CONFORMANCE TEST REPORT
FOR
FCC 47 CFR, Part 15 Subpart C

Report No.: ET94S-02-100-01

Client:	Spectec Computer Co.,Ltd
Product:	SDIO Wireless Lan Card
Model:	WLAN-11b
FCC ID:	S2Y-SDIOWLAN-11B
Manufacturer/supplier:	Spectec Computer Co.,Ltd.

Date test item received:	2005/02/17
Date test campaign completed:	2005/05/04
Date of issue:	2005/05/05

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Total number of pages of this test report: 48 pages

Total number of pages of photos: External photos 1 pages

Internal photos 1 pages

Setup photos 3 pages

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Manufacturer	: Spectec Computer Co.,Ltd
Address	: 6F No.92 Nanking E. Rd. Sec.5 , Taipei , Taiwan , R.O.C
EUT	: SDIO Wireless Lan Card
Trade name	: Spectec
Model No.	: WLAN-11b
Power Source	: 3.3V DC
Regulations applied	: FCC 47 CFR, Part 15 Subpart C (2004)

The testing described in this report has been carried out to the best of our knowledge and ability, and our responsibility is limited to the exercise of reasonable care. This certification is not intended to believe the sellers from their legal and/or contractual obligations.

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Laboratory Introduction: Electronics Testing Center, Taiwan is recognized, filed and mutual recognition arrangement as following:

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② ISO/IEC 17025: BSMI, CNLA, DGT, NVLAP, CCIBLAC, UL, Compliance

③ Filing: FCC, Industry Canada, VCCI

④ MRA: Australia, Hong Kong, New Zealand, Singapore, USA, Japan, Korea, China, APLAC through CNLA

⑤ FCC Registration Number: 90588, 91094, 91095

NVLAP Lab Code 200133-0

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : SDIO Wireless Lan Card
b) Trade Name : Spectec
c) Model No. : WLAN-11b
d) Power Supply : 3.3V DC

1.2 Characteristics of Device

The EUT is a 2.4 GHz SDIO Wireless Lan Card. It conforms to the IEEE 802.11b protocal and operates in the 2.45 ISM frequency bands. Support for 11 and 5.5 Mbps CCK and legacy 2 and 1 Mbps data rates.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

1.3 Test Methodology

All testing were performed according to the procedures in ANSI C63.4 and FCC CFR 47 Part 2 and Part 15.

1.4 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.
This site has been accreditation as a FCC filing site.

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:
A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:
A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :
A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

For unintentional device, according to §15.107(a) Line Conducted Emission Limits is as following:

Frequency MHz	Quasi Peak dB μV	Average dB μV
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

*Decreases with the logarithm of the frequency.

For intentional device, according to §15.207(a) Line Conducted Emission Limits is same as above table.

(2) Radiated Emission Requirement

For unintentional device, according to §15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated dB μV/m	Radiated μV/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
above 960	3	54.0	500

For intentional device, according to §15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

(3) Antenna Requirement

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

(4) Bandwidth Requirement

According to 15.247 (a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

(5) Output Power Requirement

For systems using digital modulation , according to 15.247(b), the maximum peak output power of the intentional radiator shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(6) Spurious Emissions Measurement

According to 15.247 (c) , in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

(7) Power Density Requirement

According to 15.247 (d) , for digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission..

2.3 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

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.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio / TV technician for help.

3. SYSTEM TEST CONFIGURATION

3.1 Devices for Tested System

Device	Manufacture	Model No.	S/N No.	Cable Description
SDIO Wireless Lan Card*	Spectec Computer Co.,Ltd	WLAN-11b	----	----
Notebook PC	TOSHIBA	PP160T-00KTP	----	3.3m Unshielded Power Line/Adapter

Note:

1.Remark "*" means equipment under test.

2.Test Software: INPROCOMM RF Test Utility

Parameter setting: Tx Power (hex): 99

4 CONDUCTED EMISSION MEASUREMENT

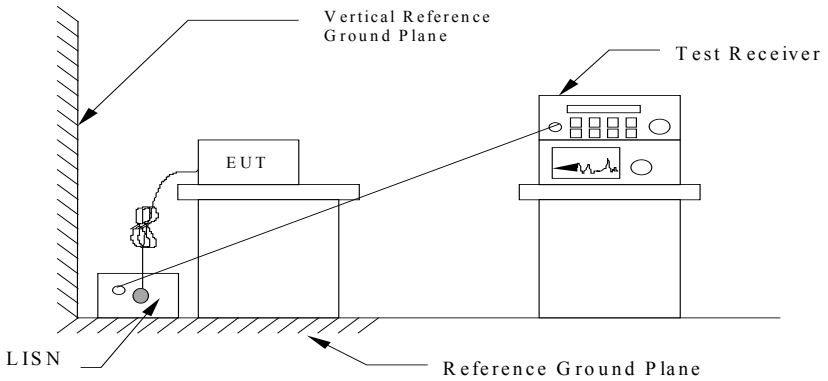
4.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to § 15.107(a) and §15.207(a) respectively. Both Limits are identical specification.

