FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart E § 15.407

Equipment	:	**Wireless MPCI Card**
Model No.	:	**WL-227N_ABAND**
Brand Name	:	**PEGATRON**
Filing Type	:	**New Application**
Applicant	:	**PEGATRON CORPORATION** 5F, No.76, Ligong St., Beitou, Taipei 112, Taiwan
FCC ID	:	**VUI-WL-227N-ABAND**
Manufacturer	:	**PEGATRON CORPORATION** 5F, No.76, Ligong St., Beitou, Taipei 112, Taiwan
Received Date	:	Nov. 03, 2009
Final Test Date	:	Nov. 19, 2009

Statement

Test result included is only for the 802.11a/n (5150~5250MHz) 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 E**.

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

Testing Laboratory
1190

SPORTON International Inc.

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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History of This Test Report

Original Issue Date: Dec. 08, 2009

Report No.: FR9O1905AI

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart E § 15.407

Equipment : Wireless MPCI Card
Model No. : WL-227N_ABAND
Brand Name : PEGATRON
Applicant : PEGATRON CORPORATION
5F, No.76, Ligong St., Beitou, Taipei 112, Taiwan

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Nov. 03, 2009 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.

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1 SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
3.1	15.207	AC Power Line Conducted Emissions	Complies	2.30 dB
3.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
3.3	15.407(a)	Maximum Conducted Output Power	Complies	0.20 dB
3.4	15.407(a)	Power Spectral Density	Complies	0.29 dB
3.5	15.407(a)	Peak Excursion	Complies	3.02 dB
3.6	15.407(b)	Radiated Emissions	Complies	1.06 dB
3.7	15.407(b)	Band Edge Emissions	Complies	1.14 dB
3.8	15.407(g)	Frequency Stability	Complies	-
3.9	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.5dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
Peak Excursion	±0.5dB	Confidence levels of 95%
26dB Spectrum Bandwidth / Frequency Stability	$\pm 8.5\times10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

2 GENERAL INFORMATION

2.1 Product Details

Only the radio detail of IEEE 802.11a/n of Monopole Antenna is shown in the table below. For more detailed features description, please refer to the manufacturer's specifications or user's manual.

Items	Description
Modulation	See the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	See the below table for IEEE 802.11n
Frequency Range	5150~5250 MHz
Channel Number	11a (20MHz): 4 ; 11n (40MHz): 2
Channel Band Width (99%)	11a Band 1: 17.00 MHz 11n MCS 0 (20MHz): 17.70 MHz ; 11n MCS 0 (40MHz): 36.00 MHz ; 11n MCS 8 (20MHz): 17.76 MHz ; 11n MCS 8 (40MHz): 36.00 MHz
Conducted Output Power	11a Band 1: 12.71 dBm 11n MCS 0 (20MHz): 12.78 dBm ; 11n MCS 0 (40MHz): 15.40 dBm ; 11n MCS 8 (20MHz): 12.46 dBm ; 11n MCS 8 (40MHz): 15.13 dBm

2.2 Table for Filed Antenna

Antenna & Bandwidth

Antenna Mode	Single Chain		Two Chain	
Bandwidth Mode	20 MHz	40 MHz	20 MHz	40 MHz
802.11a (5150~5250MHz)	V	X	X	X
802.11a (5725~5850MHz)	V	X	X	X
802.11n (5150~5250MHz)	V	V	V	V
802.11n (5725~5850MHz)	V	V	V	V

Ant.	Antenna Type	Connector	Gain (dBi)	Remark
A	Printed Antenna	U.FL	7.4	TX / RX
B	Printed Antenna	U.FL	7.4	TX / RX
C	Printed Antenna	U.FL	7.4	RX

Note: The antennas are 2T3R spatial Multiplexing MIMO configuration.

IEEE 802.11n Modulation Scheme

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0
8	2	BPSK	1/2	1	104	216	52	108	13.0	27.0
9	2	QPSK	1/2	2	208	432	104	216	26.0	54.0
10	2	QPSK	3/4	2	208	432	156	324	39.0	81.0
11	2	16-QAM	1/2	4	416	864	208	432	52.0	108.0
12	2	16-QAM	3/4	4	416	864	312	648	78.0	162.0
13	2	64-QAM	2/3	6	624	1296	416	864	104.0	216.0
14	2	64-QAM	3/4	6	624	1296	468	972	117.0	243.0
15	2	64-QAM	5/6	6	624	1296	520	1080	130.0	270.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	guard interval

2.3 Table for Carrier Frequencies

Frequency Allocation

For 802.11a, 802.11n (20MHz): Use channel 36, 40, 44, 48.

For 802.11n (40MHz): Use channel 38, 46.

Frequency Band	Channel No.	Frequency
5150~5250 MHz Band 1	36	5180 MHz
	38	5190 MHz
	40	5200 MHz
	44	5220 MHz
	46	5230 MHz
	48	5240 MHz

2.4 Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the 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	Antenna
AC Power Conducted Emission	Normal Mode	Auto	-	-
Radiated Emission Below 1GHz				
Max. Conducted Output Power	11a Band 1/BPSK	6Mbps	36/40/48	A
	11n Band 1/BPSK MCS 0 (20MHz)	6.5Mbps	36/40/48	A
	11n Band 1/BPSK MCS 0 (40MHz)	13.5Mbps	38/46	A
	11n Band 1/BPSK MCS 8 (20MHz)	13Mbps	36/40/48	A/B; A+B
	11n Band 1/BPSK MCS 8 (40MHz)	27Mbps	38/46	A/B; A+B
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Power Spectral Density Peak Excursion	11a Band 1/BPSK	6Mbps	36/40/48	A
	11n Band 1/BPSK MCS 0 (20MHz)	6.5Mbps	36/40/48	A
	11n Band 1/BPSK MCS 0 (40MHz)	13.5Mbps	38/46	A
	11n Band 1/BPSK MCS 8 (20MHz)	13Mbps	36/40/48	A+B
	11n Band 1/BPSK MCS 8 (40MHz)	27Mbps	38/46	A+B
Radiated Emission Above 1GHz Band Edge Emission	11a Band 1/BPSK	6Mbps	36/40/48	A
	11n Band 1/BPSK MCS 0 (20MHz)	6.5Mbps	36/40/48	A
	11n Band 1/BPSK MCS 0 (40MHz)	13.5Mbps	38/46	A
	11n Band 1/BPSK MCS 8 (20MHz)	13Mbps	36/40/48	A+B
	11n Band 1/BPSK MCS 8 (40MHz)	27Mbps	38/46	A+B
Frequency Stability	11a Band 1/BPSK	6Mbps	36	A
	11n Band 1/BPSK MCS 0 (20MHz)	6.5Mbps	36	A
	11n Band 1/BPSK MCS 0 (40MHz)	13.5Mbps	38	A
	11n Band 1/BPSK MCS 8 (40MHz)	27Mbps	46	A+B

2.5 Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.
CO01-HY	Conduction	Hwa Ya	643075	IC 4086B-1
TH01-HY	OVEN Room	Hwa Ya	-	-
03CH02-HY	SAC	Hwa Ya	643075	IC 4086B-1

Semi Anechoic Chamber (SAC).

2.6 Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	ASUS	W5F	N/A

Note: The Supporting Units Provide by Customer.

2.7 Table for Parameters of Test Software Setting

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

For Single Chain:

Power Parameters of IEEE 802.11a

Test Software Version	Ralink Wereless Utility		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11a(20MHz)	0	-1	-2

Power Parameters of IEEE 802.11n

Test Software Version	Ralink Wereless Utility		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11n(20MHz)	0	-1	-2
Frequency	5190 MHz	5230 MHz	-
IEEE 802.11n(40MHz)	2	1	-

For Two Chain:

Power Parameters of IEEE 802.11n Ant. A + Ant. B

Test Software Version	Ralink Wereless Utility		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11n(20MHz)	-3	-3	-5
Frequency	5190 MHz	5230 MHz	-
IEEE 802.11n(40MHz)	-1	-1	-

2.8 EUT Operation during Test

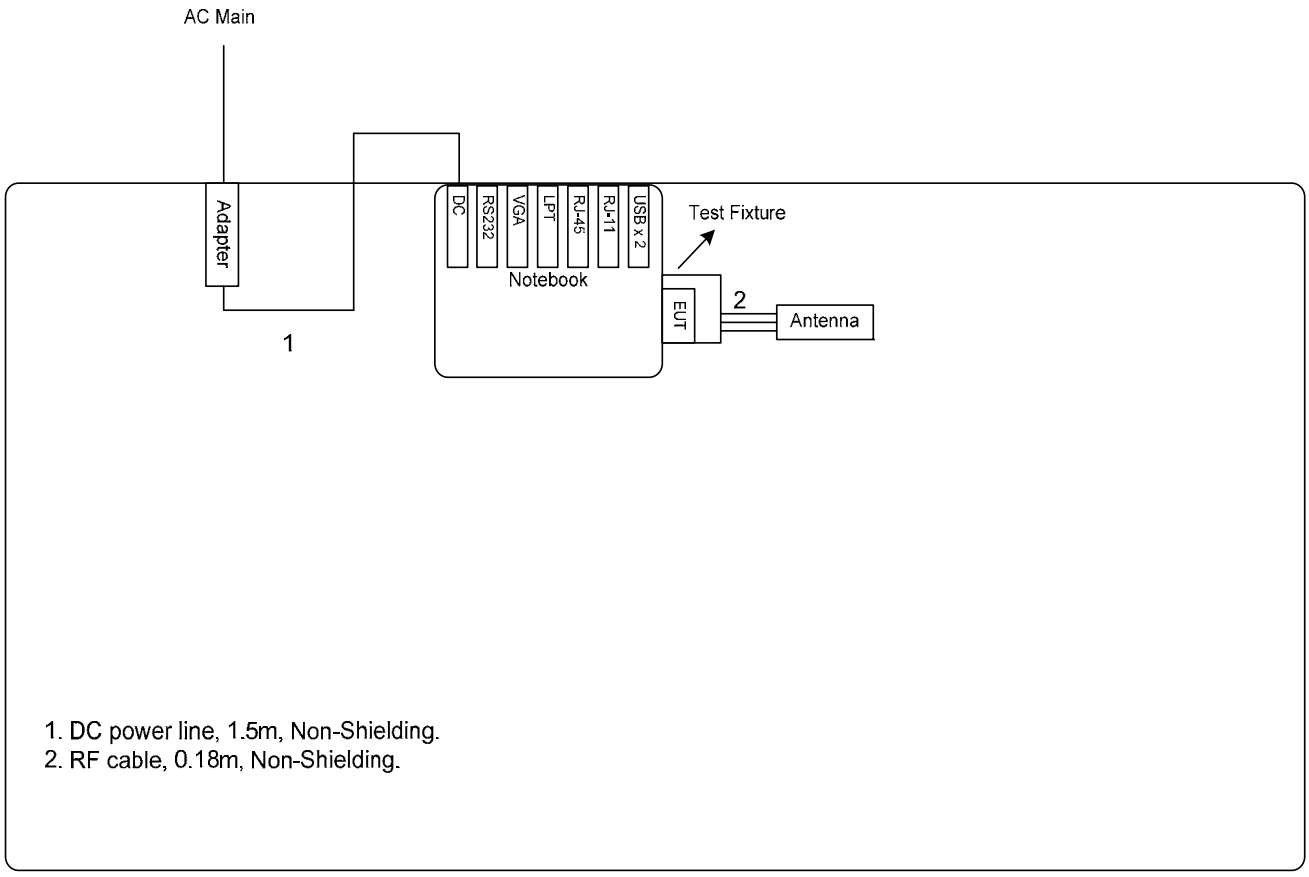
An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeat video playing was used with the test software.

-Executed “Ralink Wereless Utility” to keep transmitting signals at fixed frequency.

2.9 Test Configuration

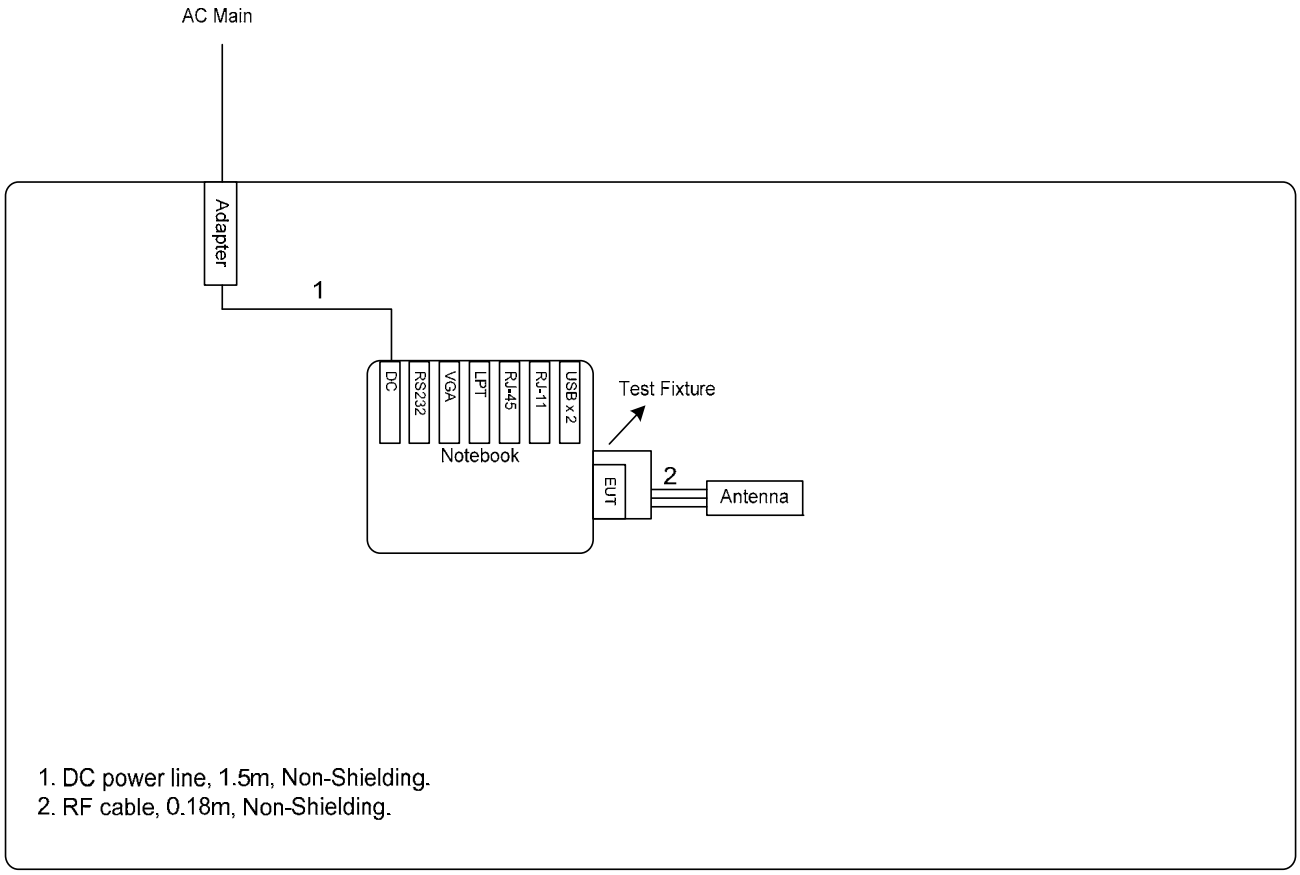
2.9.1 Radiation Emissions Test Configuration

For radiated emissions 9kHz~1GHz



1. DC power line, 1.5m, Non-Shielding.
2. RF cable, 0.18m, Non-Shielding.

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

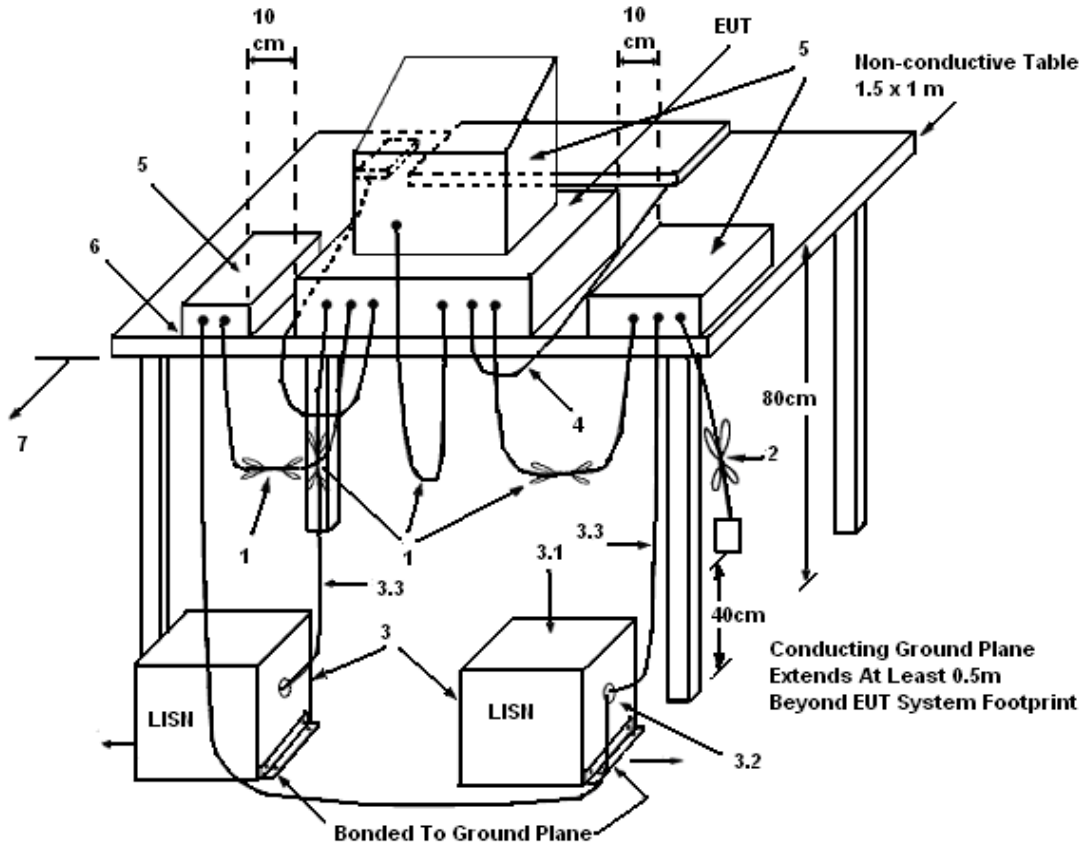
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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. 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.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. 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.

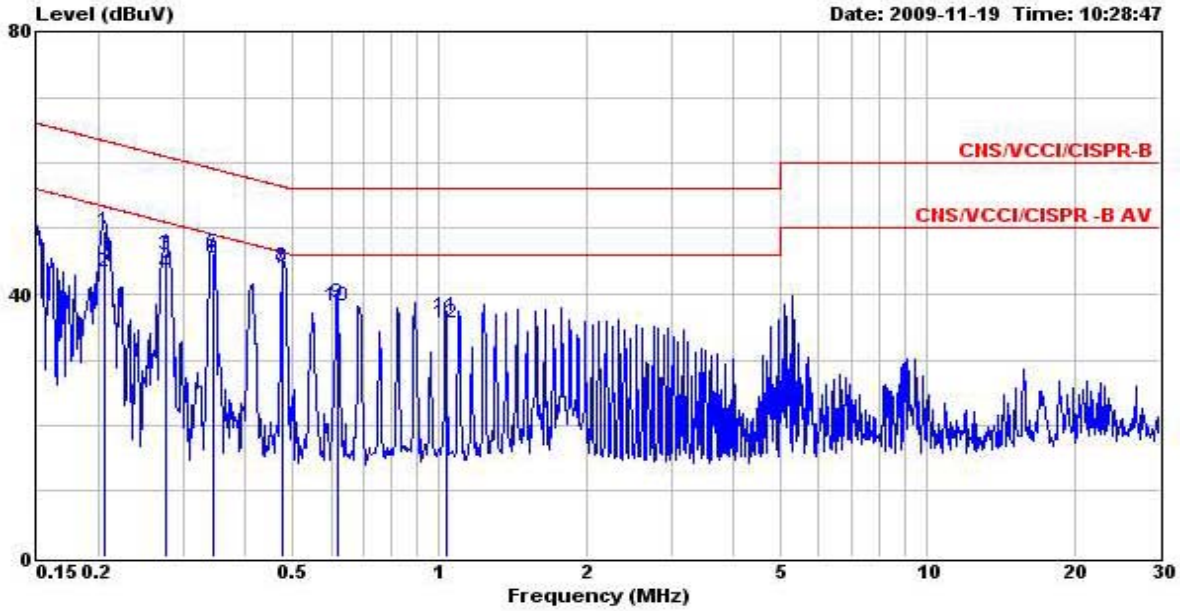
3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

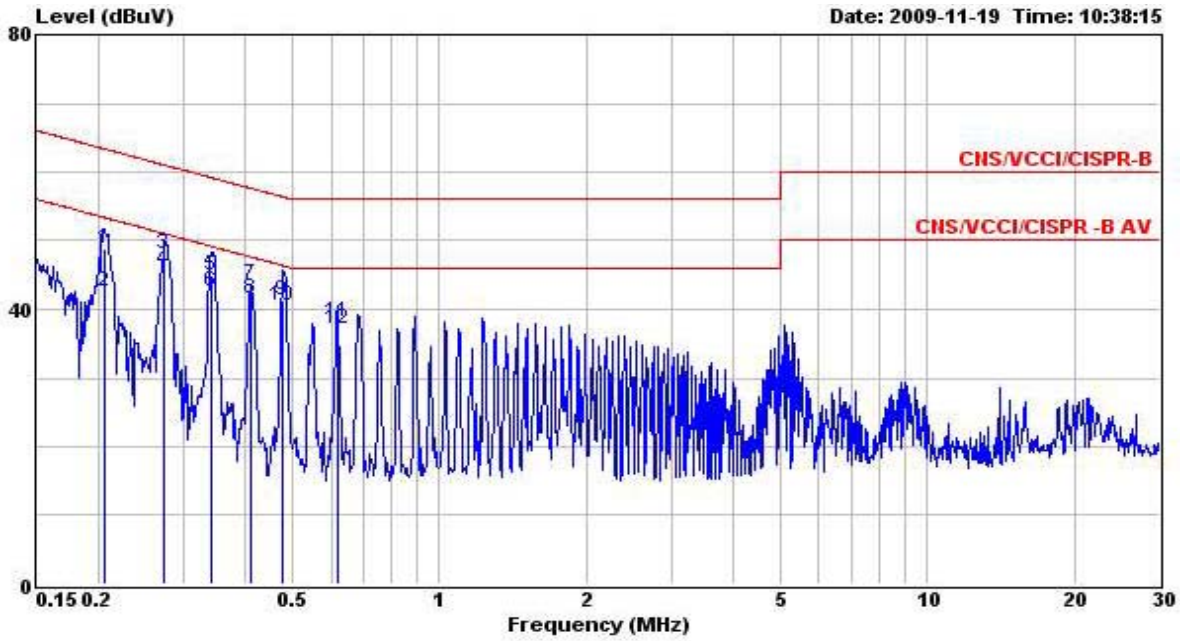
Final Test Date	Nov. 19, 2009	**Test Site No.**	CO01-HY
Temperature	27.4℃	**Humidity**	51%
Test Engineer	Ken	**Configuration**	Normal Mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.206	49.62	-13.75	63.37	49.48	0.08	0.06	QP
2	0.206	43.41	-9.96	53.37	43.27	0.08	0.06	Average
3	0.274	46.01	-14.99	61.00	45.87	0.08	0.06	QP
4	0.274	43.17	-7.83	51.00	43.03	0.08	0.06	Average
5	0.343	46.33	-12.80	59.13	46.18	0.09	0.06	QP
6	0.343	45.36	-3.77	49.13	45.21	0.09	0.06	Average
7	0.479	43.97	-12.39	56.36	43.81	0.09	0.07	QP
8	0.479	44.06	-2.30	46.36	43.90	0.09	0.07	Average
9	0.617	38.79	-17.21	56.00	38.61	0.10	0.08	QP
10	0.617	38.28	-7.72	46.00	38.10	0.10	0.08	Average
11	1.030	36.71	-19.29	56.00	36.50	0.11	0.10	QP
12	1.030	35.48	-10.52	46.00	35.27	0.11	0.10	Average

Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.206	48.74	-14.63	63.37	48.62	0.06	0.06	QP
2	0.206	42.52	-10.85	53.37	42.40	0.06	0.06	Average
3	0.273	47.94	-13.09	61.03	47.82	0.06	0.06	QP
4	0.273	45.74	-5.29	51.03	45.62	0.06	0.06	Average
5	0.342	45.03	-14.11	59.14	44.90	0.07	0.06	QP
6	0.342	42.65	-6.49	49.14	42.52	0.07	0.06	Average
7	0.411	43.69	-13.93	57.62	43.56	0.07	0.06	QP
8	0.411	41.48	-6.14	47.62	41.35	0.07	0.06	Average
9	0.479	41.34	-15.02	56.36	41.20	0.07	0.07	QP
10	0.479	40.58	-5.78	46.36	40.44	0.07	0.07	Average
11	0.617	38.25	-17.75	56.00	38.09	0.08	0.08	QP
12	0.617	37.12	-8.88	46.00	36.96	0.08	0.08	Average

Note:

Level = Read Level + LISN Factor + Cable Loss.

3.2 99% Occupied Bandwidth Measurement

3.2.1 Limit

No restriction limits. But resolution bandwidth within band edge measurement is 1% of the 99% occupied bandwidth.

3.2.2 Measuring Instruments and Setting

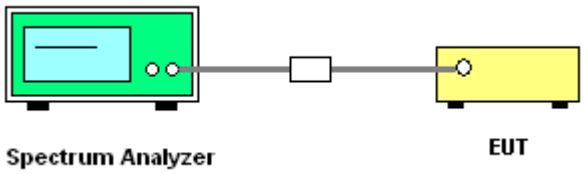
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RB	300 kHz
VB	1000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

3.2.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 300 kHz and the video bandwidth of 1000 kHz were used.
3. Measured the spectrum width with power higher than 26dB below carrier.
4. Measuring multiple antennas, the connectors are required to link with Spectrum Analyzer through a combiner.

