

FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart E § 15.407

Equipment : 300N Wireless LAN Concurrent Dual Band Router
Brand Name : EDIMAX
Model No. : BR-6435ND / GR-435ND / BR-6435nD
Filing Type : New Application
Applicant : EDIMAX TECHNOLOGY CO., LTD.
Manufacturer : No.3,Wu-Chuan 3rd Road,Wu-Ku Industrial Park,
New Taipei City, Taiwan
FCC ID : NDD9564351107
Received Date : Oct. 17, 2011
Final Test Date : Nov. 24, 2011
Multiple Listing : Please refer to section 2.2

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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CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart E § 15.407

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No.3,Wu-Chuan 3rd Road,Wu-Ku Industrial
Park, New Taipei City, Taiwan

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Oct. 17, 2011 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.


Wayne Hsu / Assistant Manager

SPORTON International Inc.

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

1 SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	Rule Section	Description of Test	Result	Under Limit
3.1	15.207	AC Power Line Conducted Emissions	Complies	8.88 dB
3.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
3.3	15.407(a)	Maximum Conducted Output Power	Complies	2.16 dB
3.4	15.407(a)	Power Spectral Density	Complies	0.1 dB
3.5	15.407(a)	Peak Excursion	Complies	7.82 dB
3.6	15.407(b)	Radiated Emissions	Complies	3.05 dB
3.7	15.407(b)	Band Edge Emissions	Complies	1.04 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°C	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

2 GENERAL INFORMATION

2.1 Product Details

Only the radio detail of IEEE 802.11a/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	+5Vdc from adapter
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 : 16.90 MHz 802.11n : MCS 8 (20MHz) : 17.60 MHz ; MCS 8 (40MHz) : 36.00 MHz
Conducted Output Power	802.11a : 11.53 dBm 802.11n : MCS 8 (20MHz) : 14.82 dBm ; MCS 8 (40MHz) : 14.84 dBm

2.2 Accessories

Accessories Information					
Accessories	Switching Adapter	Brand Name	DVE	Model Name	DSA-12PFA-05 FUS 050200
		Power Rating	I/P: 100-240V~50/60Hz 0.5A, O/P: +5V 2A		

2.3 Table for Multiple Listing

The models are exactly same in both physical and electrical. The different in model number for marketing purpose.

No.	Brand Name	Model Name
1	Edimax	BR-6435ND,GR-435ND,BR-6435nD
2	Micronet	SP-9016A

2.4 Table for Filed Antenna

Antenna Category Information (5GHz Band)	
<input type="checkbox"/>	Equipment placed on the market without antennas
<input type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input type="checkbox"/>	No temporary RF connector provided
<input checked="" type="checkbox"/>	External antenna (dedicated antennas)
<input type="checkbox"/>	Single power level with corresponding antenna(s)
<input type="checkbox"/>	Multiple power settings and corresponding antenna(s)
<input type="checkbox"/>	Professional Install
<input checked="" type="checkbox"/>	Unique antenna connector
<input type="checkbox"/>	BIOS lock.

Antenna General Information (5GHz Band)					
Ant. No.	Category	Type	Brand	Model	Gain (dBi)
1 (A)	External	Dipole	--	--	3
2 (B)	External	Dipole	--	--	3
<input type="checkbox"/> EUT is consist of single model antenna assembly for spatial multiplexing MIMO configuration. <input checked="" type="checkbox"/> EUT is consist of multiple model antennas assembly (secondary source multiple model antennas regardless of spatial multiplexing MIMO configuration), the test (except DFS test) should be performed with highest antenna gain of each antenna type. Then Ant. No. <u>1</u> shall be performed the test. <input type="checkbox"/> EUT is consist of multiple model antennas assembly for spatial multiplexing MIMO configuration (e.g. model A shall be installed in port 1 and model B shall be installed in port 2...).					

Antenna: 3dBi Dual Band Dipole Antenna x 2 (2T2R Spatial Multiplexing MIMO configuration; 2 antennas are for signal transmitting and 2 antennas are for signal receiving)

Transmitter Outputs & Receiver Inputs Information				
Modulation	Transmitter Outputs	Receiver Inputs	Transmitter Output Signals	Co-location
802.11a/b/g	1	1	Correlated	Yes
802.11n HT20 / HT40	2 (SM)	2	Uncorrelated	Yes
Note 1: CDD - Cyclic Delay Diversity (CDD) modes (e.g., legacy modes in 802.11n devices). In CDD modes, the same digital data is carried by each transmit antenna, but with different cyclic delays. Note 2: STBC - Space Time Block Codes (STBC) for which different digital data is carried by each transmit antenna during any symbol period. Note 3: SM - Spatial Multiplexing MIMO (SM-MIMO), for which independent data streams are sent to each transmit antenna. Note 4: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other.				

Antenna Directional Gain (5GHz Band)				
Modulation	Transmitter Outputs Signals Correlated	Transmitter Outputs (N)	Antenna Gain Combination (dBi)	Directional Gain (dBi)
802.11 a/b/g	Correlated	1	3	3
802.11n HT20 / HT40	Uncorrelated	2	3, 3	3
<input checked="" type="checkbox"/> For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows <ul style="list-style-type: none"> Any transmit signals are correlated, Directional Gain = GANT + 10 log(N) dBi All transmit signals are completely uncorrelated, Directional Gain = GANT <input type="checkbox"/> For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows: <ul style="list-style-type: none"> Any transmit signals are correlated, Directional Gain = 10 log$[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N]$ dBi All transmit signals are completely uncorrelated, Directional Gain = 10 log$[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N]$ dBi 				

IEEE 802.11n Modulation Scheme

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

2.5 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	-	-

2.6 Table for Test Modes

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

Test Items	Mode	Data Rate	Channel	Ant. No.
AC Power Conducted Emission Radiated Emission Below 1GHz	Normal Mode	Auto	-	-
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Peak Excursion	11a Band 1/BPSK	6Mbps	36/40/48	1
	11n Band 1/BPSK MCS 8 (20MHz)	13 Mbps	36/40/48	1+2
	11n Band 1/BPSK MCS 8 (40MHz)	27 Mbps	38/46	
Max. Conducted Output Power Measurement Power Spectral Density	11a Band 1/BPSK	6Mbps	36/40/48	1
	11n Band 1/BPSK MCS 8 (20MHz)	13 Mbps	36/40/48	1+2
	11n Band 1/BPSK MCS 8 (40MHz)	27 Mbps	38/46	
Radiated Emission Above 1GHz Fundamental Emissions	11a Band 1/BPSK	6Mbps	36/40/48	1
	11n Band 1/BPSK MCS 8 (20MHz)	13 Mbps	36/40/48	1+2
	11n Band 1/BPSK MCS 8 (40MHz)	27 Mbps	38/46	
Band Edge Emission	11a Band 1/BPSK	6Mbps	36/48	1
	11n Band 1/BPSK MCS 8 (20MHz)	13 Mbps	36/48	1+2
	11n Band 1/BPSK MCS 8 (40MHz)	27 Mbps	38/46	

2.7 Table for Testing Locations

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

Semi Anechoic Chamber (SAC).

2.8 Table for Supporting Units

Support Unit	Brand	Model	FCC ID	Remark
Notebook	DELL	INSPIRON 6400	E2KWM3945ABG	Conducted Emissions
(USB) Mouse	Microsoft	1004	N/A	
iPod nano	Apple	A1320	N/A	
Dummy Load	--	--	--	
Notebook (Remote Workstation)	DELL	E5520	N/A	
Notebook	DELL	INSPIRON 6400	E2KWM3945ABG	Radiated Emissions
(USB) Mouse	Microsoft	1004	N/A	
iPod nano	Apple	A1320	N/A	
Dummy Load	--	--	--	

2.9 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	RT 3352 QA		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11a	06	07	07

**For Three Chain:
Power Parameters of IEEE 802.11n Port 1+ Port 2**

Test Software Version	RT 3352 QA		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11n(20MHz)	08/08	09/08	09/08
Frequency	5190 MHz	5230 MHz	-
IEEE 802.11n(40MHz)	09/08	09/08	-

2.10 EUT Operation during Test

For Conducted Emissions :

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

The program was executed as follows :

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

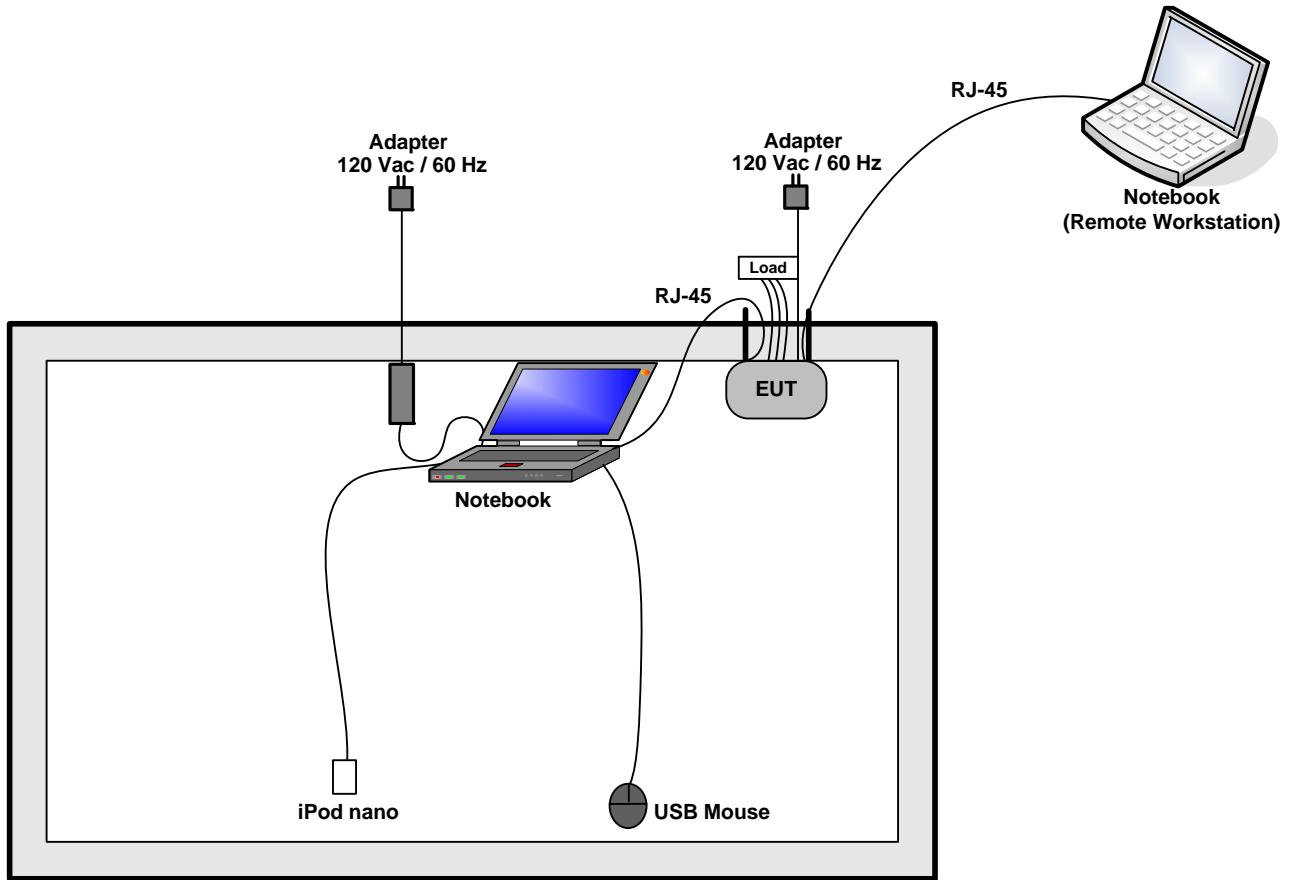
At the same time, the following programs were executed:

- Executed "Winthrx.exe" to read and write data from iPod Nano.
- Executed "Ping.exe" to link with the remote workstation to receive and transmit data by RJ45 cable.
- Open the "Wireless" to link with the remote workstation to receive and transmit data

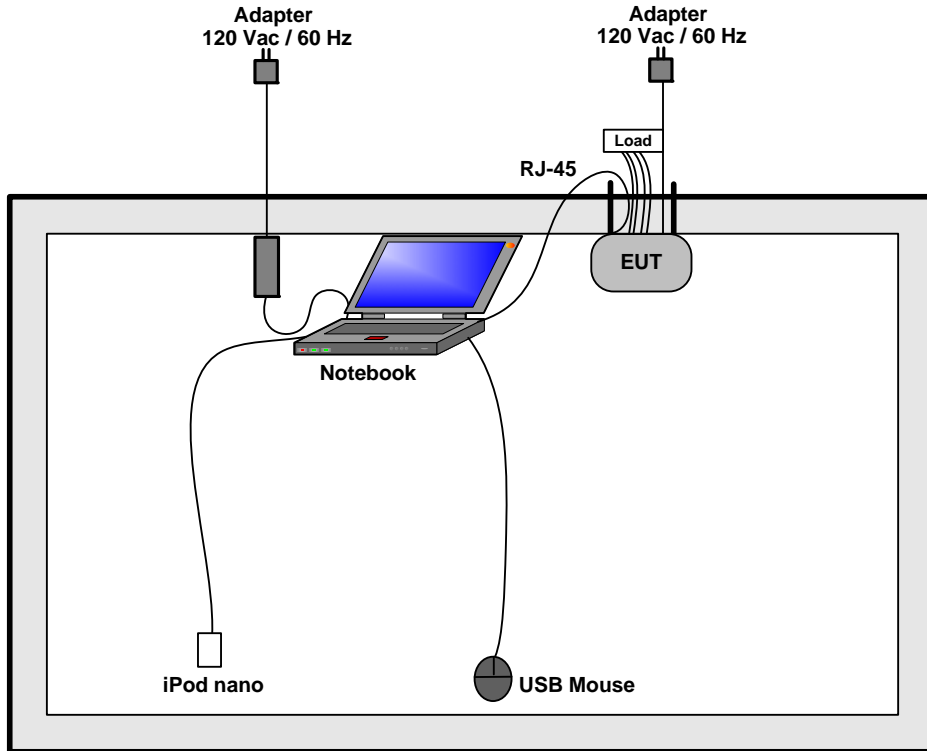
For Radiated Emissions :

- Executed "RT 3352 QA" to keep transmitting signals at fixed frequency.

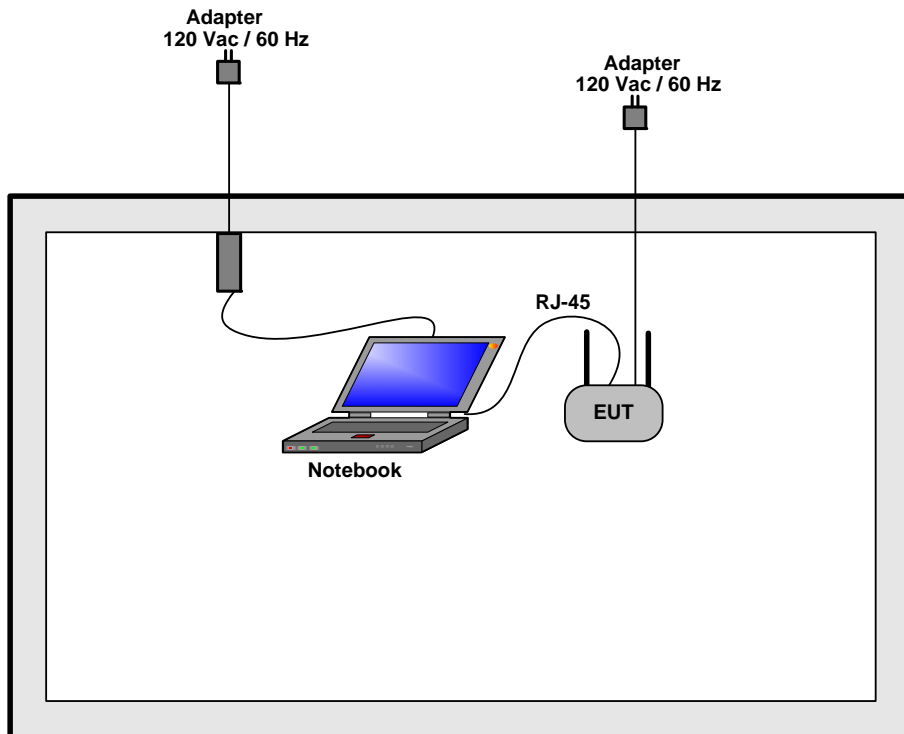
2.11 Test Configuration
For conducted emissions



For radiated emissions 9kHz~1GHz



For radiated emissions above 1GHz



3 TEST RESULT

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit

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

Class B

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

3.1.2 Measuring Instruments and Setting

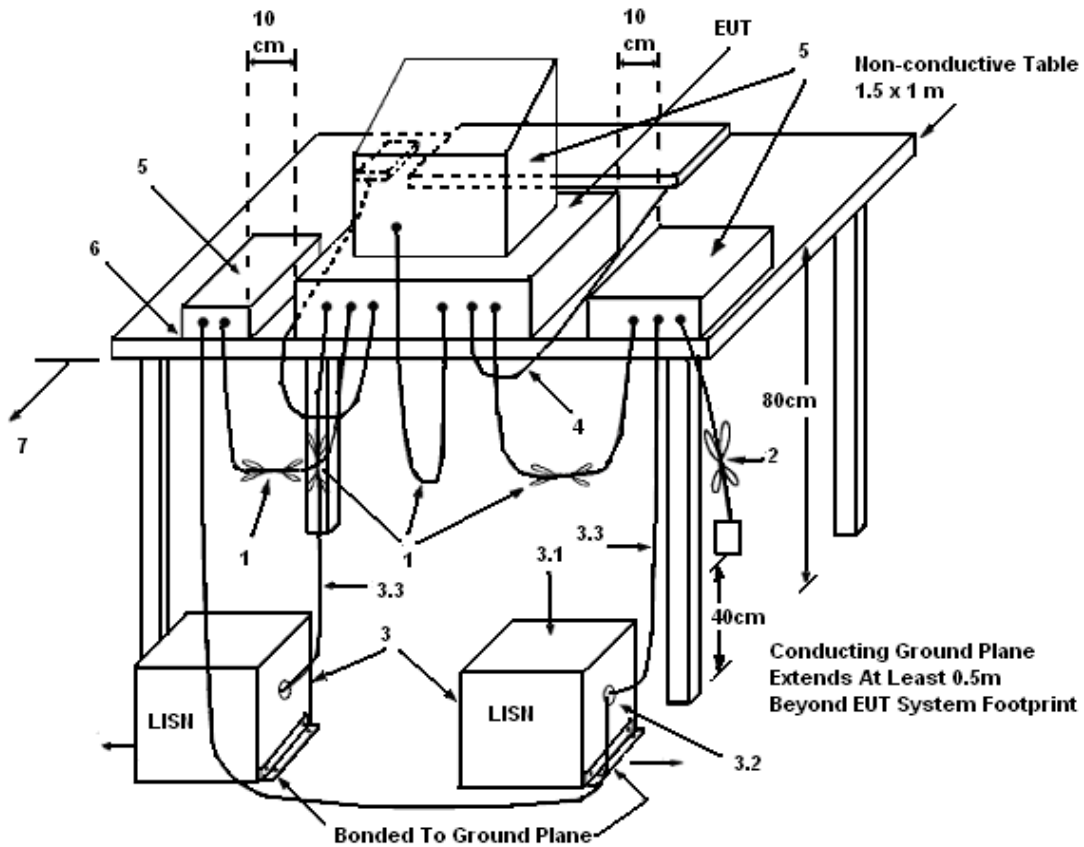
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

3.1.3 Test Procedures

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

3.1.4 Test Setup Layout



LEGEND:

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

3.1.5 Test Deviation

There is no deviation with the original standard.

