

**Test Report**  
**FOR**  
**FCC Part 15 Subpart C**

*of*

**Notebook Personal Computer**  
(with WLAN 802.11b+g Mini-PCI Module RM8 inside)

*Model*

**MS2143**

**(Brand: acer )**

*Applied by:*

Wistron NeWeb Corporation  
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Science-based Industrial Park Hsinchu 300,  
Taiwan, R. O. C.

*Test Performed by:*

**International Standards Laboratory**

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**Test Date: 2003/12/04**

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# 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 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  
(with WLAN 802.11b+g Mini-PCI Module RM8 inside)  
Model: MS2143  
Applied by Wistron NeWeb Corp.

**Sample received Date:** 2003/11/01

**Final test Date :** 200312/04

**Test Site:** Chamber 02, Conduction 02

Temperature 24° C(Conduction Test); 21° C (Radiation Test)

Humidity: 57% (Conduction Test); 51% (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

  
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Eddy Hsiung/Director

Test results given in this report apply only to the specific sample(s) tested under stated test conditions. This report shall not be reproduced other than in full without the explicit written consent of ISL. This report totally contains 75 pages, including 1 cover page, 2 contents page, and 72pages for the test description. This report must not be use to claim product endorsement by NVLAP or any agency of the U.S. Government.

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 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	

### 3. Description of Equipment Under Test (EUT)

Description: Notebook Personal Computer  
(with WLAN 802.11b+g Mini-PCI Module RM8 inside)

Model No.: MS2143

FCC ID: NKRMS2143RM8

Brand: acer

Wireless LAN Module: Wistron NeWeb, Model: RM8

Frequency Range 802.11b/g: 2412 - 2462 MHz

Support channel: 11 Channels

802.11b/g

Modulation Skill: DBPSK(1Mbps), DQPSK(2Mbps),  
CCK(5.5/11Mbps)

802.11g OFDM (6M - 54Mbps)

Antennas Type: Triple-band PIFA Type in Metal  
Model: EBO-A  
made by Wistron NeWeb Corp.

Antenna Connected: Connected to RF connector on the PCB of the  
802.11b/g WLAN Adapter. The user is not possible to  
change the antenna without disassembling the notebook  
computer.

Antenna peak Gain: 2.89 dBi (2.500GHz)

Main antenna -0.77 dBi (2.500GHz)

Aux antenna 3.3V DC from Notebook PC

Power Type of LAN module:

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		

AC Power Adapter Manufacturer: Liteon ADT 120W 3P PA-1121-02AC  
REV.A

AC Power Cord Type: Unshielded, 1.8m (Detachable) to Power Adapter

DC Power Cable Type: Unshielded, 1.8m (Non-Detachable) at Power Adapter (With a Core)

SODIMM DDR333: Micron MT8VDDT3264HDG-335C3  
256MB

LCD: 14.1 AU (Model:B141XN04 V.2

Hard Disk Driver: HGST (Model: IC25N020ATMR04-0) 20GB

DVD ROM Driver: QSI (Model: SDR-083)

Combo Driver: QSI (Model: SBW-242U)

MDC Modem Module: Ambit (Model:T60M283.10)

DVD-Dual Driver: Pioneer(Model: DVR-K12D)

1394 C0nnectoer: one 4 Pins

USB Connector: four 4 Pins

RJ11 Connector: one 2 Pins

RJ45 Connector: one 8 Pins

VGA Connector: one 15 Pins

Mini PCI Slot: one

TV Port: one 7 Pins

Line out Port: one

Line-in Port: one

DC IN Port: one

Battery: Li-ION, 12cell

Speed & CPU

Speed	CPU
100MHz	AMD Athlon XP ATH64 DTR3000+1.8G 1ML2 KC.A3302.89H
100MHz	AMD Athlon XP ATH64 DTR3300+2.0G 1ML2 KC.A3002.89H

### 3.1 Test Standards and Procedure

Test Specification: FCC Part 15 subpart 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 802.11b and 802.11g of EUT were all tested.
3. "Normal mode" of 802.11g allows data rates up to 54 Mbps.



## 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 6dB 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 6dB 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.

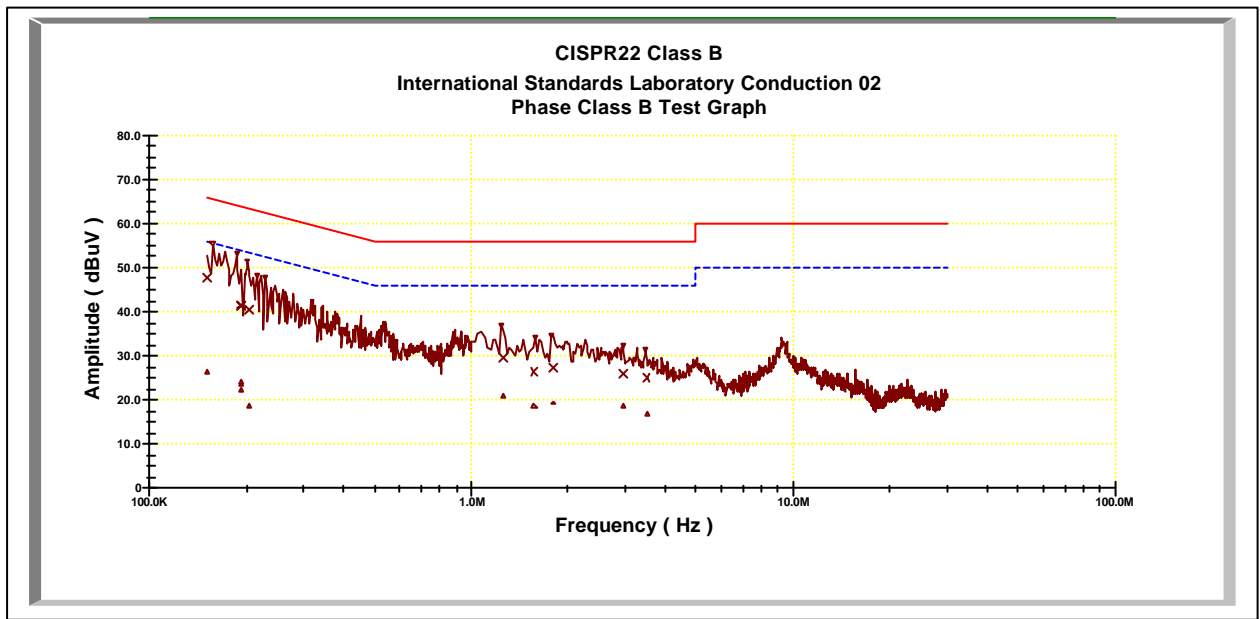
#### 4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

