

# IC RADIO TEST REPORT

According to

IC RSS-210 Annex 9

**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  
**IC ID** : 6158A-WUBR508N  
**Received Date** : Mar. 29, 2012  
**Final Test Date** : May 14, 2012

## Statement

**Test result included in this report is only for printed 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 **IC RSS-210 issue 8**.

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: Jun. 11, 2012

Report No.: CR232843-02AN

■ No additional attachment.

□ Additional attachment were issued as following record:

| Attachment No. | Issue Date | Description |
|----------------|------------|-------------|
|                |            |             |
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|                |            |             |



# CERTIFICATE OF COMPLIANCE

According to

IC RSS-210 Annex 9

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

| Applied Standard: IC RSS-210 issue 8 |               |                                   |          |             |
|--------------------------------------|---------------|-----------------------------------|----------|-------------|
| Part                                 | Rule Section  | Description of Test               | Result   | Under Limit |
| 3.1                                  | 6.6           | AC Power Line Conducted Emissions | Complies | 15.62 dB    |
| 3.2                                  | A9.2          | 26dB Spectrum Bandwidth           | Complies | -           |
| 3.3                                  | A9.2          | Maximum Conducted Output Power    | Complies | 3.34 dB     |
| 3.4                                  | 6.2.2(q1)     | Power Spectral Density            | Complies | 0.01 dB     |
| 3.5                                  | -             | Peak Excursion                    | Complies | 4.85 dB     |
| 3.6                                  | A9.3          | Radiated Emissions                | Complies | 1.02 dB     |
| 3.7                                  | A9.3          | Band Edge Emissions               | Complies | 4.29 dB     |
| 3.8                                  | A9.5          | Frequency Stability               | Complies | -           |
| 3.9                                  | RSS-Gen 7.1.4 | Antenna Requirements              | Complies | -           |

| Test Items                                    | Uncertainty           | Remark                   |
|---|-----------------------|--------------------------|
| AC Power Line Conducted Emissions             | ±2.3dB                | Confidence levels of 95% |
| Maximum Conducted Output Power                | ±0.5dB                | Confidence levels of 95% |
| Power Spectral Density                        | ±0.5dB                | Confidence levels of 95% |
| Peak Excursion                                | ±0.5dB                | Confidence levels of 95% |
| 26dB Spectrum Bandwidth / Frequency Stability | ±8.5×10 <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℃                 | 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<br>Data Rate (Mbps) | OFDM for IEEE 802.11a (BPSK / QPSK / 16QAM / 64QAM)<br>(6/9/12/18/24/36/48/54)<br>See the below table for IEEE 802.11n  |
| Frequency Range                     | 5150~5250MHz ; 5250~5350MHz ; 5470~5725MHz  |
| Channel Band Width (99%)            | 802.11a : Band 1: 17.40 MHz ; Band 2: 17.60 MHz ; Band 3: 17.40 MHz<br>802.11n : MCS 8 (20MHz) : Band 1: 18.10 MHz ; Band 2: 18.50 MHz<br>MCS 8 (20MHz) : Band 3: 18.10 MHz<br>MCS 8 (40MHz) : Band 1: 36.40 MHz ; Band 2: 37.80 MHz<br>MCS 8 (40MHz) : Band 3: 36.80 MHz     |
| Conducted Output Power              | 802.11a : Band 1: 13.02 dBm ; Band 2: 17.21 dBm ; Band 3: 13.68 dBm<br>802.11n : MCS 8 (20MHz) : Band 1: 12.53 dBm ; Band 2: 19.82 dBm ;<br>MCS 8 (20MHz) : Band 3: 19.18 dBm<br>MCS 8 (40MHz) : Band 1: 15.58 dBm ; Band 2: 18.33 dBm ;<br>MCS 8 (40MHz) : Band 3: 18.54 dBm |

#### IEEE 802.11n Modulation Scheme

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

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



## 2.2 Table for Filed Antenna

| Antenna Category (Ant. Cat.)        |   |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Integral antenna (antenna permanently attached) |
| <input checked="" type="checkbox"/> | Temporary RF connector provided                 |

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

| Antenna General Information   |  |  |           |           |   |           |                           |   |   |
|---|--|--|-----------|-----------|---|-----------|---------------------------|---|---|
| Antenna Port (Total 2 Port)   |  |  |           |           | 1(TX/RX), 2(TX/RX)  |           |                           |   |   |
| Maximum RF Output Power Level (PL)  |  |  |           |           | 1   |           |                           |   |   |
| Transmit Chains Power Distribution  |  |  |           |           | <input checked="" type="checkbox"/> symmetrical distribution <input type="checkbox"/> asymmetrical distribution |           |                           |   |   |
| Ant. No.  | PL   | Ant. Port<br>[Ant No. X connect<br>to Ant. Port Y] | Ant. Cat. | Ant. Type | Brand   | Model     | G <sub>ANT</sub><br>(dBi) | DG (dBi)<br>[correlated]<br>N <sub>TX</sub> = 1 | DG (dBi)<br>[uncorrelated]<br>N <sub>TX</sub> = 2 |
| 1   | 1  | 1  | Internal  | Printed   | SparkLAN  | WUBR-508N | 6.64                      | N/A   | 6.64  |
|   | 1  | 2  | Internal  | Printed   | SparkLAN  | WUBR-508N | 6.64                      |   |   |
| <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:<br>Any transmit signals are correlated, Directional Gain (DG) = G <sub>ANT</sub> + 10 log(N) dBi<br>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:<br>Any transmit signals are correlated, Directional Gain (DG) =<br>10 log[(10 <sup>G<sub>1/20</sub></sup> + 10 <sup>G<sub>2/20</sub></sup> + ... + 10 <sup>G<sub>N/20</sub></sup> ) <sup>2</sup> /N] dBi<br>All transmit signals are completely uncorrelated, Directional Gain (DG) =<br>10 log[(10 <sup>G<sub>1/10</sub></sup> + 10 <sup>G<sub>2/10</sub></sup> + ... + 10 <sup>G<sub>N/10</sub></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<br>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<br>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<br>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<br>Radiated Emission Below 1GHz   | System Mode                        | Auto      | -                                 |
| Max. Conducted Output Power<br>26dB Spectrum Bandwidth<br>99% Occupied Bandwidth<br>Measurement<br>Power Spectral Density<br>Peak Excursion | 11a Band 1~2/BPSK                  | 6Mbps     | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>MCS 0 (20MHz) | 6.5 Mbps  | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>MCS 0 (40MHz) | 13.5 Mbps | 38/46/54/62/102/110/134           |
|   | 11n Band 1~2/BPSK<br>MCS 8 (20MHz) | 13Mbps    | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>MCS 8 (40MHz) | 27Mbps    | 38/46/54/62/102/110/134           |
| Radiated Emission Above 1GHz  | 11a Band 1~2/BPSK                  | 6Mbps     | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>MCS 0 (20MHz) | 6.5 Mbps  | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>MCS 0 (40MHz) | 13.5 Mbps | 38/46/54/62/102/110/134           |
|   | 11n Band 1~2/BPSK<br>MCS 8 (20MHz) | 13Mbps    | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>MCS 8 (40MHz) | 27Mbps    | 38/46/54/62/102/110/134           |
| Band Edge Emission  | 11a Band 1~2/BPSK                  | 6Mbps     | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>MCS 0 (20MHz) | 6.5 Mbps  | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>MCS 0 (40MHz) | 13.5 Mbps | 38/46/54/62/102/110/134           |
|   | 11n Band 1~2/BPSK<br>MCS 8 (20MHz) | 13Mbps    | 36/40/48/52/56<br>/64/100/116/140 |
|   | 11n Band 1~2/BPSK<br>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<br>(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 "Winthrax.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.

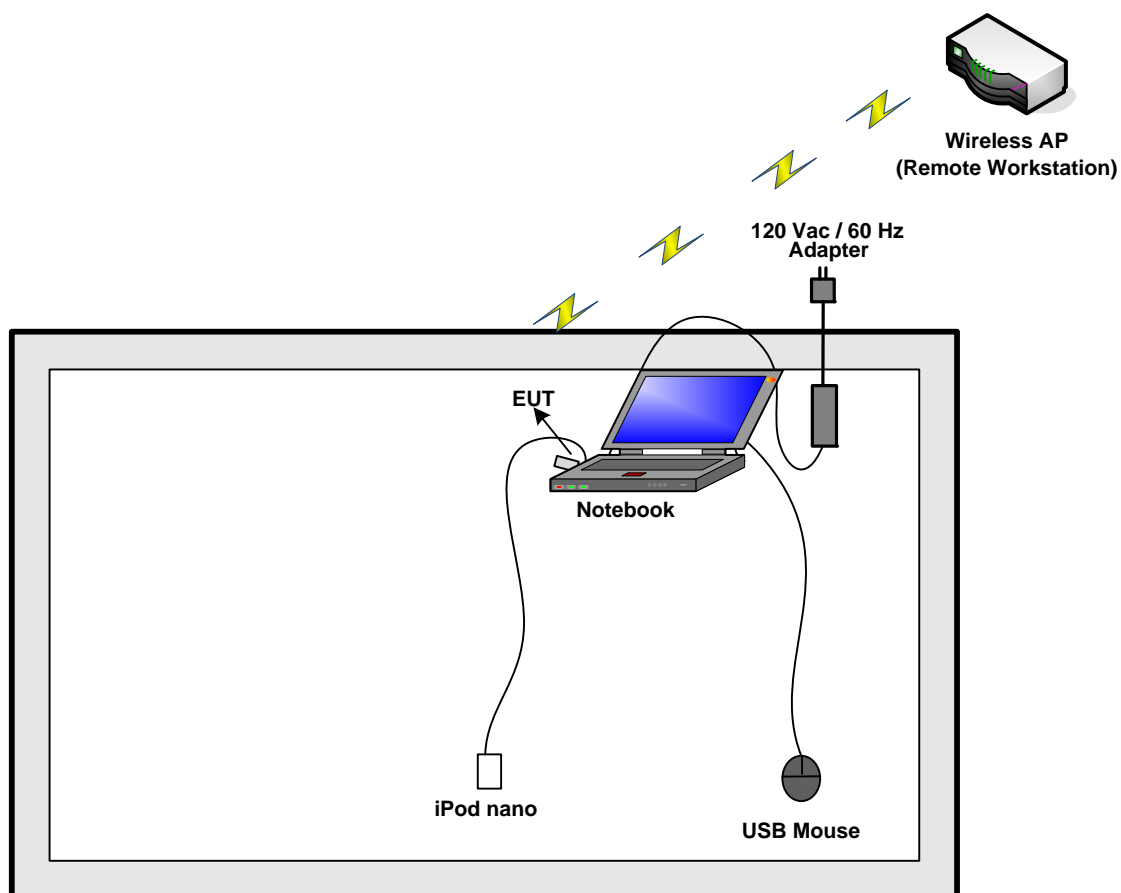
### **Radiated emissions above 1GHz**

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



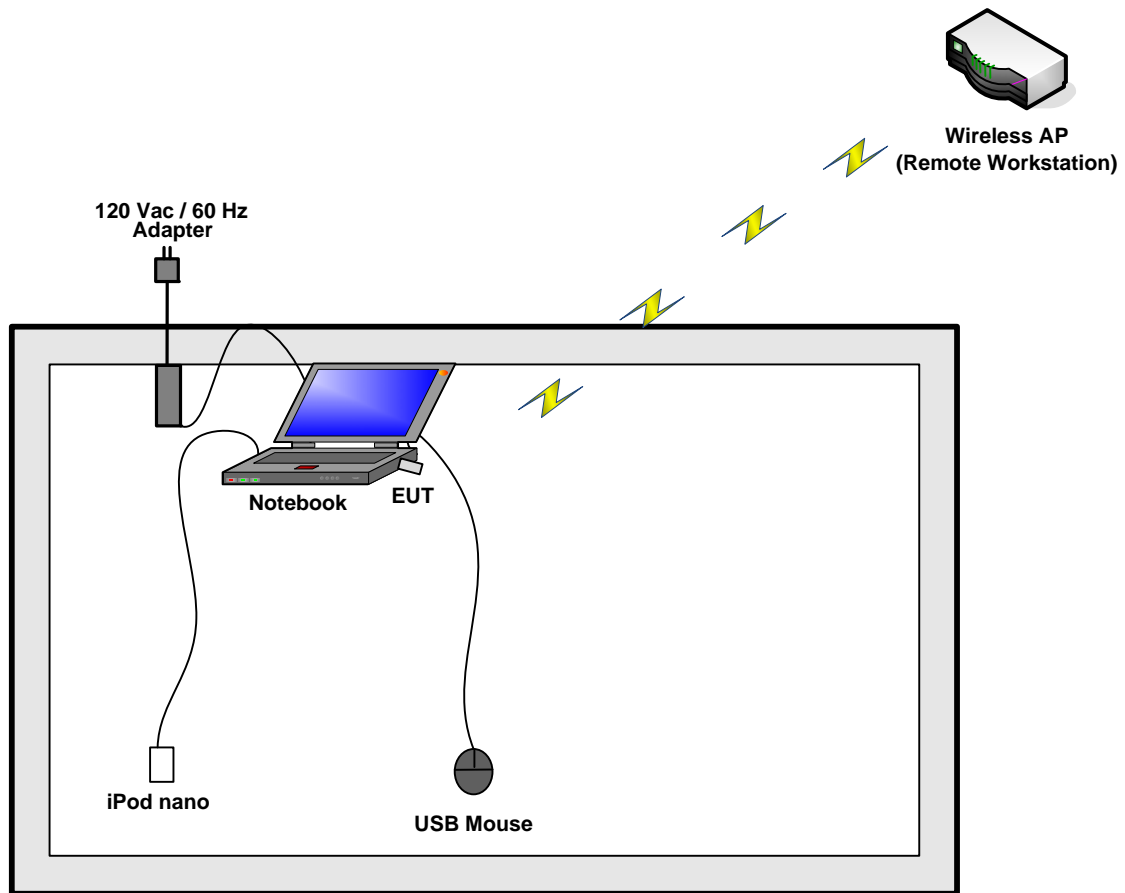
## 2.9 Test Configuration

## Conducted emissions

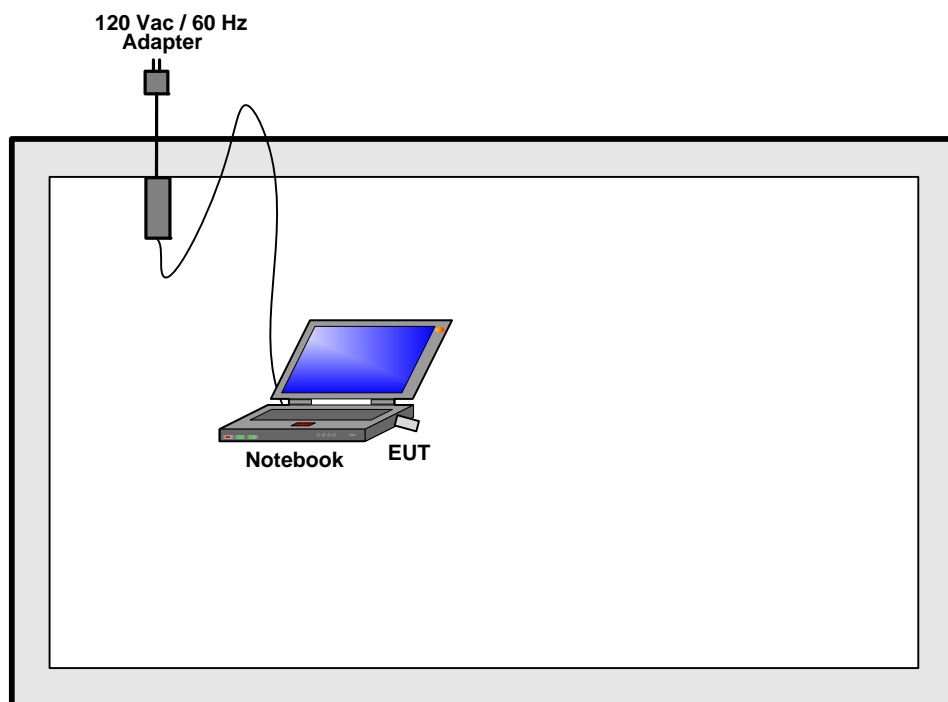




**Radiated emissions 9kHz~1GHz**





**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.



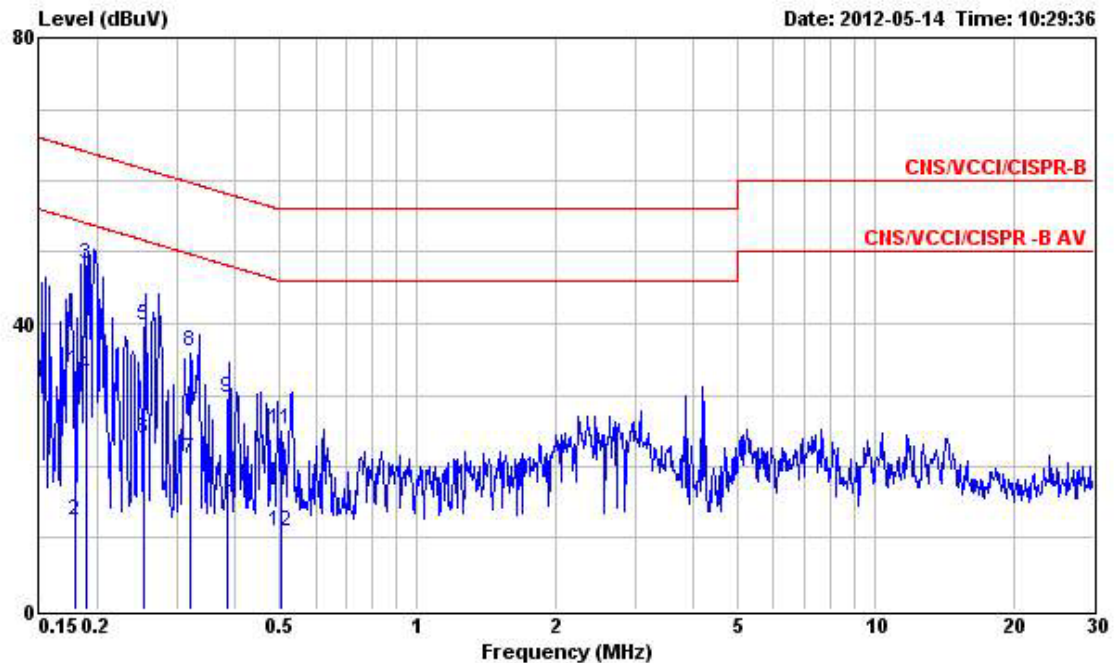




## 3.1.7 Results of AC Power Line Conducted Emissions Measurement

|                 |              |               |             |
|-----------------|--------------|---------------|-------------|
| Final Test Date | May 14, 2012 | Test Site No. | CO01-HY     |
| Temperature     | 23.6°C       | Humidity      | 49%         |
| Test Engineer   | David        | Configuration | System Mode |

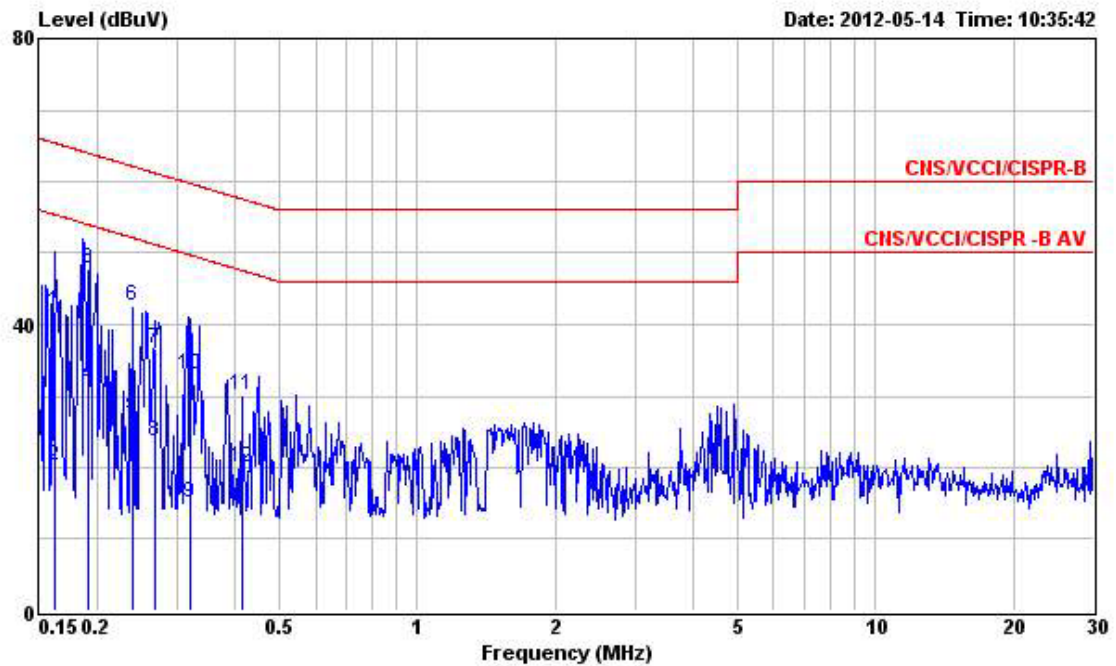
Line



|    | Freq  | Level | Over Limit | Limit Line | Read Level | Probe Factor | Cable Loss | Remark  |
|----|-------|-------|------------|------------|------------|--------------|------------|---------|
|    | MHz   | dBuV  | dB         | dBuV       | dBuV       | dB           | dB         |         |
| 1  | 0.179 | 33.55 | -30.97     | 64.52      | 33.37      | 0.08         | 0.10       | QP      |
| 2  | 0.179 | 12.50 | -42.02     | 54.52      | 12.32      | 0.08         | 0.10       | Average |
| 3  | 0.190 | 48.41 | -15.62     | 64.03      | 48.23      | 0.08         | 0.10       | QP      |
| 4  | 0.190 | 32.72 | -21.31     | 54.03      | 32.54      | 0.08         | 0.10       | Average |
| 5  | 0.252 | 39.65 | -22.05     | 61.70      | 39.47      | 0.08         | 0.10       | QP      |
| 6  | 0.252 | 23.96 | -27.74     | 51.70      | 23.78      | 0.08         | 0.10       | Average |
| 7  | 0.320 | 21.12 | -28.59     | 49.71      | 20.93      | 0.09         | 0.10       | Average |
| 8  | 0.320 | 36.04 | -23.67     | 59.71      | 35.85      | 0.09         | 0.10       | QP      |
| 9  | 0.386 | 29.65 | -28.49     | 58.14      | 29.46      | 0.09         | 0.10       | QP      |
| 10 | 0.386 | 16.35 | -31.79     | 48.14      | 16.16      | 0.09         | 0.10       | Average |
| 11 | 0.503 | 25.13 | -30.87     | 56.00      | 24.93      | 0.10         | 0.10       | QP      |
| 12 | 0.503 | 11.02 | -34.98     | 46.00      | 10.82      | 0.10         | 0.10       | Average |



## Neutral



|    | Freq  | Level | Over<br>Limit | Limit<br>Line | Read<br>Level | Probe<br>Factor | Cable<br>Loss | Remark  |
|----|-------|-------|---------------|---------------|---------------|-----------------|---------------|---------|
|    | MHz   | dBuV  | dB            | dBuV          | dBuV          | dB              | dB            |         |
| 1  | 0.162 | 41.94 | -23.42        | 65.36         | 41.77         | 0.07            | 0.10          | QP      |
| 2  | 0.162 | 20.37 | -34.99        | 55.36         | 20.20         | 0.07            | 0.10          | Average |
| 3  | 0.191 | 47.88 | -16.10        | 63.98         | 47.72         | 0.06            | 0.10          | QP      |
| 4  | 0.191 | 31.51 | -22.47        | 53.98         | 31.35         | 0.06            | 0.10          | Average |
| 5  | 0.238 | 27.19 | -24.97        | 52.16         | 27.03         | 0.06            | 0.10          | Average |
| 6  | 0.238 | 42.57 | -19.59        | 62.16         | 42.41         | 0.06            | 0.10          | QP      |
| 7  | 0.267 | 36.55 | -24.66        | 61.21         | 36.39         | 0.06            | 0.10          | QP      |
| 8  | 0.267 | 23.71 | -27.50        | 51.21         | 23.55         | 0.06            | 0.10          | Average |
| 9  | 0.321 | 15.09 | -34.60        | 49.69         | 14.92         | 0.07            | 0.10          | Average |
| 10 | 0.321 | 32.95 | -26.74        | 59.69         | 32.78         | 0.07            | 0.10          | QP      |
| 11 | 0.413 | 30.14 | -27.45        | 57.59         | 29.97         | 0.07            | 0.10          | QP      |
| 12 | 0.413 | 20.06 | -27.53        | 47.59         | 19.89         | 0.07            | 0.10          | Average |

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

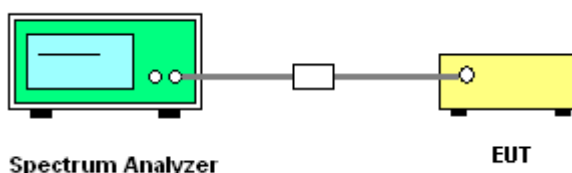
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameters | Setting          |
|---------------------|------------------|
| Attenuation         | Auto             |
| Span Frequency      | > 26dB Bandwidth |
| RB                  | 300 kHz          |
| VB                  | 1000 kHz         |
| Detector            | Sample           |
| 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. For 99% Occupied Bandwidth the resolution Bandwidth  $\geq 1\%$  of the selected span.
5. 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℃         | <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<br/>(MHz)</b> | <b>99% Occupied Bandwidth<br/>(MHz)</b> |
|----------------|------------------|---------------------------------|---|
| 36             | 5180 MHz         | 19.90                           | 17.20                                   |
| 40             | 5200 MHz         | 19.90                           | 17.40                                   |
| 48             | 5240 MHz         | 19.40                           | 17.30                                   |
| 52             | 5260 MHz         | 20.40                           | 17.60                                   |
| 56             | 5280 MHz         | 20.40                           | 17.40                                   |
| 64             | 5320 MHz         | 19.70                           | 17.20                                   |
| 100            | 5500 MHz         | 19.70                           | 17.20                                   |
| 116            | 5580 MHz         | 20.10                           | 17.40                                   |
| 140            | 5700 MHz         | 19.40                           | 17.20                                   |



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

| Channel | Frequency | 26dB Bandwidth<br>(MHz) | 99% Occupied Bandwidth<br>(MHz) |
|---------|-----------|-------------------------|---------------------------------|
| 36      | 5180 MHz  | 24.10                   | 17.40                           |
| 40      | 5200 MHz  | 22.60                   | 17.60                           |
| 48      | 5240 MHz  | 22.50                   | 17.20                           |
| 52      | 5260 MHz  | 32.60                   | 17.60                           |
| 56      | 5280 MHz  | 27.50                   | 17.70                           |
| 64      | 5320 MHz  | 24.70                   | 17.40                           |
| 100     | 5500 MHz  | 20.00                   | 17.30                           |
| 116     | 5580 MHz  | 20.50                   | 17.20                           |
| 140     | 5700 MHz  | 19.20                   | 17.20                           |

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

| Channel | Frequency | 26dB Bandwidth<br>(MHz) | 99% Occupied Bandwidth<br>(MHz) |
|---------|-----------|-------------------------|---------------------------------|
| 36      | 5180 MHz  | 19.80                   | 18.00                           |
| 40      | 5200 MHz  | 20.20                   | 18.10                           |
| 48      | 5240 MHz  | 20.10                   | 18.00                           |
| 52      | 5260 MHz  | 28.60                   | 18.40                           |
| 56      | 5280 MHz  | 27.30                   | 18.10                           |
| 64      | 5320 MHz  | 25.00                   | 18.50                           |
| 100     | 5500 MHz  | 30.90                   | 18.10                           |
| 116     | 5580 MHz  | 19.90                   | 18.10                           |
| 140     | 5700 MHz  | 29.10                   | 18.10                           |



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

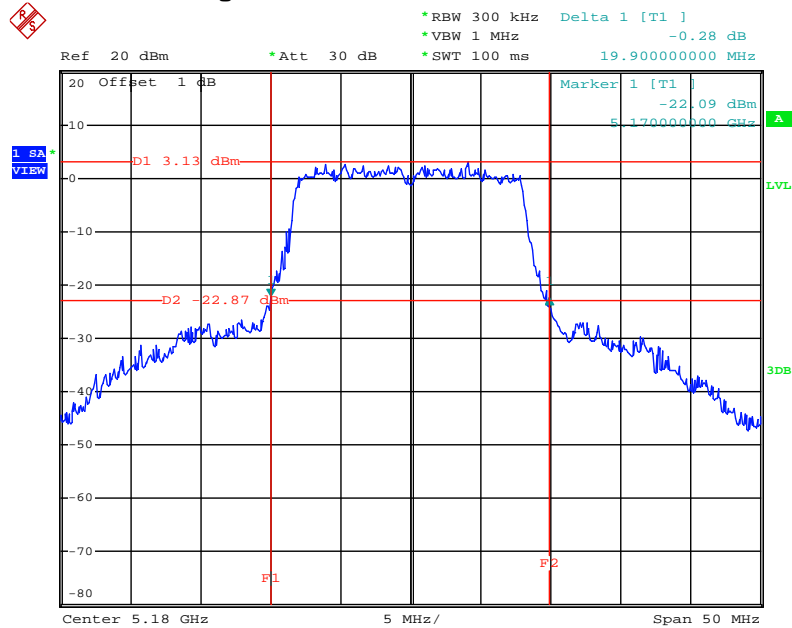
| Channel | Frequency | 26dB Bandwidth<br>(MHz) | 99% Occupied Bandwidth<br>(MHz) |
|---------|-----------|-------------------------|---------------------------------|
| 38      | 5190 MHz  | 40.20                   | 36.40                           |
| 46      | 5230 MHz  | 41.60                   | 36.40                           |
| 54      | 5270 MHz  | 52.80                   | 36.80                           |
| 62      | 5310 MHz  | 55.00                   | 36.40                           |
| 102     | 5510 MHz  | 48.00                   | 36.80                           |
| 110     | 5550 MHz  | 65.00                   | 36.60                           |
| 134     | 5670 MHz  | 41.60                   | 36.40                           |

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

| Channel | Frequency | 26dB Bandwidth<br>(MHz) | 99% Occupied Bandwidth<br>(MHz) |
|---------|-----------|-------------------------|---------------------------------|
| 38      | 5190 MHz  | 54.00                   | 36.40                           |
| 46      | 5230 MHz  | 40.60                   | 36.40                           |
| 54      | 5270 MHz  | 63.20                   | 36.40                           |
| 62      | 5310 MHz  | 49.00                   | 36.40                           |
| 102     | 5510 MHz  | 53.00                   | 36.40                           |
| 110     | 5550 MHz  | 53.00                   | 36.80                           |
| 134     | 5670 MHz  | 47.00                   | 36.40                           |

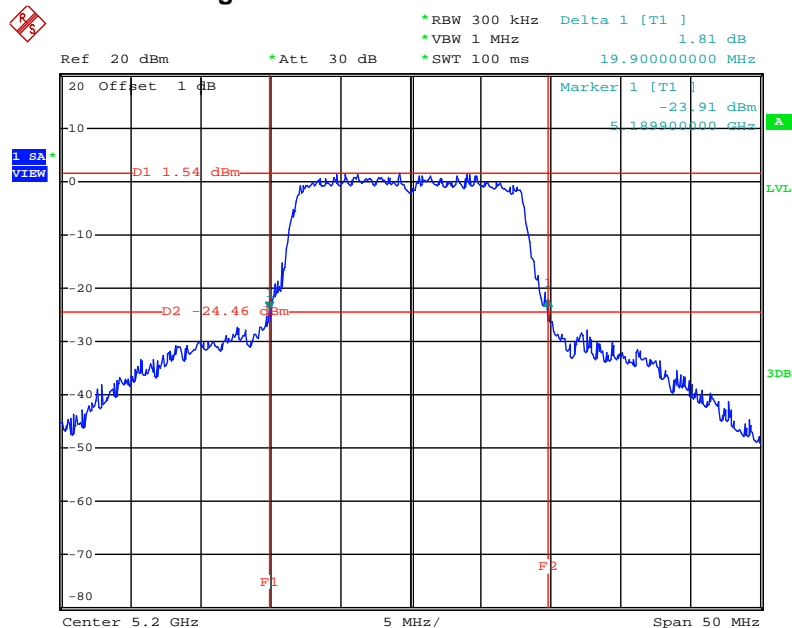


For Single Chain:  
26 dB Bandwidth Plot on Configuration IEEE 802.11a 5180 MHz Port 2



Date: 26.APR.2012 09:06:54

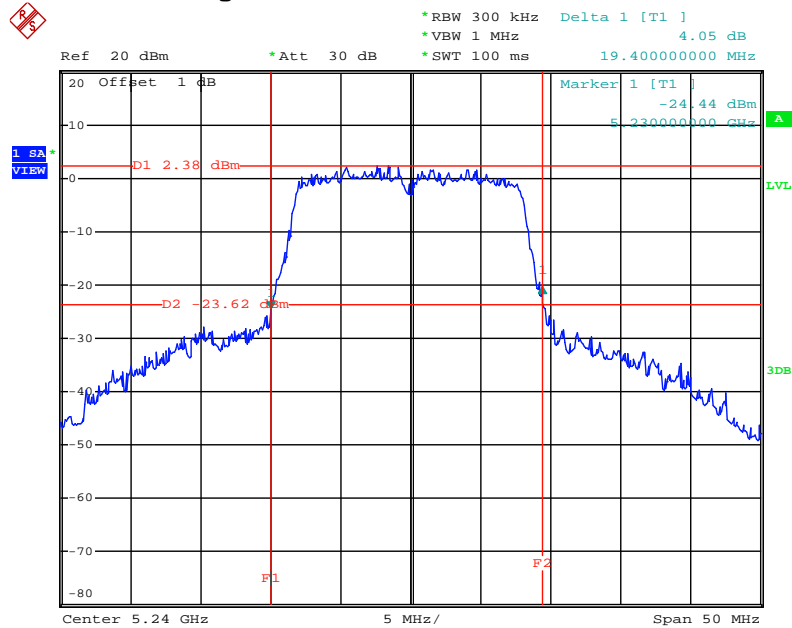
26 dB Bandwidth Plot on Configuration IEEE 802.11a 5200 MHz Port 2



Date: 26.APR.2012 09:12:07

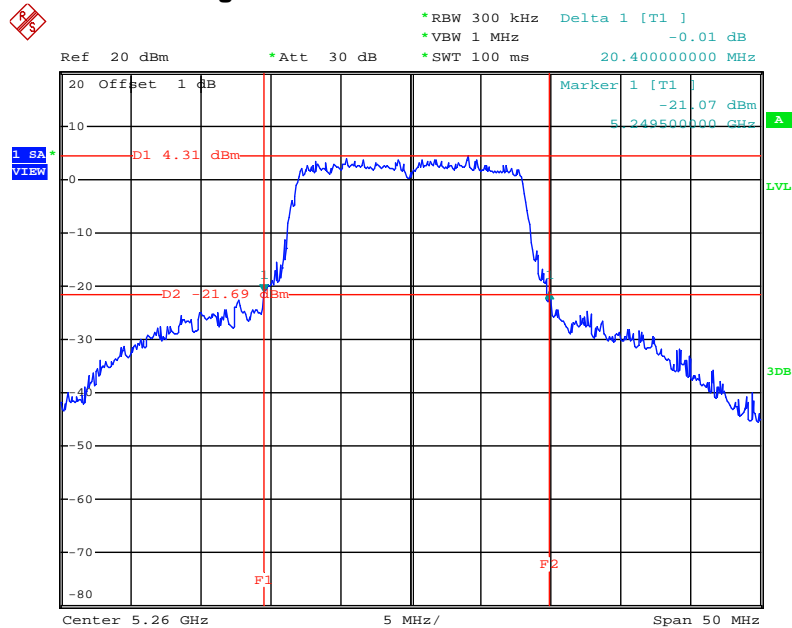


## 26 dB Bandwidth Plot on Configuration IEEE 802.11a 5240 MHz Port 2



Date: 26.APR.2012 09:15:01

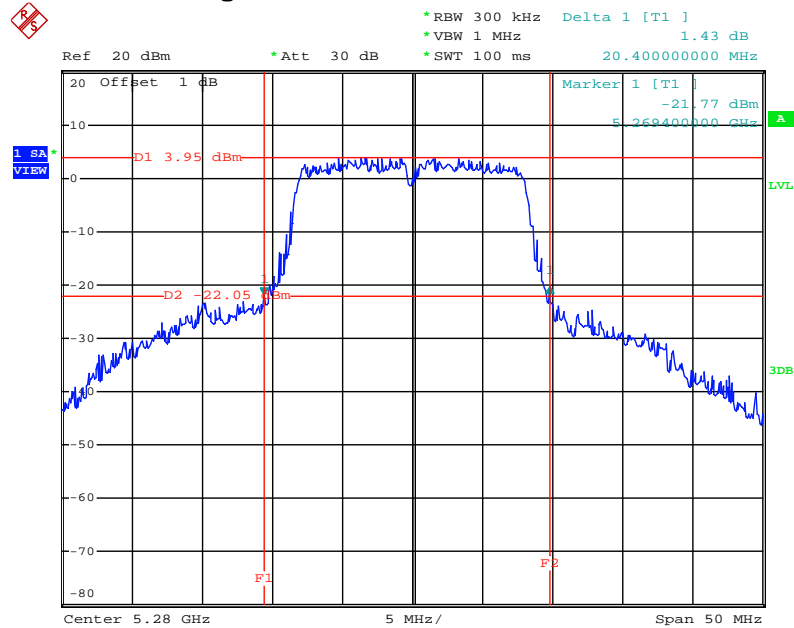
## 26 dB Bandwidth Plot on Configuration IEEE 802.11a 5260 MHz Port 2



Date: 26.APR.2012 09:22:50

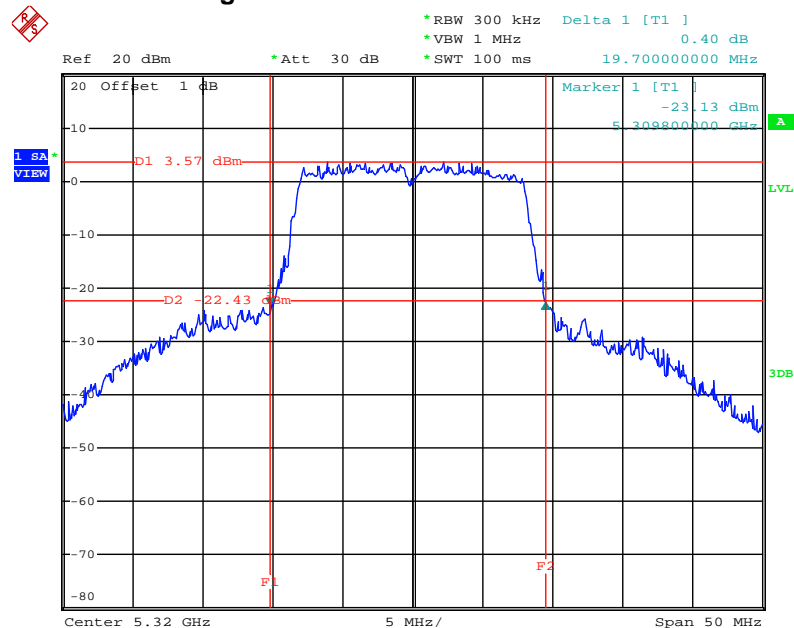


## 26 dB Bandwidth Plot on Configuration IEEE 802.11a 5280 MHz Port 2



Date: 26.APR.2012 09:26:26

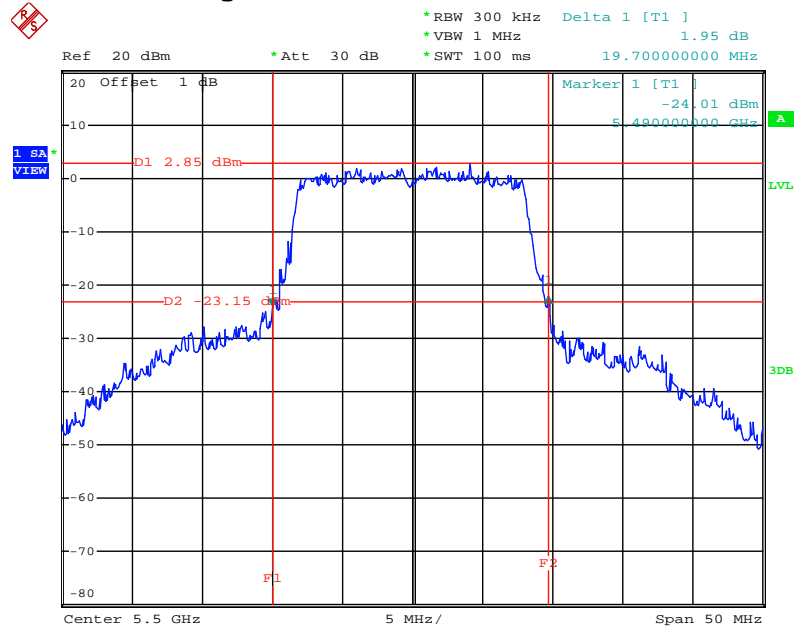
## 26 dB Bandwidth Plot on Configuration IEEE 802.11a 5320 MHz Port 2



Date: 26.APR.2012 09:30:49

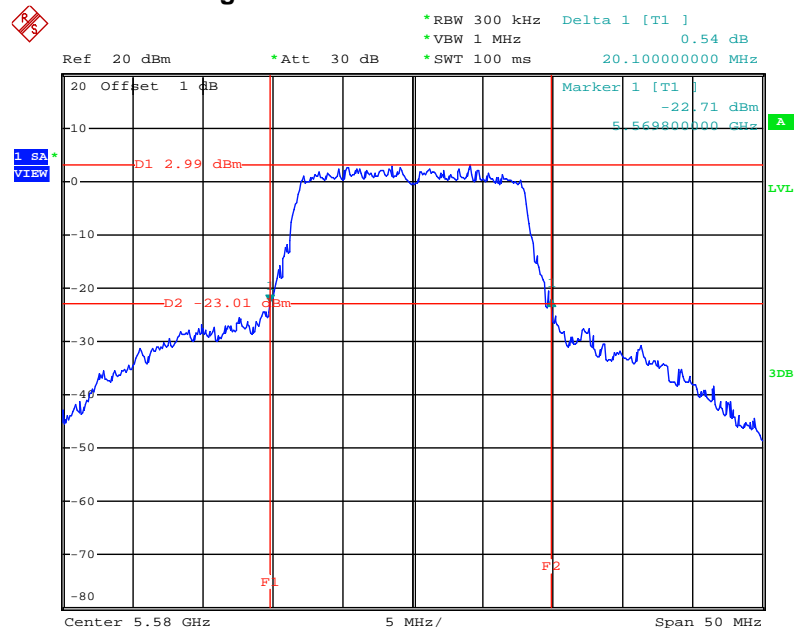


## 26 dB Bandwidth Plot on Configuration IEEE 802.11a 5500 MHz Port 2



Date: 26.APR.2012 09:32:29

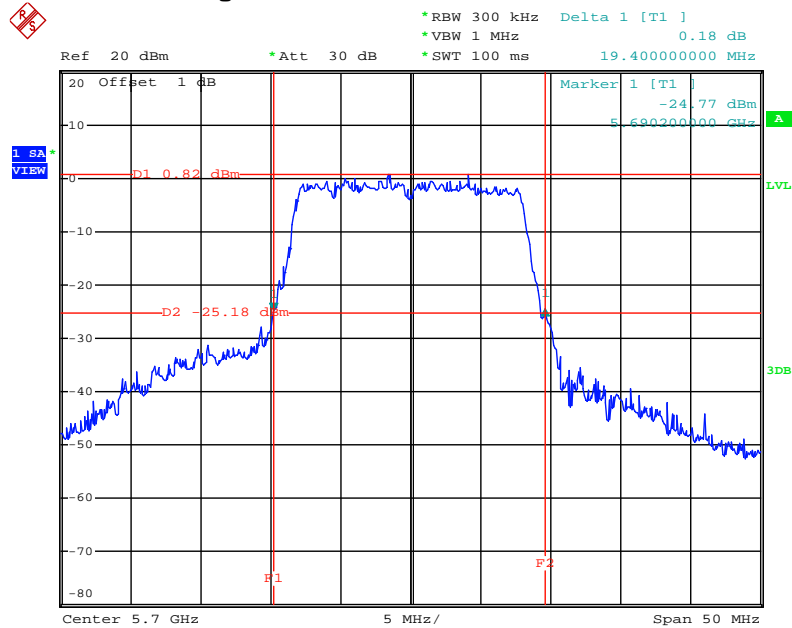
## 26 dB Bandwidth Plot on Configuration IEEE 802.11a 5580 MHz Port 2



Date: 26.APR.2012 09:40:43



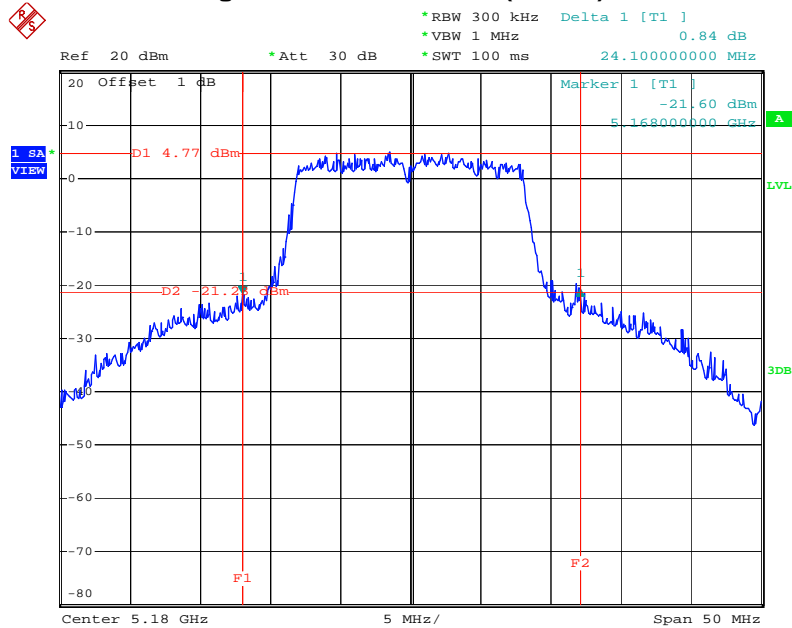
26 dB Bandwidth Plot on Configuration IEEE 802.11a 5700 MHz Port 2



Date: 26.APR.2012 09:42:19

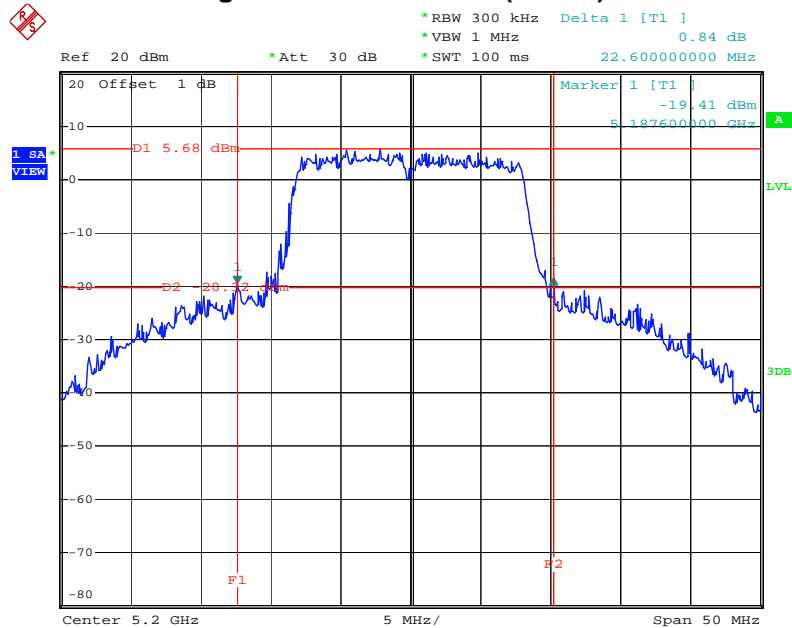


For Two Chains:  
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 1



Date: 26.APR.2012 16:38:09

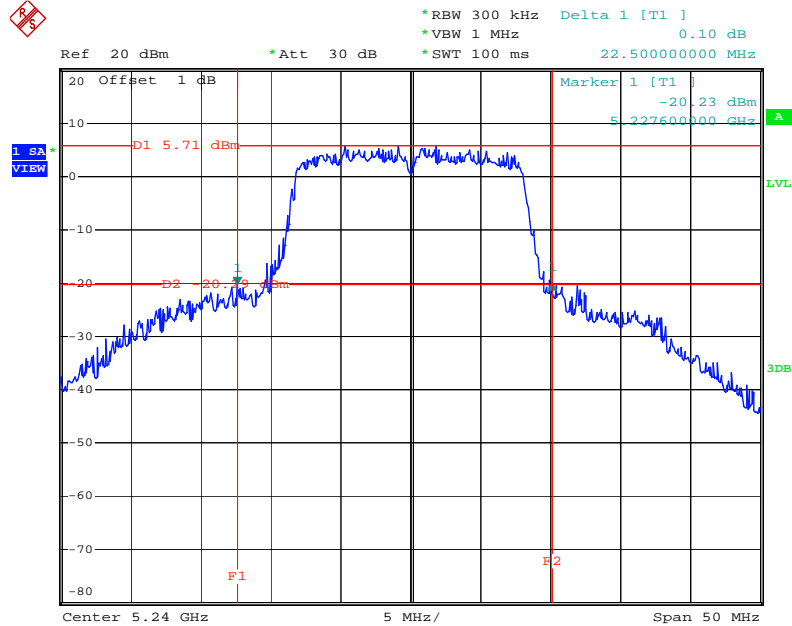
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 1



