

# FCC RADIO TEST REPORT

According to

47 CFR FCC Part 15 Subpart E § 15.407

**Equipment** : 802.11abgn, USB module  
**Brand Name** : SparkLAN  
**Model No.** : WUBR-508N  
**Filing Type** : New Application  
**Applicant** : SparkLAN Communications, Inc.  
**Manufacturer** : 8F., No. 257, Sec. 2, Tiding Blvd., Neihu District,  
Taipei City 11493, Taiwan  
**FCC ID** : RYK-WUBR508N  
**Received Date** : Mar. 29, 2012  
**Final Test Date** : Apr. 26, 2012

## Statement

**Test result included in this report is only for dipole antenna (802.11a/n Band 1 to 3) of the product.**

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

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

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

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



## **SPORTON International Inc.**

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

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**History of This Test Report**

Original Issue Date: May 11, 2012

Report No.: FR232843AN

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

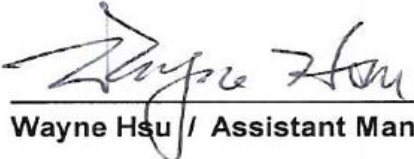
# CERTIFICATE OF COMPLIANCE

According to

47 CFR FCC Part 15 Subpart E § 15.407

Equipment : 802.11abgn, USB module  
Brand Name : SparkLAN  
Model No. : WUBR-508N  
Applicant : SparkLAN Communications, Inc.  
8F., No. 257, Sec. 2, Tiding Blvd., Neihu District,  
Taipei City 11493, Taiwan

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Mar. 29, 2012 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Wayne Hsu / Assistant Manager

## **SPORTON International Inc.**

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

**1 SUMMARY OF THE TEST RESULT**

<b>Applied Standard: 47 CFR FCC Part 15 Subpart E</b>				
<b>Part</b>	<b>Rule Section</b>	<b>Description of Test</b>	<b>Result</b>	<b>Under Limit</b>
3.1	15.207	AC Power Line Conducted Emissions	Complies	13.96 dB
3.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
3.3	15.407(a)	Maximum Conducted Output Power	Complies	3.98 dB
3.4	15.407(a)	Power Spectral Density	Complies	0.65 dB
3.5	15.407(a)	Peak Excursion	Complies	4.85 dB
3.6	15.407(b)	Radiated Emissions	Complies	1.01 dB
3.7	15.407(b)	Band Edge Emissions	Complies	1.01 dB
3.8	15.407(g)	Frequency Stability	Complies	-
3.9	15.203	Antenna Requirements	Complies	-

<b>Test Items</b>	<b>Uncertainty</b>	<b>Remark</b>
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 <sup>-8</sup>	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

There are three types of the EUT. The difference between these three types is connector; we chose the full function type to test. Only the radio detail of IEEE 802.11a/n is shown in this report. For more detailed features description, please refer to the manufacturer's specifications or user's manual.

Items	Description
Power Type	From system
Data Modulation Data Rate (Mbps)	OFDM for IEEE 802.11a (BPSK / QPSK / 16QAM / 64QAM) (6/9/12/18/24/36/48/54) See the below table for IEEE 802.11n
Frequency Range	5150~5250MHz ; 5250~5350MHz ; 5470~5725MHz
Channel Band Width (99%)	802.11a : Band 1: 16.90 MHz ; Band 2: 17.00 MHz ; Band 3: 16.90 MHz 802.11n : MCS 8 (20MHz) : Band 1: 17.60 MHz ; Band 2: 17.70 MHz MCS 8 (20MHz) : Band 3: 17.60 MHz MCS 8 (40MHz) : Band 1: 36.20 MHz ; Band 2: 37.80 MHz MCS 8 (40MHz) : Band 3: 36.20 MHz
Conducted Output Power	802.11a : Band 1: 13.02 dBm ; Band 2: 17.21 dBm ; Band 3: 13.68 dBm 802.11n : MCS 8 (20MHz) : Band 1: 12.53 dBm ; Band 2: 19.82 dBm ; MCS 8 (20MHz) : Band 3: 19.18 dBm MCS 8 (40MHz) : Band 1: 15.58 dBm ; Band 2: 18.33 dBm ; MCS 8 (40MHz) : Band 3: 18.54 dBm

#### IEEE 802.11n Modulation Scheme

MCS	Spatial	Modulation	Coding Rate	Data rate(Mbps)	
				20 MHz channel	40 MHz channel
Index	Streams	Type	Type	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

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

2.2 Table for Filed Antenna

Antenna Category (Ant. Cat.)	
<input checked="" type="checkbox"/>	External antenna (dedicated antennas)
<input checked="" type="checkbox"/>	Single Power Level (PL) with corresponding antenna(s). Power Level (PL): 1
<input checked="" type="checkbox"/>	Unique antenna connector. (e.g., MMCX, U.FL, IPX, and RP-SMA, RP-N type...)

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

Antenna General Information									
Antenna Port (Total 2 Port)					1(TX/RX), 2(TX/RX)				
Maximum RF Output Power Level (PL)					1				
Transmit Chains Power Distribution					<input checked="" type="checkbox"/> symmetrical distribution <input type="checkbox"/> asymmetrical distribution				
Ant. No.	PL	Ant. Port [Ant No. X connect to Ant. Port Y]	Ant. Cat.	Ant. Type	Brand	Model	G <sub>ANT</sub> (dBi)	DG (dBi) [correlated] N <sub>TX</sub> = 1	DG (dBi) [uncorrelated] N <sub>TX</sub> = 2
1	1	1	External	Dipole	Lct	FDE_ACBSMA-BGP	5.97	N/A	6.0
	1	2	External	Dipole	Lct	FDE_ACBSMA-BGP	5.97		
<input checked="" type="checkbox"/> EUT is consist of multiple antenna models assembly (multiple antenna models are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type. Then Ant. No. <u>1</u> shall be performed the radiated test.									
<input checked="" type="checkbox"/> The equipment is normally installed and point-to-point or point-to-multipoint systems: Ant. No. <u>1</u>									
Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows: Any transmit signals are correlated, Directional Gain (DG) = G <sub>ANT</sub> + 10 log(N) dBi All transmit signals are completely uncorrelated, Directional Gain (DG)= G <sub>ANT</sub> Note 2: For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows: Any transmit signals are correlated, Directional Gain (DG) = 10 log[(10 <sup>G<sub>1</sub>/20</sup> + 10 <sup>G<sub>2</sub>/20</sup> + ... + 10 <sup>G<sub>N</sub>/20</sup> ) <sup>2</sup> /N] dBi All transmit signals are completely uncorrelated, Directional Gain (DG) = 10 log[(10 <sup>G<sub>1</sub>/10</sup> + 10 <sup>G<sub>2</sub>/10</sup> + ... + 10 <sup>G<sub>N</sub>/10</sup> )/N] dBi									

\*\*The EUT was pre-tested antenna port 1 and antenna port 2 for single chain, the worst case was antenna port 2. therefore only the test data recorded in this report.

**2.3 Table for Carrier Frequencies**

Frequency Band	Channel No.	Frequency (20MHz)	Channel No.	Frequency (40MHz)
5150~5250 MHz Band 1	36	5180 MHz	38	5190 MHz
	40	5200 MHz	46	5230 MHz
	44	5220 MHz	-	-
	48	5240 MHz	-	-

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	-	-

Frequency Band	Channel No.	Frequency (20MHz)
5470~5725 MHz Band 3	100	5500 MHz
	104	5520 MHz
	108	5540 MHz
	112	5560 MHz
	116	5580 MHz
	132	5660 MHz
	136	5680 MHz
	140	5700 MHz
	Channel No.	Frequency (40MHz)
	102	5510 MHz
	110	5550 MHz
	134	5670 MHz



**2.4 Table for Test Modes**

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

Test Items	Mode	Data Rate	Channel
AC Power Conducted Emission Radiated Emission Below 1GHz	System Mode	Auto	-
Max. Conducted Output Power 26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Power Spectral Density Peak Excursion	11a Band 1~3/BPSK	6Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 0 (20MHz)	6.5 Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 0 (40MHz)	13.5 Mbps	38/46/54/62/102/110/134
	11n Band 1~3/BPSK MCS 8 (20MHz)	13Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 8 (40MHz)	27Mbps	38/46/54/62/102/110/134
Radiated Emission Above 1GHz	11a Band 1~3/BPSK	6Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 0 (20MHz)	6.5 Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 0 (40MHz)	13.5 Mbps	38/46/54/62/102/110/134
	11n Band 1~3/BPSK MCS 8 (20MHz)	13Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 8 (40MHz)	27Mbps	38/46/54/62/102/110/134
Band Edge Emission	11a Band 1~3/BPSK	6Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 0 (20MHz)	6.5 Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 0 (40MHz)	13.5 Mbps	38/46/54/62/102/110/134
	11n Band 1~3/BPSK MCS 8 (20MHz)	13Mbps	36/40/48/52/56 /64/100/116/140
	11n Band 1~3/BPSK MCS 8 (40MHz)	27Mbps	38/46/54/62/102/110/134

**2.5 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).

**2.6 Table for Supporting Units**

Support Unit	Brand	Model	FCC ID
Notebook	DELL	VOSTRO 3350	DoC
(USB) Mouse	Microsoft	1113	JNZ211443
iPod nano	Apple	A1199	N/A
Wireless AP (Remote Workstation)	D-Link	DNS-G120	DoC

**2.7 Table for Parameters of Test Software Setting**

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

**For Single Chain:**

**Power Parameters of IEEE 802.11a Port 2**

Test Software Version	RT 5x7x QA		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11a	1C	1E	20
Frequency	5260 MHz	5280 MHz	5320 MHz
IEEE 802.11a	24	25	24
Frequency	5500 MHz	5580 MHz	5700 MHz
IEEE 802.11a	1E	21	18

**For Two Chains:**

**Power Parameters of IEEE 802.11n (20MHz) Port 1 + Port 2**

Test Software Version	RT 5x7x QA		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11n	18;18	1A;1A	1D;1D
Frequency	5260 MHz	5280 MHz	5320 MHz
IEEE 802.11n	2B;2B	2B;2B	2B;2B
Frequency	5500 MHz	5580 MHz	5700 MHz
IEEE 802.11n	29;29	29;29	29;29

**Power Parameters of IEEE 802.11n (40MHz) Port 1 + Port 2**

Test Software Version	RT 5x7x QA		
Frequency	5190 MHz	5230 MHz	5270 MHz
IEEE 802.11n	21;21	21;21	2B;2B
Frequency	5310 MHz	5510 MHz	5550 MHz
IEEE 802.11n	2B;2B	2B;2B	2B;2B
Frequency	5670 MHz		
IEEE 802.11n	2B;2B		

## **2.8 EUT Operation during Test**

### **Conducted emissions and radiated emissions 9kHz~1GHz**

Two executive programs, "EMITEST.exe" and "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:

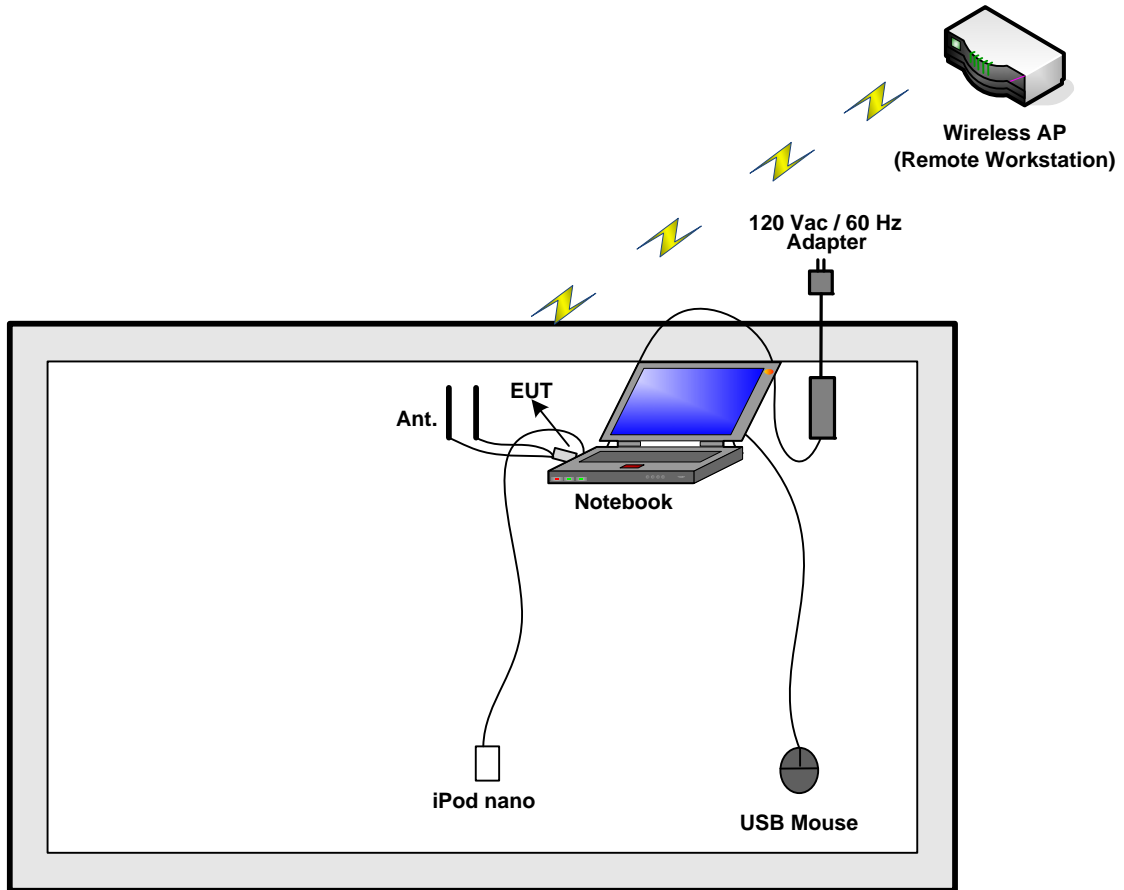
- a. Turn on the power of all equipment.
- b. The NB executed "Winthrx.exe" to read/write data from EUT.
- c. The NB executed "EMITEST.exe" sends "H" messages to the panel and displays "H" patterns on the screen.
- d. The EUT connect to remote workstation (Wireless AP) via WiFi.

### **Radiated emissions above 1GHz**

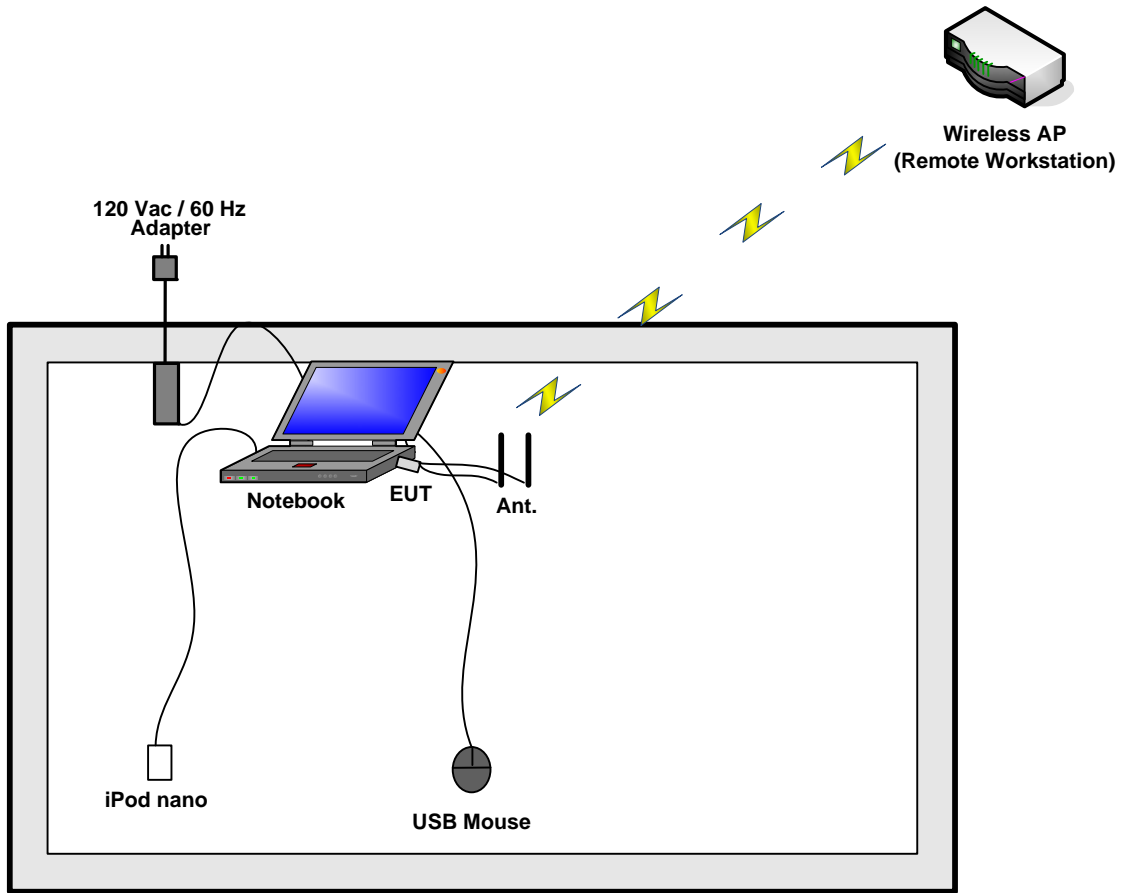
The Notebook executed "RT 5x7x QA" to EUT keep transmitting signals at fixed frequency via wireless.

**2.9 Test Configuration**

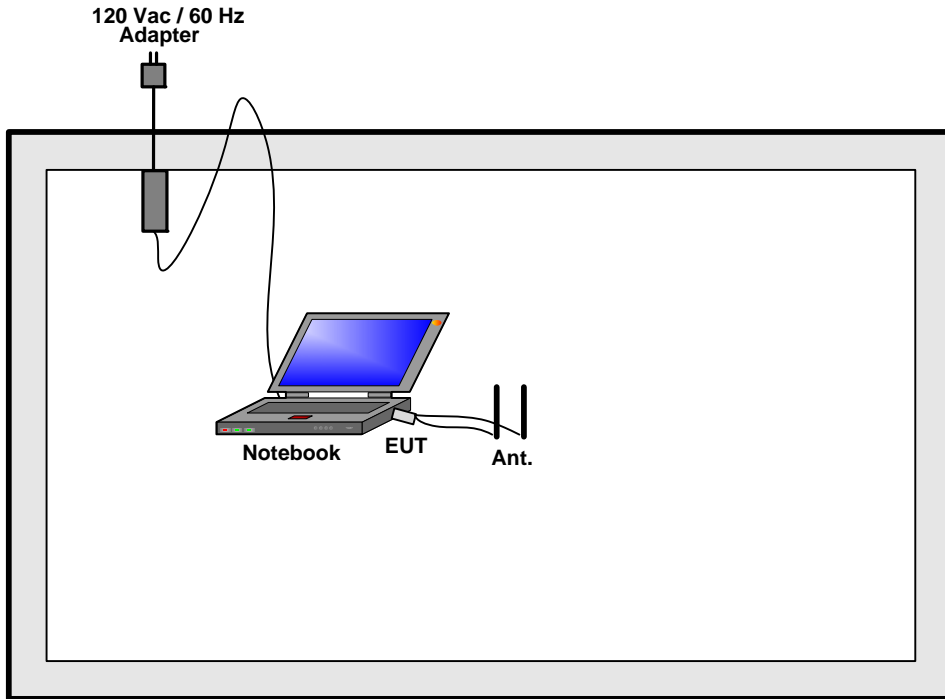
**Conducted emissions**



**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

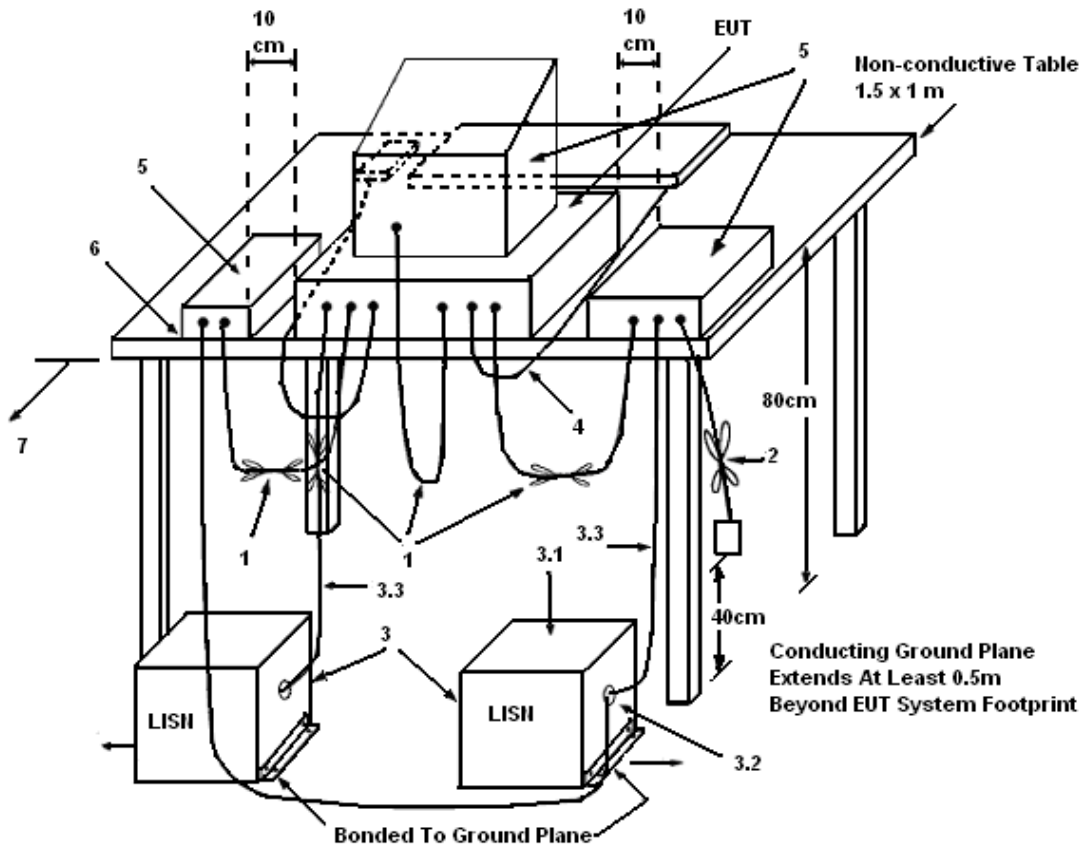
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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 was warmed up for 15 minutes before testing started.
2. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connect to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The CISPR states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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

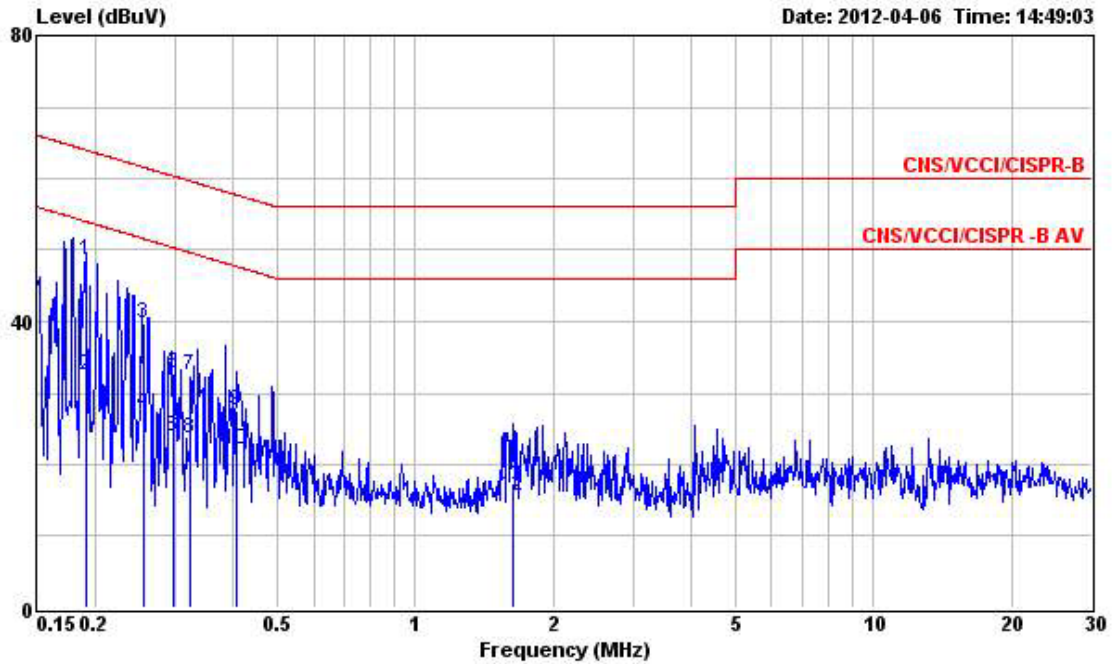
The EUT was placed on the test table and programmed in transmitting function.



3.1.7 Results of AC Power Line Conducted Emissions Measurement

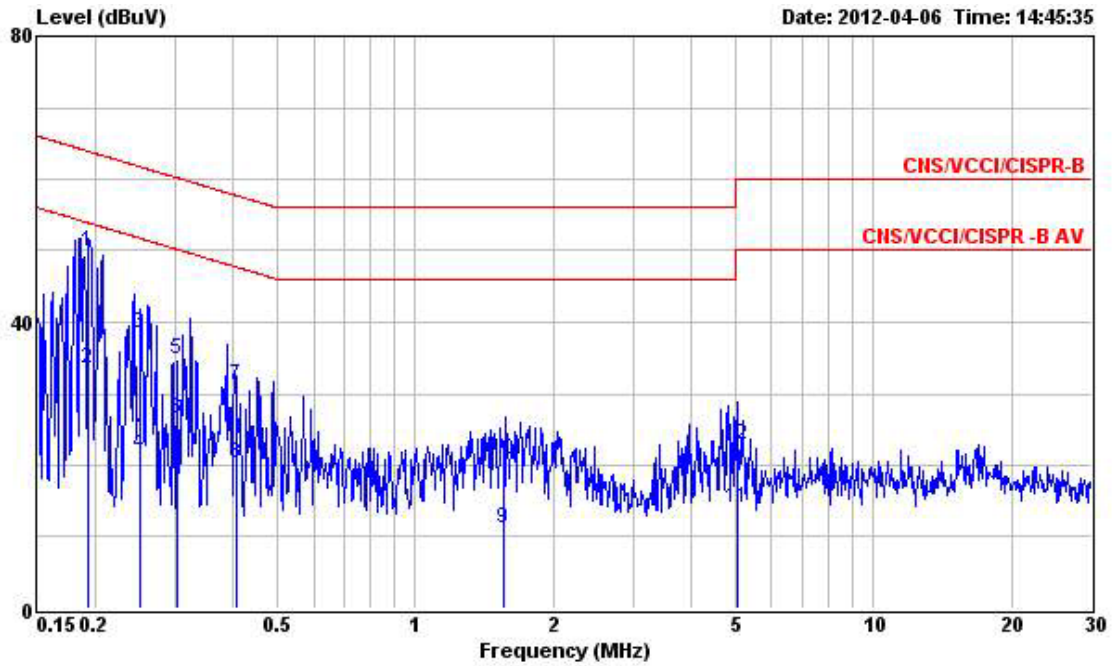
Final Test Date	Apr. 06, 2012	Test Site No.	CO01-HY
Temperature	23.6°C	Humidity	49%
Test Engineer	David	Configuration	System Mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.192	48.57	-15.38	63.95	48.39	0.08	0.10	QP
2	0.192	32.58	-21.37	53.95	32.40	0.08	0.10	Average
3	0.255	39.62	-21.97	61.59	39.44	0.08	0.10	QP
4	0.255	27.40	-24.19	51.59	27.22	0.08	0.10	Average
5	0.297	32.70	-27.63	60.33	32.51	0.09	0.10	QP
6	0.297	23.98	-26.35	50.33	23.79	0.09	0.10	Average
7	0.323	32.38	-27.26	59.64	32.19	0.09	0.10	QP
8	0.323	23.61	-26.02	49.63	23.42	0.09	0.10	Average
9	0.408	27.51	-30.18	57.69	27.32	0.09	0.10	QP
10	0.408	22.01	-25.68	47.69	21.82	0.09	0.10	Average
11	1.630	17.49	-38.51	56.00	17.27	0.12	0.10	QP
12	1.630	15.66	-30.34	46.00	15.44	0.12	0.10	Average

Neutral



	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.193	49.95	-13.96	63.91	49.79	0.06	0.10	QP
2	0.193	33.53	-20.38	53.91	33.37	0.06	0.10	Average
3	0.250	38.53	-23.23	61.76	38.37	0.06	0.10	QP
4	0.250	21.67	-30.09	51.76	21.51	0.06	0.10	Average
5	0.301	34.68	-25.54	60.22	34.51	0.07	0.10	QP
6	0.301	26.41	-23.81	50.22	26.24	0.07	0.10	Average
7	0.408	31.15	-26.54	57.69	30.98	0.07	0.10	QP
8	0.408	20.22	-27.47	47.69	20.05	0.07	0.10	Average
9	1.560	11.20	-34.80	46.00	11.00	0.10	0.10	Average
10	1.560	20.73	-35.27	56.00	20.53	0.10	0.10	QP
11	5.030	13.90	-36.10	50.00	13.61	0.17	0.12	Average
12	5.030	22.92	-37.08	60.00	22.63	0.17	0.12	QP

Note:  
Level = Read Level + Probe 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**

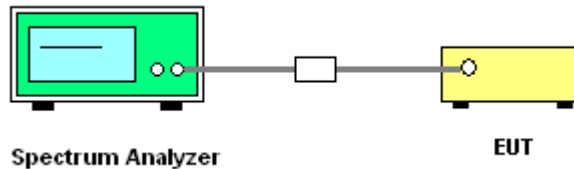
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

<b>Spectrum Parameters</b>	<b>Setting</b>
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**

<b>Final Test Date</b>	Apr. 26, 2012	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	25.9°C	<b>Humidity</b>	30%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	802.11a/n

**For Single Chain:  
Configuration of IEEE 802.11a Port 2**

<b>Channel</b>	<b>Frequency</b>	<b>26dB Bandwidth (MHz)</b>	<b>99% Occupied Bandwidth (MHz)</b>
36	5180 MHz	22.30	16.80
40	5200 MHz	23.30	16.90
48	5240 MHz	20.20	16.80
52	5260 MHz	27.90	16.80
56	5280 MHz	22.40	17.00
64	5320 MHz	19.90	16.80
100	5500 MHz	20.20	16.80
116	5580 MHz	20.00	16.80
140	5700 MHz	20.16	16.90

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

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.60	17.60
40	5200 MHz	20.50	17.60
48	5240 MHz	22.20	17.60
52	5260 MHz	27.70	17.70
56	5280 MHz	25.20	17.70
64	5320 MHz	22.20	17.70
100	5500 MHz	20.70	17.60
116	5580 MHz	20.80	17.60
140	5700 MHz	20.50	17.60

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

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.00	17.50
40	5200 MHz	20.00	17.60
48	5240 MHz	20.00	17.60
52	5260 MHz	26.70	17.70
56	5280 MHz	20.70	17.60
64	5320 MHz	20.20	17.60
100	5500 MHz	20.10	17.60
116	5580 MHz	19.80	17.60
140	5700 MHz	20.00	17.60

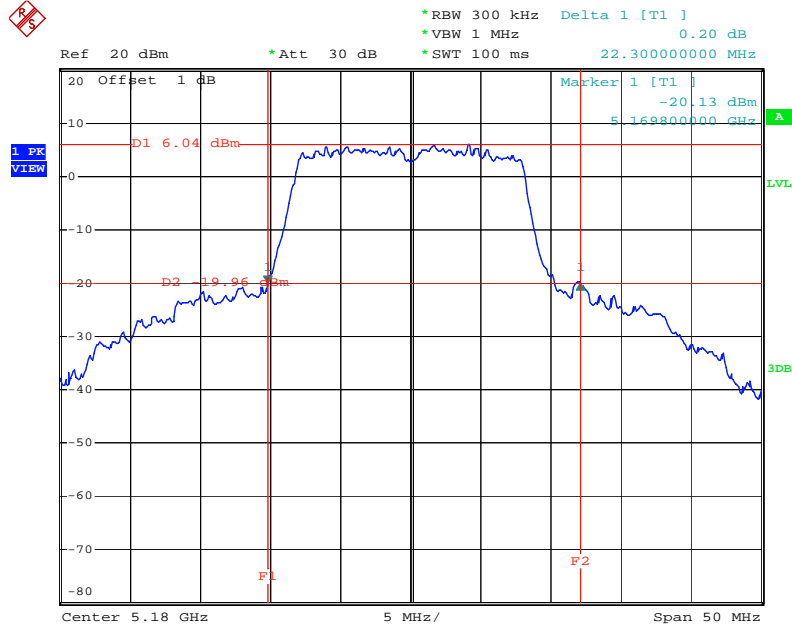
**Configuration IEEE 802.11n Port 1 (40MHz) Port 1**

<b>Channel</b>	<b>Frequency</b>	<b>26dB Bandwidth (MHz)</b>	<b>99% Occupied Bandwidth (MHz)</b>
38	5190 MHz	40.80	36.00
46	5230 MHz	40.40	36.00
54	5270 MHz	56.00	36.40
62	5310 MHz	51.40	36.40
102	5510 MHz	55.60	36.20
110	5550 MHz	51.20	36.20
134	5670 MHz	40.80	36.20

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

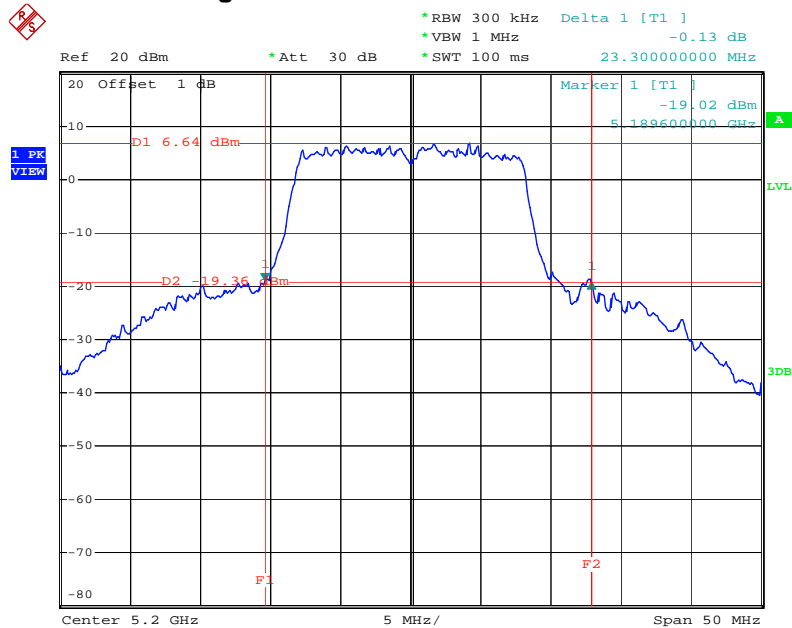
<b>Channel</b>	<b>Frequency</b>	<b>26dB Bandwidth (MHz)</b>	<b>99% Occupied Bandwidth (MHz)</b>
38	5190 MHz	40.40	36.20
46	5230 MHz	40.20	36.00
54	5270 MHz	49.40	36.40
62	5310 MHz	41.80	37.80
102	5510 MHz	49.00	36.20
110	5550 MHz	40.64	36.20
134	5670 MHz	40.40	36.20

For Single Chain:  
26 dB Bandwidth Plot on Configuration IEEE 802.11a 5180 MHz Port 2



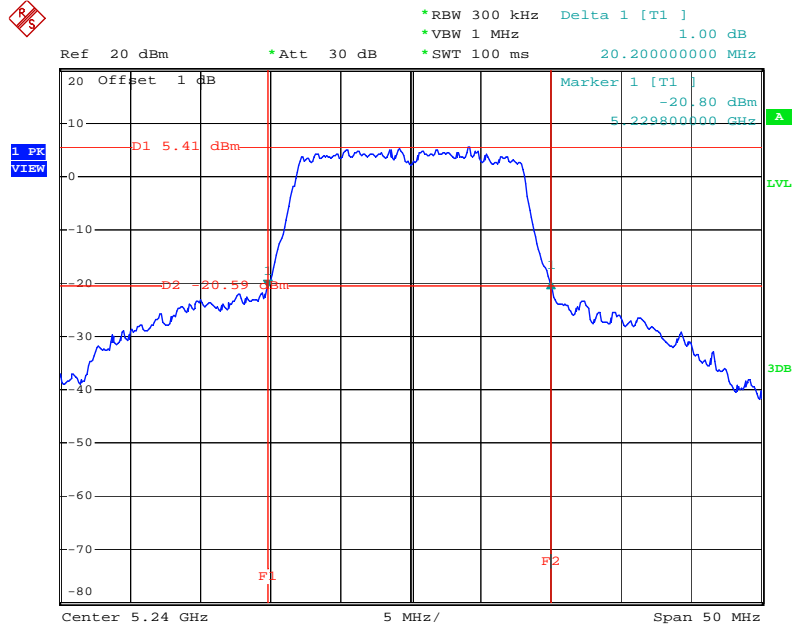
Date: 25.APR.2012 11:53:12

26 dB Bandwidth Plot on Configuration IEEE 802.11a 5200 MHz Port 2



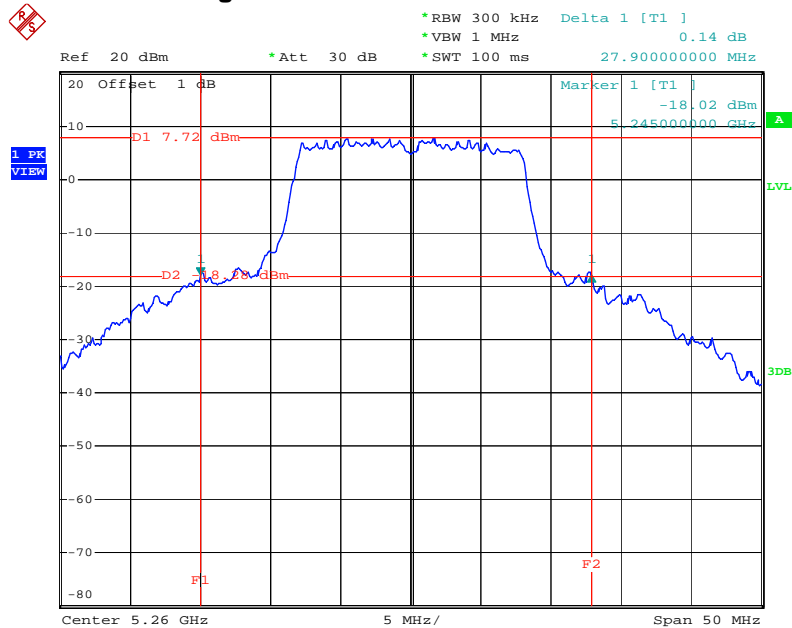
Date: 25.APR.2012 11:57:46

26 dB Bandwidth Plot on Configuration IEEE 802.11a 5240 MHz Port 2



Date: 25.APR.2012 13:45:48

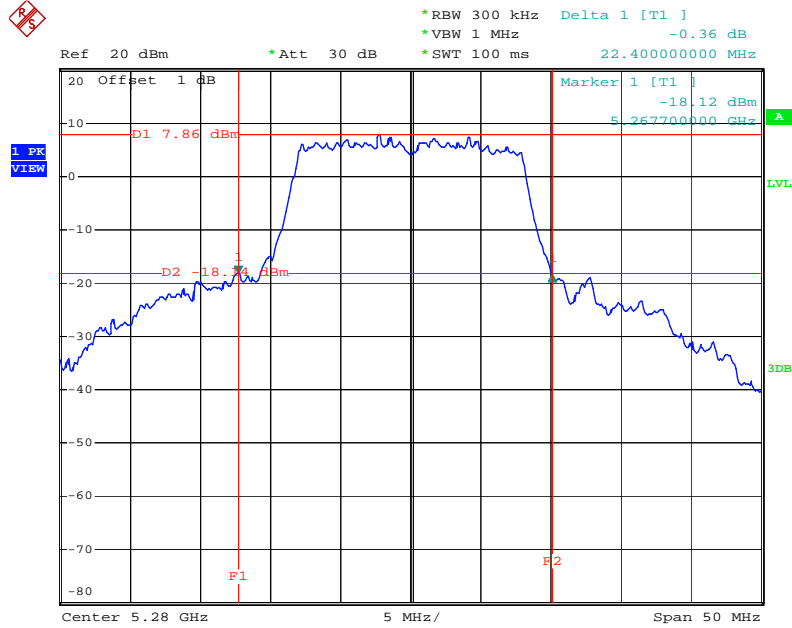
26 dB Bandwidth Plot on Configuration IEEE 802.11a 5260 MHz Port 2



Date: 25.APR.2012 14:22:45

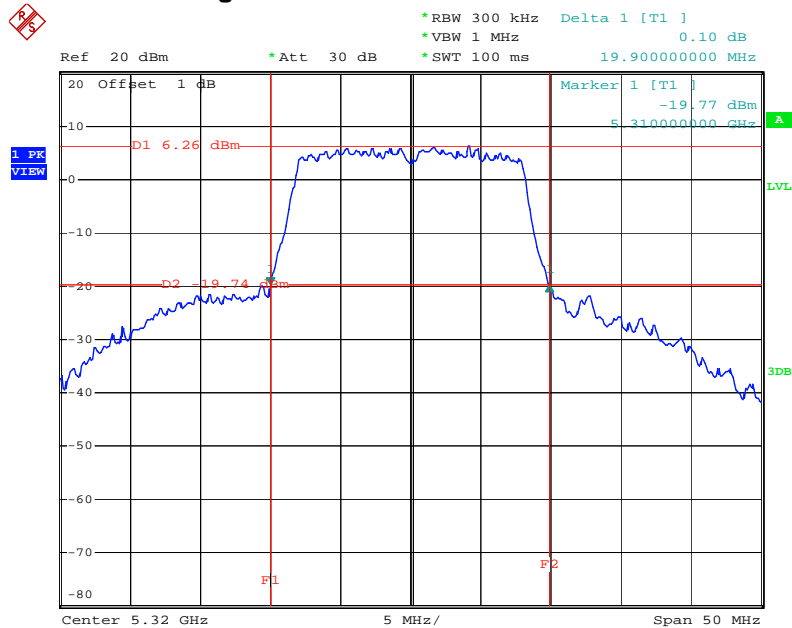


26 dB Bandwidth Plot on Configuration IEEE 802.11a 5280 MHz Port 2



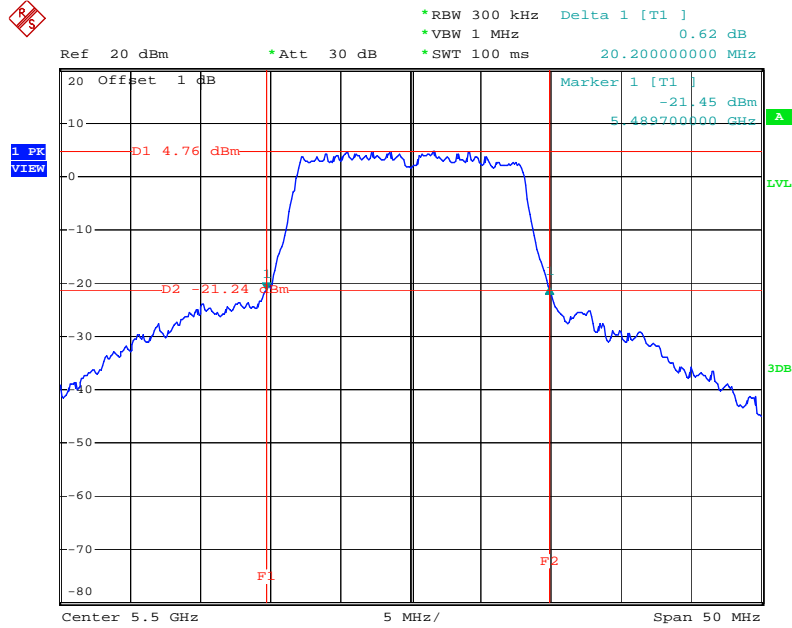
Date: 25.APR.2012 14:25:55

26 dB Bandwidth Plot on Configuration IEEE 802.11a 5320 MHz Port 2



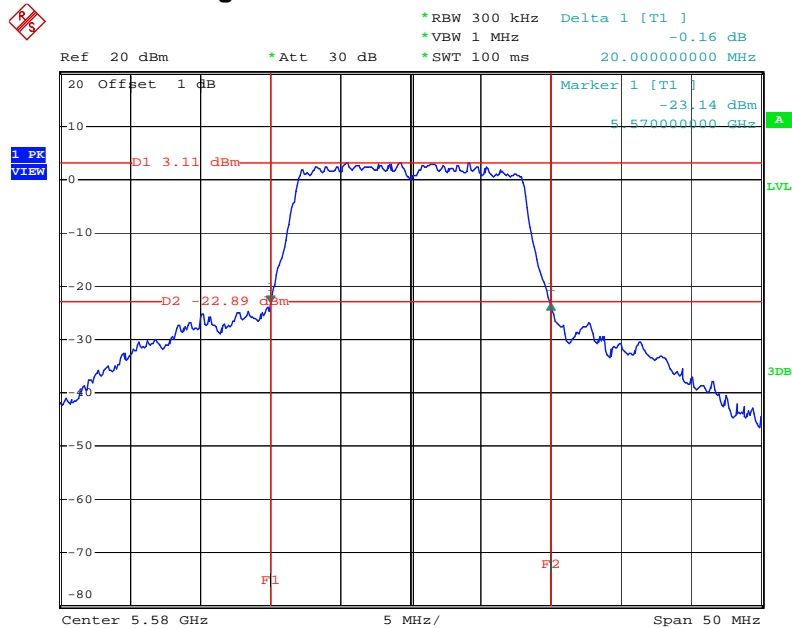
Date: 25.APR.2012 14:29:38

26 dB Bandwidth Plot on Configuration IEEE 802.11a 5500 MHz Port 2



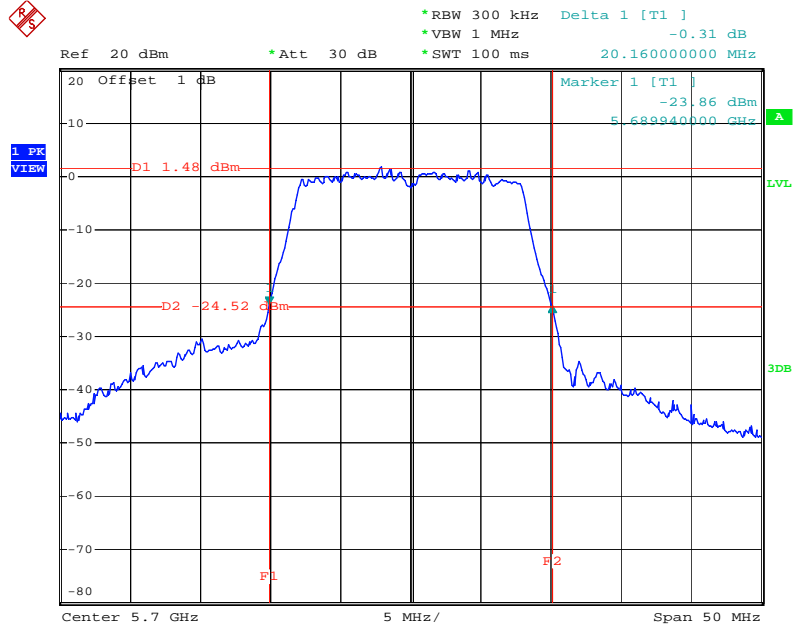
Date: 25.APR.2012 14:33:34

26 dB Bandwidth Plot on Configuration IEEE 802.11a 5580 MHz Port 2



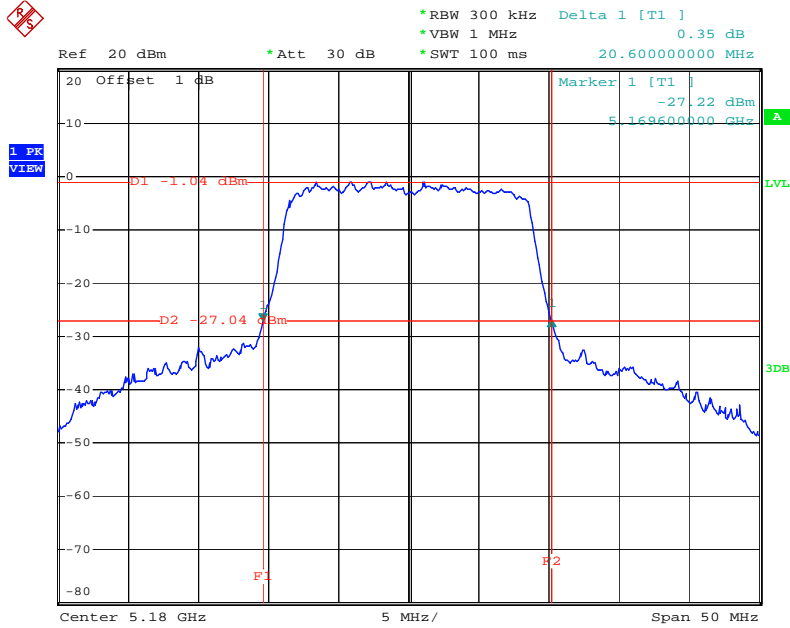
Date: 25.APR.2012 14:38:50

26 dB Bandwidth Plot on Configuration IEEE 802.11a 5700 MHz Port 2



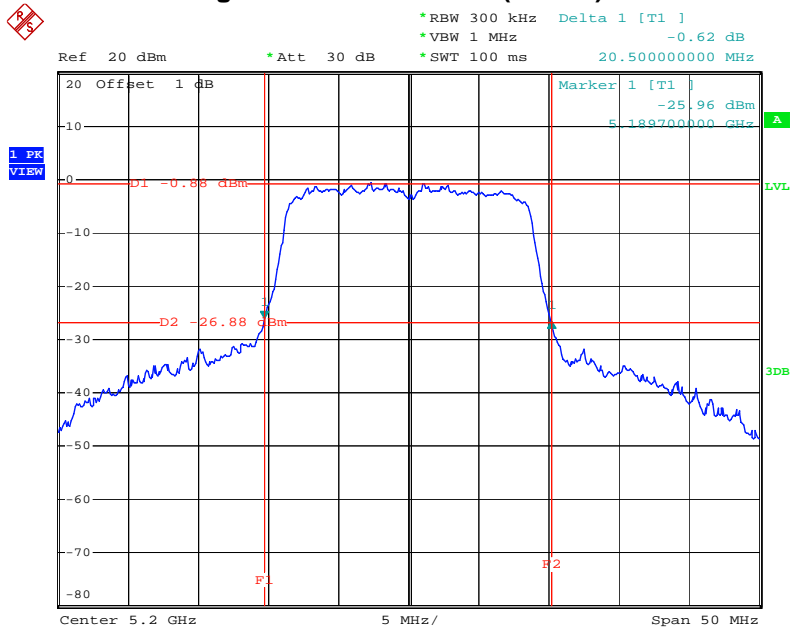
Date: 25.APR.2012 14:41:27

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



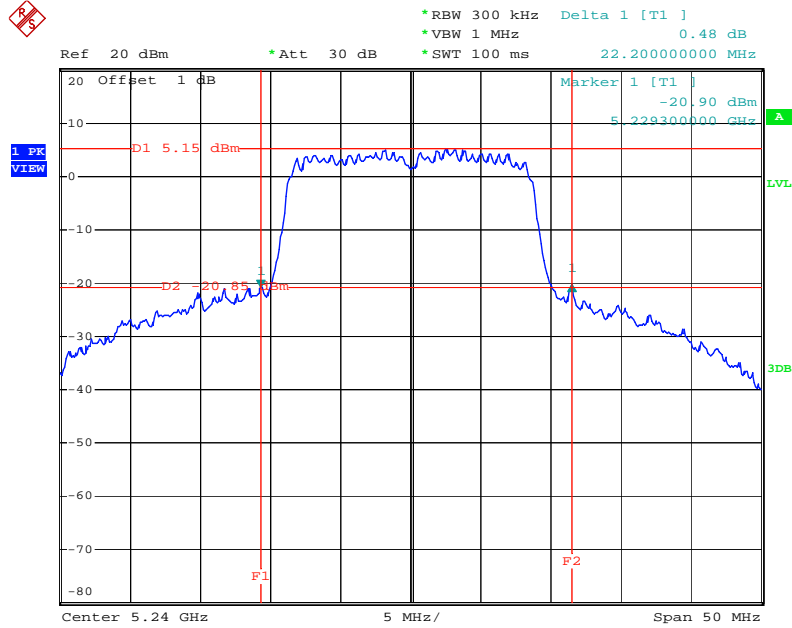
Date: 25.APR.2012 22:12:50

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



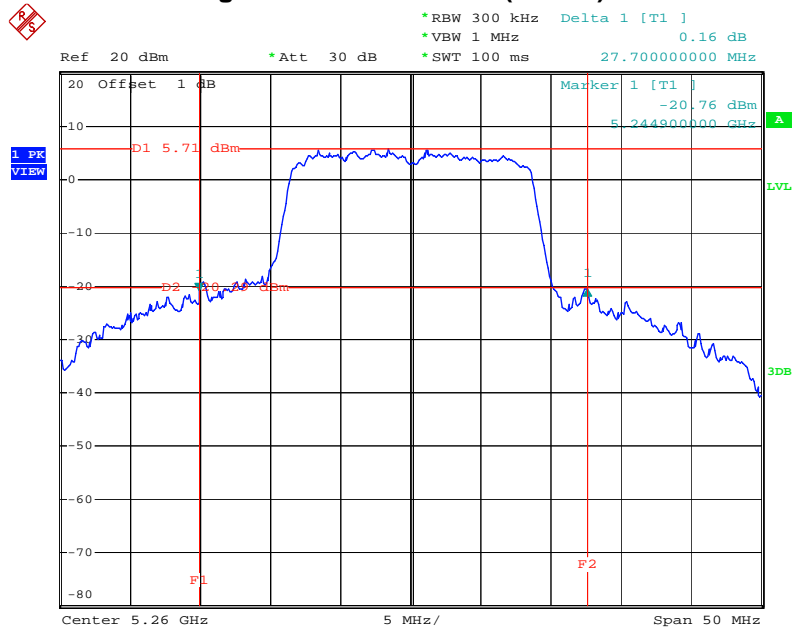
Date: 25.APR.2012 22:14:39

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



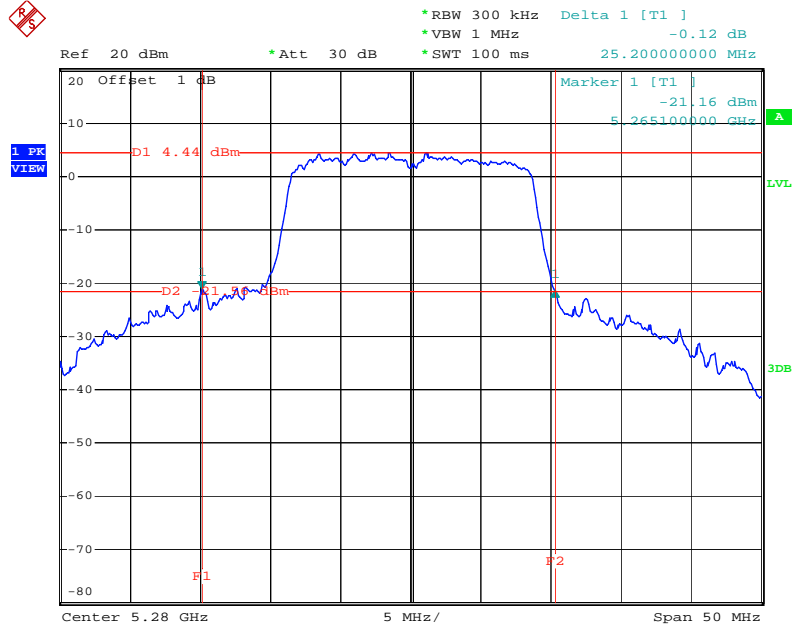
Date: 26.APR.2012 09:56:14

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



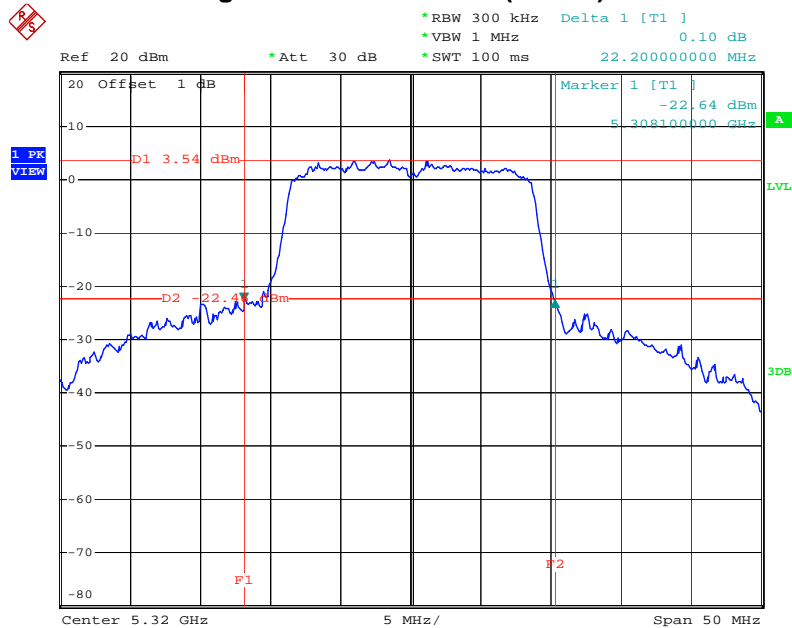
Date: 25.APR.2012 22:19:10

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



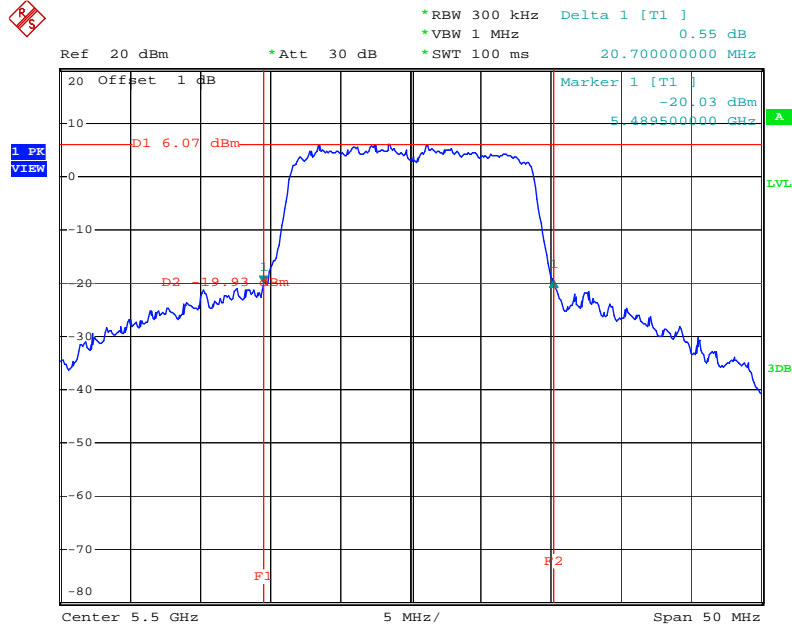
Date: 25.APR.2012 22:21:17

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



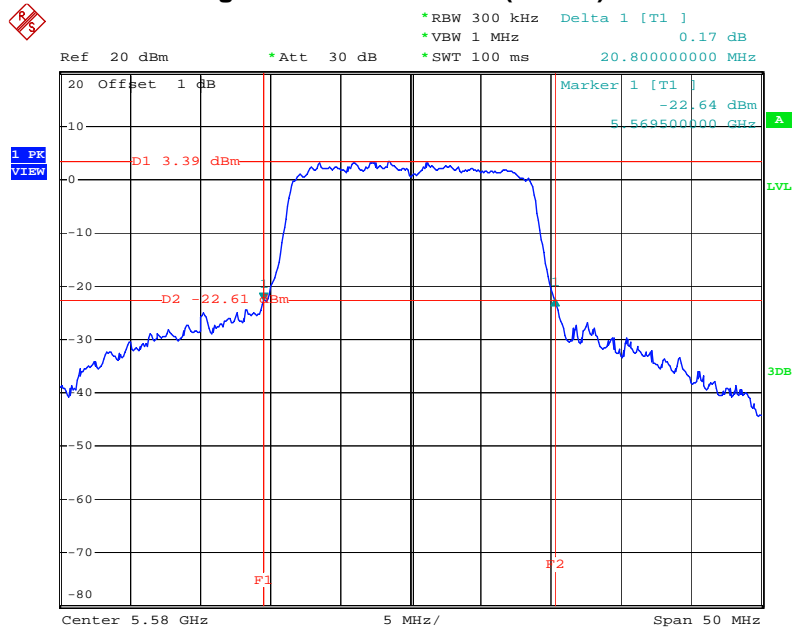
Date: 25.APR.2012 22:23:34

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 1



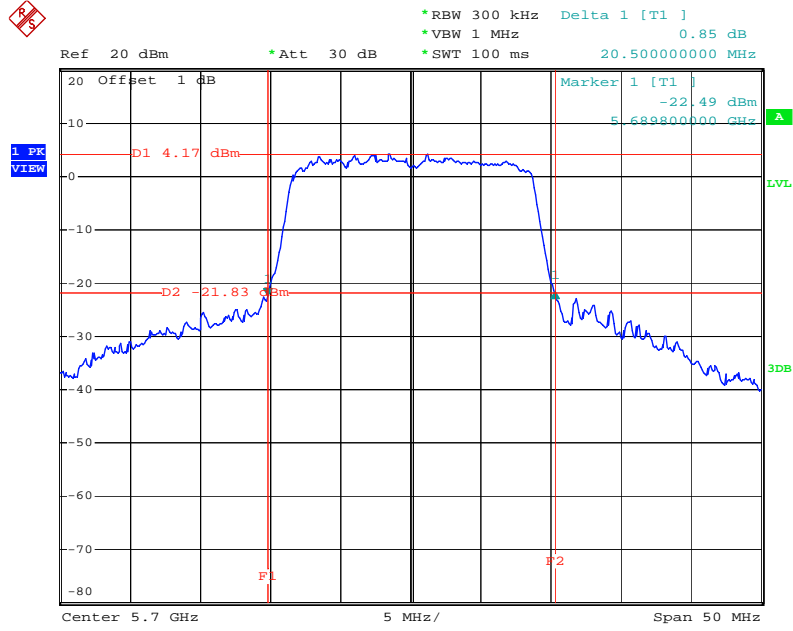
Date: 25.APR.2012 22:25:29

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 1



Date: 25.APR.2012 22:27:39

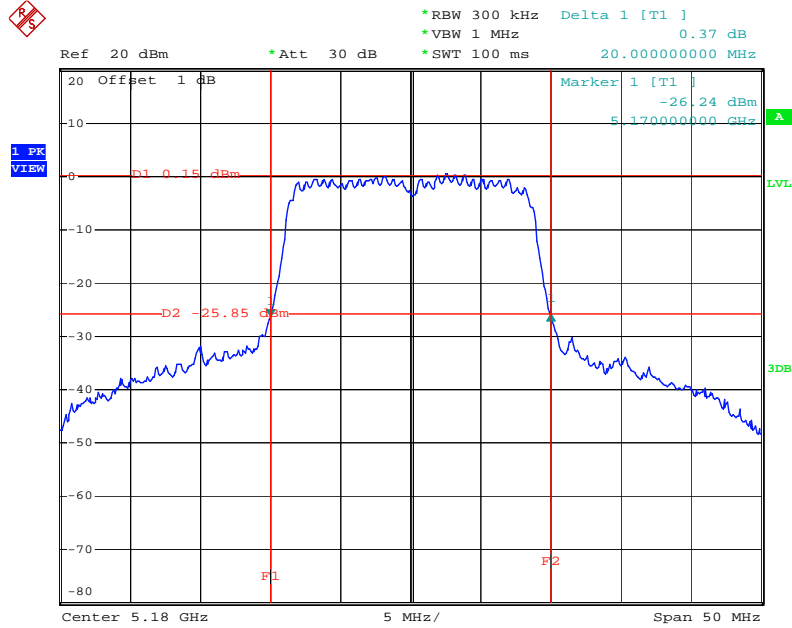
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 1



Date: 25.APR.2012 22:29:40

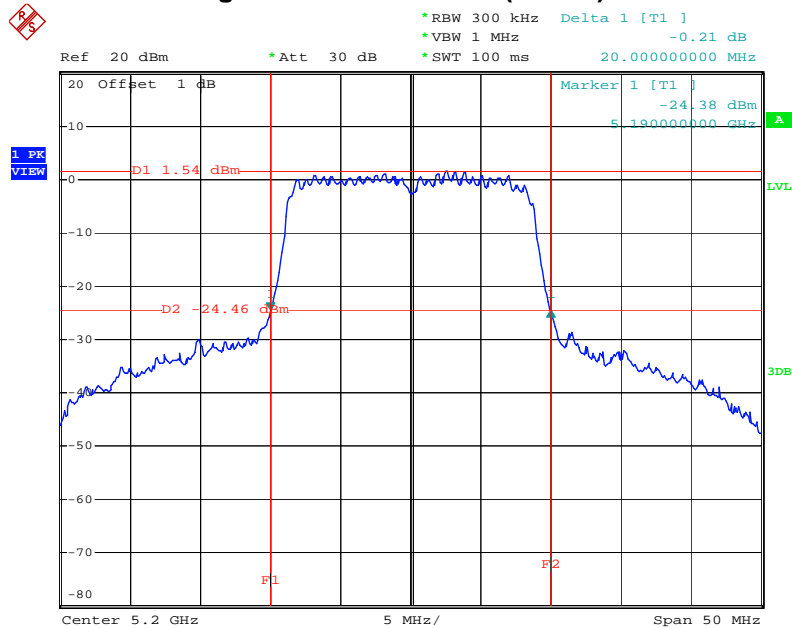


26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



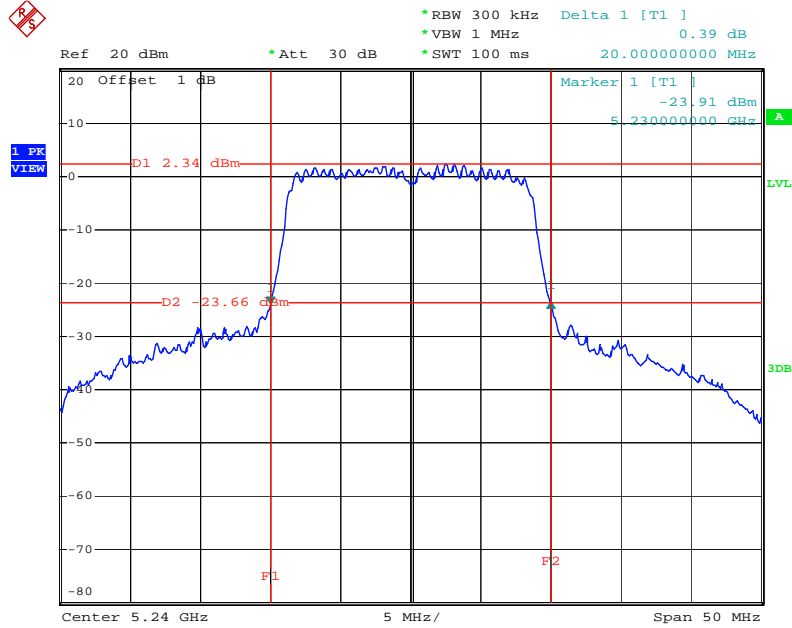
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26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



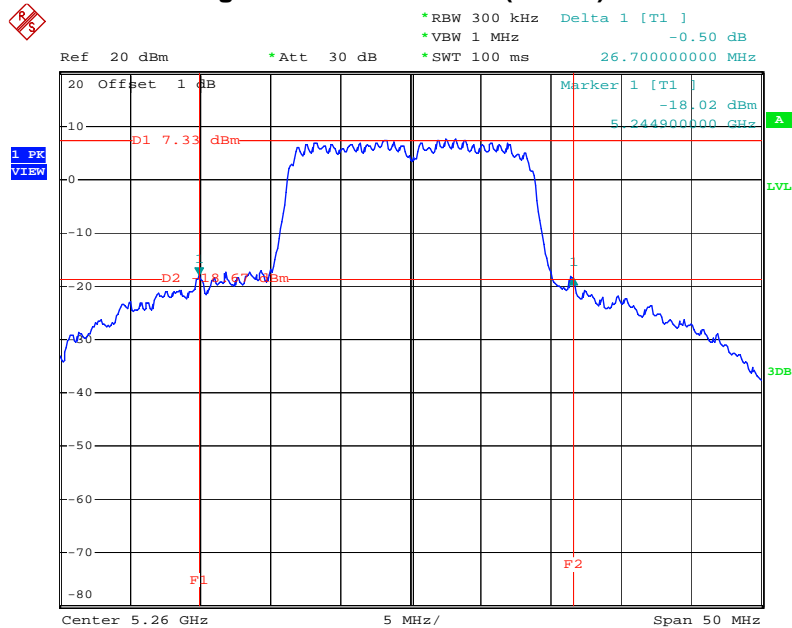
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26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



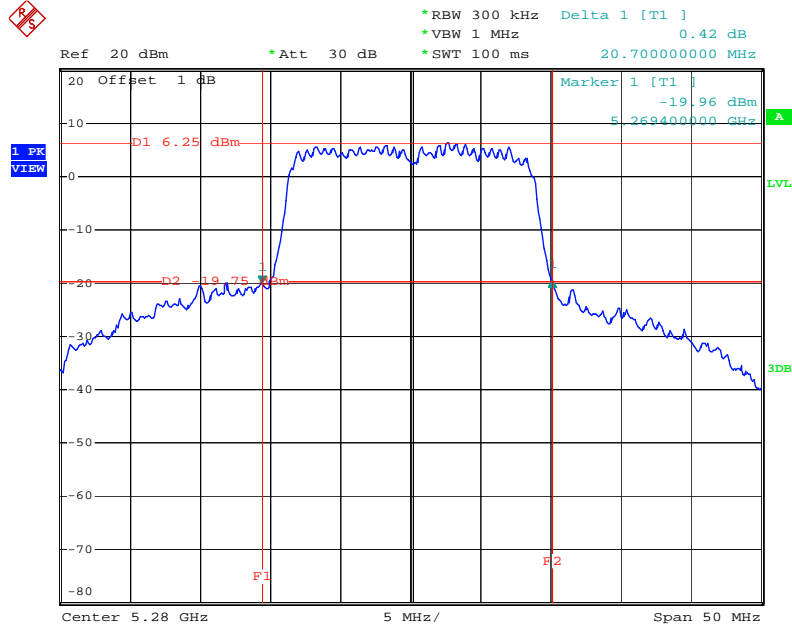
Date: 25.APR.2012 22:58:48

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



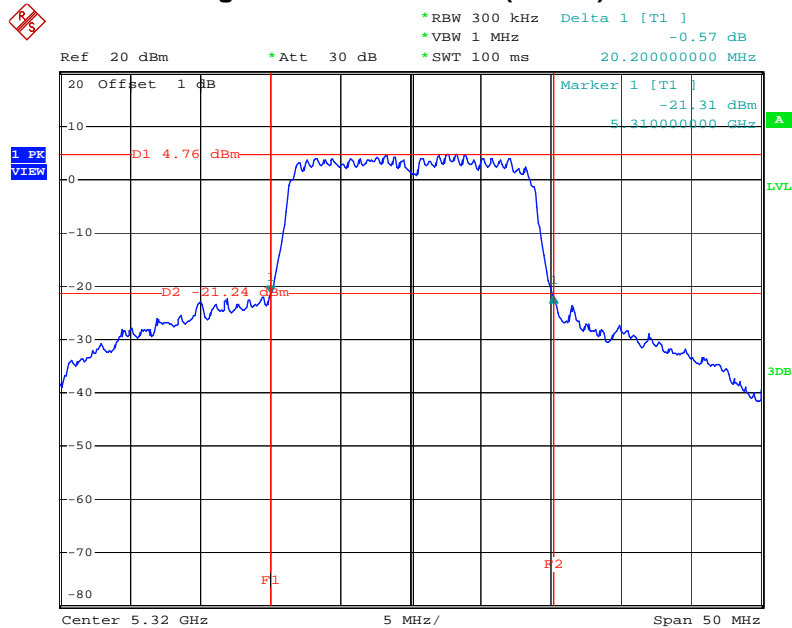
Date: 25.APR.2012 23:01:02

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



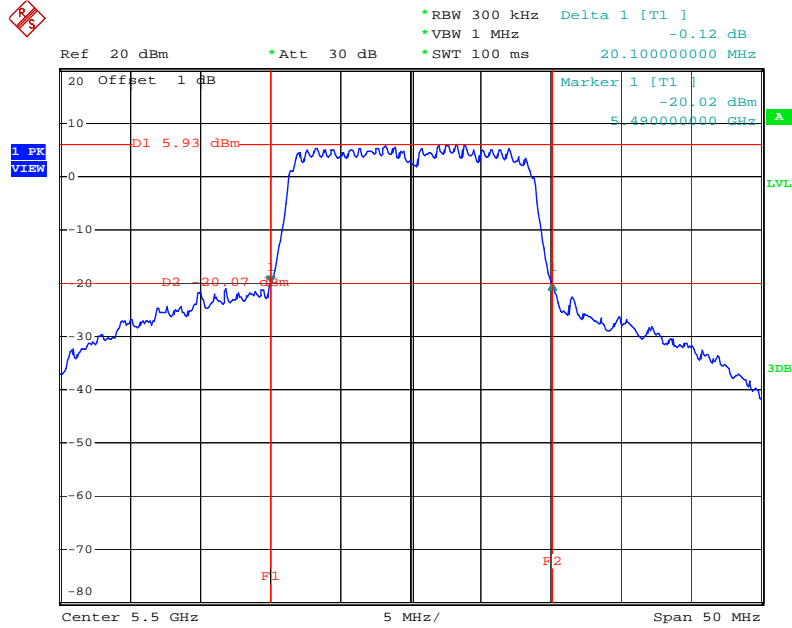
Date: 25.APR.2012 23:03:34

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



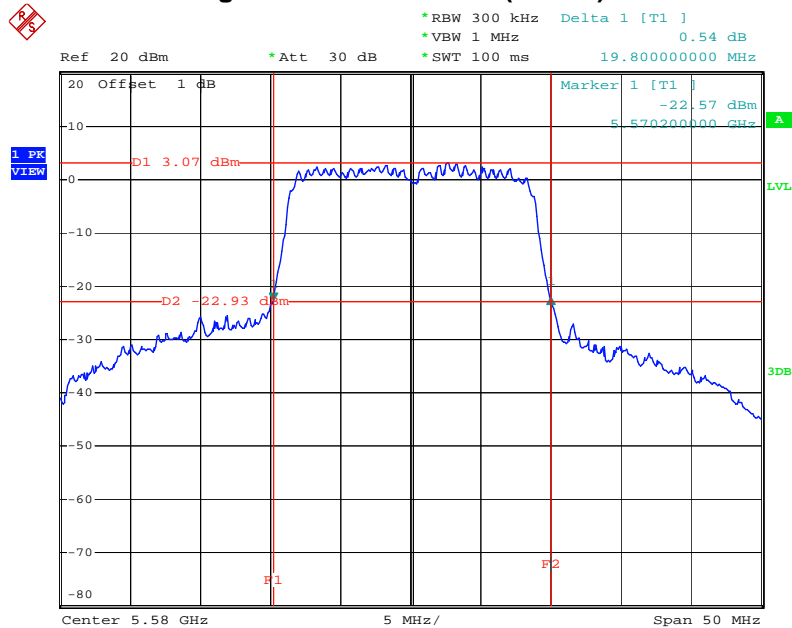
Date: 25.APR.2012 23:06:09

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 2



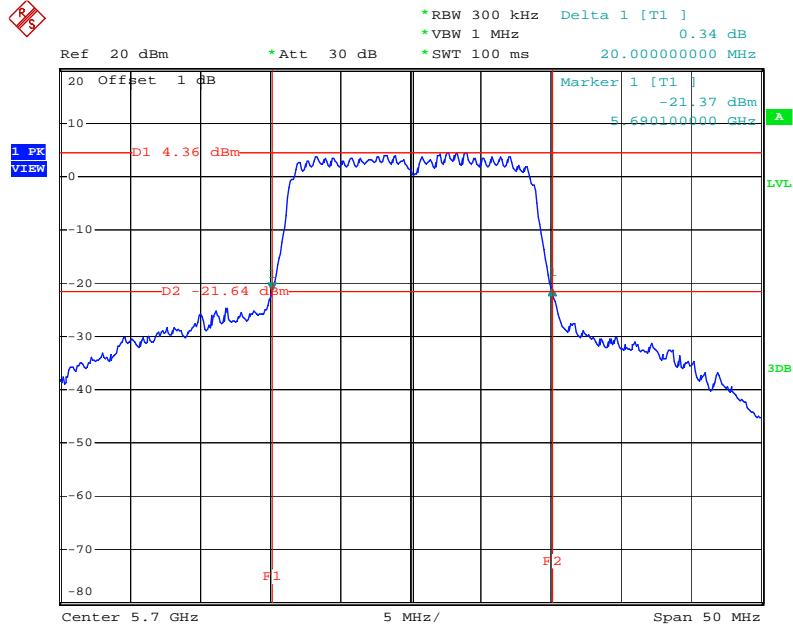
Date: 25.APR.2012 23:09:02

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 2



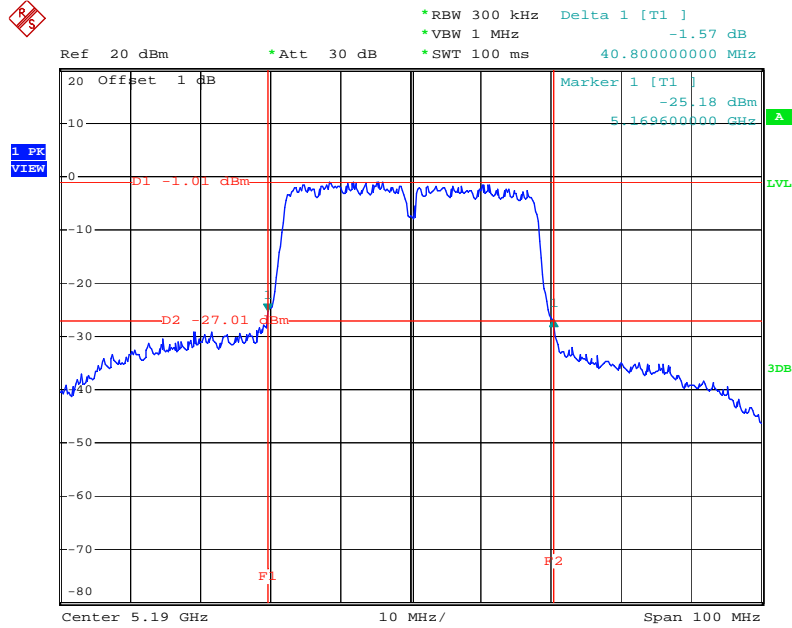
Date: 25.APR.2012 23:11:13

26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 2



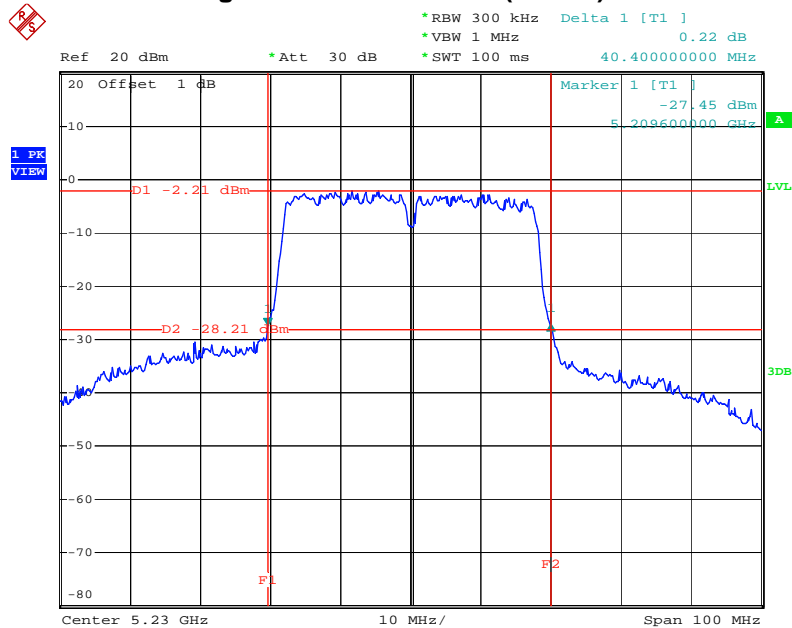
Date: 25.APR.2012 23:13:09

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



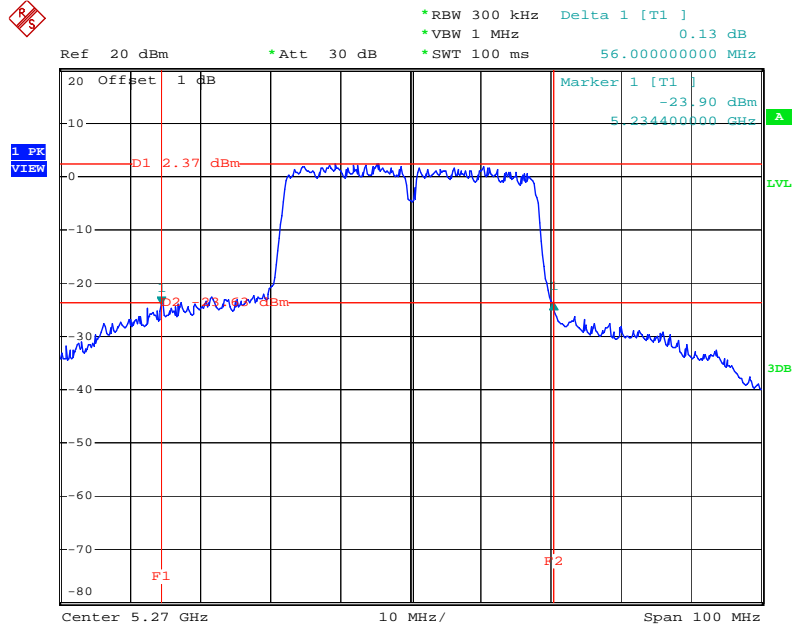
Date: 25.APR.2012 22:31:45

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



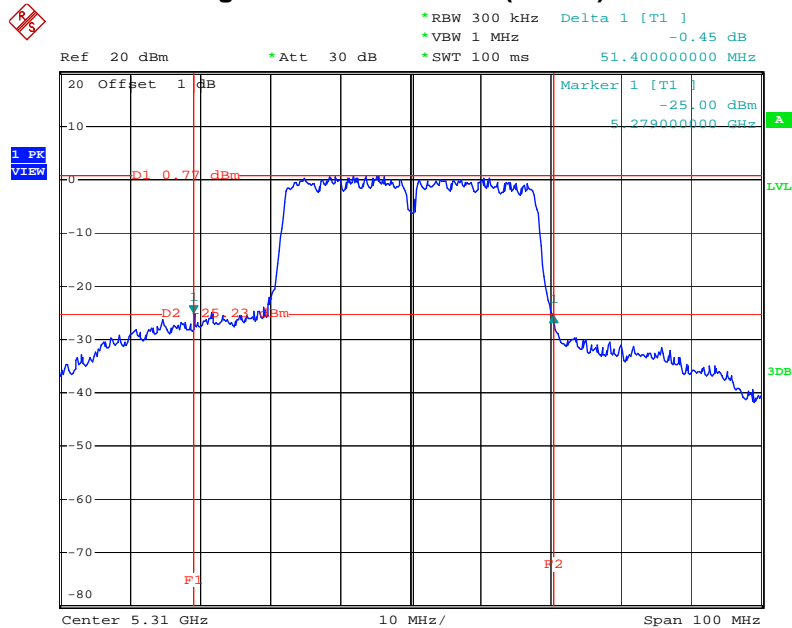
Date: 25.APR.2012 22:34:11

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



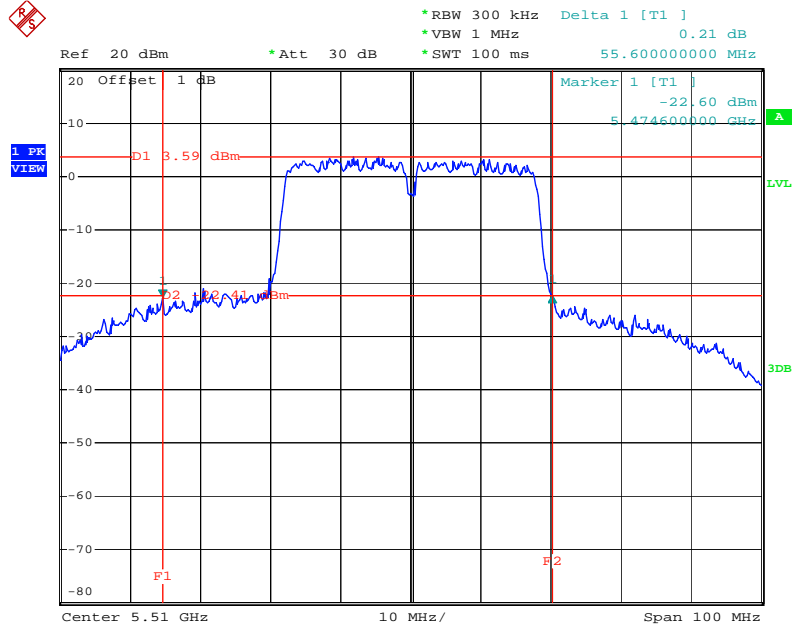
Date: 25.APR.2012 22:36:04

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



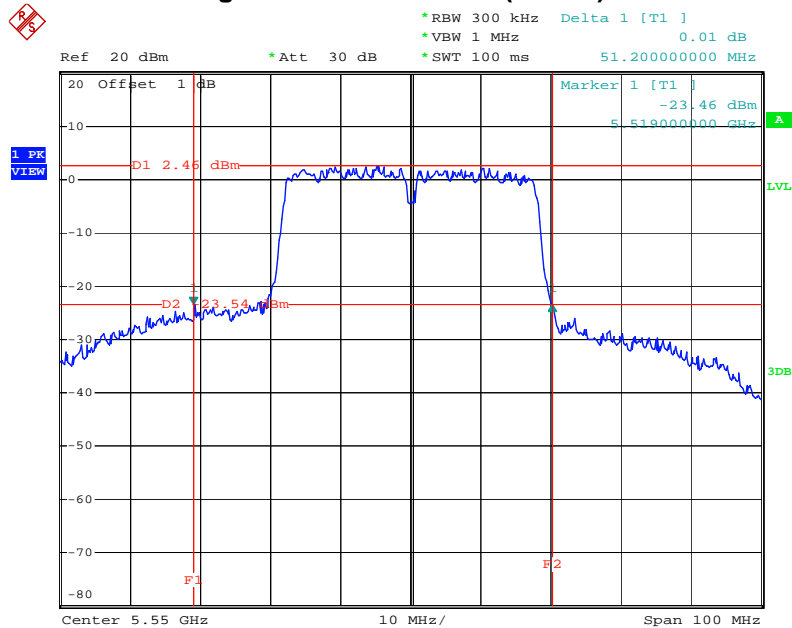
Date: 25.APR.2012 22:38:33

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 1



Date: 25.APR.2012 22:41:01

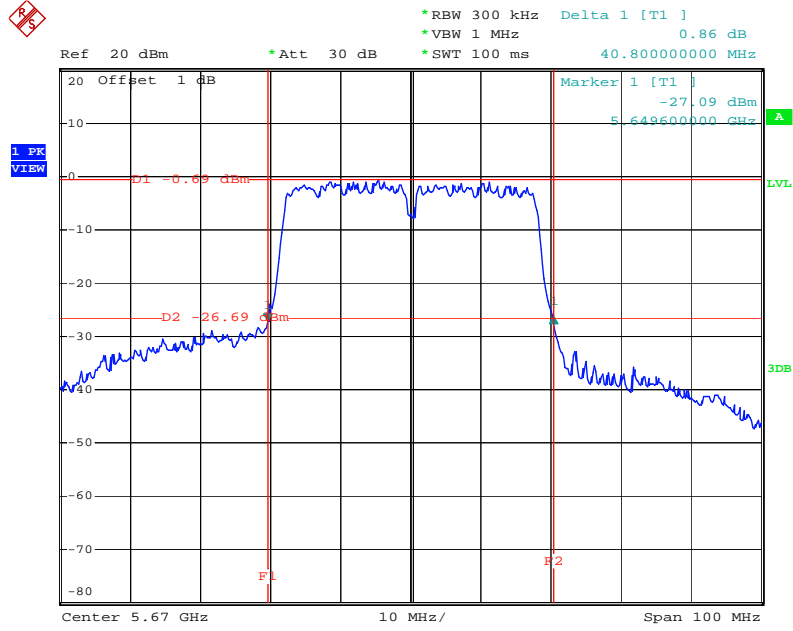
26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 1



Date: 25.APR.2012 22:45:34

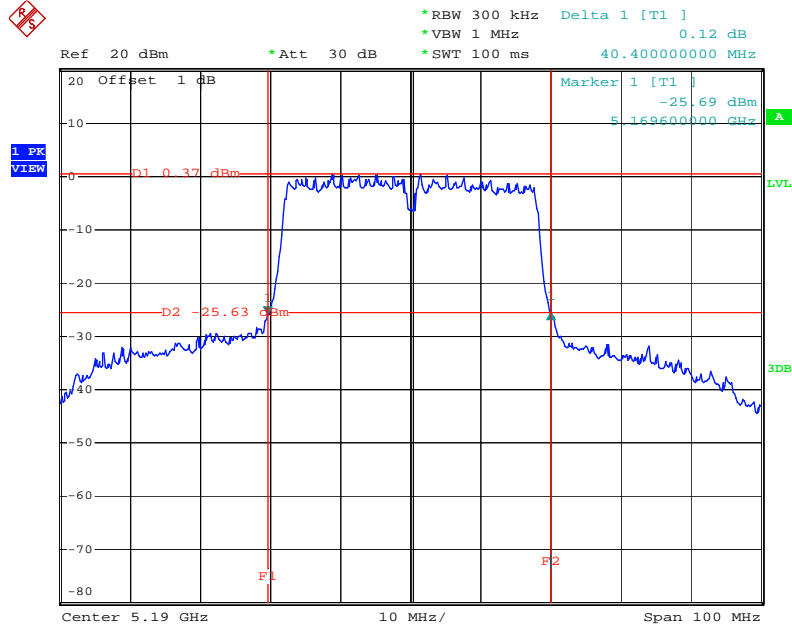


26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 1



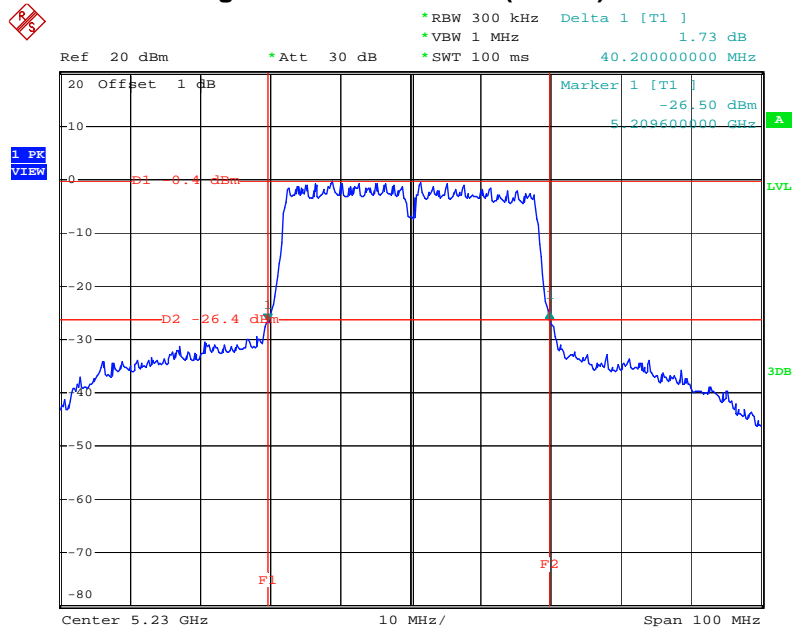
Date: 25.APR.2012 22:47:20

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



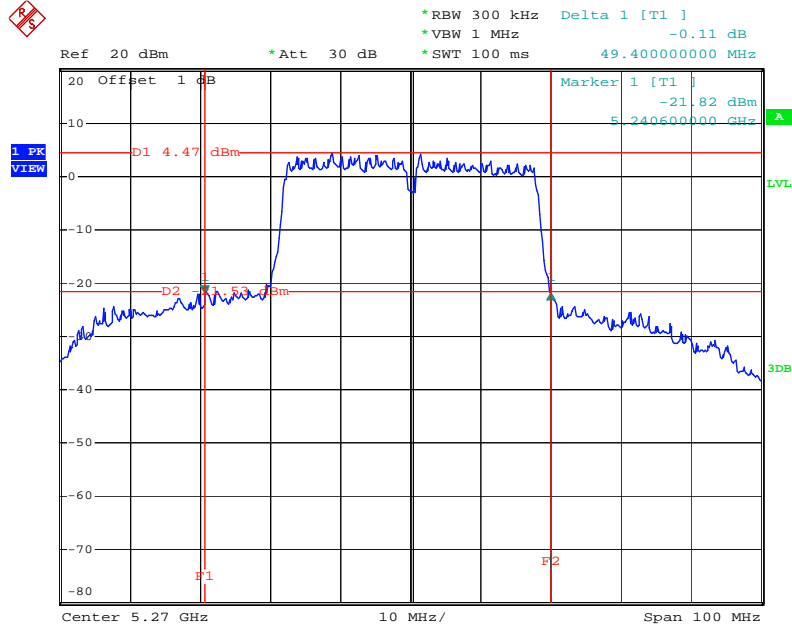
Date: 25.APR.2012 23:15:44

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



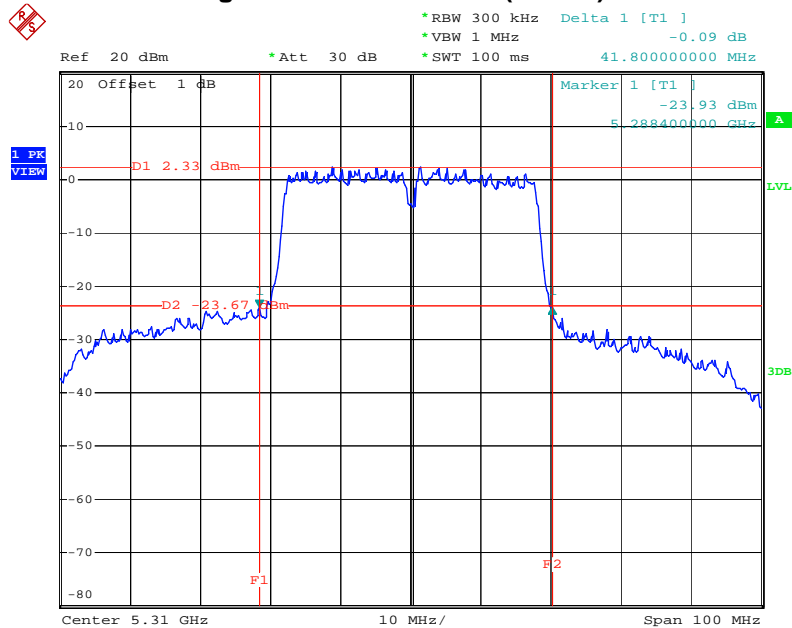
Date: 25.APR.2012 23:17:52

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



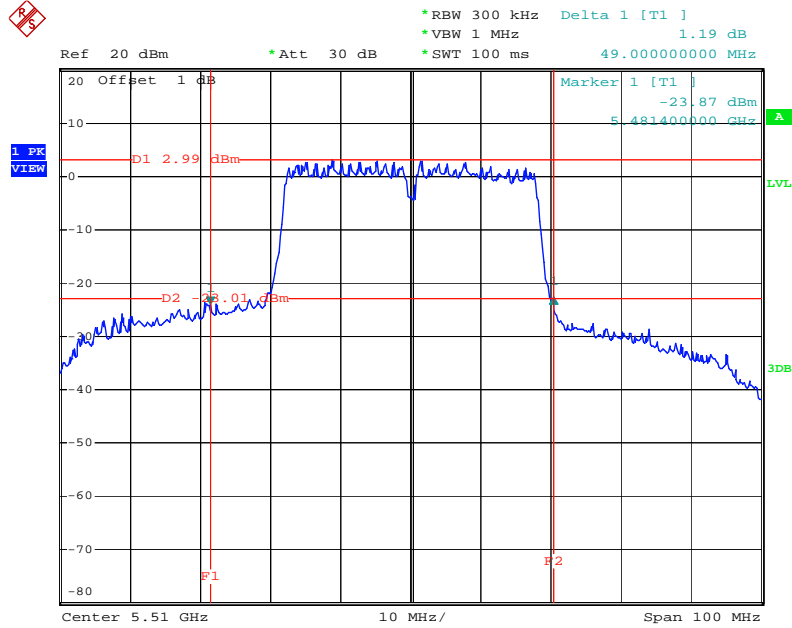
Date: 25.APR.2012 23:19:57

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



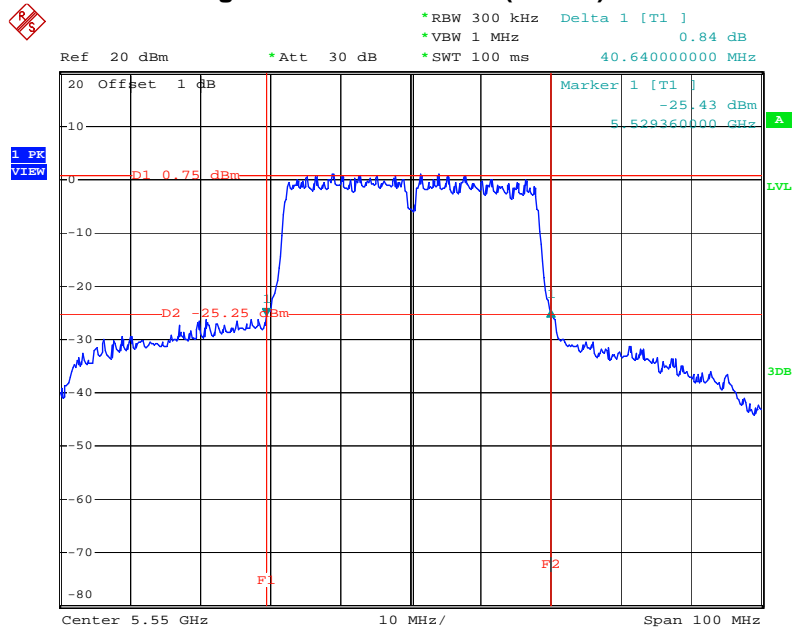
Date: 25.APR.2012 23:22:03

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 2



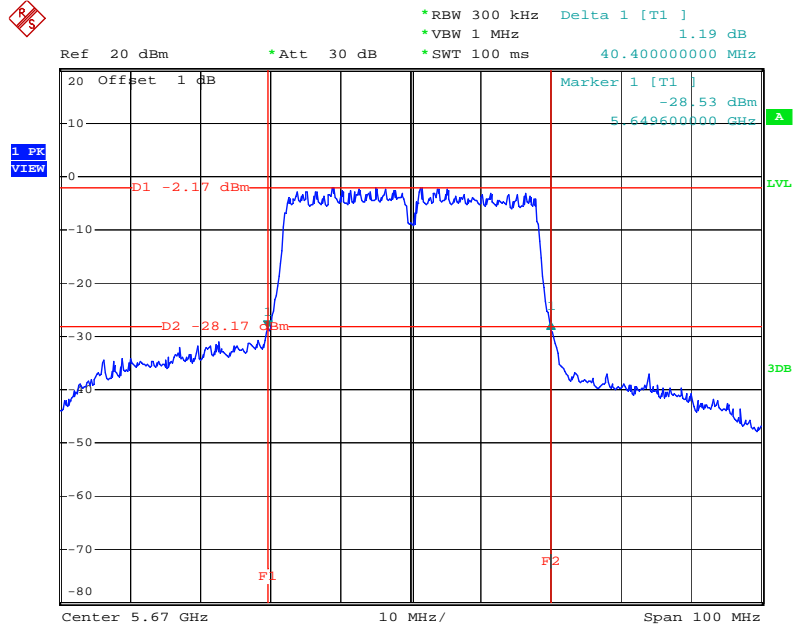
Date: 25.APR.2012 23:24:08

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 2



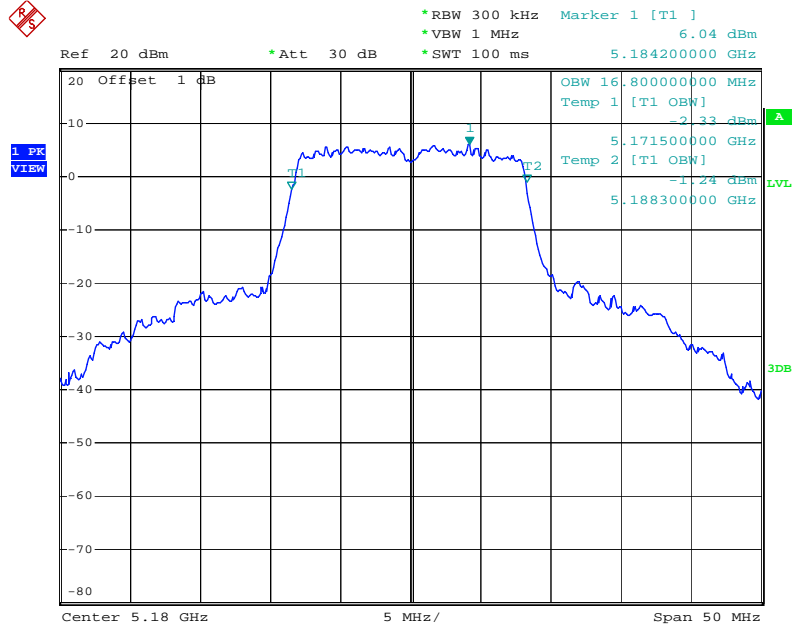
Date: 25.APR.2012 23:25:59

26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 2



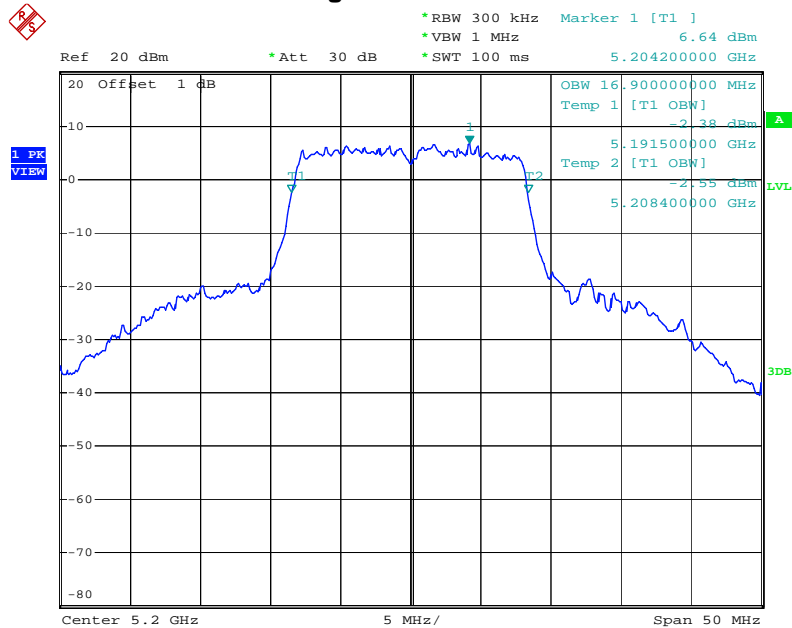
Date: 25.APR.2012 23:28:07

For Single Chain:  
99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5180 MHz Port 2



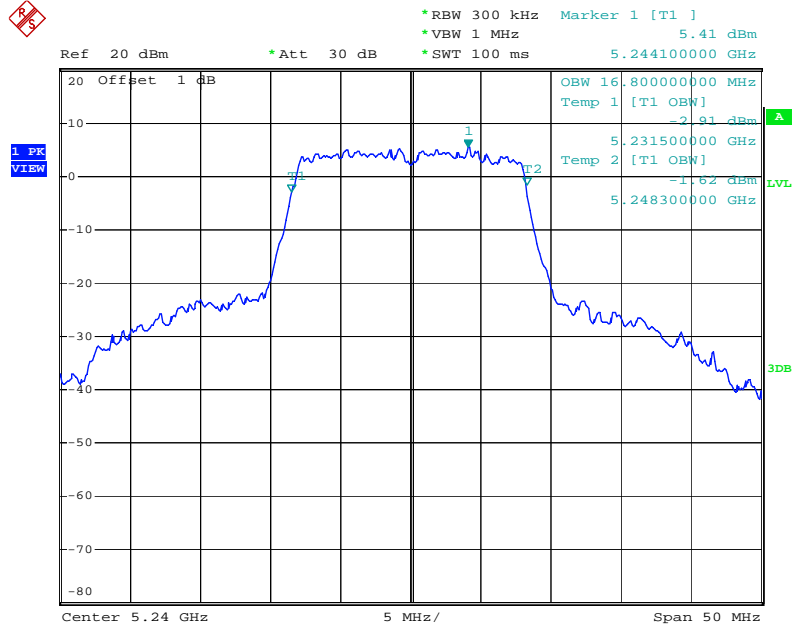
Date: 25.APR.2012 11:53:35

99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5200 MHz Port 2



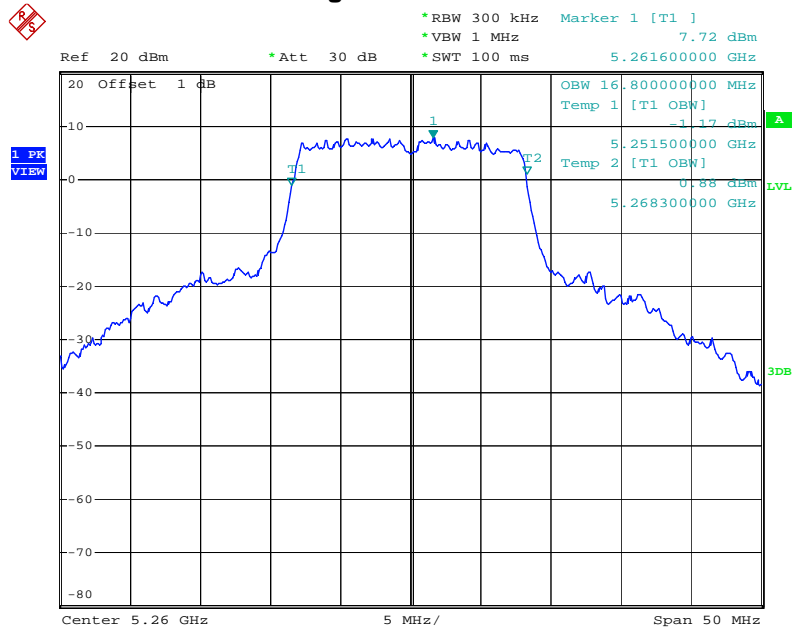
Date: 25.APR.2012 11:57:56

99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5240 MHz Port 2



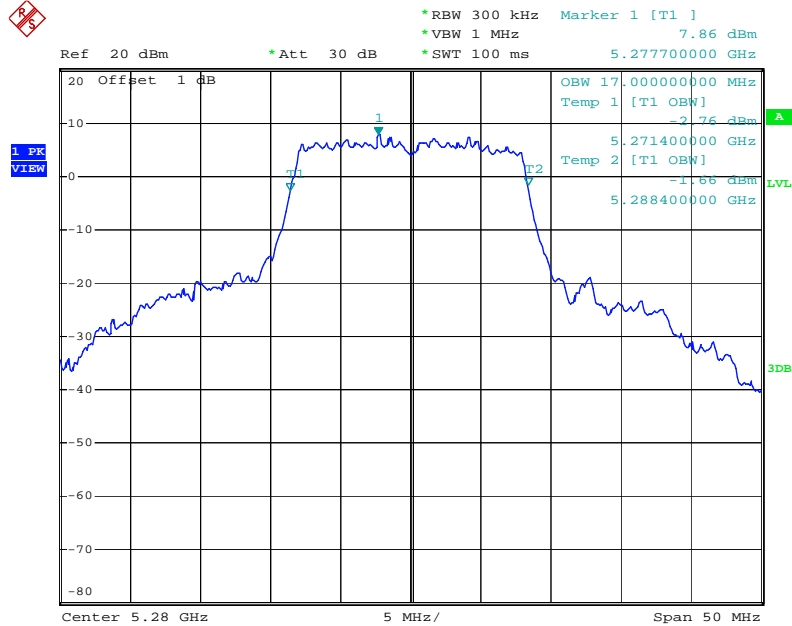
Date: 25.APR.2012 13:45:59

99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5260 MHz Port 2



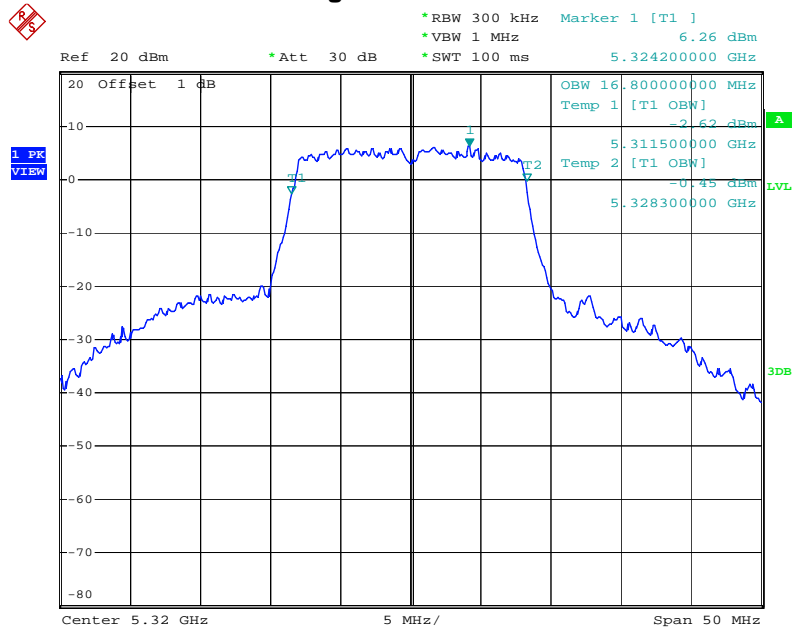
Date: 25.APR.2012 14:22:56

99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5280 MHz Port 2



Date: 25.APR.2012 14:26:05

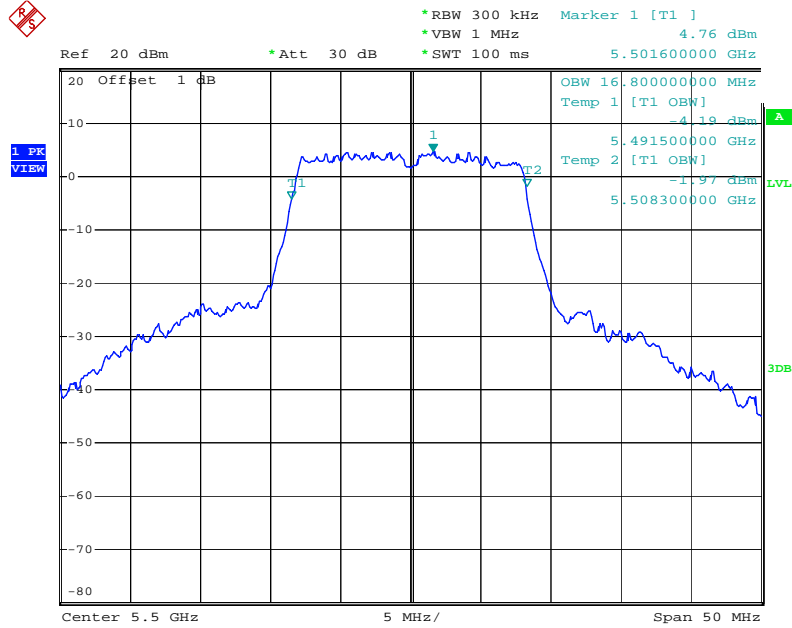
99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5320 MHz Port 2



Date: 25.APR.2012 14:29:50

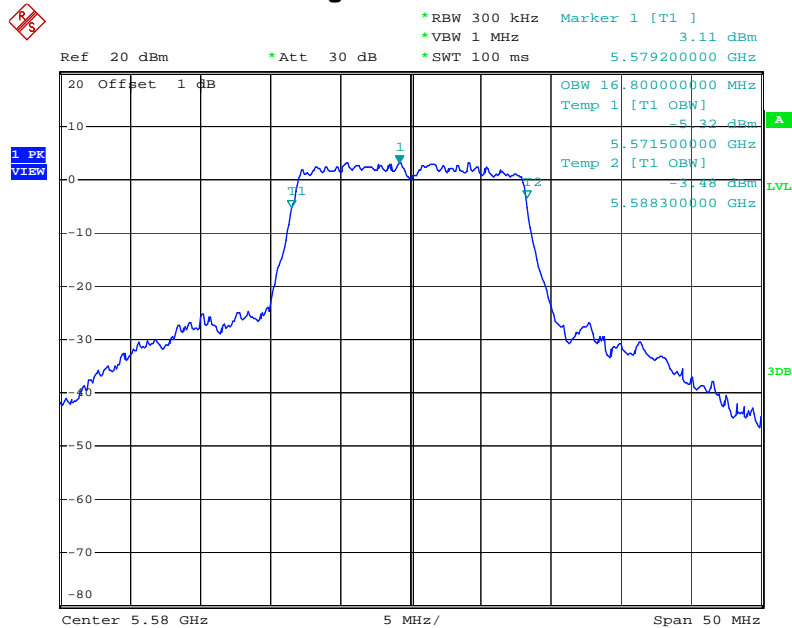


99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5500 MHz Port 2



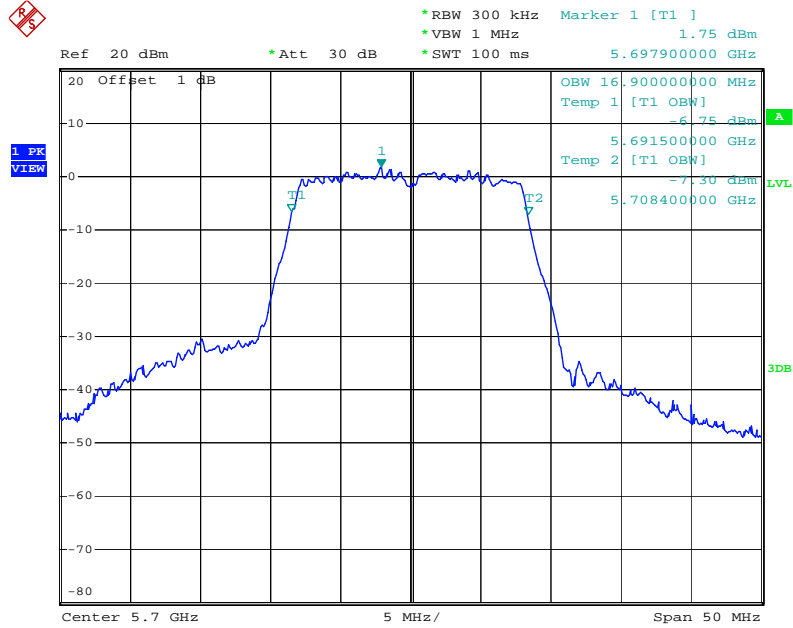
Date: 25.APR.2012 14:33:57

99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5580 MHz Port 2



Date: 25.APR.2012 14:39:01

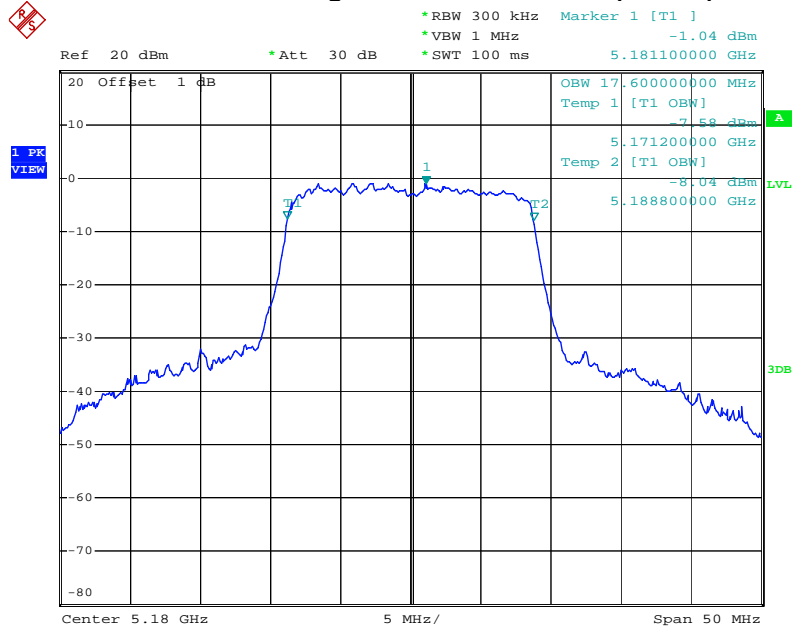
99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5700 MHz Port 2



Date: 25.APR.2012 14:41:37

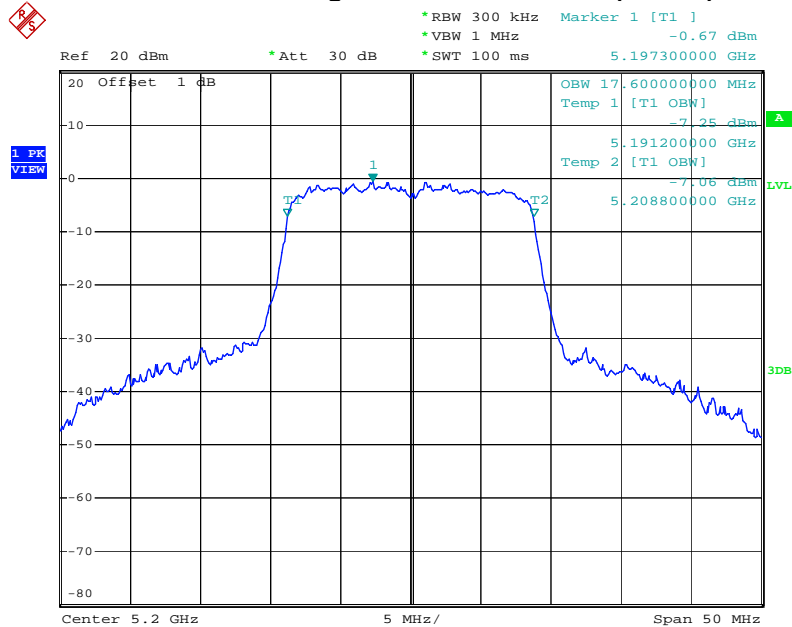
For Two Chains:

