Test Report

FOR

FCC Part 15 Subpart C

of

Notebook Personal Computer

(With 802.11b+g WLAN module, ***Model: RM8*** Inside)

Model

Aspire 1450 ; ZI3

(Brand: acer ; Quanta)

Applied by:

Quanta Computer Inc.
No. 188, Wen-Hwa 2nd Road, Kuei-Shan Hsiang,
Tao Yuan Shien,
Taiwan, R. O. C.

Test Performed by:

(NVLAP Lab. Code: 200234-0)

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: 03LR018FC **Test Date: 2003/10/03**

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

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 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: Aspire 1450 (acer) ; ZI3 (Quanta)
(With 802.11b+g WLAN module, ***Model: RM8*** Inside)
Applied by Quanta Computer Inc.

Sample received Date: 2003/09/25

Final test Date : 200310/03

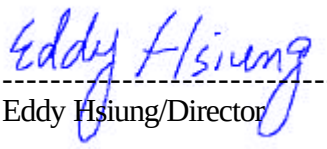
Test Site: Chamber 02, Conduction 02

Temperature	23°C(Conduction Test);	23°C (Radiation Test)
Humidity:	48% (Conduction Test);	50% (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/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	See the SAR report
15.247 (d)	Power Spectral Density	Pass	

3. Description of Equipment Under Test (EUT)

Description:	Notebook Personal Computer (with WLAN Mini-PCI module RM8 inside)
Brand:	acer ; Quanta
Condition:	Pre-Production
Model:	Aspire1450 ; ZI3
Serial Number:	N/A
FCC ID:	HFSZI3RM8
AC-DC Adapter:	LiteOn (Model:PA-1900-05) or Li Shin (Model:LSE02)02C1990
AC Power Cord Type:	Unshielded, 1.8m (Detachable) to Power Adapter
DC Power Cable Type:	Unshielded, 1.8m (Non-Detachable) at Power Adapter)
CPU Manufacturer:	AMD, Model: Barton 2500+,2400+,2200+
OSC/Clock Frequencies:	133MHz
Memory Capacity:	512MB
LCD:	TFT 15'' Panel /LG,Model:LP150X08-A3
HDD Manufacturer:	HITACHI Model: IC25N030ATMR04-0 (30 GB)
DVD- ROM Manufacturer:	QSI Model: SDR-083
Battery Manufacturer (Li-Ion):	Simplo Li-Ion 4.4Ahr 8 cells
WLAN Manufacturer:	Wistron NeWeb, Model: RM8
Frequency Range:	2412 - 2462MHz
Support channel:	11 Channels
Modulation Skill:	
802.11b:	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g:	BPSK-OFDM (6/9 Mbps), QPSK-OFDM (12/18 Mbps), 16QUAM-OFDM (24/36 Mbps), 64QUAM-OFDM (48/54 Mbps)
Antennas Type:	PCB printed Dipole made by FOXCONN NWInG
Antenna Connected:	The antenna is connected to the RF connector of the WLAN adapter, and the user is not possible to change the antenna without disassembling the notebook
Antenna peak Gain:	2.02 dBi
WLAN Power Type :	3.3V DC from Notebook Computer

The EUT is a Notebook PC consisting of one VGA port, one parallel port , four USB ports, one RJ45 port, one Audio-In port, one Line-In port, one S-connector, one 1394 port, one microphone port, one ear-phone port, and one power jack for DC-IN.

This WLAN device is a 802.11b+g wireless lan adapter, and its operation frequency is from 2412MHz to 2462MHz. There are 11 channels for data communication.
The channel and the operation frequency of 802.11b+g is listed below:

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

The antenna is a PCB printed Dipole antenna, and made by FOXCONN NWInG. The antenna is connected to the RF connector of the WLAN adapter, and the user is not possible to change the antenna without disassembling the notebook. The peak gain of the main antenna is 2.02dBi at 2.4GHz.

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 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 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.

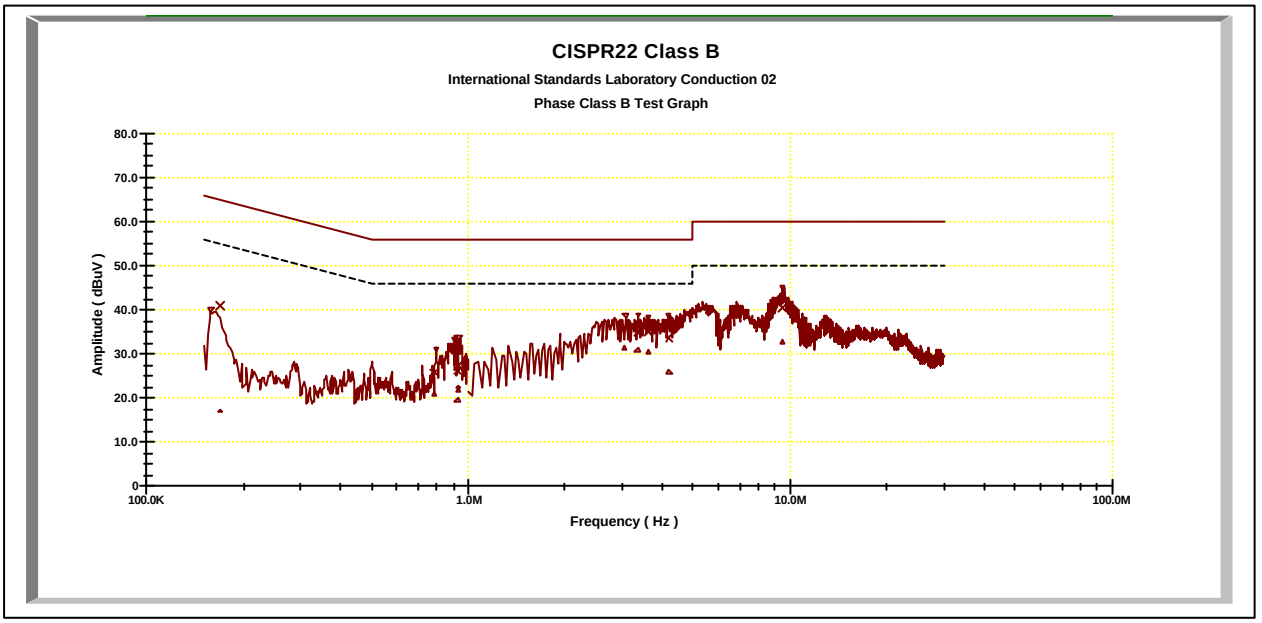
4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

