

# FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.247

**Equipment** : Pocket-Sized Mobile Computer  
**Model No.** : DL-MEMOR  
**Brand Name** : Datalogic Memor™  
**Filing Type** : New Application  
**Applicant** : DATALOGIC MOBILE S.r.l.  
**Manufacturer** : Via S. Vitalino, 13 – 40012 Lippo di  
Calderara di Reno (Bologna) - ITALY  
**FCC ID** : U4GA030  
**Received Date** : Feb. 15, 2011  
**Final Test Date** : Apr. 15, 2011

## Statement

**Test result included is only for the 802.11a/b/g (5725~5850 MHz / 2400~2483.5MHz) part of the product.**

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart C**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.



***SPORTON International Inc.***

No. 52 Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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## History of This Test Report

Original Issue Date: Apr. 19, 2011

Report No.: FR001814AC

Attachment No.	Issue Date	Description

# **CERTIFICATE OF COMPLIANCE**

according to

**47 CFR FCC Part 15 Subpart C § 15.247**

Equipment : Pocket-Sized Mobile Computer

Model No. : DL-MEMOR

Brand Name : Datalogic Memor™

Applicant : DATALOGIC MOBILE S.r.l.

Via S. Vitalino, 13 – 40012 Lippo di  
Calderara di Reno (Bologna) - ITALY

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Feb. 15, 2011 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



**Wayne Hsu / Vice Manager**

***SPORTON International Inc.***

*No. 52 Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.*

## 1 SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	Rule Section	Description of Test	Result	Under Limit
3.1	15.207	AC Power Line Conducted Emissions	Complies	21.26 dB
3.2	15.247(b)(3)	Maximum Peak Output Power	Complies	8.15 dB
3.3	15.247(e)	Power Spectral Density	Complies	19.25 dB
3.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
3.5	15.247(d)	Radiated Emissions	Complies	3.02 dB
3.6	15.247(d)	Band Edge and Fundamental Emissions	Complies	1.07 dB
3.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Peak Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	±8.5×10 <sup>-8</sup>	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7°C	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

## 2 GENERAL INFORMATION

### 2.1 Feature of Equipment under Test

Product Feature & Specification	
<b>Model</b>	DL-MEMOR
<b>Equipment Description</b>	DL-Memor+802.11+BT+1DGS+CE5
	DL-Memor+802.11+BT+2D+CE5
	DL-Memor+802.11+BT+1DGS+WM6.1
	DL-Memor+802.11+BT+2D+WM6.1
<b>Sample A</b>	DL-Memor+802.11+BT+1DGS+WM6.1 (P/N: 944201040)
<b>Sample B</b>	DL-Memor+802.11+BT+2D+WM6.1 (P/N: 944201041)
<b>HW Version</b>	R1
<b>SW Version</b>	4.0

Items	Description
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11a/g
Data Modulation	DSSS (DBPSK / DQPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	11a: 5 ; 11b/g: 11
Channel Band Width (99%)	11a: 16.52 MHz ; 11b: 15.64 MHz ; 11g: 16.52 MHz
Conducted Output Power	11a: 15.23 dBm ; 11b: 16.48 dBm ; 11g: 21.85 dBm

Antenna Type	Connector	Gain (dBi)	
		2.4G	5G
PIFA Antenna	I-PEX	1.23	3.27

List of Accessory:

Product Feature & Specification	
<b>AC Adapter</b>	Brand/Model Name: AKII/A15P2-05MP Power Rating: /P: 100-240Vac, 47-63Hz, 0.5A; O/P: 5Vdc, 3.0A AC Power Cord Type: 1.5 meter shielded cable without ferrite core
<b>Battery</b>	Brand/Model Name: ETICA/ BP08-000600 Power Rating: 3.7Vdc, 1100mA Type: Li-ion
<b>Earphone</b>	Brand/Model Name: AATCC/ AEP-HA36D-04 Signal Line Type: 1.3 meter non-shielded cable without ferrite core
<b>USB Cable</b>	Brand/Model Name: CHIN SHONG/ S081219201 Signal Line Type: 1.2 meter non-shielded cable without ferrite core
<b>RS232 Cable</b>	Signal Line Type: 1.6 meter non-shielded cable without ferrite core
<b>LCD Panel</b>	Brand/Model Name: EVERVISION/ VGG2432B3-7UFLWA-S-REV5
<b>1D Scan Module</b>	Brand/Model Name: Motorola/SE950
<b>2D Scan Module</b>	Brand/Model Name: Motorola/SE4500
<b>WLAN Module</b>	Brand/Model Name: SUMMIT/SDC-SSD30AG

## 2.2 Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency
5725~5850 MHz	149	5745 MHz
	153	5765 MHz
	157	5785 MHz
	161	5805 MHz
	165	5825 MHz

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 MHz	-	-

## 2.3 Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on the entire possible configuration for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
AC Power Line Conducted Emissions Radiated Emissions Below 1GHz	Normal Mode	Auto	-
Maximum Peak Output Power Power Spectral Density 6dB Spectrum Bandwidth	11a/BPSK	6 Mbps	149/157/165
	11b/CCK	11 Mbps	1/6/11
	11g/BPSK	54 Mbps	1/6/11
Radiated Emissions Above 1GHz	11a/BPSK	6 Mbps	149/157/165
	11b/CCK	11 Mbps	1/6/11
	11g/BPSK	54 Mbps	1/6/11
Band Edge Emissions	11a/BPSK	6 Mbps	149/165
	11b/CCK	11 Mbps	1/11
	11g/BPSK	54 Mbps	1/11

## 2.4 Table for Testing Locations

Test Site No.	Site Category	Location
CO04-HY	Conduction	Hwa Ya
TH01-HY	OVEN Room	Hwa Ya
03CH02-HY	SAC	Hwa Ya

Semi Anechoic Chamber (SAC).

## 2.5 Table for Supporting Units

Support Unit	Brand	Model	FCC ID	Remark
Person Computer	HP	DC7700	N/A	Conducted Emissions
LCD Monitor	DELL	2408WFPb	N/A	
(PS/2) Keyboard	HP	KB-0133	DoC	
(PS/2) Mouse	HP	M-S69	DoC	
Micro SD Card	SanDisk	1GB	N/A	
Wireless AP (Remote workstation)	D-Link	DNS-G120	DoC	
Bluetooth Headset (Remote workstation)	Sony Ericsson	Hbh-pv702	DoC	

Note: The radiated emission was tested alone.

## 2.6 Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

### Power Parameters of IEEE 802.11a

Test Software Version	SRU_30AG		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	93	93	93

### Power Parameters of IEEE 802.11b/g

Test Software Version	SRU-30AG		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	Default	Default	Default
IEEE 802.11g	Default	Default	Default

## 2.7 EUT Operation during Test

### Conducted Emissions:

An executive program, "EMCTEST.EXE" under Win 2003, which generates a complete line of continuously repeating "H" pattern was used as the test software.

The program was executed as follows:

- Turn on the power of all equipment.
- The PC sends "H" messages to the monitor and displays "H" patterns on the screen.
- The PC reads the test program "PDA.exe" to the EUT and writes the message.
- Repeat the steps from c to d.

At the same time, the following programs were executed:

- Executed "Read\_WiFi\_BT\_SD\_RS232.exe" to scanner read bar-code and sent message to PC.
- Executed "Windows Media Player.exe" to play music to earphone.
- Executed "EMCTEST.exe" to read and write data from micro SD card.
- Executed "Hyper Terminal.exe" to link with the EUT to receive and transmit data via RS232.
- Executed "WiFi.exe" to link with the remote workstation to receive and transmit data by Wireless AP.
- Executed "Bluetooth.exe" to link with the remote workstation to receive and transmit voice by Bluetooth headset.
- Executed "Active Sync" to link with PC to EUT and transmit data by USB cable.

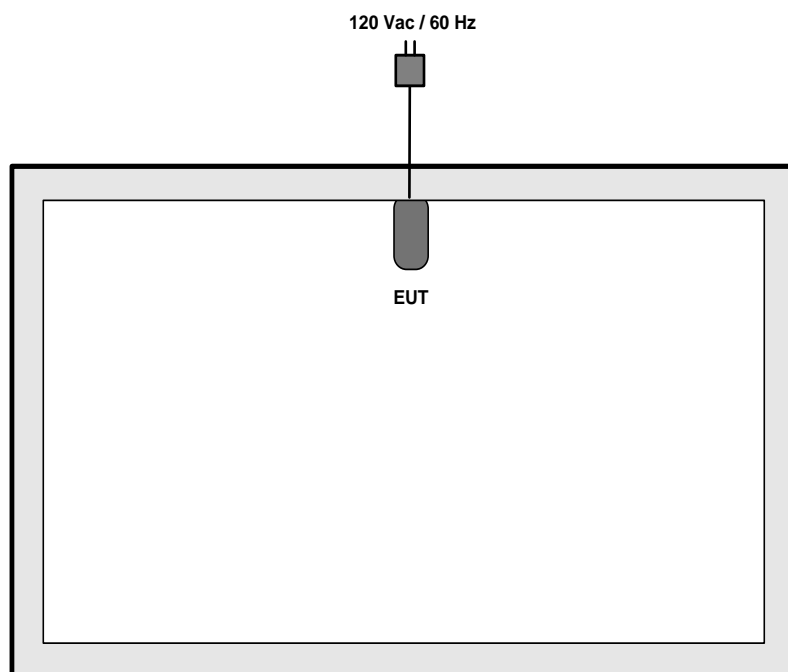
### Radiated Emissions:

- Executed "SRU-30AG" to keep transmitting signals at fixed frequency.

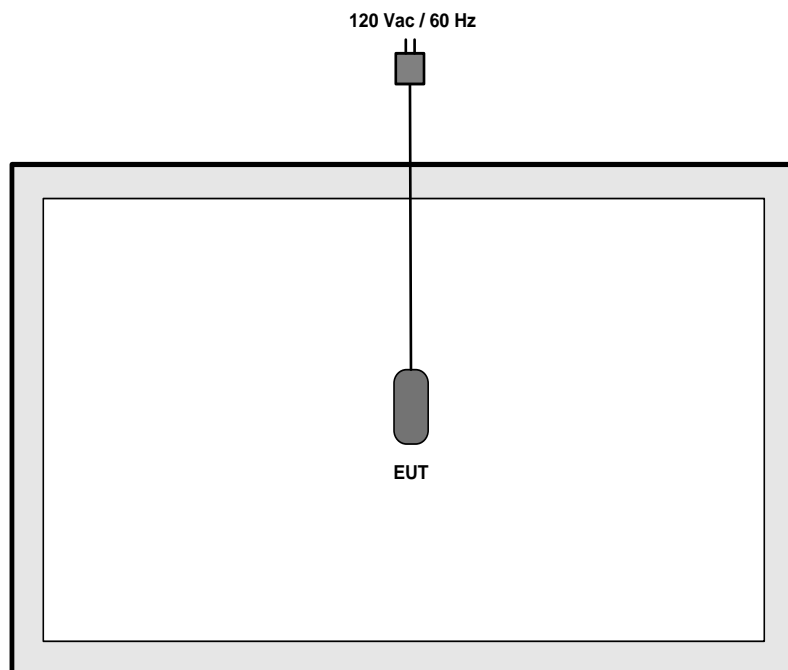


## 2.8 Test Configuration

### Radiation Emissions Test Configuration For radiated emissions 9kHz~1GHz



### For radiated emissions above 1GHz



### 3 TEST RESULT

#### 3.1 AC Power Line Conducted Emissions Measurement

##### 3.1.1 Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

##### **Class B**

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

##### 3.1.2 Measuring Instruments and Setting

Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

##### 3.1.3 Test Procedures

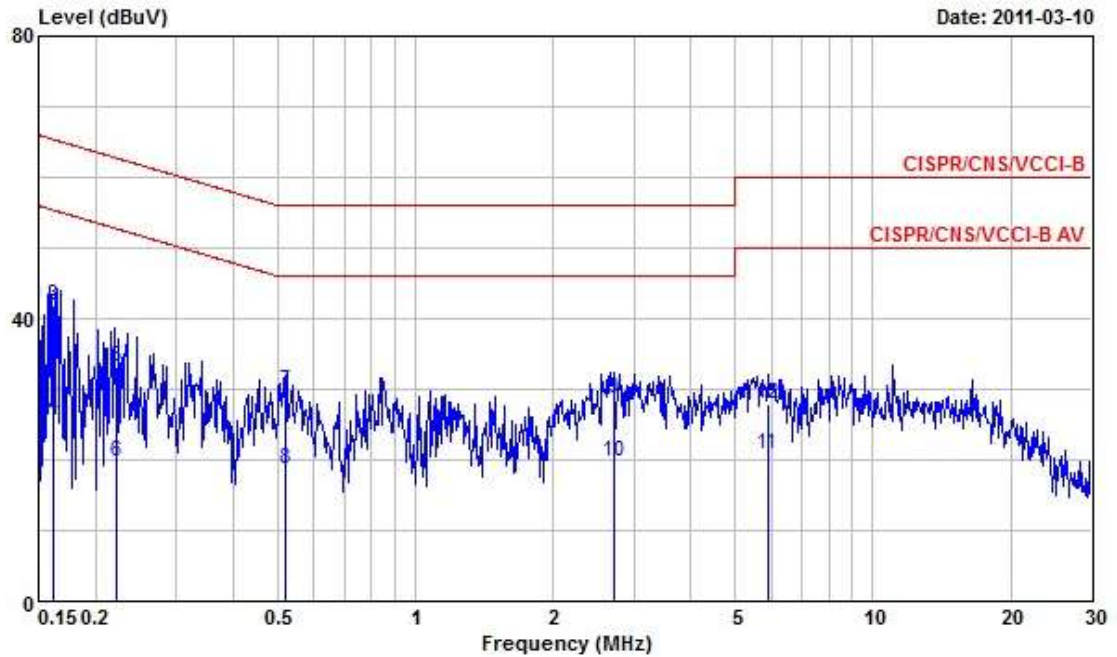
1. The EUT warm up about 15 minutes then start test.
2. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. The measurement has to be done between each power line and ground at the power terminal.



## 3.1.7 Results of AC Power Line Conducted Emissions Measurement

<b>Final Test Date</b>	Mar. 10, 2011	<b>Test Site No.</b>	CO04-HY
<b>Temperature</b>	22.3°C	<b>Humidity</b>	54.6%
<b>Test Engineer</b>	Jason	<b>Configuration</b>	Normal Mode

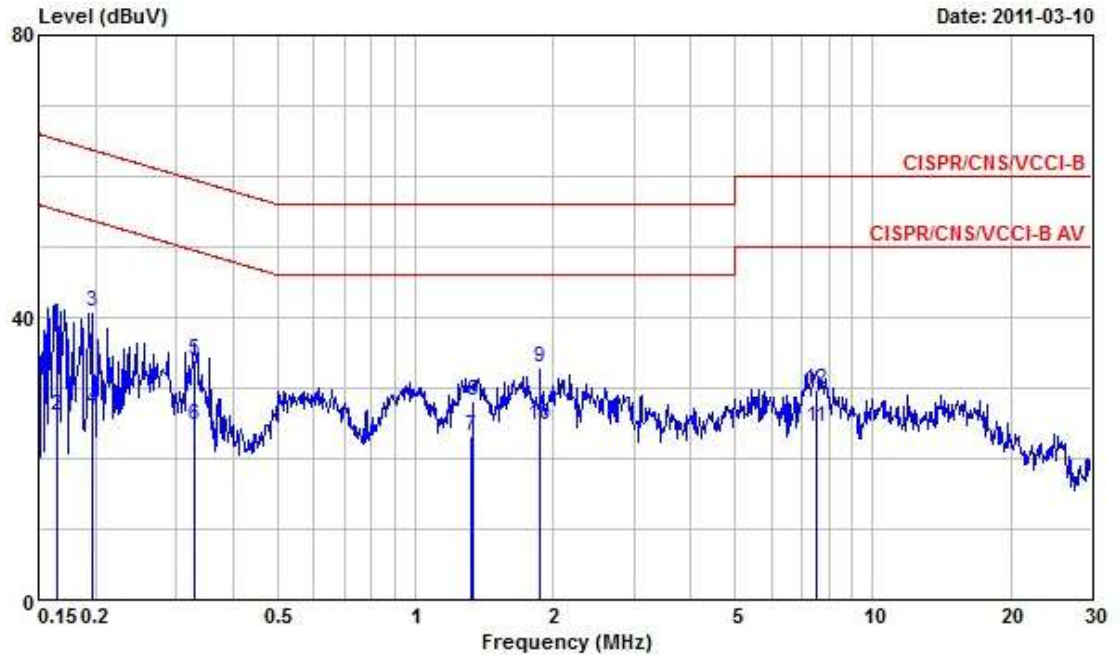
Line



1. 0.1500000  
 2. 0.1500000  
 3. 0.1616020  
 4. 0.1616020  
 5. 0.2215340  
 6. 0.2215340  
 7. 0.5175120  
 8. 0.5175120  
 9. 2.710  
 10. 2.710  
 11. 5.900  
 12. 5.900

