

Test Report
FOR
FCC Part 15 Subpart C & E

of

Notebook Personal Computer
(with WLAN a+b+g Mini-PCI Module EM-500AG inside)

Model

BQ12

(Brand: acer)

Applied by:

Wistron NeWeb Corporation
No. 10-1, Li-hsin Road I,
Science-based Industrial Park Hsinchu 300,
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: ISL-03LR005FC

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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

1.1 Certification of Accuracy of Test Data..... 1

2. Test Results Summary 2

3. Description of Equipment Under Test (EUT) 3

3.1 Test Standards and Procedure 5

3.2 General Test Conditions 5

4. TEST RESULTS (802.11b)..... 6

4.1 Powerline Conducted Emissions [Section 15.207] 6

4.1.1 EUT Configuration 6

4.1.2 Test Procedure 6

4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)..... 6

4.1.4 Test Data:..... 7

4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]..... 9

4.2.1 Test Procedure 9

4.2.2 Test Setup..... 9

4.2.3 Test Data..... 9

4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]..... 12

4.3.1 Test Procedure 12

4.3.2 Test Setup..... 12

4.3.3 Test Data:..... 12

4.4 Radiated Emission Measurement [Section [15.247(c)(4)] 13

4.4.1 EUT Configuration 13

4.4.2 Test Procedure 13

4.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)..... 13

4.4.4 Test Data (30MHz – 1GHz) :..... 14

4.4.5 Test Data (1GHz – 25 GHz, Transmitting from Main antenna) 15

4.4.6 Test Data (1GHz – 25 GHz, Transmitting from Aux antenna)..... 18

4.5 Band Edge Measurement 21

4.5.1 Test Procedure (Conducted)..... 21

4.5.2 Test Setup (Conducted) 21

4.5.3 Test Data:..... 21

4.5.4 Band Edge measurement Test Procedure (Radiated)..... 24

4.5.5 Test Setup (Radiated)..... 24

4.5.6 Test Data:..... 25

4.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]..... 30

4.7 DSSS Peak Power Spectral Density [Section 15.247(d)]..... 31

4.7.1 Test Procedure 31

4.7.2 Test Setup..... 31

4.7.3 Test Data:..... 31

5. TEST RESULTS (802.11g) 34

5.1 Powerline Conducted Emissions [Section 15.207] 34

5.1.1 EUT Configuration 34

5.1.2 Test Procedure 34

5.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)..... 34

5.1.4 Test Data:..... 35

5.2 Bandwidth for DSSS [Section 15.247 (a)(2)]..... 37

5.2.1 Test Procedure 37

5.2.2 Test Setup..... 37

5.2.3 Test Data:..... 37

- 5.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]..... 40
 - 5.3.1 Test Procedure 40
 - 5.3.2 Test Setup..... 40
 - 5.3.3 Test Data..... 40
- 5.4 Radiated Emission Measurement [Section [15.247(c)(4)] 41
 - 5.4.1 EUT Configuration 41
 - 5.4.2 Test Procedure 41
 - 5.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)..... 41
 - 5.4.4 Test Data (30MHz – 1GHz) :..... 42
 - 5.4.5 Test Data (1GHz – 25 GHz, Transmitting from Main antenna) 43
 - 5.4.6 Test Data (1GHz – 25 GHz, Transmitting from Aux antenna)..... 46
- 5.5 Band Edge Measurement 49
 - 5.5.1 Test Procedure (Conducted)..... 49
 - 5.5.2 Test Setup (Conducted) 49
 - 5.5.3 Test Data:..... 49
 - 5.5.4 Test Procedure (Radiated)..... 52
 - 5.5.5 Test Setup (Radiated) 52
 - 5.5.6 Test Data:..... 53
- 5.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]..... 58
- 5.7 DSSS Peak Power Spectral Density [Section 15.247(d)] 59
 - 5.7.1 Test Procedure 59
 - 5.7.2 Test Setup..... 59
 - 5.7.3 Test Data:..... 59
- 6. TEST RESULTS (802.11a) 62
 - 6.1 Maximum Peak Output Power [Section 15.407 (a)(1)(2)(3)]..... 62
 - 6.1.1 Test Procedure 62
 - 6.1.2 Test Setup..... 62
 - 6.1.3 Test Data: (Normal Mode)..... 62
 - 6.1.4 Test Data: (Turbo Mode)..... 62
 - 6.2 Peak Power Spectral Density [Section 15.407(a)(1)(2)(3)] 70
 - 6.2.1 Test Procedure 70
 - 6.2.2 Test Setup..... 70
 - 6.2.3 Test Data: (Normal Mode)..... 70
 - 6.2.4 Test Data: (Turbo Mode)..... 70
 - 6.3 Peak Power Excursion Measurement [Section 15.407(a)(6)]..... 76
 - 6.3.1 Test Procedure 76
 - 6.3.2 Test Setup..... 76
 - 6.3.3 Test Data: (Normal Mode)..... 76
 - 6.3.4 Test Data: (Turbo Mode)..... 76
 - 6.4 Powerline Conducted Emissions [Section 15.207 & 15.407 (b)(5)] 84
 - 6.4.1 EUT Configuration 84
 - 6.4.2 Test Procedure 84
 - 6.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)..... 84
 - 6.4.4 Test Data:..... 85
 - 6.5 Radiated Emission Measurement [Section 15.209 & 15.407(b)(5)] 87
 - 6.5.1 EUT Configuration 87
 - 6.5.2 Test Procedure 87
 - 6.5.3 EMI Receiver/Spectrum Analyzer Configuration 87
 - 6.5.4 Test Data (30MHz – 1GHz) 88
 - 6.5.5 Test Data (1GHz – 40 GHz, Transmitting from Main antenna) 89
 - 6.5.6 Test Data (1GHz – 40 GHz, Transmitting from Aux antenna) 96
 - 6.6 Band Edge Measurement (Section 15.407 (b) (1) (2))..... 103
 - 6.6.1 Test Procedure (Conducted)..... 103

- 6.6.2 Test Setup (Conducted) 103
- 6.6.3 Test Data (conducted): 103
- 6.6.4 Bandedge Measurement Test Procedure (Radiated) 108
- 6.6.5 Test Setup (Radiated) 109
- 6.6.6 Test Data (Radiated): 110
- 6.7 RF Exposure Measurement [Section 15.407(f)(4) & 1.1307(b)] 119
- Refer to SAR Test Report 119**
- 6.8 Frequency Stability [Section 15.407(g)] 120
 - 6.8.1 Limits of Frequency Stability Measurement 120
 - 6.8.2 Test Procedure 120
 - 6.8.3 Test Setup 120
 - 6.8.4 Test Data 121
- 7. Appendix 122**
 - 7.1 Appendix A: Measurement Procedure for Powerline Conducted Emissions 122
 - 7.2 Appendix B: Test Procedure for Radiated Emissions 123
 - 7.3 Appendix C: Test Equipment 124
 - 7.3.1 Test Equipment List 124
 - 7.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data 125
 - 7.4 Appendix D: Layout of EUT and Support Equipment 126
 - 7.4.1 General Conducted Test Configuration 126
 - 7.4.2 General Radiation Test Configuration 127
 - 7.5 Appendix E: Description of Support Equipment 128
 - 7.5.1 Description of Support Equipment 128
 - 7.5.2 Software for Controlling Support Unit 129
 - 7.5.3 I/O Cable Condition of EUT and Support Units 130
 - 7.6 Appendix F: Accuracy of Measurement 131
 - 7.7 Appendix G: Photographs of EUT Configuration Test Set Up 133
 - 7.8 Appendix H: Antenna Spec. 135

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), Subpart E (15.407) , 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 a+b+g Mini-PCI module EM-500AG inside)
Model:BQ12
Applied by Wistron NeWeb Corp.

Sample received Date: 2003/02/24

Final test Date : 2003/03/18

Test Site: Chamber 02, Conduction 02

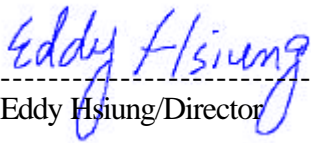
Temperature 21°C(Conduction Test); 21°C (Radiation Test)

Humidity: 51% (Conduction Test); 47% (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; and the limits of FCC Part 15 Subpart E (Section 15.407).

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 138 pages, including 1 cover page , 3 contents page, and 134 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	SAR report attached
15.247 (d)	Power Spectral Density	Pass	

The 802.11a functions of EUT has been tested to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart E			
Standard Section	Test Type	Result	Remarks
15.407 (a)(1)(2)(3)	Peak Transmit Power	Pass	
15.407 (a)(1)(2)(3)	Peak Power Spectral Density	Pass	
15.407 (a)(6)	Peak Power Excursion	Pass	
15.407 (b)(5)	AC Power Line Emissions	Pass	
15.407 (b)(5)	Radiated Emissions 30MHz – 40 GHz	Pass	
15.407(f)	Radiation exposure	Pass	SAR report attached
15.407 (g)	Frequency Stability	Pass	

3. Description of Equipment Under Test (EUT)

Description: Notebook Personal Computer
(with WLAN a+b+g Mini-PCI module EM-500AG inside)

Model No.: BQ12

FCC ID: NKRBQ12B

Brand: acer

Wireless LAN Module: WNC, Model: EM-500AG
(802.11a/b/g)

Frequency Range 802.11a: 5180 - 5320 MHz

Frequency Range 802.11b/g: 2412 - 2462 MHz

Support channel:

802.11a Normal mode 8 Channels

802.11a Turbo mode 3 Channels

802.11b 11 Channels

802.11g 11 Channels

Modulation Skill:

802.11a Normal mode OFDM (6 Mbps – 54 Mbps)

802.11a Turbo mode OFDM (12 Mbps – 108 MBps)

802.11b DBPSK(1Mbps), DQPSK(2Mbps),
CCK(5.5/11Mbps)

802.11g OFDM (6M - 54Mbps)

Antennas Type: Dual PIFA Type in Metal
made by Wistron NeWeb Corp.