4.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 1 : Conducted emissions measurement configuration



4.3 Conducted Emission Data

Operation Mode: TX (Worse Case Data)

Test Date : Mar. 04, 2005 Temperature : 16℃ Humidity : 73%

Freq. (MHz)	Meter Reading (dBuV)				Factor (dB)	Result (dBuV)				Limit (dBuV)		Margins (dB)
	Q.P Value		AVG. Value			Q.P Value		AVG. Value		Q.P Value	AVG. Value	Q.P. or AVG.
	L1	L2	L1	L2		L1	L2	L1	L2			
0.150	38.2	37.9	----	----	0.2	38.4	38.1	----	----	66.0	56.0	-27.6
0.189	***	35.8	----	----	0.2	***	36.0	----	----	64.1	54.1	-28.1
0.191	36.8	***	----	----	0.2	37.0	***	----	----	64.0	54.0	-27.0
0.214	***	32.7	----	----	0.2	***	32.9	----	----	63.0	53.0	-30.1
0.231	33.2	***	----	----	0.2	33.4	***	----	----	62.4	52.4	-29.0
0.263	***	31.6	----	----	0.2	***	31.8	----	----	61.3	51.3	-29.5
0.283	32.1	***	----	----	0.2	32.3	***	----	----	60.7	50.7	-28.4
0.298	***	28.7	----	----	0.2	***	28.9	----	----	60.3	50.3	-31.4
0.302	28.1	***	----	----	0.2	28.3	***	----	----	60.2	50.2	-31.9
0.324	***	26.9	----	----	0.2	***	27.1	----	----	59.6	49.6	-32.5
0.348	27.2	***	----	----	0.2	27.4	***	----	----	59.0	49.0	-31.6

Note:

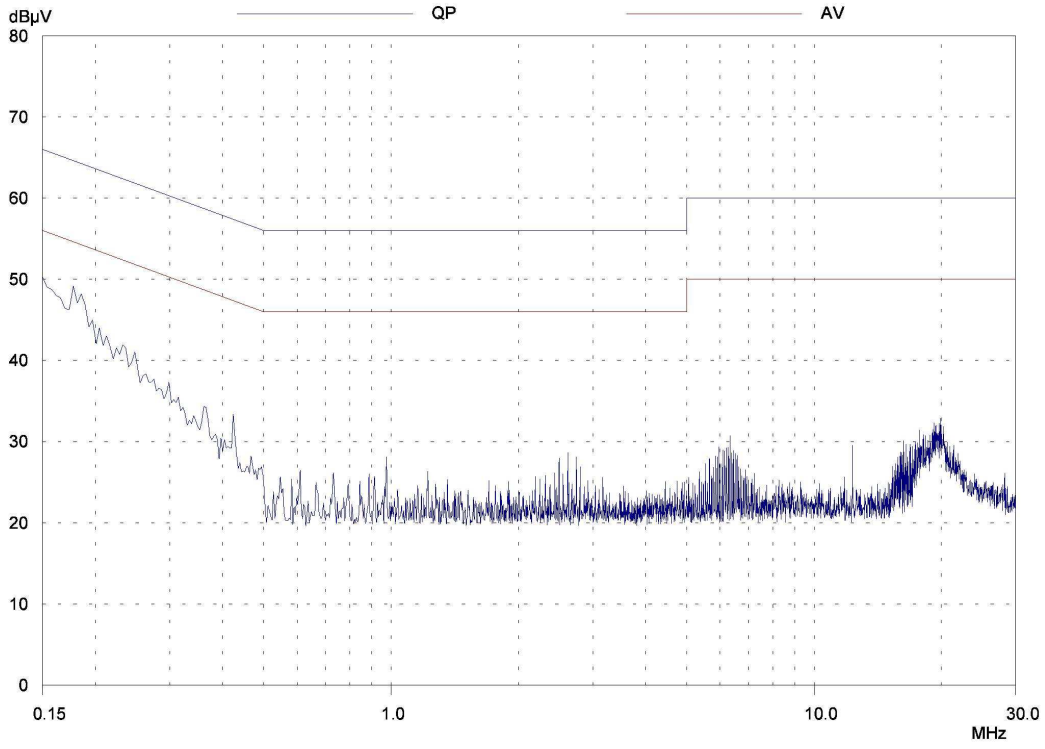
1. Place of measurement: EMC LAB. of the ETC.
2. "***" means the value was too low to be measured.
3. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
4. "#" means the noise was too low, so record the peak value.
5. The estimated measurement uncertainty of the result measurement is ±2.5dB.
6. Please refer to page 14 to page 19 for chart

