

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

*of*

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

*Model*

**DT3**

**(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**

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**Report Number: 03LR028DGT**

**Test Date: 2003/12/09**

NVLAP Lab. Code: 200234-0; VCCI: R-1435, C-1440; NEMKO Aut. No: ELA 113; BSMI Lab. Code: SL2-IN-E-0013

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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 802.11g Mini-PCI Module RM8 inside)  
Model: DT3  
Applied by Acer Inc.

**Sample received Date:** 2003/11/22

**Final test Date :** 200312/09

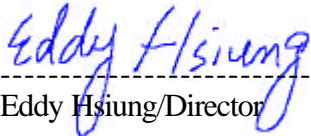
**Test Site:** Chamber 02, Conduction 02

Temperature 23° C(Conduction Test); 23° C (Radiation Test)  
Humidity: 52% (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 72 pages 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	
15.247 (d)	Power Spectral Density	Pass	

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

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

Model No.: DT3

FCC ID: HLZAS1710

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: PIFA Type in Meta  
made by FOXCONN NWInG

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: 1.40 dBi

Main antenna 1.36 dBi

Aux antenna 1.36 dBi

Power Type of LAN 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		

Adapter Type:	Auto Switch/ Lite-On (Model: PA-1181-08QA) 3 Pins
Hard Disk Driver:	Seagate HDD(ALPINE 120G)ST3120022A Seagate HDD(U9 80GB) ST380012A F/W:4.04 WD HDD (80GB) WD800EB-00DJF0 WD HDD (120GB) WD1200BB-00DWA0
LCD:	QDI 17" SXGA ( QDI/ QD17EL07 )
DVD ROM Driver:	QSI 8X DVD-ROM, Slim, SDR-083
CD-RW/DVD Driver:	QSI 8X DVD- Combo, Slim, SBW-242
DVD Dual Driver:	Pioneer DVD Dual DVR-K12D
DDR SDRAM:	Infineon 512MB/ HYS64D64320GU-5-B Infineon 256MB/ HYS64D32300GU-5-B Nanya 512MB/ NT512D64S8HB1G-5T Nanya 256MB/ NT256D64S88B1G-5T
Parallel Connector:	one 25-pins
VGA Connector:	one 15-pins
TV Out:	one 4-pins
USB Connector:	Four 4-pins
1394 Connector:	Two 4-pins
RJ11 Connector:	one 2-pins
RJ45 Connector:	one 8-pins
Mic-in Port:	one
Headphone-out Port:	one
PCMCIA Slot:	one
MS/SD/MMC Slot:	one
DC IN Port:	one
Battery:	Simplo/ BATT PACK LI 916-2600(DT1,4S3P,6.6A)
Power Cord:	Nonshielded, Detachable
Speed & CPU:	
Speed	CPU
133MHz	Pentium IV 2.66GHz
200MHz	Pentium IV / Prescott 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, 4.0 GHz

### 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.

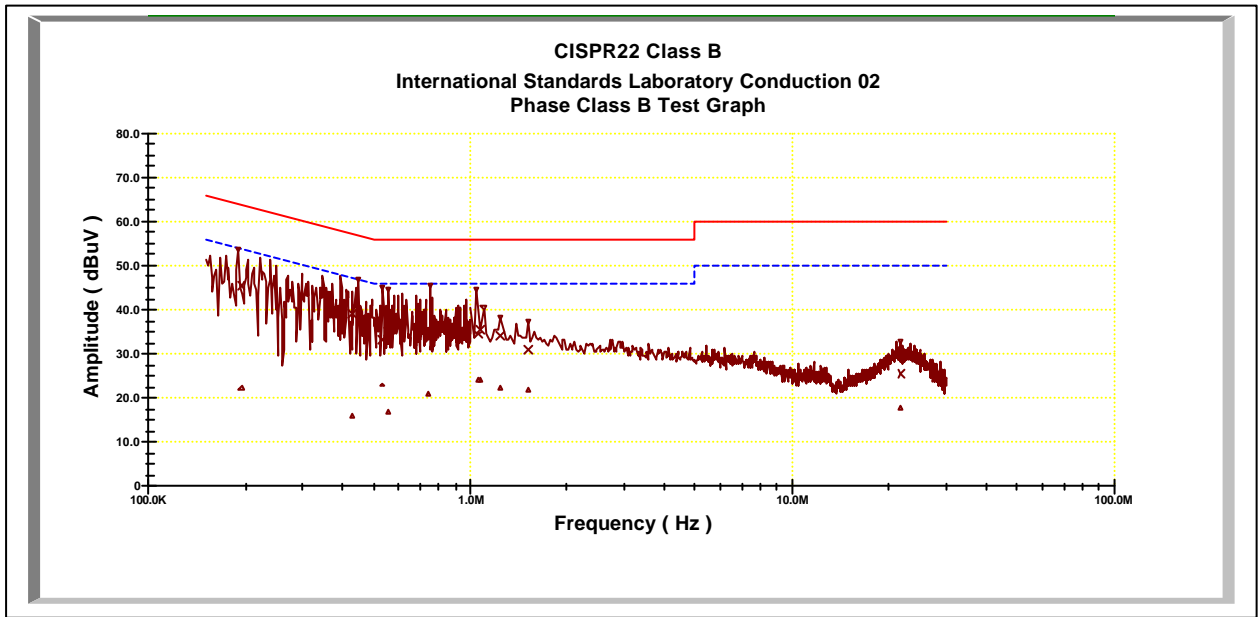
#### 4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