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 99% Occupied Bandwidth

Final Test Date	Nov. 18, 2009	**Test Site No.**	TH01-HY
Temperature	26℃	**Humidity**	56%
Test Engineer	Allen	**Configuration**	802.11a/n

For Single Chain:

Configuration of IEEE 802.11a

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	23.20	17.00
40	5200 MHz	22.50	17.00
48	5240 MHz	23.20	16.90

Configuration IEEE 802.11n (20MHz)

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	21.00	17.70
40	5200 MHz	20.90	17.70
48	5240 MHz	20.90	17.70

Configuration IEEE 802.11n (40MHz)

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	39.80	35.80
46	5230 MHz	39.80	36.00

For Two Chain:

Configuration IEEE 802.11n Ant. A + Ant. B (20MHz)

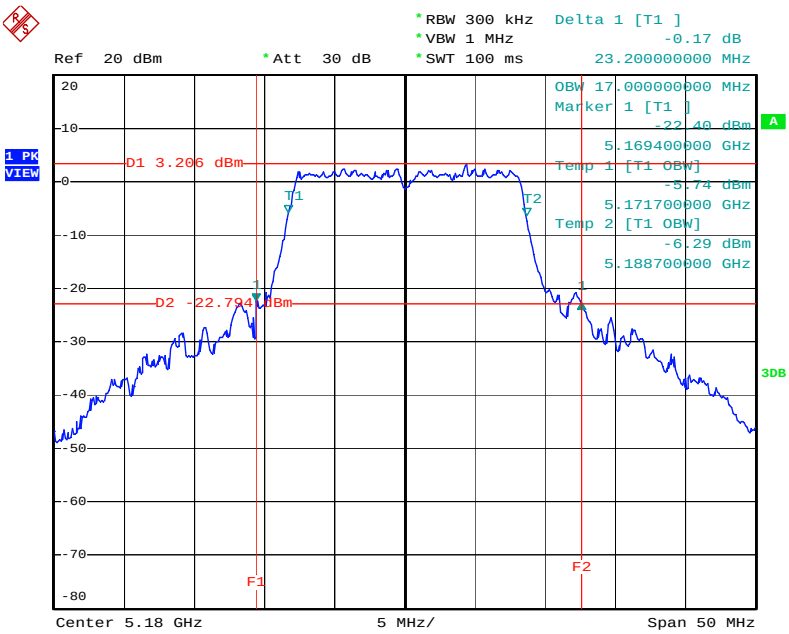
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.00	17.76
40	5200 MHz	20.00	17.76
48	5240 MHz	20.00	17.76

Configuration IEEE 802.11n Ant. A + Ant. B (40MHz)

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	39.84	36.00
46	5230 MHz	39.52	36.00

For Single Chain:

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5180 MHz



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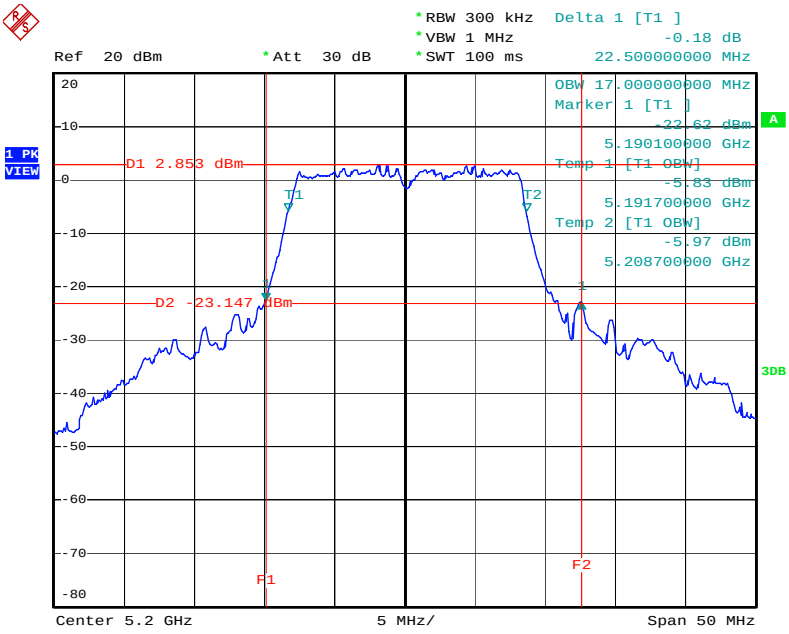
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5200 MHz



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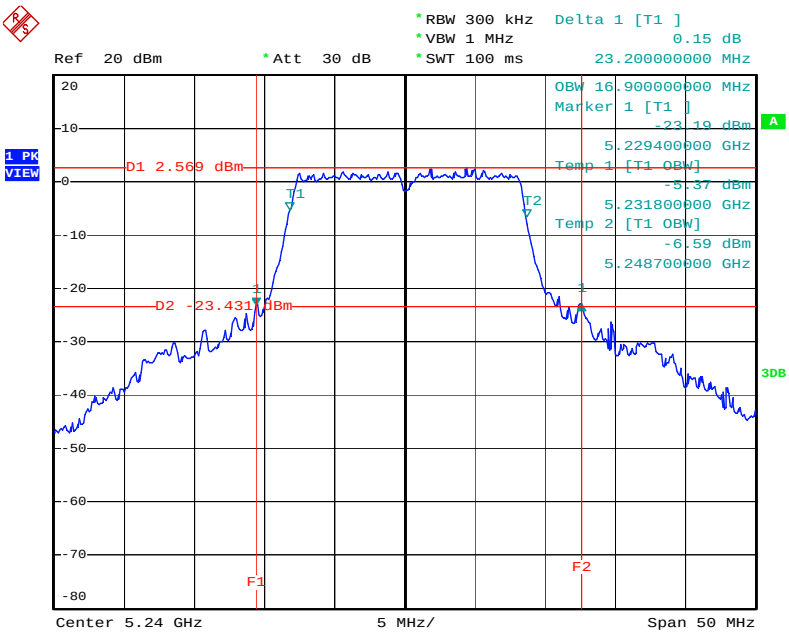
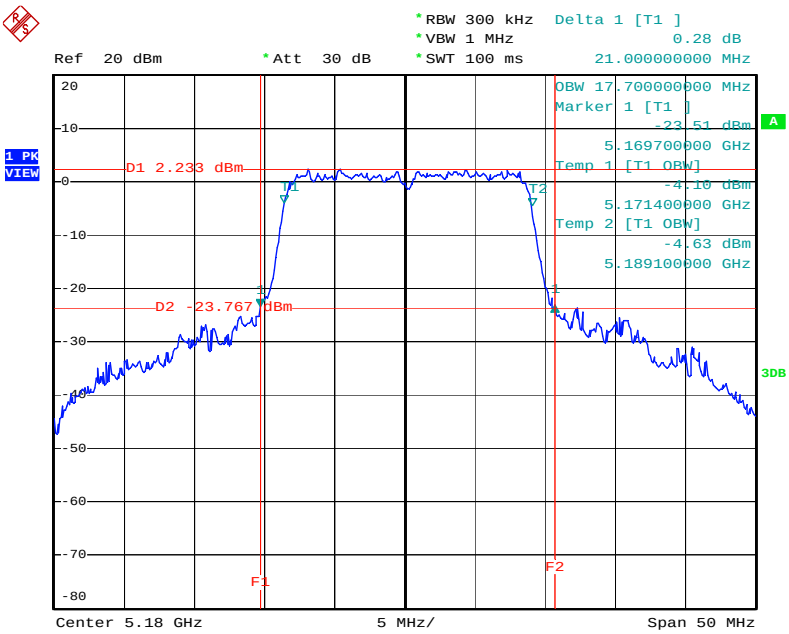
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5240 MHz



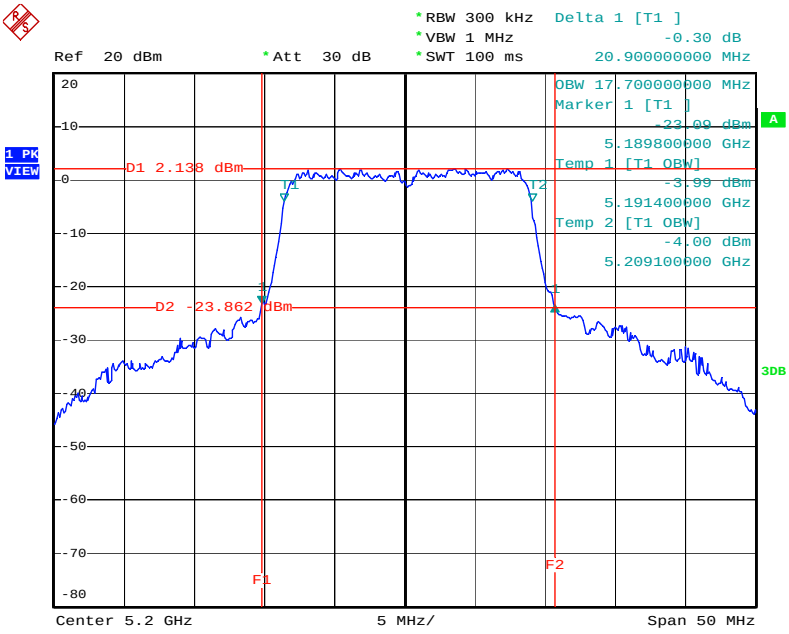
Date: 18.NOV.2009 08:23:24

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz)/ 5180 MHz



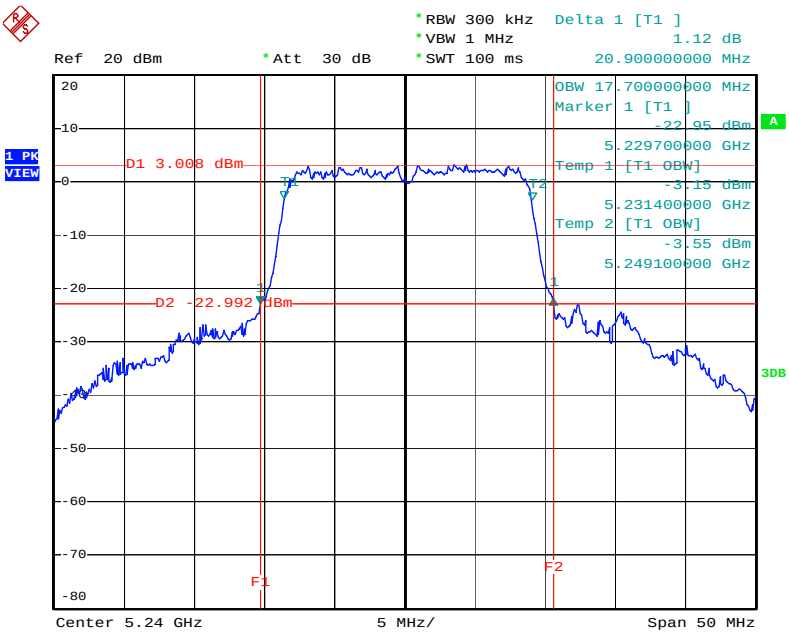
Date: 18.NOV.2009 08:32:29

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) / 5200 MHz

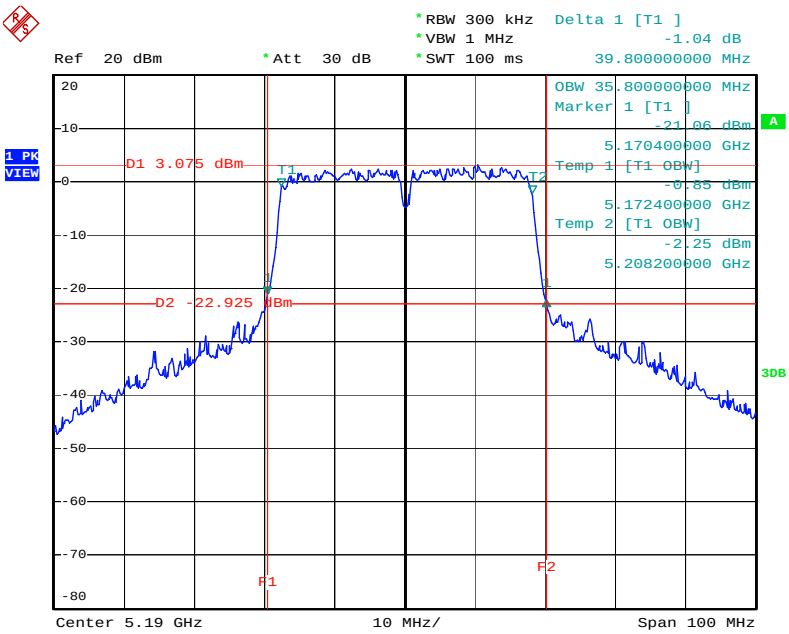


Date: 18.NOV.2009 08:36:05

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz)/ 5240 MHz

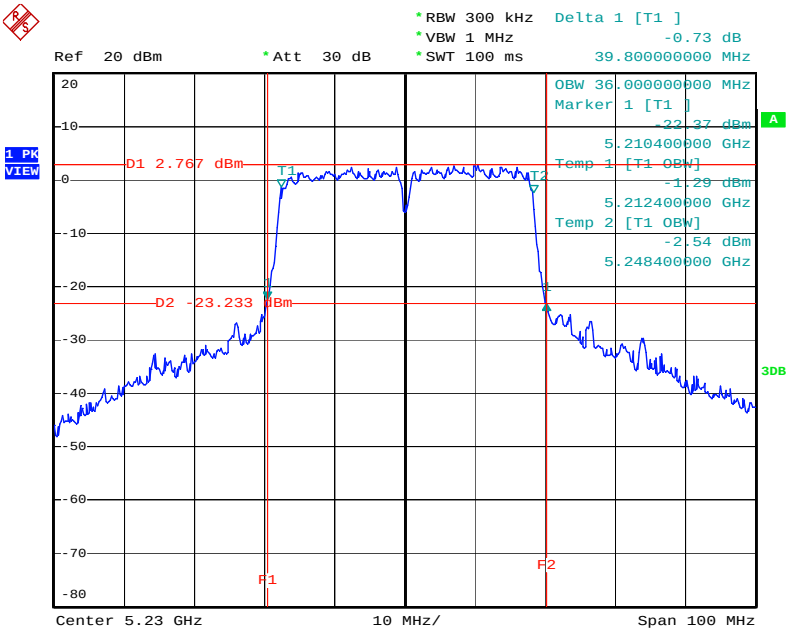


26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz)/ 5190 MHz



Date: 18.NOV.2009 08:47:51

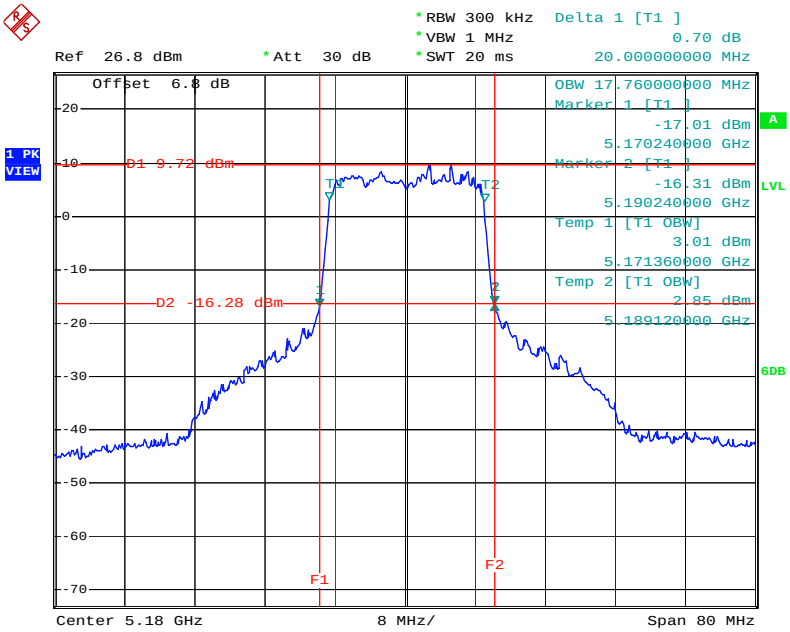
26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) / 5230 MHz



Date: 18.NOV.2009 08:53:29

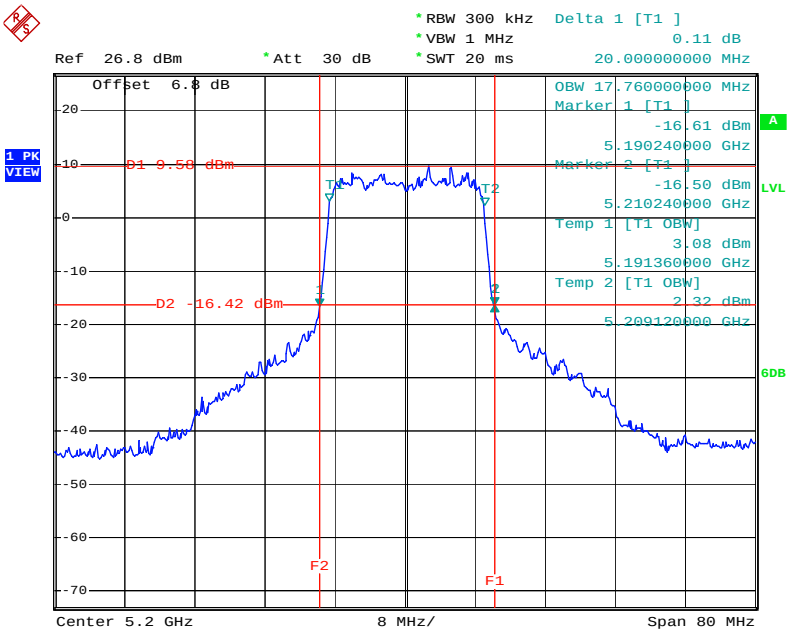
For Two Chain:

26 dB Bandwidth Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz)/ 5180 MHz



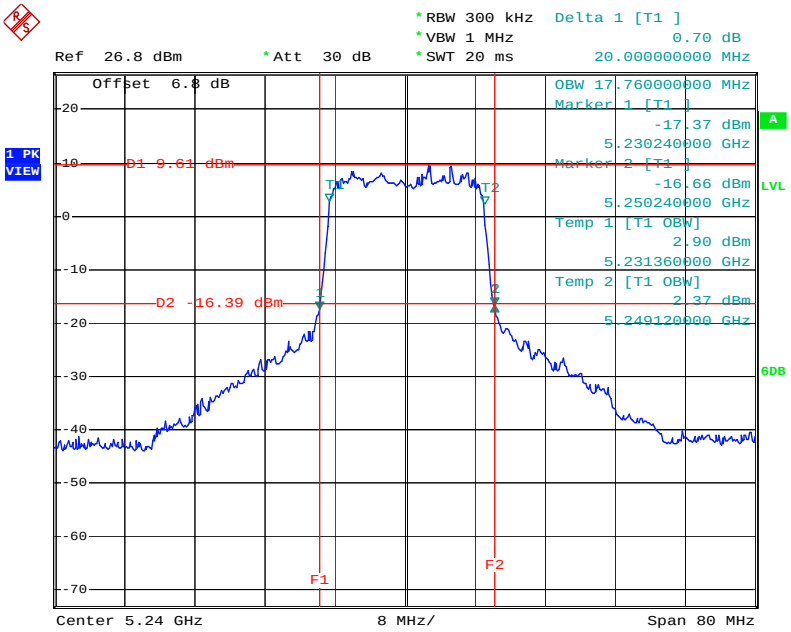
Date: 18.NOV.2009 11:08:47

26 dB Bandwidth Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz) / 5200 MHz



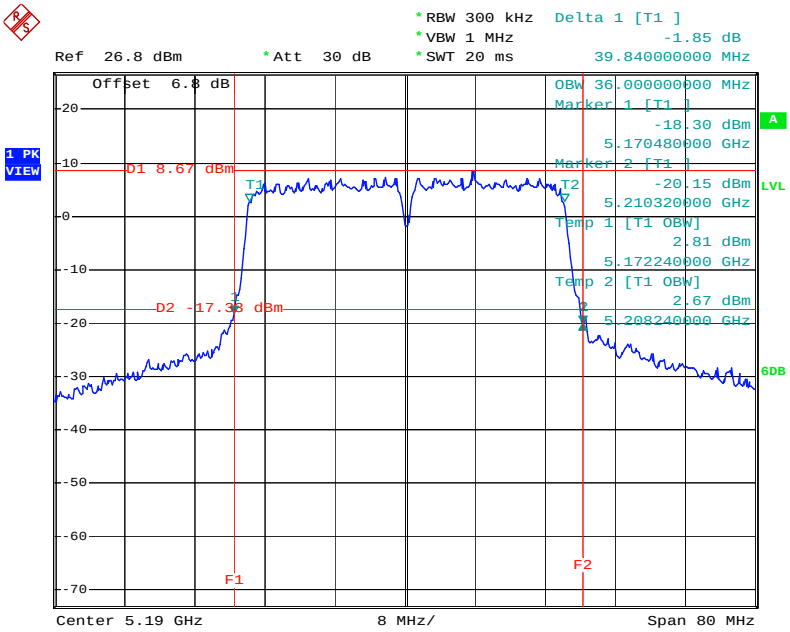
Date: 18.NOV.2009 11:06:29

26 dB Bandwidth Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz) / 5240 MHz



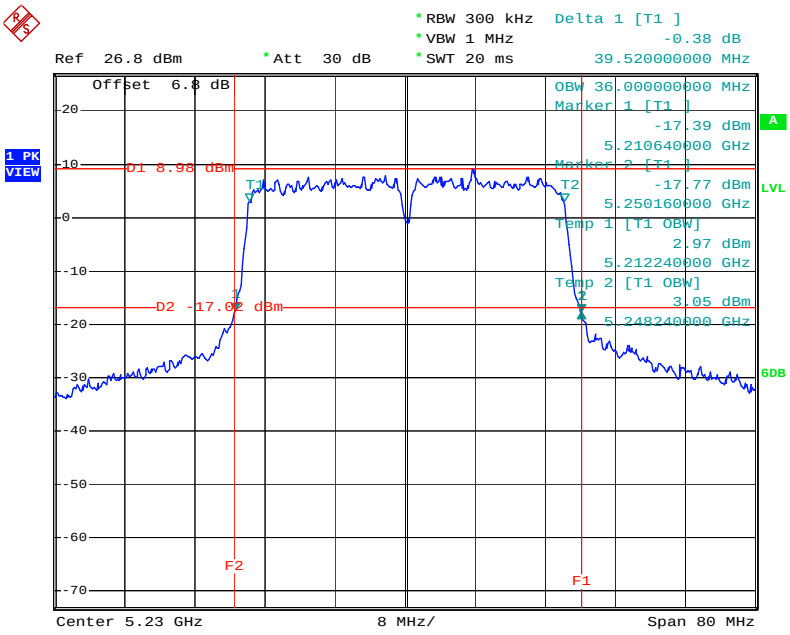
Date: 18.NOV.2009 11:04:00

26 dB Bandwidth Plot on Configuration IEEE 802.11n Ant. A + Ant. B (40MHz) / 5190 MHz



Date: 18.NOV.2009 11:00:47

26 dB Bandwidth Plot on Configuration IEEE 802.11n Ant. A + Ant. B (40MHz) / 5230 MHz



Date: 18.NOV.2009 10:57:33

3.3 Maximum Conducted Output Power Measurement

3.3.1 Limit

For the band 5.15~5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B, where B is the 26 dB emissions bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power and power density from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments and Setting

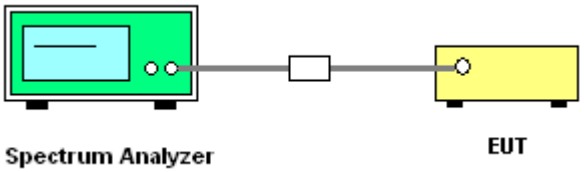
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	300 kHz
Detector	Sample
Trace	Max Hold
Sweep Time	60s

3.3.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with method #3 of FCC Public Notice DA-02-2138.
3. When measuring maximum conducted output power within multiple antenna systems, add every result of the values by mathematic formula.

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 Maximum Conducted Output Power

Final Test Date	Nov. 18, 2009	**Test Site No.**	TH01-HY
Temperature	26℃	**Humidity**	56%
Test Engineer	Allen	**Configuration**	802.11a/n

For Single Chain:

Configuration of IEEE 802.11a

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.71	15.60	**Complies**
40	5200 MHz	11.18	15.60	**Complies**
48	5240 MHz	12.63	15.60	**Complies**

Configuration IEEE 802.11n (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.63	15.60	**Complies**
40	5200 MHz	12.34	15.60	**Complies**
48	5240 MHz	12.78	15.60	**Complies**

Configuration IEEE 802.11n (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	14.95	15.60	**Complies**
46	5230 MHz	15.40	15.60	**Complies**

For Two Chain:

Configuration IEEE 802.11n Ant. A (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	9.69	15.60	**Complies**
40	5200 MHz	10.26	15.60	**Complies**
48	5240 MHz	10.06	15.60	**Complies**

Configuration IEEE 802.11n Ant. B (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	8.31	15.60	**Complies**
40	5200 MHz	8.45	15.60	**Complies**
48	5240 MHz	6.95	15.60	**Complies**

Configuration IEEE 802.11n Ant. A + Ant. B (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.06	15.60	**Complies**
40	5200 MHz	12.46	15.60	**Complies**
48	5240 MHz	11.79	15.60	**Complies**

Configuration IEEE 802.11n Ant. A (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	11.76	15.60	**Complies**
46	5230 MHz	13.26	15.60	**Complies**

Configuration IEEE 802.11n Ant. B (40MHz)

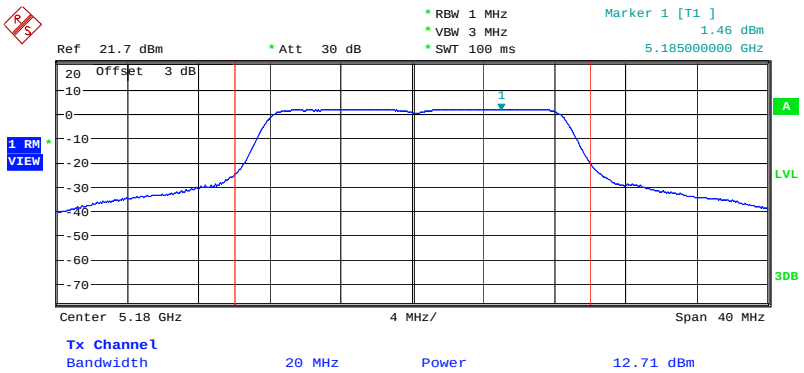
Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	10.35	15.60	**Complies**
46	5230 MHz	10.58	15.60	**Complies**

Configuration IEEE 802.11n Ant. A + Ant. B (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	14.12	15.60	**Complies**
46	5230 MHz	15.13	15.60	**Complies**

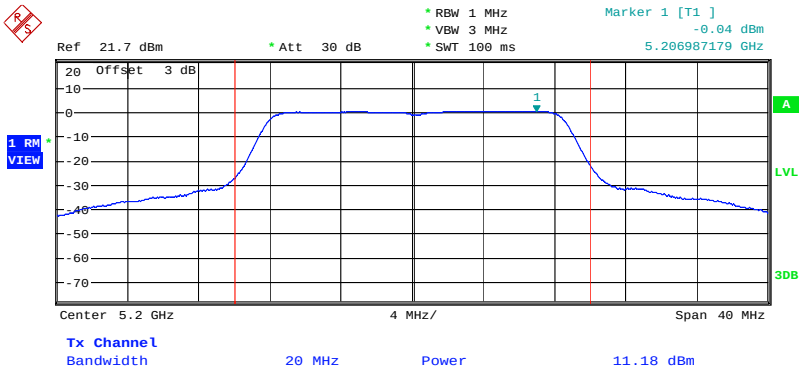
For Single Chain:

Channel Output Power Plot on Configuration IEEE 802.11a / 5180 MHz



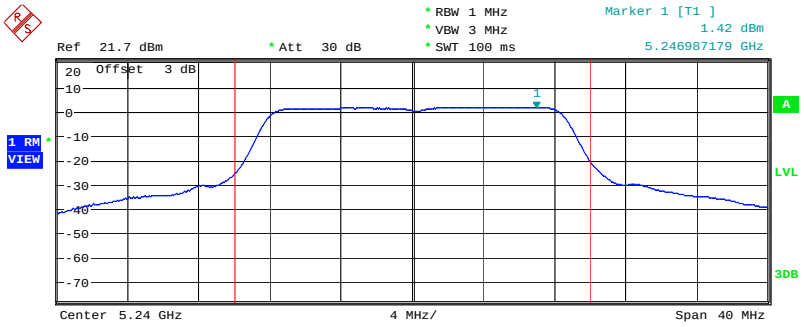
Date: 18.NOV.2009 11:57:52

Channel Output Power Plot on Configuration IEEE 802.11a / 5200 MHz



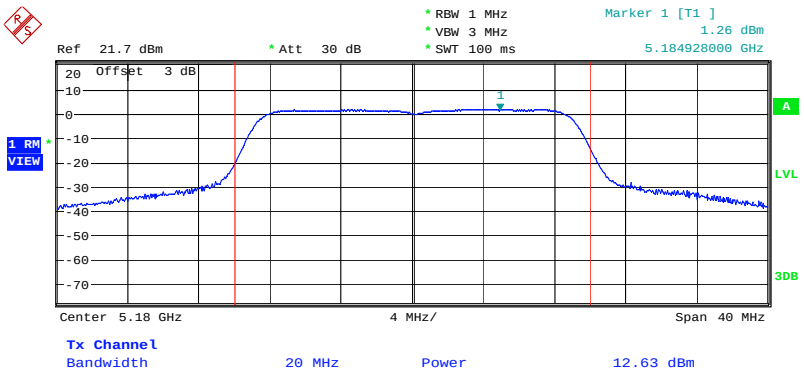
Date: 18.NOV.2009 11:57:05

Channel Output Power Plot on Configuration IEEE 802.11a / 5240 MHz



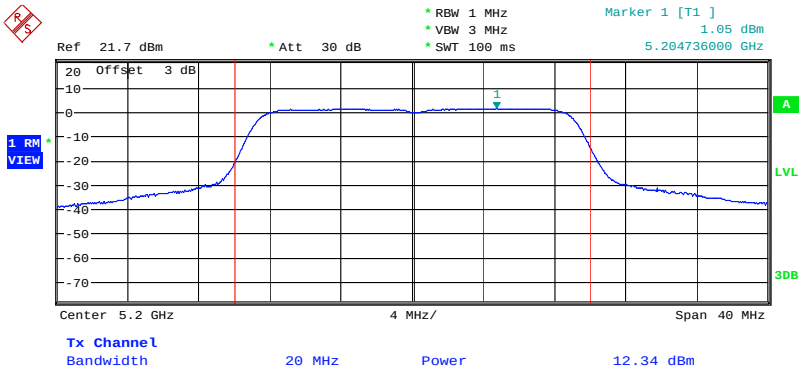
Date: 18.NOV.2009 11:56:09

Channel Output Power Plot on Configuration IEEE 802.11n (20MHz) / 5180 MHz



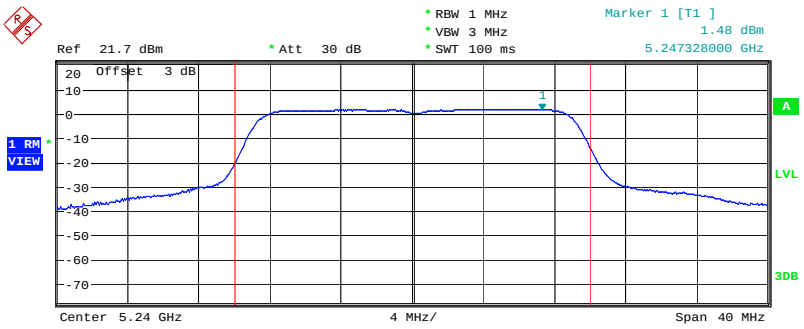
Date: 18.NOV.2009 13:50:47

Channel Output Power Plot on Configuration IEEE 802.11n (20MHz) / 5200 MHz



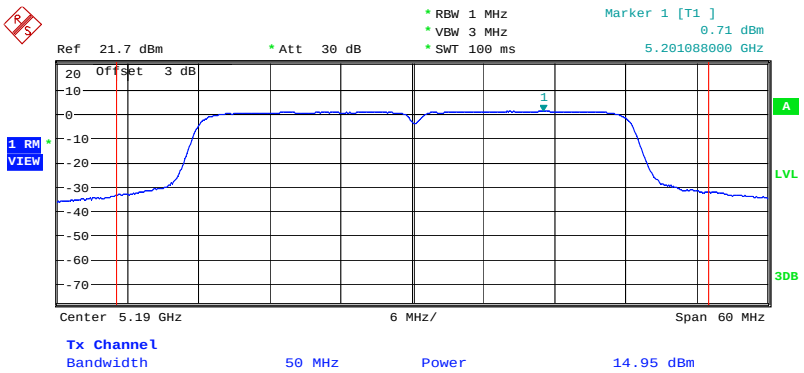
Date: 18.NOV.2009 13:51:37

Channel Output Power Plot on Configuration IEEE 802.11n (20MHz) / 5240 MHz



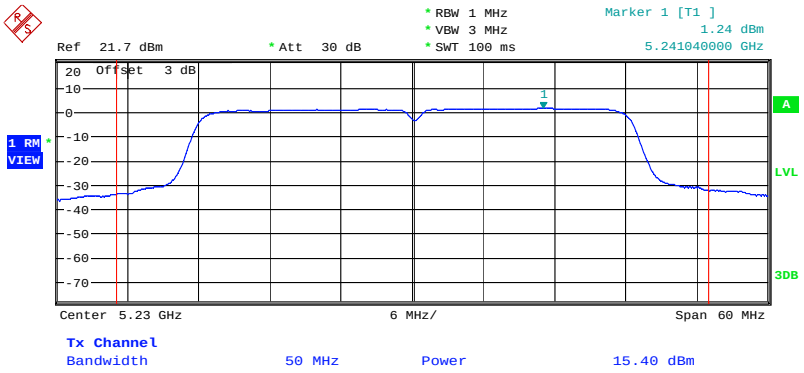
Date: 18.NOV.2009 13:52:24

Channel Output Power Plot on Configuration IEEE 802.11n (40MHz) / 5190 MHz



Date: 18.NOV.2009 14:05:18

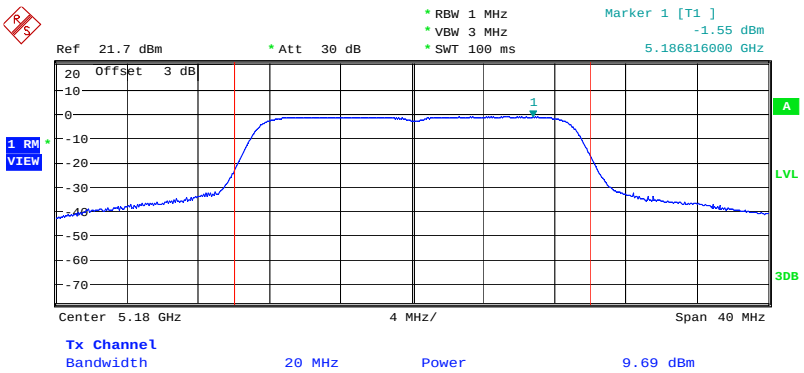
Channel Output Power Plot on Configuration IEEE 802.11n (40MHz) / 5230 MHz



