FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment	:	Notebook
Model No.	:	REVOLUTION SERIES 3000
FCC ID	:	Q7KREVOLUTION-V3
Filing Type	:	Certification
Applicant	:	**TAIWAN MYCOMP CO., LTD.** 1FL, NO. 16, LANE 50, NANKANG RD., SEC. 3, NANKANG DISTRICT,TAIPEI, TAIWAN

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: May 05, 2003

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

Certificate No. : F2D2005

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

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Applicant	:	**TAIWAN MYCOMP CO., LTD.** 1FL, NO. 16, LANE 50, NANKANG RD., SEC. 3, NANKANG DISTRICT,TAIPEI, TAIWAN

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 Jan. 16, 2003 at **SPORTON International Inc.** LAB.

May 30, 2003

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

TAIWAN MYCOMP CO., LTD.
1FL, NO. 16, LANE 50, NANKANG RD., SEC. 3,
NANKANG DISTRICT,TAIPEI, TAIWAN

1.2. Manufacturer

Same as 1.1.

1.3. Basic Description of Equipment under Test

Equipment	: Notebook
Model No.	: REVOLUTION SERIES 3000
FCC ID.	: Q7KREVOLUTION-V3
Trade Name	: MYCOMP, KONTRON
UTP Cable	: Non-Shielded, 10m
TEL Cable	: Non-Shielded, 10m
Power Supply Type	: Switching
AC Power Input	: Non-Shelded, 1.8m, 2pin
DC Power Cable	: Non-Shielded, 1.8m, 2pin

1.4. Feature of Equipment under Test

Processor	Intel Mobile Pentium® III-M 1.06 GHz
Main Battery	Lithium Ion battery - 57 Watt, 3.5 hour life (approximate)
BIOS:	PhoenixBIOS 4.0, Release 6
RAM:	128 MB SDRAM standard
L2-Cache	512KB
Keyboard:	Full-size QWERTY keyboard with 84 keys (USA Standard)
Interfaces:	1x Power Connector with 10-28 VDC, 4.6 Amps 1x Serial Port (COM 1) 2x USB 2.0 Ports Docking connector 1x RJ11 56K V.90 Modem 1x RJ45 10/100Mbs Ethernet/LAN Audio phonejacks: 1x MIC-In 1x Line-In 1x Speaker-Out Integrated: 802.11b WLAN, Bluetooth PAN

PCMCIA:	Card BUS connector provides two open PC Card slots that accommodate two Type II, or one Type III PCMCIA device.
Graphics Controller:	Integrated Direct AGP Graphics Core frequency up to 166 MHz 350 MHz RAM DAC Video-RAM: 8 to 48 MB of Dynamic Video Memory (shared) Up to 32 MB with 128 MB RAM; 48 MB with 256 MB RAM
Pointing Device:	Touch Pad on the keyboard, Touchscreen on the display
Power specification	10-24 VDC
AC adapter:	Input: 100-240 VAC, 50-60 Hz; Output: 12V, 55W
RTC/CMOS Battery	Rechargeable LIon real-time clock/CMOS battery on main board. Not user-serviceable.
CPU	INTEL / RH80530 1066/5.2 / 1.06GHz
HDD	IBM / IC25N040ATCS04-0 / 40GB
CD ROM	MITSUMI / SR244W1
PANEL	PHILIPS / LP121X1 / 12”
ADAPTOR	ILAN / F1960A / INPUT 100-240V 50-60Hz 1.8A

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 remote workstation, LOGITECH PS/2 Keyboard, ACEEX Modem, TeraSys External HD Case, STEREO Headset, ViewSonic Monitor, KOKA Walk Man, Epson Printer and EUT for EMI test. The remote Workstation included HP PC, HITACHI Monitor, LOGITECH PS/2 Keyboard and LOGITECH PS/2 Mouse.

c. The EUT can operate on eleven channels from 2414MHz to 2462MHz for Wireless 802.11b function.
According to 15.31(m), three channels (one near top, one near middle and one near bottom) were performed as following:
Mode 1: 2412MHz（Channel 1）
Mode 2: 2437MHz（Channel 6）
Mode 3: 2462MHz（Channel 11）

d. The EUT can operate on seventy-nine channels from 2414MHz to 2480MHz for Wireless Bluetooth function.
According to 15.31(m), three channels (one near top, one near middle and one near bottom) were performed as following:
Mode 1: 2402MHz（Channel 00）
Mode 2: 2441MHz（Channel 39）
Mode 3: 2480MHz（Channel 78）

e. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 24800MHz.

2.2. Description of Test System

Support Unit 1. -- PS/2 Keyboard (LOGITECH) -- for local and remote workstation

FCC ID	: N/A
Model No.	: Y-SJ17
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.

Support Unit 2. -- Modem (ACEEX) -- for local workstation

FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0015

Data Cable : Shielded, 1.15m

Support Unit 3. – External HD Case (TeraSys) -- for local workstation

FCC ID : N/A
Model No. : F12-UF
Power Cord : Non-Shielded
Serial No. : SP0020
Data Cable : Shielded, 1.8m
Remark : This support device was tested to compy with FCC standards and authorized under a declaration of conformity.

Support Unit 4. -- Headset (STEREO) -- for local workstation

FCC ID : N/A
Model No. : MSB-206
Serial No. : SP0060
Data Cable : Non-Shielded, 2.3m
Remark : This support device was tested to compy with FCC standards and authorized under a declaration of conformity.

Support Unit 5. -- Monitor (VIEWSONIC) -- for local workstation

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 6. – Walk Man (KOKA) -- for local workstation

FCC ID : N/A
Model No. : KW-235
Serial No. : SP0038
Data Cable : Non-Shielded, 1.7m
Remark : This support device was tested to compy with FCC standards and authorized under a declaration of conformity.

Support Unit 7. -- Printer (Epson) -- for local workstation

FCC ID	: N/A
Model No.	: COLOR 740
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0048
Data Cable	: Shielded, 1.35m
Remark	: This support device was tested to compy with FCC standards and authorized under a declaration of conformity.

Support Unit 8. -- Personal Computer (HP) -- for remote workstation

FCC ID	: N/A
Model No.	: VECTRAC VL420 DT
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.

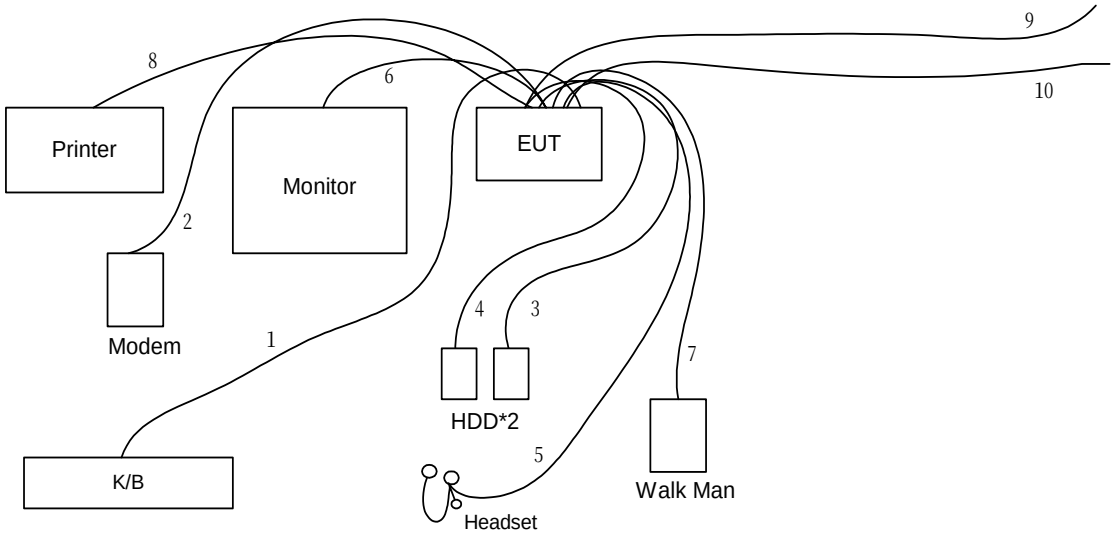
Support Unit 9. -- Monitor (HITACHI) -- for remote workstation

FCC ID	: N/A
Model No.	: CM823F
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 10. -- PS/2 Mouse (LOGITECH) -- for remote workstation

FCC ID	: DZL211029
Model No.	: M-S34
Serial No.	: SP0041
Data Cable	: Shielded, 1.7m

2.3. Connection Diagram of Test System



1. The I/O cable is connected from EUT to the support unit 1
2. The I/O cable is connected from EUT to the support unit 2
3. The I/O cable is connected from EUT to the support unit 3
4. The I/O cable is connected from EUT to the support unit 3
5. The I/O cable is connected from EUT to the support unit 4
6. The I/O cable is connected from EUT to the support unit 5
7. The I/O cable is connected from EUT to the support unit 6
8. The I/O cable is connected from EUT to the support unit 7
9. The TP cable is connected from EUT to the remote workstation.
10. The Telephone line cable is connected from EUT to the remote workstation.

3. Operation of Equipment under Test

An executive program, EMCTEST.EXE under WIN XP, which generates 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, the following programs were executed:

- Executed “Copy.exe” to read and write data from EUT.
- Executed “Blue Test, Prism Test Utility” to keep transmitting signals at fixed frequency.
- Executed "Ping.exe " was executed to link with the remote workstation to receive and transmit data by TP cable.

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, 03CH03-HY

4.1. Test Voltage

110V/ 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 24800MHz

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
15.247(a)(1)	Hopping Channel Separation	Pass
15.247(a)(1)(ii)	Number of Hopping Frequency Used	Pass
15.247(a)(1)(ii)	Hopping Channel Bandwidth	Pass
15.247(a)(1)(ii)	Dwell Time of Each Frequency within a 30 Second Period	Pass
15.247(b)	Output Power	Pass
15.247(c)	100KHz Bandwidth of Frequency Band Edges	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

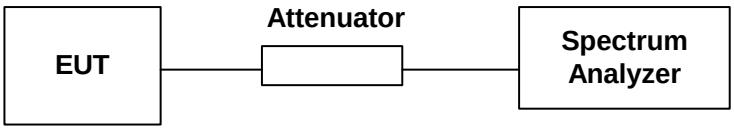
5.2.1. Measuring Instruments：

As described in chapter 6 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：

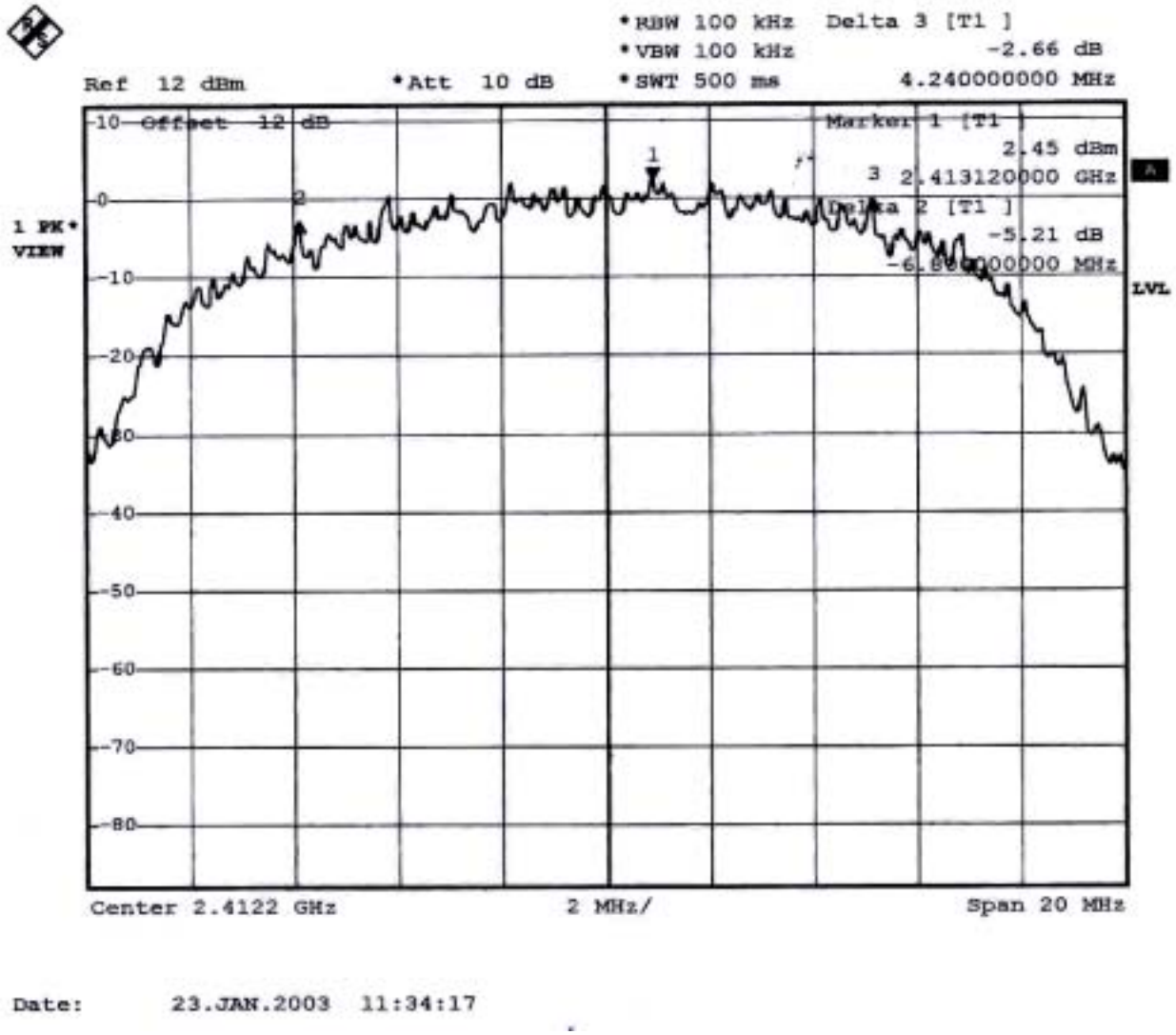


5.2.4. Test Result：The spectrum analyzer plots are attached as below

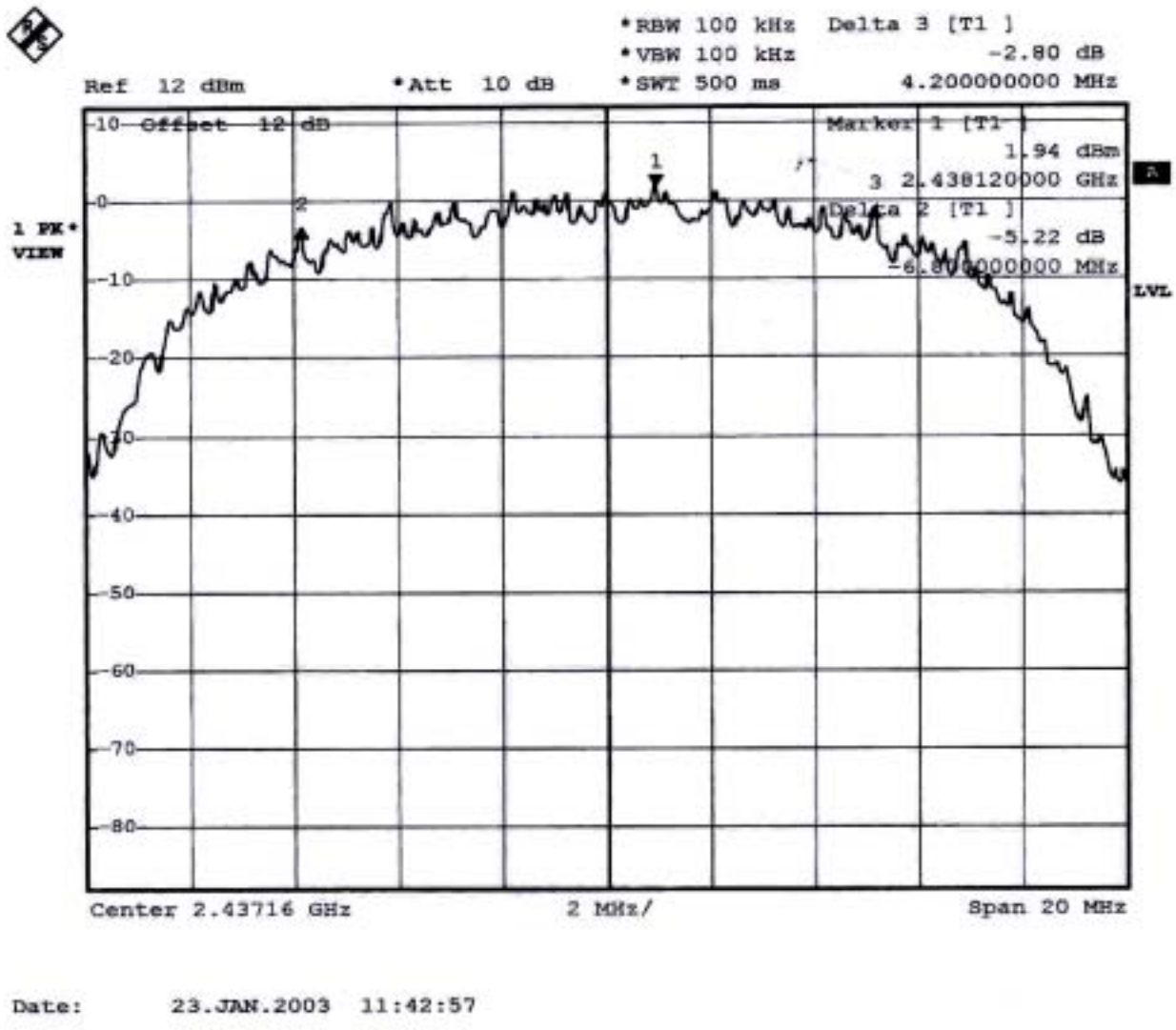
- Temperature : 26 °C
- Relative Humidity : 55%

Channel	Frequency (MHz)	6dB Emission bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
1	2412	11.04	0.5	1
6	2437	11.00	0.5	2
11	2462	11.04	0.5	3

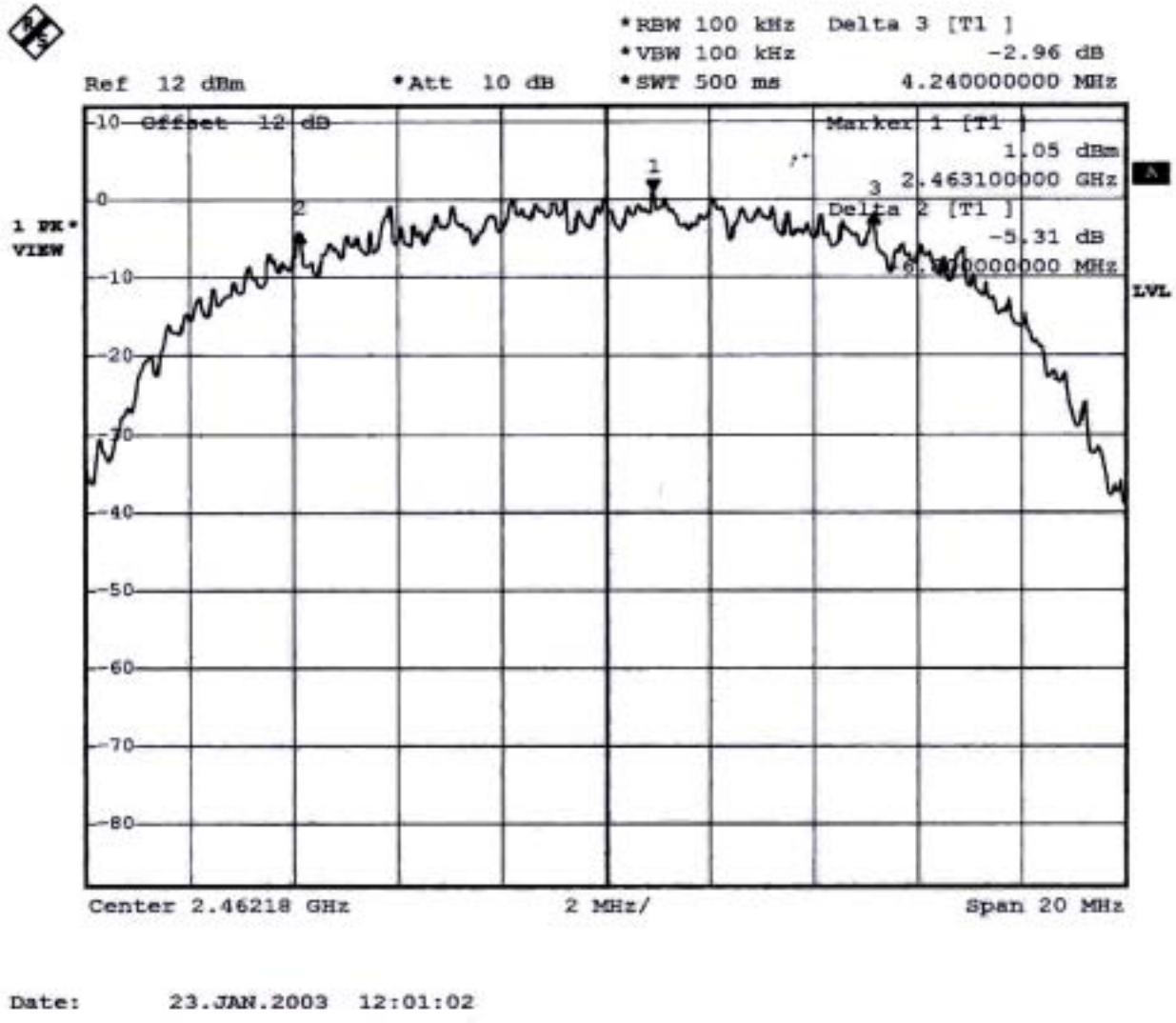
Plot1(Channel 1)：



Plot2(Channel 6)：



Plot3(Channel 11)：



Comments：6dB Emission bandwidth>500kHz

5.3. Peak Output Power

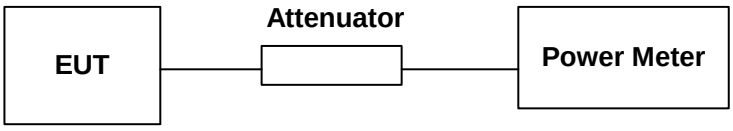
5.3.1. Measuring Instruments：

As described in chapter 6 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 : 26°C
- Relative Humidity : 55 %
- Antenna Gain: 2 dBi

Channel	Frequency (MHz)	Measured Output Power (mWatt)	Measured Output Power (dBm)	Limits (Watt/dBm)
1	2412	86.50	19.37	1W/30 dBm
6	2437	66.99	18.26	1W/30 dBm
11	2462	54.45	17.36	1W/30 dBm

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

5.4. Power Spectral Density

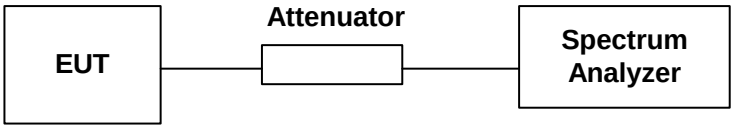
5.4.1. Measuring Instruments：

As described in chapter 6 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：

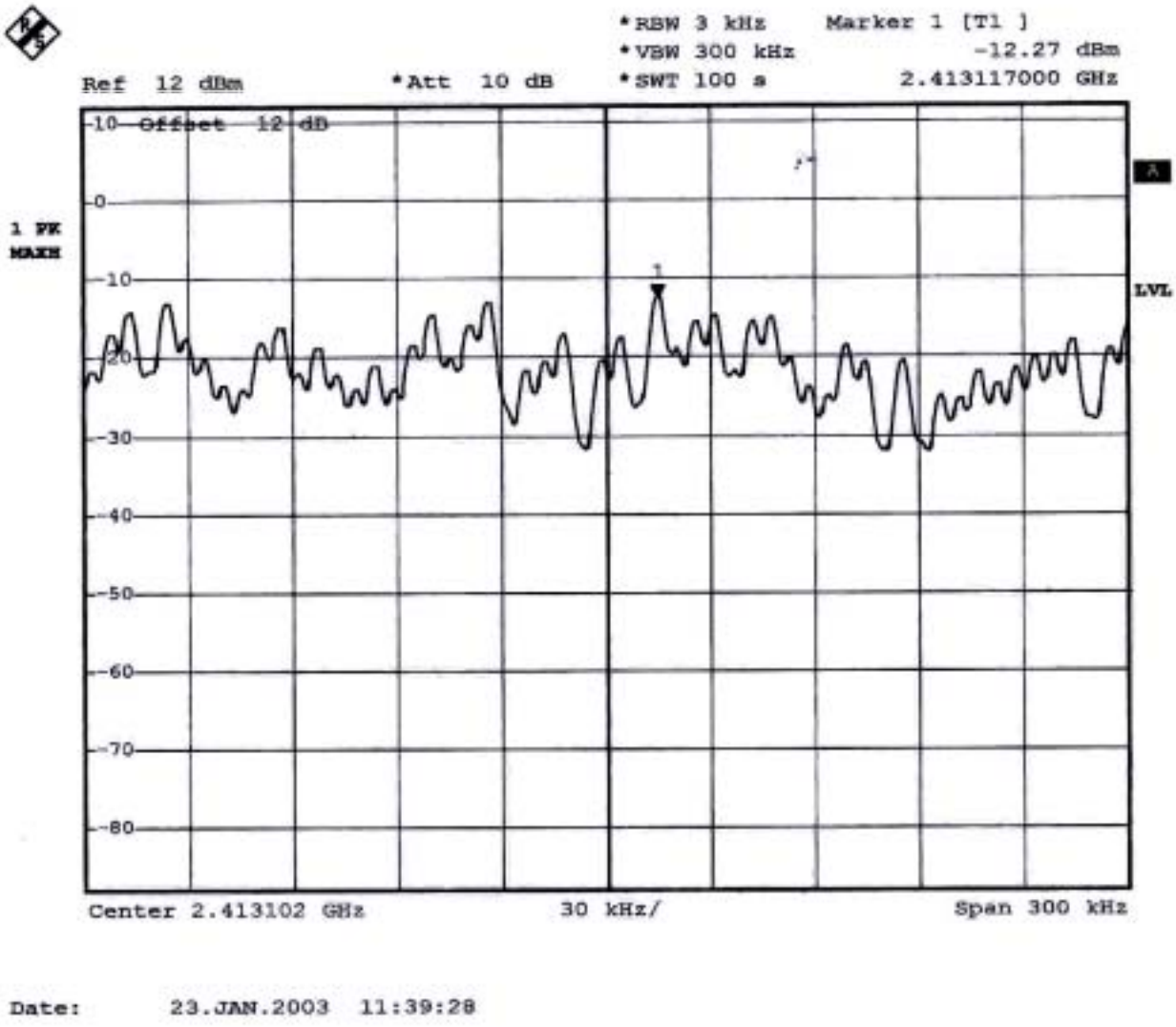


5.4.4. Test Result：See spectrum analyzer plots below

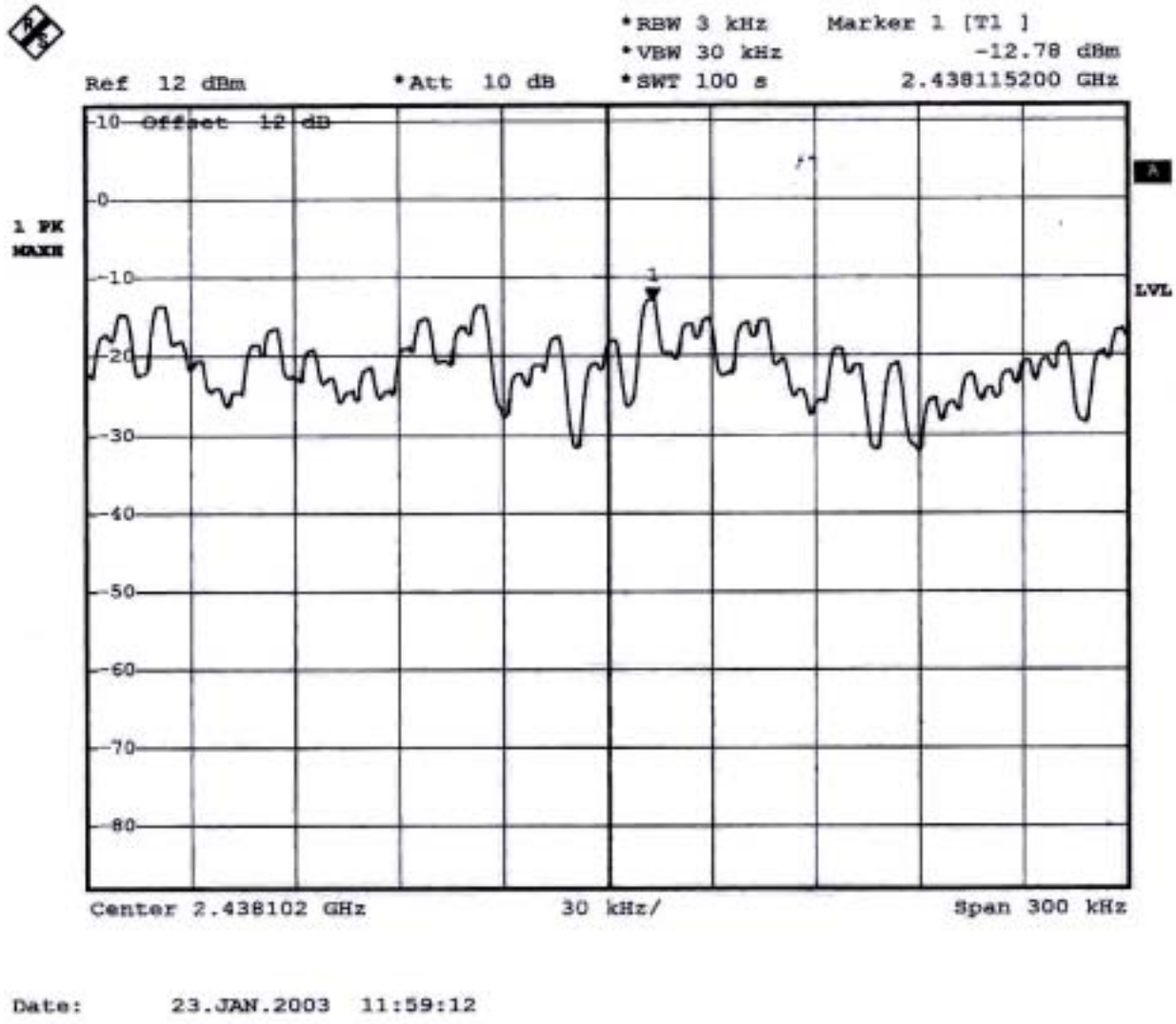
- Temperature : 26°C
- Relative Humidity : 55 %

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Plot Ref. No.
1	2412	-12.27	8	1
6	2437	-12.78	8	2
11	2462	-13.66	8	3

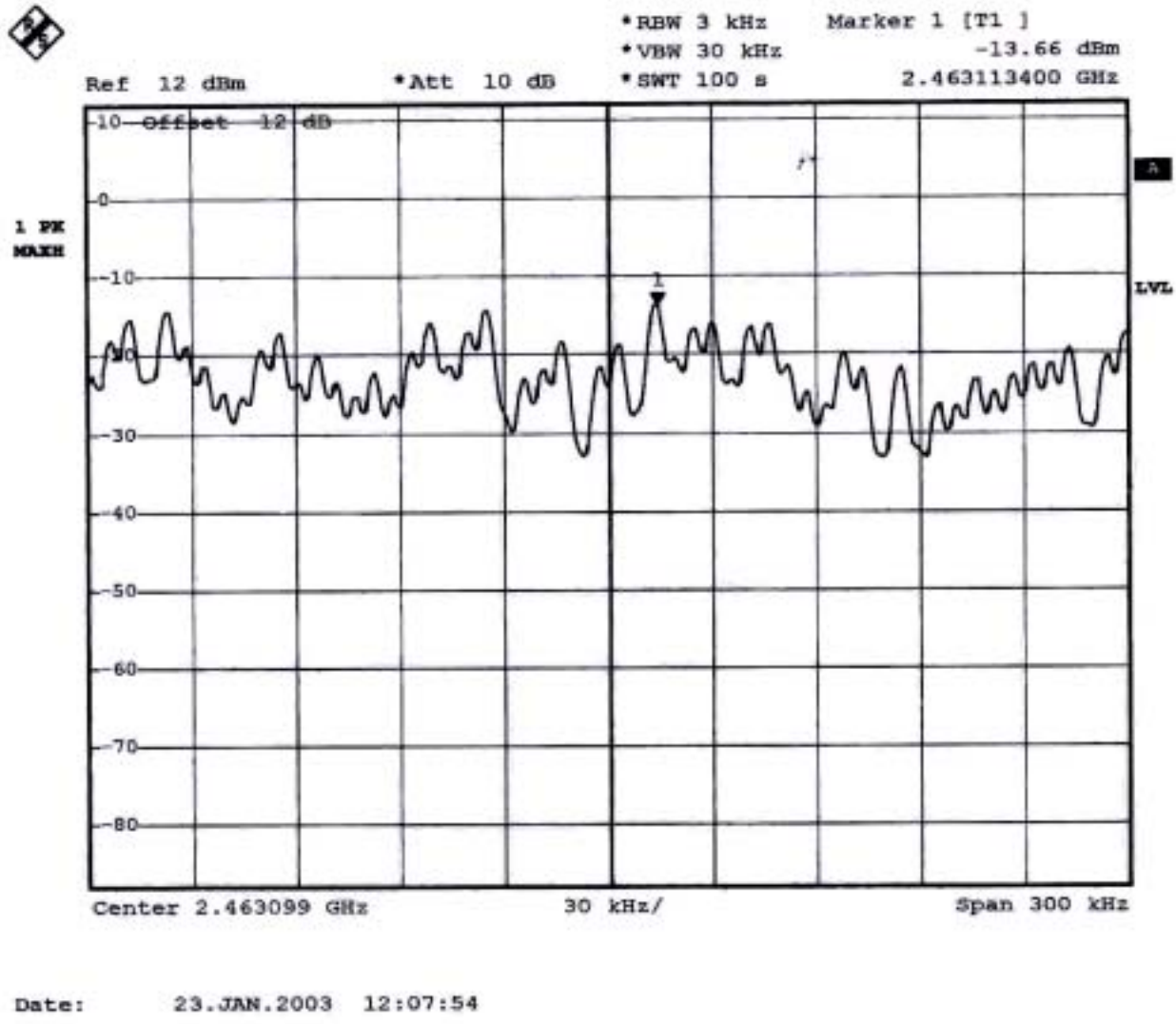
Plot1(Channel 1):



Plot2(Channel 6):



Plot3(Channel 11):



5.5. Hopping Channel Separation

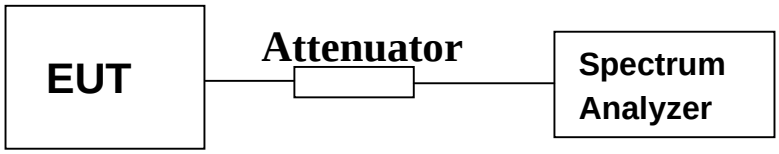
5.5.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.5.2. 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 Hopping Channel Separation is defined as the channel is separated with the next channel.

5.5.3. Test Setup Layout：

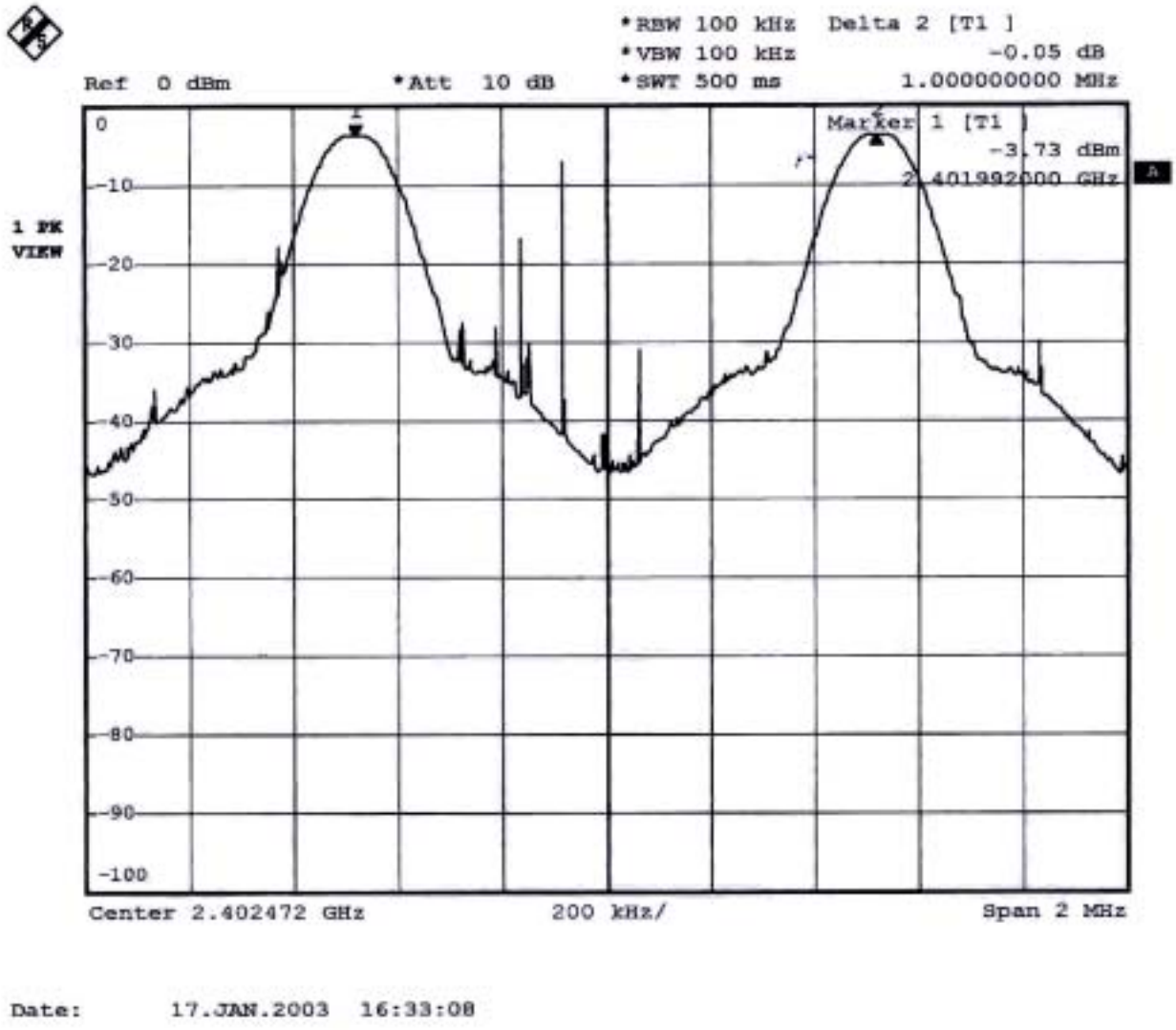


5.5.4. Test Result：The spectrum analyzer plots are attached as below

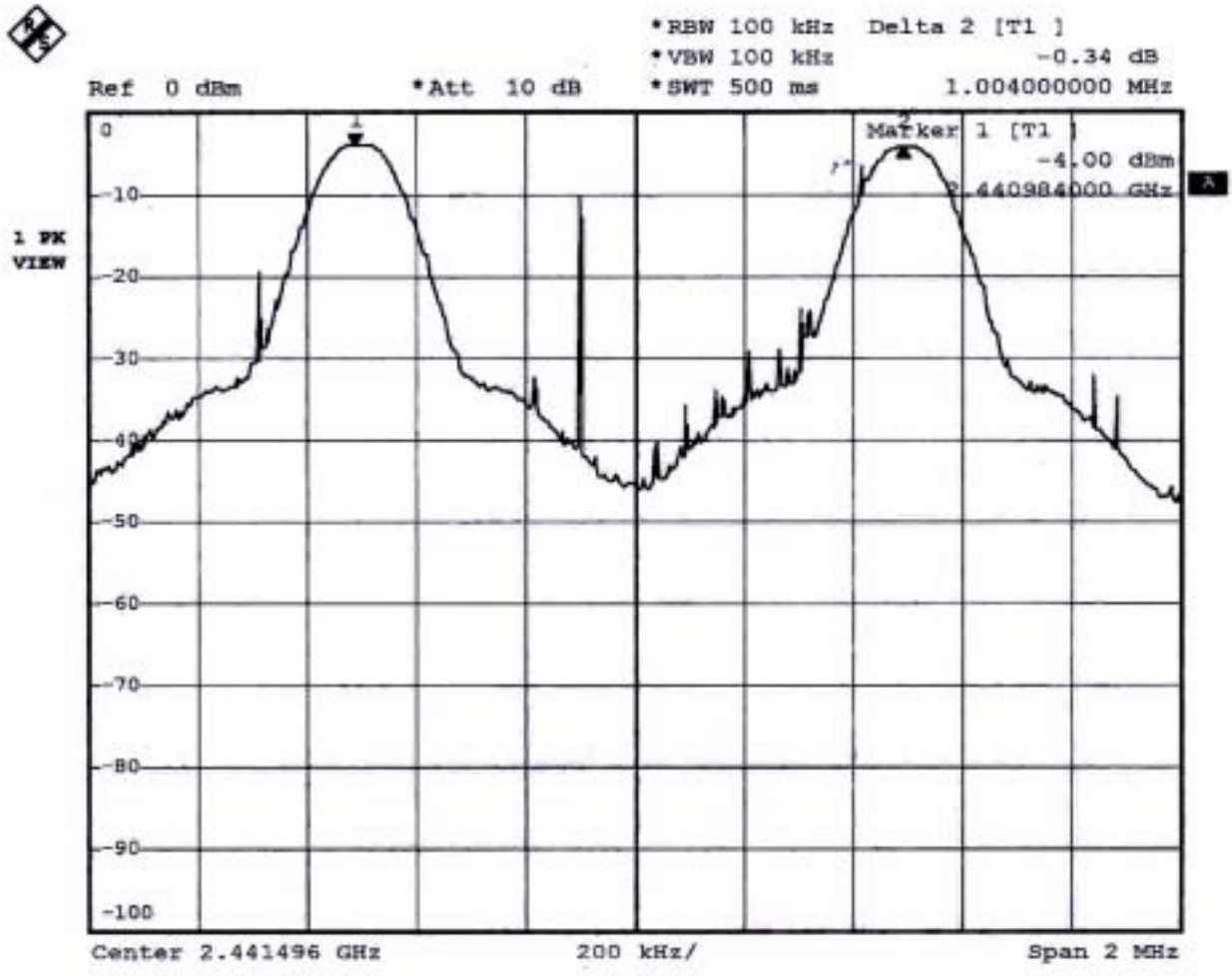
- Temperature: 26°C
- Relative Humidity: 55 %
- Duty cycle of the equipment during the test X ＝ 36%
-

Channel	Frequency (MHz)	Hopping Channel Separation (KHz)	Limits (KHz)	Plot Ref. No.
00	2402	1000.00	25	1
39	2441	1004.00	25	2
78	2480	1004.00	25	3

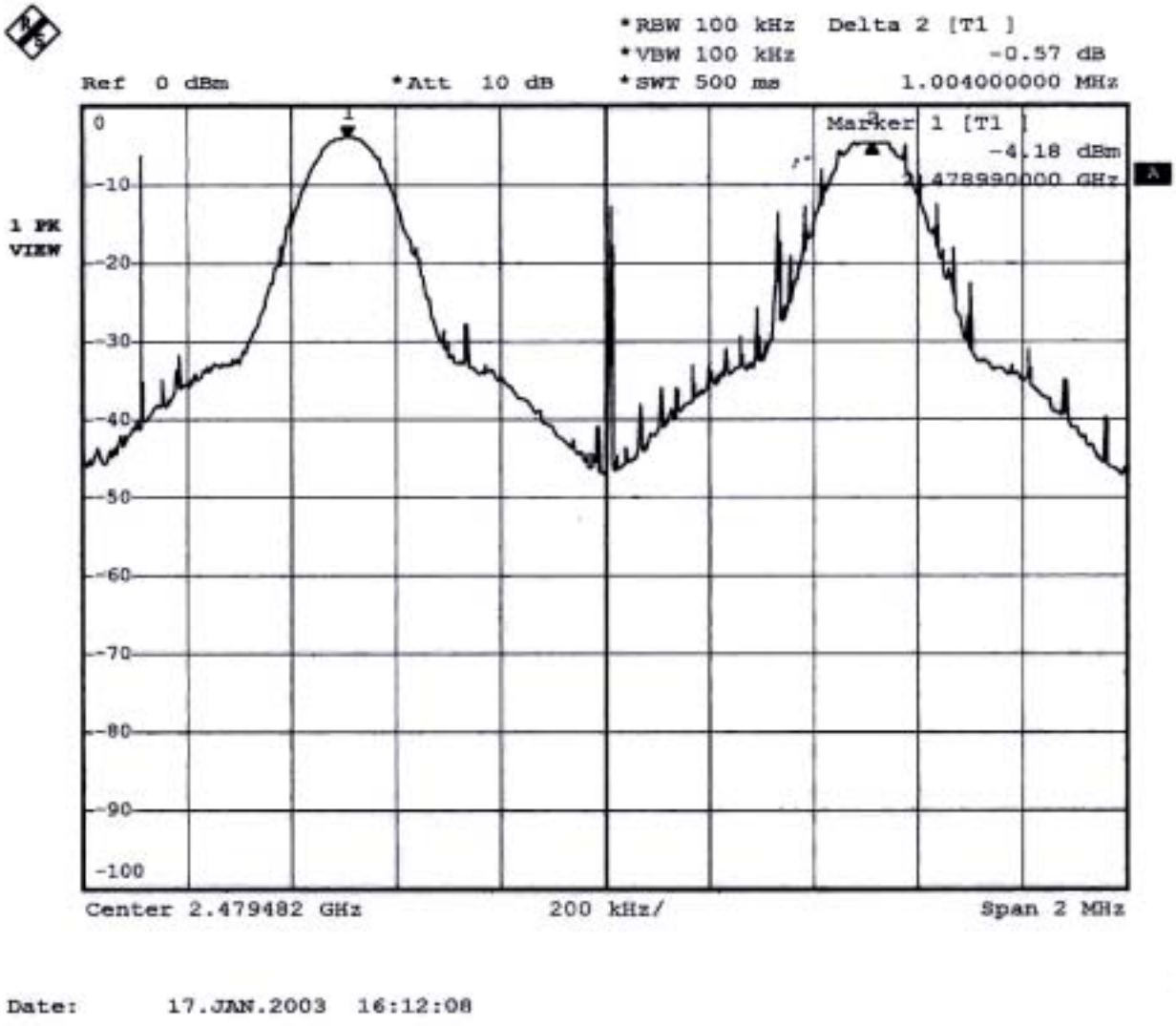
Plot 1 (Channel 00)：



Plot 2 (Channel 39)：



Plot 3 (Channel 78)：



5.5.5. Test Configuration（EUT Operating Condition）：

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies respectively.

5.6. Number of Hopping Frequency

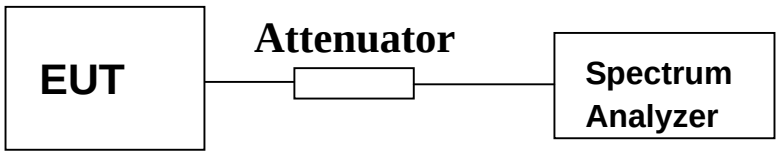
5.6.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.6.2. 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 number of hopping frequency used is defined as the device has the numbers of total channel.

5.6.3. Test Setup Layout：

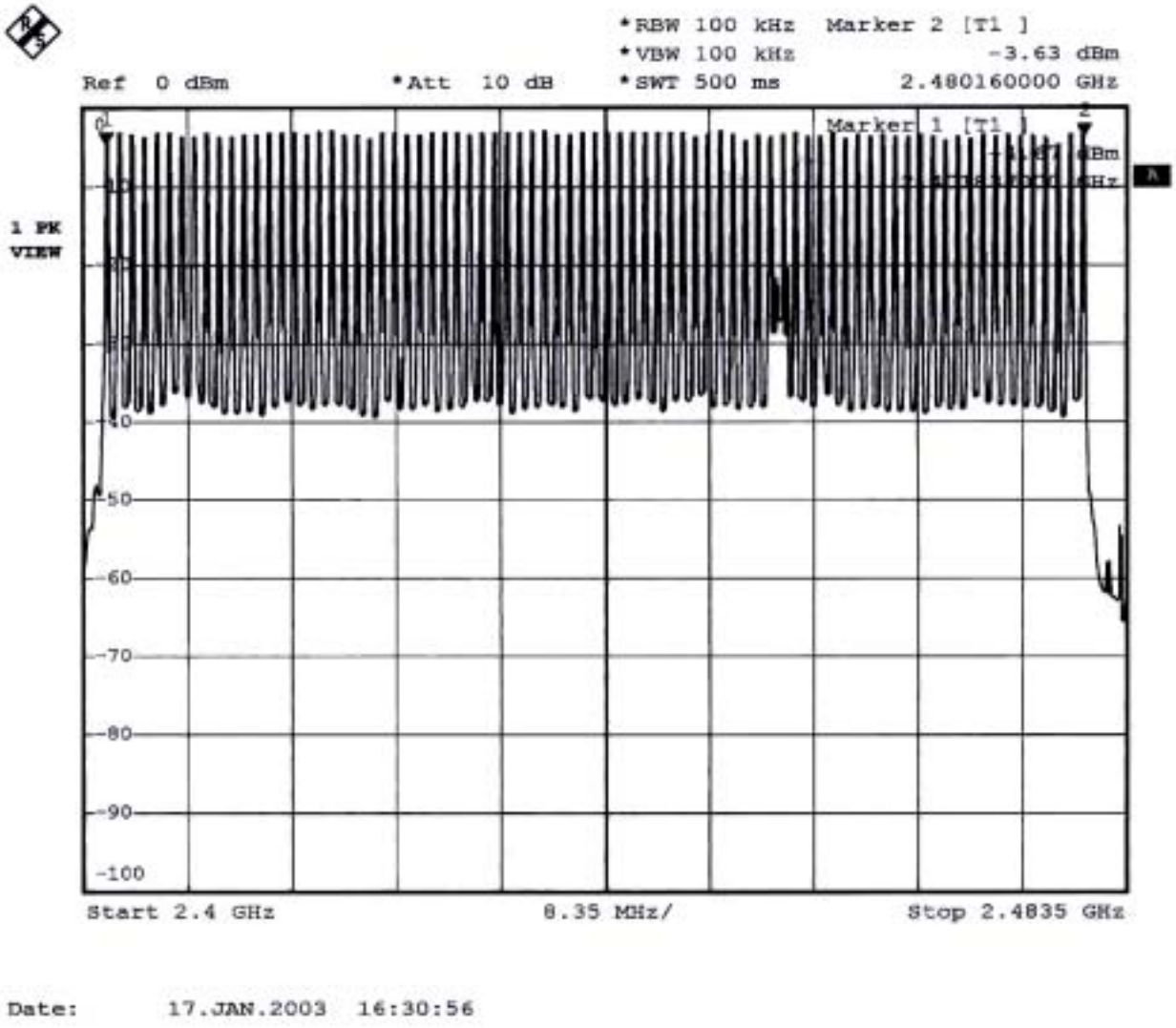


5.6.4. Test Result：See spectrum analyzer plots below

- Temperature: 26°C
- Relative Humidity: 55 %
- Duty cycle of the equipment during the test X ＝ 36%

Number of Hopping Frequency (Channel)	Limits (Channel)	Plot Ref. No.
79	75	1

Plot 1：


*RBW 100 kHz
*VBW 100 kHz
*SWT 500 ms
Marker 2 [T1]
-3.63 dBm
2.480160000 GHz
Ref 0 dBm
*Att 10 dB
Marker 1 [T1]
1 PK
VIEW
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 2.4 GHz
8.35 MHz/
Stop 2.4835 GHz
Date: 17.JAN.2003 16:30:56

5.7. Hopping Channel Bandwidth

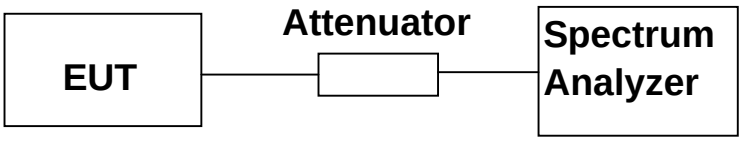
5.7.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.7.2. 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 Hopping Channel bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

5.7.3. Test Setup Layout：

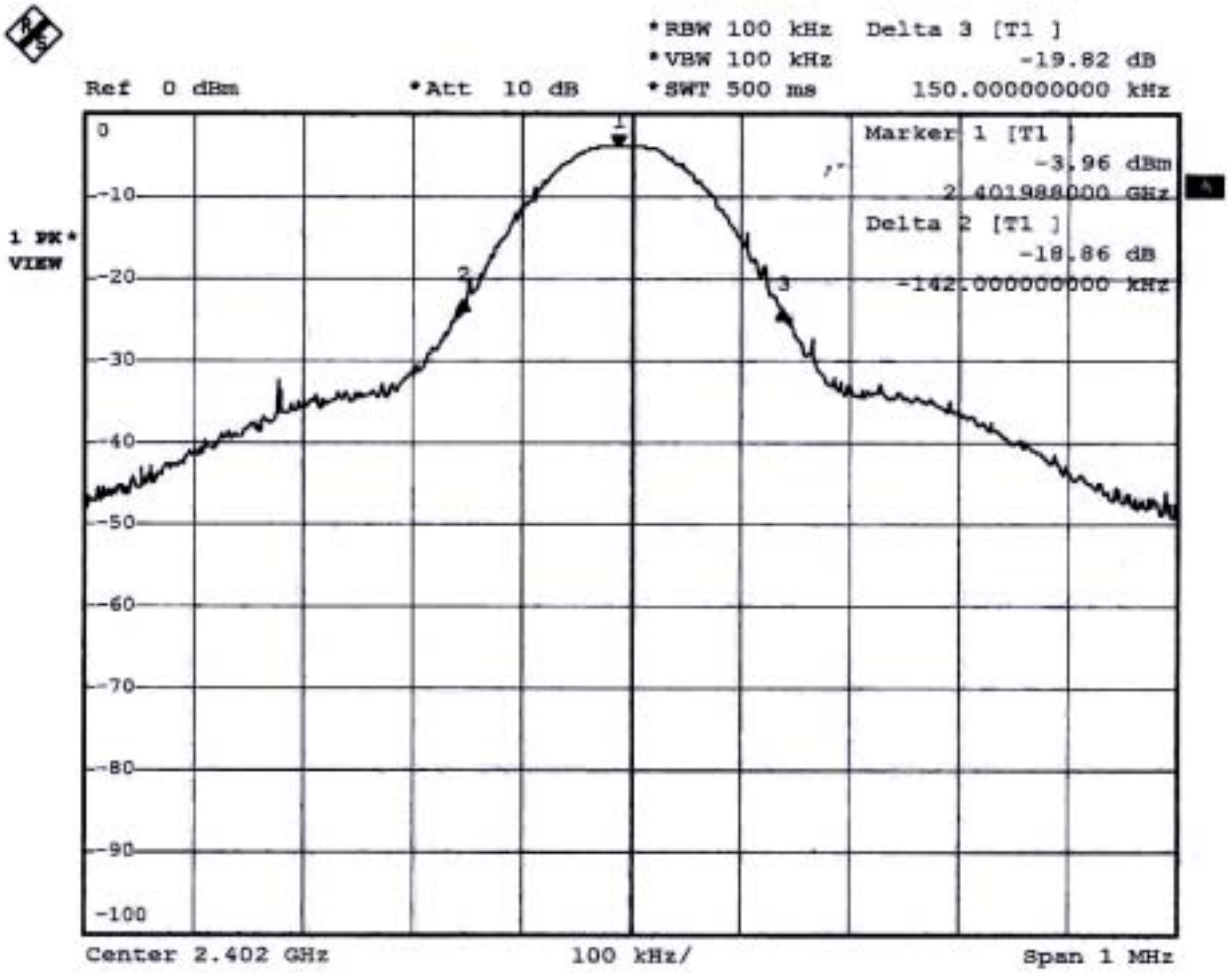


5.7.4. Test Result：See spectrum analyzer plots below

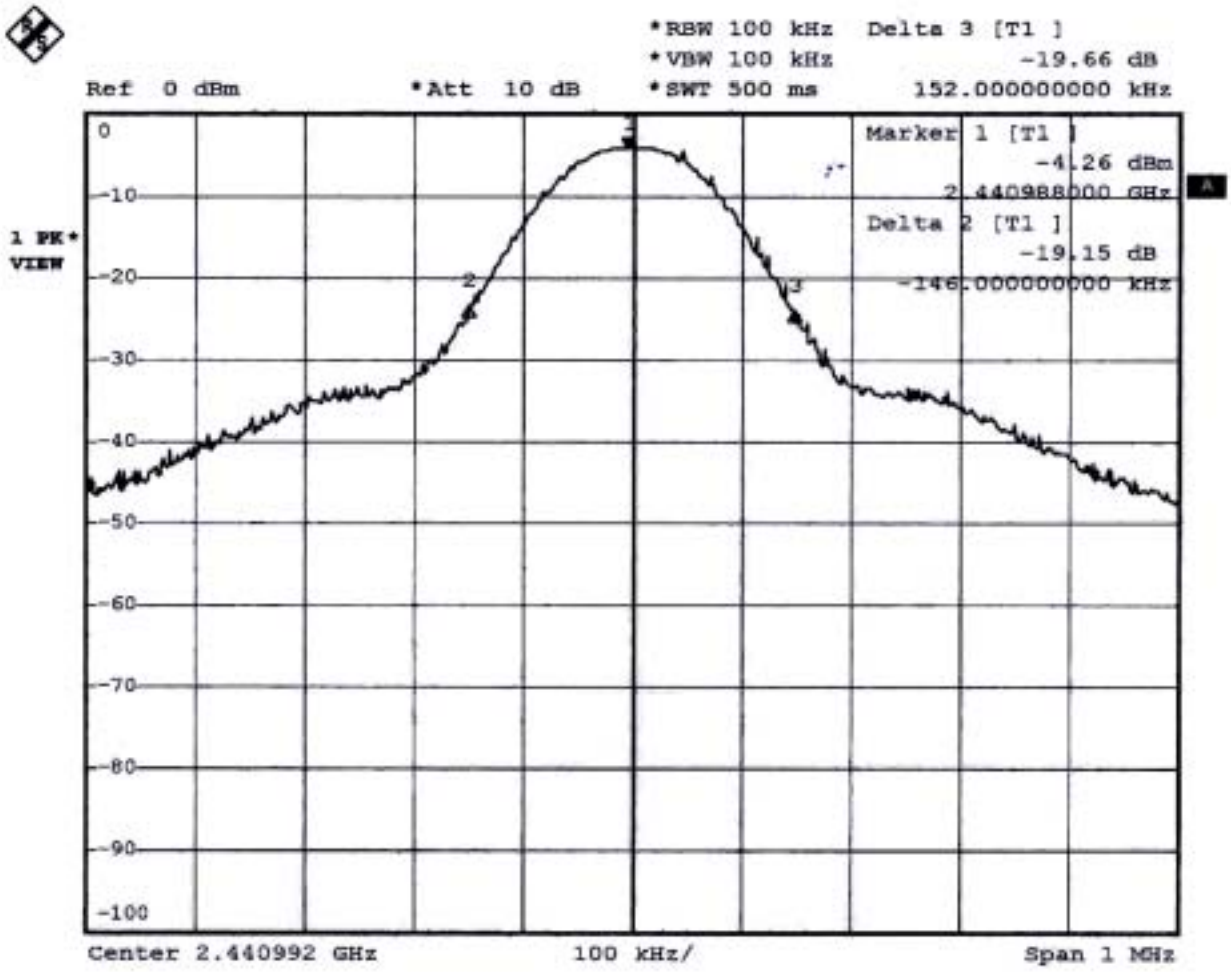
- Temperature: 26°C
- Relative Humidity: 55 %
- Duty cycle of the equipment during the test X ＝ 36%

Channel	Frequency (MHz)	Hopping Channel Bandwidth (KHz)	Limits (KHz)	Plot Ref. No.
00	2402	292.00	1000	1
39	2441	298.00	1000	2
78	2480	312.00	1000	3

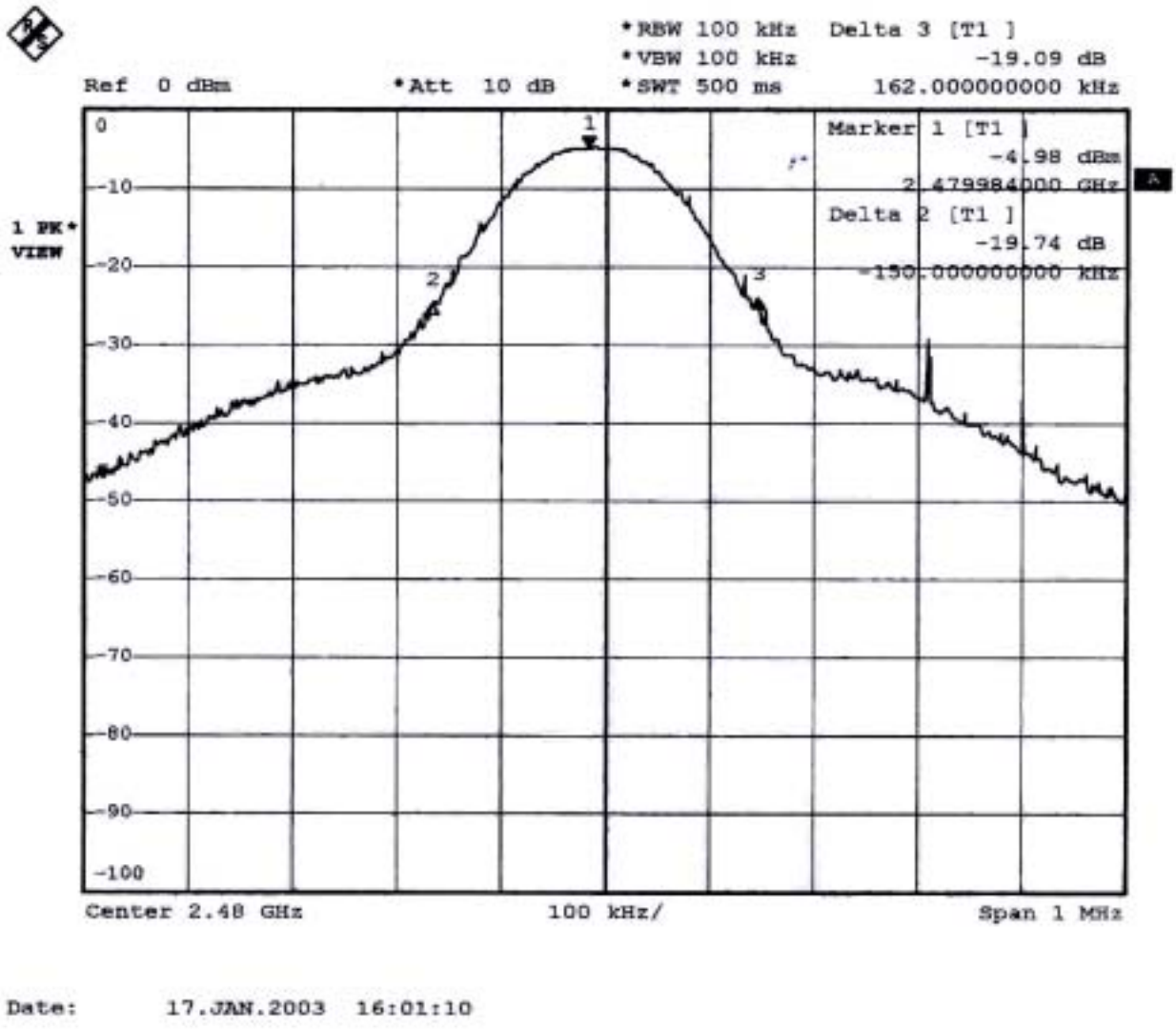
Plot 1 (Channel 00)



Plot 2 (Channel 39)



Plot 3 (Channel 78)



5.7.5. Test Configuration（EUT Operating Condition）：

Same as Section 4.2.5.

5.8. Dwell Time of Each Frequency within a 30 Seconds Period

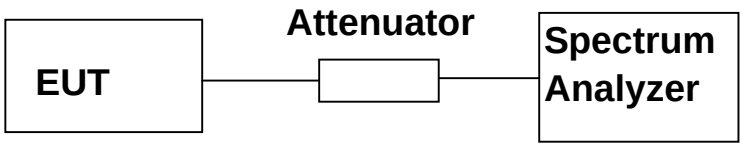
5.8.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.8.2. 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. Set the center frequency on any frequency would be measure and set the frequency span to zero span.

5.8.3. Test Setup Layout：

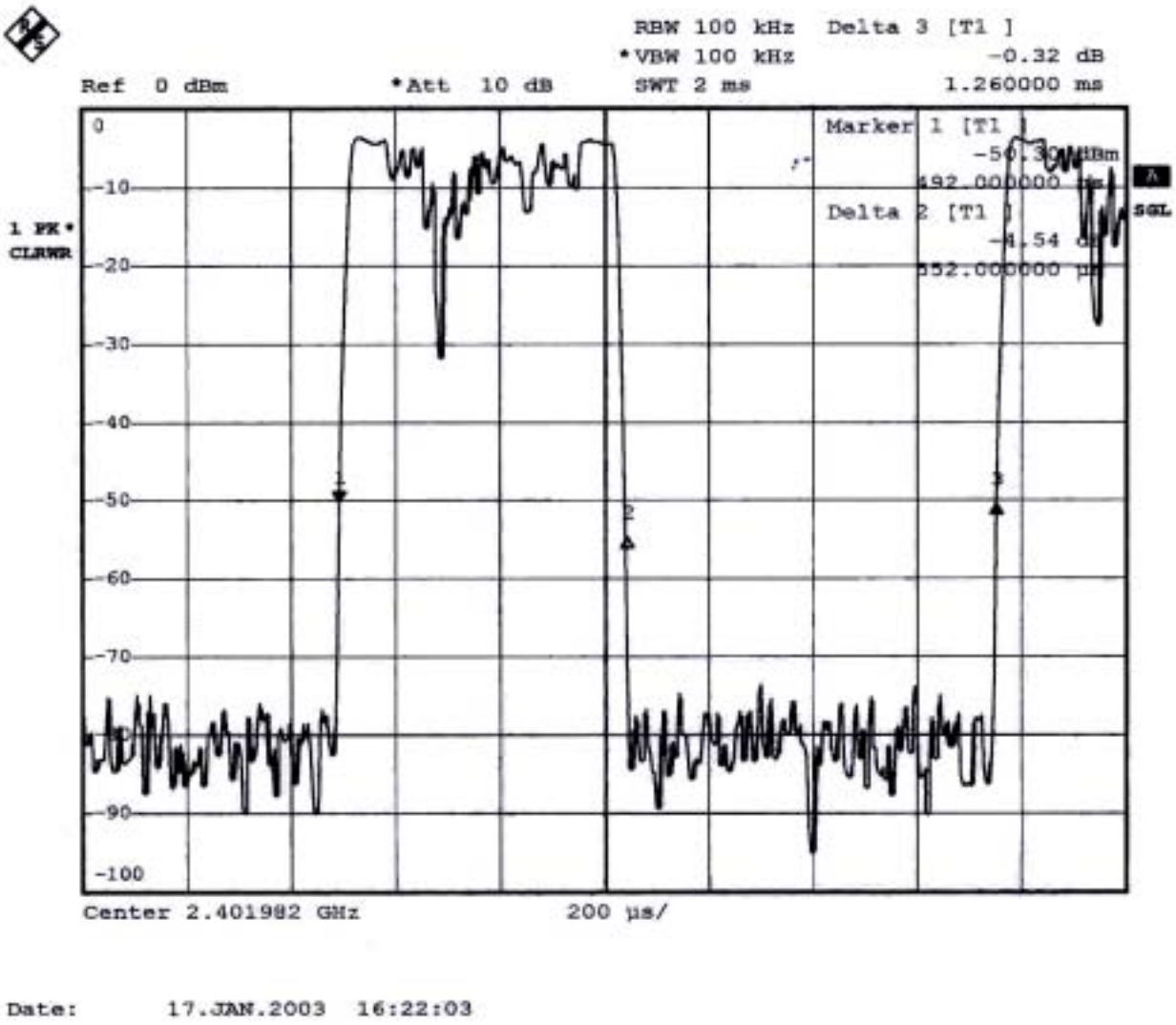


5.8.4. Test Result：See spectrum analyzer plots below

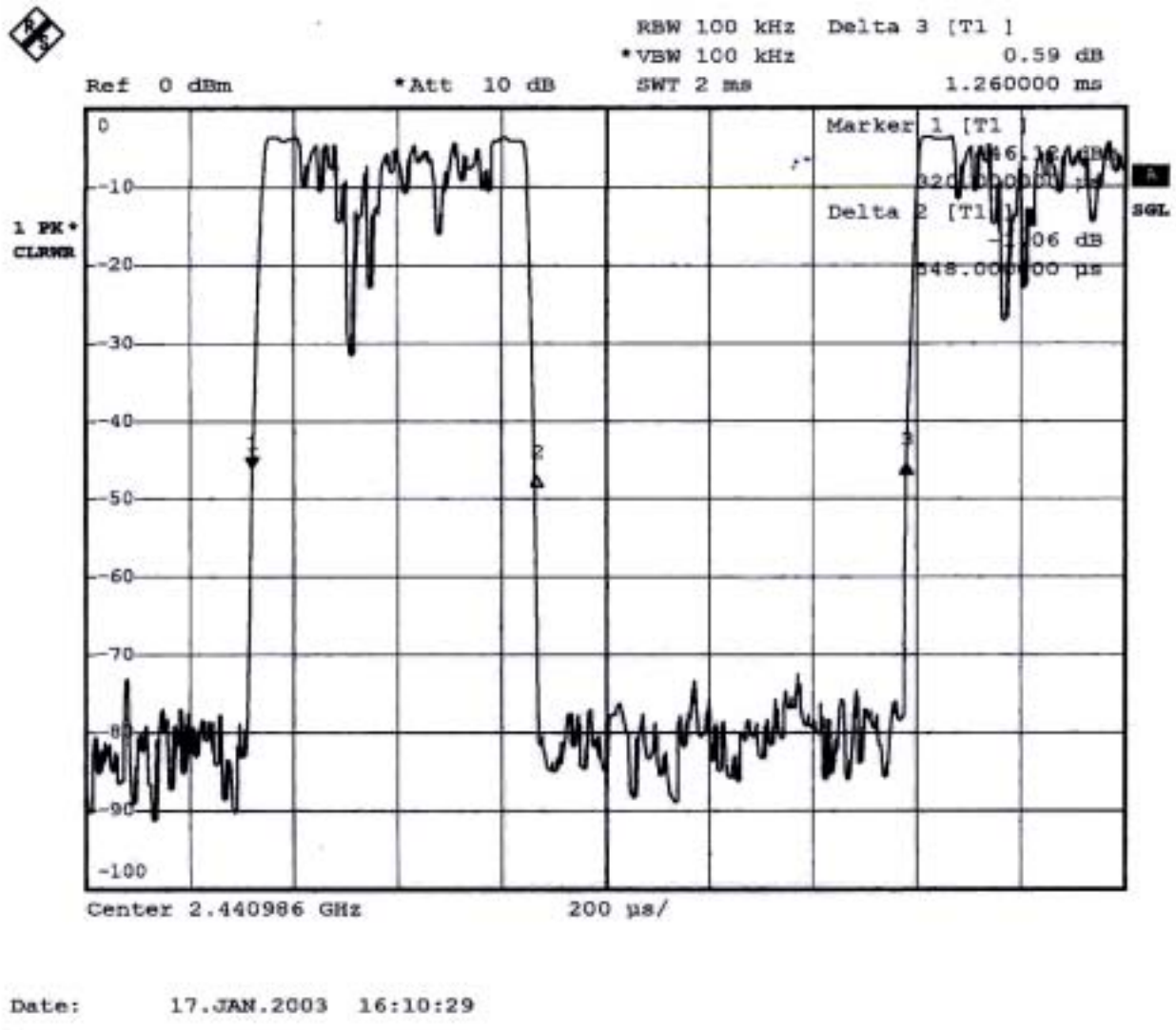
- Temperature: 26°C
- Relative Humidity: 55 %
- Duty cycle of the equipment during the test X ＝ 36%

Channel	Frequency (MHz)	Dwell Time (s)	Limits (s)	Plot Ref. No.
00	2402	0.16636528	0.4	1
39	2441	0.165159735	0.4	2
78	2480	0.163954189	0.4	3

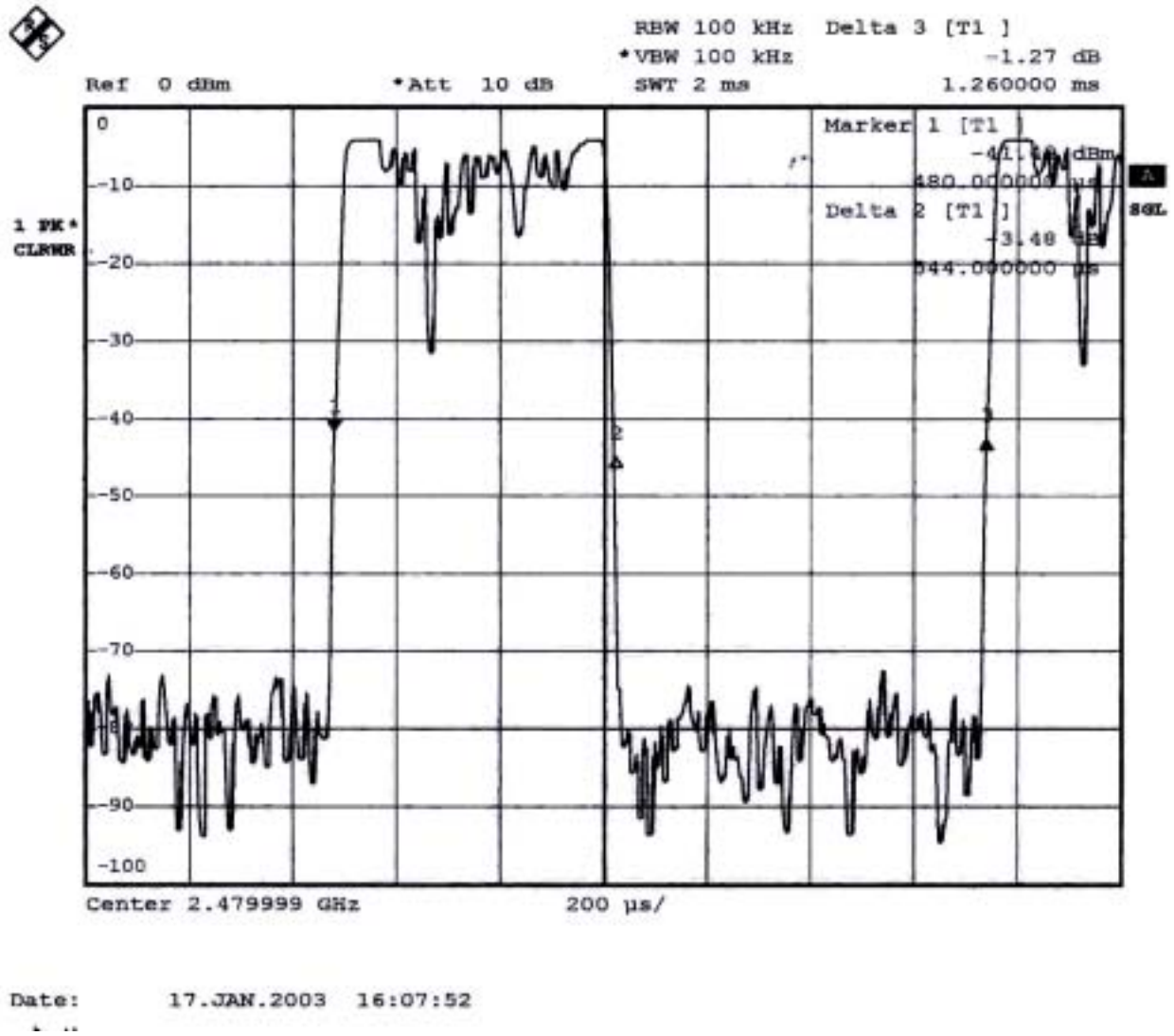
Plot 1 (Channel 00)



Plot 2 (Channel 39)



Plot 3 (Channel 78)



5.8.5. Test Configuration（EUT Operating Condition）：

Same as Section 4.2.5.

5.9. Output Power

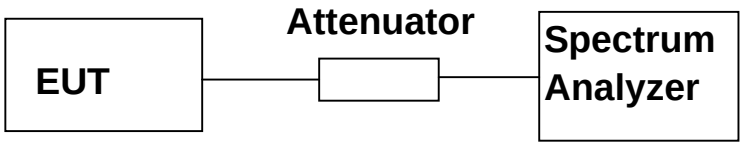
5.9.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.9.2. Test Procedure：

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The center frequency of the spectrum analyzer was set to the fundamental frequency and using 1MHz RBW and 1MHz VBW.
3. Use the channel power function of the spectrum analyzer to measured peak output power.
4. The channel bandwidth set 1MHz.

5.9.3. Test Setup Layout：



5.9.4. Test Result：See spectrum analyzer plots below

- Temperature: 26°C
- Relative Humidity: 55 %
- Duty cycle of the equipment during the test X ＝ 36%

Channel	Frequency (MHz)	Measured Output Power (mWatt)	Measured Output Power (dBm)	Limits (Watt/dBm)
00	2402	0.41	-3.87	1W/30 dBm
39	2441	0.38	-4.17	1W/30 dBm
78	2480	0.33	-4.81	1W/30 dBm

5.9.5. Test Configuration（EUT Operating Condition）：

Same as Section 4.2.5.

5.10. 100KHz Bandwidth of Frequency Band Edges

5.10.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.10.2. 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.

5.10.3. Test Result：

Test Result in lower band (Channel 00)： PASS

Test Result in higher band(Channel 78)： PASS

5.10.4. Note on Band edge Emission

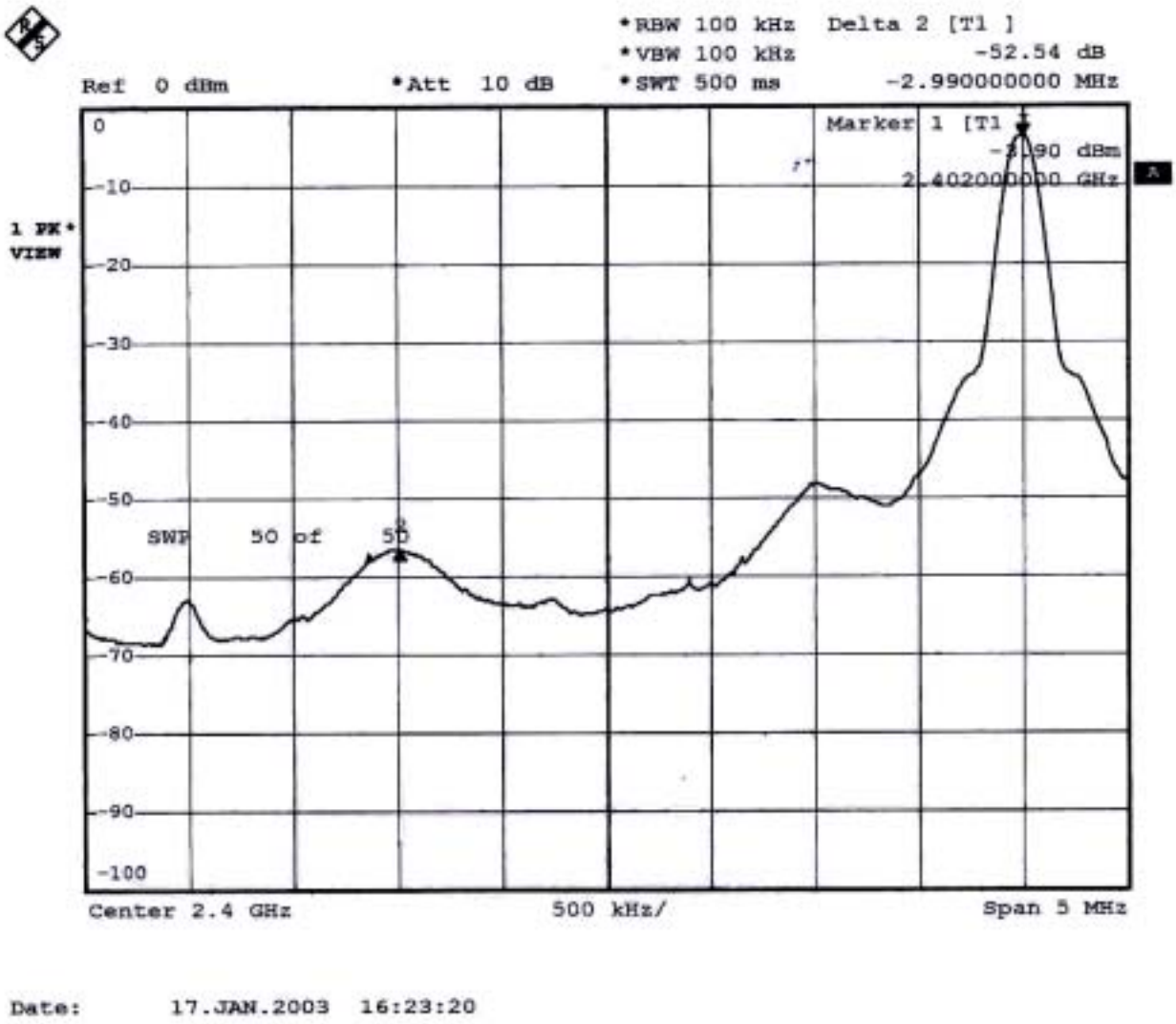
The band edge emission plot on page 38. shows 48.86dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

Polarity	The emission of carrier power strength (dB μV/m)	The maximum field strength in restrict band (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Detector	Result
V	52.10	-1.81	74.00	-75.81	Peak	Pass
V	42.68	-11.23	54.00	-65.23	Average	Pass
H	54.43	0.52	74.00	-73.48	Peak	Pass
H	43.37	-10.54	54.00	-64.54	Average	Pass

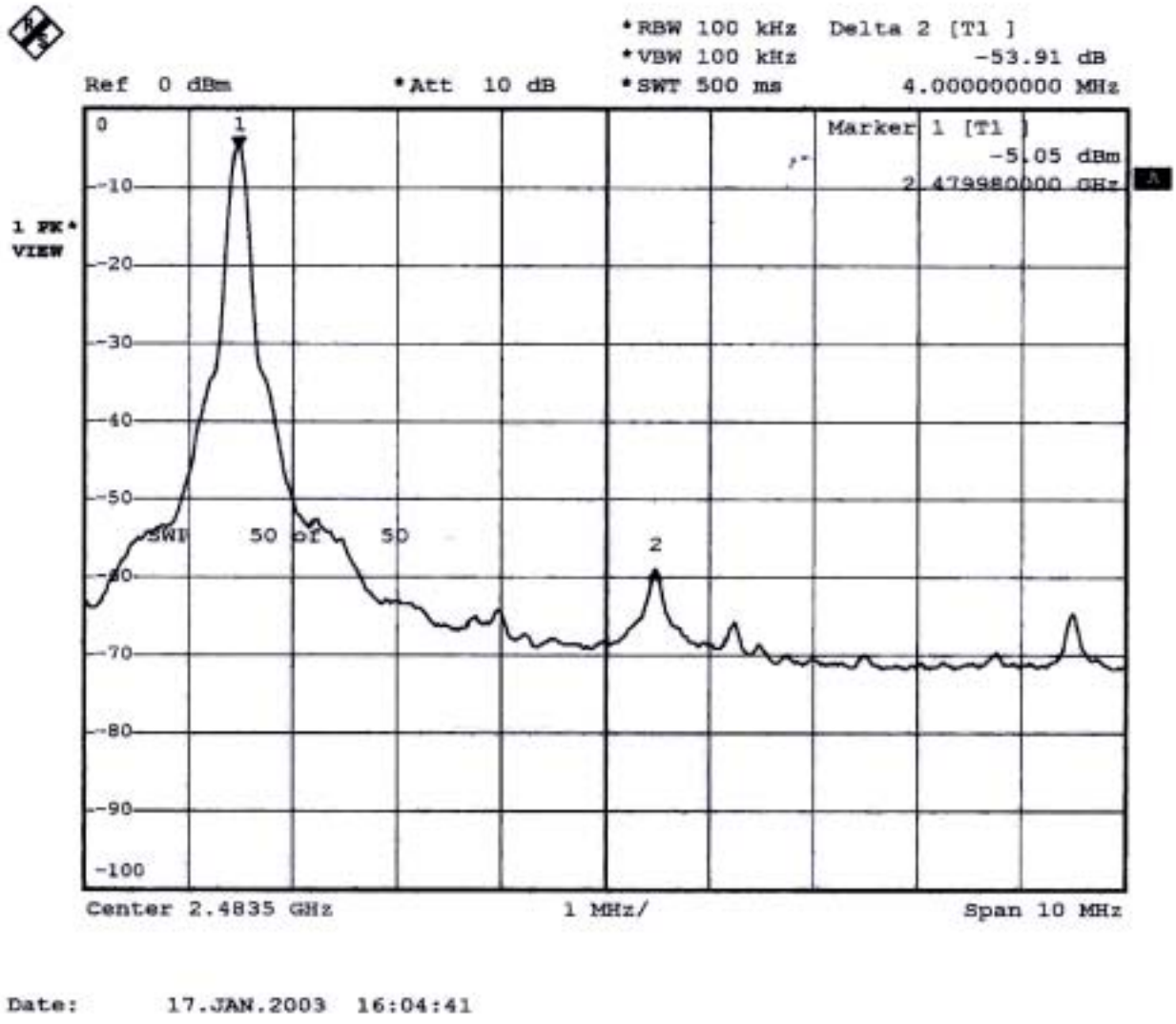
＊The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

The spectrum analyzer plots are attached as below：

Plot 1 (Channel 00)：



Plot 2 (Channel 78)：



Comments： All emissions in those 100kHz bandwidth are attenuated more then 20dB from the carrier.

5.10.5. Test Configuration（EUT Operating Condition）：

The software provided by client to enable the EUT under transmission condition continuously at lowest, and highest channel frequencies respectively.

5.11. 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.

5.11.1. 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

5.11.2. 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.

5.11.3. Test Result of Conducted Emission：

Frequency Range of Test : from 150KHz to 30 MHz

6dB Bandwidth : 9KHz

- Test Mode : Mode 1
- Temperature : 23.9°C
- Relative Humidity : 52 %
- Test Date: Jan. 16, 2003

■ **The test was passed at the minimum margin that marked under gray area in the following table**

Frequency	Line	Meter Reading		Limits		Margin	
	or	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.
(MHz)	Neutral	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)
0.338	L	44.41	45.29	59.25	49.25	-14.84	-3.96
0.450	L	43.65	44.38	56.88	46.88	-13.23	-2.50
0.506	L	42.03	42.33	56.00	46.00	-13.97	-3.67
0.562	L	42.27	42.72	56.00	46.00	-13.73	-3.28
0.618	L	42.00	42.19	56.00	46.00	-14.00	-3.81
4.270	L	41.92	36.66	56.00	46.00	-14.08	-9.34
0.787	N	41.72	41.96	56.00	46.00	-14.28	-4.04
0.899	N	41.88	42.38	56.00	46.00	-14.12	-3.62
1.349	N	41.44	40.60	56.00	46.00	-14.56	-5.40
1.515	N	42.24	41.48	56.00	46.00	-13.76	-4.52
4.157	N	45.21	40.88	56.00	46.00	-10.79	-5.12
4.323	N	46.38	40.56	56.00	46.00	-9.62	-5.44

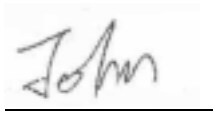
Test Engineer : 

John Huang

- Test Mode : Mode 2
- Temperature : 23.9°C
- Relative Humidity : 52 %
- Test Date: Jan. 16, 2003

■ The test was passed at the minimum margin that marked under gray area in the following table

Frequency	Line	Meter Reading		Limits		Margin	
	or	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.
(MHz)	Neutral	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)
0.337	L	44.55	45.39	59.28	49.28	-14.73	-3.89
0.450	L	43.22	44.10	56.88	46.88	-13.66	-2.78
0.562	L	42.27	42.73	56.00	46.00	-13.73	-3.27
0.618	L	42.08	42.22	56.00	46.00	-13.92	-3.78
0.731	L	40.98	41.59	56.00	46.00	-15.02	-4.41
4.380	L	41.68	36.38	56.00	46.00	-14.32	-9.62
0.788	N	41.26	41.59	56.00	46.00	-14.74	-4.41
1.180	N	42.16	41.95	56.00	46.00	-13.84	-4.05
1.460	N	42.27	41.48	56.00	46.00	-13.73	-4.52
1.740	N	42.17	41.27	56.00	46.00	-13.83	-4.73
1.910	N	42.12	41.22	56.00	46.00	-13.88	-4.78
4.150	N	45.81	41.17	56.00	46.00	-10.19	-4.83

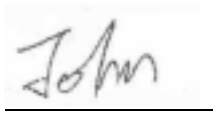
Test Engineer : 

John Huang

- Test Mode : Mode 3
- Temperature : 23.9°C
- Relative Humidity : 52 %
- Test Date: Jan. 16, 2003

■ The test was passed at the minimum margin that marked under gray area in the following table

Frequency	Line	Meter Reading		Limits		Margin	
	or	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.
(MHz)	Neutral	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)
0.336	L	44.53	45.57	59.30	49.30	-14.77	-3.73
0.449	L	43.75	44.48	56.89	46.89	-13.14	-2.41
0.506	L	42.09	42.36	56.00	46.00	-13.91	-3.64
0.561	L	42.59	42.96	56.00	46.00	-13.41	-3.04
0.617	L	42.30	42.44	56.00	46.00	-13.70	-3.56
4.150	L	41.79	36.58	56.00	46.00	-14.21	-9.42
0.899	N	41.78	42.33	56.00	46.00	-14.22	-3.67
1.290	N	42.14	42.37	56.00	46.00	-13.86	-3.63
1.460	N	42.33	41.31	56.00	46.00	-13.67	-4.69
1.680	N	42.26	41.77	56.00	46.00	-13.74	-4.23
2.300	N	42.09	40.90	56.00	46.00	-13.91	-5.10
4.100	N	45.45	39.74	56.00	46.00	-10.55	-6.26

Test Engineer : 

John Huang

5.12. Test of Radiated Emission

Radiated emissions from 30 MHz to 24.80 GHz were measured according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 4.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

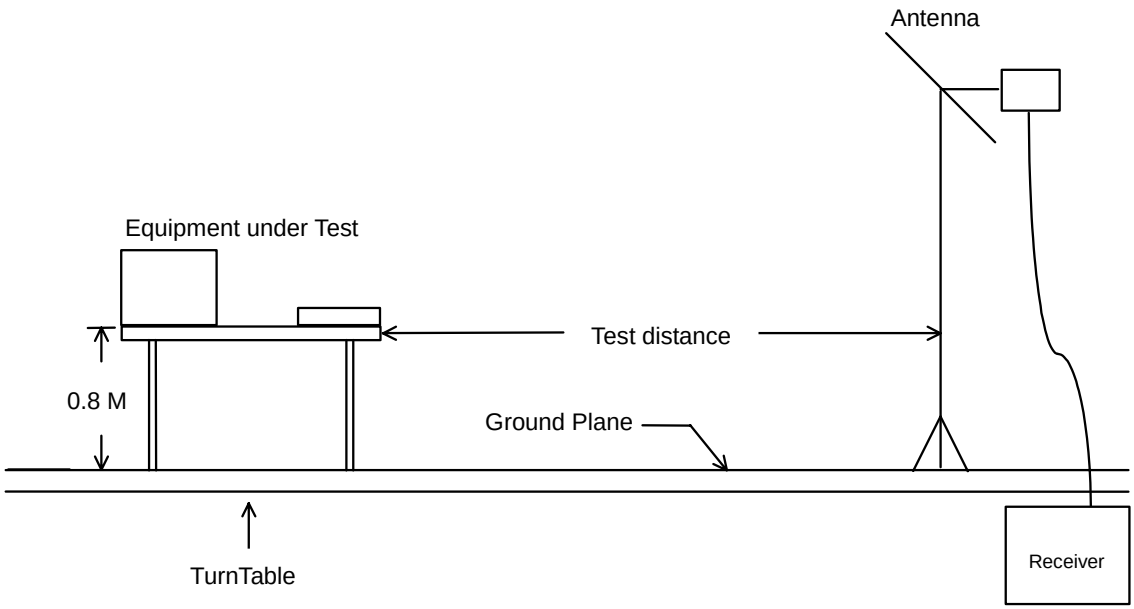
5.12.1. Major Measuring Instruments

• Amplifier	(HP 8447D)
RF Gain	30 dB
Signal Input	100 KHz to 1.3 GHz
• Amplifier	(MITEQ AFS44)
RF Gain	40 dB
Signal Input	100 MHz to 26.5 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
• 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

5.12.2. 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.

5.12.3. Typical Test Setup Layout of Radiated Emission



5.12.4. Test Result of Radiated Emission

- Test Mode: Mode 1 (2412MHz, 2402MHz)
- Test Distance : 3 M
- Temperature : 26 °C
- Relative Humidity : 55 %
- Test Date : Jan. 14, 2003
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

■ **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 100°.**

■ Spurious Emission

- For 30MHz to 1GHz

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
33.191	V	14.06	1.06	19.13	40.00	100	34.25	51.58	-5.75	QP
45.718	V	9.56	1.25	23.71	40.00	100	34.52	53.21	-5.48	QP
61.454	V	5.05	1.47	31.72	40.00	100	38.24	81.66	-1.76	QP
147.180	H	9.65	2.32	27.46	43.50	150	39.43	93.65	-4.07	QP
165.540	H	7.69	2.49	29.80	43.50	150	39.98	99.77	-3.52	QP
233.580	H	10.37	3.07	28.28	46.00	200	41.72	121.90	-4.28	QP

- For above 1GHz

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
2102.000	V	30.89	4.83	6.17	74.00	5012	41.89	124.31	-32.11	Peak
3966.000	V	31.33	6.83	6.45	74.00	5012	44.61	170.02	-29.39	Peak

- Field strength of fundamental and harmonics
- 2412MHz （Channel 1）

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
2414.000	V	30.57	5.20	48.55	-	-	84.32	16443.72		Peak
2414.000	V	30.57	5.20	37.92	-	-	73.69	4836.15		AV
2414.000	H	30.57	5.20	43.67	-	-	79.44	9375.62		Peak
2414.000	H	30.57	5.20	33.18	-	-	68.95	2802.21		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,

- Field strength of fundamental and harmonics
- 2402MHz（Channel 00）

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
2404.000	V	30.58	5.19	14.34	-	-	50.11	320.26		Peak
2404.000	V	30.58	5.19	3.73	-	-	39.50	94.41		AV
2404.000	H	30.58	5.19	16.09	-	-	51.86	391.74		Peak
2404.000	H	30.58	5.19	5.04	-	-	40.81	109.77		AV
4804.000	V/H						-			AV/ Peak
7206.000	V/H						-			AV/ Peak
9608.000	V/H						-			AV/ Peak
12010.000	V/H						-			AV/ Peak
14412.000	V/H						-			AV/ Peak
16814.000	V/H						-			AV/ Peak
19216.000	V/H						-			AV/ Peak
21618.000	V/H						-			AV/ Peak
24020.000	V/H						-			AV/ Peak

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

Test Engineer : 

Jay Zhong

- Test Mode: Mode 2 (2437 MHz, 2441MHz)
- Test Distance : 3 M
- Temperature : 26 °C
- Relative Humidity : 55 %
- Test Date : Jan. 14, 2003
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

■ The test was passed at the minimum margin that marked under gray area in the following table, and its antenna height is1 m, turn table degree is 107 ^{o}.

■ Spurious Emission

- For 30MHz to 1GHz

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission (dBuV/m)	Level (uV/m)	Margin (dB)	Detect Mode
55.650	V	5.73	1.39	29.35	40.00	100	36.47	66.60	-3.53	QP
61.050	V	5.08	1.46	31.65	40.00	100	38.19	81.19	-1.81	QP
478.500	V	15.73	4.51	21.56	46.00	200	41.80	123.03	-4.20	Peak
147.450	H	9.62	2.32	28.16	43.50	150	40.10	101.16	-3.40	Peak
165.540	H	7.69	2.49	30.01	43.50	150	40.19	102.21	-3.31	QP
233.580	H	10.37	3.07	29.17	46.00	200	42.61	135.07	-3.39	QP

- For above 1GHz

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission (dBuV/m)	Level (uV/m)	Margin (dB)	Detect Mode
1454.000	H	27.26	3.96	5.99	74.00	5012	37.21	72.53	-36.79	Peak
1908.000	H	30.39	4.59	5.52	54.00	501	40.50	105.93	-13.50	Peak

- Field strength of fundamental and harmonics
- 2437 MHz（Channel 6）

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
2438.000	V	30.55	5.23	2438.000	-	-	80.44	10519.62		Peak
2438.000	V	30.55	5.23	2438.000	-	-	69.55	3002.62		AV
2438.000	H	30.55	5.23	2438.000	-	-	80.58	10690.55		Peak
2438.000	H	30.55	5.23	2438.000	-	-	69.01	2821.63		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,

- Field strength of fundamental and harmonics
- 2441MHz（Channel 39）

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
2438.000	V	30.55	5.23	12.81	-	-	48.59	268.84		Peak
2438.000	V	30.55	5.23	4.19	-	-	39.97	99.66		AV
2444.000	H	30.54	5.23	15.52	-	-	51.29	366.86		Peak
2444.000	H	30.54	5.23	6.05	-	-	41.82	123.31		AV
4882.000	V/H						-			AV/ Peak
7323.000	V/H						-			AV/ Peak
9764.000	V/H						-			AV/ Peak
12205.000	V/H						-			AV/ Peak
14646.000	V/H						-			AV/ Peak
17087.000	V/H						-			AV/ Peak
19528.000	V/H						-			AV/ Peak
21969.000	V/H						-			AV/ Peak
24410.000	V/H						-			AV/ Peak

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

Test Engineer : 

Jay Zhong

- Test Mode: Mode 3 (2462 MHz, 2480 MHz)
- Test Distance : 3 M
- Temperature : 26 °C
- Relative Humidity : 55 %
- Test Date : Jan. 14, 2003
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

■ 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 109 °.