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

4.1.4 Test Data:

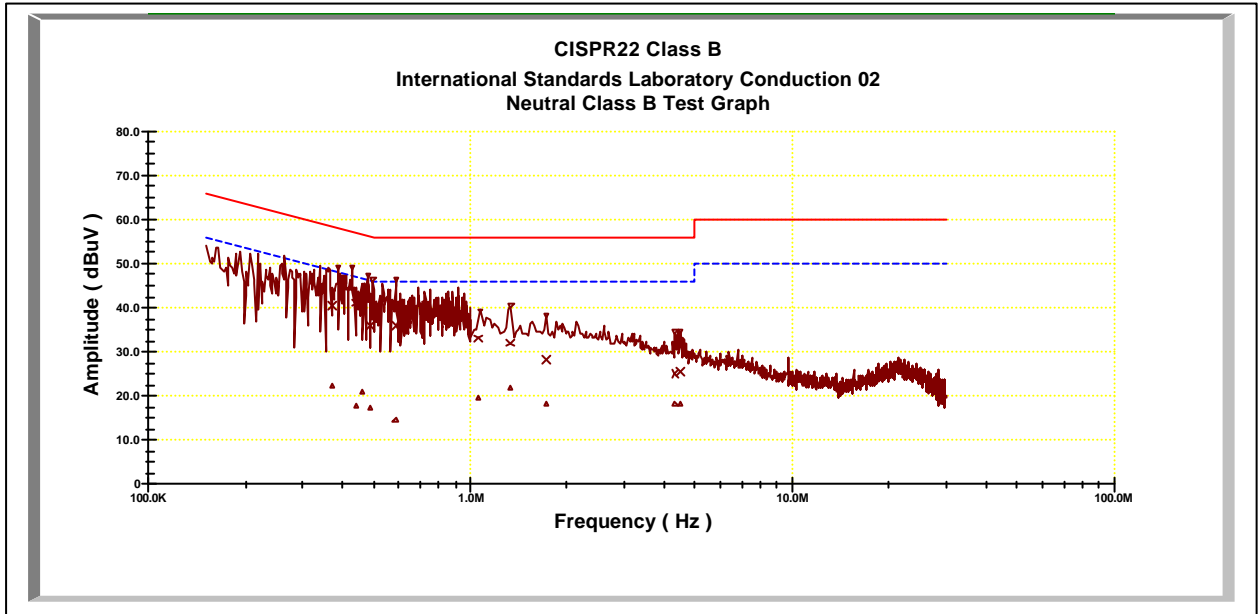
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

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)
0.19398	0.10	0.02	45.29	64.74	-19.45	22.27	54.74	-32.47
0.42943	0.10	0.03	39.04	58.02	-18.97	15.92	48.02	-32.10
0.5305	0.12	0.03	33.30	56.00	-22.70	22.91	46.00	-23.09
0.55343	0.13	0.03	34.93	56.00	-21.07	16.61	46.00	-29.39
0.7392	0.16	0.05	34.64	56.00	-21.36	20.97	46.00	-25.03
1.05494	0.48	0.07	34.33	56.00	-21.67	24.14	46.00	-21.86
1.07312	0.48	0.07	35.30	56.00	-20.70	24.12	46.00	-21.88
1.23927	0.43	0.08	34.04	56.00	-21.96	22.03	46.00	-23.97
1.51103	0.35	0.09	30.91	56.00	-25.09	21.74	46.00	-24.26
21.8199	0.90	0.28	25.51	60.00	-34.49	17.55	50.00	-32.45



**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)
0.37203	0.10	0.02	40.39	59.66	-19.26	22.27	49.66	-27.38
0.44301	0.11	0.03	41.08	57.63	-16.54	17.83	47.63	-29.79
0.46093	0.11	0.03	41.60	57.12	-15.52	20.79	47.12	-26.32
0.48748	0.11	0.03	35.91	56.36	-20.44	17.14	46.36	-29.21
0.58415	0.13	0.04	35.86	56.00	-20.14	14.57	46.00	-31.43
1.06208	0.29	0.07	32.97	56.00	-23.03	19.66	46.00	-26.34
1.33278	0.27	0.08	32.06	56.00	-23.94	21.60	46.00	-24.40
1.71585	0.23	0.09	28.29	56.00	-27.71	18.28	46.00	-27.72
4.32923	0.21	0.12	25.14	56.00	-30.86	18.15	46.00	-27.85
4.49757	0.21	0.12	25.32	56.00	-30.68	17.95	46.00	-28.05



\* 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

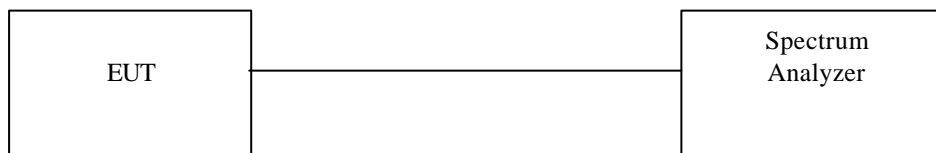
## 4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

