

Test Report
for
FCC Part 15 Subpart B & C
Class II Permissive Change

of

Product Name

AR5BXB63-L 802.11 b/g PCI Express Module

Model

AR5BXB63-L

Applied by:

Atheros Communications, Inc.
529 Almanor
Sunnyvale, CA 94085
USA

Test Performed by:

International Standards Laboratory

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Report Number: ISL-07LR014FC

Issue Date: 04/20/2007

HC LAB: NVLAP:200234-0; VCCI: R-341, C-354; NEMKO: ELA 113A; BSMI: SL2-IN-E-0037; SL2-R1-E-0037; TAF: 1178; IC: IC4067

LT LAB: NVLAP:200234-0; VCCI: R-1435, C-1440; NEMKO: ELA 113B; BSMI: SL2-IN-E-0013; TAF: 0997; IC: IC4164-1

ISL-T10-R2-3

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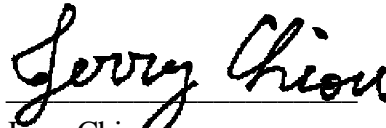
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1. General

1.1 Certification of Accuracy of Test Data

Standards:	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.247)
Test Procedure:	ANSI C63.4:2003
Equipment Tested:	AR5BXB63-L 802.11 b/g PCI Express Module
Model:	AR5BXB63-L
Applied by:	Atheros Communications, Inc.
Sample received Date:	2007/03/08
Final test Date :	2007/03/16, 2007/04/19-2007/04/20
Test Result	PASS
Test Site:	Chamber 02, Conduction 02
Temperature	Refer to each site test data
Humidity:	Refer to each site test data
Test Engineer:	


Jerry Chiou

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



Eddy Hsiung/Director

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 65 contains 62 pages, including 1 cover page, 2 contents page, and 59 pages for the test description. This report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.

This test data shown below is traceable to NIST or national or international standard. International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

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	

3. Description of Equipment Under Test (EUT)

Description: AR5BXB63-L 802.11 b/g PCI Express Module
 Model No.: AR5BXB63-L
 FCC ID: PPD-AR5BXB63-L
 Brand: Atheros
 Frequency Range 802.11b/g: 2400~2483.5 MHz
 Support channel:
 802.11b/g 11 Channels
 802.11g Turbo mode 1 Channel
 Modulation Skill:
 802.11b DBPSK(1Mbps), DQPSK(2Mbps),
 CCK(5.5/11Mbps)
 802.11g OFDM (6M - 54Mbps)

Antennas Type:
 Main antenna 1: PIFA (P/N: 25.90354.001)
 made by Wistron NeWeb Corp.
 Main antenna 2: PIFA (P/N: 25.90424.001)
 made by Wistron NeWeb Corp.
 Aux antenna: PIFA (P/N: 25.90355.001)
 made by Wistron NeWeb Corp.
 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.
 Antenna peak Gain:
 Main antenna 1: 0.9 dBi (11b,11g)
 Main antenna 2: -0.9 dBi (11b,11g)
 AUX antenna : 1.52 dBi (11b,11g)

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		

Configurations:

	PIFA Antenna	WWAN	Bluetooth
Configuration 1	Main antenna 1 Aux antenna	with WWAN(WLAN and WWAN can not transmit at the same time)	with Bluetooth
Configuration 2	Main antenna 2 Aux antenna	without WWAN	with Bluetooth

All of configurations have been tested. The worse data of each antenna are shown.

Configuration list as below:

	PIFA Antenna	WWAN	Bluetooth
Configuration 1	Main antenna 1 Aux antenna	with WWAN(WLAN and WWAN can not transmit at the same time)	with Bluetooth

The Conducted Power output of EUT

802.11b (dBm)							
Freq. (MHz)	Bit rate 1 mbps	Bit rate 2 mbps	Bit rate 5.5	Bit rate 11			
2412	23.76	23.7	23.7	23.63			
2437	23.58	23.45	23.32	23.32			
2462	23.70	23.51	23.42	23.56			
802.11g (dBm)							
Freq. (MHz)	Bit rate 6 mbps	Bit rate 9 mbps	Bit rate 12	Bit rate 18	Bit rate 24 mbps	Bit rate 36 mbps	Bit rate 54
2412	23.76	23.58	23.42	23.7	23.32	23.6	23.6
2437	26.77	26.3	26.4	26.3	26.2	26.3	26.5
2462	23.83	23.45	23.38	23.57	23.38	23.57	23.28

4. TEST RESULTS (802.11b)

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.

