

# **TEST REPORT**

of

## **FCC Part 15 Subpart B & C**

Product : **Internet Radio Receiver**

Model(s): **IRF**

Applicant: **BEHAVIOR TECH COMPUTER CORP.**

Address: **20F-B, No.98, Sec.1, Sintai 5th Rd.,  
Sijhih City, Taipei Hsien, 22102  
Taiwan**

Test Performed by:

**International Standards Laboratory**

<Lung-Tan LAB>

\*Site Registration No.

BSMI: SL2-IN-E-0013; TAF: 0997; IC: IC4164-1 ;

VCCI: R-1435, C-1440, T-299, R-2598, C-2845; NEMKO: ELA 113B

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Report No.: **ISL-08LR016FC**

Issue Date : **2008/05/30**

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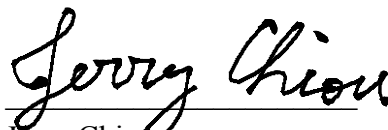
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## 1. General

### 1.1 Certification of Accuracy of Test Data

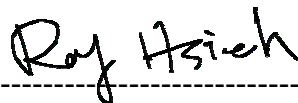
<b>Standards:</b>	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.247)
<b>Test Procedure:</b>	ANSI C63.4:2003
<b>Equipment Tested:</b>	Internet Radio Receiver
<b>Model:</b>	IRF
<b>Applied by:</b>	BEHAVIOR TECH COMPUTER CORP.
<b>Sample received Date:</b>	2008/05/15
<b>Final test Date :</b>	2008/04/24; 2008/05/20-2008/05/21
<b>Test Result</b>	PASS
<b>Test Site:</b>	Chamber 12, Conduction 03
<b>Temperature</b>	Refer to each site test data
<b>Humidity:</b>	Refer to each site test data
<b>Test Engineer:</b>	

  
Jerry Chion

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Approve & Signature



Roy Hsieh / Manager

Test results given in this report apply only to the specific sample(s) tested under stated test conditions. This report shall not be reproduced other than in full without the explicit written consent of ISL. This report totally contains 71 pages, including 1 cover page, 2 contents page, and 68 pages for the test description.
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## 1.2 Test Results Summary

The 802.11b functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247( c )	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 ( c )	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

The 802.11g functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247( c )	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 ( c )	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

## 2. Description of Equipment Under Test (EUT)

Description:	Internet Radio Receiver
Condition:	Pre-Production
Model:	IRF, Wireless connection
Brand:	BTC; EMPREX; MaxD
Frequency Range of 802.11b/g:	2400 - 2483.5 MHz
Support channel: 802.11b/g	11 Channels
Modulation Skill: 802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
Antennas Type: WLAN Main antenna:	PIFA (Model: RFA-02-C2H1), made by Aristotle.
Antenna Connected:	Connected to RF connector on the PCB of the WLAN module .The user is not possible to change the antenna without disassembling the notebook computer.
Antenna peak Gain: WLAN Main antenna	2.5dBi(11b,11g)
Power Type of wireless module:	3.3V DC from EUT

The channel and the operation frequency of 802.11b and 802.11g listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437		

Power Supply:	UNIFIVE Power Devices Inc. (Model:US300520) Input AC100-240V, 50/60Hz , 0.3A With Core
USB Port:	one 4-pins
USB Data Cable:	one
LAN Port:	one 8-pin(10Mbps)
Wireless antenna LAN Port:	one
AUDIO OUT Port:	one
DC Power Port:	one
Remote control:	one

EMI Noise Source:

Crystal: 12.888MHz (Y1), Crystal: 25.000MHz (Y2), Crystal: 24.000MHz (Y3), Crystal: 32.768KHz (Y4), Crystal: 8MHz(Y5)

EMI Solution:

1. Added one Ferrite Core on the Wireless antenna LAN cable.
2. Added one Ferrite Core on the USB Data cable.
3. Added five CLIP on the Motherboard contact with chassis Ground.
4. Added one Ferrite Core on the Power Supply cable.

### 3. Description of Support Equipment

#### 3.1 Description of Support Equipment

None

##### 3.1.1 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
DC Power Cord	SPS to DC Power Port of EUT	1.8M	Non-shielded, Non-detachable	Metal Head



## **4. TEST RESULTS (802.11b & g)**

### **4.1 Powerline Conducted Emissions [Section 15.207]**

#### **4.1.1 EUT Configuration**

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit used.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

#### **4.1.2 Test Procedure**

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

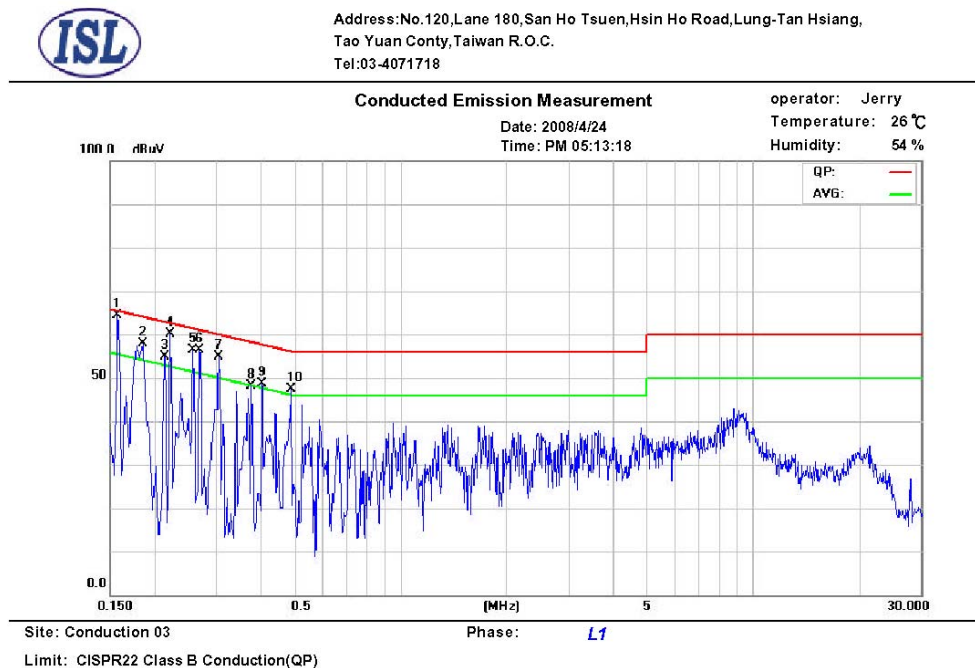
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

#### **4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)**

Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

#### 4.1.4 802.11b Test Data:

#### 802.11b Power Line Conducted Emissions (Hot) Channel 1, 6, 11



Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.1580	1.7	0.02	36.57	65.5	-29.0	26.57	55.5	-29.0	
0.1860	1.37	0.04	34.94	64.2	-29.2	29.52	54.2	-24.6	
0.2140	1.13	0.05	39.56	63.0	-23.4	29.88	53.0	-23.1	
0.2220	1.09	0.06	40.69	62.7	-22.0	21.39	52.7	-31.3	
0.2580	0.91	0.08	37.78	61.5	-23.7	29.62	51.5	-21.8	
0.2700	0.85	0.08	36.41	61.1	-24.7	26.80	51.1	-24.3	
0.3060	0.69	0.1	34.37	60.0	-25.7	30.01	50.0	-20.0	
* 0.3780	0.54	0.09	40.54	58.3	-17.7	14.56	48.3	-33.7	
0.4060	0.49	0.08	29.60	57.7	-28.1	17.40	47.7	-30.3	
0.4900	0.41	0.07	28.40	56.1	-27.7	15.17	46.1	-31.0	

\*:Maximum data x:Over limit

## 802.11b Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

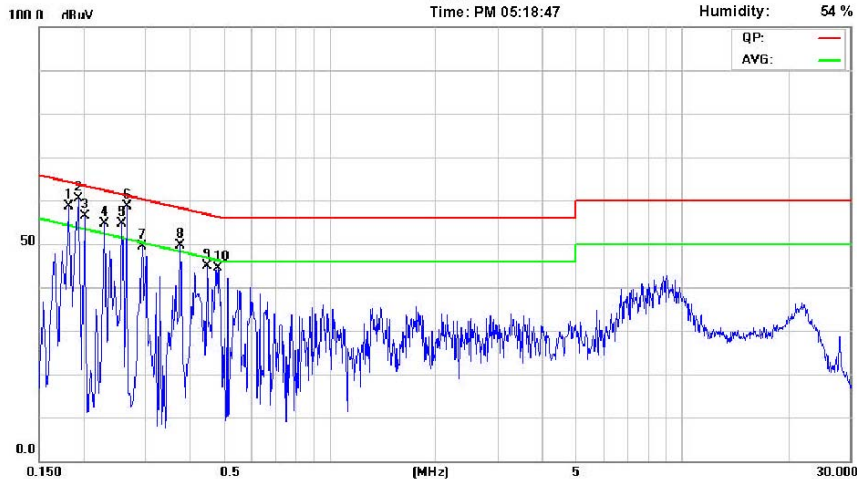


Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road, Lung-Tan Hsiang,  
Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

### Conducted Emission Measurement

operator: Jerry  
Temperature: 26 °C  
Humidity: 54 %

Date: 2008/4/24  
Time: PM 05:18:47



Site: Conduction 03

Phase: N

Limit: CISPR22 Class B Conduction(QP)

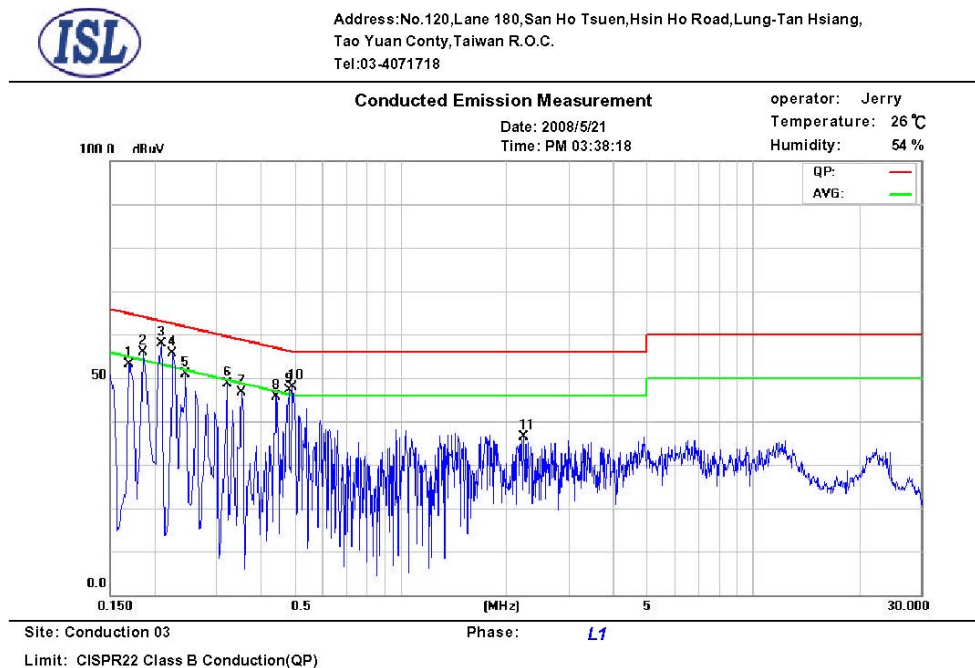
Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.1820	1.18	0.04	37.55	64.3	-26.8	21.65	54.3	-32.7	
0.1940	1.06	0.04	33.14	63.8	-30.7	24.08	53.8	-29.7	
0.2020	0.99	0.05	32.64	63.5	-30.8	21.51	53.5	-32.0	
0.2300	0.88	0.06	40.53	62.4	-21.9	26.32	52.4	-26.1	
0.2580	0.77	0.08	39.19	61.5	-22.3	19.34	51.5	-32.1	
0.2660	0.74	0.08	37.37	61.2	-23.8	17.04	51.2	-34.2	
0.2940	0.62	0.1	37.77	60.4	-22.6	27.85	50.4	-22.5	
0.3780	0.44	0.09	40.13	58.3	-18.1	14.11	48.3	-34.2	
* 0.4500	0.39	0.08	39.25	56.8	-17.6	15.00	46.8	-31.8	
0.4860	0.38	0.07	38.26	56.2	-17.9	27.94	46.2	-18.3	

\*.Maximum data x:Over limit

\* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1, 6, 11 to get the maximum reading of all these channels.  
Margin = Amplitude + Insertion Loss- Limit  
A margin of -8dB means that the emission is 8dB below the limit

#### 4.1.5 802.11g Test Data:

#### 802.11g Power Line Conducted Emissions (Hot) Channel 1, 6, 11



Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.1700	1.56	0.03	33.15	64.9	-31.8	24.03	54.9	-30.9	
0.1860	1.37	0.04	35.95	64.2	-28.2	27.95	54.2	-26.2	
0.2100	1.15	0.05	37.95	63.2	-25.2	29.96	53.2	-23.2	
0.2260	1.07	0.06	35.51	62.6	-27.0	24.67	52.6	-27.9	
0.2460	0.97	0.07	40.76	61.8	-21.1	29.69	51.8	-22.2	
0.3220	0.66	0.1	38.56	59.6	-21.1	24.52	49.6	-25.1	
0.3540	0.59	0.09	36.72	58.8	-22.1	26.22	48.8	-22.6	
* 0.4460	0.45	0.08	35.70	56.9	-21.2	29.96	46.9	-16.9	
0.4820	0.42	0.07	37.22	56.3	-19.0	28.14	46.3	-18.1	
0.4940	0.41	0.07	37.78	56.1	-18.3	25.93	46.1	-20.1	
2.2420	0.21	0.1	26.37	56.0	-29.6	23.85	46.0	-22.1	

\*:Maximum data x:Over limit

## 802.11g Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

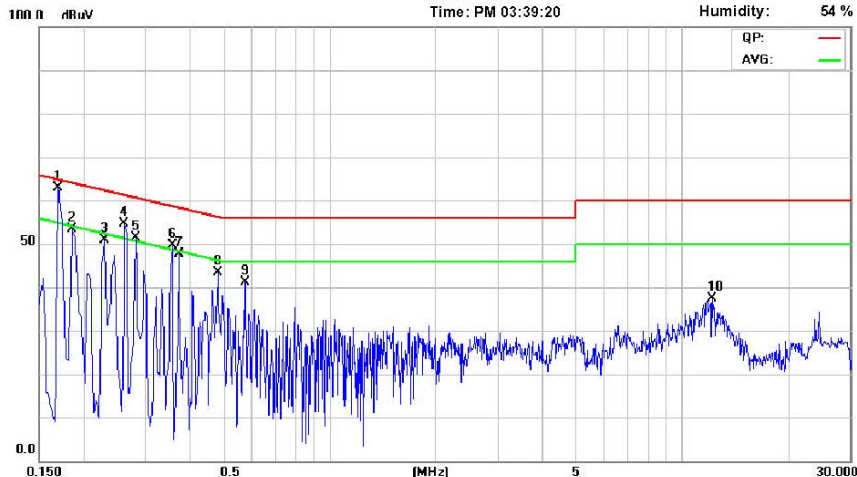


Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road, Lung-Tan Hsiang,  
Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

### Conducted Emission Measurement

Date: 2008/5/21  
Time: PM 03:39:20

operator: Jerry  
Temperature: 26 °C  
Humidity: 54 %



Site: Conduction 03

Phase: N

Limit: CISPR22 Class B Conduction(QP)

Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.1700	1.3	0.03	32.97	64.9	-31.9	23.87	54.9	-31.0	
0.1860	1.14	0.04	33.28	64.2	-30.9	24.94	54.2	-29.2	
0.2300	0.88	0.06	30.95	62.4	-31.5	26.69	52.4	-25.7	
0.2620	0.75	0.08	34.52	61.3	-26.8	30.27	51.3	-21.1	
0.2820	0.67	0.09	31.34	60.7	-29.4	24.40	50.7	-26.3	
* 0.3580	0.48	0.09	39.52	58.7	-19.2	22.31	48.7	-26.4	
0.3740	0.45	0.09	37.59	58.4	-20.8	26.18	48.4	-22.2	
0.4820	0.38	0.07	33.41	56.3	-22.8	23.99	46.3	-22.3	
0.5780	0.37	0.07	31.03	56.0	-24.9	22.19	46.0	-23.8	
12.2260	0.26	0.25	27.48	60.0	-32.5	20.46	50.0	-29.5	

\*Maximum data x:Over limit

\* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1, 6, 11 to get the maximum reading of all these channels.  
Margin = Amplitude + Insertion Loss- Limit  
A margin of -8dB means that the emission is 8dB below the limit

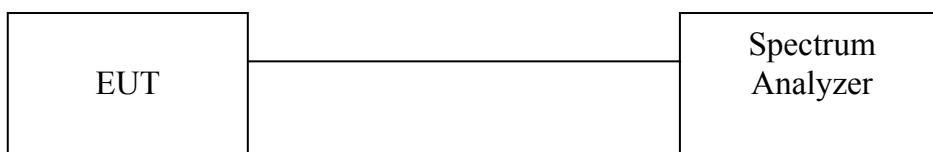
## 4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

### 4.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	100KHz
VBW	100KHz

### 4.2.2 Test Setup



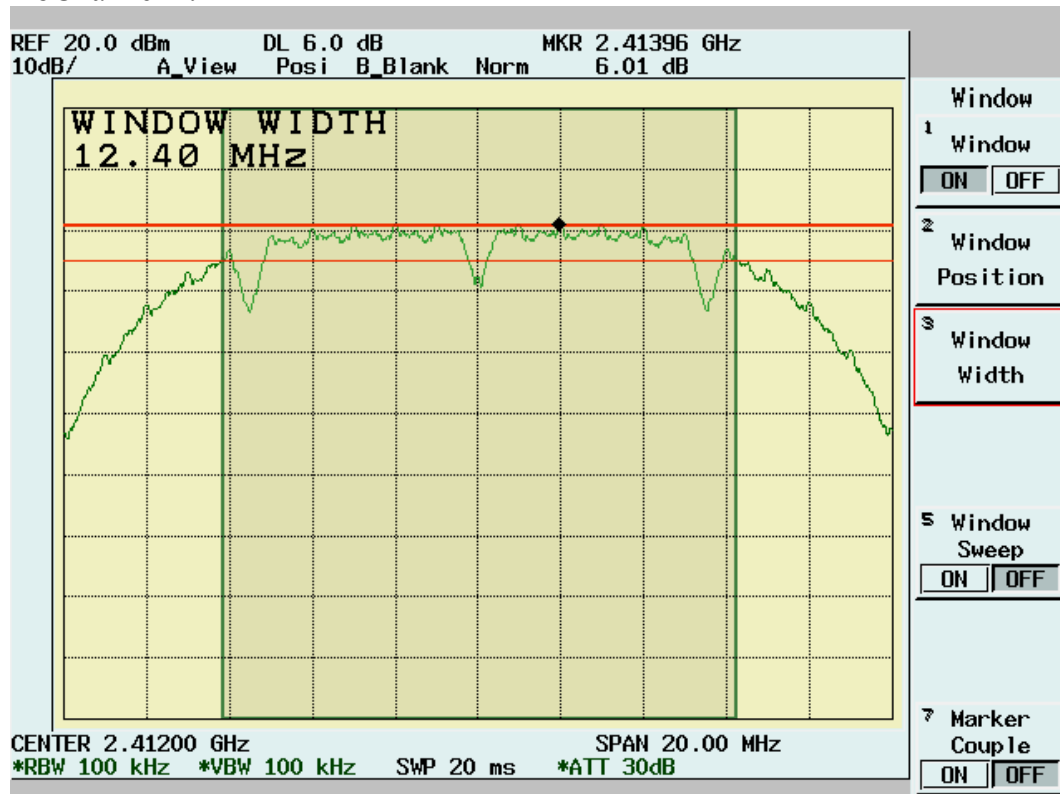
### 4.2.3 802.11b Test Data:

#### 802.11b 6dB Bandwidth

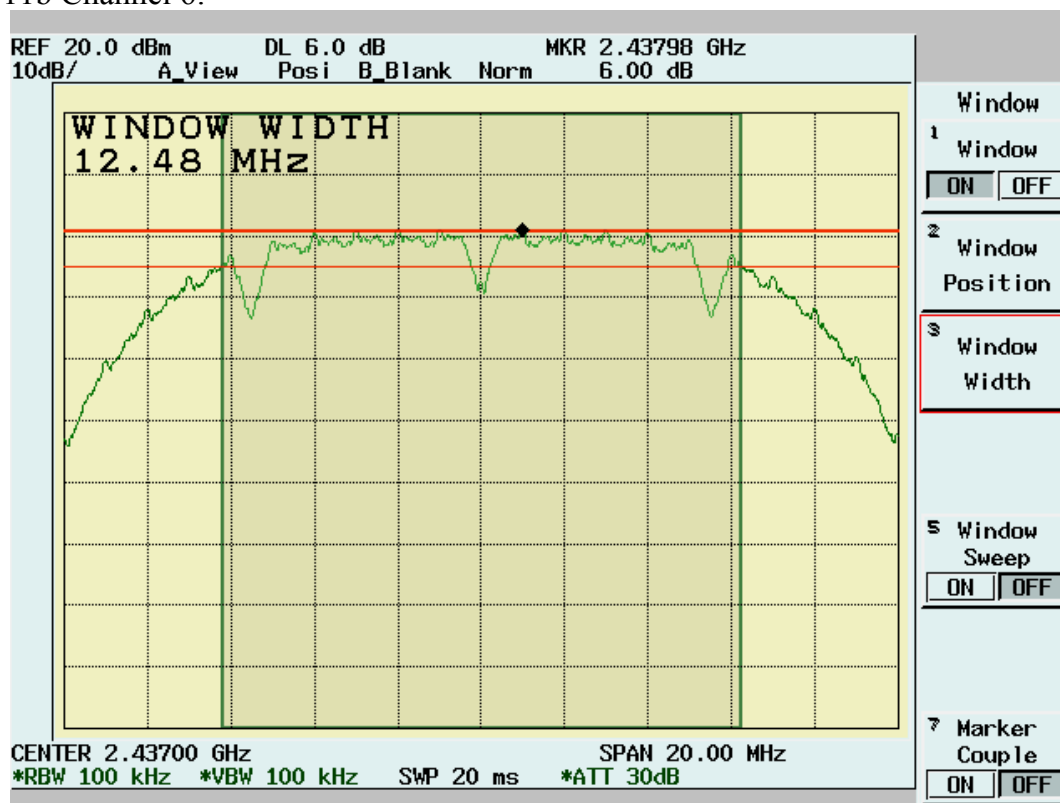
Temp. (° C): 25  
Humidity (%): 55  
Test Engr: Jerry