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

Antenna peak Gain:

Main antenna 0.93 dBi (2.4GHz), 3.08 dBi (5.25GHz)

Aux antenna 2.33 dBi (2.4GHz), 1.18dBi (5.25 GHz)

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		

The channel and the operation frequency of 802.11a Normal Mode is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	5180	05	5260
02	5200	06	5280
03	5220	07	5300
04	5240	08	5320

The channel and the operation frequency of 802.11a Turbo Mode is listed below:

Channel	Frequency(MHz)
01	5210
02	5250
03	5290

EUT power Rating :	115 VAC/ 60Hz to Power Adapter
AC Power Adapter Manufacturer:	LITEON PA-1900-05 (Input: 100-240VAC, 50-60Hz, 1.4A) (Output: 19VDC, 4.74A)
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)
CPU Manufacturer:	Intel Model: P4 3.06 GHz
OSC/Clock Frequencies:	133MHz
Memory Capacity:	Samsung 512MB
	15'' SXGA LCD Panel Manufacturer: IBM ITSX95C
FDD Manufacturer:	NEC Model: FD3238T-207
HDD Manufacturer:	IBM Model: IC25N020ATCS04-0 (20 GB)
CD- ROM Manufacturer:	Teac Model: CD-224E
Battery Manufacturer (Li-Ion):	Sanyo Model: BATBCLL (6300mAh)9-cells
MDC Modem Manufacturer:	CONEXANT Model: RD01-D480

3.1 Test Standards and Procedure

Test Specification: FCC Part 15 subpart C (Section 15.247) and subpart E (Section 15.407) and/or CISPR 22/EN55022, RSS210

Test Procedure: ANSI C63.4, CFR 47 Sec. 15.247, Sec. 15.407 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. The channel 1, 4, 5, 8 of Normal Mode of 802.11a and Channel 1, 2, 3 of Turbo Mode of 802.11a were also all tested.
4. "Normal mode" of 802.11a and 802.11g allows data rates up to 54 Mbps. The EUT was tested in the data rate that produced the highest output power (6 Mbps)
5. "Turbo mode" of 802.11a allows data rates up to 108 Mbps. The EUT was tested in the data rate that produced the highest output power (12 Mbps).
6. Both Main antenna and Aux antenna of EUT are able to be used as the Transmitting Antenna. Both antennas have been tested respectively.

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:	450 KHz--30MHz
Detector Function:	Quasi-Peak
Bandwidth (RBW):	9KHz

4.1.4 Test Data:

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

Frequency (MHz)	Corrective Factor		Quasi-Peak		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
1.31853	0.44	0.20	30.21	47.96	-17.75
1.64546	0.44	0.22	28.57	47.96	-19.39
1.66103	0.44	0.22	29.76	47.96	-18.20
1.70355	0.44	0.23	29.48	47.96	-18.48
1.83843	0.45	0.24	30.72	47.96	-17.24
12.6661	0.76	0.66	32.48	47.96	-15.48
14.7153	0.91	0.70	33.11	47.96	-14.85
15.5658	0.95	0.73	28.83	47.96	-19.13
17.1492	1.02	0.77	33.05	47.96	-14.91
17.5778	1.04	0.79	30.78	47.96	-17.18

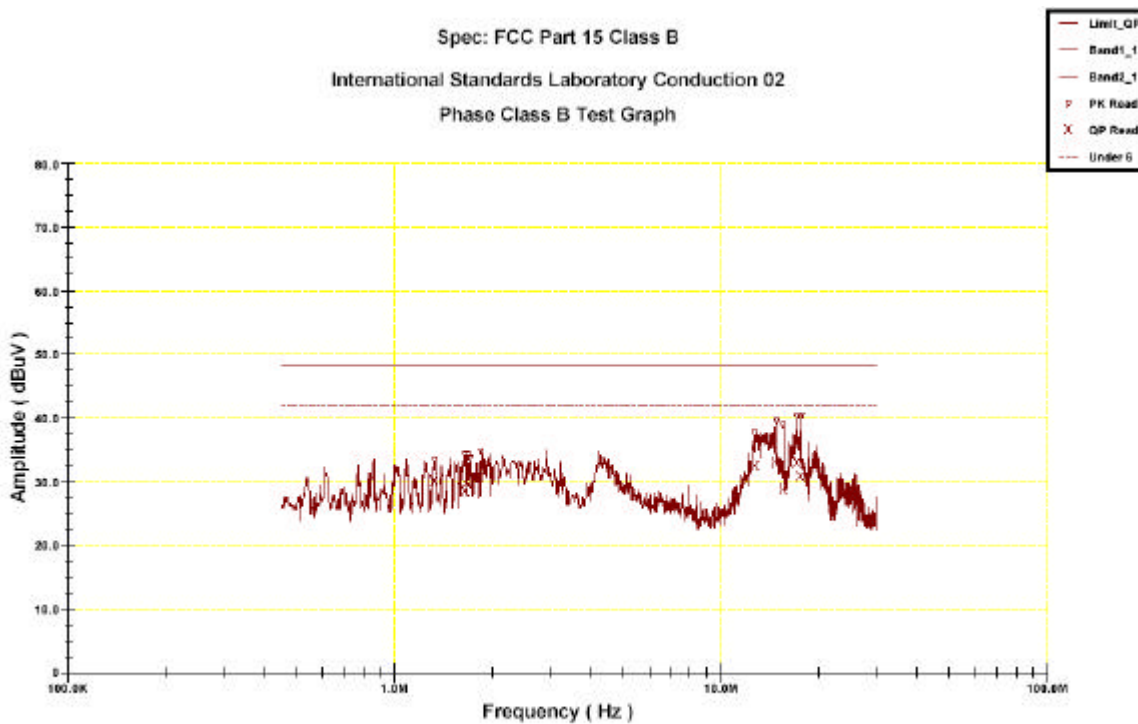
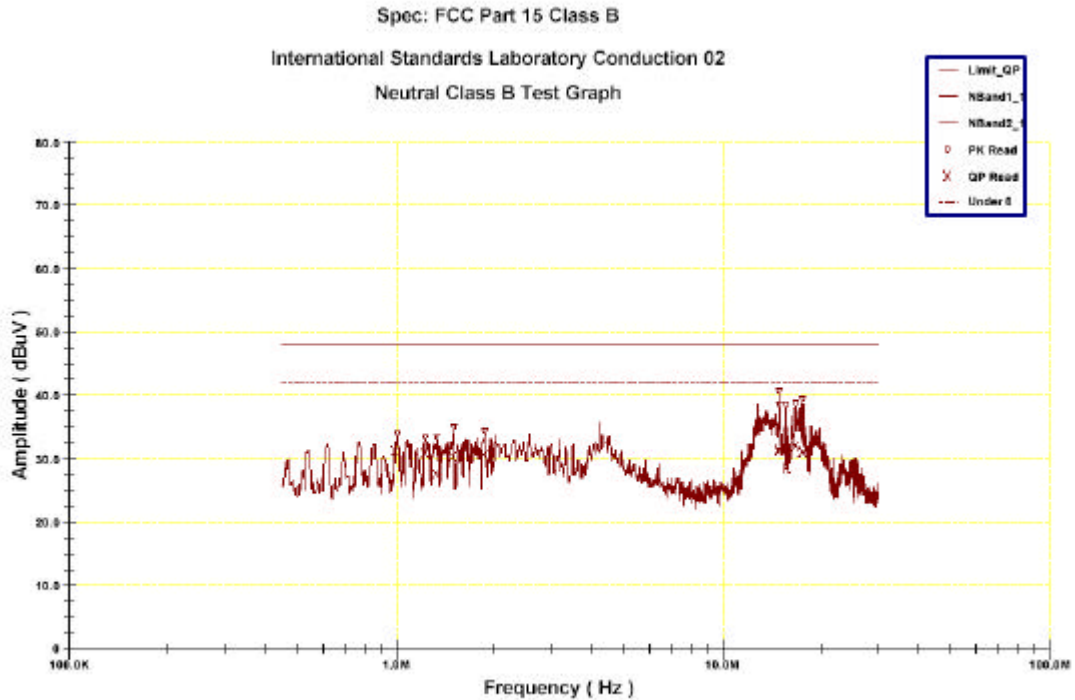


Table Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

Frequency (MHz)	Corrective Factor		Quasi-Peak		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.99703	0.41	0.17	31.18	47.96	-16.78
1.22666	0.41	0.19	30.83	47.96	-17.13
1.33148	0.41	0.20	27.53	47.96	-20.43
1.49195	0.41	0.21	30.25	47.96	-17.71
1.85493	0.42	0.24	30.64	47.96	-17.32
14.8392	0.80	0.71	31.17	47.96	-16.79
14.8778	0.80	0.71	31.38	47.96	-16.58
15.5913	0.83	0.73	28.50	47.96	-19.46
16.7442	0.88	0.76	31.99	47.96	-15.97
17.5662	0.92	0.79	31.04	47.96	-16.92