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1500000	41.94	-24.06	66.00	41.58	0.30	0.06	QP
2	0.1500000	23.17	-32.83	56.00	22.81	0.30	0.06	Average
3	0.1616020	41.97	-23.41	65.38	41.60	0.30	0.07	QP
4	0.1616020	26.07	-29.31	55.38	25.70	0.30	0.07	Average
5	0.2215340	33.13	-29.63	62.76	32.75	0.30	0.08	QP
6	0.2215340	19.79	-32.97	52.76	19.41	0.30	0.08	Average
7	0.5175120	29.82	-26.18	56.00	29.50	0.29	0.03	QP
8	0.5175120	18.73	-27.27	46.00	18.41	0.29	0.03	Average
9	2.710	28.56	-27.44	56.00	28.14	0.32	0.10	QP
10	2.710	19.78	-26.22	46.00	19.36	0.32	0.10	Average
11	5.900	20.73	-29.27	50.00	20.24	0.39	0.10	Average
12	5.900	27.77	-32.23	60.00	27.28	0.39	0.10	QP

## Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1641380	39.05	-26.20	65.25	38.72	0.26	0.07	QP
2	0.1641380	26.04	-29.21	55.25	25.71	0.26	0.07	Average
3	0.1972380	40.67	-23.06	63.73	40.32	0.25	0.10	QP
4	0.1972380	26.94	-26.79	53.73	26.59	0.25	0.10	Average
5	0.3303280	33.99	-25.45	59.44	33.72	0.24	0.03	QP
6	0.3303280	24.69	-24.75	49.44	24.42	0.24	0.03	Average
7	1.326	23.11	-22.89	46.00	22.75	0.26	0.10	Average
8	1.330	28.15	-27.85	56.00	27.79	0.26	0.10	QP
9	1.870	32.93	-23.07	56.00	32.56	0.27	0.10	QP
10	1.870	24.74	-21.26	46.00	24.37	0.27	0.10	Average
11	7.530	24.51	-25.49	50.00	24.05	0.36	0.10	Average
12	7.530	29.70	-30.30	60.00	29.24	0.36	0.10	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

## 3.2 Peak Output Power Measurement

### 3.2.1 Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limit has to be reduced by the amount in dB that the gain of the antenna exceeds 6dBi. In case of point-to-multipoint antenna reduction operation, the limit has to be reduced by 1dB for every dB that the directional gain of the antenna exceeds 6dBi. Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

### 3.2.2 Measuring Instruments and Setting

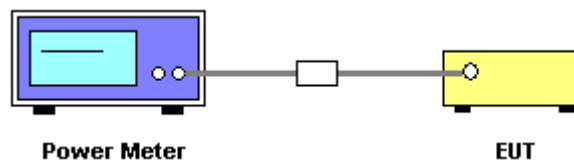
Please refer to section 4 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Filter No.	Auto
Measurement time	0.135 s ~ 26 s
Used Peak Sensor	MA2411B

### 3.2.3 Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the peak power value.
3. Repeat above procedures on all channels needed to be tested.

### 3.2.4 Test Setup Layout



### 3.2.5 Test Deviation

There is no deviation with the original standard.

### 3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

**3.2.7 Test Result of Peak Output Power**

<b>Final Test Date</b>	Mar. 05, 2011	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	20°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	802.11a/b/g

**Configuration IEEE 802.11a**

<b>Channel</b>	<b>Frequency</b>	<b>Conducted Power (dBm)</b>	<b>Max. Limit (dBm)</b>	<b>Result</b>
149	5745 MHz	15.23	30.00	<b>Complies</b>
157	5785 MHz	15.09	30.00	<b>Complies</b>
165	5825 MHz	15.19	30.00	<b>Complies</b>

**Configuration IEEE 802.11b**

<b>Channel</b>	<b>Frequency</b>	<b>Conducted Power (dBm)</b>	<b>Max. Limit (dBm)</b>	<b>Result</b>
1	2412 MHz	16.48	30.00	<b>Complies</b>
6	2437 MHz	15.42	30.00	<b>Complies</b>
11	2462 MHz	15.63	30.00	<b>Complies</b>

**Configuration IEEE 802.11g**

<b>Channel</b>	<b>Frequency</b>	<b>Conducted Power (dBm)</b>	<b>Max. Limit (dBm)</b>	<b>Result</b>
1	2412 MHz	21.85	30.00	<b>Complies</b>
6	2437 MHz	21.15	30.00	<b>Complies</b>
11	2462 MHz	21.34	30.00	<b>Complies</b>

### 3.3 Power Spectral Density Measurement

#### 3.3.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### 3.3.2 Measuring Instruments and Setting

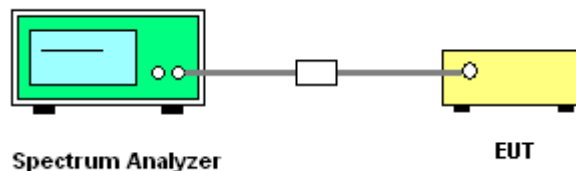
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	1.5MHz
RB	3 kHz
VB	30 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	500s

#### 3.3.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 3 kHz and VBW to 30 kHz. Set Detector to Peak, Trace to Max Hold.
3. Mark the frequency with maximum peak power as the center of the display of the spectrum.
4. Set the span to 1.5MHz and the sweep time to 500s and record the maximum peak value.

#### 3.3.4 Test Setup Layout



#### 3.3.5 Test Deviation

There is no deviation with the original standard.

#### 3.3.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



**3.3.7 Test Result of Power Spectral Density**

<b>Final Test Date</b>	Apr. 15, 2011	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	20°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	802.11a/b/g

**Configuration IEEE 802.11a**

<b>Channel</b>	<b>Frequency</b>	<b>Power Density (dBm)</b>	<b>Max. Limit (dBm)</b>	<b>Result</b>
149	5745 MHz	-19.42	8.00	<b>Complies</b>
157	5785 MHz	-18.37	8.00	<b>Complies</b>
165	5825 MHz	-19.54	8.00	<b>Complies</b>

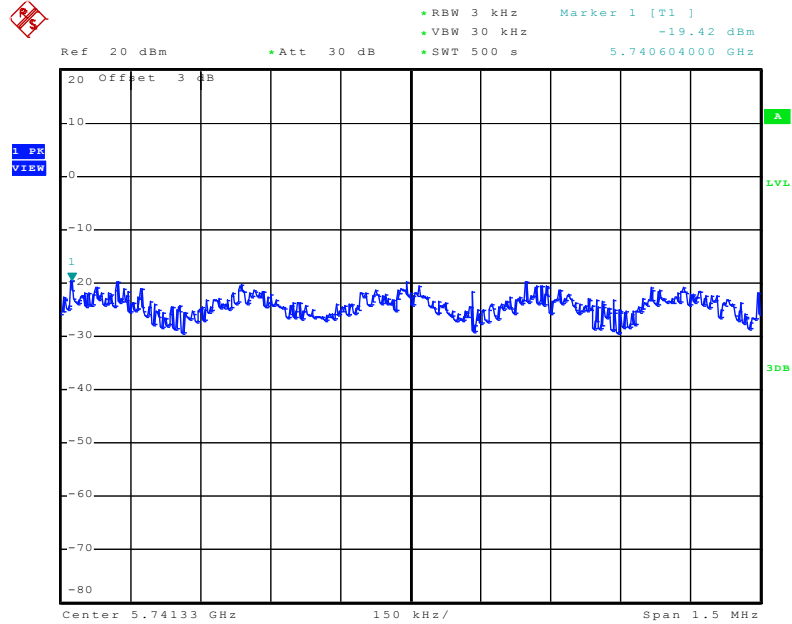
**Configuration IEEE 802.11b**

<b>Channel</b>	<b>Frequency</b>	<b>Power Density (dBm)</b>	<b>Max. Limit (dBm)</b>	<b>Result</b>
1	2412 MHz	-11.25	8.00	<b>Complies</b>
6	2437 MHz	-11.33	8.00	<b>Complies</b>
11	2462 MHz	-11.98	8.00	<b>Complies</b>

**Configuration IEEE 802.11g**

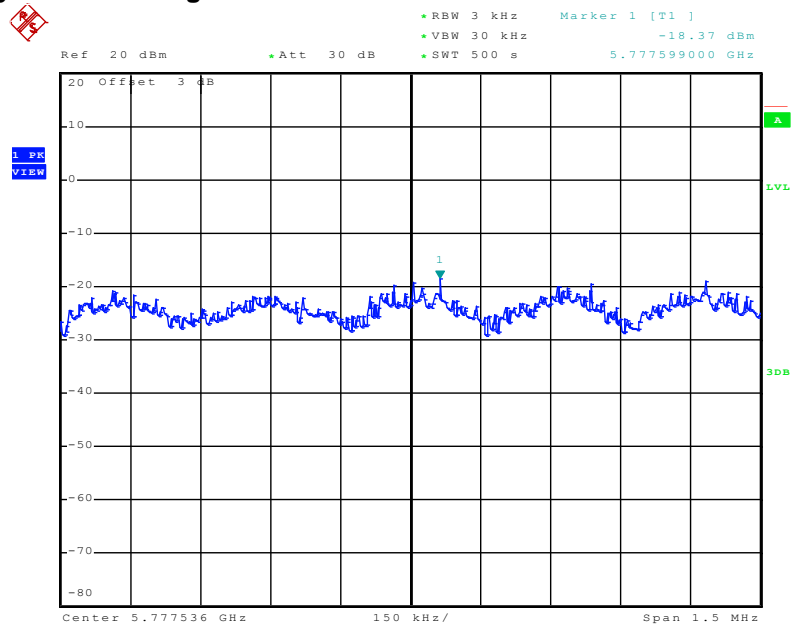
<b>Channel</b>	<b>Frequency</b>	<b>Power Density (dBm)</b>	<b>Max. Limit (dBm)</b>	<b>Result</b>
1	2412 MHz	-15.03	8.00	<b>Complies</b>
6	2437 MHz	-15.53	8.00	<b>Complies</b>
11	2462 MHz	-16.55	8.00	<b>Complies</b>

## Power Density Plot on Configuration IEEE 802.11a / 5745 MHz



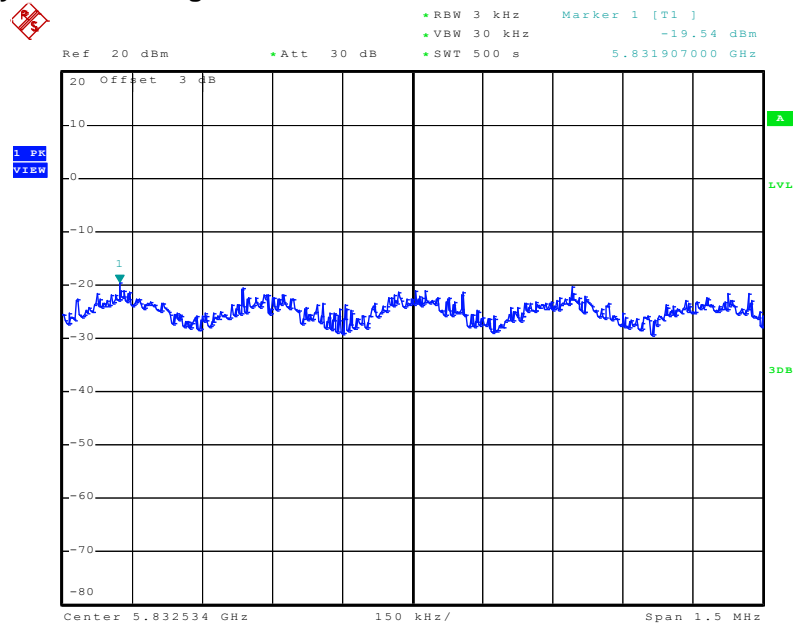
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## Power Density Plot on Configuration IEEE 802.11a / 5785 MHz



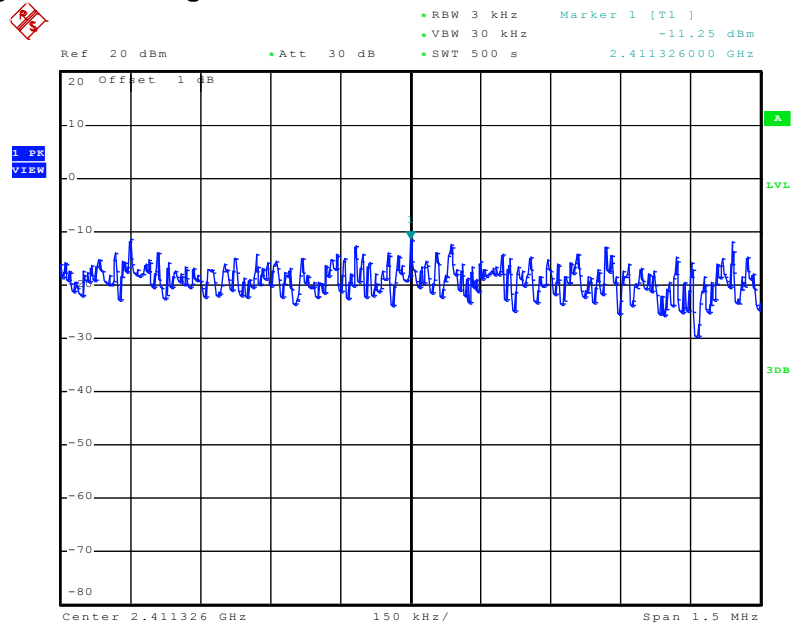
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## Power Density Plot on Configuration IEEE 802.11a / 5825 MHz



