

Test Report
FOR
FCC Part 15 Subpart C

of

WLAN 802.11g Cardbus

Model:

RB8

(Brand: Wistron NeWeb)

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



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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

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1. . General

1.1 Certification of Accuracy of Test Data

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

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

Equipment Tested: WLAN 802.11g Cardbus
Applied by Wistron NeWeb Corp.

Sample received Date: 2003/07/23

Final test Date : 2003/07/30

Test Site: Chamber 02, Conduction 02

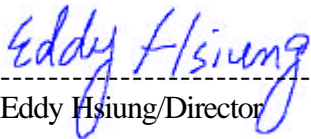
Temperature 26°C(Conduction Test); 26°C (Radiation Test)

Humidity: 53% (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 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	SAR report attached
15.247 (d)	Power Spectral Density	Pass	

3. Description of Equipment Under Test (EUT)

Description: WLAN 802.11g Cardbus
 Model No.: RB8
 FCC ID: NKRRB8
 Brand: Wistron NeWeb
 Frequency Range: 2412 - 2462 MHz
 Support channel: 11 Channels
 Modulation Skill:
 802.11b DBPSK(1Mbps), DQPSK(2Mbps),
 CCK(5.5/11Mbps)
 802.11g OFDM (6M - 54Mbps)

 Antennas Type: PCB printed Type in Metal
 made by Wistron NeWeb Corp.
 Antenna Connected: The Antenna is layout in the PCB of the WLAN
 module, the user is not possible to change the
 antenna.

 Antenna peak Gain:
 Main antenna 2.57 dBi (2.40GHz)
 Aux antenna 2.97 dBi (2.45GHz)
 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		

3.1 Test Standards and Procedure

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

Test Procedure: ANSI C63.4, CFR 47 Sec. 15.247 as detailed in Appendices

3.2 General Test Conditions

1. During the test, the EUT was set in continuously transmitting mode with a duty cycle of 99% (maximum allowed).
2. The channel 1, 6, 11 of 802.11b and 802.11g of EUT were all tested.
3. "Normal mode" of 802.11g allows data rates up to 54 Mbps.

4. TEST RESULTS (802.11b)

4.1 Powerline Conducted Emissions [Section 15.207]

4.1.1 EUT Configuration

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

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

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

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

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

4.1.2 Test Procedure

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

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

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

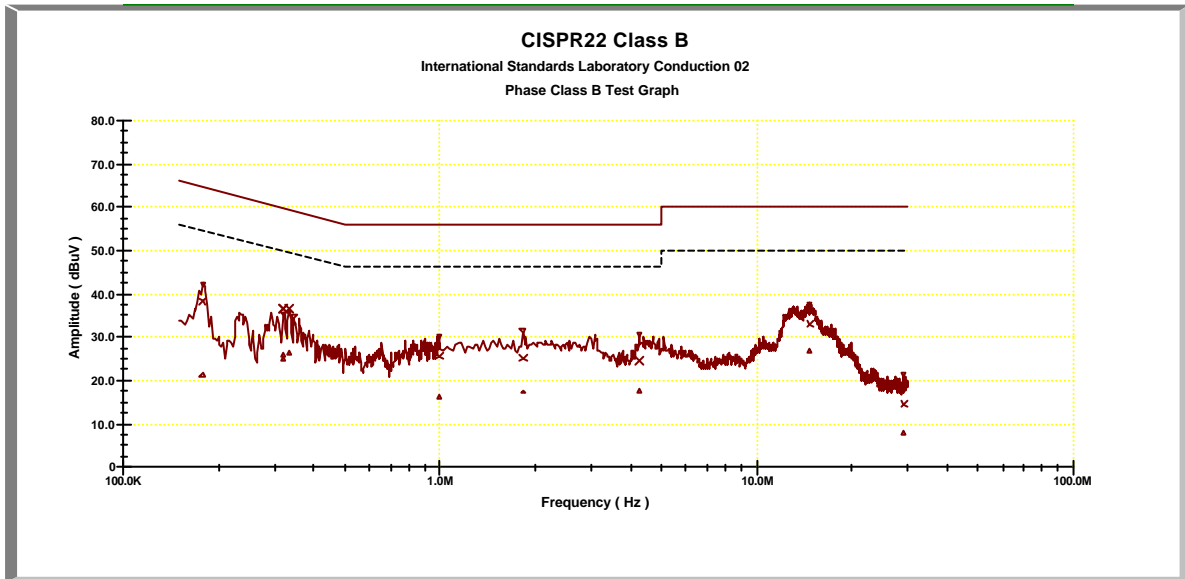
4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