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	12.4	0.5	Pass
6	2437	12.48	0.5	Pass
11	2462	12.48	0.5	Pass

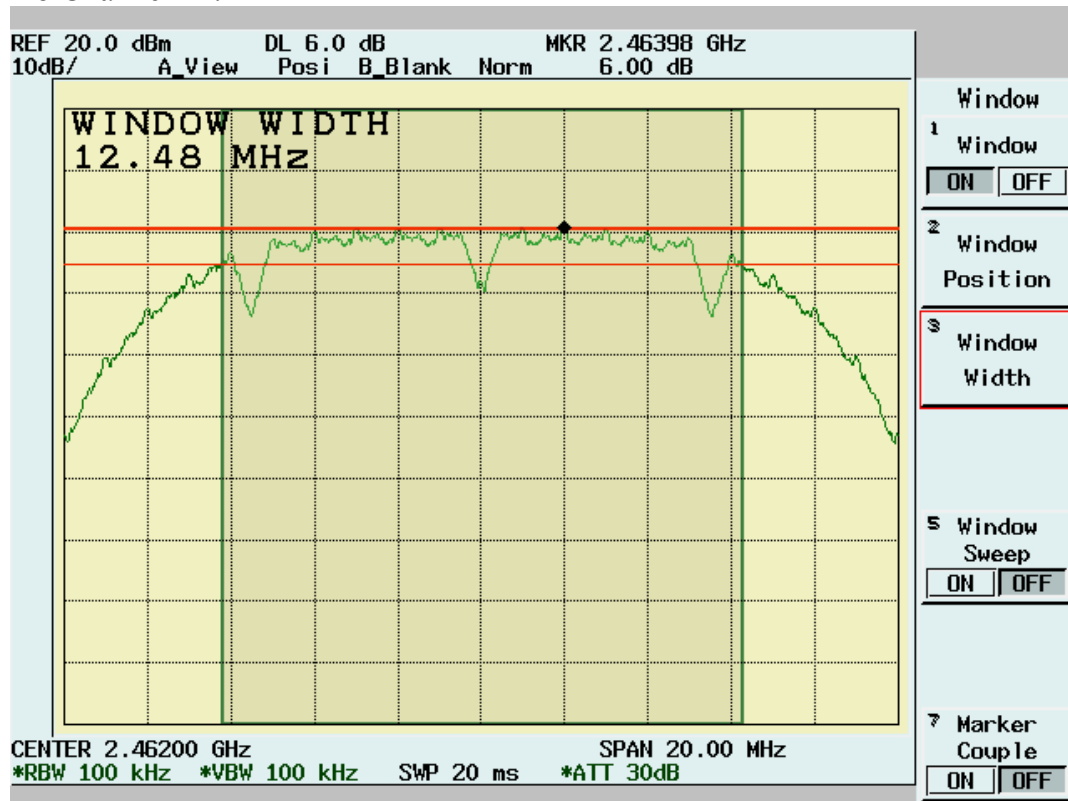
802.11b Channel 1:



802.11b Channel 6:



802.11b Channel 11:





#### 4.2.4 802.11g Test Data:

##### 802.11g 6dB Bandwidth

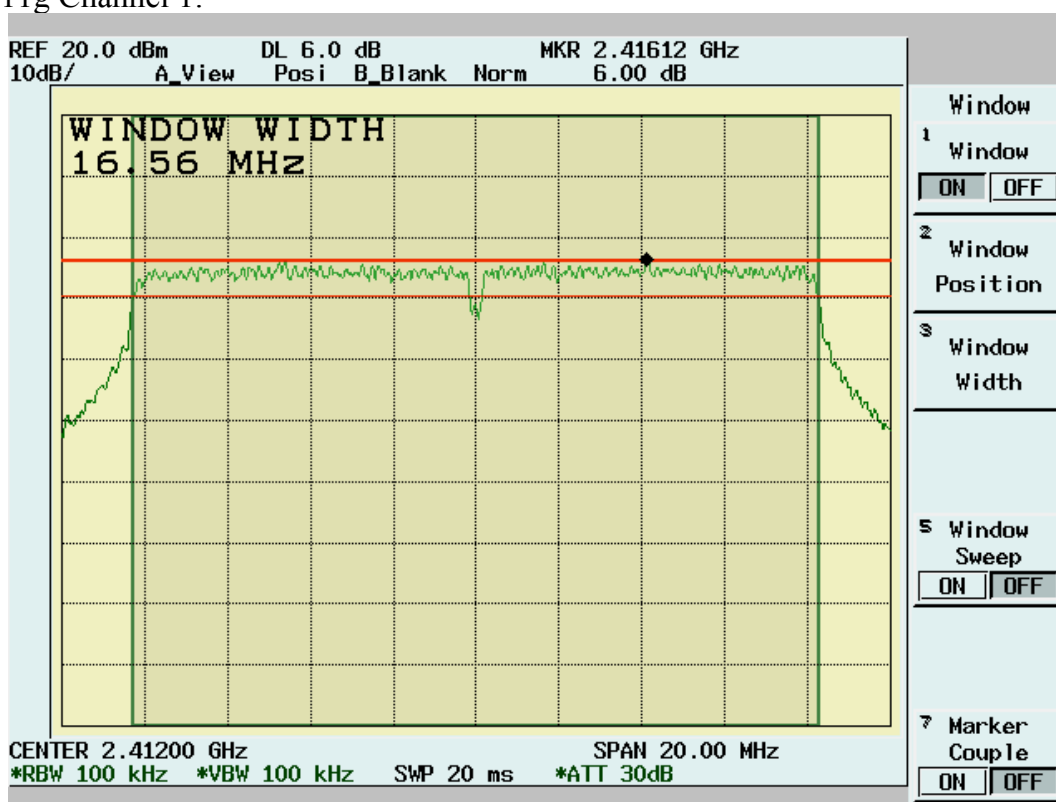
Temp. (°C): 25

Test Engr: Jerry

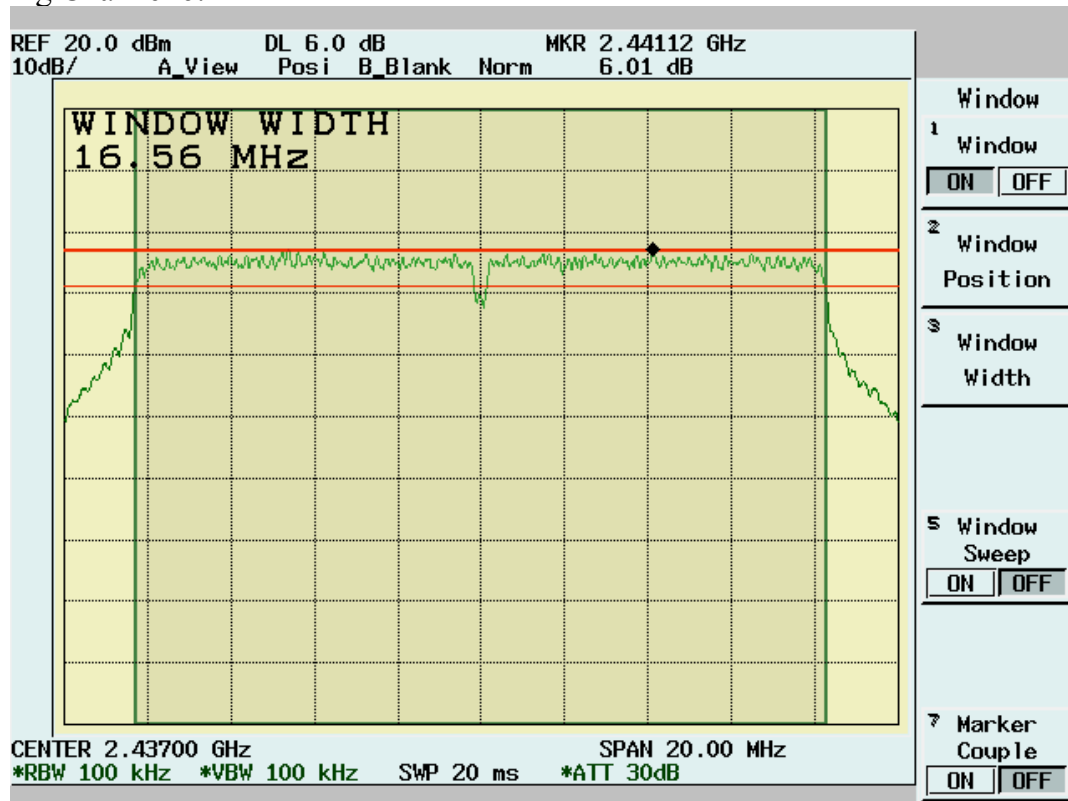
Humidity (%): 55

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.56	0.5	Pass
6	2437	16.56	0.5	Pass
11	2462	16.56	0.5	Pass

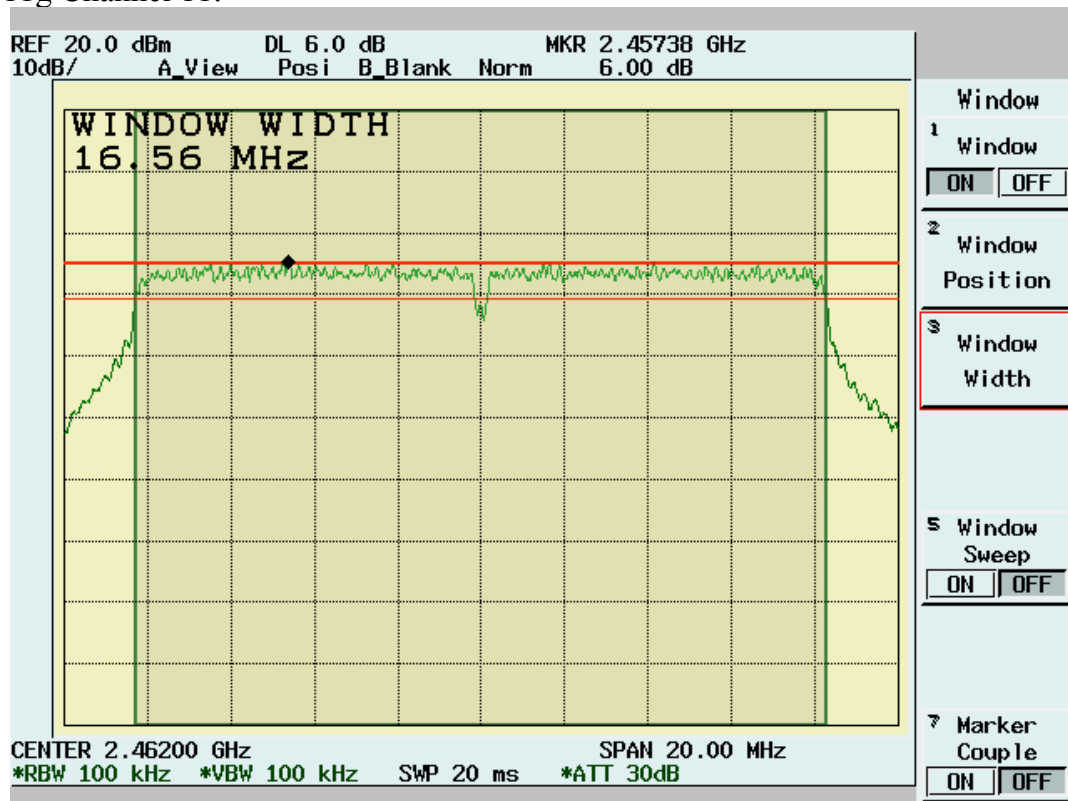
#### 802.11g Channel 1:



802.11g Channel 6:



802.11g Channel 11:

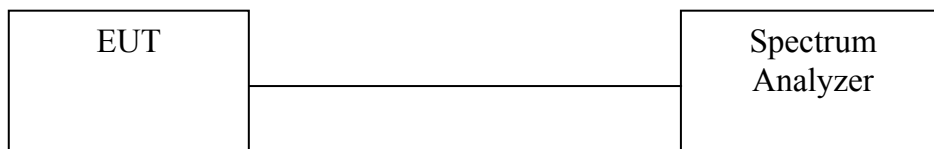


### 4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

#### 4.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer.

#### 4.3.2 Test Setup



#### 4.3.3 802.11b Test Data

##### 802.11b Maximum Peak Output Power

Temp. (° C): 25

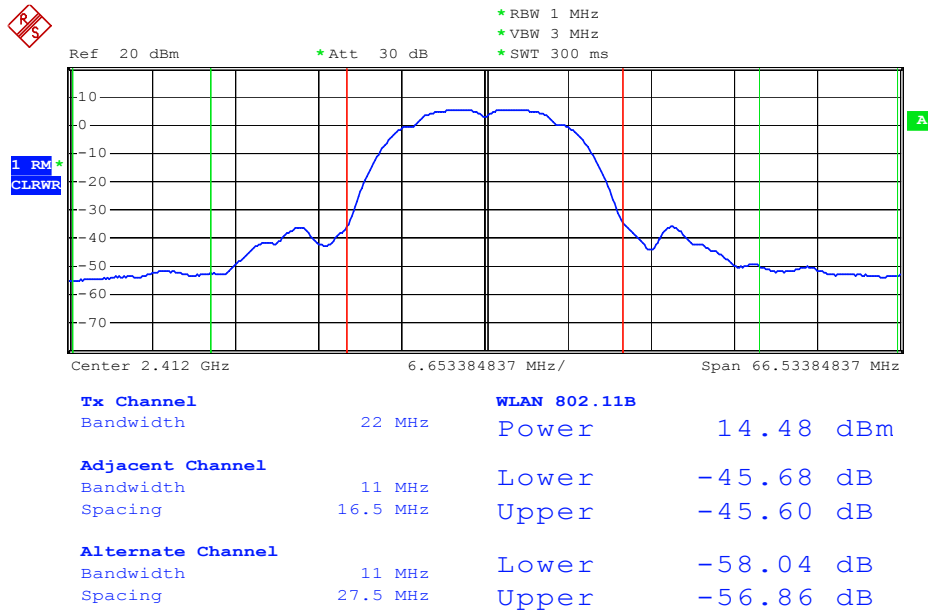
Test Engr: Jerry

Humidity (%): 55

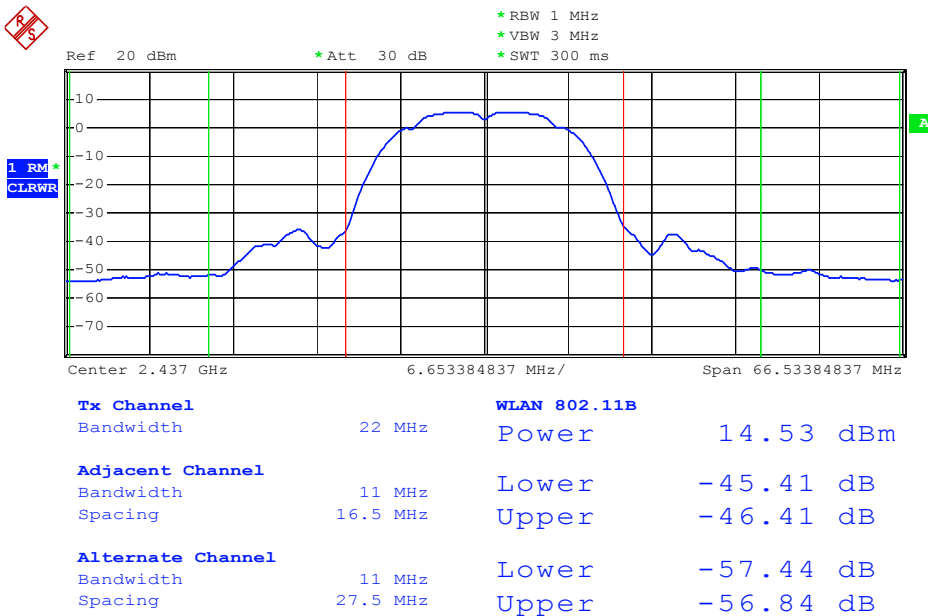
Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	14.48	1.1	36.14	15.58	30	Pass
6	2437	14.53	1.1	36.56	15.63	30	Pass
11	2462	14.07	1.1	32.89	15.17	30	Pass

802.11b (dBm)							
Freq. (MHz)	Bit rate (mbps)						
	1	2	5.5	11			
2412	15.58	15.55	15.57	15.54			
2437	15.63	15.21	15.16	15.15			
2462	15.17	15.13	15.12	15.15			

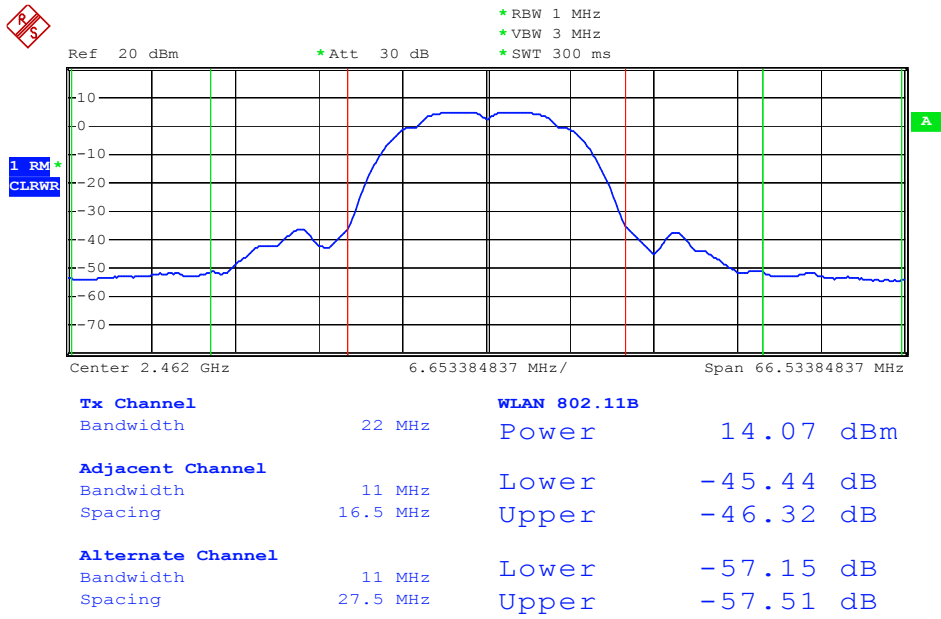
### 802.11b Channel 1:



### 802.11b Channel 6:



802.11b Channel 11:



