

# **TEST REPORT**

of

## **FCC Part 15 Subpart C**

### **Class II Permissive Change**

Product : **MiniPCIexpress 802.11 b/g transceiver**

Model(s): **AR5BHB63-L**

Applicant: **Atheros Communications, Inc.**

Address: **5480 Great America Parkway  
Santa Clara, CA 95054  
USA**

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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## 1. General

### 1.1 Certification of Accuracy of Test Data

<b>Standards:</b>	CFR 47 Part 15 Subpart C (Section 15.247)
<b>Test Procedure:</b>	ANSI C63.4:2003
<b>Equipment Tested:</b>	MiniPCIexpress 802.11 b/g transceiver
<b>Model:</b>	AR5BHB63-L
<b>Applied by:</b>	Atheros Communications, Inc.
<b>Sample received Date:</b>	2008/07/24
<b>Final test Date :</b>	2008/07/23-2008/08/21
<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>	

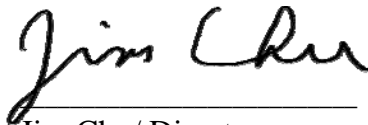
Scott Chien

Scott Chien

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



Jim Chu/ Director

<p>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 65 pages, including 1 cover page, 2 contents page, and 62 pages for the test description.</p>
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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	SAR 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	SAR report attached
15.247 (d)	Power Spectral Density	Pass	

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

Product Name: MiniPCIexpress 802.11b/g transceiver  
 Model No.: AR5BHB63-L  
 Brand: Atheros  
 Frequency Range 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:

No.	Manufacturer	Model or P/N	Type	Connecter	Length	Max. Gain	New
1	Advanced Connectek Inc.	25.90675.001	PIFA	U.FL	Grey 550mm	-0.39dBi (2.4GHz)	Yes
		25.90676.001			Black 705mm	0.64dBi (2.4GHz)	
2	Wistron NeWeb Corp.	25.90669.001	PIFA	IPEX	Black 555mm	-1.53dBi (2.4GHz)	Yes
		25.90670.001			Grey 718mm	1.32dBi (2.4GHz)	

Antenna Connected: Connected to RF connector on the PCB of the 802.11b/g WLAN Adapter .The user is not possible to change the antenna without disassembling the notebook computer.

Power Type of wireless module: 3.3V DC from Notebook PC

The channel and the operation frequency of 802.11b and 802.11g is 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		

All of antennas and transceiver port of module have been tested. The worse data of each antenna type are shown. Configuration list as below:

AR5BHB63-L	PIFA Antenna
Antenna	Antenna 1
Transceiver port	Main port

**The Conducted Power output of EUT**

802.11b (dBm)							
Freq.	Bit rate (mbps)						
(MHz)	1	2	5.5	11			
2412	18.24	18.24	18.08	18.19			
2437	18.4	18.24	18.13	18.02			
2462	<b>18.66</b>	18.61	18.45	18.35			

802.11g (dBm)								
Freq.	Bit rate (mbps)							
(MHz)	6	9	12	18	24	36	48	54
2412	22.16	21.95	21.46	22.01	21.85	21.8	21.64	21.8
2437	<b>22.85</b>	22.56	22.21	22.16	22.61	22.61	22.71	22.61
2462	21.26	21.15	21.09	21.2	21.09	21.09	20.92	20.98

### 3. Description of Support Equipment

#### 3.1 Description of Support Equipment

Unit	Model Serial No.	Brand	Power Cord	FCC ID
Tablet Personal Computer	7448;7449;7450;7453; 2263;2266;4184	Lenovo	Non-shielded, Detachable	FCC DoC
LCD Monitor	2408WFPb	DELL	Non-shielded, Detachable	FCC DoC
USB Mouse	M-SBJ96 S/N: NA	Dell	Non-shielded, Detachable	FCC DoC
Traveling Disk	U172 S/N: NA	PQI	NA	FCC DoC

##### 3.1.1 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

The RF software makes the transmitter continuously sending RF signals

	Filename	Issued Date
ART_V53_build35	art.exe	01/12/2007

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

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cord	110V (~240V) to AC Power Cord Inlet (3-pin)	1.8M	Nonshielded, Detachable	Plastic Head
Monitor Data Cable	Monitor D-SUB Port to EUT VGA Port	1.6M	Shielded, Detachable (with core)	Metal Head
USB Data Cable	Traveling Disk to EUT USB Port	1.2M	Shielded, Un-detachable	Metal Head
USB Data Cable	USB Mouse to EUT USB Port	1.0M	Shielded, Un-detachable	Metal Head



## 4. TEST RESULTS

### 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.

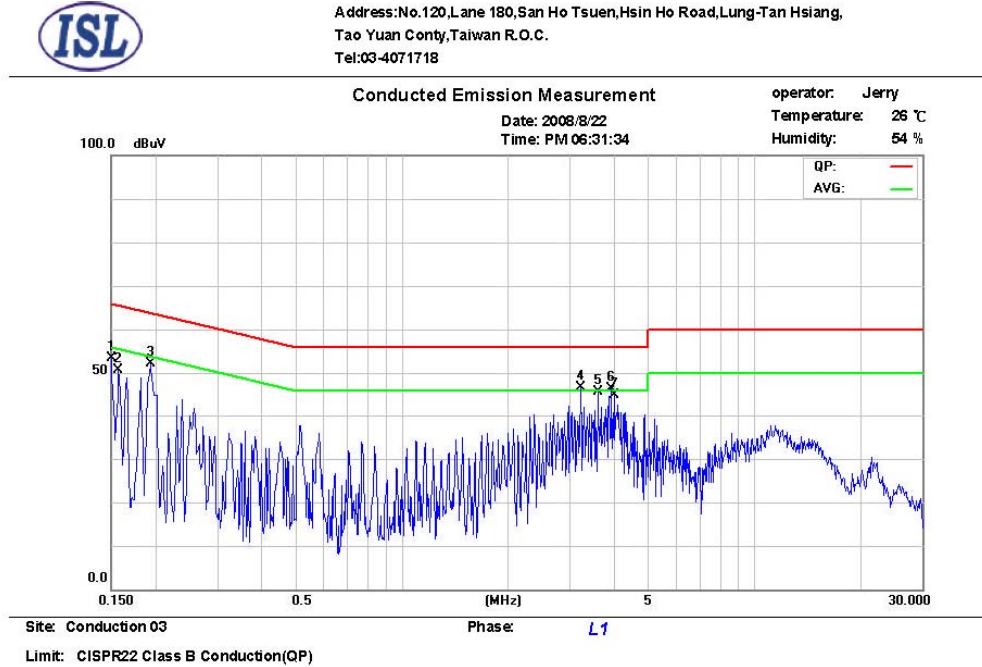
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

#### 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) Lowest, Middle, Highest channel



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
0.1500	1.8	0.02	44.96	66.0	-21.0	33.47	56.0	-22.5	
0.1580	1.7	0.02	42.95	65.5	-22.6	33.30	55.5	-22.2	
0.1940	1.27	0.04	47.52	63.8	-16.3	37.88	53.8	-15.9	
3.2340	0.21	0.12	38.47	56.0	-17.5	29.87	46.0	-16.1	
3.6220	0.21	0.13	36.75	56.0	-19.2	26.91	46.0	-19.0	
* 3.9460	0.21	0.14	33.19	56.0	-22.8	30.09	46.0	-15.9	
4.0140	0.21	0.14	39.49	56.0	-16.5	26.33	46.0	-19.6	

\*:Maximum data x:Over limit

802.11b Power Line Conducted Emissions (Neutral) Lowest, Middle, Highest channel

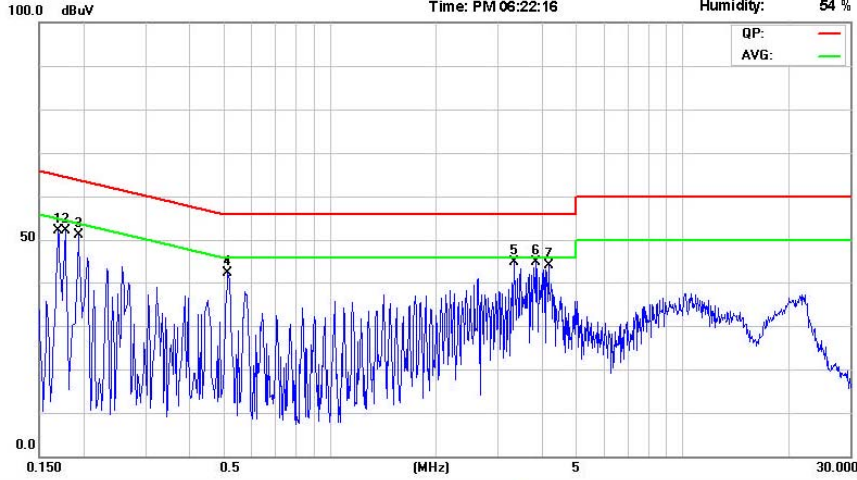


Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road, Lung-Tan Hsiang,  
Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Conducted Emission Measurement

Date: 2008/8/22  
Time: PM 06:22:16

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



Site: Conduction 03

Phase: N

Limit: CISPR22 Class B Conduction(QP)

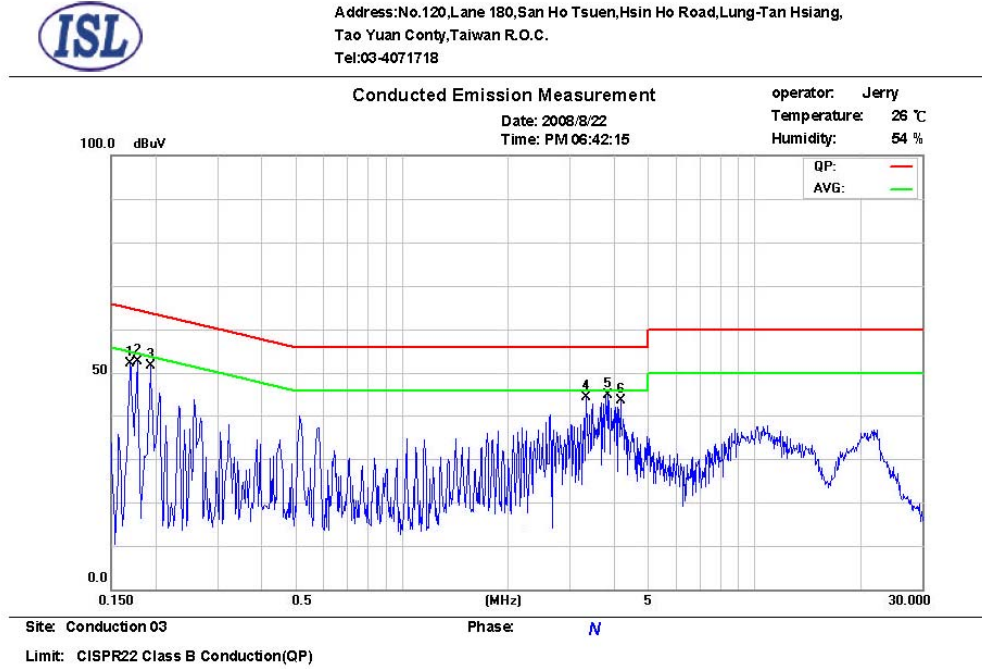
Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.1700	1.3	0.03	46.44	64.9	-18.5	31.88	54.9	-23.0	
0.1780	1.22	0.03	47.59	64.5	-16.9	33.80	54.5	-20.7	
0.1940	1.06	0.04	43.21	63.8	-20.6	29.35	53.8	-24.5	
0.5180	0.38	0.07	40.96	56.0	-15.0	29.68	46.0	-16.3	
3.3620	0.21	0.12	43.80	56.0	-12.2	31.47	46.0	-14.5	
* 3.8780	0.21	0.14	38.89	56.0	-17.1	37.87	46.0	-8.13	
4.1980	0.21	0.14	26.46	56.0	-29.5	35.82	46.0	-10.1	

\*:Maximum data x:Over limit

\* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between Lowest, Middle, Highest 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) Lowest, Middle, Highest channel



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	46.87	64.9	-18.0	31.98	54.9	-22.9	
0.1780	1.22	0.03	48.01	64.5	-16.5	33.92	54.5	-20.6	
0.1940	1.06	0.04	43.64	63.8	-20.2	37.86	53.8	-16.0	
3.3620	0.21	0.12	38.09	56.0	-17.9	31.97	46.0	-14.0	
* 3.3780	0.21	0.14	33.10	56.0	-22.9	37.10	46.0	-8.90	
4.1980	0.21	0.14	39.11	56.0	-16.8	36.10	46.0	-9.90	

\*:Maximum data x:Over limit

802.11g Power Line Conducted Emissions (Neutral) Lowest, Middle, Highest channel

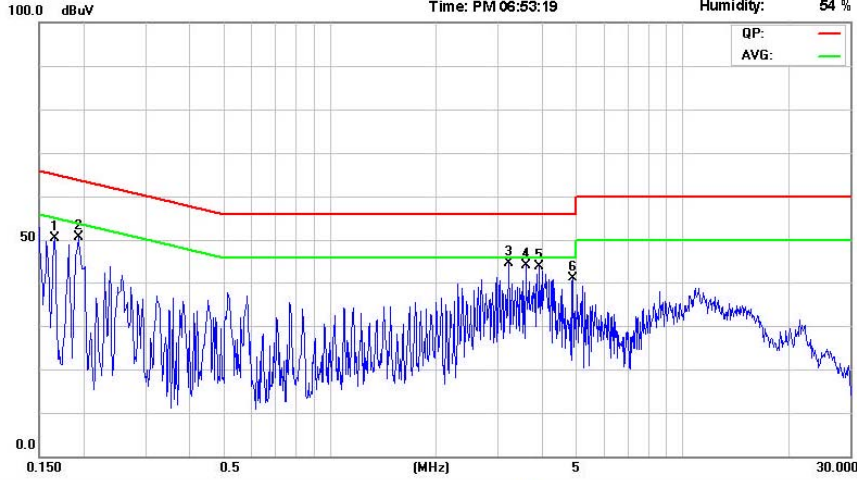


Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road, Lung-Tan Hsiang,  
Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Conducted Emission Measurement

Date: 2008/8/22  
Time: PM 06:53:19

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



Site: Conduction 03

Phase: L1

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
0.1660	1.61	0.03	47.07	65.1	-18.0	32.29	55.1	-22.8	
0.1940	1.27	0.04	43.74	63.8	-20.1	36.07	53.8	-17.7	
3.2340	0.21	0.12	37.09	56.0	-18.9	37.03	46.0	-8.97	
* 3.6220	0.21	0.13	38.10	56.0	-17.9	38.99	46.0	-7.01	
3.9460	0.21	0.14	39.11	56.0	-16.8	38.88	46.0	-7.12	
4.9180	0.21	0.15	37.11	56.0	-18.8	36.01	46.0	-9.99	

\*:Maximum data x:Over limit

\* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between Lowest, Middle, Highest 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

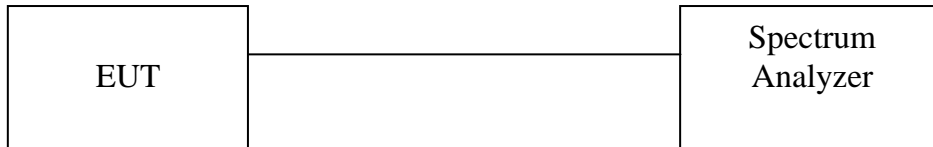
## 4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

### 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
SPAN	22MHz

### 4.2.2 Test Setup

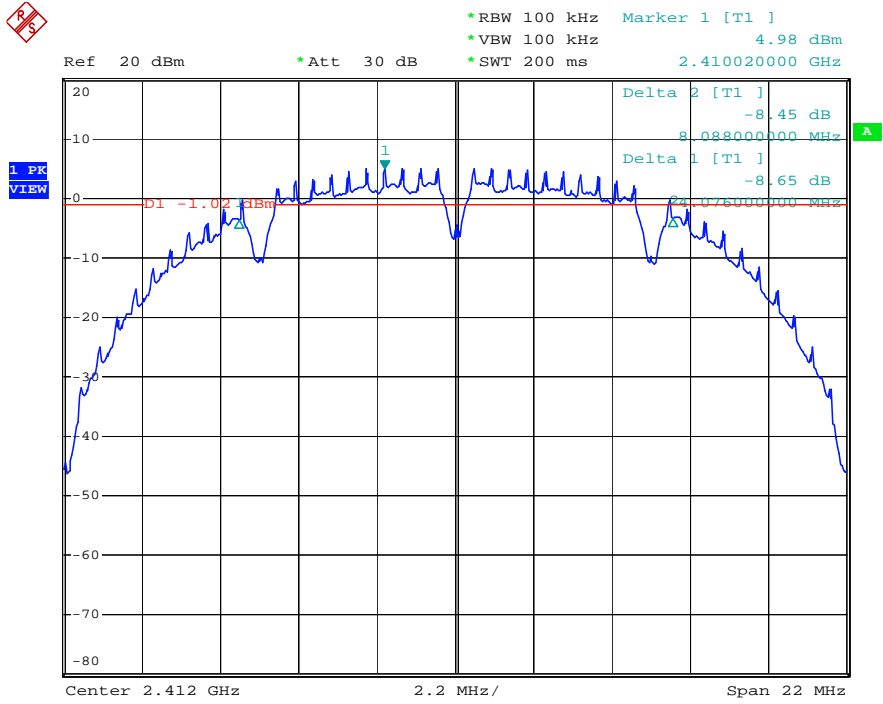


### 4.2.3 802.11b Test Data:

#### 802.11b 6dB Bandwidth

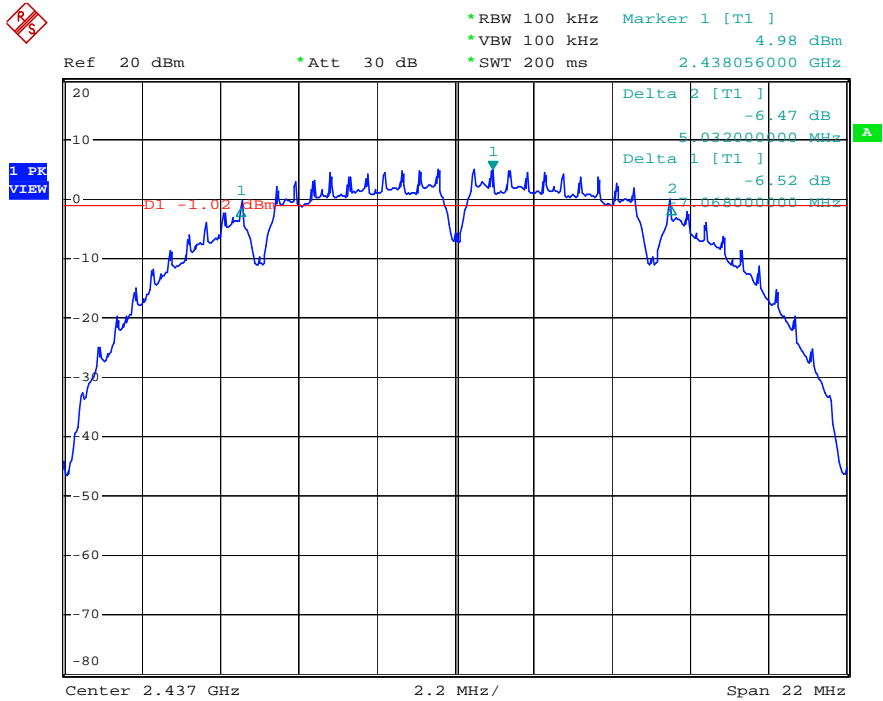
Test Engr: Jerry		Temp. (° C):	25	
		Humidity (%):	55	
Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	12.16	0.5	Pass
6	2437	12.1	0.5	Pass
11	2462	12.13	0.5	Pass

802.11b Lowest Channel:



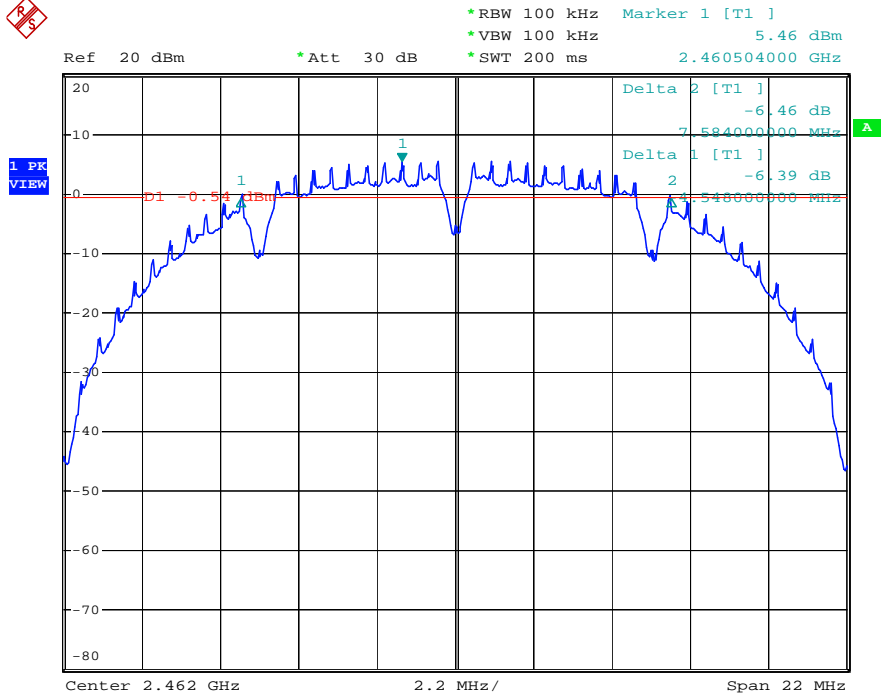
Date: 22.AUG.2008 18:03:01

802.11b Middle Channel:



Date: 22.AUG.2008 18:04:46

802.11b Highest Channel:



Date: 22.AUG.2008 18:07:48



4.2.4 802.11g Test Data:

802.11g 6dB Bandwidth

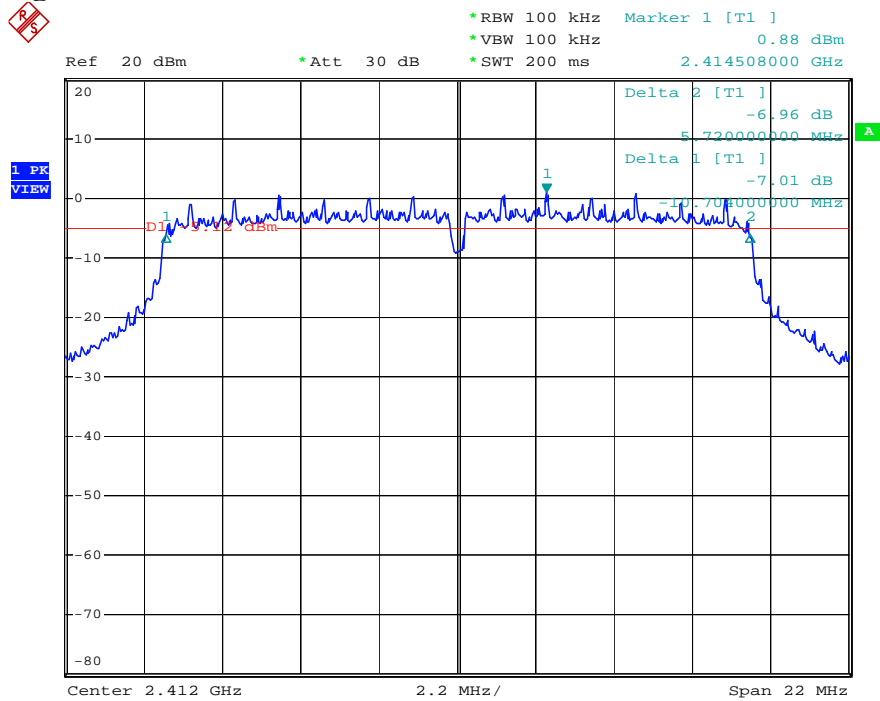
Temp. (° C): 25

Test Engr: Jerry

Humidity (%): 55

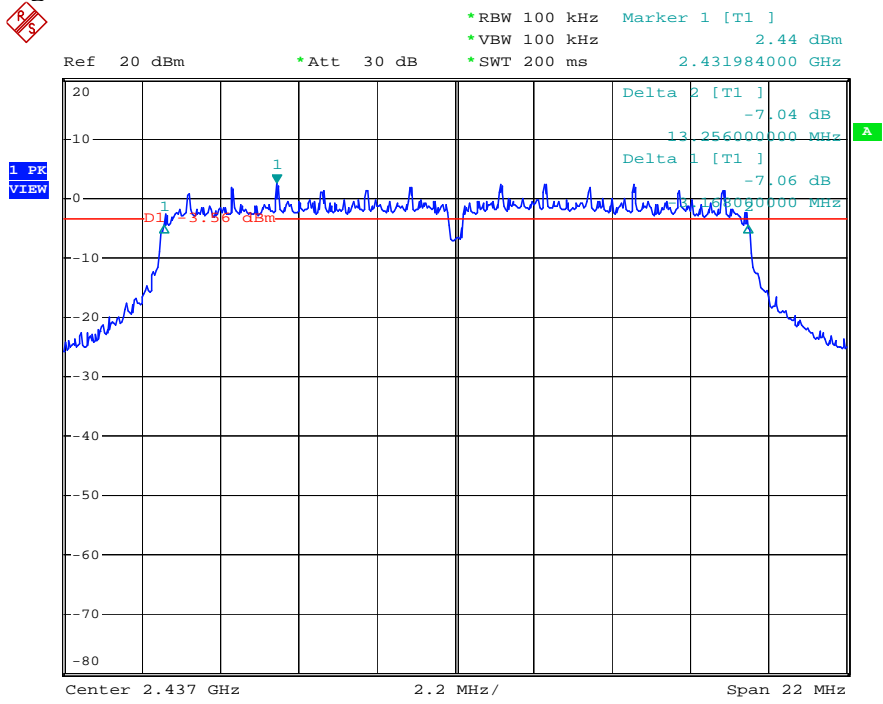
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.42	0.5	Pass
6	2437	16.42	0.5	Pass
11	2462	16.44	0.5	Pass