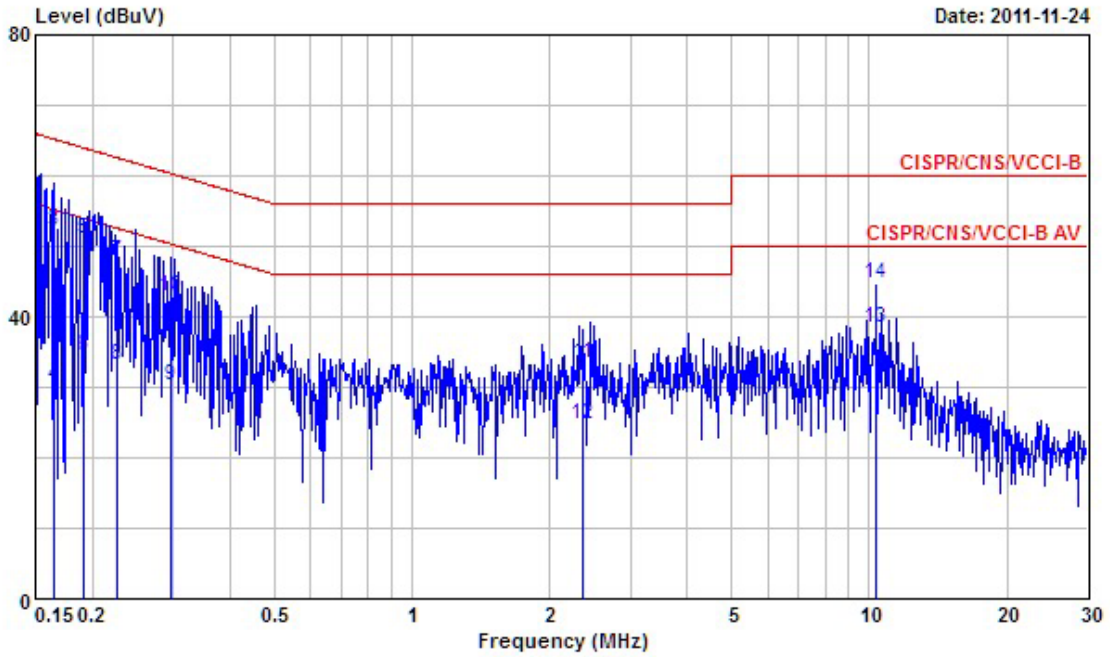
3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

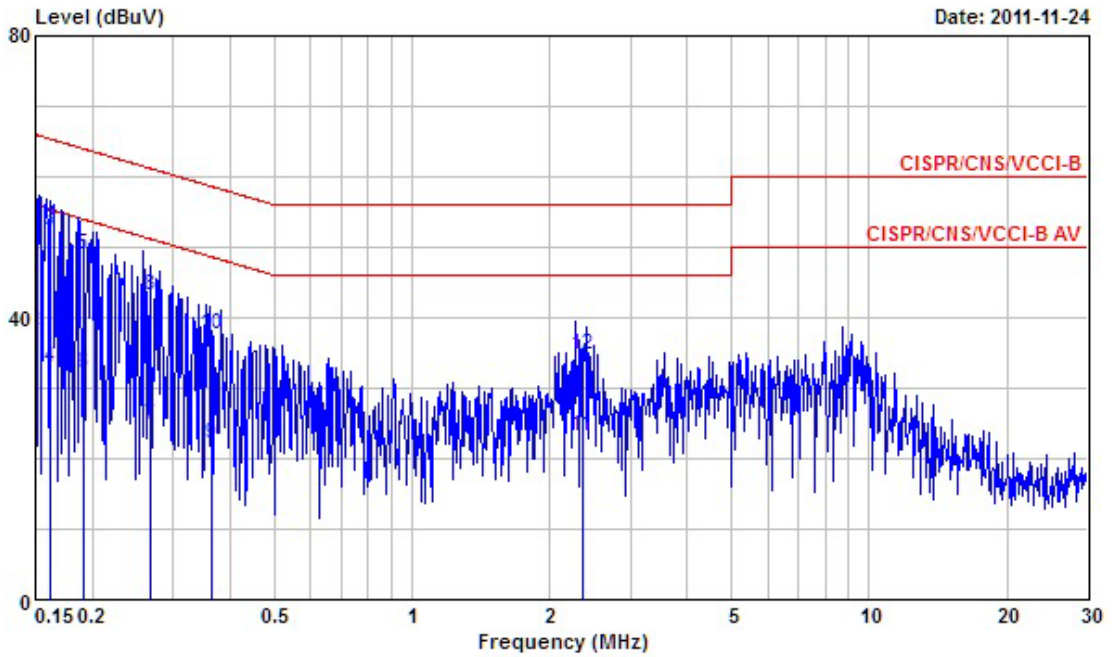
Final Test Date	Nov. 24, 2011	Test Site No.	CO04-HY
Temperature	24.5°C	Humidity	48%
Test Engineer	Assen	Configuration	Normal Mode

Line



	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.150000	57.12	-8.88	66.00	56.60	0.30	0.22	QP
2	0.150000	42.04	-13.96	56.00	41.52	0.30	0.22	Average
3	0.165010	52.13	-13.08	65.21	51.58	0.30	0.25	QP
4	0.165010	30.37	-24.84	55.21	29.82	0.30	0.25	Average
5	0.191136	51.06	-12.93	63.99	50.47	0.30	0.29	QP
6	0.191136	34.45	-19.54	53.99	33.86	0.30	0.29	Average
7	0.226136	47.89	-14.70	62.59	47.31	0.30	0.28	QP
8	0.226136	33.26	-19.33	52.59	32.68	0.30	0.28	Average
9	0.295545	30.28	-20.09	50.37	29.74	0.30	0.24	Average
10	0.295545	42.92	-17.45	60.37	42.38	0.30	0.24	QP
11	2.370	33.50	-22.50	56.00	32.78	0.32	0.40	QP
12	2.370	24.76	-21.24	46.00	24.04	0.32	0.40	Average
13	10.312	38.36	-11.64	50.00	37.29	0.46	0.61	Average
14	10.312	44.77	-15.23	60.00	43.70	0.46	0.61	QP

Neutral



File Name: 11111111

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1500000	55.10	-10.90	66.00	54.61	0.27	0.22	QP
2	0.1500000	38.05	-17.95	56.00	37.56	0.27	0.22	Average
3	0.1615500	52.39	-12.99	65.38	51.89	0.26	0.24	QP
4	0.1615500	32.78	-22.60	55.38	32.28	0.26	0.24	Average
5	0.1915200	48.82	-15.15	63.97	48.28	0.25	0.29	QP
6	0.1915200	32.12	-21.85	53.97	31.58	0.25	0.29	Average
7	0.2671290	24.65	-26.56	51.21	24.14	0.25	0.26	Average
8	0.2671290	43.09	-18.12	61.21	42.58	0.25	0.26	QP
9	0.3633820	22.19	-26.46	48.65	21.74	0.24	0.21	Average
10	0.3633820	37.70	-20.95	58.65	37.25	0.24	0.21	QP
11	2.360	23.06	-22.94	46.00	22.39	0.27	0.40	Average
12	2.360	34.69	-21.31	56.00	34.02	0.27	0.40	QP

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

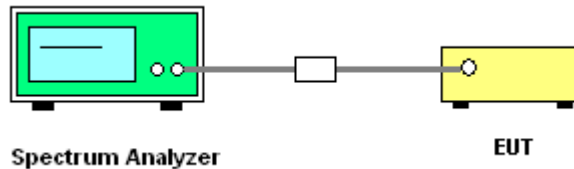
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	Oct. 27, 2011	Test Site No.	TH01-HY
Temperature	24.5°C	Humidity	60%
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	20.00	16.70
40	5200 MHz	19.90	16.70
48	5240 MHz	21.20	16.90

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

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.50	17.60
40	5200 MHz	20.30	17.60
48	5240 MHz	20.40	17.60

Configuration of IEEE 802.11n Port 2 (20MHz)

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.00	17.60
40	5200 MHz	20.00	17.60
48	5240 MHz	20.00	17.50

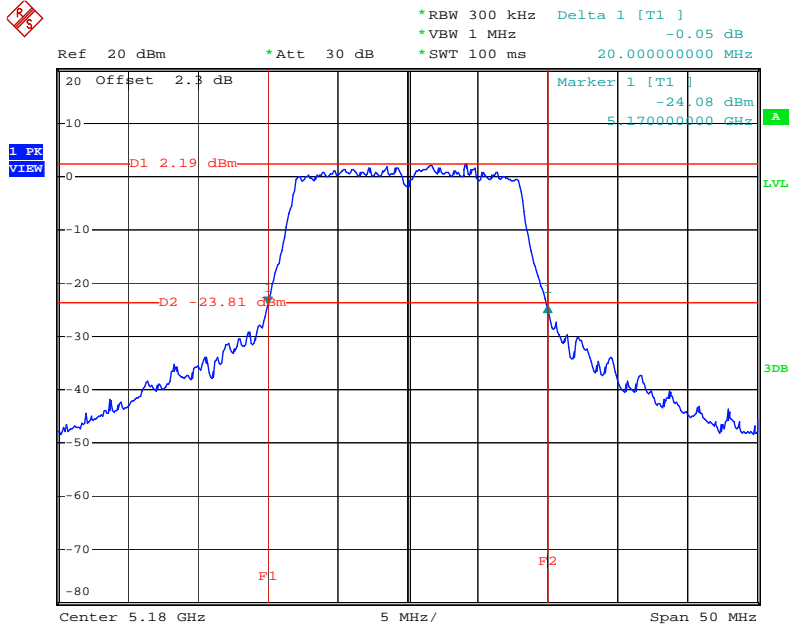
Configuration of IEEE 802.11n Port 1 (40MHz)

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	40.20	35.80
46	5230 MHz	40.20	36.00

Configuration of IEEE 802.11n Port 2 (40MHz)

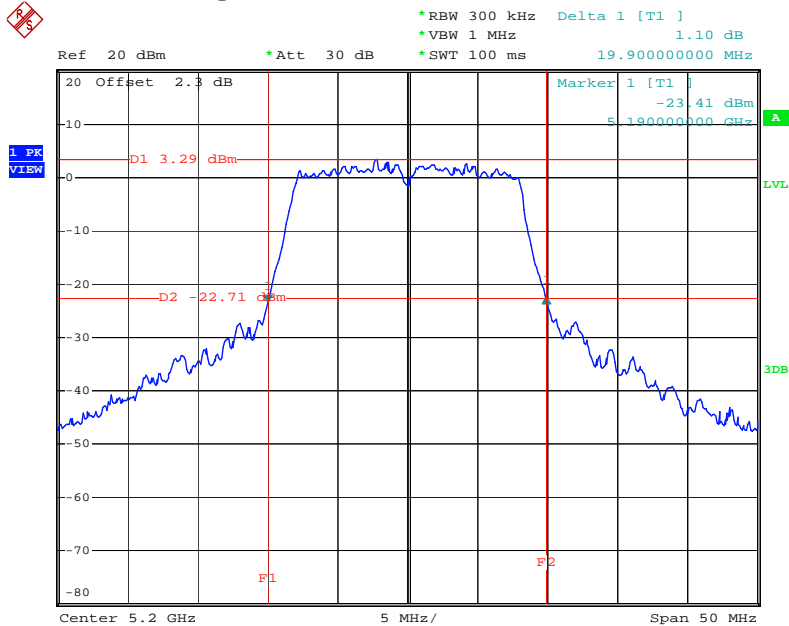
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	39.40	35.80
46	5230 MHz	39.40	35.80

