MEASUREMENT REPORT
of
IEEE 802.11b Wireless Router

Applicant	**:**	CAMEO COMMUNICATIONS, INC.
Product Name	**:**	IEEE 802.11b Wireless LAN Broadband Router
Model Name	**:**	as Appendix A
FCC ID	**:**	NHPWLB2203
Report No.	**:**	C5115386

Tested by :

Training Research Co., Ltd.

TEL : 886-2-26935155 FAX : 886-2-26934440

No. 255, Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

CERTIFICATION

We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (1992) as a reference. All test were conducted by ***Training Research Co., Ltd.***, 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart B (Declaration of Conformity) and C Section 15.247.

Applicant	**:**	CAMEO COMMUNICATIONS, INC.
Applicant address	**:**	6F, No.22, Chung Shin Rd., Hsi-Chih, Taipei 221, Taiwan
Product Name	**:**	IEEE 802.11b Wireless LAN Broadband Router
Model Name	**:**	as Appendix A
FCC ID	**:**	NHPWLB2203
Report No.	**:**	C5115386
Test Date	**:**	November 24, 2003

Prepared by: Jack Tsai

Approved by: Frank Tsai

Conditions of issue :

(1) ***This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.***

(2) ***This report must not be used by the client to claim product endorsement by NVLAP or any agency of U.S. Government.***

★ ***NVLAP LAB CODE: 200174-0***

Federal Communications Commission
Declaration of Conformity
(DoC)

For the Following Equipment:

Product name : IEEE 802.11b Wireless LAN Broadband Router

Model name : as Appendix A

Trade name : as Appendix A

Is herewith confirmed and found to comply with the requirements of CFR 47 part15 Subpart B - Unintentional Radiators regulation. The results of electromagnetic mission evaluation are shown in the *report number: C5115386*

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation

Manufacturer	*USA local representative*
Company name: CAMEO COMMUNICATIONS, INC.	To be determined
Computer address: 6F, No.22, Chung Shin Rd., Hsi-Chih, Taipei 221, Taiwan	
ZIP / Postal code 221	
Contact person: Jason Chang	
Title: Wireless Comm RD Dept Manager	
Internet e-mail address: jason_chang@mail.cameo.com.tw	
Tel / Fax: 886-2-26499800 / 886-2-26499984	

Tables of Contents

Ⅰ. GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of applicant in support that the certification in accordance with Part 2 Subpart J and Part 15 Subpart A, B and C of the Commission's Rules and Regulations.

1.2 Description of EUT

Product Name	:	IEEE 802.11b Wireless LAN Broadband Router
Model Name	:	as Appendix A
Granted FCC ID	:	NHPWLB2203
Frequency Range	:	2.412GHz ~ 2.462GHz
Support Channel	:	11 Channels
Modulation Skill	:	DBPSK, DQPSK, CCK
Power Type	:	By the power adaptor Model: DSA-0151A-05A I/P: 200-240VAC, 60Hz, 16W O/P: 7.5VDC, 1A Power cable 188cm length, non-shielded, no ferrite core
Data Cable (Intentional test)	:	RJ45 cable * 1 30m length, non-shielded, no ferrite core RJ45 cable * 4 2m length, non-shielded, no ferrite core
Data Cable (Unintentional)	:	RJ45 cable * 1 1.2m length, non-shielded, no ferrite core RJ45 cable * 3 2m length, non-shielded, no ferrite core RJ45 cable * 1 30m length, non-shielded, no ferrite core

1.3 Description of Support Equipment

In order to construct the minimum testing, following equipment were used as the support units.

Notebook	**:**	**IBM Think Pad X20**
Model No.	:	2662-11T
Serial No.	:	FX-1192200/09
FCC ID	:	N/A, DoC Approved (Declaration of Confirmation) Approved
檢磁	:	3892B565
Adaptor	**:**	**IBM**
Model No.	:	PA2450U
Serial No.	:	02K6654
FCC ID	:	N/A, DoC Approved
Power type	:	I/P: 100 ~ 240vac, 50 ~ 60 Hz, 0.5A ~ 1.2A; O/P: 16Vdc, 4.5A
Power cord	:	Non-shielded, 1.80m length, Plastic, with ferrite core
PC	**:**	**IBM 6840; HP Pavilion**
Model No.	:	6840MJV; P8574A
Serial No.	:	96CC 0C1; TW21920435
FCC ID	:	N/A, DoC
檢磁	:	3892I279; 3902H097
Power type	:	100 ~ 127VAC / 4A, 200 ~ 240VAC/2A, 50 ~ 60Hz, 5A, Switching
Power cord	:	Non-shielded, 2.33m length, Plastic hood, No ferrite core
Printer	**:**	**HP**
Model No.	:	C6464A, C2642A
Serial No.	:	TH16LEB5PK, SG69A196GV
FCC ID	:	None (DoC Approved), B94C2642X
檢磁	:	3892H381, None
Power type	:	Switching adaptor
Power cord	:	Non-shielded, 173cm length, No ferrite core (between adaptor and AC source) Non-shielded, 180cm length, with ferrite core (between printer and adaptor)
Data cable	:	Shielded, 1.70m length, No ferrite core

Monitor	**:**	**HP 15' Color Monitor, HP pavilion mx70**
Model No.	:	D2827A, P1283A
Serial No.	:	KR91379759, TWTBQ00397
FCC ID	:	C5F7NFCMC1518X
檢磁	:	3872B039
Power type	:	110 ~ 240 VAC / 50 ~ 60 Hz, Switching
Power cord	:	Shielded, 1.83m length, No ferrite core
Data cable	:	Shielded, 1.46m length, with two ferrite cores

Modem	**:**	**ACEEX**
Model No.	:	XDM-56V14
FCC ID	:	IFAXDM-56V14
Power type	:	Linear
Power cord	:	Non-shielded, 1.9m length, No ferrite cord
Data cable	:	RS232, Shielded, 1.2m length, No ferrite core
		RJ11C x 2, 7' length non-shielded, No ferrite core

PS/2 Mouse	**:**	**HP**
Model No.	:	M-S34
Serial No.	:	LZB90714106, LZC84446151
FCC ID	:	DZL211029
檢磁	:	4862A011
Power type	:	By PC
Power cord	:	Non-shielded, 1.88m length, No ferrite core

PS/2 Keyboard	**:**	**HP**
Model No.	:	5187-0343, SK-2501K
Serial No.	:	BE21700404, M981216213
FCC ID	:	DoC Approved, GYUR38SK
檢磁	:	3892C981, 3862A621
Power type	:	By PC
Data cable	:	Shielded, 1.73m length, Plastic hood, No ferrite core

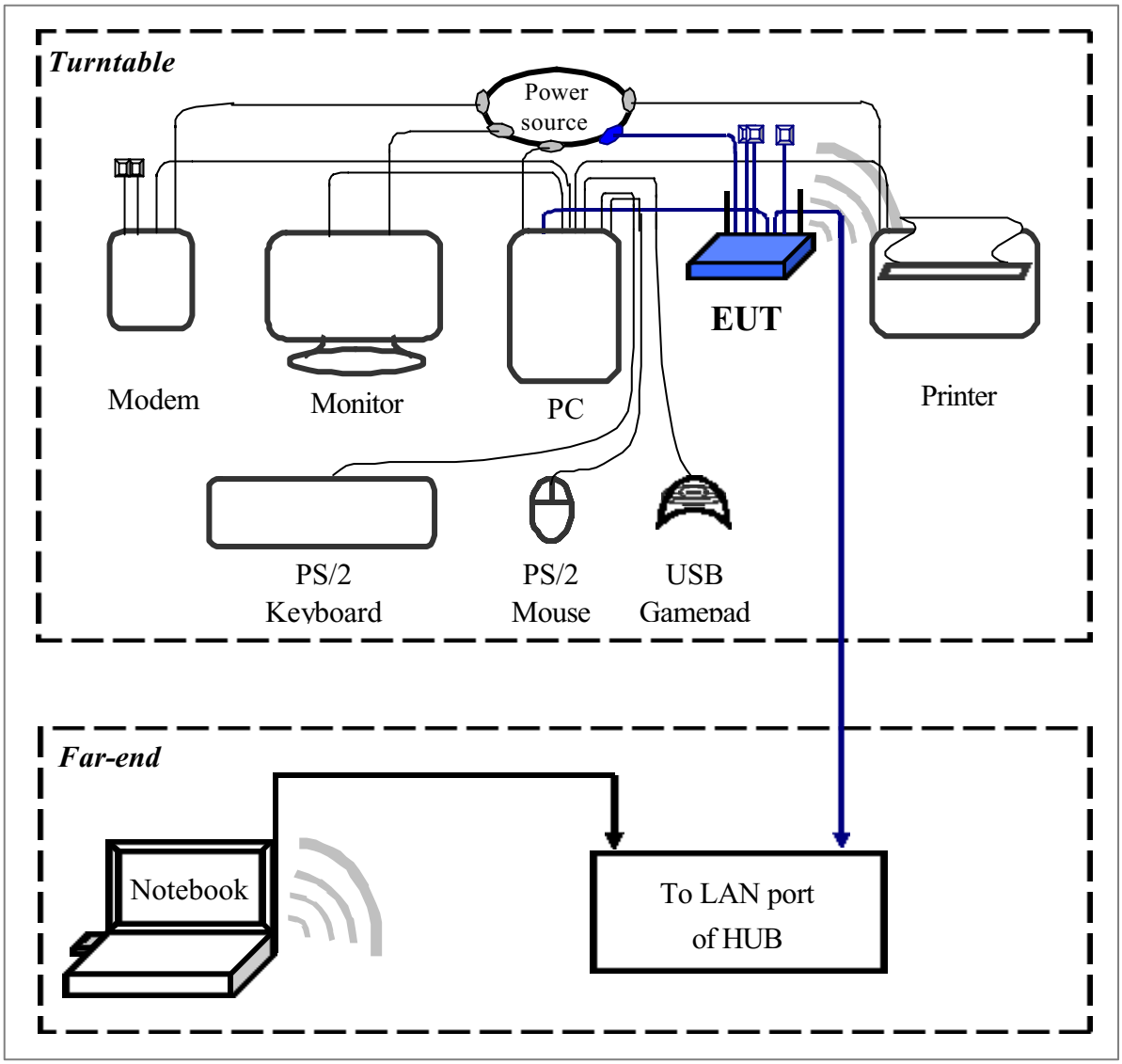
USB gamepad	**:**	**Rockfire**
Model No.	:	QF-337uv
Serial No.	:	10600545, KR91379759
FCC ID	:	None (CE approval)
檢磁	:	3862A574
Power type	:	By computer
Data Cable	:	Shielded, 1.81m length, Plastic, with ferrite core
Notebook	**:**	**ASUSTek Computer**
Model No.	:	AB00F
Serial No.	:	24NP016361
FCC ID	:	DoC Approved
BSMI	:	41016012
Power type	:	100 ~ 240VAC, 1A 50/60 Hz, Switching
Adaptor	**:**	**LITE-ON Electronics, Inc.**
Model No.	:	PA-1530-01
Serial No.	:	00151184
FCC ID	:	DoC Approved
檢磁	:	3882B259
Power cable	:	Non-shielded, 1.72m length, Plastic hood, No ferrite core (Between power adaptor and AC power source)
Power cable	:	Shielded, 1.48m length, Plastic hood, with ferrite core (Between power adaptor and notebook)
WLAN Card	**:**	**Gemtek Technology Co., Ltd.**
Model No.	:	C911003
FCC ID	:	MXF-C911003
LAN Card	**:**	**D-Link**
Model No.	:	DFE-530TX
Serial No.	:	0050BAE32FF3, 0050BAE3158B
FCC ID	:	N/A, DoC Approved
Power type	:	Powered by PC

1.4 Test method

1) The PC and test fixture is connected by RS-232 cable, and the LAN of PC connected to EUT via RJ45 cross cable, Using the test fixture to control EUT.
2) Using the test fixture to set different channels (CH1/CH6/CH11) then moving the test fixture when test mode set finish.
3) The test software provided by the manufacturer.
4) Set the channel being tested, and making EUT to as follow mode:
   (a) Radiated for intentional test:
   making EUT to the mode of continuous transmission
   (b) Conducted and Radiated for unintentional test:
   making EUT to the linking (Rx/Tx) mode with support equipments.

1.5 Configuration of System Under Test

1.5.1 Conducted and Radiated for unintentional



Connections of Equipment

PC: *Parallel Port --- a printer

*VGA Port --- a monitor

*Serial Port --- an external modem

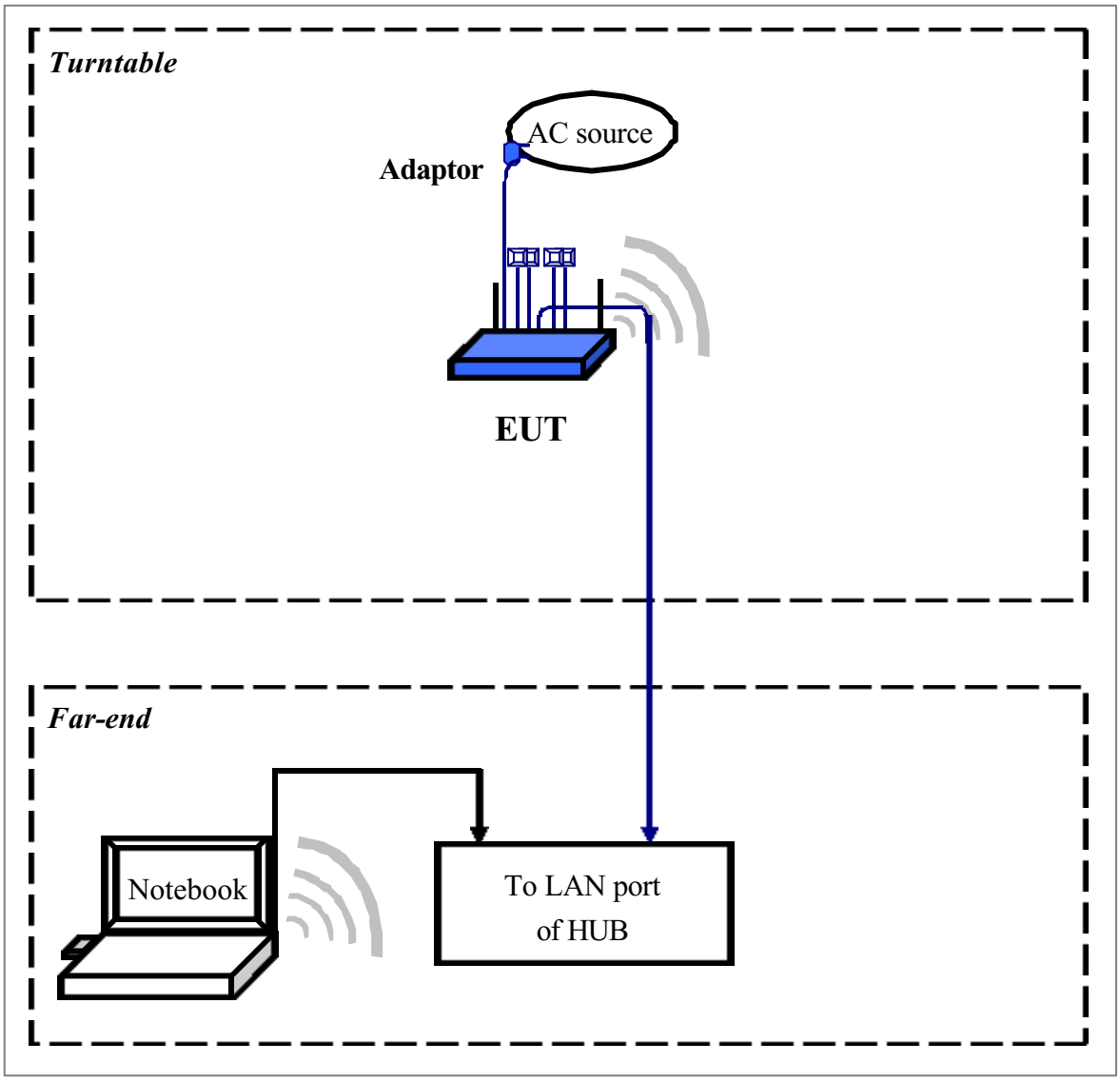
*USB Port --- a USB gamepad

*LAN Port --- **EUT**

*PS/2-key Port --- a PS/2 keyboard

*PS/2-mouse Port --- a PS/2 mouse

1.5.2 Radiated of intentional



The tests below are carried with the EUT transmitter set at high power in TDD mode. The EUT is forced to select of output power level and channel number by computer.

