

Test Report for FCC Part 15 Subpart B & C

of

Product Name

Portable Data Collection Terminal

Model

PA500

(Brand: Unitech)

Applied by:

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Test Performed by:

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ISL-T10-R2-3

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
4.	TEST RESULTS (802.11b)	5
4.1	Powerline Conducted Emissions [Section 15.207]	5
4.1.1	EUT Configuration.....	5
4.1.2	Test Procedure	5
4.1.3	EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)	5
4.1.4	Test Data:	6
4.2	Bandwidth for DSSS [Section 15.247 (a)(2)].....	8
4.2.1	Test Procedure	8
4.2.2	Test Setup	8
4.2.3	Test Data:	8
4.3	DSSS Maximum Peak Output Power [Section 15.247 (b)(1)].....	11
4.3.1	Test Procedure	11
4.3.2	Test Setup	11
4.3.3	Test Data.....	11
4.4	Radiated Emission Measurement [Section [15.247(c)(4)].....	14
4.4.1	EUT Configuration.....	14
4.4.2	Test Procedure	14
4.4.3	EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)	14
4.4.4	Test Data (30MHz – 1GHz):.....	15
4.4.5	Test Data (1GHz – 25 GHz)	16
4.5	Band Edge Measurement	19
4.5.1	Test Procedure (Conducted).....	19
4.5.2	Test Setup (Conducted)	19
4.5.3	Test Data:	19
4.5.4	Test Procedure (Radiated)	21
4.5.5	Test Setup (Radiated).....	21
4.5.6	Test Data.....	22
4.6	RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)].....	25
4.7	DSSS Peak Power Spectral Density [Section 15.247(d)]	26
4.7.1	Test Procedure	26
4.7.2	Test Setup	26
4.7.3	Test Data.....	26
5.	TEST RESULTS (802.11g).....	29
5.1	Powerline Conducted Emissions [Section 15.207]	29
5.1.1	EUT Configuration.....	29
5.1.2	Test Procedure	29
5.1.3	EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)	29
5.1.4	Test Data:	30
5.2	Bandwidth for DSSS [Section 15.247 (a)(2)].....	32
5.2.1	Test Procedure	32
5.2.2	Test Setup	32
5.2.3	Test Data:	32
5.3	DSSS Maximum Peak Output Power [Section 15.247 (b)(1)].....	35
5.3.1	Test Procedure	35
5.3.2	Test Setup	35
5.3.3	Test Data.....	35

5.4	Radiated Emission Measurement [Section [15.247(c)(4)]	38
5.4.1	EUT Configuration	38
5.4.2	Test Procedure	38
5.4.3	EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)	38
5.4.4	Test Data (30MHz – 1GHz)	39
5.4.5	Test Data (1GHz – 25 GHz)	40
5.5	Band Edge Measurement	43
5.5.1	Test Procedure (Conducted)	43
5.5.2	Test Setup (Conducted)	43
5.5.3	Test Data:	43
5.5.4	Test Procedure (Radiated)	45
5.5.5	Test Setup (Radiated)	45
5.5.6	Test Data	46
5.6	RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]	49
5.7	DSSS Peak Power Spectral Density [Section 15.247(d)]	50
5.7.1	Test Procedure	50
5.7.2	Test Setup	50
5.7.3	Test Data	50
6.	TEST RESULTS (Bluetooth)	53
6.1	Powerline Conducted Emissions	53
6.1.1	EUT Configuration	53
6.1.2	Test Procedure	53
6.1.3	EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)	53
6.1.4	Test Data:	54
6.2	FHSS Maximum Peak Output Power	56
6.2.1	Test Procedure	56
6.2.2	Test Setup	56
6.2.3	Test Data	56
6.3	Radiated Emission Measurement	58
6.3.1	EUT Configuration	58
6.3.2	Test Procedure	58
6.3.3	EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)	58
6.3.4	Test Data (30MHz – 1GHz)	59
	Test Data (1GHz – 25 GHz)	61
6.4	Band Edge Measurement	64
6.4.1	Test Procedure (Conducted)	64
6.4.2	Test Setup (Conducted)	64
6.4.3	Test Data:	64
6.4.4	Test Procedure (Radiated)	66
6.4.5	Test Setup (Radiated)	66
6.4.6	Test Data	67
6.5	Bandwidth & Hopping Channel Separation	70
6.5.1	Standard Applicable	70
6.5.2	Test Procedure	70
6.5.3	Test Setup	70
6.5.4	Test Data	71
6.6	Number of Hopping Frequency Used	75
6.6.1	Test Procedure	75
6.6.2	Test Setup	75
6.6.3	Test Data	75
6.7	Dwell Time	77
6.7.1	Test Procedure	77
6.7.2	Test Setup	77
6.7.3	Test Data	78
7.	Appendix	84

7.1	Appendix A: Measurement Procedure for Power line Conducted Emissions.....	84
7.2	Appendix B: Test Procedure for Radiated Emissions	85
7.3	Appendix C: Test Equipment	86
7.3.1	Test Equipment List.....	86
7.3.2	Software for Controlling Spectrum/Receiver and Calculating Test Data.....	86
7.4	Appendix D: Layout of EUT and Support Equipment.....	87
7.4.1	General Conducted Test Configuration	87
7.4.2	General Radiation Test Configuration	88
7.5	Appendix E: Description of Support Equipment	89
7.5.1	Description of Support Equipment.....	89
7.5.2	Software for Controlling Support Unit.....	89
7.5.3	I/O Cable Condition of EUT and Support Units	89
7.6	Appendix F: Accuracy of Measurement	90
7.7	Appendix G: Photographs of EUT Configuration Test Set Up.....	92
7.8	Appendix H: Antenna Spec.	95

1. General

1.1 Certification of Accuracy of Test Data

Standards: CFR 47 Part 15 Subpart B Class B
CFR 47 Part 15 Subpart C (Section 15.247)

Test Procedure: ANSI C63.4:2003

Equipment Tested: Portable Data Collection Terminal

Model: PA500

Applied by: Unitech Computer Co Ltd

Sample received Date: 2007/03/20

Final test Date : 2007/03/23-2007/03/30

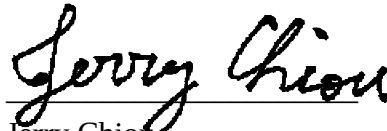
Test Result PASS

Test Site: Chamber 02, Conduction 02

Temperature Refer to each site test data

Humidity: Refer to each site test data

Test Engineer:


Jerry Chiou

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

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 99 pages, including 1 cover page, 3 contents page, and 95 pages for the test description. This report must not be used 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 functions of EUT has been tested according 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	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

The 802.11g functions of EUT has been tested according 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	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

The Bluetooth functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207(a)	AC Power Line Emissions	Pass	
15.247(b) (1)	Max. Peak Output Power	Pass	
15.209(a)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(a)(1)(iii)	Number of Hopping Frequency Used	Pass	
15.247(a) (1)(ii)	Spectrum Bandwidth Of FHSS device	Pass	
15.247(a)(1)	Hopping Channel Separation	Pass	
15.247(a)(1)(iii)	Dwell Time	Pass	

3. Description of Equipment Under Test (EUT)

Description:	Portable Data Collection Terminal
Condition:	Pre-Production
Model:	PA500
Wireless LAN + Bluetooth Module:	USI (Model: WM-BG-MR-01)
Frequency Range of 802.11b/g:	2400 - 2483.5 MHz
Support channel:	
Bluetooth	79 Channels
802.11b/g	11 Channels
Modulation Skill:	
802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
Bluetooth	GFSK(1Mbps)
Antennas Type:	
802.11b/g	PIFA in Metal,made by Aristotle Enterprises Inc. Model: Julia antenna-WLAN
Bluetooth	PIFA in Metal,made by Aristotle Enterprises Inc. Model: Julia antenna-Bluetooth
Antenna Connected:	Connected to RF connector on the PCB of the 802.11b/g WLAN + Bluetooth Adapter .The user is not possible to change the antenna without disassembling the notebook computer.
Antenna peak Gain:	
802.11b/g	4.24 dBi
Bluetooth	-0.31 dBi
Power Type of wireless+BT module:	3.3V DC from Rechargeable Battery
AC power supply:	PHIHONG Adaptor (Model : PSA15R-050P) I/P: AC 100-240, 50-60Hz, 0.5A O/P: DC 5.0V, 3.0A

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 channels and the operation frequency of Bluetooth listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	01	2403
02	2404	03	2405
04	2406	05	2407
.....			
75	2477	76	2478
77	2479	78	2480

CPU: Intel PXA270 530MHz
 SDRAM: Infineon 32MB*2
 Scanner: UNITECH(Model : EV10)
 Power Key : One
 Function Key : One
 Audio Output : One
 SD/MMC Slot: One
 Reset Key : One
 Docking Port : One
 Battery : DYNAPACK (Model : DAKA20220-00L800L) 2200mAh
 LCD : OPPOLY 240*320, 3.5" Color LCD (Model : TD035STED3)

The Conducted Power output of EUT

802.11b (dBm)							
Freq. (MHz)	Bit rate 1 mbps	Bit rate 2 mbps	Bit rate 5.5	Bit rate 11			
2412	16.25	16.02	17.35	18			
2437	17.42	17.3	18.02	18.66			
2462	17.82	17.52	18.73	18.74			
802.11g (dBm)							
Freq. (MHz)	Bit rate 6 mbps	Bit rate 9 mbps	Bit rate 12	Bit rate 18	Bit rate 24 mbps	Bit rate 36 mbps	Bit rate 54
2412	14.65	14.62	14.59	14.32	14.39	14.65	14.8
2437	15.3	15.32	15.64	15.13	15.67	15.58	15.16
2462	15.42	15.35	15.59	15.53	15.54	15.53	15.39

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 used.

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:

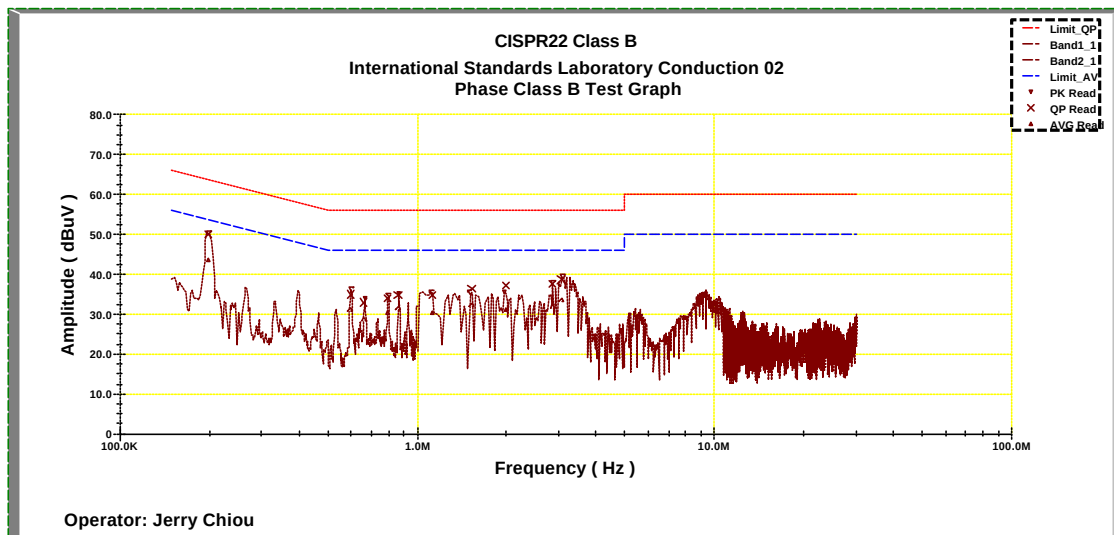
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature(C):25

Humidity(%):63

Frequency	LISN Loss	Cable Loss	QPCorrct.	QPLimit	QPMargin	AVECorrct.	AVELimit	AVEMargin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.19805	0.10	0.05	49.92	64.63	-14.71	43.65	54.63	-10.98
0.5957	0.20	0.07	34.95	56.00	-21.05	30.95	46.00	-15.05
0.66233	0.20	0.07	32.94	56.00	-23.06	28.77	46.00	-17.23
0.79478	0.20	0.07	34.08	56.00	-21.92	30.30	46.00	-15.70
0.86155	0.20	0.07	34.92	56.00	-21.08	31.64	46.00	-14.36
1.12639	0.21	0.07	34.66	56.00	-21.34	30.33	46.00	-15.67
1.52385	0.25	0.08	36.48	56.00	-19.52	32.36	46.00	-13.64
1.98782	0.30	0.09	37.21	56.00	-18.79	31.07	46.00	-14.93
2.84854	0.34	0.11	37.48	56.00	-18.52	32.11	46.00	-13.89
3.04946	0.35	0.12	38.60	56.00	-17.40	33.46	46.00	-12.54



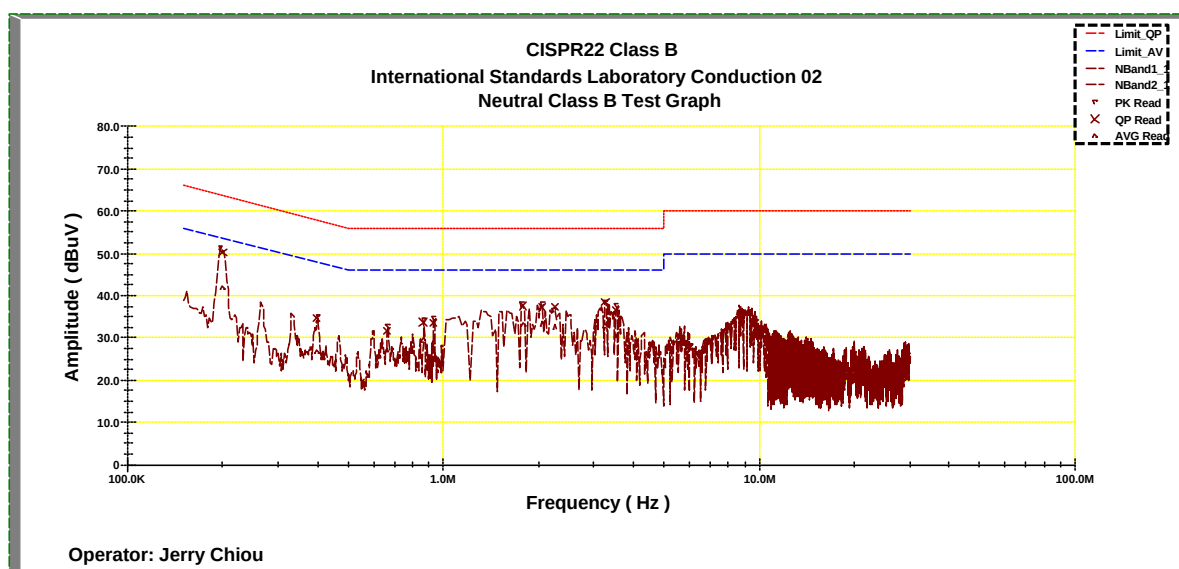
Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature(C): 25

Humidity(%): 63

Frequency MHz	LISN Loss (dB)	Cable Loss (dB)	QPCorrt. Amp.(dBuV)	QPLimit (dBuV)	QPMargin (dB)	AVECorrt. Amp.(dBuV)	AVELimit (dBuV)	AVEMargin (dB)
0.19953	0.40	0.05	50.18	64.58	-14.41	41.91	54.58	-12.67
0.3973	0.40	0.09	34.66	58.93	-24.28	26.68	48.93	-22.25
0.66226	0.40	0.07	31.74	56.00	-24.26	27.10	46.00	-18.90
0.86245	0.40	0.07	33.65	56.00	-22.35	29.45	46.00	-16.55
0.92783	0.40	0.07	33.62	56.00	-22.38	28.90	46.00	-17.10
1.78968	0.50	0.09	37.61	56.00	-18.39	33.11	46.00	-12.89
2.05508	0.50	0.09	37.22	56.00	-18.78	33.36	46.00	-12.64
2.25313	0.50	0.10	37.31	56.00	-18.69	32.59	46.00	-13.41
3.24885	0.50	0.12	38.53	56.00	-17.47	32.93	46.00	-13.07
3.51306	0.50	0.13	36.67	56.00	-19.33	30.47	46.00	-15.53



* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1, 6, 11 to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

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

4.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

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

4.2.2 Test Setup



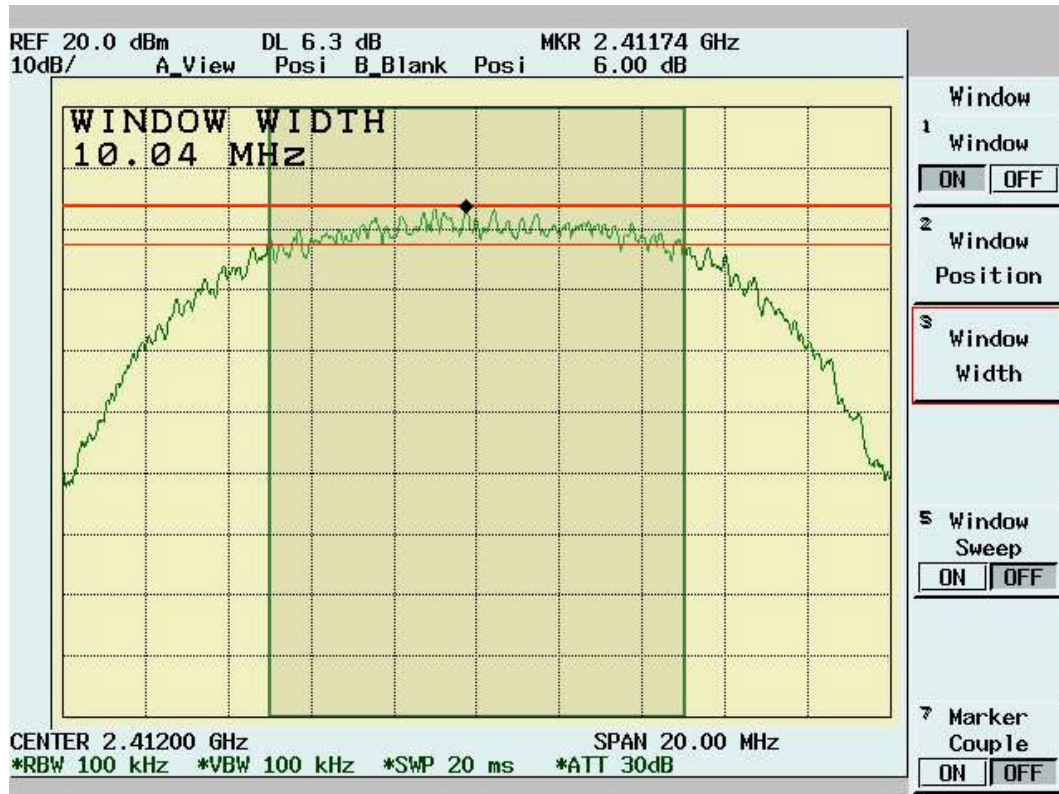
4.2.3 Test Data:

6dB Bandwidth

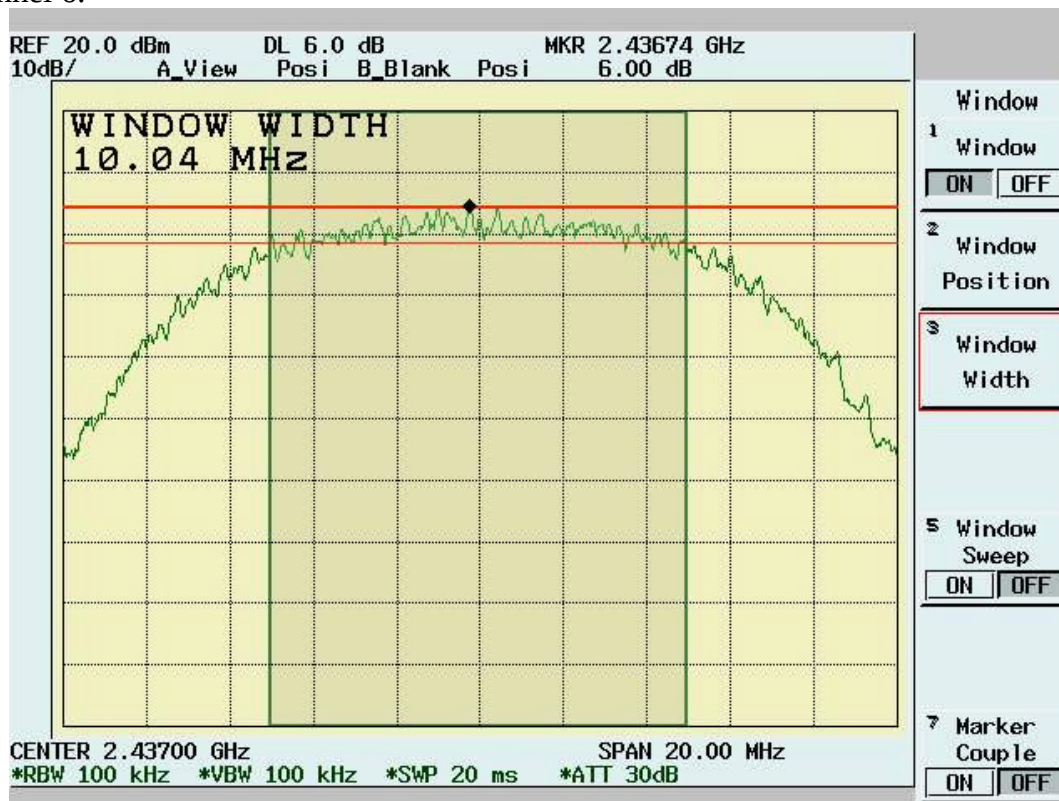
Test Engr:	Jerry Chiou	Temp. (? C):	25
		Humidity (%):	50

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	10.04	0.5	Pass
6	2437	10.04	0.5	Pass
11	2462	10.04	0.5	Pass

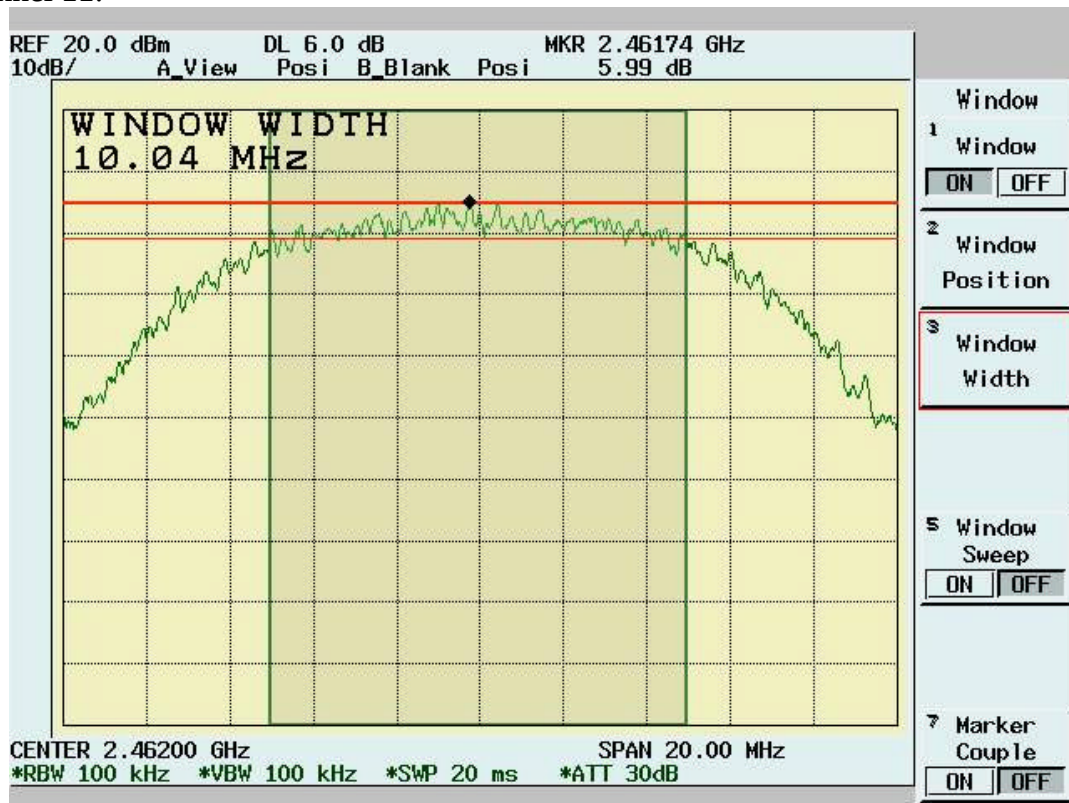
Channel 1:



Channel 6:



Channel 11:

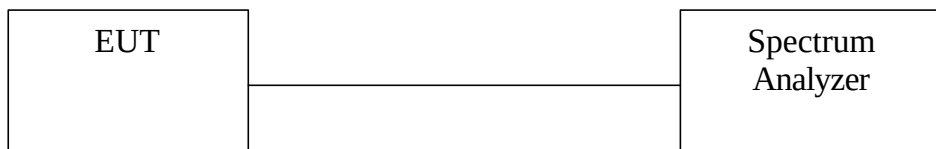


4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

4.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer.

4.3.2 Test Setup



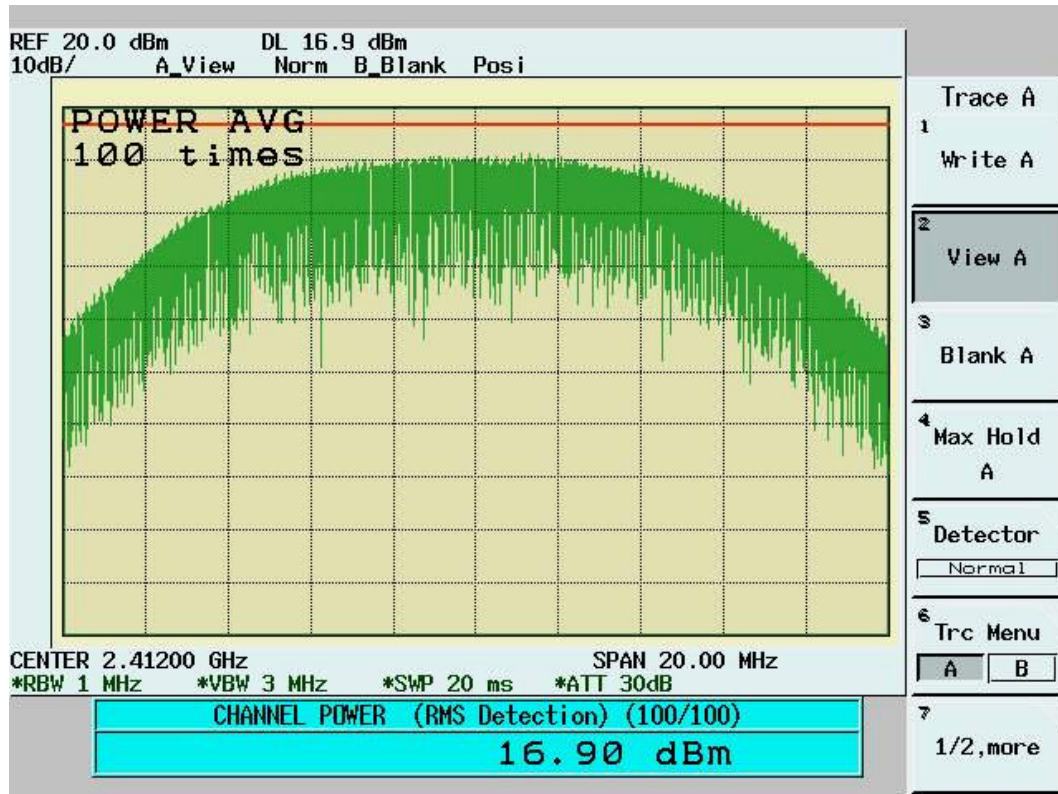
4.3.3 Test Data

Maximum Peak Output Power

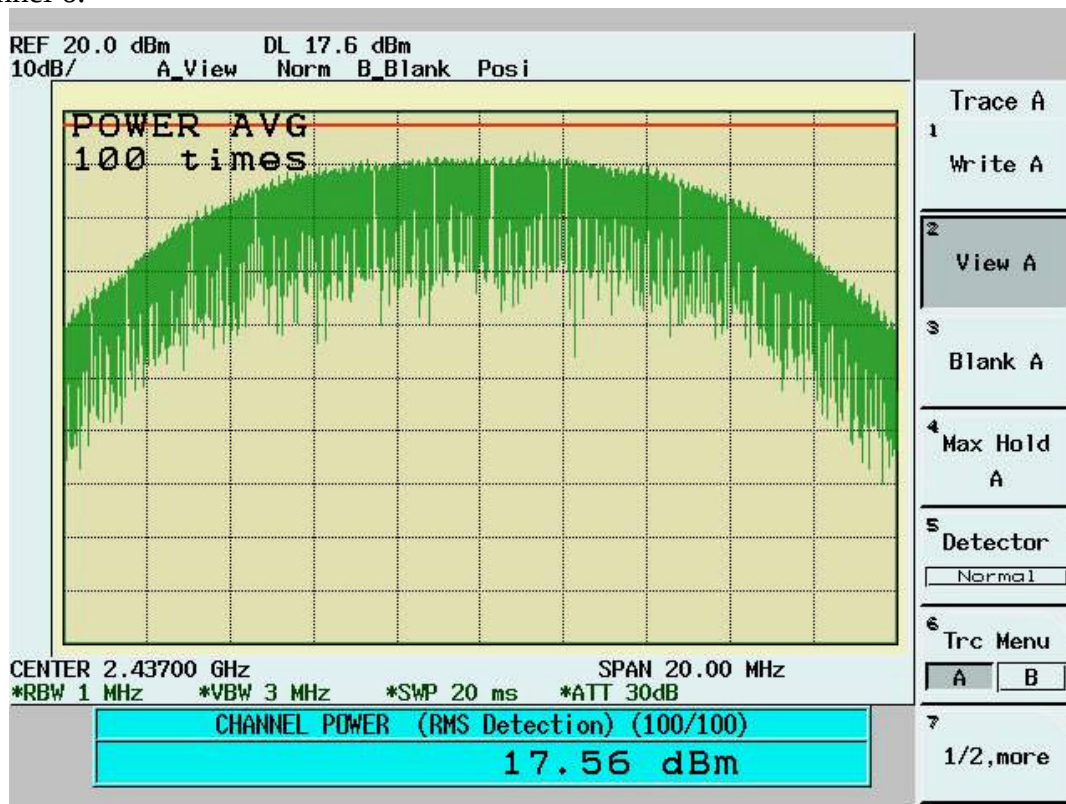
Test Engr: Jerry Chiou Temp. (? C): 25
 Humidity (%): 50

Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	16.9	1.1	63.10	18	30	Pass
6	2437	17.56	1.1	73.45	18.66	30	Pass
11	2462	17.64	1.1	74.82	18.74	30	Pass

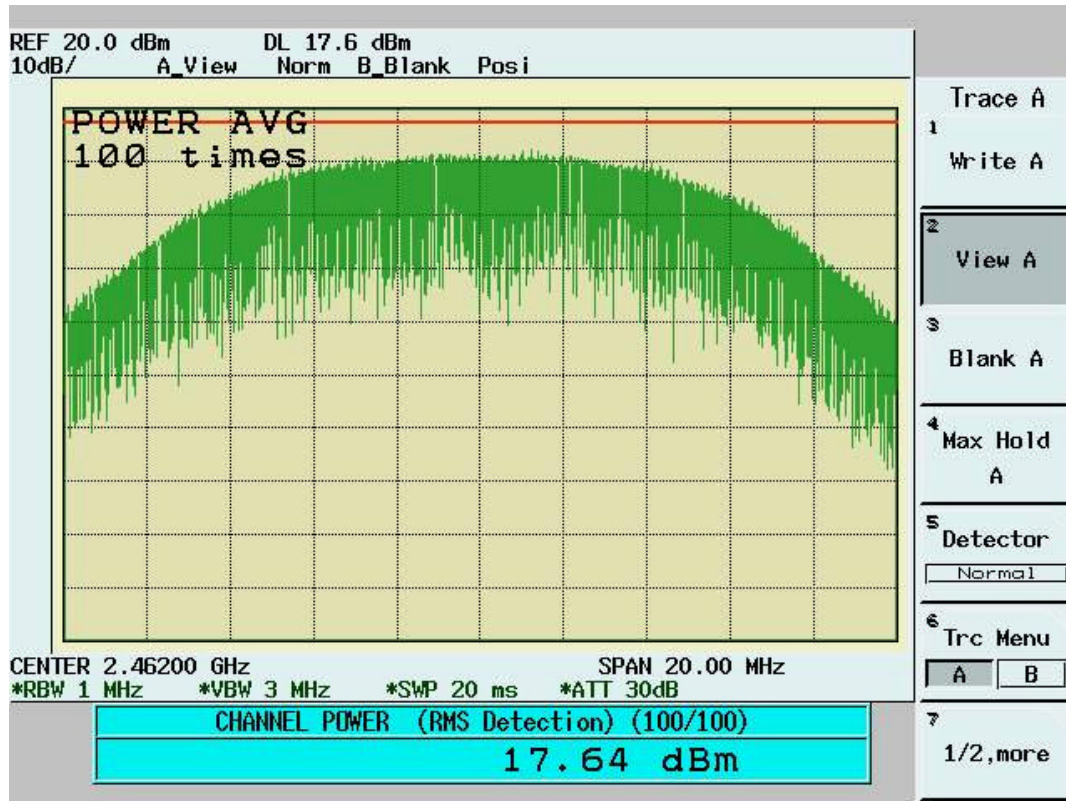
Channel 1:



Channel 6:



Channel 11:



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)	3MHz
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

Operator: JerryChiou

Temperature(C): 25

Humidity(%): 63

Frequency MHz	RxAmp. (dBuV)	AntFact (dB/m)	CableLoss (dB)	PreAmpGain (dB)	Corrct.Emi. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos. (cm)	TablePos. (deg)
68.8	16.23	6.16	1.51	0.00	23.90	40.00	-16.10	101.00	138.00
88.2	11.66	8.54	1.67	0.00	21.87	43.50	-21.63	101.00	323.00
95.96	16.22	9.91	1.79	0.00	27.93	43.50	-15.57	101.00	32.00
145.43	18.55	10.66	2.27	0.00	31.48	43.50	-12.02	101.00	138.00
191.99	10.45	9.04	2.53	0.00	22.02	43.50	-21.48	101.00	85.00
219.15	14.71	9.10	2.73	0.00	26.54	46.00	-19.46	101.00	85.00
533.43	5.73	18.47	4.26	0.00	28.45	46.00	-17.55	101.00	111.00
547.01	2.30	18.90	4.35	0.00	25.55	46.00	-20.45	101.00	244.00

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

Operator: JerryChiou

Temperature(C): 25

Humidity(%): 63

Frequency MHz	RxAmp. (dBuV)	AntFact (dB/m)	CableLoss (dB)	PreAmpGain (dB)	Corrct.Emi. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos. (cm)	TablePos. (deg)
33.88	10.89	16.24	1.09	0.00	28.22	40.00	-11.78	101.00	297.00
56.19	17.93	7.10	1.31	0.00	26.33	40.00	-13.67	101.00	349.00
66.86	21.16	6.26	1.48	0.00	28.90	40.00	-11.10	101.00	349.00
95.96	25.48	9.91	1.79	0.00	37.19	43.50	-6.31	101.00	32.00
106.63	15.93	11.79	1.93	0.00	29.65	43.50	-13.85	101.00	244.00
126.03	10.84	12.12	2.03	0.00	24.99	43.50	-18.51	101.00	349.00
148.34	19.70	10.37	2.31	0.00	32.37	43.50	-11.13	101.00	138.00
547.01	3.44	18.90	4.35	0.00	26.69	46.00	-19.31	101.00	244.00
589.69	5.15	18.76	4.45	0.00	28.36	46.00	-17.64	101.00	244.00
870.02	0.80	20.38	5.19	0.00	26.37	46.00	-19.63	101.00	349.00

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

4.4.5 Test Data (1GHz – 25 GHz) .

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

Operator:JerryChiou

RBW:1MHz
Humidity(%):59
Temperature(C):25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4818.18	39.40pk	34.11	5.14	27.49	51.15pk	54.00av	-2.85	100	18

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

Operator:JerryChiou

RBW:1MHz
Humidity(%):59
Temperature(C):25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4818.18	40.13pk	34.11	5.14	27.49	51.89pk	54.00av	-2.11	100	18

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “pk”: peak mode
- “av”: average mode
- “---”: 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) , Channel 6 : 2437 MHz

Operator:JerryChiou

RBW:1MHz
Humidity(%):59
Temperature(C):25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4861.64	37.25pk	34.27	5.13	27.43	49.23pk	54.00av	-4.77	100	14

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

Operator:JerryChiou

RBW:1MHz
Humidity(%):59
Temperature(C):25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4861.64	36.66pk	34.27	5.13	27.43	48.63pk	54.00av	-5.37	100	14

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “av”: average mode
- “---”: 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), Channel 11: 2462 MHz

Operator:JerryChiou

RBW:1MHz
Humidity(%):59
Temperature(C):25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4919.58	36.05pk	34.49	5.13	27.35	48.33pk	54.00av	-5.67	100	8

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

Operator:JerryChiou

RBW:1MHz
Humidity(%):59
Temperature(C):25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4919.58	35.69pk	34.49	5.13	27.35	47.96pk	54.00av	-6.04	100	8

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “av”: average mode
- “---”: 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.
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)

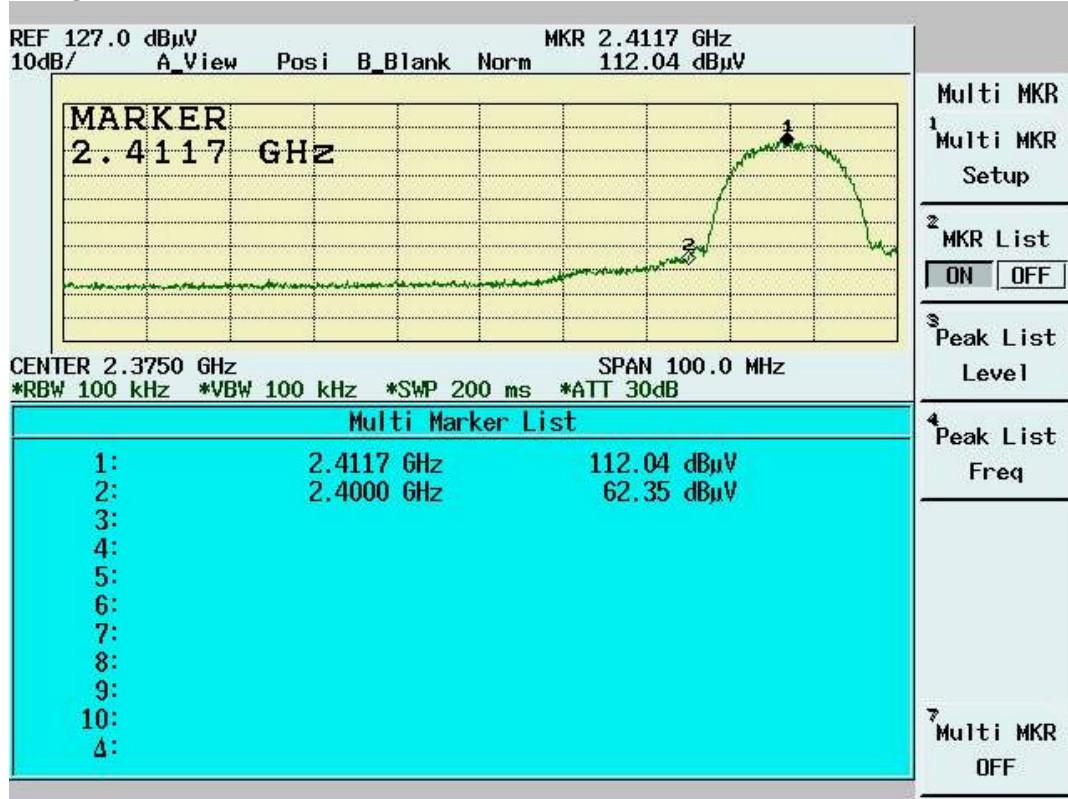
Temp. (?C): 25

Test Engr: Jerry Chiou

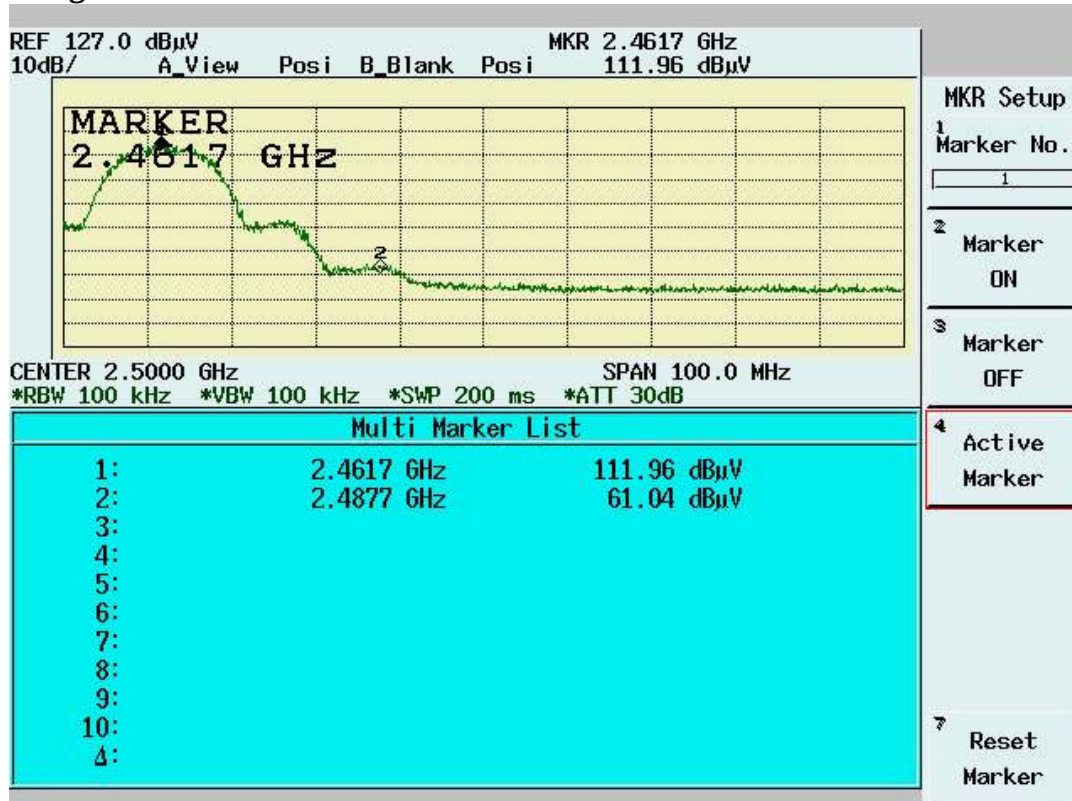
Humidity (%): 50

Channel	Frequency	Spectrum Reading	Carrier - Outsideband Limit: >30dB	Pass/Fail
	(MHz)	(dBuV)	(dB)	
1	2.4117	112.04	---	---
Outside band	2400	62.35	49.69	Pass
11	2461.7	111.96	---	---
Outside band	2487.7	61.04	50.92	Pass

Band Edge Conducted measurement



Band Edge Conducted Measurement



4.5.4 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: 1MHz
VBW: 3MHz
Center frequency: 2.395GHz, 2.48GHz.
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

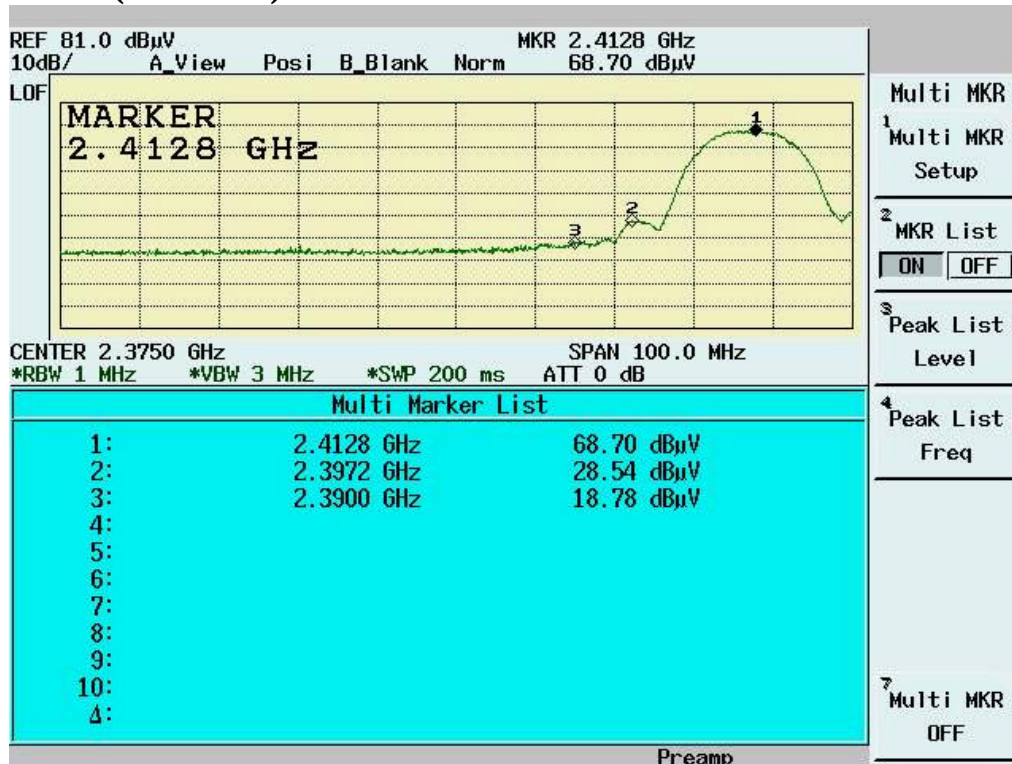
Table Band Edge measurement (Radiated)

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc (Limit: > 30dBc)	dBc (Limit: > 20dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_1 (average mode)	2413.8	64.28	35.48	99.76	---	---	---	10Hz	---
Channel_1 (peak mode)	2412.8	68.7	35.48	104.18	---	---	---	3MHz	---
Outside band (average mode)	2397.2	22.66	35.48	58.14	41.62	---	---	10Hz	Pass
Outside band (peak mode)	2397.2	28.54	35.48	64.02	---	40.16	---	3MHz	Pass
Channel_11 (average mode)	2486.5	12.24	35.5	102.72	---	---	---	10Hz	---
Channel_11 (peak mode)	2487.5	26.51	35.5	111.52	---	---	---	3MHz	---
Outside band (average mode)	2486.5	12.24	35.51	47.75	54.97	---	---	10Hz	Pass
Outside band (peak mode)	2487.5	26.51	35.51	62.02	---	49.5	---	3MHz	Pass
Channel_1 Restricted band (peak mode)	2390	18.78	35.47	54.25	---	---	74	3MHz	Pass
Restricted band (average mode)	2463.2	76.02	35.47	43.15	---	---	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2463.3	67.22	35.51	62.02	---	---	74	3MHz	Pass
Restricted band (average mode)	2486.5	12.24	35.51	47.75	---	---	54	10Hz	Pass

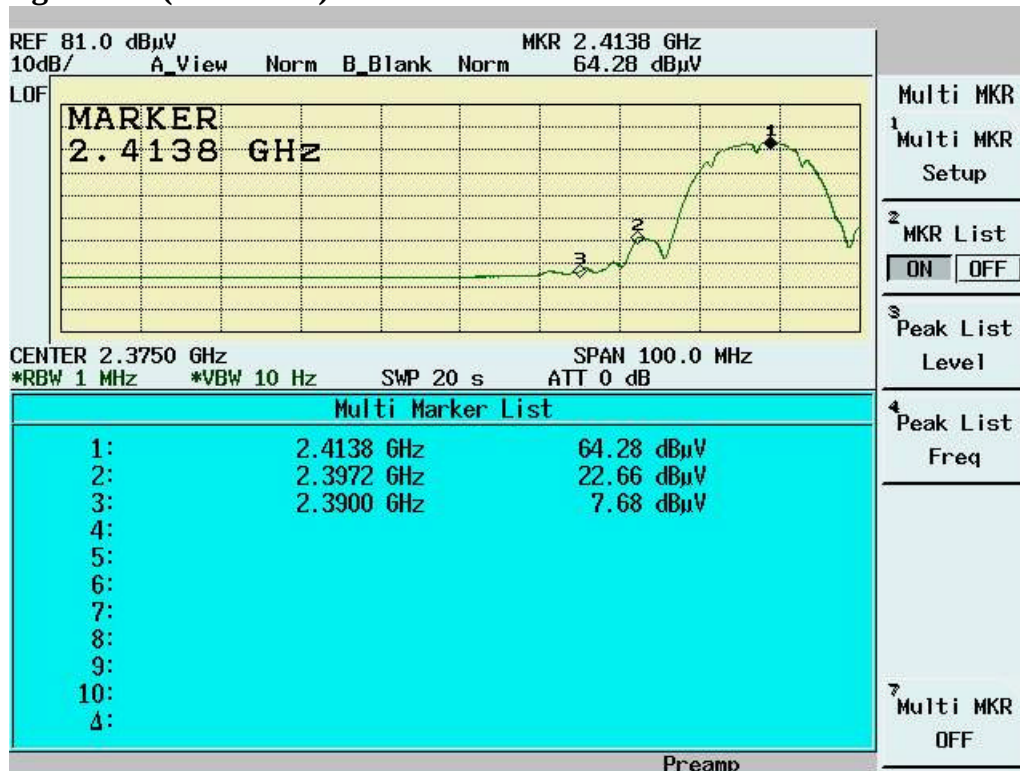
Note:

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

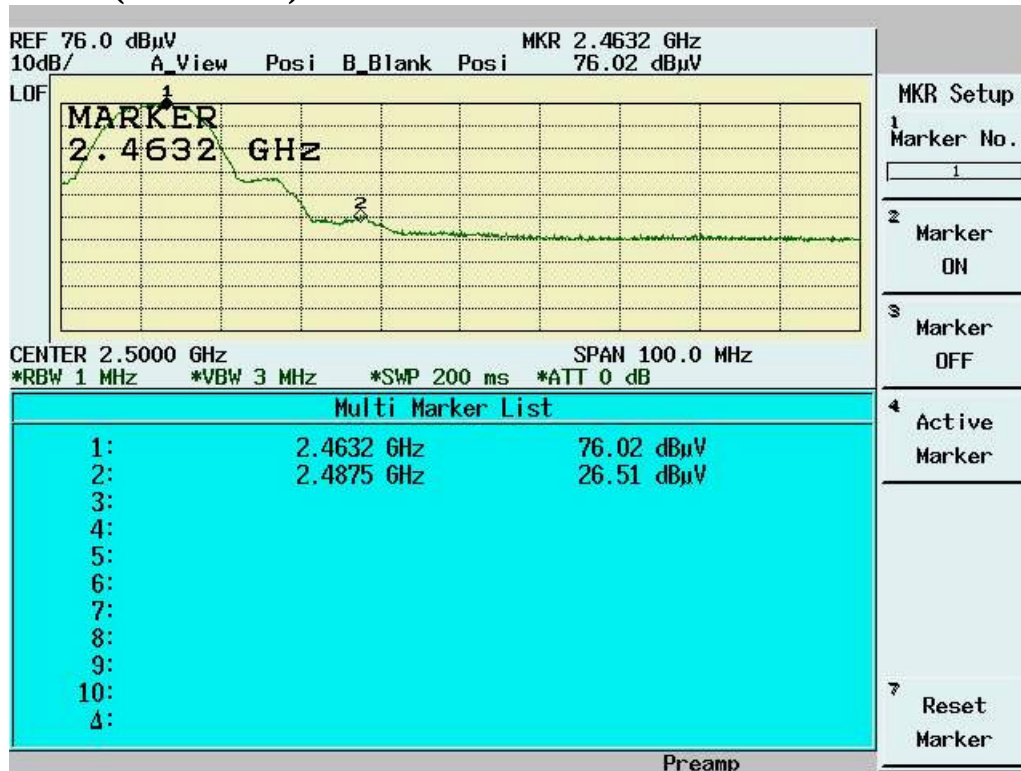
Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 1)



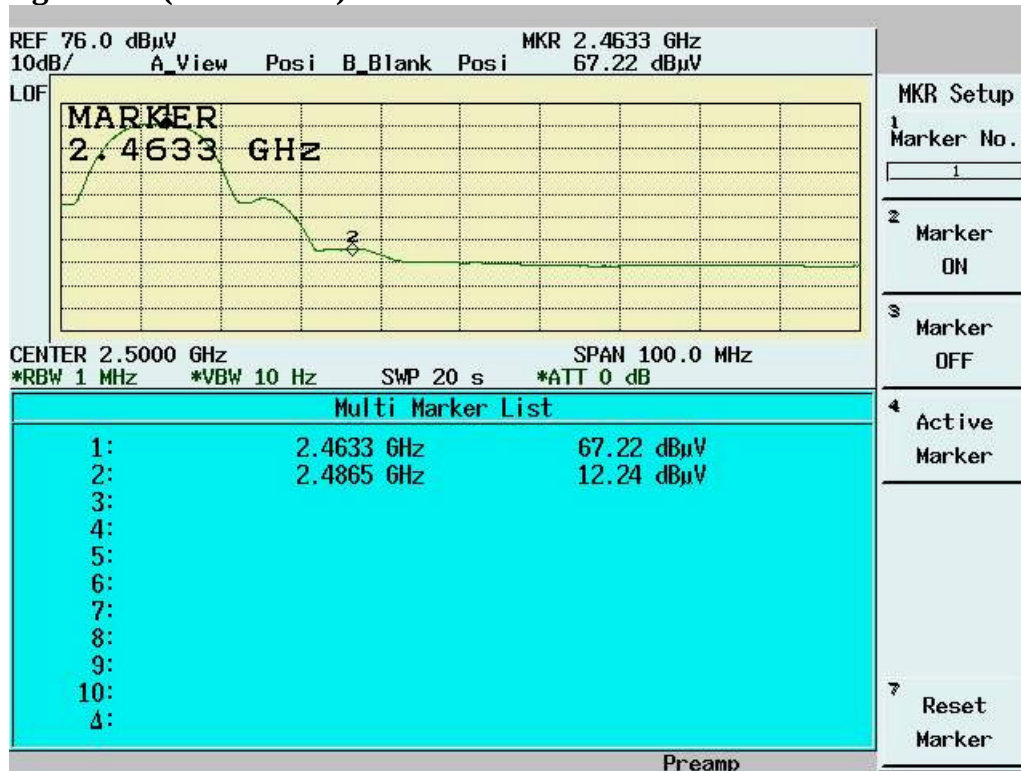
Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 1)



Band Edge measurement for radiated emission in 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)]

See SAR report

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

4.7.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN:1.5MHz
RBW: 3KHz
VBW: 30KHz
Center frequency: fundamental frequency tested.
Sweep time= 500 sec.
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

4.7.2 Test Setup



4.7.3 Test Data

Maximum Peak Output Power Density

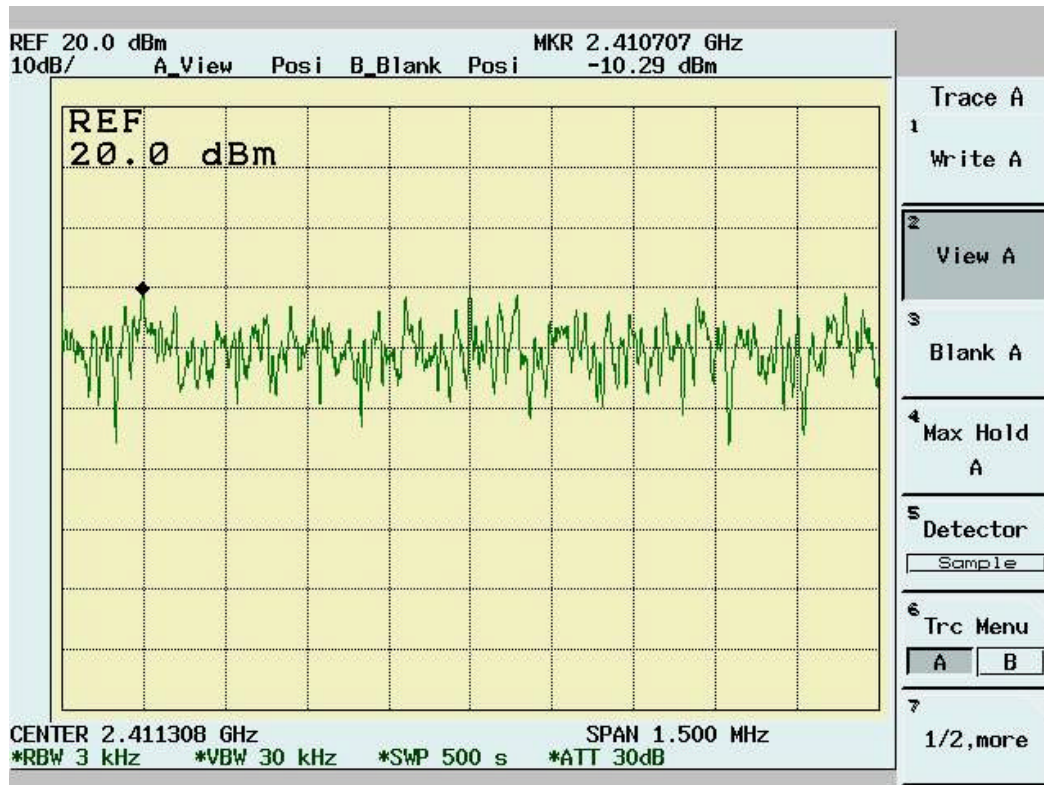
Temp. (°C): 25

Test Engr: Jerry Chiou

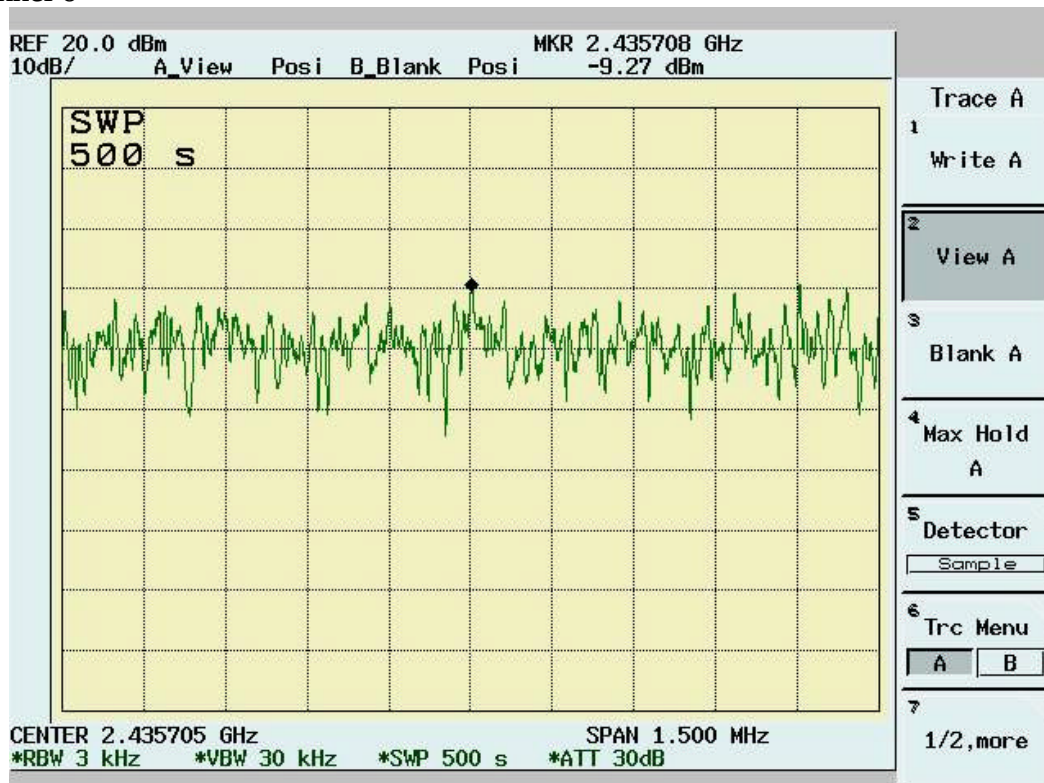
Humidity (%): 50

Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-10.29	1.1	-9.19	8	Pass
6	2437	-9.27	1.1	-8.17	8	Pass
11	2462	-8.85	1.1	-7.75	8	Pass

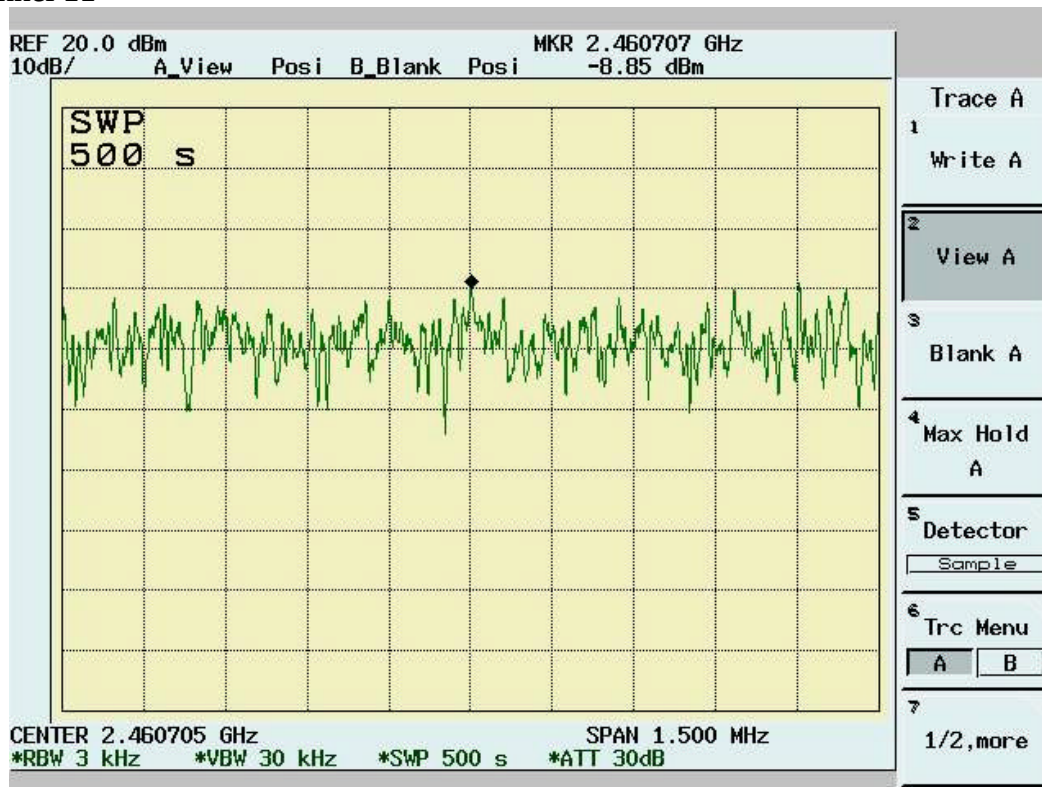
Channel 1



Channel 6



Channel 11



5. TEST RESULTS (802.11g)

5.1 Powerline Conducted Emissions [Section 15.207]

5.1.1 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 used.

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

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

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

5.1.2 Test Procedure

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

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

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

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

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

5.1.4 Test Data:

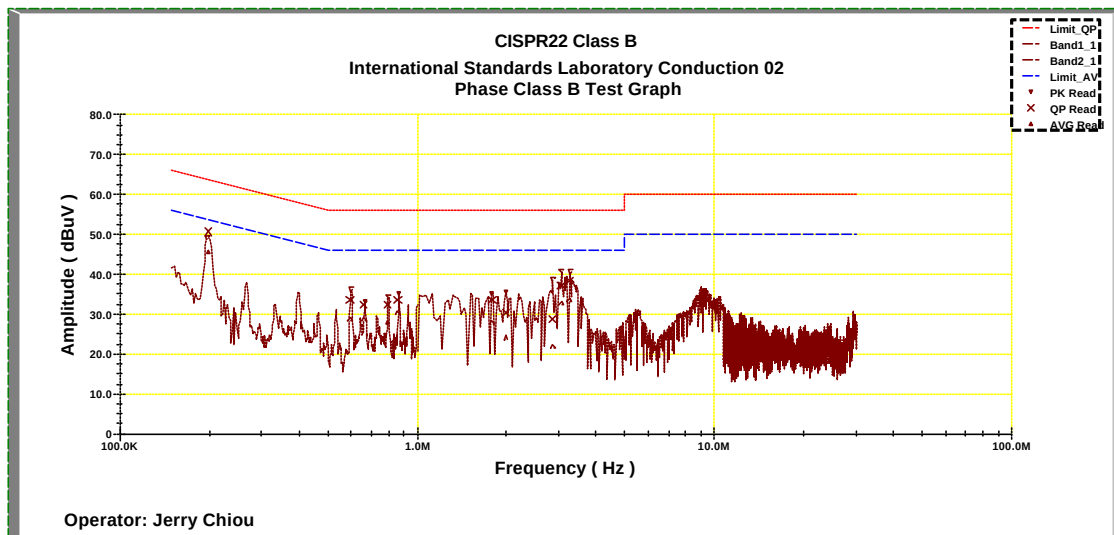
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature(C):25

Humidity(%):63

Frequency	LISN Loss	Cable Loss	QPCorrct.	QPLimit	QPMargin	AVECorrct.	AVELimit	AVEMargin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.19826	0.10	0.05	50.65	64.62	-13.98	45.61	54.62	-9.01
0.59458	0.20	0.07	33.68	56.00	-22.32	28.52	46.00	-17.48
0.66203	0.20	0.07	32.42	56.00	-23.58	28.59	46.00	-17.41
0.79523	0.20	0.07	32.45	56.00	-23.55	27.97	46.00	-18.03
0.86073	0.20	0.07	33.65	56.00	-22.35	30.27	46.00	-15.73
1.78826	0.28	0.09	33.70	56.00	-22.30	27.73	46.00	-18.27
1.98776	0.30	0.09	30.34	56.00	-25.66	24.03	46.00	-21.97
2.85409	0.34	0.11	28.82	56.00	-27.18	21.98	46.00	-24.02
3.04727	0.35	0.12	37.09	56.00	-18.91	32.67	46.00	-13.33
3.24572	0.36	0.12	38.38	56.00	-17.62	33.62	46.00	-12.38



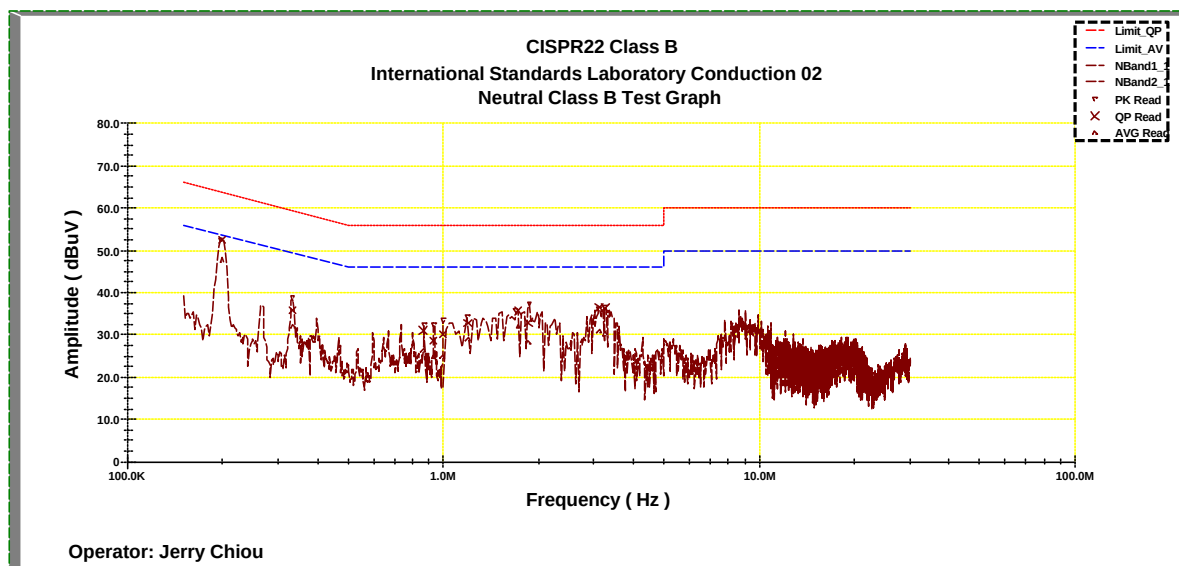
Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature(C):25

Humidity(%):63

Frequency MHz	LISN Loss (dB)	Cable Loss (dB)	QPCorrt. Amp.(dBuV)	QPLimit (dBuV)	QPMargin (dB)	AVECorrt. Amp.(dBuV)	AVELimit (dBuV)	AVEMargin (dB)
0.19878	0.40	0.05	52.47	64.61	-12.14	47.73	54.61	-6.88
0.33336	0.40	0.09	35.80	60.76	-24.96	31.86	50.76	-18.90
0.86203	0.40	0.07	31.01	56.00	-24.99	26.34	46.00	-19.66
0.92788	0.40	0.07	28.66	56.00	-27.34	24.66	46.00	-21.34
0.99363	0.40	0.07	30.21	56.00	-25.79	24.89	46.00	-21.11
1.19356	0.50	0.07	32.86	56.00	-23.14	28.90	46.00	-17.10
1.72258	0.50	0.08	35.66	56.00	-20.34	31.98	46.00	-14.02
1.85553	0.50	0.09	32.99	56.00	-23.01	28.11	46.00	-17.89
3.11391	0.50	0.12	36.49	56.00	-19.51	30.77	46.00	-15.23
3.24638	0.50	0.12	36.37	56.00	-19.63	30.25	46.00	-15.75



* 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