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

4.1.4 Test Data:

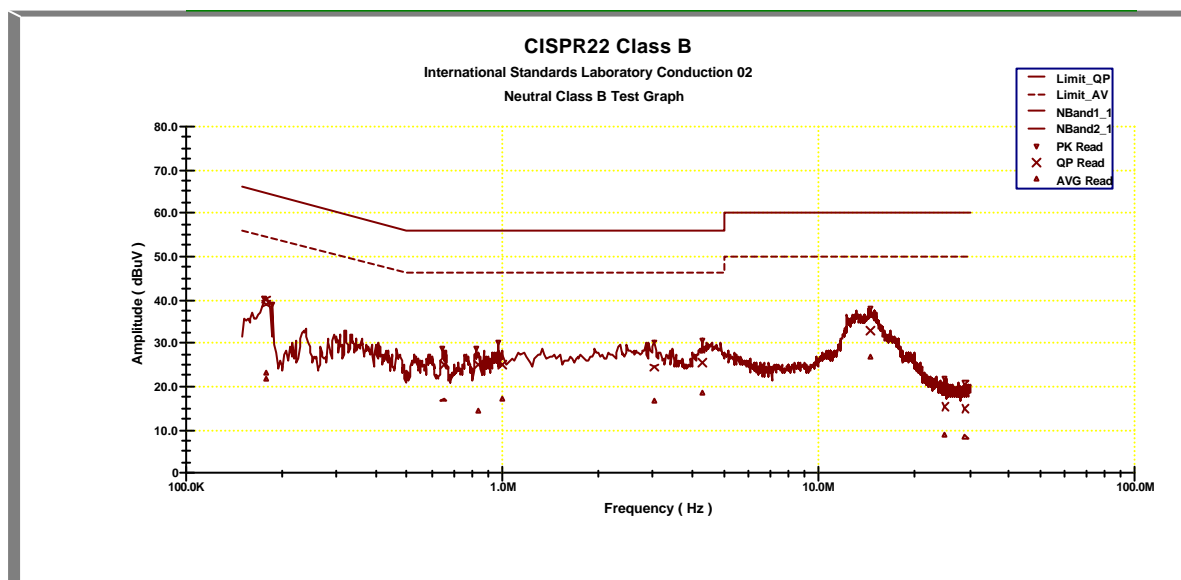
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

Frequency (MHz)	Corrective Factor		Quasi-Peak			Average		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.17725	0.10	0.02	38.20	65.22	-27.02	21.27	55.22	-33.96
0.31933	0.10	0.02	36.56	61.16	-24.60	24.76	51.16	-26.40
0.31978	0.10	0.02	36.67	61.15	-24.48	25.86	51.15	-25.29
0.33343	0.10	0.02	36.59	60.76	-24.17	26.12	50.76	-24.64
0.99443	0.20	0.07	25.65	56.00	-30.35	16.00	46.00	-30.00
1.82557	0.25	0.09	25.20	56.00	-30.80	17.32	46.00	-28.68
4.27046	0.31	0.12	24.63	56.00	-31.37	17.57	46.00	-28.43
14.7691	0.69	0.29	32.99	60.00	-27.01	26.84	50.00	-23.16
29.3092	0.90	0.35	14.59	60.00	-45.41	8.01	50.00	-41.99



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

Frequency (MHz)	Corrective Factor		Quasi-Peak			Average		
	LISN Loss (dB)	Cable Loss (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
0.17838	0.10	0.02	40.06	65.19	-25.13	22.89	55.19	-32.30
0.18001	0.10	0.02	39.03	65.14	-26.11	21.58	55.14	-33.56
0.65058	0.14	0.04	24.93	56.00	-31.07	16.86	46.00	-29.14
0.83685	0.17	0.06	25.07	56.00	-30.93	14.35	46.00	-31.65
0.99676	0.20	0.07	25.06	56.00	-30.94	16.97	46.00	-29.03
3.01536	0.20	0.11	24.31	56.00	-31.69	16.58	46.00	-29.42
4.27339	0.20	0.12	25.58	56.00	-30.42	18.38	46.00	-27.62
14.5485	0.39	0.29	32.98	60.00	-27.02	26.61	50.00	-23.39
25.0857	0.40	0.32	15.22	60.00	-44.78	8.66	50.00	-41.34
29.0457	0.32	0.34	14.70	60.00	-45.30	8.34	50.00	-41.66



* 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

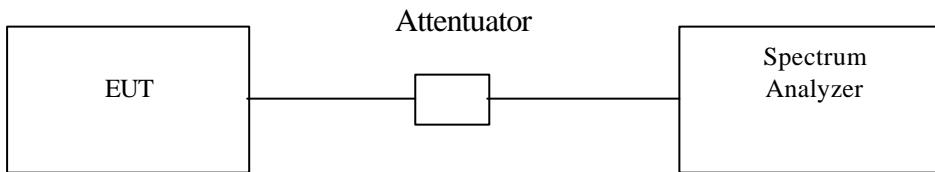
4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

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

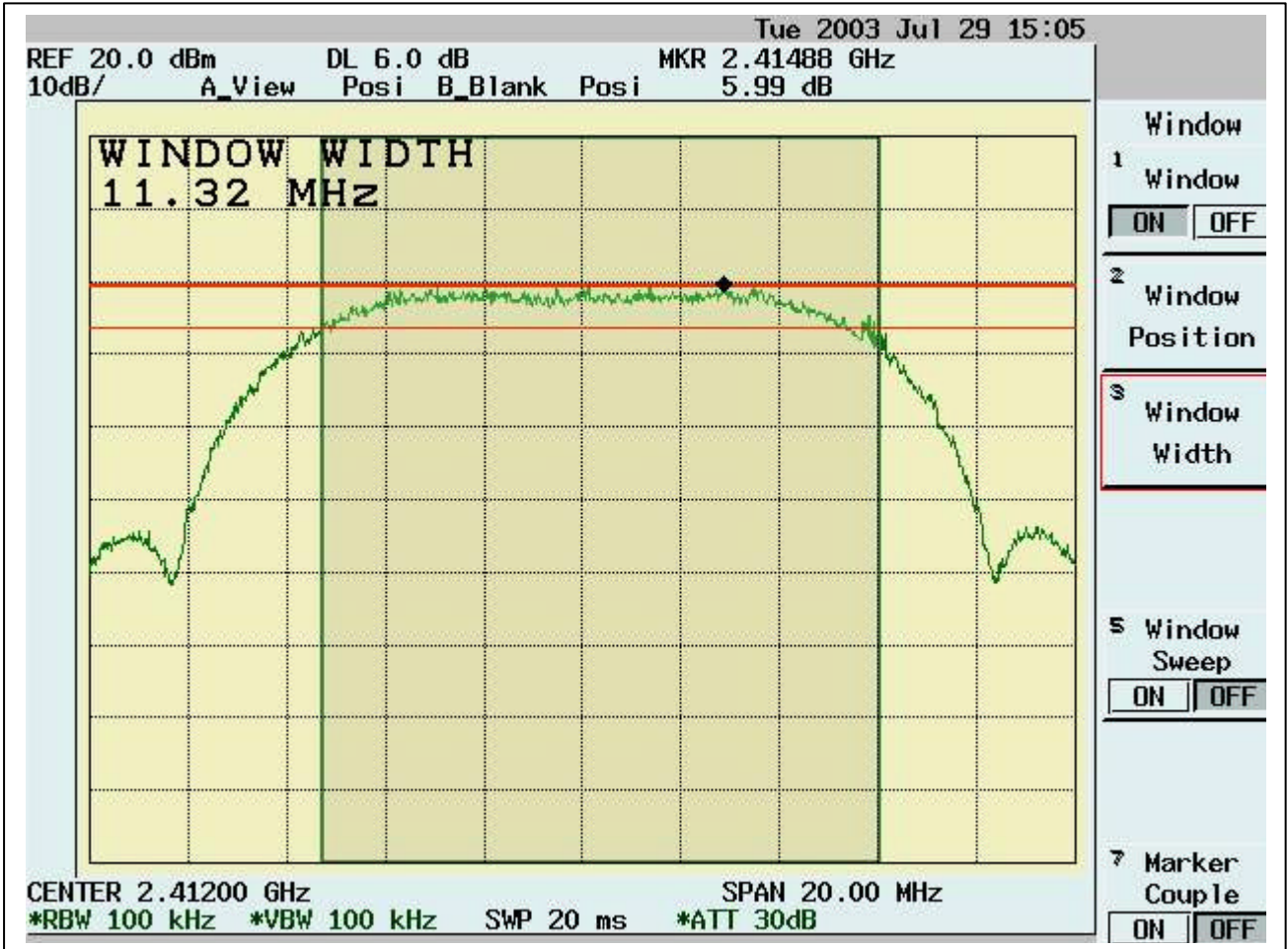
4.2.2 Test Setup

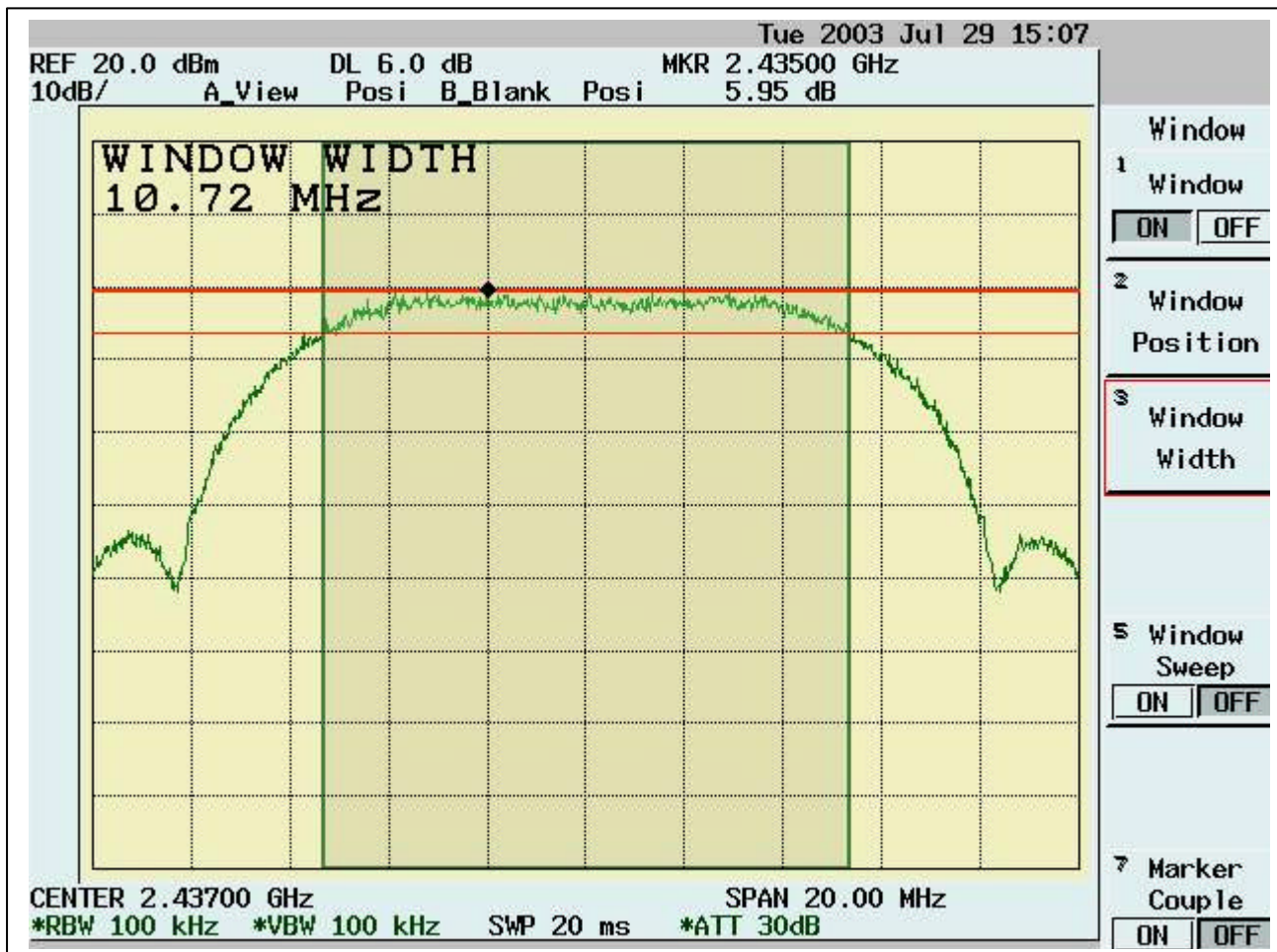


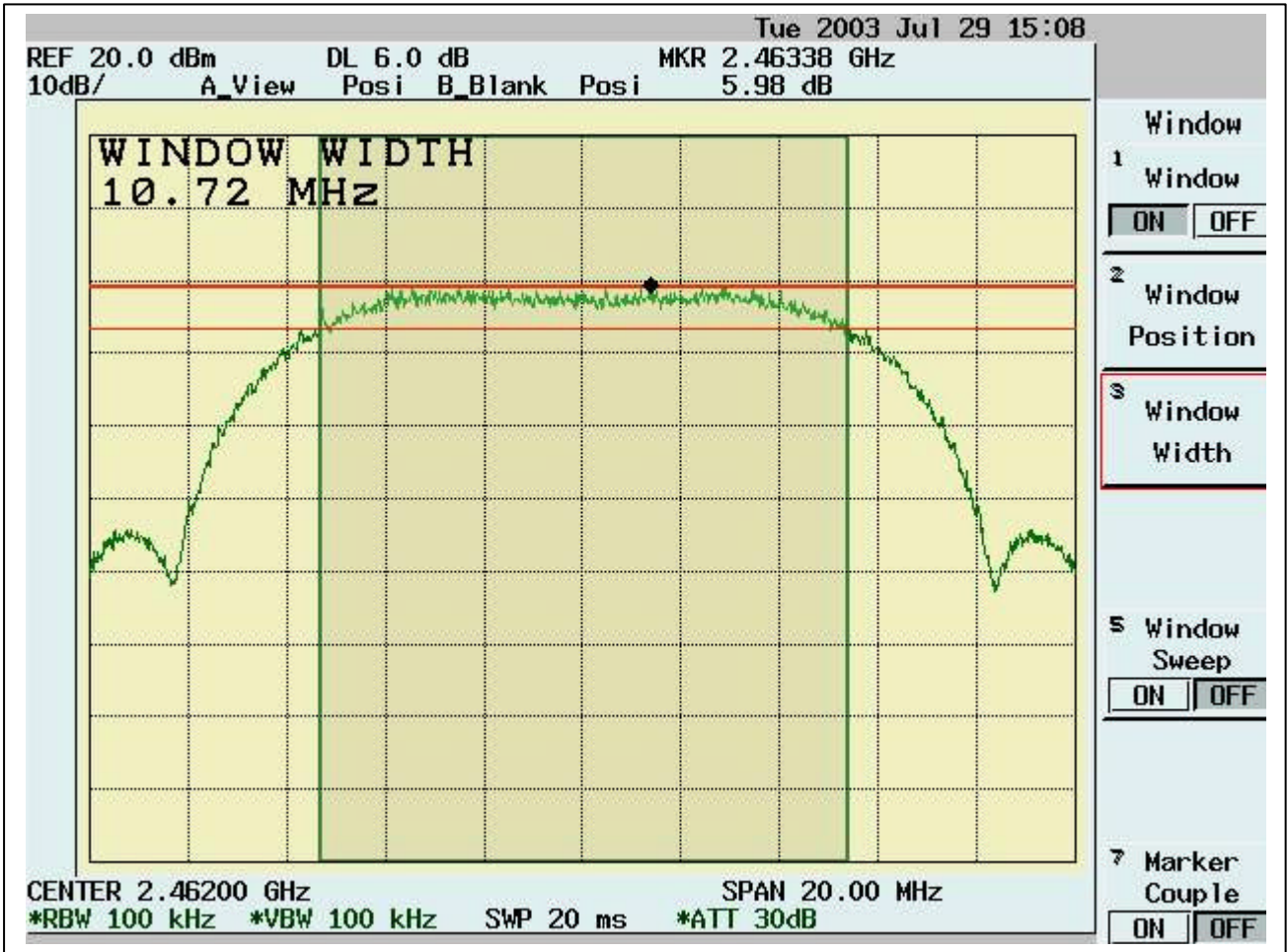
4.2.3 Test Data

Table 6dB Bandwidth

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	11.32	0.5	Pass
6	2437	10.72	0.5	Pass
11	2462	10.72	0.5	Pass





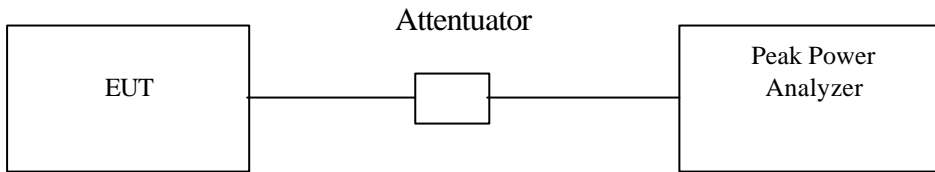


4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

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:

Maximum Peak Output Power

Channel	Frequency (MHz)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	40.672	16.093	30	Pass
6	2437	45.803	16.609	30	Pass
11	2462	43.863	16.421	30	Pass

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

4.4.1 EUT Configuration

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

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

4.4.2 Test Procedure

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

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

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

For the test of 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 (°)
91.11	21.55	8.78	2.55	0.00	32.88	43.50	-10.62	100.00	250.00
194.9	21.01	8.45	3.72	0.00	33.18	43.50	-10.32	150.00	267.00
210.42	24.16	8.69	3.86	0.00	36.70	43.50	-6.80	100.00	267.00
243.4	17.85	11.11	4.19	0.00	33.15	46.00	-12.85	200.00	234.00
266.68	19.25	12.63	4.32	0.00	36.20	46.00	-9.80	150.00	137.00
330.7	15.34	13.67	4.75	0.00	33.76	46.00	-12.24	100.00	185.00
365.62	13.72	14.61	5.01	0.00	33.34	46.00	-12.66	150.00	283.00
596.48	11.12	18.50	6.30	0.00	35.93	46.00	-10.07	100.00	137.00
799.21	11.02	19.90	7.27	0.00	38.19	46.00	-7.81	200.00	202.00
915.61	5.12	20.58	7.73	0.00	33.43	46.00	-12.57	100.00	218.00
944.71	6.77	20.85	7.83	0.00	35.45	46.00	-10.55	200.00	267.00
959.26	8.47	20.90	7.88	0.00	37.24	46.00	-8.76	100.00	250.00