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

4.1.4 Test Data:

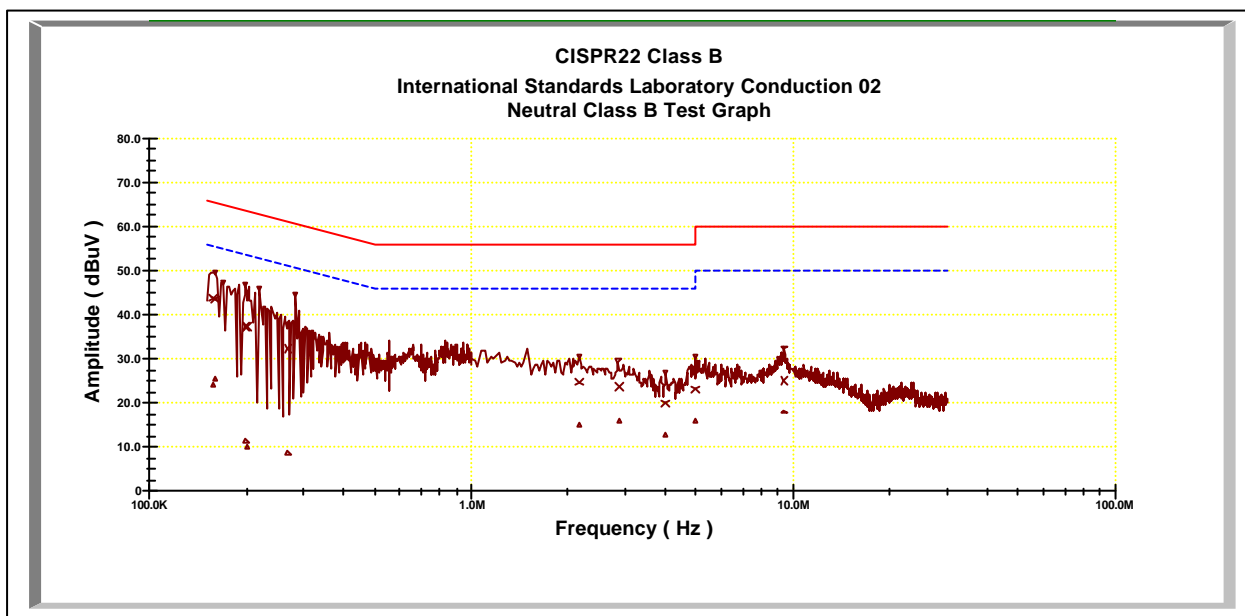
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

Frequency (MHz)	Corrective Factor		Quasi-Peak			Average		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.15084	0.10	0.02	47.56	65.98	-18.42	26.50	55.98	-29.48
0.19175	0.10	0.02	41.52	64.81	-23.29	22.33	54.81	-32.48
0.19208	0.10	0.02	41.31	64.80	-23.49	24.07	54.80	-30.73
0.19331	0.10	0.02	41.48	64.76	-23.28	23.36	54.76	-31.40
0.20343	0.10	0.02	40.31	64.47	-24.16	18.73	54.47	-35.75
1.25052	0.42	0.08	29.46	56.00	-26.54	21.01	46.00	-24.99
1.56628	0.33	0.09	26.45	56.00	-29.55	18.65	46.00	-27.35
1.78968	0.26	0.09	27.28	56.00	-28.72	19.27	46.00	-26.73
2.96936	0.25	0.11	25.90	56.00	-30.10	18.50	46.00	-27.50
3.50297	0.28	0.12	24.98	56.00	-31.02	16.68	46.00	-29.32



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

Frequency (MHz)	Corrective Factor		Quasi-Peak			Average		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.15717	0.10	0.02	43.83	65.80	-21.97	23.99	55.80	-31.81
0.1593	0.10	0.02	43.46	65.73	-22.27	25.27	55.73	-30.47
0.1995	0.10	0.02	37.37	64.59	-27.22	11.22	54.59	-43.37
0.20143	0.10	0.02	37.29	64.53	-27.24	10.07	54.53	-44.46
0.26911	0.10	0.02	32.35	62.60	-30.25	8.48	52.60	-44.12
2.17321	0.20	0.10	24.75	56.00	-31.25	15.14	46.00	-30.86
2.88971	0.20	0.11	23.69	56.00	-32.31	15.86	46.00	-30.14
4.00928	0.20	0.12	19.82	56.00	-36.18	12.71	46.00	-33.29
4.96139	0.22	0.13	22.98	56.00	-33.02	16.06	46.00	-29.94
9.39244	0.30	0.17	25.08	60.00	-34.92	17.93	50.00	-32.07



\* 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

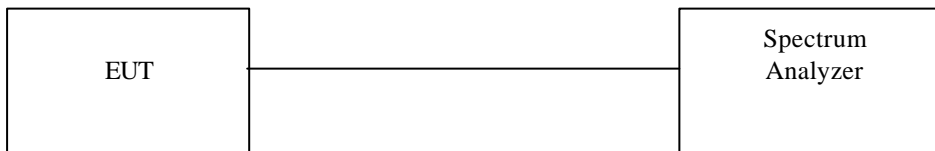
## 4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

### 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

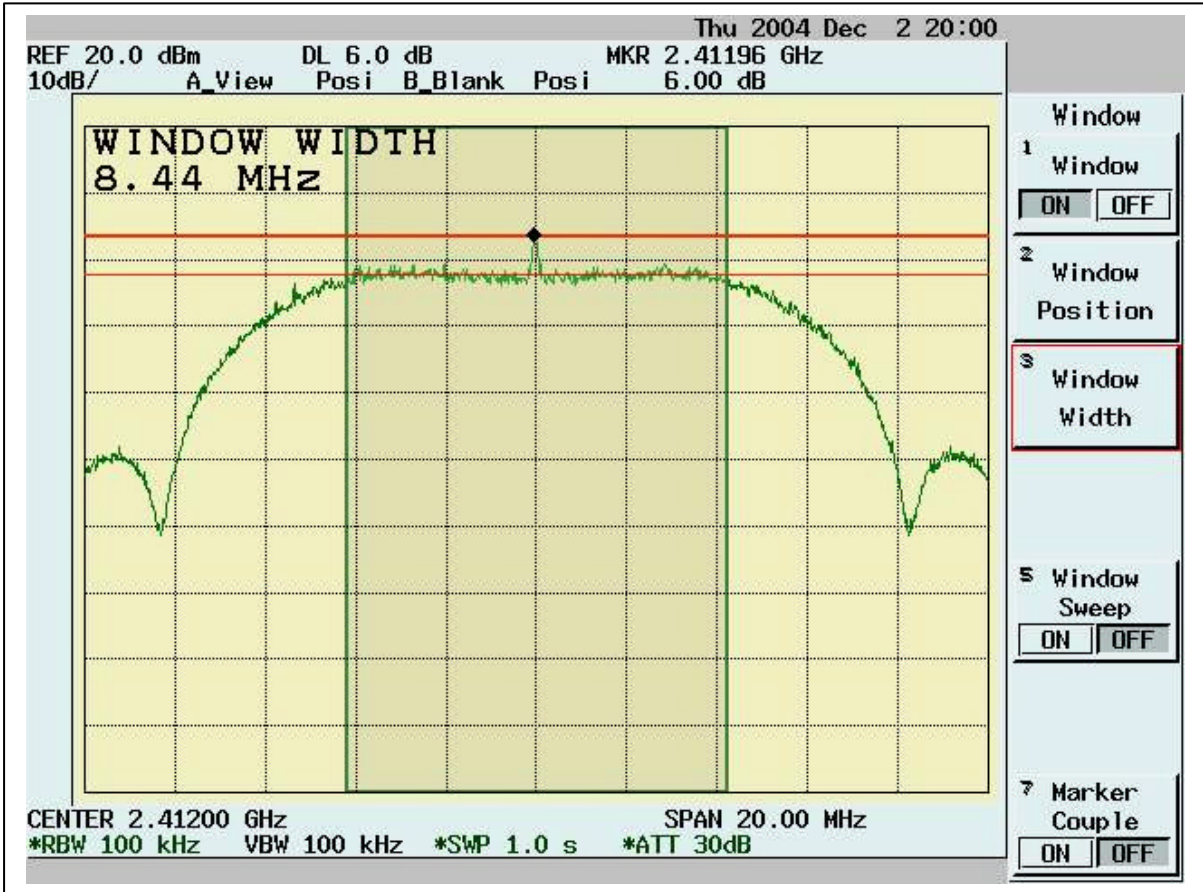
### 4.2.2 Test Setup

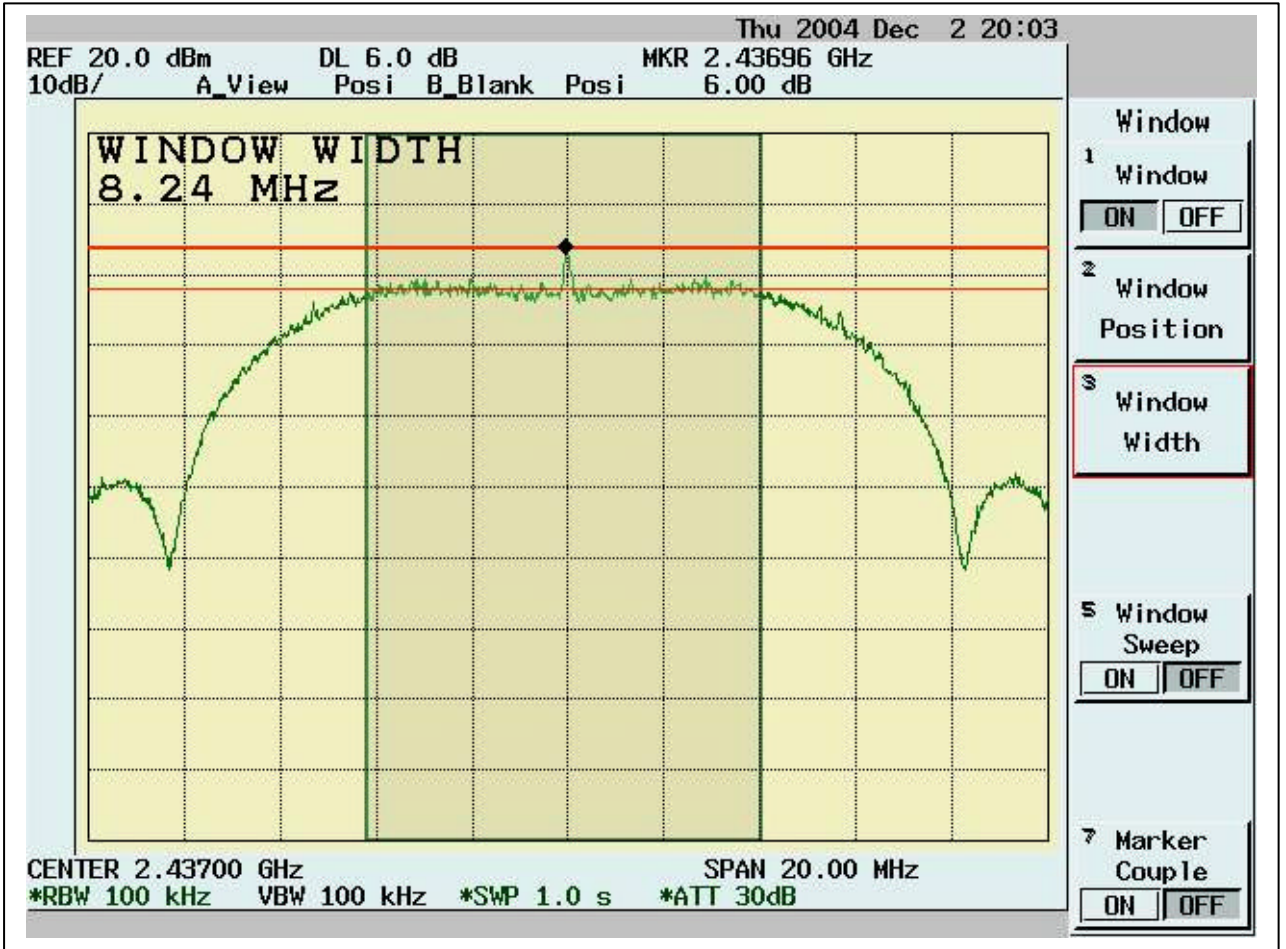


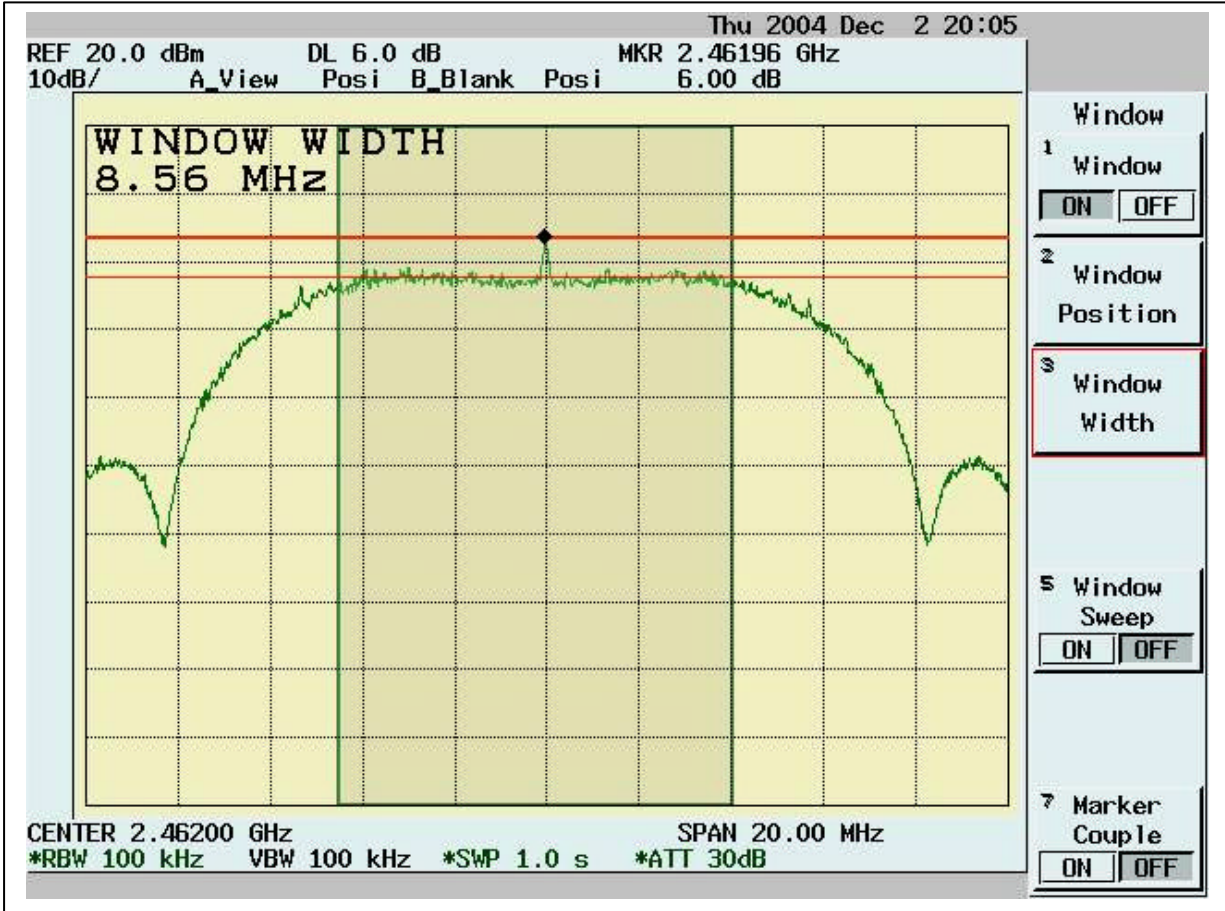
### 4.2.3 Test Data

**Table 6dB Bandwidth**

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	8.44	0.5	Pass
6	2437	8.24	0.5	Pass
11	2462	8.56	0.5	Pass







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

#### 4.3.1 Test Procedure

1. 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	15.517	1.02	45.05	16.537	30	Pass
6	2437	15.517	1.02	45.05	16.537	30	Pass
11	2462	15.329	1.02	43.14	16.349	30	Pass



## 5. Radiated Emission Measurement [Section [15.247(c)(4)]

### 5.1 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.

#### 5.1.1 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<sup>nd</sup> to 10<sup>th</sup> 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.

#### 5.1.2 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

**5.1.3 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 (°)
165.80	16.84	8.68	3.44	0.00	28.96	43.50	-14.54	150.00	184.00
199.75	17.44	8.89	3.78	0.00	30.11	43.50	-13.39	200.00	297.00
364.65	11.78	14.47	5.00	0.00	31.25	46.00	-14.75	100.00	345.00
432.55	13.99	15.86	5.39	0.00	35.24	46.00	-10.76	200.00	39.00
527.61	8.21	17.76	5.94	0.00	31.92	46.00	-14.08	100.00	71.00
532.46	7.58	17.88	5.97	0.00	31.43	46.00	-14.57	100.00	87.00
699.30	5.45	18.90	6.79	0.00	31.13	46.00	-14.87	100.00	168.00
732.28	9.84	19.35	6.91	0.00	36.11	46.00	-9.89	150.00	329.00
796.30	6.93	19.79	7.25	0.00	33.97	46.00	-12.03	100.00	281.00
929.19	4.21	20.38	7.78	0.00	32.37	46.00	-13.63	200.00	329.00

**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 (°)
106.63	15.62	11.20	2.74	0.00	29.56	43.50	-13.94	150.00	191.00
432.55	13.46	15.86	5.39	0.00	34.71	46.00	-11.29	100.00	288.00
463.59	11.87	16.30	5.57	0.00	33.73	46.00	-12.27	100.00	272.00
567.38	9.02	18.30	6.15	0.00	33.48	46.00	-12.52	200.00	159.00
599.39	11.84	18.30	6.32	0.00	36.45	46.00	-9.55	100.00	159.00
632.37	10.20	18.56	6.47	0.00	35.23	46.00	-10.77	100.00	256.00
665.35	8.23	18.76	6.62	0.00	33.61	46.00	-12.39	100.00	240.00
696.39	8.75	18.89	6.77	0.00	34.41	46.00	-11.59	100.00	240.00
732.28	11.26	19.35	6.91	0.00	37.52	46.00	-8.48	100.00	240.00
796.30	5.78	19.79	7.25	0.00	32.82	46.00	-13.18	150.00	337.00

\* 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**

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

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV) (pk)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m) (av)	Margin (dB)	Height (cm)	Position (°)
3088.91	45.13	30.91	1.38	46.59	30.82	54.00	-23.18	109	312
3411.59	47.71	31.29	1.48	46.64	33.85	54.00	-20.15	101	264
7164.83	40.31	39.80	2.35	46.24	36.23	54.00	-17.77	100	174
11461.5	24.88	42.25	3.02	41.51	28.65	54.00	-25.35	100	359
14688.3	27.69	44.22	3.43	42.34	33.01	54.00	-20.99	101	224
15299.7	26.32	43.12	3.50	43.26	29.67	54.00	-24.33	101	158

‘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) (pk)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m) (av)	Margin (dB)	Height (cm)	Position (°)
3088.91	48.68	30.91	1.38	46.59	34.37	54.00	-19.63	100	294
3190.81	46.50	31.03	1.41	46.61	32.33	54.00	-21.67	100	164
3411.59	53.56	31.29	1.48	46.64	39.70	54.00	-14.30	100	288
3581.42	49.58	31.50	1.54	46.56	36.06	54.00	-17.94	101	208
3751.25	45.96	31.70	1.60	46.38	32.88	54.00	-21.12	103	121
7130.87	42.43	39.84	2.34	46.25	38.36	54.00	-15.64	100	335

‘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) (pk)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m) (av)	Margin (dB)	Height (cm)	Position (°)
3088.91	44.73	30.91	1.38	46.59	30.43	54.00	-23.57	100	262
3377.62	44.30	31.25	1.47	46.63	30.40	54.00	-23.60	100	203
3428.57	47.92	31.31	1.49	46.64	34.09	54.00	-19.91	101	296
3581.42	42.90	31.50	1.54	46.56	29.38	54.00	-24.62	100	112
7130.87	40.59	39.84	2.34	46.25	36.53	54.00	-17.47	101	291
14688.3	27.88	44.22	3.43	42.34	33.20	54.00	-20.80	101	176

'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) (pk)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m) (av)	Margin (dB)	Height (cm)	Position (°)
3088.91	49.02	30.91	1.38	46.59	34.71	54.00	-19.29	101	276
3173.83	46.79	31.01	1.40	46.60	32.60	54.00	-21.40	101	349
3411.59	53.52	31.29	1.48	46.64	39.66	54.00	-14.34	100	264
3564.44	47.81	31.48	1.54	46.58	34.25	54.00	-19.75	107	119
3751.25	45.78	31.70	1.60	46.38	32.70	54.00	-21.30	104	352
7130.87	42.32	39.84	2.34	46.25	38.25	54.00	-15.75	100	232

'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) (pk)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m) (av)	Margin (dB)	Height (cm)	Position (°)
3088.91	43.69	30.91	1.38	46.59	29.38	54.00	-24.62	101	114
3411.59	47.79	31.29	1.48	46.64	33.93	54.00	-20.07	101	110
3581.42	44.38	31.50	1.54	46.56	30.85	54.00	-23.15	100	347
7130.87	40.70	39.84	2.34	46.25	36.63	54.00	-17.37	100	224
14688.3	27.82	44.22	3.43	42.34	33.14	54.00	-20.86	100	118
15282.7	25.98	43.15	3.49	43.30	29.32	54.00	-24.68	100	329

'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) (pk)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m) (av)	Margin (dB)	Height (cm)	Position (°)
3088.91	48.34	30.91	1.38	46.59	34.03	54.00	-19.97	100	264
3173.83	46.38	31.01	1.40	46.60	32.18	54.00	-21.82	102	225
3411.59	53.69	31.29	1.48	46.64	39.83	54.00	-14.17	101	282
3581.42	47.44	31.50	1.54	46.56	33.91	54.00	-20.09	100	220
3734.27	46.27	31.68	1.59	46.40	33.14	54.00	-20.86	100	165
7164.83	42.20	39.80	2.35	46.24	38.12	54.00	-15.88	102	263

'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

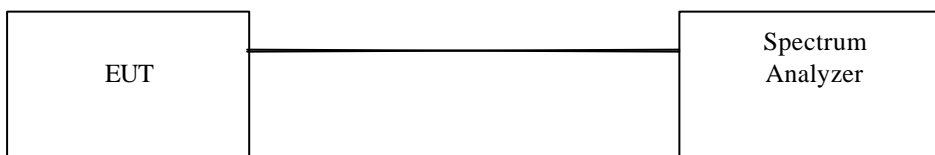
**All frequencies from 1GHz to 25 GHz have been tested.**