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

4.1.4 Test Data:

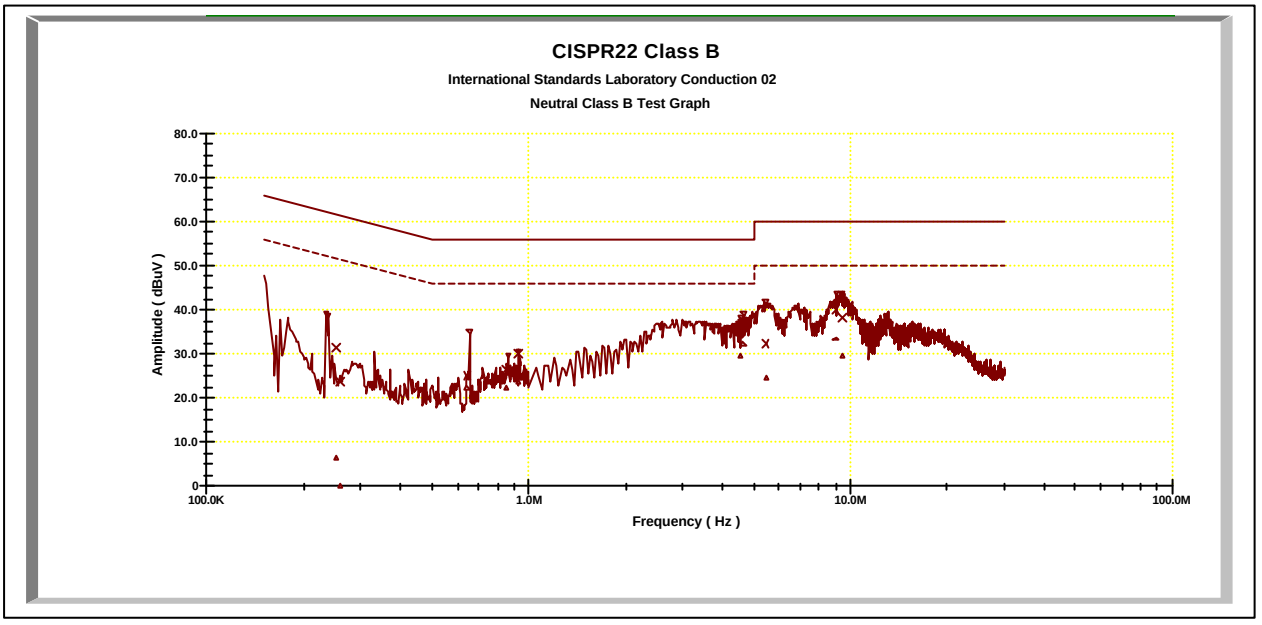
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

	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)
0.16914	0.10	0.02	40.96	65.45	-24.49	17.02	55.45	-38.44
0.78453	0.16	0.05	25.74	56.00	-30.26	20.70	46.00	-25.30
0.9233	0.19	0.06	26.10	56.00	-29.90	19.54	46.00	-26.46
0.9259	0.19	0.06	27.31	56.00	-28.69	21.98	46.00	-24.02
0.9277	0.19	0.06	27.32	56.00	-28.68	22.45	46.00	-23.55
3.06874	0.25	0.11	36.11	56.00	-19.89	31.49	46.00	-14.51
3.35161	0.27	0.11	34.97	56.00	-21.03	30.80	46.00	-15.20
3.63813	0.28	0.12	35.04	56.00	-20.96	30.28	46.00	-15.72
4.21318	0.31	0.12	33.79	56.00	-22.21	25.94	46.00	-20.06
9.4894	0.50	0.17	40.41	60.00	-19.59	32.66	50.00	-17.34



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)
0.25338	0.10	0.02	31.42	63.05	-31.63	6.23	53.05	-46.81
0.25861	0.10	0.02	23.58	62.90	-39.32	0.12	52.90	-52.78
0.6432	0.14	0.04	25.00	56.00	-31.00	22.15	46.00	-23.85
0.8549	0.18	0.06	26.35	56.00	-29.65	22.42	46.00	-23.58
0.92578	0.19	0.06	30.10	56.00	-25.90	23.71	46.00	-22.29
4.56775	0.21	0.13	36.24	56.00	-19.76	29.35	46.00	-16.65
4.63972	0.21	0.13	37.40	56.00	-18.60	32.38	46.00	-13.62
5.45094	0.23	0.13	32.33	60.00	-27.67	24.40	50.00	-25.60
8.99536	0.29	0.17	40.10	60.00	-19.90	33.34	50.00	-16.66
9.41036	0.30	0.17	38.17	60.00	-21.83	29.36	50.00	-20.64



* 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 through an attenuator. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

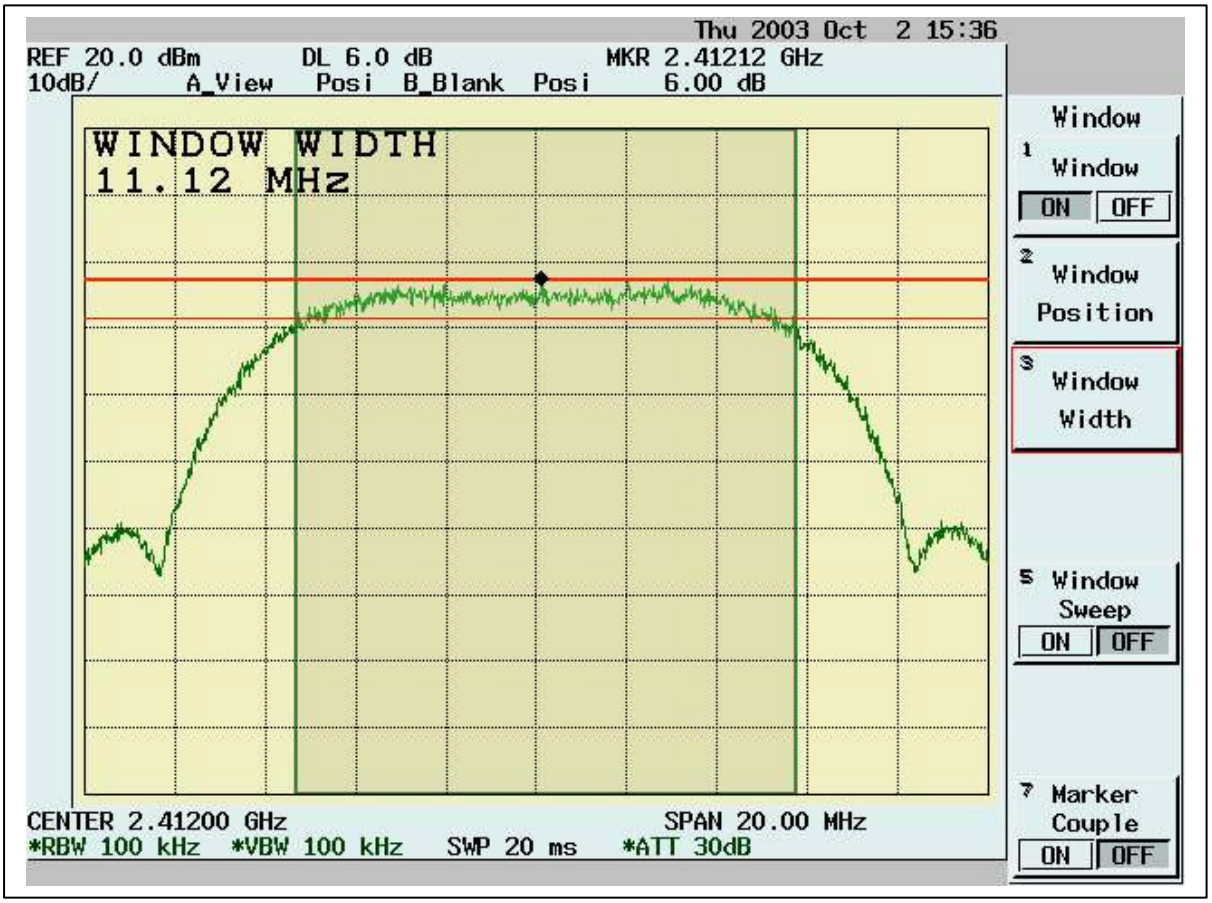
Equipment mode: Spectrum analyzer
Detector function: Peak mode
RBW: 100KHz
VBW: 100KHz

