FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.247

Equipment	:	**Wireless 2T2R Module**
Brand Name	:	**Altec Lansing**
Model No.	:	**EW-7722MUN-IP**
Filing Type	:	**New Application**
Applicant	:	**Altec Lansing, LLC** 9330 Scranton Road, Suite 600, San Diego CA 92121
FCC ID	:	**VJS-MN5000**
Manufacturer	:	**EDIMAX TECHNOLOGY CO., LTD.** No.3,Wu-Chuan 3rd Road,Wu-Ku Industrial Park, New Taipei City, Taiwan
Received Date	:	Dec. 12, 2011
Final Test Date	:	Jan. 04, 2012

Statement

Test result included is only for the 802.11b/g/n 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.

Testing Laboratory
1190

SPORTON International Inc.

No. 52 Hwa Ya 1st 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: Mar. 15, 2012
Report No.: FR1N2832
■ No additional attachment.
□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart C § 15.247

Equipment : Wireless 2T2R Module
Brand Name : Altec Lansing
Model No. : EW-7722MUN-IP
Applicant : Altec Lansing, LLC
9330 Scranton Road, Suite 600, San Diego CA 92121

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 12, 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 / Assistant Manager

SPORTON International Inc.

No. 52 Hwa Ya 1st 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	19.03 dB
3.2	15.247(b)(3)	Maximum Peak Output Power	Complies	5.14 dB
3.3	15.247(e)	Power Spectral Density	Complies	14.40 dB
3.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
3.5	15.247(d)	Radiated Emissions	Complies	3.00 dB
3.6	15.247(d)	Band Edge Emissions	Complies	1.18 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	$\pm 8.5\times10^{-8}$	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℃	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 Product Details

Only the radio detail of IEEE 802.11b/g/n is shown in this report. For more detailed features description, please refer to the manufacturer's specifications or user's manual.

Items	Description
Power Type	Power from host
Data Modulation Data Rate (Mbps)	DSSS for IEEE 802.11b (DBPSK / DQPSK / CCK) (1/2/ 5.5/11) OFDM for IEEE 802.11g (BPSK / QPSK / 16QAM / 64QAM) (6/9/12/18/24/36/48/54) See the below table for IEEE 802.11n
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11b/g/n (20MHz): 11 ; 11/n (40MHz): 7
Channel Band Width (99%)	802.11b/g : 11b: 14.16 MHz ; 11g: 16.40 MHz 802.11n : MCS 8 (20MHz) : 17.48 MHz ; MCS 8 (40MHz) : 35.92 MHz
Conducted Output Power	802.11b/g : 11b: 19.82 dBm ; 11g: 23.52 dBm 802.11n : MCS 8 (20MHz) : 24.86 dBm ; MCS 8 (40MHz) : 24.73 dBm

IEEE 802.11n Modulation Scheme

MCS	Spatial	Modulation	Coding Rate	Data rate(Mbps)	
Index	Streams	Type	Type	20 MHz channel	40 MHz channel
				800nsGI	800nsGI
0	1	BPSK	1/2	6.5	13.5
1	1	QPSK	1/2	13	27
2	1	QPSK	3/4	19.5	40.5
3	1	16-QAM	1/2	26	54
4	1	16-QAM	3/4	39	81
5	1	64-QAM	2/3	52	108
6	1	64-QAM	3/4	58.5	121.5
7	1	64-QAM	5/6	65	135
8	2	BPSK	1/2	13	27
9	2	QPSK	1/2	26	54
10	2	QPSK	3/4	39	81
11	2	16-QAM	1/2	52	108
12	2	16-QAM	3/4	78	162
13	2	64-QAM	2/3	104	216
14	2	64-QAM	3/4	117	243
15	2	64-QAM	5/6	130	270

2.2 Table for Filed Antenna

Antenna Category Information (2.4GHz Band)	
☐	Equipment placed on the market without antennas
☒	Integral antenna (antenna permanently attached)
☒	Temporary RF connector provided
☐	No temporary RF connector provided
☐	External antenna (dedicated antennas)
☐	Single power level with corresponding antenna(s)
☐	Multiple power settings and corresponding antenna(s)
☐	Professional Install
☐	Unique antenna connector
☐	BIOS lock.

Antenna General Information (2.4GHz Band)					
Ant. No.	**Category**	**Type**	**Brand**	**Model**	**Gain (dBi)**
1	Internal	PIFA	--	--	4.59

☐ EUT is consist of single model antenna assembly for spatial multiplexing MIMO configuration.
☒ EUT is consist of multiple model antennas assembly (secondary source multiple model antennas regardless of spatial multiplexing MIMO configuration), the test (except DFS test) should be performed with highest antenna gain of each antenna type. Then Ant. No. 1 shall be performed the test.
☐ EUT is consist of multiple model antennas assembly for spatial multiplexing MIMO configuration (e.g. model A shall be installed in port 1 and model B shall be installed in port 2…).

☐: Not Require ; ☒ : Require

Transmitter Outputs & Receiver Inputs Information				
Modulation	**Transmitter Outputs**	**Receiver Inputs**	**Transmitter Output Signals**	**Co-location**
802.11b/g	1	1	-	No
802.11n HT20	2	2	-	No
802.11n HT40	2	2	-	No

Note 1: CDD - Cyclic Delay Diversity (CDD) modes (e.g., legacy modes in 802.11n devices). In CDD modes, the same digital data is carried by each transmit antenna, but with different cyclic delays.
Note 2: STBC - Space Time Block Codes (STBC) for which different digital data is carried by each transmit antenna during any symbol period.
Note 3: SM - Spatial Multiplexing MIMO (SM-MIMO), for which independent data streams are sent to each transmit antenna.
Note 4: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other.

Antenna Directional Gain (2.4GHz Band)					
Port No.	**Modulaton**	**Transmitter Outputs Signals Correlated**	**Transmitter Outputs (N)**	**Antenna Gain Combination (dBi)**	**Directional Gain (dBi)**
0	802.11b/g	-	1	4.59	4.59
0+1	802.11n HT20	-	2	4.59, 4.59	4.59
0+1	802.11n HT40	-	2	4.59, 4.59	4.59

☒ For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows
- Any transmit signals are correlated, Directional Gain = GANT + 10 log(N) dBi
- All transmit signals are completely uncorrelated, Directional Gain = GANT

☐ For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows:
- Any transmit signals are correlated, Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2$ /N] dBi
- All transmit signals are completely uncorrelated, Directional Gain = 10 log[$(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10})$/N] dBi

2.3 Table for Carrier Frequencies

There are two bandwidth systems for IEEE 802.11b/g/n.
For IEEE 802.11 b/g/n (20MHz) bandwidth systems use channel 1 ~ 11.
For IEEE 802.11 n (40MHz) bandwidth systems use channel 3 ~ 9.

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	-	-

2.4 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	Port No.
AC Power Line Conducted Emissions Radiated Emissions Below 1GHz	Normal Mode	Auto	-	-
Maximum Peak Output Power Power Spectral Density	11b/CCK	11 Mbps	1/6/11	0
	11g/BPSK	6 Mbps	1/6/11	
	MCS 8 (20MHz)	13 Mbps	1/6/11	0/1; 0+1
	MCS 8 (40MHz)	27 Mbps	3/6/9	
6dB Spectrum Bandwidth	11b/CCK	11 Mbps	1/6/11	0
	11g/BPSK	6 Mbps	1/6/11	
	MCS 8 (20MHz)	13 Mbps	1/6/11	0/1
	MCS 8 (40MHz)	27 Mbps	3/6/9	
Radiated Emissions Above 1GHz	11b/CCK	11 Mbps	1/6/11	0
	11g/BPSK	6 Mbps	1/6/11	
	MCS 8 (20MHz)	13 Mbps	1/6/11	0/1
	MCS 8 (40MHz)	27 Mbps	3/6/9	
Band Edge Emissions	11b/CCK	11 Mbps	1/11	0
	11g/BPSK	6 Mbps	1/11	
	MCS 8 (20MHz)	13 Mbps	1/11	0/1
	MCS 8 (40MHz)	27 Mbps	3/9	

2.5 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).

2.6 Table for Supporting Units

Support Unit	Brand	Model	FCC ID	Remark
Notebook	DELL	E5520	N/A	Conducted Radiated Emissions
(USB) Mouse	Microsoft	1004	DoC	
iPod Nano	Apple	A1320	DoC	
Wireless AP (Remote Workstation)	D-LINK	DNS-G120	N/A	

2.7 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.

For Single Chain:
Power Parameters of IEEE 802.11b/g

Test Software Version	RT 3x7x QA		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	1B	1D	1C
IEEE 802.11g	18	19	1A

For Two Chains:
Power Parameters of IEEE 802.11n

Test Software Version	RT 3x7x QA		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n	16/15	16/17	16/1A
Frequency	2422 MHz	2437 MHz	2452 MHz
IEEE 802.11n	15/16	17/1A	16/19

2.8 EUT Operation during Test

For Conducted Emissions:

Two executive programs, "EMITEST.exe" and "EMCTEST.exe" under WIN 7, which generates a complete line of continuously repeating “H“ pattern was used as the test software.

The program was executed as follows :

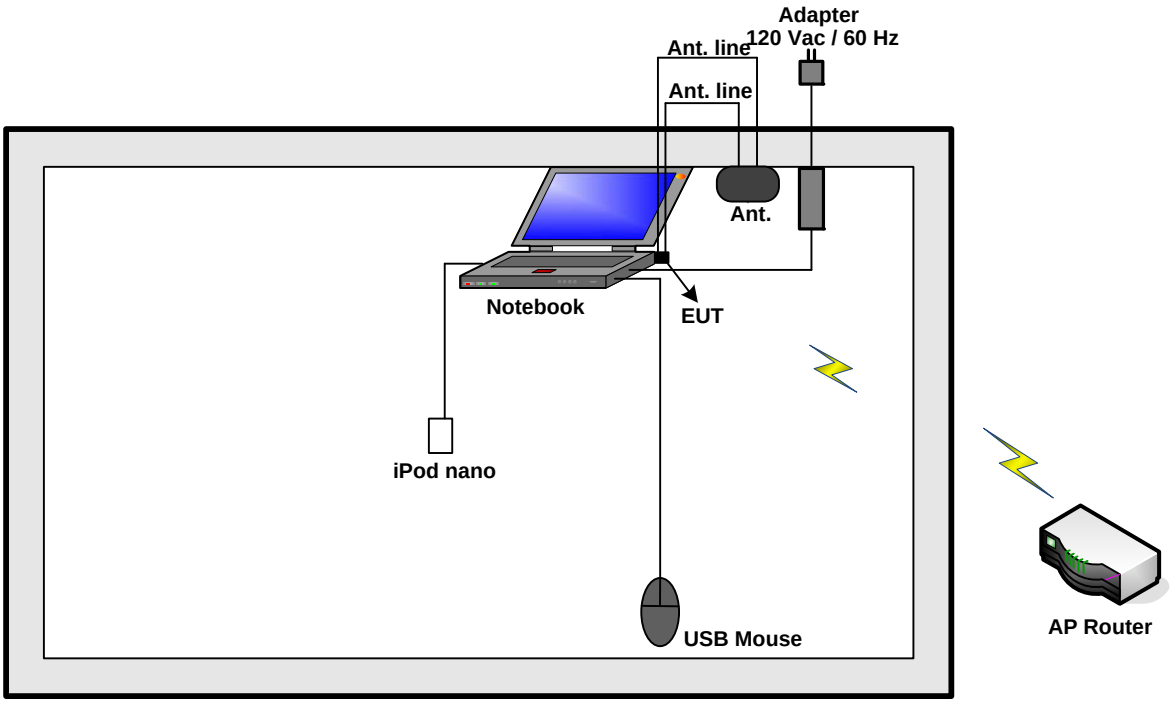
a. Turn on the power of all equipment.
b. The NB reads the test program from the hard disk drive and runs it.
c. The NB sends “H” messages to the monitor, and the monitor displays “H” patterns on the screen.
d. The NB sends "H" messages to the internal hard disk, and the hard disk reads and writes the message.
e. Repeat the steps from b to s.

At the same time, the following programs were executed:
- Executed “Winthrax.exe” to read and write data from iPod Nano.
- Executed "Ping.exe" to link with the remote workstation to receive and transmit data by RJ45 cable.
- Open the "Wireless" to link with the remote workstation to receive and transmit data.

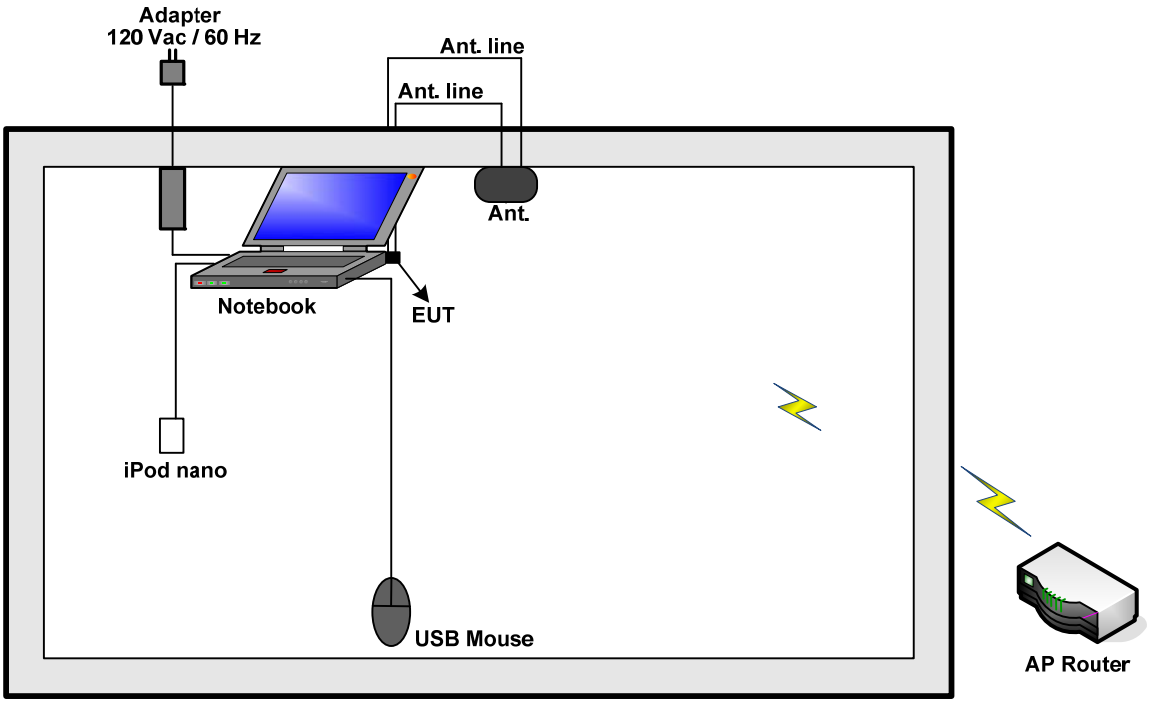
For Radiated Emissions :
- Executed “RT 3x7x QA” to keep transmitting signals at fixed frequency.

2.9 Test Configuration

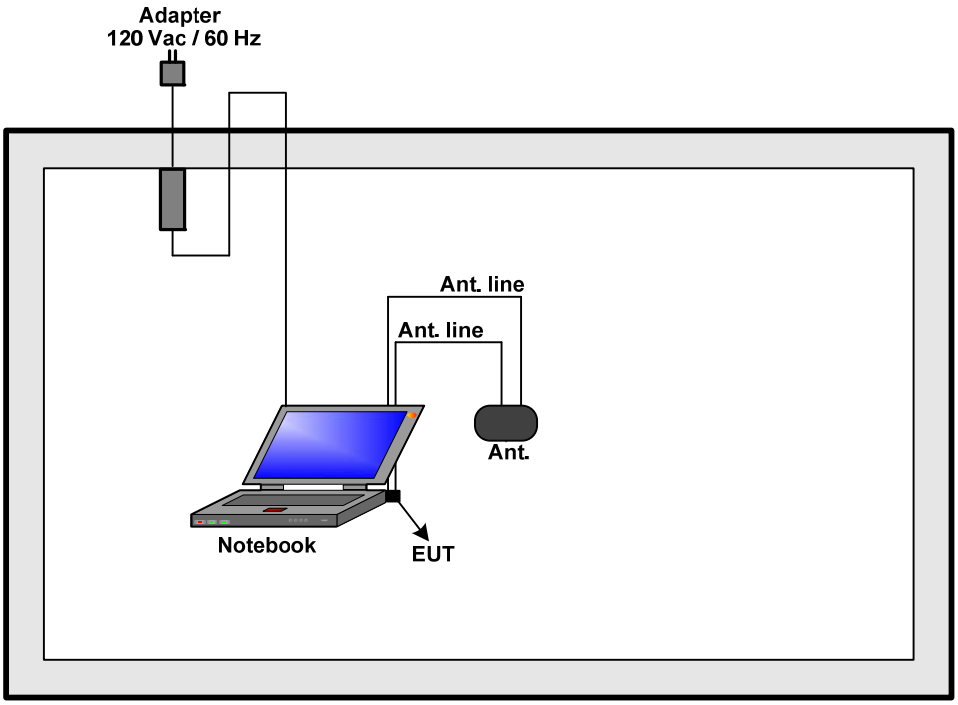
For conducted emissions



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

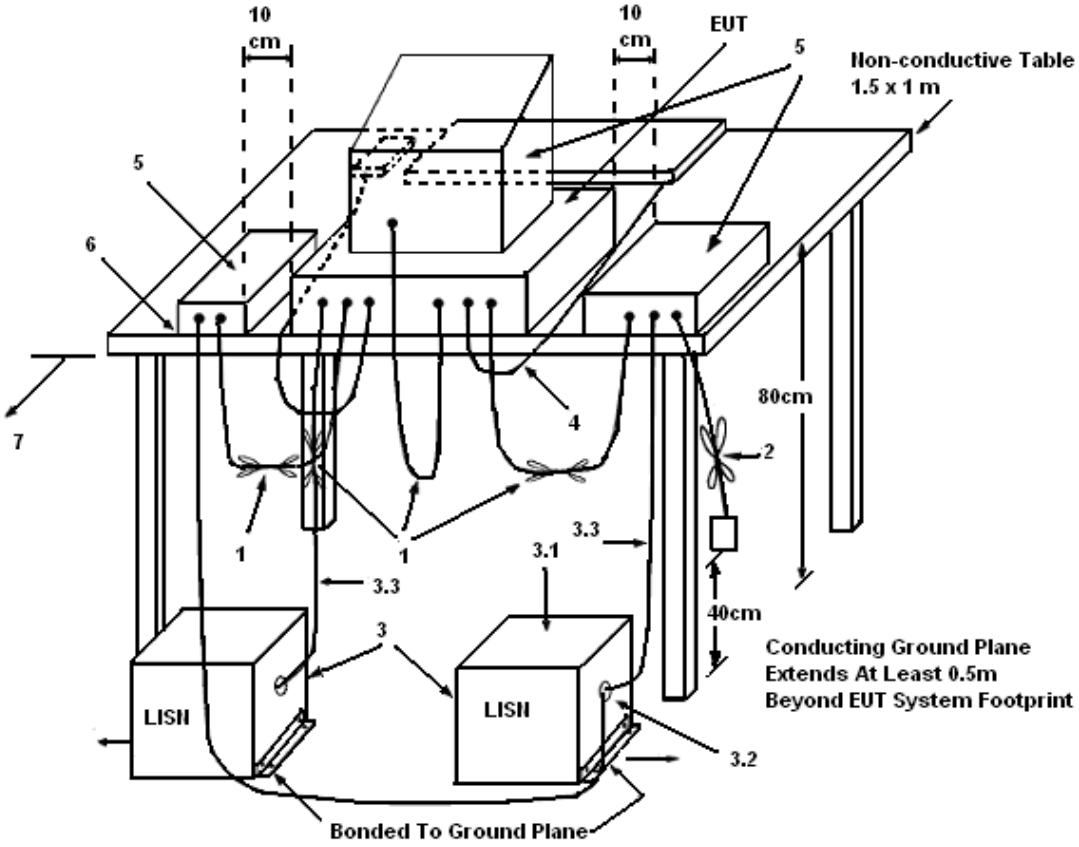
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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.

3.1.4 Test Setup Layout



LEGEND:
(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.
(3.1) All other equipment powered from additional LISN(s).
(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
(3.3) LISN at least 80 cm from nearest part of EUT chassis.
(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
(5) Non-EUT components of EUT system being tested.
(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

3.1.5 Test Deviation

There is no deviation with the original standard.

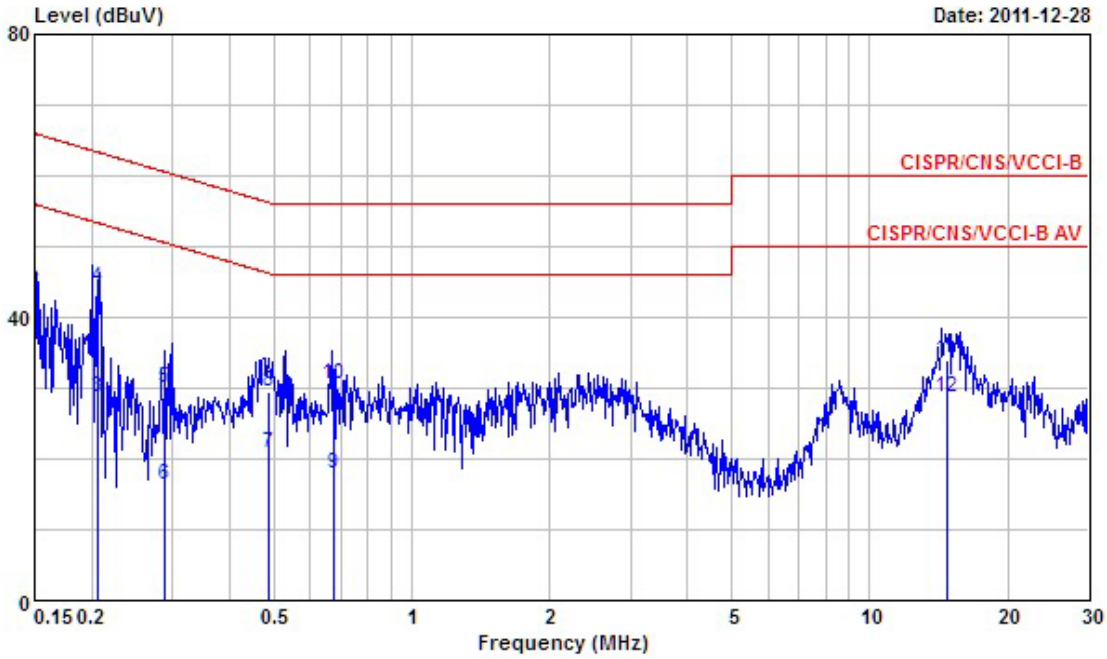
3.1.6 EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

3.1.7 Results of AC Power Line Conducted Emissions Measurement

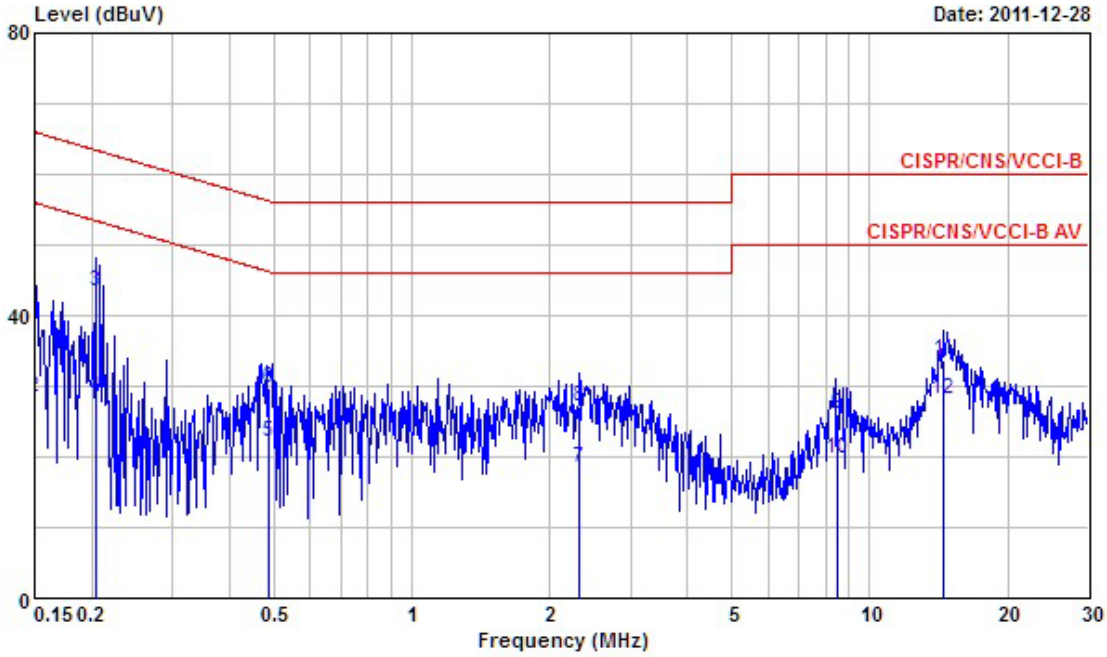
Final Test Date	Dec. 28, 2011	**Test Site No.**	CO04-HY
Temperature	24.5℃	**Humidity**	48%
Test Engineer	Assen	**Configuration**	Normal Mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1500000	28.46	-27.54	56.00	28.06	0.30	0.10	Average
2	0.1500000	43.75	-22.25	66.00	43.35	0.30	0.10	QP
3	0.2066860	28.75	-24.59	53.34	28.35	0.30	0.10	Average
4	@0.2066860	44.31	-19.03	63.34	43.91	0.30	0.10	QP
5	0.2893470	30.09	-30.45	60.54	29.69	0.30	0.10	QP
6	0.2893470	16.35	-34.19	50.54	15.95	0.30	0.10	Average
7	0.4886030	20.88	-25.31	46.19	20.49	0.29	0.10	Average
8	0.4886030	29.50	-26.69	56.19	29.11	0.29	0.10	QP
9	0.6748660	17.79	-28.21	46.00	17.40	0.29	0.10	Average
10	0.6748660	30.61	-25.39	56.00	30.22	0.29	0.10	QP
11	14.710	33.92	-26.08	60.00	33.30	0.53	0.09	QP
12	14.710	28.58	-21.42	50.00	27.96	0.53	0.09	Average

Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1500000	42.32	-23.68	66.00	41.95	0.27	0.10	QP
2	0.1500000	28.48	-27.52	56.00	28.11	0.27	0.10	Average
3	0.2039630	43.44	-20.01	63.45	43.09	0.25	0.10	QP
4	0.2039630	28.44	-25.01	53.45	28.09	0.25	0.10	Average
5	0.4881110	22.21	-23.99	46.20	21.87	0.24	0.10	Average
6	0.4881110	29.81	-26.39	56.20	29.47	0.24	0.10	QP
7	2.320	18.30	-27.70	46.00	17.95	0.27	0.08	Average
8	2.320	27.10	-28.90	56.00	26.75	0.27	0.08	QP
9	8.520	26.09	-33.91	60.00	25.72	0.37	0.00	QP
10	8.520	19.67	-30.33	50.00	19.30	0.37	0.00	Average
11	14.520	33.71	-26.29	60.00	33.18	0.44	0.09	QP
12	14.520	28.22	-21.78	50.00	27.69	0.44	0.09	Average

Note:
Level = Read Level + LISN Factor + Cable Loss.

3.2 Maximum 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 limited has to be reduced by the amount in dB that the gain of the antenna exceed 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.

3.2.2 Measuring Instruments and Setting

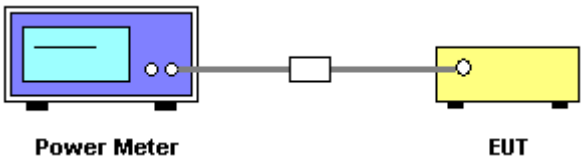
Please refer to section 4 of equipments list in this report. The following table is the setting of the power meter.