#### 4.3.4 802.11g Test Data

##### 802.11g Maximum Peak Output Power

Temp. (° C): 25

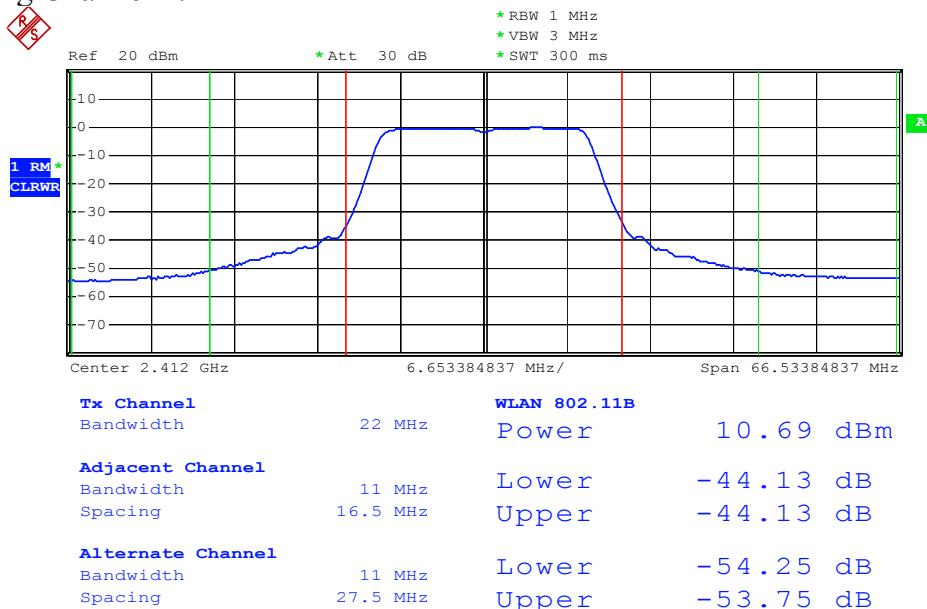
Test Engr: Jerry

Humidity (%): 55

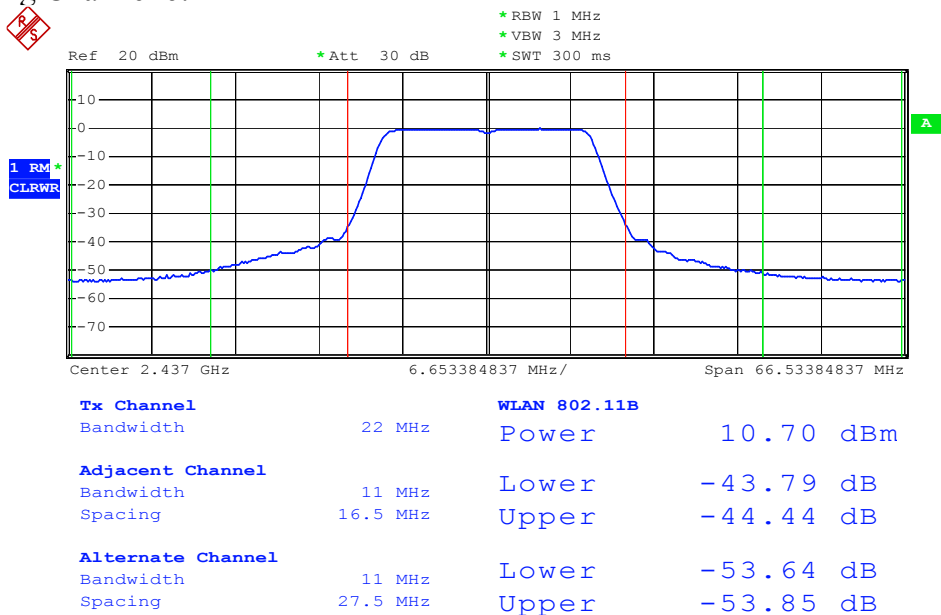
Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	10.69	1.1	15.10	11.79	30	Pass
6	2437	10.7	1.1	15.14	11.8	30	Pass
11	2462	10.56	1.1	14.66	11.66	30	Pass

802.11g (dBm)							
Freq. (MHz)	Bit rate (mbps)						
	6	9	12	18	24	36	54
2412	11.79	11.6	11.67	11.55	11.22	11.08	11.17
2437	11.8	11.22	11.39	11.43	11.24	11.15	11.31
2462	11.66	11.21	11.56	11.4	11.27	11.23	11.43

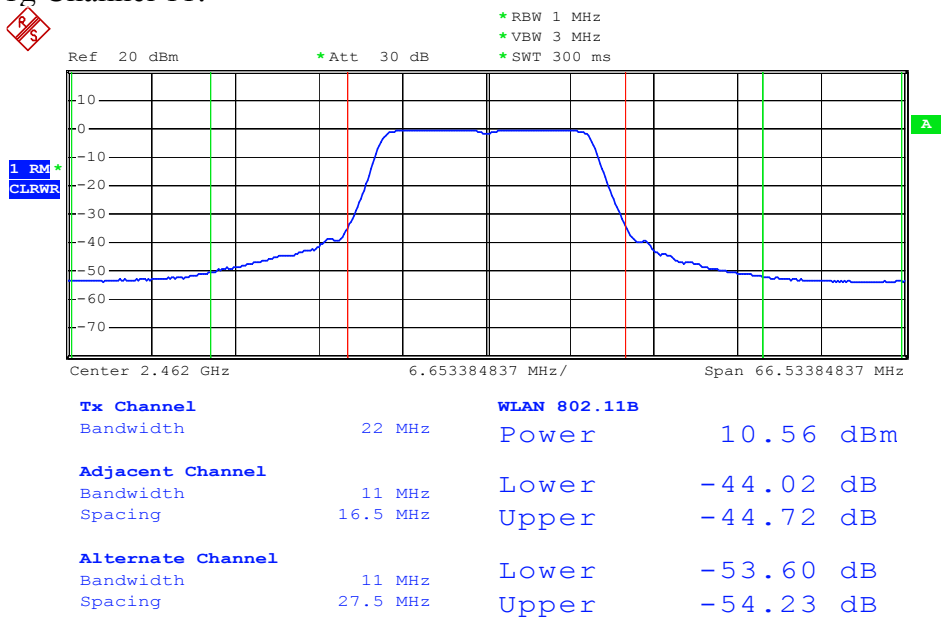
#### 802.11g Channel 1:



# 802.11g Channel 6:



# 802.11g Channel 11:



## 4.4 Radiated Emission Measurement [Section 15.247(c)(4)]

### 4.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

### 4.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.

For the test of 2<sup>nd</sup> to 10<sup>th</sup> harmonics frequencies, the equipment setup was also refer to EMI Receiver/Spectrum Analyzer Configuration. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

### 4.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	360KHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz



#### 4.4.4 802.11b Test Data (30MHz – 1GHz):

#### 30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11

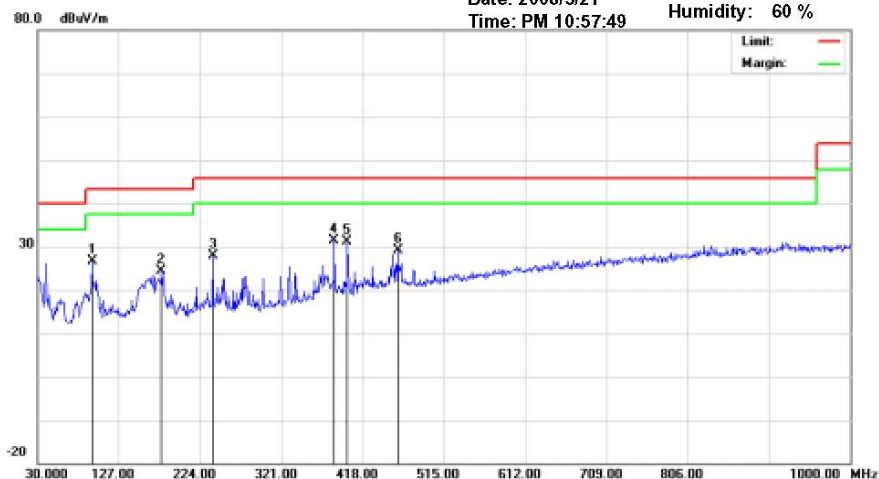


Address: No. 120, Lane 180, San Ho Tsuen, Hsin Ho Road  
 , Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
 Tel: 03-4071718

Radiated Emission Measurement

Date: 2008/5/21  
 Time: PM 10:57:49

Operator: Jerry  
 Temperature: 26 °C  
 Humidity: 60 %



Site : Chamber 12

Condition : FCC Class B 3M Radiation

Polarization: *Horizontal*

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	95.9600	15.82	8.76	2.06	0	26.64	43.50	-16.86	178	273	peak
	178.4100	13.61	8.1	2.6	0	24.31	43.50	-19.19	305	124	peak
	239.5200	16.00	8.96	2.9	0	27.86	46.00	-18.14	325	277	peak
*	384.0500	14.65	13.11	3.74	0	31.50	46.00	-14.50	100	293	peak
	399.5700	13.87	13.41	3.8	0	31.08	46.00	-14.92	100	17	peak
	460.6800	10.34	14.72	4.04	0	29.10	46.00	-16.90	322	23	peak

\*:Maximum data x:Over limit !:over margin

## 30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11



Address: No. 120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

### Radiated Emission Measurement

Date: 2008/5/21

Time: PM 11:04:05

Operator: Jerry

Temperature: 26 °C

Humidity: 60 %



Site : Chamber 12

Condition : FCC Class B 3M Radiation

Polarization: *Vertical*

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
*	95.9600	24.20	8.76	2.06	0	35.02	43.50	-8.48	100	254	peak
	176.4700	18.39	8.12	2.6	0	29.11	43.50	-14.39	284	161	peak
	399.5700	16.18	13.41	3.8	0	33.39	46.00	-12.61	172	134	peak
	460.6800	13.47	14.72	4.04	0	32.23	46.00	-13.77	250	4	peak
	649.8300	8.58	17.75	4.8	0	31.13	46.00	-14.87	239	182	peak
	922.4000	5.83	21.23	5.69	0	32.75	46.00	-13.25	249	126	peak

\*:Maximum data x:Over limit !:over margin

### NOTE:

- During the Pre-test, the EUT has been tested for Channel 1, 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

- Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

**All frequencies from 30MHz to 1GHz have been tested**

1GHz~ 25 GHz (Horizontal), Channel 1: 2412 MHz



Address: No. 120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Radiated Emission Measurement

Date: 2008/5/20

Time: PM 01:37:27

Operator: Jerry

Temperature: 20 °C

Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: *Horizontal*

Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
*	4824.000	47.66	33.61	2.83	30.49	53.61	74.00	-20.39	290	43	peak
	6425.000	42.73	35.13	3.2	31.18	49.88	74.00	-24.12	221	206	peak
	7236.000	31.33	38.11	3.37	30.86	41.95	74.00	-32.05	100	297	peak
	9646.000	30.14	40.07	4	28.29	45.92	74.00	-28.08	100	256	peak
	12060.000	33.34	41.74	4.49	31.82	47.75	74.00	-26.25	100	285	peak
	14472.000	30.06	43.62	4.86	31.5	47.04	74.00	-26.96	159	223	peak
	16884.000	29.09	42.23	5.39	31.01	45.70	74.00	-28.30	207	213	peak
	19296.000	27.87	32.42	5.68	29.8	36.17	74.00	-37.83	220	198	peak
	21708.000	24.98	33.1	6.03	27.7	36.41	74.00	-37.59	108	62	peak
	24120.000	24.54	33.35	5.78	27.87	35.80	74.00	-38.20	157	258	peak

\*:Maximum data    x:Over limit    !:over margin

# 1GHz~ 25 GHz (Vertical), Channel 1: 2412 MHz

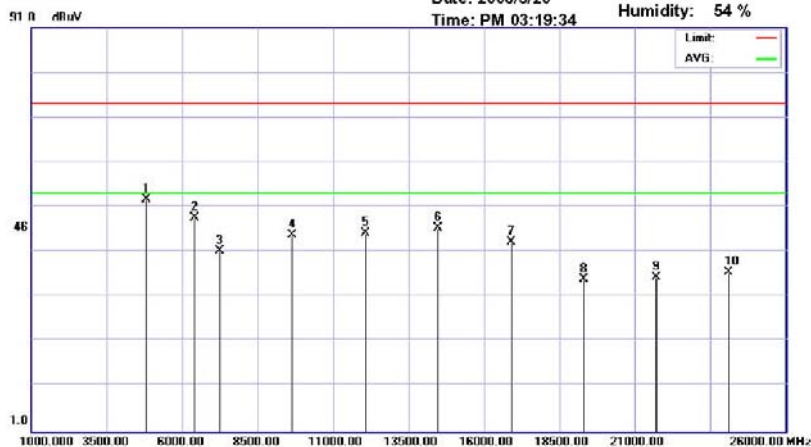


Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

## Radiated Emission Measurement

Date: 2008/5/20  
Time: PM 03:19:34

Operator: Jerry  
Temperature: 20 °C  
Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

Mk.	Frequency (MHz)	RX_R (dBμV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBμV)	Limit (dBμV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
*	4824.000	46.68	33.61	2.83	30.49	52.63	74.00	-21.37	100	197	peak
	6425.000	41.35	35.13	3.2	31.18	48.50	74.00	-25.50	150	36	peak
	7236.000	30.65	38.11	3.37	30.86	41.27	74.00	-32.73	259	181	peak
	9646.000	29.09	40.07	4	28.29	44.87	74.00	-29.13	368	66	peak
	12060.000	30.84	41.74	4.49	31.82	45.25	74.00	-28.75	319	334	peak
	14472.000	29.39	43.62	4.86	31.5	46.37	74.00	-27.63	200	269	peak
	16884.000	26.49	42.23	5.39	31.01	43.10	74.00	-30.90	100	99	peak
	19296.000	26.67	32.42	5.68	29.8	34.97	74.00	-39.03	250	2	peak
	21708.000	23.79	33.1	6.03	27.7	35.22	74.00	-38.78	123	135	peak
	24120.000	25.26	33.35	5.78	27.87	36.52	74.00	-37.48	341	155	peak

\*:Maximum data x:Over limit !:over margin

## Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “peak”: peak mode; “avg”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**

1GHz~ 25 GHz (Horizontal), Channel 6: 2437 MHz



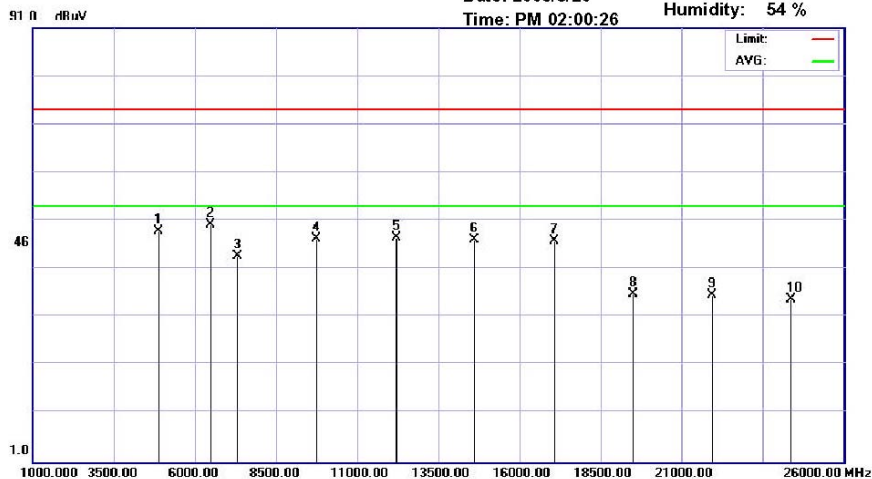
Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Radiated Emission Measurement

Operator: Jerry  
Temperature: 20 °C  
Humidity: 54 %

Date: 2008/5/20

Time: PM 02:00:26



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: *Horizontal*

Mk.	Frequency (MHz)	RX_R (dBμV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBμV)	Limit (dBμV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4874.000	42.82	33.75	2.82	30.55	48.84	74.00	-25.16	229	322	peak
*	6475.000	43.00	35.18	3.21	31.2	50.19	74.00	-23.81	209	1	peak
	7311.000	32.70	38.31	3.38	30.79	43.60	74.00	-30.40	100	314	peak
	9748.000	31.55	40.05	4.03	28.35	47.28	74.00	-26.72	298	314	peak
	12185.000	32.94	41.81	4.52	31.87	47.40	74.00	-26.60	301	33	peak
	14622.000	30.26	43.21	4.87	31.26	47.08	74.00	-26.92	215	157	peak
	17059.000	29.17	43.19	5.43	31.1	46.69	74.00	-27.31	241	216	peak
	19496.000	27.33	32.5	5.71	29.8	35.74	74.00	-38.26	253	349	peak
	21933.000	24.09	33.1	6.07	27.7	35.56	74.00	-38.44	317	37	peak
	24370.000	23.84	33.45	5.56	28.22	34.63	74.00	-39.37	199	357	peak

\*:Maximum data x:Over limit !:over margin

# 1GHz~ 25 GHz (Vertical), Channel 6: 2437 MHz

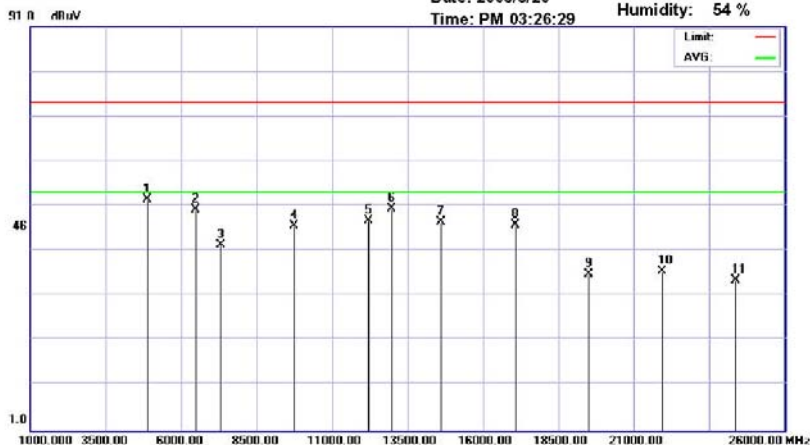


Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

## Radiated Emission Measurement

Date: 2008/5/20  
Time: PM 03:26:29

Operator: Jerry  
Temperature: 20 °C  
Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

Mk.	Frequency (MHz)	R <sub>X</sub> R (dBμV)	Ant. F (dB)	Cab. L (dB)	PreAmp (dB)	Emission (dBμV)	Limit (dBμV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
*	4874.000	46.34	33.75	2.82	30.55	52.36	74.00	-21.64	100	133	peak
	6475.000	43.07	35.18	3.21	31.2	50.26	74.00	-23.74	302	306	peak
	7311.000	31.34	38.31	3.38	30.79	42.24	74.00	-31.76	100	102	peak
	9748.000	30.85	40.05	4.03	28.35	46.58	74.00	-27.42	195	266	peak
	12185.000	33.17	41.81	4.52	31.87	47.63	74.00	-26.37	315	246	peak
	12975.000	36.24	40.95	4.74	31.62	50.31	74.00	-23.69	243	103	peak
	14622.000	30.59	43.21	4.87	31.26	47.41	74.00	-26.59	358	79	peak
	17059.000	29.18	43.19	5.43	31.1	46.70	74.00	-27.30	182	51	peak
	19496.000	27.46	32.5	5.71	29.8	35.87	74.00	-38.13	271	148	peak
	21933.000	24.97	33.1	6.07	27.7	36.44	74.00	-37.56	227	135	peak
	24370.000	23.67	33.45	5.56	28.22	34.46	74.00	-39.54	100	306	peak

\*:Maximum data x:Over limit !:over margin

### Note:

- According to the standards used, where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
- “peak”: peak mode; “avg”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**

1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz



Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Radiated Emission Measurement

Date: 2008/5/20

Time: PM 02:15:34

Operator: Jerry

Temperature: 20 °C

Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: *Horizontal*

Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4924.000	40.78	33.89	2.81	30.61	46.87	74.00	-27.13	396	235	peak
	6550.000	42.03	35.43	3.23	31.19	49.50	74.00	-24.50	226	139	peak
	7386.000	32.54	38.5	3.39	30.71	43.72	74.00	-30.28	100	157	peak
	9848.000	30.94	40.03	4.06	28.41	46.62	74.00	-27.38	349	183	peak
	12310.000	32.71	41.89	4.56	31.92	47.24	74.00	-26.76	307	215	peak
*	13125.000	38.18	41.08	4.76	31.53	52.49	74.00	-21.51	100	84	peak
	14772.000	28.85	42.61	4.88	30.96	45.38	74.00	-28.62	100	222	peak
	17234.000	29.61	43.75	5.44	31.1	47.70	74.00	-26.30	353	288	peak
	19696.000	27.92	32.5	5.74	29.68	36.48	74.00	-37.52	100	98	peak
	22158.000	24.41	33.35	6.11	27.73	36.14	74.00	-37.86	157	147	peak
	24620.000	24.47	33.84	5.43	28.78	34.96	74.00	-39.04	100	203	peak

\*:Maximum data x:Over limit !:over margin

# 1GHz~ 25 GHz (Vertical), Channel 11: 2462 MHz



Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

## Radiated Emission Measurement

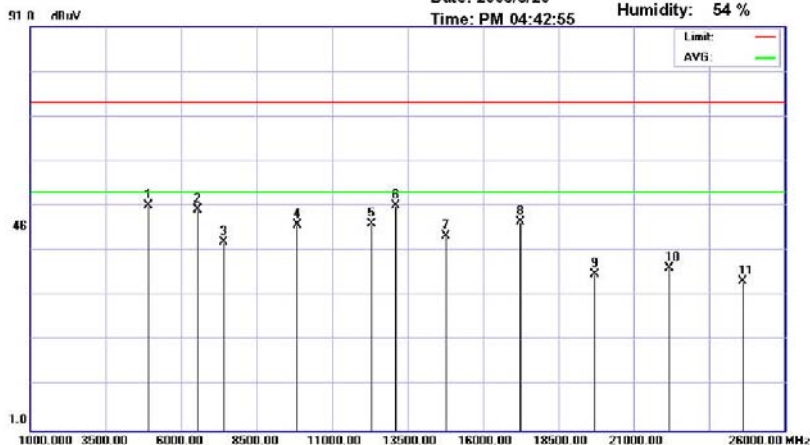
Date: 2008/5/20

Time: PM 04:42:55

Operator: Jerry

Temperature: 20 °C

Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

Mk.	Frequency (MHz)	R <sub>X</sub> R (dBμV)	Ant. F (dB)	Cab. L (dB)	PreAmp (dB)	Emission (dBμV)	Limit (dBμV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4924.000	44.98	33.89	2.81	30.61	51.07	74.00	-22.93	136	142	peak
	6550.000	42.62	35.43	3.23	31.19	50.09	74.00	-23.91	162	42	peak
	7386.000	31.87	38.5	3.39	30.71	43.05	74.00	-30.95	162	38	peak
	9848.000	31.04	40.03	4.06	28.41	46.72	74.00	-27.28	221	214	peak
	12310.000	32.41	41.89	4.56	31.92	46.94	74.00	-27.06	255	10	peak
*	13125.000	36.80	41.08	4.76	31.53	51.11	74.00	-22.89	159	313	peak
	14772.000	27.86	42.61	4.88	30.96	44.39	74.00	-29.61	322	266	peak
	17234.000	29.26	43.75	5.44	31.1	47.35	74.00	-26.65	100	219	peak
	19696.000	27.17	32.5	5.74	29.68	35.73	74.00	-38.27	124	92	peak
	22158.000	25.37	33.35	6.11	27.73	37.10	74.00	-36.90	268	35	peak
	24620.000	23.75	33.84	5.43	28.78	34.24	74.00	-39.76	237	123	peak