### 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

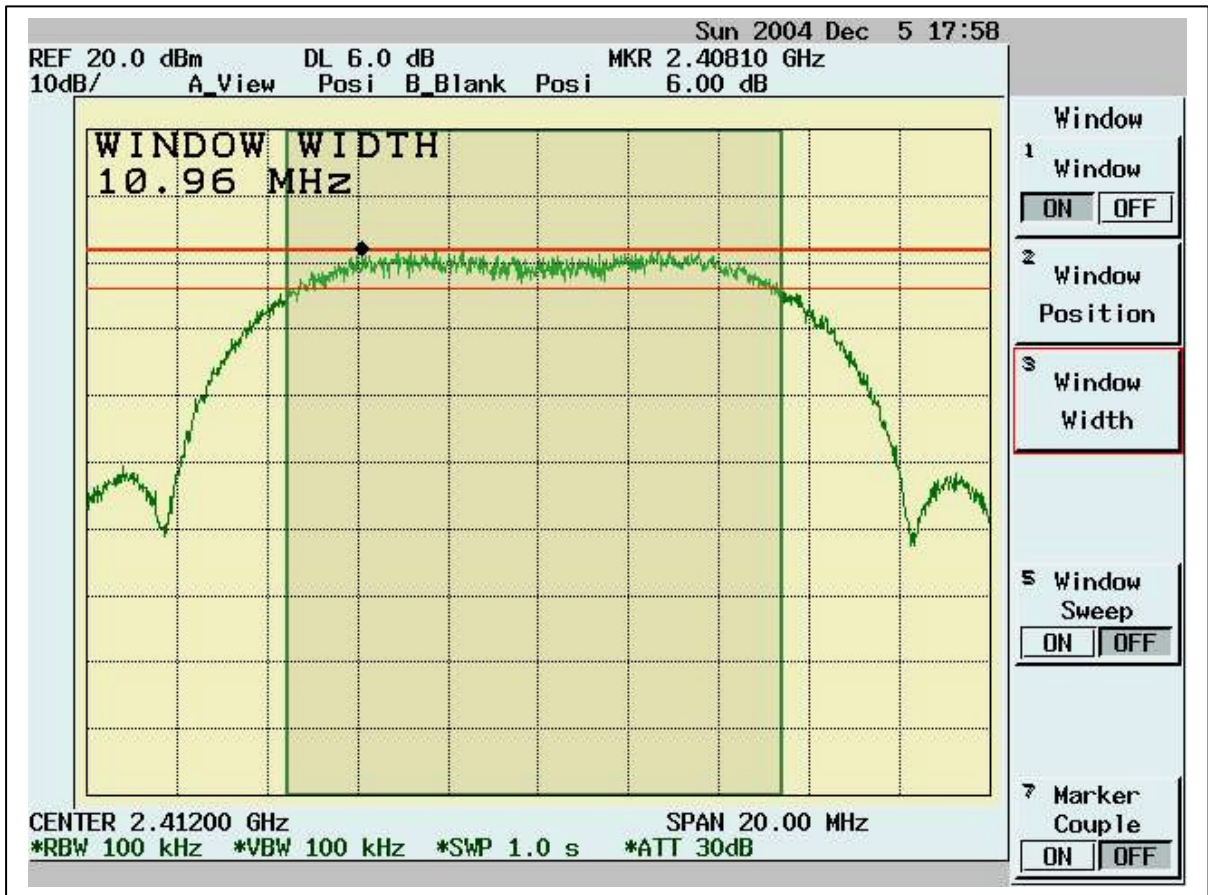
### 4.2.2 Test Setup

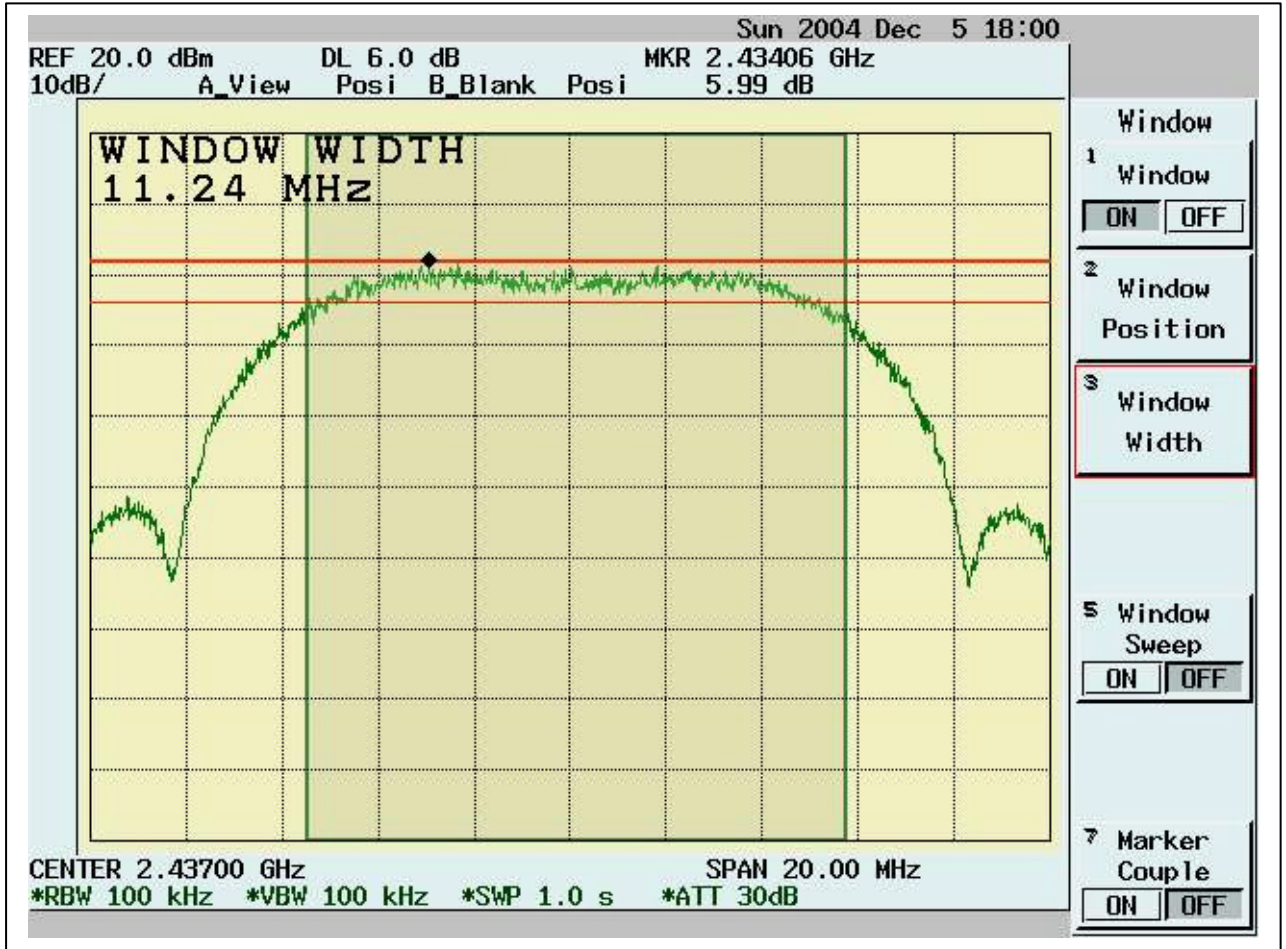


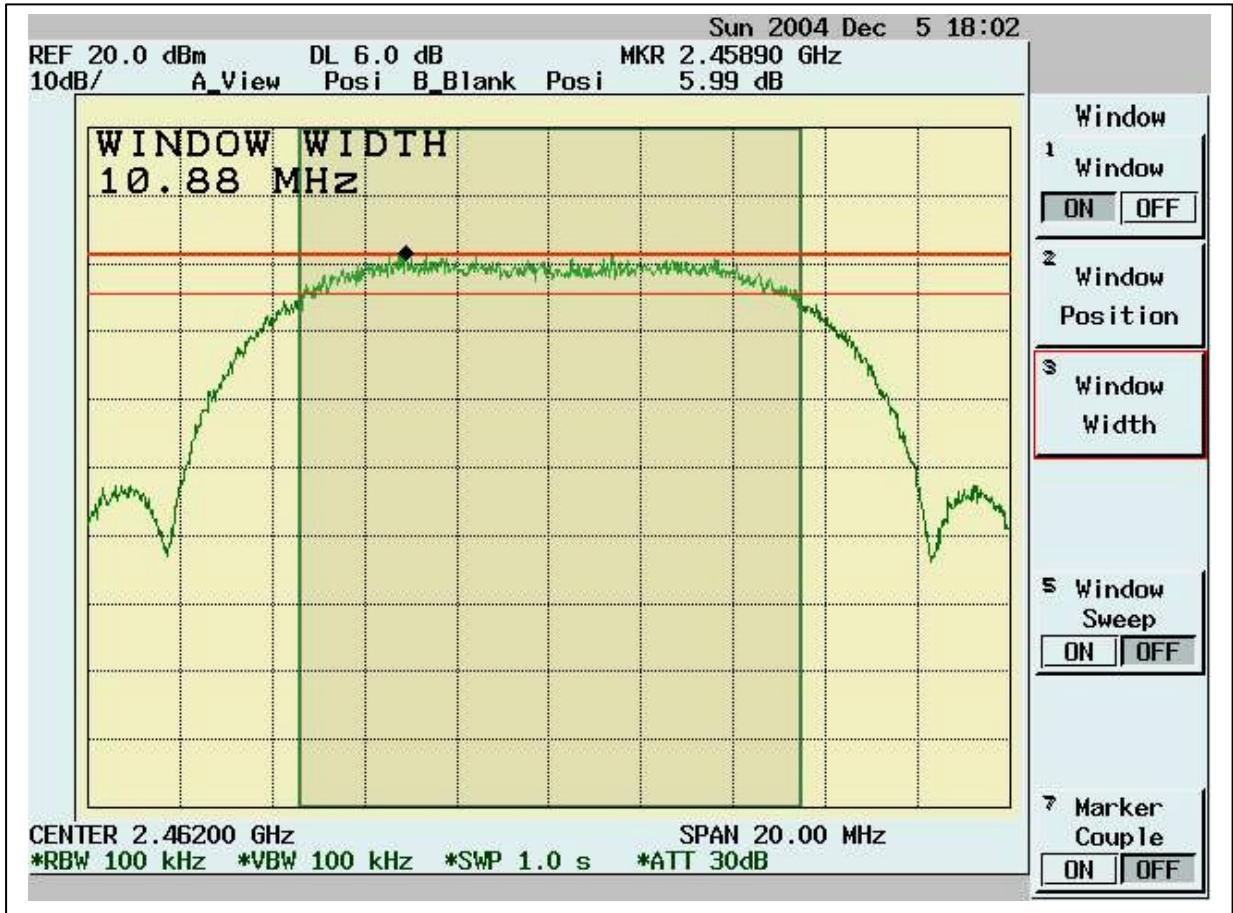
### 4.2.3 Test Data

**Table 6dB Bandwidth**

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	10.96	0.5	Pass
6	2437	11.24	0.5	Pass
11	2462	10.88	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	16.980	1.02	63.095	18.000	30	Pass
6	2437	16.823	1.02	60.855	17.843	30	Pass
11	2462	16.230	1.02	53.088	17.250	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<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.

#### 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 (°)
42.61	21.77	11.04	1.76	0.00	34.57	40.00	-5.43	100.00	224.00
165.80	28.25	8.68	3.44	0.00	40.37	43.50	-3.13	200.00	7.00
269.59	20.91	12.40	4.33	0.00	37.64	46.00	-8.36	100.00	345.00
337.49	17.65	13.65	4.80	0.00	36.10	46.00	-9.90	200.00	39.00
366.59	18.55	14.53	5.01	0.00	38.10	46.00	-7.90	100.00	71.00
472.32	20.49	16.49	5.61	0.00	42.60	46.00	-3.40	100.00	87.00
499.48	14.08	17.09	5.79	0.00	36.95	46.00	-9.05	100.00	168.00
539.25	14.90	18.04	6.01	0.00	38.95	46.00	-7.05	150.00	329.00
708.03	13.37	19.01	6.82	0.00	39.21	46.00	-6.79	150.00	281.00
944.71	13.84	20.47	7.83	0.00	42.14	46.00	-3.86	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 (°)
165.80	27.42	8.68	3.44	0.00	39.54	43.50	-3.96	150.00	46.00
235.64	26.91	10.16	4.12	0.00	41.19	46.00	-4.81	100.00	224.00
269.59	24.86	12.40	4.33	0.00	41.59	46.00	-4.41	100.00	159.00
337.49	24.15	13.65	4.80	0.00	42.60	46.00	-3.40	200.00	127.00
464.56	19.43	16.32	5.57	0.00	41.32	46.00	-4.68	100.00	337.00
472.32	20.59	16.49	5.61	0.00	42.69	46.00	-3.31	100.00	321.00
540.22	18.22	18.07	6.02	0.00	42.31	46.00	-3.69	100.00	14.00
675.05	16.88	18.80	6.66	0.00	42.34	46.00	-3.66	100.00	321.00