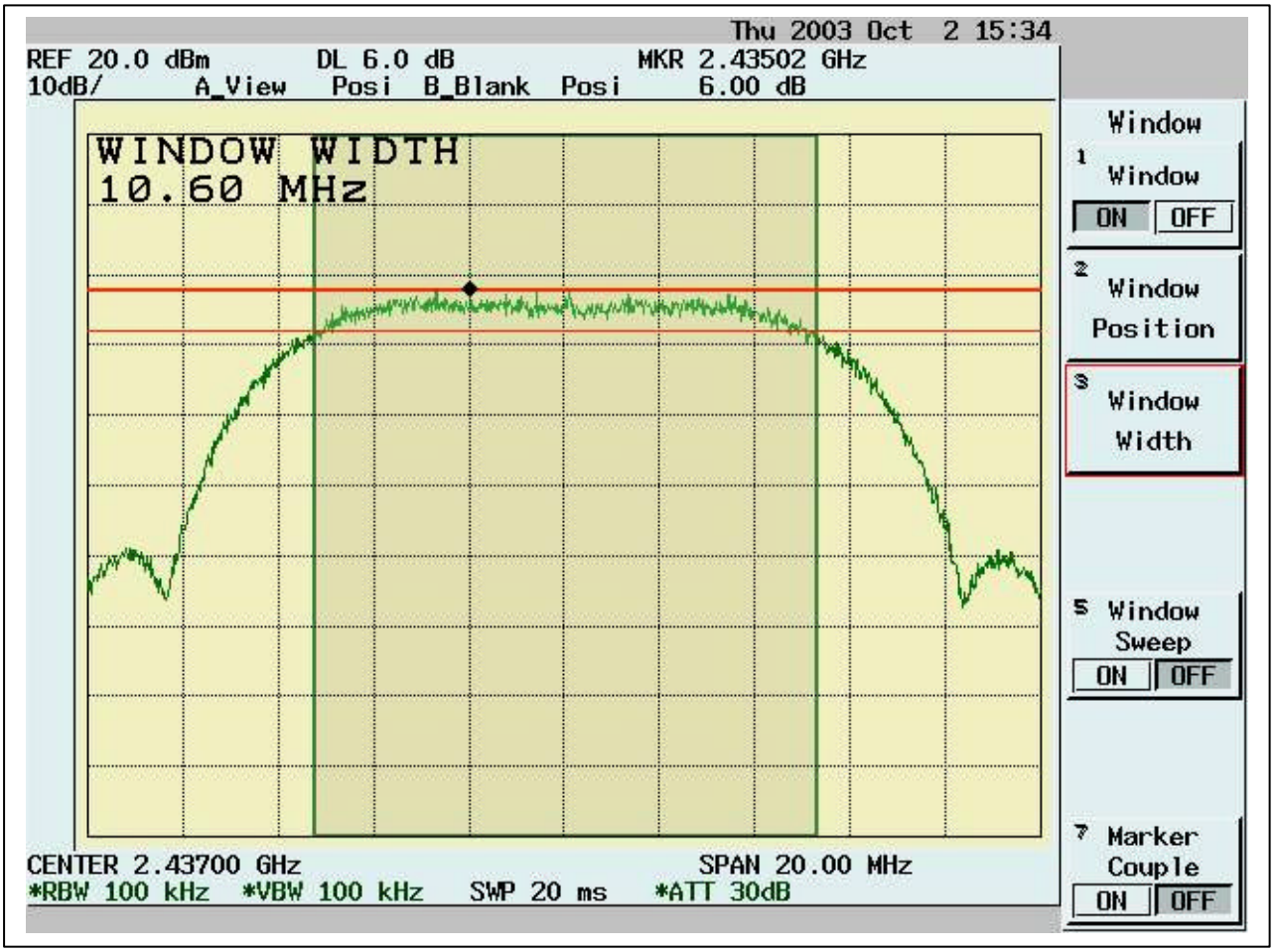
4.2.2 Test Setup

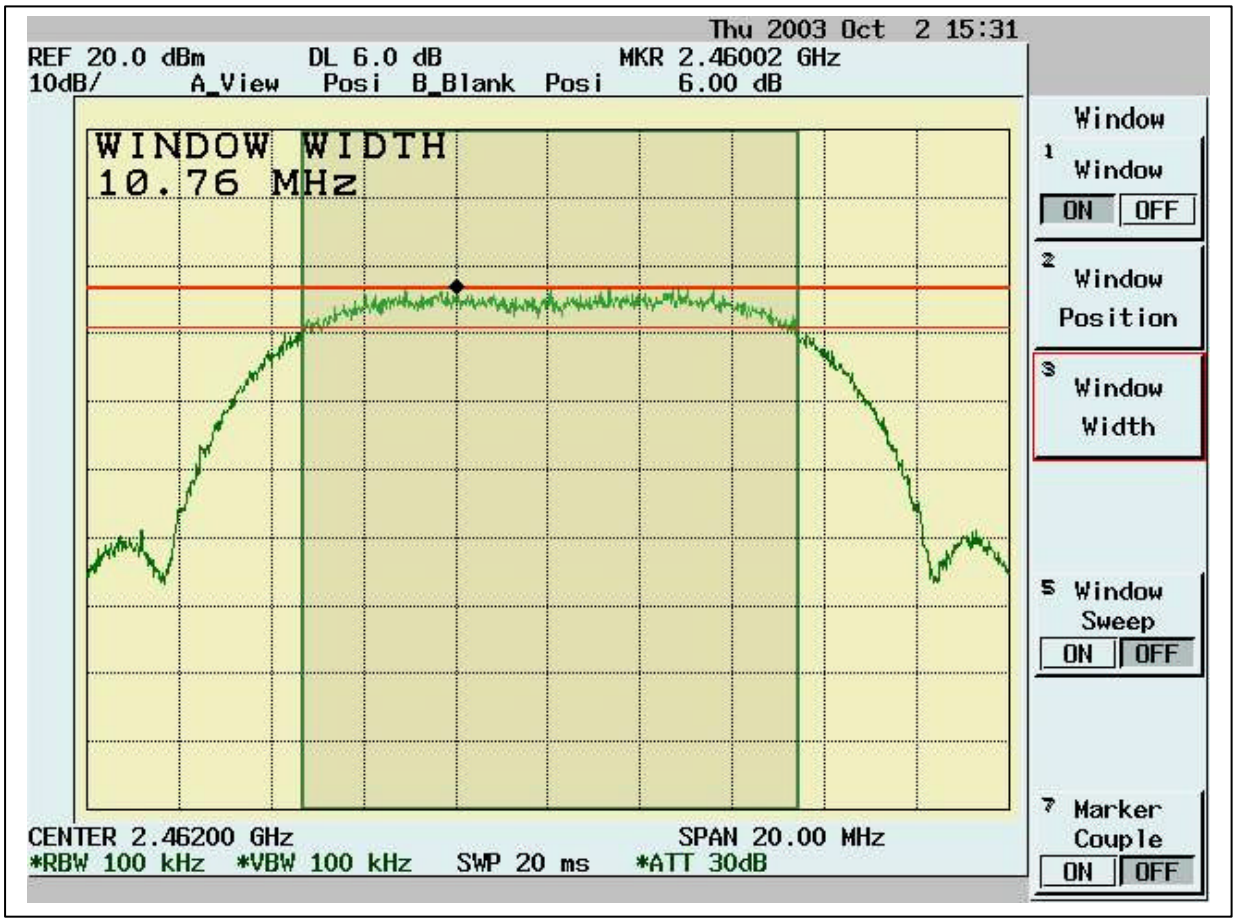
4.2.3 Test Data

Table 6dB Bandwidth

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	11.12	0.5	Pass
6	2437	10.60	0.5	Pass
11	2462	10.76	0.5	Pass


Thu 2003 Oct 2 15:36
REF 20.0 dBm
DL 6.0 dB
MKR 2.41212 GHz
10dB/
A_View
Posi
B_Blank
Posi
6.00 dB
WINDOW WIDTH
11.12 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 20 ms
*ATT 30dB


Thu 2003 Oct 2 15:34
REF 20.0 dBm
DL 6.0 dB
MKR 2.43502 GHz
10dB/
A_View
Posi
B_Blank
Posi
6.00 dB
WINDOW WIDTH
10.60 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 20 ms
*ATT 30dB


Thu 2003 Oct 2 15:31
REF 20.0 dBm
DL 6.0 dB
MKR 2.46002 GHz
10dB/
A_View
Posi
B_Blank
Posi
6.00 dB
WINDOW WIDTH
10.76 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 20 ms
*ATT 30dB

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	14.4432	3.13	57.19	17.5732	30	Pass
6	2437	13.6462	3.13	47.60	16.7762	30	Pass
11	2462	13.0532	3.13	41.53	16.1832	30	Pass

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

4.3.4 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.

4.3.5 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.

4.3.6 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

4.3.7 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	22.27	11.04	1.76	0.00	35.07	40.00	-4.93	100.00	200.00
399.57	18.49	15.59	5.21	0.00	39.29	46.00	-6.71	200.00	200.00
528.58	13.96	17.79	5.95	0.00	37.70	46.00	-8.30	100.00	28.00
565.44	8.76	18.30	6.14	0.00	33.20	46.00	-12.80	200.00	286.00
576.11	11.79	18.30	6.20	0.00	36.28	46.00	-9.72	100.00	302.00
660.5	9.73	18.74	6.60	0.00	35.07	46.00	-10.93	100.00	97.00
799.21	11.87	19.80	7.27	0.00	38.93	46.00	-7.07	100.00	130.00
815.7	7.05	19.86	7.34	0.00	34.26	46.00	-11.74	100.00	130.00
864.2	5.42	20.06	7.50	0.00	32.98	46.00	-13.02	100.00	113.00
932.1	8.50	20.39	7.79	0.00	36.69	46.00	-9.31	150.00	44.00

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 (°)
42.61	21.21	11.04	1.76	0.00	34.02	40.00	-5.98	100.00	297.00
395.69	16.39	15.46	5.19	0.00	37.04	46.00	-8.96	100.00	184.00
532.46	18.75	17.88	5.97	0.00	42.60	46.00	-3.40	100.00	217.00
594.54	12.30	18.30	6.29	0.00	36.89	46.00	-9.11	200.00	314.00
672.14	10.70	18.79	6.65	0.00	36.13	46.00	-9.87	100.00	39.00
719.67	14.22	19.18	6.86	0.00	40.25	46.00	-5.75	150.00	55.00
732.28	11.19	19.35	6.91	0.00	37.45	46.00	-8.55	100.00	55.00