\*:Maximum data x:Over limit !:over margin

## Note:

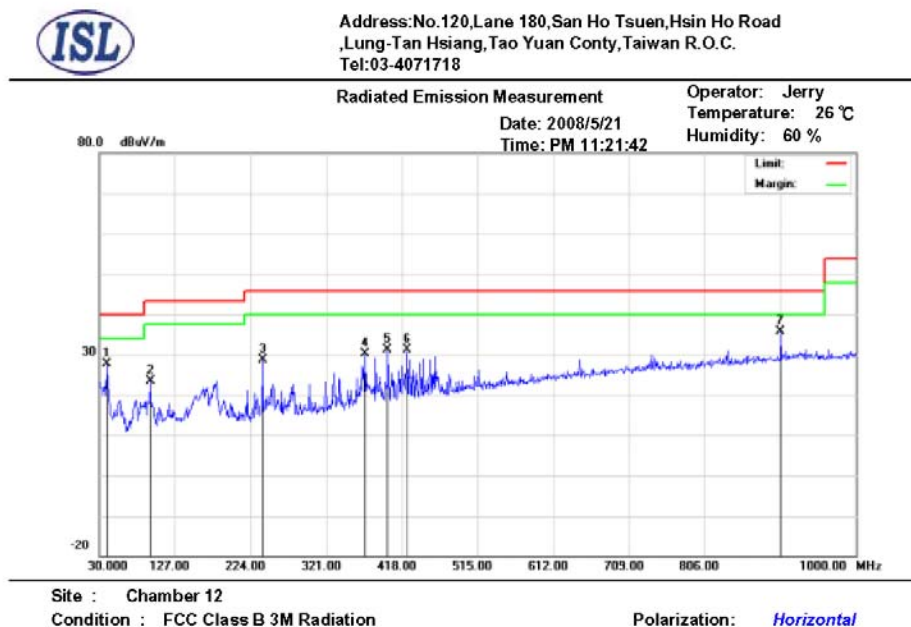
- According to the standards used, where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
- “peak”: peak mode; “avg”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**



#### 4.4.5 802.11g Test Data

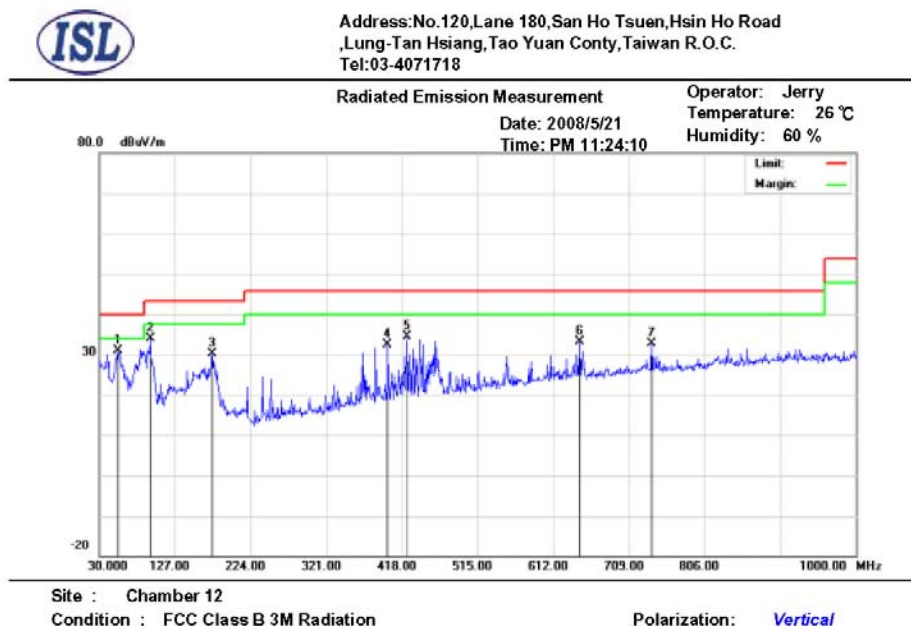
#### 30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	39.7000	12.30	14	1.39	0	27.69	40.00	-12.31	170	219	peak
	95.9600	12.54	8.76	2.06	0	23.36	43.50	-20.14	308	221	peak
	239.5200	16.89	8.96	2.9	0	28.75	46.00	-17.25	110	283	peak
	370.4700	13.59	12.8	3.68	0	30.07	46.00	-15.93	360	71	peak
	399.5700	13.83	13.41	3.8	0	31.04	46.00	-14.96	261	28	peak
	424.7900	13.43	13.91	3.9	0	31.24	46.00	-14.76	325	125	peak
*	903.9700	9.22	20.79	5.62	0	35.63	46.00	-10.37	100	335	peak

\*:Maximum data x:Over limit !:over margin

## 30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
*	53.2800	23.90	5.46	1.63	0	30.99	40.00	-9.01	366	286	peak
	95.9600	23.11	8.76	2.06	0	33.93	43.50	-9.57	324	148	peak
	175.5000	19.37	8.13	2.6	0	30.10	43.50	-13.40	100	119	peak
	399.5700	15.15	13.41	3.8	0	32.36	46.00	-13.64	367	42	peak
	424.7900	16.54	13.91	3.9	0	34.35	46.00	-11.65	100	112	peak
	645.9500	10.73	17.68	4.78	0	33.19	46.00	-12.81	239	203	peak
	738.1000	8.59	18.96	5.05	0	32.60	46.00	-13.40	372	284	peak

\*:Maximum data    x:Over limit    !:over margin

### NOTE:

- During the Pre-test, the EUT has been tested for Channel 1, 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.
- Margin = Corrected Amplitude – Limit  
Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain  
A margin of -8dB means that the emission is 8dB below the limit

**All frequencies from 30MHz to 1GHz have been tested**

1GHz~ 25 GHz (Horizontal), Channel 1: 2412 MHz



Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Radiated Emission Measurement

Date: 2008/5/20  
Time: PM 02:20:30

Operator: Jerry  
Temperature: 20 °C  
Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: *Horizontal*

Mk.	Frequency (MHz)	RX R (dBuV)	Ant. F (dB)	Cab. L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4824.000	39.30	33.61	2.83	30.49	45.25	74.00	-28.75	106	97	peak
*	6425.000	42.90	35.13	3.2	31.18	50.05	74.00	-23.95	174	147	peak
	7236.000	32.79	38.11	3.37	30.86	43.41	74.00	-30.59	100	253	peak
	9646.000	30.92	40.07	4	28.29	46.70	74.00	-27.30	263	30	peak
	12060.000	34.91	41.74	4.49	31.82	49.32	74.00	-24.68	100	79	peak
	14472.000	32.15	43.62	4.86	31.5	49.13	74.00	-24.87	139	232	peak
	16884.000	31.38	42.23	5.39	31.01	47.99	74.00	-26.01	325	236	peak
	19296.000	29.26	32.42	5.68	29.8	37.56	74.00	-36.44	128	30	peak
	21708.000	25.25	33.1	6.03	27.7	36.68	74.00	-37.32	107	344	peak
	24120.000	25.63	33.35	5.78	27.87	36.89	74.00	-37.11	190	307	peak

\*:Maximum data x:Over limit !:over margin

# 1GHz~ 25 GHz (Vertical), Channel 1: 2412 MHz



Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

## Radiated Emission Measurement

Date: 2008/5/20

Time: PM 04:45:10

Operator: Jerry

Temperature: 20 °C

Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

Mk.	Frequency (MHz)	R <sub>X</sub> R (dBμV)	Ant.F (dB)	Cab.L (dB)	PreAmp (dB)	Emission (dBμV)	Limit (dBμV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
*	4824.000	46.04	33.61	2.83	30.49	51.99	74.00	-22.01	227	239	peak
	6425.000	42.07	35.13	3.2	31.18	49.22	74.00	-24.78	343	277	peak
	7236.000	30.97	38.11	3.37	30.86	41.59	74.00	-32.41	260	205	peak
	9646.000	29.77	40.07	4	28.29	45.55	74.00	-28.45	220	334	peak
	12060.000	33.66	41.74	4.49	31.82	48.07	74.00	-25.93	235	125	peak
	12850.000	35.69	41.23	4.71	31.72	49.91	74.00	-24.09	100	256	peak
	14472.000	30.85	43.62	4.86	31.5	47.83	74.00	-26.17	109	234	peak
	16884.000	28.84	42.23	5.39	31.01	45.45	74.00	-28.55	367	31	peak
	19296.000	28.02	32.42	5.68	29.8	36.32	74.00	-37.68	101	6	peak
	21708.000	24.21	33.1	6.03	27.7	35.64	74.00	-38.36	383	271	peak
	24120.000	24.58	33.35	5.78	27.87	35.84	74.00	-38.16	246	208	peak

\*:Maximum data x:Over limit !:over margin

## Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “peak”: peak mode; “avg”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**

1GHz~ 25 GHz (Horizontal) , Channel 6 : 2437 MHz



Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Radiated Emission Measurement

Date: 2008/5/20

Time: PM 02:22:57

Operator: Jerry

Temperature: 20 °C

Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: Horizontal

Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4874.000	35.47	33.75	2.82	30.55	41.49	74.00	-32.51	188	165	peak
	6475.000	43.34	35.18	3.21	31.2	50.53	74.00	-23.47	226	102	peak
	7311.000	31.30	38.31	3.38	30.79	42.20	74.00	-31.80	313	48	peak
	9748.000	31.07	40.05	4.03	28.35	46.80	74.00	-27.20	387	45	peak
	12185.000	32.65	41.81	4.52	31.87	47.11	74.00	-26.89	373	156	peak
*	12975.000	37.84	40.95	4.74	31.62	51.91	74.00	-22.09	100	49	peak
	14622.000	30.29	43.21	4.87	31.26	47.11	74.00	-26.89	130	290	peak
	17059.000	30.06	43.19	5.43	31.1	47.58	74.00	-26.42	118	351	peak
	19496.000	27.55	32.5	5.71	29.8	35.96	74.00	-38.04	205	171	peak
	21933.000	24.41	33.1	6.07	27.7	35.88	74.00	-38.12	157	297	peak
	24370.000	23.47	33.45	5.56	28.22	34.26	74.00	-39.74	368	194	peak

\*:Maximum data x:Over limit !:over margin

# 1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz



Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

## Radiated Emission Measurement

Date: 2008/5/20

Time: PM 04:46:37

Operator: Jerry

Temperature: 20 °C

Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

Mk.	Frequency (MHz)	R <sub>X</sub> R (dBμV)	Ant. F (dB)	Cab. L (dB)	PreAmp (dB)	Emission (dBμV)	Limit (dBμV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4874.000	39.66	33.75	2.82	30.55	45.68	74.00	-28.32	330	4	peak
*	6500.000	41.96	35.2	3.22	31.2	49.18	74.00	-24.82	126	166	peak
	7311.000	31.58	38.31	3.38	30.79	42.48	74.00	-31.52	225	287	peak
	9748.000	30.68	40.05	4.03	28.35	46.41	74.00	-27.59	191	288	peak
	12185.000	32.55	41.81	4.52	31.87	47.01	74.00	-26.99	380	278	peak
	14622.000	29.72	43.21	4.87	31.26	46.54	74.00	-27.46	100	29	peak
	17059.000	28.64	43.19	5.43	31.1	46.16	74.00	-27.84	182	18	peak
	19496.000	27.33	32.5	5.71	29.8	35.74	74.00	-38.26	330	153	peak
	21933.000	24.70	33.1	6.07	27.7	36.17	74.00	-37.83	132	51	peak
	24370.000	23.61	33.45	5.56	28.22	34.40	74.00	-39.60	143	319	peak

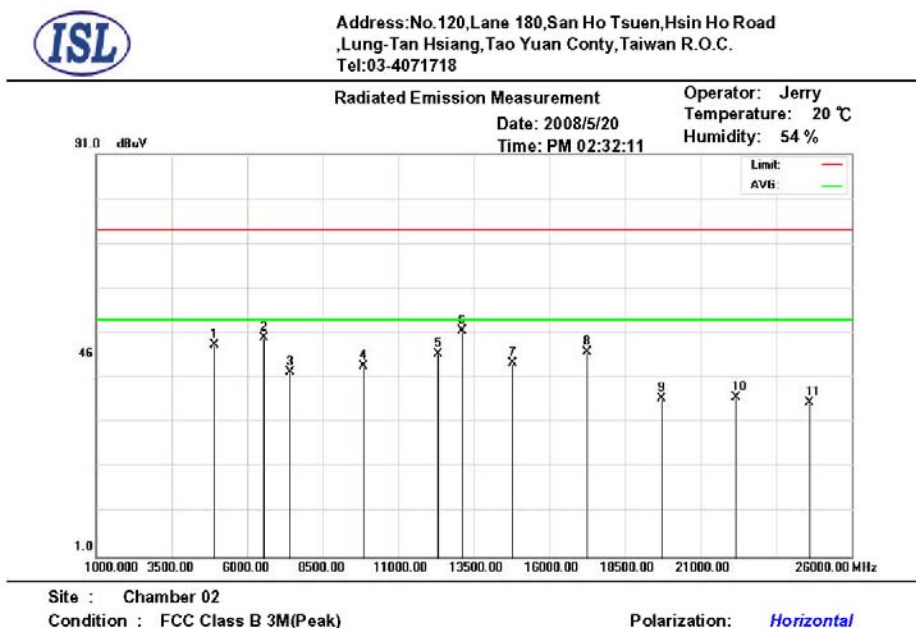
\*:Maximum data x:Over limit !:over margin

### Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
- “peak”: peak mode; “avg”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**

1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4924.000	42.28	33.89	2.81	30.61	48.37	74.00	-25.63	391	140	peak
	6550.000	42.53	35.43	3.23	31.19	50.00	74.00	-24.00	381	144	peak
	7386.000	31.04	38.5	3.39	30.71	42.22	74.00	-31.78	100	273	peak
	9848.000	27.94	40.03	4.06	28.41	43.62	74.00	-30.38	129	357	peak
	12310.000	31.71	41.89	4.56	31.92	46.24	74.00	-27.76	345	326	peak
*	13125.000	37.18	41.08	4.76	31.53	51.49	74.00	-22.51	100	161	peak
	14772.000	27.85	42.61	4.88	30.96	44.38	74.00	-29.62	248	28	peak
	17234.000	28.61	43.75	5.44	31.1	46.70	74.00	-27.30	203	224	peak
	19696.000	27.92	32.5	5.74	29.68	36.48	74.00	-37.52	189	172	peak
	22158.000	24.91	33.35	6.11	27.73	36.64	74.00	-37.36	389	325	peak
	24620.000	24.97	33.84	5.43	28.78	35.46	74.00	-38.54	113	77	peak

\*:Maximum data x:Over limit !:over margin

# 1GHz~ 25 GHz (Vertical), Channel 11: 2462 MHz



Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

## Radiated Emission Measurement

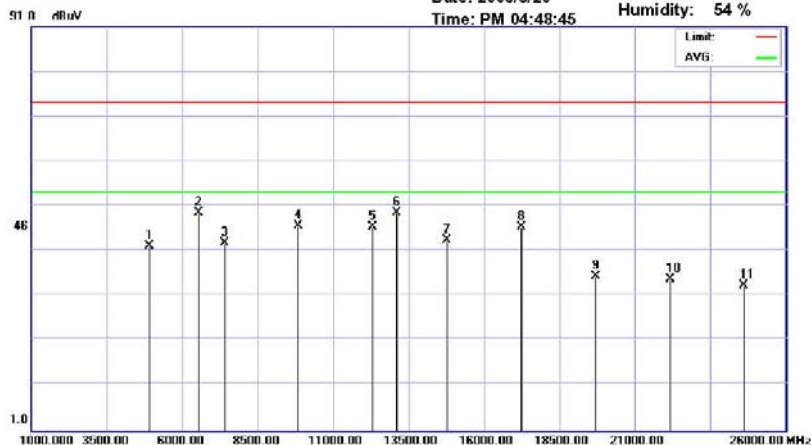
Date: 2008/5/20

Time: PM 04:48:45

Operator: Jerry

Temperature: 20 °C

Humidity: 54 %



Site : Chamber 02

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

Mk.	Frequency (MHz)	RX_R (dBμV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBμV)	Limit (dBμV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4924.000	35.98	33.89	2.81	30.61	42.07	74.00	-31.93	173	300	peak
	6550.000	41.98	35.43	3.23	31.19	49.45	74.00	-24.55	399	114	peak
	7386.000	31.46	38.5	3.39	30.71	42.64	74.00	-31.36	226	129	peak
	9848.000	30.99	40.03	4.06	28.41	46.67	74.00	-27.33	259	253	peak
	12310.000	31.88	41.89	4.56	31.92	46.41	74.00	-27.59	100	125	peak
*	13125.000	35.15	41.08	4.76	31.53	49.46	74.00	-24.54	336	15	peak
	14772.000	26.89	42.61	4.88	30.96	43.42	74.00	-30.58	125	139	peak
	17234.000	28.33	43.75	5.44	31.1	46.42	74.00	-27.58	171	304	peak
	19696.000	26.70	32.5	5.74	29.68	35.26	74.00	-38.74	317	58	peak
	22158.000	22.94	33.35	6.11	27.73	34.67	74.00	-39.33	277	58	peak
	24620.000	22.72	33.84	5.43	28.78	33.21	74.00	-40.79	327	348	peak

\*:Maximum data x:Over limit !:over margin

## Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “peak”: peak mode; “avg”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

**All frequencies from 1GHz to 25 GHz have been tested.**



## 4.5 Band Edge Measurement

### 4.5.1 Test Procedure

#### Conducted

1. The transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 100MHz  
RBW: 100KHz  
VBW: 100KHz  
Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

#### Radiated

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 100MHz  
RBW: 100KHz  
VBW: 100KHz  
Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

### 4.5.2 Test Setup

#### Conducted



#### Radiated

Same as *Radiated Emission Measurement*

#### 4.5.3 802.11b Test Data:

**Table: Band Edge measurement**

Conducted Test

Temp. (° C): 25

Test Engr: Jerry

Humidity (%): 55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >30dB (dB)	Pass/Fail
1	2413	108.48	---	---
Outside band	2397	71.95	36.53	Pass
11	2464	107.97	---	---
Outside band	2483.9	54.98	52.99	Pass

Radiated Test

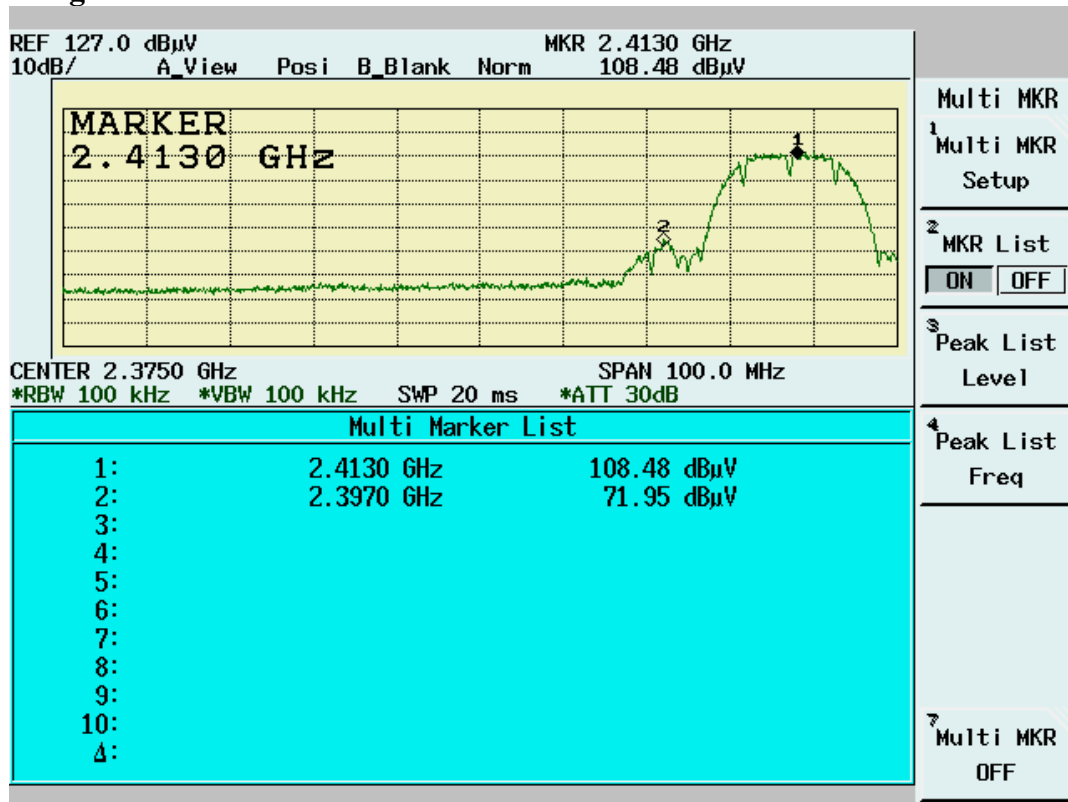
Temp. (° C): 25

Test Engr: Jerry

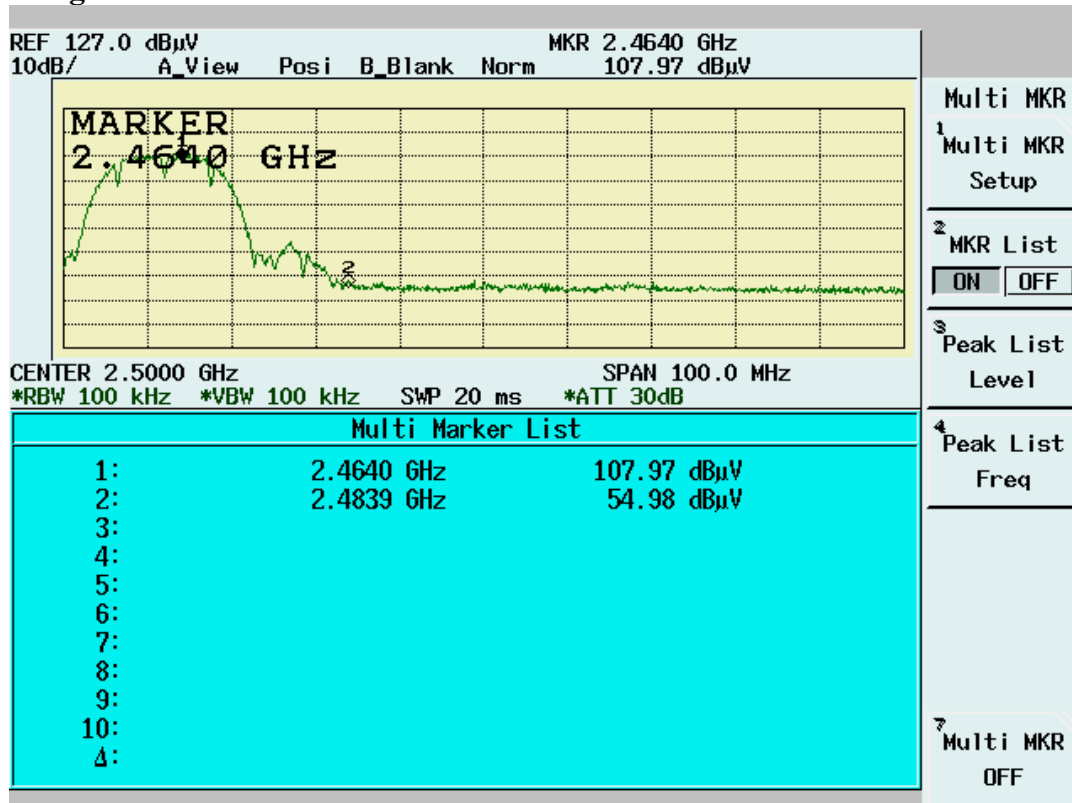
Humidity (%): 55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >30dB (dB)	Pass/Fail
1	2410	71.35	---	---
Outside band	2397	35.42	35.93	Pass
11	2464	69.47	---	---
Outside band	2483.8	17.37	52.1	Pass

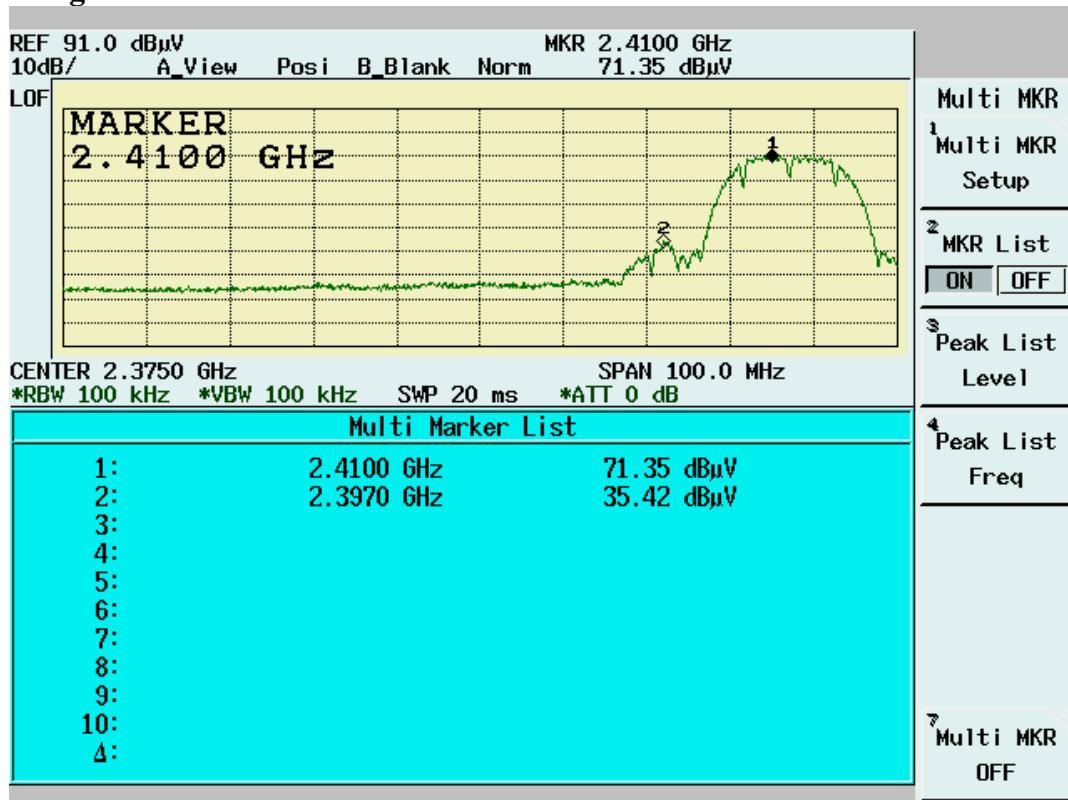
## Band Edge Conducted Measurement



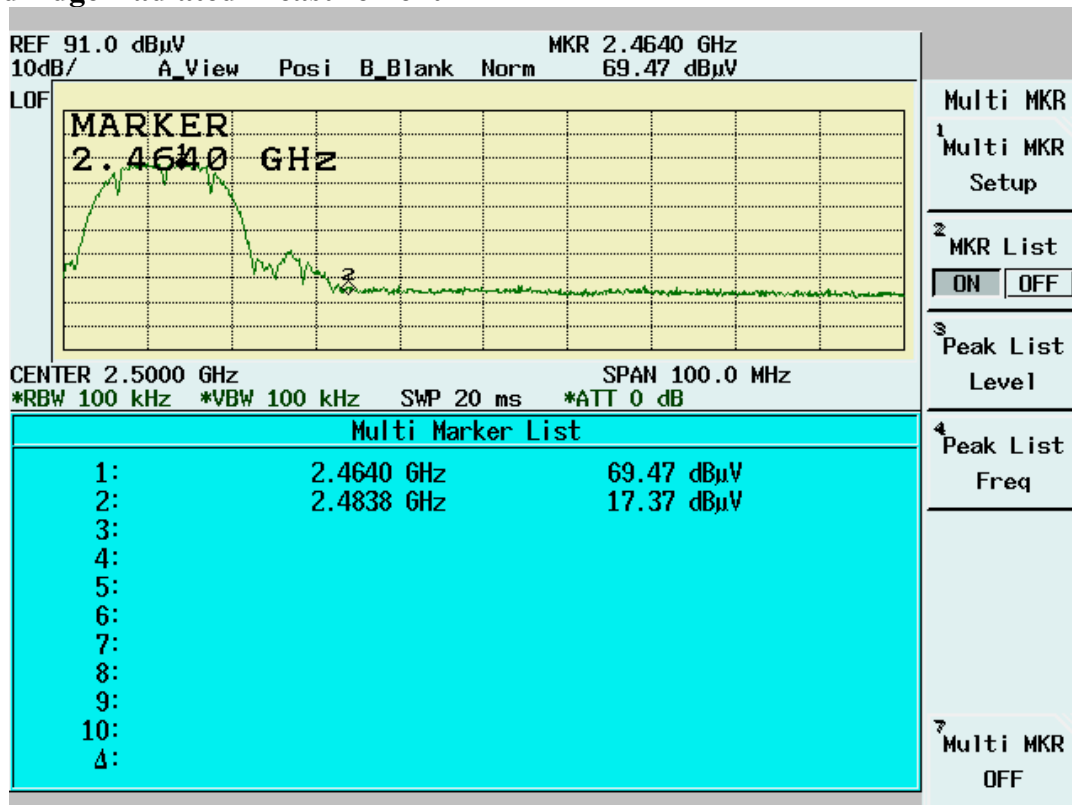
## Band Edge Conducted Measurement



## Band Edge Radiated Measurement



## Band Edge Radiated Measurement



#### 4.5.4 802.11g Test Data:

**Table: Band Edge measurement**

Conducted Test

Temp. (° C): 25

Test Engr: Jerry

Humidity (%): 55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >30dB (dB)	Pass/Fail
1	2416.2	102.94	---	---
Outside band	2399.7	67.59	35.35	Pass
11	2466.2	102.33	---	---
Outside band	2483.6	55.4	46.93	Pass

Radiated Test

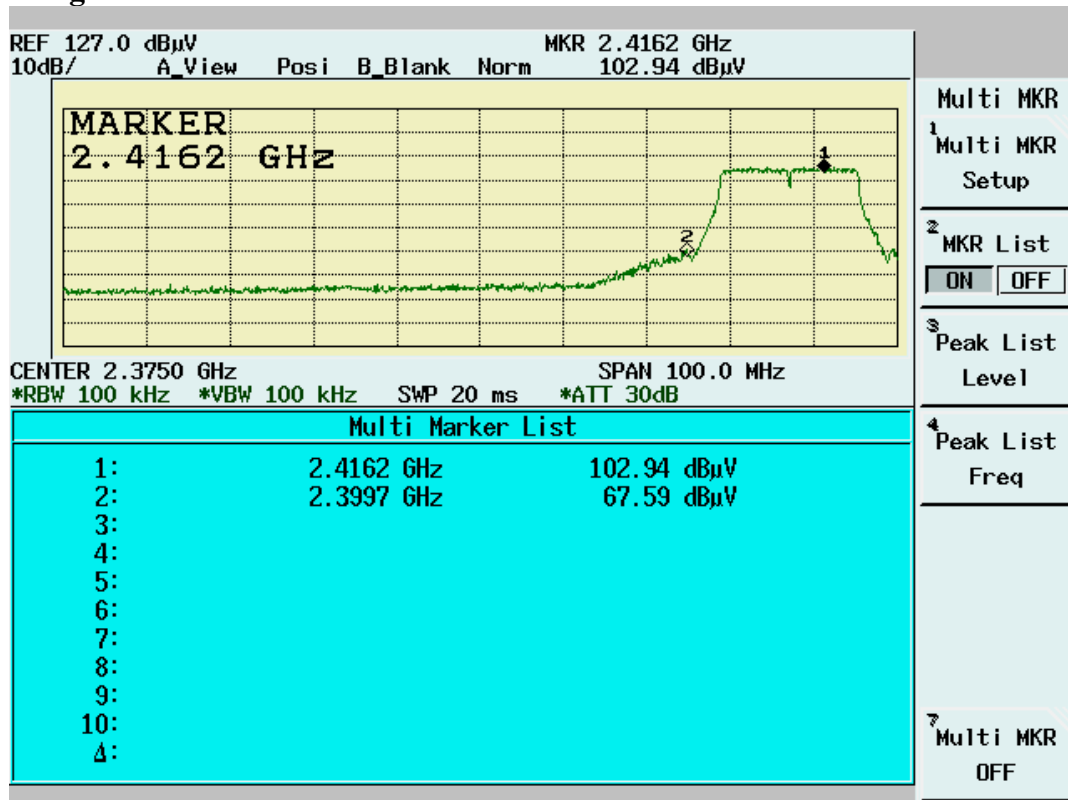
Temp. (° C): 25

Test Engr: Jerry

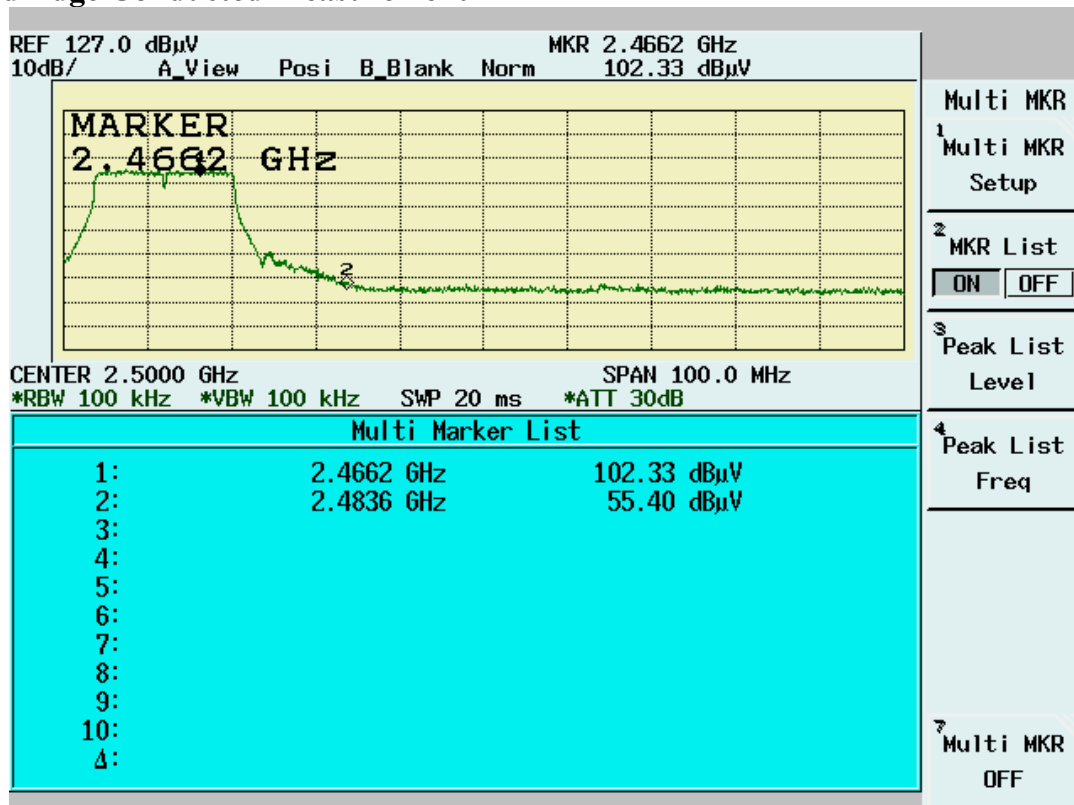
Humidity (%): 55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >30dB (dB)	Pass/Fail
1	2407.4	64.91	---	---
Outside band	2399.5	29.94	34.97	Pass
11	2457.4	64.91	---	---
Outside band	2483.7	18	46.91	Pass

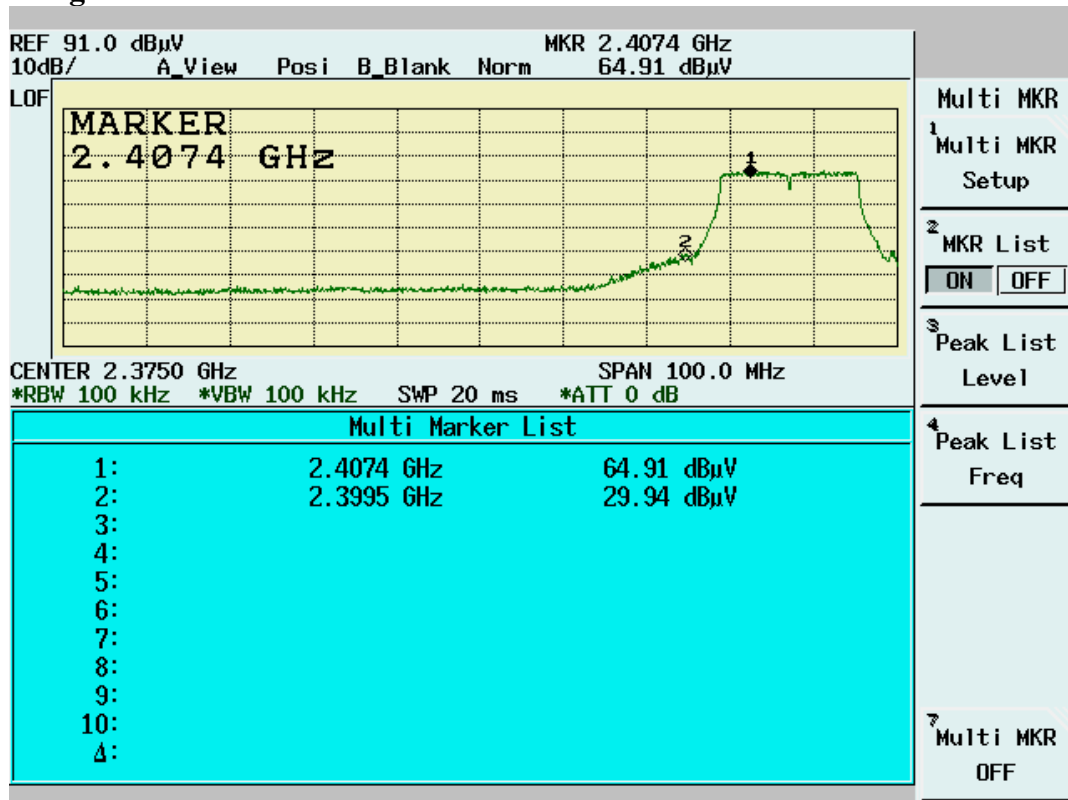
## Band Edge Conducted Measurement



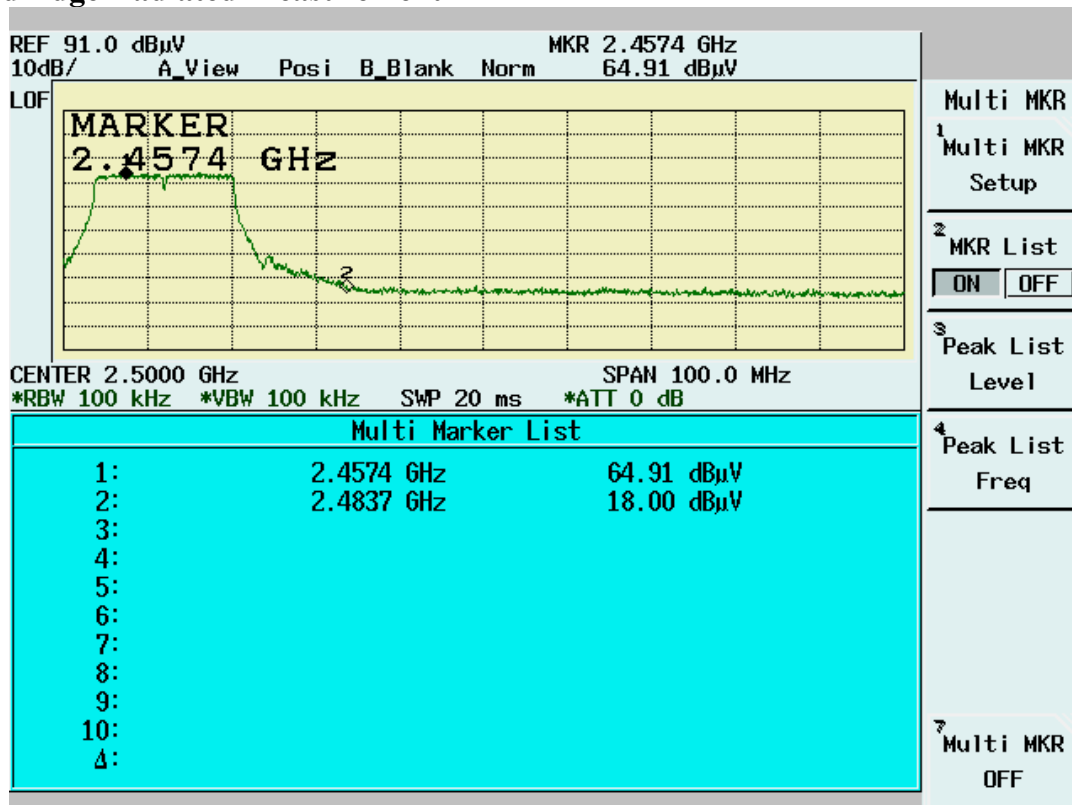
## Band Edge Conducted Measurement



## Band Edge Radiated Measurement



## Band Edge Radiated Measurement



## 4.6 Restricted Bands Measurement

### 4.6.1 Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 100MHz  
RBW: 1MHz  
VBW: 3MHz  
Center frequency: 2.4GHz, 2.48GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band
4. For peak frequency emission level measurement in Restricted Band  
Change RBW: 1MHz  
VBW: 10Hz  
Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

### 4.6.2 Test Setup (Radiated)

Same as *Radiated Emission Measurement*



#### 4.6.3 802.11b Test Data

**Table Band Edge Measurement (Radiated)**

Temp. (°C): 25

Test Engr: Jerry

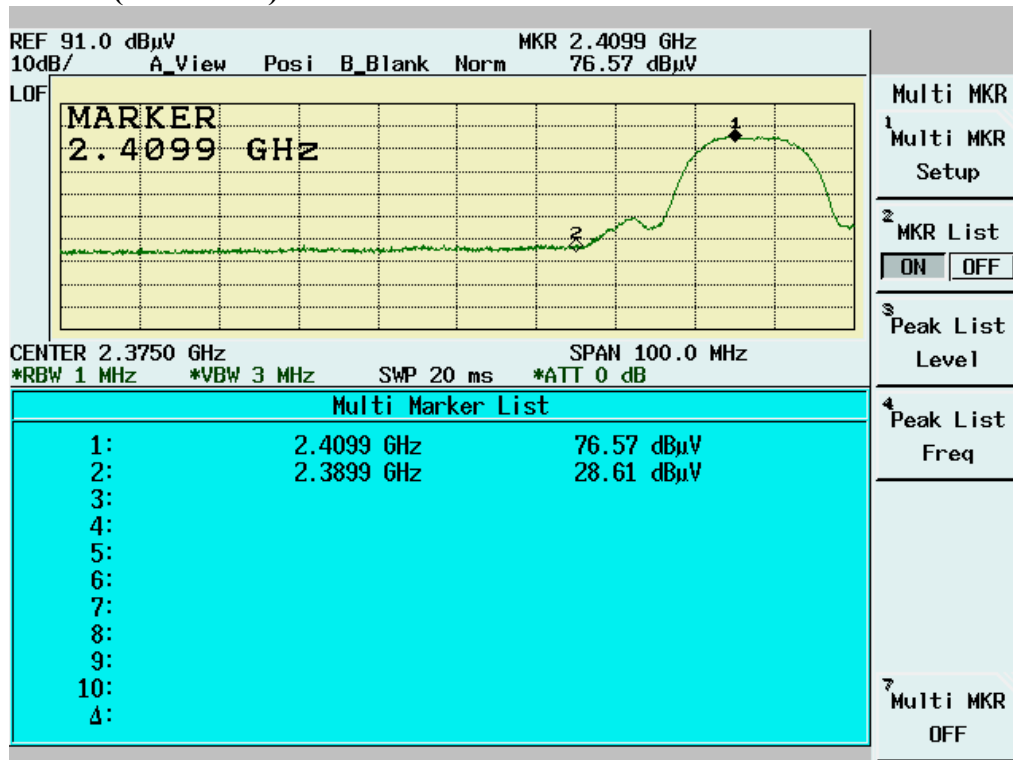
Humidity (%): 55

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_1 (peak mode)	2409.9	76.57	35.48	112.05	---	3MHz	---
Channel_1 (average mode)	2414.3	72.13	35.48	107.61	---	10Hz	---
Channel_11 (peak mode)	2459.9	75.27	35.5	110.77	---	3MHz	---
Channel_11 (average mode)	2464.2	71.17	35.5	106.67	---	10Hz	---
Channel_1 Restricted band (peak mode)	2389.9	28.61	35.47	64.08	74	3MHz	Pass
Restricted band (average mode)	2390	16.2	35.47	51.67	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2483.5	28.53	35.51	64.04	74	3MHz	Pass
Restricted band (average mode)	2483.5	16.09	35.51	51.6	54	10Hz	Pass

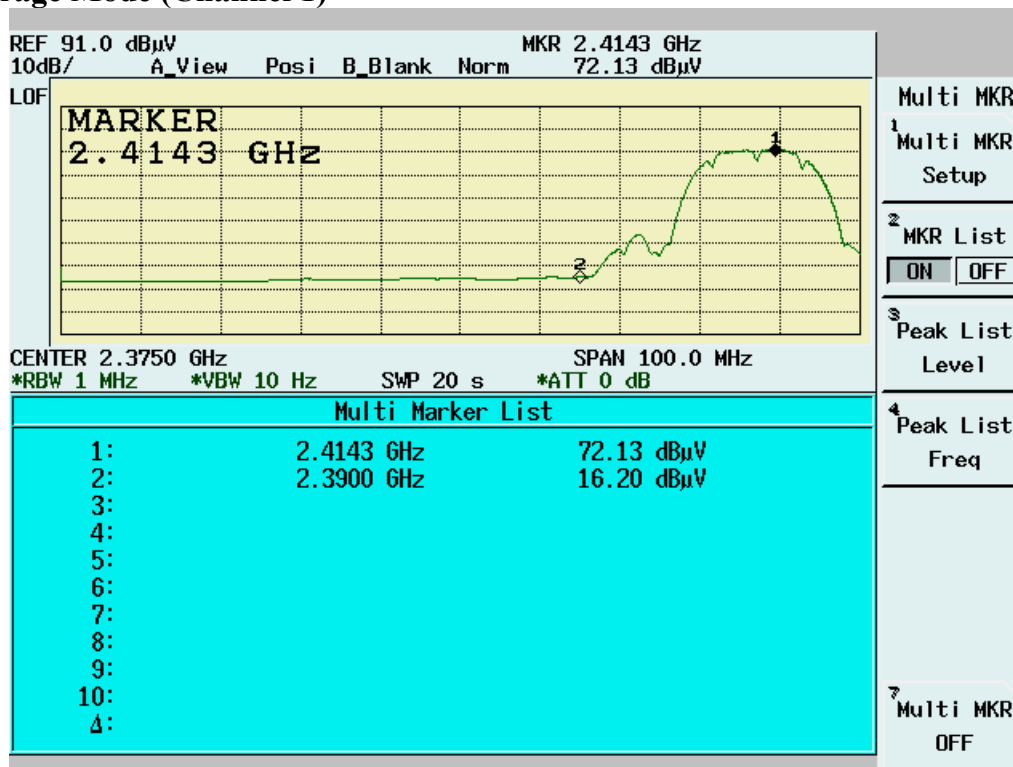
**Note:**

- The spectrum plot of emission level measurement in restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarization have been tested and the worst data is listed above.

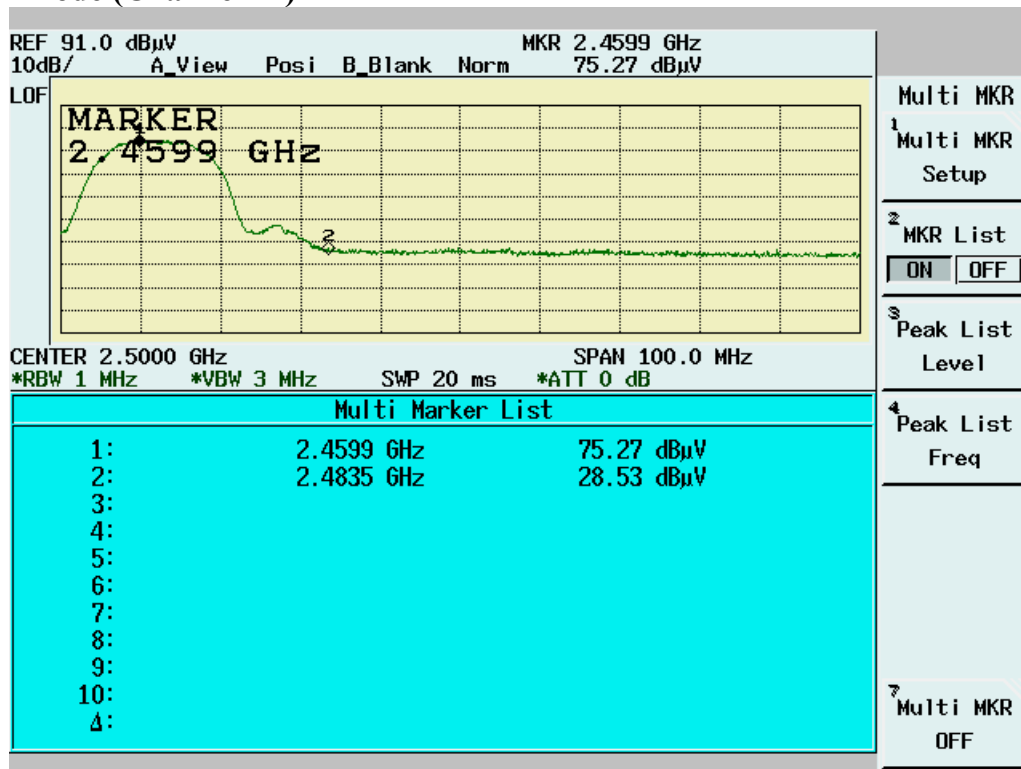
# Band Edge measurement for radiated emission in Restricted Band (Radiated) Peak Mode (Channel 1)



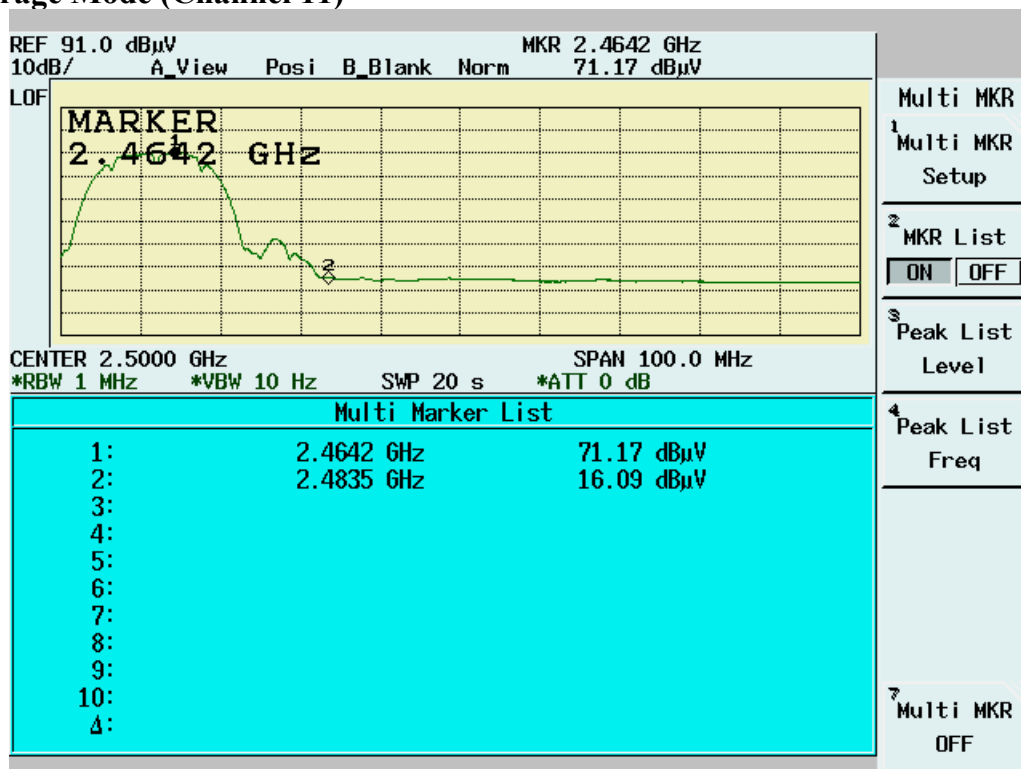
# Band Edge measurement for radiated emission in Restricted Band (Radiated) Average Mode (Channel 1)



# Band Edge measurement for radiated emission in Restricted Band (Radiated) Peak Mode (Channel 11)



# Band Edge measurement for radiated emission in Restricted Band (Radiated) Average Mode (Channel 11)



#### 4.6.4 802.11g Test Data

**Table Band Edge Measurement (Radiated)**

Temp. (°C): 25

Test Engr: Jerry

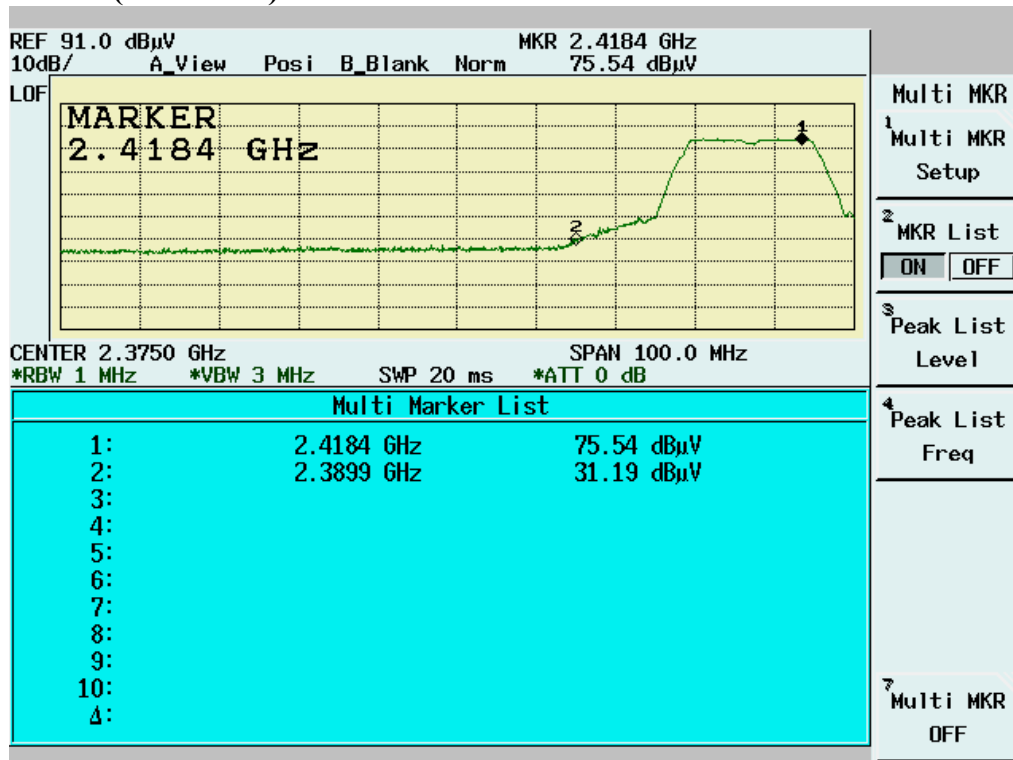
Humidity (%): 55

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_1 (peak mode)	2418.4	75.54	35.48	111.02	---	3MHz	---
Channel_1 (average mode)	2407.2	64.98	35.48	100.46	---	10Hz	---
Channel_11 (peak mode)	2466.1	75.01	35.5	110.51	---	3MHz	---
Channel_11 (average mode)	2465.9	65.37	35.5	100.87	---	10Hz	---
Channel_1 Restricted band (peak mode)	2389.9	31.19	35.47	66.66	74	3MHz	Pass
Restricted band (average mode)	2390	16.52	35.47	51.99	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2483.5	30.65	35.51	66.16	74	3MHz	Pass
Restricted band (average mode)	2483.5	16.73	35.51	52.24	54	10Hz	Pass

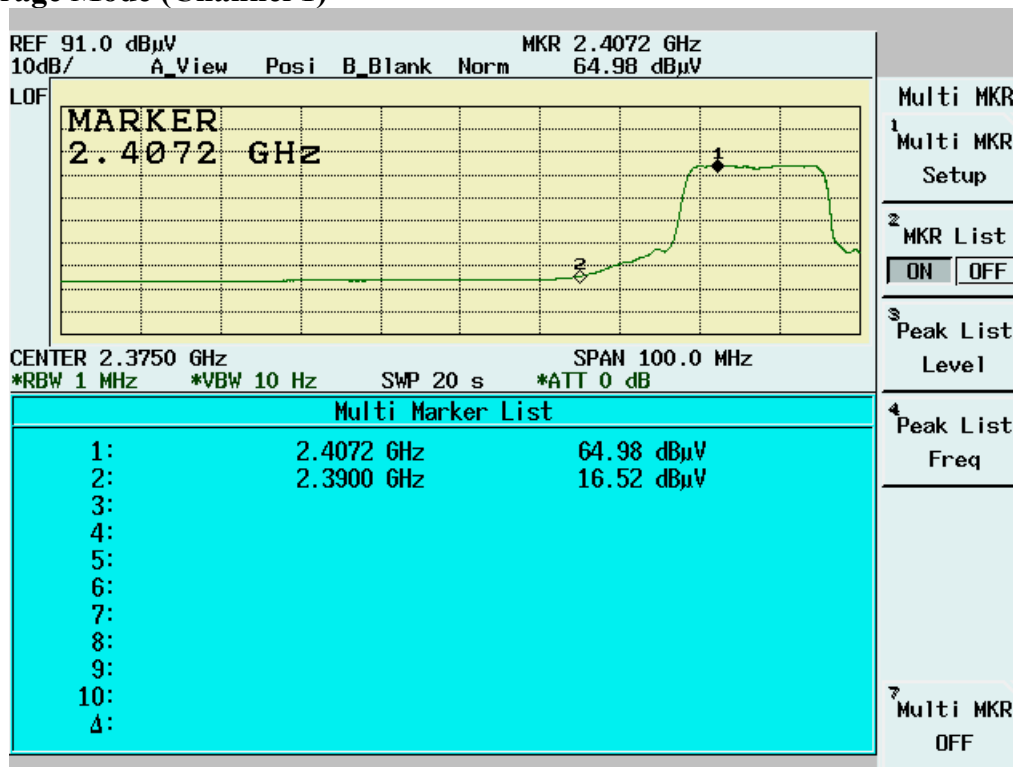
**Note:**

- The Spectrum plot of emission level measurement in restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarization have been tested and the worst data is listed above.

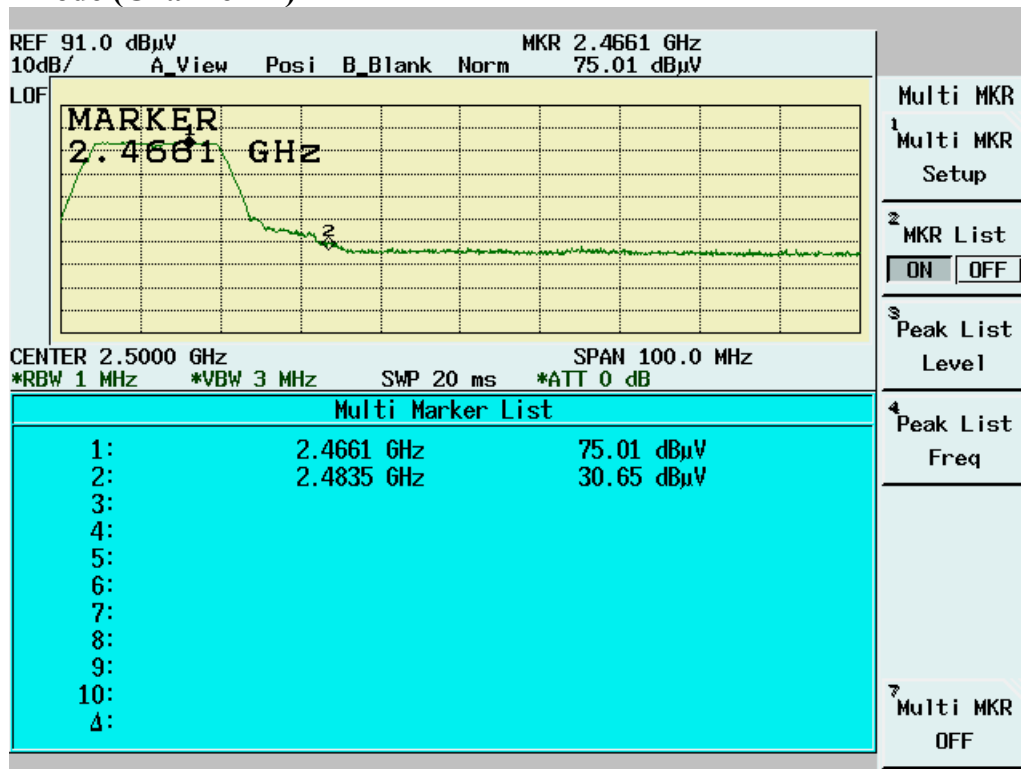
# **Band Edge measurement for radiated emission in Restricted Band (Radiated) Peak Mode (Channel 1)**



