

FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.247

Equipment : ASUS 300Mbps 11n Wireless Adapter
Brand Name : ASUS
Model Name : USB-N13
Filing Type : New Application
Applicant : ASUSTeK Computer INC
Manufacturer : No.15, Li-Te Rd., Peitou, Taipei, 11259 Taiwan
FCC ID : MSQ-USBN13
Received Date : Oct. 06, 2011
Final Test Date : Nov. 17, 2011

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.



SPORTON International Inc.

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

Table of Contents

1 SUMMARY OF THE TEST RESULT 2

2 GENERAL INFORMATION..... 3

2.1 Product Details..... 3

2.2 Accessories..... 3

2.3 Table for Filed Antenna..... 3

2.4 Table for Carrier Frequencies..... 4

2.5 Table for Test Modes..... 5

2.6 Table for Testing Locations..... 5

2.7 Table for Supporting Units..... 5

2.8 Table for Parameters of Test Software Setting..... 6

2.9 EUT Operation during Test..... 6

2.10 Test Configuration..... 7

3 TEST RESULT 9

3.1 AC Power Line Conducted Emissions Measurement 9

3.2 Maximum Peak Output Power Measurement 15

3.3 Power Spectral Density Measurement..... 18

3.4 6dB Spectrum Bandwidth Measurement 33

3.5 Radiated Emissions Measurement 60

3.6 Band Edge and Fundamental Emissions Measurement..... 92

3.7 Antenna Requirements 103

4 LIST OF MEASURING EQUIPMENTS..... 104

5 TEST LOCATION..... 106

6 TAF CERTIFICATE OF ACCREDITATION..... 107

APPENDIX A. TEST PHOTOS A1 ~ A9

APPENDIX B. PHOTOGRAPHS OF EUT B1 ~ B8

CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart C § 15.247

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Brand Name : ASUS
Model No. : USB-N13
Applicant : ASUSTeK Computer INC
No.15, Li-Te Rd., Peitou, Taipei, 11259 Taiwan

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Oct. 06, 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	17.41 dB
3.2	15.247(b)(3)	Maximum Peak Output Power	Complies	3.46 dB
3.3	15.247(e)	Power Spectral Density	Complies	20.47 dB
3.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
3.5	15.247(d)	Radiated Emissions	Complies	1.04 dB
3.6	15.247(d)	Band Edge Emissions	Complies	1.06 dB
3.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Peak Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	±8.5×10 ⁻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°C	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

2 GENERAL INFORMATION

2.1 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: 14.84 MHz ; 11g: 16.48 MHz 802.11n : MCS 8 (20MHz) : 17.88 MHz ; MCS 8 (40MHz) : 36.08 MHz
Conducted Output Power	802.11b/g : 11b: 20.21 dBm ; 11g: 24.41 dBm 802.11n : MCS 8 (20MHz) : 26.47 dBm ; MCS 8 (40MHz) : 26.54 dBm

2.2 Accessories

- ASUS USB-N13 WLAN Adapter x1
- USB cable x 1 or Cradle x1 (US SKU)
- Quick Start Guide x1
- Support CD x1
- Warranty card x1

2.3 Table for Filed Antenna

Antenna				
No.	Type	Brand	Model	Gain (dBi)
1	PIFA	N/A	N/A	2
2	PIFA	N/A	N/A	2

Directional Gain					
Set	Modulaton	Transmitter Outputs Signals Correlated	Transmitter Outputs (N)	Antenna Combination (No.)	Directional Gain (dBi)
1	802.11b/g	N/A	1	2	2
2	802.11n	No	2	1, 2	2

For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows:

- ♦ Any transmit signals are correlated, Directional Gain = $G_{ANT} + 10 \log(N)$ dBi
- ♦ All transmit signals are completely uncorrelated, Directional Gain = G_{ANT}

For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows:

- ♦ Any transmit signals are correlated, Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N]$ dBi
- ♦ All transmit signals are completely uncorrelated, Directional Gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N]$ dBi

Antenna note:

1. IEEE 802.11b/g only used one antenna for signal transmitting and receiving.
2. IEEE 802.11n used two antennas for signal transmitting and receiving.
(2T2R, MIMO technology)

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

2.4 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	-	-

2.5 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	Ant. No.
AC Power Line Conducted Emissions	EUT with USB cable mode /	Auto	-	-
Radiated Emissions Below 1GHz	EUT with cradle mode			
Maximum Peak Output Power Power Spectral Density	11b/CCK	11 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	2
	MCS 8 (20MHz)	13 Mbps	1/6/11	1/2;
	MCS 8 (40MHz)	27 Mbps	3/6/9	1+2
6dB Spectrum Bandwidth 99% Occupied Bandwidth	11b/CCK	11 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	2
	MCS 8 (20MHz)	13 Mbps	1/6/11	1/2
	MCS 8 (40MHz)	27 Mbps	3/6/9	
Radiated Emissions Above 1GHz Fundamental Emissions	11b/CCK	11 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	2
	MCS 8 (20MHz)	13 Mbps	1/6/11	1+2
	MCS 8 (40MHz)	27 Mbps	3/6/9	
Band Edge Emissions	11b/CCK	11 Mbps	1/11	1
	11g/BPSK	6 Mbps	1/11	2
	MCS 8 (20MHz)	13 Mbps	1/11	1+2
	MCS 8 (40MHz)	27 Mbps	3/9	

2.6 Table for Testing Locations

Test Site No.	Site Category	Location
CO04-HY	Conduction	Hwa Ya
TH01-HY	OVEN Room	Hwa Ya
03CH03-HY	SAC	Hwa Ya

Semi Anechoic Chamber (SAC).

2.7 Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E5520	DoC
(USB) Mouse	Microsoft	1004	N/A
iPod nano	Apple	A1320	N/A
AP (Remote Workstation)	D-Link	DNS-G120	DoC

2.8 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	REALTEK 11n Single Chip 92C USB WLAN MP Diagnostic Program 0.0013.0610.2010		
	Frequency	2412 MHz	2437 MHz
IEEE 802.11b	41	40	39
IEEE 802.11g	48	47	47

**For Two Chain:
Power Parameters of IEEE 802.11n Ant. 1+2**

Test Software Version	REALTEK 11n Single Chip 92C USB WLAN MP Diagnostic Program 0.0013.0610.2010		
	Frequency	2412 MHz	2437 MHz
IEEE 802.11n	45/47	44/46	44/46
Frequency	2422 MHz	2437 MHz	2452 MHz
IEEE 802.11n	46/48	45/47	45/47

2.9 EUT Operation during Test

For Conducted Emissions :

An executive program, EMCTEST.EXE under WIN XP, 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 panel and displays "H" patterns on the screen.
- d. The NB sends messages to the modem.

At the same time, the following programs were executed:

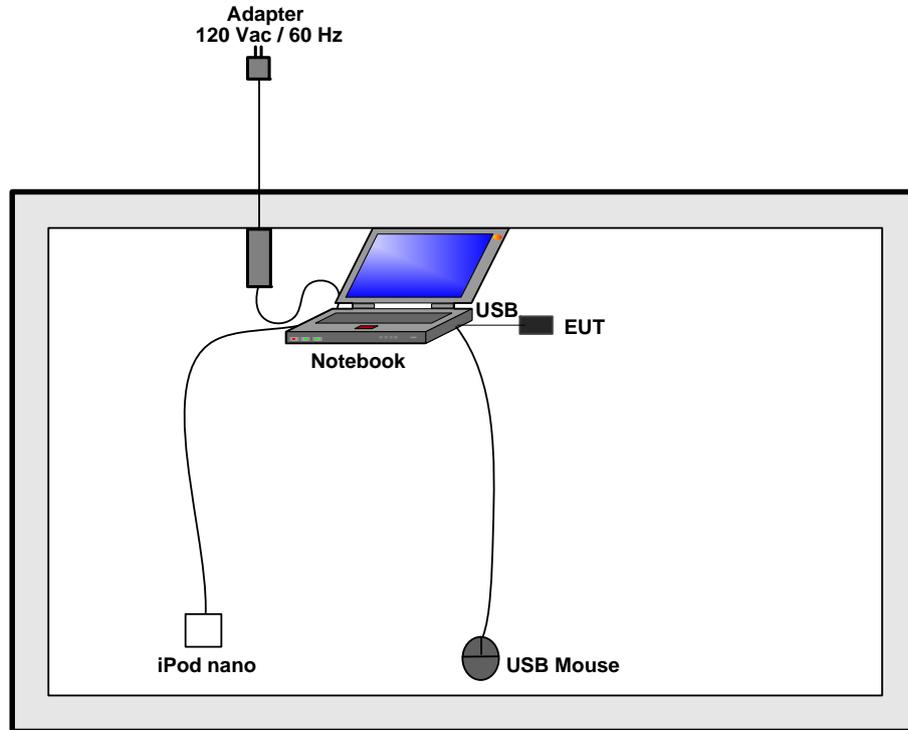
- Executed "ping.exe" to link with the remote workstation to receive and transmit data by WLAN.

For Radiated Emissions :

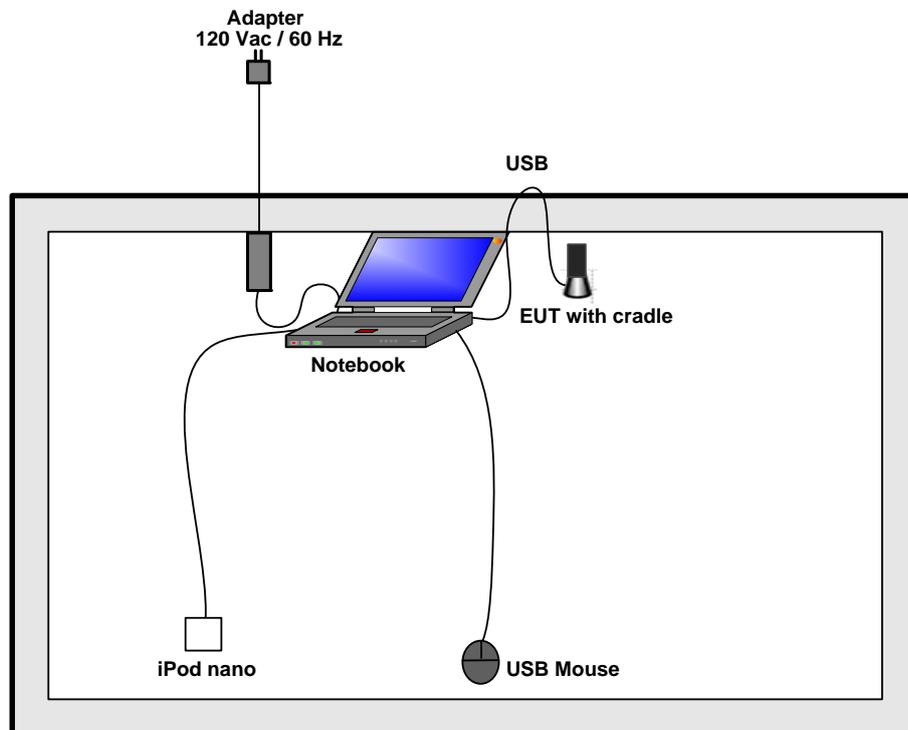
- Executed "REALTEK 11n Single Chip 92C USB WLAN MP Diagnostic Program 0.0013.0610.2010" to keep transmitting signals at fixed frequency.

2.10 Test Configuration

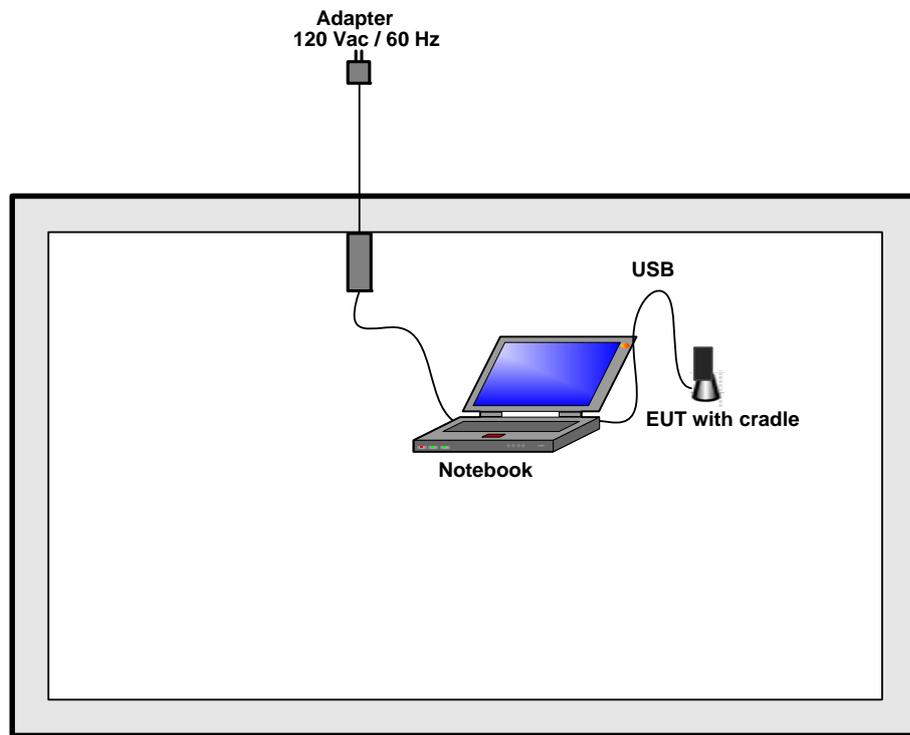
For conducted emissions and radiated emissions 9 kHz~1GHz
EUT with USB cable mode



EUT with cradle mode



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

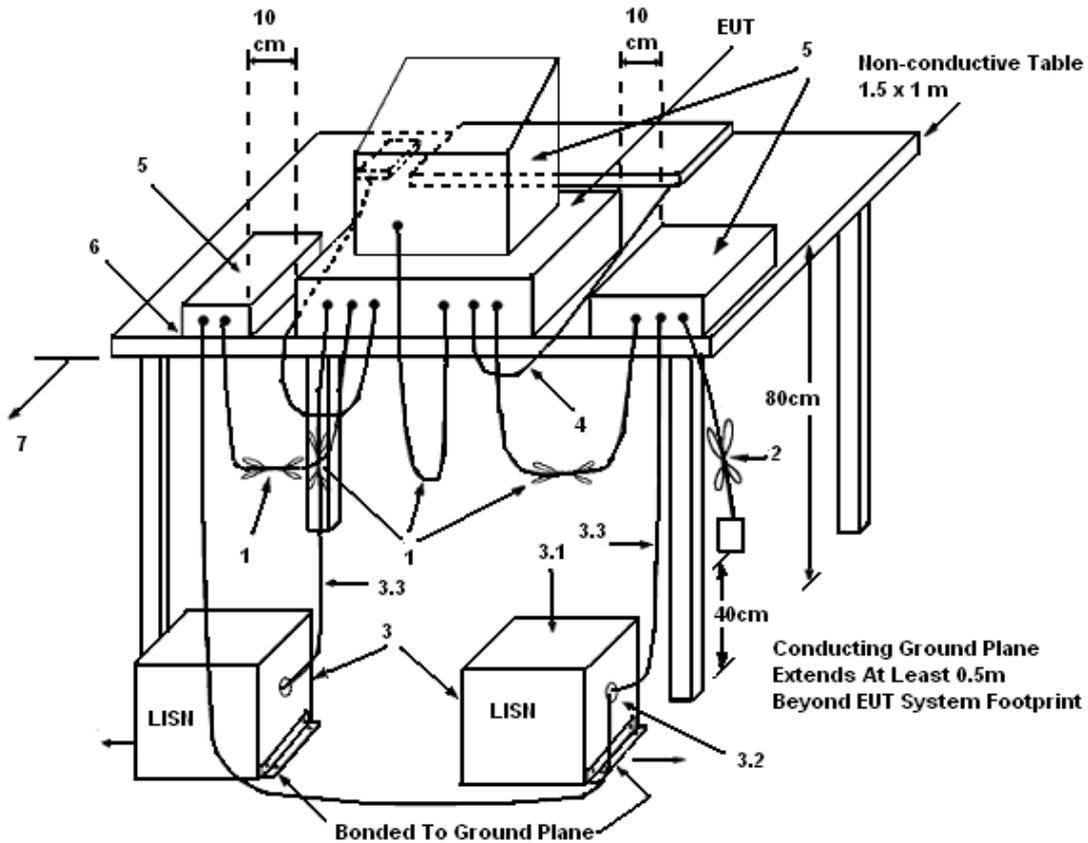
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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.

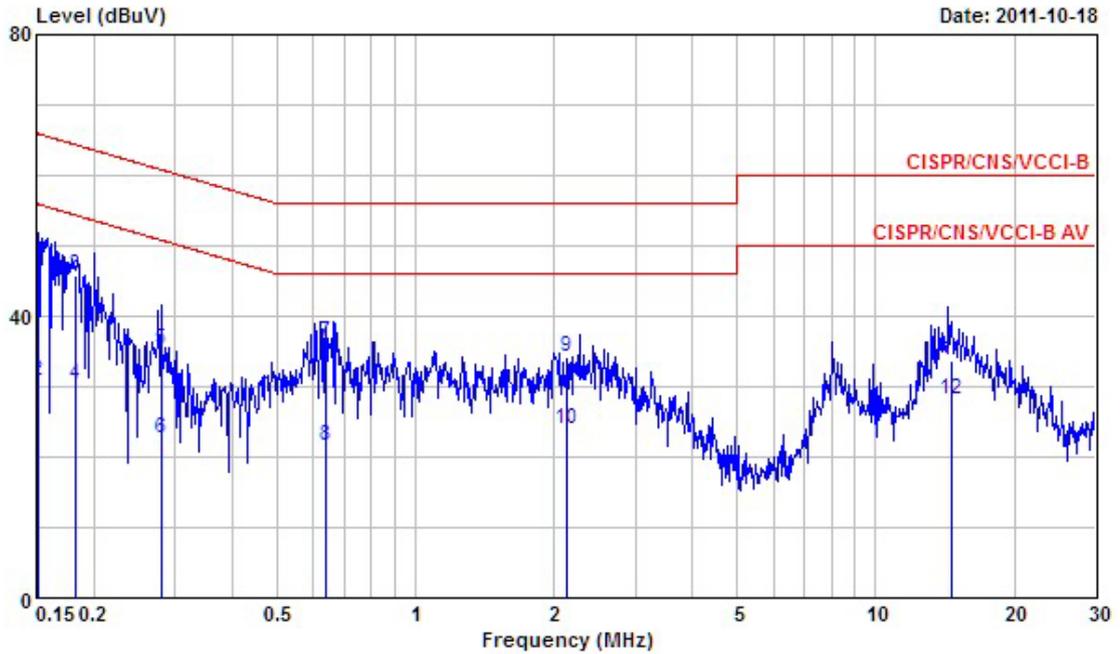
3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

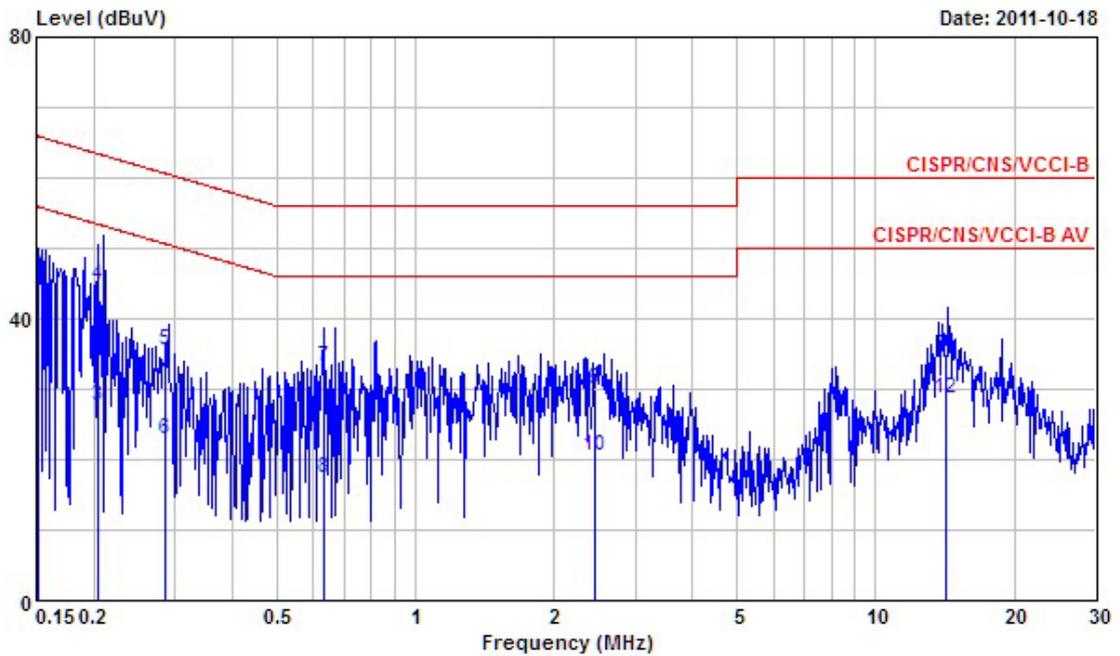
Final Test Date	Oct. 18, 2011	Test Site No.	CO04-HY
Temperature	25.1°C	Humidity	51%
Test Engineer	Assen	Configuration	EUT with USB cable mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@ 0.1515980	47.47	-18.44	65.91	47.17	0.30	0.00	QP
2	0.1515980	30.70	-25.21	55.91	30.40	0.30	0.00	Average
3	@ 0.1829970	45.82	-18.53	64.35	45.52	0.30	0.00	QP
4	0.1829970	30.27	-24.08	54.35	29.97	0.30	0.00	Average
5	0.2802930	35.39	-25.42	60.81	35.04	0.30	0.05	QP
6	0.2802930	22.71	-28.10	50.81	22.36	0.30	0.05	Average
7	@ 0.6402870	36.35	-19.65	56.00	35.96	0.29	0.10	QP
8	0.6402870	21.54	-24.46	46.00	21.15	0.29	0.10	Average
9	@ 2.140	34.18	-21.82	56.00	33.77	0.31	0.10	QP
10	@ 2.140	23.85	-22.15	46.00	23.44	0.31	0.10	Average
11	14.620	33.79	-26.21	60.00	33.08	0.52	0.19	QP
12	@ 14.620	28.11	-21.89	50.00	27.40	0.52	0.19	Average

Neutral

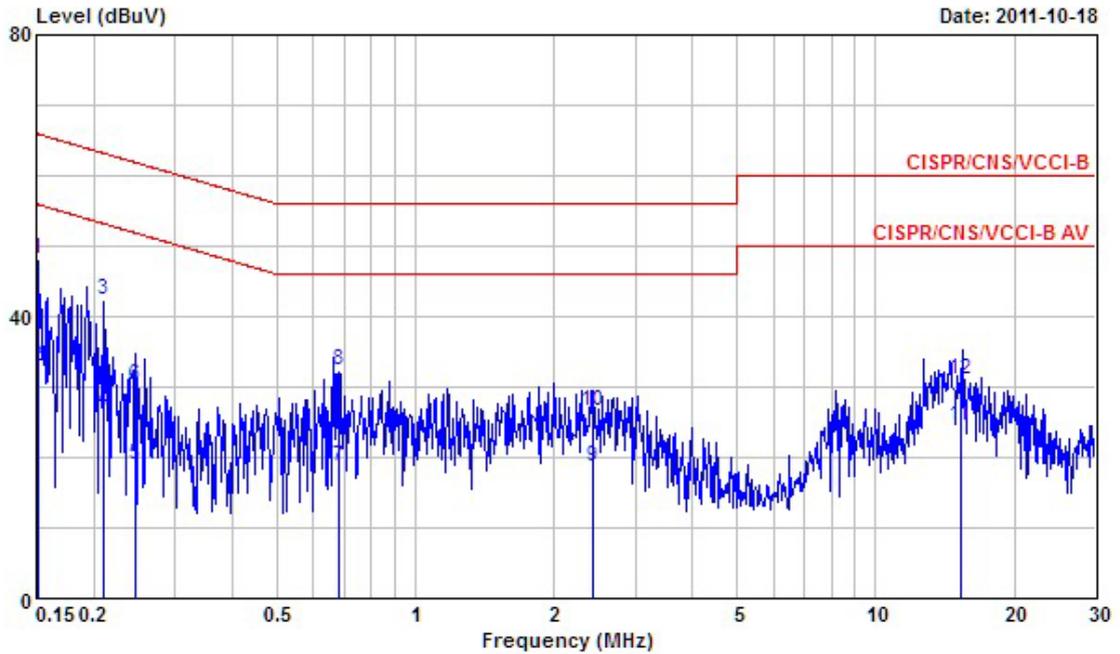


	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.1515980	28.95	-26.96	55.91	28.68	0.27	0.00	Average
2	0.1515980	46.16	-19.75	65.91	45.89	0.27	0.00	QP
3	0.2045880	27.76	-25.66	53.42	27.51	0.25	0.00	Average
4	0.2045880	44.61	-18.81	63.42	44.36	0.25	0.00	QP
5	0.2863840	35.44	-25.19	60.63	35.15	0.24	0.05	QP
6	0.2863840	22.84	-27.79	50.63	22.55	0.24	0.05	Average
7	0.6347290	33.25	-22.75	56.00	32.90	0.25	0.10	QP
8	0.6347290	17.50	-28.50	46.00	17.15	0.25	0.10	Average
9	2.450	30.08	-25.92	56.00	29.70	0.28	0.10	QP
10	2.450	20.56	-25.44	46.00	20.18	0.28	0.10	Average
11	14.240	34.90	-25.10	60.00	34.27	0.44	0.19	QP
12	14.240	28.62	-21.38	50.00	27.99	0.44	0.19	Average

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

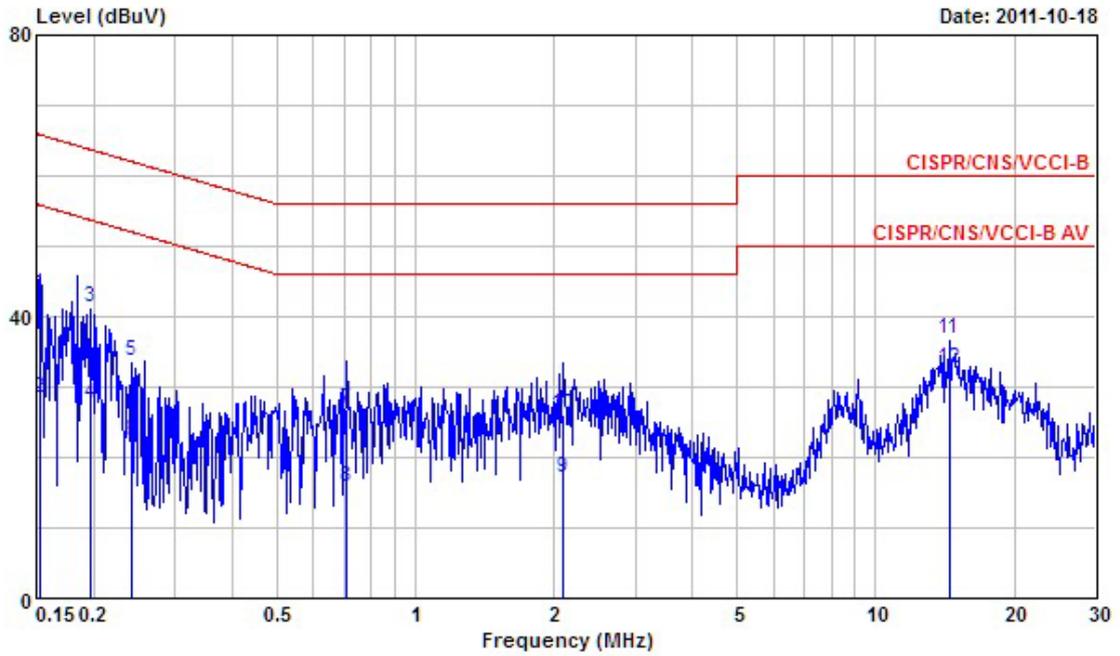
Final Test Date	Oct. 18, 2011	Test Site No.	CO04-HY
Temperature	25.1°C	Humidity	51%
Test Engineer	Assen	Configuration	EUT with cradle mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1515980	48.25	-17.66	65.91	47.95	0.30	0.00	QP
2	0.1515980	32.83	-23.08	55.91	32.53	0.30	0.00	Average
3	0.2104380	42.28	-20.91	63.19	41.97	0.30	0.01	QP
4	0.2104380	26.70	-26.49	53.19	26.39	0.30	0.01	Average
5	0.2468240	18.87	-32.99	51.86	18.54	0.30	0.03	Average
6	0.2468240	30.35	-31.51	61.86	30.02	0.30	0.03	QP
7	0.6810340	18.72	-27.28	46.00	18.33	0.29	0.10	Average
8	0.6810340	32.49	-23.51	56.00	32.10	0.29	0.10	QP
9	2.420	18.75	-27.25	46.00	18.33	0.32	0.10	Average
10	2.420	26.55	-29.45	56.00	26.13	0.32	0.10	QP
11	15.305	24.60	-25.40	50.00	23.88	0.53	0.19	Average
12	15.305	30.95	-29.05	60.00	30.23	0.53	0.19	QP

Neutral



	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	@0.1524030	43.19	-22.68	65.87	42.92	0.27	0.00	QP
2	0.1524030	28.36	-27.51	55.87	28.09	0.27	0.00	Average
3	@0.1964300	41.21	-22.55	63.76	40.96	0.25	0.00	QP
4	0.1964300	27.62	-26.14	53.76	27.37	0.25	0.00	Average
5	0.2421290	33.74	-28.28	62.02	33.46	0.25	0.03	QP
6	0.2421290	22.40	-29.62	52.02	22.12	0.25	0.03	Average
7	0.7084240	26.87	-29.13	56.00	26.52	0.25	0.10	QP
8	0.7084240	15.67	-30.33	46.00	15.32	0.25	0.10	Average
9	2.100	17.12	-28.88	46.00	16.75	0.27	0.10	Average
10	2.100	26.15	-29.85	56.00	25.78	0.27	0.10	QP
11	@ 14.440	36.86	-23.14	60.00	36.23	0.44	0.19	QP
12	@ 14.440	32.59	-17.41	50.00	31.96	0.44	0.19	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 exceeds 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

3.2.2 Measuring Instruments and Setting

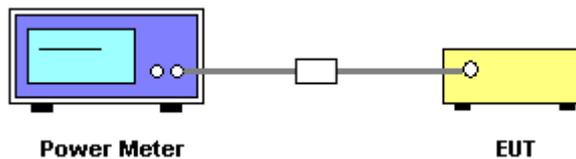
Please refer to section 4 of equipments list in this report. The following table is the setting of the power meter.