- For 30MHz to 1GHz

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission (dBuV/m)	Level (uV/m)	Margin (dB)	Detect Mode
55.650	V	5.73	1.39	29.58	40.00	100	36.70	68.39	-3.30	QP
61.050	V	5.08	1.46	31.19	40.00	100	37.73	77.00	-2.27	QP
147.450	H	9.62	2.32	27.94	43.50	150	39.88	98.63	-3.62	Peak
166.620	H	7.61	2.51	30.34	43.50	150	40.46	105.44	-3.04	Peak
232.770	H	10.29	3.06	28.80	46.00	200	42.15	128.09	-3.85	QP
240.060	H	10.97	3.09	27.51	46.00	200	41.57	119.81	-4.43	Peak

- For above 1GHz

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission (dBuV/m)	Level (uV/m)	Margin (dB)	Detect Mode
2068.000	V	30.93	4.79	5.52	74.00	5012	41.24	115.35	-32.76	Peak
3612.000	V	30.64	6.37	5.33	74.00	5012	42.34	130.92	-31.66	Peak
4014.000	H	31.43	6.89	6.65	74.00	5012	44.97	177.21	-29.03	Peak

- Field strength of fundamental and harmonics
- 2462 MHz（Channel 11）

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	V	30.53	5.25	41.34	-	-	77.12	7177.94		Peak
2462.000	V	30.53	5.25	30.92	-	-	66.70	2162.72		AV
2462.000	H	30.53	5.25	45.42	-	-	81.20	11481.54		Peak
2462.000	H	30.53	5.25	34.65	-	-	70.43	3322.77		AV
4924.000	V/H						-			AV/ Peak
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,

- Field strength of fundamental and harmonics
- 2480 MHz （Channel 78）

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
2478.000	V	30.51	5.27	16.32	-	-	52.10	402.72		Peak
2478.000	V	30.51	5.27	6.90	-	-	42.68	136.14		AV
2478.000	H	30.51	5.27	18.65	-	-	54.43	526.62		Peak
2478.000	H	30.51	5.27	7.59	-	-	43.37	147.40		AV
4960.000	V/H						-			AV/ Peak
7440.000	V/H						-			AV/ Peak
9920.000	V/H						-			AV/ Peak
12400.000	V/H						-			AV/ Peak
14880.000	V/H						-			AV/ Peak
17360.000	V/H						-			AV/ Peak
19840.000	V/H						-			AV/ Peak
22320.000	V/H						-			AV/ Peak
24800.000	V/H						-			AV/ Peak

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

Test Engineer : 

Jay Zhong

5.13. Band Edges Measurement

5.13.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.13.2. Test Procedure：

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

5.13.3. Test Result：

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

5.13.4. Note on Band edge Emission

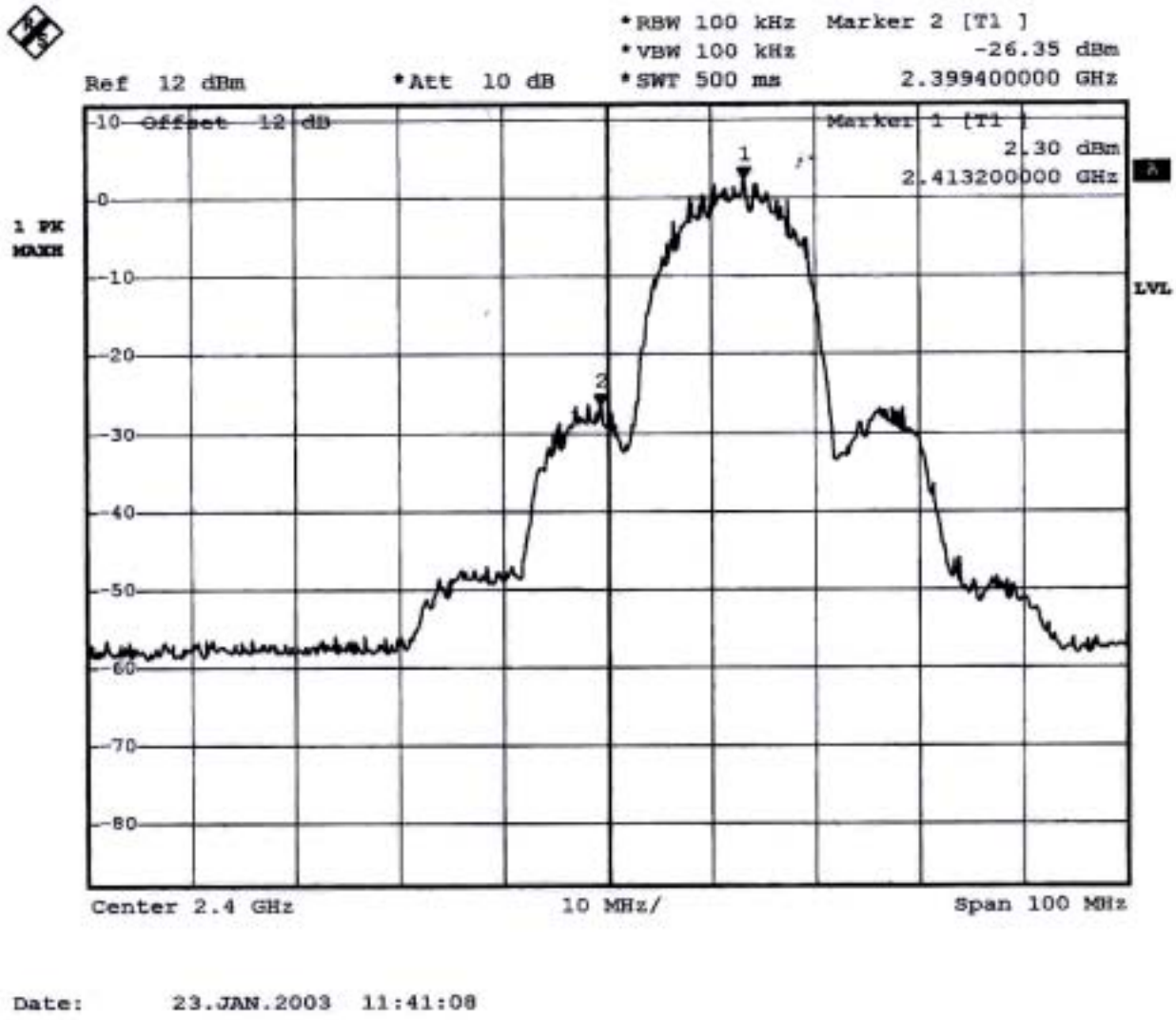
The band edge emission plot on page 57. shows 51.35dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

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	81.20	29.85	74.00	-44.15	Peak
H	70.43	19.08	54.00	-34.92	Average
V	77.12	25.77	74.00	-48.23	Peak
V	66.70	15.35	54.00	-38.65	Average

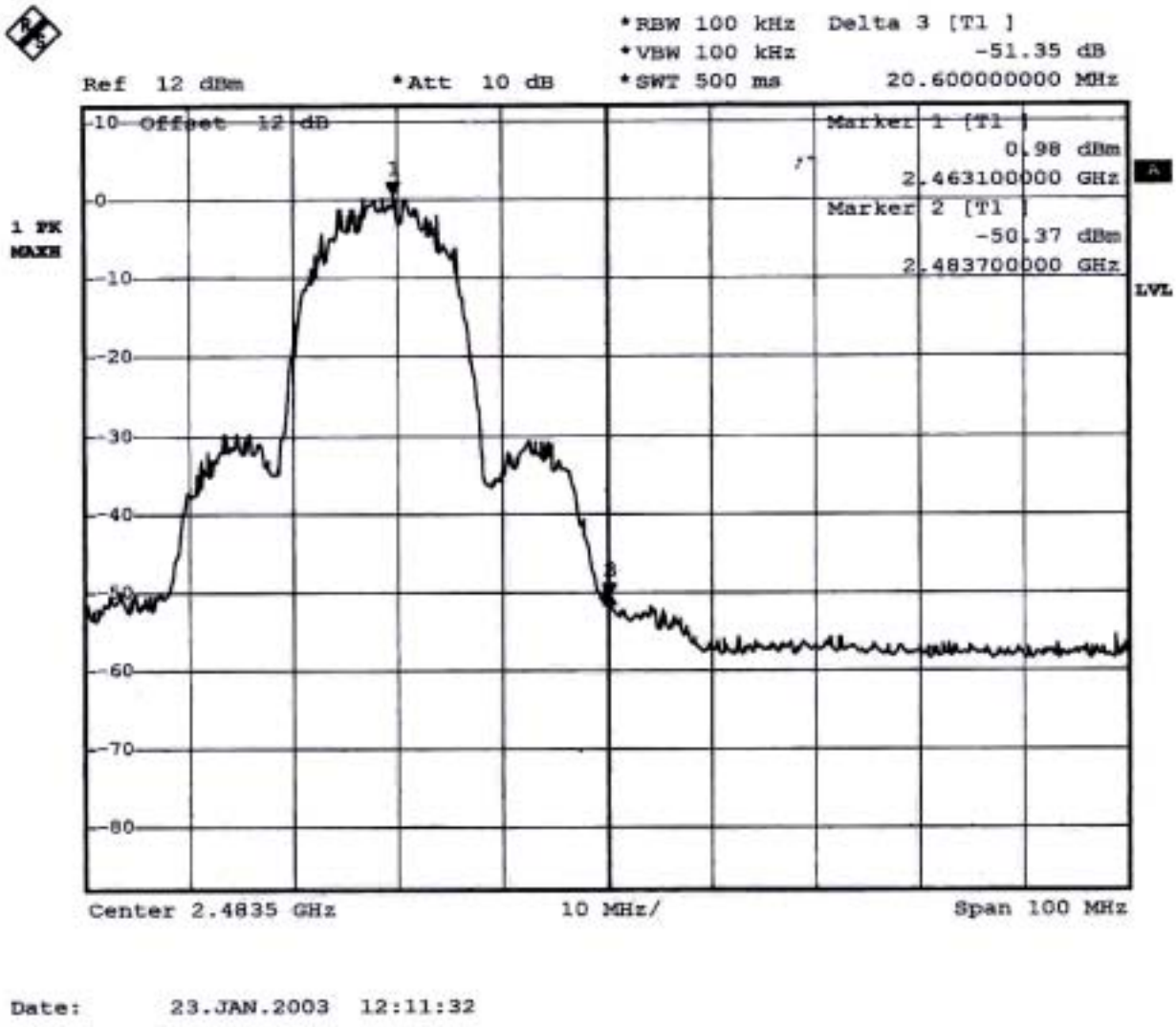
＊The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

The spectrum analyzer plots are attached as below：

Plot1 (Channel 1)：



Plot2 (Channel 11)：



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

5.14. Antenna Requirements

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

5.14.1. 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.

5.14.2. Antenna Connected Construction

The maximum Gain antenna used in this product is dipole antenna.

5.15. RF Exposure

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

RF Exposure Compliance

5.15.1. 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

5.15.2. 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 10 W/cm2. We can change the formula to:

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

Channel No.	Gain (dBi)	Gain Numeric	Peak Output Power (W)	Calculated RF Exposure Separation Distance (m)	Minimum RF Exposure Separation Distance (m)
Channel 1	2.0	1.58	86.50	1.04	20
Channel 6	2.0	1.58	66.99	0.92	20
Channel 11	2.0	1.58	54.45	0.83	20
Channel 00	1.2	1.32	-3.87	0.0021	0.20
Channel 39	1.2	1.32	-4.17	0.0020	0.20
Channel 78	1.2	1.32	-4.81	0.0019	0.20

5.15.3. 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. The chassis of hard disk drive sticks iron sheet.
   (As the Internal photo No.2)
2. The connected board of CD-ROM adds gasket.
   (As the Internal photo No.7)
3. Adds a gasket on the USB connector.
   (As the Internal photo No.11)
4. DC input circuit adds 3T bead core on the Vcc and ground.
   (As the Internal photo No.11)
5. Adds a wire on the USB connector and I/O connector.
   (As the Internal photo No.11)
6. Adds a wire on the ground of Line in / Line out , microphone board.
   (As the Internal photo No.16)
7. Short board's ground and connector on the near side of Line in / Line out , microphone board.
   (As the Internal photo No.18)
8. Add capacitor on the rear side of Line in / Line out , microphone board.
   (As the Internal photo No.18)
9. Add gasket on the rear side of Line in / Line out , microphone board.
   (As the Internal photo No.18)
10. The serial board's rear side adds capacitor.
    (As the Internal photo No.28)
11. The housing of I/O stick adds electric conduction paint.
    (As the Internal photo No.34)
12. The board of PRINTER / COM / VGA add a wire to ground.
    (As the Internal photo No.35)
13. Add wire on the PRINTER , COM and VGA port connecter' ground.
    (As the Internal photo No.36)
14. The board of USB , Line in , Line out , microphone add wire to ground.
    (As the Internal photo No.37)
15. The board's ground of USB , Line in , Line out and microphone add gasket.
    (As the Internal photo No.38)

16. Adds a gasket on the PS2 connector.
    (As the Internal photo No.39)
17. The connected board of I/O stick adds wire to ground.
    (As the Internal photo No.40)
18. The LCD panel rear side add gasket.
    (As the Internal photo No.42)
19. The LCD panel rear side add copper foil sticker.
    (As the Internal photo No.42)
20. The LCD panel rear side add aluminous foil sticker.
    (As the Internal photo No.42)
21. This signal cable is shielded by gasket.
    (As the Internal photo No.42)
22. The adapter's power cord adds a ferrite core.
    (As the External photo No.6)

7. Antenna Factor & Cable Loss

- from 30MHz to 1GHz

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	1.00
35	13.63	1.08
40	11.11	1.18
45	10.59	1.24
50	6.47	1.30
55	5.83	1.38
60	5.18	1.44
65	4.81	1.52
70	4.43	1.59
75	5.10	1.68
80	5.91	1.75
85	7.33	1.77
90	8.74	1.83
95	9.05	1.85
100	9.36	1.90
110	9.65	2.01
120	9.97	2.06
130	10.51	2.16
140	10.32	2.24
150	9.42	2.34
160	8.09	2.42
170	7.43	2.56
180	7.60	2.62
190	7.43	2.67
200	7.26	2.76
220	9.11	2.92
240	10.88	3.09
260	11.75	3.23
280	11.55	3.38
300	11.36	3.51
320	12.03	3.63
340	12.69	3.73
360	13.33	4.03
380	14.00	4.00
400	14.63	4.09
450	15.33	4.31
500	16.03	4.64
550	16.65	5.09
600	17.29	5.49
650	17.64	5.82
700	18.00	5.94
750	18.39	6.16
800	18.79	6.58
850	19.10	6.72
900	19.42	6.81
950	19.58	7.10
1000	19.75	7.41

- above 1GHz

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
1000	24.30	3.89
2000	31.10	5.41
3000	29.60	6.92
4000	30.80	8.24
5000	34.20	9.22
6000	33.30	10.25
7000	37.80	11.61
8000	39.40	11.78
9000	38.40	12.59
10000	38.90	13.84
11000	41.10	14.64
12000	42.70	14.12
13000	43.90	16.01
14000	44.10	15.82
15000	44.50	16.15
16000	45.30	16.40
17000	46.20	16.24
18000	43.40	18.62
19000	43.90	18.90
20000	44.30	19.30
21000	44.60	20.10
22000	45.10	20.50
23000	45.80	21.60
24000	46.70	21.95
25000	47.10	22.12

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. 03, 2002	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	TM009	50 ohm	May 16, 2002	Conduction (CO01-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 22, 2002	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004/040	9KHZ~40GHz	Aug. 07, 2002	Radiation (03CH03-HY)
Receiver	SCHAFFNER	SCR 3501	417	9 KHz –1GHz	Feb. 20, 2003	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Oct. 21, 2002	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2687	30MHz –2GHz	Dec. 21, 2002	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Jan. 02, 2003	Radiation (03CH03-HY)
Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Aug. 12, 2002	Radiation (03CH03-HY)
Horn Antenna	COM-POWER	AH-118	10094	1GHz – 18GHz	Apr. 10, 2003	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170154	15GHz~40GHz	May. 09, 2001	Radiation (03CH03-HY)
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Mar. 14, 2003	Radiation (03CH03-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 22, 2002	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Jan. 09, 2002	Conducted
Power meter	R&S	NRVS	100444	DC~40GHz	May. 13, 2002	Conducted
Power sensor	R&S	NRV-Z55	100049	DC~40GHz	May. 07, 2002	Conducted
Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	Apr. 29, 2002	Conducted
AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	May. 22, 2002	Conducted
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 2, 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

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