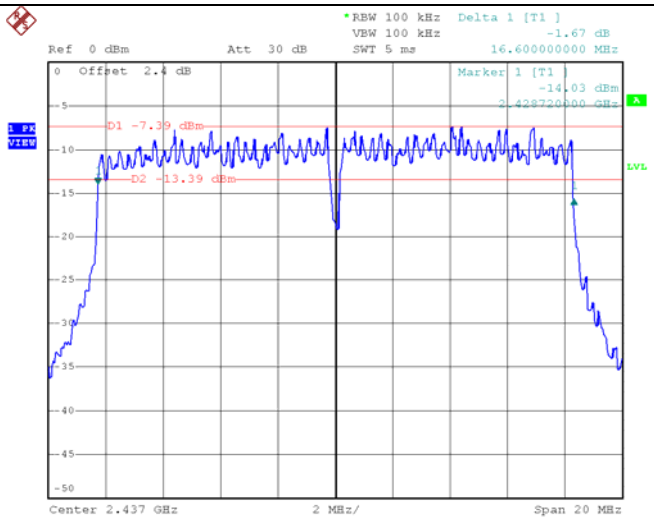
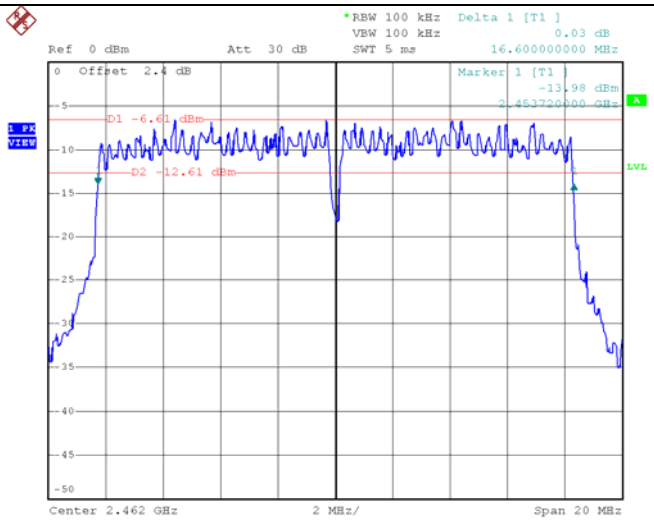
Mode	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit
802.11b	2412	11.96	More than 500 kHz
	2437	12.16	
	2462	12.12	
802.11g	2412	16.56	
	2437	16.60	
	2462	16.60	

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	
2437 MHz 16.60 MHz	
2462 MHz 16.60 MHz	

7.3.2 Maximum Peak Output Power

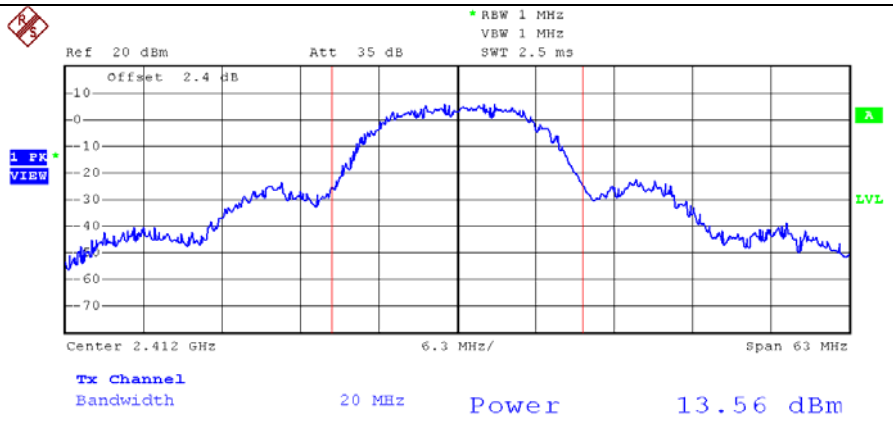
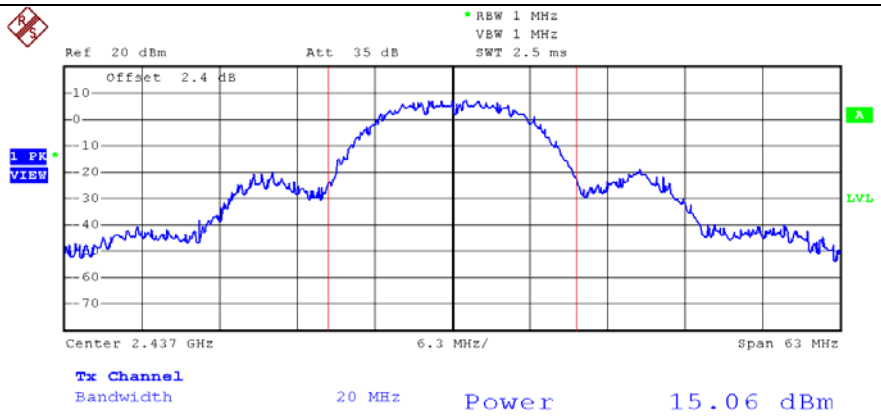
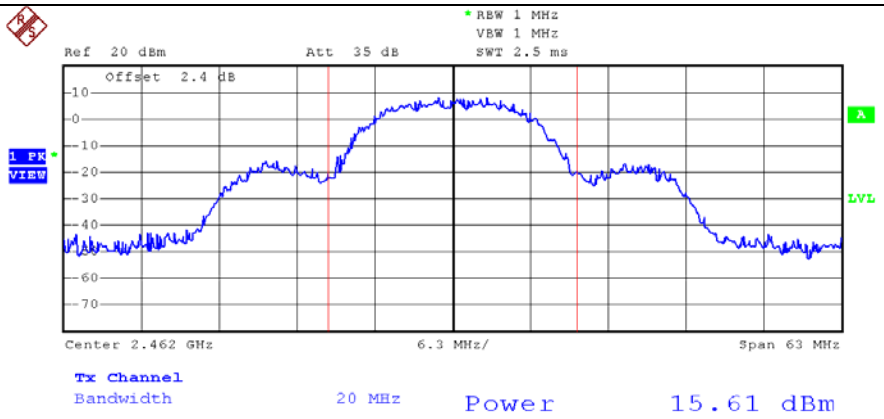
EUT	:	UREN V1
Test Standard	:	FCC Part15 Subpart C Section 15.247(b)(3)
Test Date	:	June 6, 2007
Operating Condition	:	Wireless LAN. The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

Maximum Peak Output Power Test Data

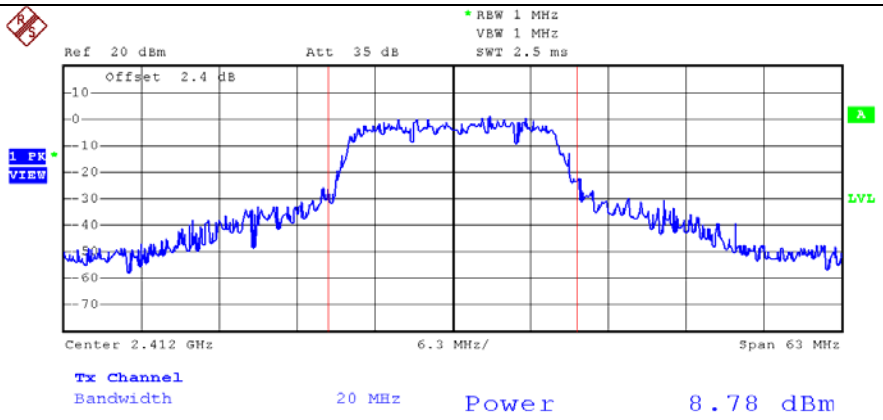
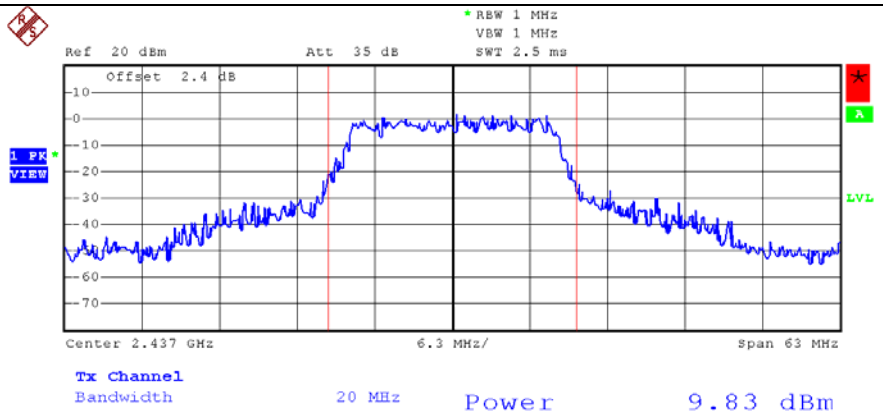
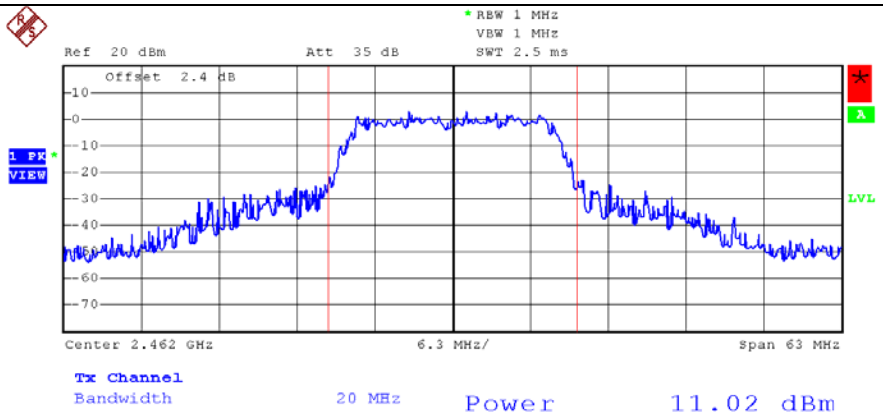
Mode	Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
802.11b	2412	13.56	30 dBm
	2437	15.06	
	2462	15.61	
802.11g	2412	8.78	
	2437	9.83	
	2462	11.02	