708.03	16.59	19.01	6.82	0.00	42.42	46.00	-3.58	100.00	288.00
944.71	13.82	20.47	7.83	0.00	42.12	46.00	-3.88	150.00	192.00

\* 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) .

##### 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 (°)
3207.79	48.30	31.05	1.42	46.61	34.16	54.00	-19.84	109	193
7164.83	41.77	39.80	2.35	46.24	37.68	54.00	-16.32	101	264
11410.6	25.45	42.06	3.01	41.40	29.12	54.00	-24.88	100	174
14688.3	29.34	44.22	3.43	42.34	34.66	54.00	-19.34	100	359
15316.7	25.78	43.09	3.50	43.22	29.15	54.00	-24.85	101	224
15690.3	27.00	43.41	3.54	42.16	31.79	54.00	-22.21	101	243

'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 (°)
3207.79	53.40	31.05	1.42	46.61	39.26	54.00	-14.74	100	294
7164.83	41.54	39.80	2.35	46.24	37.45	54.00	-16.55	100	164
7861.14	30.05	40.70	2.47	44.40	28.83	54.00	-25.17	100	288
9627.37	29.53	39.20	2.77	42.12	29.39	54.00	-24.61	101	208
11410.6	25.40	42.06	3.01	41.40	29.08	54.00	-24.92	103	121
14688.3	29.20	44.22	3.43	42.34	34.52	54.00	-19.48	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 (°)
3241.76	48.67	31.09	1.43	46.61	34.58	54.00	-19.42	100	212
7147.85	42.23	39.82	2.35	46.24	38.16	54.00	-15.84	100	203
8829.17	27.27	40.60	2.65	42.72	27.81	54.00	-26.19	101	296
11461.5	25.39	42.25	3.02	41.51	29.16	54.00	-24.84	100	112
14688.3	29.65	44.22	3.43	42.34	34.97	54.00	-19.03	101	291
15265.7	25.91	43.17	3.49	43.34	29.24	54.00	-24.76	101	93

'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 (°)
3241.76	53.11	31.09	1.43	46.61	39.01	54.00	-14.99	101	96
7130.87	41.23	39.84	2.34	46.25	37.17	54.00	-16.83	101	109
7300.70	40.75	39.64	2.37	46.18	36.59	54.00	-17.41	100	264
11053.9	26.73	40.70	2.97	40.63	29.78	54.00	-24.22	102	119
11801.2	25.91	42.22	3.07	42.28	28.92	54.00	-25.08	104	352
14688.3	29.51	44.22	3.43	42.34	34.83	54.00	-19.17	100	332