768.17	11.27	19.67	7.11	0.00	38.04	46.00	-7.96	100.00	55.00
797.27	15.64	19.79	7.26	0.00	42.69	46.00	-3.31	100.00	55.00
925.31	10.42	20.35	7.77	0.00	38.54	46.00	-7.46	100.00	55.00

* 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

4.3.8 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 (°)
3326.67	53.20	31.19	1.46	46.63	39.22	54.00	-14.78	100	262
3428.57	50.33	31.31	1.49	46.64	36.49	54.00	-17.51	100	103
7164.83	44.27	39.80	2.35	46.24	40.18	54.00	-13.82	100	296
14688.3	31.84	44.22	3.43	42.34	37.15	54.00	-16.85	100	191
16675.3	26.77	45.09	3.64	42.13	33.38	54.00	-20.62	101	32

'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	49.41	31.05	1.42	46.61	35.27	54.00	-18.73	100	342
3326.67	60.91	31.19	1.46	46.63	46.93	54.00	-7.07	103	359
3445.55	53.67	31.33	1.50	46.64	39.86	54.00	-14.14	100	158
3717.28	50.27	31.66	1.59	46.42	37.10	54.00	-16.90	101	208
17015.0	27.23	46.04	3.68	42.01	34.95	54.00	-19.05	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 (°)
3326.67	52.91	31.19	1.46	46.63	38.93	54.00	-15.07	100	226
3445.55	50.62	31.33	1.50	46.64	36.81	54.00	-17.19	100	175
3564.44	46.73	31.48	1.54	46.58	33.17	54.00	-20.83	100	174
7164.83	44.27	39.80	2.35	46.24	40.19	54.00	-13.81	102	276
14688.3	31.13	44.22	3.43	42.34	36.45	54.00	-17.55	101	238

'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	48.34	31.09	1.43	46.61	34.25	54.00	-19.75	101	262
3326.67	60.85	31.19	1.46	46.63	46.87	54.00	-7.13	101	203
3428.57	54.80	31.31	1.49	46.64	40.97	54.00	-13.03	100	296
3717.28	50.79	31.66	1.59	46.42	37.62	54.00	-16.38	101	291
4957.04	44.41	35.32	1.95	47.00	34.69	54.00	-19.31	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 (°)
3309.69	53.09	31.17	1.45	46.62	39.08	54.00	-14.92	101	326
3428.57	49.45	31.31	1.49	46.64	35.61	54.00	-18.39	101	248
14688.3	30.60	44.22	3.43	42.34	35.92	54.00	-18.08	100	284
15673.3	28.10	43.35	3.54	42.21	32.78	54.00	-21.22	100	276
15996.0	26.88	44.39	3.57	41.14	33.70	54.00	-20.30	100	138

'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 (°)
3326.67	60.43	31.19	1.46	46.63	46.45	54.00	-7.55	102	284
3428.57	55.81	31.31	1.49	46.64	41.98	54.00	-12.02	101	110
3581.42	50.83	31.50	1.54	46.56	37.31	54.00	-16.69	100	347
3700.30	51.91	31.64	1.58	46.43	38.70	54.00	-15.30	100	18
4974.03	45.72	35.39	1.96	47.02	36.05	54.00	-17.95	102	29

'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.

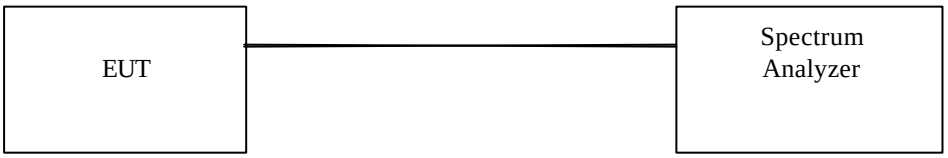
4.4 Band Edge Measurement

4.4.1 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.

4.4.2 Test Setup (Conducted)



4.4.3 Test Data:

Table Band Edge measurement (Conducted)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: > 20dB (dB)	Pass/Fail
1	2412.1	104.38	---	---
Outside band	2396.9	60.17	44.21	Pass
11	2459.0	103.98	---	---
Outside band	2470.9	67.01	36.97	Pass

.

=**Band Edge Conducted measurement**

Band Edge Conducted Measurement

4.4.4 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.

4.4.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

4.4.6 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)	2409.6	69.51	31.67	101.18	---	---	1MHz	---
Outside band	2397.5	26.86	31.67	58.53	42.65	---	1MHz	Pass
1(average mode)	2414.8	40.88	31.67	72.55	---	---	10Hz	---
Restricted band	2387.3	11.41	31.67	43.08	-----	54	10Hz	Pass
11(peak mode)	2460.6	68.30	31.64	99.94	----	---	1MHz	---
Outside band	2476.4	25.16	31.64	56.8	43.14	---	1MHz	Pass
11(average mode)	2465.4	44.86	31.64	76.50	----	---	10Hz	---
Restricted band	2524.7	15.00	31.64	36.24	-----	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)

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

See the SAR report

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

4.6.1 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.

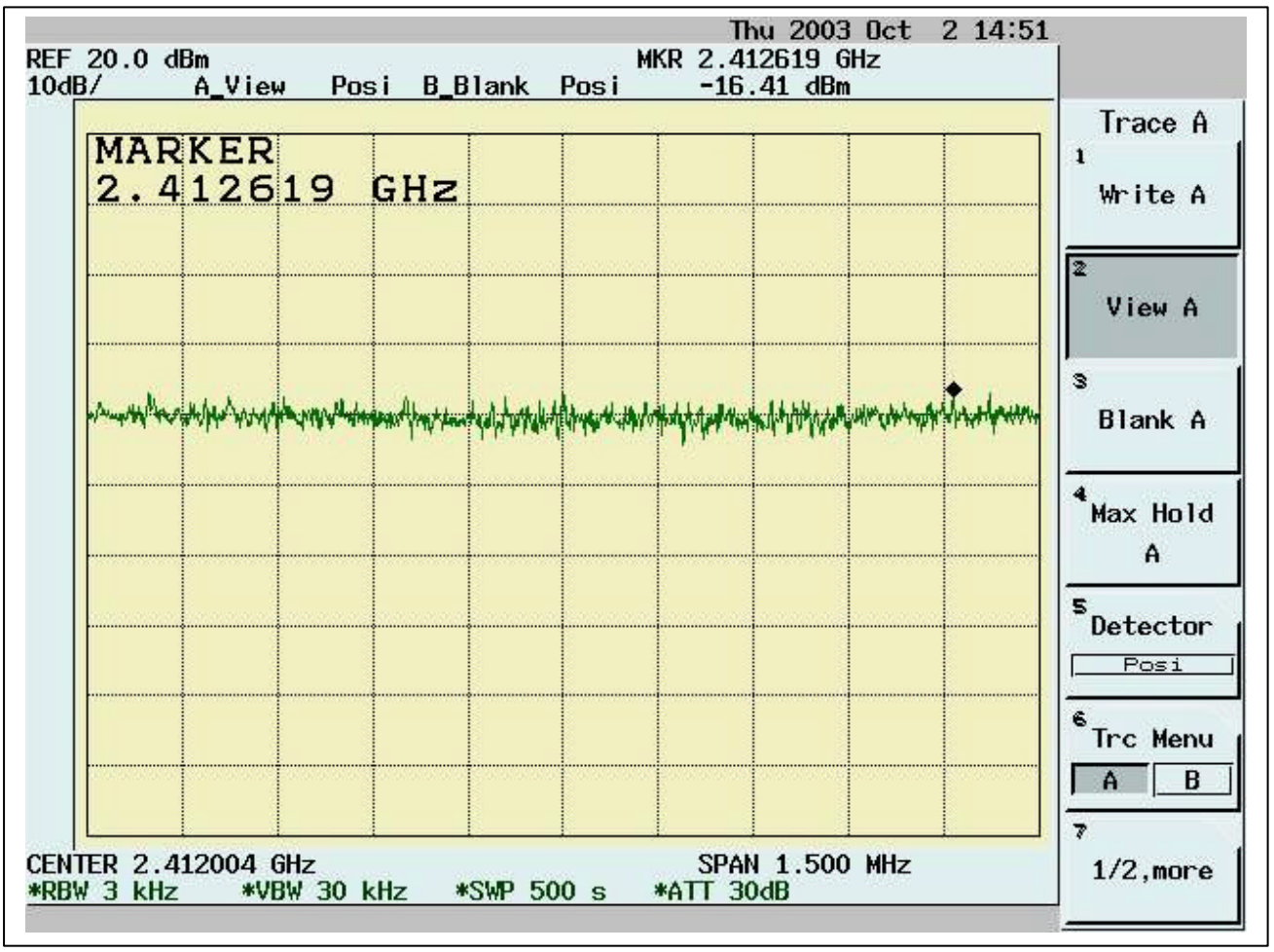
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