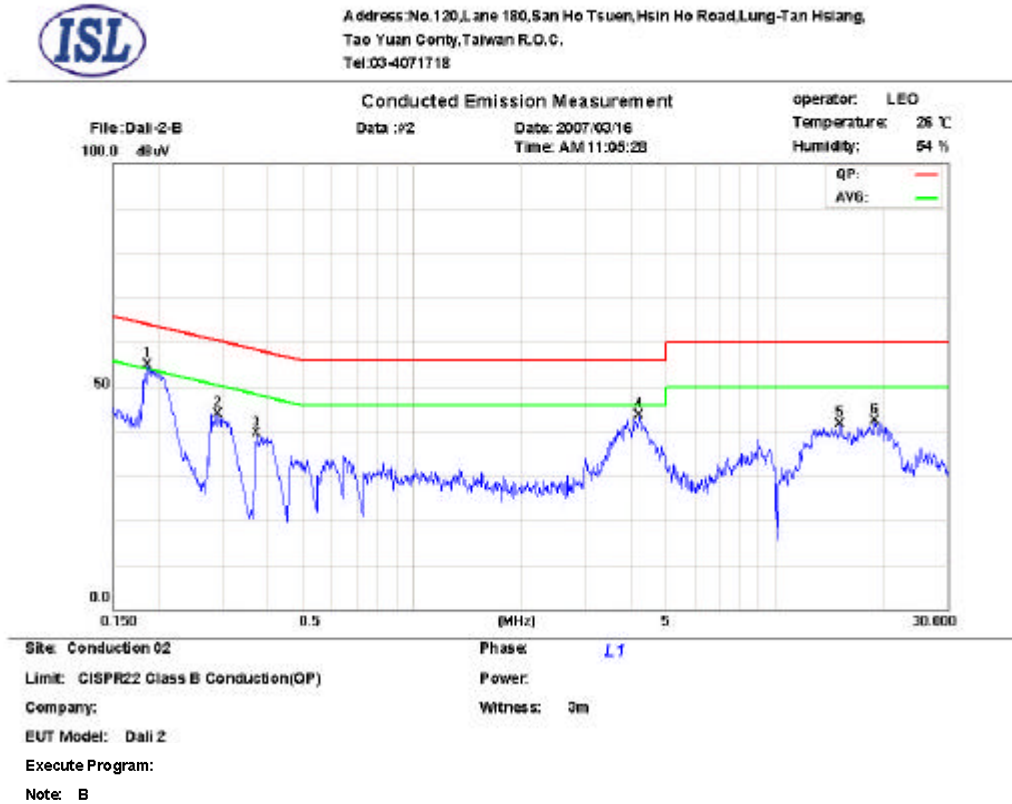
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

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 Test Data:

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



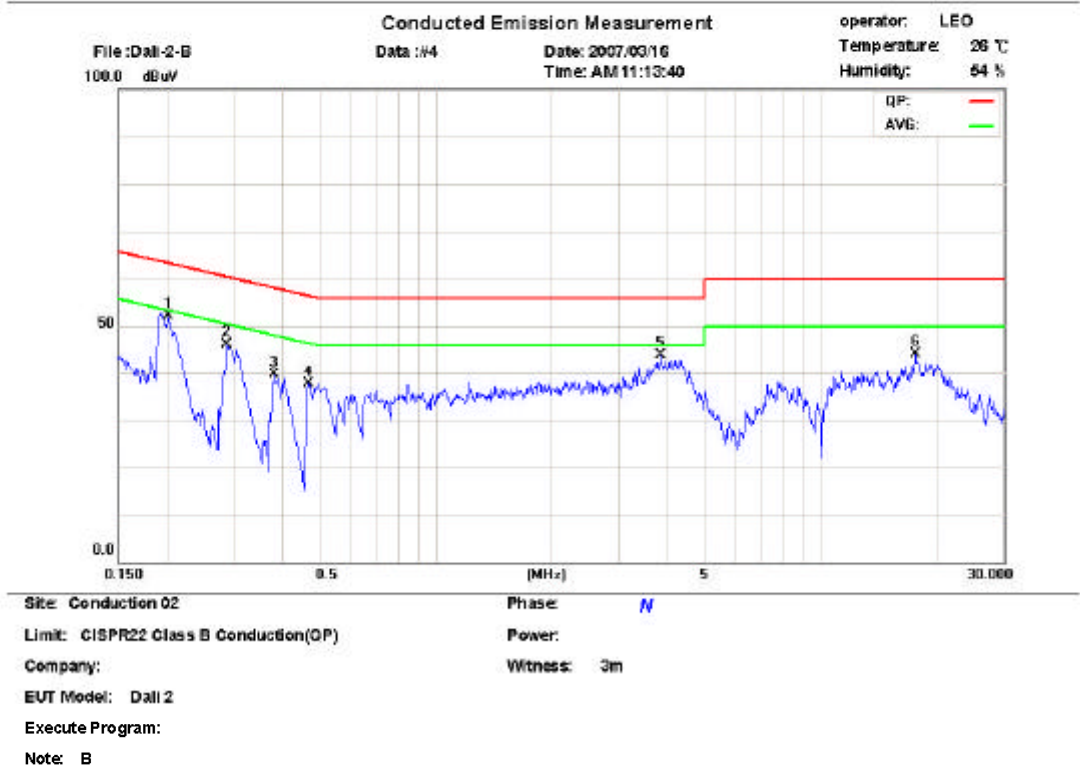
Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct dBuV	QP Limit dBuV	QP Margin dB	AVG Correct dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.1864	0.1	0.04	47.90	64.1	-16.2	35.50	54.1	-18.6	
0.2893	0.14	0.09	37.90	60.5	-22.6	26.00	50.5	-24.5	
0.3711	0.19	0.09	31.40	58.4	-27.0	29.95	48.4	-18.5	
* 4.2241	0.4	0.14	41.92	56.0	-14.0	40.11	46.0	-5.89	
15.1456	0.9	0.3	41.29	60.0	-18.7	38.48	50.0	-11.5	
18.9205	0.9	0.33	41.21	60.0	-18.7	37.50	50.0	-12.5	