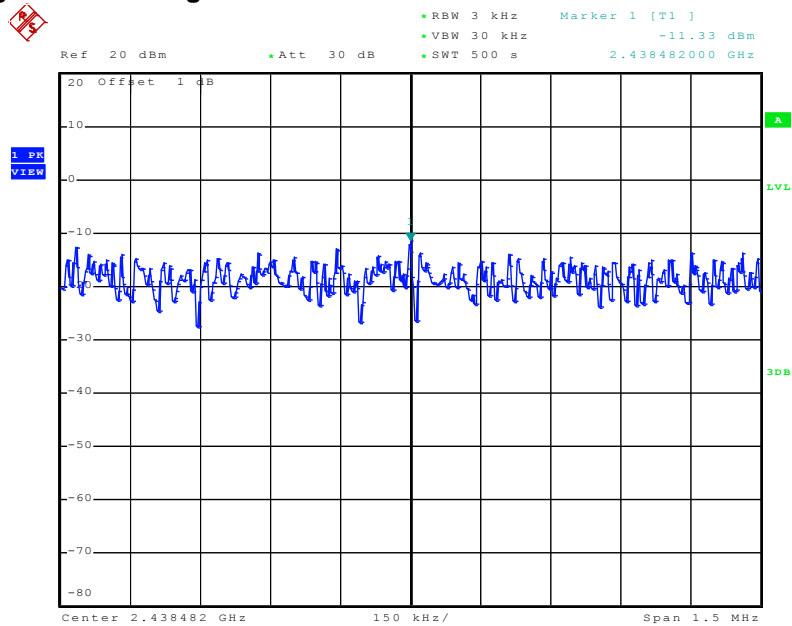
Date: 15.APR.2011 18:02:16

## Power Density Plot on Configuration IEEE 802.11b / 2412 MHz



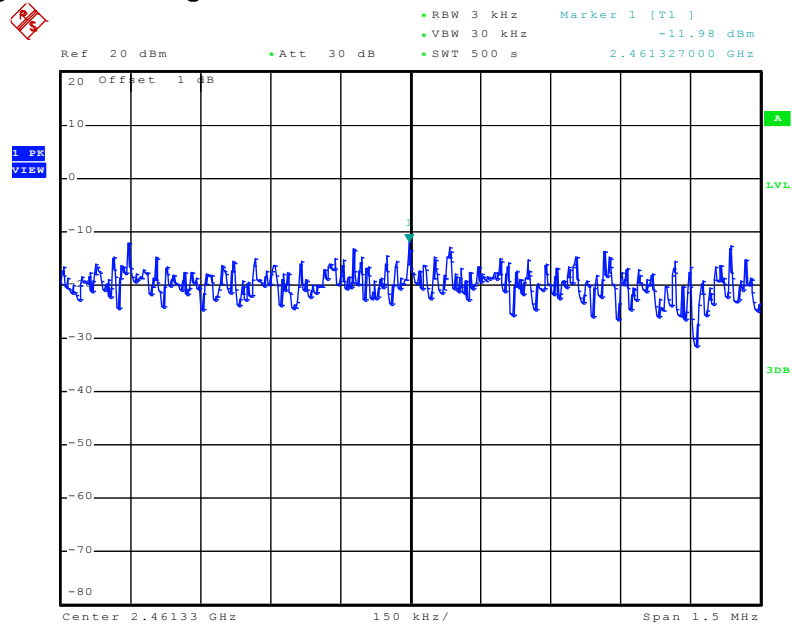
Date: 7.MAR.2011 10:36:27

## Power Density Plot on Configuration IEEE 802.11b / 2437 MHz



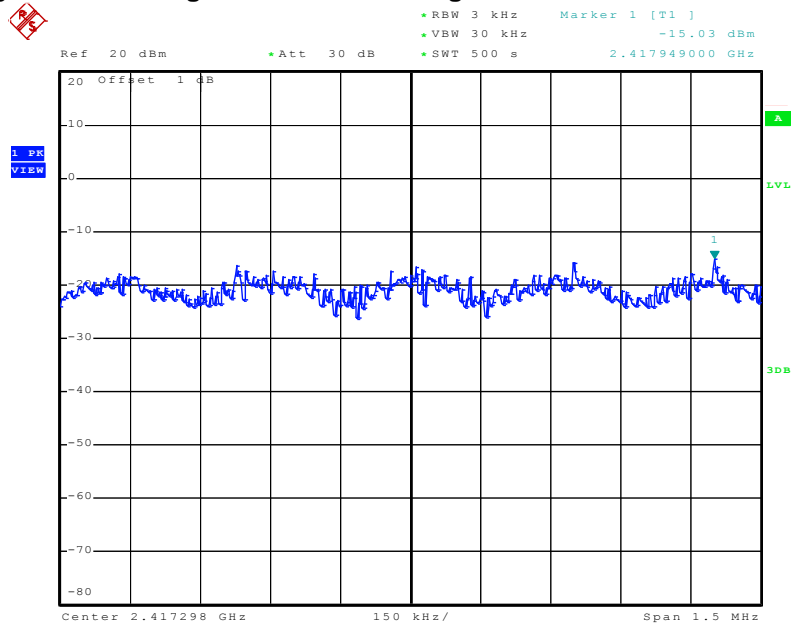
Date: 7.MAR.2011 10:38:46

## Power Density Plot on Configuration IEEE 802.11b / 2462 MHz



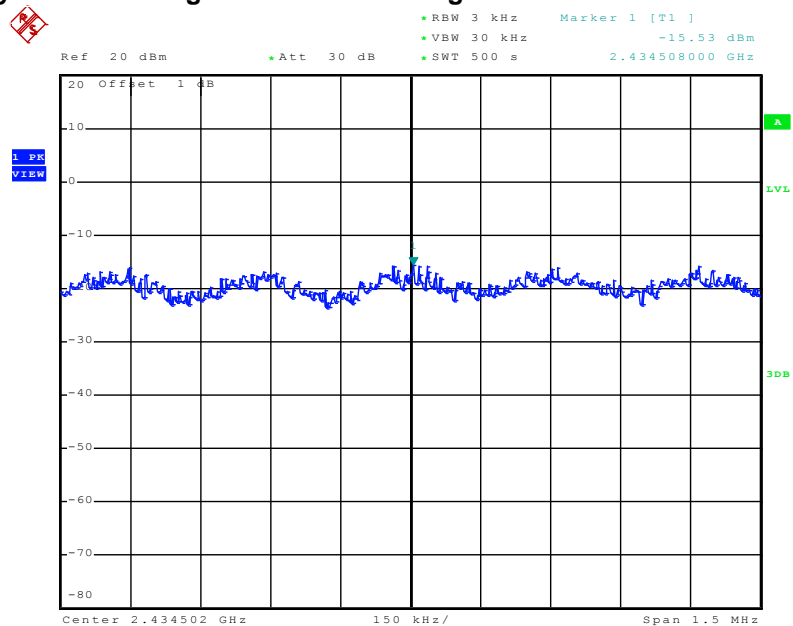
Date: 7.MAR.2011 10:40:21

## Power Density Plot on Configuration IEEE 802.11g / 2412 MHz



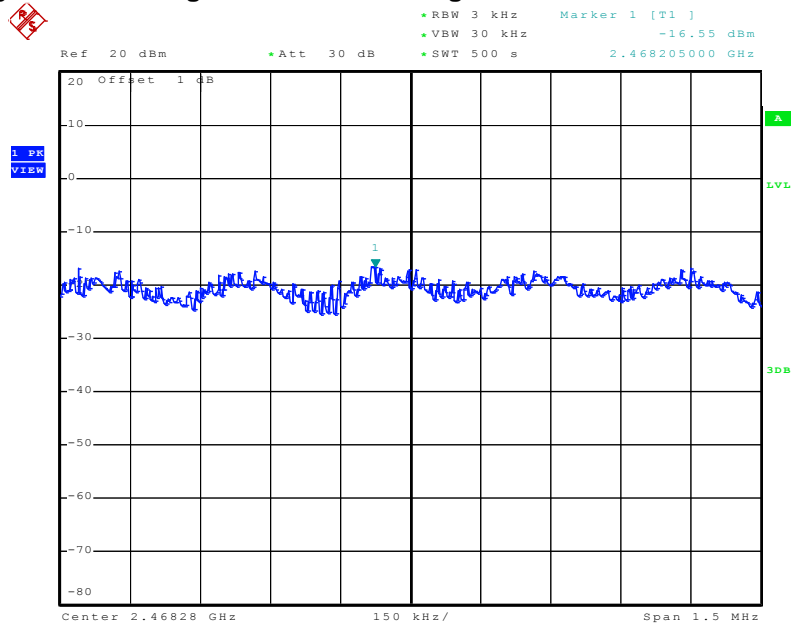
Date: 7.MAR.2011 10:42:40

## Power Density Plot on Configuration IEEE 802.11g / 2437 MHz



Date: 7.MAR.2011 10:45:02

## Power Density Plot on Configuration IEEE 802.11g / 2462 MHz



Date: 7.MAR.2011 10:47:25

### 3.4 6dB Spectrum Bandwidth Measurement

#### 3.4.1 Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

#### 3.4.2 Measuring Instruments and Setting

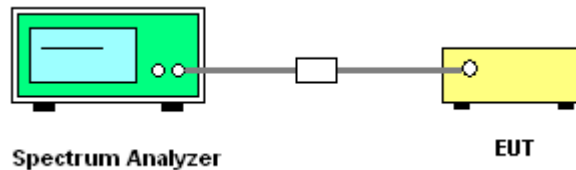
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 3.4.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

#### 3.4.4 Test Setup Layout



#### 3.4.5 Test Deviation

There is no deviation with the original standard.

#### 3.4.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



**3.4.7 Test Result of 6dB Spectrum Bandwidth**

<b>Final Test Date</b>	Apr. 15, 2011	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	20°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	802.11a/b/g

**Configuration IEEE 802.11a**

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	16.40	16.52	500	<b>Complies</b>
157	5785 MHz	16.40	16.52	500	<b>Complies</b>
165	5825 MHz	16.40	16.52	500	<b>Complies</b>

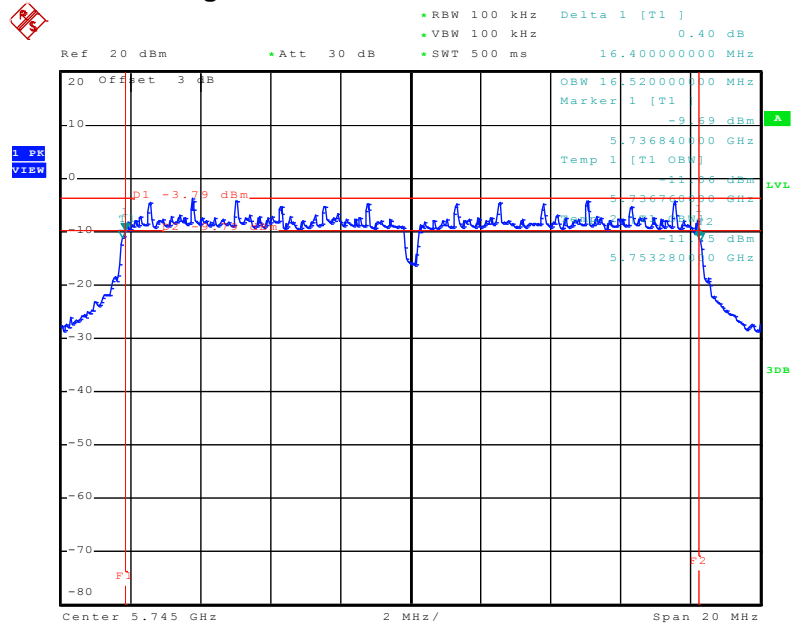
**Configuration IEEE 802.11b**

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	12.56	15.64	500	<b>Complies</b>
6	2437 MHz	12.12	15.60	500	<b>Complies</b>
11	2462 MHz	11.56	15.64	500	<b>Complies</b>

**Configuration IEEE 802.11g**

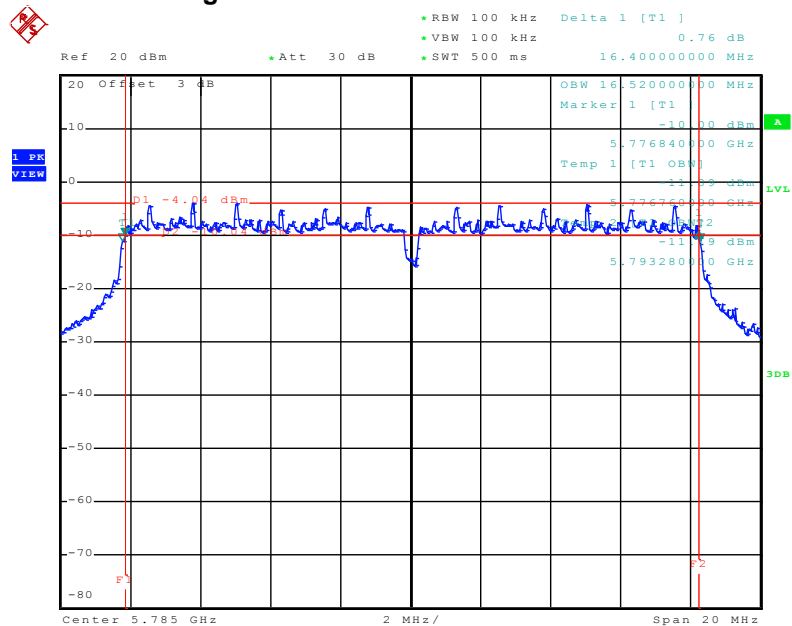
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.40	16.52	500	<b>Complies</b>
6	2437 MHz	16.40	16.52	500	<b>Complies</b>
11	2462 MHz	16.40	16.48	500	<b>Complies</b>

## 6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5745 MHz



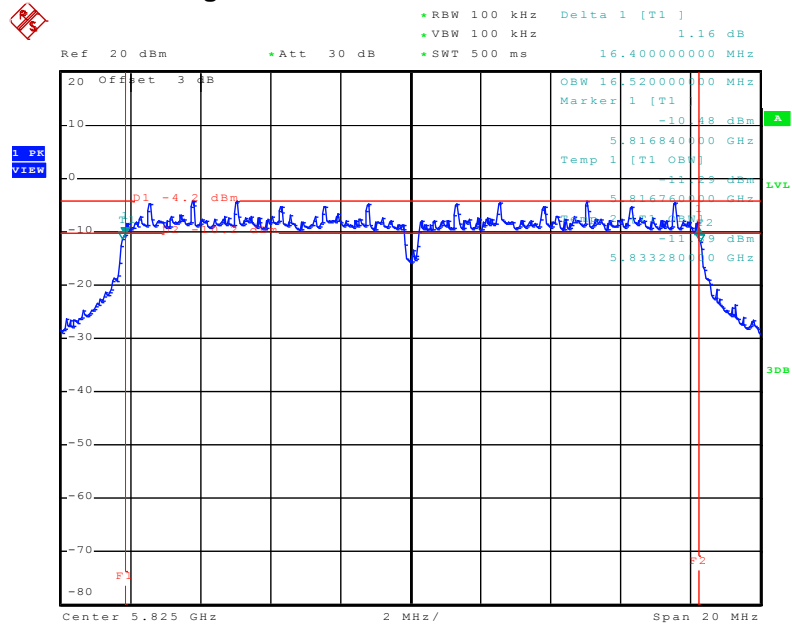
Date: 15.APR.2011 17:45:53

## 6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5785 MHz



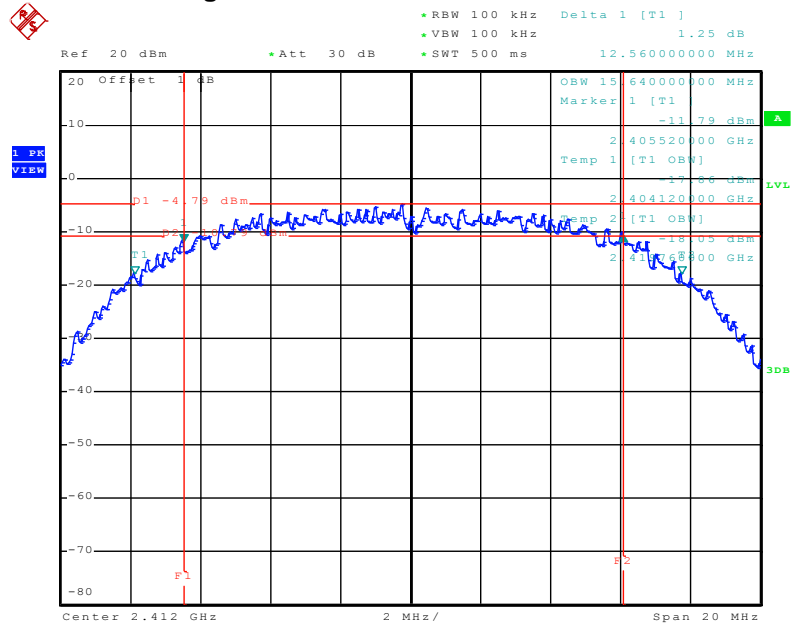
Date: 15.APR.2011 17:55:14

## 6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5825 MHz



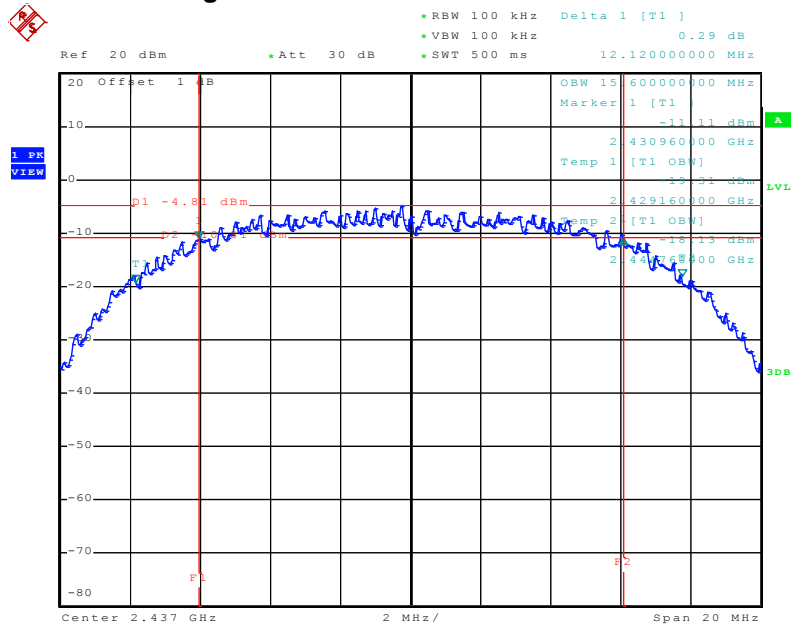
Date: 15.APR.2011 17:59:34

## 6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2412 MHz



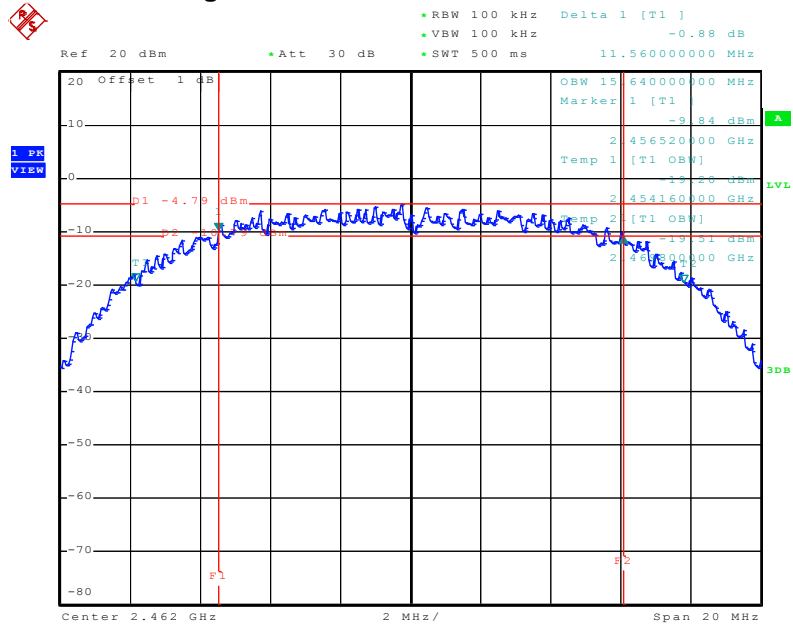
Date: 5.MAR.2011 17:07:28

## 6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2437 MHz



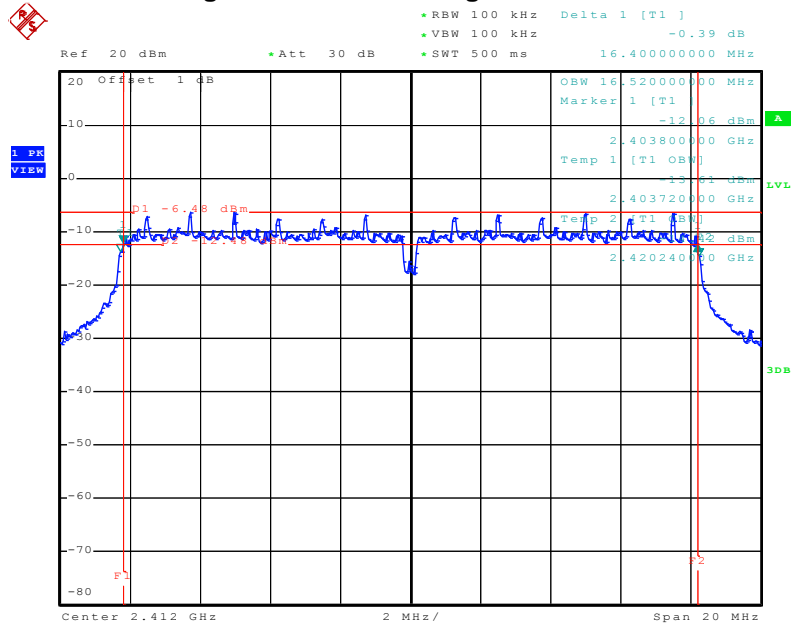
Date: 5.MAR.2011 17:12:25

## 6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2462 MHz



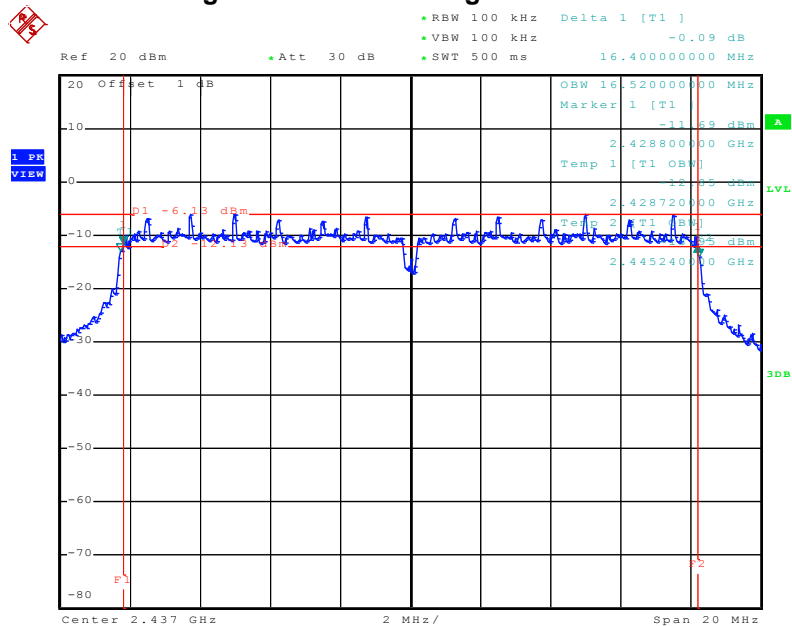
Date: 5.MAR.2011 17:17:55

## 6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2412 MHz



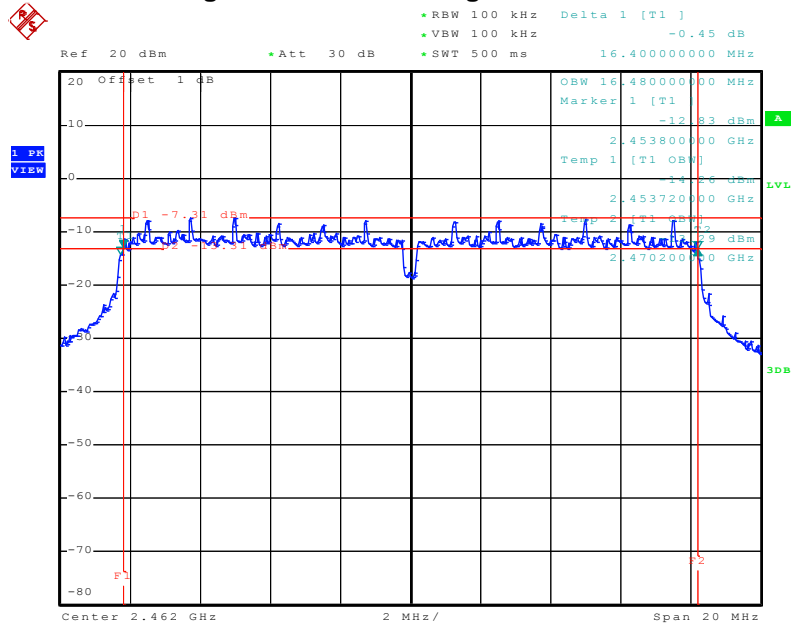
Date: 5.MAR.2011 14:42:01

## 6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz



Date: 5.MAR.2011 15:51:12

### 6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2462 MHz



Date: 5.MAR.2011 16:00:38

### 3.5 Radiated Emissions Measurement

#### 3.5.1 Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequencies (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

#### 3.5.2 Measuring Instruments and Setting

Please refer to section 4 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

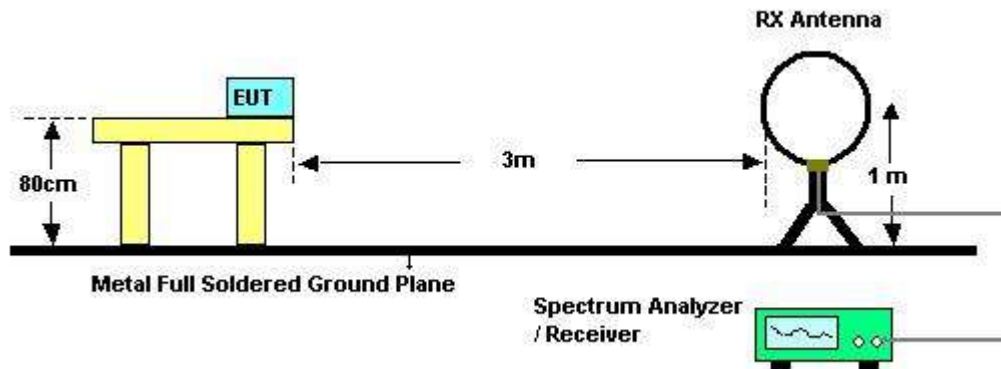


**3.5.3 Test Procedures**

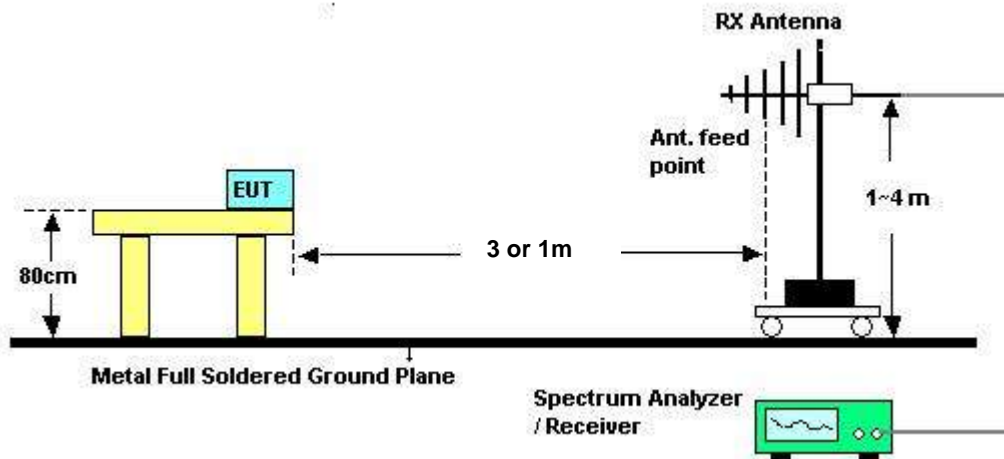
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

### 3.5.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor =  $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

### 3.5.5 Test Deviation

There is no deviation with the original standard.

### 3.5.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

**3.5.7 Results of Radiated Emissions (9kHz~30MHz)**

<b>Final Test Date</b>	Feb. 17, 2011	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	22.9℃	<b>Humidity</b>	53%
<b>Test Engineer</b>	Daniel		

<b>Freq. (MHz)</b>	<b>Level (dBuV)</b>	<b>Over Limit (dB)</b>	<b>Limit Line (dBuV)</b>	<b>Remark</b>
-	-	-	-	See Note

**Note:**

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

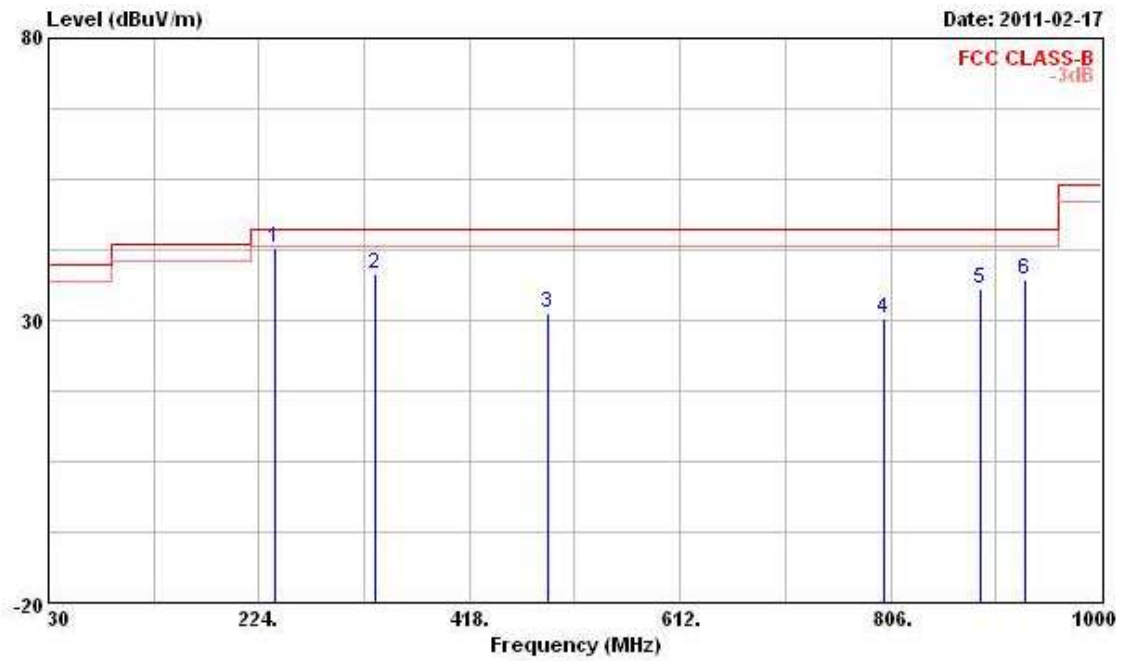
Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

## 3.5.8 Results of Radiated Emissions (30MHz~1GHz)

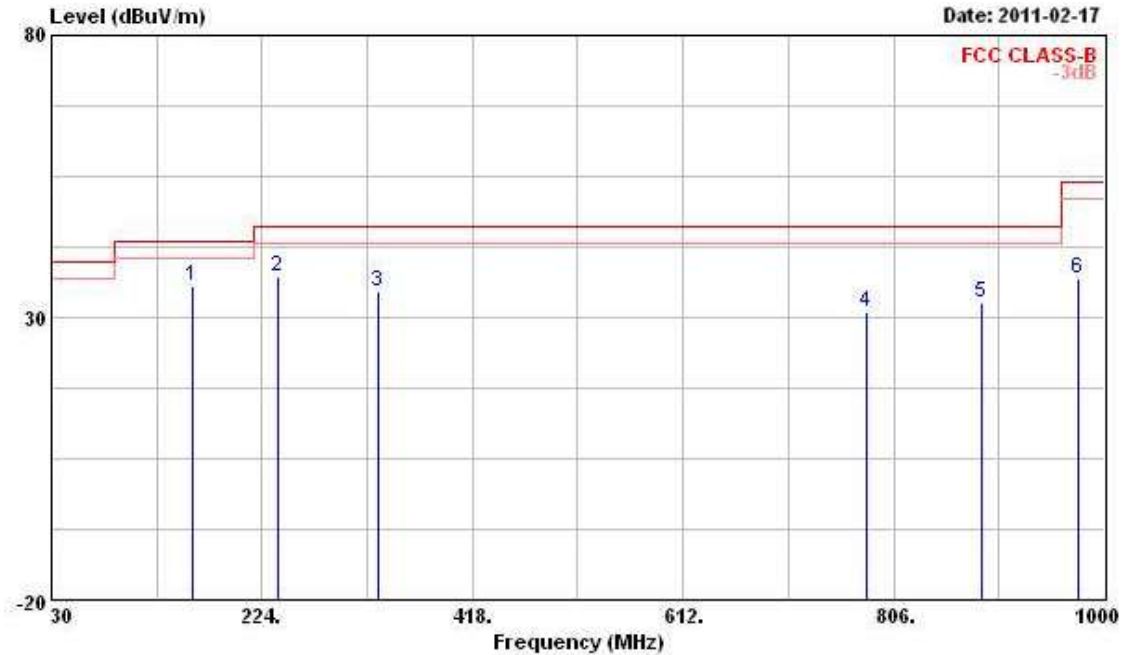
Final Test Date	Feb. 17, 2011	Test Site No.	03CH02-HY
Temperature	22.9℃	Humidity	53%
Test Engineer	Daniel	Configurations	Normal Mode

## Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	238.550	42.88	-3.12	46.00	53.17	12.62	3.96	26.87	Peak
2	330.700	38.25	-7.75	46.00	46.62	14.19	4.47	27.03	Peak
3	490.750	31.23	-14.77	46.00	36.17	17.10	6.10	28.14	Peak
4	800.180	30.37	-15.63	46.00	29.96	20.27	7.86	27.72	Peak
5	889.420	35.59	-10.41	46.00	33.42	20.05	9.51	27.39	Peak
6	929.190	37.18	-8.82	46.00	34.18	20.75	9.52	27.27	Peak

## Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	159.980	35.54	-7.96	43.50	49.27	10.55	3.09	27.37	Peak
2	238.550	37.33	-8.67	46.00	47.62	12.62	3.96	26.87	Peak
3	330.700	34.45	-11.55	46.00	42.82	14.19	4.47	27.03	Peak
4	780.780	31.10	-14.90	46.00	31.07	19.99	7.82	27.78	Peak
5	886.510	32.76	-13.24	46.00	30.68	20.06	9.42	27.40	Peak
6	975.750	36.77	-17.23	54.00	32.95	21.90	9.04	27.12	Peak

## Note:

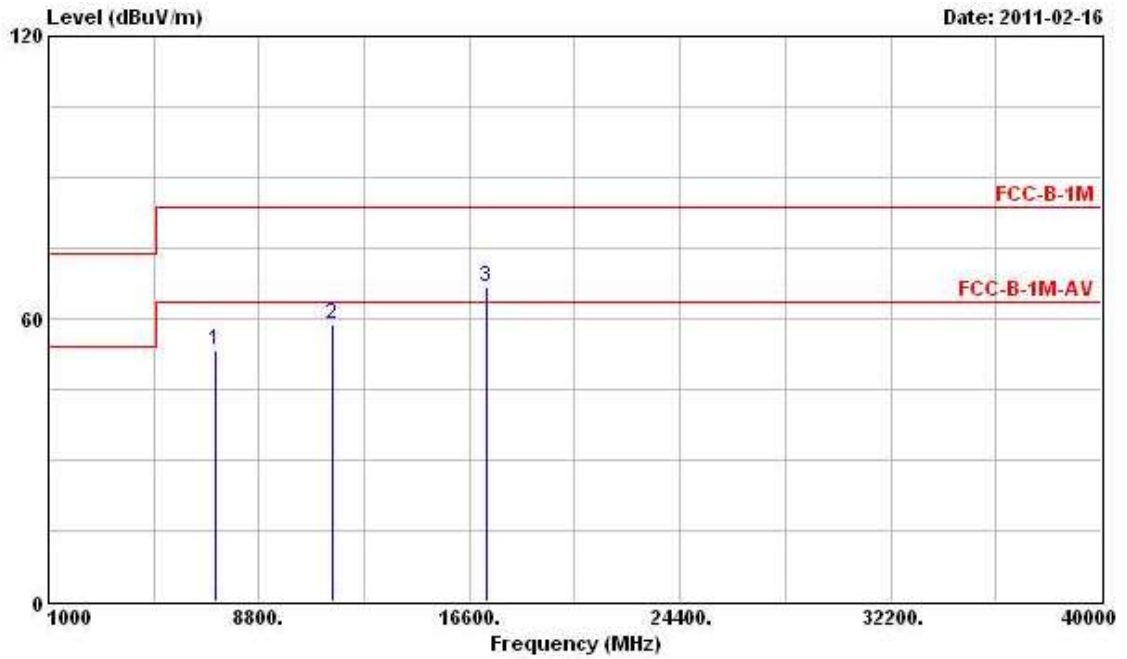
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.5.9 Results for Radiated Emissions (1GHz~10<sup>th</sup> Harmonic)

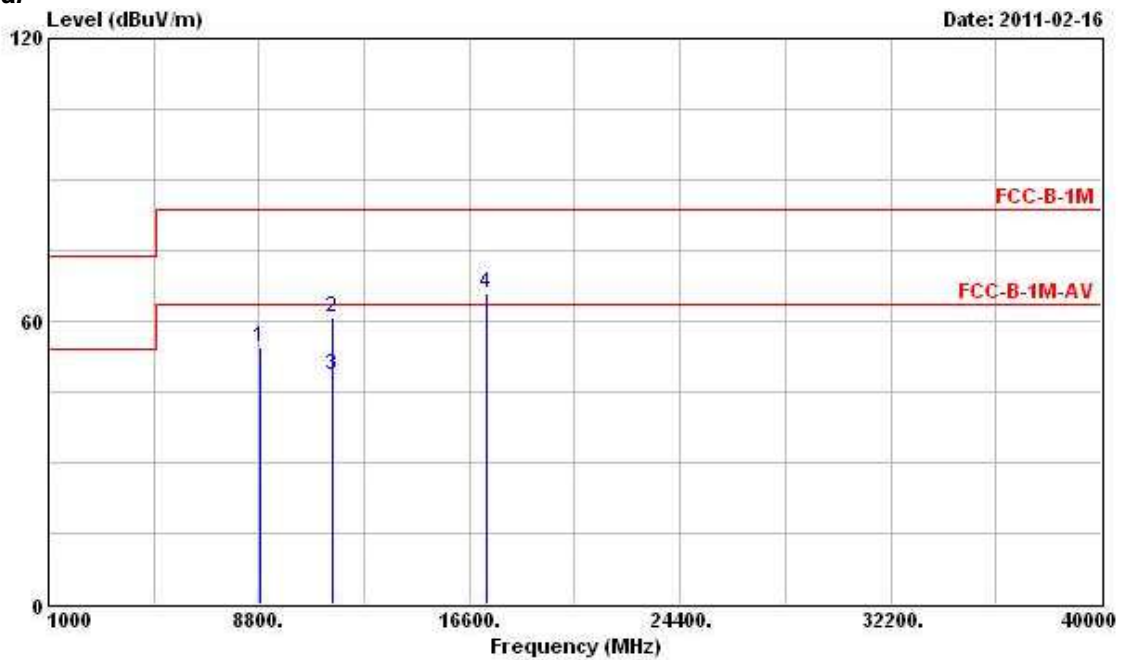
<b>Final Test Date</b>	Feb. 16, 2011	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	22.9℃	<b>Humidity</b>	53%
<b>Test Engineer</b>	Daniel	<b>Configuration</b>	802.11a Ch. 149

**Horizontal**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	7189.000	53.13			43.96	37.84	5.62	34.29	Peak
2	@11490.000	58.82	-4.72	63.54	45.24	40.59	6.63	33.64	PK
3	17235.000	66.70			46.82	43.56	8.55	32.23	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

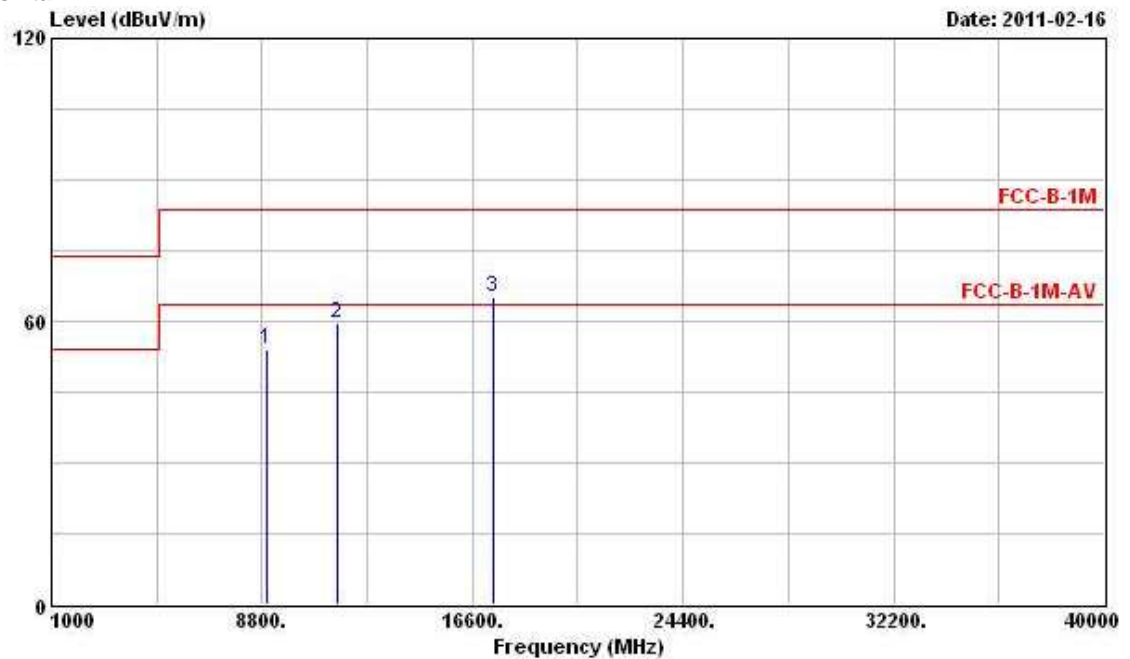
Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8822.000	54.62			44.83	38.25	6.09	34.55	Peak
2	11490.000	60.94	-22.60	83.54	47.36	40.59	6.63	33.64	Peak
3	11490.000	48.74	-14.80	63.54	35.16	40.59	6.63	33.64	Average
4	17235.000	66.02			46.14	43.56	8.55	32.23	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Feb. 16, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11a Ch. 157

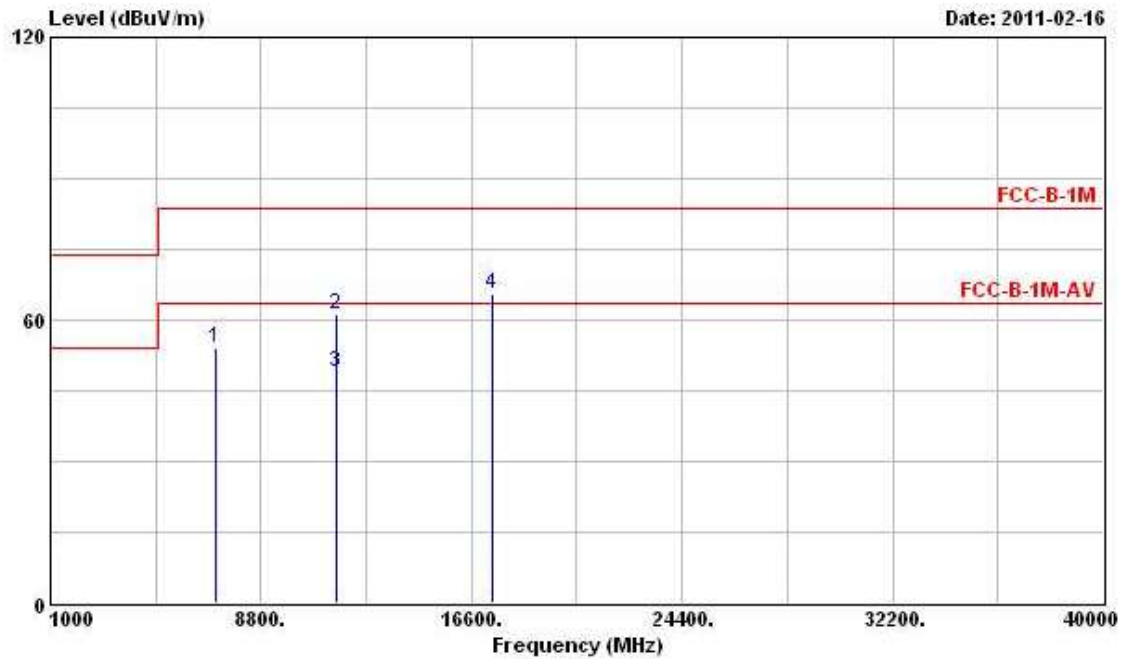
**Horizontal**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8970.000	53.97			44.41	38.13	6.14	34.71	Peak
2	11570.000	59.72	-3.82	63.54	46.09	40.63	6.63	33.63	PK
3	17355.000	65.11			45.32	43.49	8.50	32.20	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).



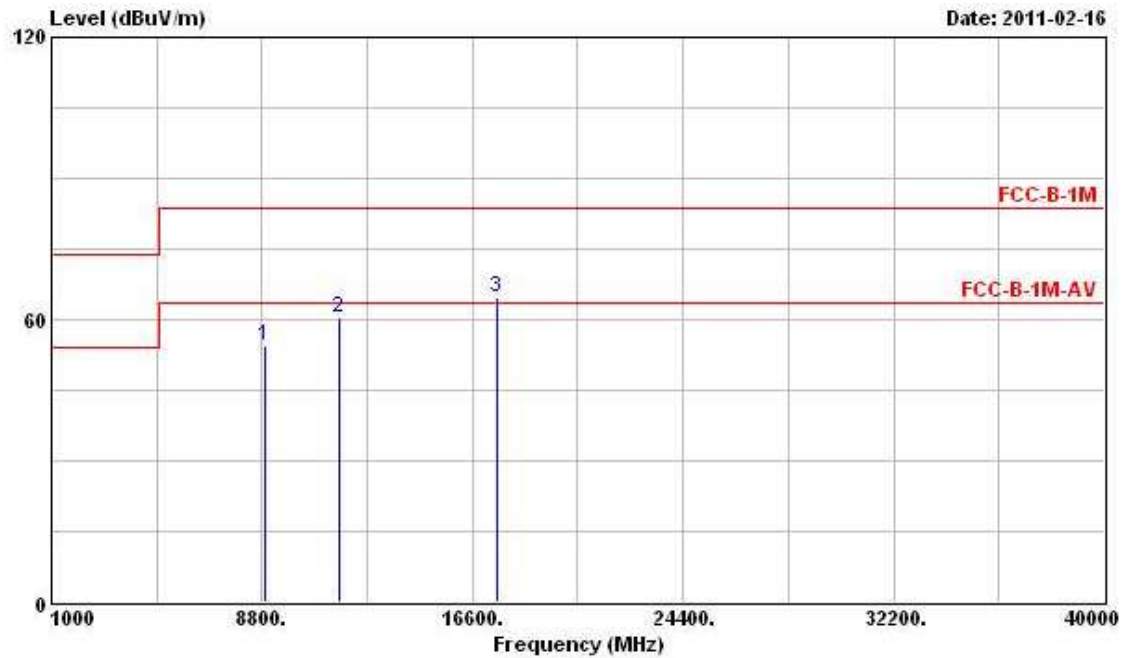
## Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	7147.000	54.19			45.02	37.83	5.62	34.28	Peak
2	11570.000	61.12	-22.42	83.54	47.49	40.63	6.63	33.63	Peak
3	11570.000	48.79	-14.75	63.54	35.16	40.63	6.63	33.63	Average
4	17355.000	65.36			45.57	43.49	8.50	32.20	Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

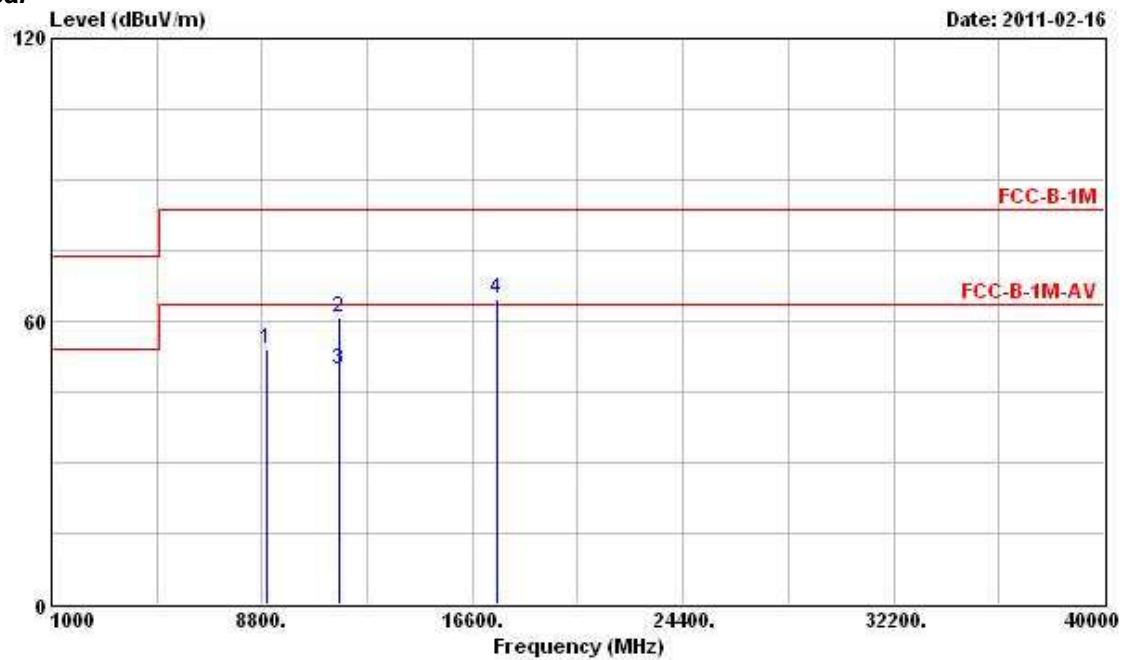
Final Test Date	Feb. 16, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11a Ch. 165

**Horizontal**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	8907.000	54.37			44.69	38.18	6.13	34.63	Peak
2	11650.000	60.52	-3.02	63.54	46.82	40.66	6.64	33.60	PK
3	17475.000	64.56			44.86	43.42	8.44	32.16	Peak

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical



FCC-B-1M FCC-B-1M-AV FCC-B-1M-AV

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Remark
			dB	dBuV/m	dBuV	dB/m	dB	dB
1	8970.000	54.22			44.66	38.13	6.14	34.71 Peak
2	11650.000	60.78	-22.76	83.54	47.08	40.66	6.64	33.60 Peak
3	11650.000	49.67	-13.87	63.54	35.97	40.66	6.64	33.60 Average
4	17475.000	64.89			45.19	43.42	8.44	32.16 Peak

Note: The items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Feb. 15, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11b Ch. 1