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	Nov. 17, 2011	Test Site No.	TH01-HY
Temperature	24.1°C	Humidity	67%
Test Engineer	Cain	Configurations	802.11b/g/n

For Single Chain:

Configuration IEEE 802.11b Ant. 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	19.88	30.00	Complies
6	2437 MHz	19.93	30.00	Complies
11	2462 MHz	20.21	30.00	Complies

Configuration IEEE 802.11g Ant. 2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	24.41	30.00	Complies
6	2437 MHz	24.37	30.00	Complies
11	2462 MHz	24.26	30.00	Complies

For Two Chain:

Configuration of IEEE 802.11n Ant. 1 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	23.63	30.00	Complies
6	2437 MHz	23.84	30.00	Complies
11	2462 MHz	24.13	30.00	Complies

Configuration of IEEE 802.11n Ant. 2 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	22.80	30.00	Complies
6	2437 MHz	22.71	30.00	Complies
11	2462 MHz	22.66	30.00	Complies

Configuration of IEEE 802.11n Ant. 1+ 2 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	26.25	30.00	Complies
6	2437 MHz	26.32	30.00	Complies
11	2462 MHz	26.47	30.00	Complies

Configuration of IEEE 802.11n Ant. 1 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	23.60	30.00	Complies
6	2437 MHz	23.68	30.00	Complies
9	2452 MHz	23.87	30.00	Complies

Configuration of IEEE 802.11n Ant. 2 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	23.41	30.00	Complies
6	2437 MHz	23.09	30.00	Complies
9	2452 MHz	23.15	30.00	Complies

Configuration of IEEE 802.11n Ant. 1+ 2 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	26.52	30.00	Complies
6	2437 MHz	26.41	30.00	Complies
9	2452 MHz	26.54	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

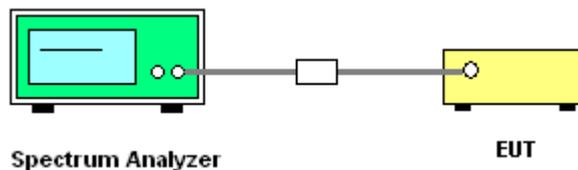
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	Nov. 17, 2011	Test Site No.	TH01-HY
Temperature	24.1°C	Humidity	67%
Test Engineer	Cain	Configurations	802.11b/g/n

For Single Chain:

Configuration IEEE 802.11b Ant. 1

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-13.88	8.00	Complies
6	2437 MHz	-14.00	8.00	Complies
11	2462 MHz	-14.24	8.00	Complies

Configuration IEEE 802.11g Ant. 2

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-14.14	8.00	Complies
6	2437 MHz	-14.61	8.00	Complies
11	2462 MHz	-14.83	8.00	Complies

For Two Chain:

Configuration of IEEE 802.11n Ant. 1 (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-15.27	8.00	Complies
6	2437 MHz	-16.70	8.00	Complies
11	2462 MHz	-16.37	8.00	Complies

Configuration of IEEE 802.11n Ant. 2 (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-15.71	8.00	Complies
6	2437 MHz	-15.64	8.00	Complies
11	2462 MHz	-15.44	8.00	Complies

Configuration of IEEE 802.11n Ant. 1+ 2 (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-12.47	8.00	Complies
6	2437 MHz	-13.13	8.00	Complies
11	2462 MHz	-12.87	8.00	Complies

Configuration of IEEE 802.11n Ant. 1 (40MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-17.22	8.00	Complies
6	2437 MHz	-17.47	8.00	Complies
9	2452 MHz	-17.25	8.00	Complies

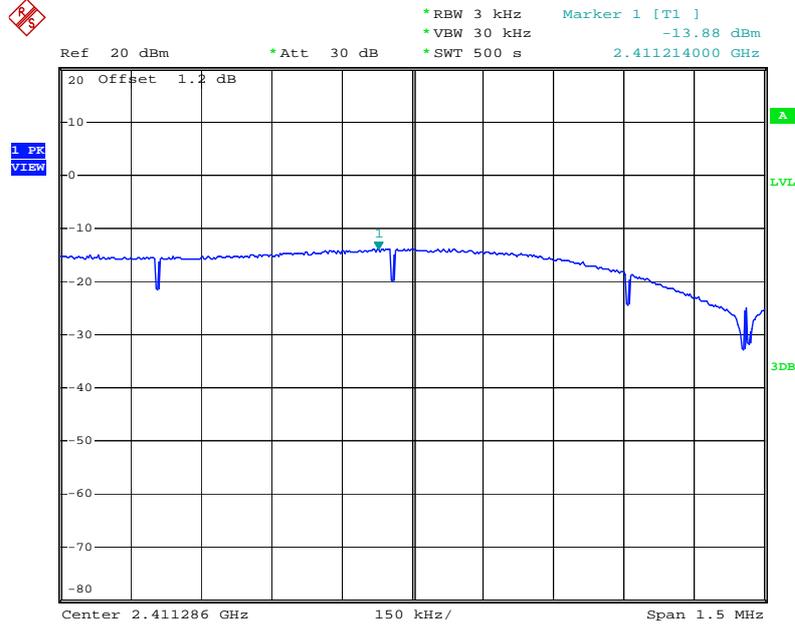
Configuration of IEEE 802.11n Ant. 2 (40MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-18.62	8.00	Complies
6	2437 MHz	-19.69	8.00	Complies
9	2452 MHz	-19.52	8.00	Complies

Configuration of IEEE 802.11n Ant. 1+ 2 (40MHz)

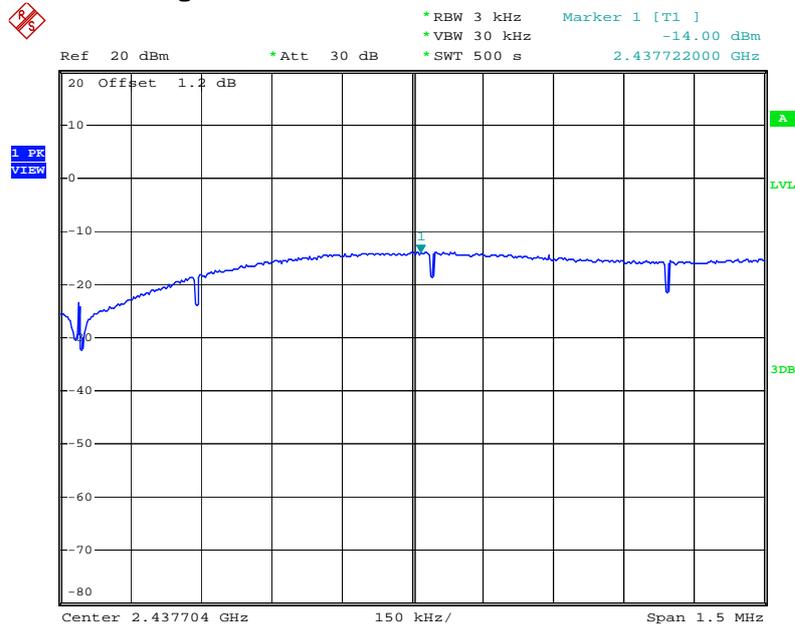
Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-14.85	8.00	Complies
6	2437 MHz	-15.43	8.00	Complies
9	2452 MHz	-15.23	8.00	Complies

For Single Chain:
Power Density Plot on Configuration IEEE 802.11b Ant. 1 / 2412 MHz



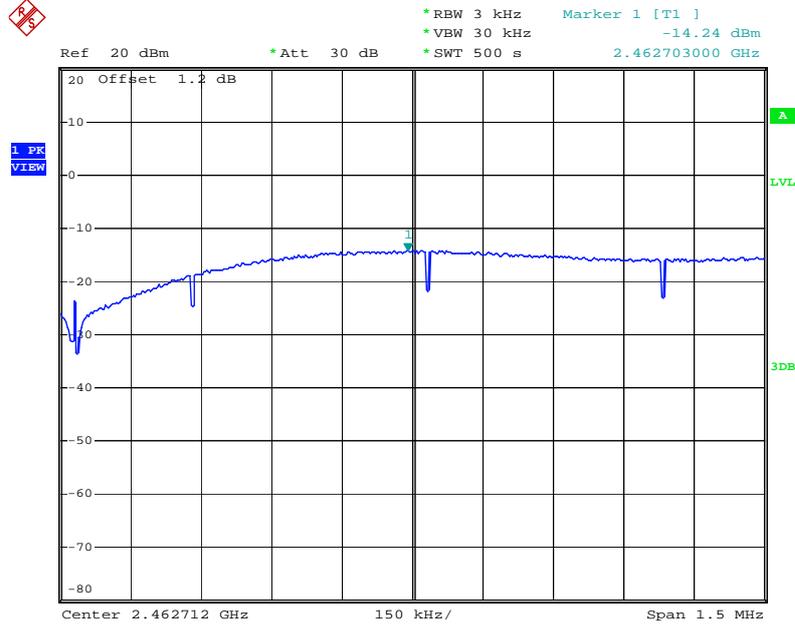
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Power Density Plot on Configuration IEEE 802.11b Ant. 1 / 2437 MHz



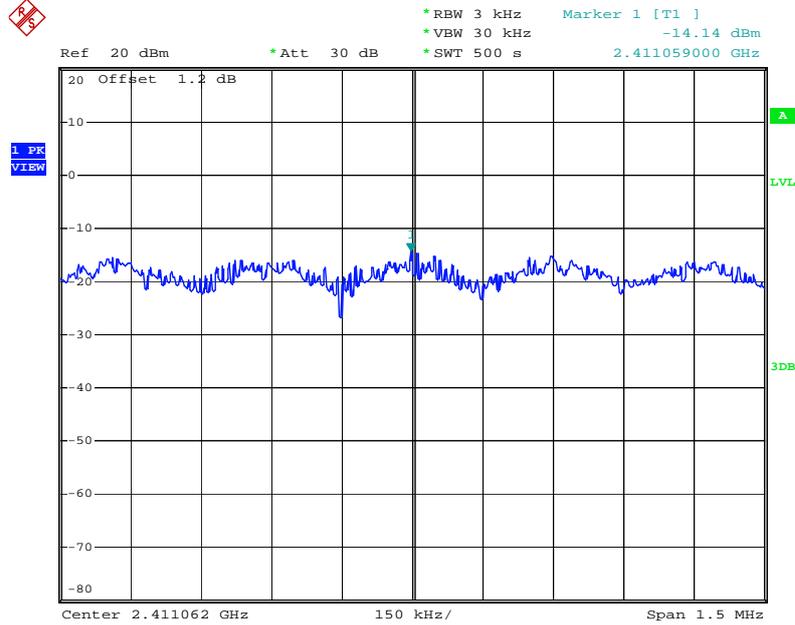
Date: 16.NOV.2011 21:52:19

Power Density Plot on Configuration IEEE 802.11b Ant. 1 / 2462 MHz



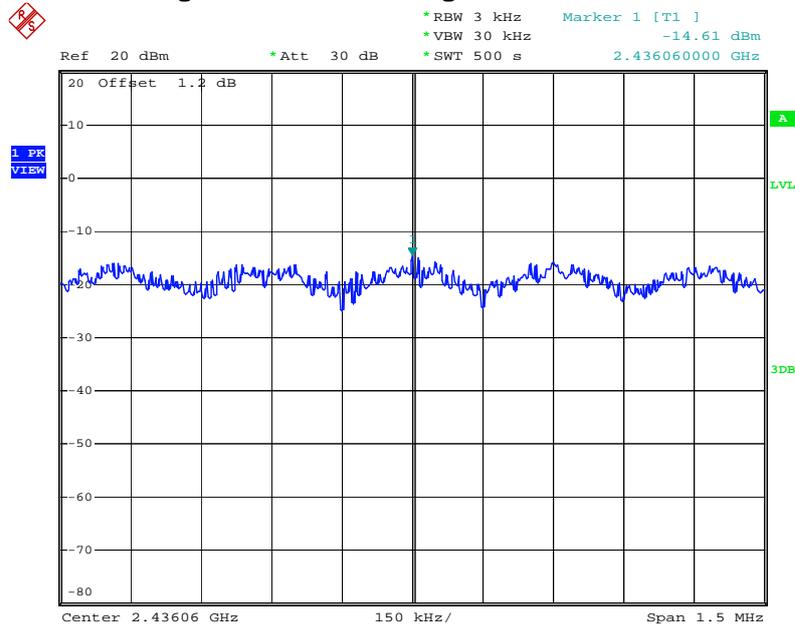
Date: 16.NOV.2011 21:57:33

Power Density Plot on Configuration IEEE 802.11g Ant. 2 / 2412 MHz



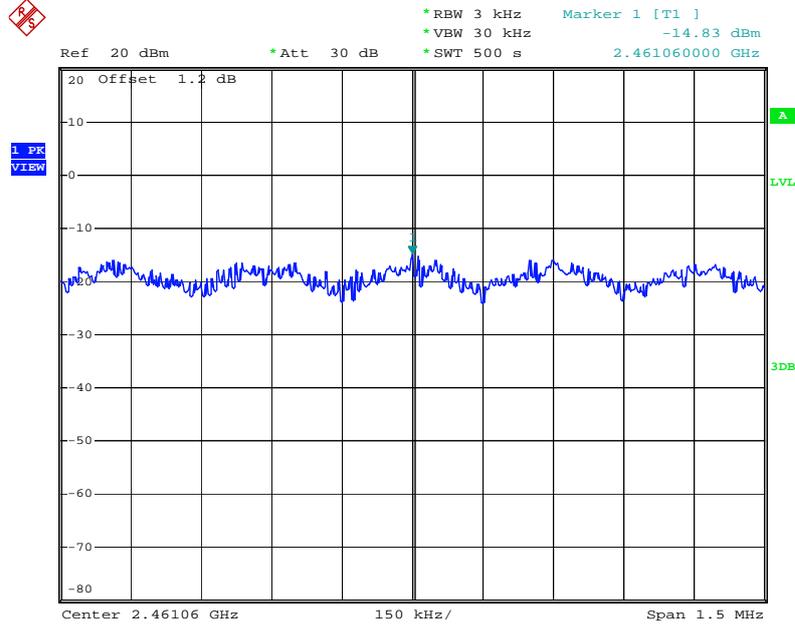
Date: 16.NOV.2011 22:02:50

Power Density Plot on Configuration IEEE 802.11g Ant. 2 / 2437 MHz



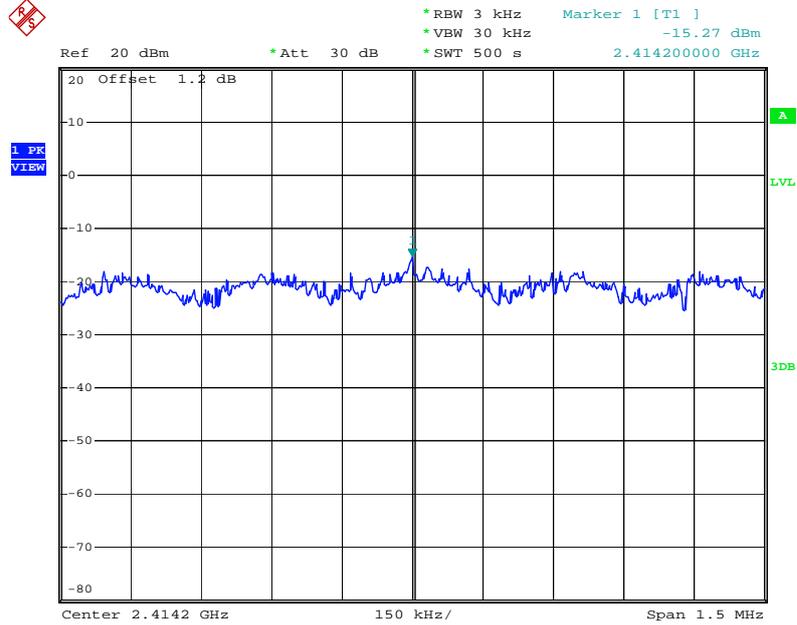
Date: 16.NOV.2011 22:04:56

Power Density Plot on Configuration IEEE 802.11g Ant. 2 / 2462 MHz



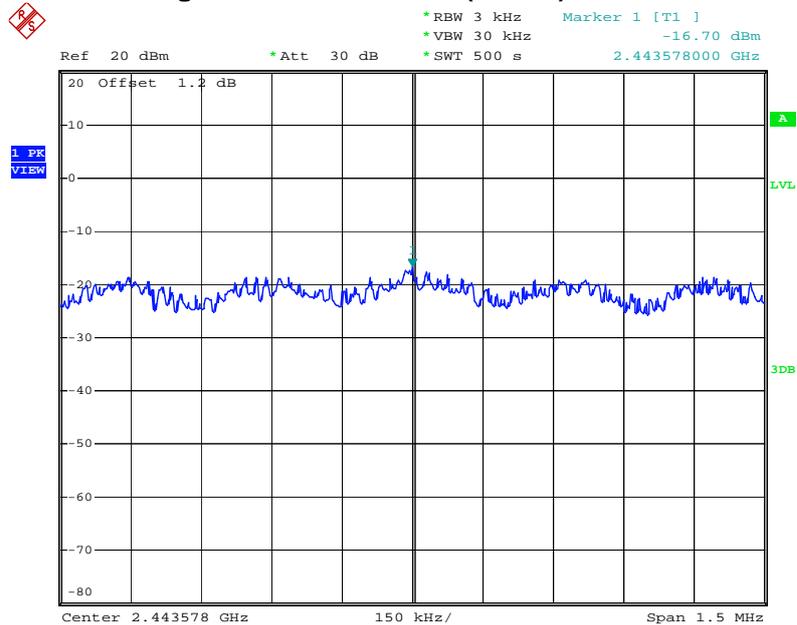
Date: 16.NOV.2011 22:10:16

For Two Chain:
Power Density Plot on Configuration IEEE 802.11n (20MHz) Ant. 1 / 2412 MHz



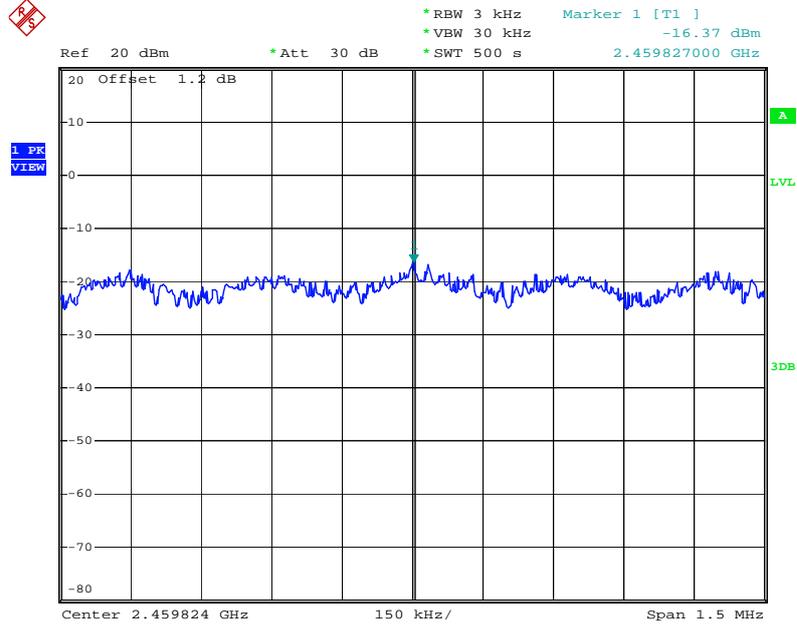
Date: 16.NOV.2011 22:15:59

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



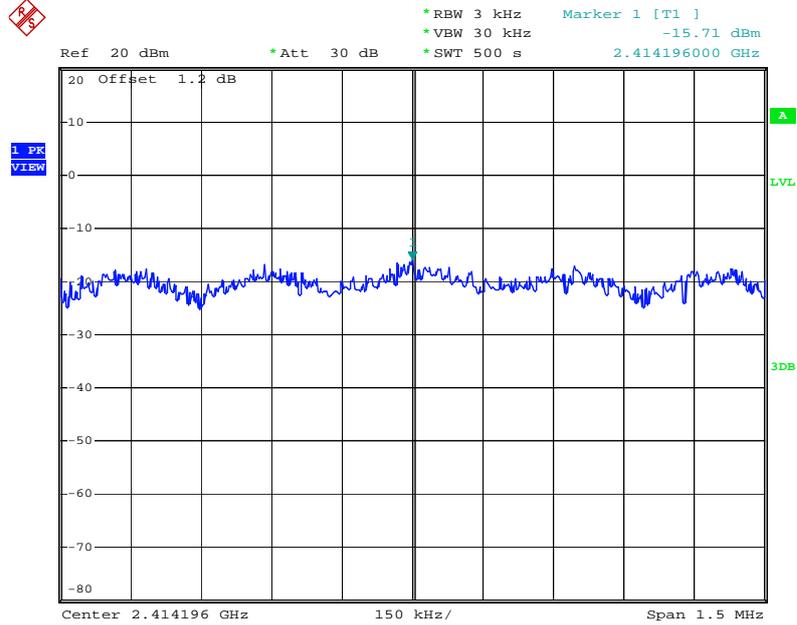
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Power Density Plot on Configuration IEEE 802.11n (20MHz) Ant. 1 / 2462 MHz