CONDUCTED EMISSION TEST

PEAK VALUE

EUT:
Manuf:
Op Cond: TX_CH1
Operator: MARK
Test Spec: FCC
Comment: L1

Prescan Measurement: Detector: X PK
Meas Time: see scan settings
Peaks: 8
Acc Margin: 6 dB

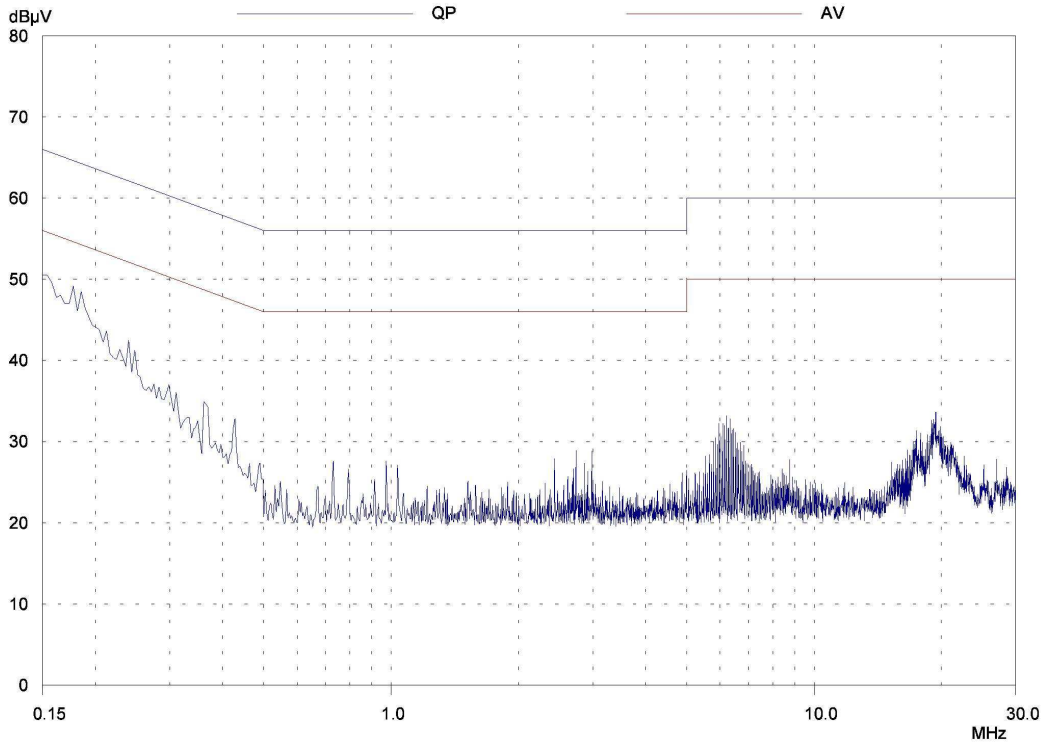


CONDUCTED EMISSION TEST

PEAK VALUE

EUT:
Manuf:
Op Cond: TX_CH1
Operator: MARK
Test Spec: FCC
Comment: L2

Prescan Measurement: Detector: X PK
Meas Time: see scan settings
Peaks: 8
Acc Margin: 6 dB

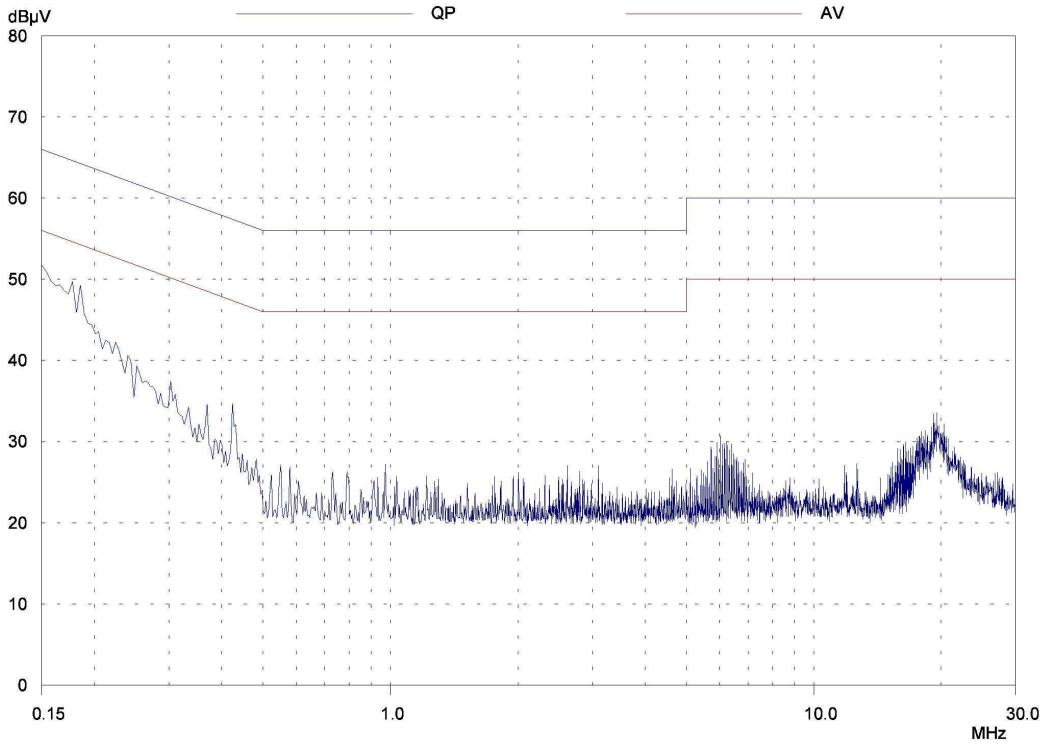


CONDUCTED EMISSION TEST

PEAK VALUE

EUT:
Manuf:
Op Cond: TX_CH6
Operator: MARK
Test Spec: FCC
Comment: L1

Prescan Measurement: Detector: X PK
Meas Time: see scan settings
Peaks: 8
Acc Margin: 6 dB

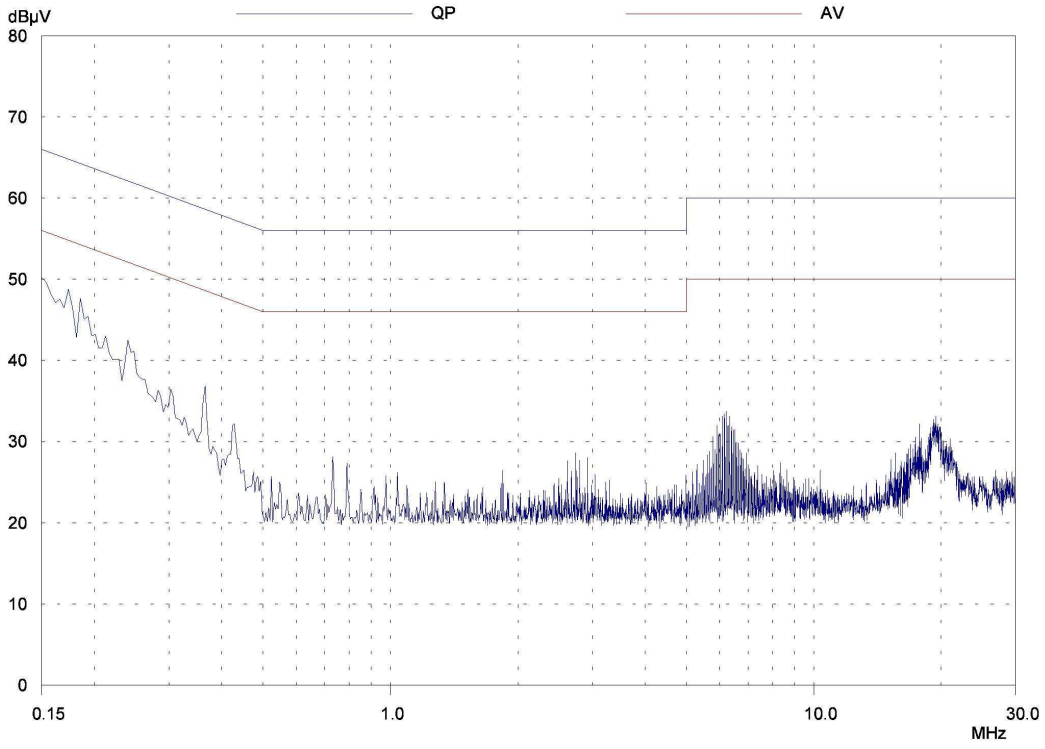


CONDUCTED EMISSION TEST

PEAK VALUE

EUT:
Manuf:
Op Cond: TX_CH6
Operator: MARK
Test Spec: FCC
Comment: L2

Prescan Measurement:
Detector: X PK
Meas Time: see scan settings
Peaks: 8
Acc Margin: 6 dB

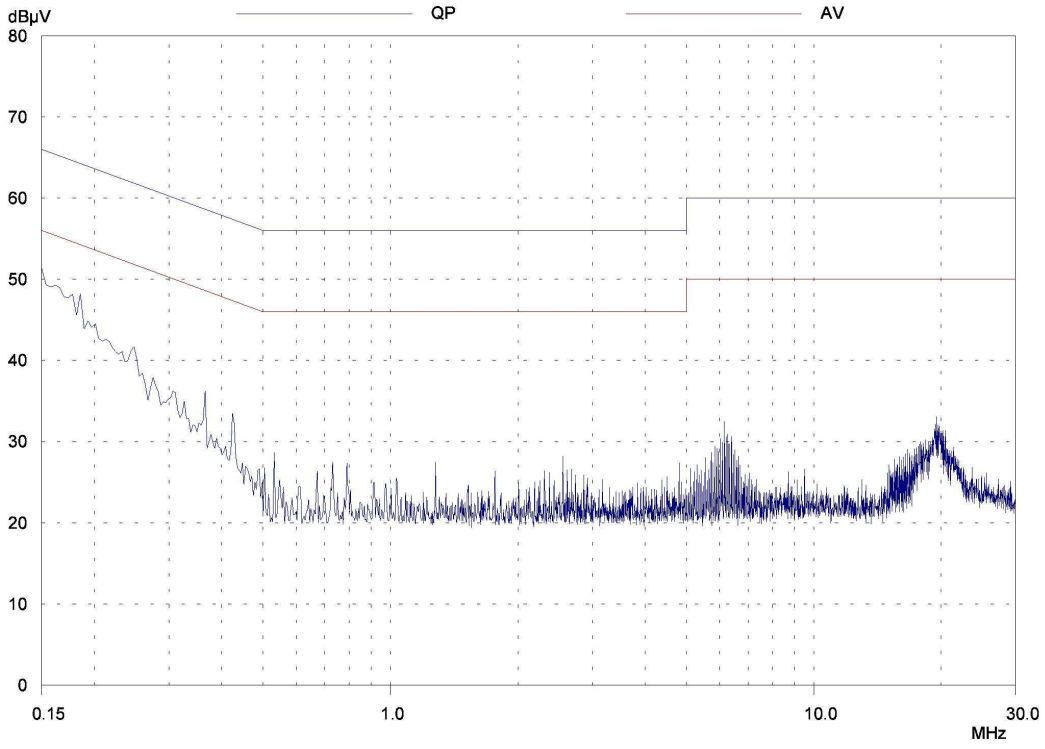


CONDUCTED EMISSION TEST

PEAK VALUE

EUT:
Manuf:
Op Cond: TX_CH11
Operator: MARK
Test Spec: FCC
Comment: L1

Prescan Measurement: Detector: X PK
Meas Time: see scan settings
Peaks: 8
Acc Margin: 6 dB

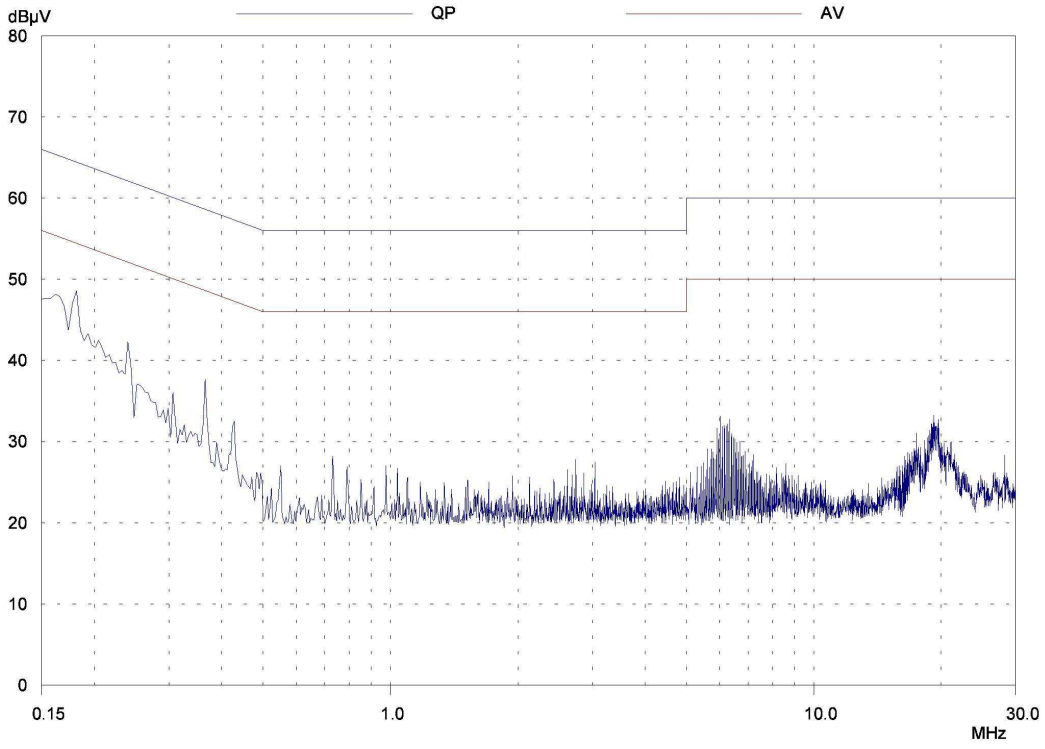


CONDUCTED EMISSION TEST

PEAK VALUE

EUT:
Manuf:
Op Cond: TX_CH11
Operator: MARK
Test Spec: FCC
Comment: L2

Prescan Measurement:
Detector: X PK
Meas Time: see scan settings
Peaks: 8
Acc Margin: 6 dB



4.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + LISN FACTOR (Included Cable Loss)

Assume a receiver reading of 22.5 dB μ V is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dB μ V.

RESULT = 22.5 + 0.1 = 22.6 dB μ V

Level in μ V = Common Antilogarithm[(22.6 dB μ V)/20]

= 13.48 μ V

4.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test.

Equipment	Manufacturer	Model No.	Next Cal. Due
RF Test Receiver	Rohde and Schwarz	ESCS30	04/01/2006
Line Impedance Stabilization network	EMCO	3825	11/09/2005

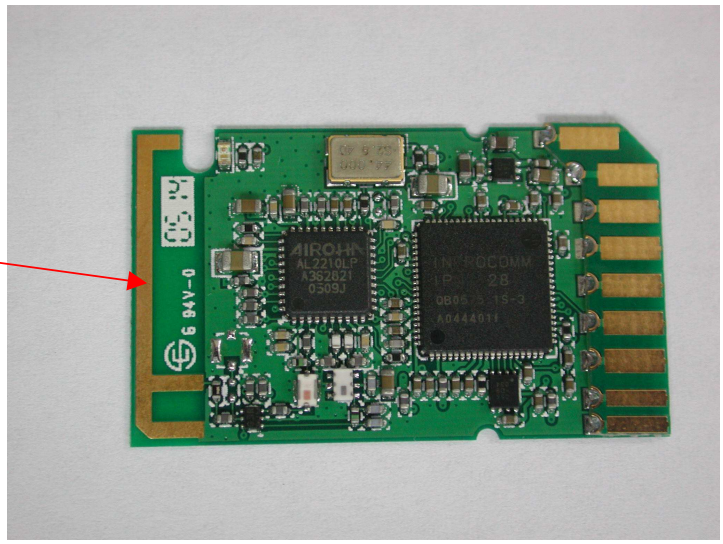
5 ANTENNA REQUIREMENT

5.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
And according to §15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2 Antenna Construction and Directional Gain

Antenna type: Inverted-F Antenna.
Antenna gain: 3.4 dBi.



6 EMISSION BANDWIDTH MEASUREMENT

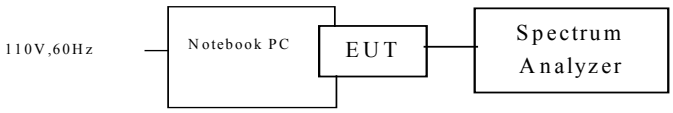
6.1 Standard Applicable

According to 15.247(a)(2), system using digital modulation techniques, the minimum 6dB bandwidth shall be at least 500 kHz.

6.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Figure 2: Emission bandwidth measurement configuration.



6.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Due
Spectrum Analyzer	Hewlett-Packard	8564EC	09/16/2005

6.4 Measurement Data

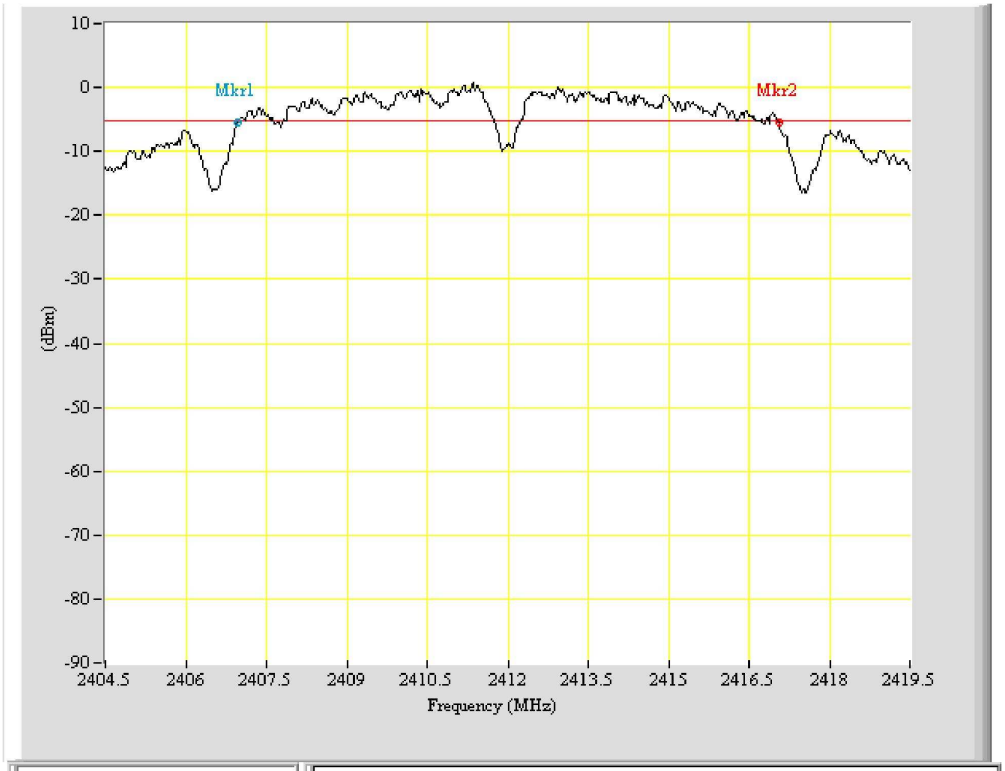
Test Date: Apr. 29, 2005 Temperature: 15 ℃ Humidity: 71 %

Channel	Frequency (MHz)	Data Transfer Rate (Mbps)	6dB Bandwidth (MHz)	FCC Limit (kHz)	Chart
1	2412	1	10.100	500	-
		2	10.075	500	Page 24
		5.5	10.300	500	
		11	10.325	500	-
6	2437	1	10.100	500	Page 25
		2	10.100	500	-
		5.5	10.525	500	-
		11	10.375	500	-
11	2462	1	10.175	500	Page 26
		2	10.175	500	-
		5.5	10.600	500	-
		11	10.425	500	-

Note:

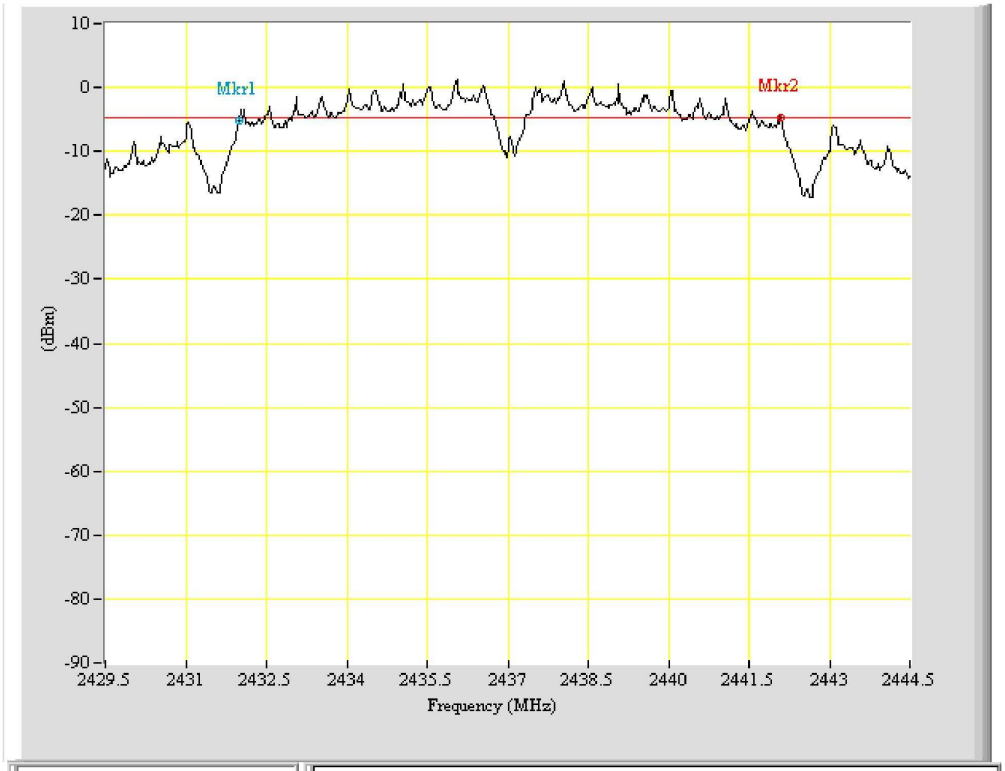
1.Please refer to page 24 to page 26 for chart

2. The estimated measurement uncertainty of the result measurement is 8.25×10^{-7} *(1GHz ≦ f ≦ 18GHz)*



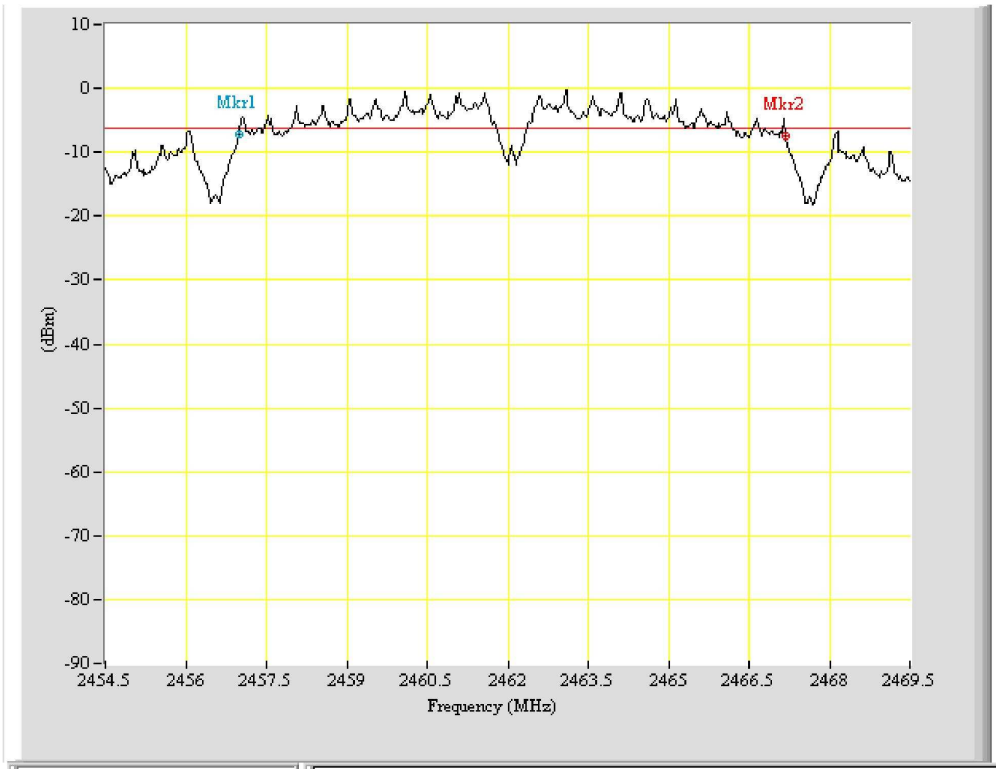
*Center 2412.0000MHz	Display Line -5.330dBm
*SPAN 15.0000MHz	Δ Marker -10.0750MHz 0.000dB
*RBW 100.00kHz	Mkr1 2406.975MHz -5.500dBm
*VBW 100.00kHz	Mkr2 2417.050MHz -5.500dBm
*SWP 50.00msec	
*ATTEN 20.00dB	
*RL 10.00dBm	

EUT: WLAN-11b
Purpose: 6dB_BW
Condition: CH1_2M
Note:



*Center 2437.0000MHz	Display Line -4.830dBm
*SPAN 15.0000MHz	Δ Marker -10.1000MHz 0.500dB
*RBW 100.00kHz	Mkr1 2432.000MHz -5.160dBm
*VBW 100.00kHz	Mkr2 2442.100MHz -4.660dBm
*SWP 50.00msec	
*ATTEN 20.00dB	
*RL 10.00dBm	

EUT: WLAN-11b
Purpose: 6dB_BW
Condition: CH6_1M
Note:



*Center 2462.0000MHz	Display Line -6.160dBm
*SPAN 15.0000MHz	Δ Marker -10.1750MHz -0.340dB
*RBW 100.00kHz	Mkr1 2457.000MHz -7.160dBm
*VBW 100.00kHz	Mkr2 2467.175MHz -7.500dBm
*SWP 50.00msec	
*ATTEN 20.00dB	
*RL 10.00dBm	

EUT: WLAN-11b
Purpose: 6dB_BW
Condition: CH11_1M
Note: