FCC TEST REPORT

for

47 CFR Part 15 Subpart C

Equipment	**: Bluetooth Headset**
Trade Name	**: Mavin**
Model No.	**MBH-C2.1**
FCC ID.	**: SI4-MBHC21**
Filing Type	**: Certification**
Applicant	**: Mavin Technology Inc.** Room 305, Bldg. 52, No.195-28, Sec.4, Chung Hsing Rd., Chutung, Hsinchu, Taiwan, 310, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- **Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.**
- The data shown in this test report were carried out on Oct. 07, 2004 at **Sporton International Inc. LAB.**

Daniel Lee 11/15/2004

Dr. Daniel Lee
EMC/SAR Manager

SPORTON International Inc.

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

Table of Contents

History of this test report

Original Report Issue Date: Nov. 15, 2004

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

1. General Description of Equipment under Test

1.1. Applicant

Mavin Technology Inc.
Room 305, Bldg. 52, No.195-28, Sec.4, Chung Hsing Rd., Chutung, Hsinchu, Taiwan, 310, R.O.C.

1.2. Manufacturer

Mavin Technology Inc.
Room 305, Bldg. 52, No.195-28, Sec.4, Chung Hsing Rd., Chutung, Hsinchu, Taiwan, 310, R.O.C.

1.3. Basic Description of Equipment under Test

Equipment	: Bluetooth Headset
Trade Name	: Mavin
Model No.	: MBH-C2.1
FCC ID	: SI4-MBHC21
Power Supply Type	: DC 3.3V

1.4. Feature of Equipment under Test

Product Feature & Specification				
1. Host/Radio Interface	UART			
2. Modulation Type/Data Rate	GFSK			
3. Freq.Range/Carrier Freqs.	2400 MHz ~ 2483.5 MHz (ISM Band)			
4. Number o f Channels	79			
5. Carrier Frequency of each channel	2402+n MHz, n=0~78			
6. Channel Spacing	1 MHz			
7. Maximum Output Power to Antenna (Normal condition)	4 dBm			
8. Type of Antenna Connector	N/A			
9. Antenna Type	PCB			
10. Antenna Gain	0 dBi			
11. Function Type	Transmitter		Transceiver	V
12. Power Rating (DC/AC , Voltage)	DC 3.3V (Bettery)			
13. Temperature Range (Operating)	-40°C~105°C			

2. Test Configuration of Equipment under Test

2.1. Test Manner

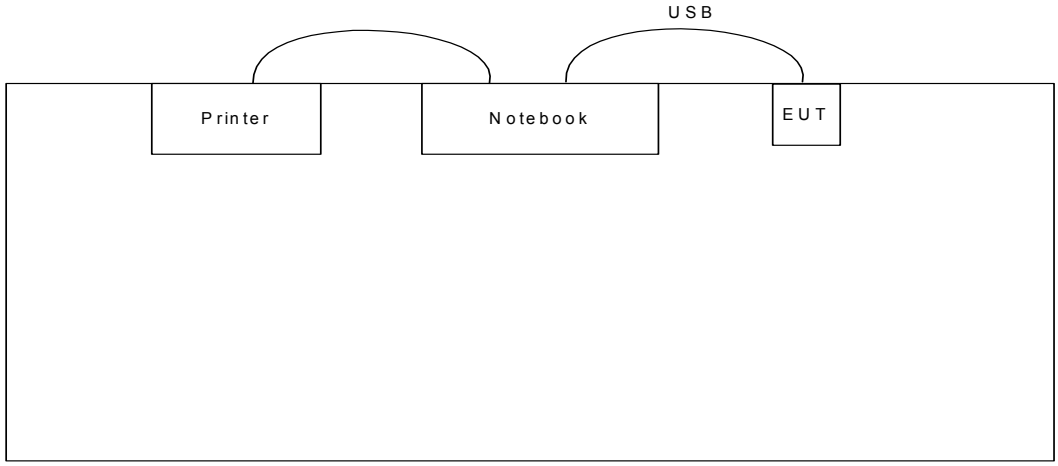
a. The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.
b. For spurious emission below 1GHz, only one channel of each application was tested because it is not related to channel selection.
c. The EUT is programmed to transmit signal continuously for all testings.
d. Frequency range investigated: conduction 150 kHz to 30 MHz, radiation 30 MHz to 25000MHz.

2.2. Test Mode

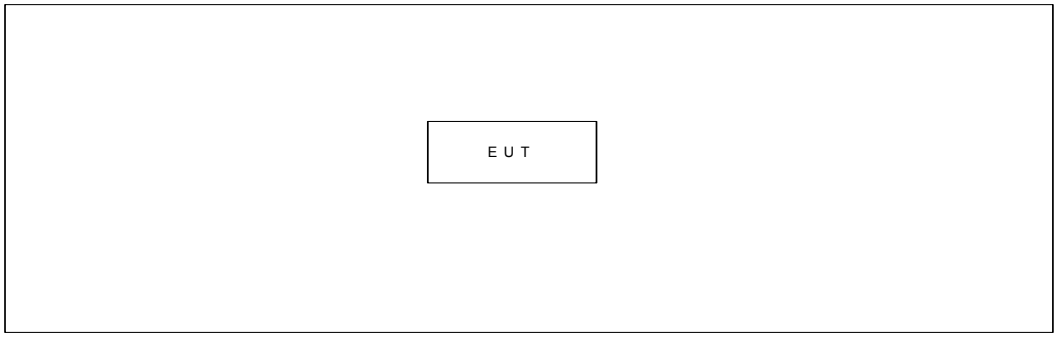
Application	**Bluetooth**
Data Rate	1 Mbps
Radiated Emission	Mode 1: Tx Ch00 Mode 2: Tx CH39 Mode 3: Tx CH78
Conducted Emission	Mode 1: Link Mode

2.3. Connection Diagram of Test System

<Conducted Emission>



<Radiated Emission>



2.4. Ancillary Equipment List

Item	Equipment	Model No.	Serial No.
1.	Notebook (DELL)	PP05L	N/A
2.	Printer (EPSON)	STYLUS COLRO C61	N/A

3. RF Utility

The programmed RF Utility, Blue test, is either installed in Notebook to provide channel selection, power level, data rate and the application type. RF Utility can make the EUT send transmitting signal for all testings.

4. General Information of Test

Test Site Location	:	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
Test Site No	:	CO01-HY, 03CH06-HY

4.1. Test Voltage

DC 3.3V

4.2. Standard for Methods of Measurement

ANSI C63.4-2003

4.3. Test in Compliance with

47 CFR Part 15 Subpart C

4.4. Frequency Range Investigated

Conduction: from 150 kHz to 30 MHz
Radiation: from 30 MHz to 25000MHz

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
15.247(a)(1)	Hopping Channel Bandwidth	Pass
15.247(a)(1)	Hopping Channel Separation	Pass
15.247(a)(1)(iii)	Number of Hopping Frequency Used	Pass
15.247(a)(1)(iii)	Dwell Time of Each Frequency within a 30 Second Period	Pass
15.247(b)(1)	Output Power	Pass
15.247(c)	100kHz Bandwidth of Frequency Band Edges	Pass
15.207	Conducted Emission	Pass
15.209	Radiated Emission	Pass
15.203	Antenna Requirement	Pass

5.2. Hopping Channel Separation

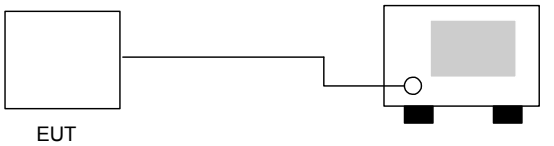
5.2.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.2.2. Test Procedure：

1. The transmitter output was connected to the spectrum analyze directly.
2. Set RBW of spectrum analyzer to 30kHz and VBW to 100kHz.
3. The Hopping Channel Separation is defined as the channel is separated with the next channel.

5.2.3. Test Setup Layout：



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

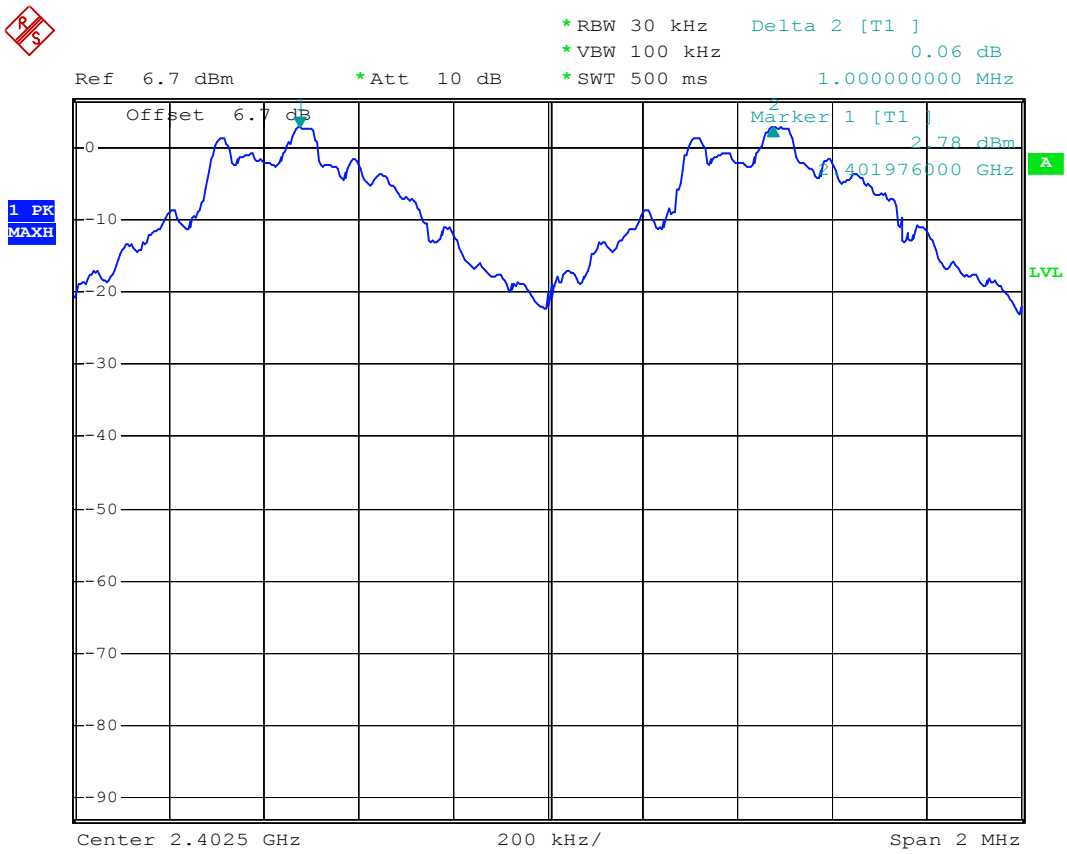
- Temperature: 26°C
- Relative Humidity: 59%
- Test Enginner : Jay

Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Limits (MHz)	Plot Ref. No.
00	2402	1.0	0.824	Mode 1
39	2441	1.0	0.780	Mode 2
78	2480	1.0	0.768	Mode 3

Remark: Limit is the greater one of 25kHz or the 20dB bandwidth of the hopping channel.

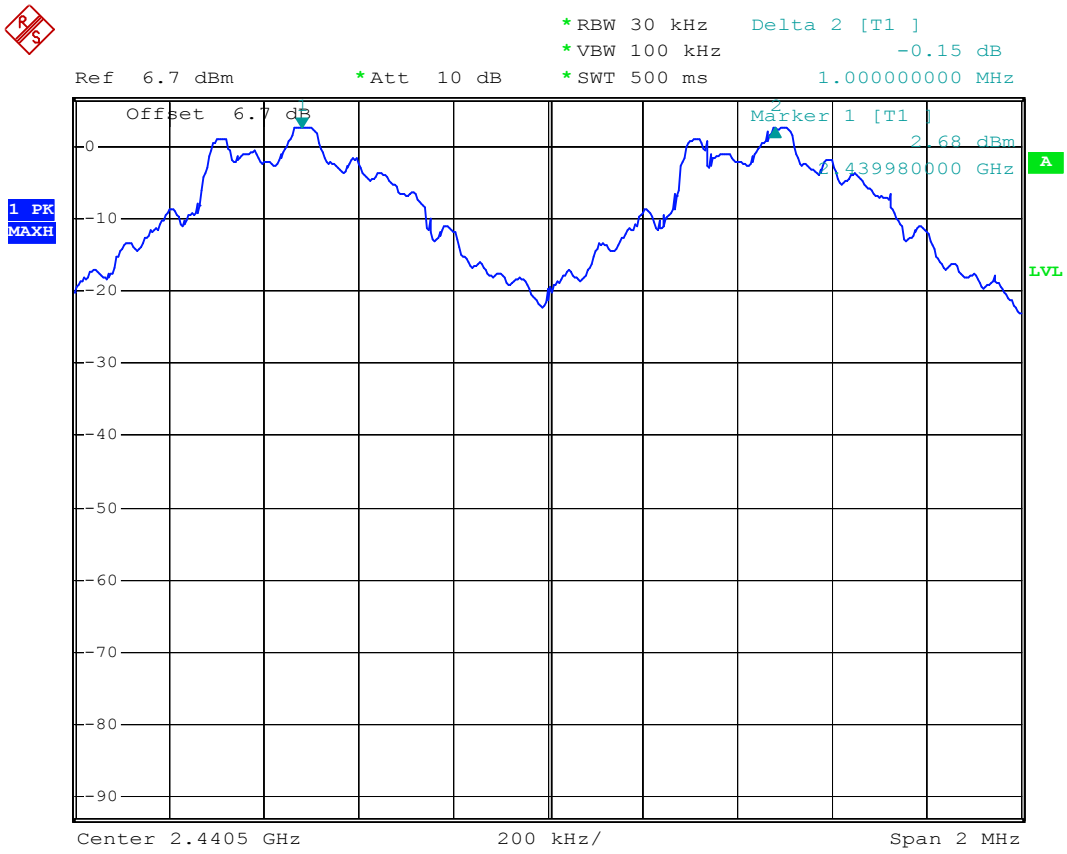
5.2.5 Hopping Channel Separation

Mode 1: CH00 (2402MHz)



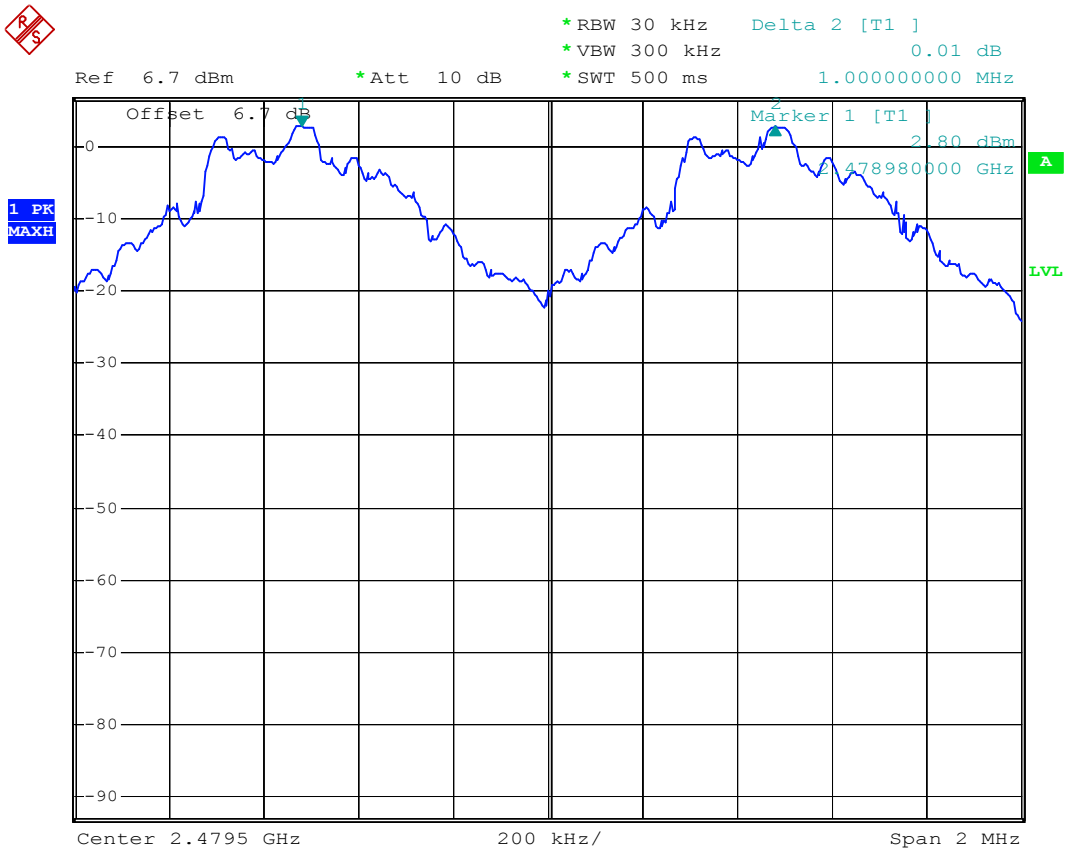
Date: 4.OCT.2004 22:23:06

Mode 2: CH39 (2441MHz)



Date: 4.OCT.2004 22:29:29

Mode 3: CH78 (2480MHz)



Date: 4.OCT.2004 22:35:09

5.3. Number of Hopping Frequency

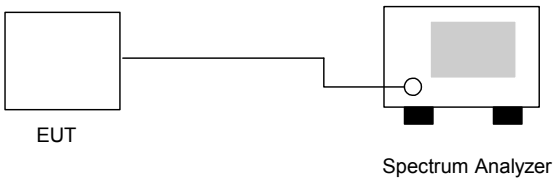
5.3.1. Measuring Instruments：

As described in chapter 6 of this test report.

5.3.2. Test Procedure：

1. The transmitter output was connected to the spectrum analyze directly.
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.

5.3.3. Test Setup Layout：

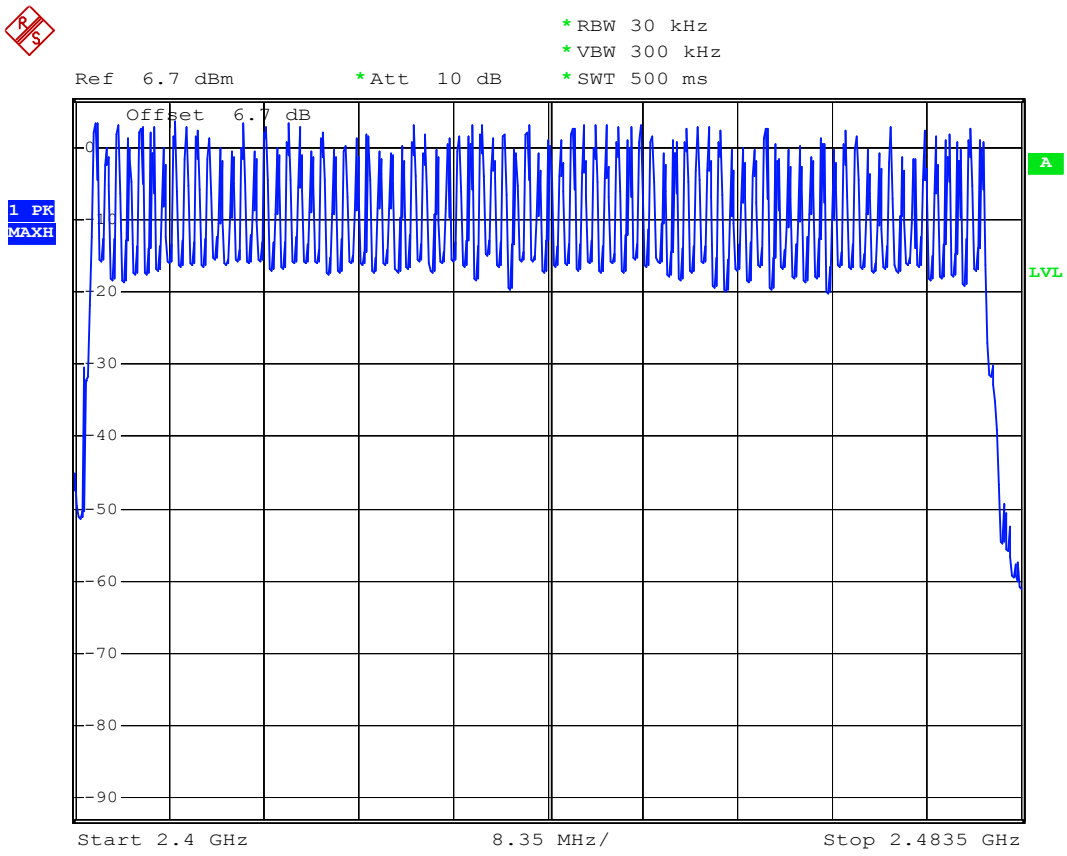


5.3.4. Test Result：See spectrum analyzer plots below

- Temperature: 26°C
- Relative Humidity: 59%
- Test Enginner : Jay

Number of Hopping Frequency (Channel)	Limits (Channel)
79	75

5.3.5 Number of Hopping Frequency



Date: 4.OCT.2004 22:39:40

5.4 Hopping Channel Bandwidth

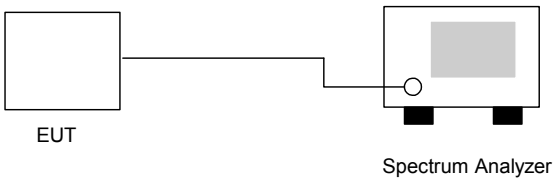
5.4.1 Measuring Instruments：

As described in chapter 6 of this test report.

5.4.2 Test Procedure：

1. The transmitter output was connected to the spectrum analyzer directly.
2. Set RBW of spectrum analyzer to 30kHz and VBW to 300kHz.
3. The Hopping Channel bandwidth is defined as the frequency range where the power is higher than peak power minus 20dB.

5.4.3 Test Setup Layout：



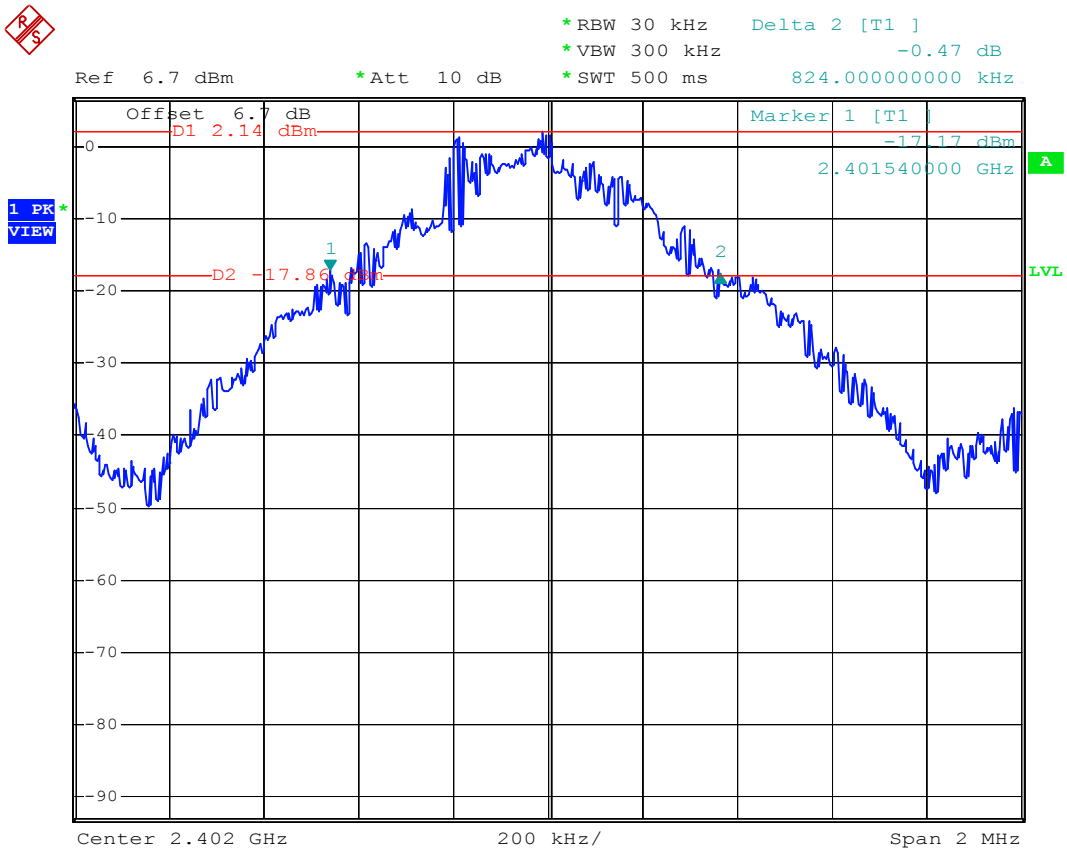
5.4.4 Test Result：See spectrum analyzer plots below

- Temperature: 26°C
- Relative Humidity: 59%
- Test Enginner : Jay

Channel	Frequency (MHz)	Hopping Channel Bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
00	2402	0.824	1.0	Mode 1
39	2441	0.780	1.0	Mode 2
78	2480	0.768	1.0	Mode 3

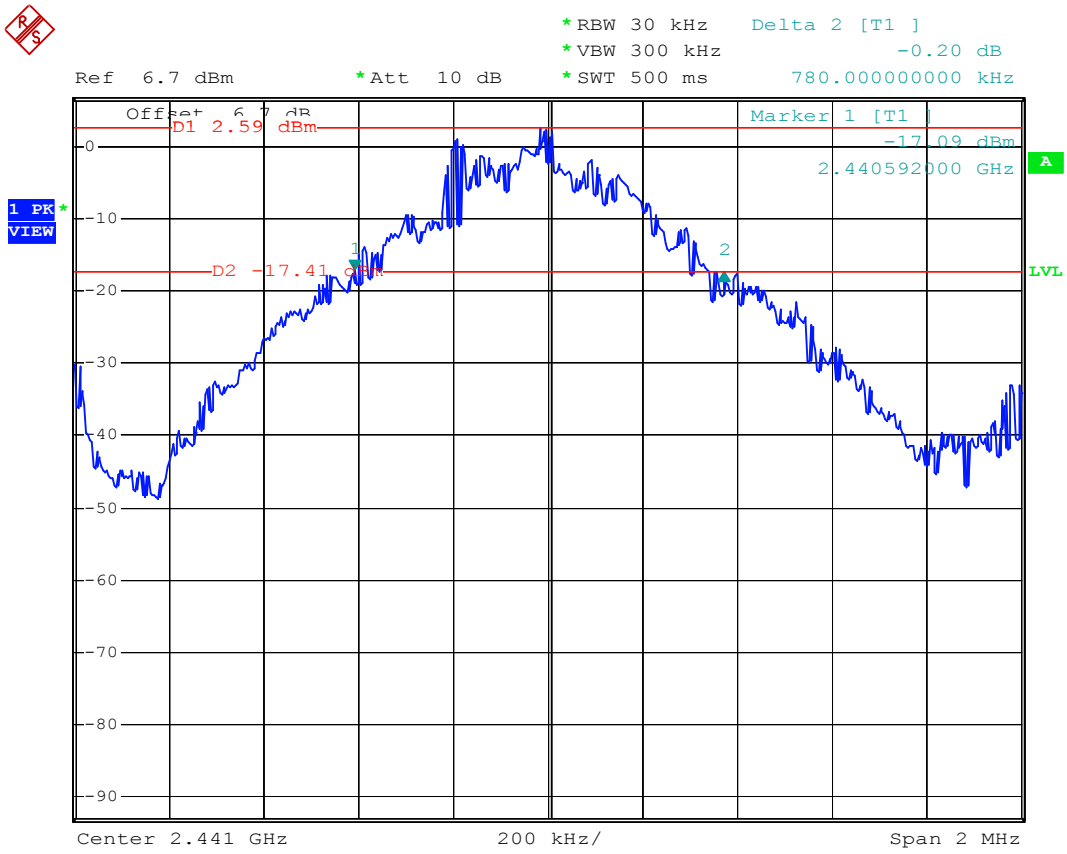
5.4.5 Hopping Channel Bandwidth

Mode 1: CH00 (2402MHz)



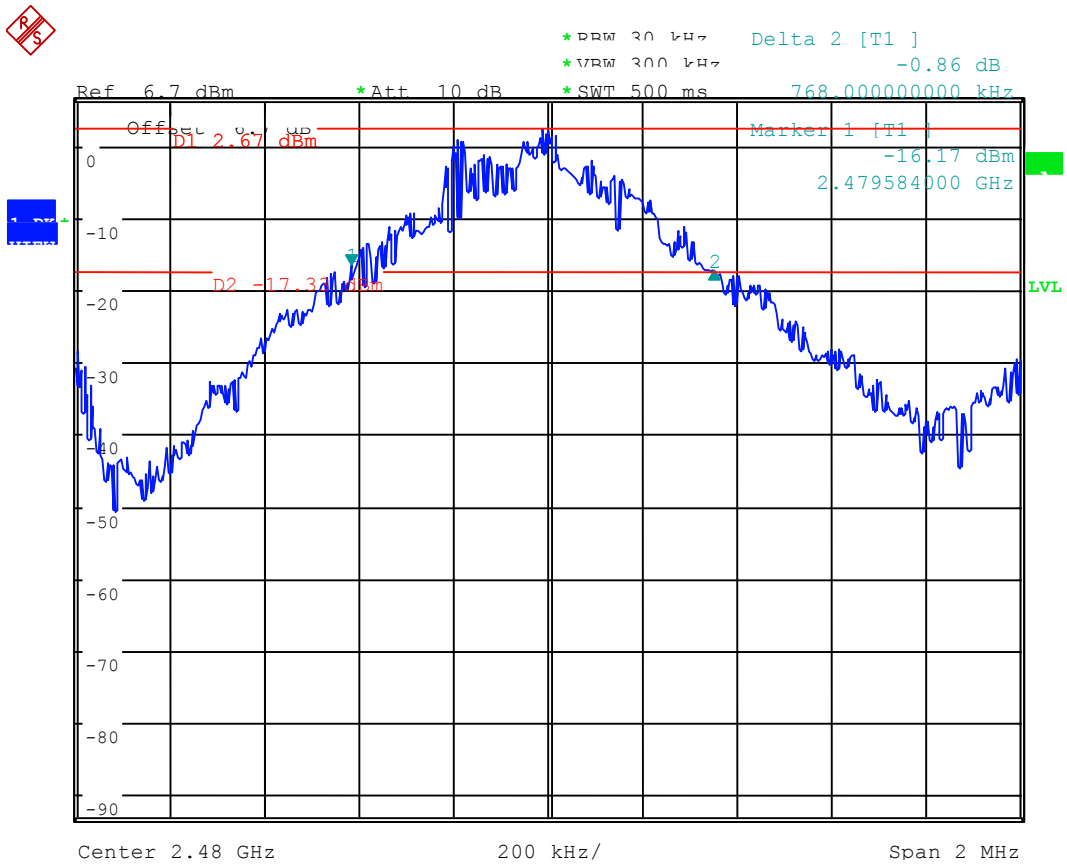
Date: 4.OCT.2004 22:20:41

Mode 2: CH39 (2441MHz)



Date: 4.OCT.2004 22:27:46

Mode 3: CH78 (2480MHz)



5.5 Dwell Time of Each Frequency within a 30 Seconds Period

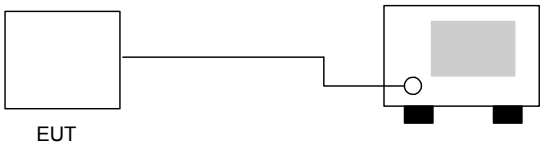
5.5.1 Measuring Instruments：

As described in chapter 6 of this test report.

5.5.2 Test Procedure：

1. The transmitter output was connected to the spectrum analyzer directly.
2. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
3. Set the center frequency on any frequency would be measured and set the frequency span to zero span.
4. The equation = 30*(1600/79)*t (t = the time duration of one single pulse)

5.5.3 Test Setup Layout：



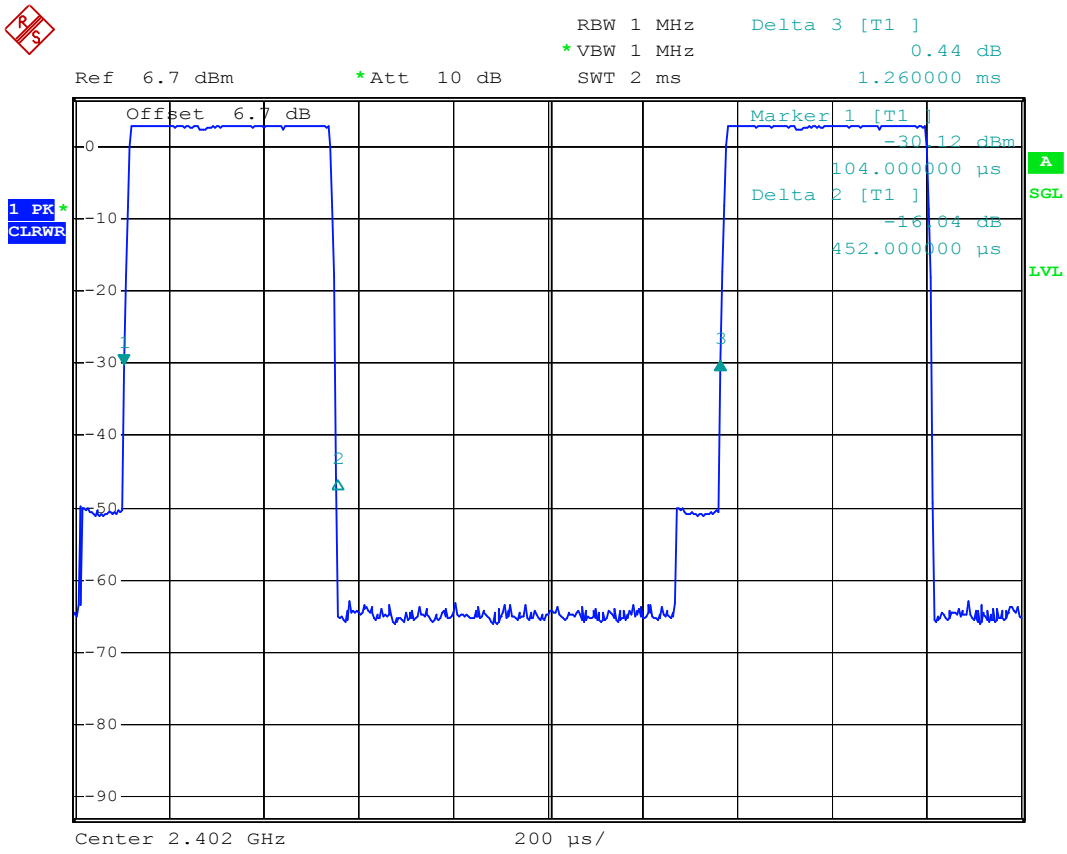
5.5.4 Test Result：See spectrum analyzer plots below

- Temperature: 26°C
- Relative Humidity: 57%
- Test Enginner : Jay

Channel	Frequency (MHz)	Dwell Time (s)	Limits (s)	Plot Ref. No.
00	2402	0.275	0.4	Mode 1
39	2441	0.272	0.4	Mode 2
78	2480	0.275	0.4	Mode 3

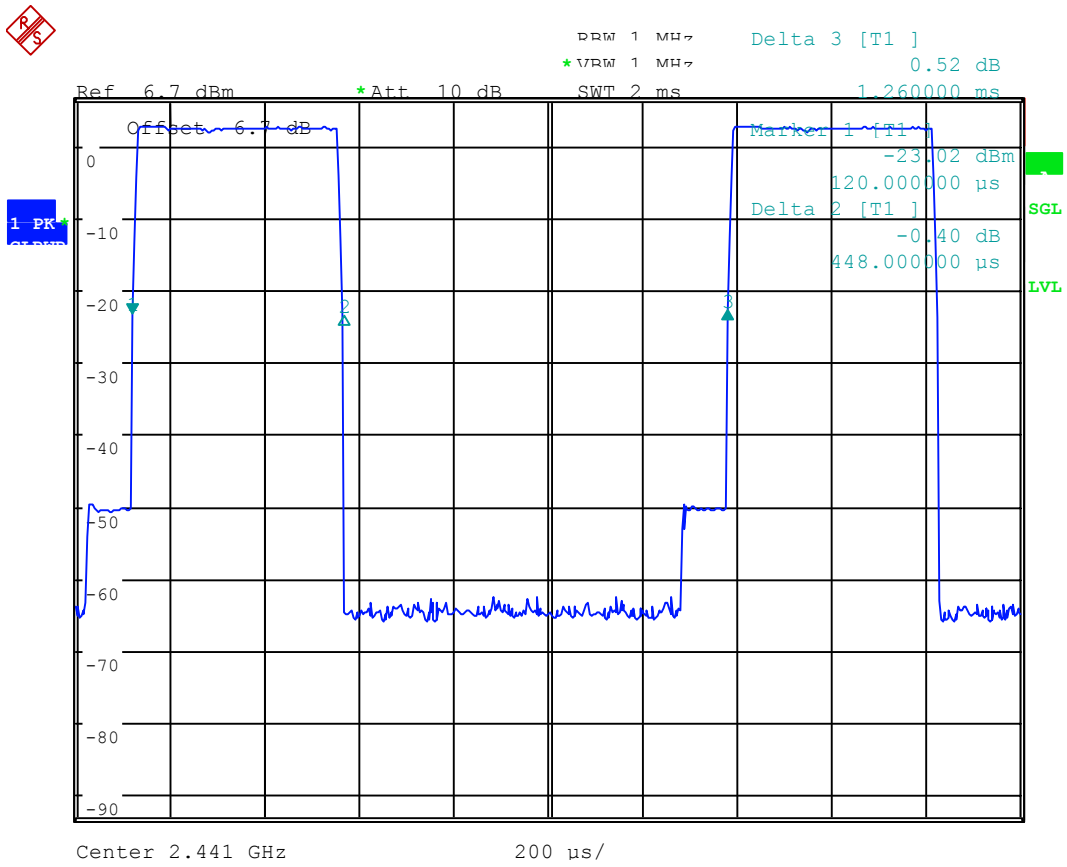
5.5.5 Dwell Time of Each Frequency

Mode 1: CH00 (2402MHz)

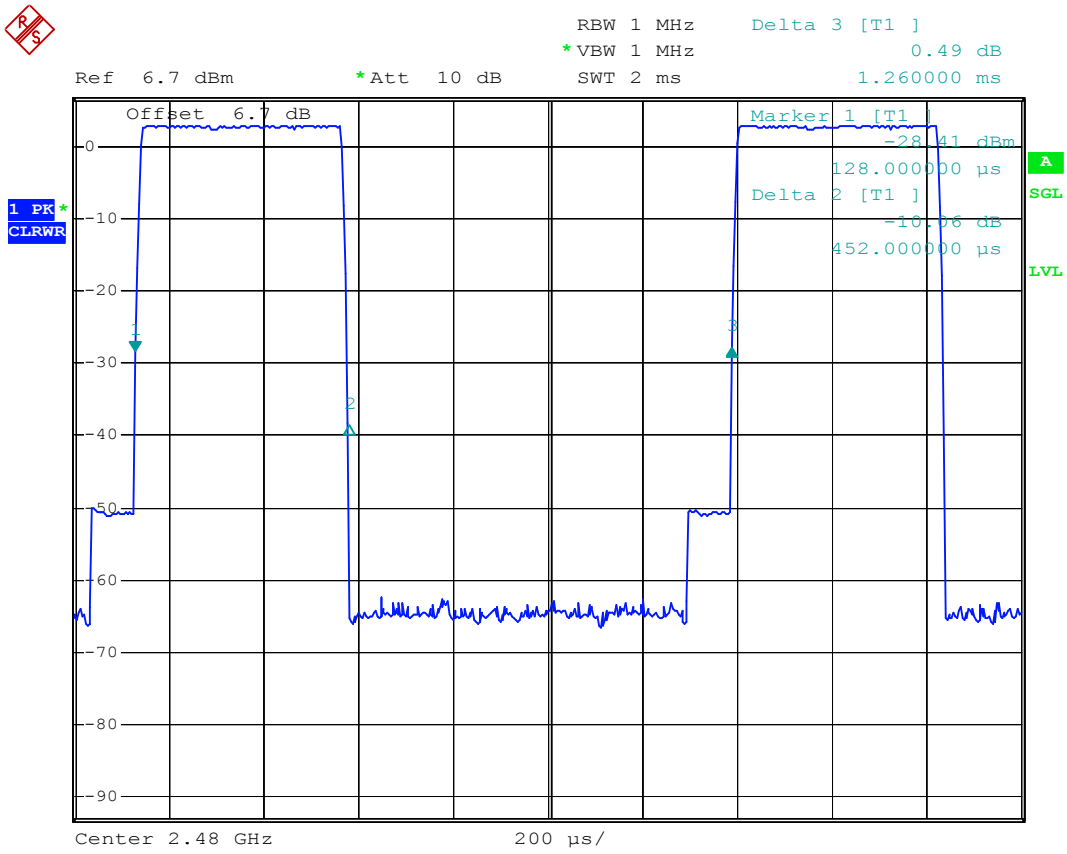


Date: 4.OCT.2004 22:24:07

Mode 2: CH39 (2441MHz)



Mode 3: CH78 (2480MHz)



Date: 4.OCT.2004 22:31:28

5.6 Output Power

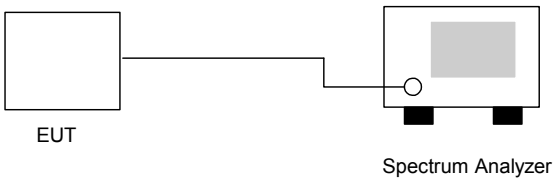
5.6.1 Measuring Instruments：

As described in chapter 6 of this test report.

5.6.2 Test Procedure：

1. The transmitter output was connected to the spectrum analyzer directly.
2. The center frequency of the spectrum analyzer was set to the fundamental frequency and set RBW to 3MHz and VBW to 3MHz.

5.6.3 Test Setup Layout：



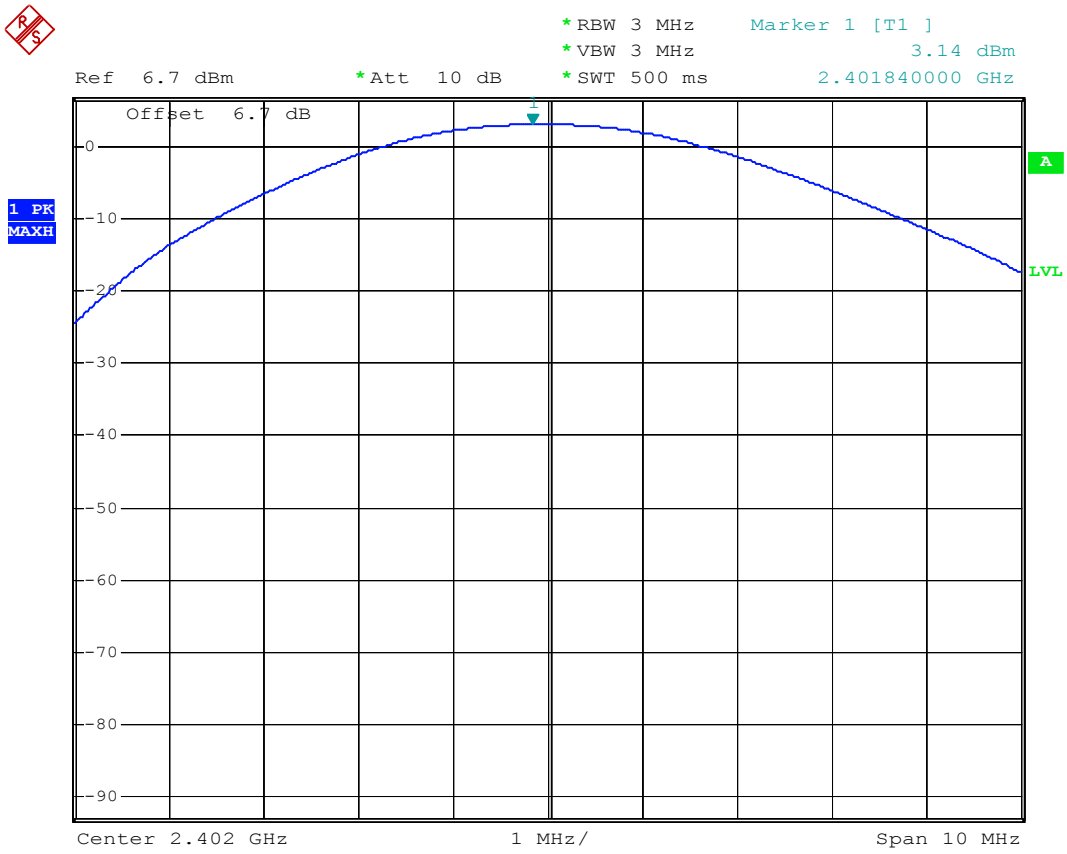
5.6.4 Test Result：See spectrum analyzer plots below

- Temperature: 26°C
- Relative Humidity: 59%
- Test Enginner : Jay

Channel	Frequency (MHz)	Measured Output Power (dBm)	Limits (Watt/dBm)	Plot Ref. No.
00	2402	3.14	1W/30 dBm	Mode 1
39	2441	3.06	1W/30 dBm	Mode 2
78	2480	3.32	1W/30 dBm	Mode 3

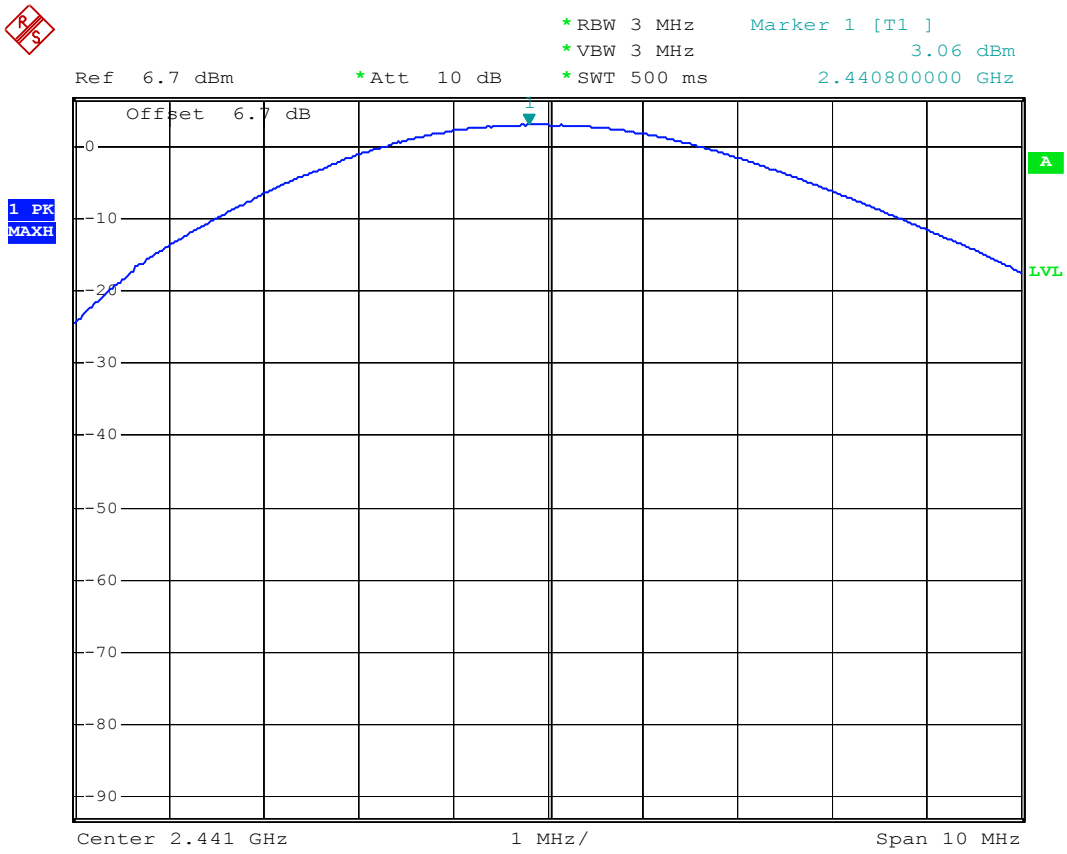
5.6.5 Output Power

Mode 1: CH00 (2402MHz)



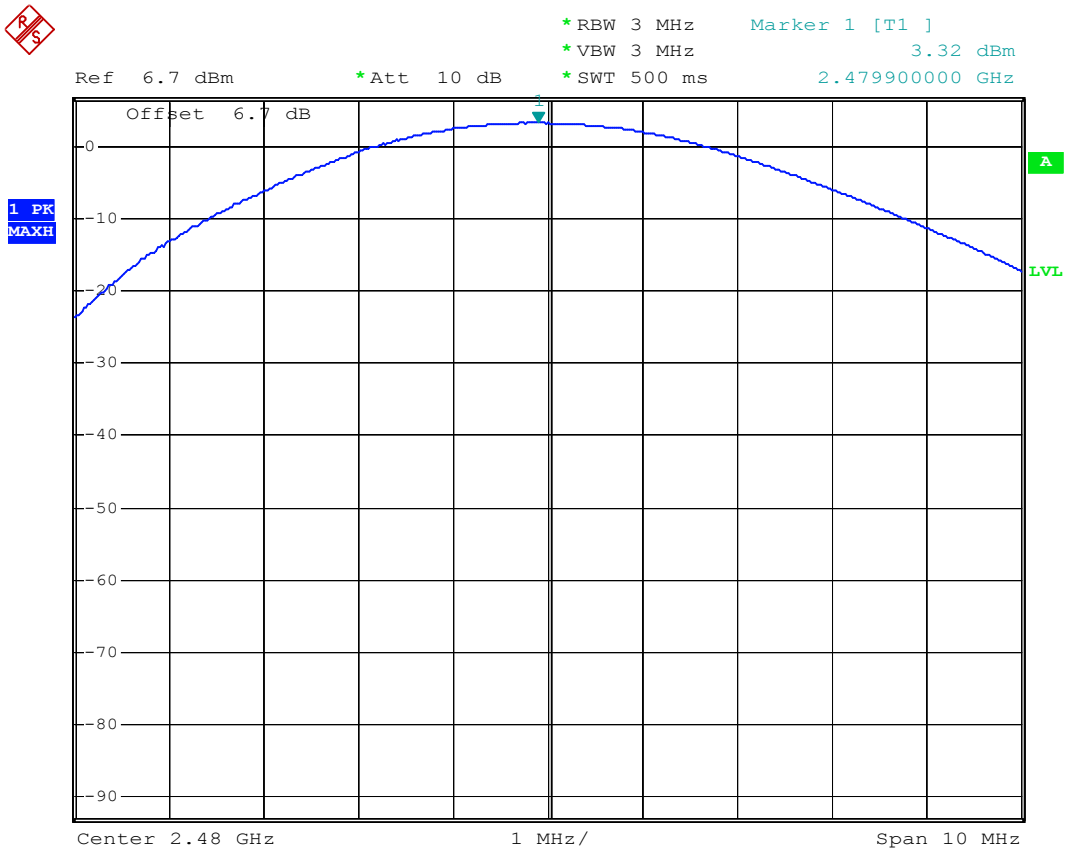
Date: 4.OCT.2004 22:19:41

Mode 2: CH39 (2441MHz)



Date: 4.OCT.2004 22:25:50

Mode 3: CH78 (2480MHz)



Date: 4.OCT.2004 22:30:48

5.7 100kHz Bandwidth of Frequency Band Edges

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 via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100 kHz bandwidth from band edge.
3. The band edges was measured and recorded.

5.7.3 Test Result：

- Temperature: 26°C
- Relative Humidity: 57%
- Test Enginner : Jay

Test Result in lower band (Channel 00)： PASS

Test Result in higher band(Channel 78)： PASS

5.7.4 Note on Band edge Emission

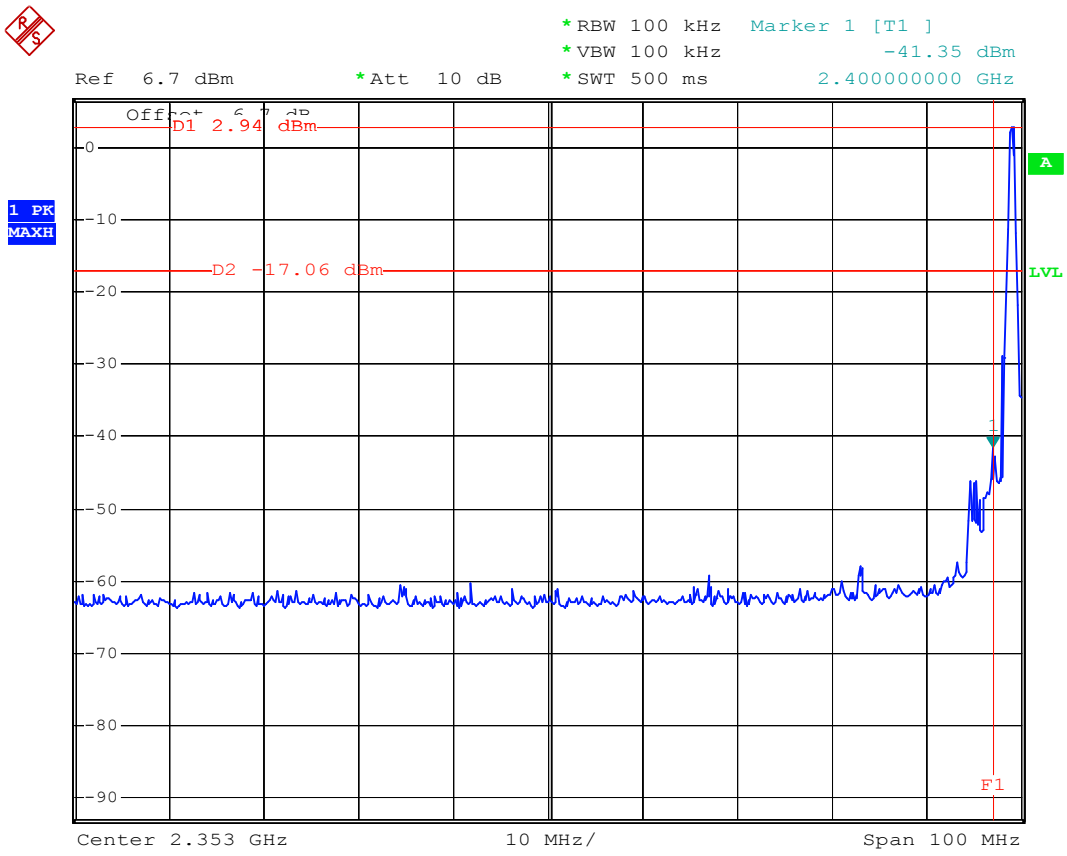
The delta between fundamental and peak spurious emission (2400MHz) for CH00 is 44.29dB.
The delta between fundamental and peak spurious emission (2483.7MHz) for CH78 is 56.640dB.

Channel	Polarity	The emission of carrier power strength	Frequency	The maximum field strength in band edge	Limit	Margin	Remark	Result
		(dBμV/m)	(GHz)	(dBμV/m)	(dBμV/m)	(dB)		
00	H	102.23	2404.00	57.94	74.00	-16.06	Peak	Pass
	H	84.11	2404.00	39.82	54.00	-14.18	Average	Pass
	V	102.39	2398.00	58.1	74.00	-15.9	Peak	Pass
	V	84.58	2398.00	40.29	54.00	-13.71	Average	Pass
78	H	92.57	2478.00	35.93	74.00	-38.07	Peak	Pass
	H	74.63	2478.00	17.99	54.00	-36.01	Average	Pass
	V	91.37	2478.00	34.73	74.00	-39.27	Peak	Pass
	V	73.15	2478.00	16.51	54.00	-37.49	Average	Pass

＊Remark: The data above can refer to radiated emission in section 5.9.

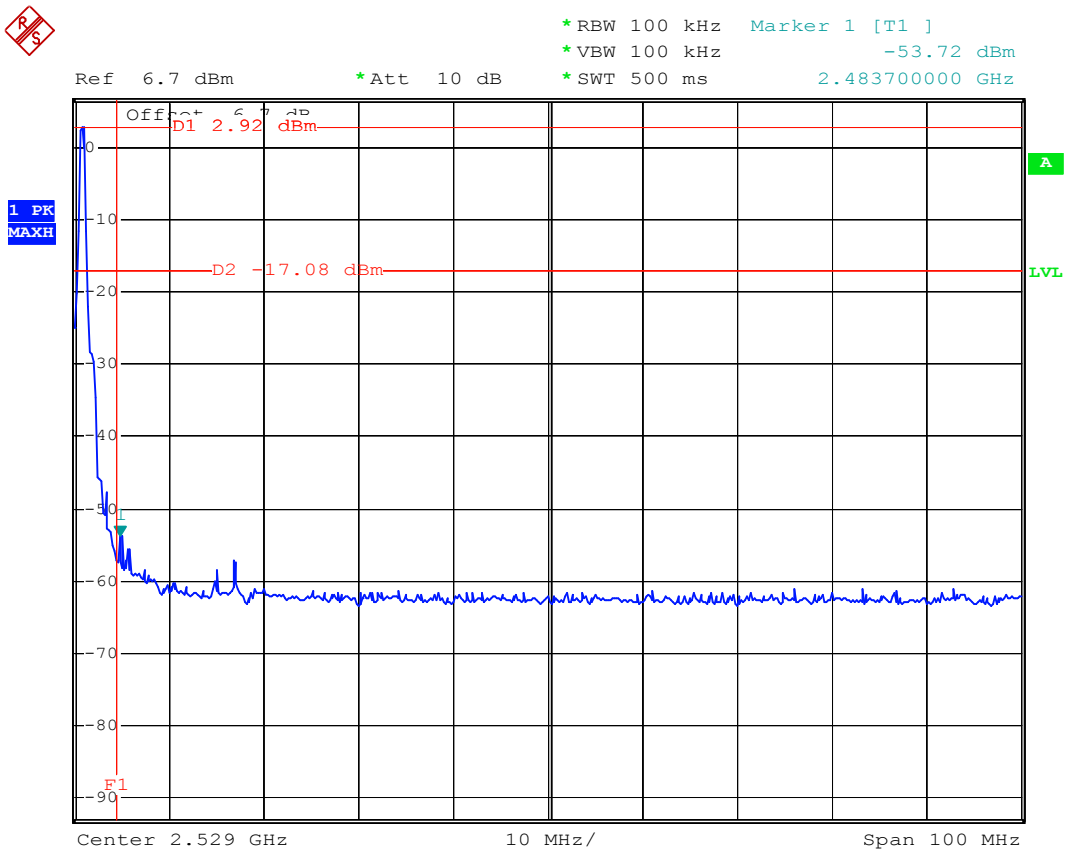
5.7.5 Frequency Band Edge

Mode 1: CH00 (2402 MHz)



Date: 4.OCT.2004 22:21:34

Mode 3: CH78 (2480 MHz)



Date: 4.OCT.2004 22:34:00

5.8 Conducted Emission

5.8.1 Measuring Instruments

As described in chapter 6 of this test Report.

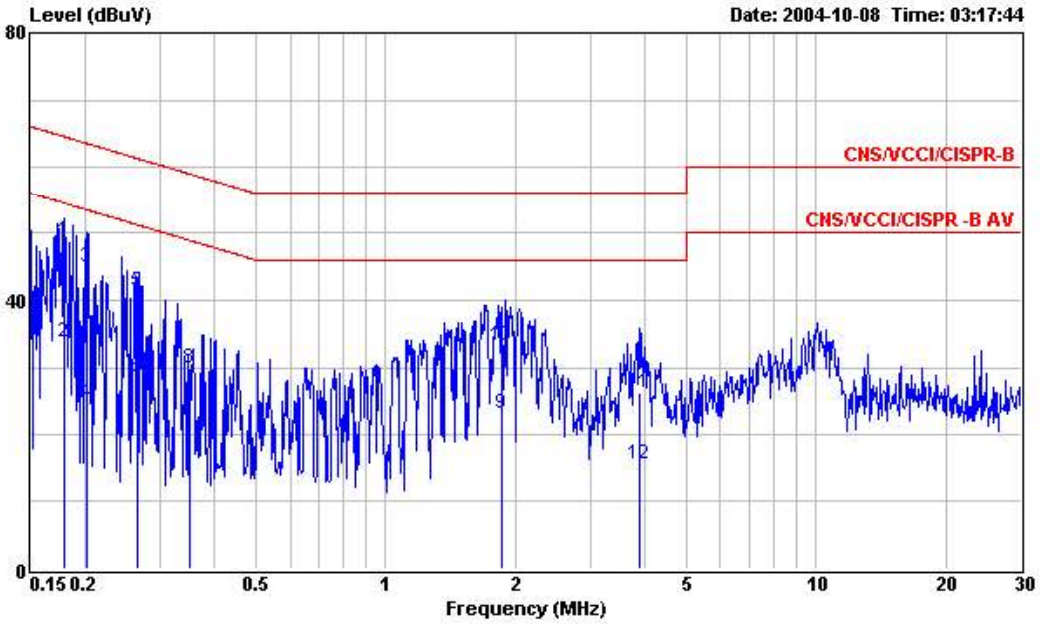
5.8.2 Test Procedures：

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 port of a line impedance stabilization network (LISN).
c. All the support units are connected 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.

5.8.3 Test Data

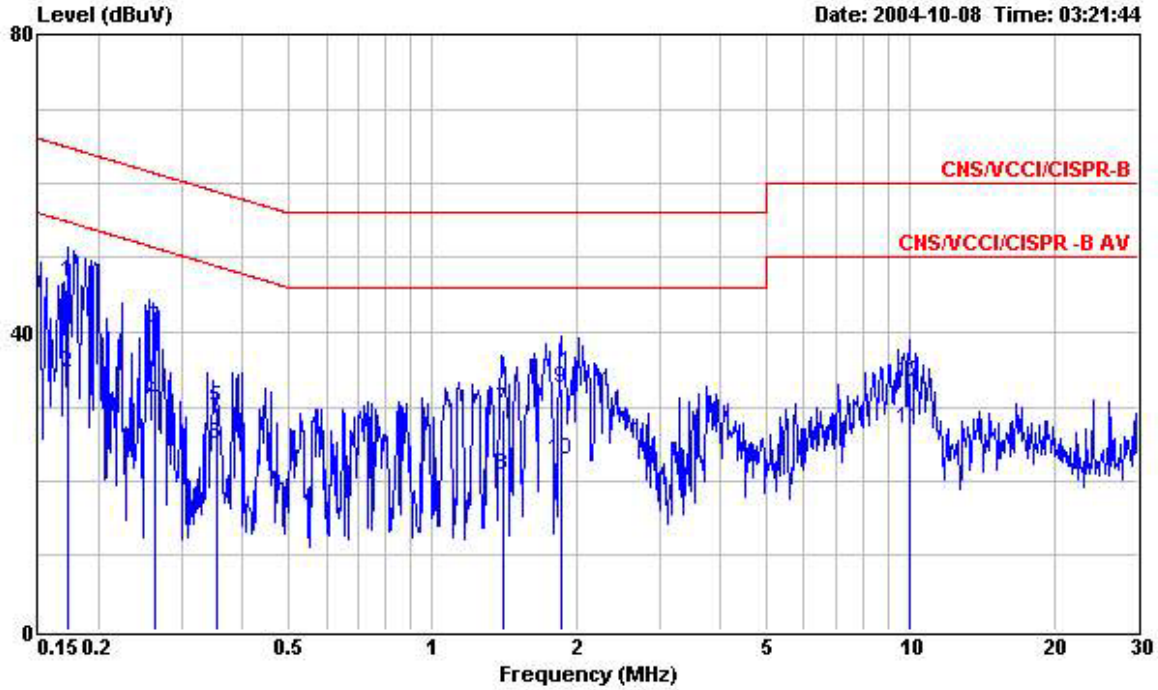
- Application Type : 802.11b
- Temperature : 26 °C
- Relating Humidity : 53 %
- Test Enginner : Jay
- Test Mode : Mode 1

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



Site : CO01-HY
Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
EUT : Bluetooth Headset
Power : 120Vac/60Hz
Model : MBH-C2.1
Memo : Link Mode

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.179	48.82	-15.71	64.53	48.63	0.10	0.09	QP
2	0.179	33.71	-20.82	54.53	33.52	0.10	0.09	Average
3	0.203	45.03	-18.46	63.49	44.83	0.10	0.10	QP
4	0.203	24.55	-28.94	53.49	24.35	0.10	0.10	Average
5	0.264	41.21	-20.08	61.29	41.04	0.10	0.07	QP
6	0.264	28.56	-22.73	51.29	28.39	0.10	0.07	Average
7	0.352	22.66	-26.26	48.92	22.53	0.10	0.03	Average
8	0.352	29.87	-29.05	58.92	29.74	0.10	0.03	QP
9	1.863	23.19	-22.81	46.00	23.04	0.10	0.05	Average
10	1.863	33.35	-22.65	56.00	33.20	0.10	0.05	QP
11	3.900	26.20	-29.80	56.00	26.02	0.10	0.08	QP
12	3.900	15.70	-30.30	46.00	15.52	0.10	0.08	Average



Site : CO01-HY
Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
EUT : Bluetooth Headset
Power : 120Vac/60Hz
Model : MBH-C2.1
Memo : Link Mode

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.173	46.82	-18.00	64.82	46.64	0.10	0.08	QP
2	0.173	34.53	-20.29	54.82	34.35	0.10	0.08	Average
3	0.264	40.57	-20.75	61.32	40.40	0.10	0.07	QP
4	0.264	30.57	-20.75	51.32	30.40	0.10	0.07	Average
5	0.354	29.77	-29.10	58.87	29.64	0.10	0.03	QP
6	0.354	24.85	-24.02	48.87	24.72	0.10	0.03	Average
7	1.413	29.61	-26.39	56.00	29.39	0.10	0.12	QP
8	1.413	20.66	-25.34	46.00	20.44	0.10	0.12	Average
9	1.860	32.60	-23.40	56.00	32.44	0.10	0.06	QP
10	1.860	22.87	-23.13	46.00	22.71	0.10	0.06	Average
11	9.970	26.90	-23.10	50.00	26.47	0.20	0.23	Average
12	9.970	33.26	-26.74	60.00	32.83	0.20	0.23	QP

5.9 Radiated Emission Measurement

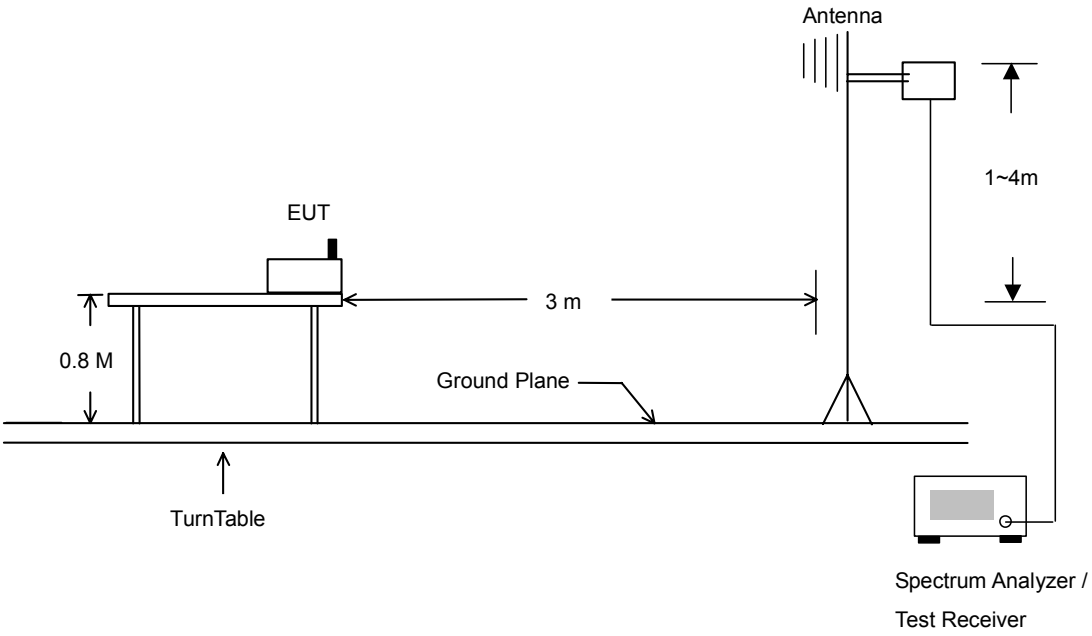
5.9.1 Measuring Instruments

As described in chapter 6 of this Report.

5.9.2 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 for both horizontal polarization and vertical polarization of the antenna.
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 turntable (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. For testing below 1GHz, 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 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 average 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.

5.9.3 Typical Test Setup Layout of Radiated Emission



5.9.4 Test Data

- Application Type : 802.11b
- Temperature : 25 °C
- Relating Humidity : 59 %
- Test Enginner : Jay
- Test Mode : Mode 1
- Polarization : Horizontal

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

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	176.88	38.04	-5.46	43.50	60.28	8.44	31.85	1.17	Peak	---	---
2 @	195.78	26.37	-17.13	43.50	48.66	8.52	32.03	1.23	Peak	---	---
3 @	244.38	27.81	-18.19	46.00	46.88	11.35	31.79	1.38	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	633.90	36.03	-9.97	46.00	46.32	18.80	31.48	2.40	Peak	---	---
2 @	766.90	34.98	-11.02	46.00	43.94	19.97	31.63	2.70	Peak	---	---
3 @	833.40	30.74	-15.26	46.00	39.22	20.33	31.81	2.99	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2310.00	52.07	-21.93	74.00	56.04	28.31	35.53	3.25	Peak	---	---
2 @	2310.00	40.77	-13.23	54.00	44.74	28.31	35.53	3.25	Average	---	---
3 @	2404.00	102.23			106.34	28.41	35.85	3.32	Peak	---	---
4 @	2404.00	84.11			88.22	28.41	35.85	3.32	Average	---	---
5 @	2500.00	51.42	-22.58	74.00	55.50	28.50	35.97	3.39	Peak	---	---
6 @	2500.00	40.61	-13.39	54.00	44.68	28.50	35.97	3.39	Average	---	---

Remark: #3 and #4 Fundamental Signal

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	3998.00	47.35	-26.65	74.00	49.89	30.50	37.34	4.29	Peak	---	---

- Test Mode : Mode 1
- Polarization : Vertical

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

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	76.44	28.94	-11.06	40.00	54.31	6.15	32.27	0.76	Peak	---	---
2 @	161.49	30.15	-13.35	43.50	51.73	9.45	32.13	1.09	Peak	---	---
3 @	199.83	27.10	-16.40	43.50	49.22	8.70	32.06	1.24	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	766.90	33.69	-12.31	46.00	42.66	19.97	31.63	2.70	Peak	---	---
2 @	833.40	34.48	-11.52	46.00	42.96	20.33	31.81	2.99	Peak	---	---
3 @	999.30	34.12	-19.88	54.00	40.89	21.09	31.07	3.20	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2338.00	52.22	-21.78	74.00	56.23	28.34	35.63	3.27	Peak	---	---
2 @	2338.00	41.51	-12.49	54.00	45.52	28.34	35.63	3.27	Average	---	---
3 @	2398.00	102.39			106.52	28.40	35.85	3.32	Peak	---	---
4 @	2398.00	84.58			88.71	28.40	35.85	3.32	Average	---	---
5 @	2488.00	51.73	-22.27	74.00	55.80	28.50	35.94	3.38	Peak	---	---
6 @	2488.00	40.71	-13.29	54.00	44.77	28.50	35.94	3.38	Average	---	---

Remark: #3 and #4 Fundamental Signal

- Test Mode : Mode 2
- Polarization : Horizontal

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

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	83.73	29.69	-10.31	40.00	61.12	0.00	32.24	0.80	Peak	---	---
2 @	194.43	31.02	-12.48	43.50	61.81	0.00	32.02	1.22	Peak	---	---
3 @	199.83	30.55	-12.95	43.50	61.37	0.00	32.06	1.24	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	313.30	27.23	-18.77	46.00	57.88	0.00	32.20	1.54	Peak	---	---
2 @	369.30	23.39	-22.61	46.00	53.11	0.00	31.44	1.72	Peak	---	---
3 @	491.80	21.32	-24.68	46.00	50.83	0.00	31.57	2.06	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2314.00	40.57	-13.43	54.00	44.62	28.31	35.63	3.27	Average	---	---
2 @	2314.00	51.96	-22.04	74.00	56.01	28.31	35.63	3.27	Peak	---	---
3 @	2438.00	102.22			106.31	28.45	35.88	3.34	Peak	---	---
4 @	2438.00	82.97			87.06	28.45	35.88	3.34	Average	---	---
5 @	2500.00	51.44	-22.56	74.00	55.52	28.50	35.97	3.39	Peak	---	---
6 @	2500.00	40.58	-13.42	54.00	44.65	28.50	35.97	3.39	Average	---	---

Remark: #3 and #4 Fundamental Signal

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	3998.00	49.00	-25.00	74.00	51.54	30.50	37.34	4.29	Peak	---	---

- Test Mode : Mode 2
- Polarization : Vertical

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

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	78.33	31.90	-8.10	40.00	63.39	0.00	32.26	0.76	Peak	---	---
2 @	159.33	33.69	-9.81	43.50	64.77	0.00	32.16	1.09	Peak	---	---
3 @	197.94	33.11	-10.39	43.50	63.93	0.00	32.06	1.23	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	313.30	23.05	-22.95	46.00	53.71	0.00	32.20	1.54	Peak	---	---
2 @	679.40	21.72	-24.28	46.00	50.60	0.00	31.40	2.52	Peak	---	---
3 @	710.90	28.30	-17.70	46.00	57.35	0.00	31.63	2.58	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	1334.00	52.66	-21.34	74.00	58.70	25.03	33.52	2.44	Peak	---	---
2 @	1998.00	53.53	-20.47	74.00	58.81	28.00	36.32	3.04	Peak	---	---
3 @	2334.00	51.92	-22.08	74.00	55.95	28.33	35.63	3.27	Peak	---	---
4 @	2334.00	43.21	-10.79	54.00	47.24	28.33	35.63	3.27	Average	---	---
5 @	2438.00	98.57			102.66	28.45	35.88	3.34	Peak	---	---
6 @	2438.00	82.47			86.56	28.45	35.88	3.34	Average	---	---
7 @	2498.00	51.55	-22.45	74.00	55.62	28.50	35.97	3.39	Peak	---	---
8 @	2498.00	40.56	-13.44	54.00	44.63	28.50	35.97	3.39	Average	---	---

Remark: #5 and #6 Fundamental Signal

- Test Mode : Mode 3
- Polarization : Horizontal

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

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	83.19	24.80	-15.20	40.00	49.00	7.25	32.24	0.79	Peak	---	---
2 @	115.59	26.57	-16.93	43.50	45.99	11.62	31.99	0.95	Peak	---	---
3 @	197.13	26.53	-16.97	43.50	48.77	8.59	32.06	1.23	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	498.80	29.88	-16.12	46.00	41.90	17.30	31.41	2.09	Peak	---	---
2 @	700.40	31.91	-14.09	46.00	41.70	19.10	31.45	2.57	Peak	---	---
3 @	766.90	34.79	-11.21	46.00	43.75	19.97	31.63	2.70	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	1334.00	41.05	-32.95	74.00	57.47	25.03	43.89	2.44	Peak	---	---
2 @	2310.00	31.85	-22.15	54.00	44.67	28.31	44.38	3.25	Average	---	---
3 @	2310.00	43.40	-30.60	74.00	56.22	28.31	44.38	3.25	Peak	---	---
4 @	2478.00	92.57			105.02	28.48	44.31	3.38	Peak	---	---
5 @	2478.00	74.63			87.08	28.48	44.31	3.38	Average	---	---
6 @	2484.00	72.00	-2.00	74.00	84.45	28.48	44.31	3.38	Peak	---	---
7 @	2484.00	53.72	-0.28	54.00	66.17	28.48	44.31	3.38	Average	---	---

Remark: #4 and #5 Fundamental Signal.

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	3000.00	39.59	-34.41	74.00	50.28	30.00	44.10	3.41	Peak	---	---
2 @	3998.00	39.88	-34.12	74.00	50.08	30.50	45.00	4.29	Peak	---	---

- Test Mode : Mode 3
- Polarization : Vertical

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

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	119.64	26.31	-17.19	43.50	45.60	11.70	31.95	0.96	Peak	---	---
2 @	153.39	27.51	-15.99	43.50	48.79	9.85	32.20	1.07	Peak	---	---
3 @	199.83	28.57	-14.93	43.50	50.69	8.70	32.06	1.24	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	565.30	31.65	-14.35	46.00	42.16	18.69	31.43	2.23	Peak	---	---
2 @	833.40	32.33	-13.67	46.00	40.81	20.33	31.81	2.99	Peak	---	---
3 @	1000.00	34.12	-19.88	54.00	40.88	21.10	31.07	3.20	Peak	---	---

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	1334.00	42.81	-31.19	74.00	59.23	25.03	43.89	2.44	Peak	---	---
2 @	1998.00	45.12	-28.88	74.00	58.58	28.00	44.50	3.04	Peak	---	---
3 @	2364.00	32.15	-21.85	54.00	44.85	28.36	44.35	3.29	Average	---	---
4 @	2364.00	43.32	-30.68	74.00	56.02	28.36	44.35	3.29	Peak	---	---
5 @	2478.00	91.37			103.82	28.48	44.31	3.38	Peak	---	---
6 @	2478.00	73.15			85.60	28.48	44.31	3.38	Average	---	---
7 @	2484.00	73.51	-0.49	74.00	85.96	28.48	44.31	3.38	Peak	---	---
8 @	2484.00	41.25	-12.75	54.00	53.70	28.48	44.31	3.38	Average	---	---

Remark: #5 and #6 Fundamental Signal

5.10 Antenna Requirements

5.10.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no other antenna except assembled by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

5.10.2 Antenna Connected Construction

The antenna used in this product is a PCB Antenna without IPEX connecter and it is considered to meet antenna requirement of FCC.

6. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 23, 2004	Jun. 23, 2005	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001/008	9 KHz – 30 MHz	May 03, 2004	May 03, 2005	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001/009	9 KHz – 30 MHz	Apr. 19, 2004	Apr. 19, 2005	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	NCR	NCR	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	NCR	NCR	Conduction (CO01-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Dec. 24, 2003	Dec. 24, 2004	Conduction (CO01-HY)
Spectrum analyzer	R&S	FSP40	100057	9kHz-40GHz	Feb. 26, 2004	Feb. 26, 2005	Radiation (03CH06-HY)
Controller	CT	SC100	N/A	N/A	NCR	NCR	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz -2GHz	Dec. 18, 2003	Dec. 18, 2004	Radiation (03CH06-HY)
Horn Antenna	Com-Power	AH118	071025	1G-18G	Feb. 11, 2004	Feb. 11, 2005	Radiation (03CH06-HY)
SHF-EHF Horn	SCHWARZBECK	BBHA 9170	9170-249	14G - 40G	Jun. 22, 2004	Jun. 22, 2005	Radiation (03CH06-HY)
PreAmplifier	Com-Power	PA-103	161055	1MHz - 1000MHz	Apr. 26, 2004	Apr. 26, 2005	Radiation (03CH06-HY)
HF Amplifier	MITEQ	AFS44	973248	0.1G - 26.5G	May. 20, 2004	May. 20, 2005	Radiation (03CH06-HY)
Amplifier	MITEQ	AMF-6F	997165	26G - 40G	Jun. 24, 2004	Jun. 24, 2005	Radiation (03CH06-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	NCR	NCR	Radiation (03CH06-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	NCR	NCR	Radiation (03CH06-HY)

7. Uncertainty Evaluation

Uncertainty of Radiated Emission Evaluation (30MHz ~ 1000MHz)

Contribution	Uncertainty of x_i		$u(x_i)$
	dB	Probability Distribution	
Receiver reading	0.41	Normal(k=2)	0.21
Antenna factor calibration	0.83	Normal(k=2)	0.42
Cable loss calibration	0.25	Normal(k=2)	0.13
Pre Amplifier Gain calibration	0.27	Normal(k=2)	0.14
RCV/SPA specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site imperfection	1.43	Rectangular	0.83
Mismatch Receiver VSWR Γ1= 0.20 Antenna VSWR Γ2= 0.23 Uncertainty=20log(1-Γ1*Γ2)	+0.39/-0.41	U-shaped	0.28
combined standard uncertainty Uc(y)	**1.27**		
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)	**2.54**		

Uncertainty of Radiated Emission Evaluation (1GHz ~ 40GHz)

Contribution	Uncertainty of x_i		$u(x_i)$	Ci	$Ci*u(x_i)$
	dB	Probability Distribution			
Receiver reading	±0.10	Normal(k=1)	0.10	1	0.10
Antenna factor calibration	±1.70	Normal(k=2)	0.85	1	0.85
Cable loss calibration	±0.50	Normal(k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR Γ1= 0.197 Antenna VSWR Γ2= 0.194 Uncertainty=20log(1-Γ1*Γ2*Γ3)	+0.34/-0.35	U-shaped	0.244	1	0.244
Combined standard uncertainty Uc(y)	**2.36**				
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	**4.72**				