FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment	:	Mini PCI Wireless LAN Card
Model No.	:	73-TMWBB-001
FCC ID	:	QS3WBBRP1
Filing Type	:	Certification
Applicant	:	**TwinMOS Technologies Inc.** 303 No. 3, Tzu Chiang Rd., Hu Kou Xiang, Hsin Chu, Taiwan, R.O.C.

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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History of this test report

Original Report Issue Date: Jun. 25, 2003

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

Certificate No. : F360603

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : Mini PCI Wireless LAN Card

Model No. : 73-TMWBB-001

FCC ID : QS3WBBRP1

Filing Type : Certification

Applicant : **TwinMOS Technologies Inc.**
303 No. 3, Tzu Chiang Rd., Hu Kou Xiang,
Hsin Chu, Taiwan, R.O.C.

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the equipment under test was ***passed*** all test items required in FCC Part 15 subpart C, relative to the equipment under test. Testing was carried out on Jun. 24, 2003 at **SPORTON International Inc.** LAB.

K. J. Lin
Manager

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1. Applicant

TwinMOS Technologies Inc.
303 No. 3, Tzu Chiang Rd., Hu Kou Xiang, Hsin Chu, Taiwan, R.O.C.

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment	: Mini PCI Wireless LAN Card
Model No.	: 73-TMWBB-001
FCC ID.	: QS3WBBRP1
Trade Name	: TwinMOS
Power Supply Type	: From system
AC Power Input	: N/A

1.4. Feature of Equipment under Test

Physical Specification

Dimensions	59.75 x 44.45 x 4.7 mm (wxhxt)
Weight	13 g
Cable Length	Option
Host Interface	Mini-PCI Type IIIB

Power Characteristics

Operating Voltage	3.3V±5%
Current Consumption	Nominal 240mA, Max. 300mA

Networking Characteristics

Compatibility	● IEEE 802.11 Standard for WLAN (DSSS) ● Internal Wi-Fi certified by TwinMOS
Host OS	Windows 98/98SE/ME/NT/2000/XP
Media Access Protocol	CSMA/CA with ACK
Network Protocol	TCP/IP, IPX, NetBEUI

RF Characteristics

Frequency Range	2.400-2.4835 GHz, Direct Sequence Spread Spectrum (DSSS)
Operating Channels	● 1-11 United States (FCC) ● 1-11 Canada (DOC) ● 1-14 Japan (MKK) ● 1-13 Europe (Except Spain and France) (ETSI)
Modulation Technique	● 11 Mbps: CCK ● 5.5 Mbps: CCK ● 2 Mbps: DQPSK ● 1 Mbps: DBPSK
Spreading	11-chip Barker Sequence
Transmit Power	14 dBm @ Nominal Temp Range
Receive Sensitivity	Nominal Temp Range: 11 Mbps 10^{-5} BER @ -83 dBm, minimum
Security	● 64/128-bit WEP Encryption ● 64/128-bit TKIP Data Encryption ● 64/128-bit AES Data Encryption
Antenna	Build-in inside host
Operating Range	Open Space: 100 ~ 300m; Indoor: 30m ~ 100m The transmission speed varies in the surrounding environment.

2. Test Configuration of Equipment under Test

2.1. Test Manner

a. The EUT has been associated with personal computer and peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner, which tended to maximize its emission characteristics in a typical application.

b. The complete test system included COMPAQ PC, VIEWSONIC Monitor, LOGITECH USB Mouse, EPSON Printer, ACEEX Modem, Gateway USB Keyboard and EUT for EMI test.

c. The EUT can operate on eleven channels from 2412.0MHz to 2462.0MHz. (as listed in section 1.4). According to 15.31(m), three channels (one near top, one near middle and one near bottom) were performed as following:

Mode 1: CH01（2412MHz）
Mode 2: CH06（2437MHz）
Mode 3: CH11（2462MHz）

d. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 24620MHz.

2.2. Description of Test System

Support Unit 1. -- Personal Computer (COMPAQ)

FCC ID	: N/A
Model No.	: D380MX
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0037
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- Monitor (VIEWSONIC)

FCC ID	: N/A
Model No.	: VCDTS21553-3P
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0051
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to compy with FCC standards and authorized under a declaration of conformity.

Support Unit 3. -- USB Mouse (LOGITECH)

FCC ID	: N/A
Model No.	: M-BE58
Serial No.	: SP0041
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 4. -- Printer (EPSON)

FCC ID	: N/A
Model No.	: STYLUS COLRO 680
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0048
Data Cable	: Shielded, 1.35m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

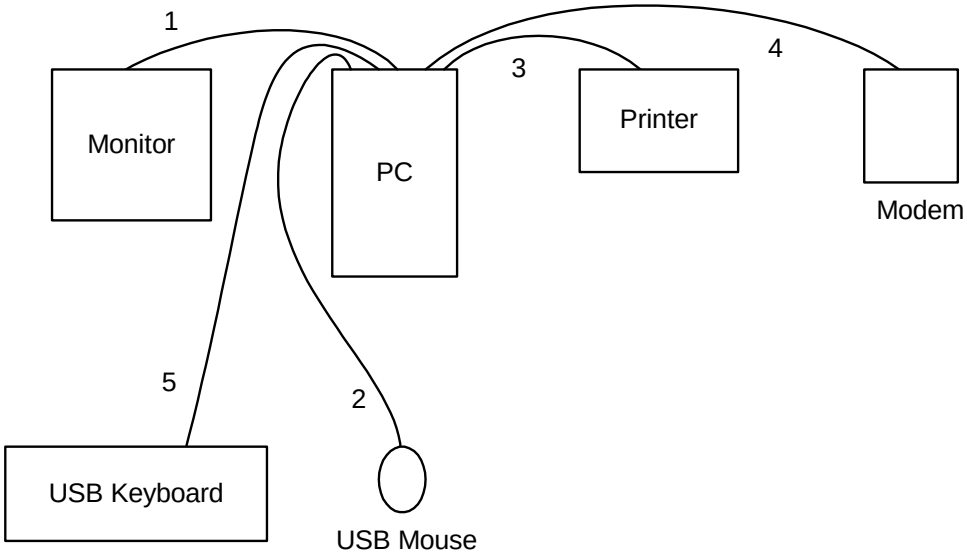
Support Unit 5. -- Modem (ACEEX)

FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0015
Data Cable	: Shielded, 1.15m

Support Unit 6. -- USB Keyboard (Gateway)

FCC ID	: N/A
Model No.	: SK-9900
Serial No.	: SP0054
Data Cable	: Shielded, 360 degree via metal backshells, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

2.3. Connection Diagram of Test System



1. The I/O cable is connected from the PC to the support unit 2.
2. The I/O cable is connected from the PC to the support unit 3.
3. The I/O cable is connected from the PC to the support unit 4.
4. The I/O cable is connected from the PC to the support unit 5.
5. The I/O cable is connected from the PC to the support unit 6.

3. Operation of Equipment under Test

An executive programs, EMCTEST.EXE under WIN XP, which generate a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows:
a. Turn on the power of all equipment.
b. The PC reads the test program from the hard disk drive and runs it.
c. The PC sends " H" messages to the monitor, and the monitor displays " H " patterns on the screen.
d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
e. The PC sends " H " messages to the modem.
f. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
g. Repeat the steps from c to f.

At the same time, "mp8180 " was executed to keep transmitting signals at fixed frequency.

4. General Information of Test

Test Site Location	:	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
Test Site No	:	CO01-HY, 03CH02-HY

4.1. Test Voltage

115V/ 60Hz

4.2. Standard for Methods of Measurement

ANSI C63.4-1992

4.3. Test in Compliance with

FCC Part 15, Subpart C

4.4. Frequency Range Investigated

a. Conduction: from 150 kHz to 30 MHz
b. Radiation: from 30 MHz to 24620MHz

4.5. Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

5. Report of Measurements and Examinations

5.1. List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.207	Conducted Emission	Pass
15.247(a)(2)	6dB Bandwidth	Pass
15.247(b)	Maximum Peak Output Power	Pass
15.209	Radiated Emission	Pass
15.247(c)	100kHz Bandwidth of Frequency Band Edges	Pass
15.247(d)	Power Spectral Density	Pass
15.203	Antenna Requirement	Pass
1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	Pass

5.2. 6dB Bandwidth

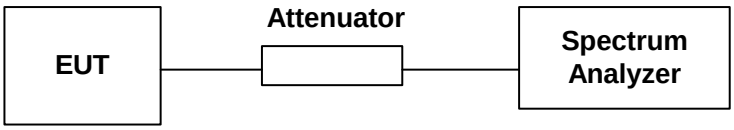
5.2.1. Measuring Instruments：

As described in chapter 7 of this test report.

5.2.2. Test Procedure：

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

5.2.3. Test Setup Layout：

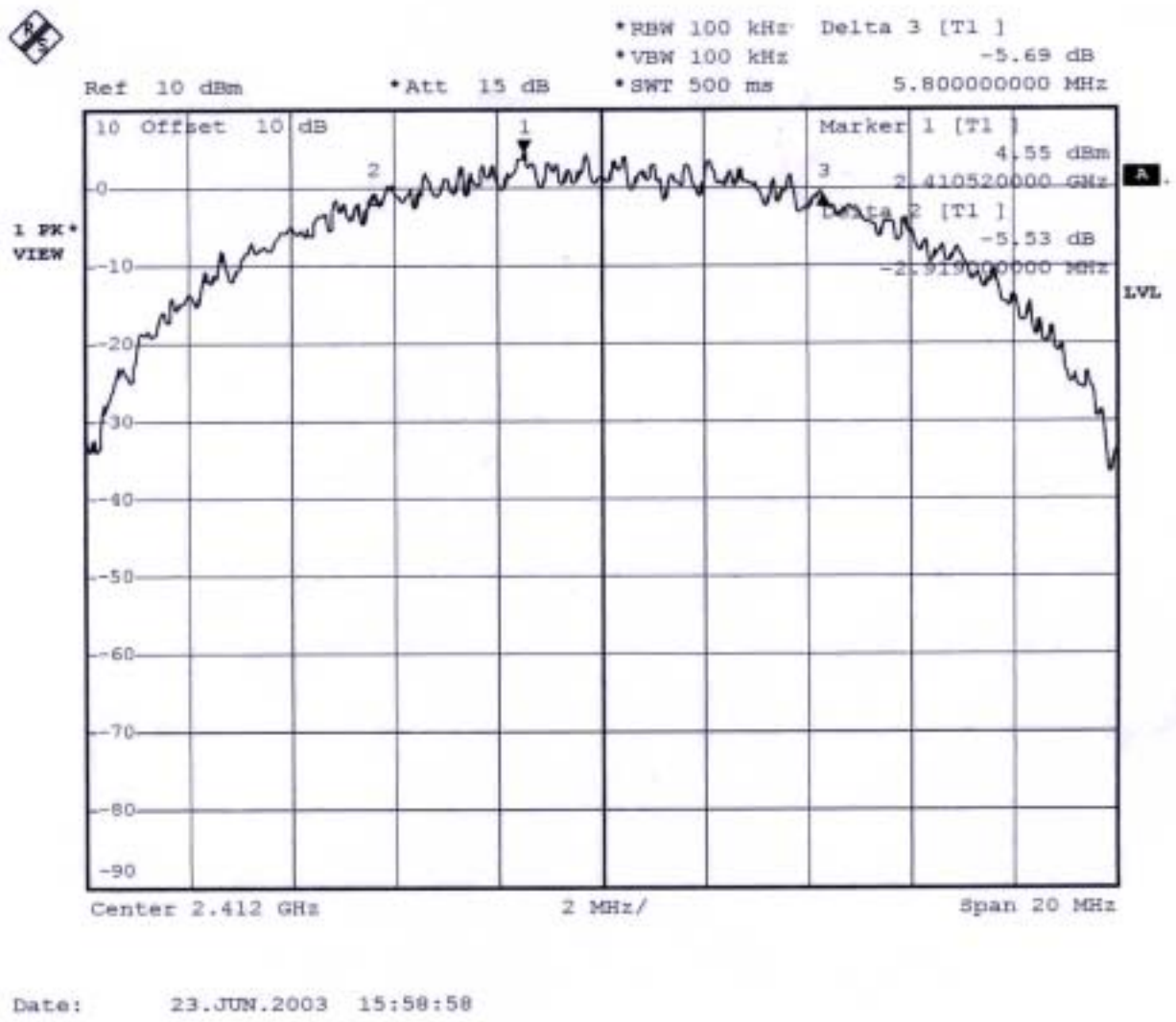


5.2.4. Test Result：The spectrum analyzer plots are attached as below

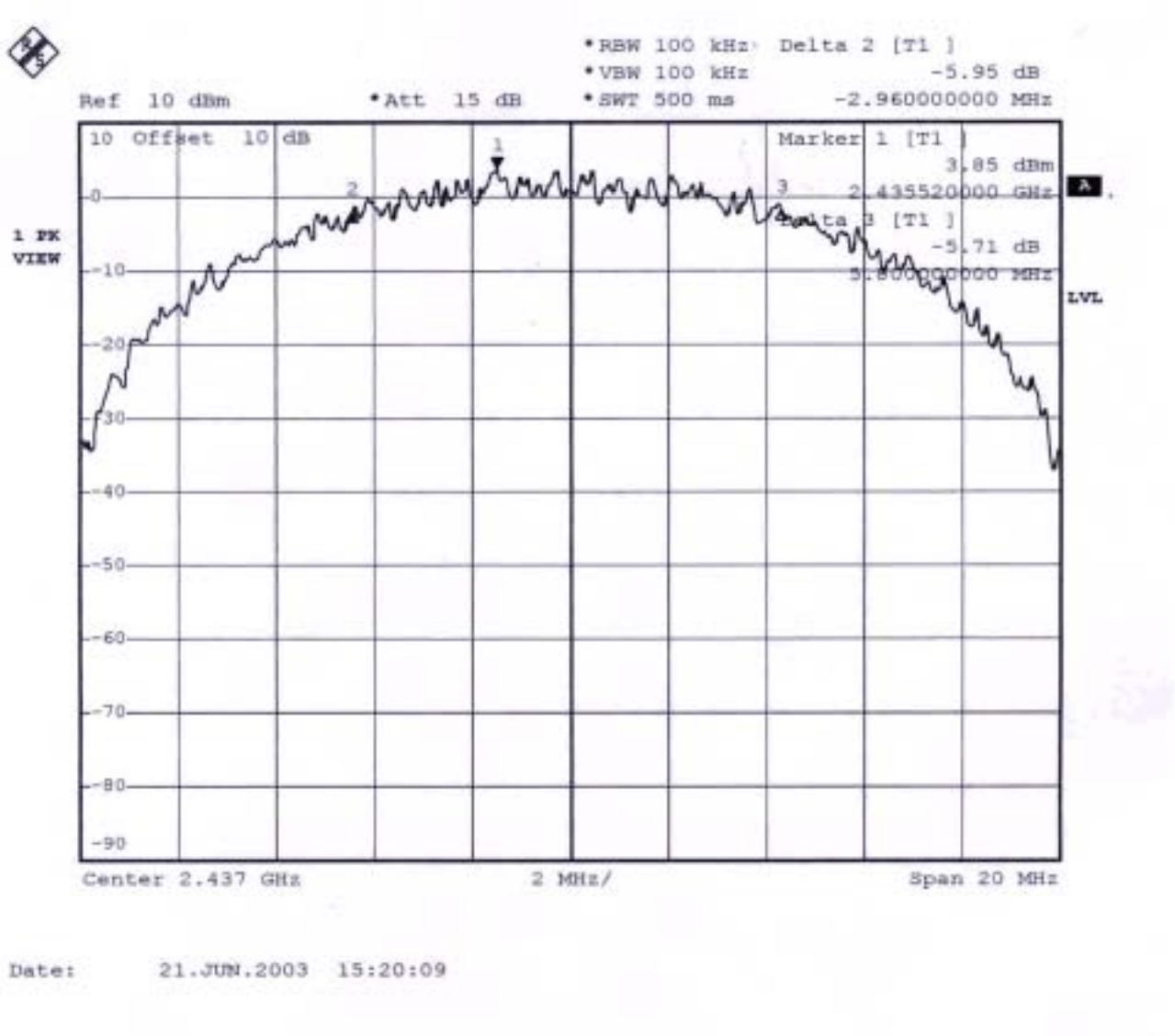
- Temperature: 27 °C
- Relative Humidity: 65%

Channel	Frequency (MHz)	6dB Emission bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
01	2412	8.72	0.5	1
06	2437	8.76	0.5	2
11	2462	8.72	0.5	3