For Single Chain:
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5180 MHz



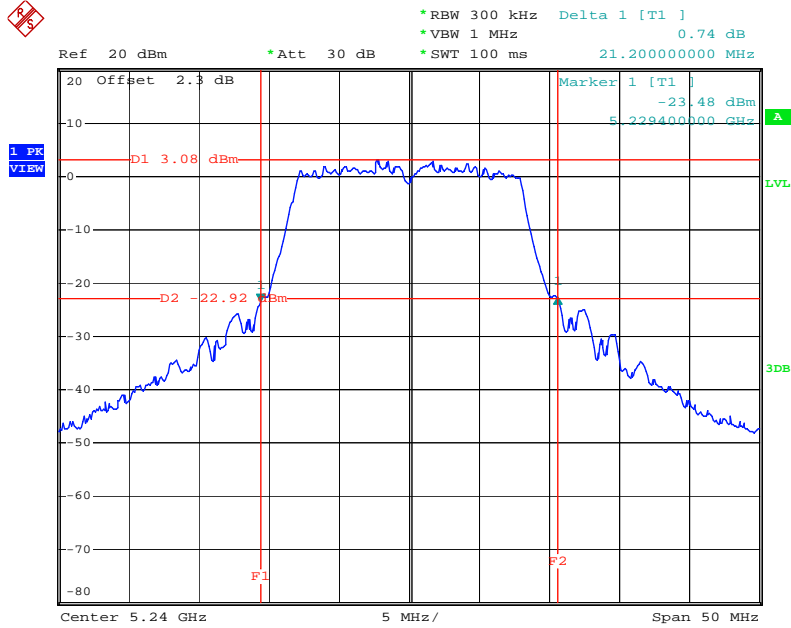
Date: 26.OCT.2011 18:28:26

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



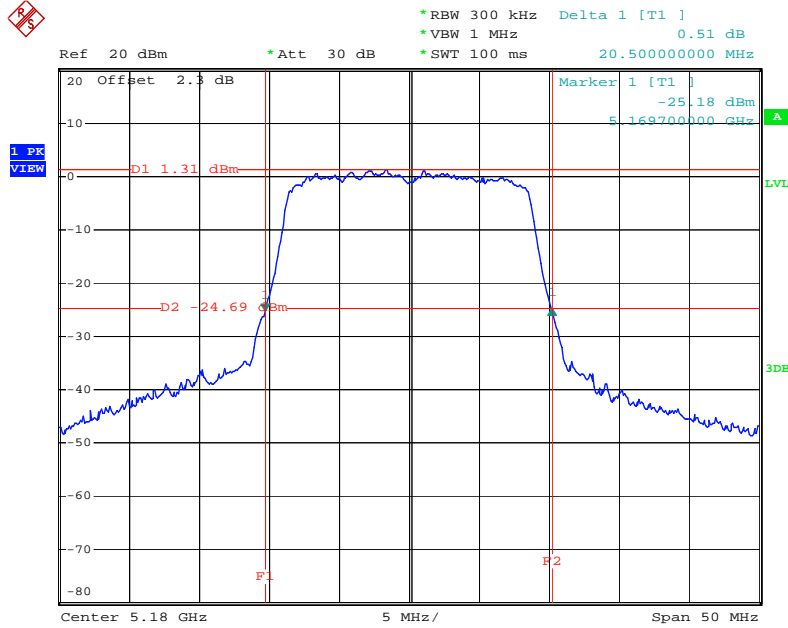
Date: 26.OCT.2011 18:31:21

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



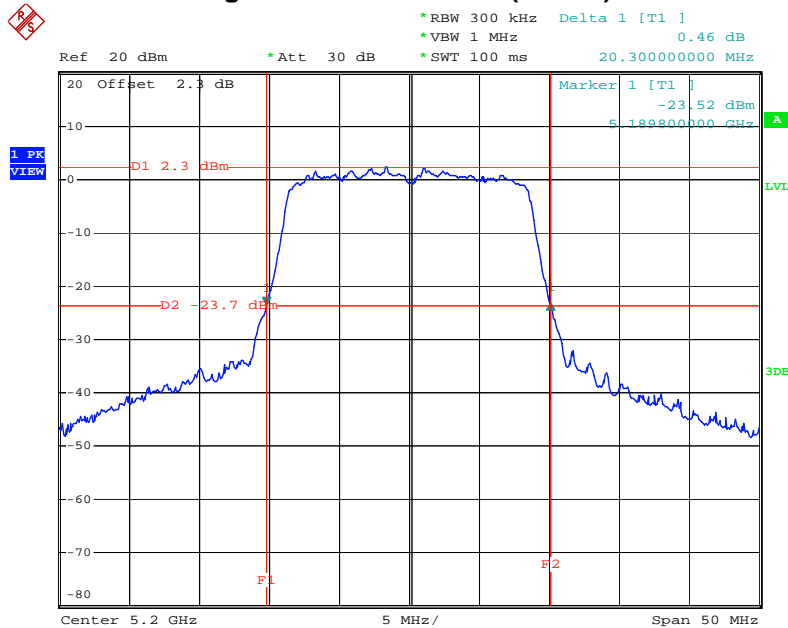
Date: 26.OCT.2011 18:34:10

For Two Chain:
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5180 MHz



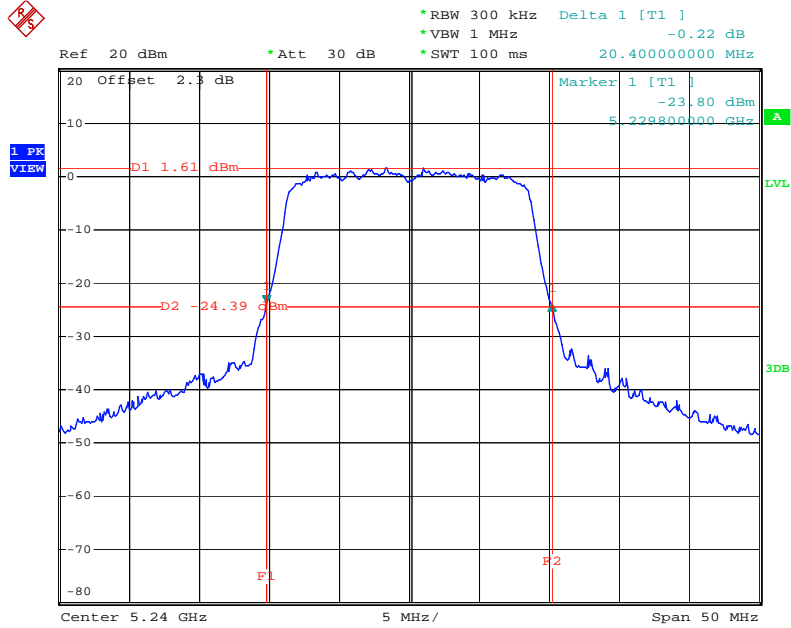
Date: 27.OCT.2011 09:08:44

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5200 MHz



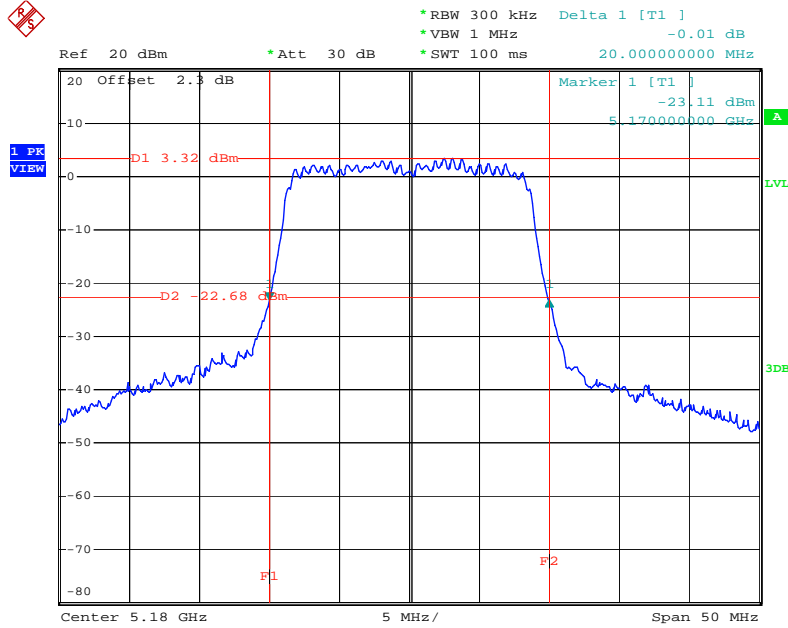
Date: 27.OCT.2011 09:12:54

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5240 MHz



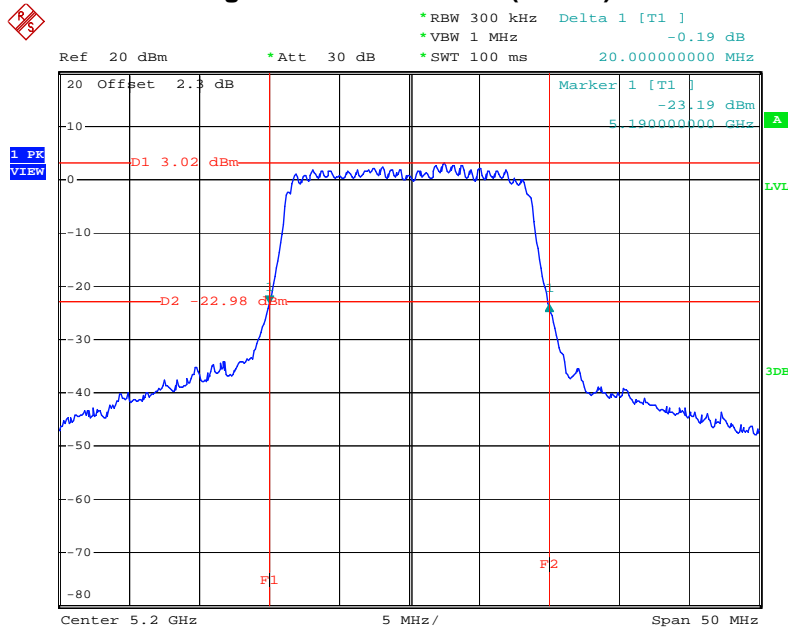
Date: 27.OCT.2011 09:16:33

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5180 MHz



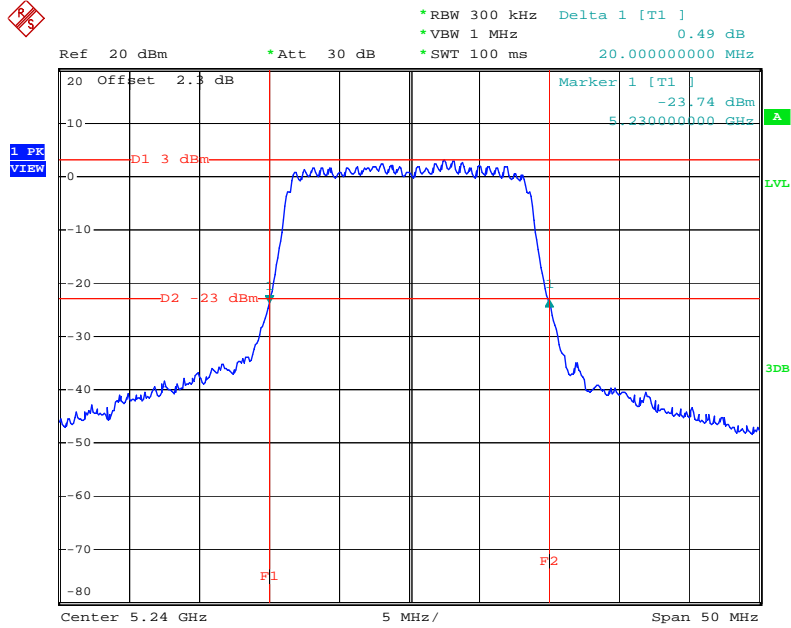
Date: 27.OCT.2011 09:26:17

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5200 MHz



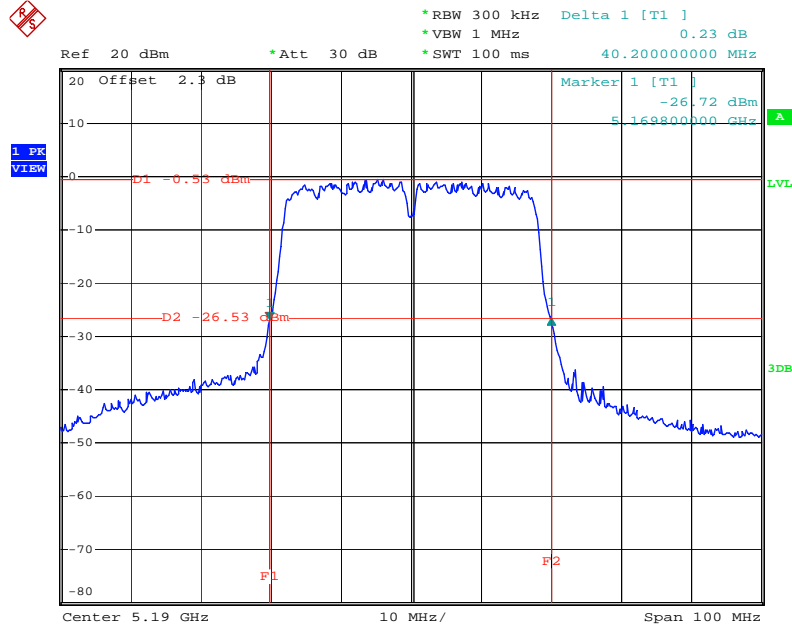
Date: 27.OCT.2011 09:29:45

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5240 MHz



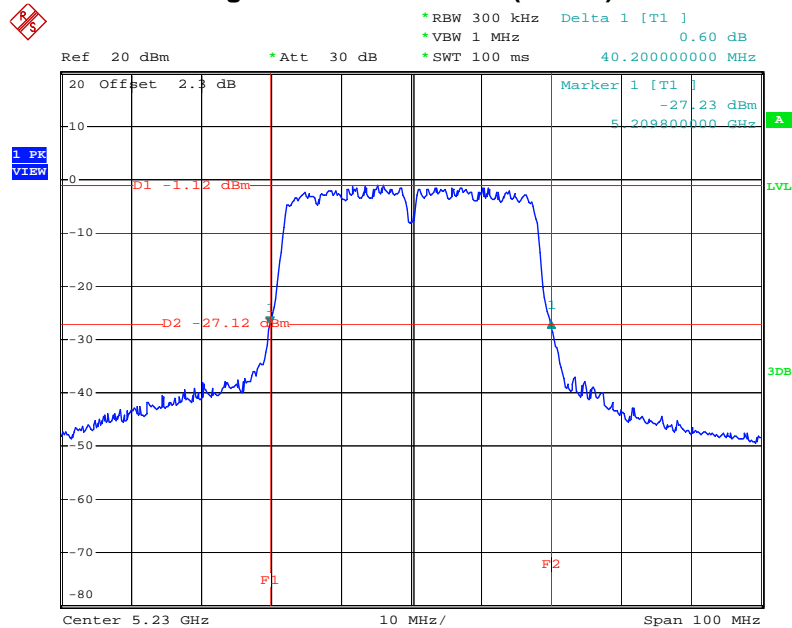
Date: 27.OCT.2011 09:32:12

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5190 MHz



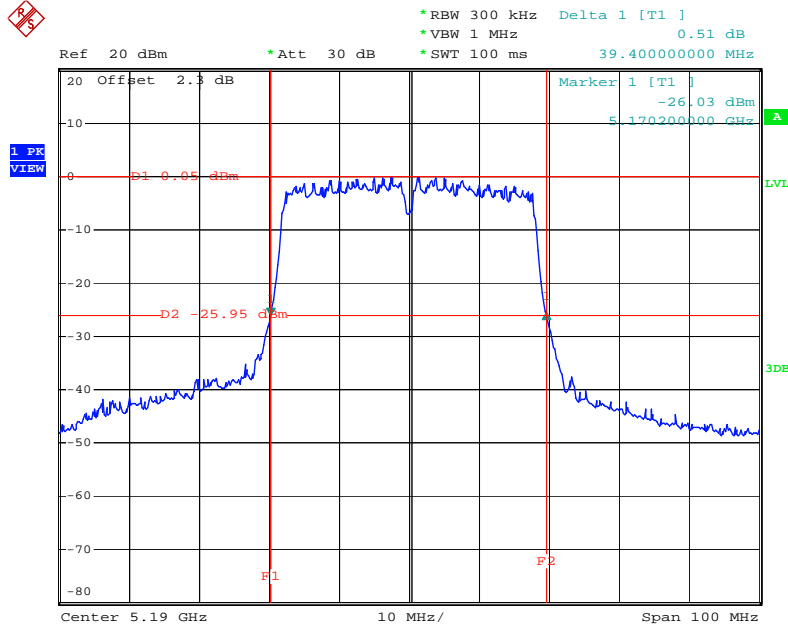
Date: 27.OCT.2011 10:53:13

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5230 MHz



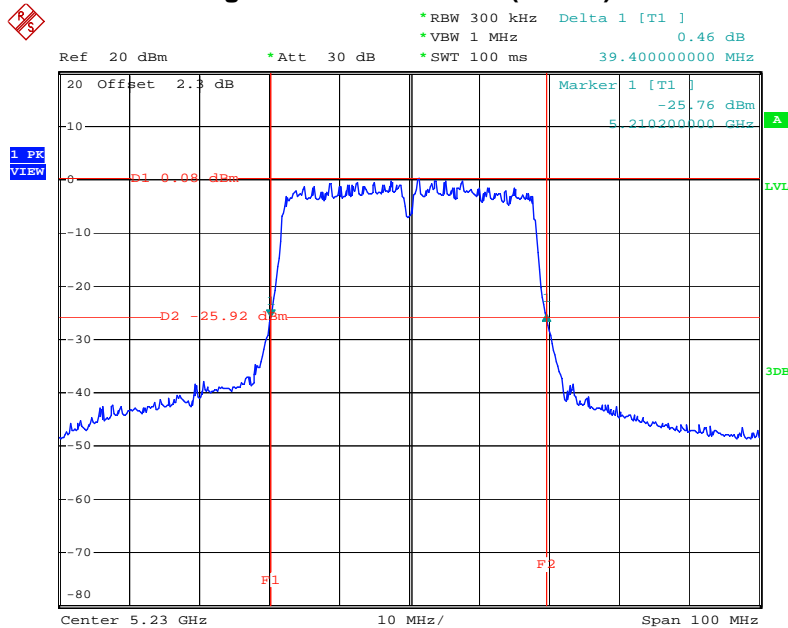
Date: 27.OCT.2011 10:55:45

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5190 MHz



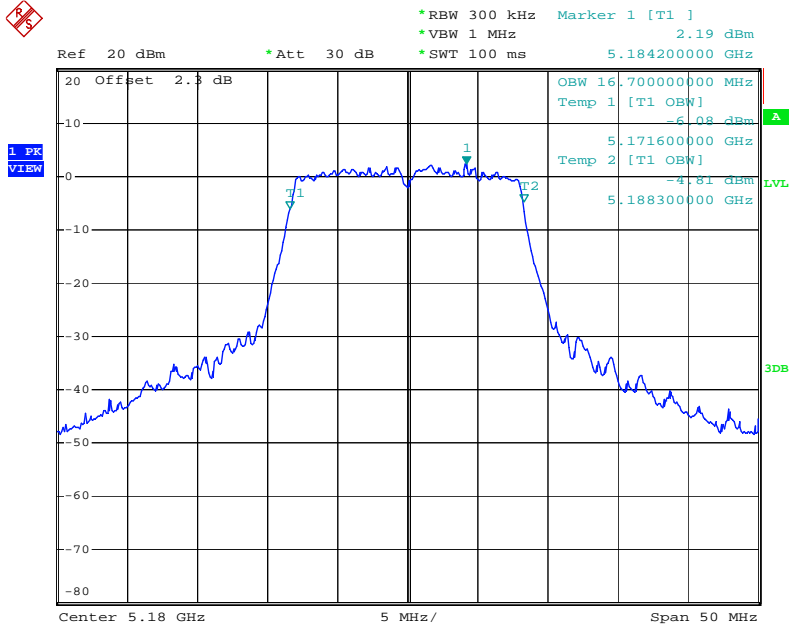
Date: 27.OCT.2011 10:58:21

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5230 MHz



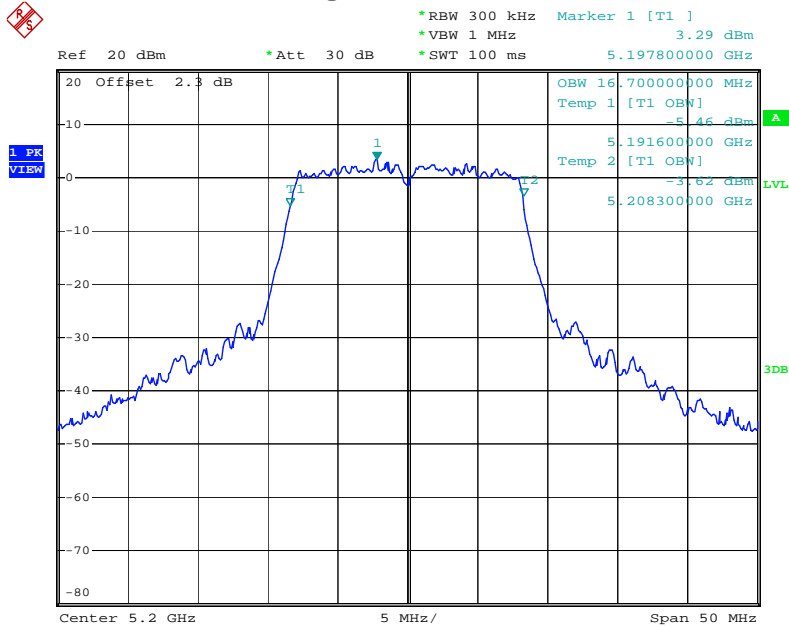
Date: 27.OCT.2011 11:00:57

For Single Chain:
 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / 5180 MHz



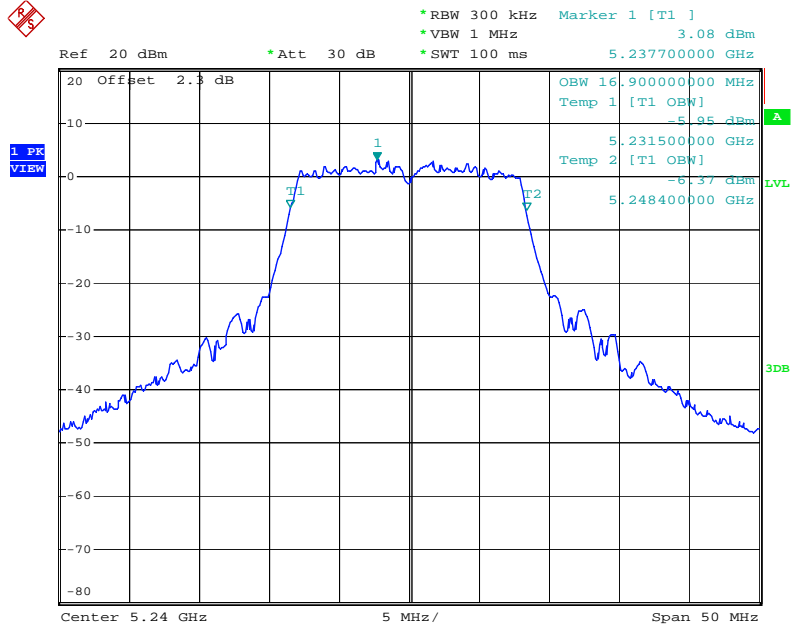
Date: 26.OCT.2011 18:28:38

99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / 5200 MHz



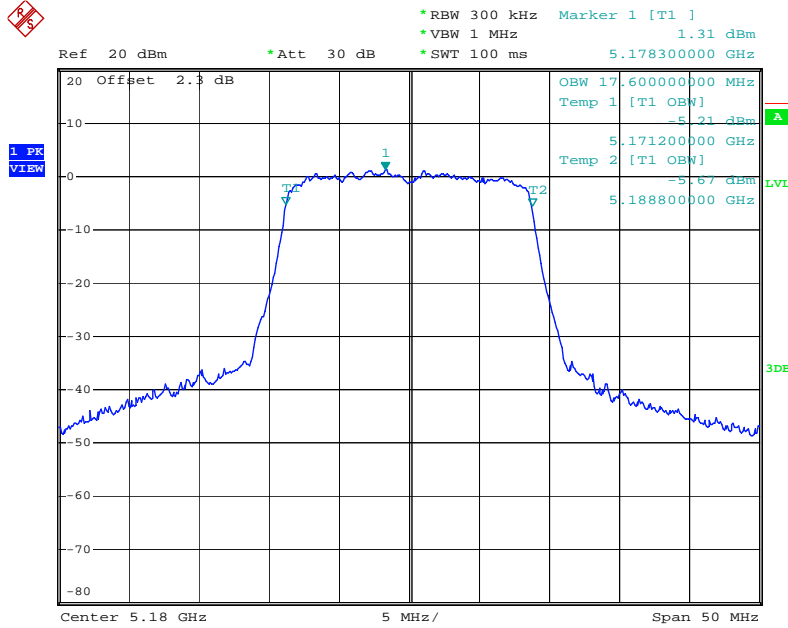
Date: 26.OCT.2011 18:31:34

99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / 5240 MHz



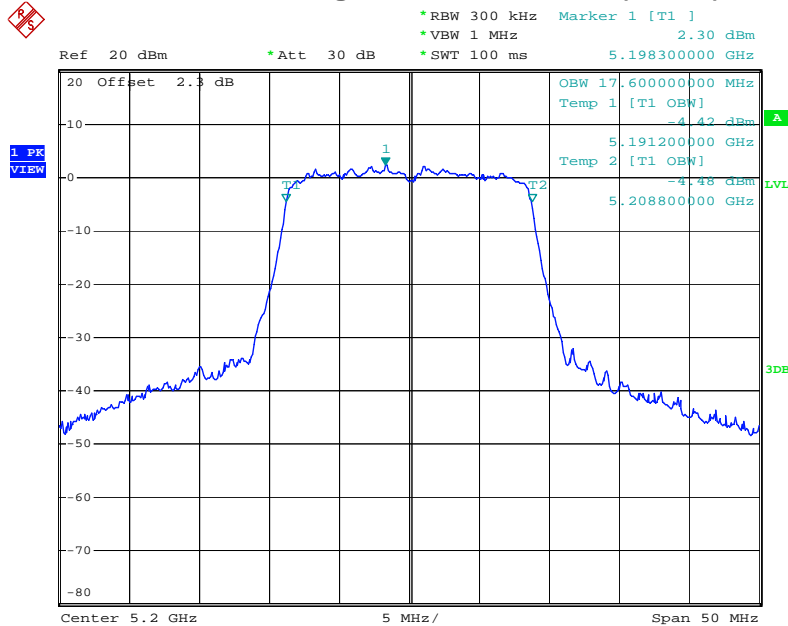
Date: 26.OCT.2011 18:34:21

**For Two Chain:
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5180 MHz**



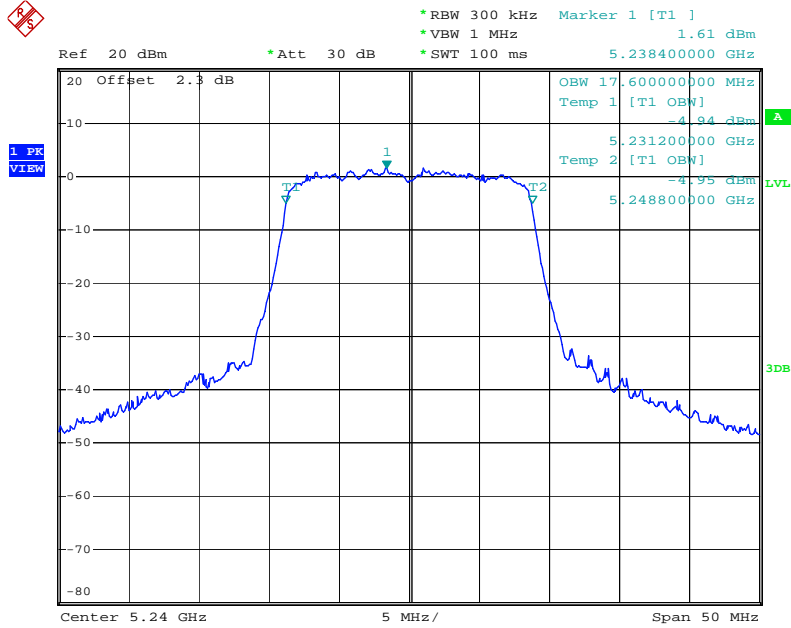
Date: 27.OCT.2011 09:08:53

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5200 MHz



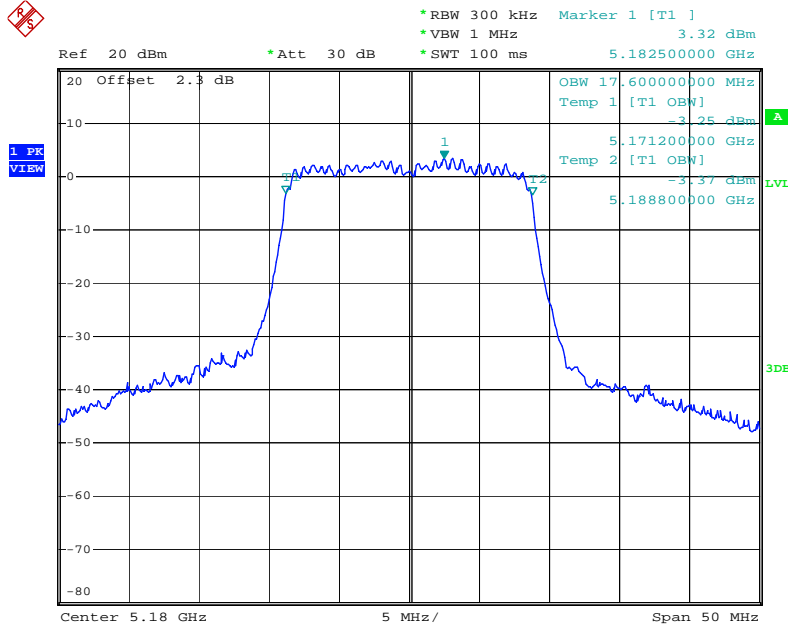
Date: 27.OCT.2011 09:13:04

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5240 MHz



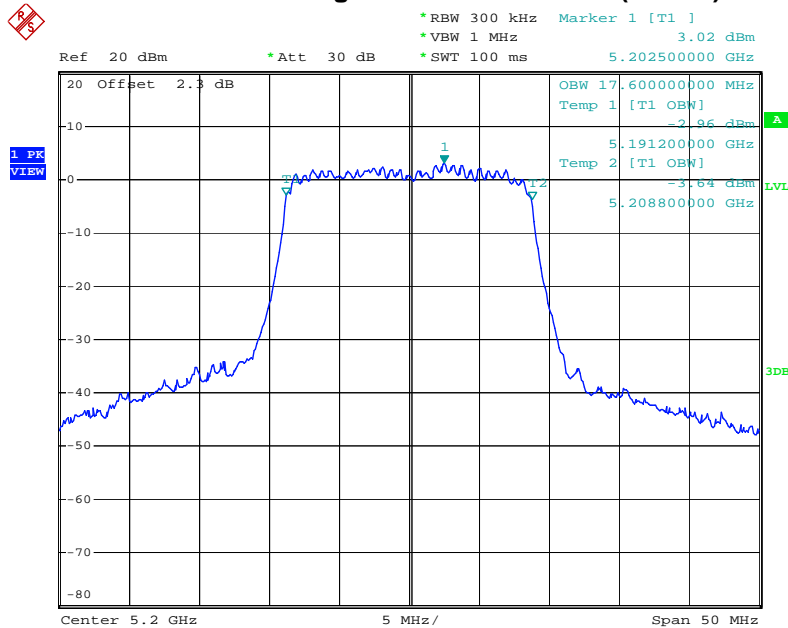
Date: 27.OCT.2011 09:16:42

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5180 MHz



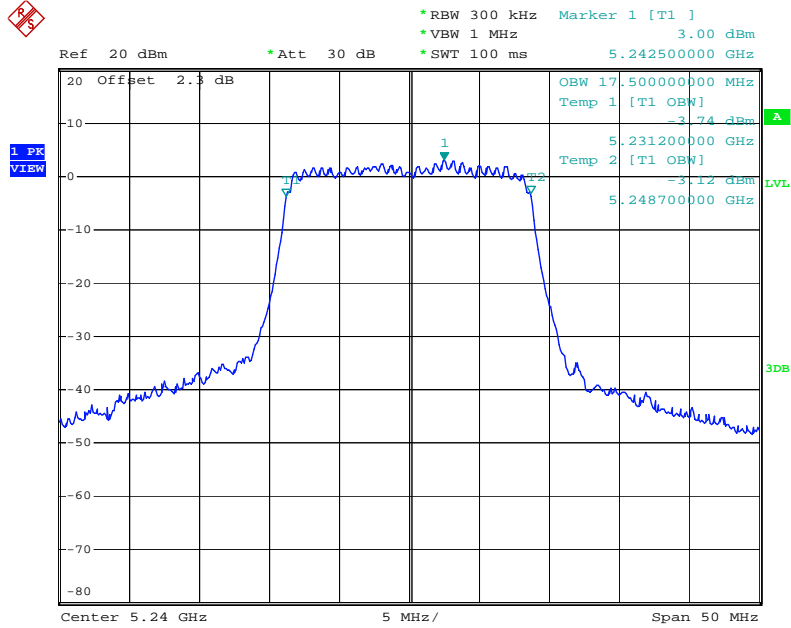
Date: 27.OCT.2011 09:26:31

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5200 MHz



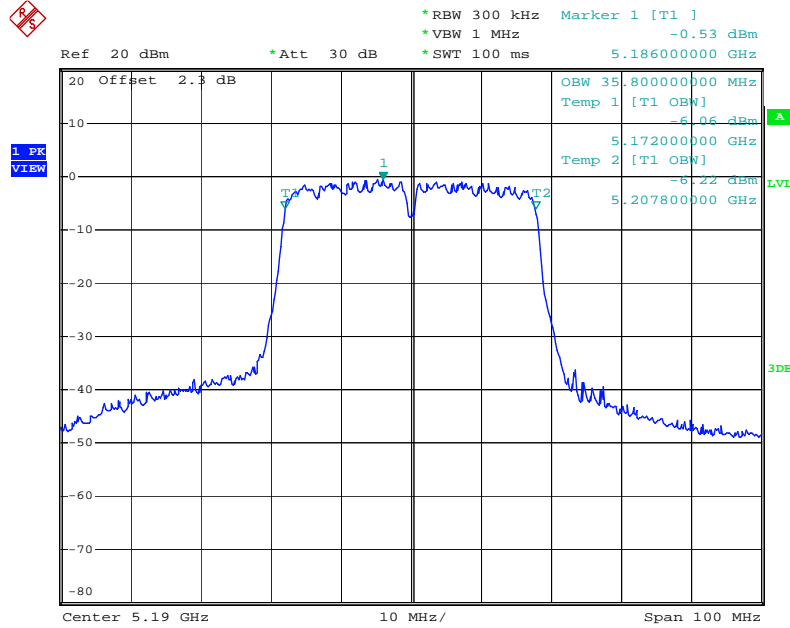
Date: 27.OCT.2011 09:29:55

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5240 MHz



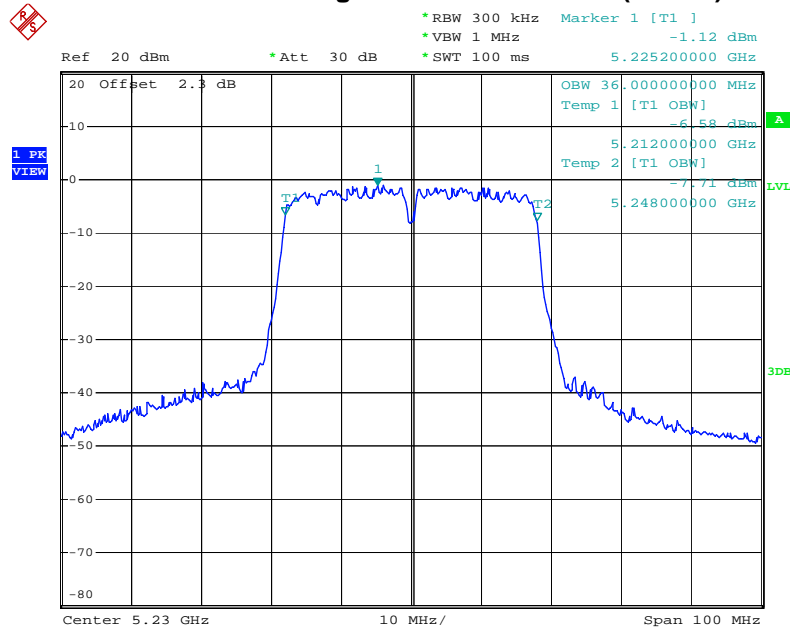
Date: 27.OCT.2011 09:32:21

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5190 MHz



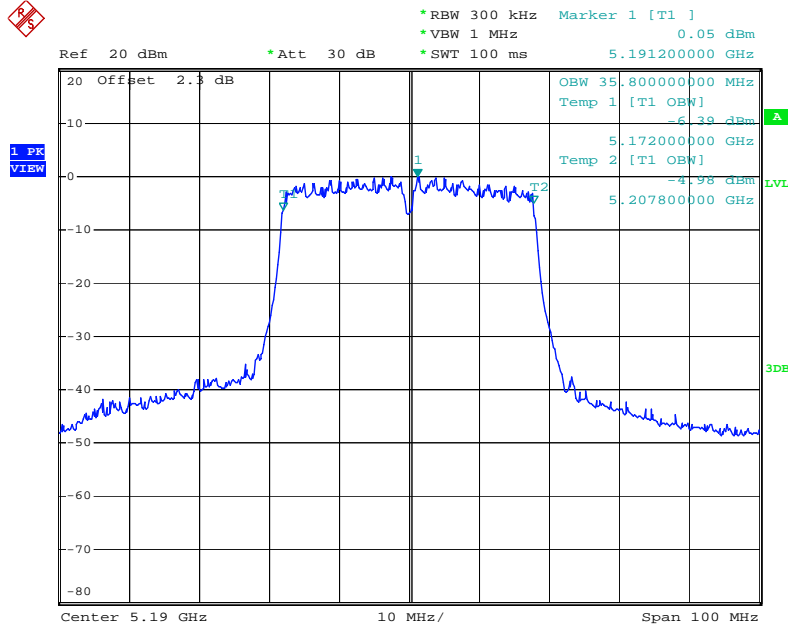
Date: 27.OCT.2011 10:53:25

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5230 MHz



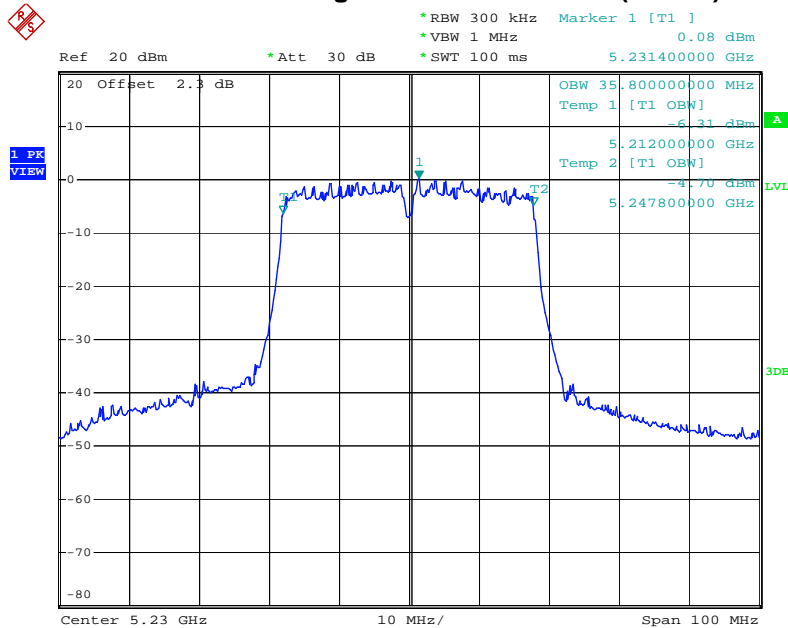
Date: 27.OCT.2011 10:55:54

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5190 MHz



Date: 27.OCT.2011 10:58:32

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5230 MHz



Date: 27.OCT.2011 11:01:06

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.

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

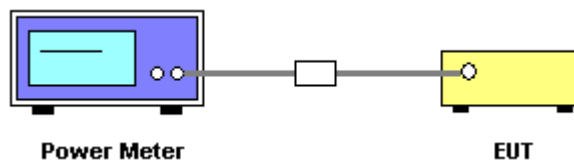
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	Oct. 27, 2011	Test Site No.	TH01-HY
Temperature	24.5°C	Humidity	60%
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	11.39	17	Complies
40	5200 MHz	11.53	17	Complies
48	5240 MHz	11.47	17	Complies

For Two Chain:

Configuration IEEE 802.11n Port 1 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	11.32	17	Complies
40	5200 MHz	11.75	17	Complies
48	5240 MHz	11.23	17	Complies

Configuration IEEE 802.11n Port 2 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.01	17	Complies
40	5200 MHz	11.87	17	Complies
48	5240 MHz	11.52	17	Complies

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	14.69	17	Complies
40	5200 MHz	14.82	17	Complies
48	5240 MHz	14.39	17	Complies

Configuration IEEE 802.11n Port 1 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	11.91	17	Complies
46	5230 MHz	11.42	17	Complies

Configuration IEEE 802.11n Port 2 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	11.74	17	Complies
46	5230 MHz	11.48	17	Complies

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	14.84	17	Complies
46	5230 MHz	14.46	17	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

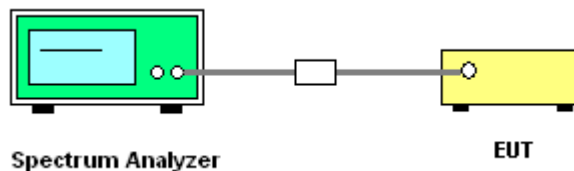
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 Peak, 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	Oct. 27, 2011	Test Site No.	TH01-HY
Temperature	24.5°C	Humidity	60%
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	0.67	4	Complies
5200 MHz	0.57	4	Complies
5240 MHz	0.57	4	Complies

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	-0.22	4	Complies
5200 MHz	0.71	4	Complies
5240 MHz	-0.12	4	Complies

Configuration IEEE 802.11n Port 2 (20MHz)

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	1.78	4	Complies
5200 MHz	0.66	4	Complies
5240 MHz	0.25	4	Complies

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	3.90	4	Complies
5200 MHz	3.70	4	Complies
5240 MHz	3.08	4	Complies

Configuration IEEE 802.11n Port 1 (40MHz)

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	-1.98	4	Complies
5230 MHz	-3.39	4	Complies

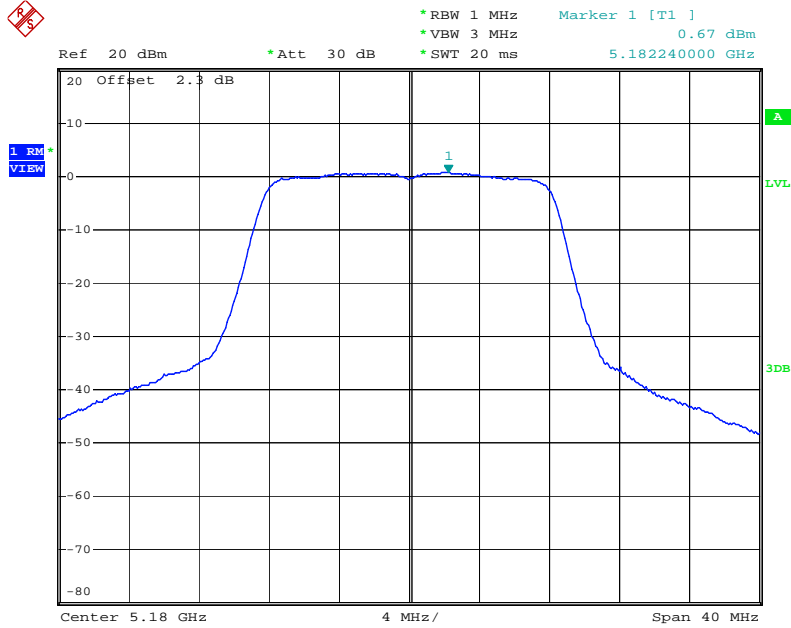
Configuration IEEE 802.11n Port 2 (40MHz)

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	-2.53	4	Complies
5230 MHz	-1.78	4	Complies

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

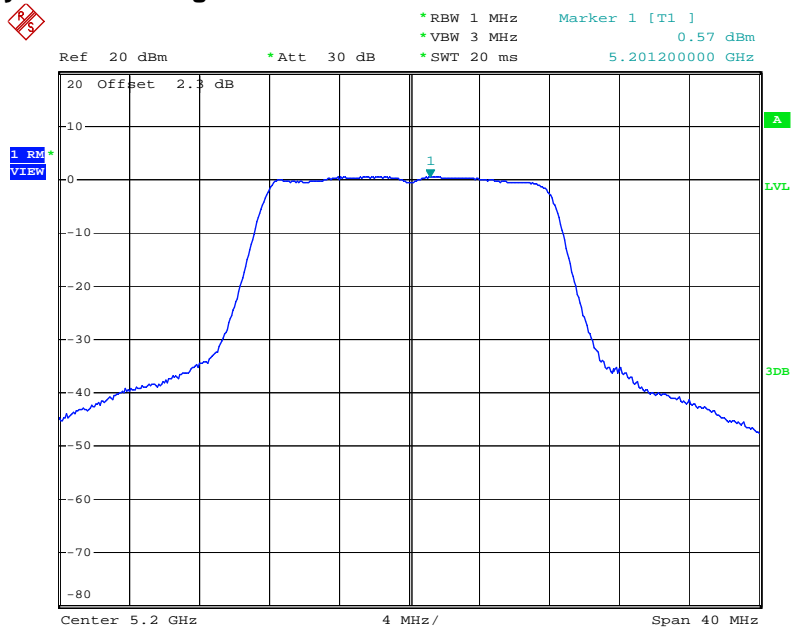
Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	0.76	4	Complies
5230 MHz	0.5	4	Complies

For Single Chain:
Power Density Plot on Configuration IEEE 802.11a / 5180 MHz



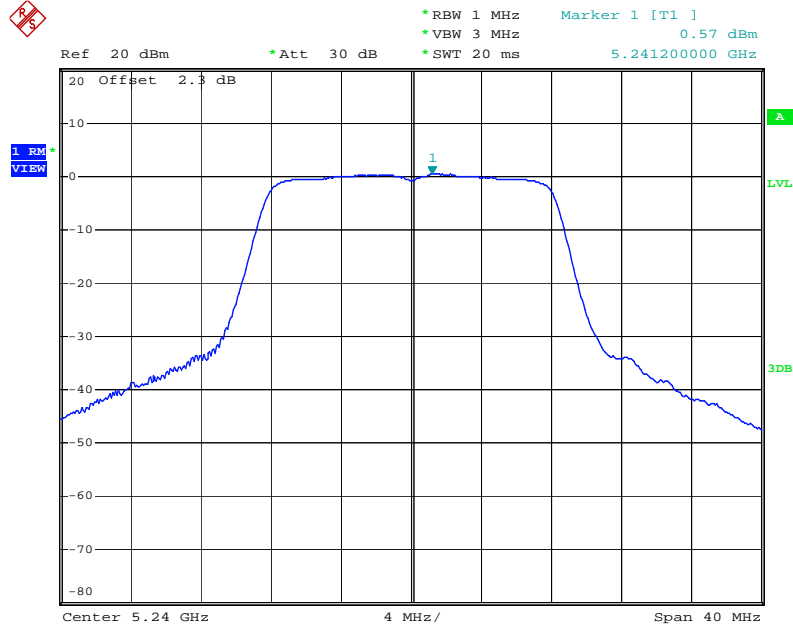
Date: 26.OCT.2011 18:25:29

Power Density Plot on Configuration IEEE 802.11a / 5200 MHz



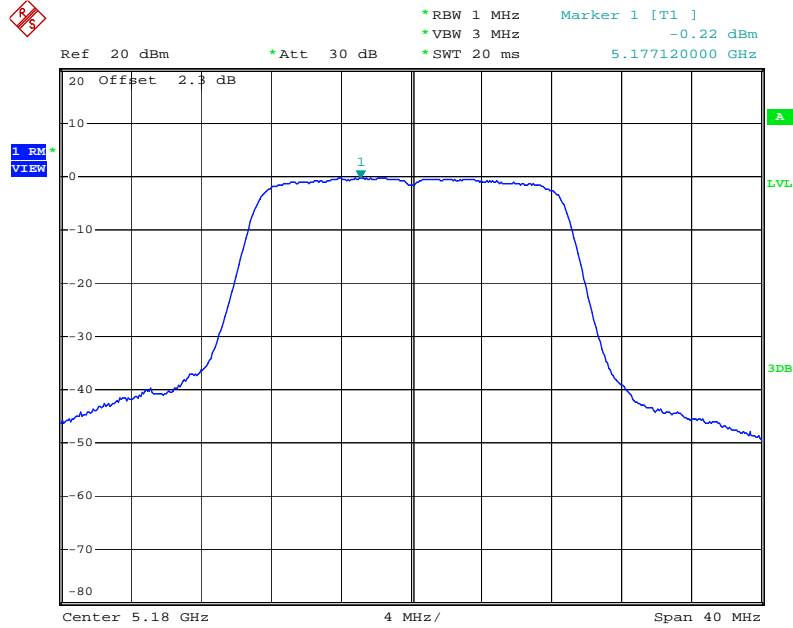
Date: 26.OCT.2011 18:29:40

Power Density Plot on Configuration IEEE 802.11a / 5240 MHz



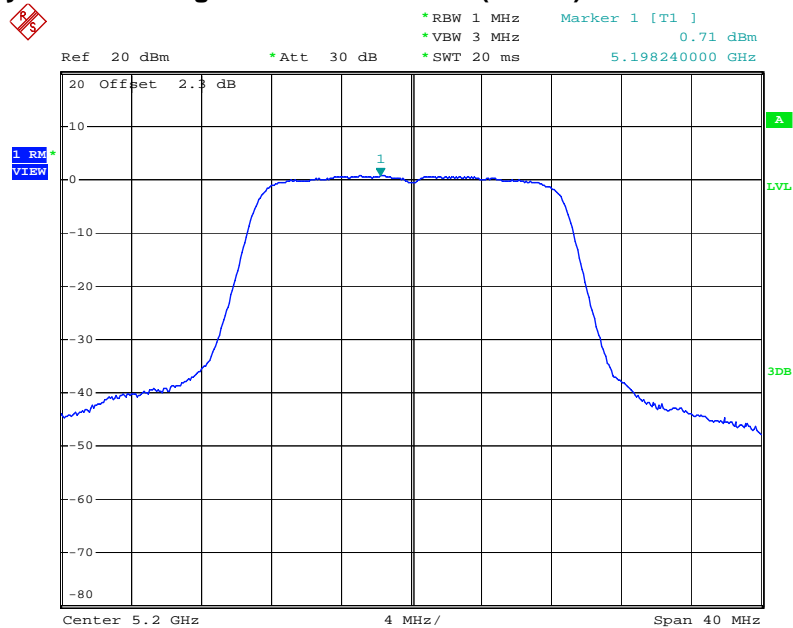
Date: 26.OCT.2011 18:32:30

For Two Chain:
Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5180 MHz



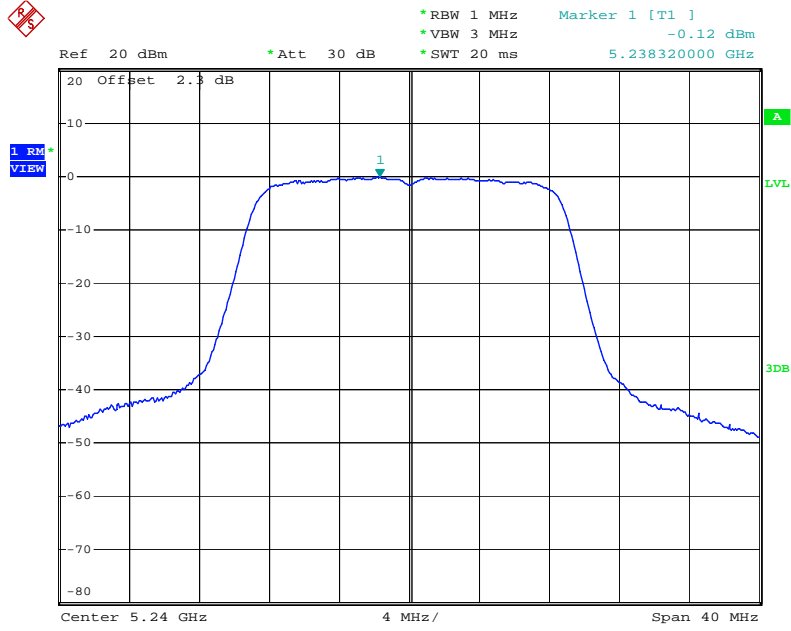
Date: 27.OCT.2011 09:06:49

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5200 MHz



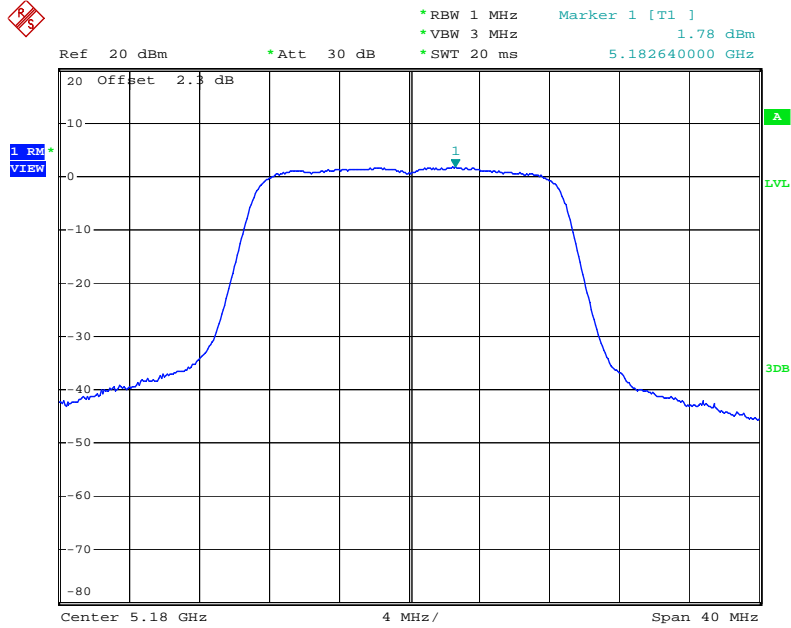
Date: 27.OCT.2011 09:11:08

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5240 MHz



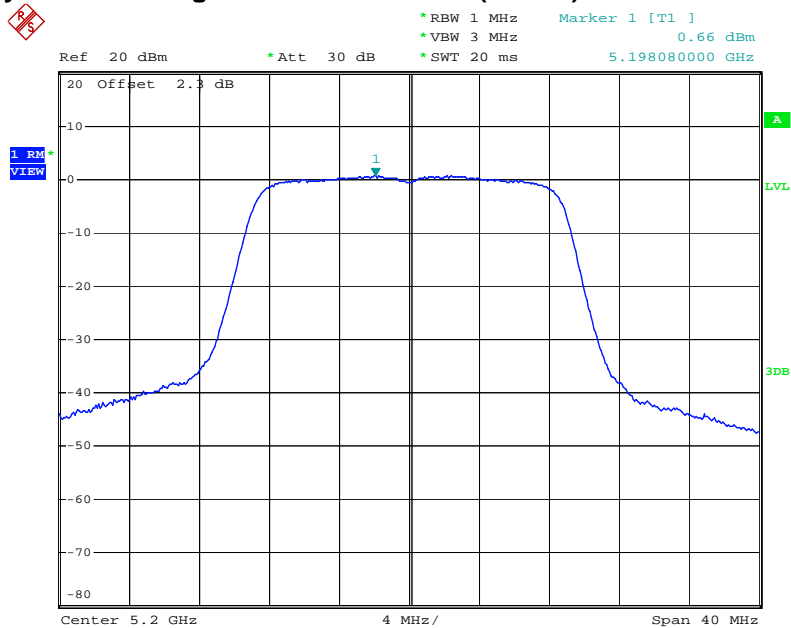
Date: 27.OCT.2011 09:14:12

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5180 MHz



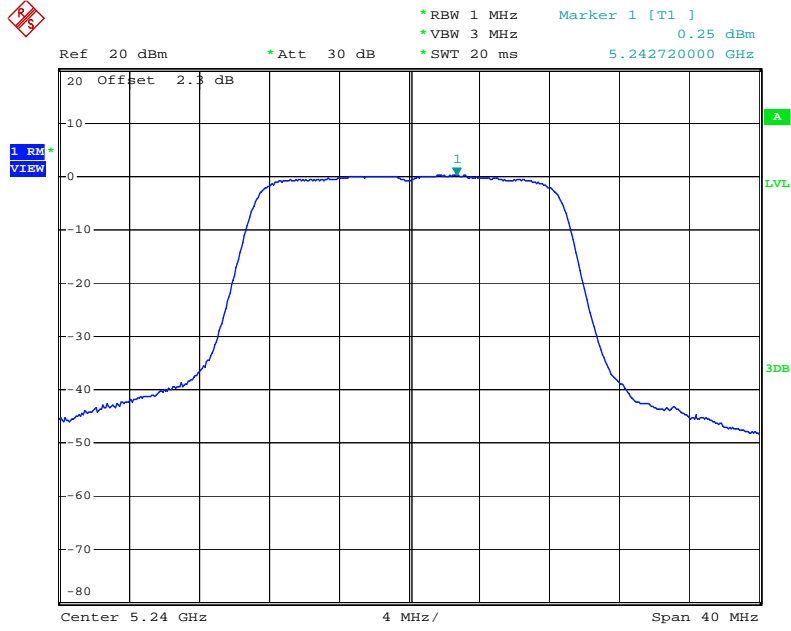
Date: 27.OCT.2011 09:24:20

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5200 MHz



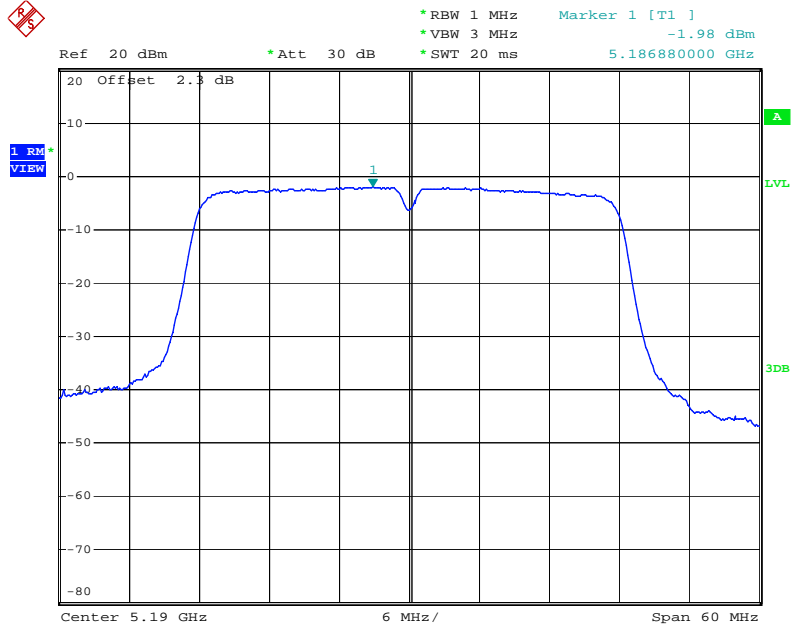
Date: 27.OCT.2011 09:27:26

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5240 MHz



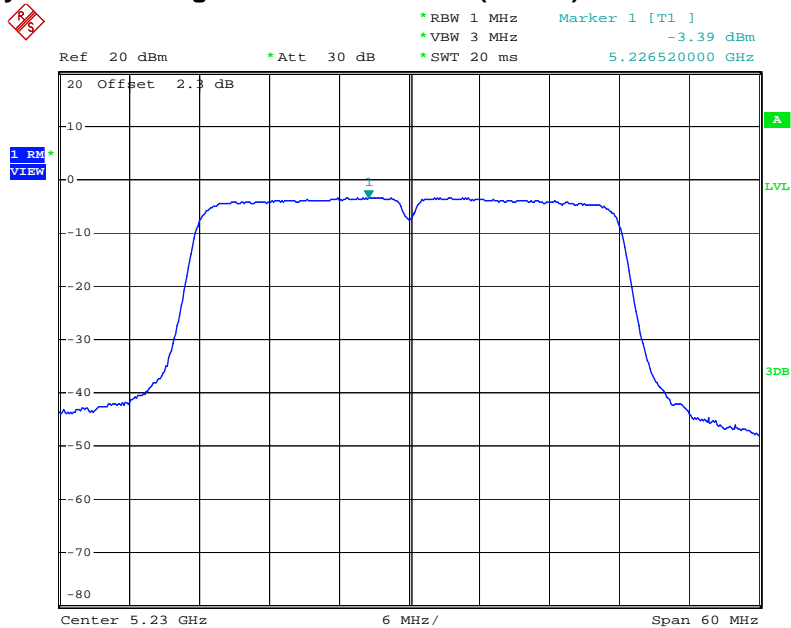
Date: 27.OCT.2011 09:30:44

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5190 MHz



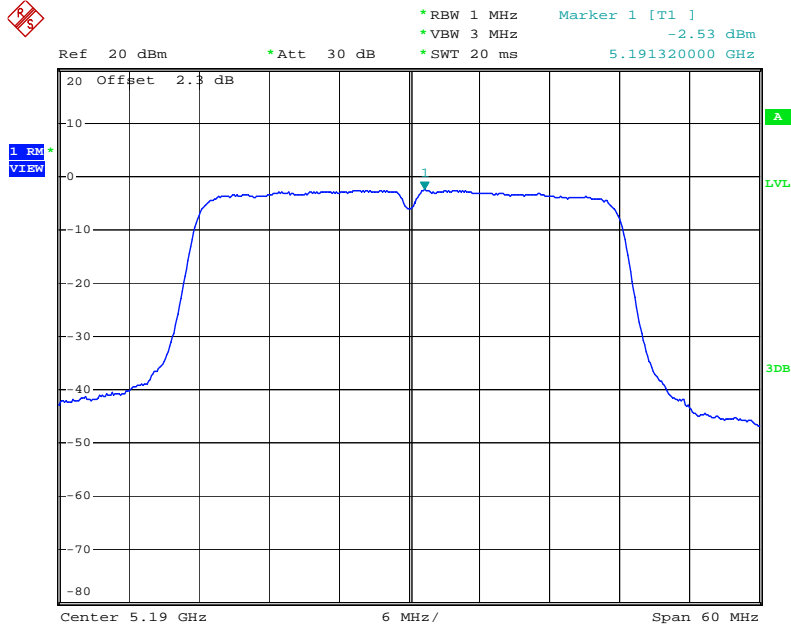
Date: 27.OCT.2011 10:51:39

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5230 MHz



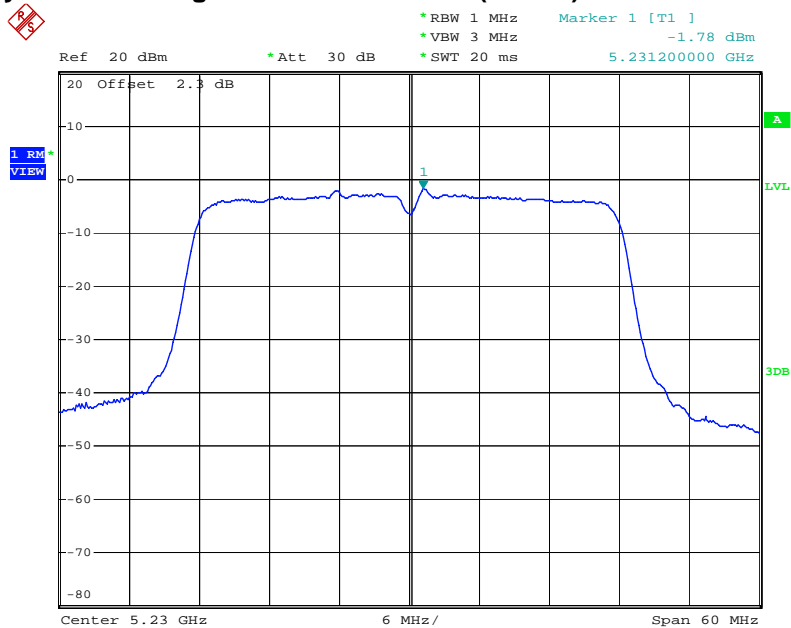
Date: 27.OCT.2011 10:54:13

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5190 MHz



Date: 27.OCT.2011 10:56:57

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5230 MHz



Date: 27.OCT.2011 10:59:15

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

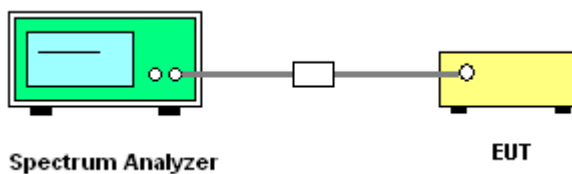
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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) / RMS (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 $\geq 1/4\mu$ 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	Oct. 27, 2011	Test Site No.	TH01-HY
Temperature	24.5°C	Humidity	60%
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	5.18	13	Complies
5200 MHz	5.33	13	Complies
5240 MHz	5.28	13	Complies

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

Frequency	Peak Excursion (Db)	Max. Limit (Db)	Result
5180 MHz	5.24	13	Complies
5200 MHz	5.22	13	Complies
5240 MHz	5.22	13	Complies

Configuration IEEE 802.11n Port 2 (20MHz)

Frequency	Peak Excursion (Db)	Max. Limit (Db)	Result
5180 MHz	6.75	13	Complies
5200 MHz	6.84	13	Complies
5240 MHz	6.86	13	Complies

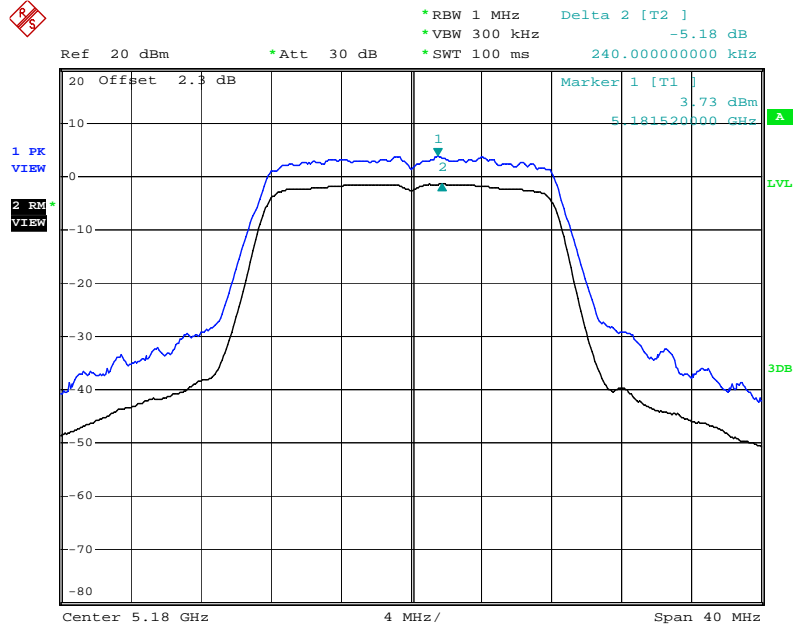
Configuration IEEE 802.11n Port 1 (40MHz)

Frequency	Peak Excursion (Db)	Max. Limit (Db)	Result
5190 MHz	6.45	13	Complies
5230 MHz	6.22	13	Complies

Configuration IEEE 802.11n Port 2 (40MHz)

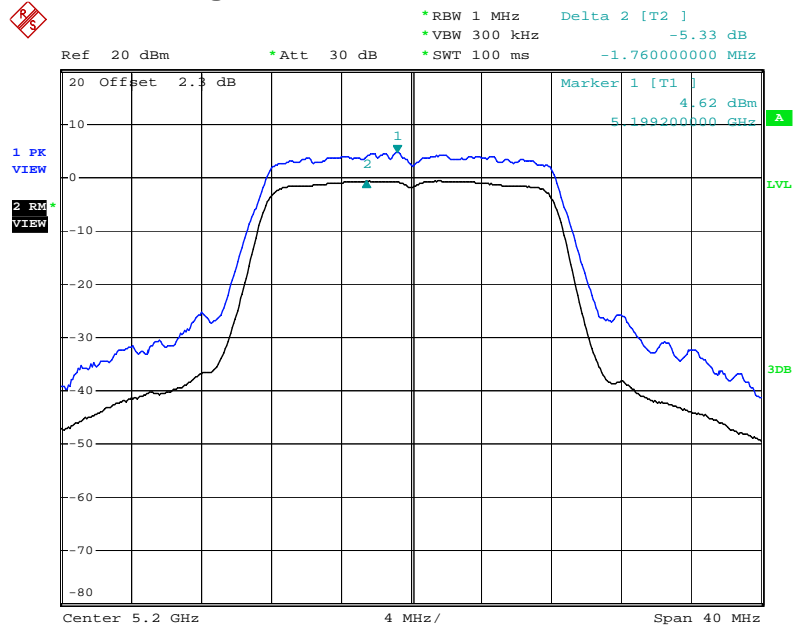
Frequency	Peak Excursion (Db)	Max. Limit (Db)	Result
5190 MHz	7.03	13	Complies
5230 MHz	7.04	13	Complies

For Single Chain:
Peak Excursion Plot on Configuration IEEE 802.11a / 5180 MHz



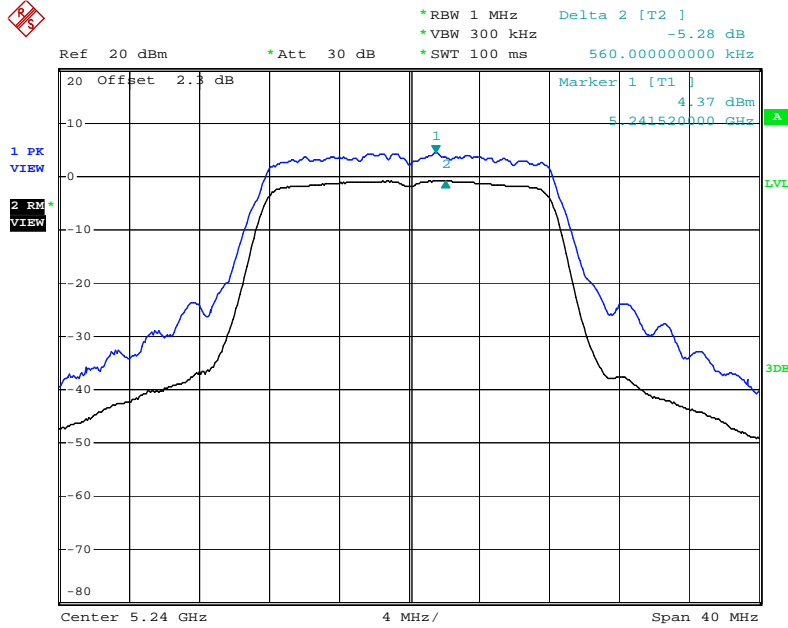
Date: 26.OCT.2011 18:26:58

Peak Excursion Plot on Configuration IEEE 802.11a / 5200 MHz



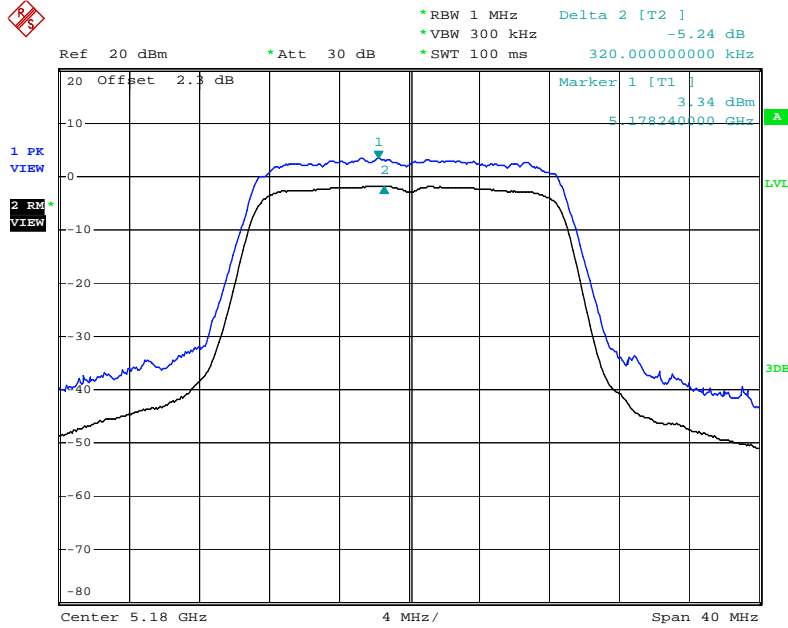
Date: 26.OCT.2011 18:30:14

Peak Excursion Plot on Configuration IEEE 802.11a / 5240 MHz



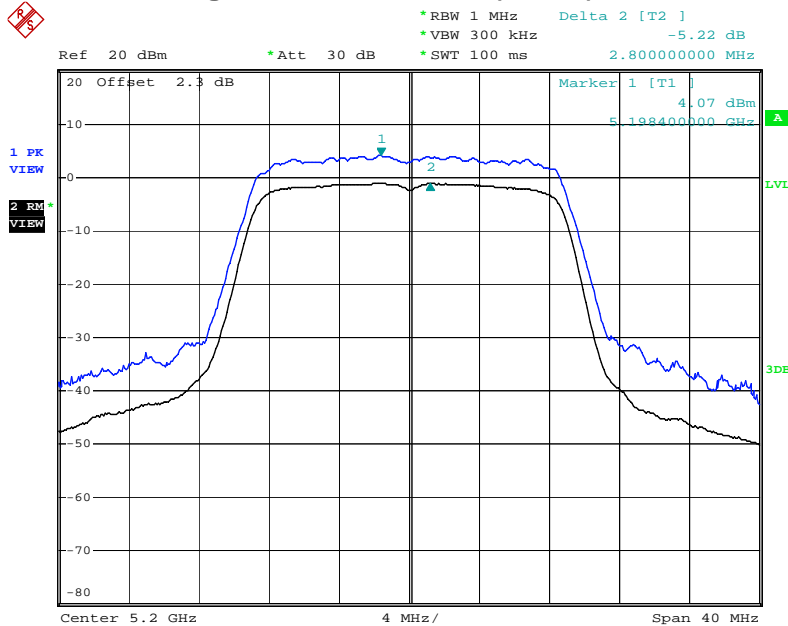
Date: 26.OCT.2011 18:32:58

For Two Chain:
Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5180 MHz



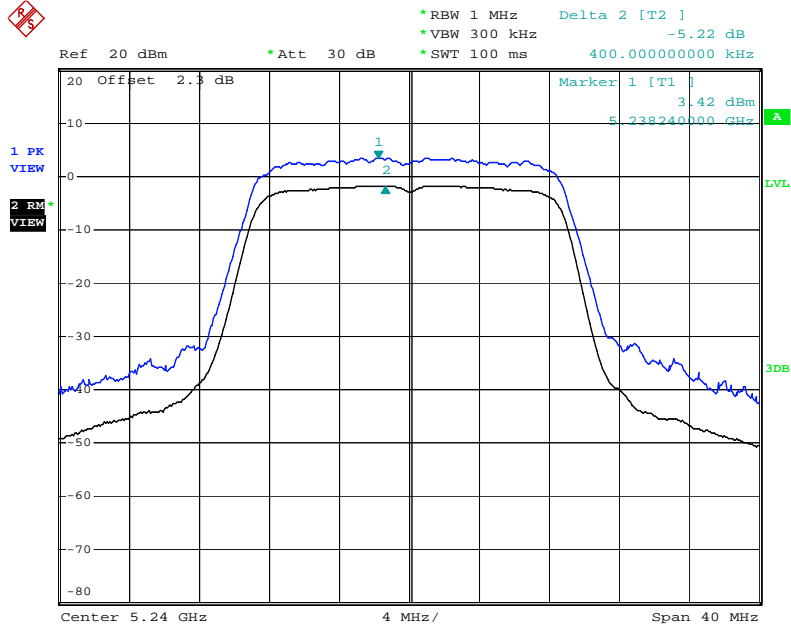
Date: 27.OCT.2011 09:07:27

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5200 MHz



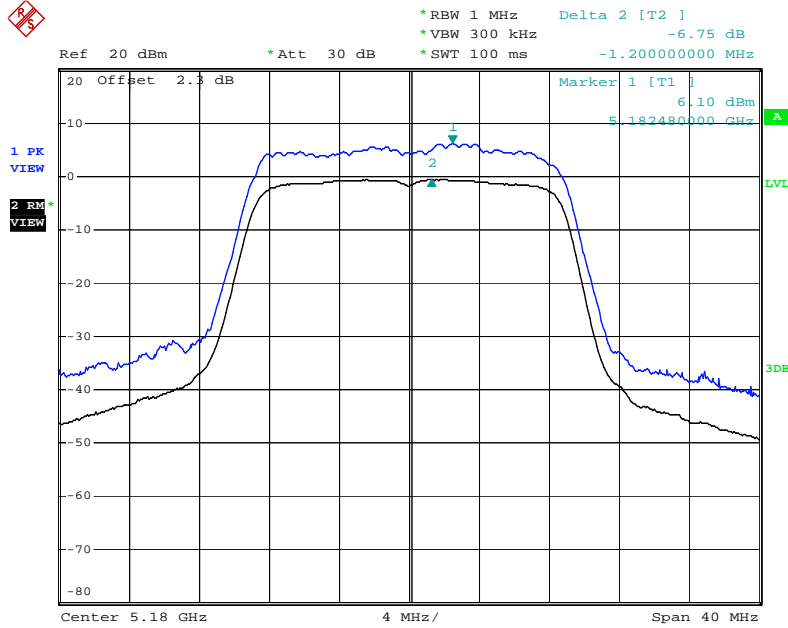
Date: 27.OCT.2011 09:11:43

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5240 MHz



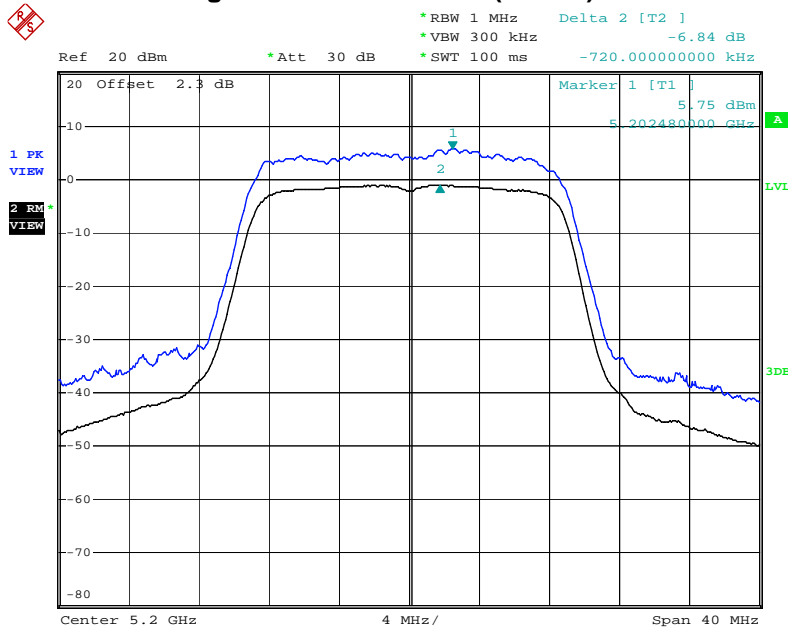
Date: 27.OCT.2011 09:15:14

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5180 MHz



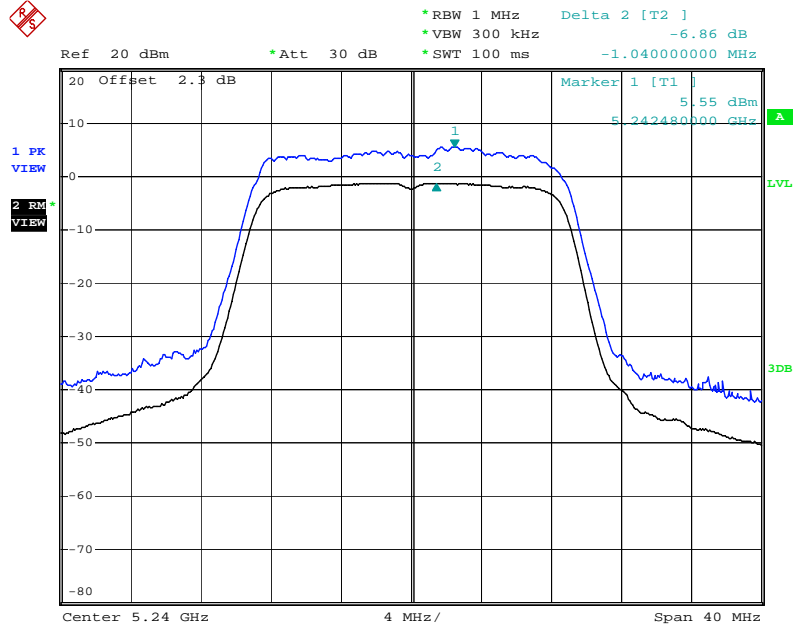
Date: 27.OCT.2011 09:24:53

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5200 MHz



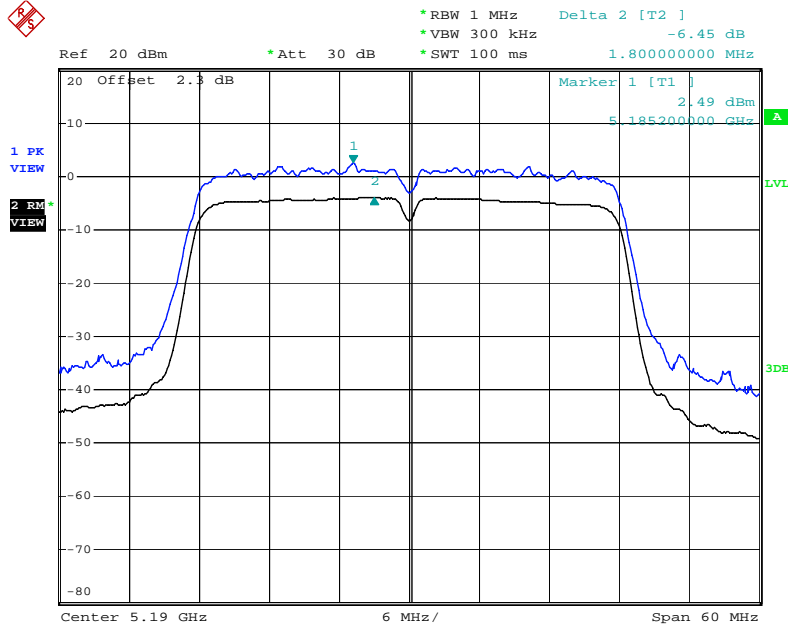
Date: 27.OCT.2011 09:28:24

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5240 MHz



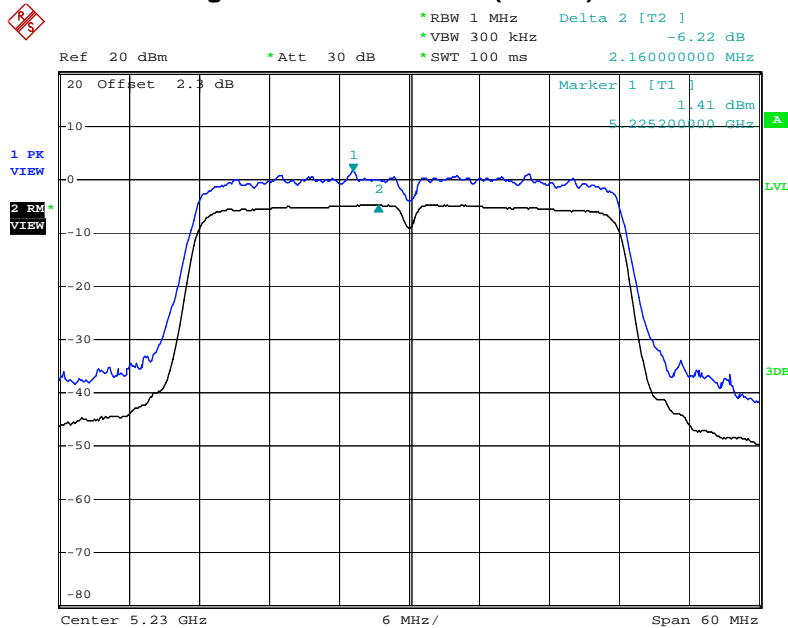
Date: 27.OCT.2011 09:31:24

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5190 MHz



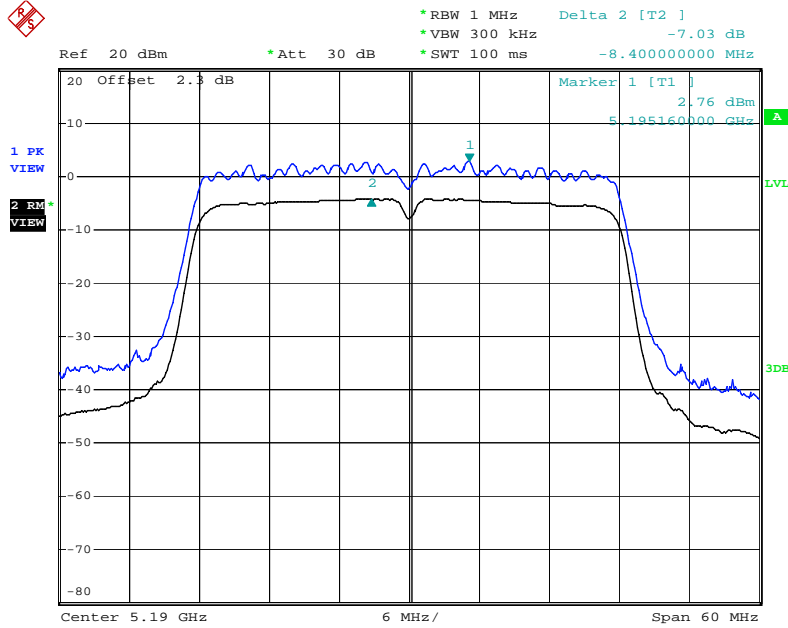
Date: 27.OCT.2011 10:52:16

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5230 MHz



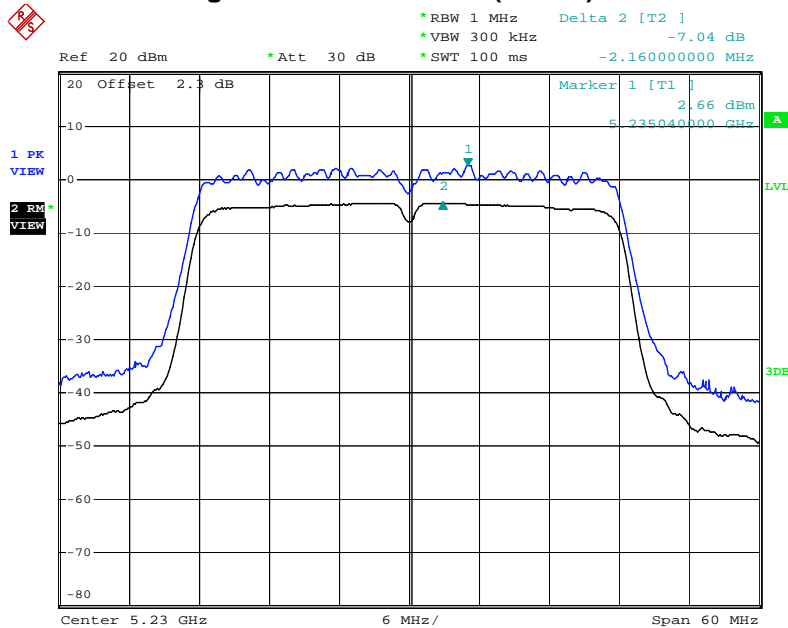
Date: 27.OCT.2011 10:54:49

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5190 MHz



Date: 27.OCT.2011 10:57:26

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5230 MHz



Date: 27.OCT.2011 10:59:46

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

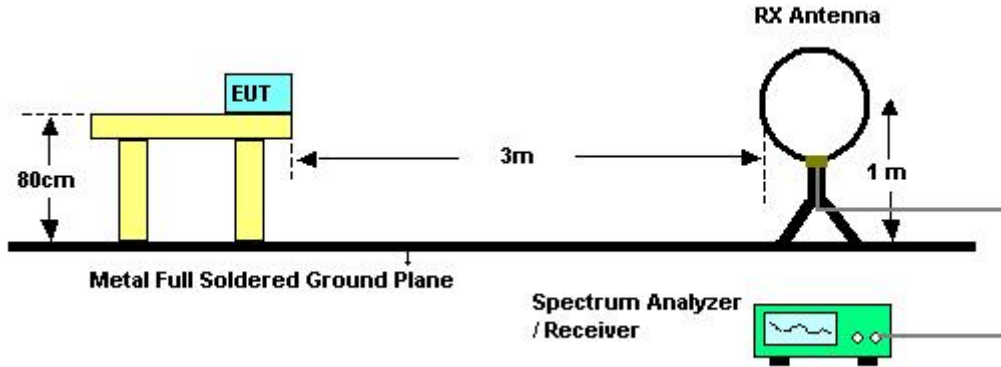
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.6.3 Test Procedures

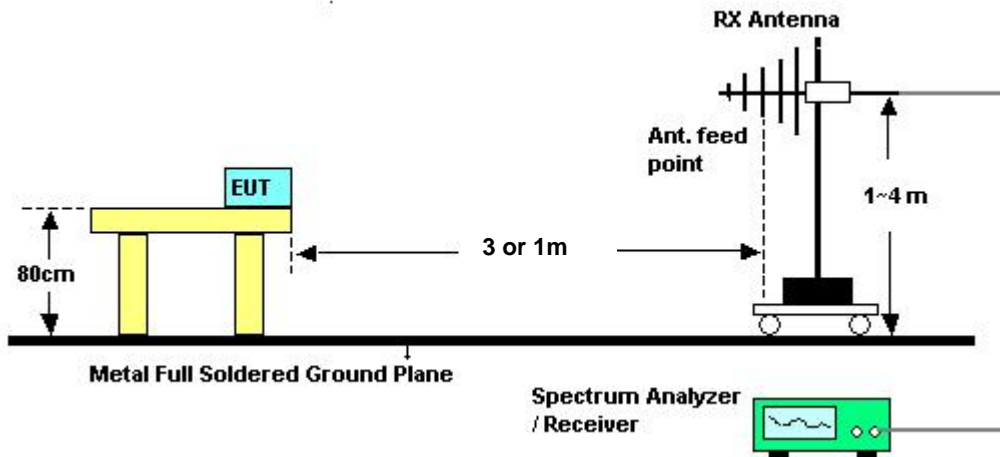
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak		

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

Note:

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

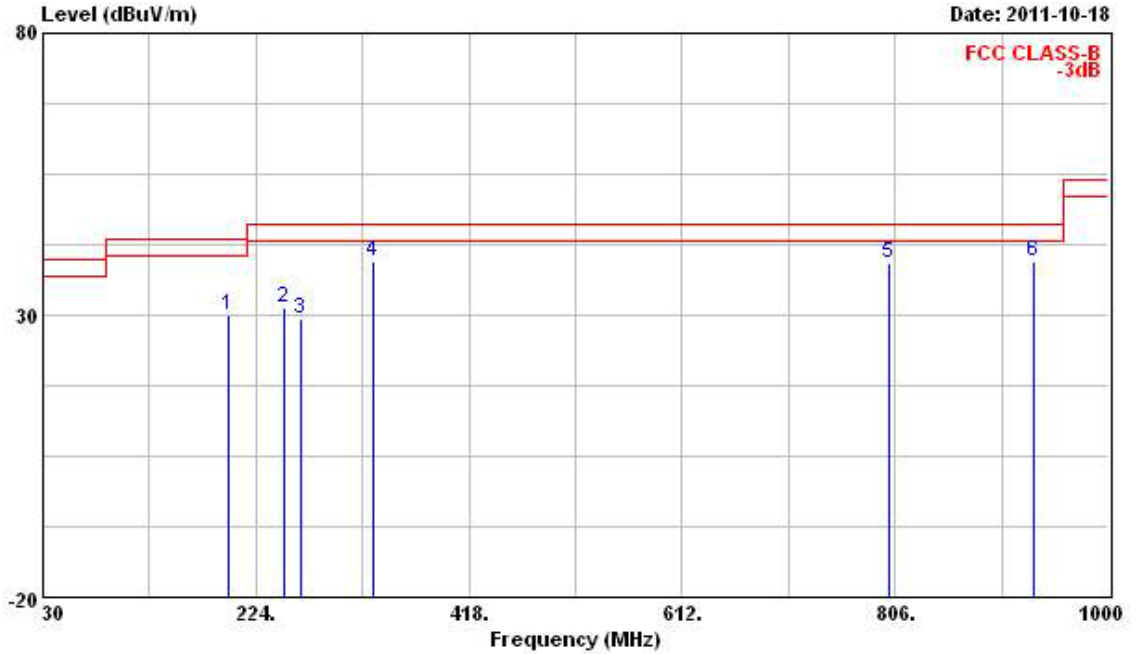
Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (Db);

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

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

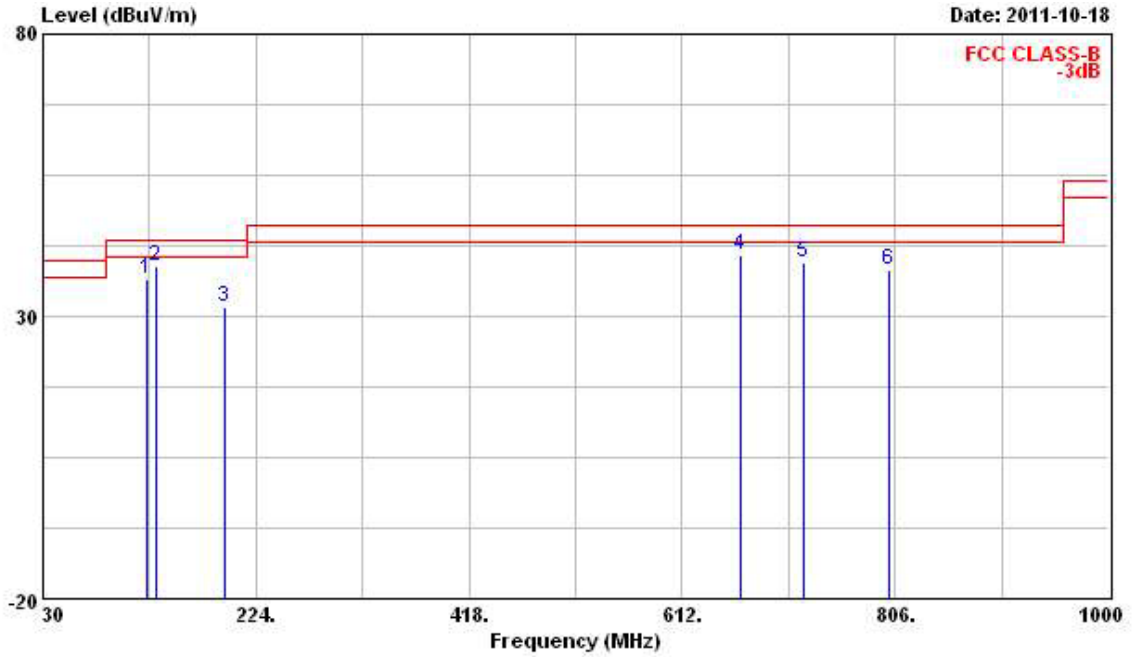
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	Normal Mode

Horizontal



	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor		Pos	Pos
			dB	dBuV/m	dBuV	dB	dB		cm	deg
1	198.780	30.06	-13.44	43.50	47.19	9.61	1.25	27.98 Peak	---	---
2	249.220	31.36	-14.64	46.00	45.19	12.58	1.59	28.00 Peak	---	---
3	265.710	29.25	-16.75	46.00	42.10	13.55	1.69	28.09 Peak	---	---
4	330.700	39.58	-6.42	46.00	51.30	14.57	2.10	28.39 Peak	---	---
5	800.180	39.13	-6.87	46.00	43.44	20.75	4.41	29.47 Peak	---	---
6	933.070	39.38	-6.62	46.00	42.20	21.23	5.19	29.24 Peak	---	---

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	125.060	36.54	-6.96	43.50	50.64	12.49	0.99	27.59	Peak	---	---
2	132.820	38.77	-4.73	43.50	53.27	12.10	1.03	27.64	Peak	---	---
3	195.870	31.68	-11.82	43.50	48.95	9.47	1.23	27.97	Peak	---	---
4	665.350	40.86	-5.14	46.00	46.90	19.73	3.70	29.47	Peak	---	---
5	722.580	39.62	-6.38	46.00	44.75	20.30	3.93	29.36	Peak	---	---
6	800.180	38.11	-7.89	46.00	42.42	20.75	4.41	29.47	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).

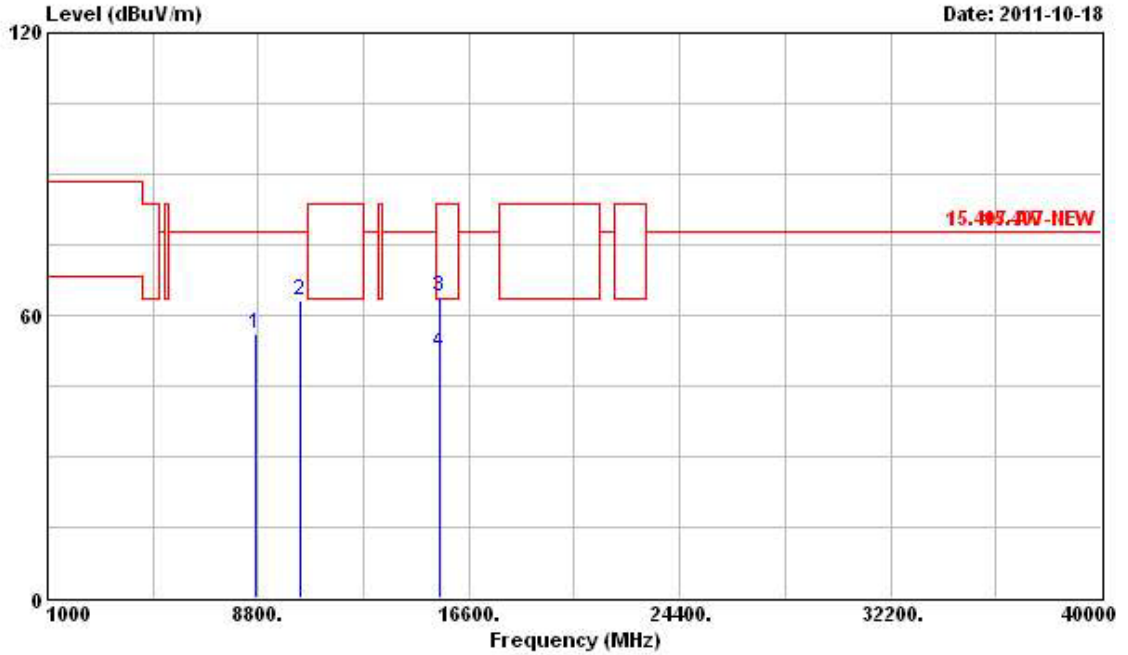
Corrected Reading: Antenna Factor + Cable Loss + Read Level – Preamp Factor = Level.

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

For Single Chain:

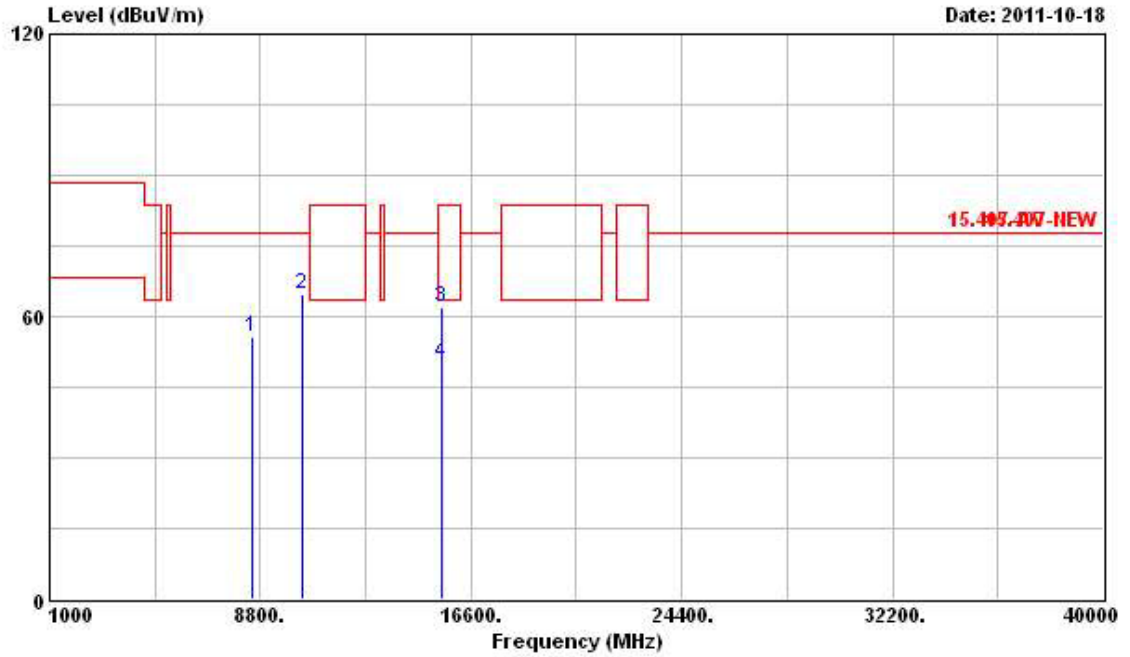
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11a Ch. 36

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	8705.000	56.03	-21.81	77.84	44.15	38.58	6.41	33.11	Peak	---	---
2	10360.000	63.31	-14.53	77.84	50.08	39.31	6.93	33.01	Peak	---	---
3	15540.000	64.10	-19.44	83.54	50.10	38.53	7.92	32.45	Peak	---	---
4	15540.000	52.23	-11.31	63.54	38.23	38.53	7.92	32.45	Average	---	---

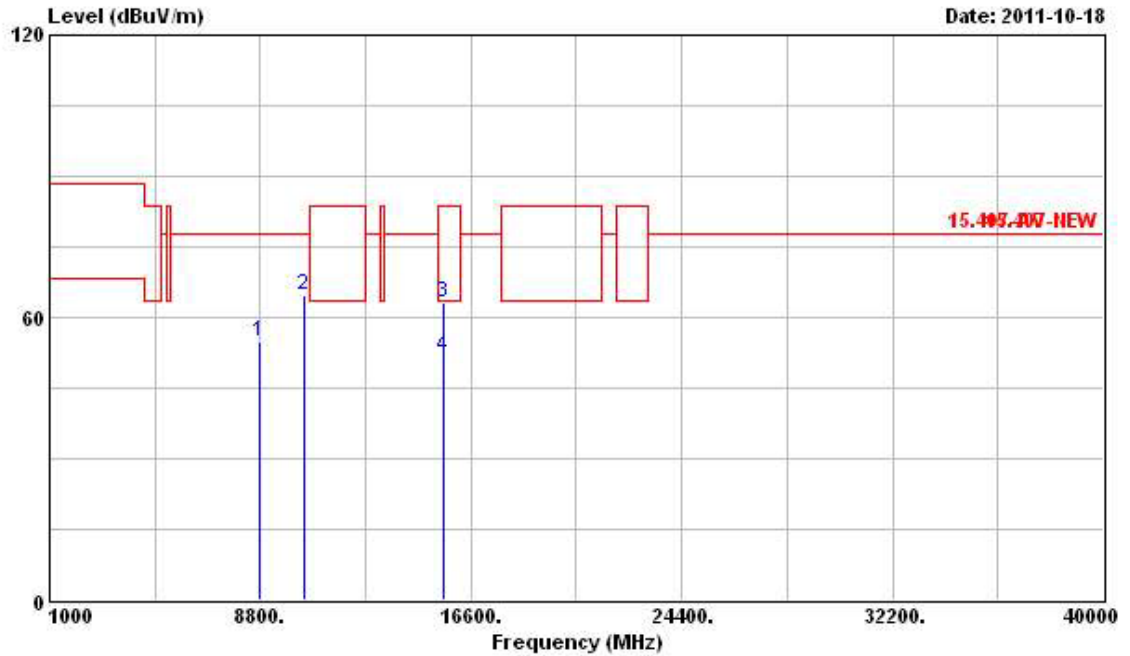
Vertical



	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	8518.000	55.58	-22.26	77.84	43.89	38.32	6.42	33.05	Peak	---	---
2	10360.000	64.59	-13.25	77.84	51.36	39.31	6.93	33.01	Peak	---	---
3	15540.000	61.97	-21.57	83.54	47.97	38.53	7.92	32.45	Peak	---	---
4	15540.000	50.09	-13.45	63.54	36.09	38.53	7.92	32.45	Average	---	---

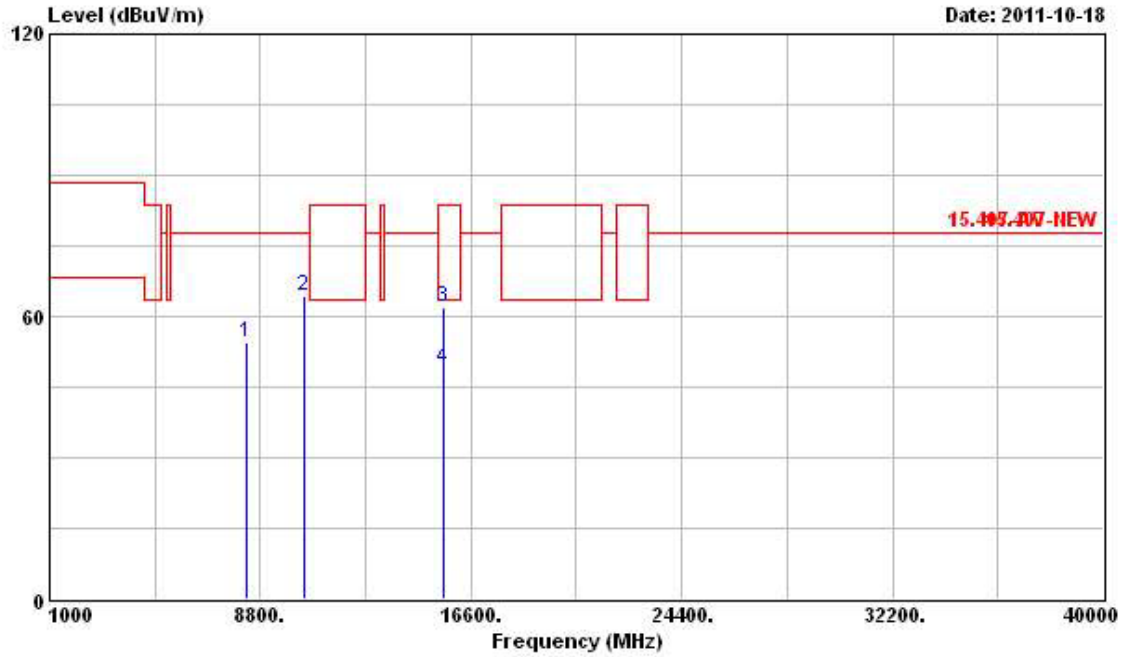
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11a Ch. 40

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	8749.000	54.73	-23.11	77.84	42.79	38.65	6.41	33.12	Peak	---	---
2	10400.000	64.55	-13.29	77.84	51.30	39.28	6.93	32.96	Peak	---	---
3	15600.000	63.06	-20.48	83.54	49.23	38.39	7.92	32.48	Peak	---	---
4	15600.000	51.55	-11.99	63.54	37.72	38.39	7.92	32.48	Average	---	---

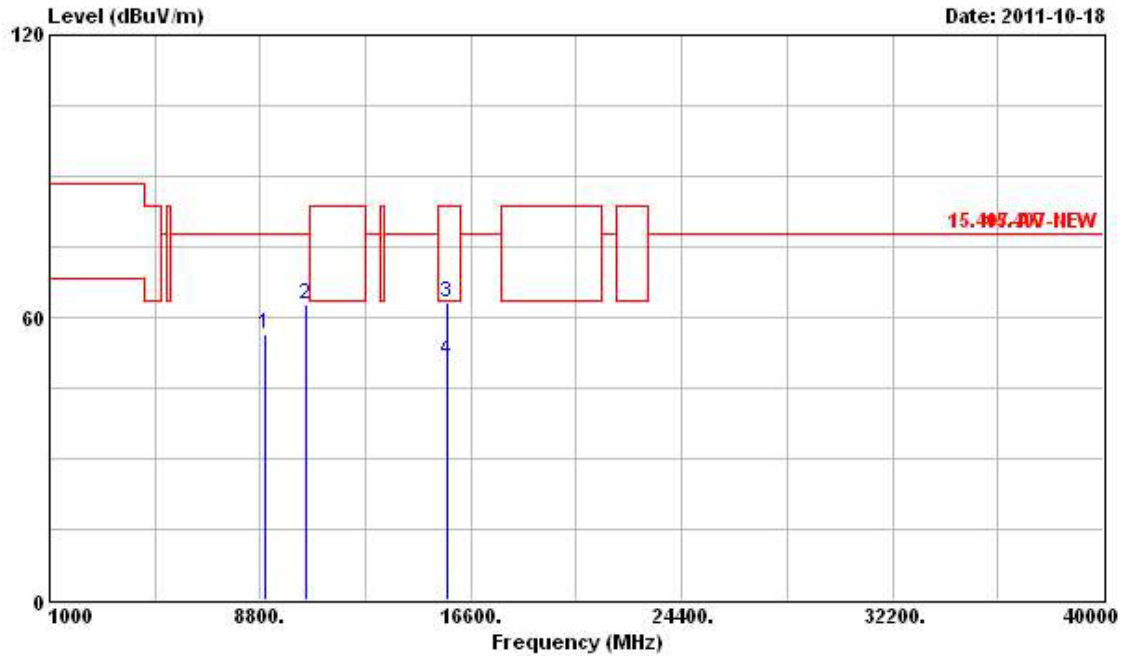
Vertical



	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	8298.000	54.58	-23.26	77.84	43.14	38.09	6.39	33.04	PK	---	---
2	10400.000	64.47	-13.37	77.84	51.22	39.28	6.93	32.96	Peak	---	---
3	15600.000	61.78	-21.76	83.54	47.95	38.39	7.92	32.48	Peak	---	---
4	15600.000	49.10	-14.44	63.54	35.27	38.39	7.92	32.48	Average	---	---

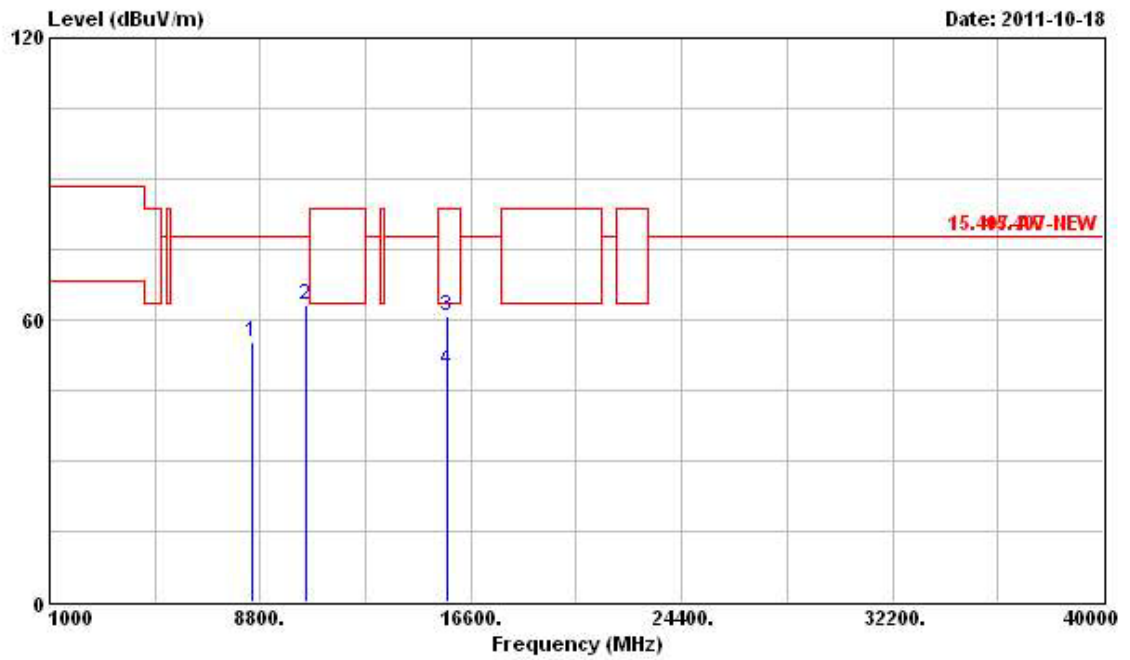
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11a Ch. 48

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	8969.000	56.25	-21.59	77.84	44.10	38.95	6.40	33.20	Peak	---	---
2	10480.000	62.75	-15.09	77.84	49.50	39.21	6.94	32.90	Peak	---	---
3	15720.000	63.24	-20.30	83.54	49.69	38.15	7.92	32.52	Peak	---	---
4	15720.000	51.08	-12.46	63.54	37.53	38.15	7.92	32.52	Average	---	---

Vertical

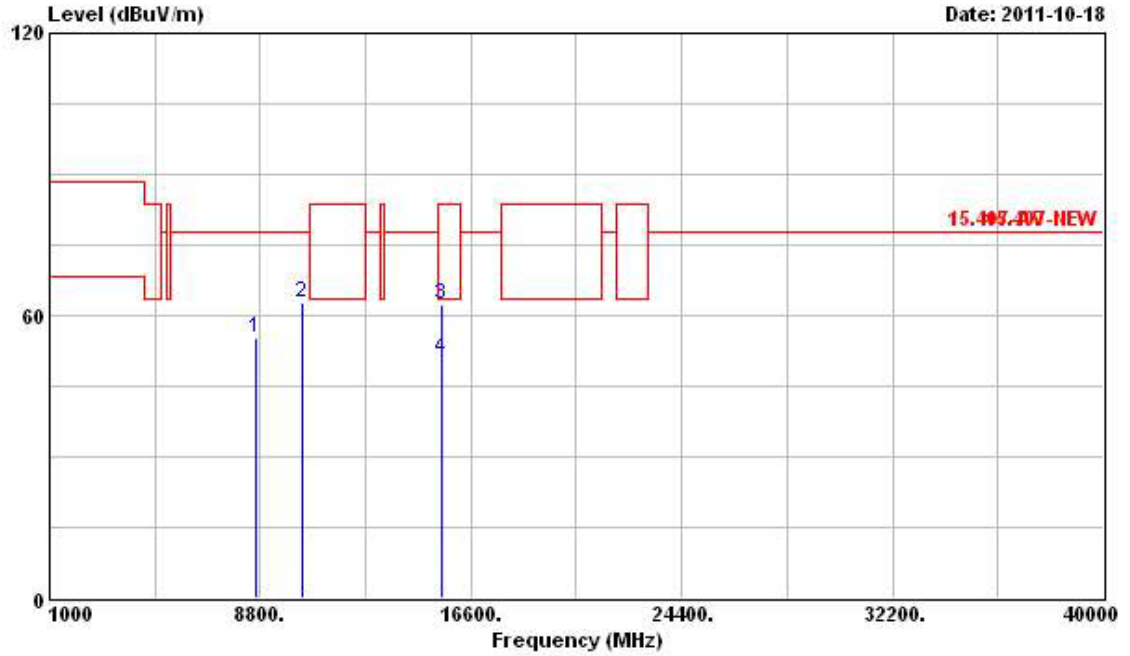


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8485.000	55.37	-22.47	77.84	43.71	38.28	6.42	33.04	PK	---	---
2	10480.000	63.14	-14.70	77.84	49.89	39.21	6.94	32.90	Peak	---	---
3	15720.000	60.60	-22.94	83.54	47.05	38.15	7.92	32.52	Peak	---	---
4	15720.000	49.23	-14.31	63.54	35.68	38.15	7.92	32.52	Average	---	---

For Two Chain:

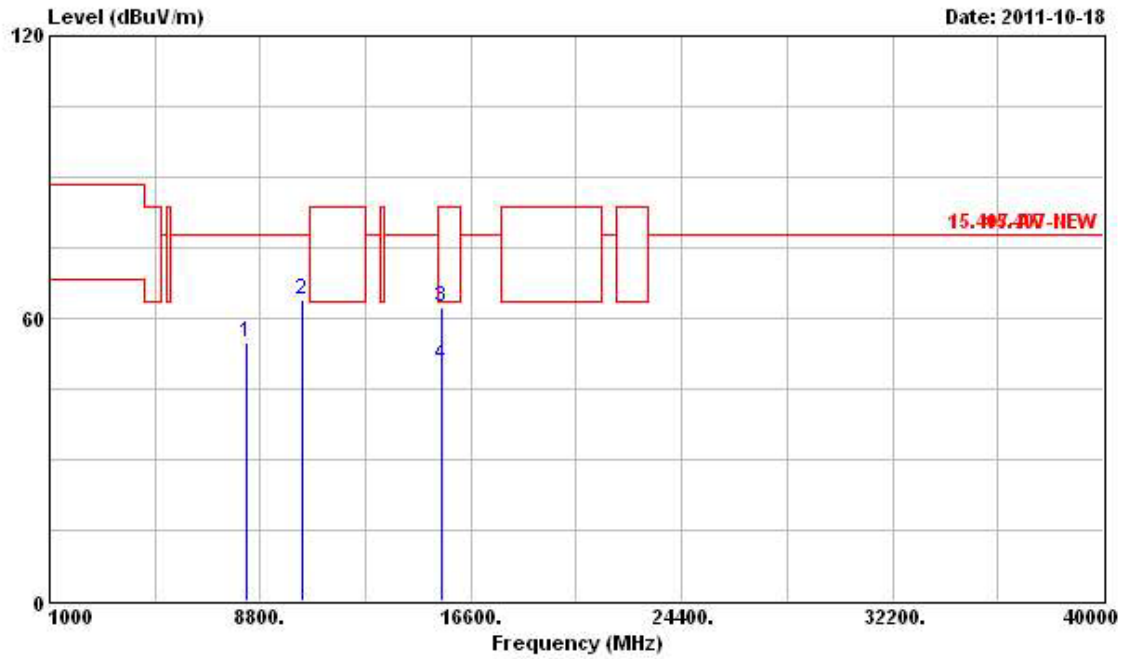
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11n Ch. 36 (20MHz)

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	8617.000	55.46	-22.38	77.84	43.66	38.46	6.42	33.08	Peak	---	---
2	10360.000	62.84	-15.00	77.84	49.61	39.31	6.93	33.01	Peak	---	---
3	15540.000	62.50	-21.04	83.54	48.50	38.53	7.92	32.45	Peak	---	---
4	15540.000	51.02	-12.52	63.54	37.02	38.53	7.92	32.45	Average	---	---

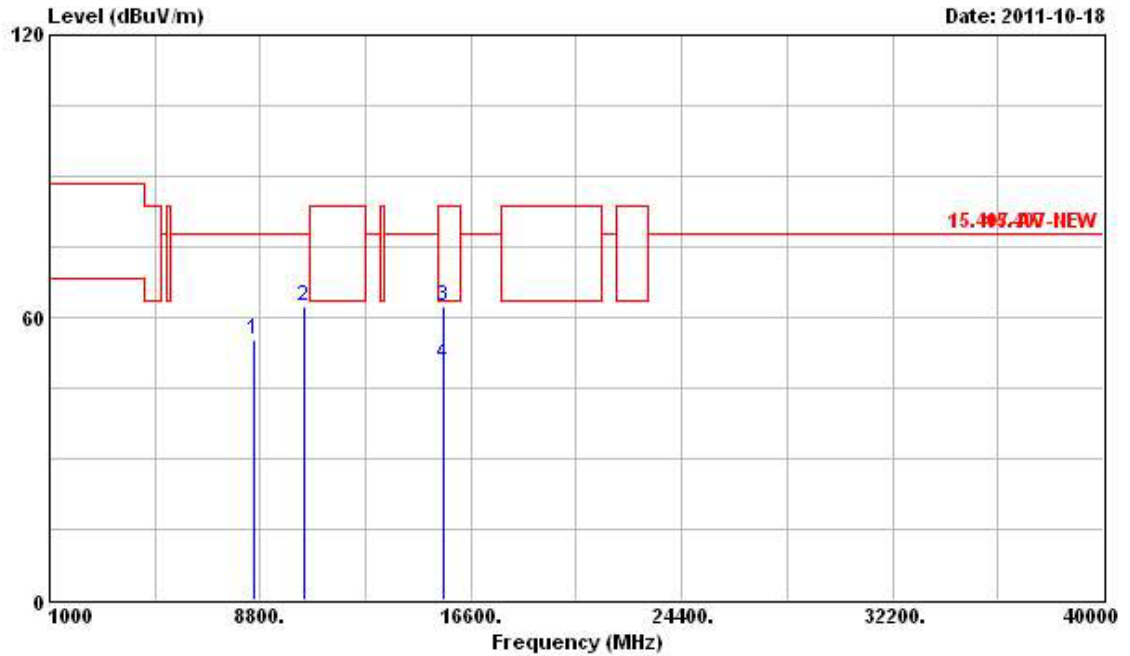
Vertical



	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	8265.000	54.97	-22.87	77.84	43.57	38.06	6.38	33.04	PK	---	---
2	10360.000	64.10	-13.74	77.84	50.87	39.31	6.93	33.01	Peak	---	---
3	15540.000	62.46	-21.08	83.54	48.46	38.53	7.92	32.45	Peak	---	---
4	15540.000	50.07	-13.47	63.54	36.07	38.53	7.92	32.45	Average	---	---

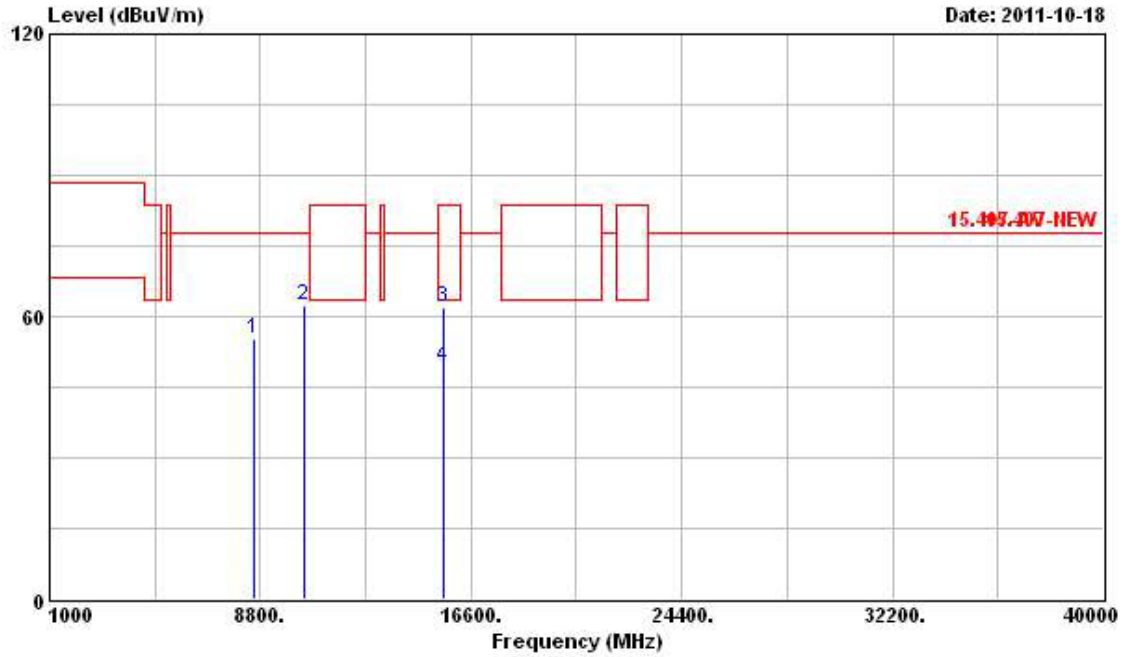
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11n Ch. 40 (20 MHz)

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	8562.000	55.27	-22.57	77.84	43.53	38.39	6.42	33.07	Peak	---	---
2	10400.000	62.39	-15.45	77.84	49.14	39.28	6.93	32.96	Peak	---	---
3	15600.000	62.49	-21.05	83.54	48.66	38.39	7.92	32.48	Peak	---	---
4	15600.000	50.17	-13.37	63.54	36.34	38.39	7.92	32.48	Average	---	---

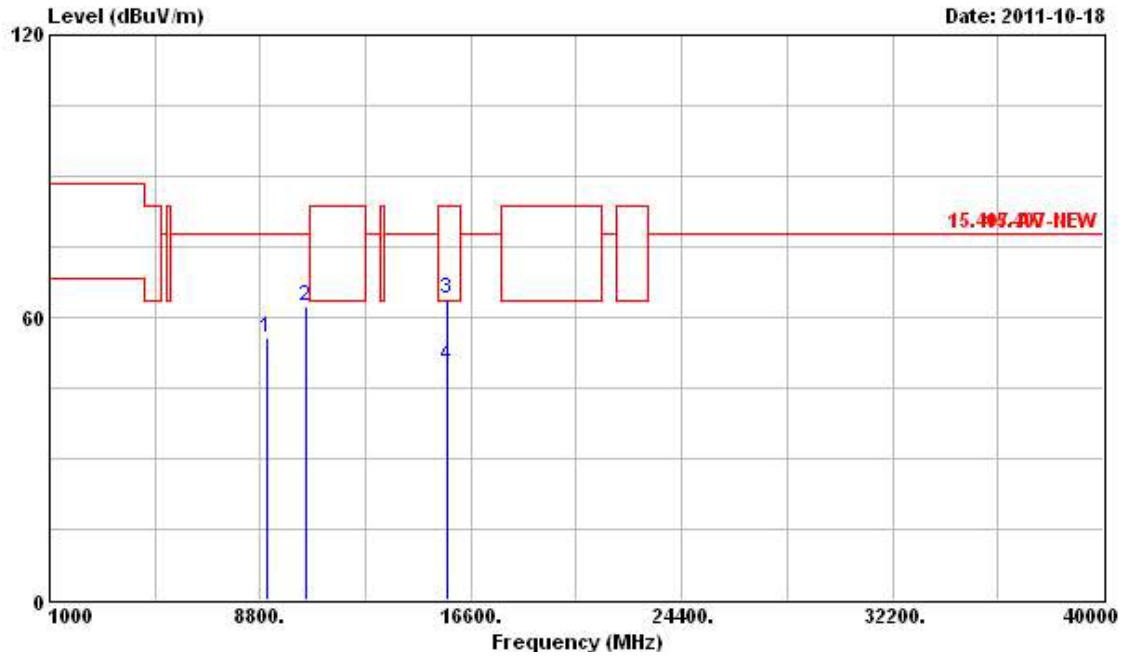
Vertical



	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	55.38	-22.46	77.84	43.64	38.39	6.42	33.07	Peak	---	---
2	10400.000	62.21	-15.63	77.84	48.96	39.28	6.93	32.96	Peak	---	---
3	15600.000	62.13	-21.41	83.54	48.30	38.39	7.92	32.48	Peak	---	---
4	15600.000	49.26	-14.28	63.54	35.43	38.39	7.92	32.48	Average	---	---

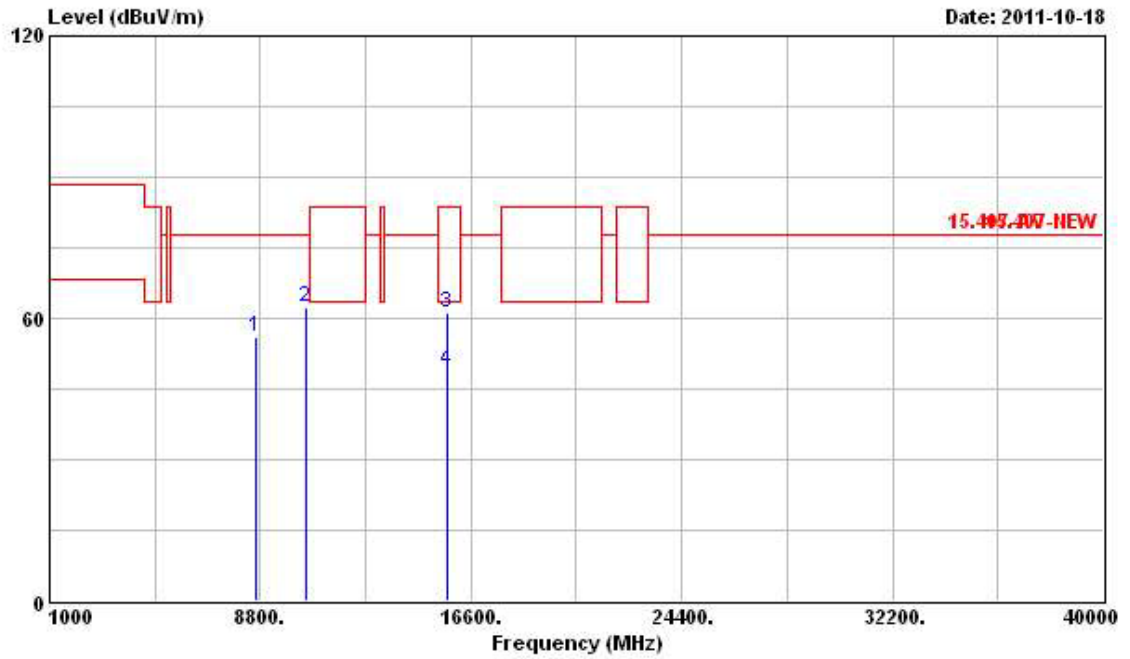
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11n Ch. 48 (20 MHz)

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	9046.000	55.57	-22.27	77.84	43.44	38.93	6.42	33.22	PK	---	---
2	10480.000	62.21	-15.63	77.84	48.96	39.21	6.94	32.90	Peak	---	---
3	15720.000	63.84	-19.70	83.54	50.29	38.15	7.92	32.52	Peak	---	---
4	15720.000	49.69	-13.85	63.54	36.14	38.15	7.92	32.52	Average	---	---

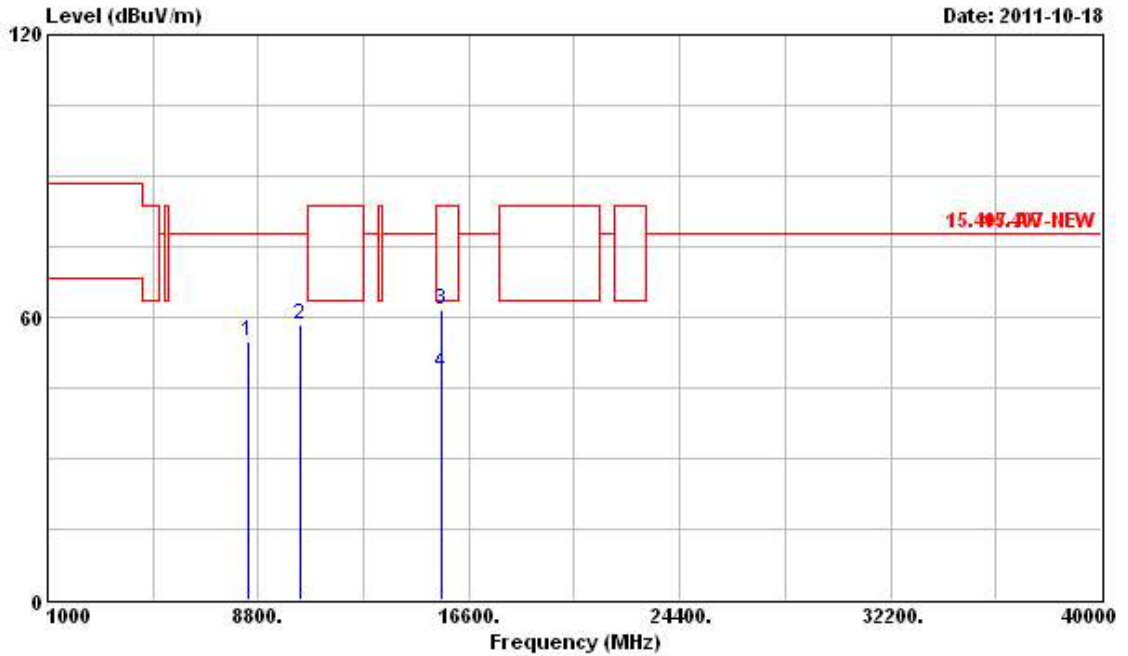
Vertical



	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	8661.000	55.86	-21.98	77.84	44.00	38.53	6.42	33.09	Peak	---	---
2	10480.000	62.33	-15.51	77.84	49.08	39.21	6.94	32.90	Peak	---	---
3	15720.000	61.02	-22.52	83.54	47.47	38.15	7.92	32.52	Peak	---	---
4	15720.000	49.09	-14.45	63.54	35.54	38.15	7.92	32.52	Average	---	---

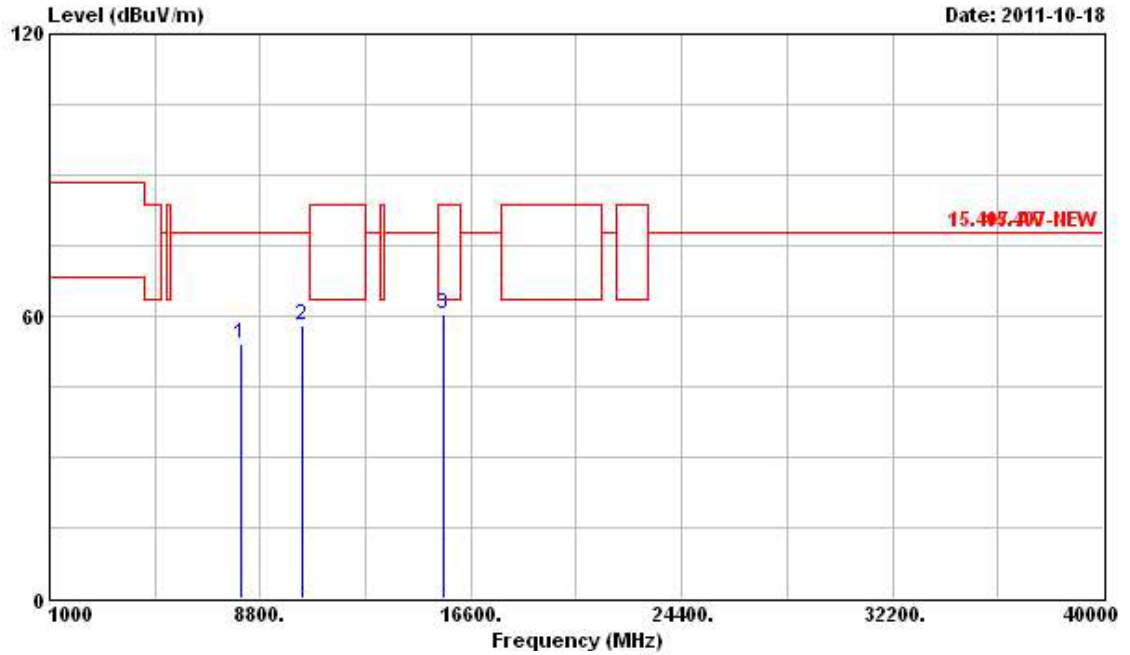
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11n Ch. 38 (40MHz)

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	8397.000	54.81	-23.03	77.84	43.24	38.20	6.41	33.04	PK	---	---
2	10380.000	58.38	-19.46	77.84	45.15	39.29	6.93	32.99	Peak	---	---
3	15570.000	61.62	-21.92	83.54	47.70	38.46	7.92	32.46	Peak	---	---
4	15570.000	48.08	-15.46	63.54	34.16	38.46	7.92	32.46	Average	---	---

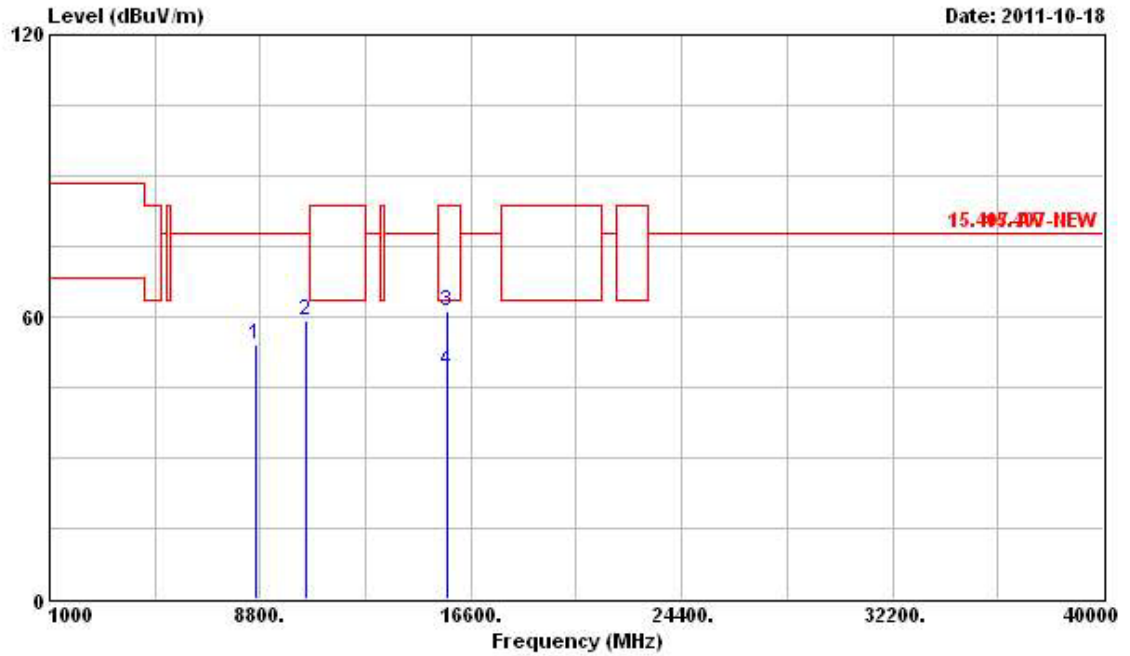
Vertical



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	8078.000	54.02	-23.82	77.84	42.84	37.87	6.35	33.04 PK	---	---
2	10380.000	58.20	-39.64	97.84	44.97	39.29	6.93	32.99 Peak	---	---
3	15570.000	60.49	-3.05	63.54	46.57	38.46	7.92	32.46 PK	---	---

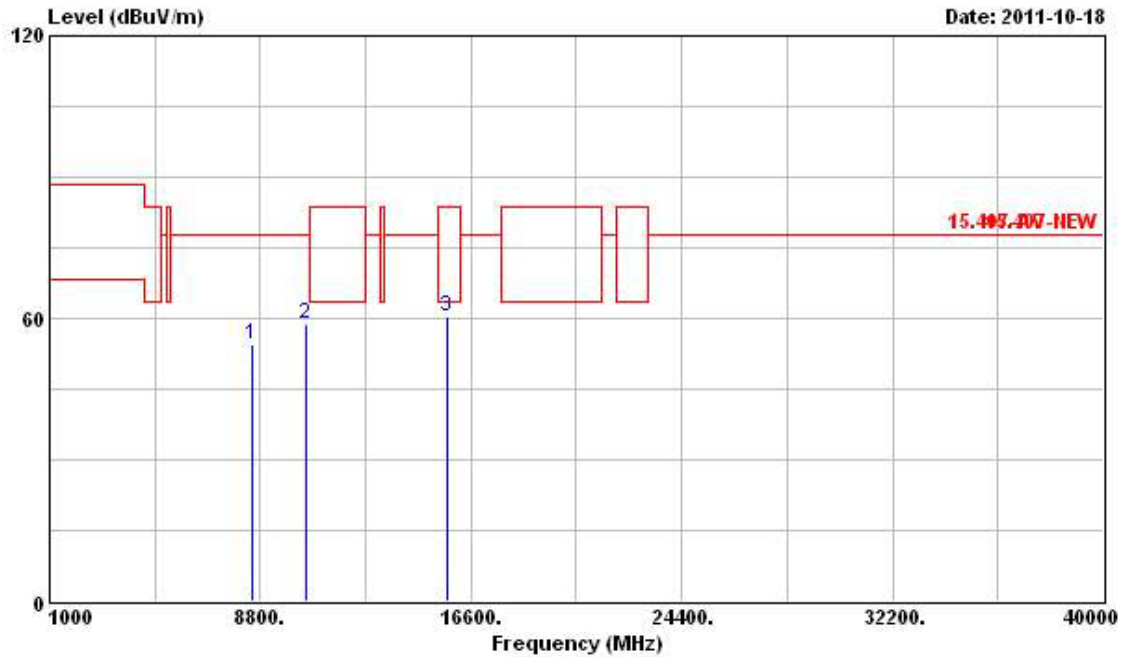
Final Test Date	Oct. 18, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11n Ch. 46 (40MHz)

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	8606.000	54.26	-23.58	77.84	42.47	38.44	6.42	33.07 Peak	---	---
2	10460.000	59.22	-18.62	77.84	45.96	39.24	6.94	32.92 Peak	---	---
3	15690.000	61.16	-22.38	83.54	47.53	38.22	7.92	32.51 Peak	---	---
4	15690.000	48.44	-15.10	63.54	34.81	38.22	7.92	32.51 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	8485.000	54.39	-23.45	77.84	42.73	38.28	6.42	33.04	PK	---	---
2	10460.000	58.95	-18.89	77.84	45.69	39.24	6.94	32.92	Peak	---	---
3	@15690.000	60.40	-3.14	63.54	46.77	38.22	7.92	32.51	PK	---	---

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

3.7.2 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	Oct. 17, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	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 @	5127.400	61.97	-1.57	63.54	21.80	34.78	5.39	0.00	Average	---	---
2 @	5181.000	111.61			71.41	34.81	5.39	0.00	Average	---	---
1 @	5149.000	79.41	-4.13	83.54	39.23	34.79	5.39	0.00	Peak	---	---
2 @	5181.800	122.36			82.16	34.81	5.39	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 @	5147.400	62.50	-1.04	63.54	22.32	34.79	5.39	0.00	Average	---	---
2 @	5197.800	111.44			71.24	34.82	5.38	0.00	Average	---	---
3	5352.900	58.29	-5.25	63.54	18.01	34.91	5.37	0.00	Average	---	---
1	5146.500	74.46	-9.08	83.54	34.28	34.79	5.39	0.00	Peak	---	---
2 @	5199.000	121.72			81.52	34.82	5.38	0.00	Peak	---	---
3	5362.500	72.30	-11.24	83.54	32.01	34.92	5.37	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	5111.700	57.78	-5.76	63.54	17.62	34.77	5.39	0.00	Average	---	---
2 @	5238.600	111.29			71.07	34.84	5.38	0.00	Average	---	---
3	5397.300	58.26	-5.28	63.54	17.96	34.94	5.36	0.00	Average	---	---
1	5103.000	71.56	-11.98	83.54	31.41	34.76	5.39	0.00	Peak	---	---
2 @	5238.600	121.79			81.57	34.84	5.38	0.00	Peak	---	---
3	5398.500	71.87	-11.67	83.54	31.57	34.94	5.36	0.00	Peak	---	---

The item 2 is fundamental emissions.

For Two Chain:

Final Test Date	Oct. 17, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	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 @ 5128.200	62.50	-1.04	63.54	22.33	34.78	5.39	0.00	Average	---	---
2 @ 5178.700	112.35			72.15	34.81	5.39	0.00	Average	---	---
1 5127.500	76.03	-7.51	83.54	35.86	34.78	5.39	0.00	Peak	---	---
2 @ 5182.200	124.25			84.05	34.81	5.39	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	62.32	-1.22	63.54	22.14	34.79	5.39	0.00	Average	---	---
2 @ 5196.600	110.30			70.10	34.82	5.38	0.00	Average	---	---
3 5352.600	58.58	-4.96	63.54	18.30	34.91	5.37	0.00	Average	---	---
1 5147.700	74.38	-9.16	83.54	34.20	34.79	5.39	0.00	Peak	---	---
2 @ 5196.900	122.48			82.28	34.82	5.38	0.00	Peak	---	---
3 5351.400	71.78	-11.76	83.54	31.50	34.91	5.37	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 5111.400	58.71	-4.83	63.54	18.55	34.77	5.39	0.00	Average	---	---
2 @ 5238.600	112.31			72.09	34.84	5.38	0.00	Average	---	---
3 @ 5392.500	58.86	-4.68	63.54	18.57	34.93	5.36	0.00	Average	---	---
1 5107.800	72.42	-11.12	83.54	32.26	34.77	5.39	0.00	Peak	---	---
2 @ 5237.400	124.05			83.83	34.84	5.38	0.00	Peak	---	---
3 5397.300	72.22	-11.32	83.54	31.92	34.94	5.36	0.00	Peak	---	---

The item 2 is fundamental emissions.

Final Test Date	Oct. 17, 2011	Test Site No.	03CH03-HY
Temperature	24°C	Humidity	53%
Test Engineer	Streak	Configuration	802.11n (40MHz) Ch. 38, 46

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 @	5150.000	62.07	-1.47	63.54	21.89	34.79	5.39	0.00	Average	---	---
2 @	5192.200	105.94			65.73	34.82	5.39	0.00	Average	---	---
1	5146.300	77.12	-6.42	83.54	36.94	34.79	5.39	0.00	Peak	---	---
2 @	5195.000	117.43			77.23	34.82	5.38	0.00	Peak	---	---

The 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 @	5125.750	62.32	-1.22	63.54	22.15	34.78	5.39	0.00	Average	---	---
2 @	5225.750	111.37			71.15	34.84	5.38	0.00	Average	---	---
3 @	5364.750	59.05	-4.49	63.54	18.76	34.92	5.37	0.00	Average	---	---
1	5126.750	74.77	-8.77	83.54	34.60	34.78	5.39	0.00	Peak	---	---
2 @	5225.750	122.30			82.08	34.84	5.38	0.00	Peak	---	---
3	5356.500	72.50	-11.04	83.54	32.22	34.91	5.37	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 ±20ppm (IEEE 802.11a specification).

3.8.2 Measuring Instruments and Setting

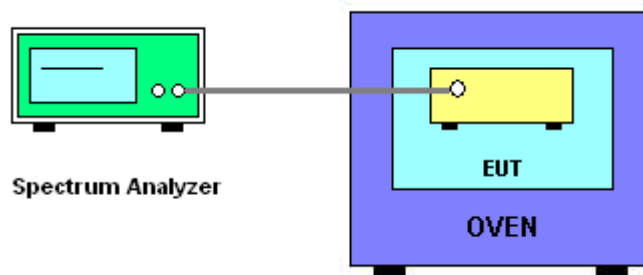
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. 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 ±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.
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)	5200 MHz
126.5	5199.996400
110	5199.986800
93.5	5199.981400
Max. Deviation (MHz)	0.018600
Max. Deviation (ppm)	3.58

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	5200 MHz
-30	5199.987400
-20	5199.988600
-10	5199.996400
0	5199.995800
10	5199.995200
20	5199.986800
30	5199.981400
40	5199.980800
50	5199.985200
Max. Deviation (MHz)	0.019200
Max. Deviation (ppm)	3.69

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 2.4 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	Apr. 20, 2011	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz – 30MHz	Jan. 17, 2011	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9 kHz ~ 30 MHz	May 04, 2011	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	CB049	9 kHz ~ 30 MHz	Apr. 21, 2011	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP 30	100023	9KHz ~ 30GHz	Mar. 15, 2011	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Apr. 15, 2011	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Oct. 21, 2011	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 02, 2010	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 02, 2010	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 29, 2011	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	0917017	300MHz~40GHz	Jan. 06, 2011	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	0949003	300MHz~40GHz	Jan. 06, 2011	Conducted (TH01-HY)

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

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

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz ~ 2 GHz	Jan. 25, 2011	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz ~ 26.5 GHz	Aug. 08, 2011	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100004	9 kHz ~ 40 GHz	Nov. 17, 2010	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz ~ 1 GHz	Oct. 15, 2011	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1 GHz ~ 18 GHz	May 30, 2011	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz ~ 40 GHz	Jan.13, 2011	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz ~ 1 GHz	Jan. 18, 2011	Radiation (03CH03-HY)
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz ~ 40 GHz	Jan. 18, 2011	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz ~ 2 GHz	Jan. 25, 2011	Radiation (03CH03-HY)

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

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

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

5 TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 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. : L1190-110111

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

Certificate of Accreditation

This is to certify that

Sporton International Inc.

EMC & Wireless Communications Laboratory

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

is accredited in respect of laboratory

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

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

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