

FCC RADIO TEST REPORT

According to

47 CFR FCC Part 15 Subpart E § 15.407

Equipment	: 802.11n WiFi, PCIe Half Mini Card
Brand Name	: Provision
Model	: WPEA-121N
Filing Type	: New Application
Applicant	: GI Provision Ltd.
Manufacturer	: 10 Victoria Street, Bristol, BS1 6BN, UK
FCC ID	: CUO-GIP116
Received Date	: Mar. 08, 2012
Final Test Date	: Apr. 16, 2012

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.



SPORTON International Inc.

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

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History of This Test Report

Original Issue Date: Apr. 23, 2012

Report No.: FR230842AN

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

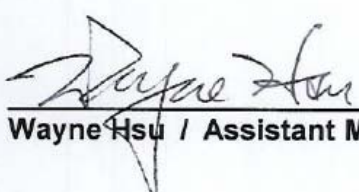
CERTIFICATE OF COMPLIANCE

According to

47 CFR FCC Part 15 Subpart E § 15.407

Equipment : 802.11n WiFi, PCIe Half Mini Card
Brand Name : Provision
Model : WPEA-121N
Applicant : GI Provision Ltd.
10 Victoria Street, Bristol, BS1 6BN, UK

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Mar. 08, 2012 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.


Wayne Hsu / Assistant Manager

SPORTON International Inc.

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

1 SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	Rule Section	Description of Test	Result	Under Limit
3.1	15.207	AC Power Line Conducted Emissions	Complies	21.72 dB
3.2	15.407(a)	26dB Spectrum Bandwidth Measurement	Complies	-
3.3	15.407(a)	Maximum Conducted Output Power	Complies	0.55 dB
3.4	15.407(a)	Power Spectral Density	Complies	0.05 dB
3.5	15.407(a)	Peak Excursion	Complies	5.48 dB
3.6	15.407(b)	Radiated Emissions	Complies	1.05 dB
3.7	15.407(b)	Band Edge Emissions	Complies	1.34 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	±8.5×10 ⁻⁸	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	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

EUT may match the four antennas use. Only the radio detail of IEEE 802.11a/n is shown in this report. For more detailed features description, please refer to the manufacturer's specifications or user's manual.

Items	Description
Power Type	From System
Data Modulation Data Rate (Mbps)	OFDM for IEEE 802.11a (BPSK / QPSK / 16QAM / 64QAM) (6/9/12/18/24/36/48/54) See the below table for IEEE 802.11n
Frequency Range	5150~5250MHz
Channel Band Width (99%)	802.11a : 17.80 MHz 802.11n : MCS 8 (20MHz) : 18.40 MHz ; MCS 8 (40MHz) : 37.00 MHz
Conducted Output Power	802.11a : 12.79 dBm 802.11n : MCS 8 (20MHz) : 12.05 dBm ; MCS 8 (40MHz) : 14.75 dBm

IEEE 802.11n Modulation Scheme

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

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

2.2 Table for Filed Antenna

Antenna Category (Ant. Cat.)	
☒	Integral antenna (antenna permanently attached)
☒	Temporary RF connector provided ; ☐ No temporary RF connector provided

Transmitter Outputs & Receiver Inputs Information			
Modulation	Transmitter Outputs	Receiver Inputs	Transmitter Output Signals
802.11a	1	1	-
802.11n HT20 / HT40	2	2	-

Antenna General Information									
Antenna Port (Total 2 Port)					1(TX/RX), 2(TX/RX)				
Maximum RF Output Power Level (PL)					1				
Transmit Chains Power Distribution					☒ symmetrical distribution ☐ asymmetrical distribution				
Ant. No.	PL	Ant. Port [Ant No. X connect to Ant. Port Y]	Ant. Cat.	Ant. Type	Brand	Model	G _{ANT} (dBi)	DG (dBi) [correlated] N _{TX} = 1	DG (dBi) [uncorrelated] N _{TX} = 2
1	1	1	Integral	Patch	Provision	GC102010	7.70	N/A	7.70
	1	2	Integral	Patch	Provision	GC102010	7.70		
☒ Different target RF output power levels are used depending on the multiple antenna models. The test should be performed all power levels.									
Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows: Any transmit signals are correlated, Directional Gain (DG) = G_{ANT} + 10 log(N) dBi All transmit signals are completely uncorrelated, Directional Gain (DG)= G_{ANT} Note 2: For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows: Any transmit signals are correlated, Directional Gain (DG) = 10 log[(10^{G_{1/20}} + 10^{G_{2/20}} + ... + 10^{G_{N/20}})² /N] dBi All transmit signals are completely uncorrelated, Directional Gain (DG) = 10 log[(10^{G_{1/10}} + 10^{G_{2/10}} + ... + 10^{G_{N/10}})/N] dBi									

2.3 Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency (20MHz)	Channel No.	Frequency (40MHz)
5150~5250 MHz Band 1	36	5180 MHz	38	5190 MHz
	40	5200 MHz	46	5230 MHz
	44	5220 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 the entire possible Configuration for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
AC Power Conducted Emission Radiated Emission Below 1GHz	System Mode	-	-
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Peak Excursion	11a Band 1/BPSK	6Mbps	36/40/48
	11n Band 1/BPSK MCS 8 (20MHz)	13Mbps	36/40/48
	11n Band 1/BPSK MCS 8 (40MHz)	27Mbps	38/46
Max. Conducted Output Power Measurement Power Spectral Density	11a Band 1/BPSK	6Mbps	36/40/48
	11n Band 1/BPSK MCS 8 (20MHz)	13Mbps	36/40/48
	11n Band 1/BPSK MCS 8 (40MHz)	27Mbps	38/46
Radiated Emission Above 1GHz Fundamental Emissions	11a Band 1/BPSK	6Mbps	36/40/48
	11n Band 1/BPSK MCS 8 (20MHz)	13Mbps	36/40/48
	11n Band 1/BPSK MCS 8 (40MHz)	27Mbps	38/46
Band Edge Emission	11a Band 1/BPSK	6Mbps	36/48
	11n Band 1/BPSK MCS 8 (20MHz)	13Mbps	36/48
	11n Band 1/BPSK MCS 8 (40MHz)	27Mbps	38/46

2.5 Table for Testing Locations

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

Semi Anechoic Chamber (SAC).

2.6 Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E5520	DoC
(USB) Mouse	Microsoft	1113	JNZ211443
Earphone	Apple	MB770FE/A	
Test Fixture	--	--	--
Wireless AP (Remote Workstation)	D-Link	DNS-G120	DoC

**The EUT was embedded into test fixture testing.

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	Atheros Radio Test 2 (ATR2-GUI)		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11a	13	12.5	13

For Two Chains:

Power Parameters of IEEE 802.11n Port 1+Port 2

Test Software Version	Atheros Radio Test 2 (ATR2-GUI)		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11n (20MHz)	10.5 ; 10.5	11 ; 11	11.5 ; 11.5
Frequency	5190 MHz	5230 MHz	-
IEEE 802.11n (40MHz)	14 ; 14	14 ; 14	-

2.8 EUT Operation during Test

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

The program was executed as follows:

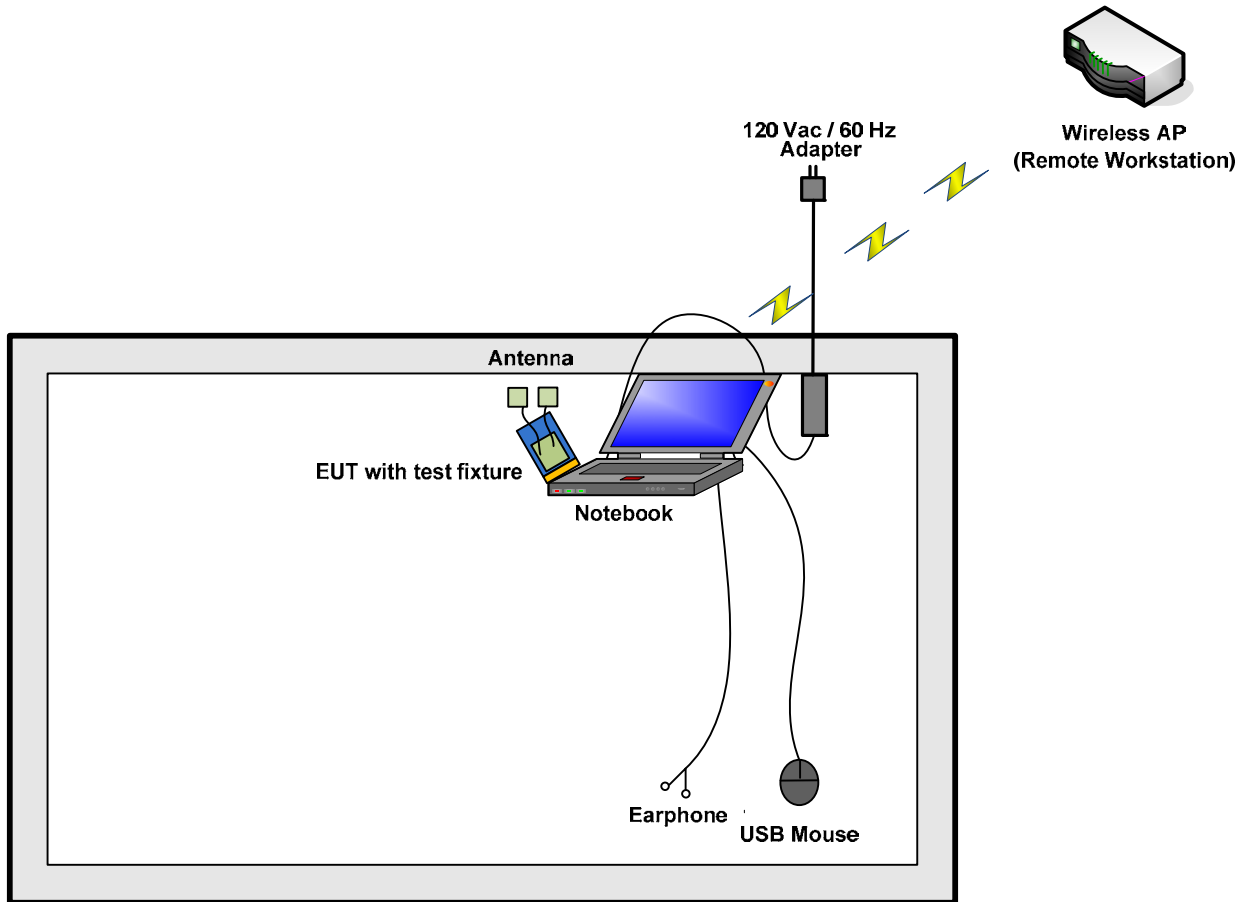
- Turn on the power of all equipment.
- The NB reads the test program from the hard disk drive and runs it.
- The NB sends "H" messages to the monitor and displays "H" patterns on the screen.

At the same time, the following programs were executed:

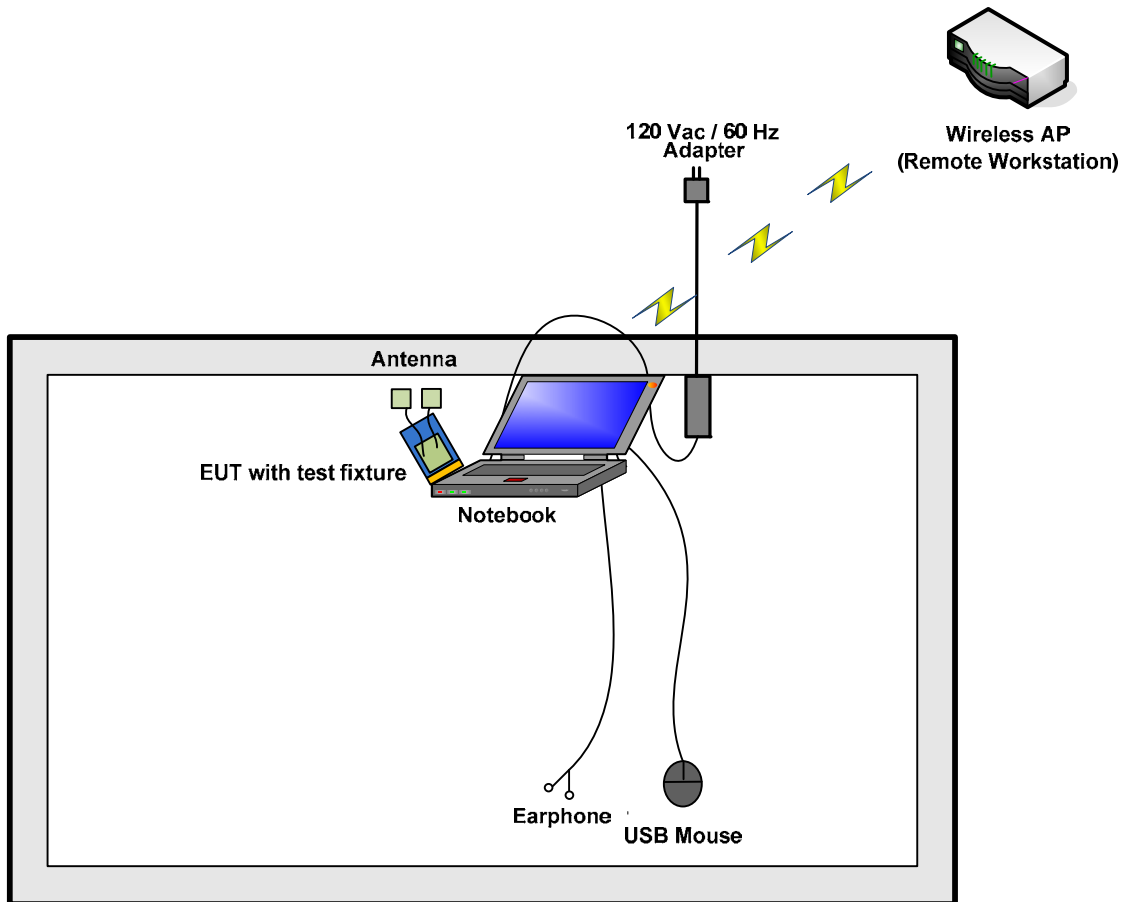
- Executed "WiFi function" to link with the Wireless AP (remote workstation) to receive and transmit.
- Executed "Media Player" to play audio to earphone.
- Executed "Atheros Radio Test 2 (ATR2-GUI)" to keep transmitting signals at fixed frequency.

2.9 Test Configuration

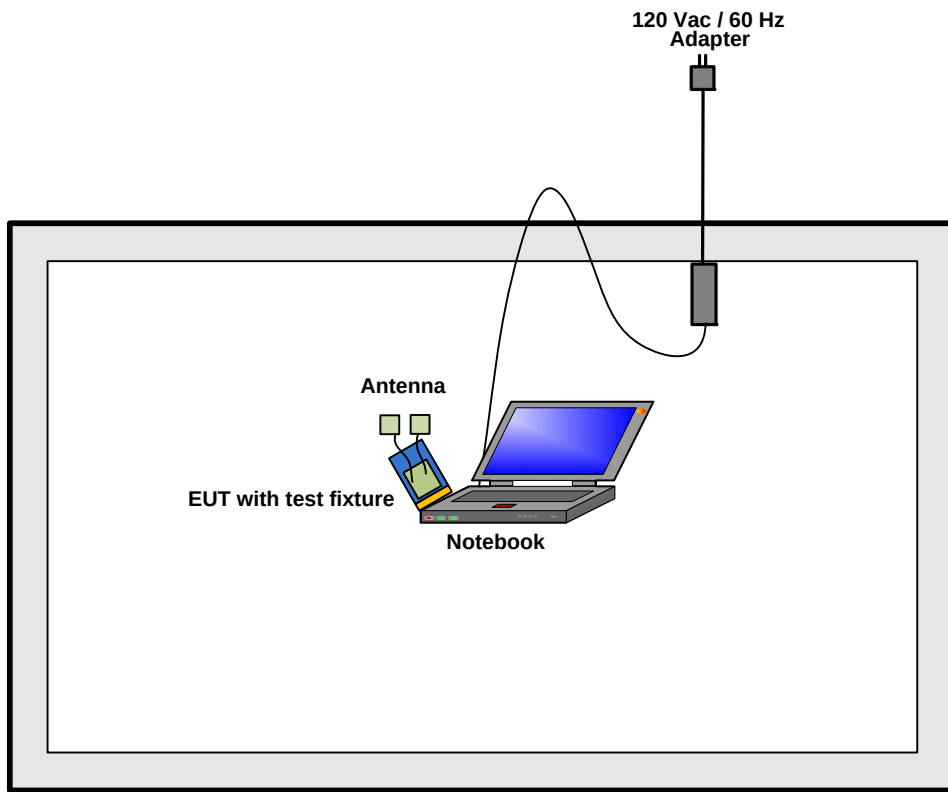
For Conducted Emissions



For Radiated Emissions 9kHz~1GHz



For Radiated Emissions above 1GHz



3 TEST RESULT

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit

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

Class B

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

3.1.2 Measuring Instruments and Setting

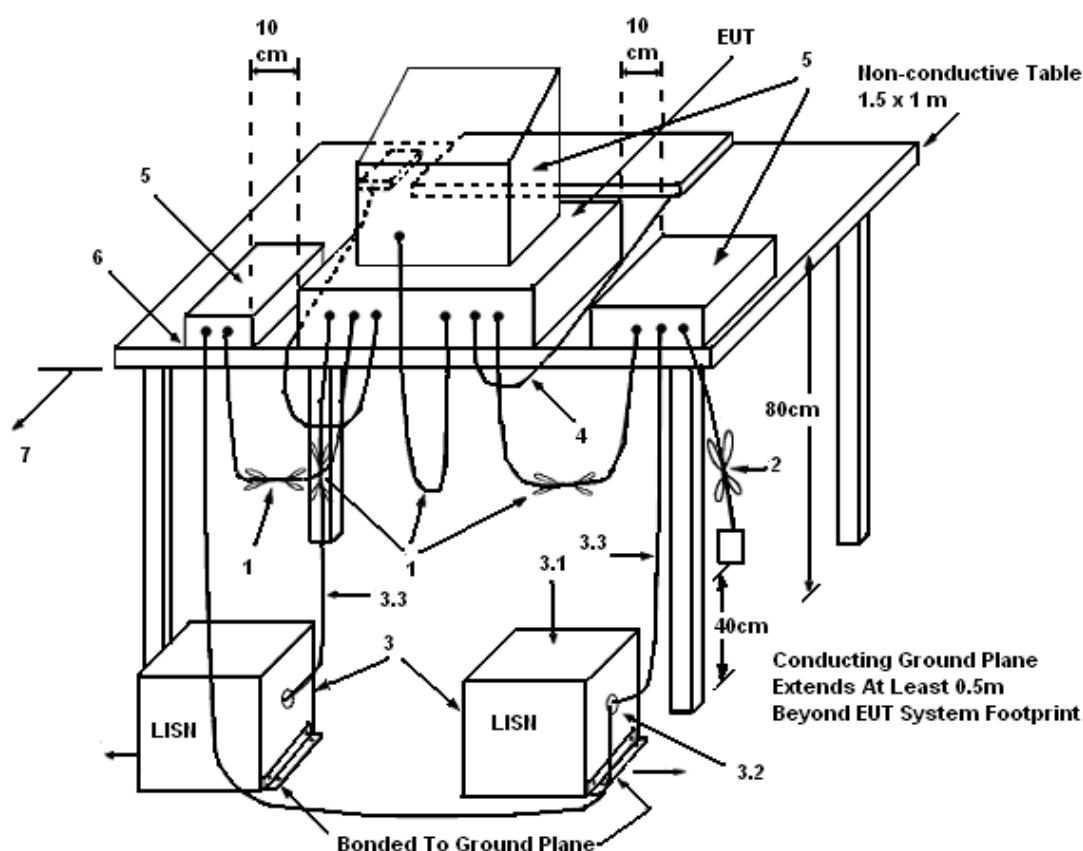
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

3.1.3 Test Procedures

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

3.1.4 Test Setup Layout



LEGEND:

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

3.1.5 Test Deviation

There is no deviation with the original standard.

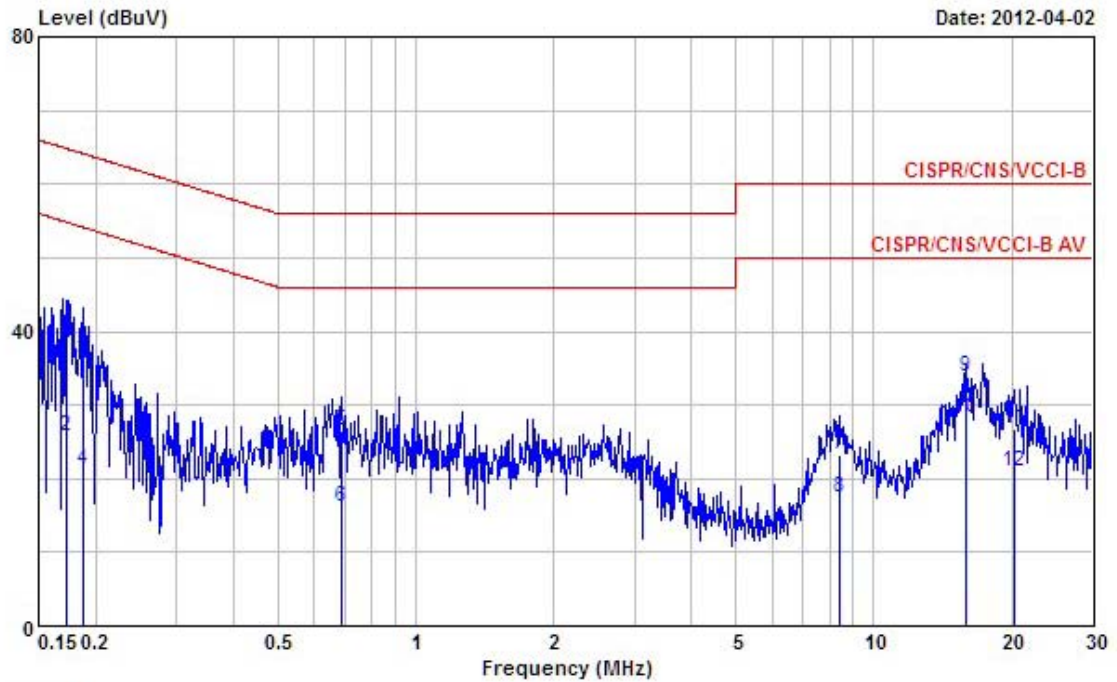
3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

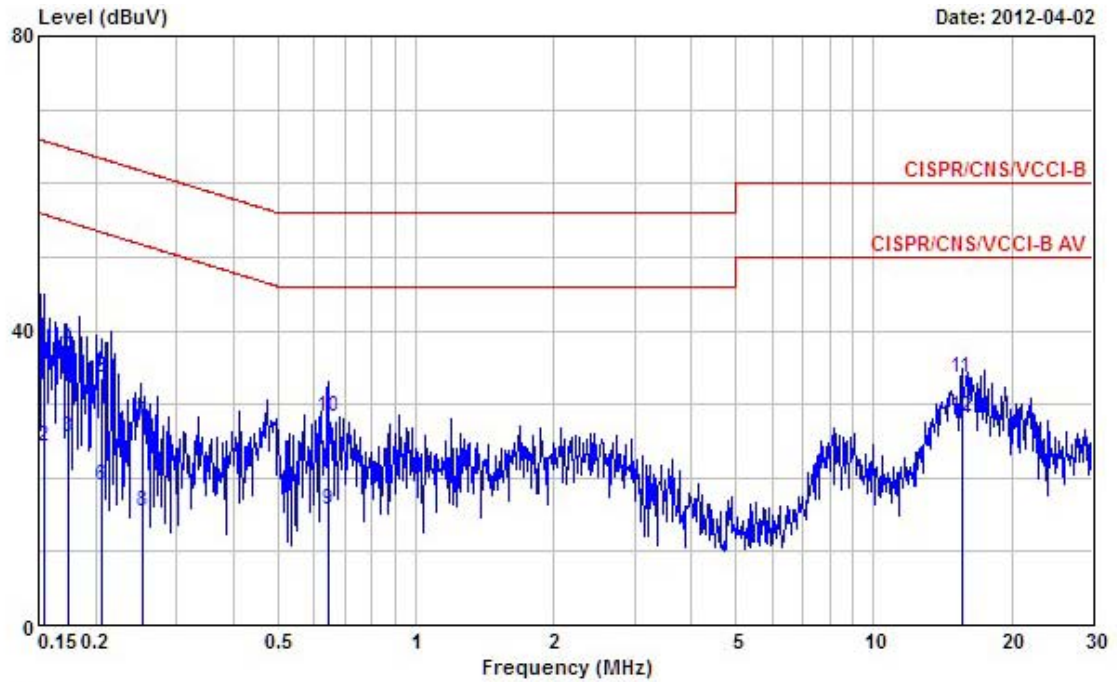
Final Test Date	Apr. 02, 2012	Test Site No.	CO04-HY
Temperature	23°C	Humidity	49%
Test Engineer	Assen	Configuration	System Mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1719400	39.62	-25.25	64.87	39.28	0.30	0.04	QP
2	0.1719400	25.79	-29.08	54.87	25.45	0.30	0.04	Average
3	0.1875850	36.21	-27.93	64.14	35.89	0.30	0.02	QP
4	0.1875850	21.18	-32.96	54.14	20.86	0.30	0.02	Average
5	0.6899030	26.59	-29.41	56.00	26.22	0.29	0.08	QP
6	0.6899030	16.06	-29.94	46.00	15.69	0.29	0.08	Average
7	8.410	23.29	-36.71	60.00	22.67	0.44	0.18	QP
8	8.410	17.37	-32.63	50.00	16.75	0.44	0.18	Average
9	15.890	33.90	-26.10	60.00	32.92	0.54	0.44	QP
10	15.890	28.23	-21.77	50.00	27.25	0.54	0.44	Average
11	20.270	26.77	-33.23	60.00	25.98	0.58	0.21	QP
12	20.270	20.91	-29.09	50.00	20.12	0.58	0.21	Average

Neutral



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.1540270	38.82	-26.96	65.78	38.47	0.27	0.08	QP
2	0.1540270	24.28	-31.50	55.78	23.93	0.27	0.08	Average
3	0.1749540	25.53	-29.19	54.72	25.23	0.26	0.04	Average
4	0.1749540	37.56	-27.16	64.72	37.26	0.26	0.04	QP
5	0.2070030	33.58	-29.74	63.32	33.32	0.25	0.01	QP
6	0.2070030	18.92	-34.40	53.32	18.66	0.25	0.01	Average
7	0.2531790	27.60	-34.05	61.65	27.28	0.25	0.07	QP
8	0.2531790	15.35	-36.30	51.65	15.03	0.25	0.07	Average
9	0.6439830	15.75	-30.25	46.00	15.40	0.25	0.10	Average
10	0.6439830	28.22	-27.78	56.00	27.87	0.25	0.10	QP
11	15.550	33.61	-26.39	60.00	32.69	0.45	0.47	QP
12	15.550	28.28	-21.72	50.00	27.36	0.45	0.47	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

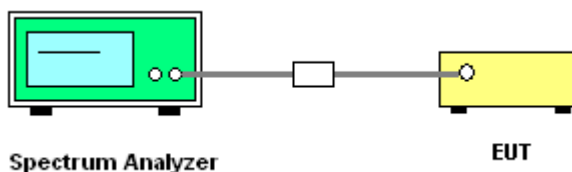
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. (Only for IEEE 802.11n test)

3.2.4 Test Setup Layout



3.2.5 Test Deviation

There is no deviation with the original standard.

3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.2.7 Test Result of 99% Occupied Bandwidth

Final Test Date	Apr. 16, 2012	Test Site No.	TH01-HY
Temperature	25.9℃	Humidity	23%
Test Engineer	Ian	Configurations	802.11a/n

For Single Chain:

Configuration of IEEE 802.11a

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	25.10	17.80
40	5200 MHz	25.50	17.80
48	5240 MHz	25.30	17.60

For Two Chains:

Configuration of IEEE 802.11n (20MHz) Port 1

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	24.80	18.40
40	5200 MHz	24.60	18.40
48	5240 MHz	24.90	18.40

Configuration of IEEE 802.11n (20MHz) Port 2

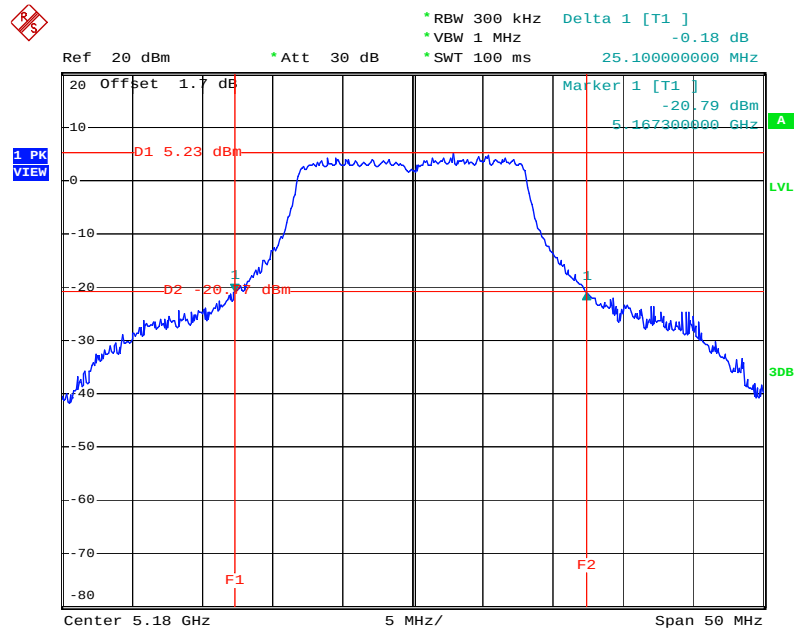
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	24.80	18.30
40	5200 MHz	24.50	18.30
48	5240 MHz	24.80	18.40

Configuration of IEEE 802.11n (40MHz) Port 1

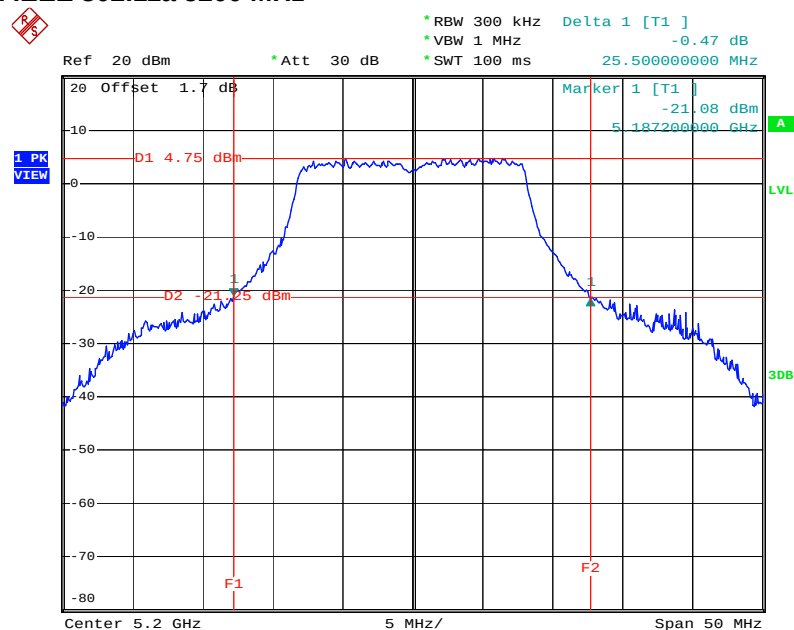
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	54.20	37.00
46	5230 MHz	50.00	36.80

Configuration of IEEE 802.11n (40MHz) Port 2

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	47.20	36.60
46	5230 MHz	47.20	36.60

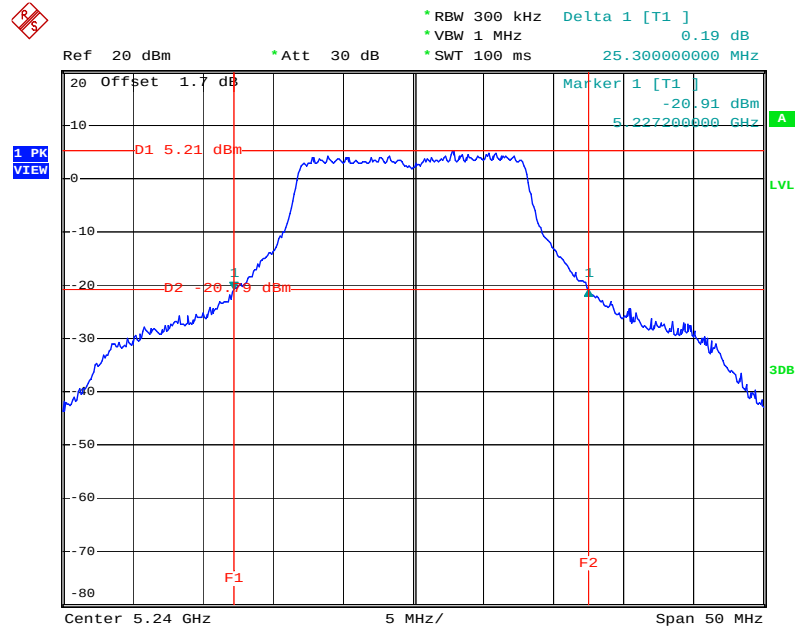
26 dB Bandwidth Plot
Configuration IEEE 802.11a 5180 MHz

Date: 16.APR.2012 13:52:23

Configuration IEEE 802.11a 5200 MHz

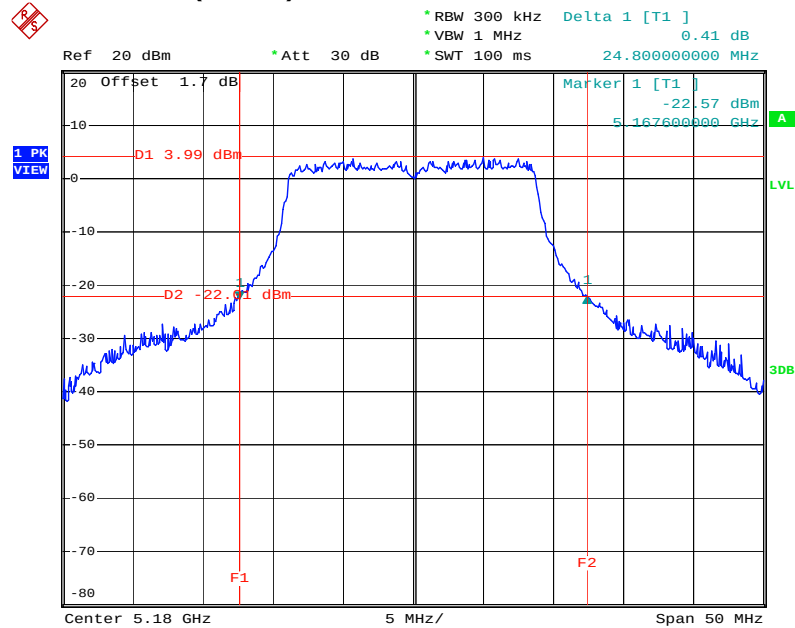
Date: 16.APR.2012 13:48:55

Configuration IEEE 802.11a 5240 MHz



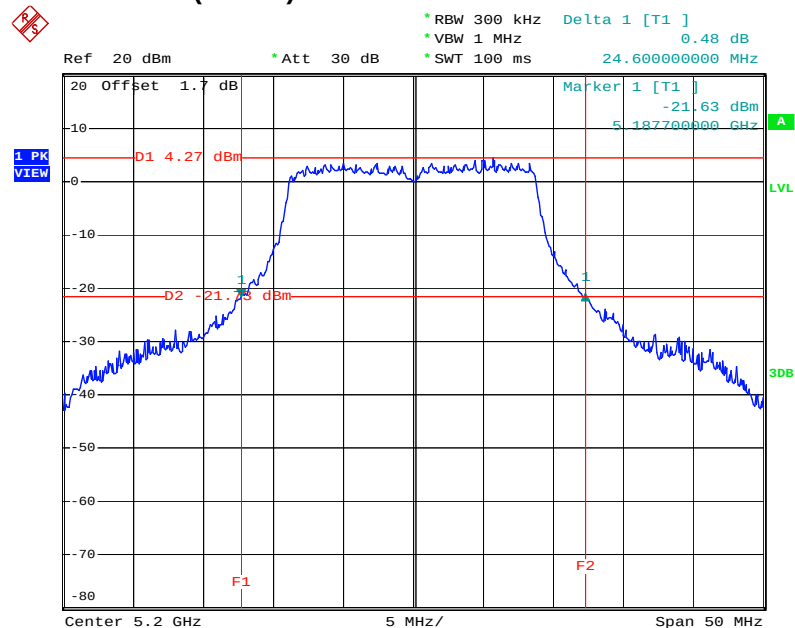
Date: 16.APR.2012 13:38:46

Configuration IEEE 802.11n (20MHz) 5180 MHz Port 1



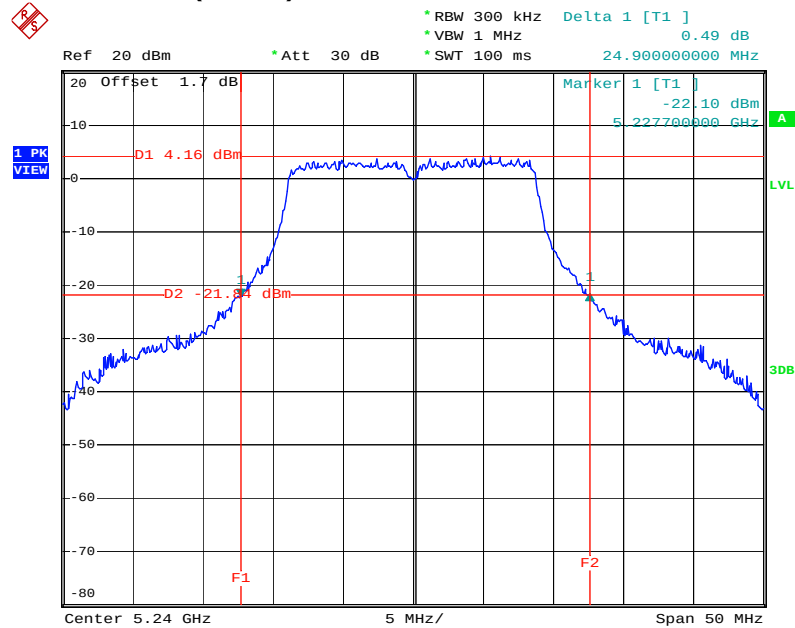
Date: 16.APR.2012 23:18:25

Configuration IEEE 802.11n (20MHz) 5200 MHz Port 1



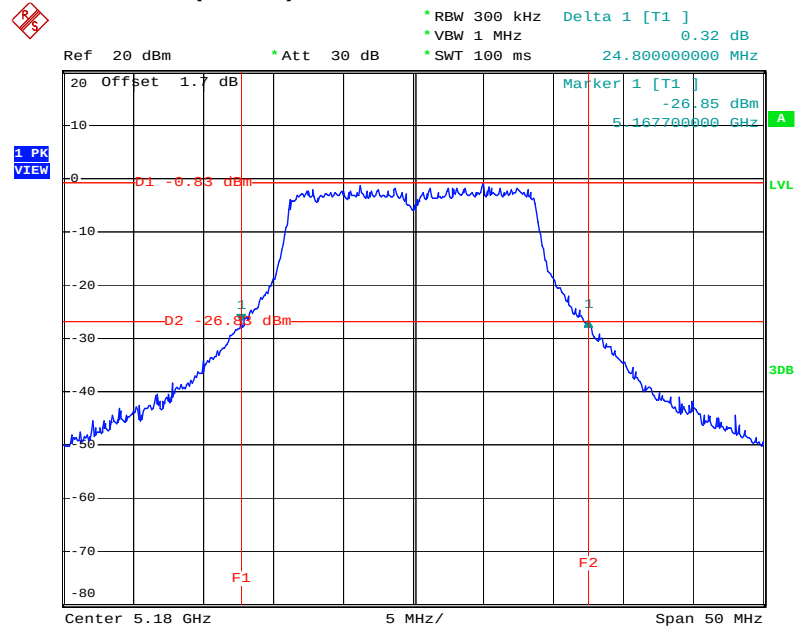
Date: 16.APR.2012 23:12:05

Configuration IEEE 802.11n (20MHz) 5240 MHz Port 1



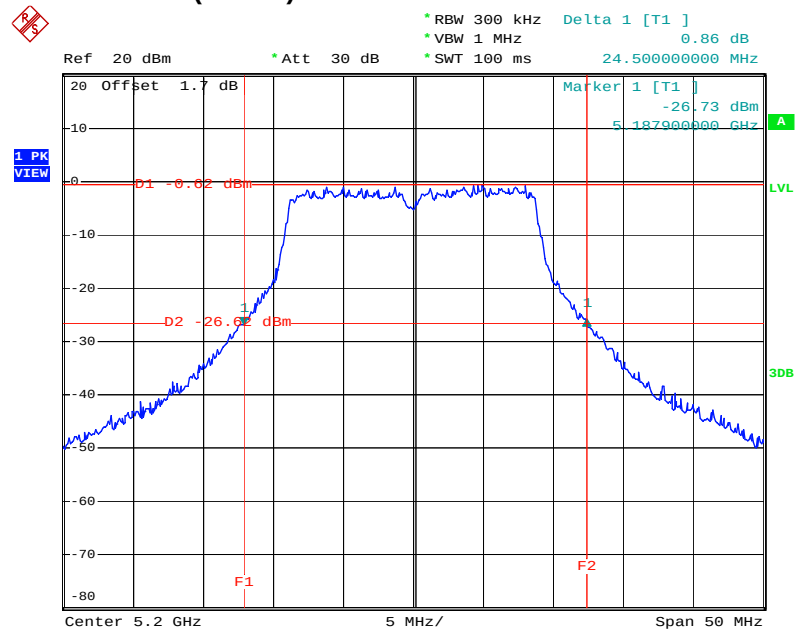
Date: 16.APR.2012 23:08:11

Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



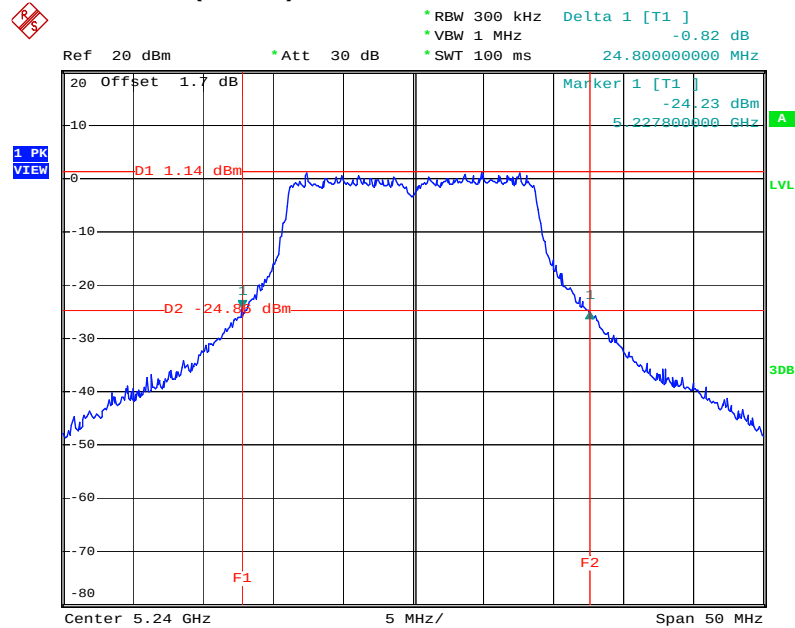
Date: 16.APR.2012 22:37:41

Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



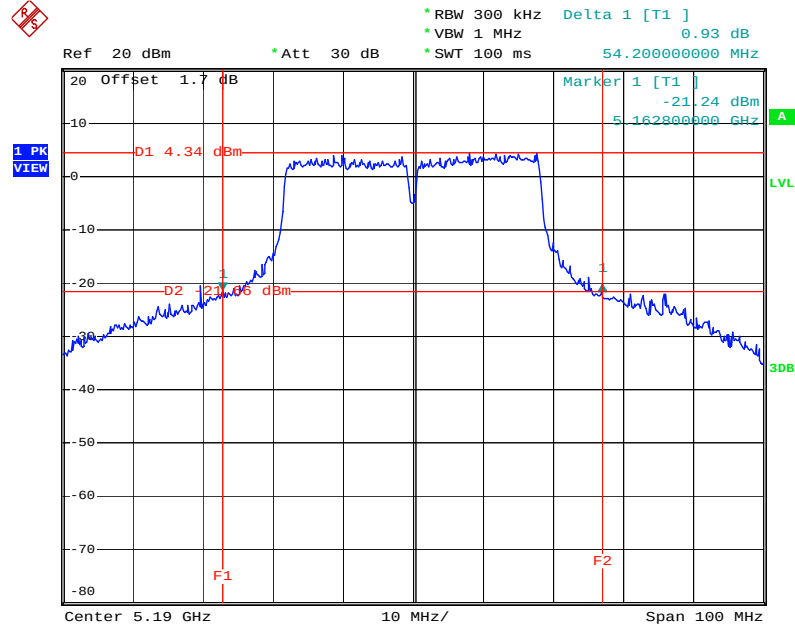
Date: 16.APR.2012 22:46:06

Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



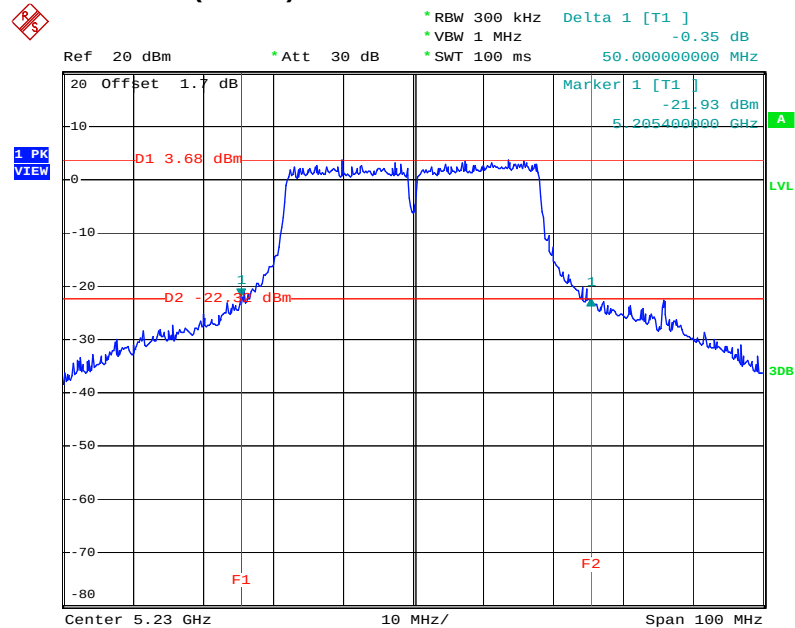
Date: 16.APR.2012 22:49:35

Configuration IEEE 802.11n (40MHz) 5190 MHz Port 1



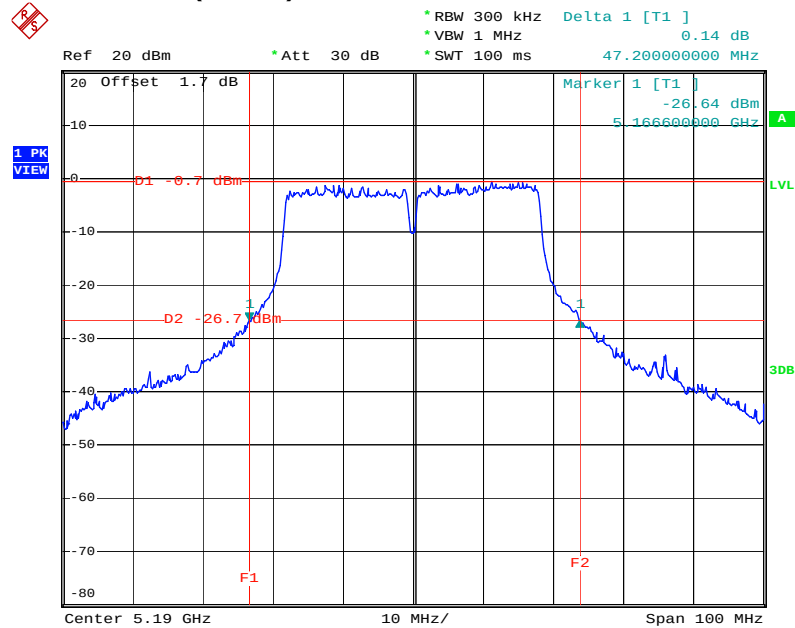
Date: 15.APR.2012 13:34:47

Configuration IEEE 802.11n (40MHz) 5230 MHz Port 1



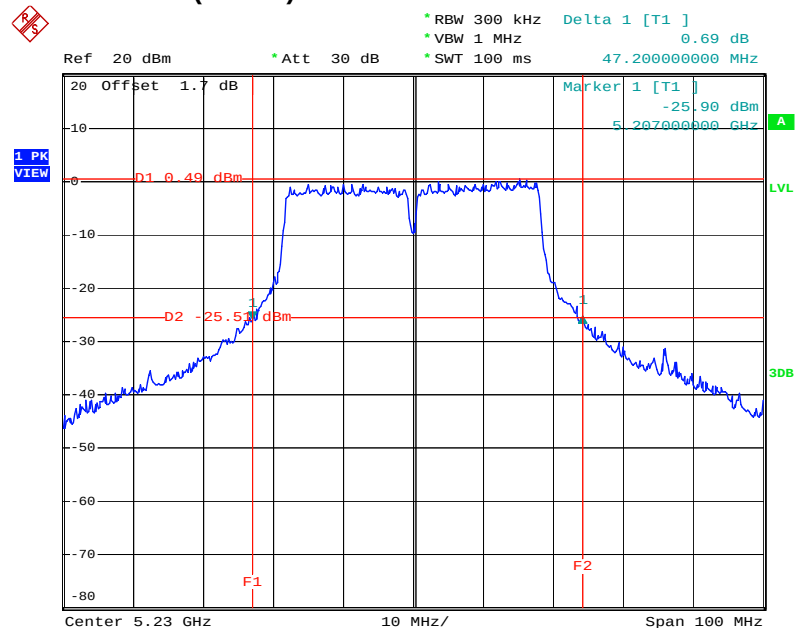
Date: 16.APR.2012 23:01:59

Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2

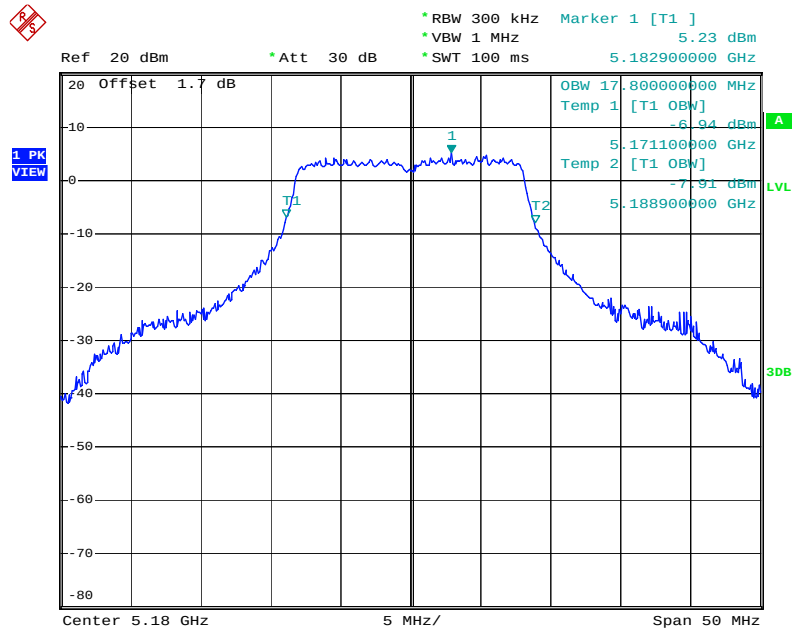


Date: 15.APR.2012 14:02:21

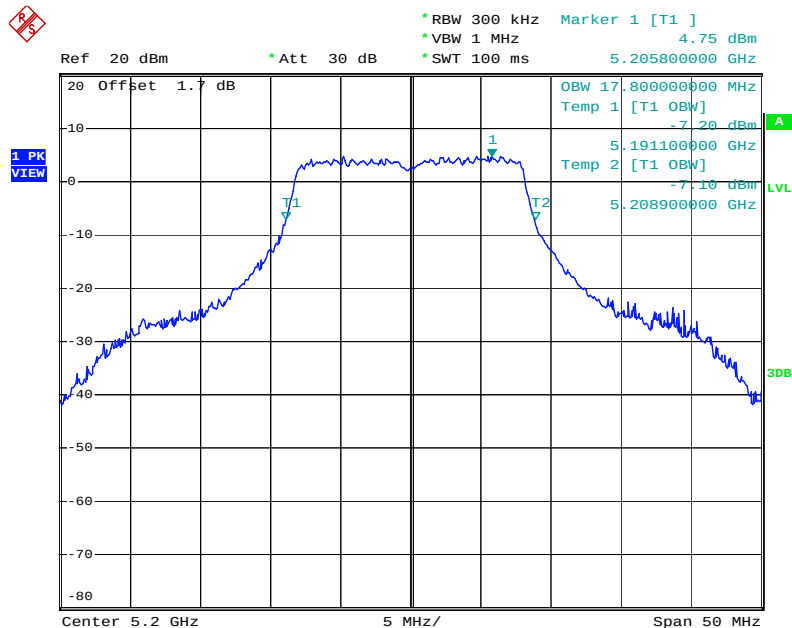
Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



Date: 16.APR.2012 22:57:58

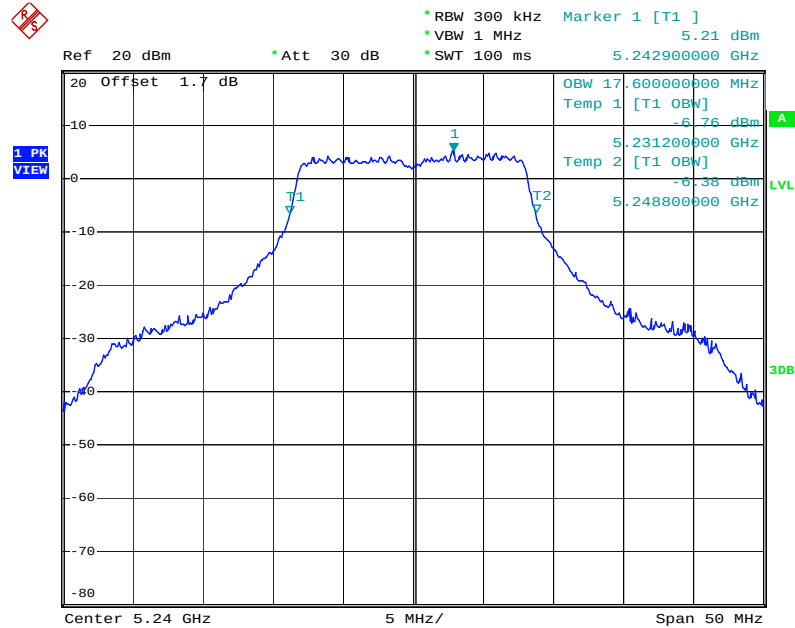
99% Occupied Bandwidth Plot
Configuration IEEE 802.11a 5180 MHz

Date: 16.APR.2012 13:52:36

Configuration IEEE 802.11a 5200 MHz

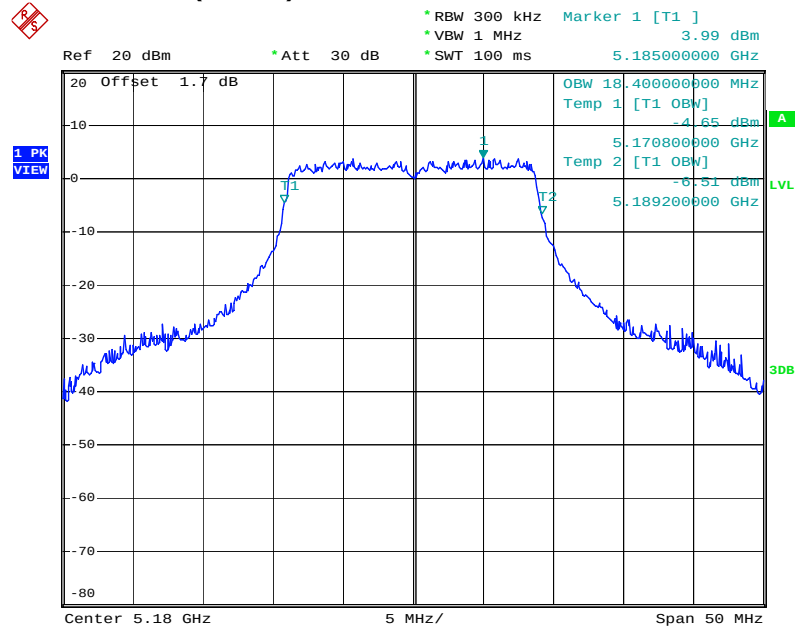
Date: 16.APR.2012 13:49:07

Configuration IEEE 802.11a 5240 MHz



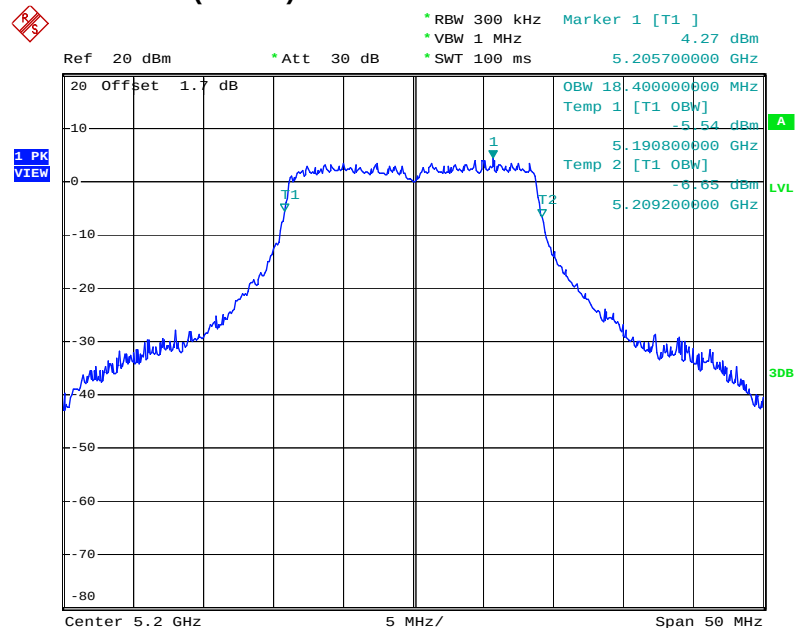
Date: 16.APR.2012 13:39:00

Configuration IEEE 802.11n (20MHz) 5180 MHz Port 1



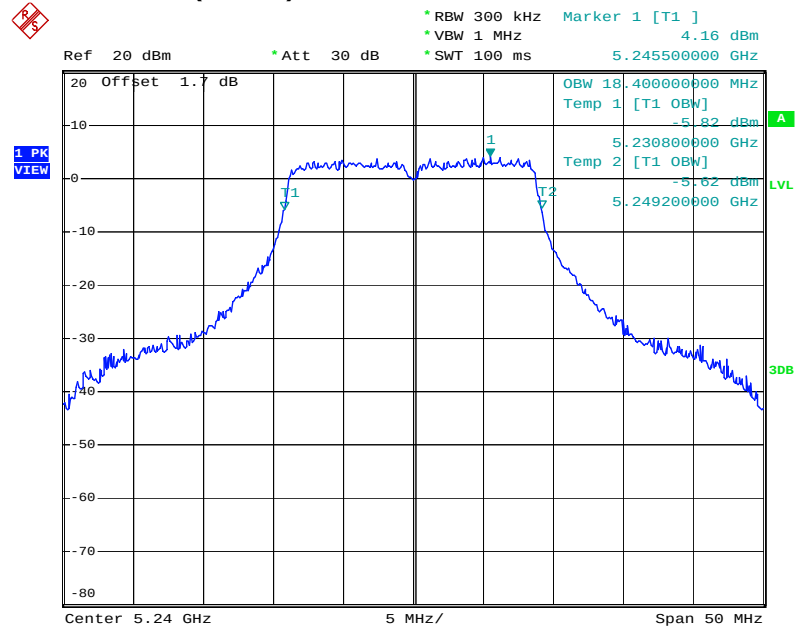
Date: 16.APR.2012 23:18:37

Configuration IEEE 802.11n (20MHz) 5200 MHz Port 1



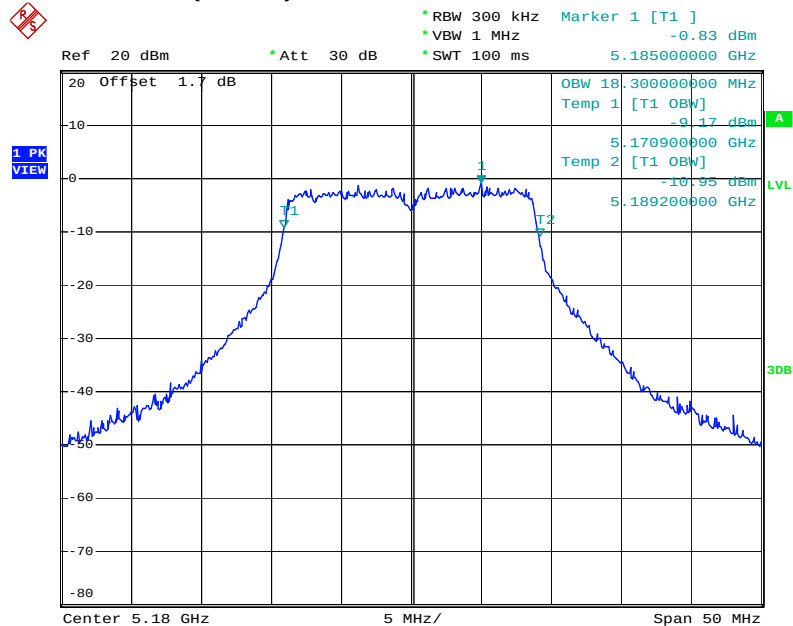
Date: 16.APR.2012 23:12:16

Configuration IEEE 802.11n (20MHz) 5240 MHz Port 1



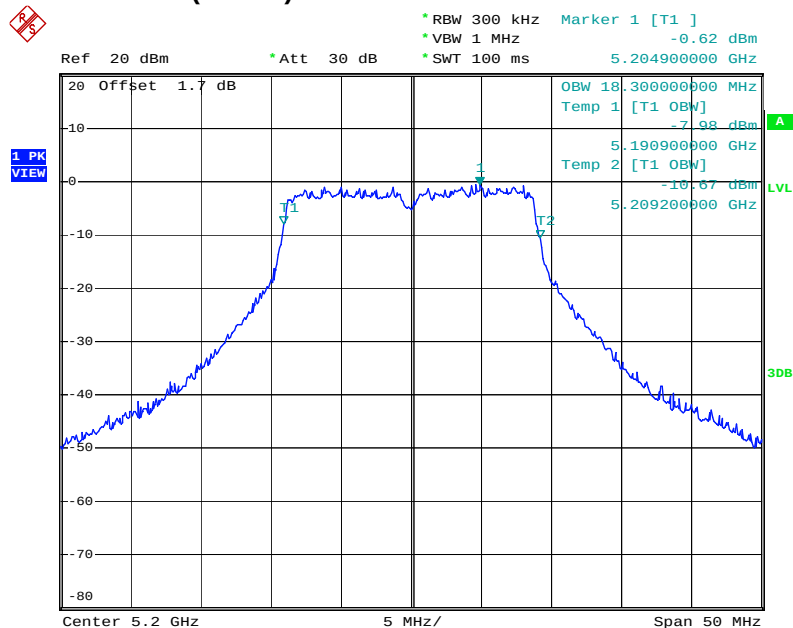
Date: 16.APR.2012 23:09:17

Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



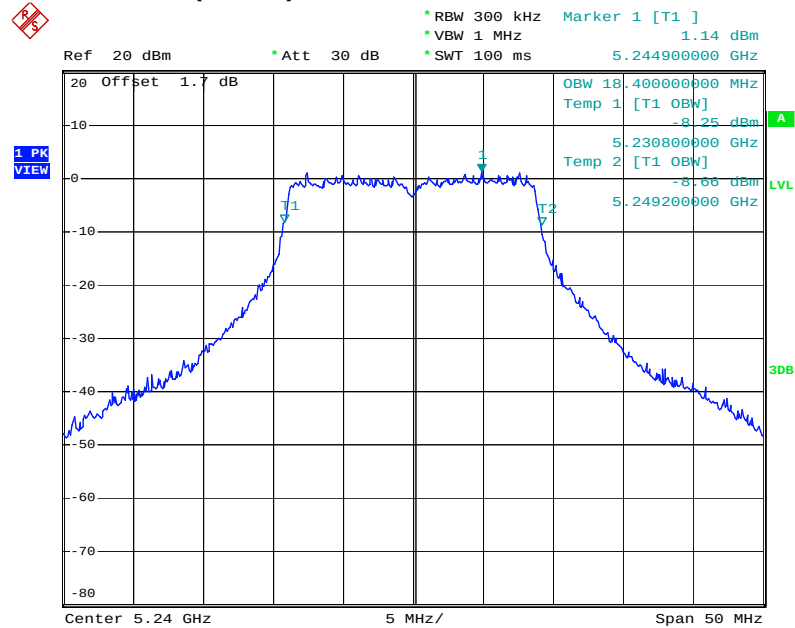
Date: 16.APR.2012 22:38:29

Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



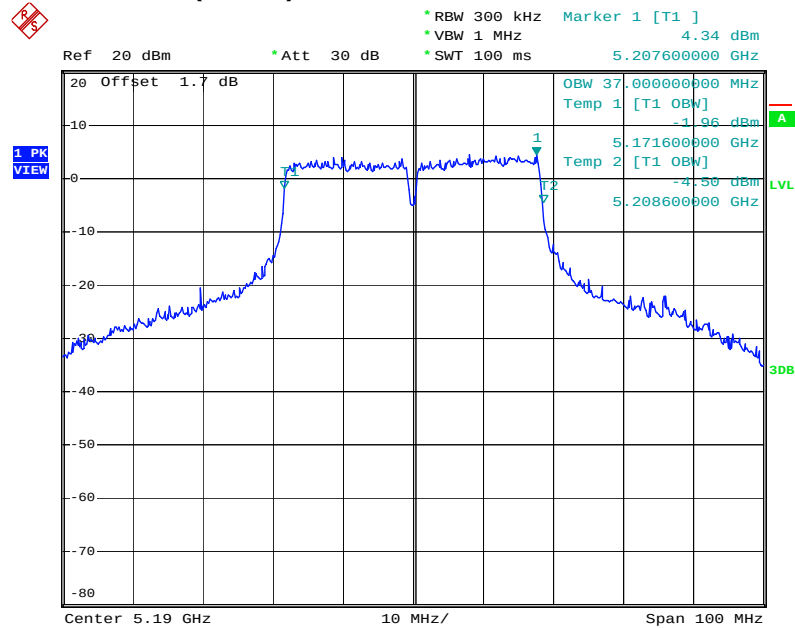
Date: 16.APR.2012 22:46:18

Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



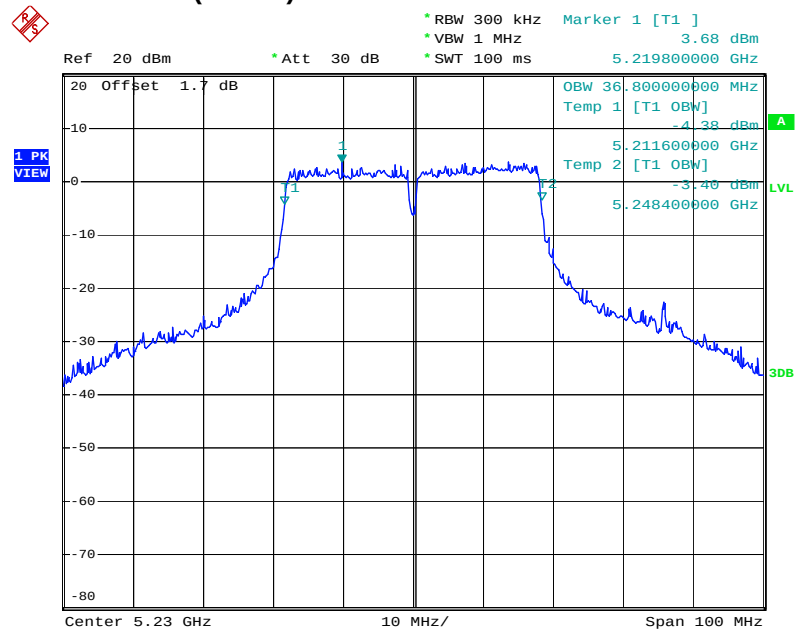
Date: 16.APR.2012 22:49:47

Configuration IEEE 802.11n (40MHz) 5190 MHz Port 1



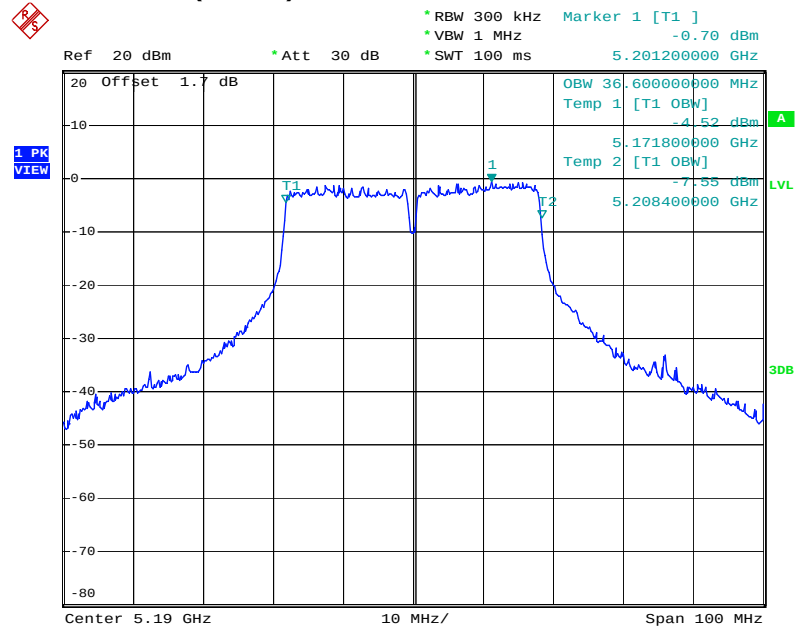
Date: 15.APR.2012 13:34:59

Configuration IEEE 802.11n (40MHz) 5230 MHz Port 1



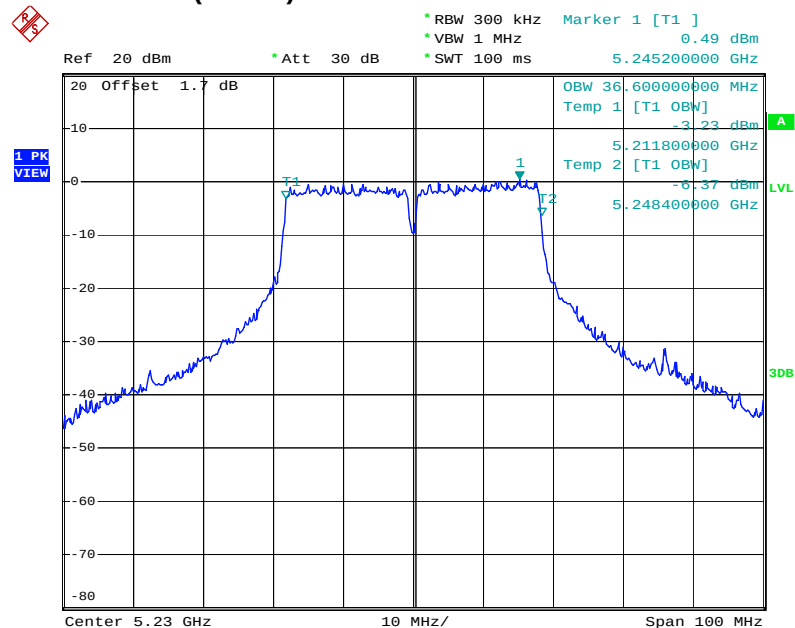
Date: 16.APR.2012 23:02:11

Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2



Date: 15.APR.2012 14:02:35

Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



Date: 16.APR.2012 22:58:12

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 $4 \text{ dBm} + 10\log B$, 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.

Maximum Conducted Output Power mean that the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level

3.3.2 Measuring Instruments and Setting

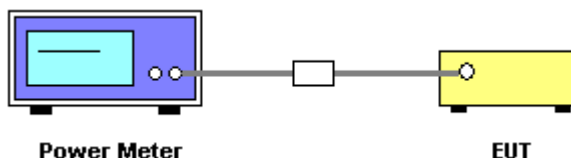
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

3.3.3 Test Procedures

1. The transmitter output (antenna port) was connected to the wideband power meter.
2. Turn on the EUT and power meter and then record the power value.
3. Repeat above procedures on all channels needed to be tested.
4. When measuring maximum conducted output power within multiple antenna systems, add every result of the values by mathematic formula. (Only for IEEE 802.11n test)

3.3.4 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	Apr. 16, 2012	Test Site No.	TH01-HY
Temperature	25.9℃	Humidity	23%
Test Engineer	Ian	Configurations	802.11a/n

For Single Chain:

Configuration of IEEE 802.11a

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.79	15.30	Complies
40	5200 MHz	12.48	15.30	Complies
48	5240 MHz	12.06	15.30	Complies

For Two Chains:

Configuration IEEE 802.11n (20MHz) Port 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	10.41	15.30	Complies
40	5200 MHz	10.55	15.30	Complies
48	5240 MHz	10.30	15.30	Complies

Configuration IEEE 802.11n (20MHz) Port 2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	5.35	15.30	Complies
40	5200 MHz	6.33	15.30	Complies
48	5240 MHz	7.25	15.30	Complies

Configuration IEEE 802.11n (20MHz) Port 1+Port 2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	11.59	15.30	Complies
40	5200 MHz	11.94	15.30	Complies
48	5240 MHz	12.05	15.30	Complies

Configuration IEEE 802.11n (40MHz) Port 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	13.68	15.30	Complies
46	5230 MHz	12.33	15.30	Complies

Configuration IEEE 802.11n (40MHz) Port 2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	8.15	15.30	Complies
46	5230 MHz	9.30	15.30	Complies

Configuration IEEE 802.11n (40MHz) Port 1+Port 2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	14.75	15.30	Complies
46	5230 MHz	14.08	15.30	Complies

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

3.4.2 Measuring Instruments and Setting

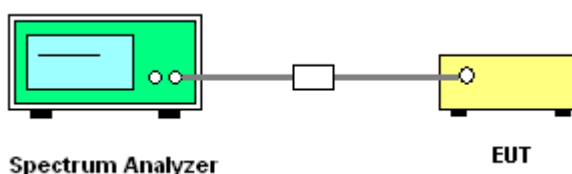
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	3000 kHz
Detector	RMS
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 RMS, Trace to Max Hold. Mark the frequency with maximum peak power as the center of the display of the spectrum.
3. When measuring maximum conducted output power within multiple antenna systems, add every result of the values by mathematic formula. (Only for IEEE 802.11n test)

3.4.4 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	Apr. 16, 2012	Test Site No.	TH01-HY
Temperature	25.9℃	Humidity	23%
Test Engineer	Ian	Configurations	802.11a/n

For Single Chain:
Configuration of IEEE 802.11a

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	1.92	2.30	Complies
5200 MHz	2.12	2.30	Complies
5240 MHz	1.91	2.30	Complies

For Two Chains:
Configuration IEEE 802.11n (20MHz) Port 1

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	0.57	2.30	Complies
5200 MHz	0.36	2.30	Complies
5240 MHz	0.52	2.30	Complies

Configuration IEEE 802.11n (20MHz) Port 2

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	-3.44	2.30	Complies
5200 MHz	-3.73	2.30	Complies
5240 MHz	-2.59	2.30	Complies

Configuration IEEE 802.11n (20MHz) Port 1+Port 2

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	2.02	2.30	Complies
5200 MHz	1.79	2.30	Complies
5240 MHz	2.25	2.30	Complies

Configuration IEEE 802.11n Port 1 (40MHz)

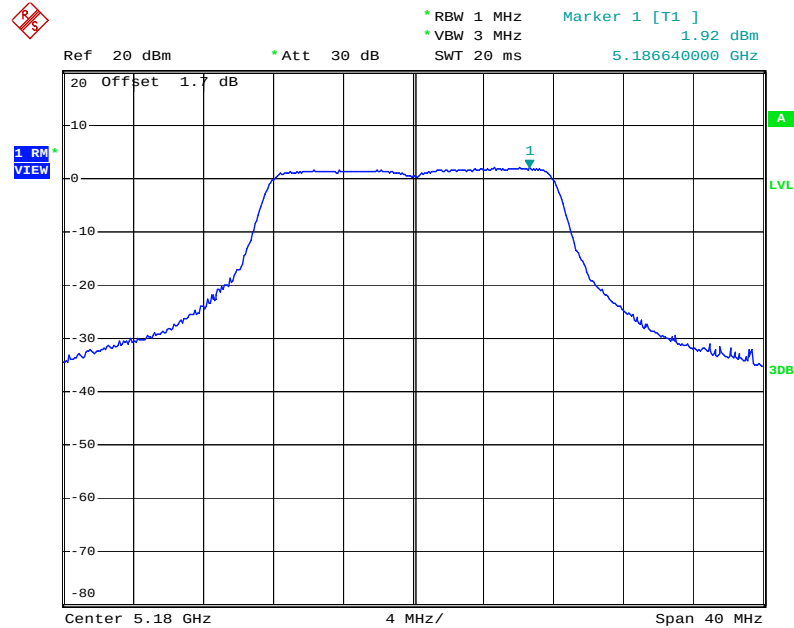
Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	0.96	2.30	Complies
5230 MHz	0.38	2.30	Complies

Configuration IEEE 802.11n Port 2 (40MHz)

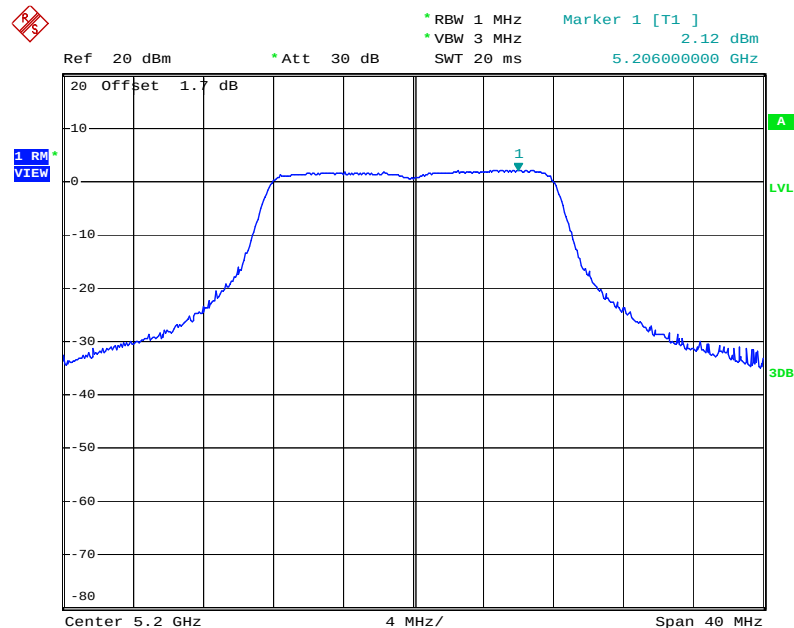
Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	-4.26	2.30	Complies
5230 MHz	-3.04	2.30	Complies

Configuration IEEE 802.11n Port 1 + Port 2 (40MHz)

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	2.10	2.30	Complies
5230 MHz	2.01	2.30	Complies

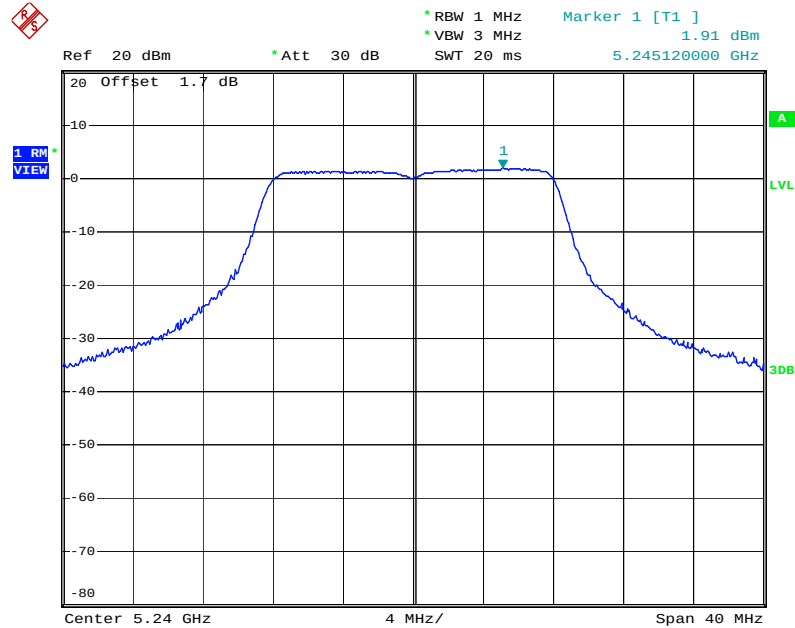
Power Density Plot
Configuration IEEE 802.11a 5180 MHz

Date: 16.APR.2012 13:30:31

Configuration IEEE 802.11a 5200 MHz

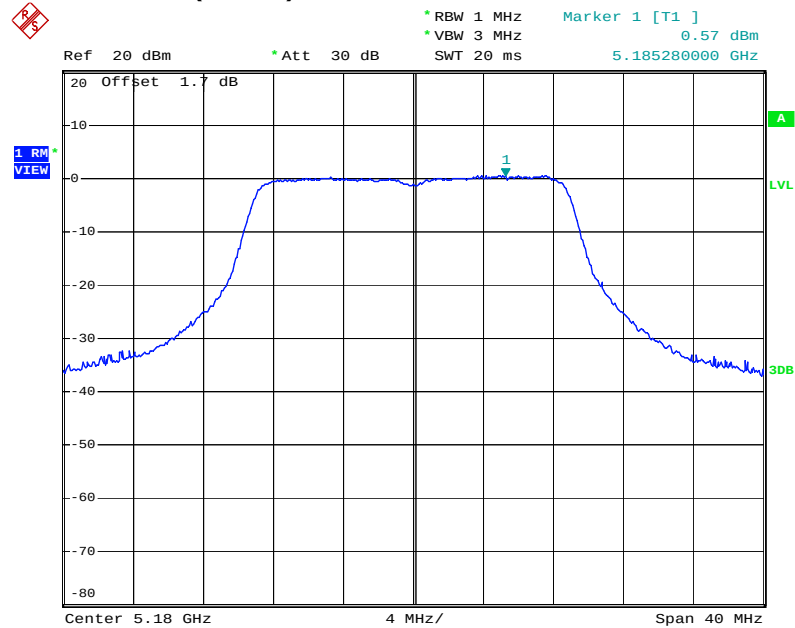
Date: 16.APR.2012 13:33:17

Configuration IEEE 802.11a 5240 MHz



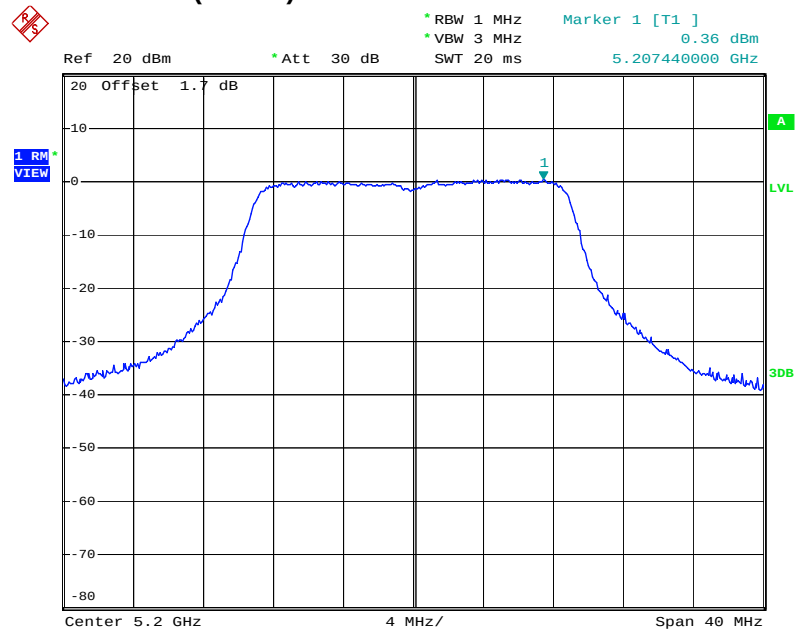
Date: 16.APR.2012 13:35:20

Configuration IEEE 802.11n (20MHz) 5180 MHz Port 1



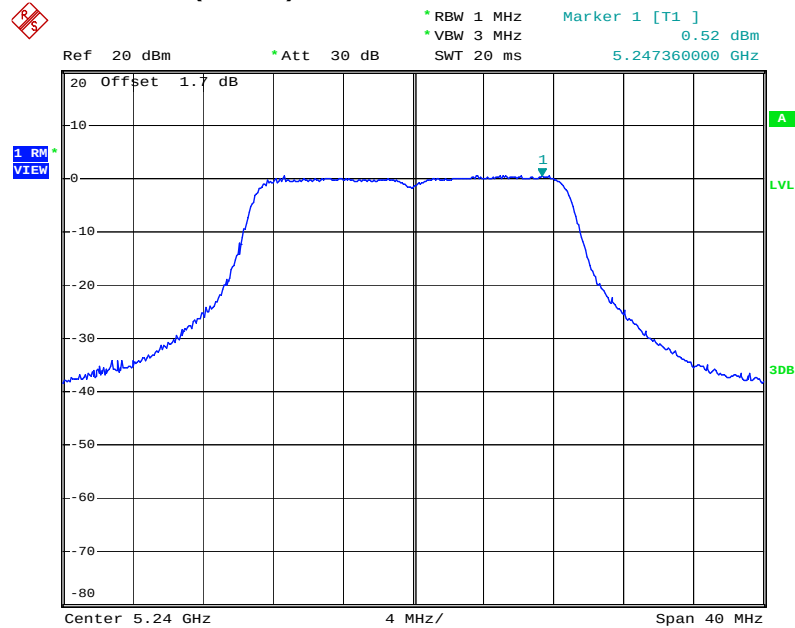
Date: 16.APR.2012 22:23:13

Configuration IEEE 802.11n (20MHz) 5200 MHz Port 1



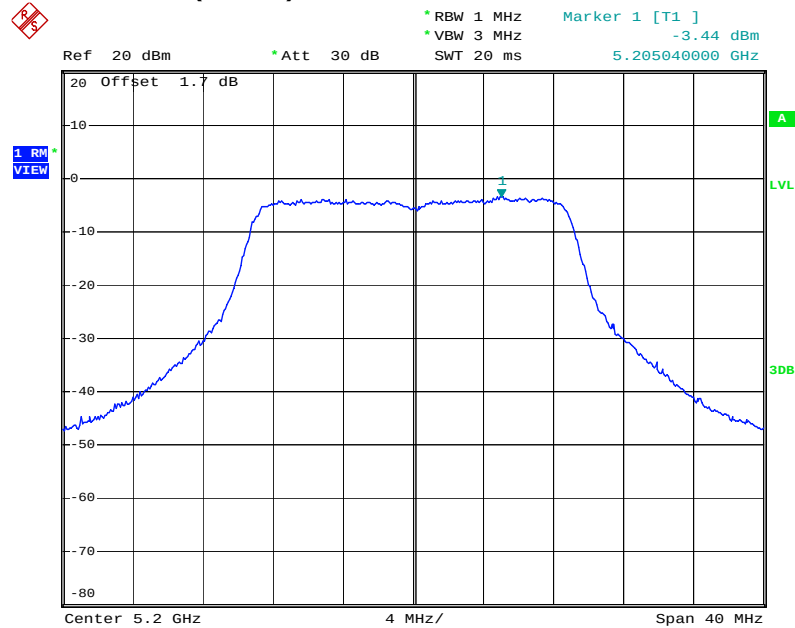
Date: 16.APR.2012 22:24:26

Configuration IEEE 802.11n (20MHz) 5240 MHz Port 1



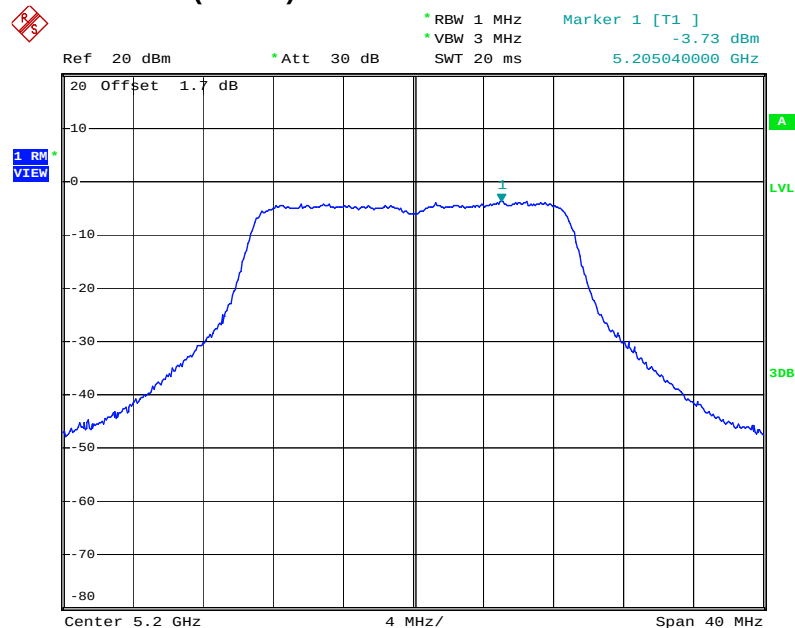
Date: 16.APR.2012 22:27:38

Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



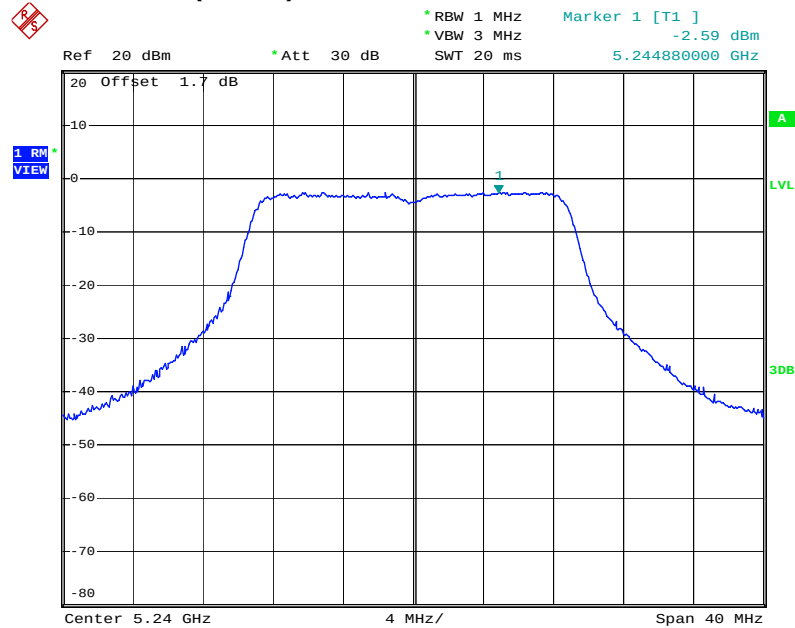
Date: 16.APR.2012 22:34:55

Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



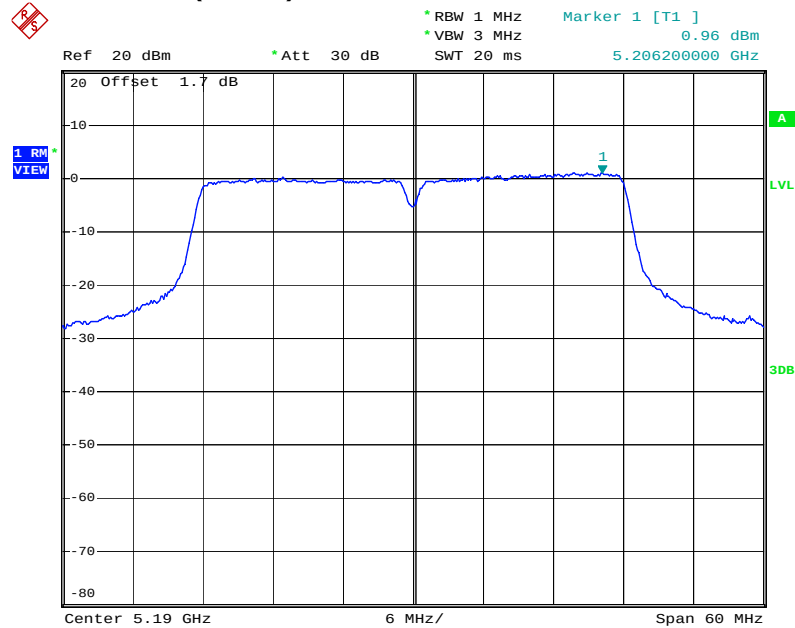
Date: 16.APR.2012 22:33:59

Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



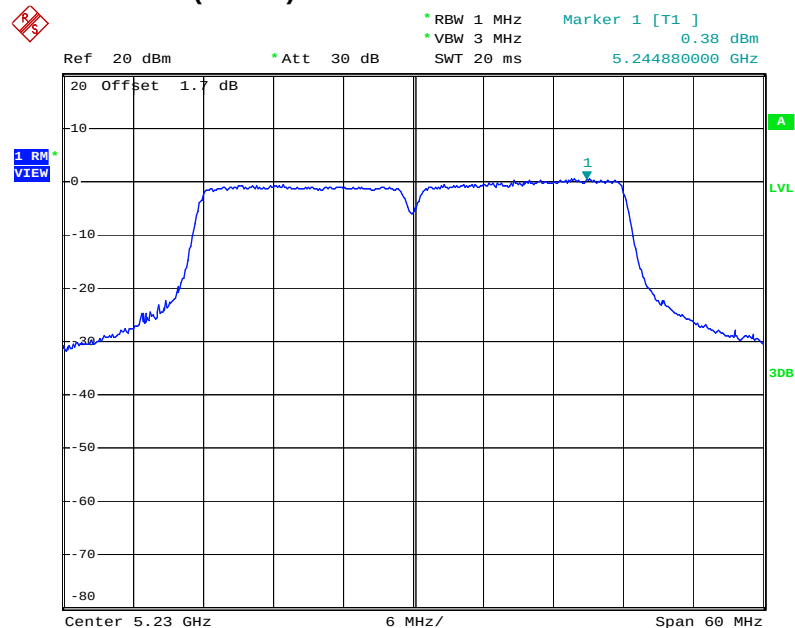
Date: 16.APR.2012 22:32:19

Configuration IEEE 802.11n (40MHz) 5190 MHz Port 1



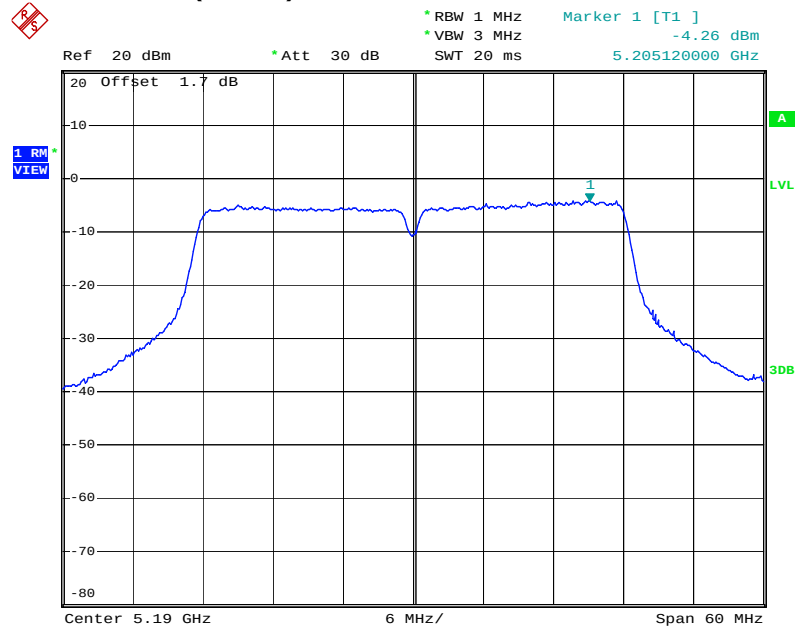
Date: 13.APR.2012 21:18:50

Configuration IEEE 802.11n (40MHz) 5230 MHz Port 1



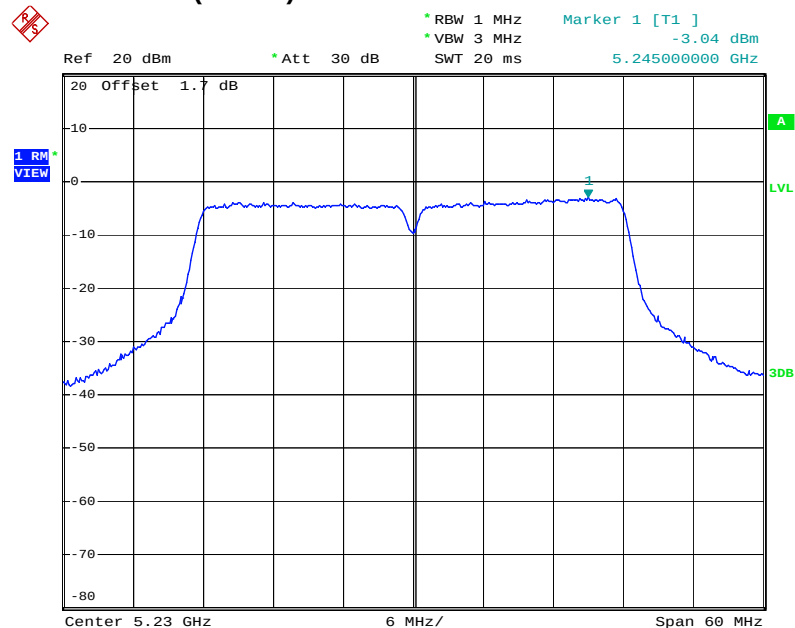
Date: 16.APR.2012 22:29:52

Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2



Date: 13.APR.2012 21:19:57

Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



Date: 16.APR.2012 22:31:13

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

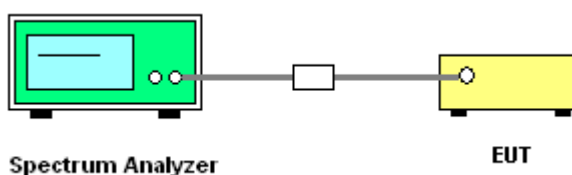
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 $\geq 1/T$ (IEEE 802.11a VBW = 300kHz $\geq 1/4\mu\text{s}$). 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. (Only for IEEE 802.11n test)

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	Apr. 16, 2012	Test Site No.	TH01-HY
Temperature	25.9°C	Humidity	23%
Test Engineer	Ian	Configurations	802.11a/n

**For Single Chain:
Configuration of IEEE 802.11a**

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	6.05	13	Complies
5200 MHz	5.94	13	Complies
5240 MHz	5.79	13	Complies

**For Two Chains:
Configuration IEEE 802.11n (20MHz) Port 1**

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	6.87	13	Complies
5200 MHz	6.51	13	Complies
5240 MHz	6.82	13	Complies

Configuration IEEE 802.11n (20MHz) Port 2

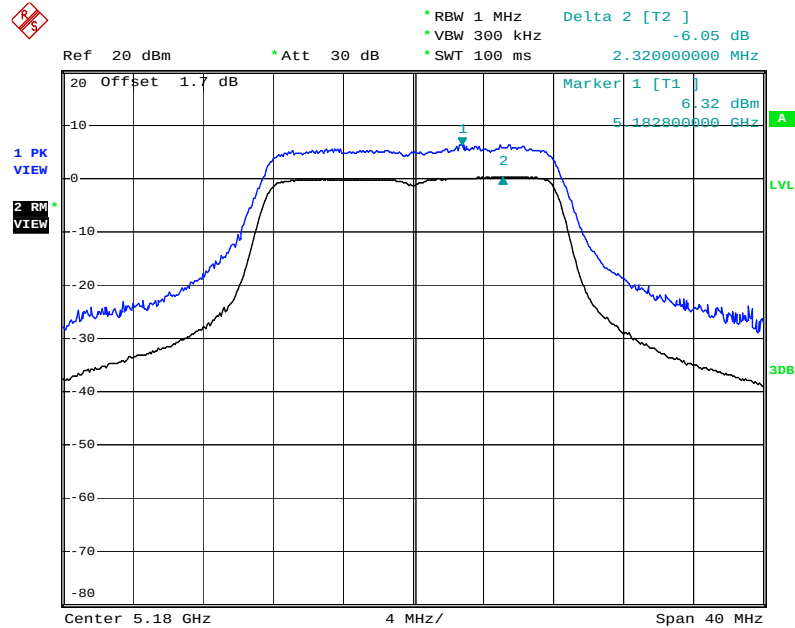
Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	7.22	13	Complies
5200 MHz	7.52	13	Complies
5240 MHz	7.03	13	Complies

Configuration IEEE 802.11n (40MHz) Port 1

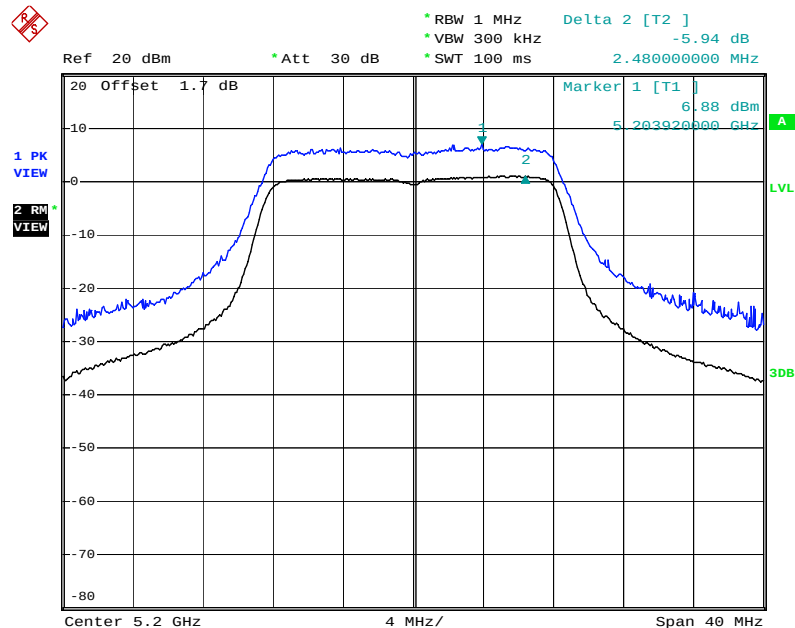
Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5190 MHz	7.19	13	Complies
5230 MHz	7.35	13	Complies

Configuration IEEE 802.11n (40MHz) Port 2

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5190 MHz	7.20	13	Complies
5230 MHz	6.95	13	Complies

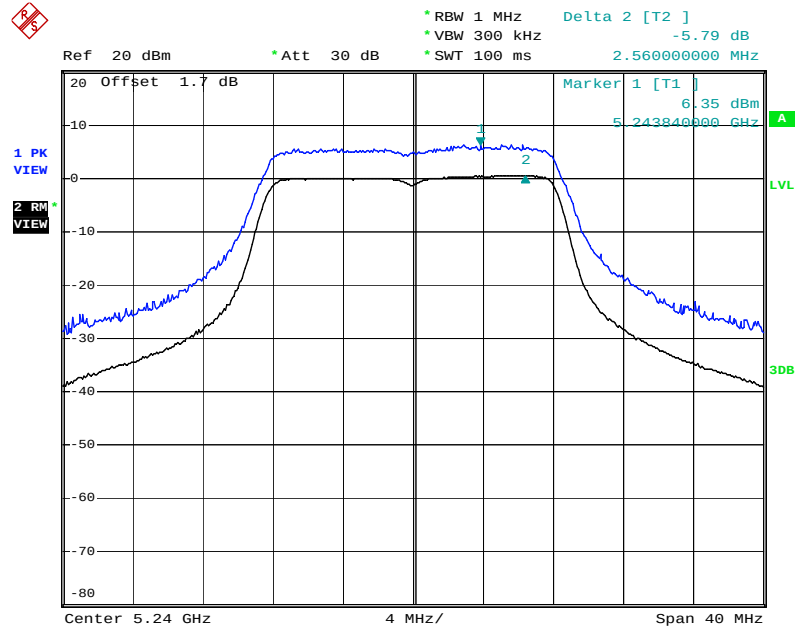
Peak Excursion Plot
Configuration IEEE 802.11a 5180 MHz

Date: 16.APR.2012 13:51:04

Configuration IEEE 802.11a 5200 MHz

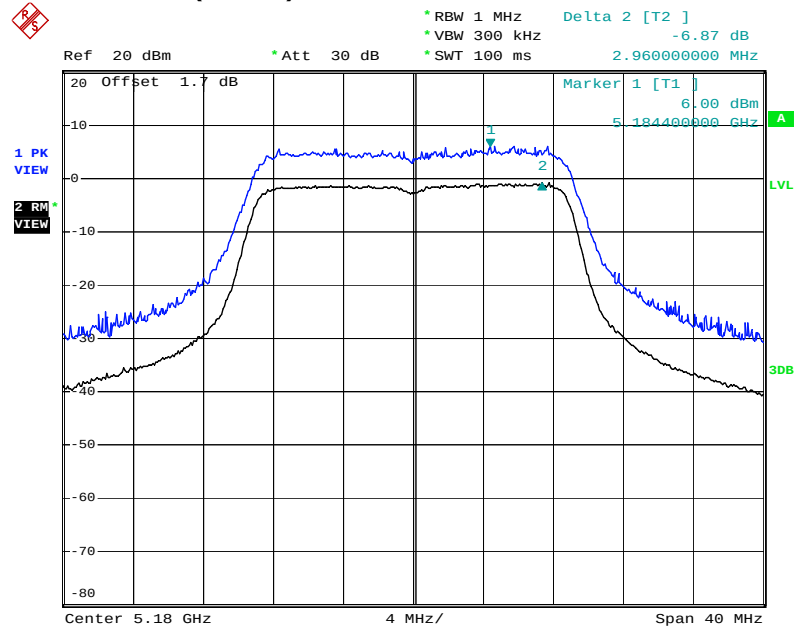
Date: 16.APR.2012 13:49:51

Configuration IEEE 802.11a 5240 MHz



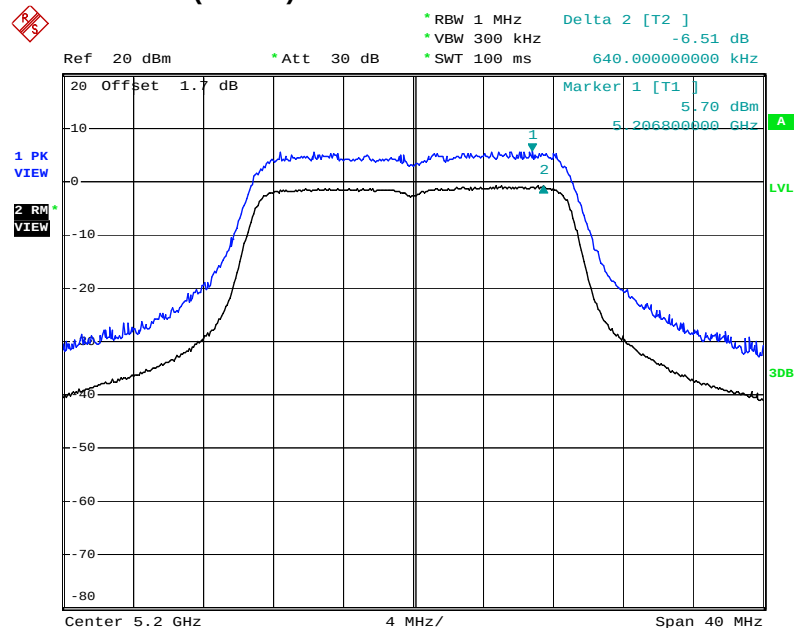
Date: 16.APR.2012 13:40:09

Configuration IEEE 802.11n (20MHz) 5180 MHz Port 1



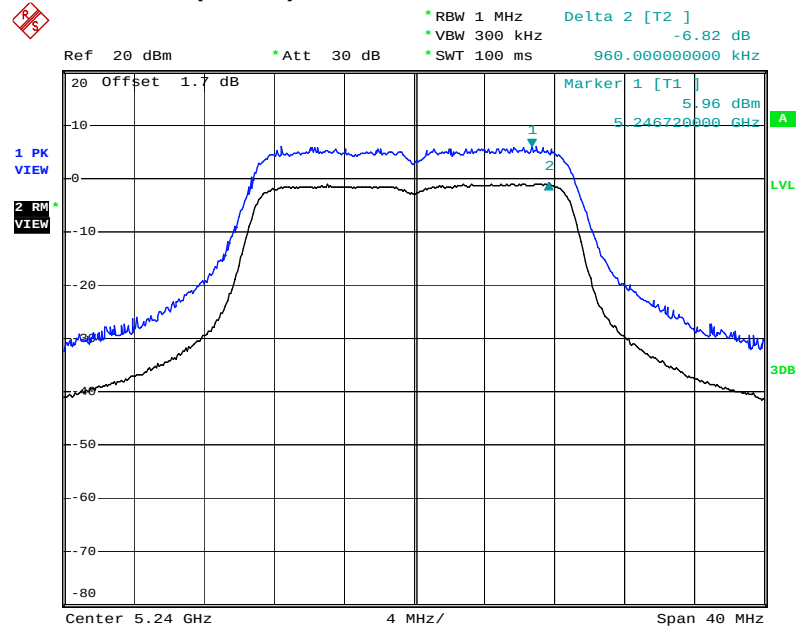
Date: 16.APR.2012 23:19:20

Configuration IEEE 802.11n (20MHz) 5200 MHz Port 1



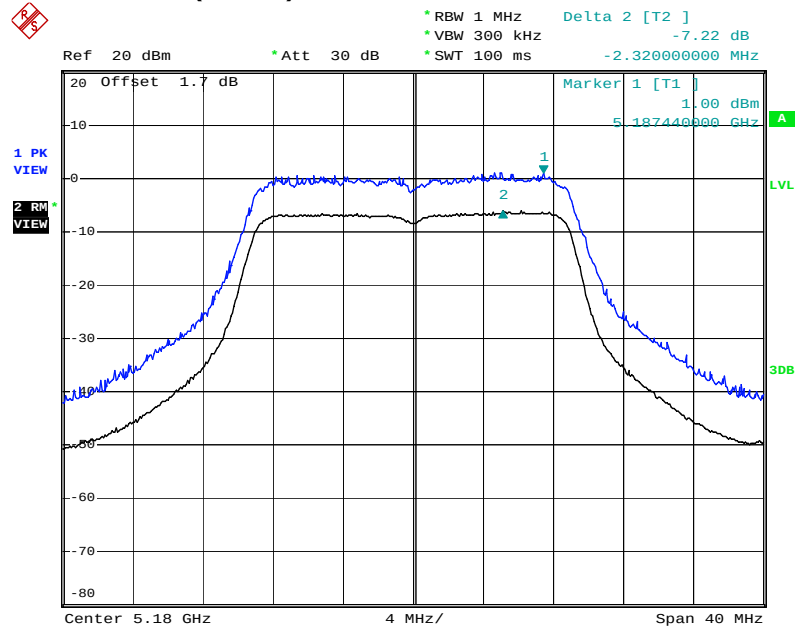
Date: 16.APR.2012 23:10:59

Configuration IEEE 802.11n (20MHz) 5240 MHz Port 1



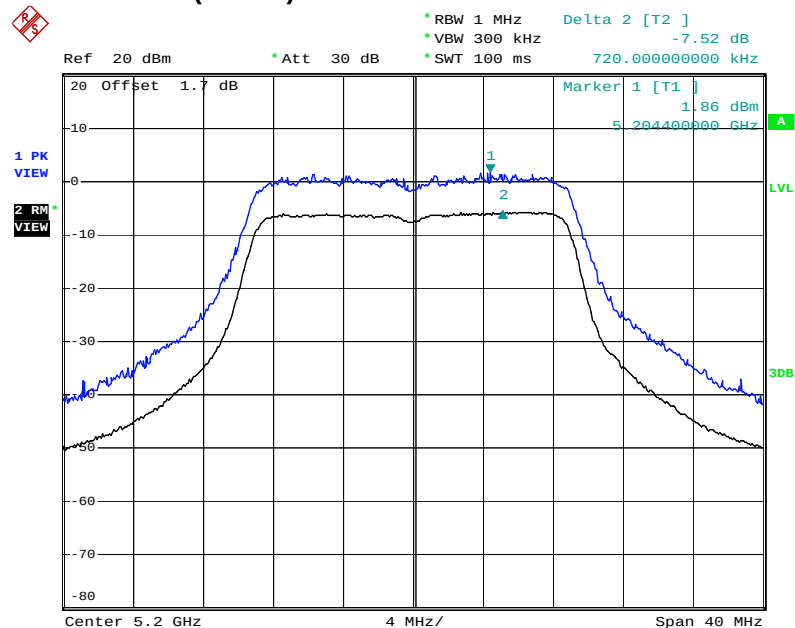
Date: 16.APR.2012 23:10:09

Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



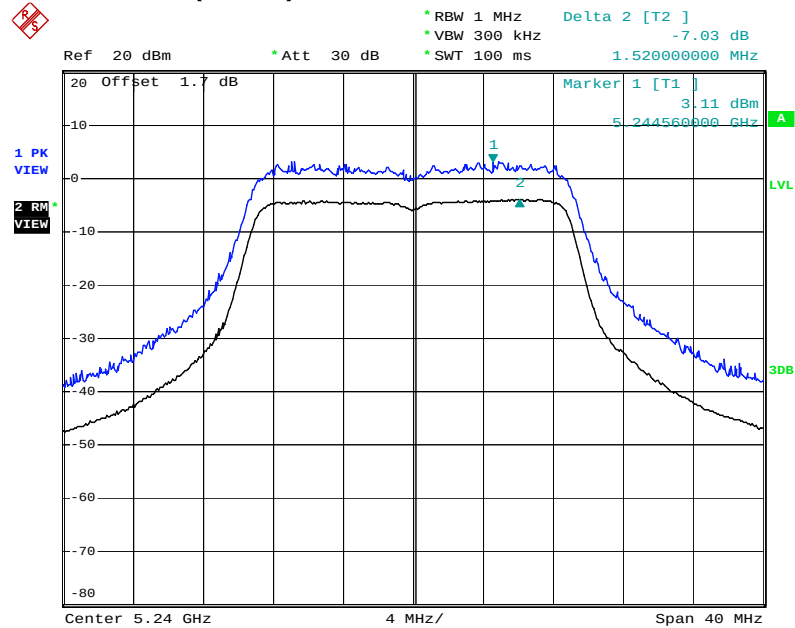
Date: 16.APR.2012 22:39:29

Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



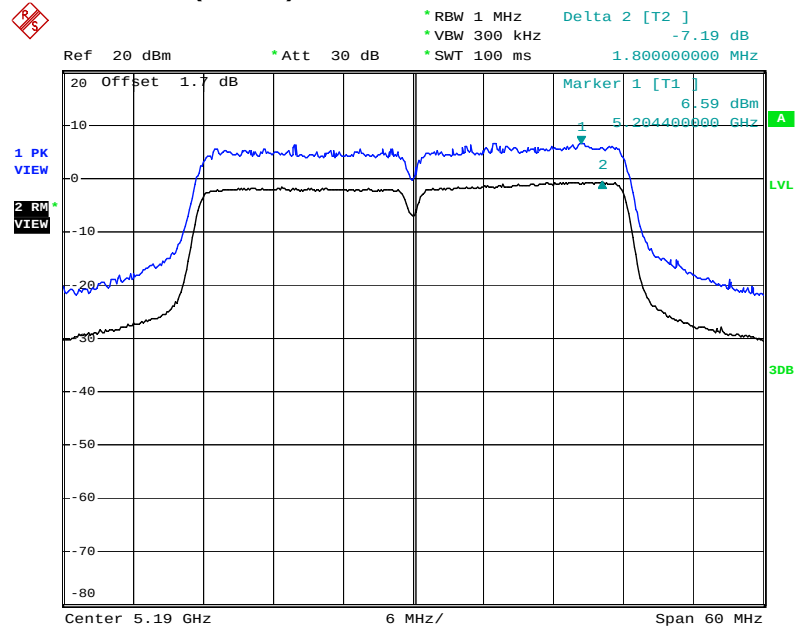
Date: 16.APR.2012 22:47:02

Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



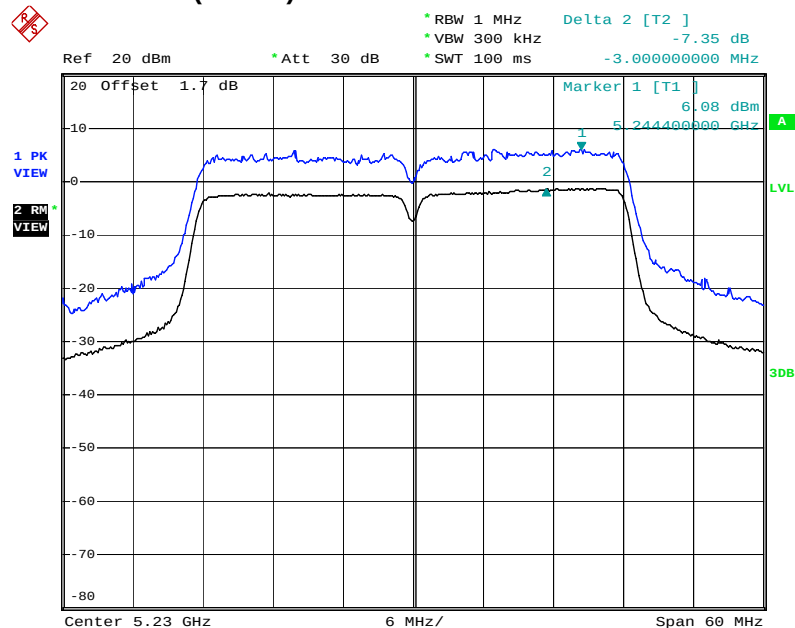
Date: 16.APR.2012 22:48:25

Configuration IEEE 802.11n (40MHz) 5190 MHz Port 1



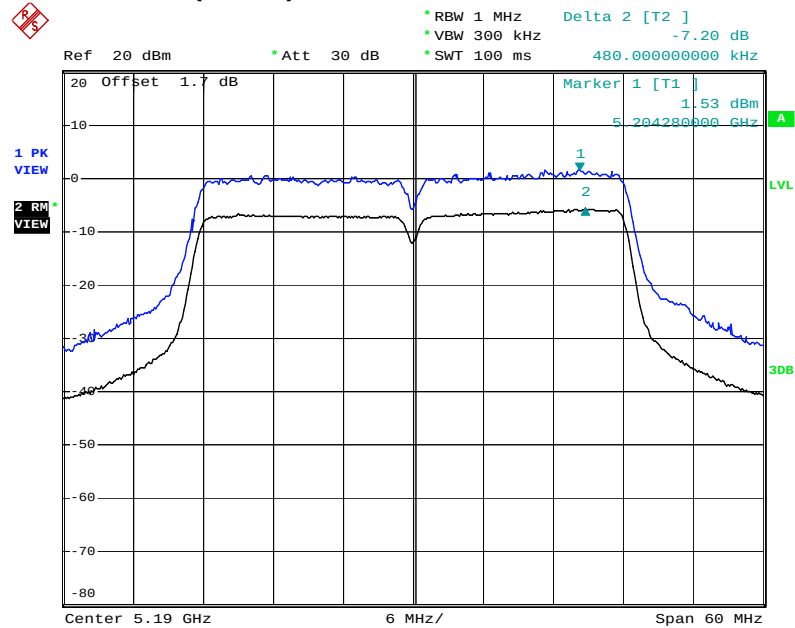
Date: 15.APR.2012 13:30:52

Configuration IEEE 802.11n (40MHz) 5230 MHz Port 1



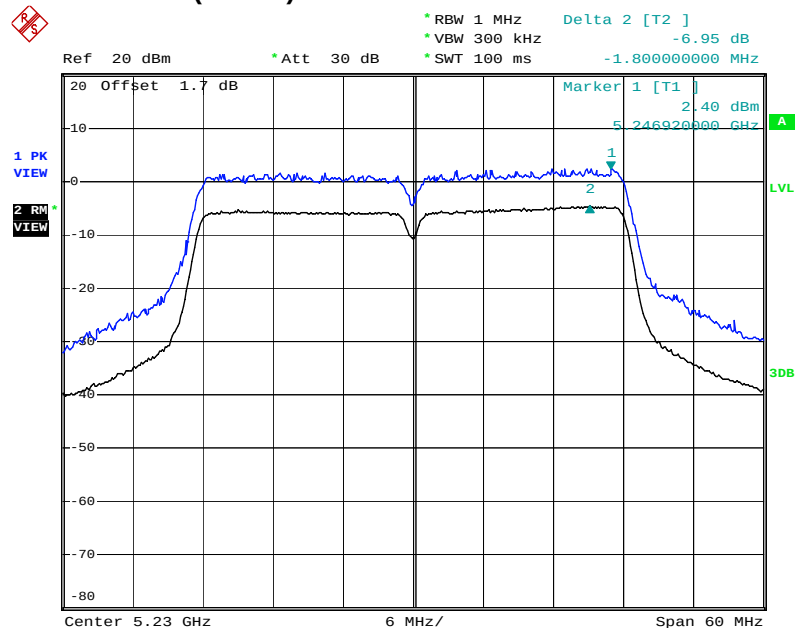
Date: 16.APR.2012 23:00:24

Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2



Date: 15.APR.2012 14:03:35

Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



Date: 16.APR.2012 22:58:59

3.6 Radiated Emissions Measurement

3.6.1 Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.25 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). 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 z for peak

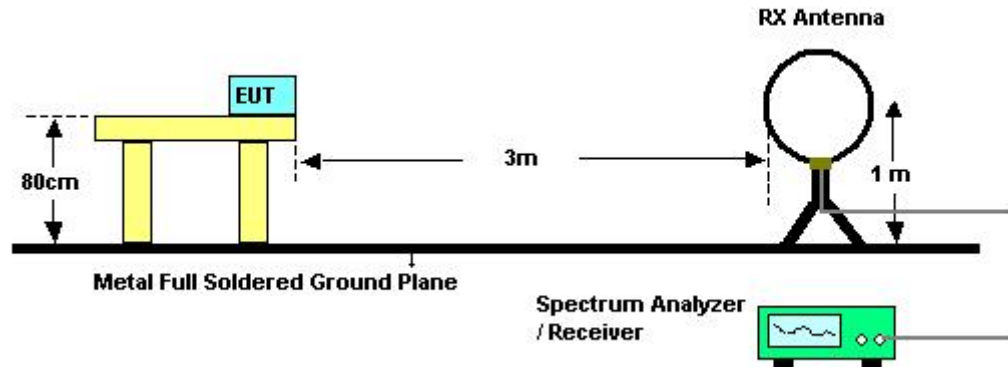
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.6.3 Test Procedures

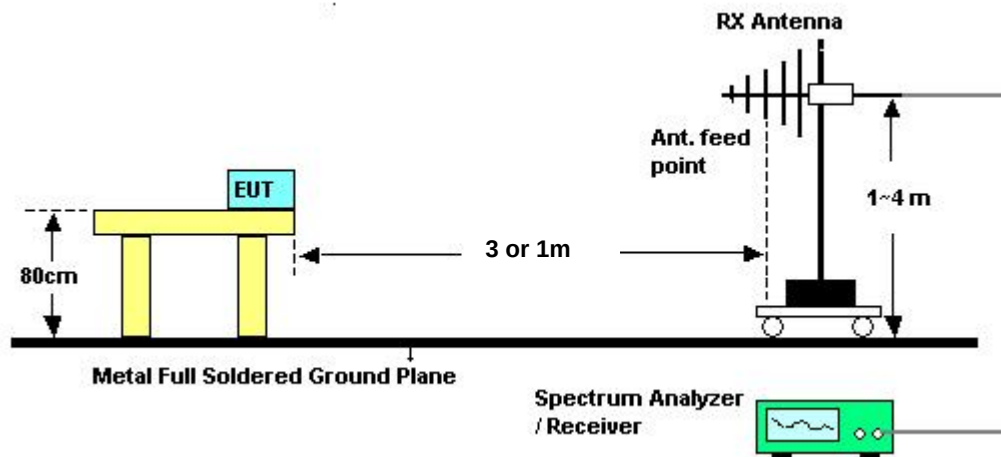
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

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

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

3.6.5 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	Mar. 21, 2012	Test Site No.	03CH02-HY
Temperature	21.5℃	Humidity	55%
Test Engineer	Hsiao		

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

Note:

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

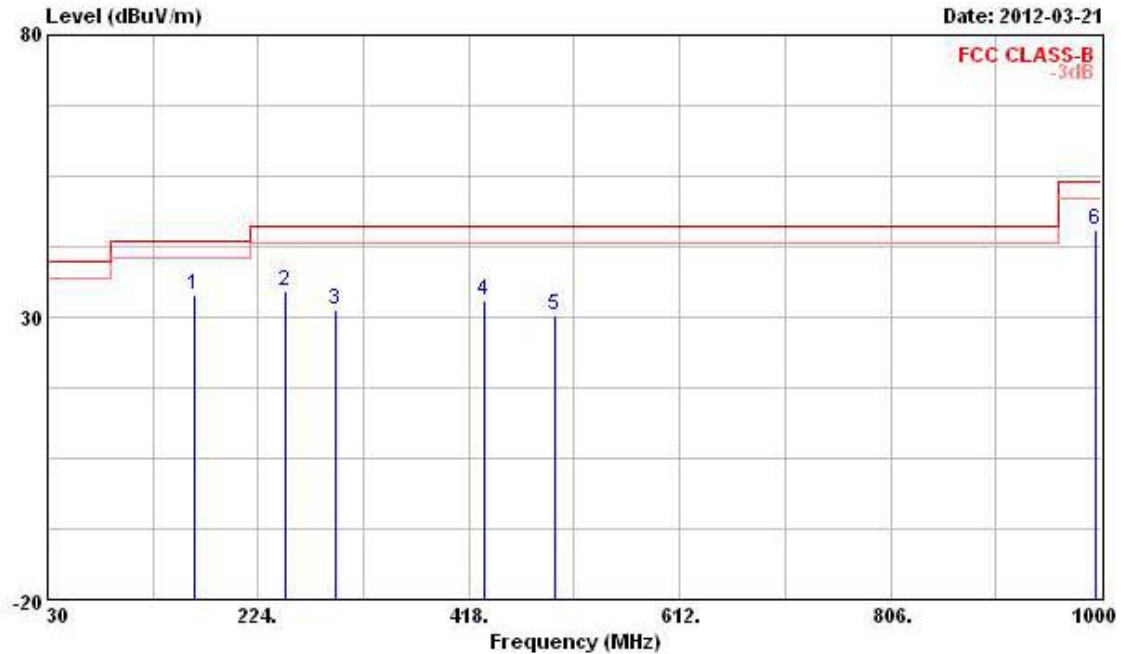
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

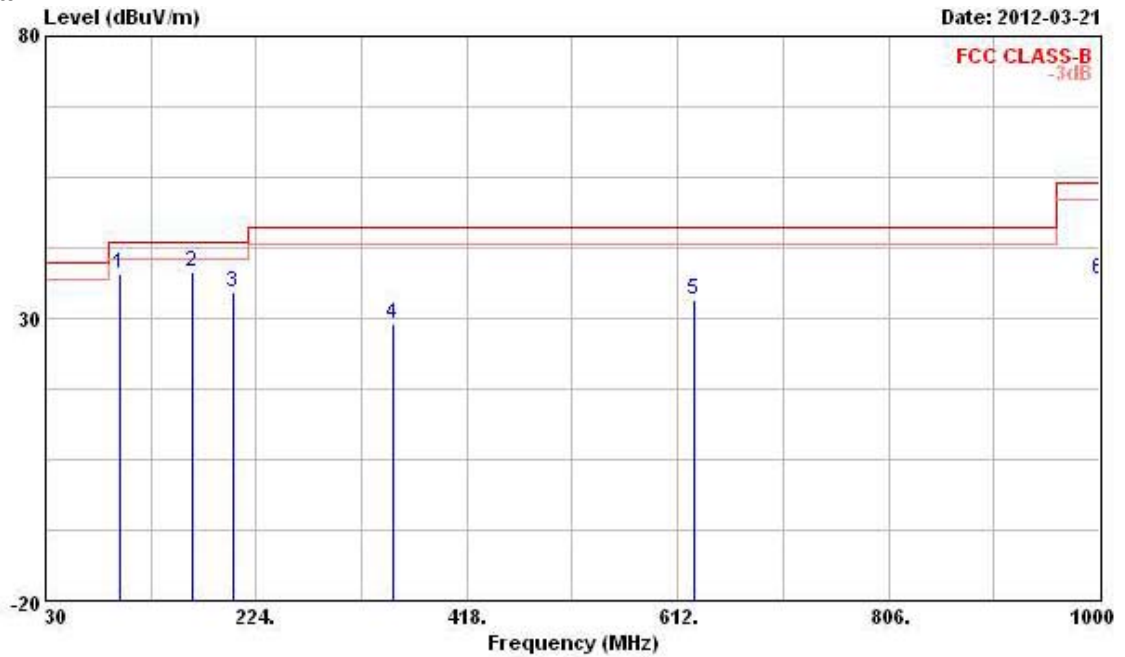
Final Test Date	Mar. 21, 2012	Test Site No.	03CH02-HY
Temperature	21.5℃	Humidity	55%
Test Engineer	Hsiao	Configuration	System Mode

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	164.830	34.05	-9.45	43.50	49.13	10.34	2.14	27.56	Peak	---	---
2	249.220	34.57	-11.43	46.00	46.12	12.97	2.77	27.29	Peak	---	---
3	295.780	31.40	-14.60	46.00	41.98	13.65	2.94	27.17	Peak	---	---
4	431.580	32.92	-13.08	46.00	41.54	15.90	3.51	28.03	Peak	---	---
5	497.540	30.44	-15.56	46.00	37.74	17.24	3.82	28.36	Peak	---	---
6	995.150	45.35	-8.65	54.00	44.55	22.38	5.66	27.24	Peak	---	---

Vertical



	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	98.870	37.91	-5.59	43.50	53.10	11.01	1.65	27.85	QP	---	---
2	164.830	38.23	-5.27	43.50	53.31	10.34	2.14	27.56	QP	---	---
3	203.630	34.71	-8.79	43.50	48.18	11.48	2.45	27.40	Peak	---	---
4	350.100	28.85	-17.15	46.00	38.71	14.48	3.18	27.52	Peak	---	---
5	626.550	33.35	-12.65	46.00	37.61	19.83	4.32	28.41	Peak	---	---
6	999.900	36.79	-17.21	54.00	35.85	22.50	5.67	27.23	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).

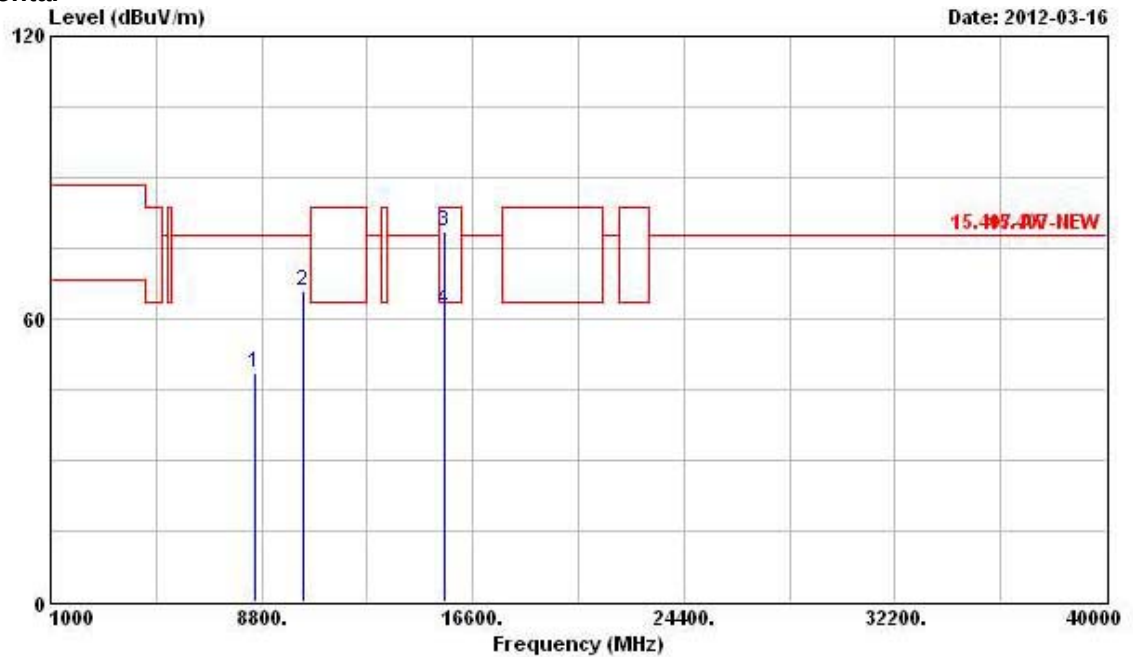
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

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

For Single Chain:

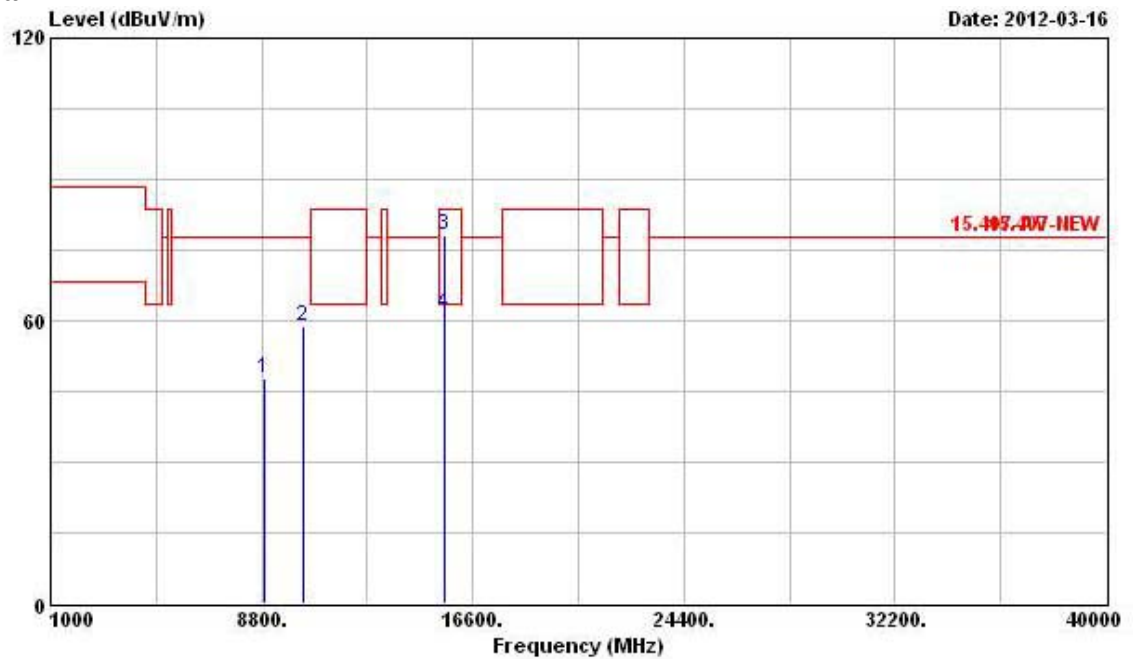
Final Test Date	Mar. 16, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsaio	Configuration	802.11a Ch. 36

Horizontal



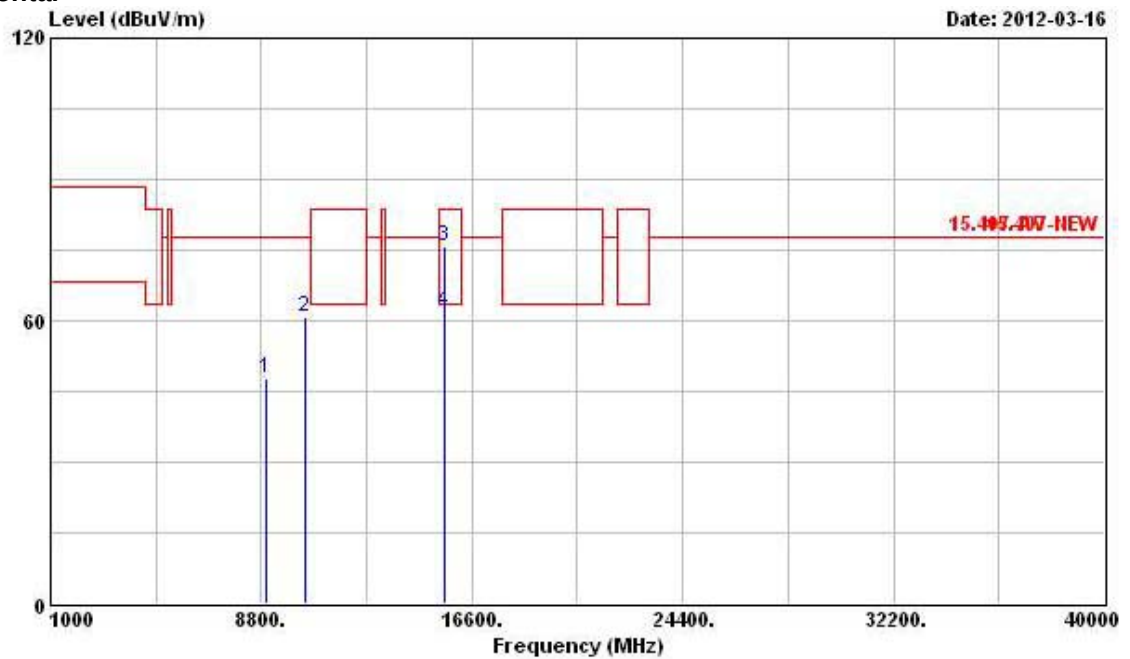
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8529.000	48.43	-29.41	77.84	41.39	36.32	5.96	35.24	Peak	---	---
2	10360.000	65.73	-12.11	77.84	56.02	38.22	6.71	35.22	Peak	---	---
3	15540.000	78.43	-5.11	83.54	64.20	40.81	8.45	35.03	Peak	---	---
4	15540.000	61.83	-1.71	63.54	47.60	40.81	8.45	35.03	Average	---	---

Vertical



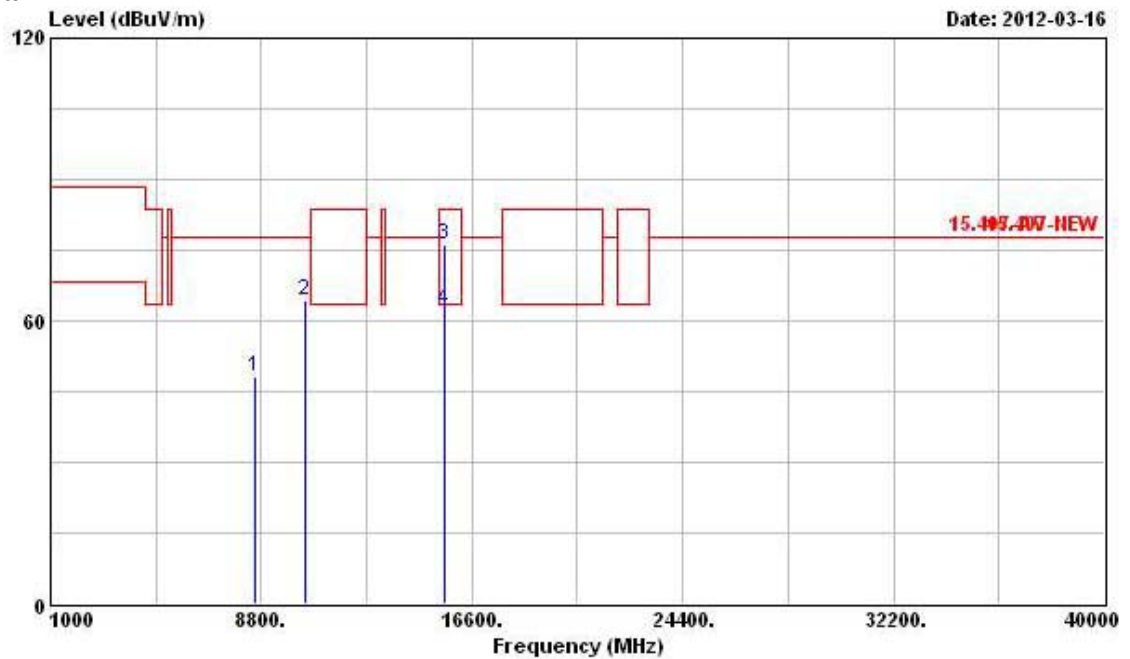
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8914.000	47.85	-29.99	77.84	40.47	36.55	6.13	35.30	Peak	---	---
2	10360.000	58.98	-18.86	77.84	49.27	38.22	6.71	35.22	Peak	---	---
3	15540.000	78.05	-5.49	83.54	63.82	40.81	8.45	35.03	Peak	---	---
4	15540.000	61.62	-1.92	63.54	47.39	40.81	8.45	35.03	Average	---	---

Final Test Date	Mar. 16, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11a Ch. 40

Horizontal

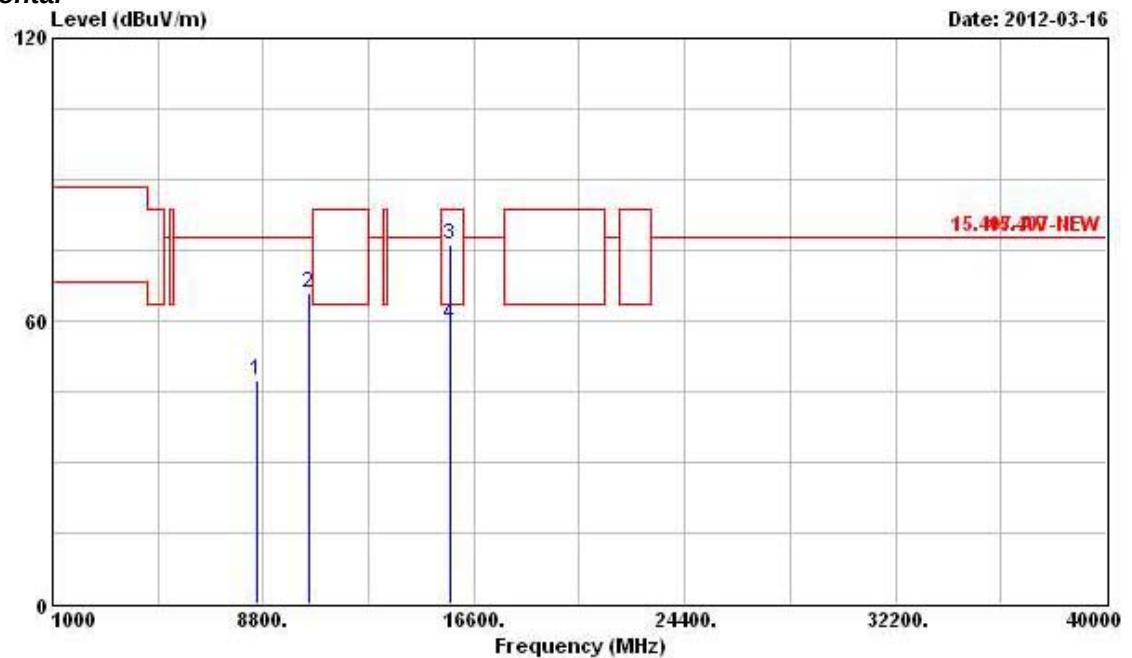
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8991.000	47.68	-30.16	77.84	40.25	36.59	6.16	35.32	Peak	---	---
2	10400.000	60.77	-17.07	77.84	50.96	38.24	6.75	35.18	Peak	---	---
3	15600.000	75.75	-7.79	83.54	61.56	40.84	8.45	35.10	Peak	---	---
4	15600.000	62.00	-1.54	63.54	47.81	40.84	8.45	35.10	Average	---	---

Vertical



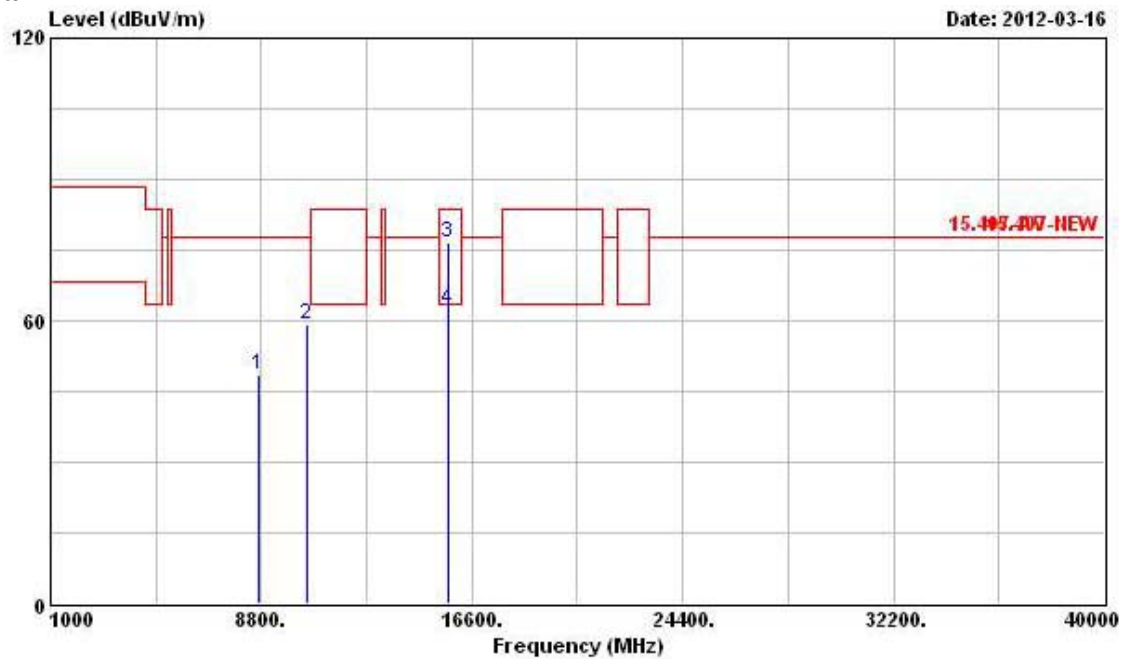
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8573.000	48.14	-29.70	77.84	41.08	36.34	5.97	35.25	Peak	---	---
2	10400.000	64.39	-13.45	77.84	54.58	38.24	6.75	35.18	Peak	---	---
3	15600.000	76.08	-7.46	83.54	61.89	40.84	8.45	35.10	Peak	---	---
4	@15600.000	62.48	-1.06	63.54	48.29	40.84	8.45	35.10	Average	---	---

Final Test Date	Mar. 16, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11a Ch. 48

Horizontal

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8573.000	47.24	-30.60	77.84	40.18	36.34	5.97	35.25	Peak	---	---
2	10480.000	65.99	-11.85	77.84	56.00	38.29	6.82	35.12	Peak	---	---
3	15720.000	76.32	-7.22	83.54	62.17	40.89	8.46	35.20	Peak	---	---
4	15720.000	59.18	-4.36	63.54	45.03	40.89	8.46	35.20	Average	---	---

Vertical

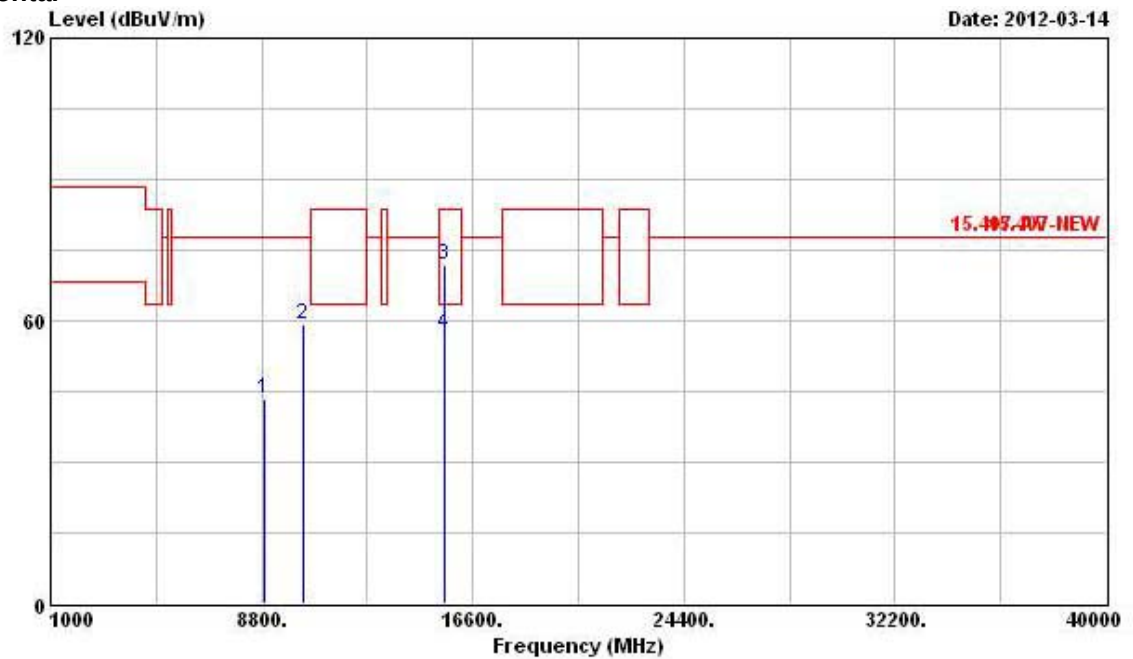


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8705.000	48.48	-29.36	77.84	41.29	36.42	6.04	35.27	Peak	---	---
2	10480.000	59.08	-18.76	77.84	49.09	38.29	6.82	35.12	Peak	---	---
3	15720.000	76.53	-7.01	83.54	62.38	40.89	8.46	35.20	Peak	---	---
4	15720.000	62.35	-1.19	63.54	48.20	40.89	8.46	35.20	Average	---	---

For Two Chains:

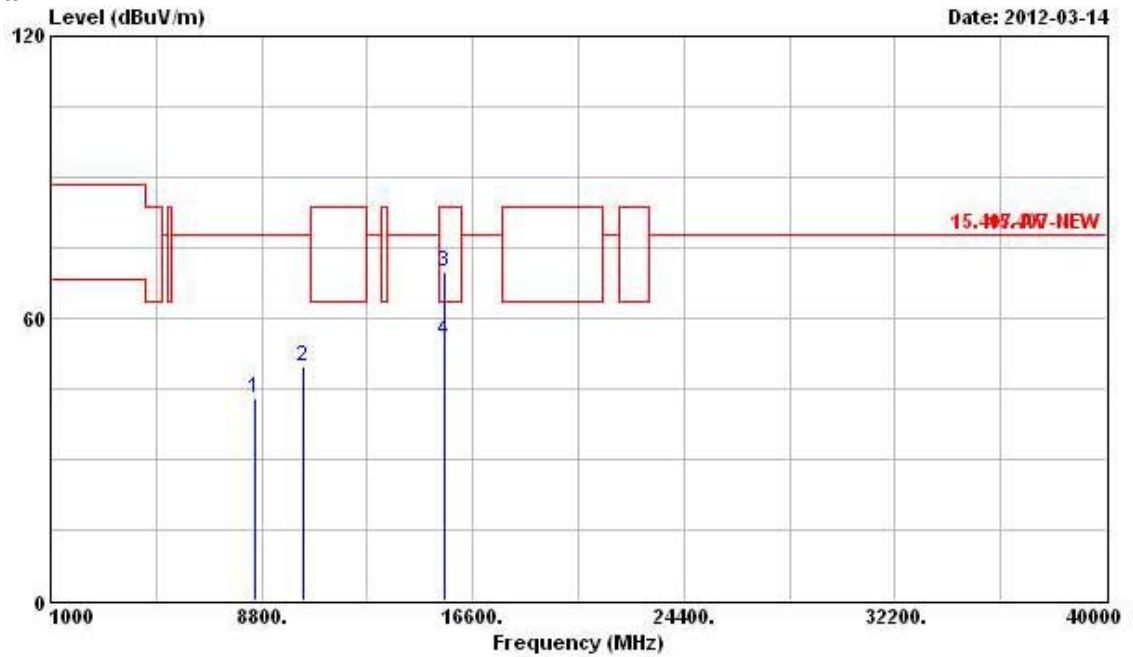
Final Test Date	Mar. 14, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11n Ch. 36 (20MHz)

Horizontal



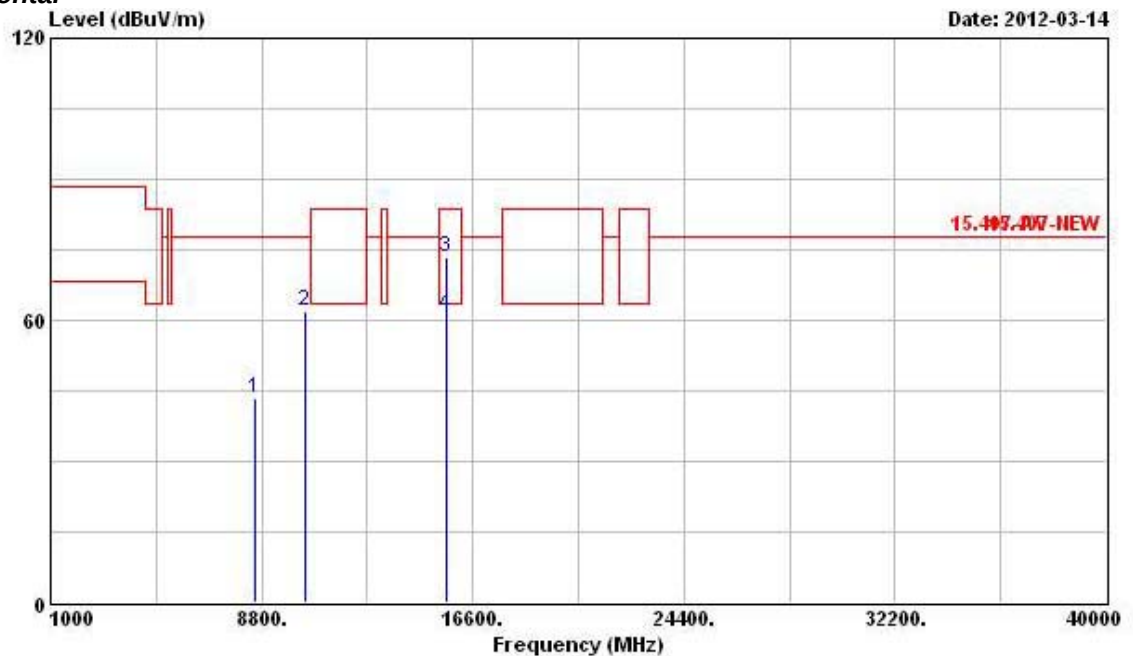
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8870.000	43.55	-34.29	77.84	36.22	36.52	6.11	35.30	Peak	---	---
2	10360.000	59.02	-18.82	77.84	49.31	38.22	6.71	35.22	Peak	---	---
3	15540.000	71.93	-11.61	83.54	57.70	40.81	8.45	35.03	Peak	---	---
4	15540.000	57.11	-6.43	63.54	42.88	40.81	8.45	35.03	Average	---	---

Vertical



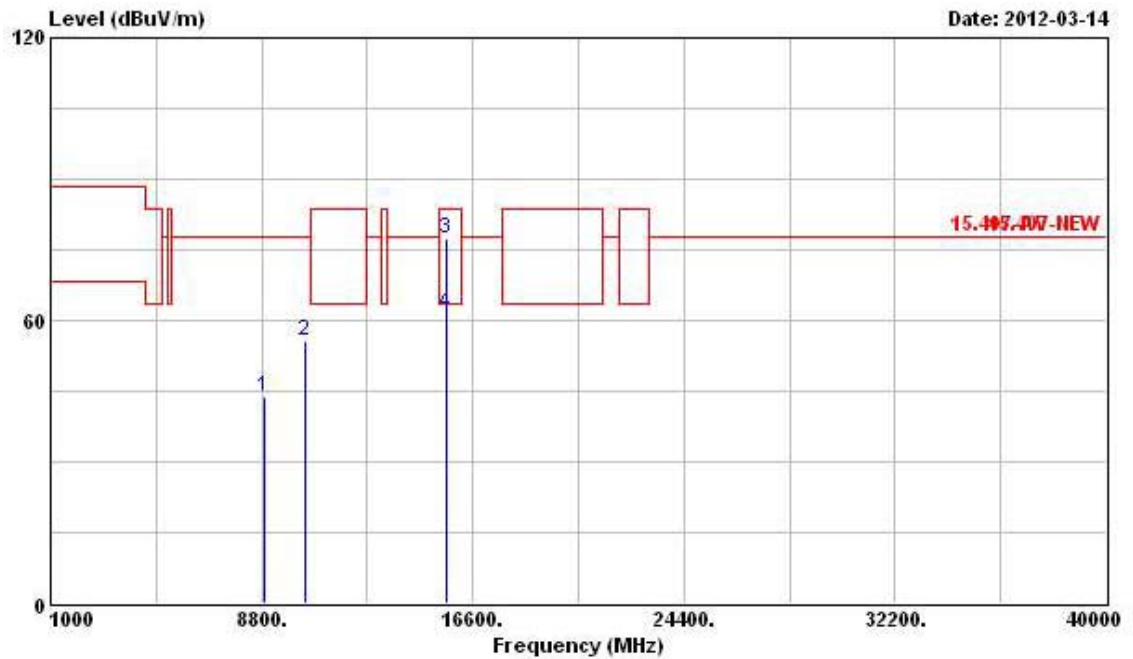
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8562.000	43.17	-34.67	77.84	36.11	36.34	5.97	35.25	Peak	---	---
2	10360.000	49.89	-27.95	77.84	40.18	38.22	6.71	35.22	Peak	---	---
3	15540.000	69.80	-13.74	83.54	55.57	40.81	8.45	35.03	Peak	---	---
4	15540.000	55.45	-8.09	63.54	41.22	40.81	8.45	35.03	Average	---	---

Final Test Date	Mar. 14, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11n Ch. 40 (20 MHz)

Horizontal

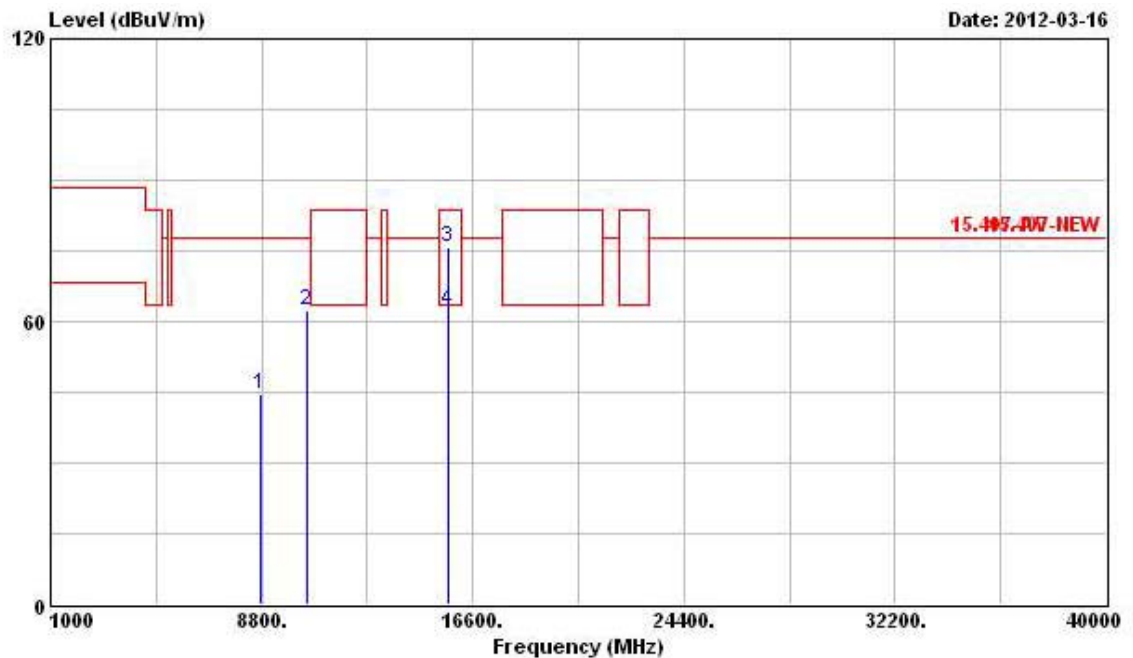
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8529.000	43.26	-34.58	77.84	36.22	36.32	5.96	35.24	Peak	---	---
2	10400.000	61.97	-15.87	77.84	52.16	38.24	6.75	35.18	Peak	---	---
3	15600.000	73.50	-10.04	83.54	59.31	40.84	8.45	35.10	Peak	---	---
4	15600.000	61.28	-2.26	63.54	47.09	40.84	8.45	35.10	Average	---	---

Vertical



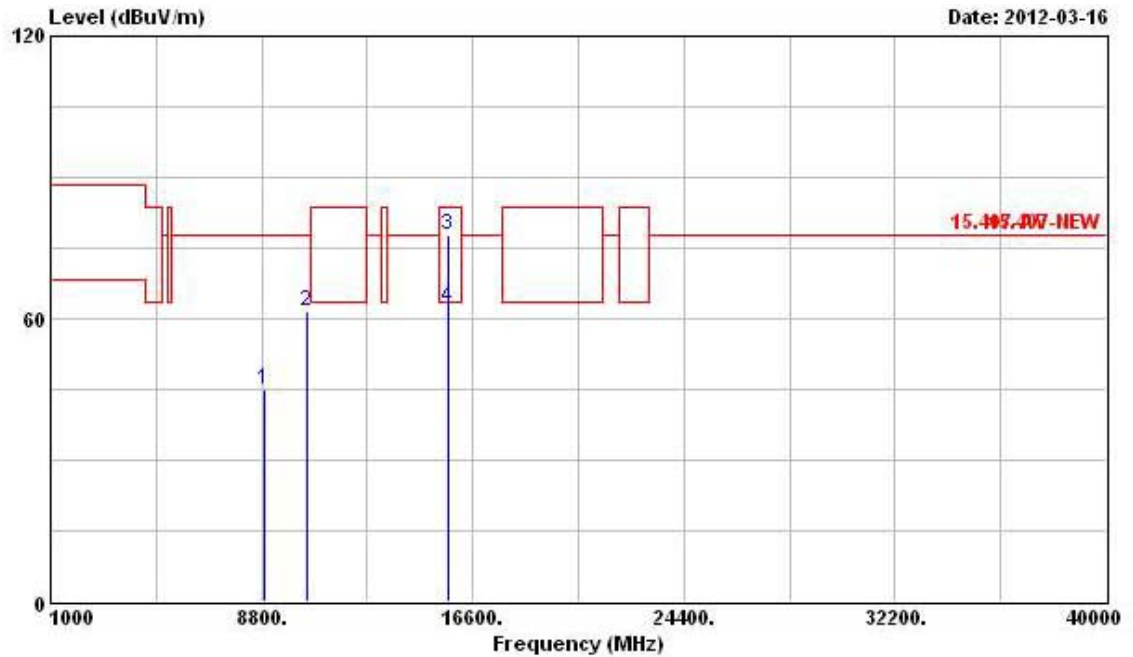
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8914.000	43.65	-34.19	77.84	36.27	36.55	6.13	35.30	Peak	---	---
2	10400.000	55.81	-22.03	77.84	46.00	38.24	6.75	35.18	Peak	---	---
3	15600.000	77.35	-6.19	83.54	63.16	40.84	8.45	35.10	Peak	---	---
4	15600.000	61.71	-1.83	63.54	47.52	40.84	8.45	35.10	Average	---	---

Final Test Date	Mar. 16, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11n Ch. 48 (20 MHz)

Horizontal

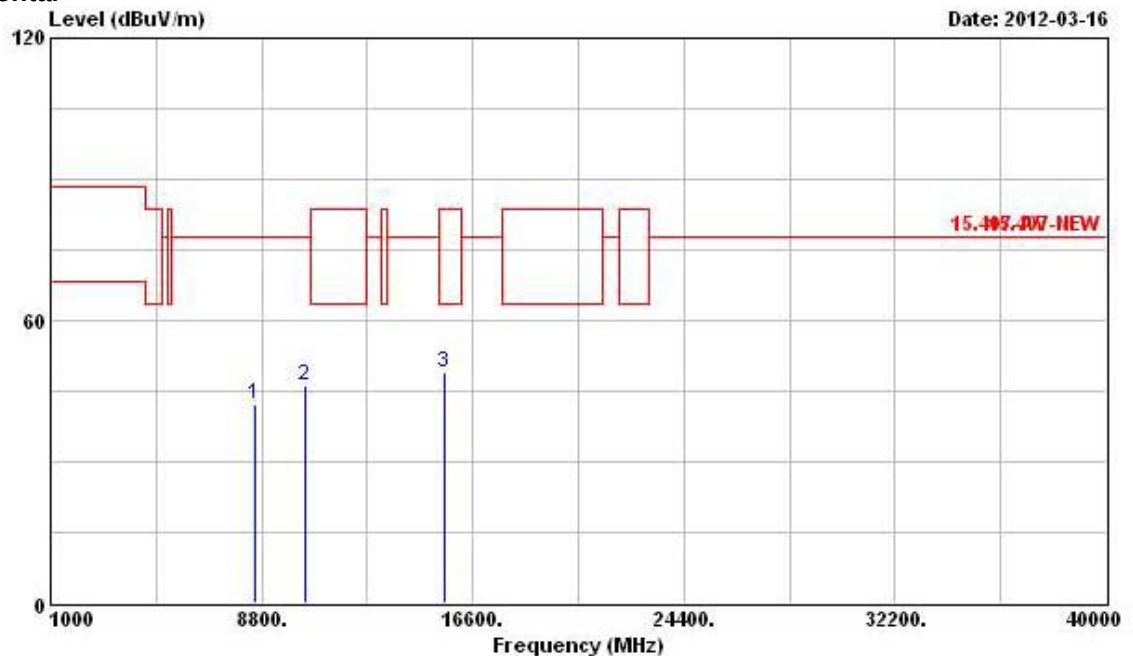
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8793.000	44.69	-33.15	77.84	37.43	36.47	6.08	35.29	Peak	---	---
2	10480.000	62.34	-15.50	77.84	52.35	38.29	6.82	35.12	Peak	---	---
3	15720.000	75.72	-7.82	83.54	61.57	40.89	8.46	35.20	Peak	---	---
4	15720.000	62.18	-1.36	63.54	48.03	40.89	8.46	35.20	Average	---	---

Vertical



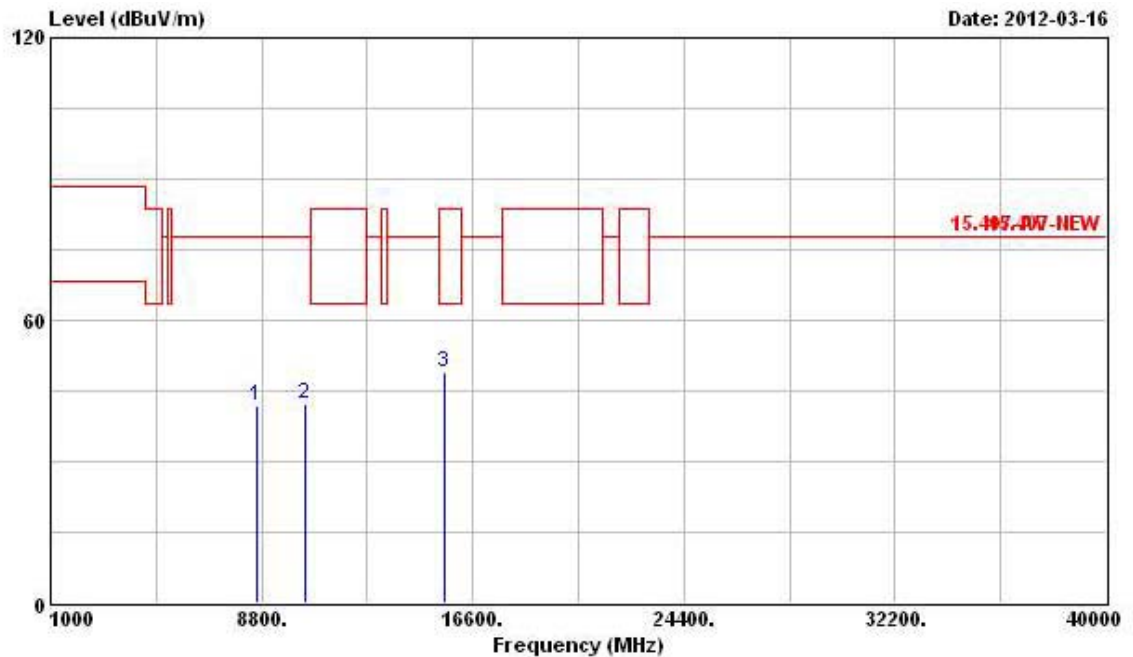
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8870.000	45.13	-32.71	77.84	37.80	36.52	6.11	35.30	Peak	---	---
2	10480.000	61.77	-16.07	77.84	51.78	38.29	6.82	35.12	Peak	---	---
3	15720.000	77.65	-5.89	83.54	63.50	40.89	8.46	35.20	Peak	---	---
4	15720.000	62.49	-1.05	63.54	48.34	40.89	8.46	35.20	Average	---	---

Final Test Date	Mar. 16, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11n Ch. 38 (40MHz)

Horizontal

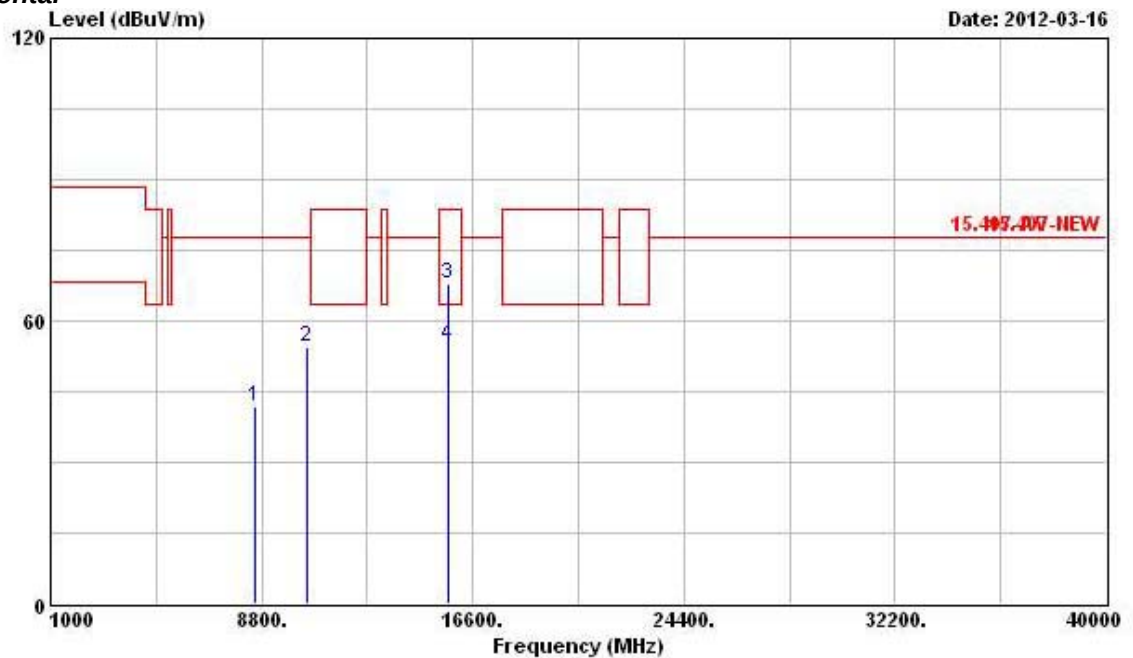
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8562.000	42.20	-35.64	77.84	35.14	36.34	5.97	35.25	Peak	---	---
2	10380.000	46.24	-31.60	77.84	36.46	38.23	6.75	35.20	Peak	---	---
3	15570.000	49.04	-14.50	63.54	34.81	40.83	8.45	35.05	PK	---	---

Vertical



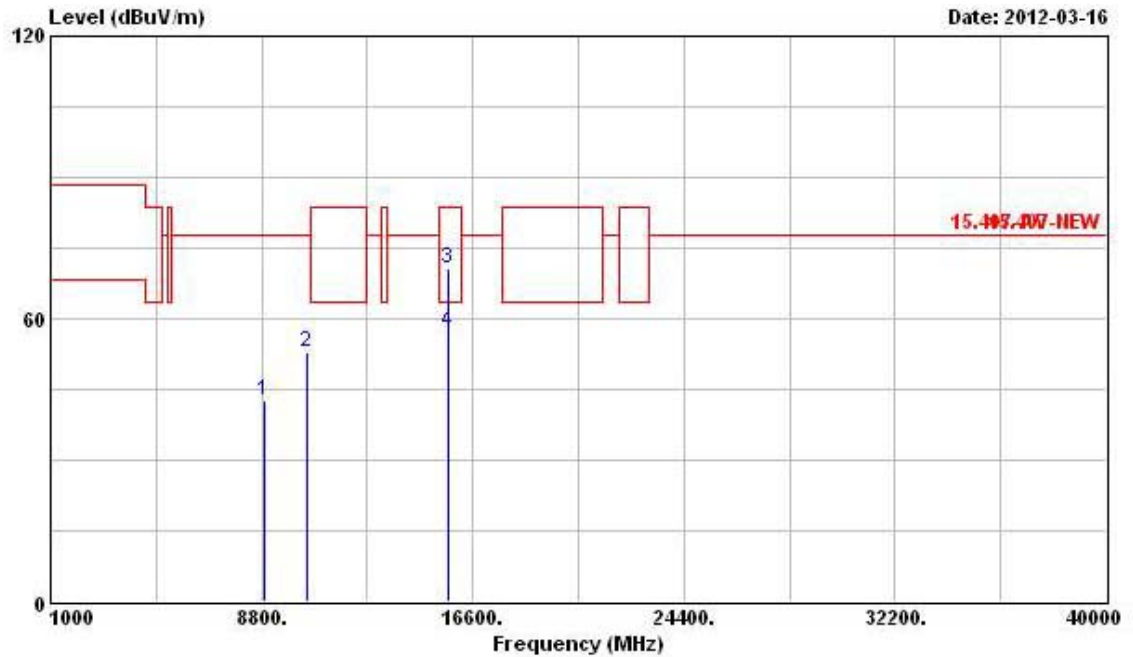
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8617.000	41.98	-35.86	77.84	34.88	36.37	5.99	35.26	Peak	---	---
2	10380.000	42.40	-35.44	77.84	32.62	38.23	6.75	35.20	Peak	---	---
3	15570.000	49.03	-14.51	63.54	34.80	40.83	8.45	35.05	PK	---	---

Final Test Date	Mar. 16, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11n Ch. 46 (40MHz)

Horizontal

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8562.000	41.80	-36.04	77.84	34.74	36.34	5.97	35.25	Peak	---	---
2	10460.000	54.29	-23.55	77.84	44.34	38.27	6.82	35.14	Peak	---	---
3	15690.000	67.92	-15.62	83.54	53.76	40.88	8.46	35.18	Peak	---	---
4	15690.000	54.71	-8.83	63.54	40.55	40.88	8.46	35.18	Average	---	---

Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8881.000	42.65	-35.19	77.84	35.31	36.53	6.11	35.30	Peak	---	---
2	10460.000	52.94	-24.90	77.84	42.99	38.27	6.82	35.14	Peak	---	---
3	15690.000	70.58	-12.96	83.54	56.42	40.88	8.46	35.18	Peak	---	---
4	15690.000	57.06	-6.48	63.54	42.90	40.88	8.46	35.18	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 from 3m to 1m.

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

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

3.7 Band Edge and Fundamental Emissions Measurement

3.7.1 Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.25 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). 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	Mar. 16, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11a Ch. 36, 40, 48

Channel 36

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5149.800	57.60	-5.94	63.54	17.93	34.89	4.78	0.00	Average	---	---
2 @	5186.700	102.81			63.10	34.91	4.80	0.00	Average	---	---
1	5149.000	81.16	-2.38	83.54	41.49	34.89	4.78	0.00	Peak	---	---
2 @	5186.300	114.50			74.79	34.91	4.80	0.00	Peak	---	---

The item 2 is fundamental emissions.

Channel 40

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5147.700	50.72	-12.82	63.54	11.05	34.89	4.78	0.00	Average	---	---
2 @	5206.200	103.40			63.67	34.92	4.81	0.00	Average	---	---
3	5390.100	50.84	-12.70	63.54	10.93	35.03	4.88	0.00	Average	---	---
1	5104.500	63.87	-19.67	83.54	24.24	34.86	4.77	0.00	Peak	---	---
2 @	5206.200	114.71			74.98	34.92	4.81	0.00	Peak	---	---
3	5396.100	63.69	-19.85	83.54	23.77	35.04	4.88	0.00	Peak	---	---

The item 2 is fundamental emissions.

Channel 48

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5139.300	50.53	-13.01	63.54	10.87	34.88	4.78	0.00	Average	---	---
2 @	5246.100	105.12			65.35	34.95	4.82	0.00	Average	---	---
3	5392.200	50.81	-12.73	63.54	10.90	35.03	4.88	0.00	Average	---	---
1	5141.700	63.30	-20.24	83.54	23.63	34.89	4.78	0.00	Peak	---	---
2 @	5246.100	116.74			76.97	34.95	4.82	0.00	Peak	---	---
3	5397.300	63.38	-20.16	83.54	23.46	35.04	4.88	0.00	Peak	---	---

The item 2 is fundamental emissions.

For Two Chains:

Final Test Date	Mar. 14, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11n (20MHz) Ch. 36, 40, 48

Channel 36

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5149.900	61.94	-1.60	63.54	22.27	34.89	4.78	0.00	Average	---	---
2	5181.400	102.14			62.43	34.91	4.80	0.00	Average	---	---
1	5149.500	82.15	-1.39	83.54	42.48	34.89	4.78	0.00	Peak	---	---
2	5181.000	115.73			76.02	34.91	4.80	0.00	Peak	---	---

The item 2 is fundamental emissions.

Channel 40

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5149.900	53.86	-9.68	63.54	14.19	34.89	4.78	0.00	Average	---	---
2	5206.500	103.96			64.23	34.92	4.81	0.00	Average	---	---
3	5360.100	52.15	-11.39	63.54	12.27	35.01	4.87	0.00	Average	---	---
1	5148.900	74.70	-8.84	83.54	35.03	34.89	4.78	0.00	Peak	---	---
2	5206.200	117.59			77.86	34.92	4.81	0.00	Peak	---	---
3	5380.500	64.25	-19.29	83.54	24.35	35.03	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

Channel 48

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5147.400	50.80	-12.74	63.54	11.13	34.89	4.78	0.00	Average	---	---
2	5246.100	106.62			66.85	34.95	4.82	0.00	Average	---	---
3	5360.100	52.06	-11.48	63.54	12.18	35.01	4.87	0.00	Average	---	---
1	5149.800	64.60	-18.94	83.54	24.93	34.89	4.78	0.00	Peak	---	---
2	5242.200	120.30			80.53	34.95	4.82	0.00	Peak	---	---
3	5363.700	64.12	-19.42	83.54	24.23	35.02	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

Final Test Date	Mar. 14, 2012	Test Site No.	03CH02-HY
Temperature	21.5°C	Humidity	55%
Test Engineer	Hsiao	Configuration	802.11n (40MHz) Ch. 38, 46

Channel 38

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5149.900	62.20	-1.34	63.54	22.53	34.89	4.78	0.00	Average	---	---
2	5204.300	94.81			55.08	34.92	4.81	0.00	Average	---	---
1	5147.500	79.71	-3.83	83.54	40.04	34.89	4.78	0.00	Peak	---	---
2	5199.400	110.09			70.36	34.92	4.81	0.00	Peak	---	---

The item 2 is fundamental emissions.

Channel 46

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	5149.900	60.93	-2.61	63.54	21.26	34.89	4.78	0.00	Average	---	---
2	5241.000	101.16			61.40	34.94	4.82	0.00	Average	---	---
3	5350.100	55.02	-8.52	63.54	15.14	35.01	4.87	0.00	Average	---	---
1	5149.900	75.92	-7.62	83.54	36.25	34.89	4.78	0.00	Peak	---	---
2	5243.400	115.96			76.19	34.95	4.82	0.00	Peak	---	---
3	5356.200	72.42	-11.12	83.54	32.54	35.01	4.87	0.00	Peak	---	---

The item 2 is fundamental emissions.

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 $\pm 20\text{ppm}$ (IEEE 802.11a specification).

3.8.2 Measuring Instruments and Setting

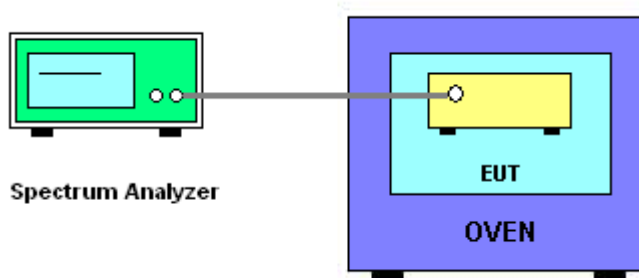
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than $\pm 20\text{ppm}$ (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 $-20^\circ\text{C} \sim 50^\circ\text{C}$.
8. Measuring multiple antennas, the connectors are required to link with Spectrum Analyzer through a combiner.

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

Voltage	Measurement Frequency (MHz)
(V)	5180 MHz
110.00	5179.9406
126.50	5179.9400
93.50	5179.9409
Max. Deviation (MHz)	0.0600
Max. Deviation (ppm)	11.58

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	5180 MHz
50	5179.9490
40	5179.9388
30	5179.9382
20	5179.9526
10	5179.9610
0	5179.9556
-10	5179.9754
-20	5179.9742
Max. Deviation (MHz)	0.0618
Max. Deviation (ppm)	11.93

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	100174	9 kHz ~ 2.75 GHz	Mar. 23, 2012	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz – 30MHz	Feb. 08, 2012	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9 kHz ~ 30 MHz	May 04, 2011	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	CB049	9 kHz ~ 30 MHz	Apr. 21, 2011	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP 40	100305	9 KHz ~ 40 GHz	Feb. 21, 2012	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Jun. 03, 2011	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20~100℃	Dec. 07, 2011	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10 MHz ~ 40 GHz	Jun. 07, 2011	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	1027452	300 MHz ~ 40 GHz	Jun. 16, 2011	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	1124009	300 MHz ~ 40 GHz	Jun. 20, 2011	Conducted (TH01-HY)
RF Cable-1m	Jye Bao	RG142	CB034-1m	20 MHz ~ 7 GHz	Dec. 03, 2011	Conducted (TH01-HY)
RF Cable-2m	Jye Bao	RG142	CB035-2m	20 MHz ~ 1 GHz	Dec. 03, 2011	Conducted (TH01-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9 kHz ~ 40 GHz	Aug. 08, 2011	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz ~ 1 GHz 3m	May 11, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz ~ 1.3 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1 GHz ~ 26.5 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1 GHz ~ 18 GHz	Nov. 15, 2011	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz ~ 1 GHz	Nov. 11, 2011	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1 GHz ~ 40 GHz	Mar. 06, 2012	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz ~ 2 GHz	Oct. 22, 2011	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 - 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)

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

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

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

5 TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei 221, Taiwan, 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 Vil., Linkou Dist., New Taipei City 244, Taiwan, R.O.C. TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei 114, Taiwan, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei 235, Taiwan, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

6 TAF CERTIFICATE OF ACCREDITATION


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

Certificate No. : L1190-111208

Certificate of Accreditation

This is to certify that

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

is accredited in respect of laboratory

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


Jay-San Chen
President, Taiwan Accreditation Foundation
Date : December 08, 2011

P1, total 24 pages

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