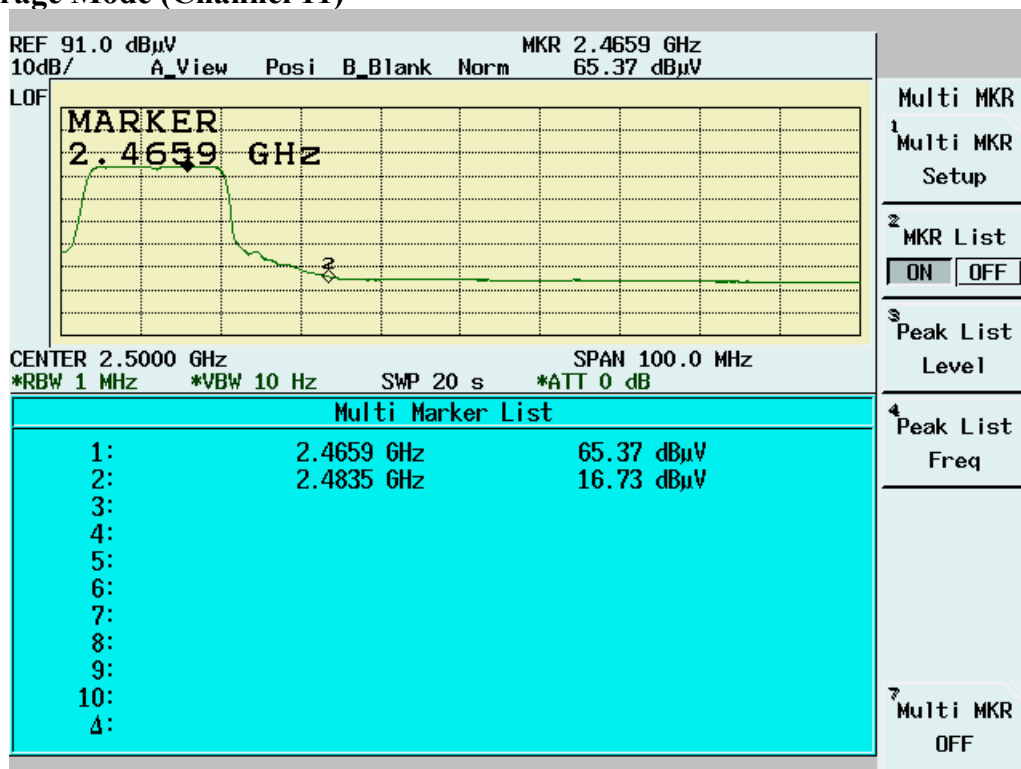
# **Band Edge measurement for radiated emission in Restricted Band (Radiated) Average Mode (Channel 1)**



**Band Edge measurement for radiated emission in Restricted Band (Radiated)  
Peak Mode (Channel 11)**



**Band Edge measurement for radiated emission in Restricted Band (Radiated)  
Average Mode (Channel 11)**



#### **4.7 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]**

**See MPE report**

## 4.8 DSSS Peak Power Spectral Density [Section 15.247(d) ]

### 4.8.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN:1.5MHz  
RBW: 3KHz  
VBW: 30KHz  
Center frequency: fundamental frequency tested.  
Sweep time= 500 sec.
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

### 4.8.2 Test Setup



### 4.8.3 802.11b Test Data

#### 802.11b Maximum Peak Output Power Density

Temp. (° C): 25

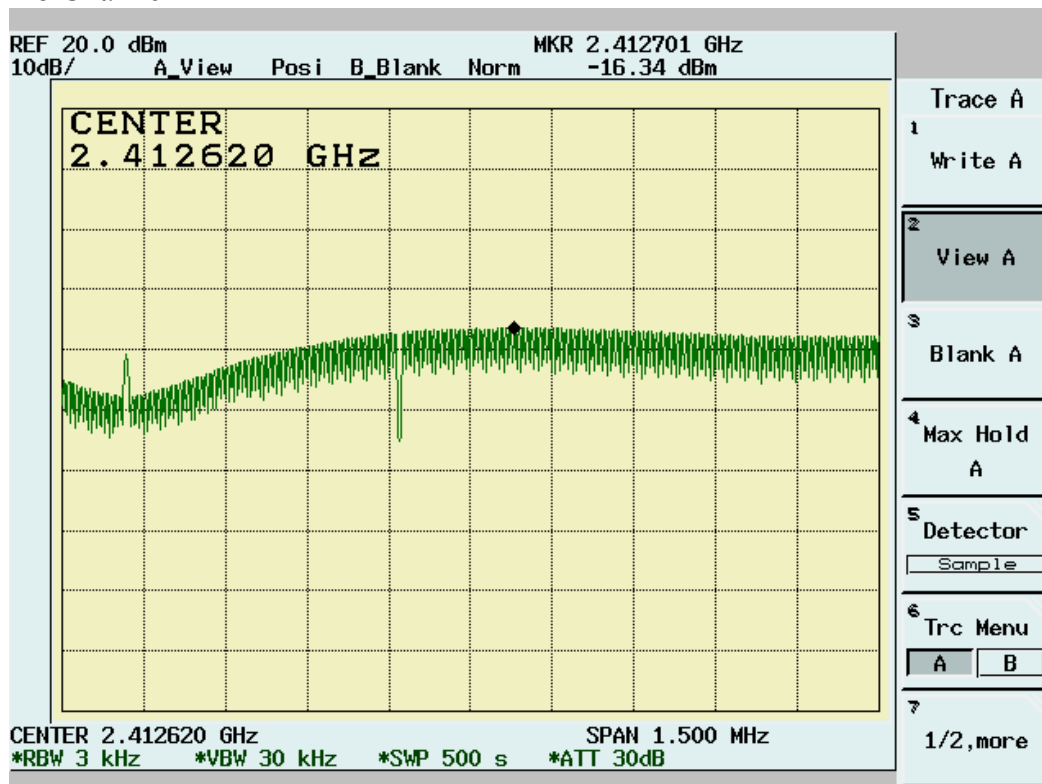
Test Engr: Jerry

Humidity (%): 55

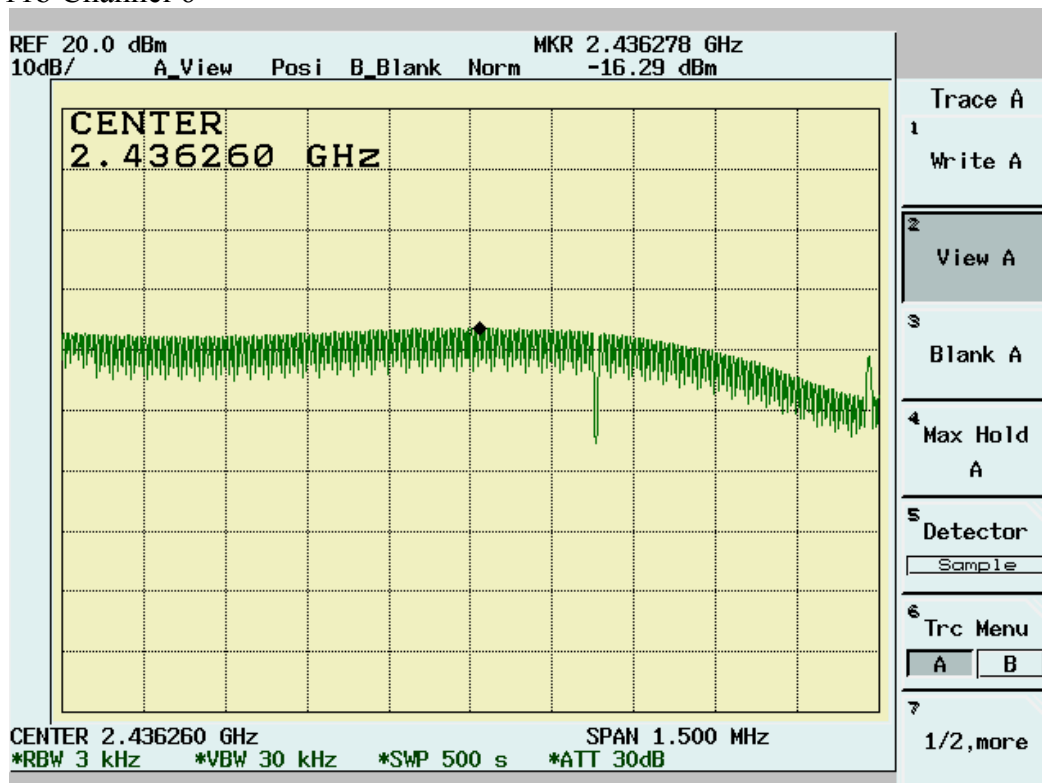
Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-16.34	1.1	-15.24	8	Pass
6	2437	-16.29	1.1	-15.19	8	Pass
11	2462	-16.36	1.1	-15.26	8	Pass



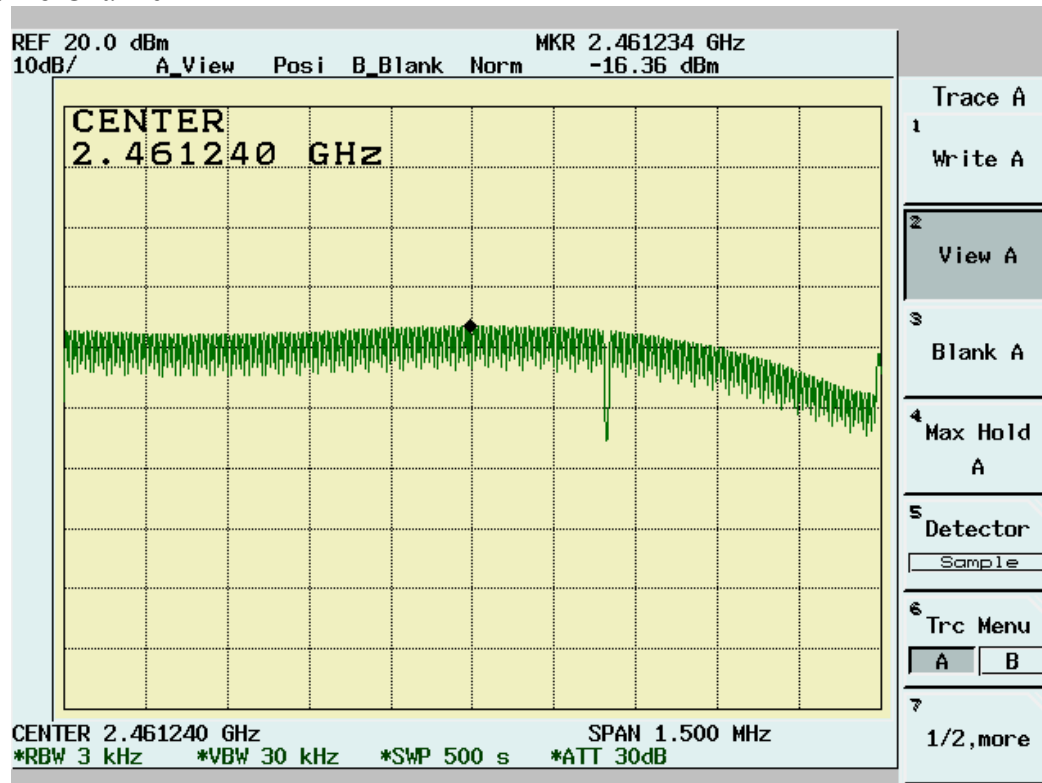
802.11b Channel 1



802.11b Channel 6



802.11b Channel 11



#### 4.8.4 802.11g Test Data

##### 802.11g Maximum Peak Output Power Density

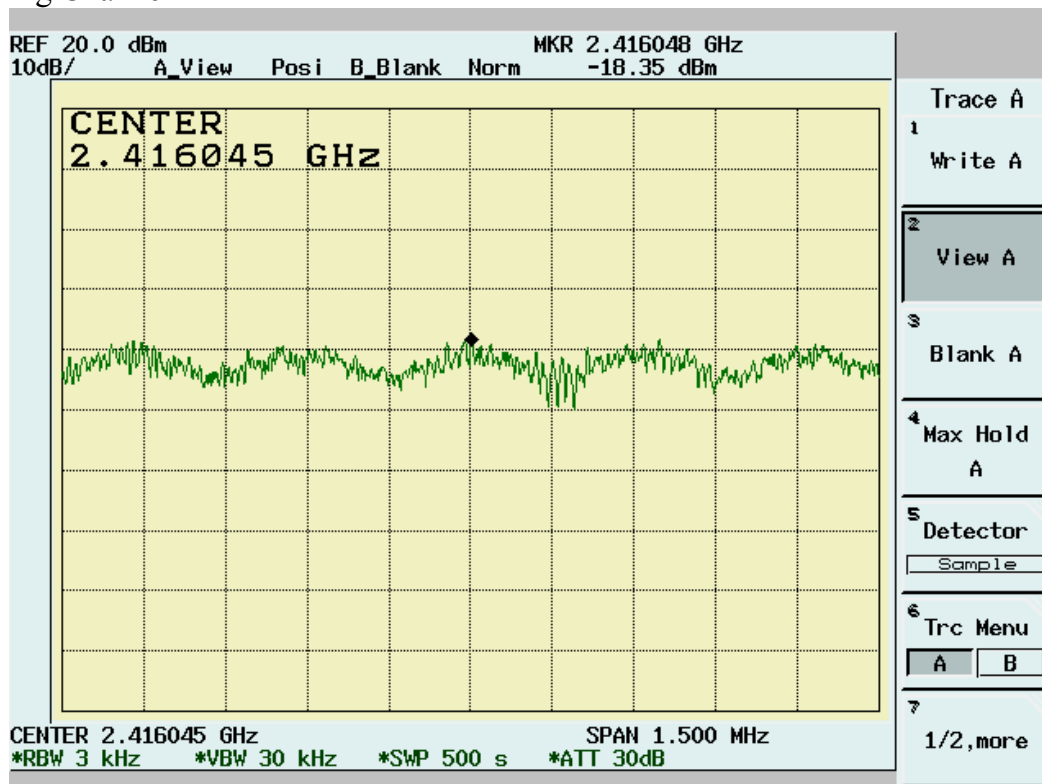
Temp. (°C): 25

Test Engr: Jerry

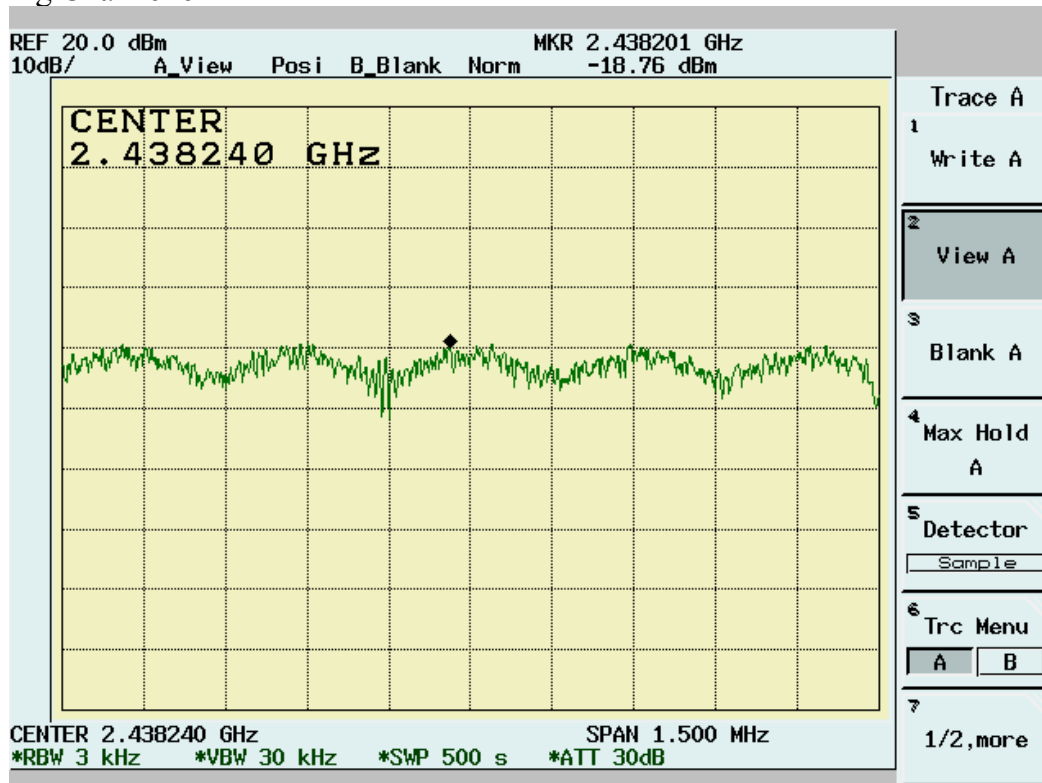
Humidity (%): 55

Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-18.35	1.1	-17.25	8	Pass
6	2437	-18.76	1.1	-17.66	8	Pass
11	2462	-19.32	1.1	-18.22	8	Pass

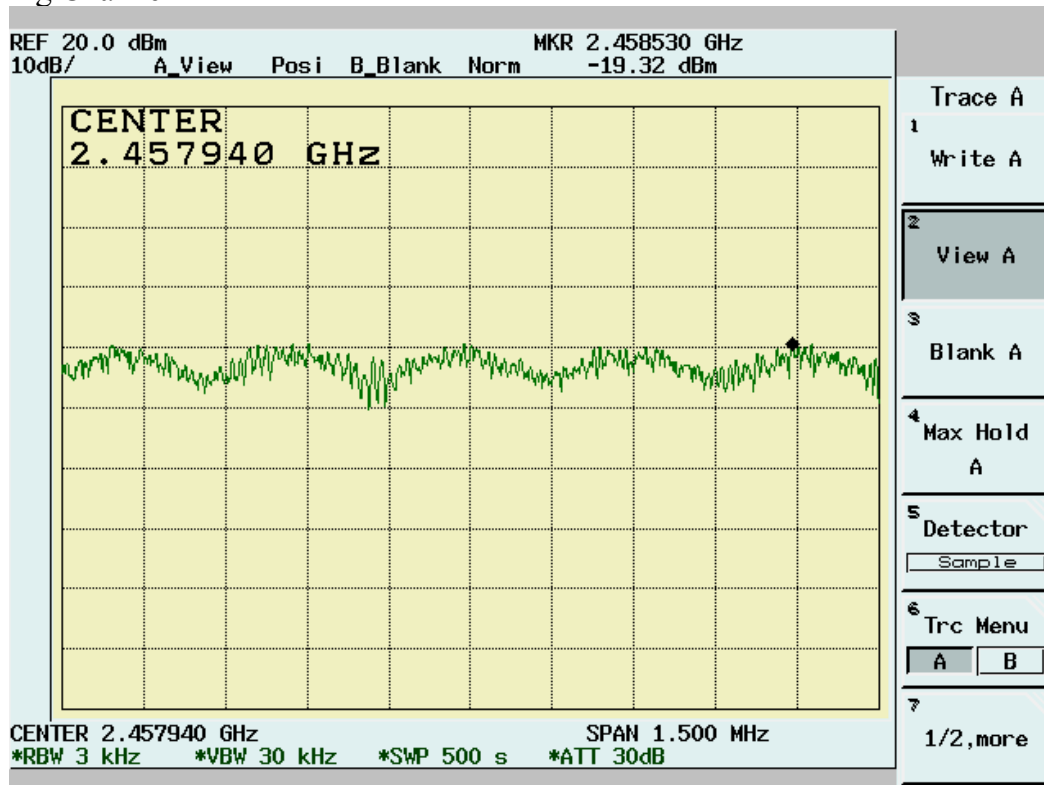
802.11g Channel 1



802.11g Channel 6



802.11g Channel 11



## 5. Appendix

### 5.1 Appendix A: Measurement Procedure for Power line Conducted Emissions

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the required standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

If the EUT is supplied with a flexible power cord, the power cord length in excess of the distance separating the EUT from the LISN shall be folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall not be longer than 1 meter. The excess power cord shall be bundled as described above. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The interconnecting cables were arranged and moved to get the maximum emission. Both the line of power cord, hot and neutral, were measured.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

## **5.2 Appendix B: Test Procedure for Radiated Emissions**

### **Preliminary Measurements in the Anechoic Chamber**

The radiated emissions are initially measured in the anechoic chamber at a measurement distance of 3 meters. Desktop EUT are placed on a wooden stand 0.8 meter in height. The measurement antenna is 3 meters from the EUT. The test setup in anechoic chamber is the same as open site. The turntable rotated 360°C. The antenna height is varied from 1-2.5m. The primary objective of the radiated measurements in the anechoic chamber is to identify the frequency spectrum in the absence of the electromagnetic environment existing on the open test site. The frequencies can then be pre-selected on the open test site to obtain the corresponding amplitude. The initial scan is made with the spectrum analyzer in automatic sweep mode. The spectrum peaks are then measured manually to determine the exact frequencies.

### **Measurements on the Open Site or 10m EMC Chamber**

The radiated emissions test will then be repeated on the open site or 10m EMC chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of the 3 or 10 meter open field sites. Desktop EUT are set up on a wooden stand 0.8 meter above the ground.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. Both reading are recorded with the quasi-peak detector with 120KHz bandwidth. For frequency between 30 MHz and 1000MHz, the reading is recorded with peak detector or quasi-peak detector. For frequency above 1 GHz, the reading is recorded with peak detector or average detector with 1 MHz bandwidth.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum emission. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.

### 5.3 Appendix C: Test Equipment

#### 5.3.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction	Coaxial Cable 1F-C2	Harbourindustries	RG400	1F-C2	02/13/2008	02/13/2009
Conduction	Digital Hygro-Thermometer Conduct	MicroLife	HT-2126G	ISL-Conduction02	12/26/2007	12/26/2008
Conduction	EMI Receiver 07	Schwarzbeck Mess-Elektronik	FCKL 1528	1528-201	08/31/2007	08/30/2008
Conduction	LISN 01	R&S	ESH2-Z5	890485/013	01/03/2008	01/03/2009
Conduction	LISN 06	R&S	ESH3-Z5	828874/009	12/14/2007	12/14/2008
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/13/2007	06/12/2008
Radiation	Coaxial Cable Chmb 02-10M	Belden	RG-8/U	Chmb 02-10M	02/13/2008	02/12/2009
Radiation	Digital Hygro-Thermometer Chmb 02	MicroLife	HT-2126G	Chmb 02	12/26/2006	12/26/2008
Radiation	EMI Receiver 02	HP	85460A	3448A00183	12/29/2007	12/28/2008
Radiation	Spectrum Analyzer 13	Advantest	R3132	121200411	03/16/2008	03/15/2009
Radiation	Horn Antenna 02	Com-Power	AH-118	10088	12/28/2007	12/27/2008
Radiation	Horn Antenna 04	Com-Power	AH-826	081-001	03/23/2008	03/22/2009
Radiation	Horn Antenna 05	Com-Power	AH-640	100A	11/16/2007	11/15/2008
Radiation	Microwave Cable RF SK-01	HUBER+SUHNER AG.	Sucoflex 102	22139 /2	06/01/2007	06/01/2008
Radiation	Preamplifier 09	MITEQ	AFS44-00102 650-40-10P-44	858687	04/02/2008	04/02/2009
Radiation	Preamplifier 10	MITEQ	JS-26004000-27-5A	818471	12/28/2007	12/28/2008
Radiation	High Pass Filter 01	HEWLETT-PACKARD	84300-80038	001	N/A	N/A
Radiation	High Pass Filter 02	HEWLETT-PACKARD	84300-80039	005	N/A	N/A
Radiation	Spectrum Analyzer 14	Advantest	R3182	140600028	12/06/2007	12/06/2008
Radiation	Spectrum Analyzer 19	R&S	FSP40	100116	09/12/2007	09/12/2008

Note: Calibration is traceable to NIST or national or international standards.

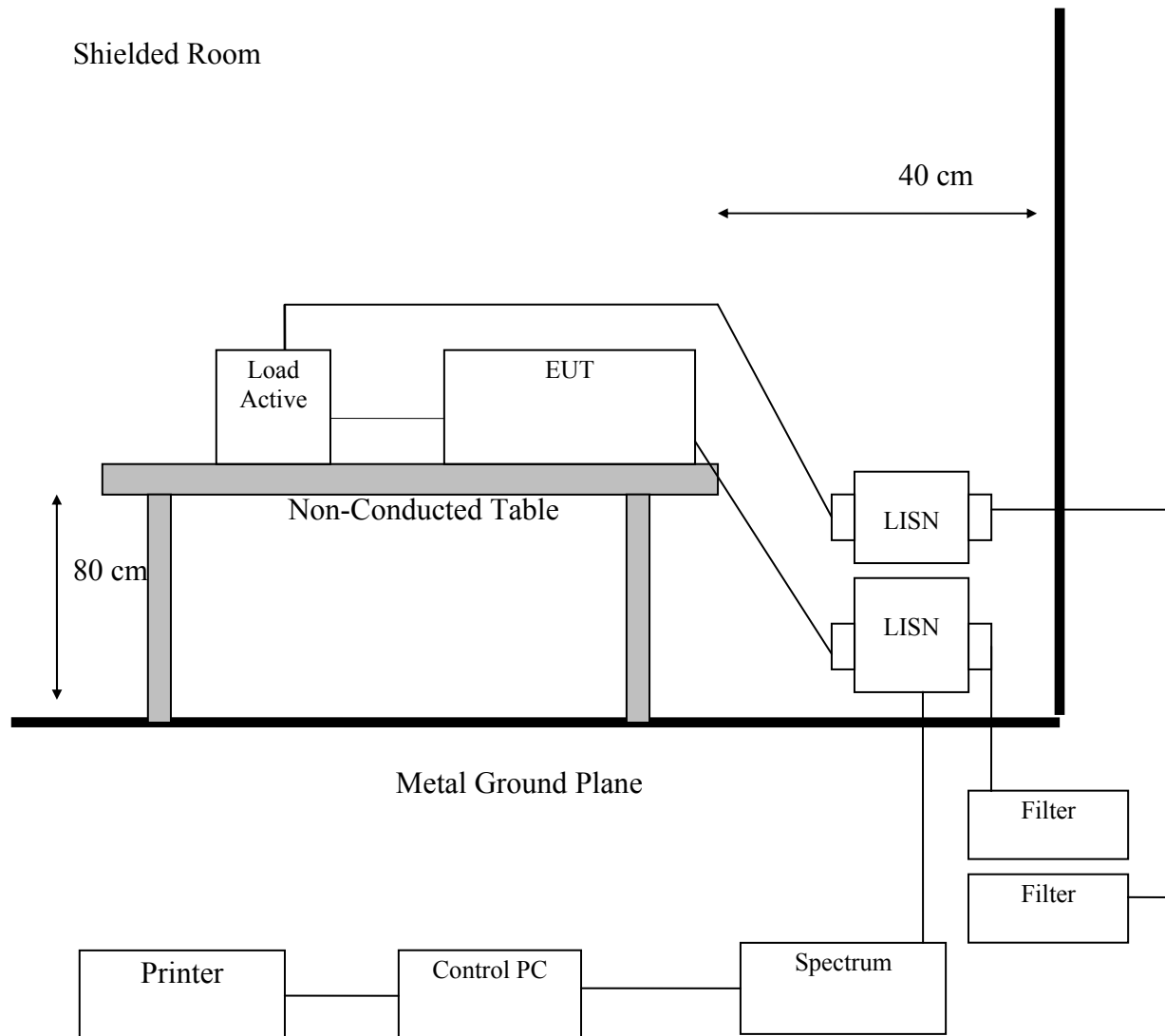
#### 5.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

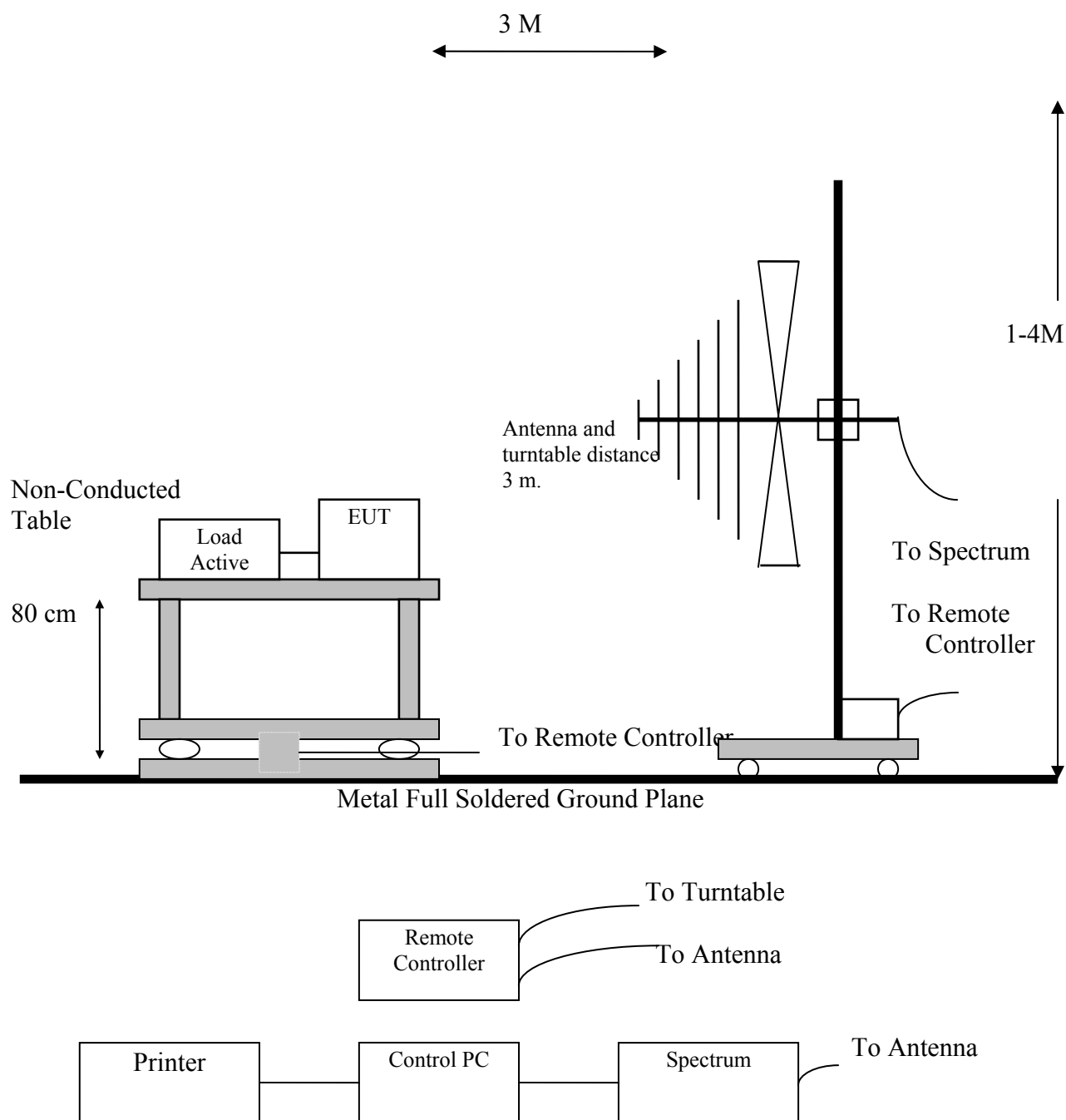


## 5.4 Appendix D: Layout of EUT and Support Equipment

### 5.4.1 General Conducted Test Configuration



### 5.4.2 General Radiation Test Configuration



## 5.5 Appendix E: Accuracy of Measurement

The measurement uncertainty refers to CISPR 16-4-2:2003. The coverage factor  $k = 2$  yields approximately a 95 % level of confidence.

<Conduction 03>:  $\pm 0.88\text{dB}$

<Chamber 12 (3M)>

30MHz~1GHz:  $\pm 3.306\text{ dB}$

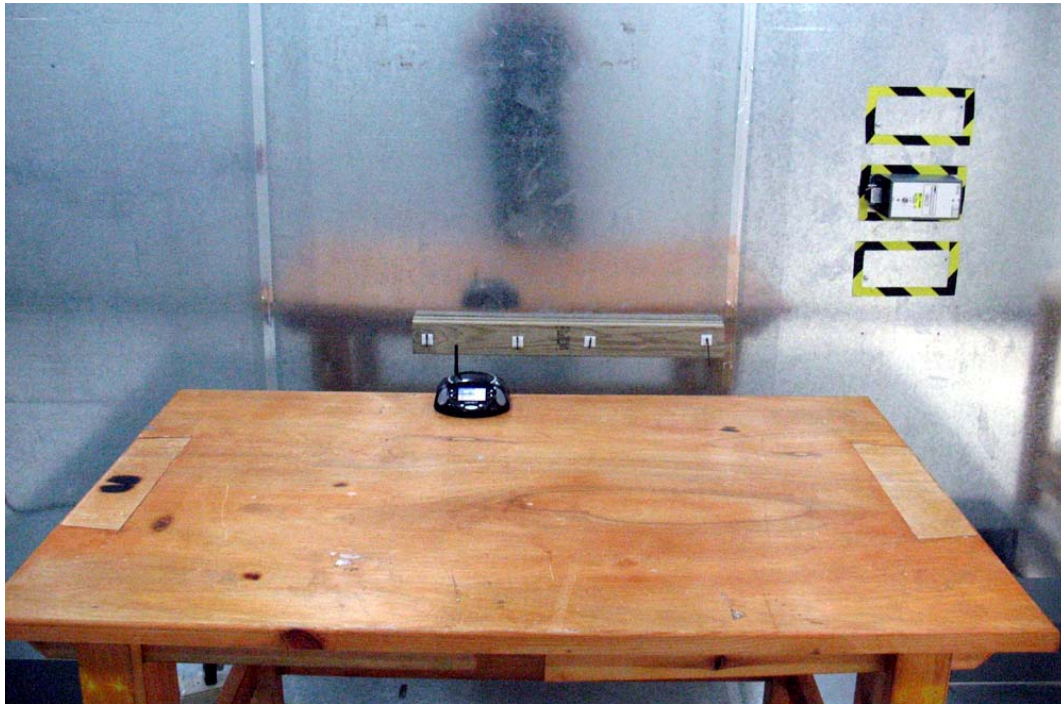
1GHz~18GHz:  $\pm 2.62\text{ dB}$

18GHz~26GHz:  $\pm 3.609\text{ dB}$

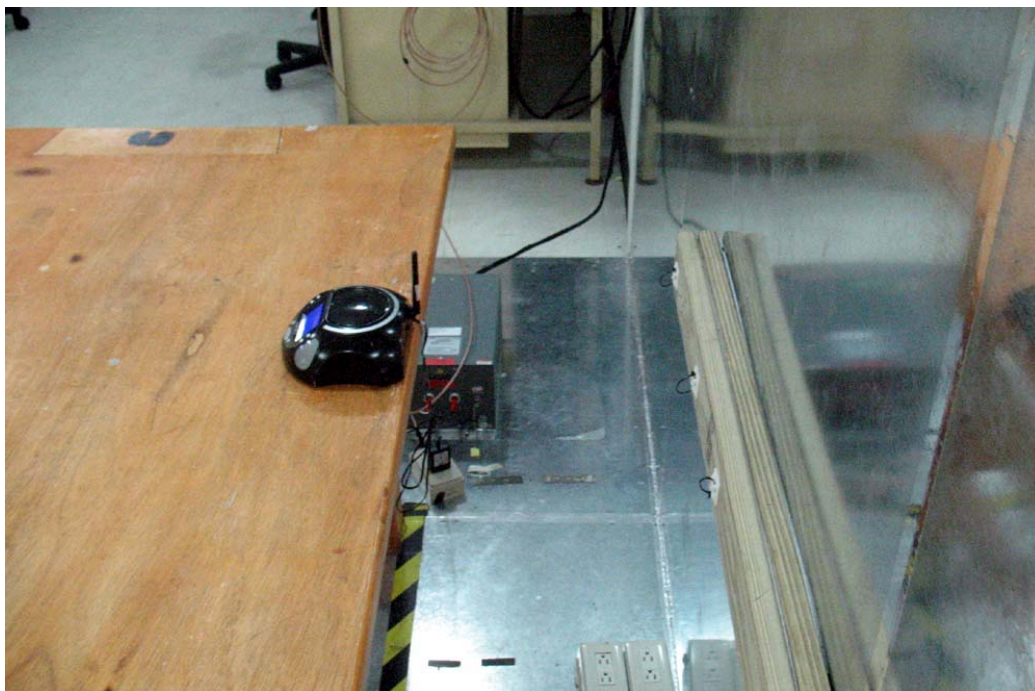
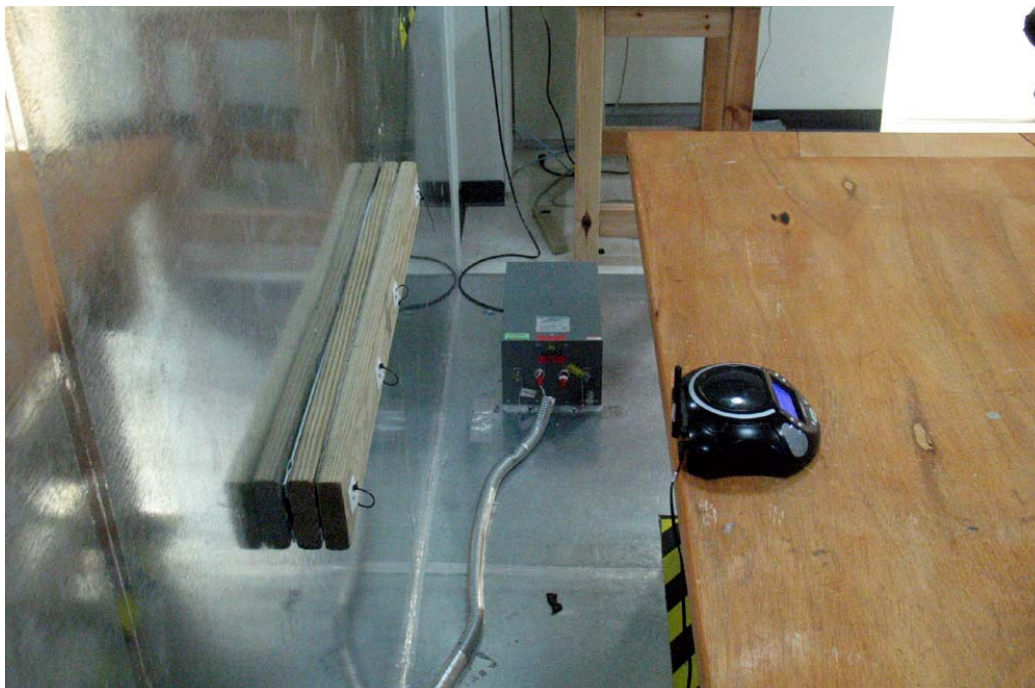
26GHz~40GHz:  $\pm 2.702\text{ dB}$

## 5.6 Appendix F: Photographs of EUT Configuration Test Set Up

The Front View of Highest Conducted Set-up For EUT

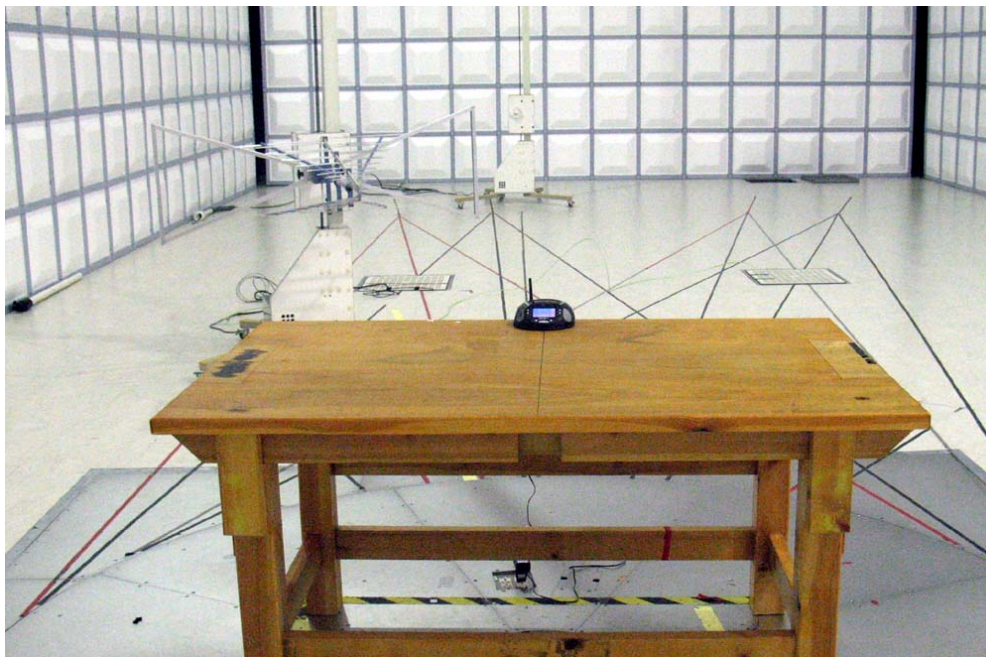


The Back View of Highest Conducted Set-up For EUT

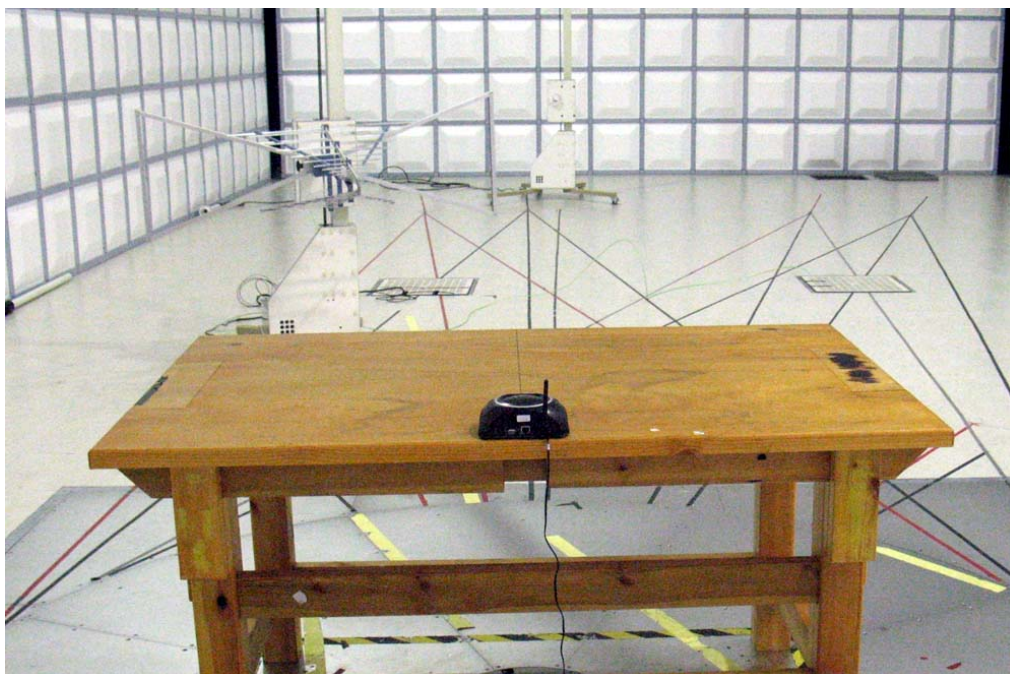




The Front View of Highest Radiated Set-up For EUT



The Back View of Highest Radiated Set-up For EUT



## **5.7 Appendix G: Antenna Spec.**

Please refer to the attached file.