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	
2437 MHz 15.06 dBm	
2462 MHz 15.61 dBm	

Plots of Maximum Peak Output Power (802.11g)

Frequency	Maximum Peak Output Power measured conducted of 802.11g
2412 MHz 8.78 dBm	
2437 MHz 9.83 dBm	
2462 MHz 11.02 dBm	

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. 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

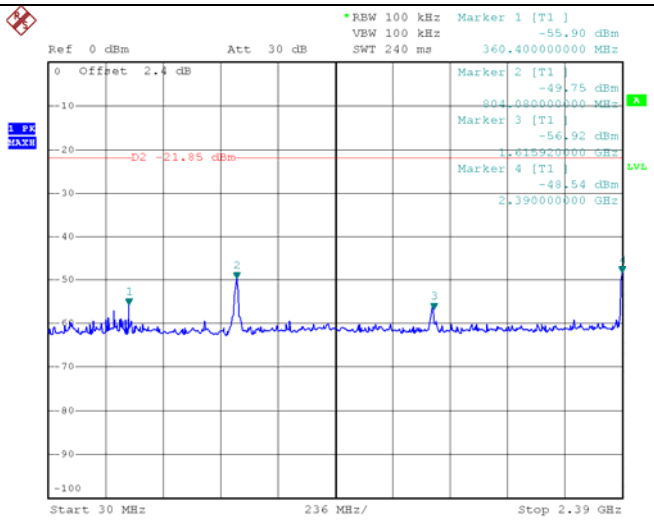
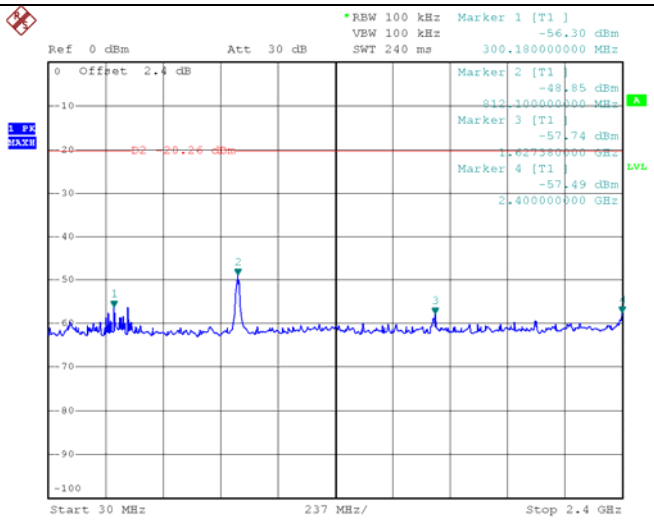
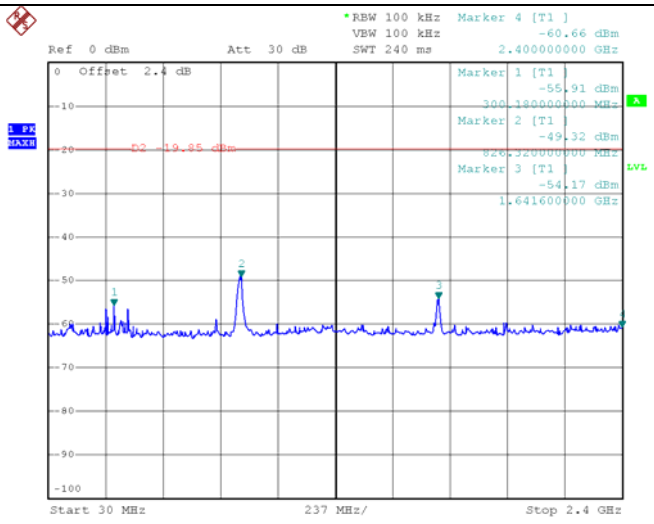
Result : Please refer to the attached Plots for details :

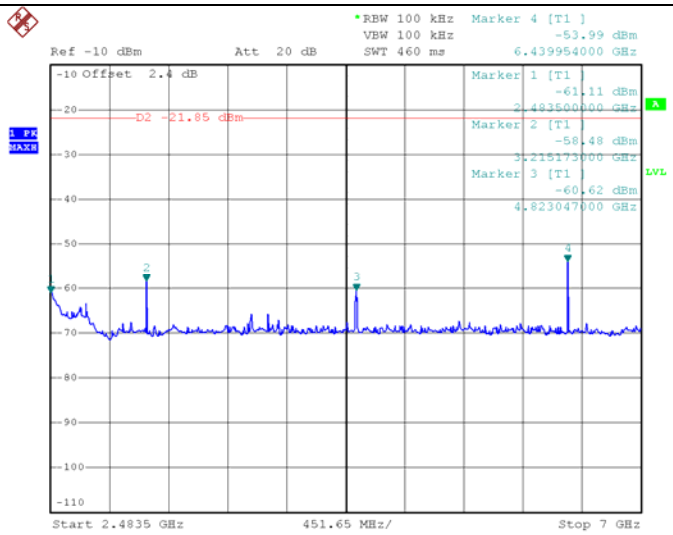
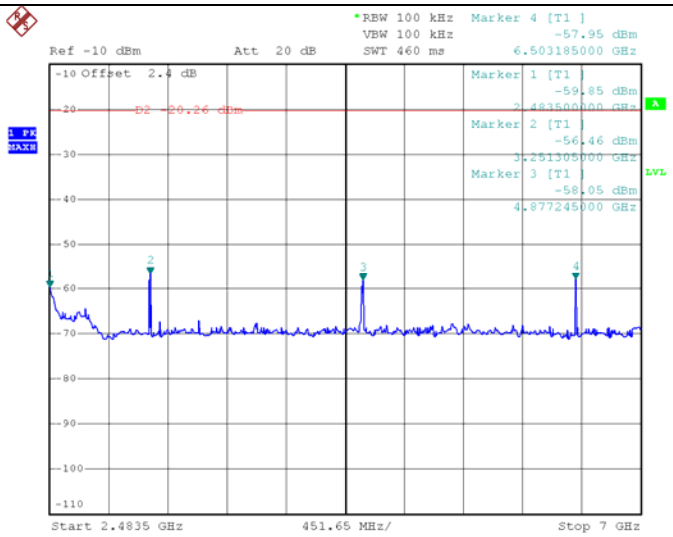
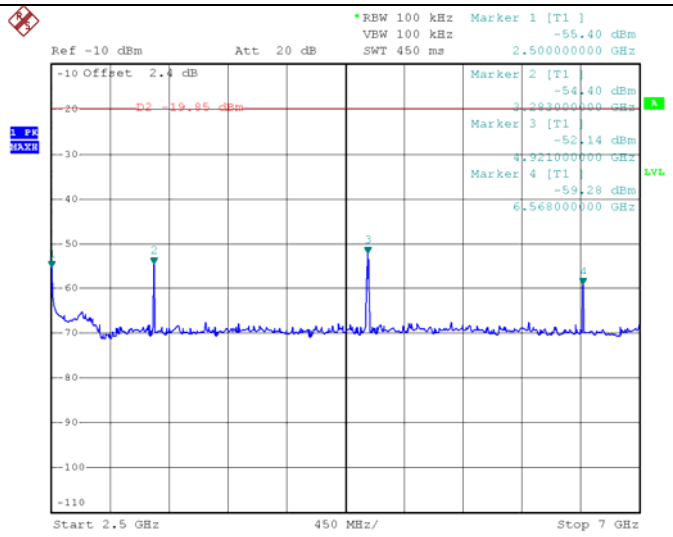
7.3.3.2 100 kHz Bandwidth of Frequency Band Edges

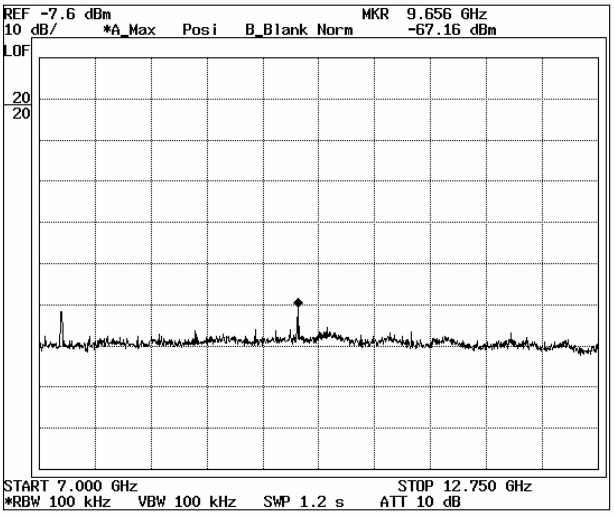
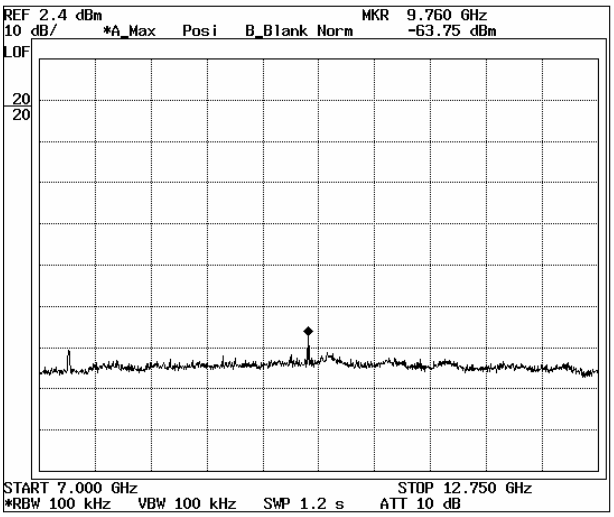
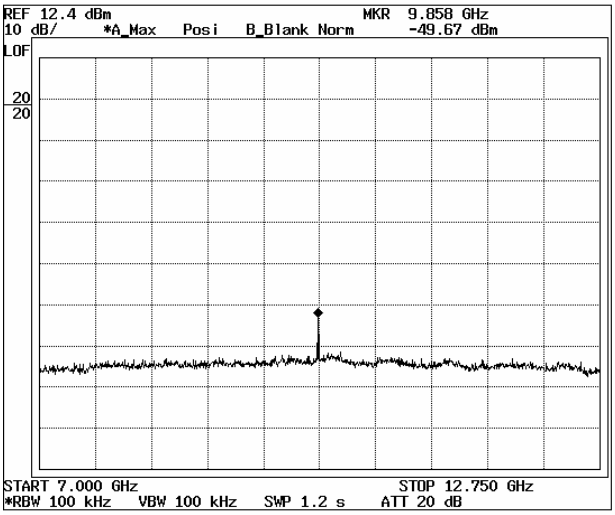
The test was performed to make a direct field strength measurement at the bandedge frequencies.
Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209. There is a restricted band starting at 2483.5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

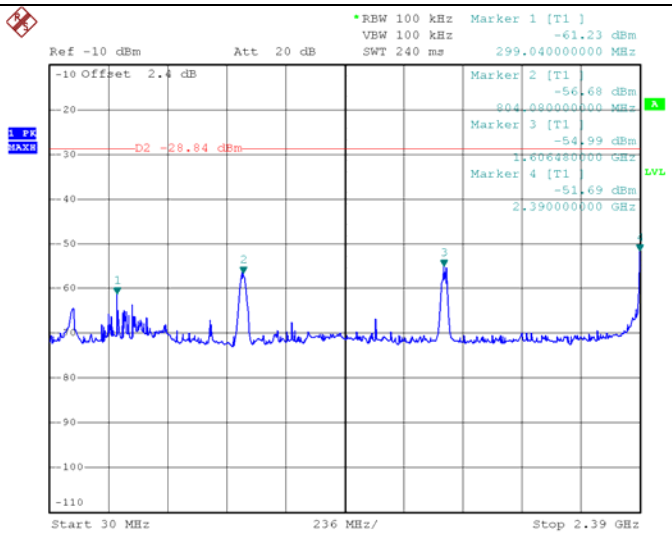
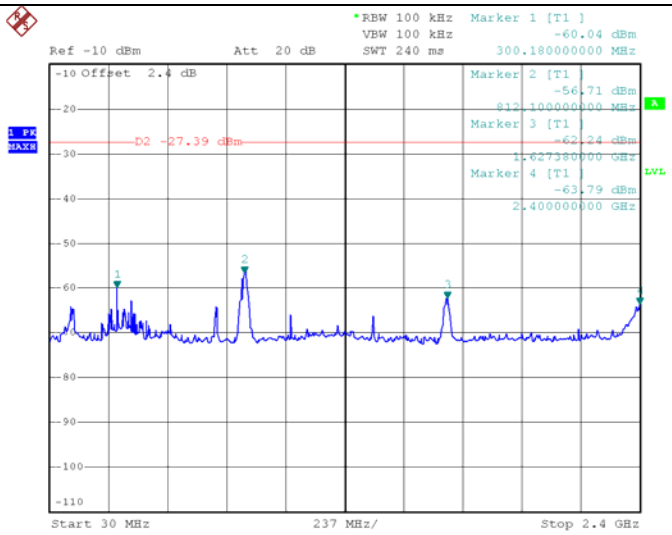
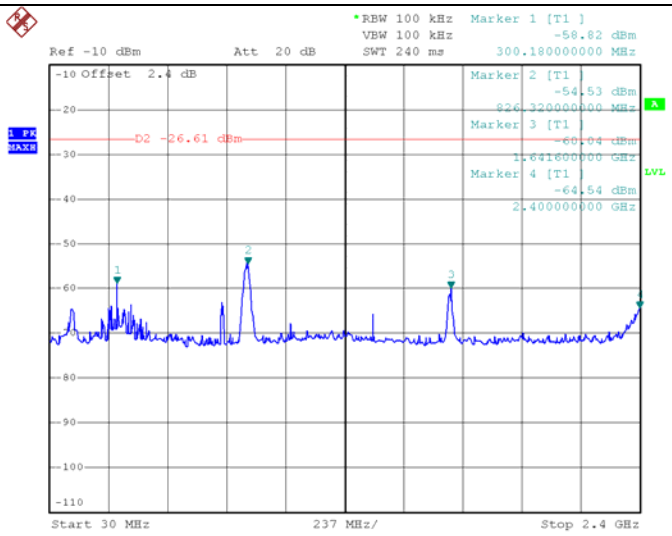
All emissions below noise floor of 7 dBuV/m.

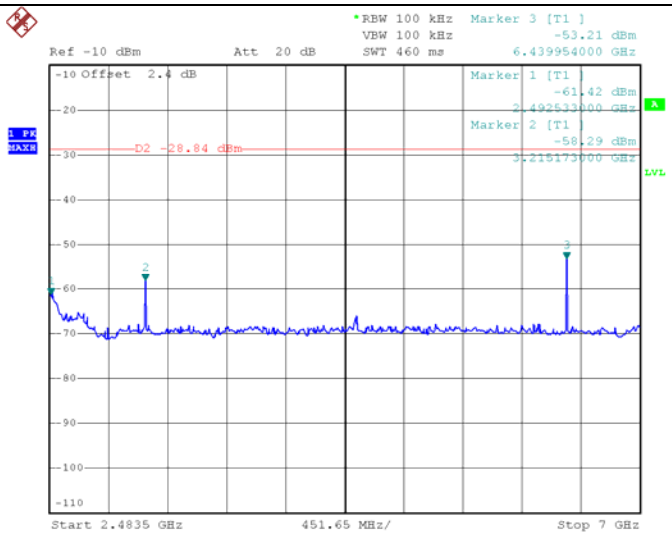
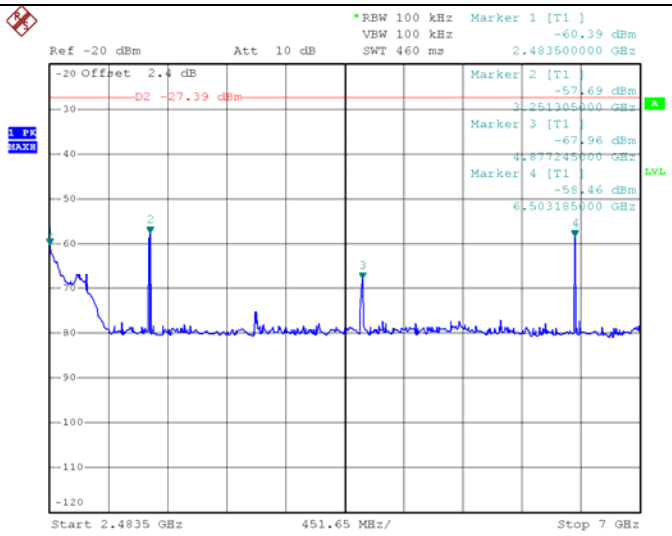
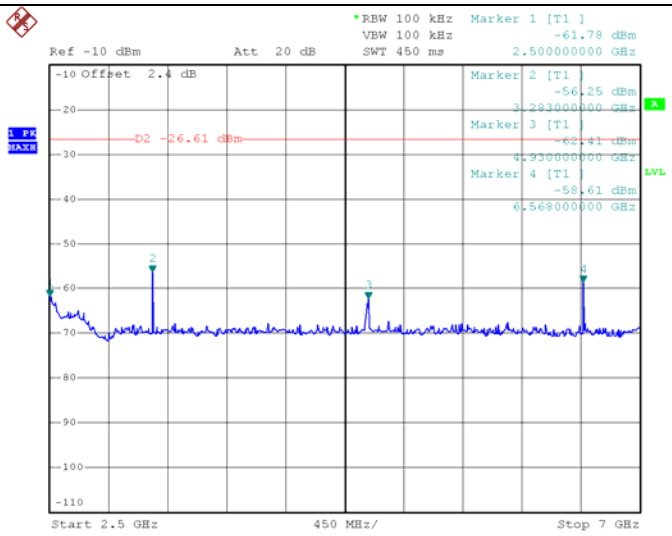
Plots of Conducted Emission