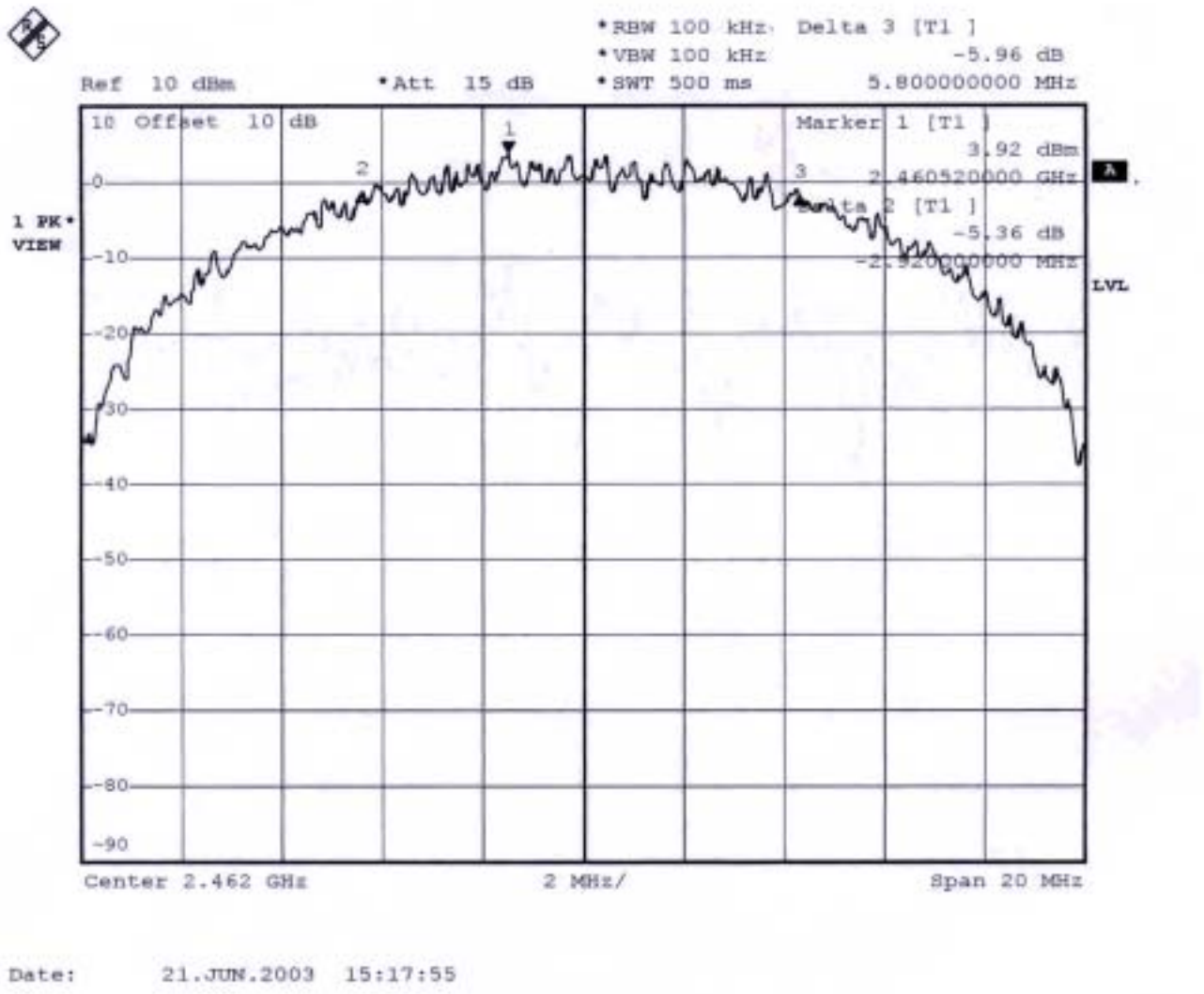
Plot1(Channel 01)：



Plot2(Channel 06)：



Plot3(Channel 11)：



Comments：6dB Emission bandwidth>500kHz

5.3. Peak Output Power

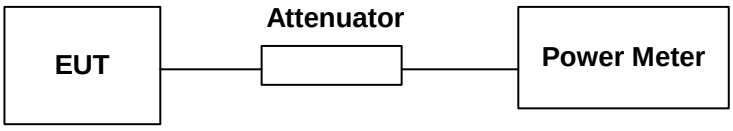
5.3.1. Measuring Instruments：

As described in chapter 7 of this test report.

5.3.2. Test Procedure：

The antenna port（RF output）of the EUT was connected to the input（RF input）of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

5.3.3. Test Setup Layout：



5.3.4. Test Result：See spectrum analyzer plots below

- Temperature: 27°C
- Relative Humidity: 65 %
- Antenna Gain: 2 dBi

Channel	Frequency (MHz)	Measured Output Power (dBm)	Measured Output Power (mW)	Limits (Watt/dBm)
01	2412	13.84	24.21029047	1W/30 dBm
06	2437	13.47	22.23309891	1W/30 dBm
11	2462	13.49	22.33572223	1W/30 dBm

- Comments：Maximum Peak Output Power < 30dBm (1Watt)

5.4. Power Spectral Density

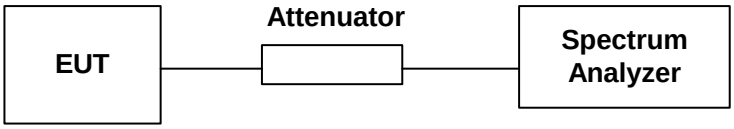
5.4.1. Measuring Instruments：

As described in chapter 7 of this test report.

5.4.2. Test Procedure：

1. The transmitter output was connected to spectrum analyzer through an attenuator.
2. The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=span/3KHz.
3. The power spectral density was measured and recorded.
4. The Sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

5.4.3. Test Setup Layout：

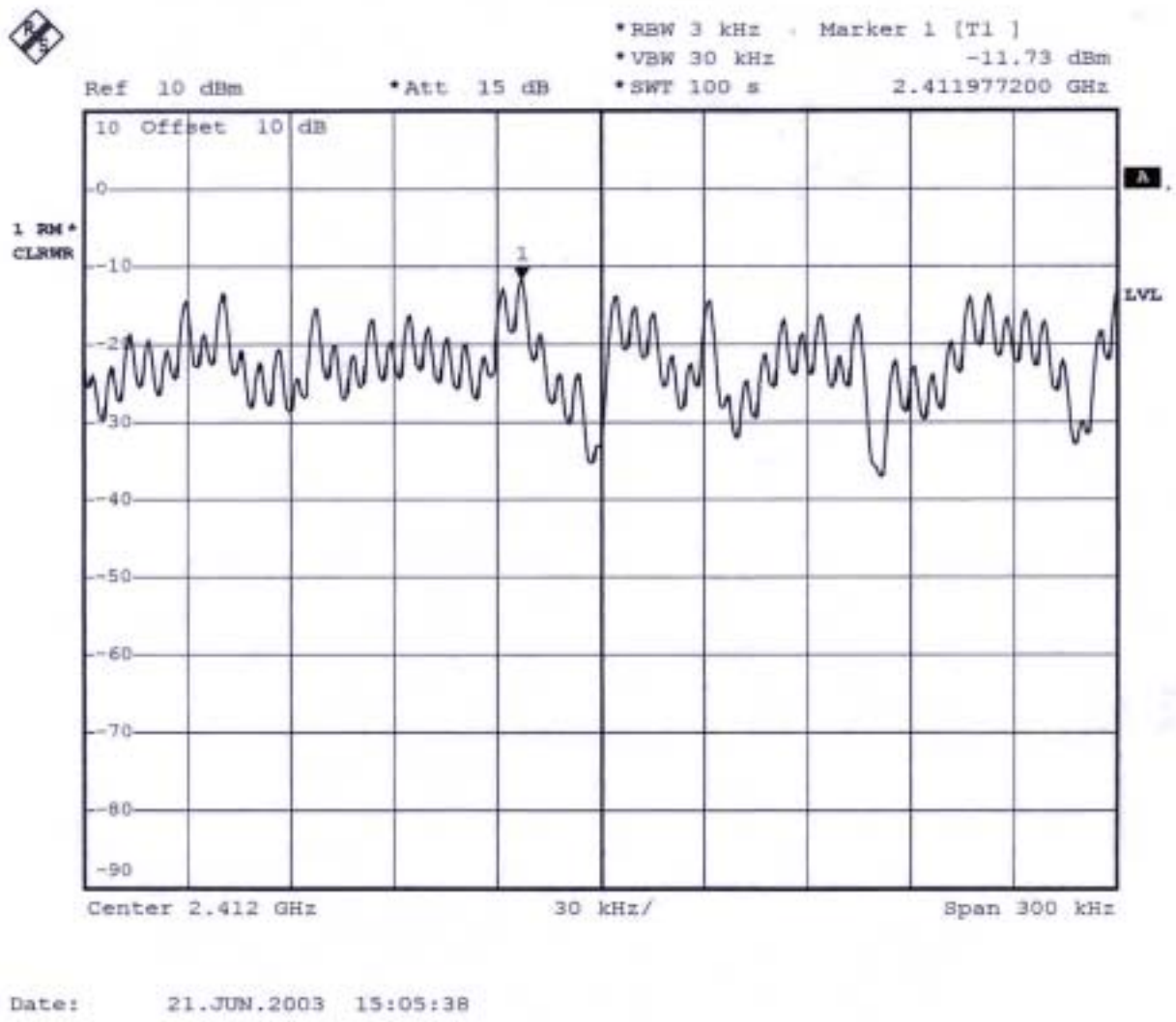


5.4.4. Test Result：See spectrum analyzer plots below

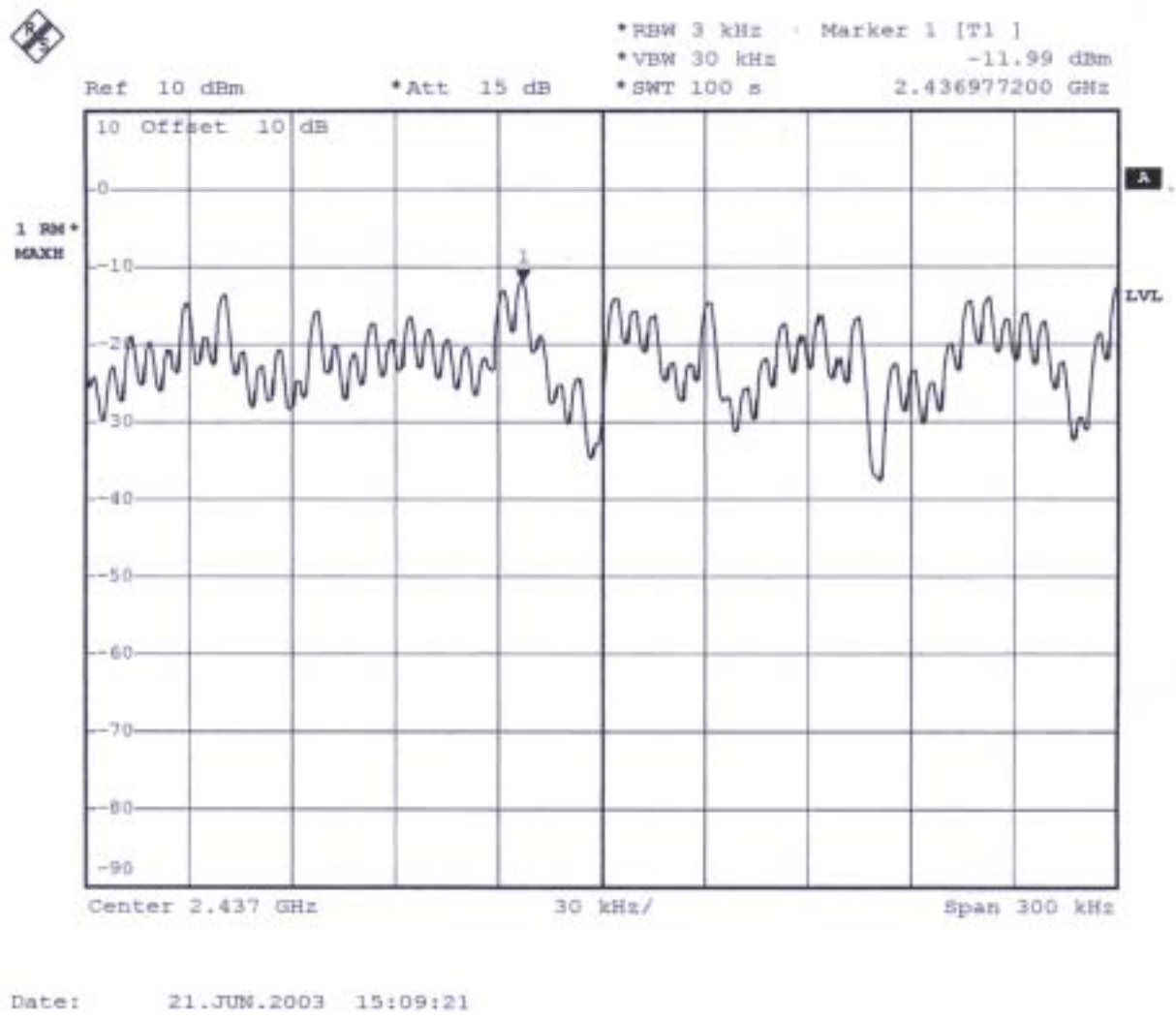
- Temperature: 27°C
- Relative Humidity: 65 %

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Plot Ref. No.
01	2412	-11.73	8	1
06	2437	-11.99	8	2
11	2462	-11.95	8	3

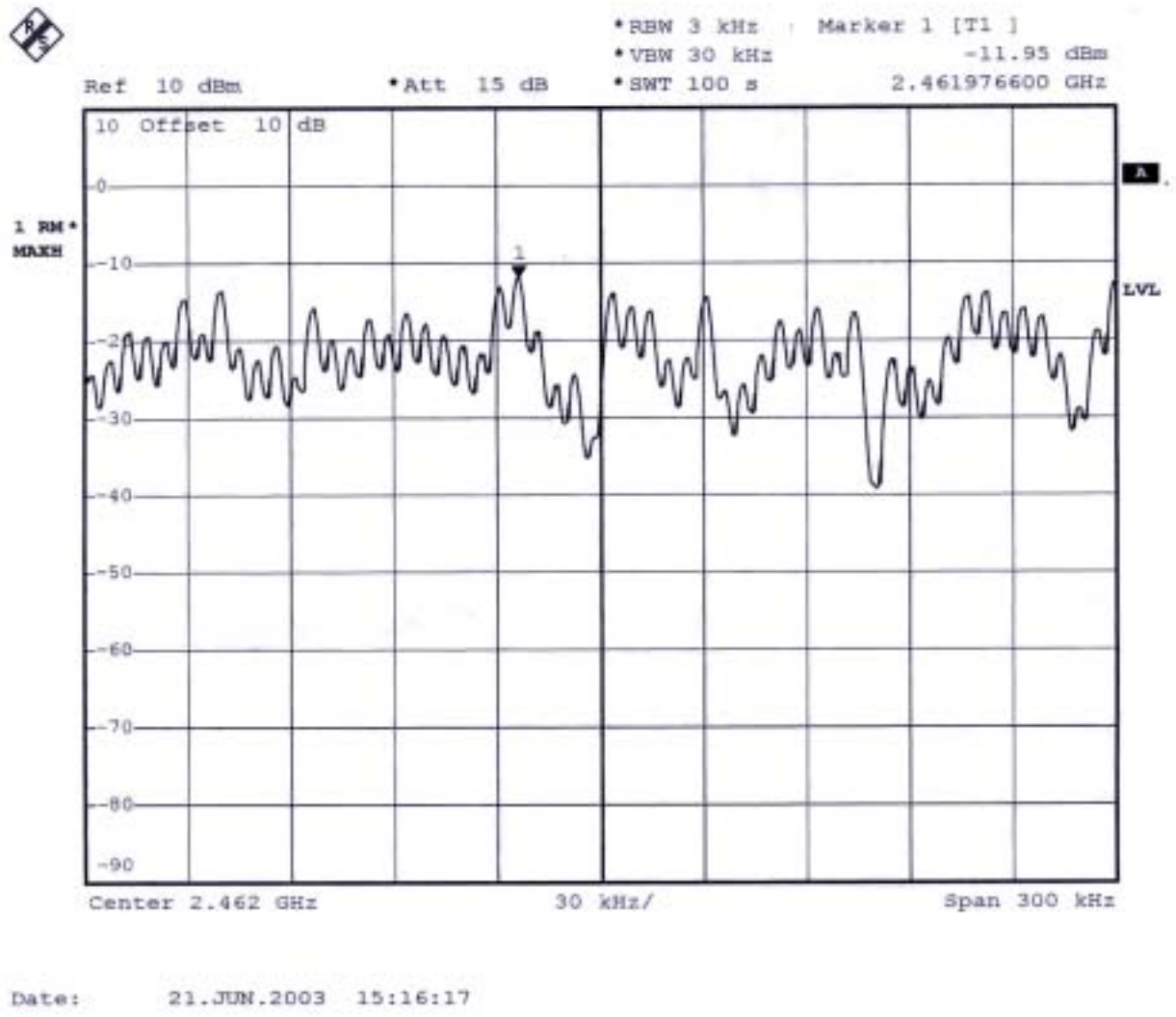
Plot1(Channel 01):



Plot2(Channel 06):



Plot3(Channel 11):



5.5. Test of Conducted Emission

Conducted Emissions were measured from 150 KHz to 30 MHz with a bandwidth of 9 KHz and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

5.5.1. Major Measuring Instruments：

• Test Receiver	(R&S ESCS 30)
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

