Test Report

FOR

FCC Part 15 Subpart B&C

of

Notebook Personal Computer

(with Wistron NeWeb WLAN 802.11g mini-PCI module RM8
and Ambit Bluetooth Modem Combo Module T60M665 inside)

Model

MS2154

(Brand: acer)

Applied by:

Acer Inc.

8F, 88, Sec.1, Hsin Tai Wu Rd.,
Hsichih, Taipei Hsien 221,
Taiwan, R.O.C.

Test Performed by:

International Standards Laboratory

No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325
Taiwan, R.O.C.
Tel:(03)407-1718 Fax:(03)407-1738

Report Number: 04LR015FC **Test Date: 2004/3/08**

HC LAB:NVLAP:200234-0;VCCI: R-341,C-354;NEMKO:ELA 113a,113c;BSMI:SL2-IN-E-0037;SL2-R1-E-0037;CNLA:1178
LT LAB:NVLAP:200234-0;VCCI: R-1435,C-1440;NEMKO:ELA 113b,113d;BSMI:SL2-IN-E-0013;CNLA:0997

Contents of Report

1. . General

1.1 Certification of Accuracy of Test Data

The electromagnetic interference tests which this report describes were conducted by an independent electromagnetic compatibility consultant, International Standards Laboratory in accordance with the test procedure specified in CFR 47 Part 15 Subpart B&C (Section 15.247) , and ANSI C63.4 Rules.

The test results contained in this report accurately represent the measurements of the EMC characteristics and the energy generated by sample equipment under test at the time of the test.

Equipment Tested: Notebook Personal Computer
Model: MS2154
Applied by Acer Inc.

Sample received Date: 2004/2/22

Final test Date : 2004/3/8

Test Site: Chamber 02, Conduction 02

Temperature	21°C(Conduction Test);	22°C (Radiation Test)
Humidity:	51% (Conduction Test);	52% (Radiation Test)

Test Engineer: Jerry Chiou

The results show that the sample equipment tested as described in this report is in compliance with the Class B conducted and radiated emission limits of FCC Rules Part 15 Subpart B, and the limit of Part Subpart C Sec. 15.247.

Approve & Signature

Eddy Hsiung

Eddy Hsiung/Director

This test data shown below is traceable to NIST or national or international standard. International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

2. Test Results Summary

The 802.11b and 802.11g functions of EUT has been tested to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart B&C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247(c)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	SAR report attached
15.247 (d)	Power Spectral Density	Pass	

The Bluetooth of EUT has been tested to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart B&C
Please see the bluetooth test report

3. Description of Equipment Under Test (EUT)

Description:	Notebook Personal Computer (with WNC WLAN 802.11g mini-PCI module RM8 and Ambit Bluetooth Modem Combo Module T60M665 inside)
Model No.:	MS2154
FCC ID:	HLZMS2154RM8
Brand:	acer
Wireless LAN Module:	Wistron NeWeb, Model: RM8
Bluetooth Wireless Card:	Ambitl, Model: T60M665
Frequency Range 802.11b/g:	2400 - 2483.5 MHz
Frequency Range of bluetooth:	2400 - 2483.5 MHz
Support channel:	
802.11b/g	11 Channels
bluetooth	79 Channels
Modulation Skill:	
802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
bluetooth	GFSK
Antennas Type:	PIFA Type in Metal WLAN ant1: made by Wistron NeWeb WLAN ant2: made by Hannstar Bluetooth ant: made by Hannstar
Antenna Connected:	Connected to RF connector on the PCB of the 802.11b/g WLAN Adapter and bluetooth card. The user is not possible to change the antenna without disassembling the notebook computer.
WLAN Antenna peak Gain:	Ant1(Main p/n:25.90137.xxx) 2.76dBi Ant1(Aux p/n:25.90138.xxx) 1.34dBi Ant2(Main p/n:25.90117.011) 0.99dBi Ant2(Aux p/n:25.90118.011) –0.23dBi
Bluetooth antenna peak Gain	3dBi
Power Type of wireless module:	3.3V DC from Notebook PC

The channel and the operation frequency of 802.11b and 802.11g is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437		

The channel and the operation frequency of bluetooth is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	01	2403
02	2404	03	2405
~	~		
77	2479	78	2480

In this report,, we will show the Radiated Emission above1GHz and the Radiated Band-Edge when the blue tooth device is co-located with the WLAN device.
The EUT is applied with two sets of WLAN antennas, naming as antenna 1, antenna2.

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	brand	Main/Aux	P/N	Gain
Antenna 1	WNC	Main	25.90137.xxx	2.76dBi
		Aux	25.90138.xxx	1.34dBi
Antenna 2	HannStar	Main	25.90117.011	0.99dBi
		Aux	25.90118.011	–0.23dBi

AC Adapter Type: Lite-On (Model: PA-1131-08AC) 3 Pins or
LSE (Model: 0317A19135) 3 Pins

Hard Disk Driver: Fujitsu 40GB (Model:MHT2040AT) or
Fujitsu 30GB (Model:MHT2030AT) or
IBM 80GB (Model: IC25N080ATMR04) or
IBM 60GB (Model:IC25N060ATMR04) or
IBM 60GB (Model: DK23FA-60) or
IBM 40GB (Model: IC25N040ATMR04) or
IBM 30GB (Model: IC25N030ATMR04) or
IBM 20GB (Model: IC25N020ATMR04) or
Toshiba 80GB (Model: MK8025GAS) or
Toshiba 60GB (Model:MK6021GAS) or
Toshiba 40GB (Model:MK4025GAS) or
Toshiba 30GB (Model:MK3021GAS) or
Seagate 40GB (Model: ST94019A) or
Seagate 30GB (Model: ST93015A) or
Hitachi (Model: IC25N040ATMR04)

LCD: 14.1" XGA
AU (Model: B141XN04) or
CMO (Model: N141XB-L01) or
Hydis (Model: HT14X19-100) or
TOPPOLY (Model: TD141TGCB1)
15.1" XGA
AU (Model: B150XG01) or
AU (Model: B150XG02) or
CMO (Model: N150X3-L05) or

	Hitachi (Model: TX38D81VC1CAB) or
	LG (Model: LP150X08-A5) or
	Samsung (Model: LTN150XB-L03) or
	QDI (Model: QD15XL06-01) or
	Hannstar (Model: HSD150PX14 - A02) or
	15.1" SXGA+
	AU (Model: B150PG01) or
	Hitachi (Model: TX38D91VC1FAB) or
	Samsung (Model: LTN150P4-L03) or
	Hannstar (Model: HSD150PK14 - A02) or
DVD/RW (Multi):	Pioneer (Model: DVR K12D) or
	HLDS (Model:GWA-4040N) or
	Toshiba (Model: SD-R6112) or
	KME (Model: UJ820) or
DVD/CD-RW (Combo):	KME (Model: UJDA750) or
	HLDS (Model:GCC-4241N) or
	QSI (Model: SBW-242B) or
	QSI (Model:SBW-242C) or
DVD-ROM:	MKE (Model:SR8177)
CD-ROM:	Mitsumi (Model: SR--224W1)
	QSI (Model: SCR242) or
DDR DRAM: (optional)	Infenion 128MB(Model:HYS64D16000GDL-6-B) or
	Infenion 256MB(Model: HYS64D32020GDL-6-B) or
	Micron 256MB(Model: MT8VDDT3264HDG-335C3)
	Nanya 256MB(Model: NT256D64SH8BAGM-6KE) or
	Elpedia 256MB(Model: W30256AAEPI652A) or
	Infenion 512MB(Model:HYS64D64020GBDL-6-B)
Extral VGA Module	ATI (Model: M11)
FDD 1.44: (optional)	MCI (Model: D353G)
	Mitsumi (型號: JU-226A)
Battery:	Sanyo (Model: BTP-60A1) Li-ion
	Sony (Model: BTP 59A1) Li-ion
	Simplo (Model:) Li-ion
Parallel Port:	one 25-pins
VGA Port:	one 15-pins
TV Port:	one 4-pins
USB 2.0Connecter:	four 4-pins
1394 Connecter:	one 4-pins
Modem Connector:	one 4-pins
LAN Connector:	one 8-pin (10Mbps/100Mbps)
Line out Port:	one
Microphone Port:	one
PCMCIA Slot:	one
Line In Port:	one
Power Cord:	Shielded, Detachable (3pins)

Display:	LCD & CRT (1024 x 768) or LCD & TV (800 x 600) or LCD only (1024 x 768)
Maximum Resolution:	LCD & CRT (1024 x 768) Noninterlaced

Speed & CPU

Speed	CPU
200 MHz	Intel Celeron 2.4, 2.5, 2.6, 2.7,2.8 GHz
266 MHz	Intel Celeron Prescott 2.53, 2.66, 2.8,3.06,3.2 GHz
400 MHz	Intel DT Prescott 2.8,3,3.2,3.4,3.6,3.8 GHz
200 MHz	Intel DT Northwood 2.6 GHz
233 MHz	Intel DT Northwood 2.8 GHz
233 MHz	Intel Mobile Pentium4 3.06,3.2 GHz

3.1 Test Standards and Procedure

Test Specification: FCC Part 15 subpartB& C (Section 15.247) and subpart B and/or CISPR 22/EN55022, RSS210
Test Procedure: ANSI C63.4, CFR 47 Sec. 15.247 as detailed in Appendices

3.2 General Test Conditions

1. During the test, the EUT was set in continuously transmitting mode with a duty cycle of 99% (maximum allowed).
2. the channel 1, 6, 11 of of 802.11b and 802.11g of EUT were all tested.
3. The channel 00, 39, 78 of of bluetooth were all tested.
4. Both Main antenna and Aux antenna of EUT are able to be used as the Transmitting Antenna. Both antennas have been tested respectively, and the worst data is showed in the report.

4. TEST RESULTS (802.11b)

4.1 Powerline Conducted Emissions [Section 15.207]

4.1.1 EUT Configuration

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit shown on the figure 1 of ANSI C63.4-2001.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

4.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dß below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dß below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

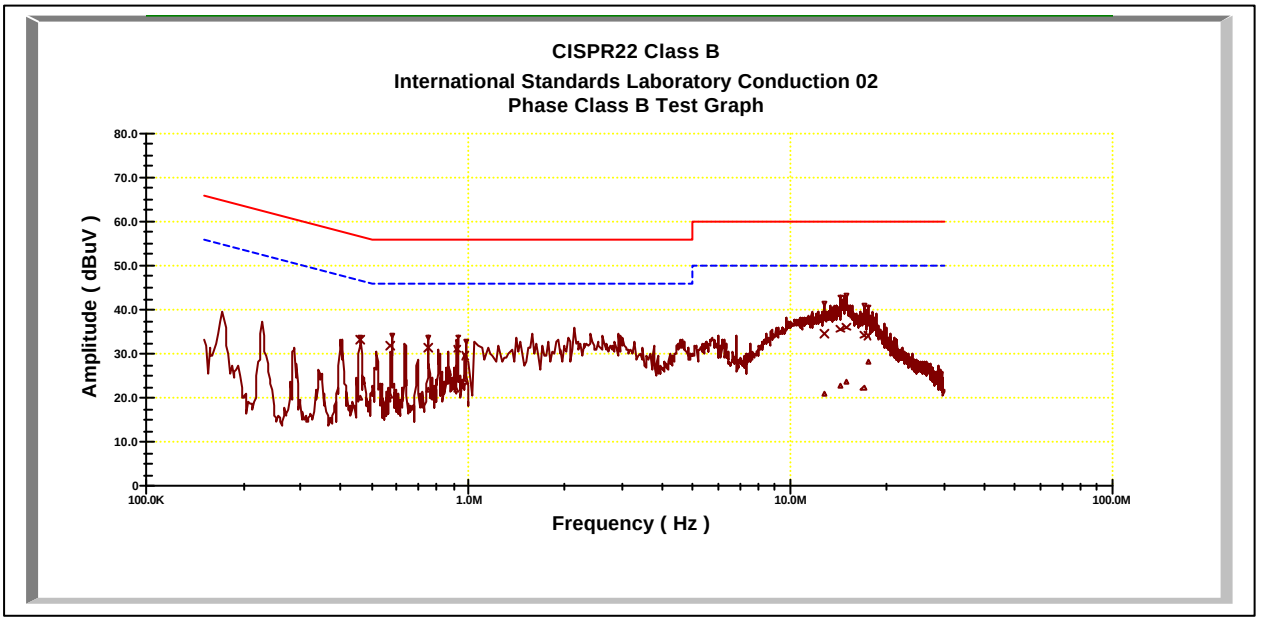
4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150 KHz--30MHz
Detector Function:	Quasi-Peak/Average
Bandwidth (RBW):	9KHz

4.1.4 Test Data:

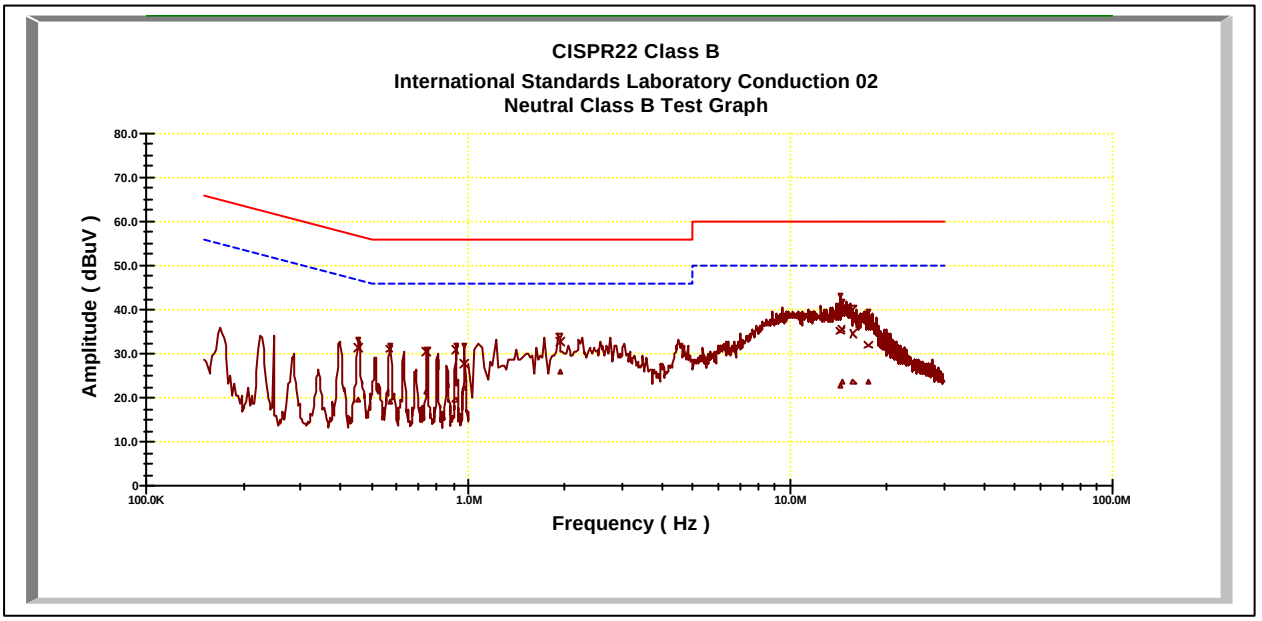
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

	Corrective Factor		Quasi-Peak			Average		
Frequency (MHz)	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.46021	0.11	0.03	33.16	57.14	-23.98	19.91	47.14	-27.22
0.57363	0.13	0.04	31.82	56.00	-24.18	20.49	46.00	-25.51
0.74715	0.16	0.05	31.27	56.00	-24.73	21.93	46.00	-24.07
0.92151	0.19	0.06	31.11	56.00	-24.89	21.68	46.00	-24.32
0.97603	0.20	0.07	29.70	56.00	-26.30	23.40	46.00	-22.60
12.7925	0.62	0.25	34.47	60.00	-25.53	21.01	50.00	-28.99
14.2926	0.67	0.28	35.65	60.00	-24.35	22.51	50.00	-27.49
14.9886	0.70	0.30	36.10	60.00	-23.90	23.68	50.00	-26.32
16.8998	0.78	0.28	34.26	60.00	-25.74	22.26	50.00	-27.74
17.4119	0.80	0.28	34.15	60.00	-25.85	28.21	50.00	-21.79



Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

	Corrective Factor		Quasi-Peak			Average		
Frequency (MHz)	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.45563	0.11	0.03	31.47	57.27	-25.80	19.47	47.27	-27.80
0.5685	0.13	0.04	31.09	56.00	-24.91	19.24	46.00	-26.76
0.74013	0.16	0.05	30.43	56.00	-25.57	21.37	46.00	-24.63
0.91073	0.19	0.06	30.86	56.00	-25.14	19.48	46.00	-26.52
0.97058	0.20	0.07	27.67	56.00	-28.33	22.16	46.00	-23.84
1.93934	0.21	0.10	32.59	56.00	-23.41	25.87	46.00	-20.13
14.2872	0.39	0.28	35.18	60.00	-24.82	22.67	50.00	-27.33
14.4632	0.39	0.29	35.66	60.00	-24.34	23.70	50.00	-26.30
15.7212	0.41	0.29	34.43	60.00	-25.57	23.44	50.00	-26.56
17.5246	0.45	0.28	32.05	60.00	-27.95	23.52	50.00	-26.48



* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1 , 6, 11 to get the maximum reading of all these channels .
Margin = Amplitude + Insertion Loss - Limit
A margin of -8dB means that the emission is 8dB below the limit

4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

4.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

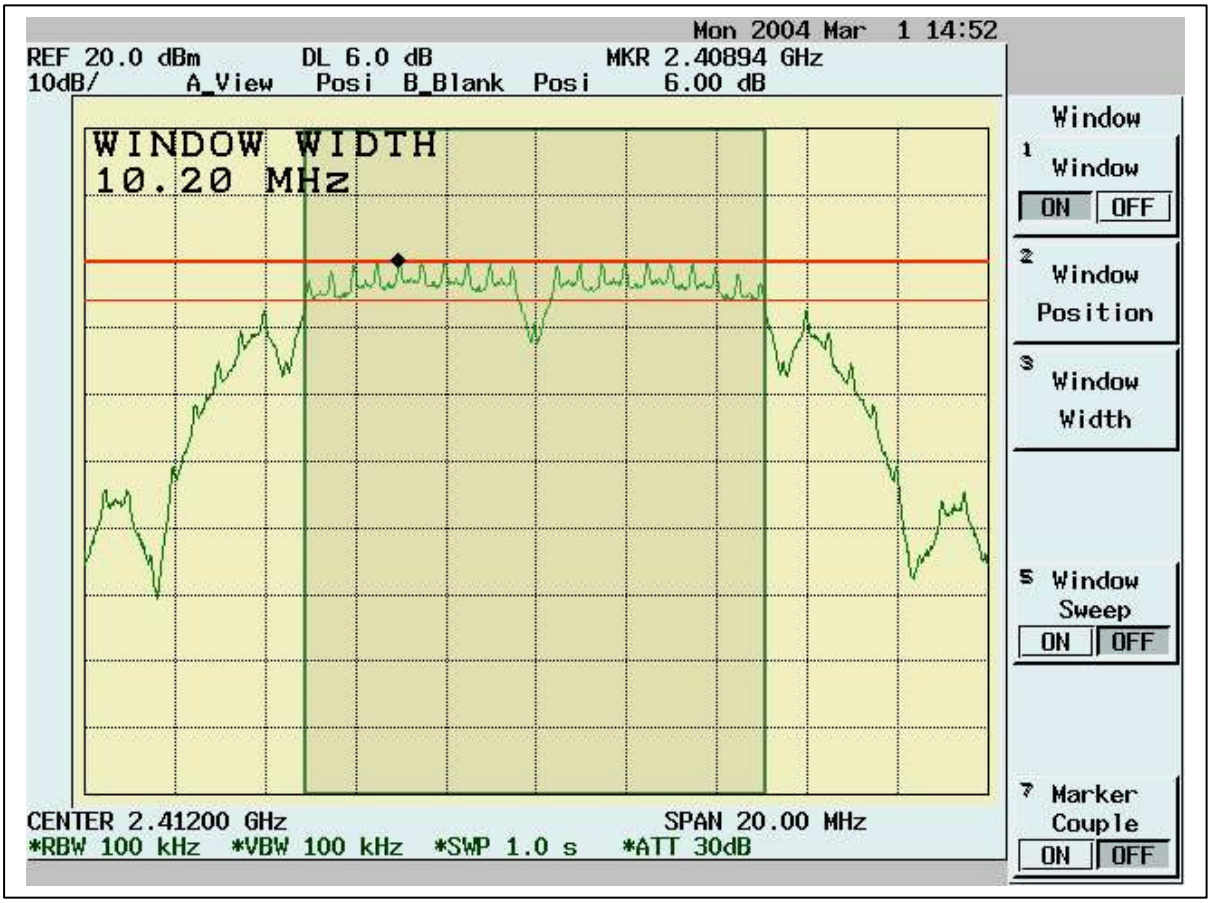
Equipment mode: Spectrum analyzer
Detector function: Peak mode
RBW: 100KHz
VBW: 100KHz

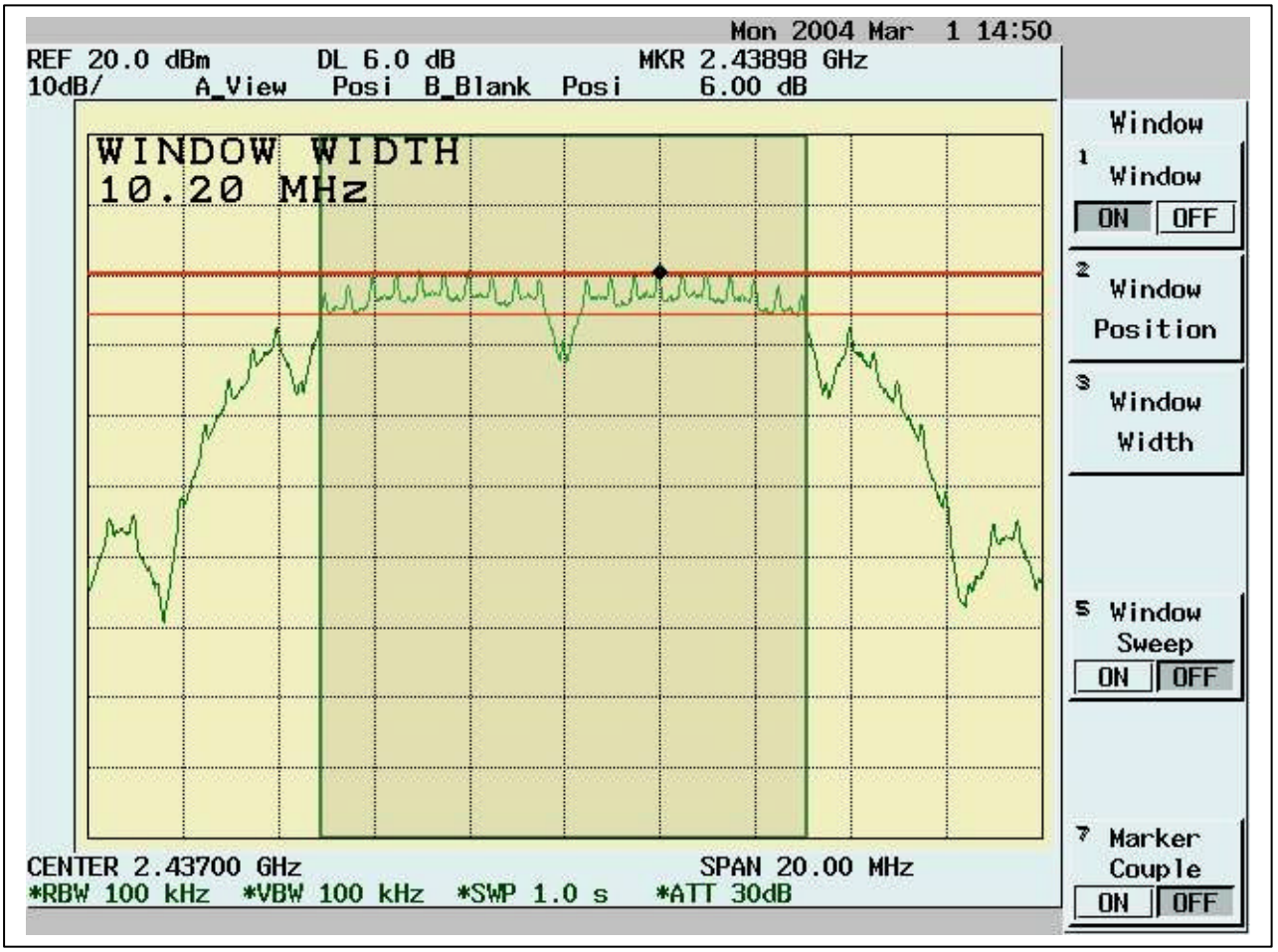
4.2.2 Test Setup

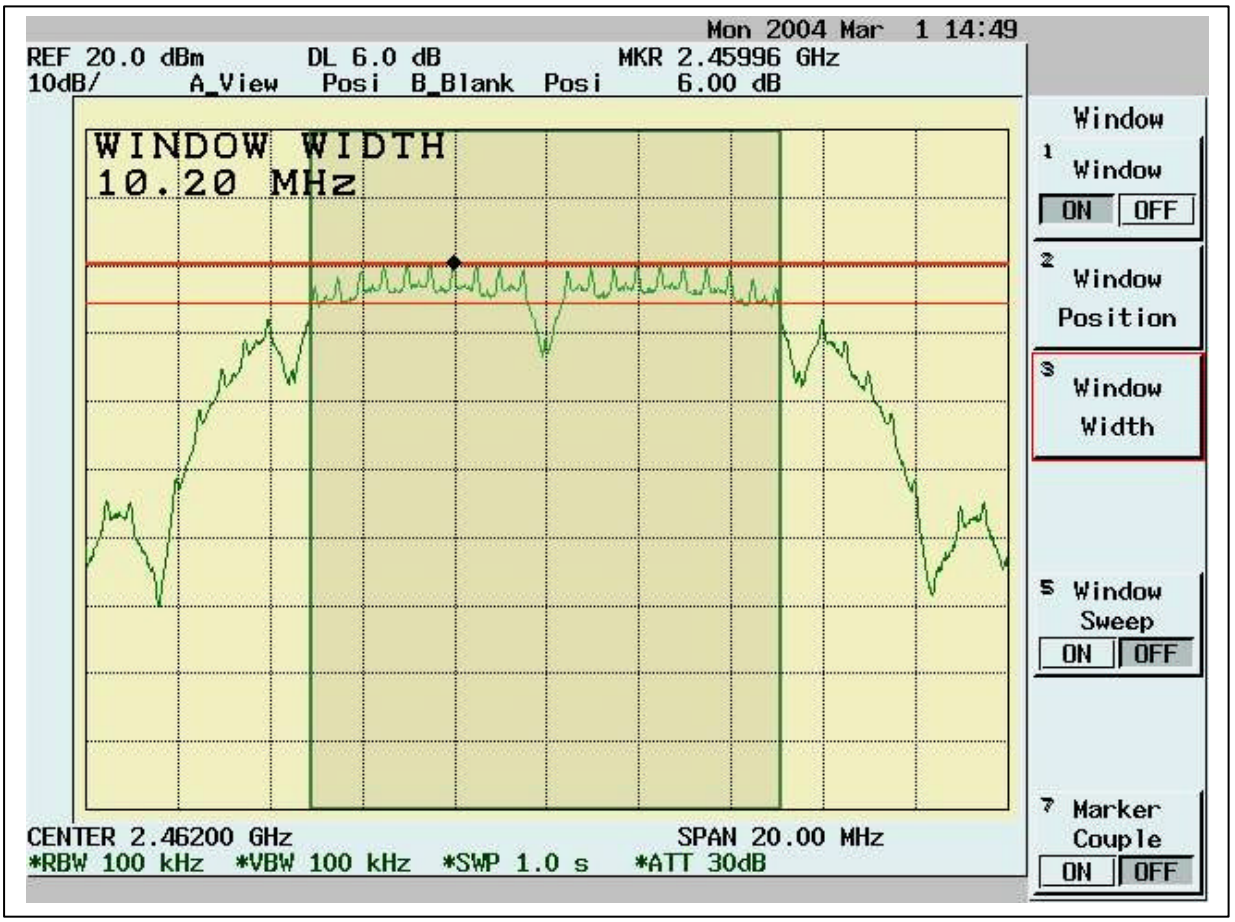
4.2.3 Test Data

Table 6dB Bandwidth

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	10.2	0.5	Pass
6	2437	10.2	0.5	Pass
11	2462	10.2	0.5	Pass


Mon 2004 Mar 1 14:52
REF 20.0 dBm
DL 6.0 dB
MKR 2.40894 GHz
10dB/
A_View
Posi
B_Blank
Posi
6.00 dB
WINDOW WIDTH
10.20 MHz
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF
CENTER 2.41200 GHz
SPAN 20.00 MHz
*RBW 100 kHz
*VBW 100 kHz
*SWP 1.0 s
*ATT 30dB


Mon 2004 Mar 1 14:50
REF 20.0 dBm
DL 6.0 dB
MKR 2.43898 GHz
10dB/
A_View
Posi
B_Blank
Posi
6.00 dB
WINDOW WIDTH
10.20 MHz
Window
1 Window
ON
OFF
2 Window Position
3 Window Width
5 Window Sweep
ON
OFF
7 Marker Couple
ON
OFF
CENTER 2.43700 GHz
SPAN 20.00 MHz
*RBW 100 kHz
*VBW 100 kHz
*SWP 1.0 s
*ATT 30dB

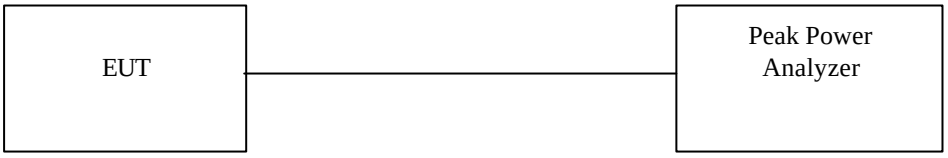

Mon 2004 Mar 1 14:49
REF 20.0 dBm
10dB/
DL 6.0 dB
A_View Posi
B_Blank Posi
MKR 2.45996 GHz
6.00 dB
WINDOW WIDTH
10.20 MHz
CENTER 2.46200 GHz
SPAN 20.00 MHz
*RBW 100 kHz
*VBW 100 kHz
*SWP 1.0 s
*ATT 30dB
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF

4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

4.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer .

4.3.2 Test Setup



4.3.3 Test Data:

Maximum Peak Output Power

Chennel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	15.906	1.1	50.19	17.006	30	Pass
6	2437	15.562	1.1	46.37	16.662	30	Pass
11	2462	15.343	1.1	44.09	16.443	30	Pass

4.4 Radiated Emission Measurement [Section [15.247(c)(4)]

4.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

4.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.
For the test of 2^{nd} to 10^{th} harmonics frequencies , the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

4.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	1MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

4.4.4 Test Data (30MHz – 1GHz) :.

30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
174.53	20.35	8.61	3.52	0.00	32.48	43.50	-11.02	150.00	8.00
199.75	25.77	8.89	3.78	0.00	38.44	43.50	-5.06	150.00	261.00
232.73	24.27	9.33	4.09	0.00	37.69	46.00	-8.31	100.00	261.00
332.64	20.16	14.06	4.77	0.00	38.99	46.00	-7.01	150.00	66.00
366.59	13.79	14.86	5.01	0.00	33.67	46.00	-12.33	100.00	228.00
398.6	13.01	15.95	5.20	0.00	34.16	46.00	-11.84	200.00	261.00
764.29	6.84	20.07	7.08	0.00	33.99	46.00	-12.01	100.00	208.00
832.19	5.87	20.39	7.40	0.00	33.65	46.00	-12.35	200.00	166.00
897.18	5.90	20.41	7.66	0.00	33.97	46.00	-12.03	100.00	166.00
913.67	5.45	20.62	7.72	0.00	33.79	46.00	-12.21	100.00	166.00

30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
55.22	24.32	6.56	2.03	0.00	32.91	40.00	-7.09	250.00	184.00
77.53	23.80	6.35	2.35	0.00	32.51	40.00	-7.49	150.00	342.00
132.82	16.72	11.12	3.08	0.00	30.91	43.50	-12.59	200.00	35.00
165.8	18.94	8.78	3.44	0.00	31.16	43.50	-12.34	100.00	119.00
199.75	22.10	8.89	3.78	0.00	34.77	43.50	-8.73	200.00	324.00
456.8	17.09	16.58	5.53	0.00	39.19	46.00	-6.81	100.00	342.00
531.49	9.66	18.58	5.97	0.00	34.20	46.00	-11.80	100.00	250.00
651.77	8.91	19.10	6.56	0.00	34.56	46.00	-11.44	100.00	119.00
699.3	8.67	19.00	6.79	0.00	34.46	46.00	-11.54	200.00	184.00
717.73	7.72	19.39	6.85	0.00	33.96	46.00	-12.04	200.00	342.00

* NOTE:
During the test, the EUT was set to Channel 1 , 6, 11 respectively to get the maximum reading of all the critical emission frequencies.
Margin = Corrected Amplitude – Limit
Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
All frequencies from 30MHz to 1GHz have been tested

4.4.5 Test Data (1GHz – 25 GHz, Transmitting from Main antenna) .

ANT1

1GHz~ 25 GHz (Horizontal), Channel 1 : 2412 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3185.31	39.60	31.02	2.54	46.61	26.56	54.00	-27.44	101	113
3420.08	39.04	31.30	2.19	46.64	25.89	54.00	-28.11	100	143
4821.68	39.55	34.75	1.93	46.88	29.35	54.00	-24.65	100	245
6940.56	33.93	39.66	2.31	46.34	29.55	54.00	-24.45	101	54
7935.06	38.75	40.97	2.49	44.05	38.15	54.00	-15.85	100	19
8336.66	37.68	41.07	2.56	42.89	38.42	54.00	-15.58	104	276

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 1 : 2412 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3147.85	39.19	30.98	2.60	46.60	26.16	54.00	-27.84	100	199
3492.51	38.95	31.39	2.08	46.65	25.77	54.00	-28.23	100	200
4003.50	45.45	32.01	1.68	46.11	33.03	54.00	-20.97	100	25
4821.68	41.60	34.75	1.93	46.88	31.40	54.00	-22.60	100	112
8876.12	38.30	40.55	2.66	42.76	38.75	54.00	-15.25	101	211
9643.36	47.04	39.20	2.78	42.07	46.94	54.00	-7.06	100	299

'pk'---- peak, 'av'----average

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB
Margin = Corrected Amplitude – Limit
Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal), Channel 6 : 2437 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3257.74	39.98	31.11	2.43	46.62	26.90	54.00	-27.10	100	20
3430.07	38.57	31.32	2.17	46.64	25.42	54.00	-28.58	101	349
3996.50	42.10	32.00	1.68	46.11	29.66	54.00	-24.34	100	264
4898.60	38.45	35.07	1.94	46.95	28.51	54.00	-25.49	100	119
6982.52	34.13	39.90	2.32	46.32	30.02	54.00	-23.98	107	98
8786.21	38.20	40.66	2.64	42.69	38.81	54.00	-15.19	100	302

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3260.24	40.40	31.11	2.43	46.62	27.32	54.00	-26.68	100	214
3667.83	44.51	31.60	1.57	46.47	31.21	54.00	-22.79	101	110
4006.99	45.69	32.02	1.68	46.12	33.27	54.00	-20.73	100	347
4870.63	43.13	34.96	1.94	46.93	33.09	54.00	-20.91	100	224
6965.04	34.48	39.80	2.31	46.33	30.27	54.00	-23.73	105	333
9745.25	39.95	39.20	2.79	41.81	40.13	54.00	-13.87	100	118

'pk'---- peak, 'av'----average

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
3297.70	40.10	31.16	2.37	46.62	27.01	54.00	-26.99	100	154
3477.52	39.30	31.37	2.10	46.65	26.13	54.00	-27.87	100	225
4923.08	37.88	35.18	1.95	46.97	28.04	54.00	-25.96	101	19
6919.58	34.11	39.53	2.31	46.35	29.60	54.00	-24.40	100	220
7923.08	38.02	40.92	2.49	44.11	37.31	54.00	-16.69	100	165
8768.23	36.33	40.68	2.64	42.67	36.97	54.00	-17.03	102	78

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 11 : 2462 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
3297.70	40.15	31.16	2.37	46.62	27.06	54.00	-26.94	100	322
3480.02	38.38	31.38	2.10	46.65	25.20	54.00	-28.80	101	111
4000.00	45.77	32.00	1.68	46.11	33.34	54.00	-20.66	100	311
4923.08	42.83	35.18	1.95	46.97	32.98	54.00	-21.02	100	224
8354.64	37.33	41.06	2.56	42.84	38.11	54.00	-15.89	101	65
8846.15	37.58	40.58	2.65	42.73	38.08	54.00	-15.92	103	128

'pk'---- peak, 'av'----averag

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 1GHz to 25 GHz have been tested.

ANT2

1GHz~ 25 GHz (Horizontal), Channel 1 : 2412 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3172.83	38.58	31.01	2.56	46.60	25.54	54.00	-28.46	101	245
3410.09	39.70	31.29	2.20	46.64	26.55	54.00	-27.45	108	113
4258.74	43.24	32.72	1.77	46.36	31.37	54.00	-22.63	100	95
6989.51	34.56	39.94	2.32	46.32	30.50	54.00	-23.50	101	154
7947.05	40.58	41.01	2.49	44.00	40.08	54.00	-13.92	100	319
8858.14	39.15	40.57	2.65	42.74	39.63	54.00	-14.37	100	216

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 1 : 2412 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3205.29	39.83	31.05	2.51	46.61	26.78	54.00	-27.22	100	174
3440.06	40.12	31.33	2.16	46.64	26.96	54.00	-27.04	100	298
4821.68	46.00	34.75	1.93	46.88	35.80	54.00	-18.20	100	295
6965.04	35.48	39.80	2.31	46.33	31.26	54.00	-22.74	100	112
8822.18	38.75	40.61	2.65	42.71	39.29	54.00	-14.71	100	211
9643.36	38.70	39.20	2.78	42.07	38.60	54.00	-15.40	100	291

'pk'---- peak, 'av'----average

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal), Channel 6 : 2437 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3245.25	39.59	31.09	2.45	46.61	26.52	54.00	-27.48	100	230
3472.53	38.85	31.37	2.11	46.65	25.68	54.00	-28.32	100	349
4870.63	42.30	34.96	1.94	46.93	32.27	54.00	-21.73	100	264
6968.53	35.41	39.82	2.31	46.33	31.21	54.00	-22.79	100	119
8006.99	38.87	41.20	2.50	43.73	38.83	54.00	-15.17	100	302
8732.27	38.19	40.72	2.63	42.65	38.89	54.00	-15.11	103	113

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3245.25	39.05	31.09	2.45	46.61	25.98	54.00	-28.02	100	294
3460.04	38.97	31.35	2.13	46.64	25.81	54.00	-28.19	101	110
4870.63	45.43	34.96	1.94	46.93	35.40	54.00	-18.60	100	347
6975.52	34.41	39.86	2.32	46.32	30.26	54.00	-23.74	100	224
7755.24	39.23	40.32	2.46	44.90	37.11	54.00	-16.89	100	321
8282.72	38.02	41.09	2.55	43.03	38.63	54.00	-15.37	100	56

'pk'---- peak, 'av'----average

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
3325.17	39.14	31.19	2.33	46.63	26.04	54.00	-27.96	100	154
3497.50	38.95	31.40	2.07	46.65	25.77	54.00	-28.23	100	225
4923.08	40.55	35.18	1.95	46.97	30.71	54.00	-23.29	101	159
6972.03	34.46	39.84	2.31	46.32	30.29	54.00	-23.71	100	220
8024.97	39.18	41.19	2.50	43.69	39.19	54.00	-14.81	100	165
8750.25	39.85	40.70	2.63	42.66	40.52	54.00	-13.48	102	78

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 11 : 2462 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
3260.24	38.64	31.11	2.43	46.62	25.57	54.00	-28.43	100	332
3385.11	39.16	31.26	2.24	46.63	26.03	54.00	-27.97	101	191
4923.08	41.41	35.18	1.95	46.97	31.56	54.00	-22.44	100	311
6965.04	34.46	39.80	2.31	46.33	30.24	54.00	-23.76	100	224
7863.14	40.00	40.71	2.47	44.39	38.79	54.00	-15.21	101	65
8696.30	38.27	40.76	2.62	42.62	39.03	54.00	-14.97	103	128

'pk'---- peak, 'av'----averag

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 1GHz to 25 GHz have been tested.

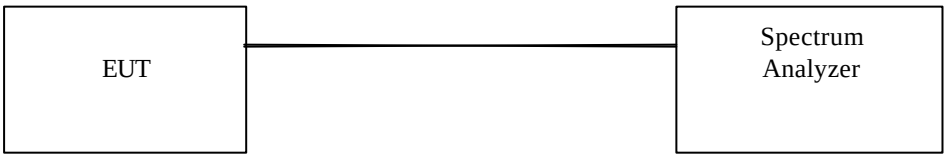
4.5 Band Edge Measurement

4.5.1 Test Procedure (Conducted)

1. The Transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 100MHz
   RBW: 100KHz
   VBW: 100KHz
   Center frequency: 2.412GHz, 2.462GHz.
   Sweep time= 200ms sec.

2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band.

4.5.2 Test Setup (Conducted)



4.5.3 Test Data:

Table Band Edge measurement (Conducted)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: > 20dB (dB)	Pass/Fail
1	2414.4	106.95	---	---
Outside band	2399.9	65.27	41.68	Pass
11	2458.9	106.78	---	---
Outside band	2471.4	71.41	35.37	Pass

.

Band Edge Conducted measurement

Band Edge Conducted Measurement

4.5.4 Band Edge measurement Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as *Radiated Emission Measurement*
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN:100MHz
   RBW: 1MHz
   VBW: 1MHz
   Center frequency: 2.395GHz, 2.48 GHz.

2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band.

4. For peak frequency emission level measurement in Restricted Band ,
   Change RBW: 1MHz ,
   VBW: 10Hz,
   Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

4.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

4.5.6 Test Data:

ANT1

Table Band Edge measurement (Radiated)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit: > 20dB (dBC)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
1(peak mode)	2409.2	65.1	31.67	96.77	---	---	1MHz	---
Outside band	2397.1	27.27	31.67	58.94	37.83	---	1MHz	Pass
1(average mode)	2414.3	60.24	31.67	91.91	---	---	10Hz	---
Restricted band	2340	6.17	31.67	37.84	-----	54	10Hz	Pass
11(peak mode)	2459.2	65.3	31.64	96.94	----	---	1MHz	---
Outside band	2471.5	32.27	31.64	63.91	33.03	---	1MHz	Pass
11(average mode)	2464.2	61.84	31.64	93.48	----	---	10Hz	---
Restricted band	2483.6	9.02	31.64	40.66	-----	54	10Hz	Pass

Note: The Spectrum plot of emission level measurement in Restricted band is attached.
Emission Level = Spectrum Reading + Correction Factor
Correction Factor = Antenna Factor + cable loss – amplifier gain

Band Edge measurement for radiated emission in Restricted Band(Radiated)

Peak Mode (Channel 1)

Band Edge measurement for radiated emission in Restricted Band(Radiated)

Average Mode (Channel 1)

Band Edge measurement for radiated emission in Ristricted Band(Radiated)

Peak Mode (Channel 11)

Band Edge measurement for radiated emission in Restricted Band(Radiated)

Average Mode (Channel 11)

ANT2

Table Band Edge measurement (Radiated)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit: > 20dB (dBC)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
1(peak mode)	2409.2	62.08	31.67	93.75	---	---	1MHz	---
Outside band	2397.2	22.91	31.67	54.58	39.17	---	1MHz	Pass
1(average mode)	2414.2	57.02	31.67	88.69	---	---	10Hz	---
Restricted band	2337.2	5.42	31.67	37.09	-----	54	10Hz	Pass
11(peak mode)	2464.8	58.2	31.64	89.84	----	---	1MHz	---
Outside band	2471.3	24.77	31.64	56.41	33.43	---	1MHz	Pass
11(average mode)	2459.2	61.67	31.64	93.31	----	---	10Hz	---
Restricted band	2485.5	15.63	31.64	47.27	-----	54	10Hz	Pass

Note: The Spectrum plot of emission level measurement in Restricted band is attached.
Emission Level = Spectrum Reading + Correction Factor
Correction Factor = Antenna Factor + cable loss – amplifier gain

Band Edge measurement for radiated emission in Restricted Band(Radiated)

Peak Mode (Channel 1)

Band Edge measurement for radiated emission in Restricted Band(Radiated)

Average Mode (Channel 1)

Band Edge measurement for radiated emission in Ristricted Band(Radiated)

Peak Mode (Channel 11)

Band Edge measurement for radiated emission in Restricted Band(Radiated)

Average Mode (Channel 11)

4.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]

See the SAR report

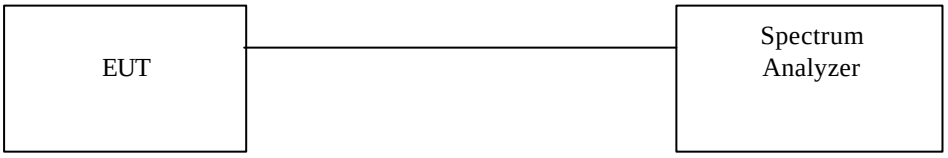
4.7 DSSS Peak Power Spectral Density [Section 15.247(d)]

4.7.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN:1.5MHz
   RBW: 3KHz
   VBW: 30KHz
   Center frequency: fundamental frequency tested.
   Sweep time= 500 sec.

2. Using Peak Search to read the peak power after Maximum Hold function is completed.

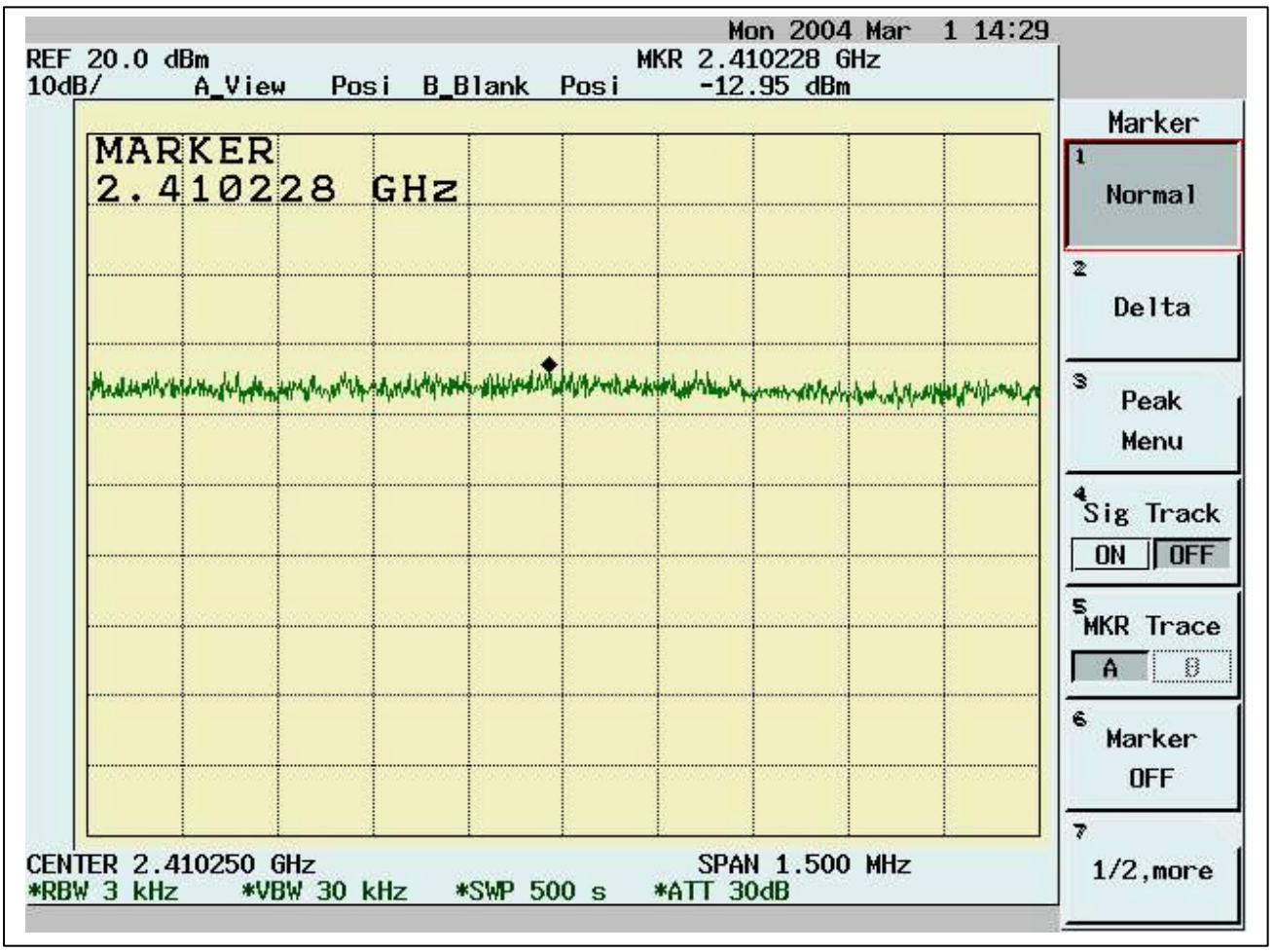
4.7.2 Test Setup

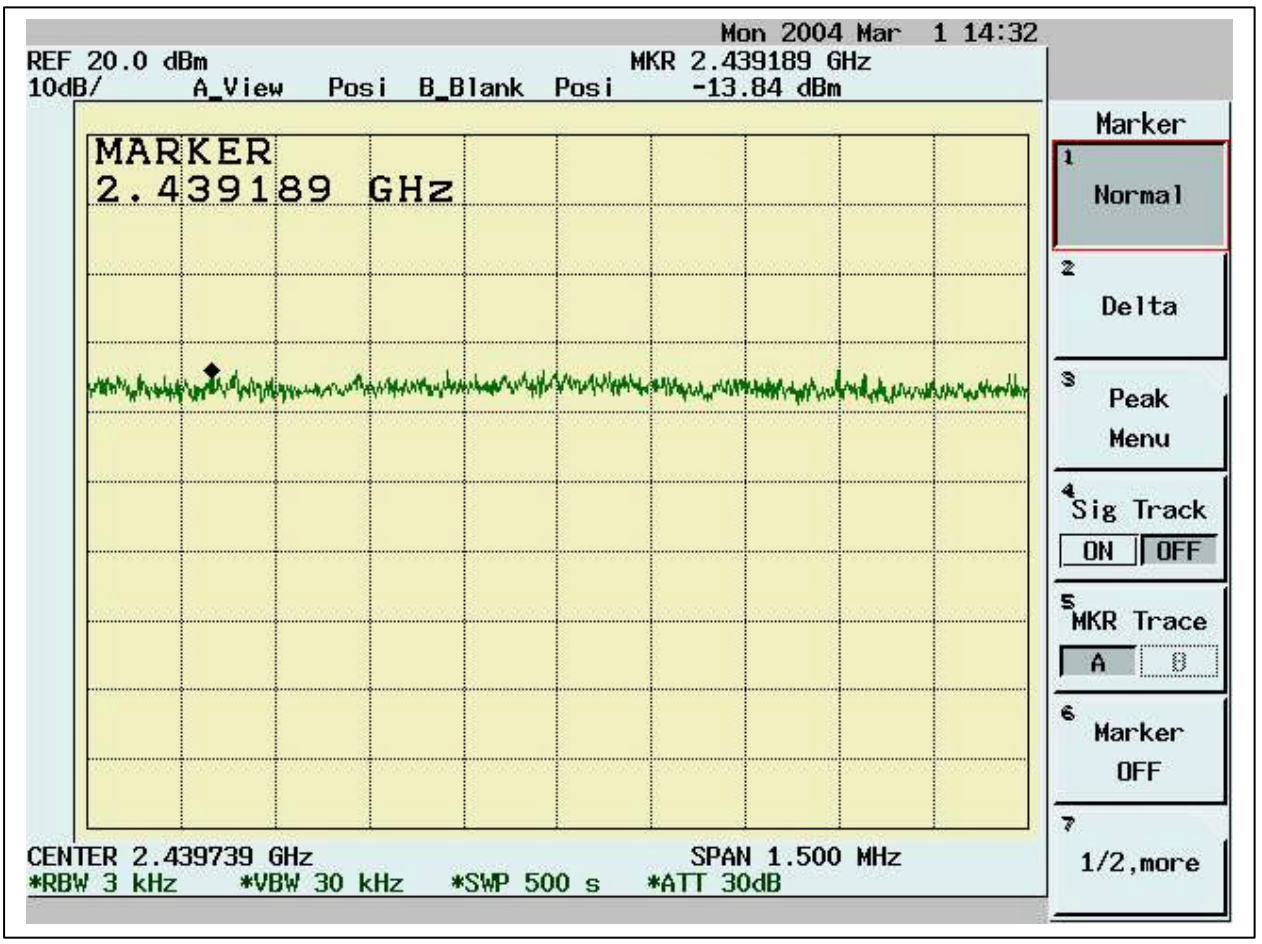


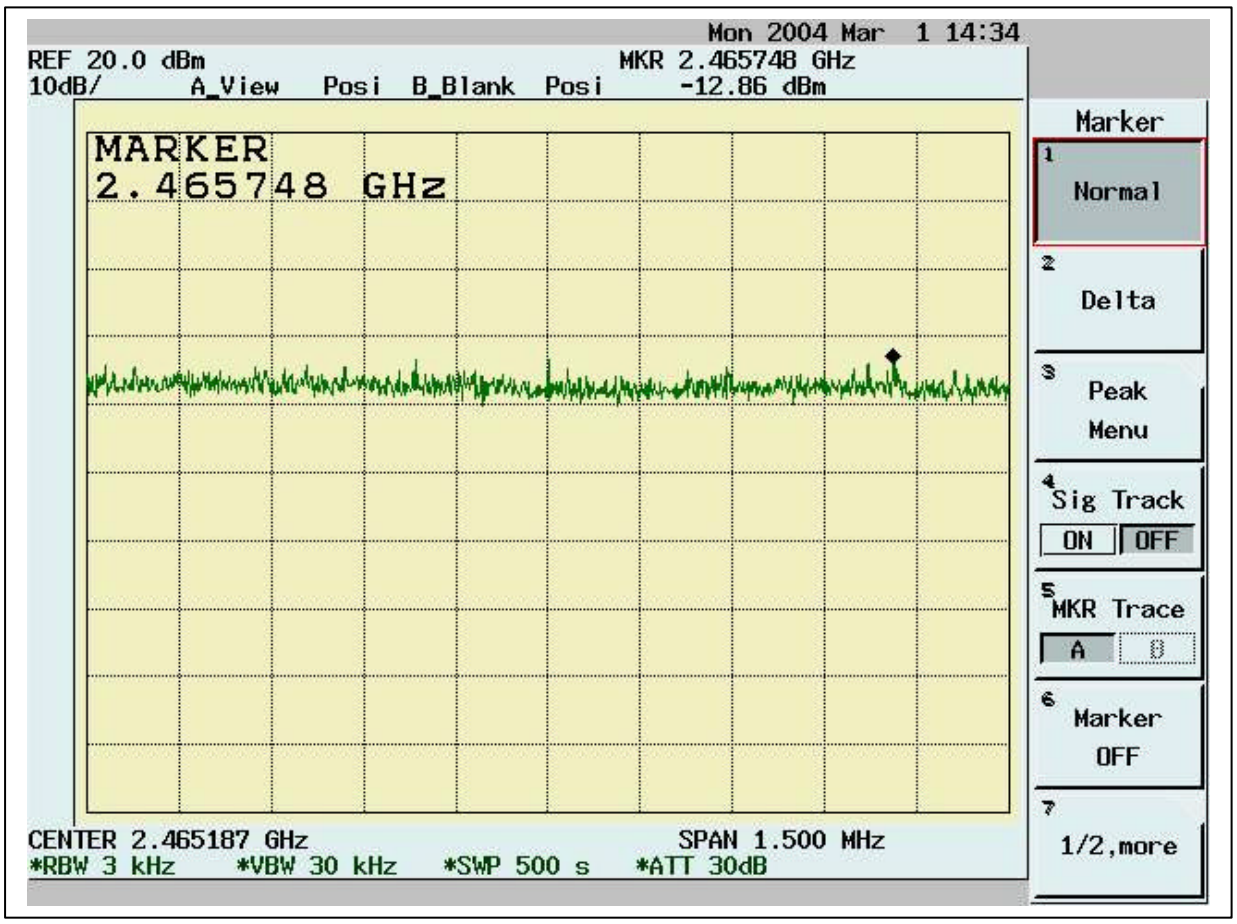
4.7.3 Test Data:

Table Maximum Peak Output Power Density

Chennel	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
Channel 01(2412MHz)	-12.95	1.1	-11.85	8	Pass
Channel 06(2437MHz)	-13.84	1.1	-12.74	8	Pass
Channel 11(2462MHz)	-12.86	1.1	-11.76	8	Pass


Mon 2004 Mar 1 14:29
REF 20.0 dBm
MKR 2.410228 GHz
10dB/ A_View Posi B_Blank Posi -12.95 dBm
MARKER
2.410228 GHz
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track ON OFF
5 MKR Trace A B
6 Marker OFF
7 1/2,more
CENTER 2.410250 GHz
SPAN 1.500 MHz
*RBW 3 kHz *VBW 30 kHz *SWP 500 s *ATT 30dB


Mon 2004 Mar 1 14:32
REF 20.0 dBm
MKR 2.439189 GHz
10dB/ A_View Posi B_Blank Posi -13.84 dBm
MARKER
2.439189 GHz
CENTER 2.439739 GHz
SPAN 1.500 MHz
*RBW 3 kHz *VBW 30 kHz *SWP 500 s *ATT 30dB
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track
ON OFF
5 MKR Trace
A B
6 Marker OFF
7 1/2,more


Mon 2004 Mar 1 14:34
REF 20.0 dBm
10dB/ A_View Posi B_Blank Posi
MKR 2.465748 GHz
-12.86 dBm
MARKER
2.465748 GHz
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track
ON OFF
5 MKR Trace
A B
6 Marker OFF
7 1/2,more
CENTER 2.465187 GHz
SPAN 1.500 MHz
*RBW 3 kHz *VBW 30 kHz *SWP 500 s *ATT 30dB

5. TEST RESULTS (802.11g)

5.1 Powerline Conducted Emissions [Section 15.207]

5.1.1 EUT Configuration

The conducted emission test setups are in accordance with Figs 9, 10(a) and 10(b) of ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996.

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit shown on the figure 1 of ANSI C63.4-2001.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

5.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dß below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dß below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

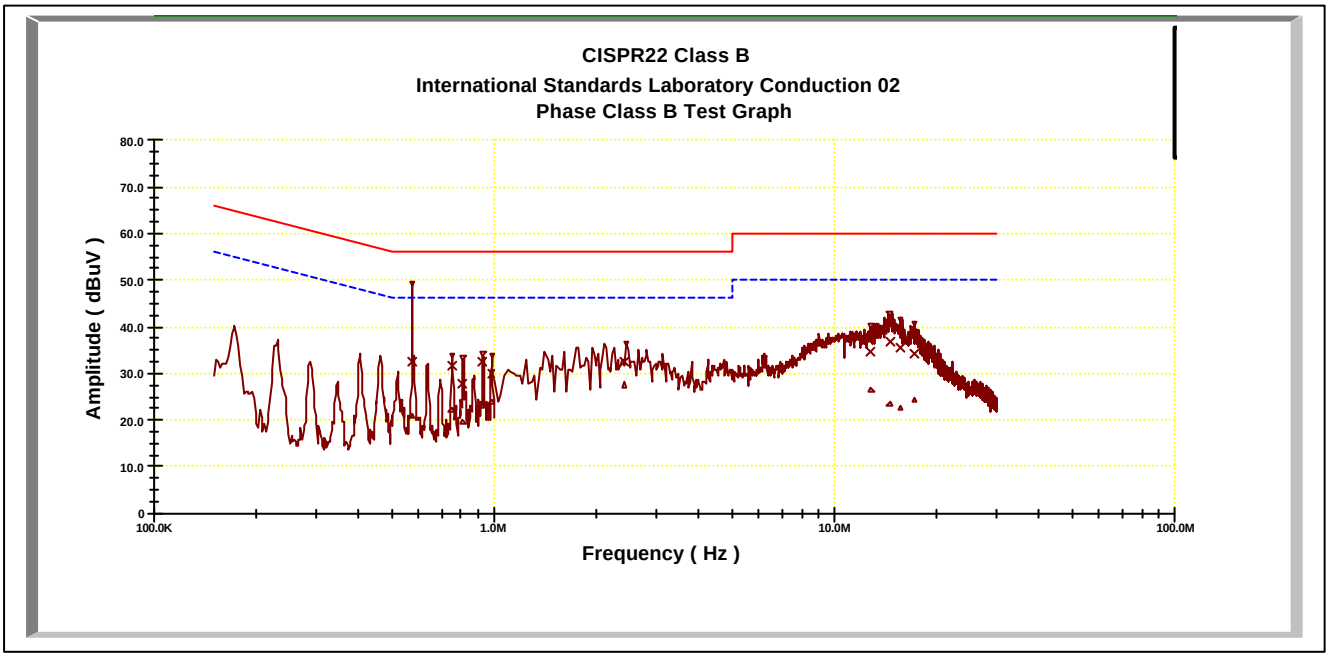
5.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150 KHz--30MHz
Detector Function:	Quasi-Peak/Average
Bandwidth (RBW):	9KHz

5.1.4 Test Data:

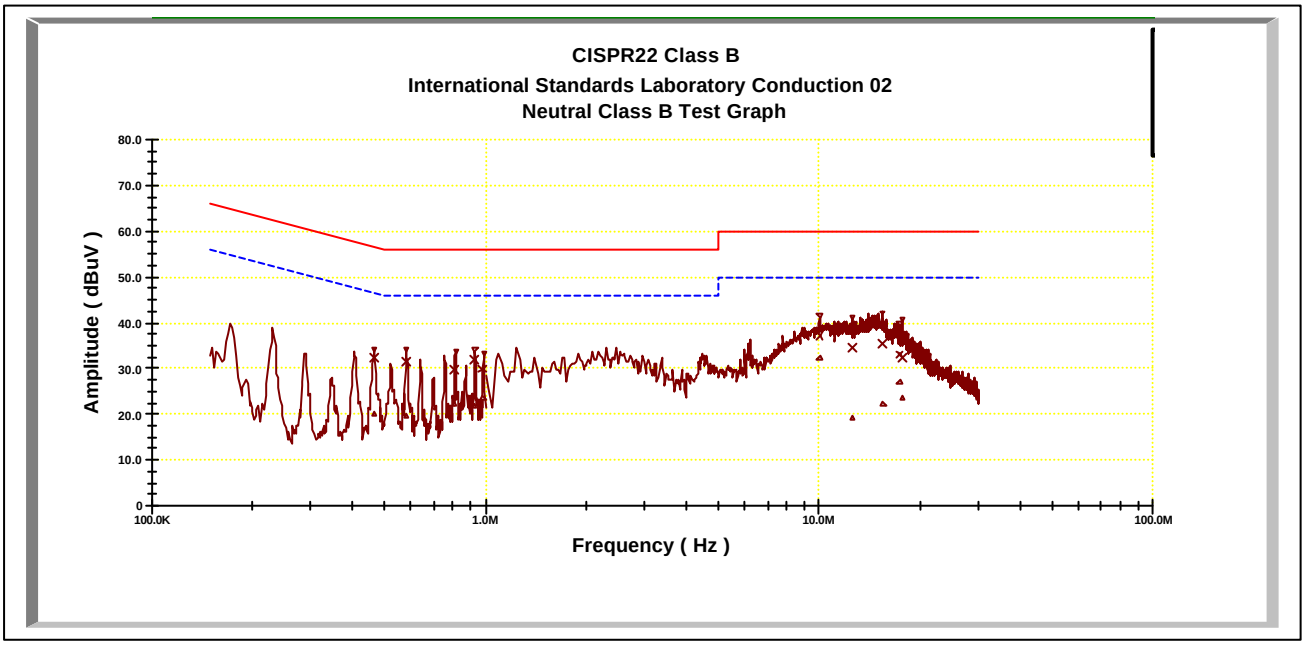
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

	Corrective Factor		Quasi-Peak			Average		
Frequency (MHz)	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.57696	0.13	0.04	32.31	56.00	-23.69	20.67	46.00	-25.33
0.74968	0.16	0.05	31.63	56.00	-24.37	22.00	46.00	-24.00
0.81103	0.17	0.05	27.81	56.00	-28.19	19.37	46.00	-26.63
0.92265	0.19	0.06	32.63	56.00	-23.37	22.82	46.00	-23.18
0.98123	0.20	0.07	30.08	56.00	-25.92	23.83	46.00	-22.17
2.42286	0.22	0.10	32.60	56.00	-23.40	27.49	46.00	-18.51
12.8283	0.62	0.25	34.83	60.00	-25.17	26.35	50.00	-23.65
14.5225	0.68	0.29	36.73	60.00	-23.27	23.55	50.00	-26.45
15.5691	0.72	0.30	35.38	60.00	-24.62	22.66	50.00	-27.34
17.1741	0.79	0.28	34.14	60.00	-25.86	24.31	50.00	-25.69



Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

	Corrective Factor		Quasi-Peak			Average		
Frequency (MHz)	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.46316	0.11	0.03	32.16	57.05	-24.89	20.21	47.05	-26.84
0.57733	0.13	0.04	31.47	56.00	-24.53	19.58	46.00	-26.42
0.80966	0.17	0.05	29.72	56.00	-26.28	22.03	46.00	-23.97
0.9257	0.19	0.06	31.91	56.00	-24.09	21.60	46.00	-24.40
0.98465	0.20	0.07	29.91	56.00	-26.09	23.60	46.00	-22.40
10.0163	0.31	0.18	37.15	60.00	-22.85	32.20	50.00	-17.80
12.5322	0.36	0.24	34.41	60.00	-25.59	19.14	50.00	-30.86
15.5476	0.41	0.30	35.25	60.00	-24.75	22.18	50.00	-27.82
17.3759	0.45	0.28	33.02	60.00	-26.98	27.08	50.00	-22.92
17.6537	0.45	0.28	32.17	60.00	-27.83	23.32	50.00	-26.68



* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1 , 6, 11 to get the maximum reading of all these channels.
Two type of antennas have been test, and the worse data show above.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

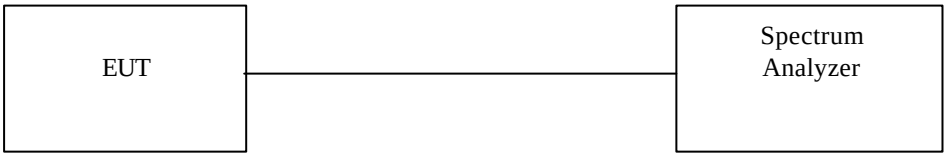
5.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

5.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode: Spectrum analyzer
Detector function: Peak mode
RBW: 100KHz
VBW: 100KHz

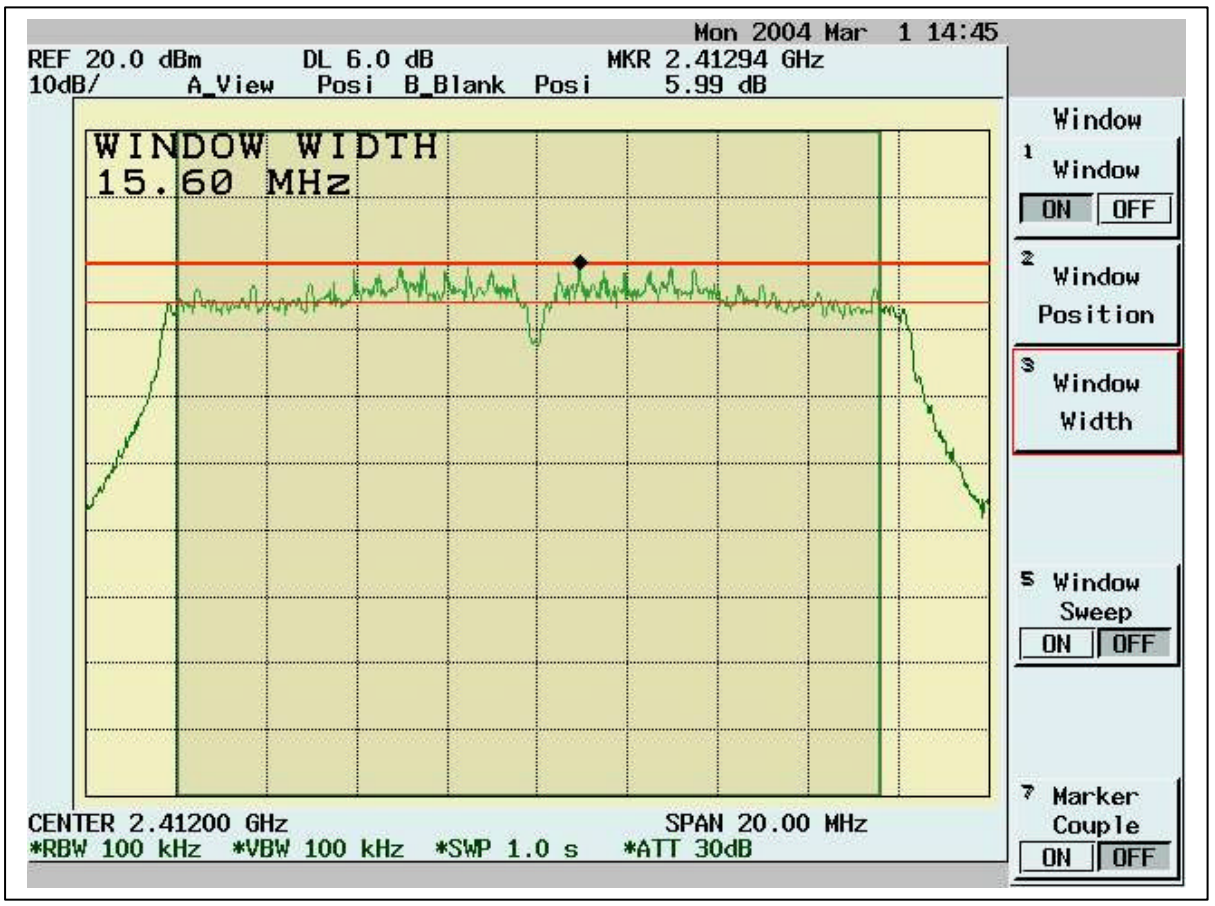
5.2.2 Test Setup

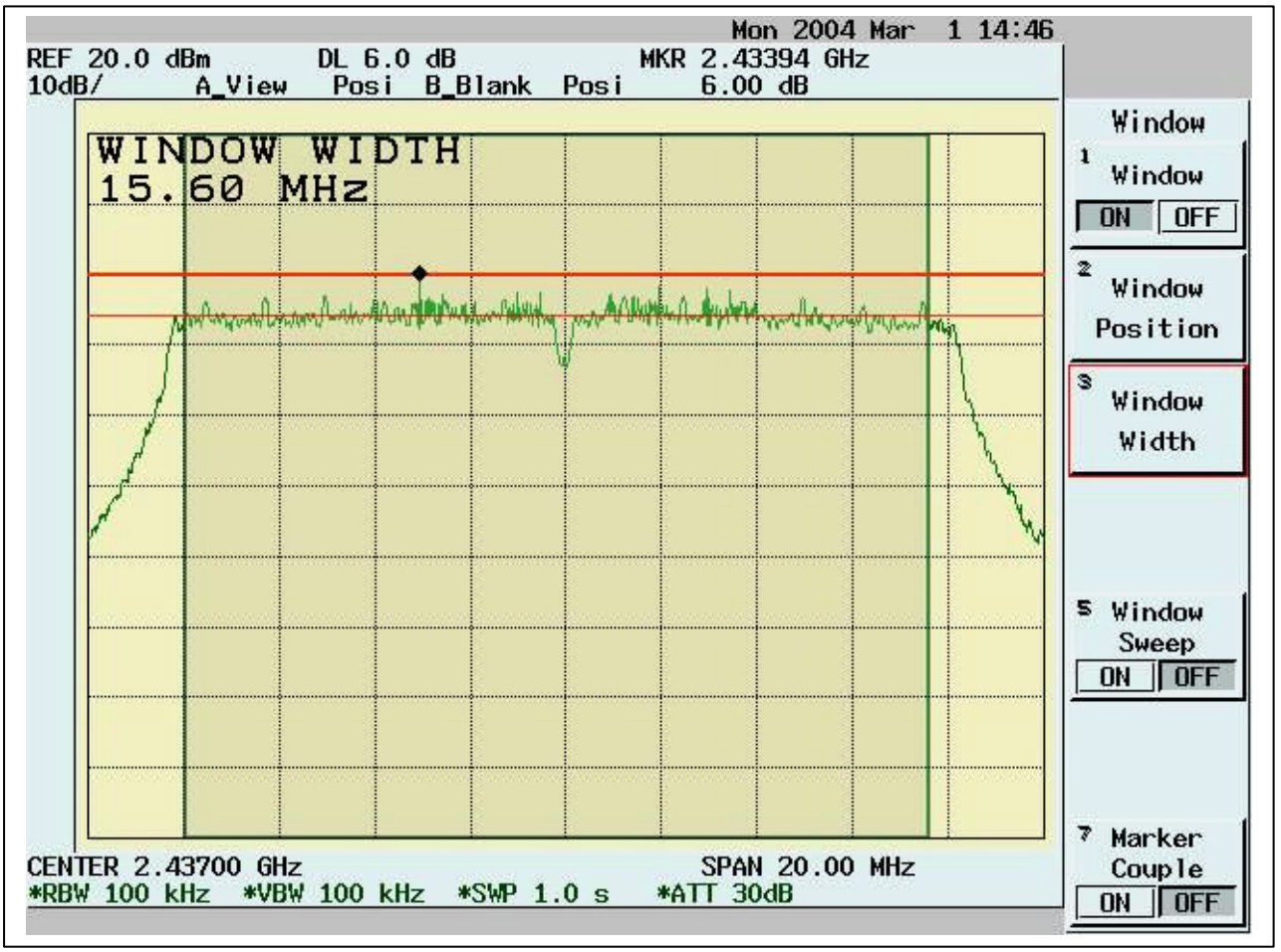


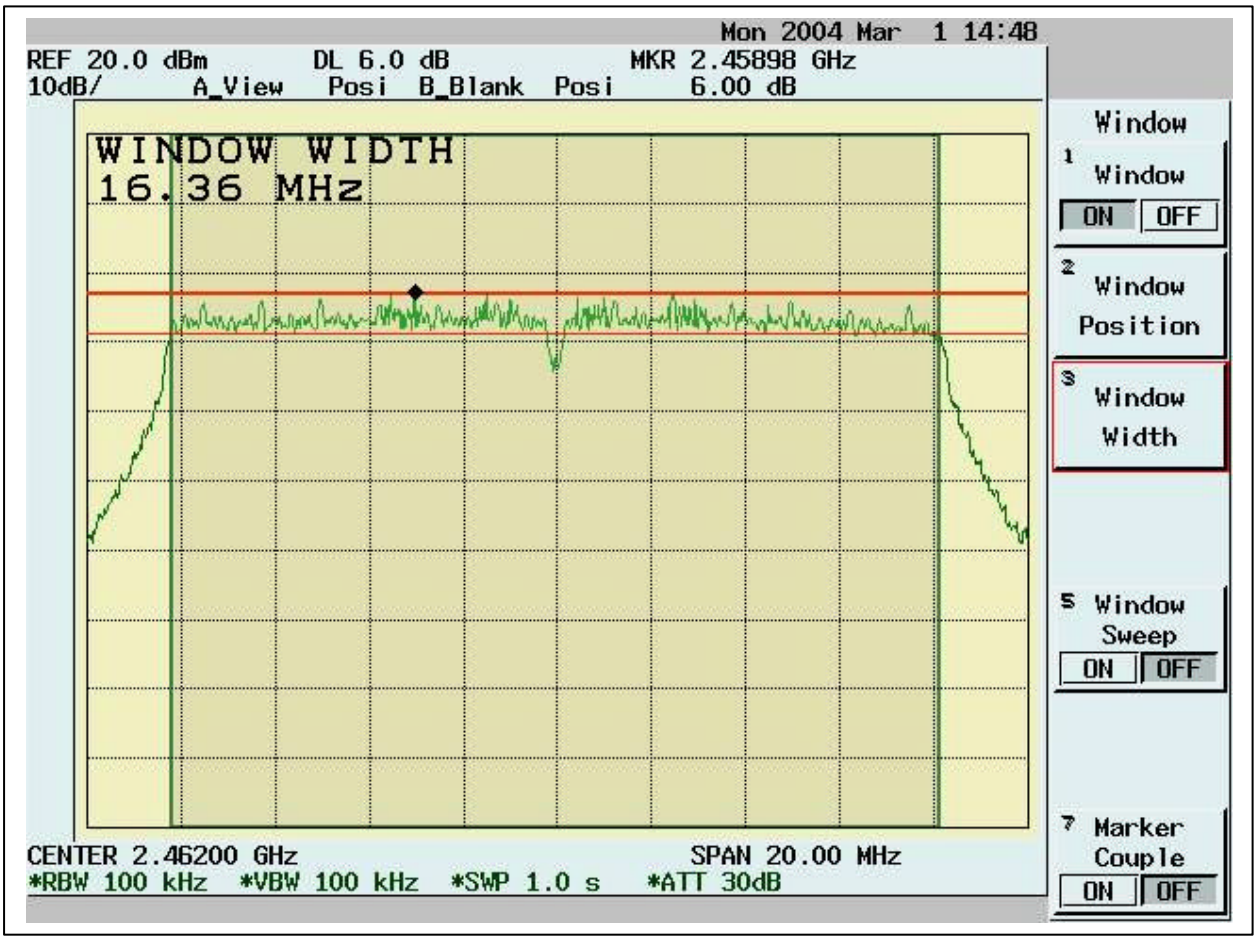
5.2.3 Test Data:

Table 6dB Bandwidth

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	15.6	0.5	Pass
6	2437	15.6	0.5	Pass
11	2462	16.36	0.5	Pass


Mon 2004 Mar 1 14:45
REF 20.0 dBm
DL 6.0 dB
MKR 2.41294 GHz
10dB/
A_View
Posi
B_Blank
Posi
5.99 dB
WINDOW WIDTH
15.60 MHz
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF
CENTER 2.41200 GHz
SPAN 20.00 MHz
*RBW 100 kHz
*VBW 100 kHz
*SWP 1.0 s
*ATT 30dB


Mon 2004 Mar 1 14:46
REF 20.0 dBm
DL 6.0 dB
MKR 2.43394 GHz
10dB/
A_View
Posi
B_Blank
Posi
6.00 dB
WINDOW WIDTH
15.60 MHz
Window
1 Window
ON
OFF
2 Window Position
3 Window Width
5 Window Sweep
ON
OFF
7 Marker Couple
ON
OFF
CENTER 2.43700 GHz
SPAN 20.00 MHz
*RBW 100 kHz
*VBW 100 kHz
*SWP 1.0 s
*ATT 30dB


Mon 2004 Mar 1 14:48
REF 20.0 dBm
DL 6.0 dB
MKR 2.45898 GHz
10dB/
A_View
Posi
B_Blank
Posi
6.00 dB
WINDOW WIDTH
16.36 MHz
Window
1 Window
ON
OFF
2 Window Position
3 Window Width
5 Window Sweep
ON
OFF
7 Marker Couple
ON
OFF
CENTER 2.46200 GHz
SPAN 20.00 MHz
*RBW 100 kHz
*VBW 100 kHz
*SWP 1.0 s
*ATT 30dB

5.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

5.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer .

5.3.2 Test Setup

5.3.3 Test Data:

Maximum Peak Output Power

Chennel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	18.124	1.1	83.64	19.224	30	Pass
6	2437	18.093	1.1	83.04	19.193	30	Pass
11	2462	17.843	1.1	78.40	18.943	30	Pass

5.4 Radiated Emission Measurement [Section [15.247(c)(4)]

5.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

5.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.
For the test of 2^{nd} to 10^{th} harmonics frequencies , the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

5.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	1MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

5.4.4 Test Data (30MHz – 1GHz) :.

30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
191.99	17.45	8.66	3.70	0.00	29.81	43.50	-13.69	100.00	68.00
198.78	25.38	8.86	3.77	0.00	38.01	43.50	-5.49	100.00	219.00
233.7	24.14	9.44	4.10	0.00	37.69	46.00	-8.31	150.00	203.00
332.64	17.91	14.06	4.77	0.00	36.73	46.00	-9.27	100.00	337.00
365.62	14.24	14.83	5.01	0.00	34.08	46.00	-11.92	100.00	304.00
398.6	13.31	15.95	5.20	0.00	34.47	46.00	-11.53	100.00	203.00
455.83	11.09	16.55	5.52	0.00	33.17	46.00	-12.83	100.00	337.00
764.29	5.27	20.07	7.08	0.00	32.42	46.00	-13.58	100.00	120.00
830.25	6.38	20.36	7.39	0.00	34.14	46.00	-11.86	200.00	104.00
898.15	6.86	20.41	7.66	0.00	34.93	46.00	-11.07	200.00	203.00

30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
68.8	24.88	5.60	2.22	0.00	32.70	40.00	-7.30	100.00	203.00
77.53	24.54	6.35	2.35	0.00	33.24	40.00	-6.76	150.00	219.00
133.79	17.41	11.02	3.09	0.00	31.52	43.50	-11.98	100.00	252.00
142.52	17.97	10.15	3.23	0.00	31.34	43.50	-12.16	100.00	268.00
199.75	21.50	8.89	3.78	0.00	34.17	43.50	-9.33	150.00	105.00
456.8	16.83	16.58	5.53	0.00	38.93	46.00	-7.07	100.00	170.00
531.49	10.05	18.58	5.97	0.00	34.59	46.00	-11.41	150.00	7.00
651.77	8.49	19.10	6.56	0.00	34.15	46.00	-11.85	100.00	23.00
701.24	9.27	19.03	6.79	0.00	35.10	46.00	-10.90	150.00	333.00
716.76	6.82	19.37	6.85	0.00	33.04	46.00	-12.96	100.00	186.00

* NOTE:
During the Pre-test, the EUT has been tested for Channel 1 , 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.
Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 30MHz to 1GHz have been tested

5.4.5 Test Data (1GHz – 25 GHz) .

ANT1

1GHz~ 25 GHz (Horizontal), Channel 1 : 2412 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3245.25	39.71	31.09	2.45	46.61	26.64	54.00	-27.36	100	113
3492.51	38.55	31.39	2.08	46.65	25.37	54.00	-28.63	100	323
4003.50	41.25	32.01	1.68	46.11	28.83	54.00	-25.17	100	158
4849.65	38.24	34.87	1.93	46.91	28.14	54.00	-25.86	101	222
6961.54	34.17	39.78	2.31	46.33	29.93	54.00	-24.07	102	338
8630.37	36.79	40.84	2.61	42.57	37.68	54.00	-16.32	101	208

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 1 : 2412 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
2895.60	38.21	30.74	2.82	46.50	25.27	54.00	-28.73	103	156
3262.74	39.59	31.12	2.43	46.62	26.52	54.00	-27.48	100	132
3657.34	44.73	31.59	1.57	46.48	31.41	54.00	-22.59	100	284
4818.18	38.88	34.74	1.93	46.88	28.67	54.00	-25.33	102	118
8030.97	38.34	41.19	2.50	43.67	38.36	54.00	-15.64	101	276
9643.36	39.59	39.20	2.78	42.07	39.49	54.00	-14.51	100	131

'pk'---- peak, 'av'----average

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB
Margin = Corrected Amplitude – Limit
Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal), Channel 6 : 2437 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3277.72	40.10	31.13	2.40	46.62	27.02	54.00	-26.98	101	232
3435.06	38.16	31.32	2.17	46.64	25.00	54.00	-29.00	101	93
4895.10	38.02	35.06	1.94	46.95	28.08	54.00	-25.92	100	293
6961.54	33.53	39.78	2.31	46.33	29.29	54.00	-24.71	100	291
7929.07	38.37	40.94	2.49	44.08	37.72	54.00	-16.28	101	359
8006.99	37.77	41.20	2.50	43.73	37.73	54.00	-16.27	100	230

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
2888.11	38.35	30.73	2.82	46.50	25.41	54.00	-28.59	102	39
3297.70	40.03	31.16	2.37	46.62	26.94	54.00	-27.06	101	147
4870.63	40.72	34.96	1.94	46.93	30.69	54.00	-23.31	100	18
6989.51	34.22	39.94	2.32	46.32	30.16	54.00	-23.84	102	191
8276.72	36.78	41.09	2.55	43.04	37.38	54.00	-16.62	104	345
9745.25	39.01	39.20	2.79	41.81	39.19	54.00	-14.81	102	11

'pk'---- peak, 'av'----average

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
2900.60	37.58	30.74	2.82	46.51	24.63	54.00	-29.37	100	194
3267.73	40.31	31.12	2.42	46.62	27.23	54.00	-26.77	100	186
4919.58	40.54	35.16	1.95	46.97	30.68	54.00	-23.32	100	167
6996.50	33.13	39.98	2.32	46.31	29.12	54.00	-24.88	101	109
7899.10	38.99	40.84	2.48	44.22	38.09	54.00	-15.91	103	163
8522.48	36.94	40.97	2.59	42.49	38.02	54.00	-15.98	102	91

'pk'---- peak, 'av'----average

1GHz~ 25 GHz (Vertical), Channel 11 : 2462 MHz (RBW=1MHz VBW=1MHz)

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
3235.26	39.94	31.08	2.47	46.61	26.87	54.00	-27.13	100	139
3435.06	38.50	31.32	2.17	46.64	25.35	54.00	-28.65	100	147
4000.00	44.27	32.00	1.68	46.11	31.84	54.00	-22.16	100	118
4923.08	41.38	35.18	1.95	46.97	31.53	54.00	-22.47	102	191
7941.06	38.93	40.99	2.49	44.03	38.38	54.00	-15.62	103	139
9847.15	37.45	39.20	2.80	41.54	37.92	54.00	-16.08	104	345

'pk'---- peak, 'av'----averag

Note:

The Spectrum noise level + Correction Factor < Limit - 6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 1GHz to 25 GHz have been tested.