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 1



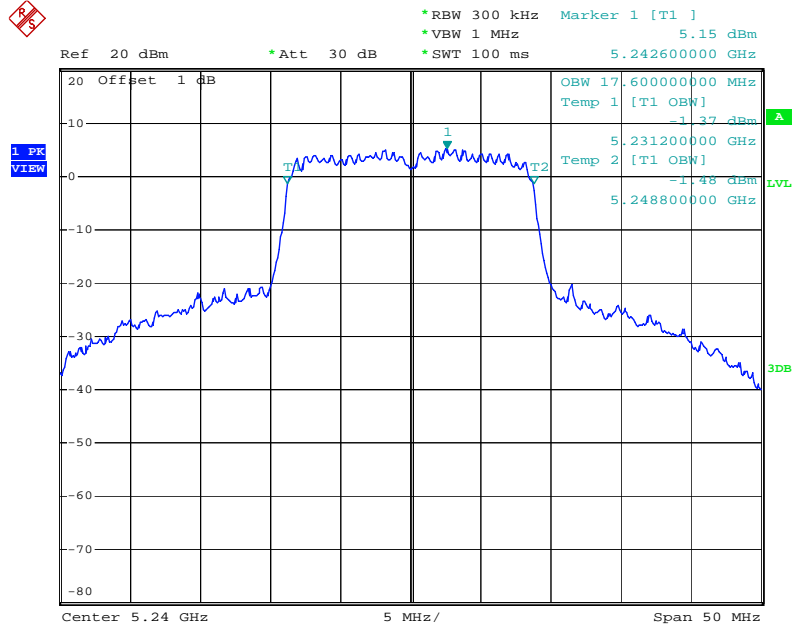
Date: 25.APR.2012 22:12:59

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



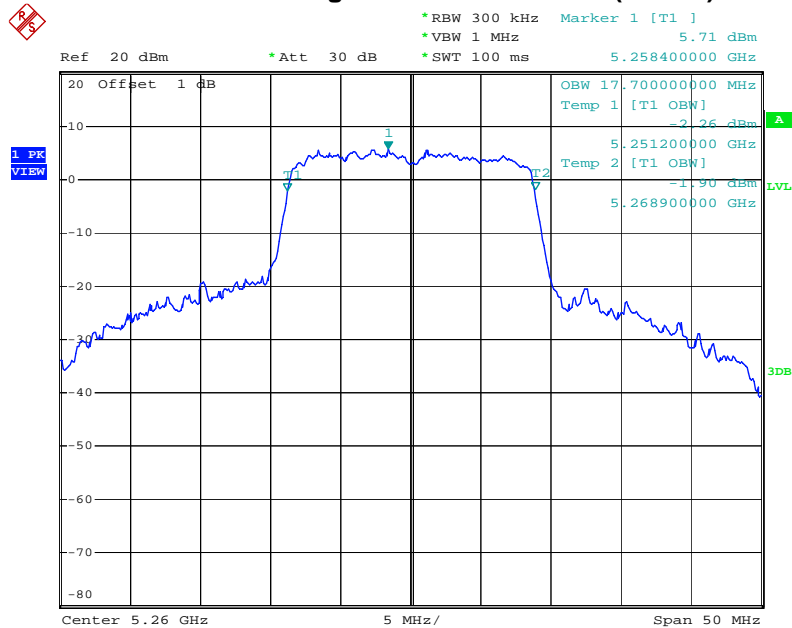
Date: 25.APR.2012 22:14:47

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



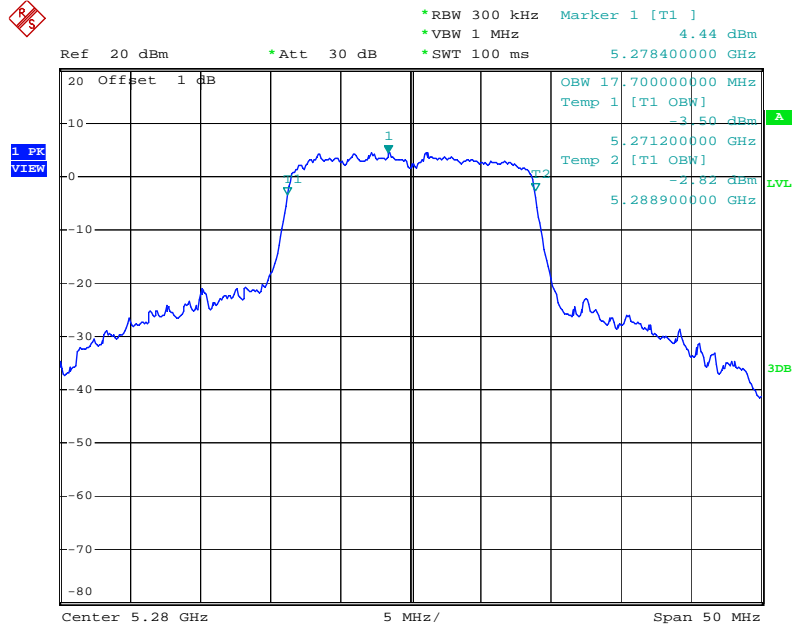
Date: 26.APR.2012 09:56:32

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 1



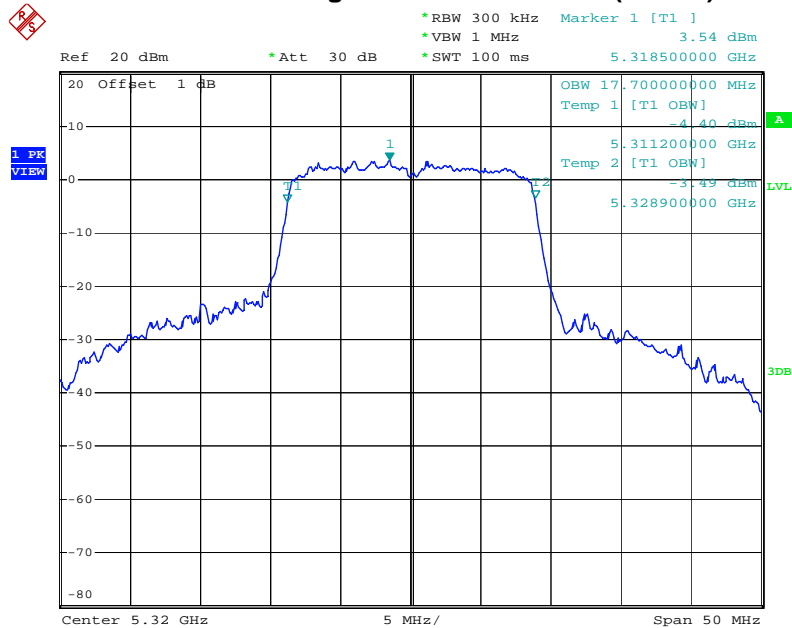
Date: 25.APR.2012 22:19:19

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 1



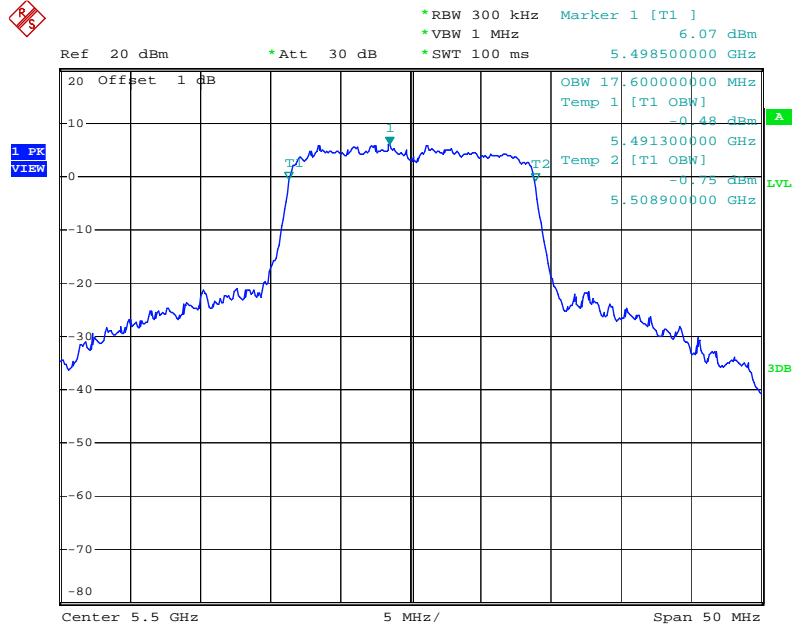
Date: 25.APR.2012 22:21:25

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 1



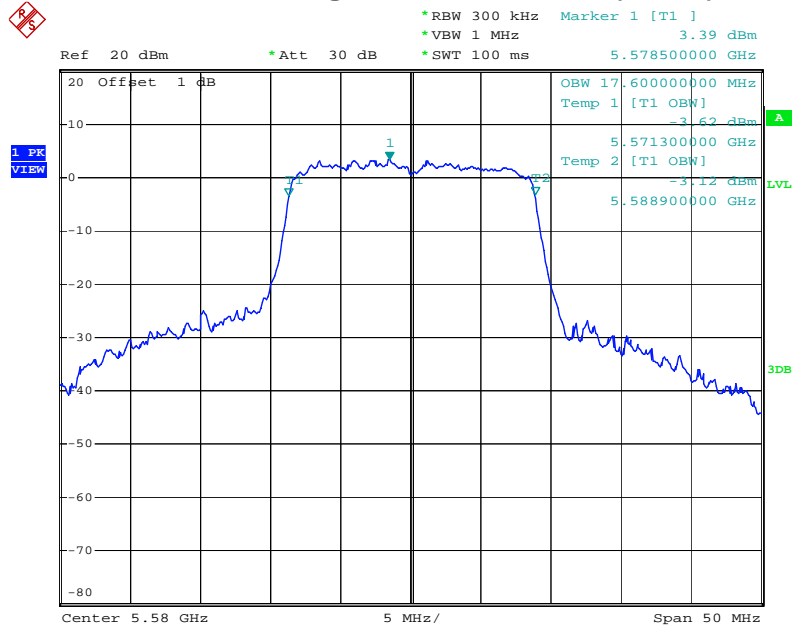
Date: 25.APR.2012 22:23:42

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 1



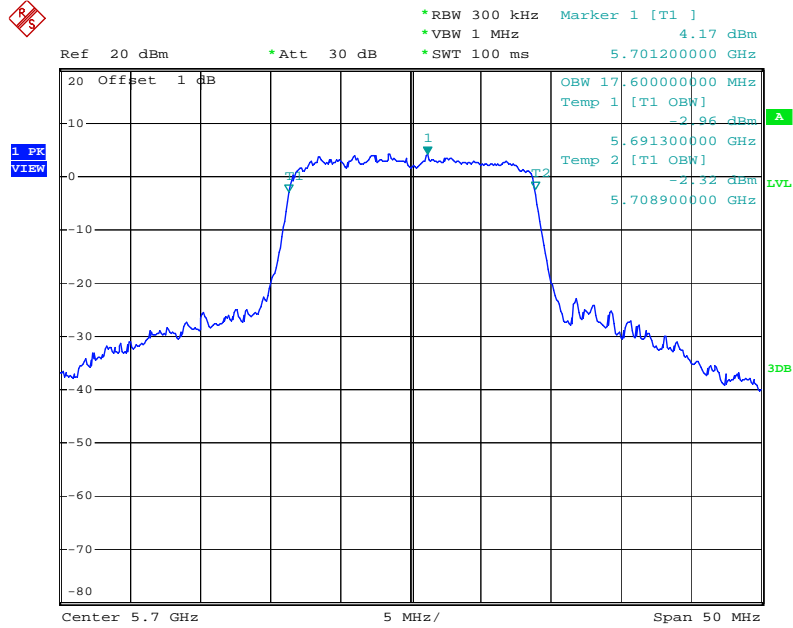
Date: 25.APR.2012 22:25:37

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 1



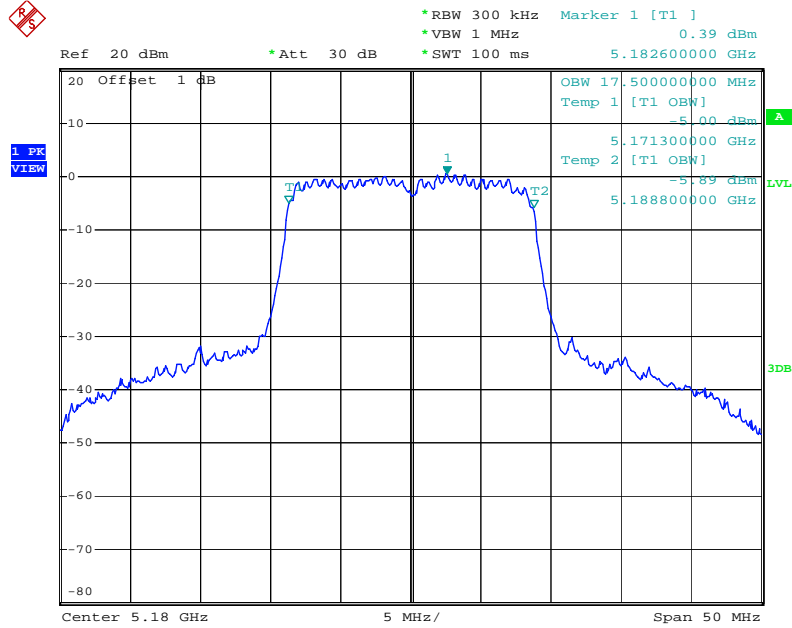
Date: 25.APR.2012 22:27:47

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 1



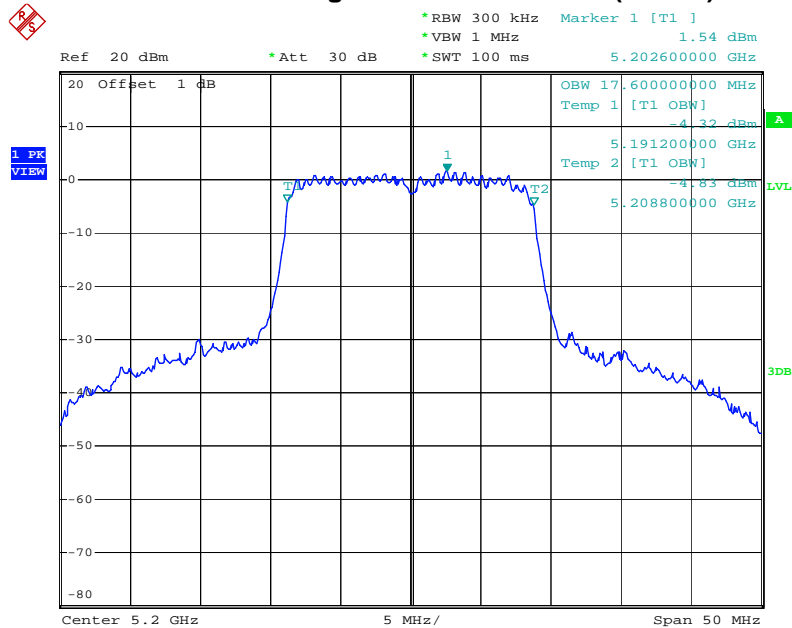
Date: 25.APR.2012 22:29:50

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



Date: 25.APR.2012 22:52:35

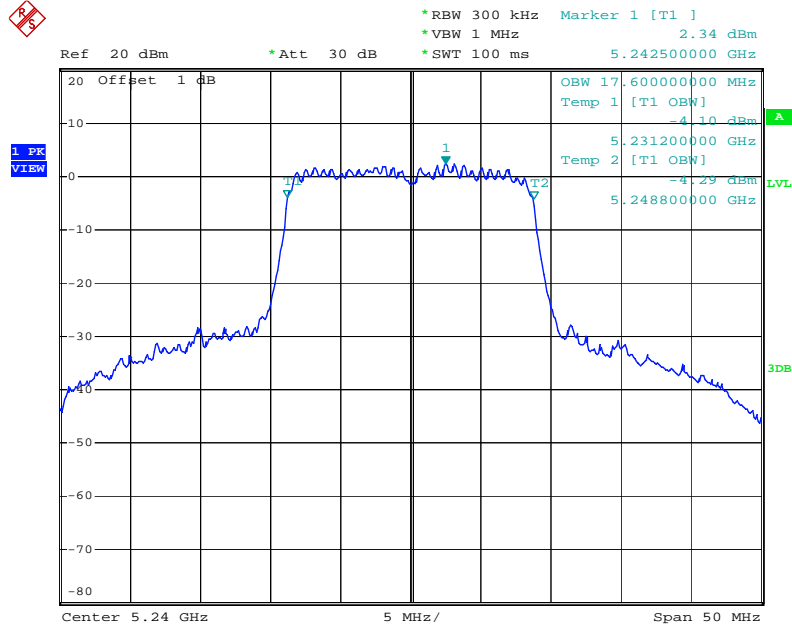
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



Date: 25.APR.2012 22:54:48

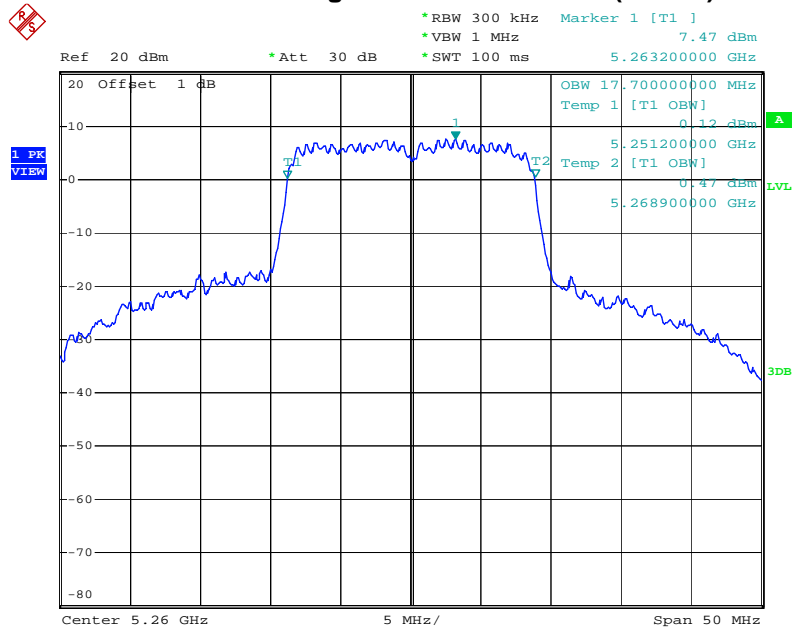


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



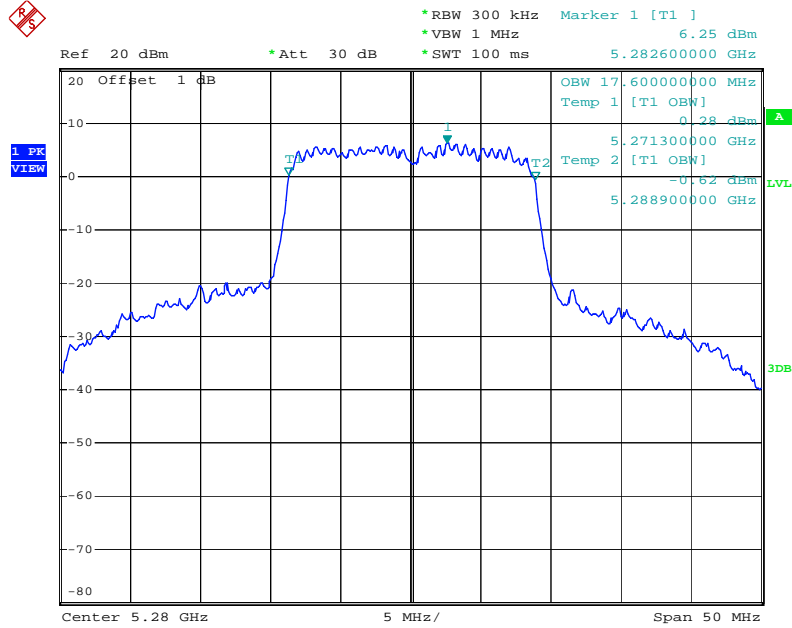
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99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 2



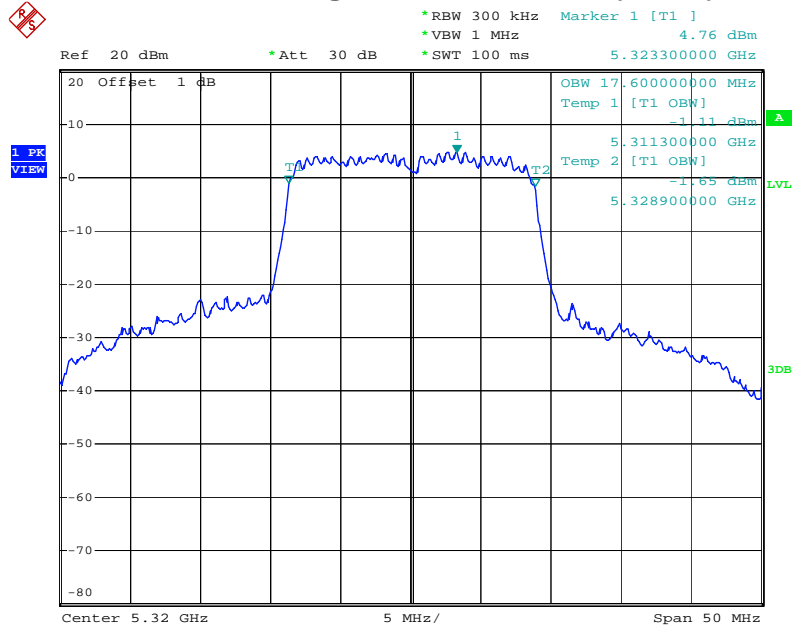
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99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 2



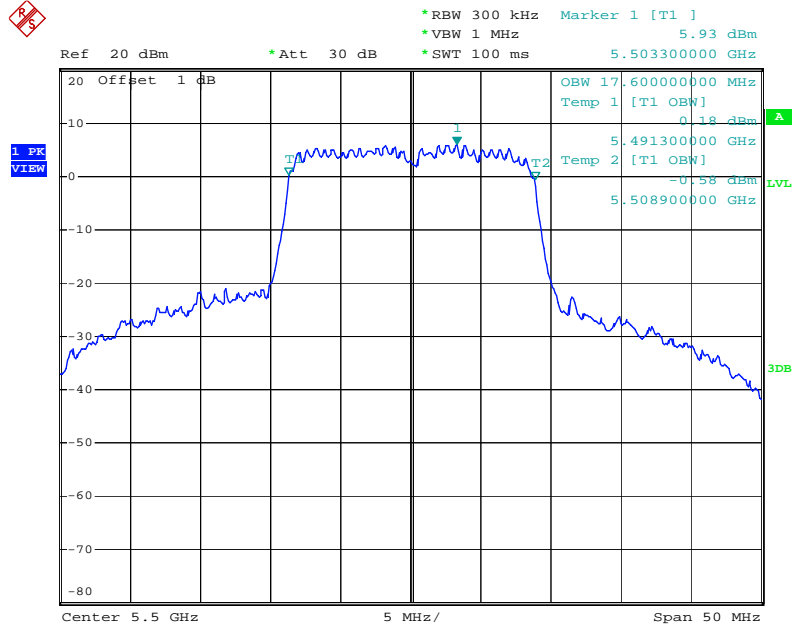
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99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 2



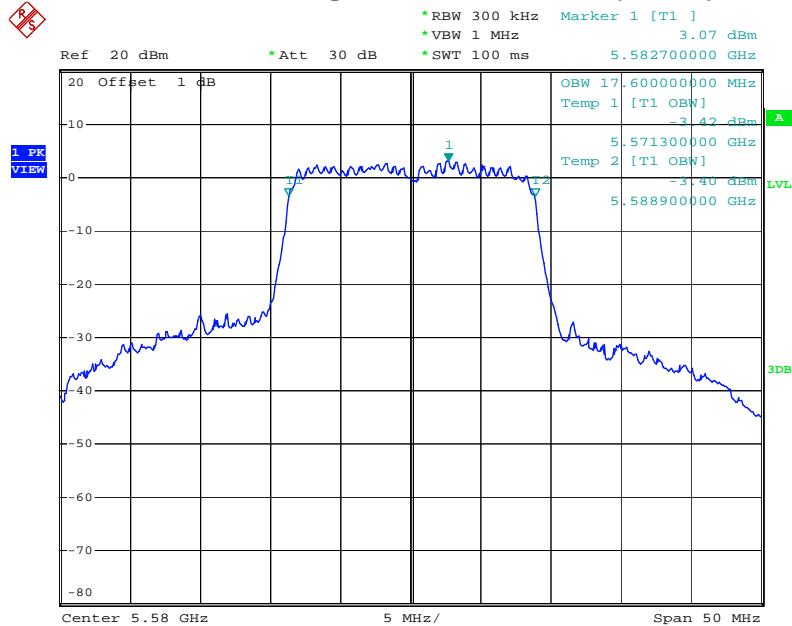
Date: 25.APR.2012 23:06:17

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 2



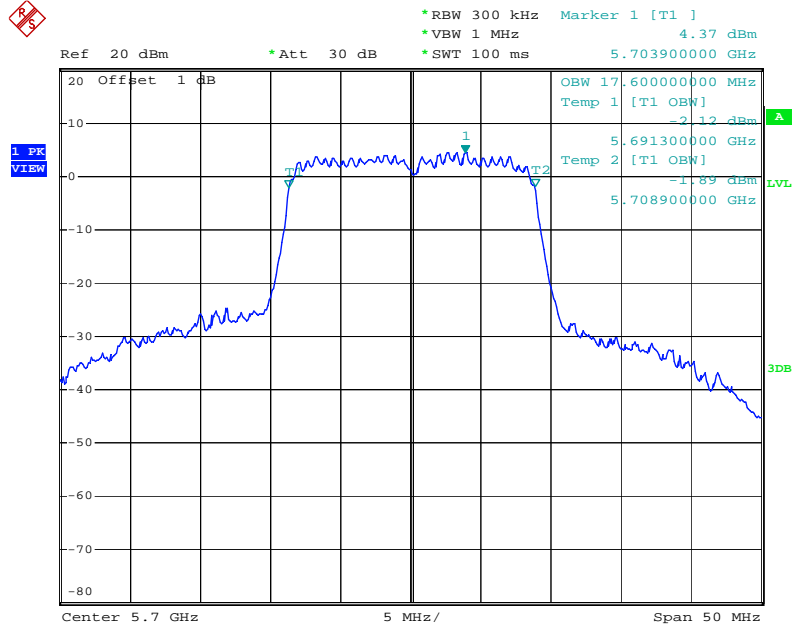
Date: 25.APR.2012 23:09:12

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 2



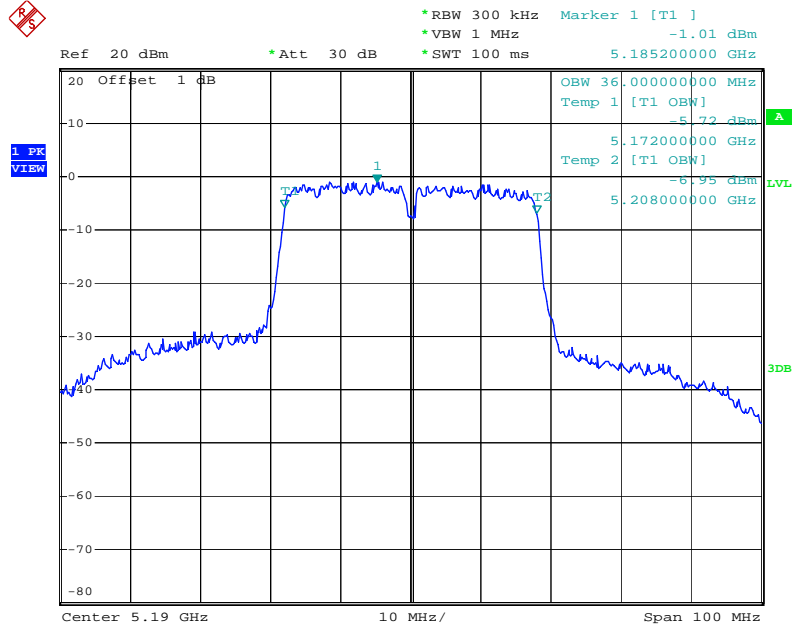
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99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 2



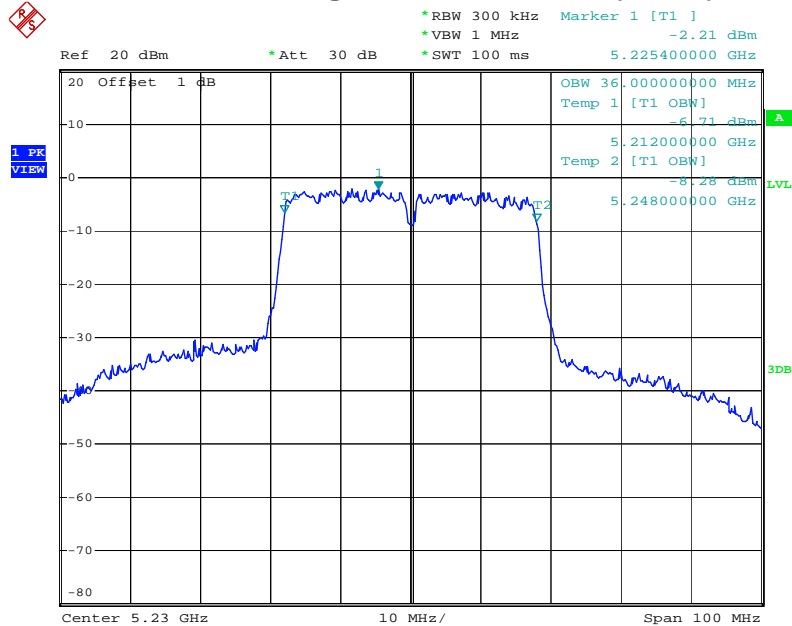
Date: 25.APR.2012 23:13:18

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



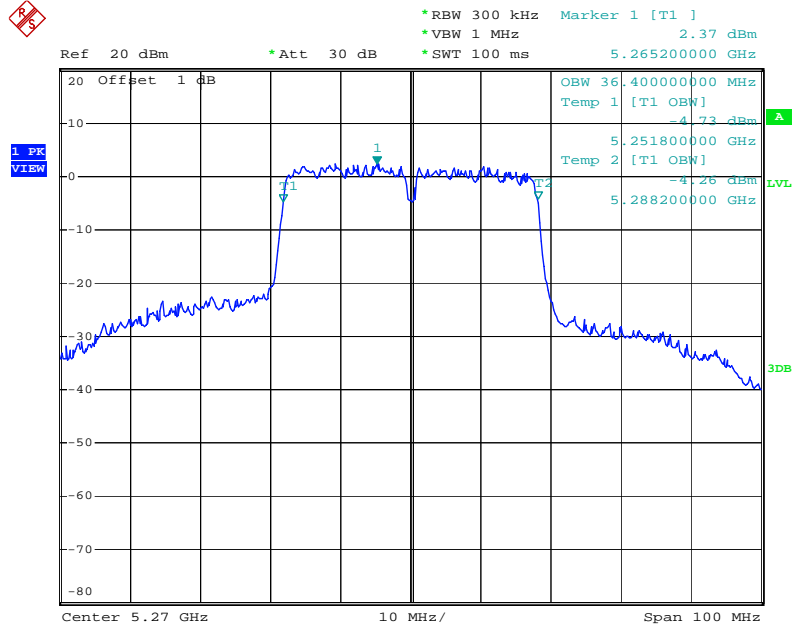
Date: 25.APR.2012 22:31:56

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



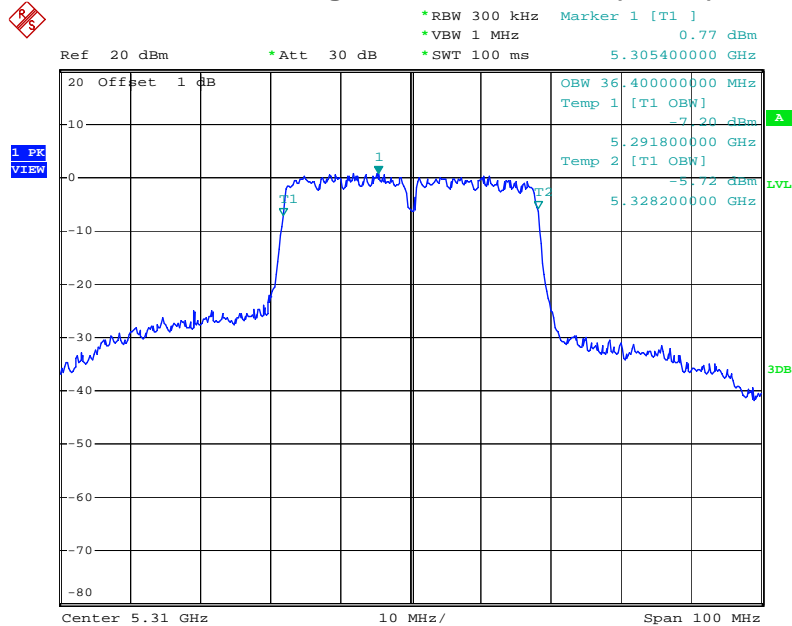
Date: 25.APR.2012 22:34:19

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 1



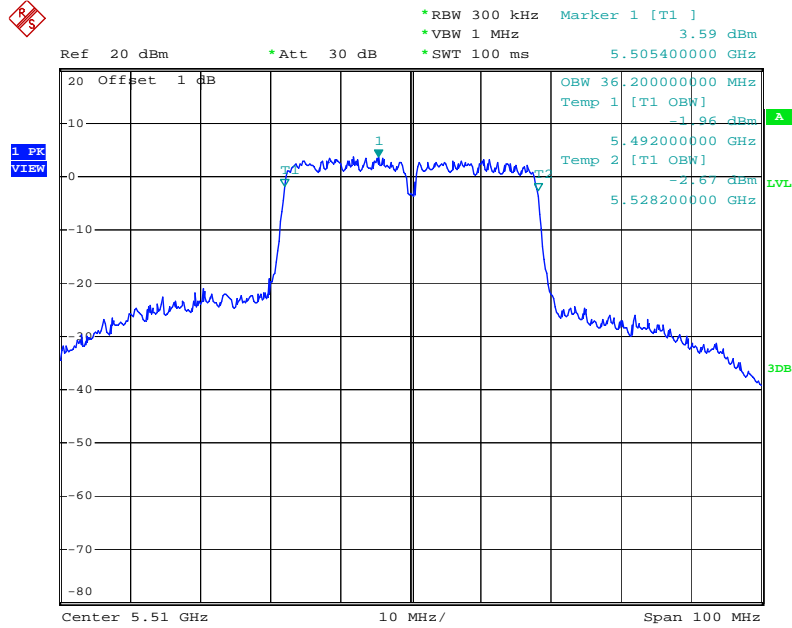
Date: 25.APR.2012 22:36:13

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 1



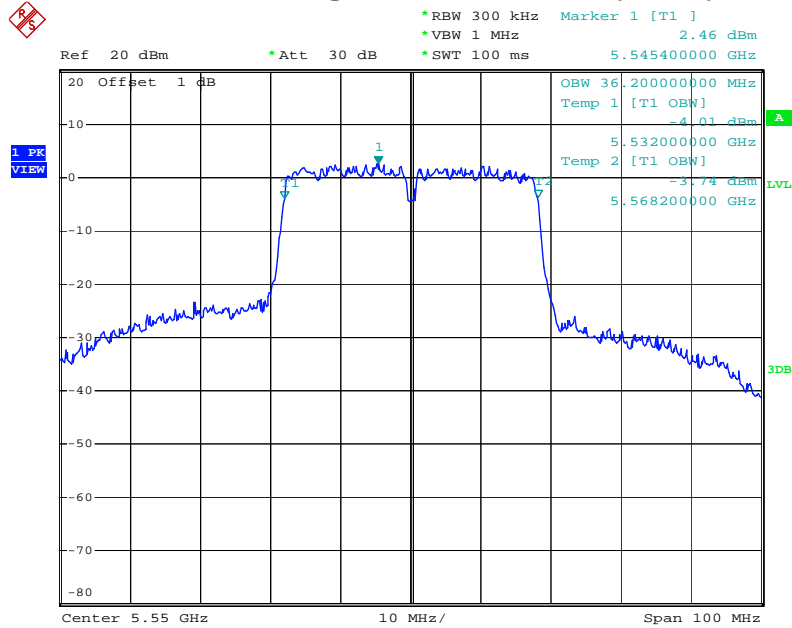
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99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 1



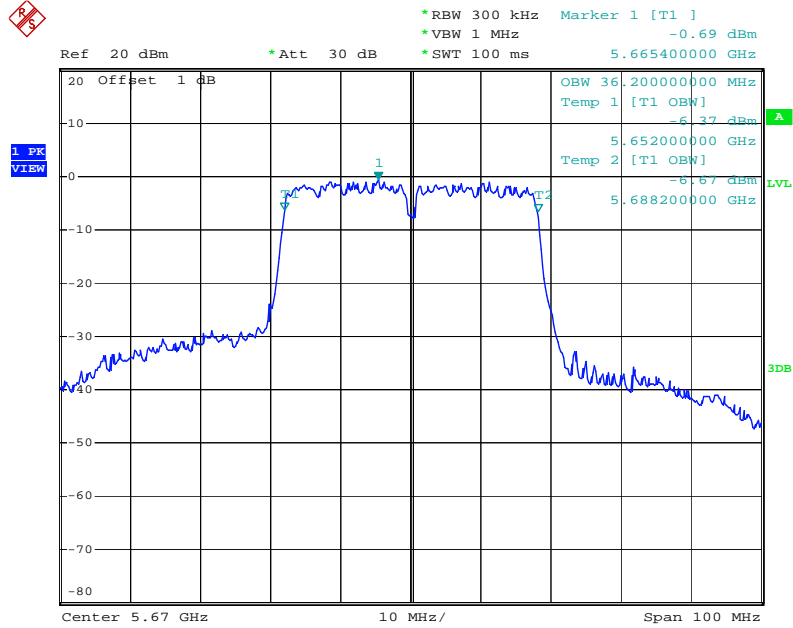
Date: 25.APR.2012 22:41:12

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 1



Date: 25.APR.2012 22:45:43

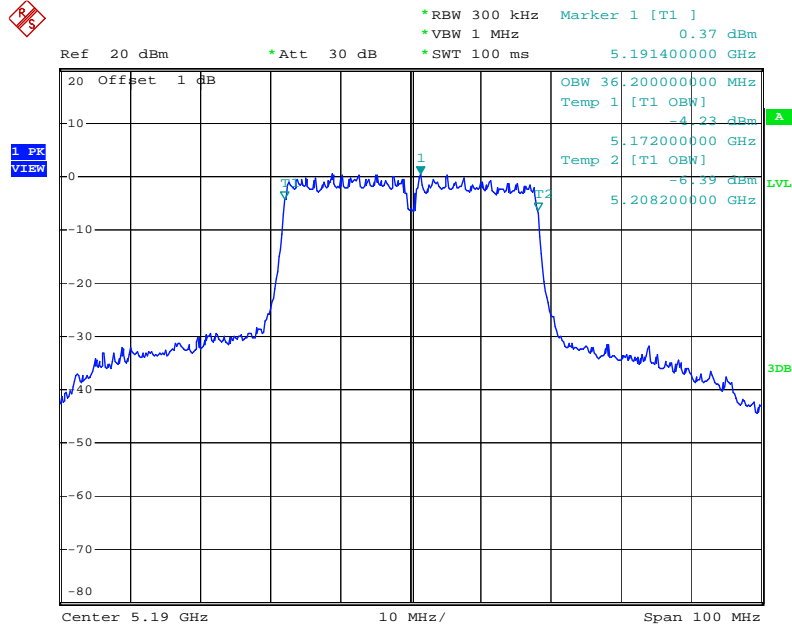
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 1



Date: 25.APR.2012 22:47:29

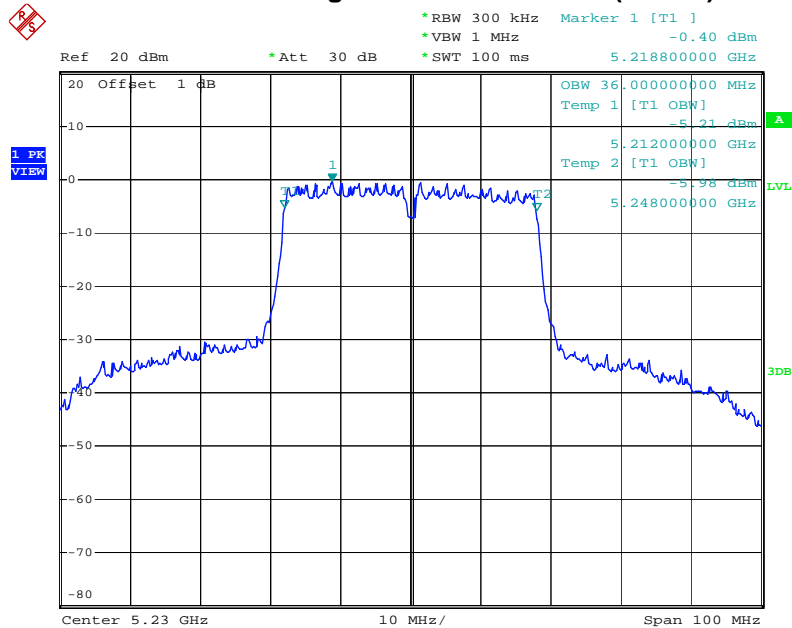


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2



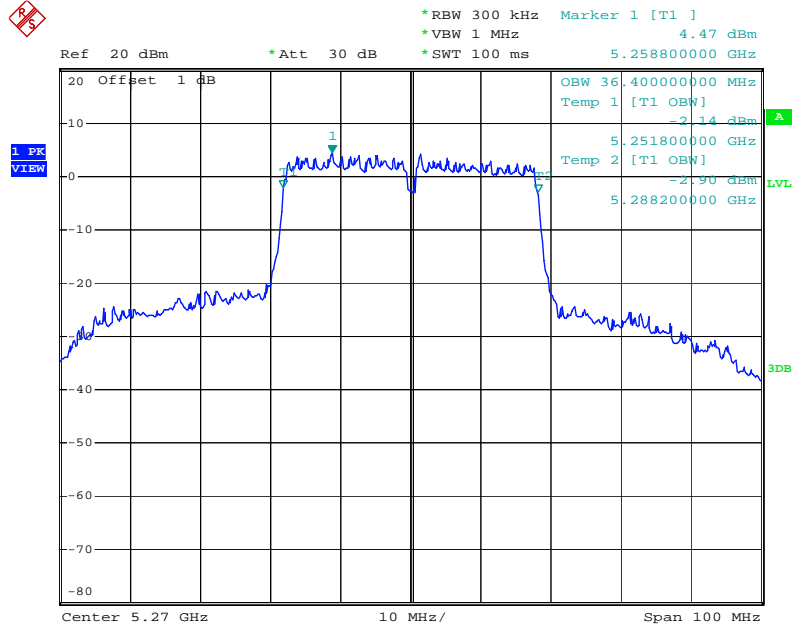
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99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



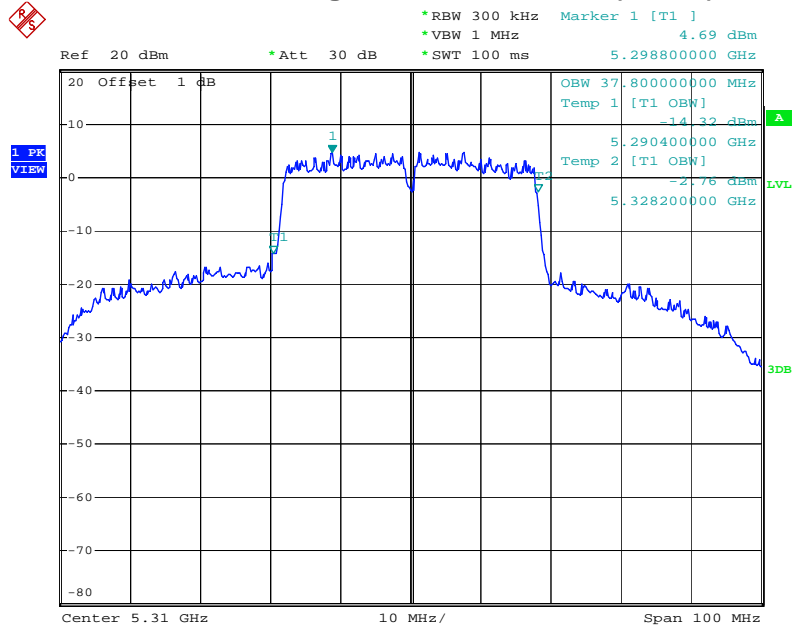
Date: 25.APR.2012 23:18:01

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 2



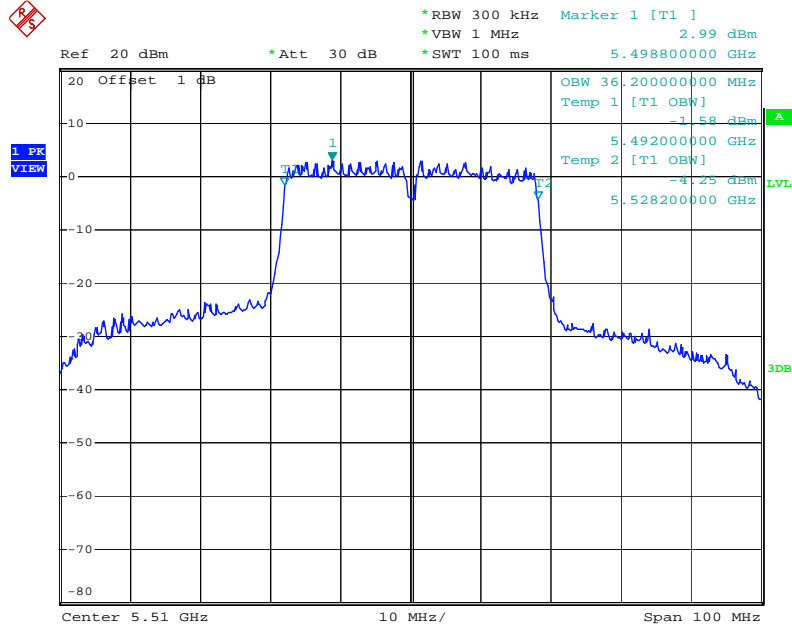
Date: 25.APR.2012 23:20:06

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 2



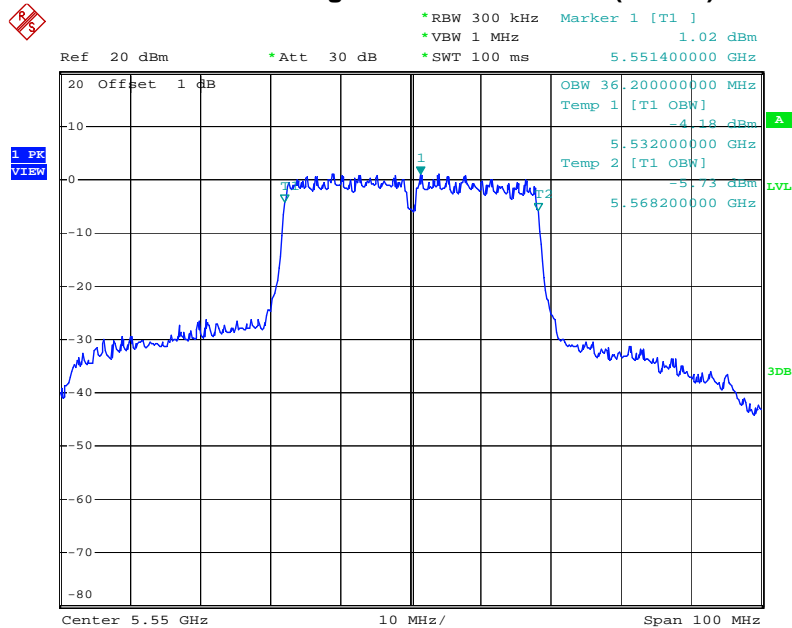
Date: 26.APR.2012 09:58:56

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 2



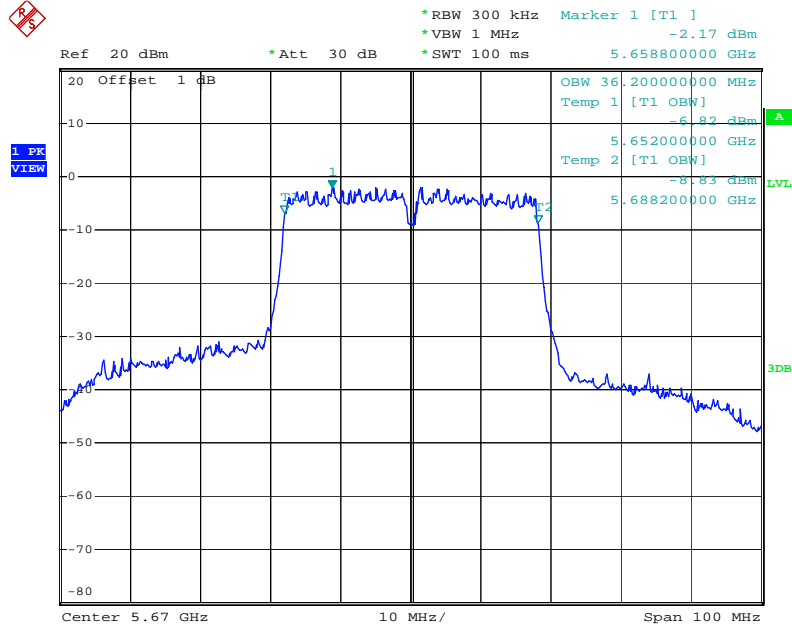
Date: 25.APR.2012 23:24:16

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 2



Date: 25.APR.2012 23:26:12

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 2



Date: 25.APR.2012 23:28:19

### 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 and 5.47~5.725 GHz bands, 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

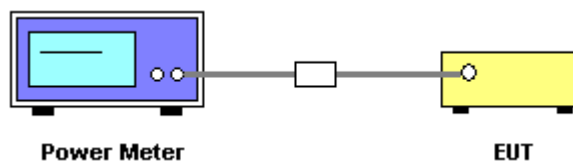
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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**

<b>Final Test Date</b>	Apr. 25, 2012	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	25.9°C	<b>Humidity</b>	30%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	802.11a/n

**For Single Chain:  
Configuration of IEEE 802.11a Port 2**

<b>Channel</b>	<b>Frequency</b>	<b>Conducted Power (dBm)</b>	<b>Max. Limit (dBm)</b>	<b>Result</b>
36	5180 MHz	12.94	17.00	<b>Complies</b>
40	5200 MHz	13.02	17.00	<b>Complies</b>
48	5240 MHz	12.68	17.00	<b>Complies</b>
52	5260 MHz	17.19	24.00	<b>Complies</b>
56	5280 MHz	17.21	24.00	<b>Complies</b>
64	5320 MHz	16.29	24.00	<b>Complies</b>
100	5500 MHz	13.57	24.00	<b>Complies</b>
116	5580 MHz	13.68	24.00	<b>Complies</b>
140	5700 MHz	10.67	24.00	<b>Complies</b>

**For Two Chains:**

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	8.51	17.00	<b>Complies</b>
40	5200 MHz	8.97	17.00	<b>Complies</b>
48	5240 MHz	8.64	17.00	<b>Complies</b>
52	5260 MHz	16.34	24.00	<b>Complies</b>
56	5280 MHz	15.59	24.00	<b>Complies</b>
64	5320 MHz	13.57	24.00	<b>Complies</b>
100	5500 MHz	15.69	24.00	<b>Complies</b>
116	5580 MHz	15.64	24.00	<b>Complies</b>
140	5700 MHz	15.19	24.00	<b>Complies</b>

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	9.75	17.00	<b>Complies</b>
40	5200 MHz	10.01	17.00	<b>Complies</b>
48	5240 MHz	9.99	17.00	<b>Complies</b>
52	5260 MHz	17.23	24.00	<b>Complies</b>
56	5280 MHz	16.91	24.00	<b>Complies</b>
64	5320 MHz	14.89	24.00	<b>Complies</b>
100	5500 MHz	16.61	24.00	<b>Complies</b>
116	5580 MHz	16.43	24.00	<b>Complies</b>
140	5700 MHz	16.01	24.00	<b>Complies</b>

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.18	17.00	<b>Complies</b>
40	5200 MHz	12.53	17.00	<b>Complies</b>
48	5240 MHz	12.38	17.00	<b>Complies</b>
52	5260 MHz	19.82	24.00	<b>Complies</b>
56	5280 MHz	19.31	24.00	<b>Complies</b>
64	5320 MHz	17.29	24.00	<b>Complies</b>
100	5500 MHz	19.18	24.00	<b>Complies</b>
116	5580 MHz	19.06	24.00	<b>Complies</b>
140	5700 MHz	18.63	24.00	<b>Complies</b>

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	12.68	17.00	<b>Complies</b>
46	5230 MHz	11.65	17.00	<b>Complies</b>
54	5270 MHz	15.39	24.00	<b>Complies</b>
62	5310 MHz	14.57	24.00	<b>Complies</b>
102	5510 MHz	15.64	24.00	<b>Complies</b>
110	5550 MHz	15.58	24.00	<b>Complies</b>
134	5670 MHz	13.35	24.00	<b>Complies</b>

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	12.46	17.00	<b>Complies</b>
46	5230 MHz	11.46	17.00	<b>Complies</b>
54	5270 MHz	15.24	24.00	<b>Complies</b>
62	5310 MHz	14.38	24.00	<b>Complies</b>
102	5510 MHz	15.42	24.00	<b>Complies</b>
110	5550 MHz	15.26	24.00	<b>Complies</b>
134	5670 MHz	13.19	24.00	<b>Complies</b>

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

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	15.58	17.00	<b>Complies</b>
46	5230 MHz	14.57	17.00	<b>Complies</b>
54	5270 MHz	18.33	24.00	<b>Complies</b>
62	5310 MHz	17.49	24.00	<b>Complies</b>
102	5510 MHz	18.54	24.00	<b>Complies</b>
110	5550 MHz	18.43	24.00	<b>Complies</b>
134	5670 MHz	16.28	24.00	<b>Complies</b>



### 3.4 Power Spectral Density Measurement

#### 3.4.1 Limit

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

Frequency Range	Power Spectral Density limit (dBm/MHz)
5.15~5.25 GHz	4
5.25~5.35 GHz	11
5.47~5.725 GHz	11

#### 3.4.2 Measuring Instruments and Setting

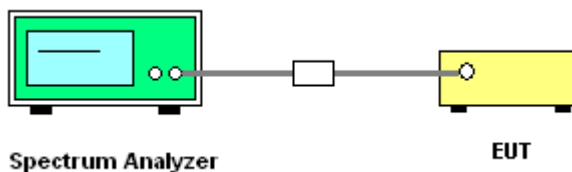
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 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**

<b>Final Test Date</b>	Apr. 25, 2012	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	25.9°C	<b>Humidity</b>	30%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	802.11a/n

**For Single Chain:  
Configuration of IEEE 802.11a Port 2**

<b>Frequency</b>	<b>Power Density (dBm)</b>	<b>Max. Limit (dBm)</b>	<b>Result</b>
5180 MHz	3.12	4.00	<b>Complies</b>
5200 MHz	3.24	4.00	<b>Complies</b>
5240 MHz	3.23	4.00	<b>Complies</b>
5260 MHz	6.89	11.00	<b>Complies</b>
5280 MHz	5.18	11.00	<b>Complies</b>
5320 MHz	4.50	11.00	<b>Complies</b>
5500 MHz	3.21	11.00	<b>Complies</b>
5580 MHz	1.98	11.00	<b>Complies</b>
5700 MHz	-1.04	11.00	<b>Complies</b>

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	-0.01	4.00	Complies
5200 MHz	0.26	4.00	Complies
5240 MHz	-1.59	4.00	Complies
5260 MHz	5.42	11.00	Complies
5280 MHz	5.93	11.00	Complies
5320 MHz	5.07	11.00	Complies
5500 MHz	6.71	11.00	Complies
5580 MHz	6.59	11.00	Complies
5700 MHz	5.96	11.00	Complies

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	0.63	4.00	Complies
5200 MHz	0.42	4.00	Complies
5240 MHz	0.21	4.00	Complies
5260 MHz	7.64	11.00	Complies
5280 MHz	6.90	11.00	Complies
5320 MHz	5.81	11.00	Complies
5500 MHz	5.60	11.00	Complies
5580 MHz	5.47	11.00	Complies
5700 MHz	5.13	11.00	Complies

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	3.33	4.00	Complies
5200 MHz	3.35	4.00	Complies
5240 MHz	2.41	4.00	Complies
5260 MHz	9.68	11.00	Complies
5280 MHz	9.45	11.00	Complies
5320 MHz	8.47	11.00	Complies
5500 MHz	9.20	11.00	Complies
5580 MHz	9.08	11.00	Complies
5700 MHz	8.58	11.00	Complies

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

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	0.75	4.00	<b>Complies</b>
5230 MHz	-0.45	4.00	<b>Complies</b>
5270 MHz	4.35	11.00	<b>Complies</b>
5310 MHz	2.05	11.00	<b>Complies</b>
5510 MHz	4.36	11.00	<b>Complies</b>
5550 MHz	3.66	11.00	<b>Complies</b>
5670 MHz	1.16	11.00	<b>Complies</b>

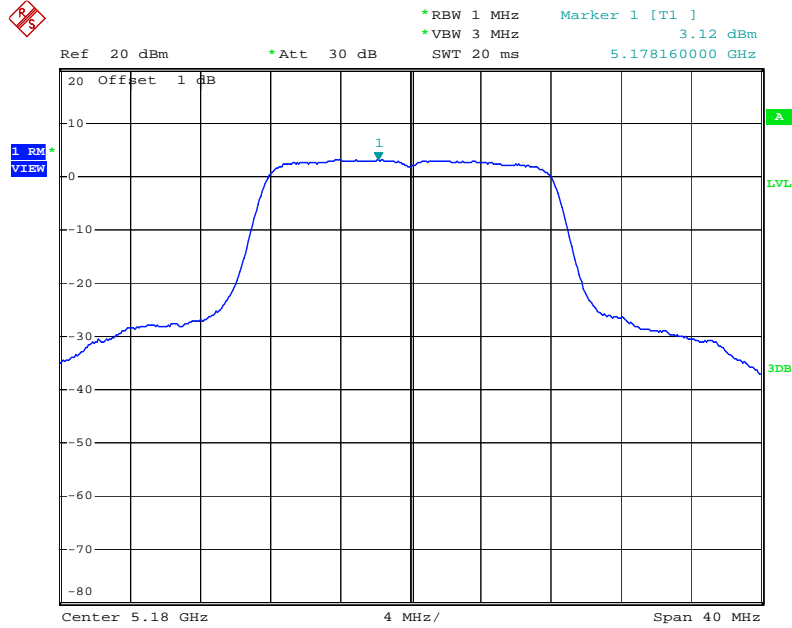
**Configuration IEEE 802.11n (40MHz) Port 2**

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	-0.41	4.00	<b>Complies</b>
5230 MHz	0.52	4.00	<b>Complies</b>
5270 MHz	5.07	11.00	<b>Complies</b>
5310 MHz	2.73	11.00	<b>Complies</b>
5510 MHz	3.71	11.00	<b>Complies</b>
5550 MHz	2.65	11.00	<b>Complies</b>
5670 MHz	-0.68	11.00	<b>Complies</b>

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

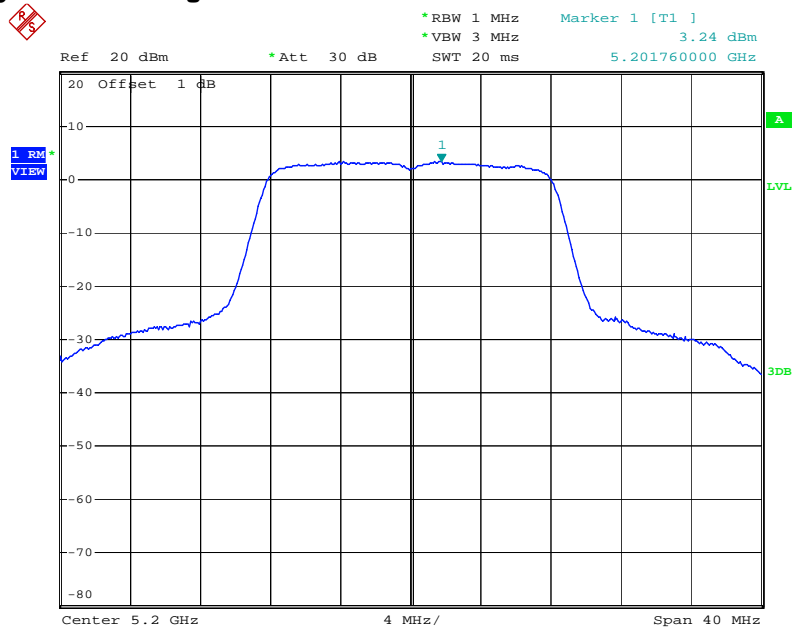
Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5190 MHz	3.22	4.00	<b>Complies</b>
5230 MHz	3.07	4.00	<b>Complies</b>
5270 MHz	7.74	11.00	<b>Complies</b>
5310 MHz	5.41	11.00	<b>Complies</b>
5510 MHz	7.06	11.00	<b>Complies</b>
5550 MHz	6.19	11.00	<b>Complies</b>
5670 MHz	3.35	11.00	<b>Complies</b>

For Single Chain:  
Power Density Plot on Configuration IEEE 802.11a 5180 MHz Port 2



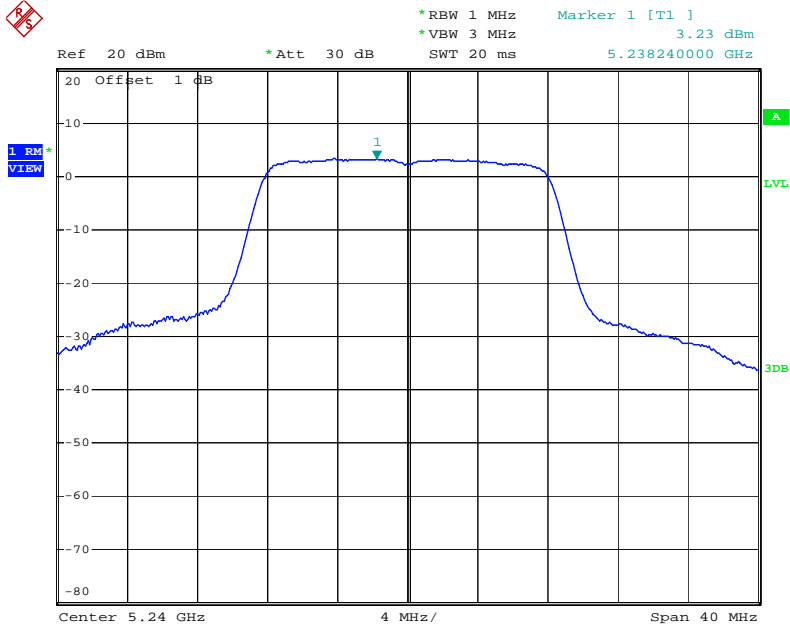
Date: 25.APR.2012 15:49:06

Power Density Plot on Configuration IEEE 802.11a 5200 MHz Port 2



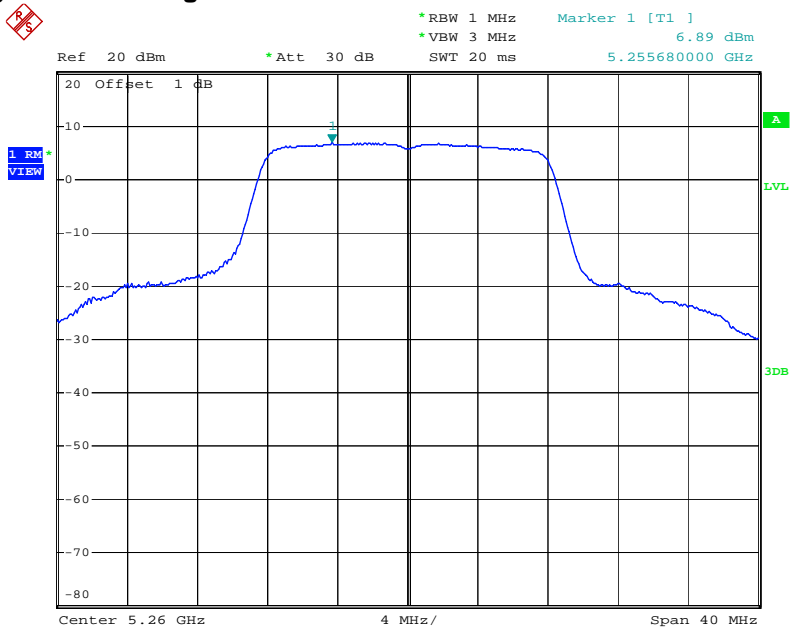
Date: 25.APR.2012 15:52:19

Power Density Plot on Configuration IEEE 802.11a 5240 MHz Port 2



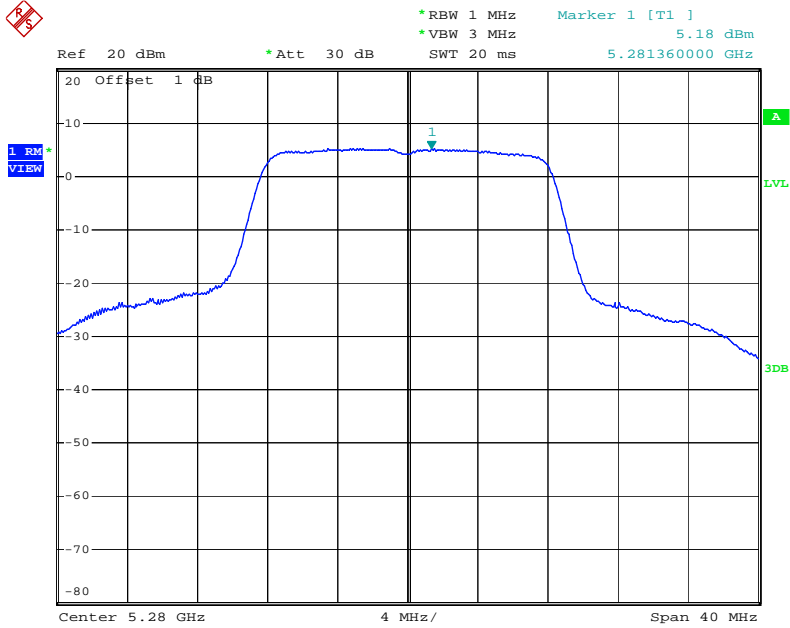
Date: 25.APR.2012 15:55:06

Power Density Plot on Configuration IEEE 802.11a 5260 MHz Port 2



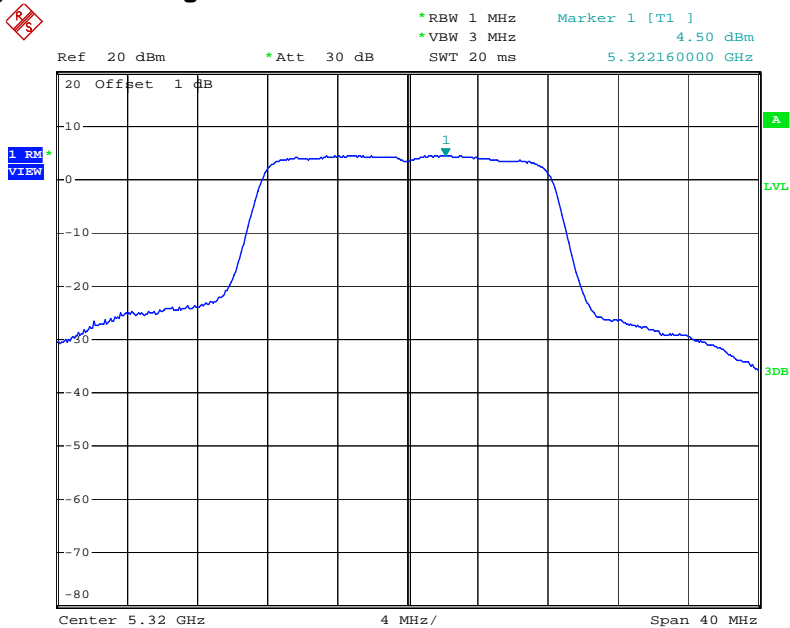
Date: 25.APR.2012 14:20:32

Power Density Plot on Configuration IEEE 802.11a 5280 MHz Port 2



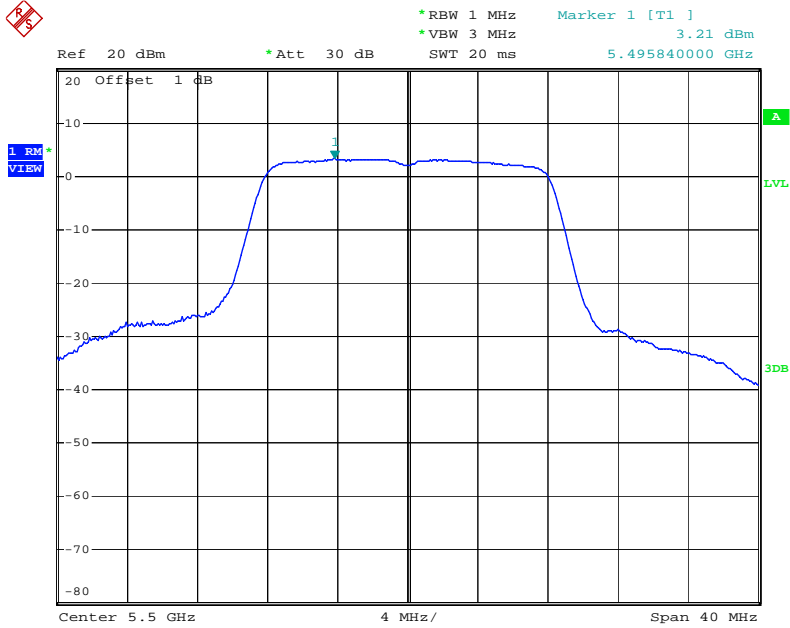
Date: 25.APR.2012 14:23:55

Power Density Plot on Configuration IEEE 802.11a 5320 MHz Port 2



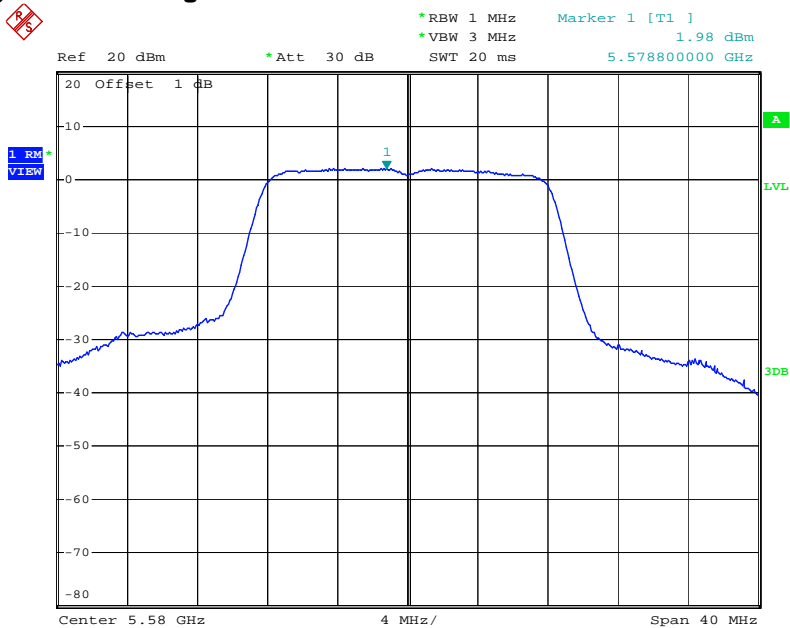
Date: 25.APR.2012 14:27:38

Power Density Plot on Configuration IEEE 802.11a 5500 MHz Port 2



Date: 25.APR.2012 14:31:44

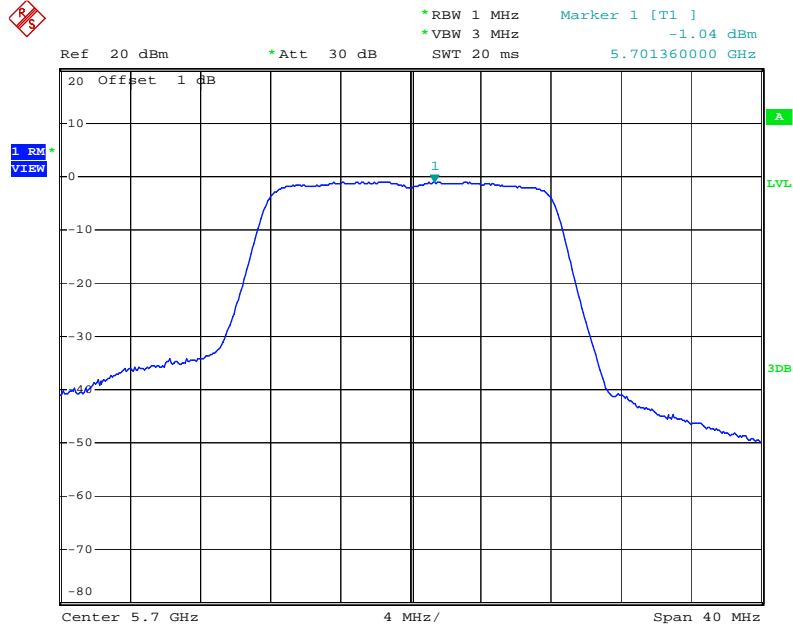
Power Density Plot on Configuration IEEE 802.11a 5580 MHz Port 2



Date: 25.APR.2012 14:35:13

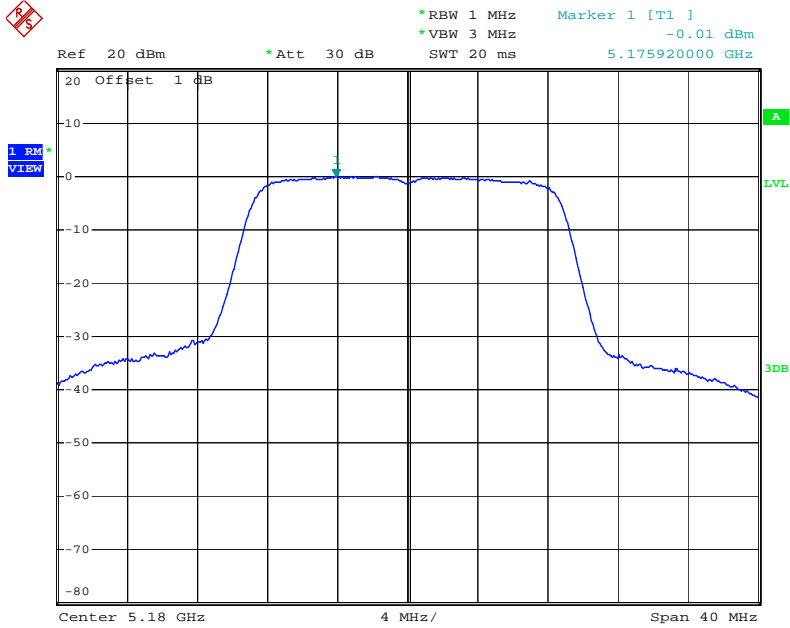


Power Density Plot on Configuration IEEE 802.11a 5700 MHz Port 2



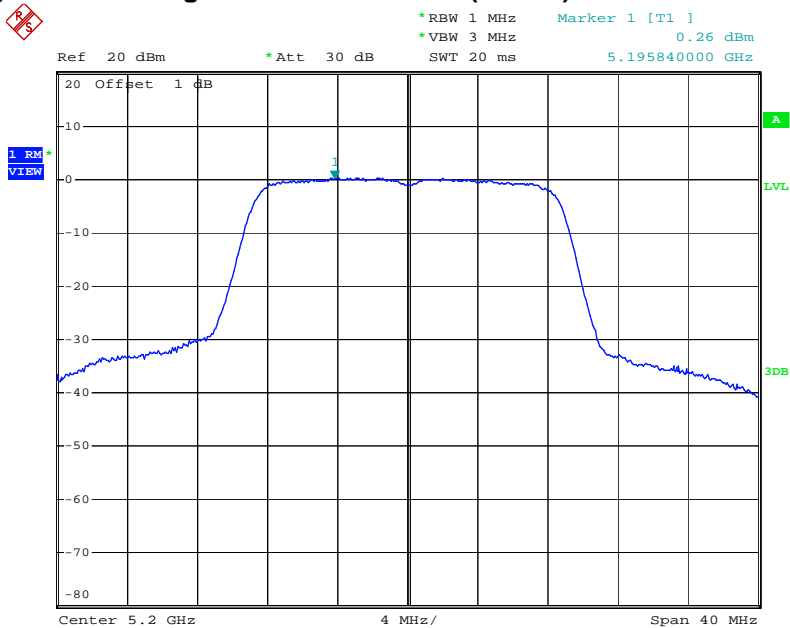
Date: 25.APR.2012 14:39:49

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



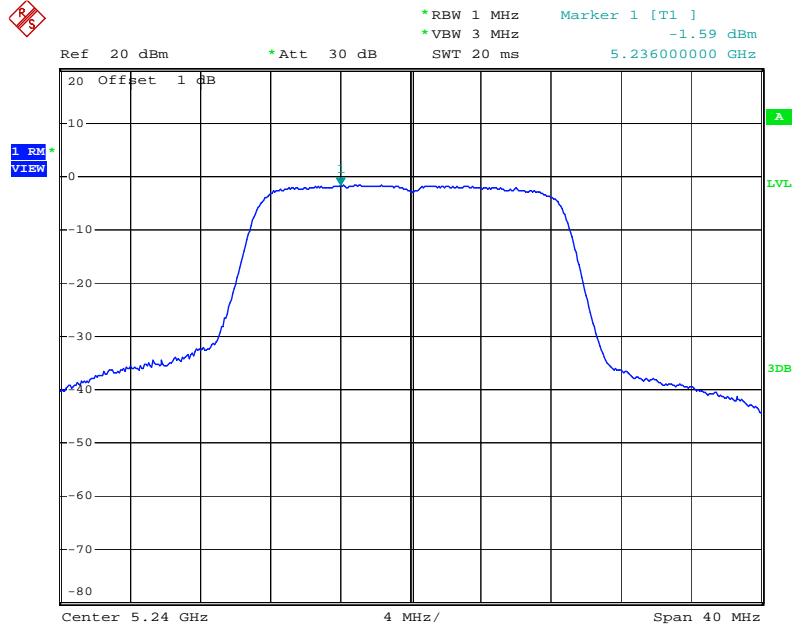
Date: 25.APR.2012 19:40:30

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



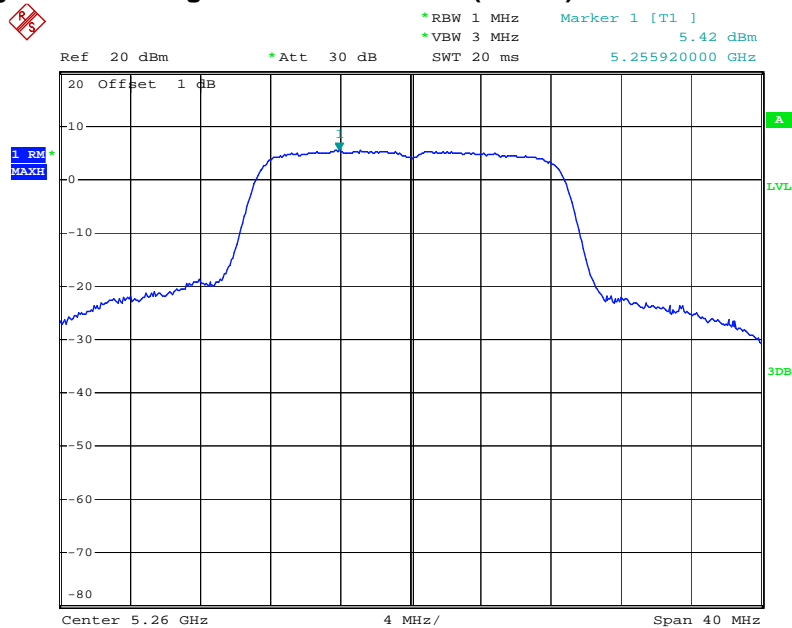
Date: 25.APR.2012 20:04:51

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



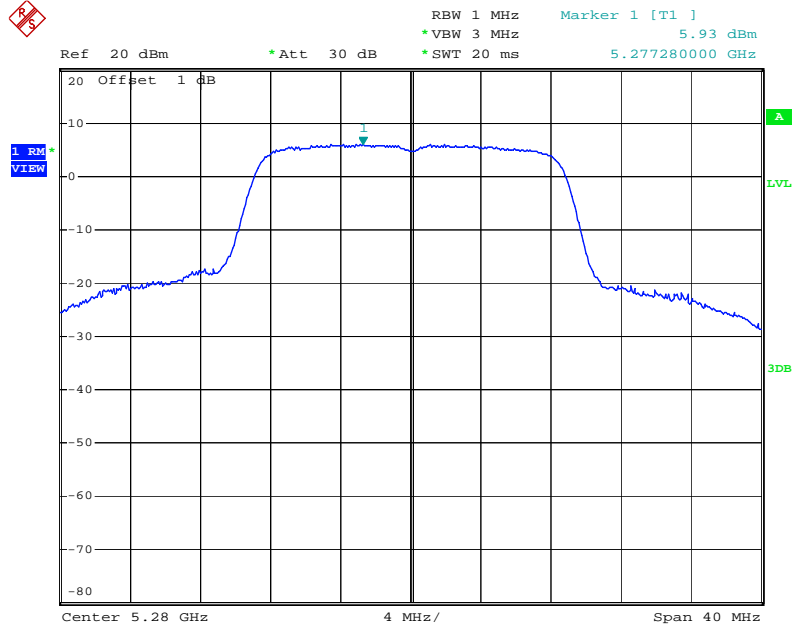
Date: 25.APR.2012 20:15:55

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



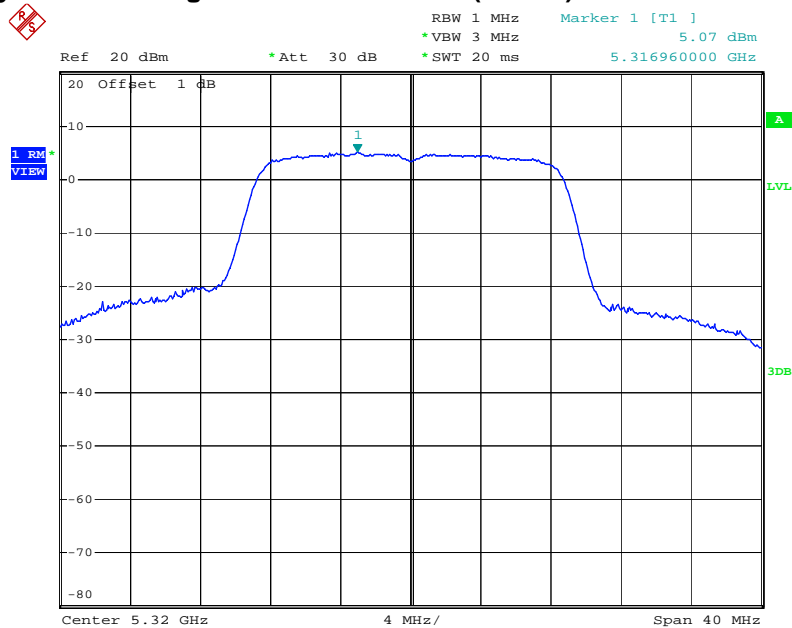
Date: 25.APR.2012 20:23:46

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



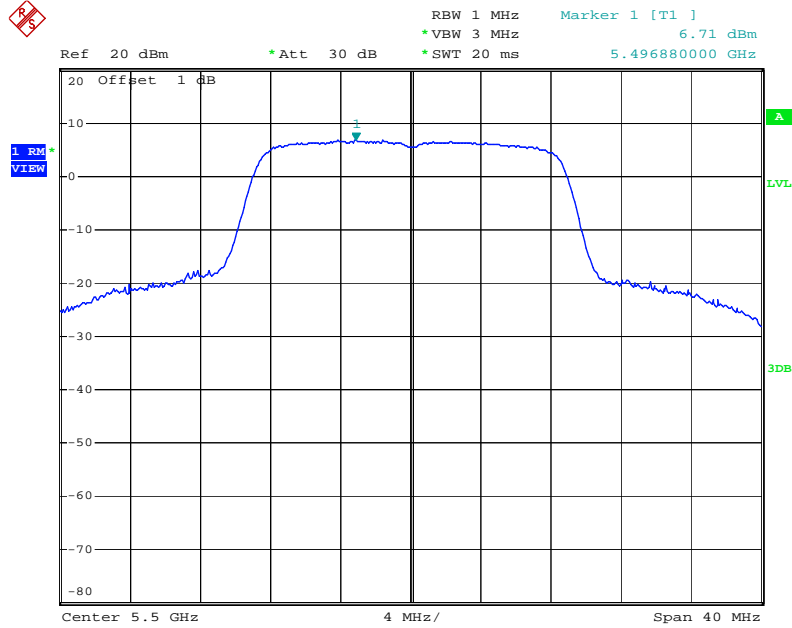
Date: 25.APR.2012 20:25:49

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



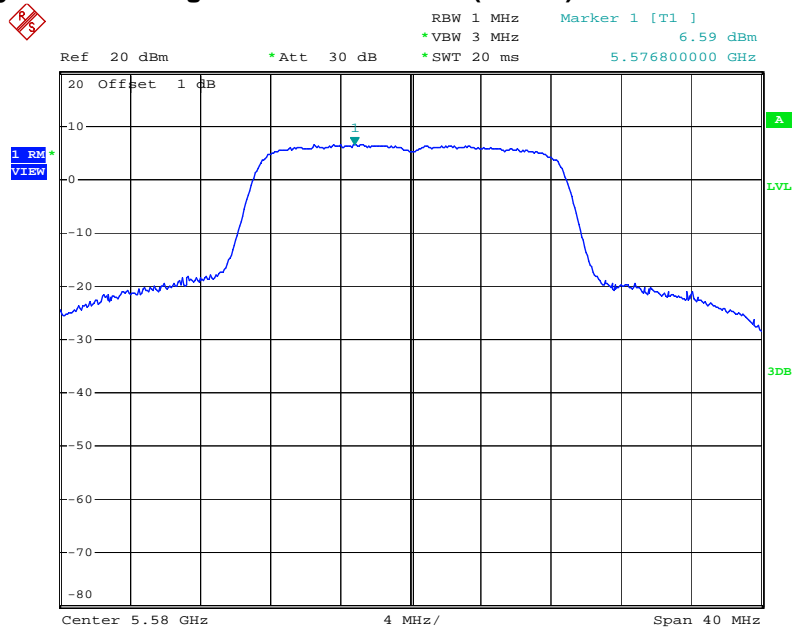
Date: 25.APR.2012 20:27:50

Power Density Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 1



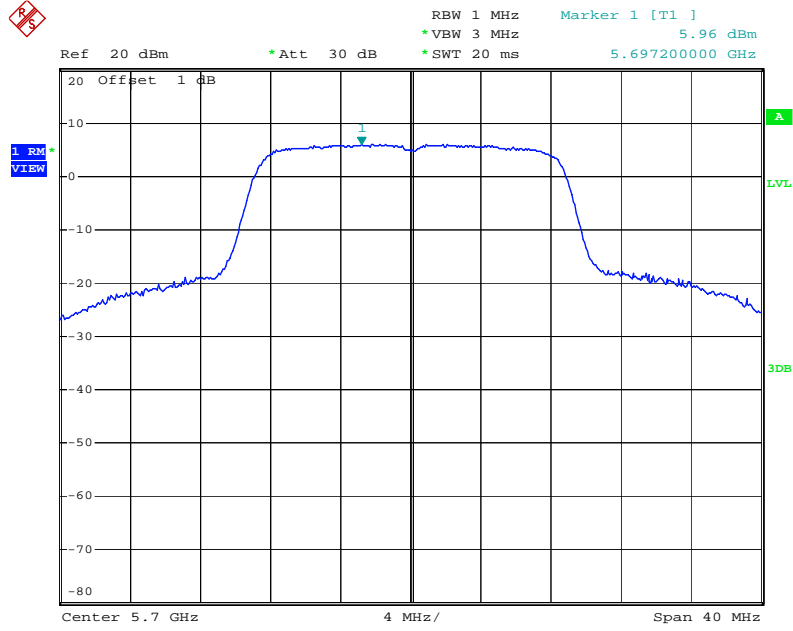
Date: 25.APR.2012 20:32:06

Power Density Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 1



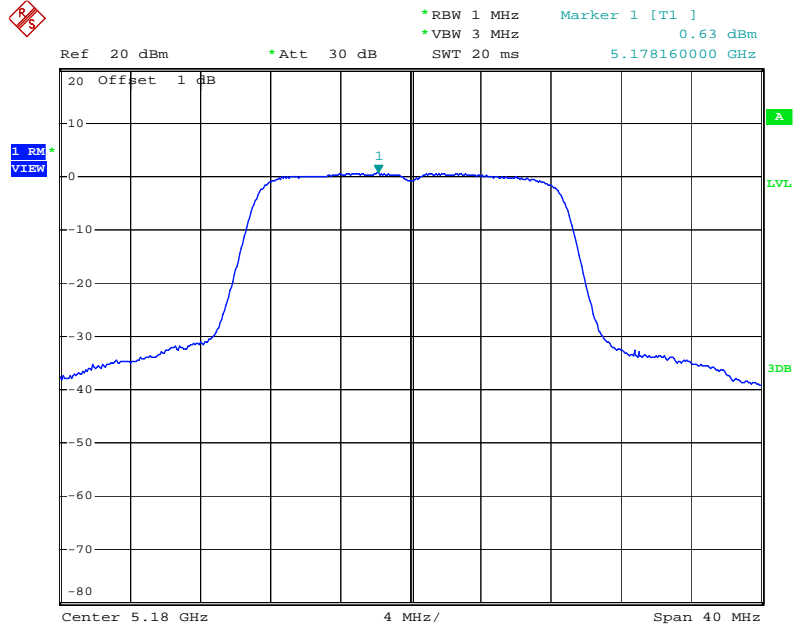
Date: 25.APR.2012 20:38:29

Power Density Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 1



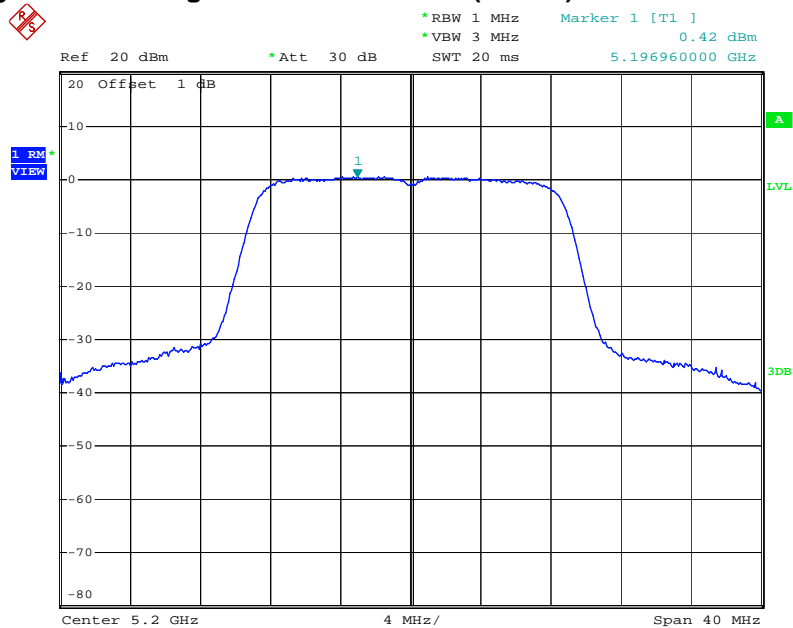
Date: 25.APR.2012 20:41:47

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



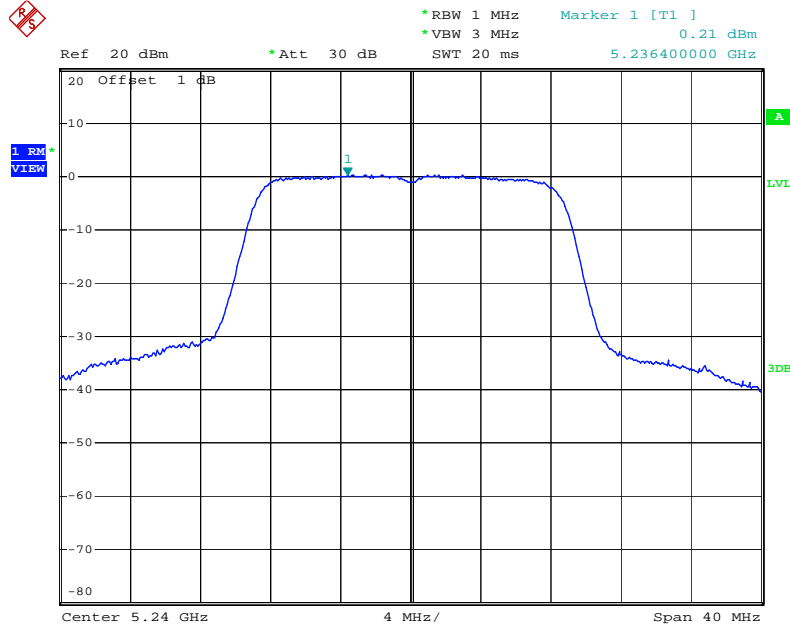
Date: 25.APR.2012 19:41:44

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



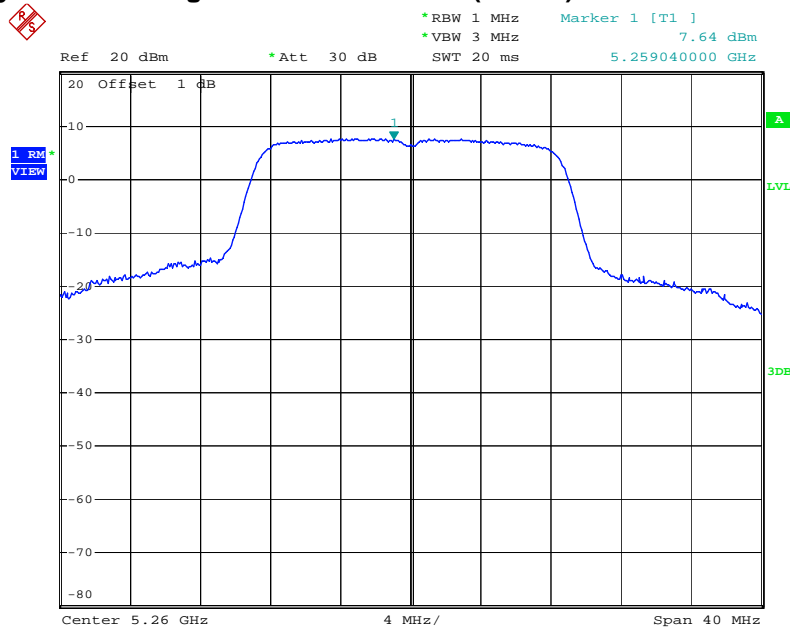
Date: 25.APR.2012 20:06:18

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



Date: 25.APR.2012 20:16:55

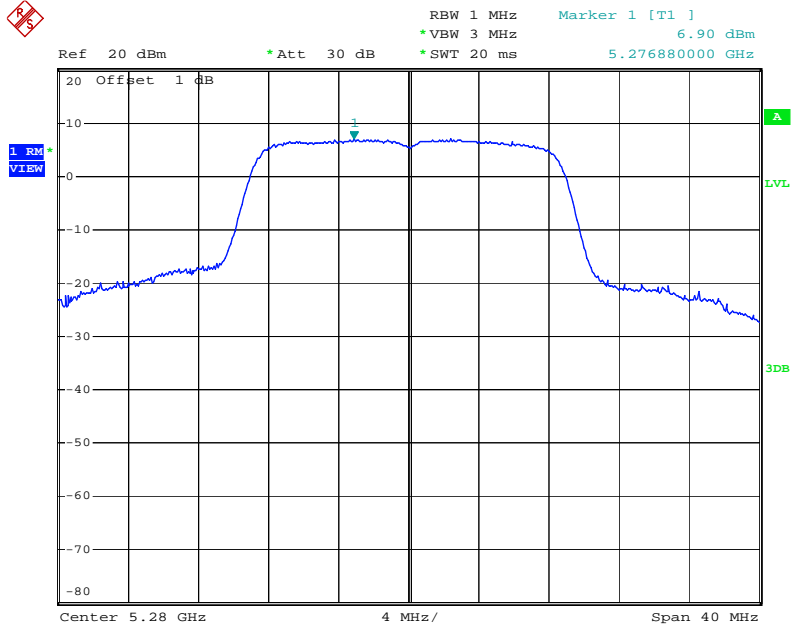
Power Density Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 2



Date: 25.APR.2012 20:23:05

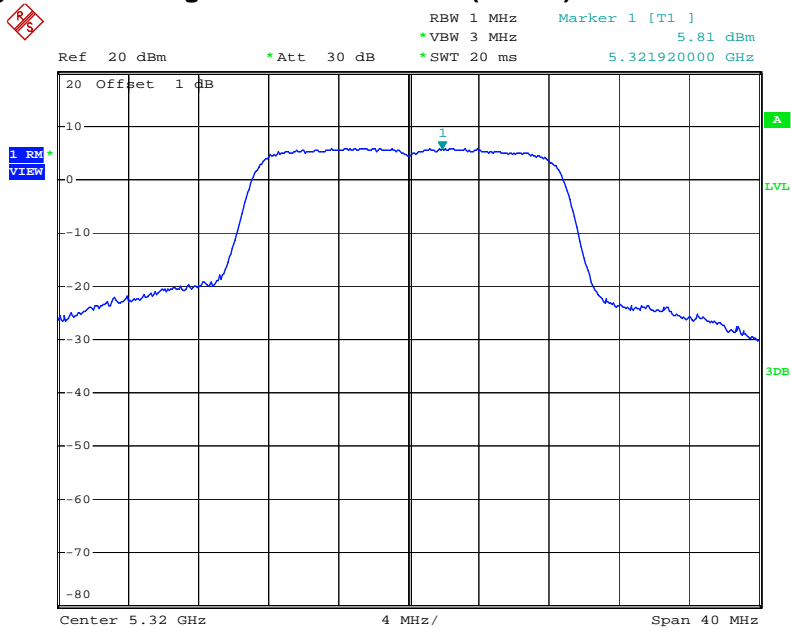


Power Density Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 2



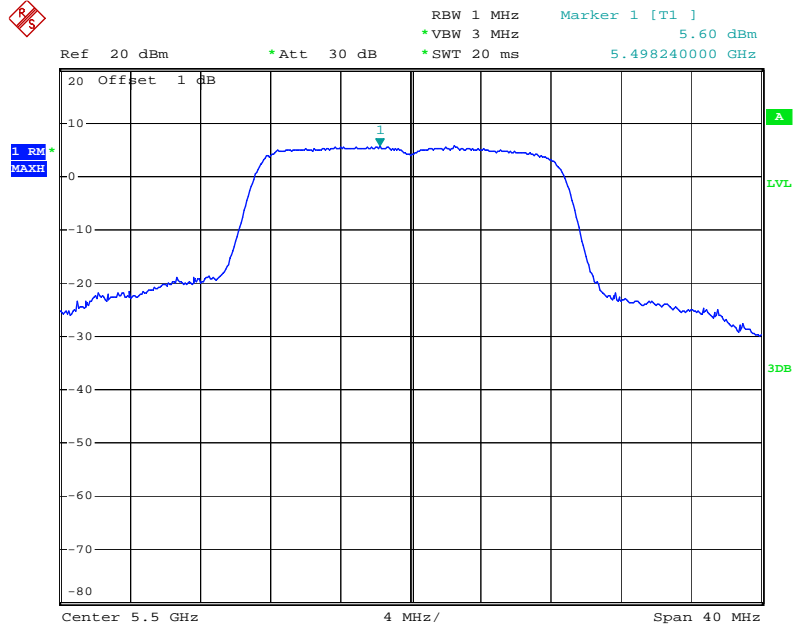
Date: 25.APR.2012 20:26:42

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



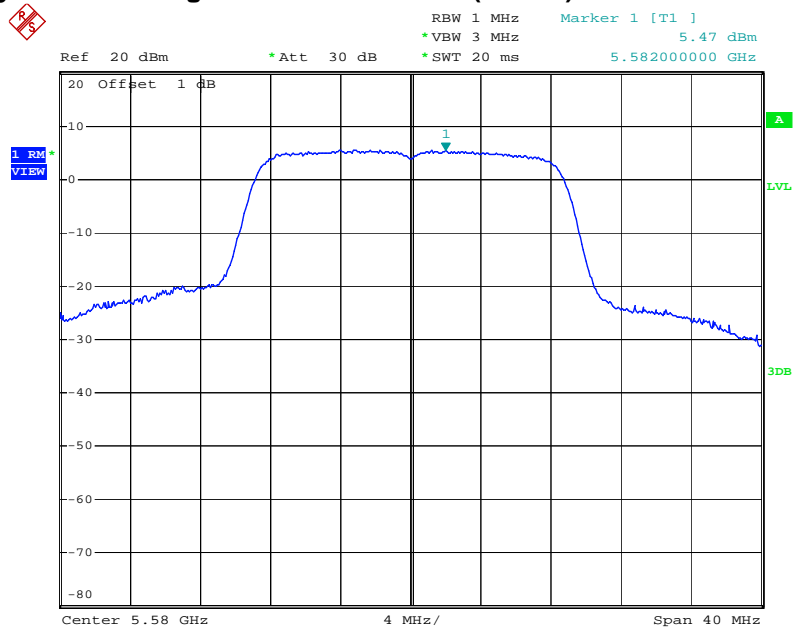
Date: 25.APR.2012 20:28:33

Power Density Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 2



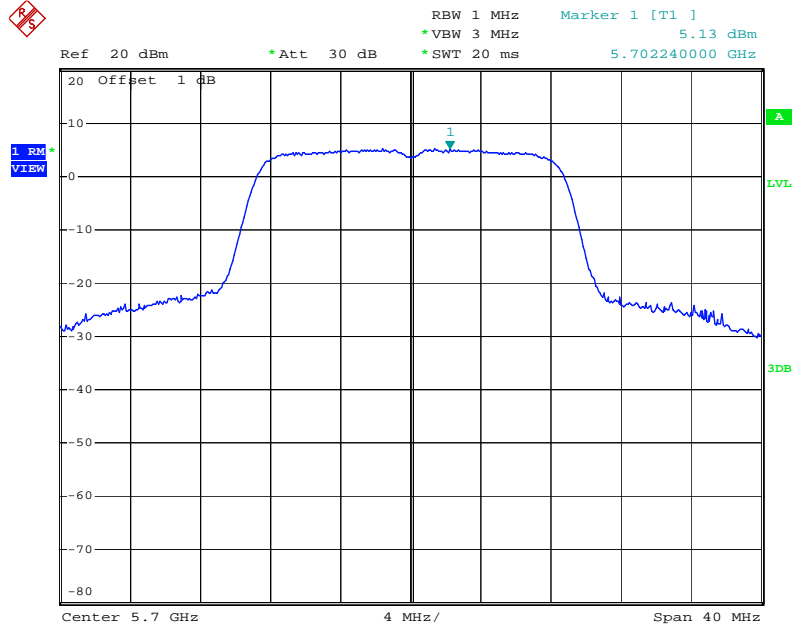
Date: 25.APR.2012 20:33:12

Power Density Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 2



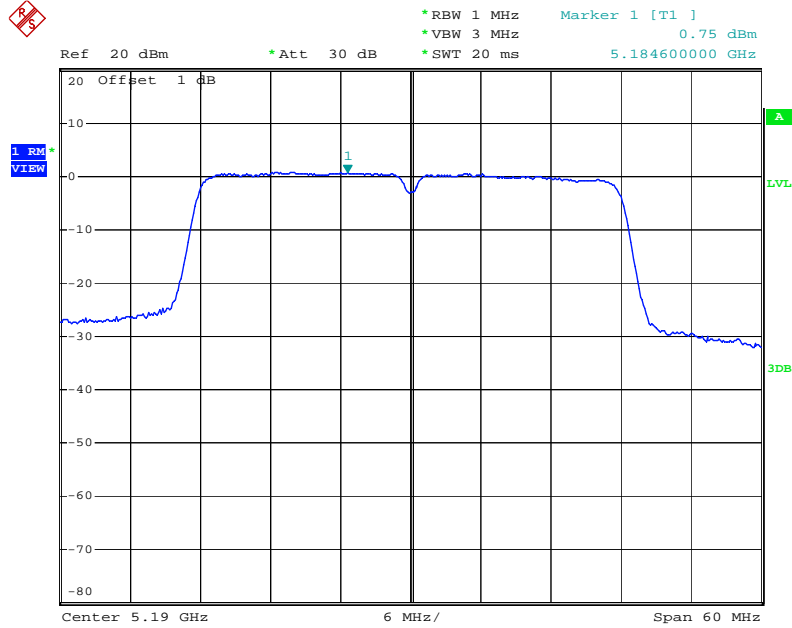
Date: 25.APR.2012 20:39:43

Power Density Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 2



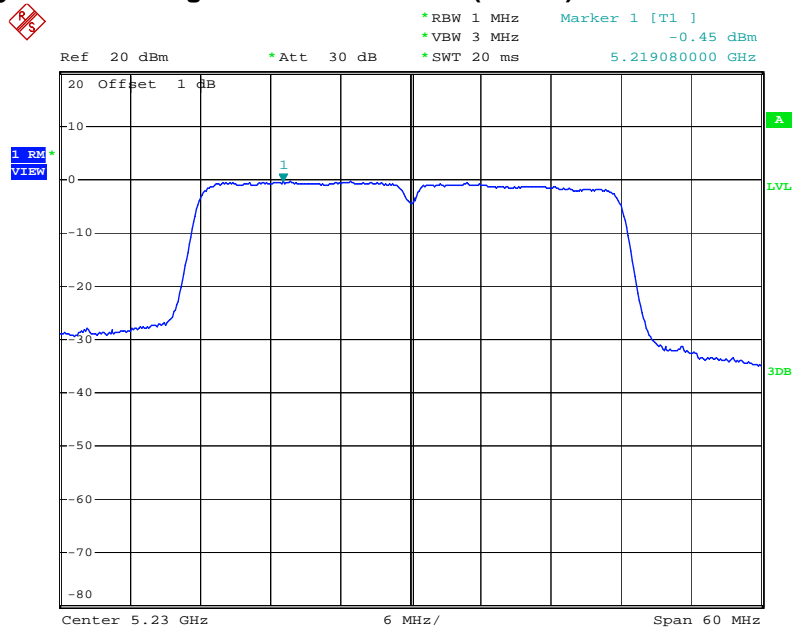
Date: 25.APR.2012 20:43:08

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



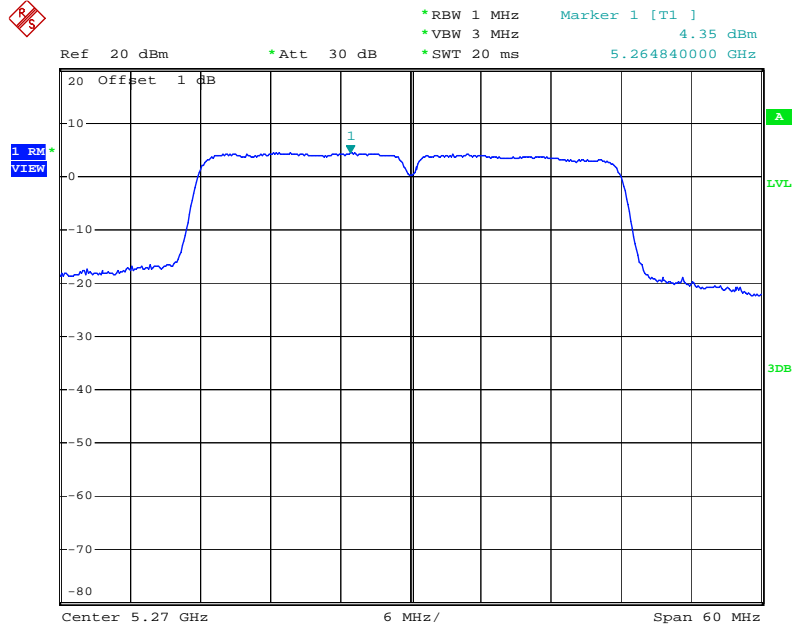
Date: 25.APR.2012 21:05:45

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



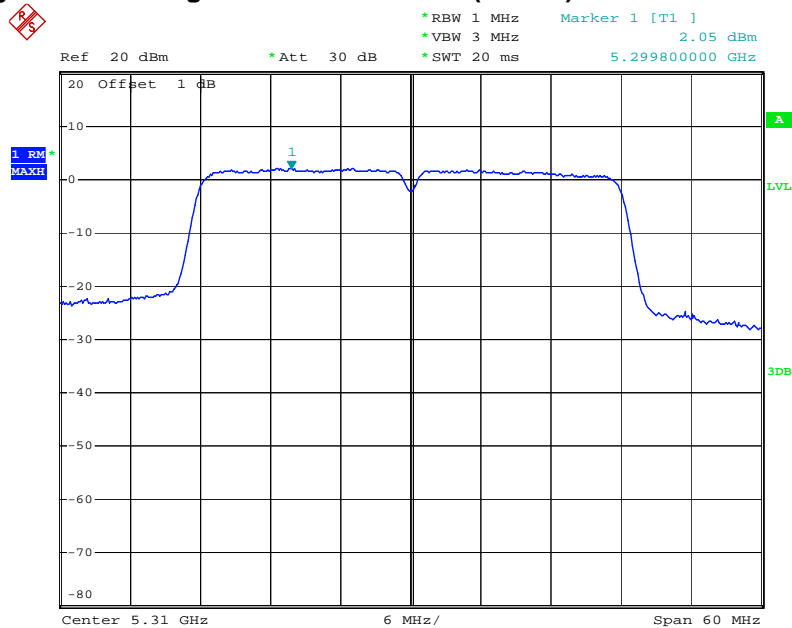
Date: 25.APR.2012 21:10:18

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



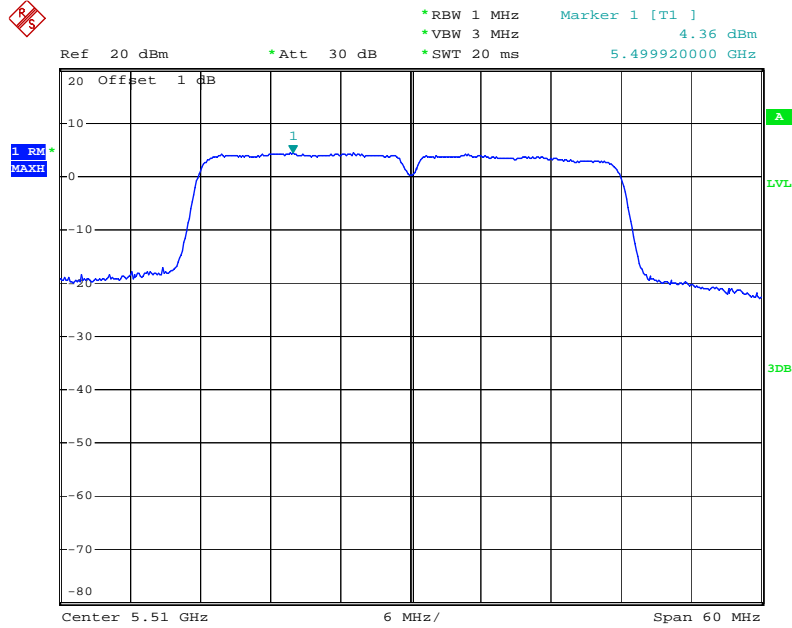
Date: 25.APR.2012 21:14:43

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



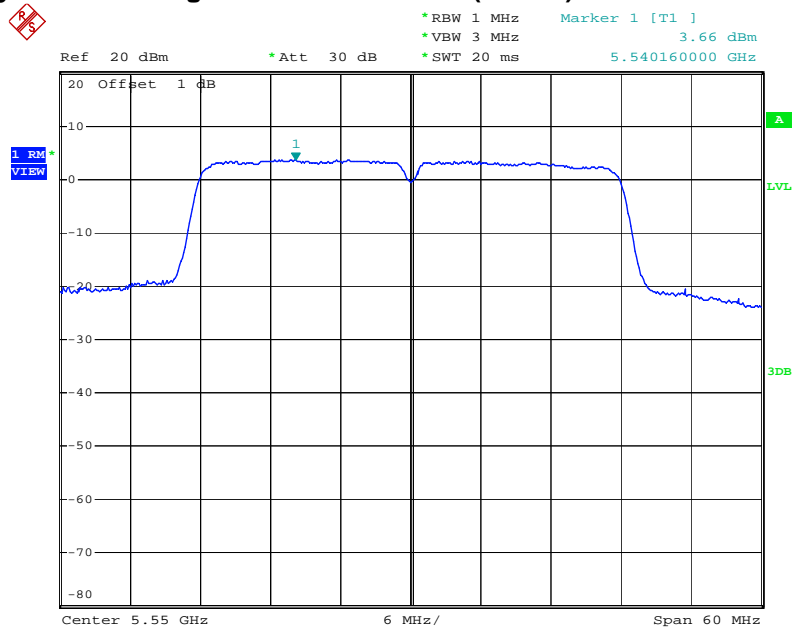
Date: 25.APR.2012 21:30:31

Power Density Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 1



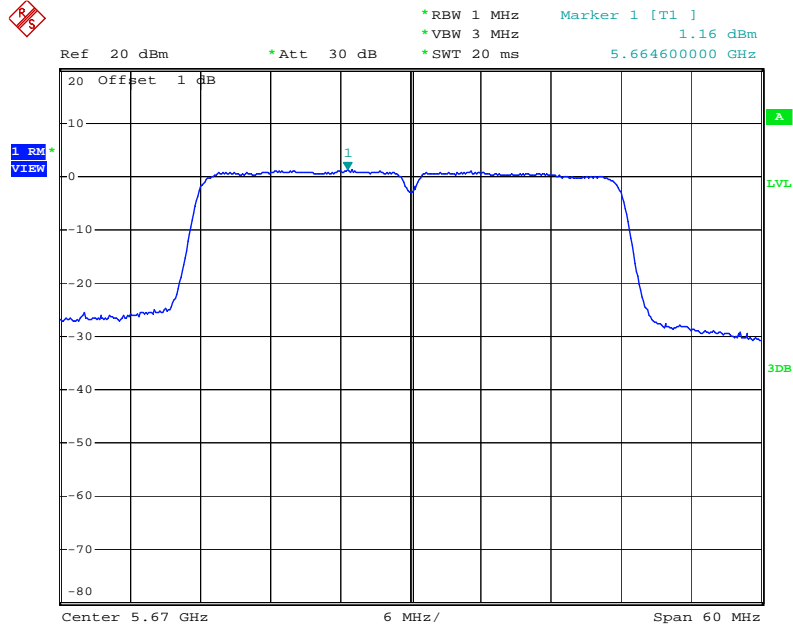
Date: 25.APR.2012 21:28:25

Power Density Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 1



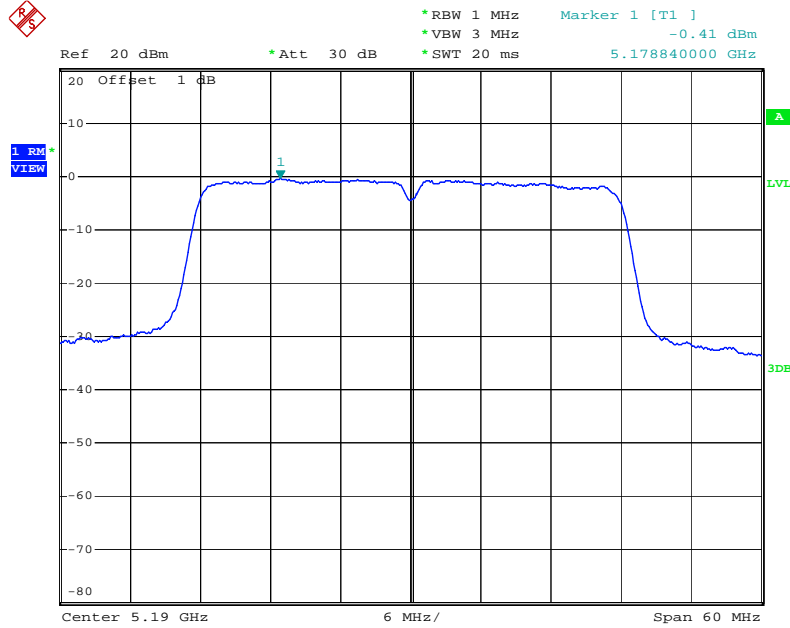
Date: 25.APR.2012 21:32:38

Power Density Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 1



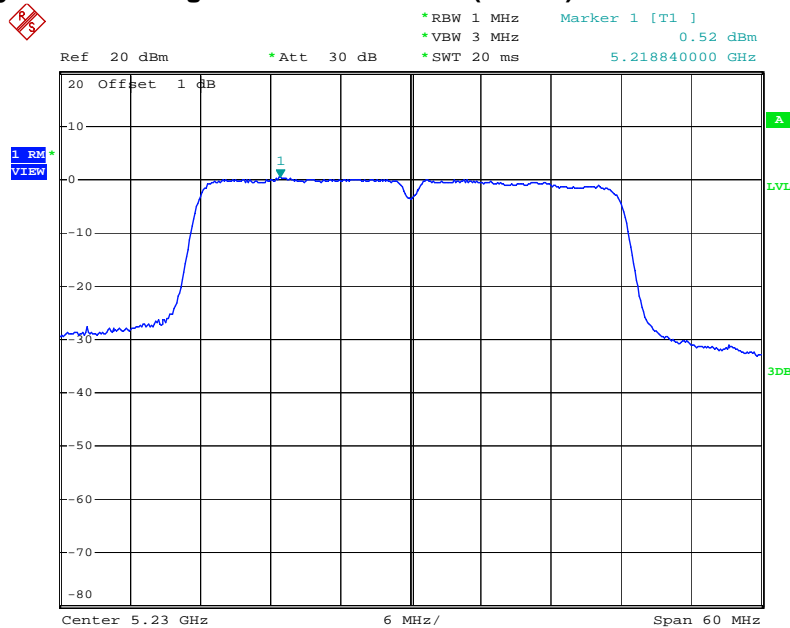
Date: 25.APR.2012 21:34:31

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



Date: 25.APR.2012 21:07:35

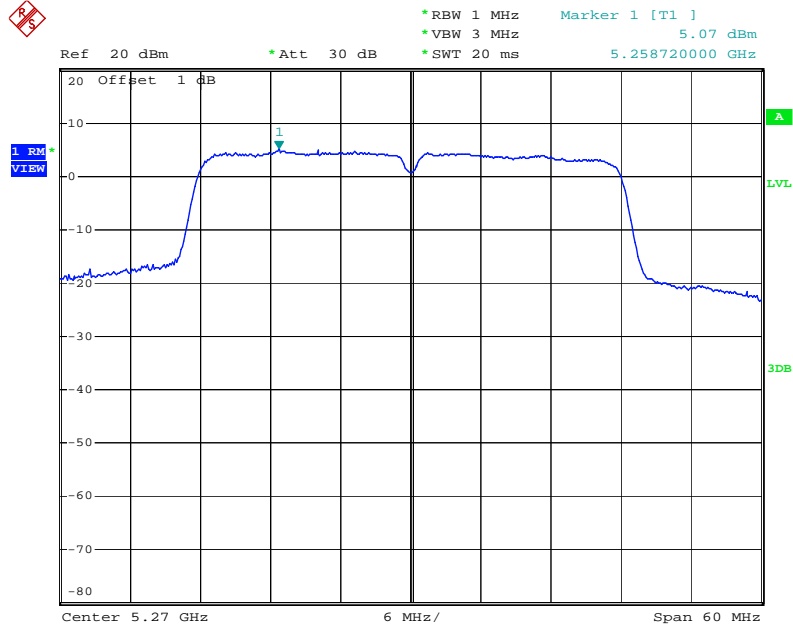
Power Density Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



Date: 25.APR.2012 21:11:15

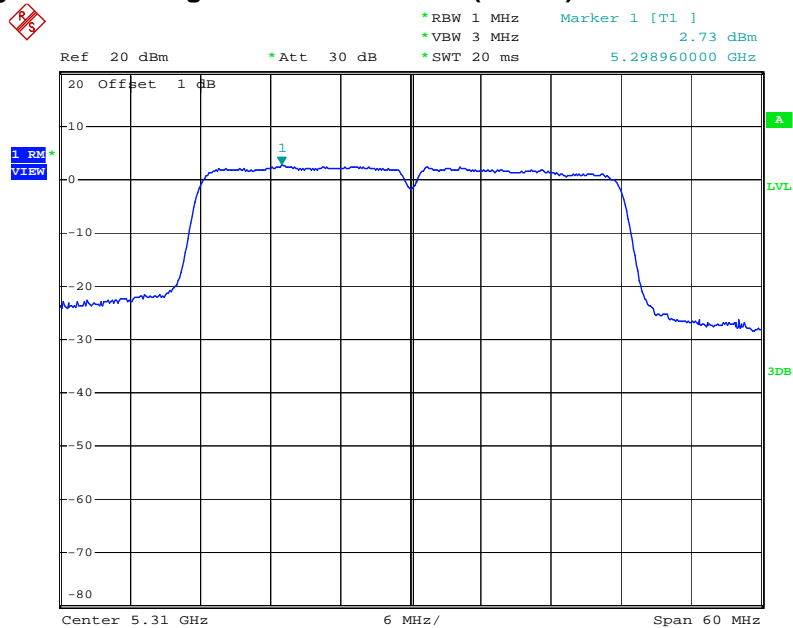


Power Density Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 2



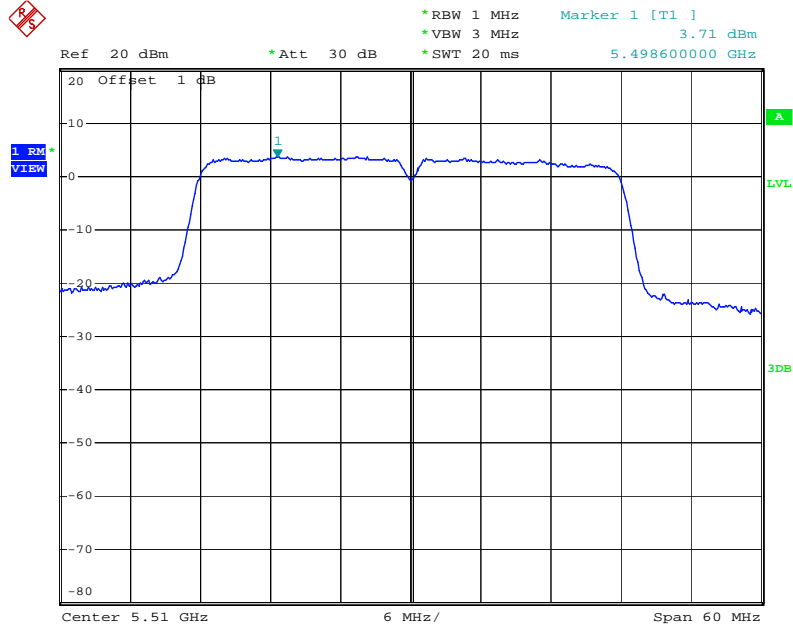
Date: 25.APR.2012 21:15:44

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



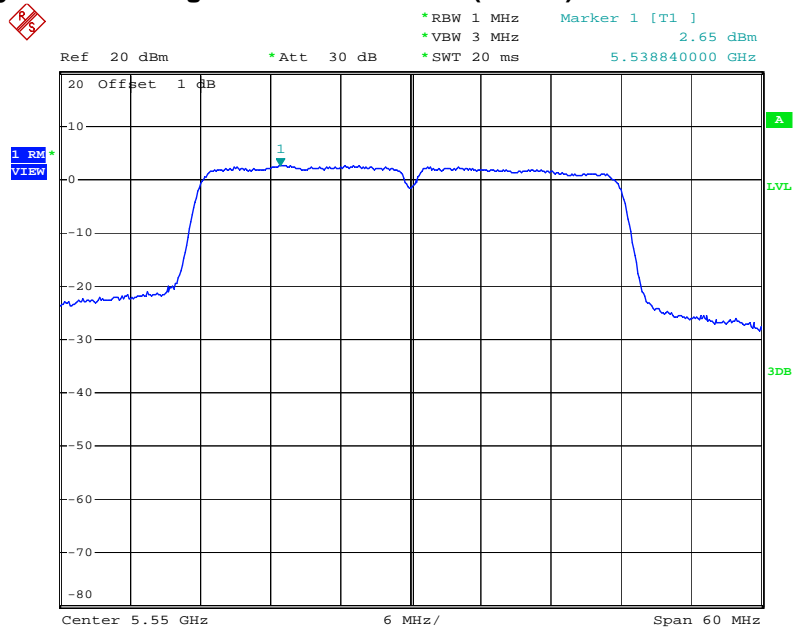
Date: 25.APR.2012 21:31:22

Power Density Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 2



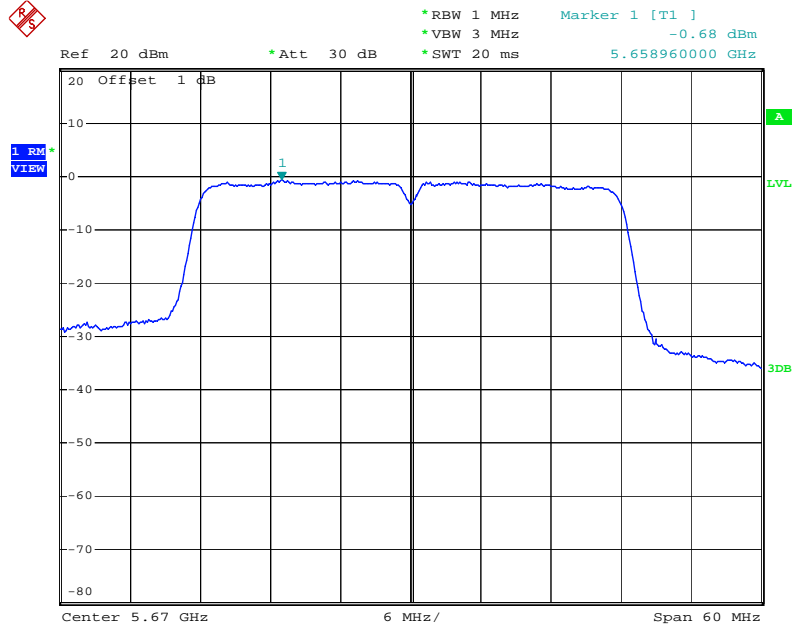
Date: 25.APR.2012 21:29:06

Power Density Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 2



Date: 25.APR.2012 21:33:28

Power Density Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 2



Date: 25.APR.2012 21:35:37

**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**

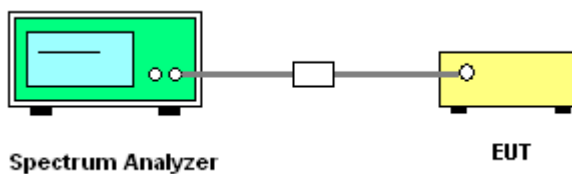
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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  $\leq 13$  Db for all frequencies across the emissions bandwidth. Submit a plot.
3. Peak Trace: Set RBW = 1 MHz, VBW  $\geq 3$  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**

<b>Final Test Date</b>	Apr. 25, 2012	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	25.9°C	<b>Humidity</b>	30%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	802.11a/n

**For Single Chain:  
Configuration of IEEE 802.11a Port 2**

<b>Frequency</b>	<b>Peak Excursion (dB)</b>	<b>Max. Limit (dB)</b>	<b>Result</b>
5180 MHz	5.47	13	<b>Complies</b>
5200 MHz	5.53	13	<b>Complies</b>
5240 MHz	5.36	13	<b>Complies</b>
5260 MHz	5.09	13	<b>Complies</b>
5280 MHz	5.33	13	<b>Complies</b>
5320 MHz	5.08	13	<b>Complies</b>
5500 MHz	5.11	13	<b>Complies</b>
5580 MHz	5.30	13	<b>Complies</b>
5700 MHz	5.07	13	<b>Complies</b>

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

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	5.65	13	Complies
5200 MHz	5.60	13	Complies
5240 MHz	5.58	13	Complies
5260 MHz	5.91	13	Complies
5280 MHz	5.70	13	Complies
5320 MHz	6.35	13	Complies
5500 MHz	6.00	13	Complies
5580 MHz	6.15	13	Complies
5700 MHz	6.08	13	Complies

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

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	7.63	13	Complies
5200 MHz	7.27	13	Complies
5240 MHz	7.67	13	Complies
5260 MHz	7.36	13	Complies
5280 MHz	7.85	13	Complies
5320 MHz	7.18	13	Complies
5500 MHz	7.85	13	Complies
5580 MHz	7.70	13	Complies
5700 MHz	7.79	13	Complies

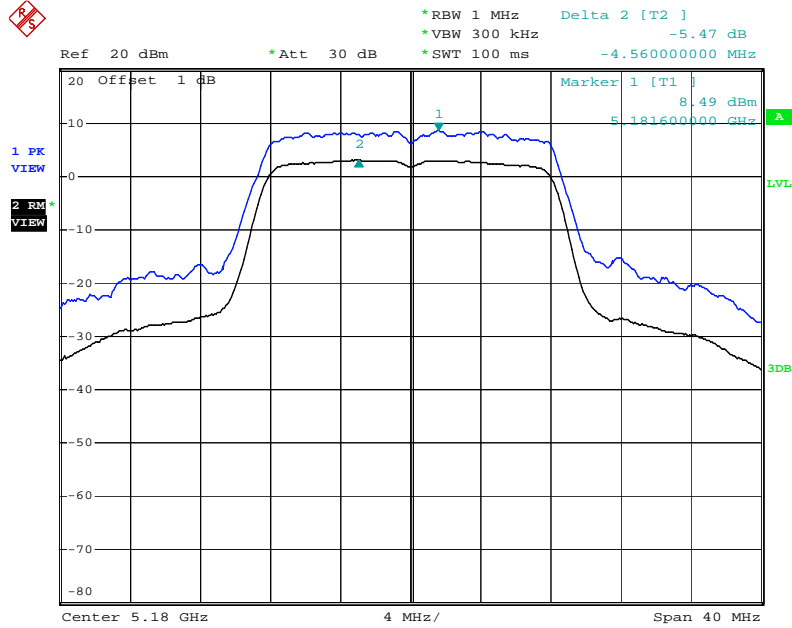
**Configuration IEEE 802.11n (40MHz) Port 1**

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5190 MHz	6.56	13	Complies
5230 MHz	6.72	13	Complies
5270 MHz	7.02	13	Complies
5310 MHz	6.93	13	Complies
5510 MHz	7.13	13	Complies
5550 MHz	7.07	13	Complies
5670 MHz	6.76	13	Complies

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

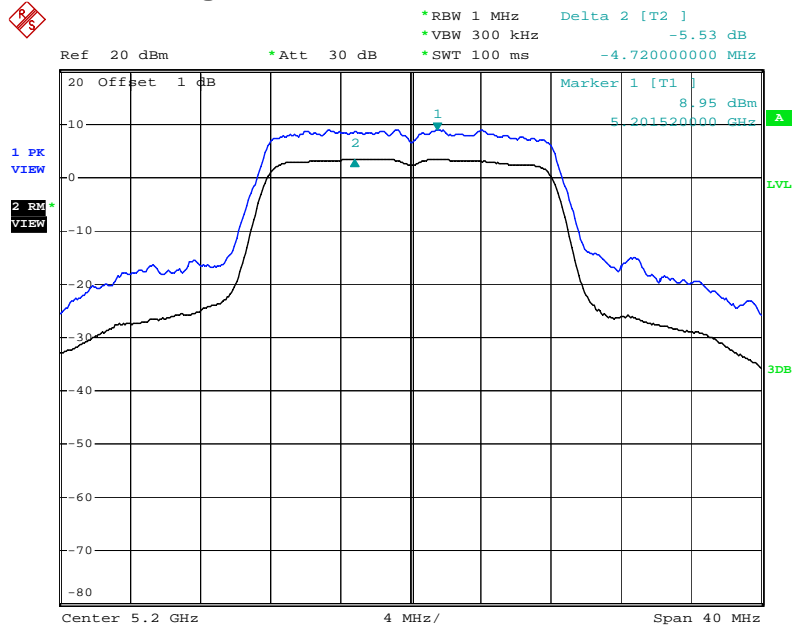
Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5190 MHz	7.50	13	Complies
5230 MHz	7.49	13	Complies
5270 MHz	7.37	13	Complies
5310 MHz	7.45	13	Complies
5510 MHz	7.90	13	Complies
5550 MHz	8.15	13	Complies
5670 MHz	7.58	13	Complies

For Single Chain:  
Peak Excursion Plot on Configuration IEEE 802.11a 5180 MHz Port 2



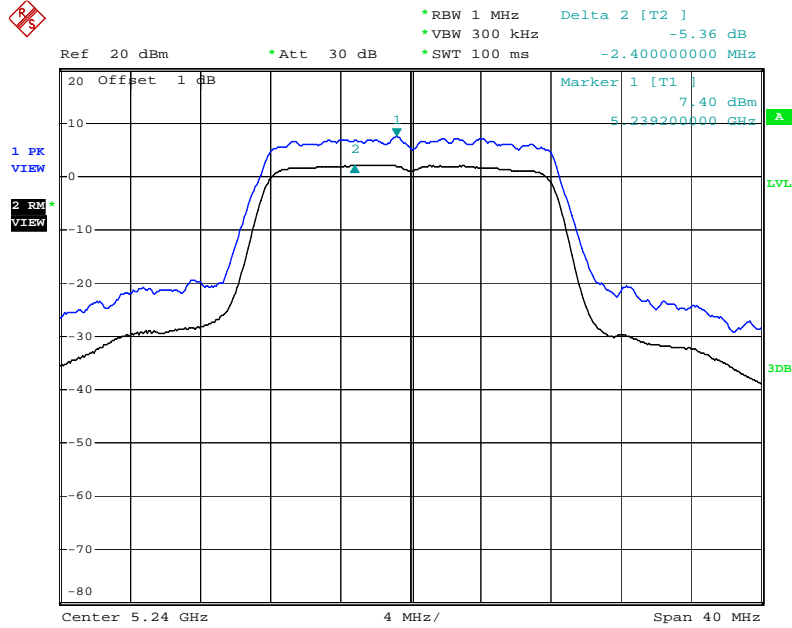
Date: 25.APR.2012 11:51:29

Peak Excursion Plot on Configuration IEEE 802.11a 5200 MHz Port 2



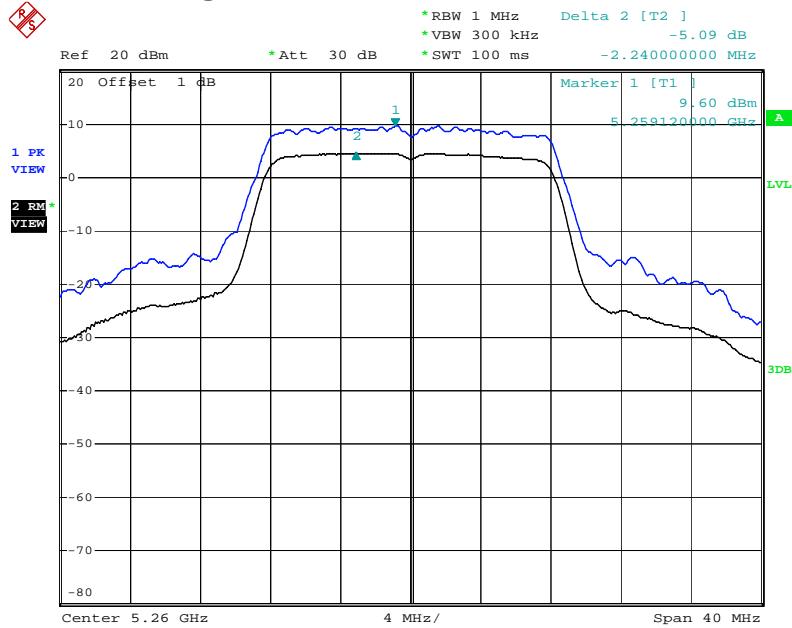
Date: 25.APR.2012 11:54:57

Peak Excursion Plot on Configuration IEEE 802.11a 5240 MHz Port 2



Date: 25.APR.2012 13:44:02

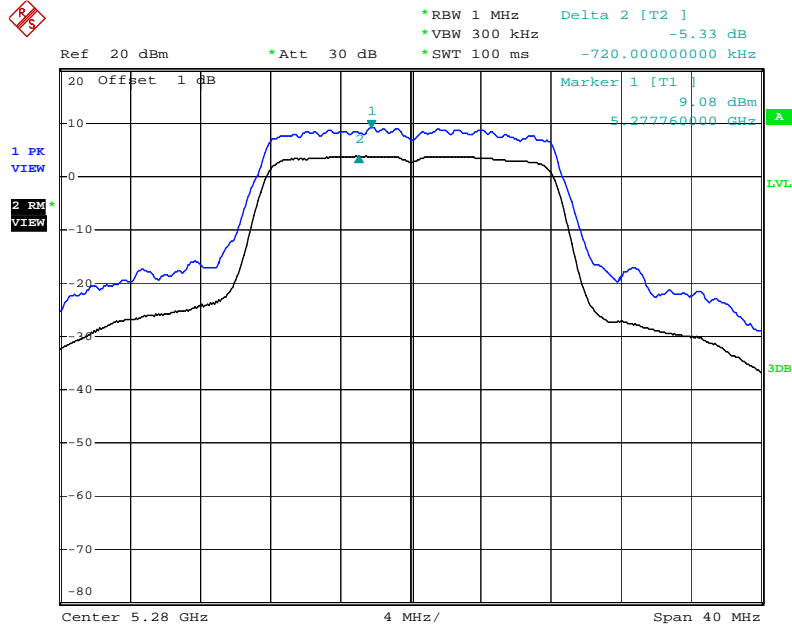
Peak Excursion Plot on Configuration IEEE 802.11a 5260 MHz Port 2



Date: 25.APR.2012 14:21:04

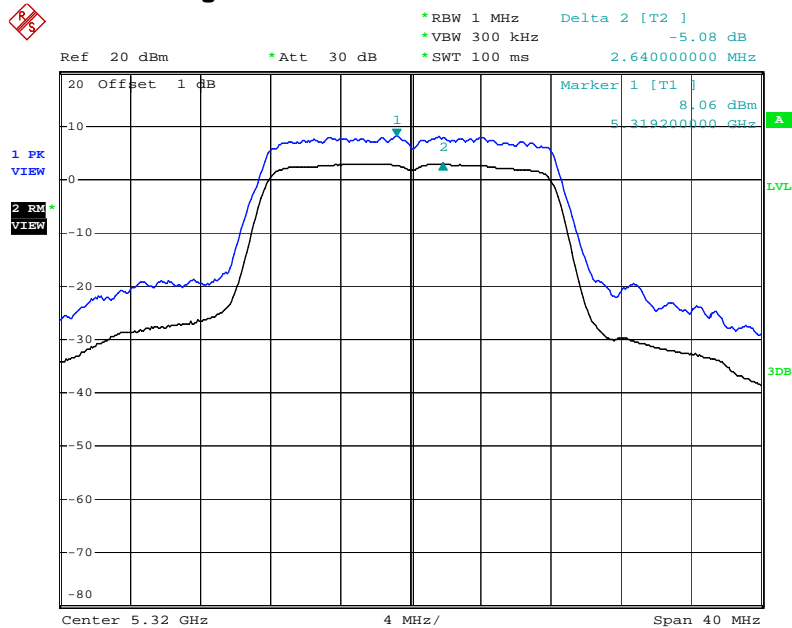


Peak Excursion Plot on Configuration IEEE 802.11a 5280 MHz Port 2



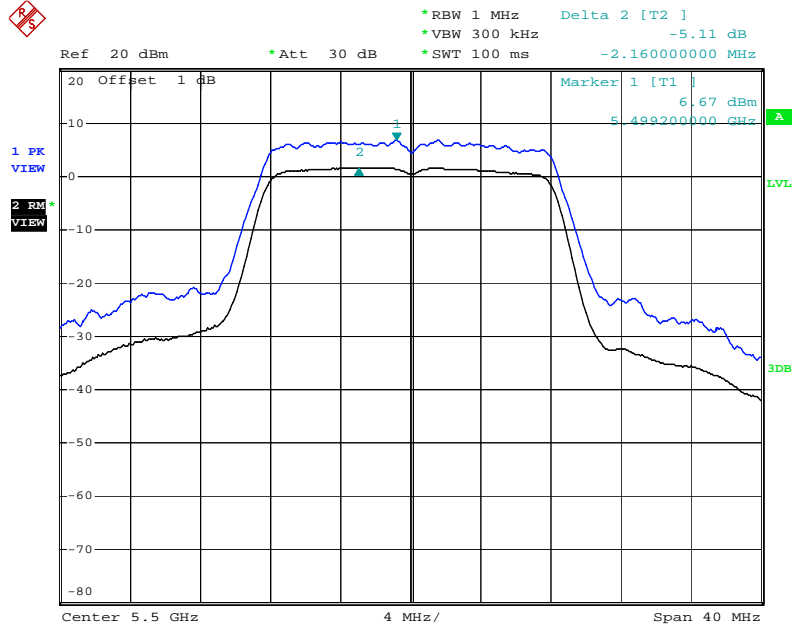
Date: 25.APR.2012 14:24:31

Peak Excursion Plot on Configuration IEEE 802.11a 5320 MHz Port 2



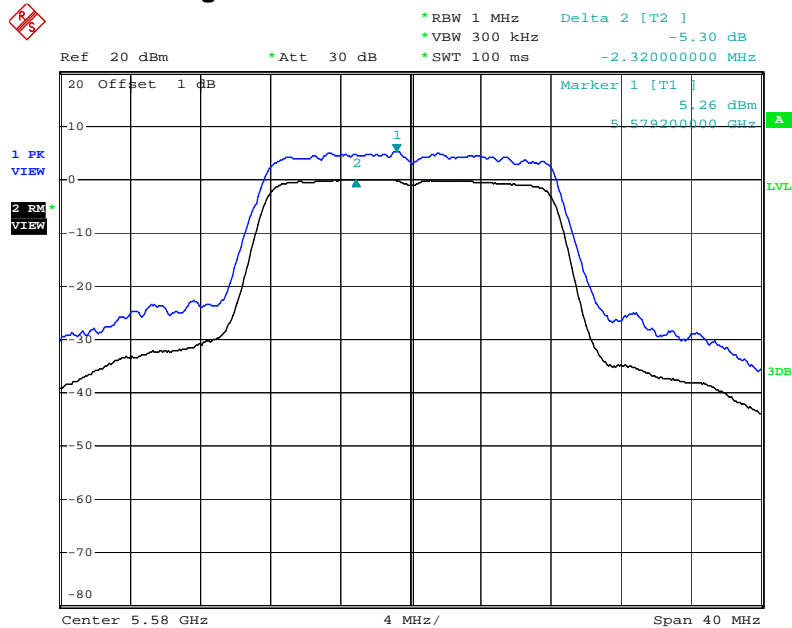
Date: 25.APR.2012 14:28:05

Peak Excursion Plot on Configuration IEEE 802.11a 5500 MHz Port 2



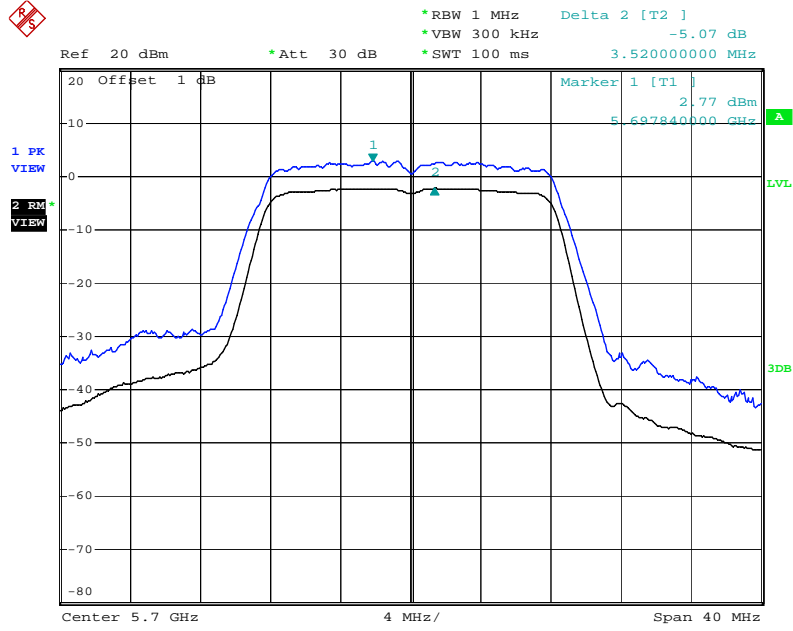
Date: 25.APR.2012 14:32:12

Peak Excursion Plot on Configuration IEEE 802.11a 5580 MHz Port 2



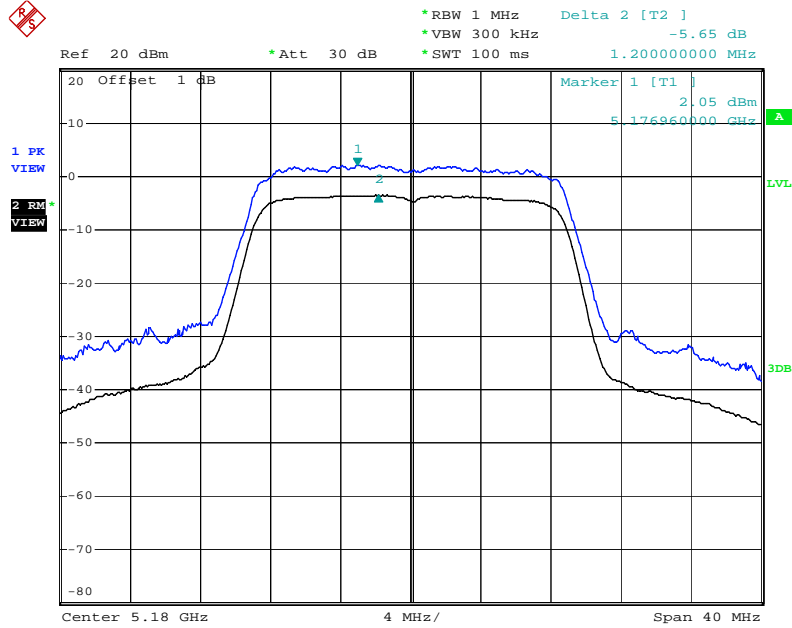
Date: 25.APR.2012 14:37:41

Peak Excursion Plot on Configuration IEEE 802.11a 5700 MHz Port 2



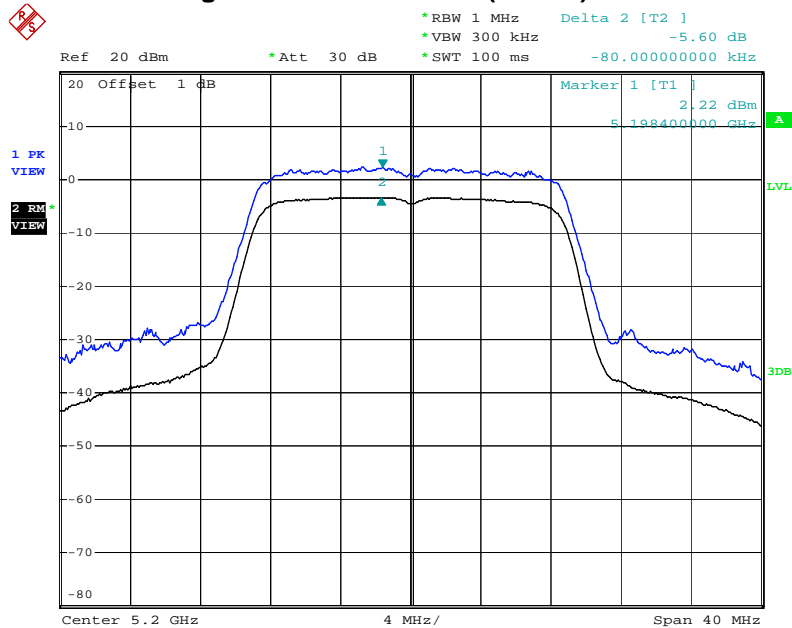
Date: 25.APR.2012 14:40:19

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



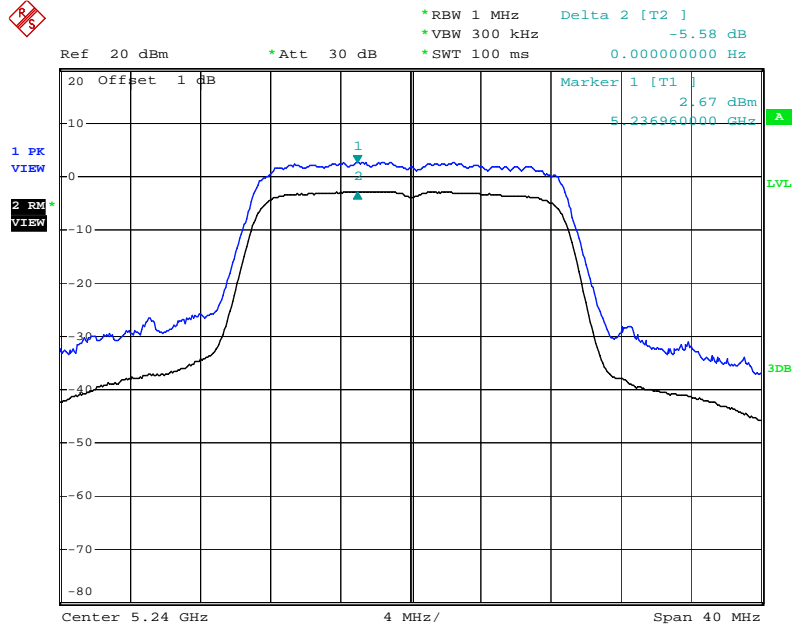
Date: 25.APR.2012 22:12:00

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



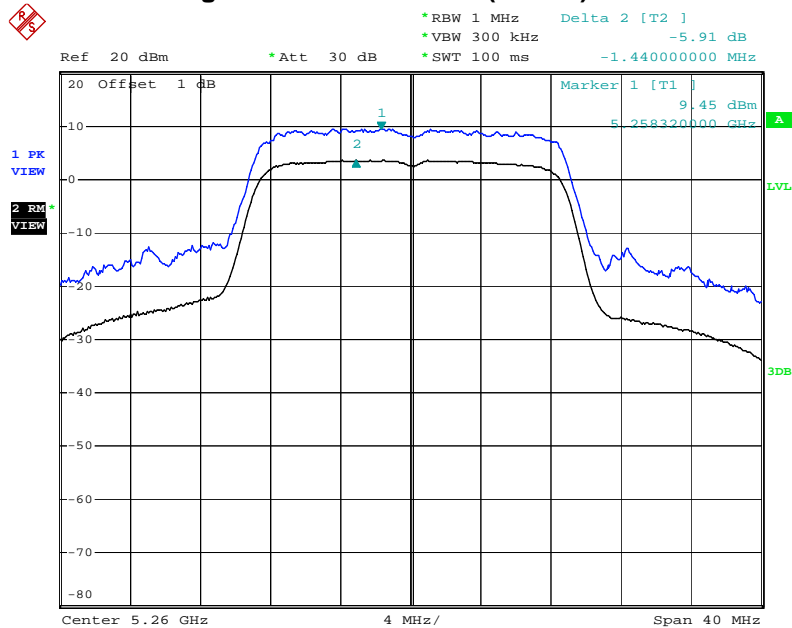
Date: 25.APR.2012 22:13:57

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



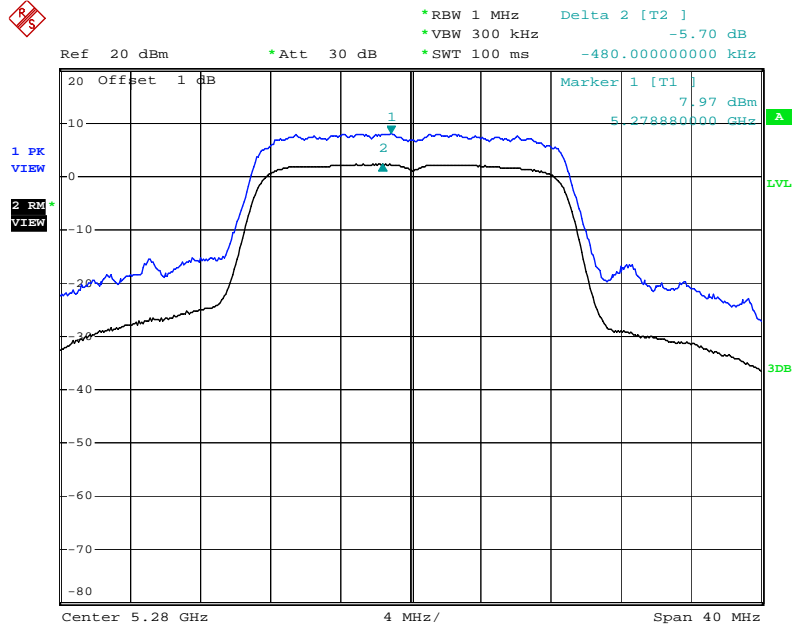
Date: 25.APR.2012 22:15:52

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



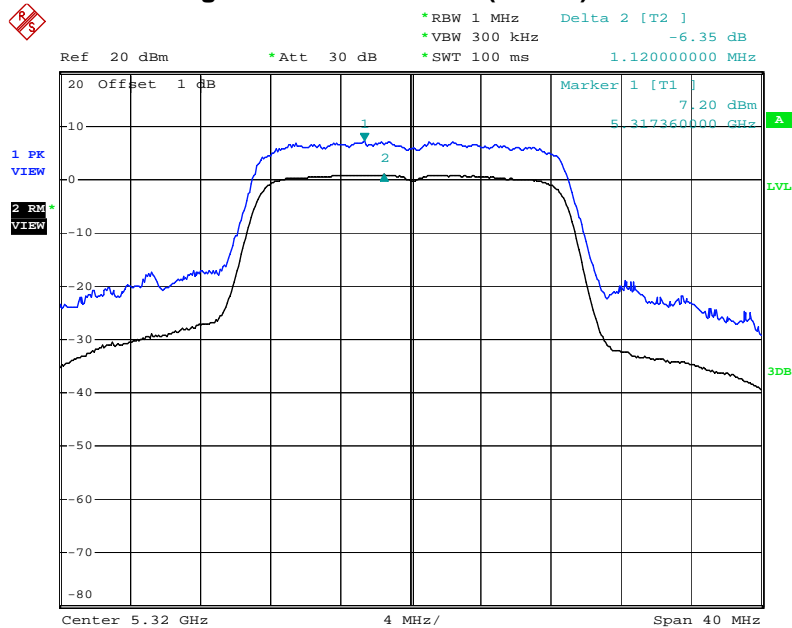
Date: 25.APR.2012 22:17:38

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



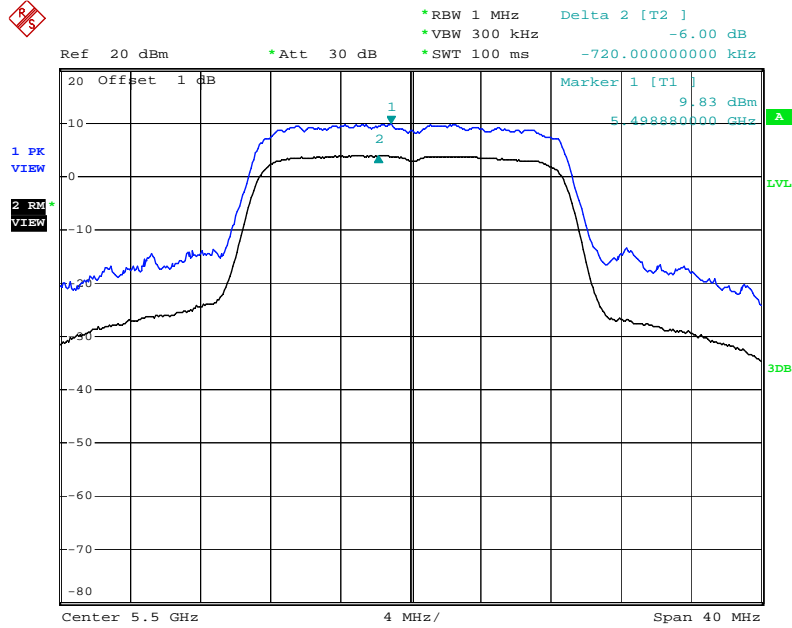
Date: 25.APR.2012 22:20:15

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



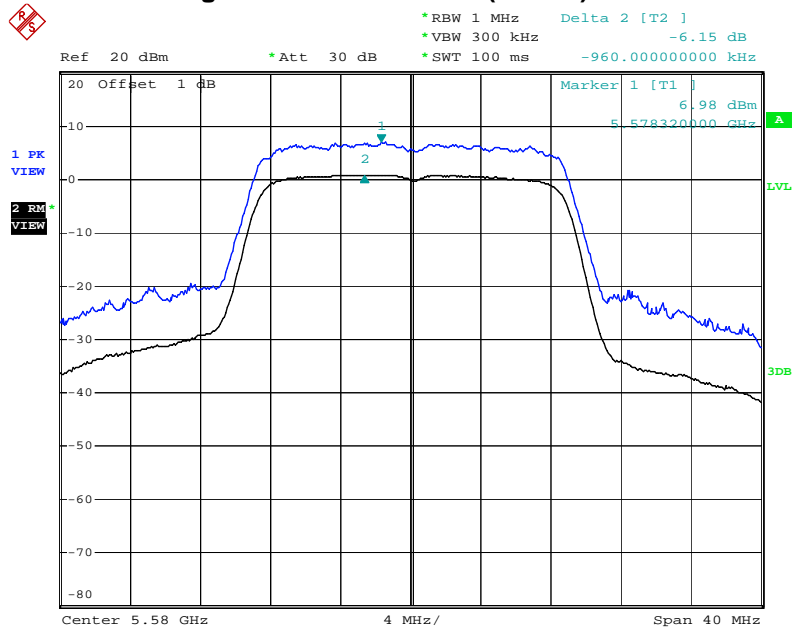
Date: 25.APR.2012 22:22:34

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 1



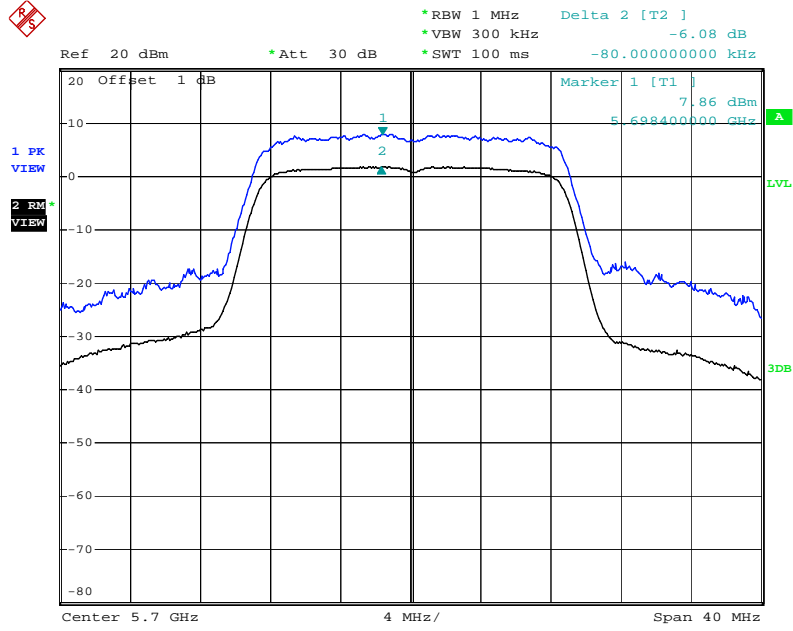
Date: 25.APR.2012 22:24:36

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 1



Date: 25.APR.2012 22:26:33

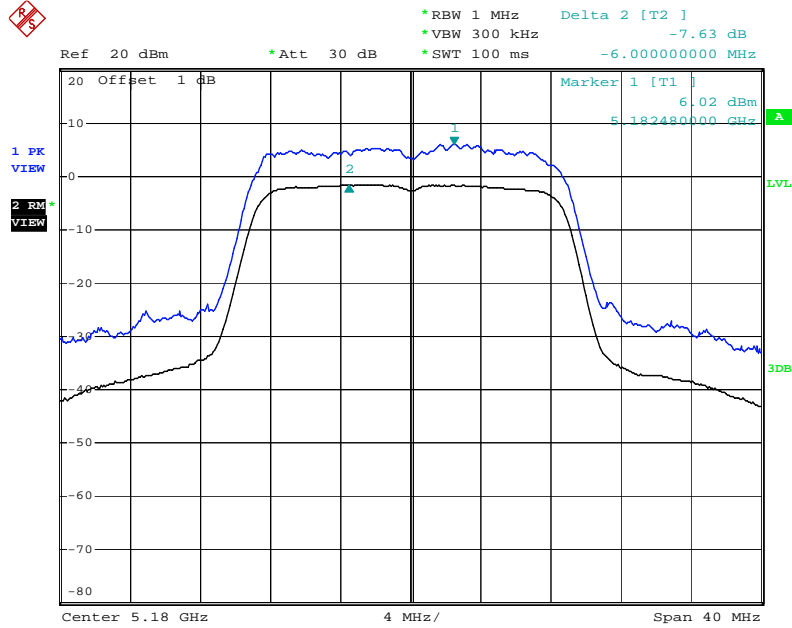
Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 1



Date: 25.APR.2012 22:28:42

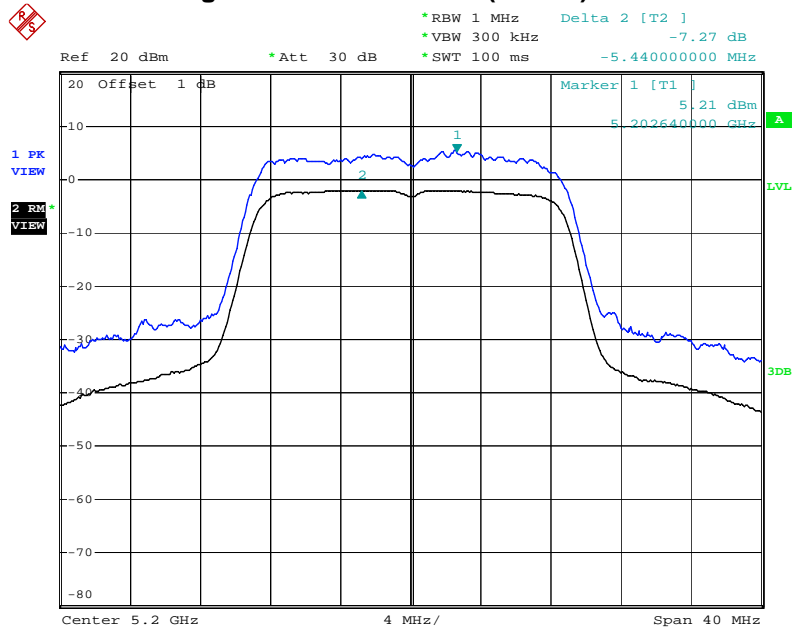


Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



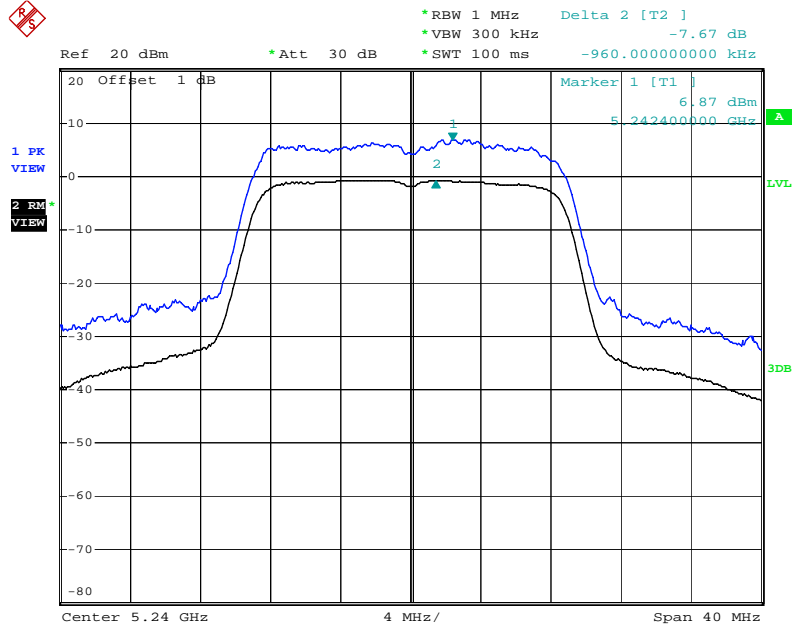
Date: 25.APR.2012 22:50:46

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



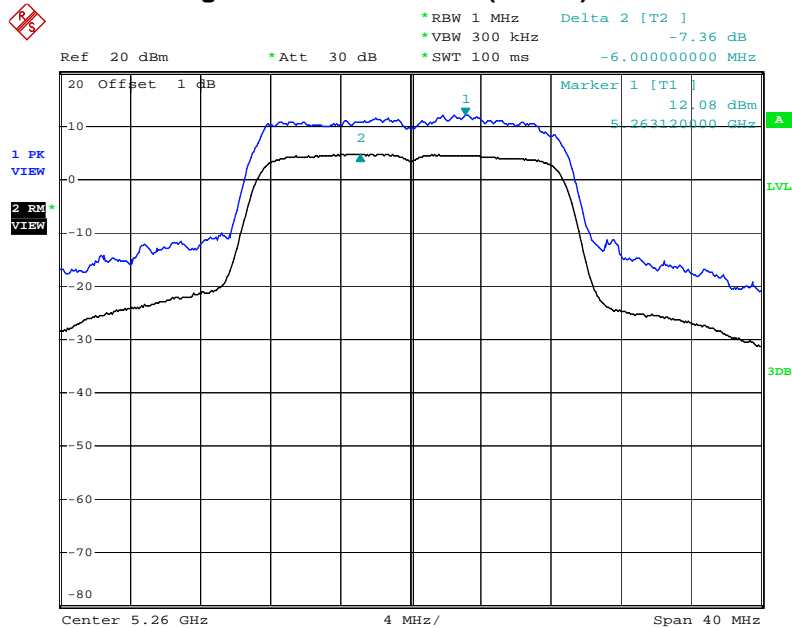
Date: 25.APR.2012 22:53:26

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



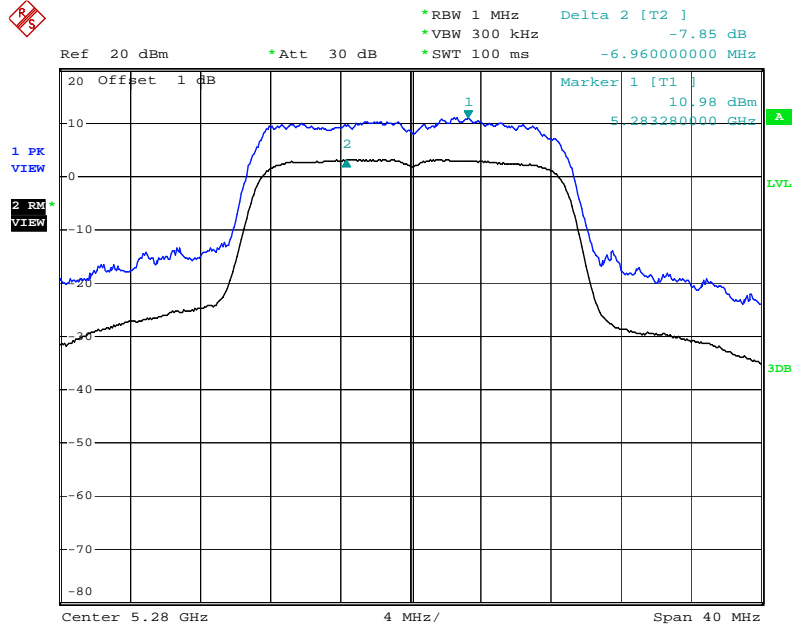
Date: 25.APR.2012 22:56:41

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



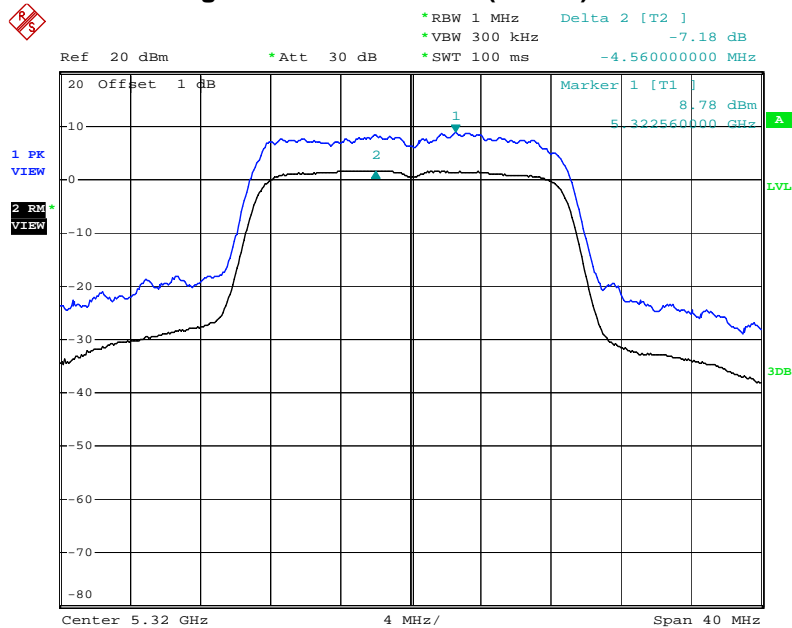
Date: 25.APR.2012 22:59:49

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



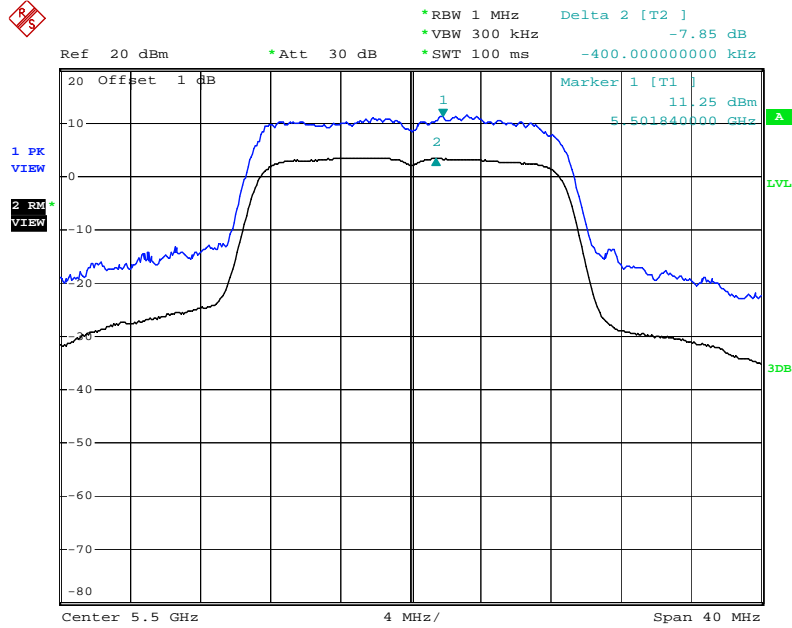
Date: 25.APR.2012 23:02:22

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



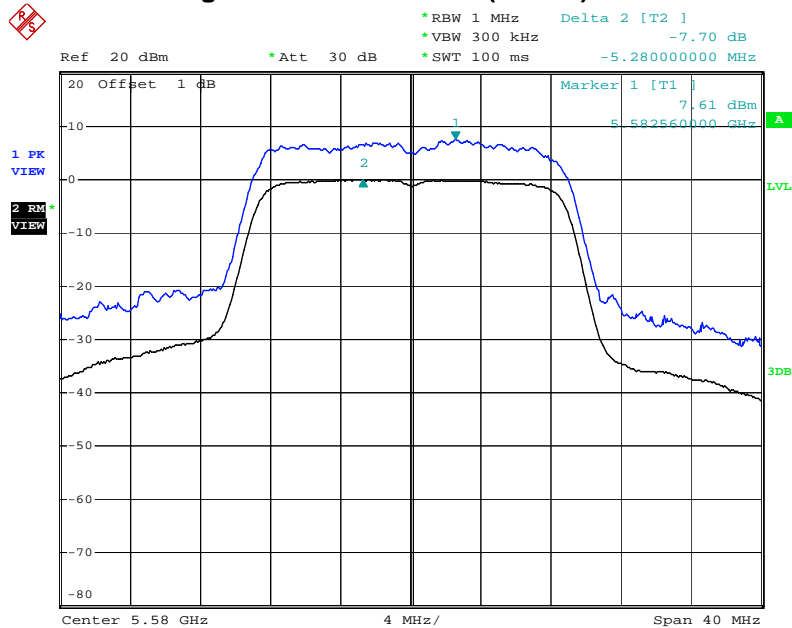
Date: 25.APR.2012 23:05:05

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 2



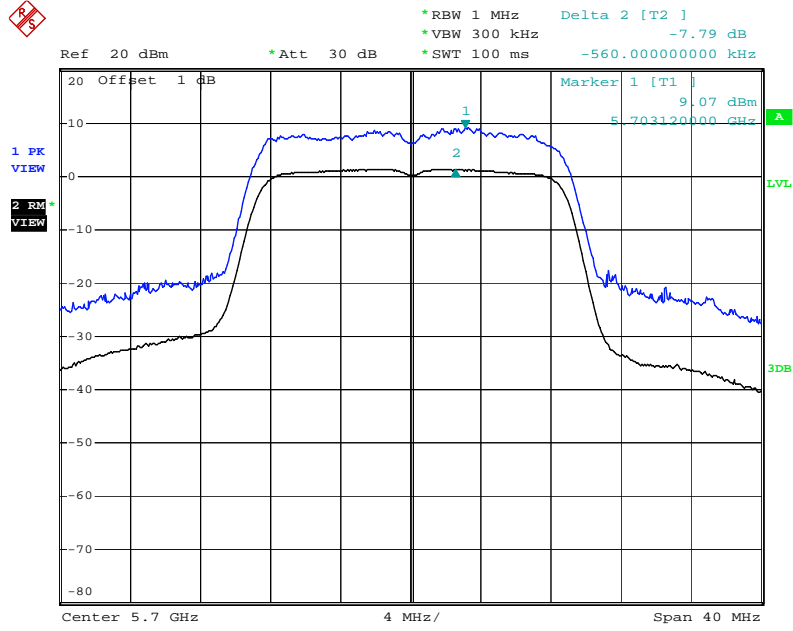
Date: 25.APR.2012 23:07:27

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 2



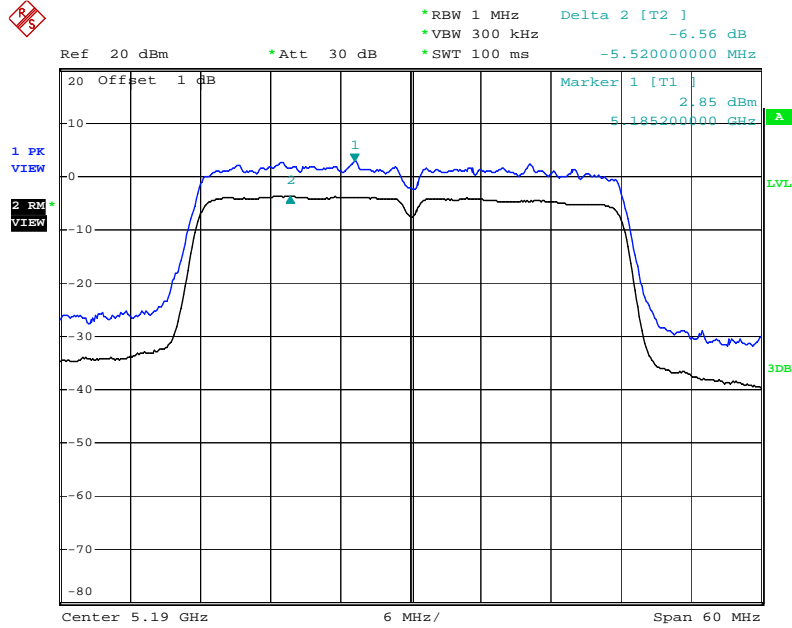
Date: 25.APR.2012 23:10:12

Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 2



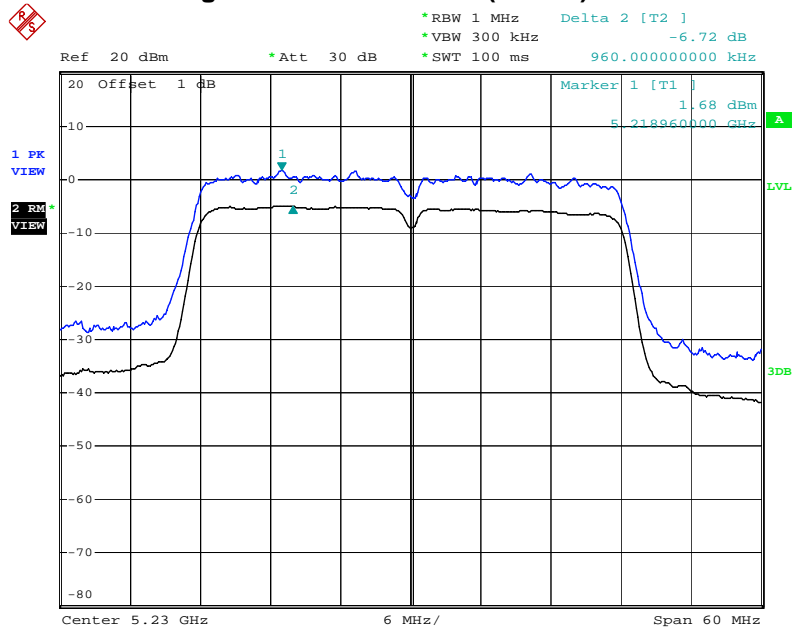
Date: 25.APR.2012 23:12:13

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



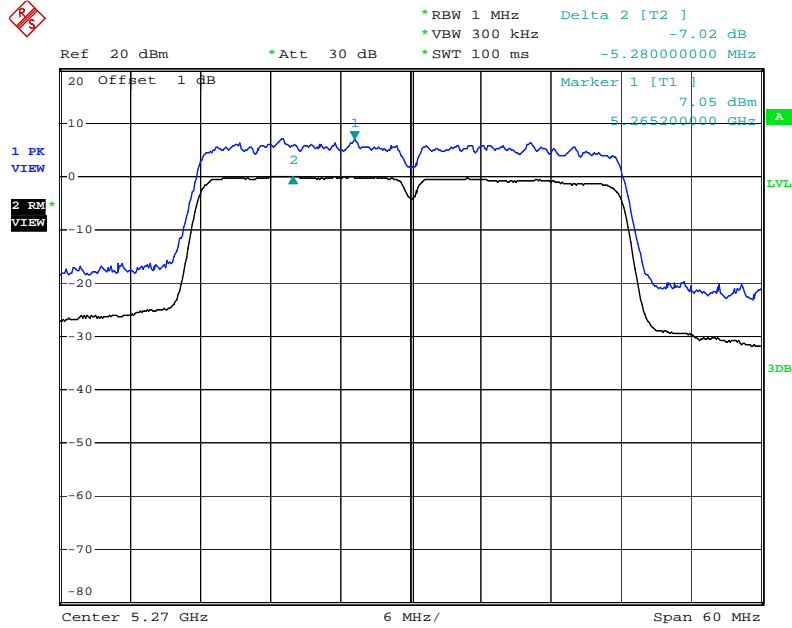
Date: 25.APR.2012 22:30:53

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



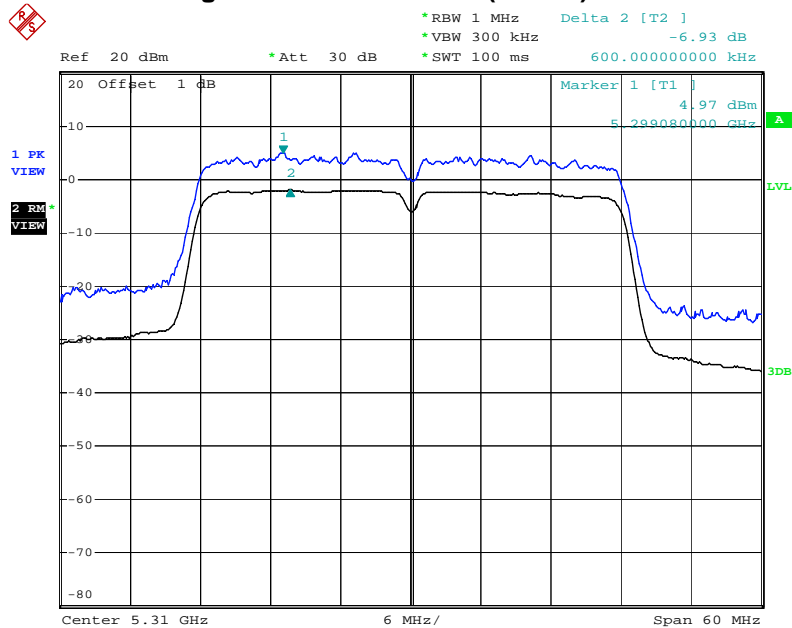
Date: 25.APR.2012 22:33:03

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



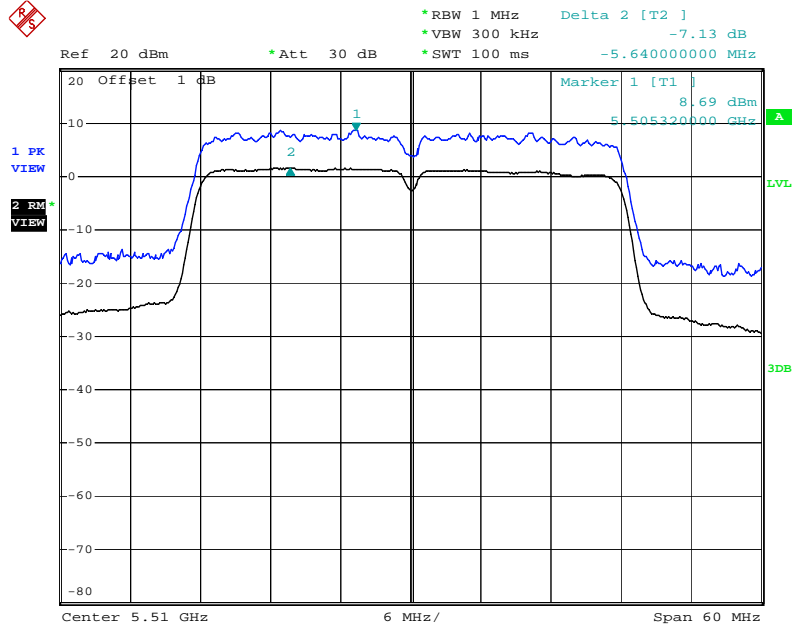
Date: 25.APR.2012 22:35:07

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



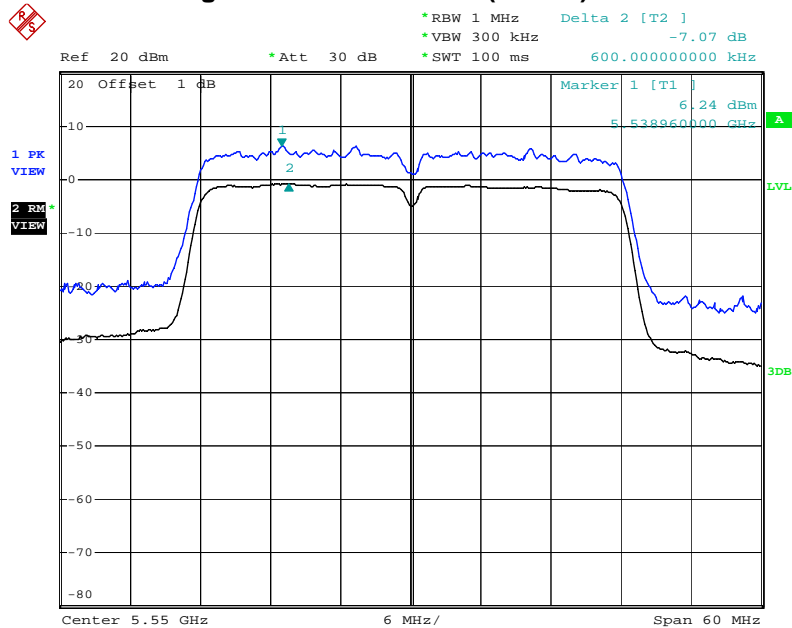
Date: 25.APR.2012 22:37:14

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 1



Date: 25.APR.2012 22:39:56

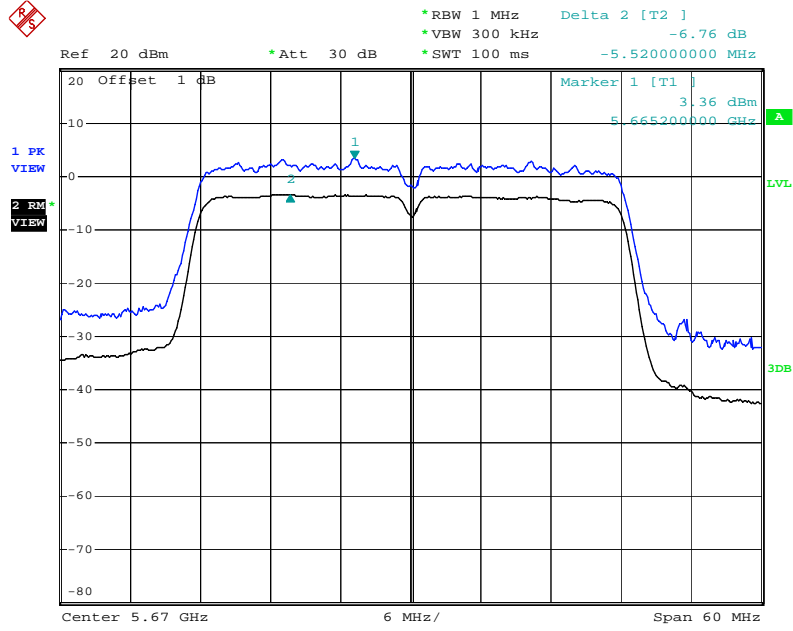
Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 1



Date: 25.APR.2012 22:42:16

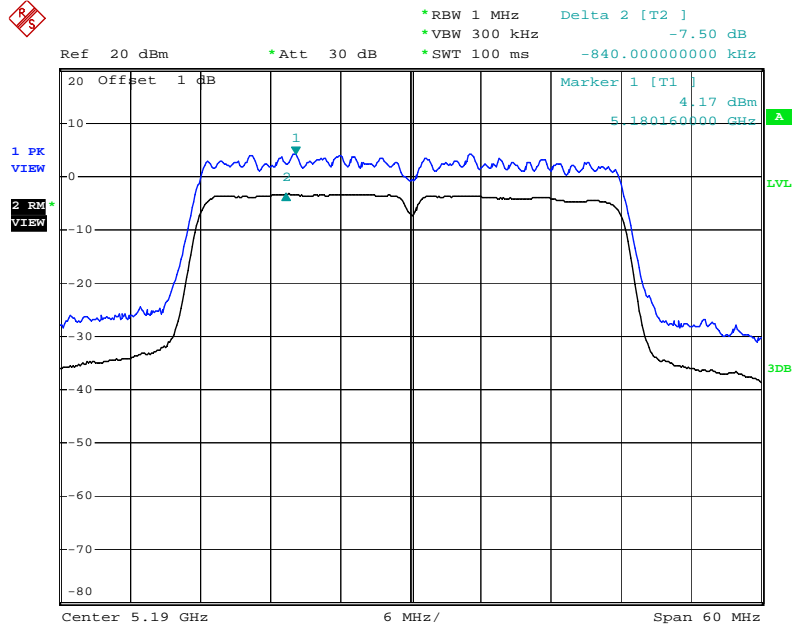


Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 1



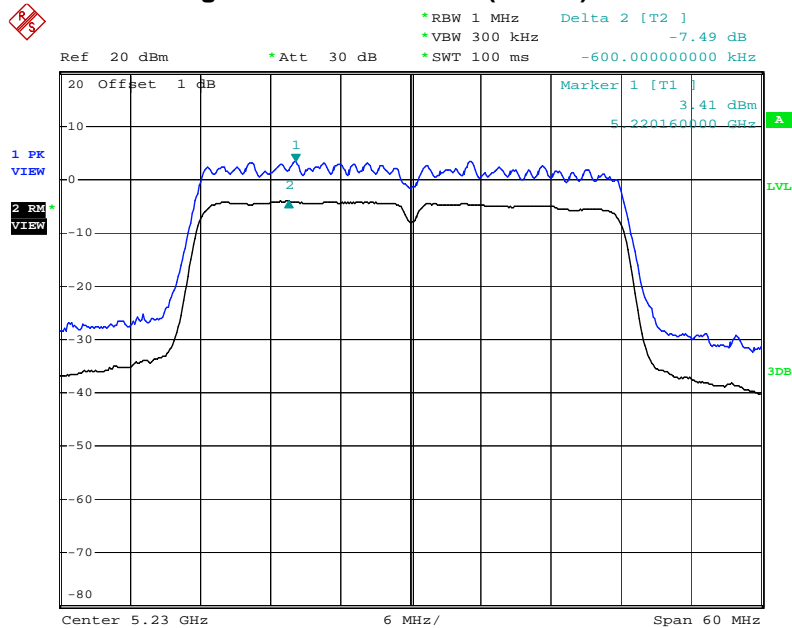
Date: 25.APR.2012 22:46:33

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



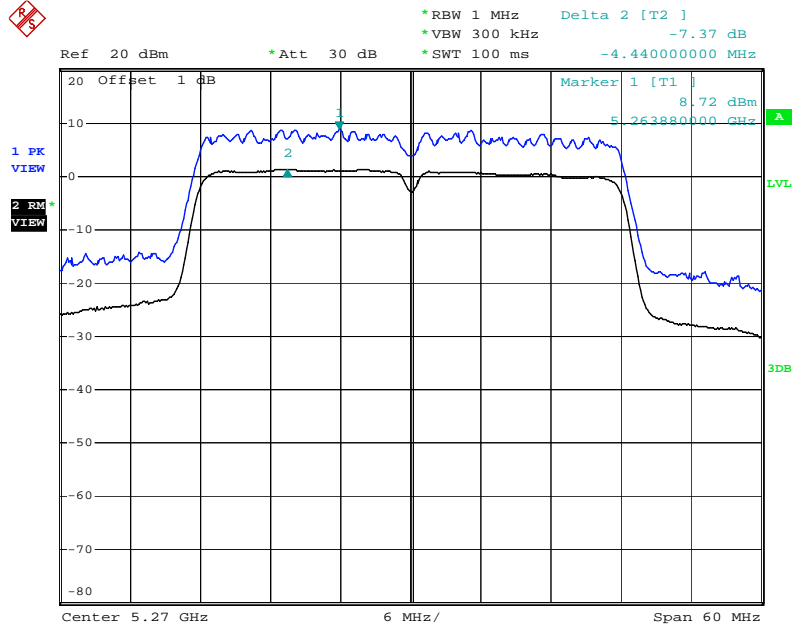
Date: 25.APR.2012 23:14:38

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



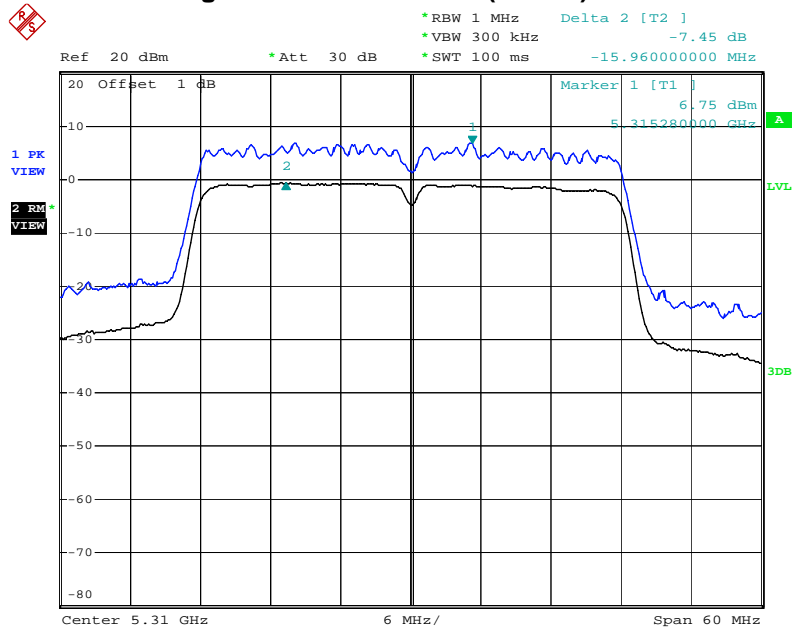
Date: 25.APR.2012 23:17:06

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



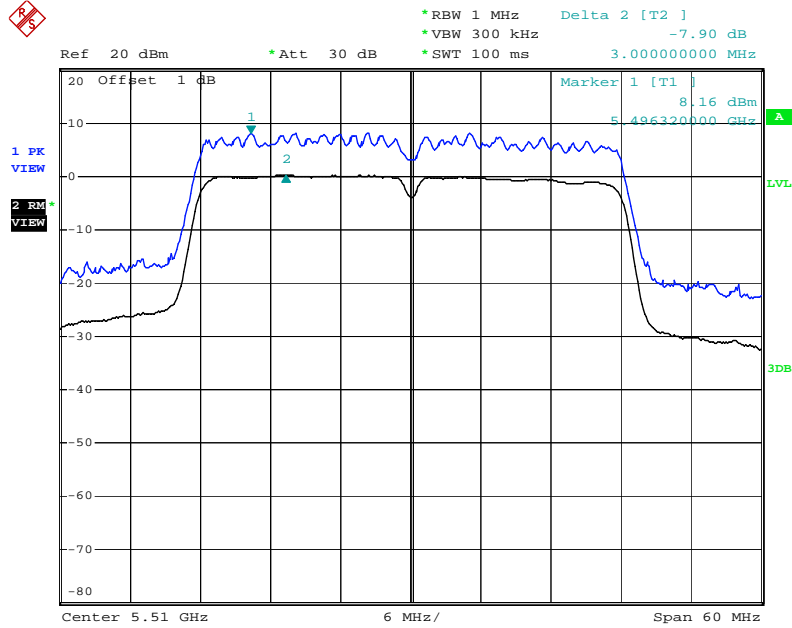
Date: 25.APR.2012 23:18:50

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



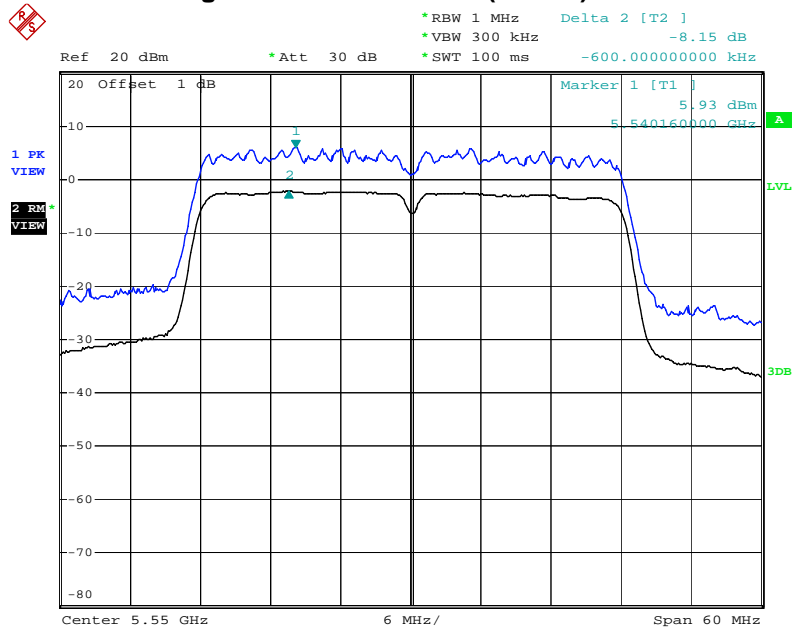
Date: 25.APR.2012 23:21:04

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 2



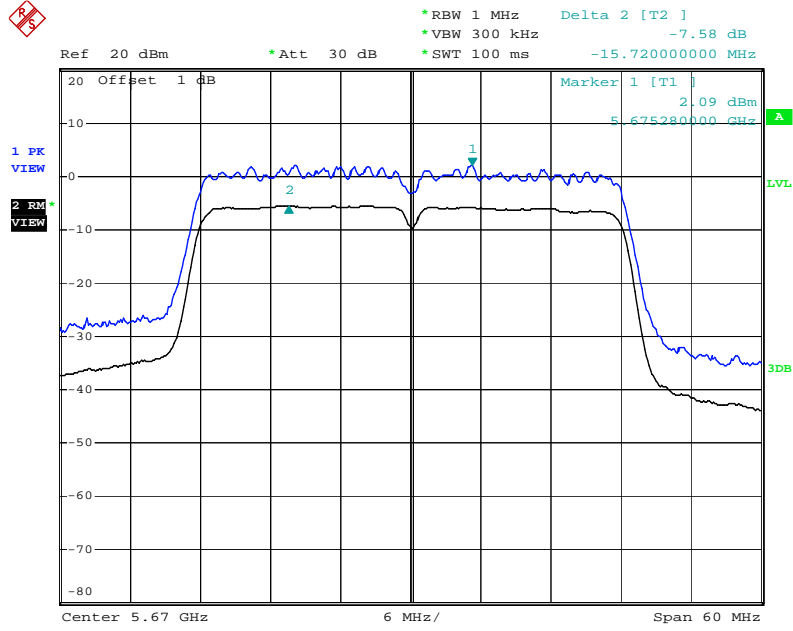
Date: 25.APR.2012 23:23:09

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 2



Date: 25.APR.2012 23:25:13

Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 2



Date: 25.APR.2012 23:27:07

**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.

<b>Frequencies (MHz)</b>	<b>Field Strength (micorvolts/meter)</b>	<b>Measurement Distance (meters)</b>
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.

<b>Spectrum Parameter</b>	<b>Setting</b>
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

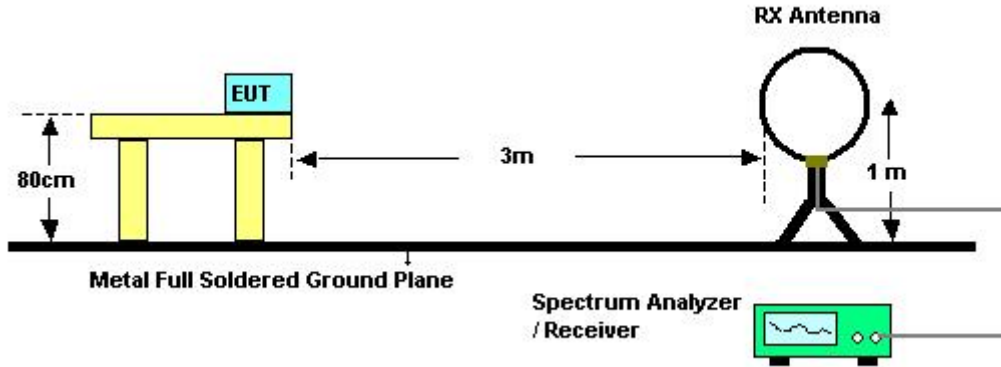
<b>Receiver Parameter</b>	<b>Setting</b>
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

**3.6.3 Test Procedures**

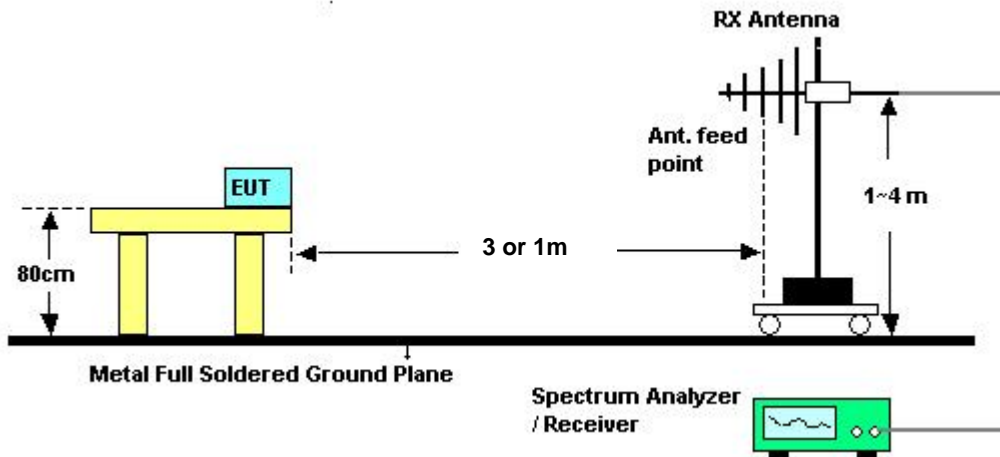
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

<b>Final Test Date</b>	Apr. 11, 2012	<b>Test Site No.</b>	03CH02-HY
<b>Temperature</b>	23.9°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Streak		

<b>Freq. (MHz)</b>	<b>Level (dBuV)</b>	<b>Over Limit (dB)</b>	<b>Limit Line (dBuV)</b>	<b>Remark</b>
-	-	-	-	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.

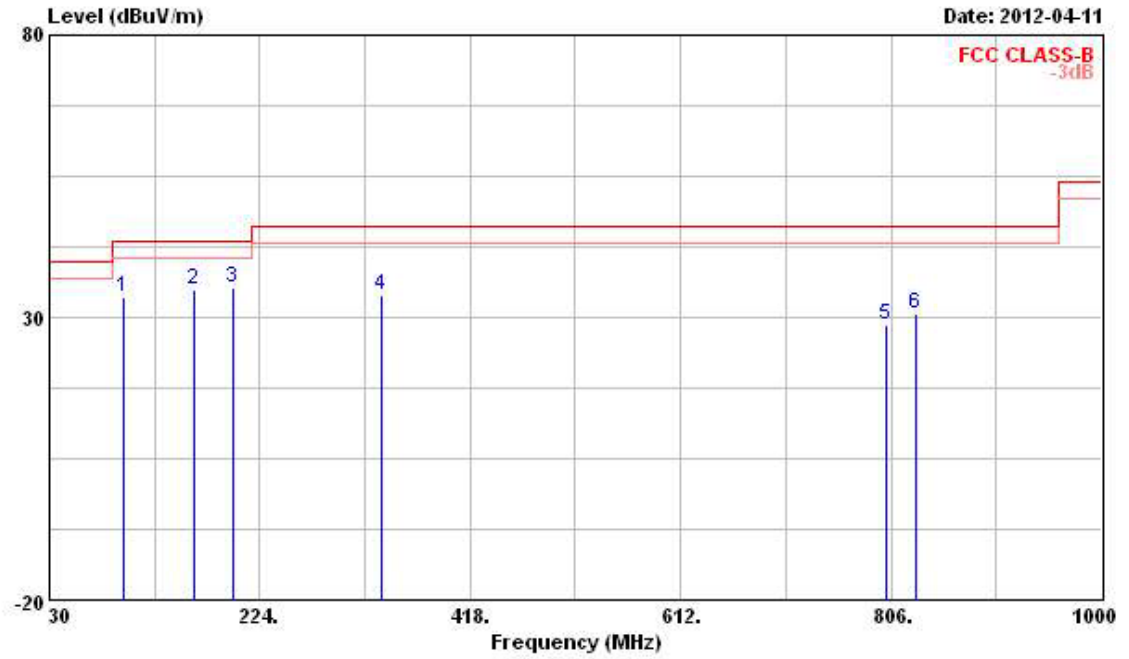
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

Final Test Date	Apr. 11, 2012	Test Site No.	03CH02-HY
Temperature	23.9°C	Humidity	63%
Test Engineer	Streak	Configurations	System Mode

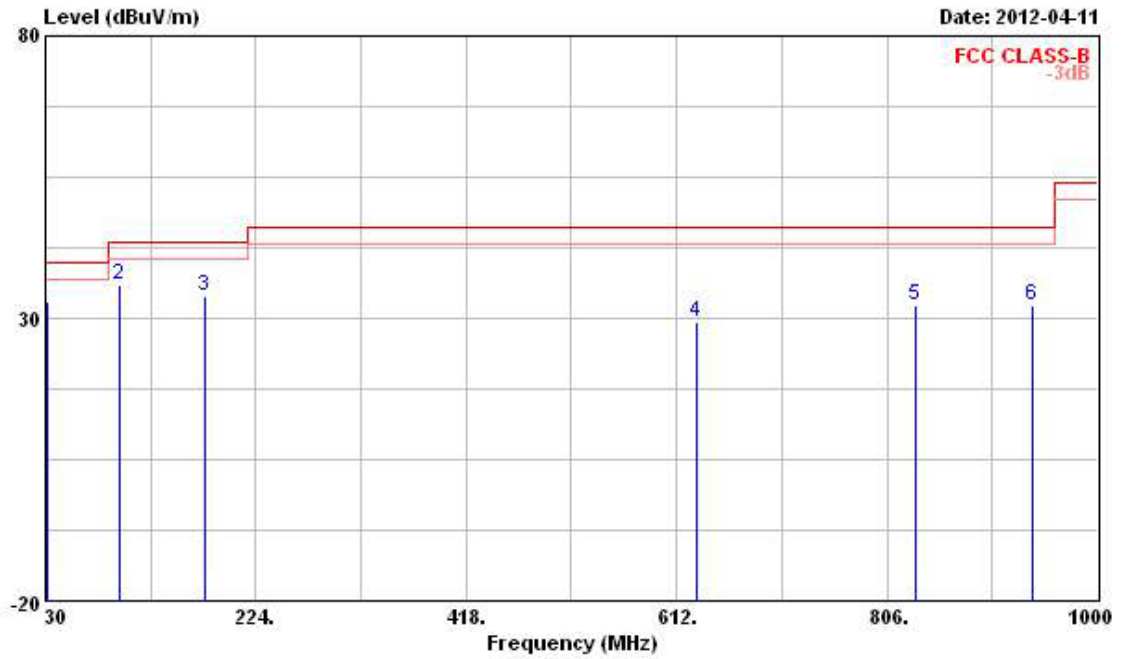
Horizontal



4/11/2012 09:04

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	98.870	33.76	-9.74	43.50	48.95	11.01	1.65	27.85	Peak	---	---
2	163.860	34.82	-8.68	43.50	49.89	10.38	2.12	27.57	Peak	---	---
3	198.780	35.24	-8.26	43.50	48.96	11.28	2.42	27.42	Peak	---	---
4	335.550	33.87	-12.13	46.00	43.90	14.26	3.12	27.41	Peak	---	---
5	801.150	28.54	-17.46	46.00	31.32	20.27	4.89	27.94	Peak	---	---
6	828.310	30.73	-15.27	46.00	33.39	20.20	4.98	27.84	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	31.940	32.95	-7.05	40.00	44.49	15.48	0.92	27.94	Peak	---	---
2	98.870	35.91	-7.59	43.50	51.10	11.01	1.65	27.85	Peak	---	---
3	176.470	34.02	-9.48	43.50	49.40	9.88	2.25	27.51	Peak	---	---
4	630.430	29.35	-16.65	46.00	33.64	19.78	4.33	28.40	Peak	---	---
5	832.190	32.28	-13.72	46.00	34.93	20.19	4.99	27.83	Peak	---	---
6	939.860	32.21	-13.79	46.00	33.17	21.01	5.48	27.45	Peak	---	---

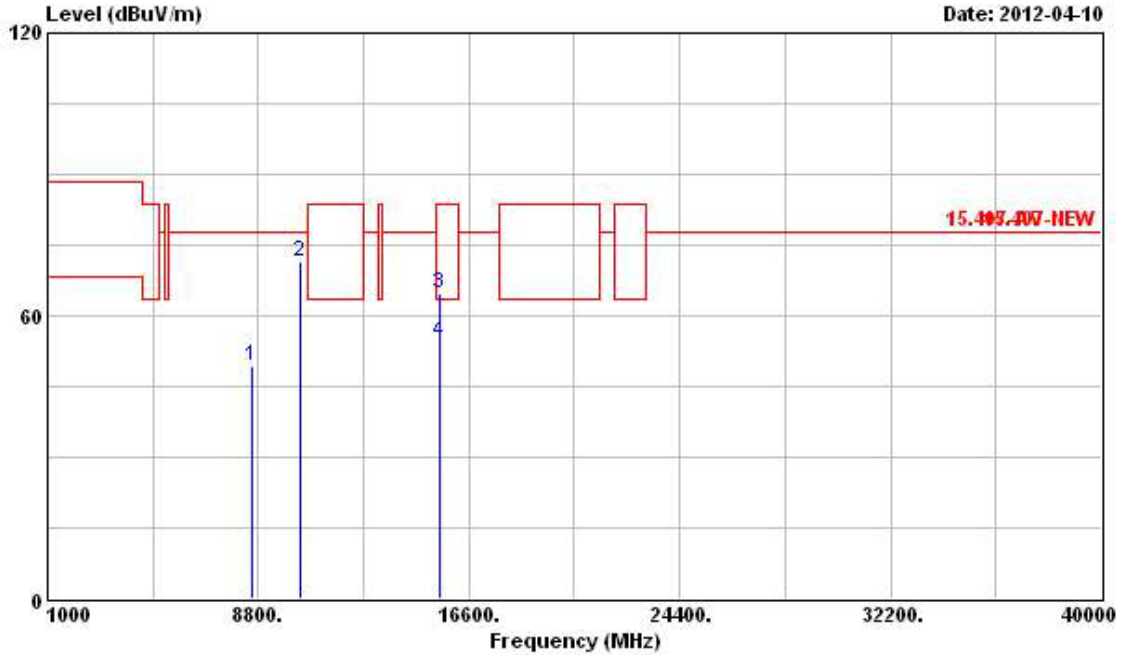
Note:  
 The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.  
 Emission level (dBuV/m) = 20 log Emission level (Uv/m).  
 Corrected Reading: Antenna Factor + Cable Loss + Read Level – Preamp Factor = Level.

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

For Single Chain:

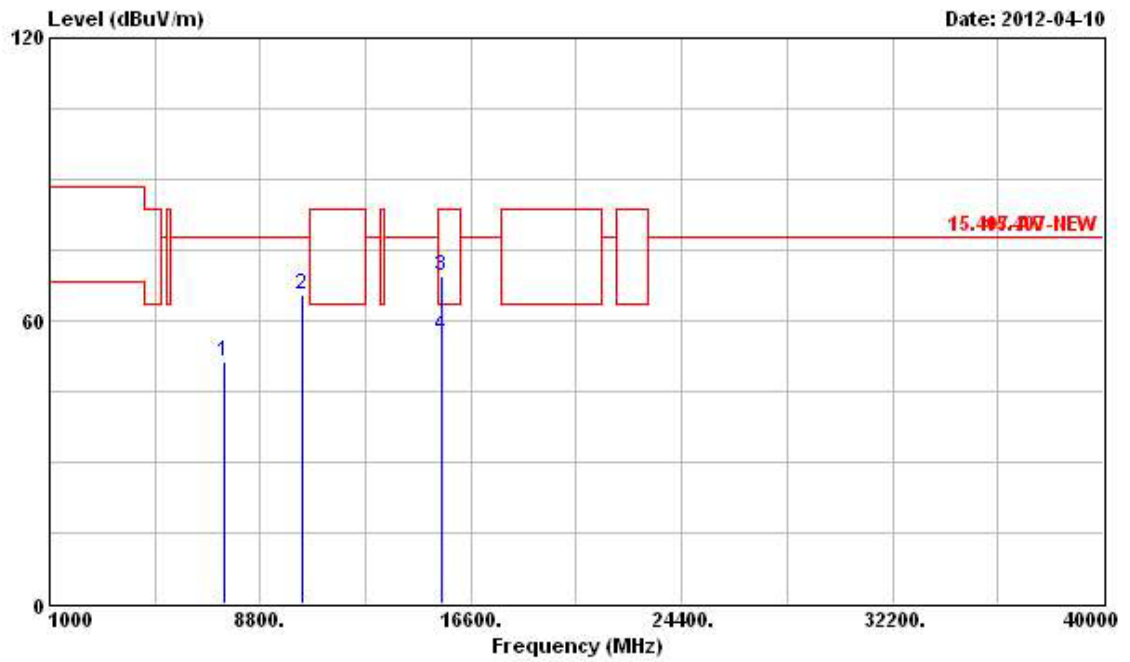
Final Test Date	Apr. 10, 2012	Test Site No.	03CH02-HY
Temperature	23.9°C	Humidity	63%
Test Engineer	Streak	Configuration	802.11a Ch. 36

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	8562.000	49.32	-28.52	77.84	42.26	36.34	5.97	35.25	Peak	---	---
2	10360.000	71.48	-6.36	77.84	61.77	38.22	6.71	35.22	Peak	---	---
3	15540.000	64.72	-18.82	83.54	50.49	40.81	8.45	35.03	Peak	---	---
4	15540.000	54.49	-9.05	63.54	40.26	40.81	8.45	35.03	Average	---	---

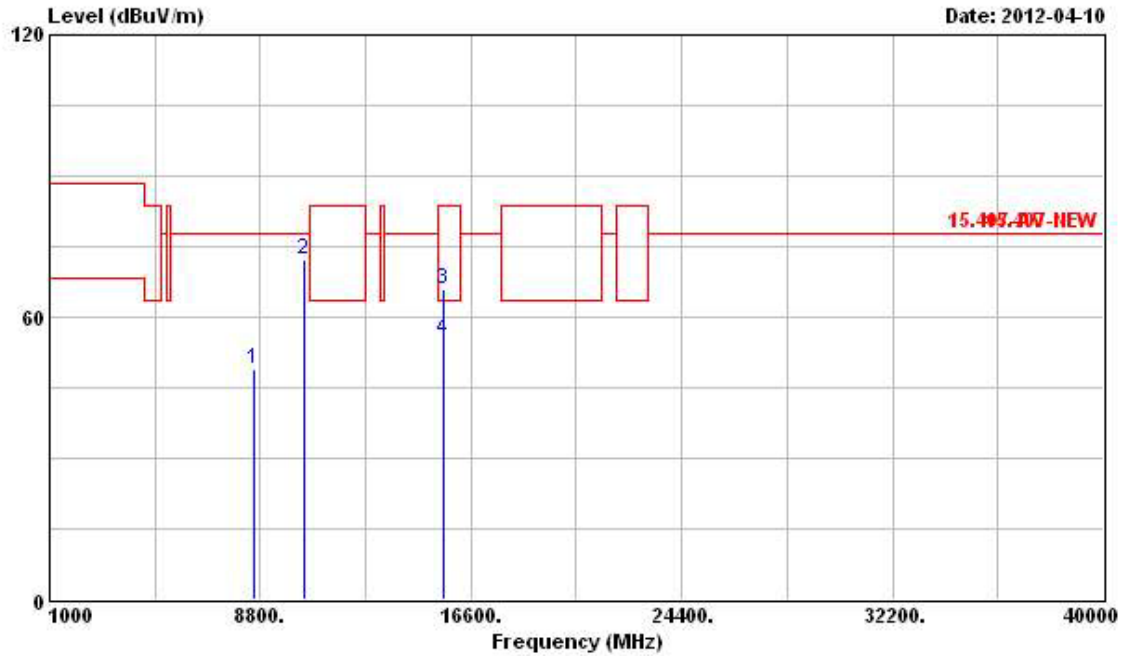
Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	7462.000	51.25	-26.59	77.84	44.92	35.81	5.66	35.14	PK	---	---
2	10360.000	65.54	-12.30	77.84	55.83	38.22	6.71	35.22	Peak	---	---
3	15540.000	69.52	-14.02	83.54	55.29	40.81	8.45	35.03	Peak	---	---
4	15540.000	56.93	-6.61	63.54	42.70	40.81	8.45	35.03	Average	---	---

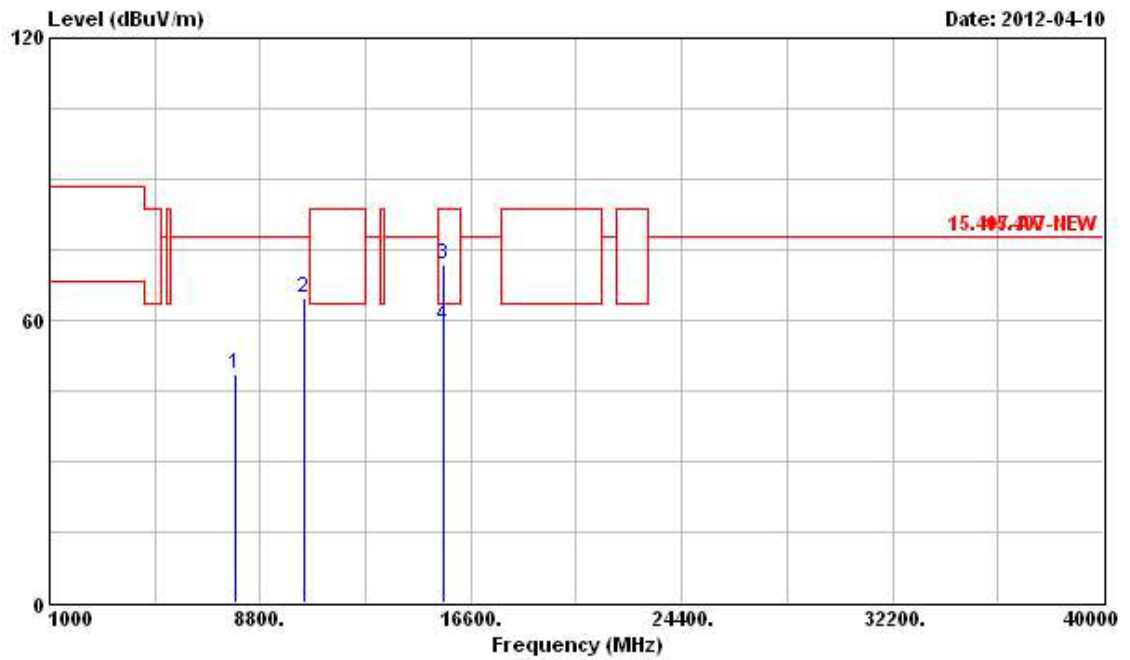
Final Test Date	Apr. 10, 2012	Test Site No.	03CH02-HY
Temperature	23.9°C	Humidity	63%
Test Engineer	Streak	Configuration	802.11a Ch. 40

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	8573.000	48.81	-29.03	77.84	41.75	36.34	5.97	35.25	Peak	---	---
2	10400.000	72.06	-5.78	77.84	62.25	38.24	6.75	35.18	Peak	---	---
3	15600.000	65.85	-17.69	83.54	51.66	40.84	8.45	35.10	Peak	---	---
4	15600.000	55.35	-8.19	63.54	41.16	40.84	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	7858.000	48.44	-29.40	77.84	42.03	35.87	5.77	35.23 Peak	---	---
2	10400.000	64.74	-13.10	77.84	54.93	38.24	6.75	35.18 Peak	---	---
3	15600.000	71.68	-11.86	83.54	57.49	40.84	8.45	35.10 Peak	---	---
4	15600.000	58.85	-4.69	63.54	44.66	40.84	8.45	35.10 Average	---	---