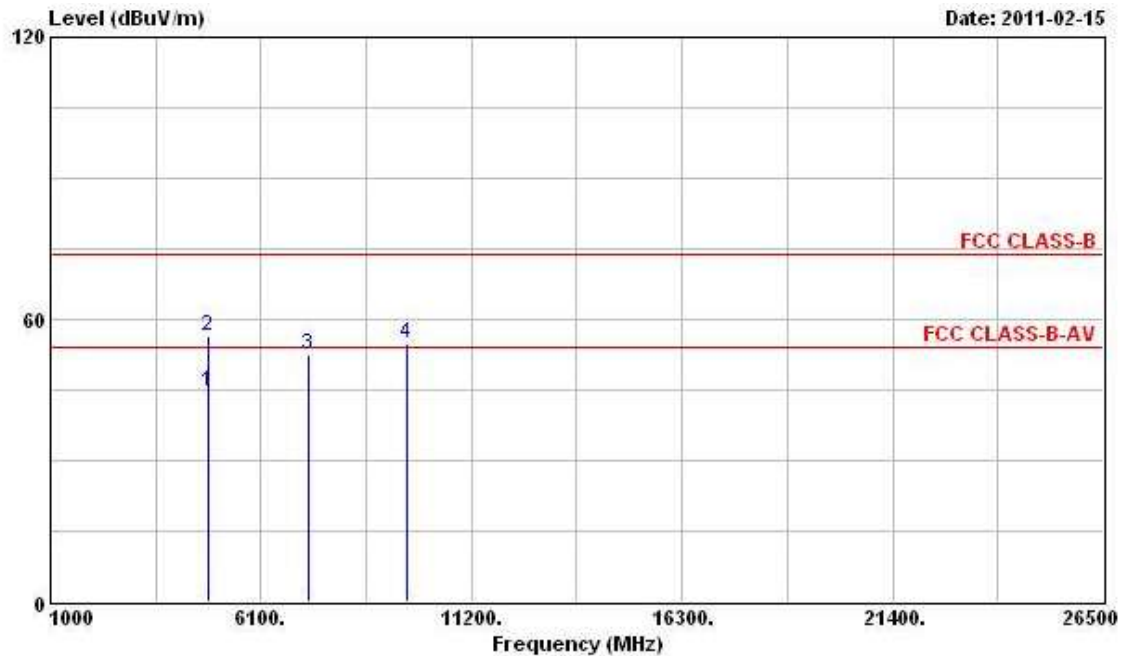
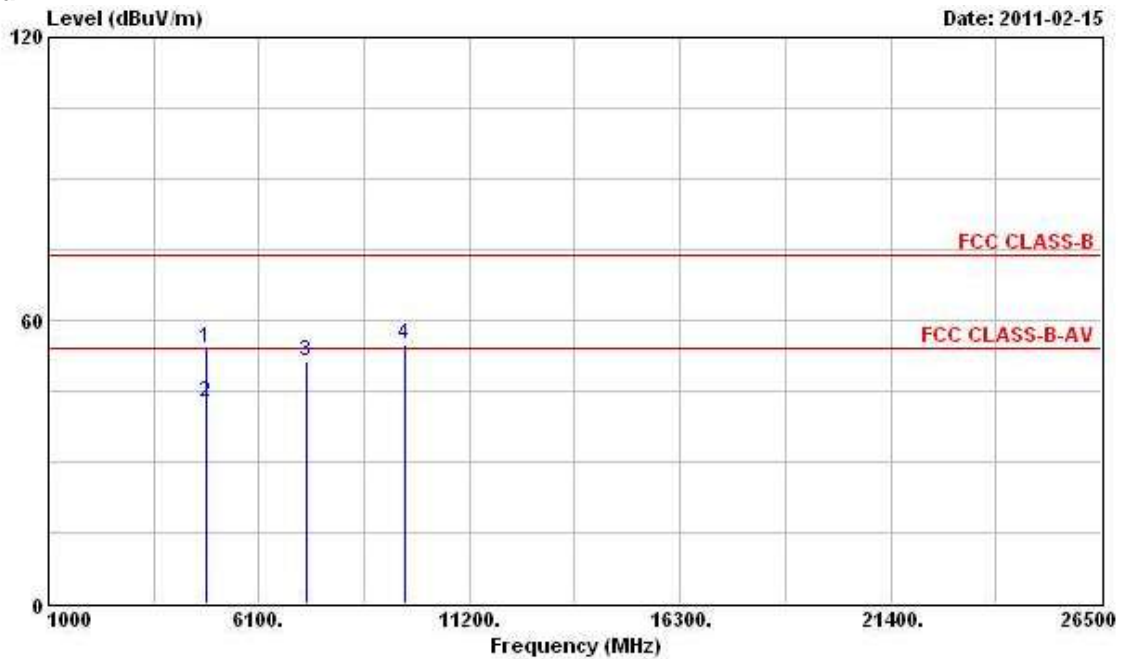
**Horizontal**

TABLE 2

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.000	44.73	-9.27	54.00	38.90	35.76	4.58	34.51	Average
2	4824.000	56.42	-17.58	74.00	50.59	35.76	4.58	34.51	Peak
3	7236.000	52.32			43.13	37.85	5.63	34.29	Peak
4	9648.000	54.99			43.89	39.39	6.34	34.63	Peak

Note: The items 3 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

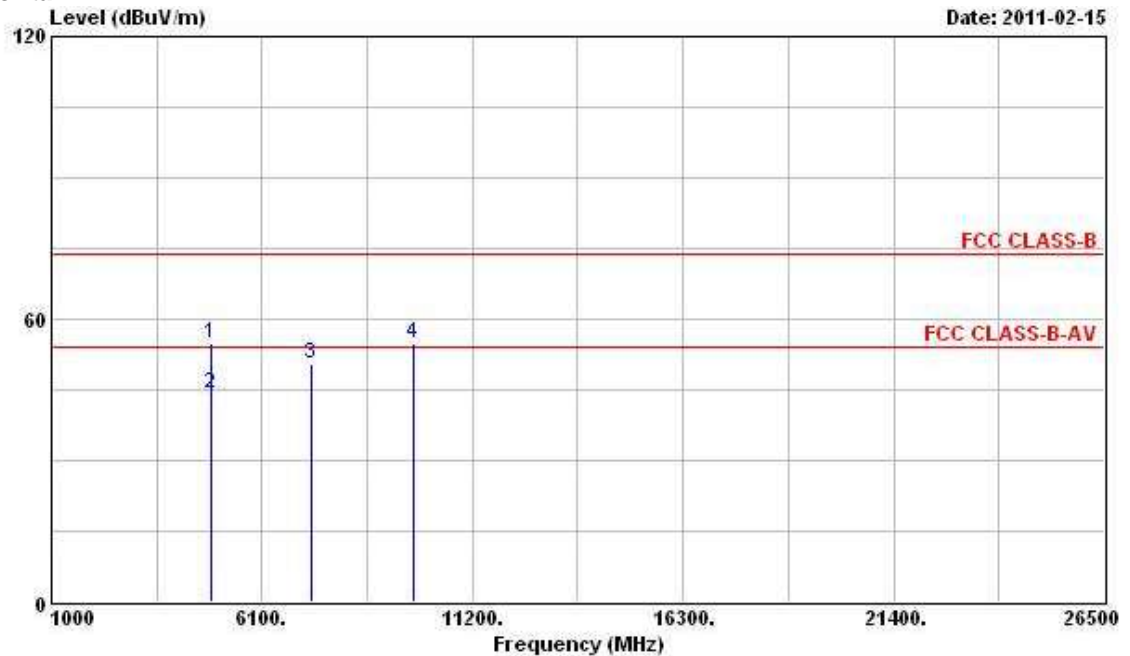
## Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB
1	4824.000	54.13	-19.87	74.00	48.93	35.13	4.58	34.51 Peak
2	4824.000	42.70	-11.30	54.00	37.50	35.13	4.58	34.51 Average
3	7236.000	51.20			42.96	36.90	5.63	34.29 Peak
4	9648.000	55.01			44.71	38.59	6.34	34.63 Peak

Note: The items 3 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

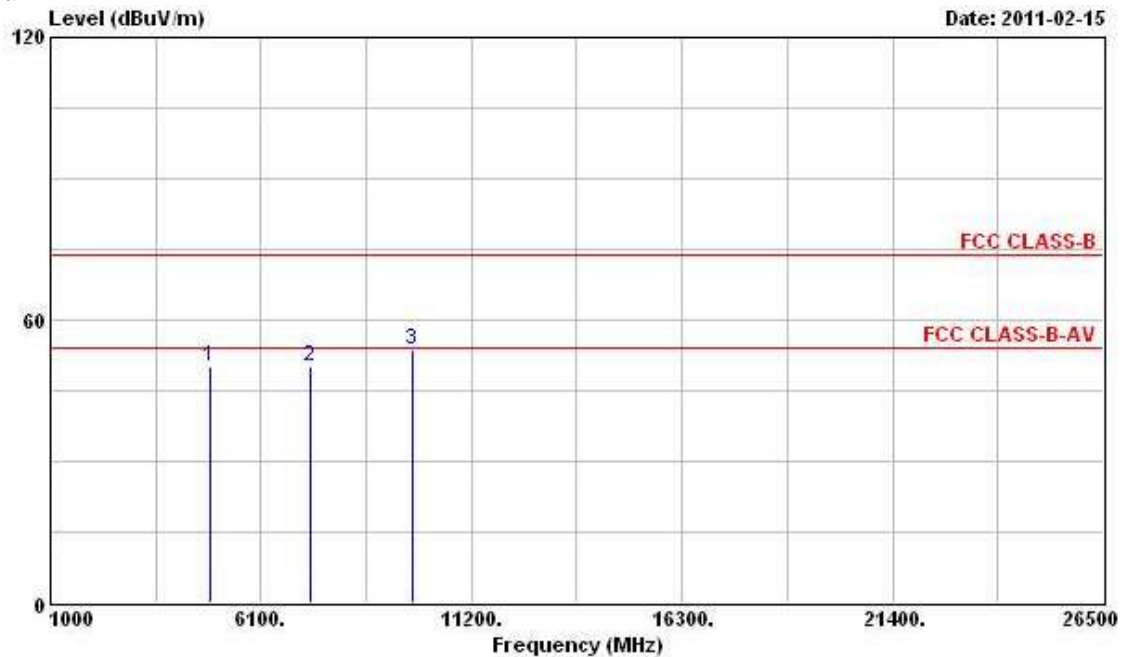
Final Test Date	Feb. 15, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11b Ch. 6

**Horizontal**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	54.86	-19.14	74.00	48.87	35.83	4.61	34.45	Peak
2	4874.000	44.06	-9.94	54.00	38.07	35.83	4.61	34.45	Average
3	7311.000	50.39	-3.61	54.00	41.18	37.86	5.64	34.29	PK
4	9748.000	54.92			43.63	39.51	6.36	34.58	Peak

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

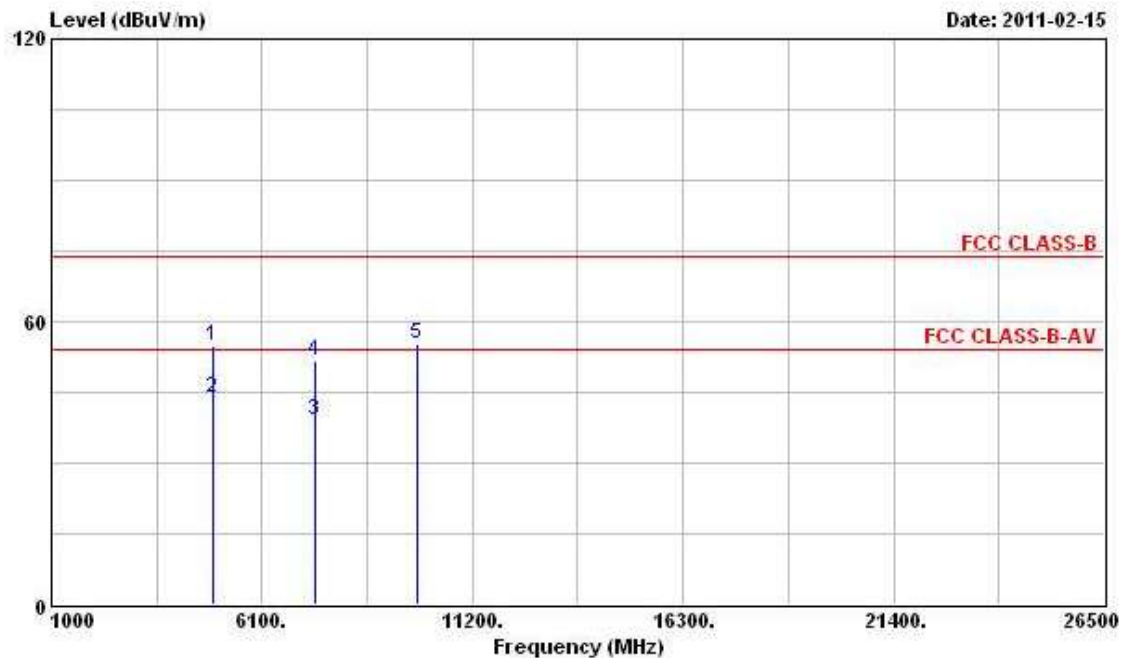
## Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	50.26	-3.74	54.00	44.92	35.18	4.61	34.45	PK
2	7311.000	50.05	-3.95	54.00	41.78	36.92	5.64	34.29	PK
3	9748.000	53.72			43.23	38.71	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Feb. 15, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11b Ch. 11

**Horizontal**

E:\EXPORT\2011\02\15

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	55.03	-18.97	74.00	48.83	35.90	4.68	34.38	Peak
2	4924.000	43.78	-10.22	54.00	37.58	35.90	4.68	34.38	Average
3	7386.000	38.99	-15.01	54.00	29.75	37.88	5.65	34.29	Average
4	7386.000	51.65	-22.35	74.00	42.41	37.88	5.65	34.29	Peak
5	9848.000	55.44			43.99	39.61	6.38	34.54	Peak

Note: The item 5 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).



## Vertical

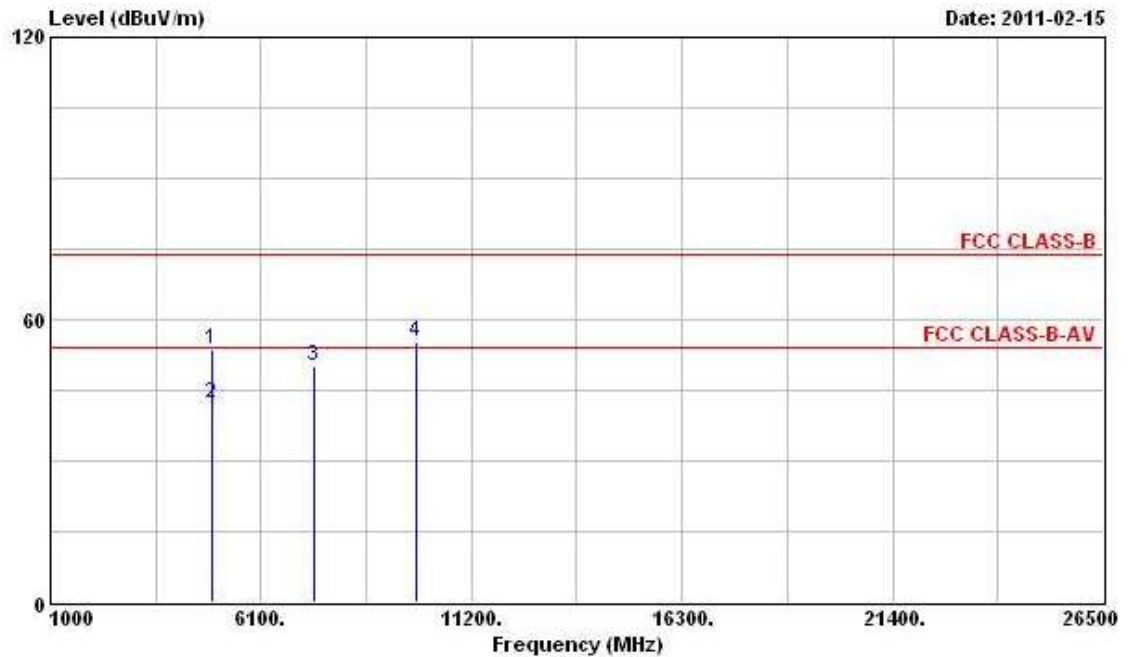
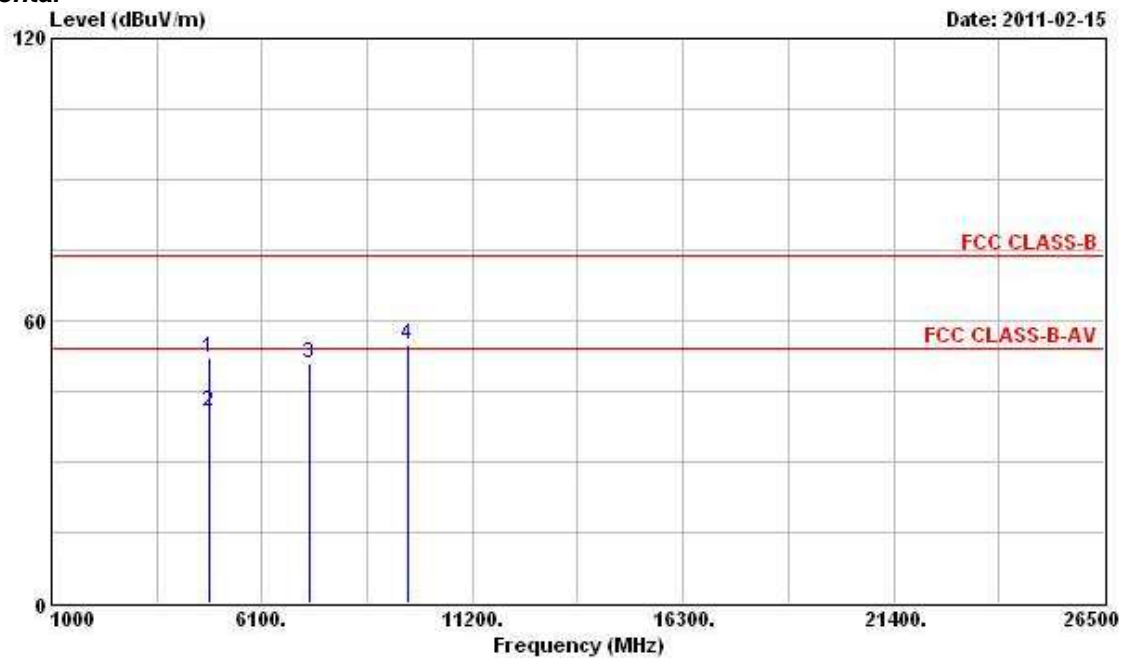


TABLE 2

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB
1	4924.000	53.54	-20.46	74.00	48.01	35.23	4.68	34.38 Peak
2	4924.000	42.10	-11.90	54.00	36.57	35.23	4.68	34.38 Average
3	7386.000	50.03	-3.97	54.00	41.71	36.96	5.65	34.29 PK
4	9848.000	55.27			44.62	38.81	6.38	34.54 Peak

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

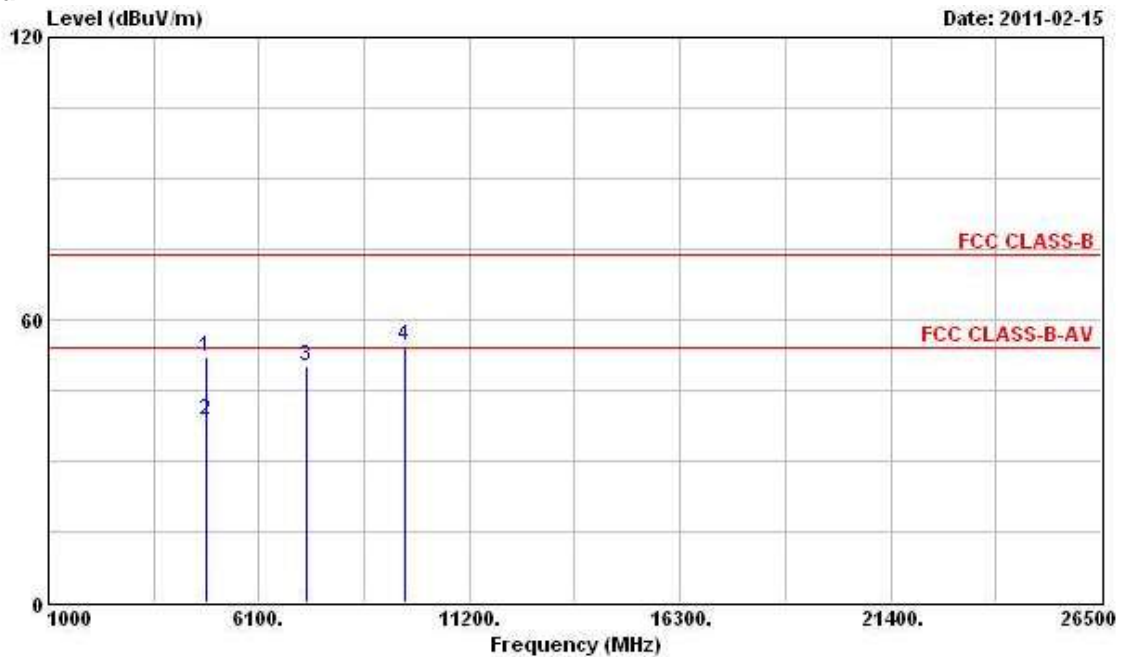
Final Test Date	Feb. 15, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11g Ch. 1

**Horizontal**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.000	52.26	-21.74	74.00	46.43	35.76	4.58	34.51	Peak
2	4824.000	40.67	-13.33	54.00	34.84	35.76	4.58	34.51	Average
3	7236.000	50.97			41.78	37.85	5.63	34.29	Peak
4	9648.000	54.85			43.75	39.39	6.34	34.63	Peak

Note: The items 3 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

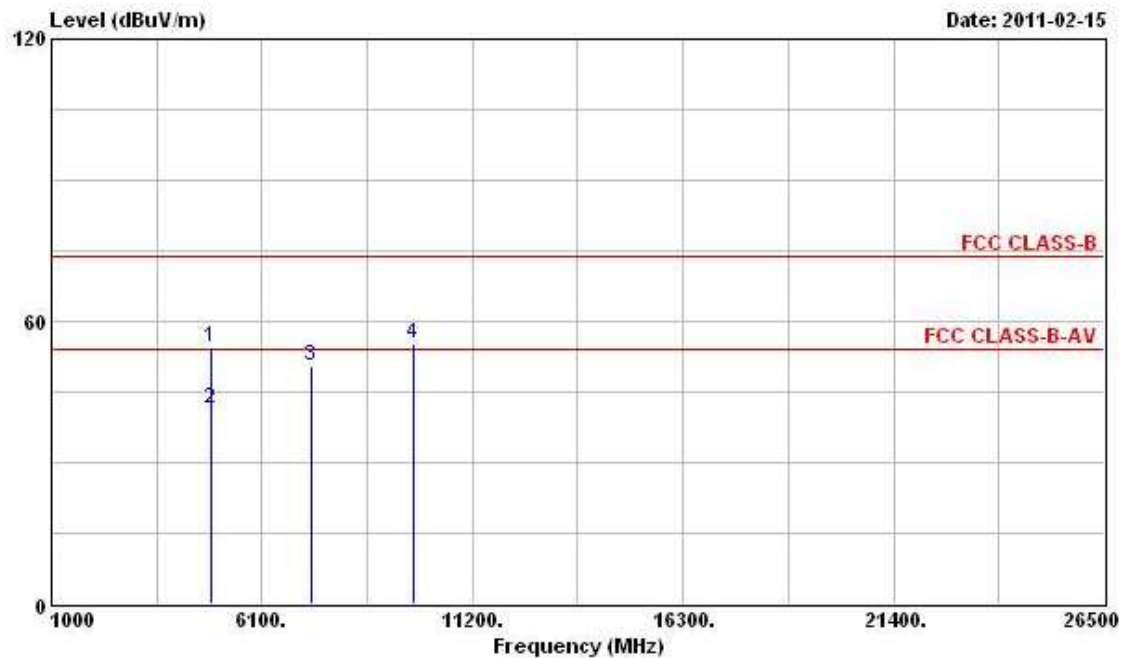
## Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4824.000	52.15	-21.85	74.00	46.95	35.13	4.58	34.51	Peak
2	4824.000	38.62	-15.38	54.00	33.42	35.13	4.58	34.51	Average
3	7236.000	50.14			41.90	36.90	5.63	34.29	Peak
4	9648.000	54.62			44.32	38.59	6.34	34.63	Peak

Note: The items 3 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

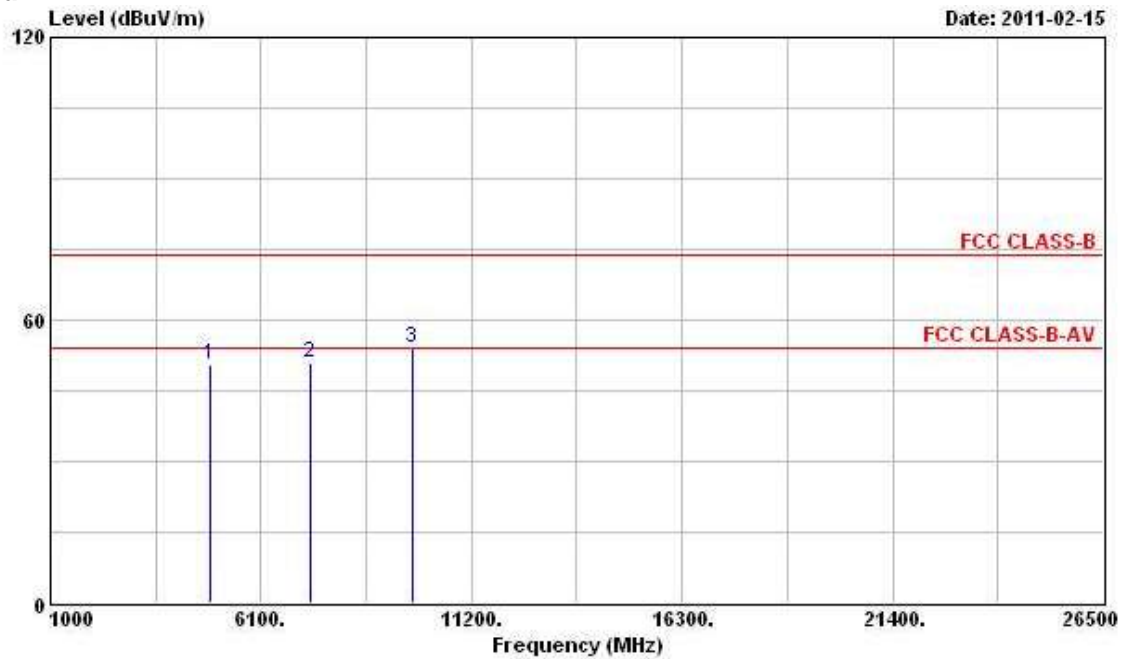
Final Test Date	Feb. 15, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11g Ch. 6

**Horizontal**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	54.29	-19.71	74.00	48.30	35.83	4.61	34.45	Peak
2	4874.000	41.27	-12.73	54.00	35.28	35.83	4.61	34.45	Average
3	7311.000	50.62	-3.38	54.00	41.41	37.86	5.64	34.29	PK
4	9748.000	55.09			43.80	39.51	6.36	34.58	Peak

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

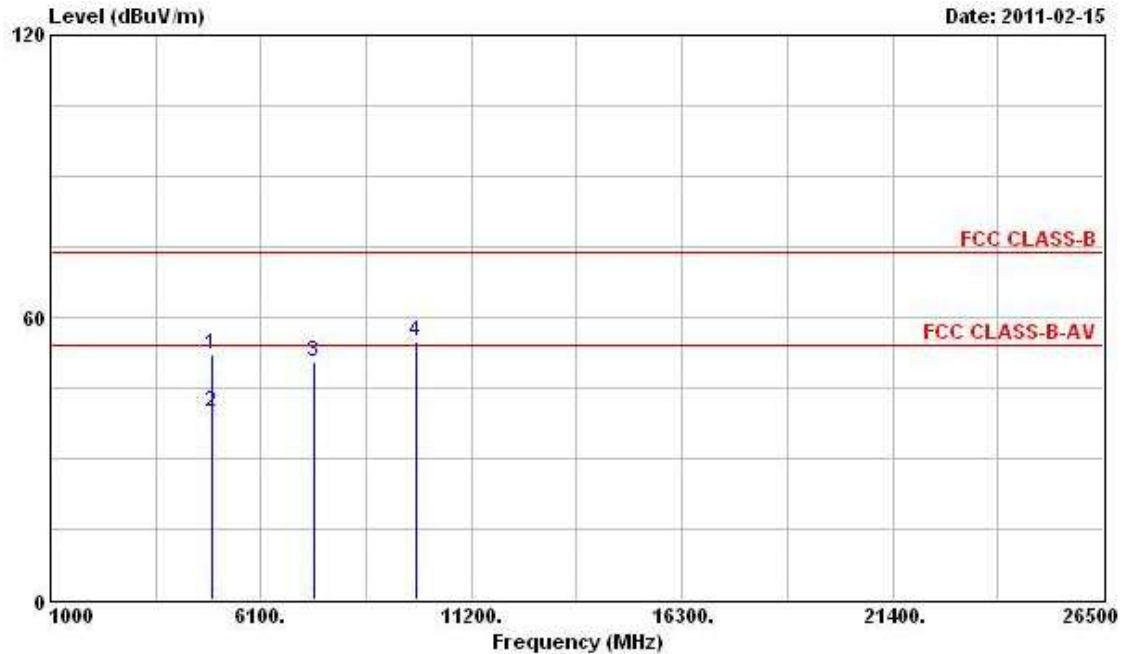
## Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4874.000	50.62	-3.38	54.00	45.28	35.18	4.61	34.45	PK
2	7311.000	50.94	-3.06	54.00	42.67	36.92	5.64	34.29	PK
3	9748.000	54.00			43.51	38.71	6.36	34.58	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

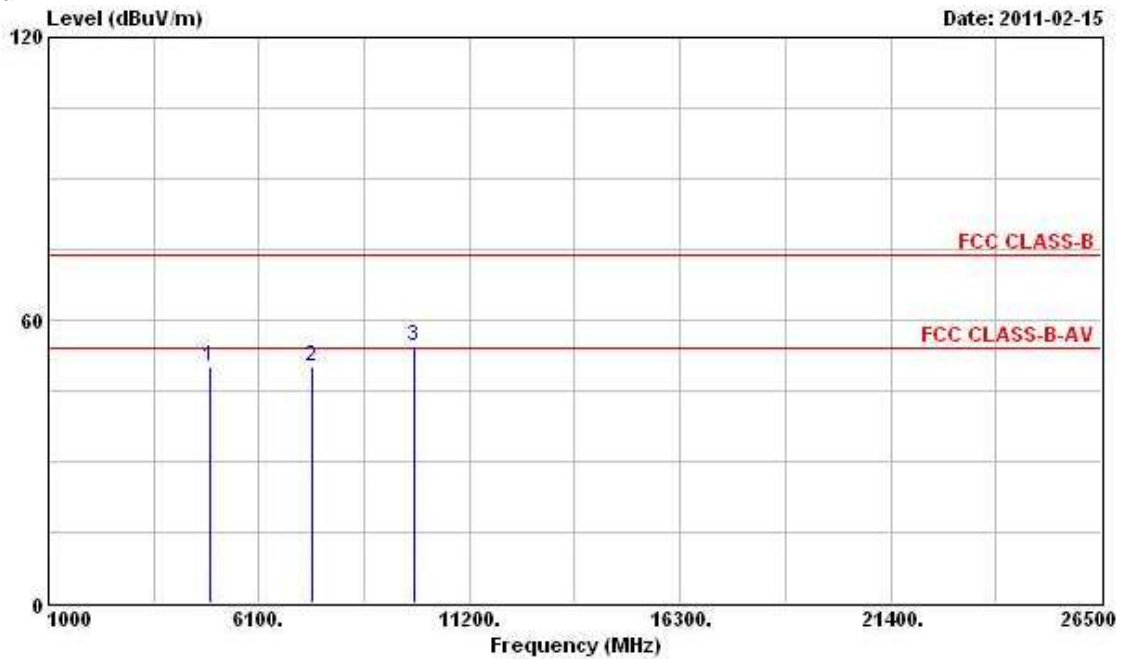
Final Test Date	Feb. 15, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11g Ch. 11

**Horizontal**

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	52.20	-21.80	74.00	46.00	35.90	4.68	34.38	Peak
2	4924.000	40.06	-13.94	54.00	33.86	35.90	4.68	34.38	Average
3	7386.000	50.48	-3.52	54.00	41.24	37.88	5.65	34.29	PK
4	9848.000	54.75			43.30	39.61	6.38	34.54	Peak

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

## Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4924.000	50.29	-3.71	54.00	44.76	35.23	4.68	34.38	PK
2	7386.000	50.14	-3.86	54.00	41.82	36.96	5.65	34.29	PK
3	9848.000	54.36			43.71	38.81	6.38	34.54	Peak

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

### 3.6 Band Edge and Fundamental Emissions Measurement

#### 3.6.1 Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequencies (MHz)	Field Strength (micovolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

#### 3.6.2 Measuring Instruments and Setting

Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak

#### 3.6.3 Test Procedures

1. The test procedure is the same as section 3.5.3; only the frequency range investigated is limited to 100MHz around band edges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

#### 3.6.4 Test Setup Layout

This test setup layout is the same as that shown in section 3.5.4.

#### 3.6.5 Test Deviation

There is no deviation with the original standard.

#### 3.6.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



## 3.6.7 Test Result of Band Edge and Fundamental Emissions

<b>Final Test Date</b>	Feb. 17, 2011	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	22.9°C	<b>Humidity</b>	53%
<b>Test Engineer</b>	Daniel	<b>Configuration</b>	802.11a Ch. 149, 157, 165

## Channel 149

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 @	5725.000	83.36			41.35	36.97	5.04	0.00	Peak
2 @	5738.340	118.92			76.89	36.99	5.04	0.00	Peak
1 @	5725.000	67.55			25.54	36.97	5.04	0.00	Average
2 @	5738.620	108.61			66.55	36.99	5.07	0.00	Average

The item 2 is fundamental emissions and the item 1 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

## Channel 157

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	5708.500	74.01			32.02	36.95	5.04	0.00	Peak
2 @	5778.710	119.42			77.30	37.03	5.09	0.00	Peak
3	5858.950	73.71			31.45	37.13	5.13	0.00	Peak
1 @	5718.020	60.48			18.47	36.97	5.04	0.00	Average
2 @	5777.860	108.83			66.71	37.03	5.09	0.00	Average
3 @	5858.100	59.97			17.71	37.13	5.13	0.00	Average

The item 2 is fundamental emissions and the items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

## Channel 165

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 @	5822.150	118.45			76.25	37.09	5.11	0.00	Peak
2 @	5850.150	78.24			36.02	37.11	5.11	0.00	Peak
1 @	5822.430	107.96			65.76	37.09	5.11	0.00	Average
2 @	5850.090	62.33			20.11	37.11	5.11	0.00	Average

The item 1 is fundamental emissions and the item 2 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Final Test Date	Feb. 15, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11b Ch. 1, 6, 11

## Channel 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2387.140	47.88	-6.12	54.00	13.07	31.79	3.02	0.00	Average
2 @	2412.980	101.29	-----	-----	66.41	31.86	3.02	0.00	Average
1	2385.810	60.80	-13.20	74.00	25.99	31.79	3.02	0.00	Peak
2 X	2413.170	109.83			74.95	31.86	3.02	0.00	Peak

The item 2 is fundamental emissions.

## Channel 6

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 @	2435.780	99.84			64.87	31.92	3.05	0.00	Average
1 X	2434.260	108.18			73.21	31.92	3.05	0.00	Peak

The item 1 is fundamental emissions.

## Channel 11

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 @	2463.330	99.31			64.17	32.06	3.08	0.00	Average
2	2487.460	47.94	-6.06	54.00	12.73	32.13	3.08	0.00	Average
1 X	2463.330	107.80			72.66	32.06	3.08	0.00	Peak
2	2486.890	60.76	-13.24	74.00	25.55	32.13	3.08	0.00	Peak

The item 1 is fundamental emissions.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Final Test Date	Feb. 15, 2011	Test Site No.	03CH02-HY
Temperature	22.9°C	Humidity	53%
Test Engineer	Daniel	Configuration	802.11g Ch. 1, 6, 11

## Channel 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2390.000	52.93	-1.07	54.00	18.12	31.79	3.02	0.00	Average
2 X	2414.500	97.48			62.60	31.86	3.02	0.00	Average
1	2390.000	70.66	-3.34	74.00	35.85	31.79	3.02	0.00	Peak
2 X	2417.540	108.15			73.27	31.86	3.02	0.00	Peak

The item 2 is fundamental emissions.

## Channel 6

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	2429.890	97.94			62.97	31.92	3.05	0.00	Average
1 X	2430.650	108.35			73.38	31.92	3.05	0.00	Peak

The item 1 is fundamental emissions.

## Channel 11

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 X	2454.970	97.79			62.68	32.06	3.05	0.00	Average
2	2483.500	51.77	-2.23	54.00	16.56	32.13	3.08	0.00	Average
1 X	2455.540	108.02			72.91	32.06	3.05	0.00	Peak
2	2483.500	65.93	-8.07	74.00	30.72	32.13	3.08	0.00	Peak

The item 1 is fundamental emissions.

Note:

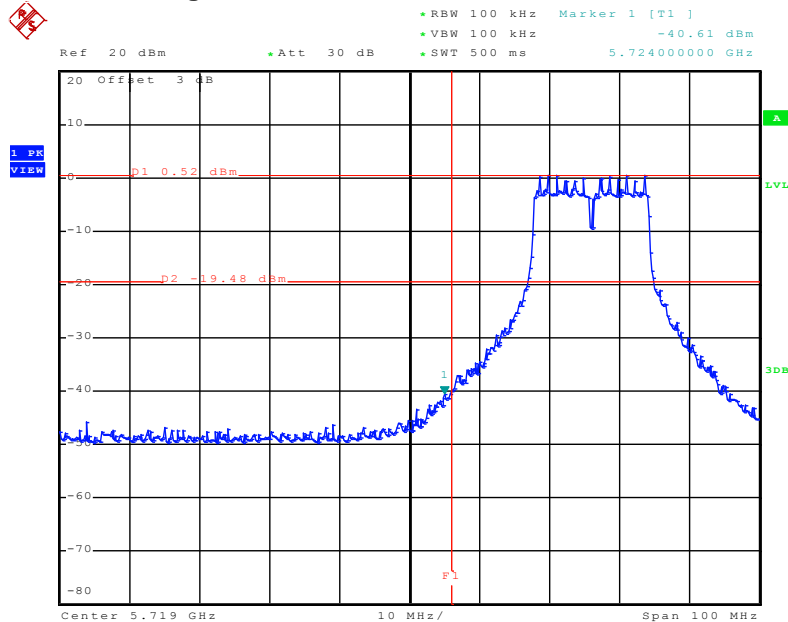
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

## For Emission not in Restricted Band

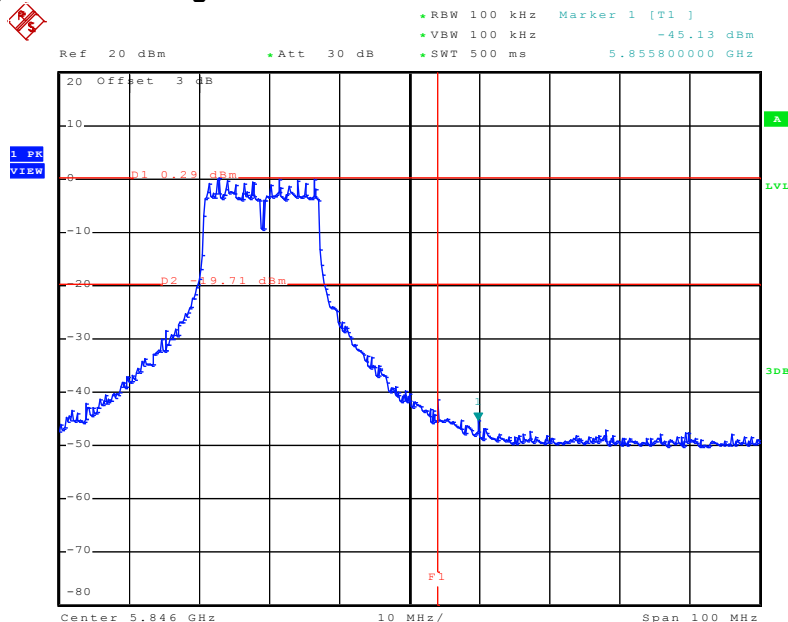
Final Test Date	Mar. 05, 2011	Test Site No.	TH01-HY
Temperature	20°C	Humidity	61%
Test Engineer	Ian	Configurations	802.11a/b/g

## Low Band Edge Plot on Configuration IEEE 802.11a / 5745 MHz



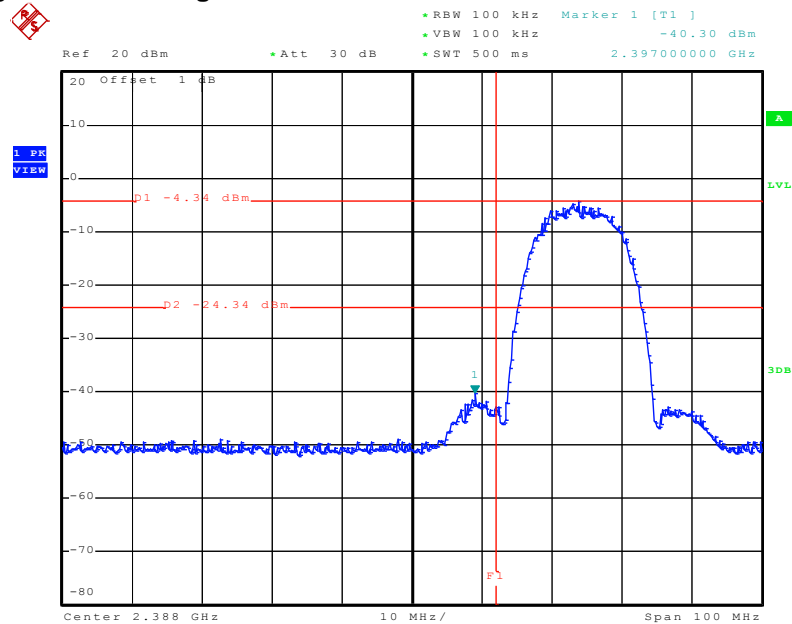
Date: 5.MAR.2011 17:55:12

## High Band Edge Plot on Configuration IEEE 802.11a / 5825 MHz



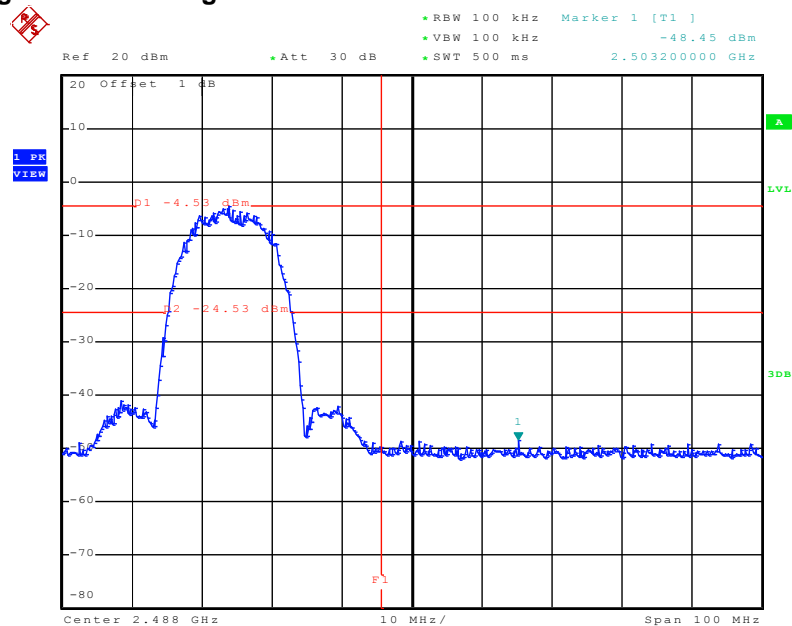
Date: 5.MAR.2011 18:15:37

## Low Band Edge Plot on Configuration IEEE 802.11b / 2412 MHz



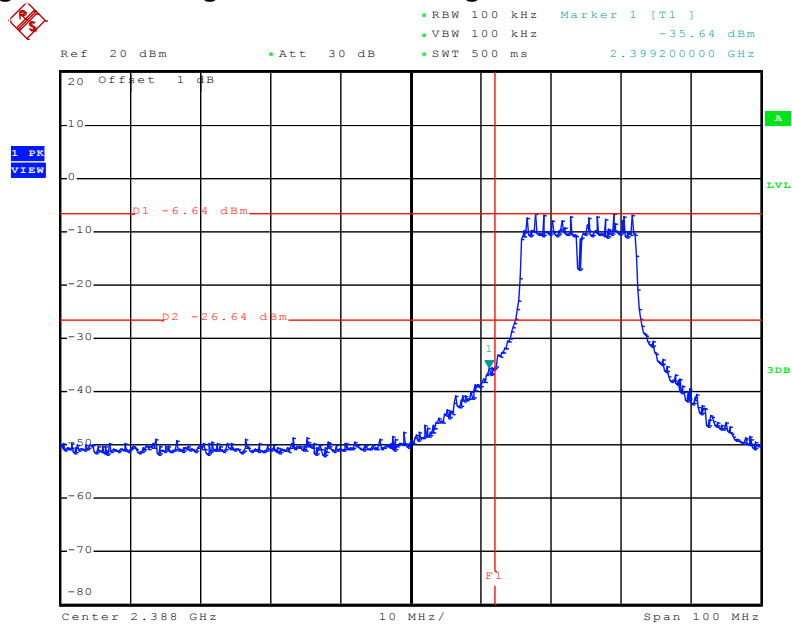
Date: 5.MAR.2011 17:08:44

## High Band Edge Plot on Configuration IEEE 802.11b / 2462 MHz



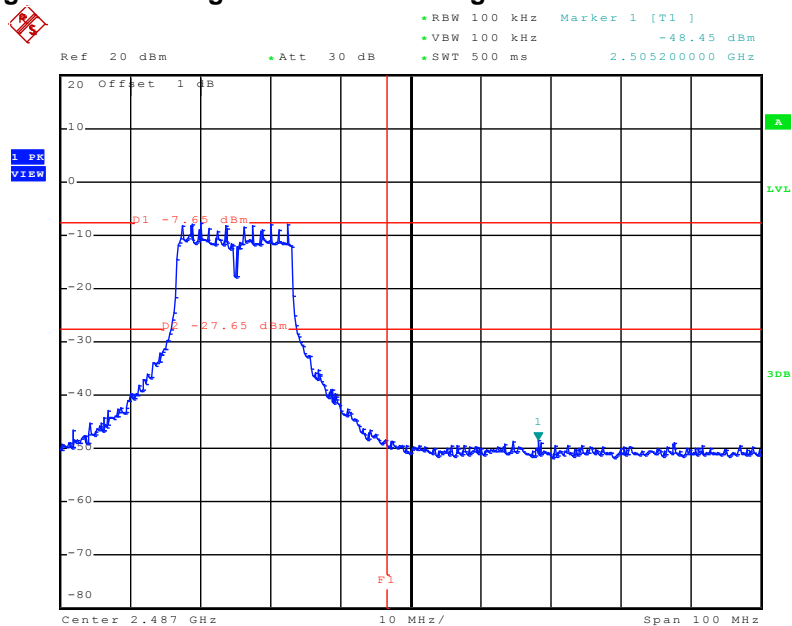
Date: 5.MAR.2011 17:18:32

## Low Band Edge Plot on Configuration IEEE 802.11g / 2412 MHz



Date: 5.MAR.2011 14:42:51

## High Band Edge Plot on Configuration IEEE 802.11g / 2462 MHz



Date: 5.MAR.2011 16:01:27

### **3.7 Antenna Requirements**

#### **3.7.1 Limit**

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

#### **3.7.2 Antenna Connector Construction**

Please refer to section 2.1 in this test report; antenna connector complied with the requirements.

#### 4 LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Apr. 06, 2010	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99041	9kHz – 30MHz	Mar. 23, 2010	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Apr. 29, 2010	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2010	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Nov. 19, 2010	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Apr. 16, 2010	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Oct. 22, 2010	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 02, 2010	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 02, 2010	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100302	10MHz-40GHz	Nov. 19, 2010	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	0917017	300MHz~40GHz	Dec. 03, 2010	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	0949003	300MHz~40GHz	Dec. 03, 2010	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jul. 26, 2010*	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is two year.



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100004	9 kHz - 40 GHz	Nov. 17, 2010	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz - 1 GHz 3m	May 01, 2010	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz – 1.3 GHz	Jul. 23, 2010	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1GHz – 26.5 GHz	Jul. 23, 2010	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz~18GHz	Nov. 11, 2010	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Feb. 26, 2010	Radiation (03CH02-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX106	03CH02-HY	1GHz~40GHz	Feb. 26, 2010	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz - 2 GHz	Oct. 16, 2010	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 - 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 29, 2010*	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is two year.

**5 TEST LOCATION**

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 <sup>nd</sup> Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

## 6 TAF CERTIFICATE OF ACCREDITATION

  
財團法人全國認證基金會  
Taiwan Accreditation Foundation

Certificate No. : L1190-110111

## Certificate of Accreditation

This is to certify that

**Sporton International Inc.**  
**EMC & Wireless Communications Laboratory**  
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,  
Taiwan, R.O.C.

**is accredited in respect of laboratory**

<b>Accreditation Criteria</b>	: ISO/IEC 17025:2005
<b>Accreditation Number</b>	: 1190
<b>Originally Accredited</b>	: December 15, 2003
<b>Effective Period</b>	: January 10, 2010 to January 09, 2013
<b>Accredited Scope</b>	: Testing Field, see described in the Appendix
<b>Specific Accreditation Program</b>	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities

  
Jay-San Chen  
President, Taiwan Accreditation Foundation  
Date : January 11, 2011

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