Operator: Jerry Chiou

* 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

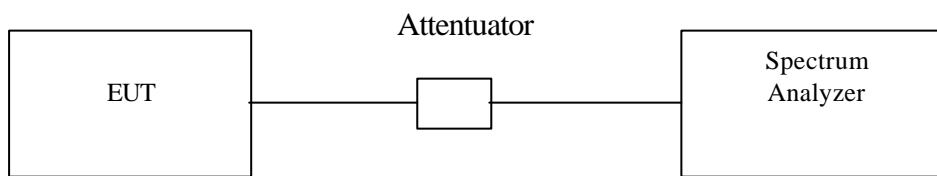
4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

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

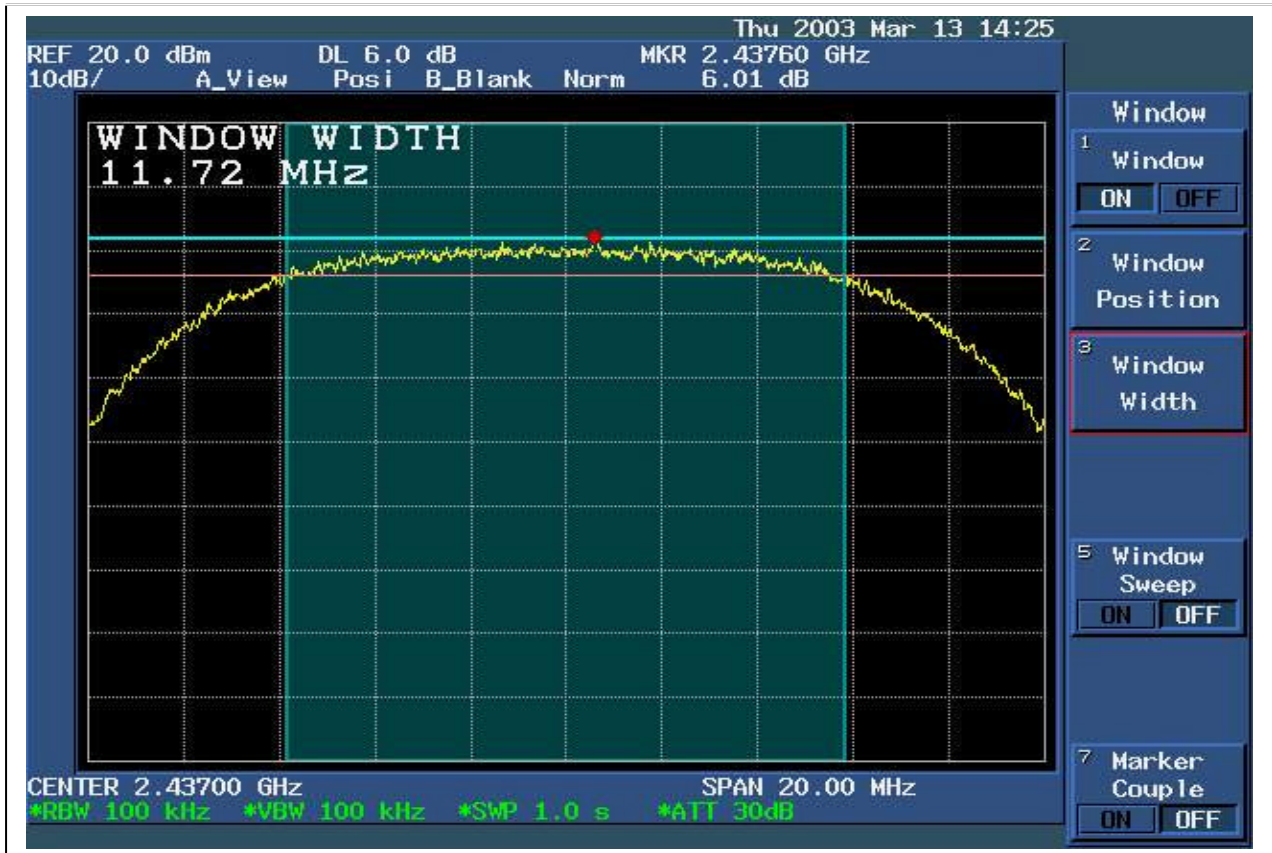
4.2.2 Test Setup



4.2.3 Test Data

Table 6dB Bandwidth

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	11.72	0.5	Pass
6	2437	11.76	0.5	Pass
11	2462	11.40	0.5	Pass



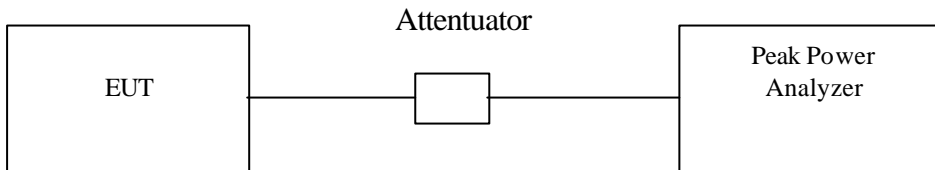


4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

4.3.1 Test Procedure

1. The Transmitter output of EUT was connected to the peak power analyzer through an attenuator.

4.3.2 Test Setup



4.3.3 Test Data:

Table Maximum Peak Output Power

Chennel	Frequency (MHz)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	51.05	17.08	30	Pass
6	2437	50.23	17.01	30	Pass
11	2462	50.82	17.06	30	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

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 2nd to 10th 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 (°)
360.77	15.68	14.52	3.57	0.00	33.77	46.00	-12.23	230	162.00
366.59	11.55	14.63	3.60	0.00	29.78	46.00	-16.22	210	355.00
399.57	14.84	15.58	3.80	0.00	34.22	46.00	-11.78	180	245.00
433.52	10.98	16.30	3.95	0.00	31.23	46.00	-14.77	175	52.00
715.79	14.20	19.29	5.24	0.00	38.74	46.00	-7.26	125	245.00
775.93	5.17	19.90	5.52	0.00	30.59	46.00	-15.41	135	272.00
833.16	3.38	20.23	5.74	0.00	29.36	46.00	-16.64	110	272.00
866.14	5.76	20.36	5.85	0.00	31.97	46.00	-14.03	150	272.00
898.15	8.11	20.40	5.96	0.00	34.47	46.00	-11.53	122	327.00

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 (°)
360.78	15.54	14.52	3.57	0.00	33.62	46.00	-12.38	225	355.00
496.57	11.03	17.30	4.24	0.00	32.57	46.00	-13.43	185	135.00
499.48	10.91	17.30	4.26	0.00	32.47	46.00	-13.53	115	135.00
516.95	11.00	17.38	4.34	0.00	32.72	46.00	-13.28	110	217.00
540.22	8.73	18.41	4.44	0.00	31.58	46.00	-14.42	128	217.00
562.53	8.99	18.67	4.54	0.00	32.21	46.00	-13.79	183	25.00
626.54	7.86	19.00	4.84	0.00	31.70	46.00	-14.30	142	355.00
716.76	17.65	19.32	5.25	0.00	42.22	46.00	-3.78	163	217.00
720.64	18.10	19.42	5.27	0.00	42.78	46.00	-4.22	100	196.00

* 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.

Two type of antennas have been test, and the worse data show above.:

Margin = Corrected Amplitude – Limit

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

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

All frequencies from 30MHz to 1GHz have been tested

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

1GHz~ 25 GHz (Horizontal), Main antenna , Channel 1 : 2412 MHz

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 (°)
*2412.8	111.00(pk)	30.24	0.9	47.38	94.76	--	--	100	120
*2412.8	104.2(av)	30.24	0.9	47.37	87.97	--	--	100	120
4434.0	53.60(pk)	33.95	1.74	48.13	41.16	54	-12.84	110	130
4824.1	51.19(pk)	34.14	1.91	49.24	38	54	-16	107	132
6336.0	62.27(av)	37.51	2.12	48.32	53.58	**67.97	-14.39	115	173
7233.1	53.19(pk)	39.4	2.34	48.52	46.41	54	-7.59	100	226

1GHz~ 25 GHz (Vertical), Main antenna , Channel 1 : 2412 MHz

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 (°)
*2412.9	111.99(pk)	30.24	0.9	47.37	95.76	--	--	100	120
*2412.9	105.28(av)	30.24	0.9	47.37	89.05	--	--	100	120
4434.0	54.17(pk)	33.95	1.74	48.13	41.73	54	-12.27	110	130
4824.1	52.8(pk)	34.14	1.91	49.24	39.61	54	-14.39	100	132
6336.2	69.17(av)	37.51	2.12	48.32	60.48	**69.05	-8.57	116	173
7233.1	56.17(pk)	39.4	2.34	48.52	49.39	54	-4.61	105	226

Note:

“ * ” : Fundamental Frequency

“**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“ pk” : peak reading

“ av” : average reading

“---“ : No meter reading data due to the emission level is smaller than spectrum noise level.

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), Main antenna , Channel 6 : 2437 MHz

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Am pl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
*2412.9	111.99(pk)	30.24	0.9	47.37	95.76	--	--	105	117
*2412.9	105.28(av)	30.24	0.9	47.37	89.05	--	--	105	117
4434.0	54.17(pk)	33.95	1.74	48.13	41.73	54	-12.27	100	110
4824.1	52.8(pk)	34.14	1.91	49.24	39.61	54	-14.39	110	142
6336.2	69.17(av)	37.51	2.12	48.32	60.48	**69.05	-8.57	108	309
7233.1	56.17(pk)	39.4	2.34	48.52	49.39	54	-4.61	105	205

1GHz~ 25 GHz (Vertical), Main antenna , Channel 6 : 2437 MHz

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*	Height (cm)	Position (°)
*2437.1	112.91(pk)	30.24	0.9	47.37	96.68	--	--	100	117
*2437.1	105.62(av)	30.24	0.9	47.37	89.39	--	--	100	117
4432.5	57.77(pk)	33.95	1.74	48.13	45.33	54	-8.67	105	110
4874.3	52.97(pk)	34.14	1.91	49.24	39.78	54	-14.22	100	142
6336.5	68.11(av)	37.51	2.12	48.32	59.42	**69.39	-9.97	115	309
7310.1	55.97(pk)	39.4	2.34	48.52	49.19	54	-4.81	100	205

Note:

“ * ” : Fundamental Frequency

“**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“ pk ”: peak reading

“ av ”: average reading

“ --- ” : No meter reading data due to the emission level is smaller than spectrum noise level.

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), Main antenna , Channel 11: 2462 MHz

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 (°)
*2461.0	112.17(pk)	30.22	0.9	47.7	95.59	--	--	100	117
*2461.0	105.19(av)	30.22	0.9	47.7	88.61	--	--	100	117
4780.8	56.21(pk)	33.95	1.74	48.13	43.77	54	-10.23	110	88
4925.5	53.78(pk)	34.3	1.91	49.26	40.73	54	-13.27	105	178
6335.5	61.99(av)	37.51	2.12	48.32	53.3	**68.61	-15.31	100	165
7386.7	53.21(pk)	39.6	2.38	48.34	46.85	54	-7.15	116	215

1GHz~ 25 GHz (Vertical), Main antenna , Channel 11 : 2462 MHz

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 (°)
*2462.0	113.61(pk)	30.22	0.9	47.7	97.03	--	--	100	117
*2462.0	106.82(av)	30.22	0.9	47.7	90.24	--	--	100	117
4780.2	56.97(pk)	33.95	1.74	48.13	44.53	54	-9.47	120	88
4924.2	54.98(pk)	34.3	1.91	49.26	41.93	54	-12.07	105	178
6335.2	65.31(av)	37.51	2.12	48.32	56.62	**70.24	-13.62	112	165
7386.9	53.73(pk)	39.6	2.38	48.34	47.37	54	-6.63	100	215

Note:

“ * ” : Fundamental Frequency

“**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“ pk” : peak reading

“ av” : average reading

”---“ : No meter reading data due to the emission level is smaller than spectrum noise level.

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.

4.4.6 Test Data (1GHz – 25 GHz, Transmitting from Aux antenna)

1GHz~ 25 GHz (Horizontal), Aux antenna , Channel 1 : 2412 MHz

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 (°)
*2412.3	114.20(pk)	30.24	0.9	47.38	97.96	--	--	105	10
*2412.3	106.18(av)	30.24	0.9	47.37	89.95	--	--	105	10
4434.1	53.37(pk)	33.95	1.74	48.13	40.93	54	-13.07	100	32
4824.4	51.57(pk)	34.14	1.91	49.24	38.38	54	-15.62	100	71
6336.2	61.17(av)	37.51	2.12	48.32	52.48	**69.95	-17.47	118	173
7233.6	53.89(pk)	39.4	2.34	48.52	47.11	54	-6.89	107	90

1GHz~ 25 GHz (Vertical), Aux antenna , Channel 1 : 2412 MHz

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 (°)
*2412.2	114.90(pk)	30.24	0.9	47.37	98.67	--	--	100	10
*2412.2	106.11(av)	30.24	0.9	47.37	89.88	--	--	100	10
4434.1	54.65(pk)	33.95	1.74	48.13	42.21	54	-11.79	110	32
4824.2	53.21(pk)	34.14	1.91	49.24	40.02	54	-13.98	108	71
6336.1	67.89(av)	37.51	2.12	48.32	59.2	**69.88	-10.68	100	173
7233.9	54.44(pk)	39.4	2.34	48.52	47.66	54	-6.34	100	90

Note:

“ * ” : Fundamental Frequency

“**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

”---“ : No meter reading data due to the emission level is smaller than spectrum noise level.

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), Aux antenna , Channel 6 : 2437 MHz

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 (°)
*2437.4	113.74(pk)	30.24	0.9	47.37	97.51	--	--	100	5
*2437.4	106.60(av)	30.24	0.9	47.37	90.37	--	--	100	5
4432.4	57.11(pk)	33.95	1.74	48.13	44.67	54	-9.33	115	35
4874.2	52.21(pk)	34.14	1.91	49.24	39.02	54	-14.98	100	70
6336.9	62.21(av)	37.51	2.12	48.32	53.52	**70.37	-16.85	109	173
7311.3	53.69(pk)	39.4	2.34	48.52	46.91	54	-7.09	110	96

1GHz~ 25 GHz (Vertical), Aux antenna , Channel 6 : 2437 MHz

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 (°)
*2438.8	113.80(pk)	30.24	0.9	47.37	97.57	--	--	106	5
*2438.8	106.50(av)	30.24	0.9	47.37	90.27	--	--	106	5
4432.5	56.97(pk)	33.95	1.74	48.13	44.53	54	-9.47	115	35
4874.3	53.48(pk)	34.14	1.91	49.24	40.29	54	-13.71	102	70
6336.2	69.91(av)	37.51	2.12	48.32	61.22	**70.27	-9.05	100	173
7311.8	54.29(pk)	39.4	2.34	48.52	47.51	54	-6.49	108	96

Note:

“ * ” : Fundamental Frequency

“**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“ pk ”: peak reading

“ av ”: average reading

”---“ : No meter reading data due to the emission level is smaller than spectrum noise level.

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), Aux antenna , Channel 11 : 2462 MHz

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 (°)
*2462.1	113.85(pk)	30.22	0.9	47.7	97.27	--	--	110	6
*2462.1	106.77(av)	30.22	0.9	47.7	90.19	--	--	110	6
4780.0	56.51(pk)	33.95	1.74	48.13	44.07	54	-9.93	100	37
4925.1	52.58(pk)	34.3	1.91	49.26	39.53	54	-14.47	100	79
6335.5	62.49(av)	37.51	2.12	48.32	53.8	**70.19	-16.39	115	169
7386.2	51.31(pk)	39.6	2.38	48.34	44.95	54	-9.05	100	98

1GHz~ 25 GHz (Vertical), Aux antenna , Channel 11 : 2462 MHz

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 (°)
*2462.0	114.61(pk)	30.22	0.9	47.7	98.03	--	--	100	6
*2462.0	108.42(av)	30.22	0.9	47.7	91.84	--	--	100	6
4780.5	55.91(pk)	33.95	1.74	48.13	43.47	54	-10.53	109	37
4925.5	52.98(pk)	34.3	1.91	49.26	39.93	54	-14.07	100	79
6335.7	65.11(av)	37.51	2.12	48.32	56.42	**71.84	-15.42	116	169
7386.1	53.21(pk)	39.6	2.38	48.34	46.85	54	-7.15	104	98

Note:

“ * ” : Fundamental Frequency

**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“ pk”: peak reading

“av”: average reading

”---“ : No meter reading data due to the emission level is smaller than spectrum noise level.

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

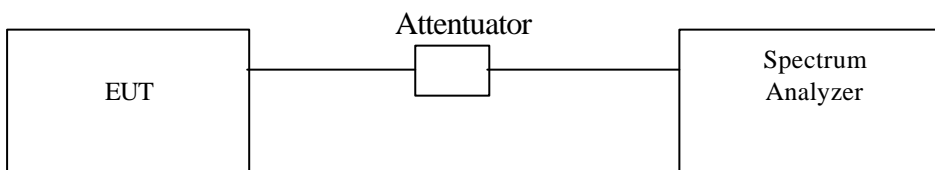
All frequencies from 1GHz to 25 GHz have been tested.

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: 2.4GHz, 2.4835GHz.
 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	2412.6	108.98	---	---
Outside band	2396.5	78.3	30.68	Pass
11	2460.8	107.14	---	---
Outside band	2476.5	74.32	32.82	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

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: 100KHz
VBW: 100KHz
Center frequency: 2.395GHz, 2.48 GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximun 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 Maximun 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)	2412.6	110.04	-16.4	93.64	---	---	100KHz	---
Outside band	2396.0	79.57	-16.3	63.27	30.37	---	100KHz	Pass
1(average mode)	2410.7	107.94	-16.4	91.54	---	---	10Hz	---
Restricted band	2388.9	62.95	-16.3	46.65	-----	54	10Hz	Pass
11(peak mode)	2462.7	106.26	-16.2	90.06	----	---	100KHz	---
Outside band	2475.9	71.6	-16.2	57.4	32.66	---	100KHz	Pass
11(average mode)	2463.3	105.95	-16.2	89.75	----	---	10Hz	---
Restricted band	2528.0	57.77	-16.3	41.47	-----	54	10Hz	Pass

Note: Two type of antennas have been test, and the worse data show above.:

The Spectrum plot of emission level measurement in Restricted band is attached.

Emission Level = Spectrum Reading + Correction Factor

Correction Factor = Antenna Factor + cable loss – amplifier gain

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

Peak Mode (Channel 1)



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

Average Mode (Channel 1)



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

Peak Mode (Channel 11)



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

Average Mode (Channel 11)



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

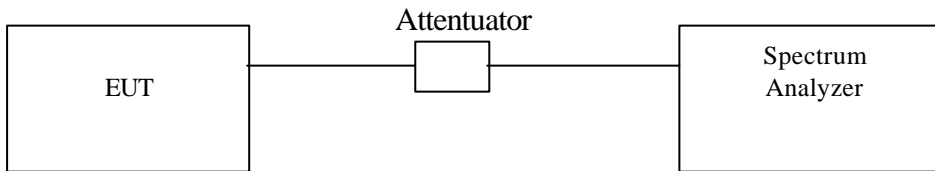
Refer to SAR Test Report attached

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.
 Cable loss=0.5dB
2. Using Peak Search to read the peak power after Maximun Hold function is completed.

4.7.2 Test Setup

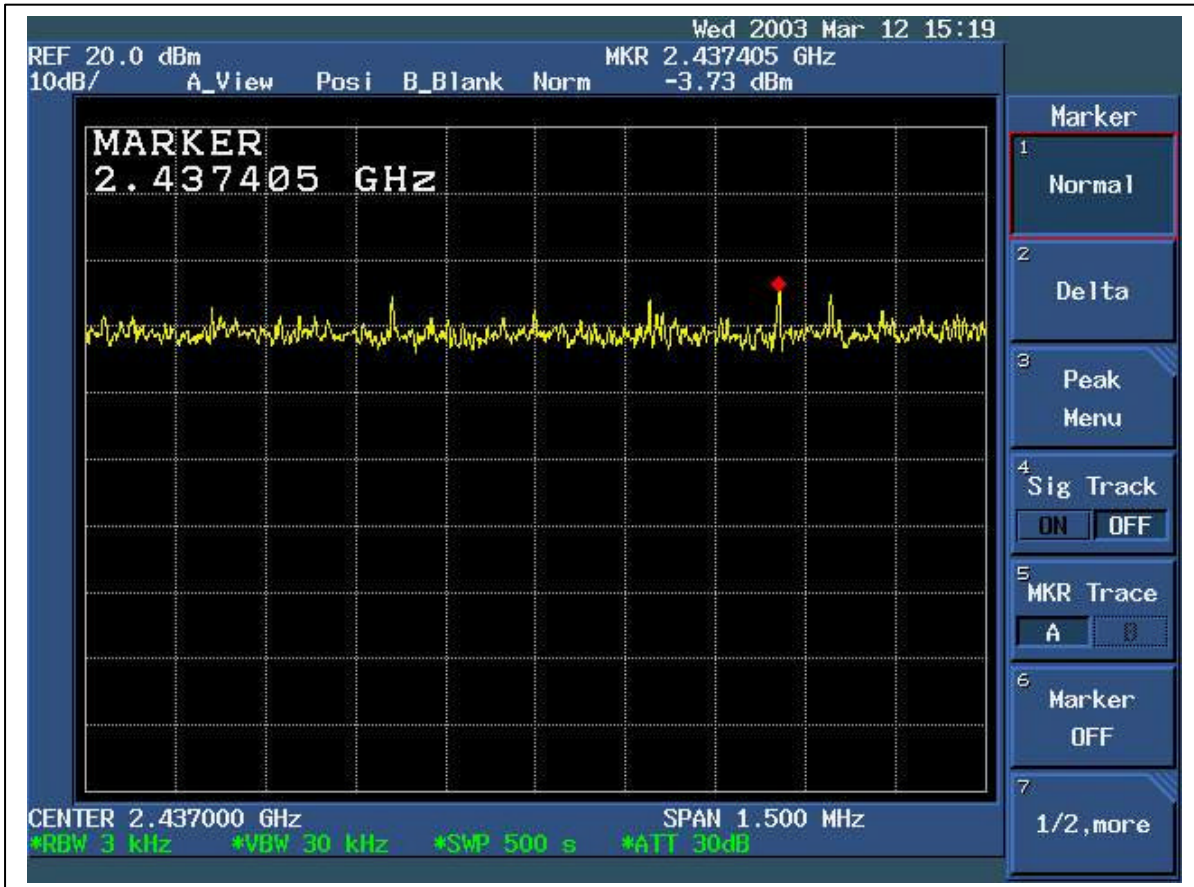
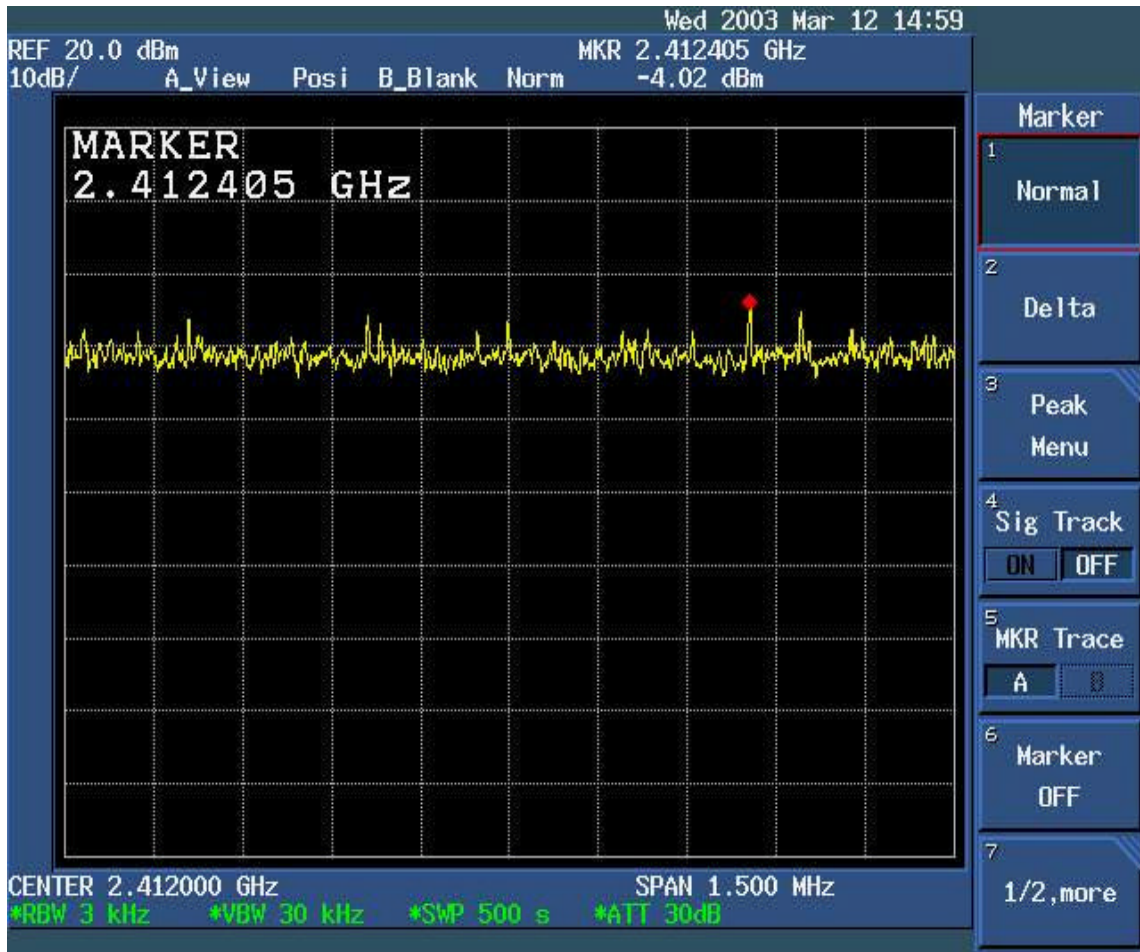


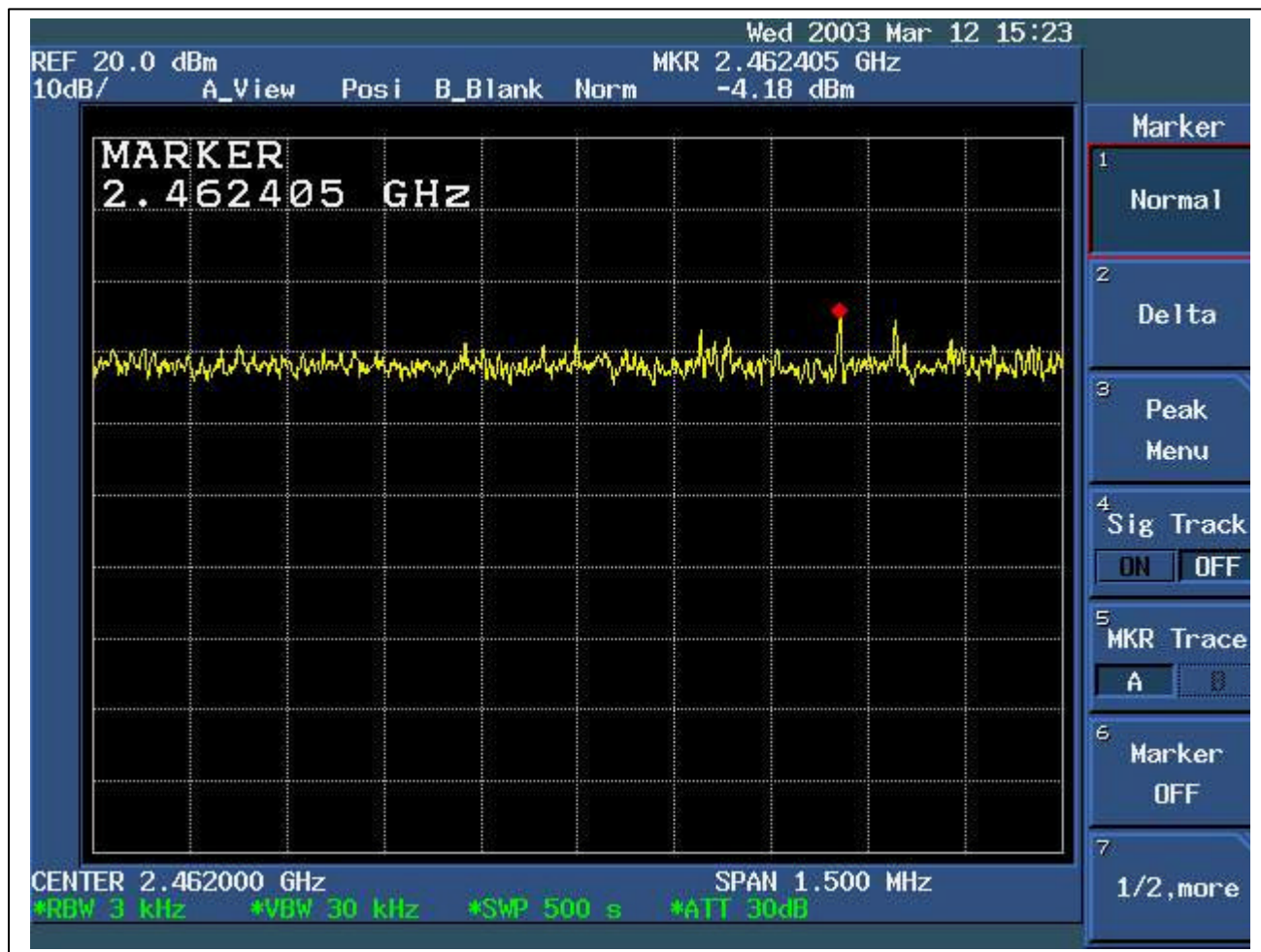
4.7.3 Test Data:

Table Maximum Peak Output Power Density

Chennel	Frequency (MHz)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412.5	-3.52	8	Pass
6	2437.5	-3.23	8	Pass
11	2462.5	-3.68	8	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.
 Cable Lose=0.5dB





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.

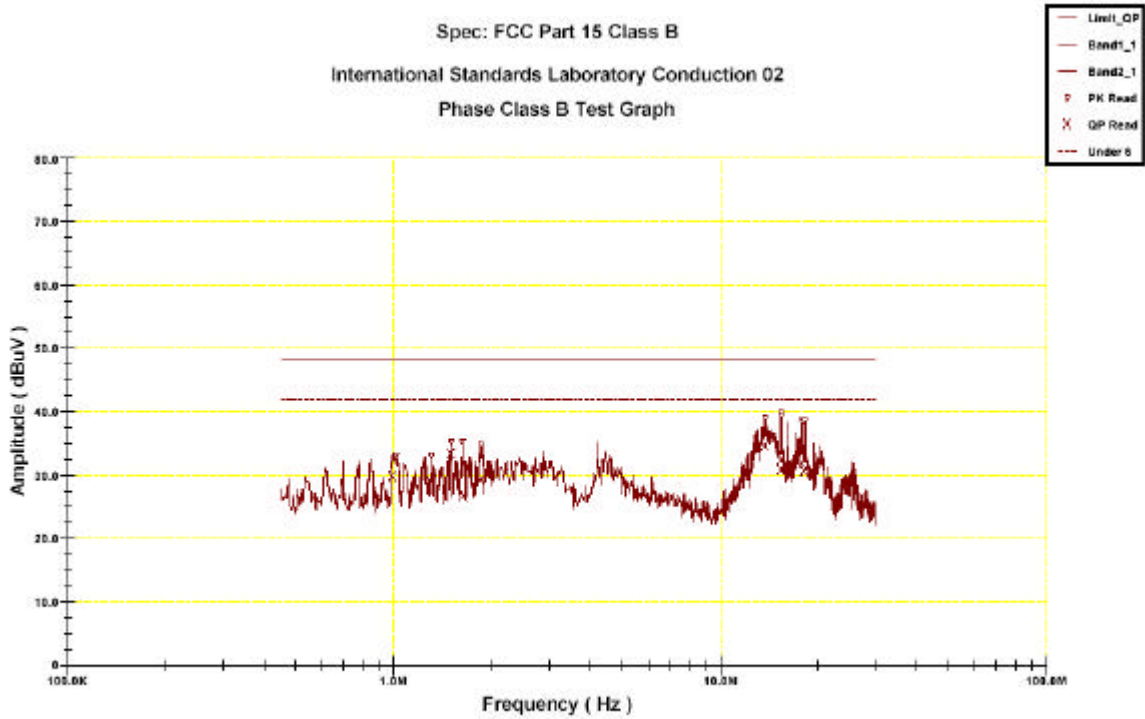
5.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	450KHz--30MHz
Detector Function:	Quasi-Peak
Bandwidth (RBW):	9KHz

5.1.4 Test Data:

Table 2.2.1 Power Line Conducted Emissions (Hot) Channel 1, 6, 11

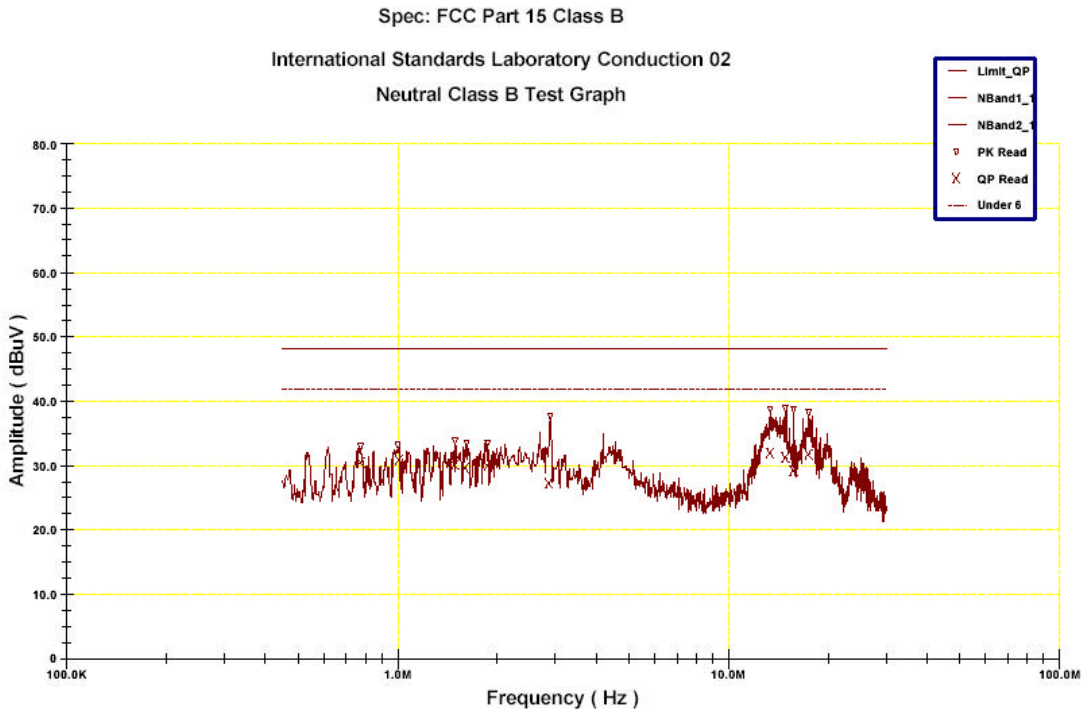
Frequency (MHz)	Corrective Factor		Quasi-Peak		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.98833	0.44	0.17	29.81	47.96	-18.15
1.28966	0.44	0.19	29.10	47.96	-18.86
1.49128	0.44	0.21	33.31	47.96	-14.65
1.63063	0.44	0.22	26.65	47.96	-21.31
1.85276	0.45	0.24	29.20	47.96	-18.76
13.6947	0.83	0.68	34.65	47.96	-13.31
15.3637	0.95	0.72	32.31	47.96	-15.65
15.4519	0.95	0.72	30.84	47.96	-17.12
17.8335	1.05	0.80	31.86	47.96	-16.10
18.131	1.07	0.80	30.72	47.96	-17.24



Operator: Jerry Chiou

Table 2.2.2 Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

Frequency (MHz)	Corrective Factor		Quasi-Peak		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.77178	0.50	0.16	30.42	47.96	-17.54
1.0108	0.41	0.17	30.87	47.96	-17.09
1.49431	0.41	0.21	30.14	47.96	-17.82
1.60745	0.41	0.22	29.51	47.96	-18.45
1.86455	0.42	0.24	30.02	47.96	-17.94
2.88082	0.42	0.31	27.24	47.96	-20.72
13.3393	0.73	0.67	31.96	47.96	-16.00
14.8759	0.80	0.71	31.13	47.96	-16.83
15.6793	0.84	0.73	29.30	47.96	-18.66
17.5158	0.91	0.79	31.78	47.96	-16.18



Operator: Jerry Chiou

* 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

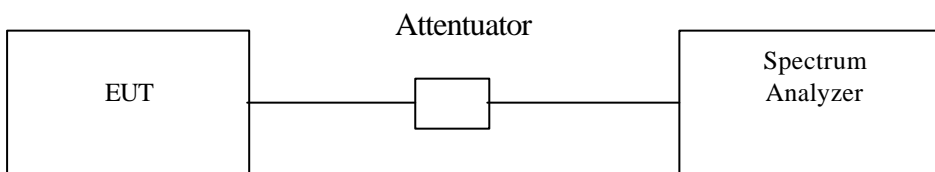
5.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

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

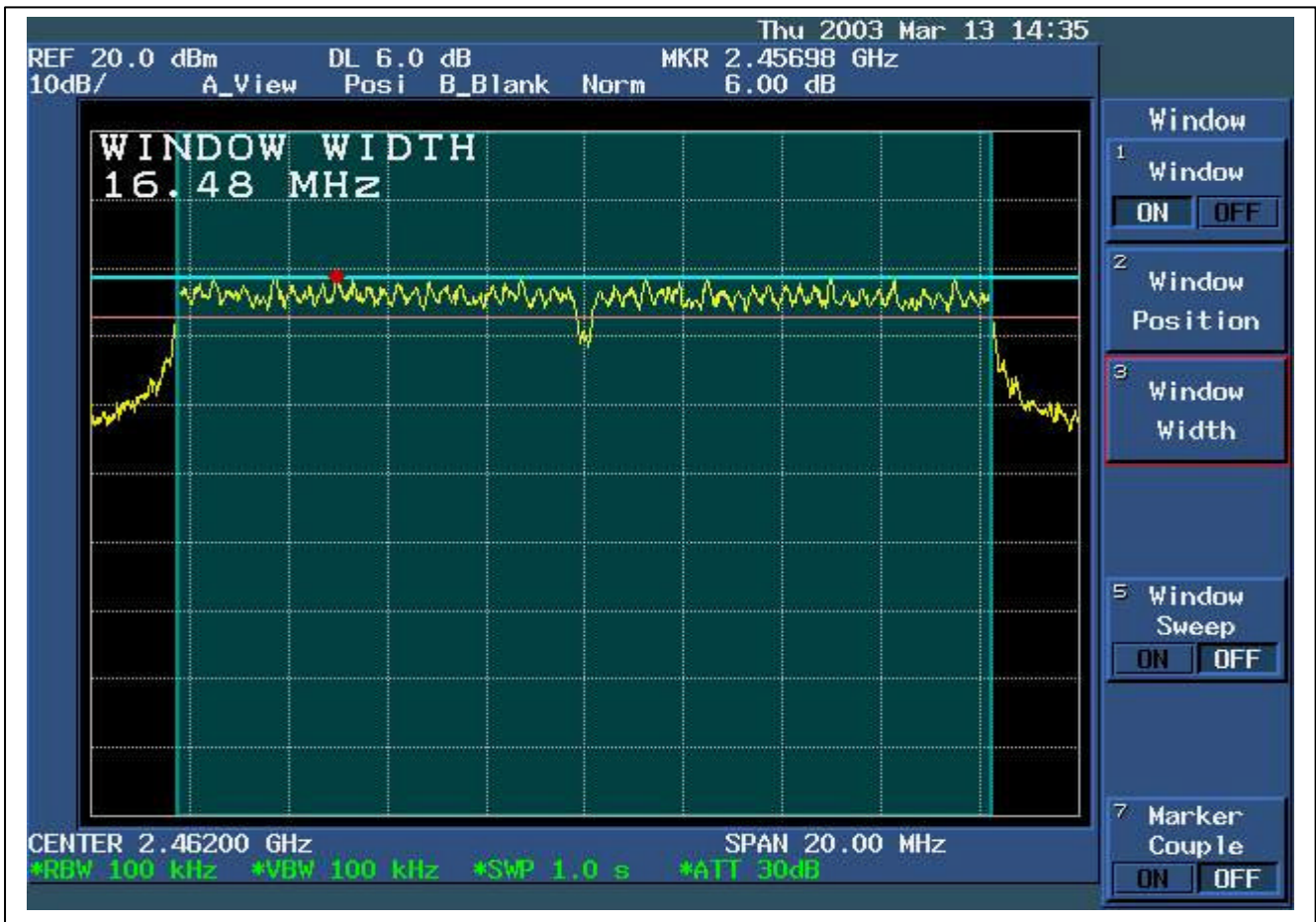


5.2.3 Test Data:

Table 6dB Bandwidth

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.48	0.5	Pass
6	2437	16.48	0.5	Pass
11	2462	16.48	0.5	Pass



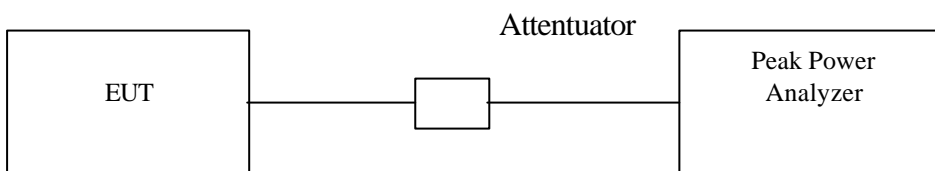


5.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

5.3.1 Test Procedure

2. The Transmitter output of EUT was connected to the peak power analyzer through an attenuator.

5.3.2 Test Setup



5.3.3 Test Data

Table Maximum Peak Output Power

Channel	Frequency (MHz)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	50.69	17.05	30	Pass
6	2437	51.16	17.09	30	Pass
11	2462	50.35	17.02	30	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

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

5.4.1 EUT Configuration

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

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

5.4.2 Test Procedure

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

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

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.

For the test of 2nd to 10th harmonics frequencies, the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

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

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

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

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

5.4.4 Test Data (30MHz – 1GHz) :

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
199.75	16.24	8.59	2.63	0.00	27.46	43.50	-16.04	252.00	25.00
320.03	15.34	13.50	3.33	0.00	32.17	46.00	-13.83	125.00	135.00
360.77	15.47	14.52	3.57	0.00	33.56	46.00	-12.44	230.00	162.00
433.52	12.64	16.30	3.95	0.00	32.89	46.00	-13.11	105.00	52.00
715.79	15.34	19.29	5.24	0.00	39.87	46.00	-6.13	123.00	245.00
833.16	4.32	20.23	5.74	0.00	30.29	46.00	-15.71	106.00	272.00
898.15	8.94	20.40	5.96	0.00	35.30	46.00	-10.70	110.00	327.00

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 (°)
360.77	14.97	14.52	3.57	0.00	33.06	46.00	-12.94	103.00	355.00
516.94	12.05	17.38	4.34	0.00	33.77	46.00	-12.23	110.00	217.00
540.22	10.34	18.41	4.44	0.00	33.19	46.00	-12.81	100.00	217.00
623.64	6.79	19.00	4.82	0.00	30.61	46.00	-15.39	112.00	327.00
716.76	17.32	19.32	5.25	0.00	41.89	46.00	-4.11	152.00	217.00
720.64	15.49	19.42	5.27	0.00	40.18	46.00	-5.82	135.00	190.00
861.29	4.73	20.31	5.84	0.00	30.88	46.00	-15.12	124.00	217.00

* NOTE:

During the Pre-test, the EUT has been tested for Channel 1, 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

Margin = Corrected Amplitude – Limit

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

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

All frequencies from 30MHz to 1GHz have been tested

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

1GHz~ 25 GHz (Horizontal), Main antenna , Channel 1 : 2412 MHz

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 (°)
*2412.2	113.65(pk)	30.24	0.9	47.38	97.41	--	--	100	125
*2412.2	105.48(av)	30.24	0.9	47.37	89.25	--	--	100	125
4434.4	53.67(pk)	33.95	1.74	48.13	41.23	54	-12.77	103	135
4824.5	51.39(pk)	34.14	1.91	49.24	38.2	54	-15.8	107	136
5579.4	60.15(av)	36.54	2.03	48.54	50.18	**69.25	-19.07	100	325
6336.1	62.77(av)	37.51	2.12	48.32	54.08	**69.25	-15.17	100	180
7233.7	53.99(pk)	39.4	2.34	48.52	47.21	54	-6.79	115	235

1GHz~ 25 GHz (Vertical), Main antenna , Channel 1 : 2412 MHz

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 (°)
*2412.2	113.91(pk)	30.24	0.9	47.37	97.68	--	--	106	125
*2412.2	105.18(av)	30.24	0.9	47.37	88.95	--	--	106	125
4434.4	54.67(pk)	33.95	1.74	48.13	42.23	54	-11.77	108	135
4824.5	52.8(pk)	34.14	1.91	49.24	39.61	54	-14.39	112	136
5581.1	64.67(av)	36.54	2.03	48.54	54.7	**68.95	-14.25	105	325
6336.1	69.87(av)	37.51	2.12	48.32	61.18	**68.95	-7.77	100	180
7233.7	56.07(pk)	39.4	2.34	48.52	49.29	54	-4.71	107	235

Note:

“ * ” : Fundamental Frequency

“***” Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk” : peak reading

“av” : average reading

“---“ : No meter reading data due to the emission level is smaller than spectrum noise level.

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), Main antenna , Channel 6 : 2437 MHz

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 (°)
*2437.2	112.86(pk)	30.24	0.9	47.37	96.63	--	--	102	120
*2437.2	105.65(av)	30.24	0.9	47.37	89.42	--	--	102	120
4432.4	57.21(pk)	33.95	1.74	48.13	44.77	54	-9.23	100	114
4874.5	52.11(pk)	34.14	1.91	49.24	38.92	54	-15.08	107	146
5605.1	58.67(av)	36.54	2.03	48.54	48.7	**69.42	-20.72	100	303
6336.9	62.11(av)	37.51	2.12	48.32	53.42	**69.42	-16	113	175
7311.7	53.57(pk)	39.4	2.34	48.52	46.79	54	-7.21	100	210

1GHz~ 25 GHz (Vertical), Main antenna , Channel 6 : 2437 MHz

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 (°)
*2437.0	112.81(pk)	30.24	0.9	47.37	96.58	--	--	100	120
*2437.0	105.32(av)	30.24	0.9	47.37	89.09	--	--	100	120
4432.5	57.67(pk)	33.95	1.74	48.13	45.23	54	-8.77	113	114
4874.3	52.88(pk)	34.14	1.91	49.24	39.69	54	-14.31	101	146
5605.1	63.67(av)	36.54	2.03	48.54	53.7	**69.09	-15.39	106	303
6336.5	69.11(av)	37.51	2.12	48.32	60.42	**69.09	-8.67	105	175
7311.0	55.07(pk)	39.4	2.34	48.52	48.29	54	-5.71	101	210

Note:

“ * ” : Fundamental Frequency

“**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk” : peak reading

“av” : average reading

“---” : No meter reading data due to the emission level is smaller than spectrum noise level.

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), Main antenna , Channel 11: 2462 MHz

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 (°)
*2462.0	112.87(pk)	30.22	0.9	47.7	96.29	--	--	105	112
*2462.0	105.99(av)	30.22	0.9	47.7	89.41	--	--	105	112
4780.8	56.71(pk)	33.95	1.74	48.13	44.27	54	-9.73	100	95
4925.5	53.78(pk)	34.3	1.91	49.26	40.73	54	-13.27	101	173
5626.6	58.54(av)	36.54	2.03	48.54	48.57	**69.41	-20.84	110	285
6335.5	62.99(av)	37.51	2.12	48.32	54.3	**69.41	-15.11	103	170
7386.8	53.11(pk)	39.6	2.38	48.34	46.75	54	-7.25	100	220

1GHz~ 25 GHz (Vertical), Main antenna , Channel 11 : 2462 MHz

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 (°)
*2462.1	113.11(pk)	30.22	0.9	47.7	96.53	--	--	101	112
*2462.1	106.32(av)	30.22	0.9	47.7	89.74	--	--	101	112
4780.1	56.97(pk)	33.95	1.74	48.13	44.53	54	-9.47	100	95
4924.5	54.98(pk)	34.3	1.91	49.26	41.93	54	-12.07	115	173
5626.9	68.76(av)	36.54	2.03	48.54	58.79	**69.74	-10.95	100	285
6335.8	65.21(av)	37.51	2.12	48.32	56.52	**69.74	-13.22	106	170
7386.0	53.43(pk)	39.6	2.38	48.34	47.07	54	-6.93	100	220

Note:

“ * ” : Fundamental Frequency

“***” Not in the restricted band, Limit level=Fundamental Emission-20dB

“ pk ”: peak reading

“ av ”: average reading

“ --- ”: No meter reading data due to the emission level is smaller than spectrum noise level.

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.

5.4.6 Test Data (1GHz – 25 GHz, Transmitting from Aux antenna)

1GHz~ 25 GHz (Horizontal), Aux antenna , Channel 1 : 2412 MHz

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 (°)
*2412.4	113.60(pk)	30.24	0.9	47.38	97.36	--	--	106	7
*2412.4	105.08(av)	30.24	0.9	47.37	88.85	--	--	106	7
4434.4	53.27(pk)	33.95	1.74	48.13	40.83	54	-13.17	102	36
4824.7	51.87(pk)	34.14	1.91	49.24	38.68	54	-15.32	106	75
5579.4	61.15(av)	36.54	2.03	48.54	51.18	**68.85	-17.67	104	195
6336.1	61.77(av)	37.51	2.12	48.32	53.08	**68.85	-15.77	104	174
7233.9	53.79(pk)	39.4	2.34	48.52	47.01	54	-6.99	100	95

1GHz~ 25 GHz (Vertical), Aux antenna , Channel 1 : 2412 MHz

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 (°)
*2412.0	113.90(pk)	30.24	0.9	47.37	97.67	--	--	101	7
*2412.0	105.11(av)	30.24	0.9	47.37	88.88	--	--	101	7
4434.4	54.65(pk)	33.95	1.74	48.13	42.21	54	-11.79	100	36
4824.1	53.21(pk)	34.14	1.91	49.24	40.02	54	-13.98	109	75
5581.1	64.21(av)	36.54	2.03	48.54	54.24	**68.88	-14.64	100	195
6336.1	67.99(av)	37.51	2.12	48.32	59.3	**68.88	-9.58	108	174
7233.0	55.44(pk)	39.4	2.34	48.52	48.66	54	-5.34	100	95

Note:

“ * ” : Fundamental Frequency

“**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“---“ : No meter reading data due to the emission level is smaller than spectrum noise level.

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), Aux antenna , Channel 6 : 2437 MHz

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 (°)
*2437.9	112.74(pk)	30.24	0.9	47.37	96.51	--	--	109	5
*2437.9	105.60(av)	30.24	0.9	47.37	89.37	--	--	109	5
4432.4	57.11(pk)	33.95	1.74	48.13	44.67	54	-9.33	104	40
4874.2	52.21(pk)	34.14	1.91	49.24	39.02	54	-14.98	105	72
5605.2	58.67(av)	36.54	2.03	48.54	48.7	**69.37	-20.67	108	191
6336.9	62.21(av)	37.51	2.12	48.32	53.52	**69.37	-15.85	106	175
7311.2	53.59(pk)	39.4	2.34	48.52	46.81	54	-7.19	107	93

1GHz~ 25 GHz (Vertical), Aux antenna , Channel 6 : 2437 MHz

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 (°)
*2438.1	112.80(pk)	30.24	0.9	47.37	96.57	--	--	111	5
*2438.1	105.20(av)	30.24	0.9	47.37	88.97	--	--	111	5
4432.5	56.97(pk)	33.95	1.74	48.13	44.53	54	-9.47	102	40
4874.3	53.48(pk)	34.14	1.91	49.24	40.29	54	-13.71	106	72
5604.1	62.67(av)	36.54	2.03	48.54	52.7	**68.97	-16.27	100	191
6336.2	69.01(av)	37.51	2.12	48.32	60.32	**68.97	-8.65	105	175
7311.0	54.27(pk)	39.4	2.34	48.52	47.49	54	-6.51	100	93

Note:

“ * ” : Fundamental Frequency

“**” Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“---”: No meter reading data due to the emission level is smaller than spectrum noise level.

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), Aux antenna , Channel 11 : 2462 MHz

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Amp. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
*2462.6	112.85(pk)	30.22	0.9	47.7	96.27	--	--	105	10
*2462.6	105.97(av)	30.22	0.9	47.7	89.39	--	--	105	10
4780.0	56.51(pk)	33.95	1.74	48.13	44.07	54	-9.93	100	40
4925.0	52.58(pk)	34.3	1.91	49.26	39.53	54	-14.47	104	76
5627.5	58.55(av)	36.54	2.03	48.54	48.58	**69.39	-20.81	100	182
6335.5	62.49(av)	37.51	2.12	48.32	53.8	**69.39	-15.59	103	164
7386.9	53.71(pk)	39.6	2.38	48.34	47.35	54	-6.65	100	102

1GHz~ 25 GHz (Vertical), Aux antenna , Channel 11 : 2462 MHz

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turntable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Amp. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin* (dB)	Height (cm)	Position (°)
*2462.1	113.01(pk)	30.22	0.9	47.7	96.43	--	--	100	10
*2462.1	106.22(av)	30.22	0.9	47.7	89.64	--	--	100	10
4780.5	55.93(pk)	33.95	1.74	48.13	43.49	54	-10.51	100	40
4925.5	52.98(pk)	34.3	1.91	49.26	39.93	54	-14.07	108	76
5626.6	68.34(av)	36.54	2.03	48.54	58.37	**69.64	-11.27	105	182
6335.7	65.01(av)	37.51	2.12	48.32	56.32	**69.64	-13.32	106	164
7386.8	53.11(pk)	39.6	2.38	48.34	46.75	54	-7.25	109	102

Note:

“ * ” : Fundamental Frequency

“***” Not in the restricted band, Limit level=Fundamental Emission-20dB

“pk”: peak reading

“av”: average reading

“---”: No meter reading data due to the emission level is smaller than spectrum noise level.

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

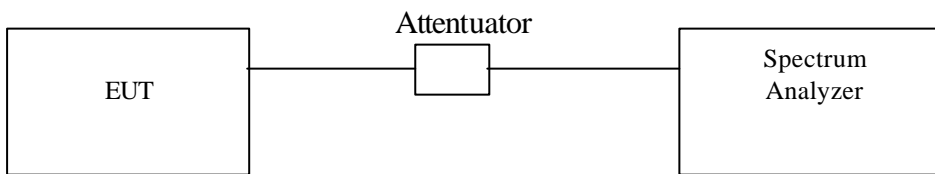
All frequencies from 1GHz to 25 GHz have been tested.

5.5 Band Edge Measurement

5.5.1 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: 2.4GHz, 2.4835GHz.
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.

5.5.2 Test Setup (Conducted)



5.5.3 Test Data:

Table Band Edge measurement (Conducted)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: > 20dB (dB)	Pass/Fail
1	2410.6	106.19	---	---
Outside band	2401.3	83.04	23.15	Pass
Outside band	2390.9	71.36	34.83	Pass
11	2465.7	105.77	---	---
Outside band	2483.5	70.00	35.77	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

Band Edge Conducted measurement



Band Edge Conducted Measurement



5.5.4 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: 100KHz
VBW: 100KHz
Center frequency: 2.395GHz, 2.48 GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximun 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 Maximun Hold function is completed.

5.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

5.5.6 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)	2409.9	108.24	-16.4	91.84	---	-----	100KHz	-----
Outside band	2401.2	85.72	-16.3	69.41	22.43	-----	100KHz	Pass
1(average mode)	2409.8	105.41	-16.4	89.01	---	-----	10Hz	-----
Restricted band	2389.7	67.6	-16.3	51.30	-----	54	10Hz	Pass
11(peak mode)	2460.9	104.71	-16.2	88.51	----	-----	100KHz	-----
Outside band	2483.5	67.55	-16.2	51.35	37.16	-----	100KHz	Pass
11(average mode)	2459.7	103.58	-16.2	87.38	----	-----	10Hz	-----
Restricted band	2484.4	63.09	-16.2	46.89	-----	54	10Hz	Pass

Note: Two type of antennas have been test, and the worse data show above.:

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

Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

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)