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.
4. When measuring maximum conducted output power within multiple antenna systems, add every result of the values by mathematic formula. (Only for IEEE 802.11n test)

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 Maximum Peak Output Power

Final Test Date	Jan. 03, 2012	**Test Site No.**	TH01-HY
Temperature	22.2℃	**Humidity**	26%
Test Engineer	Ian	**Configurations**	802.11b/g/n

For Single Chain:
Configuration IEEE 802.11b Port 0

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	19.46	30.00	**Complies**
6	2437 MHz	19.74	30.00	**Complies**
11	2462 MHz	19.82	30.00	**Complies**

Configuration IEEE 802.11g Port 0

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	23.45	30.00	**Complies**
6	2437 MHz	23.52	30.00	**Complies**
11	2462 MHz	23.23	30.00	**Complies**

For Two Chains:
Configuration of IEEE 802.11n Port 0 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	21.98	30.00	**Complies**
6	2437 MHz	22.21	30.00	**Complies**
11	2462 MHz	21.67	30.00	**Complies**

Configuration of IEEE 802.11n Port 1 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	21.65	30.00	**Complies**
6	2437 MHz	21.45	30.00	**Complies**
11	2462 MHz	21.41	30.00	**Complies**

Configuration of IEEE 802.11n Port 0+ Port 1 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	24.83	30.00	**Complies**
6	2437 MHz	24.86	30.00	**Complies**
11	2462 MHz	24.55	30.00	**Complies**

Configuration of IEEE 802.11n Port 0 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	21.74	30.00	**Complies**
6	2437 MHz	22.08	30.00	**Complies**
9	2452 MHz	21.56	30.00	**Complies**

Configuration of IEEE 802.11n Port 1 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	21.69	30.00	**Complies**
6	2437 MHz	21.32	30.00	**Complies**
9	2452 MHz	21.46	30.00	**Complies**

Configuration of IEEE 802.11n Port 0+ Port 1 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	24.73	30.00	**Complies**
6	2437 MHz	24.73	30.00	**Complies**
9	2452 MHz	24.52	30.00	**Complies**

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

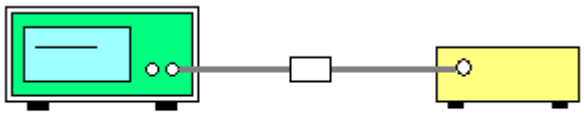
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 3kHz and VBW to 30kHz. 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.
5. When measuring maximum conducted output power within multiple antenna systems, add every result of the values by mathematic formula. (Only for IEEE 802.11n test)

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

Final Test Date	Jan. 04, 2012	**Test Site No.**	TH01-HY
Temperature	22.2℃	**Humidity**	26%
Test Engineer	Ian	**Configurations**	802.11b/g/n

For Single Chain:
Configuration IEEE 802.11b Port 0

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-7.55	8.00	**Complies**
6	2437 MHz	-6.40	8.00	**Complies**
11	2462 MHz	-7.34	8.00	**Complies**

Configuration IEEE 802.11g Port 0

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-12.10	8.00	**Complies**
6	2437 MHz	-12.25	8.00	**Complies**
11	2462 MHz	-12.93	8.00	**Complies**

For Two Chains:
Configuration of IEEE 802.11n Port 0 (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-13.99	8.00	**Complies**
6	2437 MHz	-13.43	8.00	**Complies**
11	2462 MHz	-15.62	8.00	**Complies**

Configuration of IEEE 802.11n Port 1 (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-16.62	8.00	**Complies**
6	2437 MHz	-15.85	8.00	**Complies**
11	2462 MHz	-16.56	8.00	**Complies**

Configuration of IEEE 802.11n Port 0+ Port 1 (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-12.10	8.00	**Complies**
6	2437 MHz	-11.46	8.00	**Complies**
11	2462 MHz	-13.05	8.00	**Complies**

Configuration of IEEE 802.11n Port 0 (40MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-15.34	8.00	**Complies**
6	2437 MHz	-13.63	8.00	**Complies**
9	2452 MHz	-15.49	8.00	**Complies**

Configuration of IEEE 802.11n Port 1 (40MHz)

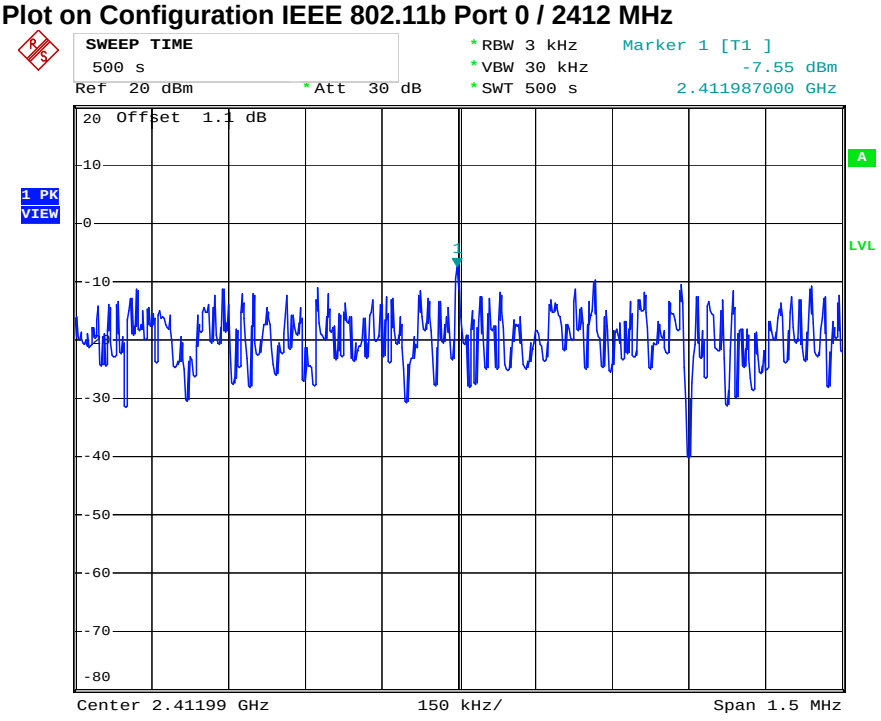
Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-18.01	8.00	**Complies**
6	2437 MHz	-19.48	8.00	**Complies**
9	2452 MHz	-18.89	8.00	**Complies**

Configuration of IEEE 802.11n Port 0+ Port 1 (40MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-13.46	8.00	**Complies**
6	2437 MHz	-12.63	8.00	**Complies**
9	2452 MHz	-13.86	8.00	**Complies**

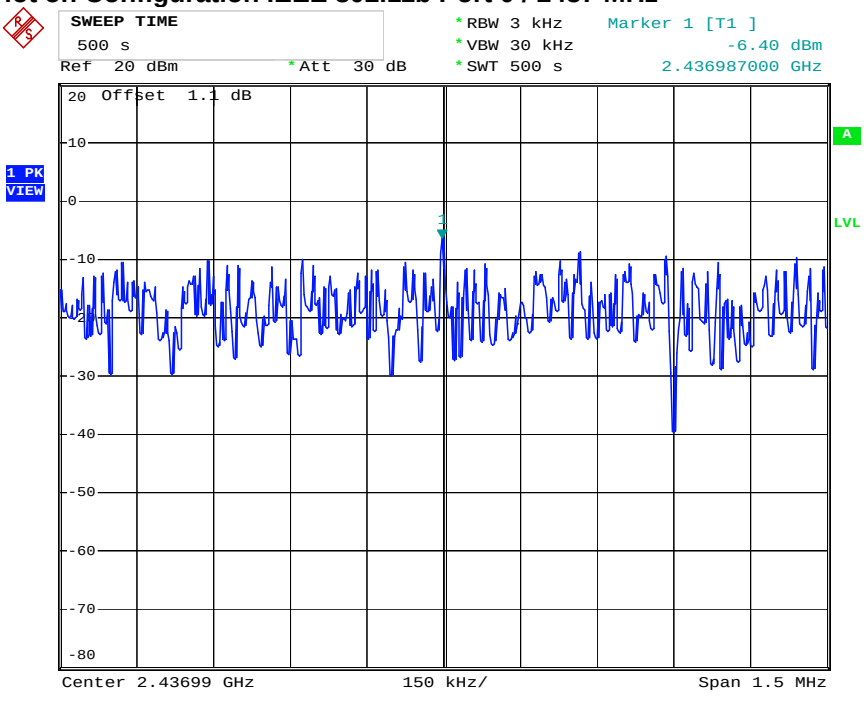
For Single Chain:

Power Density Plot on Configuration IEEE 802.11b Port 0 / 2412 MHz



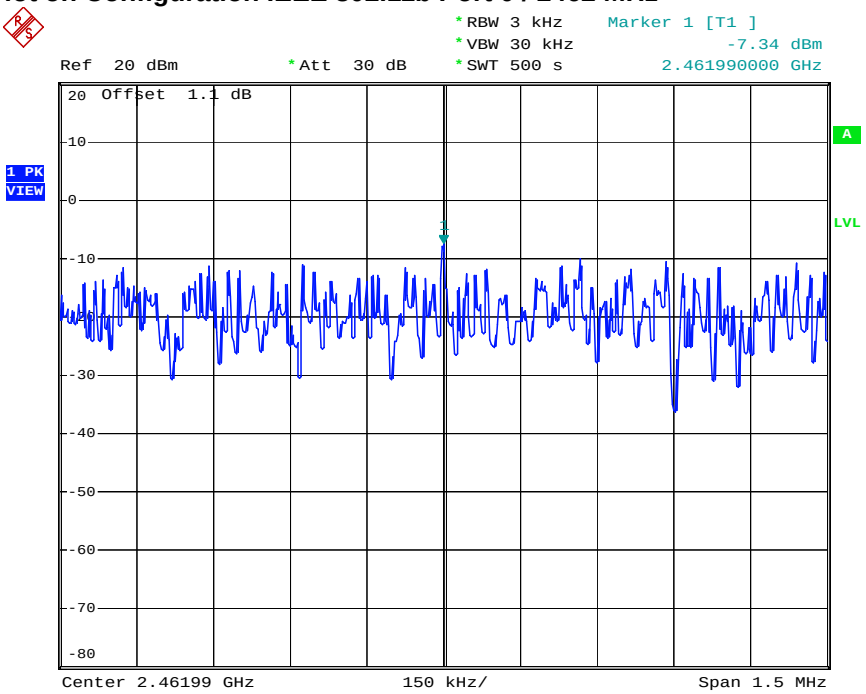
Date: 3.JAN.2012 20:39:36

Power Density Plot on Configuration IEEE 802.11b Port 0 / 2437 MHz

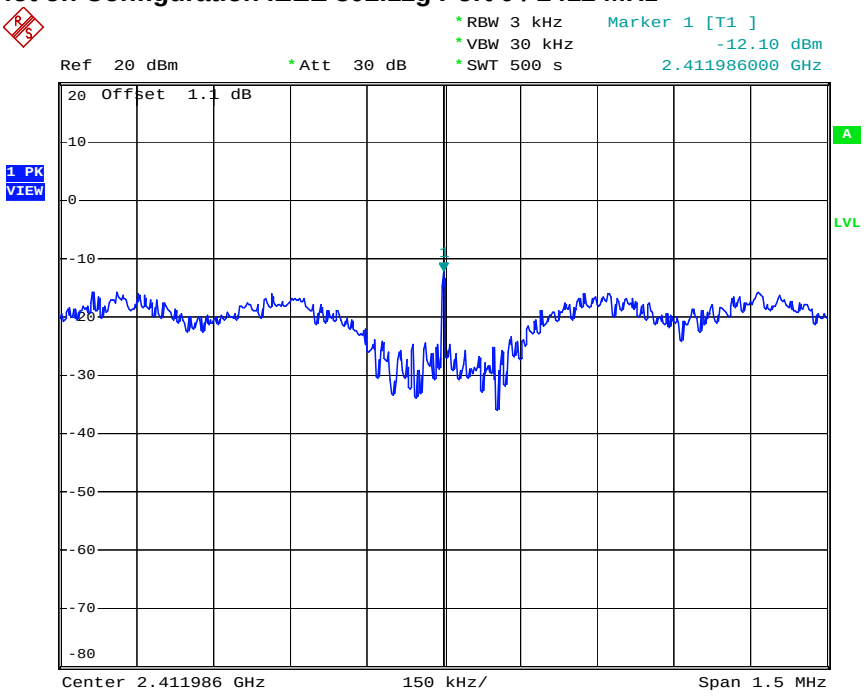


Date: 3.JAN.2012 20:41:52

Power Density Plot on Configuration IEEE 802.11b Port 0 / 2462 MHz

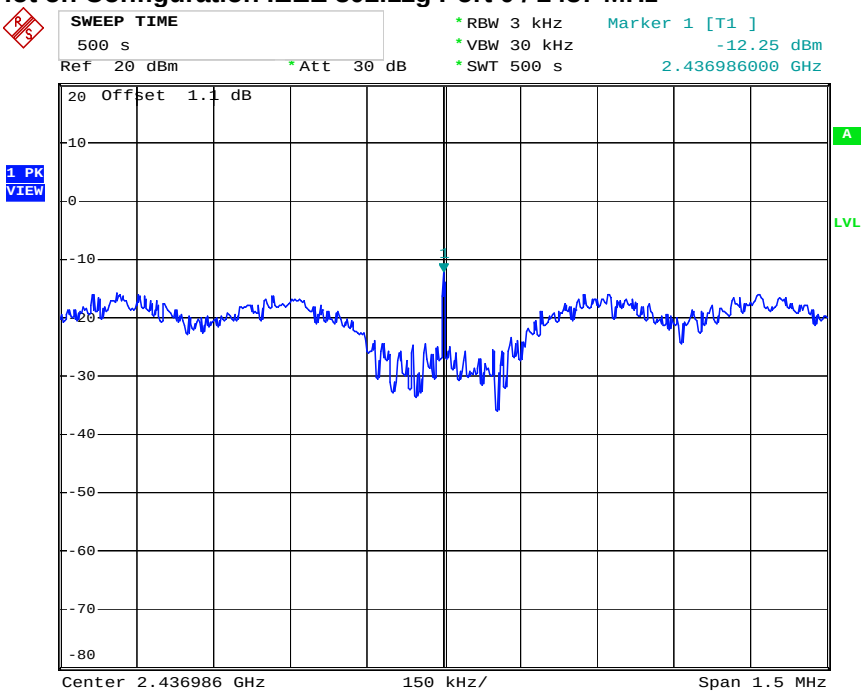


Power Density Plot on Configuration IEEE 802.11g Port 0 / 2412 MHz



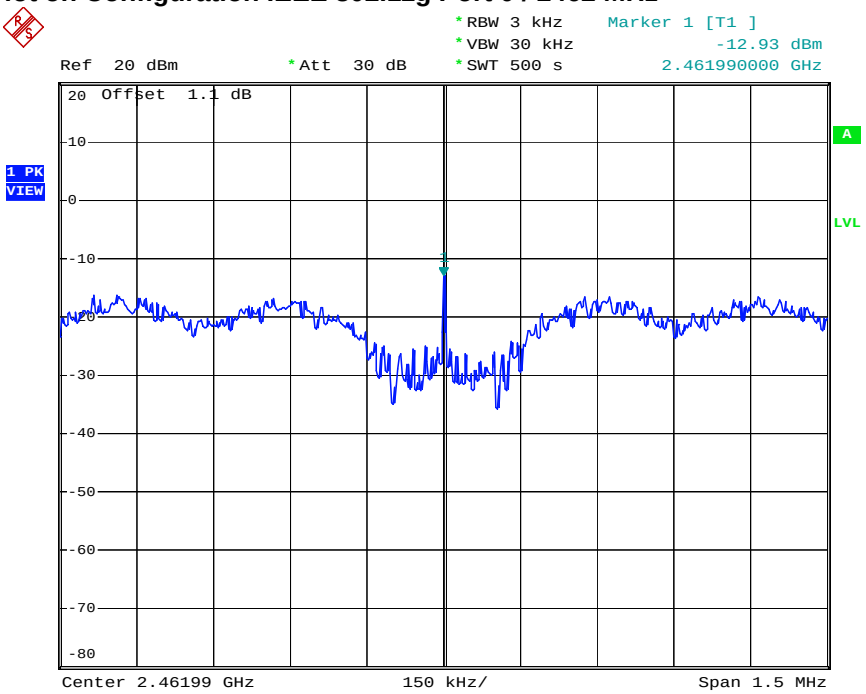
Date: 3.JAN.2012 20:57:12

Power Density Plot on Configuration IEEE 802.11g Port 0 / 2437 MHz



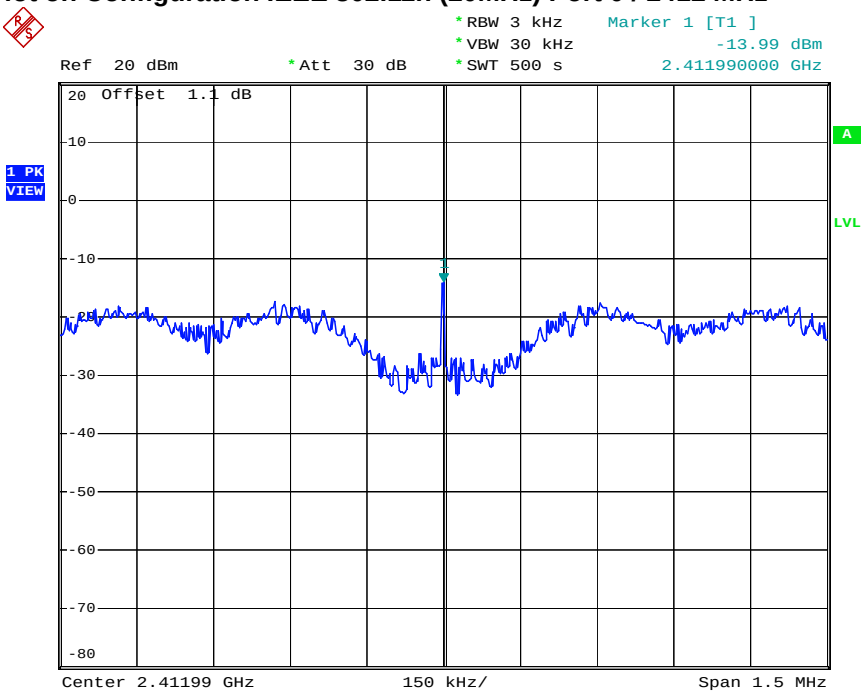
Date: 3.JAN.2012 21:01:53

Power Density Plot on Configuration IEEE 802.11g Port 0 / 2462 MHz



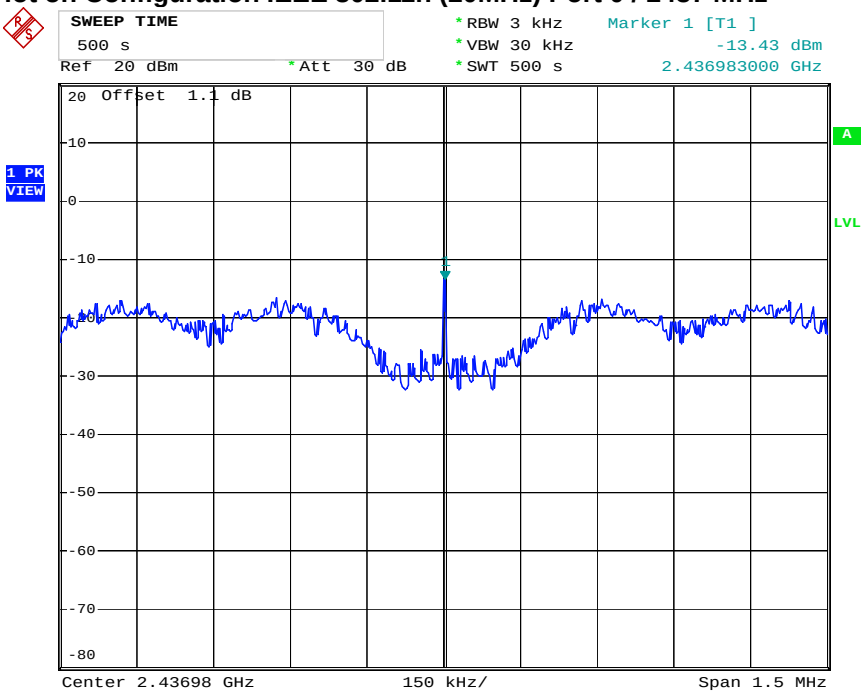
For Two Chains:

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2412 MHz



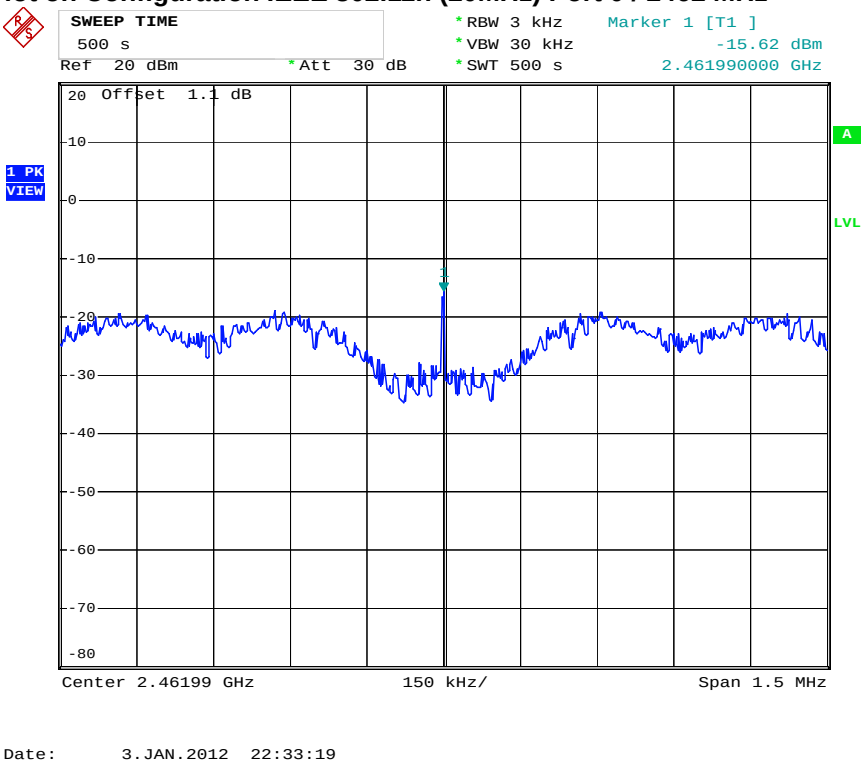
Date: 3.JAN.2012 22:03:09

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2437 MHz

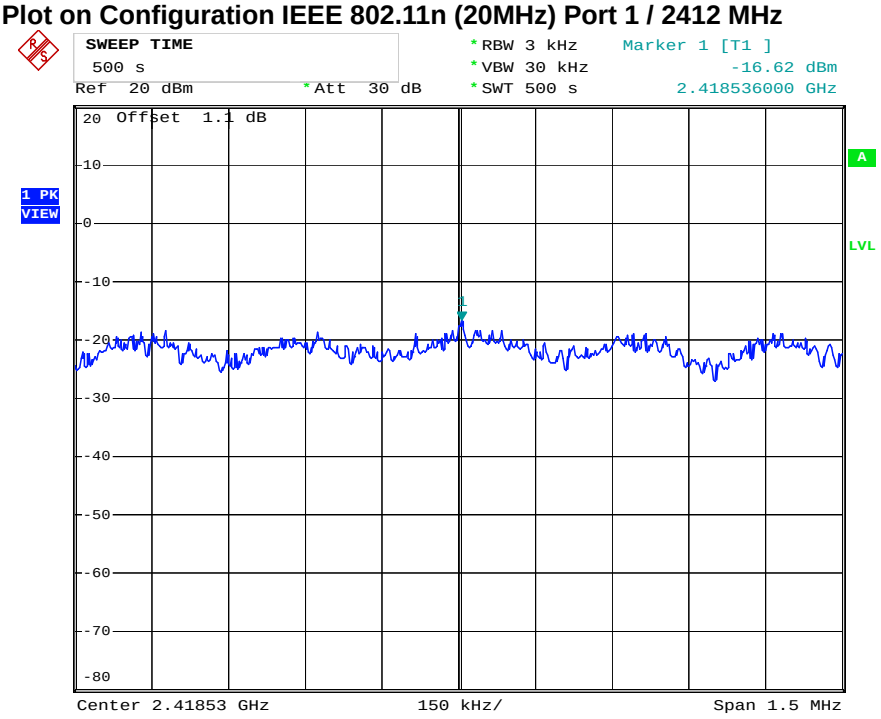


Date: 3.JAN.2012 22:25:55

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2462 MHz

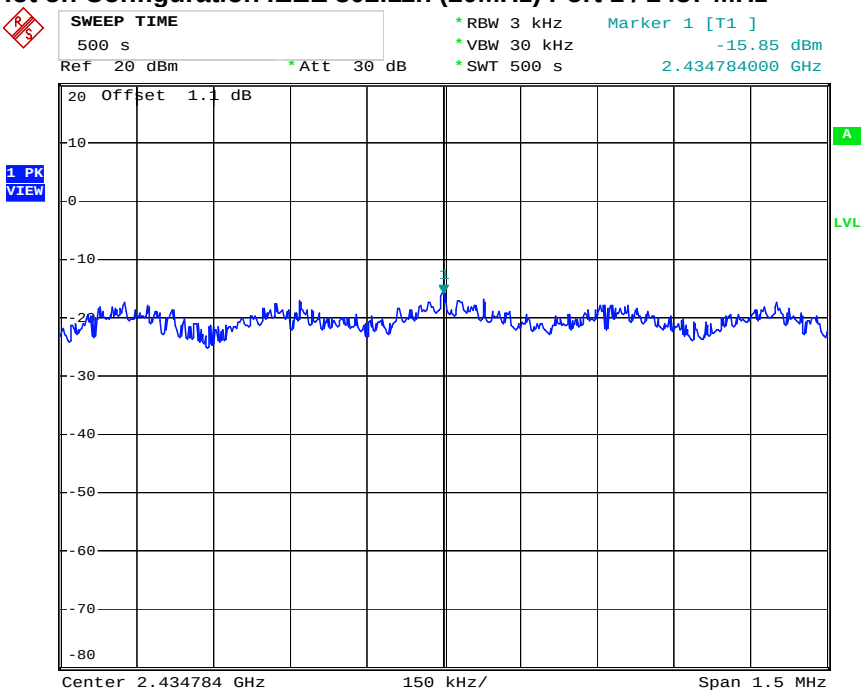


Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2412 MHz



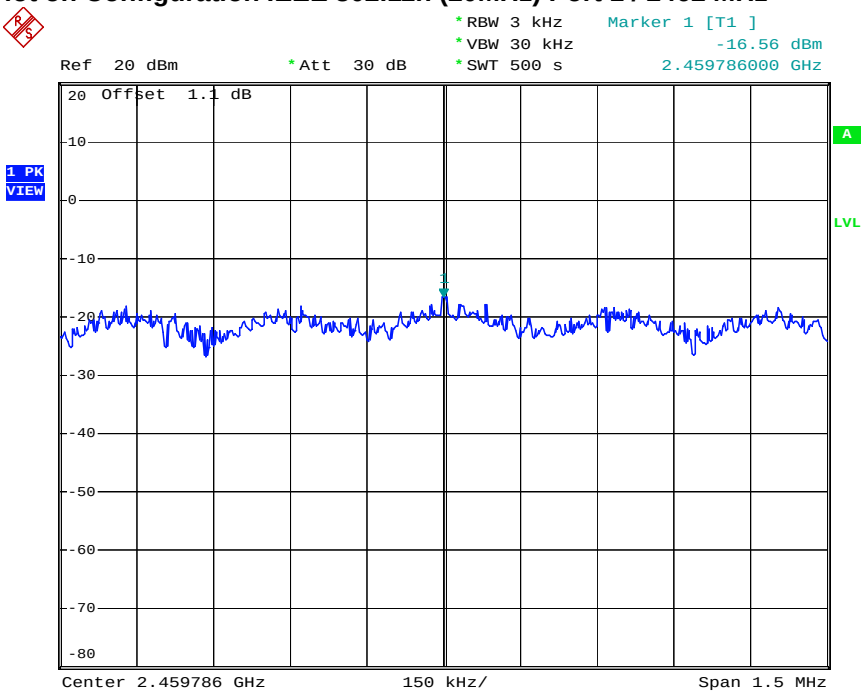
Date: 3.JAN.2012 22:10:21

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2437 MHz

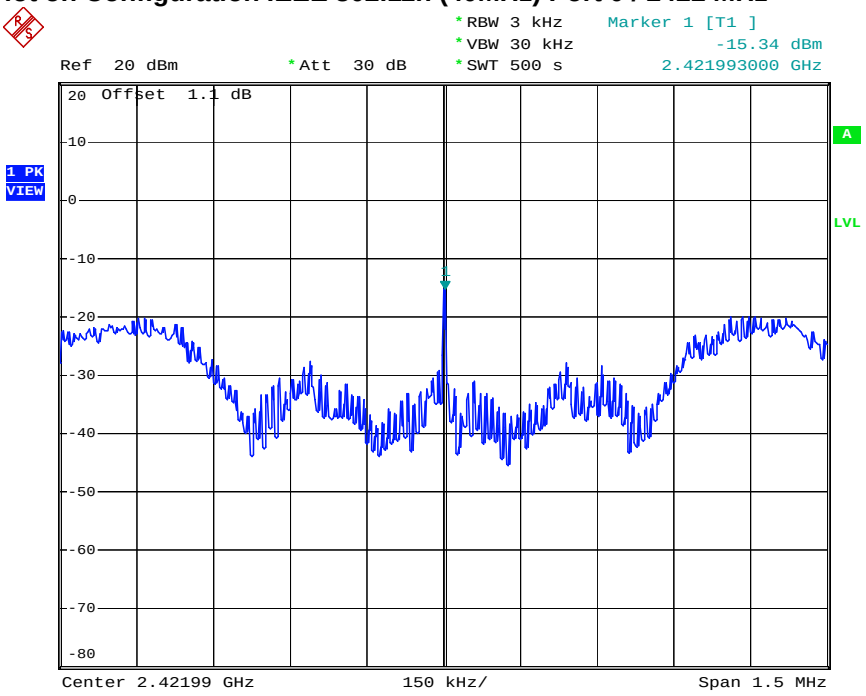


Date: 3.JAN.2012 22:29:23

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2462 MHz

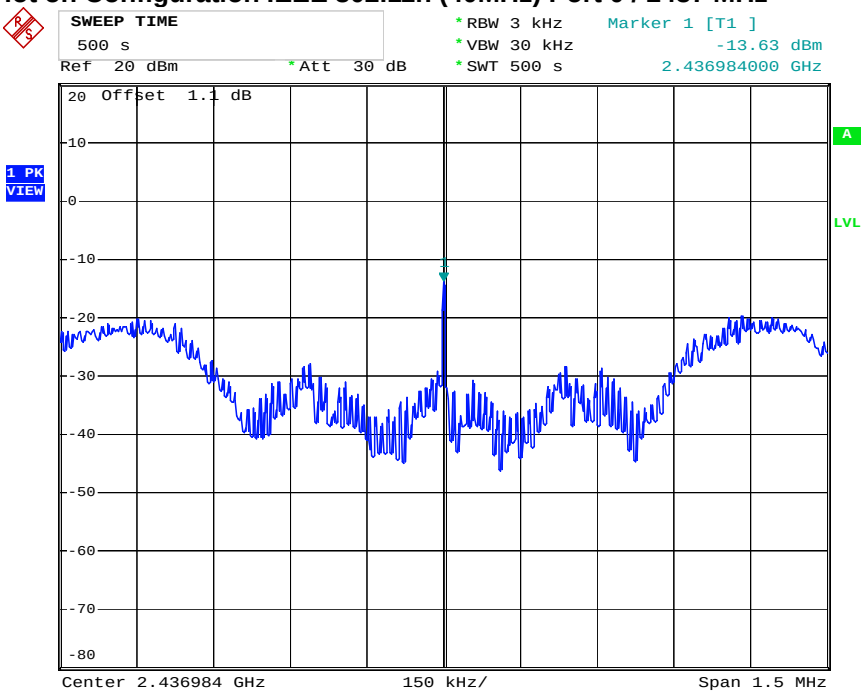


Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2422 MHz



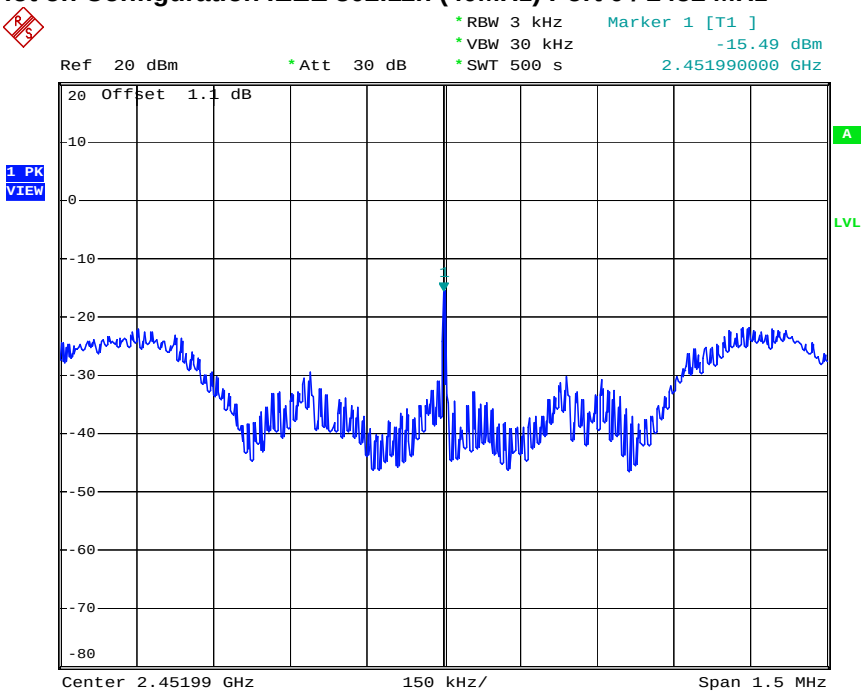
Date: 3.JAN.2012 23:18:52

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2437 MHz

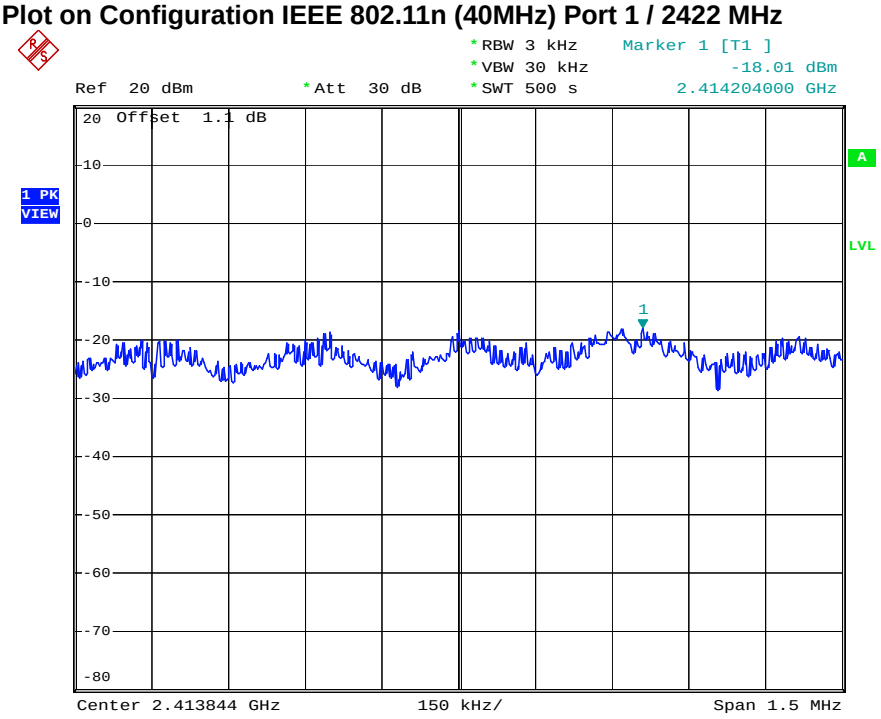


Date: 3.JAN.2012 23:49:59

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2452 MHz

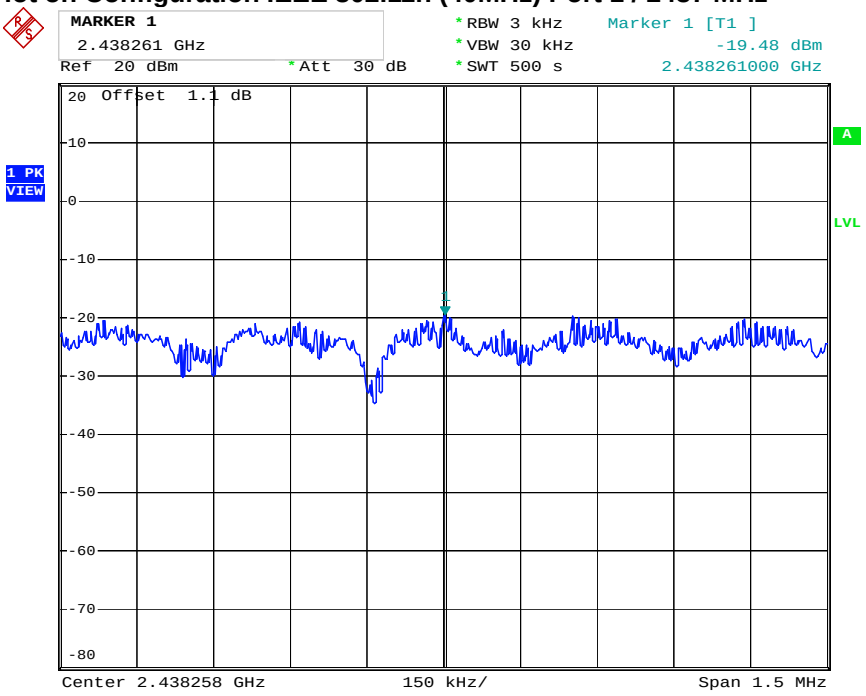


Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2422 MHz



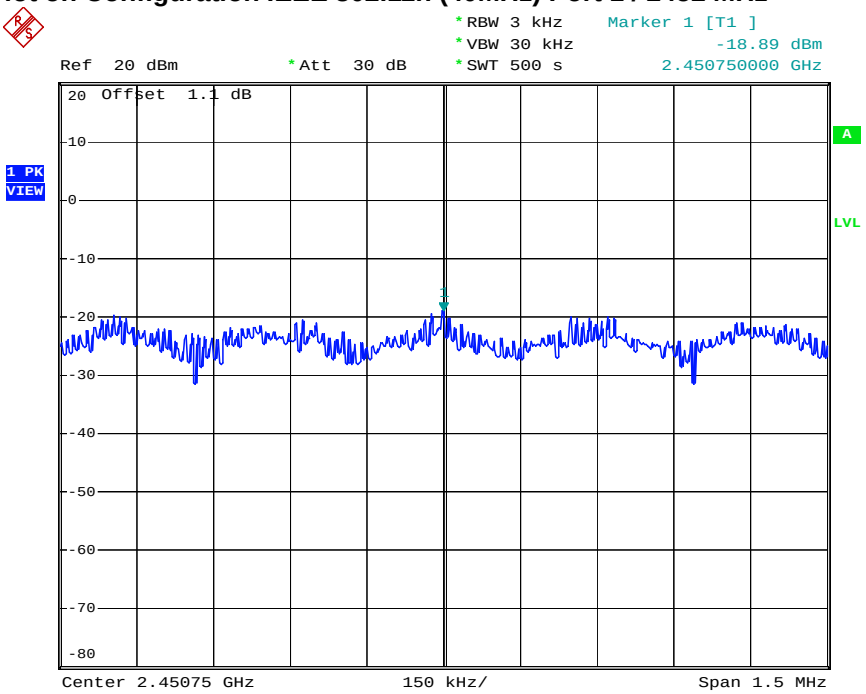
Date: 3.JAN.2012 23:23:22

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2437 MHz



Date: 4.JAN.2012 00:17:21

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2452 MHz



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

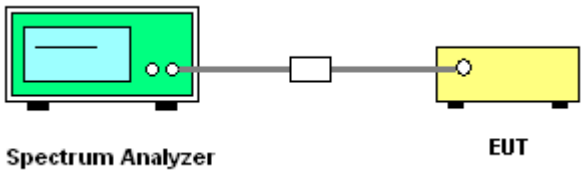
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	100 kHz
VB	300 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. For 6dB Bandwidth the resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.
4. For 99% Occupied Bandwidth the resolution Bandwidth of 100 kHz and the video bandwidth of 300 kHz were used.

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

Final Test Date	Jan. 04, 2012	**Test Site No.**	TH01-HY
Temperature	22.2℃	**Humidity**	26%
Test Engineer	Ian	**Configurations**	802.11b/g/n

For Single Chain:
Configuration IEEE 802.11b Port 0

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	11.12	14.16	500	**Complies**
6	2437 MHz	11.12	14.16	500	**Complies**
11	2462 MHz	11.12	14.12	500	**Complies**

Configuration IEEE 802.11g Port 0

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.44	16.40	500	**Complies**
6	2437 MHz	16.48	16.36	500	**Complies**
11	2462 MHz	16.44	16.36	500	**Complies**

For Two Chains:
Configuration of IEEE 802.11n Port 0 (20MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.60	17.48	500	**Complies**
6	2437 MHz	17.60	17.48	500	**Complies**
11	2462 MHz	17.64	17.48	500	**Complies**

Configuration of IEEE 802.11n Port 1 (20MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.56	17.48	500	**Complies**
6	2437 MHz	17.56	17.48	500	**Complies**
11	2462 MHz	17.32	17.44	500	**Complies**

Configuration of IEEE 802.11n Port 0 (40MHz)

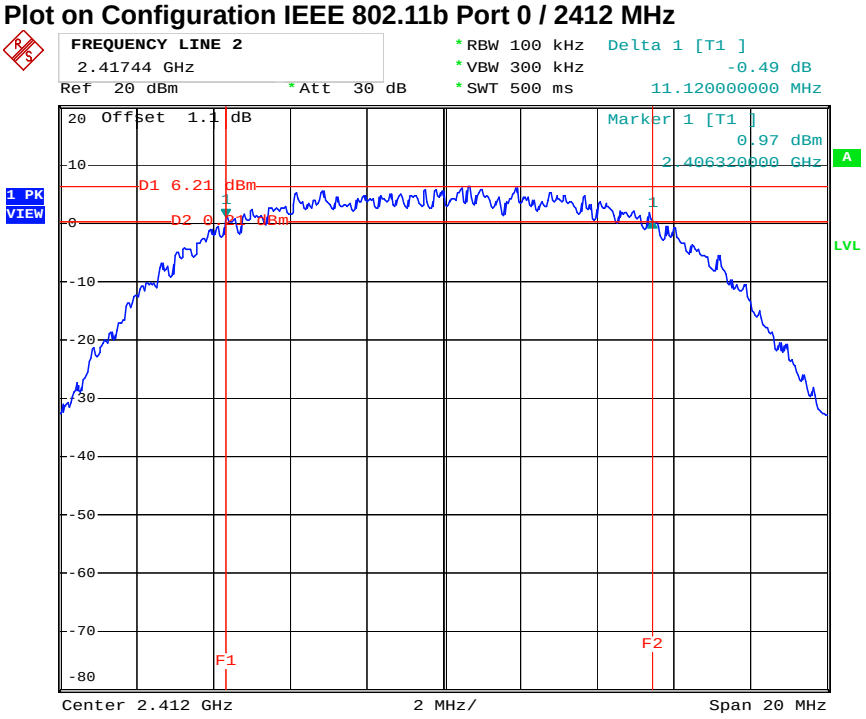
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	36.40	35.92	500	**Complies**
6	2437 MHz	36.40	35.84	500	**Complies**
9	2452 MHz	36.40	35.84	500	**Complies**

Configuration of IEEE 802.11n Port 1 (40MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	35.76	35.76	500	**Complies**
6	2437 MHz	35.84	35.76	500	**Complies**
9	2452 MHz	35.84	35.84	500	**Complies**

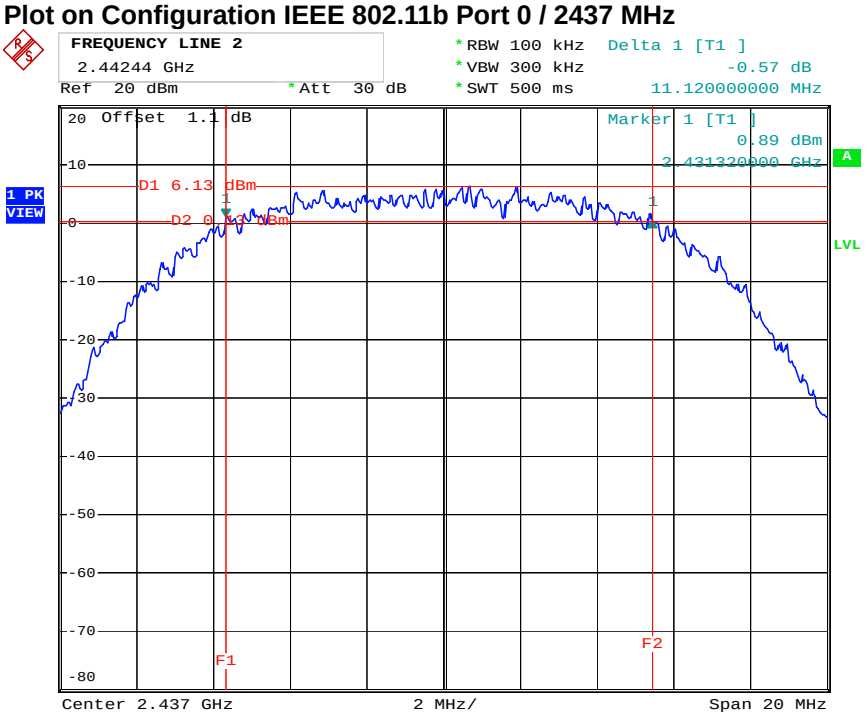
For Single Chain:

6 dB Bandwidth Plot on Configuration IEEE 802.11b Port 0 / 2412 MHz



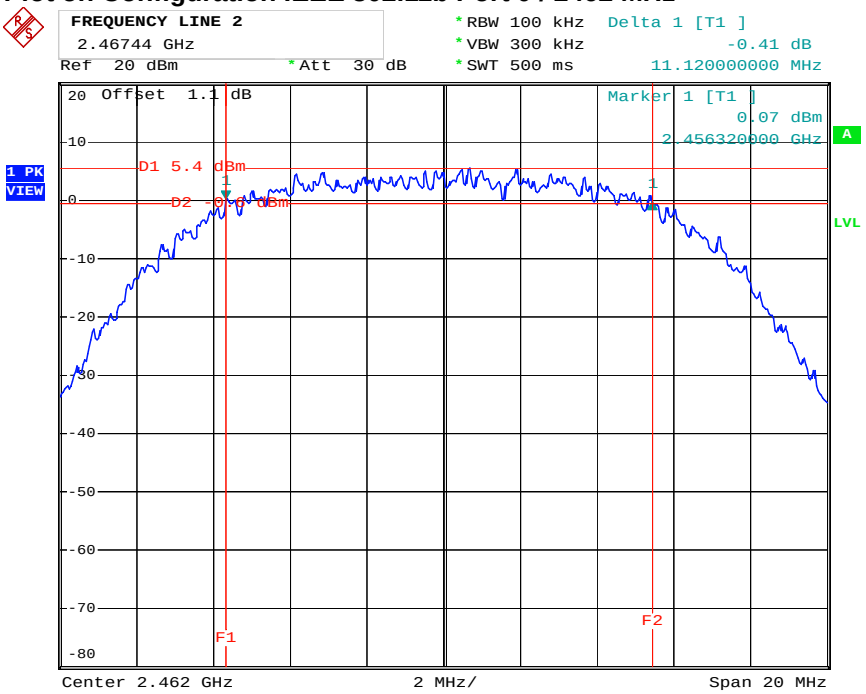
Date: 3.JAN.2012 20:35:32

6 dB Bandwidth Plot on Configuration IEEE 802.11b Port 0 / 2437 MHz

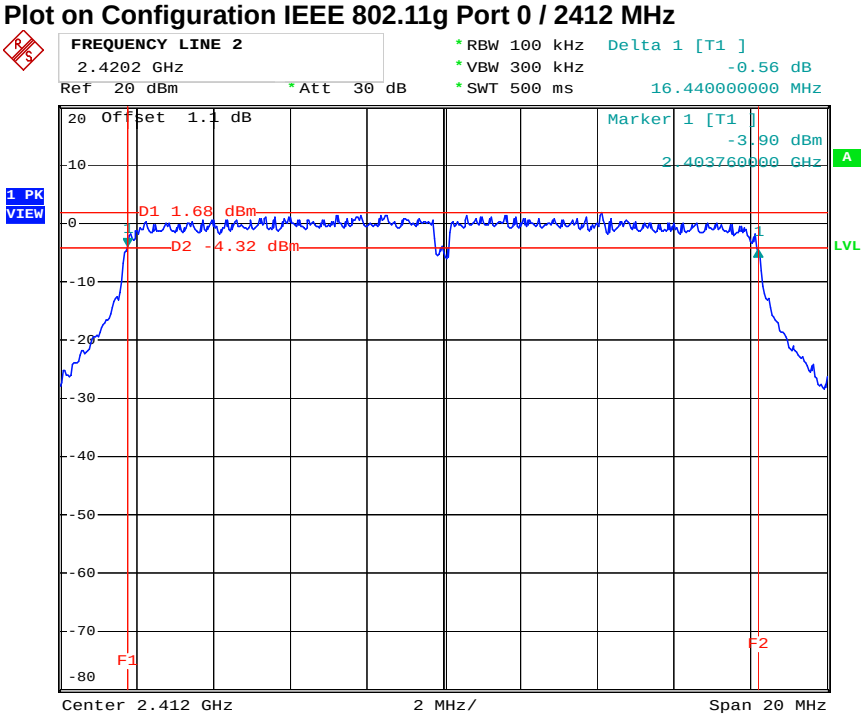


Date: 3.JAN.2012 20:41:01

6 dB Bandwidth Plot on Configuration IEEE 802.11b Port 0 / 2462 MHz

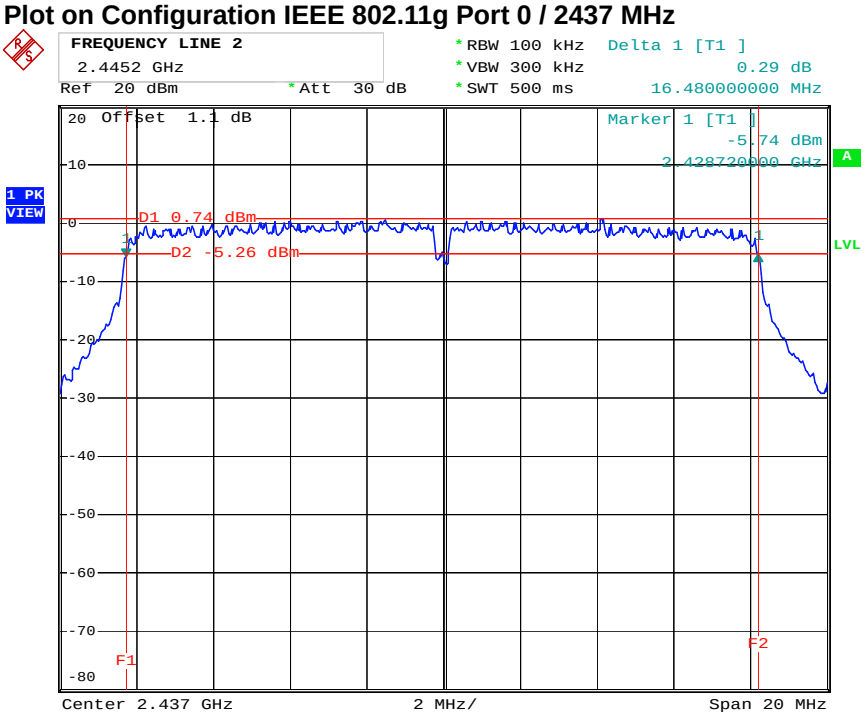


6 dB Bandwidth Plot on Configuration IEEE 802.11g Port 0 / 2412 MHz



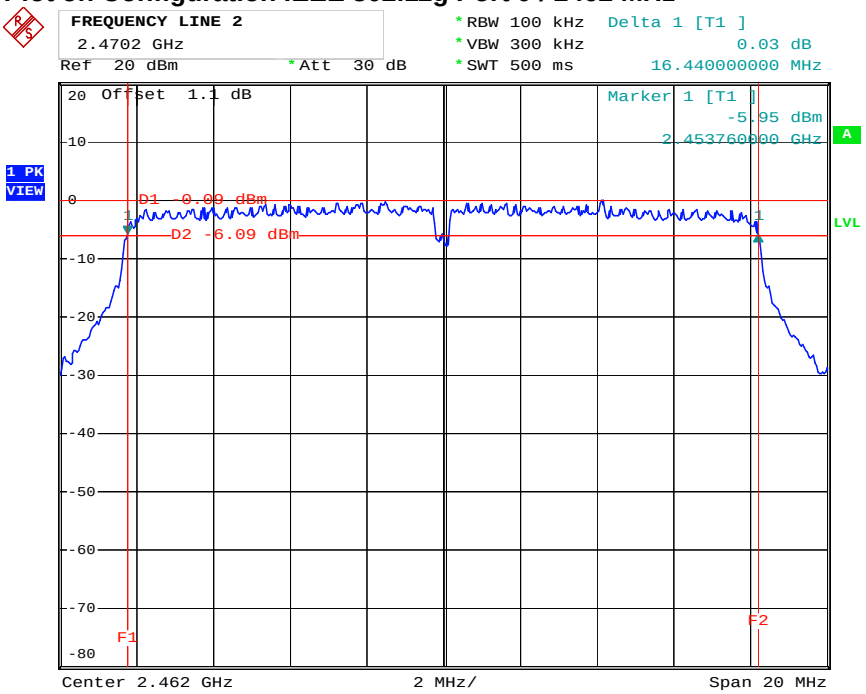
Date: 3.JAN.2012 20:55:13

6 dB Bandwidth Plot on Configuration IEEE 802.11g Port 0 / 2437 MHz



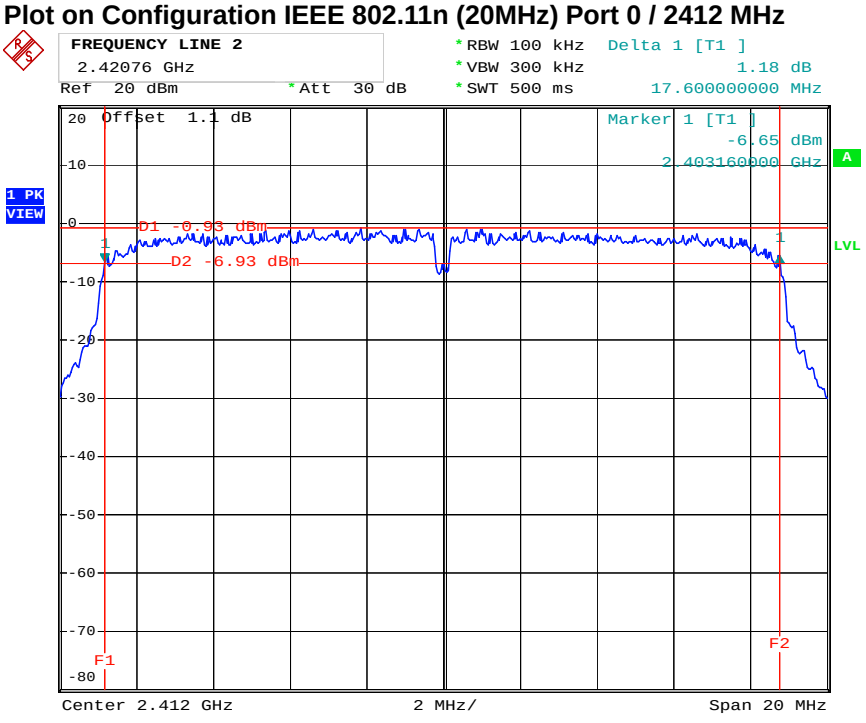
Date: 3.JAN.2012 21:01:08

6 dB Bandwidth Plot on Configuration IEEE 802.11g Port 0 / 2462 MHz

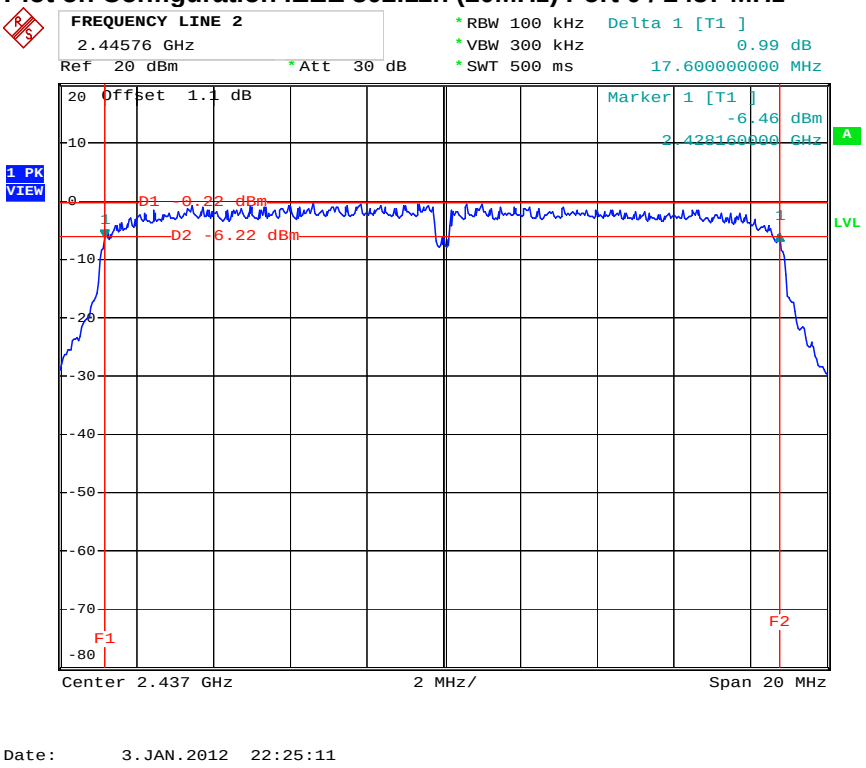


For Two Chains:

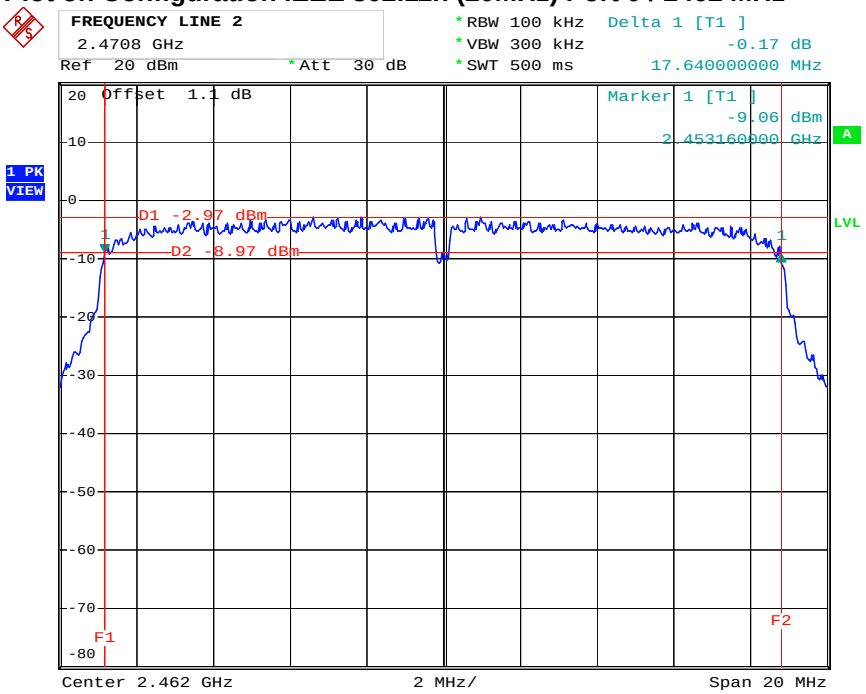
6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2412 MHz



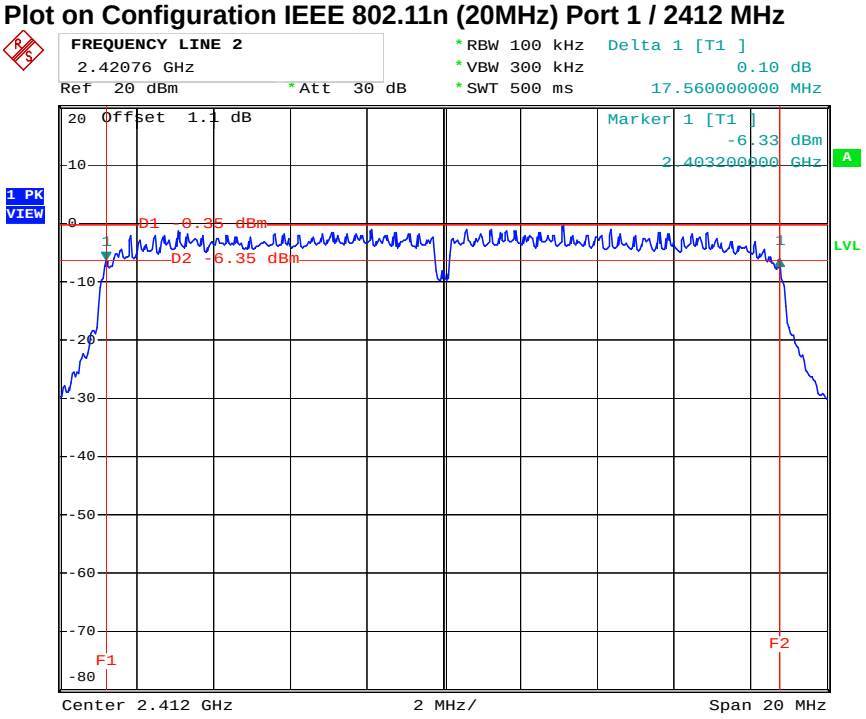
6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2437 MHz



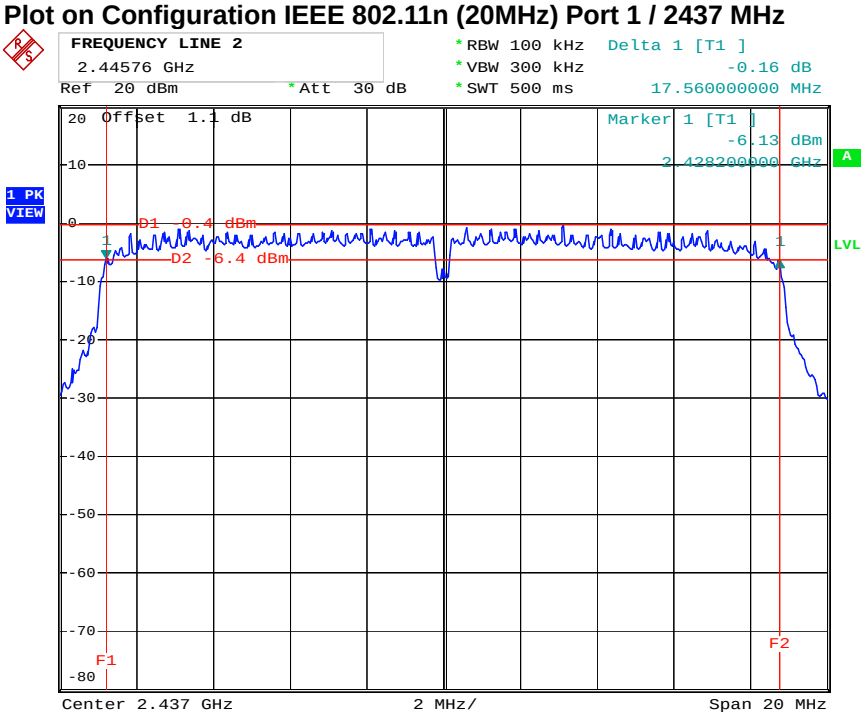
6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2462 MHz



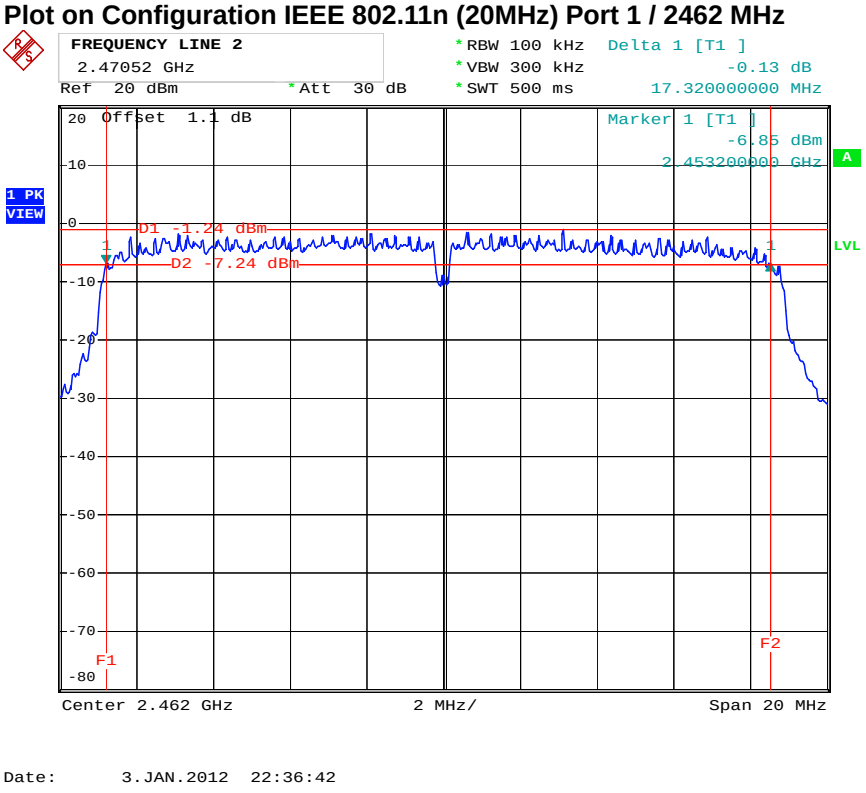
6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2412 MHz



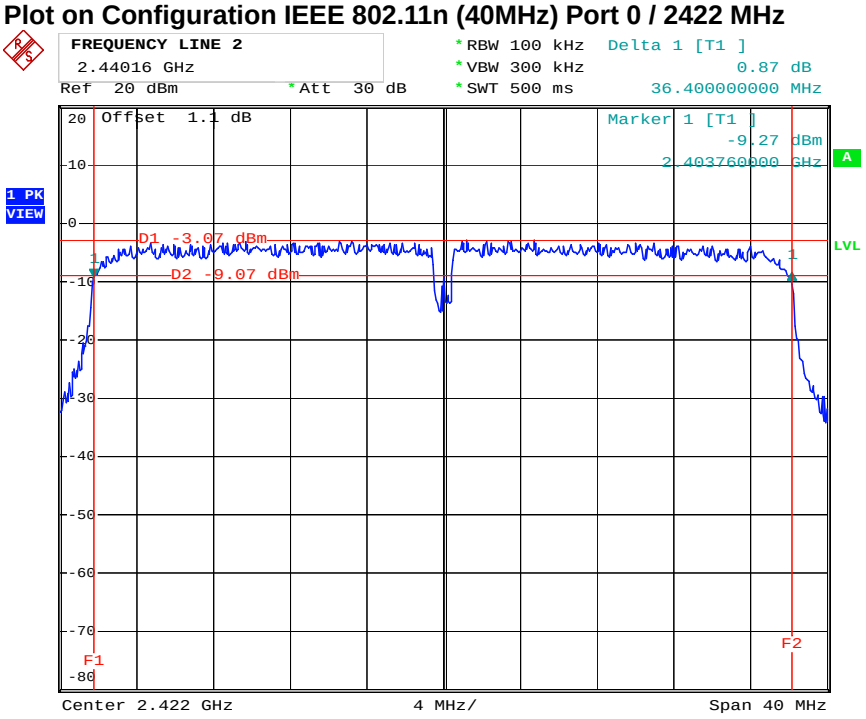
6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2437 MHz



6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2462 MHz

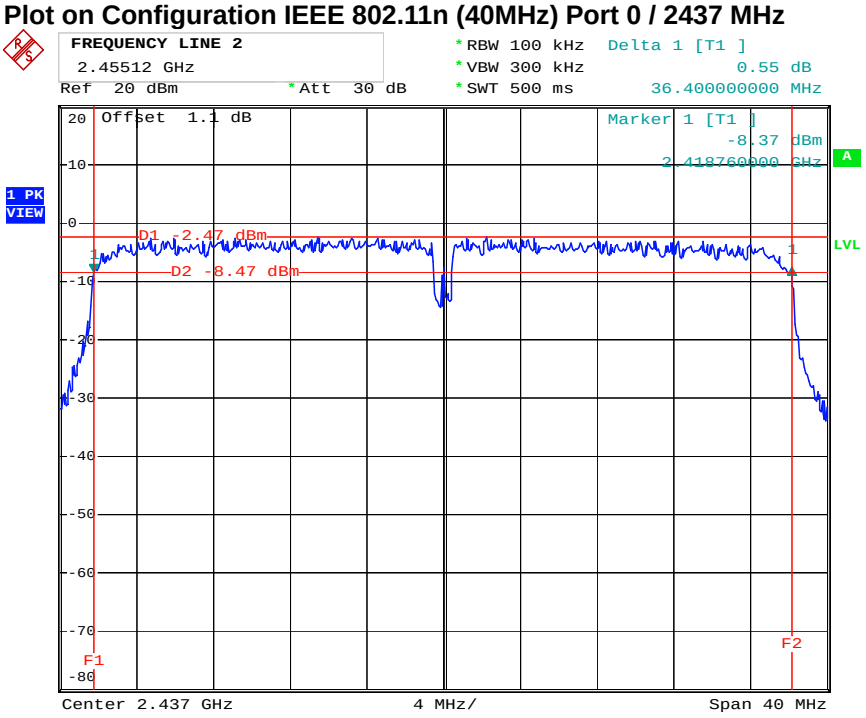


6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2422 MHz



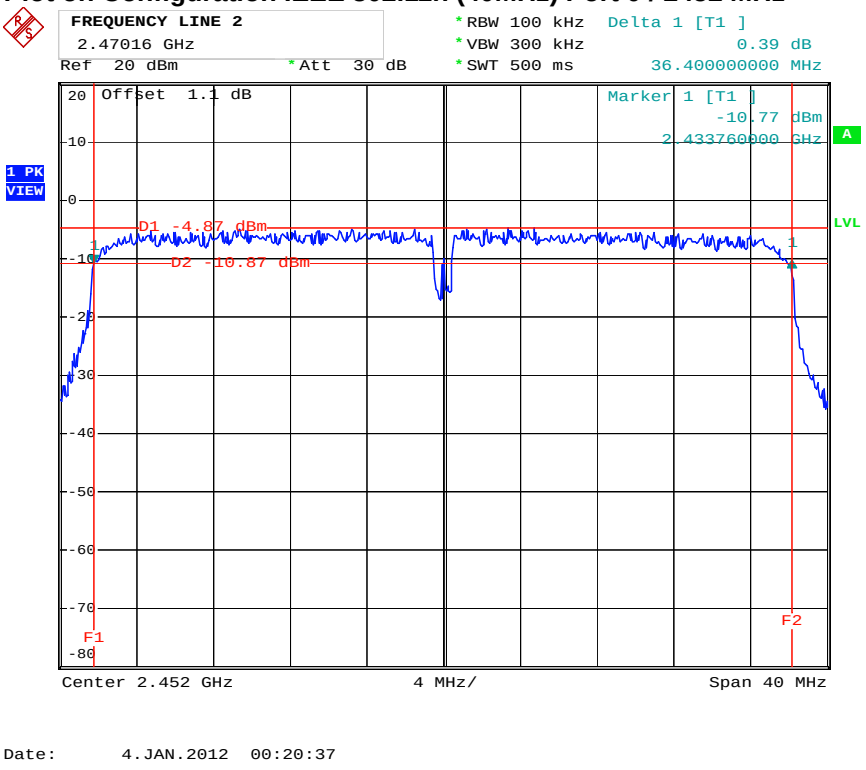
Date: 3.JAN.2012 23:17:21

6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2437 MHz

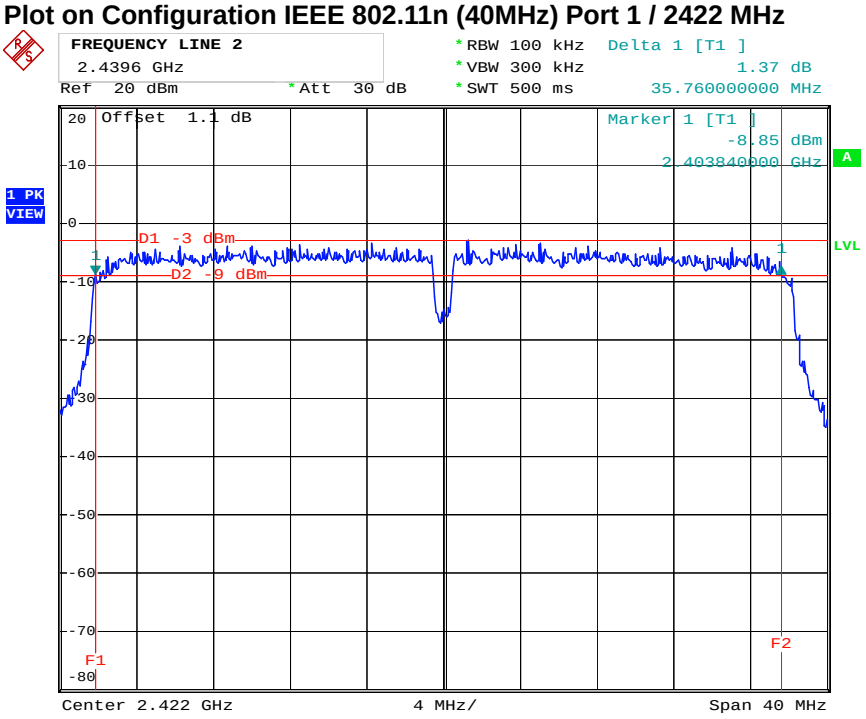


Date: 3.JAN.2012 23:49:09

6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2452 MHz

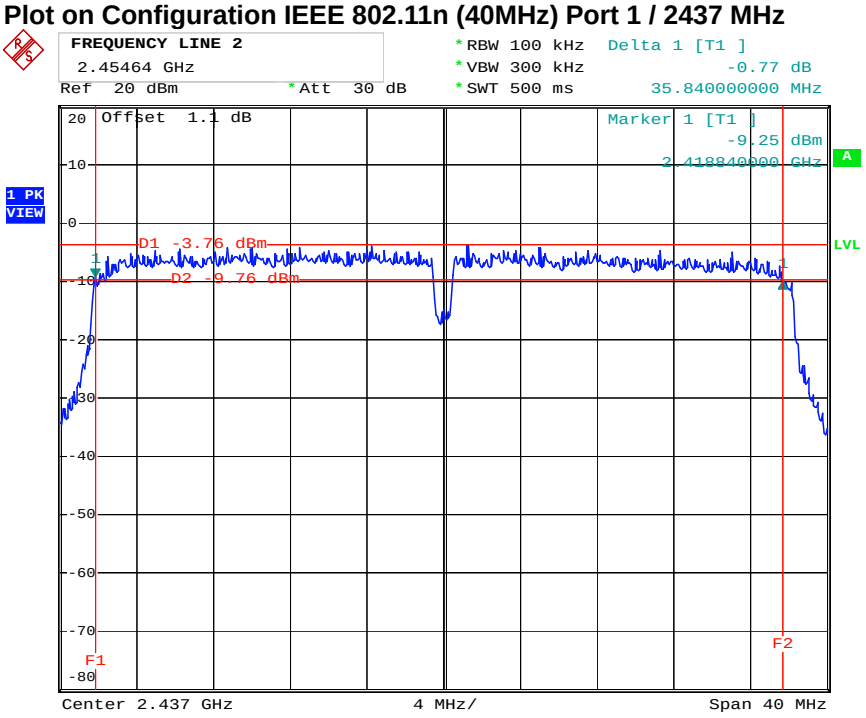


6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2422 MHz



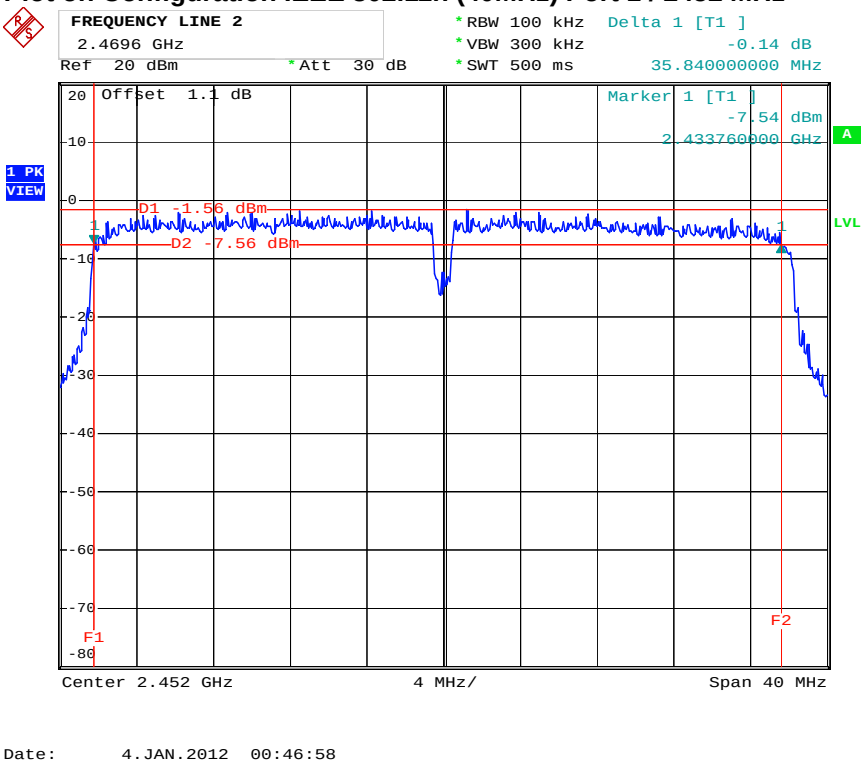
Date: 3.JAN.2012 23:21:45

6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2437 MHz



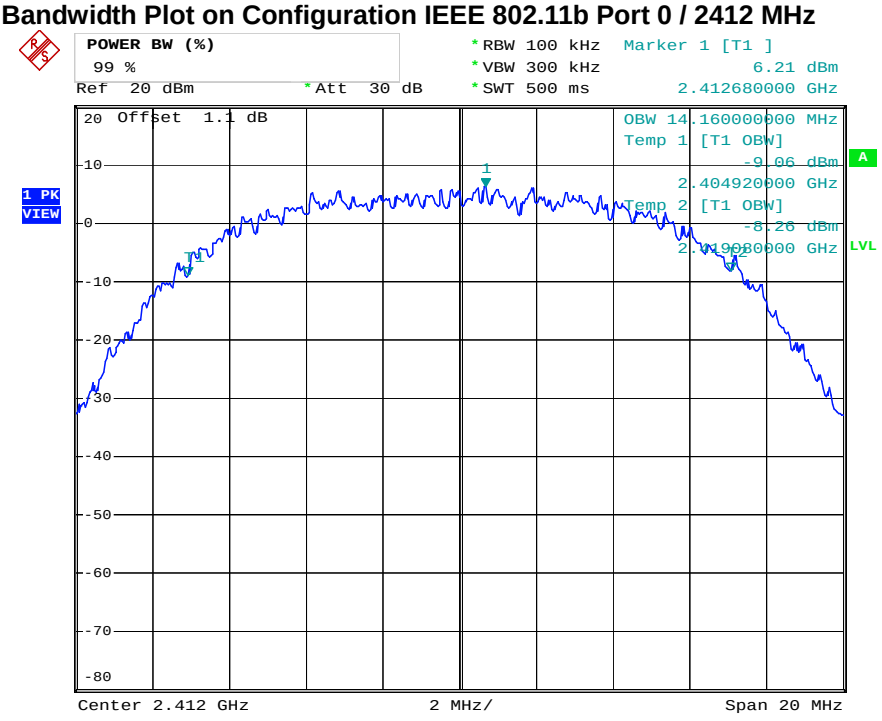
Date: 3.JAN.2012 23:58:15

6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2452 MHz



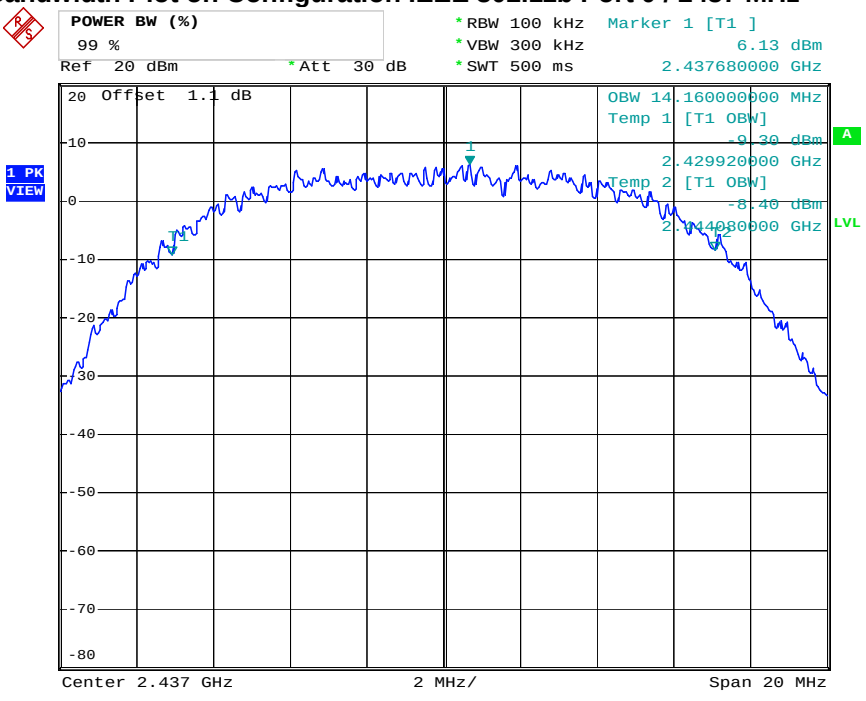
For Single Chain:

99% Occupied Bandwidth Plot on Configuration IEEE 802.11b Port 0 / 2412 MHz



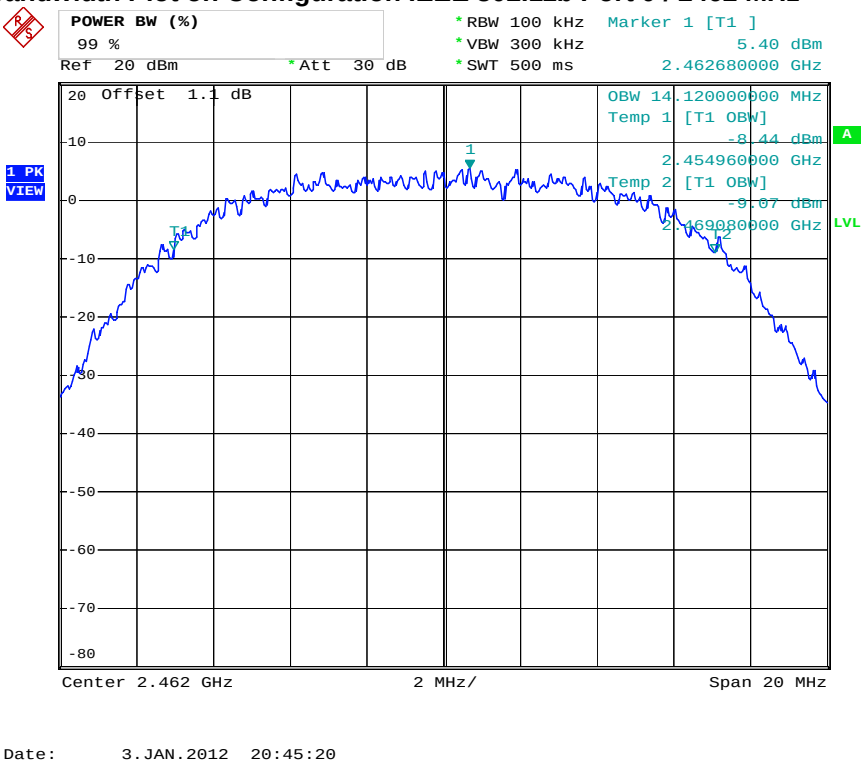
Date: 3.JAN.2012 20:35:44

99% Occupied Bandwidth Plot on Configuration IEEE 802.11b Port 0 / 2437 MHz

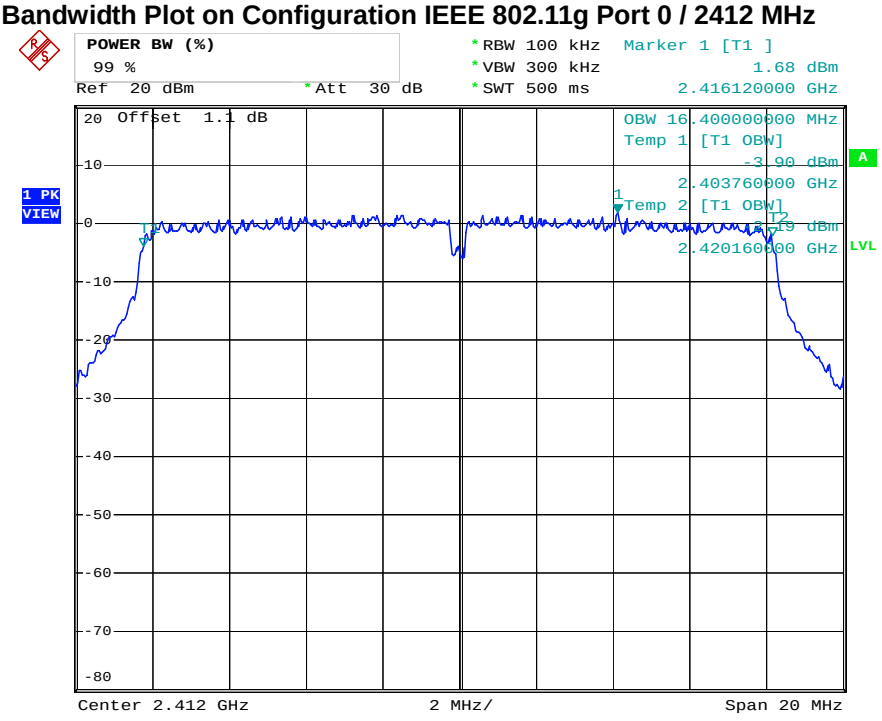


Date: 3.JAN.2012 20:41:15

99% Occupied Bandwidth Plot on Configuration IEEE 802.11b Port 0 / 2462 MHz

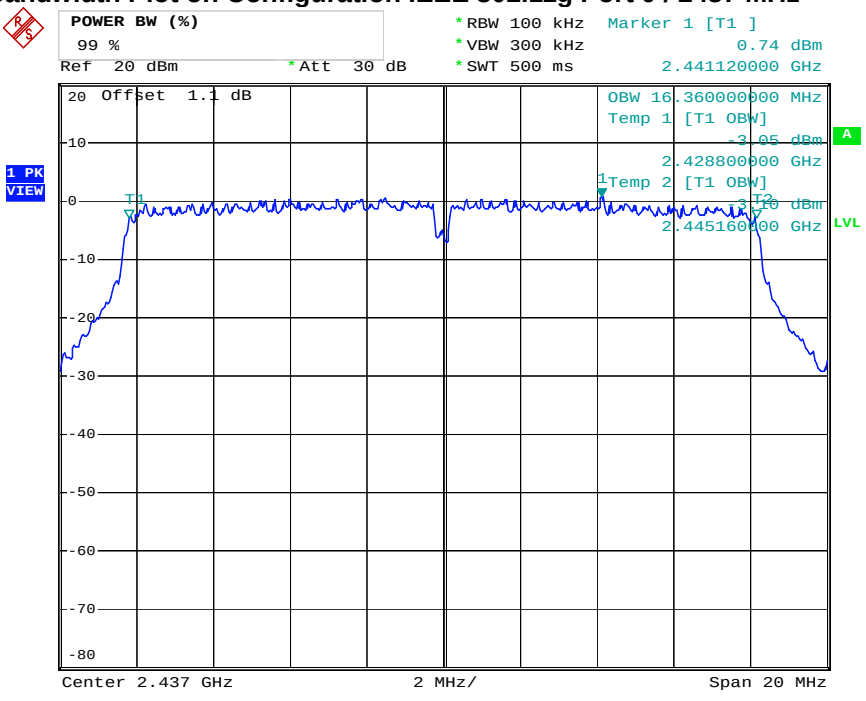


99% Occupied Bandwidth Plot on Configuration IEEE 802.11g Port 0 / 2412 MHz



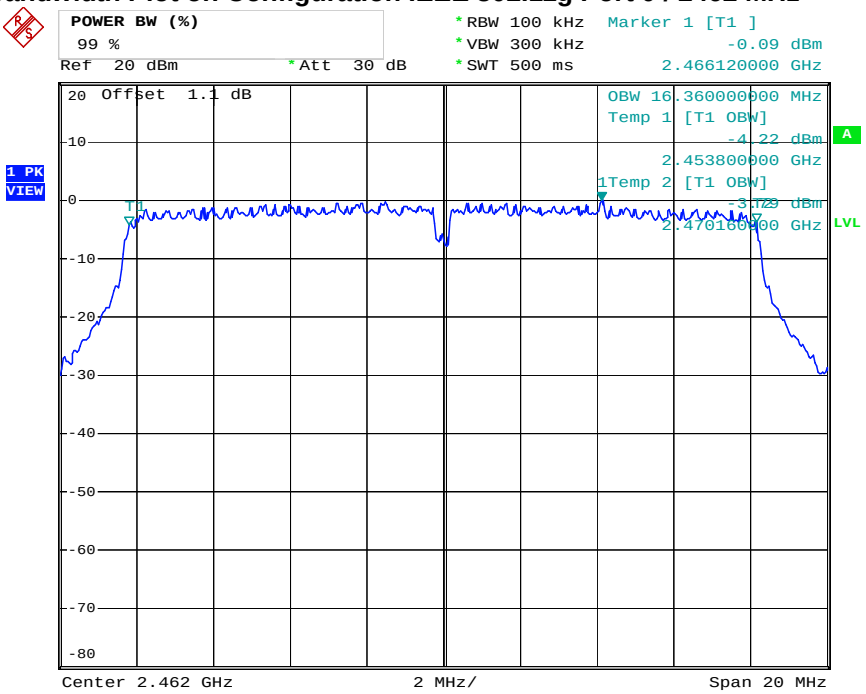
Date: 3.JAN.2012 20:55:26

99% Occupied Bandwidth Plot on Configuration IEEE 802.11g Port 0 / 2437 MHz



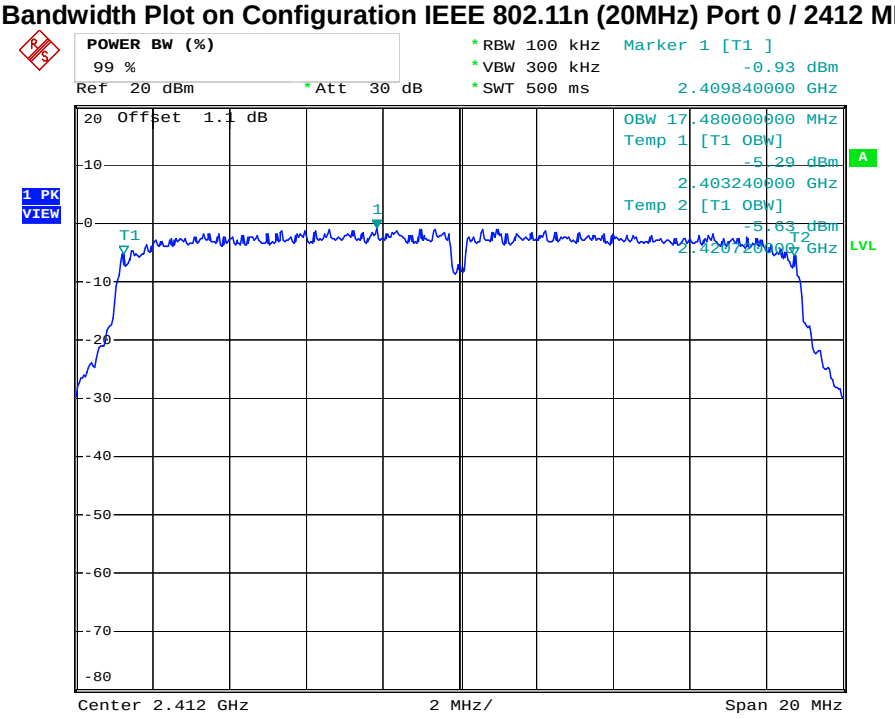
Date: 3.JAN.2012 21:01:18

99% Occupied Bandwidth Plot on Configuration IEEE 802.11g Port 0 / 2462 MHz



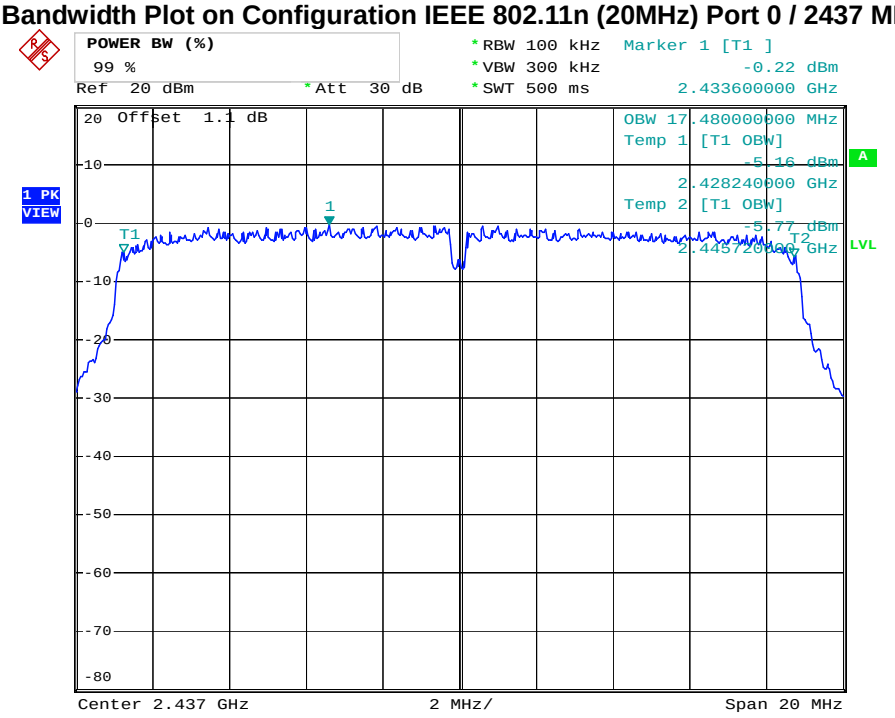
For Two Chains:

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2412 MHz



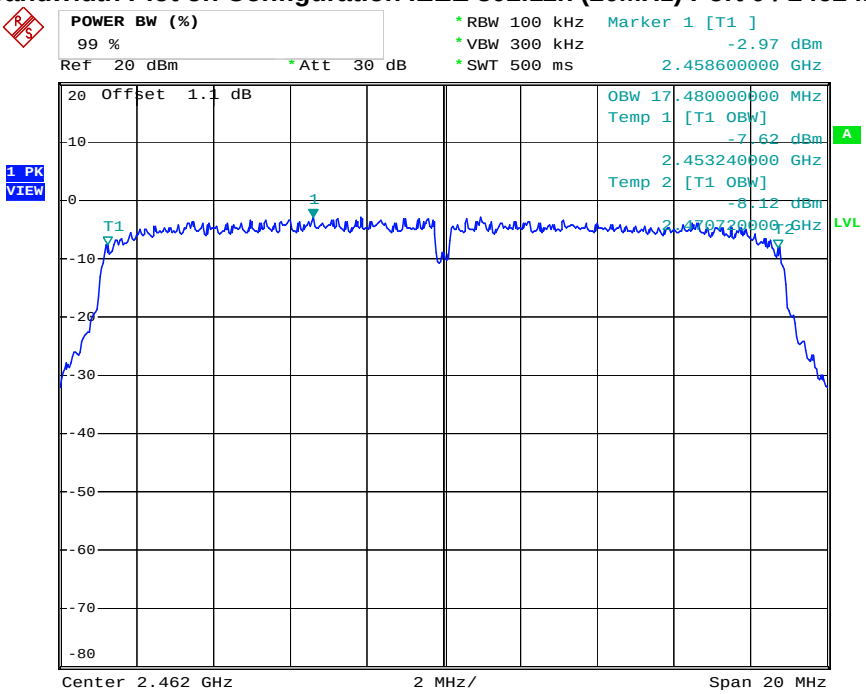
Date: 3.JAN.2012 22:01:46

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2437 MHz

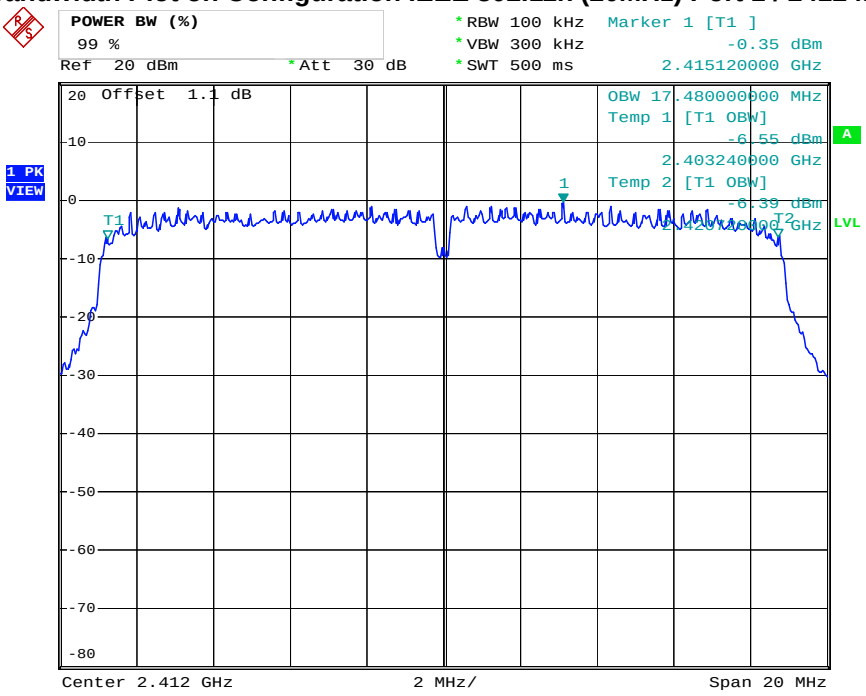


Date: 3.JAN.2012 22:25:20

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2462 MHz

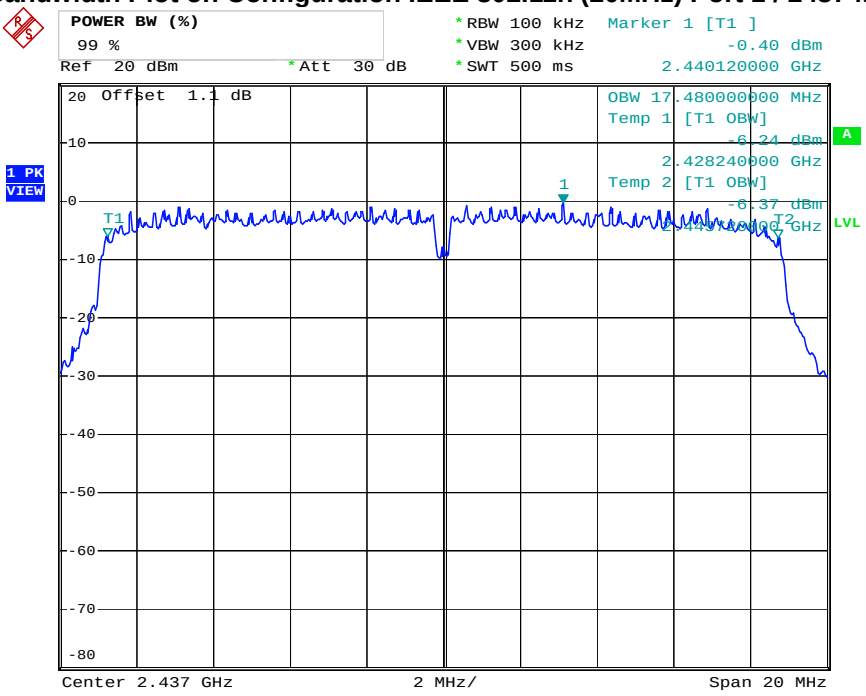


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2412 MHz



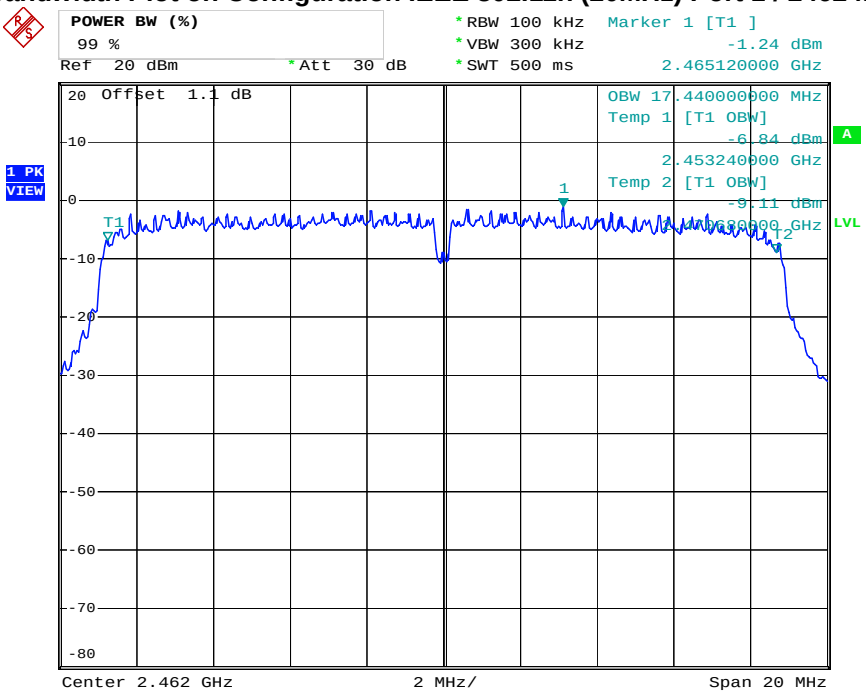
Date: 3.JAN.2012 22:08:58

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2437 MHz

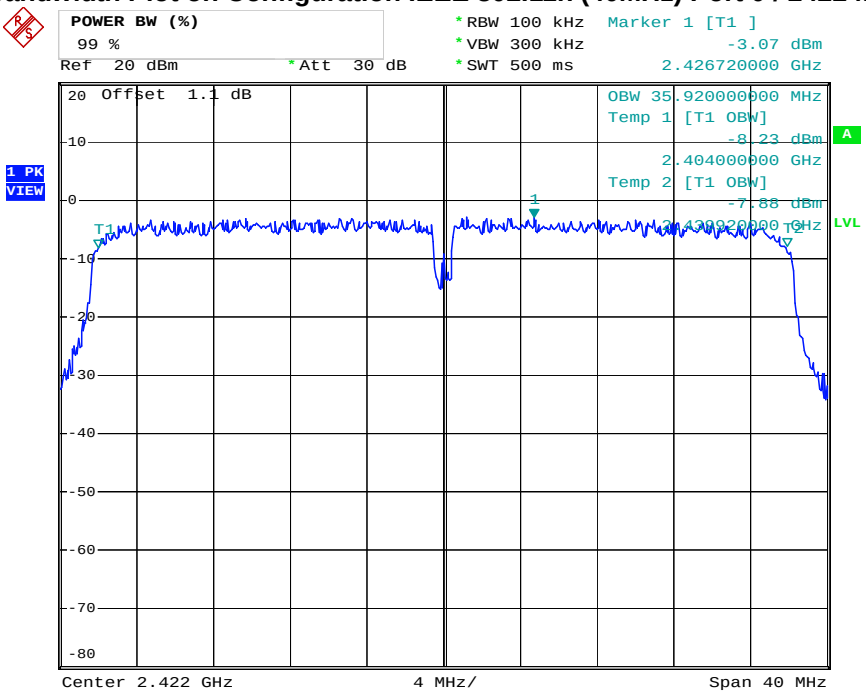


Date: 3.JAN.2012 22:28:49

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2462 MHz

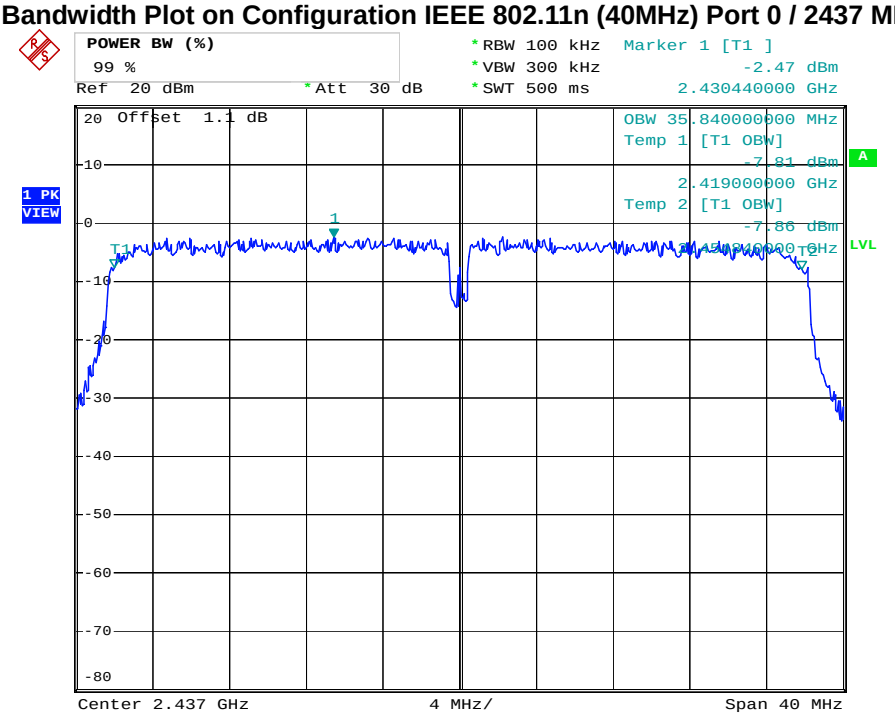


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2422 MHz



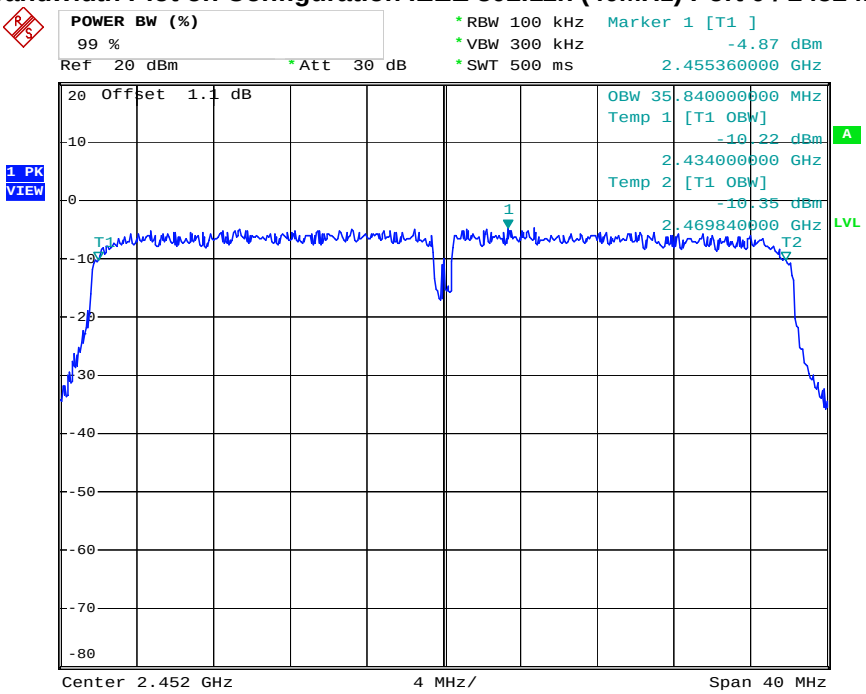
Date: 3.JAN.2012 23:17:30

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2437 MHz

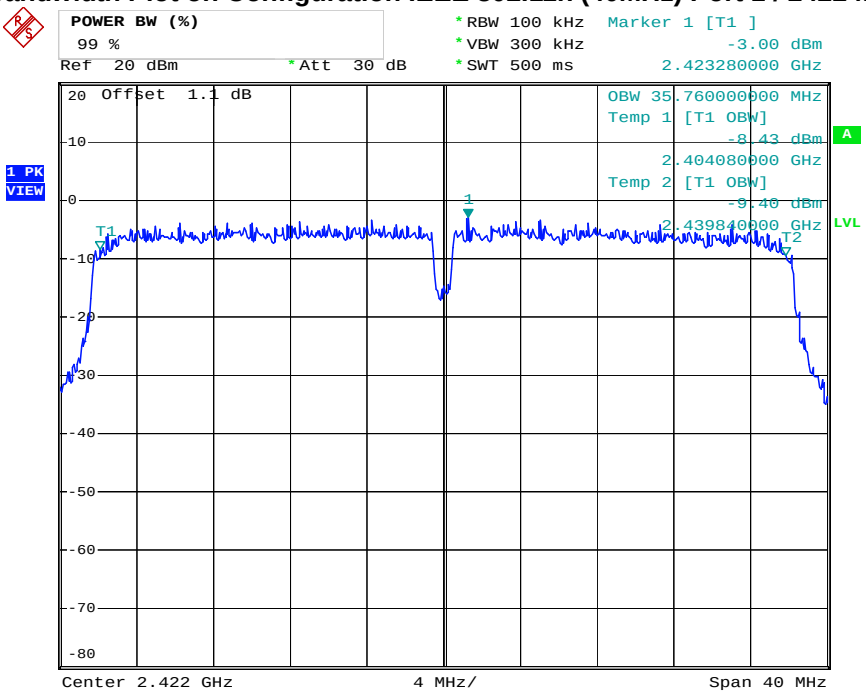


Date: 3.JAN.2012 23:49:18

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2452 MHz

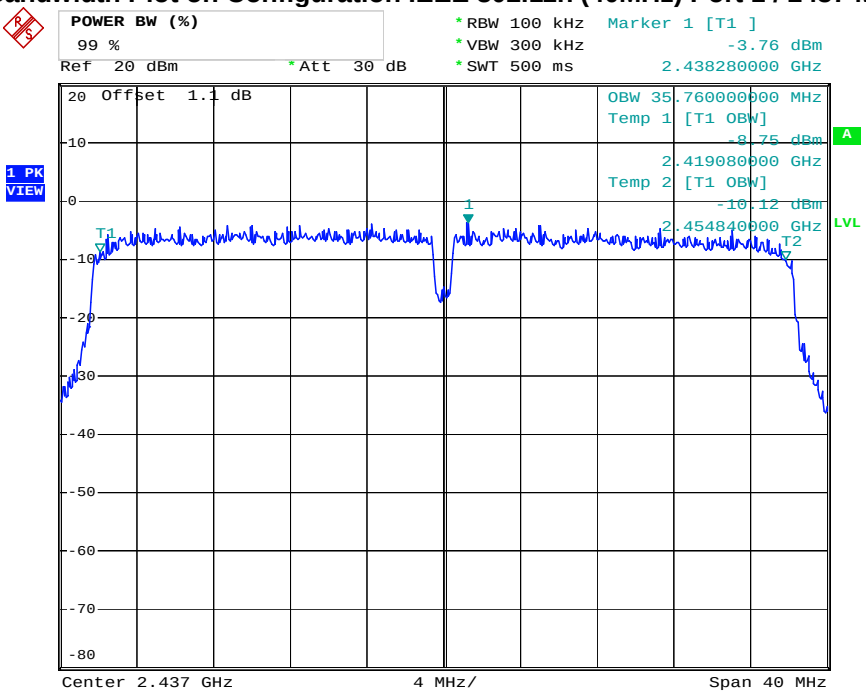


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2422 MHz



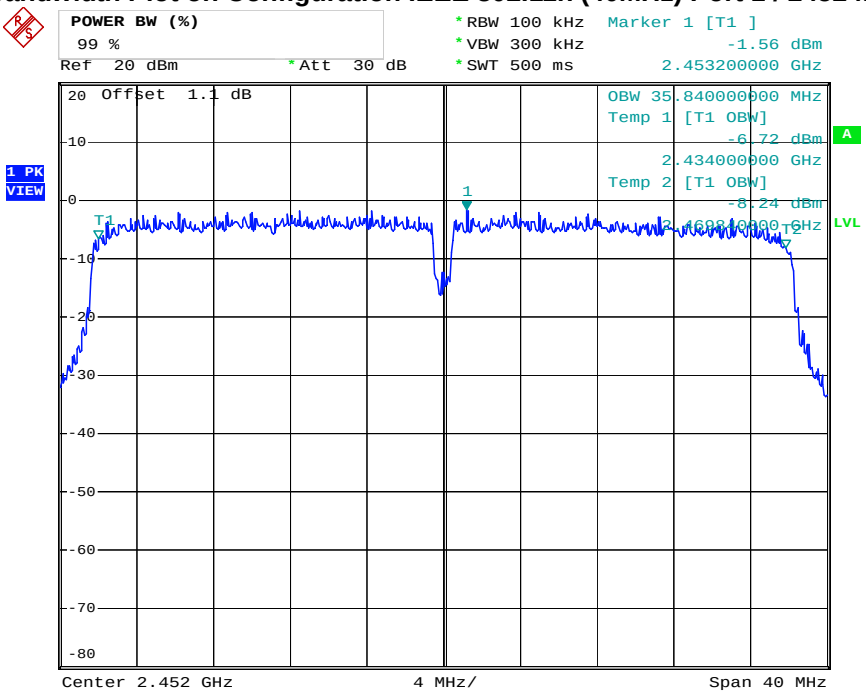
Date: 3.JAN.2012 23:21:53

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2437 MHz



Date: 3.JAN.2012 23:58:24

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2452 MHz



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

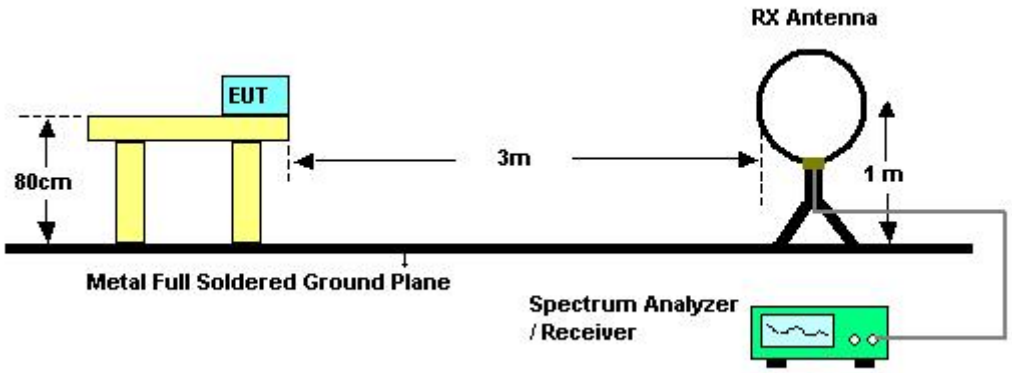
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.5.3 Test Procedures

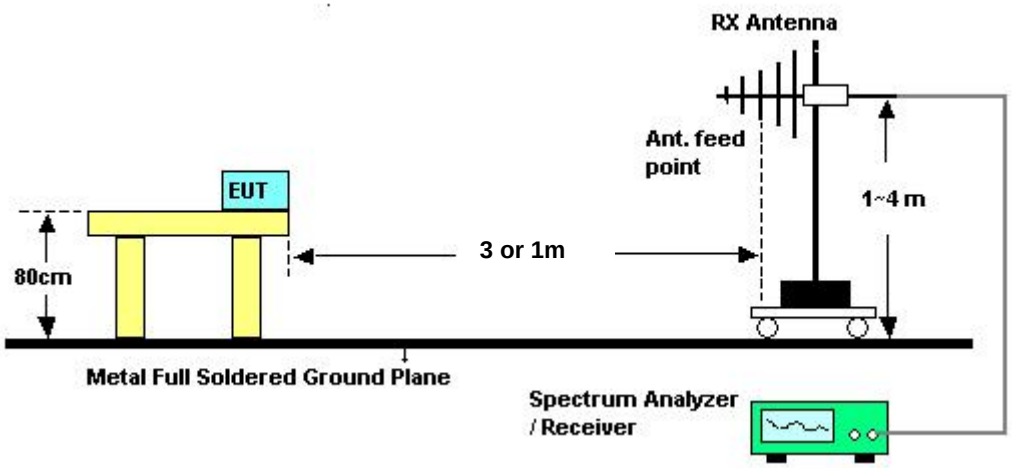
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 (specific distance [3m] / 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)

Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao		

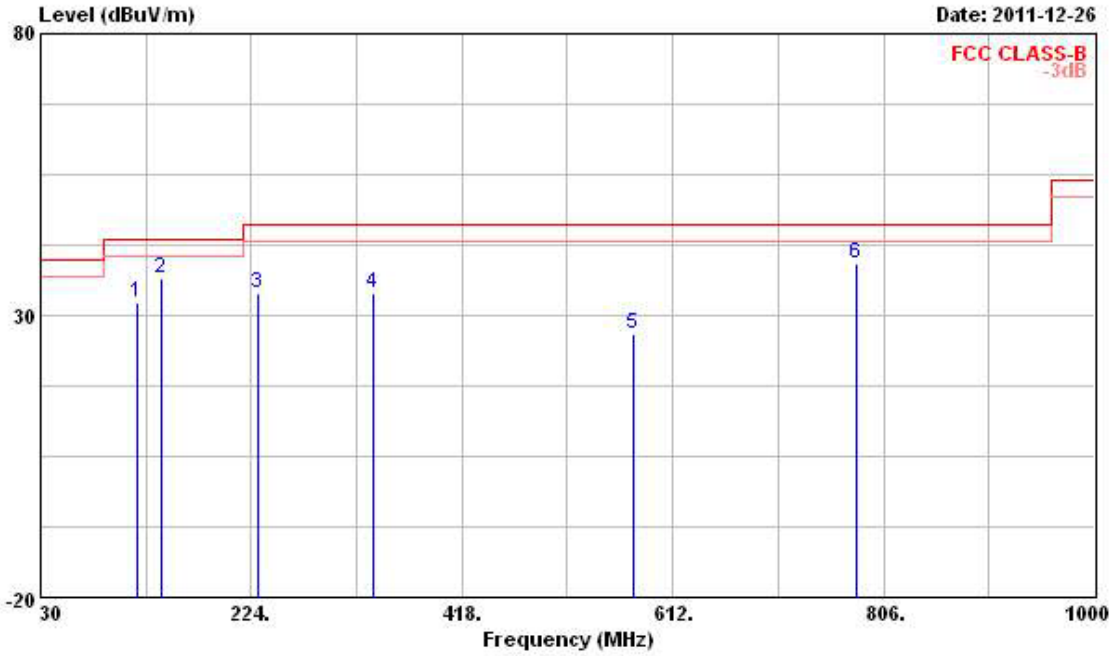
Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

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 (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

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

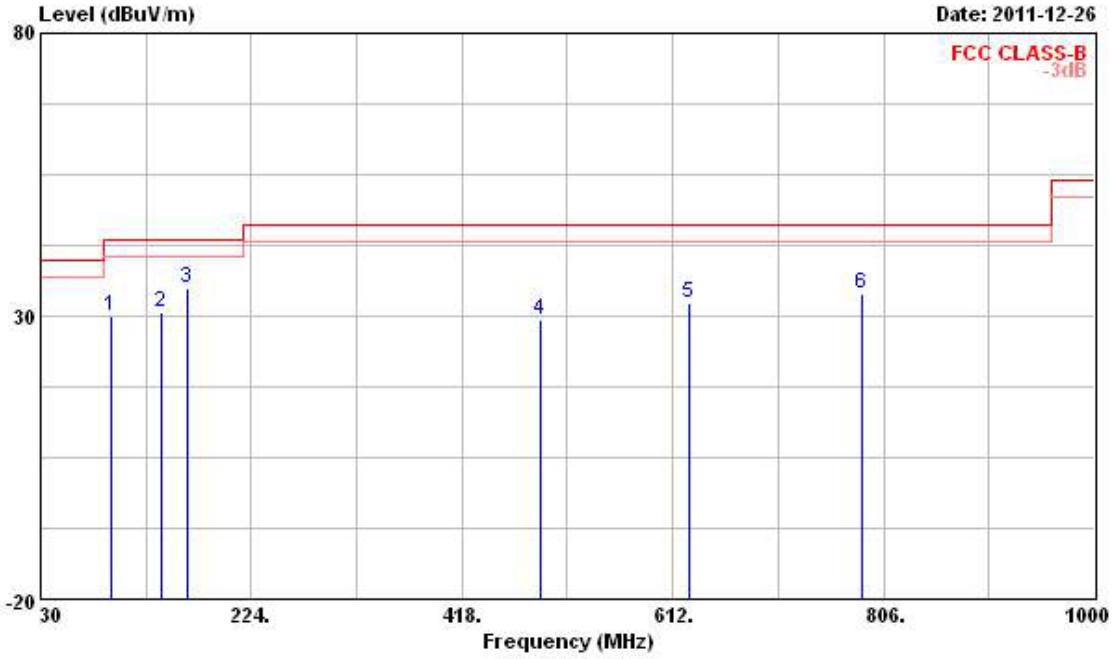
Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	Normal Mode

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	118.270	32.25	-11.25	43.50	44.83	13.38	1.81	27.77	Peak	---	---
2	141.550	36.60	-6.90	43.50	50.49	11.78	2.00	27.67	Peak	---	---
3	230.790	33.81	-12.19	46.00	46.13	12.37	2.64	27.33	Peak	---	---
4	335.550	33.96	-12.04	46.00	43.99	14.26	3.12	27.41	Peak	---	---
5	575.140	26.57	-19.43	46.00	31.42	19.45	4.14	28.44	Peak	---	---
6	780.780	39.07	-6.93	46.00	42.26	19.99	4.82	28.00	Peak	---	---

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	94.990	29.86	-13.64	43.50	45.77	10.34	1.60	27.85	Peak	0	0
2	141.550	30.56	-12.94	43.50	44.45	11.78	2.00	27.67	Peak	0	0
3	164.830	35.04	-8.46	43.50	50.12	10.34	2.14	27.56	Peak	0	0
4	489.780	29.42	-16.58	46.00	36.88	17.08	3.78	28.32	Peak	0	0
5	626.550	32.28	-13.72	46.00	36.54	19.83	4.32	28.41	Peak	0	0
6	785.630	33.79	-12.21	46.00	36.88	20.06	4.84	27.99	Peak	0	0