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 (°)
178.41	20.19	8.63	3.55	0.00	32.37	43.50	-11.13	150.00	29.00
431.58	14.68	16.33	5.39	0.00	36.39	46.00	-9.61	100.00	13.00
438.37	12.80	16.22	5.42	0.00	34.45	46.00	-11.55	100.00	61.00
471.35	16.39	16.88	5.61	0.00	38.88	46.00	-7.12	200.00	190.00
503.36	15.03	17.32	5.81	0.00	38.16	46.00	-7.84	150.00	206.00
519.85	10.77	17.40	5.90	0.00	34.07	46.00	-11.93	100.00	77.00
531.49	13.81	16.91	5.97	0.00	36.69	46.00	-9.31	100.00	239.00
663.41	12.19	18.82	6.61	0.00	37.61	46.00	-8.39	150.00	352.00
714.82	8.60	19.27	6.84	0.00	34.72	46.00	-11.28	200.00	352.00
779.81	6.09	19.90	7.17	0.00	33.16	46.00	-12.84	250.00	13.00
941.8	5.26	20.82	7.82	0.00	33.90	46.00	-12.10	100.00	239.00
944.71	7.49	20.85	7.83	0.00	36.17	46.00	-9.83	150.00	239.00

* NOTE:

During the test, the EUT was set to Channel 1, 6, 11 respectively to get the maximum reading of all the critical emission frequencies.

Margin = Corrected Amplitude – Limit

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

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

All frequencies from 30MHz to 1GHz have been tested

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

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turtable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3205.79	50.21	31.05	1.42	46.61	36.06	54.00	-17.94	110	187
3313.69	51.02	31.18	1.45	46.62	37.03	54.00	-16.97	108	190
3409.59	50.35	31.29	1.48	46.64	36.49	54.00	-17.51	100	190
3577.42	50.86	31.49	1.54	46.57	37.33	54.00	-16.67	104	187
3973.03	46.57	31.97	1.67	46.14	34.07	54.00	-19.93	102	165
7905.09	35.09	40.86	2.48	44.19	34.24	54.00	-19.76	100	176

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

Meter Reading		Correction Factor			Corrected Emissions			Antenna	Turtable
Freq. (MHz)	Ampl. (dBuV)	Ant. (dB/m)	Cable (dB)	Pre-Ampl. (dB)	Ampl. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Position (°)
3193.81	54.71	31.03	1.41	46.61	40.55	54.00	-13.45	104	286
3325.67	52.60	31.19	1.46	46.63	38.62	54.00	-15.38	100	276
3409.59	56.44	31.29	1.48	46.64	42.58	54.00	-11.42	102	287
3565.43	51.16	31.48	1.54	46.58	37.60	54.00	-16.40	100	280
3637.36	52.16	31.56	1.56	46.50	38.79	54.00	-15.21	100	332

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

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 (°)
3181.82	51.63	31.02	1.41	46.61	37.45	54.00	-16.55	103	283
3241.76	51.06	31.09	1.43	46.61	36.97	54.00	-17.03	100	256
3313.69	49.51	31.18	1.45	46.62	35.51	54.00	-18.49	106	290
3409.59	49.40	31.29	1.48	46.64	35.54	54.00	-18.46	106	306
3577.42	49.32	31.49	1.54	46.57	35.79	54.00	-18.21	100	232
3661.34	49.09	31.59	1.57	46.48	35.78	54.00	-18.22	100	298
3997	49.73	32.00	1.68	46.11	37.29	54.00	-16.71	102	201

1GHz~ 25 GHz (Vertical), 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 (°)
3061.94	48.88	30.87	1.37	46.59	34.53	54.00	-19.47	102	156
3193.81	52.53	31.03	1.41	46.61	38.37	54.00	-15.63	100	143
3241.76	51.23	31.09	1.43	46.61	37.14	54.00	-16.86	108	123
3313.69	53.67	31.18	1.45	46.62	39.68	54.00	-14.32	102	130
3409.59	53.78	31.29	1.48	46.64	39.92	54.00	-14.08	100	130
3457.54	49.30	31.35	1.50	46.64	35.51	54.00	-18.49	100	132
3577.42	55.23	31.49	1.54	46.57	41.69	54.00	-12.31	100	128
3637.36	50.11	31.56	1.56	46.50	36.73	54.00	-17.27	100	165
3829.17	49.30	31.80	1.62	46.29	36.43	54.00	-17.57	100	109
3973.03	53.84	31.97	1.67	46.14	41.34	54.00	-12.66	104	164
4092.91	47.81	32.26	1.71	46.20	35.58	54.00	-18.42	100	134
7953.05	34.55	41.03	2.49	43.97	34.10	54.00	-19.90	100	153

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

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 (°)
3181.82	51.22	31.02	1.41	46.61	37.04	54.00	-16.96	100	265
3277.72	50.69	31.13	1.44	46.62	36.64	54.00	-17.36	100	131
3313.69	50.33	31.18	1.45	46.62	36.33	54.00	-17.67	102	184
3409.59	50.16	31.29	1.48	46.64	36.29	54.00	-17.71	105	276
3565.43	48.69	31.48	1.54	46.58	35.12	54.00	-18.88	100	321
3961.04	49.16	31.95	1.67	46.15	36.63	54.00	-17.37	108	288
7749.25	37.32	40.30	2.45	44.92	35.15	54.00	-18.85	103	267
7953.05	35.66	41.03	2.49	43.97	35.21	54.00	-18.79	100	254
8001	35.05	41.20	2.50	43.75	35.00	54.00	-19.00	100	246

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 (°)
3181.82	53.07	31.02	1.41	46.61	38.89	54.00	-15.11	100	214
3313.69	52.71	31.18	1.45	46.62	38.72	54.00	-15.28	102	220
3409.59	54.99	31.29	1.48	46.64	41.13	54.00	-12.87	100	288
3577.42	55.01	31.49	1.54	46.57	41.47	54.00	-12.53	100	254
3637.36	49.80	31.56	1.56	46.50	36.43	54.00	-17.57	100	274
3817.18	51.93	31.78	1.62	46.31	39.02	54.00	-14.98	100	294
3985.01	53.54	31.98	1.68	46.13	41.07	54.00	-12.93	110	248
4092.91	48.15	32.26	1.71	46.20	35.92	54.00	-18.08	100	202
7857.14	36.23	40.69	2.47	44.42	34.97	54.00	-19.03	100	271
7905.09	35.59	40.86	2.48	44.19	34.74	54.00	-19.26	103	214
8144.85	33.85	41.14	2.52	43.38	34.14	54.00	-19.86	100	259

Note:

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

Margin = Corrected Amplitude – Limit

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

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

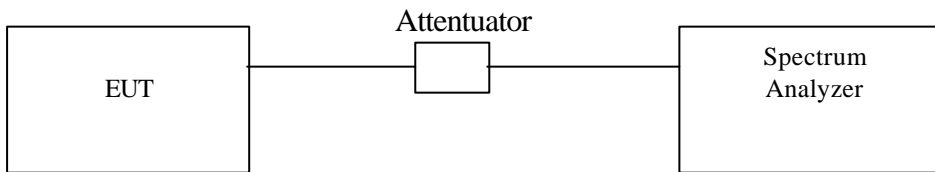
All frequencies from 1GHz to 25 GHz have been tested.

4.5 Band Edge Measurement

4.5.1 Test Procedure (Conducted)

1. The Transmitter output of EUT was connected to the spectrum analyzer.
 Equipment mode: Spectrum analyzer
 Detector function: Peak mode
 SPAN: 100MHz
 RBW: 100KHz
 VBW: 100KHz
 Center frequency: 2.4GHz, 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:

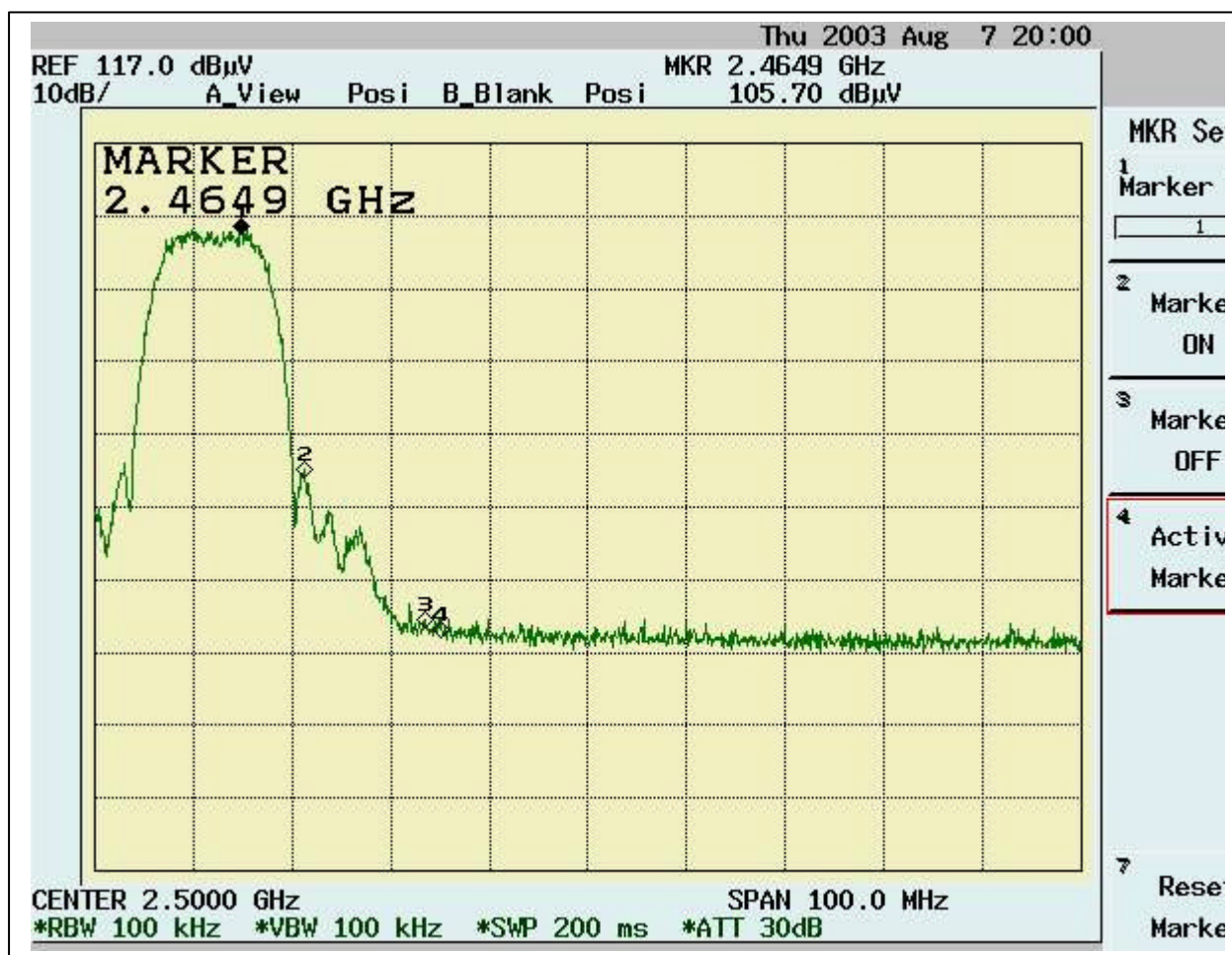
Table Band Edge measurement (Conducted)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: > 20dB (dB)	Pass/Fail
1	2415.0	106.04	---	---
Outside band	2396.9	65.05	40.99	Pass
11	2464.9	105.70	---	---
Outside band	2471.2	72.18	33.52	Pass

Band Edge Conducted measurement



Band Edge Conducted Measurement



4.5.4 Band Edge measurement Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as *Radiated Emission Measurement*
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN: 100MHz
RBW: 1MHz
VBW: 1MHz
Center frequency: 2.395GHz, 2.48 GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band.
4. For peak frequency emission level measurement in Restricted Band ,
Change RBW: 1MHz ,
VBW: 10Hz,
Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

4.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

4.5.6 Test Data:

Table Band Edge measurement (Radiated)

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit: > 20dB (dBC)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
1(peak mode)	2414.0	73.96	31.67	105.63	---	---	1MHz	---
Outside band	2396.7	31.13	31.67	62.80	42.83	---	1MHz	Pass
1(average mode)	2415.5	55.91	31.67	87.58	---	---	10Hz	---
Restricted band	2390.0	8.89	31.67	40.54	-----	54	10Hz	Pass
11(peak mode)	2460.1	71.99	31.64	103.63	----	---	1MHz	---
Outside band	2473.3	32.52	31.64	64.16	39.47	---	1MHz	Pass
11(average mode)	2465.0	55.58	31.64	87.22	----	---	10Hz	---
Restricted band	2503.6	10.95	31.64	42.59	-----	54	10Hz	Pass

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

Emission Level = Spectrum Reading + Correction Factor

Correction Factor = Antenna Factor + cable loss – amplifier gain

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

Peak Mode (Channel 1)



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

Average Mode (Channel 1)



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

Peak Mode (Channel 11)



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

Average Mode (Channel 11)



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

Refer to SAR Test Report attached