FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart E § 15.407

Equipment	:	**SX-DS-3000WAN**
Brand Name	:	**Silex**
Model No.	:	**SX-DS-3000WAN**
Filing Type	:	**New Application**
Applicant	:	**Silex technology, Inc.** 2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto, Japan
Manufacturer	:	**EDIMAX Technology Co.,Ltd.** No.3, Wu-Chuan 3rd Road, Wu-Gu, New Taipei City 248,Taiwan
FCC ID	:	**N6C-SXDS3000WAN**
Received Date	:	Sep. 09, 2011
Final Test Date	:	Nov. 09, 2011

Statement

Test result included is only for the Chip antennas 802.11a/n (5150~5250MHz; 5250~5350MHz) of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart E**.

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

Testing Laboratory
1190

SPORTON International Inc.

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: Nov. 14, 2011
Report No.: FR192614AN
■ 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	:	SX-DS-3000WAN
Brand Name	:	Silex
Model No.	:	SX-DS-3000WAN
Applicant	:	Silex technology, Inc. 2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto, Japan

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Sep. 09, 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.

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	8.14 dB
3.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
3.3	15.407(a)	Maximum Conducted Output Power	Complies	1.19 dB
3.4	15.407(a)	Power Spectral Density	Complies	0.40 dB
3.5	15.407(a)	Peak Excursion	Complies	6.03 dB
3.6	15.407(b)	Radiated Emissions	Complies	1.01 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	$\pm 8.5\times10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

2 GENERAL INFORMATION

2.1 Product Details

Only the radio detail of IEEE 802.11a/n 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
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Frequency Range	5150~5250MHz; 5250~5350MHz
Channel Band Width (99%)	802.11a: 16.60 MHz 802.11n MCS 8 (20MHz) : 17.40 MHz ; MCS 8 (40MHz) : 35.80 MHz
Conducted Output Power	802.11a: 12.84 dBm 802.11n MCS 8 (20MHz) : 15.81 dBm ; MCS 8 (40MHz) : 15.47 dBm

2.2 Accessories

Power	Brand	Model	Rating
AC/DC Adapter	UNIFIVE	US115-05	INPUT : AC 100-120V 50/60Hz 0.4A OUTPUT : DC 5V 2.5A

2.3 Table for Filed Antenna

Antenna Category Information (2.4GHz/5GHz Band)	
☐	Equipment placed on the market without antennas
☒	Integral antenna (antenna permanently attached)
☒	Temporary RF connector provided
☐	No temporary RF connector provided
☐	External antenna (dedicated antennas)
☐	Single power level with corresponding antenna(s)
☐	Multiple power settings and corresponding antenna(s)
☐	Professional Install
☐	Unique antenna connector
☐	BIOS lock.

Antenna General Information (2.4GHz/5GHz Band)						
Ant. No.	Category	Type	Brand	Model	Gain (dBi)	
					2.4GHz	5GHz
2	Internal	Chip	PSA	RFANT3216120ADT	2.12	-
				RFECA3216060KDT	-	4
	Internal	Chip		RFANT3216120ADT	2.12	-
				RFECA3216060KDT	-	4

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

Transmitter Outputs & Receiver Inputs Information				
Modulation	**Transmitter Outputs**	**Receiver Inputs**	**Transmitter Output Signals**	**Co-location**
802.11a	1	1	Correlated	No
802.11n HT20	2 (SM)	2	Uncorrelated	No
802.11n HT40	2 (SM)	2	Uncorrelated	No

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

Antenna Directional Gain (5GHz Band)					
Port No.	**Modulaton**	**Transmitter Outputs Signals Correlated**	**Transmitter Outputs (N)**	**Antenna Gain Combination (dBi)**	**Directional Gain (dBi)**
1	802.11a	Correlated	1	4	4
1+2	802.11n HT20	Uncorrelated	2	4, 4	4
1+2	802.11n HT40	Uncorrelated	2	4, 4	4

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

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

IEEE 802.11n Modulation Scheme

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

2.4 Table for Carrier Frequencies

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	-	-

Frequency Band	Channel No.	Frequency (20MHz)	Channel No.	Frequency (40MHz)
5250~5350 MHz Band 2	52	5260 MHz	54	5270 MHz
	56	5280 MHz	62	5310 MHz
	60	5300 MHz	-	-
	64	5320 MHz	-	-

2.5 Table for Test Modes

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

Test Items	Mode	Data Rate	Channel	Port No.
AC Power Conducted Emission Radiated Emission Below 1GHz	Normal Mode	Auto	-	-
26dB Spectrum Bandwidth 99% Occupied Bandwidth	11a Band 1~2/BPSK	6Mbps	36/40/48/52/56/64	1
	11n Band 1~2/BPSK MCS 8 (20MHz)	13Mbps	36/40/48/52/56/64	1/2
	11n Band 1~2/BPSK MCS 8 (40MHz)	27Mbps	38/46/54/62	
Max. Conducted Output Power Power Spectral Density Peak Excursion	11a Band 1~2/BPSK	6Mbps	36/40/48/52/56/64	1
	11n Band 1~2/BPSK MCS 8 (20MHz)	13Mbps	36/40/48/52/56/64	1/2; 1+2
	11n Band 1~2/BPSK MCS 8 (40MHz)	27Mbps	38/46/54/62	
Radiated Emission Above 1GHz	11a Band 1~2/BPSK	6Mbps	36/40/48/52/56/64	1
	11n Band 1~2/BPSK MCS 8 (20MHz)	13Mbps	36/40/48/52/56/64	1+2
	11n Band 1~2/BPSK MCS 8 (40MHz)	27Mbps	38/46/54/62	
Band Edge Emission	11a Band 1~2/BPSK	6Mbps	36/40/48/52/56/64	1
	11n Band 1~2/BPSK MCS 8 (20MHz)	13Mbps	36/40/48/52/56/64	1+2
	11n Band 1~2/BPSK MCS 8 (40MHz)	27Mbps	38/46/54/62	

2.6 Table for Testing Locations

Test Site No.	Site Category	Location
CO01-HY	Conduction	Hwa Ya
TH01-HY	OVEN Room	Hwa Ya
03CH02-HY	SAC	Hwa Ya

Semi Anechoic Chamber (SAC).

2.7 Table for Supporting Units

Support Unit	Brand	Model	FCC ID	Remark
Notebook	DELL	E5500	N/A	Conducted Emission
Modem	ACEEX	DM1414	IFAXDM1414	
iPod nano *2	Apple	A1199	N/A	
(USB) Mouse	Microsoft	1004	DoC	
Notebook (Remote workstation)	DELL	PP32LB	DoC	
Notebook	DELL	DNS-G120	N/A	Radiated Emission
Modem	ACEEX	DM1414	IFAXDM1414	
(USB) Mouse	Microsoft	1004	DoC	
iPod nano *2	Apple	1320	N/A	

2.8 Table for Parameters of Test Software Setting

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

For Single Chain:
Power Parameters of IEEE 802.11a

Test Software Version	Ralink RT3883 QA		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11a	7	6	6
Frequency	5260 MHz	5280 MHz	5320 MHz
IEEE 802.11a	5	5	4

For Two Chains:
Power Parameters of IEEE 802.11n (20MHz)

Test Software Version	Ralink RT3883 QA		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11n	9/12	8/12	8/12
Frequency	5260 MHz	5280 MHz	5320 MHz
IEEE 802.11n	7/11	7/11	7/11

Power Parameters of IEEE 802.11n (40MHz)

Test Software Version	Ralink RT3883 QA			
Frequency	5190 MHz	5230 MHz	5270 MHz	5310 MHz
IEEE 802.11n	6/0F	5/0F	4/0F	4/0F

2.9 EUT Operation during Test

For Conducted Emissions :

An executive program, “EMITEST.EXE” under WIN XP, which generates a complete line of continuously repeating “H“ pattern was used as the test software.
The program was executed as follows :

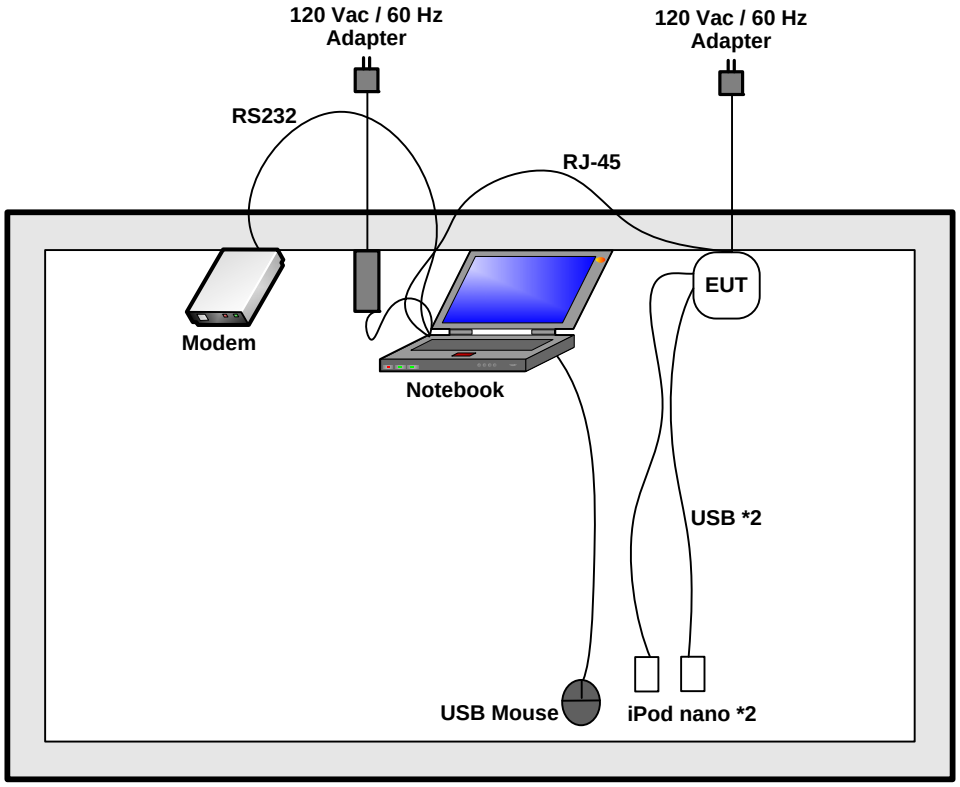
a. Turn on the power of all equipment.
b. The NB reads the test program from the hard disk drive and runs it.
c. The NB sends “H” messages to the panel, and the panel displays “H” patterns on the screen.
d. The NB sends messages to the modem.
e. The NB sends "H" messages to the internal hard disk, and 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 "Ping.exe" to link with the remote workstation to receive and transmit data by RJ45 cable.

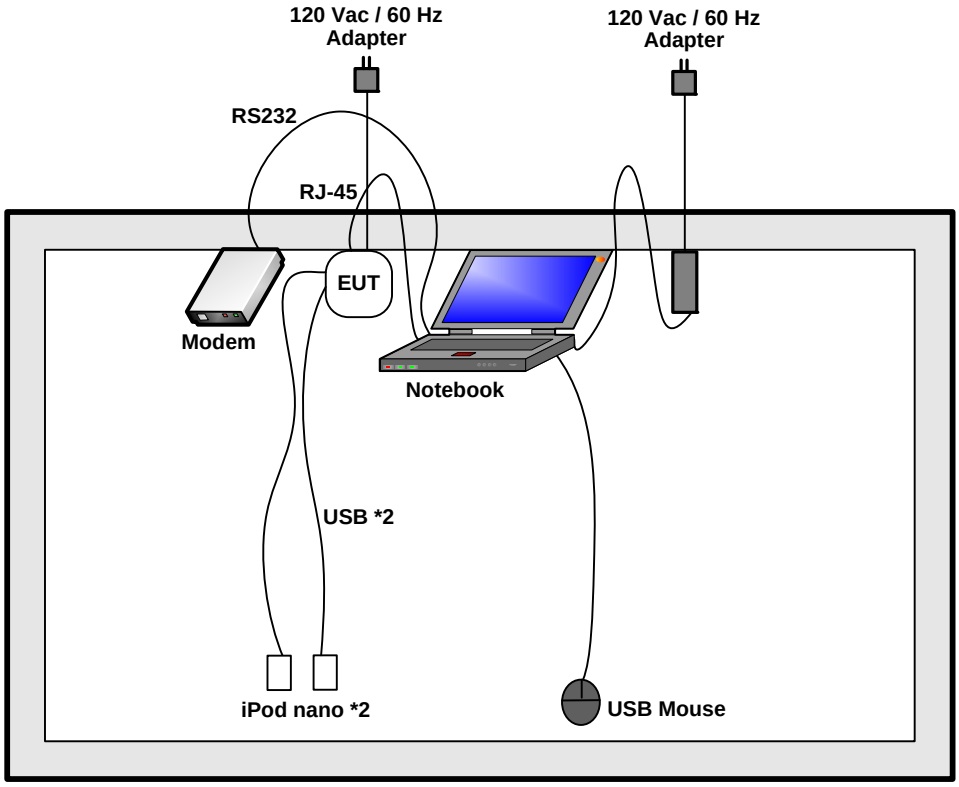
For Radiated Emissions :
- Executed “Ralink RT3883 QA” to keep transmitting signals at fixed frequency.

2.10 Test Configuration

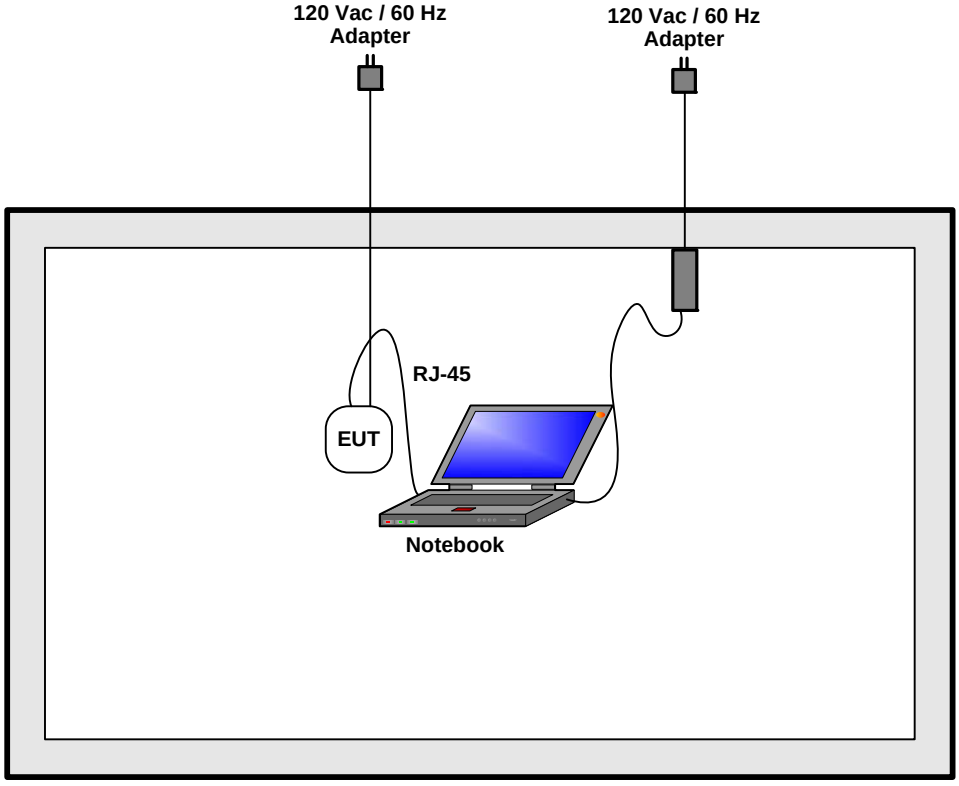
Conducted emission



Radiated emissions 9kHz~1GHz



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

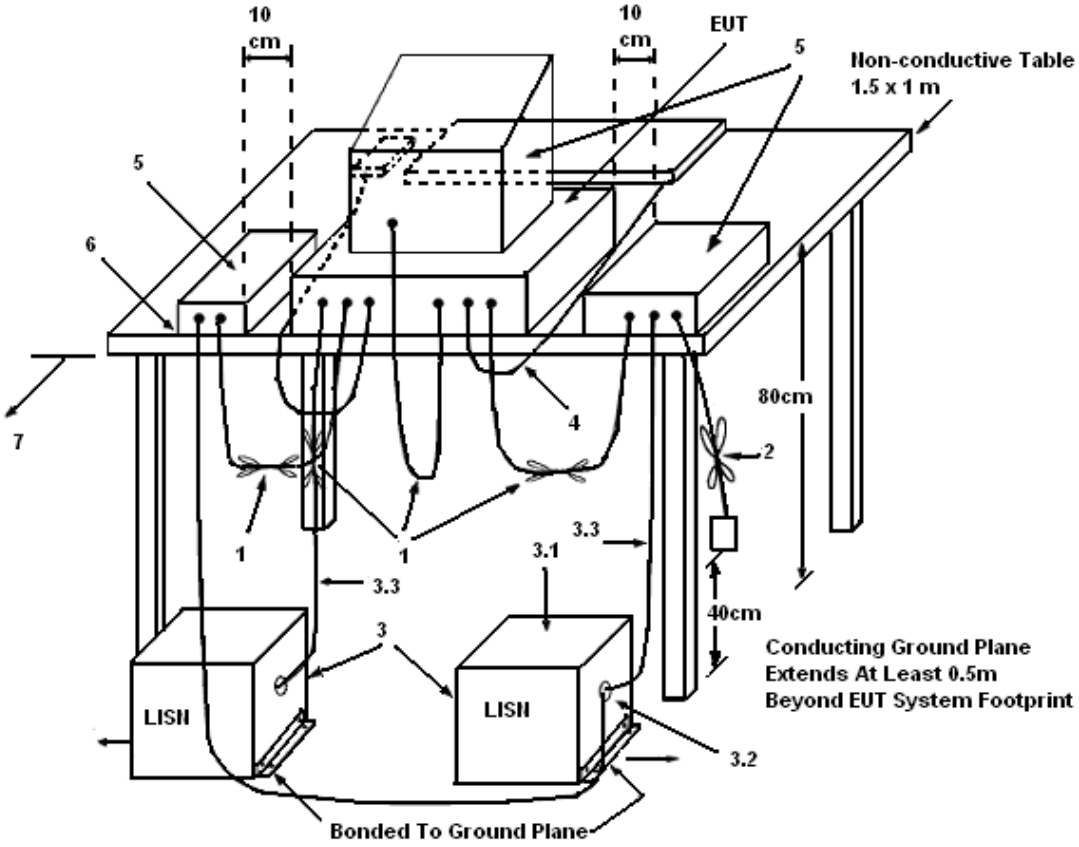
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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.

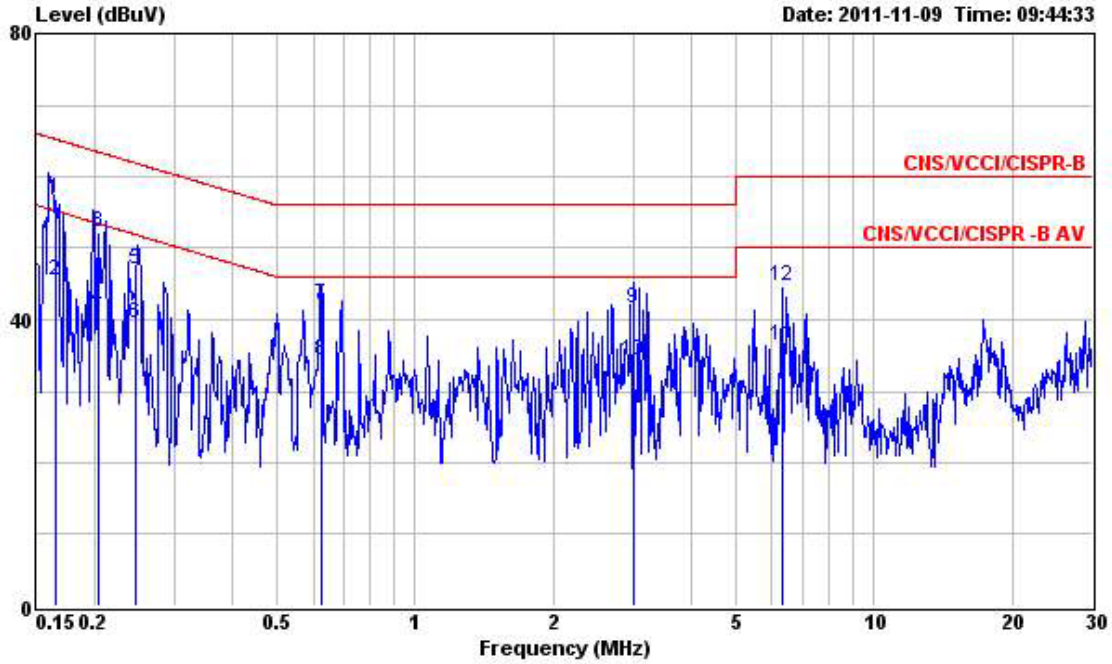
3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

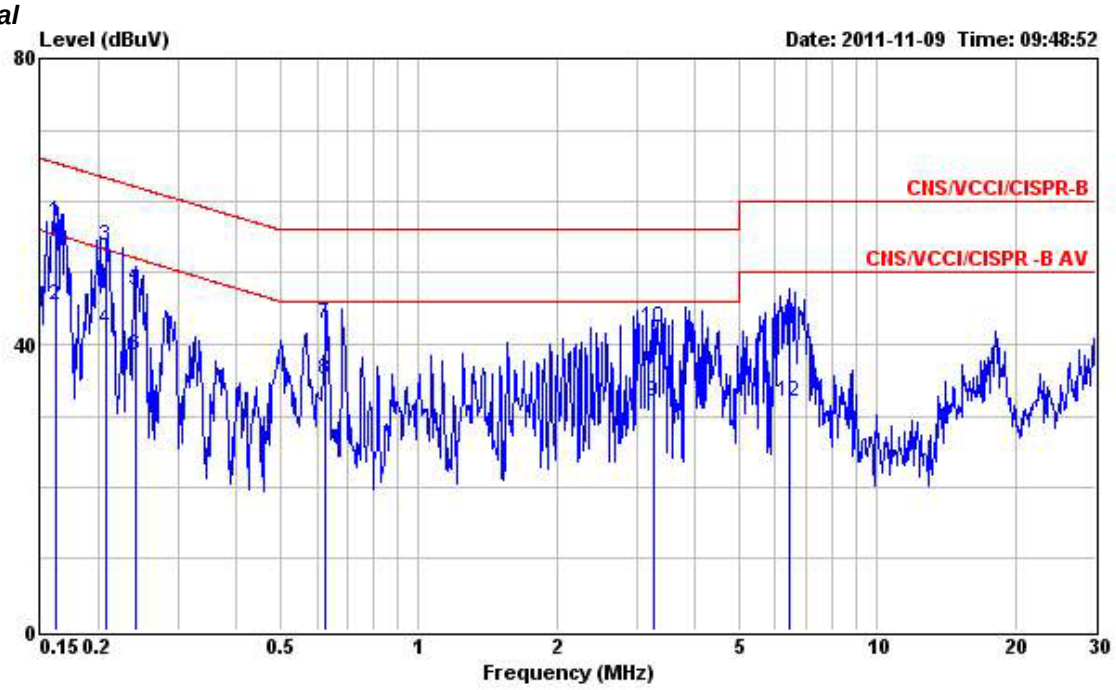
Final Test Date	Nov. 09, 2011	**Test Site No.**	CO01-HY
Temperature	20℃	**Humidity**	52%
Test Engineer	David	**Configuration**	Normal Mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.165	56.89	-8.32	65.21	56.71	0.08	0.10	QP
2	0.165	45.41	-9.80	55.21	45.23	0.08	0.10	Average
3	0.205	52.14	-11.28	63.42	51.96	0.08	0.10	QP
4	0.205	41.43	-11.99	53.42	41.25	0.08	0.10	Average
5	0.245	47.08	-14.84	61.92	46.90	0.08	0.10	QP
6	0.245	39.48	-12.44	51.92	39.30	0.08	0.10	Average
7	0.624	42.19	-13.81	56.00	41.99	0.10	0.10	QP
8	0.624	34.28	-11.72	46.00	34.08	0.10	0.10	Average
9	3.000	41.47	-14.53	56.00	41.22	0.15	0.10	QP
10	3.000	34.21	-11.79	46.00	33.96	0.15	0.10	Average
11	6.310	36.46	-13.54	50.00	36.14	0.22	0.10	Average
12	6.313	44.65	-15.35	60.00	44.33	0.22	0.10	QP

Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.162	57.22	-8.14	65.36	57.05	0.07	0.10	QP
2	0.162	45.48	-9.88	55.36	45.31	0.07	0.10	Average
3	0.207	53.70	-9.62	63.32	53.54	0.06	0.10	QP
4	0.207	41.98	-11.34	53.32	41.82	0.06	0.10	Average
5	0.242	47.42	-14.61	62.03	47.26	0.06	0.10	QP
6	0.242	38.34	-13.69	52.03	38.18	0.06	0.10	Average
7	0.627	42.77	-13.23	56.00	42.59	0.08	0.10	QP
8	0.627	35.07	-10.93	46.00	34.89	0.08	0.10	Average
9	3.260	31.85	-14.15	46.00	31.62	0.13	0.10	Average
10	3.260	42.26	-13.74	56.00	42.03	0.13	0.10	QP
11	6.450	42.41	-17.59	60.00	42.11	0.20	0.10	QP
12	6.450	31.99	-18.01	50.00	31.69	0.20	0.10	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.

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	Sep. 10, 2011	**Test Site No.**	TH01-HY
Temperature	24.5℃	**Humidity**	56%
Test Engineer	Cain	**Configurations**	802.11a/n

For Single Chain:
Configuration of IEEE 802.11a Port 1

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.20	16.50
40	5200 MHz	21.10	16.50
48	5240 MHz	20.10	16.50
52	5260 MHz	21.10	16.50
56	5280 MHz	21.10	16.60
64	5320 MHz	21.20	16.50

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

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	19.70	17.40
40	5200 MHz	19.70	17.30
48	5240 MHz	19.50	17.30
52	5260 MHz	20.30	17.30
56	5280 MHz	20.50	17.30
64	5320 MHz	19.70	17.30

Configuration IEEE 802.11n (20MHz) Port 2

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	19.50	17.30
40	5200 MHz	19.50	17.40
48	5240 MHz	19.40	17.30
52	5260 MHz	19.40	17.30
56	5280 MHz	19.50	17.30
64	5320 MHz	19.50	17.40

Configuration IEEE 802.11n (40MHz) Port 1

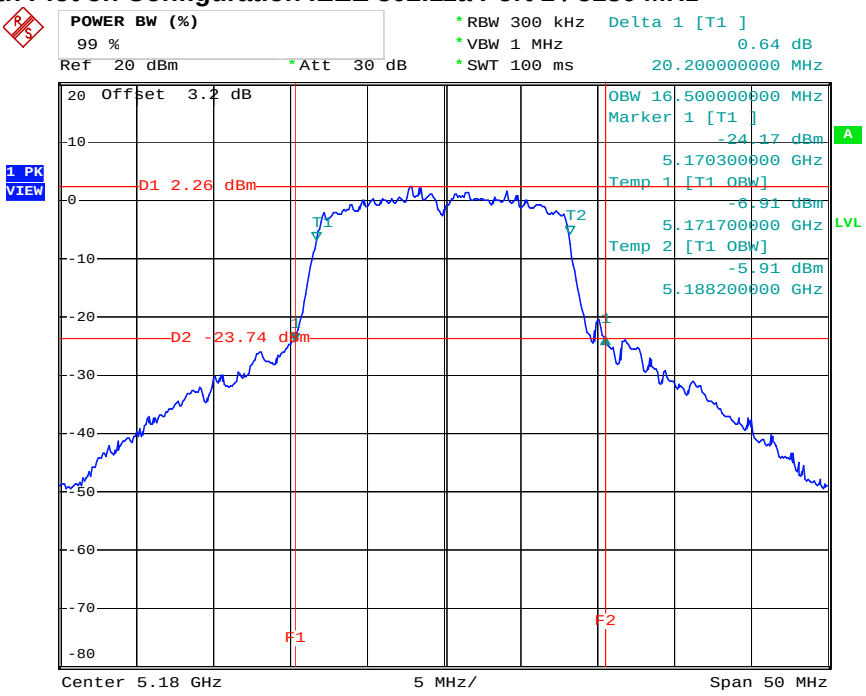
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	41.80	35.80
46	5230 MHz	43.00	35.80
54	5270 MHz	42.60	35.80
62	5310 MHz	39.80	35.80

Configuration IEEE 802.11n (40MHz) Port 2

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	41.80	35.80
46	5230 MHz	41.40	35.80
54	5270 MHz	41.40	35.80
62	5310 MHz	41.60	35.80

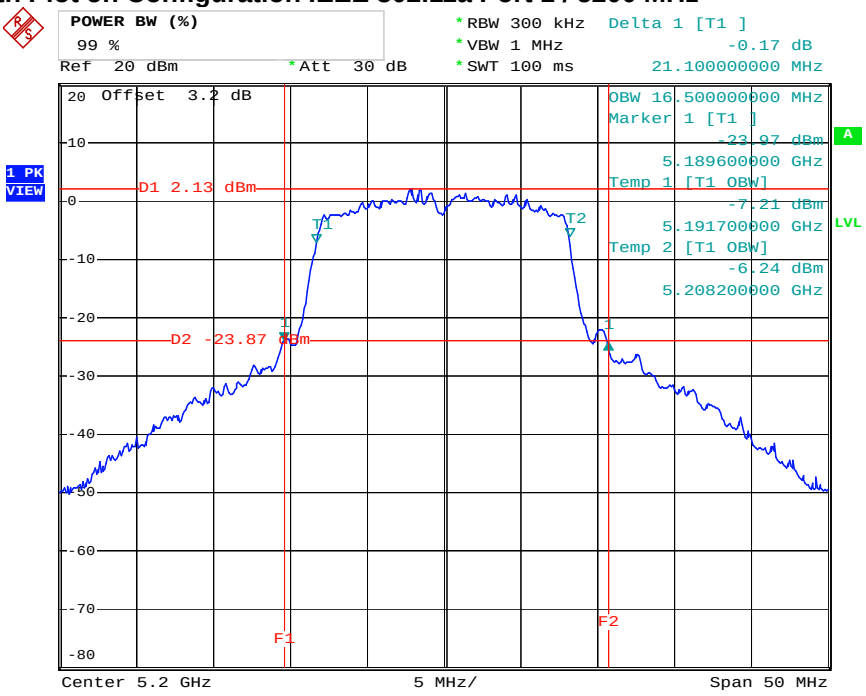
For Single Chain:

26 dB Bandwidth Plot on Configuration IEEE 802.11a Port 1 / 5180 MHz



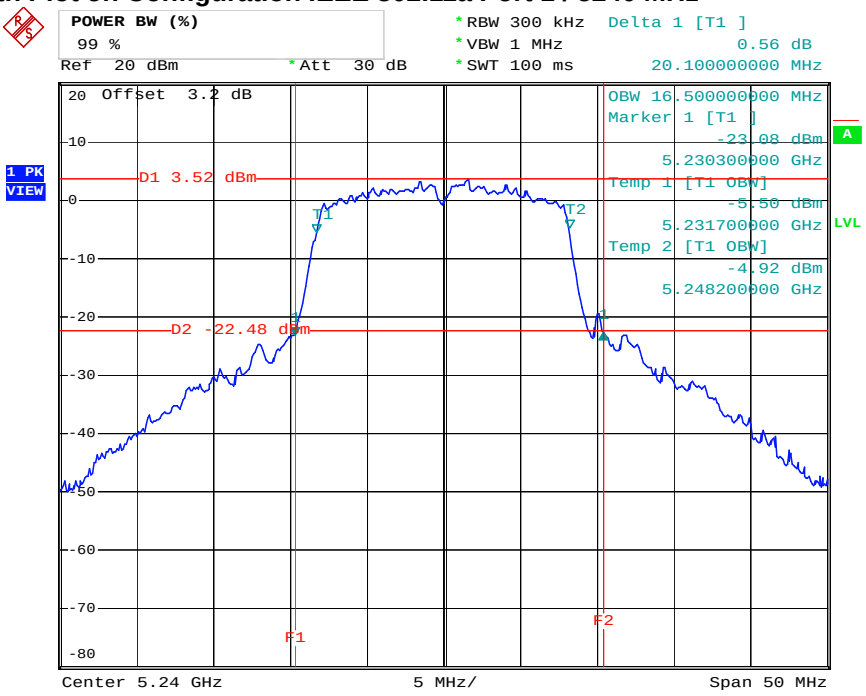
Date: 8.SEP.2011 20:51:59

26 dB Bandwidth Plot on Configuration IEEE 802.11a Port 1 / 5200 MHz



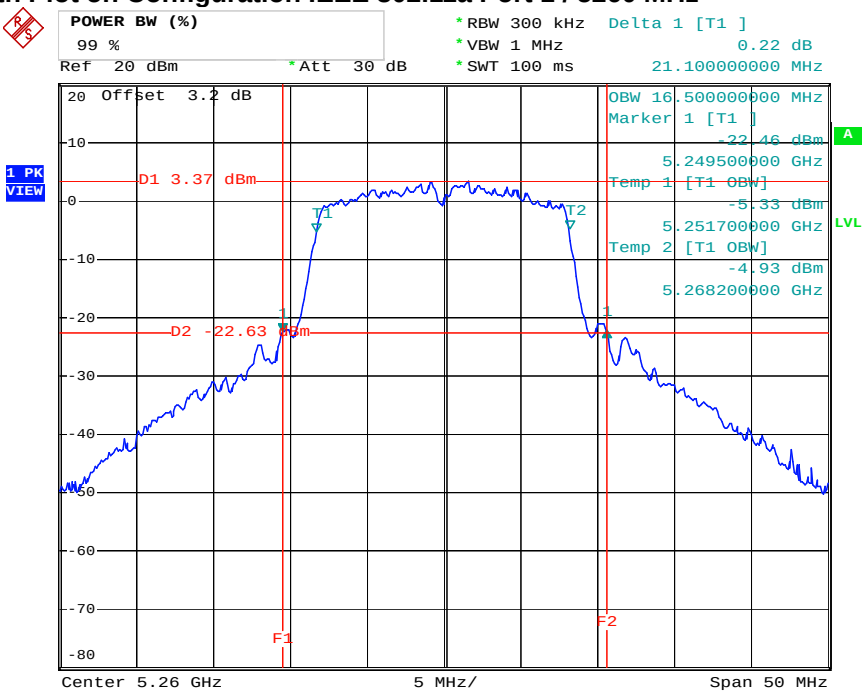
Date: 8.SEP.2011 20:58:25

26 dB Bandwidth Plot on Configuration IEEE 802.11a Port 1 / 5240 MHz



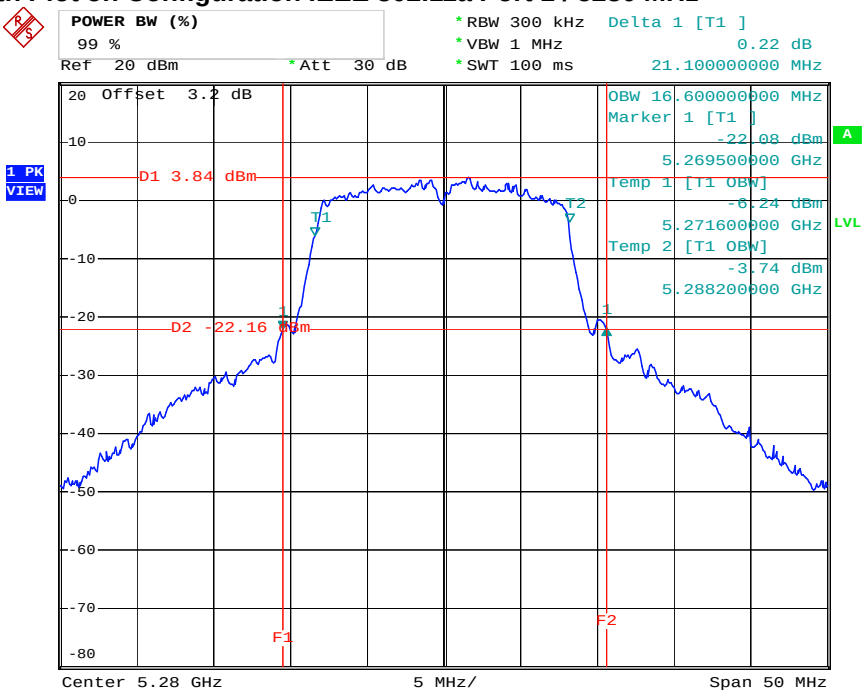
Date: 8.SEP.2011 21:00:48

26 dB Bandwidth Plot on Configuration IEEE 802.11a Port 1 / 5260 MHz



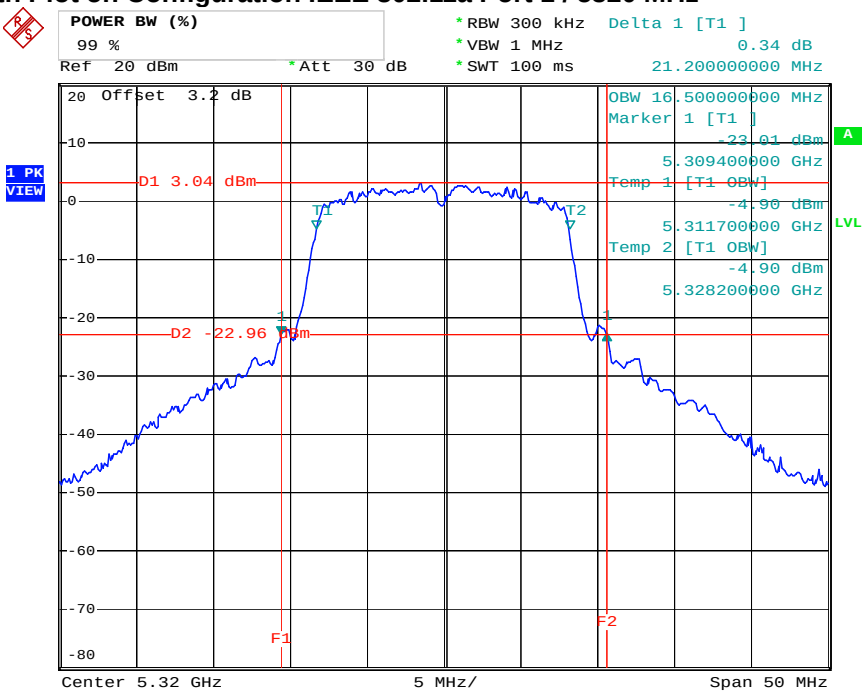
Date: 8.SEP.2011 21:05:13

26 dB Bandwidth Plot on Configuration IEEE 802.11a Port 1 / 5280 MHz



Date: 8.SEP.2011 21:06:46

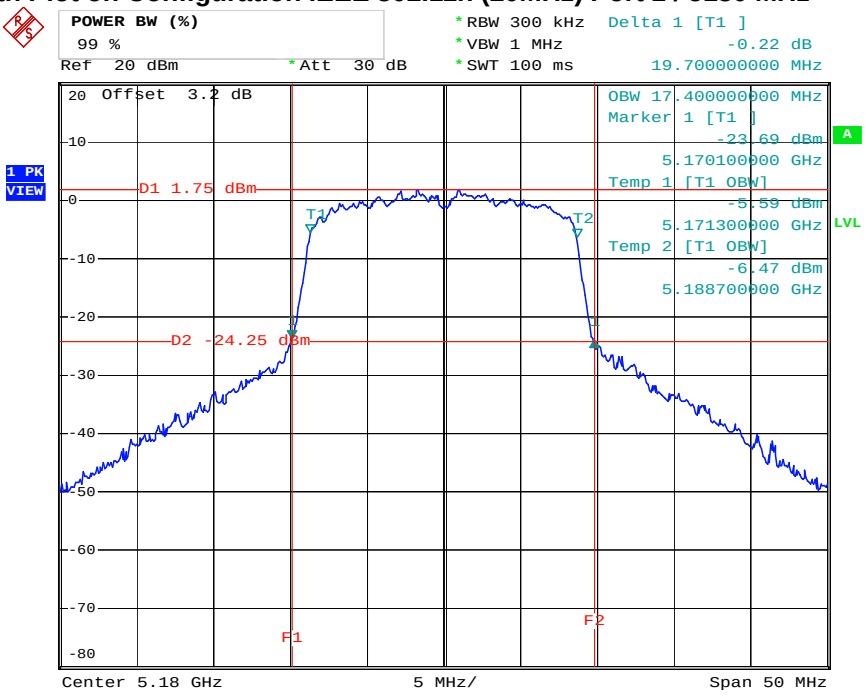
26 dB Bandwidth Plot on Configuration IEEE 802.11a Port 1 / 5320 MHz



Date: 8.SEP.2011 21:10:17

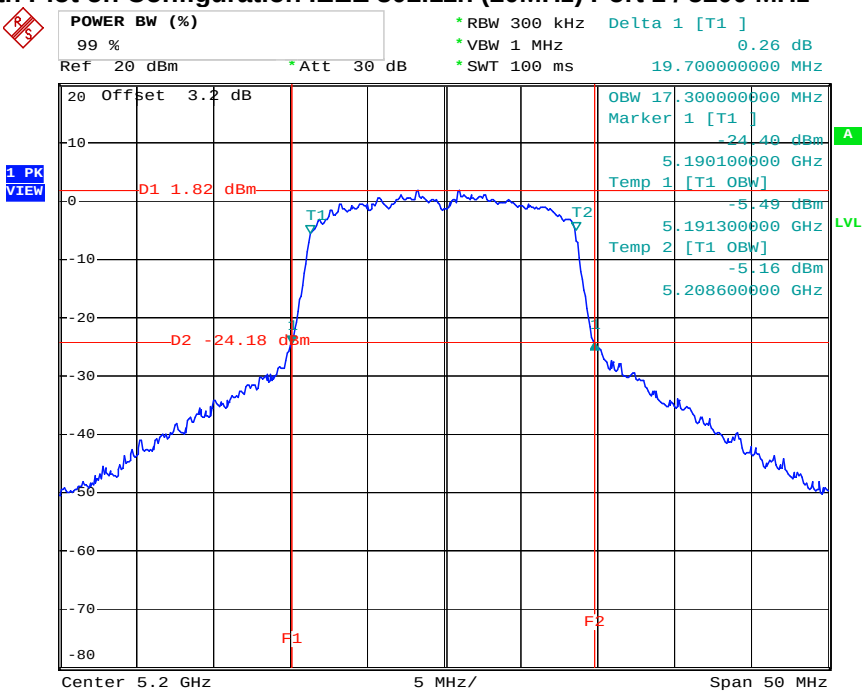
For Two Chains:

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



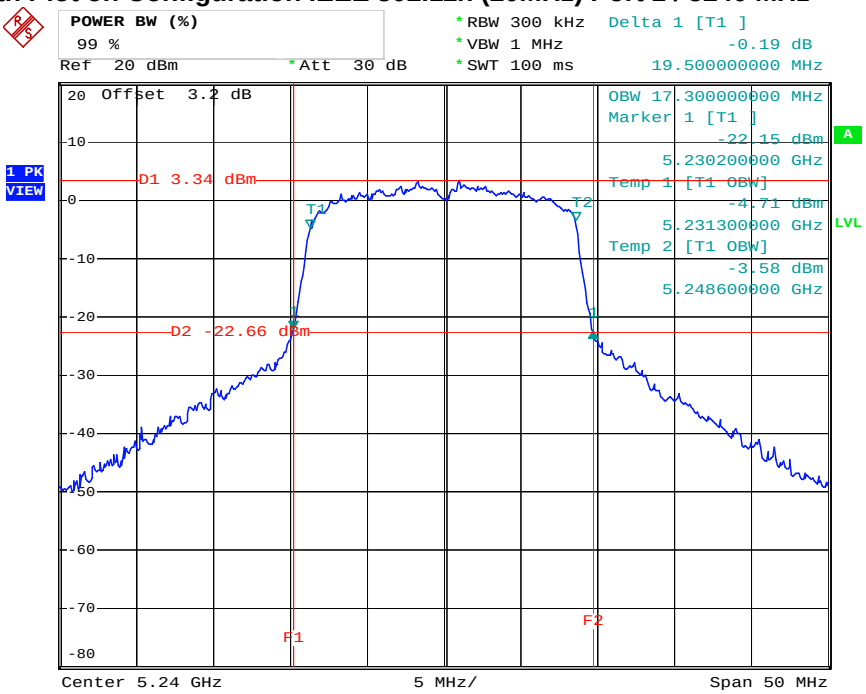
Date: 8.SEP.2011 23:32:31

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



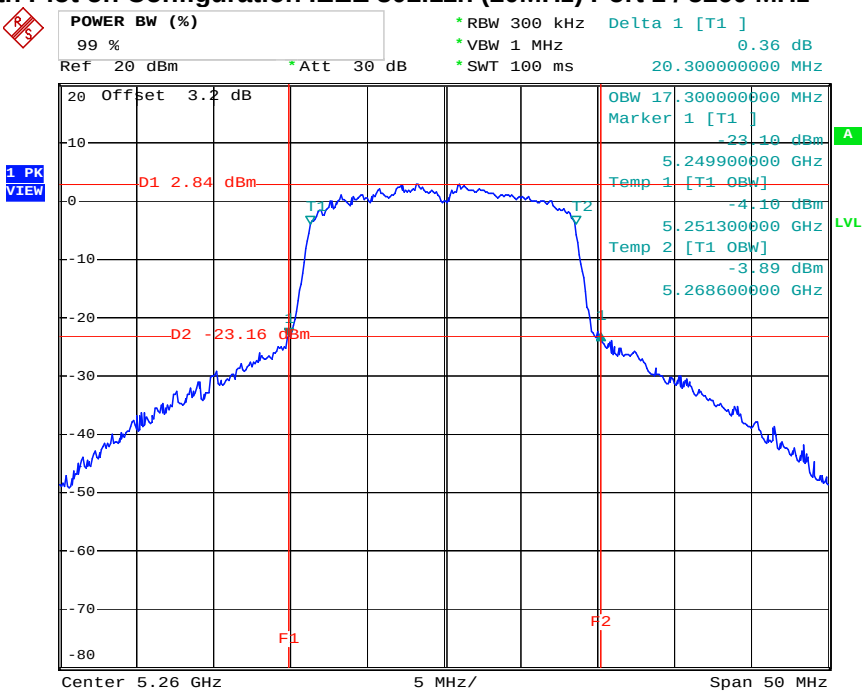
Date: 8.SEP.2011 23:38:05

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



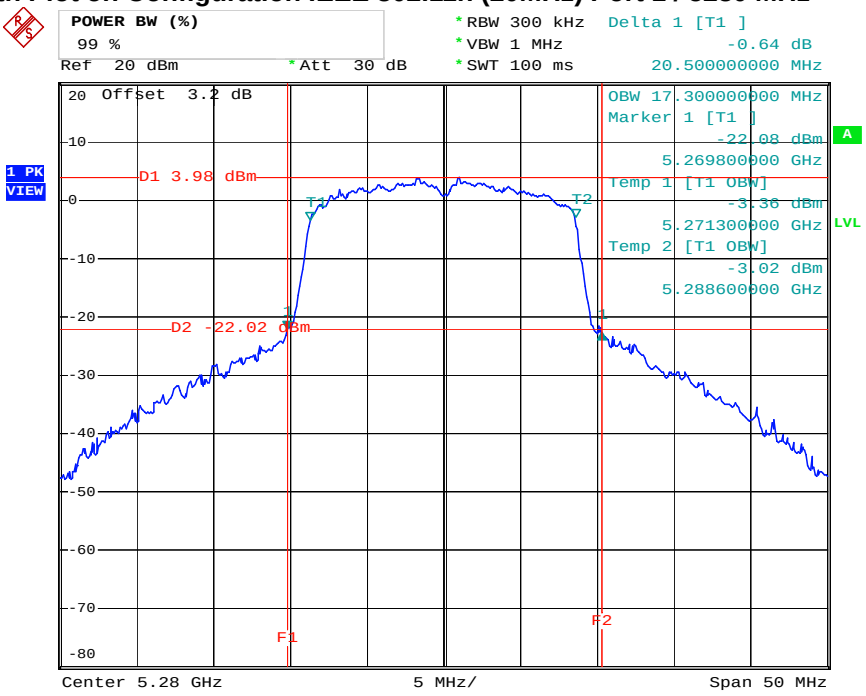
Date: 8.SEP.2011 23:42:45

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5260 MHz



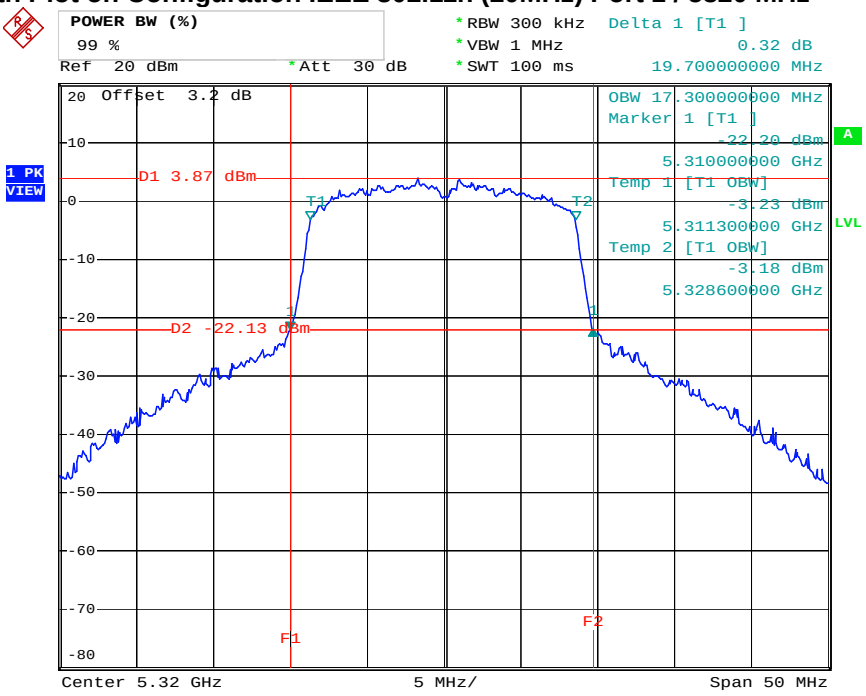
Date: 8.SEP.2011 23:48:22

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5280 MHz



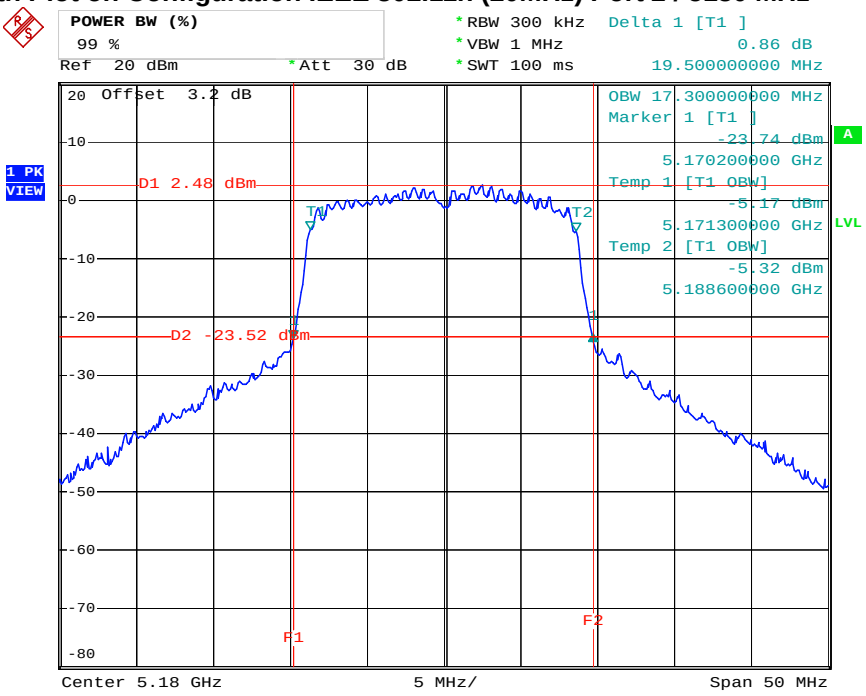
Date: 9.SEP.2011 00:09:52

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5320 MHz



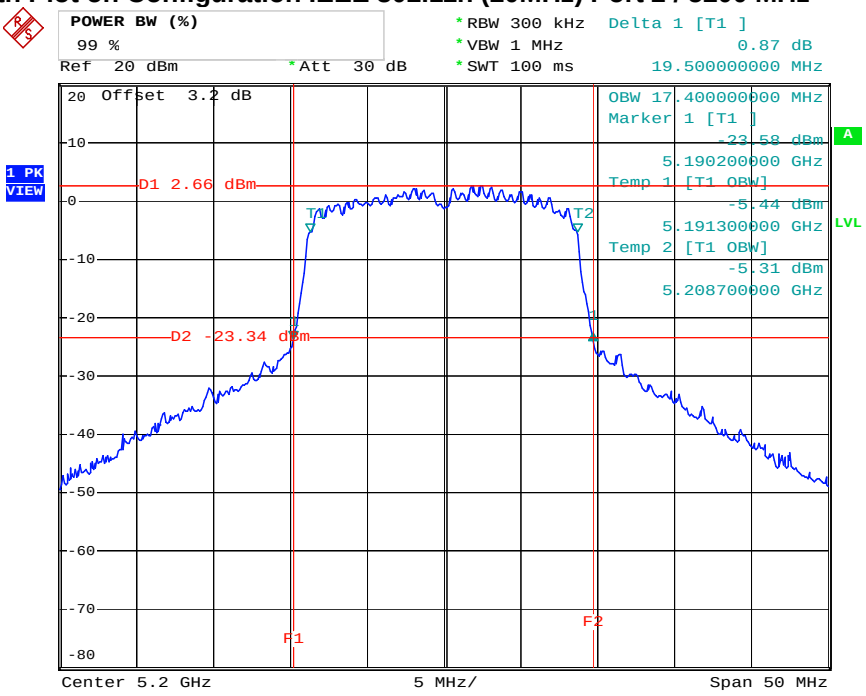
Date: 9.SEP.2011 00:20:17

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



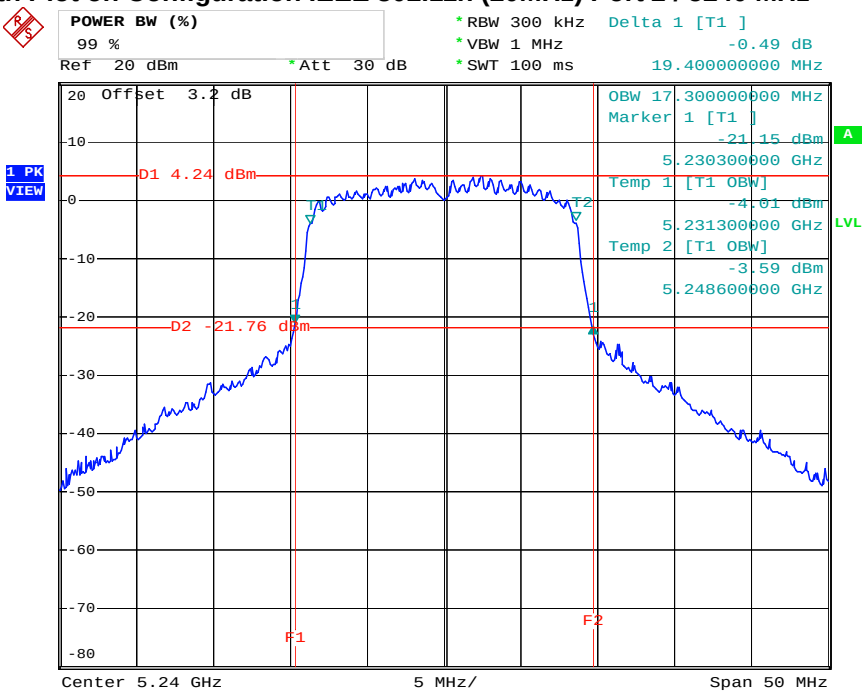
Date: 10.SEP.2011 00:06:48

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



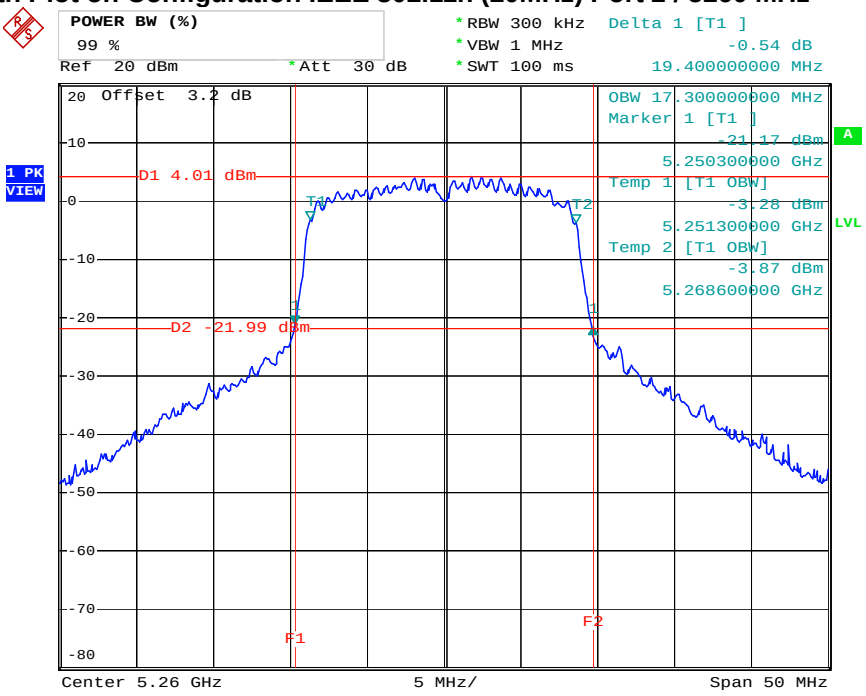
Date: 10.SEP.2011 00:14:13

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



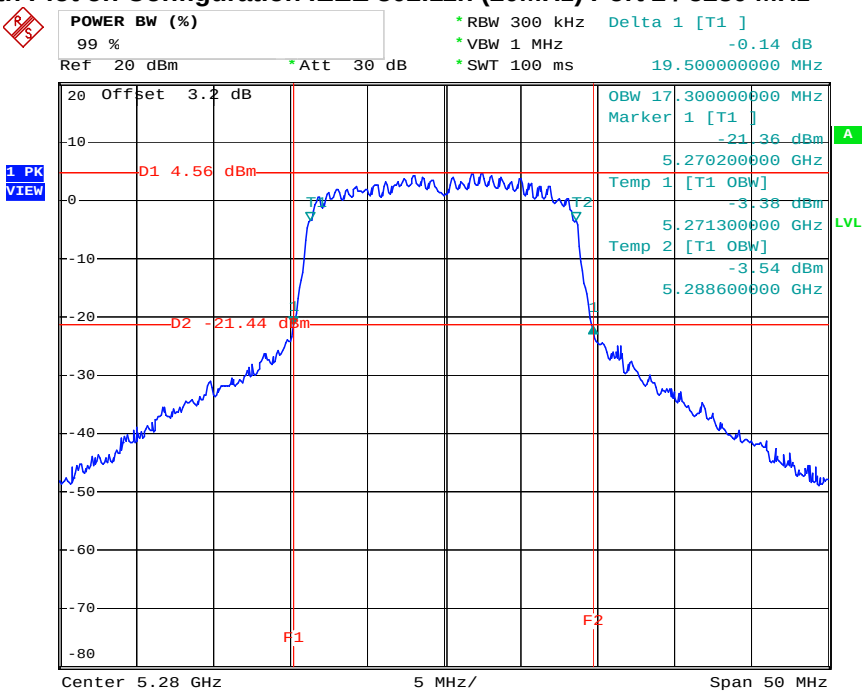
Date: 10.SEP.2011 00:16:07

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5260 MHz



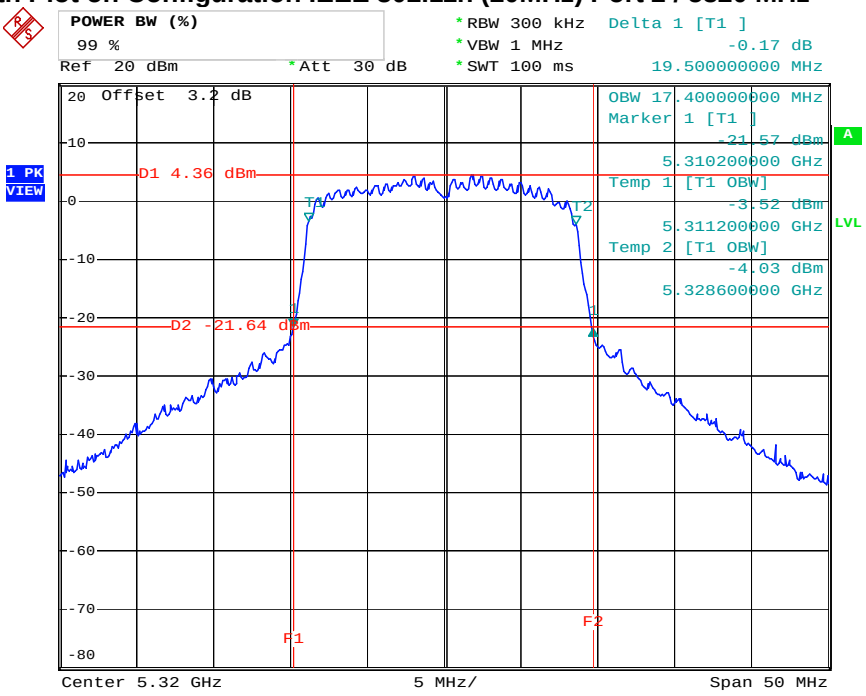
Date: 10.SEP.2011 00:23:55

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5280 MHz



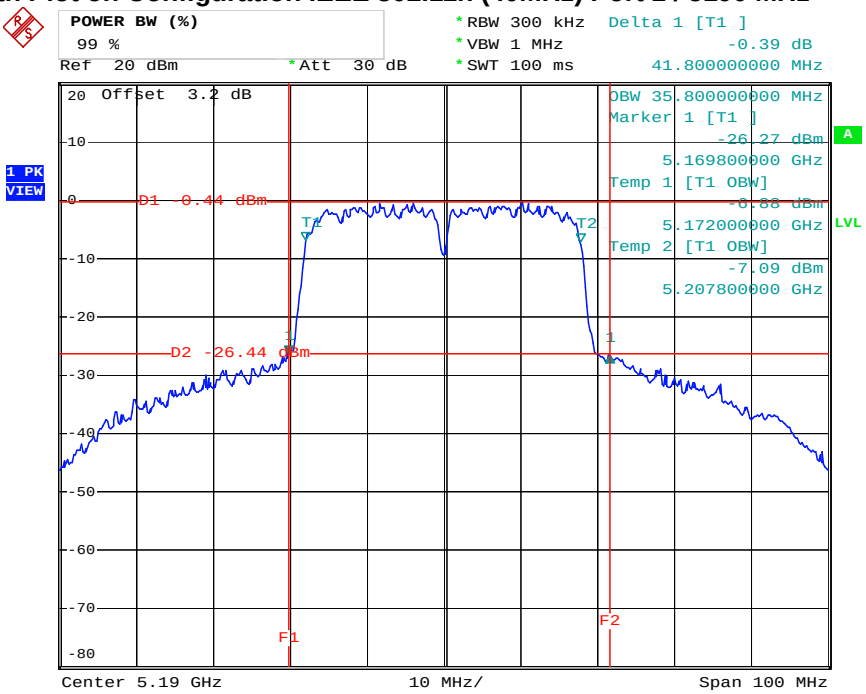
Date: 10.SEP.2011 00:25:13

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5320 MHz



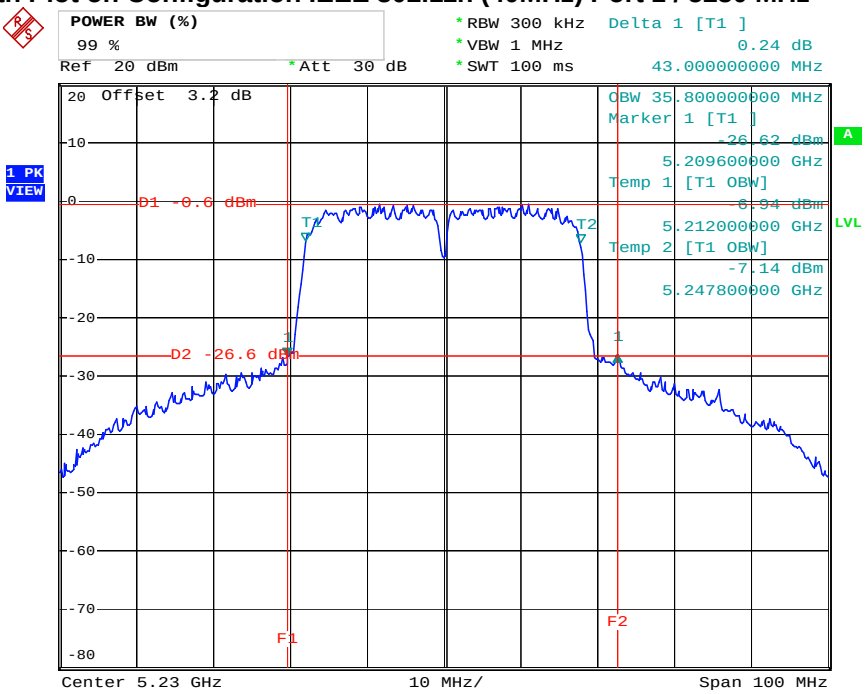
Date: 10.SEP.2011 00:30:11

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



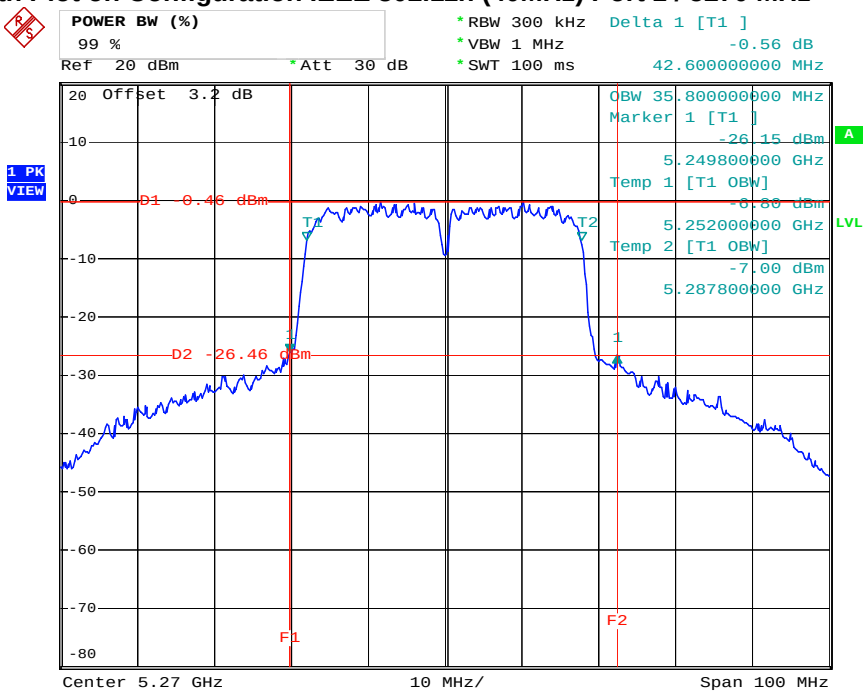
Date: 9.SEP.2011 10:20:48

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



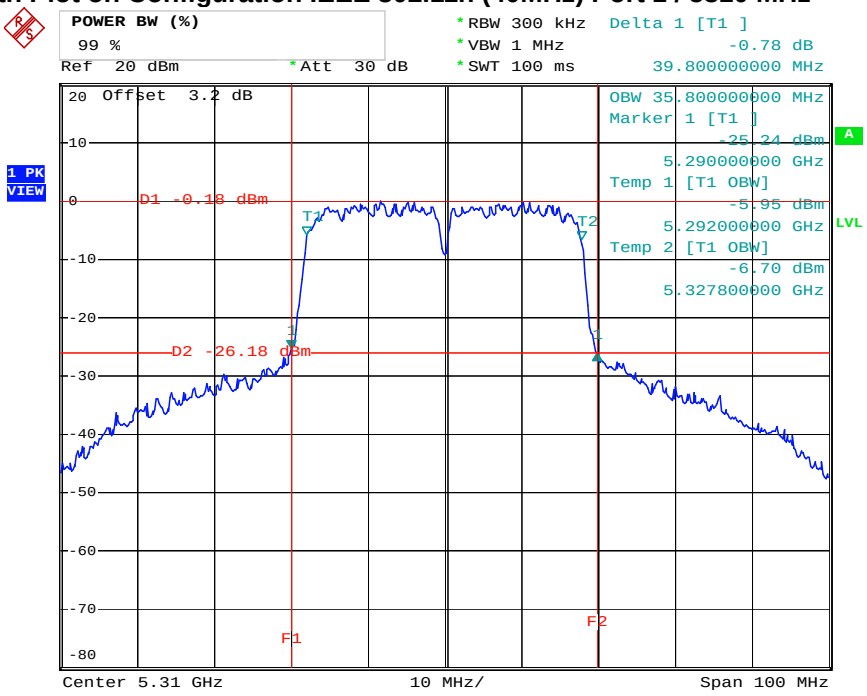
Date: 9.SEP.2011 11:03:43

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5270 MHz



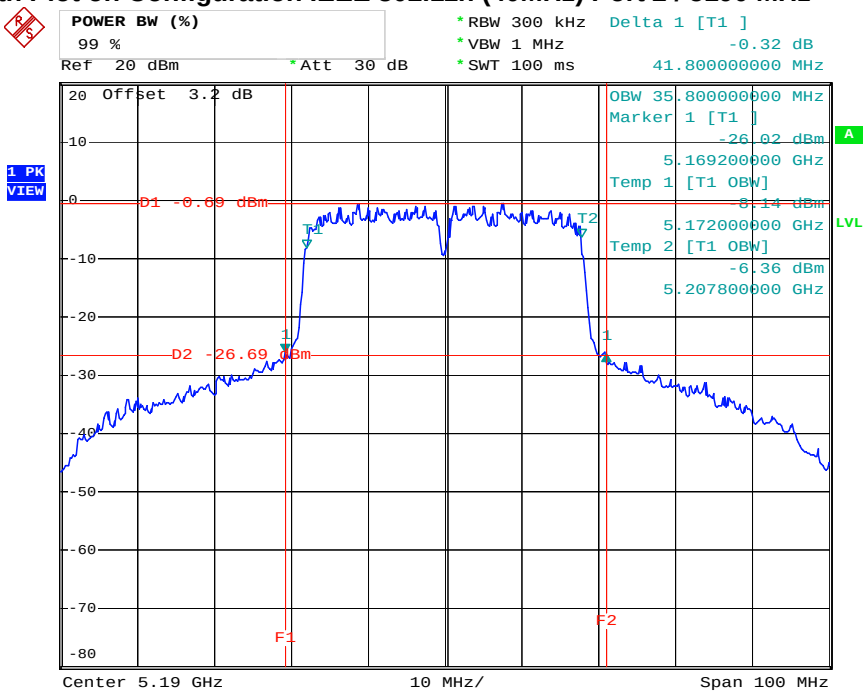
Date: 9.SEP.2011 11:15:56

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5310 MHz



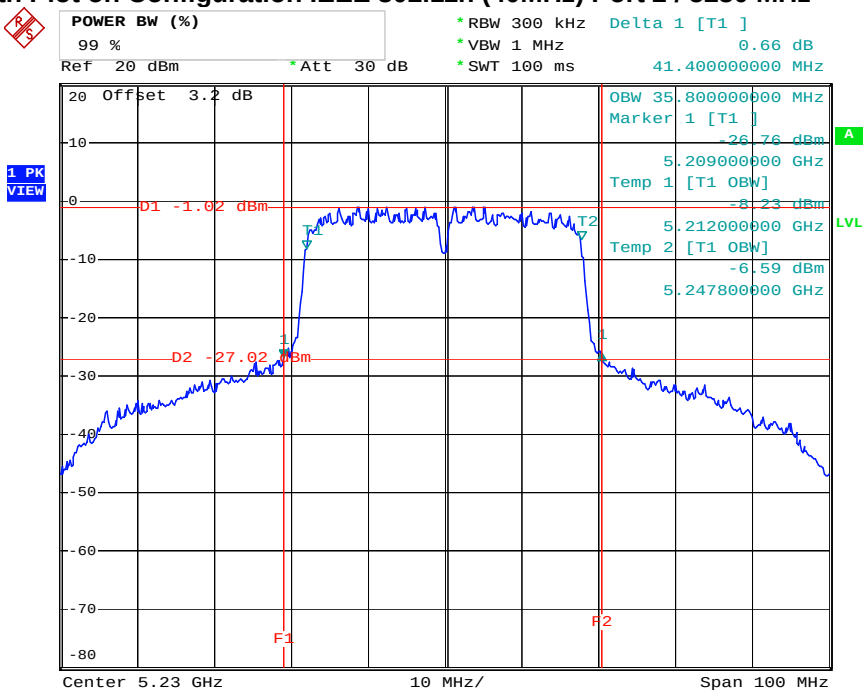
Date: 9.SEP.2011 11:30:29

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



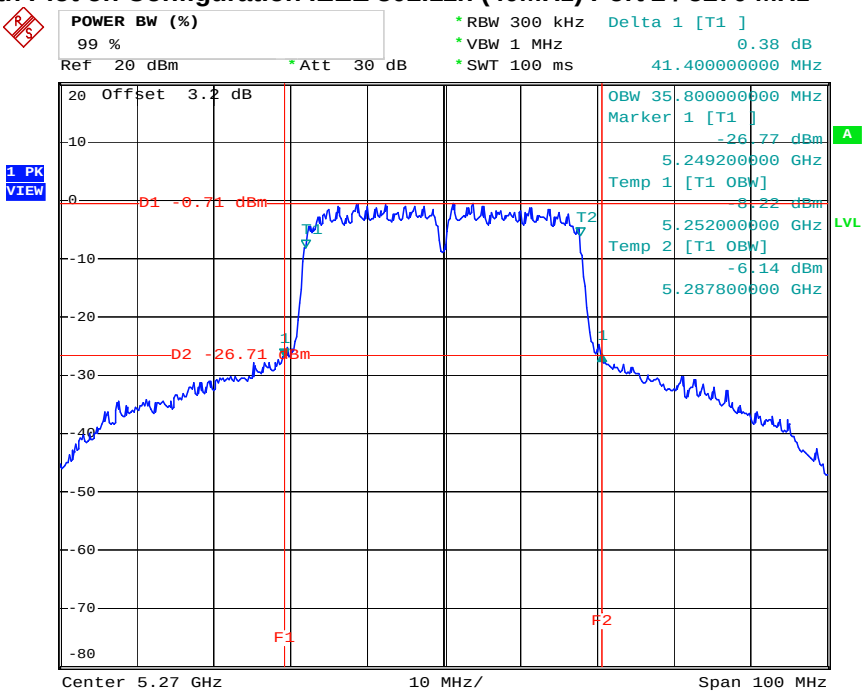
Date: 9.SEP.2011 10:38:14

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



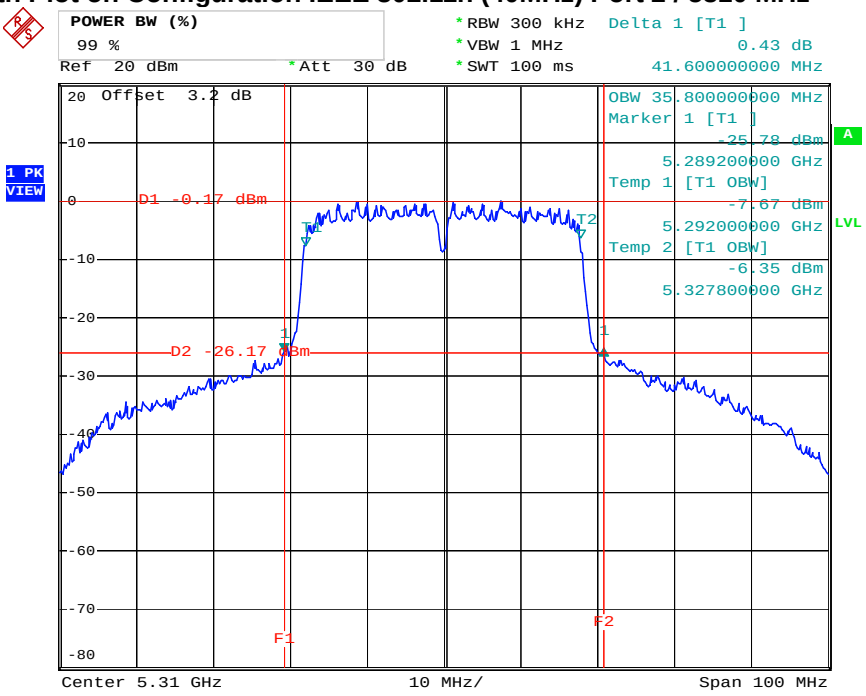
Date: 9.SEP.2011 10:50:33

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5270 MHz



Date: 9.SEP.2011 11:21:26

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5310 MHz



Date: 9.SEP.2011 11:34:05

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.
For the 5.25-5.35 GHz, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B. 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

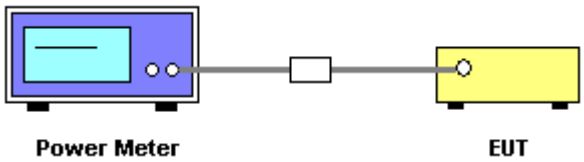
Please refer to section 4 of equipments list in this report. The following table is the setting of the power meter.

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	Sep. 09, 2011	**Test Site No.**	TH01-HY
Temperature	24.5℃	**Humidity**	56%
Test Engineer	Cain	**Configurations**	802.11a/n

For Single Chain:
Configuration of IEEE 802.11a Port 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.62	17.00	**Complies**
40	5200 MHz	12.48	17.00	**Complies**
48	5240 MHz	12.84	17.00	**Complies**
52	5260 MHz	12.56	24.00	**Complies**
56	5280 MHz	12.63	24.00	**Complies**
64	5320 MHz	12.46	24.00	**Complies**

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.74	17.00	**Complies**
40	5200 MHz	12.56	17.00	**Complies**
48	5240 MHz	12.85	17.00	**Complies**
52	5260 MHz	12.23	24.00	**Complies**
56	5280 MHz	12.28	24.00	**Complies**
64	5320 MHz	12.55	24.00	**Complies**

Configuration IEEE 802.11n (20MHz) Port 2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.31	17.00	**Complies**
40	5200 MHz	12.57	17.00	**Complies**
48	5240 MHz	12.75	17.00	**Complies**
52	5260 MHz	12.16	24.00	**Complies**
56	5280 MHz	12.14	24.00	**Complies**
64	5320 MHz	12.36	24.00	**Complies**

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	15.54	17.00	**Complies**
40	5200 MHz	15.58	17.00	**Complies**
48	5240 MHz	15.81	17.00	**Complies**
52	5260 MHz	15.21	24.00	**Complies**
56	5280 MHz	15.22	24.00	**Complies**
64	5320 MHz	15.47	24.00	**Complies**

Configuration IEEE 802.11n (40MHz) Port 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	12.73	17.00	**Complies**
46	5230 MHz	12.77	17.00	**Complies**
54	5270 MHz	12.52	24.00	**Complies**
62	5310 MHz	12.73	24.00	**Complies**

Configuration IEEE 802.11n (40MHz) Port 2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	12.18	17.00	**Complies**
46	5230 MHz	12.03	17.00	**Complies**
54	5270 MHz	12.00	24.00	**Complies**
62	5310 MHz	12.10	24.00	**Complies**

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	15.47	17.00	**Complies**
46	5230 MHz	15.43	17.00	**Complies**
54	5270 MHz	15.28	24.00	**Complies**
62	5310 MHz	15.44	24.00	**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
5.25-5.35 GHz	11

3.4.2 Measuring Instruments and Setting

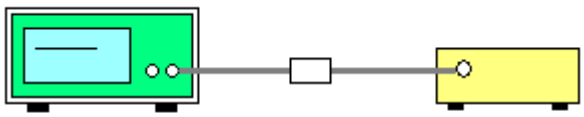
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 1000 kHz and VBW to 3000 kHz. 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	Sep. 10, 2011	**Test Site No.**	TH01-HY
Temperature	24.5℃	**Humidity**	56%
Test Engineer	Cain	**Configurations**	802.11a/n

For Single Chain:
Configuration of IEEE 802.11a Port 1

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	-1.28	4.00	**Complies**
5200 MHz	-0.85	4.00	**Complies**
5240 MHz	0.46	4.00	**Complies**
5260 MHz	0.67	11.00	**Complies**
5280 MHz	1.04	11.00	**Complies**
5320 MHz	1.18	11.00	**Complies**

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	-1.42	4.00	**Complies**
5200 MHz	-1.25	4.00	**Complies**
5240 MHz	0.11	4.00	**Complies**
5260 MHz	-0.02	11.00	**Complies**
5280 MHz	0.87	11.00	**Complies**
5320 MHz	0.80	11.00	**Complies**

Configuration IEEE 802.11n (20MHz) Port 2

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	-0.88	4.00	**Complies**
5200 MHz	0.28	4.00	**Complies**
5240 MHz	1.03	4.00	**Complies**
5260 MHz	1.74	11.00	**Complies**
5280 MHz	1.51	11.00	**Complies**
5320 MHz	1.99	11.00	**Complies**

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	1.87	4.00	**Complies**
5200 MHz	2.59	4.00	**Complies**
5240 MHz	3.60	4.00	**Complies**
5260 MHz	3.96	11.00	**Complies**
5280 MHz	4.21	11.00	**Complies**
5320 MHz	4.45	11.00	**Complies**

Configuration IEEE 802.11n (40MHz) Port 1

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	-3.52	4.00	**Complies**
5230 MHz	-3.30	4.00	**Complies**
5270 MHz	-3.14	11.00	**Complies**
5310 MHz	-3.18	11.00	**Complies**

Configuration IEEE 802.11n (40MHz) Port 2

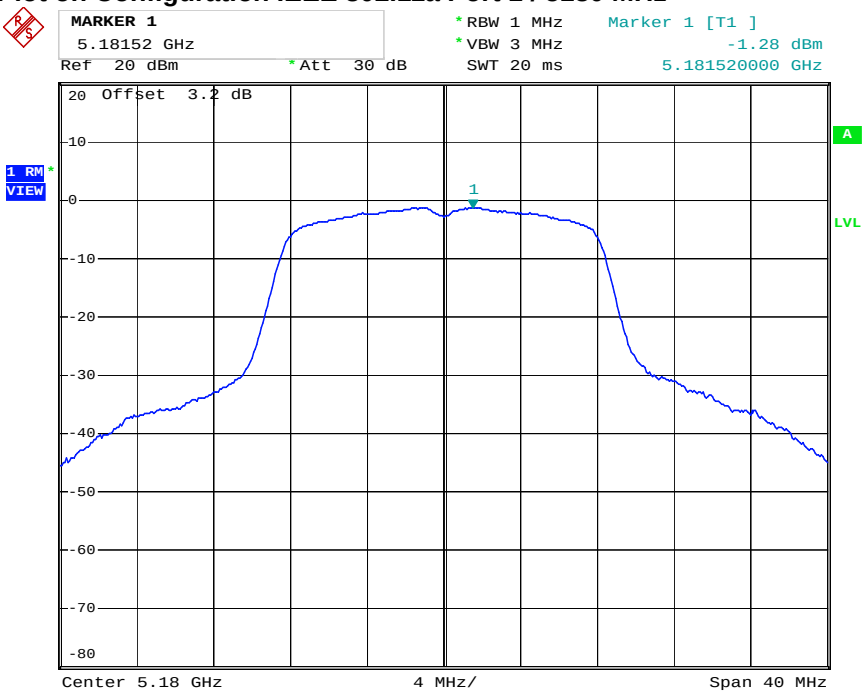
Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	-3.99	4.00	**Complies**
5230 MHz	-3.74	4.00	**Complies**
5270 MHz	-3.27	11.00	**Complies**
5310 MHz	-3.33	11.00	**Complies**

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	-0.74	4.00	**Complies**
5230 MHz	-0.50	4.00	**Complies**
5270 MHz	-0.19	11.00	**Complies**
5310 MHz	-0.24	11.00	**Complies**

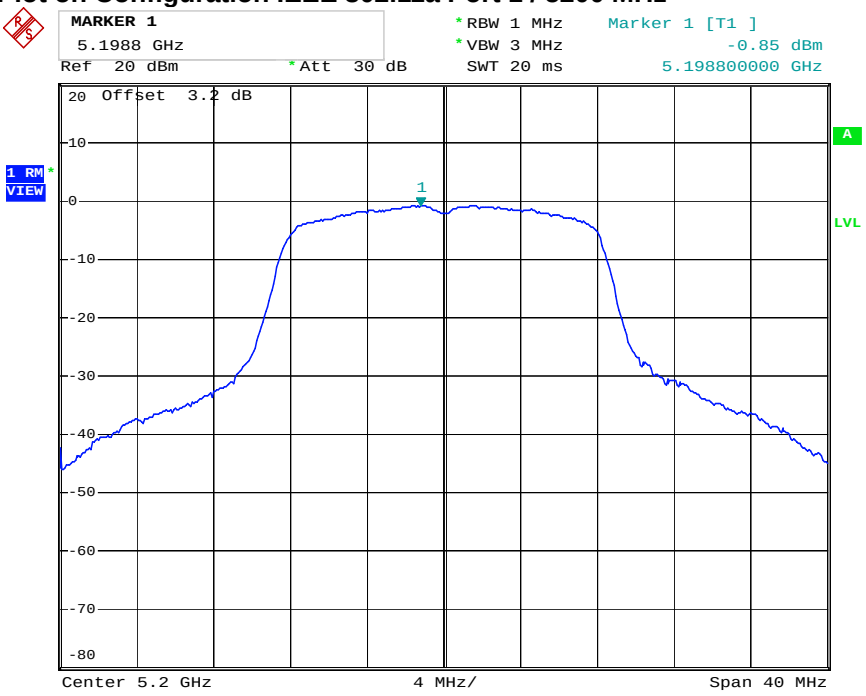
For Single Chain:

Power Density Plot on Configuration IEEE 802.11a Port 1 / 5180 MHz



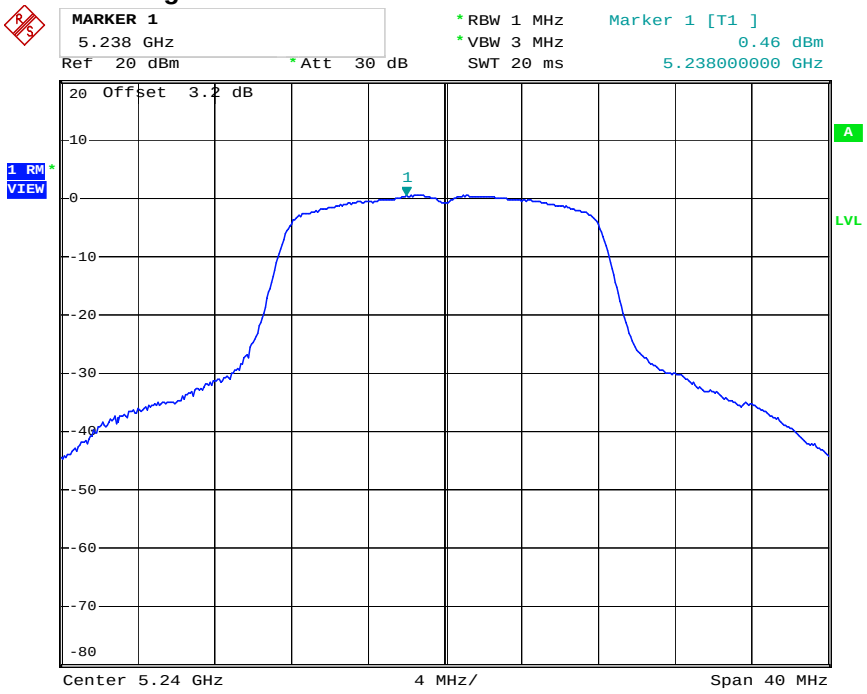
Date: 8.SEP.2011 20:54:43

Power Density Plot on Configuration IEEE 802.11a Port 1 / 5200 MHz



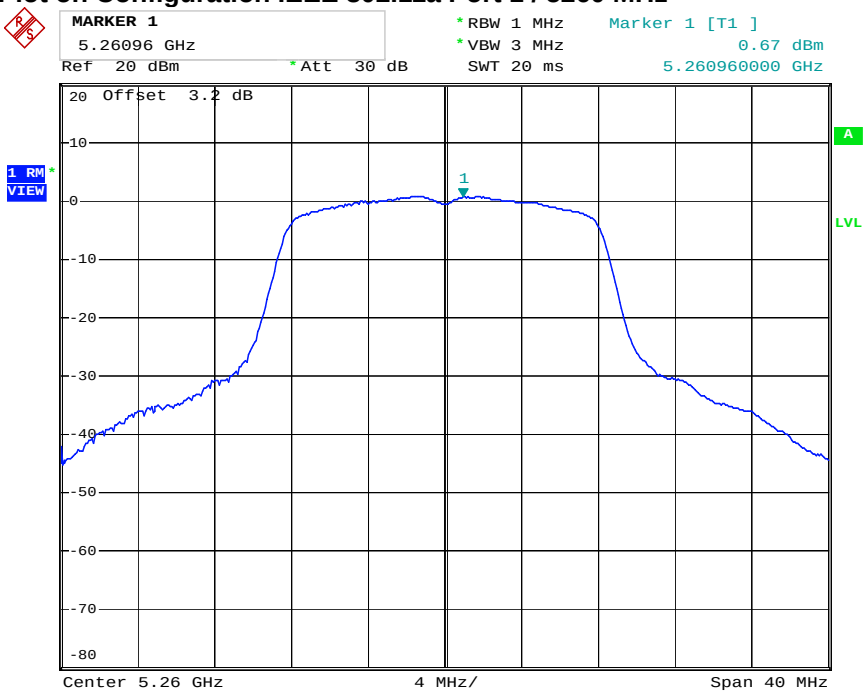
Date: 8.SEP.2011 20:55:58

Power Density Plot on Configuration IEEE 802.11a Port 1 / 5240 MHz



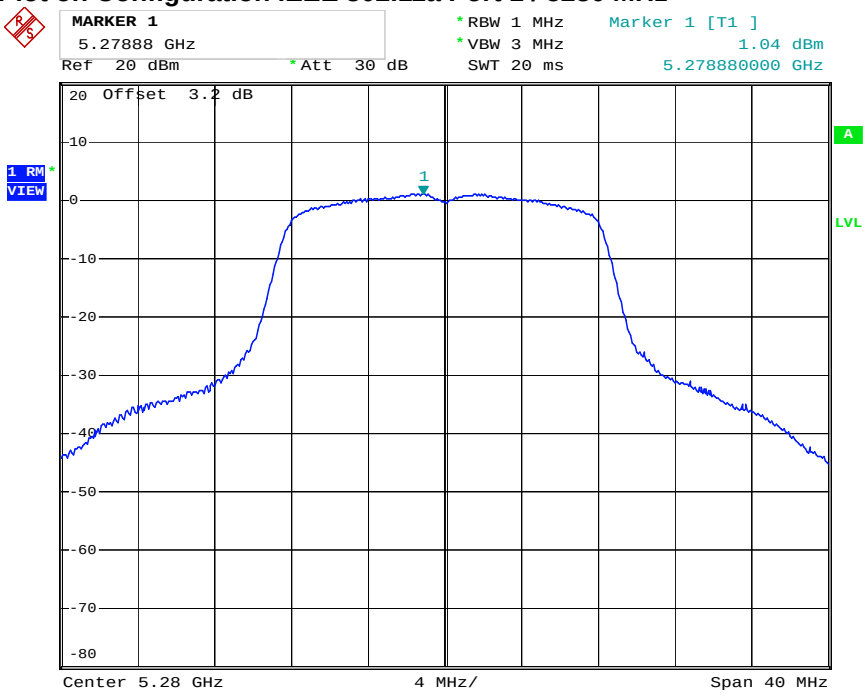
Date: 8.SEP.2011 21:02:17

Power Density Plot on Configuration IEEE 802.11a Port 1 / 5260 MHz



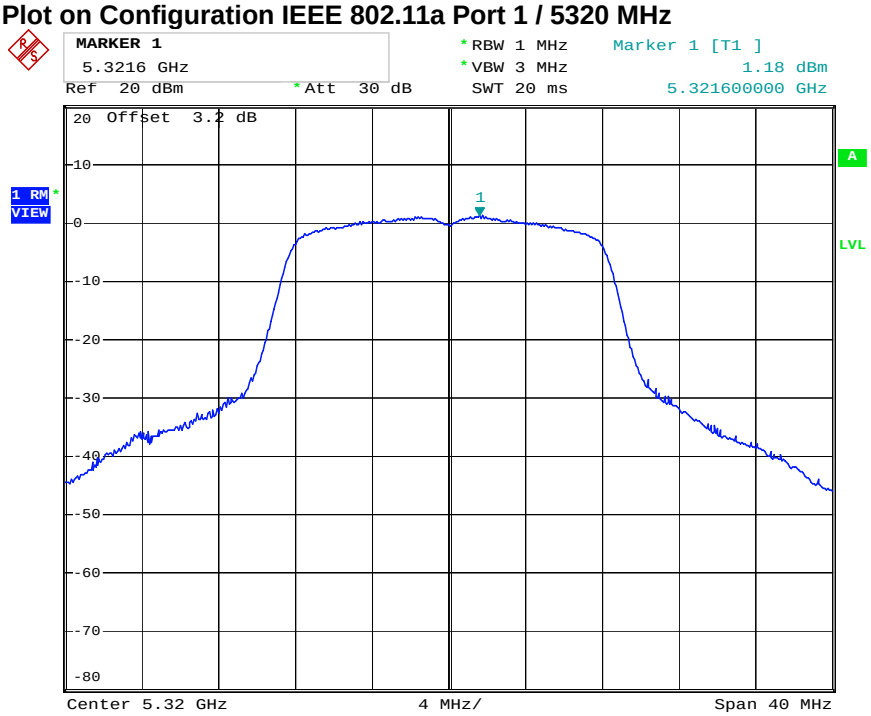
Date: 8.SEP.2011 21:03:21

Power Density Plot on Configuration IEEE 802.11a Port 1 / 5280 MHz



Date: 8.SEP.2011 21:07:42

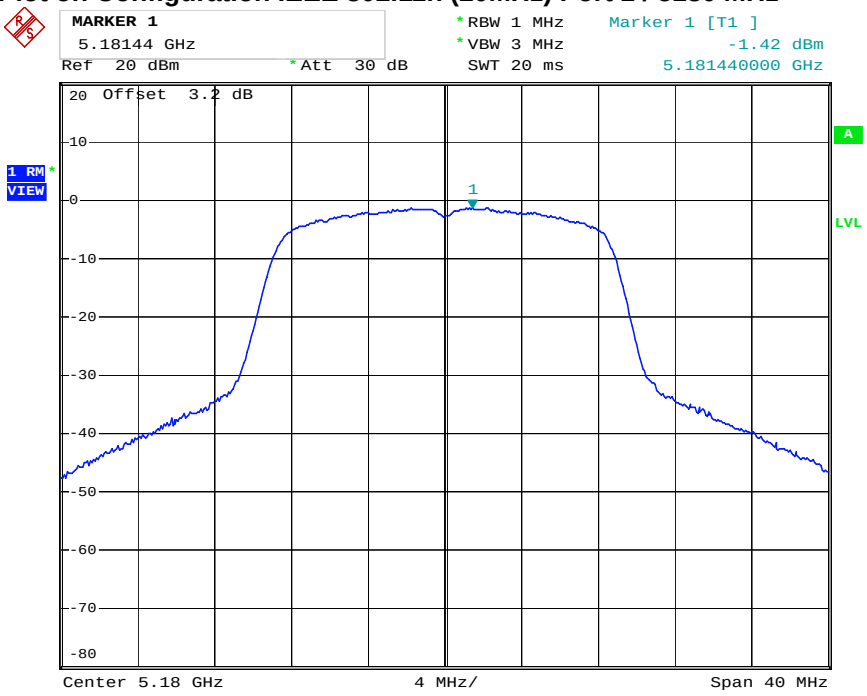
Power Density Plot on Configuration IEEE 802.11a Port 1 / 5320 MHz



Date: 8.SEP.2011 21:08:41

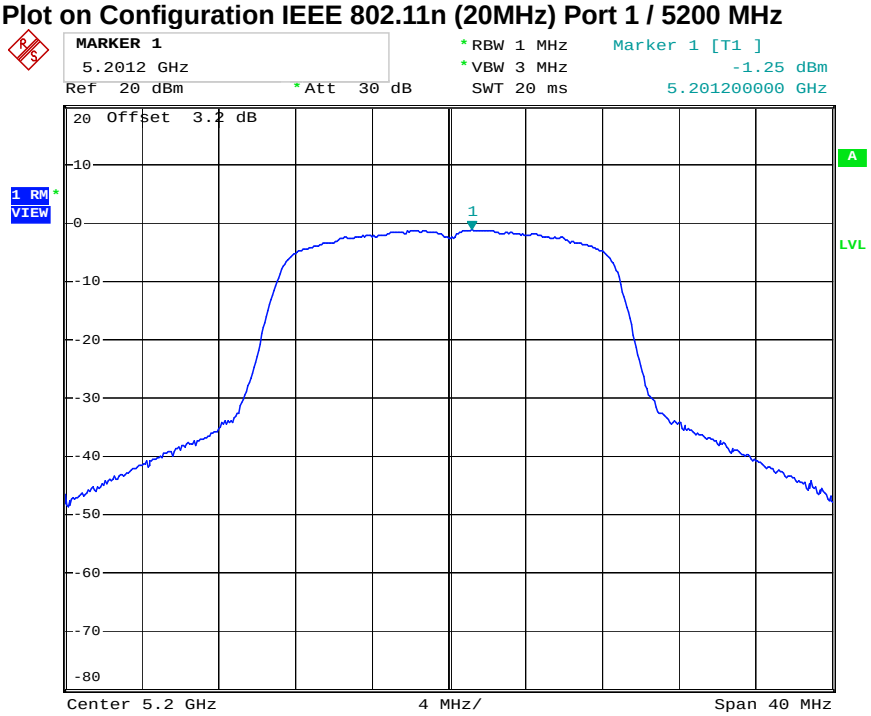
For Two Chains:

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



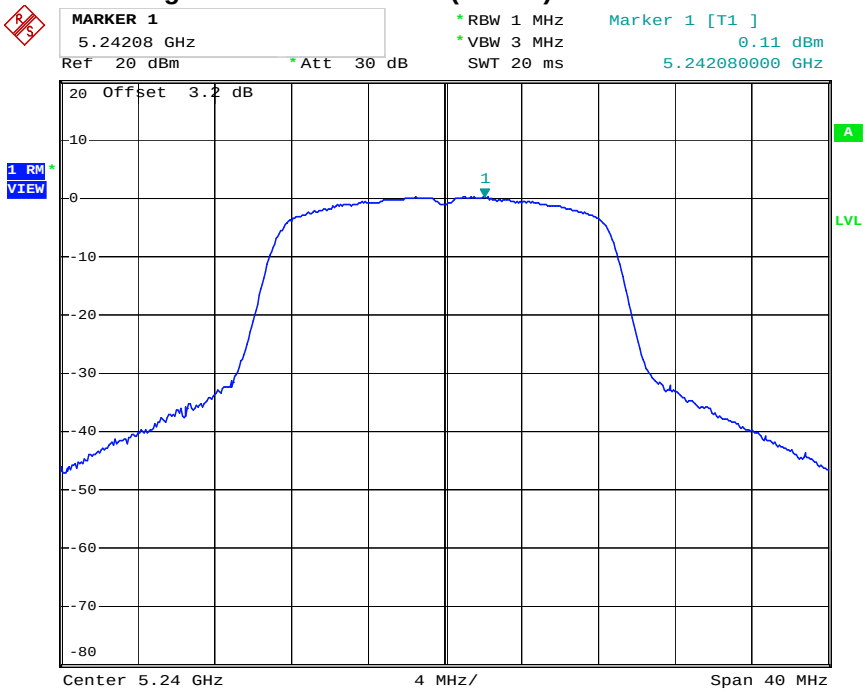
Date: 8.SEP.2011 23:33:54

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



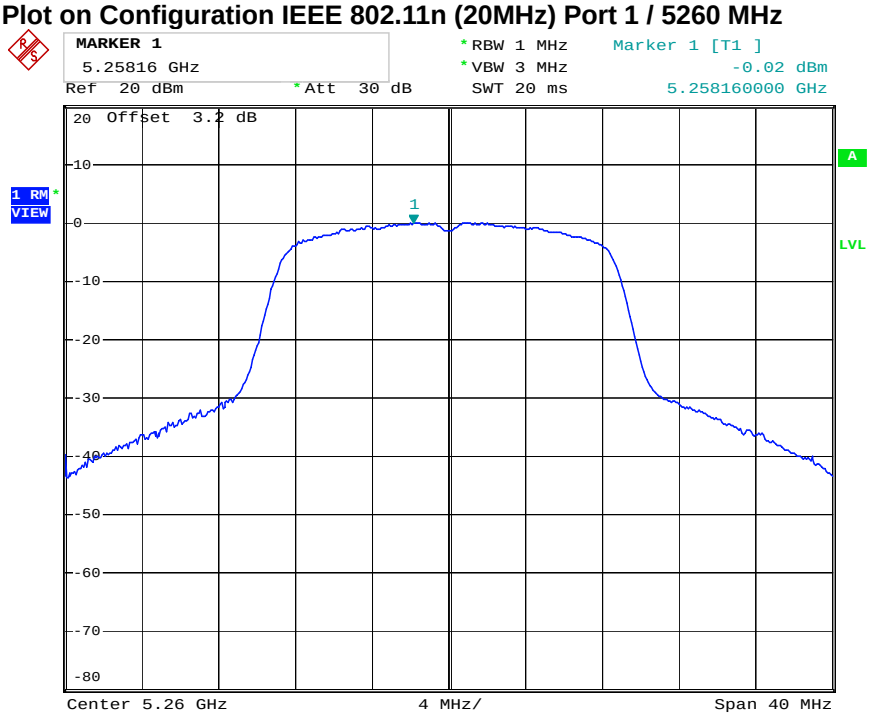
Date: 8.SEP.2011 23:38:54

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



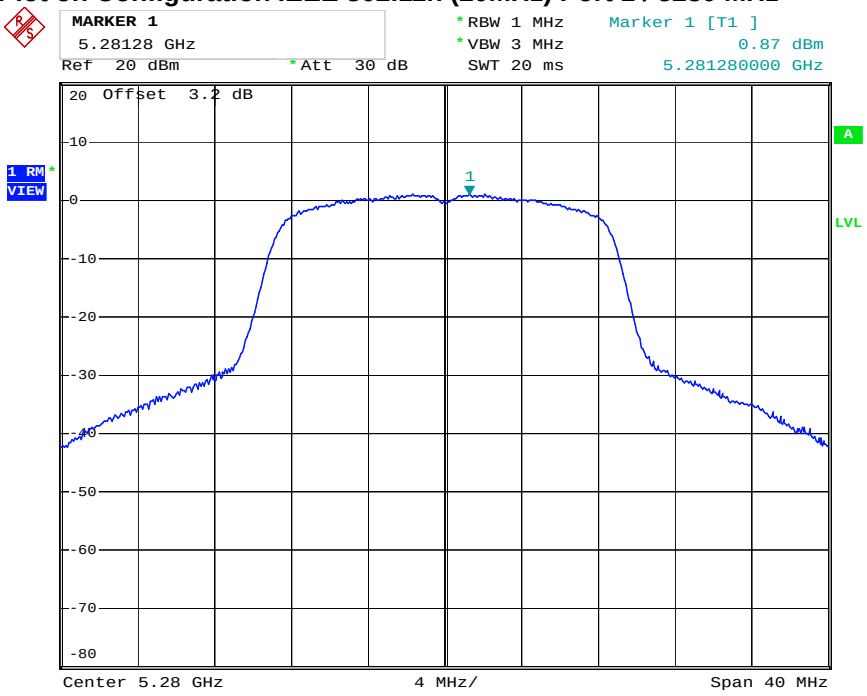
Date: 8.SEP.2011 23:43:45

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5260 MHz



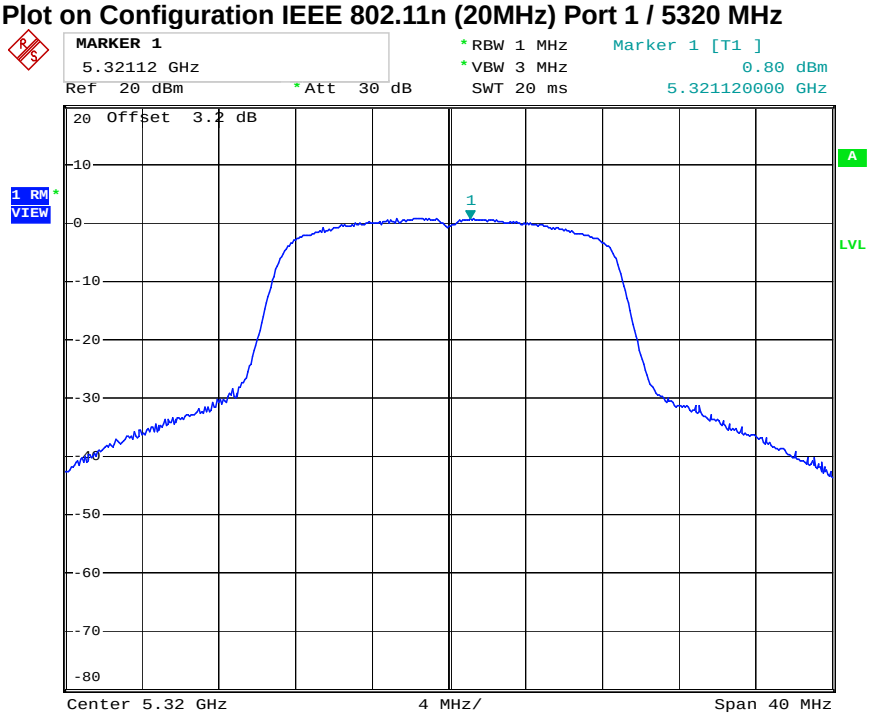
Date: 8.SEP.2011 23:49:39

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5280 MHz



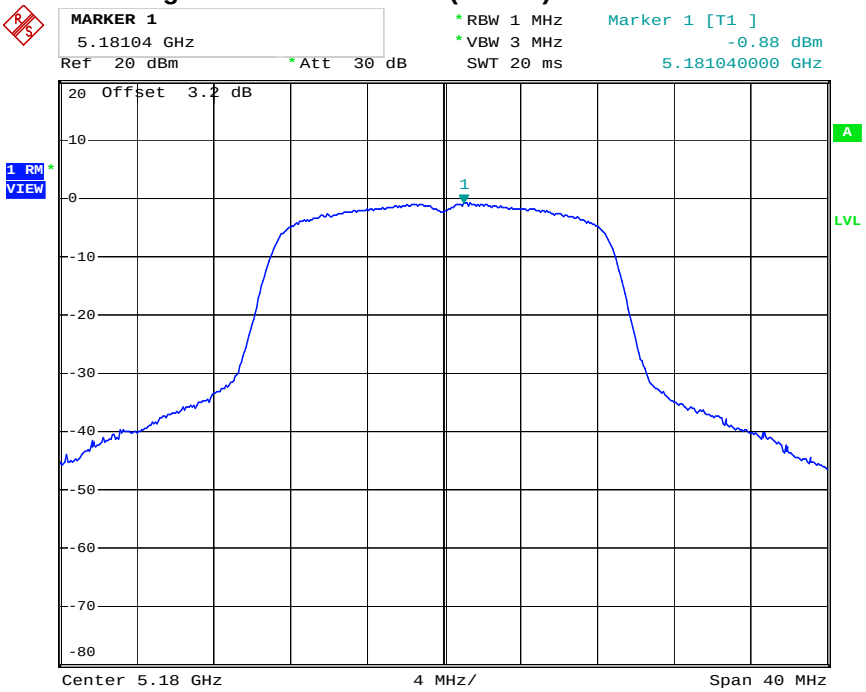
Date: 9.SEP.2011 00:10:52

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5320 MHz



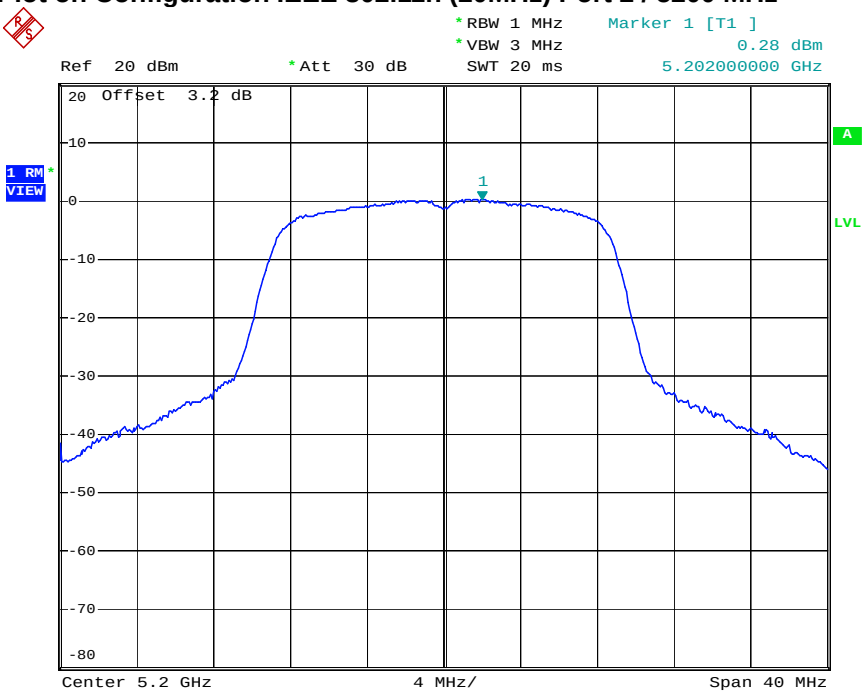
Date: 9.SEP.2011 00:21:11

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



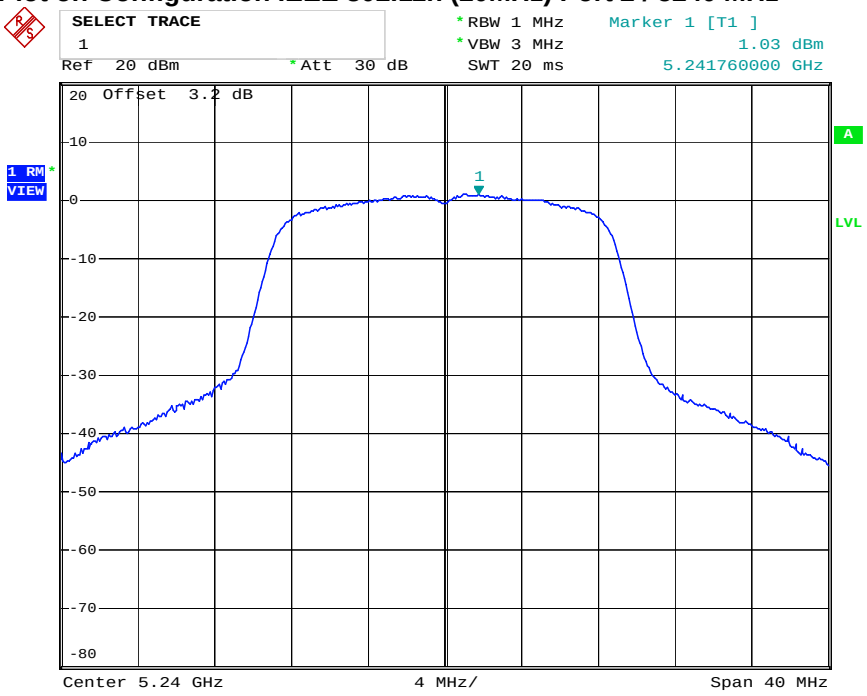
Date: 10.SEP.2011 00:08:50

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



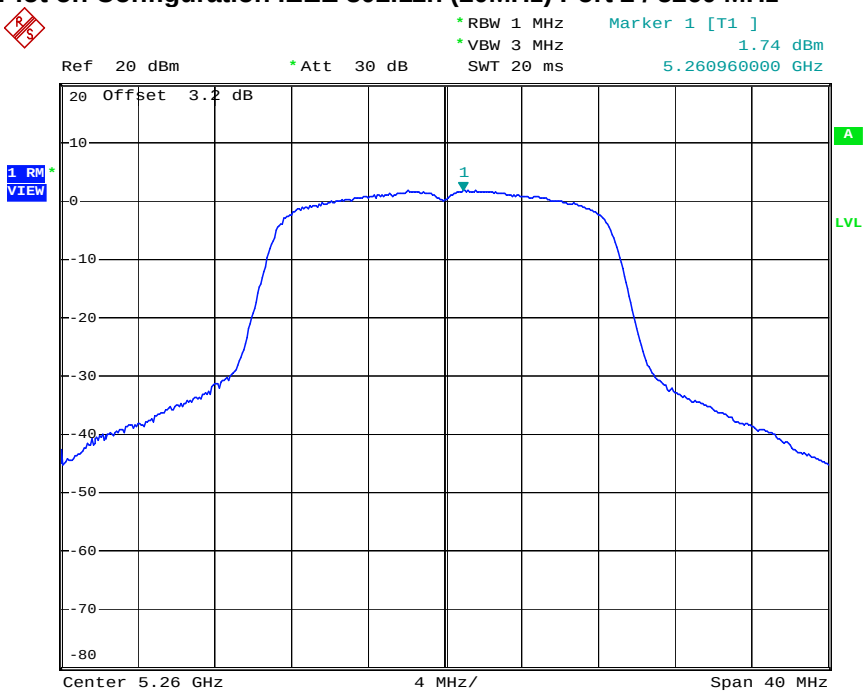
Date: 10.SEP.2011 00:12:14

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



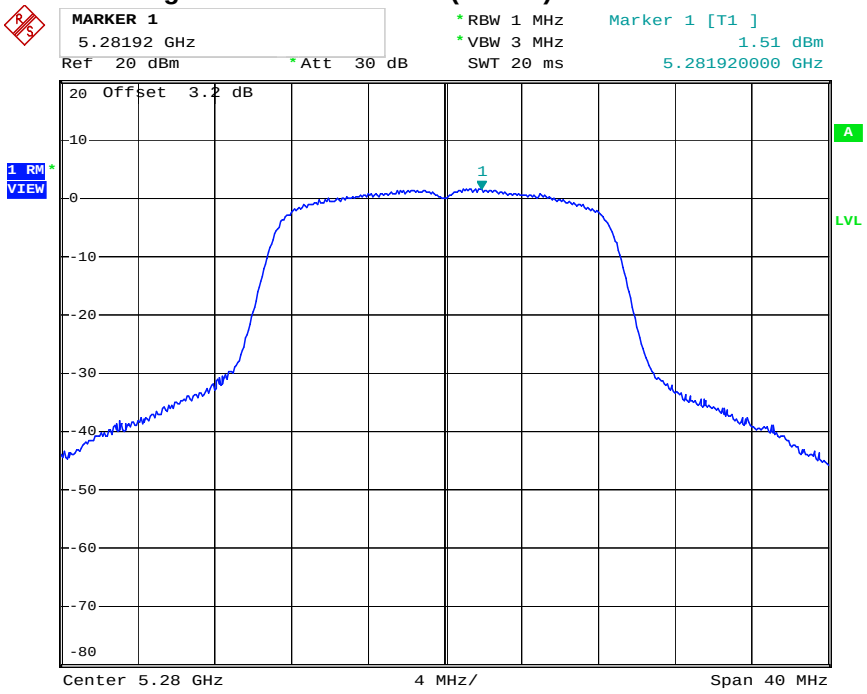
Date: 10.SEP.2011 00:17:48

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5260 MHz



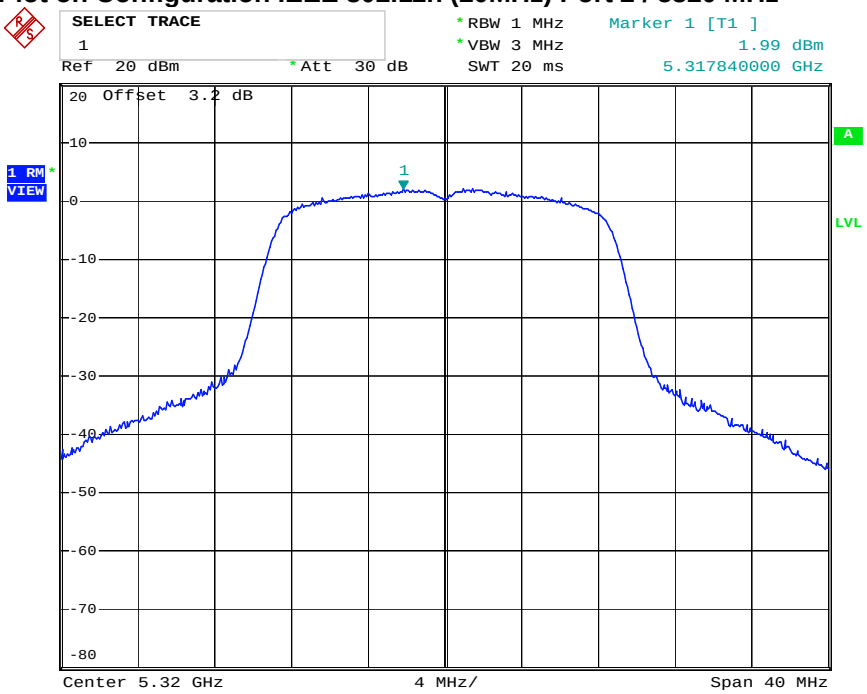
Date: 10.SEP.2011 00:22:18

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5280 MHz



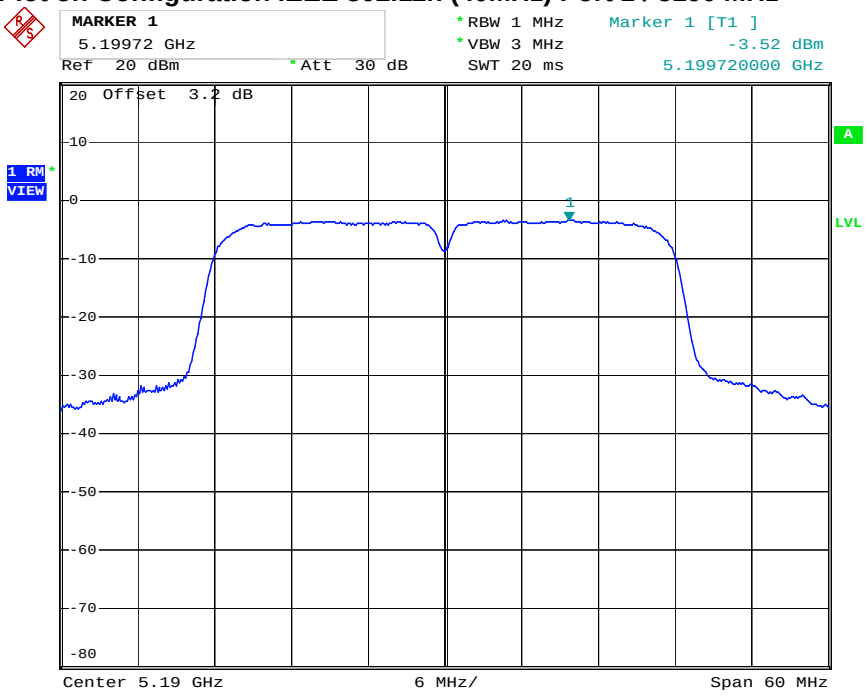
Date: 10.SEP.2011 00:26:11

Power Density Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5320 MHz



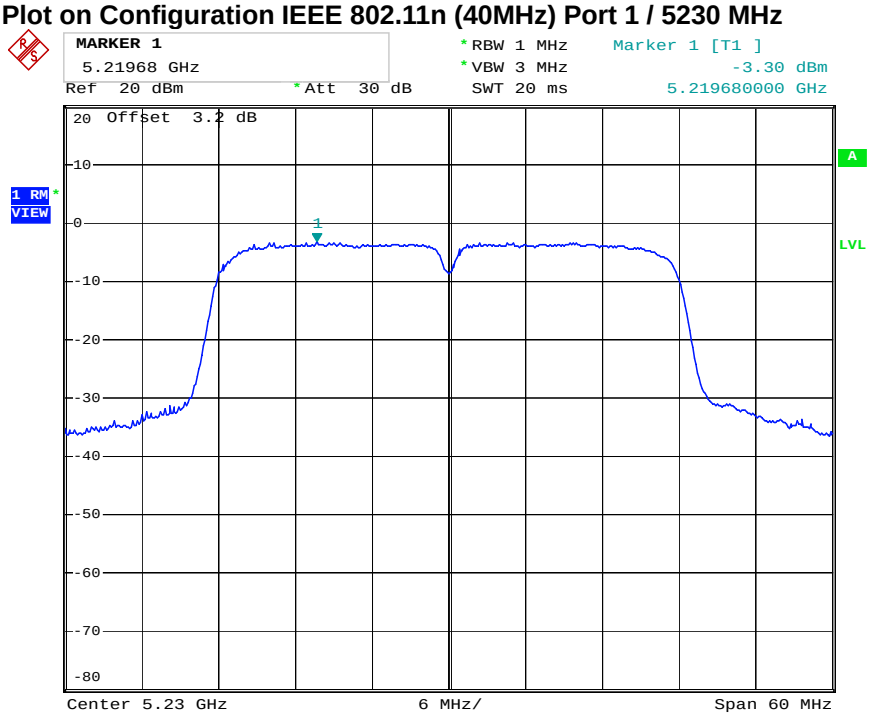
Date: 10.SEP.2011 00:28:02

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



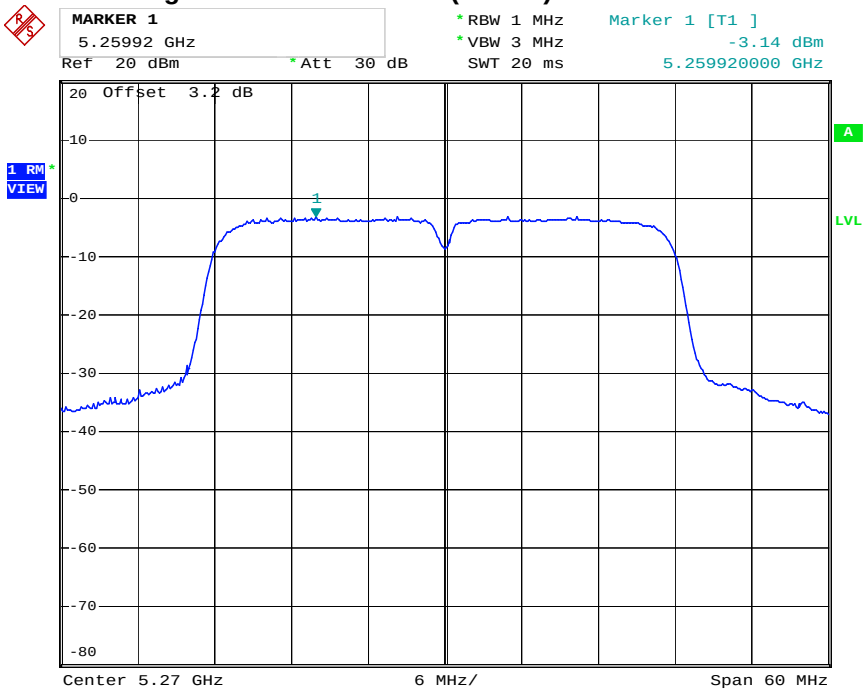
Date: 9.SEP.2011 10:25:03

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



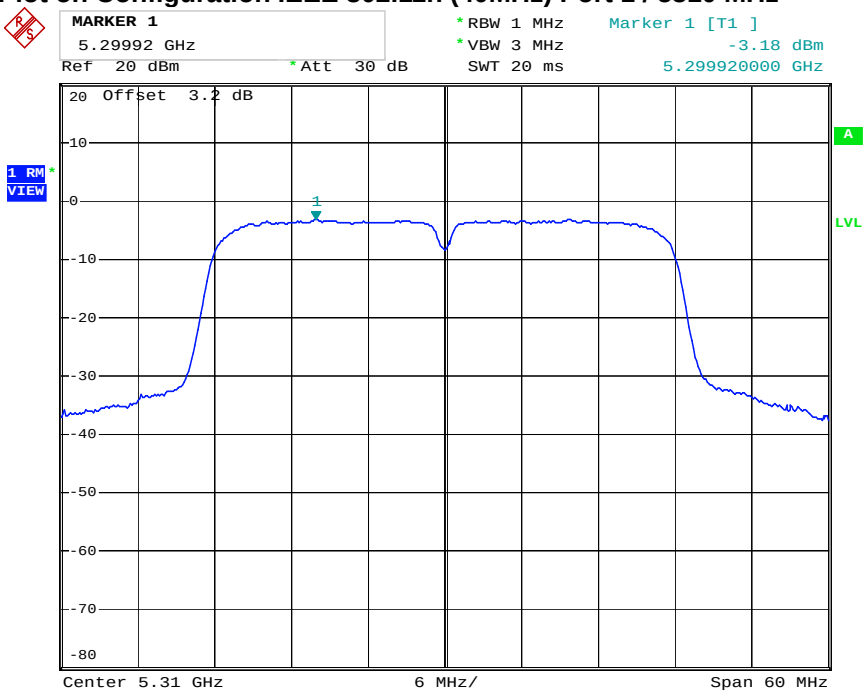
Date: 9.SEP.2011 11:05:36

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5270 MHz



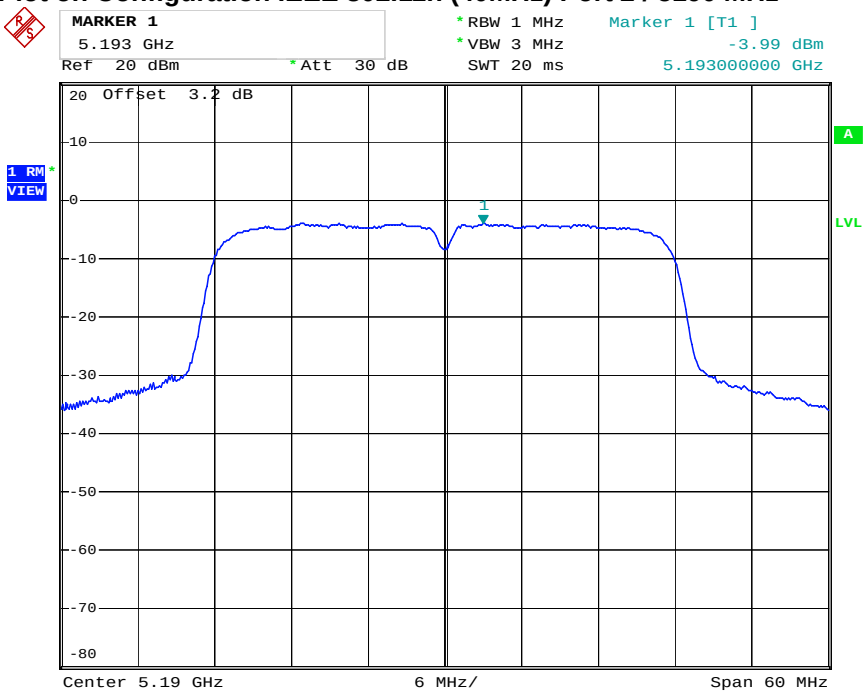
Date: 9.SEP.2011 11:18:30

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5310 MHz



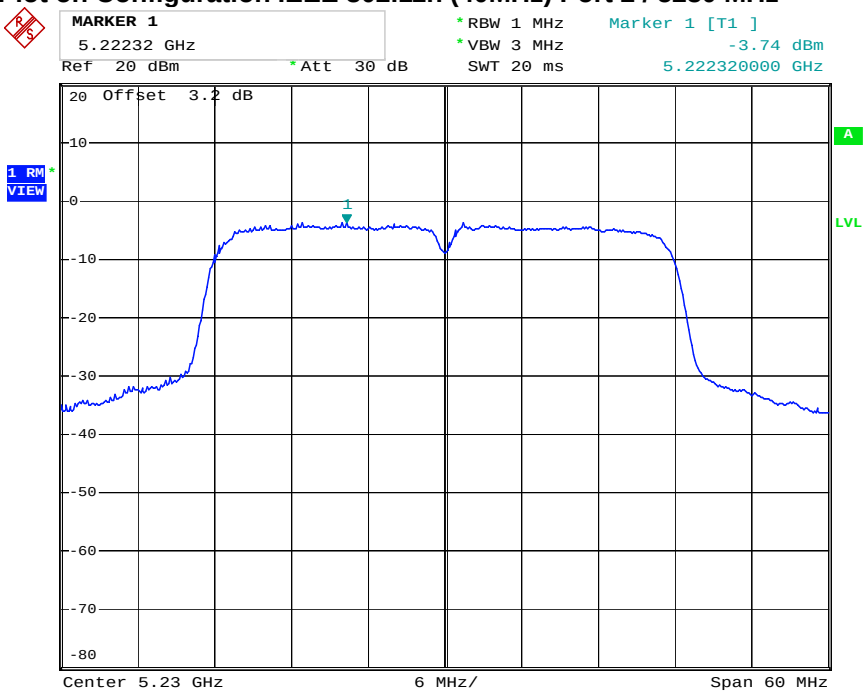
Date: 9.SEP.2011 11:32:28

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



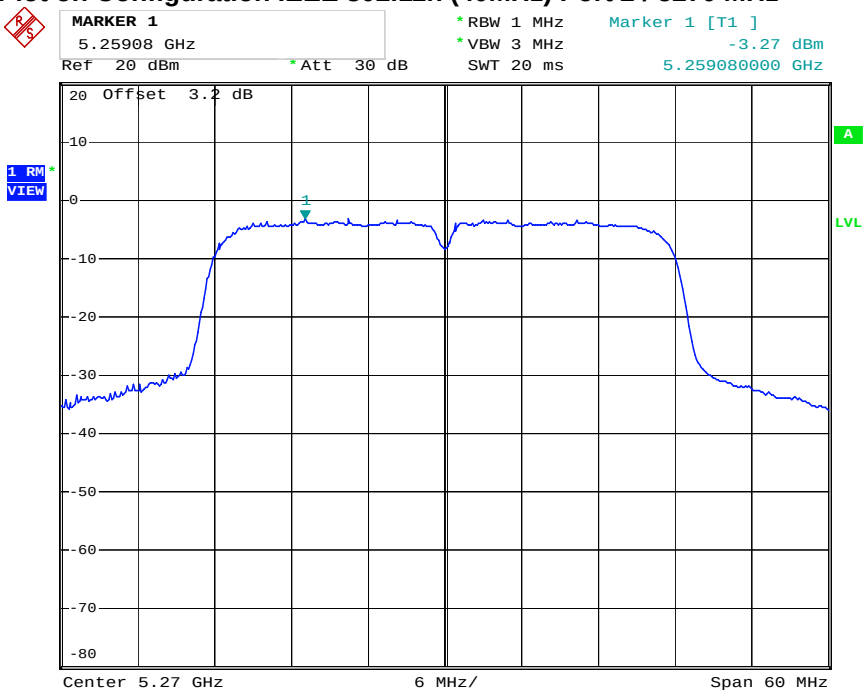
Date: 9.SEP.2011 10:42:01

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



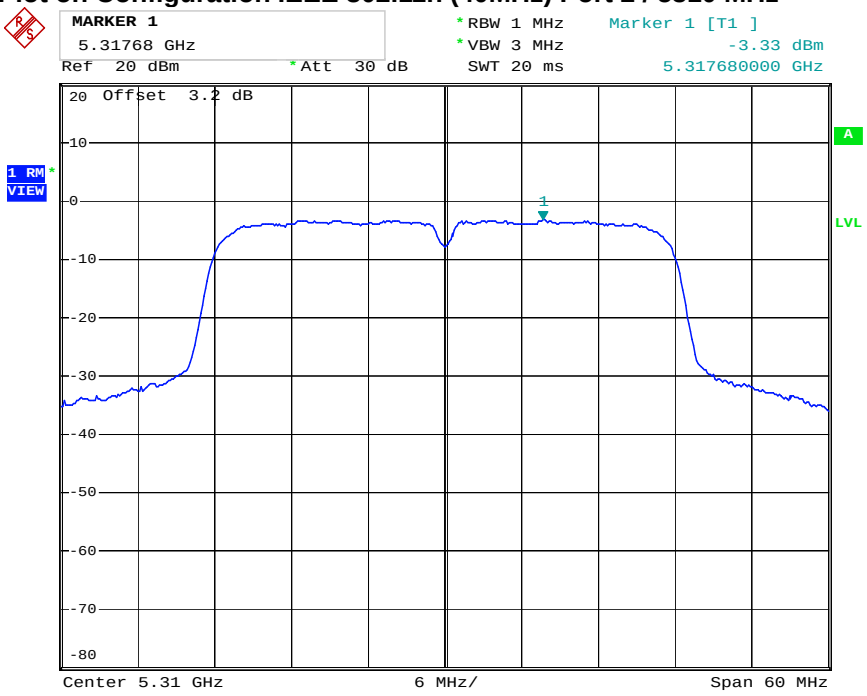
Date: 9.SEP.2011 10:53:30

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5270 MHz



Date: 9.SEP.2011 11:23:08

Power Density Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5310 MHz



Date: 9.SEP.2011 11:35:59

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

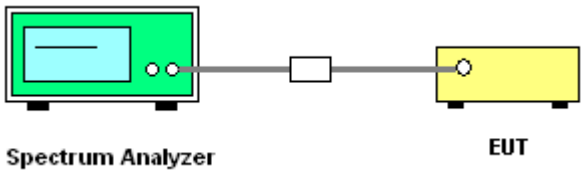
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	300 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 ≥ 300 kHz with peak detector and max-hold settings.
4. Average Trace: Method #3—video averaging with max hold--and sum power across the band. Set span to encompass the entire emissions bandwidth (EBW) of the signal. Set sweep trigger to “free run”. Set RBW = 1 MHz. Set VBW ≥ 1/T (IEEE 802.11a VBW = 300kHz ≥ 1/4μs). Use sample detector mode if bin width (i.e., span/number of points in spectrum) < 0.5 RBW. Otherwise use peak detector mode. Set max hold. Allow max hold to run for 60 seconds.

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	Sep. 10, 2011	**Test Site No.**	TH01-HY
Temperature	24.5℃	**Humidity**	56%
Test Engineer	Cain	**Configurations**	802.11a/n

For Single Chain:
Configuration of IEEE 802.11a Port 1

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	5.07	13	**Complies**
5200 MHz	5.32	13	**Complies**
5240 MHz	5.41	13	**Complies**
5260 MHz	5.31	13	**Complies**
5280 MHz	5.27	13	**Complies**
5320 MHz	5.10	13	**Complies**

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

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	5.05	13	**Complies**
5200 MHz	5.03	13	**Complies**
5240 MHz	5.08	13	**Complies**
5260 MHz	5.07	13	**Complies**
5280 MHz	5.07	13	**Complies**
5320 MHz	5.13	13	**Complies**

Configuration IEEE 802.11n (20MHz) Port 2

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	6.54	13	**Complies**
5200 MHz	6.71	13	**Complies**
5240 MHz	6.57	13	**Complies**
5260 MHz	6.72	13	**Complies**
5280 MHz	6.60	13	**Complies**
5320 MHz	6.57	13	**Complies**

Configuration IEEE 802.11n (40MHz) Port 1

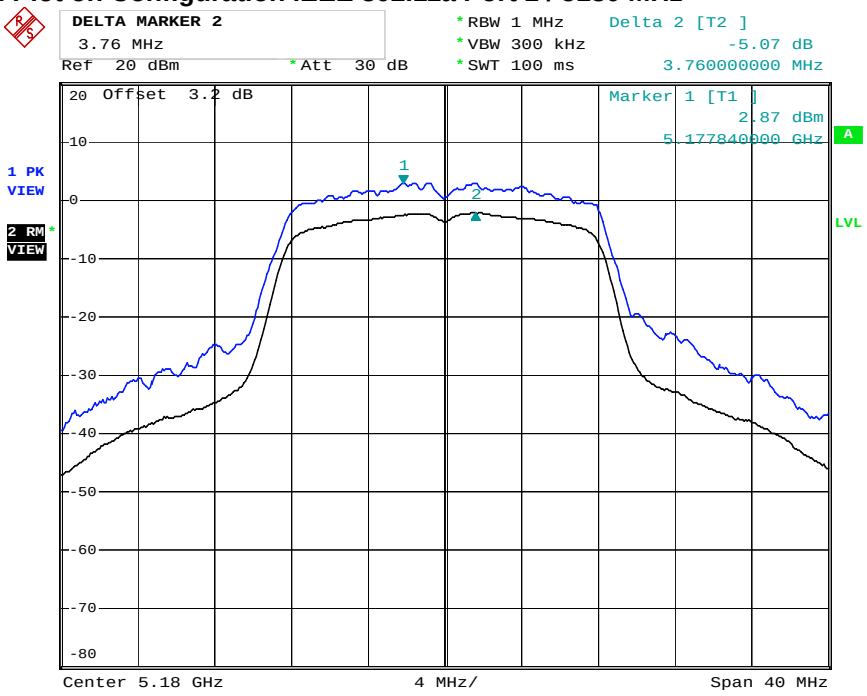
Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5190 MHz	6.22	13	**Complies**
5230 MHz	5.97	13	**Complies**
5270 MHz	6.08	13	**Complies**
5310 MHz	5.99	13	**Complies**

Configuration IEEE 802.11n (40MHz) Port 2

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5190 MHz	6.87	13	**Complies**
5230 MHz	6.80	13	**Complies**
5270 MHz	6.89	13	**Complies**
5310 MHz	6.97	13	**Complies**

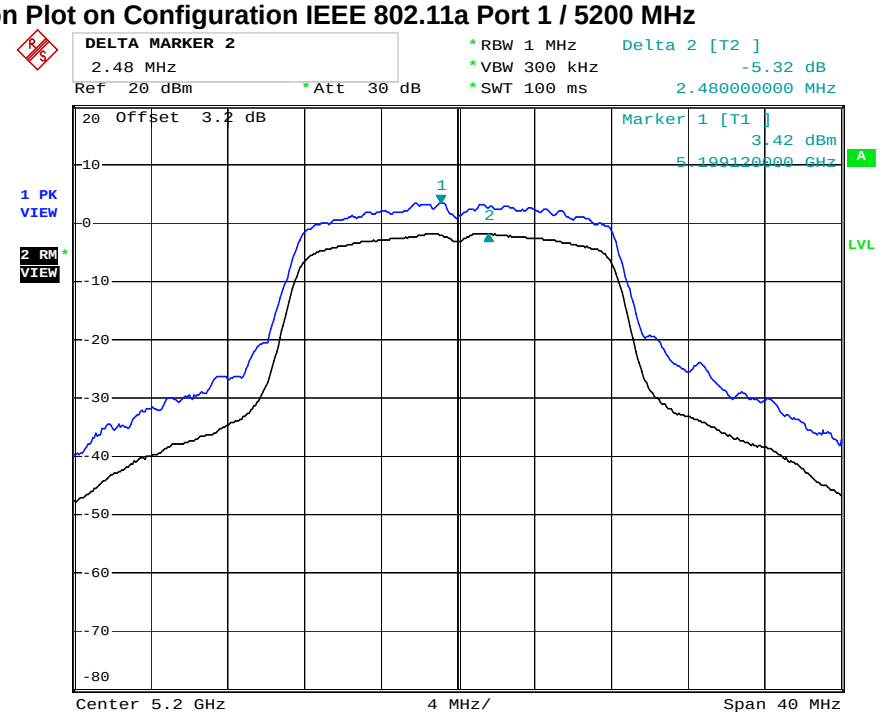
For Single Chain:

Peak Excursion Plot on Configuration IEEE 802.11a Port 1 / 5180 MHz



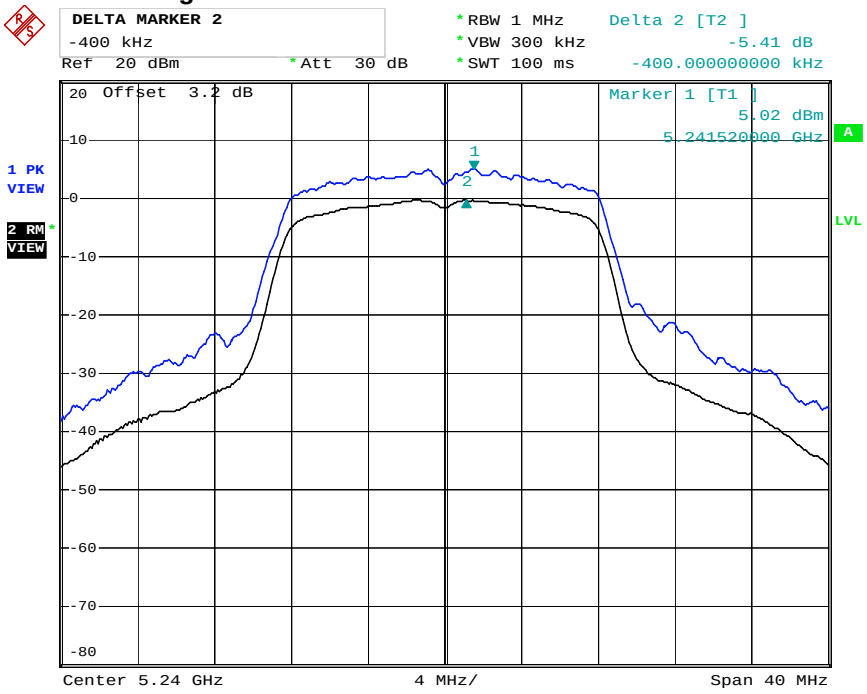
Date: 8.SEP.2011 20:54:02

Peak Excursion Plot on Configuration IEEE 802.11a Port 1 / 5200 MHz



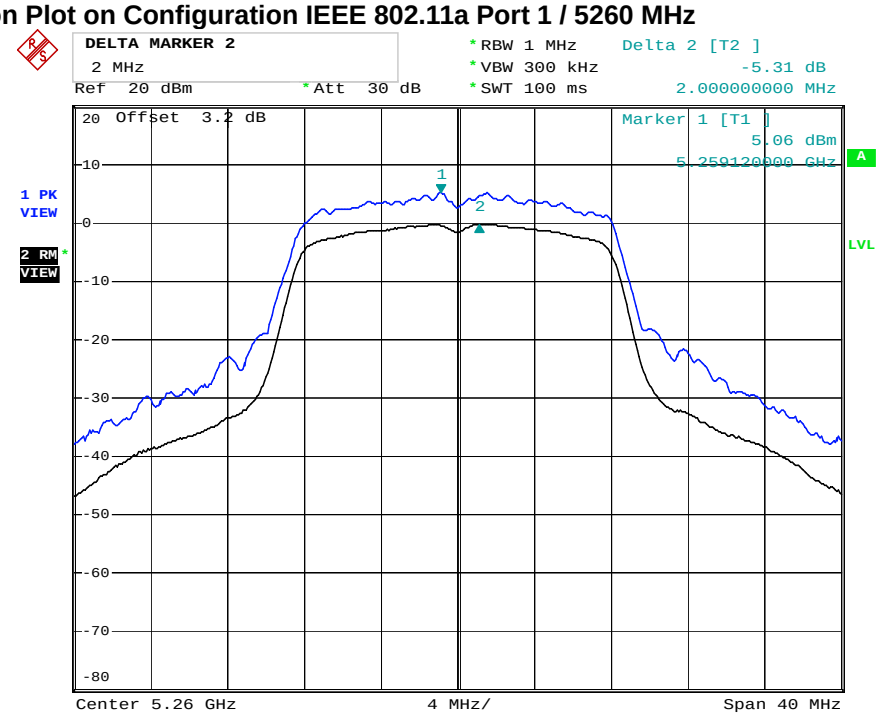
Date: 8.SEP.2011 20:56:48

Peak Excursion Plot on Configuration IEEE 802.11a Port 1 / 5240 MHz



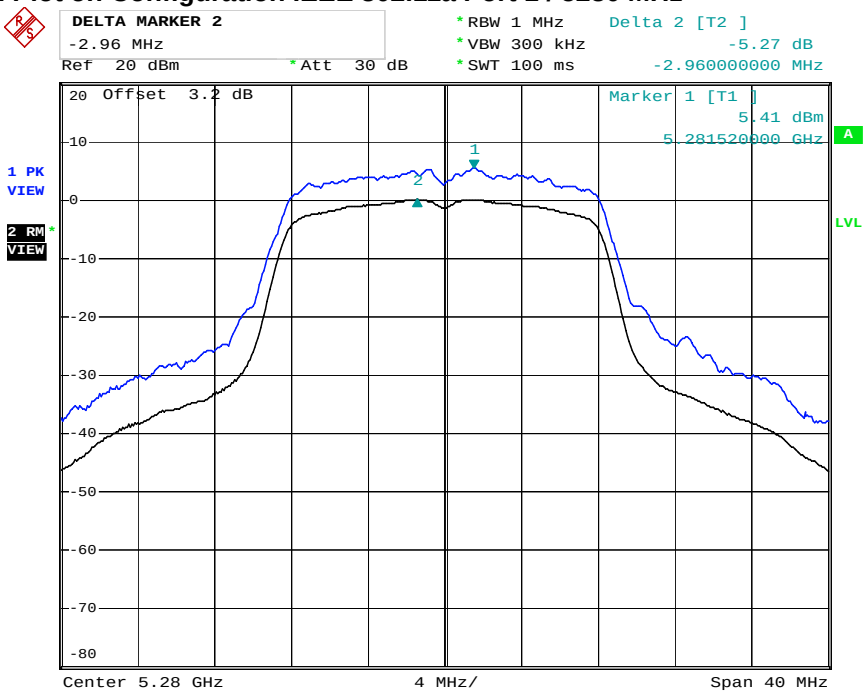
Date: 8.SEP.2011 21:01:42

Peak Excursion Plot on Configuration IEEE 802.11a Port 1 / 5260 MHz



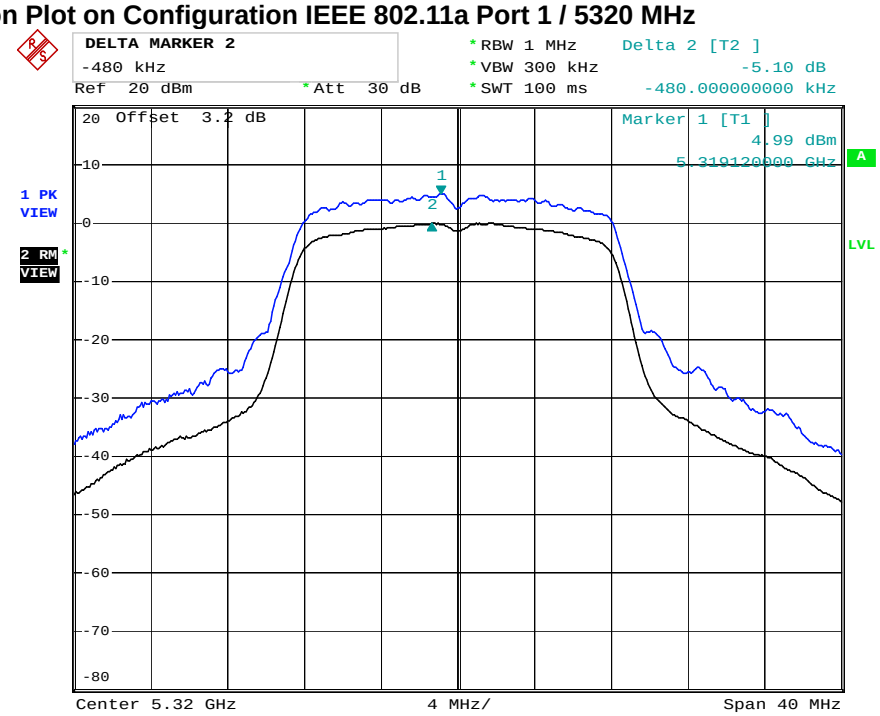
Date: 8.SEP.2011 21:03:51

Peak Excursion Plot on Configuration IEEE 802.11a Port 1 / 5280 MHz



Date: 8.SEP.2011 21:07:22

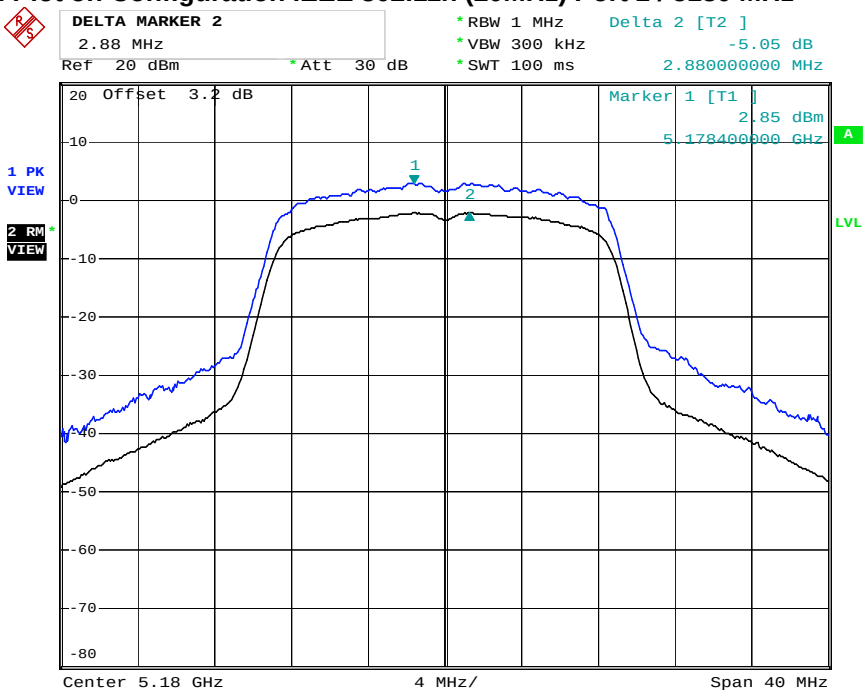
Peak Excursion Plot on Configuration IEEE 802.11a Port 1 / 5320 MHz



Date: 8.SEP.2011 21:09:14

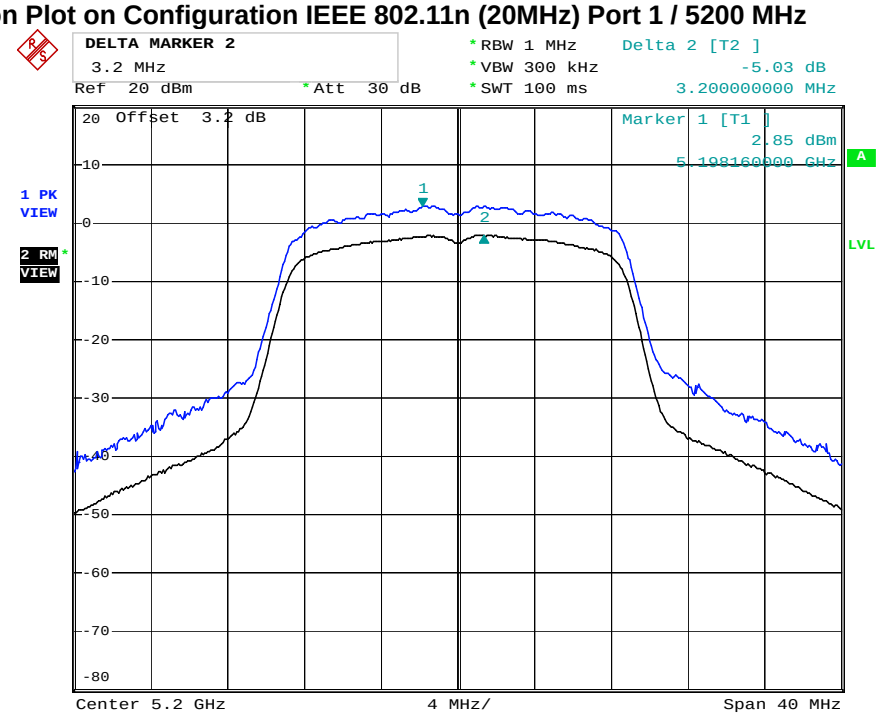
For Two Chains:

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



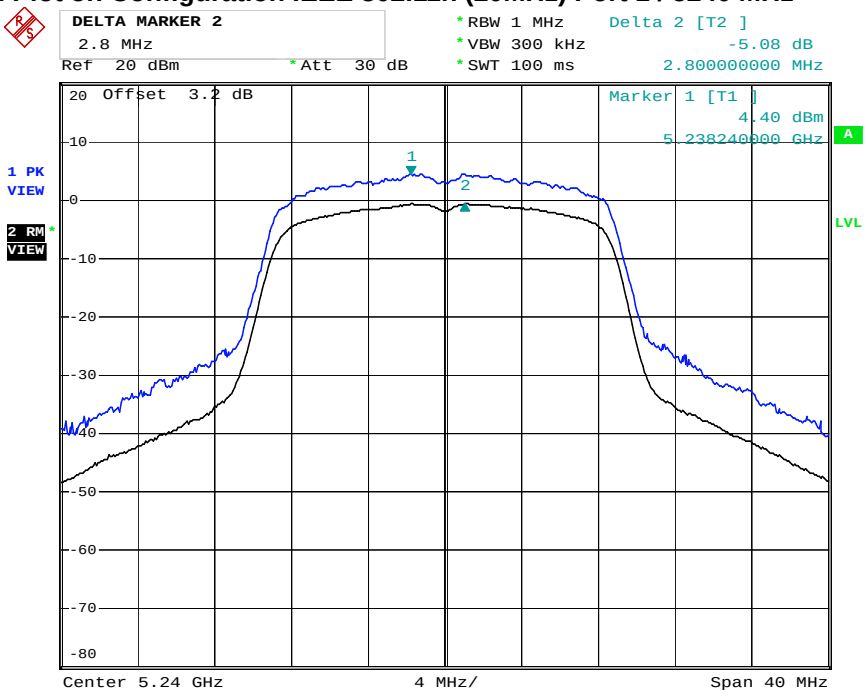
Date: 8.SEP.2011 23:33:29

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



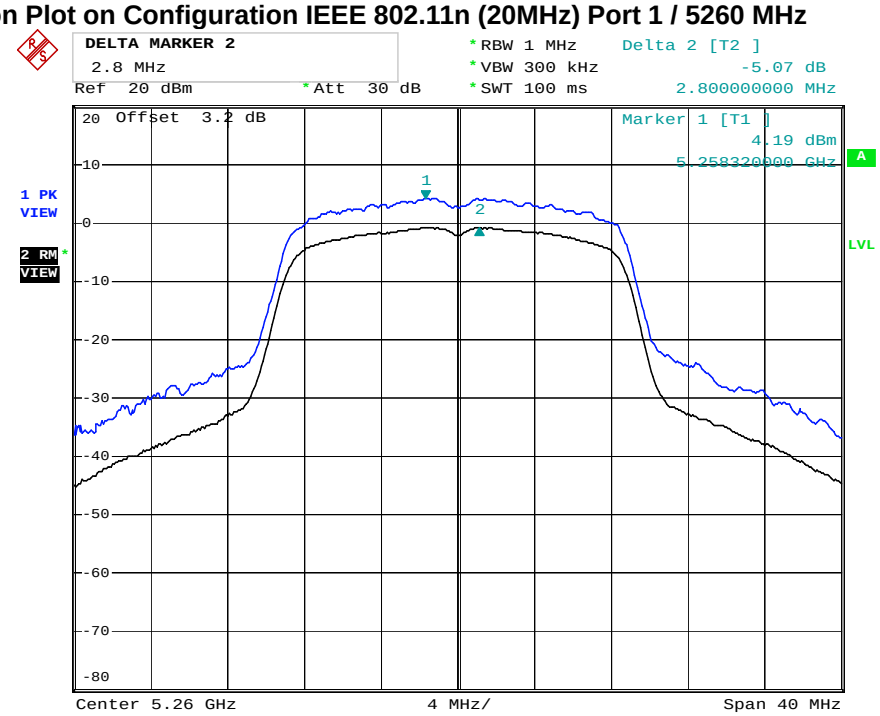
Date: 8.SEP.2011 23:38:32

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



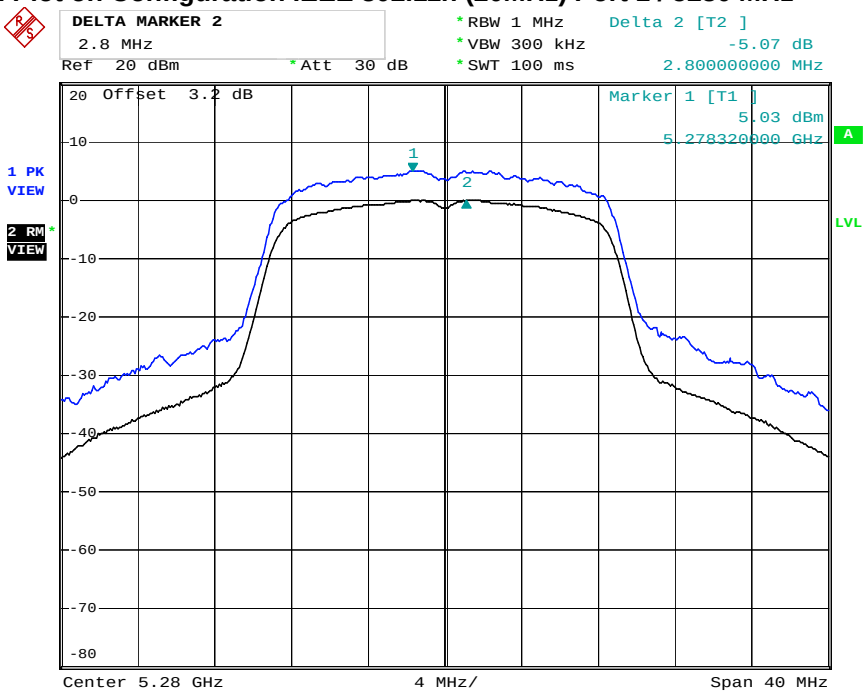
Date: 8.SEP.2011 23:43:20

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5260 MHz



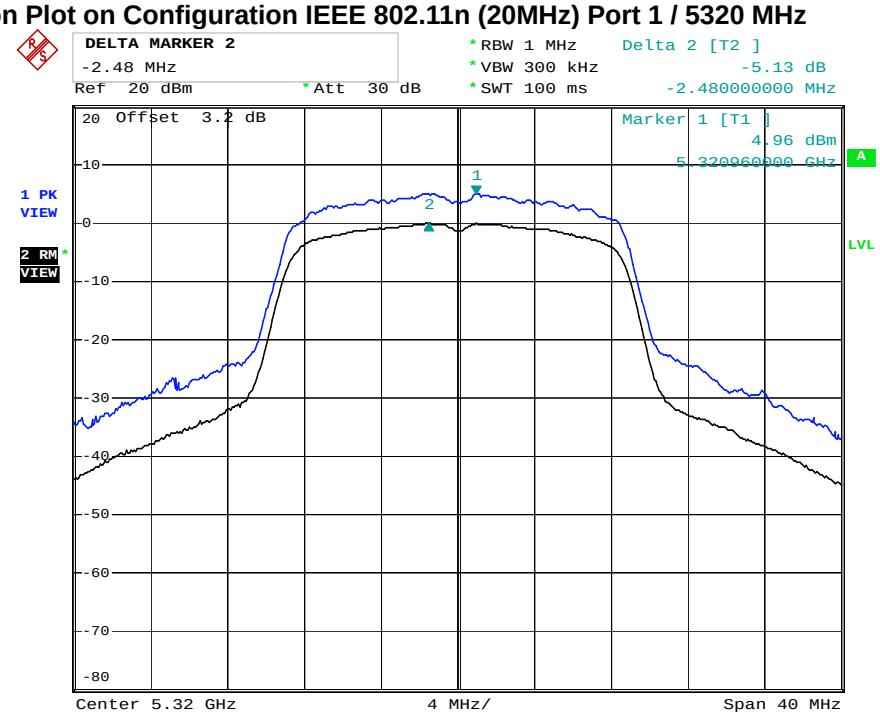
Date: 8.SEP.2011 23:49:02

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5280 MHz



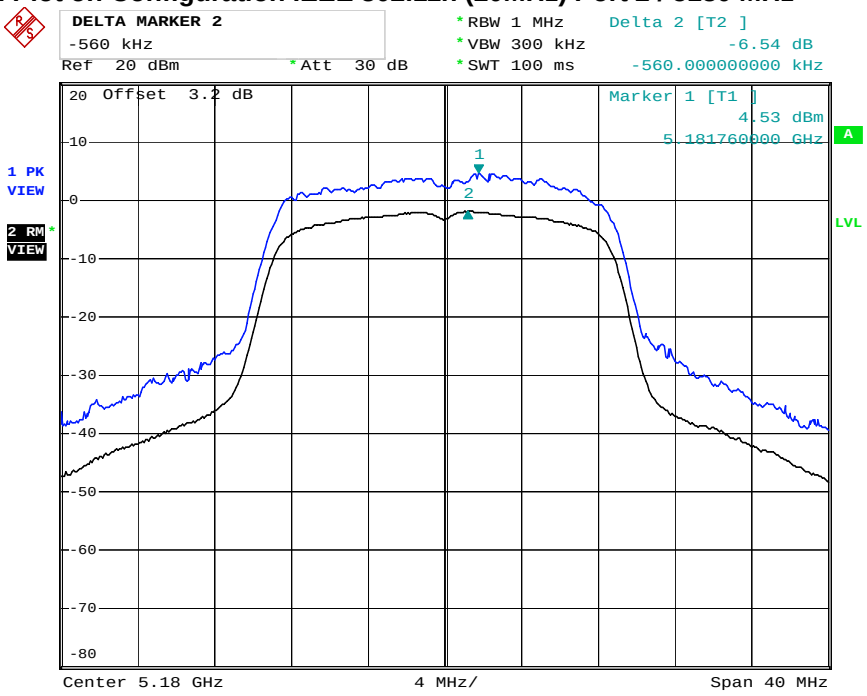
Date: 9.SEP.2011 00:10:29

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 1 / 5320 MHz



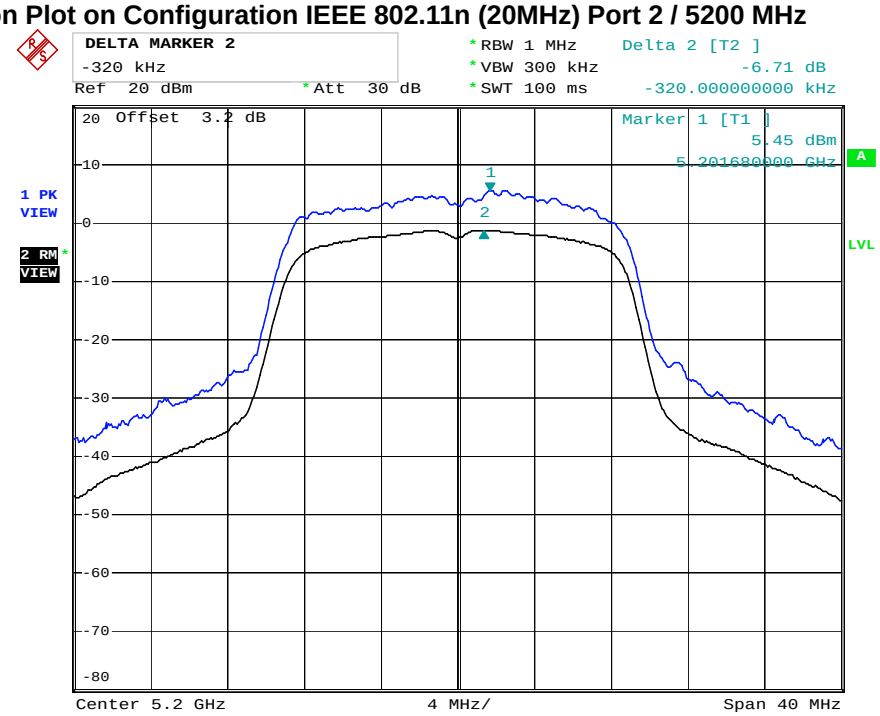
Date: 9.SEP.2011 00:20:54

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



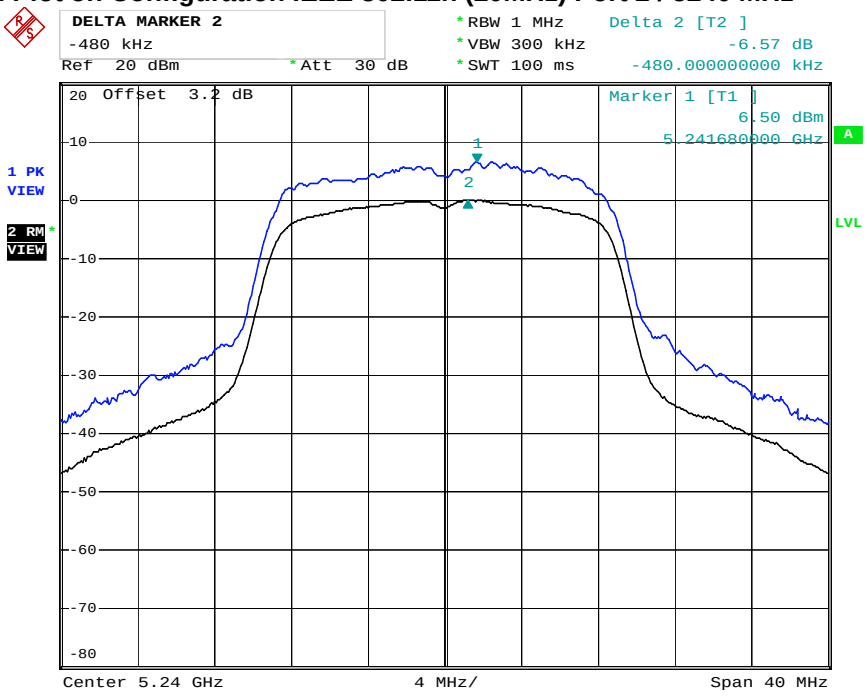
Date: 10.SEP.2011 00:08:20

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



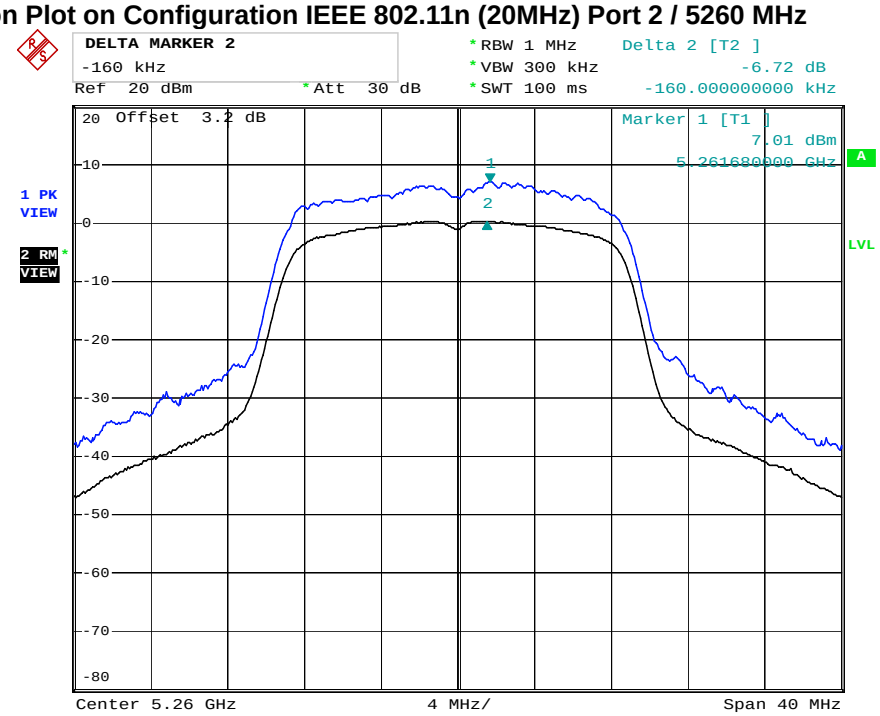
Date: 10.SEP.2011 00:13:05

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



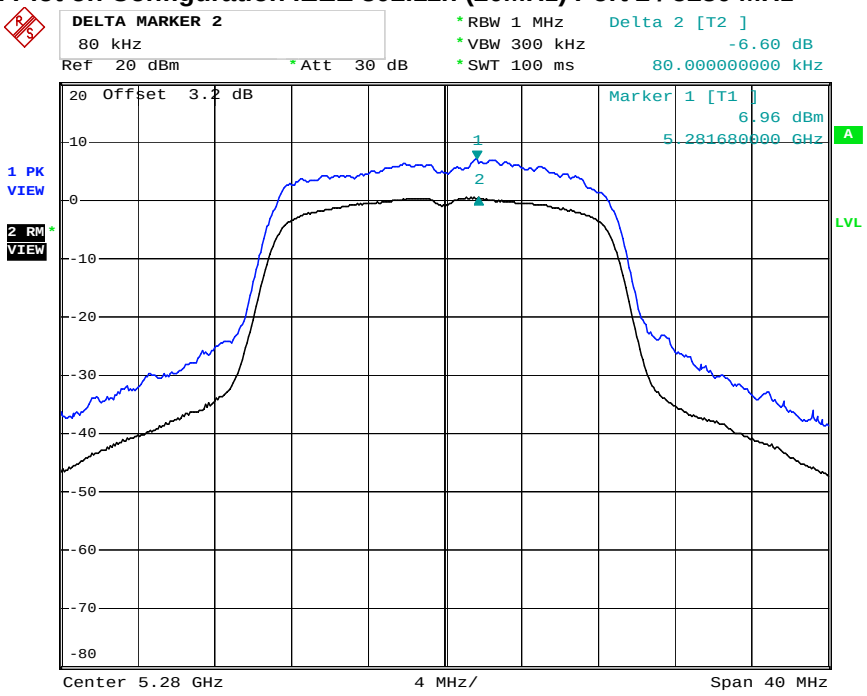
Date: 10.SEP.2011 00:16:42

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5260 MHz



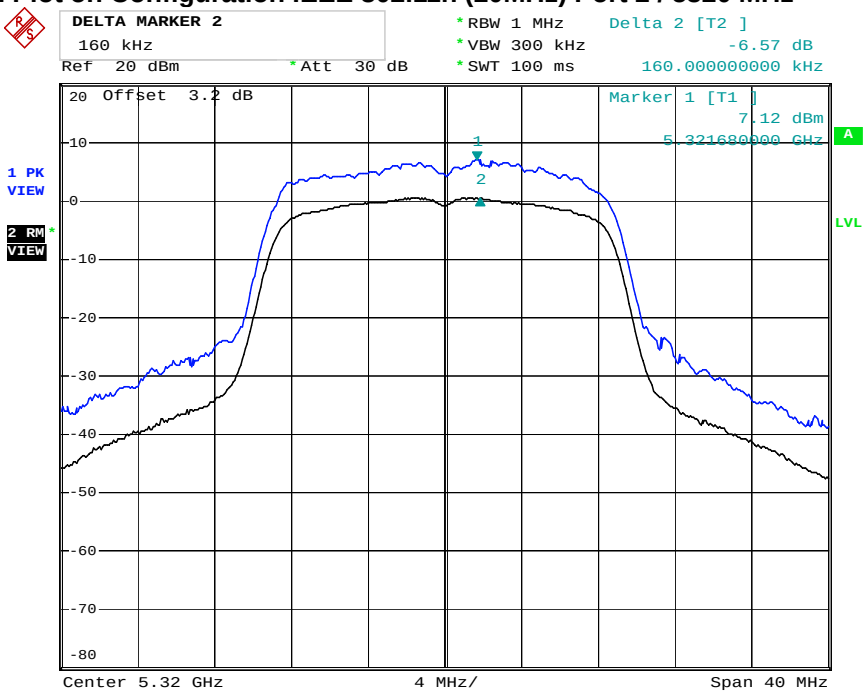
Date: 10.SEP.2011 00:22:54

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5280 MHz



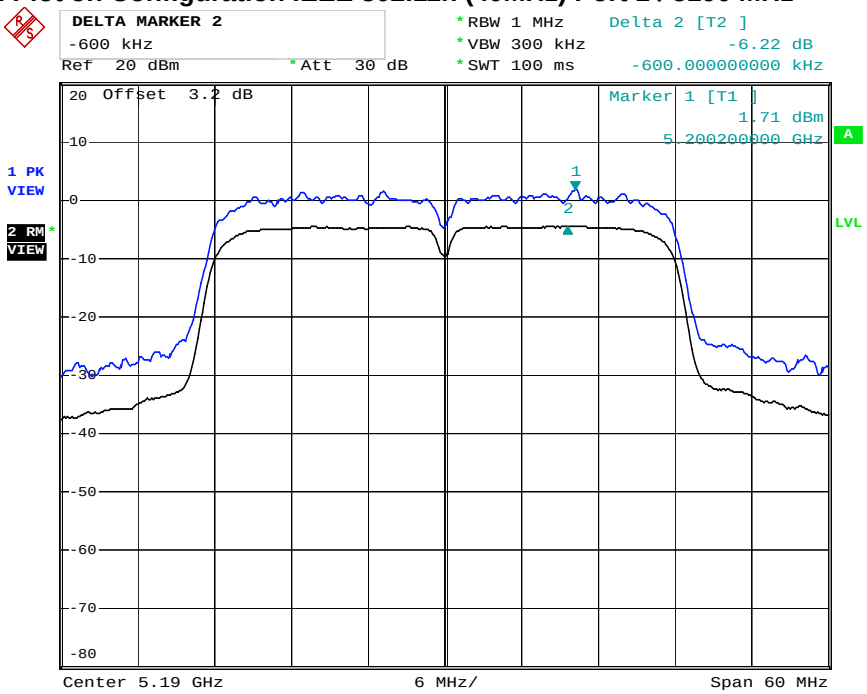
Date: 10.SEP.2011 00:25:49

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) Port 2 / 5320 MHz



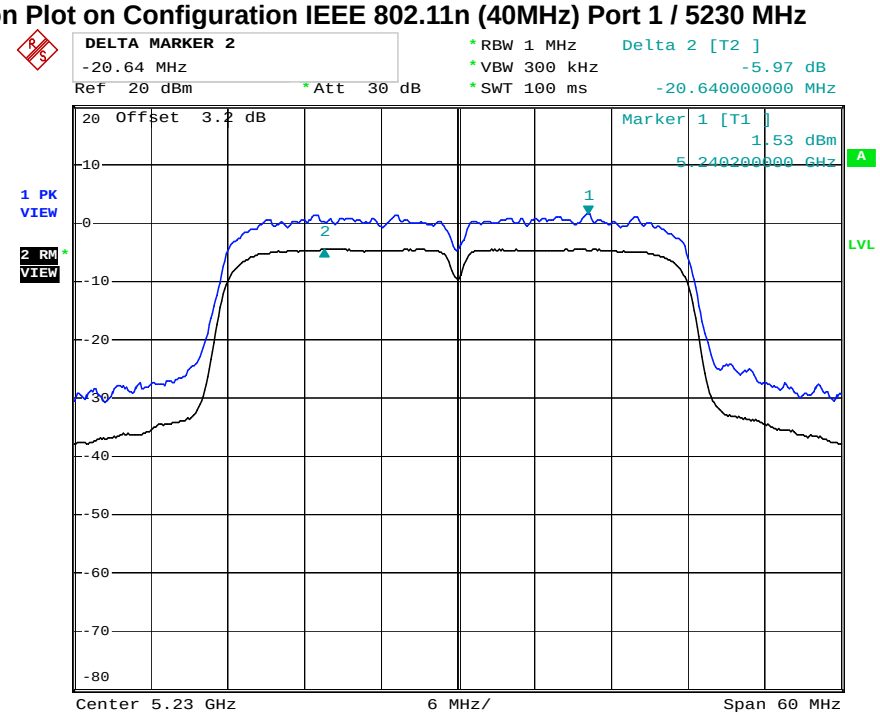
Date: 10.SEP.2011 00:29:21

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



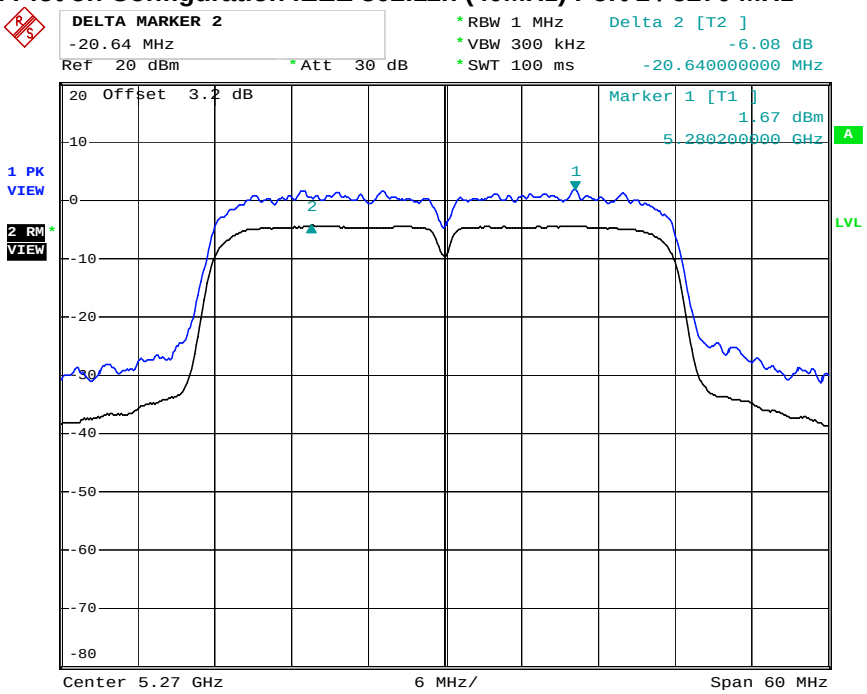
Date: 9.SEP.2011 10:23:55

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



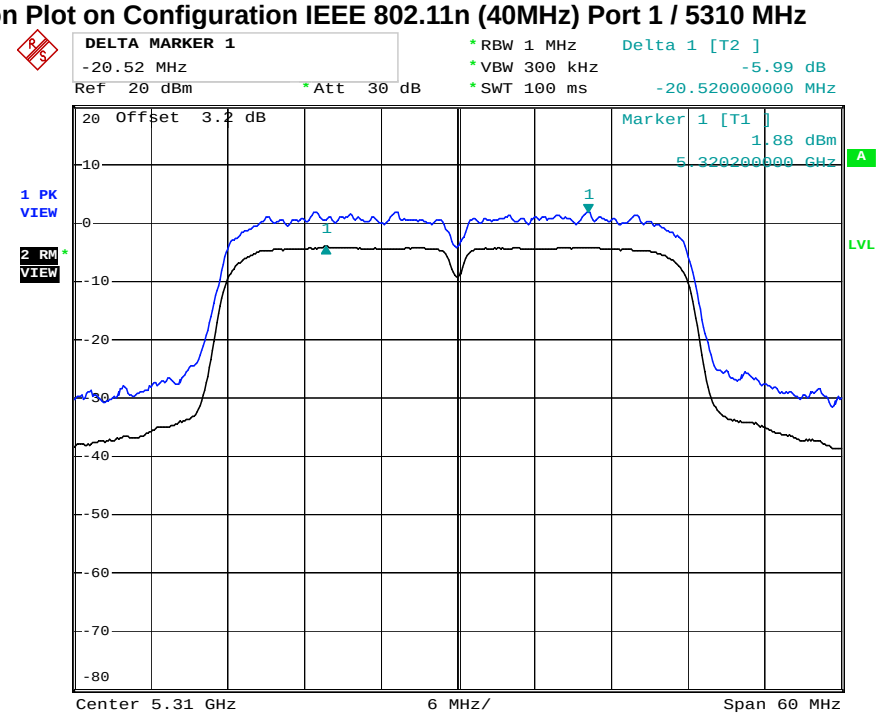
Date: 9.SEP.2011 11:04:54

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5270 MHz



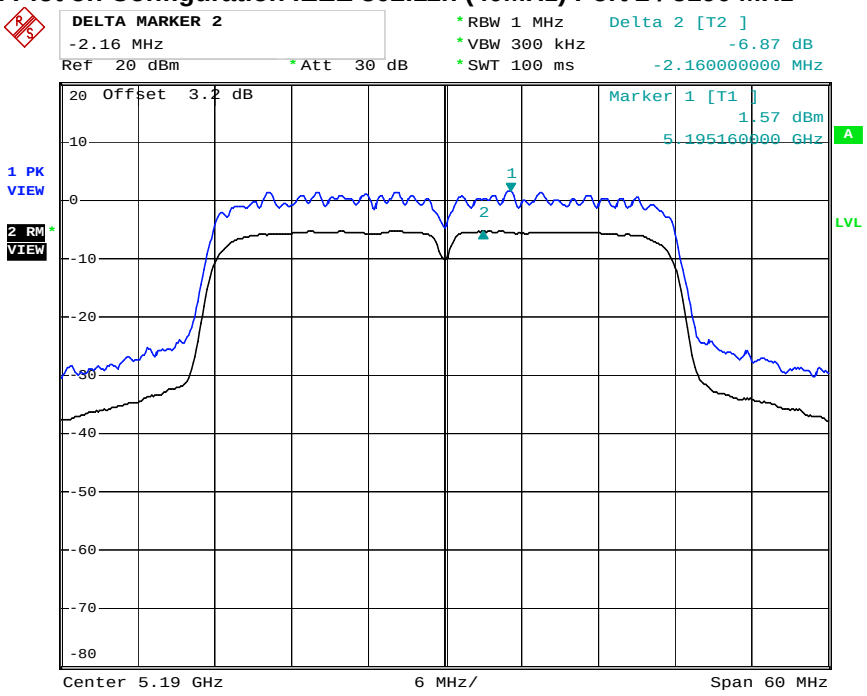
Date: 9.SEP.2011 11:17:31

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) Port 1 / 5310 MHz



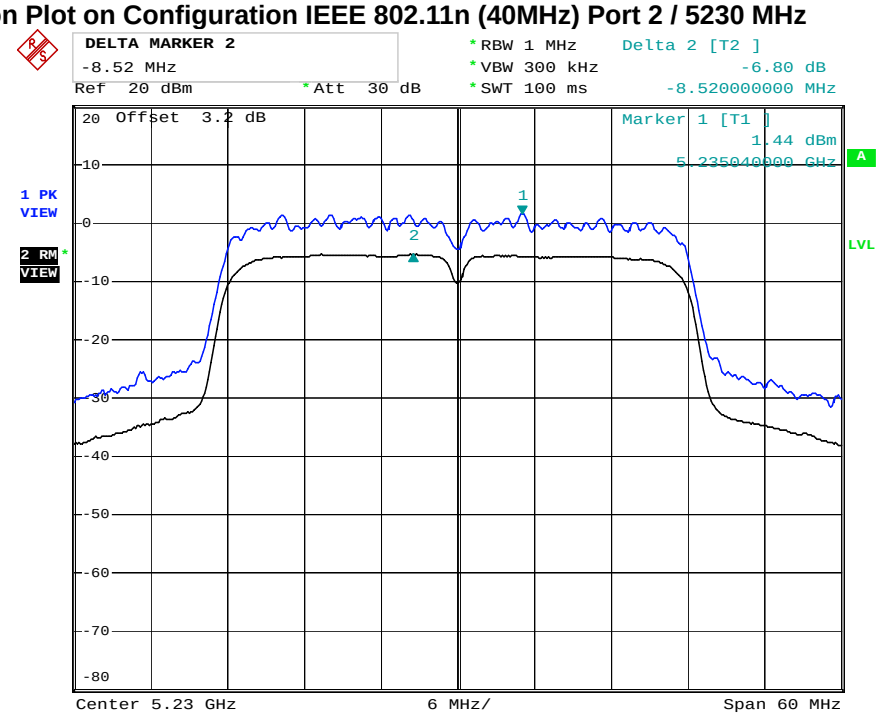
Date: 9.SEP.2011 11:31:33

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



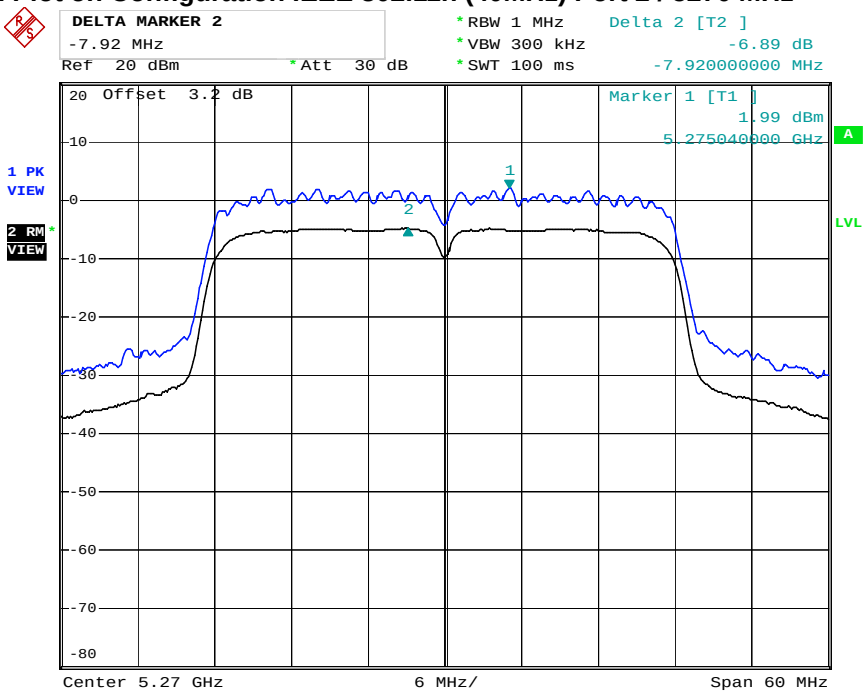
Date: 9.SEP.2011 10:40:42

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



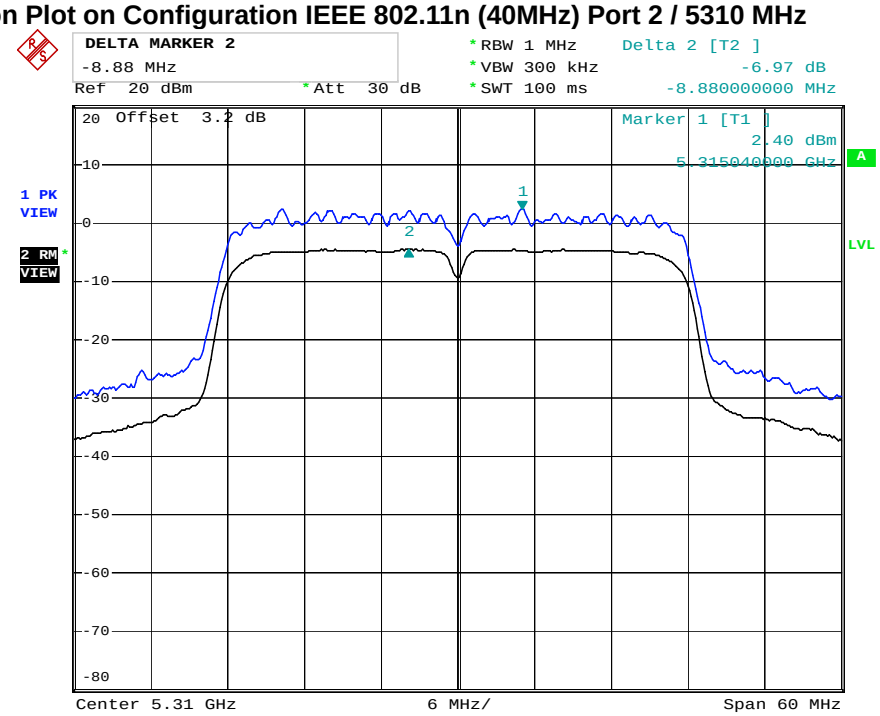
Date: 9.SEP.2011 10:52:21

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5270 MHz



Date: 9.SEP.2011 11:22:25

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) Port 2 / 5310 MHz



Date: 9.SEP.2011 11:35:14

3.6 Radiated Emissions Measurement

3.6.1 Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). 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

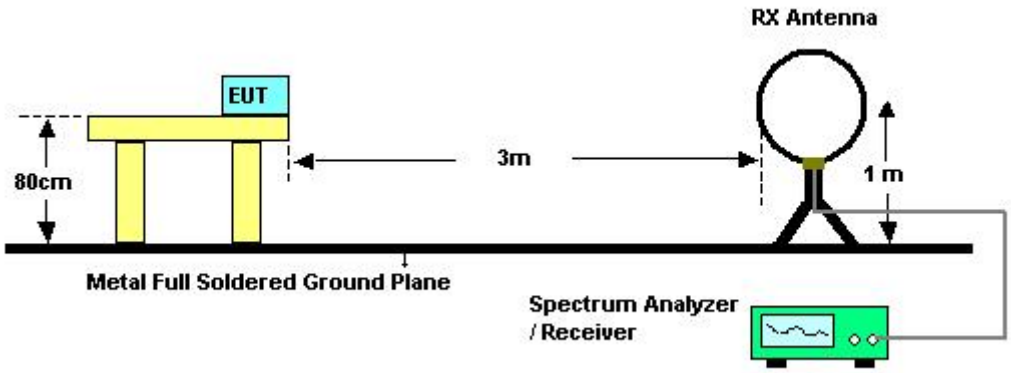
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.6.3 Test Procedures

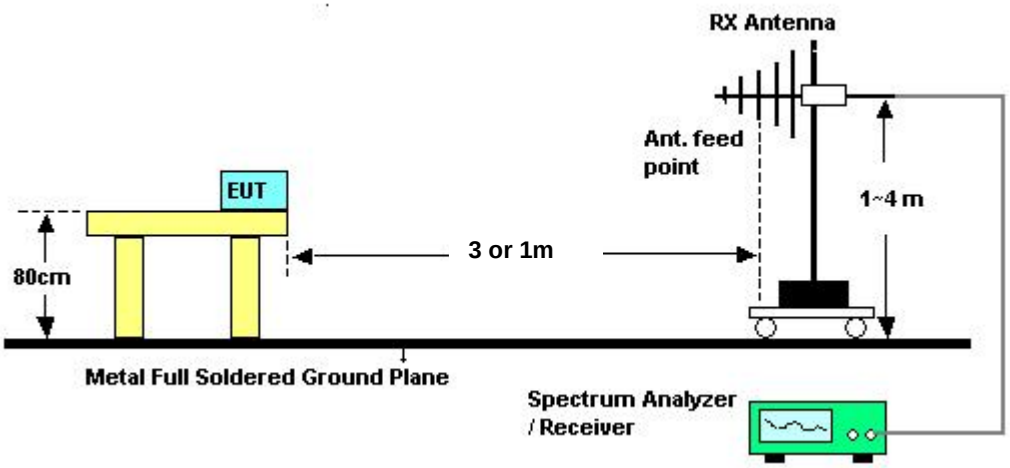
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 (specific distance [3m] / test distance [1m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

3.6.5 Test Deviation

There is no deviation with the original standard.

3.6.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

Final Test Date	Sep. 06, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Chris		

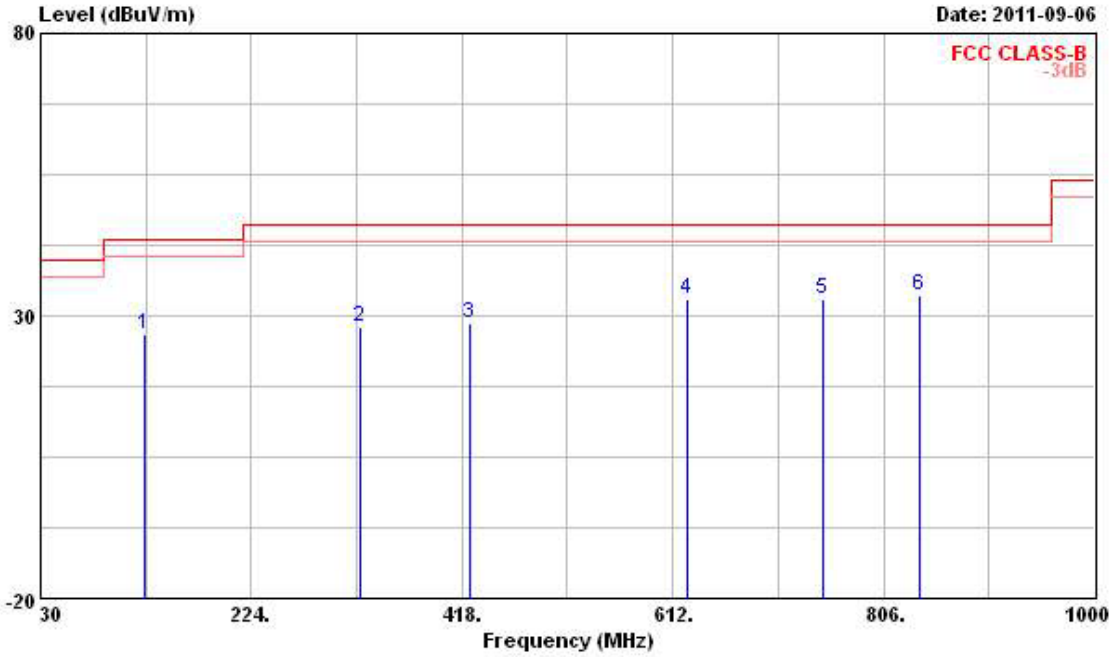
Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

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

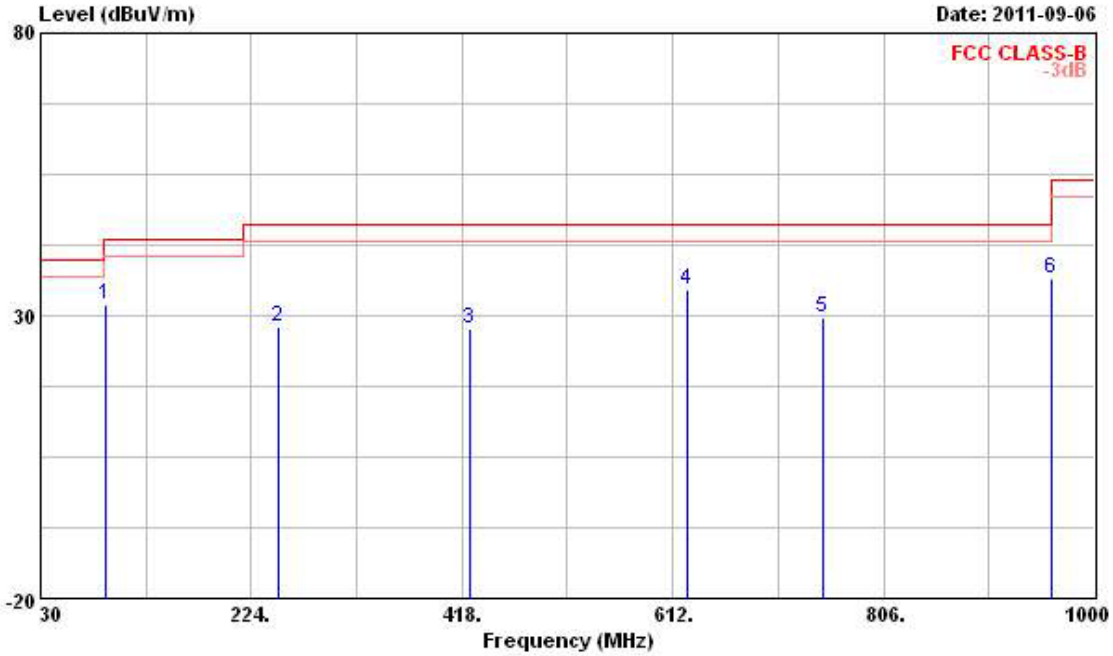
Final Test Date	Sep. 06, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Chris	**Configurations**	Normal Mode

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	125.060	26.69	-16.81	43.50	39.43	13.18	1.82	27.74	Peak	---	---
2	323.910	28.02	-17.98	46.00	38.31	14.08	2.96	27.33	Peak	---	---
3	424.790	28.84	-17.16	46.00	37.67	15.76	3.41	28.00	Peak	---	---
4	625.580	33.10	-12.90	46.00	37.53	19.84	4.14	28.41	Peak	---	---
5	749.740	32.94	-13.06	46.00	36.93	19.55	4.57	28.11	Peak	---	---
6	839.950	33.74	-12.26	46.00	36.52	20.17	4.85	27.80	Peak	---	---

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	90.140	31.94	-11.56	43.50	48.80	9.50	1.49	27.85	Peak	---	---
2	249.220	27.88	-18.12	46.00	39.52	12.97	2.68	27.29	Peak	---	---
3	424.790	27.67	-18.33	46.00	36.50	15.76	3.41	28.00	Peak	---	---
4	625.580	34.76	-11.24	46.00	39.19	19.84	4.14	28.41	Peak	---	---
5	749.740	29.83	-16.17	46.00	33.82	19.55	4.57	28.11	Peak	---	---
6	960.230	36.50	-17.50	54.00	37.06	21.52	5.29	27.37	Peak	---	---

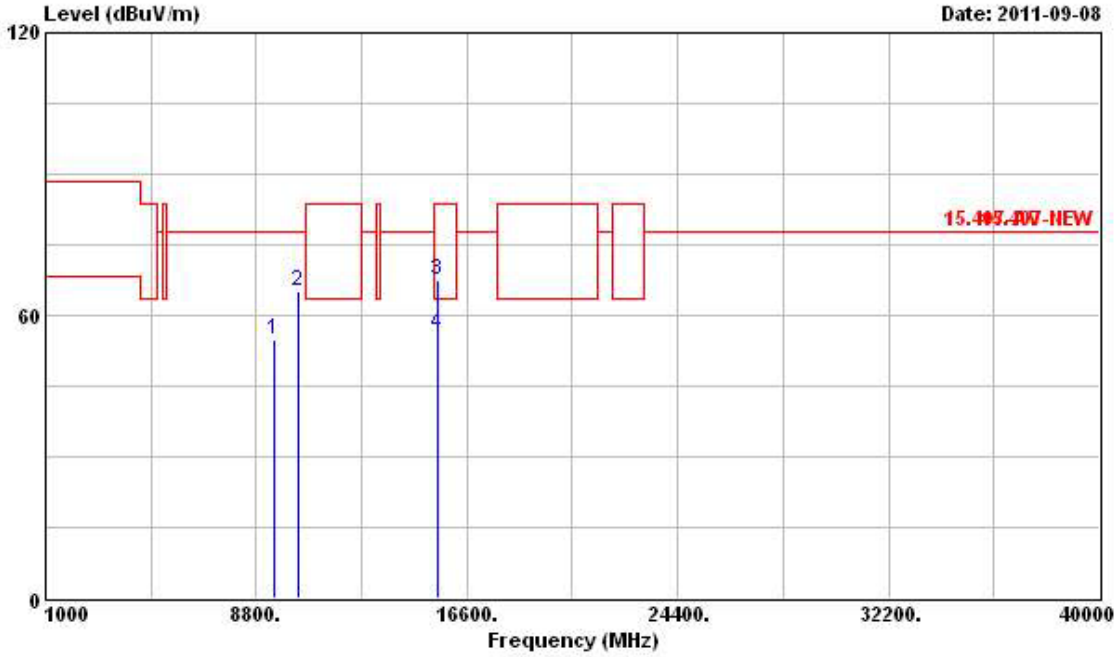
Note:
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

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

For Single Chain:

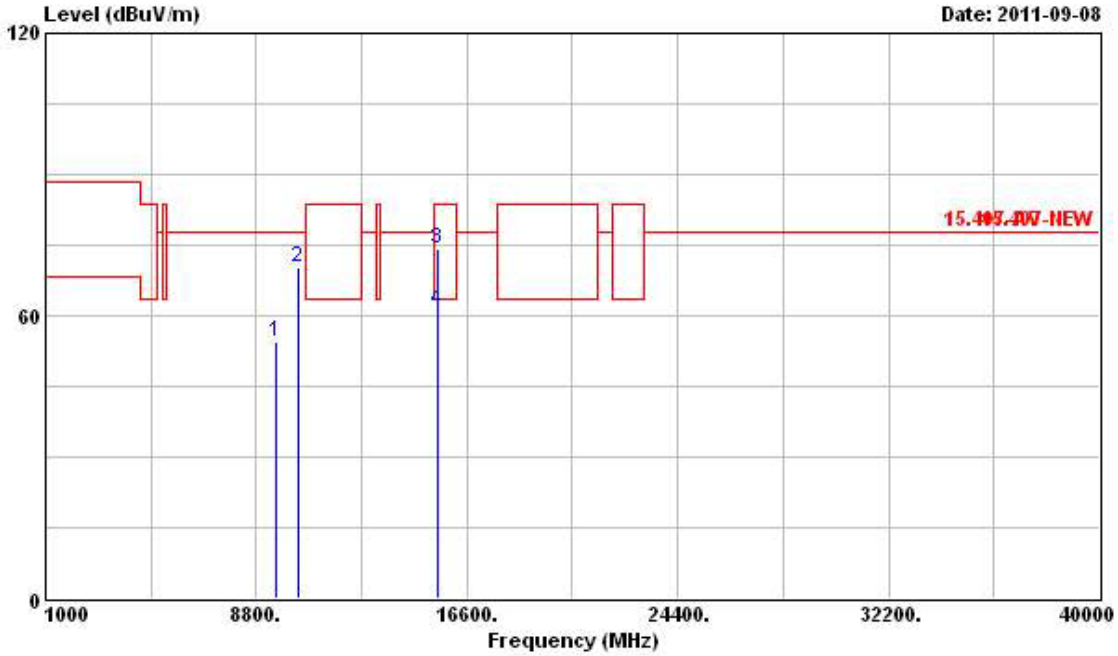
Final Test Date	Sep. 08, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Chris	**Configuration**	802.11a Ch. 36

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	9486.000	54.98	-22.86	77.84	44.96	39.16	6.32	35.46	PK	---	---
2	10350.000	65.08	-12.76	77.84	53.58	40.01	6.71	35.22	Peak	---	---
3	15543.000	67.64	-15.90	83.54	51.41	42.81	8.45	35.03	Peak	---	---
4	15543.000	56.12	-7.42	63.54	39.89	42.81	8.45	35.03	Average	---	---

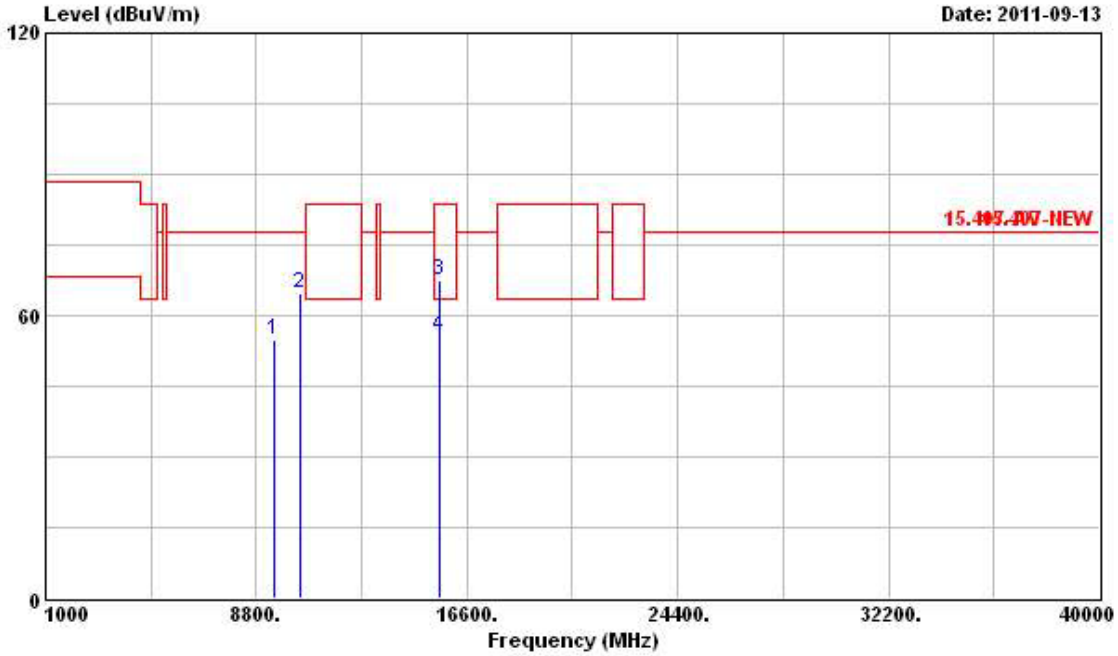
Vertical



	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	9495.000	54.63	-23.21	77.84	44.57	39.20	6.32	35.46	PK	---	---
2	10350.000	70.30	-7.54	77.84	58.80	40.01	6.71	35.22	Peak	---	---
3	15543.000	74.07	-9.47	83.54	57.84	42.81	8.45	35.03	Peak	---	---
4	@15543.000	61.18	-2.36	63.54	44.95	42.81	8.45	35.03	Average	---	---

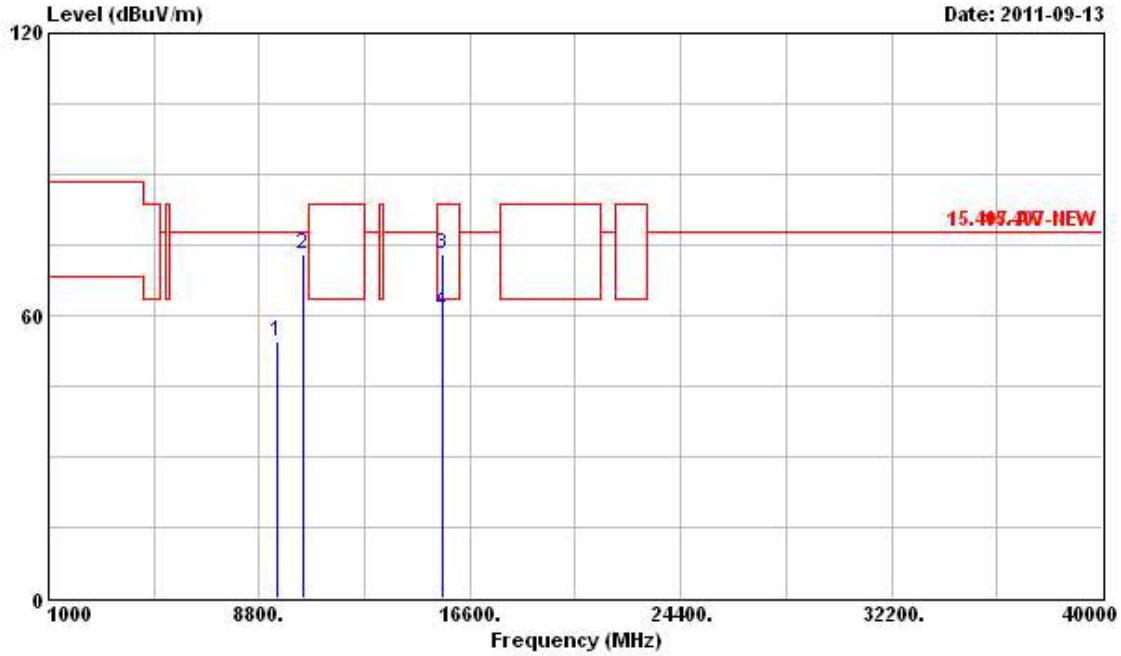
Final Test Date	Sep. 13, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Chris	**Configuration**	802.11a Ch. 40

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	9450.000	54.87	-22.97	77.84	44.92	39.09	6.31	35.45	PK	---	---
2	10395.000	64.89	-12.95	77.84	53.30	40.04	6.75	35.20	Peak	---	---
3	15606.000	67.48	-16.06	83.54	51.31	42.82	8.45	35.10	Peak	---	---
4	15606.000	55.83	-7.71	63.54	39.66	42.82	8.45	35.10	Average	---	---

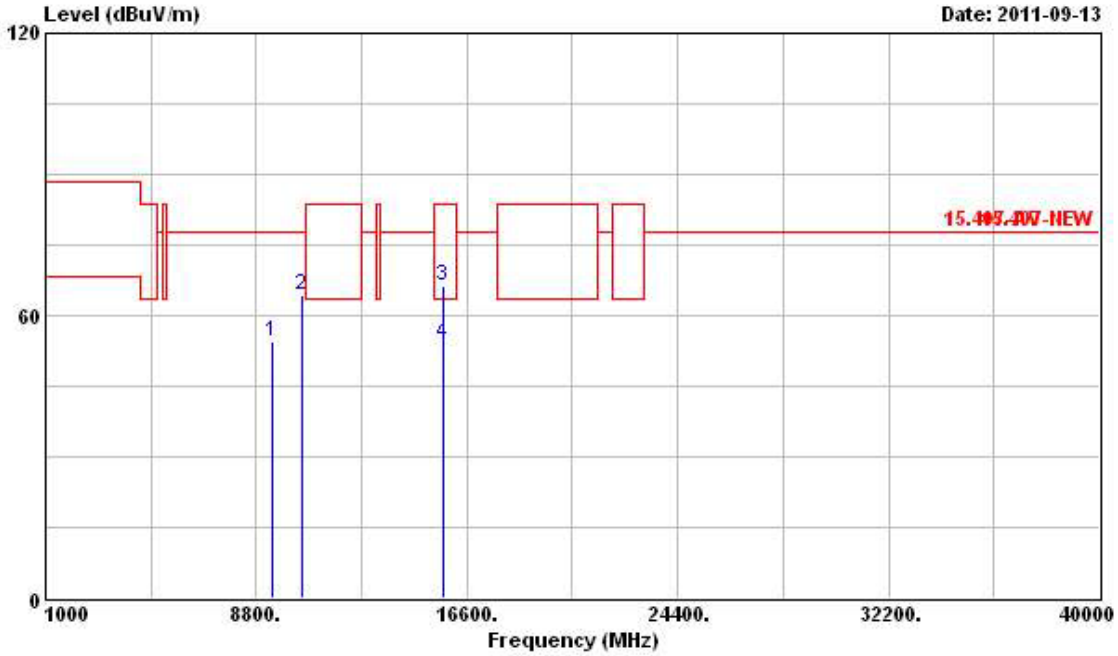
Vertical



	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	9432.000	54.37	-23.47	77.84	44.47	39.05	6.30	35.45	PK	---	---
2	@10395.000	72.89	-4.95	77.84	61.30	40.04	6.75	35.20	Peak	---	---
3	15606.000	73.10	-10.44	83.54	56.93	42.82	8.45	35.10	Peak	---	---
4	@15606.000	60.73	-2.81	63.54	44.56	42.82	8.45	35.10	Average	---	---

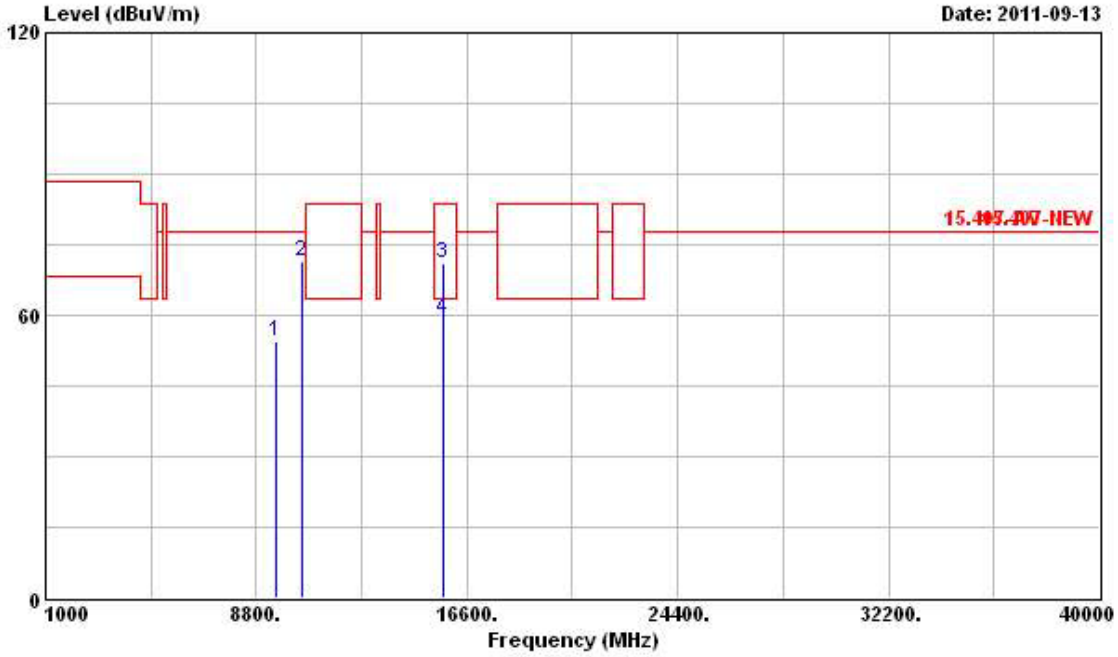
Final Test Date	Sep. 13, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Chris	**Configuration**	802.11a Ch. 48

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	9423.000	54.47	-23.37	77.84	44.60	39.01	6.30	35.44	PK	---	---
2	10467.000	64.47	-13.37	77.84	52.71	40.08	6.82	35.14	Peak	---	---
3	15723.000	66.14	-17.40	83.54	50.04	42.84	8.46	35.20	Peak	---	---
4	15723.000	54.13	-9.41	63.54	38.03	42.84	8.46	35.20	Average	---	---

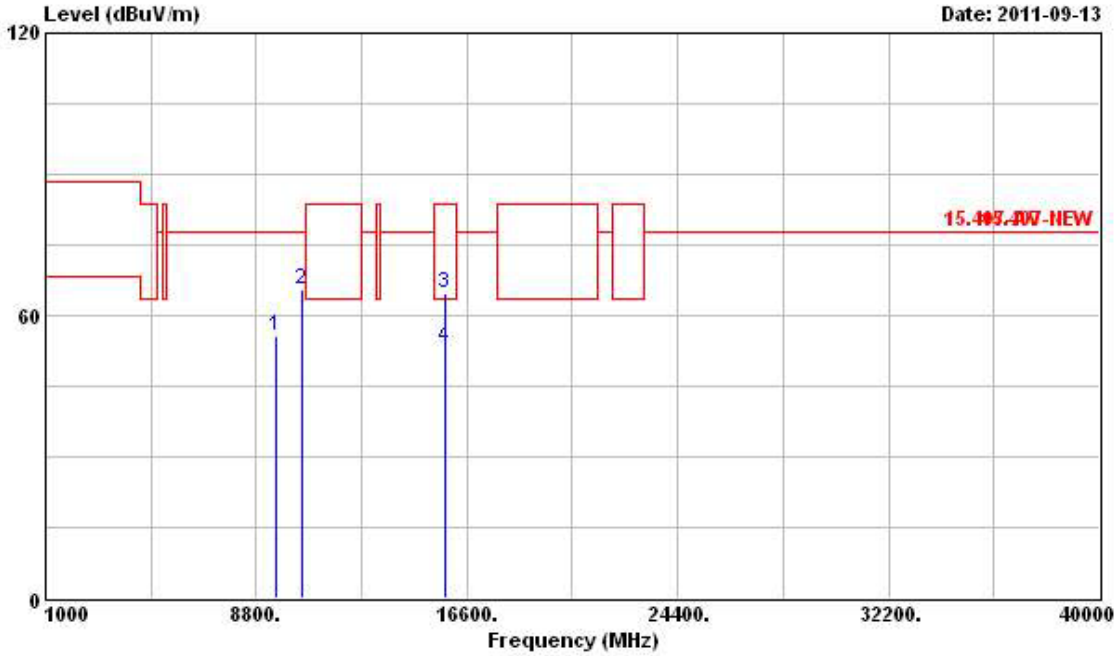
Vertical



	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	9495.000	54.48	-23.36	77.84	44.42	39.20	6.32	35.46	PK	---	---
2	10467.000	71.44	-6.40	77.84	59.68	40.08	6.82	35.14	Peak	---	---
3	15714.000	71.03	-12.51	83.54	54.93	42.84	8.46	35.20	Peak	---	---
4	@15714.000	59.15	-4.39	63.54	43.05	42.84	8.46	35.20	Average	---	---

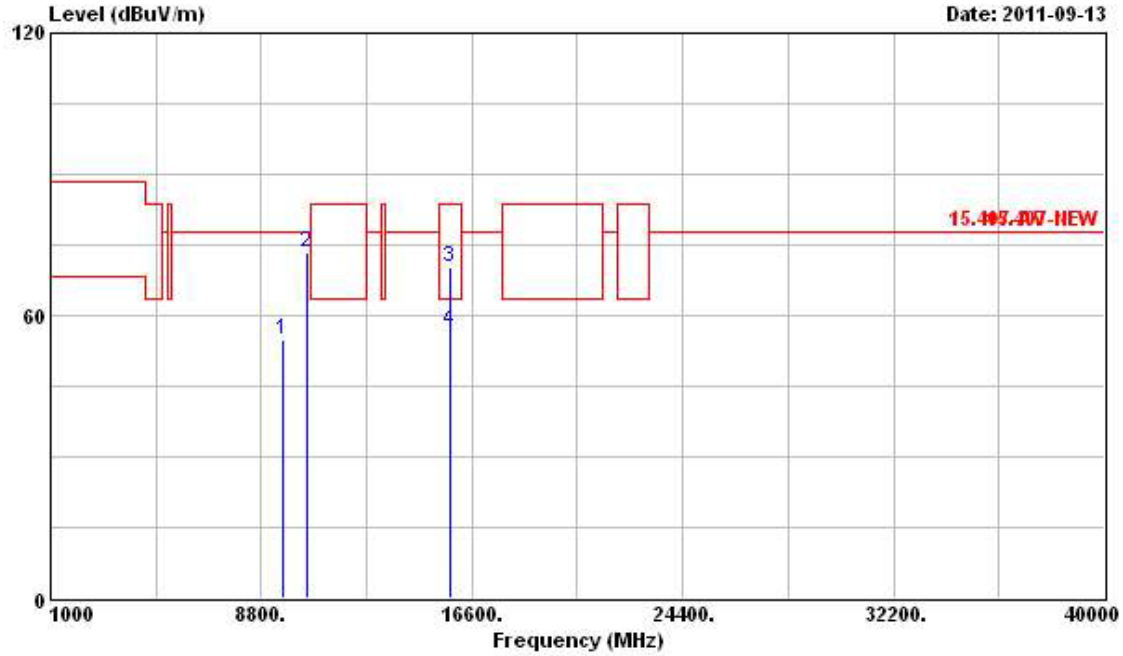
Final Test Date	Sep. 13, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Chris	**Configuration**	802.11a Ch. 52

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	9495.000	55.58	-22.26	77.84	45.52	39.20	6.32	35.46	PK	---	---
2	10520.000	65.54	-12.30	77.84	53.68	40.11	6.85	35.10	Peak	---	---
3	15780.000	64.66	-18.88	83.54	48.62	42.86	8.46	35.28	Peak	---	---
4	15780.000	53.41	-10.13	63.54	37.37	42.86	8.46	35.28	Average	---	---

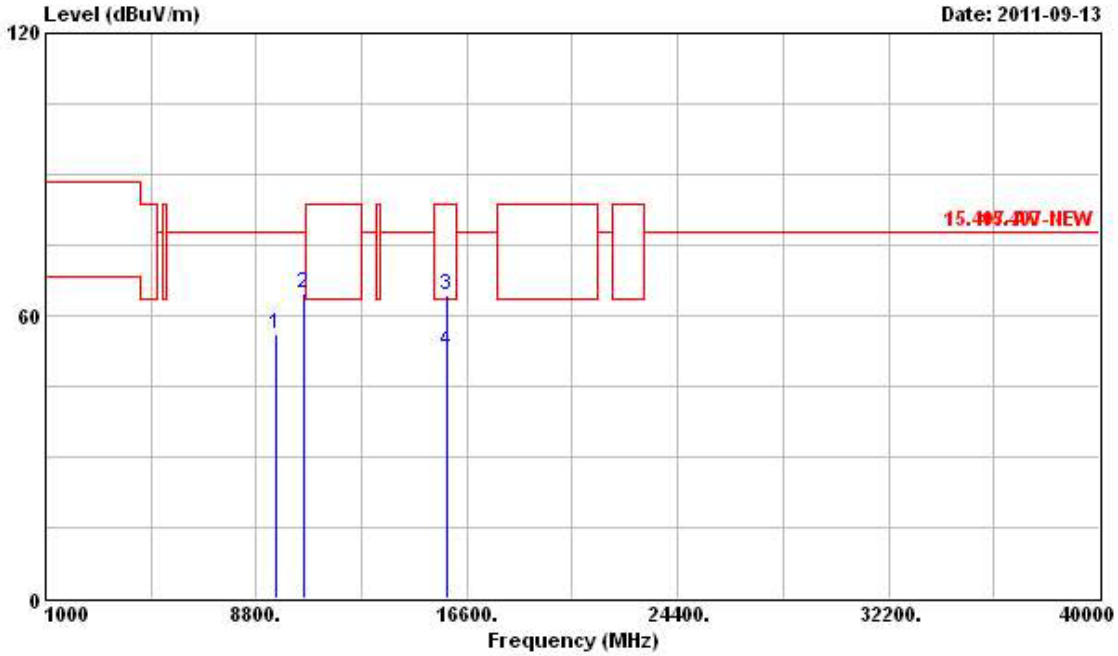
Vertical



	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	9603.000	54.69	-23.15	77.84	44.50	39.32	6.34	35.47	PK	---	---
2	@10503.000	73.54	-4.30	77.84	61.69	40.10	6.85	35.10	Peak	---	---
3	15786.000	70.09	-13.45	83.54	54.05	42.86	8.46	35.28	Peak	---	---
4	15786.000	56.89	-6.65	63.54	40.85	42.86	8.46	35.28	Average	---	---

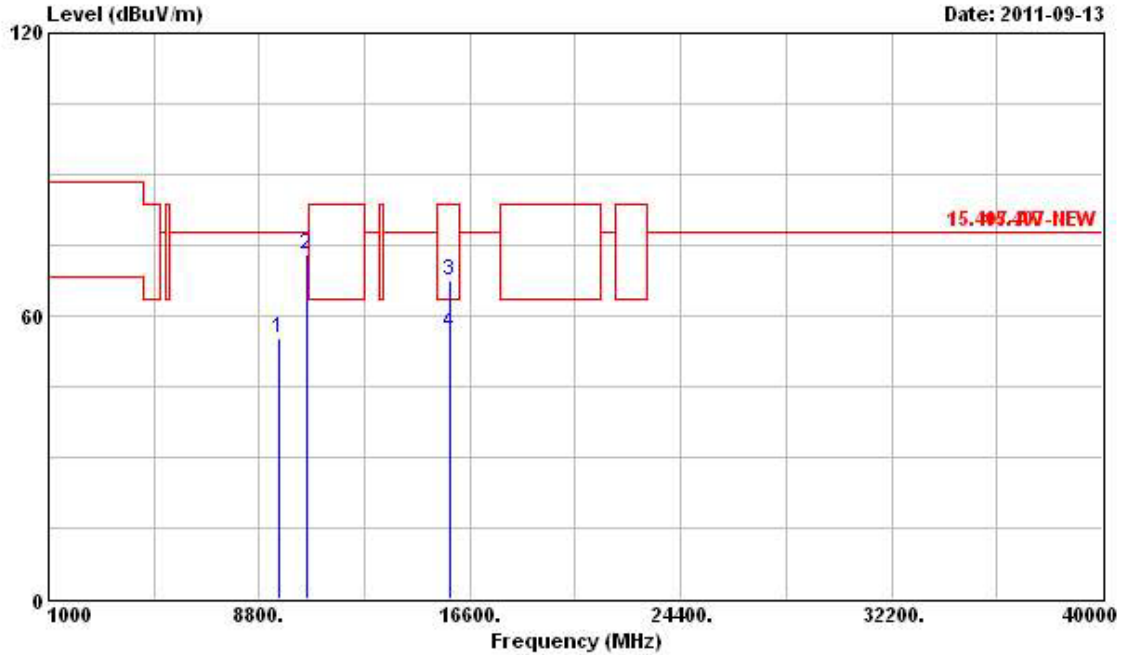
Final Test Date	Sep. 13, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Chris	**Configuration**	802.11a Ch. 56

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	9558.000	56.12	-41.72	97.84	46.00	39.26	6.33	35.47	Peak	---	---
2	10539.000	64.67	-13.17	77.84	52.75	40.12	6.88	35.08	Peak	---	---
3	15840.000	64.52	-19.02	83.54	48.52	42.87	8.46	35.33	Peak	---	---
4	15840.000	52.42	-11.12	63.54	36.42	42.87	8.46	35.33	Average	---	---

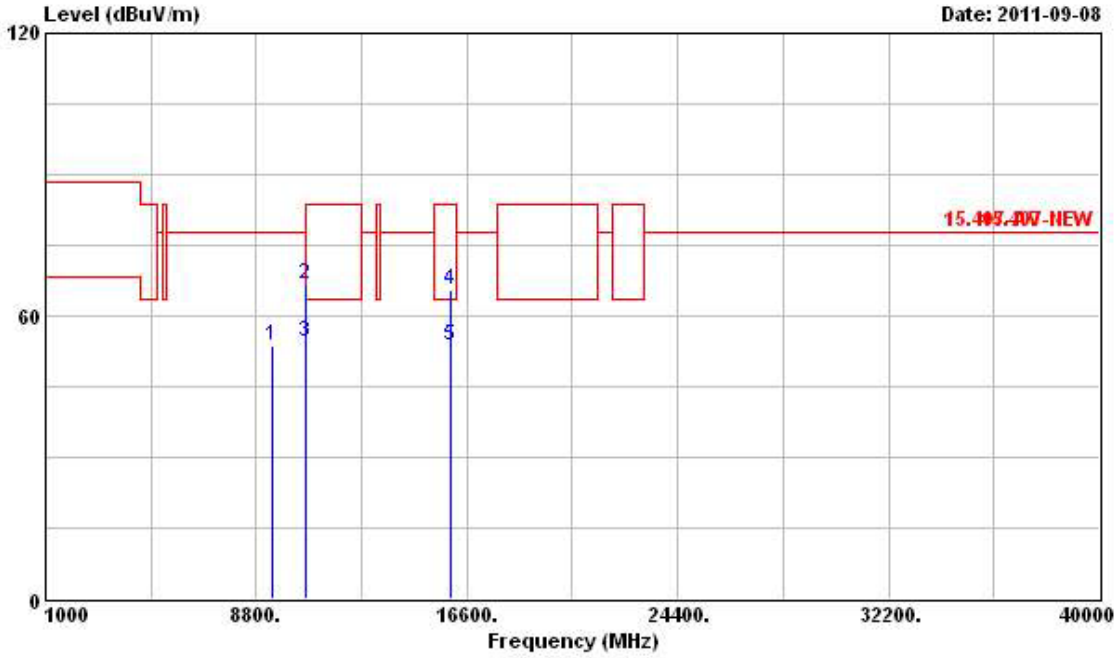
Vertical



	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	9522.000	55.21	-42.63	97.84	45.12	39.22	6.33	35.46	Peak	---	---
2	@10566.000	73.21	-4.63	77.84	61.25	40.14	6.88	35.06	Peak	---	---
3	15831.000	67.65	-15.89	83.54	51.65	42.87	8.46	35.33	Peak	---	---
4	15831.000	56.34	-7.20	63.54	40.34	42.87	8.46	35.33	Average	---	---

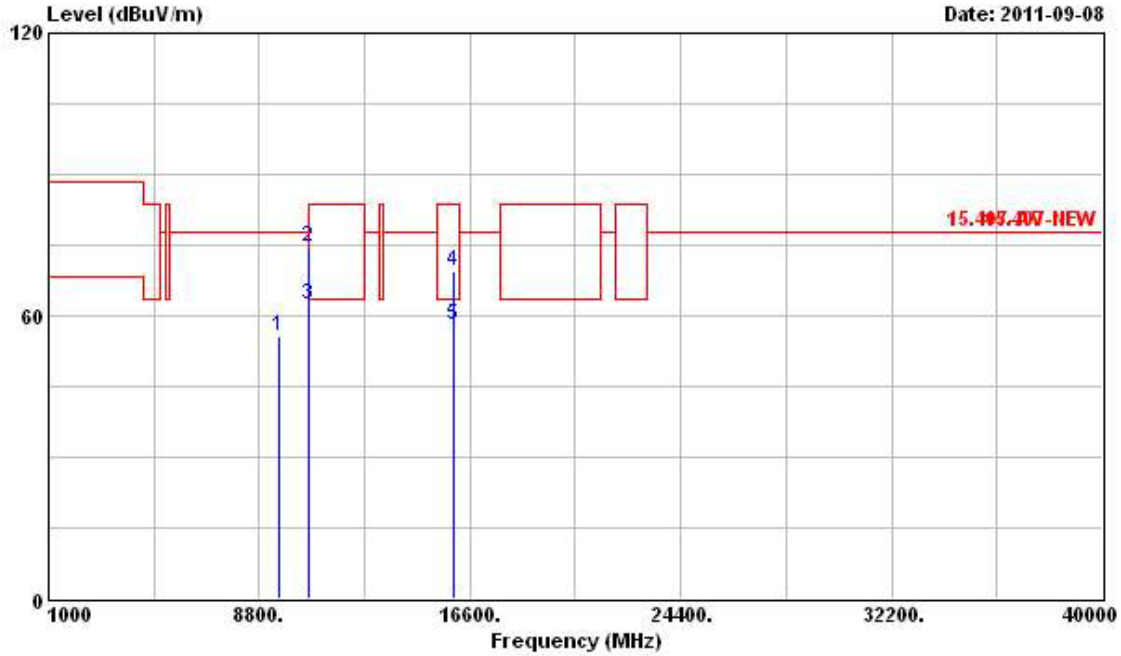
Final Test Date	Sep. 13, 2011	**Test Site No.**	03CH02-HY
Temperature	23℃	**Humidity**	58%
Test Engineer	Chris	**Configuration**	802.11a Ch. 64

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	9414.000	53.88	-23.96	77.84	44.01	39.01	6.30	35.44	PK	---	---
2	10638.000	66.59	-16.95	83.54	54.48	40.18	6.93	35.00	Peak	---	---
3	10638.000	54.45	-9.09	63.54	42.34	40.18	6.93	35.00	Average	---	---
4	15966.000	65.33	-18.21	83.54	49.42	42.89	8.47	35.45	Peak	---	---
5	15966.000	53.78	-9.76	63.54	37.87	42.89	8.47	35.45	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	9558.000	55.54	-42.30	97.84	45.42	39.26	6.33	35.47	Peak	---	---
2	10638.000	74.74	-8.80	83.54	62.63	40.18	6.93	35.00	Peak	---	---
3	@10638.000	62.53	-1.01	63.54	50.42	40.18	6.93	35.00	Average	---	---
4	15966.000	69.57	-13.97	83.54	53.66	42.89	8.47	35.45	Peak	---	---
5	@15966.000	57.84	-5.70	63.54	41.93	42.89	8.47	35.45	Average	---	---