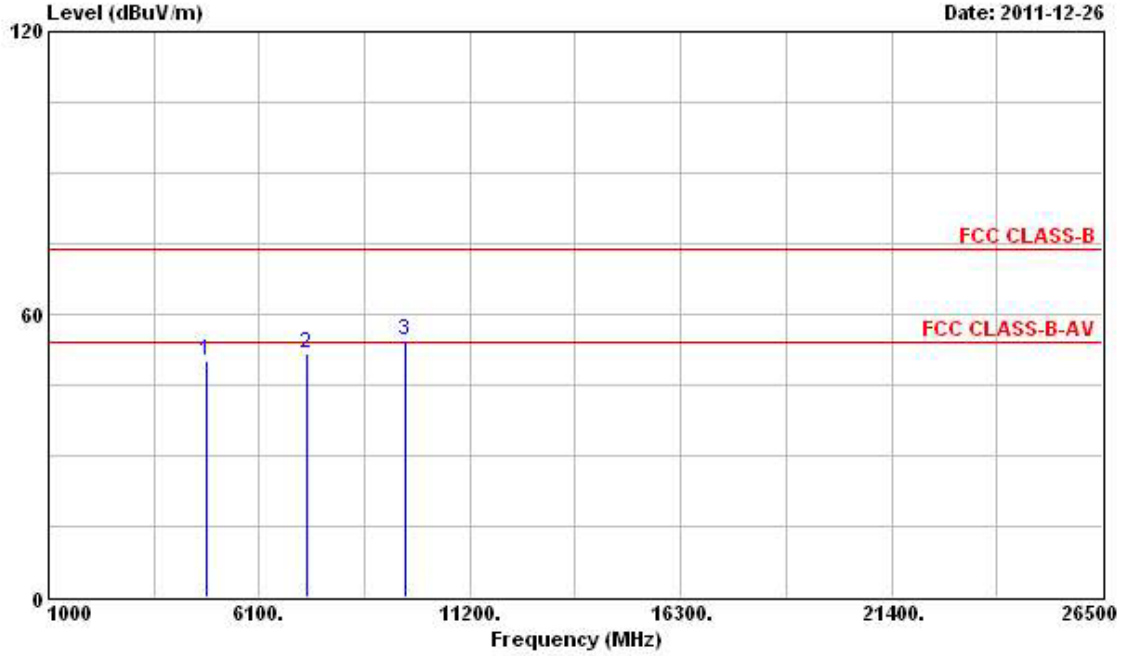
Note:
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.5.9 Results for Radiated Emissions (1GHz~10th Harmonic)

For Single Chain:

Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11b Ch. 1

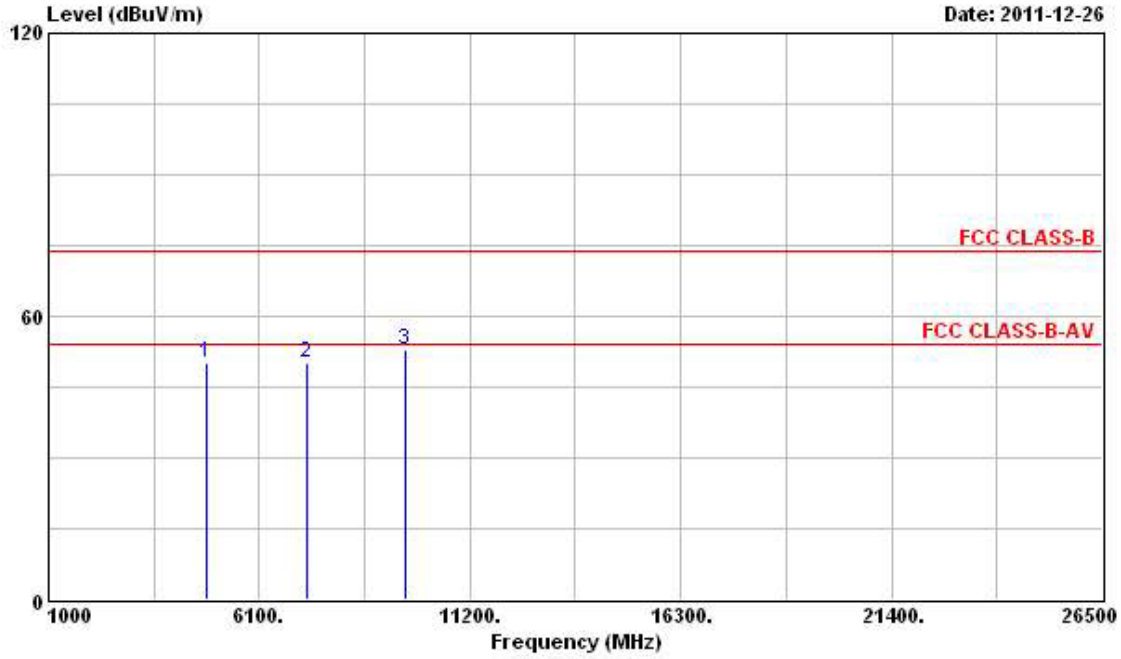
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	50.13	-3.87	54.00	44.59	35.76	4.58	34.80	PK	---	---
2	7236.000	51.88			43.48	37.85	5.63	35.08	Peak	---	---
3	9648.000	54.28			44.02	39.39	6.34	35.47	Peak	---	---

Note: The items 2 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

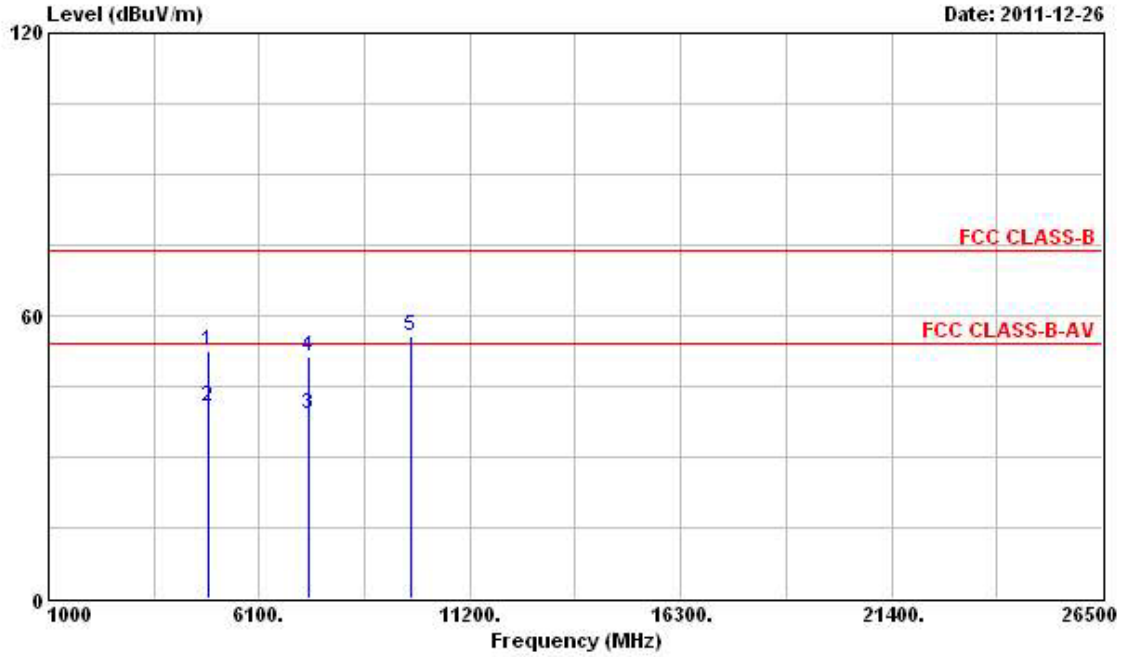


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	50.25	-3.75	54.00	45.34	35.13	4.58	34.80	PK	---	---
2	7236.000	50.27			42.82	36.90	5.63	35.08	Peak	---	---
3	9648.000	53.00			43.54	38.59	6.34	35.47	Peak	---	---

Note: The items 2 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).

Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11b Ch. 6

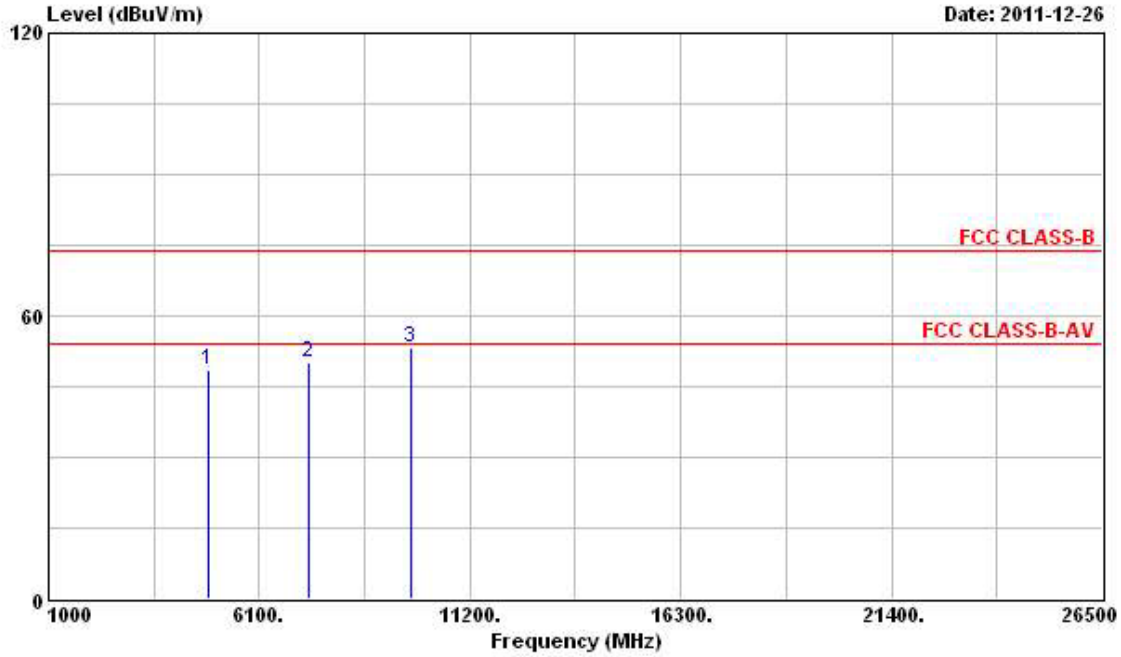
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	52.60	-21.40	74.00	46.94	35.83	4.61	34.78	Peak	---	---
2	4874.000	40.64	-13.36	54.00	34.98	35.83	4.61	34.78	Average	---	---
3	7311.000	39.08	-14.92	54.00	30.68	37.86	5.64	35.10	Average	---	---
4	7311.000	51.45	-22.55	74.00	43.05	37.86	5.64	35.10	Peak	---	---
5	9748.000	55.63			45.24	39.51	6.36	35.48	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

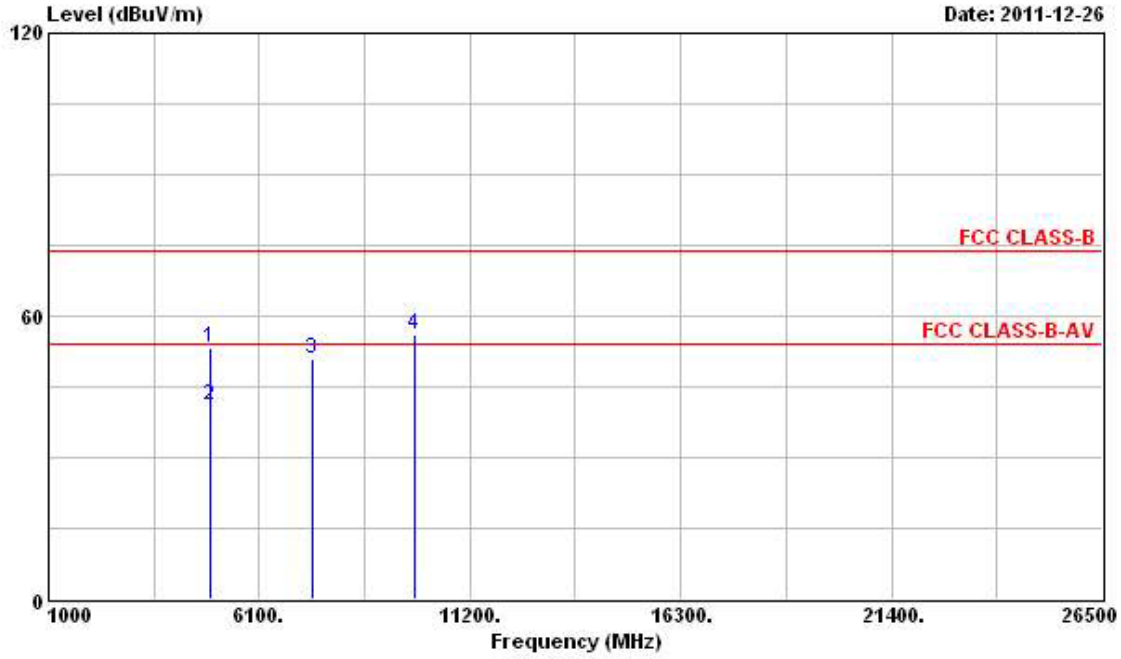


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	48.57	-5.43	54.00	43.56	35.18	4.61	34.78	PK	---	---
2	7311.000	50.18	-3.82	54.00	42.72	36.92	5.64	35.10	PK	---	---
3	9748.000	53.43			43.84	38.71	6.36	35.48	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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11b Ch. 11

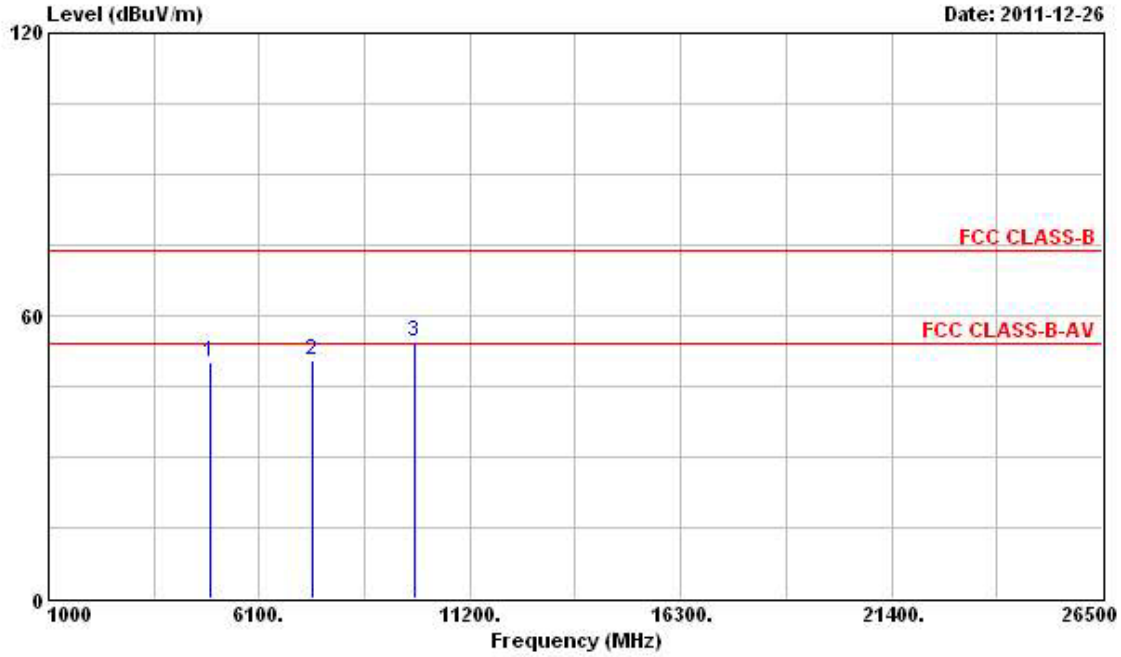
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	53.14	-20.86	74.00	47.33	35.90	4.68	34.77	Peak	---	---
2	4924.000	40.96	-13.04	54.00	35.15	35.90	4.68	34.77	Average	---	---
3 @	7386.000	51.00	-3.00	54.00	42.59	37.88	5.65	35.12	PK	---	---
4	9848.000	55.90			45.40	39.61	6.38	35.49	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

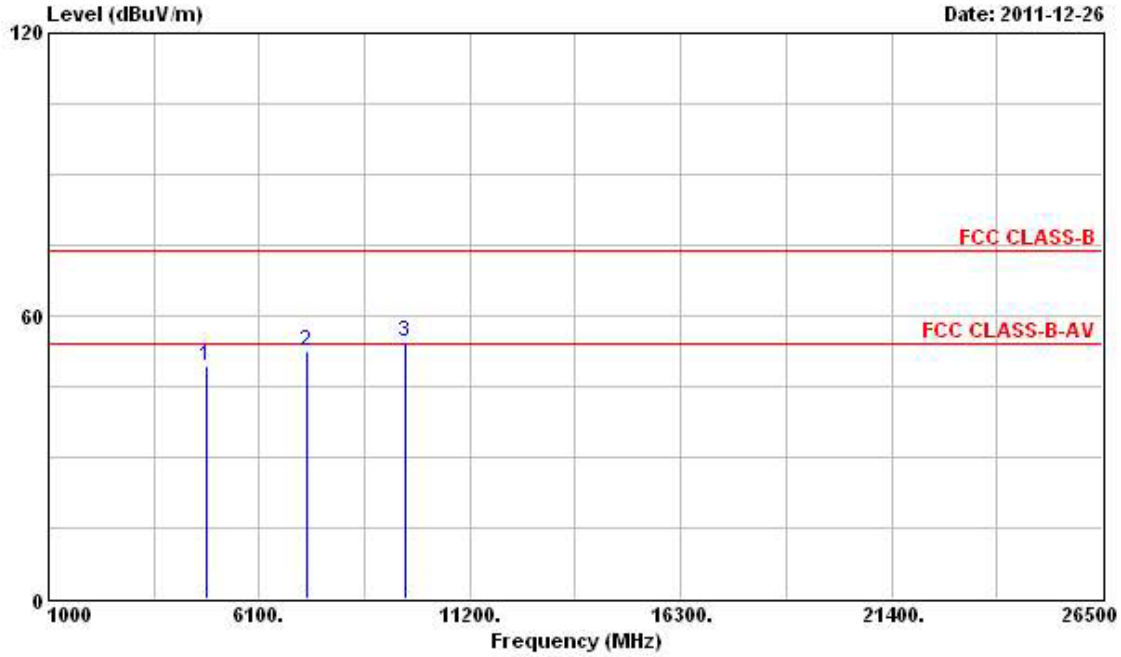


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	50.06	-3.94	54.00	44.92	35.23	4.68	34.77	PK	---	---
2	7386.000	50.70	-3.30	54.00	43.21	36.96	5.65	35.12	PK	---	---
3	9848.000	54.33			44.63	38.81	6.38	35.49	Peak	---	---

N 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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11g Ch. 1

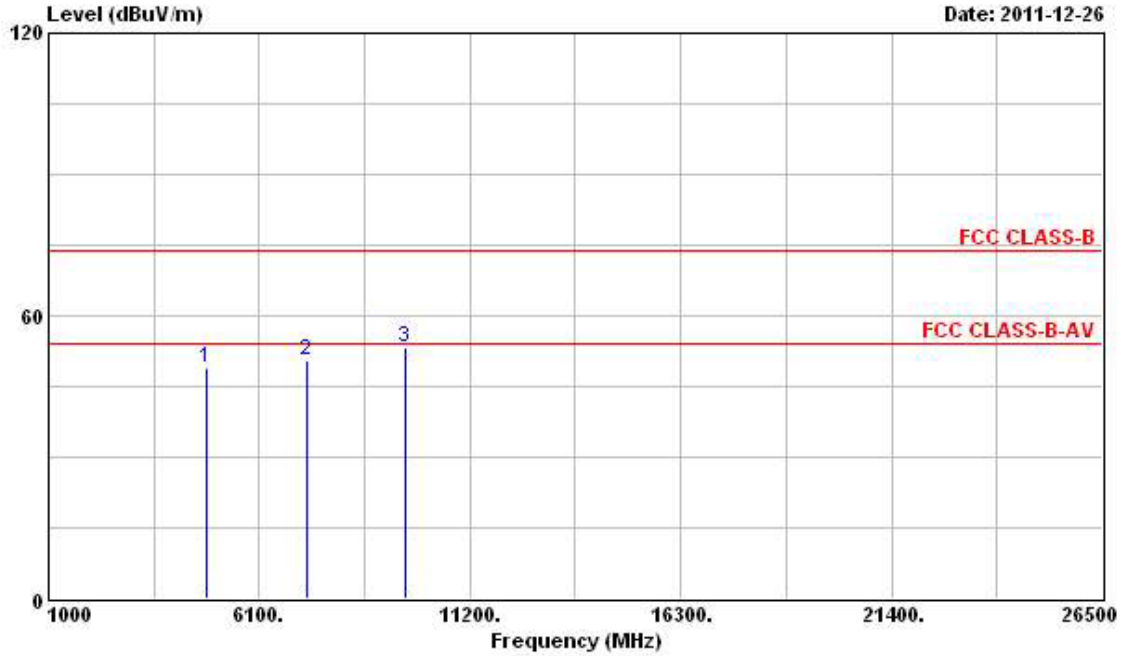
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	49.24	-4.76	54.00	43.70	35.76	4.58	34.80	PK	---	---
2	7236.000	52.58			44.18	37.85	5.63	35.08	Peak	---	---
3	9648.000	54.40			44.14	39.39	6.34	35.47	Peak	---	---

Note: The items 2 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

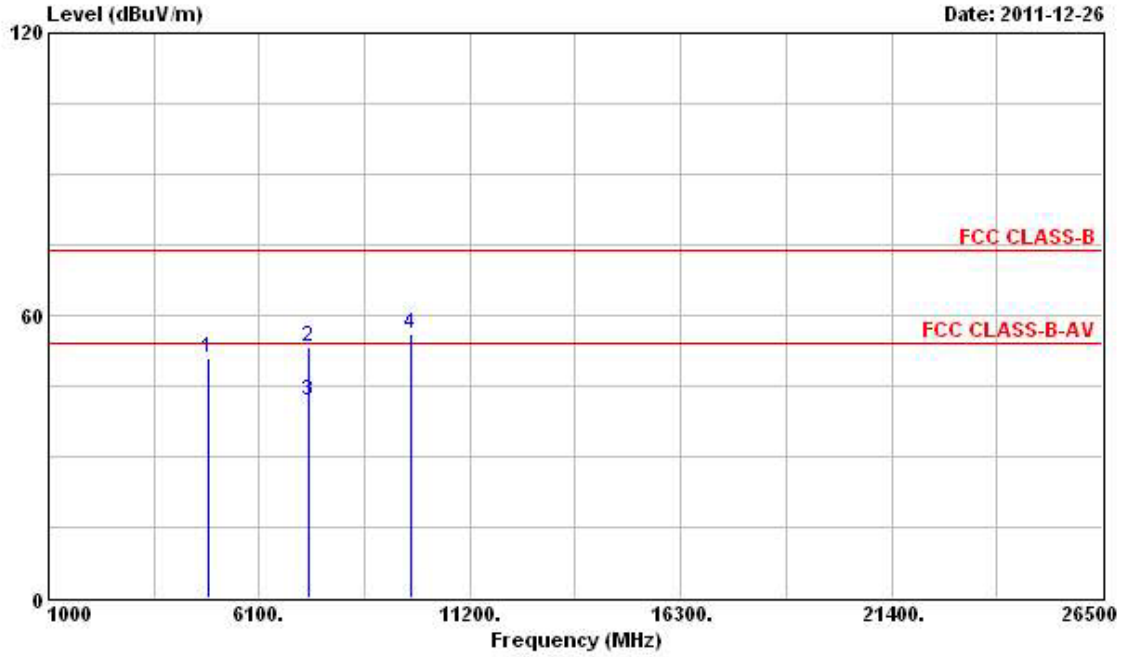


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	49.11	-4.89	54.00	44.20	35.13	4.58	34.80	PK	---	---
2	7236.000	50.46			43.01	36.90	5.63	35.08	Peak	---	---
3	9648.000	53.22			43.76	38.59	6.34	35.47	Peak	---	---

Note: The items 2 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).

Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11g Ch. 6

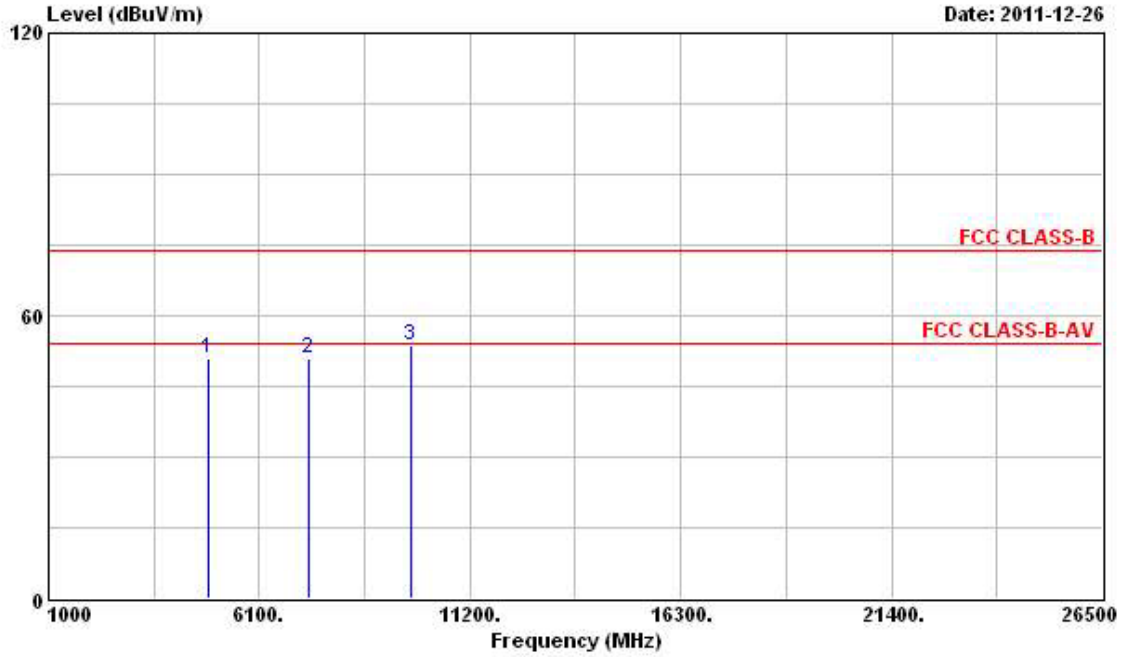
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	50.92	-3.08	54.00	45.26	35.83	4.61	34.78	PK	---	---
2	7311.000	53.36	-20.64	74.00	44.96	37.86	5.64	35.10	Peak	---	---
3	7311.000	41.82	-12.18	54.00	33.42	37.86	5.64	35.10	Average	---	---
4	9748.000	56.22			45.83	39.51	6.36	35.48	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

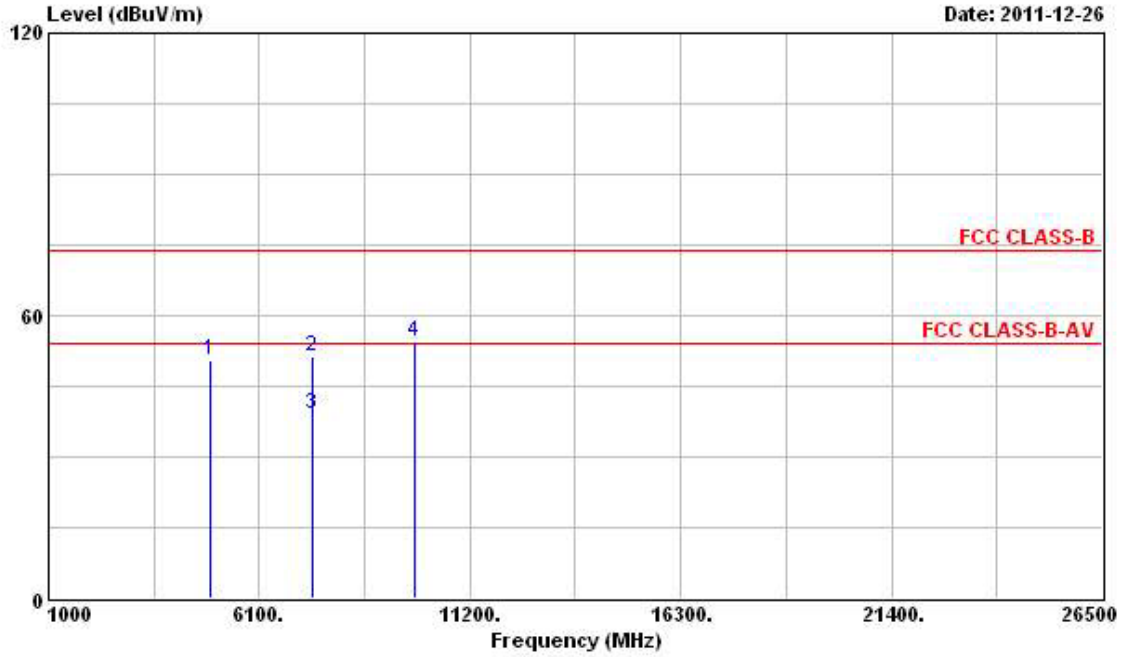


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	50.97	-3.03	54.00	45.96	35.18	4.61	34.78	PK	---	---
2	7311.000	50.73	-3.27	54.00	43.27	36.92	5.64	35.10	PK	---	---
3	9748.000	53.49			43.90	38.71	6.36	35.48	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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11g Ch. 11

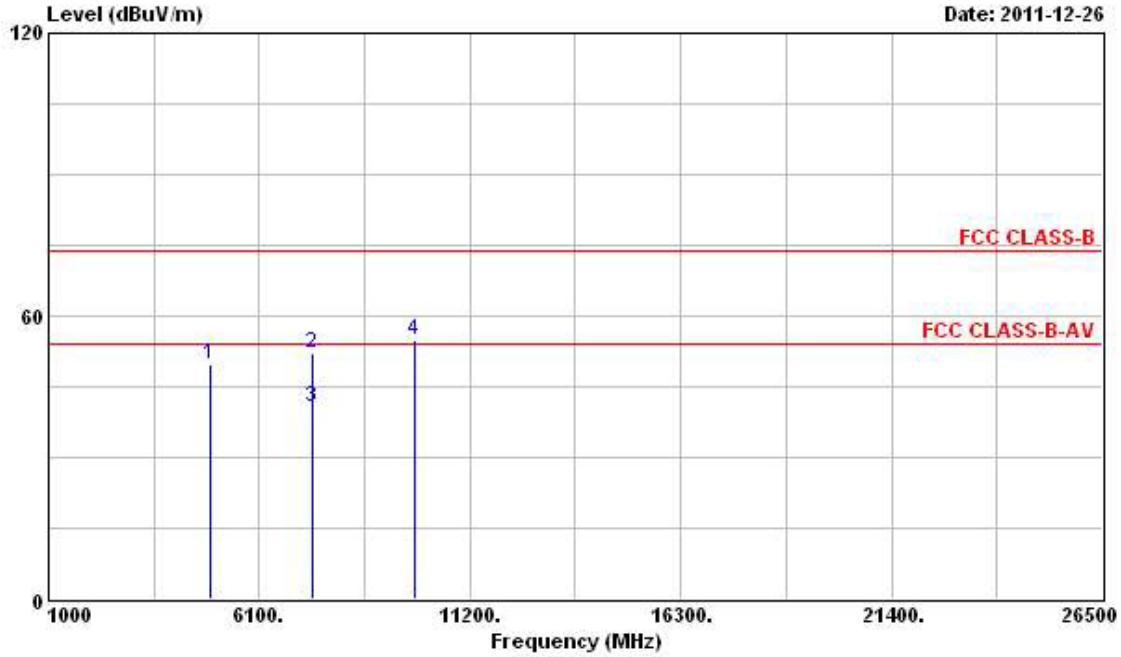
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	50.34	-3.66	54.00	44.53	35.90	4.68	34.77	PK	---	---
2	7386.000	51.18	-22.82	74.00	42.77	37.88	5.65	35.12	Peak	---	---
3	7386.000	39.09	-14.91	54.00	30.68	37.88	5.65	35.12	Average	---	---
4	9848.000	54.36			43.86	39.61	6.38	35.49	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



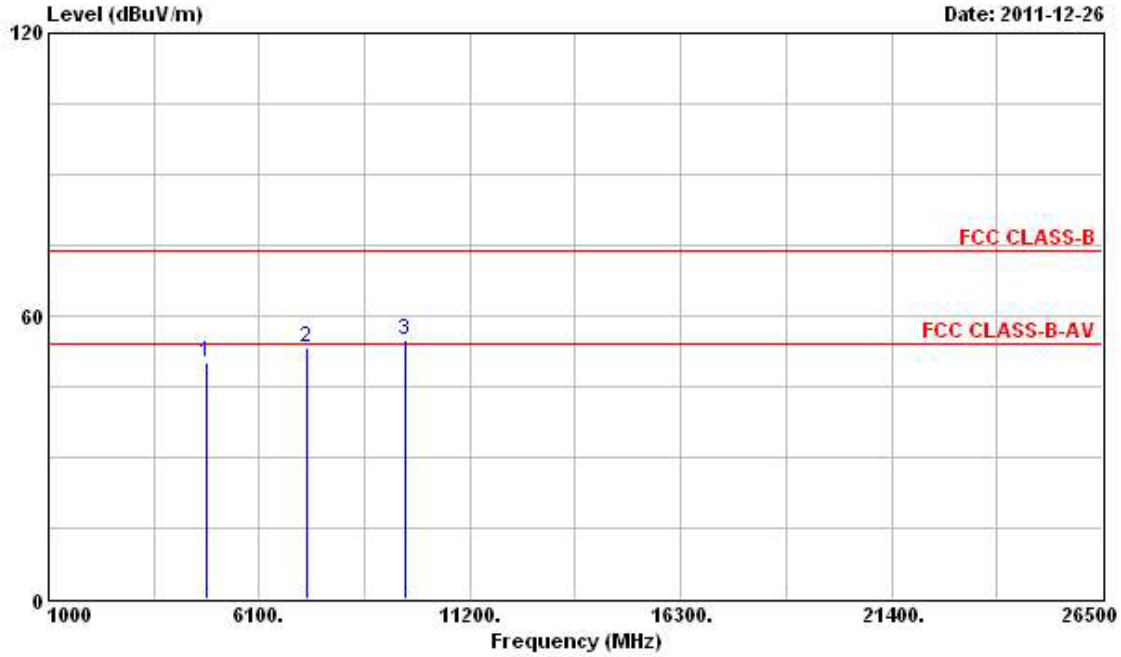
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	49.80	-4.20	54.00	44.66	35.23	4.68	34.77	PK	---	---
2	7386.000	52.18	-21.82	74.00	44.69	36.96	5.65	35.12	Peak	---	---
3	7386.000	40.67	-13.33	54.00	33.18	36.96	5.65	35.12	Average	---	---
4	9848.000	54.75			45.05	38.81	6.38	35.49	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).

For Two Chains:

Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11n (20MHz) Ch. 1

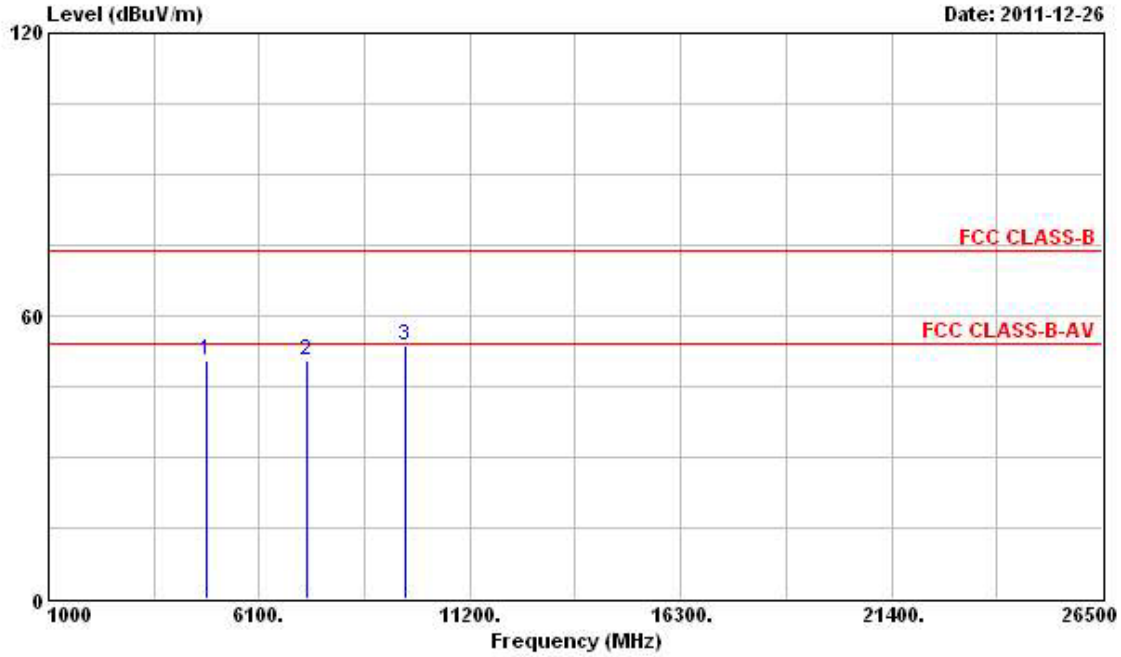
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	50.18	-3.82	54.00	44.64	35.76	4.58	34.80	PK	---	---
2	7236.000	53.14			44.74	37.85	5.63	35.08	Peak	---	---
3	9648.000	54.85			44.59	39.39	6.34	35.47	Peak	---	---

Note: The items 2 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

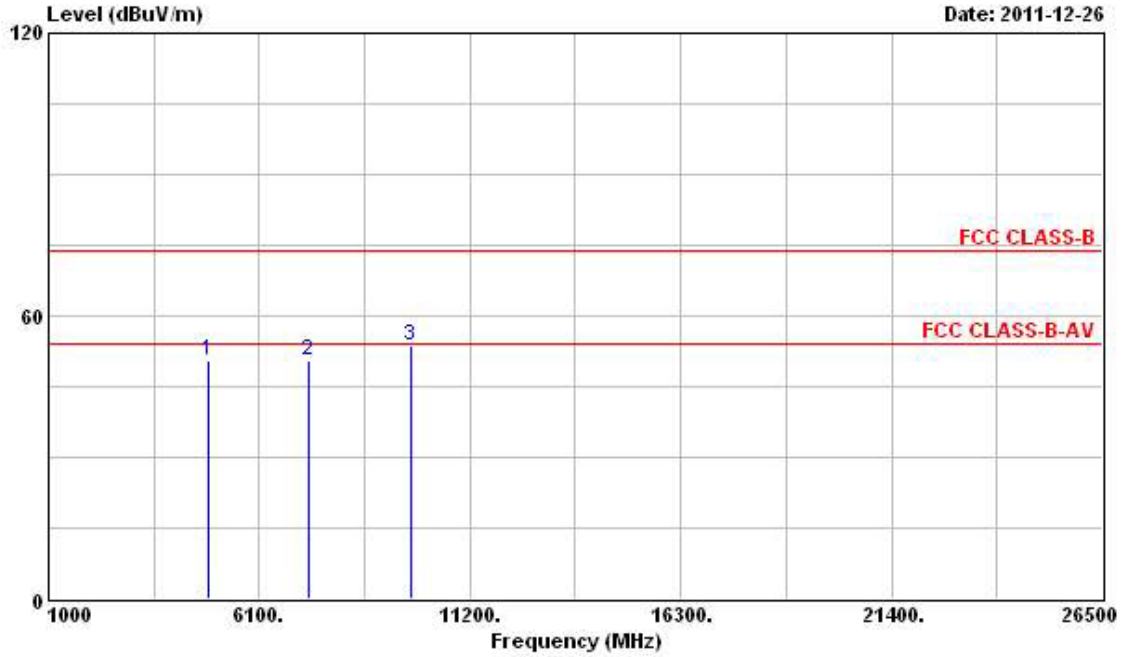


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	50.48	-3.52	54.00	45.57	35.13	4.58	34.80	PK	---	---
2	7236.000	50.61			43.16	36.90	5.63	35.08	Peak	---	---
3	9648.000	53.60			44.14	38.59	6.34	35.47	Peak	---	---

Note: The items 2 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).

Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11n (20MHz) Ch. 6

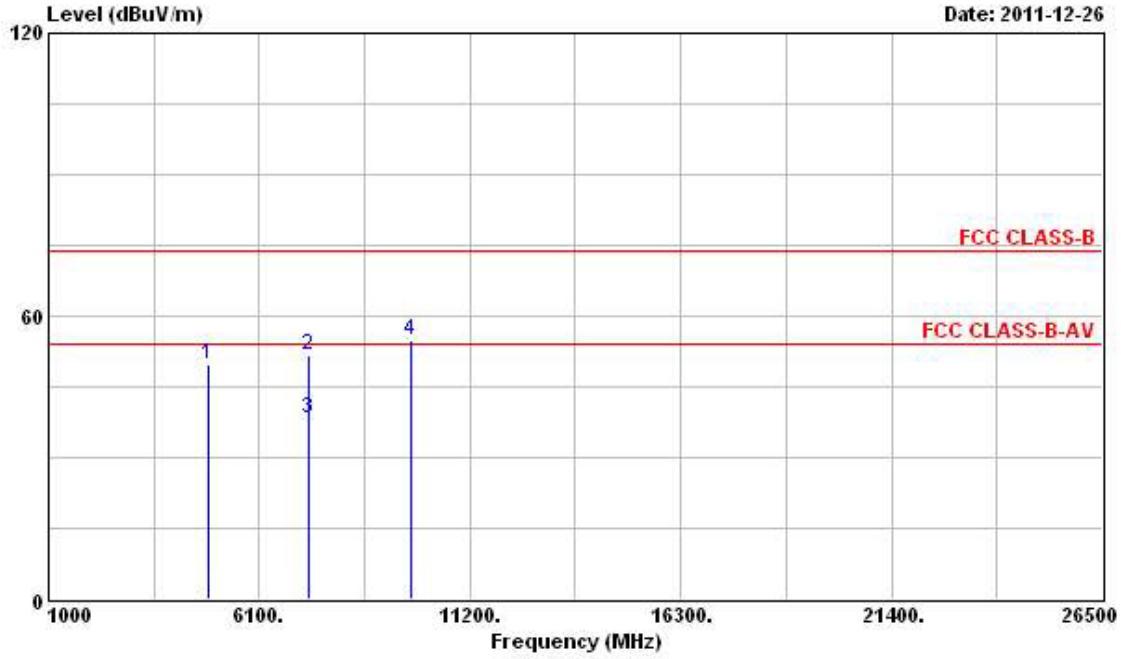
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	50.33	-3.67	54.00	44.67	35.83	4.61	34.78	PK	---	---
2	7311.000	50.63	-3.37	54.00	42.23	37.86	5.64	35.10	PK	---	---
3	9748.000	53.51			43.12	39.51	6.36	35.48	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).

Vertical

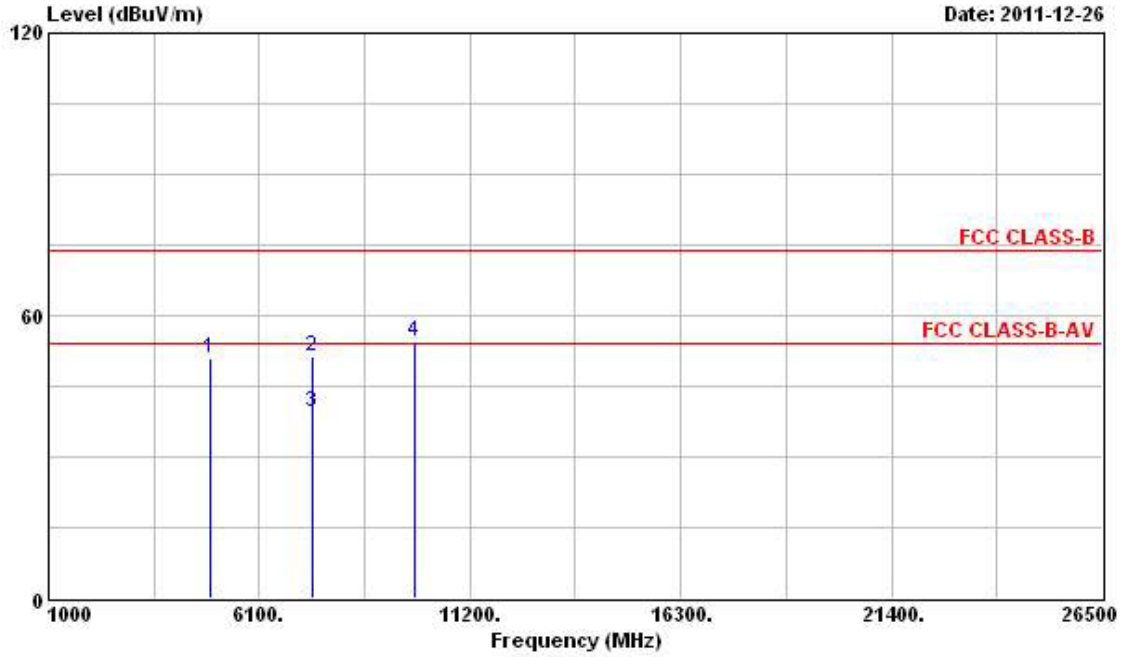


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	49.87	-4.13	54.00	44.86	35.18	4.61	34.78	PK	---	---
2	7311.000	51.80	-22.20	74.00	44.34	36.92	5.64	35.10	Peak	---	---
3	7311.000	38.20	-15.80	54.00	30.74	36.92	5.64	35.10	Average	---	---
4	9748.000	54.72			45.13	38.71	6.36	35.48	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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11n (20MHz) Ch. 11

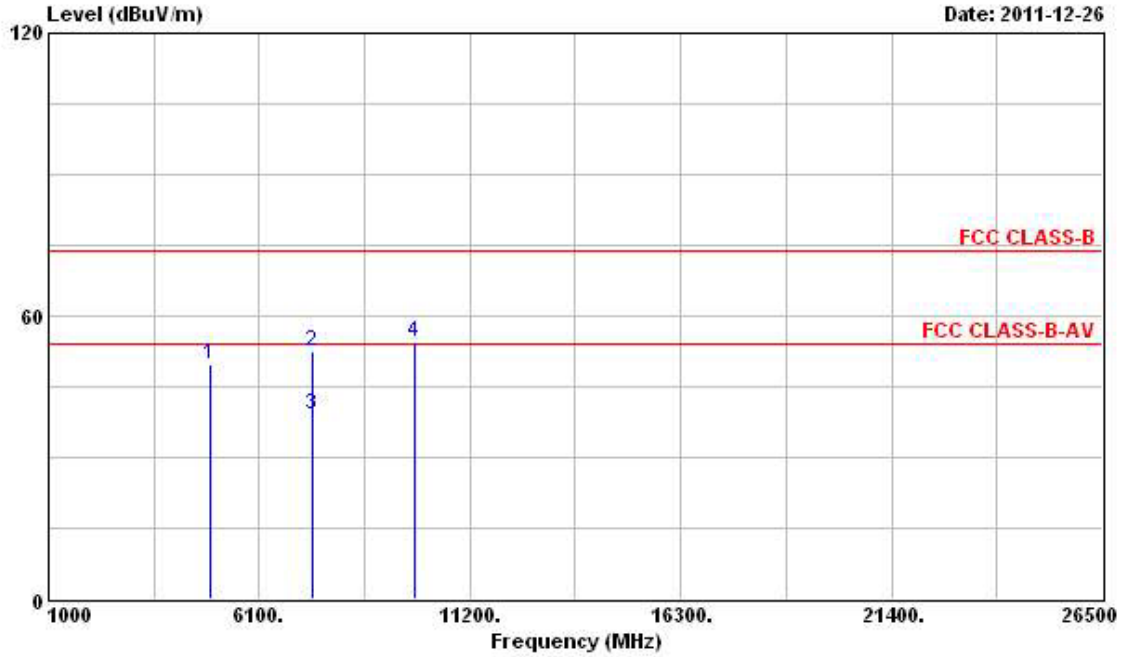
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	50.95	-3.05	54.00	45.14	35.90	4.68	34.77	PK	---	---
2	7386.000	51.30	-22.70	74.00	42.89	37.88	5.65	35.12	Peak	---	---
3	7386.000	39.65	-14.35	54.00	31.24	37.88	5.65	35.12	Average	---	---
4	9848.000	54.41			43.91	39.61	6.38	35.49	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

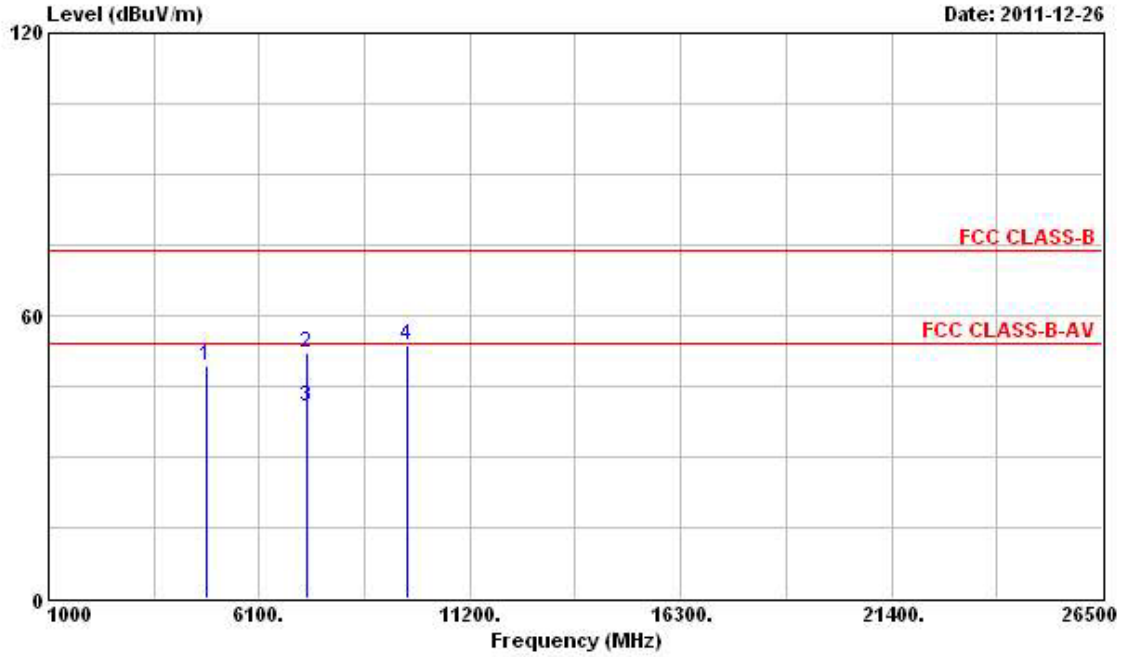


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	49.79	-4.21	54.00	44.65	35.23	4.68	34.77	PK	---	---
2	7386.000	52.40	-21.60	74.00	44.91	36.96	5.65	35.12	Peak	---	---
3	7386.000	39.05	-14.95	54.00	31.56	36.96	5.65	35.12	Average	---	---
4	9848.000	54.59			44.89	38.81	6.38	35.49	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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11n (40MHz) Ch. 3

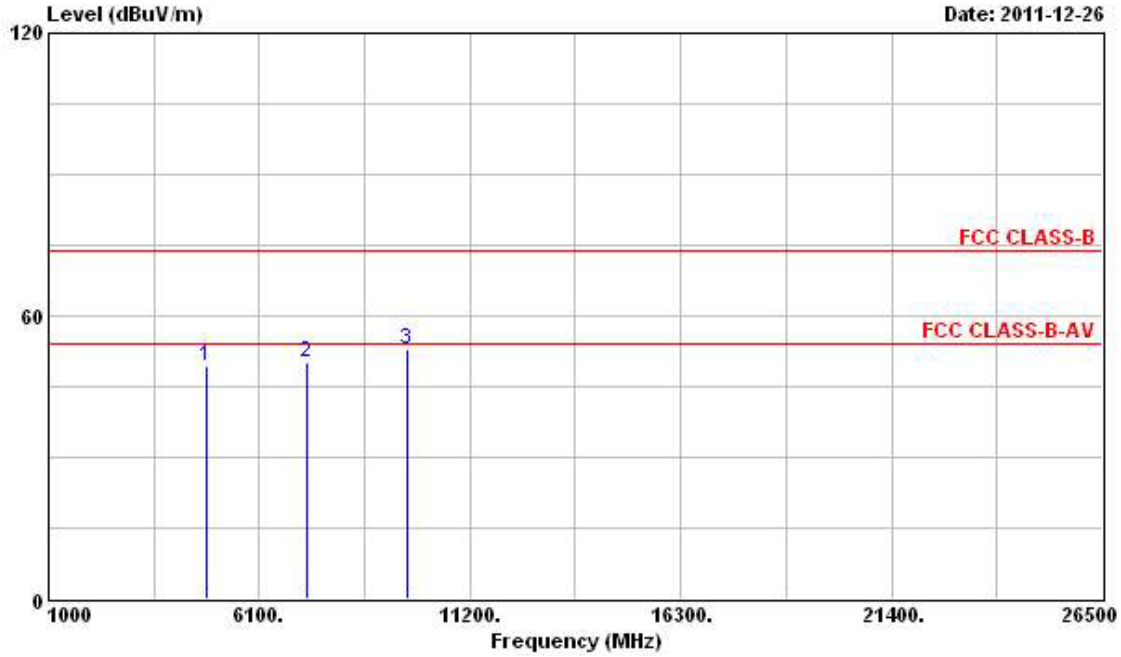
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4844.000	49.30	-4.70	54.00	43.70	35.78	4.61	34.79	PK	---	---
2	7266.000	51.96	-22.04	74.00	43.56	37.86	5.63	35.09	Peak	---	---
3	7266.000	40.73	-13.27	54.00	32.33	37.86	5.63	35.09	Average	---	---
4	9688.000	53.76			43.46	39.43	6.35	35.48	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

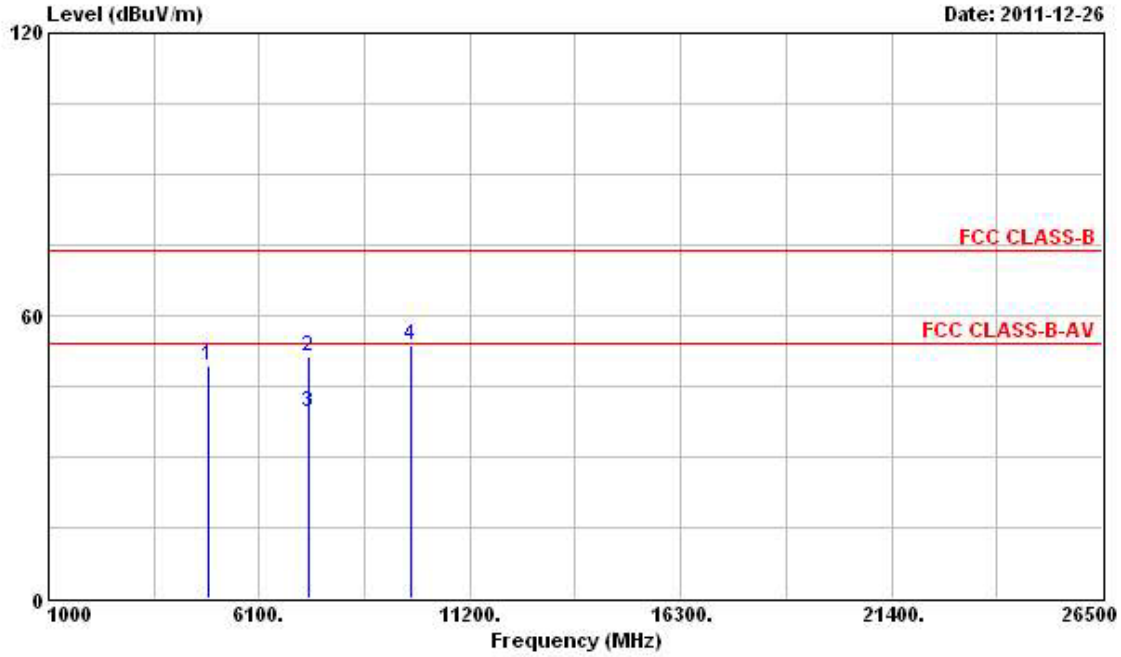


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4844.000	49.32	-4.68	54.00	44.36	35.14	4.61	34.79	PK	---	---
2	7266.000	50.02	-3.98	54.00	42.57	36.91	5.63	35.09	PK	---	---
3	9688.000	52.96			43.46	38.63	6.35	35.48	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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11n (40MHz) Ch. 6

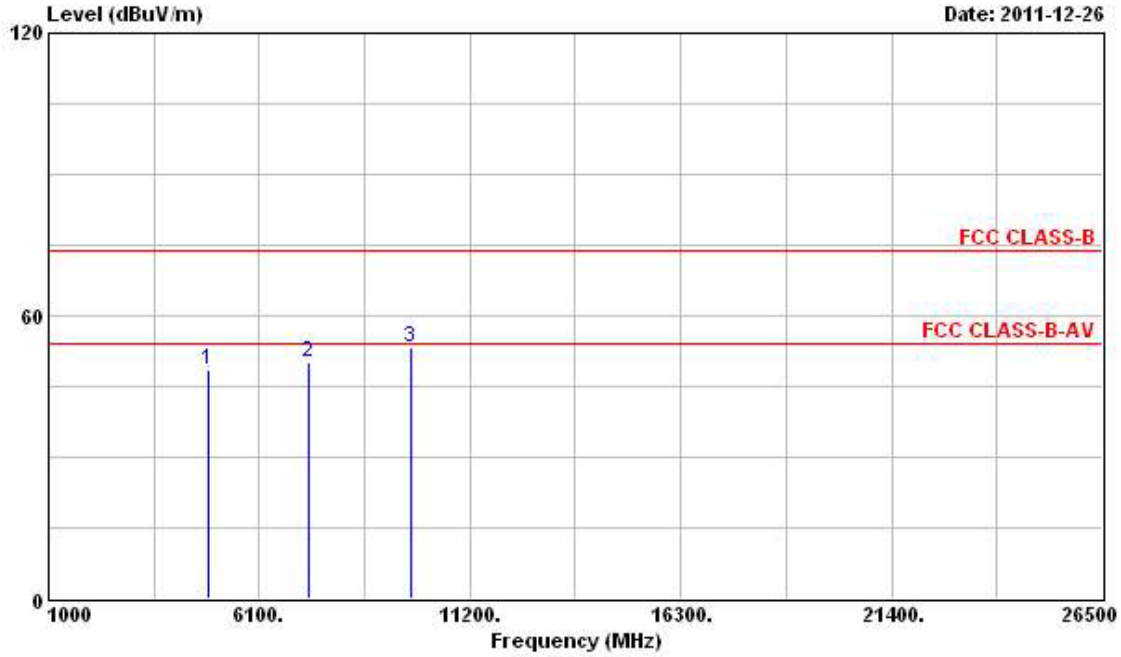
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	49.21	-4.79	54.00	43.55	35.83	4.61	34.78	PK	---	---
2	7311.000	51.12	-22.88	74.00	42.72	37.86	5.64	35.10	Peak	---	---
3	7311.000	39.38	-14.62	54.00	30.98	37.86	5.64	35.10	Average	---	---
4	9748.000	53.56			43.17	39.51	6.36	35.48	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