Date: 18.NOV.2009 14:04:07

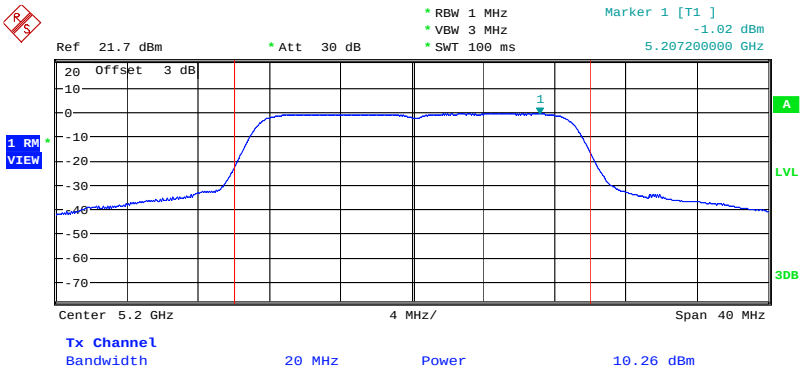
For Two Chain:

Channel Output Power Plot on Configuration IEEE 802.11n Ant. A (20MHz) / 5180 MHz



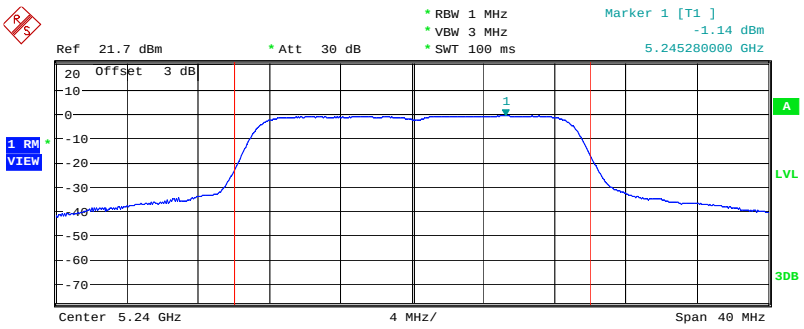
Date: 18.NOV.2009 15:12:01

Channel Output Power Plot on Configuration IEEE 802.11n Ant. A (20MHz) / 5200 MHz



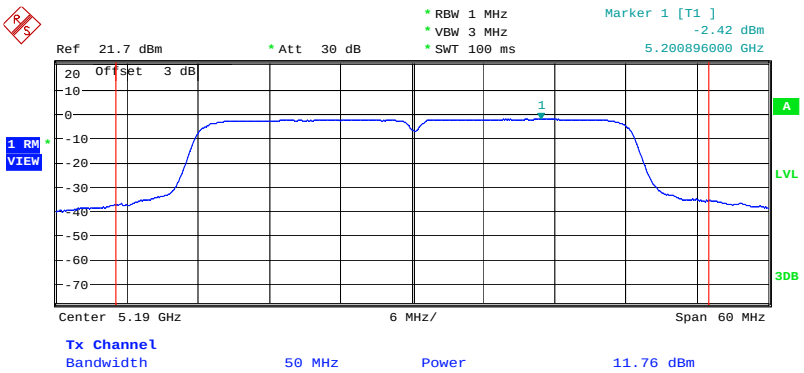
Date: 18.NOV.2009 15:13:00

Channel Output Power Plot on Configuration IEEE 802.11n Ant. A (20MHz) / 5240 MHz



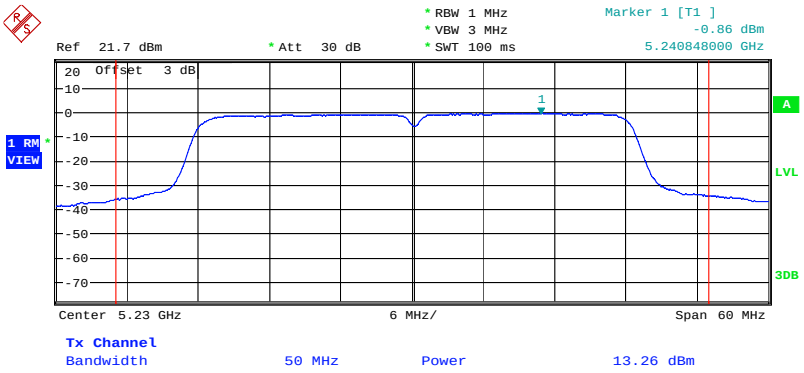
Date: 18.NOV.2009 15:13:54

Channel Output Power Plot on Configuration IEEE 802.11n Ant. A (40MHz) / 5190 MHz



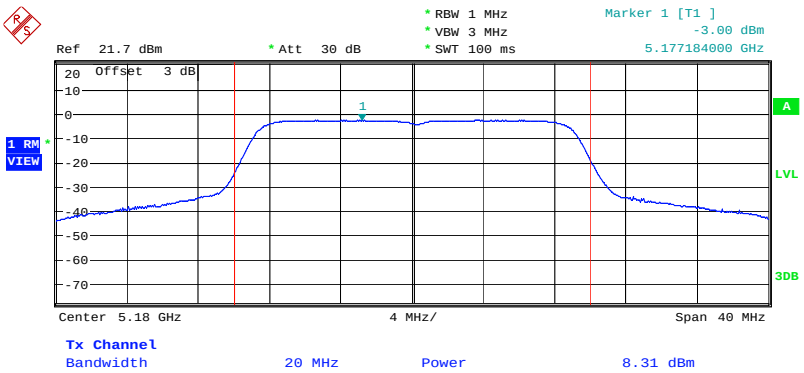
Date: 18.NOV.2009 15:21:19

Channel Output Power Plot on Configuration IEEE 802.11n Ant. A (40MHz) / 5230 MHz



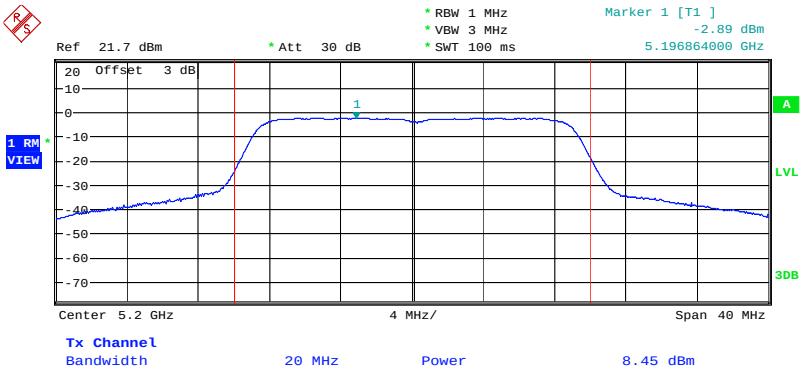
Date: 18.NOV.2009 15:19:59

Channel Output Power Plot on Configuration IEEE 802.11n Ant. B (20MHz) / 5180 MHz



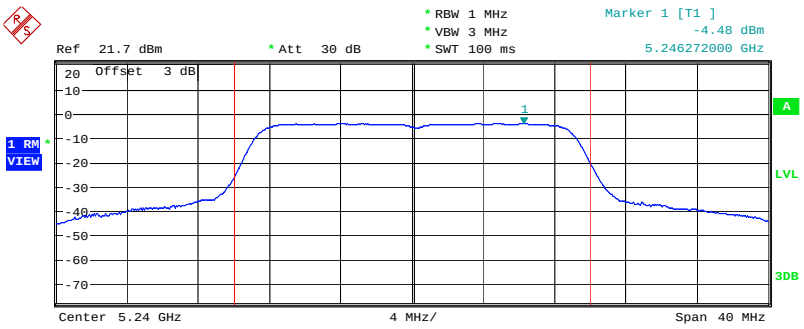
Date: 18.NOV.2009 15:15:17

Channel Output Power Plot on Configuration IEEE 802.11n Ant. B (20MHz) / 5200 MHz



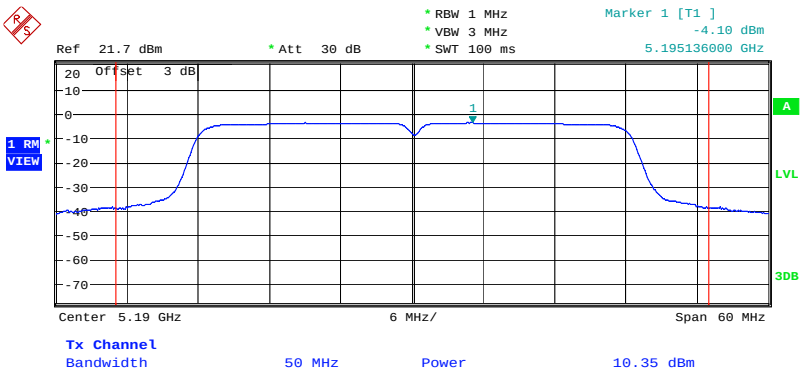
Date: 18.NOV.2009 15:16:00

Channel Output Power Plot on Configuration IEEE 802.11n Ant. B (20MHz) / 5240 MHz



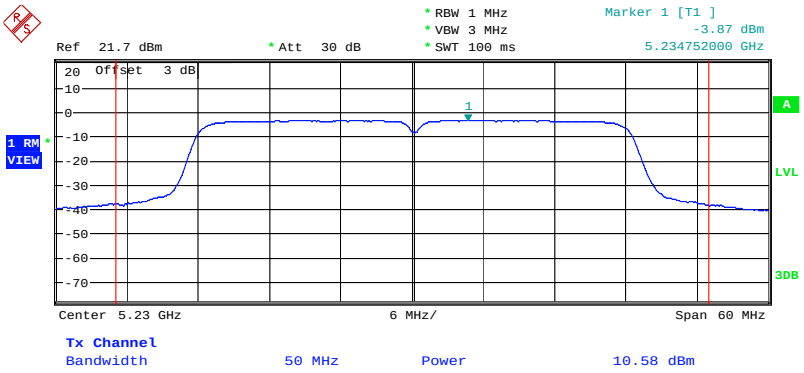
Date: 18.NOV.2009 15:16:52

Channel Output Power Plot on Configuration IEEE 802.11n Ant. B (40MHz) / 5190 MHz



Date: 18.NOV.2009 15:18:04

Channel Output Power Plot on Configuration IEEE 802.11n Ant. B (40MHz) / 5230 MHz



Date: 18.NOV.2009 15:18:44

3.4 Power Spectral Density Measurement

3.4.1 Limit

The power spectral density is defined as the highest level of power in dBm per MHz generated by the transmitter within the power envelope. The following table is power spectral density limits and decrease power density limit rule refer to section 3.3.1.

Frequency Range	Power Spectral Density limit (dBm/MHz)
5.15~5.25 GHz	4
5.25-5.35 GHz	11
5.725-5.825	17

3.4.2 Measuring Instruments and Setting

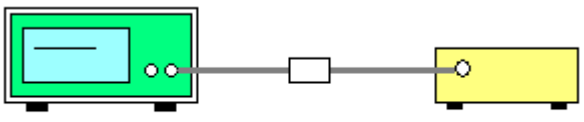
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	3000 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.
2. Set RBW of spectrum analyzer to 1000kHz and VBW to 3000kHz. Set Detector to Peak, Trace to Max Hold. Mark the frequency with maximum peak power as the center of the display of the spectrum.
3. Measuring multiple antennas, the connectors are required to link with Spectrum Analyzer through a combiner.

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 Power Spectral Density

Final Test Date	Nov. 18, 2009	**Test Site No.**	TH01-HY
Temperature	26℃	**Humidity**	56%
Test Engineer	Allen	**Configuration**	802.11a/n

For Single Chain:

Configuration of IEEE 802.11a

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	2.17	2.60	**Complies**
5200 MHz	1.57	2.60	**Complies**
5240 MHz	1.88	2.60	**Complies**

Configuration IEEE 802.11n (20MHz)

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	1.99	2.60	**Complies**
5200 MHz	2.04	2.60	**Complies**
5240 MHz	2.13	2.60	**Complies**

Configuration IEEE 802.11n (40MHz)

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	1.62	2.60	**Complies**
5230 MHz	1.68	2.60	**Complies**

For Two Chain:

Configuration IEEE 802.11n Ant. A + Ant. B (20MHz)

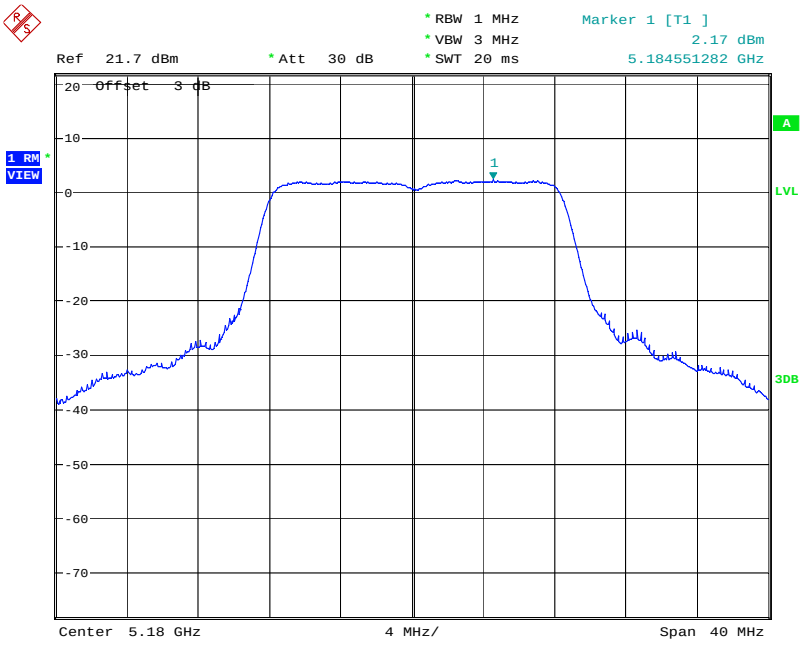
Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	1.56	2.60	**Complies**
5200 MHz	2.15	2.60	**Complies**
5240 MHz	1.78	2.60	**Complies**

Configuration IEEE 802.11n Ant. A + Ant. B (40MHz)

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	2.31	2.60	**Complies**
5230 MHz	2.20	2.60	**Complies**

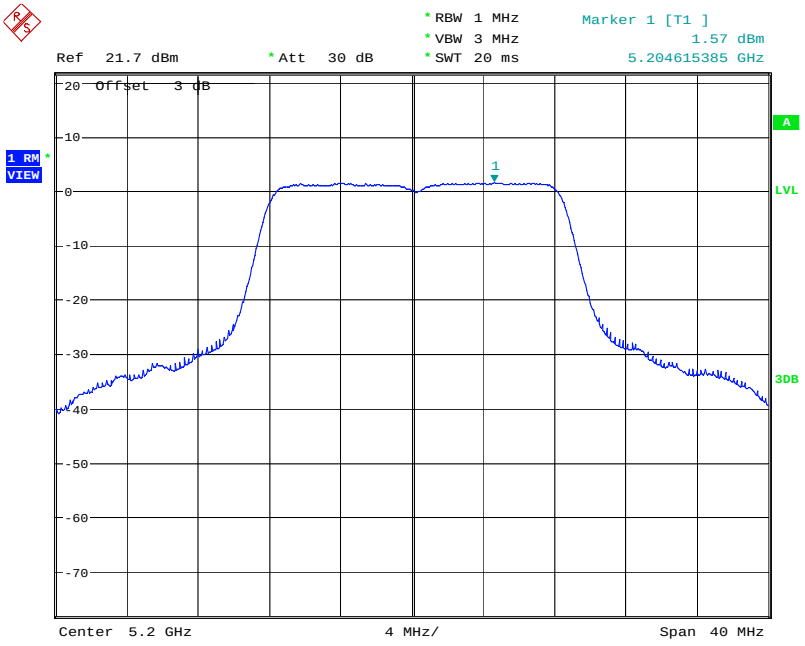
For Single Chain:

Power Density Plot on Configuration IEEE 802.11a / 5180 MHz



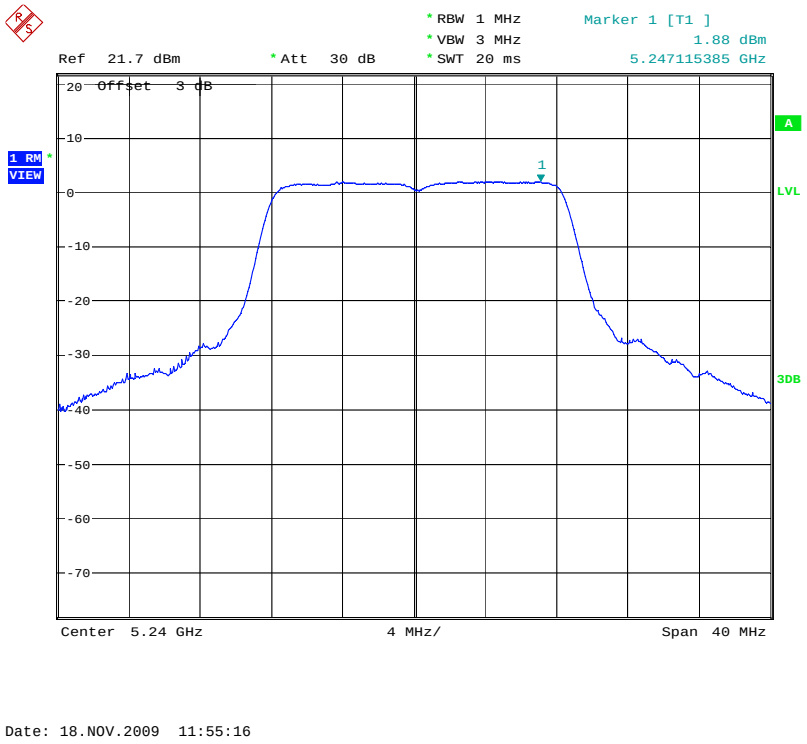
Date: 18.NOV.2009 11:52:31

Power Density Plot on Configuration IEEE 802.11a / 5200 MHz

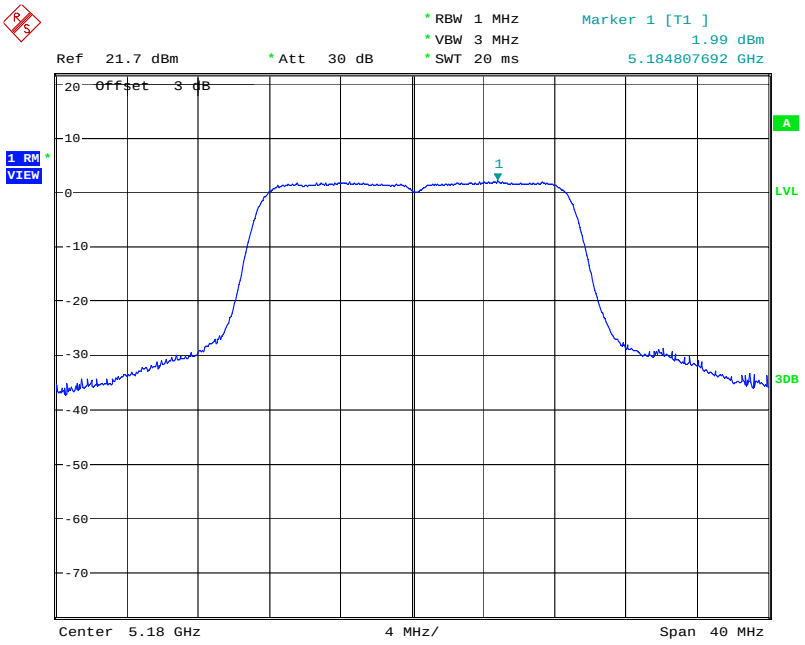


Date: 18.NOV.2009 11:53:52

Power Density Plot on Configuration IEEE 802.11a / 5240 MHz

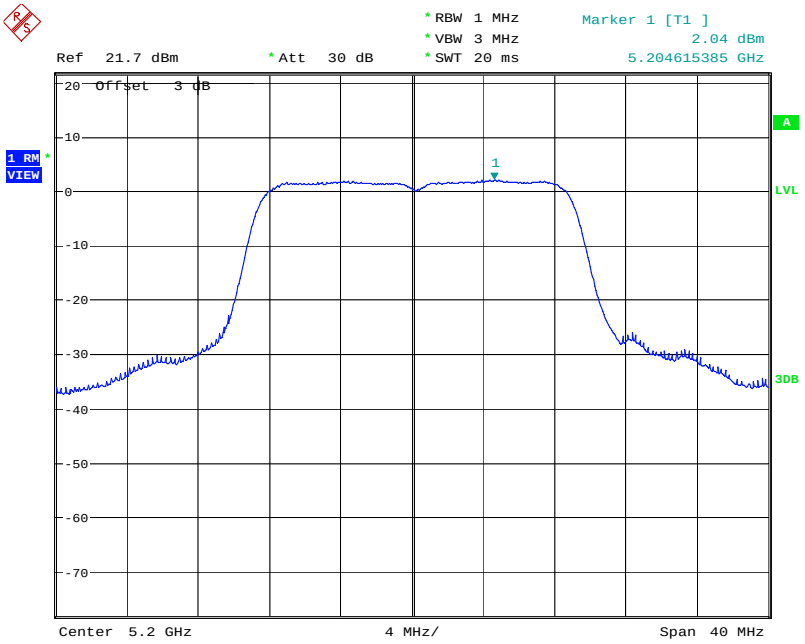


Power Density Plot on Configuration IEEE 802.11n (20MHz) / 5180 MHz



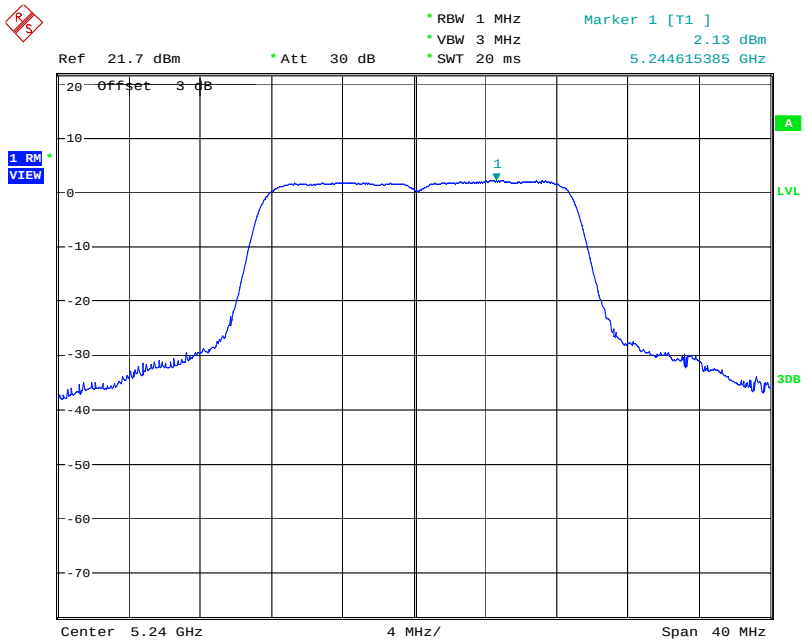
Date: 18.NOV.2009 12:00:07

Power Density Plot on Configuration IEEE 802.11n (20MHz) / 5200 MHz

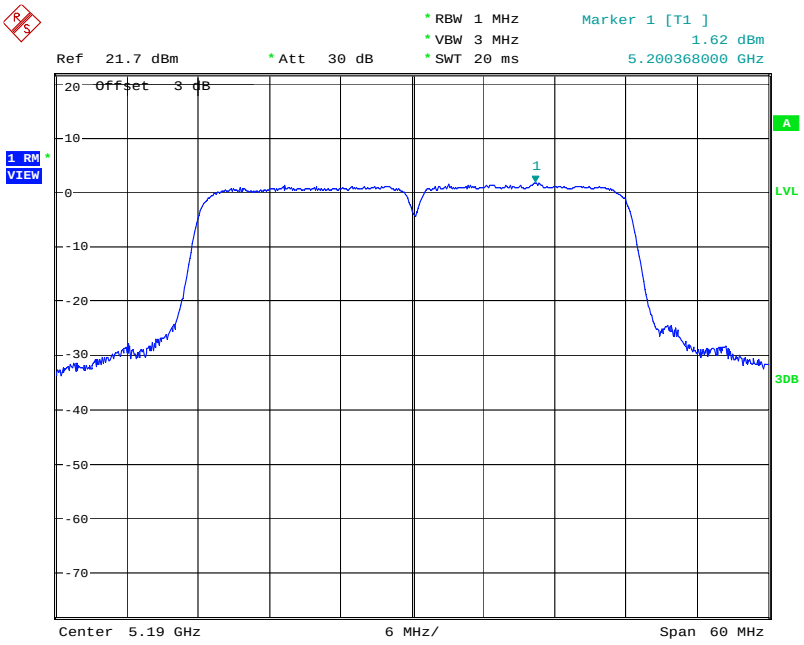


Date: 18.NOV.2009 13:32:46

Power Density Plot on Configuration IEEE 802.11n (20MHz) / 5240 MHz

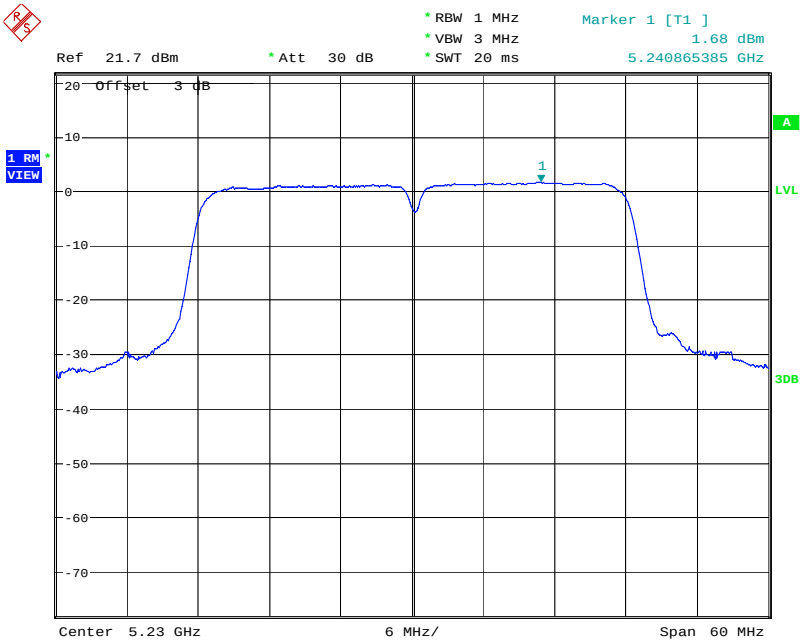


Power Density Plot on Configuration IEEE 802.11n (40MHz) / 5190 MHz



Date: 18.NOV.2009 13:48:44

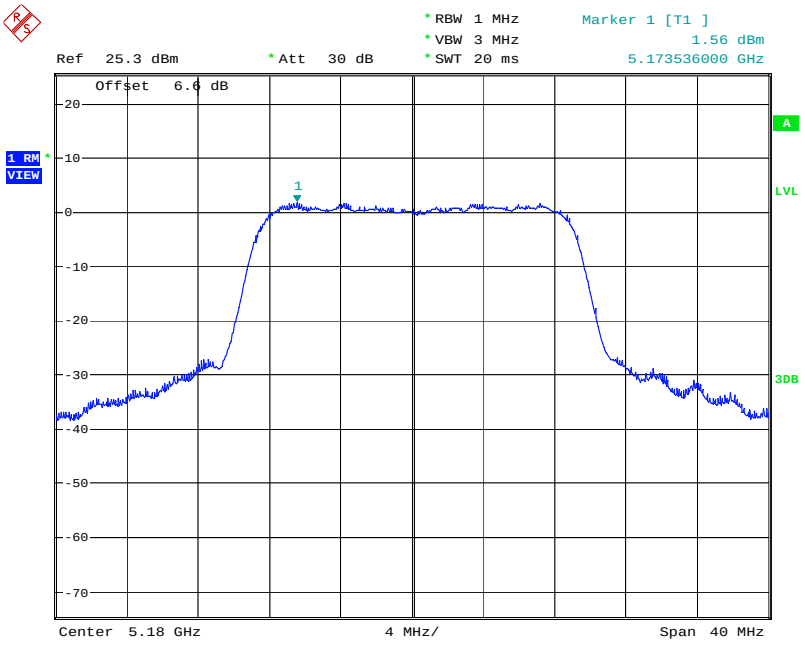
Power Density Plot on Configuration IEEE 802.11n (40MHz) / 5230 MHz



Date: 18.NOV.2009 13:45:35

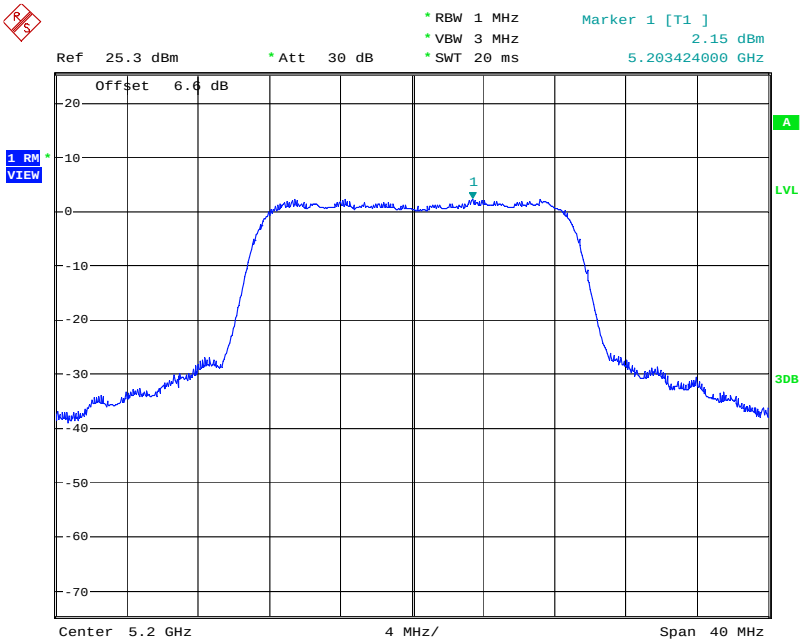
For Two Chain:

Power Density Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz) / 5180 MHz



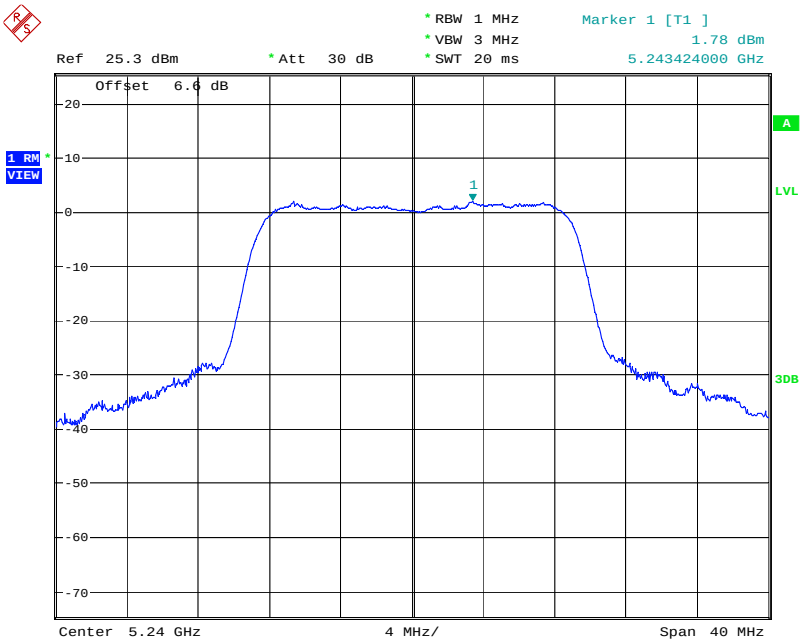
Date: 18.NOV.2009 14:57:18

Power Density Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz) / 5200 MHz

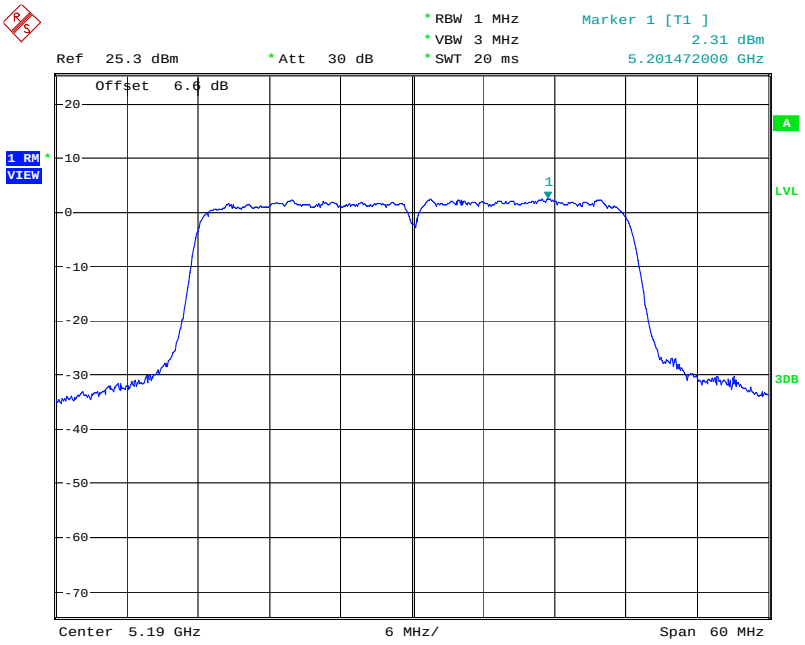


Date: 18.NOV.2009 14:55:27

Power Density Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz) / 5240 MHz

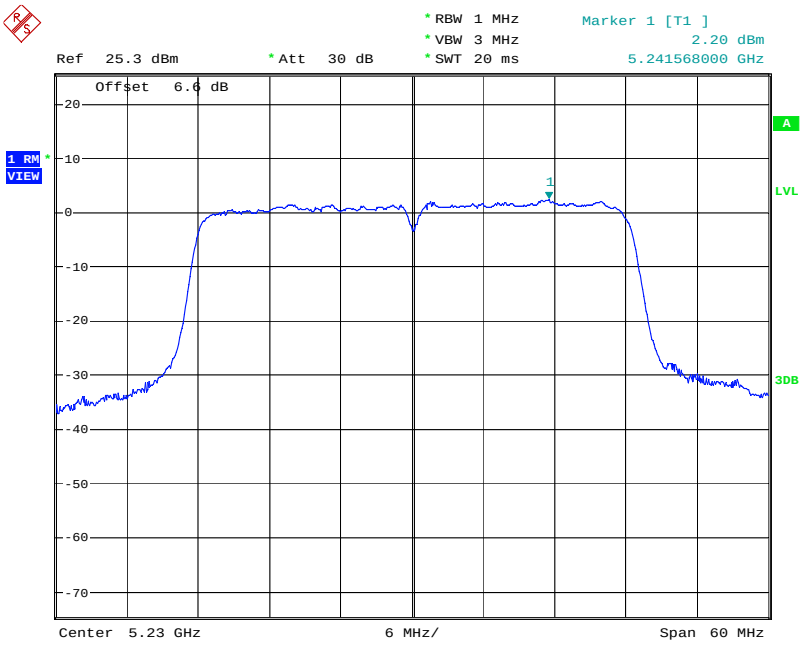


Power Density Plot on Configuration IEEE 802.11n Ant. A + Ant. B (40MHz) / 5190 MHz



Date: 18.NOV.2009 15:01:27

Power Density Plot on Configuration IEEE 802.11n Ant. A + Ant. B (40MHz) / 5230 MHz



Date: 18.NOV.2009 15:02:45

3.5 Peak Excursion Measurement

3.5.1 Limit

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emissions bandwidth whichever is less.

3.5.2 Measuring Instruments and Setting

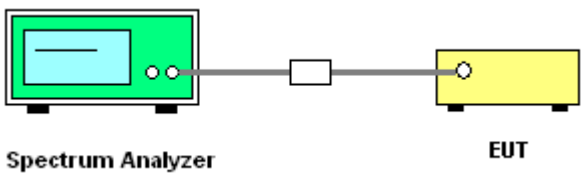
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz (Peak Trace) / 1000 kHz (Average Trace)
VB	3000 kHz (Peak Trace) / 300 kHz (Average Trace)
Detector	Peak (Peak Trace) / Sample (Average Trace)
Trace	Max Hold
Sweep Time	60s

3.5.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set the spectrum analyzer span to view the entire emissions bandwidth. The largest difference between the following two traces (Peak Trace and Average Trace) must be ≤ 13 dB for all frequencies across the emissions bandwidth. Submit a plot.
3. Peak Trace: Set RBW = 1 MHz, VBW ≥ 3 MHz with peak detector and max-hold settings.
4. Average Trace: Method #3—video averaging with max hold--and sum power across the band. Set span to encompass the entire emissions bandwidth (EBW) of the signal. Set sweep trigger to “free run”. Set RBW = 1 MHz. Set VBW ≥ 1/T (IEEE 802.11a VBW = 300kHz ≥ 1/4μs). Use sample detector mode if bin width (i.e., span/number of points in spectrum) < 0.5 RBW. Otherwise use peak detector mode. Set max hold. Allow max hold to run for 60 seconds.
5. Measuring multiple antennas, the connectors are required to link with Spectrum Analyzer through a combiner.

3.5.4 Test Setup Layout



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 Test Result of Peak Excursion

Final Test Date	Nov. 18, 2009	**Test Site No.**	TH01-HY
Temperature	26℃	**Humidity**	56%
Test Engineer	Allen	**Configuration**	802.11a/n

For Single Chain:

Configuration of IEEE 802.11a

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	8.85	13	**Complies**
5200 MHz	9.02	13	**Complies**
5240 MHz	8.96	13	**Complies**

Configuration IEEE 802.11n (20MHz)

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	9.05	13	**Complies**
5200 MHz	9.02	13	**Complies**
5240 MHz	9.20	13	**Complies**

Configuration IEEE 802.11n (40MHz)

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5190 MHz	9.21	13	**Complies**
5230 MHz	9.23	13	**Complies**

For Two Chain:

Configuration IEEE 802.11n Ant. A + Ant. B (20MHz)

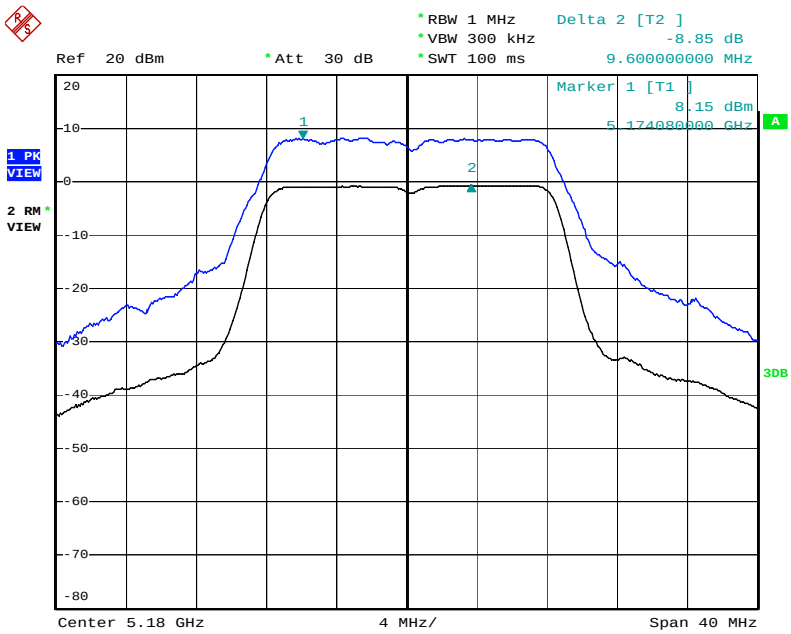
Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	9.87	13	**Complies**
5200 MHz	9.93	13	**Complies**
5240 MHz	9.98	13	**Complies**

Configuration IEEE 802.11n Ant. A + Ant. B (40MHz)

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5190 MHz	9.61	13	**Complies**
5230 MHz	9.73	13	**Complies**

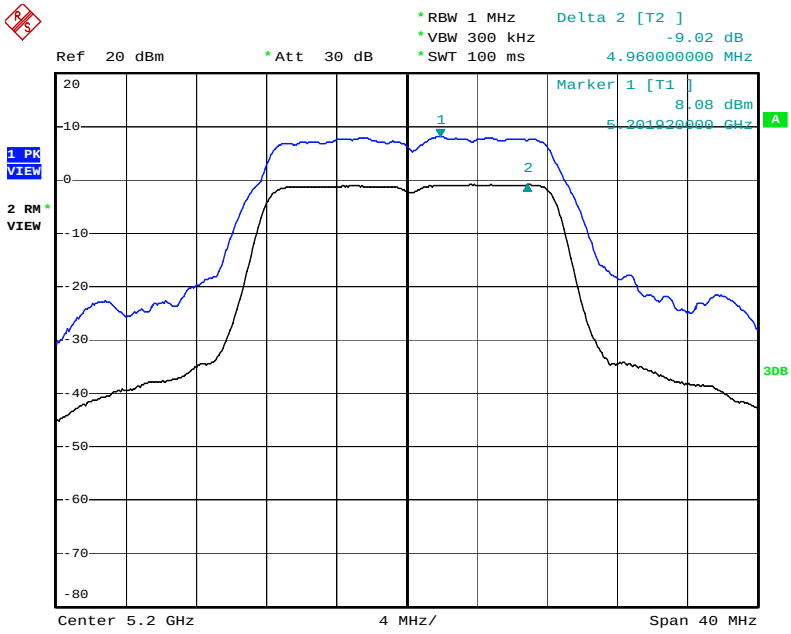
For Single Chain:

Peak Excursion Plot on Configuration IEEE 802.11a / 5180 MHz



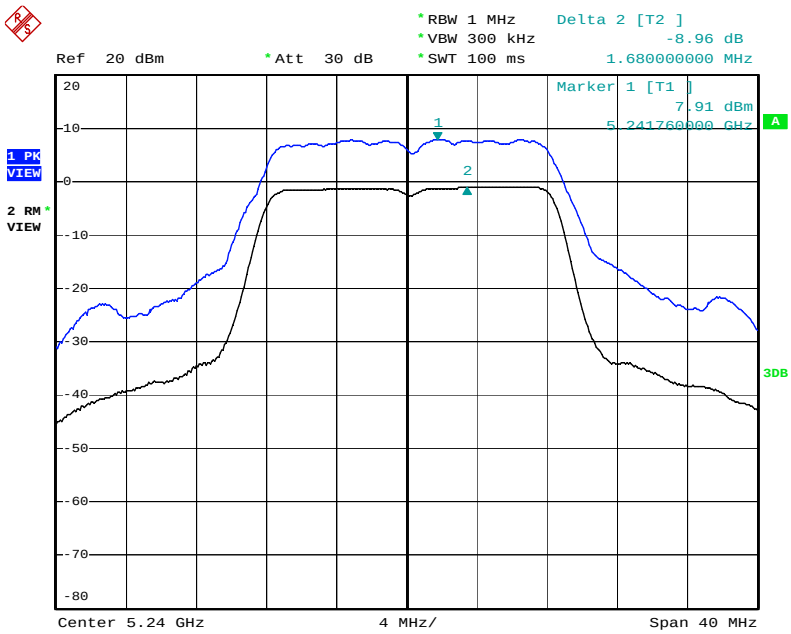
Date: 18.NOV.2009 07:59:08

Peak Excursion Plot on Configuration IEEE 802.11a / 5200 MHz



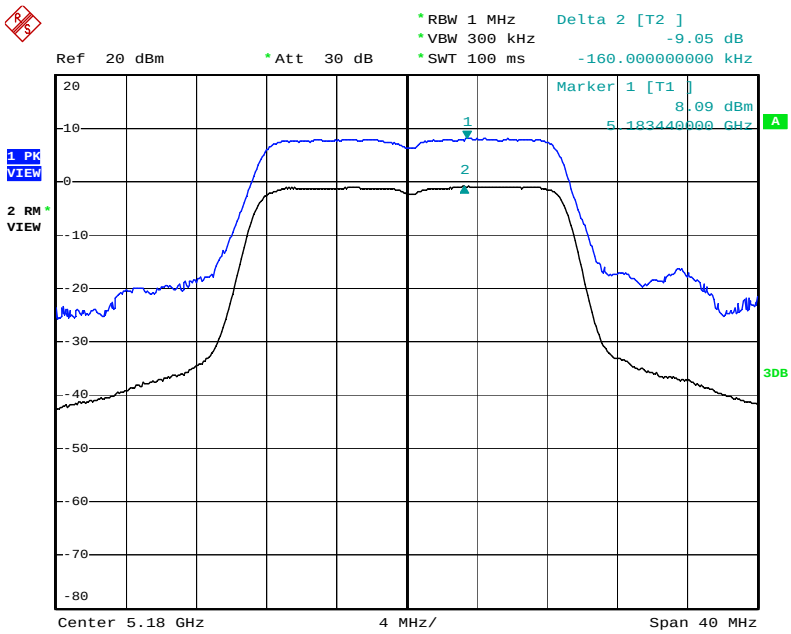
Date: 18.NOV.2009 08:27:06

Peak Excursion Plot on Configuration IEEE 802.11a / 5240 MHz

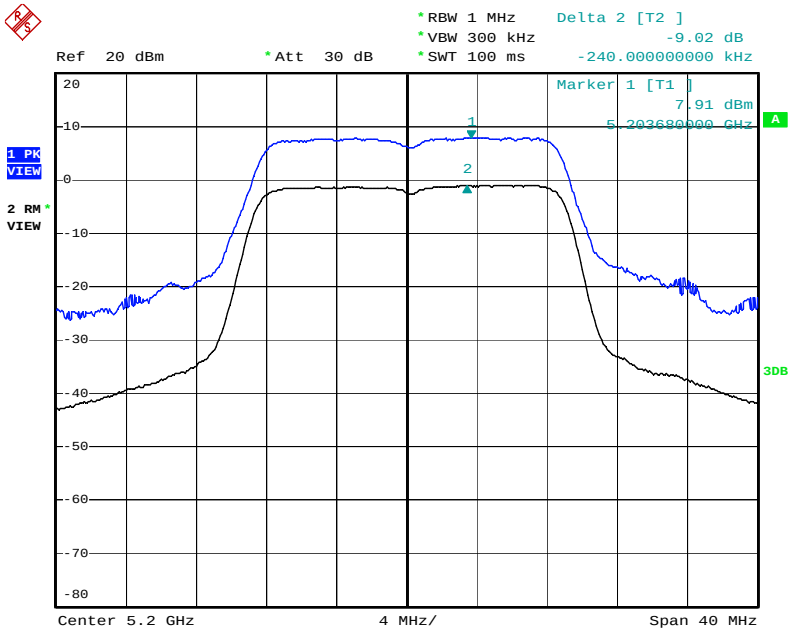


Date: 18.NOV.2009 08:23:41

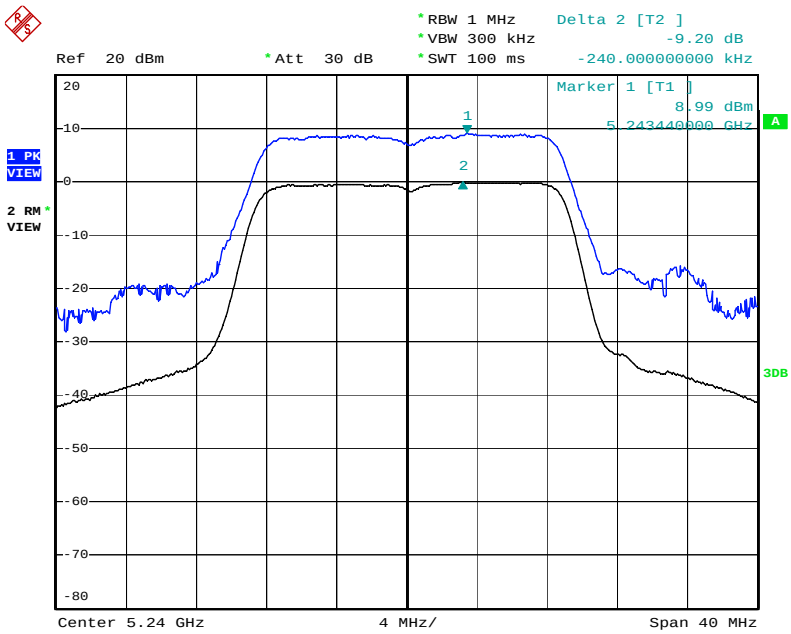
Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) / 5180 MHz



Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) / 5200 MHz

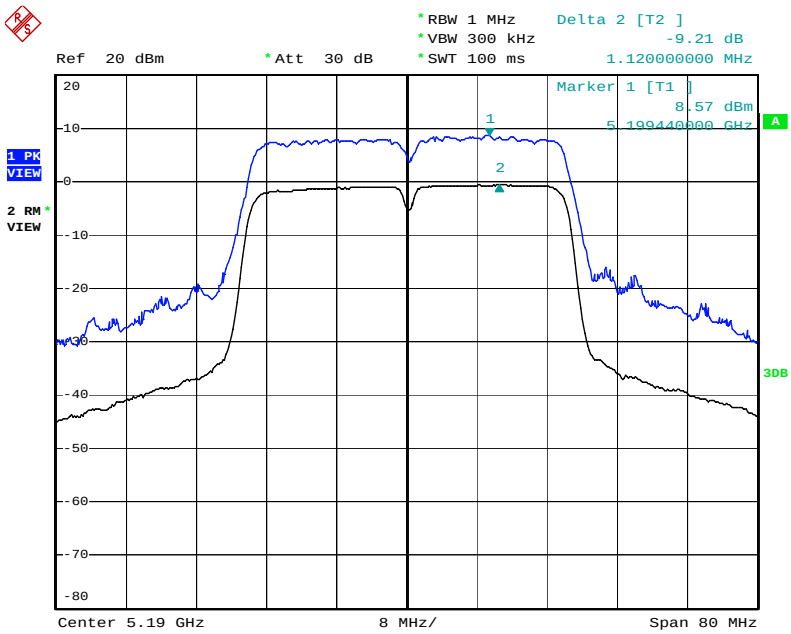


Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) / 5240 MHz



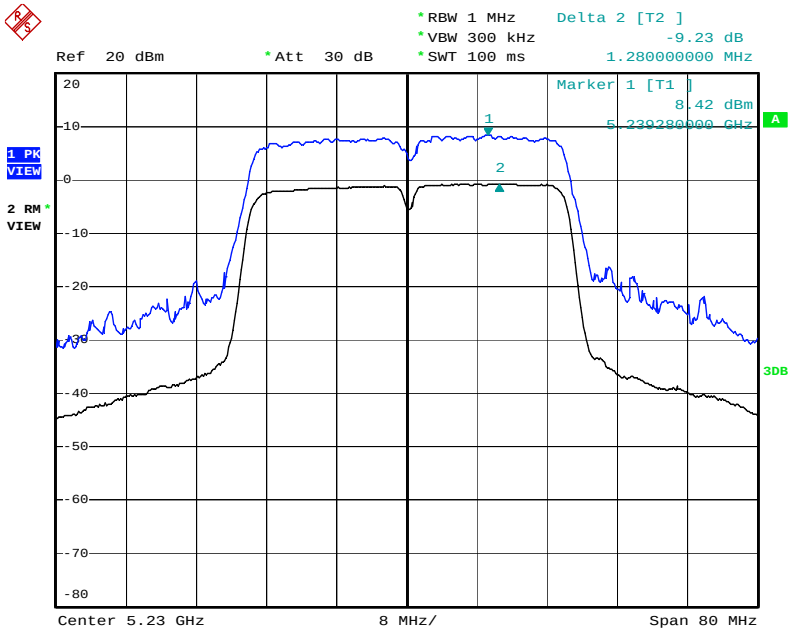
Date: 18.NOV.2009 08:41:06

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) / 5190 MHz



Date: 18.NOV.2009 08:48:08

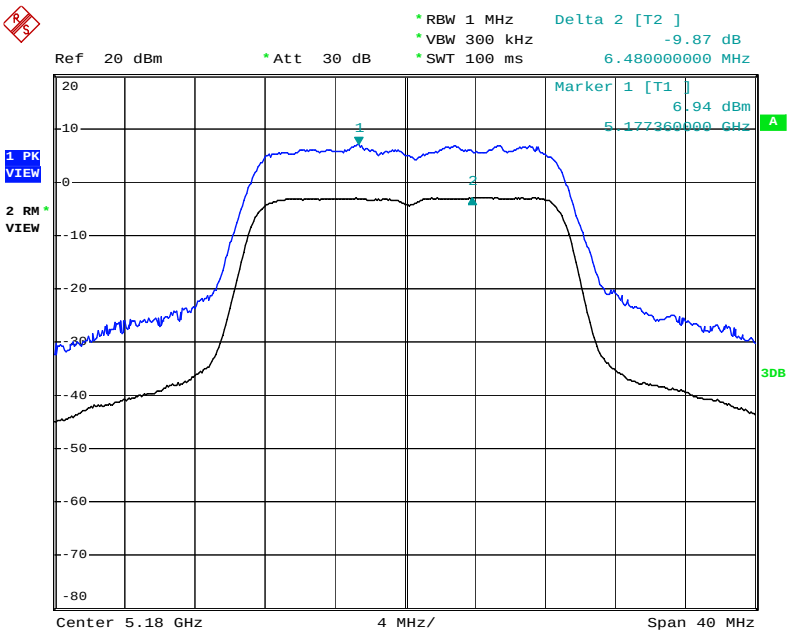
Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) / 5230 MHz



Date: 18.NOV.2009 08:53:45

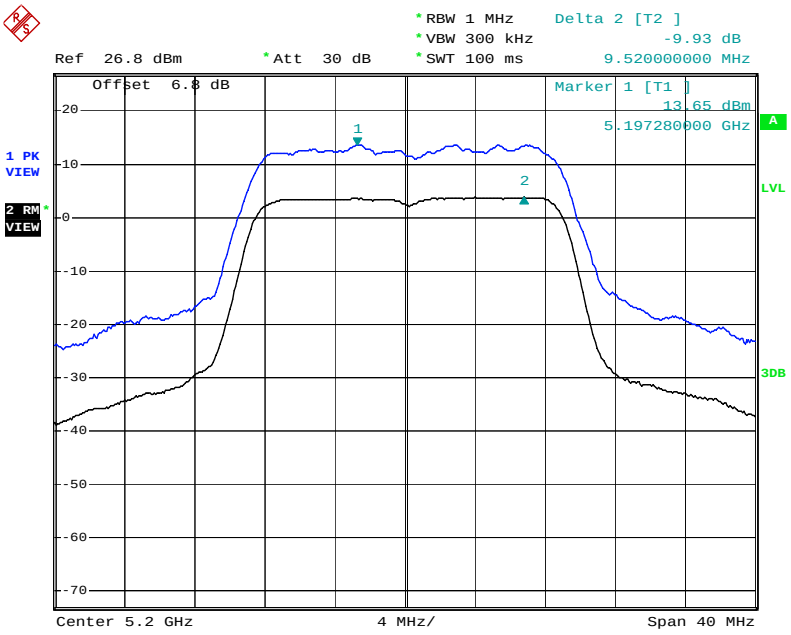
For Two Chain:

Peak Excursion Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz) / 5180 MHz



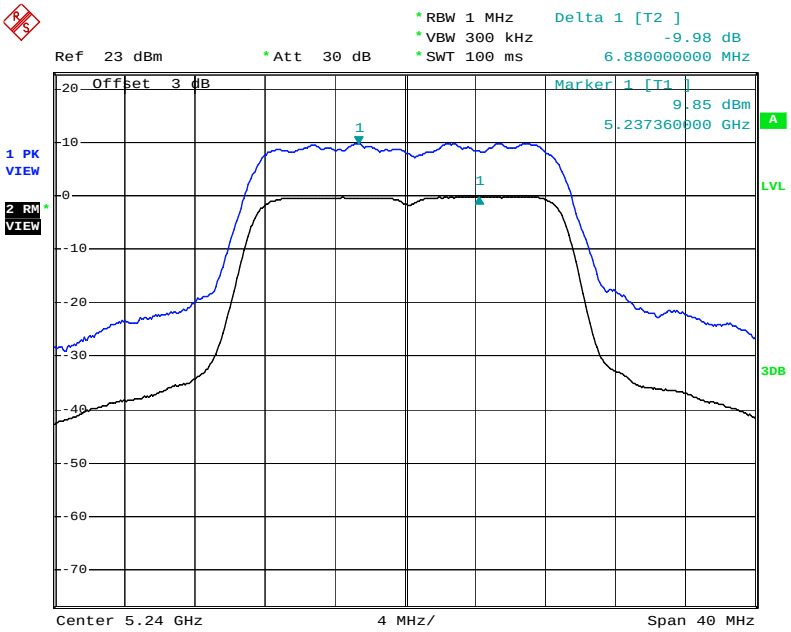
Date: 18.NOV.2009 11:18:27

Peak Excursion Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz) / 5200 MHz



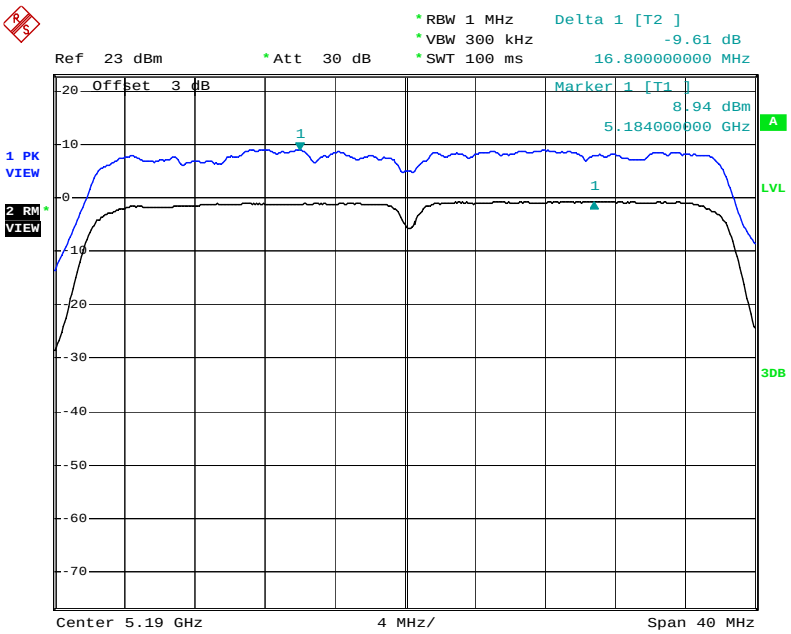
Date: 18.NOV.2009 11:23:03

Peak Excursion Plot on Configuration IEEE 802.11n Ant. A + Ant. B (20MHz) / 5240 MHz



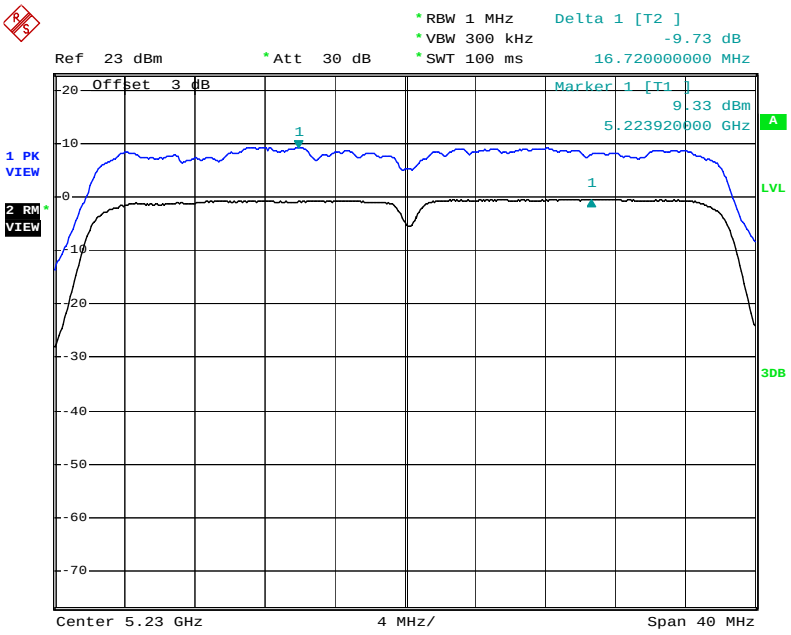
Date: 18.NOV.2009 13:33:07

Peak Excursion Plot on Configuration IEEE 802.11n Ant. A + Ant. B (40MHz) / 5190 MHz



Date: 18.NOV.2009 13:36:05

Peak Excursion Plot on Configuration IEEE 802.11n Ant. A + Ant. B (40MHz) / 5230 MHz



Date: 18.NOV.2009 13:37:25

3.6 Radiated Emissions Measurement

3.6.1 Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBuV/m at 3m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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 spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
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

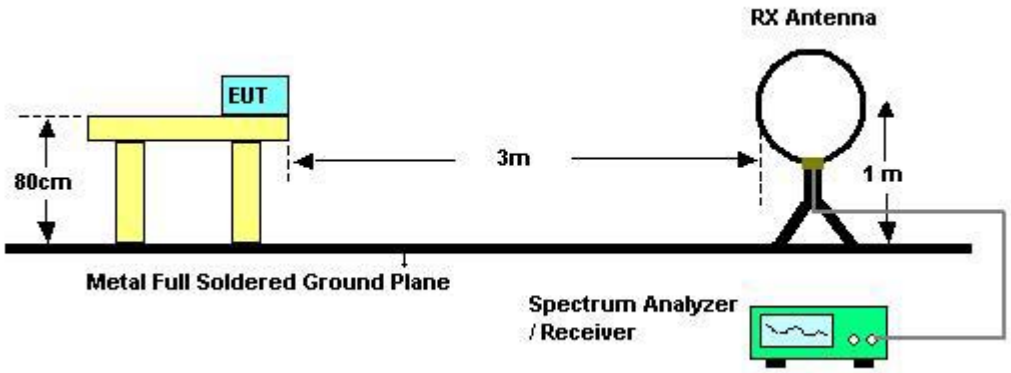
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.6.3 Test Procedures

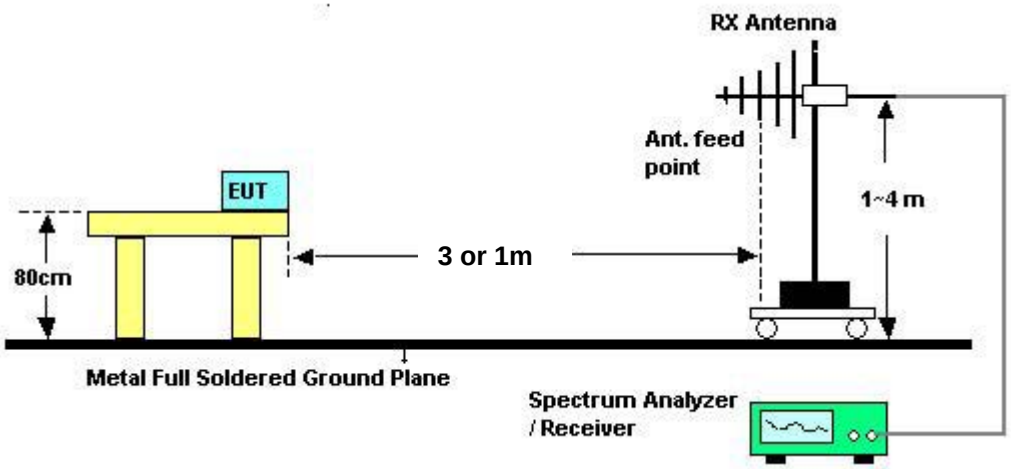
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

3.6.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

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

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

Final Test Date	Nov. 13, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven		

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 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

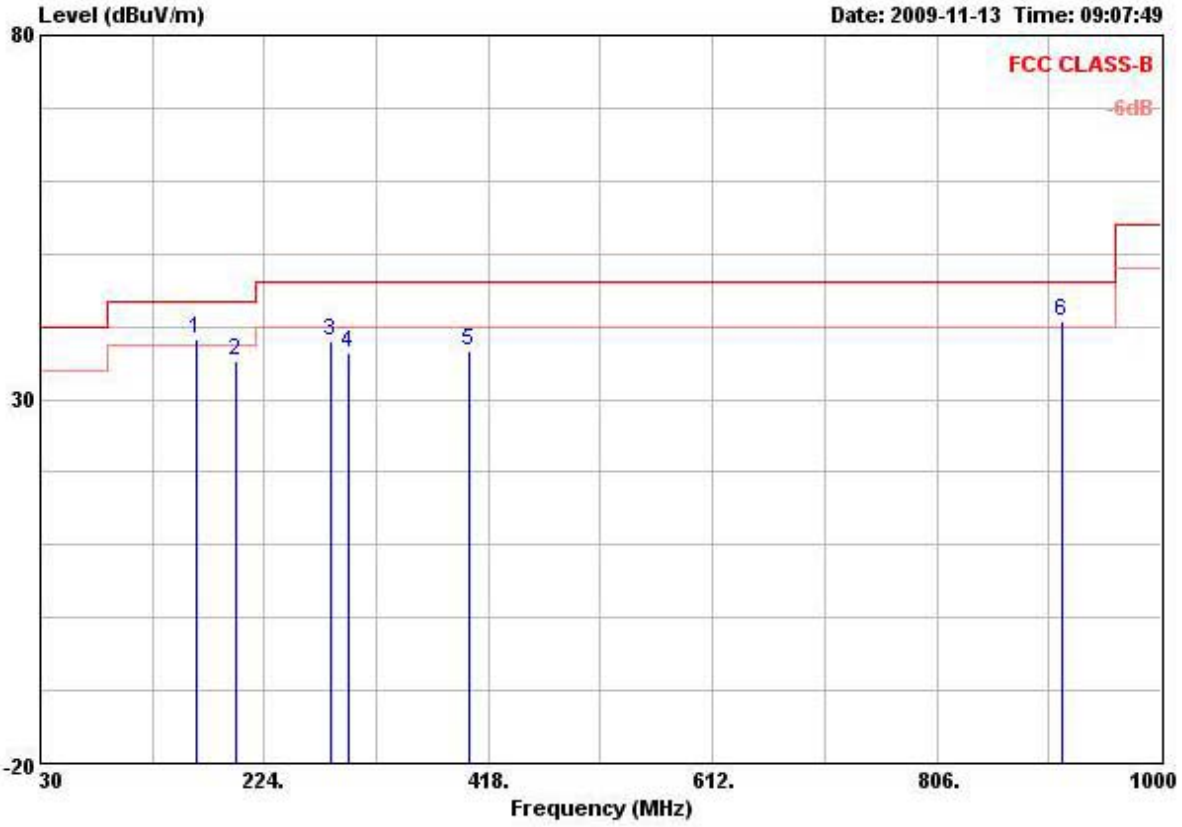
Limit line = specific limits (dBuV) + distance extrapolation factor.

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

For Two Chain:

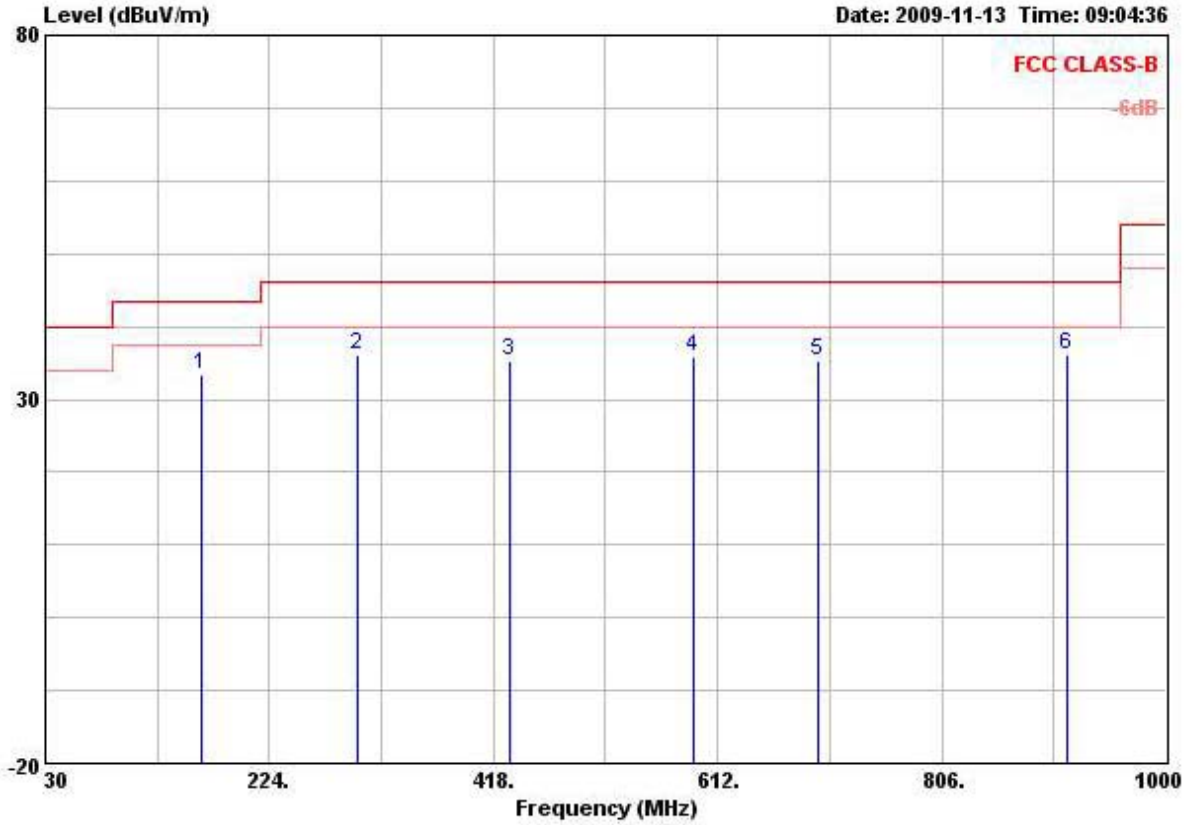
Final Test Date	Nov. 13, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	Normal Mode

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 !	164.830	38.36	-5.14	43.50	56.52	10.83	1.31	30.30	Peak	---	---
2	198.780	35.40	-8.10	43.50	53.25	10.94	1.44	30.23	Peak	---	---
3	281.230	37.92	-8.08	46.00	52.88	13.64	1.70	30.30	Peak	---	---
4	296.750	36.25	-9.75	46.00	51.29	13.61	1.75	30.40	Peak	---	---
5	400.540	36.71	-9.29	46.00	48.91	16.21	2.04	30.45	Peak	---	---
6 !	913.670	40.79	-5.21	46.00	43.48	23.96	3.06	29.71	Peak	---	---

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	164.830	33.43	-10.07	43.50	51.59	10.83	1.31	30.30	Peak	---	---
2	299.660	36.15	-9.85	46.00	51.21	13.60	1.76	30.42	Peak	---	---
3	432.550	35.35	-10.65	46.00	47.07	16.46	2.11	30.29	Peak	---	---
4	590.660	35.81	-10.19	46.00	41.87	21.60	2.43	30.09	Peak	---	---
5	699.300	35.30	-10.70	46.00	40.99	21.60	2.69	29.98	Peak	---	---
6	913.670	36.16	-9.84	46.00	38.85	23.96	3.06	29.71	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).

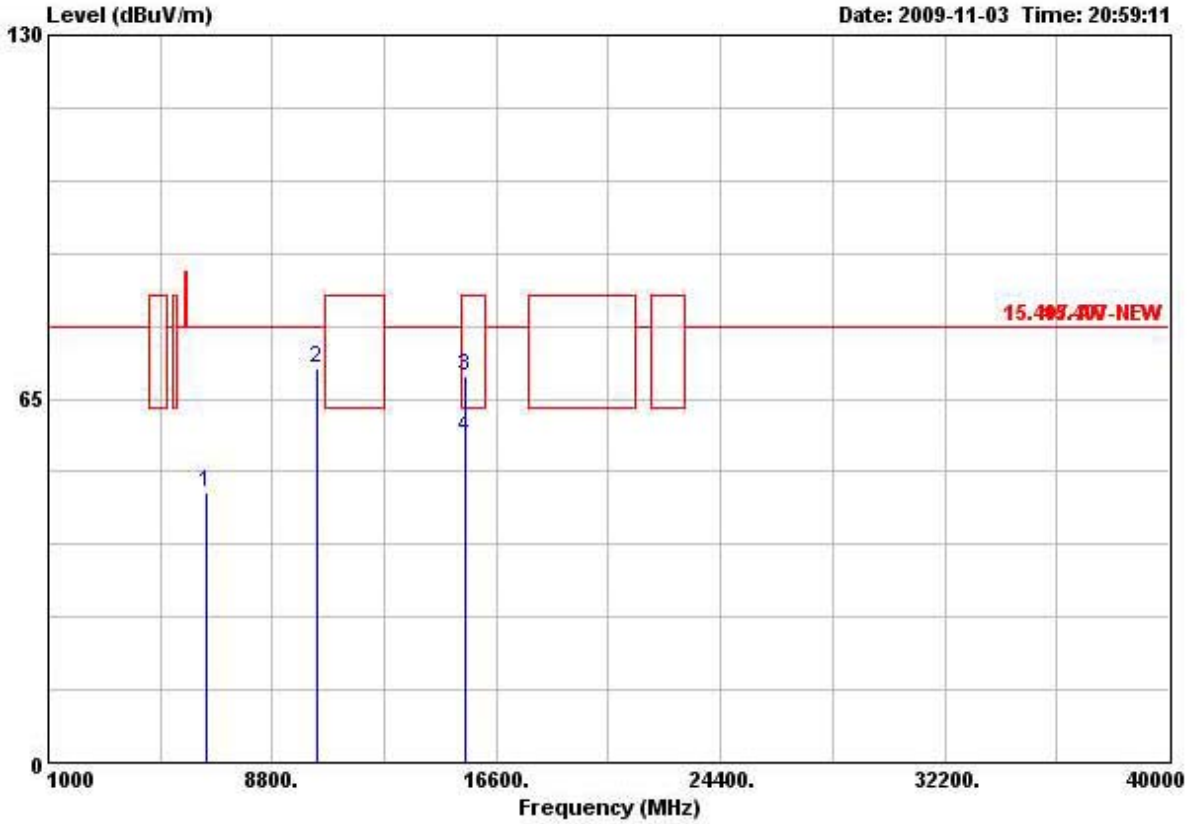
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.6.9 Results for Radiated Emissions (1GHz~40GHz)

For Single Chain:

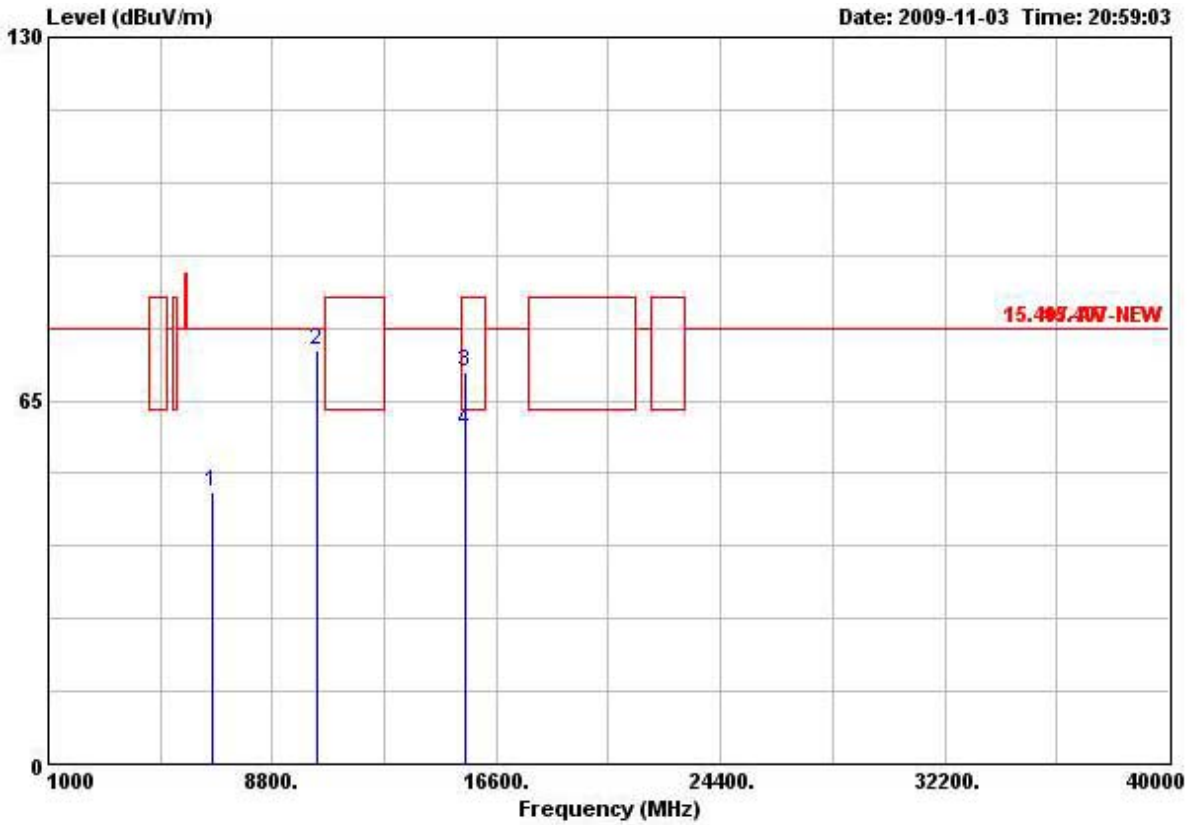
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11a CH 36

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	6504.000	48.20	-29.64	77.84	39.70	35.00	5.36	31.86	Peak	---	---
2	10356.000	70.49	-7.35	77.84	55.30	39.33	7.68	31.82	Peak	---	---
3	15540.000	68.96	-14.58	83.54	52.76	37.51	9.90	31.21	Peak	---	---
4	15540.000	58.26	-5.28	63.54	42.06	37.51	9.90	31.21	Average	---	---

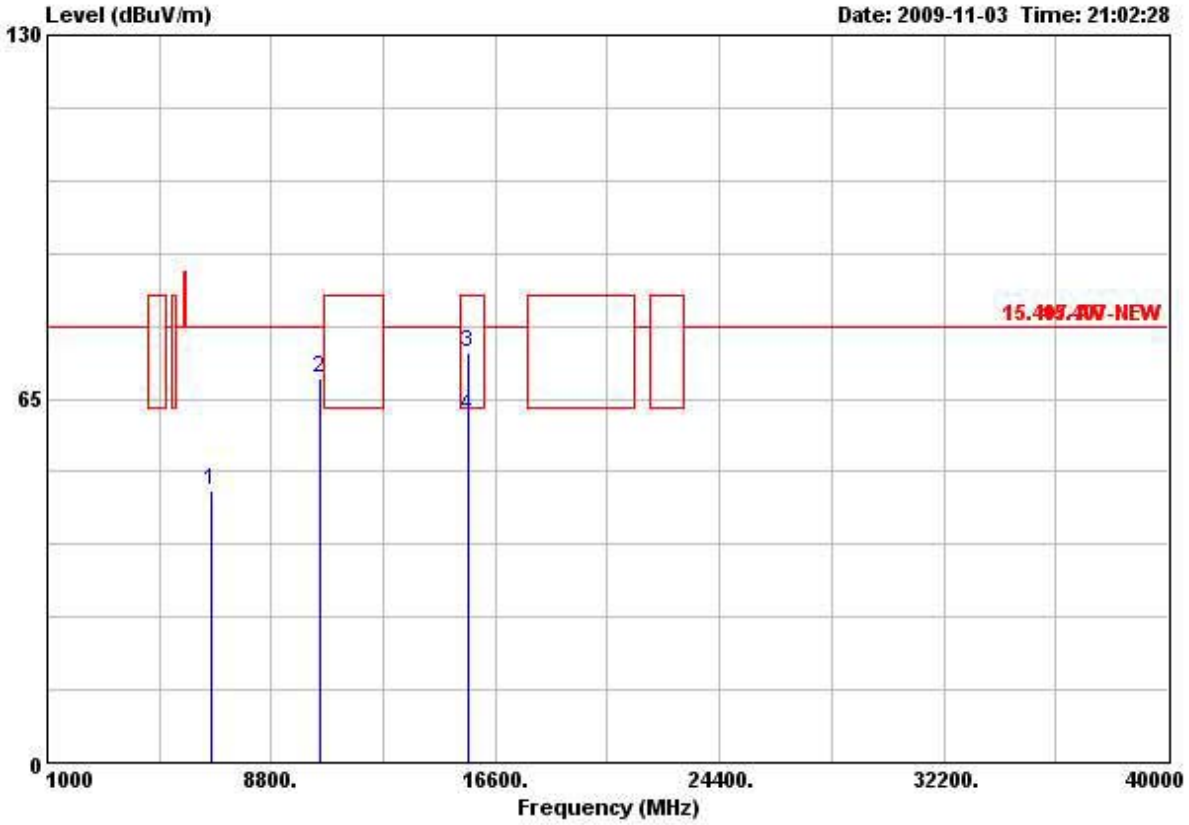
Vertical



	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	6708.000	48.50	-29.34	77.84	39.84	35.46	5.63	32.43	Peak	---	---
2	10356.000	73.92	-3.92	77.84	58.73	39.33	7.68	31.82	Peak	---	---
3	15540.000	70.22	-13.32	83.54	54.02	37.51	9.90	31.21	Peak	---	---
4	15540.000	59.43	-4.11	63.54	43.23	37.51	9.90	31.21	Average	---	---

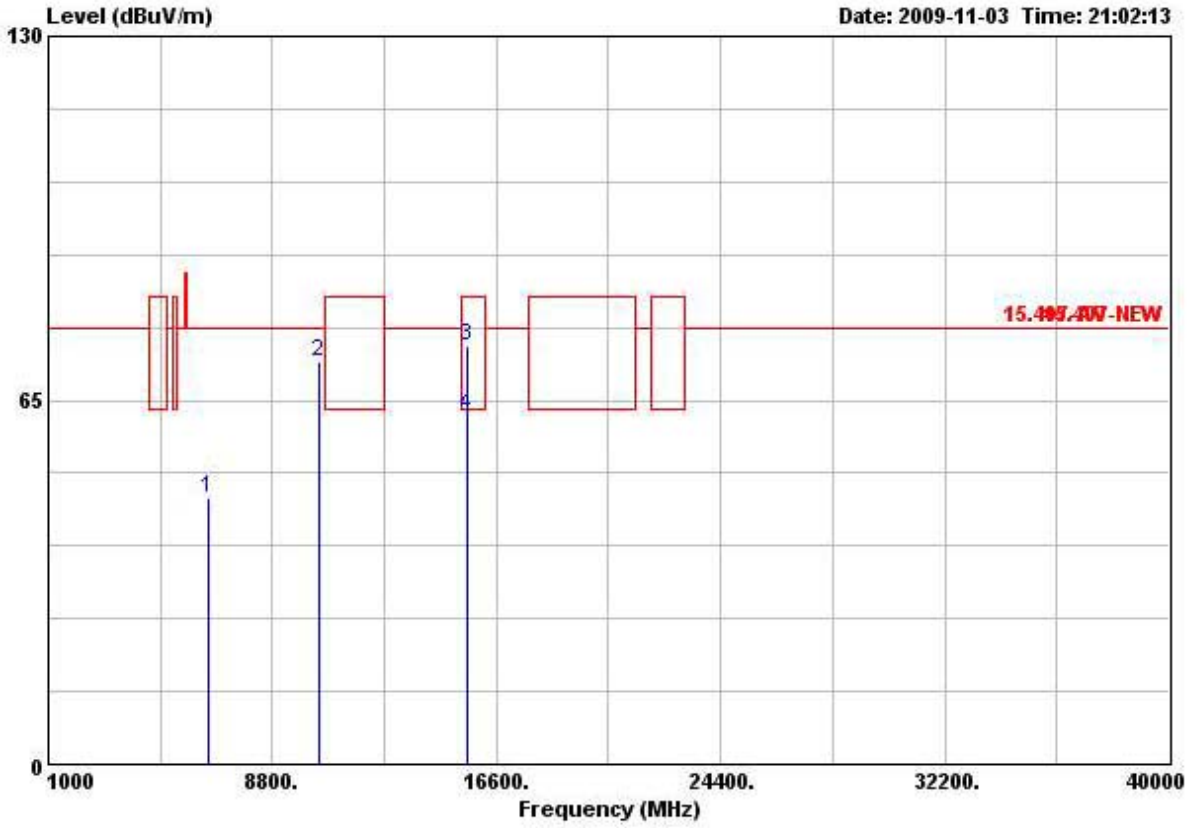
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11a CH 40

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	6708.000	48.58	-29.26	77.84	39.92	35.46	5.63	32.43	Peak	---	---
2	10500.000	68.76	-9.08	77.84	53.40	39.30	7.61	31.55	Peak	---	---
3	15624.000	73.24	-10.30	83.54	56.96	37.55	9.97	31.24	Peak	---	---
4	15624.000	62.04	-1.50	63.54	45.76	37.55	9.97	31.24	Average	---	---

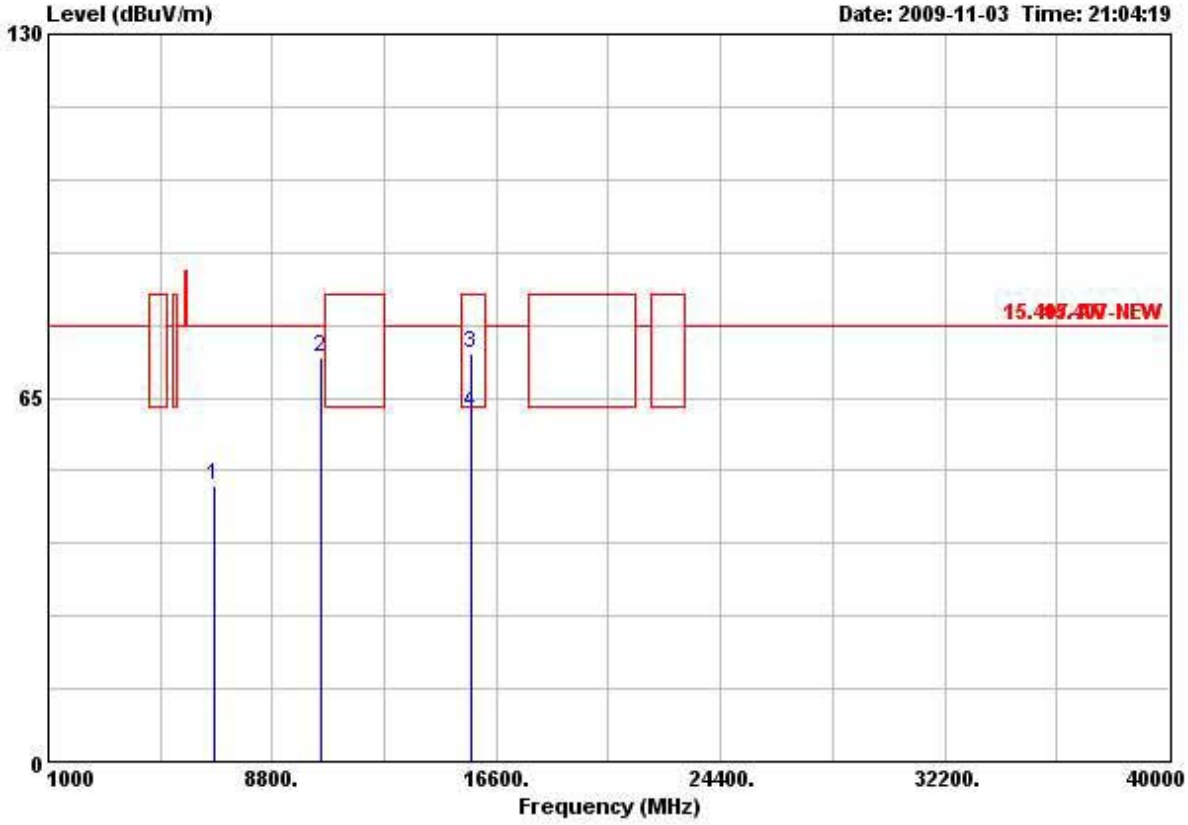
Vertical



	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	6576.000	47.48	-30.36	77.84	38.96	35.15	5.45	32.08	Peak	---	---
2	10404.000	72.04	-5.80	77.84	56.80	39.32	7.65	31.73	Peak	---	---
3	15588.000	74.76	-8.78	83.54	58.52	37.53	9.94	31.23	Peak	---	---
4	15588.000	62.48	-1.06	63.54	46.24	37.53	9.94	31.23	Average	---	---

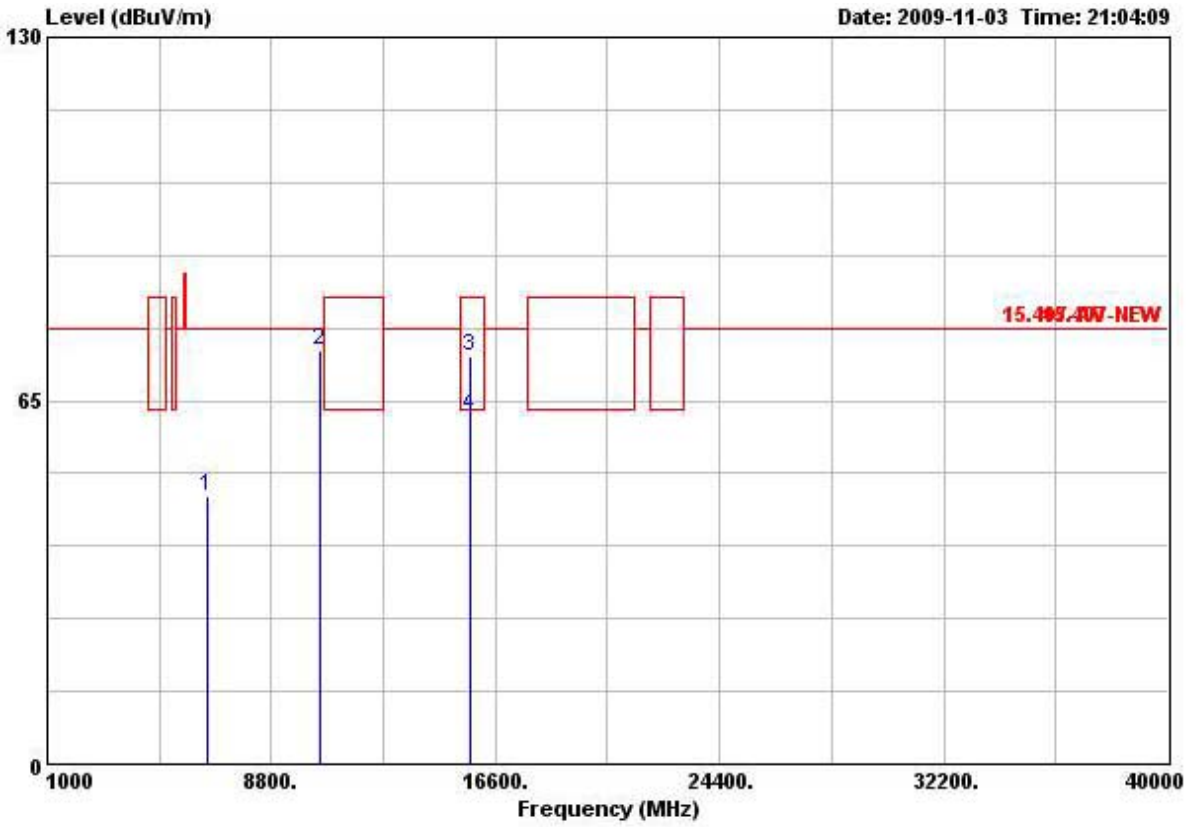
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11a CH 48

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	6780.000	49.37	-28.47	77.84	40.69	35.61	5.72	32.65	Peak	---	---
2	10488.000	72.10	-5.74	77.84	56.79	39.30	7.61	31.60	Peak	---	---
3	15720.000	73.08	-10.46	83.54	56.74	37.59	10.04	31.29	Peak	---	---
4	15720.000	62.28	-1.26	63.54	45.94	37.59	10.04	31.29	Average	---	---

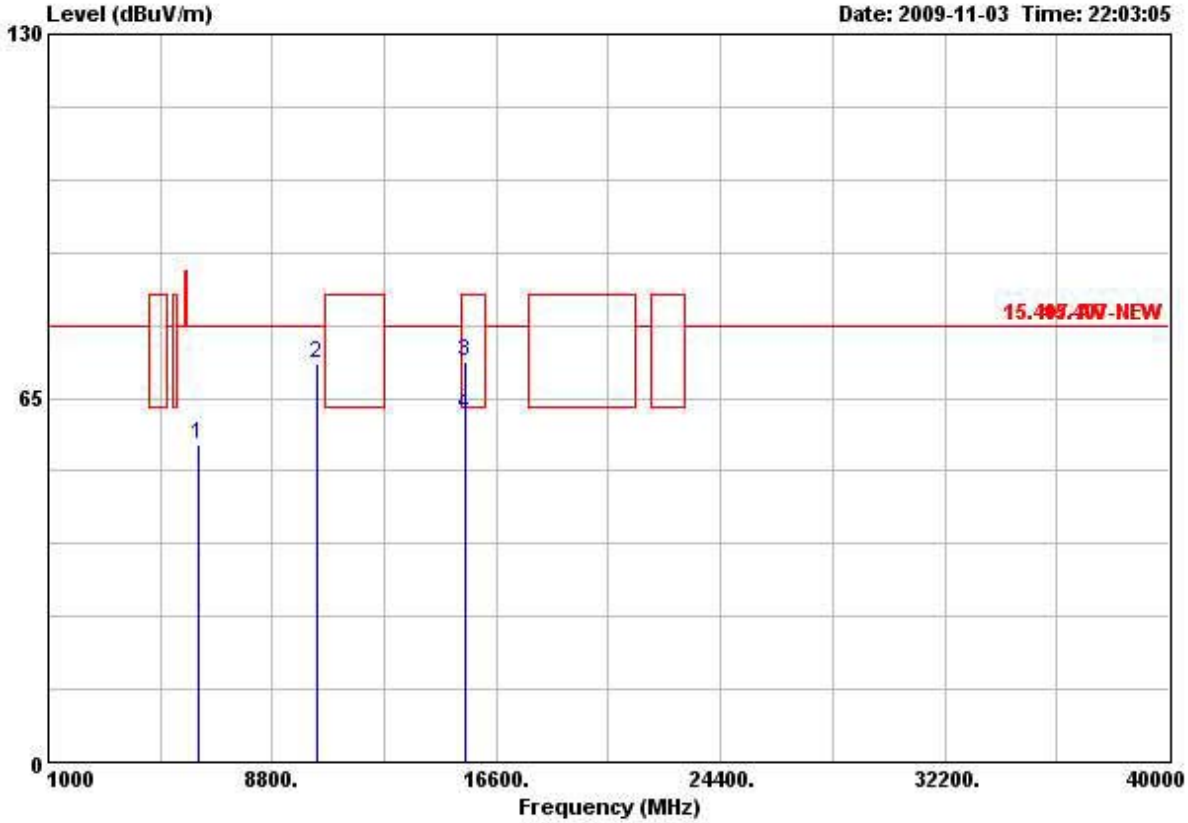
Vertical



	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	6576.000	48.00	-29.84	77.84	39.48	35.15	5.45	32.08	Peak	---	---
2	10488.000	73.97	-3.87	77.84	58.66	39.30	7.61	31.60	Peak	---	---
3	15720.000	73.07	-10.47	83.54	56.73	37.59	10.04	31.29	Peak	---	---
4	15720.000	62.34	-1.20	63.54	46.00	37.59	10.04	31.29	Average	---	---

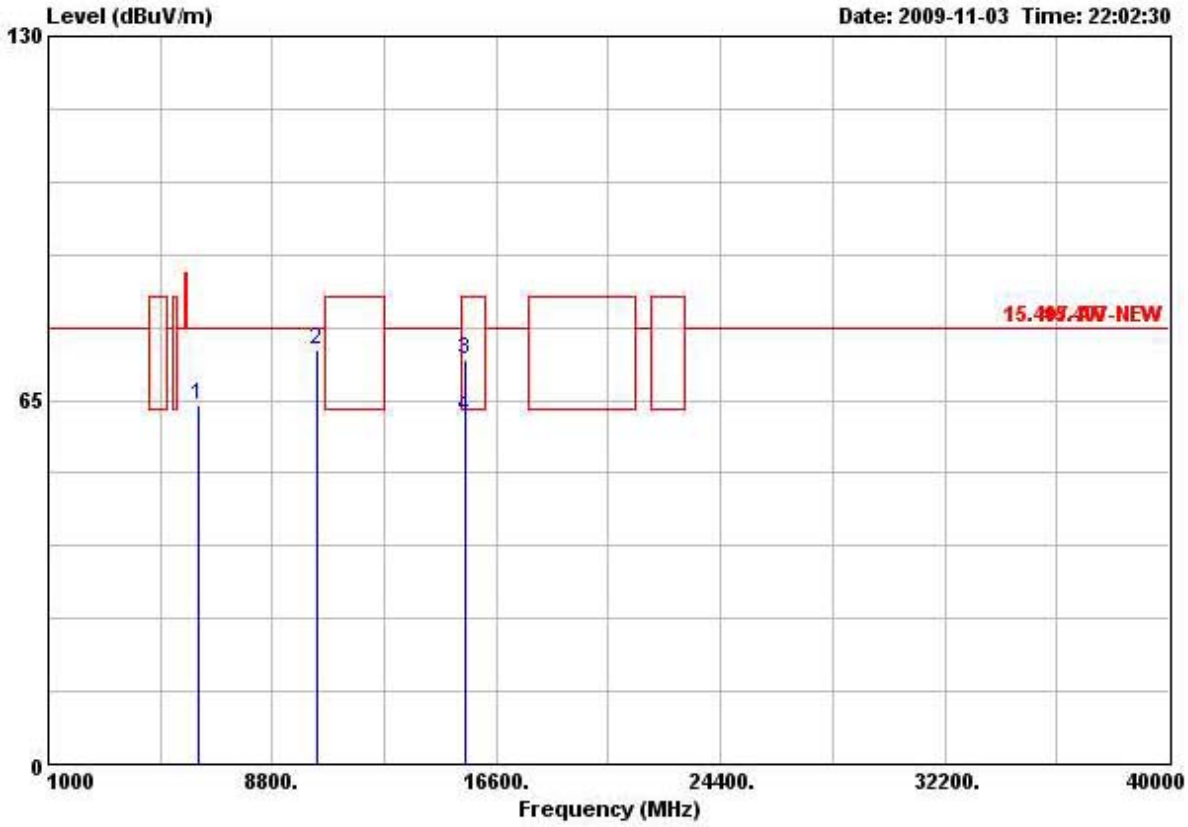
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 36 (20MHz)

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	6222.000	56.70	-21.14	77.84	48.40	34.89	5.44	32.03	Peak	---	---
2	10343.000	71.11	-6.73	77.84	55.95	39.33	7.70	31.87	Peak	---	---
3	15543.000	71.64	-11.90	83.54	55.44	37.51	9.90	31.21	Peak	---	---
4	15543.000	62.08	-1.46	63.54	45.88	37.51	9.90	31.21	Average	---	---

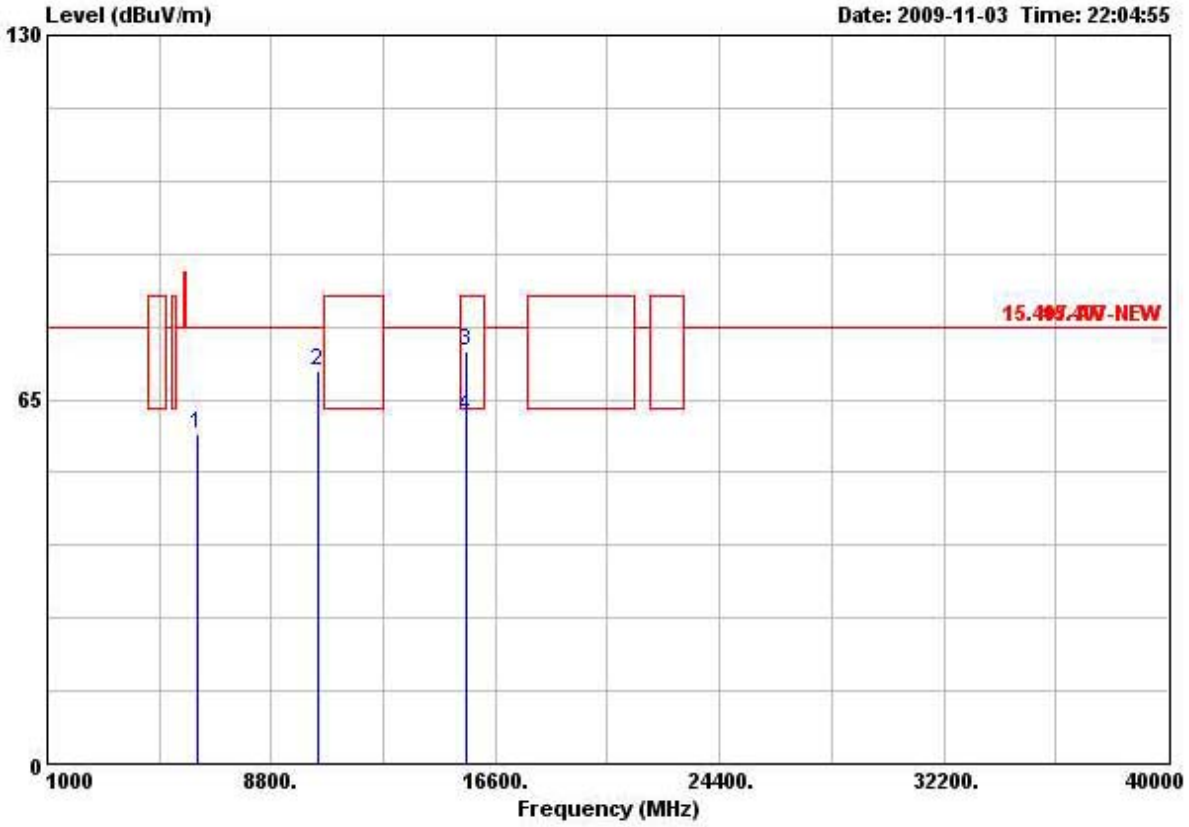
Vertical



	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	6222.000	64.04	-13.80	77.84	55.74	34.89	5.44	32.03	Peak	---	---
2	10343.000	73.99	-3.85	77.84	58.83	39.33	7.70	31.87	Peak	---	---
3	15543.000	72.19	-11.35	83.54	55.99	37.51	9.90	31.21	Peak	---	---
4	15543.000	61.85	-1.69	63.54	45.65	37.51	9.90	31.21	Average	---	---

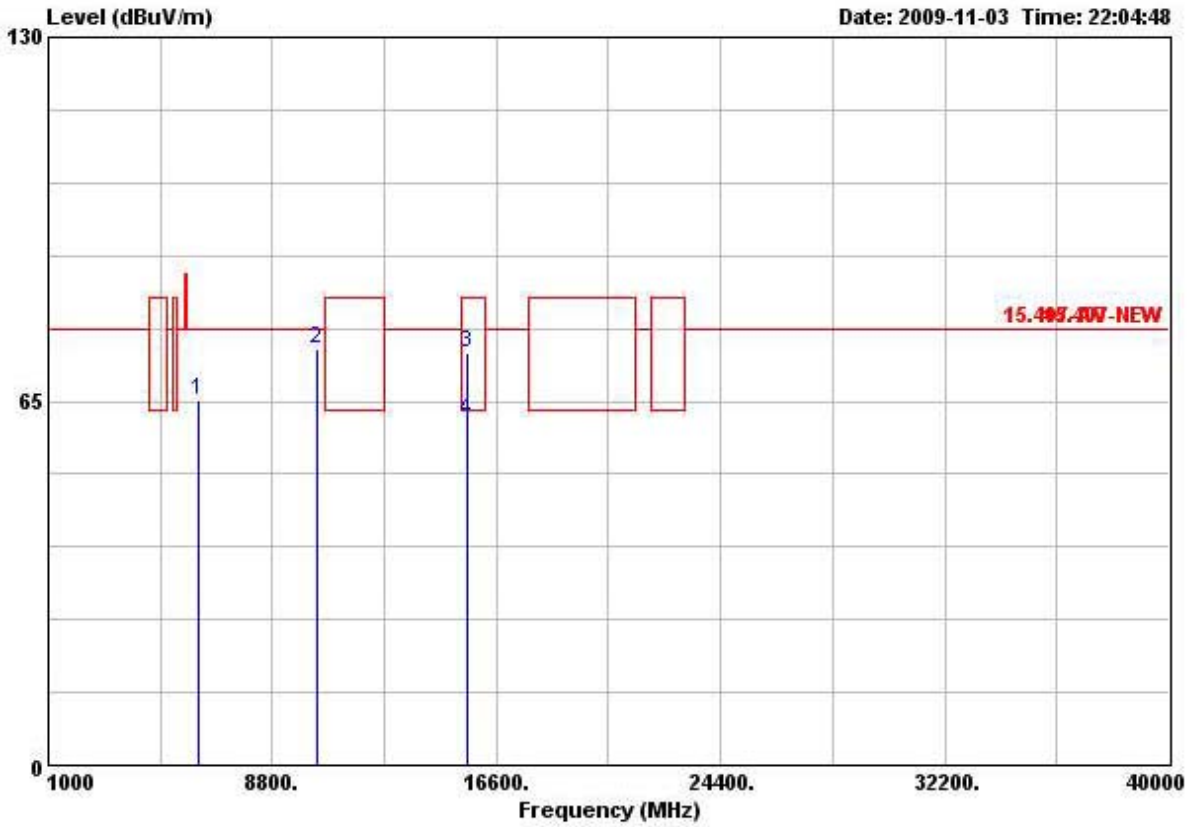
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 40 (20MHz)

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	6222.000	58.89	-18.95	77.84	50.59	34.89	5.44	32.03	Peak	---	---
2	10395.000	69.99	-7.85	77.84	54.80	39.32	7.65	31.78	Peak	---	---
3	15595.000	73.73	-9.81	83.54	57.48	37.54	9.94	31.23	Peak	---	---
4	15595.000	61.98	-1.56	63.54	45.73	37.54	9.94	31.23	Average	---	---

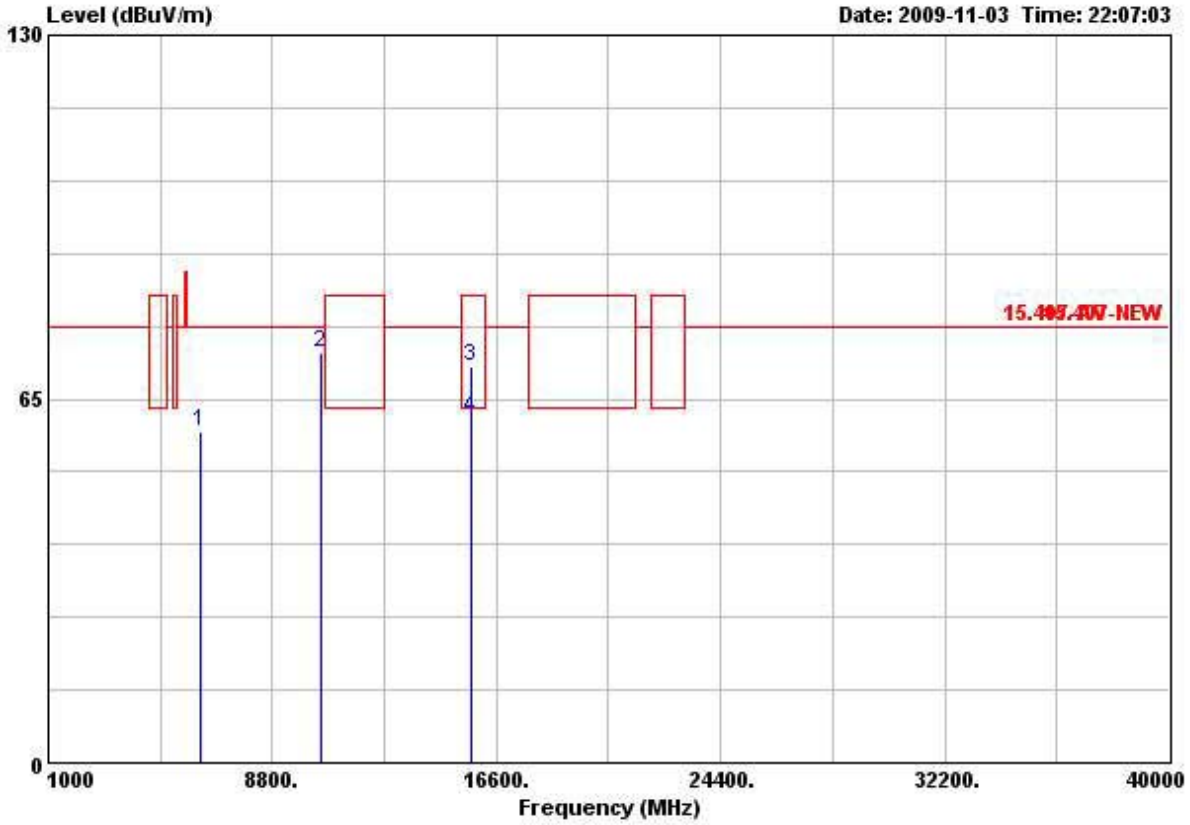
Vertical



	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	6235.000	65.20	-12.64	77.84	56.91	34.89	5.43	32.03	Peak	---	---
2	10382.000	74.27	-3.57	77.84	59.05	39.32	7.68	31.78	Peak	---	---
3	15595.000	73.80	-9.74	83.54	57.55	37.54	9.94	31.23	Peak	---	---
4	15595.000	61.69	-1.85	63.54	45.44	37.54	9.94	31.23	Average	---	---

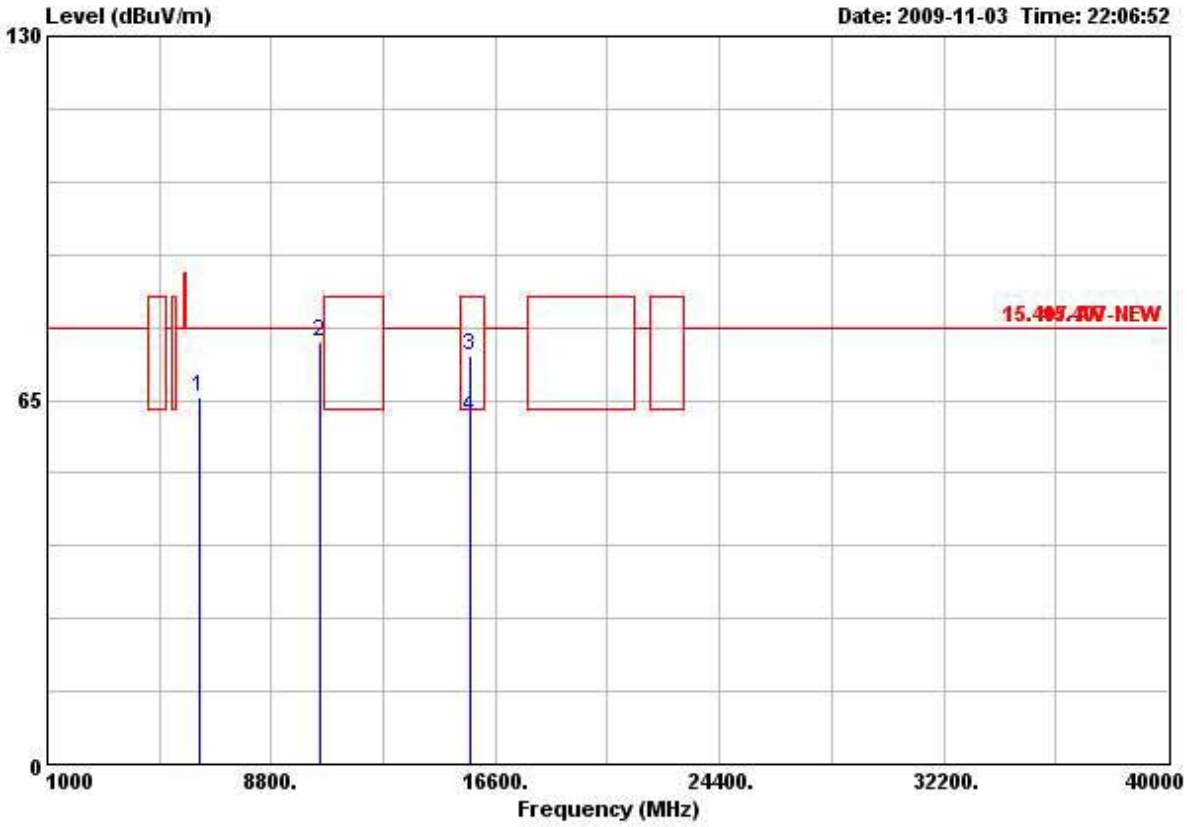
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 48 (20MHz)

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	6274.000	59.04	-18.80	77.84	50.71	34.91	5.42	32.00	Peak	---	---
2	10486.000	73.13	-4.71	77.84	57.82	39.30	7.61	31.60	Peak	---	---
3	15738.000	70.91	-12.63	83.54	54.53	37.60	10.08	31.30	Peak	---	---
4	15738.000	61.81	-1.73	63.54	45.43	37.60	10.08	31.30	Average	---	---

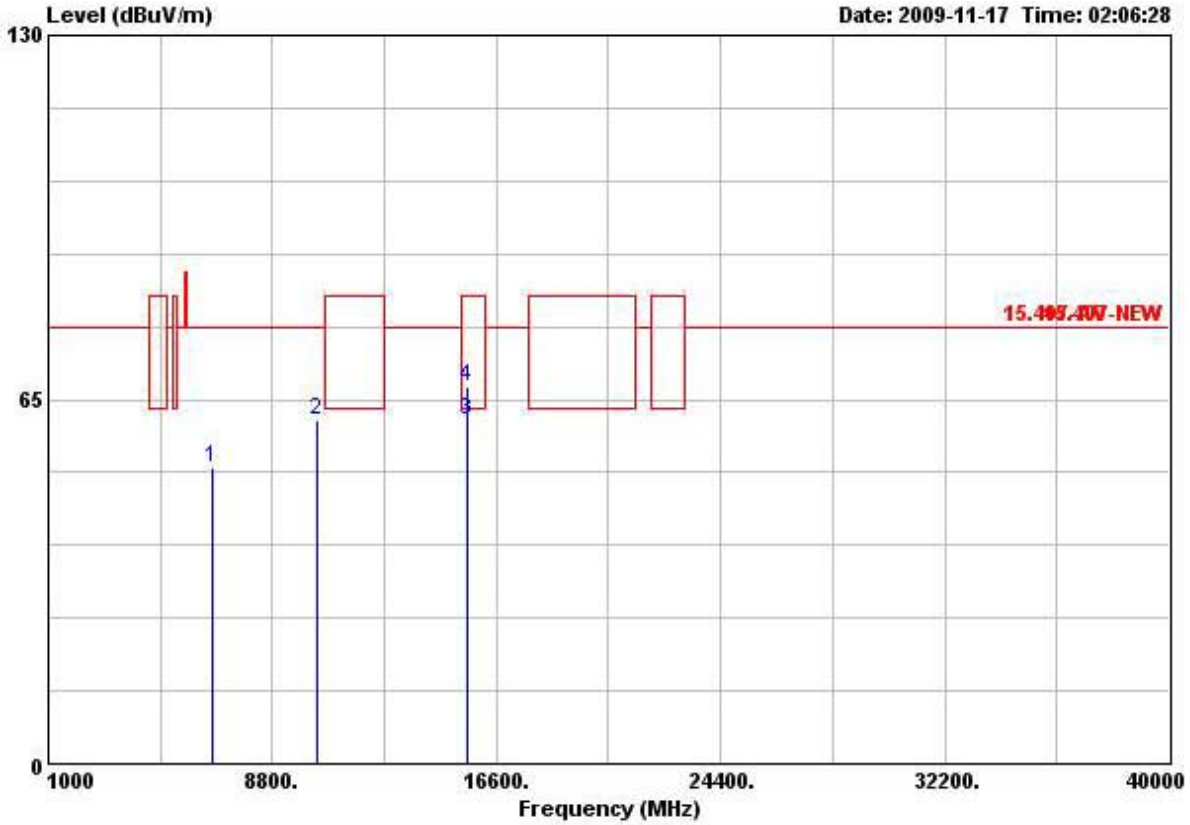
Vertical



	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	6274.000	65.64	-12.20	77.84	57.31	34.91	5.42	32.00	Peak	---	---
2	10486.000	75.43	-2.41	77.84	60.12	39.30	7.61	31.60	Peak	---	---
3	15699.000	72.85	-10.69	83.54	56.51	37.58	10.04	31.28	Peak	---	---
4	15699.000	61.90	-1.64	63.54	45.56	37.58	10.04	31.28	Average	---	---

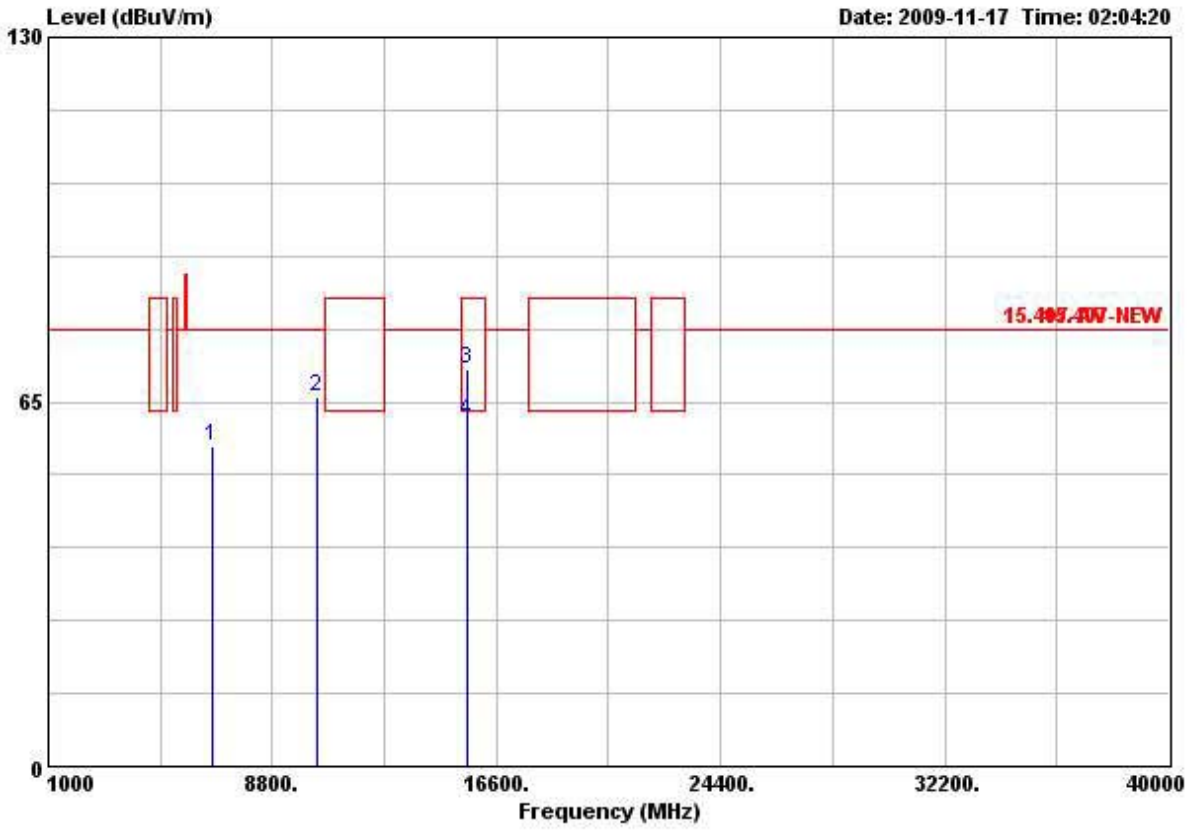
Final Test Date	Nov. 17, 2009	Test Site No.	03CH02-HY
Temperature	25℃	Humidity	55%
Test Engineer	Steven	Configuration	802.11n CH 38 (40MHz)

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	6712.000	52.69	-25.15	77.84	44.03	35.46	5.63	32.43	Peak	---	---
2	10380.000	61.25	-16.59	77.84	46.03	39.32	7.68	31.78	Peak	---	---
3	15570.000	61.25	-2.29	63.54	45.00	37.53	9.94	31.22	Average	---	---
4	15570.000	67.25	-16.29	83.54	51.00	37.53	9.94	31.22	Peak	---	---

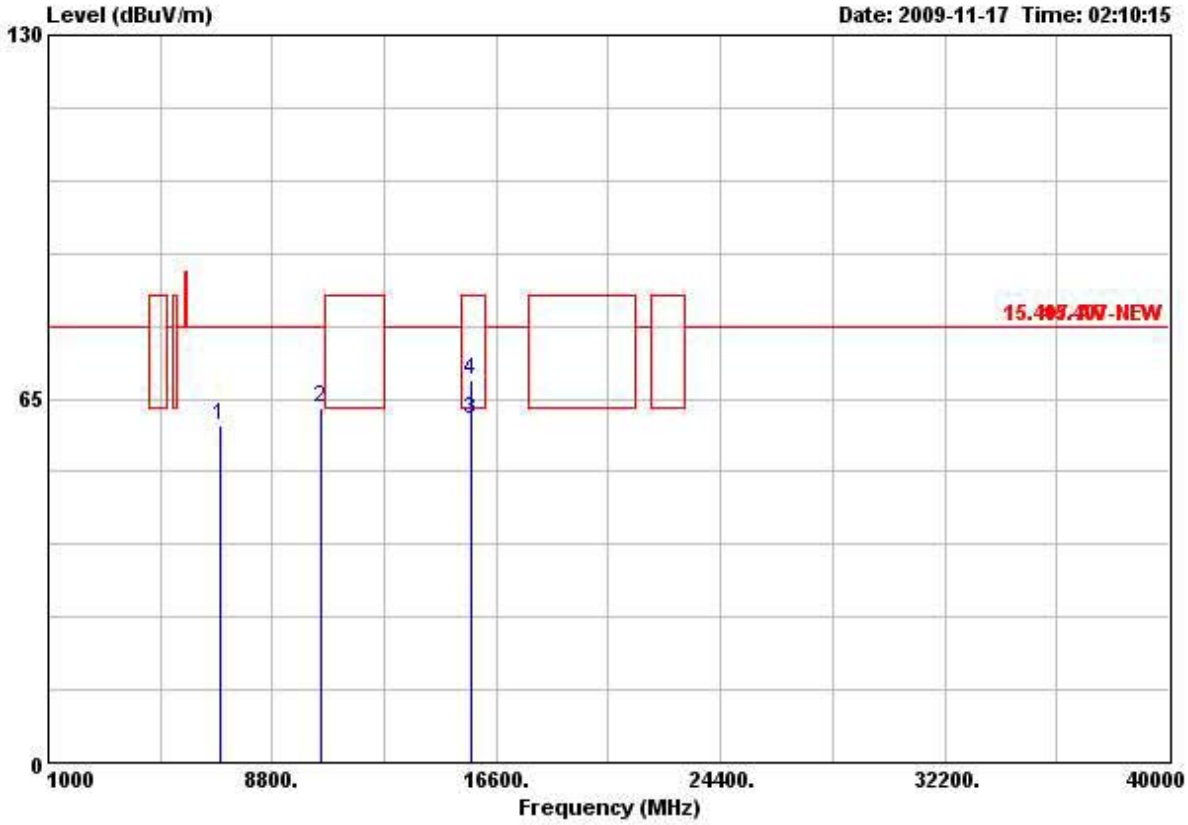
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	6711.000	57.18	-20.66	77.84	48.52	35.46	5.63	32.43	Peak	---	---
2	10380.000	65.74	-12.10	77.84	50.52	39.32	7.68	31.78	Peak	---	---
3	15570.000	70.74	-12.80	83.54	54.49	37.53	9.94	31.22	Peak	---	---
4	15570.000	61.74	-1.80	63.54	45.49	37.53	9.94	31.22	Average	---	---

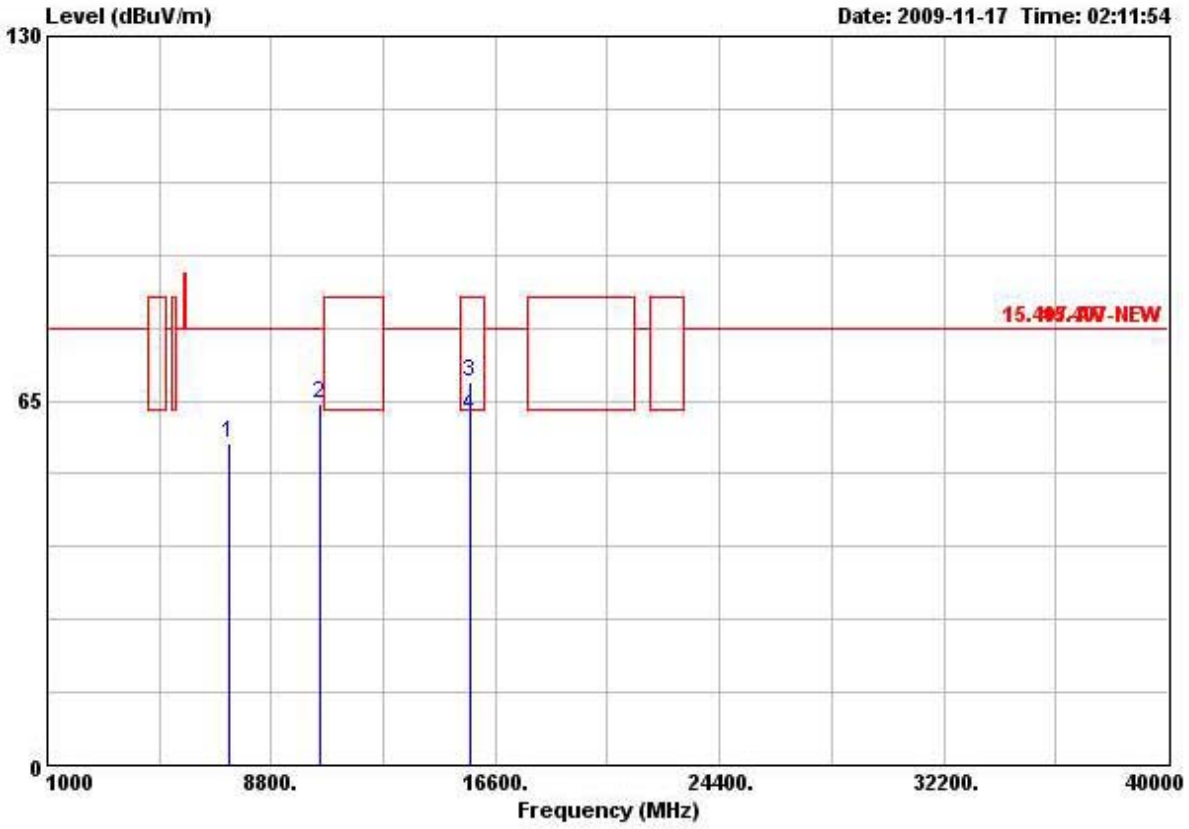
Final Test Date	Nov. 17, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 46 (40MHz)

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	7014.000	60.30	-17.54	77.84	51.34	36.14	5.98	33.16	Peak	---	---
2	10460.000	63.30	-14.54	77.84	48.00	39.31	7.63	31.64	Peak	---	---
3	15690.000	61.30	-2.24	63.54	44.96	37.58	10.04	31.28	Average	---	---
4	15690.000	68.30	-15.24	83.54	51.96	37.58	10.04	31.28	Peak	---	---

Vertical

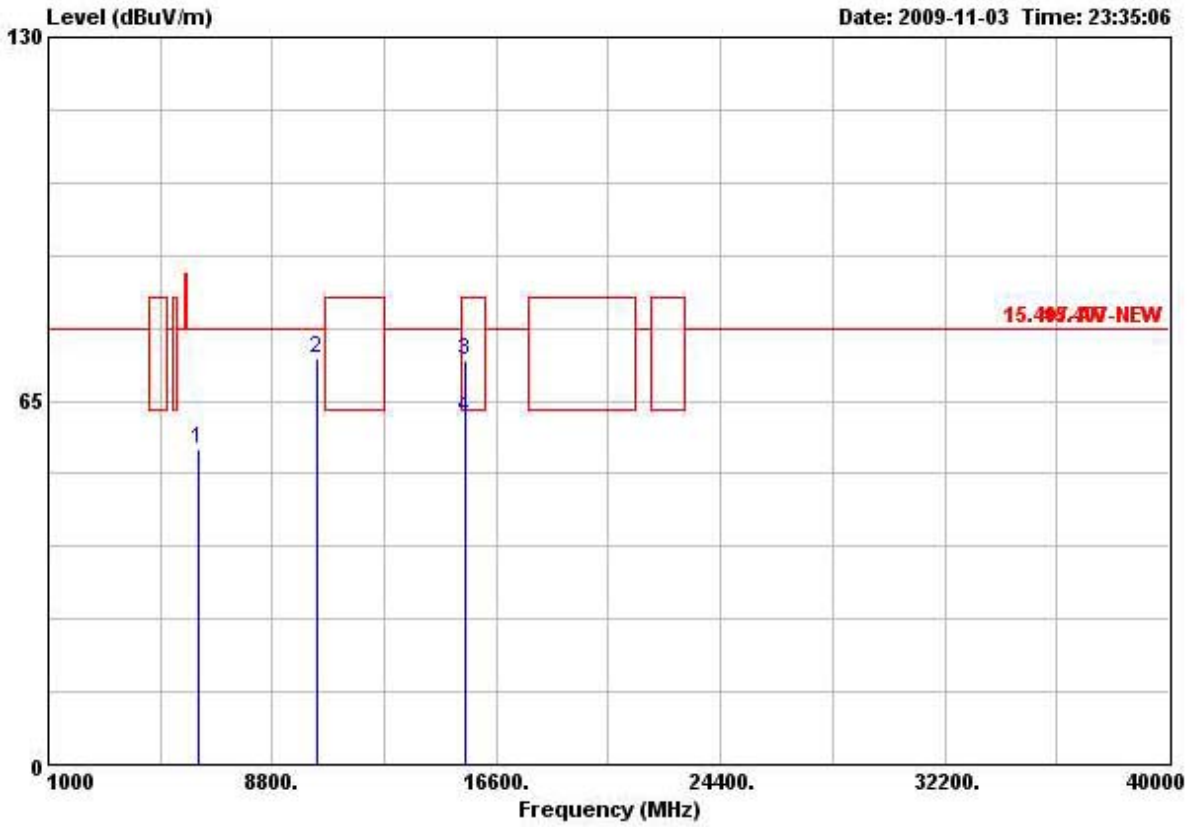


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	7314.000	57.35	-20.49	77.84	46.74	36.84	6.19	32.42	Peak	---	---
2	10460.000	64.35	-13.49	77.84	49.05	39.31	7.63	31.64	Peak	---	---
3	15690.000	68.35	-15.19	83.54	52.01	37.58	10.04	31.28	Peak	---	---
4	15690.000	62.35	-1.19	63.54	46.01	37.58	10.04	31.28	Average	---	---

For Two Chain:

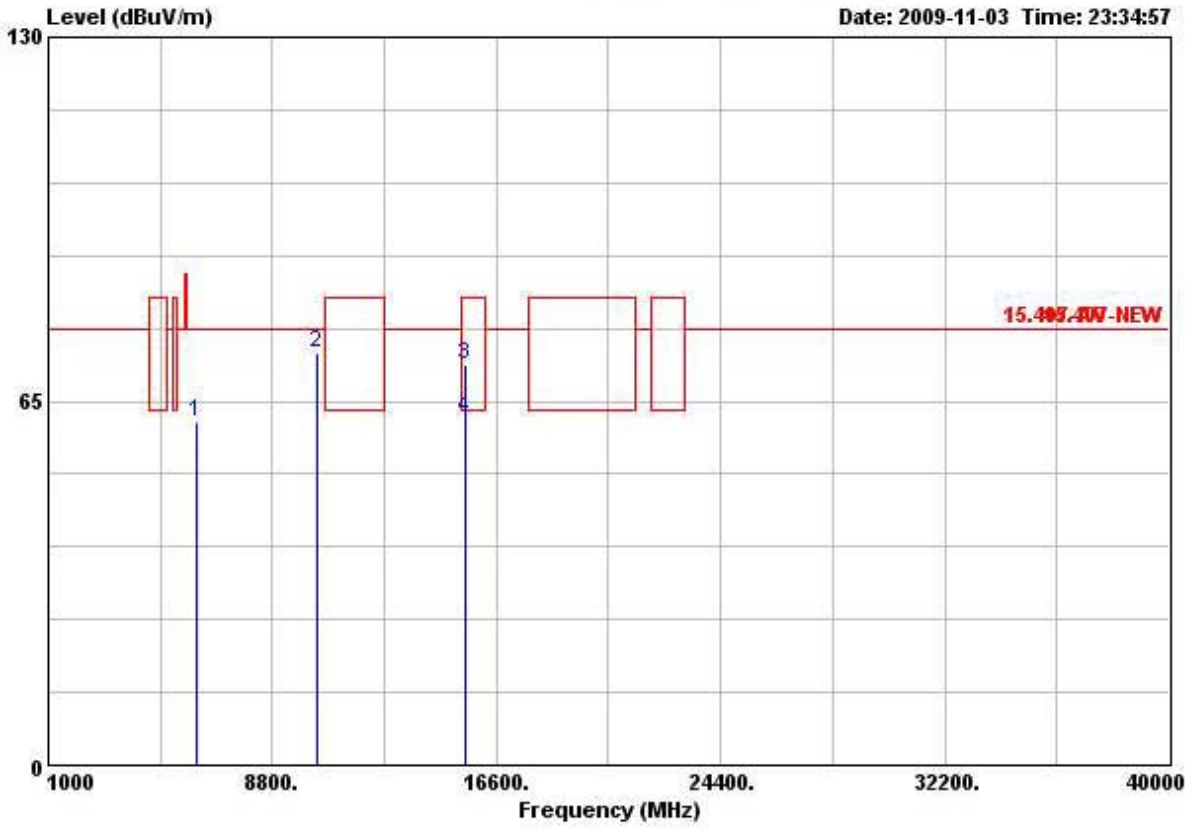
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 36 (20MHz)

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	6222.000	56.24	-21.60	77.84	47.94	34.89	5.44	32.03	Peak	---	---
2	10343.000	72.68	-5.16	77.84	57.52	39.33	7.70	31.87	Peak	---	---
3	15543.000	72.06	-11.48	83.54	55.86	37.51	9.90	31.21	Peak	---	---
4	15543.000	62.10	-1.44	63.54	45.90	37.51	9.90	31.21	Average	---	---

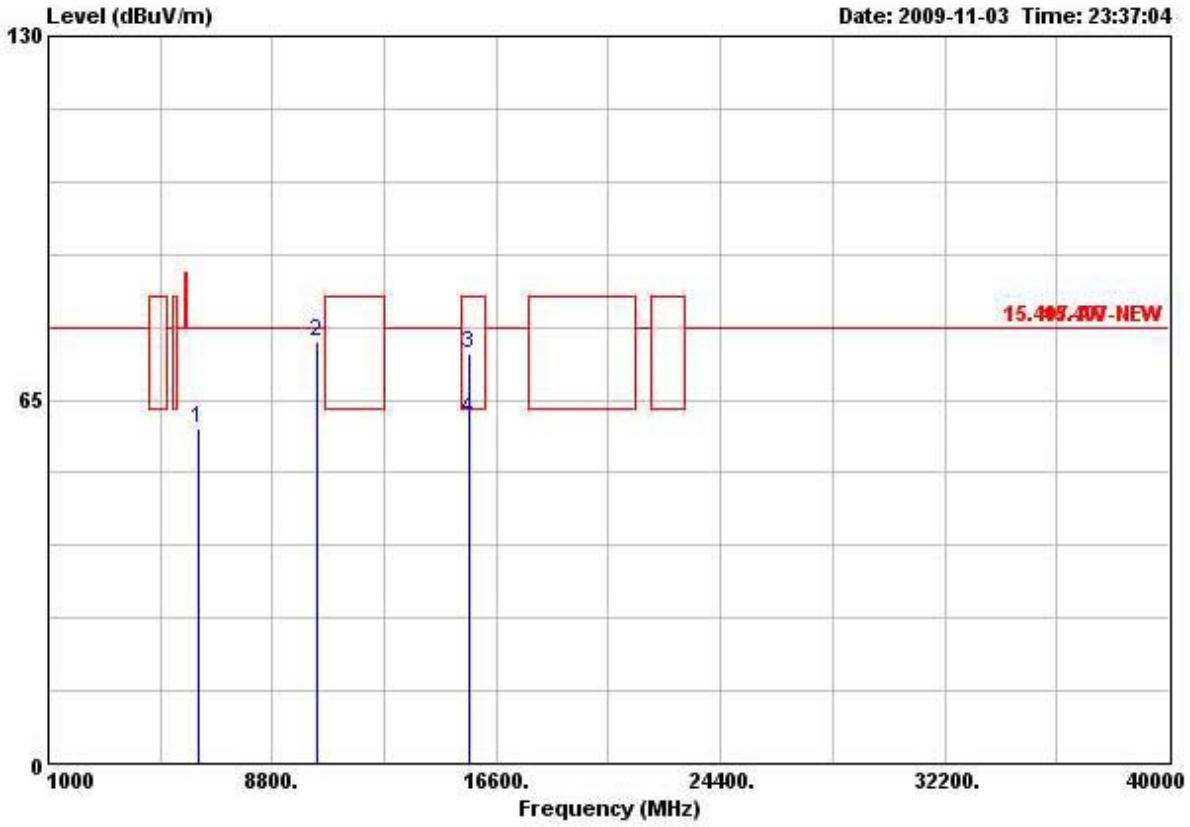
Vertical



	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	6183.000	61.40	-16.44	77.84	53.15	34.87	5.45	32.07	Peak	---	---
2	10343.000	73.63	-4.21	77.84	58.47	39.33	7.70	31.87	Peak	---	---
3	15543.000	71.60	-11.94	83.54	55.40	37.51	9.90	31.21	Peak	---	---
4	15543.000	61.97	-1.57	63.54	45.77	37.51	9.90	31.21	Average	---	---

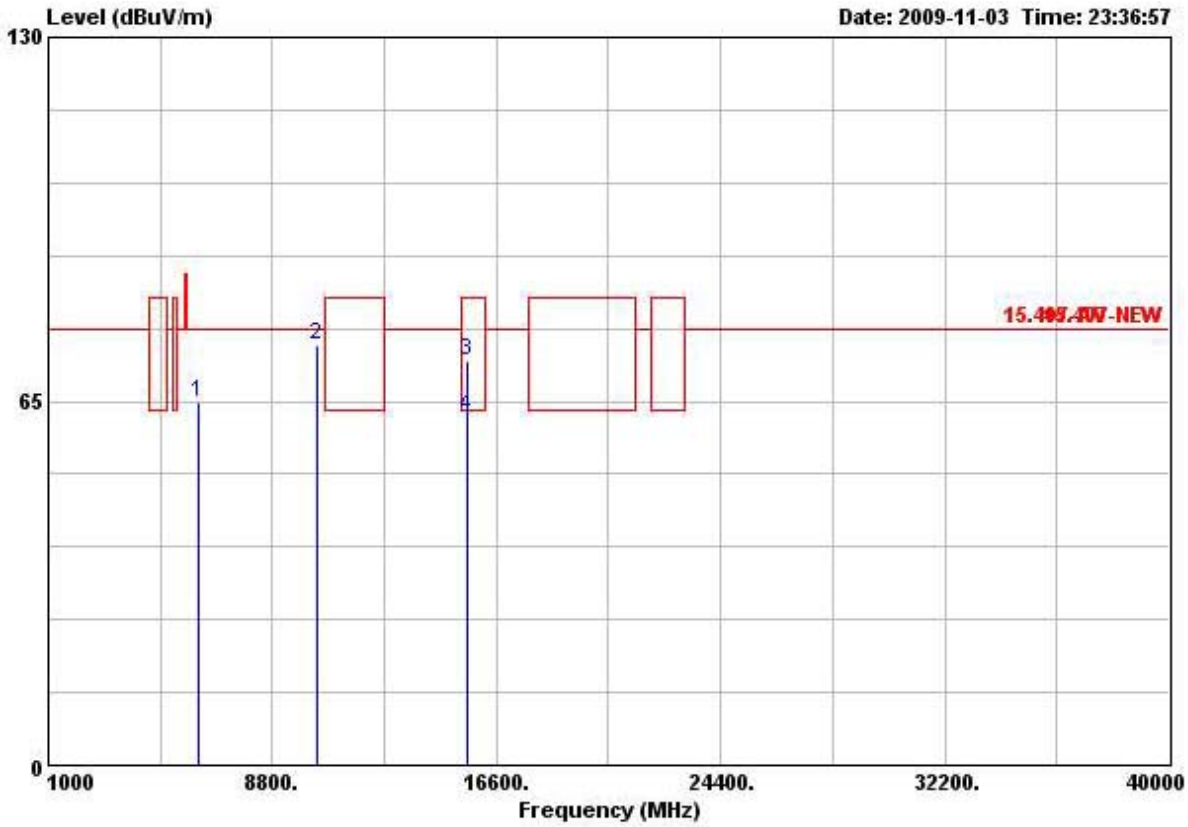
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 40 (20MHz)

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	6222.000	59.76	-18.08	77.84	51.46	34.89	5.44	32.03	Peak	---	---
2	10382.000	75.27	-2.57	77.84	60.05	39.32	7.68	31.78	Peak	---	---
3	15634.000	73.41	-10.13	83.54	57.13	37.56	9.97	31.25	Peak	---	---
4	15634.000	61.83	-1.71	63.54	45.55	37.56	9.97	31.25	Average	---	---

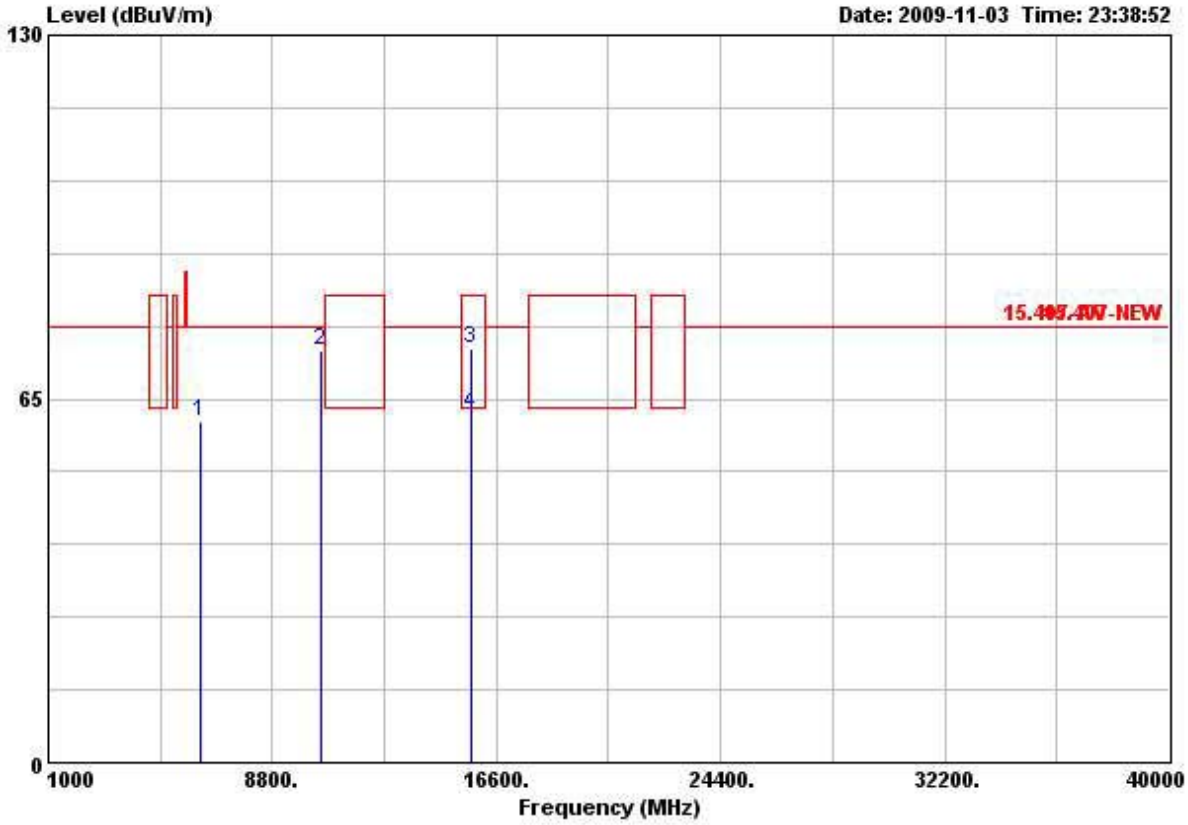
Vertical



	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	6222.000	64.76	-13.08	77.84	56.46	34.89	5.44	32.03	Peak	---	---
2	10382.000	74.99	-2.85	77.84	59.77	39.32	7.68	31.78	Peak	---	---
3	15595.000	72.18	-11.36	83.54	55.93	37.54	9.94	31.23	Peak	---	---
4	15595.000	62.37	-1.17	63.54	46.12	37.54	9.94	31.23	Average	---	---

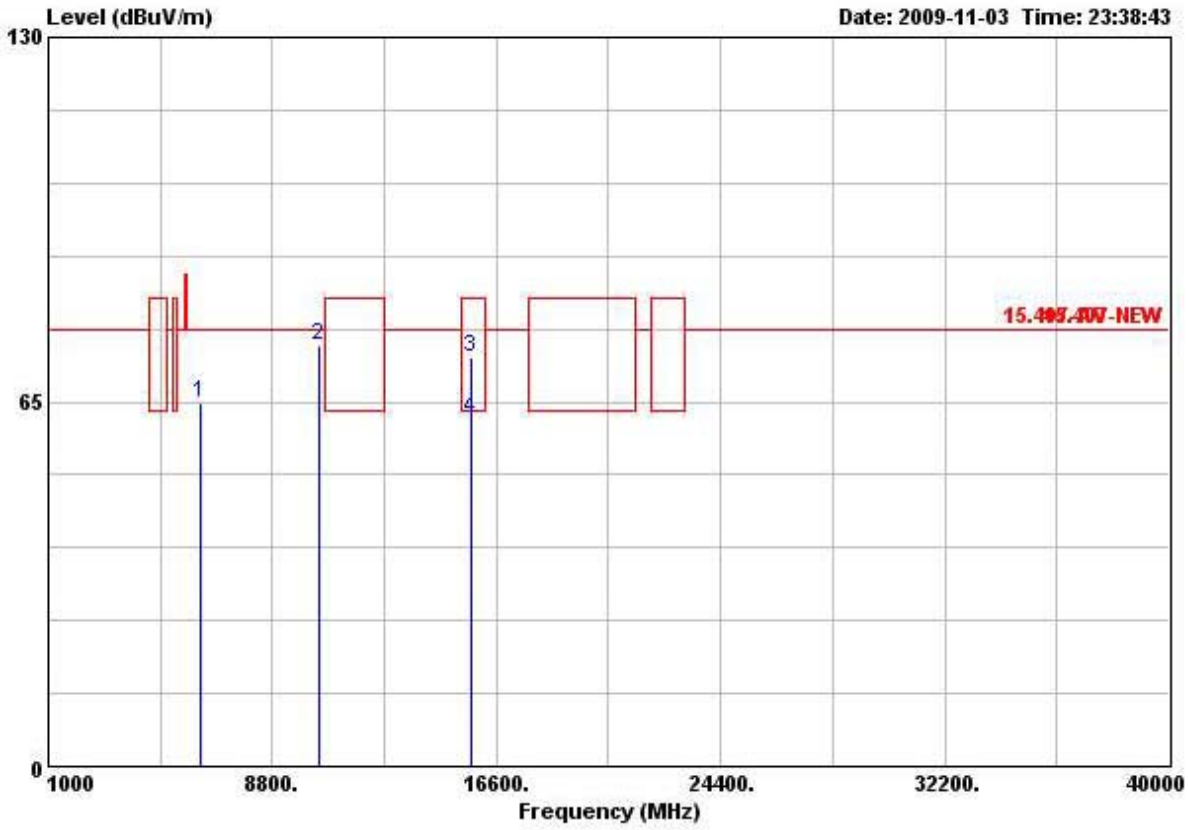
Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 48 (20MHz)

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	6274.000	61.07	-16.77	77.84	52.74	34.91	5.42	32.00	Peak	---	---
2	10486.000	73.68	-4.16	77.84	58.37	39.30	7.61	31.60	Peak	---	---
3	15738.000	73.86	-9.68	83.54	57.48	37.60	10.08	31.30	Peak	---	---
4	15738.000	62.24	-1.30	63.54	45.86	37.60	10.08	31.30	Average	---	---

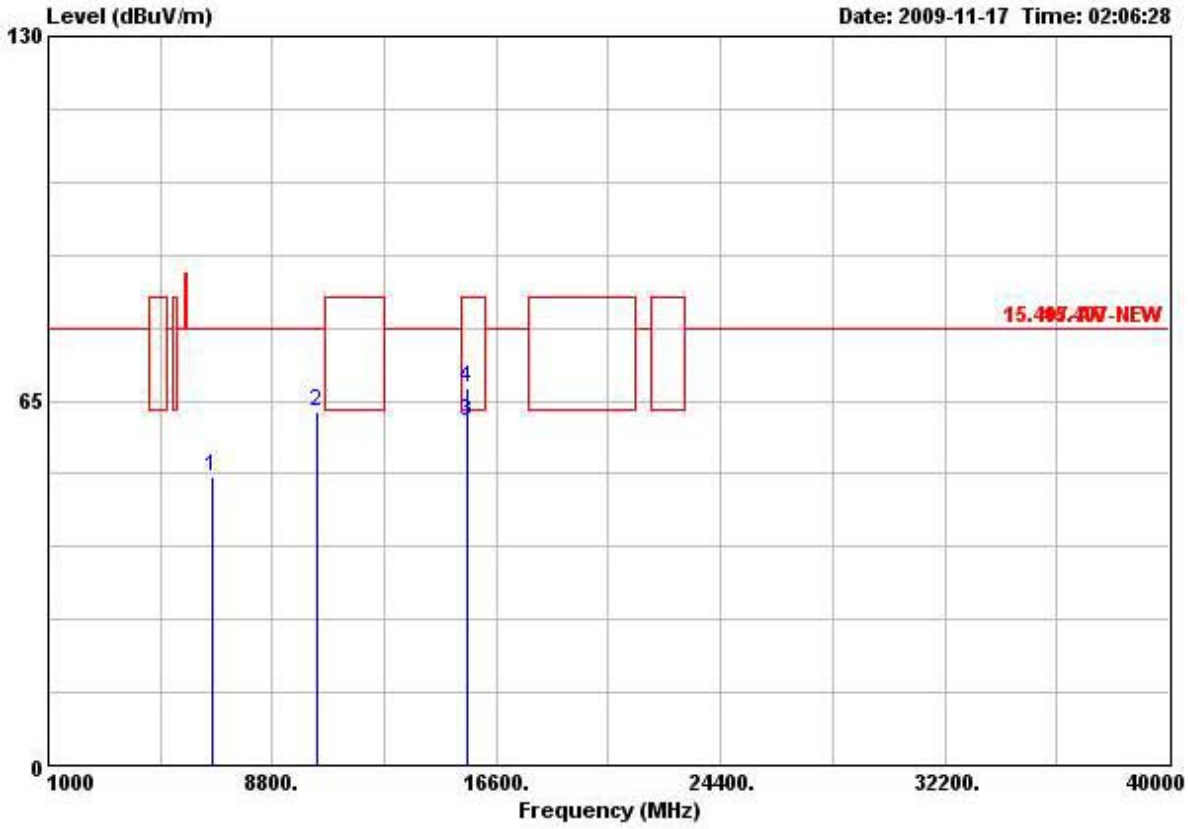
Vertical



	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	6274.000	64.91	-12.93	77.84	56.58	34.91	5.42	32.00	Peak	---	---
2	10447.000	75.12	-2.72	77.84	59.87	39.31	7.63	31.69	Peak	---	---
3	15738.000	72.97	-10.57	83.54	56.59	37.60	10.08	31.30	Peak	---	---
4	15738.000	62.02	-1.52	63.54	45.64	37.60	10.08	31.30	Average	---	---

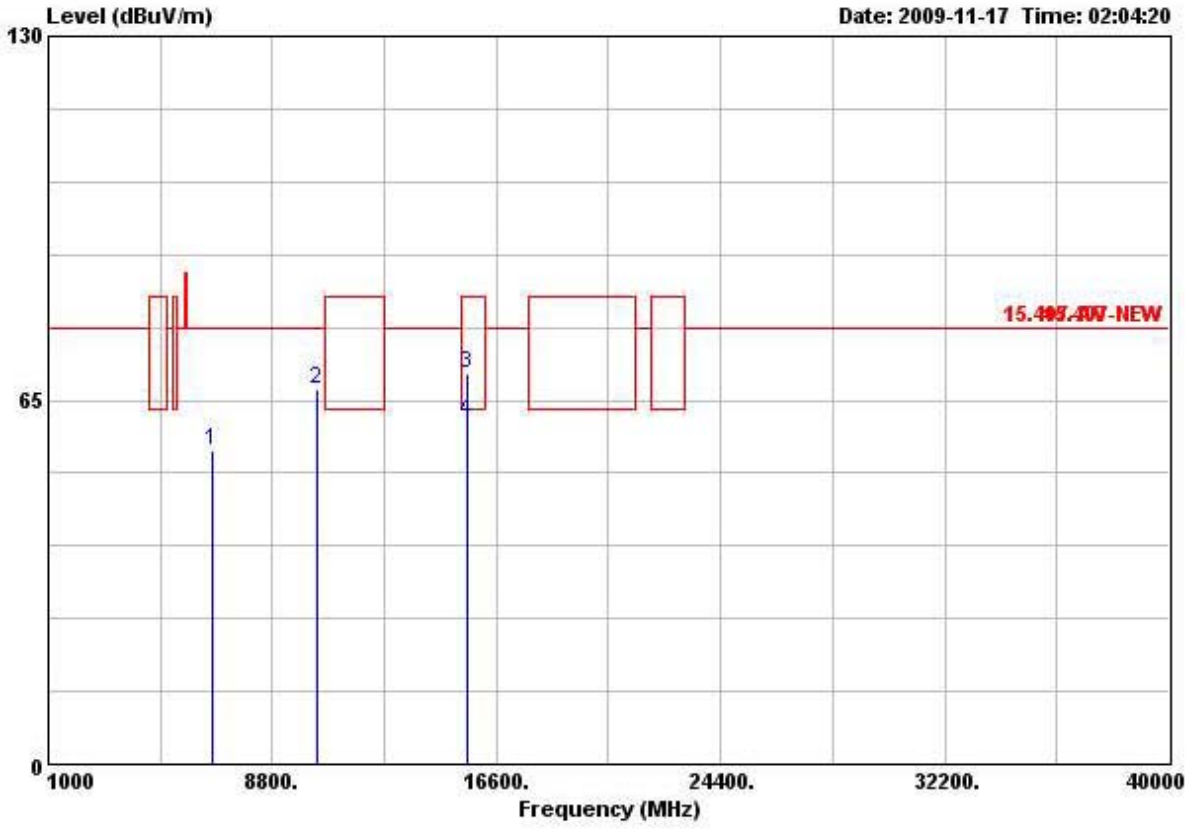
Final Test Date	Nov. 17, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 38 (40MHz)

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	6713.000	51.34	-26.50	77.84	42.68	35.46	5.63	32.43	Peak	---	---
2	10380.000	63.07	-14.77	77.84	47.85	39.32	7.68	31.78	Peak	---	---
3	15570.000	61.23	-2.31	63.54	44.98	37.53	9.94	31.22	Average	---	---
4	15570.000	67.13	-16.41	83.54	50.88	37.53	9.94	31.22	Peak	---	---

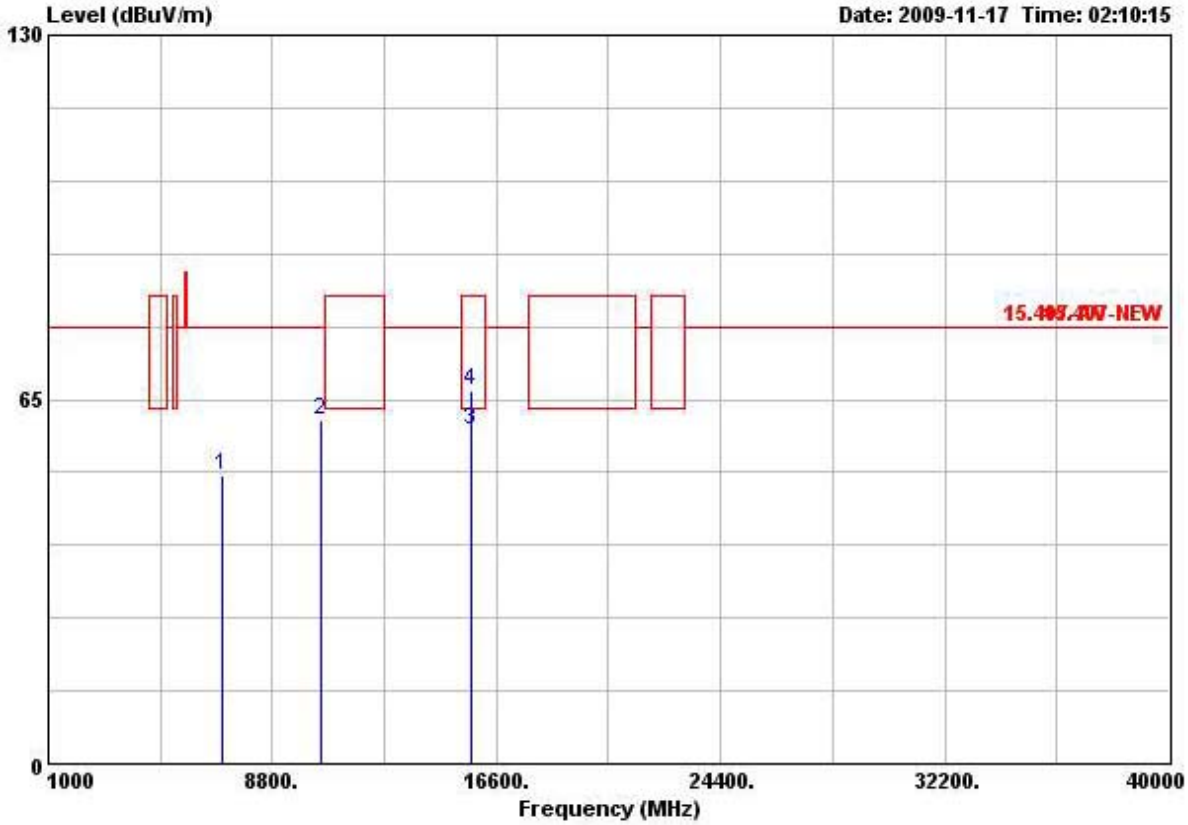
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	6702.000	56.15	-21.69	77.84	47.53	35.42	5.63	32.43	Peak	---	---
2	10380.000	66.88	-10.96	77.84	51.66	39.32	7.68	31.78	Peak	---	---
3	15570.000	69.83	-13.71	83.54	53.58	37.53	9.94	31.22	Peak	---	---
4	15570.000	61.23	-2.31	63.54	44.98	37.53	9.94	31.22	Average	---	---

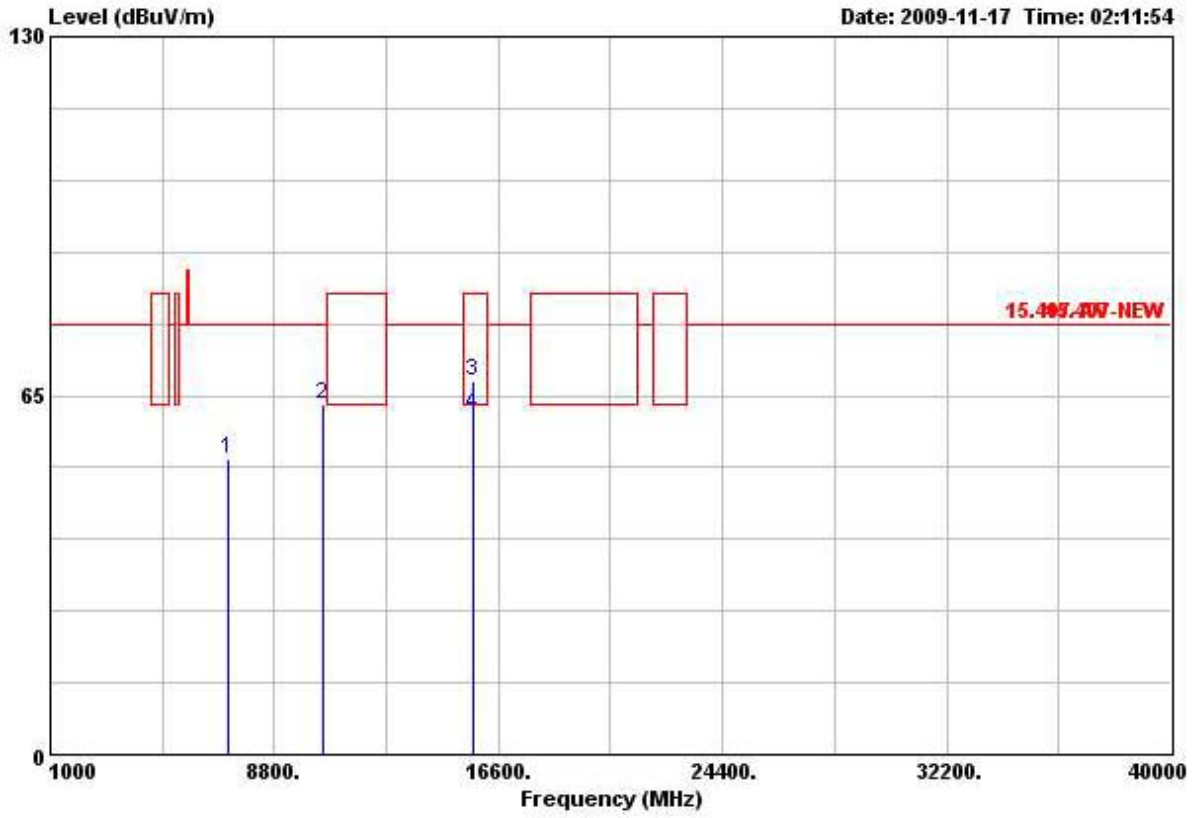
Final Test Date	Nov. 17, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 46 (40MHz)

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	7047.000	51.45	-26.39	77.84	42.35	36.22	5.98	33.10	Peak	---	---
2	10460.000	61.18	-16.66	77.84	45.88	39.31	7.63	31.64	Peak	---	---
3	15690.000	59.49	-4.05	63.54	43.15	37.58	10.04	31.28	Average	---	---
4	15690.000	66.45	-17.09	83.54	50.11	37.58	10.04	31.28	Peak	---	---

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	7211.000	53.64	-24.20	77.84	43.58	36.60	6.13	32.67	Peak	---	---
2	10460.000	63.41	-14.43	77.84	48.11	39.31	7.63	31.64	Peak	---	---
3	15690.000	67.59	-15.95	83.54	51.25	37.58	10.04	31.28	Peak	---	---
4	15690.000	61.56	-1.98	63.54	45.22	37.58	10.04	31.28	Average	---	---

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.

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

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

3.7 Band Edge and Fundamental Emissions Measurement

3.7.1 Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBuV/m at 3m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

3.7.2 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)	1 MHz / 1 MHz for Peak

3.7.3 Test Procedures

1. The test procedure is the same as section 3.6.3, 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.

3.7.4 Test Setup Layout

This test setup layout is the same as that shown in section 3.6.4.

3.7.5 Test Deviation

There is no deviation with the original standard.

3.7.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.7.7 Test Result of Band Edge and Fundamental Emissions

For Single Chain:

Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11a CH 36, 40, 48

Chanel 36

		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		5149.990	80.33	-3.21	83.54	40.79	34.35	5.19	0.00	Peak	---	---
2	X	5183.400	115.12			75.53	34.38	5.21	0.00	Peak	---	---
1		5149.990	58.96	-4.58	63.54	19.42	34.35	5.19	0.00	Average	---	---
2	X	5183.100	104.35			64.76	34.38	5.21	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Channel 40

		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		5116.560	67.98	-15.56	83.54	28.49	34.32	5.17	0.00	Peak	---	---
2	X	5203.280	117.01			77.40	34.40	5.21	0.00	Peak	---	---
3		5408.080	66.44	-17.10	83.54	26.54	34.60	5.30	0.00	Peak	---	---
1		5125.200	55.67	-7.87	63.54	16.17	34.33	5.17	0.00	Average	---	---
2	X	5203.280	106.05			66.44	34.40	5.21	0.00	Average	---	---
3		5355.920	53.37	-10.17	63.54	13.54	34.55	5.28	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Channel 48

		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		5147.280	66.43	-17.11	83.54	26.89	34.35	5.19	0.00	Peak	---	---
2	X	5243.280	118.84			79.16	34.45	5.23	0.00	Peak	---	---
3		5372.240	66.78	-16.76	83.54	26.93	34.57	5.28	0.00	Peak	---	---
1		5145.680	53.15	-10.39	63.54	13.61	34.35	5.19	0.00	Average	---	---
2	X	5243.280	107.71			68.03	34.45	5.23	0.00	Average	---	---
3		5354.640	53.62	-9.92	63.54	13.79	34.55	5.28	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Final Test Date	Nov. 03, 2009	Test Site No.	03CH02-HY
Temperature	25℃	Humidity	55%
Test Engineer	Steven	Configuration	802.11n CH 36, 40, 48 (20MHz)

Channel 36

	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	5149.500	79.64	-3.90	83.54	40.10	34.35	5.19	0.00	Peak	---	---
2 X	5184.700	114.00			74.41	34.38	5.21	0.00	Peak	---	---
1	5149.900	58.64	-4.90	63.54	19.10	34.35	5.19	0.00	Average	---	---
2 X	5185.500	103.43			63.84	34.38	5.21	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Channel 40

	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	5149.840	70.21	-13.33	83.54	30.67	34.35	5.19	0.00	Peak	---	---
2 X	5204.560	116.50			76.89	34.40	5.21	0.00	Peak	---	---
3	5364.560	67.12	-16.42	83.54	27.27	34.57	5.28	0.00	Peak	---	---
1	5125.200	55.57	-7.97	63.54	16.07	34.33	5.17	0.00	Average	---	---
2 X	5204.880	105.72			66.11	34.40	5.21	0.00	Average	---	---
3	5354.640	53.39	-10.15	63.54	13.56	34.55	5.28	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Channel 48

	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	5102.160	66.74	-16.80	83.54	27.28	34.30	5.16	0.00	Peak	---	---
2 X	5244.560	118.21			78.53	34.45	5.23	0.00	Peak	---	---
3	5370.960	66.88	-16.66	83.54	27.03	34.57	5.28	0.00	Peak	---	---
1	5149.990	53.27	-10.27	63.54	13.73	34.35	5.19	0.00	Average	---	---
2 X	5245.520	107.35			67.67	34.45	5.23	0.00	Average	---	---
3	5353.040	53.66	-9.88	63.54	13.83	34.55	5.28	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Final Test Date	Nov. 17, 2009	Test Site No.	03CH02-HY
Temperature	25℃	Humidity	55%
Test Engineer	Steven	Configuration	802.11n CH 38, 46 (40MHz)

Channel 38

	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	5148.700	79.06	-4.48	83.54	39.52	34.35	5.19	0.00	Peak	---	---
2 @	5187.000	119.90			80.31	34.38	5.21	0.00	Peak	---	---
1	5149.600	61.12	-2.42	63.54	21.58	34.35	5.19	0.00	Average	---	---
2 X	5187.100	107.91			68.32	34.38	5.21	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Channel 46

	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	5148.560	76.75	-6.79	83.54	37.21	34.35	5.19	0.00	Peak	---	---
2 @	5234.320	124.15			84.49	34.43	5.23	0.00	Peak	---	---
3	5354.640	73.51	-10.03	83.54	33.68	34.55	5.28	0.00	Peak	---	---
1	5147.280	62.14	-1.40	63.54	22.60	34.35	5.19	0.00	Average	---	---
2 X	5233.040	113.42			73.76	34.43	5.23	0.00	Average	---	---
3	5355.600	60.53	-3.01	63.54	20.70	34.55	5.28	0.00	Average	---	---

An item 2 is Fundamental Emissions.

For Two Chain:

Final Test Date	Nov. 03, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 36, 40, 48 (20MHz)

Channel 36

	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	5146.300	81.64	-1.90	83.54	42.10	34.35	5.19	0.00	Peak	---	---
2 X	5185.000	119.63			80.04	34.38	5.21	0.00	Peak	---	---
1	5149.990	61.81	-1.73	63.54	22.27	34.35	5.19	0.00	Average	---	---
2 X	5187.000	108.75			69.16	34.38	5.21	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Channel 40

	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	5149.840	82.40	-1.14	83.54	42.86	34.35	5.19	0.00	Peak	---	---
2 @	5207.120	120.70			81.09	34.40	5.21	0.00	Peak	---	---
3	5351.760	68.56	-14.98	83.54	28.73	34.55	5.28	0.00	Peak	---	---
1	5149.990	61.64	-1.90	63.54	22.10	34.35	5.19	0.00	Average	---	---
2 X	5207.120	110.72			71.11	34.40	5.21	0.00	Average	---	---
3	5408.400	54.31	-9.23	63.54	14.41	34.60	5.30	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Channel 48

	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	5149.990	70.79	-12.75	83.54	31.25	34.35	5.19	0.00	Peak	---	---
2 @	5247.120	122.16			82.48	34.45	5.23	0.00	Peak	---	---
3	5355.600	68.44	-15.10	83.54	28.61	34.55	5.28	0.00	Peak	---	---
1	5149.990	55.47	-8.07	63.54	15.93	34.35	5.19	0.00	Average	---	---
2 X	5247.120	111.11			71.43	34.45	5.23	0.00	Average	---	---
3	5352.080	55.87	-7.67	63.54	16.04	34.55	5.28	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Final Test Date	Nov. 17, 2009	**Test Site No.**	03CH02-HY
Temperature	25℃	**Humidity**	55%
Test Engineer	Steven	**Configuration**	802.11n CH 38, 46 (40MHz)

Channel 38

	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	5148.300	82.08	-1.46	83.54	42.54	34.35	5.19	0.00	Peak	---	---
2 @	5175.900	123.50			83.93	34.38	5.19	0.00	Peak	---	---
1	5149.800	62.19	-1.35	63.54	22.65	34.35	5.19	0.00	Average	---	---
2 X	5174.300	111.89			72.32	34.38	5.19	0.00	Average	---	---

An item 2 is Fundamental Emissions.

Channel 46

	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	5135.440	75.39	-8.15	83.54	35.89	34.33	5.17	0.00	Peak	---	---
2 @	5232.720	124.60			84.94	34.43	5.23	0.00	Peak	---	---
3	5403.280	73.84	-9.70	83.54	33.94	34.60	5.30	0.00	Peak	---	---
1	5134.480	62.03	-1.51	63.54	22.53	34.33	5.17	0.00	Average	---	---
2 X	5234.000	114.26			74.60	34.43	5.23	0.00	Average	---	---
3	5357.200	61.02	-2.52	63.54	21.19	34.55	5.28	0.00	Average	---	---

An item 2 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

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

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

3.8 Frequency Stability Measurement

3.8.1 Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user's manual or ±20ppm (IEEE 802.11a specification).

3.8.2 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	Entire absence of modulation emissions bandwidth
RB	10 kHz
VB	10 kHz
Sweep Time	Auto

3.8.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±20ppm (IEEE 802.11a specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is -30°C~50°C.

3.8.4 Test Setup Layout

3.8.5 Test Deviation

There is no deviation with the original standard.

3.8.6 EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

3.8.7 Test Result of Frequency Stability

Voltage vs. Frequency Stability

For Single Chain

Voltage	Measurement Frequency (MHz)	
	IEEE 802.11a/n (20MHz)	**IEEE 802.11n (40MHz)**
(V)	**5180**	**5190**
126.5	5179.978400	5189.979000
110	5179.979600	5189.979000
93.5	5179.979000	5189.977800
Max. Deviation (MHz)	**0.021600**	**0.022200**
Max. Deviation (ppm)	**4.17**	**4.28**

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
	IEEE 802.11a/n (20MHz)	**IEEE 802.11n (40MHz)**
(℃)	**5180**	**5190**
-30	5180.034000	5190.034000
-20	5180.030000	5190.033000
-10	5180.019000	5190.031500
0	5180.018000	5190.019000
10	5180.008000	5190.007200
20	5179.985000	5189.995800
30	5179.946000	5189.985000
40	5179.977800	5189.977800
50	5179.978400	5189.974840
Max. Deviation (MHz)	**0.054000**	**0.034000**
Max. Deviation (ppm)	**10.42**	**6.55**

For Two Chain

Voltage	Measurement Frequency (MHz)
(V)	**IEEE 802.11n 5230 (40MHz)**
126.5	5229.970000
110	5229.977800
93.5	5229.979000
Max. Deviation (MHz)	**0.030000**
Max. Deviation (ppm)	**5.74**

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(℃)	**IEEE 802.11n 5230 (40MHz)**
-30	5230.033000
-20	5230.032000
-10	5230.020000
0	5230.016000
10	5230.003600
20	5229.964000
30	5229.985000
40	5229.979600
50	5229.979000
Max. Deviation (MHz)	**0.036000**
Max. Deviation (ppm)	**6.88**

3.9 Antenna Requirements

3.9.1 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.

3.9.2 Antenna Connector Construction

Please refer to section 2.2 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	100132	9kHz – 2.75GHz	Sep. 01, 2009	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001/004	9kHz – 30MHz	Mar. 18, 2009	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001/009	9kHz – 30MHz	Feb. 24, 2009	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 – 60Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832010001	9kHz – 30MHz	May 05, 2009	Conduction (CO01-HY)
Isolation Transformer	Erika Fiedler OHG	D-65396 Walluf	58	45MHz-2.15GHz	N/A	Conduction (CO01-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Oct. 29, 2009	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 31, 2009	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100666	DC ~ 30GHz	Aug. 05, 2009	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jul. 31, 2009	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2009	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Aug. 06, 2009	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2008	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2008	Conducted (TH01-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jul. 12, 2009*	Conducted (TH01-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100305/040	9 kHz - 40GHz	Feb. 04, 2009	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz - 1 GHz 3m	May 11, 2009	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz – 1.3 GHz	Jul. 07, 2009	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1GHz – 26.5 GHz	Jul. 16, 2009	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz~18GHz	Oct. 22, 2009	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB020	30 MHz - 1 GHz	Dec. 17, 2008	Radiation (03CH02-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX106	03CH02-HY	1GHz~40GHz	Dec. 17, 2008	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz - 2 GHz	Nov. 30, 2008	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 - 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 28, 2008*	Radiation (03CH02-HY)

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

5 TEST LOCATION

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	886-3-327-3456
	FAX	:	886-3-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	886-2-8227-2020
	FAX	:	886-2-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2794-8886
	FAX	:	886-2-2794-9777
JHUBEI	ADD	:	No.8, Lane 728, 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. : L1190-090318

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, 2007 to January 09, 2010
Accredited Scope	:	Testing Field, see described in the Appendix
Specific Accreditation Program	:	Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangment with Foreign Authorities

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : March 18, 2009

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The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix