

# Test Report for FCC Part 15 Subpart B & C & E

*of*

*Product Name*

**Notebook Personal Computer**

*Model*

**V100**

**(Brand: MITAC)**

*Applied by:*

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*Test Performed by:*

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**Report Number: ISL-07LR006FC**

**Issue Date: 2007/02/12**

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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## 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)  
CFR 47 Part 15 Subpart E (Section 15.407)

**Test Procedure:** ANSI C63.4:2003

**Equipment Tested:** Notebook Personal Computer

**Model:** V100

**Applied by:** MITAC Technology Corporation

**Sample received Date:** 2007/02/05

**Final test Date :** 2007/02/06-2007/02/08

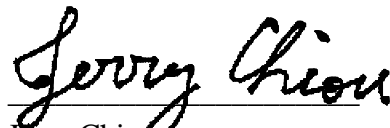
**Test Result** PASS

**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

  
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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 contains 130 pages, including 1 cover page, 5 contents page, and 124 pages for the test description. This report must not be use 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).

## 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	



The 802.11a (5725 - 5850MGz) 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 802.11a (5150 - 5350MGz) functions of EUT has been tested to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart E			
Standard Section	Test Type	Result	Remarks
15.407(a)(1)(2)(3)	Peak Transmit Power	Pass	
15.407(a)(1)(2)(3)	Peak Power Spectral Density	Pass	
15.407(a)(6)	Peak Power Excursion	Pass	
15.407(b)(5)	AC Power Line Emissions	Pass	
15.407(b)(5)	Radiated Emissions 30MHz – 40 GHz	Pass	
15.407(f)	Radiation exposure	Pass	SAR report attached
15.407(g)	Frequency Stability	Pass	
15.407(h)(1)	Transmitter Power Control	Pass	
15.407(h)(2)	Dynamic Frequency Selection	Pass	DFS report attached

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

Description:	Notebook Personal Computer
Condition:	Pre-Production
Model:	V100
Brand:	MITAC
Wireless LAN Module:	Intel, Model: WM3945ABG
Frequency Range of 802.11a:	5150 - 5250 MHz 5250 - 5350 MHz 5725 - 5850 MHz
Frequency Range of 802.11b/g:	2400 - 2483.5 MHz
Support channel:	
802.11a Normal mode	13 Channels
802.11b/g	11 Channel
Modulation Skill:	
802.11a Normal mode	OFDM (6 Mbps – 54 Mbps)
802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
Antennas Type:	
Right antenna:	PIFA (P/N: IA-060076) White made by JOINSOON ELECTRONICS MFG. CO., LTD
Left antenna:	PIFA (P/N: IA-060239) Black made by JOINSOON ELECTRONICS MFG. CO., LTD
Antenna Connected:	Connected to RF connector on the PCB of the 802.11a/b/g WLAN Adapter .The user is not possible to change the antenna without disassembling the notebook computer.
Right antenna	1.61dBi(11b,11g), 2.45dBi(11a)
Left antenna	-0.55 dBi (11b,11g), 3.97 dBi (11a)
Power Type of wireless module:	3.3V DC from Notebook PC

The channel and the operation frequency of 802.11a Normal Mode is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	5180	02	5200
03	5220	04	5240
05	5260	06	5280
07	5300	08	5320
09	5745	10	5765
11	5785	12	5805
13	5825		

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		

CPU:	Genuine intel U2500 1.2GHz
Adapter Type:	Auto Switching AC Adapter 100-240V,1.2A 50-60Hz EPS (Model: F10903-A)
Hard Disk Driver:	Toshiba (Model:MK8032GSX) 80G or Toshiba (Model:MK1234GSX) 120G
Modem Card:	Conexant (Model: RD-02-D330)
Wireless LAN Card:	Intel(Model:WM3945ABG)
USB Connector:	two 4 pin
RJ11 Connector:	one 2 pin
Serial Port:	two 9 pin
RJ45 Connector:	one 8 pin
Line out Port:	one
Line-in Port:	one
SD Card Port:	one
PCMCIA Slot:	two
DC IN Port:	one
Battery:	MITAC(Model: BP-LC2600/33-0151), 11.1Vdc, 7800mAh
LCD:	Toshiba(Model: LTD104KA1S) or Toshiba(Model: LTD121EXEV)
DDR:	Infineon(Model:PC2-4200S-444-11-A0) 512M Hnnix(Model:PC2-5300S555-12) 1G
Power Cord:	Non-shielded, Detachable

Test configuration:

configuration	LCD	LAN speed	CPU	Adapter Type	Hard Disk	Modem Card	Wireless LAN Card	Battery	DDR
1	Toshiba( Model: LTD104K A1S)	1 Gbps	Genuine intel U2500 1.2GHz	EPS (Model: F10903-A)	Toshiba (Model:MK 1234GSX) 120G	Conexant (Model: RD-02-D33 0)	Intel(Model: WM3945A BG)	MITAC(M odel:BP-LC 2600/33-015 1)	Hnnix(M odel:PC2- 5300S555 -12)
2	Toshiba( Model: LTD121E XEV)	1 Gbps	Genuine intel U2500 1.2GHz	EPS (Model: F10903-A)	Toshiba (Model:MK 1234GSX) 120G	Conexant (Model: RD-02-D33 0)	Intel(Model: WM3945A BG)	MITAC(M odel:BP-LC 2600/33-015 1)	Hnnix(M odel:PC2- 5300S555 -12)

All types of LCD、LAN speed、CPU、Adapter Type、Hard Disk、Modem Card、Wireless LAN Card、Battery、DDR with related components have been tested, only shown the worst data using the following configuration in this report.

configuration	LCD	LAN speed	CPU	Adapter Type	Hard Disk	Modem Card	Wireless LAN Card	Battery	DDR
2	Toshiba( Model: LTD121E XEV)	1 Gbps	Genuine intel U2500 1.2GHz	EPS (Model: F10903-A)	Toshiba (Model:MK 1234GSX) 120G	Conexant (Model: RD-02-D33 0)	Intel(Model: WM3945A BG)	MITAC(M odel:BP-LC 2600/33-015 1)	Hnnix(M odel:PC2- 5300S555 -12)

**EMI Noise Source:**

- GPS board Crystal: 12MHz(X1)
- Touch Panel board Crystal:7.372MHz(X1)
- SD card board Crystal:12MHz(X2)
- Main board Crystal:25MHz(X3),10MHz(X2),14.318MHz(X501)
- Clock Generator: U514

**EMI Solution:**

1. Adding shielded tape on LCD Signal cable
2. Adding Gasket on LCD Signal cable
3. Adding Gasket on LCD Panel around
4. Adding Gasket on Bluetooth Module
5. Adding aluminum foil on 3GCDMA antenna
6. Adding Copper on Main board
7. Adding Copper on Modem Card
8. Adding Gasket on Main board
9. Adding Gasket on Modem Card
10. Adding Core(A5 FS 16\*5\*12) on LAN Signal cable
11. Adding Core(A3 FS 15\*3\*11) on Modem Card Signal cable
12. Adding Core(K5B RH 6.35\*15.8\*3.3) on DC IN Jack
13. Adding aluminum foil on Case
14. Adding Core(FPC 40\*2.7\*12-K) on Keyboard Signal cable
15. Adding Core(RC 16\*28\*9 -M2) on Adapter Type Signal cable

### 3. TEST RESULTS (802.11b)

#### 3.1 Powerline Conducted Emissions [Section 15.207]

##### 3.1.1 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.

##### 3.1.2 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.

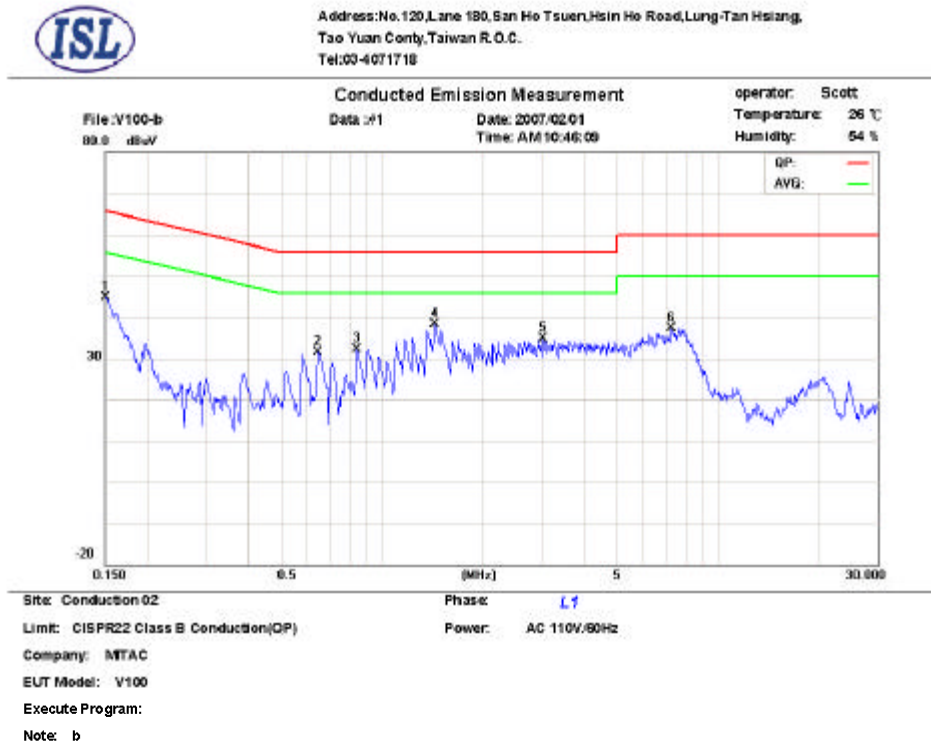
At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions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

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

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

### 3.1.4 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
0.1508	0.1	0.02	43.00	65.9	-22.9	39.90	55.9	-16.0	
0.6440	0.2	0.07	32.70	56.0	-23.3	29.60	46.0	-16.4	
0.8438	0.2	0.07	33.00	56.0	-23.0	32.60	46.0	-13.4	
* 1.4257	0.2	0.08	39.90	56.0	-16.1	36.90	46.0	-9.10	
3.0253	0.3	0.12	25.80	56.0	-30.2	22.40	46.0	-23.6	
7.2518	0.45	0.18	38.50	60.0	-21.5	34.90	50.0	-15.1	

\*:Maximum data x:Over limit

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



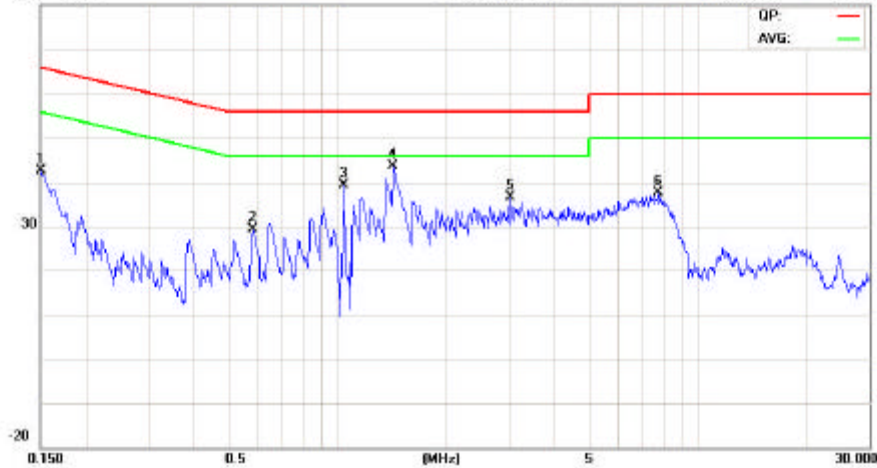
Address: No. 120, Lane 180, San Ho Tsuen, Hsin Ho Road, Lung-Tan Hsiang,  
Tao Yuan Conty, Taiwan R.O.C.  
Tel: 03-4071718

Conducted Emission Measurement

operator: Scott  
Temperature: 25 °C  
Humidity: 54 %

File: Y100-b  
88.9 dBuV

Date: #2 Date: 2007/02/01  
Time: AM 10:54:32



Site: Conduction 02 Phase: N  
Limit: CISPR22 Class B Conduction(OP) Power: AC 110V/60Hz  
Company: MITAC  
EUT Model: Y100  
Execute Program:  
Note: b

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
0.1508	0.1	0.02	42.30	65.9	-23.6	39.50	55.9	-16.4	
0.5854	0.2	0.07	31.10	56.0	-24.9	28.00	46.0	-18.0	
1.0430	0.2	0.07	23.40	56.0	-32.6	15.50	46.0	-30.5	
* 1.4220	0.2	0.08	43.70	56.0	-12.3	40.30	46.0	-5.70	
3.0253	0.2	0.12	26.90	56.0	-29.1	21.60	46.0	-24.4	
7.7689	0.33	0.18	36.80	60.0	-23.2	32.60	50.0	-17.4	

\*: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

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

#### 3.2.1 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

#### 3.2.2 Test Setup



#### 3.2.3 Test Data:

##### 6dB Bandwidth

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

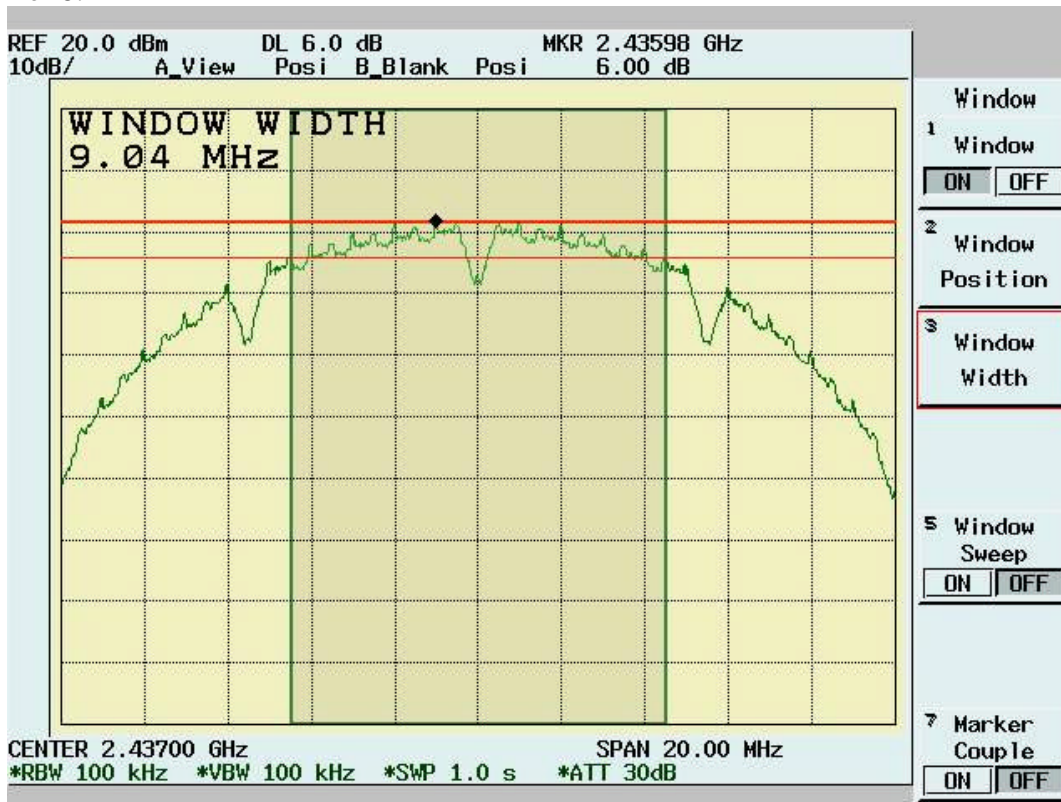
Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	9.08	0.5	Pass
6	2437	9.04	0.5	Pass
11	2462	9.08	0.5	Pass



Channel 1:



Channel 6:



Channel 11:



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

#### 3.3.1 Test Procedure

- The Transmitter output of EUT was connected to the spectrum analyzer.
  - Equipment mode: Spectrum analyzer
  - Detector function: Channel Power
  - SPAN:20MHz
  - Channel BW:20MHz
  - RBW: 1MHz
  - VBW: 3MHz
  - Center frequency: fundamental frequency tested.
  - Sweep time= auto
  - Average times = 100.

#### 3.3.2 Test Setup



#### 3.3.3 Test Data

##### Maximum Peak Output Power

Temp. (deg. C): 25

Test Engr: Jerry Chiou

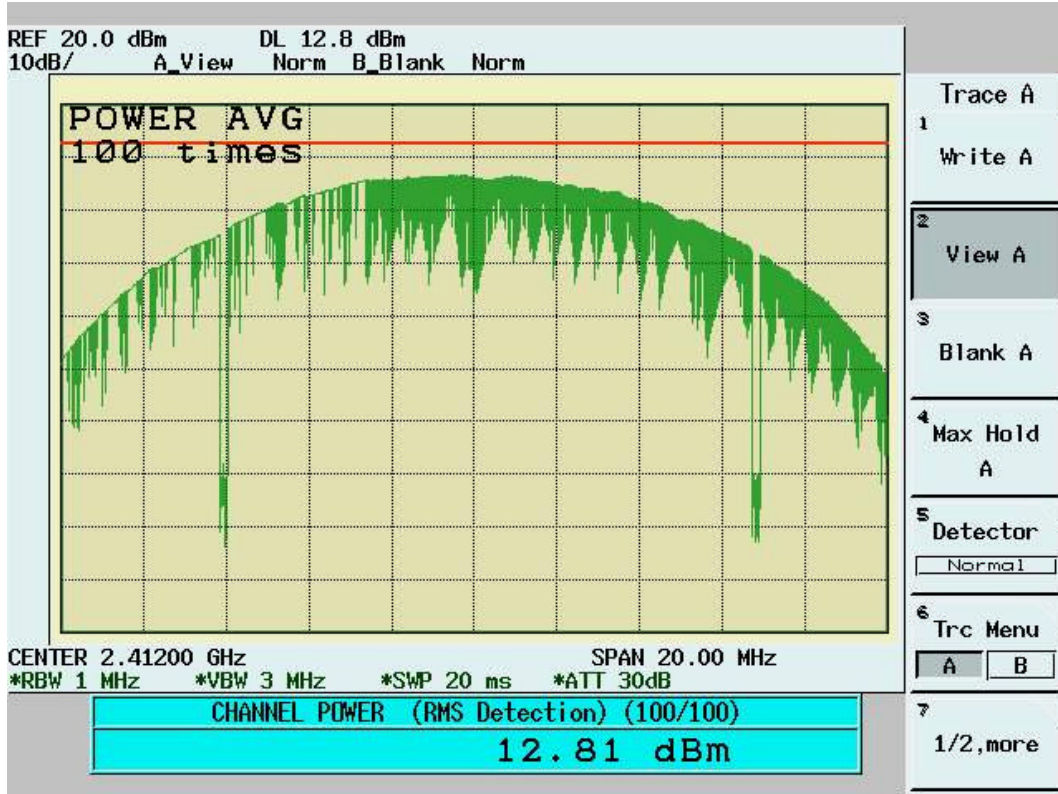
Humidity (%): 50

Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	12.81	1.1	24.60	13.91	30	Pass
6	2437	13.6	1.1	29.51	14.7	30	Pass
11	2462	13.85	1.1	31.26	14.95	30	Pass

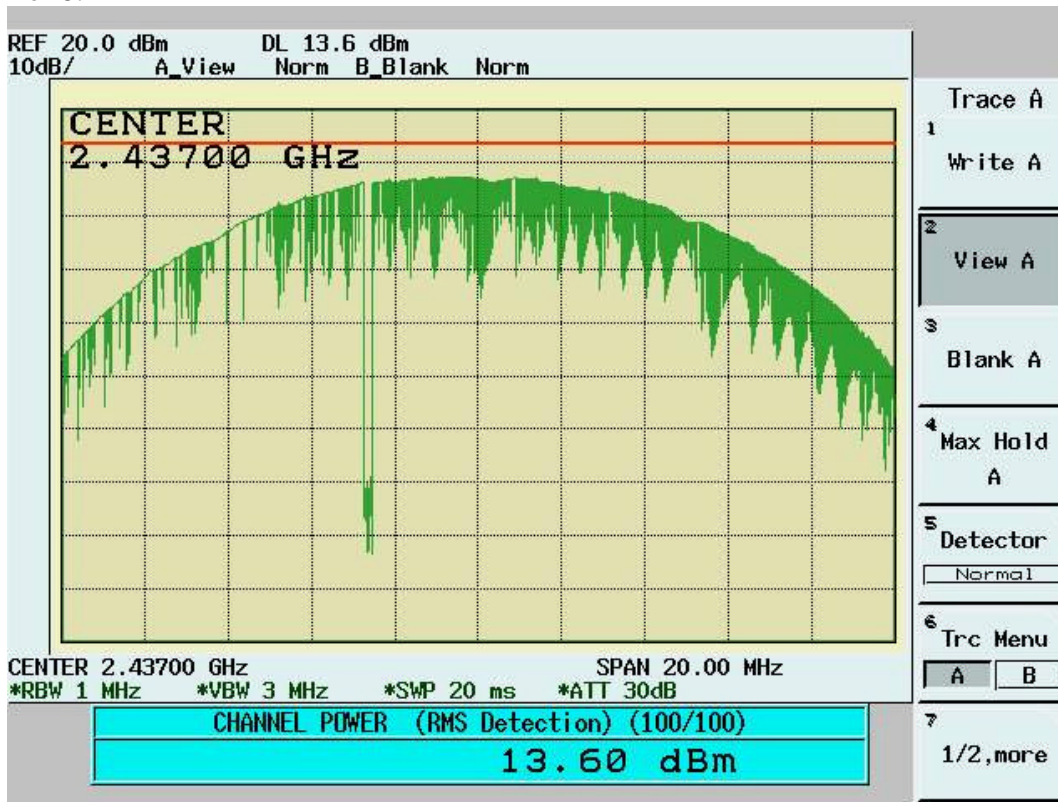
Note: Two RF output( MAIN & AUX) have been test,the worse data shown above.



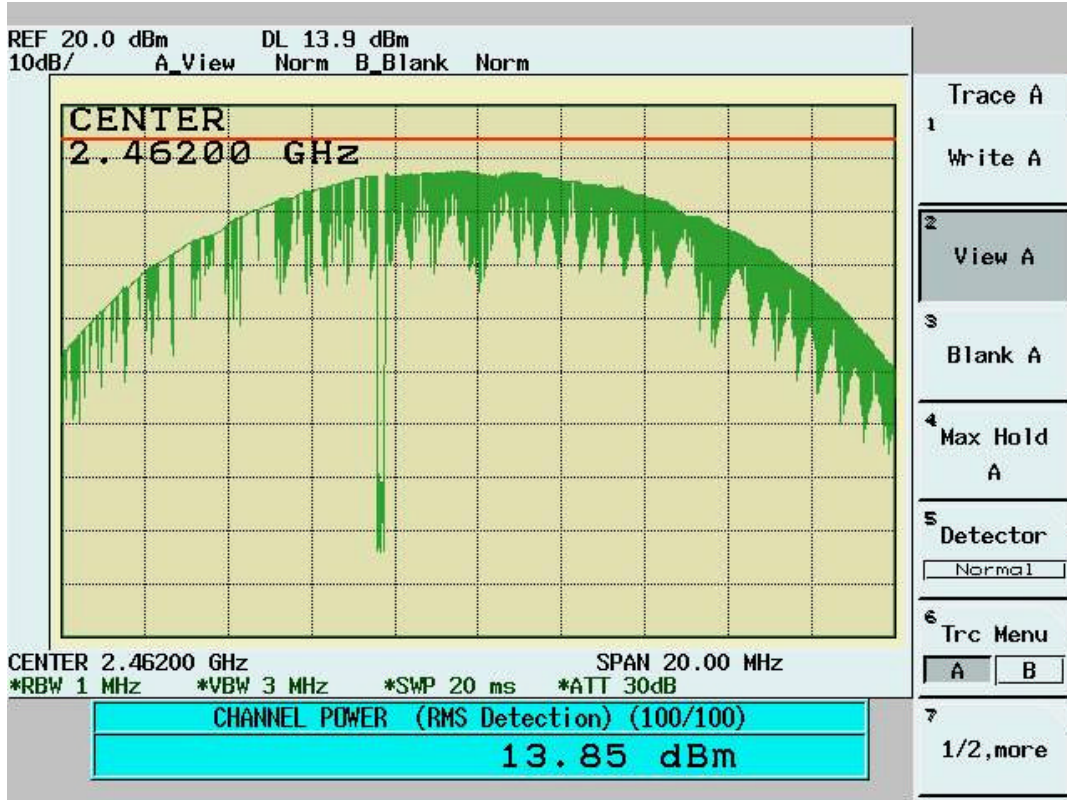
Channel 1:



Channel 6:



Channel 11:



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

#### 3.4.1 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.

#### 3.4.2 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.

#### 3.4.3 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

**3.4.4 Test Data (30MHz – 1GHz):**

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

Operator: Jerry Chiou  
 Temperature(C): 25  
 Humidity(%): 63

Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos	TablePos
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
65.89	22.39	6.31	1.47	0.00	30.16	40.00	-9.84	96.00	218.00
87.23	22.49	8.35	1.67	0.00	32.51	40.00	-7.49	96.00	244.00
95.96	17.37	9.91	1.79	0.00	29.07	43.50	-14.43	96.00	34.00
105.66	15.52	11.62	1.93	0.00	29.07	43.50	-14.43	96.00	60.00
108.57	16.24	12.14	1.94	0.00	30.32	43.50	-13.18	96.00	34.00
111.48	19.59	12.43	1.90	0.00	33.92	43.50	-9.58	96.00	34.00
157.07	16.10	10.13	2.34	0.00	28.57	43.50	-14.93	96.00	218.00
163.86	16.33	9.87	2.39	0.00	28.58	43.50	-14.92	96.00	218.00
182.29	15.59	9.23	2.47	0.00	27.30	43.50	-16.20	96.00	271.00
197.81	15.91	9.16	2.60	0.00	27.67	43.50	-15.83	96.00	244.00
201.69	16.92	9.18	2.63	0.00	28.73	43.50	-14.77	96.00	244.00
919.49	4.29	20.66	5.32	0.00	30.26	46.00	-15.74	96.00	324.00

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

Operator: Jerry Chiou  
 Temperature(C): 25  
 Humidity(%): 63

Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	CorrctEmi	Limit	Margin	Ant.Pos.	TablePos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
70.74	21.44	6.16	1.55	0.00	29.14	40.00	-10.86	96.00	244.00
89.17	21.96	8.73	1.66	0.00	32.36	43.50	-11.14	96.00	218.00
95.96	16.63	9.91	1.79	0.00	28.34	43.50	-15.16	96.00	34.00
102.75	13.90	11.10	1.93	0.00	26.92	43.50	-16.58	96.00	34.00
105.66	14.79	11.62	1.93	0.00	28.34	43.50	-15.16	96.00	60.00
111.48	19.16	12.43	1.90	0.00	33.50	43.50	-10.00	96.00	34.00
159.01	17.81	10.11	2.38	0.00	30.30	43.50	-13.20	96.00	218.00
163.86	15.97	9.87	2.39	0.00	28.22	43.50	-15.28	96.00	218.00
183.26	15.73	9.20	2.48	0.00	27.41	43.50	-16.09	96.00	191.00
202.66	16.46	9.17	2.63	0.00	28.26	43.50	-15.24	96.00	244.00
208.48	14.85	9.12	2.62	0.00	26.58	43.50	-16.92	96.00	244.00
584.84	5.77	18.79	4.42	0.00	28.98	46.00	-17.02	96.00	297.00

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**

**3.4.5 Test Data ( 1GHz – 25 GHz) .**

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

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1986.51	35.79pk	30.89	2.59	23.75	45.52pk	54.00av	-8.48	100	44
4818.18	35.01pk	34.11	5.14	27.49	46.76pk	54.00av	-7.24	100	18
7222.78	36.09pk	38.09	3.85	26.60	51.43pk	54.00av	-2.57	101	142
9641.86	30.61pk	38.84	3.94	24.84	48.55pk	54.00av	-5.45	102	7

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

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1861.64	37.81pk	29.84	2.50	23.75	46.40pk	54.00av	-7.60	100	53
4818.18	35.76pk	34.11	5.14	27.49	47.51pk	54.00av	-6.49	100	18
7222.78	38.45pk	38.09	3.85	26.60	53.79pk	54.00av	-0.21	101	142
9641.86	33.26pk	38.84	3.94	24.84	51.20pk	54.00av	-2.80	102	7

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:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4861.64	42.02pk	34.27	5.13	27.43	54.00pk	74.00pk	-20	100	14
4873.91	39.58av	34.27	5.13	27.43	51.56av	54.00av	-2.44	100	14
7295.2	35.80pk	38.38	3.88	26.57	51.49pk	54.00av	-2.51	101	152
9728.77	32.55pk	38.69	4.00	24.78	50.46pk	54.00av	-3.54	102	5

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

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4861.64	43.80pk	34.27	5.13	27.43	55.77pk	74.00pk	-18.23	100	14
4874.16	40.56av	34.27	5.13	27.43	52.53av	54.00av	-1.47	100	14
7295.2	38.87pk	38.38	3.88	26.57	54.56pk	74.00pk	-19.44	101	152
7308.2	33.82av	38.38	3.88	26.57	49.51av	54.00av	-4.49	101	152
9728.77	39.96pk	38.69	4.00	24.78	57.86pk	74.00pk	-16.14	102	5
9747.95	33.54av	38.69	4.00	24.78	51.44av	54.00av	-2.56	102	5

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:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4919.58	35.10pk	34.49	5.13	27.35	47.37pk	54.00av	-6.63	100	8
7367.63	32.79pk	38.67	3.92	26.54	48.84pk	54.00av	-5.16	101	163

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

Operator:JerryChiou

RBW:1MHz  
Humidity(%):57  
Temperature(C):22

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
4919.58	39.78pk	34.49	5.13	27.35	52.05pk	54.00av	-1.95	100	8
7382.12	35.71pk	38.73	3.93	26.53	51.83pk	54.00av	-2.17	101	165
9830.17	31.63pk	38.51	4.07	24.72	49.49pk	54.00av	-4.51	101	3

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.**

### 3.5 Band Edge Measurement

#### 3.5.1 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

#### 3.5.2 Test Setup (Conducted)



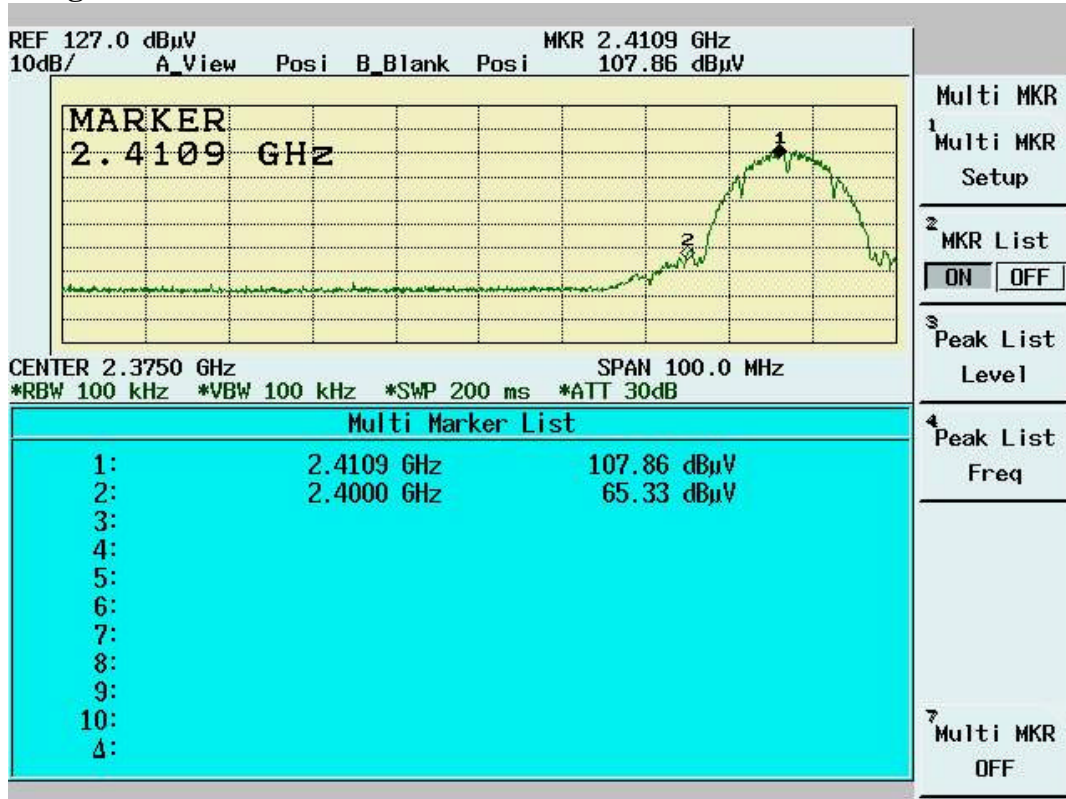
#### 3.5.3 Test Data:

**Table: Band Edge measurement (Conducted)**

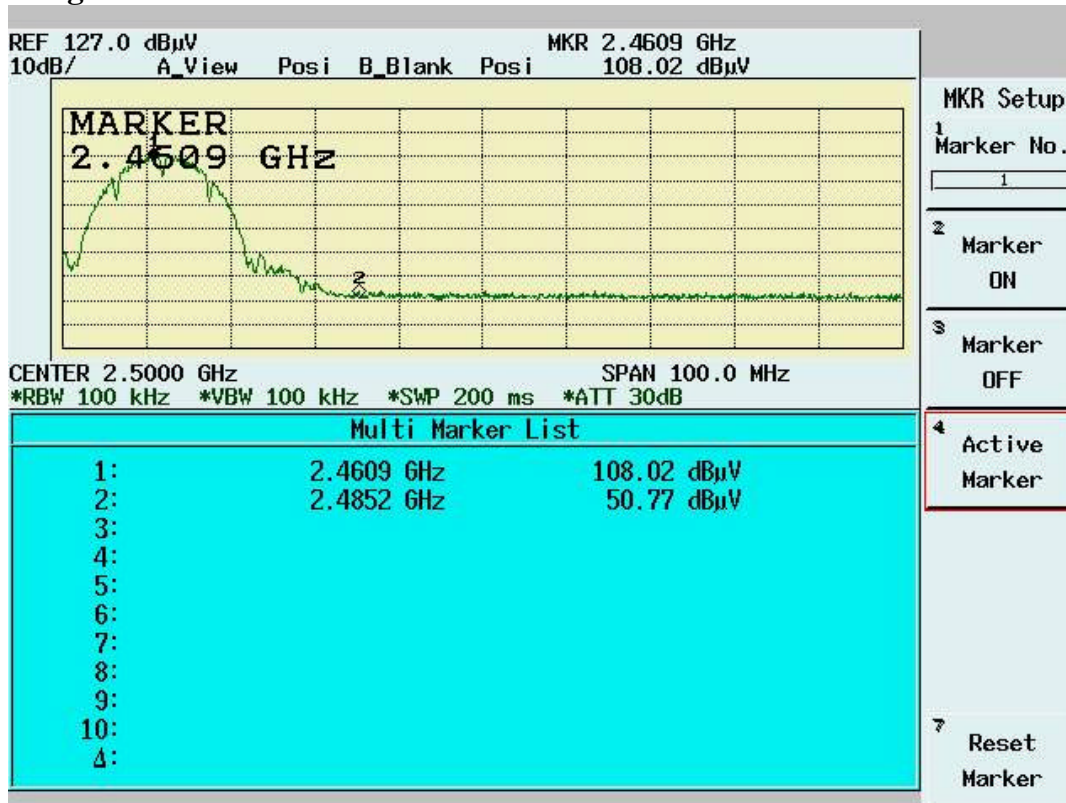
Test Engr: Jerry Chiou		Temp. (deg. C):	25	
		Humidity (%):	50	
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
1	2410.9	107.86	---	---
Outside band	2400	65.33	42.53	Pass
11	2460.9	108.02	---	---
Outside band	2485.2	50.77	57.25	Pass

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

### Band Edge Conducted measurement



### Band Edge Conducted Measurement



### 3.5.4 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.

### 3.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

3.5.6 Test Data

Table Band Edge measurement (Radiated)

Temp. (deg. C): 25

Test Engr: Jerry Chiou

Humidity (%): 50

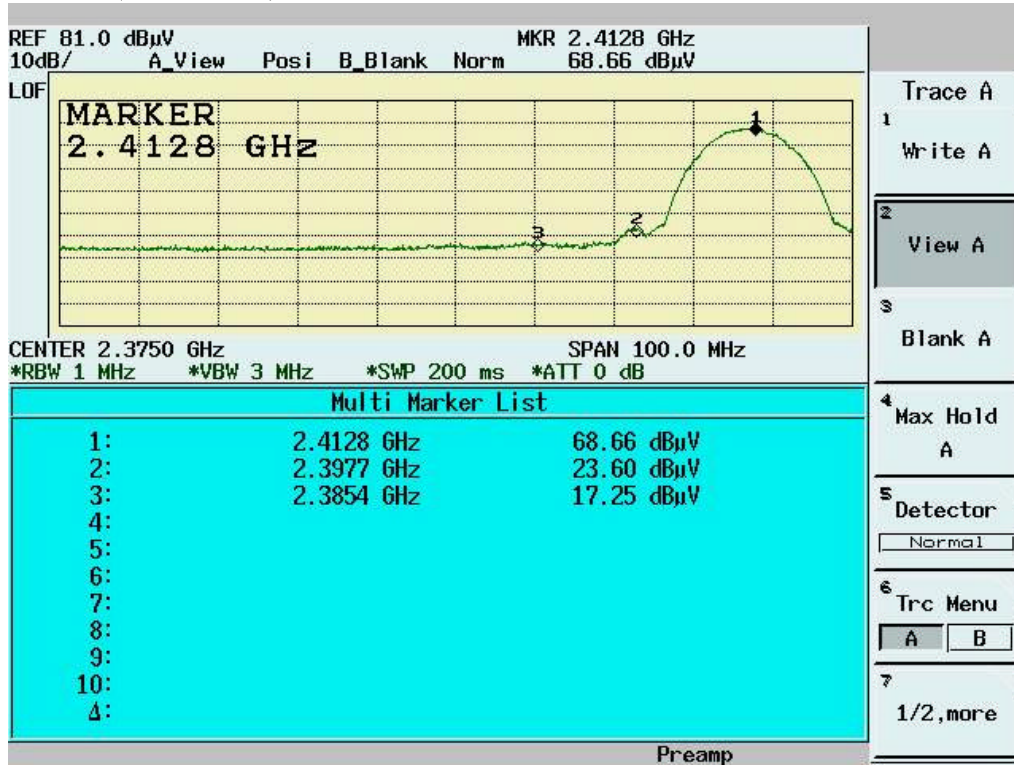
Description	Frequency	Spectrum	Correction	Emission	dBc ( Limit: > 30dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
	(MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)				
Channel_1 (average mode)	2412.8	65.41	35.48	100.89	---	---	10Hz	---
Channel_1 (peak mode)	2412.8	68.66	35.48	104.14	---	---	3MHz	---
Outside band (average mode)	2399.3	22.15	35.48	57.63	43.26	---	10Hz	Pass
Channel_11 (average mode)	2462.7	64.06	35.5	99.56	---	---	10Hz	---
Channel_11 (peak mode)	2462.9	69.09	35.5	104.59	---	---	3MHz	---
Outside band (average mode)	2490.6	6.55	35.51	42.06	57.5	---	10Hz	Pass
Channel_1 Restricted band (peak mode)	2385.4	17.25	35.47	52.72	---	74	3MHz	Pass
Restricted band (average mode)	2386.8	6.97	35.47	42.44	---	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2488.1	16.61	35.51	52.12	---	74	3MHz	Pass
Restricted band (average mode)	2490.6	6.55	35.51	42.06	---	54	10Hz	Pass

Note:

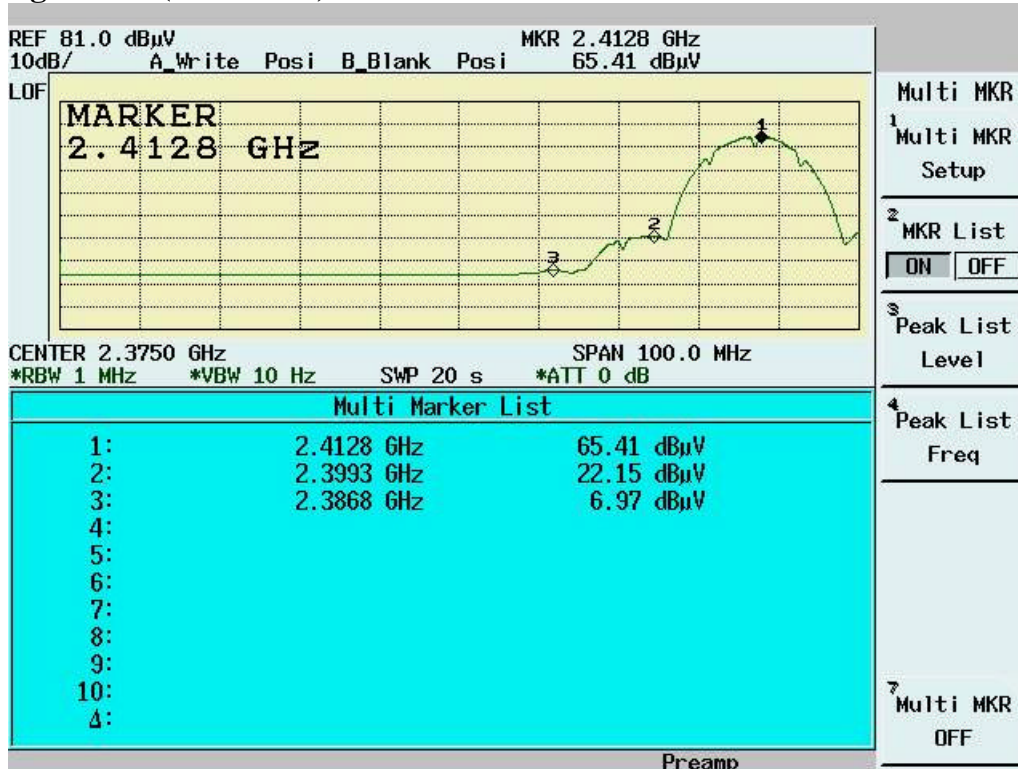
- > The Spectrum plot of emission level measurement in Restricted band is attached.
- > Emission Level=Spectrum Reading+Correction Factor
- > Correction Factor=Antenna Factor+cable loss–amplifier gain
- > Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.



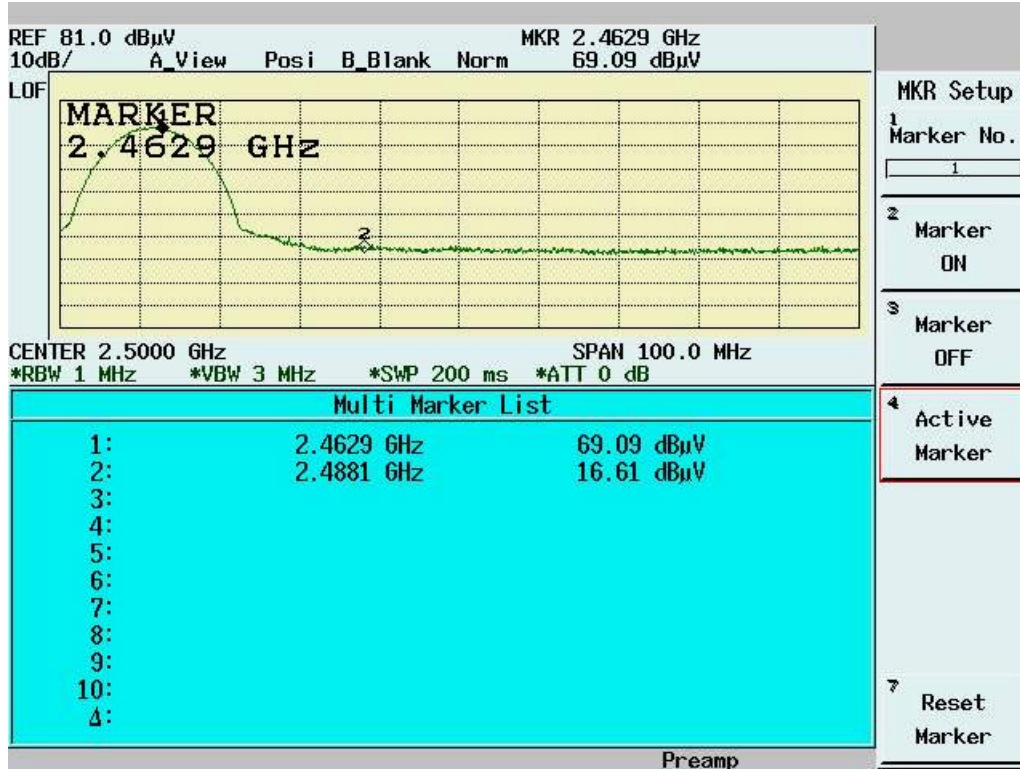
**Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 1)**



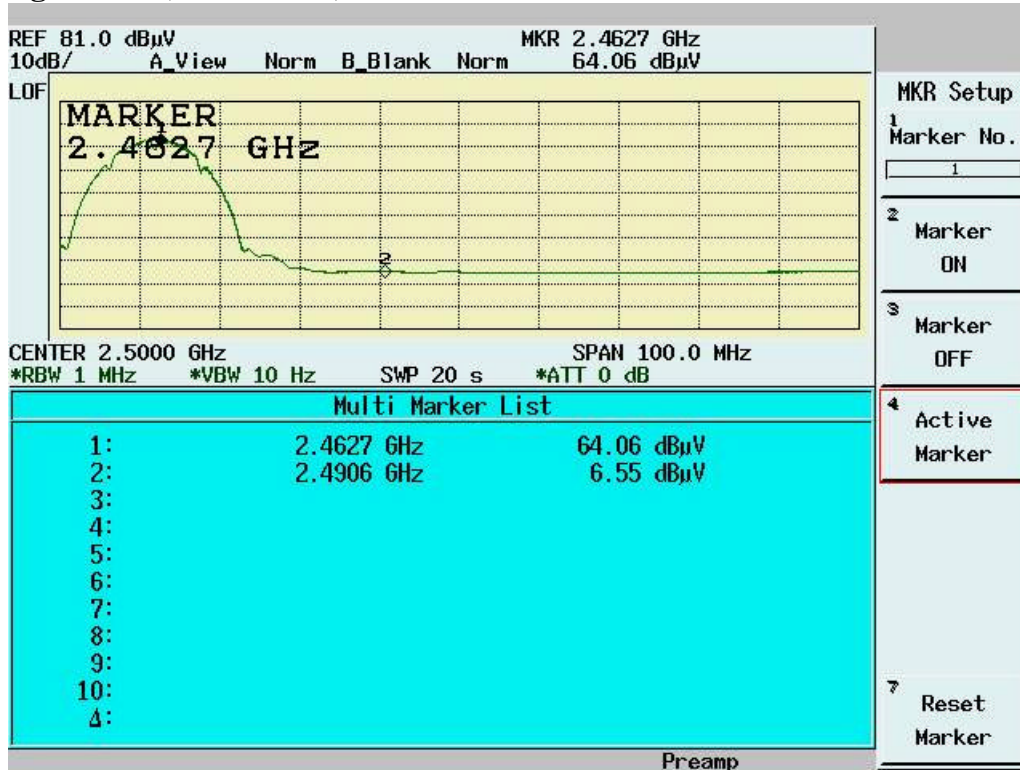
**Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 1)**



**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)**





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

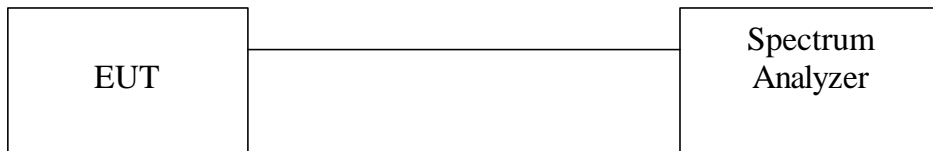
See SAR report

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

#### 3.7.1 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.

#### 3.7.2 Test Setup



#### 3.7.3 Test Data

##### Maximum Peak Output Power Density

Test Engr: Jerry Chiou

Temp. (deg. C): 25

Humidity (%): 50

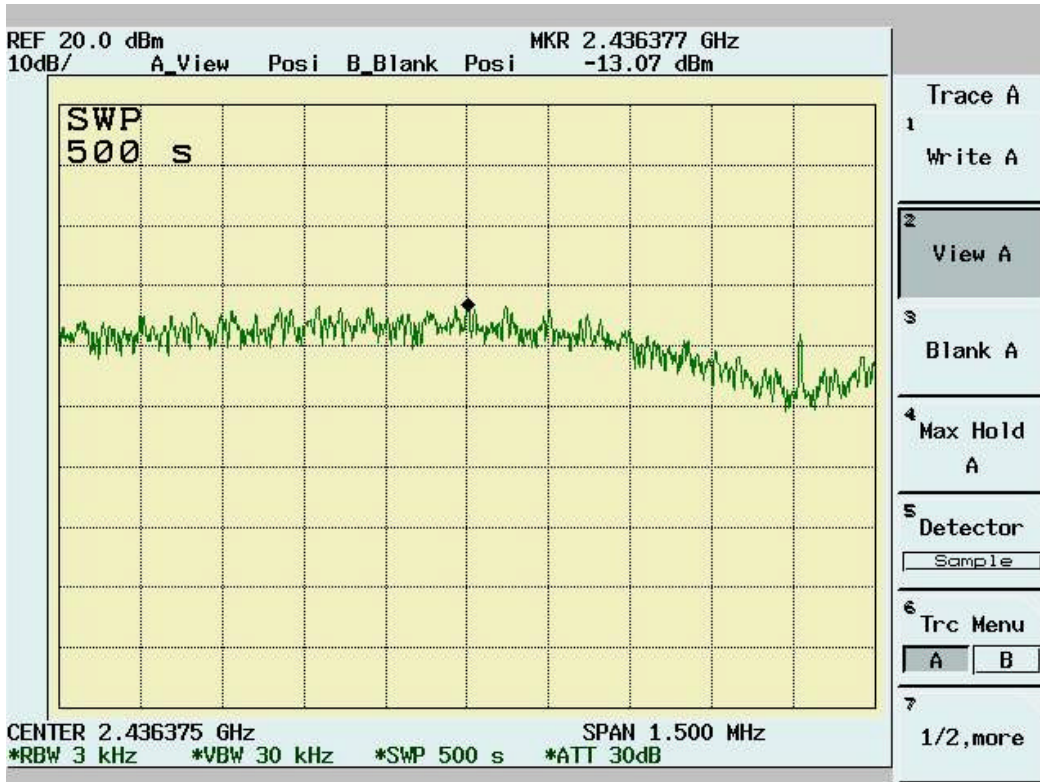
Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-13.45	1.1	-12.35	8	Pass
6	2437	-13.07	1.1	-11.97	8	Pass
11	2462	-13.06	1.1	-11.96	8	Pass

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

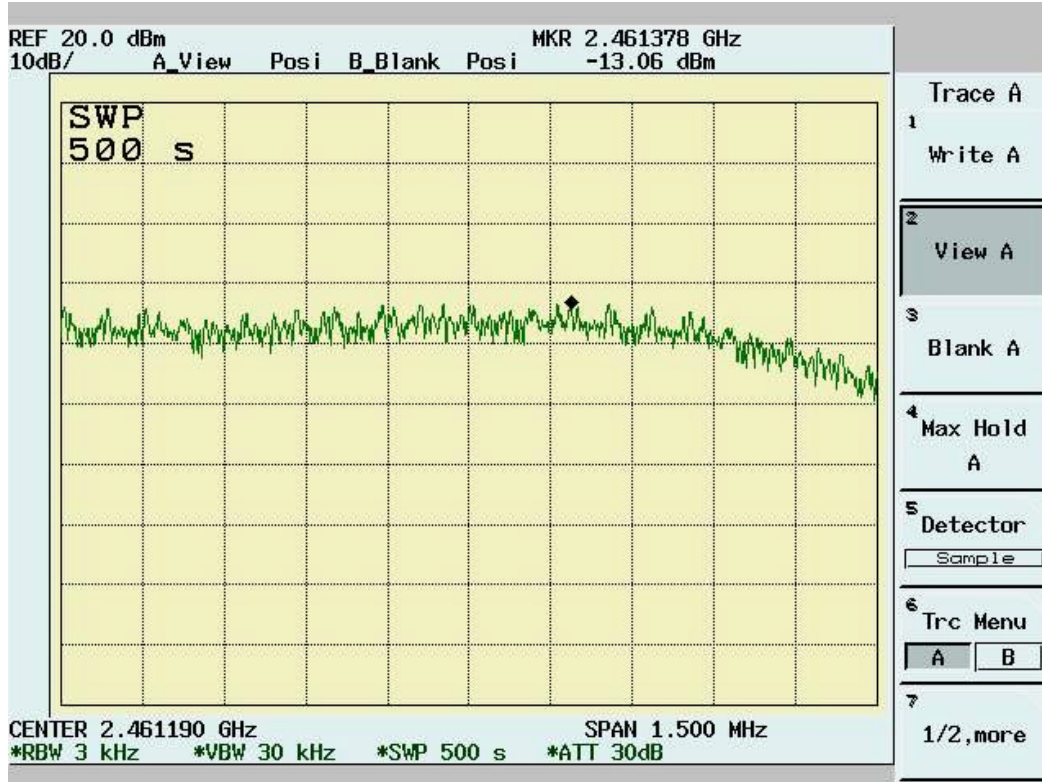
Channel 1



Channel 6



Channel 11



## 4. TEST RESULTS (802.11g)

### 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.

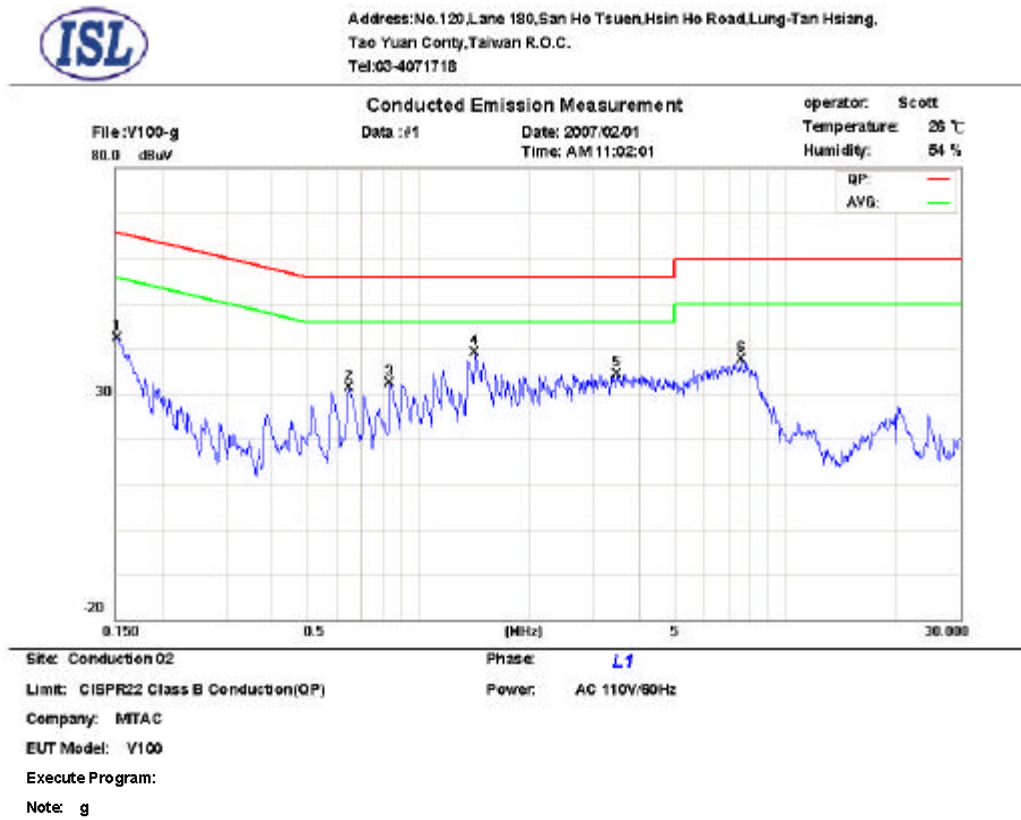
At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions 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
0.1516	0.1	0.02	42.90	65.9	-23.0	39.70	55.9	-16.2	
0.6508	0.2	0.07	32.60	56.0	-23.4	29.10	46.0	-16.9	
0.8393	0.2	0.07	32.50	56.0	-23.5	31.90	46.0	-14.1	
* 1.4257	0.2	0.08	39.60	56.0	-16.4	36.40	46.0	-9.60	
3.4906	0.35	0.13	34.30	56.0	-21.7	33.60	46.0	-12.4	
7.5658	0.46	0.18	37.80	60.0	-22.2	37.90	50.0	-12.1	

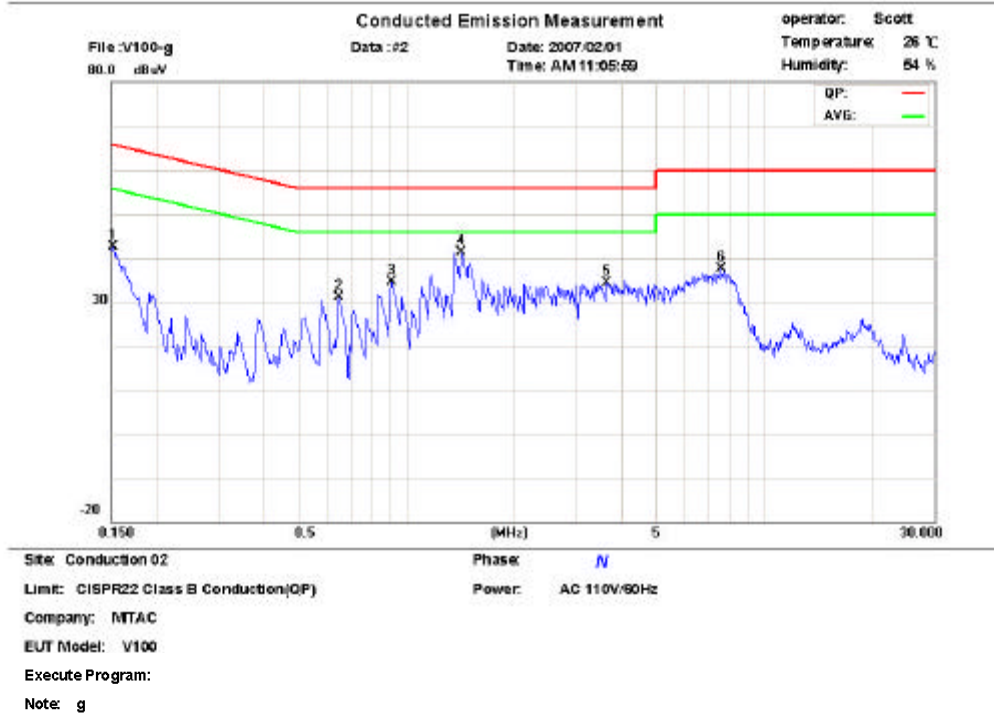
\*:Maximum data x:Over limit



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 Cony, Taiwan R.O.C.  
Tel: 09-4971718



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
0.1516	0.1	0.02	42.30	65.9	-23.6	39.20	55.9	-16.7	
0.6474	0.2	0.07	31.70	56.0	-24.3	30.90	46.0	-15.1	
0.9087	0.2	0.07	35.20	56.0	-20.8	32.00	46.0	-14.0	
* 1.4242	0.2	0.08	40.40	56.0	-15.6	40.30	46.0	-5.70	
3.6418	0.2	0.13	24.80	56.0	-31.2	19.60	46.0	-26.4	
7.5658	0.32	0.18	37.40	60.0	-22.6	36.00	50.0	-14.0	

\*: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 Test Data:

#### 6dB Bandwidth

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

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.48	0.5	Pass
6	2437	16.48	0.5	Pass
11	2462	16.48	0.5	Pass