802.11g Lowest Channel:



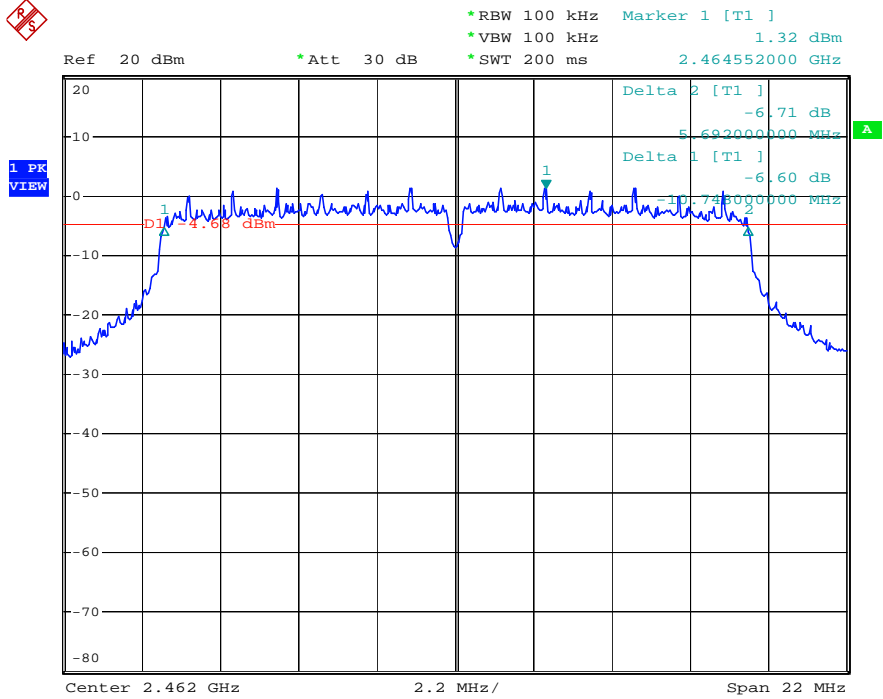
Date: 22.AUG.2008 17:55:31

802.11g Middle Channel:



Date: 22.AUG.2008 17:52:54

802.11g Highest Channel:



Date: 22.AUG.2008 17:57:27

### 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.

The test is performed in accordance with FCC document “Measurement of Digital Transmission Systems Operating under Section 15.247”, March 23, 2005. The transmitter operates continuously therefore Power Output Option 1 is used.

Equipment	Peak Power Analyzer
Detector function	Maximum Peak

#### 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

#### Main Port

Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	17.14	1.1	66.68	18.24	30	Pass
6	2437	17.3	1.1	69.18	18.4	30	Pass
11	2462	17.56	1.1	73.45	<b>18.66</b>	30	Pass

802.11b (dBm)							
Freq. (MHz)	Bit rate (mbps)						
	1	2	5.5	11			
2412	18.24	18.24	18.08	18.19			
2437	18.4	18.24	18.13	18.02			
2462	<b>18.66</b>	18.61	18.45	18.35			

#### AUX Port Bit rate=1 mbps

Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	17.3	1.1	69.18	18.4	30	Pass
6	2437	17.08	1.1	65.77	18.18	30	Pass
11	2462	17.24	1.1	68.23	18.34	30	Pass

### 4.3.4 802.11g Test Data

#### 802.11g Maximum Peak Output Power

Temp. (° C): 25

Test Engr: Jerry

Humidity (%): 55

#### Main Port

Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	21.06	1.1	164.44	22.16	30	Pass
6	2437	21.75	1.1	<b>192.75</b>	<b>22.85</b>	30	Pass
11	2462	20.16	1.1	133.66	21.26	30	Pass

802.11g (dBm)								
Freq.	Bit rate (Mbps)							
(MHz)	6	9	12	18	24	36	48	54
2412	22.16	21.95	21.46	22.01	21.85	21.8	21.64	21.8
2437	<b>22.85</b>	22.56	22.21	22.16	22.61	22.61	22.71	22.61
2462	21.26	21.15	21.09	21.2	21.09	21.09	20.92	20.98

#### AUX Port Bit rate=6 Mbps

Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	19.88	1.1	125.31	20.98	30	Pass
6	2437	20.65	1.1	149.62	21.75	30	Pass
11	2462	19.3	1.1	109.65	20.4	30	Pass

## 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*.

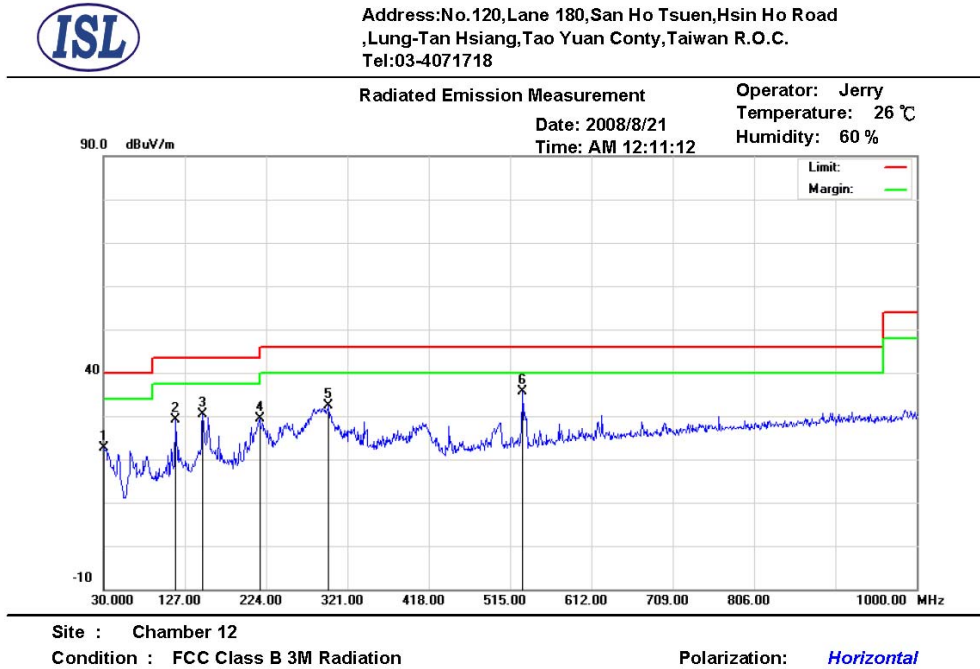
For the test of 2<sup>nd</sup> to 10<sup>th</sup> harmonics frequencies, the equipment setup was also refer to EMI Receiver/Spectrum Analyzer Configuration. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average 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):

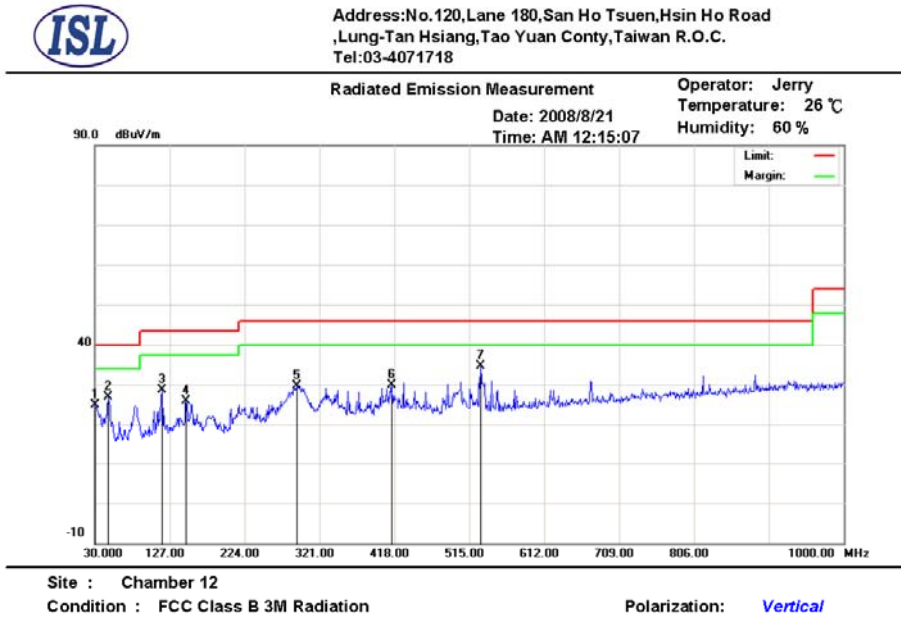
30M – 1GHz Open Field Radiated Emissions (Horizontal) Lowest, Middle, Highest channel



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
	30.0000	2.53	19.02	1	0	22.55	40.00	-17.45	384	96	peak
	115.3600	17.24	9.62	2.2	0	29.06	43.50	-14.44	133	109	peak
	148.3400	20.35	7.71	2.4	0	30.46	43.50	-13.04	344	96	peak
	216.2400	18.80	7.76	2.8	0	29.36	46.00	-16.64	131	234	peak
	298.6900	18.22	10.77	3.29	0	32.28	46.00	-13.72	229	237	peak
*	529.5500	15.39	15.92	4.32	0	35.63	46.00	-10.37	100	16	peak

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

### 30M – 1GHz Open Field Radiated Emissions (Vertical) Lowest, Middle, Highest channel



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
	30.0000	4.98	19.02	1	0	25.00	40.00	-15.00	100	277	peak
	47.4600	15.98	9.28	1.55	0	26.81	40.00	-13.19	100	260	peak
	117.3000	16.77	9.68	2.2	0	28.65	43.50	-14.85	189	325	peak
	148.3400	15.89	7.71	2.4	0	26.00	43.50	-17.50	100	201	peak
	291.9000	15.91	10.59	3.22	0	29.72	46.00	-16.28	229	53	peak
	415.0900	12.33	13.69	3.86	0	29.88	46.00	-16.12	219	317	peak
*	529.5500	14.51	15.92	4.32	0	34.75	46.00	-11.25	100	137	peak

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

NOTE:

- During the Pre-test, the EUT has been tested for Lowest, Middle, Highest channel 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), Lowest Channel



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: 2008/8/4

Time: PM 07:18:53

Operator: Jerry

Temperature: 25 °C

Humidity: 54 %



Site : Chamber 12

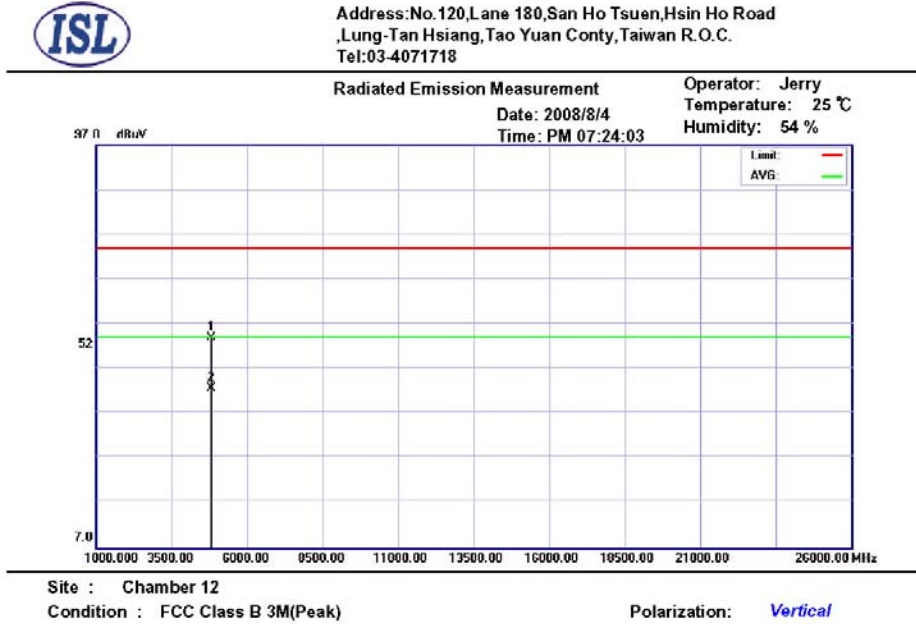
Condition : FCC Class B 3M(Peak)

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
*	4823.925	31.26	33.61	8.91	27.01	46.77	54.00	-7.23	100	347	AVG
	4824.010	39.45	33.61	8.91	27.01	54.96	74.00	-19.04	100	347	peak

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

1GHz~ 25 GHz (Vertical), Lowest Channel



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
	4823.940	38.34	33.61	8.91	27.01	53.85	74.00	-20.15	100	174	peak
*	4824.120	27.13	33.61	8.91	27.01	42.64	54.00	-11.36	100	174	AVG

\*: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
- 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), Middle Channel



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: 25 °C  
Humidity: 54 %

Date: 2008/8/4

Time: PM 07:28:59



Site : Chamber 12

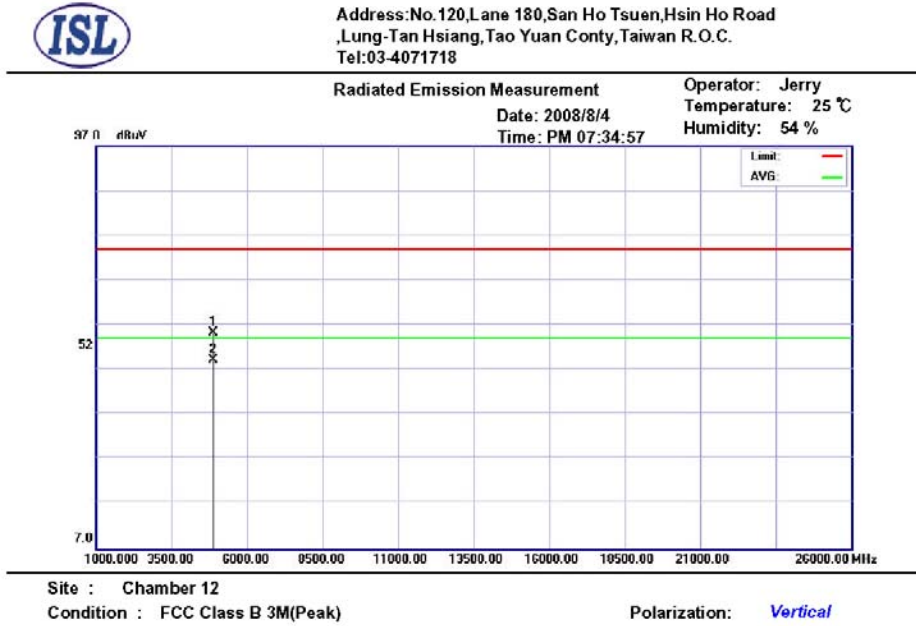
Condition : FCC Class B 3M(Peak)

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
*	4874.125	32.80	33.75	8.36	26.93	47.98	54.00	-6.02	100	229	AVG
	4875.000	37.97	33.75	8.38	26.93	53.17	74.00	-20.83	100	229	peak

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

1GHz~ 25 GHz (Vertical), Middle Channel



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
	4874.050	40.05	33.75	8.36	26.93	55.23	74.00	-18.77	100	111	peak
*	4874.110	33.95	33.75	8.36	26.93	49.13	54.00	-4.87	100	111	AVG

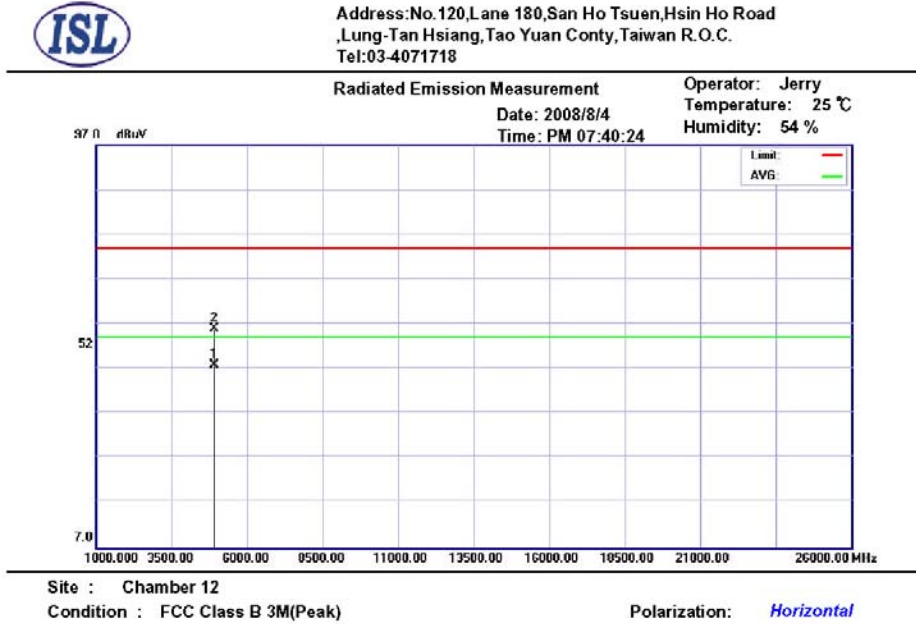
\*:Maximum data x:Over limit !:over margin

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
- 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), Highest Channel



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
*	4924.070	31.24	33.89	9.5	26.74	47.89	54.00	-6.11	100	91	AVG
	4924.150	39.30	33.89	9.5	26.75	55.94	74.00	-18.06	100	91	peak

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

1GHz~ 25 GHz (Vertical), Highest Channel



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
	4923.980	38.41	33.89	9.51	26.74	55.07	74.00	-18.93	100	199	peak
*	4924.115	32.23	33.89	9.5	26.75	48.87	54.00	-5.13	100	199	AVG

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

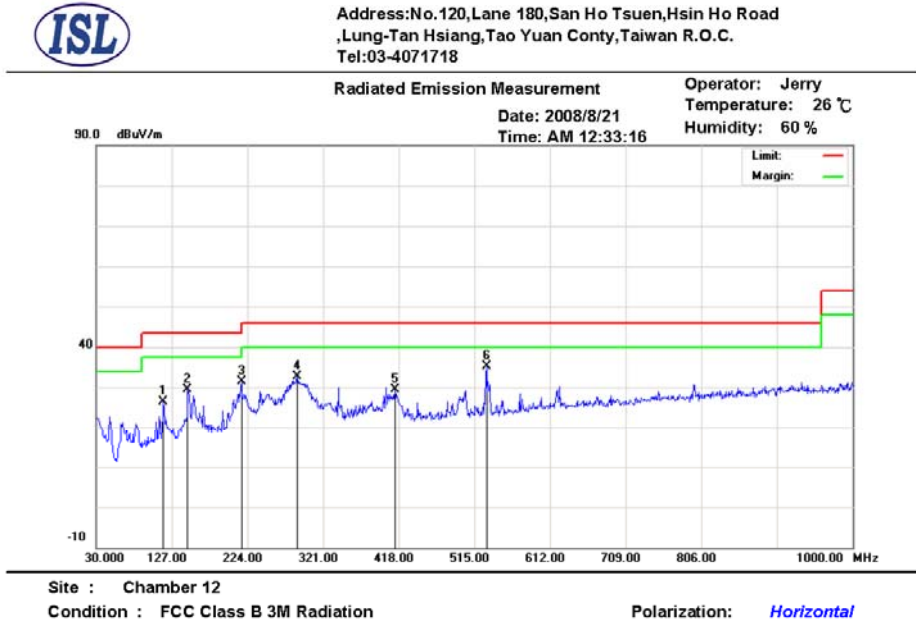
Note:

- 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
- 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.**

### 4.4.5 802.11g Test Data

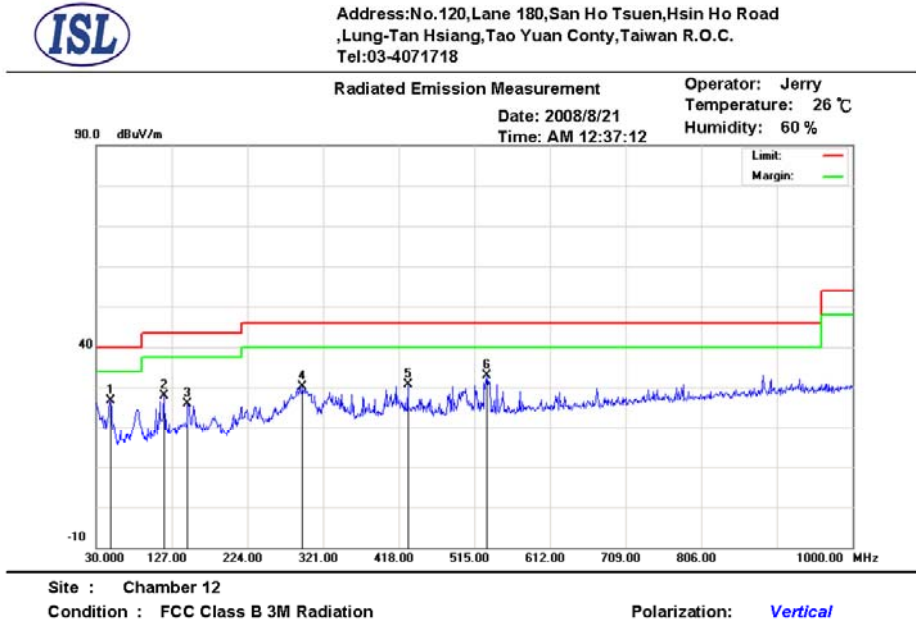
### 30M – 1GHz Open Field Radiated Emissions (Horizontal) Lowest, Middle, Highest channel



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
	116.3300	14.53	9.65	2.2	0	26.38	43.50	-17.12	100	166	peak
	147.3700	19.13	7.77	2.4	0	29.30	43.50	-14.20	100	23	peak
	216.2400	20.71	7.76	2.8	0	31.27	46.00	-14.73	101	337	peak
	288.0200	19.02	10.47	3.2	0	32.69	46.00	-13.31	346	66	peak
	413.1500	11.77	13.65	3.85	0	29.27	46.00	-16.73	199	32	peak
*	530.5200	14.98	15.93	4.32	0	35.23	46.00	-10.77	371	113	peak

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

### 30M – 1GHz Open Field Radiated Emissions (Vertical) Lowest, Middle, Highest channel



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
	48.4300	16.46	8.65	1.57	0	26.68	40.00	-13.32	281	20	peak
	117.3000	16.05	9.68	2.2	0	27.93	43.50	-15.57	363	40	peak
	147.3700	15.60	7.77	2.4	0	25.77	43.50	-17.73	380	169	peak
	294.8100	16.15	10.66	3.25	0	30.06	46.00	-15.94	274	47	peak
	429.6400	12.71	13.99	3.92	0	30.62	46.00	-15.38	100	292	peak
*	531.4900	12.68	15.94	4.33	0	32.95	46.00	-13.05	100	155	peak

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

NOTE:

- During the Pre-test, the EUT has been tested for Channel Lowest, Middle, Highest 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), Lowest Channel



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

Date: 2008/7/23

Temperature: 27 °C

Time: AM 10:01:52

Humidity: 64 %



Site : Chamber 12

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
	4825.000	43.37	33.61	8.9	27.01	58.87	74.00	-15.13	100	67	peak
*	4828.800	27.39	33.62	8.86	27	42.87	54.00	-11.13	100	67	AVG

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

1GHz~ 25 GHz (Vertical), Lowest Channel



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: 27 °C  
Humidity: 64 %

Date: 2008/7/23  
Time: AM 10:06:25



Site : Chamber 12

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

Mk.	Frequency (MHz)	R <sub>X</sub> R (dBuV)	Ant F (dB)	Cab L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4823.050	41.31	33.6	8.89	27.02	56.78	74.00	-17.22	100	89	peak
*	4827.650	26.10	33.62	8.87	27	41.59	54.00	-12.41	100	89	AVG

\*: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
- 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) , Middle Channel

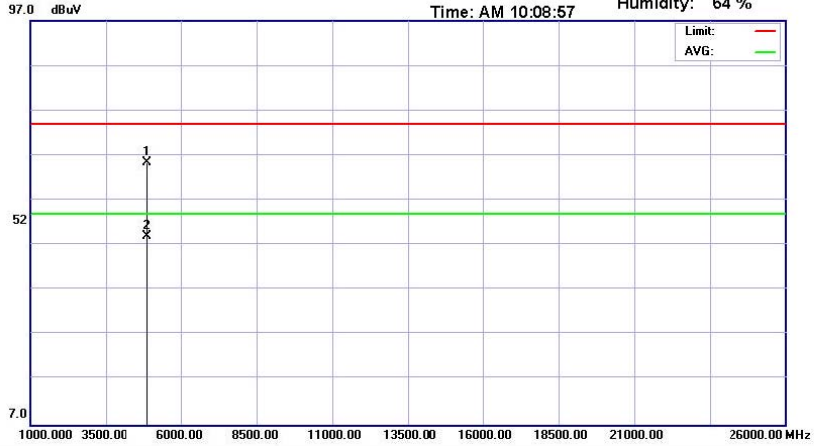


Address: No.120, Lane 180, San Ho Tsuen, Hsin Ho Road  
, Lung-Tan Hsiang, Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Radiated Emission Measurement

Date: 2008/7/23  
Time: AM 10:08:57

Operator: Jerry  
Temperature: 27 °C  
Humidity: 64 %



Site : Chamber 12

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
	4872.700	50.13	33.74	8.37	26.93	65.31	74.00	-8.69	100	233	peak
*	4873.300	33.67	33.75	8.37	26.93	48.86	54.00	-5.14	100	233	AVG

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

1GHz~ 25 GHz (Vertical), Middle Channel



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: 27 °C  
Humidity: 64 %

Date: 2008/7/23  
Time: AM 10:15:54



Site : Chamber 12

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

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
	4872.800	46.91	33.74	8.37	26.93	62.09	74.00	-11.91	100	93	peak
*	4874.950	30.74	33.75	8.38	26.93	45.94	54.00	-8.06	100	93	AVG

\*: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
- 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), Highest Channel



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: 2008/7/23  
Time: AM 10:18:31

Operator: Jerry  
Temperature: 27 °C  
Humidity: 64 %



Site : Chamber 12

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
	4918.800	44.59	33.87	9.39	26.76	61.09	74.00	-12.91	100	69	peak
*	4923.350	28.20	33.89	9.5	26.74	44.85	54.00	-9.15	100	69	AVG

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

1GHz~ 25 GHz (Vertical), Highest Channel



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: 27 °C  
Humidity: 64 %

Date: 2008/7/23  
Time: AM 10:21:07



Site : Chamber 12

Condition : FCC Class B 3M(Peak)

Polarization: Vertical

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
*	4924.650	28.17	33.89	9.45	26.77	44.74	54.00	-9.26	100	182	AVG
	4925.400	43.70	33.89	9.39	26.81	60.17	74.00	-13.83	100	182	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
- 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

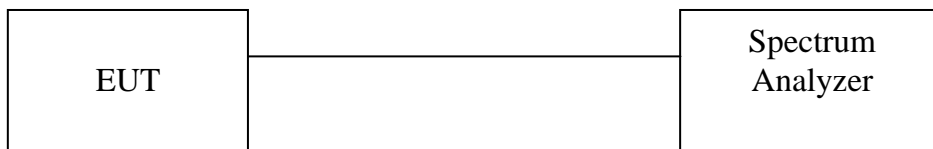
1. The transmitter output of EUT was connected to the spectrum analyzer.  
Equipment mode: Spectrum analyzer  
Detector function: Peak mode  
SPAN: 60MHz  
RBW: 100KHz  
VBW: 100KHz  
Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum 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: 60MHz  
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	Spectrum Reading	Carrier - Outsideband Limit: >30dB	Pass/Fail
	(MHz)	(dBuV)	(dB)	
1	2411.52	112.23	---	---
Outside band	2397	73.8	38.43	Pass
11	2462.98	112.1	---	---
Outside band	2483.5	56.25	55.85	Pass

Radiated Test

Temp. (° C): 25

Test Engr: Jerry

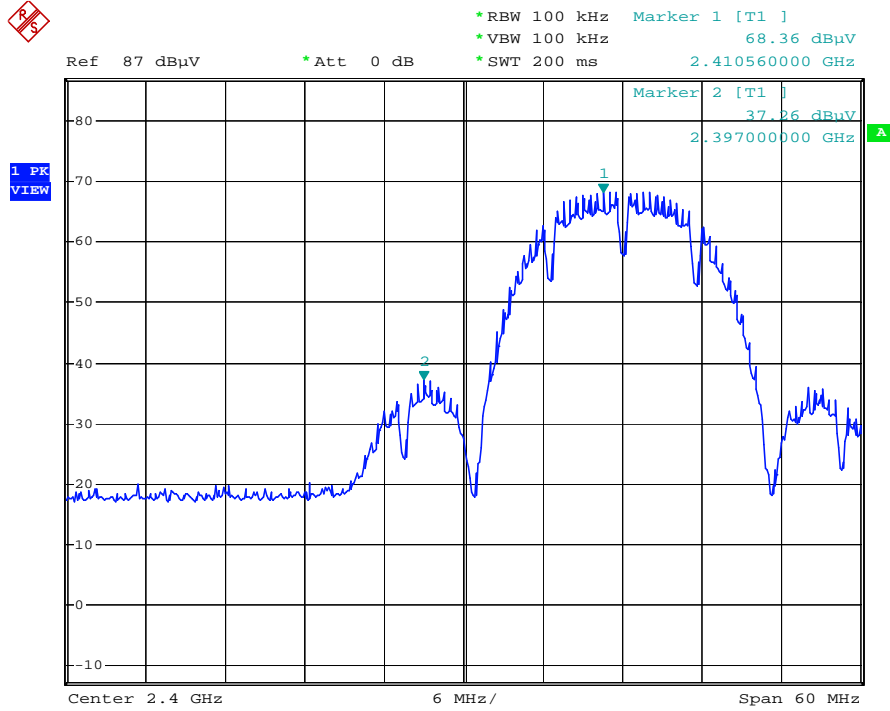
Humidity (%): 55

Channel	Frequency	Spectrum Reading	Carrier - Outsideband Limit: >30dB	Pass/Fail
	(MHz)	(dBuV)	(dB)	
1	2410.56	68.36	---	---
Outside band	2397	37.26	31.1	Pass
11	2462.5	67.88	---	---
Outside band	2483.5	18.45	49.43	Pass



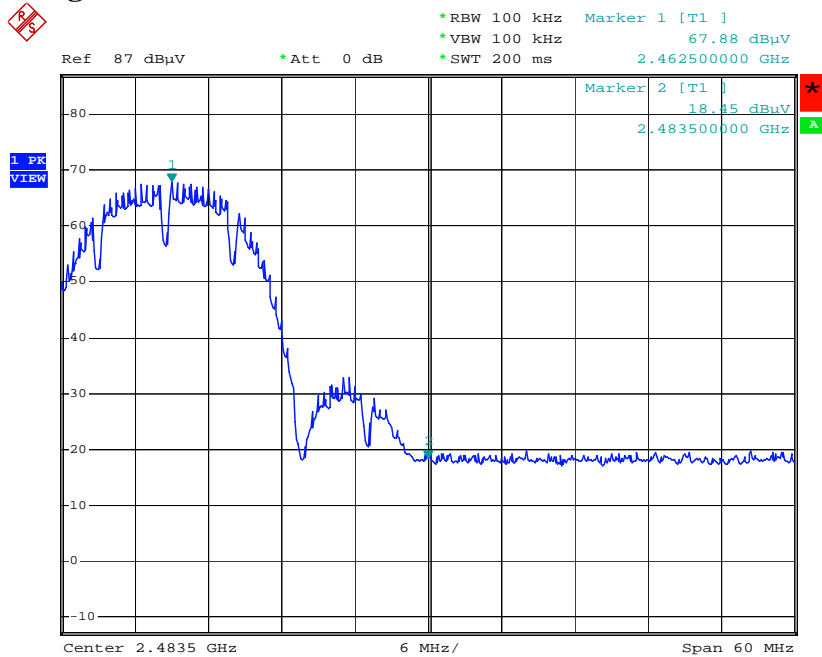


### Band Edge Radiated Measurement



Date: 19.AUG.2008 17:07:41

### Band Edge Radiated Measurement



Date: 19.AUG.2008 18:00:34

**4.5.4 802.11g Test Data:**

**Table: Band Edge measurement**

Conducted Test

Temp. (° C): 25

Test Engr: Jerry

Humidity (%): 55

Channel	Frequency	Spectrum Reading	Carrier - Outsideband Limit: >30dB	Pass/Fail
	(MHz)	(dBuV)	(dB)	
1	2417.04	107.47	---	---
Outside band	2400	75.99	31.48	Pass
11	2460.7	108.13	---	---
Outside band	2483.5	62.86	45.27	Pass

Radiated Test

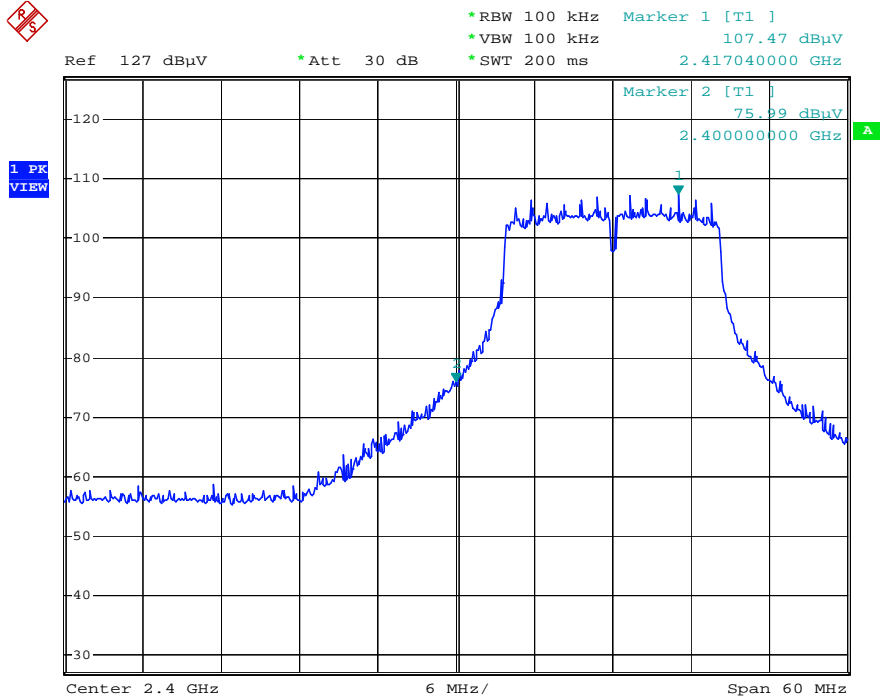
Temp. (° C): 25

Test Engr: Jerry

Humidity (%): 55

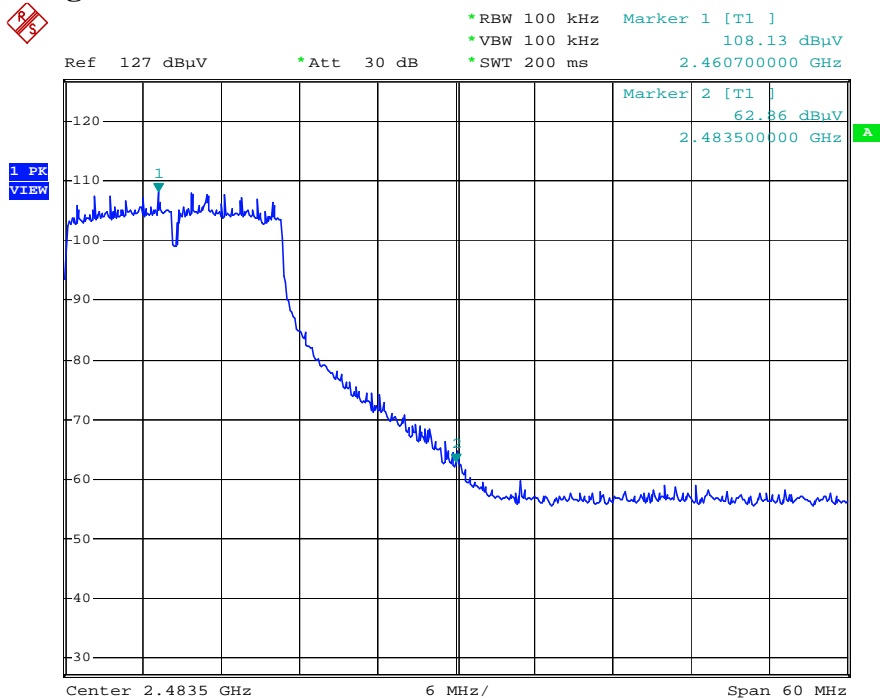
Channel	Frequency	Spectrum Reading	Carrier - Outsideband Limit: >30dB	Pass/Fail
	(MHz)	(dBuV)	(dB)	
1	2410.8	63.45	---	---
Outside band	2400	33.3	30.15	Pass
11	2464.54	64.02	---	---
Outside band	2483.5	21.85	42.17	Pass

### Band Edge Conducted Measurement



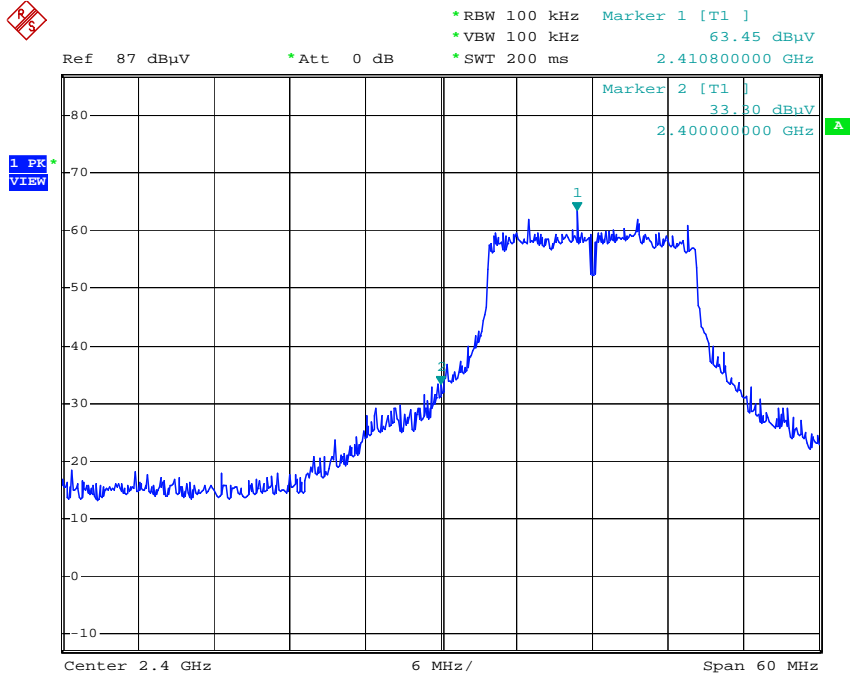
Date: 22.AUG.2008 18:12:40

### Band Edge Conducted Measurement



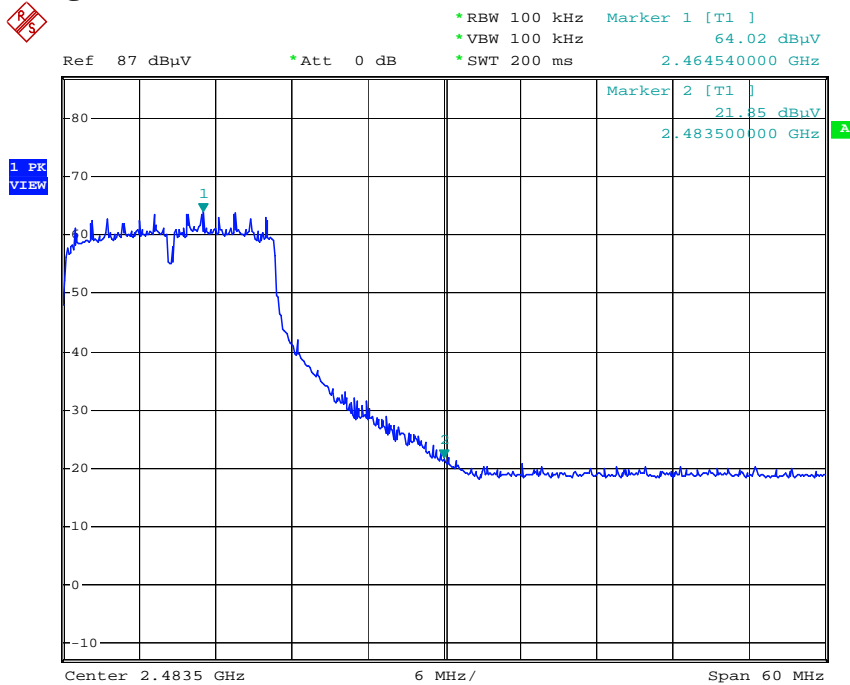
Date: 22.AUG.2008 18:14:25

**Band Edge Radiated Measurement**



Date: 19.AUG.2008 17:39:29

**Band Edge Radiated Measurement**



Date: 19.AUG.2008 17:56:27

## 4.6 Band Edge 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: 60MHz  
RBW: 1MHz  
VBW: 3MHz  
Center frequency: 2.39GHz, 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. For peak frequency emission level measurement in Restricted Band  
Change RBW: 1MHz  
VBW: 10Hz
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

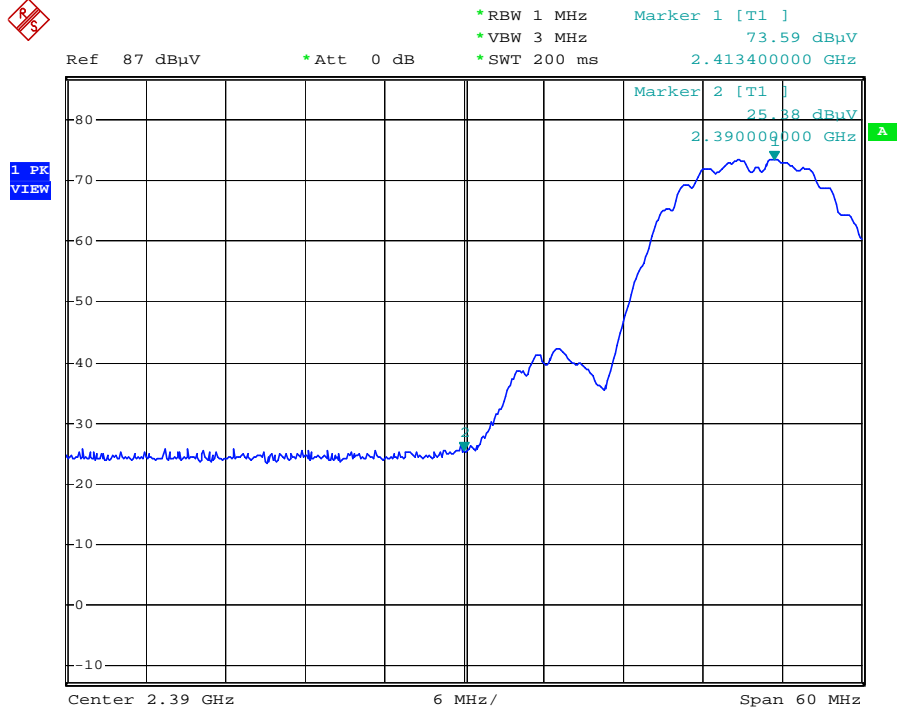
Humidity (%): 55

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)	2413.4	73.59	30.71	104.3	---	3MHz	---
Channel_1 (average mode)	2412.8	68.26	30.71	98.97	---	10Hz	---
Channel_11 (peak mode)	2463.34	72.48	30.76	103.24	---	3MHz	---
Channel_11 (average mode)	2464.78	67.42	30.76	98.18	---	10Hz	---
Channel_1 Restricted band (peak mode)	2390	25.38	30.69	56.07	74	3MHz	Pass
Restricted band (average mode)	2390	12.8	30.69	43.49	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2483.5	24.68	30.78	55.46	74	3MHz	Pass
Restricted band (average mode)	2483.5	12.24	30.78	43.02	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 polarizaion have been tested and the worst data is listed above.

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



Date: 19.AUG.2008 17:09:23

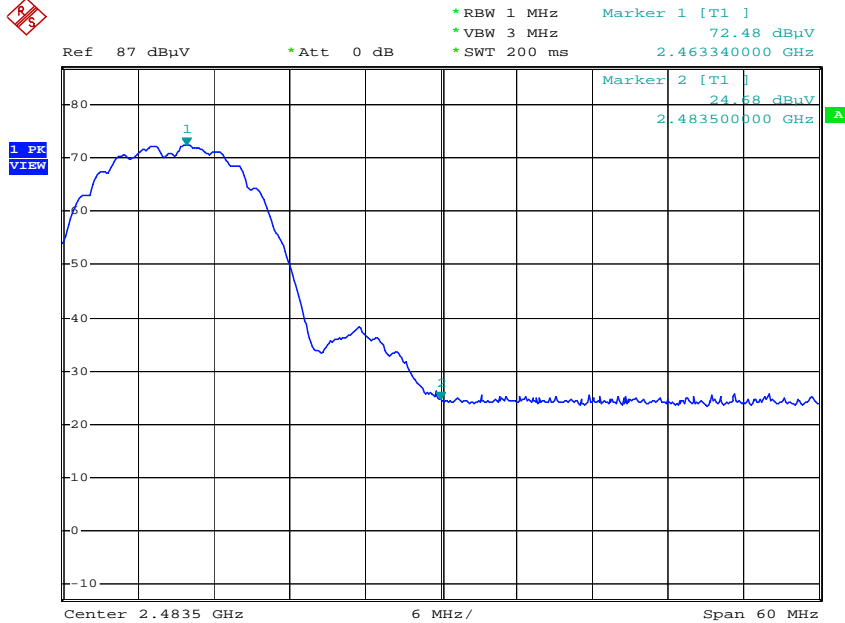
**Band Edge measurement for radiated emission in Restricted Band (Radiated)  
Average Mode (Lowest Channel)**



Date: 19.AUG.2008 17:10:45



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



Date: 19.AUG.2008 18:01:09

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



Date: 19.AUG.2008 18:02:10

**4.6.4 802.11g Test Data**

**Table Band Edge Measurement (Radiated)**

Temp. (° C): 25

Test Engr: Jerry

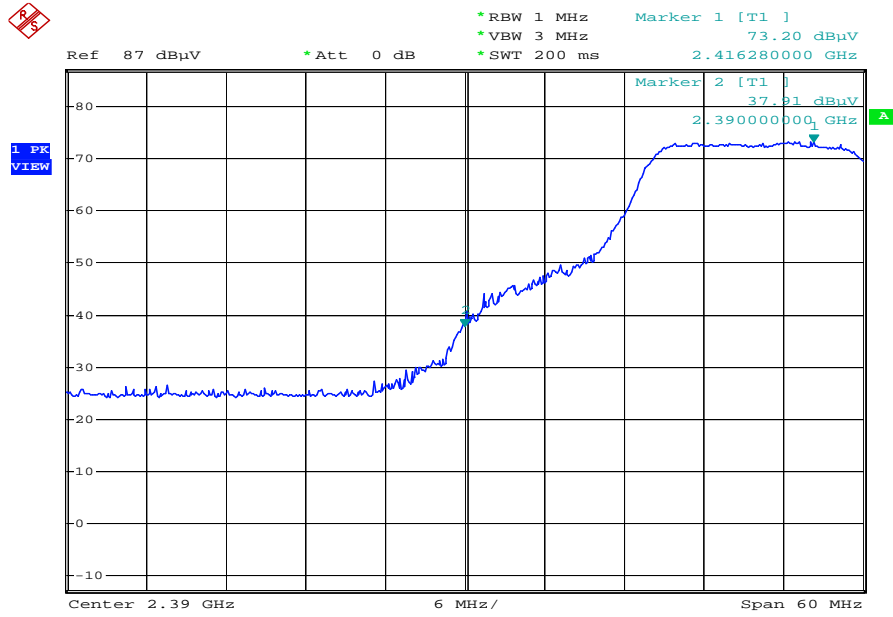
Humidity (%): 55

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)	2416.28	73.2	30.71	103.91	---	3MHz	---
Channel_1 (average mode)	2413.28	61.49	30.71	92.2	---	10Hz	---
Channel_11 (peak mode)	2463.82	73.61	30.76	104.37	---	3MHz	---
Channel_11 (average mode)	2464.06	61.46	30.76	92.22	---	10Hz	---
Channel_1 Restricted band (peak mode)	2390	37.91	30.69	68.6	74	3MHz	Pass
Restricted band (average mode)	2390	16.12	30.69	46.81	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2483.5	35.11	30.78	65.89	74	3MHz	Pass
Restricted band (average mode)	2483.5	15.47	30.78	46.25	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 polarizaion have been tested and the worst data is listed above.

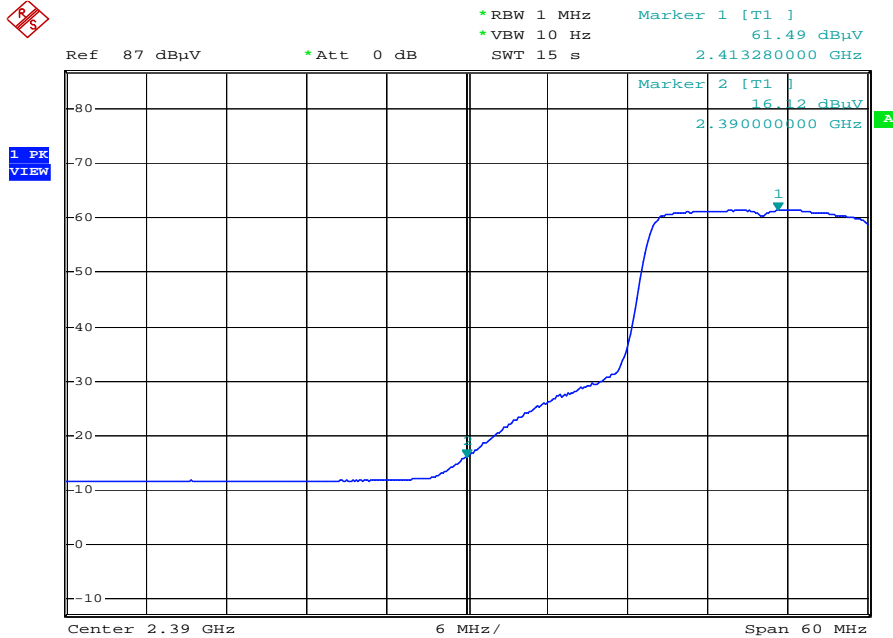
**Band Edge measurement for radiated emission in Restricted Band (Radiated)**



Date: 19.AUG.2008 17:49:32

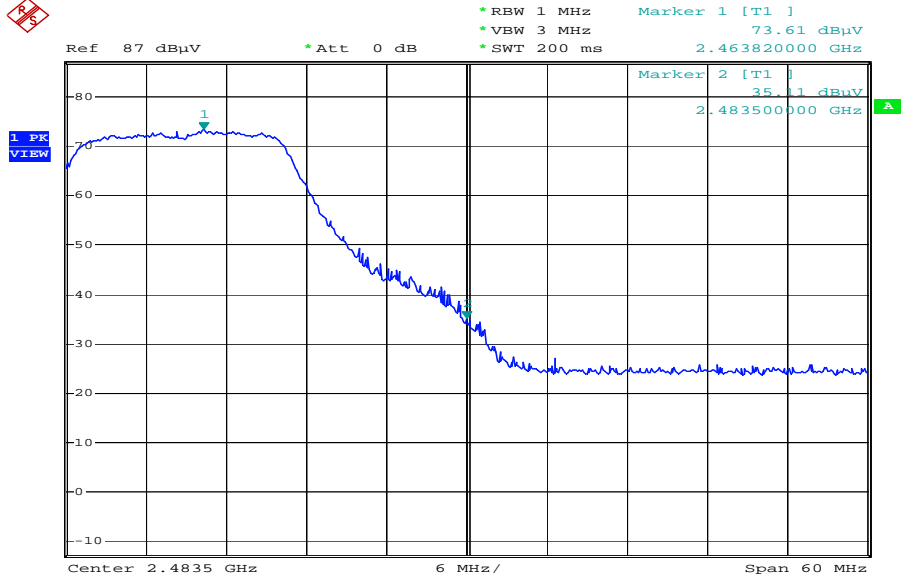
**Peak Mode (Lowest Channel)**

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



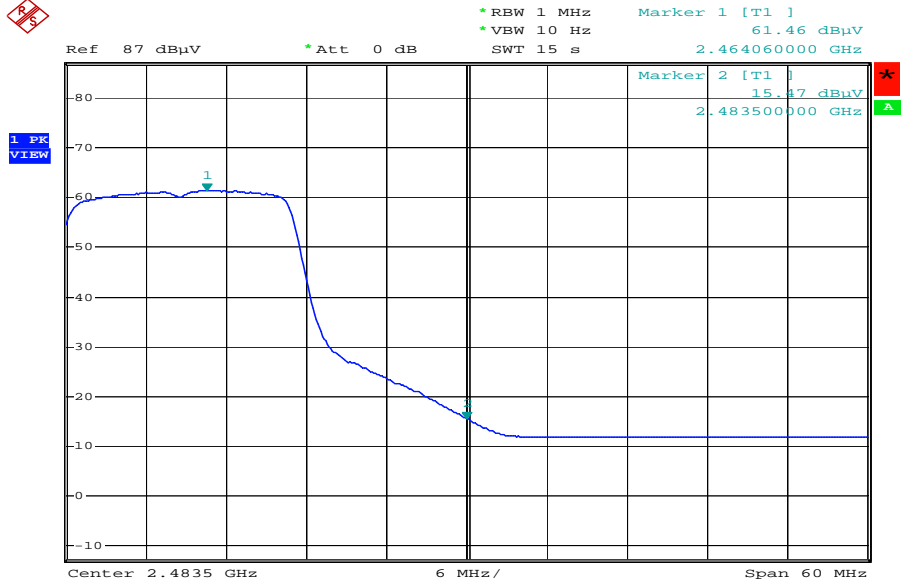
Date: 19.AUG.2008 17:51:09

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



Date: 19.AUG.2008 17:57:49

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



Date: 19.AUG.2008 17:58:50

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

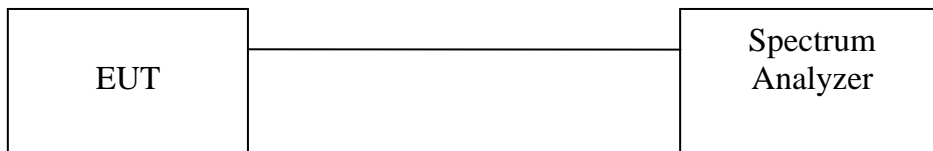
**See SAR report**

## 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

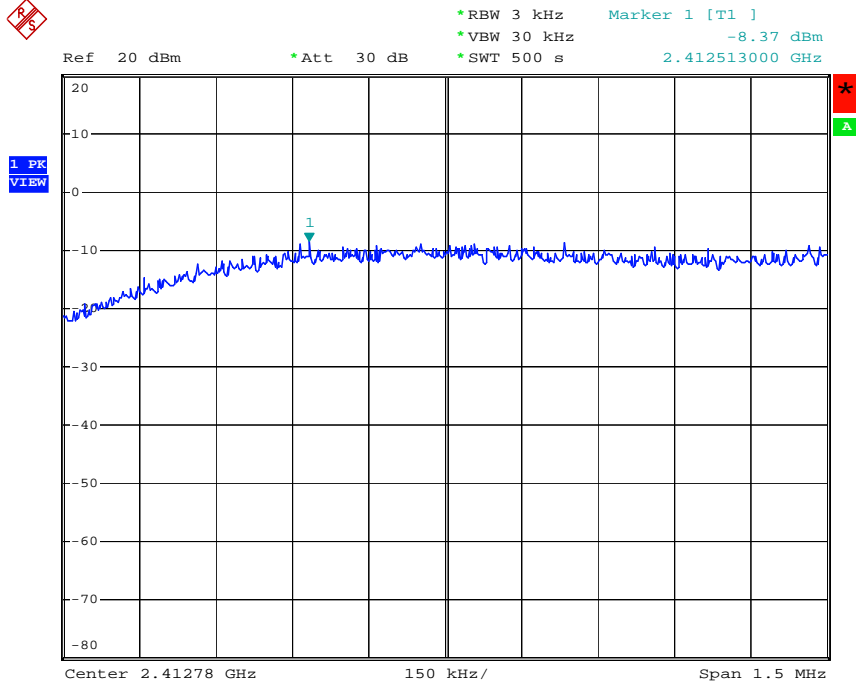
Temp. (° C): 25

Test Engr: Jerry

Humidity (%): 55

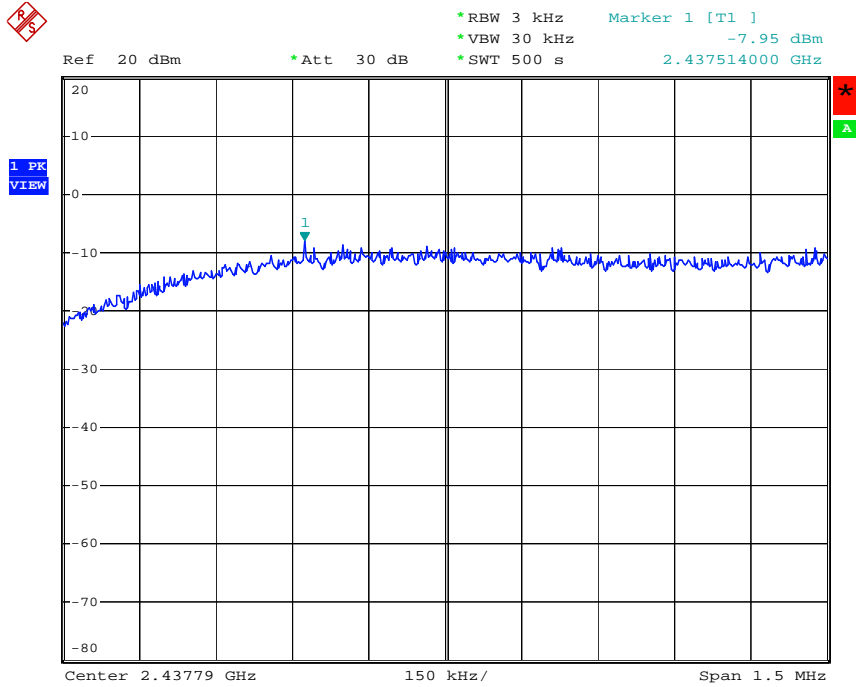
Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-8.37	1.1	-7.27	8	Pass
6	2437	-7.95	1.1	-6.85	8	Pass
11	2462	-7.36	1.1	-6.26	8	Pass

### 802.11b Lowest Channel



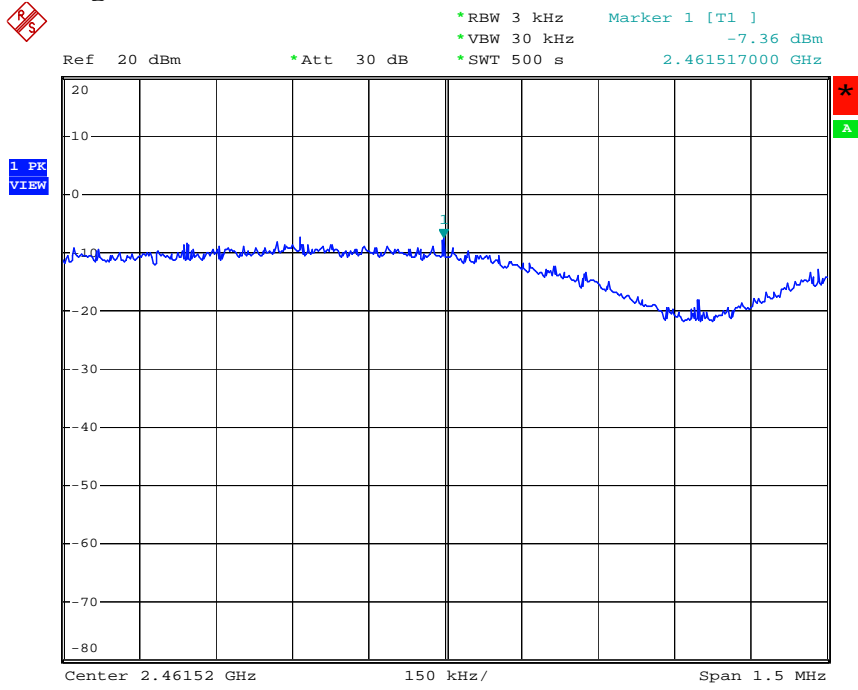
Date: 22.AUG.2008 17:14:57

### 802.11b Middle Channel



Date: 22.AUG.2008 17:18:31

### 802.11b Highest Channel



Date: 22.AUG.2008 17:23:12



### 4.8.4 802.11g Test Data

#### 802.11g Maximum Peak Output Power Density

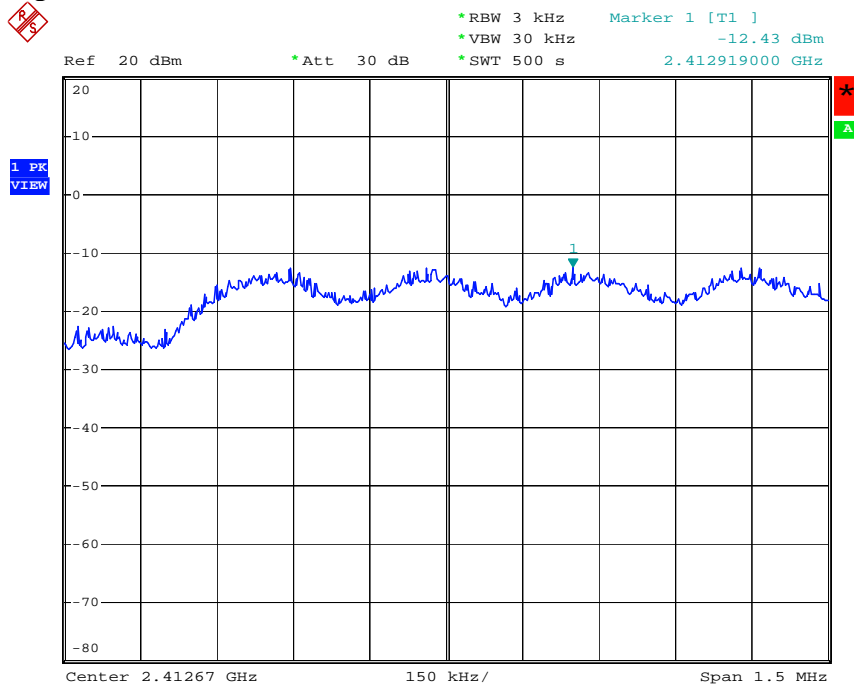
Temp. (° C): 25

Test Engr: Jerry

Humidity (%): 55

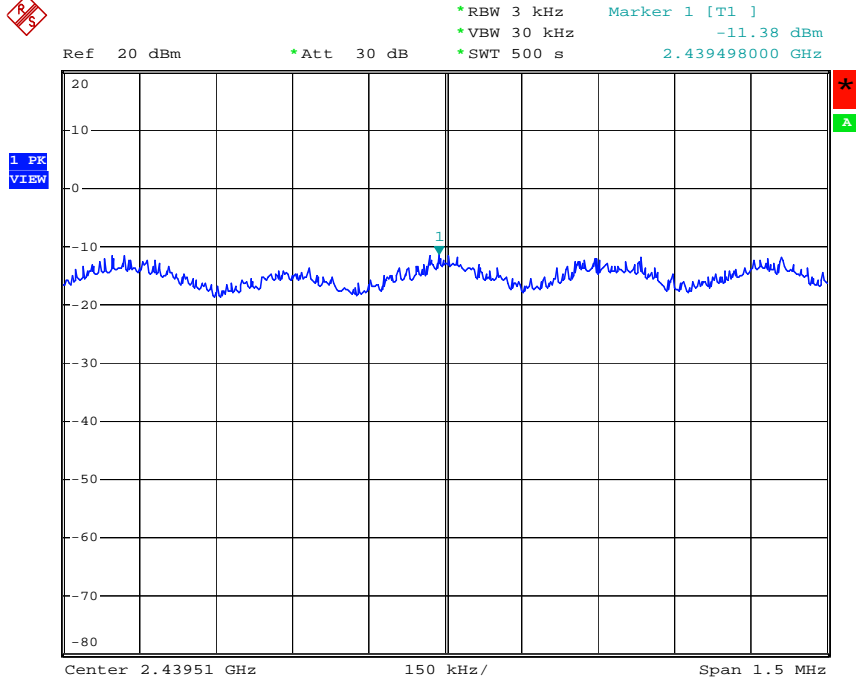
Channel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-12.43	1.1	-11.33	8	Pass
6	2437	-11.38	1.1	-10.28	8	Pass
11	2462	-12.14	1.1	-11.04	8	Pass

#### 802.11g Lowest Channel



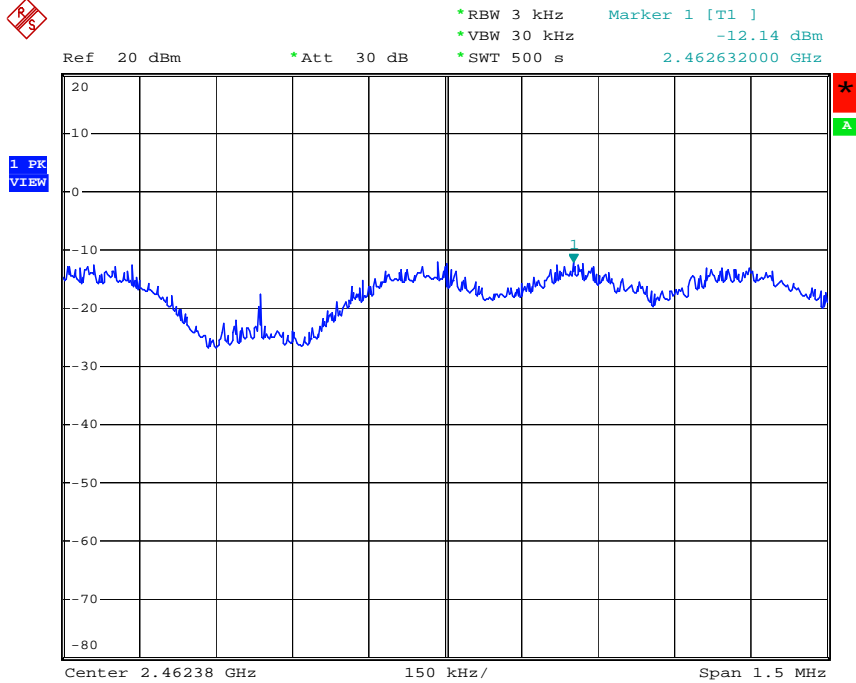
Date: 22.AUG.2008 17:33:56

### 802.11g Middle Channel



Date: 22.AUG.2008 17:36:09

### 802.11g Highest Channel



Date: 22.AUG.2008 17:37:50

## 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°. 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 readings 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 03	Coaxial Cable 1F-C2-02	JYE	RG400	1F-C2-02	02/26/2008	02/25/2009
Conduction 03	EMI Receiver 11	ROHDE & SCHWARZ	ESCI	100567	06/03/2008	06/03/2009
Conduction 03	ISNT2-02	FCC	FCC-TLISN-T 2-02	20413	05/05/2008	05/05/2009
Conduction 03	ISNT4-02	FCC	FCC-TLISN-T 4-02	20575	04/23/2008	04/23/2009
Conduction 03	IISNT8-02	FCC	FCC-TLISN-T 8-02	20476	05/05/2008	05/05/2009
Conduction 03	LISN 07	FCC Inc.	FCC-LISN-50-100-4-02	07040	05/08/2008	05/08/2009
Conduction 03	LISN 08	FCC Inc.	FCC-LISN-50-25-2-01	07039	06/02/2008	06/02/2009

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber12)	BILOG Antenna 11	ROHDE & SCHWARZ	HL562	100356	05/15/2008	05/15/2009
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-01	HARBOUR	CFD400-NL	Chmb 12-10M-01	07/11/2008	07/11/2009
Radiation (Chamber12)	EMI Receiver 10	ROHDE & SCHWARZ	ESCI	100568	05/24/2008	05/24/2009
Rad. Above 1GHz	Spectrum Analyzer 19	R&S	FPS40	100116	09/12/2007	09/12/2008
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	Microwave Cable RF SK-01	HUBER+SUHN ERAG.	Sucoflex 102	22139 /2	06/01/2008	06/01/2009
Radiation	Preamplifier 09	MITEQ	AFS44-00102 650-40-10P-44	858687	04/02/2008	04/02/2009
Radiation	High Pass Filter 01	HEWLETT-PAC KARD	84300-80038	001	N/A	N/A

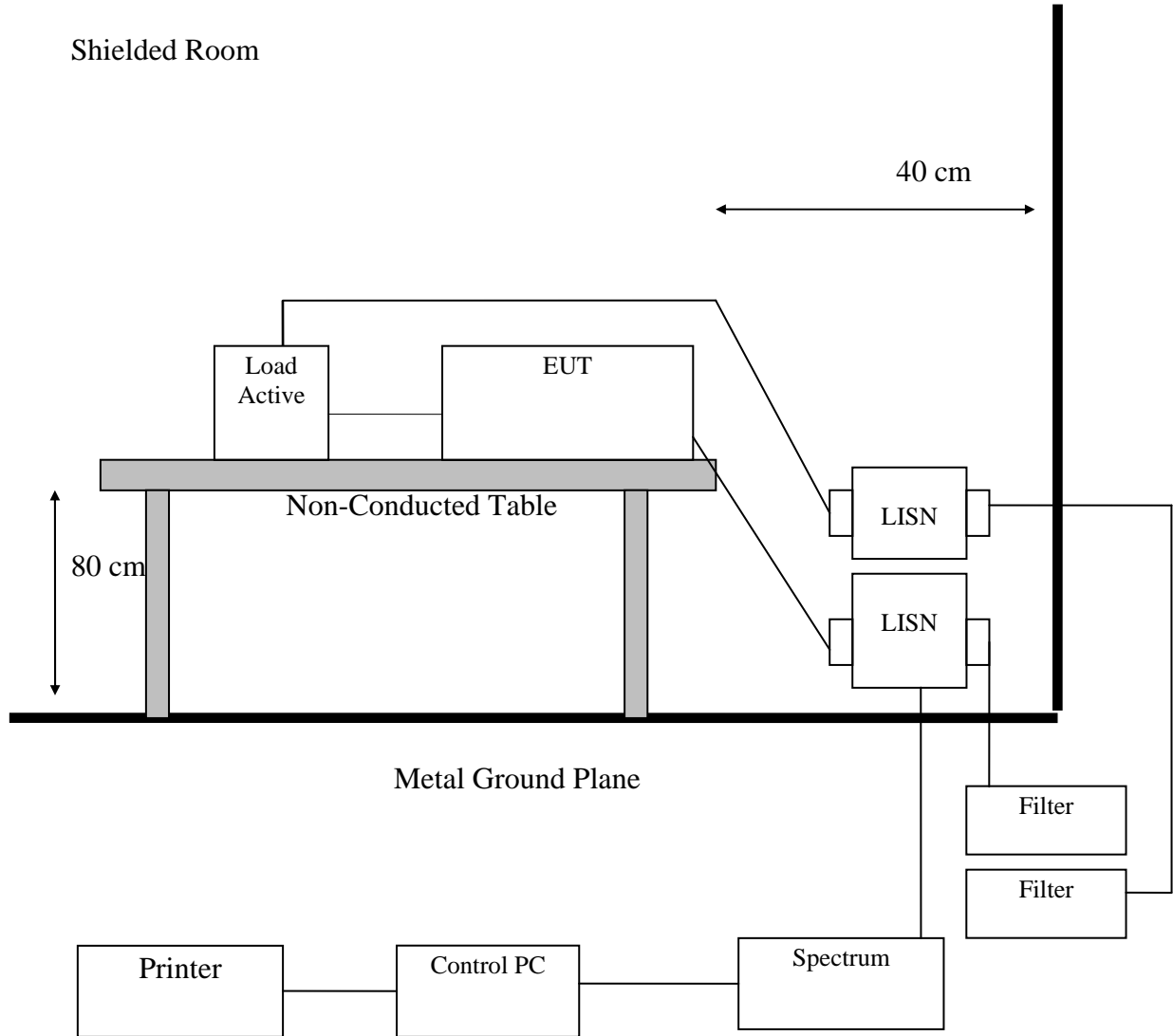
Note: Calibration is traceable to NIST or national or international standards.

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

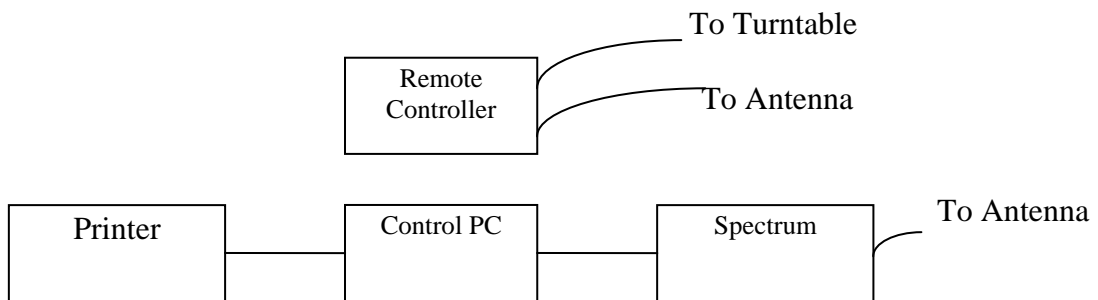
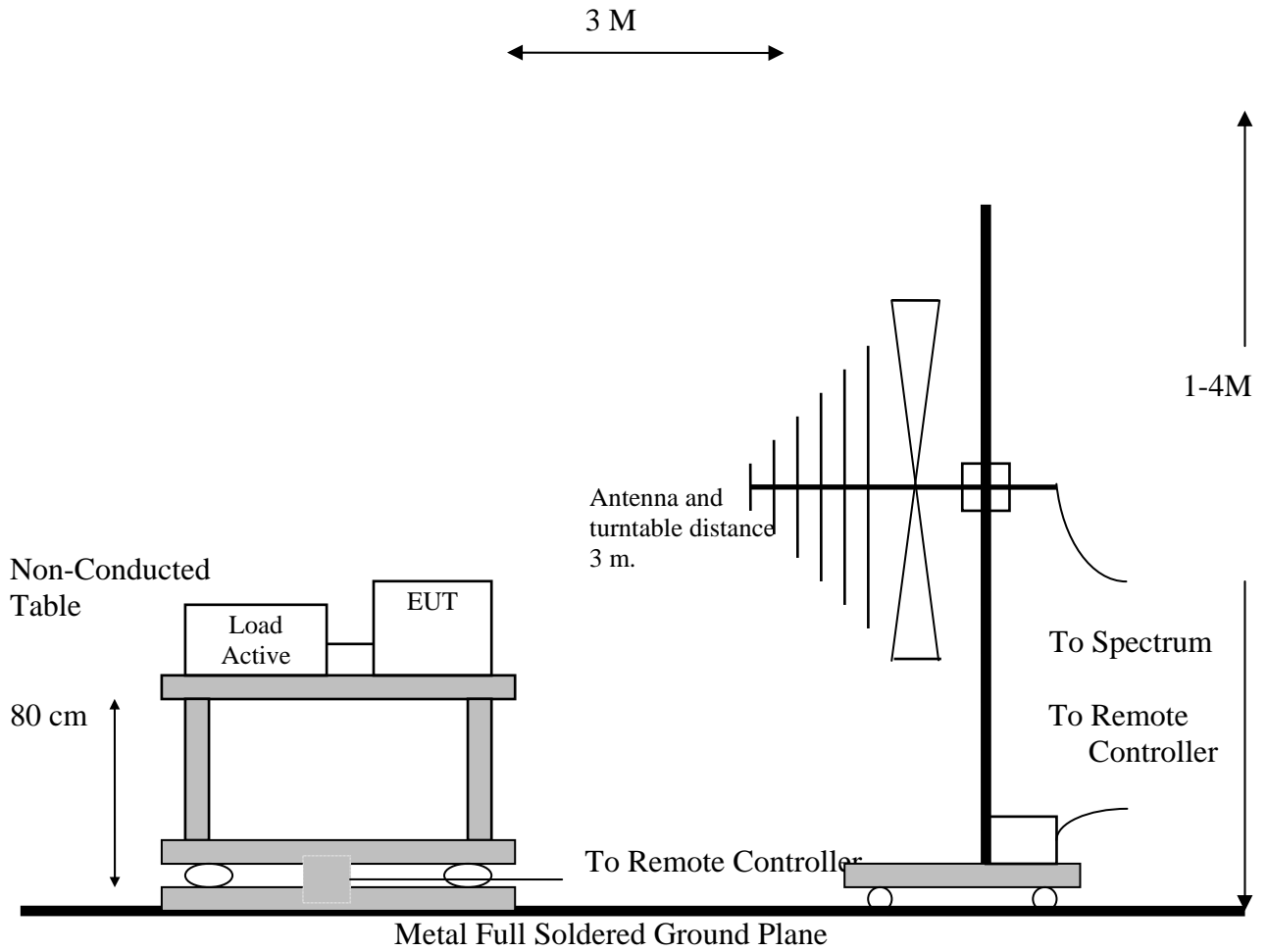
Radiation/Conduction	Filename	Version	Issued Date
Lung_Tan Conduction	EZ EMC	1.1.4.2	2/10/2007
Lung_Tan Radiation	EZ EMC	1.1.4.2	1/24/2007

## 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>:  $\pm 0.88$ dB

<Chamber 12 (3M)>

30MHz~1GHz:  $\pm 3.306$  dB

1GHz~18GHz:  $\pm 2.62$  dB

18GHz~26GHz:  $\pm 3.609$  dB

26GHz~40GHz:  $\pm 2.702$  dB



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

Please refer to the attached file.

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

Please refer to the attached file.