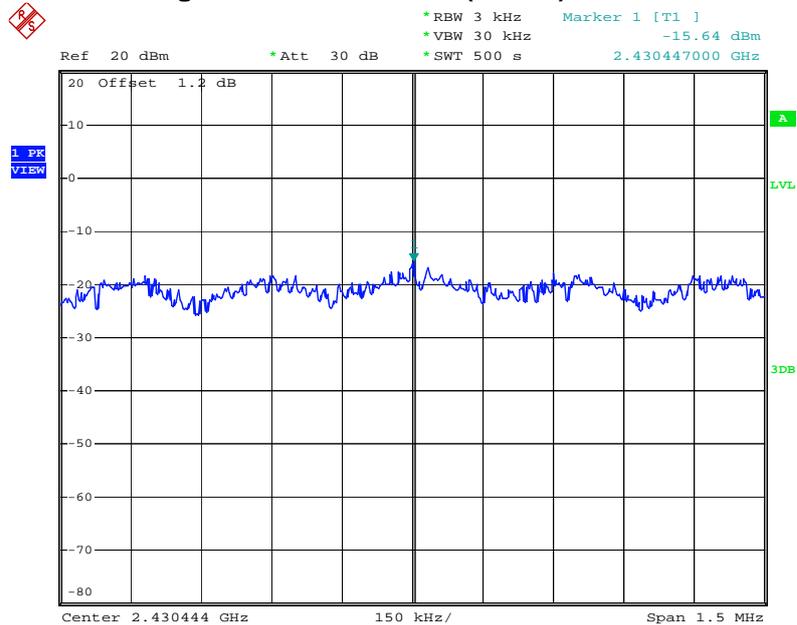
Date: 16.NOV.2011 22:29:34

Power Density Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2412 MHz



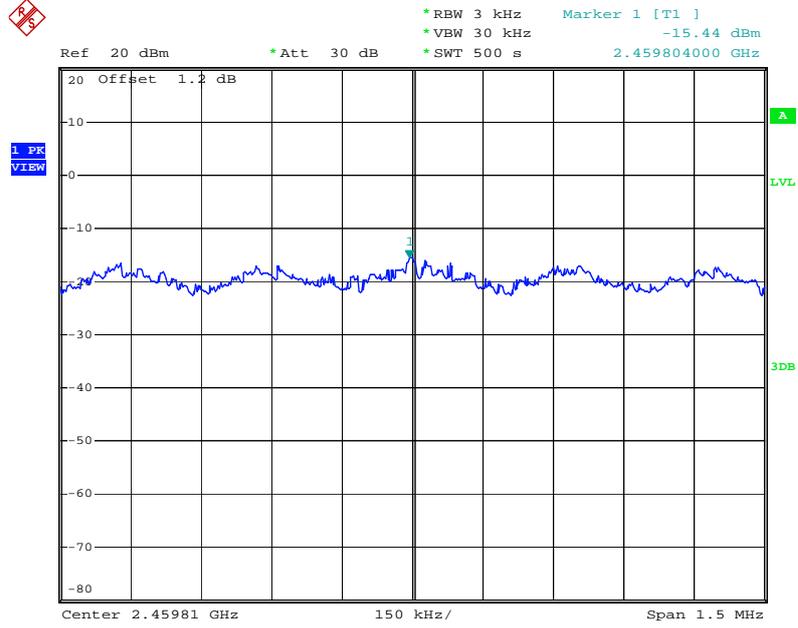
Date: 16.NOV.2011 23:59:05

Power Density Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2437 MHz



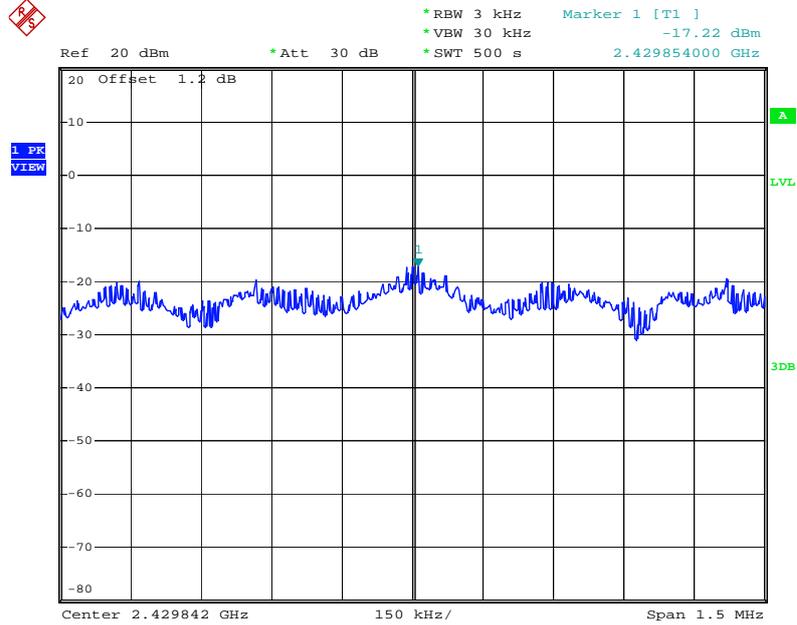
Date: 17.NOV.2011 00:00:46

Power Density Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2462 MHz



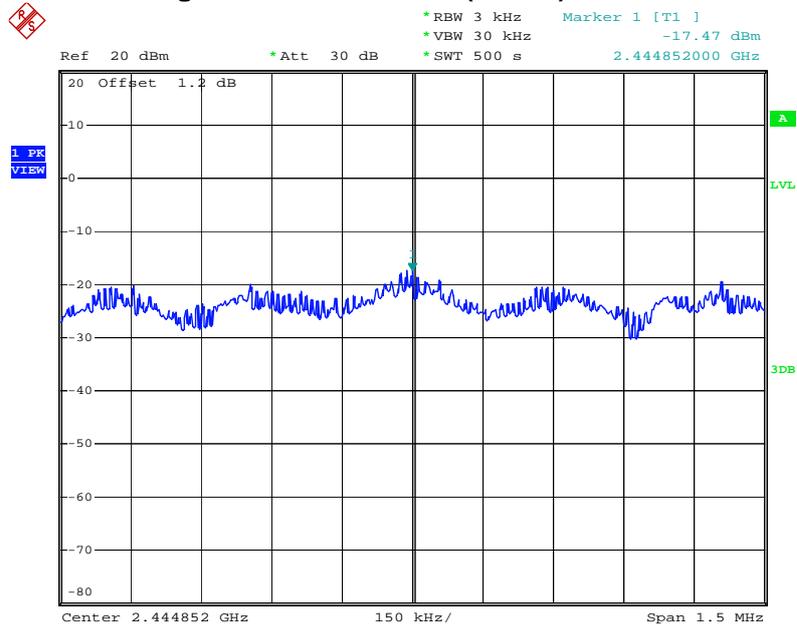
Date: 17.NOV.2011 00:10:54

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



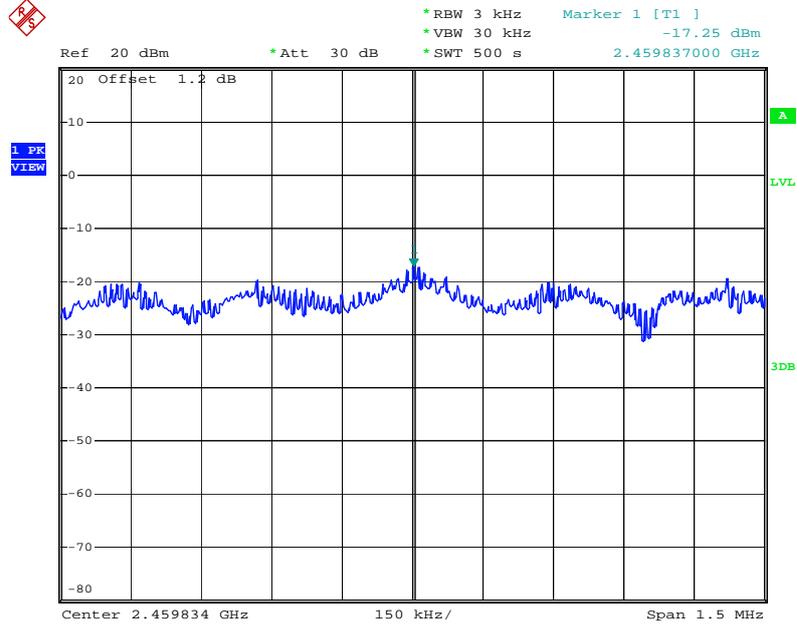
Date: 16.NOV.2011 23:08:33

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



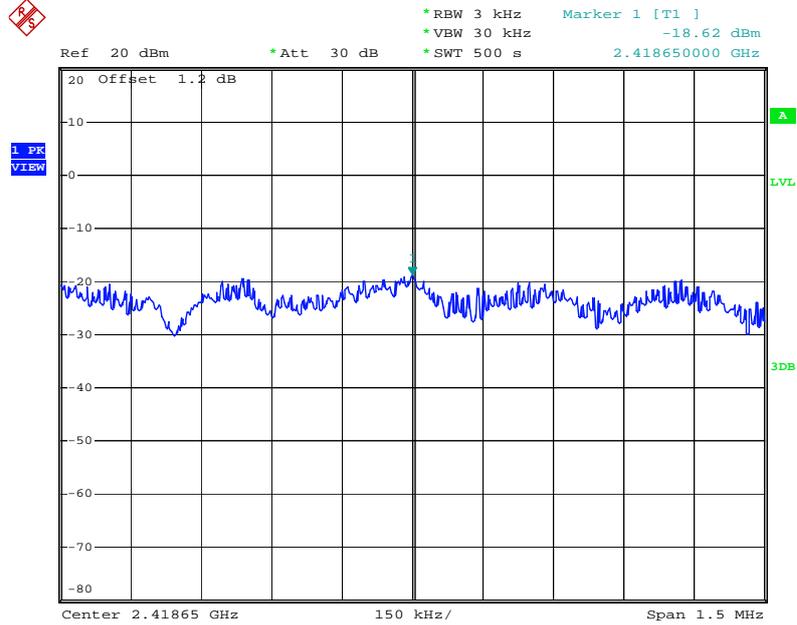
Date: 16.NOV.2011 23:10:08

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



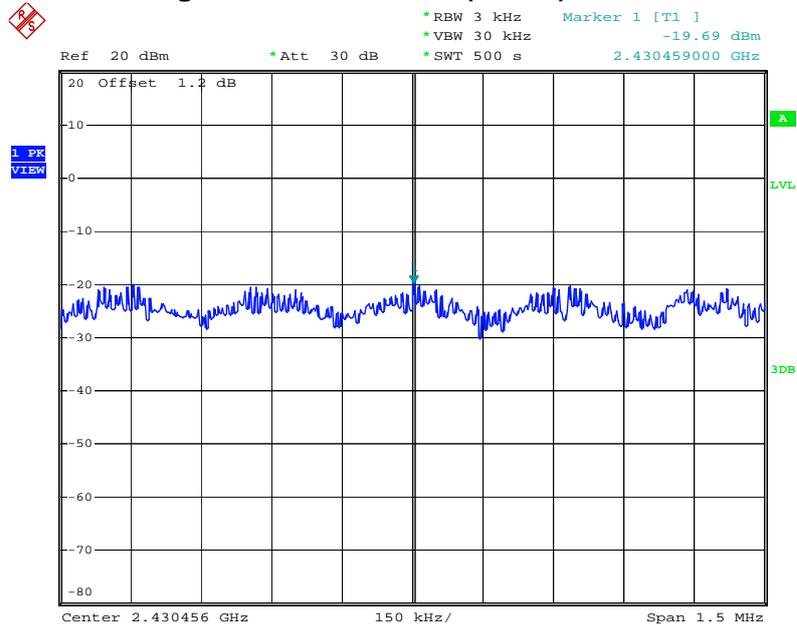
Date: 16.NOV.2011 23:33:38

Power Density Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2422 MHz



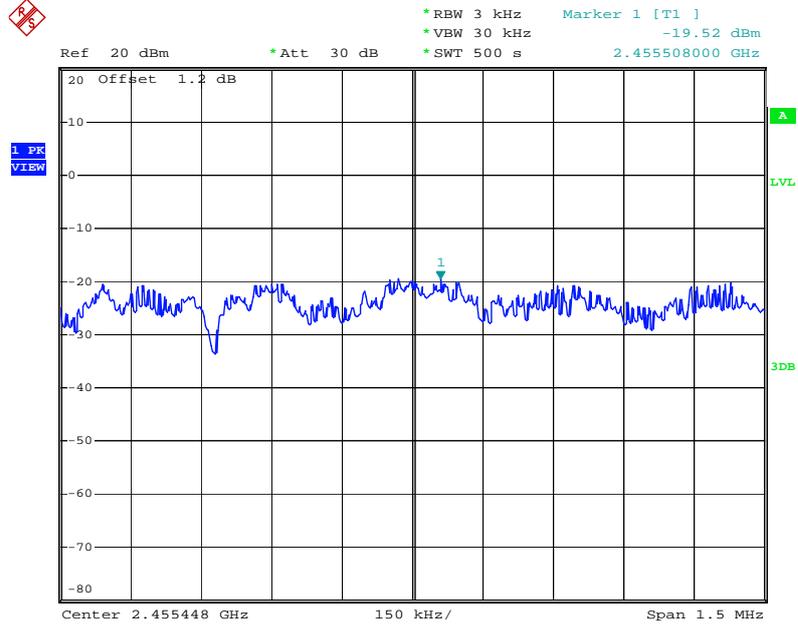
Date: 17.NOV.2011 00:14:28

Power Density Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2437 MHz



Date: 17.NOV.2011 00:16:15

Power Density Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2452 MHz



Date: 17.NOV.2011 00:18:41

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

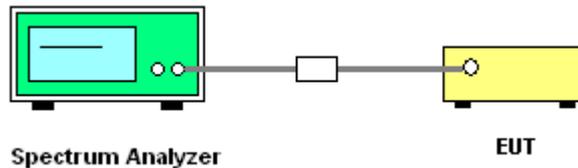
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	Nov. 17, 2011	Test Site No.	TH01-HY
Temperature	24.1°C	Humidity	67%
Test Engineer	Cain	Configurations	802.11b/g/n

For Single Chain:

Configuration IEEE 802.11b Ant. 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	10.08	14.72	500	Complies
6	2437 MHz	10.08	14.84	500	Complies
11	2462 MHz	10.12	14.72	500	Complies

Configuration IEEE 802.11g Ant. 2

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.56	16.44	500	Complies
6	2437 MHz	16.56	16.44	500	Complies
11	2462 MHz	16.56	16.48	500	Complies

For Two Chain:

Configuration of IEEE 802.11n Ant. 1 (20MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.64	17.64	500	Complies
6	2437 MHz	17.80	17.64	500	Complies
11	2462 MHz	17.80	17.64	500	Complies

Configuration of IEEE 802.11n Ant. 2 (20MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.68	17.60	500	Complies
6	2437 MHz	17.64	17.64	500	Complies
11	2462 MHz	17.72	17.64	500	Complies

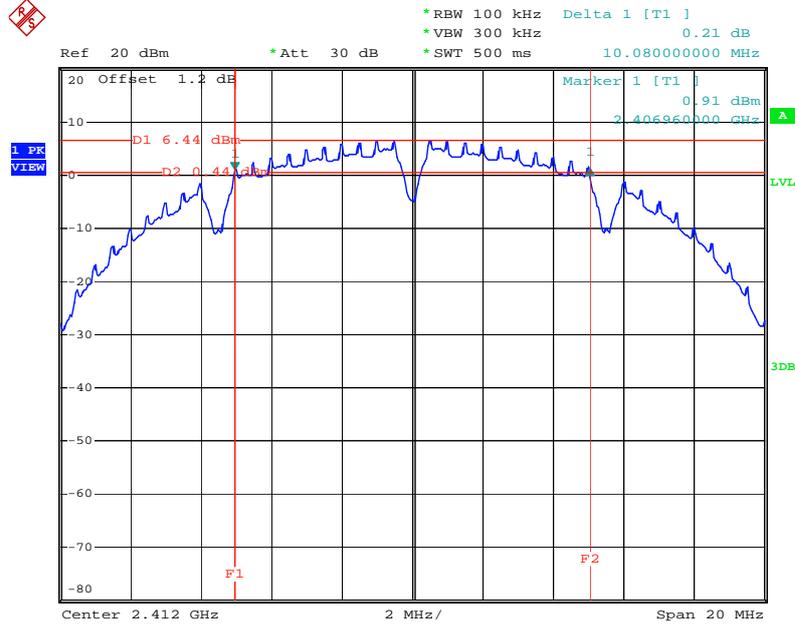
Configuration of IEEE 802.11n Ant. 1 (40MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	36.40	36.08	500	Complies
6	2437 MHz	36.40	36.00	500	Complies
9	2452 MHz	36.48	36.08	500	Complies

Configuration of IEEE 802.11n Ant. 2 (40MHz)

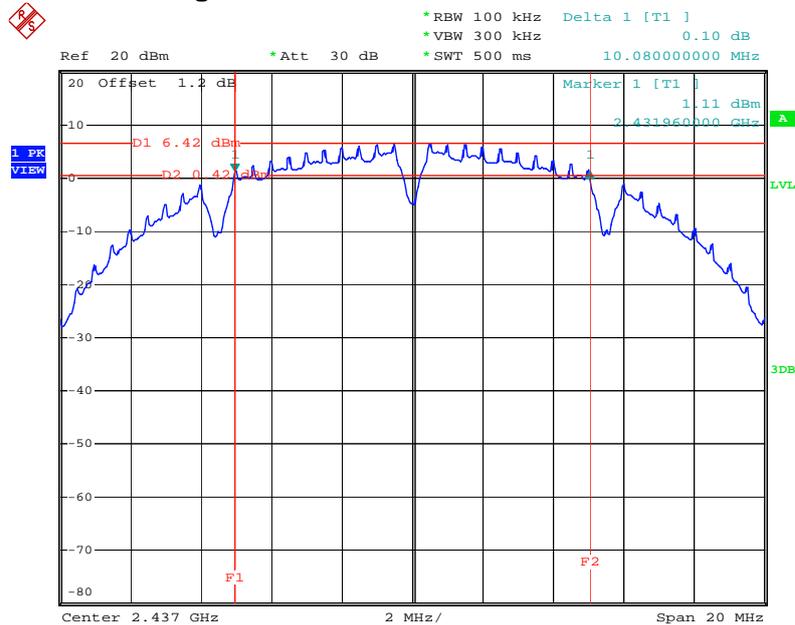
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	36.40	36.00	500	Complies
6	2437 MHz	36.40	36.00	500	Complies
9	2452 MHz	36.40	36.00	500	Complies

For Single Chain:
6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. 1 / 2412 MHz



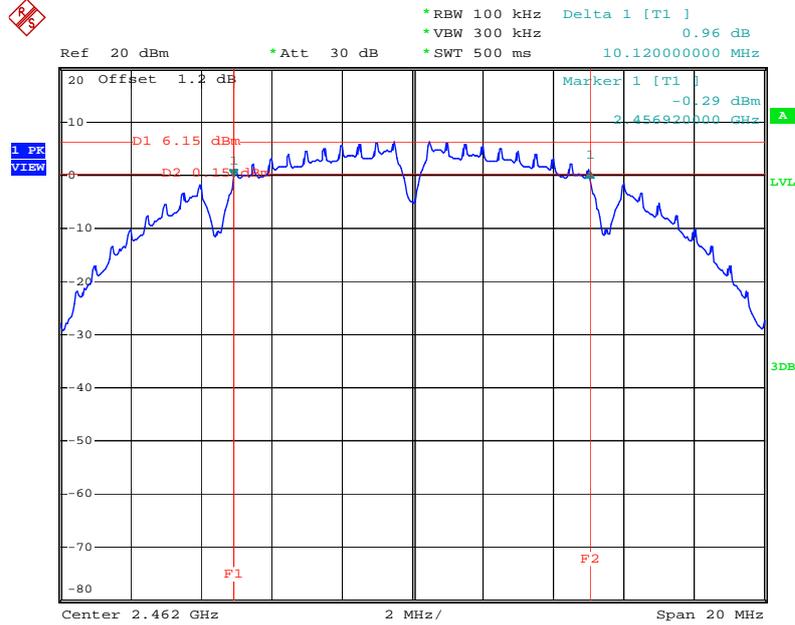
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6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. 1 / 2437 MHz



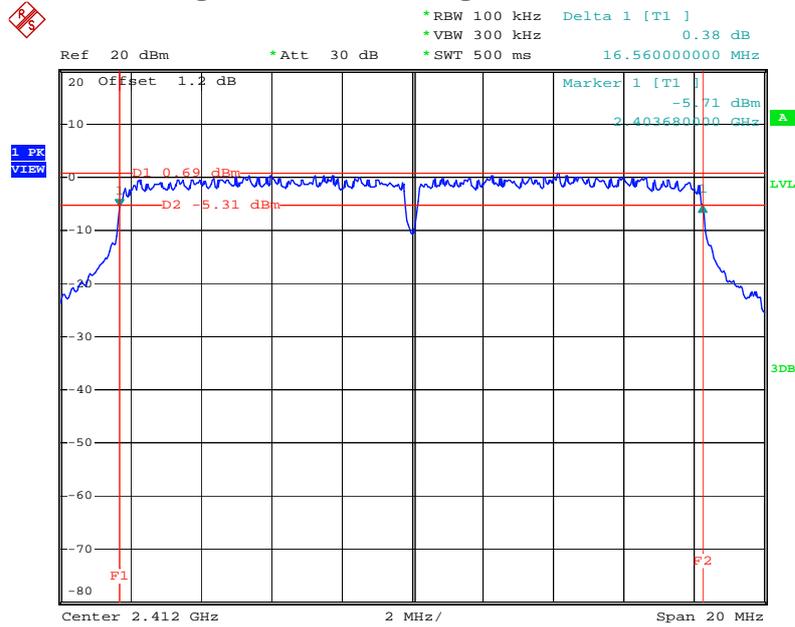
Date: 16.NOV.2011 21:53:57

6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. 1 / 2462 MHz



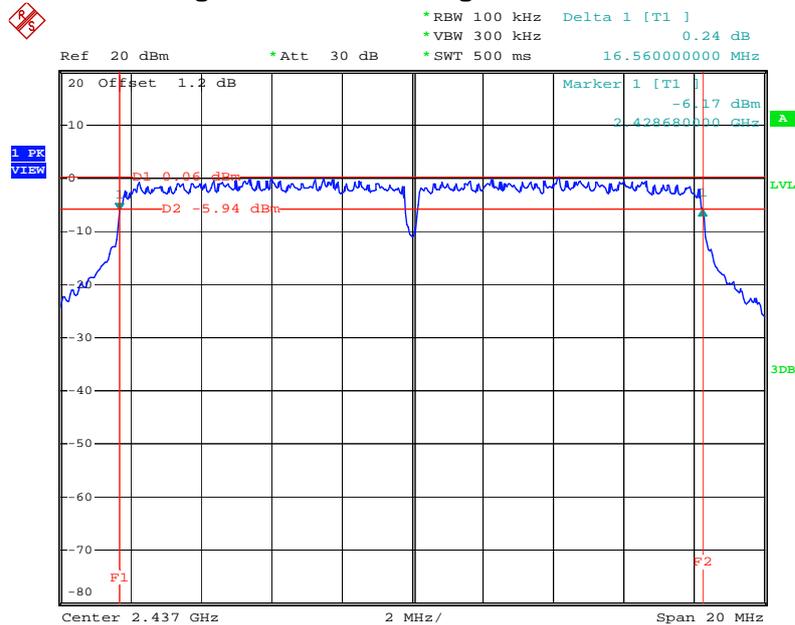
Date: 16.NOV.2011 21:55:08

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. 2 / 2412 MHz



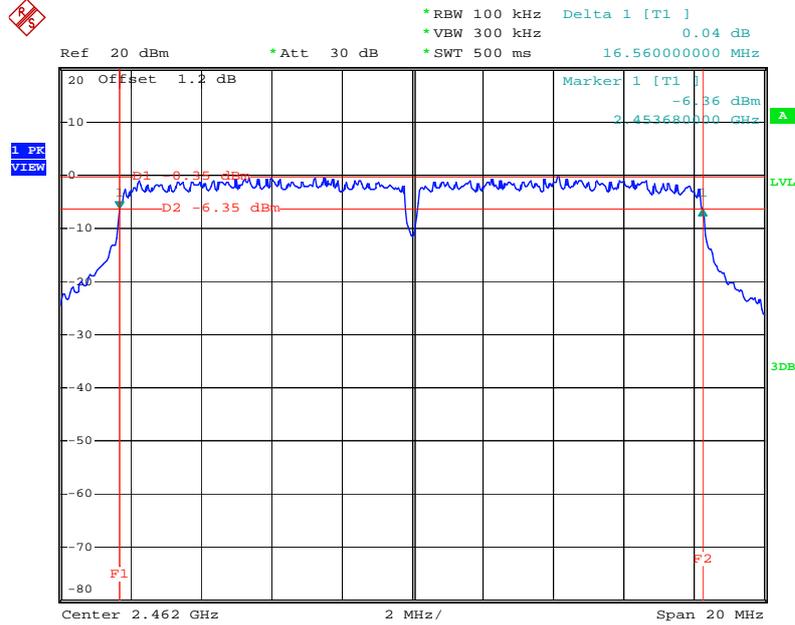
Date: 16.NOV.2011 22:00:45

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. 2 / 2437 MHz



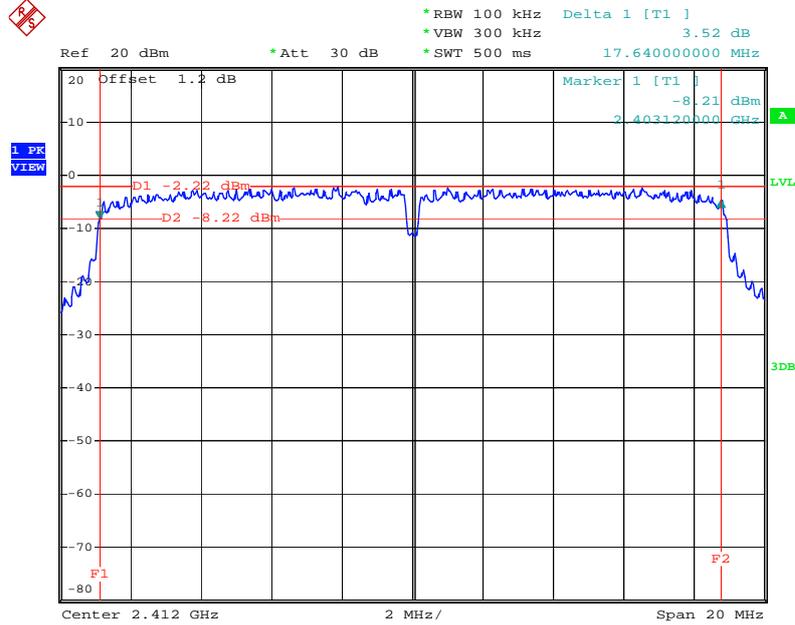
Date: 16.NOV.2011 22:04:03

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. 2 / 2462 MHz



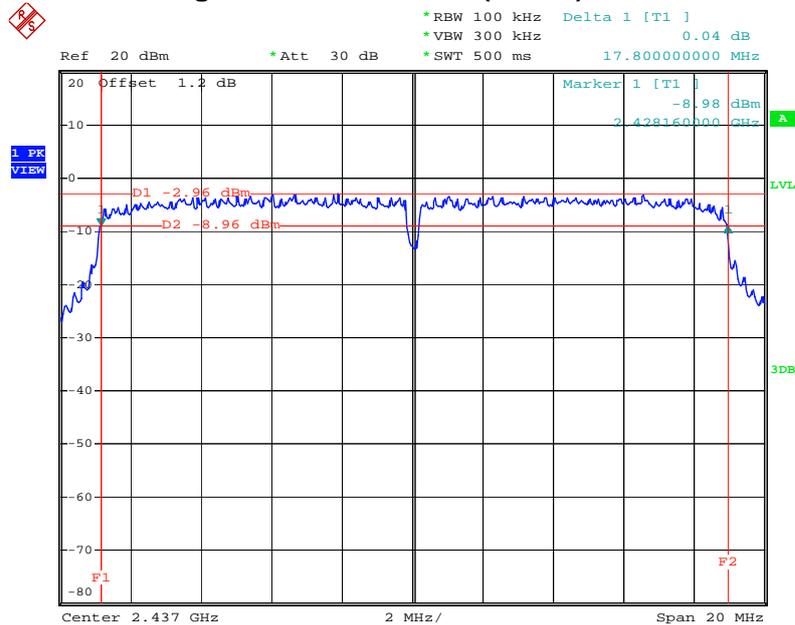
Date: 16.NOV.2011 22:09:31

For Two Chain:
6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 1 / 2412 MHz



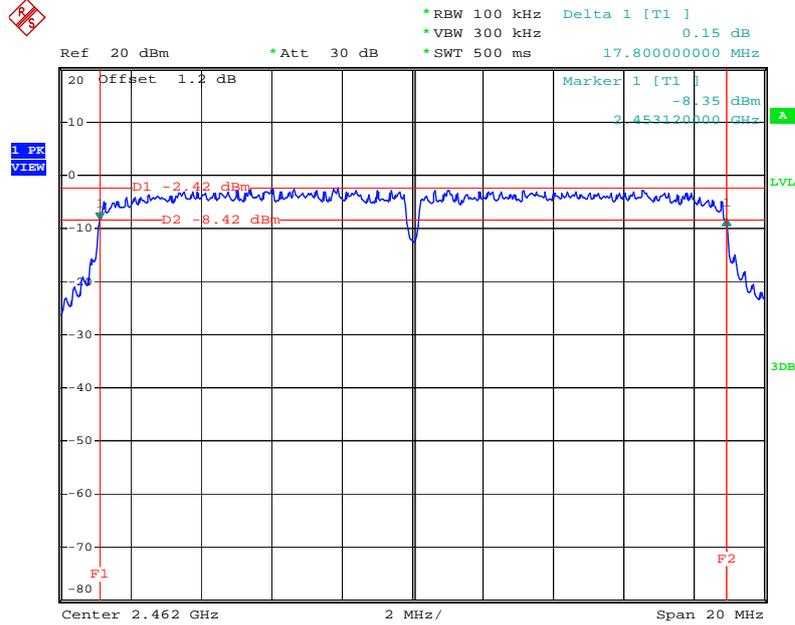
Date: 16.NOV.2011 22:13:23

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



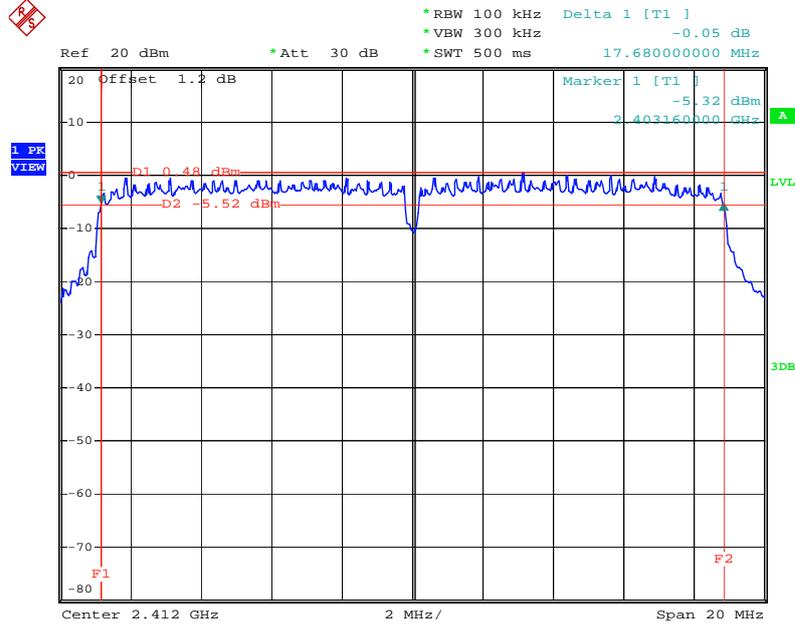
Date: 16.NOV.2011 22:20:51

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



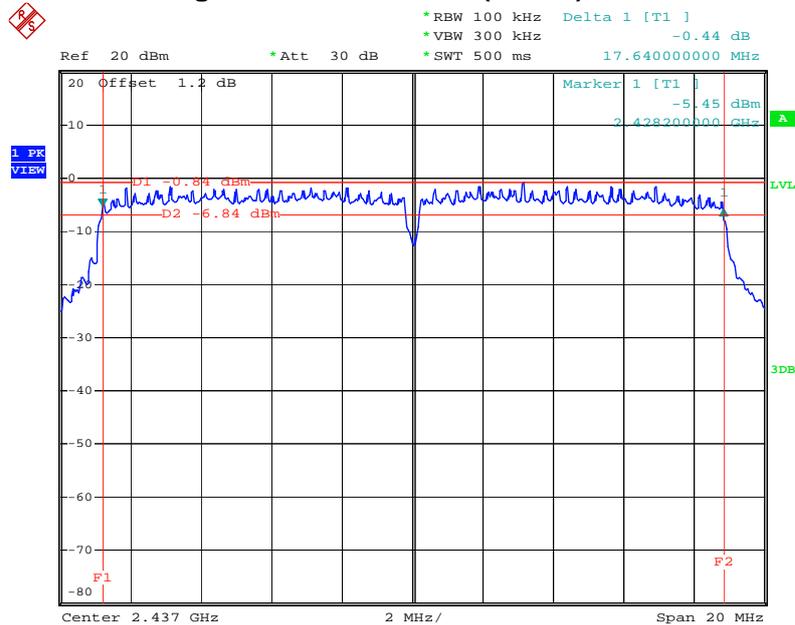
Date: 16.NOV.2011 22:27:40

6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2412 MHz



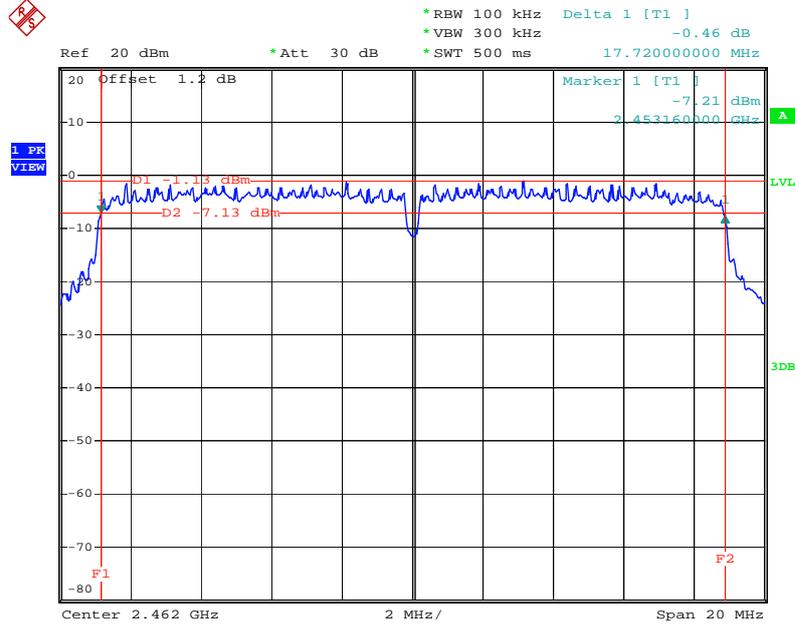
Date: 16.NOV.2011 23:56:42

6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2437 MHz



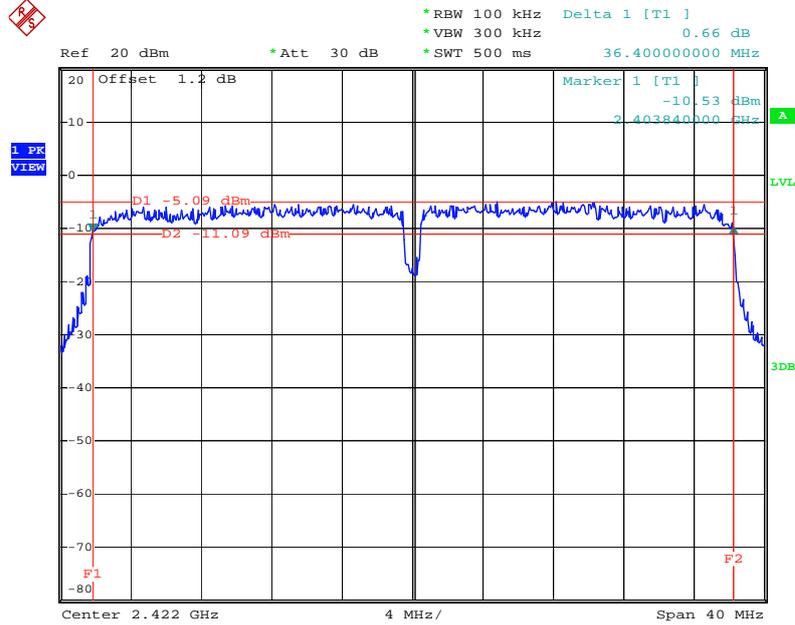
Date: 17.NOV.2011 00:00:10

6 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2462 MHz



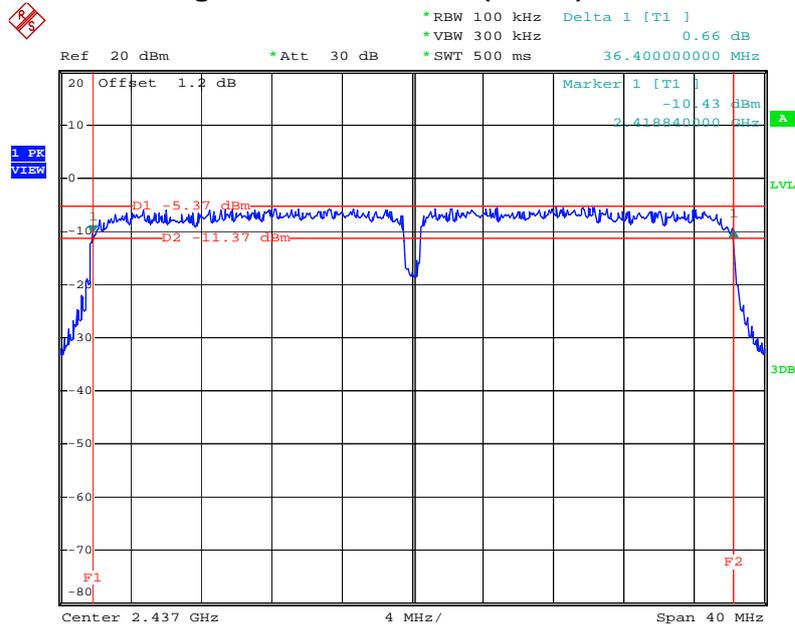
Date: 17.NOV.2011 00:19:37

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



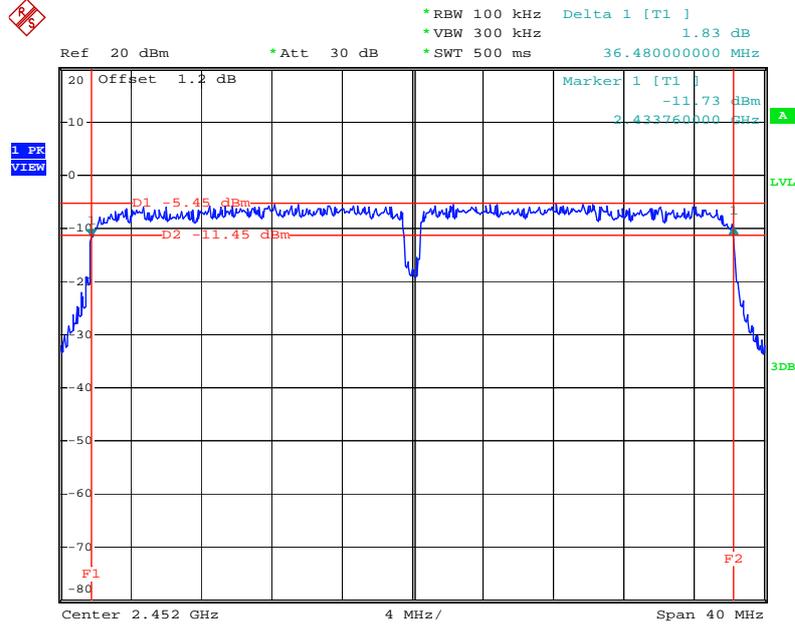
Date: 16.NOV.2011 23:06:54

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



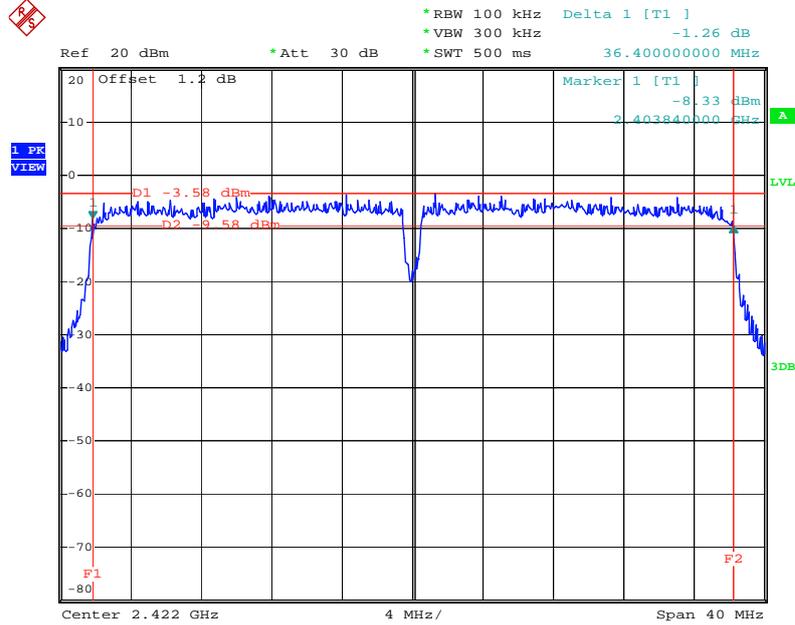
Date: 16.NOV.2011 23:09:21

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



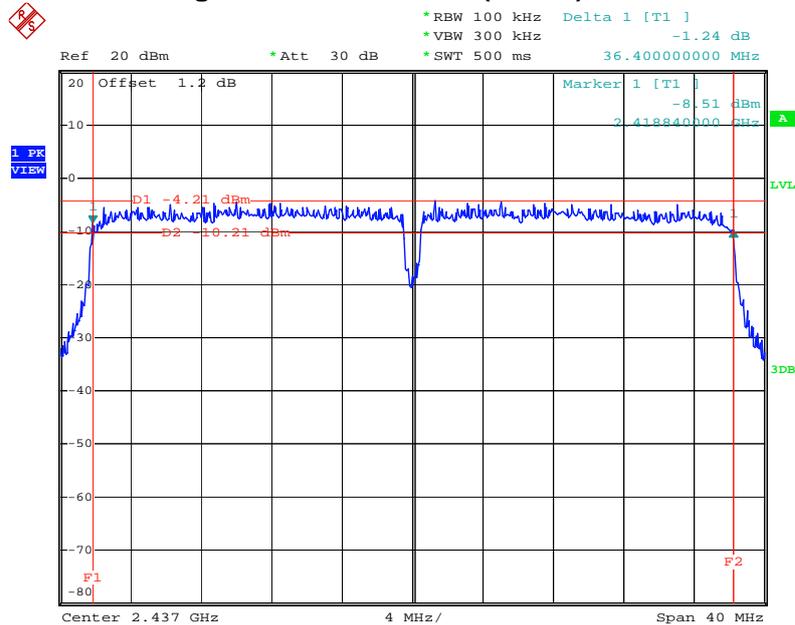
Date: 16.NOV.2011 23:11:06

6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2422 MHz



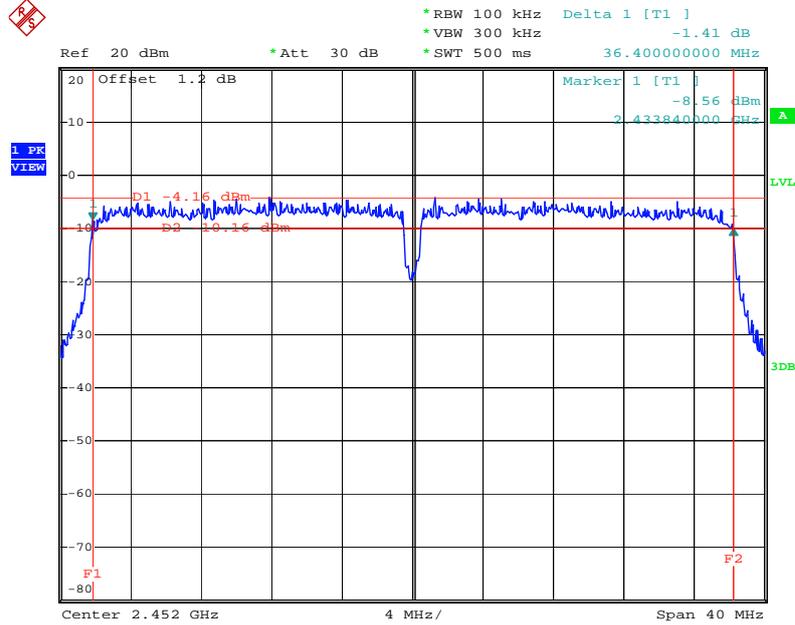
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6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2437 MHz



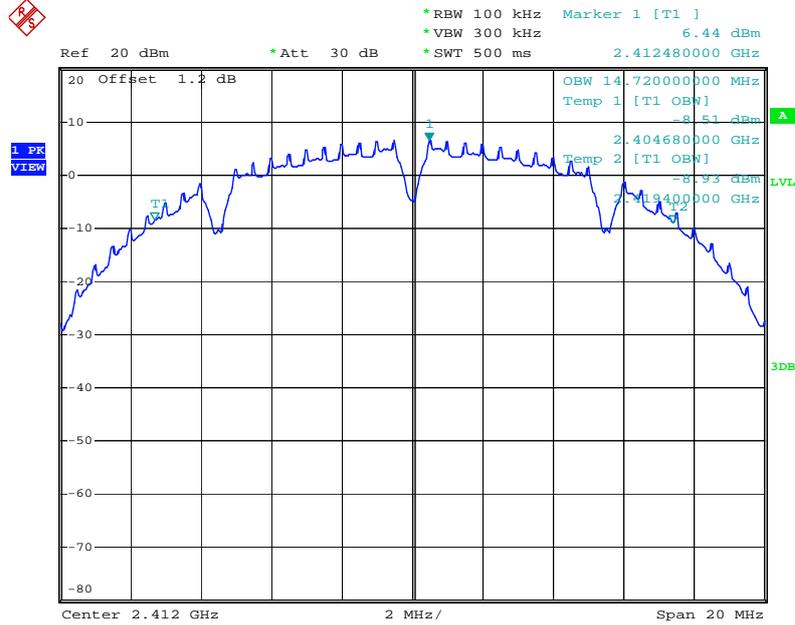
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6 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2452 MHz



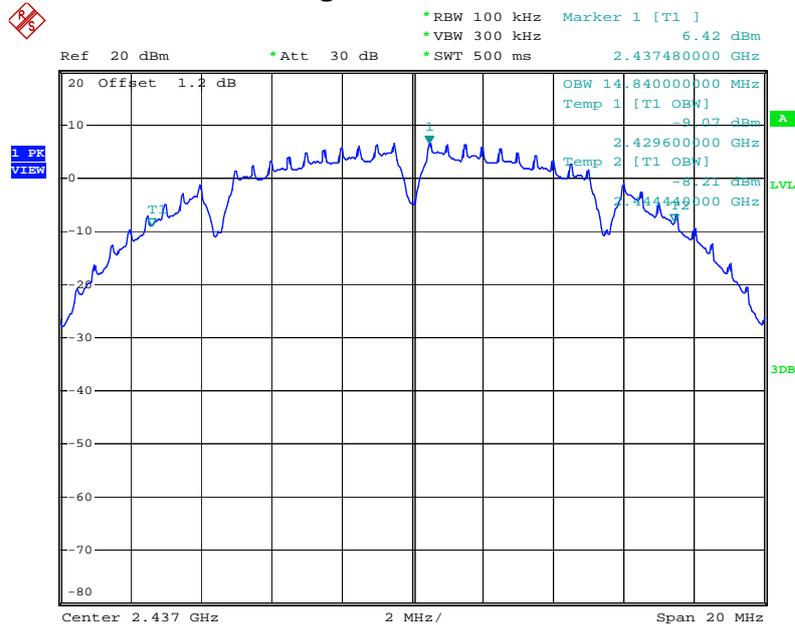
Date: 17.NOV.2011 00:17:04

For Single Chain:
99% Occupied Bandwidth Plot on Configuration IEEE 802.11b Ant. 1 / 2412 MHz



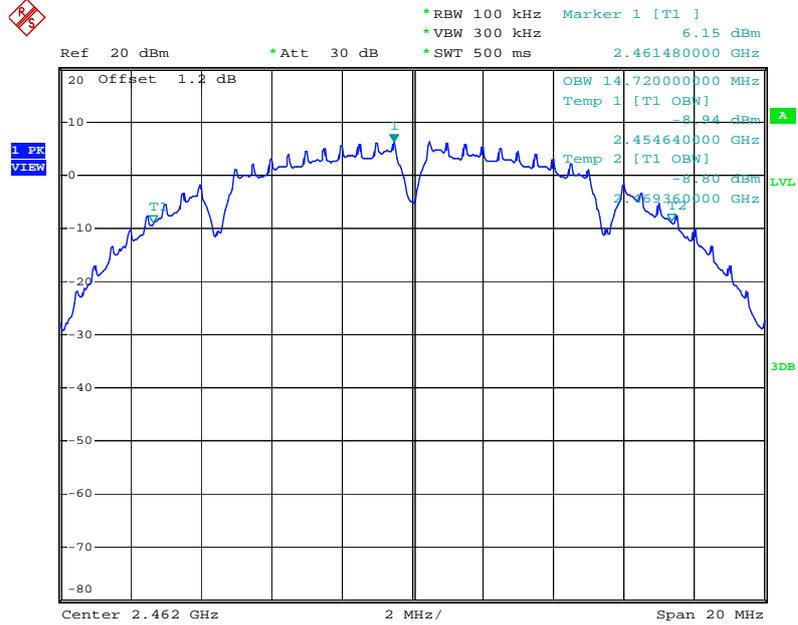
Date: 16.NOV.2011 21:47:30

99% Occupied Bandwidth Plot on Configuration IEEE 802.11b Ant. 1 / 2437 MHz



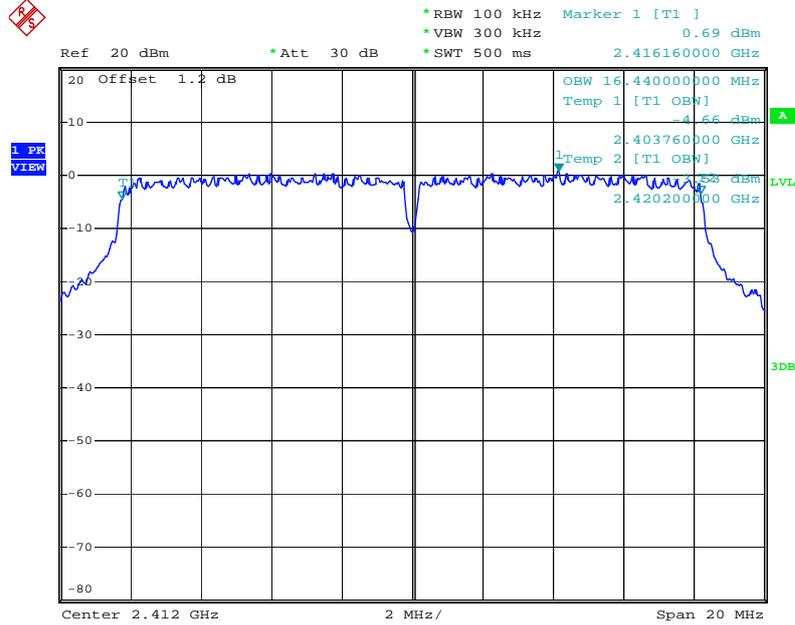
Date: 16.NOV.2011 21:54:13

99% Occupied Bandwidth Plot on Configuration IEEE 802.11b Ant. 1 / 2462 MHz



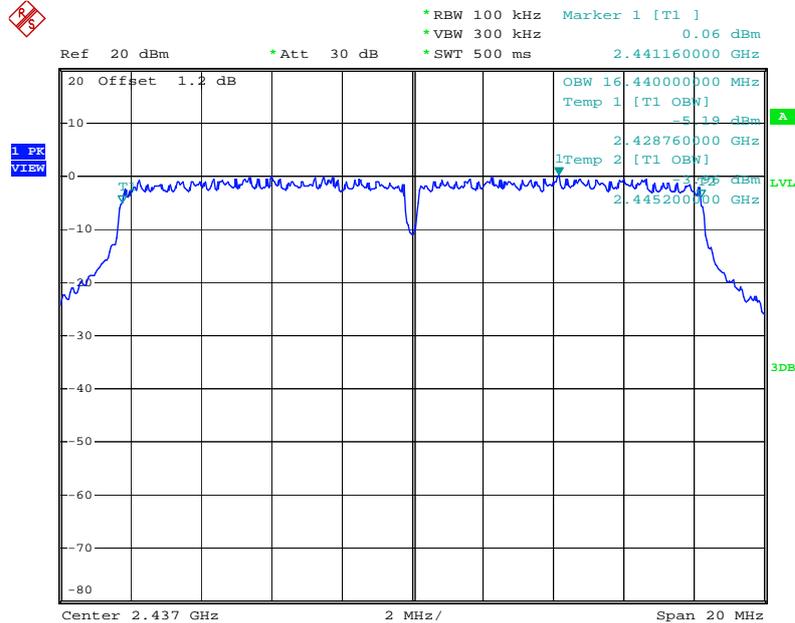
Date: 16.NOV.2011 21:55:19

99% Occupied Bandwidth Plot on Configuration IEEE 802.11g Ant. 2 / 2412 MHz



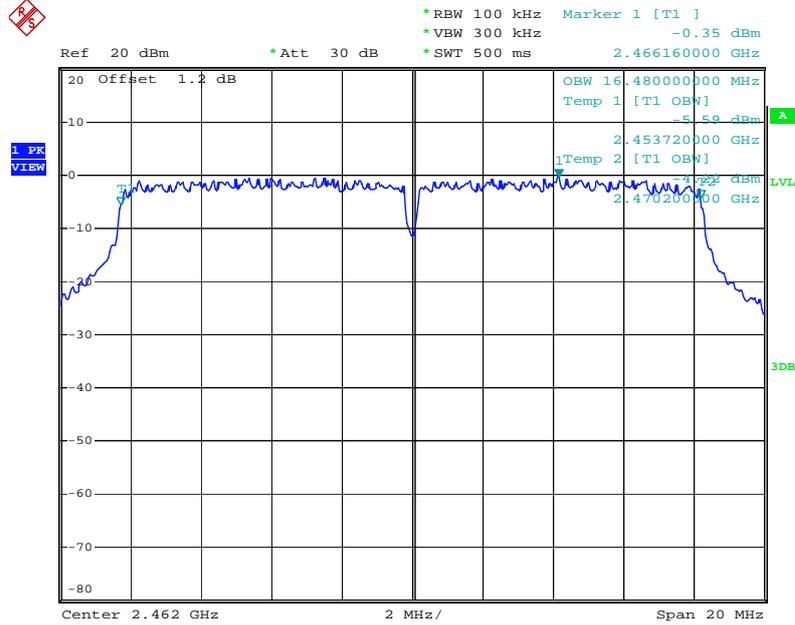
Date: 16.NOV.2011 22:00:57

99% Occupied Bandwidth Plot on Configuration IEEE 802.11g Ant. 2 / 2437 MHz



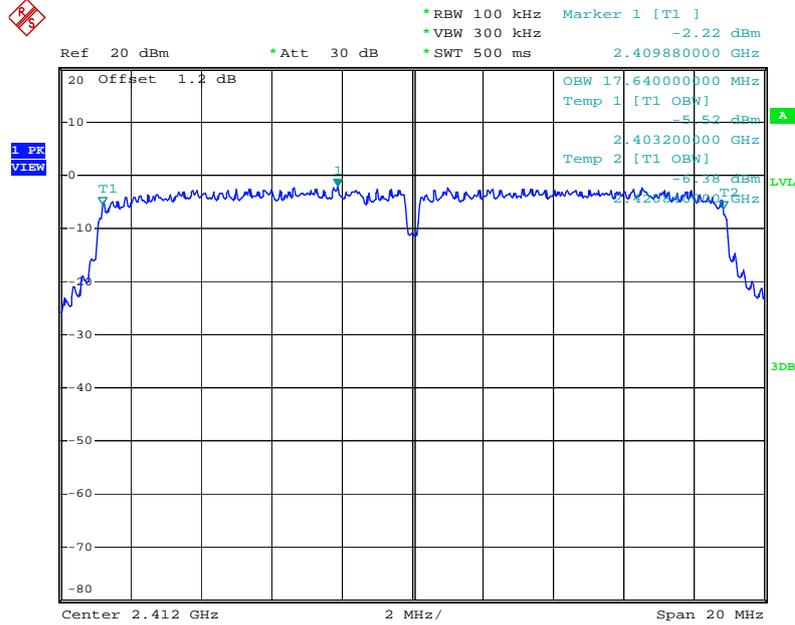
Date: 16.NOV.2011 22:04:16

99% Occupied Bandwidth Plot on Configuration IEEE 802.11g Ant. 2 / 2462 MHz



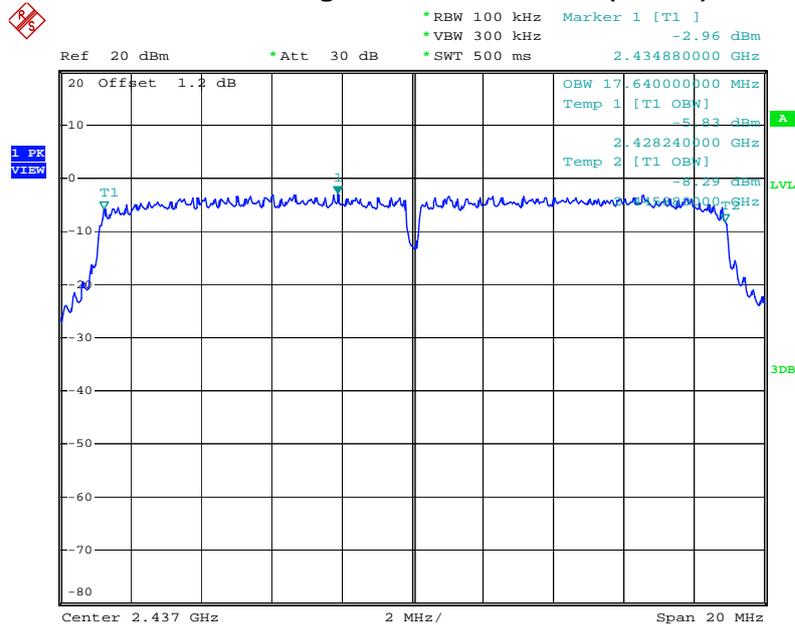
Date: 16.NOV.2011 22:09:44

For Two Chain:
 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 1 / 2412 MHz



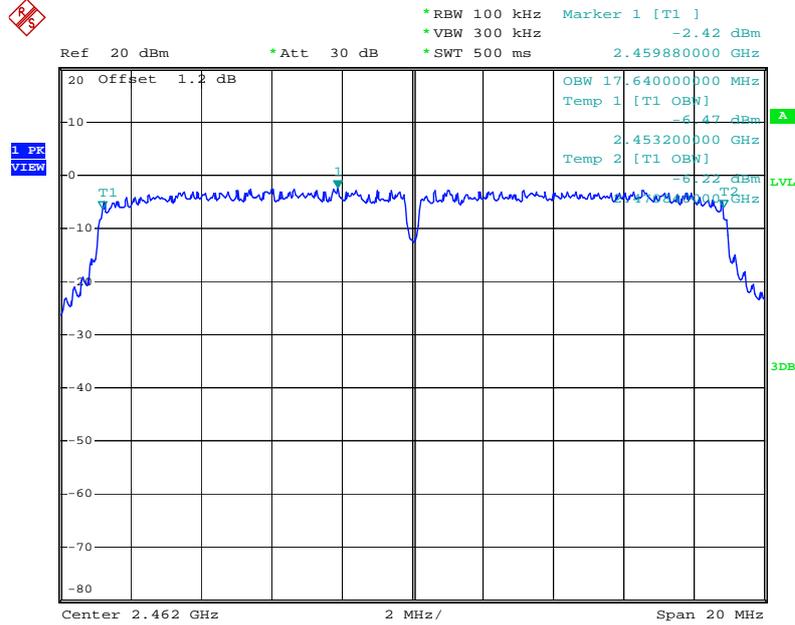
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99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 1 / 2437 MHz



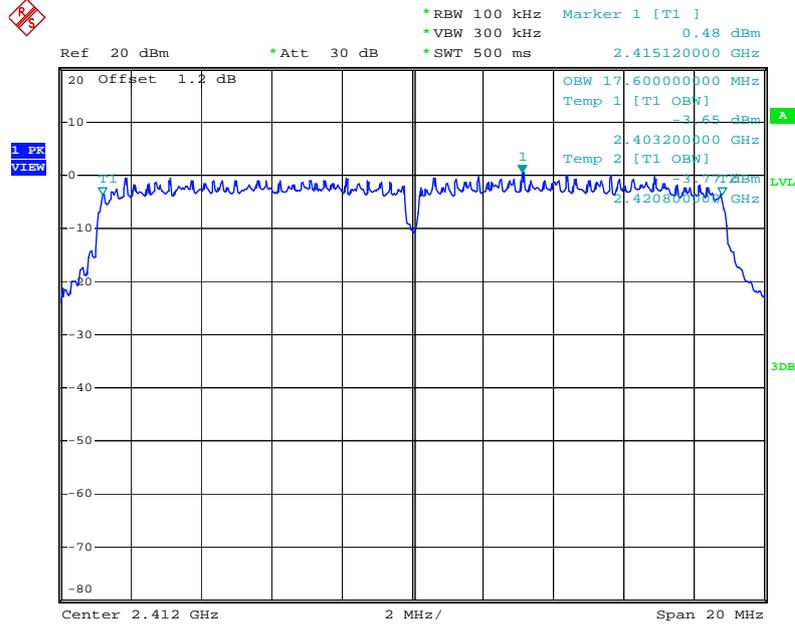
Date: 16.NOV.2011 22:21:01

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



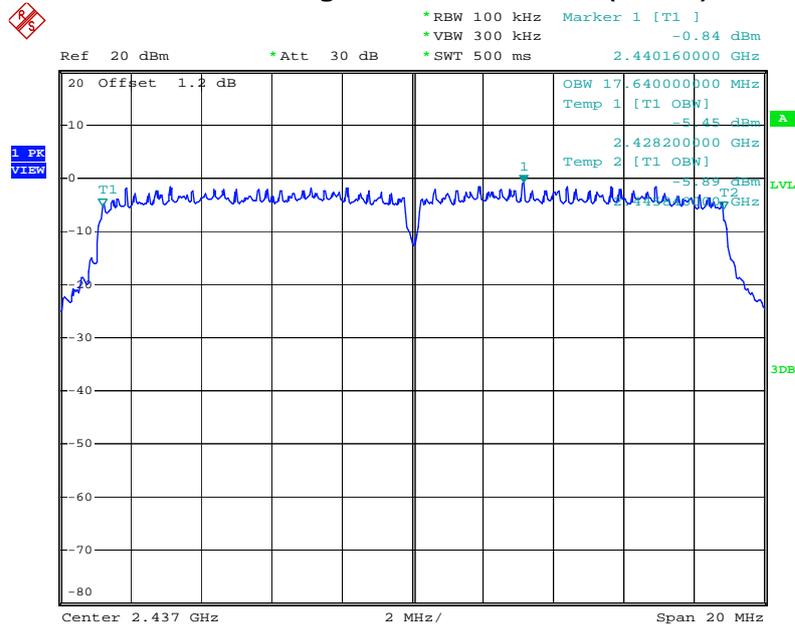
Date: 16.NOV.2011 22:27:53

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2412 MHz



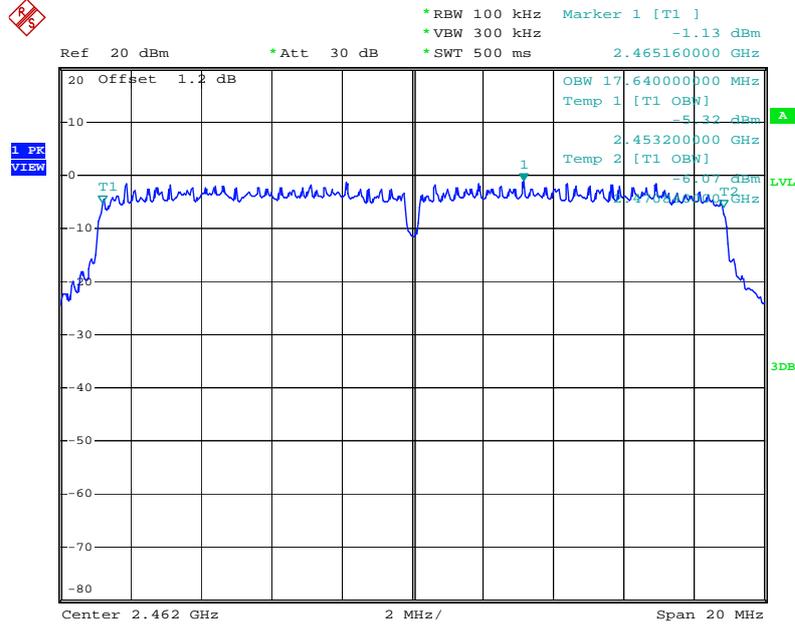
Date: 16.NOV.2011 23:56:55

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2437 MHz



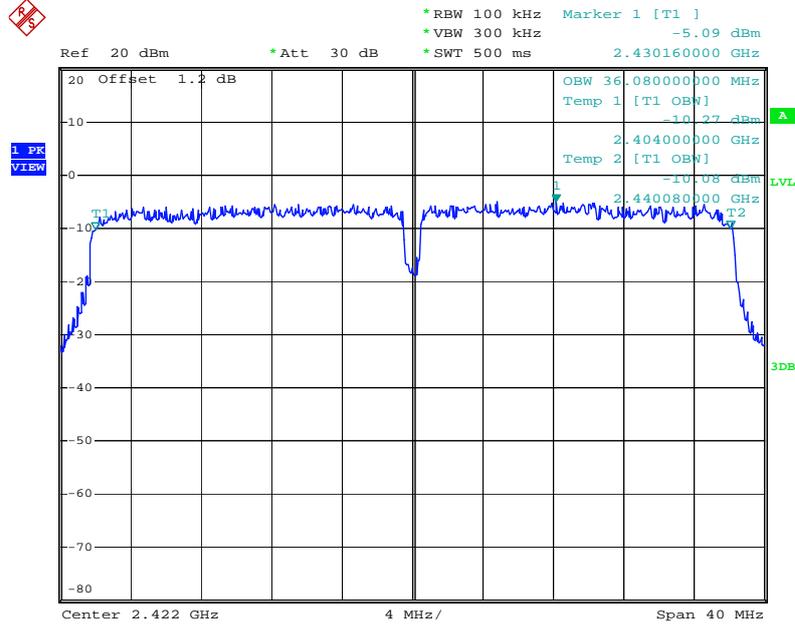
Date: 17.NOV.2011 00:00:18

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2462 MHz



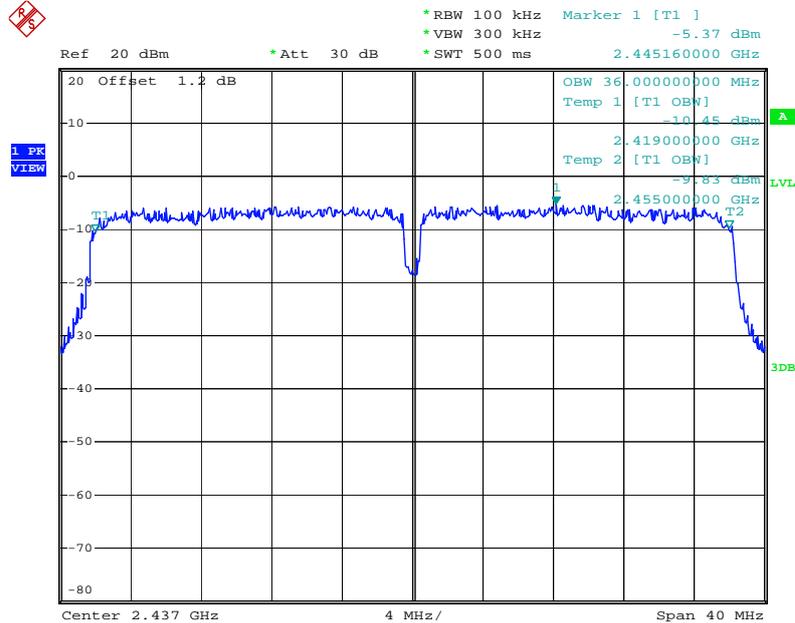
Date: 17.NOV.2011 00:19:45

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



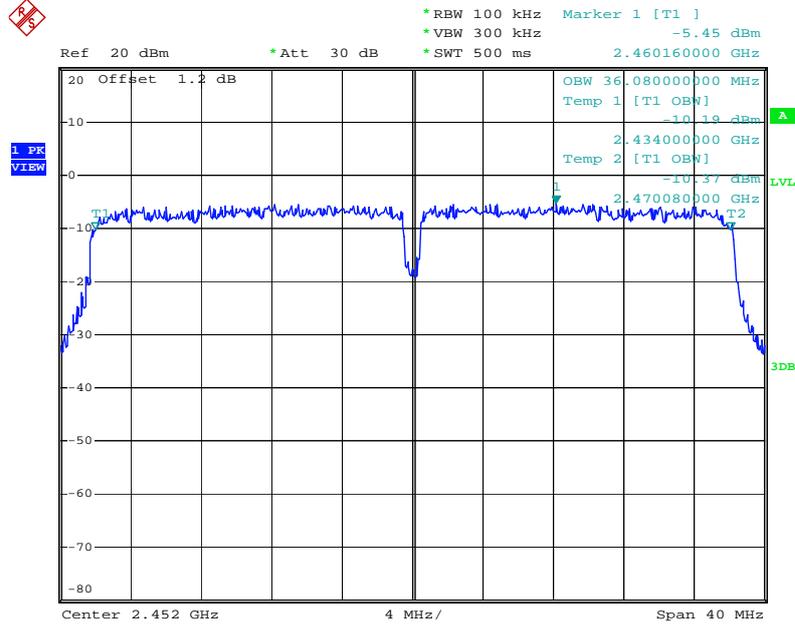
Date: 16.NOV.2011 23:07:03

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



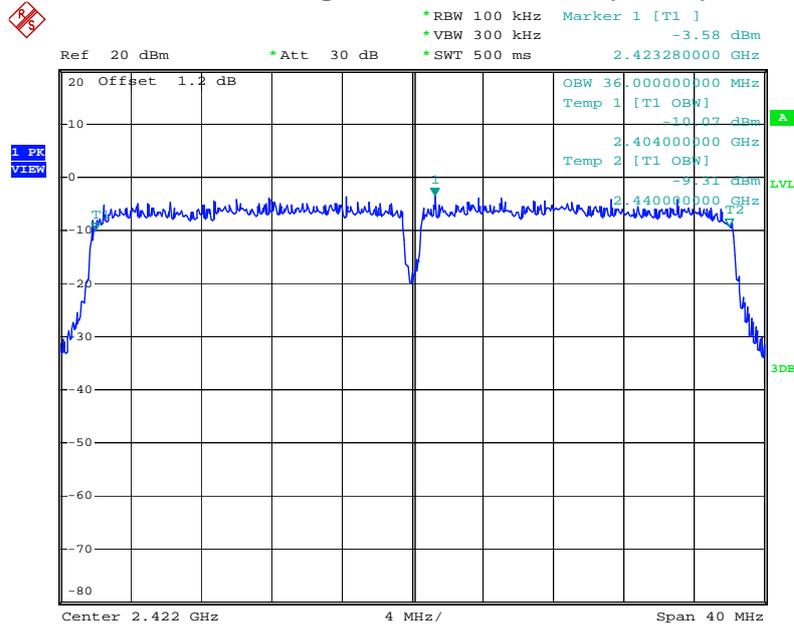
Date: 16.NOV.2011 23:09:30

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



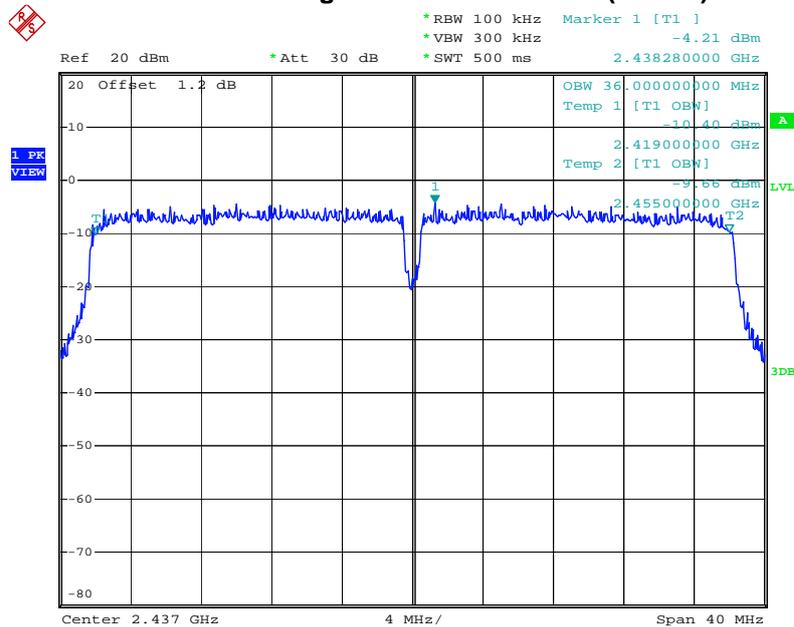
Date: 16.NOV.2011 23:11:15

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2422 MHz



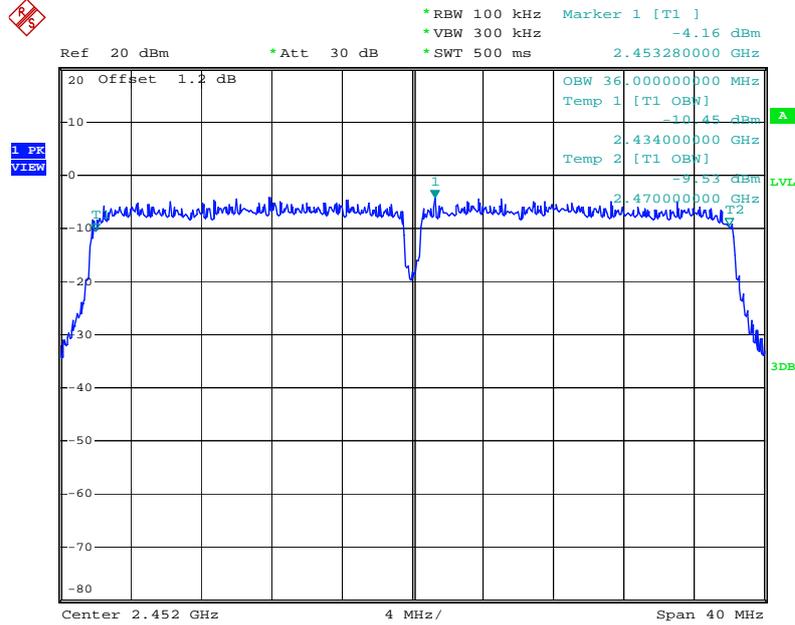
Date: 17.NOV.2011 00:13:09

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2437 MHz



Date: 17.NOV.2011 00:15:22

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2452 MHz



Date: 17.NOV.2011 00:17:12

3.5 Radiated Emissions Measurement

3.5.1 Limit

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

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

3.5.2 Measuring Instruments and Setting

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

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

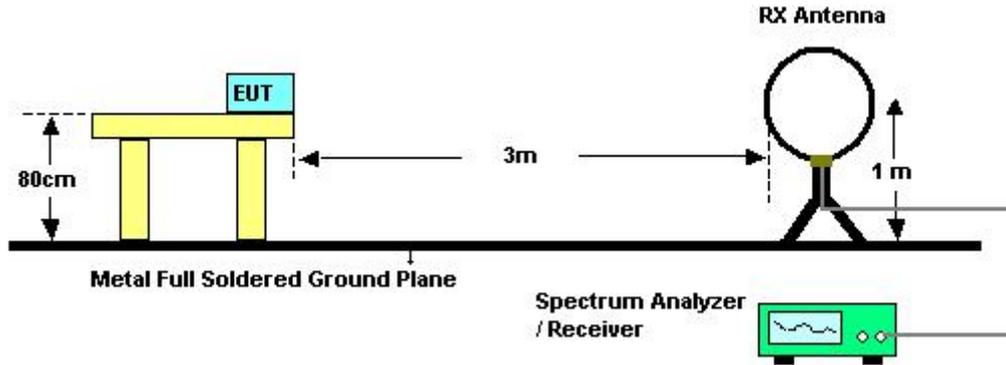
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.5.3 Test Procedures

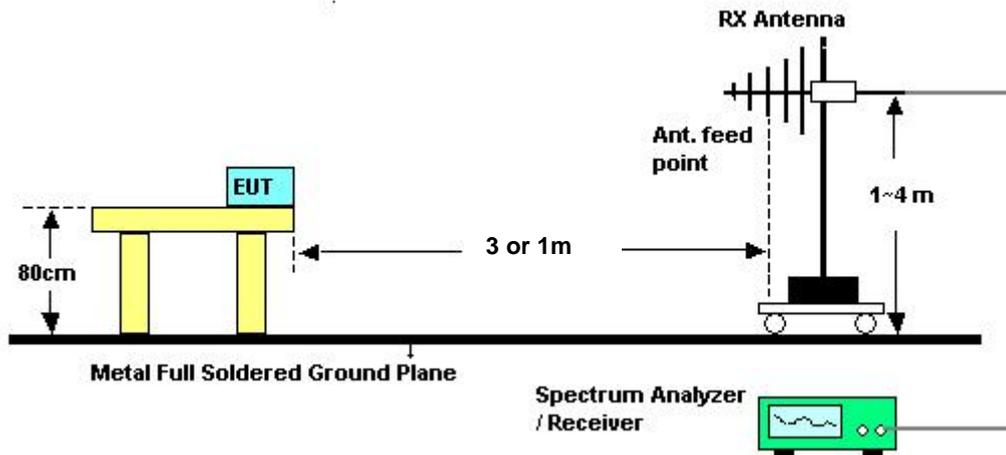
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

3.5.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

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

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

3.5.5 Test Deviation

There is no deviation with the original standard.

3.5.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

Final Test Date	Oct. 07, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak		

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.

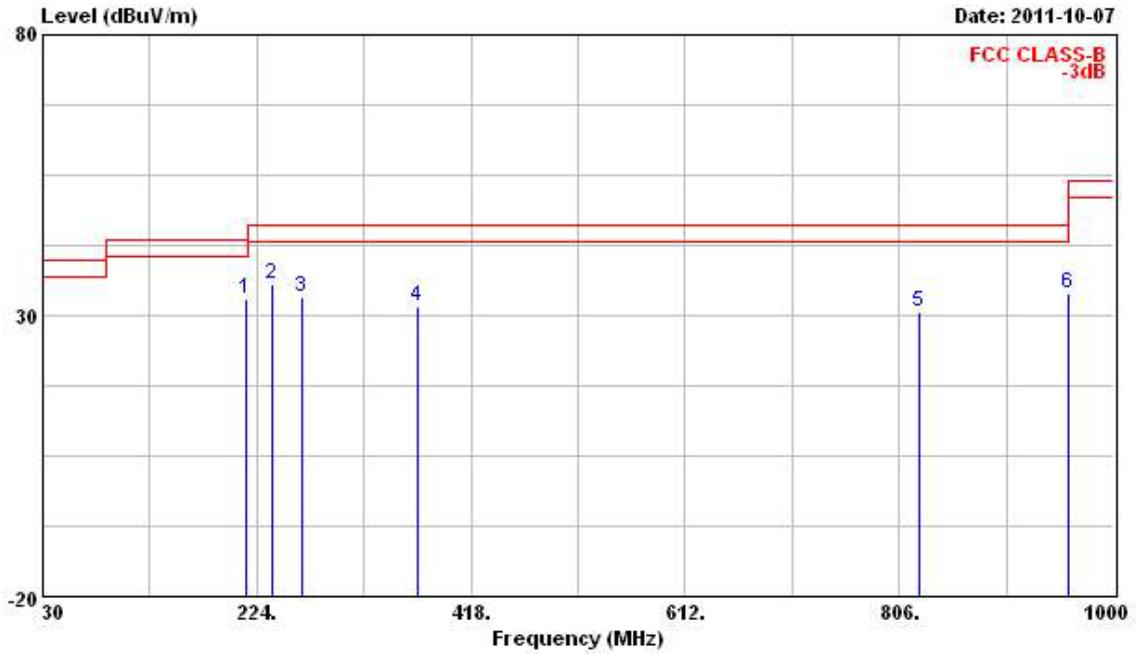
Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (dB);

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

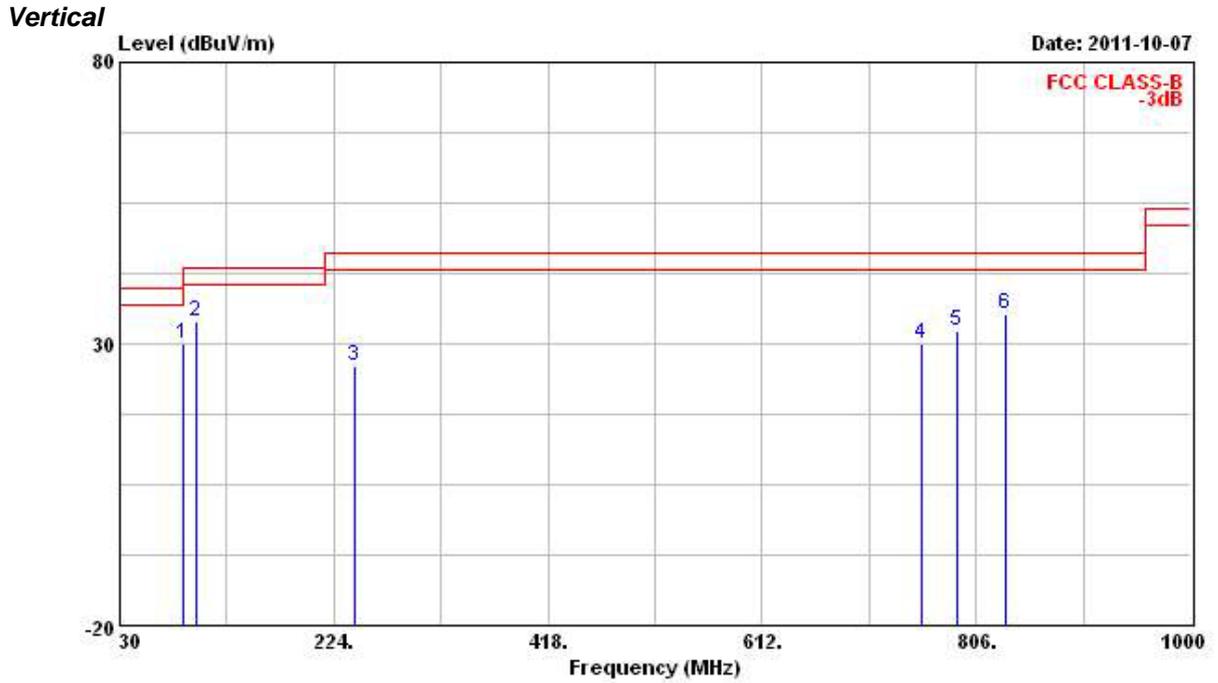
3.5.8 Results of Radiated Emissions (30MHz~1GHz)

Final Test Date	Oct. 07, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	EUT with USB cable mode

Horizontal



	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	214.300	32.86	-10.64	43.50	49.20	9.29	1.35	26.99	Peak	---	---
2	238.550	35.45	-10.55	46.00	49.36	11.44	1.52	26.87	Peak	---	---
3	264.740	33.45	-12.55	46.00	45.00	13.57	1.68	26.81	Peak	---	---
4	369.500	31.53	-14.47	46.00	41.08	15.49	2.33	27.37	Peak	---	---
5	823.460	30.71	-15.29	46.00	33.04	20.79	4.51	27.63	Peak	---	---
6	960.230	34.01	-19.99	54.00	34.58	21.24	5.36	27.17	Peak	---	---

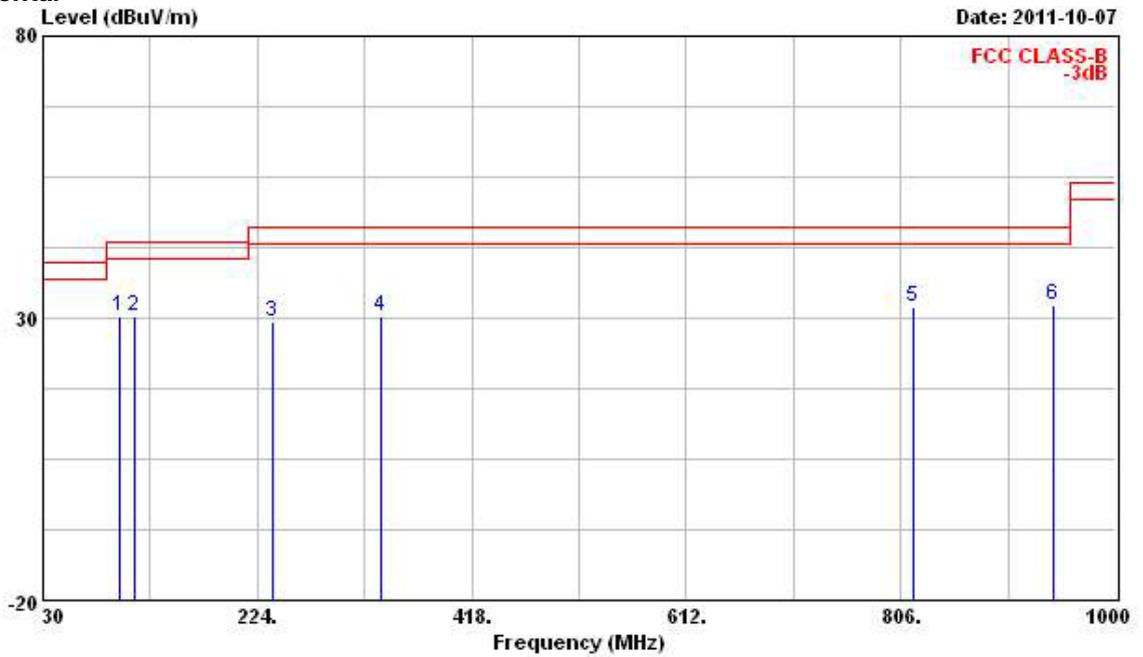


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	87.230	30.08	-9.92	46.00	48.13	8.86	0.80	27.71	Peak	---	---
2	98.870	34.03	-9.47	46.00	49.75	11.03	0.85	27.60	Peak	---	---
3	242.430	25.92	-20.08	46.00	39.34	11.88	1.54	26.85	Peak	---	---
4	757.500	30.05	-15.95	46.00	33.10	20.72	4.08	27.85	Peak	---	---
5	789.510	32.43	-13.57	46.00	35.11	20.74	4.33	27.76	Peak	---	---
6	832.190	35.24	-10.76	46.00	37.48	20.81	4.55	27.59	Peak	---	---

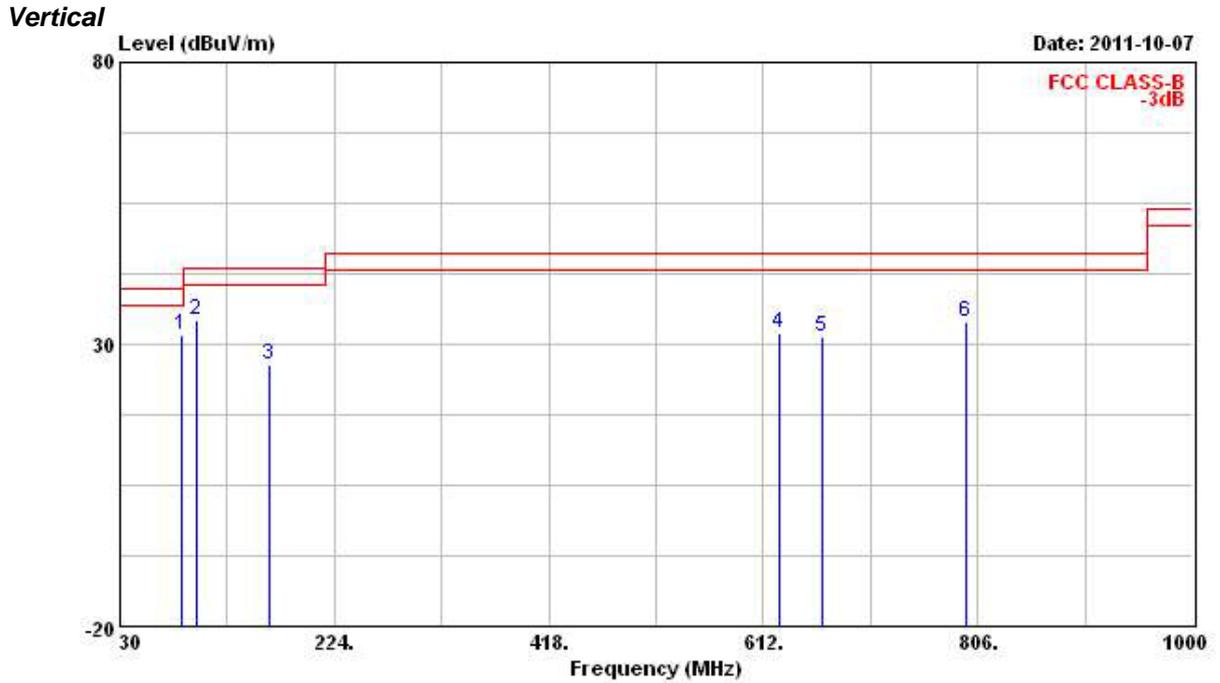
Note:
 The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
 Emission level (dBuV/m) = 20 log Emission level (uV/m).
 Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Final Test Date	Oct. 07, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	EUT with cradle mode

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna 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	98.870	30.17	-13.33	43.50	45.89	11.03	0.85	27.60	Peak	---	---
2	113.420	30.22	-13.28	43.50	44.35	12.49	0.95	27.57	Peak	---	---
3	238.550	29.46	-16.54	46.00	43.37	11.44	1.52	26.87	Peak	---	---
4	335.550	30.44	-15.56	46.00	40.70	14.67	2.13	27.07	Peak	---	---
5	816.670	32.06	-13.94	46.00	34.46	20.78	4.48	27.66	Peak	---	---
6	943.740	32.34	-13.66	46.00	32.98	21.29	5.29	27.22	Peak	---	---



	Freq	Level	Over Limit	Limit Line	ReadAntenna 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	86.260	31.70	-8.30	40.00	49.97	8.65	0.80	27.71	Peak	---	---
2	98.870	34.36	-9.14	43.50	50.08	11.03	0.85	27.60	Peak	---	---
3	164.830	26.48	-17.02	43.50	42.69	9.89	1.24	27.34	Peak	---	---
4	626.550	31.99	-14.01	46.00	37.10	19.47	3.55	28.13	Peak	---	---
5	665.350	31.40	-14.60	46.00	36.04	19.73	3.70	28.07	Peak	---	---
6	796.300	33.90	-12.10	46.00	36.51	20.75	4.38	27.74	Peak	---	---

Note:

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

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

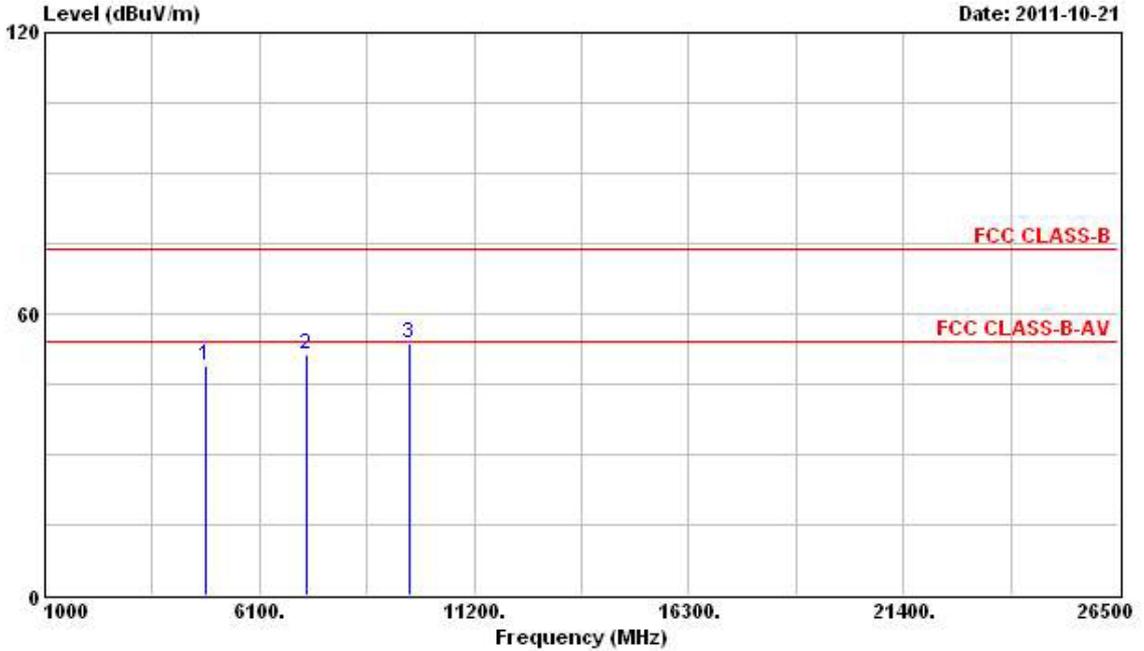
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

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

For Single Chain:

Final Test Date	Oct. 21, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11b Ch. 1

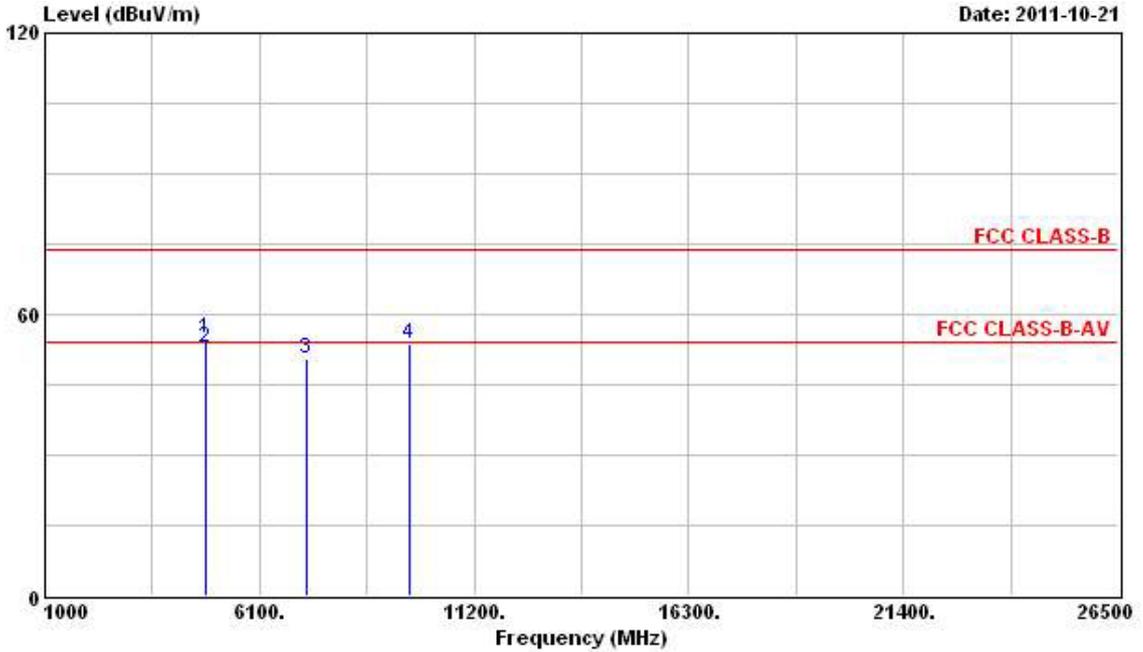
Horizontal



	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB		cm	deg
1	4824.000	49.05	-4.95	54.00	43.19	33.06	5.43	32.63 PK	---	---
2	7236.000	51.13			43.03	35.83	5.14	32.88 Peak	---	---
3	9648.000	53.86			42.24	38.24	6.70	33.33 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

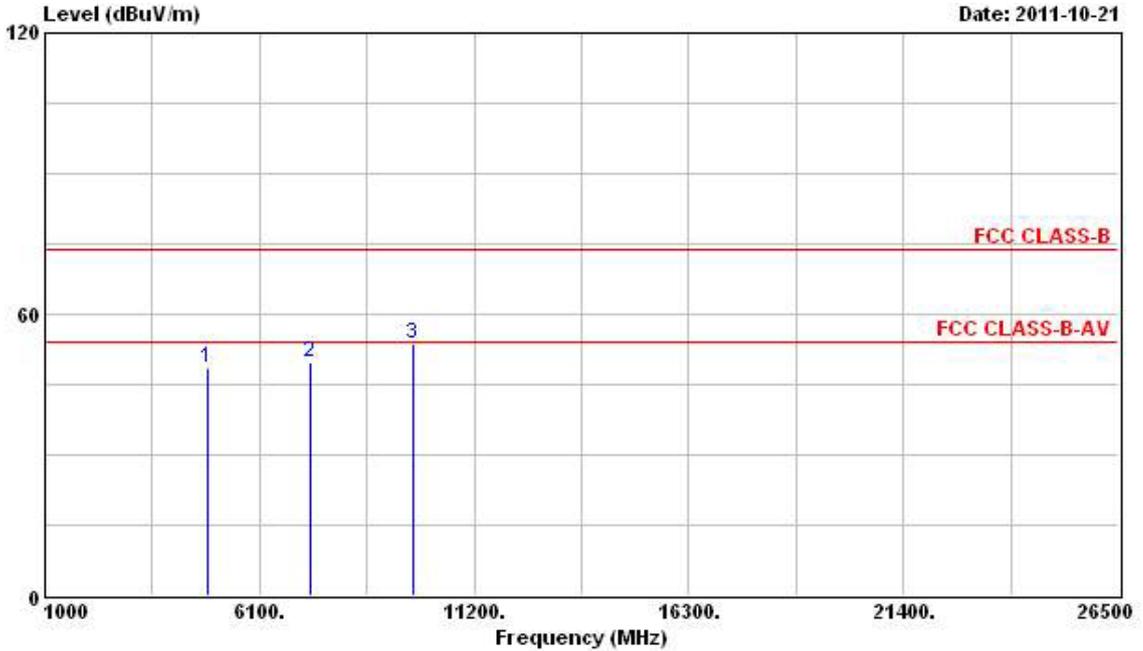


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	54.83	-19.17	74.00	48.97	33.06	5.43	32.63	Peak	---	---
2	4824.000	52.96	-1.04	54.00	47.10	33.06	5.43	32.63	Average	---	---
3	7236.000	50.40			42.30	35.83	5.14	32.88	Peak	---	---
4	9648.000	53.65			42.03	38.24	6.70	33.33	Peak	---	---

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

Final Test Date	Oct. 21, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11b Ch. 6

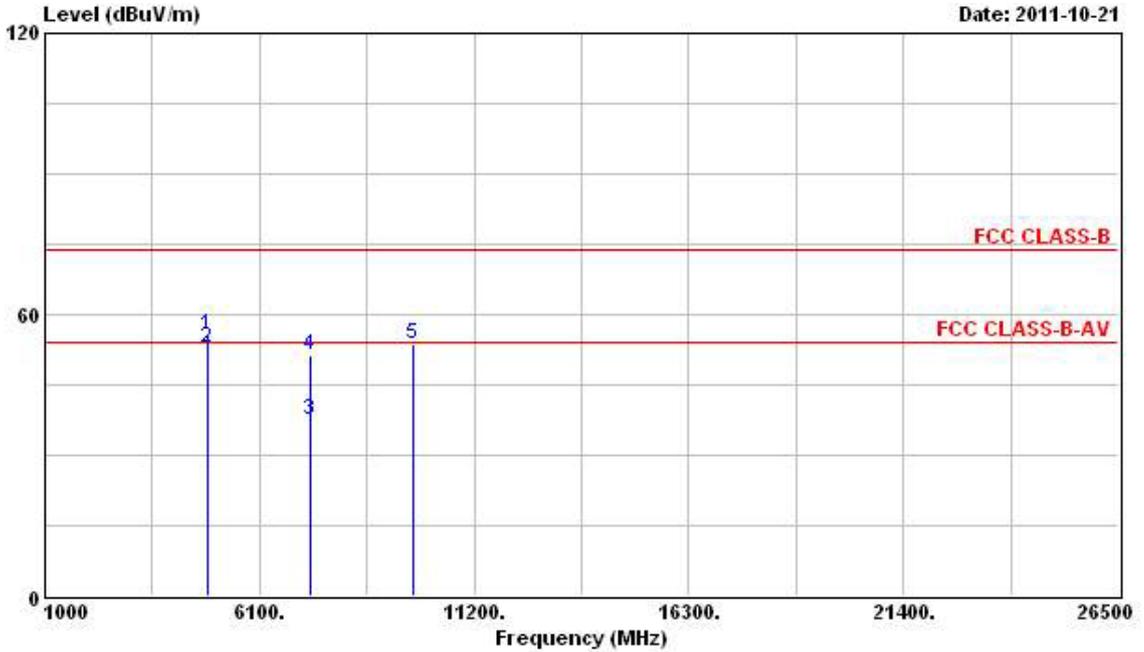
Horizontal



	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	48.72	-5.28	54.00	42.75	33.16	5.43	32.62	PK	---	---
2	7311.000	49.85	-4.15	54.00	41.38	36.01	5.36	32.89	PK	---	---
3	9748.000	53.61			41.72	38.47	6.74	33.32	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

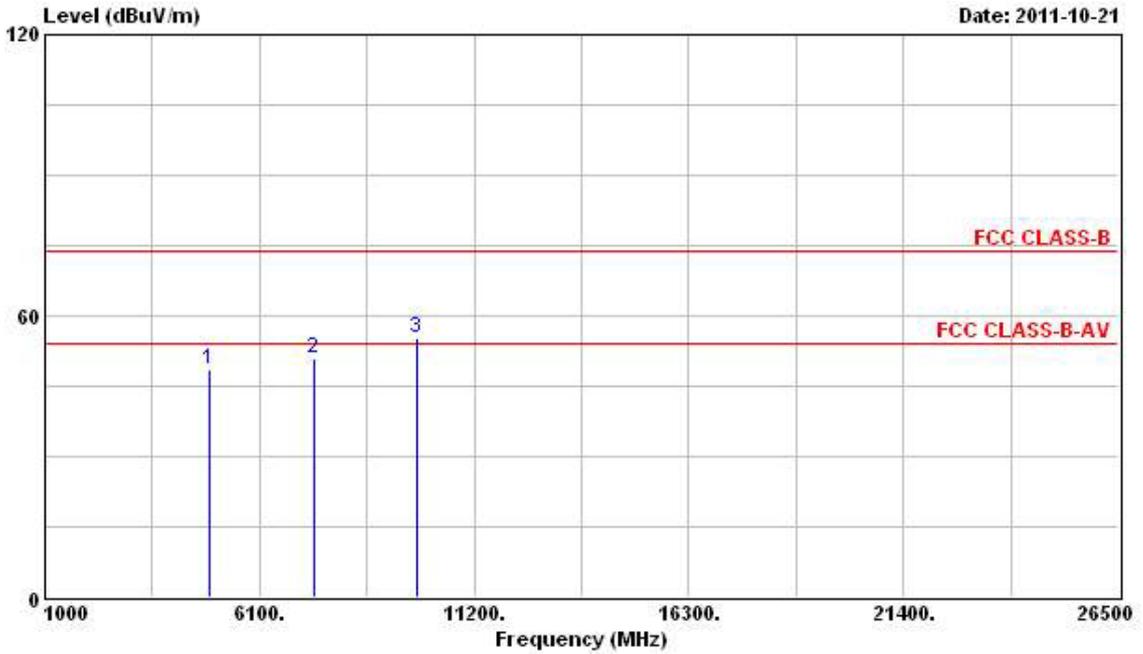


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	55.57	-18.43	74.00	49.60	33.16	5.43	32.62	Peak	---	---
2	4874.000	52.81	-1.19	54.00	46.84	33.16	5.43	32.62	Average	---	---
3	7311.000	37.42	-16.58	54.00	28.95	36.01	5.36	32.89	Average	---	---
4	7311.000	51.31	-22.69	74.00	42.84	36.01	5.36	32.89	Peak	---	---
5	9748.000	53.68			41.79	38.47	6.74	33.32	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).

Final Test Date	Oct. 21, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11b Ch. 11

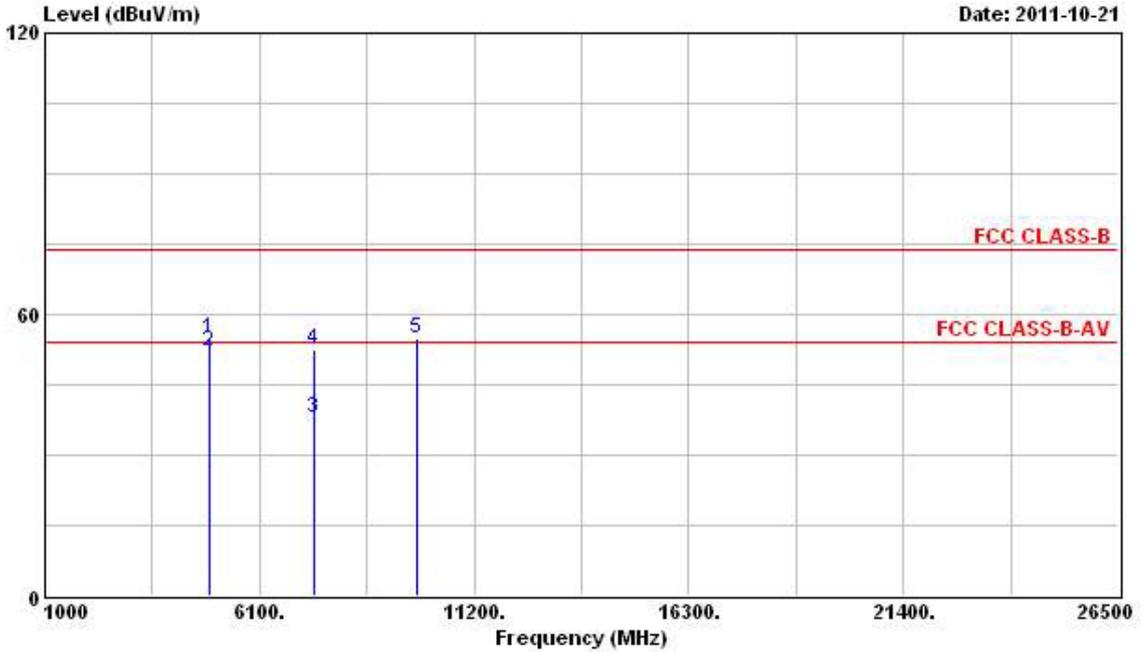
Horizontal



	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	48.75	-5.25	54.00	42.68	33.26	5.41	32.61	PK	---	---
2	7386.000	50.76	-3.24	54.00	41.87	36.23	5.57	32.91	PK	---	---
3	9848.000	55.29			43.14	38.66	6.80	33.31	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

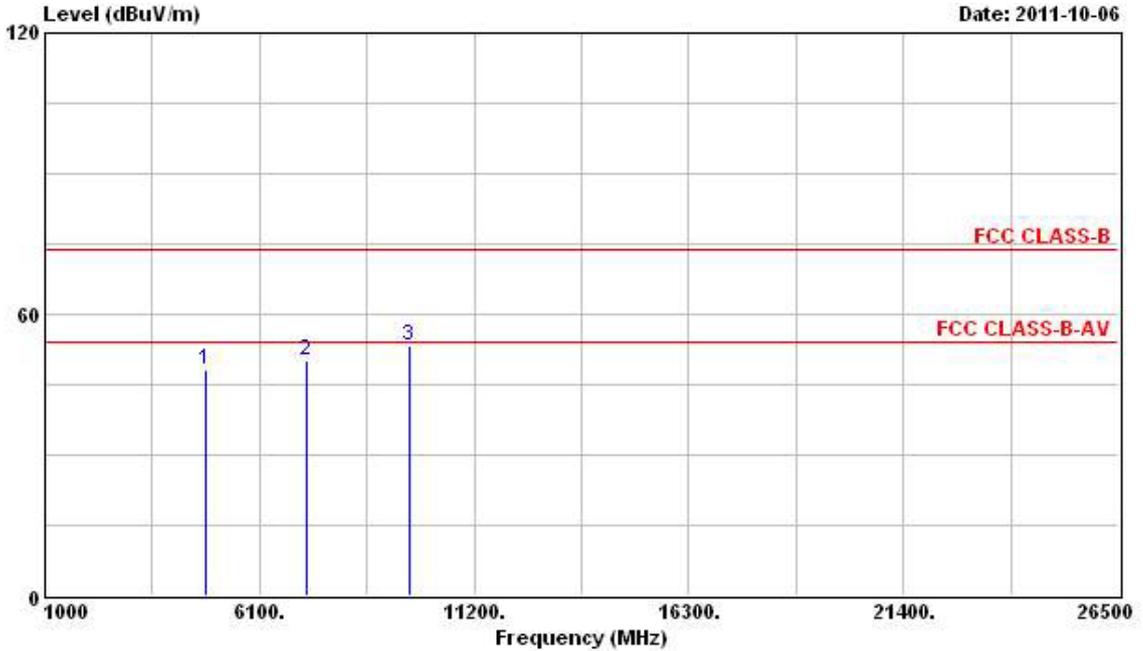


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	54.75	-19.25	74.00	48.68	33.26	5.41	32.61	Peak	---	---
2	4924.000	51.94	-2.06	54.00	45.87	33.26	5.41	32.61	Average	---	---
3	7386.000	38.00	-16.00	54.00	29.11	36.23	5.57	32.91	Average	---	---
4	7386.000	52.53	-21.47	74.00	43.64	36.23	5.57	32.91	Peak	---	---
5	9848.000	54.98			42.83	38.66	6.80	33.31	Peak	---	---

N 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).

Final Test Date	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11g Ch. 1

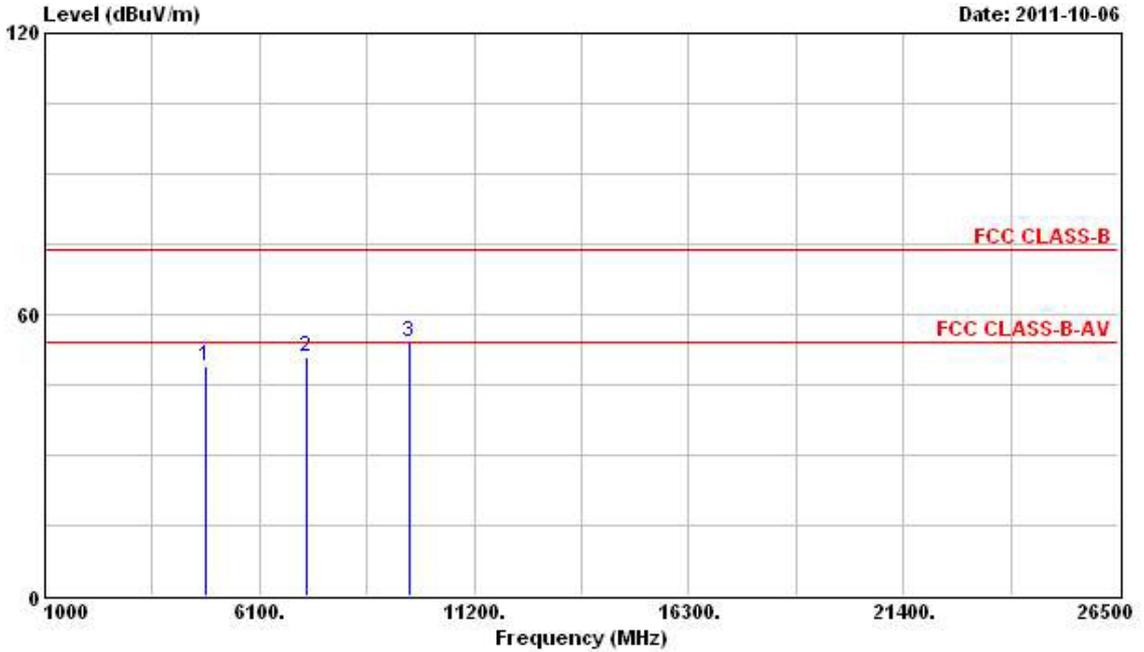
Horizontal



	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	48.25	-5.75	54.00	42.39	33.06	5.43	32.63	PK	---	---
2	7236.000	50.05			41.95	35.83	5.14	32.88	Peak	---	---
3	9648.000	53.33			41.71	38.24	6.70	33.33	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

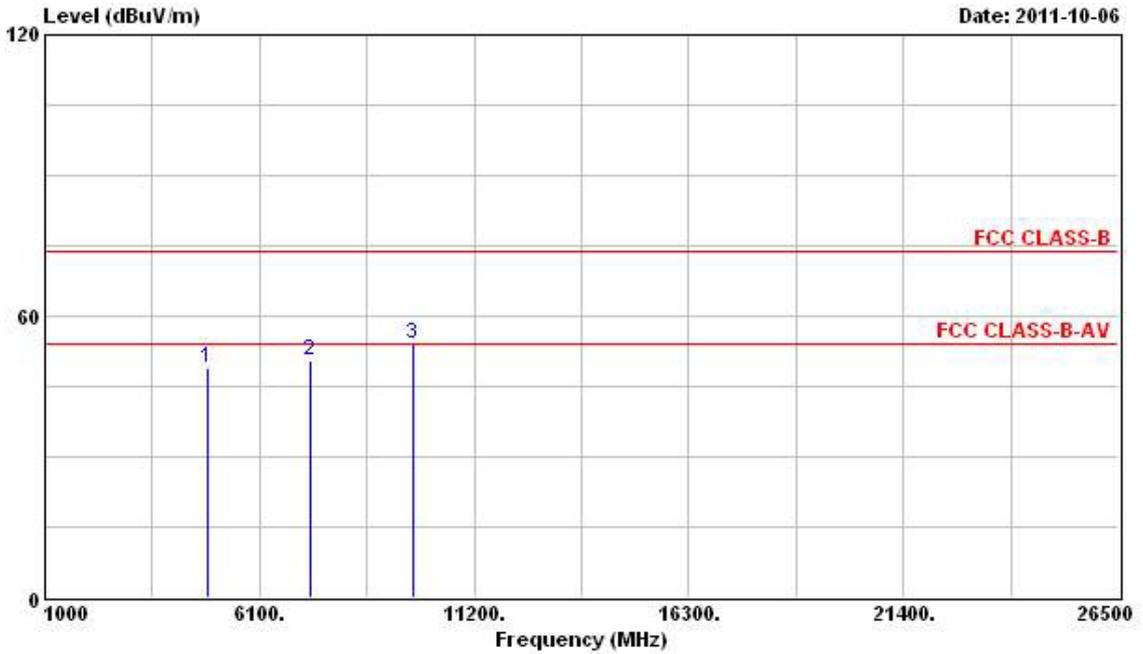


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	48.85	-5.15	54.00	42.99	33.06	5.43	32.63	PK	---	---
2	7236.000	50.77			42.67	35.83	5.14	32.88	Peak	---	---
3	9648.000	53.97			42.35	38.24	6.70	33.33	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	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11g Ch. 6

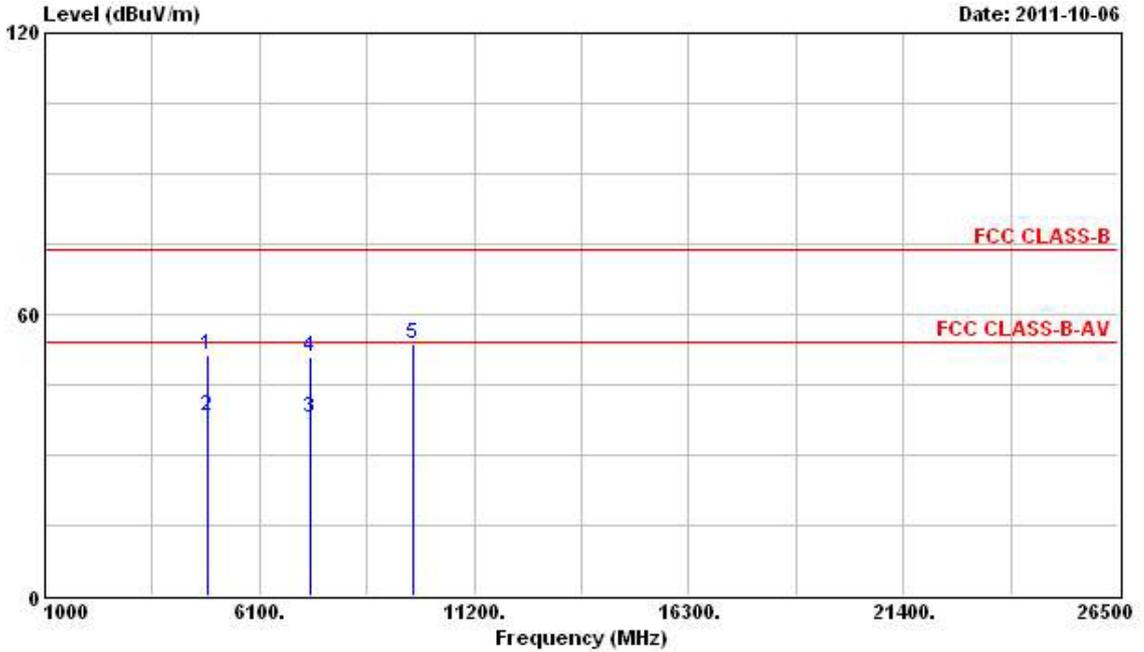
Horizontal



	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	48.89	-5.11	54.00	42.92	33.16	5.43	32.62	PK	---	---
2	7311.000	50.72	-3.28	54.00	42.25	36.01	5.36	32.89	PK	---	---
3	9748.000	53.96			42.07	38.47	6.74	33.32	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

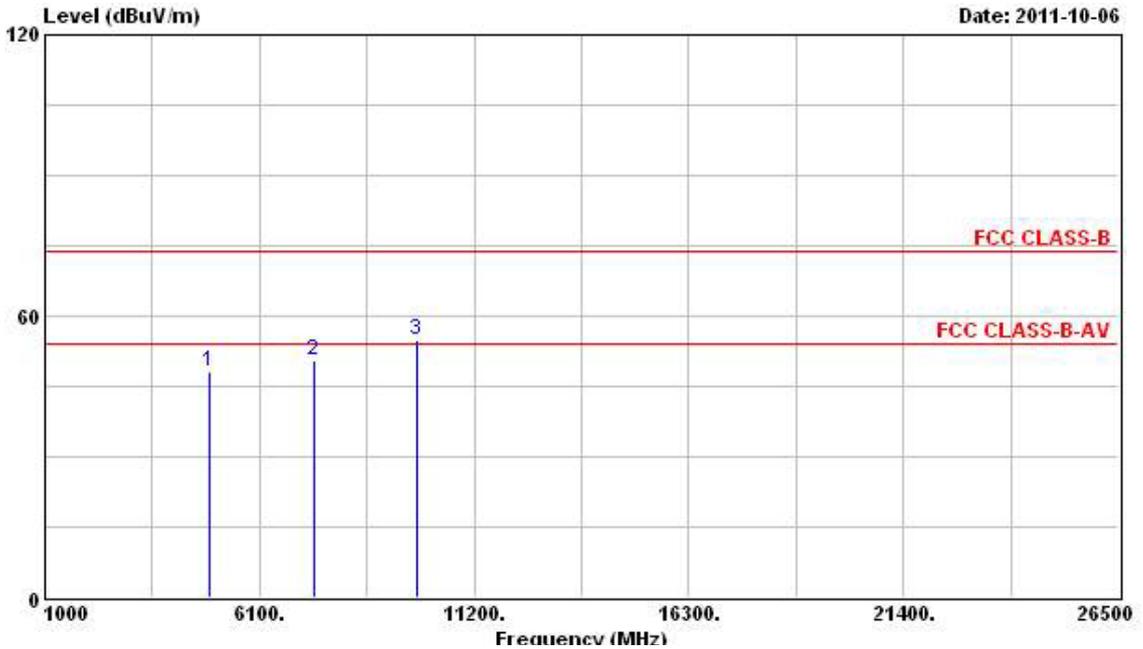


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	51.29	-22.71	74.00	45.32	33.16	5.43	32.62	Peak	---	---
2	4874.000	38.41	-15.59	54.00	32.44	33.16	5.43	32.62	Average	---	---
3	7311.000	38.03	-15.97	54.00	29.56	36.01	5.36	32.89	Average	---	---
4	7311.000	51.08	-22.92	74.00	42.61	36.01	5.36	32.89	Peak	---	---
5	9748.000	53.60			41.71	38.47	6.74	33.32	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).

Final Test Date	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11g Ch. 11

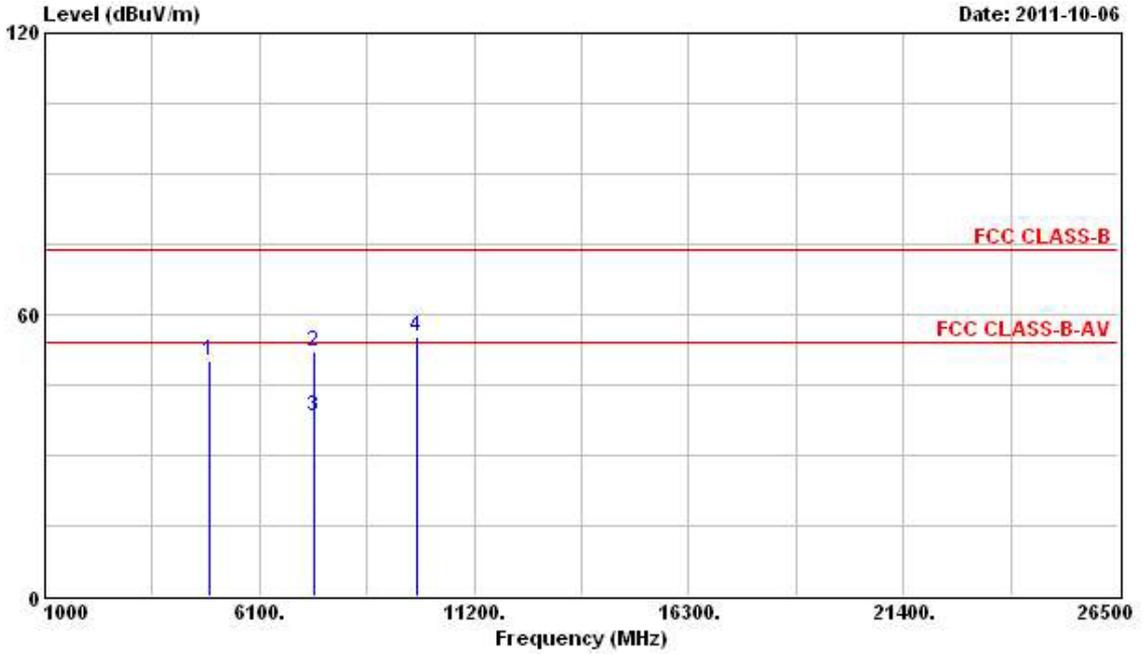
Horizontal



	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	48.26	-5.74	54.00	42.19	33.26	5.41	32.61	PK	---	---
2	7386.000	50.60	-3.40	54.00	41.71	36.23	5.57	32.91	PK	---	---
3	9848.000	54.91			42.76	38.66	6.80	33.31	Peak	---	---

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

Vertical



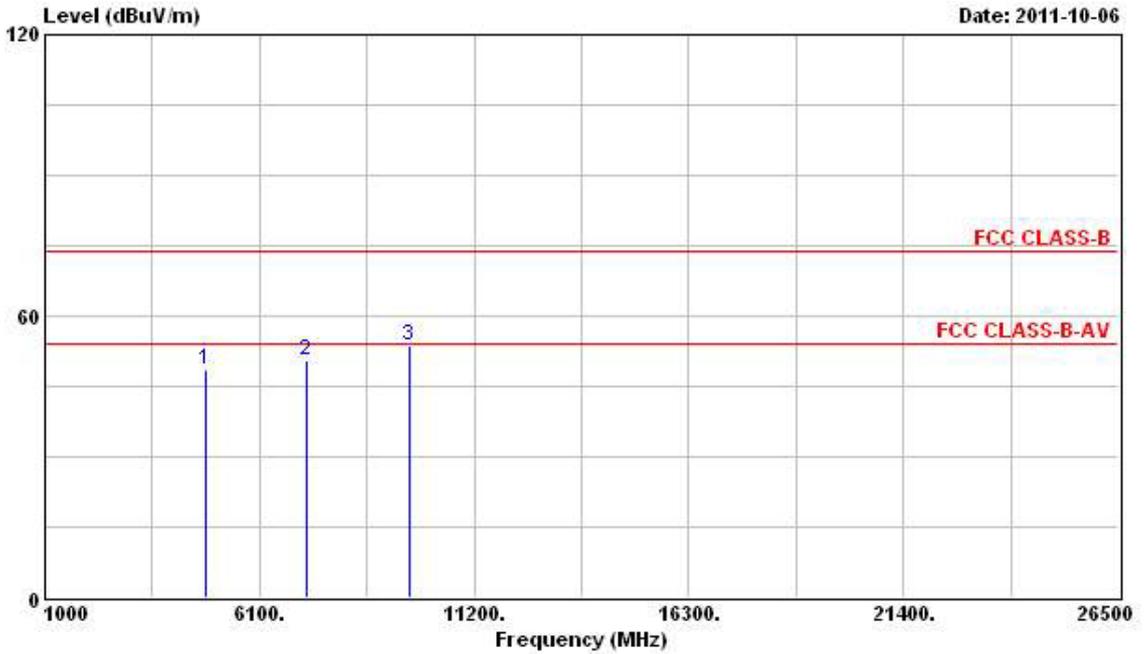
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	50.23	-3.77	54.00	44.16	33.26	5.41	32.61	PK	---	---
2	7386.000	52.16	-21.84	74.00	43.27	36.23	5.57	32.91	Peak	---	---
3	7386.000	38.18	-15.82	54.00	29.29	36.23	5.57	32.91	Average	---	---
4	9848.000	55.21			43.06	38.66	6.80	33.31	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 Chain:

Final Test Date	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11n (20MHz) Ch. 1

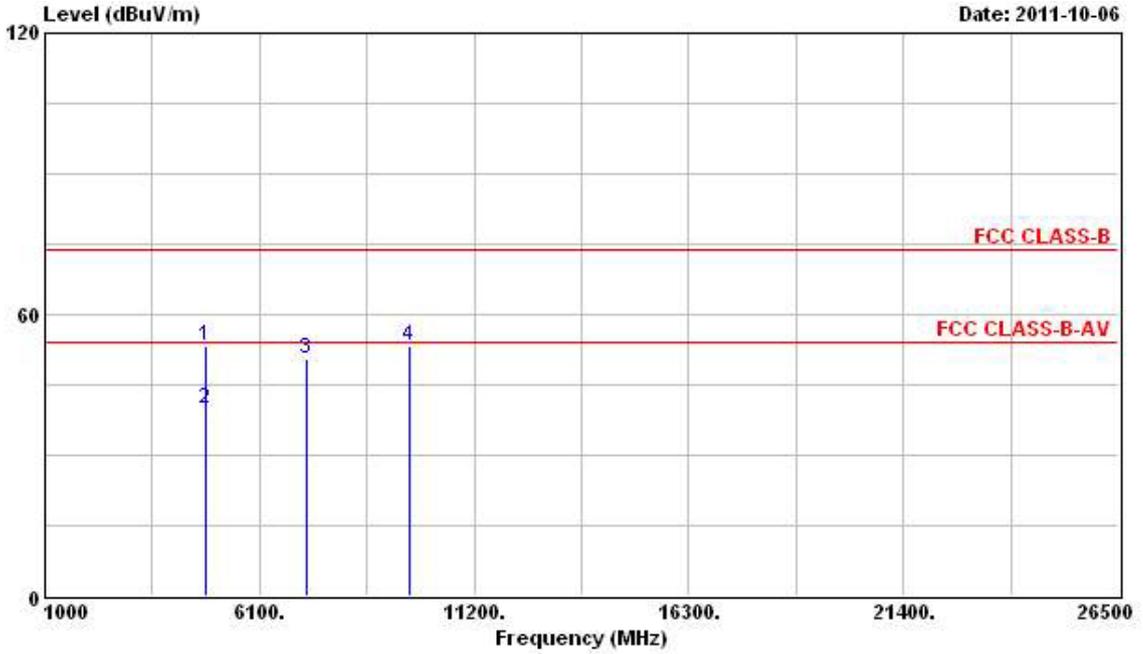
Horizontal



	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	48.52	-5.48	54.00	42.66	33.06	5.43	32.63	PK	---	---
2	7236.000	50.55			42.45	35.83	5.14	32.88	Peak	---	---
3	9648.000	53.59			41.97	38.24	6.70	33.33	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

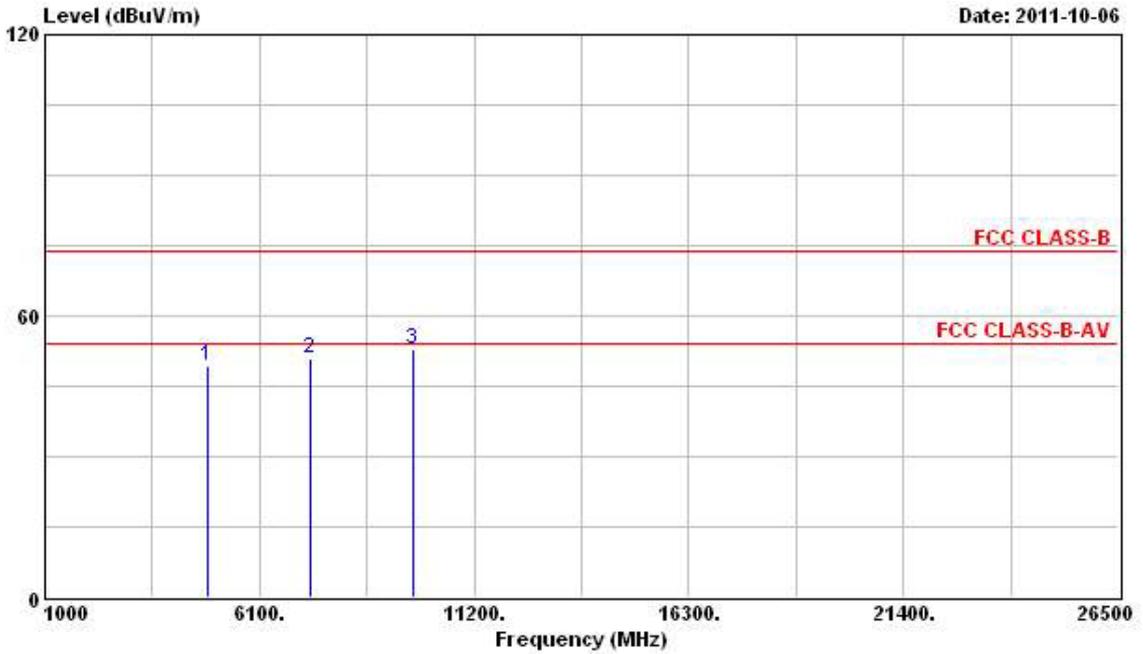


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4824.000	53.30	-20.70	74.00	47.44	33.06	5.43	32.63	Peak	---	---
2	4824.000	39.71	-14.29	54.00	33.85	33.06	5.43	32.63	Average	---	---
3	7236.000	50.66			42.56	35.83	5.14	32.88	Peak	---	---
4	9648.000	53.37			41.75	38.24	6.70	33.33	Peak	---	---

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

Final Test Date	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11n (20MHz) Ch. 6

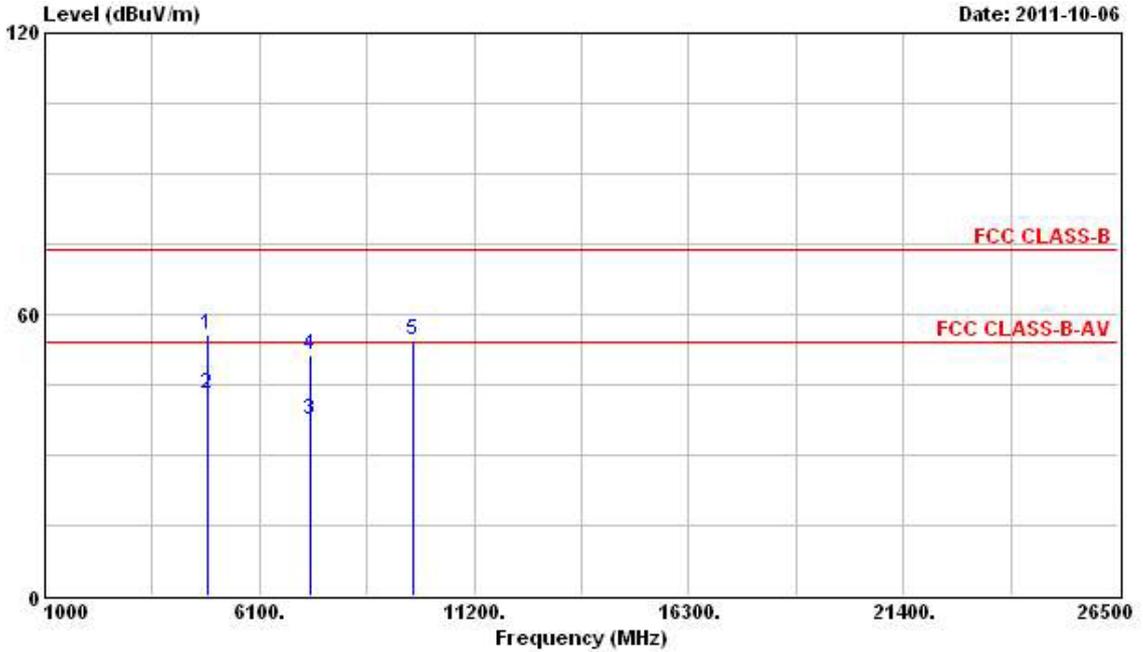
Horizontal



	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	49.31	-4.69	54.00	43.34	33.16	5.43	32.62	PK	---	---
2	7311.000	50.94	-3.06	54.00	42.47	36.01	5.36	32.89	PK	---	---
3	9748.000	52.81			40.92	38.47	6.74	33.32	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

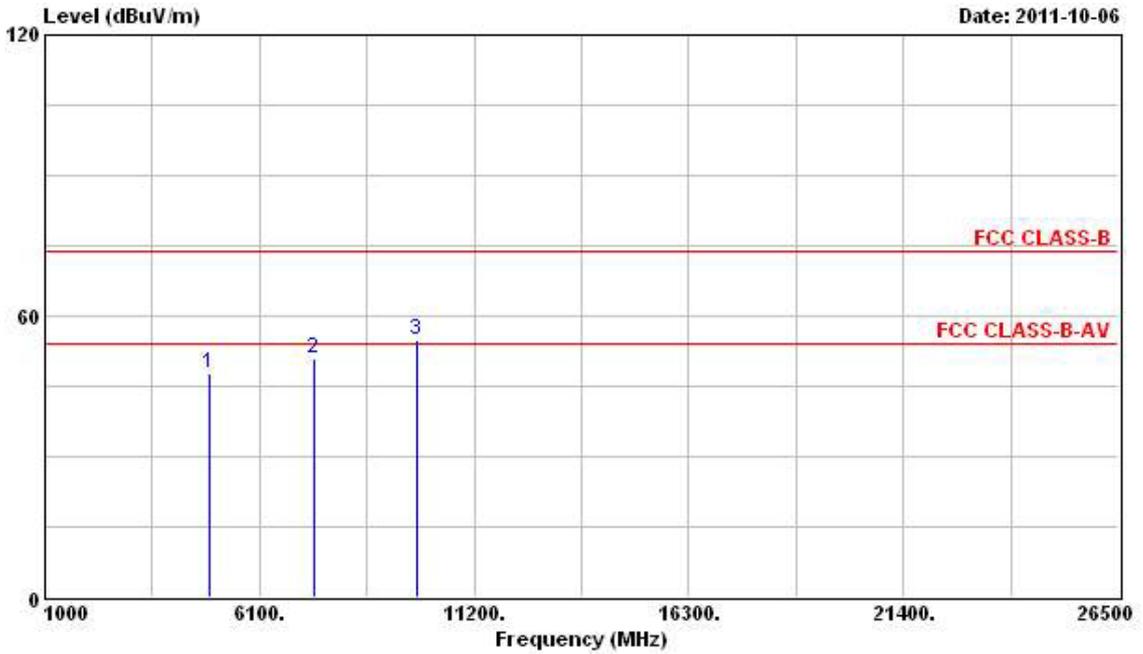


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	55.70	-18.30	74.00	49.73	33.16	5.43	32.62	Peak	---	---
2	4874.000	42.95	-11.05	54.00	36.98	33.16	5.43	32.62	Average	---	---
3	7311.000	37.39	-16.61	54.00	28.92	36.01	5.36	32.89	Average	---	---
4	7311.000	51.50	-22.50	74.00	43.03	36.01	5.36	32.89	Peak	---	---
5	9748.000	54.29			42.40	38.47	6.74	33.32	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).

Final Test Date	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11n (20MHz) Ch. 11

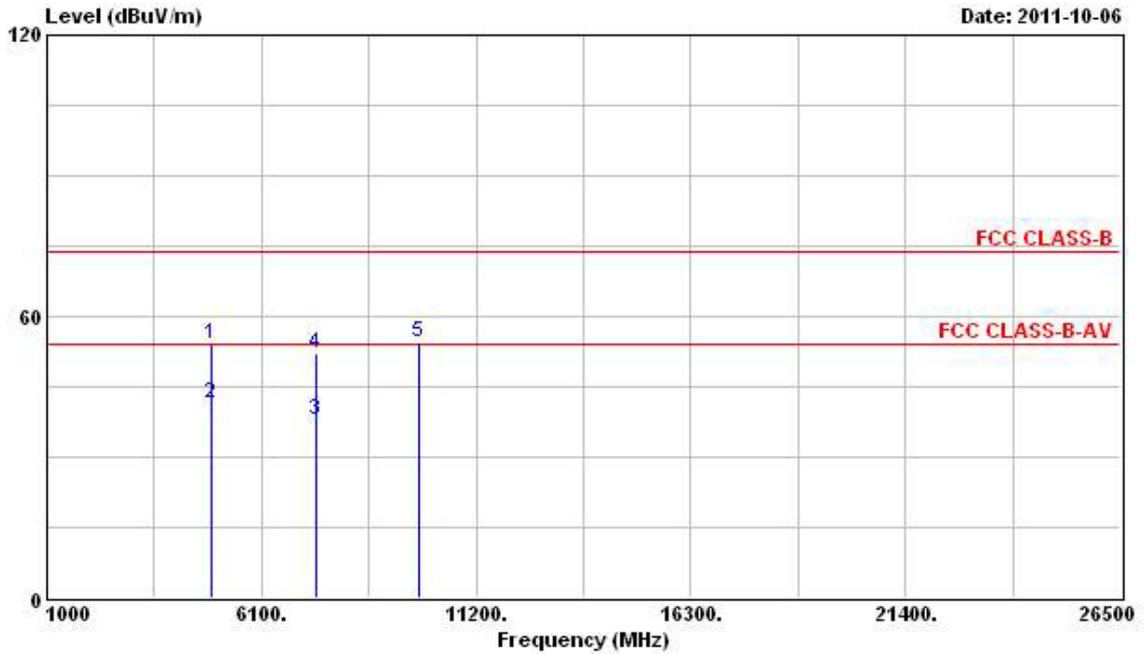
Horizontal



	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	47.87	-6.13	54.00	41.80	33.26	5.41	32.61	PK	---	---
2	7386.000	50.90	-3.10	54.00	42.01	36.23	5.57	32.91	PK	---	---
3	9848.000	54.75			42.60	38.66	6.80	33.31	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

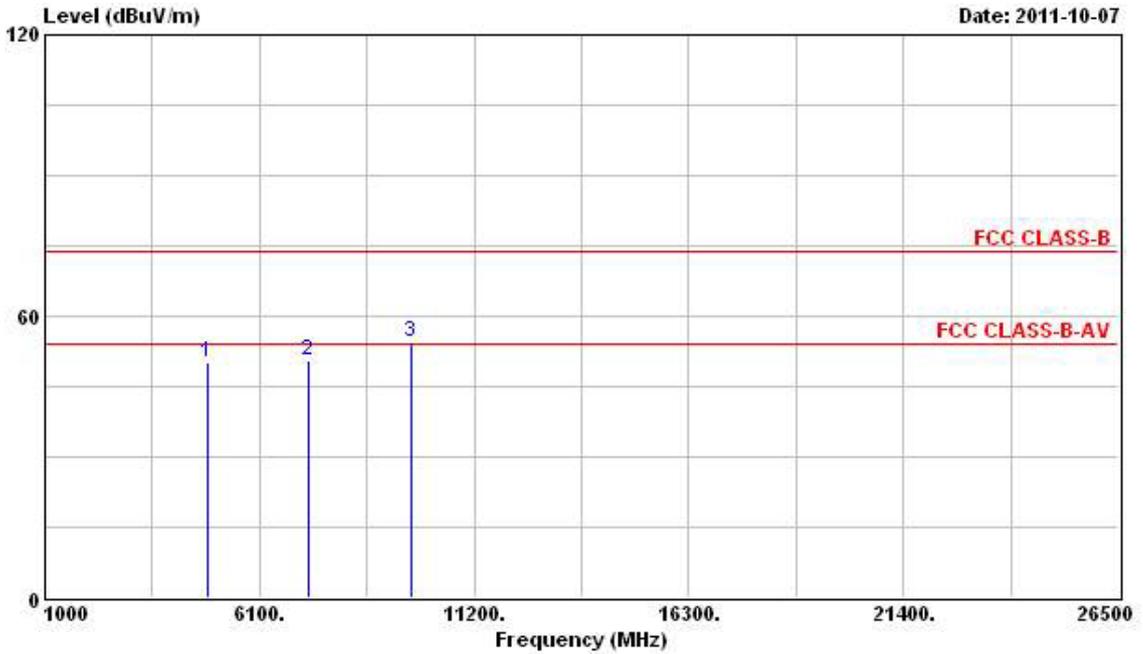


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4924.000	54.16	-19.84	74.00	48.09	33.26	5.41	32.61	Peak	---	---
2	4924.000	41.61	-12.39	54.00	35.54	33.26	5.41	32.61	Average	---	---
3	7386.000	38.07	-15.93	54.00	29.18	36.23	5.57	32.91	Average	---	---
4	7386.000	52.18	-21.82	74.00	43.29	36.23	5.57	32.91	Peak	---	---
5	9848.000	54.53			42.38	38.66	6.80	33.31	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).

Final Test Date	Oct. 07, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11n (40MHz) Ch. 3

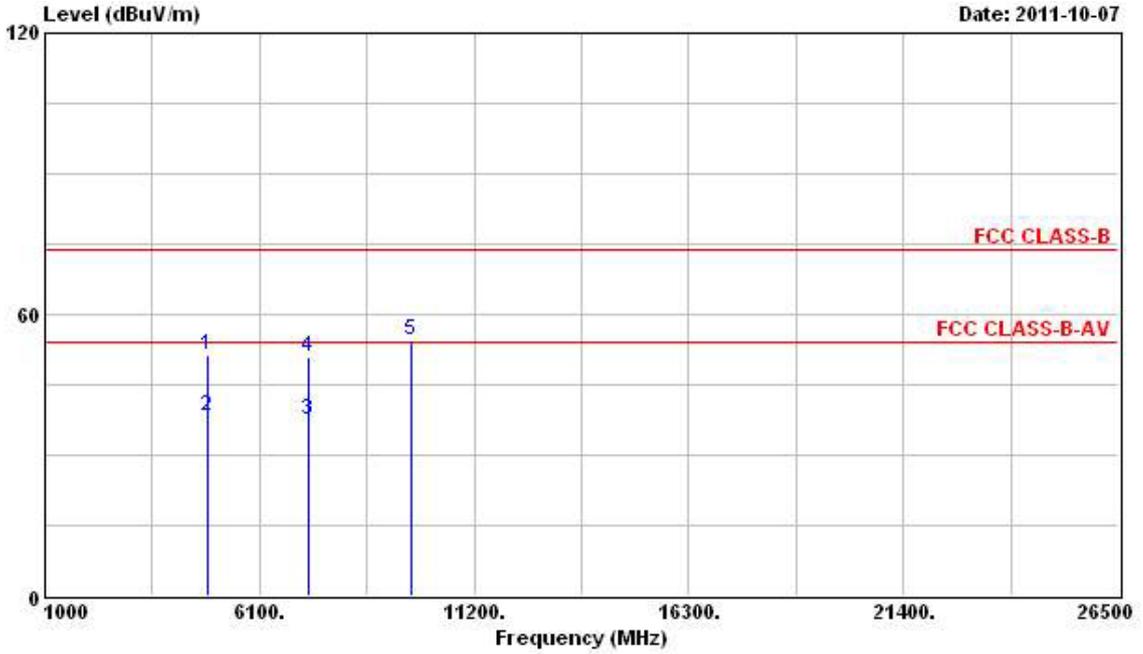
Horizontal



	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	50.03	-3.97	54.00	44.13	33.09	5.43	32.62	PK	---	---
2	7266.000	50.37	-3.63	54.00	42.08	35.92	5.25	32.88	PK	---	---
3	9688.000	54.33			42.61	38.32	6.72	33.32	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

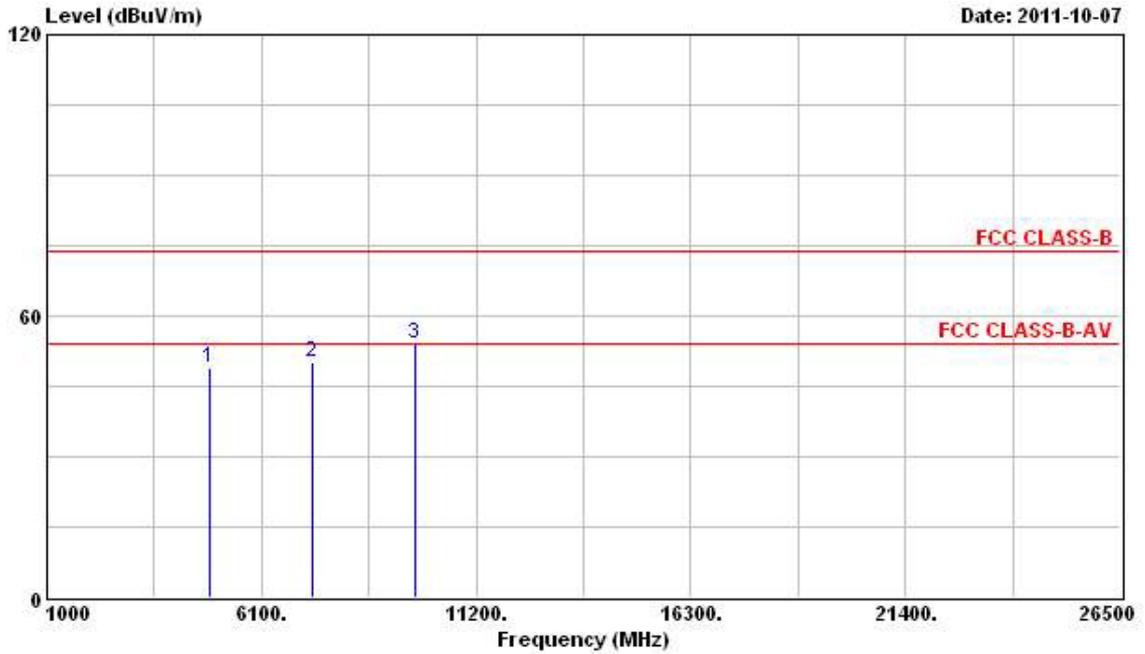


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4844.000	51.19	-22.81	74.00	45.29	33.09	5.43	32.62	Peak	---	---
2	4844.000	38.29	-15.71	54.00	32.39	33.09	5.43	32.62	Average	---	---
3	7266.000	37.45	-16.55	54.00	29.16	35.92	5.25	32.88	Average	---	---
4	7266.000	51.03	-22.97	74.00	42.74	35.92	5.25	32.88	Peak	---	---
5	9688.000	54.54			42.82	38.32	6.72	33.32	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).

Final Test Date	Oct. 07, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11n (40MHz) Ch. 6

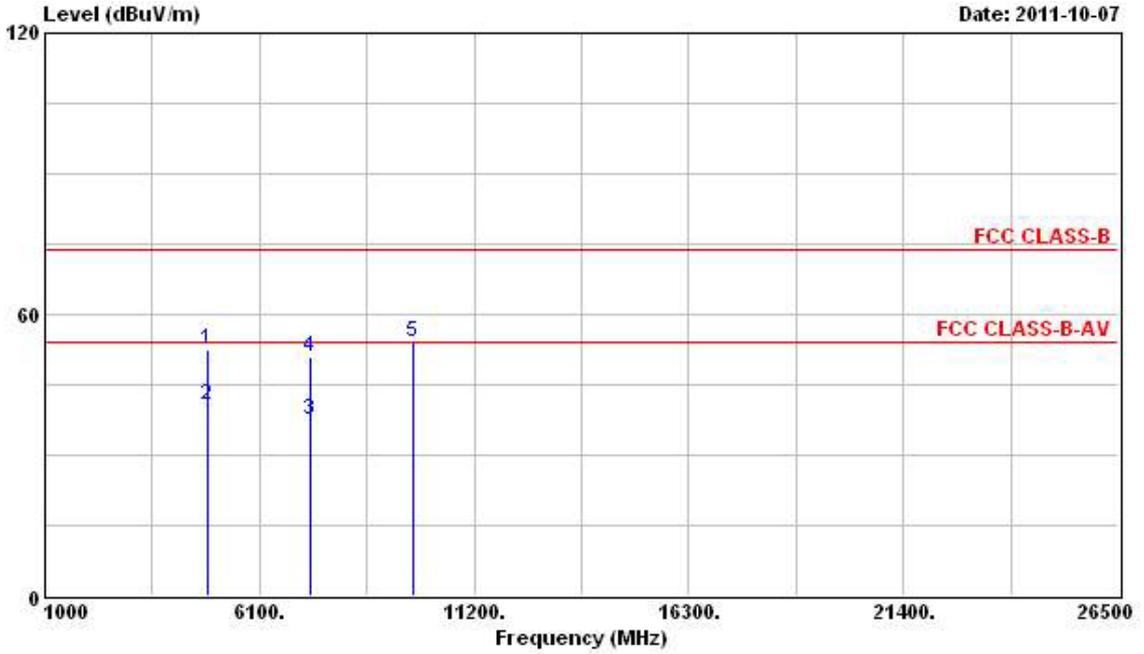
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna 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	49.11	-4.89	54.00	43.14	33.16	5.43	32.62	PK	---	---
2	7311.000	50.27	-3.73	54.00	41.80	36.01	5.36	32.89	PK	---	---
3	9748.000	54.24			42.35	38.47	6.74	33.32	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

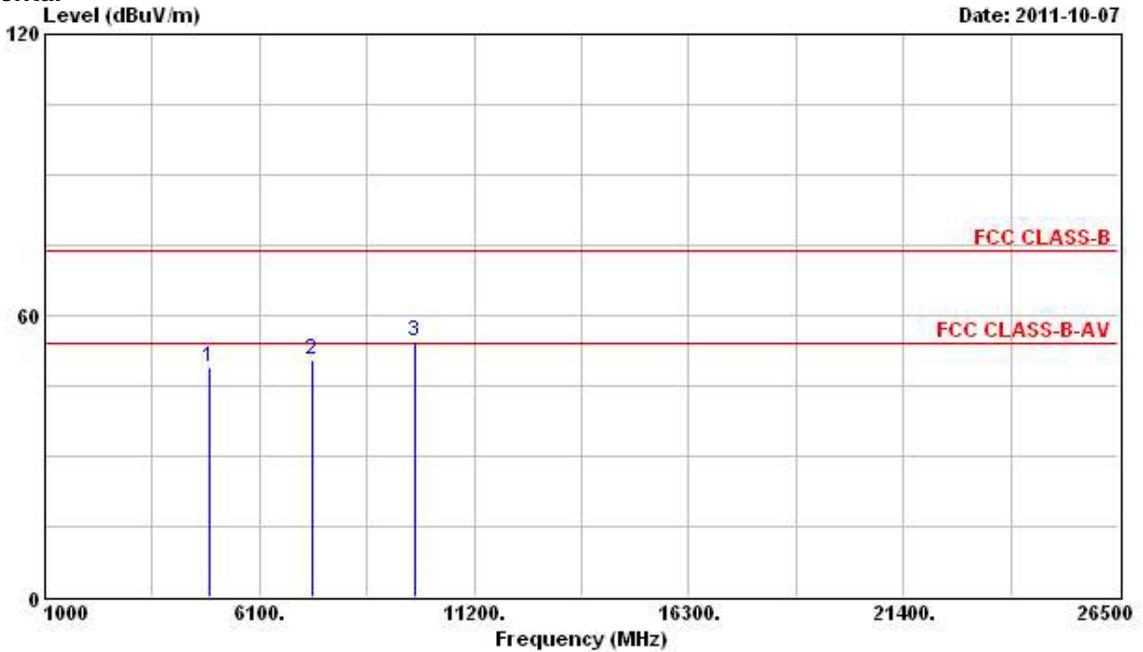


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4874.000	52.42	-21.58	74.00	46.45	33.16	5.43	32.62	Peak	---	---
2	4874.000	40.66	-13.34	54.00	34.69	33.16	5.43	32.62	Average	---	---
3	7311.000	37.37	-16.63	54.00	28.90	36.01	5.36	32.89	Average	---	---
4	7311.000	51.06	-22.94	74.00	42.59	36.01	5.36	32.89	Peak	---	---
5	9748.000	53.97			42.08	38.47	6.74	33.32	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).

Final Test Date	Oct. 07, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11n (40MHz) Ch. 9

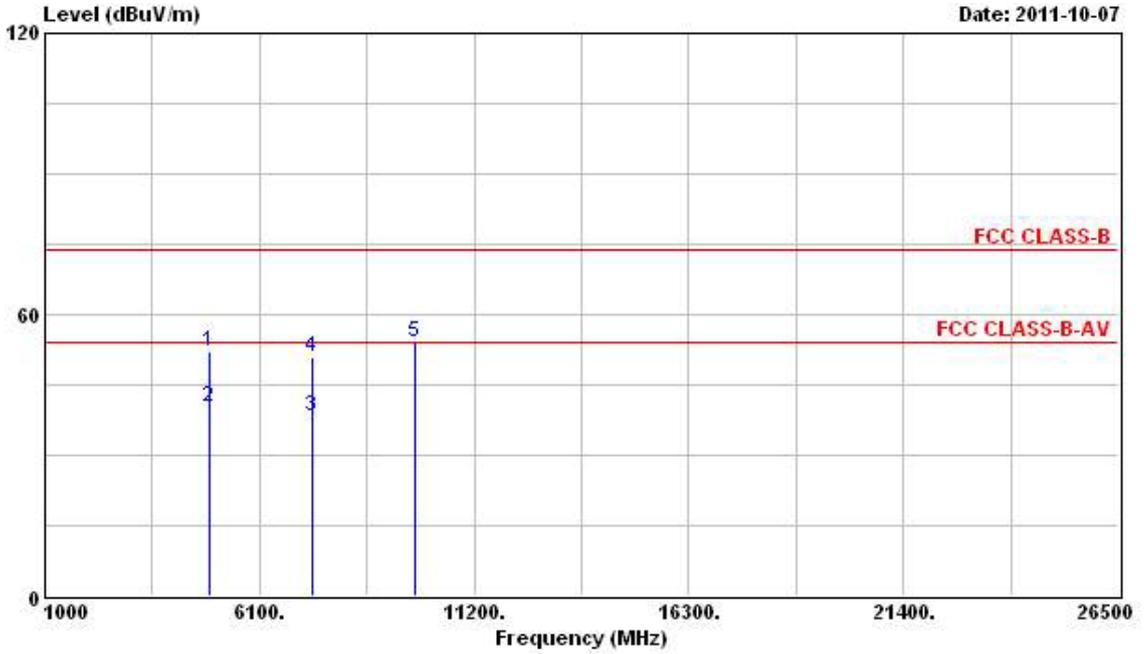
Horizontal



	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	49.05	-4.95	54.00	43.01	33.23	5.42	32.61	PK	---	---
2	7356.000	50.63	-3.37	54.00	41.93	36.14	5.46	32.91	PK	---	---
3	9808.000	54.44			42.39	38.58	6.78	33.32	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	4904.000	52.13	-21.87	74.00	46.09	33.23	5.42	32.61	Peak	---	---
2	4904.000	40.37	-13.63	54.00	34.33	33.23	5.42	32.61	Average	---	---
3	7356.000	38.14	-15.86	54.00	29.44	36.14	5.46	32.91	Average	---	---
4	7356.000	51.05	-22.95	74.00	42.35	36.14	5.46	32.91	Peak	---	---
5	9808.000	54.22			42.17	38.58	6.78	33.32	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).

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	Oct. 21, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11b Ch. 1, 6, 11

Channel 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna 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	2373.460	47.53	-6.47	54.00	14.75	28.18	4.59	0.00	Average	---	---
2 @	2410.890	106.49			73.59	28.24	4.65	0.00	Average	---	---
1	2377.260	60.46	-13.54	74.00	27.68	28.18	4.59	0.00	Peak	---	---
2 X	2410.700	111.02			78.12	28.24	4.65	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2435.970	106.60			73.62	28.28	4.71	0.00	Average	---	---
1 X	2435.970	111.14			78.16	28.28	4.71	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 11

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2462.570	103.29			70.19	28.34	4.77	0.00	Average	---	---
2	2483.500	46.38	-7.62	54.00	13.24	28.37	4.77	0.00	Average	---	---
1 X	2463.140	108.01			74.91	28.34	4.77	0.00	Peak	---	---
2	2497.530	59.70	-14.30	74.00	26.53	28.40	4.77	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	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11g Ch.1, 6, 11

Channel 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna 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	52.87	-1.13	54.00	20.00	28.21	4.65	0.00	Average	---	---
2 @	2409.370	100.05			67.15	28.24	4.65	0.00	Average	---	---
1	2390.000	67.69	-6.31	74.00	34.82	28.21	4.65	0.00	Peak	---	---
2 X	2413.740	109.91			77.01	28.24	4.65	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2431.220	103.27			70.29	28.28	4.71	0.00	Average	---	---
1 @	2430.650	113.64			80.66	28.28	4.71	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 11

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2457.060	101.23			68.18	28.34	4.71	0.00	Average	---	---
2	2483.500	52.43	-1.57	54.00	19.29	28.37	4.77	0.00	Average	---	---
1 X	2455.730	111.62			78.57	28.34	4.71	0.00	Peak	---	---
2	2483.500	68.53	-5.47	74.00	35.39	28.37	4.77	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 Chain:

Final Test Date	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	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	52.53	-1.47	54.00	19.66	28.21	4.65	0.00	Average	---	---
2 @	2415.260	100.34			67.44	28.24	4.65	0.00	Average	---	---
1	2388.850	65.92	-8.08	74.00	33.05	28.21	4.65	0.00	Peak	---	---
2 X	2410.700	111.09			78.19	28.24	4.65	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 @	2435.210	101.96			68.98	28.28	4.71	0.00	Average	---	---
1 X	2433.690	113.60			80.62	28.28	4.71	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 @	2457.250	102.00			68.95	28.34	4.71	0.00	Average	---	---
2	2483.500	52.74	-1.26	54.00	19.60	28.37	4.77	0.00	Average	---	---
1 X	2459.340	112.88			79.83	28.34	4.71	0.00	Peak	---	---
2	2483.660	67.86	-6.14	74.00	34.72	28.37	4.77	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	Oct. 06, 2011	Test Site No.	03CH03-HY
Temperature	24.1°C	Humidity	59%
Test Engineer	Streak	Configuration	802.11n (40MHz) Ch.3, 6, 9

Channel 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna 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	52.42	-1.58	54.00	19.55	28.21	4.65	0.00	Average	---	---
2 @	2411.460	95.60			62.70	28.24	4.65	0.00	Average	---	---
1	2390.000	64.84	-9.16	74.00	31.97	28.21	4.65	0.00	Peak	---	---
2 X	2412.980	106.14			73.24	28.24	4.65	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2435.210	97.83			64.85	28.28	4.71	0.00	Average	---	---
1 X	2430.650	109.08			76.10	28.28	4.71	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 9

	Freq	Level	Over Limit	Limit Line	ReadAntenna 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	96.98			63.96	28.31	4.71	0.00	Average	---	---
2	2483.500	52.94	-1.06	54.00	19.80	28.37	4.77	0.00	Average	---	---
1 X	2435.780	108.52			75.54	28.28	4.71	0.00	Peak	---	---
2	2484.420	66.54	-7.46	74.00	33.40	28.37	4.77	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Note:

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

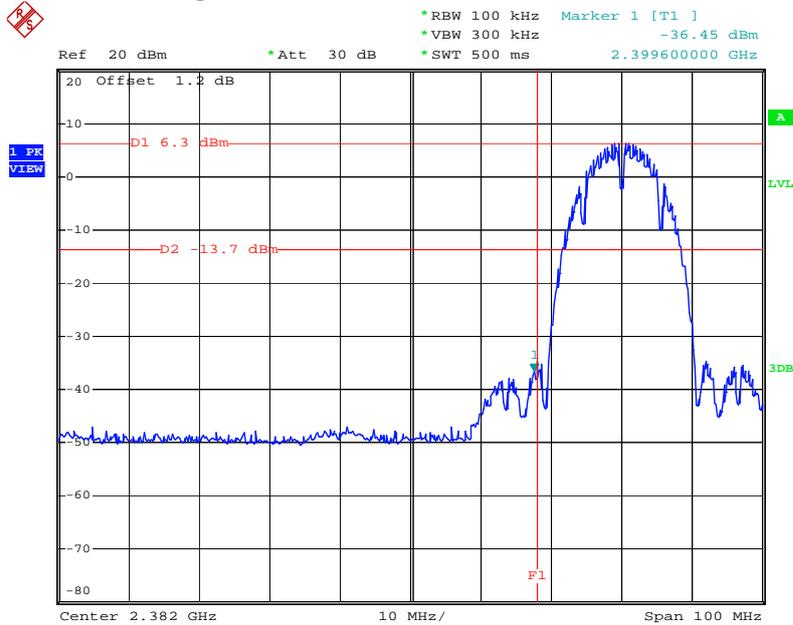
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

For Emission not in Restricted Band

Final Test Date	Nov. 17, 2011	Test Site No.	TH01-HY
Temperature	24.1°C	Humidity	67%
Test Engineer	Cain	Configurations	802.11b/g/n

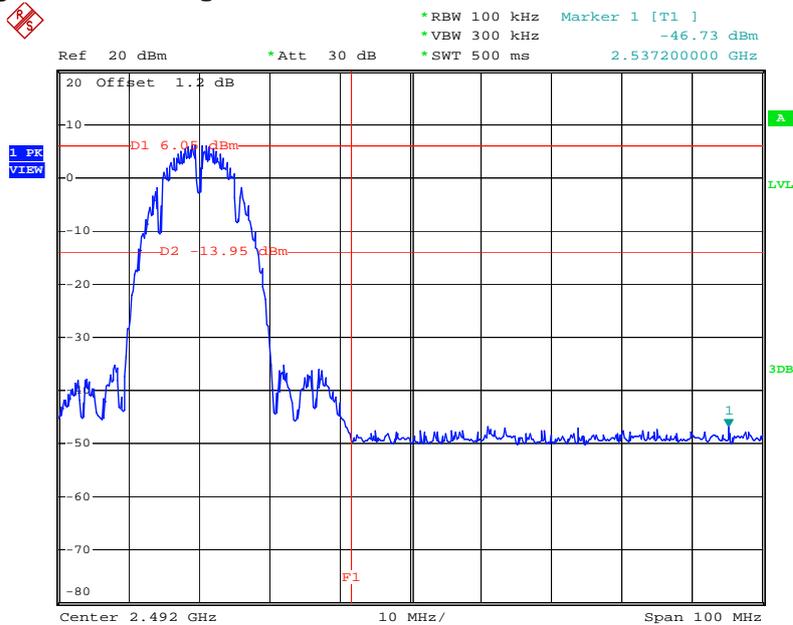
For Single Chain:

Low Band Edge Plot on Configuration IEEE 802.11b Ant. 1 / 2412 MHz



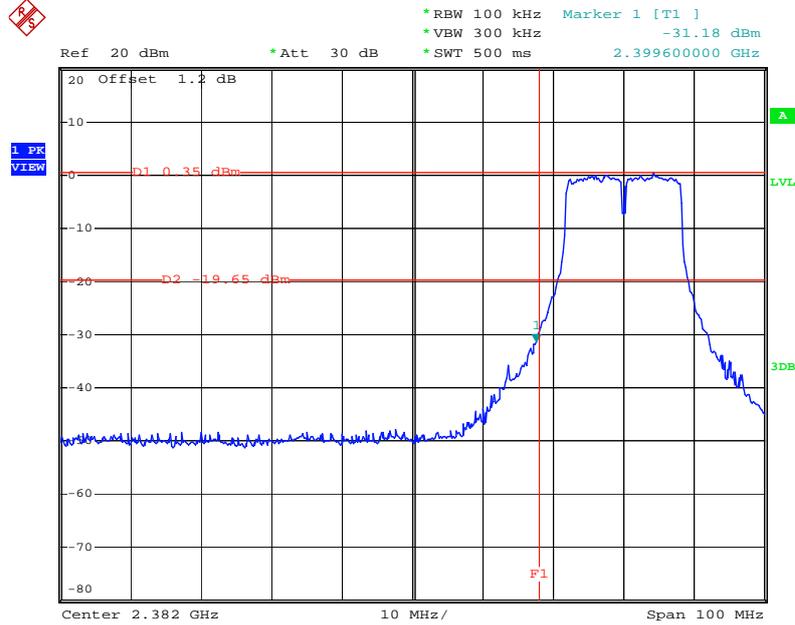
Date: 16.NOV.2011 21:48:19

High Band Edge Plot on Configuration IEEE 802.11b Ant. 1 / 2462 MHz



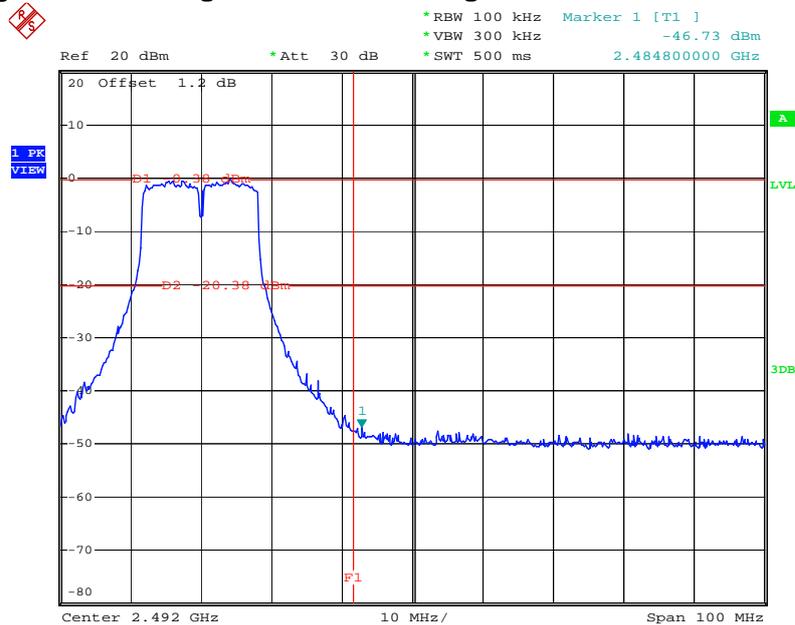
Date: 16.NOV.2011 21:56:43

Low Band Edge Plot on Configuration IEEE 802.11g Ant. 2 / 2412 MHz



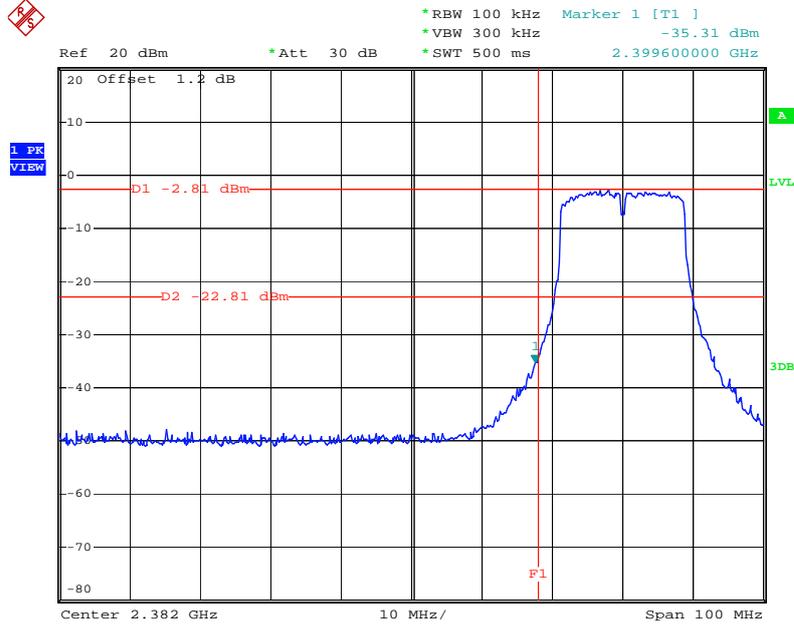
Date: 16.NOV.2011 22:01:56

High Band Edge Plot on Configuration IEEE 802.11g Ant. 2 / 2462 MHz



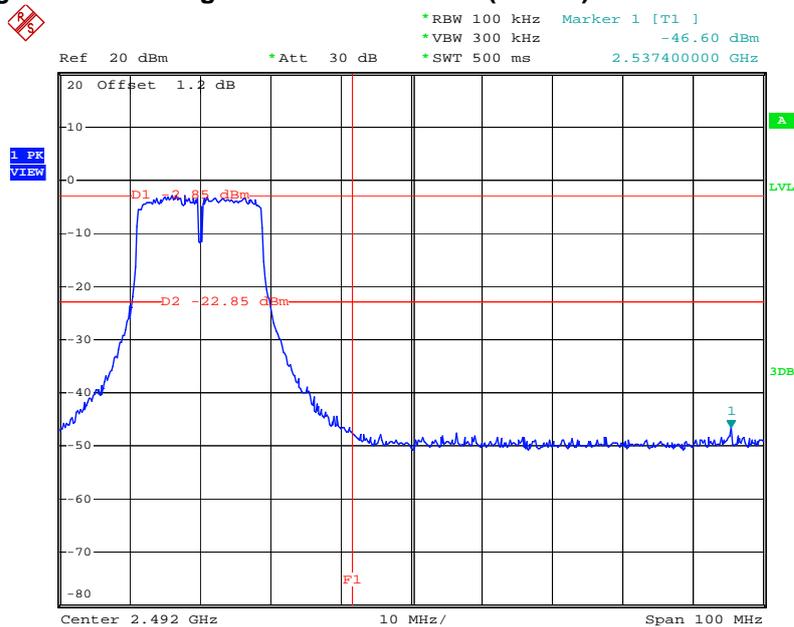
Date: 16.NOV.2011 22:08:18

For Two Chain
Low Band Edge Plot on Configuration IEEE 802.11n (20MHz) Ant. 1 / 2412 MHz



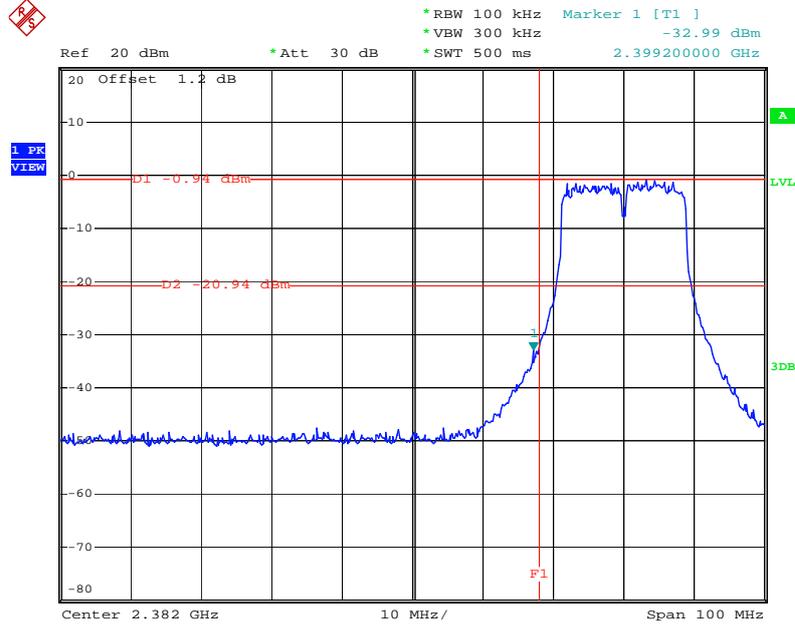
Date: 16.NOV.2011 22:14:36

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



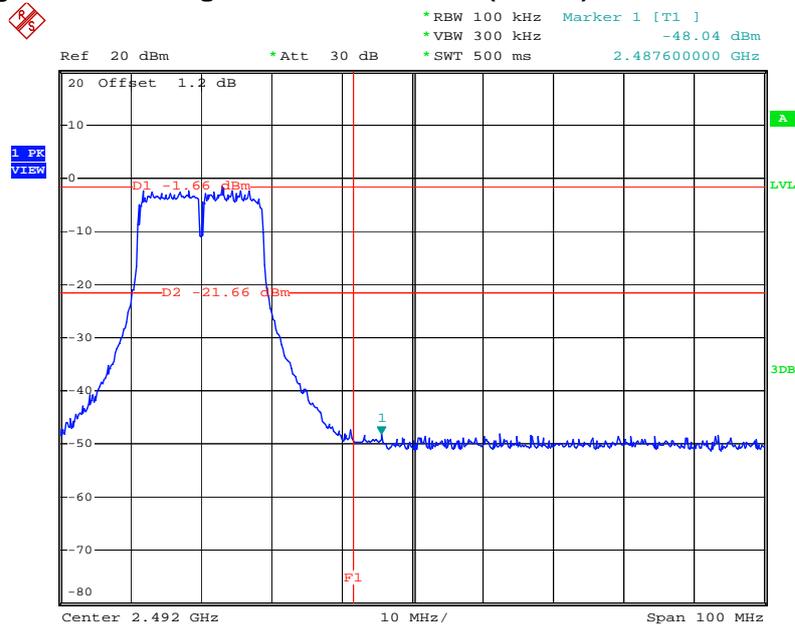
Date: 16.NOV.2011 22:28:43

Low Band Edge Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2412 MHz



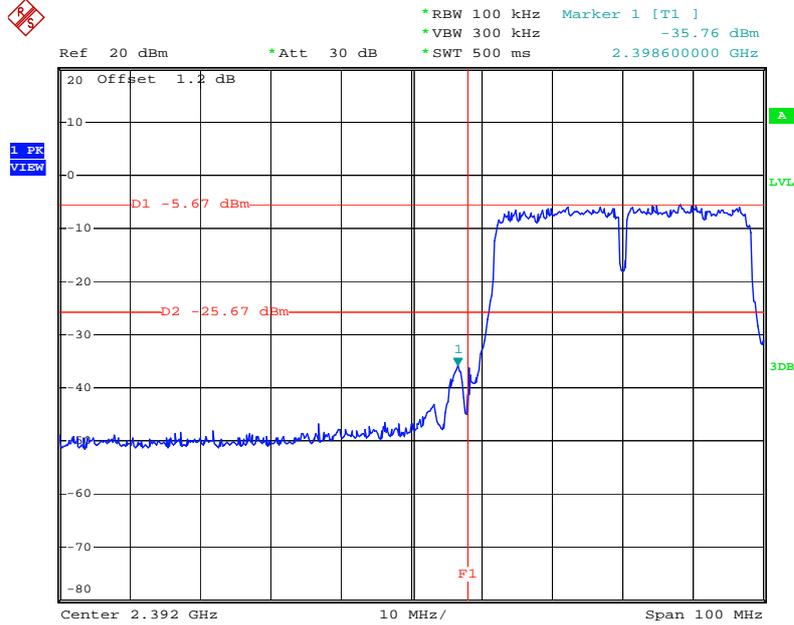
Date: 16.NOV.2011 23:58:18

High Band Edge Plot on Configuration IEEE 802.11n (20MHz) Ant. 2 / 2462 MHz



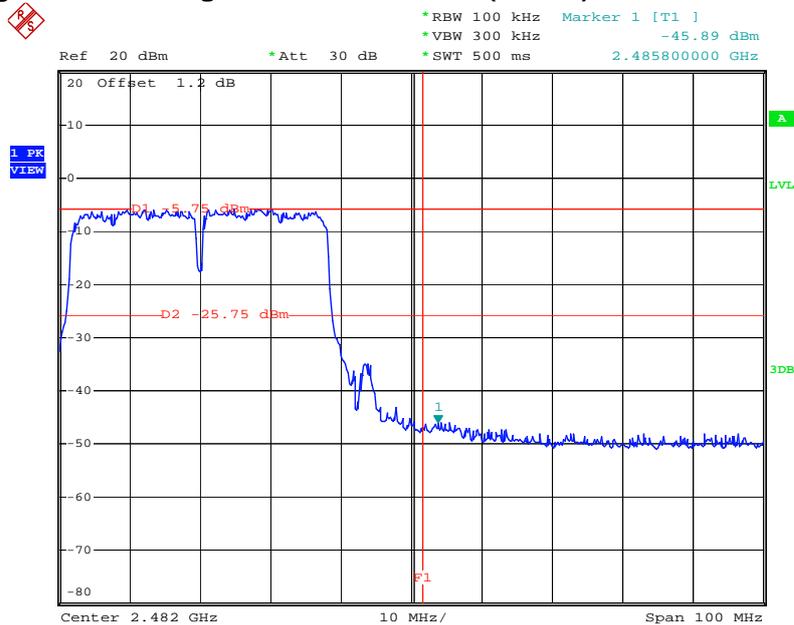
Date: 17.NOV.2011 00:02:17

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



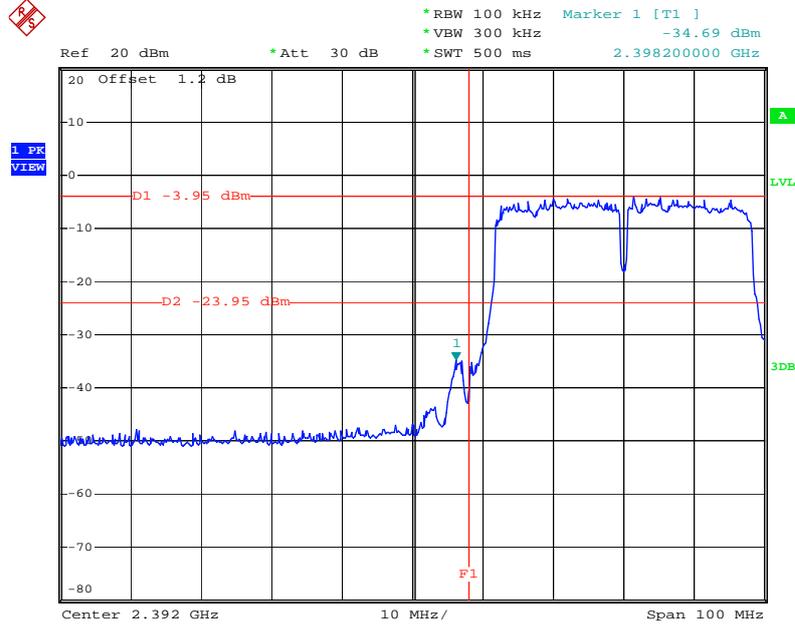
Date: 16.NOV.2011 23:07:37

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



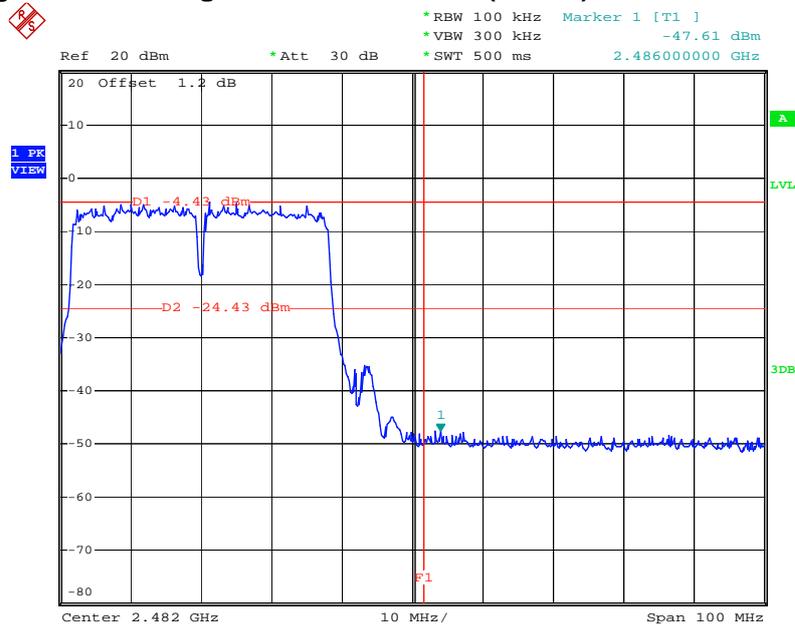
Date: 16.NOV.2011 23:11:48

Low Band Edge Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2422 MHz



Date: 17.NOV.2011 00:13:45

High Band Edge Plot on Configuration IEEE 802.11n (40MHz) Ant. 2 / 2452 MHz



Date: 17.NOV.2011 00:17:41

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 in this test report; antenna connector complied with the requirements.

4 LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Apr. 20, 2011	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99041	9kHz – 30MHz	Mar. 10, 2011	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	May 04, 2011	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	CB049	9kHz – 30MHz	Apr. 21, 2011	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP 30	100023	9 KHz ~ 30 GHz	Mar. 15, 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. 02, 2010	Conducted (TH01-HY)
RF Cable-2m	Jye Bao	RG142	CB035-2m	20 MHz ~ 1 GHz	Dec. 02, 2010	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
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz ~ 1 GHz 3m	Jun. 17, 2011	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz ~ 2 GHz	Jan. 25, 2011	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz ~ 26.5 GHz	Aug. 08, 2011	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100004	9 kHz ~ 40 GHz	Nov. 17, 2010	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz ~ 2 GHz	Oct. 22, 2010	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1 GHz ~ 18 GHz	May 30, 2011	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz ~ 40 GHz	Jan.13, 2011	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz ~ 1 GHz	Jan. 18, 2011	Radiation (03CH03-HY)
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz ~ 40 GHz	Jan. 18, 2011	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 29, 2010*	Radiation (03CH03-HY)

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

5 TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd 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 Arrangement with Foreign Authorities

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

P1, total 24 pages