4.6.2 Test Setup

4.6.3 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	-16.56	3.13	-13.43	8	Pass
6	-15.48	3.13	-12.35	8	Pass
11	-16.41	3.13	-13.28	8	Pass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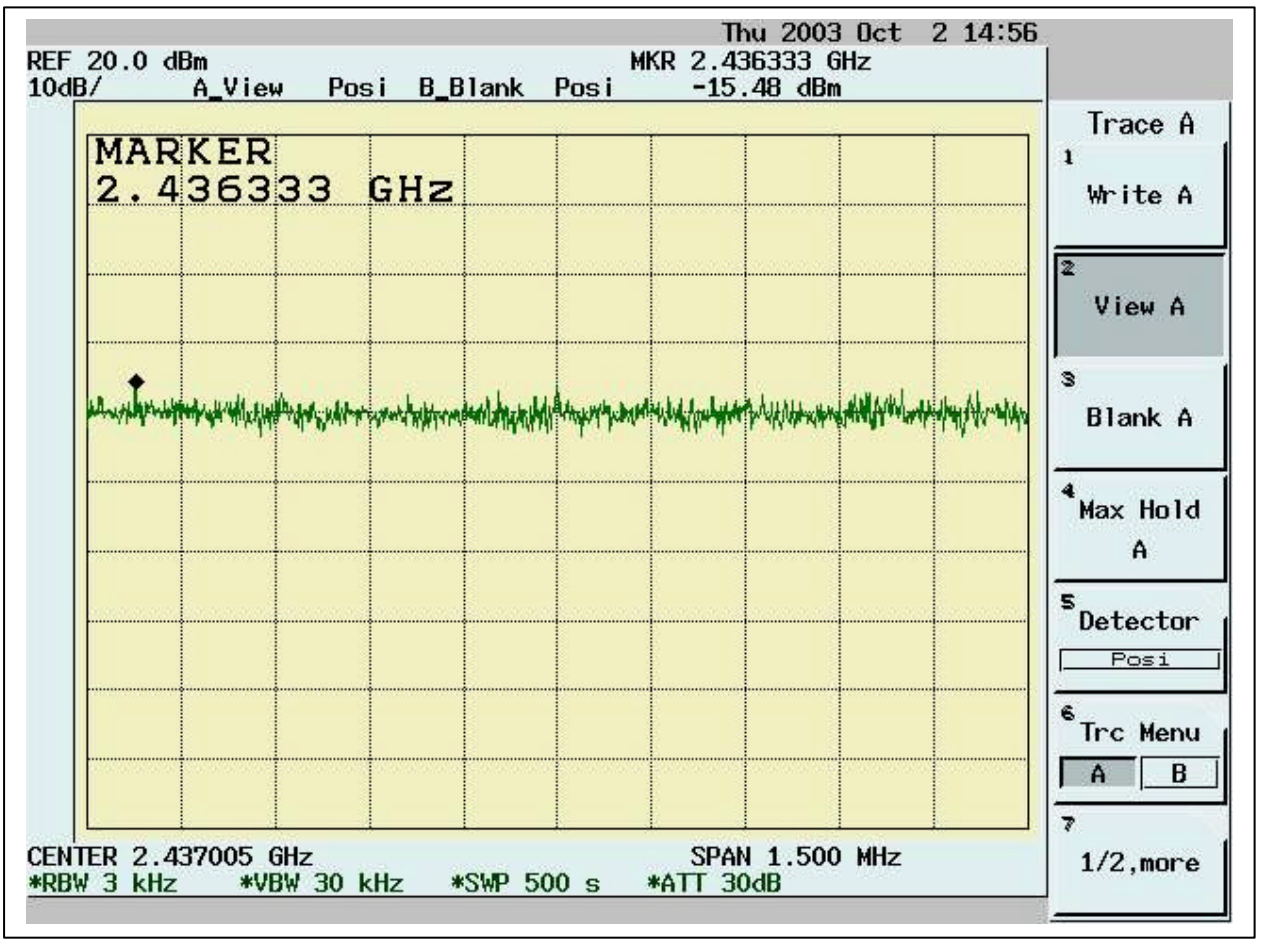
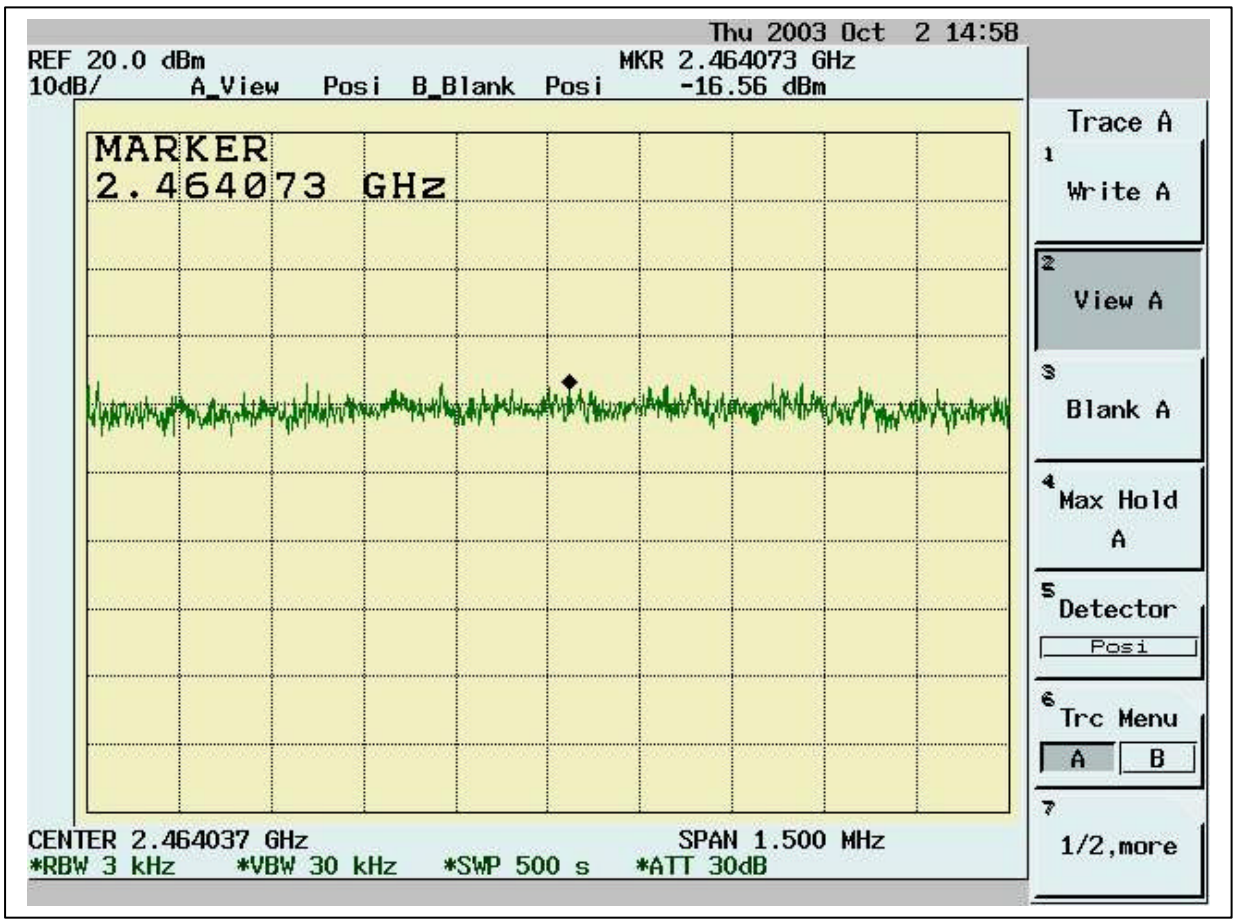
REF 20.0 dBm
MKR 2.412619 GHz
10dB/ A_View Posi B_Blank Posi -16.41 dBm
MARKER
2.412619 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
6 Trc Menu
A B
7 1/2,more
CENTER 2.412004 GHz
SPAN 1.500 MHz
*RBW 3 kHz *VBW 30 kHz *SWP 500 s *ATT 30dB


Thu 2003 Oct 2 14:56
REF 20.0 dBm
10dB/
A_View Posi B_Blank Posi
MKR 2.436333 GHz
-15.48 dBm
MARKER
2.436333 GHz
CENTER 2.437005 GHz
SPAN 1.500 MHz
*RBW 3 kHz
*VBW 30 kHz
*SWP 500 s
*ATT 30dB
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
6 Trc Menu
A B
7 1/2,more


Thu 2003 Oct 2 14:58
REF 20.0 dBm
10dB/
A_View Posi B_Blank Posi
MKR 2.464073 GHz
-16.56 dBm
MARKER
2.464073 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
6 Trc Menu
A B
7 1/2,more
CENTER 2.464037 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.

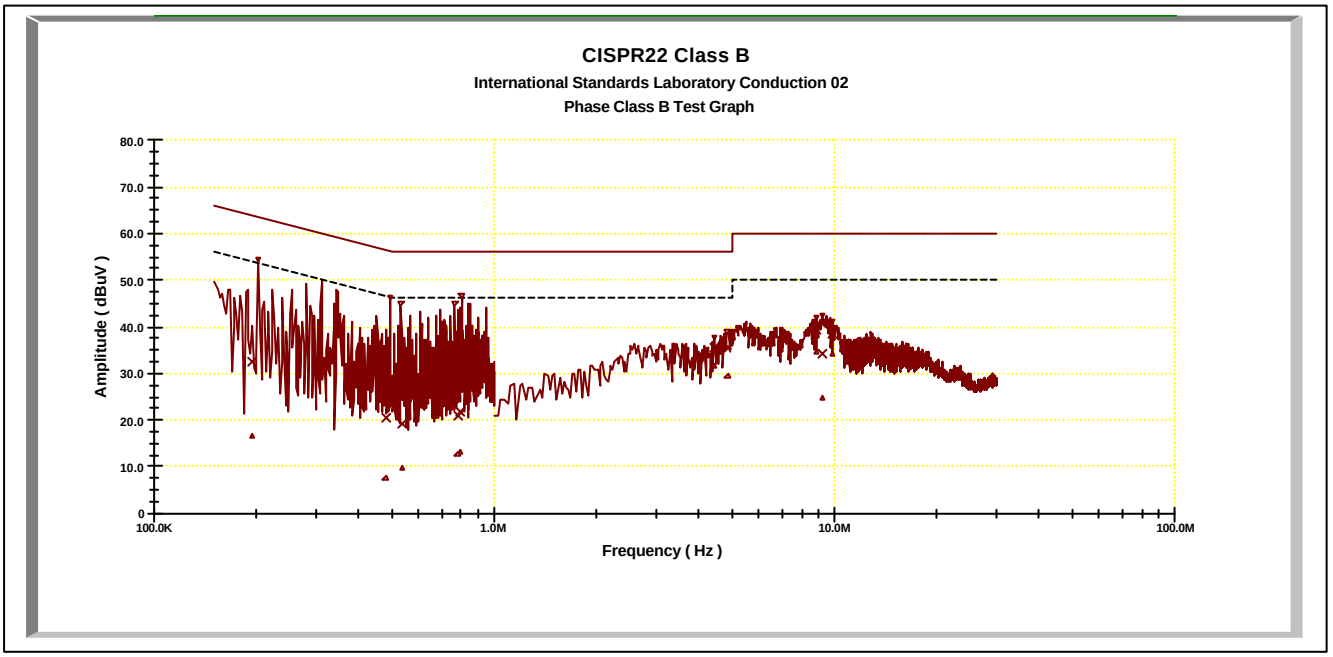
5.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

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

5.1.4 Test Data:

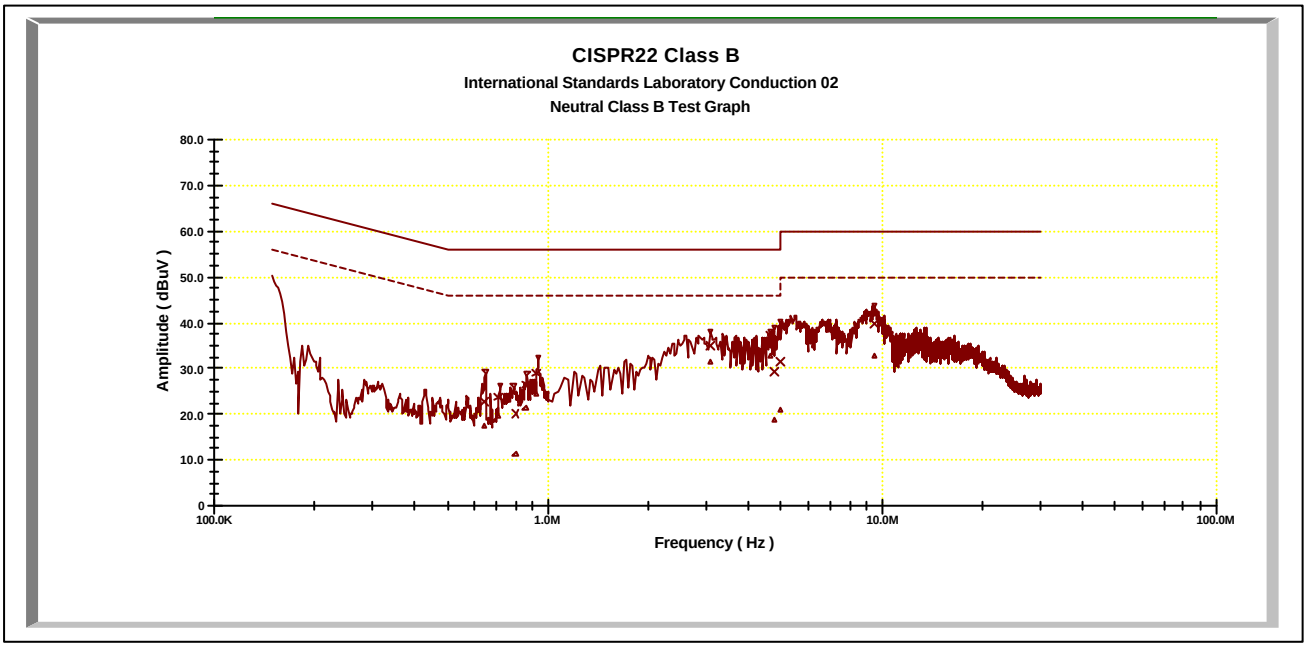
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

	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)
0.19555	0.10	0.02	32.51	64.70	-32.19	16.48	54.70	-38.22
0.47996	0.11	0.03	20.55	56.57	-36.02	7.53	46.57	-39.05
0.53708	0.12	0.03	19.28	56.00	-36.72	9.73	46.00	-36.27
0.77978	0.16	0.05	21.03	56.00	-34.97	12.73	46.00	-33.27
0.793	0.17	0.05	21.59	56.00	-34.41	12.99	46.00	-33.01
4.4172	0.32	0.12	35.47	56.00	-20.53	31.41	46.00	-14.59
4.84633	0.33	0.13	35.42	56.00	-20.58	29.50	46.00	-16.50
8.83301	0.48	0.17	39.37	60.00	-20.63	34.74	50.00	-15.26
9.22184	0.49	0.17	34.10	60.00	-25.90	24.75	50.00	-25.25
9.89819	0.51	0.18	38.47	60.00	-21.53	34.26	50.00	-15.74



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)
0.64593	0.14	0.04	22.83	56.00	-33.17	17.54	46.00	-28.46
0.71305	0.15	0.05	23.78	56.00	-32.22	19.63	46.00	-26.37
0.79861	0.17	0.05	20.26	56.00	-35.74	11.45	46.00	-34.55
0.85728	0.18	0.06	26.45	56.00	-29.55	21.50	46.00	-24.50
0.92653	0.19	0.06	29.05	56.00	-26.95	24.47	46.00	-21.53
3.06716	0.20	0.11	34.89	56.00	-21.11	31.30	46.00	-14.70
4.63372	0.21	0.13	37.11	56.00	-18.89	32.54	46.00	-13.46
4.76346	0.21	0.13	29.35	56.00	-26.65	18.90	46.00	-27.10
4.95299	0.22	0.13	31.52	56.00	-24.48	20.98	46.00	-25.02
9.47763	0.30	0.17	39.70	60.00	-20.30	32.86	50.00	-17.14



* 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

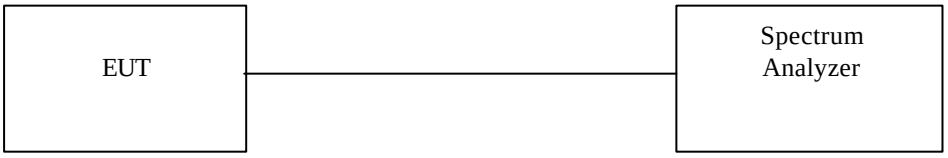
5.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

5.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer through an attenuator. 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

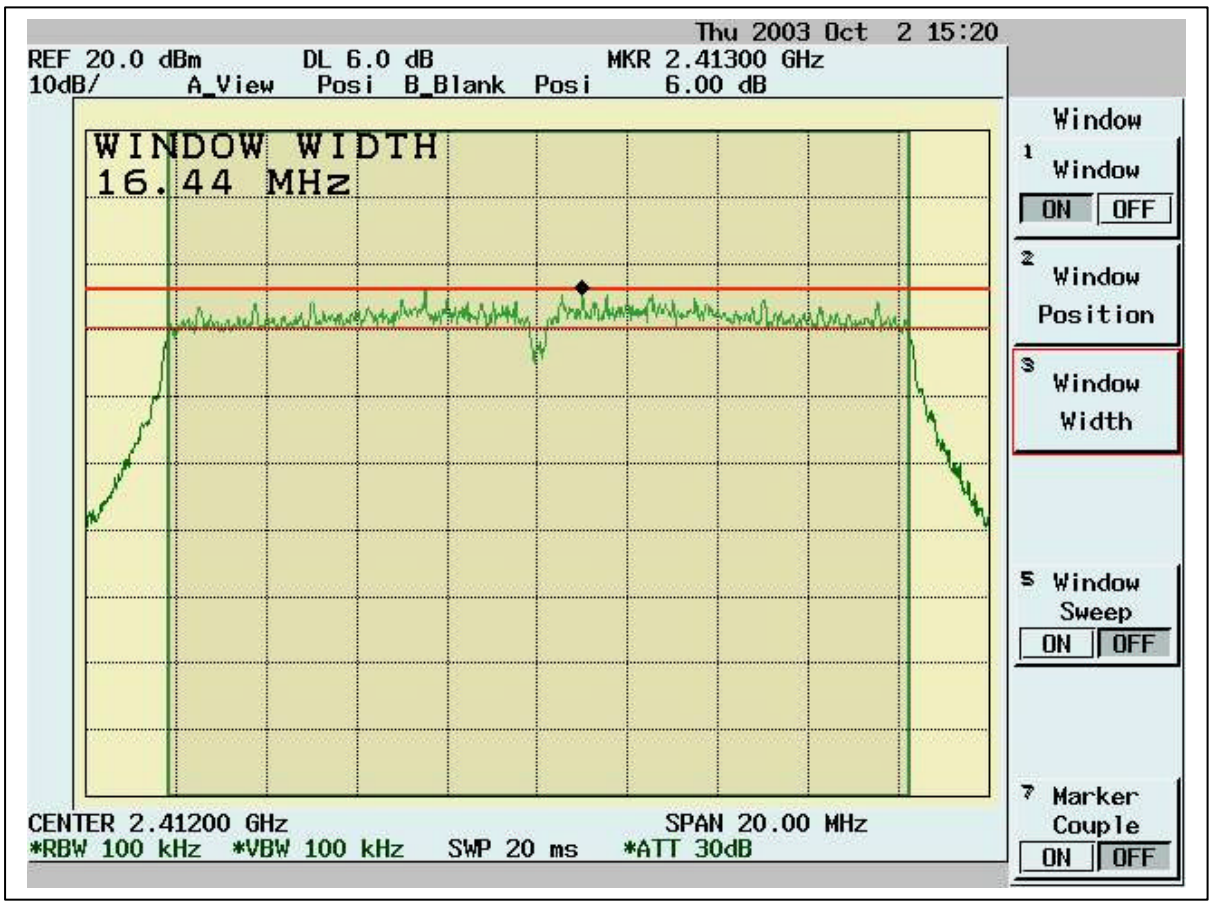
5.2.2 Test Setup



5.2.3 Test Data:

Table 6dB Bandwidth

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.44	0.5	Pass
6	2437	16.36	0.5	Pass
11	2462	16.40	0.5	Pass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DL 6.0 dB
MKR 2.41300 GHz
10dB/
A_View
Posi
B_Blank
Posi
6.00 dB
WINDOW WIDTH
16.44 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 20 ms
*ATT 30dB