'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 (°)
3275.72	44.12	31.13	1.44	46.62	30.07	54.00	-23.93	101	251
7130.87	42.01	39.84	2.34	46.25	37.94	54.00	-16.06	101	110
7521.48	35.39	39.48	2.41	45.99	31.29	54.00	-22.71	100	347
14009.0	27.92	42.93	3.36	42.89	31.32	54.00	-22.68	100	24
14688.3	29.34	44.22	3.43	42.34	34.65	54.00	-19.35	100	118
15299.7	26.05	43.12	3.50	43.26	29.41	54.00	-24.59	100	39

'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 (°)
3275.72	49.43	31.13	1.44	46.62	35.38	54.00	-18.62	100	196
7130.87	40.92	39.84	2.34	46.25	36.86	54.00	-17.14	100	225
11206.8	26.41	41.29	2.99	40.96	29.73	54.00	-24.27	101	282
14688.3	28.96	44.22	3.43	42.34	34.28	54.00	-19.72	100	220
14875.1	26.42	43.85	3.45	43.32	30.41	54.00	-23.59	100	165
15265.7	25.93	43.17	3.49	43.34	29.25	54.00	-24.75	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

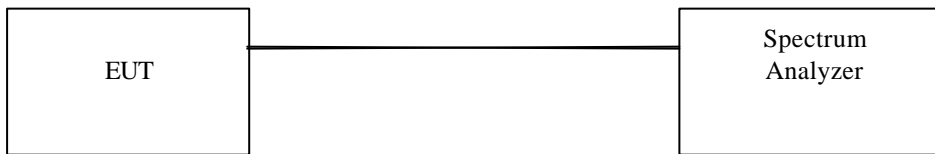
**All frequencies from 1GHz to 25 GHz have been tested.**

### 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	2409.9	108.8	---	---
Outside band	2397	64.65	44.15	Pass
11	2464.8	107.86	---	---
Outside band	2471.3	74.32	33.54	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:

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	64.39	31.67	96.06	---	---	1MHz	---
Outside band	2397.2	25.27	31.67	56.94	39.12	---	1MHz	Pass
1(average mode)	2408.6	43.35	31.67	75.02	---	---	10Hz	---
Restricted band	2390.0	5.69	31.67	37.36	-----	54	10Hz	Pass
11(peak mode)	2459.6	56.05	31.64	87.69	----	---	1MHz	---
Outside band	2471.4	23.88	31.64	55.52	32.17	---	1MHz	Pass
11(average mode)	2465.3	37.48	31.64	69.12	----	---	10Hz	---
Restricted band	2483.6	4.51	31.64	36.15	-----	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)**



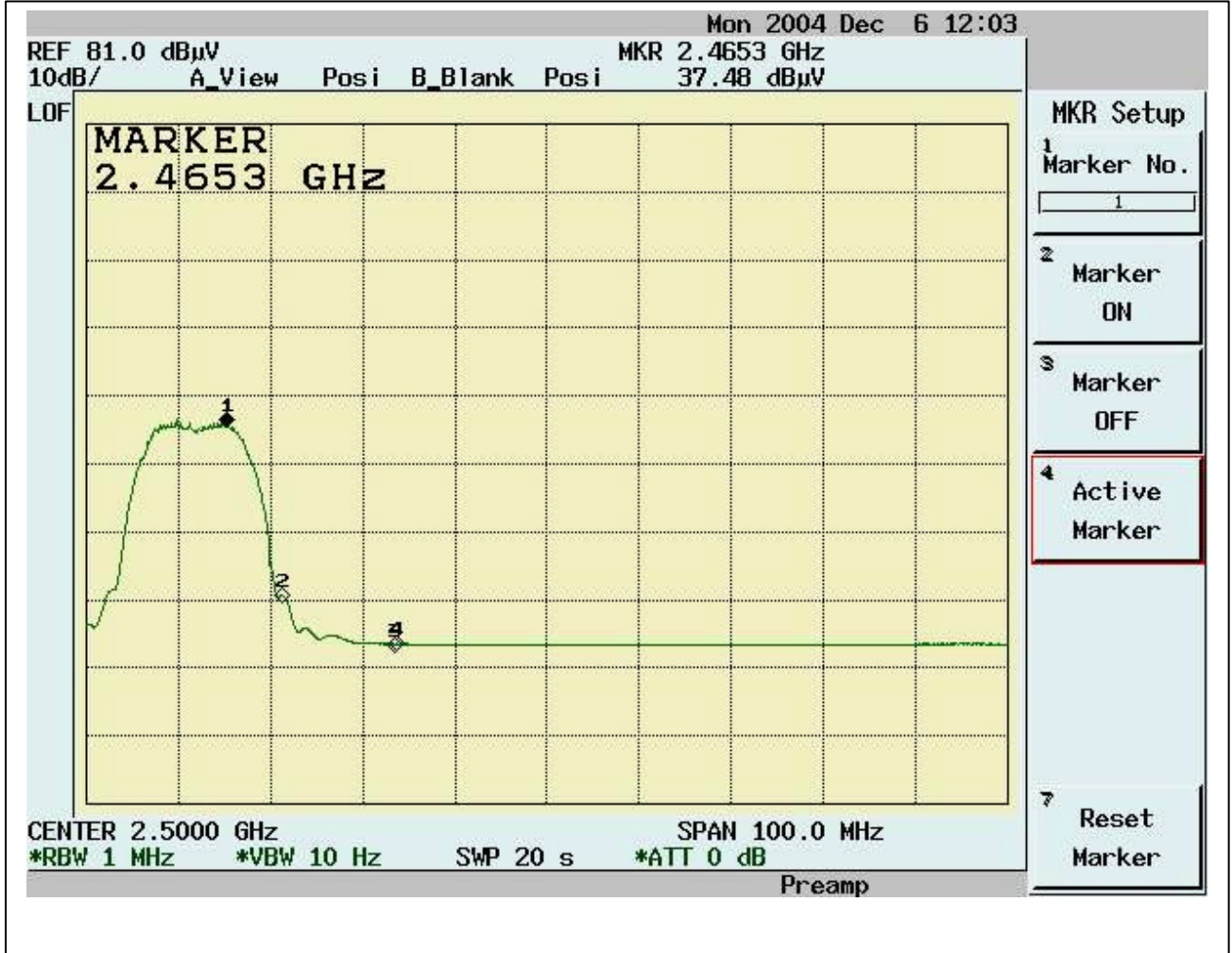
**Band Edge measurement for radiated emission in Restricted Band(Radiated)**

**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)]

#### 4.6.1 Applied Standards

#### FCC PART 1.1307, 1.1310, 2.1091, 2.1093 RF EXPOSURE

#### 4.6.2 Calculation for Maximum Permissible Exposure (MPE)

From FCC 1.1310 Table 1B, the maximum permissible RF exposure for an uncontrolled environment is 1 mW/cm<sup>2</sup>. The actual power density for the EUT with the antenna is calculated as shown below. The EUT is a professionally installed, fixed, point-to-point operating system.

$$S = (P \times G) / (4 \times \pi \times d^2)$$

where:

S = power density

P = transmitter conducted power in (W)

G = antenna numeric gain

d = distance to radiation center (m)

Antenna Manufacturer	Antenna Type	Gain (dBi)	Numeric Gain	Power (dBm)	Power (mW)	Separation Distance (cm)	Power Density (W/m <sup>2</sup> )	Power Density (mW/cm <sup>2</sup> )
FOXCONN NWInG	PIFA	1.4	1.38	18	63.1	20	0.173	0.0173

**WARNING:**

It is the responsibility of the professional installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only the antenna specified above may be used. The use of any other antenna is expressly forbidden in accordance with FCC rules CFR 47 part 15.204.

**NOTICE:**

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits for an uncontrolled environment when installed as directed. This equipment should be installed and operated with FOXCONN NWInG PIFA antenna in a fixed-mount configuration, installed with a maximum of 18dBm of radiated output power during normal operation