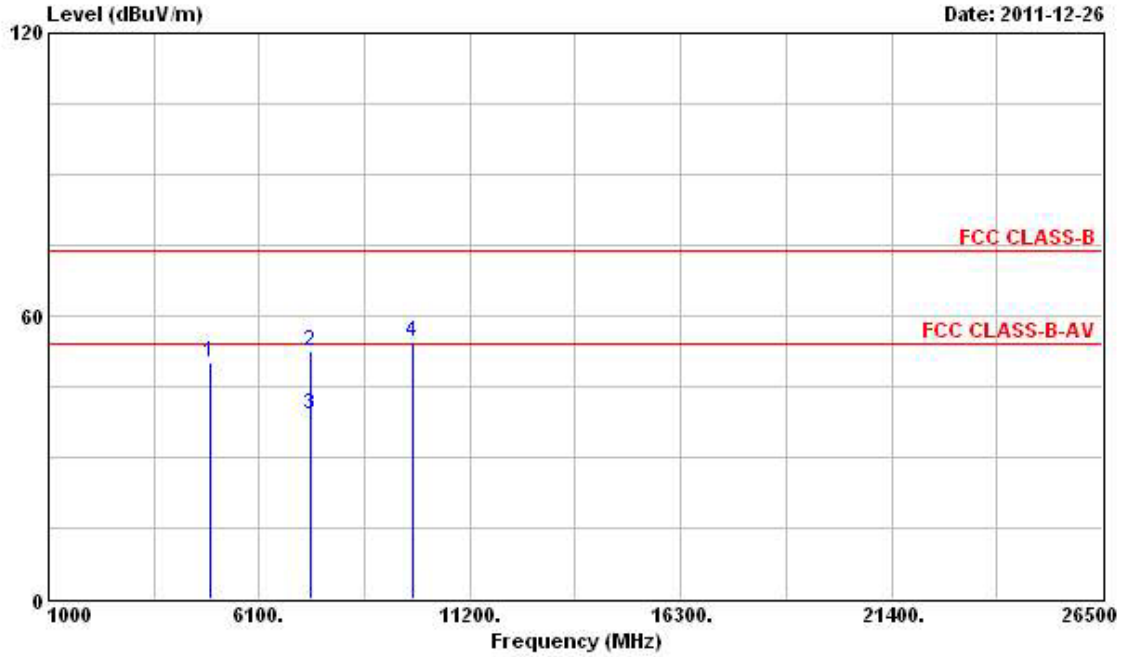


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	48.64	-5.36	54.00	43.63	35.18	4.61	34.78	PK	---	---
2	7311.000	50.18	-3.82	54.00	42.72	36.92	5.64	35.10	PK	---	---
3	9748.000	53.38			43.79	38.71	6.36	35.48	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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11n (40MHz) Ch. 9

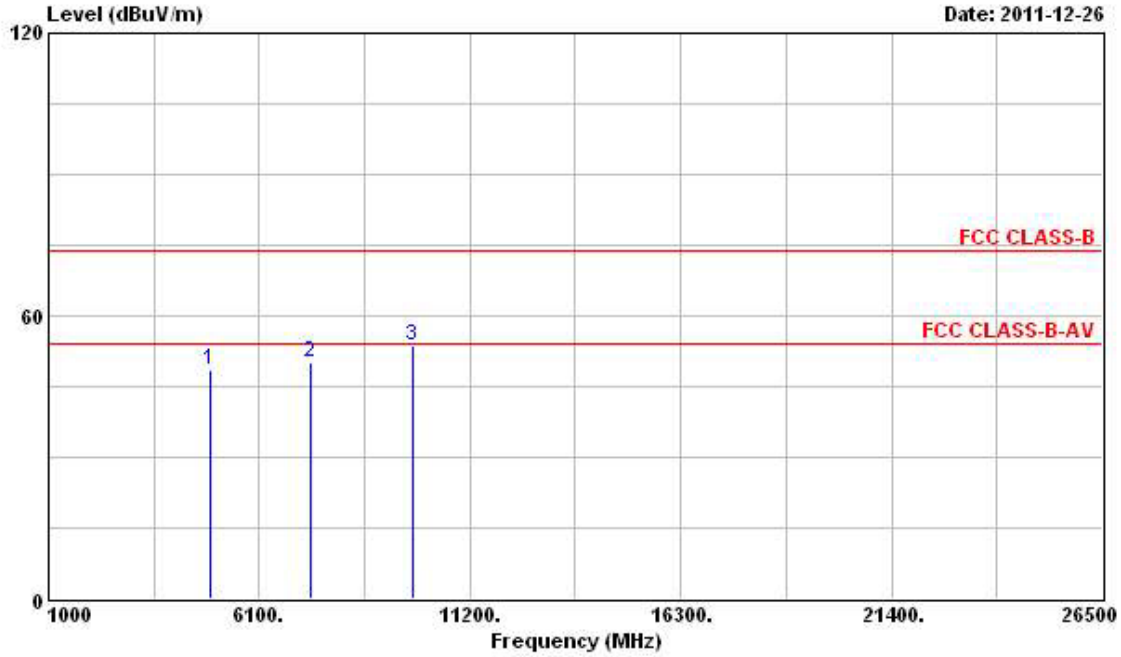
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4904.000	50.05	-3.95	54.00	44.31	35.88	4.64	34.78	PK	---	---
2	7356.000	52.55	-21.45	74.00	44.15	37.87	5.64	35.11	Peak	---	---
3	7356.000	38.96	-15.04	54.00	30.56	37.87	5.64	35.11	Average	---	---
4	9808.000	54.44			43.98	39.57	6.37	35.48	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	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4904.000	48.62	-5.38	54.00	43.55	35.21	4.64	34.78	PK	---	---
2	7356.000	49.99	-4.01	54.00	42.52	36.94	5.64	35.11	PK	---	---
3	9808.000	53.66			44.00	38.77	6.37	35.48	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 (micorvolts/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

For Single Chain:

Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11b Ch. 1, 6, 11

Channel 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	2390.000	47.63	-6.37	54.00	12.82	31.79	3.02	0.00	Average	---	---
2 @	2411.460	103.29			68.41	31.86	3.02	0.00	Average	---	---
1	2379.730	60.79	-13.21	74.00	26.08	31.72	2.99	0.00	Peak	---	---
2 X	2412.980	111.86			76.98	31.86	3.02	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2436.540	105.16			70.12	31.99	3.05	0.00	Average	---	---
1 X	2438.060	113.32			78.28	31.99	3.05	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 11

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2464.090	105.04			69.90	32.06	3.08	0.00	Average	---	---
2	2483.500	48.76	-5.24	54.00	13.55	32.13	3.08	0.00	Average	---	---
1 X	2463.140	113.38			78.24	32.06	3.08	0.00	Peak	---	---
2	2484.610	62.44	-11.56	74.00	27.23	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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11g Ch.1, 6, 11

Channel 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	2390.000	52.35	-1.65	54.00	17.54	31.79	3.02	0.00	Average	---	---
2 @	2410.700	101.02			66.14	31.86	3.02	0.00	Average	---	---
1	2388.090	67.99	-6.01	74.00	33.18	31.79	3.02	0.00	Peak	---	---
2 X	2407.090	113.35			78.47	31.86	3.02	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2434.450	102.47			67.50	31.92	3.05	0.00	Average	---	---
1 X	2432.170	115.25			80.28	31.92	3.05	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 11

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	2464.580	100.91			65.77	32.06	3.08	0.00	Average	---	---
2	2483.500	52.82	-1.18	54.00	17.61	32.13	3.08	0.00	Average	---	---
1 X	2457.320	113.49			78.38	32.06	3.05	0.00	Peak	---	---
2	2483.500	69.42	-4.58	74.00	34.21	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 Two Chains:

Final Test Date	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11n (20MHz) Ch.1, 6, 11

Channel 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	2390.000	51.58	-2.42	54.00	16.77	31.79	3.02	0.00	Average	---	---
2 X	2414.690	96.23			61.35	31.86	3.02	0.00	Average	---	---
1	2389.610	69.14	-4.86	74.00	34.33	31.79	3.02	0.00	Peak	---	---
2 X	2413.740	113.98			79.10	31.86	3.02	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	2433.500	98.11			63.14	31.92	3.05	0.00	Average	---	---
1 X	2431.980	115.07			80.10	31.92	3.05	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 11

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	2464.090	96.13			60.99	32.06	3.08	0.00	Average	---	---
2	2483.500	52.63	-1.37	54.00	17.42	32.13	3.08	0.00	Average	---	---
1 X	2464.090	113.14			78.00	32.06	3.08	0.00	Peak	---	---
2	2483.850	71.07	-2.93	74.00	35.86	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	Dec. 26, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Hsiao	**Configuration**	802.11n (40MHz) Ch.3, 6, 9

Channel 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	2390.000	51.30	-2.70	54.00	16.49	31.79	3.02	0.00	Average	---	---
2 X	2418.300	95.27			60.39	31.86	3.02	0.00	Average	---	---
1	2385.050	67.37	-6.63	74.00	32.63	31.72	3.02	0.00	Peak	---	---
2 X	2417.540	106.74			71.86	31.86	3.02	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	2432.930	98.36			63.39	31.92	3.05	0.00	Average	---	---
1 X	2432.740	109.61			74.64	31.92	3.05	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 9

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 X	2457.820	95.58			60.47	32.06	3.05	0.00	Average	---	---
2	2483.660	52.54	-1.46	54.00	17.33	32.13	3.08	0.00	Average	---	---
1 X	2455.730	106.63			71.52	32.06	3.05	0.00	Peak	---	---
2	2487.460	66.95	-7.05	74.00	31.74	32.13	3.08	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

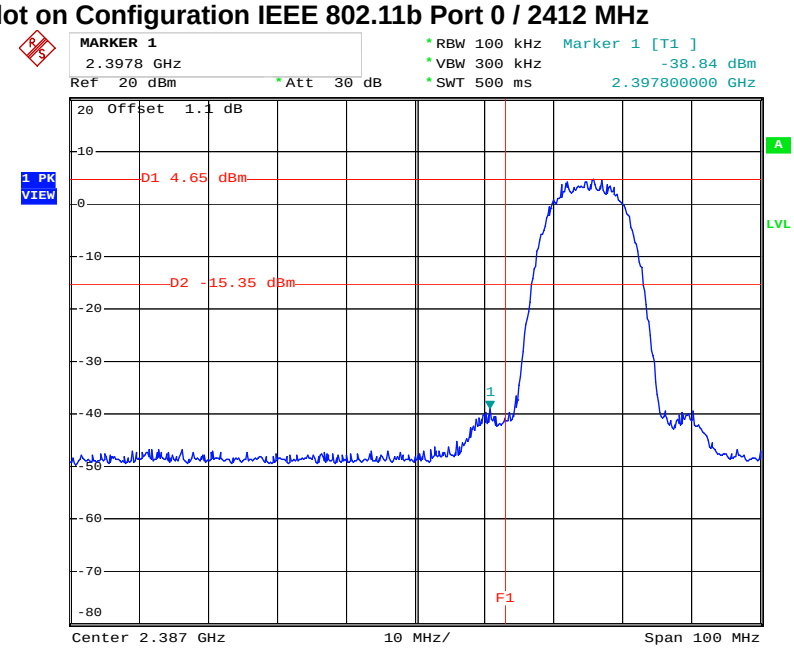
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

For Emission not in Restricted Band

Final Test Date	Jan. 03, 2012	**Test Site No.**	TH01-HY
Temperature	22.2℃	**Humidity**	26%
Test Engineer	Ian	**Configurations**	802.11b/g/n

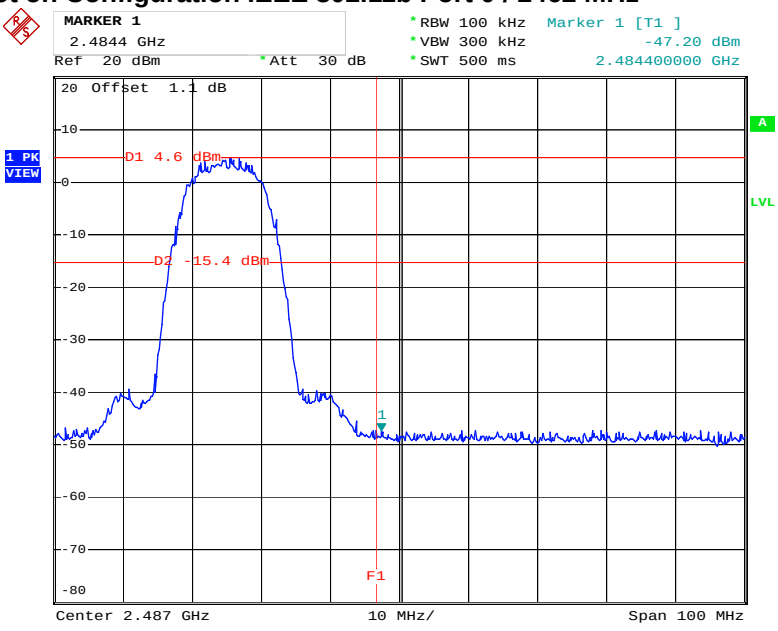
For Single Chain:

Low Band Edge Plot on Configuration IEEE 802.11b Port 0 / 2412 MHz



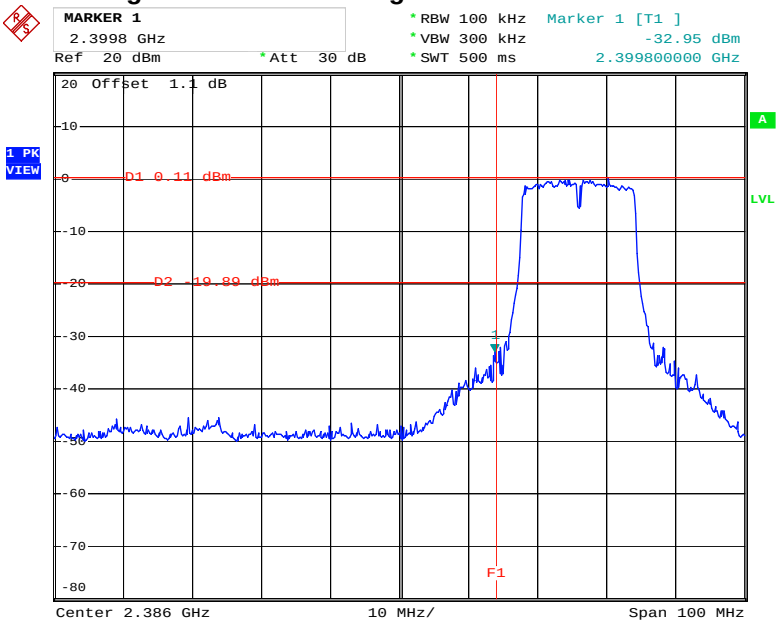
Date: 3.JAN.2012 20:38:45

High Band Edge Plot on Configuration IEEE 802.11b Port 0 / 2462 MHz



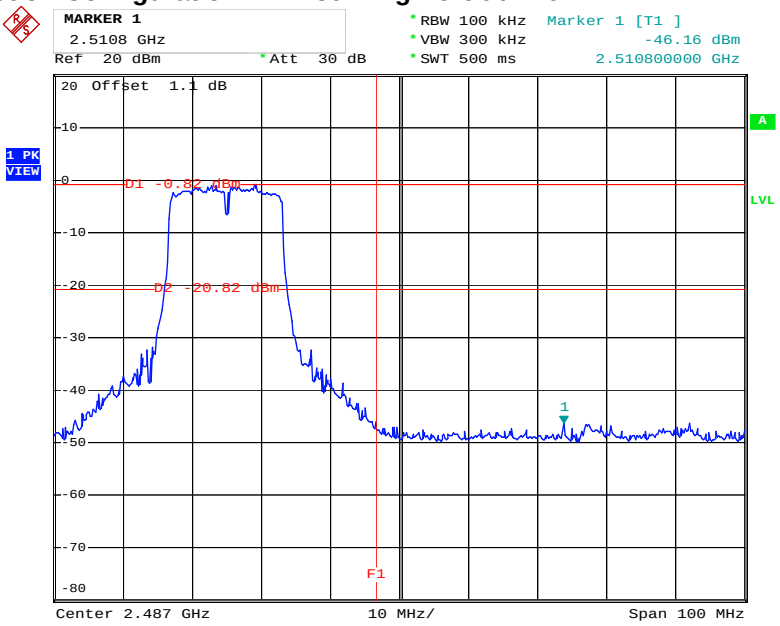
Date: 3.JAN.2012 20:46:03

Low Band Edge Plot on Configuration IEEE 802.11g Port 0 / 2412 MHz



Date: 3.JAN.2012 20:56:30

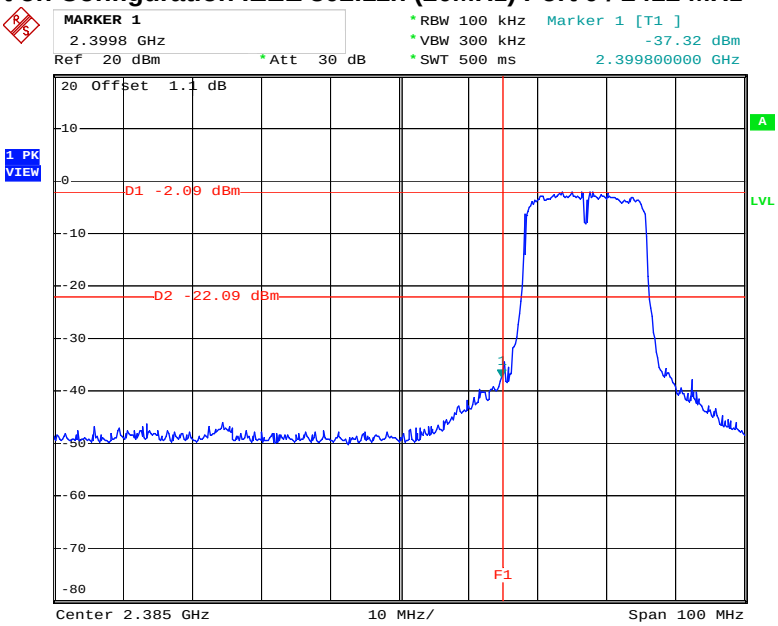
High Band Edge Plot on Configuration IEEE 802.11g Port 0 / 2462 MHz



Date: 3.JAN.2012 21:05:39

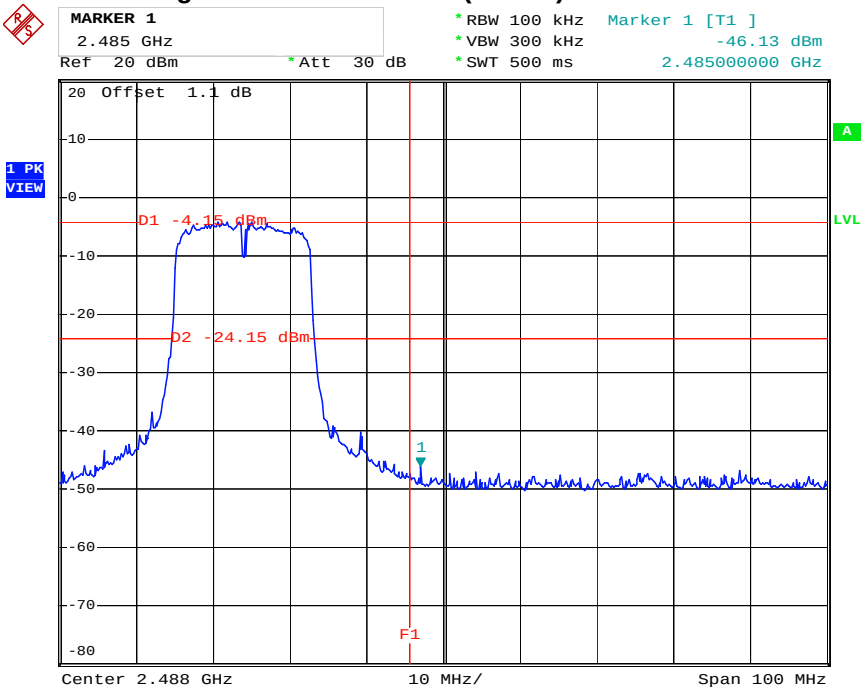
For Two Chains

Low Band Edge Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2412 MHz



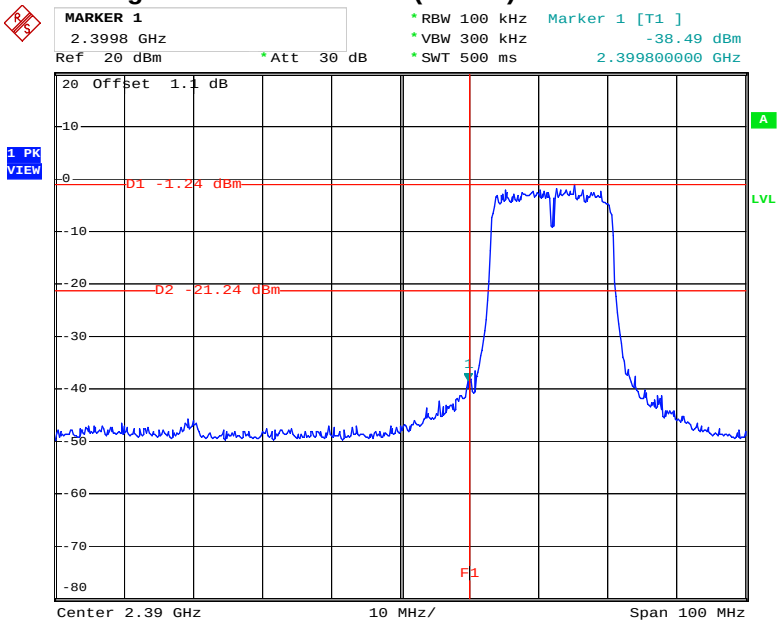
Date: 3.JAN.2012 22:02:28

High Band Edge Plot on Configuration IEEE 802.11n (20MHz) Port 0 / 2462 MHz



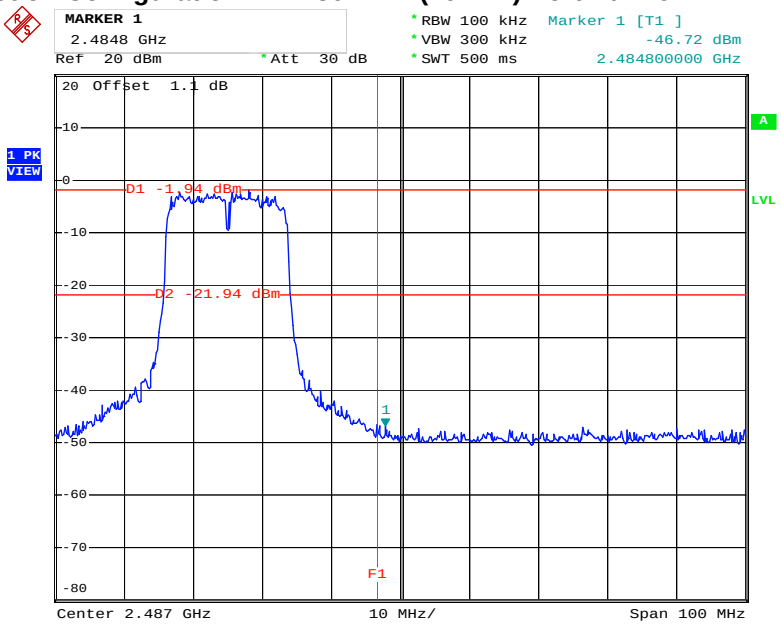
Date: 3.JAN.2012 22:34:09

Low Band Edge Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2412 MHz



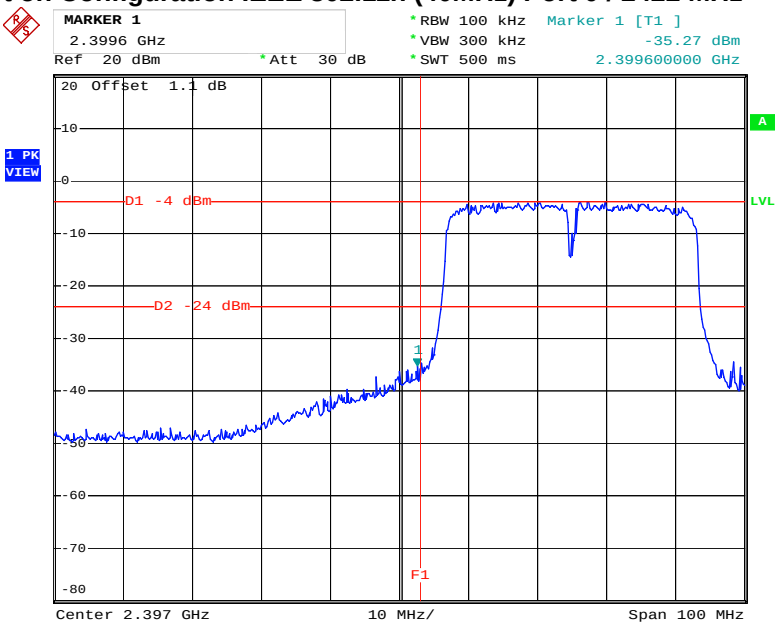
Date: 3.JAN.2012 22:09:36

High Band Edge Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 2462 MHz



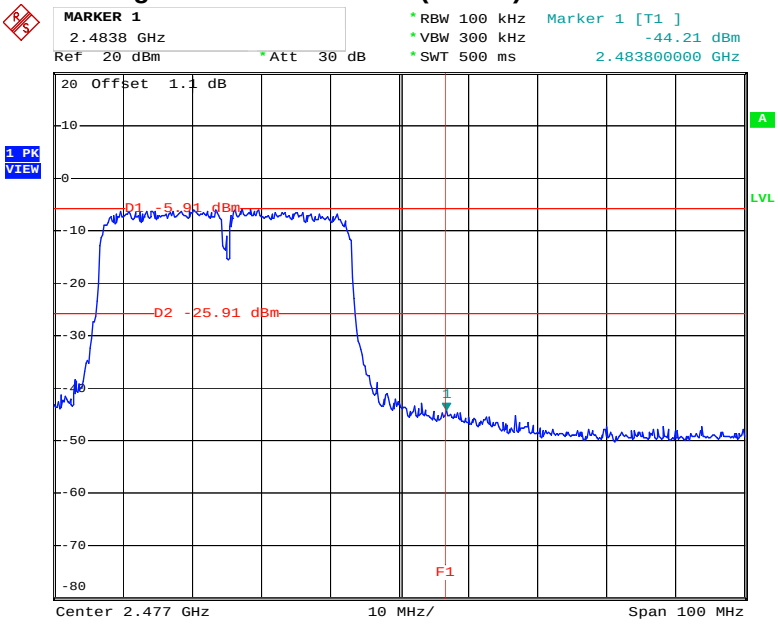
Date: 3.JAN.2012 22:37:26

Low Band Edge Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2422 MHz



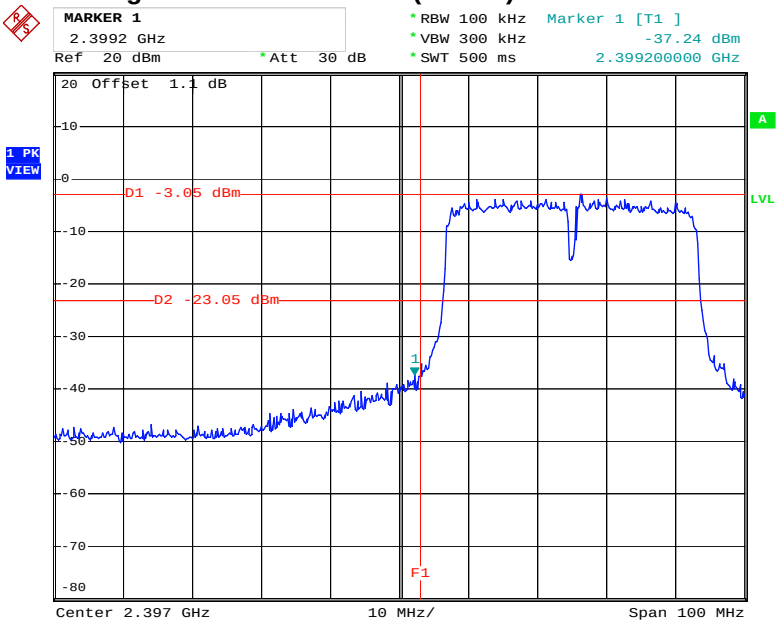
Date: 3.JAN.2012 23:18:04

High Band Edge Plot on Configuration IEEE 802.11n (40MHz) Port 0 / 2452 MHz



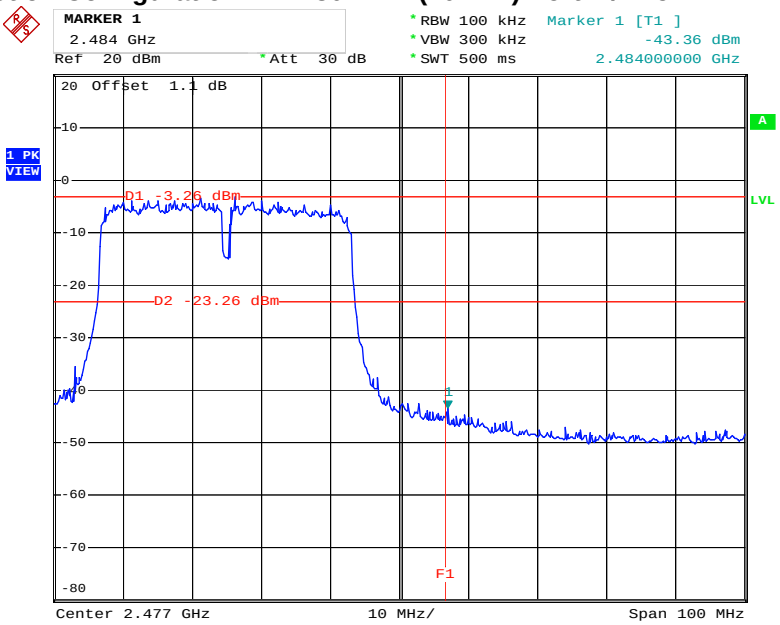
Date: 4.JAN.2012 00:21:29

Low Band Edge Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2422 MHz



Date: 3.JAN.2012 23:22:31

High Band Edge Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 2452 MHz



Date: 4.JAN.2012 00:47:51

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 2.3 n 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	9 kHz ~ 2.75 GHz	Apr. 20, 2011	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz – 30MHz	Jan. 17, 2011	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9 kHz ~ 30 MHz	May 04, 2011	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	CB049	9 kHz ~ 30 MHz	Apr. 21, 2011	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	FSP 30	100023	9 KHz ~ 30 GHz	Mar. 15, 2011	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Jun. 03, 2011	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Nov. 17, 2011	Conducted (TH01-HY)
RF Cable-1m	Jye Bao	RG142	CB034-1m	20 MHz ~ 7 GHz	Dec. 03, 2011	Conducted (TH01-HY)
RF Cable-2m	Jye Bao	RG142	CB035-2m	20 MHz ~ 1 GHz	Dec. 03, 2011	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10 MHz ~ 40 GHz	Jun. 07, 2011	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	0917017	300 MHz ~ 40 GHz	Jan. 06, 2011	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	0949003	300 MHz ~ 40 GHz	Jan. 06, 2011	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	Jun. 09, 2011*	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	100305/040	9 kHz ~ 40 GHz	Feb. 11, 2011	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz ~ 1 GHz 3m	May 11, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz ~ 1.3 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1 GHz ~ 26.5 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1 GHz ~ 18 GHz	Nov. 15, 2011	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz ~ 1 GHz	Nov. 11, 2011	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1 GHz ~ 40 GHz	Mar. 07, 2011	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz ~ 2 GHz	Oct. 22, 2011	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.

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 2nd 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

Certificate No.：L1190-110111

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

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

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

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

P1, total 24 pages