## 5.2 Band Edge Measurement

### 5.2.1 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.

### 5.2.2 Test Setup (Conducted)



### 5.2.3 Test Data:

**Table Band Edge measurement (Conducted)**

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: > 20dB (dB)	Pass/Fail
1	2411.9	109.54	---	---
Outside band	2399.9	72.38	37.16	Pass
11	2461.9	108.98	---	---
Outside band	2470.9	78.07	30.91	Pass

=Band Edge Conducted measurement



Band Edge Conducted Measurement





#### 5.2.4 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: 1KHz,  
Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

#### 5.2.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

## 5.2.6 Test Data:

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)	2411.8	72.06	31.67	103.73	---	---	1MHz	---
Outside band	2399.9	36.92	31.67	68.59	35.14	---	1MHz	Pass
1(average mode)	2409.5	57.66	31.67	89.33	---	---	1KHz	---
Restricted band	2390.0	6.50	31.67	38.17	-----	54	1KHz	Pass
11(peak mode)	2461.9	65.75	31.64	97.39	----	---	1MHz	---
Outside band	2471.3	37.46	31.64	69.1	28.29	---	1MHz	Pass
11(average mode)	2458.9	53.05	31.64	84.69	----	---	1KHz	---
Restricted band	2483.5	5.2	31.64	36.84	-----	54	1KHz	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

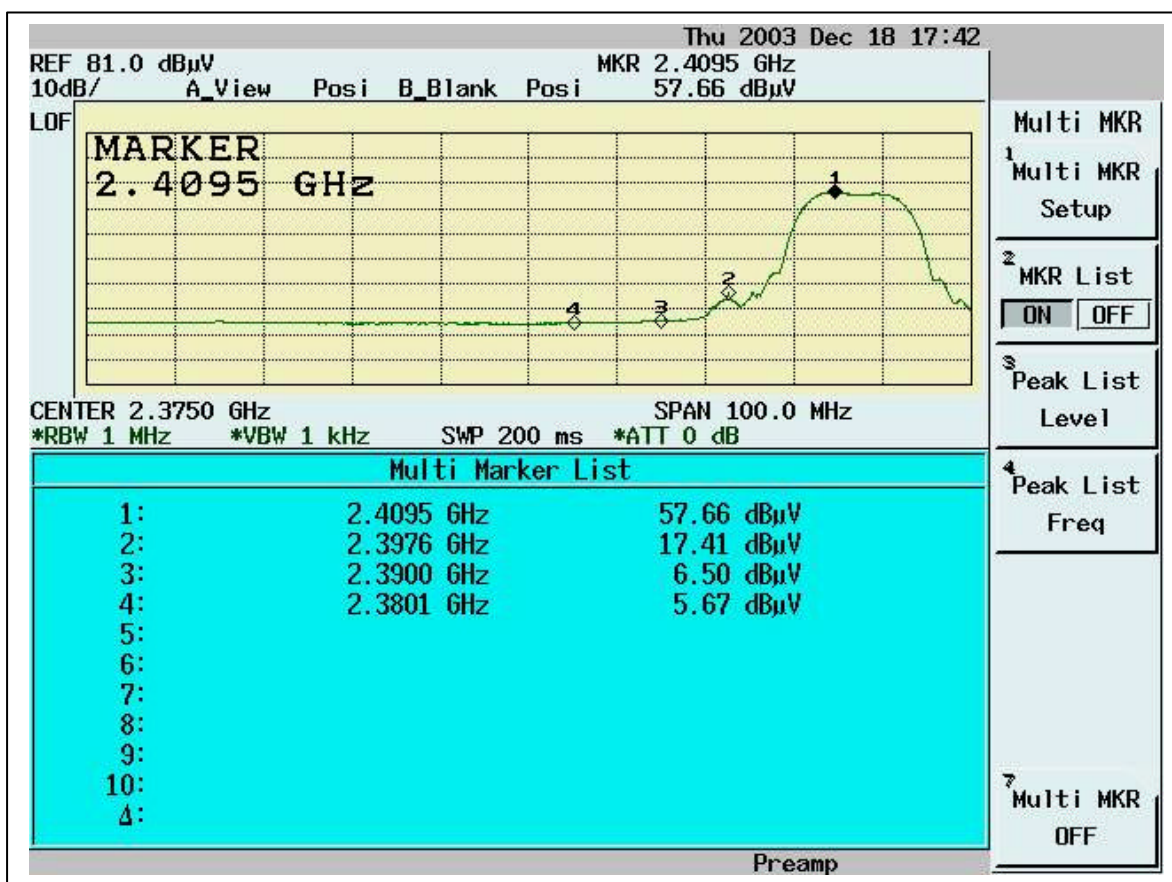
**Band Edge measurement for radiated emission in Restricted Band(Radiated)**

**Peak Mode (Channel 1)**



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

**Average Mode (Channel 1)**



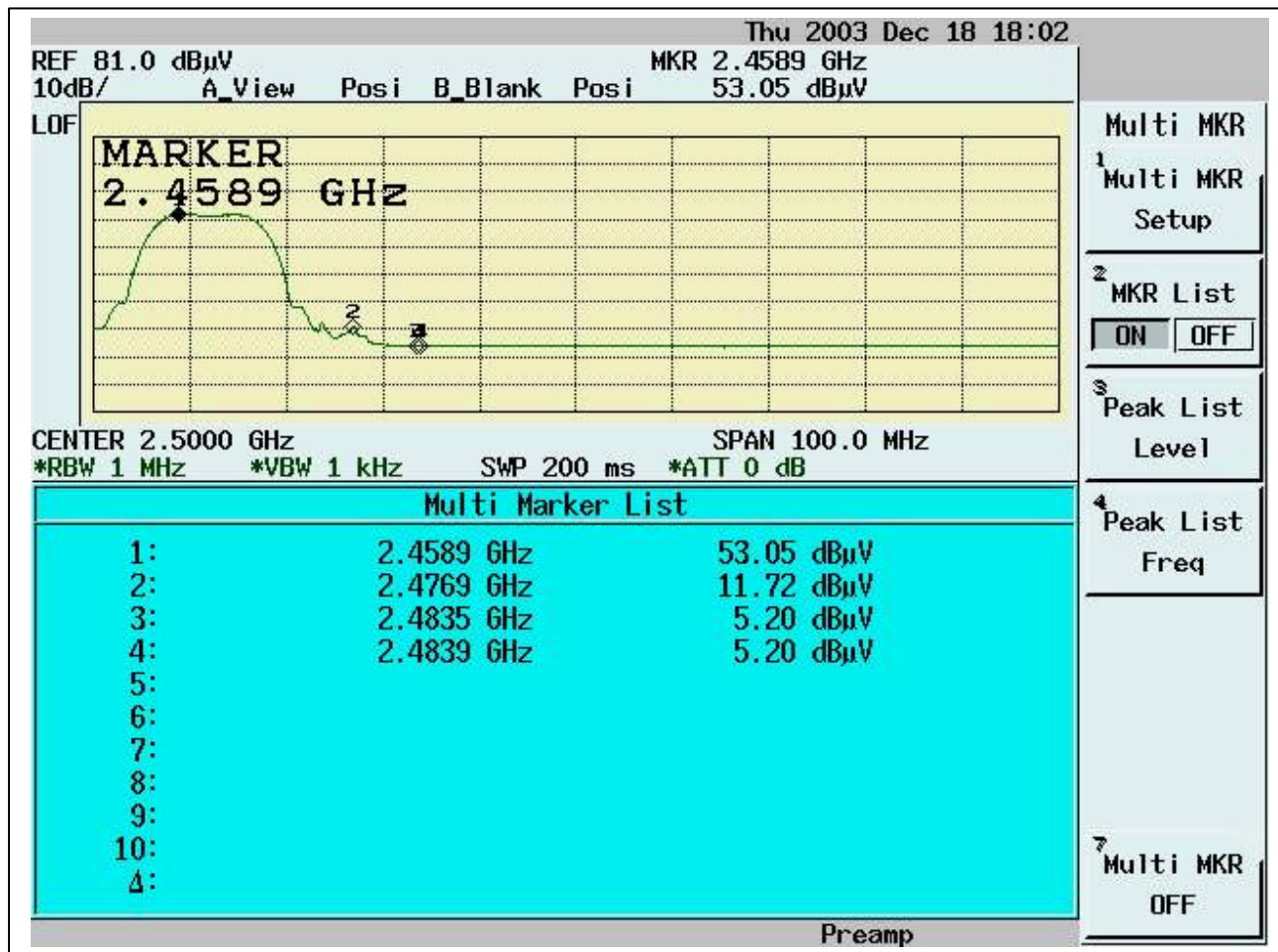
Band Edge measurement for radiated emission in Restricted Band(Radiated)

Peak Mode (Channel 11)



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

**Average Mode (Channel 11)**



### **5.3 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]**

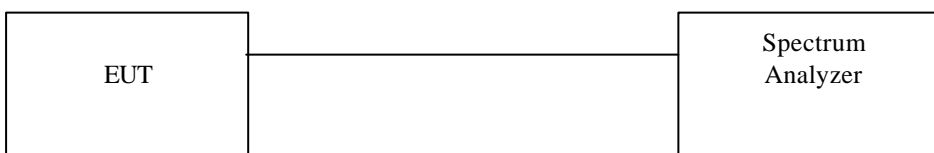
See the SAR report

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

#### 5.4.1 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.

#### 5.4.2 Test Setup

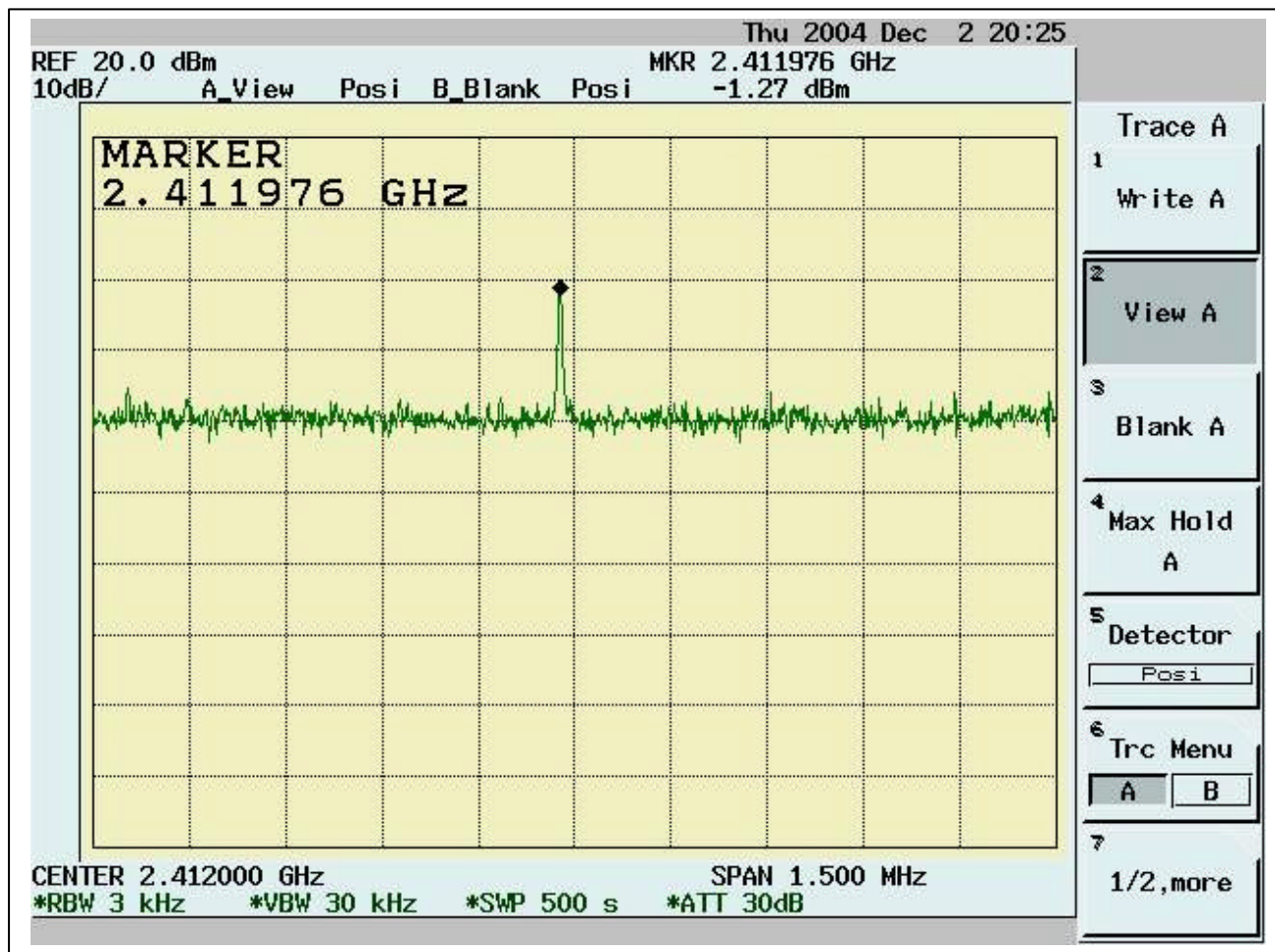


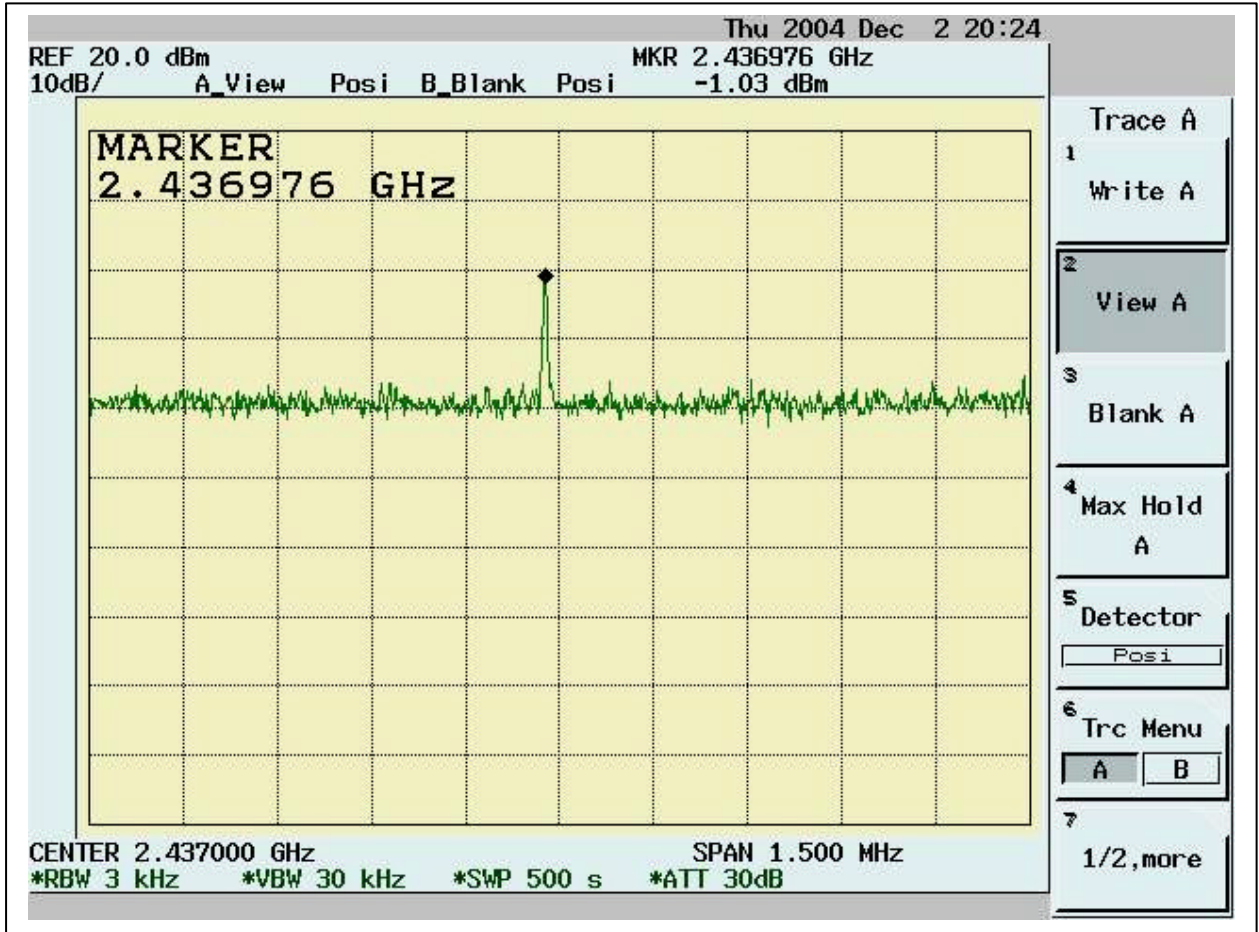
#### 5.4.3 Test Data:

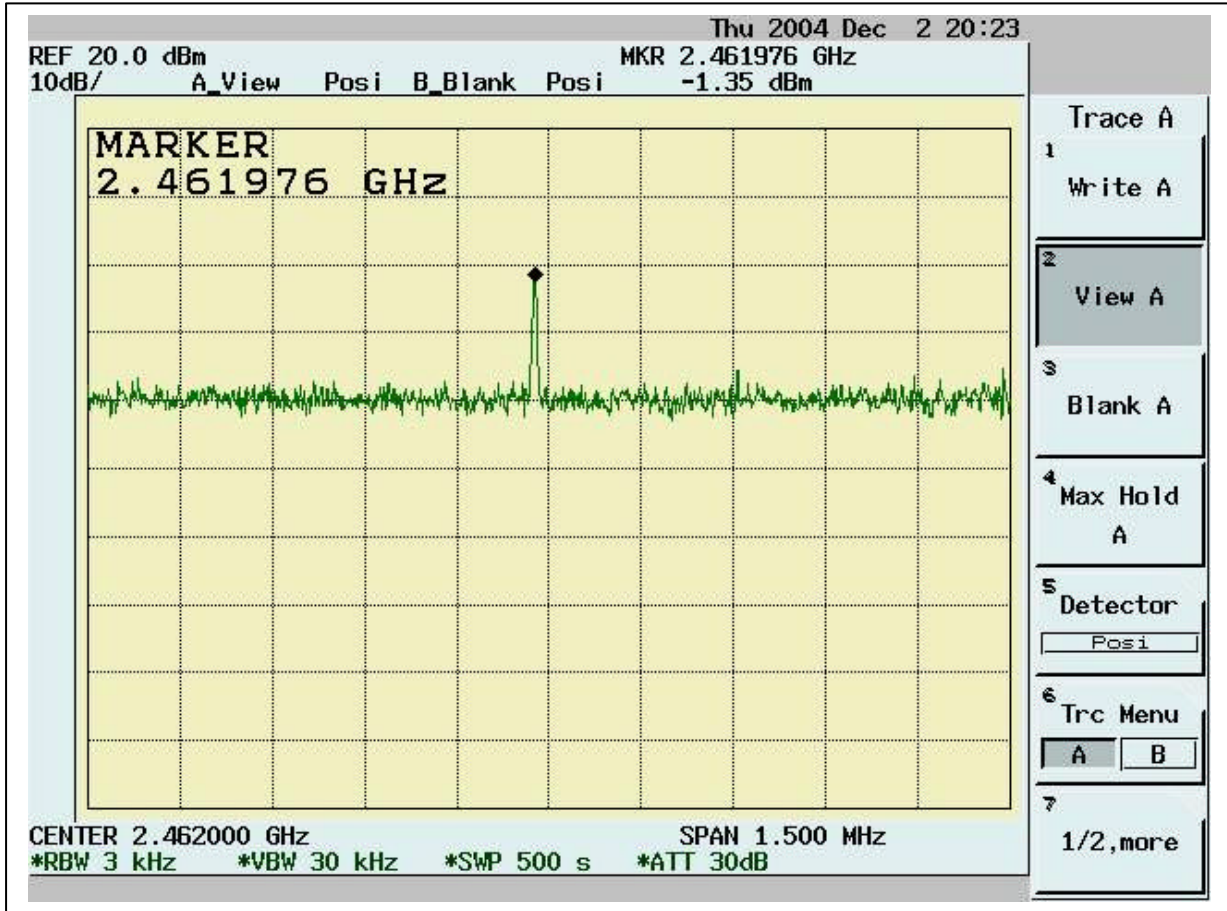
**Table Maximum Peak Output Power Density**

Chennel	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	-1.27	1.02	-0.25	8	Pass
6	-1.03	1.02	-0.01	8	Pass
11	-1.35	1.02	-0.33	8	Pass









## 6. TEST RESULTS (802.11g)

### 6.1 Powerline Conducted Emissions [Section 15.207]

#### 6.1.1 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.

#### 6.1.2 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 6dB 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 6dB 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.

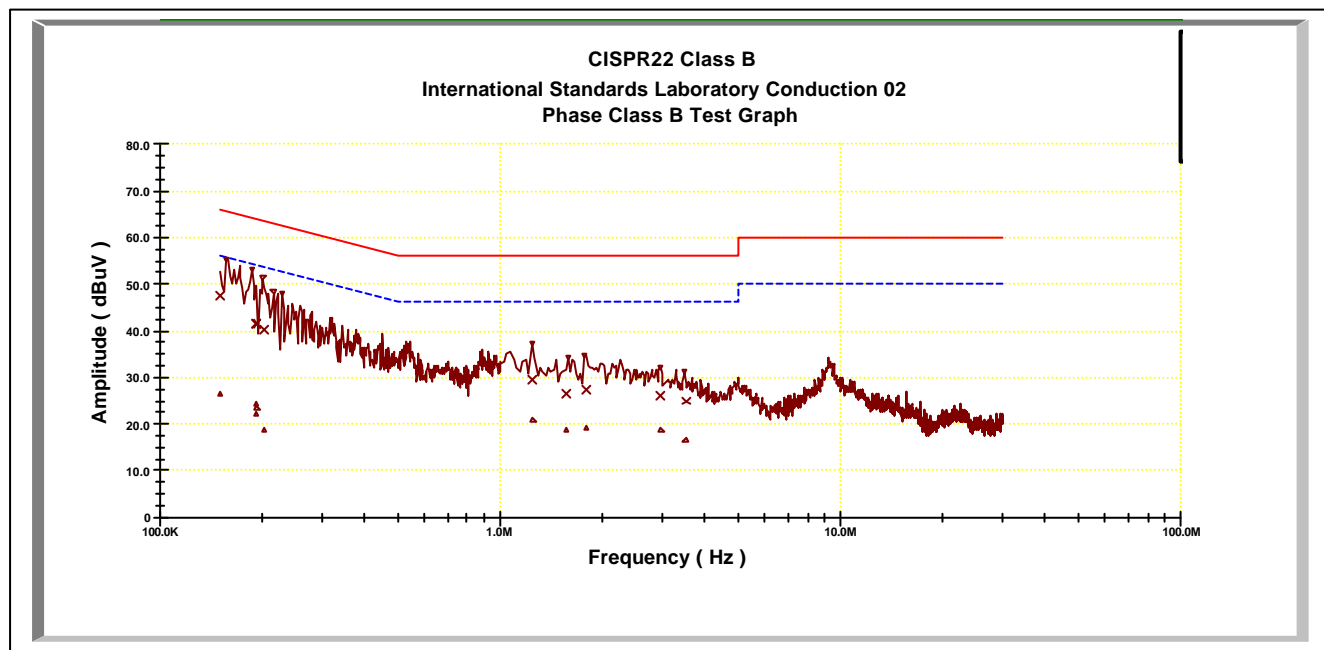
#### 6.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

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

6.1.4 Test Data:

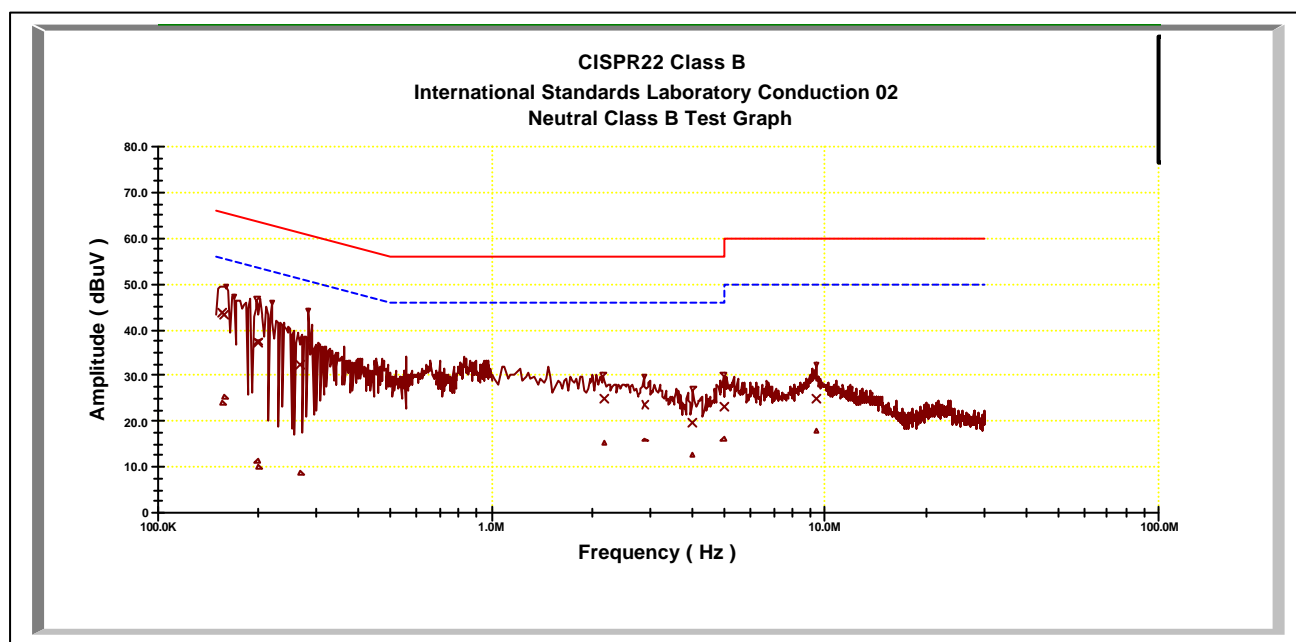
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

Frequency (MHz)	Corrective Factor		Quasi-Peak			Average		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.15084	0.10	0.02	47.56	65.98	-18.42	26.50	55.98	-29.48
0.19175	0.10	0.02	41.52	64.81	-23.29	22.33	54.81	-32.48
0.19208	0.10	0.02	41.31	64.80	-23.49	24.07	54.80	-30.73
0.19331	0.10	0.02	41.48	64.76	-23.28	23.36	54.76	-31.40
0.20343	0.10	0.02	40.31	64.47	-24.16	18.73	54.47	-35.75
1.25052	0.42	0.08	29.46	56.00	-26.54	21.01	46.00	-24.99
1.56628	0.33	0.09	26.45	56.00	-29.55	18.65	46.00	-27.35
1.78968	0.26	0.09	27.28	56.00	-28.72	19.27	46.00	-26.73
2.96936	0.25	0.11	25.90	56.00	-30.10	18.50	46.00	-27.50
3.50297	0.28	0.12	24.98	56.00	-31.02	16.68	46.00	-29.32



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

Frequency (MHz)	Corrective Factor		Quasi-Peak			Average		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.15717	0.10	0.02	43.83	65.80	-21.97	23.99	55.80	-31.81
0.1593	0.10	0.02	43.46	65.73	-22.27	25.27	55.73	-30.47
0.1995	0.10	0.02	37.37	64.59	-27.22	11.22	54.59	-43.37
0.20143	0.10	0.02	37.29	64.53	-27.24	10.07	54.53	-44.46
0.26911	0.10	0.02	32.35	62.60	-30.25	8.48	52.60	-44.12
2.17321	0.20	0.10	24.75	56.00	-31.25	15.14	46.00	-30.86
2.88971	0.20	0.11	23.69	56.00	-32.31	15.86	46.00	-30.14
4.00928	0.20	0.12	19.82	56.00	-36.18	12.71	46.00	-33.29
4.96139	0.22	0.13	22.98	56.00	-33.02	16.06	46.00	-29.94
9.39244	0.30	0.17	25.08	60.00	-34.92	17.93	50.00	-32.07



\* 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

## 6.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

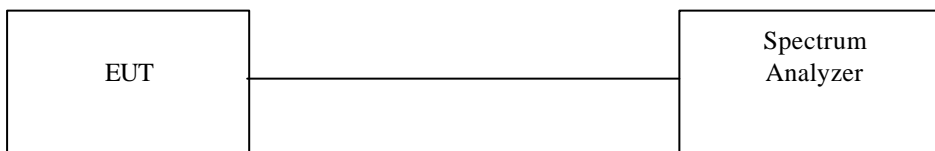
### 6.2.1 Test Procedure

### 6.3

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

### 6.3.1 Test Setup



### 6.3.2 Test Data:

**Table 6dB Bandwidth**

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	15.08	0.5	Pass
6	2437	15.12	0.5	Pass
11	2462	15.20	0.5	Pass