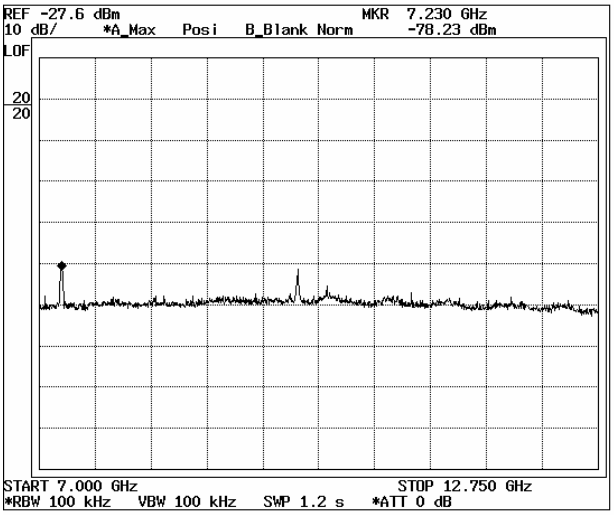
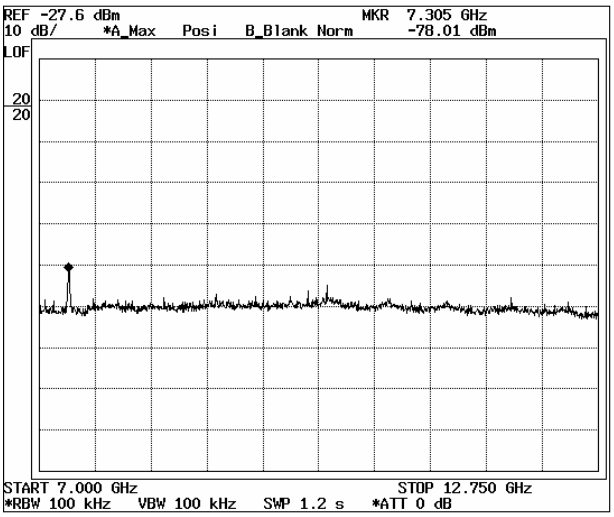
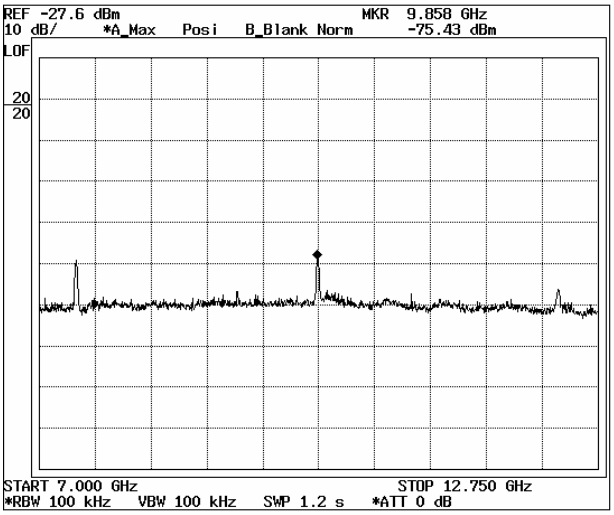
Frequency	30 MHz ~ 2400 MHz (802.11b)
2412 MHz « 20dBc	
2437 MHz « 20dBc	
2462 MHz « 20dBc	

Frequency	2483.5 MHz ~ 7 GHz(802.11b)
2412 MHz « 20dBc	
2437 MHz « 20dBc	
2462 MHz « 20dBc	

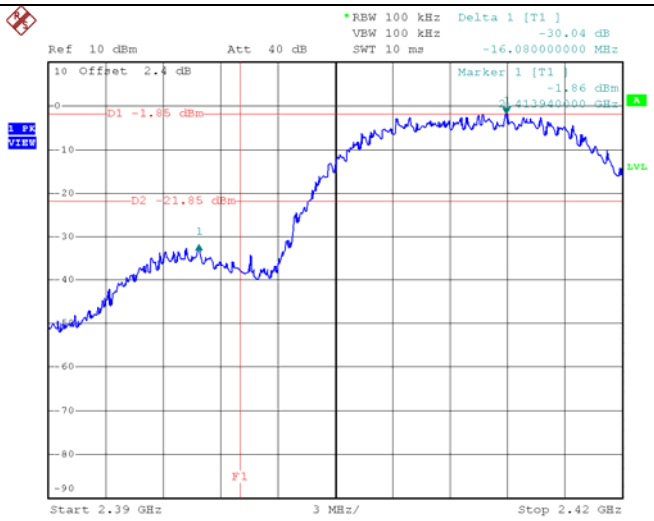
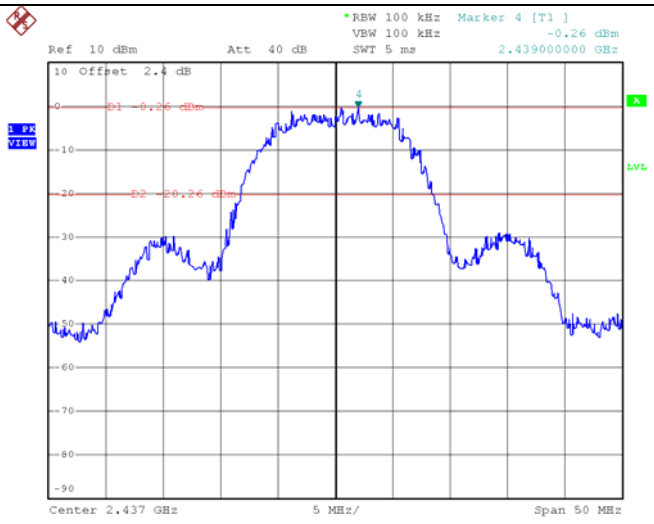
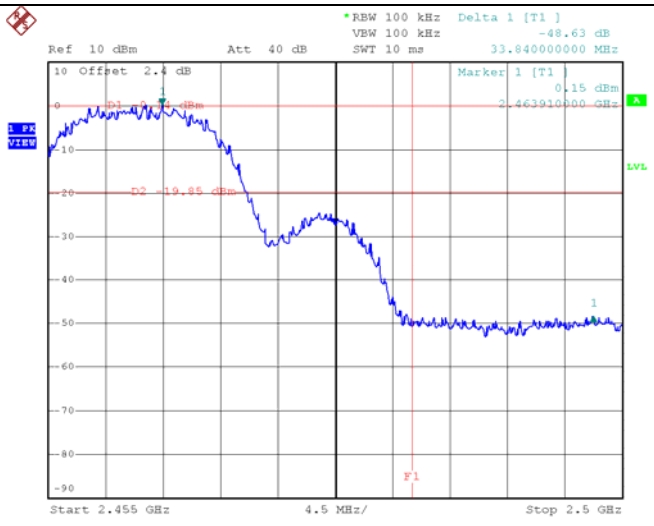
Frequency	7 GHz ~ 12.75 GHz(802.11b)
2412 MHz « 20dBc	
2437 MHz « 20dBc	
2462 MHz « 20dBc	