### 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

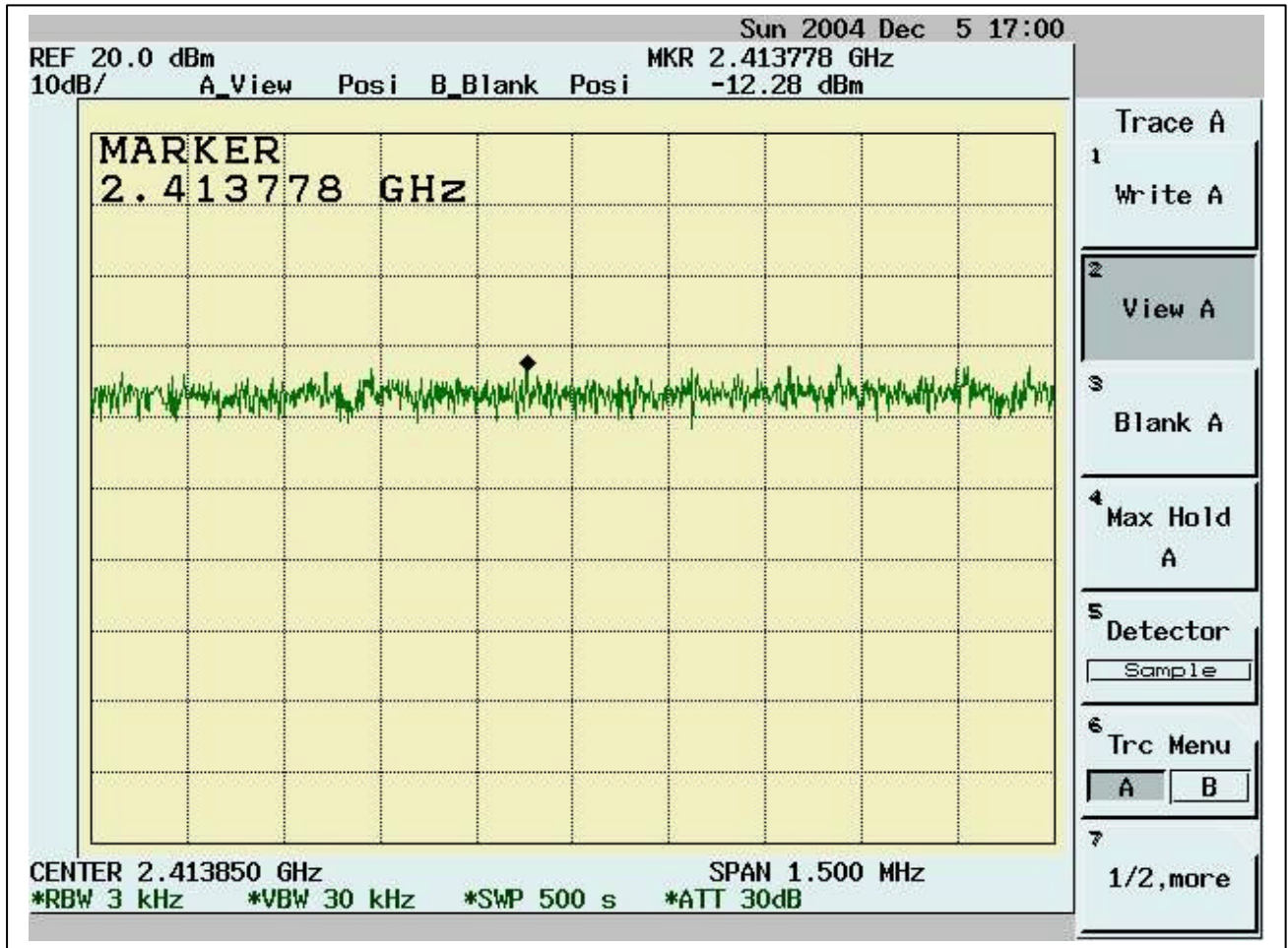


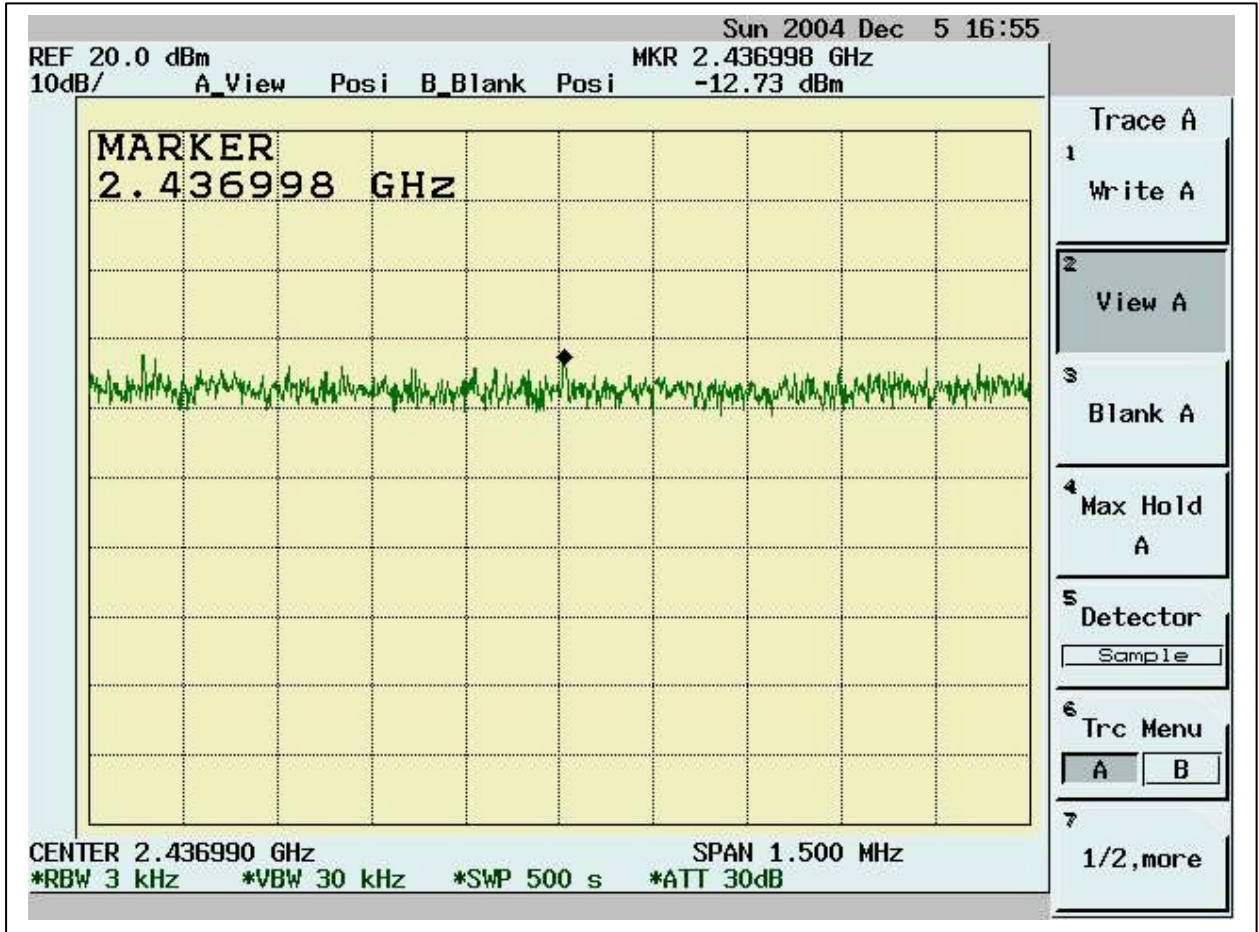
#### 4.7.3 Test Data:

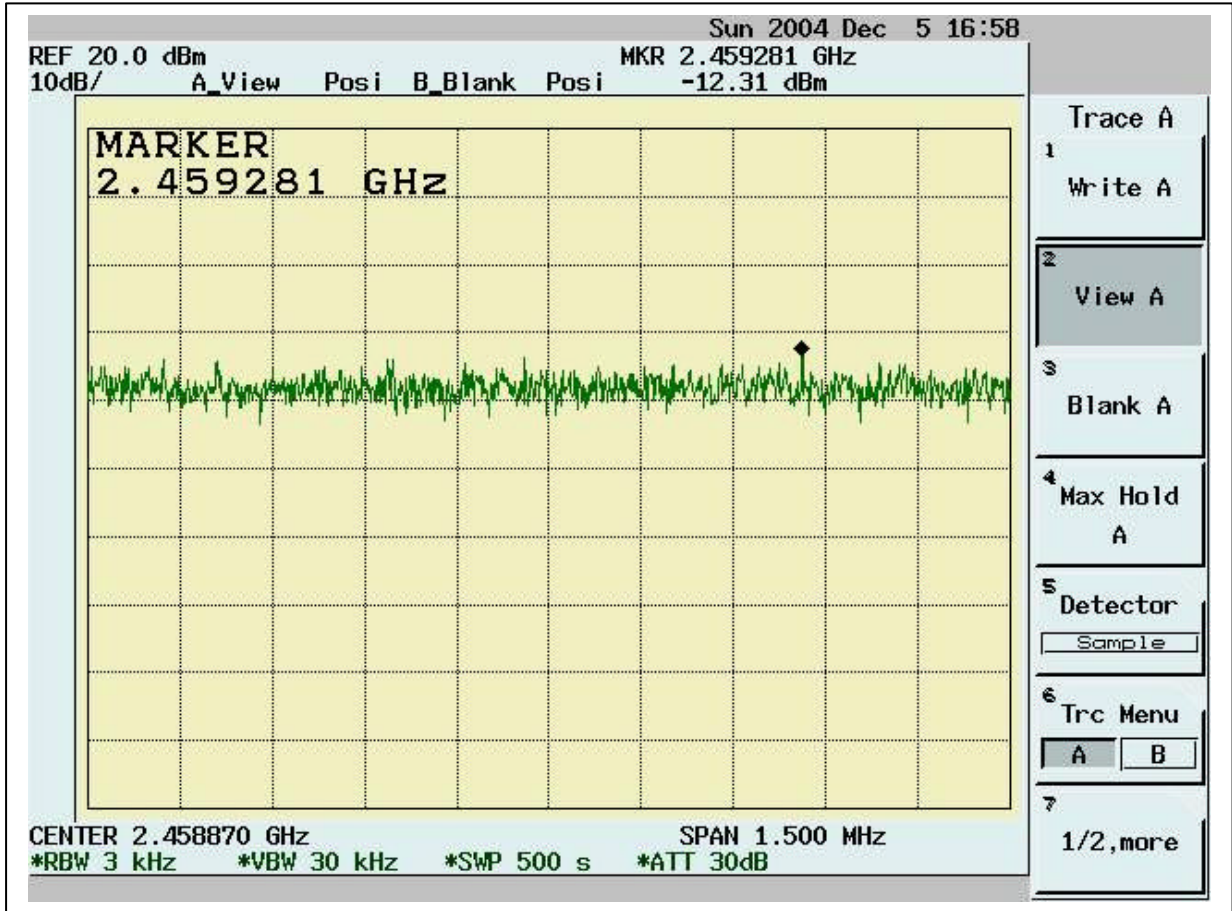
**Table Maximum Peak Output Power Density**

Chennel	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	-12.28	1.02	-11.26	8	Pass
6	-12.73	1.02	-11.71	8	Pass
11	-12.31	1.02	-11.29	8	Pass









## 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 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.

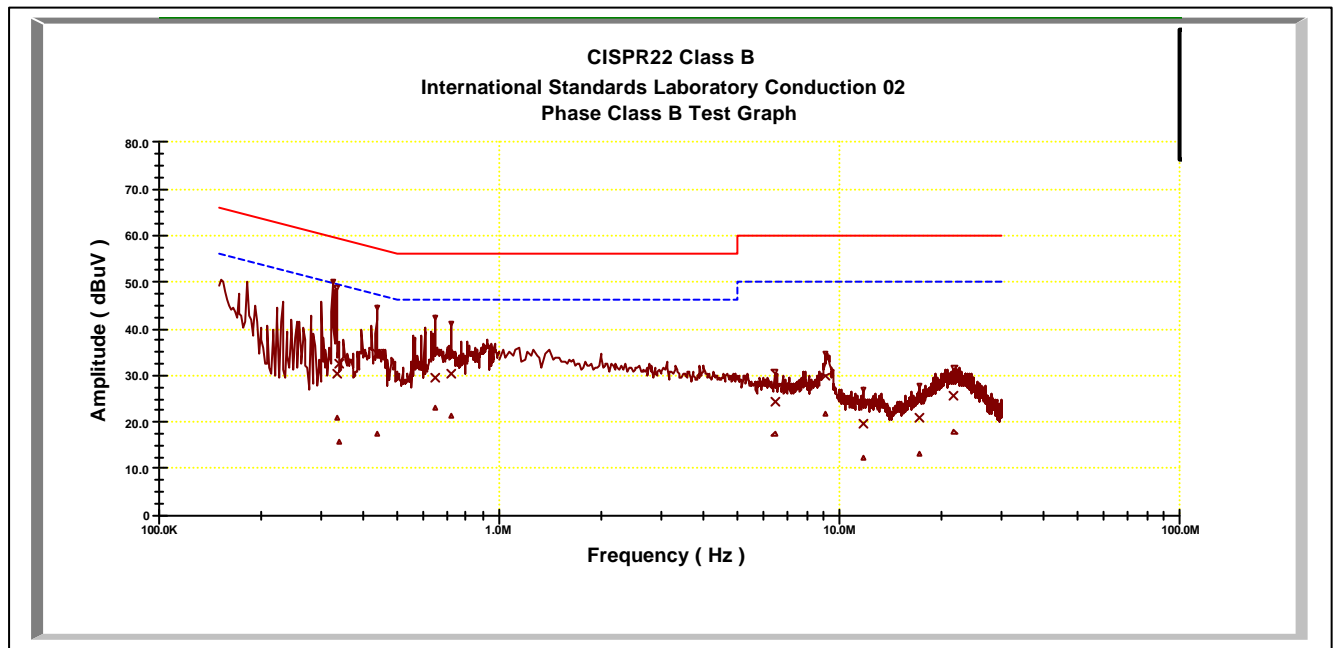
#### 5.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

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

5.1.4 Test Data:

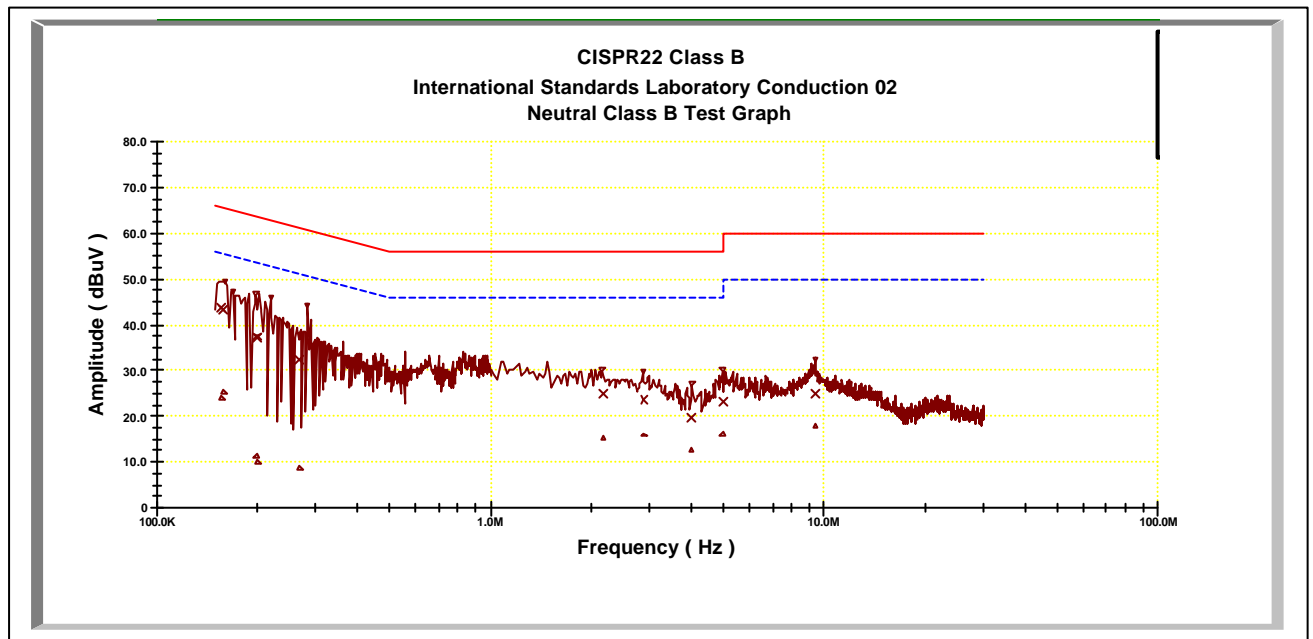
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

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)
0.33333	0.10	0.02	30.38	60.76	-30.38	20.80	50.76	-29.97
0.34041	0.10	0.02	32.54	60.56	-28.02	15.70	50.56	-34.86
0.43788	0.11	0.03	34.62	57.77	-23.15	17.50	47.77	-30.27
0.64893	0.14	0.04	29.61	56.00	-26.39	23.11	46.00	-22.89
0.72386	0.15	0.05	30.54	56.00	-25.46	21.38	46.00	-24.62
6.44621	0.39	0.14	24.20	60.00	-35.80	17.42	50.00	-32.58
9.11985	0.49	0.17	29.71	60.00	-30.29	21.78	50.00	-28.22
11.7985	0.58	0.22	19.74	60.00	-40.26	12.20	50.00	-37.80
17.1851	0.79	0.28	20.86	60.00	-39.14	13.13	50.00	-36.87
21.7469	0.90	0.28	25.60	60.00	-34.40	17.88	50.00	-32.12



**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

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

### 5.2.1 Test Procedure

### 5.3

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

### 5.3.1 Test Setup



### 5.3.2 Test Data:

**Table 6dB Bandwidth**

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.28	0.5	Pass
6	2437	16.04	0.5	Pass
11	2462	16.28	0.5	Pass