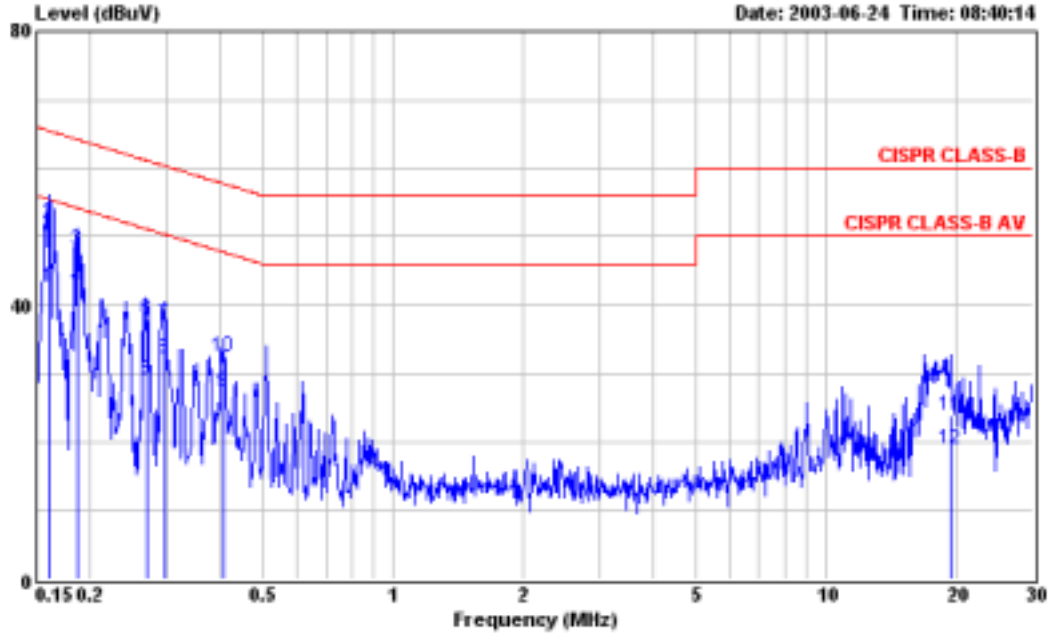
5.5.2. Test Procedures：

a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connect to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 KHz to 30 MHz was searched.
h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.5.3. Test Result of Conducted Emission：

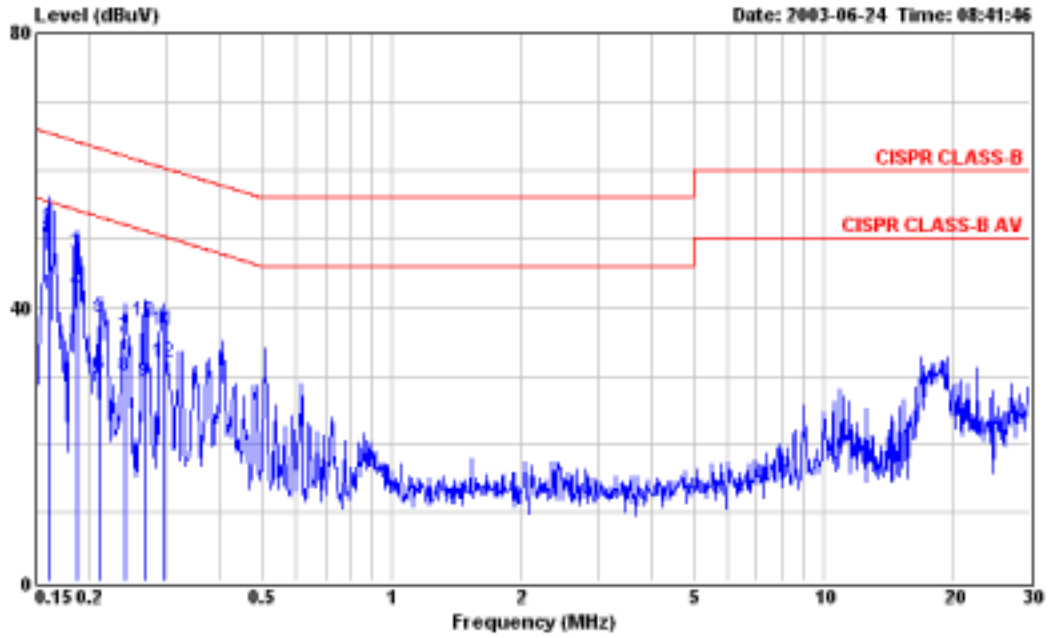
- Test Mode: Mode 1
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 28.1°C
- Relative Humidity: 68 %

■ The test was passed at the minimum margin that marked by the frame in the following table



Site : C001-HY
Condition : CISPR CLASS-B 2003 2001/008 LINE
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
Model : 73-TMMBB-001
Memo : TX CH01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.161	42.50	-12.03	55.41	42.40	0.10	0.00	Average
2	0.161	52.01	-13.40	65.41	51.83	0.10	0.08	QP
3	0.186	48.09	-16.12	64.21	47.94	0.10	0.05	QP
4	0.186	42.50	-11.63	54.21	42.43	0.10	0.05	Average
5	0.270	28.97	-22.16	51.13	28.82	0.10	0.05	Average
6	0.270	37.80	-23.33	61.13	37.65	0.10	0.05	QP
7	0.297	37.02	-23.31	60.33	36.87	0.10	0.05	QP
8	0.297	32.09	-18.24	50.33	31.94	0.10	0.05	Average
9	0.404	27.15	-20.62	47.77	26.99	0.10	0.06	Average
10	0.404	32.43	-25.34	57.77	32.27	0.10	0.06	QP
11	19.330	23.83	-36.17	60.00	23.15	0.29	0.39	QP
12	19.330	18.95	-31.05	50.00	18.27	0.29	0.39	Average



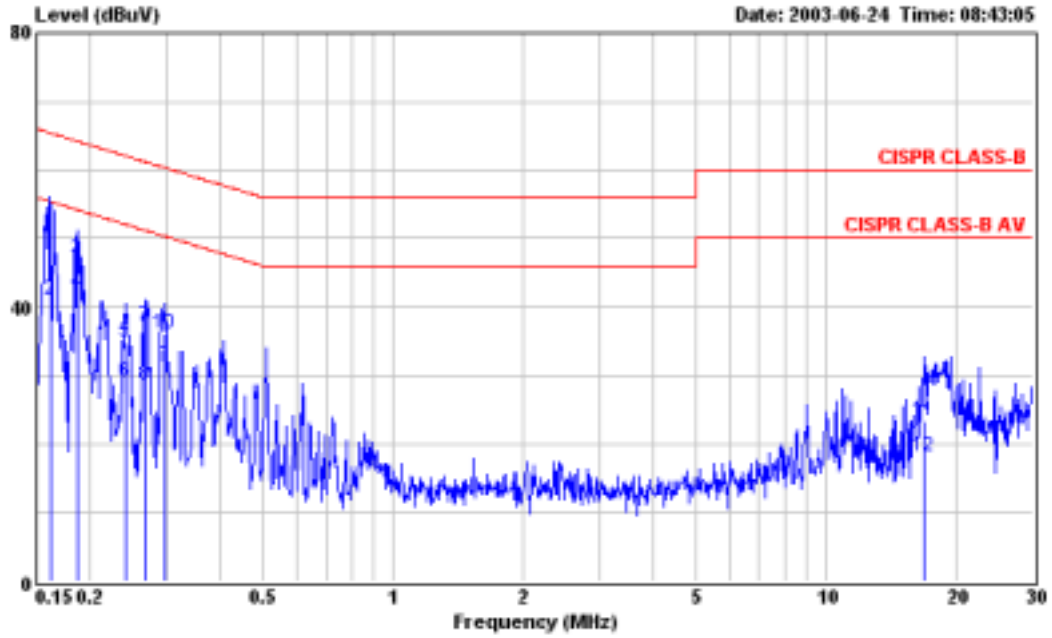
Site : C001-HY
Condition : CISPR CLASS-B 2003 2001/008 NEUTRAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
Model : 73-TMUBB-001
Memo : TX CH01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.161	41.92	-13.49	55.41	41.74	0.10	0.08	Average
2	0.161	51.39	-14.02	65.41	51.21	0.10	0.08	QP
3	0.186	47.67	-16.54	64.21	47.52	0.10	0.05	QP
4	0.186	42.37	-11.84	54.21	42.22	0.10	0.05	Average
5	0.212	38.56	-24.57	63.13	38.42	0.10	0.04	QP
6	0.212	30.02	-23.11	53.13	29.88	0.10	0.04	Average
7	0.240	35.71	-26.39	62.10	35.56	0.10	0.05	QP
8	0.240	29.84	-22.26	52.10	29.69	0.10	0.05	Average
9	0.267	29.21	-22.00	51.21	29.06	0.10	0.05	Average
10	0.267	37.90	-23.31	61.21	37.75	0.10	0.05	QP
11	0.297	36.66	-23.67	60.33	36.51	0.10	0.05	QP
12	0.297	31.87	-18.46	50.33	31.72	0.10	0.05	Average

Test Engineer: John Huang

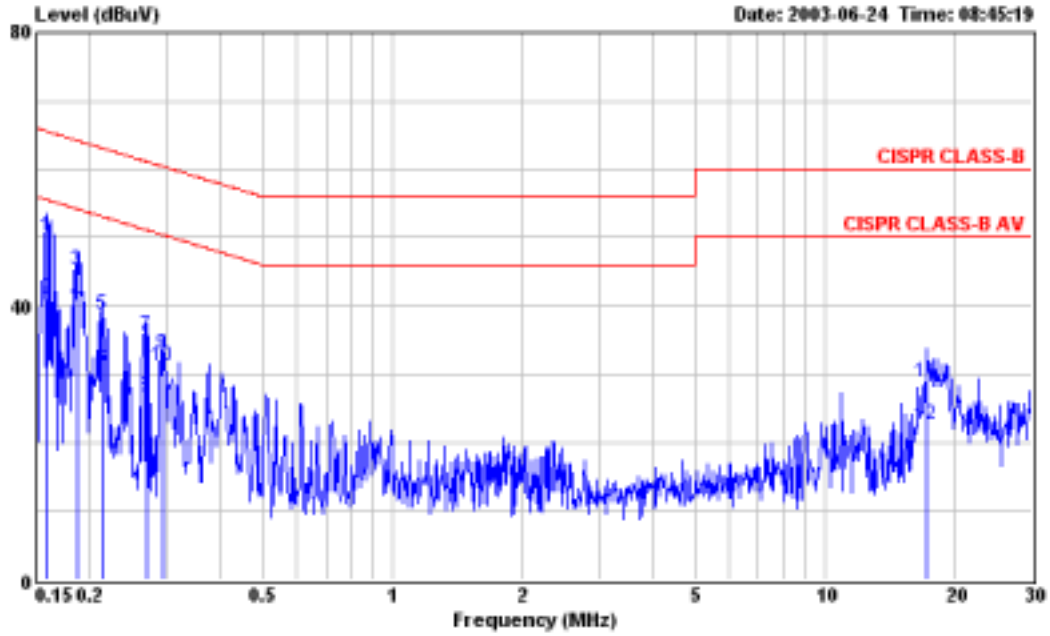
- Test Mode: Mode 2
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 28.1°C
- Relative Humidity: 68 %

■ The test was passed at the minimum margin that marked by the frame in the following table



Site : C001-HY
Condition : CISPR CLASS-B 2003 2001/008 LINE
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
Model : 73-TMMBB-001
Memo : TX CH06

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.162	50.66	-14.69	65.35	50.40	0.10	0.08	QP
2	0.162	40.97	-14.38	55.35	40.79	0.10	0.08	Average
3	0.186	47.01	-17.20	64.21	46.86	0.10	0.05	QP
4	0.186	41.99	-12.22	54.21	41.84	0.10	0.05	Average
5	0.240	34.86	-27.24	62.10	34.71	0.10	0.05	QP
6	0.240	29.07	-23.03	52.10	28.92	0.10	0.05	Average
7	0.267	37.17	-24.04	61.21	37.02	0.10	0.05	QP
8	0.267	28.60	-22.61	51.21	28.45	0.10	0.05	Average
9	0.297	31.44	-18.89	50.33	31.29	0.10	0.05	Average
10	0.297	36.07	-24.26	60.33	35.92	0.10	0.05	QP
11	16.750	23.32	-36.68	60.00	22.72	0.24	0.36	QP
12	16.750	18.28	-31.72	50.00	17.68	0.24	0.36	Average



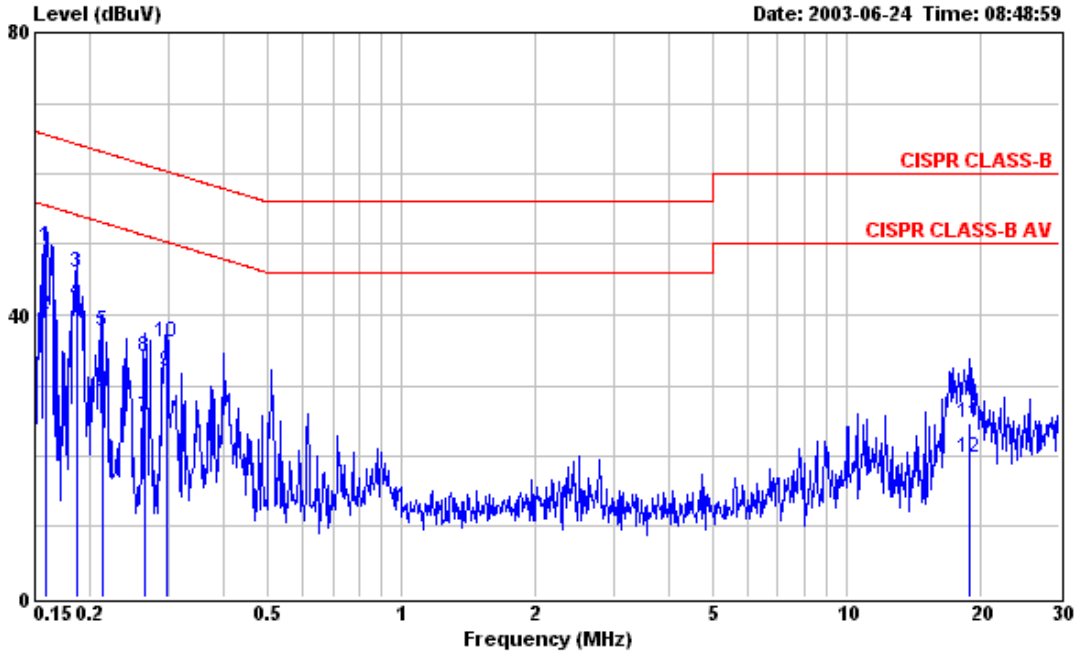
Site : C001-HY
Condition : CISPR CLASS-B 2003 2001/008 NEUTRAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
Model : 73-TMUBB-001
Memo : TX CH06

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.159	50.24	-15.28	65.52	50.05	0.10	0.09	QP
2	0.159	41.07	-14.45	55.52	40.88	0.10	0.09	Average
3	0.187	45.31	-18.86	64.17	45.16	0.10	0.05	QP
4	0.187	40.61	-13.56	54.17	40.46	0.10	0.05	Average
5	0.214	38.62	-24.43	63.05	38.48	0.10	0.04	QP
6	0.214	30.91	-22.14	53.05	30.77	0.10	0.04	Average
7	0.270	35.50	-25.54	61.12	35.43	0.10	0.05	QP
8	0.270	26.64	-24.48	51.12	26.49	0.10	0.05	Average
9	0.294	32.92	-27.49	60.41	32.77	0.10	0.05	QP
10	0.294	31.07	-19.34	50.41	30.92	0.10	0.05	Average
11	17.200	28.76	-31.24	60.00	28.09	0.30	0.37	QP
12	17.200	22.65	-27.35	50.00	21.98	0.30	0.37	Average

Test Engineer: John Huang

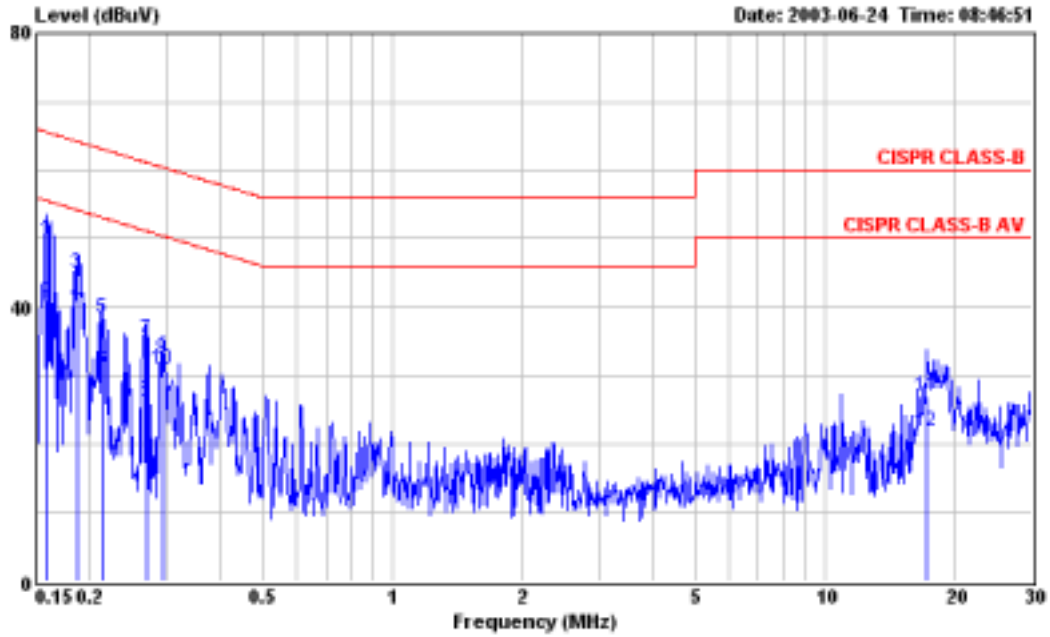
- Test Mode: Mode 3
- Frequency Range of Test: from 150KHz to 30 MHz
- 6dB Bandwidth: 9KHz
- Temperature: 28.1°C
- Relative Humidity: 68 %

■ The test was passed at the minimum margin that marked by the frame in the following table



Site : C001-HY
Condition : CISPR CLASS-B 2003 2001/008 LINE
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
Model : 73-TMWBB-001
Memo : TX CH11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.159	49.55	-15.97	65.52	49.36	0.10	0.09	QP
2	0.159	39.95	-15.57	55.52	39.76	0.10	0.09	Average
3	0.186	46.09	-18.12	64.21	45.94	0.10	0.05	QP
4	0.186	41.69	-12.52	54.21	41.54	0.10	0.05	Average
5	0.214	37.58	-25.47	63.05	37.44	0.10	0.04	QP
6	0.214	28.96	-24.09	53.05	28.82	0.10	0.04	Average
7	0.264	25.35	-25.95	51.30	25.20	0.10	0.05	Average
8	0.264	34.01	-27.29	61.30	33.86	0.10	0.05	QP
9	0.296	32.03	-18.32	50.35	31.88	0.10	0.05	Average
10	0.296	36.15	-24.20	60.35	36.00	0.10	0.05	QP
11	18.920	24.60	-35.40	60.00	23.93	0.28	0.39	QP
12	18.920	19.62	-30.38	50.00	18.95	0.28	0.39	Average



Site : C001-HY
Condition : CISPR CLASS-B 2003 2001/008 NEUTRAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
Model : 73-TMWBB-001
Memo : TX CH11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.159	49.97	-15.55	65.52	49.78	0.10	0.09	QP
2	0.159	40.80	-14.72	55.52	40.61	0.10	0.09	Average
3	0.187	45.01	-19.16	64.17	44.86	0.10	0.05	QP
4	0.187	40.44	-13.73	54.17	40.29	0.10	0.05	Average
5	0.214	38.46	-24.59	63.05	38.32	0.10	0.04	QP
6	0.214	30.78	-22.27	53.05	30.64	0.10	0.04	Average
7	0.270	35.26	-25.86	61.12	35.11	0.10	0.05	QP
8	0.270	26.20	-24.92	51.12	26.05	0.10	0.05	Average
9	0.294	32.43	-27.98	60.41	32.28	0.10	0.05	QP
10	0.294	30.94	-19.47	50.41	30.79	0.10	0.05	Average
11	17.203	26.93	-33.07	60.00	26.26	0.30	0.37	QP
12	17.203	21.76	-28.24	50.00	21.09	0.30	0.37	Average

Test Engineer: John Huang

5.6. Test of Radiated Emission

Radiated emissions from 30 MHz to 24.62 GHz were measured according to the methods defines in ANSI C63.4-1992. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

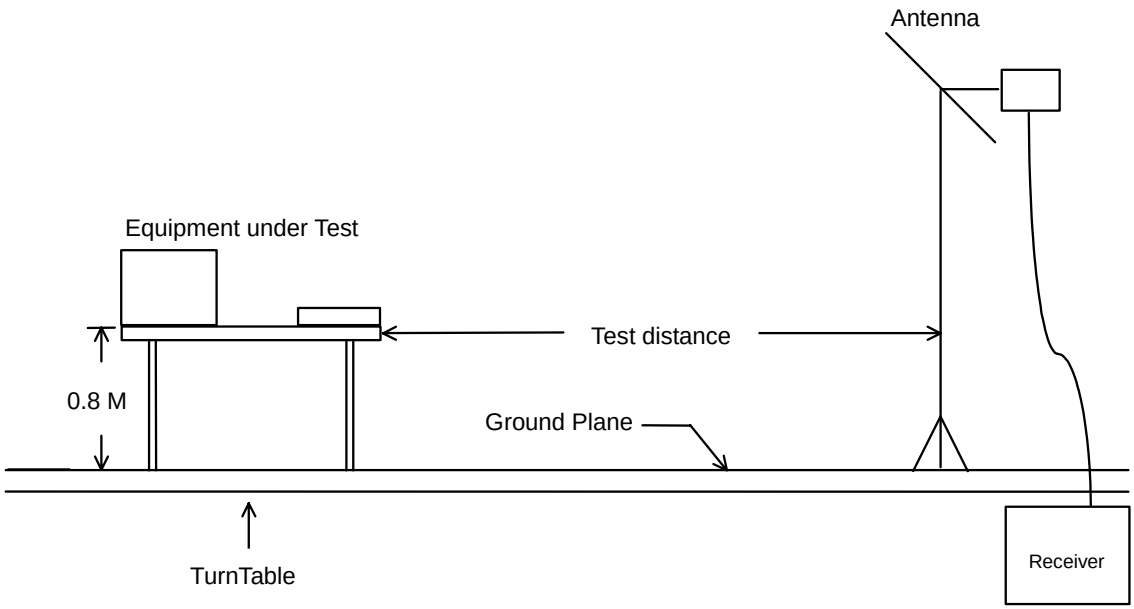
5.6.1. Major Measuring Instruments

● Amplifier	(ADVANTEST BB525C)
RF Gain	30 dB
Signal Input	9 KHz to 3 GHz
● Spectrum Analyzer	(R&S FSP7)
Attenuation	10 dB
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Resolution Bandwidth	120 KHz
Signal Input	9 KHz to 7 GHz
● Spectrum analyzer	(R&S FSP40)
Attenuation	10 dB
Start Frequency	1 GHz
Stop Frequency	18 GHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	9 KHz to 40 GHz
● Amplifier	(MITEQ AFS44)
RF Gain	40 dB
Signal Input	100 MHz to 26.5GHz
● Test Receiver	(SCHAFFNER SCR3501)
Resolution Bandwidth	120 KHz
Frequency Band	9 K – 1 GHz
Quasi-Peak Detector	ON for Quasi-Peak Mode
	OFF for Peak Mode

5.6.2. Test Procedures

1. The EUT was placed on a rotatable table top 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
5. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.6.3. Typical Test Setup Layout of Radiated Emission

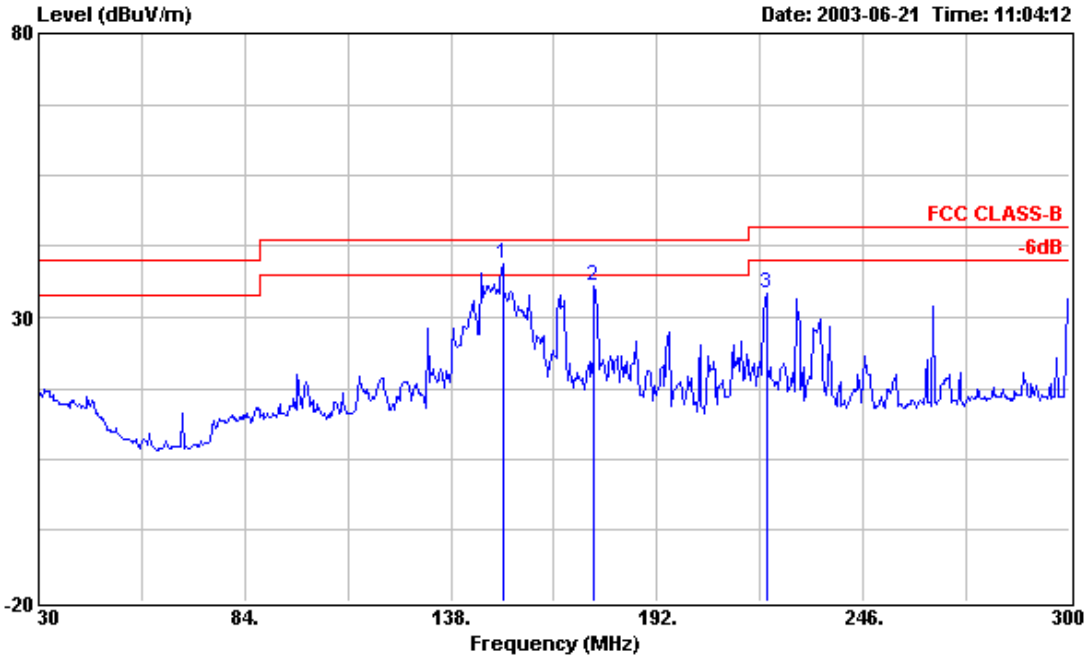


5.6.4. Test Result of Radiated Emission

- Test Mode: Mode 1
- Test Distance: 3 M
- Temperature: 27 °C
- Relative Humidity: 65 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

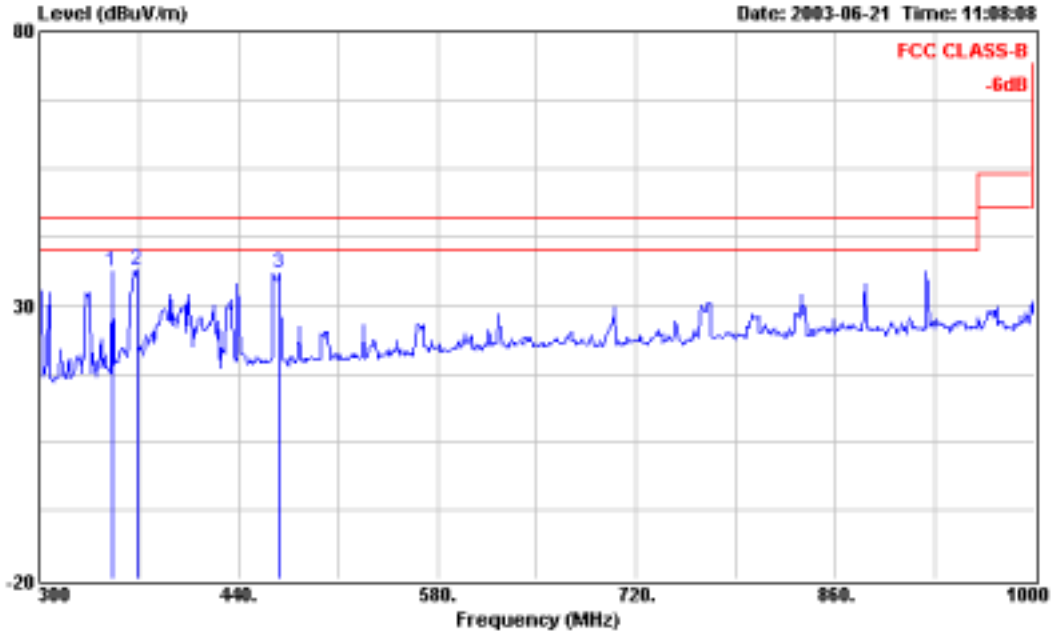
■ **The test was passed at the minimum margin that marked by the frame in the following table**

■ Spurious Emission



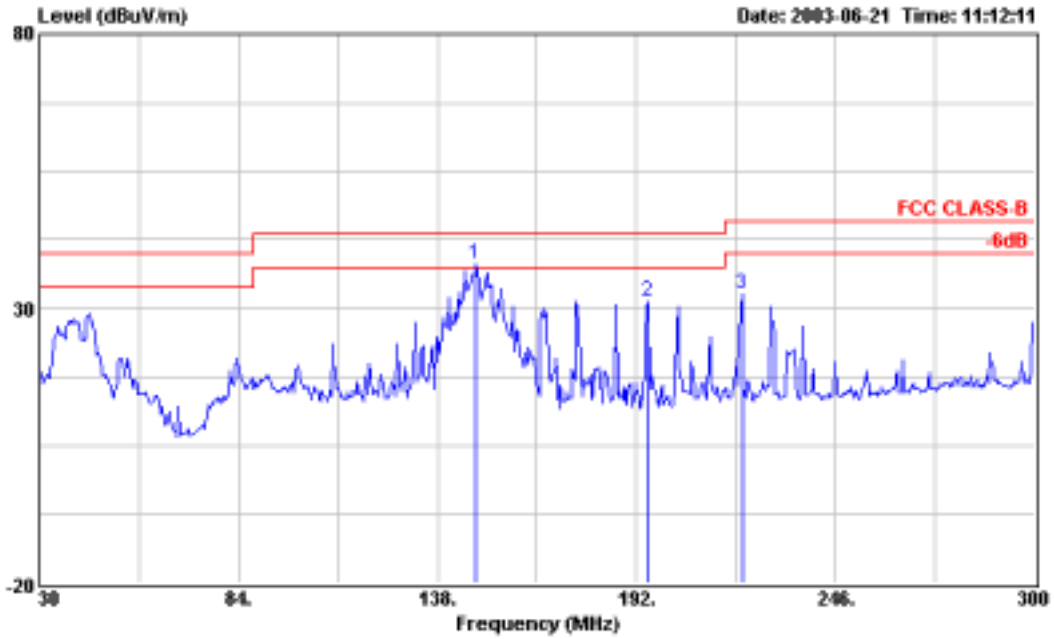
Site : 03CH02-HY
Condition : 3m CH3-3MAT HORIZONTAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMWBB-001
MEMO : TX CH01 2412MHz
: F360603

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	151.500	39.53	-3.97	43.50	57.73	10.33	2.31	30.84	Peak	200	90
2	175.530	35.66	-7.84	43.50	55.24	8.81	2.38	30.77	Peak	---	---
3	220.620	34.33	-11.67	46.00	51.87	10.07	3.05	30.66	Peak	---	---



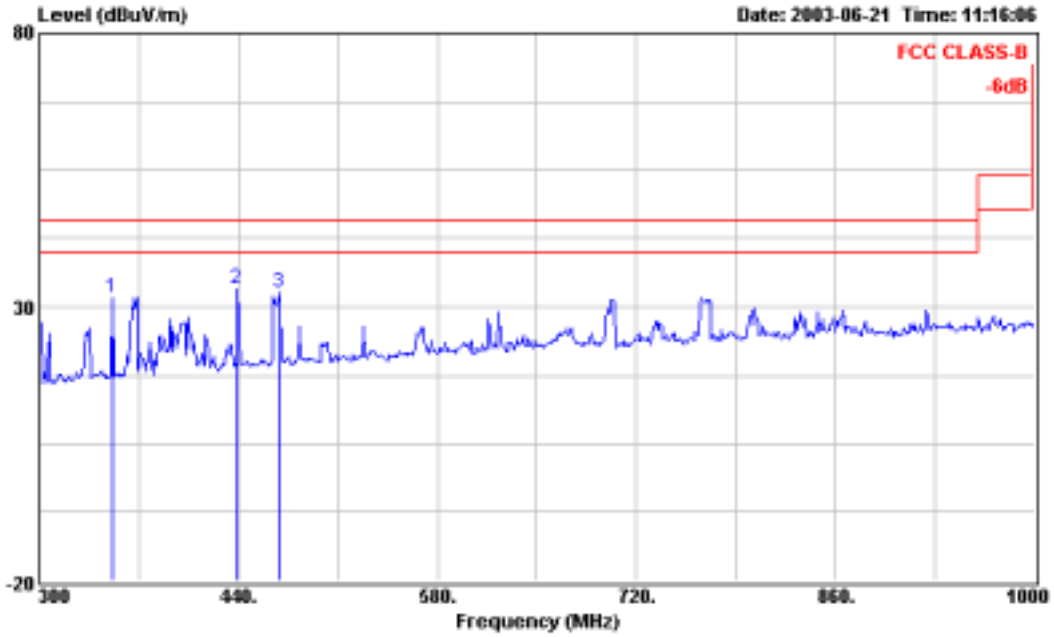
Site : 03CH02-HY
Condition : 3m CH3-3MAT HORIZONTAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMUBB-001
MEMO : TX CH01 2412MHz
: F360603

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	351.800	36.09	-9.91	46.00	48.65	14.54	3.35	30.45	Peak	---	---
2	368.600	36.41	-9.59	46.00	48.36	14.85	3.63	30.43	Peak	---	---
3	469.400	35.93	-10.07	46.00	45.60	16.33	4.12	30.12	Peak	---	---



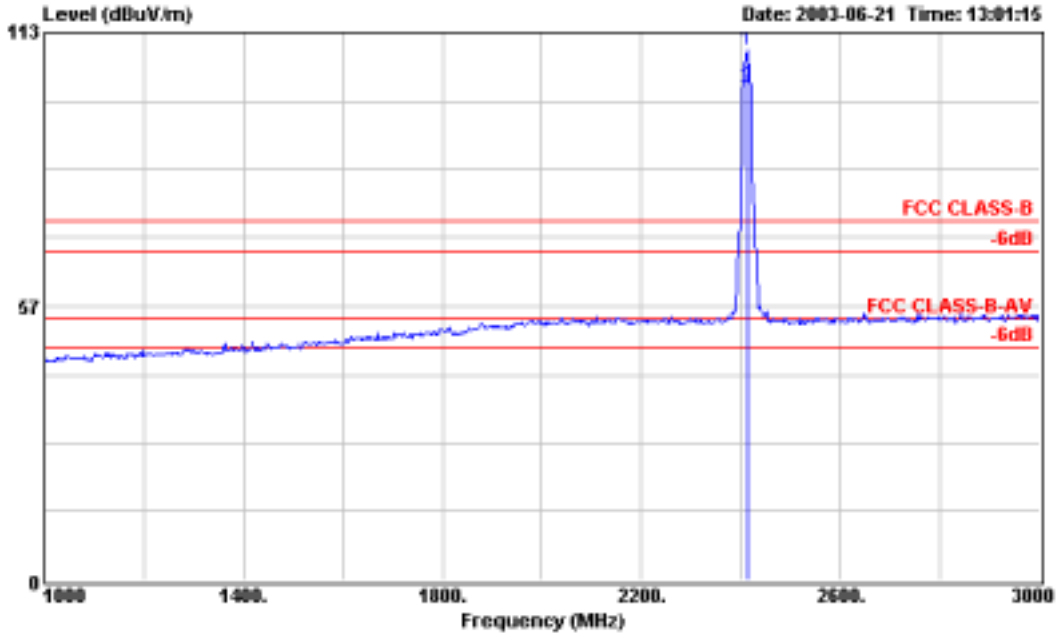
Site : 03CH02-HY
Condition : 3m CH3-3MAT VERTICAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMWBB-001
MEMO : TX CH01 2412MHz
: F360603

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	148.530	38.09	-5.41	43.50	56.04	10.68	2.22	30.85	Peak	---	---
2	194.970	31.17	-12.33	43.50	50.53	8.86	2.50	30.72	Peak	---	---
3	220.620	32.50	-13.50	46.00	50.04	10.07	3.05	30.66	Peak	---	---

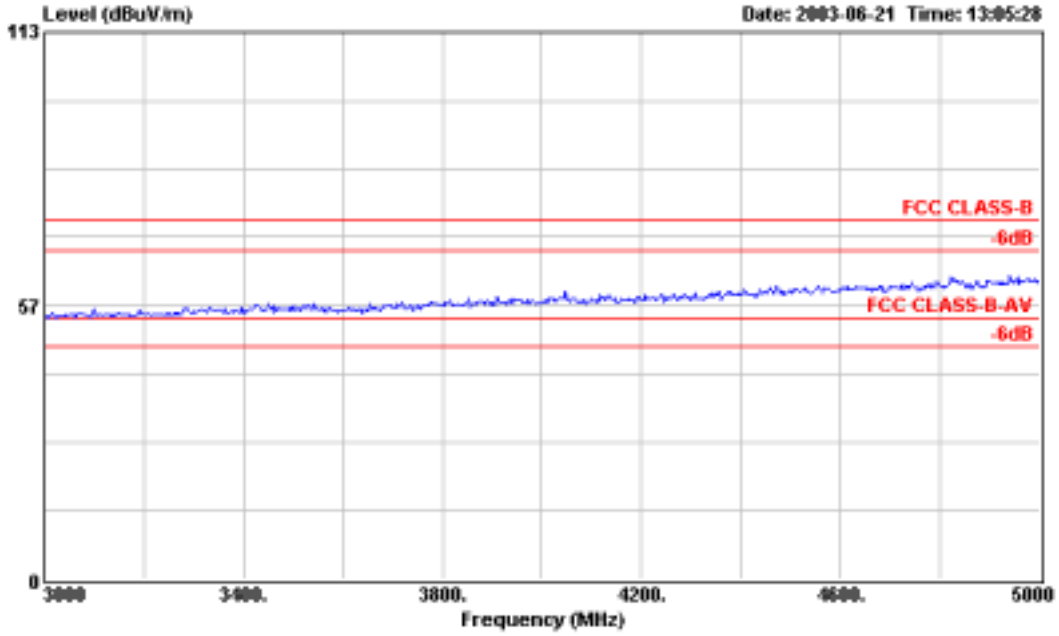


Site : 03CH02-HY
Condition : 3m CH3-3MAT VERTICAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMWBB-001
MEMO : TX CH01 2412MHz
: F360603

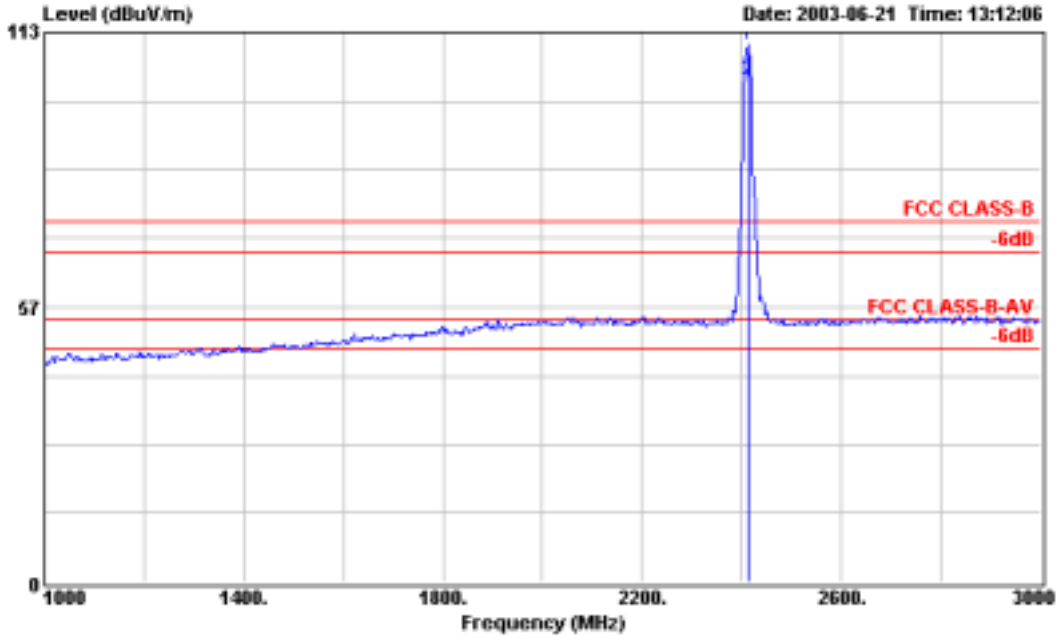
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	351.800	31.70	-14.30	46.00	44.26	14.54	3.35	30.45	Peak	---	---
2	439.300	33.20	-12.80	46.00	43.54	15.94	3.96	30.24	Peak	---	---
3	469.400	32.70	-13.30	46.00	42.37	16.33	4.12	30.12	Peak	---	---



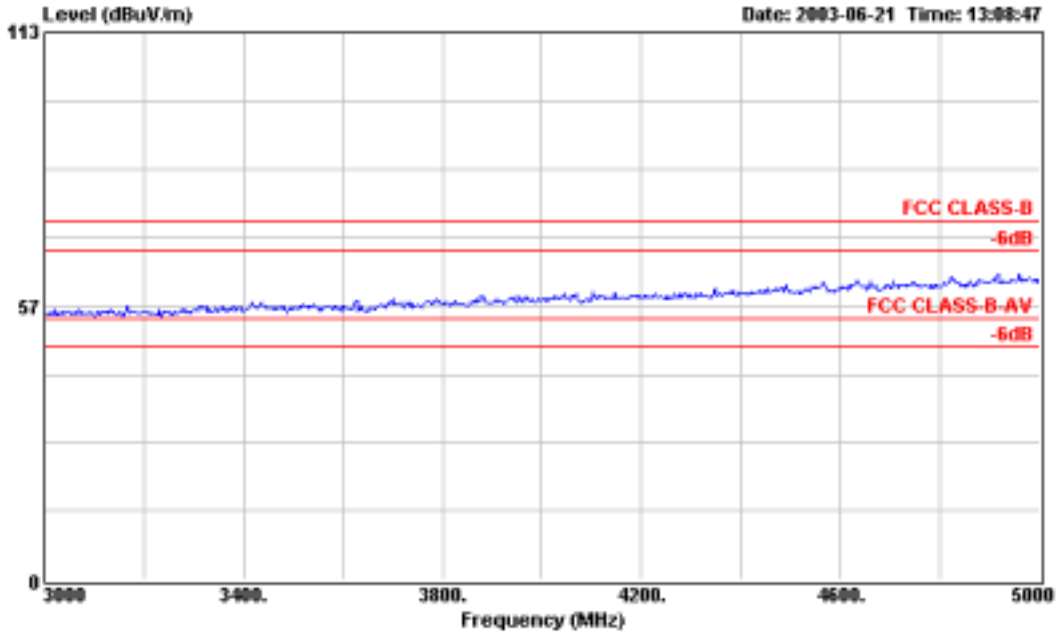

```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 HORIZONTAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMUBB-001
MEMO       : TX CH01 2412MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 HORIZONTAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMWBB-001
MEMO       : TX CH01 2412MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 VERTICAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMWBB-001
MEMO       : TX CH01 2412MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 VERTICAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMUBB-001
MEMO       : TX CH01 2412MHz
           : F360603
```

■ Field strength of fundamental and harmonics

Frequency	Polarity	Antenna Factor	Cable Loss	Reading	Limits		Emission Level		Margin	Detect
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode
2412.000	H	30.18	5.98	73.10	-	-	109.26	290402.27		Peak
2412.000	H	30.18	5.98	65.38	-	-	101.54	119398.81		AV
2412.000	V	30.18	5.98	74.17	-	-	110.33	328473.24		Peak
2412.000	V	30.18	5.98	66.94	-	-	103.10	142889.40		AV
4824.000	V/H						-			AV/Peak
7236.000	V/H						-			AV/Peak
9648.000	V/H						-			AV/Peak
12060.000	V/H						-			AV/Peak
14472.000	V/H						-			AV/Peak
16884.000	V/H						-			AV/Peak
19296.000	V/H						-			AV/Peak
21708.000	V/H						-			AV/Peak
24120.000	V/H						-			AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

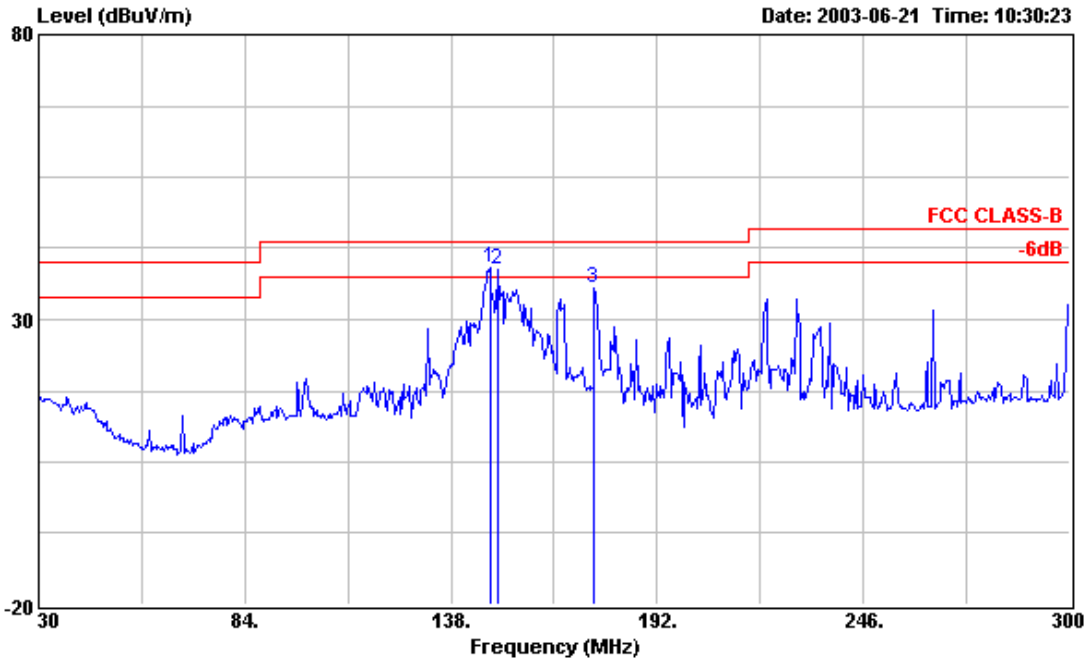
Test Engineer: Murray

Murray Lu

- Test Mode: Mode 2
- Test Distance: 3 M
- Temperature: 27 °C
- Relative Humidity: 65 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

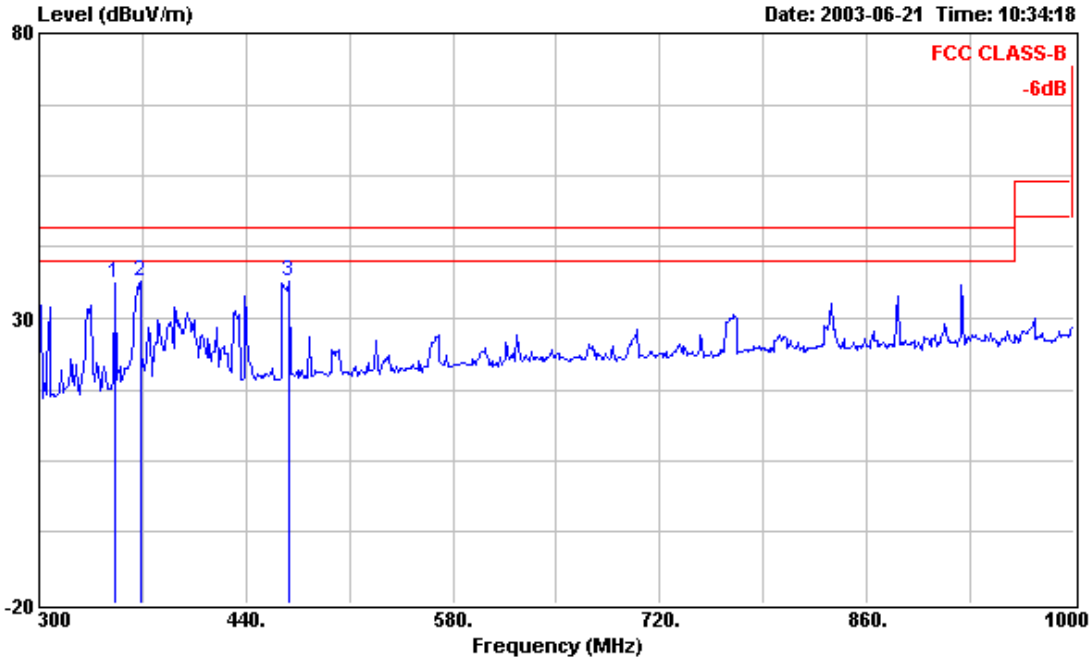
■ **The test was passed at the minimum margin that marked by the frame in the following table**

■ Spurious Emission



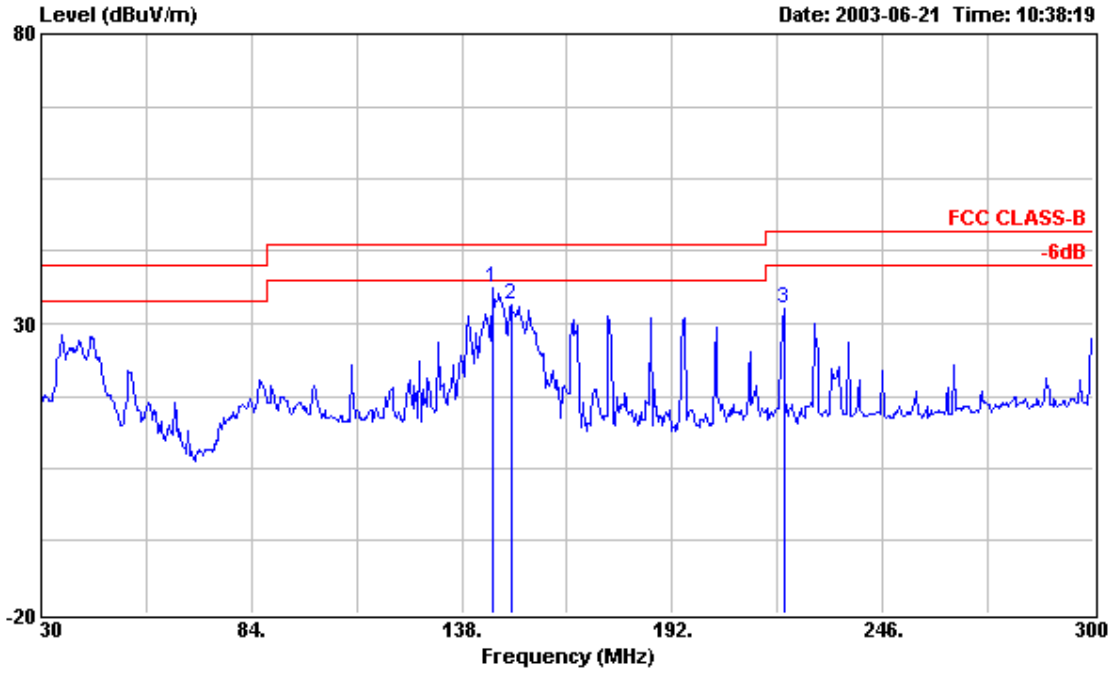

```
Site      : 03CH02-HY
Condition : 3m CH3-3MAT HORIZONTAL
EUT       : Mini PCI Wireless LAN Card
Power     : 110V/60Hz
MODEL     : 73-TMWBB-001
MEMO      : TX CH06 2437MHz
          : F360603
```

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	148.260	39.01	-4.49	43.50	56.92	10.71	2.23	30.85	Peak	200	100
2 !	150.420	38.65	-4.85	43.50	56.85	10.46	2.19	30.85	Peak	---	---
3	175.530	35.62	-7.88	43.50	55.20	8.81	2.38	30.77	Peak	---	---



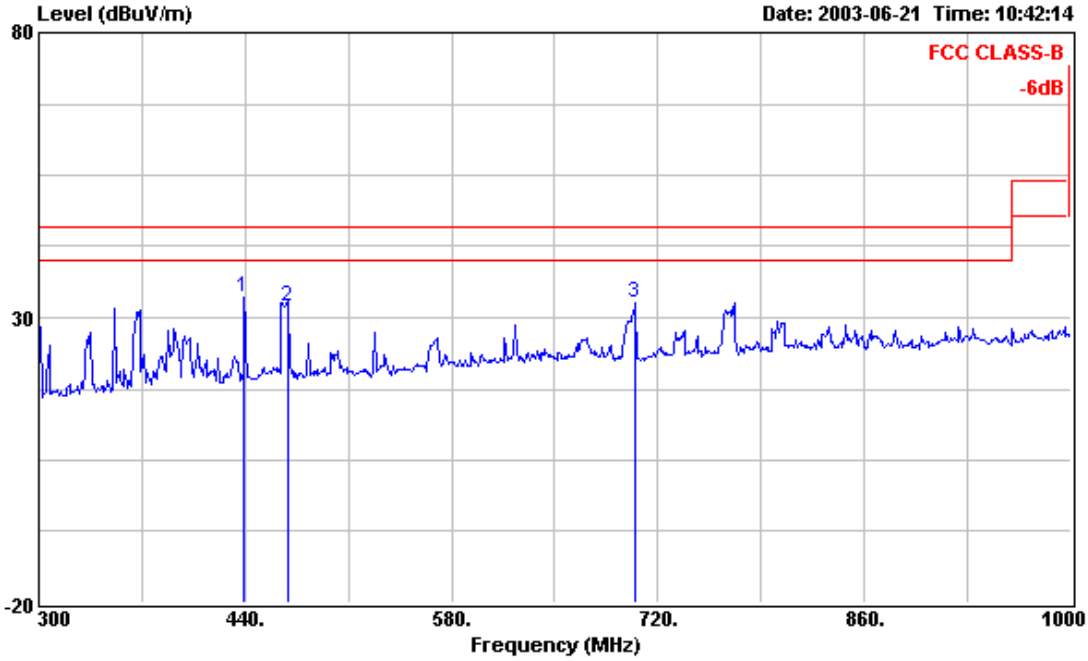
Site : 03CH02-HY
Condition : 3m CH3-3MAT HORIZONTAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMWBB-001
MEMO : TX CH06 2437MHz
: F360603

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	351.800	36.19	-9.81	46.00	48.75	14.54	3.35	30.45	Peak	---	---
2	368.600	36.59	-9.41	46.00	48.54	14.85	3.63	30.43	Peak	---	---
3	469.400	36.42	-9.58	46.00	46.09	16.33	4.12	30.12	Peak	---	---



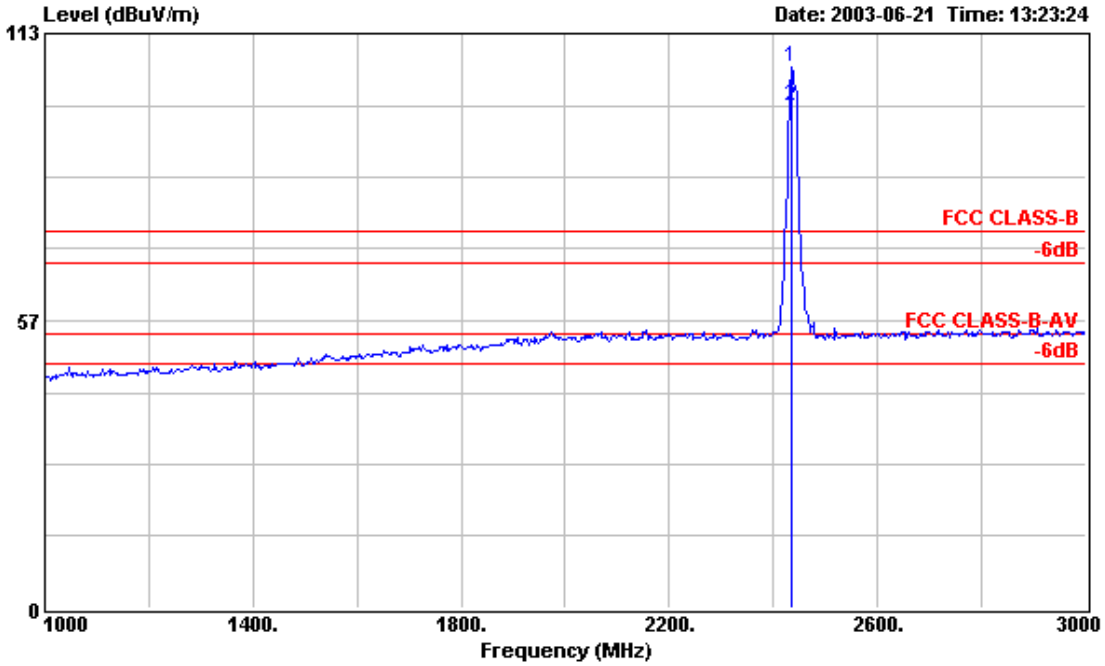
Site : 03CH02-HY
Condition : 3m CH3-3MAT VERTICAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMWBB-001
MEMO : TX CH06 2437MHz
: F360603

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	146.100	36.04	-7.46	43.50	53.63	10.96	2.31	30.86	Peak	---	---
2	150.690	33.12	-10.38	43.50	51.30	10.44	2.23	30.85	Peak	---	---
3	220.620	32.71	-13.29	46.00	50.25	10.07	3.05	30.66	Peak	---	---

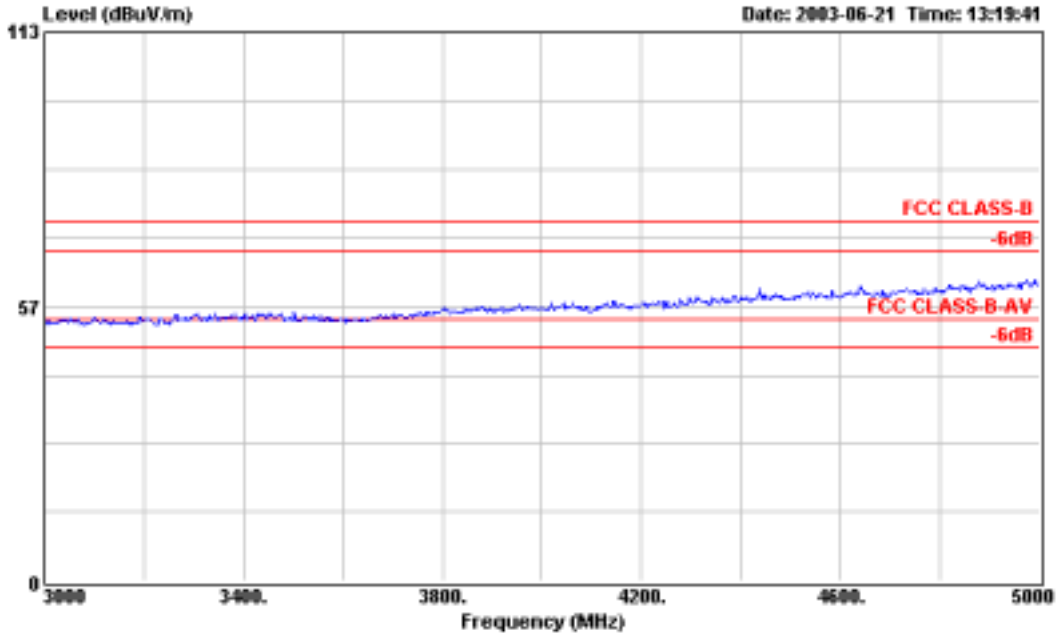


Site : 03CH02-HY
Condition : 3m CH3-3MAT VERTICAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMWBB-001
MEMO : TX CH06 2437MHz
: F360603

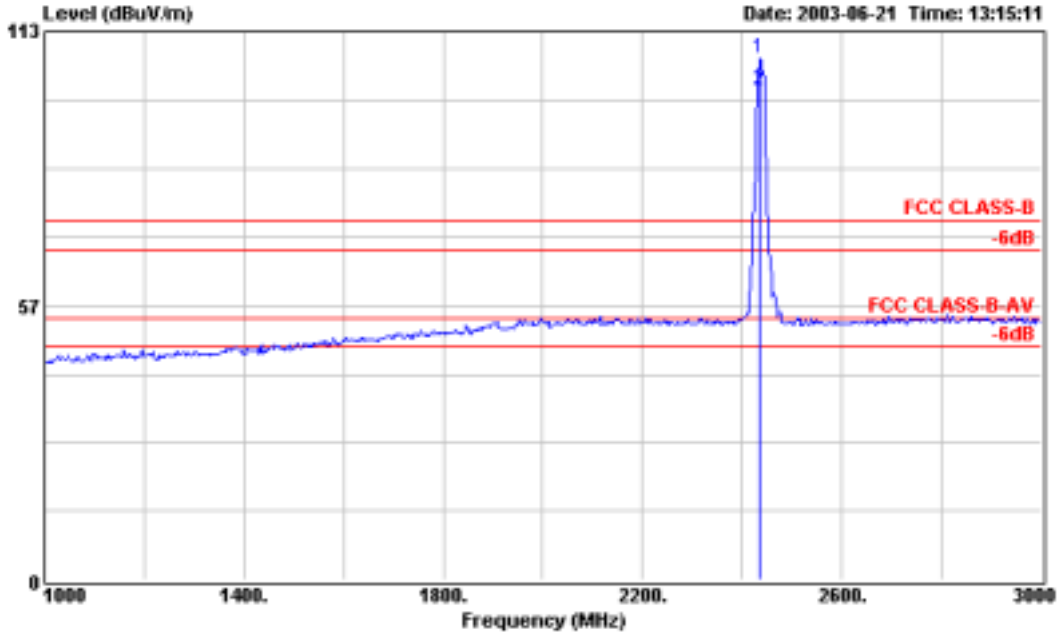
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	439.300	33.43	-12.57	46.00	43.77	15.94	3.96	30.24	Peak	---	---
2	469.400	31.86	-14.14	46.00	41.53	16.33	4.12	30.12	Peak	---	---
3	704.600	32.69	-13.31	46.00	38.18	19.35	4.83	29.67	Peak	---	---



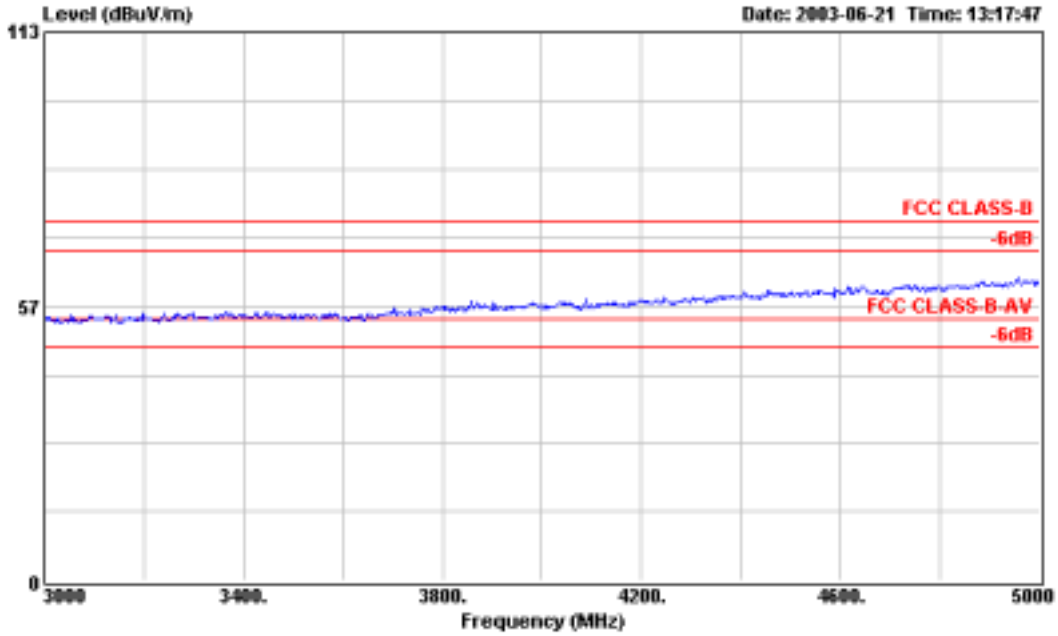

```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 HORIZONTAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMWBB-001
MEMO       : TX CH06 2437MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 HORIZONTAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMUBB-001
MEMO       : TX CH06 2437MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 VERTICAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMWBB-001
MEMO       : TX CH06 2437MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 VERTICAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMUBB-001
MEMO       : TX CH06 2437MHz
           : F360603
```

■ Field strength of fundamental and harmonics

Frequency	Polarity	Antenna Factor	Cable Loss	Reading	Limits		Emission Level		Margin	Detect
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode
2436.000	H	30.15	6.01	70.09	-	-	106.25	205352.50		Peak
2436.000	H	30.15	6.01	62.39	-	-	98.55	84625.26		AV
2436.000	V	30.15	6.01	71.43	-	-	107.59	239607.27		Peak
2436.000	V	30.15	6.01	64.77	-	-	100.93	111301.24		AV
4874.000	V/H						-			AV/Peak
7311.000	V/H						-			AV/Peak
9748.000	V/H						-			AV/Peak
12185.000	V/H						-			AV/Peak
14622.000	V/H						-			AV/Peak
17059.000	V/H						-			AV/Peak
19496.000	V/H						-			AV/Peak
21933.000	V/H						-			AV/Peak
24370.000	V/H						-			AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

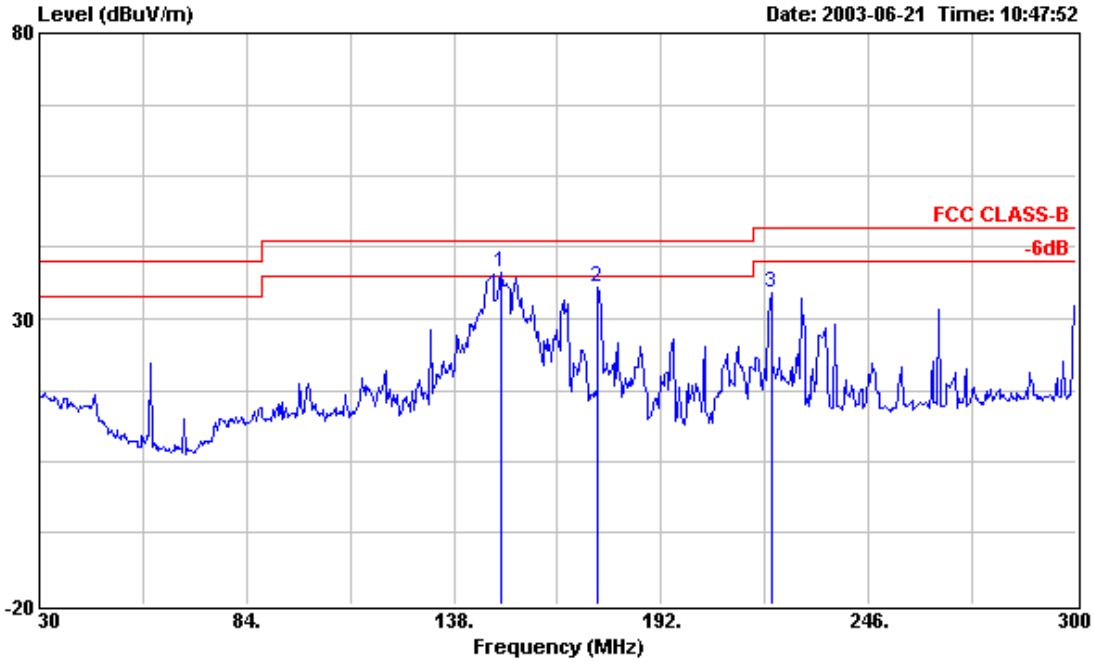
Test Engineer: Murray

Murray Lu

- Test Mode: Mode 3
- Test Distance: 3 M
- Temperature: 27 °C
- Relative Humidity: 65 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

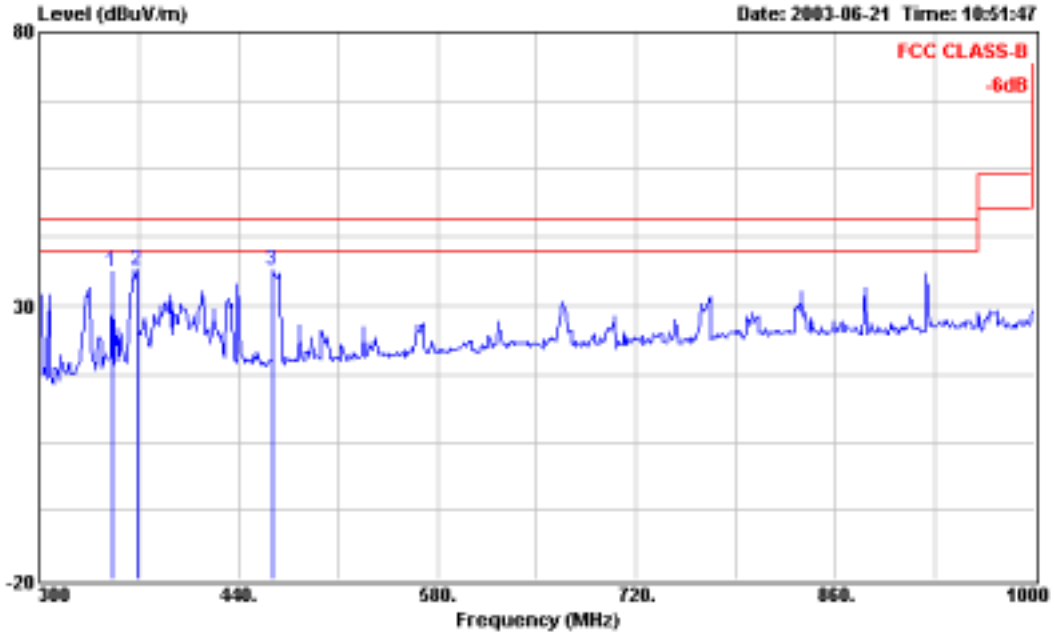
■ **The test was passed at the minimum margin that marked under gray area in the following table, and its antenna height is 1 m, turn table degree is 0°**

■ Spurious Emission



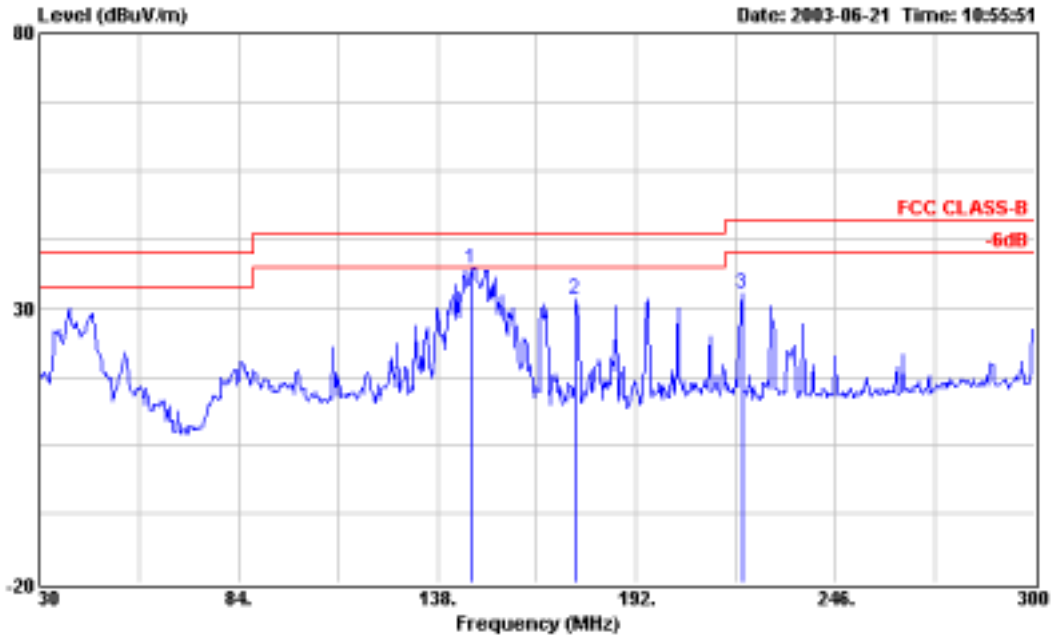

```
Site       : 03CH02-HY
Condition  : 3m CH3-3MAT HORIZONTAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMWBB-001
MEMO       : TX CH11 2462MHz
           : F360603
```

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	150.420	38.07	-5.43	43.50	56.27	10.46	2.19	30.85	Peak	---	---
2	175.530	35.53	-7.97	43.50	55.11	8.81	2.38	30.77	Peak	---	---
3	220.620	34.51	-11.49	46.00	52.05	10.07	3.05	30.66	Peak	---	---



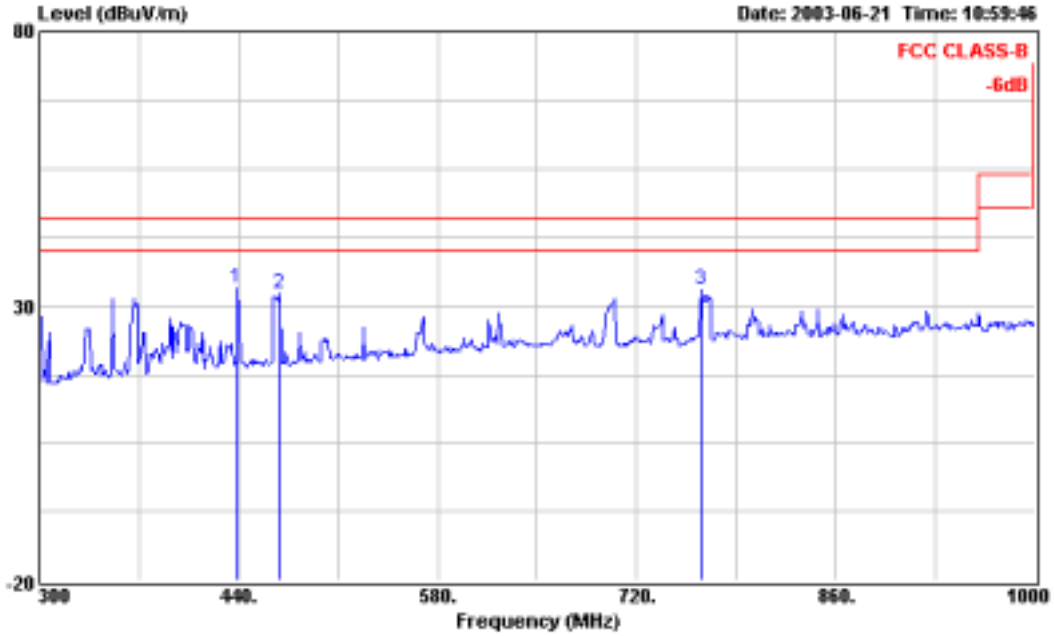
Site : 03CH02-HY
Condition : 3m CH3-3MAT HORIZONTAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMUBB-001
MEMO : TX CH11 2462MHz
: F360603

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	351.800	36.16	-9.84	46.00	48.72	14.54	3.35	30.45	Peak	---	---
2	368.600	36.53	-9.47	46.00	48.48	14.85	3.63	30.43	Peak	---	---
3	464.500	36.41	-9.59	46.00	46.28	16.27	4.00	30.14	Peak	---	---



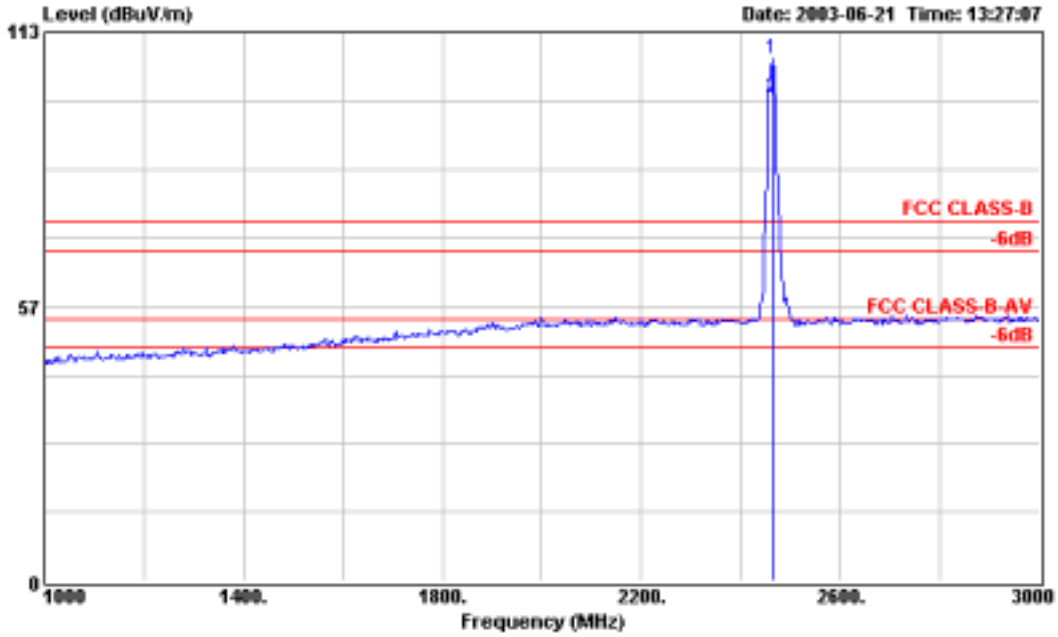
Site : 03CH02-HY
Condition : 3m CH3-3MAT VERTICAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMUBB-001
MEMO : TX CH11 2462MHz
: F360603

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	147.450	37.25	-6.25	43.50	55.06	10.79	2.26	30.86	Peak	---	---
2	175.530	31.48	-12.02	43.50	51.06	8.81	2.30	30.77	Peak	---	---
3	220.620	32.57	-13.43	46.00	50.11	10.07	3.05	30.66	Peak	---	---

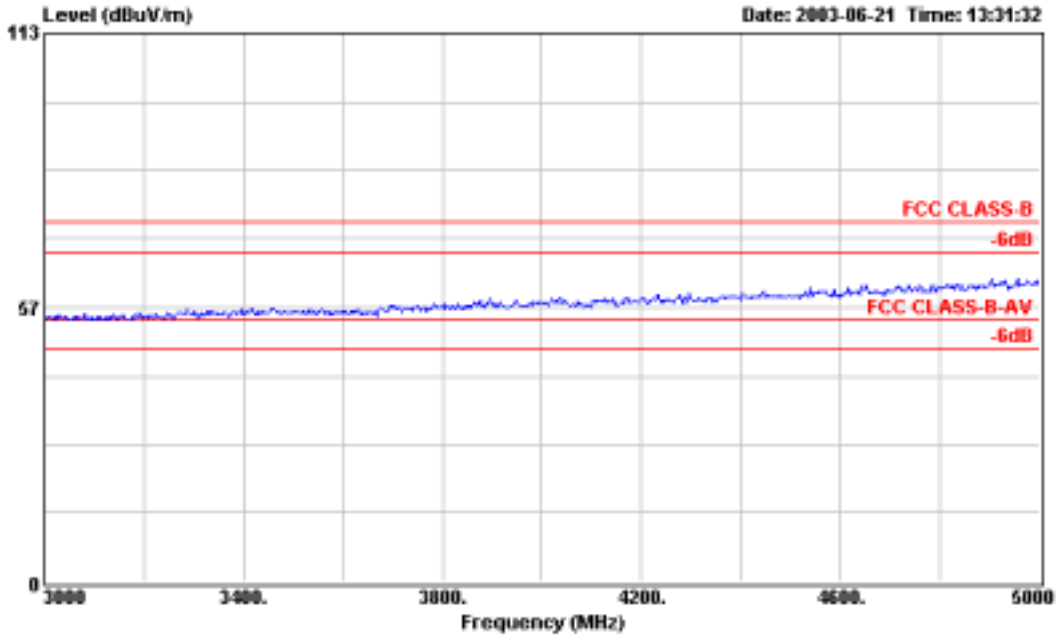


Site : 03CH02-HY
Condition : 3m CH3-3MAT VERTICAL
EUT : Mini PCI Wireless LAN Card
Power : 110V/60Hz
MODEL : 73-TMUBB-001
MEMO : TX CH11 2462MHz
: F360603

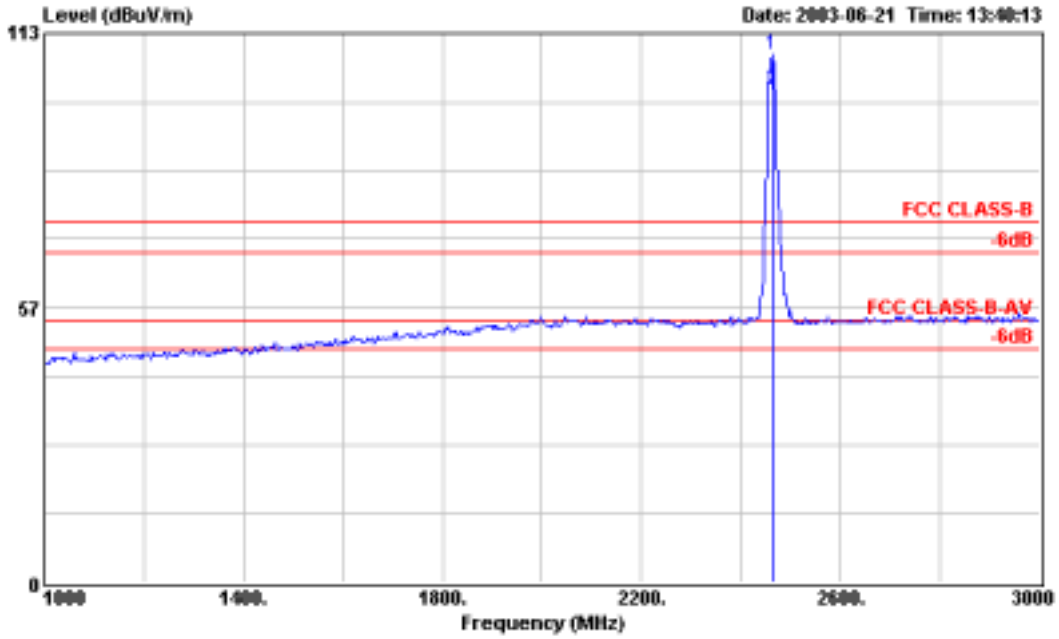
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	439.300	33.28	-12.72	46.00	43.62	15.94	3.96	30.24	Peak	---	---
2	469.400	32.37	-13.63	46.00	42.04	16.33	4.12	30.12	Peak	---	---
3	766.200	32.82	-13.18	46.00	37.10	20.02	5.06	29.36	Peak	---	---



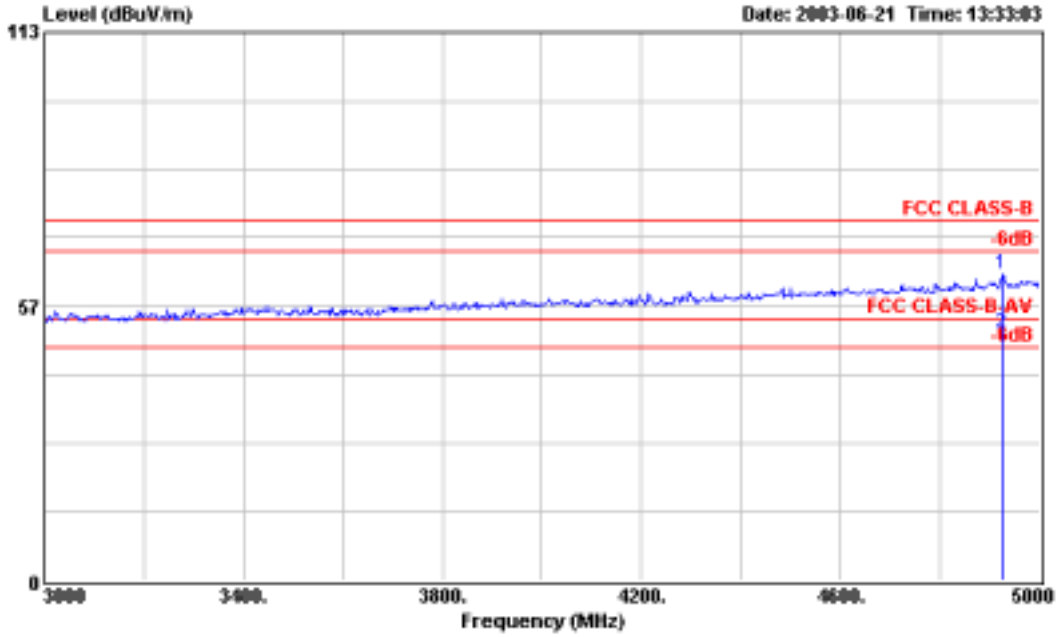

```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 HORIZONTAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMUBB-001
MEMO       : TX CH11 2462MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 HORIZONTAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMWBB-001
MEMO       : TX CH11 2462MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 VERTICAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMWBB-001
MEMO       : TX CH11 2462MHz
           : F360603
```




```
Site       : 03CH02-HY
Condition  : 3m HORN-ANT-10094 VERTICAL
EUT        : Mini PCI Wireless LAN Card
Power      : 110V/60Hz
MODEL      : 73-TMUBB-001
MEMO       : TX CH11 2462MHz
           : F360603
```

■ Field strength of fundamental and harmonics

Frequency	Polarity	Antenna Factor	Cable Loss	Reading	Limits		Emission Level		Margin	Detect
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode
2462.000	H	30.13	6.04	71.36	-	-	107.53	237957.83		Peak
2462.000	H	30.13	6.04	63.43	-	-	99.60	95499.26		AV
2462.000	V	30.13	6.04	72.49	-	-	108.66	271019.16		Peak
2462.000	V	30.13	6.04	65.22	-	-	101.39	117354.57		AV
4924.000	H						-			AV/Peak
4926.000	V	33.60	9.20	20.28	74.00	5011.87	63.08	1425.61	-10.92	Peak
4926.000	V	33.60	9.20	8.16	54.00	501.19	50.96	353.18	-3.04	AV
7386.000	V/H						-			AV/Peak
9848.000	V/H						-			AV/Peak
12310.000	V/H						-			AV/Peak
14772.000	V/H						-			AV/Peak
17234.000	V/H						-			AV/Peak
19696.000	V/H						-			AV/Peak
22158.000	V/H						-			AV/Peak
24620.000	V/H						-			AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer: Murray

Murray Lu

5.7. Band Edges Measurement

5.7.1. Measuring Instruments：

As described in chapter 7 of this test report.

5.7.2. Test Procedure：

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges was measured and recorded.

5.7.3. Test Result：

- Test Result in lower band (Channel 1)： PASS
- Test Result in higher band(Channel 11)： PASS

5.7.4. Note on Band edge Emission

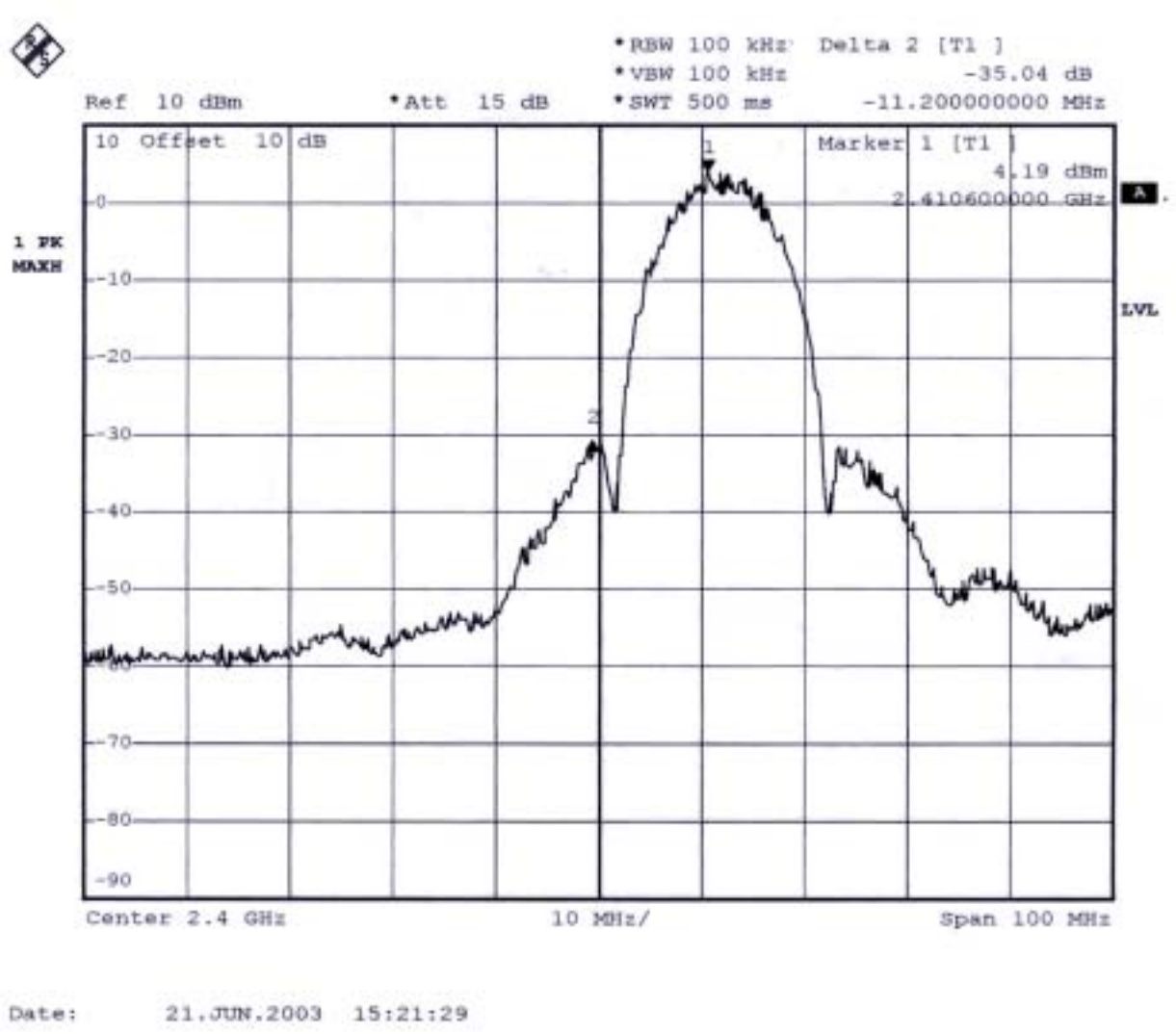
The band edge emission plot on page 61. shows 54.49dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

Polarity	The emission of carrier power strength (dB μ V/m)	The maximum field strength in restrict band (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
H	107.53	56.94	74.00	-17.06	Peak
H	99.60	49.01	54.00	-4.99	Average
V	108.66	58.07	74.00	-15.93	Peak
V	101.39	50.80	54.00	-3.20	Average

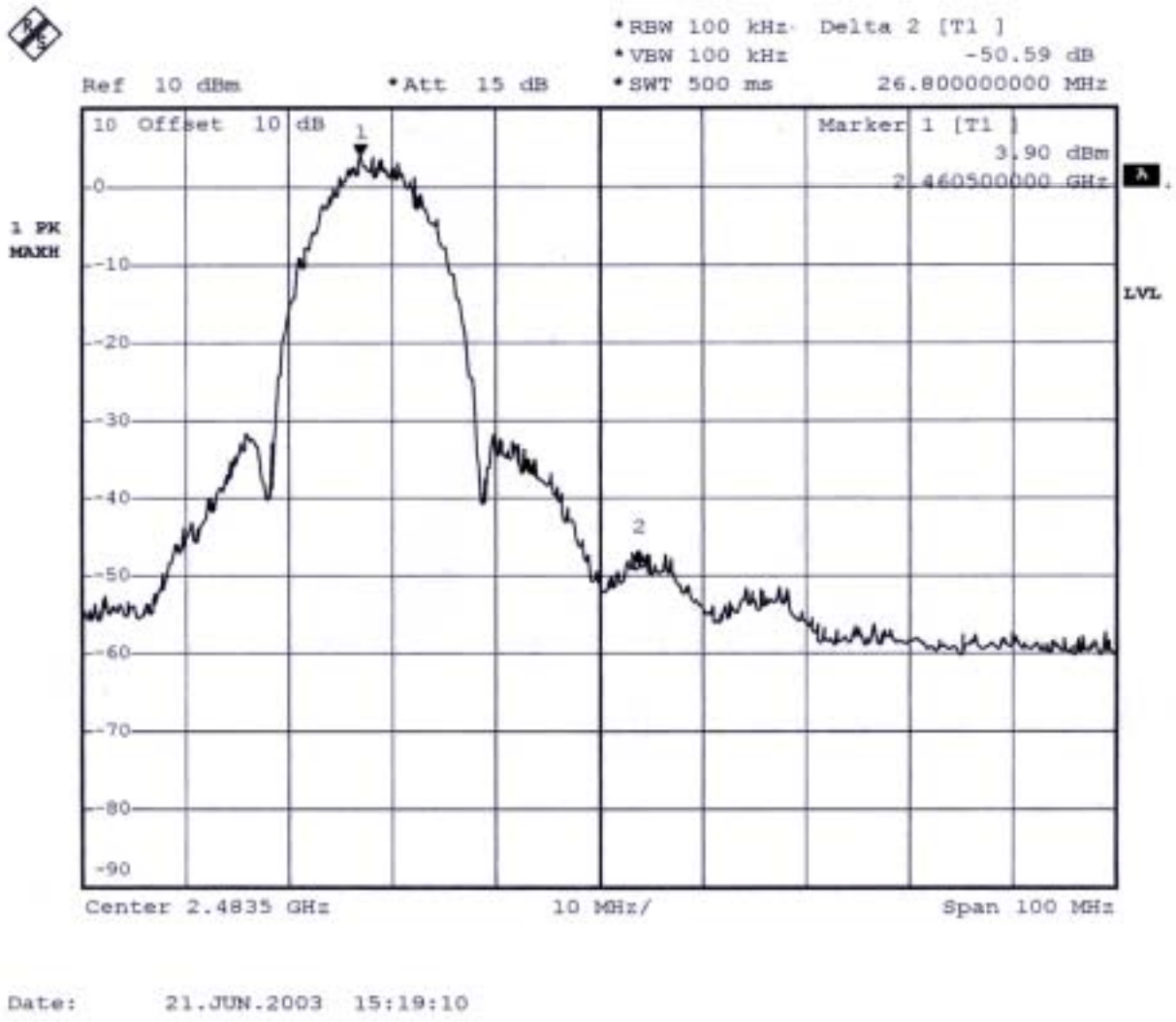
＊The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

The spectrum analyzer plots are attached as below：

Plot1 (Channel 01)：



Plot2 (Channel 11)：



Comments： All emissions in any 100kHz bandwidth outside the band edge are attenuated more then 20dB from the carrier.

5.8. Antenna Requirements

The EUT use a undetachable antenna via U.FL external connector. It is considered meet antenna requirement of FCC.

5.8.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 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 FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.8.2. Antenna Connected Construction

The maximum Gain antenna used in this product is dipole antenna. The antenna connector type is U.FL. The coaxial cable of the antenna is fixed to the antenna.

5.9. RF Exposure

FCC Rules and Regulations Part 1.1307,1.1310,2.1091,2.1093:

RF Exposure Compliance

5.9.1. Limit For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm2)	Averaging Time |E|2,|H|2 or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Time |E|2,|H|2 or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F=frequency in MHz *Plane-wave equivalent power density

5.9.2. MPE Calculations

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density:} \quad Pd\ (mW/cm^2) = \frac{E^2}{3770}$$

E＝Electric field (V/m)

P＝Peak output power (mW)

G＝Antenna numeric gain (numeric)

d＝Separation distance (m)

Because the EUT is belong to General Population/ Uncontrolled Exposure. So the Limit of Power Density is 1.0 mW/cm^2. We can change the formula to:

$$d = \sqrt{\frac{30 \times P \times G}{3770}}$$

Channel NO.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (W)	Calculated RF Exposure Separation Distance (m)	Minimum RF Exposure Separation Distance (m)
Channel 1	2.00	1.58	13.84	0.0242	0.0175	0.20
Channel 6	2.00	1.58	13.47	0.0222	0.0167	0.20
Channel 11	2.00	1.58	13.49	0.0223	0.0168	0.20

5.9.3. FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation. Proposed RF exposure safety information to include in User's Manual.

6. EMI Suppression Component List

1. Aluminum foil and copper foil are added on two sides of the main board.
   (As the Internal photo No.1, 2)

7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	1.04	1000	24.30	3.89
35	13.83	1.15	2000	31.10	5.41
40	12.41	1.18	3000	29.60	6.92
45	11.69	1.29	4000	30.80	8.24
50	7.77	1.28	5000	34.20	9.22
55	6.68	1.45	6000	33.30	10.25
60	5.58	1.42	7000	37.80	11.61
65	5.51	1.81	8000	39.40	11.78
70	5.43	1.49	9000	38.40	12.59
75	6.65	1.48	10000	38.90	13.84
80	8.11	1.92	11000	41.10	14.64
85	9.23	1.96	12000	42.70	14.12
90	10.34	1.97	13000	43.90	16.01
95	10.85	2.00	14000	43.70	13.76
100	11.36	2.25	15000	43.40	14.30
110	11.27	2.10	16000	40.90	15.16
120	11.17	2.27	17000	44.40	15.88
130	11.17	2.23	18000	47.10	16.09
140	11.72	2.12	19000	37.60	16.98
150	10.52	2.16	20000	37.30	16.21
160	9.39	2.34	21000	37.00	20.13
170	8.93	2.33	22000	38.00	19.24
180	9.20	2.49	23000	38.70	19.64
190	8.98	2.30	24000	38.60	20.54
200	8.76	2.62	25000	38.90	20.14
220	10.01	3.05	14000	43.70	13.76
240	11.20	3.03	15000	43.40	14.30
260	12.19	2.82	16000	40.90	15.16
280	12.89	3.74	17000	44.40	15.88
300	13.56	3.32	18000	47.10	16.09
320	13.94	3.45	19000	37.60	16.98
340	14.32	3.54	20000	37.30	16.21
360	14.69	3.50	21000	37.00	20.13
380	15.07	3.73	22000	38.00	19.24
400	15.43	4.00	23000	38.70	19.64
450	16.08	4.03	24000	38.60	20.54
500	16.73	4.38	25000	38.90	20.14
550	17.70	4.29			
600	18.69	4.29			
650	18.99	4.94			
700	19.30	4.74			
750	19.84	4.88			
800	20.39	5.17			
850	20.60	5.23			
900	20.82	5.24			
950	20.98	5.92			
1000	21.15	6.38			

8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 12, 2003	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001-008	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001-009	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Jan. 07, 2003	Conduction (CO01-HY)
50 ohm BNC type Terminal	NOBLE	50ohm	TM013	50 ohm	Apr. 24, 2003	Conduction (CO01-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz~1GHz 3m	Jun. 22, 2002	Radiation (03CH02-HY)
Spectrum Analyzer	R&S	FSP7	838858/039	9KHz – 7GHz	Jan. 20, 2003	Radiation (03CH02-HY)
Receiver	SCHAFFNER	SCR 3501	416	9 KHz –1GHz	Feb. 19, 2003	Radiation (03CH02-HY)
Amplifier	ADVANTEST	BB525C	CH300001	9KHz – 3GHz	Nov. 18, 2002	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2681	30MHz –2GHz	Dec. 21, 2002	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 ~ 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB020	30MHz~1GHz	Jan. 02, 2003	Radiation (03CH02-HY)
Horn Antenna	COM-POWER	AH-118	10094	1GHz – 18GHz	Apr. 10, 2003	Radiation
Spectrum analyzer	R&S	FSP40	100004/040	9KHZ~40GHZ	Aug. 07, 2002	Radiation
Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Aug. 12, 2002	Radiation
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Mar. 14, 2003	Radiation
Power meter	R&S	NRVS	100444	DC~40GHz	May 28, 2003	Conducted
Power sensor	R&S	NRV-Z55	100049	DC~40GHz	May 28, 2003	Conducted
Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	May 28, 2003	Conducted
AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	May 27, 2003	Conducted
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 02, 2002	Conducted

※ Calibration Interval of instruments listed above is one year.

9. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m
Antenna factor calibration	normal(k=2)	±1
cable loss calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
Antenna Directivity	rectangular	±3
Antenna Factor V.S. Height	rectangular	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25
site imperfection	rectangular	±2
Mismatch Receiver VSWR Γ1=0.09 Antenna VSWR Γ2=0.67 Uncertainty=20log(1-Γ1*Γ2)	U-shaped	±0.54
combined standard uncertainty Ue(y)	normal	±2.7
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	±5.4

$U=\sqrt{\{(1/2)^2+(0.3/2)^2+(2^2+0.5^2+2^2+0.25^2+2^2)/3+(0.54)^2/2\}}=2.2$ for 10m test distance

$U=\sqrt{\{(1/2)^2+(0.3/2)^2+(2^2+3^2+2^2+0.25^2+2^2)/3+(0.54)^2/2\}}=2.7$ for 3m test distance

Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR Γ1=0.09 LISN VSWR Γ2=0.33 Uncertainty=20log(1-Γ1*Γ2)	U-shaped	0.2
combined standard uncertainty Ue(y)	normal	±1.66
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	±3.32

$U=\sqrt{\{(0.3/2)^2+(2^2+1.5^2+0.2^2)/3+(0.2)^2/2\}}=1.66$