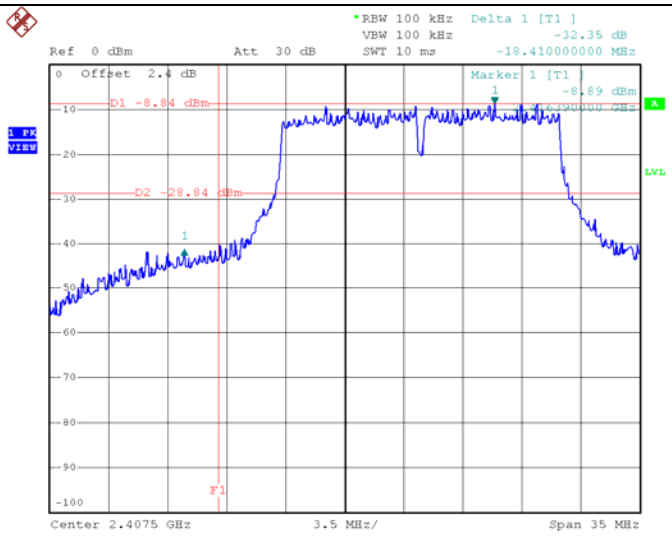
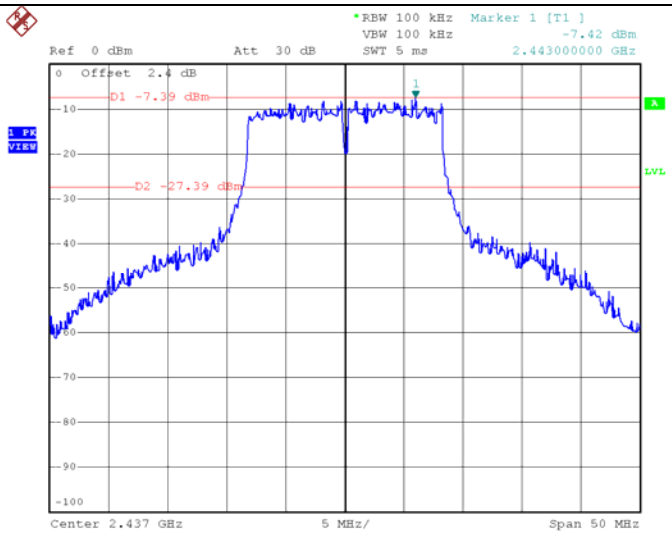
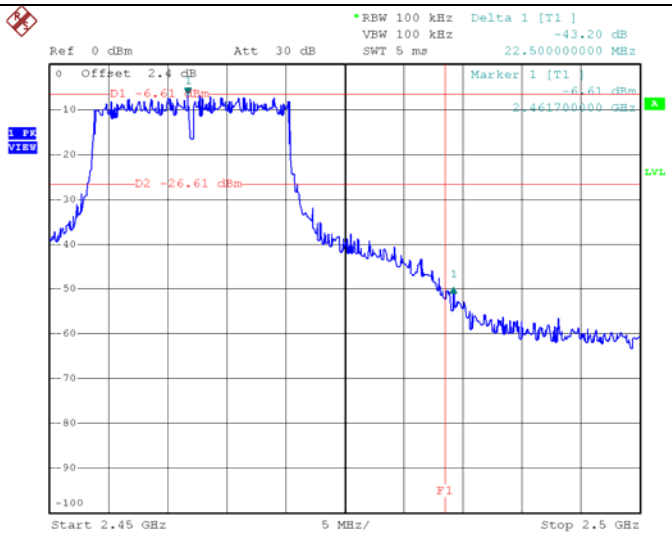
Frequency	30 MHz ~ 2400 MHz (802.11g)
2412 MHz « 20dBc	
2437 MHz « 20dBc	
2462 MHz « 20dBc	

Frequency	2483.5 MHz ~ 7 GHz(802.11g)
2412 MHz « 20dBc	
2437 MHz « 20dBc	
2462 MHz « 20dBc	

Frequency	7 GHz ~ 12.75 GHz(802.11g)
2412 MHz « 20dBc	
2437 MHz « 20dBc	
2462 MHz « 20dBc	

Plots of 100 kHz Bandwidth of Frequency Band Edges

Frequency	802.11b
2412 MHz « 20dBc	
2437 MHz N/A	
2462 MHz « 20dBc	

Frequency	802.11g
2412 MHz « 20dBc	
2437 MHz N/A	
2462 MHz « 20dBc	

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. 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 [dBμV]	Polarization [*H/**V]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dBμV/m]	Emission Level [dBμV/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 [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)							
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. The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	25 °C/ 41 %
Result	:	Passed

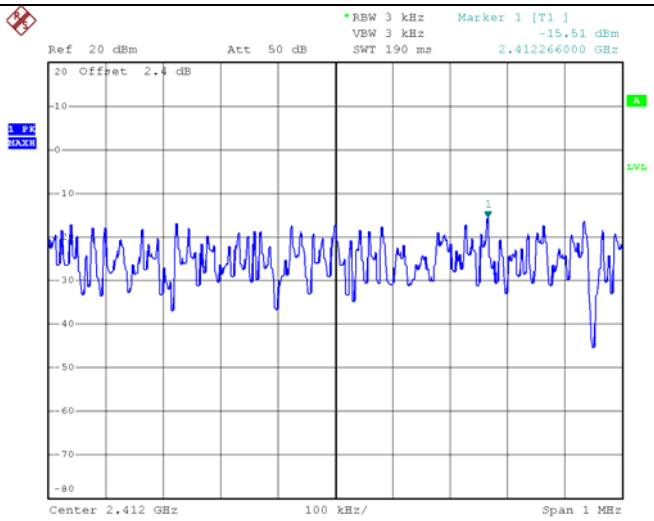
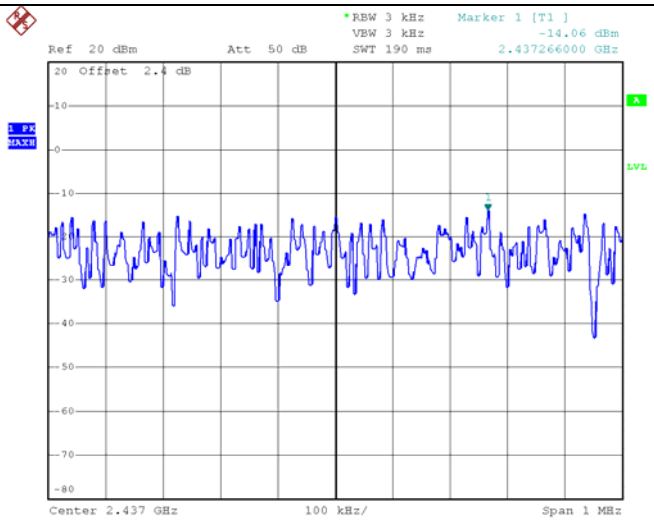
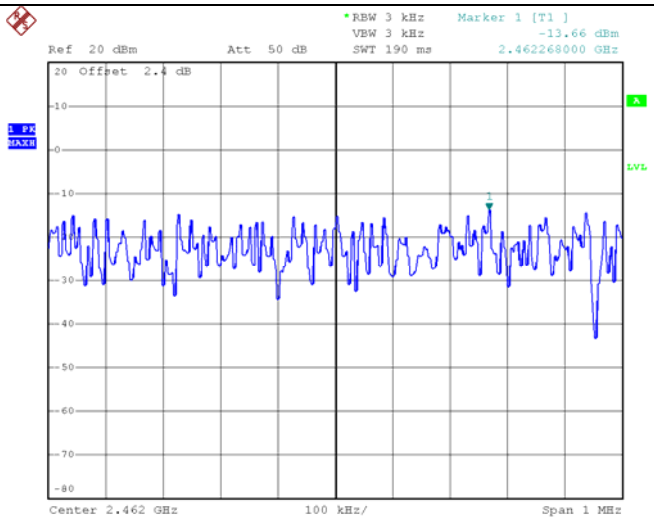
Power Spectral Density Test Data

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	
	2437	-21.01	
	2462	-20.80	

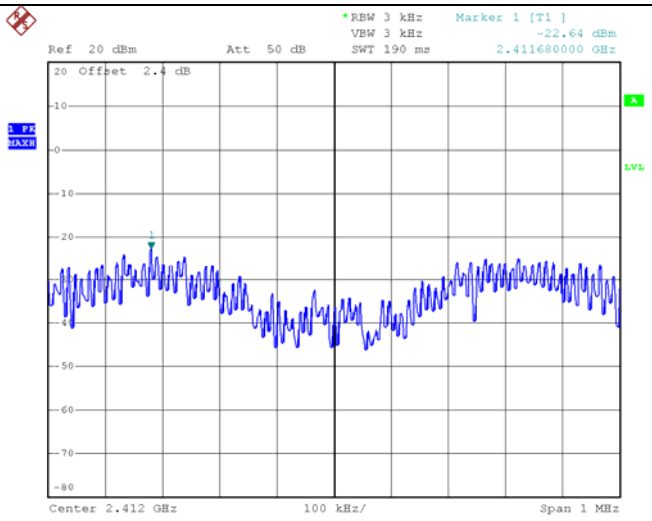
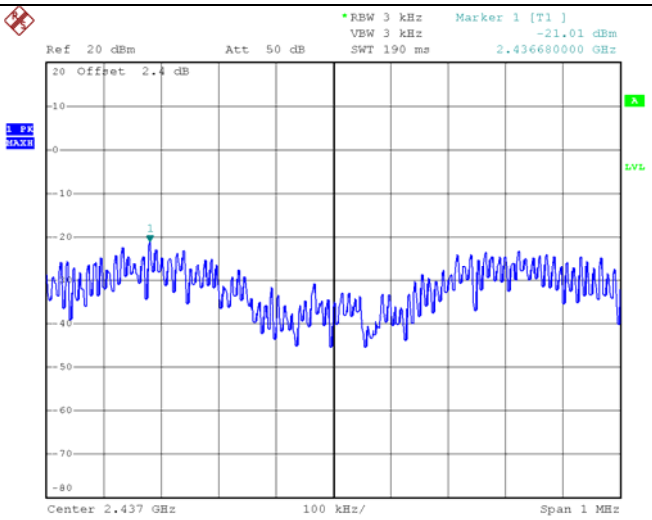
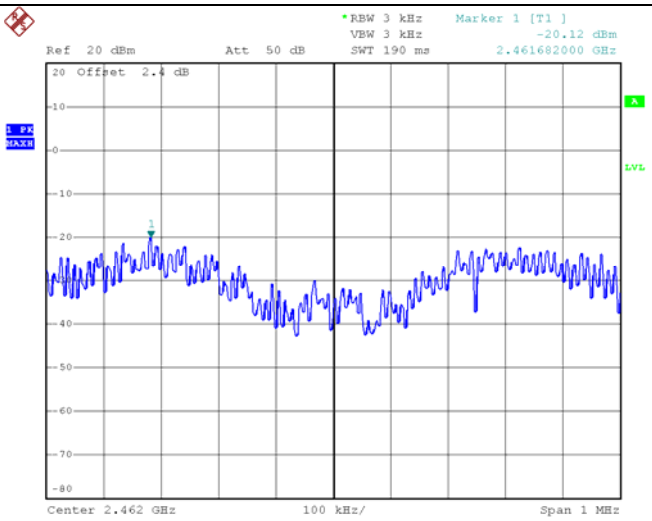
NOTES:

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	
2437 MHz -14.06 dBm	
2462 MHz -13.66 dBm	

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 The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

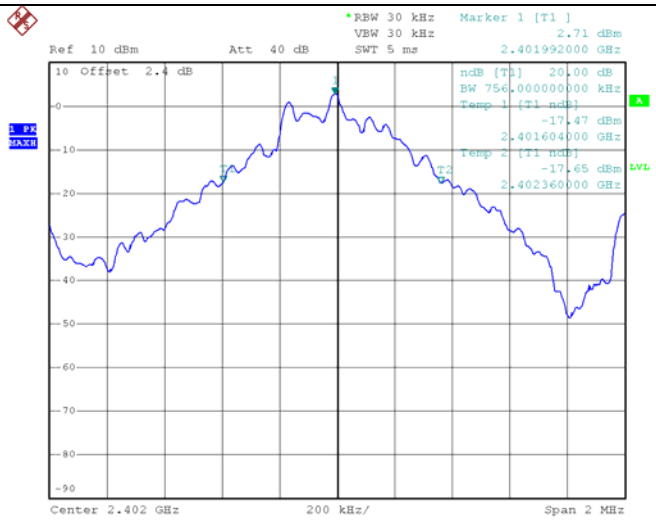
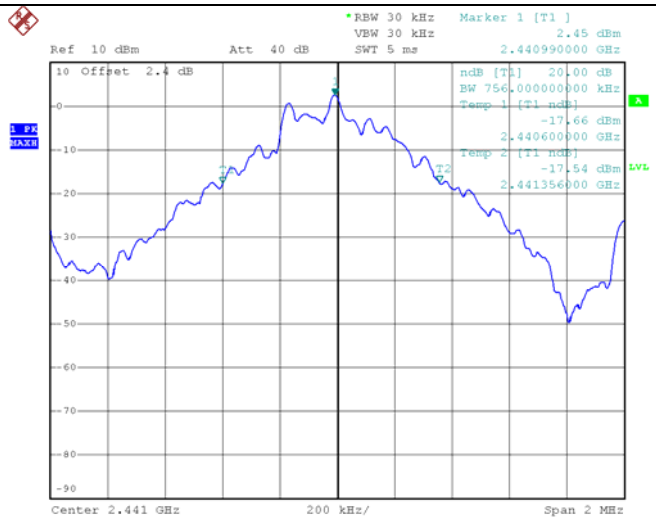
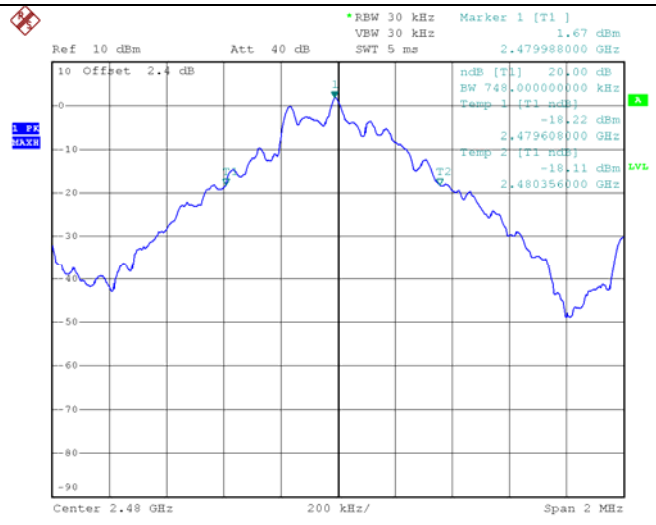
20 dB Bandwidth Test Data

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	
2441 MHz 756 kHz	
2480 MHz 748 kHz	

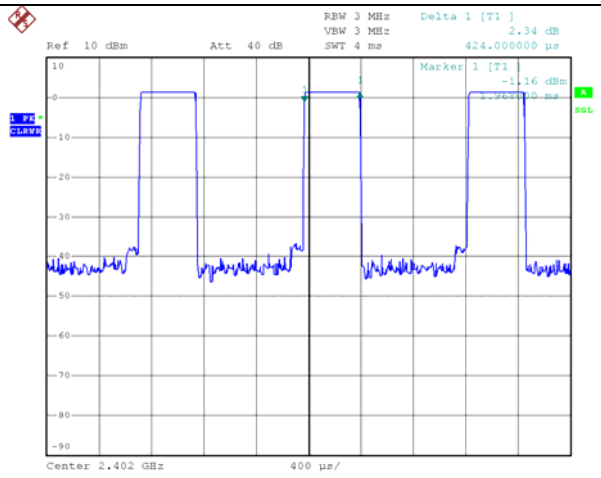
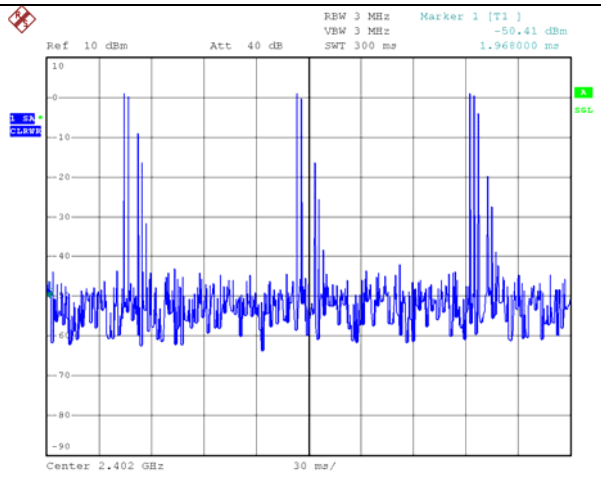
7.4.2 Average time of occupancy

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 ((800×0.42)×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 x 0.42 ms) x 31.6 s / 79 = 134.4 ms

Duration	
In 300 ms period	

7.4.3 Maximum Peak Output Power

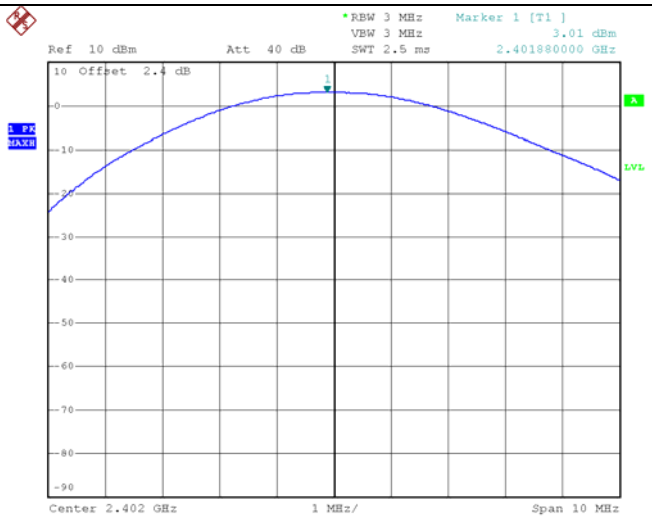
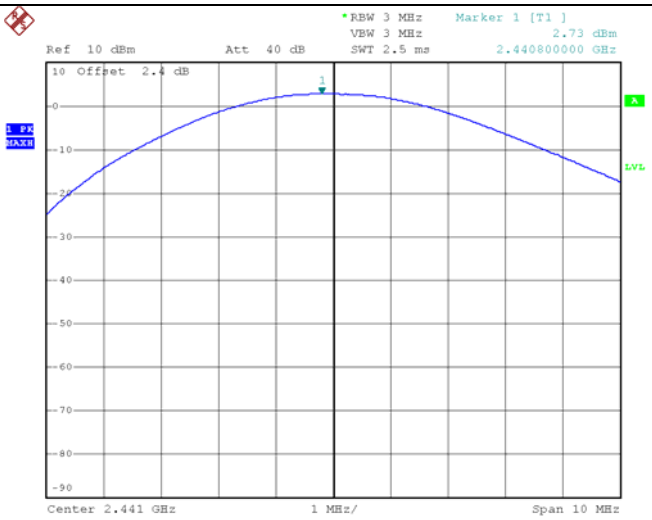
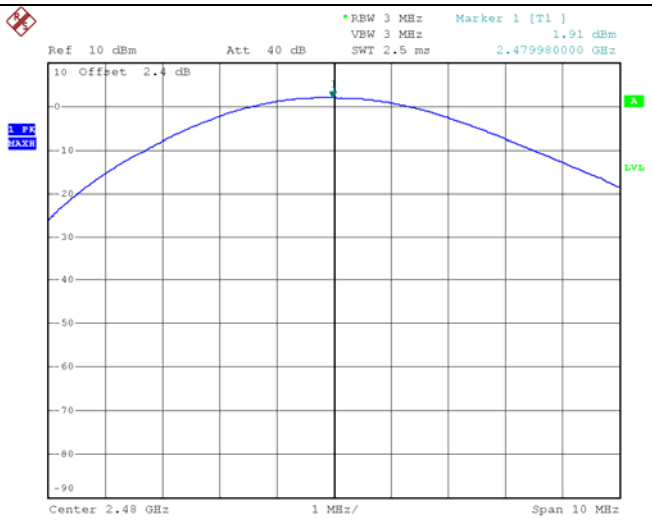
EUT	:	UREN V1
Test Standard	:	FCC Part15 Subpart C Section 15.247(b)(1)
Test Date	:	June 6, 2007
Operating Condition	:	Bluetooth The EUT was operated at transmitting condition continuously during the test.
Environment Condition	:	24 °C/ 43 %
Result	:	Passed

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 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

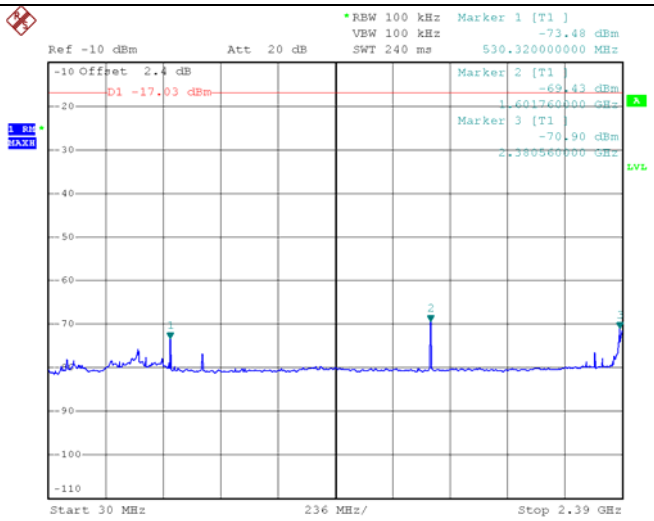
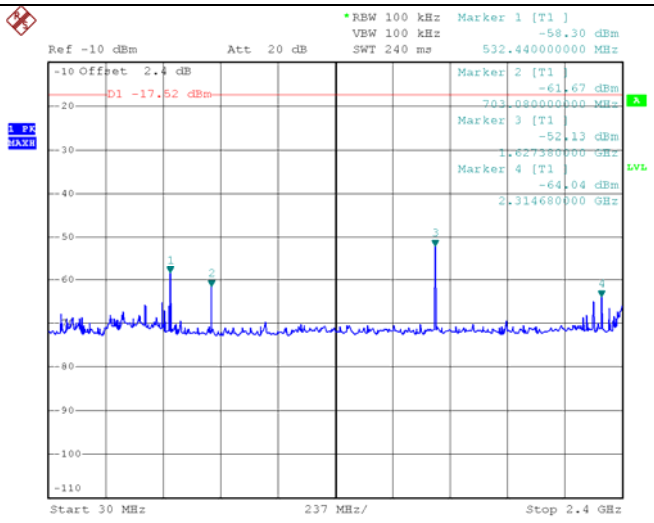
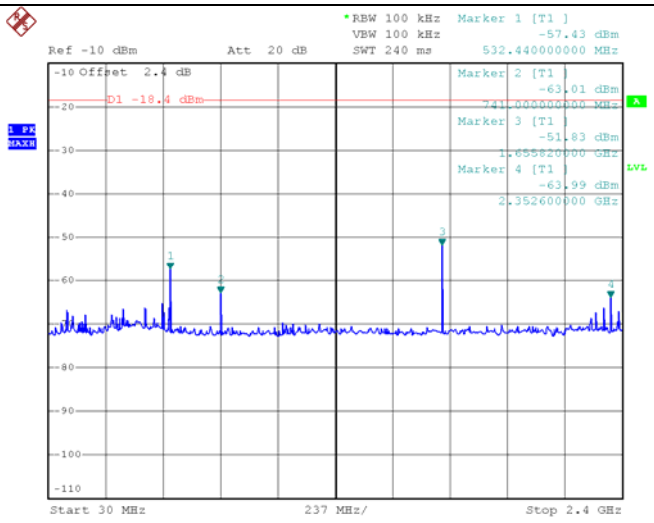
Result : Please refer to the attached Plots for details :

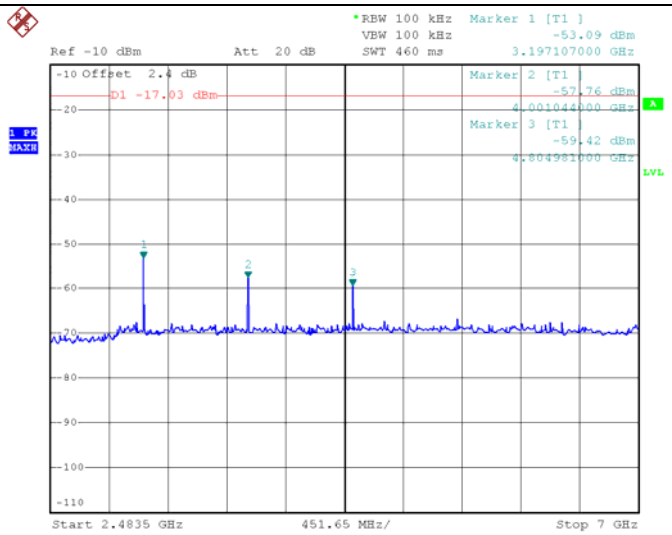
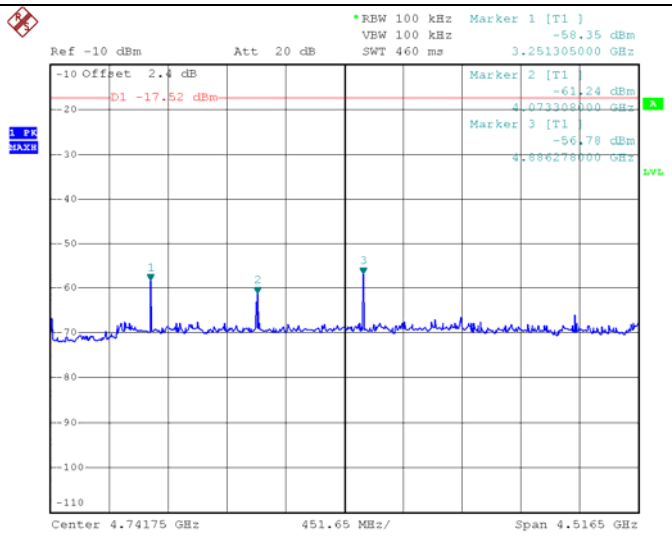
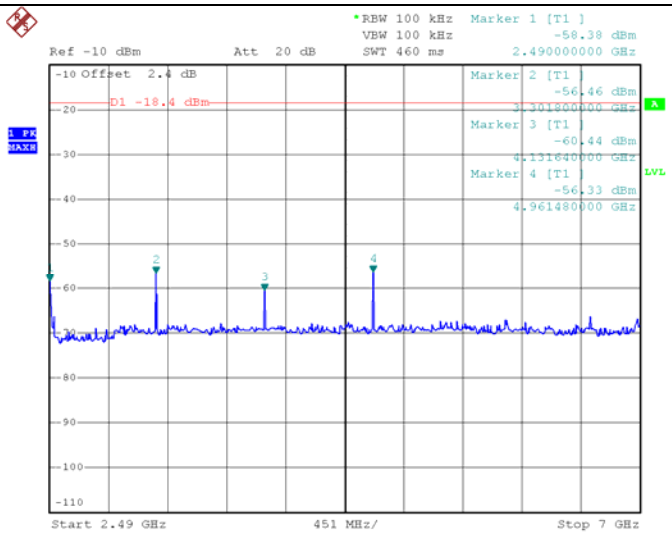
7.4.4.2 100 kHz Bandwidth of Frequency Band Edges

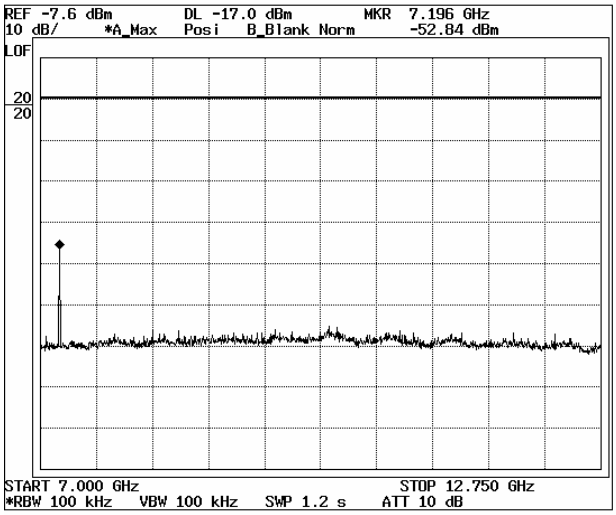
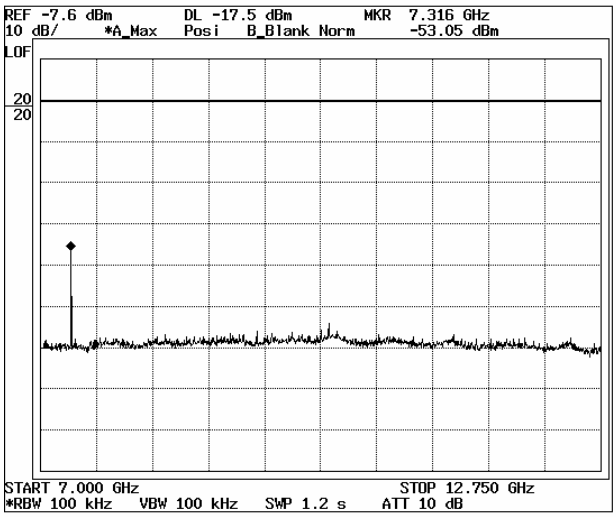
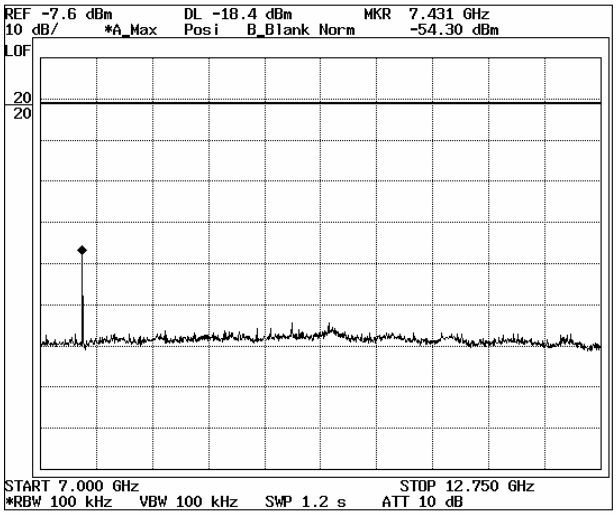
The test was performed to make a direct field strength measurement at the bandedge frequencies.
Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209. There is a restricted band starting at 2483.5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

All emissions below noise floor of 7 dBuV/m.

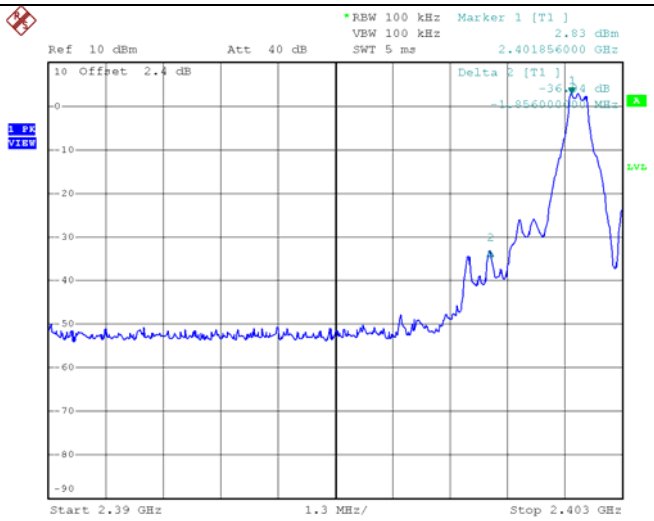
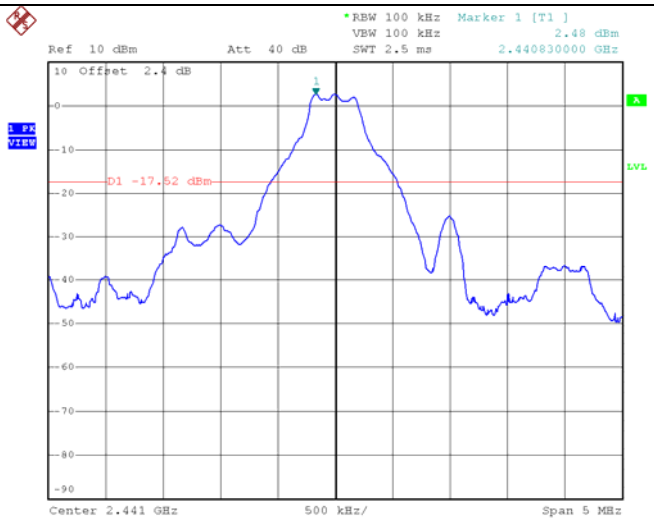
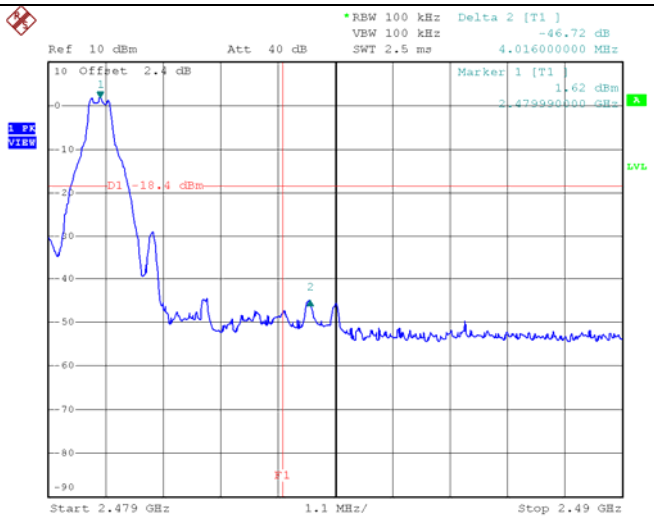
Plots of Conducted Emission

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

Frequency	2483.5 MHz ~ 7 GHz
2402 MHz « 20dBc	
2441 MHz « 20dBc	
2480 MHz « 20dBc	

Frequency	7 GHz ~ 12.75 GHz
2402 MHz « 20dBc	
2441 MHz « 20dBc	
2480 MHz « 20dBc	

Plots of 100 kHz Bandwidth of Frequency Band Edges

Frequency	30 MHz ~ 2400 MHz
2402 MHz « 20dBc	
2441 MHz N/A	
2480 MHz « 20dBc	

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	:	Blutooth 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 [dBμV]	Polarization [*H/**V]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dBμV/m]	Emission Level [dBμV/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 [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)							
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

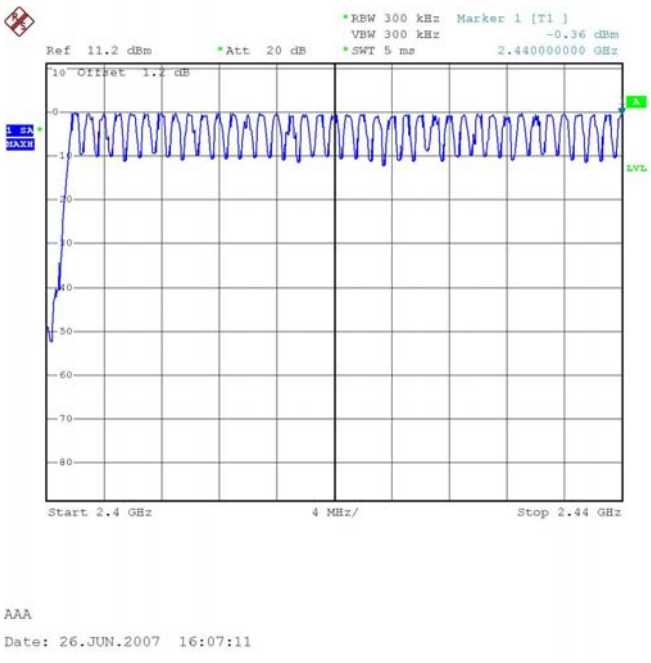
Test Standard	:	FCC Part15 Subpart C Section 15.247(a)(1)
Operating Condition	:	The EUT was operated at transmitting condition continuously during the test.
Temperature/Humidity	:	22.0 °C/ 41 %

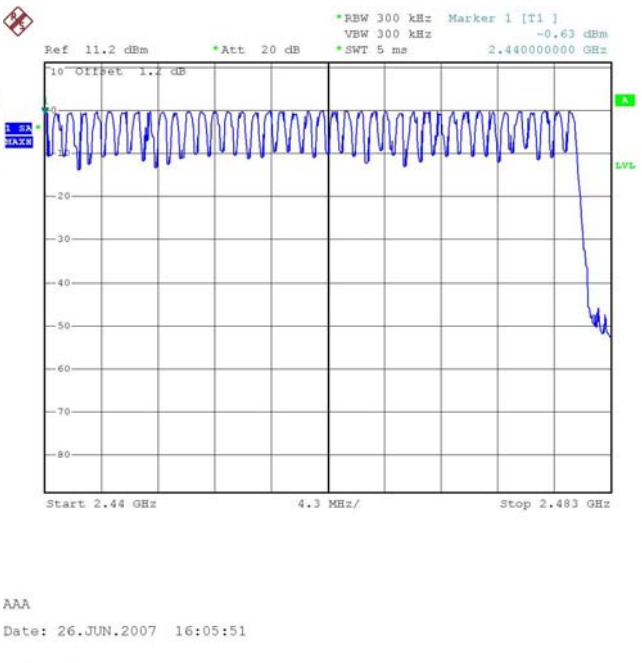
Minimum Hopping Channels Test Data

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.





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