*:Maximum data x:Over limit

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



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
* 0.2014	0.1	0.05	49.20	63.5	-14.3	38.50	53.5	-15.0	
0.2883	0.14	0.09	42.00	60.5	-18.5	29.50	50.5	-21.0	
0.3811	0.19	0.09	34.70	58.2	-23.5	20.90	48.2	-27.3	
0.4686	0.2	0.07	34.30	56.5	-22.2	16.00	46.5	-30.5	
3.8329	0.2	0.14	37.70	56.0	-18.3	22.30	46.0	-23.7	
17.6600	0.45	0.32	35.60	60.0	-24.4	30.10	50.0	-19.9	

*: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

International Standards Laboratory

Report Number: 07LR014FC

HC LAB: NVLAP:200234-0; VCCI: R-341, C-354; NEMKO: ELA 113A; BSMI: SL2-IN-E-0037; SL2-R1-E-0037; TAF: 1178; IC: IC4067

LT LAB: NVLAP:200234-0; VCCI: R-1435, C-1440; NEMKO: ELA 113B; BSMI: SL2-IN-E-0013; TAF: 0997; IC: IC4164-1

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 Test Data:

6dB Bandwidth

Temp. (? C): 25

Test Engr: Jerry Chiou Humidity (%): 50

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	12.08	0.5	Pass
6	2437	12.08	0.5	Pass
11	2462	12.08	0.5	Pass

Channel 1:



Channel 6:



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 Test Data

Maximum Peak Output Power

Temp. (? C): 25

Test Engr: Jerry Chiou

Humidity (%): 50

Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	22.66	1.1	237.68	23.76	30	Pass
6	2437	22.48	1.1	228.03	23.58	30	Pass
11	2462	22.6	1.1	234.42	23.7	30	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

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.

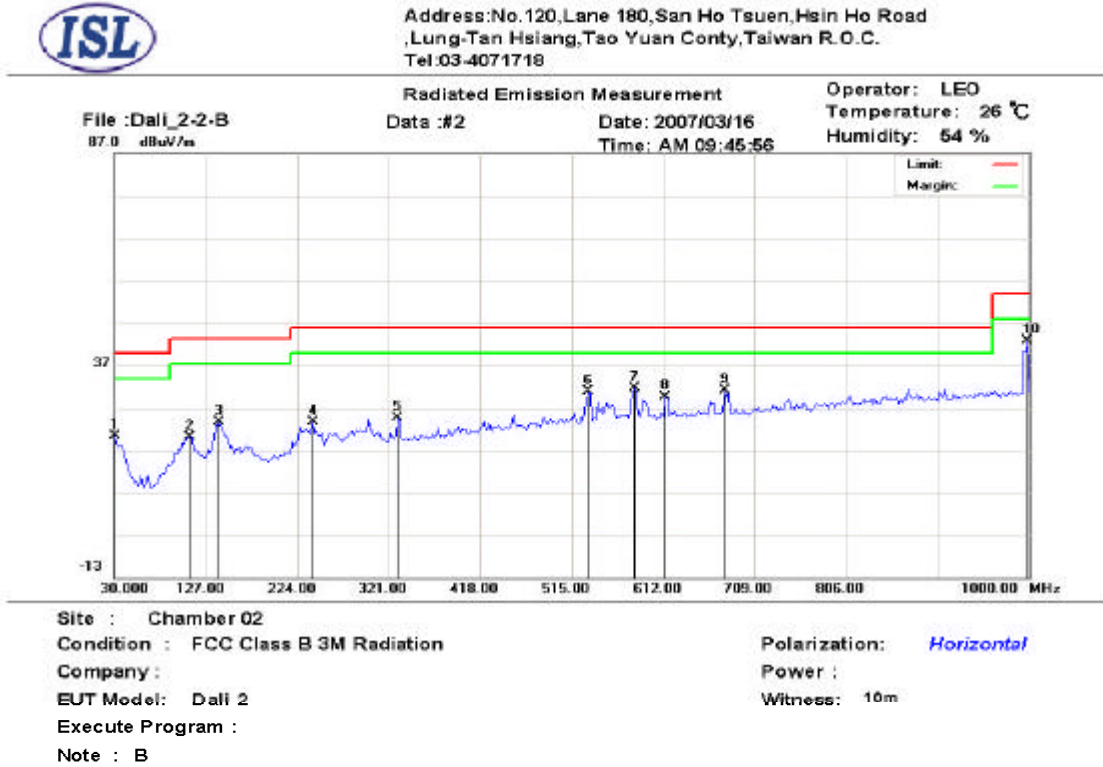
1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was 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 2nd to 10th 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)	1MHz
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

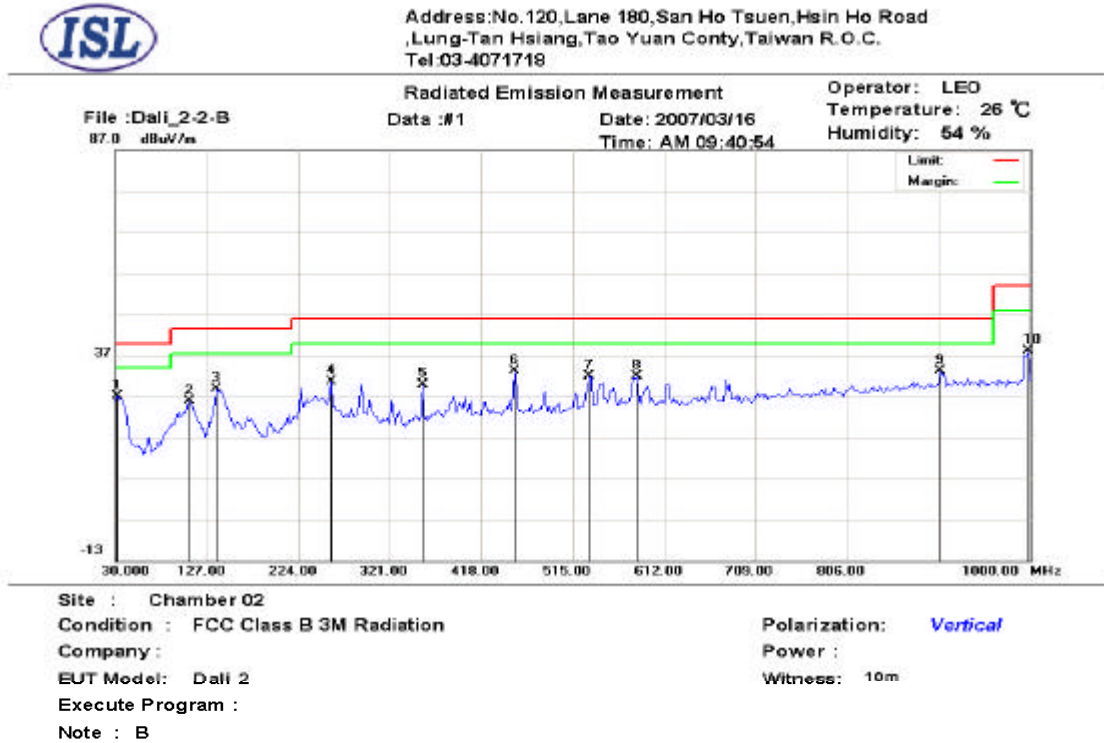
4.4.4 Test Data (30MHz – 1GHz):



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	0.84	18.8	0.84	0	20.48	40.00	-19.52			peak
	109.5400	6.14	12.32	1.66	0	20.12	43.50	-23.38			peak
	140.5800	10.55	11.14	1.89	0	23.58	43.50	-19.92			peak
	239.5200	9.62	11.44	2.48	0	23.54	46.00	-22.46			peak
	330.7000	7.40	13.94	3.21	0	24.55	46.00	-21.45			peak
	532.4600	8.16	18.44	4.25	0	30.95	46.00	-15.15			peak
	580.9600	8.26	18.81	4.54	0	31.61	46.00	-14.39			peak
	613.9400	6.07	18.78	4.67	0	29.52	46.00	-16.48			peak
	677.9600	7.21	18.94	4.99	0	31.14	46.00	-14.86			peak
*	998.0600	15.09	21.28	6.47	0	42.84	54.00	-11.16			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
	31.9400	8.60	17.52	0.89	0	27.01	40.00	-12.99			peak
	107.6000	12.27	11.97	1.66	0	25.90	43.50	-17.60			peak
	136.7000	15.55	11.4	1.87	0	28.82	43.50	-14.68			peak
	258.9200	13.95	14.01	2.63	0	30.59	46.00	-15.41			peak
	355.9200	11.97	14.57	3.34	0	29.88	46.00	-16.12			peak
	452.9200	12.41	16.74	3.87	0	33.02	46.00	-12.98			peak
	532.4600	9.09	18.44	4.25	0	31.78	46.00	-14.22			peak
	582.9000	8.47	18.8	4.55	0	31.82	46.00	-14.18			peak
*	904.9400	6.56	20.54	5.95	0	33.05	46.00	-12.95			peak
	998.0600	10.41	21.28	6.47	0	38.16	54.00	-15.84			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

4.4.5 Test Data (1GHz – 25 GHz) .

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

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 52
Temperature (C): 22

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
4818.18	31.13pk	34.11	5.14	27.49	42.89pk	54.00av	-11.11	100	18
7874.63	30.30pk	39.87	3.86	26.64	47.39pk	54.00av	-6.61	100	237
9772.23	29.63pk	38.61	4.03	24.75	47.51pk	54.00av	-6.49	101	5
12032	32.37pk	41.86	4.73	28.48	50.47pk	54.00av	-3.53	100	93

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

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 52
Temperature (C): 22

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
4818.18	35.38pk	34.11	5.14	27.49	47.13pk	54.00av	-6.87	100	18
7222.78	30.20pk	38.09	3.85	26.6	45.54pk	54.00av	-8.46	101	142
9641.86	31.93pk	38.84	3.94	24.84	49.87pk	54.00av	-4.13	102	7
14566.9	29.50pk	45.03	4.57	28.46	50.64pk	54.00av	-3.36	101	22

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.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “pk”: peak mode
- “av”: 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

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 52
Temperature (C): 22

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
2483.52	41.80pk	30.9	1.45	24.79	49.36pk	54.00av	-4.64	101	195
4861.64	31.73pk	34.27	5.13	27.43	43.70pk	54.00av	-10.3	100	14
8483.02	29.83pk	41.07	3.81	26.41	48.29pk	54.00av	-5.71	101	141
9192.81	29.19pk	40.08	3.69	25.44	47.52pk	54.00av	-6.48	103	16
11858.1	32.00pk	41.99	4.76	28.53	50.22pk	54.00av	-3.78	100	106
14653.8	29.38pk	45.06	4.62	28.38	50.68pk	54.00av	-3.32	101	18

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

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 52
Temperature (C): 22

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
1664.34	44.88pk	28.18	2.35	23.75	51.66pk	54.00av	-2.34	101	66
4861.64	37.20pk	34.27	5.13	27.43	49.18pk	54.00av	-4.82	100	14
7932.57	30.24pk	39.98	3.84	26.66	47.40pk	54.00av	-6.6	100	245
9728.77	33.32pk	38.69	4	24.78	51.22pk	54.00av	-2.78	102	5
11930.6	31.85pk	41.94	4.77	28.53	50.03pk	54.00av	-3.97	100	95
14668.3	29.70pk	45.07	4.63	28.37	51.03pk	54.00av	-2.97	101	17

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.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “pk”: peak mode
- “av”: 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

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 52
Temperature (C): 22

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
1661.84	45.83pk	28.16	2.35	23.75	52.59pk	54.00av	-1.41	101	66
2286.21	40.36pk	30.94	1.73	24.37	48.66pk	54.00av	-5.34	101	133
4919.58	30.12pk	34.49	5.13	27.35	42.39pk	54.00av	-11.61	100	8
8569.93	29.16pk	41.04	3.78	26.31	47.67pk	54.00av	-6.33	102	121
11742.3	31.20pk	42.05	4.75	28.54	49.47pk	54.00av	-4.53	101	123
12727.3	31.86pk	40.7	4.41	27.61	49.36pk	54.00av	-4.64	101	276
14595.9	28.87pk	45.04	4.59	28.43	50.06pk	54.00av	-3.94	101	21

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

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 52
Temperature (C): 22

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
1661.84	47.66pk	28.16	2.35	23.75	54.42pk	74.00pk	-19.58	101	66
1672.45	30.23av	28.16	2.35	23.75	36.99av	54.00av	-17.01	101	66
1996.5	38.63pk	30.97	2.6	23.75	48.44pk	54.00av	-5.56	100	43
4919.58	36.27pk	34.49	5.13	27.35	48.54pk	54.00av	-5.46	100	8
8483.02	29.19pk	41.07	3.81	26.41	47.65pk	54.00av	-6.35	101	141
9076.92	28.95pk	40.45	3.64	25.63	47.41pk	54.00av	-6.59	103	18
12872.1	31.27pk	40.38	4.62	27.43	48.85pk	54.00av	-5.15	101	314
14262.7	29.84pk	43.72	5.03	28.28	50.32pk	54.00av	-3.68	102	38
4861.64	36.99pk	34.27	5.13	27.43	48.97pk	54.00av	-5.03	100	14

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.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “pk”: peak mode
- “av”: 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

4.5.2 Test Setup (Conducted)



4.5.3 Test Data:

Table: Band Edge measurement (Conducted)

Temp. (?C): 25
 Humidity (%): 50
 Test Engr: Jerry Chiou

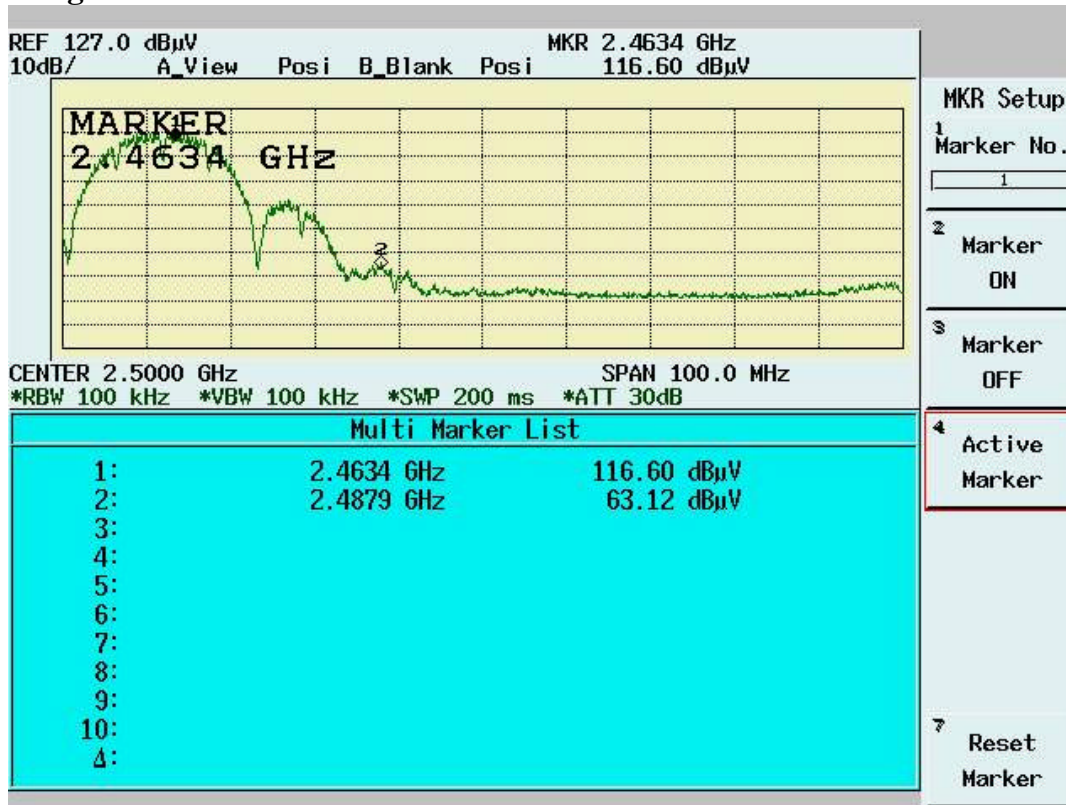
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
1	2410.9	118.01	---	---
Outside band	2396.9	92.44	25.57	Pass
11	2463.4	116.6	---	---
Outside band	2487.9	63.12	53.48	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

Band Edge Conducted measurement



Band Edge Conducted Measurement



4.5.4 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: 2.395GHz, 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.

4.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

4.5.6 Test Data

Table Band Edge measurement (Radiated)

Temp. (? C): 25

Test Engr: Jerry Chiou

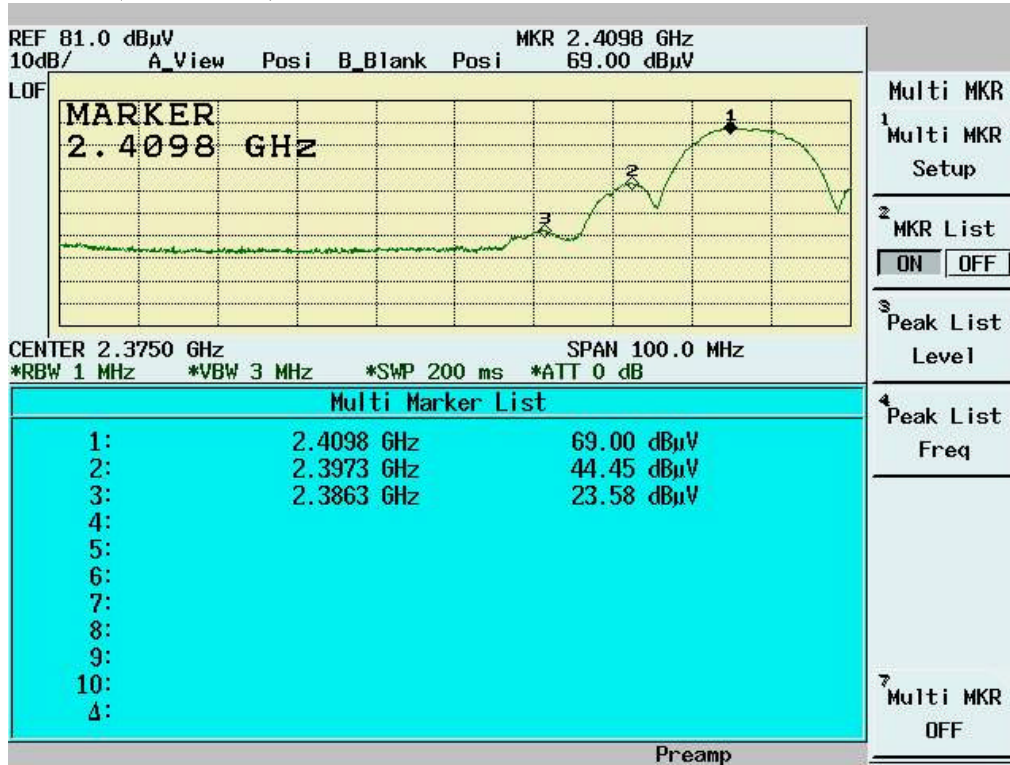
Humidity (%): 50

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc (Limit: > 20dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_1 (average mode)	2413.8	64.84	35.48	100.32	---	---	10Hz	---
Channel_1 (peak mode)	2409.8	69	35.48	104.48	---	---	3MHz	---
Outside band (peak mode)	2397.3	44.45	35.48	79.93	24.55	---	3MHz	Pass
Channel_11 (average mode)	2460.7	62.62	35.5	98.12	---	---	10Hz	---
Channel_11 (peak mode)	2459.8	68	35.5	103.5	---	---	3MHz	---
Outside band (peak mode)	2483.9	17.27	35.51	52.78	50.72	---	3MHz	Pass
Channel_1 Restricted band (peak mode)	2386.3	23.58	35.47	59.05	---	74	3MHz	Pass
Restricted band (average mode)	2386.3	18.19	35.47	53.66	---	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2483.9	17.27	35.51	52.78	---	74	3MHz	Pass
Restricted band (average mode)	2483.5	6.79	35.51	42.3	---	54	10Hz	Pass

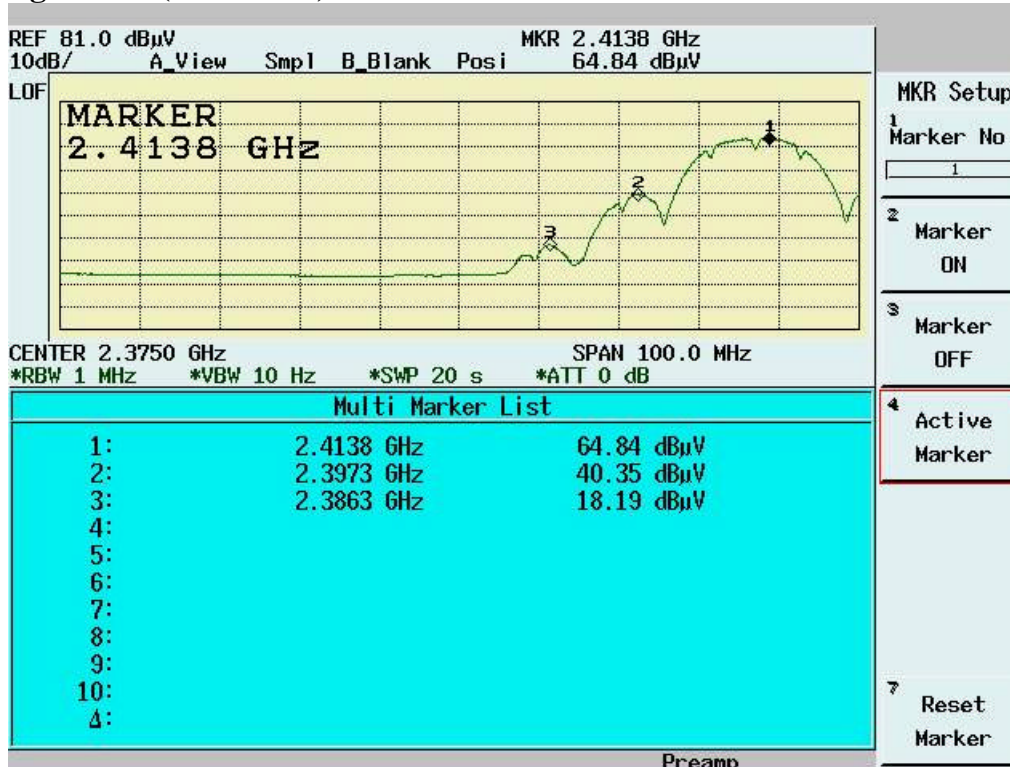
Note:

- 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.

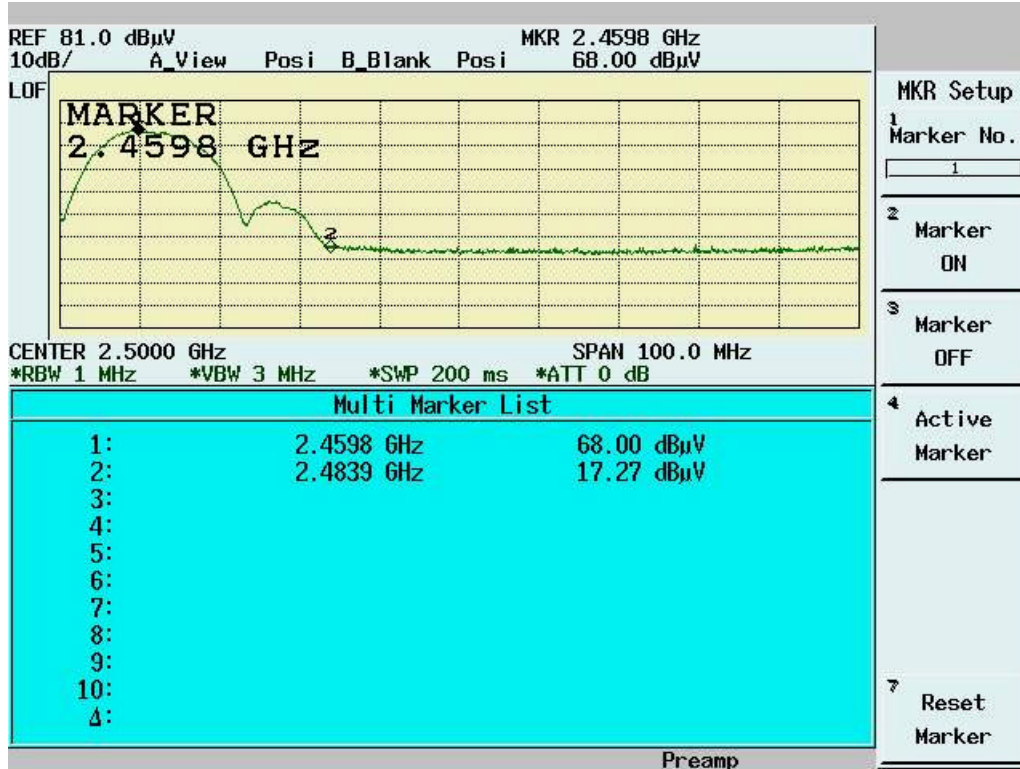
Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 1)



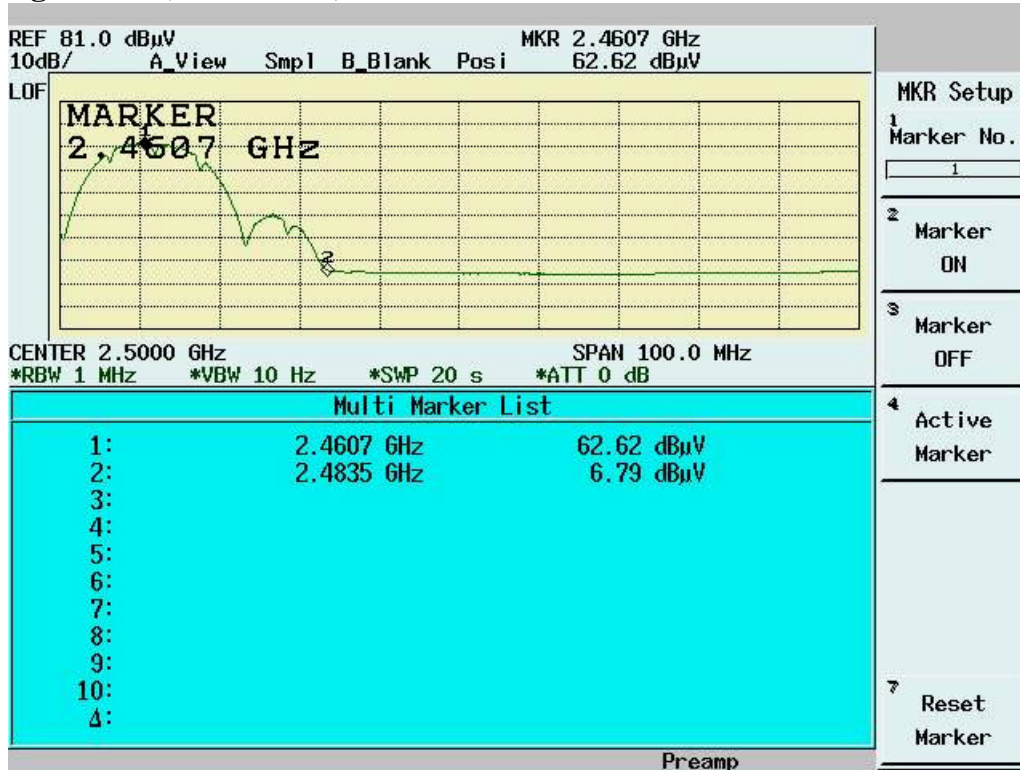
Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 1)



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

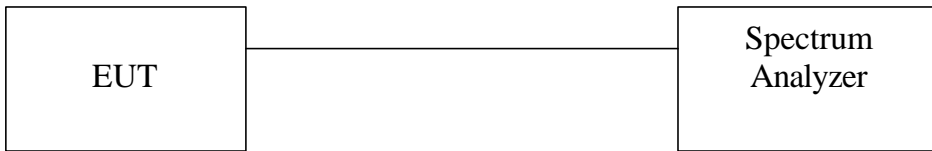
See SAR report

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

4.7.1 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.

4.7.2 Test Setup



4.7.3 Test Data

Maximum Peak Output Power Density

Temp. (?C): 25
 Humidity (%): 50

Test Engr: Jerry Chiou

Chennel	Frequency	Spectrum	Cable Loss	Peak Power	Limit	Pass/Fail
	(MHz)	Reading (dBm/3KHz)	(dB)	Output (dBm/3KHz)	(dBm/3KHz)	
1	2412	-1.72	1.1	-0.62	8	Pass
6	2437	-2.02	1.1	-0.92	8	Pass
11	2462	-3.2	1.1	-2.1	8	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

Channel 1



Channel 6



Channel 11