The setting up procedure was recorded in 1.4 test method.

1.6 Verify the Frequency and Channel

CH	1	2	3	4	5	6	7	8	9	10
0	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457
1	2462	---	---	---	---	---	---	---	---	---

Note: 1. This is for confirming that all frequencies are in 2.412GHz to 2.462GHz.

2. Section 15.31(m): Measurements on intentional radiators or receivers shall be performed at three frequencies for operating frequency range over 10 MHz.
   (The locations of these frequencies one near the top, one near the middle and one near the bottom.)
3. After test, the EUT operating frequencies are in 2.412GHz to 2.462GHz. So all the items as followed in testing report are need to test these three frequencies:
   Top: Channel – 1; Middle: Channel – 6; Bottom: Channel – 11.

1.7 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in ANSI C63.4 (1992) and the pre-setup was written on 1.4 test method, the detail setup was written on each test item.

1.8 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter**, **Anechoic Chamber (FCC Registration Number: 93906)** maintained by *Training Research Co., Ltd.* 1F, No. 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in a anechoic chamber also located at Training Research Co., Ltd.

No. 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

1.9 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions, which the EUT was considered likely to encounter in normal use were investigated.

In test, they were set in high power and continuously transmitting mode that controlled by computer. The ch01, ch06 and ch11 of EUT were all tested. The setting up procedure is recorded on 1.4 test method.

II. Section 15.101(a): Equipment authorization of unintentional radiators

The EUT equipped with a LAN interface and should be operated with the computer. It was categorized to *Class B personal computers and peripherals* as cannot be operated stand-alone. The authorization requires **Declaration of Conformity (DoC)** and the items required such as Sect.15.107 (Conducted limits) and Sect.15.109 (Radiated emission limits) is same as Sect.15.207 and 15.247(C).

III. Section 15.203: Antenna requirement

The EUT is equipped with integral antennas. The antenna cannot be removed or modified without any tools from outside in order to prevent the un-authorized modification. This makes that complies with the antenna requirement stated in Sect.15.203.

The antenna specification of list as follows, (Please Ref. to RF Exposure Calculations, antenna spec.)

Undetachable antenna

Manufacturer	:	WHA YU INDUSTRIAL CO., LTD.
Part No.	:	11722B028A57*02 / 11722B028A57*03
Antenna Type	:	Dipole
Antenna Gain	:	1.8dBi (Max.)
Cable	:	Mil-C-17 Coaxial Cable RG-178

IV. Section 15.207: Power Line Conducted Emissions for AC Powered Units

4.1 Test Condition & Setup

The power line conducted emission measurements were performed in an anechoic chamber. The EUT was assembled on a wooden table, which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer (or EMI receiver) was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak and average detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 2.4.

There is a test condition apply in this test item, the test procedure description as <1.4>. Three channels were tested, one in the top (CH01), one in the middle (CH06) and the other in bottom (CH11).

4.2 List of Test Instruments

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	HP	3520A00242	07/28/03	07/28/04
RF Filter Section	85460A	HP	3448A00217	07/28/03	07/28/04
LISN (EUT)	LISN-01	TRC	9912-03,04	07/21/03	07/21/04
LISN (Support E.)	LISN-01	TRC	9912-05	06/21/03	06/21/04
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	11/20/03	11/20/04

The level of confidence of 95%, the uncertainty of measurement of conducted emission is +2.43dB / -2.53dB.

4.3 Test Result of Power Line Conducted Emissions

The following table shows a summary of the highest emissions of power line conducted emissions on the LIVE and NETURAL conductors of the EUT power cord.

Test Conditions: Temperature : 25 °C Humidity : 73 % RH

Test mode: Channel 1

Power Connected Emissions					*FCC Class B*		
Conductor	*Frequency (KHz)*	*Peak (dBμV)*	*QP (dBμV)*	*Average (dBμV)*	*QP-limit (dBμV)*	*AVG-limit (dBμV)*	*Margin (dB)*
Line 1	117.730	55.06	52.20	18.30	65.63	55.63	-13.43
	142.200	53.84	51.26	17.47	64.60	54.60	-13.34
	199.960	51.70	49.04	16.76	62.94	52.94	-13.90
	278.910	50.03	46.67	12.82	60.74	50.74	-14.07
	380.530	48.29	44.62	10.83	58.11	48.11	-13.49
	647.370	45.45	40.82	6.82	56.00	46.00	-15.18
	13430.000	30.14	---	---	60.00	50.00	-19.86
	17710.000	35.75	---	---	60.00	50.00	-14.25
	21630.000	37.81	---	---	60.00	50.00	-12.19
	26540.000	39.82	---	---	60.00	50.00	-10.18
Line 2	117.660	55.72	51.66	17.86	65.83	55.83	-14.17
	248.090	50.76	47.29	13.05	61.66	51.66	-14.37
	328.180	49.32	45.54	11.94	59.43	49.43	-13.89
	425.850	47.41	43.65	9.73	56.71	46.71	-13.06
	448.990	47.13	43.00	9.34	56.00	46.00	-13.00
	565.250	46.16	41.54	8.75	56.00	46.00	-14.46
	583.000	45.59	41.39	7.34	56.00	46.00	-14.61
	16230.000	35.81	---	---	60.00	50.00	-14.19
	18240.000	37.76	---	---	60.00	50.00	-12.24
	21630.000	37.46	---	---	60.00	50.00	-12.54

NOTE:

(1) Margin = Peak Amplitude – Limit, *The reading amplitudes are all under limit.*

(2) A "+" sign in the margin column means the emission is OVER the Class B Limit and "–" sign of means UNDER the Class B limit

Test mode: Channel 6

Power Connected Emissions					*FCC Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	119.590	58.61	52.00	18.35	65.94	55.94	-13.94
	117.940	57.12	52.09	18.44	65.31	55.31	-13.22
	136.510	54.67	51.34	17.56	64.71	54.71	-13.37
	199.950	52.24	48.96	16.96	63.00	53.00	-14.04
	331.310	47.48	45.45	11.96	59.31	49.31	-13.86
	13290.000	30.52	---	---	60.00	50.00	-19.48
	16160.000	34.14	---	---	60.00	50.00	-15.86
	17710.000	36.46	---	---	60.00	50.00	-13.54
	23120.000	40.28	---	---	60.00	50.00	-9.72
	26400.000	41.14	---	---	60.00	50.00	-8.86
Line 2	121.920	55.51	51.91	17.98	65.86	55.86	-13.95
	281.510	49.70	46.44	12.80	60.63	50.63	-14.19
	387.870	47.73	44.11	15.99	57.74	47.74	-13.63
	445.200	46.48	42.90	8.90	56.03	46.03	-13.13
	550.920	45.94	41.47	7.57	56.00	46.00	-14.53
	603.590	45.84	41.00	7.57	56.00	46.00	-15.00
	16230.000	36.08	---	---	60.00	50.00	-13.92
	18240.000	36.70	---	---	60.00	50.00	-13.30
	21630.000	38.23	---	---	60.00	50.00	-11.77
	27080.000	39.87	---	---	60.00	50.00	-10.13

Test mode: Channel 11

Power Connected Emissions					*FCC Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	122.120	58.87	52.48	18.53	65.83	55.83	-13.35
	131.160	56.63	51.86	17.97	64.94	54.94	-13.08
	222.000	51.91	48.46	14.46	62.37	52.37	-13.91
	342.760	47.73	45.52	11.77	58.91	48.91	-13.39
	674.000	40.31	---	---	56.00	46.00	-5.69
	12740.000	29.09	---	---	60.00	50.00	-20.91
	16230.000	33.61	---	---	60.00	50.00	-16.39
	17710.000	37.40	---	---	60.00	50.00	-12.60
	23120.000	39.75	---	---	60.00	50.00	-10.25
	26540.000	41.35	---	---	60.00	50.00	-8.65
Line 2	120.890	55.75	52.24	18.49	65.74	55.74	-13.50
	123.570	55.37	52.27	18.44	65.31	55.31	-13.04
	281.860	50.32	46.72	12.91	60.74	50.74	-14.02
	405.150	47.85	44.49	11.09	57.11	47.11	-12.62
	576.630	46.18	41.82	8.00	56.00	46.00	-14.18
	902.000	41.93	---	---	56.00	46.00	-4.07
	16230.000	36.22	---	---	60.00	50.00	-13.78
	19620.000	37.42	---	---	60.00	50.00	-12.58
	23120.000	39.77	---	---	60.00	50.00	-10.23
	26540.000	40.31	---	---	60.00	50.00	-9.69

V. Section 15.247 (a): Technical description of the EUT

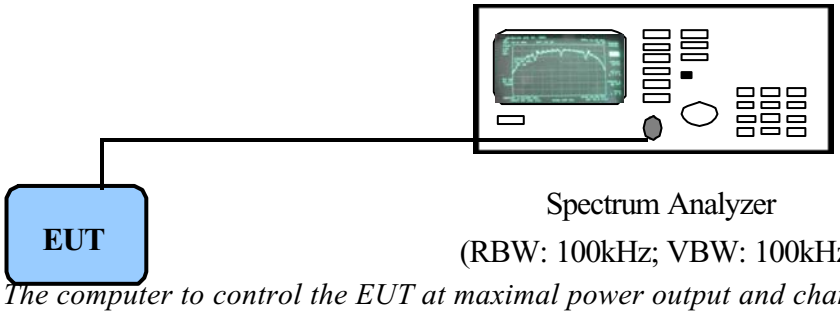
Direct Sequence System is a spread spectrum system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high speed code sequence dominates the "modulating function" and is the direct cause of the wide spreading of the transmitted signal. In the operational description demonstrates the operation principles of the Baseband processor employed by the EUT, shows that which is a complete DSSS baseband processor and meets the definition of the Direct sequence spread spectrum system.

VI. Section 15.247(a)(2): Bandwidth for Direct Sequence System.

6.1 Test Condition & Setup

The transmitter bandwidth measurements were performed by the contact manner. The EUT was set to transmit continuously, also various channels were investigated to find the maximum occupied bandwidth. The output of the EUT was connected to the spectrum analyzer. The bandwidth of the fundamental frequency is observed by the spectrum analyzer with 100kHz RBW and 100kHz VBW.

6.2 Test Instruments Configuration



P.S.: The computer to control the EUT at maximal power output and channel Number and set antenna kit

6.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/30/03	09/30/04

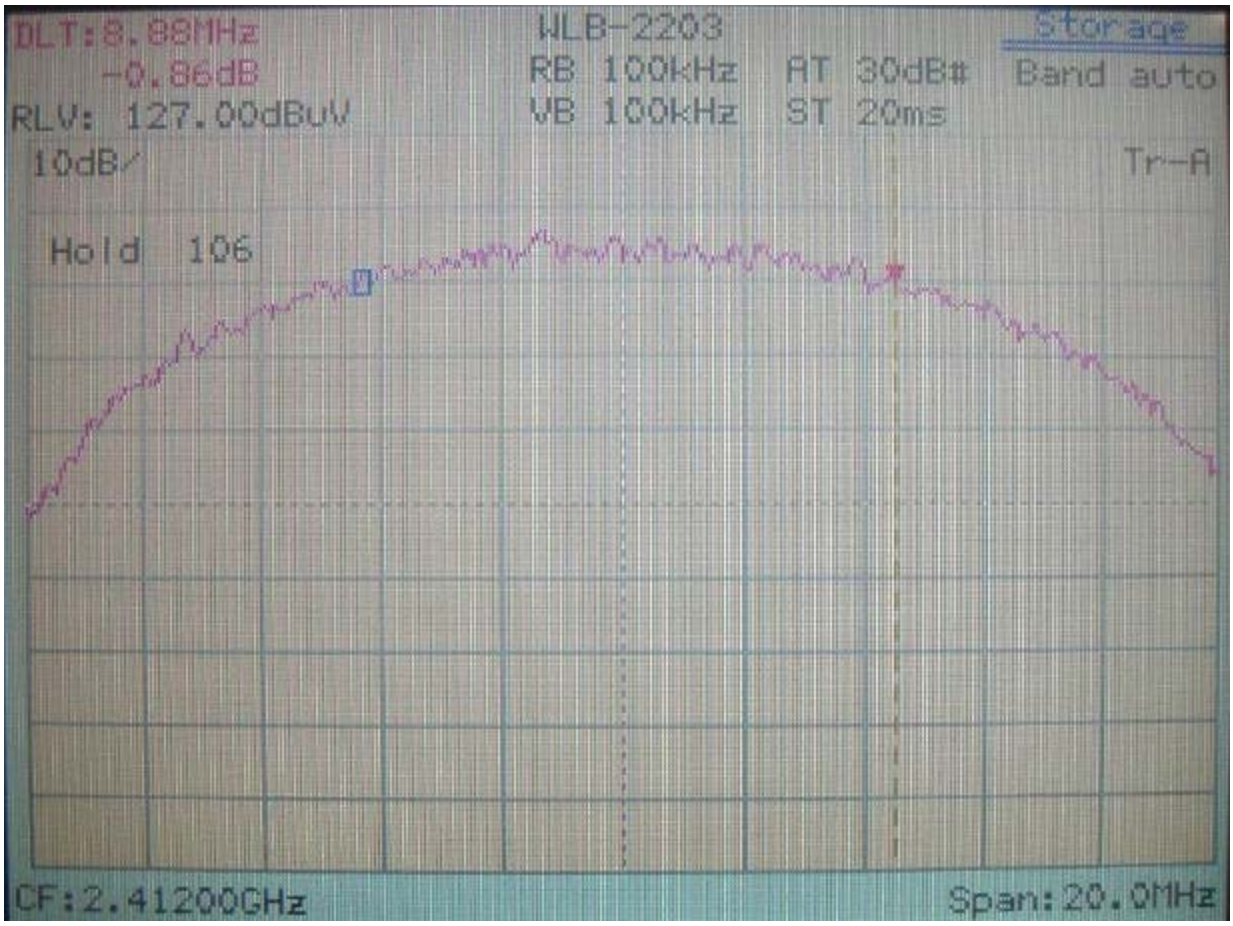
6.4 Test Result of Bandwidth

Channel	Bandwidth
01	8.88 MHz
06	8.88 MHz
11	8.88 MHz

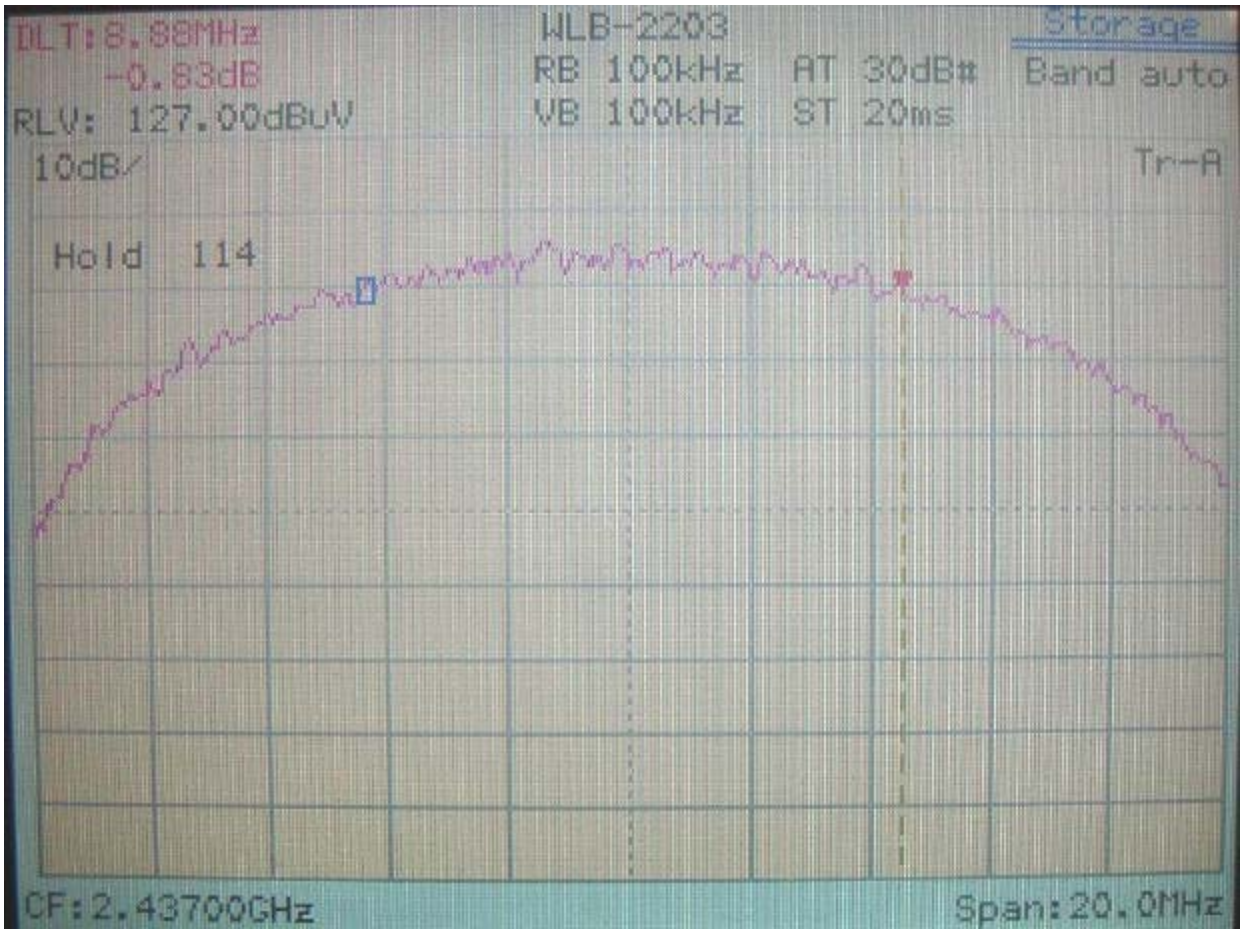
Note: 1. The data in the above table are summarizing the following attachment spectrum analyzer hard copy. According to the guidance, we' d made the measurement with the spectrum analyzer' s resolution bandwidth *(RBW)=100kHz* and set the *span>>RBW*. The results show the measured 6dB bandwidth comply with the minimum 500kHz requirement.

2. The attachments show these on the following pages.

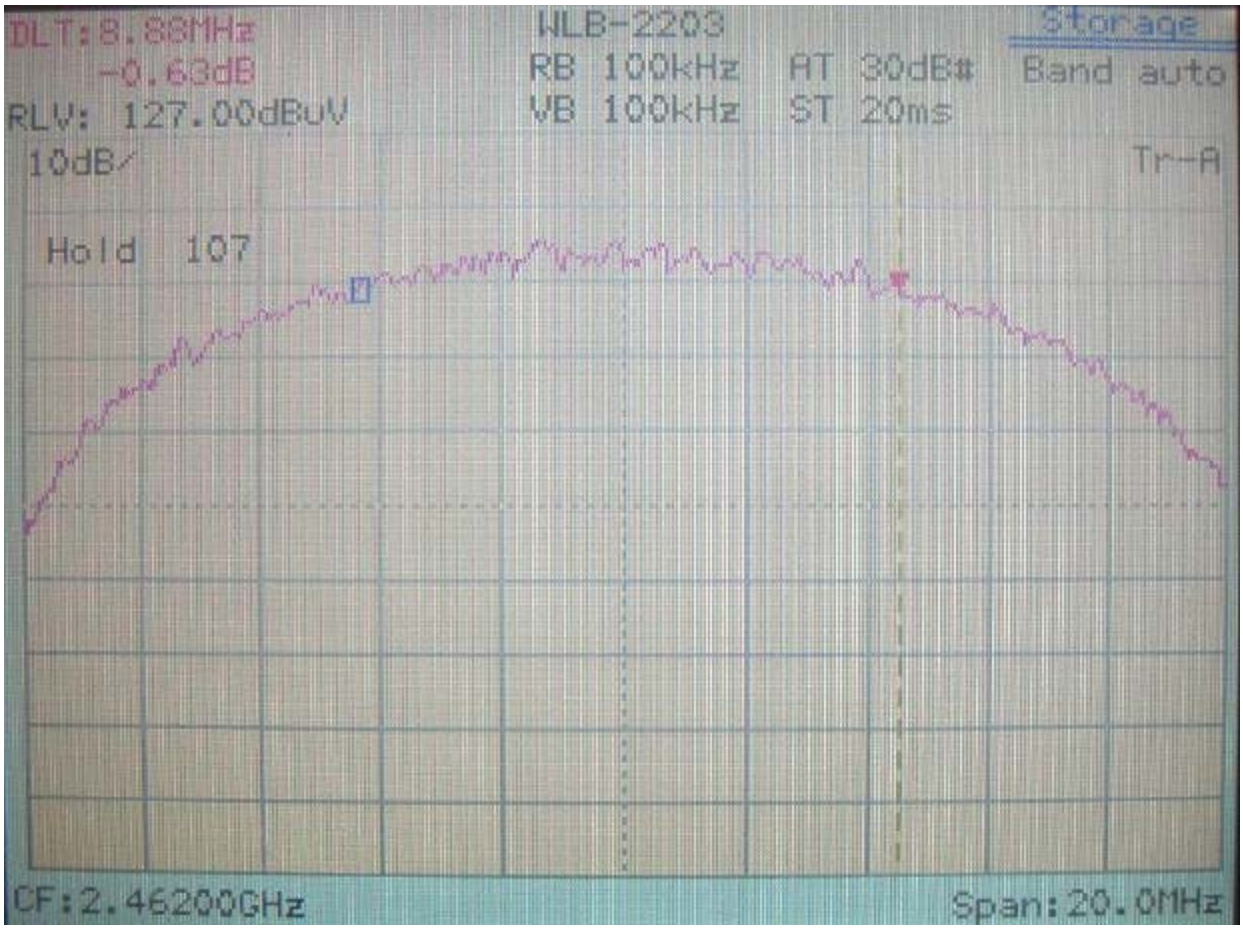
6dB Bandwidth of Channel 1: 8.88MHz (The minimum 6dB BW at least 500kHz)



6dB Bandwidth of Channel 6: 8.88MHz (The minimum 6dB BW at least 500kHz)

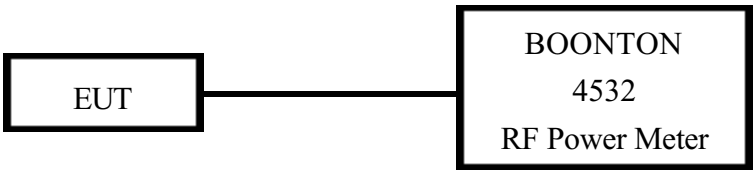


6dB Bandwidth of Channel 11: 8.88MHz (The minimum 6dB BW at least 500kHz)



VII. Section 15.247(b): Power Output

7.1 Test Condition & Setup



1. The output of the transmitter is connected to the BOONTON RF Power Meter.
2. The calibration is performed before every tests. The values of the output power of the EUT will shown in the dBm directly are the transmitter output peak power. Recording as follows.

7.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
RF Power Meter	4532	BOONTON	117501	04/12/03	04/12/04
Peak Power Sensor	57340	BOONTON	2698	04/12/03	04/12/04

7.3 Test Result

Formula:
Signal generator + |Cable loss| = Output peak power

Channel	**Signal Generator**	**Cable Loss**	**Output peak power**	
	dBm	**dBm**	**dBm**	**mW**
CH 01	20.34	0.70	21.04	127.058
CH 06	19.49	0.70	20.19	104.473
CH 11	18.68	0.70	19.38	86.697

VIII. Section 15.247 (C): Spurious Emissions (Radiated)

8.1 Test Condition & Setup

We' d performed the test by the *radiated emission* skill: The EUT was placed in an anechoic chamber, and set the EUT transmitting continuously and scanned at 3-meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration, which produced the highest emissions were noted so it could be reproduced later during the final tests. For the measurement above 1GHz, according to the guidance we' d set the spectrum analyzer' s 6dB bandwidth RBW to 1MHz.

This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 8546A EMI Receiver, CHASE whole range Bi-log antenna (Model No.: CBL 6141A) is used to measure frequency from 30 MHz to 1GHz. The final test is used the HP 85460A spectrum and 8564E spectrum was examined from 1GHz to 25GHz using an Hewlett Packard Spectrum Analyzer, EMCO/CMT Horn Antenna (Model 3115 / RA42-K-F-4B-C) for 1G - 25GHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. There are two spectrum analyzers use on this testing, HP 85460A for frequency 30MHz to 1000MHz, and 8564E for frequency 1GHz to 25GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6dB bandwidth was set to 120KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1GHz to 25GHz) and the analyzer was operated in the maximum hold mode. There is a test condition applies in this test item, the test procedure description as the following:

Three channels were tested, one in the top (CH01), one in the middle (CH06) and the other in bottom (CH11). The setting up procedure is recorded on <1.4 test method >

With the transmitter operating from a AC source and using the internal of EUT, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to upper, middle and bottom channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dBμV/m) is determined by algebraically adding the measured reading in dBμV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency. Since the EUT was set to transmit continuously, no *duty cycle* is present.

For frequency between 30MHz to 1000MHz

FIa (dBuV/m) = FIr (dBμV) + Correction Factors

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

For frequency between 1GHz to 25GHz

FIa (dBμV/m) = FIr (dBμV) + Correction Factor

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

8.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	HP	3520A00242	07/28/03	07/28/04
RF Filter Section	85460A	HP	3448A00217	07/28/03	07/28/04
Bi-log Antenna	CBL 6141A	CHASE	4206	05/27/03	05/27/04
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	11/20/03	11/20/04
Spectrum Analyzer	8564E	HP	3720A00840	07/23/03	07/23/04
Microwave Preamplifier	84125C	HP	US36433002	07/30/03	07/30/04
Horn Antenna	3115	EMCO	9104-3668	12/24/02	12/24/03
Horn Antenna	RA42-K-F-4B-C	CMT	961505-003	02/01/03	02/01/04
Anechoic Chamber (cable calibrated together)				05/20/03	05/20/04

The level of confidence of 95% , the uncertainty of measurement of radiated emission is +3.05dB / -3.84dB.

8.3 Test Result of Spurious Radiated Emissions

The highest peak values of radiated emissions form the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

Test Conditions: Temperature : 25 ° C Humidity : 73 % RH

30MHz to 1GHz for Horizontal

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBμV)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBμV/m)*	*Limit (dBμV/m)*	*Margin (dB)*
251.89	47.27	1.00	290	-2.64	44.63	46.00	-1.37
270.07	45.47	1.00	233	-2.83	42.64	46.00	-3.36
311.30	45.32	1.00	228	-2.10	43.22	46.00	-2.78
376.77	41.49	1.00	299	-0.27	41.22	46.00	-4.78
411.94	40.01	1.00	215	1.06	41.07	46.00	-4.93
426.49	41.26	1.00	355	1.46	42.72	46.00	-3.28

30MHz to 1GHz for Vertical

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBμV)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBμV/m)*	*Limit (dBμV/m)*	*Margin (dB)*
78.50	34.35	1.00	217	1.74	36.09	40.00	-3.91
125.79	38.78	1.00	262	-1.62	37.16	43.50	-6.34
251.89	47.41	1.00	338	-2.64	44.77	46.00	-1.23
305.24	39.27	1.00	195	-2.20	37.07	46.00	-8.93
616.85	27.46	1.00	279	9.26	36.72	46.00	-9.28
881.17	24.15	1.00	316	16.53	40.68	46.00	-5.32

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude + Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)

1GHz to 25GHz for Horizontal [CH 1]

Radiated Emission				*Corrected Amplitude (dBμV/m)*		*Class B (3m)*		
Frequency (MHz)	*Ant. H. (m)*	*Table (°)*	*Correction Factors (dB)*			*Limit (dBμV/m)*		*Margin (dB)*
				Peak	*Average*	*Peak*	*Ave.*	
4825.14	1.00	349	3.76	42.20	---	74.00	53.96	-11.76
7237.78	1.00	160	10.10	45.20	---	74.00	53.96	-8.76
9650.42	1.00	174	11.47	48.08	---	74.00	53.96	-5.88
12059.03	1.00	225	9.81	48.09	---	74.00	53.96	-5.87

1GHz to 25GHz for Vertical [CH 1]

Radiated Emission				*Corrected Amplitude (dBμV/m)*		*Class B (3m)*		
Frequency (MHz)	*Ant. H. (m)*	*Table (°)*	*Correction Factors (dB)*			*Limit (dBμV/m)*		*Margin (dB)*
				Peak	*Average*	*Peak*	*Ave.*	
4825.14	1.00	124	3.76	46.54	---	74.00	53.96	-7.42
7233.85	1.00	166	10.07	50.87	41.34	74.00	53.96	-12.62
9647.94	1.00	28	11.46	51.08	47.57	74.00	53.96	-6.39
12058.37	1.00	146	9.82	50.09	40.76	74.00	53.96	-13.20

Note:

1. Margin = Corrected - Limit.
2. The EUT utilizes a *permanently attached antenna*. In addition the spurious RF Radiated emissions levels do comply with the *20dBc limit* both at its bandedges and other spurious emissions.
3. As stated in Section 15.35(b), for any frequencies above 1000MHz, radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. As the results of our test, the peak amplitudes are already below the FCC limit. Thus the average amplitudes of the rest are omitted.

1GHz to 25GHz for Horizontal [CH 6]

Radiated Emission				Corrected Amplitude (dBμV/m)		Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	Peak	Average	Limit (dBμV/m) Peak	Ave.	Margin (dB)
4873.47	1.00	295	3.95	41.39	---	74.00	53.96	-12.57
7310.28	1.00	317	10.30	43.07	---	74.00	53.96	-10.89
9747.08	1.00	261	11.89	45.49	---	74.00	53.96	-8.47

1GHz to 25GHz for Vertical [CH 6]

Radiated Emission				Corrected Amplitude (dBμV/m)		Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	Peak	Average	Limit (dBμV/m) Peak	Ave.	Margin (dB)
4873.47	1.00	95	3.95	45.39	---	74.00	53.96	-8.57
7310.28	1.00	107	10.30	46.90	---	74.00	53.96	-7.06
9747.92	1.00	229	11.89	49.84	46.33	74.00	53.96	-7.63

1GHz to 25GHz for Horizontal [CH 11]

Radiated Emission				Corrected Amplitude (dBμV/m)		Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	Peak	Average	Limit (dBμV/m) Peak	Ave.	Margin (dB)
4925.84	1.00	267	4.13	40.07	---	74.00	53.96	-13.89
7386.80	1.00	118	10.42	43.03	---	74.00	53.96	-10.93
9847.78	1.00	149	11.93	45.37	---	74.00	53.96	-8.59

1GHz to 25GHz for Vertical [CH 11]

Radiated Emission				Corrected Amplitude (dBμV/m)		Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	Peak	Average	Limit (dBμV/m) Peak	Ave.	Margin (dB)
4925.84	1.00	142	4.13	43.74	---	74.00	53.96	-10.22
7386.80	1.00	337	10.42	45.69	---	74.00	53.96	-8.27
9851.80	1.00	194	11.93	46.71	---	74.00	53.96	-7.25

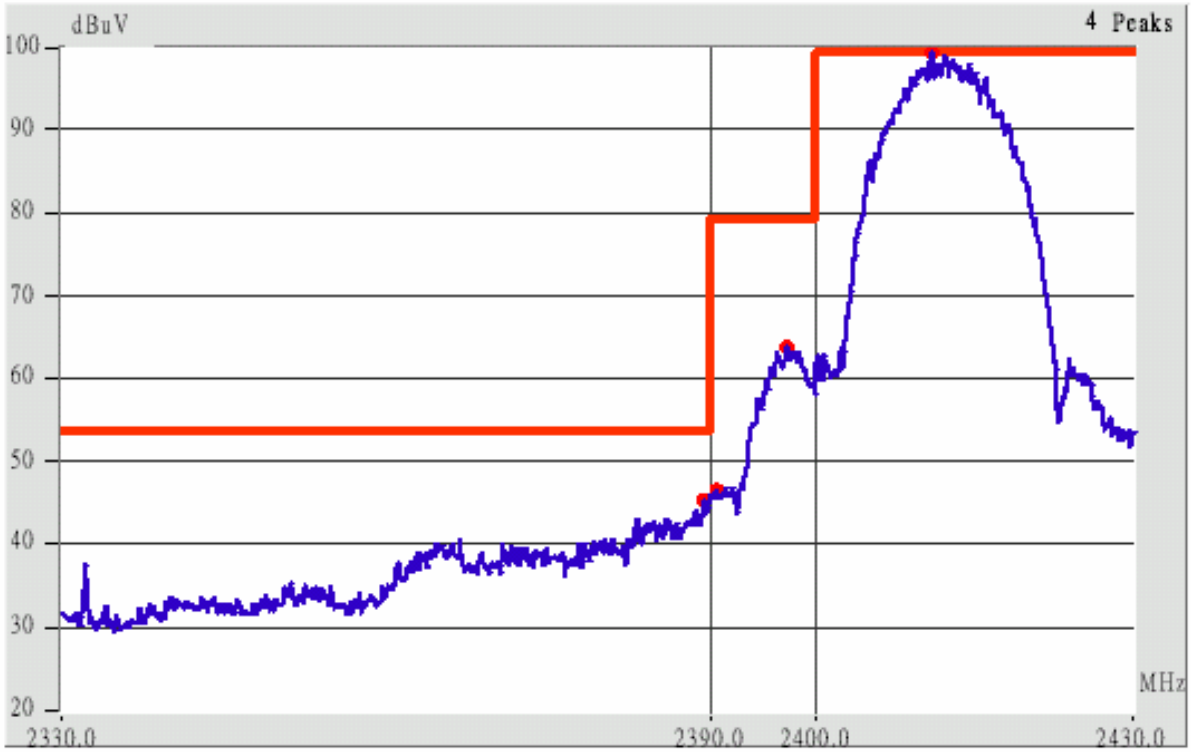
8.4 Test Result of the Bandedge

If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either *at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified id § 15.209(a)*,

We perform this section by the *conducted* manner, the RBW is set to 100kHz and VBW>RBW. We' d made the observation *up to 10th harmonics and the criterion is all the harmonic/spurious emissions must be 20dB below the highest emission level measured.* If the emissions fall in the restricted bands stated in the Part15.205(a) must also *comply with the radiated emission limits specified in Part15.209(a). (Peak mode: RBW=VBW=1MHz, Average mode: RBW=1MHz; VBW=10Hz)*

The following pages show our observations referring to the channel 1 and 11 respectively.
Test Condition & Setup: same as < 8.1 >

Channel 1 (The lowest one in the frequency bands)

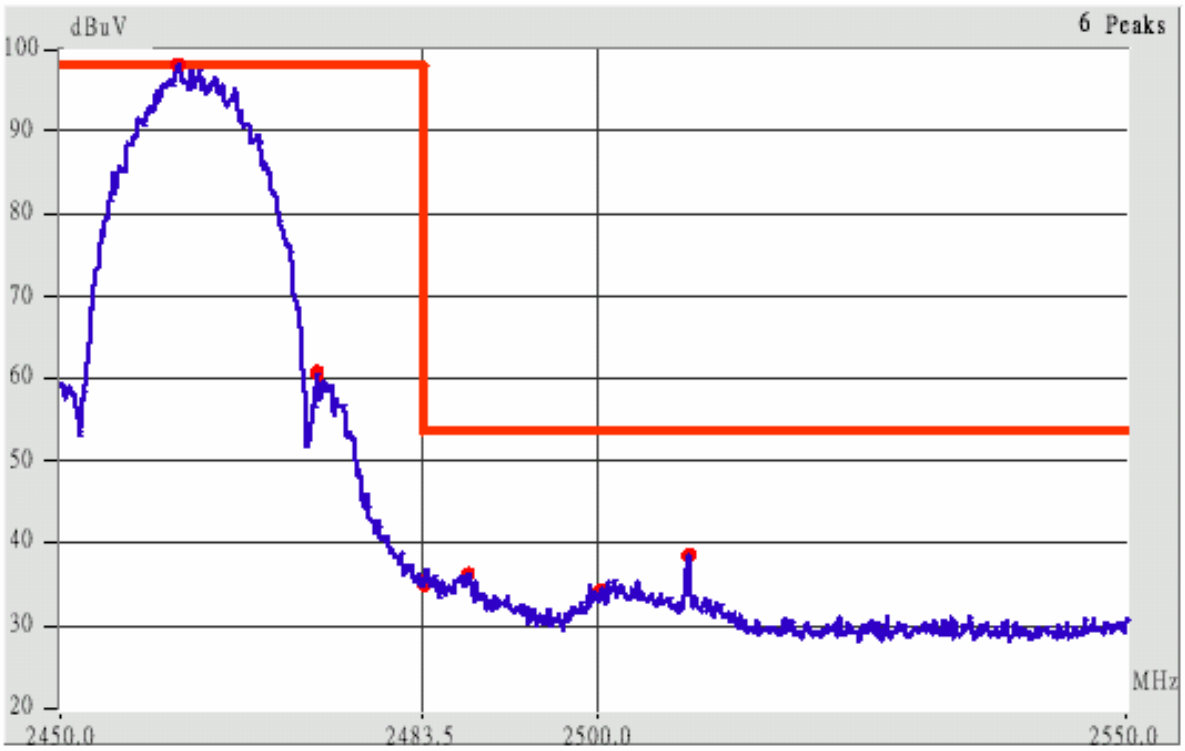


This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 1.

1. The lobe left by the fundamental side is already 20dB below the highest emission level.
2. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission					*Corrected Amplitude (dBμV/m)*		*FCC Class B (3m)*		
Frequency (MHz)	*Ant. P.*	*Ant. H. (m)*	*Table (°)*	*Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2385.85	Hor	1.00	14	3.12	48.12	---	74.00	53.96	-5.84
2390.02	Hor	1.00	176	3.13	43.80	---	74.00	53.96	-10.16
2385.97	Ver	1.00	229	3.12	55.29	43.45	74.00	53.96	-10.51
2390.07	Ver	1.00	30	3.14	52.80	---	74.00	53.96	-1.16

Channel 11 (The Highest one in the frequency bands)



This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 11.

3. The lobe right by the fundamental side is already 20dB below the highest emission level.
4. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below

Radiated Emission					*Corrected Amplitude (dBμV/m)*		*FCC Class B (3m)*		
Frequency (MHz)	*Ant. P.*	*Ant. H. (m)*	*Table (°)*	*Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2487.93	Hor	1.00	69	3.46	40.13	---	74.00	53.96	-13.83
2508.64	Hor	1.00	148	3.51	40.01	---	74.00	53.96	-13.95
2483.50	Vor	1.00	334	3.45	45.11	---	74.00	53.96	-8.85
2487.47	Ver	1.00	197	3.46	46.63	---	74.00	53.96	-7.33
2500.01	Ver	1.00	48	3.50	43.17	---	74.00	53.96	-10.79
2508.12	Ver	1.00	207	3.51	46.68	---	74.00	53.96	-7.28

IX. Section 15.247(d): Power Spectral Density

9.1 Test Condition & Setup

The tests below are running with the EUT transmitter set at high power in TDD mode. The EUT is needed to force selection of output power level and channel number. While testing, the EUT was set to transmit continuously and to be tested by the contact manner with the spectrum analyzer.

9.2 Test Instruments Configuration

P.S.: The computer to control the EUT at maximal power output and channel Number and set antenna kit

9.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/30/03	09/30/04

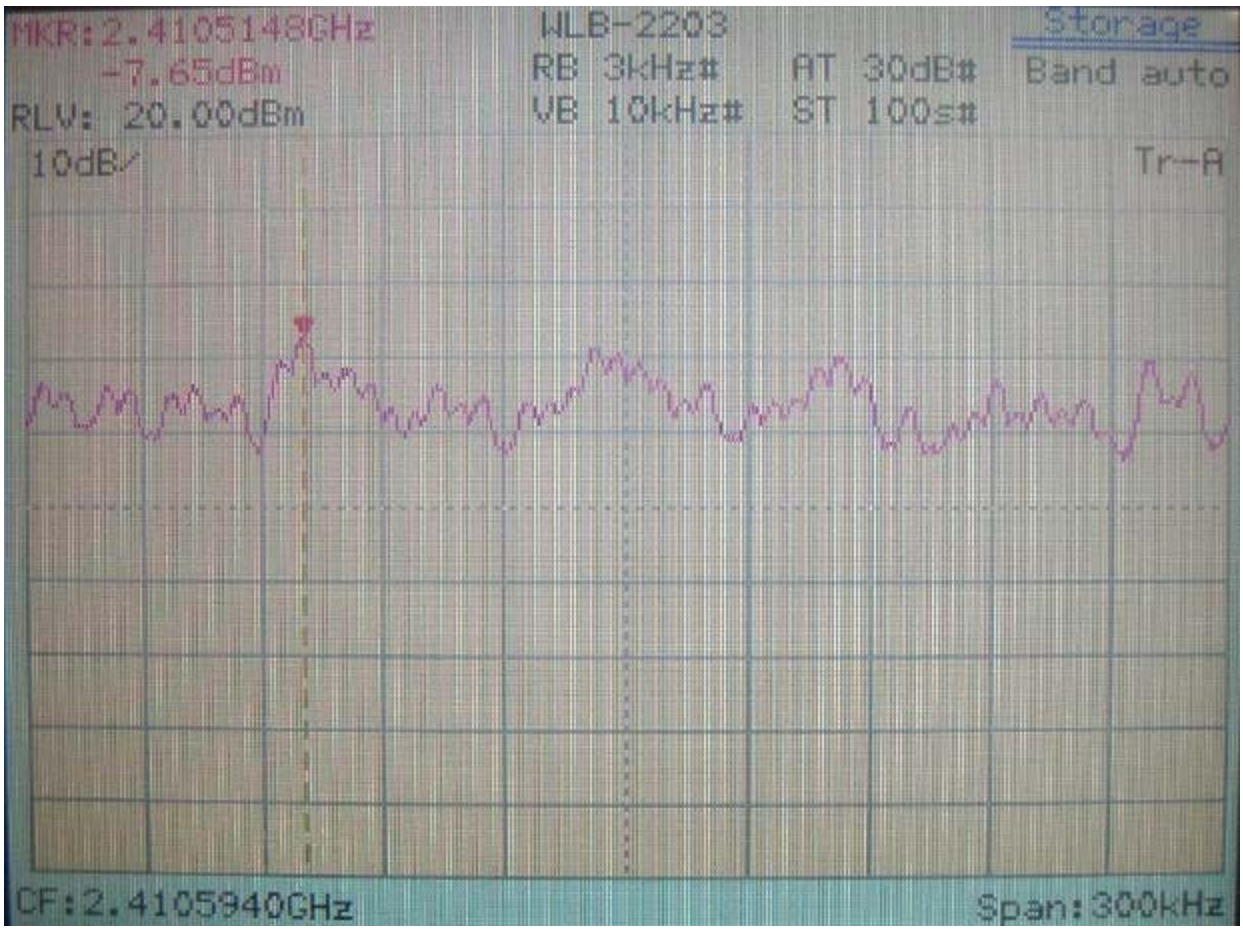
9.4 Test Result of Power spectral density

Channel	*Frequency (GHz)*	*Ppr (dBm)*	*Cable Loss (dB)*	*Ppq (dBm)*	*Limit (dB)*	*Margin (dB)*
CH 01	2.412	-7.65	0.70	-6.95	8.00	-14.95
CH 06	2.437	-8.25	0.70	-7.55	8.00	-15.55
CH 11	2.462	-8.52	0.70	-7.82	8.00	-15.82

Note:

1. The following pages show the results of spectrum reading.
2. Ppr: spectrum read power density (using peak search mode),
   Ppq: actual peak power density in the spread spectrum band.
3. Ppq = Ppr + |Cable Loss|

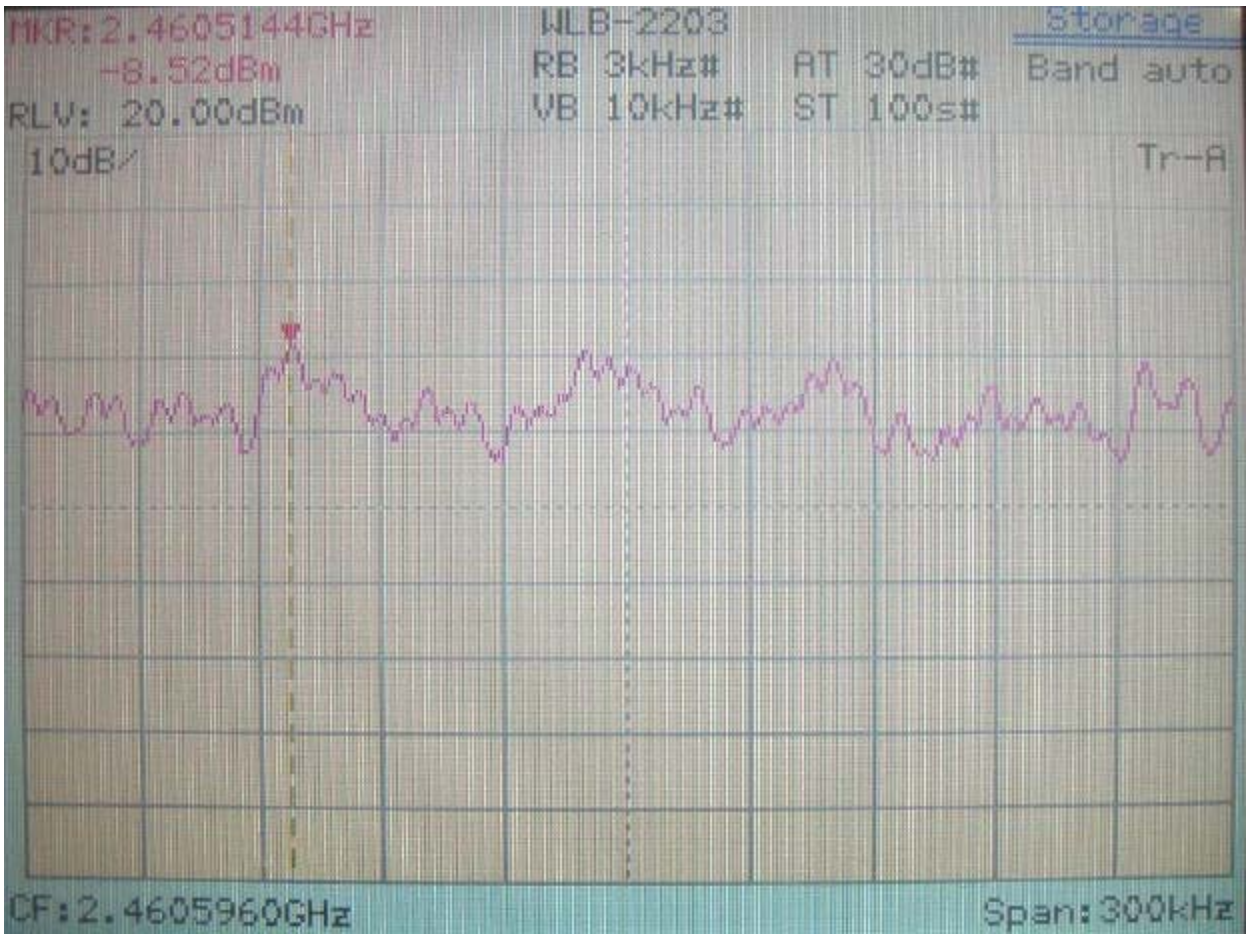
Channel 01


MKR:2.4105148GHz
-7.65dBm
RLV: 20.00dBm
10dB/
WLB-2203
RB 3kHz#
VB 10kHz#
AT 30dB#
ST 100s#
Storage
Band auto
Tr-A
CF:2.4105940GHz
Span:300kHz

Channel 06


MKR:2.435515GHz
-8.25dBm
RLV: 20.00dBm
10dB/
WLB-2203
RB 3kHz#
VB 10kHz#
AT 30dB#
ST 100s#
Trace A,B
Band auto
Tr-A
CF:2.4355938GHz
Span:300kHz

Channel 11


MKR:2.4605144GHz
-8.52dBm
RLV: 20.00dBm
10dB/
WLB-2203
RB 3kHz#
VB 10kHz#
AT 30dB#
ST 100s#
Storage
Band auto
Tr-A
CF:2.4605960GHz
Span:300kHz

Appendix A

Brand Name and Model Name List:

Brand Name	Model Name
CAMEO	WLB-2203
ALLNET GmbH	ALL0186
TRENDware	TEW-231BRP
toplink	WL-2204AR
Aopen	AOI-906
Asante	FR1104A
LG CNS CO, LTD	LW2500R
KTI	KWB-301
LEMEL	LM-WLB840
KOBIAN	KOB WL465
BONA	WL-R4R
EARTHCOM NETWORKS CORP (PEABIRD)	PEAB-WL-DSL-SW4
SVEC	FD2164
IC Intracom Asia Co., Ltd.	522847