Date: 26.APR.2012 16:41:44

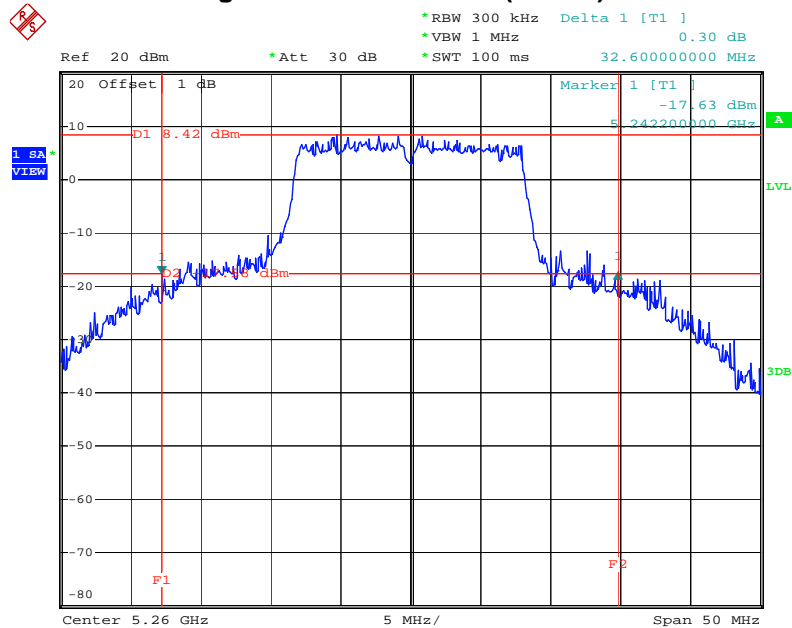


26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 1



Date: 26.APR.2012 17:04:48

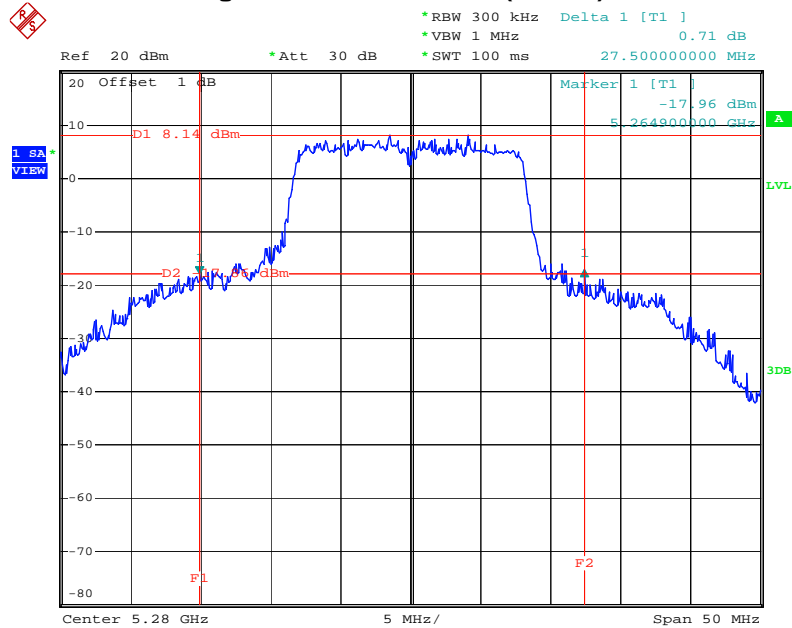
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 1



Date: 26.APR.2012 17:06:32

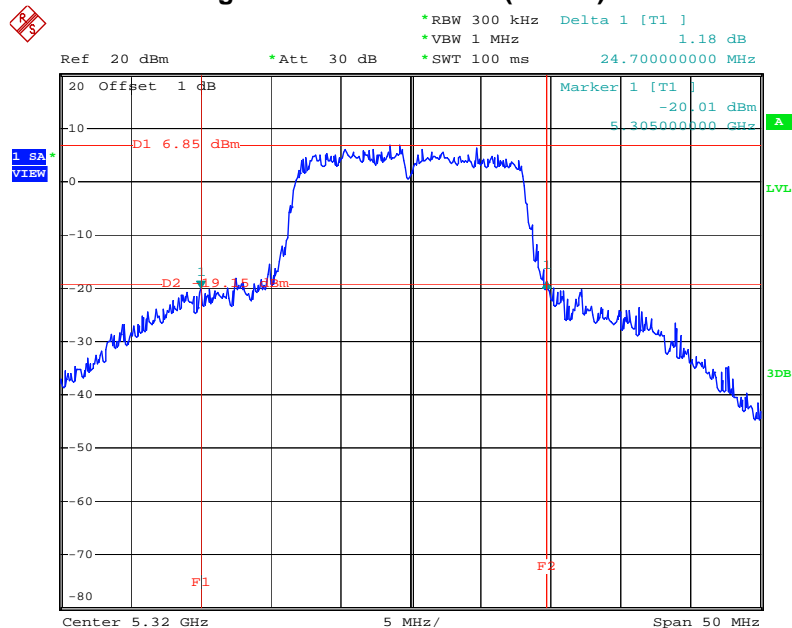


## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 1



Date: 26.APR.2012 17:09:12

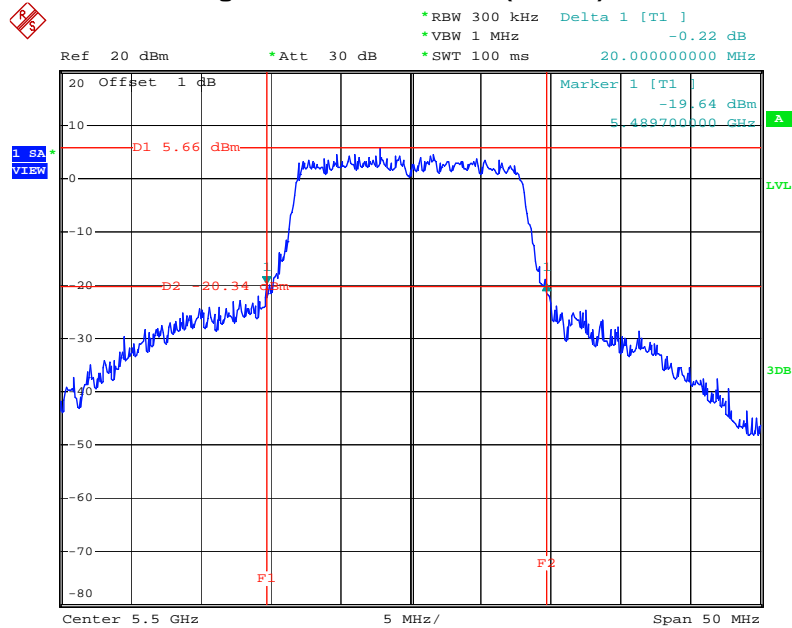
## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 1



Date: 26.APR.2012 17:10:31

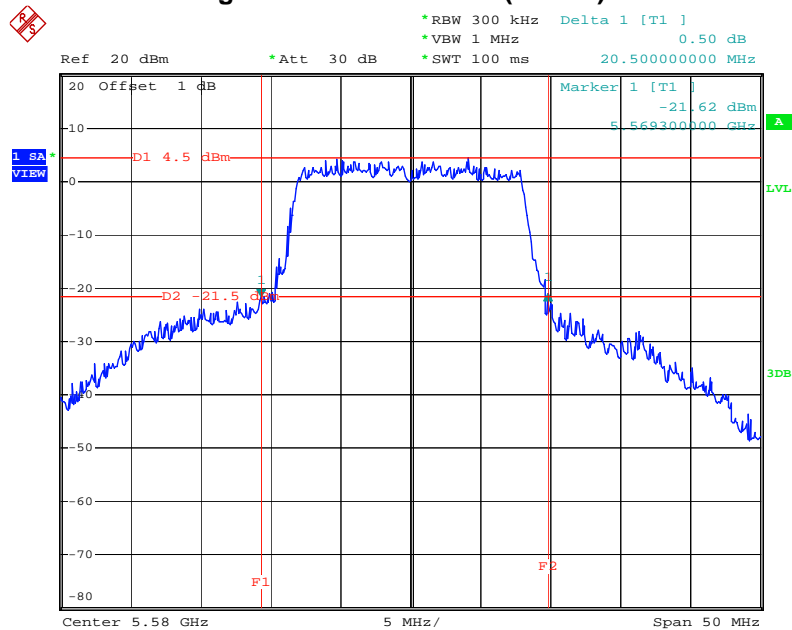


26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 1



Date: 26.APR.2012 17:13:00

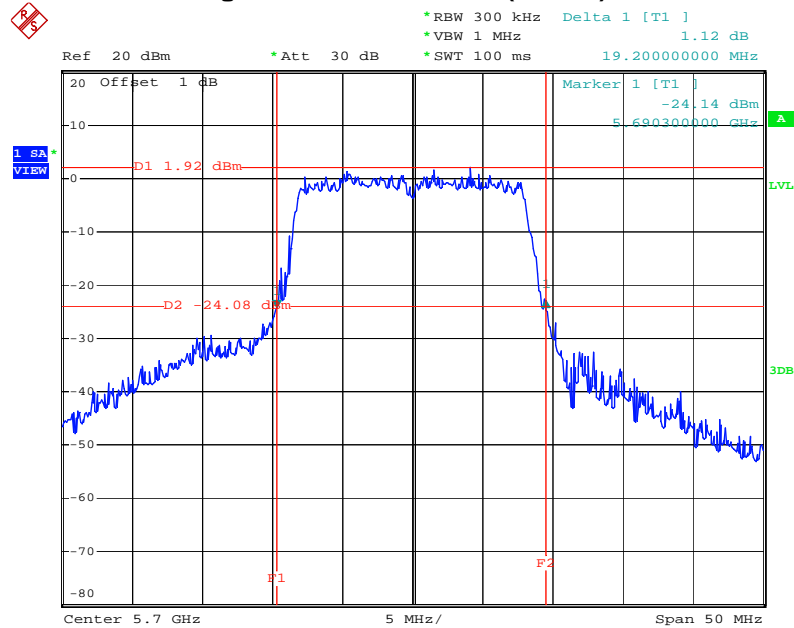
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 1



Date: 26.APR.2012 17:14:22



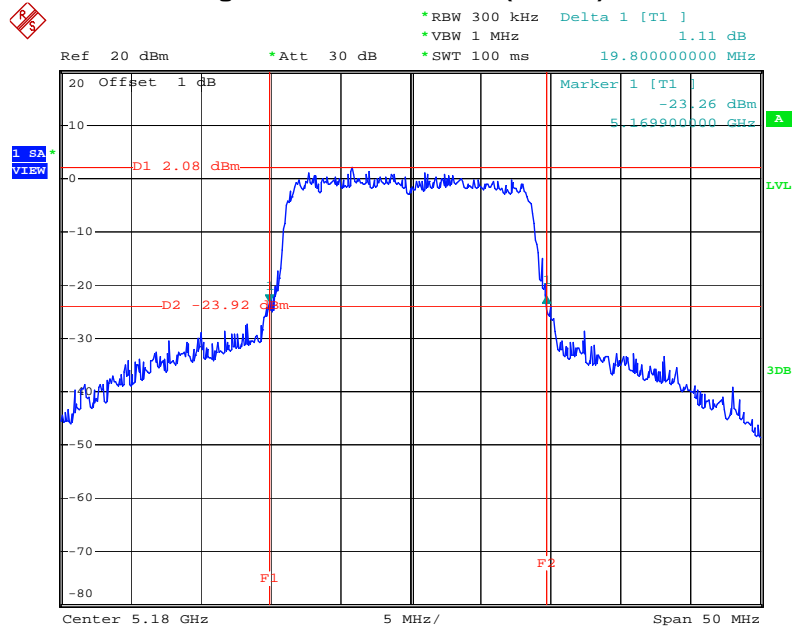
## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 1



Date: 26.APR.2012 17:16:32

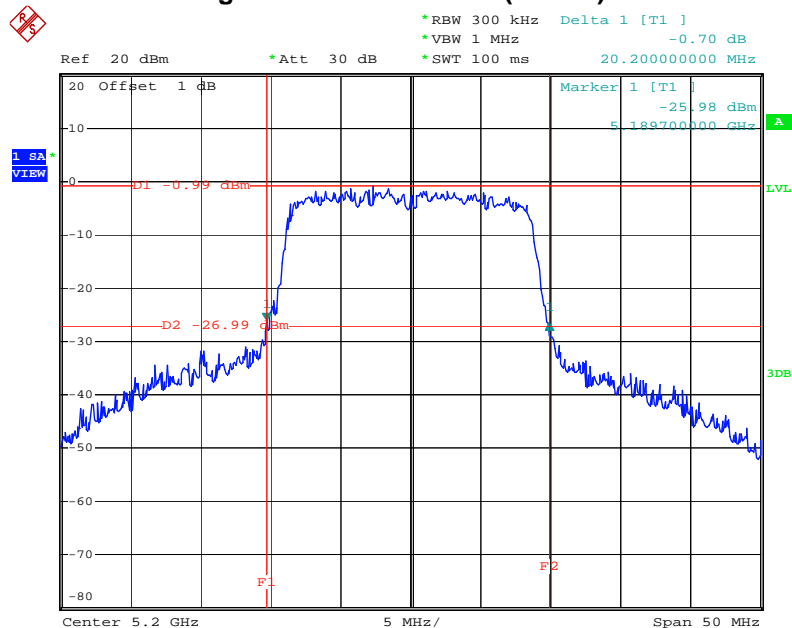


## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



Date: 26.APR.2012 17:46:31

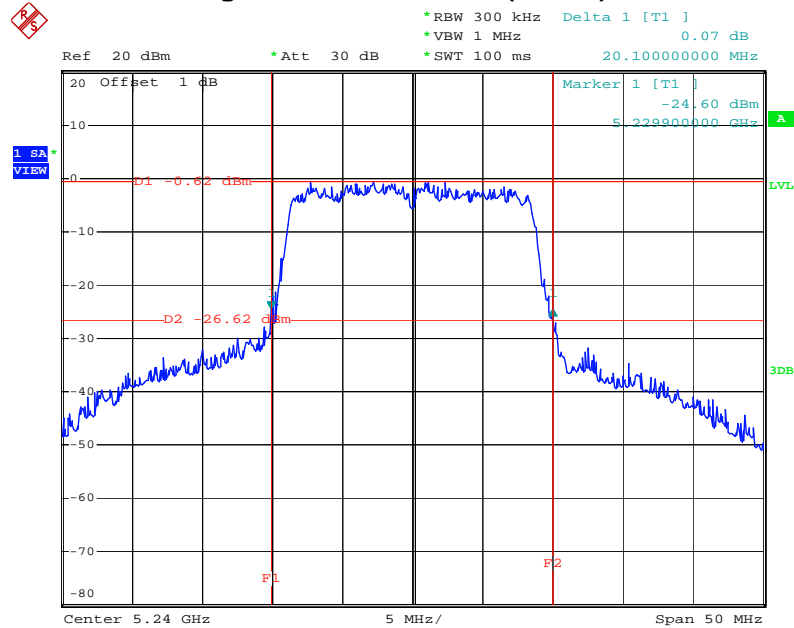
## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



Date: 26.APR.2012 17:49:35

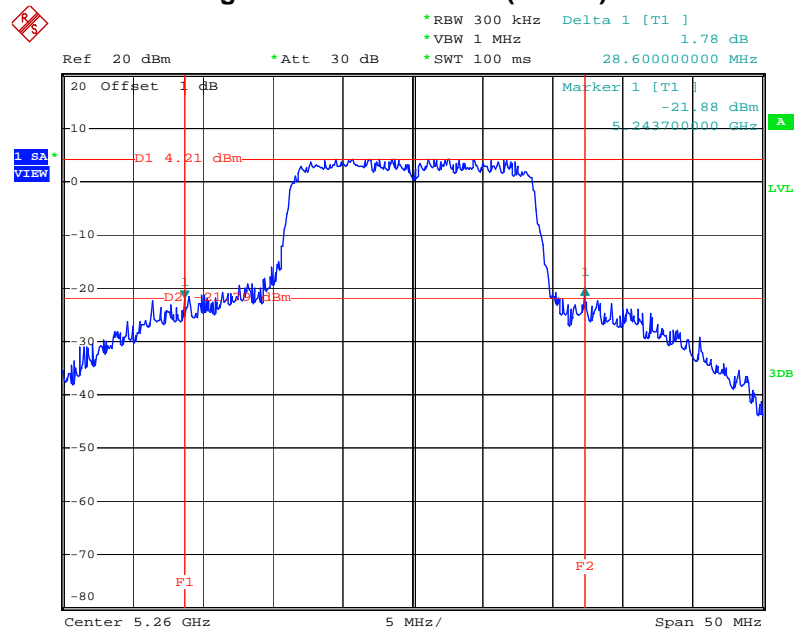


## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



Date: 26.APR.2012 17:51:02

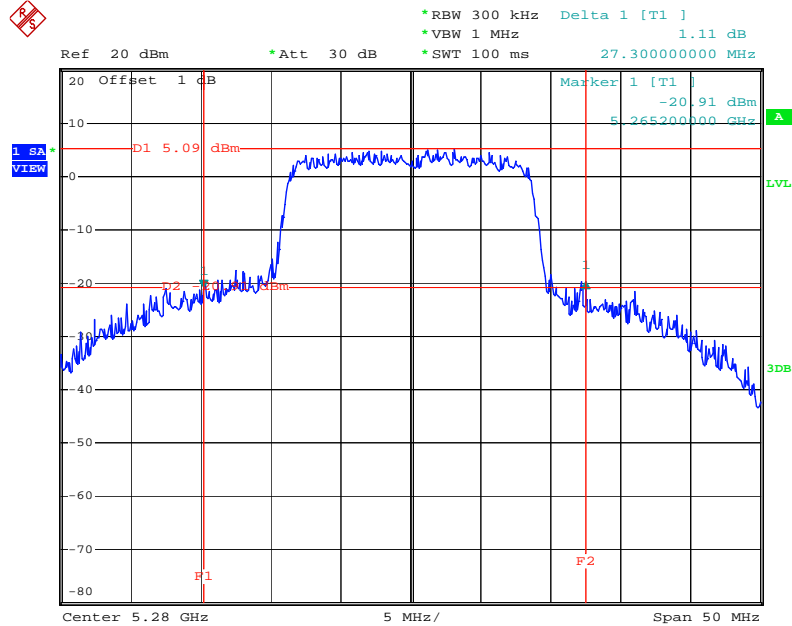
## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 2



Date: 26.APR.2012 17:53:56

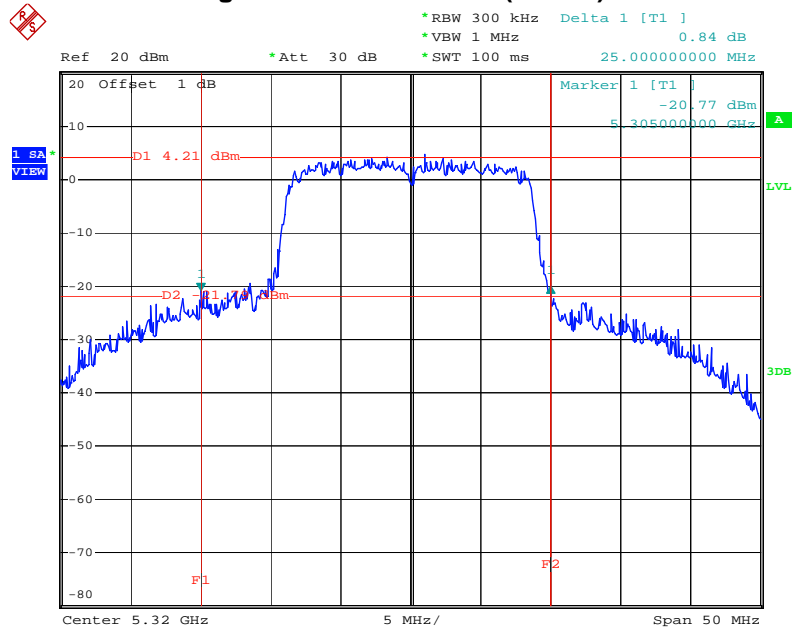


26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 2



Date: 26.APR.2012 17:55:17

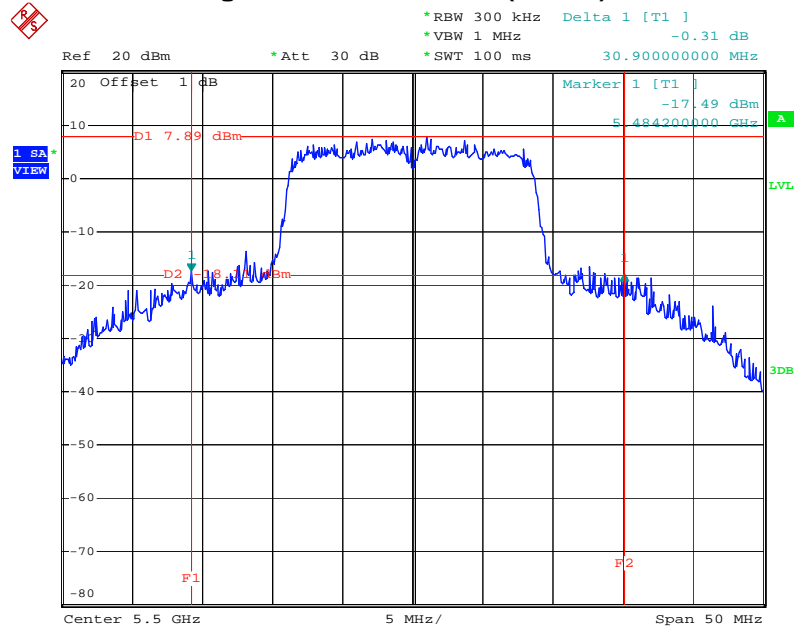
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 2



Date: 26.APR.2012 18:03:18

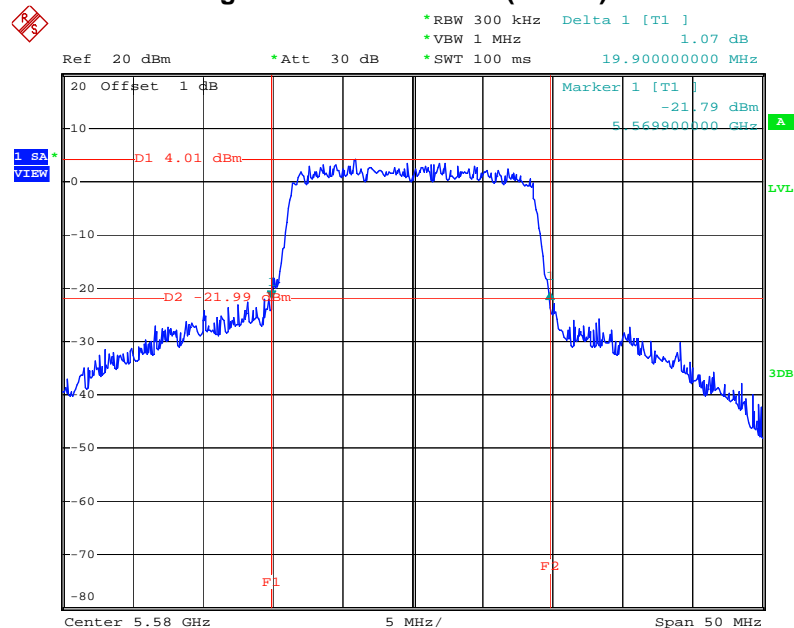


26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 2



Date: 26.APR.2012 18:05:12

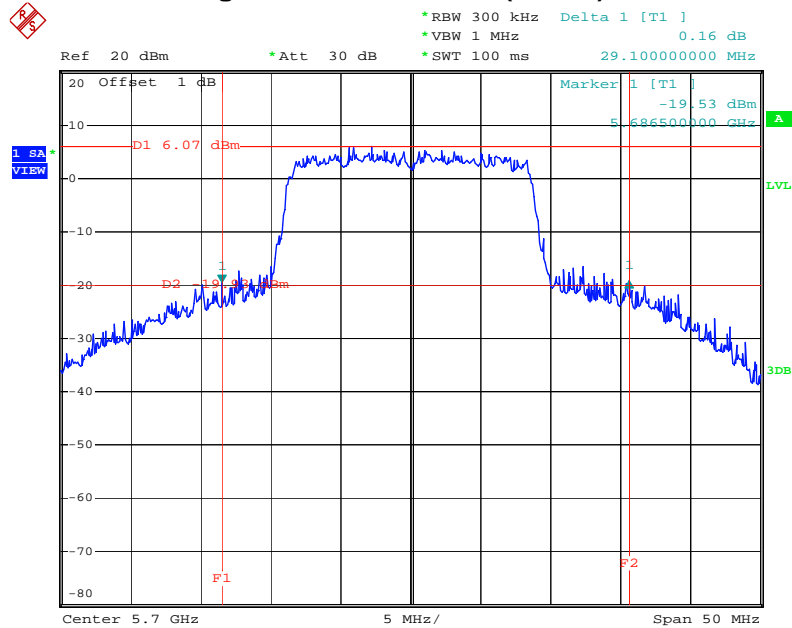
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 2



Date: 26.APR.2012 18:07:56



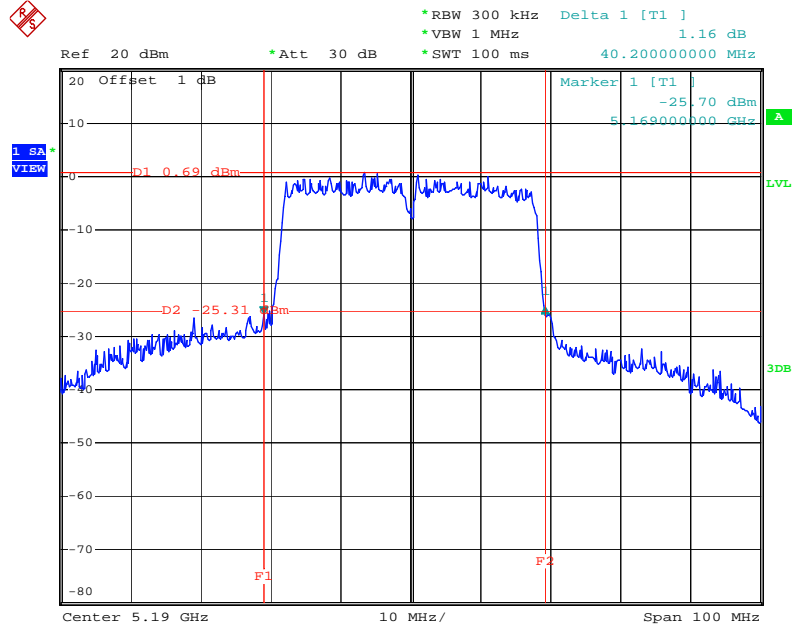
26 dB Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 2



Date: 26.APR.2012 18:10:02

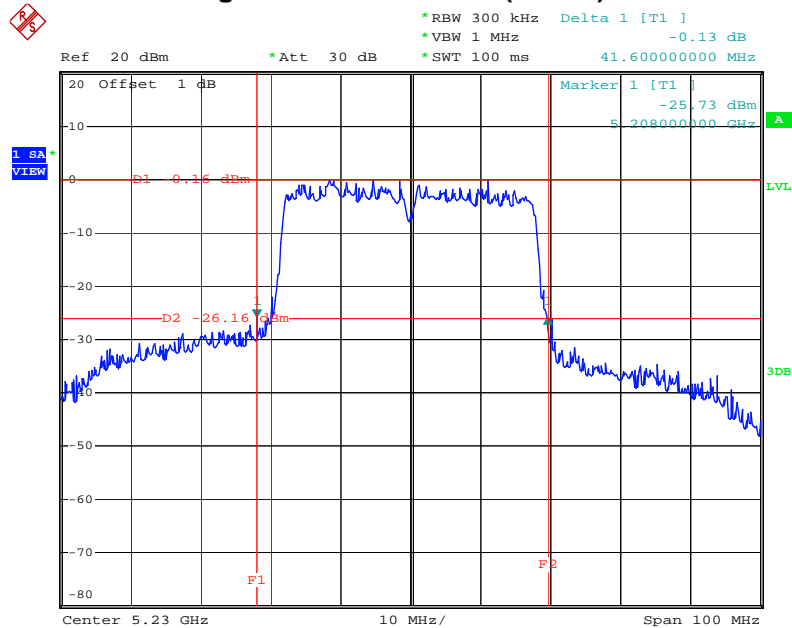


26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 1



Date: 26.APR.2012 19:27:12

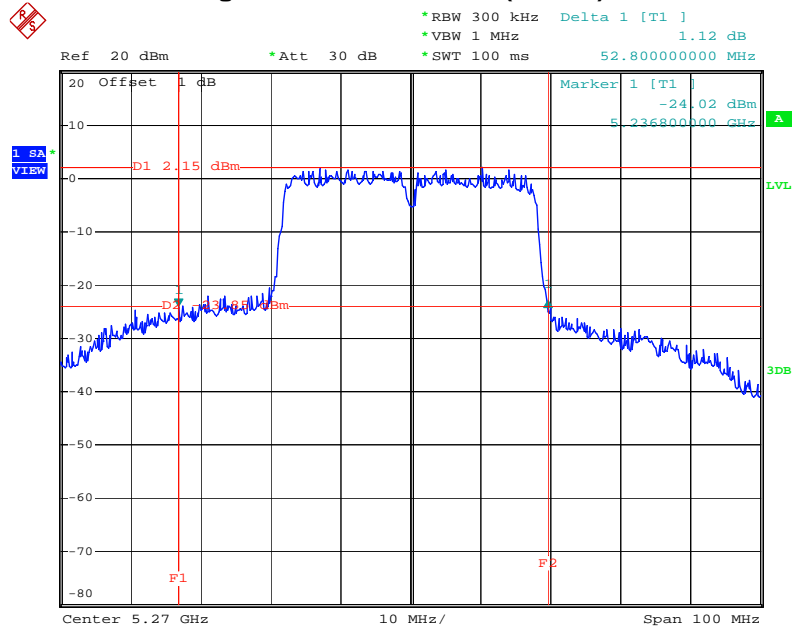
26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 1



Date: 26.APR.2012 19:28:34

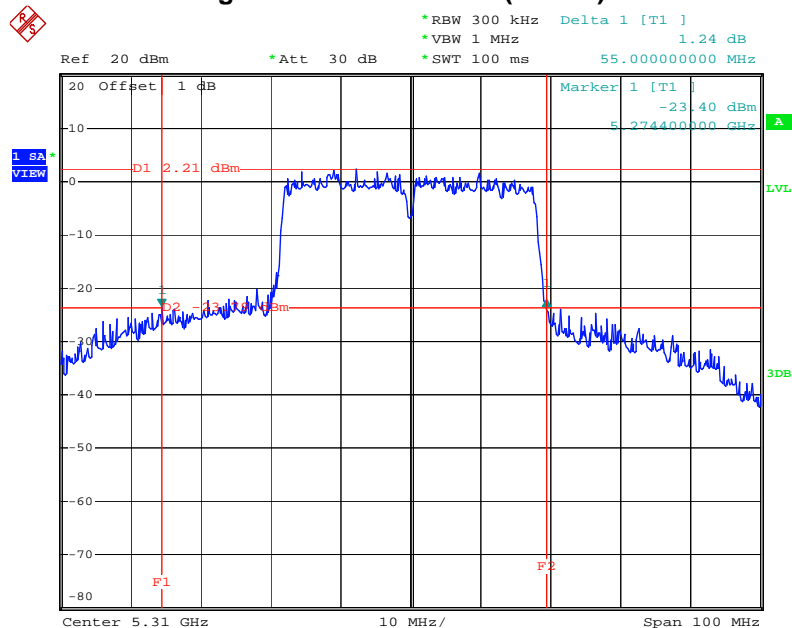


## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 1



Date: 26.APR.2012 19:35:37

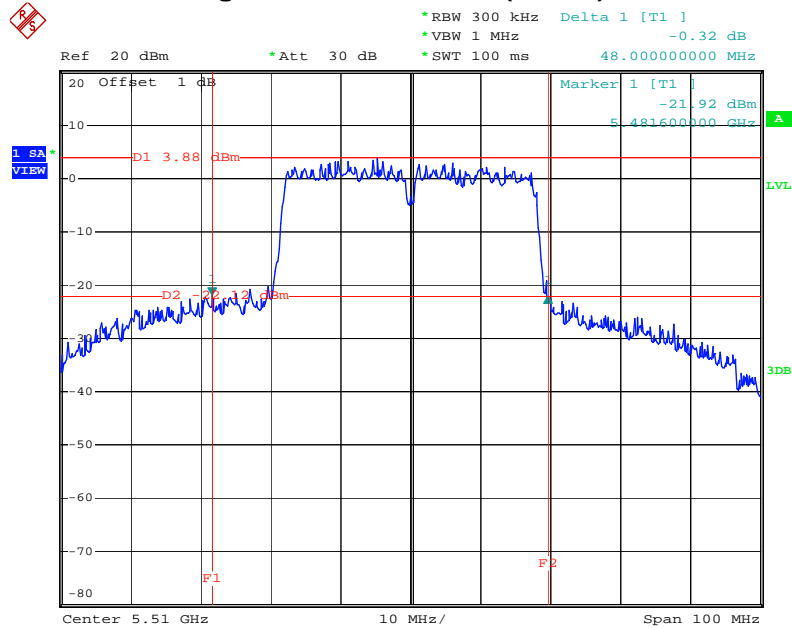
## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 1



Date: 26.APR.2012 19:37:13

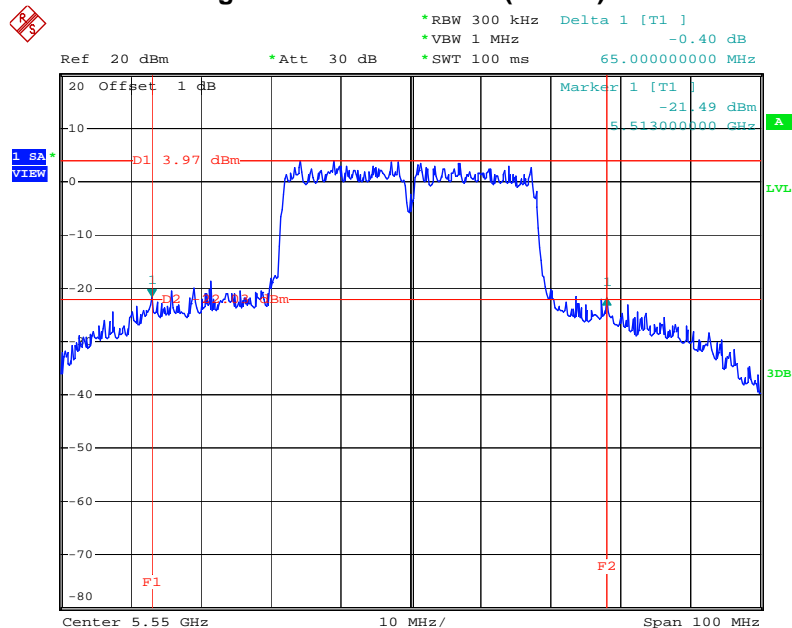


## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 1



Date: 26.APR.2012 19:39:59

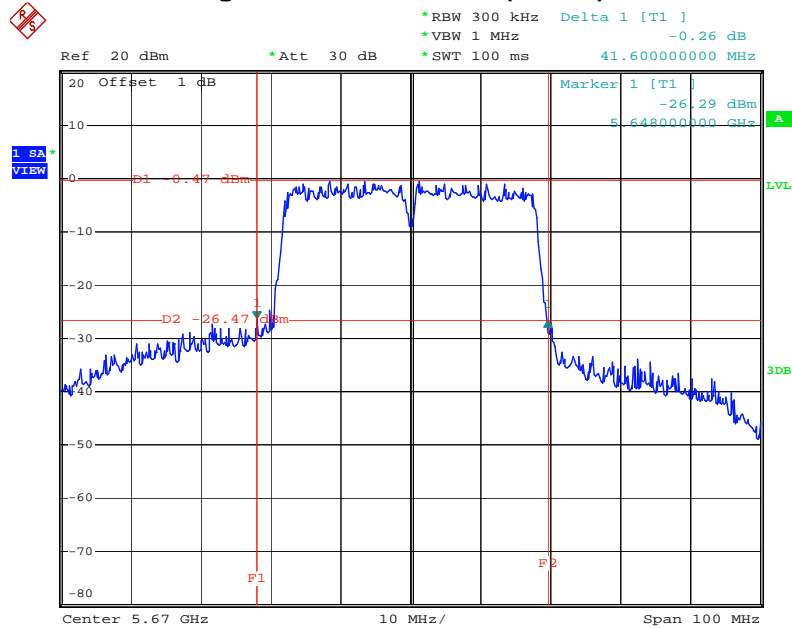
## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 1



Date: 26.APR.2012 19:41:31



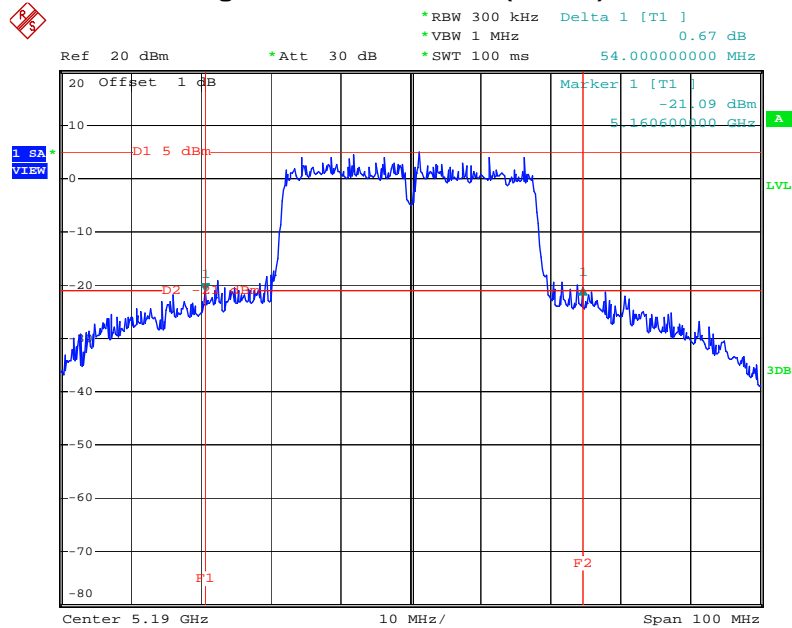
## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 1



Date: 26.APR.2012 19:43:38

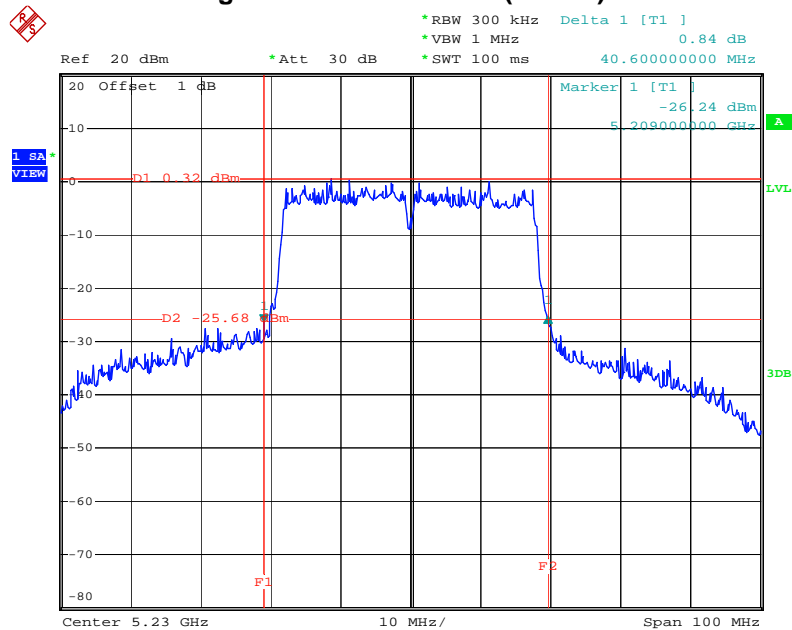


26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2



Date: 26.APR.2012 19:50:41

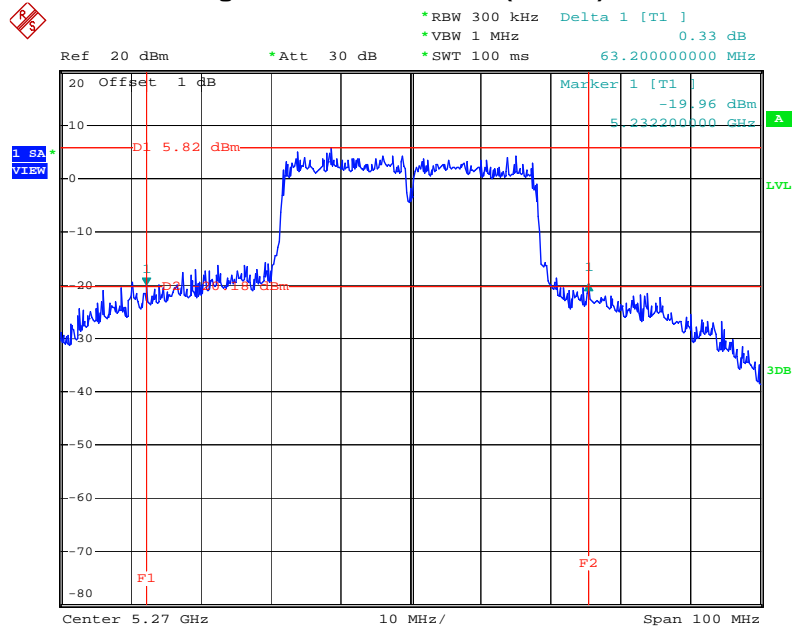
26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



Date: 26.APR.2012 19:53:02

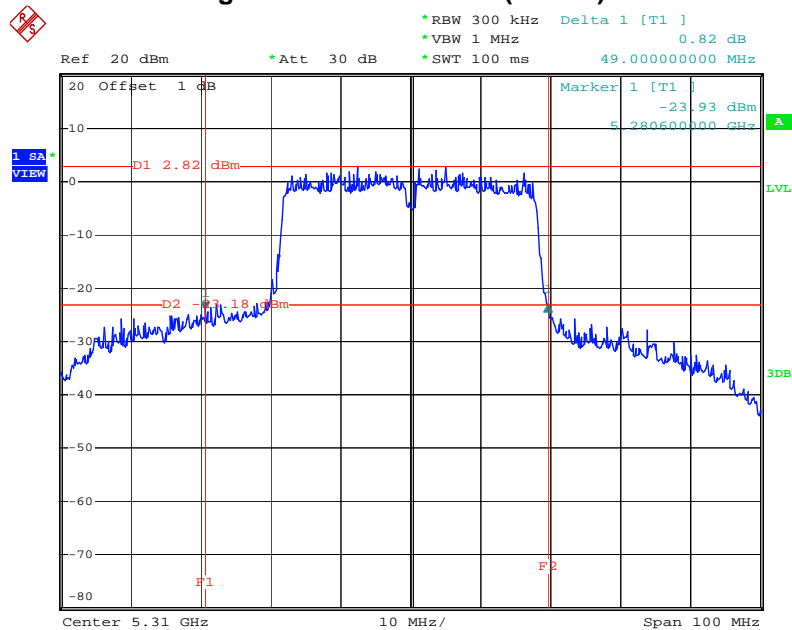


26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 2



Date: 26.APR.2012 19:54:21

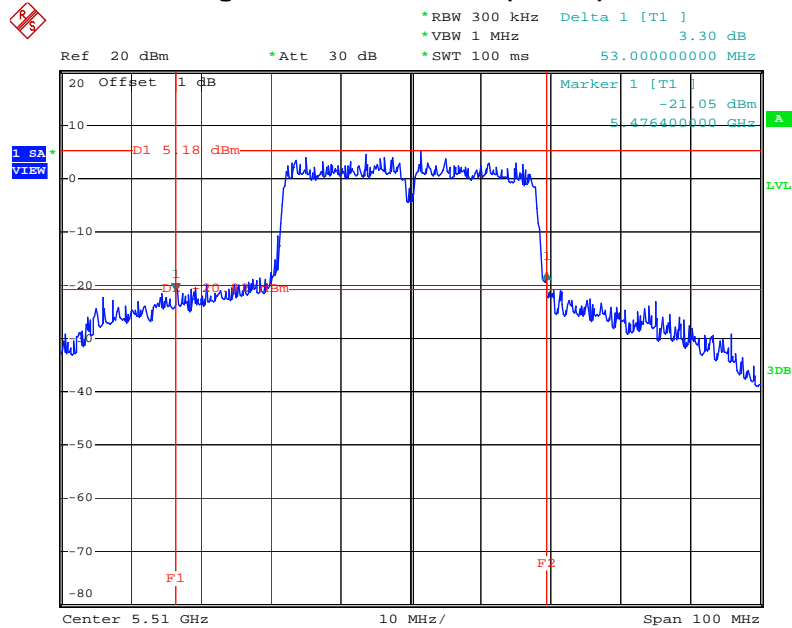
26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 2



Date: 26.APR.2012 19:56:43

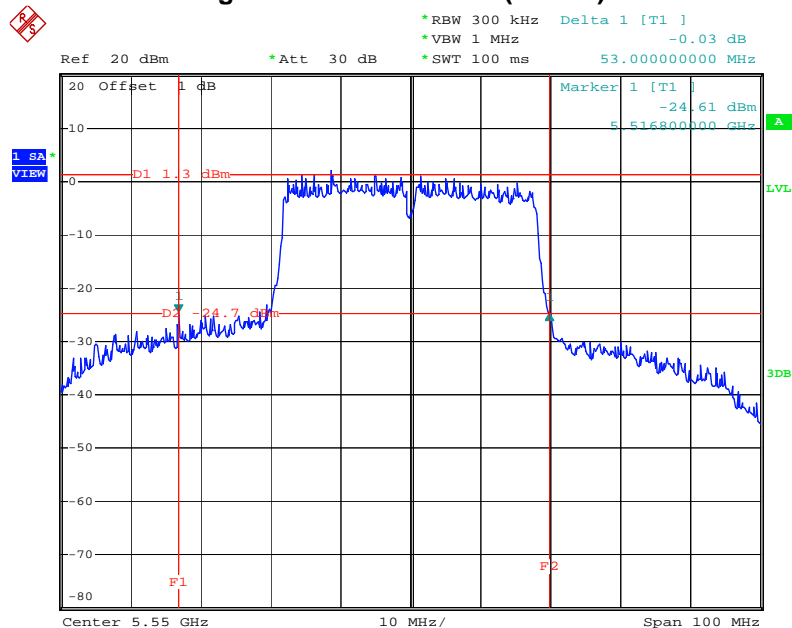


## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 2



Date: 26.APR.2012 19:58:04

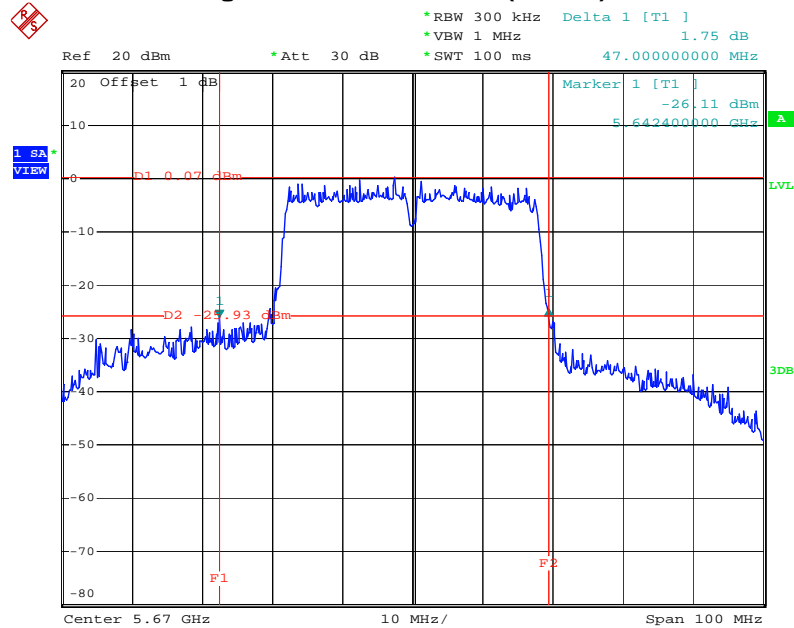
## 26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 2



Date: 26.APR.2012 20:00:08



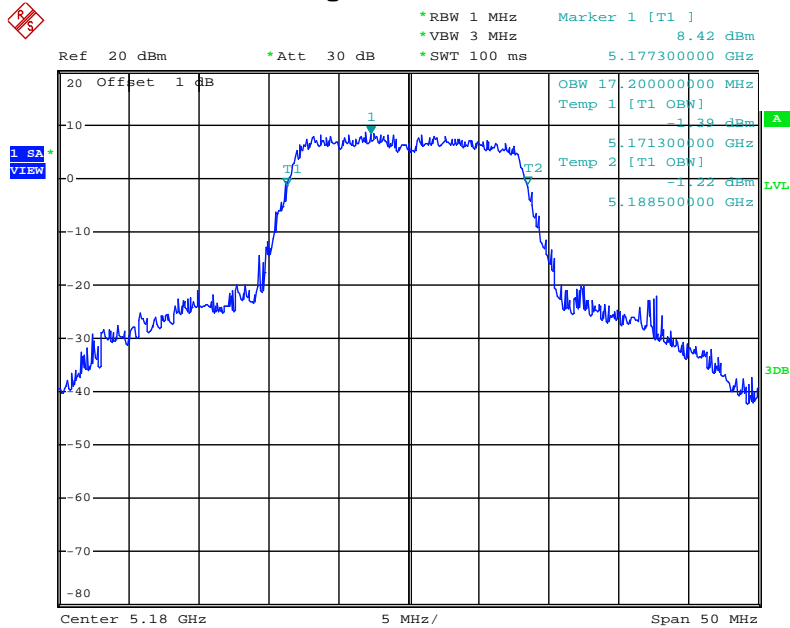
26 dB Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 2



Date: 26.APR.2012 20:01:27

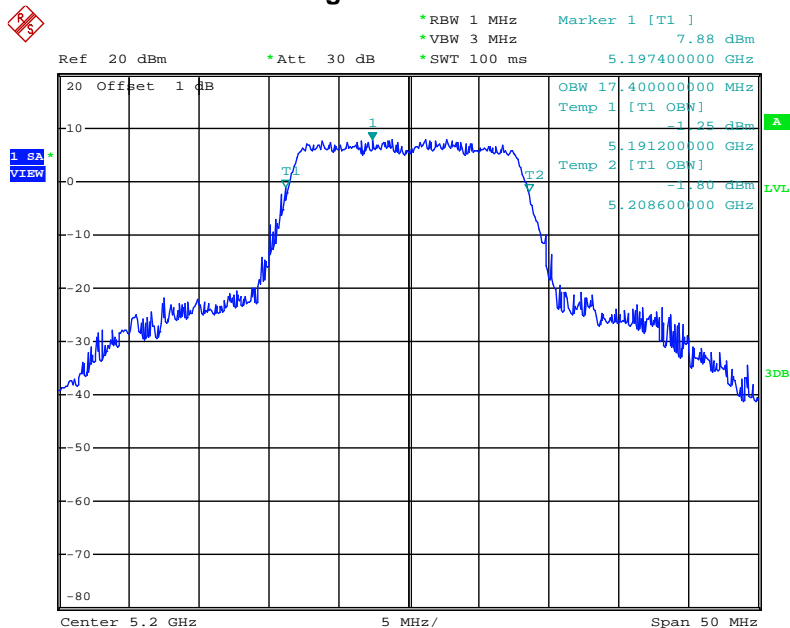


For Single Chain:  
99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5180 MHz Port 2



Date: 26.APR.2012 09:08:07

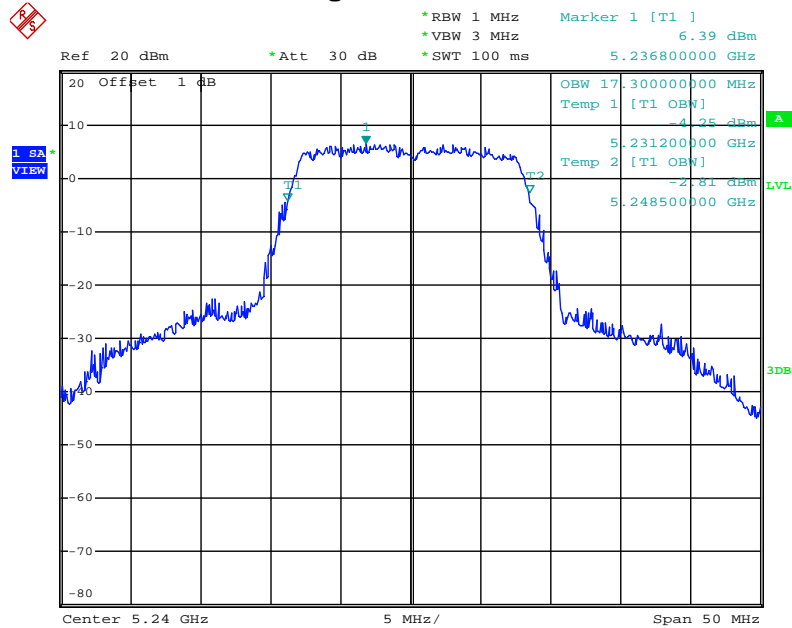
99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5200 MHz Port 2



Date: 26.APR.2012 09:09:59

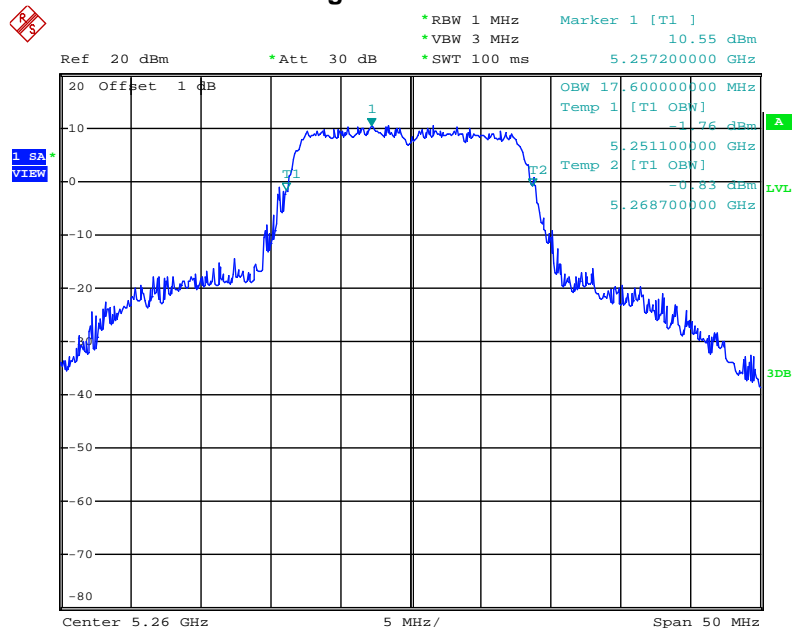


## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5240 MHz Port 2



Date: 26.APR.2012 09:16:33

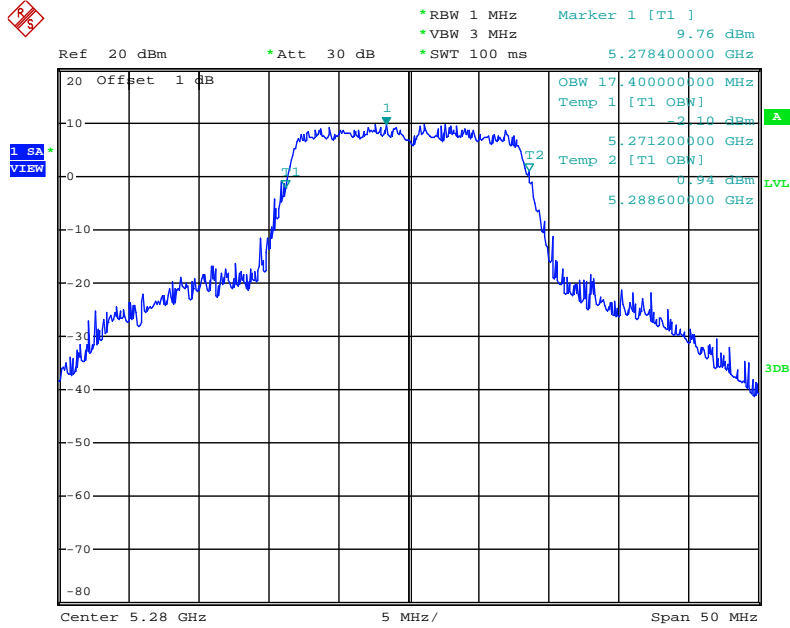
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5260 MHz Port 2



Date: 26.APR.2012 09:18:48

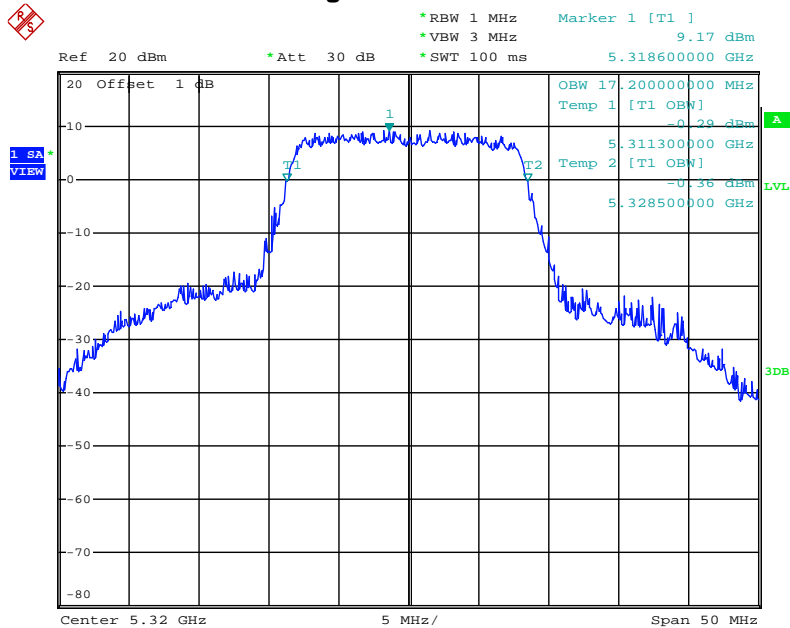


99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5280 MHz Port 2



Date: 26.APR.2012 09:27:36

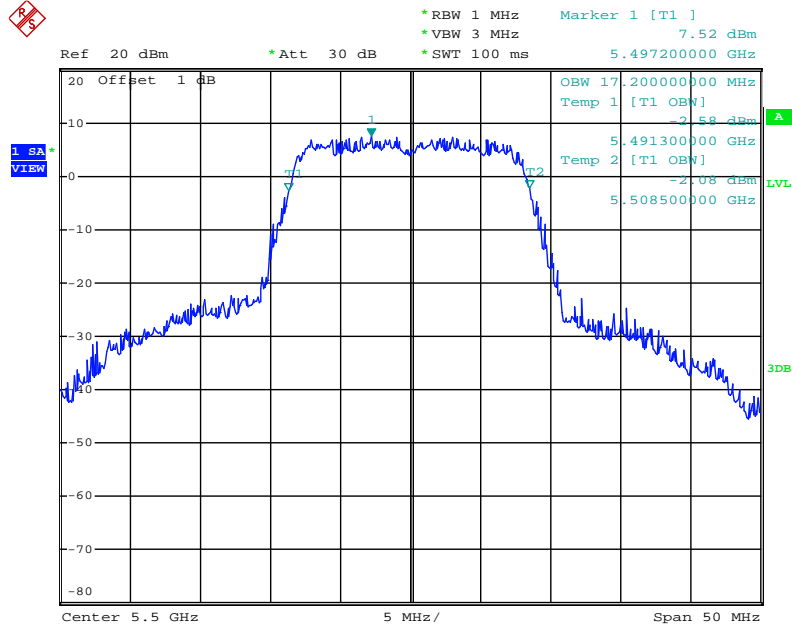
99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5320 MHz Port 2



Date: 26.APR.2012 09:29:03

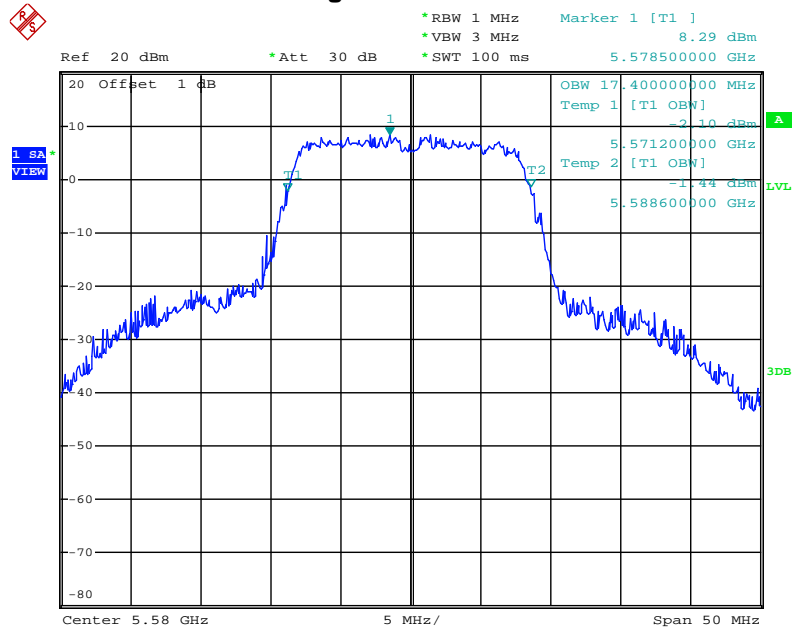


99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5500 MHz Port 2



Date: 26.APR.2012 09:33:17

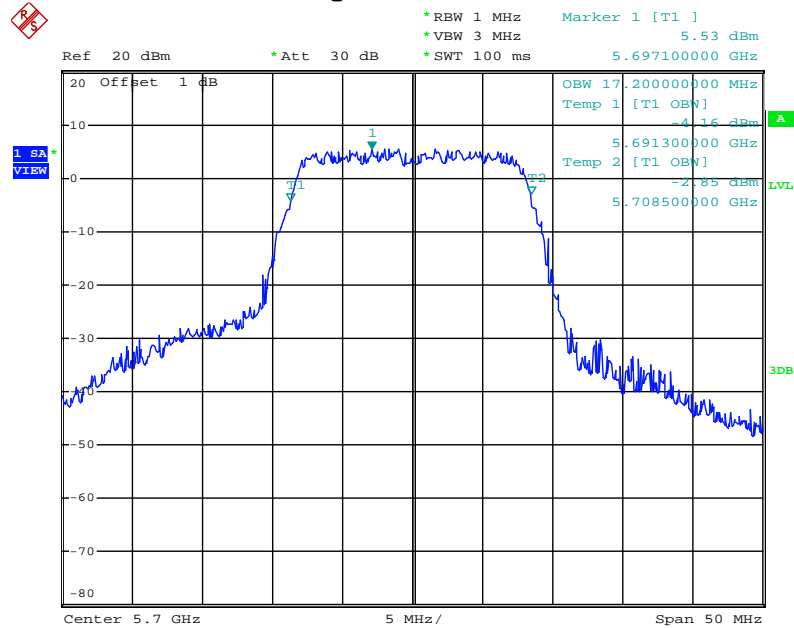
99% Occupied Bandwidth Plot on Configuration IEEE 802.11a 5580 MHz Port 2



Date: 26.APR.2012 09:35:21



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

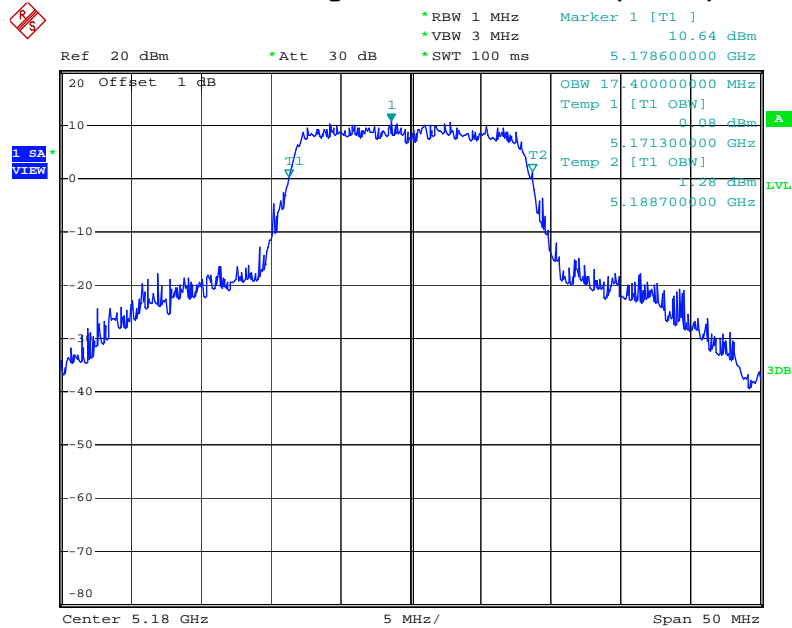


Date: 26.APR.2012 09:43:16



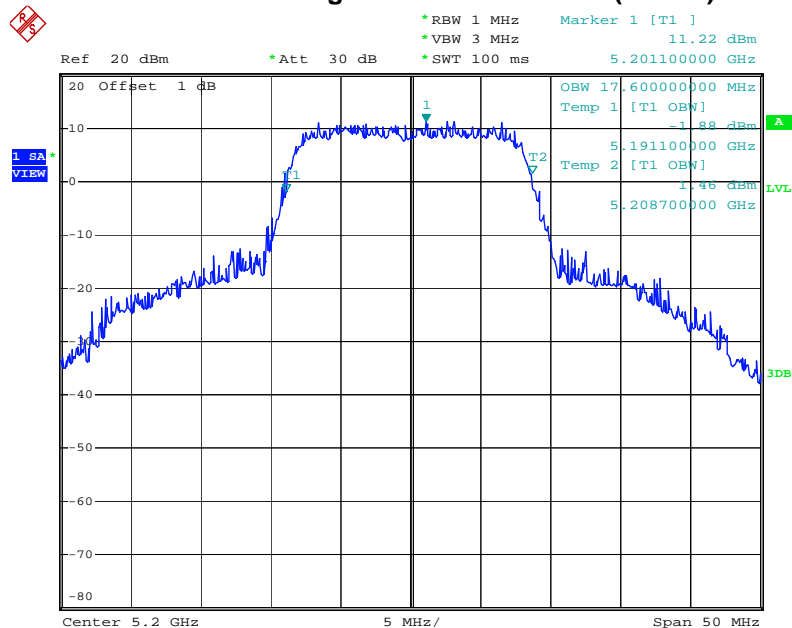
For Two Chains:

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



Date: 26.APR.2012 16:38:54

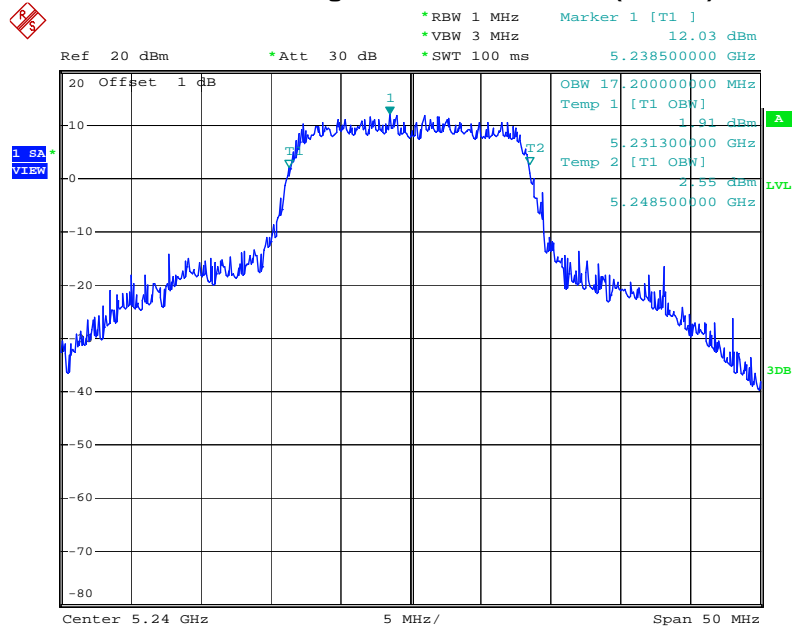
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 1



Date: 26.APR.2012 16:40:34

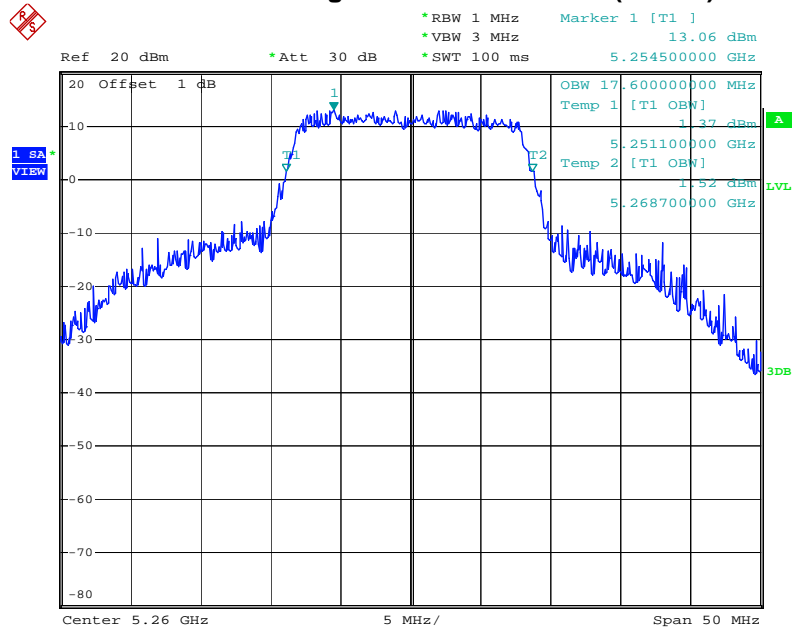


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 1



Date: 26.APR.2012 17:03:41

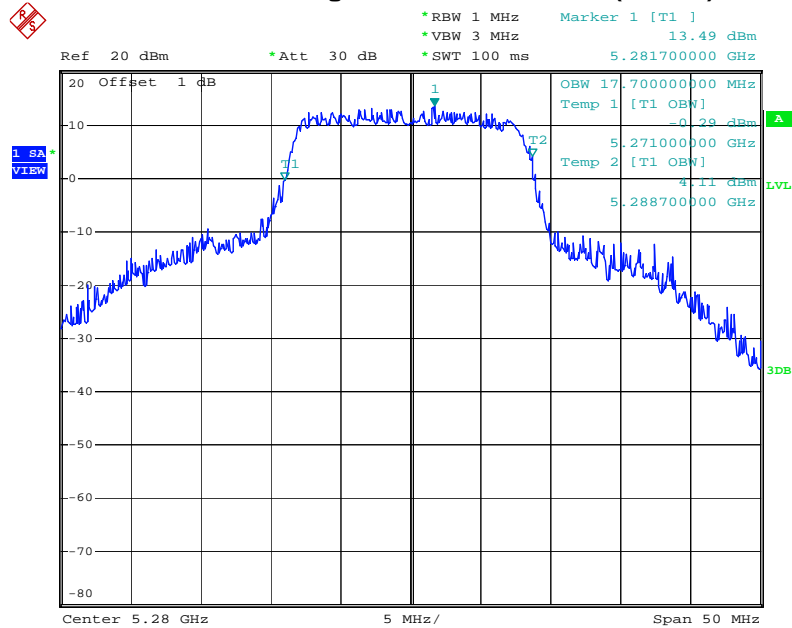
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 1



Date: 26.APR.2012 17:07:04

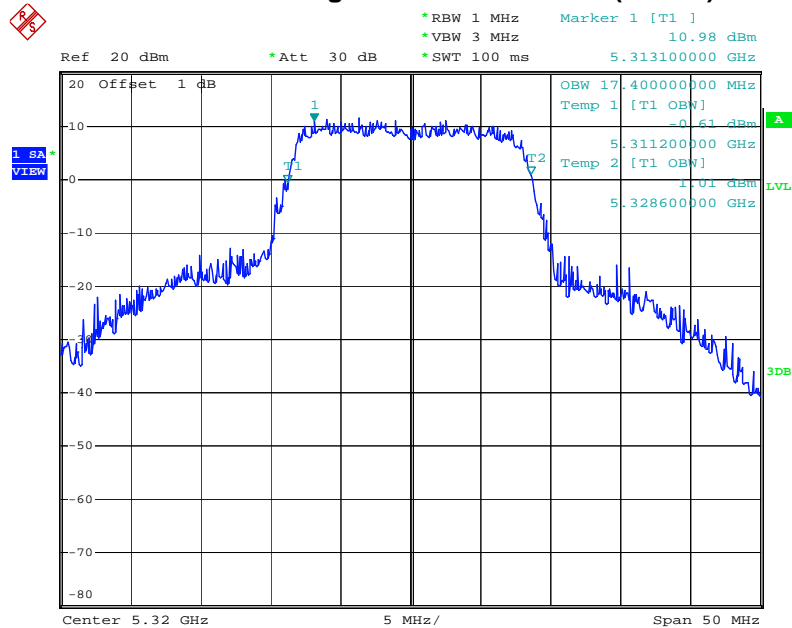


## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 1



Date: 26.APR.2012 17:07:51

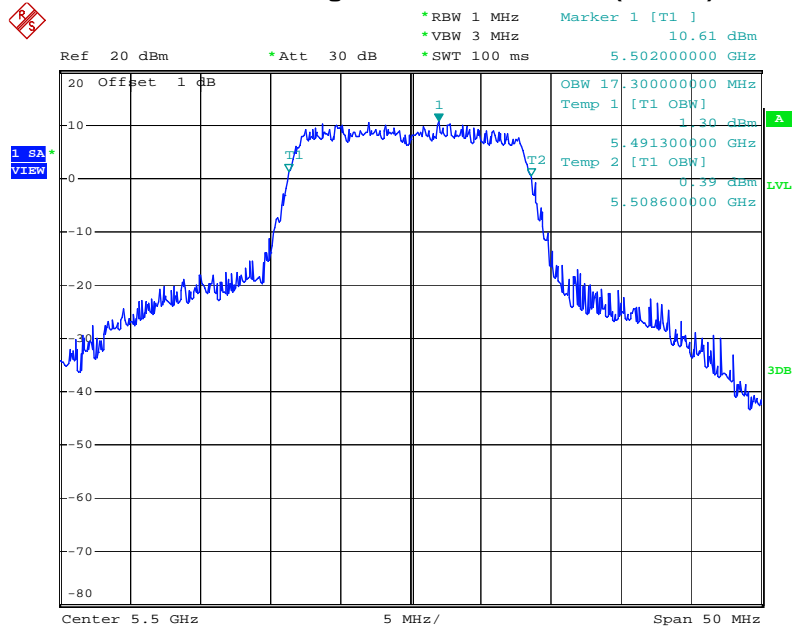
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 1



Date: 26.APR.2012 17:10:56

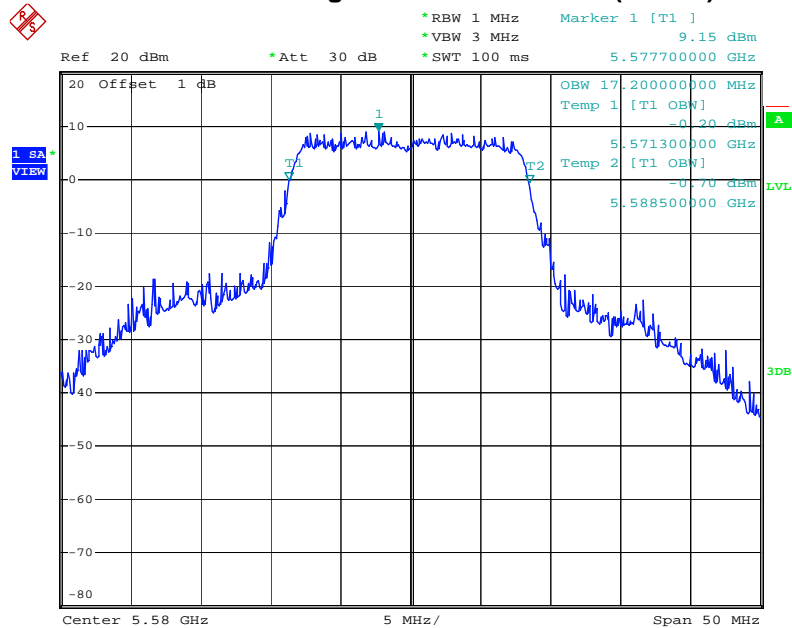


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 1



Date: 26.APR.2012 17:11:53

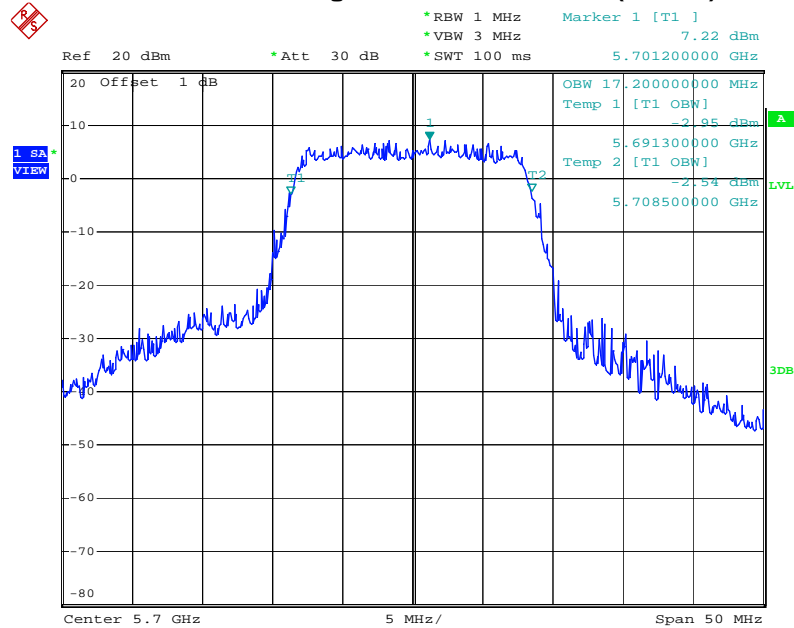
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 1



Date: 26.APR.2012 17:14:51



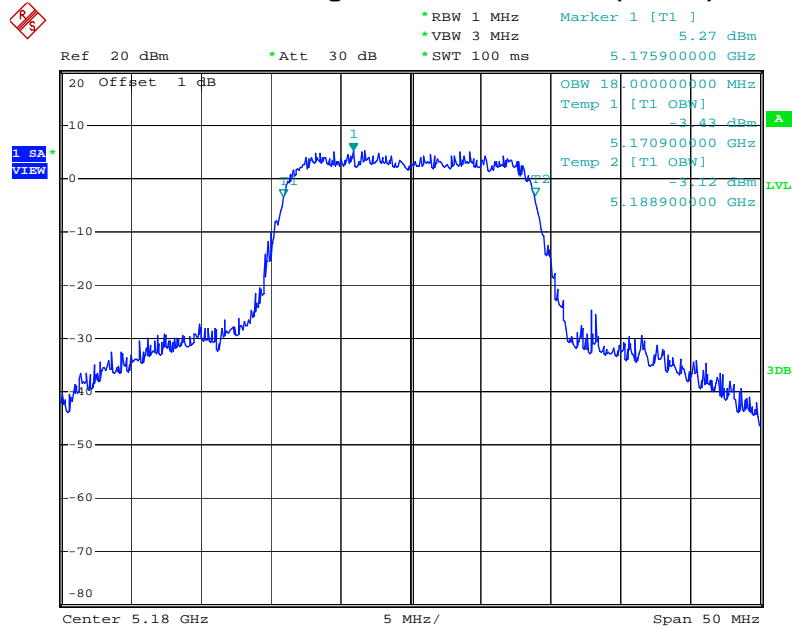
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 1



Date: 26.APR.2012 17:15:34

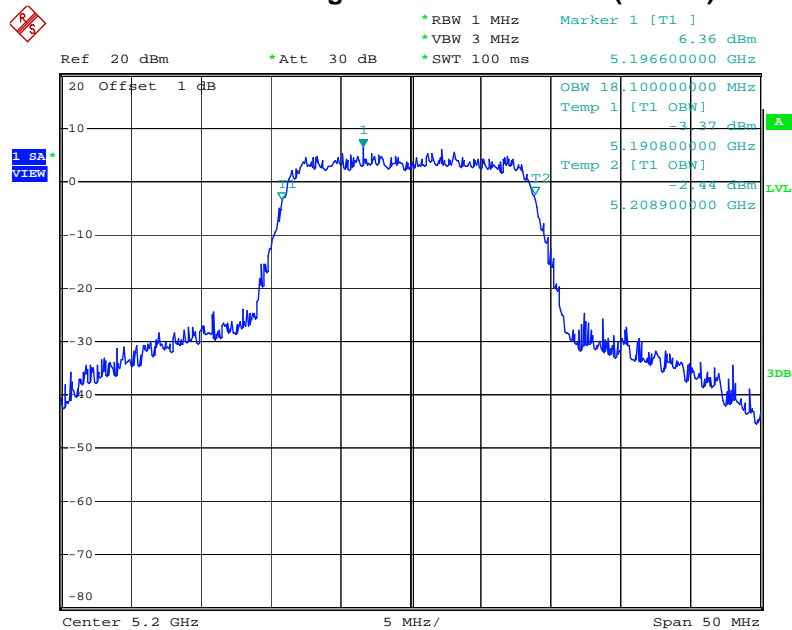


## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



Date: 26.APR.2012 17:47:35

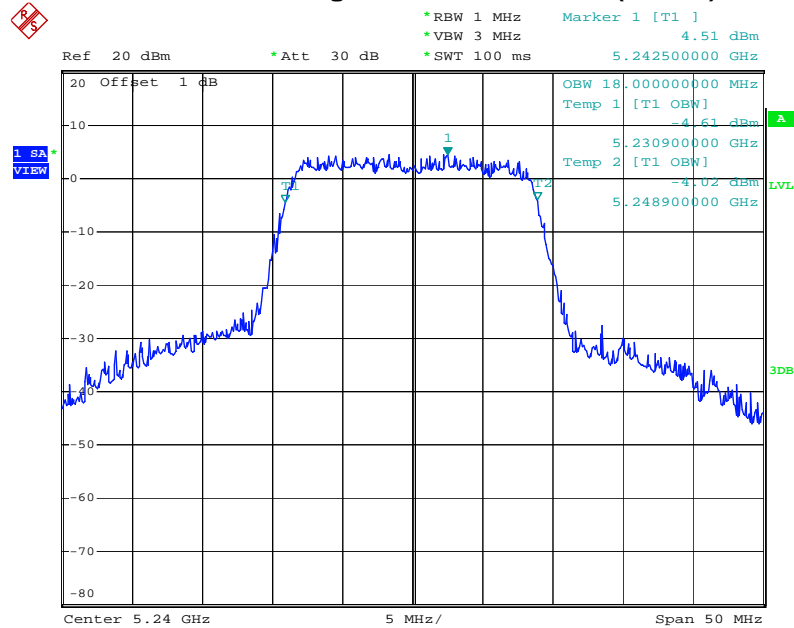
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



Date: 26.APR.2012 17:48:25

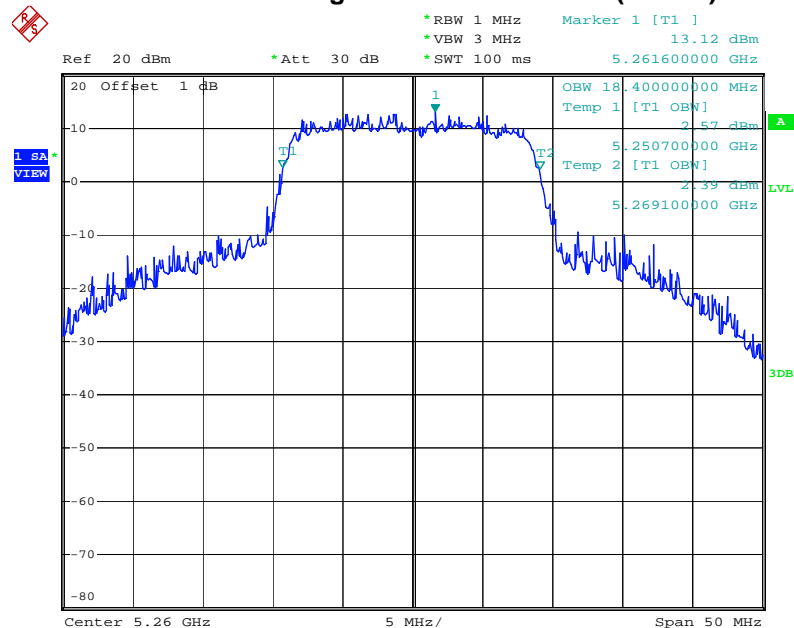


## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



Date: 26.APR.2012 17:51:48

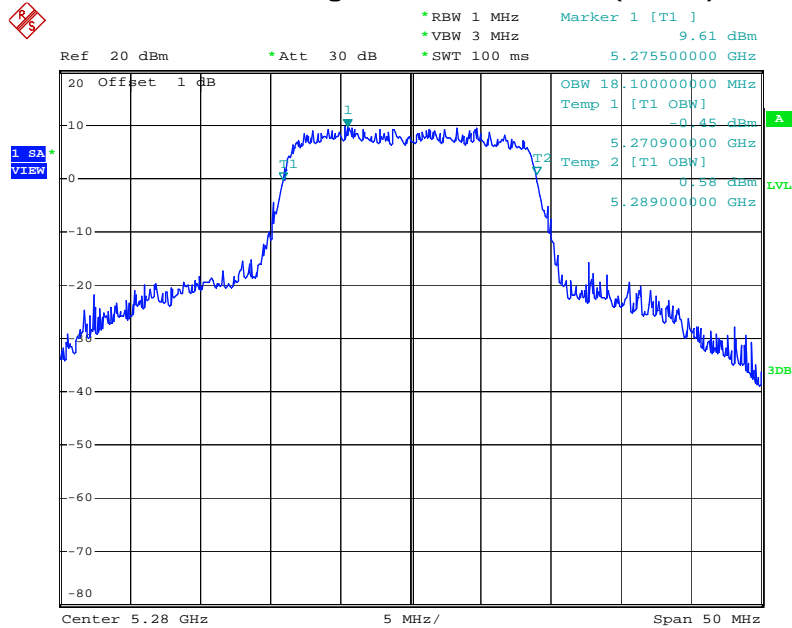
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 2



Date: 26.APR.2012 17:52:44

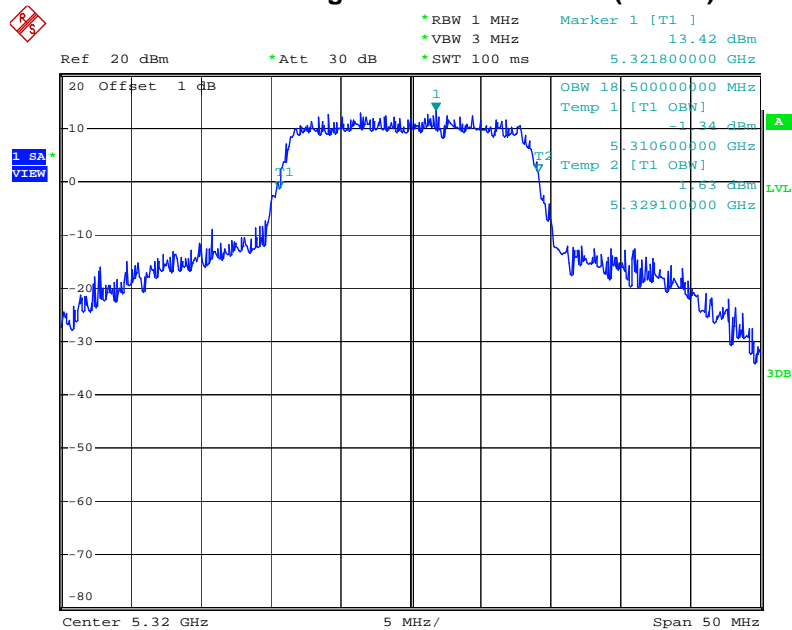


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 2



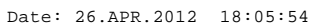
Date: 26.APR.2012 17:55:59

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



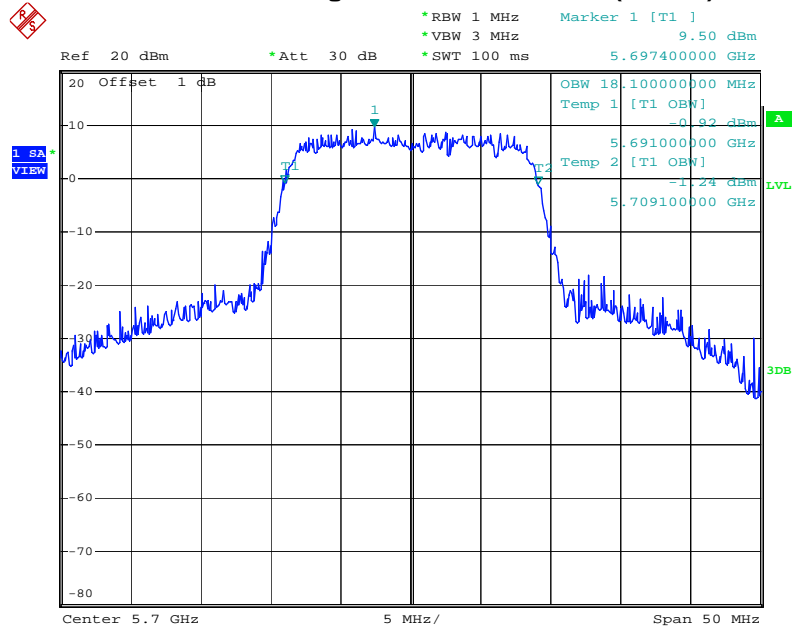
Date: 26.APR.2012 18:01:59







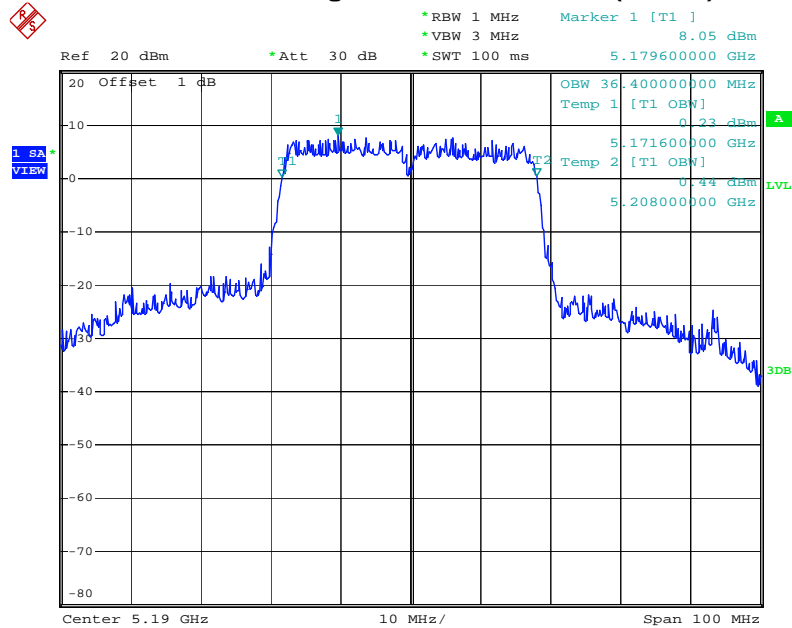
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 2



Date: 26.APR.2012 18:10:32

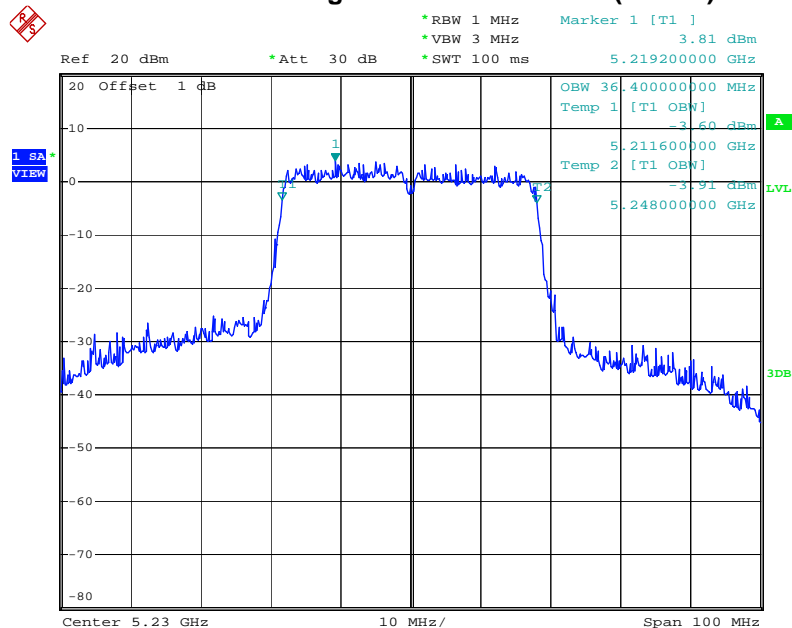


## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 1



Date: 26.APR.2012 19:25:56

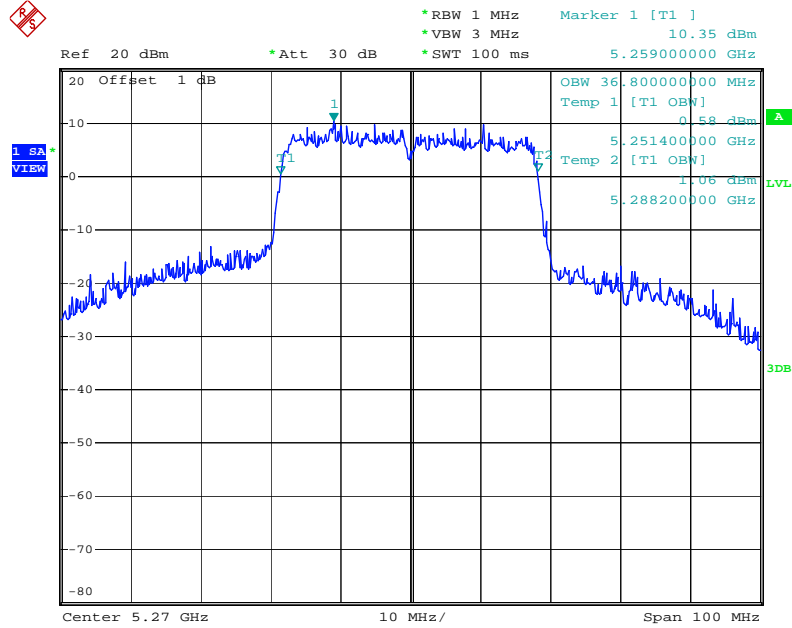
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 1



Date: 26.APR.2012 19:29:08

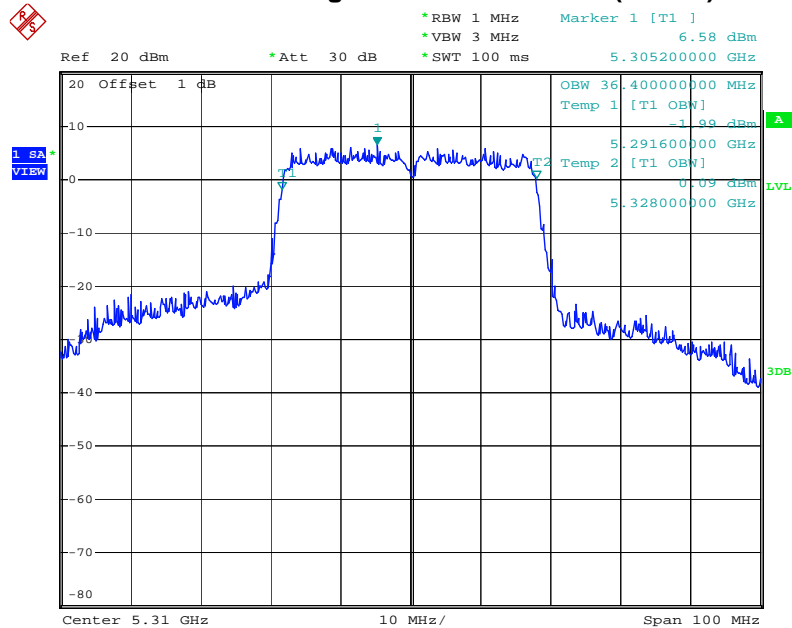


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 1



Date: 26.APR.2012 19:34:26

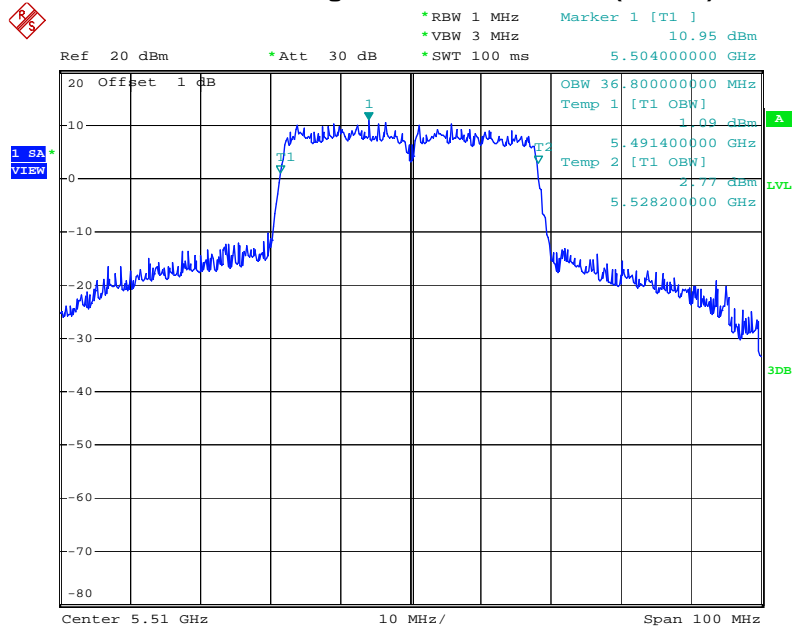
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 1



Date: 26.APR.2012 19:37:53

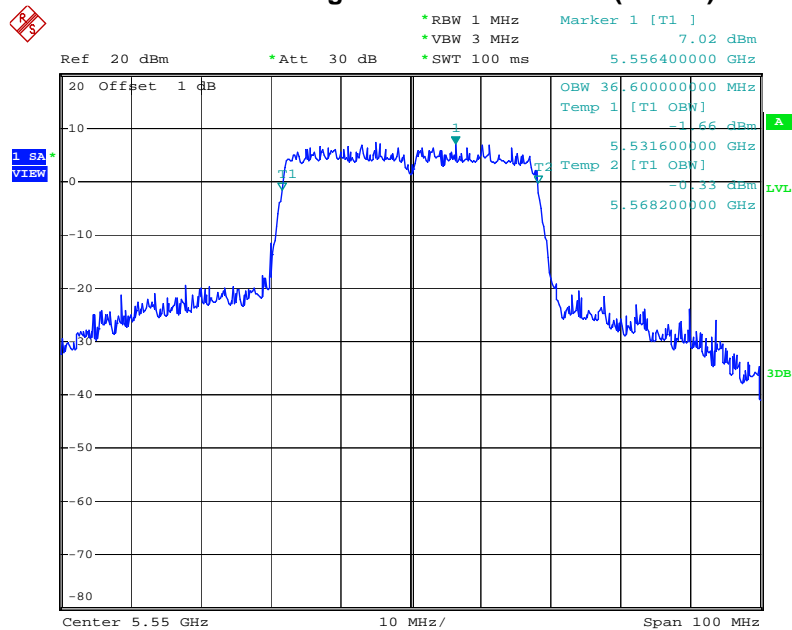


## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 1



Date: 26.APR.2012 19:38:41

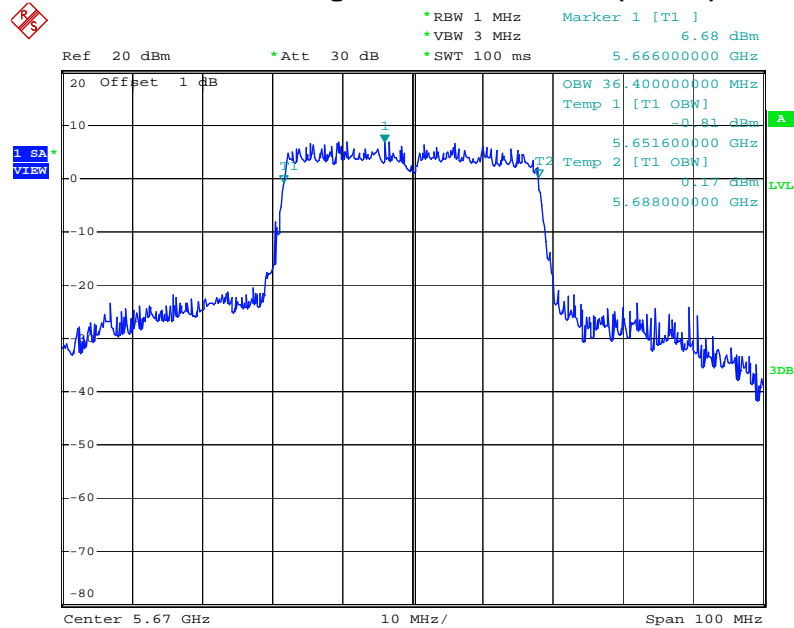
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 1



Date: 26.APR.2012 19:42:00



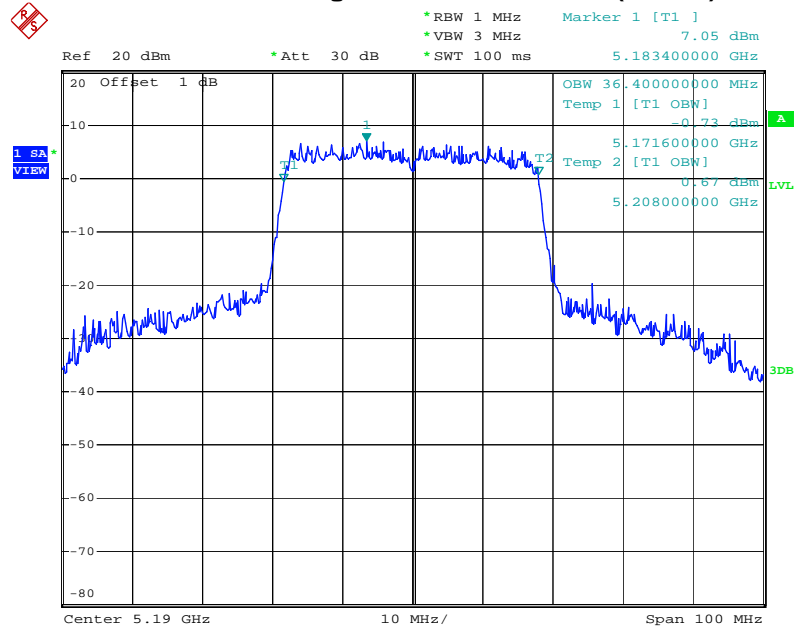
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 1



Date: 26.APR.2012 19:42:42

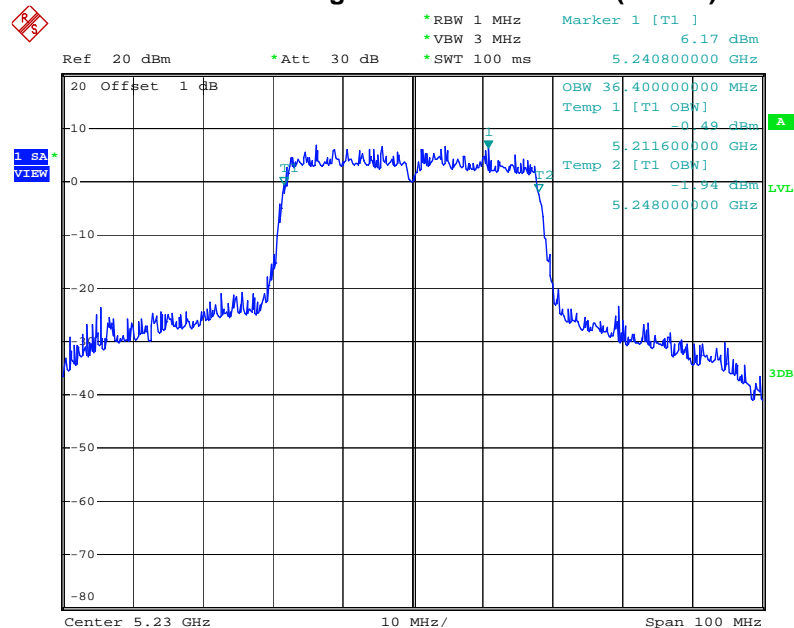


## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2



Date: 26.APR.2012 19:51:14

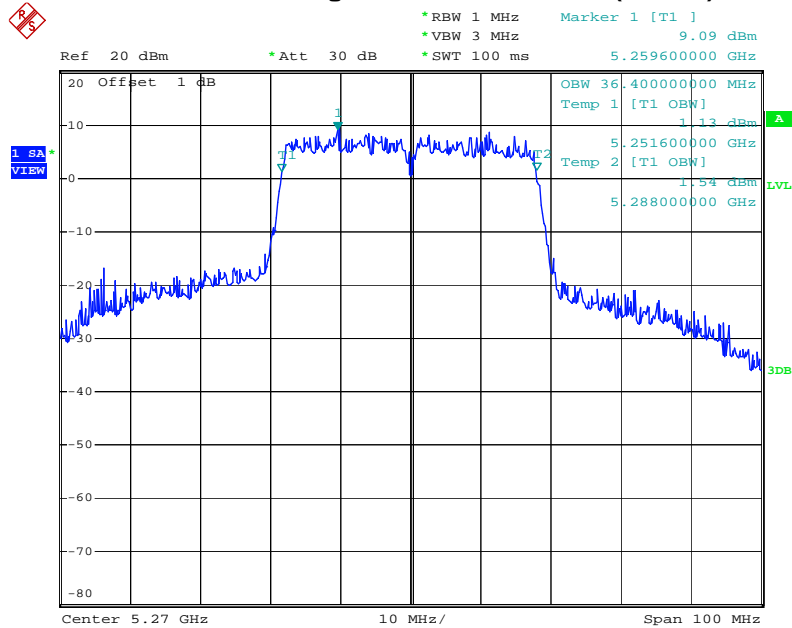
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



Date: 26.APR.2012 19:51:55

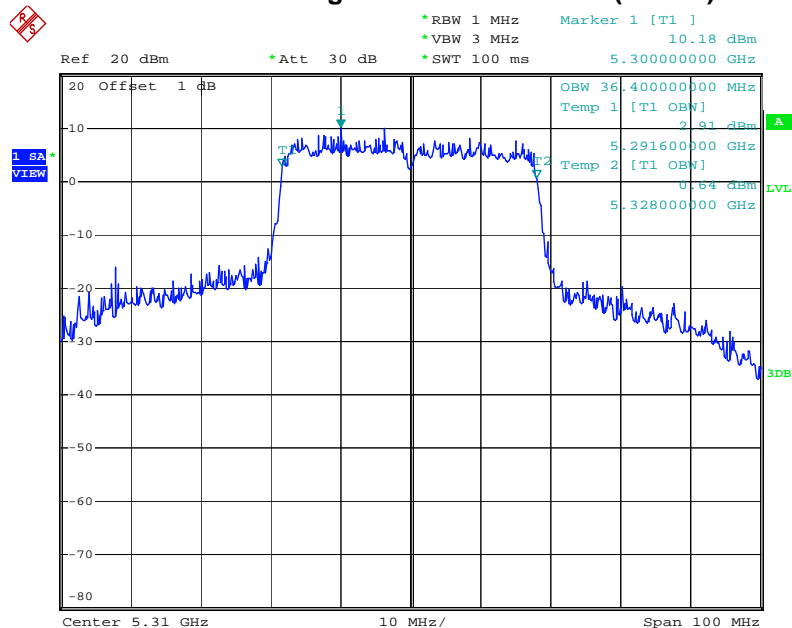


## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 2



Date: 26.APR.2012 19:54:53

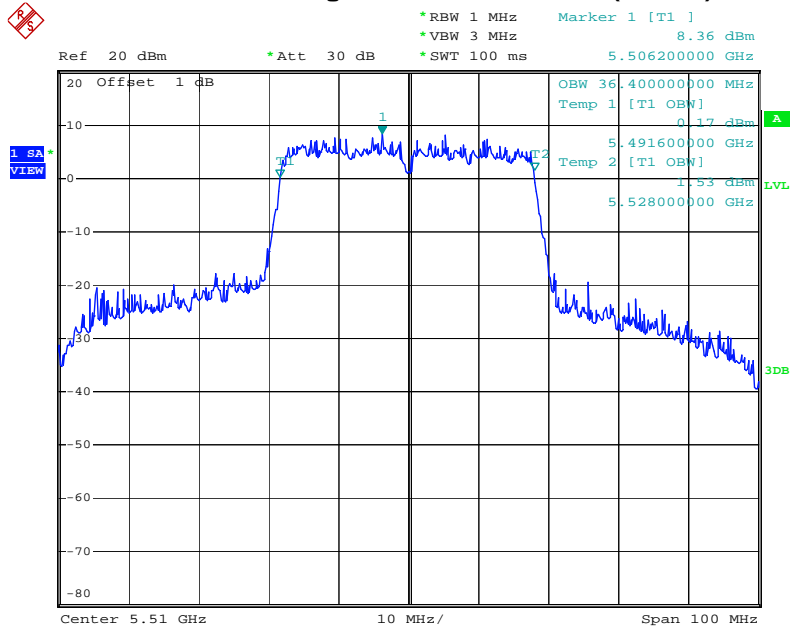
## 99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 2



Date: 26.APR.2012 19:55:31

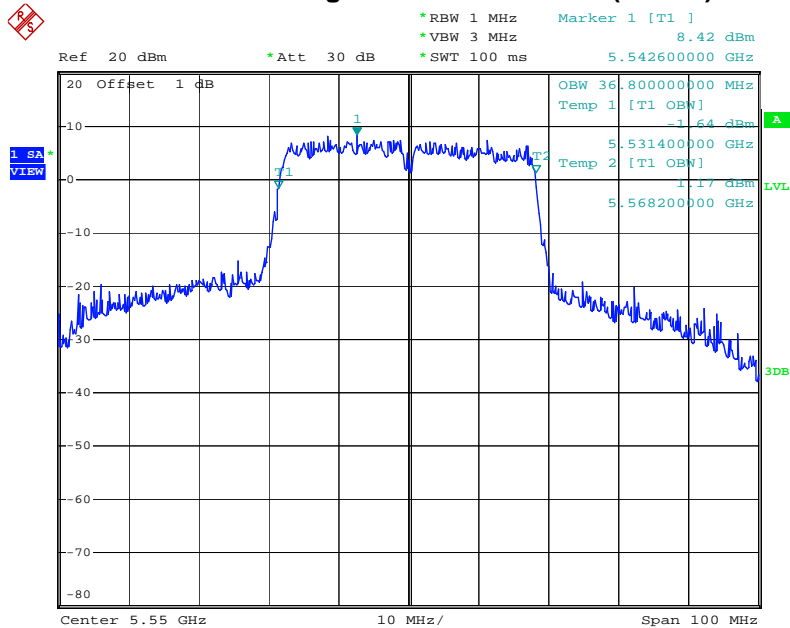


99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 2



Date: 26.APR.2012 19:58:33

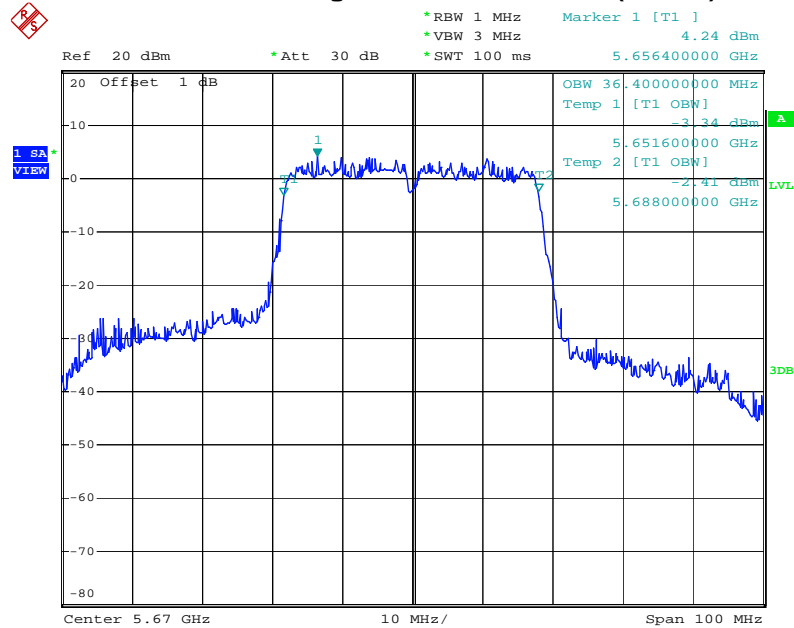
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 2



Date: 26.APR.2012 19:59:16



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



Date: 26.APR.2012 20:02:03



### 3.3 Maximum Conducted Output Power Measurement

#### 3.3.1 Limit

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

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  $11 \text{ dBm} + 10\log B$ . 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

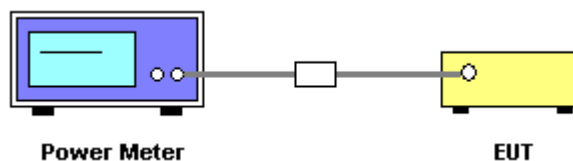
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| 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℃         | <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                        | 16.36                   | <b>Complies</b> |
| 40             | 5200 MHz         | 13.02                        | 16.36                   | <b>Complies</b> |
| 48             | 5240 MHz         | 12.68                        | 16.36                   | <b>Complies</b> |
| 52             | 5260 MHz         | 17.19                        | 23.36                   | <b>Complies</b> |
| 56             | 5280 MHz         | 17.21                        | 23.36                   | <b>Complies</b> |
| 64             | 5320 MHz         | 16.29                        | 23.36                   | <b>Complies</b> |
| 100            | 5500 MHz         | 13.57                        | 23.36                   | <b>Complies</b> |
| 116            | 5580 MHz         | 13.68                        | 23.36                   | <b>Complies</b> |
| 140            | 5700 MHz         | 10.67                        | 23.36                   | <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                  | 16.36            | Complies |
| 40      | 5200 MHz  | 8.97                  | 16.36            | Complies |
| 48      | 5240 MHz  | 8.64                  | 16.36            | Complies |
| 52      | 5260 MHz  | 16.34                 | 23.36            | Complies |
| 56      | 5280 MHz  | 15.59                 | 23.36            | Complies |
| 64      | 5320 MHz  | 13.57                 | 23.36            | Complies |
| 100     | 5500 MHz  | 15.69                 | 23.36            | Complies |
| 116     | 5580 MHz  | 15.64                 | 23.36            | Complies |
| 140     | 5700 MHz  | 15.19                 | 23.36            | Complies |

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

| Channel | Frequency | Conducted Power (dBm) | Max. Limit (dBm) | Result   |
|---------|-----------|-----------------------|------------------|----------|
| 36      | 5180 MHz  | 9.75                  | 16.36            | Complies |
| 40      | 5200 MHz  | 10.01                 | 16.36            | Complies |
| 48      | 5240 MHz  | 9.99                  | 16.36            | Complies |
| 52      | 5260 MHz  | 17.23                 | 23.36            | Complies |
| 56      | 5280 MHz  | 16.91                 | 23.36            | Complies |
| 64      | 5320 MHz  | 14.89                 | 23.36            | Complies |
| 100     | 5500 MHz  | 16.61                 | 23.36            | Complies |
| 116     | 5580 MHz  | 16.43                 | 23.36            | Complies |
| 140     | 5700 MHz  | 16.01                 | 23.36            | Complies |

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

| Channel | Frequency | Conducted Power (dBm) | Max. Limit (dBm) | Result   |
|---------|-----------|-----------------------|------------------|----------|
| 36      | 5180 MHz  | 12.18                 | 16.36            | Complies |
| 40      | 5200 MHz  | 12.53                 | 16.36            | Complies |
| 48      | 5240 MHz  | 12.38                 | 16.36            | Complies |
| 52      | 5260 MHz  | 19.82                 | 23.36            | Complies |
| 56      | 5280 MHz  | 19.31                 | 23.36            | Complies |
| 64      | 5320 MHz  | 17.29                 | 23.36            | Complies |
| 100     | 5500 MHz  | 19.18                 | 23.36            | Complies |
| 116     | 5580 MHz  | 19.06                 | 23.36            | Complies |
| 140     | 5700 MHz  | 18.63                 | 23.36            | Complies |



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

| Channel | Frequency | Conducted Power (dBm) | Max. Limit (dBm) | Result   |
|---------|-----------|-----------------------|------------------|----------|
| 38      | 5190 MHz  | 12.68                 | 16.36            | Complies |
| 46      | 5230 MHz  | 11.65                 | 16.36            | Complies |
| 54      | 5270 MHz  | 15.39                 | 23.36            | Complies |
| 62      | 5310 MHz  | 14.57                 | 23.36            | Complies |
| 102     | 5510 MHz  | 15.64                 | 23.36            | Complies |
| 110     | 5550 MHz  | 15.58                 | 23.36            | Complies |
| 134     | 5670 MHz  | 13.35                 | 23.36            | Complies |

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

| Channel | Frequency | Conducted Power (dBm) | Max. Limit (dBm) | Result   |
|---------|-----------|-----------------------|------------------|----------|
| 38      | 5190 MHz  | 12.46                 | 16.36            | Complies |
| 46      | 5230 MHz  | 11.46                 | 16.36            | Complies |
| 54      | 5270 MHz  | 15.24                 | 23.36            | Complies |
| 62      | 5310 MHz  | 14.38                 | 23.36            | Complies |
| 102     | 5510 MHz  | 15.42                 | 23.36            | Complies |
| 110     | 5550 MHz  | 15.26                 | 23.36            | Complies |
| 134     | 5670 MHz  | 13.19                 | 23.36            | Complies |

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

| Channel | Frequency | Conducted Power (dBm) | Max. Limit (dBm) | Result   |
|---------|-----------|-----------------------|------------------|----------|
| 38      | 5190 MHz  | 15.58                 | 16.36            | Complies |
| 46      | 5230 MHz  | 14.57                 | 16.36            | Complies |
| 54      | 5270 MHz  | 18.33                 | 23.36            | Complies |
| 62      | 5310 MHz  | 17.49                 | 23.36            | Complies |
| 102     | 5510 MHz  | 18.54                 | 23.36            | Complies |
| 110     | 5550 MHz  | 18.43                 | 23.36            | Complies |
| 134     | 5670 MHz  | 16.28                 | 23.36            | Complies |



### 3.4 Power Spectral Density Measurement

#### 3.4.1 Limit

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

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

#### 3.4.2 Measuring Instruments and Setting

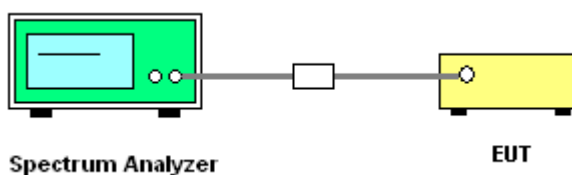
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| 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<br/>(dBm)</b> | <b>Max. Limit<br/>(dBm)</b> | <b>Result</b>   |
|------------------|--------------------------------|-----------------------------|-----------------|
| 5180 MHz         | 3.12                           | 3.36                        | <b>Complies</b> |
| 5200 MHz         | 3.24                           | 3.36                        | <b>Complies</b> |
| 5240 MHz         | 3.23                           | 3.36                        | <b>Complies</b> |
| 5260 MHz         | 6.89                           | 10.36                       | <b>Complies</b> |
| 5280 MHz         | 5.18                           | 10.36                       | <b>Complies</b> |
| 5320 MHz         | 4.50                           | 10.36                       | <b>Complies</b> |
| 5500 MHz         | 3.21                           | 10.36                       | <b>Complies</b> |
| 5580 MHz         | 1.98                           | 10.36                       | <b>Complies</b> |
| 5700 MHz         | -1.04                          | 10.36                       | <b>Complies</b> |



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

| <b>Frequency</b> | <b>Power Density<br/>(dBm)</b> | <b>Max. Limit<br/>(dBm)</b> | <b>Result</b>   |
|------------------|--------------------------------|-----------------------------|-----------------|
| 5180 MHz         | -0.01                          | 3.36                        | <b>Complies</b> |
| 5200 MHz         | 0.26                           | 3.36                        | <b>Complies</b> |
| 5240 MHz         | -1.59                          | 3.36                        | <b>Complies</b> |
| 5260 MHz         | 5.42                           | 10.36                       | <b>Complies</b> |
| 5280 MHz         | 5.93                           | 10.36                       | <b>Complies</b> |
| 5320 MHz         | 5.07                           | 10.36                       | <b>Complies</b> |
| 5500 MHz         | 6.71                           | 10.36                       | <b>Complies</b> |
| 5580 MHz         | 6.59                           | 10.36                       | <b>Complies</b> |
| 5700 MHz         | 5.96                           | 10.36                       | <b>Complies</b> |

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

| <b>Frequency</b> | <b>Power Density<br/>(dBm)</b> | <b>Max. Limit<br/>(dBm)</b> | <b>Result</b>   |
|------------------|--------------------------------|-----------------------------|-----------------|
| 5180 MHz         | 0.63                           | 3.36                        | <b>Complies</b> |
| 5200 MHz         | 0.42                           | 3.36                        | <b>Complies</b> |
| 5240 MHz         | 0.21                           | 3.36                        | <b>Complies</b> |
| 5260 MHz         | 7.64                           | 10.36                       | <b>Complies</b> |
| 5280 MHz         | 6.90                           | 10.36                       | <b>Complies</b> |
| 5320 MHz         | 5.81                           | 10.36                       | <b>Complies</b> |
| 5500 MHz         | 5.60                           | 10.36                       | <b>Complies</b> |
| 5580 MHz         | 5.47                           | 10.36                       | <b>Complies</b> |
| 5700 MHz         | 5.13                           | 10.36                       | <b>Complies</b> |

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

| <b>Frequency</b> | <b>Power Density<br/>(dBm)</b> | <b>Max. Limit<br/>(dBm)</b> | <b>Result</b>   |
|------------------|--------------------------------|-----------------------------|-----------------|
| 5180 MHz         | 3.33                           | 3.36                        | <b>Complies</b> |
| 5200 MHz         | 3.35                           | 3.36                        | <b>Complies</b> |
| 5240 MHz         | 2.41                           | 3.36                        | <b>Complies</b> |
| 5260 MHz         | 9.68                           | 10.36                       | <b>Complies</b> |
| 5280 MHz         | 9.45                           | 10.36                       | <b>Complies</b> |
| 5320 MHz         | 8.47                           | 10.36                       | <b>Complies</b> |
| 5500 MHz         | 9.20                           | 10.36                       | <b>Complies</b> |
| 5580 MHz         | 9.08                           | 10.36                       | <b>Complies</b> |
| 5700 MHz         | 8.58                           | 10.36                       | <b>Complies</b> |



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

| <b>Frequency</b> | <b>Power Density<br/>(dBm)</b> | <b>Max. Limit<br/>(dBm)</b> | <b>Result</b>   |
|------------------|--------------------------------|-----------------------------|-----------------|
| 5190 MHz         | 0.75                           | 3.36                        | <b>Complies</b> |
| 5230 MHz         | -0.45                          | 3.36                        | <b>Complies</b> |
| 5270 MHz         | 4.35                           | 10.36                       | <b>Complies</b> |
| 5310 MHz         | 2.05                           | 10.36                       | <b>Complies</b> |
| 5510 MHz         | 4.36                           | 10.36                       | <b>Complies</b> |
| 5550 MHz         | 3.66                           | 10.36                       | <b>Complies</b> |
| 5670 MHz         | 1.16                           | 10.36                       | <b>Complies</b> |

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

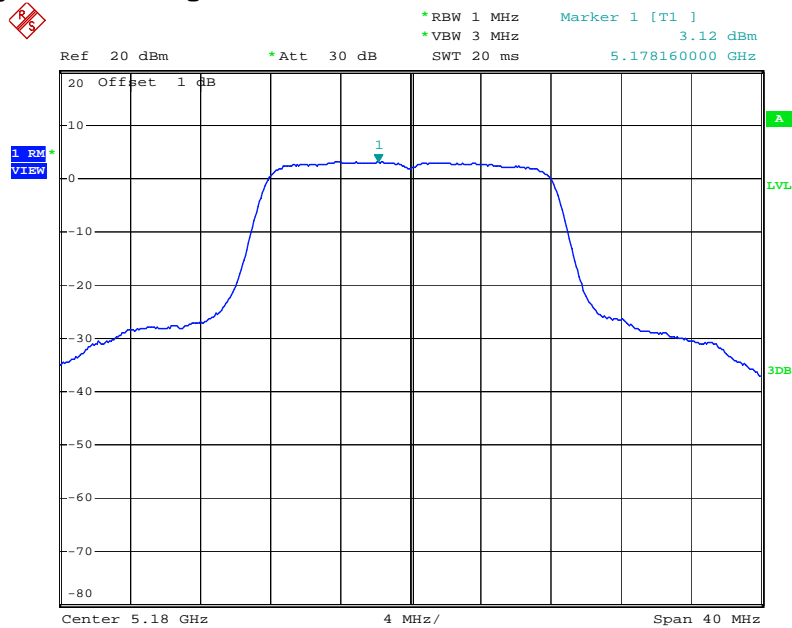
| <b>Frequency</b> | <b>Power Density<br/>(dBm)</b> | <b>Max. Limit<br/>(dBm)</b> | <b>Result</b>   |
|------------------|--------------------------------|-----------------------------|-----------------|
| 5190 MHz         | -0.41                          | 3.36                        | <b>Complies</b> |
| 5230 MHz         | 0.52                           | 3.36                        | <b>Complies</b> |
| 5270 MHz         | 5.07                           | 10.36                       | <b>Complies</b> |
| 5310 MHz         | 2.73                           | 10.36                       | <b>Complies</b> |
| 5510 MHz         | 3.71                           | 10.36                       | <b>Complies</b> |
| 5550 MHz         | 2.65                           | 10.36                       | <b>Complies</b> |
| 5670 MHz         | -0.68                          | 10.36                       | <b>Complies</b> |

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

| <b>Frequency</b> | <b>Power Density<br/>(dBm)</b> | <b>Max. Limit<br/>(dBm)</b> | <b>Result</b>   |
|------------------|--------------------------------|-----------------------------|-----------------|
| 5190 MHz         | 3.22                           | 3.36                        | <b>Complies</b> |
| 5230 MHz         | 3.07                           | 3.36                        | <b>Complies</b> |
| 5270 MHz         | 7.74                           | 10.36                       | <b>Complies</b> |
| 5310 MHz         | 5.41                           | 10.36                       | <b>Complies</b> |
| 5510 MHz         | 7.06                           | 10.36                       | <b>Complies</b> |
| 5550 MHz         | 6.19                           | 10.36                       | <b>Complies</b> |
| 5670 MHz         | 3.35                           | 10.36                       | <b>Complies</b> |

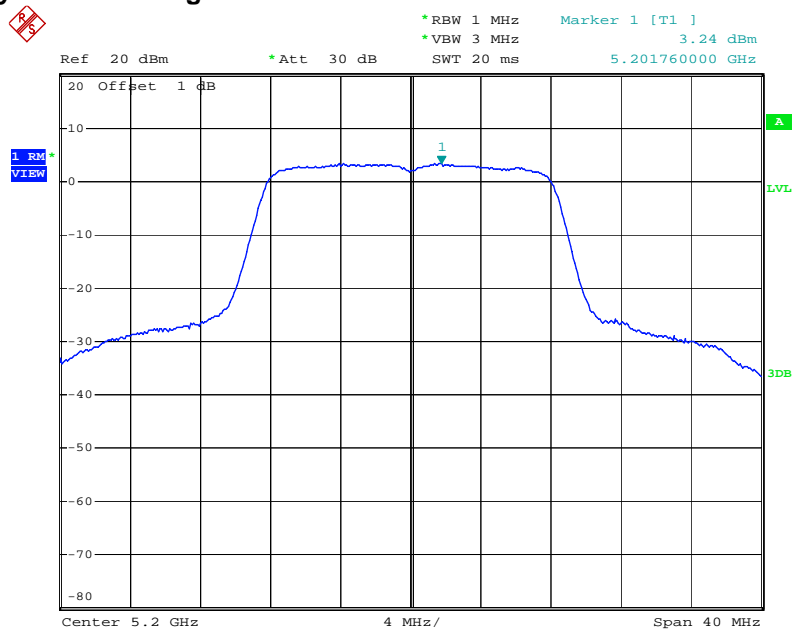


For Single Chain:  
Power Density Plot on Configuration IEEE 802.11a 5180 MHz Port 2



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

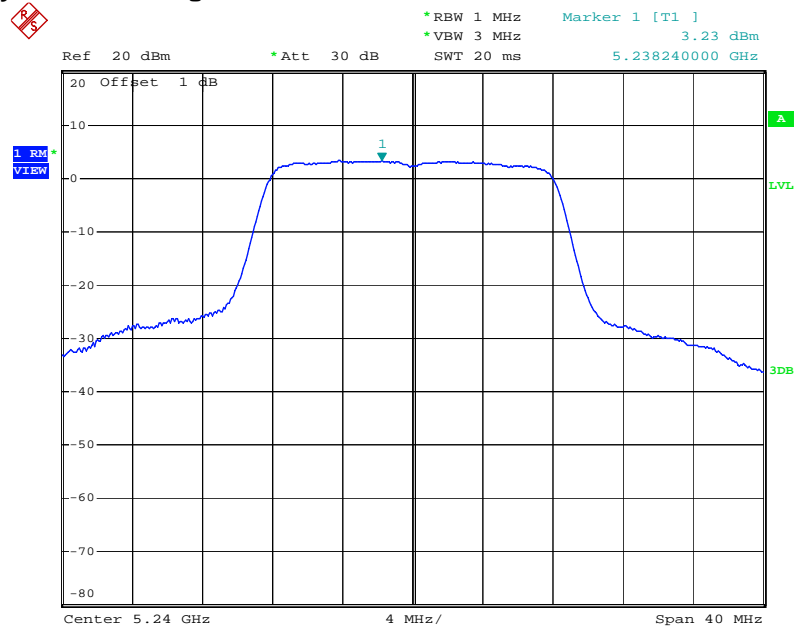
Power Density Plot on Configuration IEEE 802.11a 5200 MHz Port 2



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

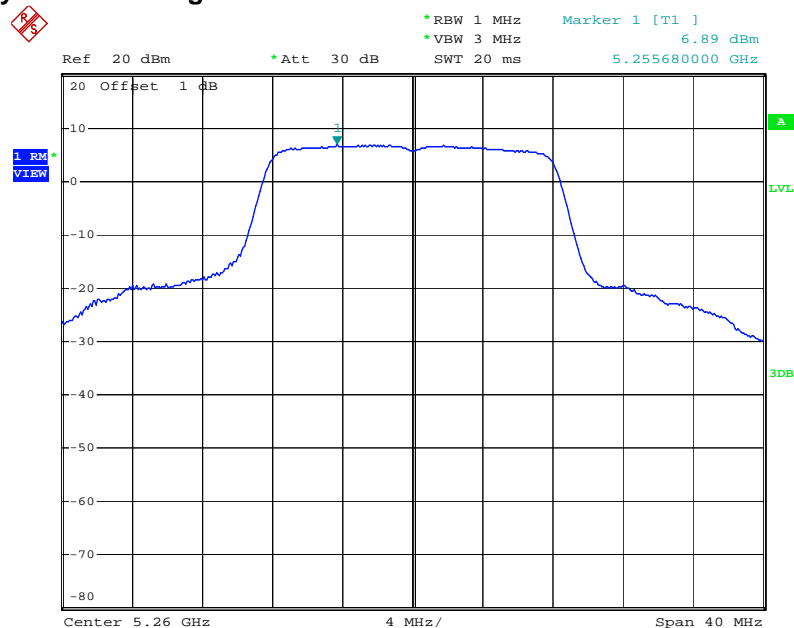


Power Density Plot on Configuration IEEE 802.11a 5240 MHz Port 2



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

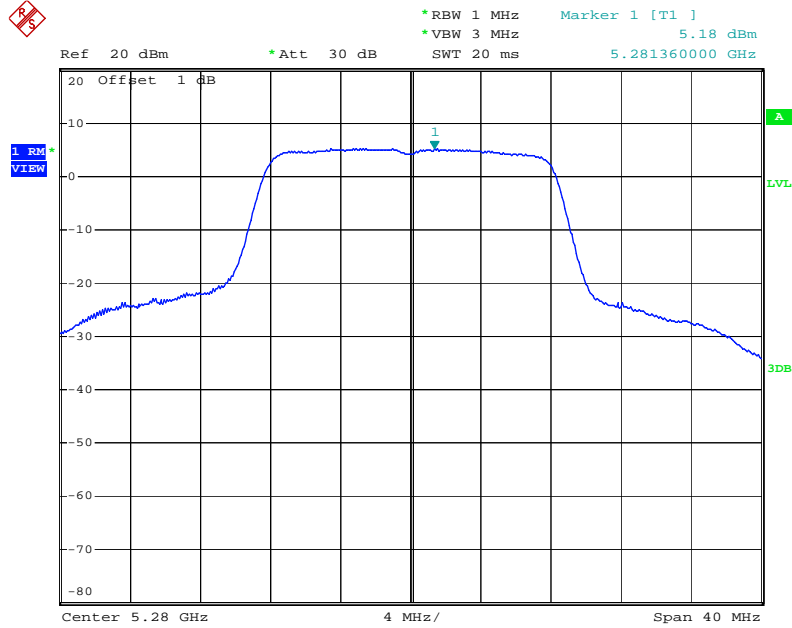
Power Density Plot on Configuration IEEE 802.11a 5260 MHz Port 2



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

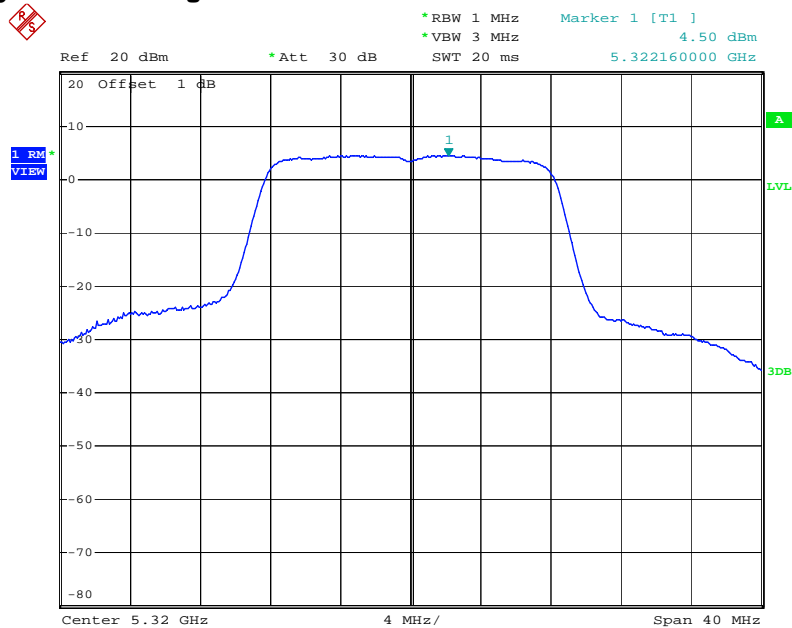


Power Density Plot on Configuration IEEE 802.11a 5280 MHz Port 2



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

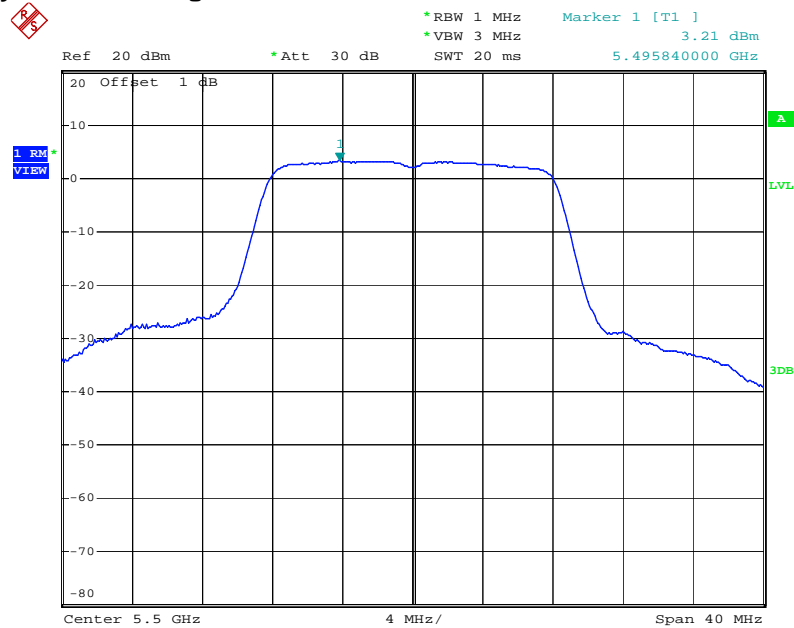
Power Density Plot on Configuration IEEE 802.11a 5320 MHz Port 2



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

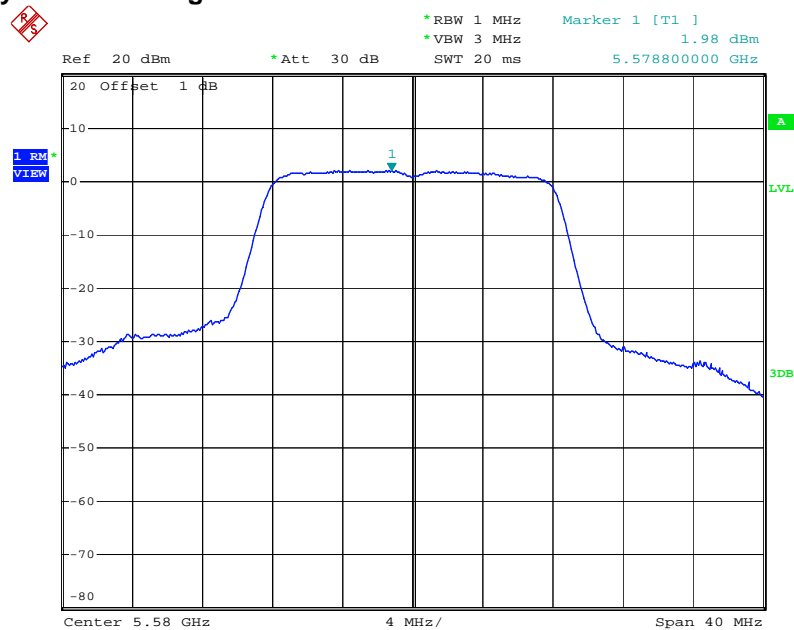


Power Density Plot on Configuration IEEE 802.11a 5500 MHz Port 2



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

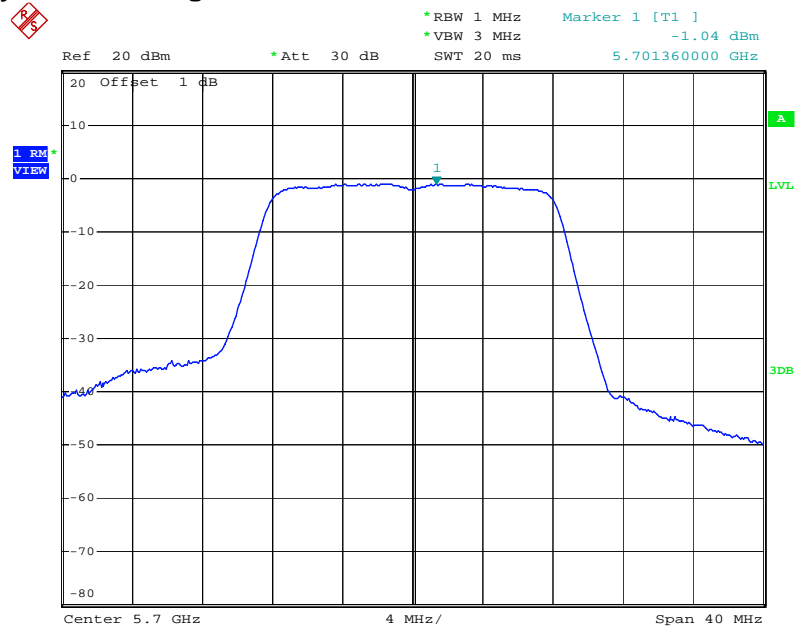
Power Density Plot on Configuration IEEE 802.11a 5580 MHz Port 2



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



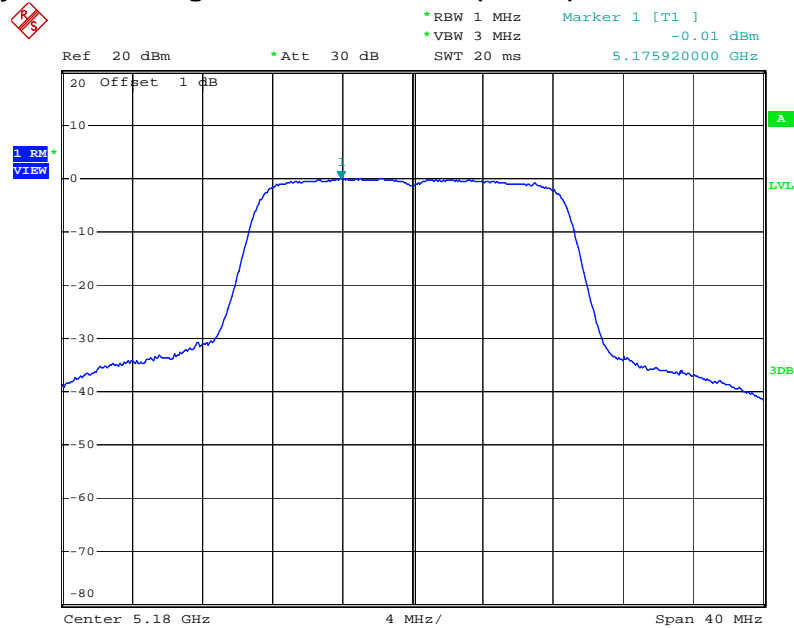
## Power Density Plot on Configuration IEEE 802.11a 5700 MHz Port 2



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

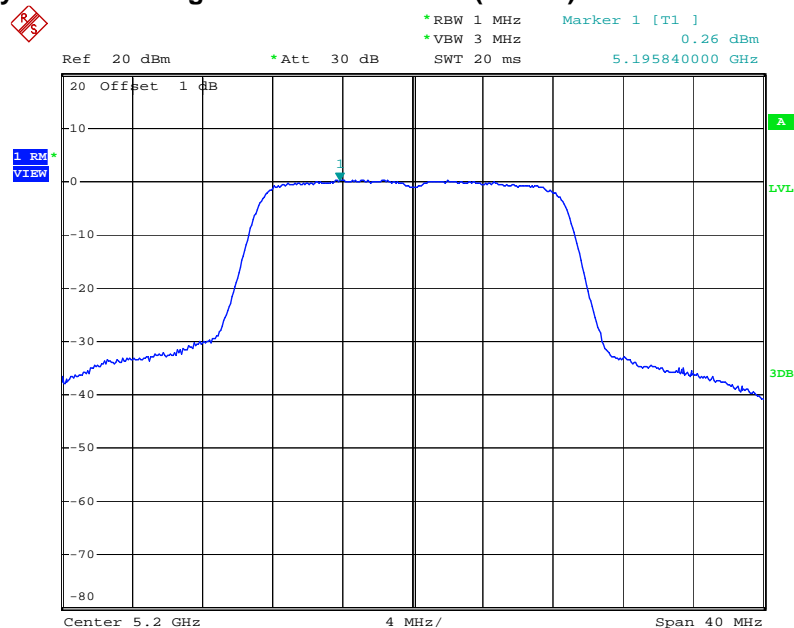


For Two Chains:  
Power Density Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 1



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

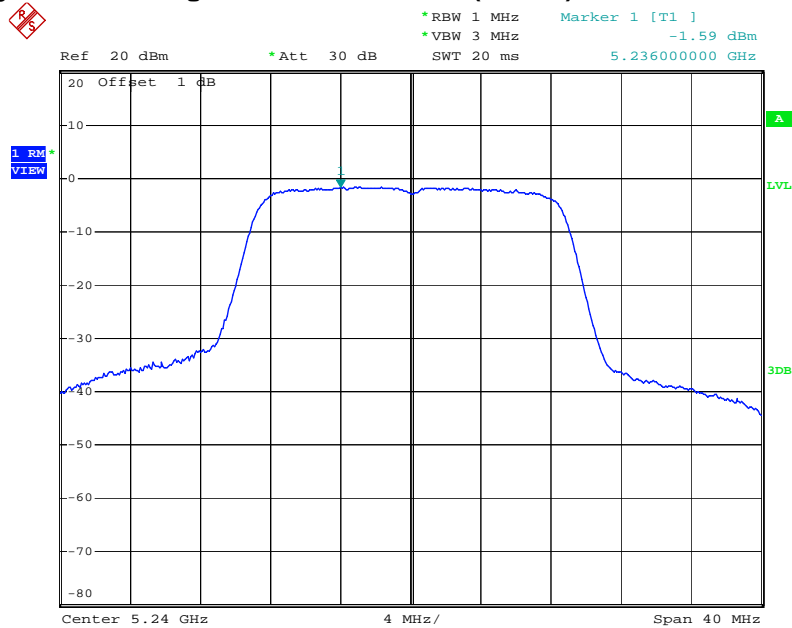
Power Density Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 1



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

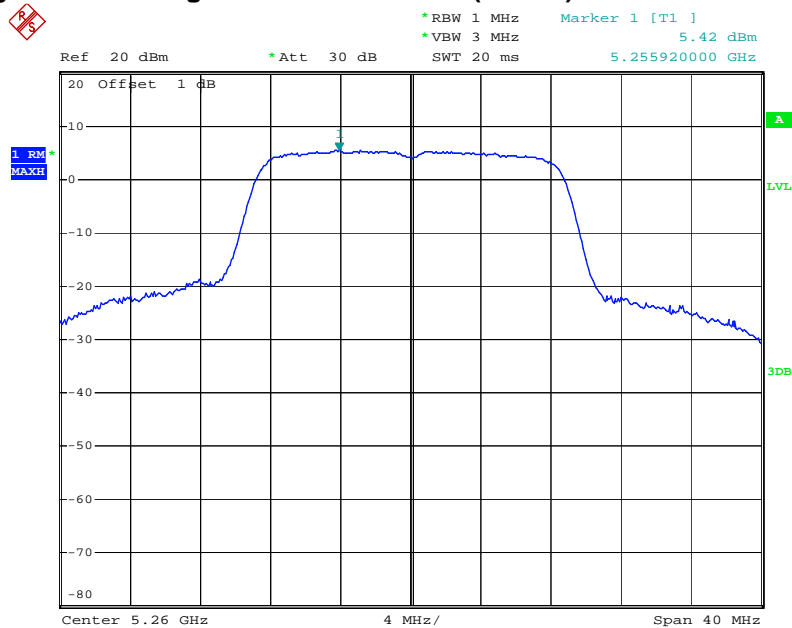


Power Density Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 1



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

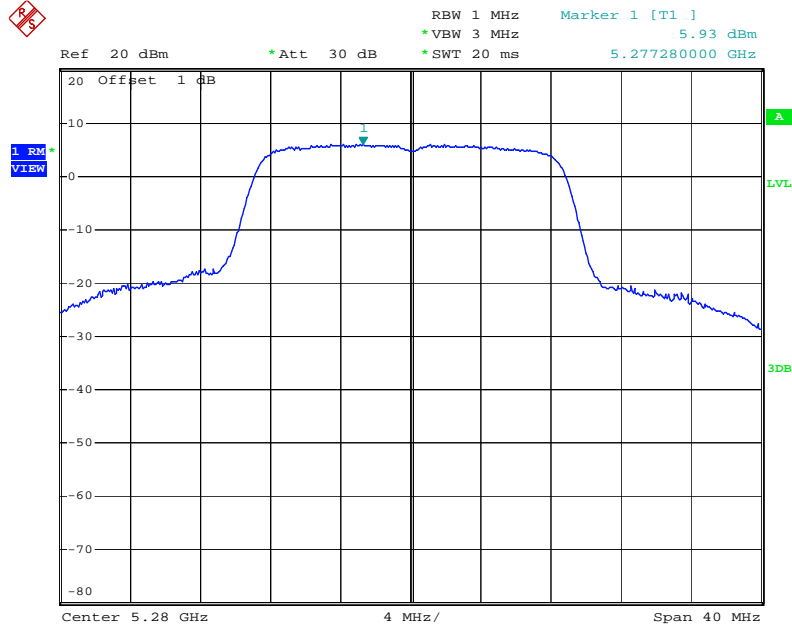
Power Density Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 1



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

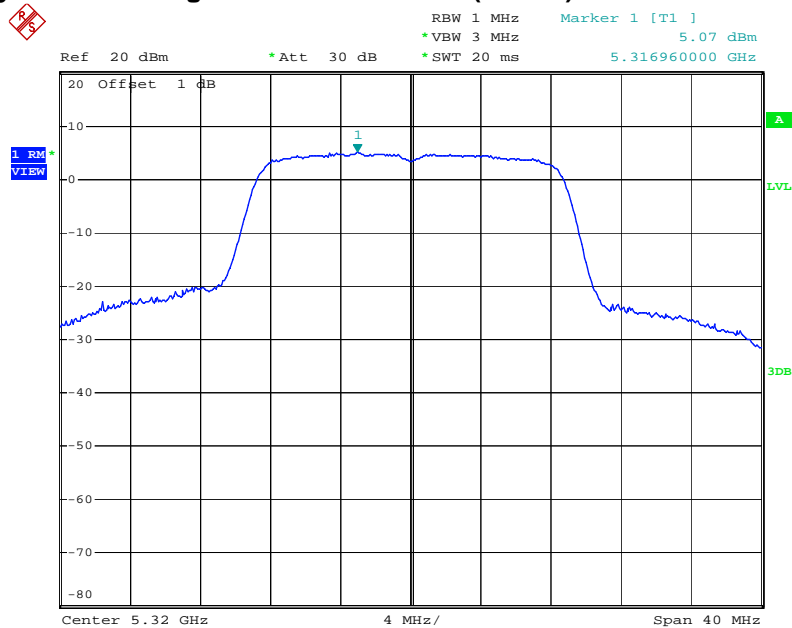


Power Density Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 1



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

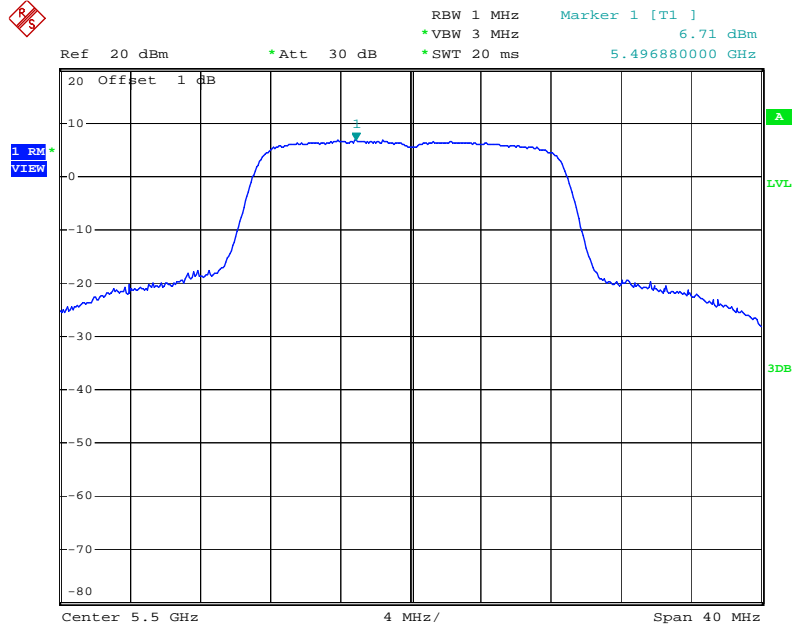
Power Density Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 1



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

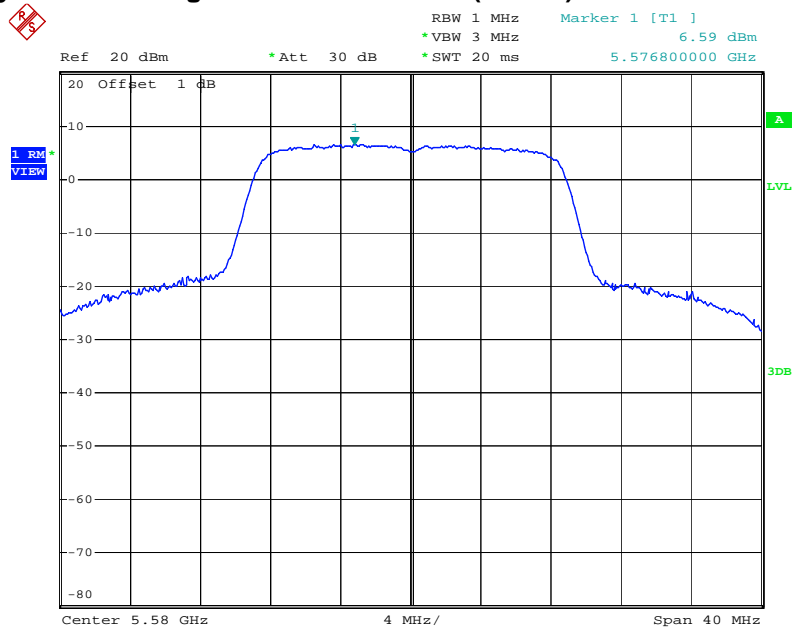


## Power Density Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 1



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

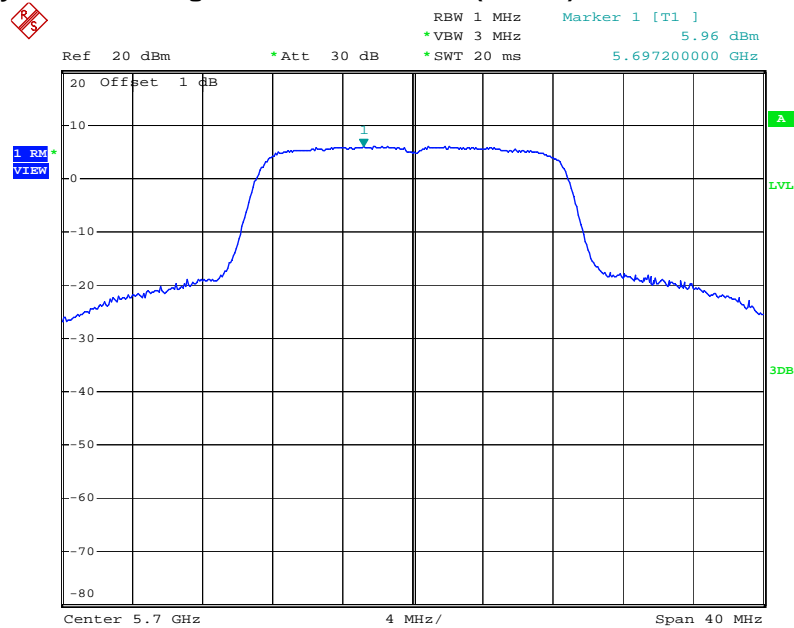
## Power Density Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 1



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



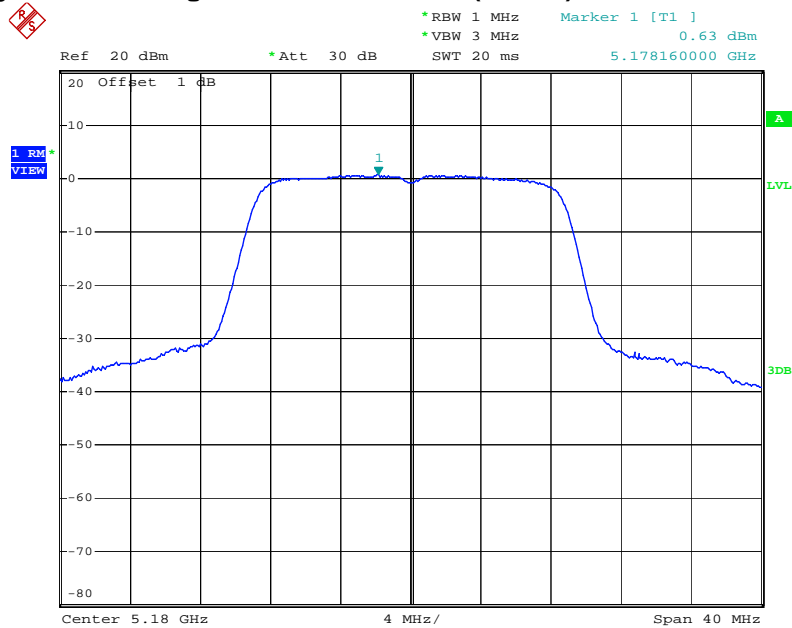
Power Density Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 1



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

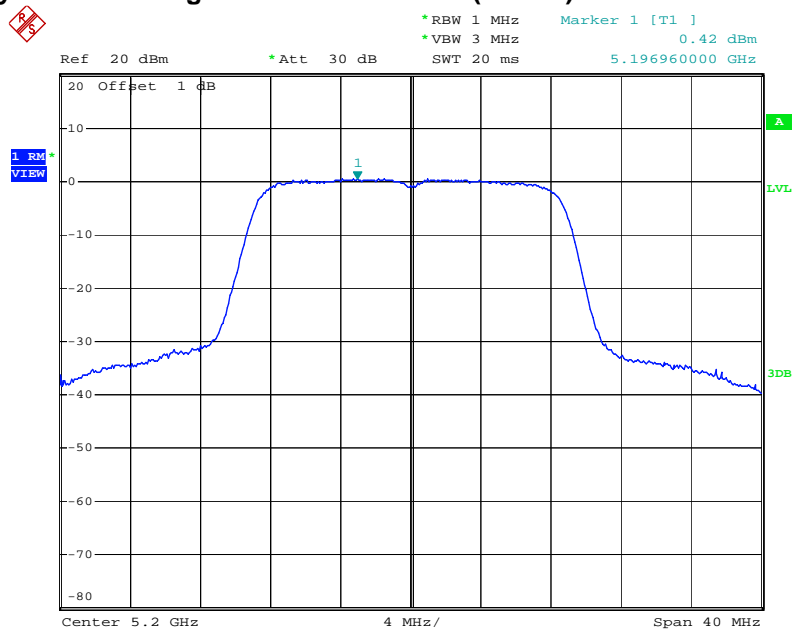


## Power Density Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



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

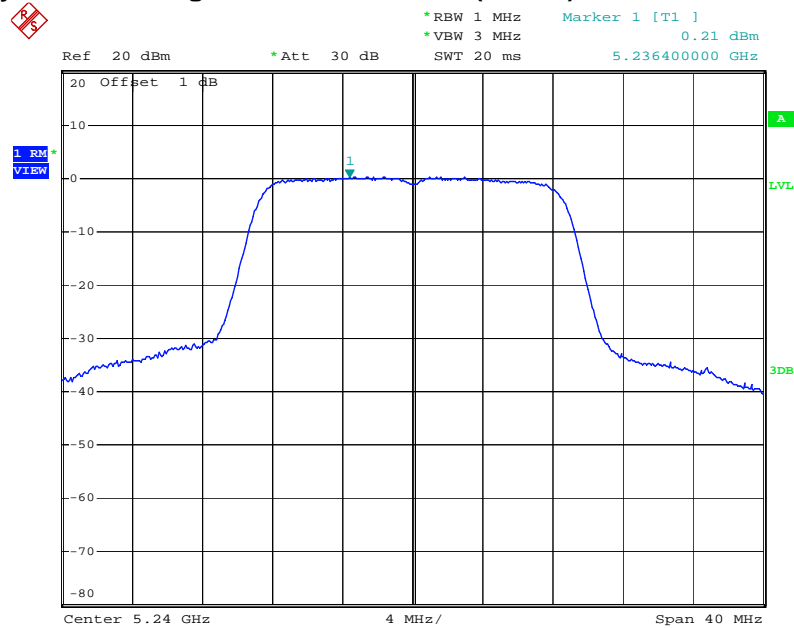
## Power Density Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



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

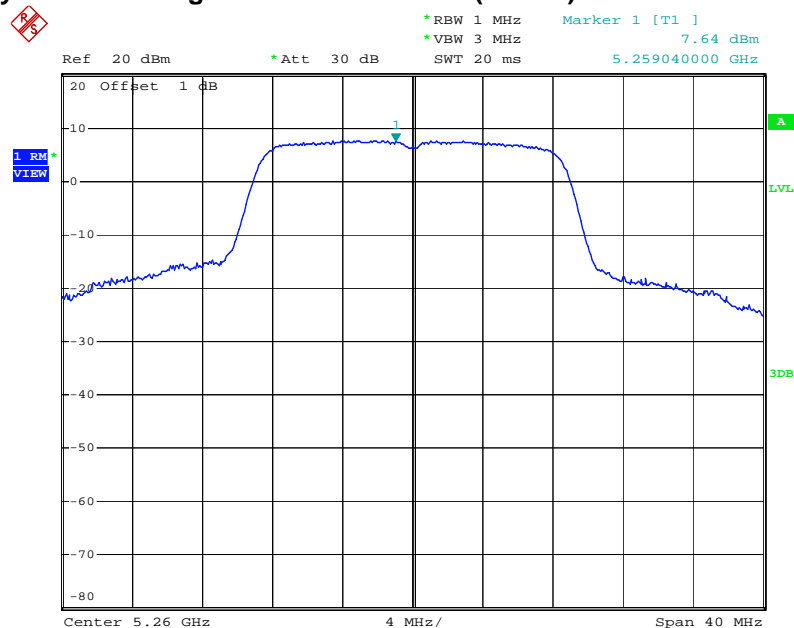


## Power Density Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



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

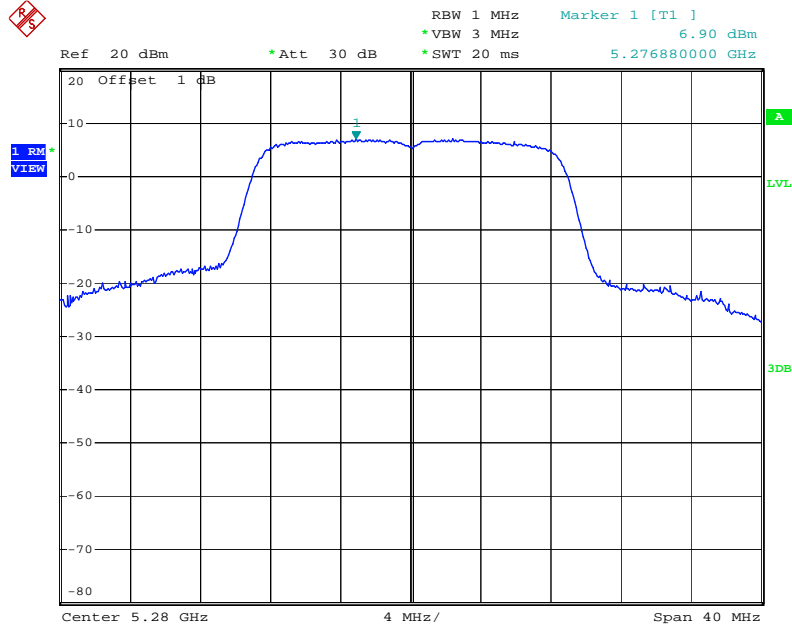
## Power Density Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 2



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

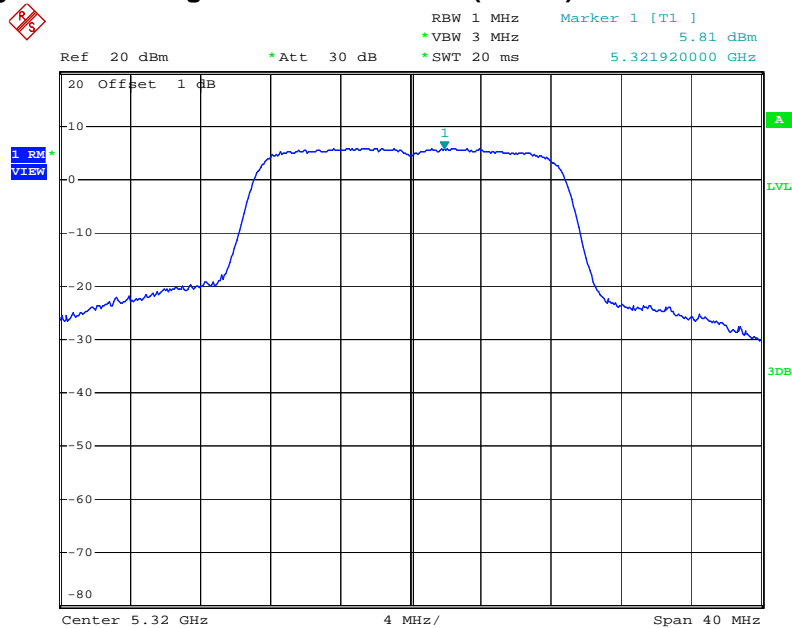


Power Density Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 2



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

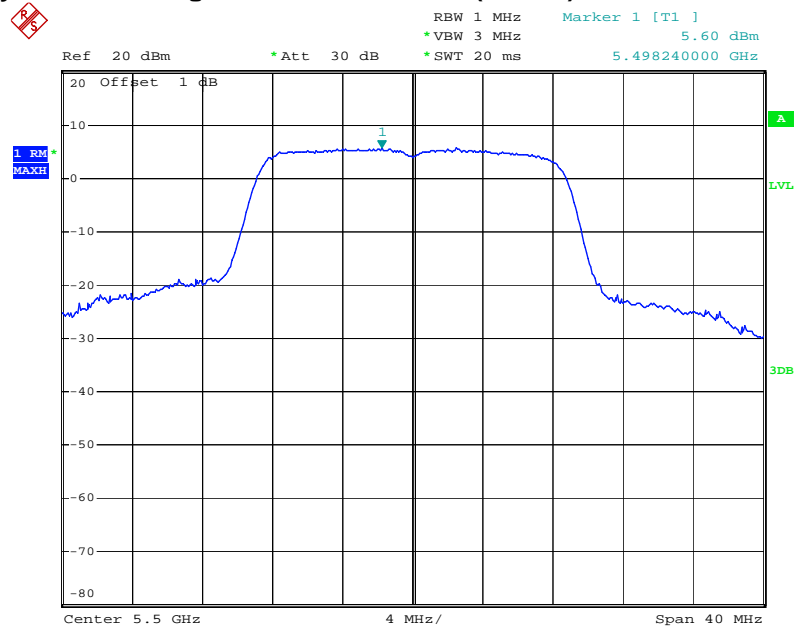
Power Density Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 2



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

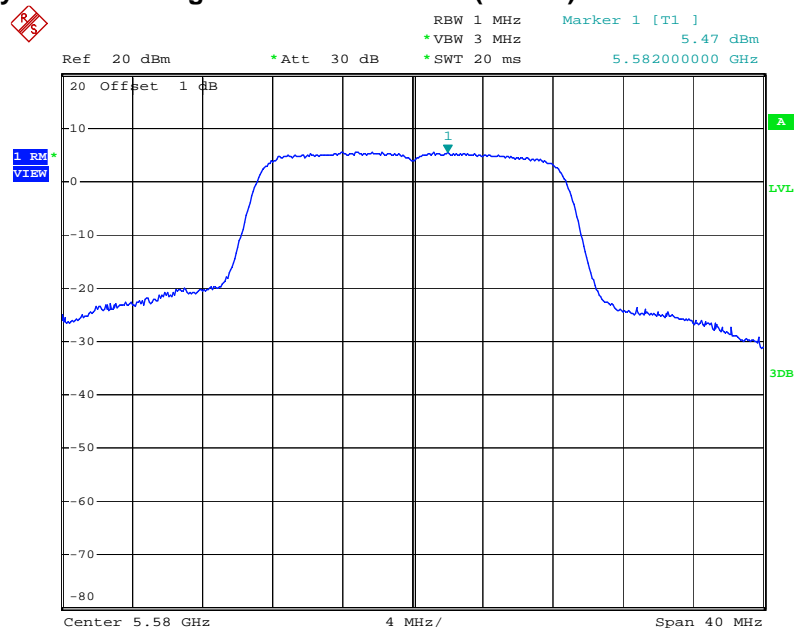


## Power Density Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 2



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

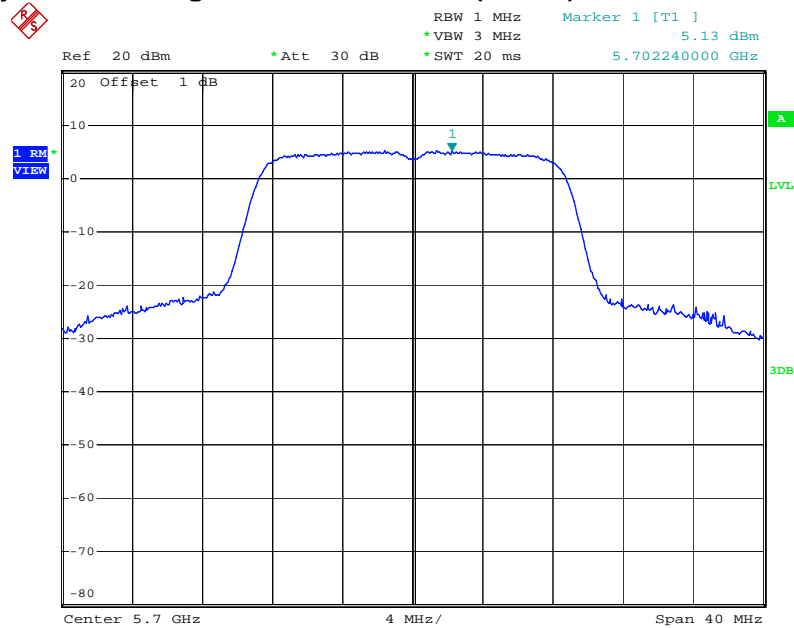
## Power Density Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 2



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



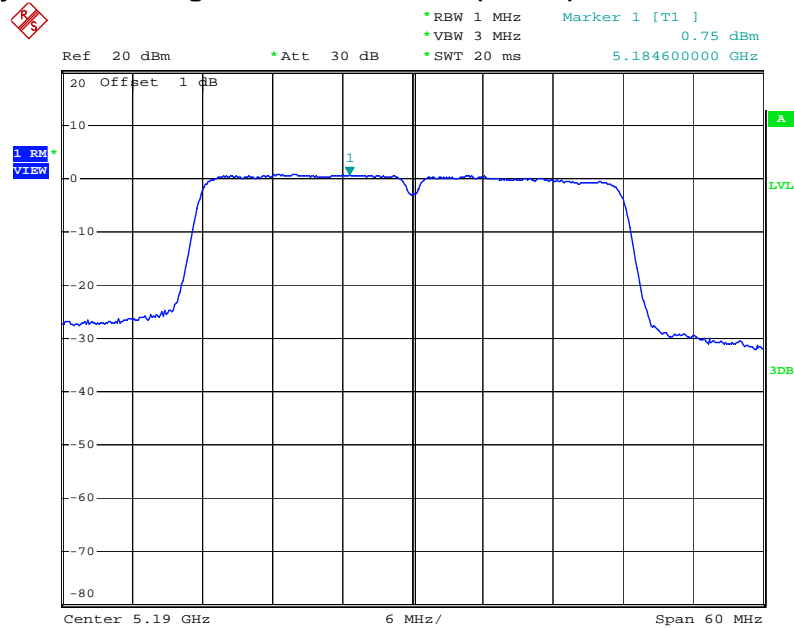
Power Density Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 2



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

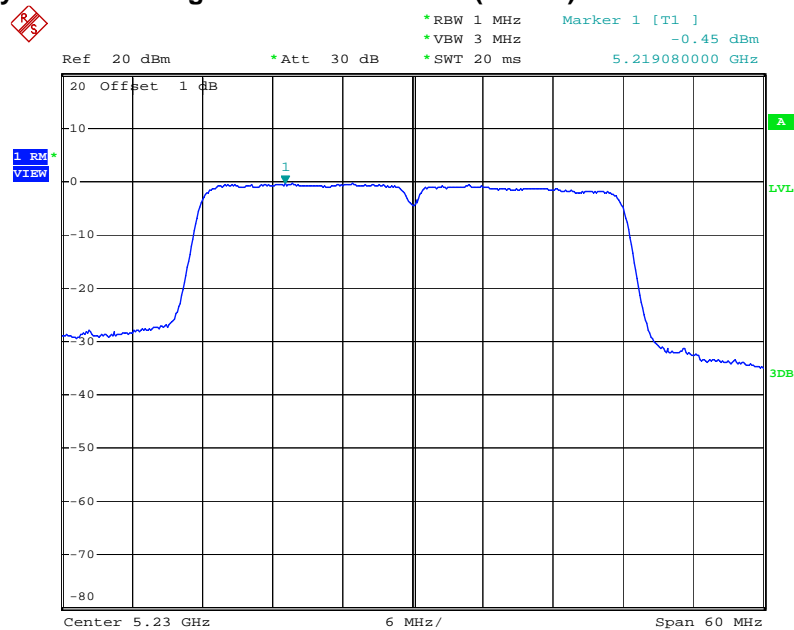


## Power Density Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 1



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

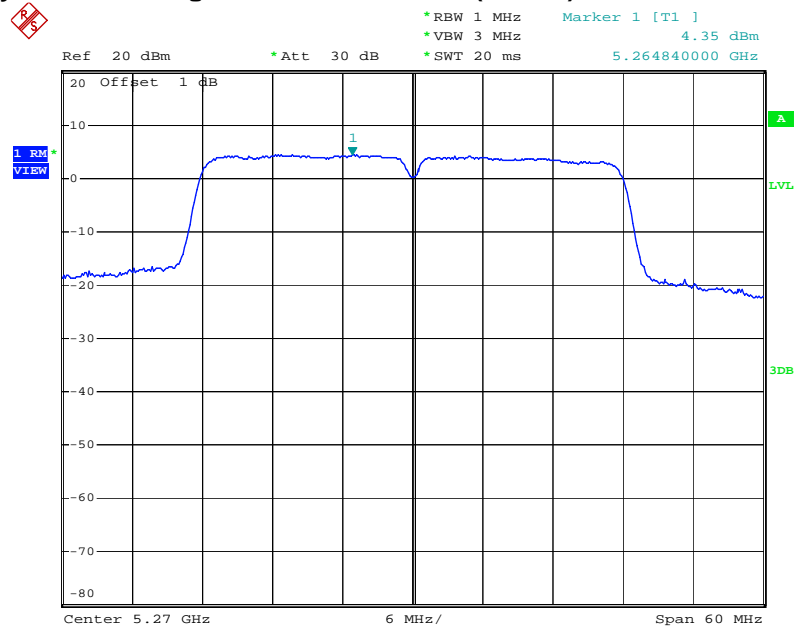
## Power Density Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 1



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

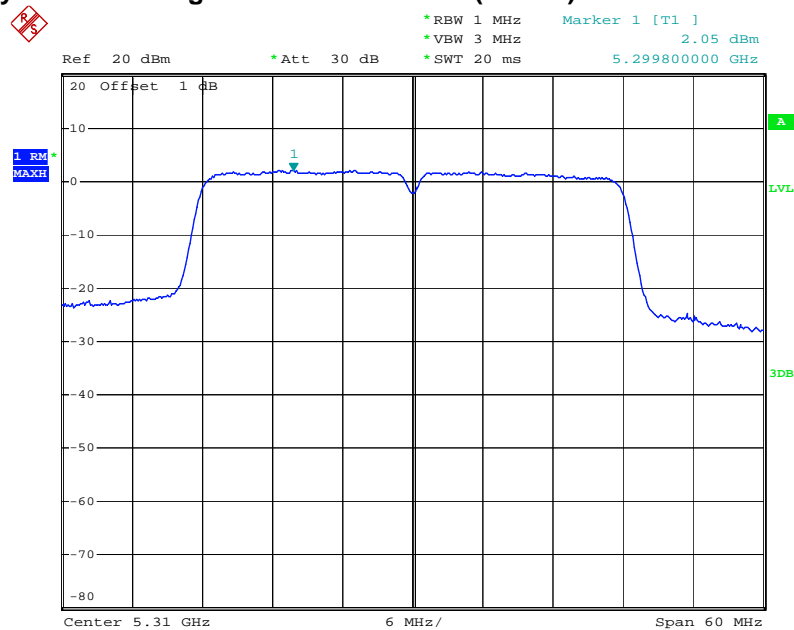


Power Density Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 1



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

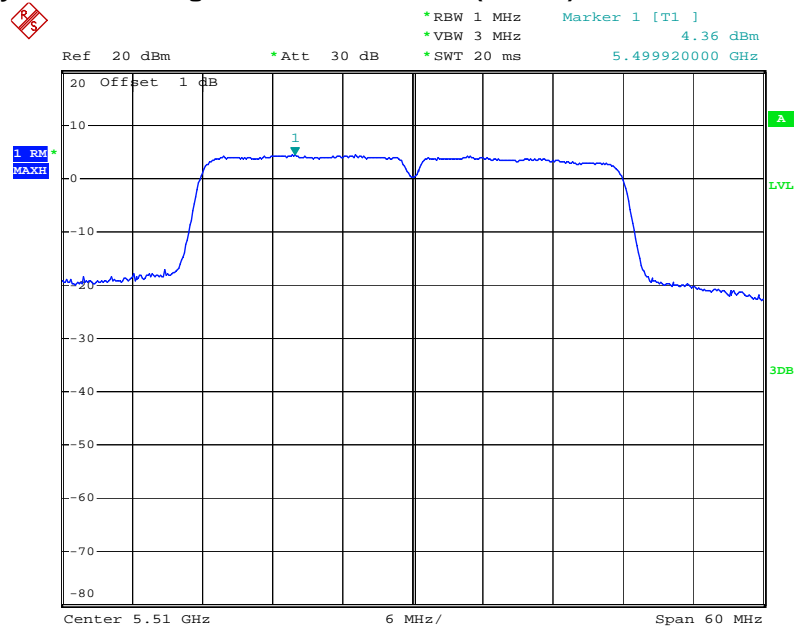
Power Density Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 1



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

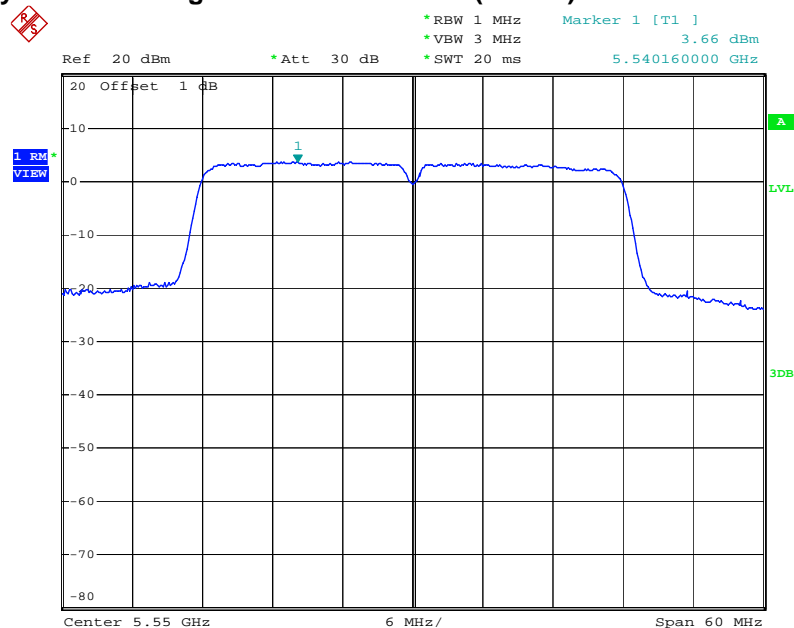


## Power Density Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 1



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

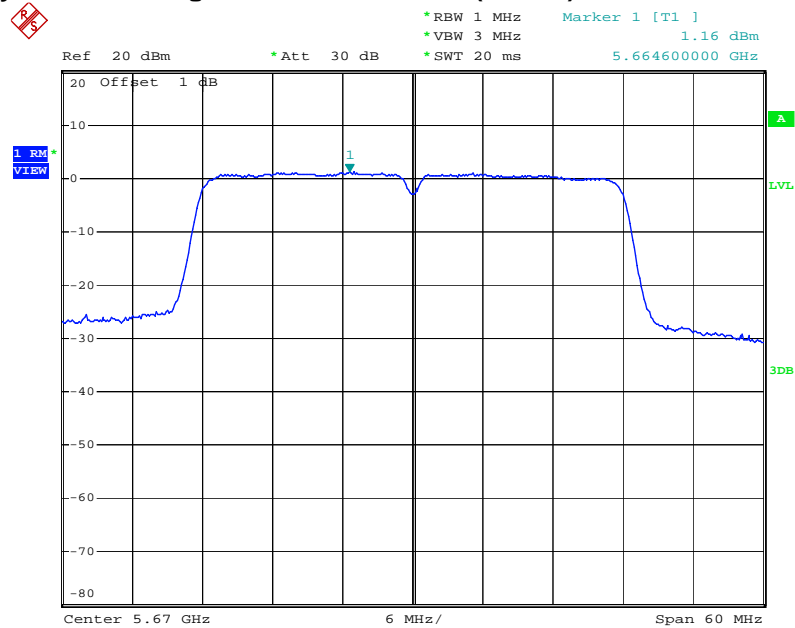
## Power Density Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 1



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



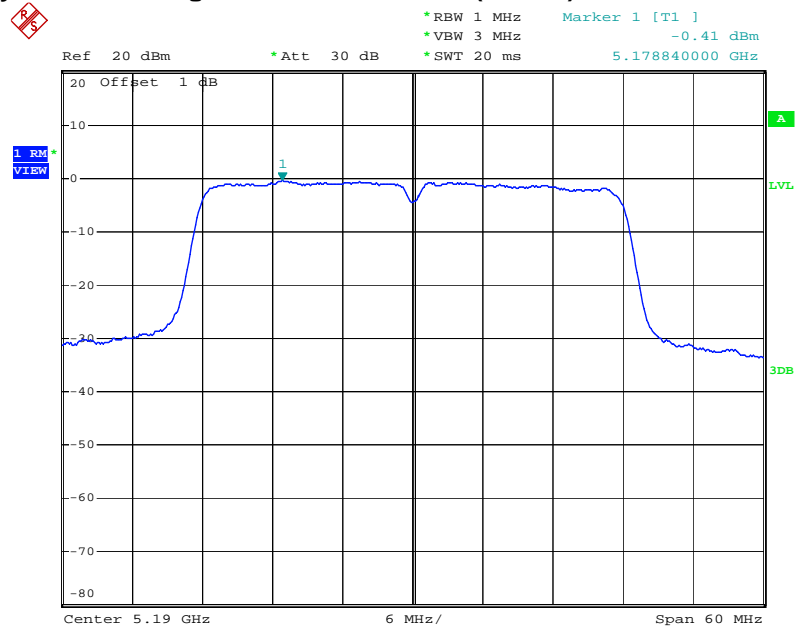
Power Density Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 1



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

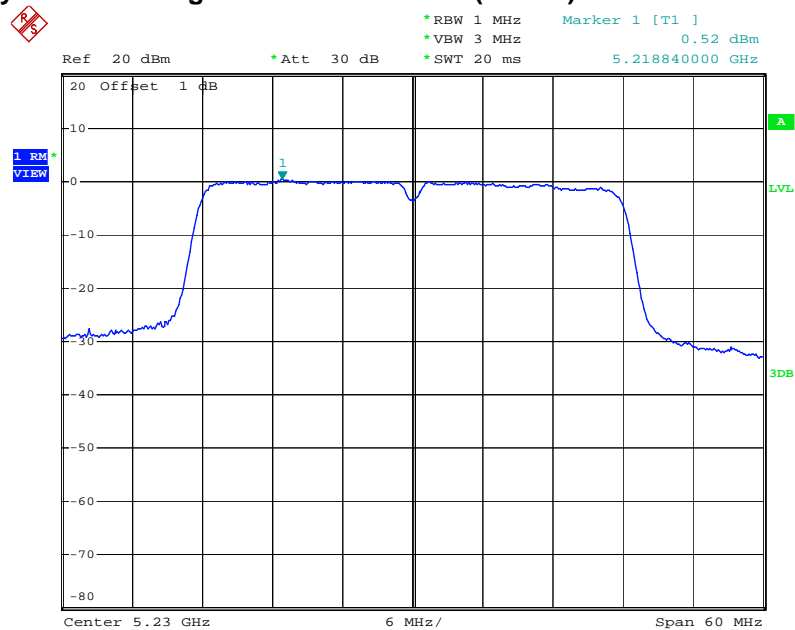


## Power Density Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2



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

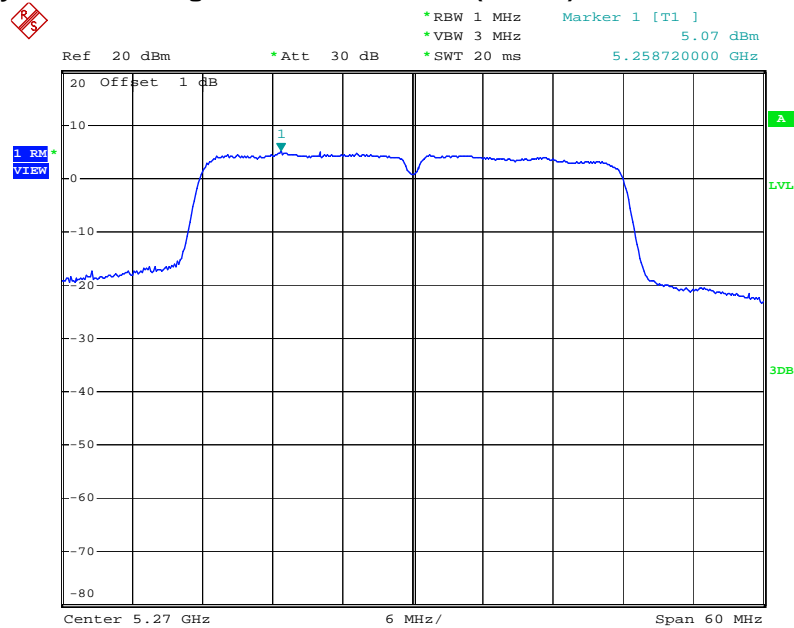
## Power Density Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



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

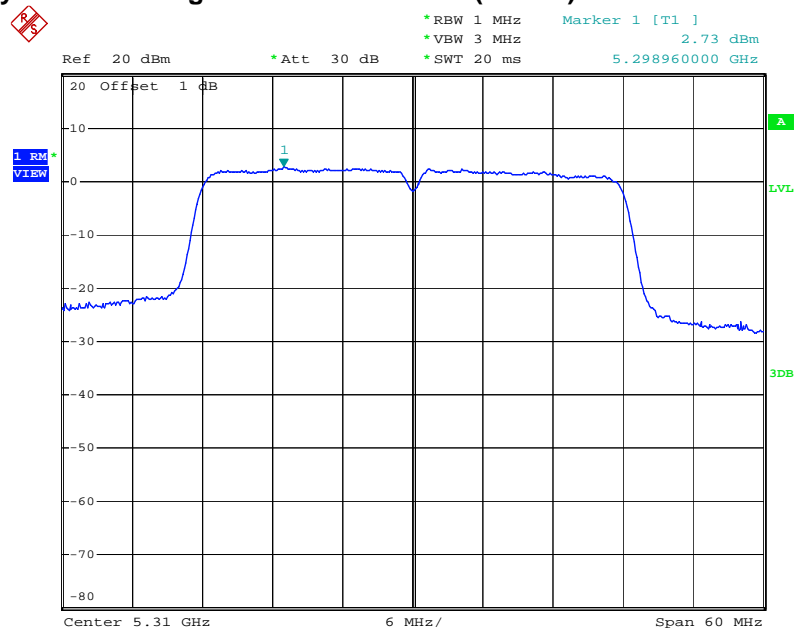


## Power Density Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 2



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

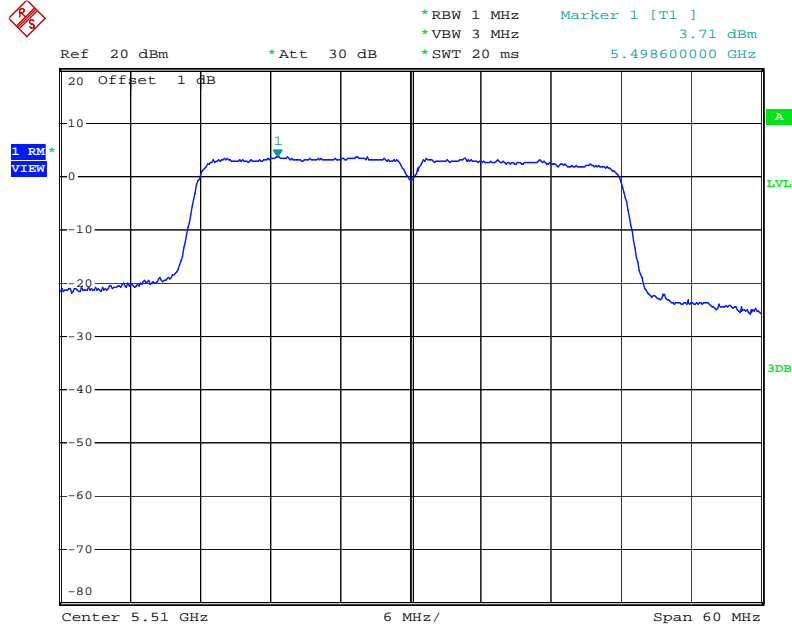
## Power Density Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 2



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

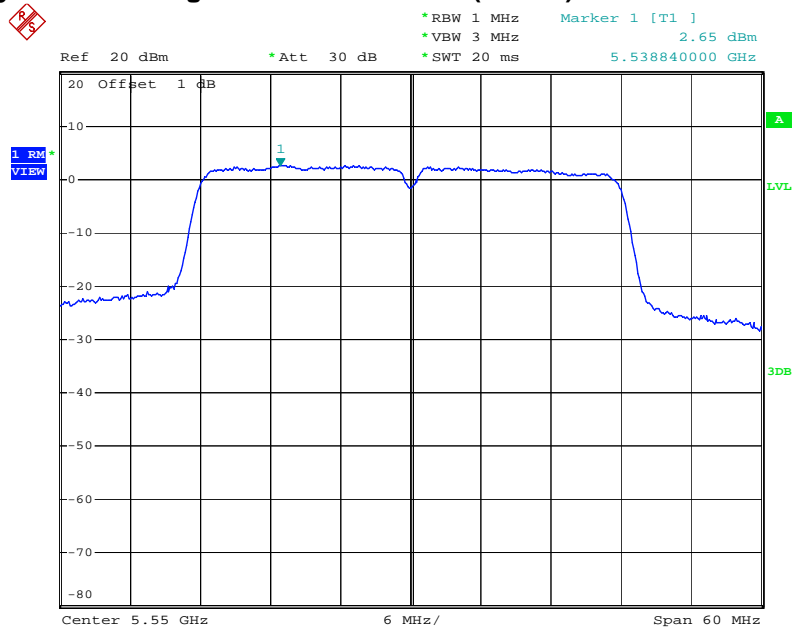


Power Density Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 2



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

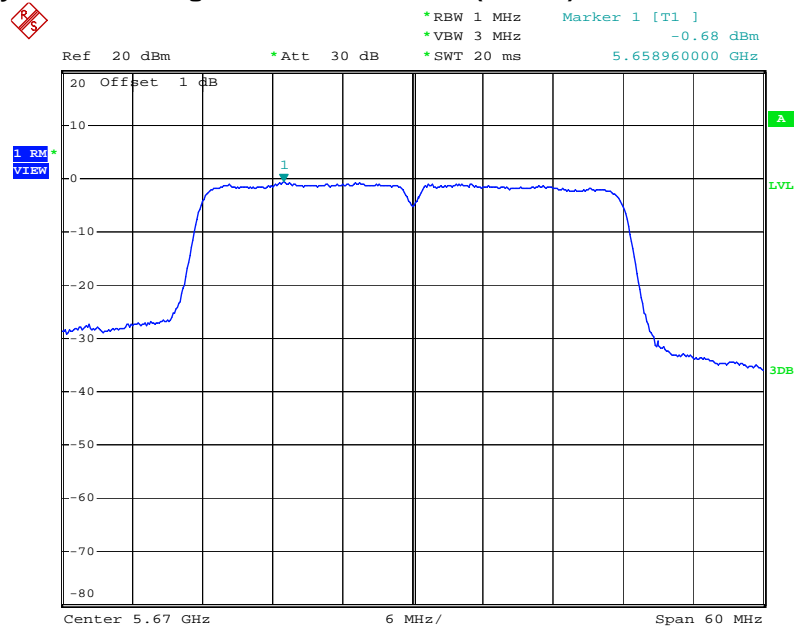
Power Density Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 2



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

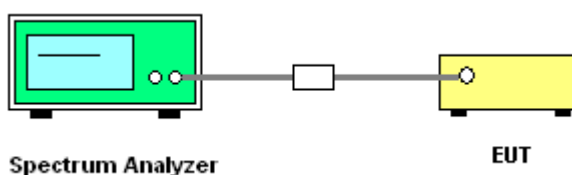
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| 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  $\geq 1/4\mu\text{s}$ ). Use sample detector mode if bin width (i.e., span/number of points in spectrum)  $< 0.5$  RBW. Otherwise use peak detector mode. Set max hold. Allow max hold to run for 60 seconds.
5. Measuring multiple antennas, the connectors are required to link with Spectrum Analyzer through a combiner. (Only for IEEE 802.11n test)

#### 3.5.4 Test Setup Layout



#### 3.5.5 Test Deviation

There is no deviation with the original standard.

#### 3.5.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



**3.5.7 Test Result of Peak Excursion**

|                        |               |                       |           |
|------------------------|---------------|-----------------------|-----------|
| <b>Final Test Date</b> | Apr. 25, 2012 | <b>Test Site No.</b>  | TH01-HY   |
| <b>Temperature</b>     | 25.9℃         | <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**

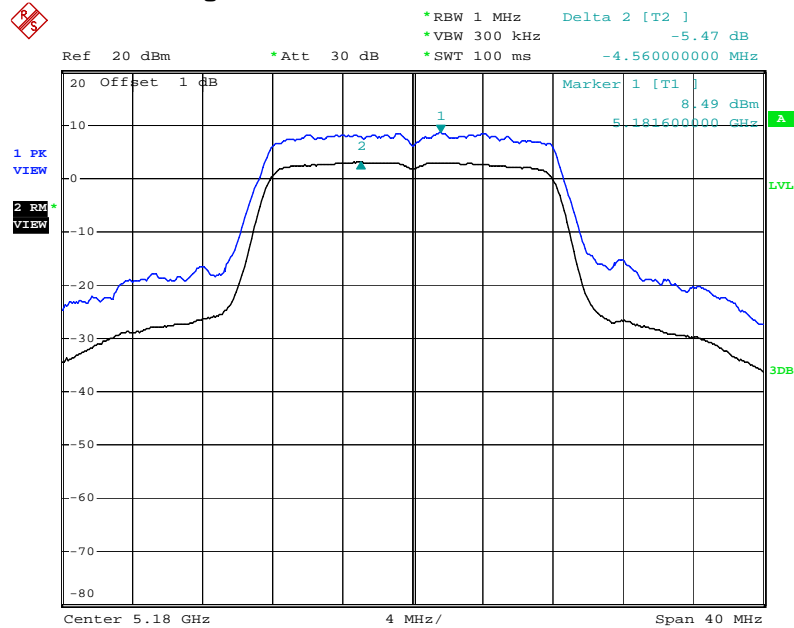
| Frequency | Peak Excursion (dB) | Max. Limit (dB) | Result   |
|-----------|---------------------|-----------------|----------|
| 5190 MHz  | 6.56                | 13              | Complies |
| 5230 MHz  | 6.72                | 13              | Complies |
| 5270 MHz  | 7.02                | 13              | 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 |

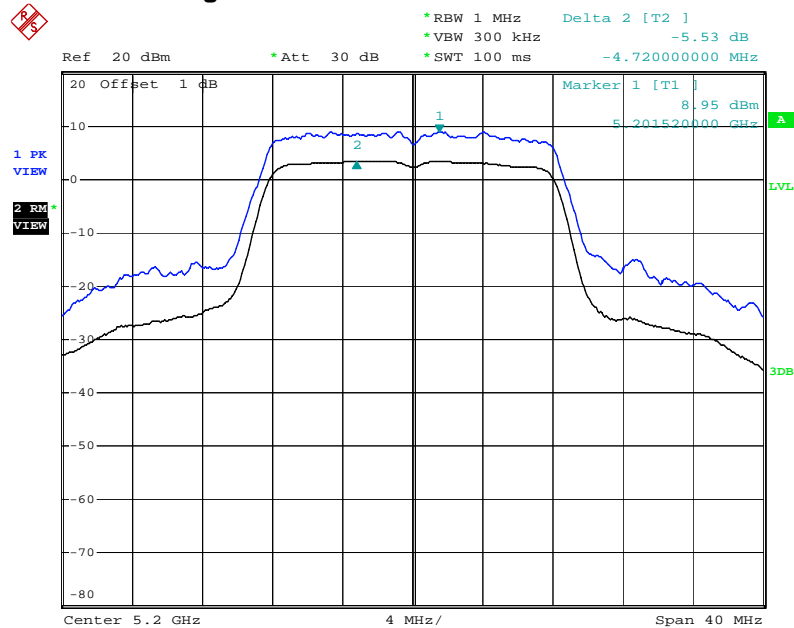


For Single Chain:  
Peak Excursion Plot on Configuration IEEE 802.11a 5180 MHz Port 2



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

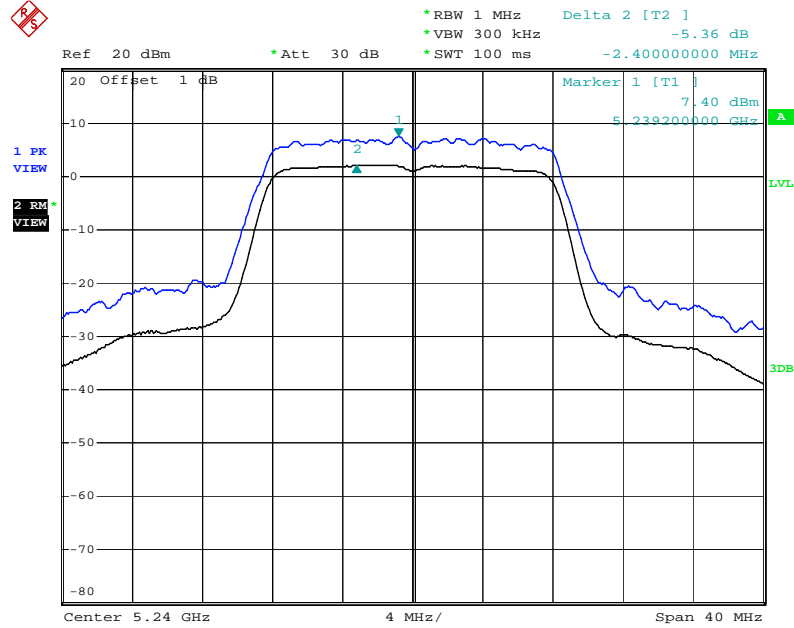
Peak Excursion Plot on Configuration IEEE 802.11a 5200 MHz Port 2



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

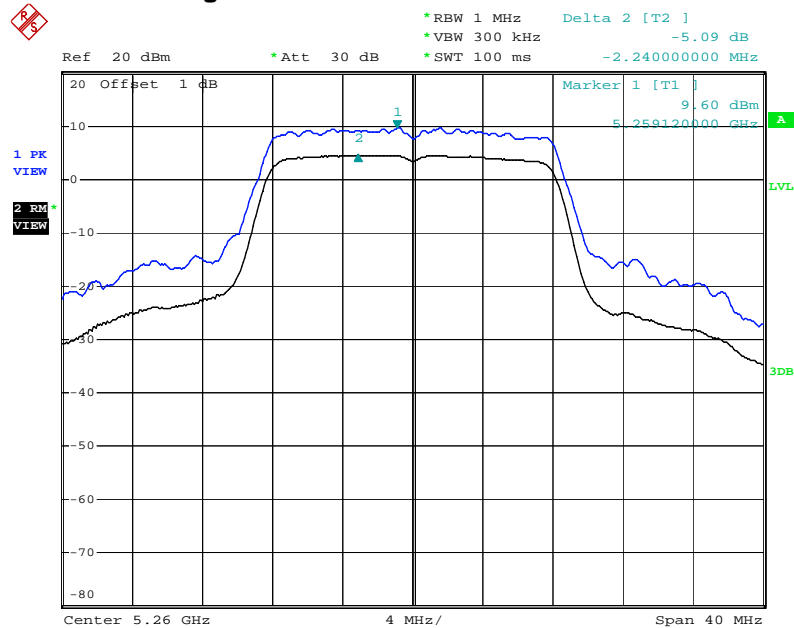


Peak Excursion Plot on Configuration IEEE 802.11a 5240 MHz Port 2



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

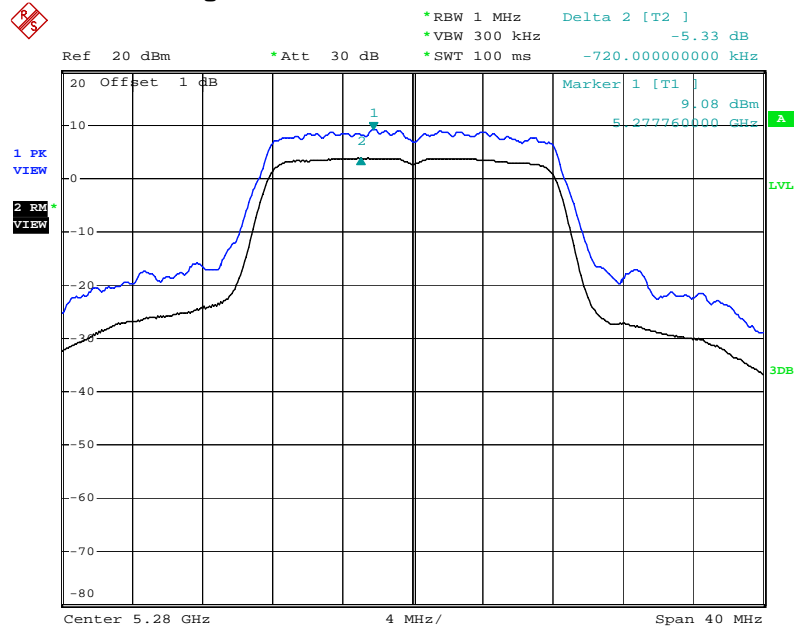
Peak Excursion Plot on Configuration IEEE 802.11a 5260 MHz Port 2



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

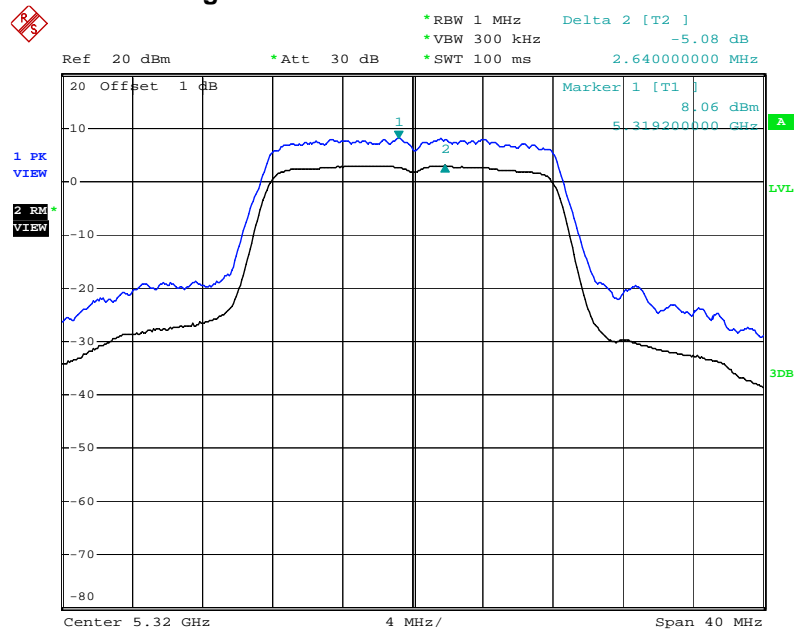


## Peak Excursion Plot on Configuration IEEE 802.11a 5280 MHz Port 2



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

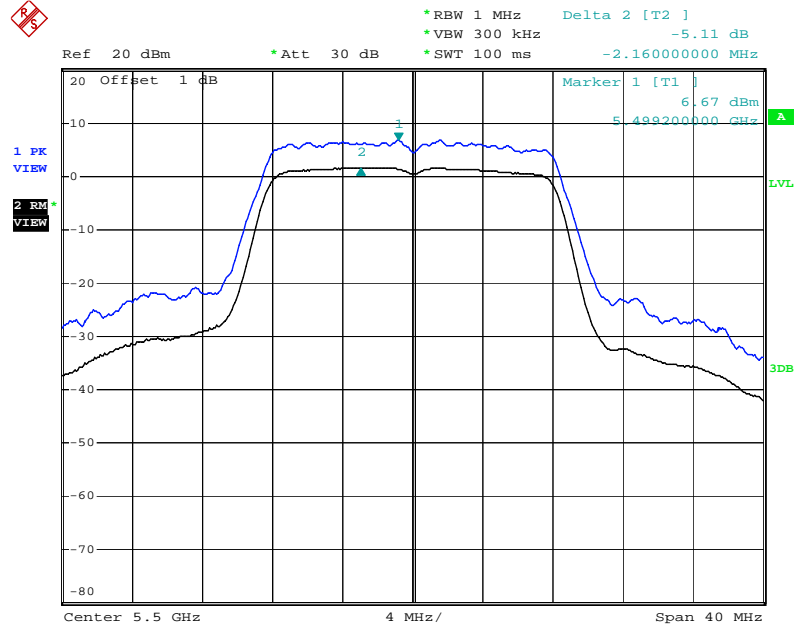
## Peak Excursion Plot on Configuration IEEE 802.11a 5320 MHz Port 2



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

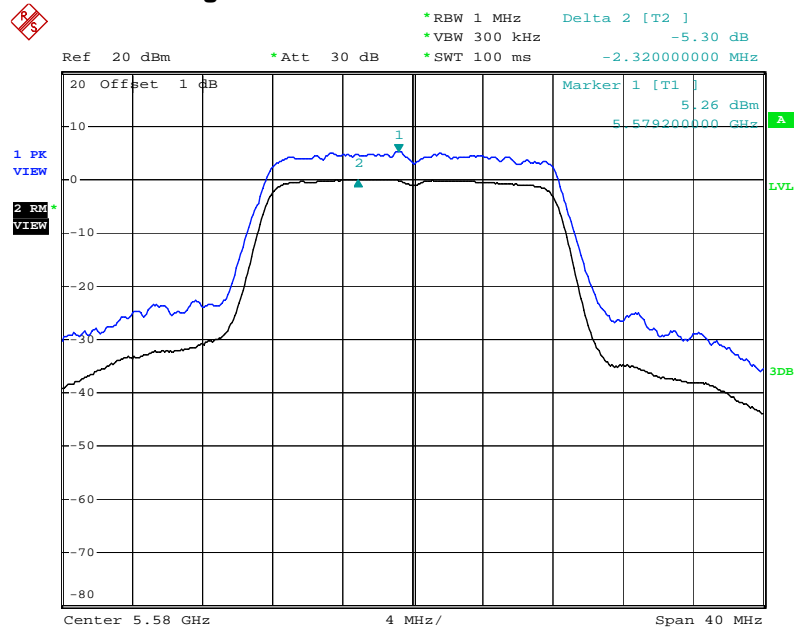


Peak Excursion Plot on Configuration IEEE 802.11a 5500 MHz Port 2



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

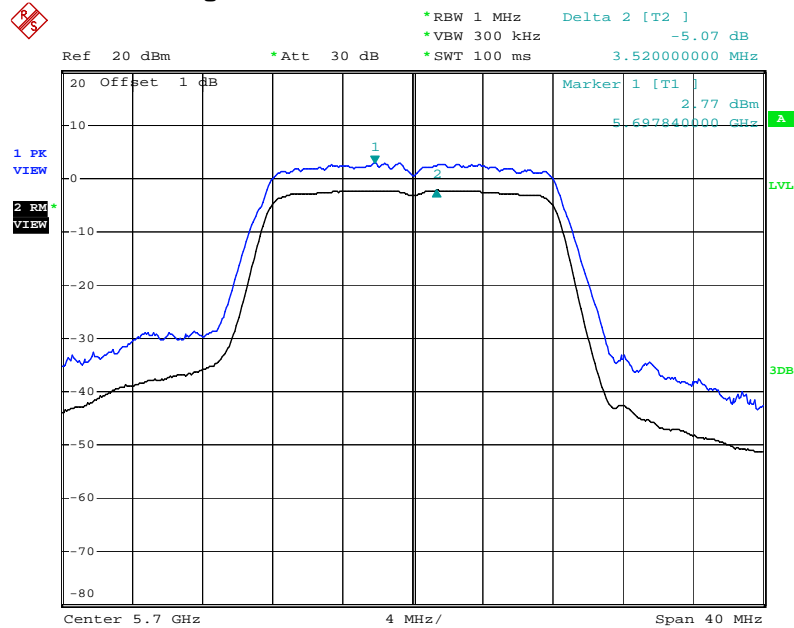
Peak Excursion Plot on Configuration IEEE 802.11a 5580 MHz Port 2



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



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

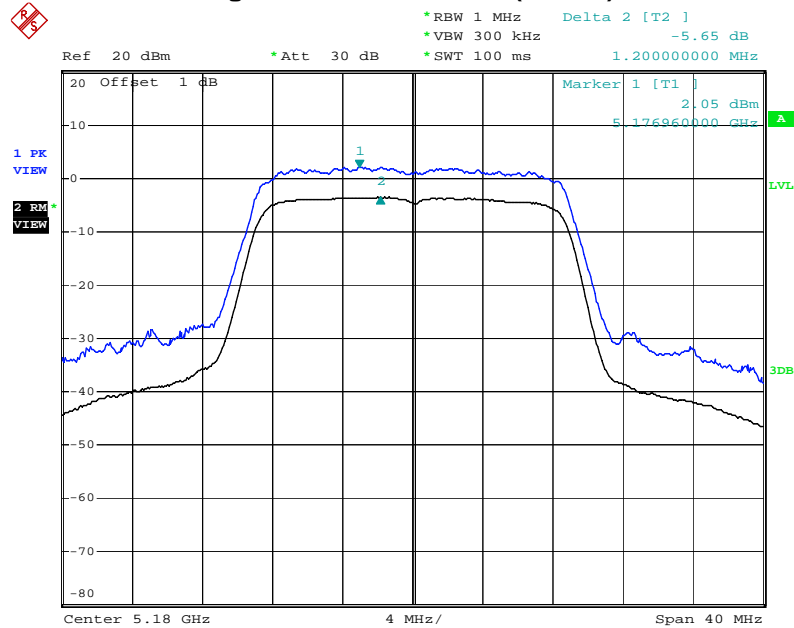


Date: 25.APR.2012 14:40:19



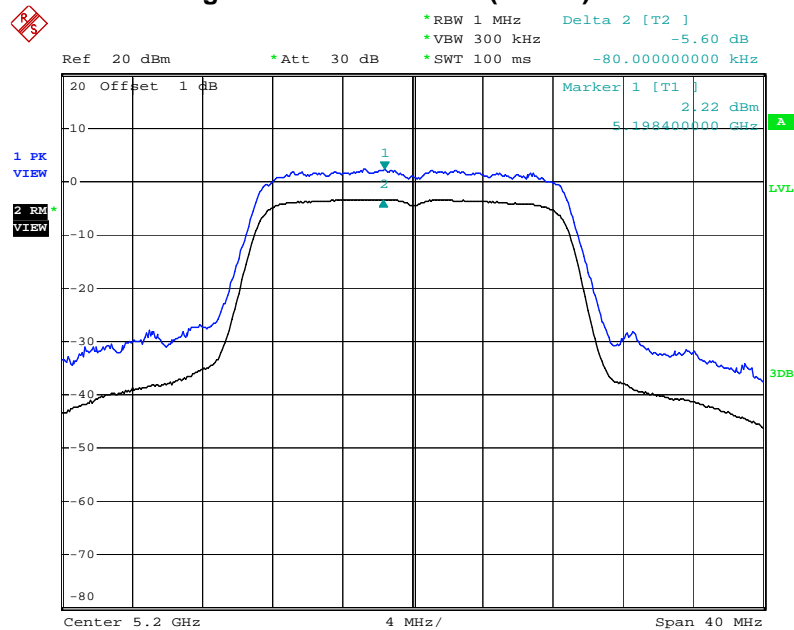
For Two Chains:

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



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

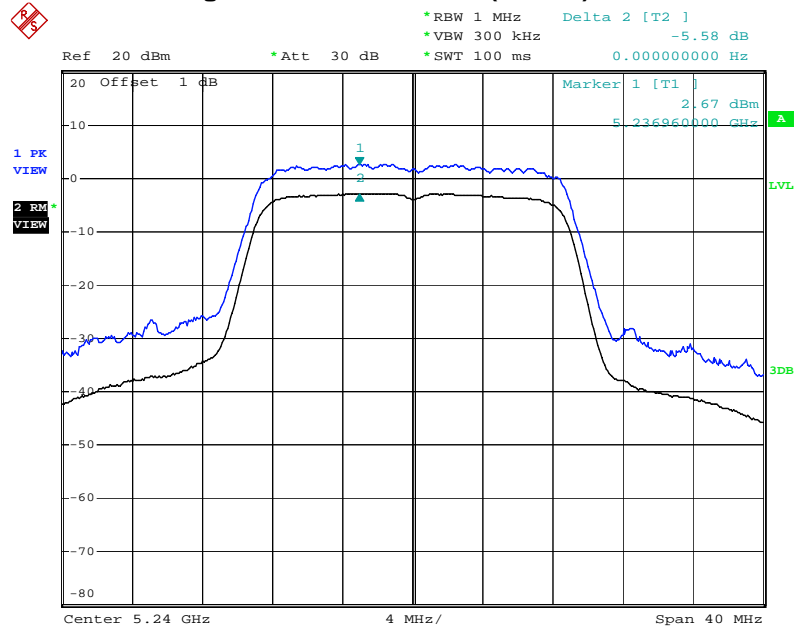
Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 1



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

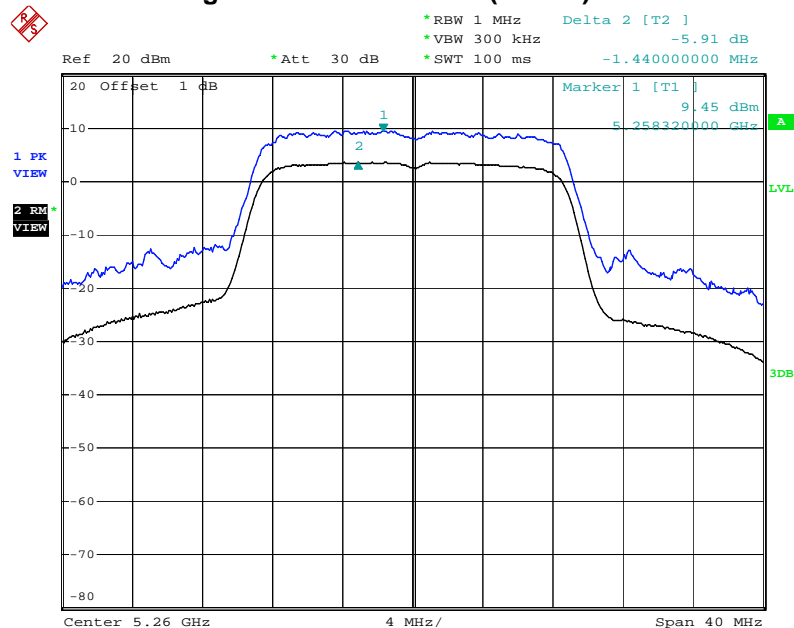


## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 1



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

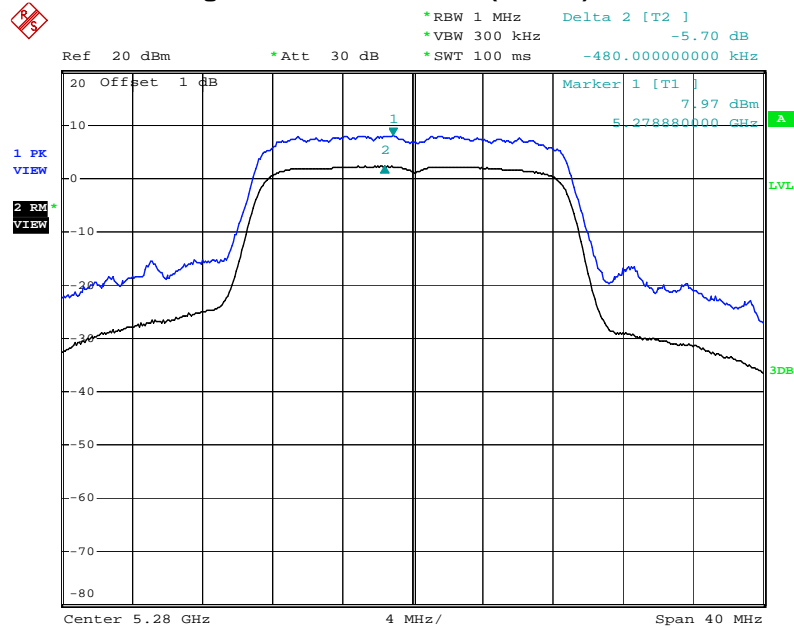
## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 1



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

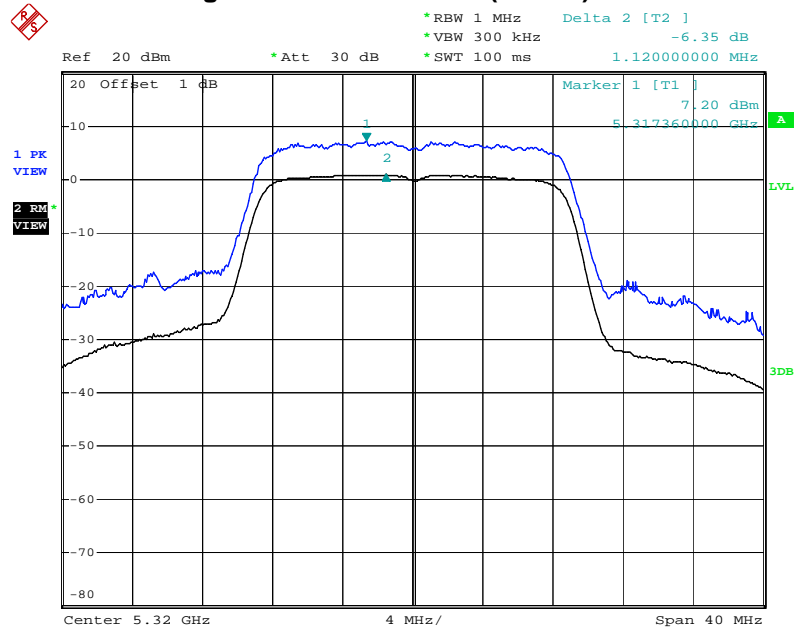


## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 1



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

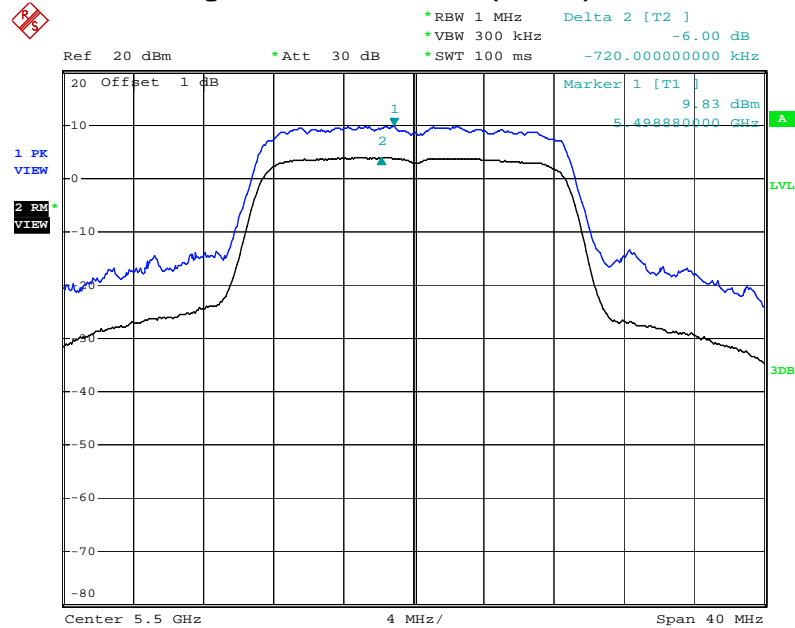
## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 1



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

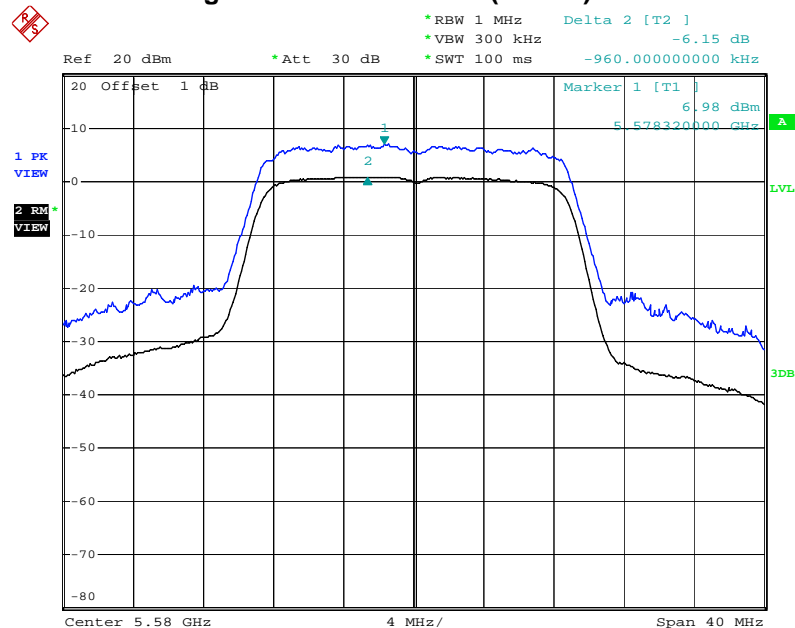


## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 1



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

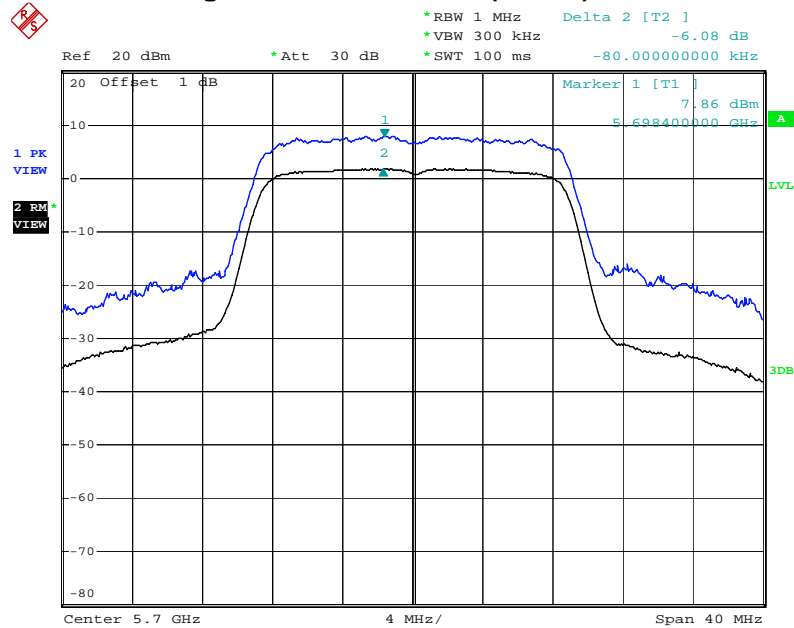
## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 1



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



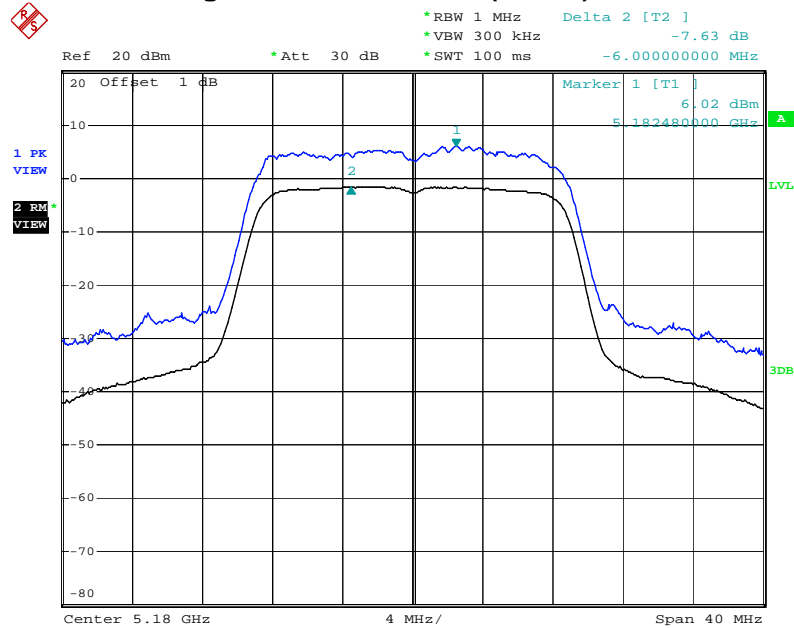
Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 1



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

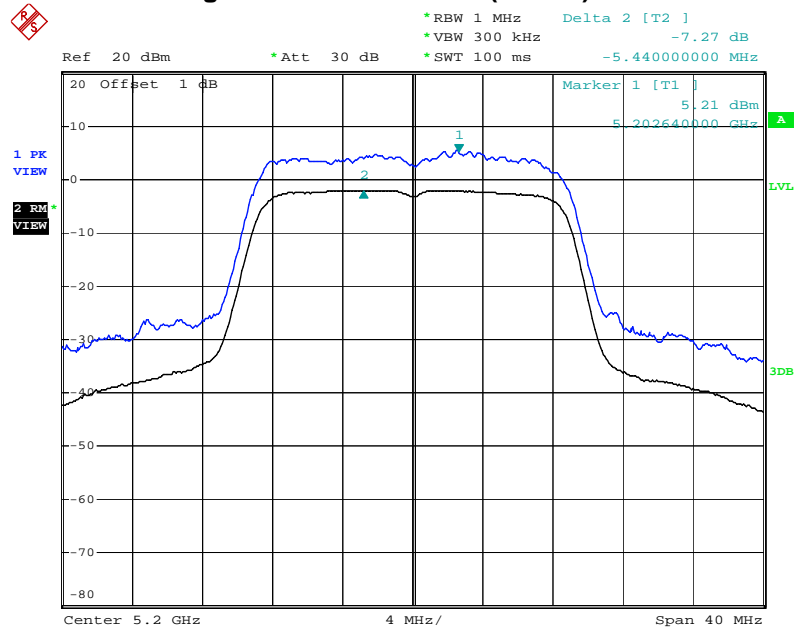


## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5180 MHz Port 2



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

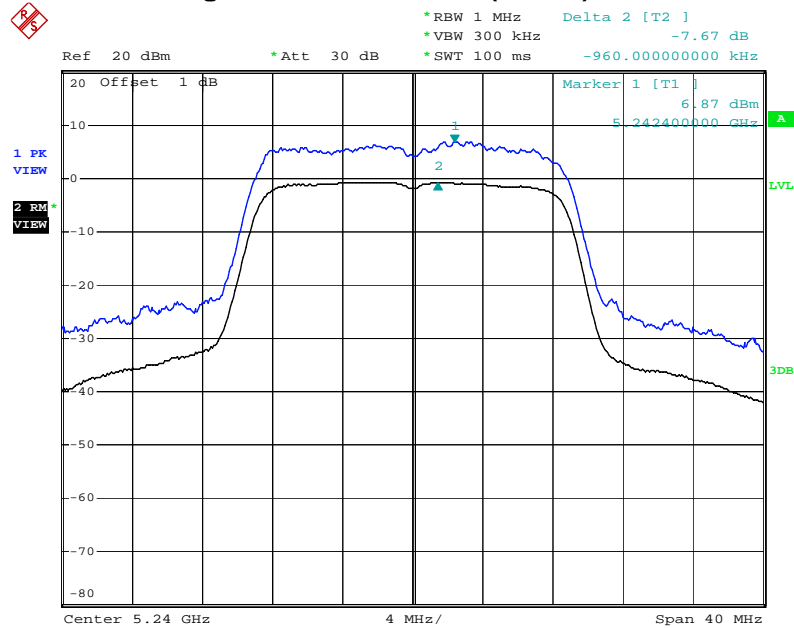
## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5200 MHz Port 2



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

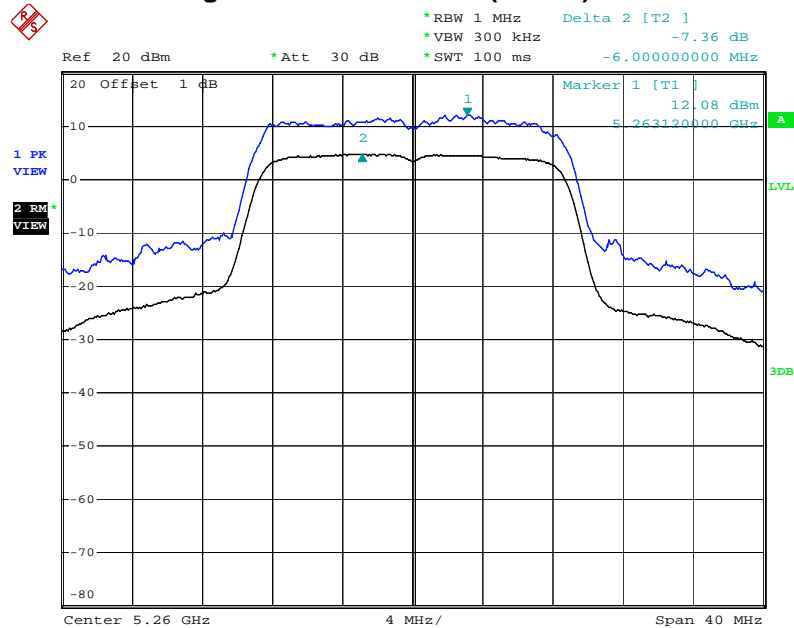


Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5240 MHz Port 2



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

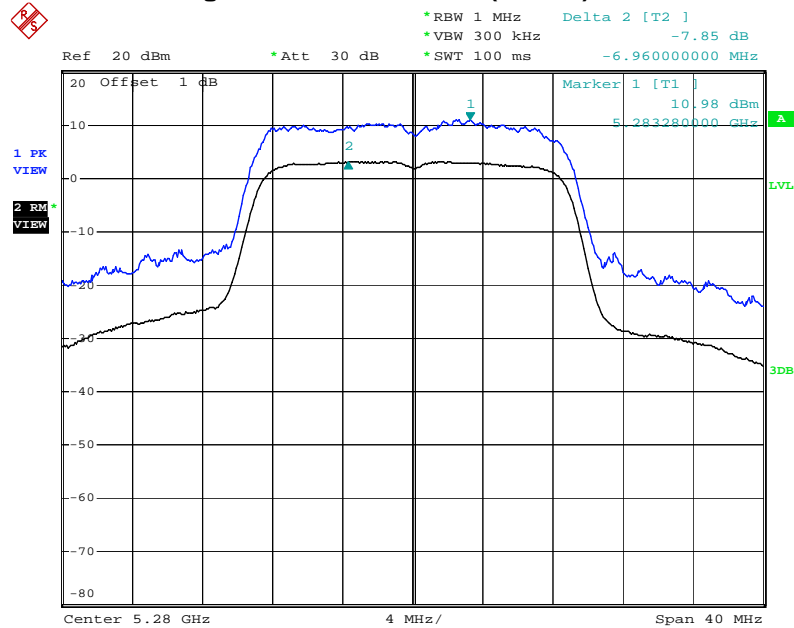
Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5260 MHz Port 2



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

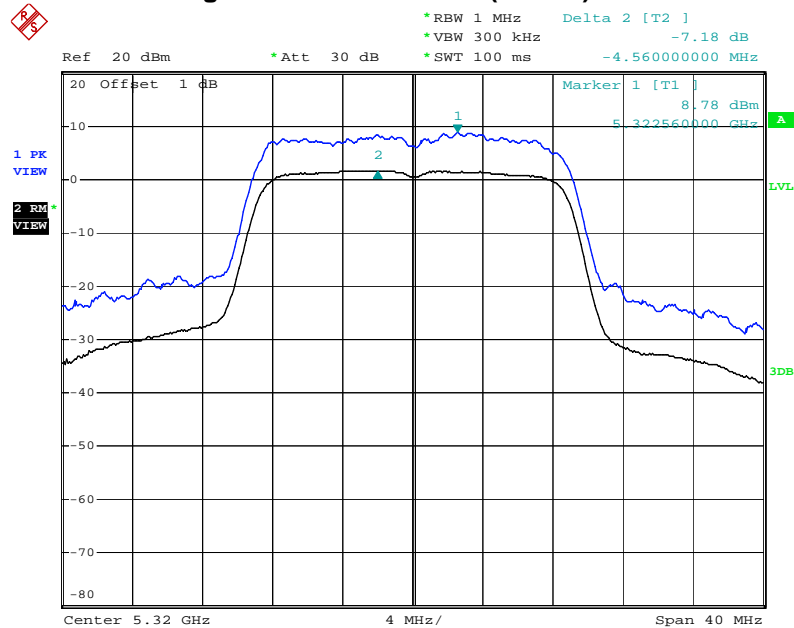


Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5280 MHz Port 2



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

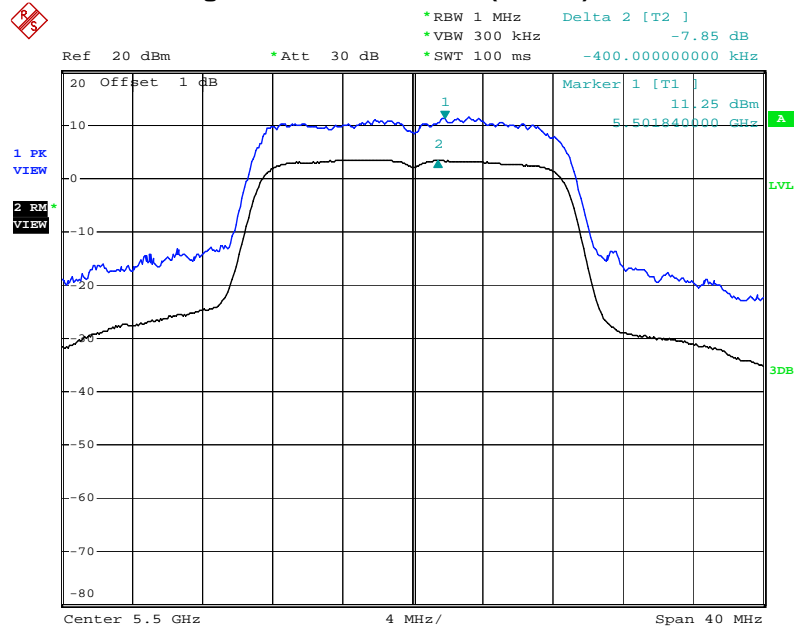
Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5320 MHz Port 2



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

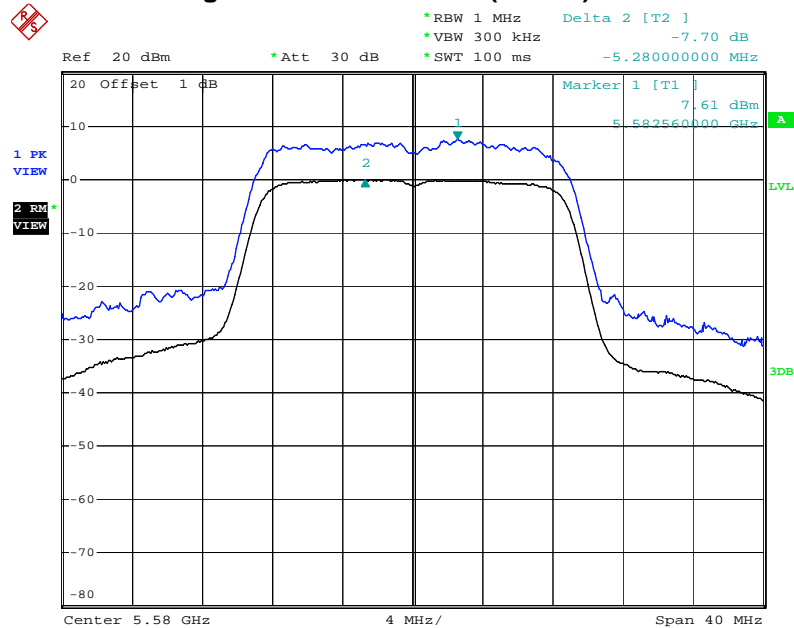


## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5500 MHz Port 2



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

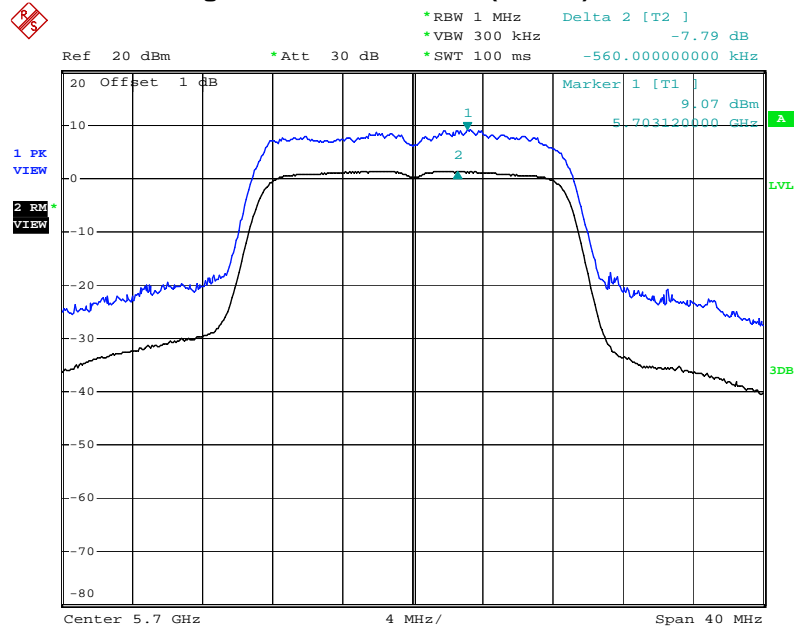
## Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5580 MHz Port 2



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



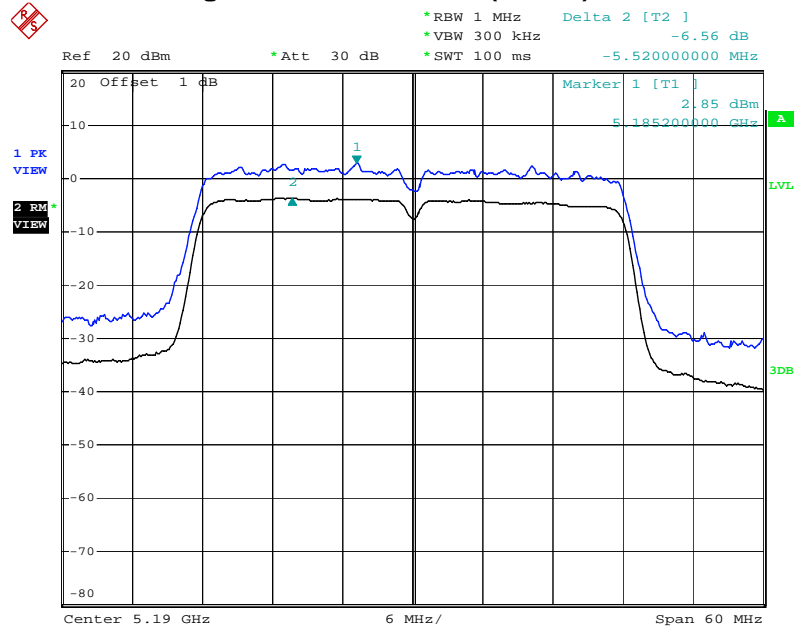
Peak Excursion Plot on Configuration IEEE 802.11n (20MHz) 5700 MHz Port 2



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

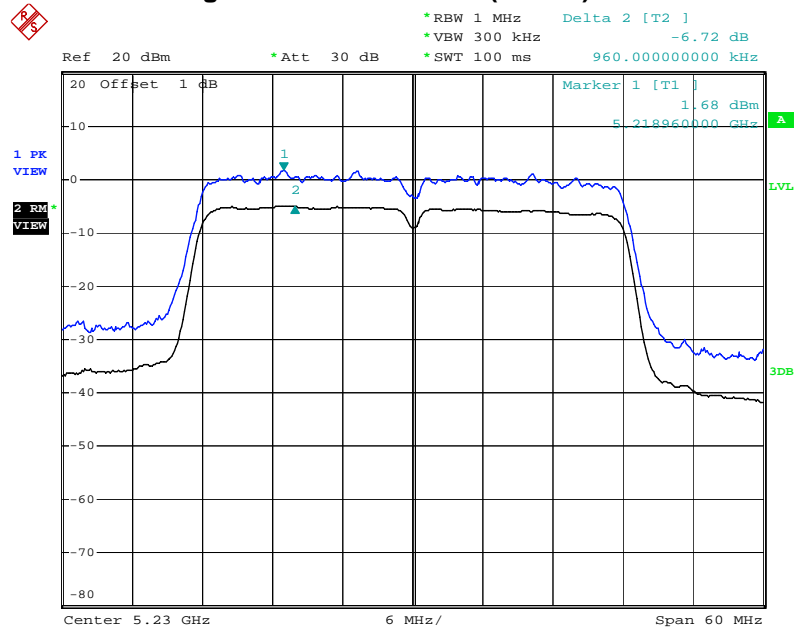


## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 1



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

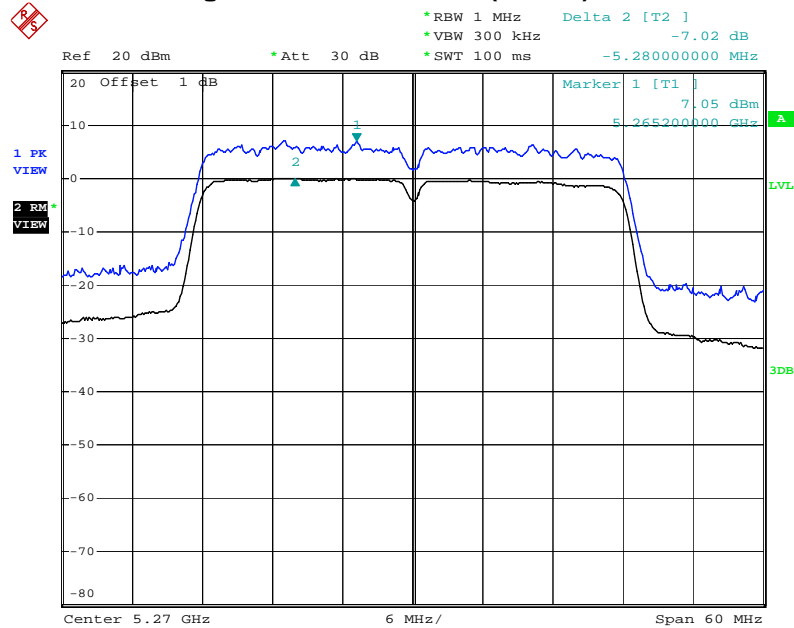
## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 1



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

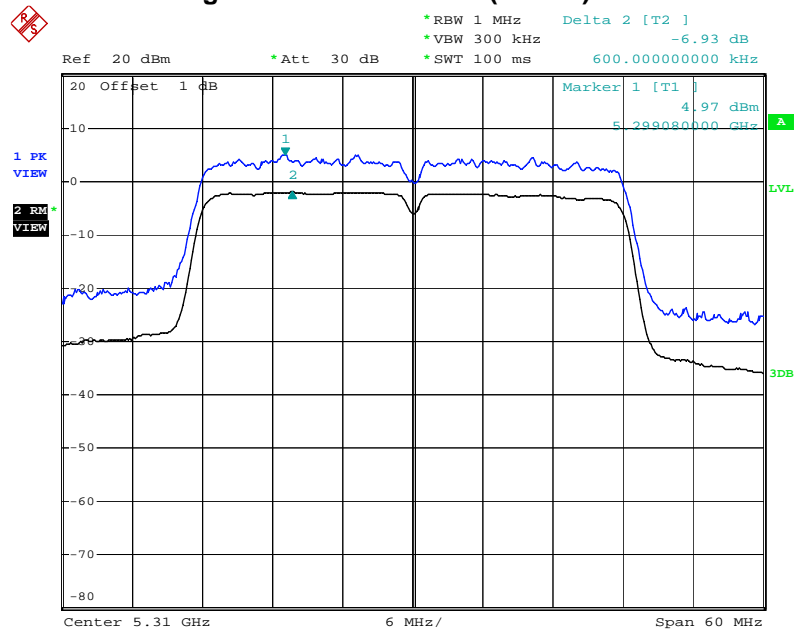


## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 1



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

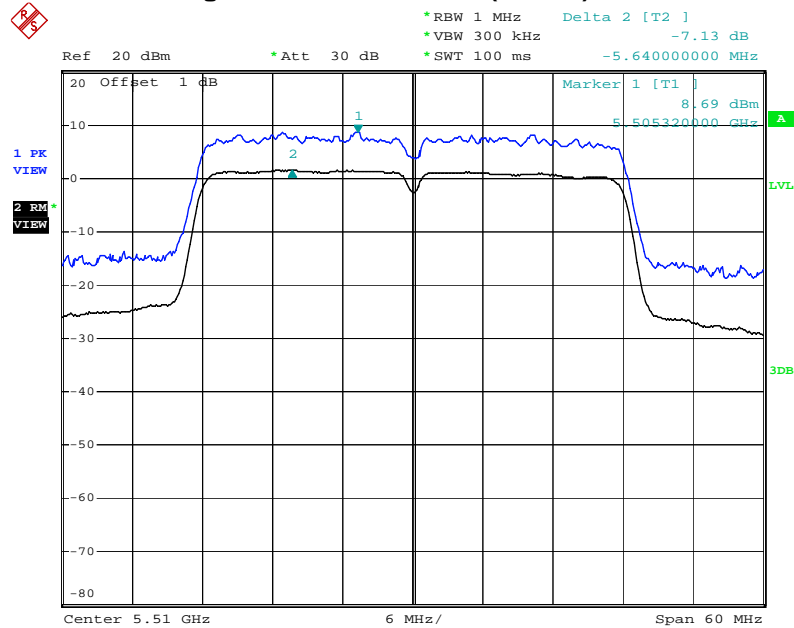
## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 1



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

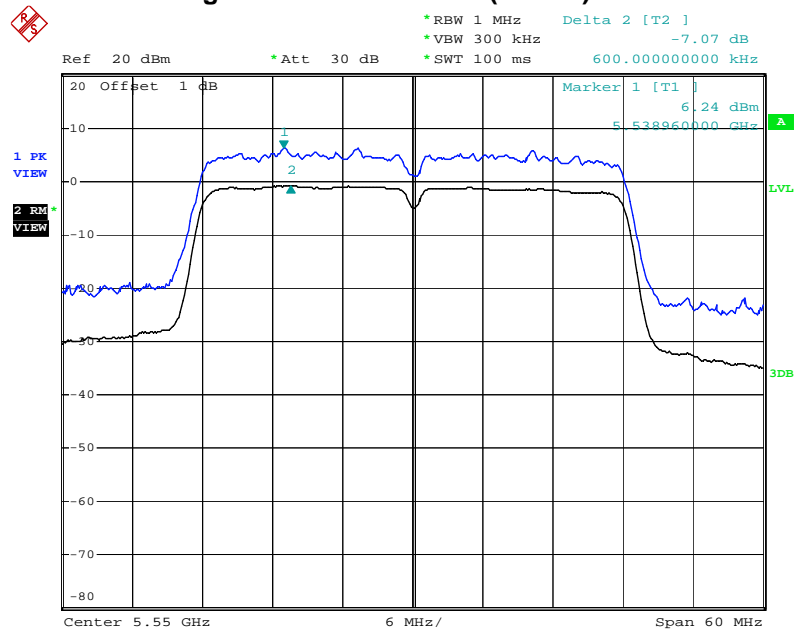


## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 1



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

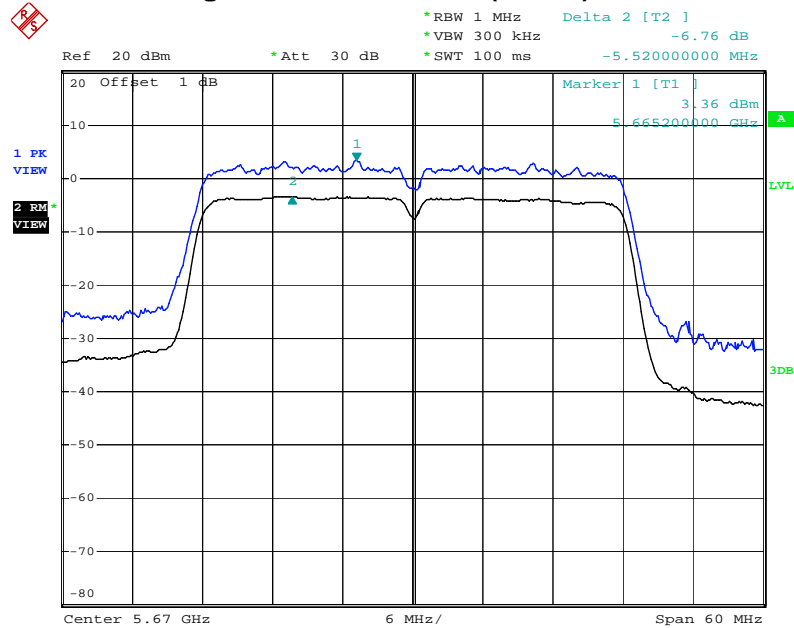
## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 1



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



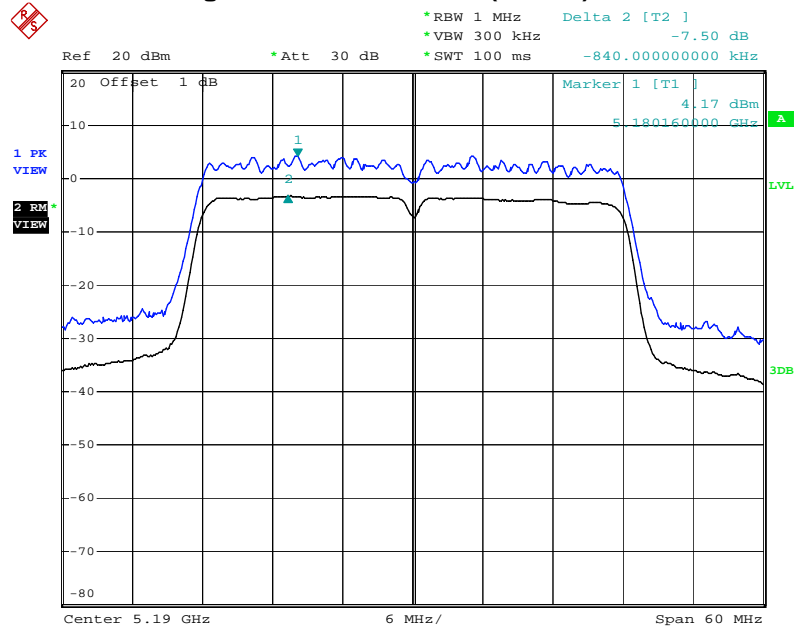
Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5670 MHz Port 1



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

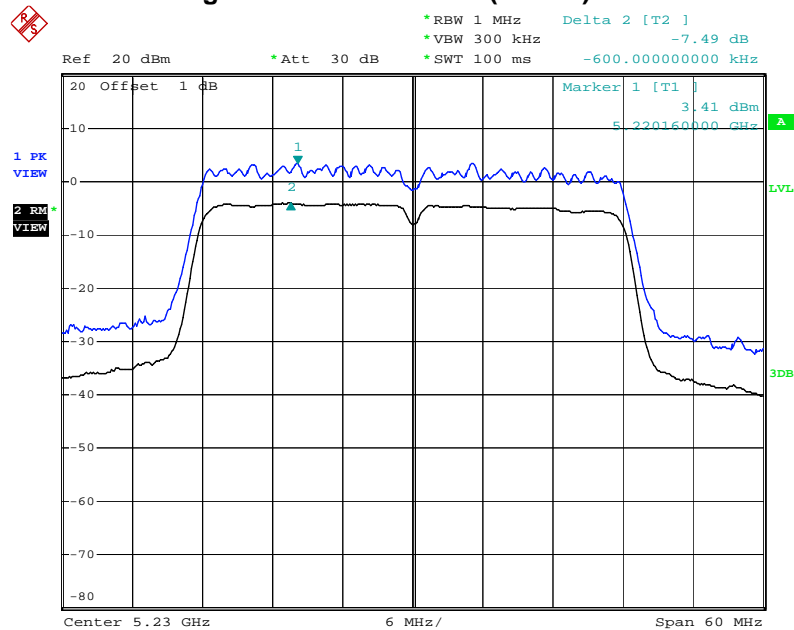


Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5190 MHz Port 2



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

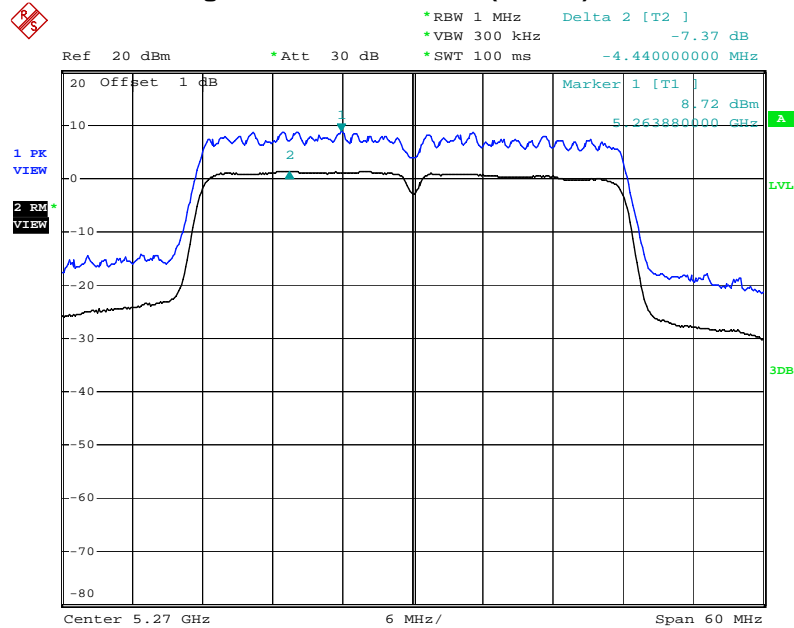
Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5230 MHz Port 2



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

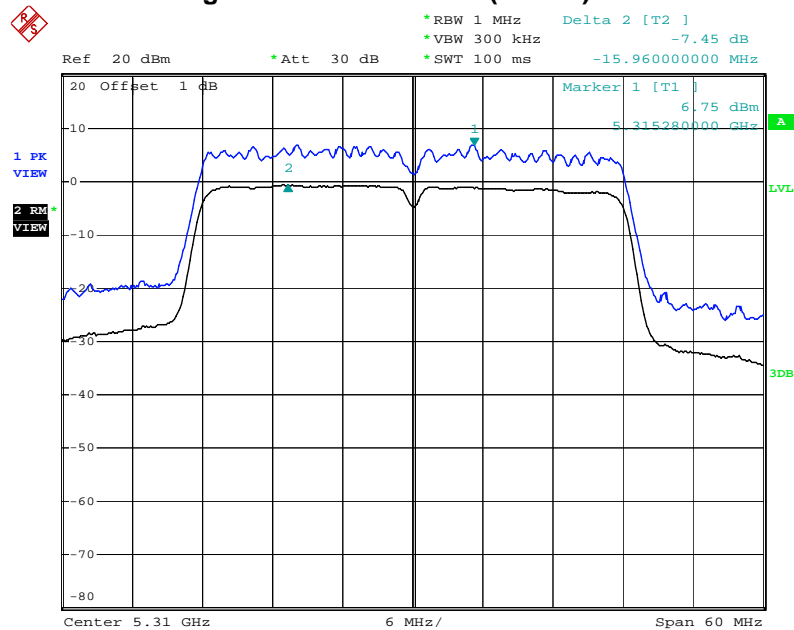


## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5270 MHz Port 2



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

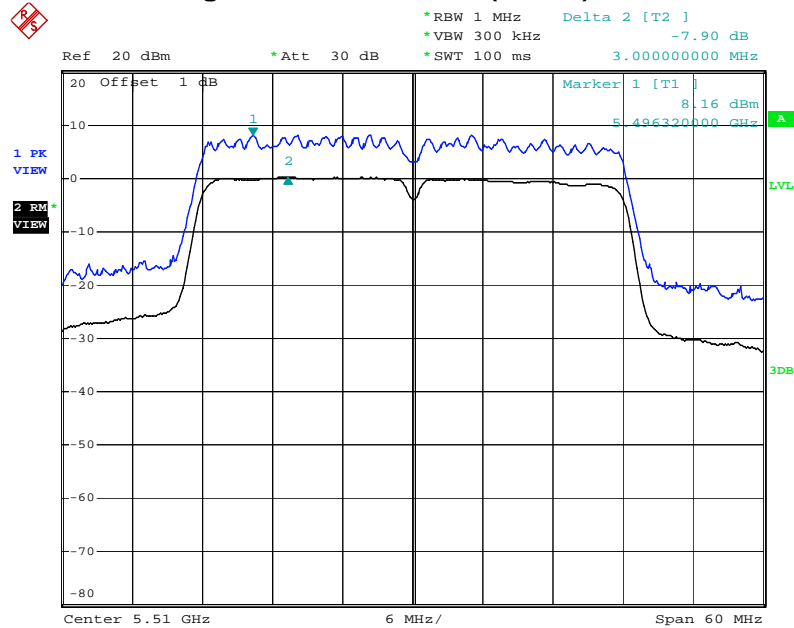
## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5310 MHz Port 2



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

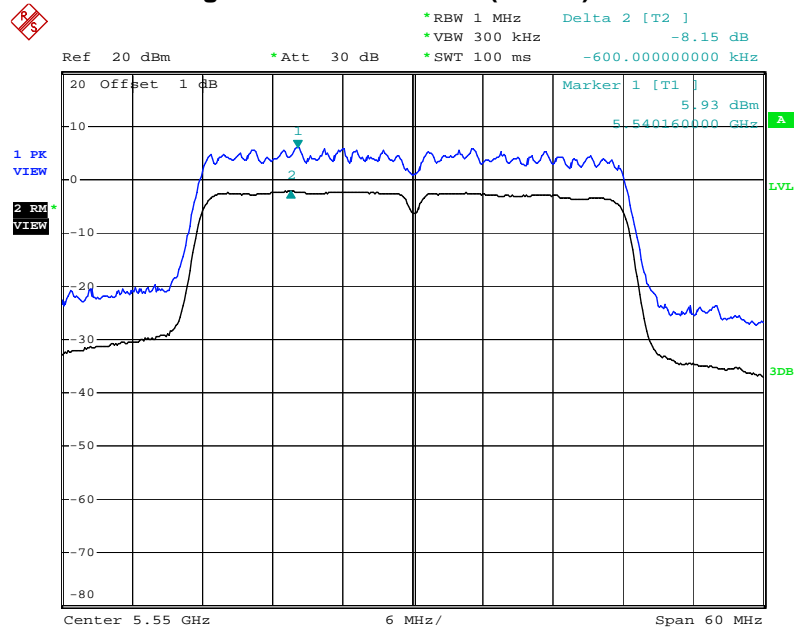


## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5510 MHz Port 2



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

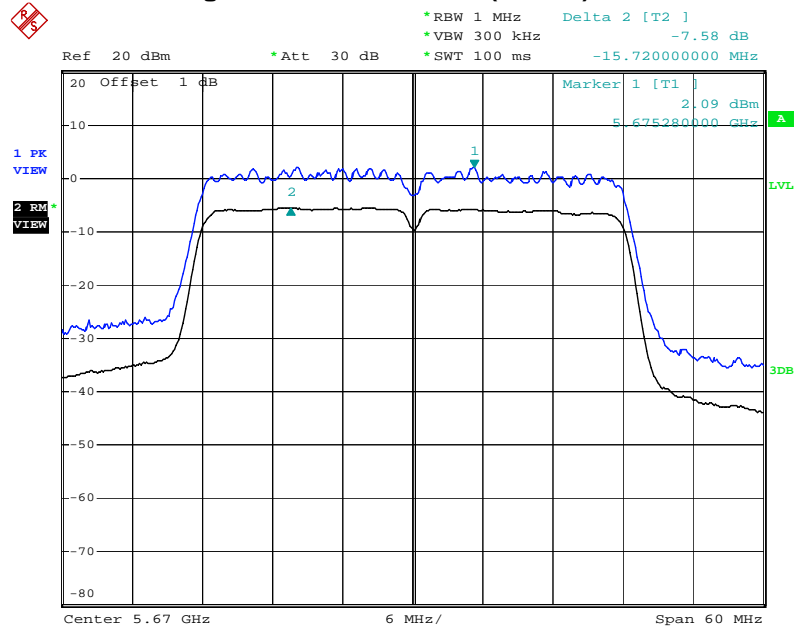
## Peak Excursion Plot on Configuration IEEE 802.11n (40MHz) 5550 MHz Port 2



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 5.15~5.35 GHz band: all emissions outside of the 5.15~5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.47~5.725 GHz band: all emissions outside of the 5.47~5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 2.2(a), then the 2.2(b) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009~0.490       | 2400/F(kHz)                       | 300                           |
| 0.490~1.705       | 24000/F(kHz)                      | 30                            |
| 1.705~30.0        | 30                                | 30                            |
| 30~88             | 100                               | 3                             |
| 88~216            | 150                               | 3                             |
| 216~960           | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

#### 3.6.2 Measuring Instruments and Setting

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

| Spectrum Parameter                        | Setting  |
|---|--|
| Attenuation                               | Auto   |
| Start Frequency                           | 1000 MHz                                       |
| Stop Frequency                            | 40 GHz   |
| RB / VB (Emission in restricted band)     | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz z for peak                         |

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



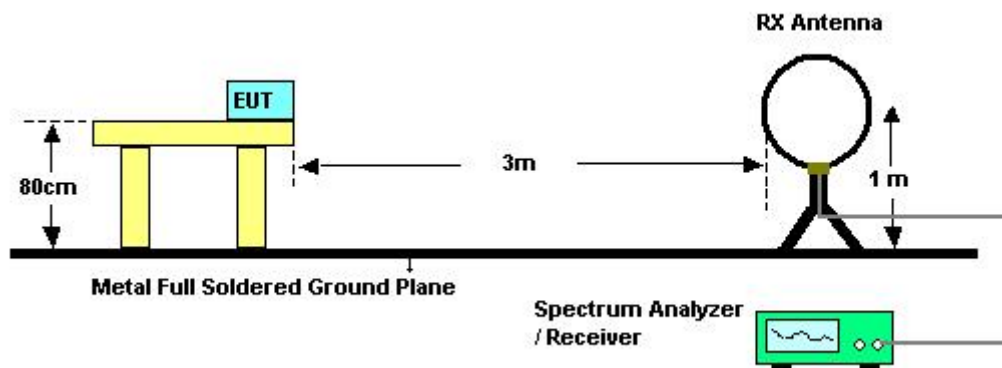
**3.6.3 Test Procedures**

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

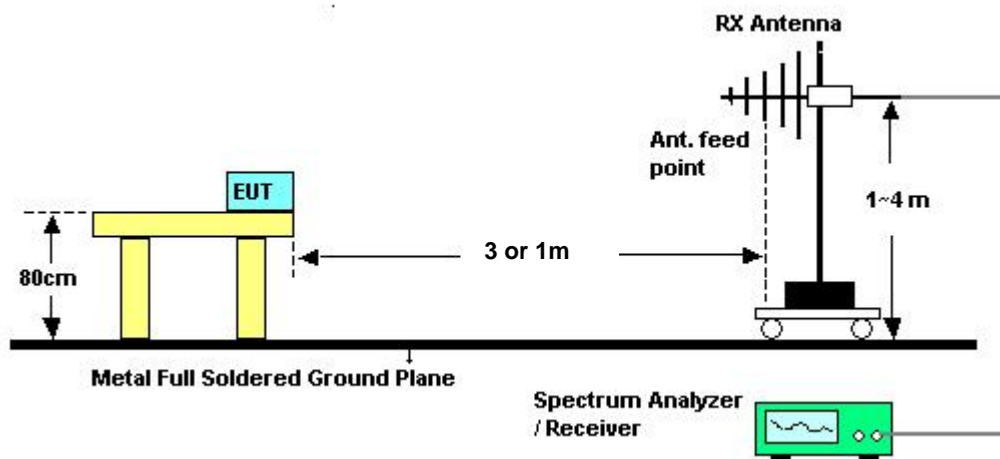


### 3.6.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

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

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

### 3.6.5 Test Deviation

There is no deviation with the original standard.

### 3.6.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



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

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

| <b>Freq.<br/>(MHz)</b> | <b>Level<br/>(dBuV)</b> | <b>Over Limit<br/>(dB)</b> | <b>Limit Line<br/>(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.

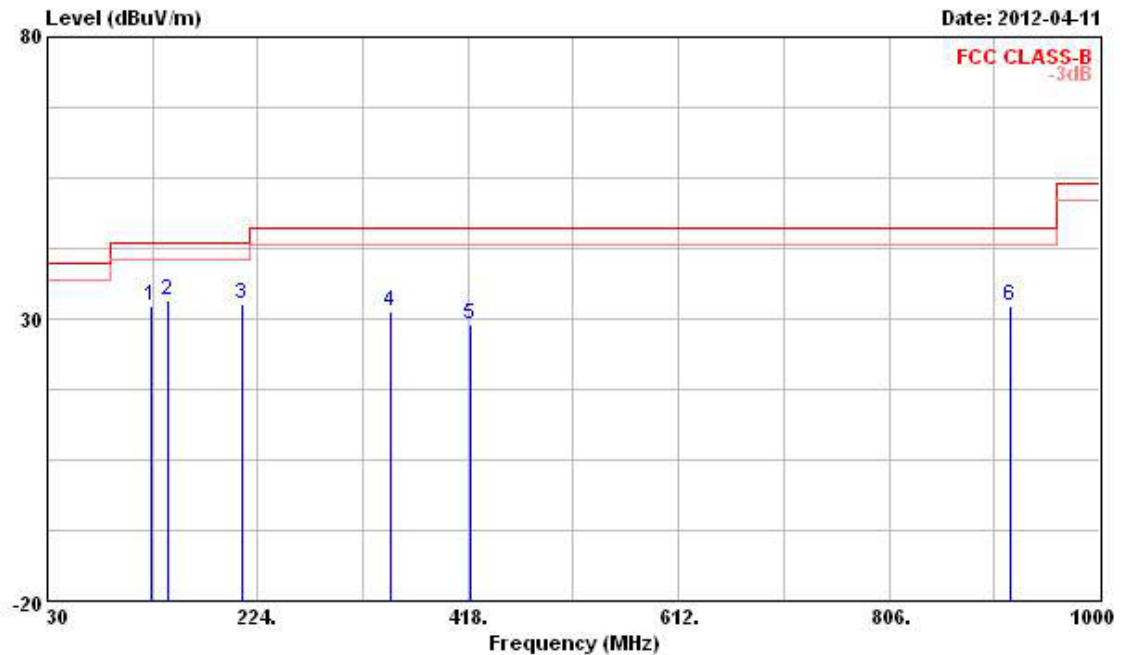
Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

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



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

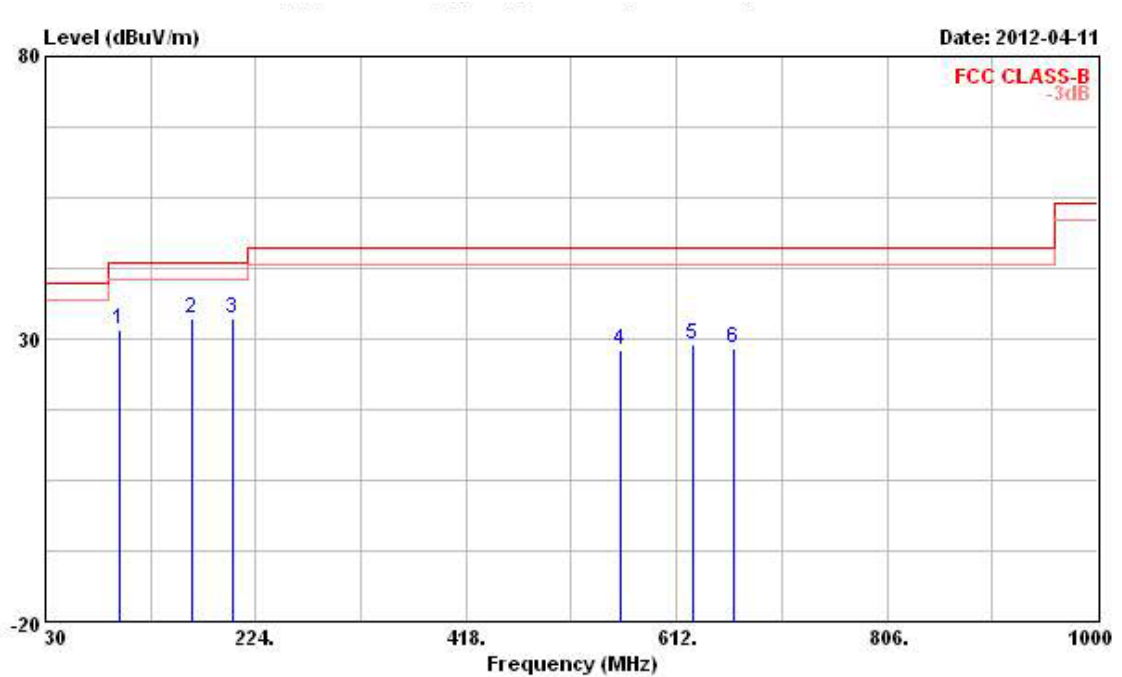
|                 |               |                |             |
|-----------------|---------------|----------------|-------------|
| Final Test Date | Apr. 11, 2012 | Test Site No.  | 03CH02-HY   |
| Temperature     | 23.9℃         | Humidity       | 63%         |
| Test Engineer   | Streak      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

**Horizontal**

|   | Freq    | Level  | Over   | Limit  | ReadAntenna | Cable  | Preamp |        |        | Ant | Table |
|---|---------|--------|--------|--------|-------------|--------|--------|--------|--------|-----|-------|
|   | MHz     | dBuV/m | Limit  | Line   | Level       | Factor | Loss   | Factor | Remark | Pos | Pos   |
|   |         |        | dB     | dBuV/m | dBuV        | dB/m   | dB     | dB     |        | cm  | deg   |
| 1 | 126.030 | 32.18  | -11.32 | 43.50  | 44.95       | 13.10  | 1.87   | 27.74  | Peak   | --- | ---   |
| 2 | 141.550 | 33.13  | -10.37 | 43.50  | 47.02       | 11.78  | 2.00   | 27.67  | Peak   | --- | ---   |
| 3 | 210.420 | 32.71  | -10.79 | 43.50  | 45.89       | 11.70  | 2.50   | 27.38  | Peak   | --- | ---   |
| 4 | 347.190 | 31.33  | -14.67 | 46.00  | 41.22       | 14.43  | 3.17   | 27.49  | Peak   | --- | ---   |
| 5 | 419.940 | 29.02  | -16.98 | 46.00  | 37.86       | 15.66  | 3.47   | 27.97  | Peak   | --- | ---   |
| 6 | 917.550 | 32.15  | -13.85 | 46.00  | 33.87       | 20.46  | 5.35   | 27.53  | 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 | 98.870  | 31.72  | -11.78     | 43.50      | 46.91             | 11.01          | 1.65       | 27.85         | Peak   | ---     | ---       |
| 2 | 164.830 | 33.49  | -10.01     | 43.50      | 48.57             | 10.34          | 2.14       | 27.56         | Peak   | ---     | ---       |
| 3 | 202.660 | 33.51  | -9.99      | 43.50      | 47.02             | 11.45          | 2.44       | 27.40         | Peak   | ---     | ---       |
| 4 | 559.620 | 27.98  | -18.02     | 46.00      | 33.32             | 19.00          | 4.08       | 28.42         | Peak   | ---     | ---       |
| 5 | 626.550 | 28.94  | -17.06     | 46.00      | 33.20             | 19.83          | 4.32       | 28.41         | Peak   | ---     | ---       |
| 6 | 664.380 | 28.39  | -17.61     | 46.00      | 32.98             | 19.32          | 4.43       | 28.34         | 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.

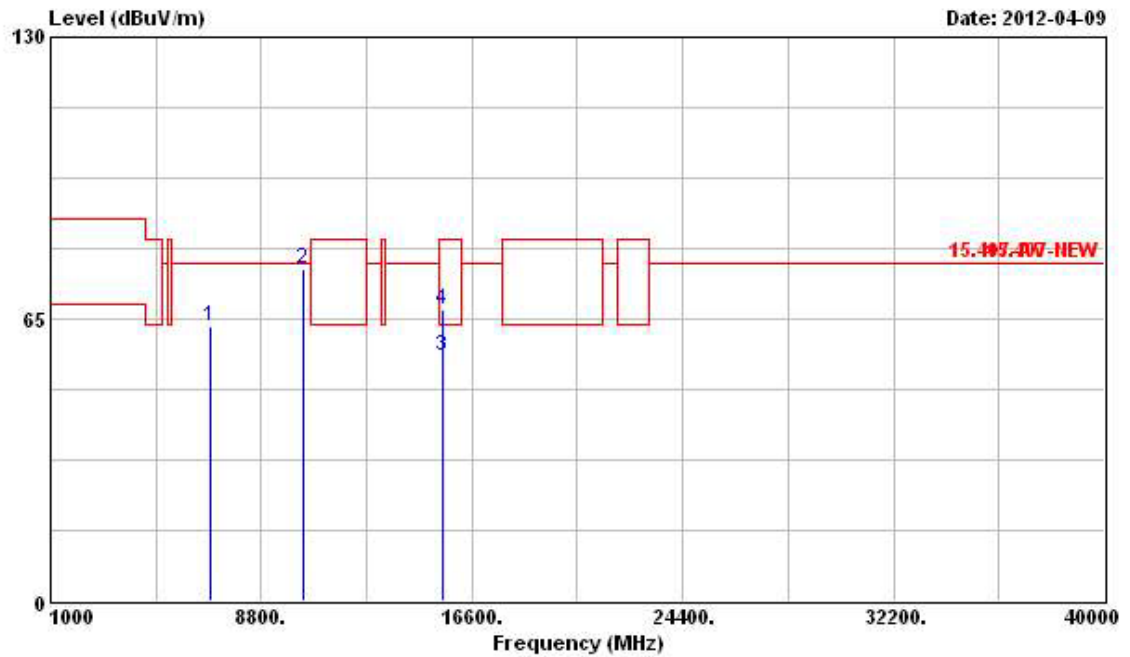


## 3.6.9 Results for Radiated Emissions (1GHz~40GHz)

For Single Chain:

|                 |               |               |                |
|-----------------|---------------|---------------|----------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY      |
| Temperature     | 23.9℃         | Humidity      | 63%            |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 36 |

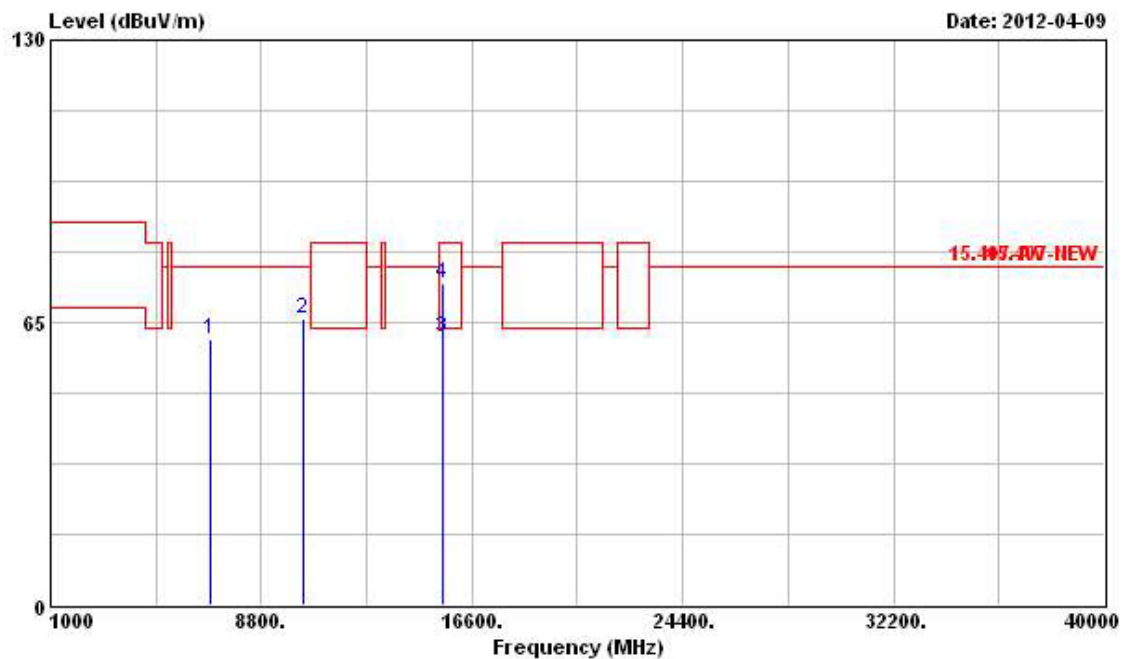
Horizontal



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 6888.000  | 63.19  | -14.65     | 77.84      | 56.76             | 35.85          | 5.57       | 34.99         | Peak    | ---     | ---       |
| 2 | 10360.000 | 76.63  | -1.21      | 77.84      | 66.92             | 38.22          | 6.71       | 35.22         | Peak    | ---     | ---       |
| 3 | 15540.000 | 56.27  | -7.27      | 63.54      | 42.04             | 40.81          | 8.45       | 35.03         | Average | ---     | ---       |
| 4 | 15540.000 | 66.93  | -16.61     | 83.54      | 52.70             | 40.81          | 8.45       | 35.03         | Peak    | ---     | ---       |



## Vertical

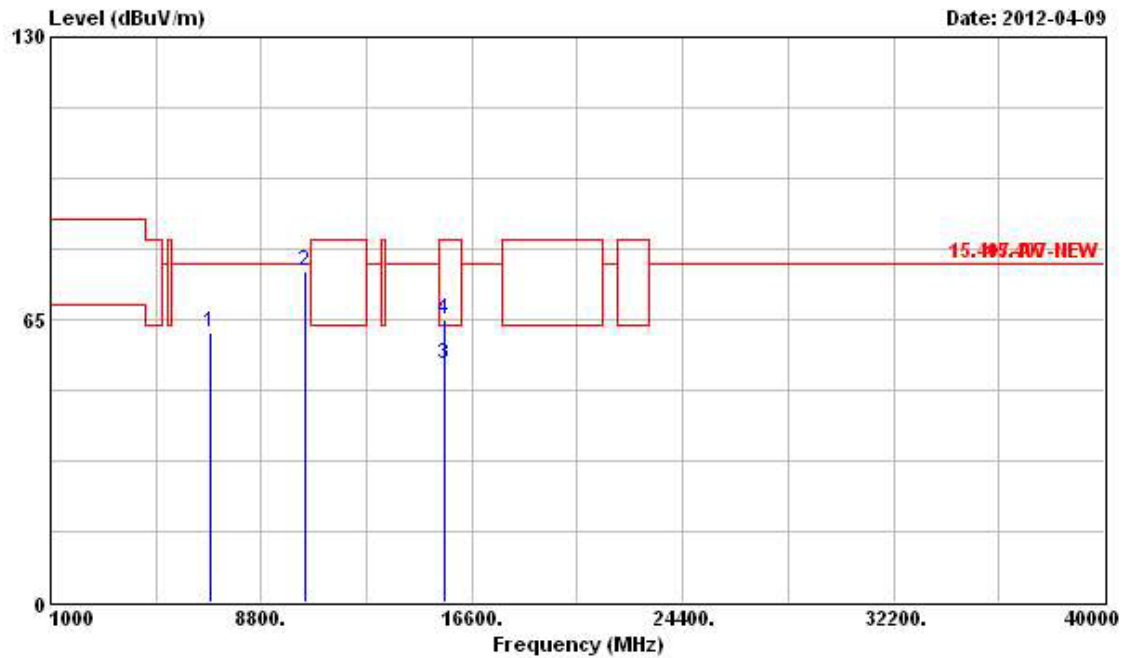


|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 6888.000  | 61.25  | -16.59     | 77.84      | 54.82             | 35.85          | 5.57       | 34.99         | Peak    | ---     | ---       |
| 2 | 10360.000 | 65.69  | -12.15     | 77.84      | 55.98             | 38.22          | 6.71       | 35.22         | Peak    | ---     | ---       |
| 3 | 15540.000 | 61.53  | -2.01      | 63.54      | 47.30             | 40.81          | 8.45       | 35.03         | Average | ---     | ---       |
| 4 | 15540.000 | 73.95  | -9.59      | 83.54      | 59.72             | 40.81          | 8.45       | 35.03         | Peak    | ---     | ---       |



|                 |               |               |                |
|-----------------|---------------|---------------|----------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY      |
| Temperature     | 23.9°C        | Humidity      | 63%            |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 40 |

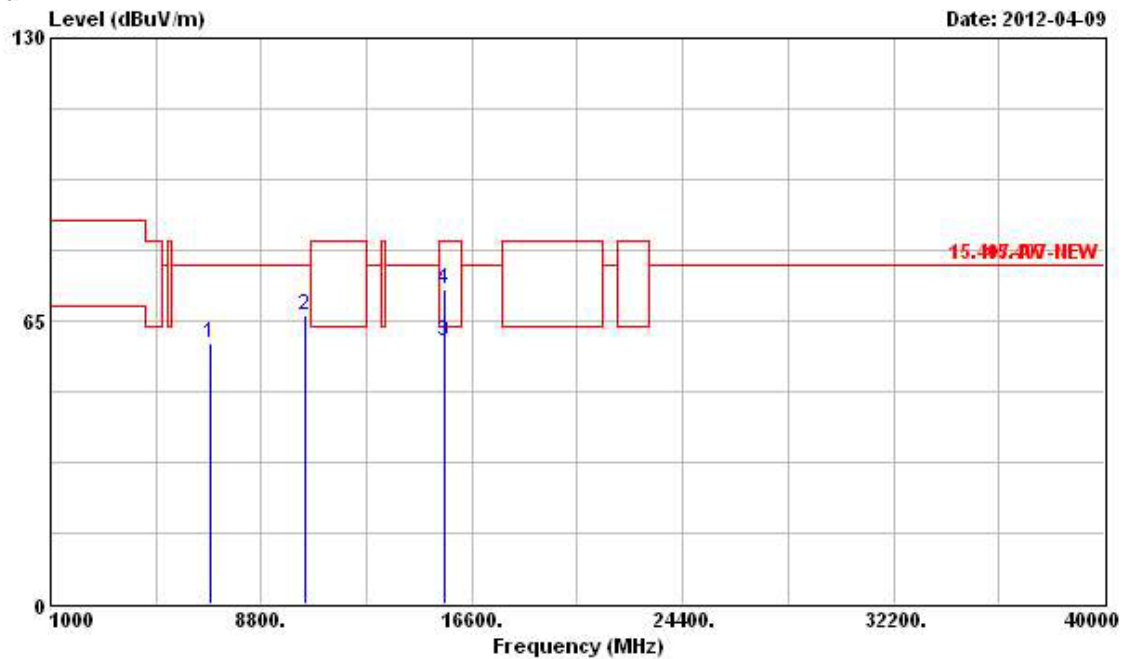
Horizontal



|   | Freq      | Level  | Over Limit | Limit Line | 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 | 6912.000  | 61.86  | -15.98     | 77.84      | 55.41             | 35.87          | 5.58       | 35.00         | Peak    | ---     | ---       |
| 2 | 10400.000 | 75.96  | -1.88      | 77.84      | 66.15             | 38.24          | 6.75       | 35.18         | Peak    | ---     | ---       |
| 3 | 15600.000 | 54.61  | -8.93      | 63.54      | 40.42             | 40.84          | 8.45       | 35.10         | Average | ---     | ---       |
| 4 | 15600.000 | 65.10  | -18.44     | 83.54      | 50.91             | 40.84          | 8.45       | 35.10         | Peak    | ---     | ---       |



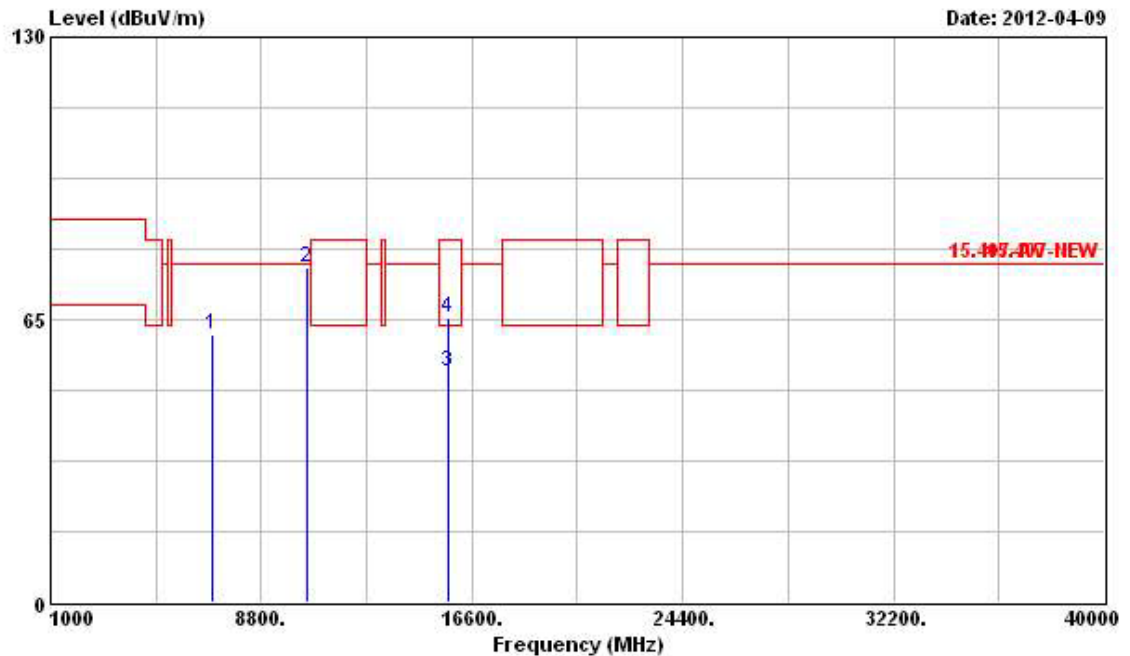
Vertical



|   | 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 | 6912.000  | 59.81  | -18.03     | 77.84      | 53.36             | 35.87          | 5.58       | 35.00         | Peak    | ---     | ---       |
| 2 | 10400.000 | 66.22  | -11.62     | 77.84      | 56.41             | 38.24          | 6.75       | 35.18         | Peak    | ---     | ---       |
| 3 | 15600.000 | 60.08  | -3.46      | 63.54      | 45.89             | 40.84          | 8.45       | 35.10         | Average | ---     | ---       |
| 4 | 15600.000 | 72.13  | -11.41     | 83.54      | 57.94             | 40.84          | 8.45       | 35.10         | Peak    | ---     | ---       |



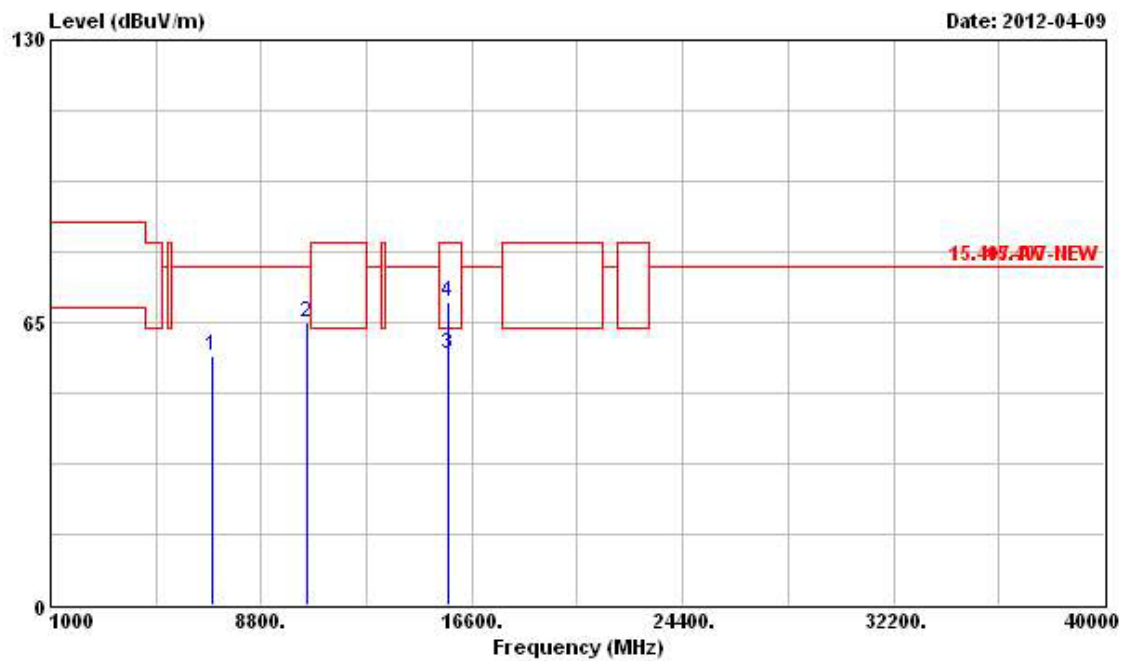
|                 |               |               |                |
|-----------------|---------------|---------------|----------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY      |
| Temperature     | 23.9°C        | Humidity      | 63%            |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 48 |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 6984.000  | 61.41  | -16.43     | 77.84      | 54.95             | 35.89          | 5.59       | 35.02         | Peak    | ---     | ---       |
| 2 | 10480.000 | 76.82  | -1.02      | 77.84      | 66.83             | 38.29          | 6.82       | 35.12         | Peak    | ---     | ---       |
| 3 | 15720.000 | 53.14  | -10.40     | 63.54      | 38.99             | 40.89          | 8.46       | 35.20         | Average | ---     | ---       |
| 4 | 15720.000 | 65.26  | -18.28     | 83.54      | 51.11             | 40.89          | 8.46       | 35.20         | Peak    | ---     | ---       |



## Vertical

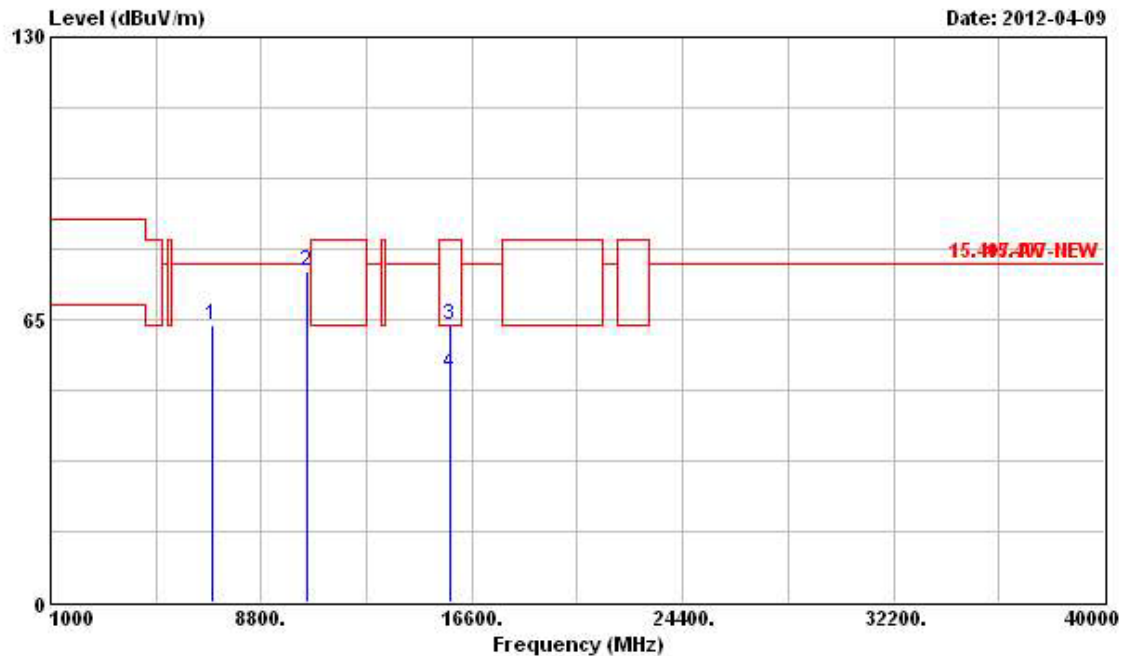


|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 6984.000  | 57.37  | -20.47     | 77.84      | 50.91             | 35.89          | 5.59       | 35.02         | Peak    | ---     | ---       |
| 2 | 10480.000 | 65.09  | -12.75     | 77.84      | 55.10             | 38.29          | 6.82       | 35.12         | Peak    | ---     | ---       |
| 3 | 15720.000 | 57.63  | -5.91      | 63.54      | 43.48             | 40.89          | 8.46       | 35.20         | Average | ---     | ---       |
| 4 | 15720.000 | 69.70  | -13.84     | 83.54      | 55.55             | 40.89          | 8.46       | 35.20         | Peak    | ---     | ---       |



|                 |               |               |                |
|-----------------|---------------|---------------|----------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY      |
| Temperature     | 23.9°C        | Humidity      | 63%            |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 52 |

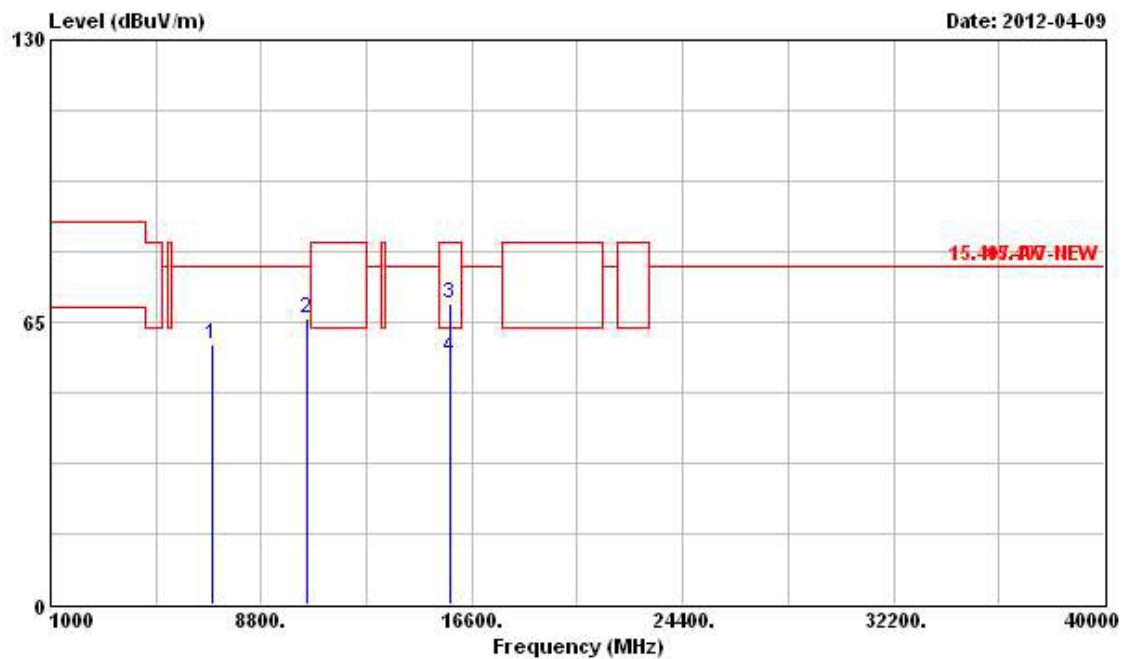
Horizontal



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 6996.000  | 63.82  | -14.02     | 77.84      | 57.34             | 35.90          | 5.60       | 35.02         | Peak    | ---     | ---       |
| 2 | 10520.000 | 76.24  | -1.60      | 77.84      | 66.18             | 38.31          | 6.85       | 35.10         | Peak    | ---     | ---       |
| 3 | 15780.000 | 63.81  | -19.73     | 83.54      | 49.72             | 40.91          | 8.46       | 35.28         | Peak    | ---     | ---       |
| 4 | 15780.000 | 52.53  | -11.01     | 63.54      | 38.44             | 40.91          | 8.46       | 35.28         | Average | ---     | ---       |



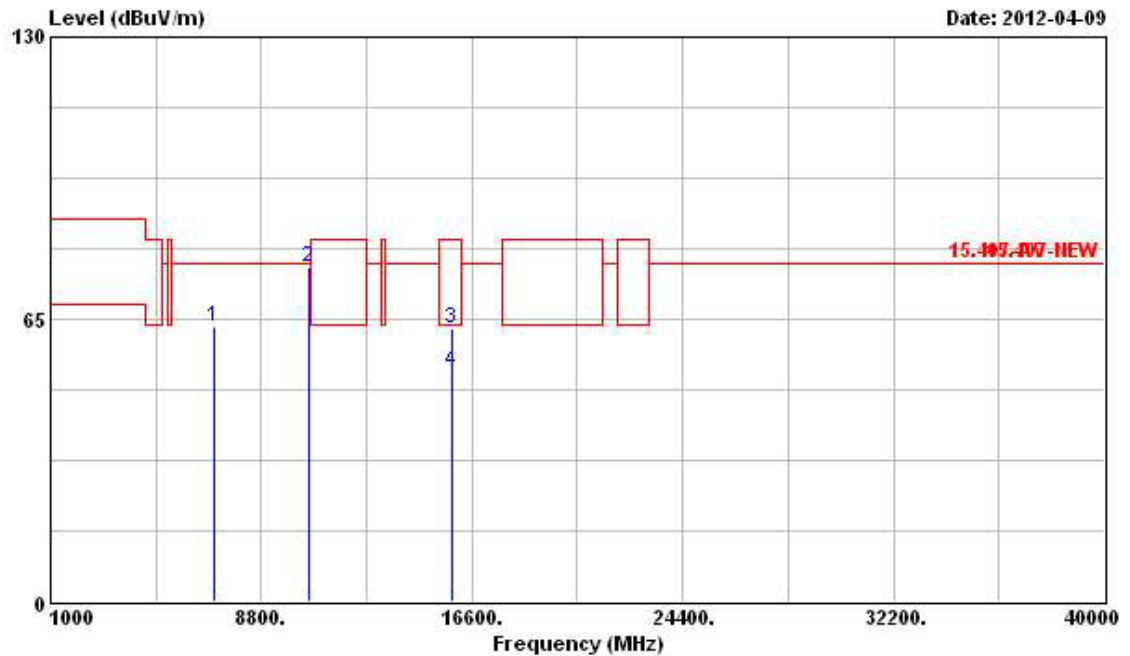
## Vertical



|   | 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 | 6996.000  | 59.93  | -17.91     | 77.84      | 53.45             | 35.90          | 5.60       | 35.02         | Peak    | ---     | ---       |
| 2 | 10520.000 | 65.70  | -12.14     | 77.84      | 55.64             | 38.31          | 6.85       | 35.10         | Peak    | ---     | ---       |
| 3 | 15780.000 | 69.45  | -14.09     | 83.54      | 55.36             | 40.91          | 8.46       | 35.28         | Peak    | ---     | ---       |
| 4 | 15780.000 | 56.93  | -6.61      | 63.54      | 42.84             | 40.91          | 8.46       | 35.28         | Average | ---     | ---       |



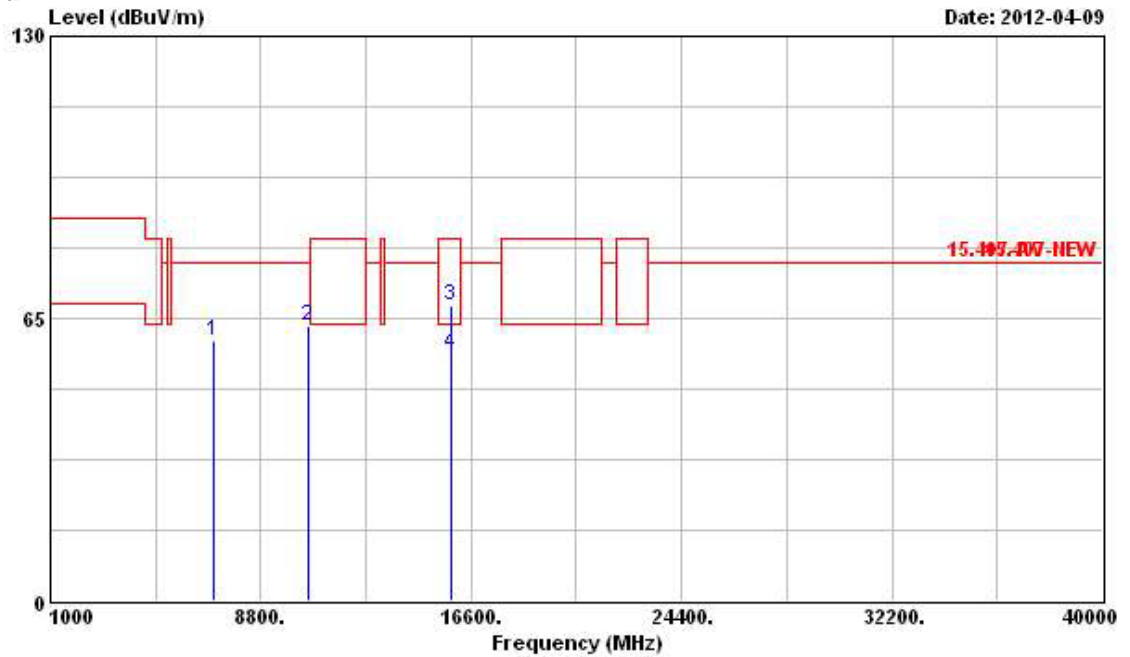
|                        |               |                      |                |
|------------------------|---------------|----------------------|----------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY      |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%            |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11a Ch. 56 |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 7032.000  | 63.11  | -14.73     | 77.84      | 56.65             | 35.89          | 5.60       | 35.03         | Peak    | ---     | ---       |
| 2 | 10560.000 | 76.79  | -1.05      | 77.84      | 66.64             | 38.33          | 6.88       | 35.06         | Peak    | ---     | ---       |
| 3 | 15840.000 | 62.74  | -20.80     | 83.54      | 48.67             | 40.94          | 8.46       | 35.33         | Peak    | ---     | ---       |
| 4 | 15840.000 | 52.88  | -10.66     | 63.54      | 38.81             | 40.94          | 8.46       | 35.33         | Average | ---     | ---       |



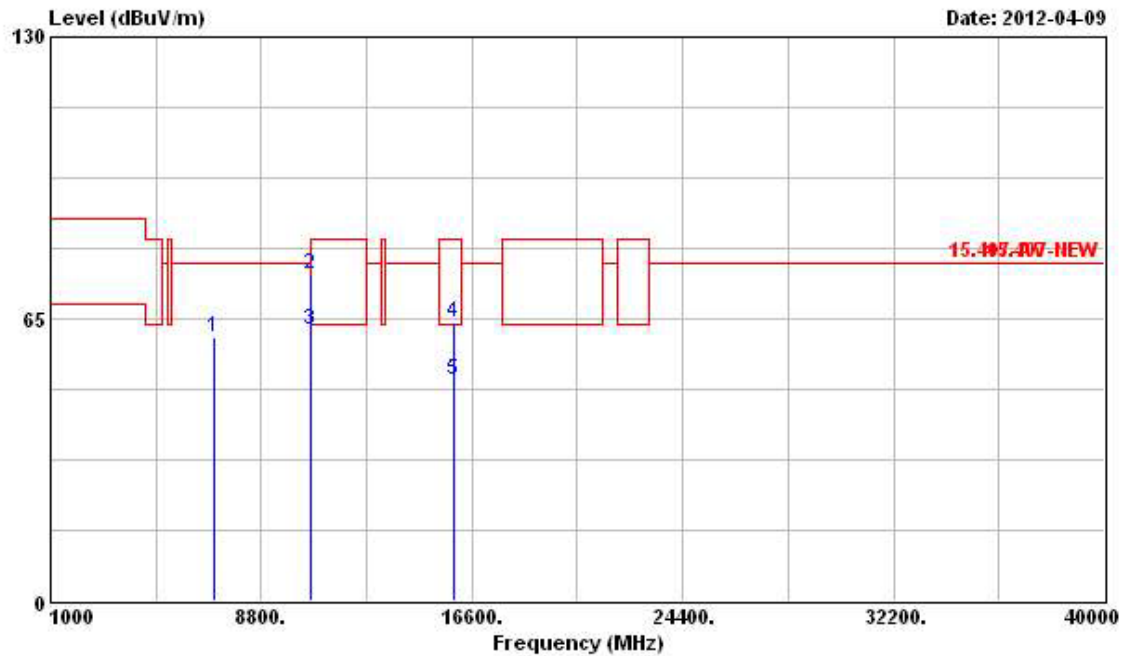
Vertical



|   | 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 | 7032.000  | 60.07  | -17.77     | 77.84      | 53.61             | 35.89          | 5.60       | 35.03         | Peak    | ---     | ---       |
| 2 | 10560.000 | 63.39  | -14.45     | 77.84      | 53.24             | 38.33          | 6.88       | 35.06         | Peak    | ---     | ---       |
| 3 | 15840.000 | 68.19  | -15.35     | 83.54      | 54.12             | 40.94          | 8.46       | 35.33         | Peak    | ---     | ---       |
| 4 | 15840.000 | 56.98  | -6.56      | 63.54      | 42.91             | 40.94          | 8.46       | 35.33         | Average | ---     | ---       |



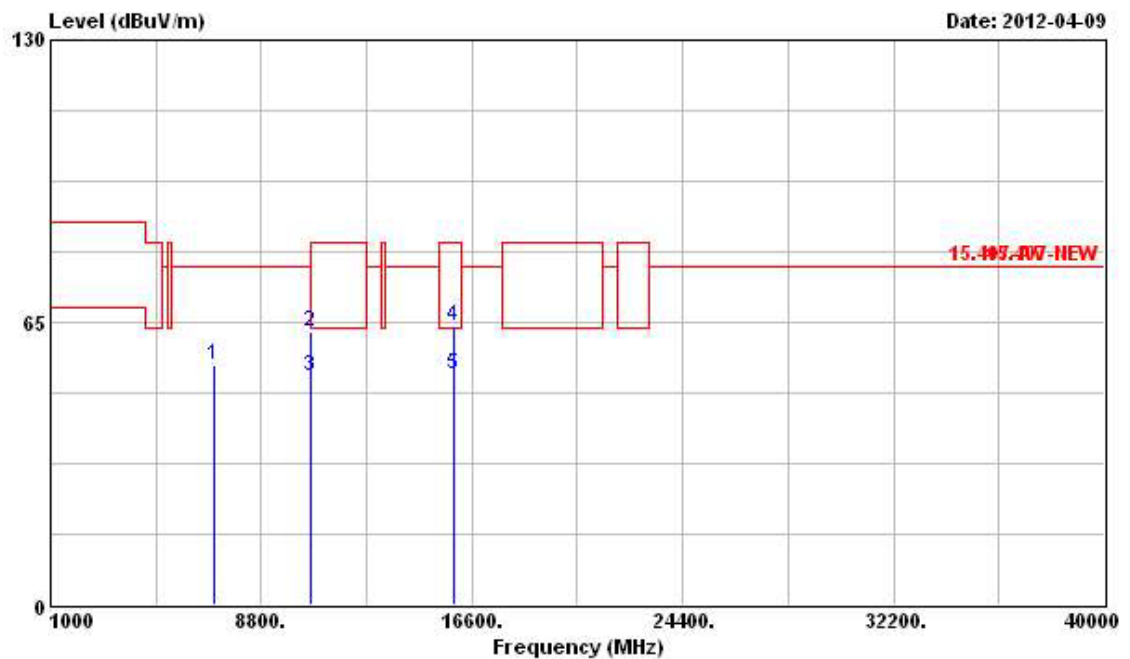
|                        |               |                      |                |
|------------------------|---------------|----------------------|----------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY      |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%            |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11a Ch. 64 |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 7080.000  | 60.61  | -17.23     | 77.84      | 54.16             | 35.88          | 5.61       | 35.04         | Peak    | ---     | ---       |
| 2 | 10640.000 | 75.42  | -8.12      | 83.54      | 65.11             | 38.38          | 6.93       | 35.00         | Peak    | ---     | ---       |
| 3 | 10640.000 | 62.27  | -1.27      | 63.54      | 51.96             | 38.38          | 6.93       | 35.00         | Average | ---     | ---       |
| 4 | 15960.000 | 64.03  | -19.51     | 83.54      | 50.02             | 40.99          | 8.47       | 35.45         | Peak    | ---     | ---       |
| 5 | 15960.000 | 51.05  | -12.49     | 63.54      | 37.04             | 40.99          | 8.47       | 35.45         | Average | ---     | ---       |



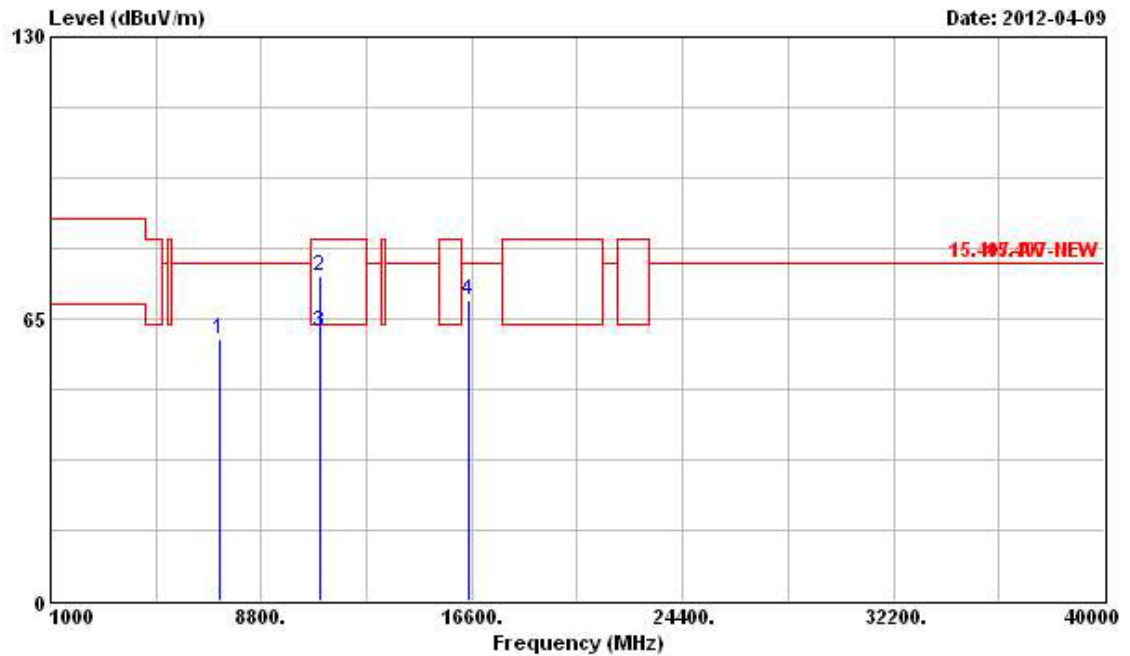
## Vertical



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 7080.000  | 55.12  | -22.72     | 77.84      | 48.67             | 35.88          | 5.61       | 35.04         | Peak    | ---     | ---       |
| 2 | 10640.000 | 62.74  | -20.80     | 83.54      | 52.43             | 38.38          | 6.93       | 35.00         | Peak    | ---     | ---       |
| 3 | 10640.000 | 52.56  | -10.98     | 63.54      | 42.25             | 38.38          | 6.93       | 35.00         | Average | ---     | ---       |
| 4 | 15960.000 | 64.31  | -19.23     | 83.54      | 50.30             | 40.99          | 8.47       | 35.45         | Peak    | ---     | ---       |
| 5 | 15960.000 | 53.17  | -10.37     | 63.54      | 39.16             | 40.99          | 8.47       | 35.45         | Average | ---     | ---       |



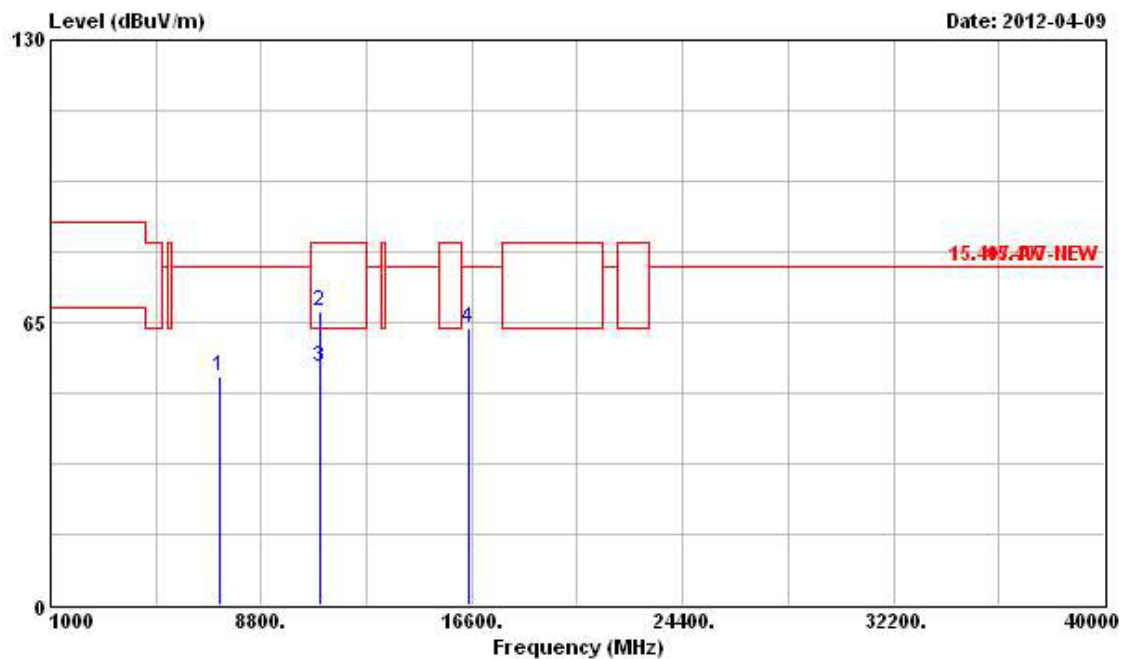
|                        |               |                      |                 |
|------------------------|---------------|----------------------|-----------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY       |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%             |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11a Ch. 100 |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 7241.000  | 60.20  | -17.64     | 77.84      | 53.80             | 35.85          | 5.63       | 35.08         | Peak    | ---     | ---       |
| 2 | 11000.000 | 75.02  | -8.52      | 83.54      | 63.97             | 38.60          | 7.17       | 34.72         | Peak    | ---     | ---       |
| 3 | 11000.000 | 62.06  | -1.48      | 63.54      | 51.01             | 38.60          | 7.17       | 34.72         | Average | ---     | ---       |
| 4 | 16500.000 | 69.24  | -8.60      | 77.84      | 53.99             | 42.00          | 8.24       | 34.99         | Peak    | ---     | ---       |



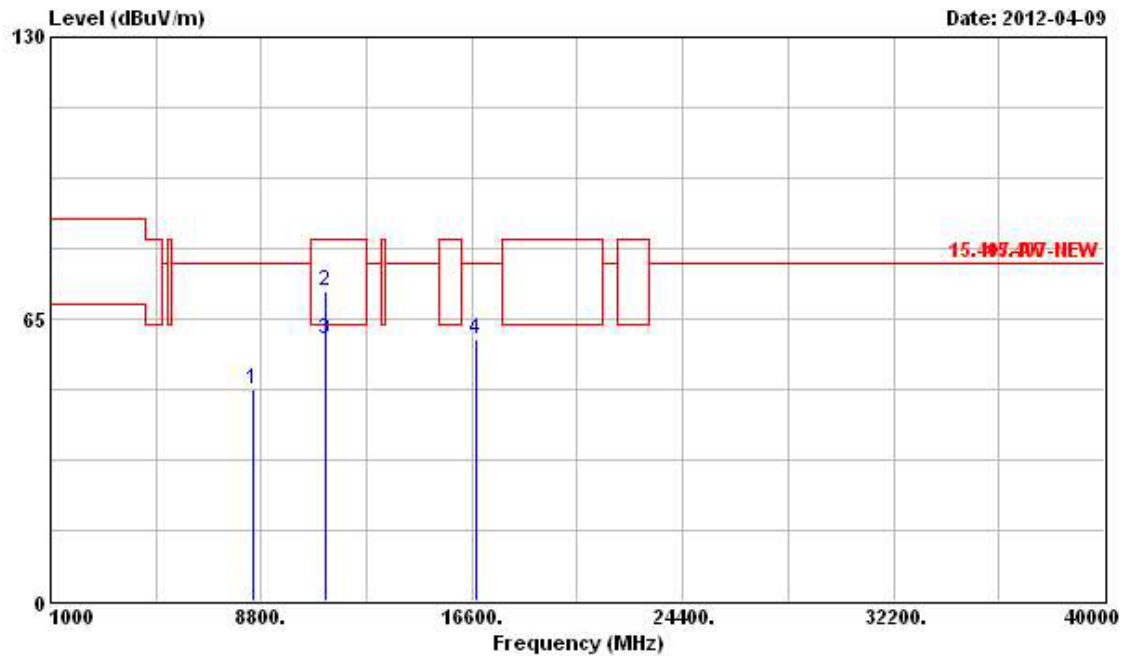
## Vertical



|   | 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 | 7241.000  | 52.79  | -25.05     | 77.84      | 46.39             | 35.85          | 5.63       | 35.08         | Peak    | ---     | ---       |
| 2 | 11000.000 | 67.57  | -15.97     | 83.54      | 56.52             | 38.60          | 7.17       | 34.72         | Peak    | ---     | ---       |
| 3 | 11000.000 | 54.77  | -8.77      | 63.54      | 43.72             | 38.60          | 7.17       | 34.72         | Average | ---     | ---       |
| 4 | 16500.000 | 63.64  | -14.20     | 77.84      | 48.39             | 42.00          | 8.24       | 34.99         | Peak    | ---     | ---       |



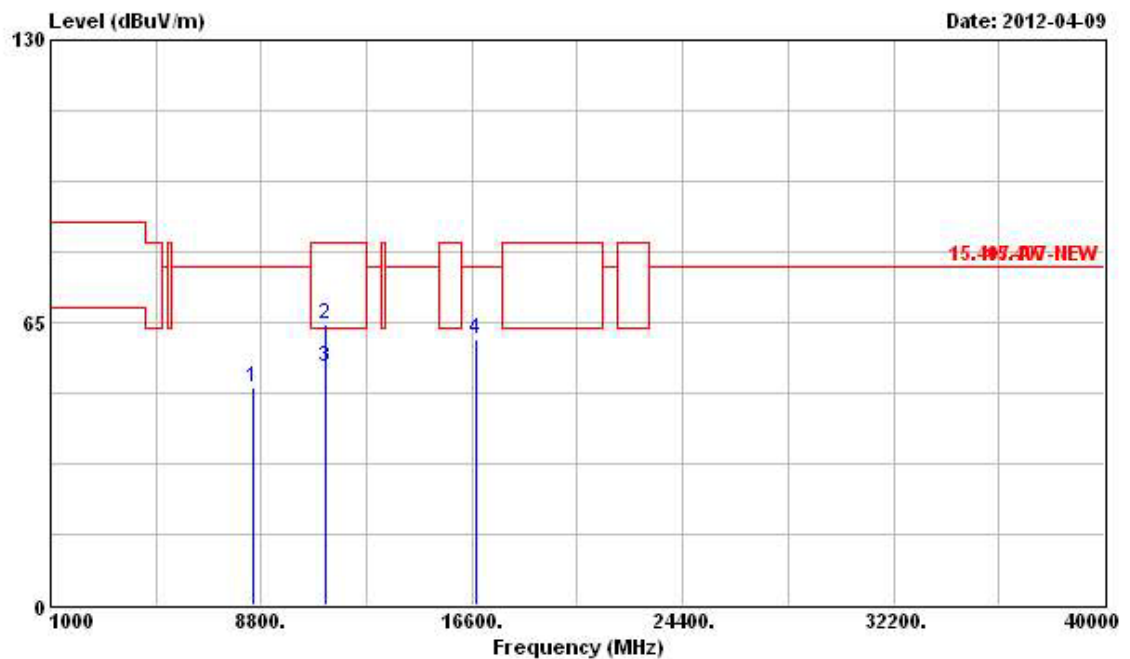
|                 |               |               |                 |
|-----------------|---------------|---------------|-----------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY       |
| Temperature     | 23.9°C        | Humidity      | 63%             |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 116 |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8520.000  | 48.90  | -28.94     | 77.84      | 41.87             | 36.31          | 5.96       | 35.24         | Peak    | ---     | ---       |
| 2 | 11160.000 | 71.48  | -12.06     | 83.54      | 60.54             | 38.70          | 6.96       | 34.72         | Peak    | ---     | ---       |
| 3 | 11160.000 | 60.30  | -3.24      | 63.54      | 49.36             | 38.70          | 6.96       | 34.72         | Average | ---     | ---       |
| 4 | 16740.000 | 60.19  | -17.65     | 77.84      | 44.37             | 41.86          | 8.47       | 34.51         | Peak    | ---     | ---       |



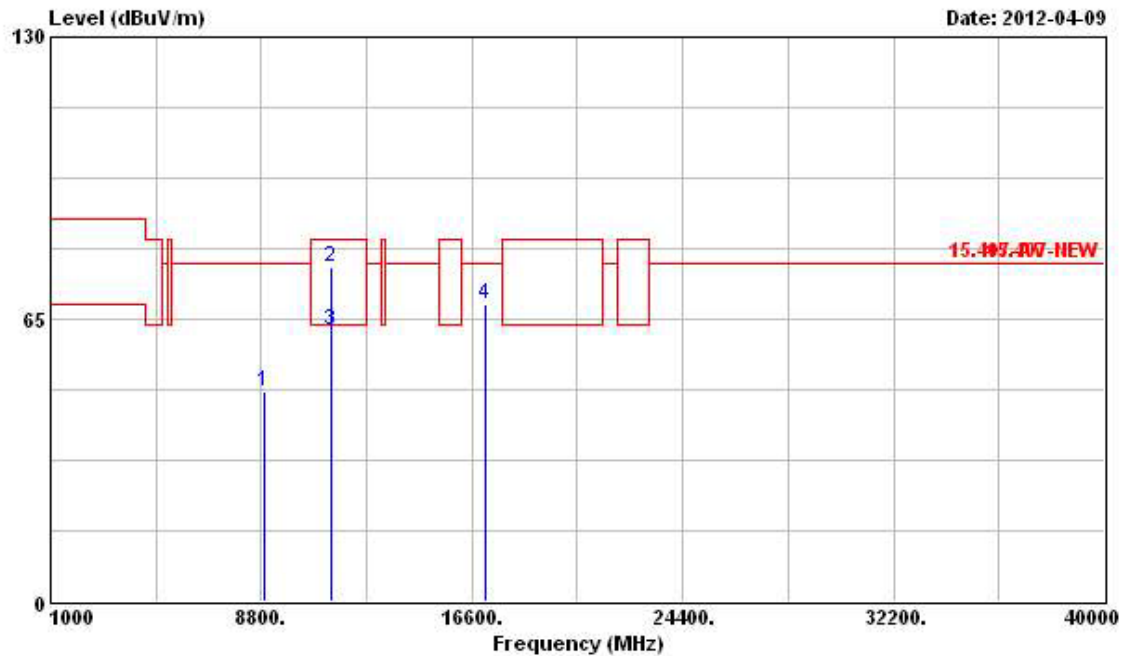
## Vertical



|   | 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 | 8520.000  | 50.12  | -27.72     | 77.84      | 43.09             | 36.31          | 5.96       | 35.24         | Peak    | ---     | ---       |
| 2 | 11160.000 | 64.43  | -19.11     | 83.54      | 53.49             | 38.70          | 6.96       | 34.72         | Peak    | ---     | ---       |
| 3 | 11160.000 | 54.59  | -8.95      | 63.54      | 43.65             | 38.70          | 6.96       | 34.72         | Average | ---     | ---       |
| 4 | 16740.000 | 60.97  | -16.87     | 77.84      | 45.15             | 41.86          | 8.47       | 34.51         | Peak    | ---     | ---       |



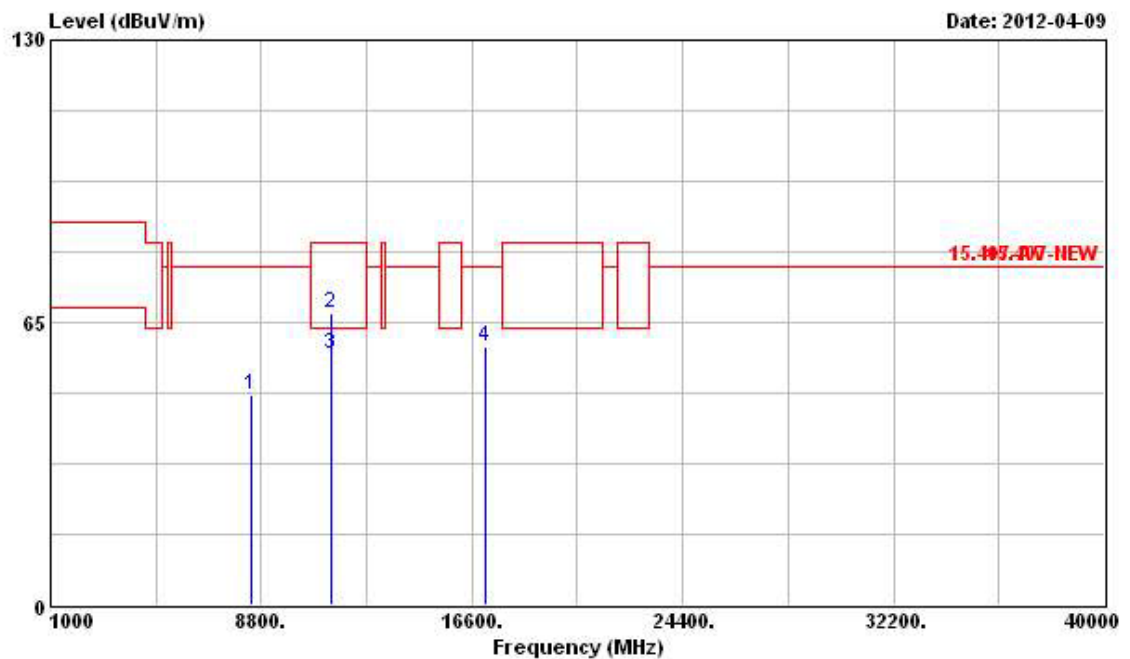
|                 |               |               |                 |
|-----------------|---------------|---------------|-----------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY       |
| Temperature     | 23.9°C        | Humidity      | 63%             |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 140 |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8904.000  | 48.36  | -29.48     | 77.84      | 40.99             | 36.54          | 6.13       | 35.30         | Peak    | ---     | ---       |
| 2 | 11400.000 | 76.80  | -6.74      | 83.54      | 65.97             | 38.84          | 6.71       | 34.72         | Peak    | ---     | ---       |
| 3 | 11400.000 | 62.39  | -1.15      | 63.54      | 51.56             | 38.84          | 6.71       | 34.72         | Average | ---     | ---       |
| 4 | 17100.000 | 68.34  | -9.50      | 77.84      | 52.05             | 41.66          | 8.61       | 33.98         | Peak    | ---     | ---       |



## Vertical



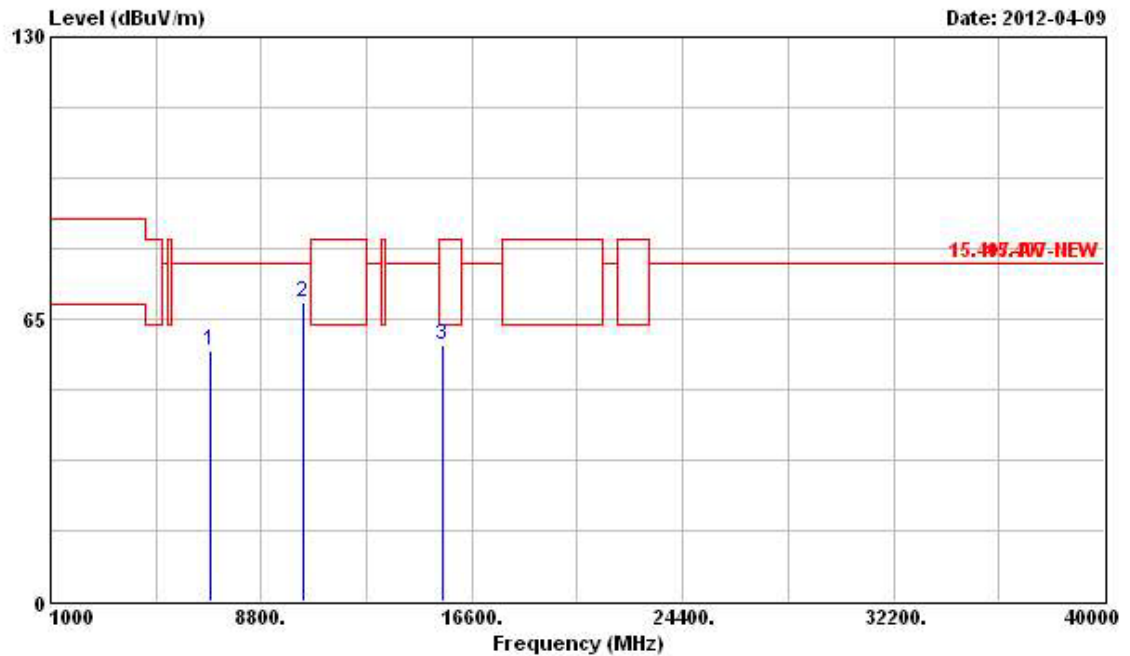
|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8436.000  | 48.41  | -29.43     | 77.84      | 41.48             | 36.24          | 5.93       | 35.24         | PK      | ---     | ---       |
| 2 | 11400.000 | 66.93  | -16.61     | 83.54      | 56.10             | 38.84          | 6.71       | 34.72         | Peak    | ---     | ---       |
| 3 | 11400.000 | 57.85  | -5.69      | 63.54      | 47.02             | 38.84          | 6.71       | 34.72         | Average | ---     | ---       |
| 4 | 17100.000 | 59.52  | -18.32     | 77.84      | 43.23             | 41.66          | 8.61       | 33.98         | Peak    | ---     | ---       |



For Two Chains:

|                 |               |               |                        |
|-----------------|---------------|---------------|------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY              |
| Temperature     | 23.9°C        | Humidity      | 63%                    |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 36 (20MHz) |

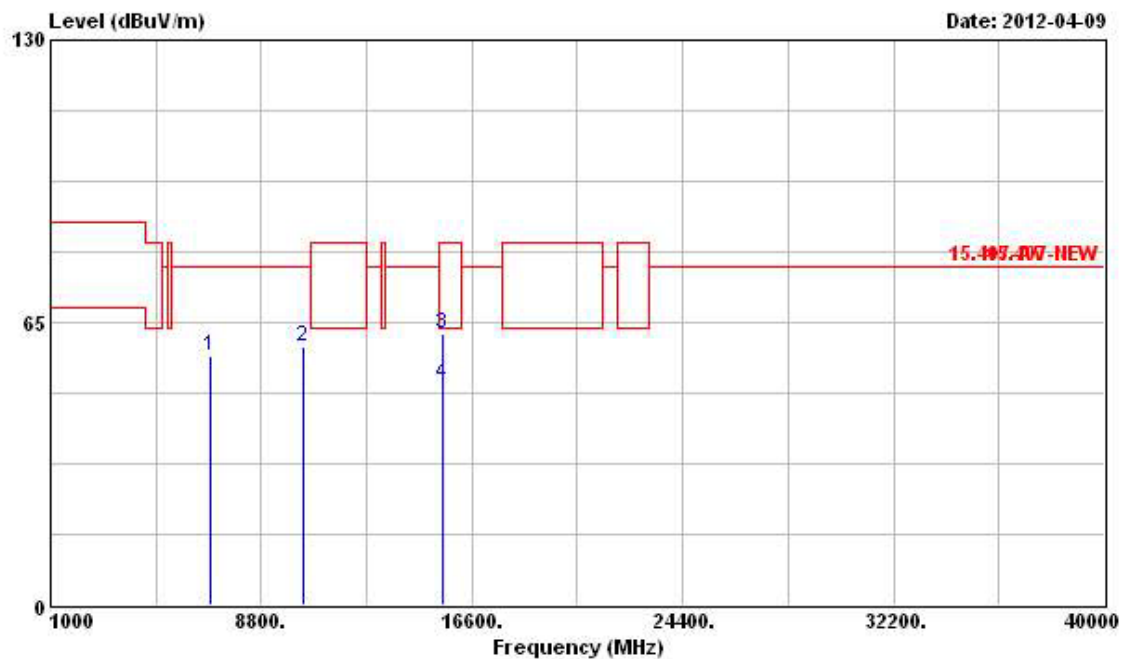
Horizontal



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6888.000  | 57.60  | -20.24     | 77.84      | 51.17             | 35.85          | 5.57       | 34.99         | Peak   | ---     | ---       |
| 2 | 10360.000 | 68.80  | -9.04      | 77.84      | 59.09             | 38.22          | 6.71       | 35.22         | Peak   | ---     | ---       |
| 3 | 15540.000 | 59.15  | -4.39      | 63.54      | 44.92             | 40.81          | 8.45       | 35.03         | PK     | ---     | ---       |



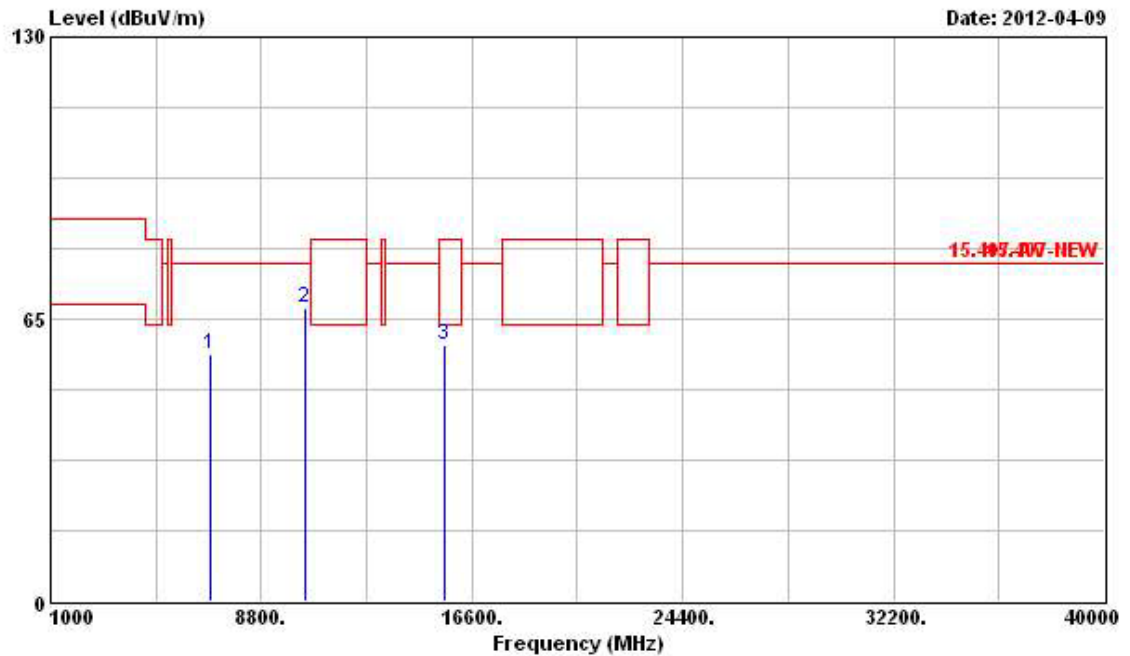
## Vertical



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 6888.000  | 57.36  | -20.48     | 77.84      | 50.93             | 35.85          | 5.57       | 34.99         | Peak    | ---     | ---       |
| 2 | 10360.000 | 59.40  | -18.44     | 77.84      | 49.69             | 38.22          | 6.71       | 35.22         | Peak    | ---     | ---       |
| 3 | 15540.000 | 62.49  | -21.05     | 83.54      | 48.26             | 40.81          | 8.45       | 35.03         | Peak    | ---     | ---       |
| 4 | 15540.000 | 51.00  | -12.54     | 63.54      | 36.77             | 40.81          | 8.45       | 35.03         | Average | ---     | ---       |



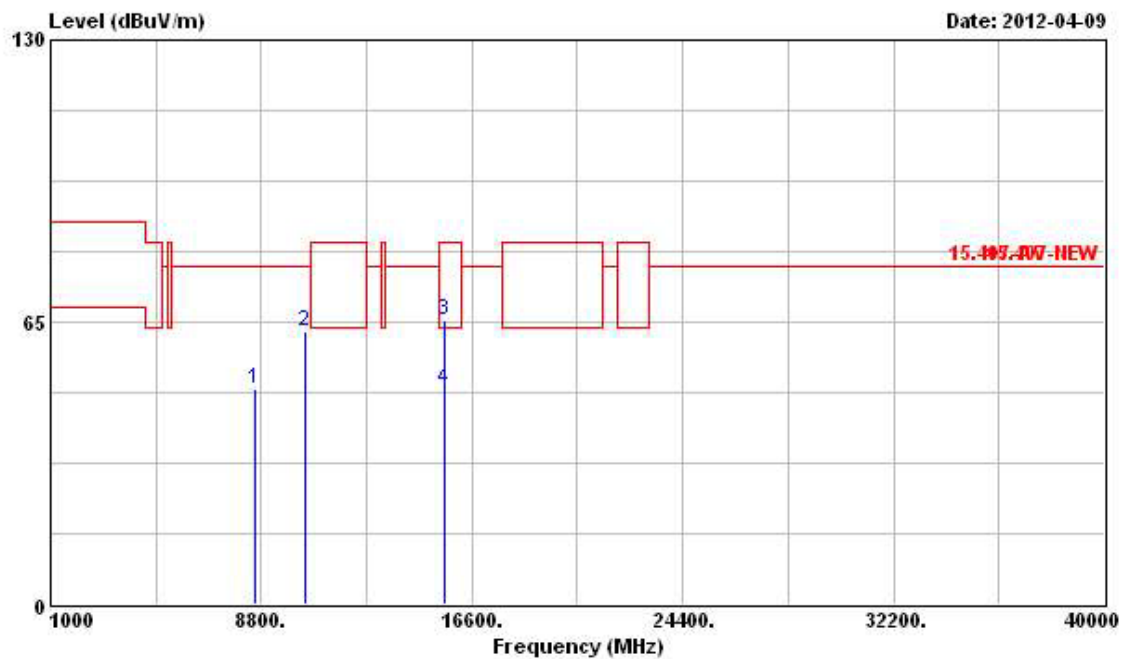
|                        |               |                      |                         |
|------------------------|---------------|----------------------|-------------------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY               |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%                     |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11n Ch. 40 (20 MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6900.000  | 56.75  | -21.09     | 77.84      | 50.31             | 35.86          | 5.57       | 34.99         | Peak   | ---     | ---       |
| 2 | 10400.000 | 67.51  | -10.33     | 77.84      | 57.70             | 38.24          | 6.75       | 35.18         | Peak   | ---     | ---       |
| 3 | 15600.000 | 58.81  | -4.73      | 63.54      | 44.62             | 40.84          | 8.45       | 35.10         | PK     | ---     | ---       |



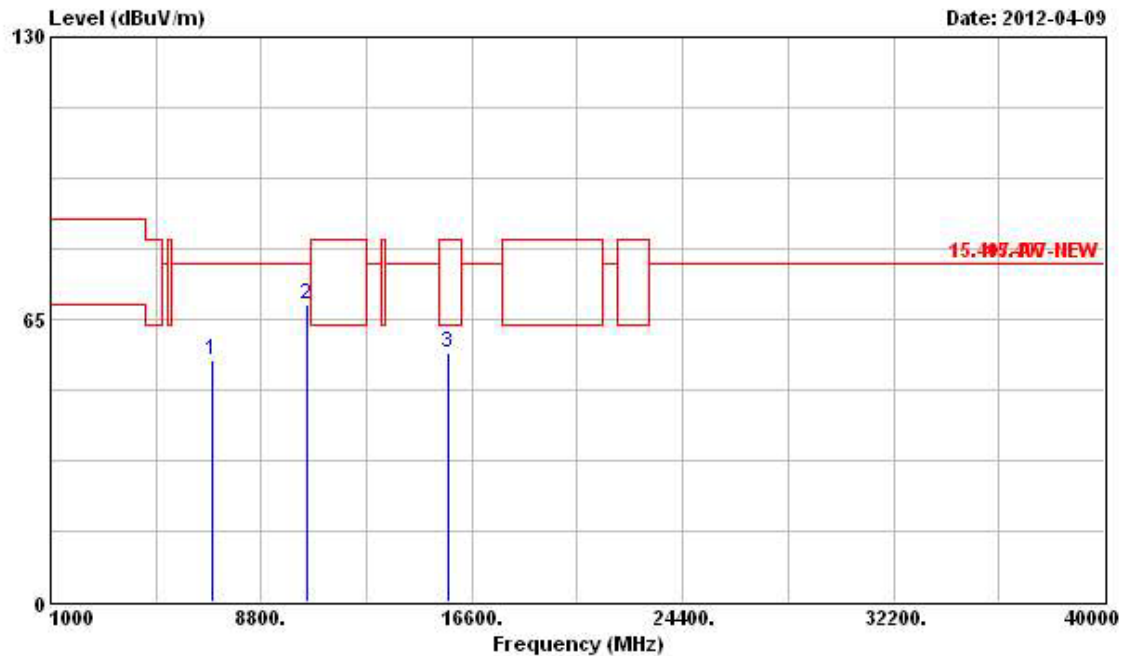
## Vertical



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8532.000  | 49.54  | -28.30     | 77.84      | 42.50             | 36.32          | 5.96       | 35.24         | Peak    | ---     | ---       |
| 2 | 10400.000 | 62.65  | -15.19     | 77.84      | 52.84             | 38.24          | 6.75       | 35.18         | Peak    | ---     | ---       |
| 3 | 15600.000 | 65.23  | -18.31     | 83.54      | 51.04             | 40.84          | 8.45       | 35.10         | Peak    | ---     | ---       |
| 4 | 15600.000 | 49.71  | -13.83     | 63.54      | 35.52             | 40.84          | 8.45       | 35.10         | Average | ---     | ---       |



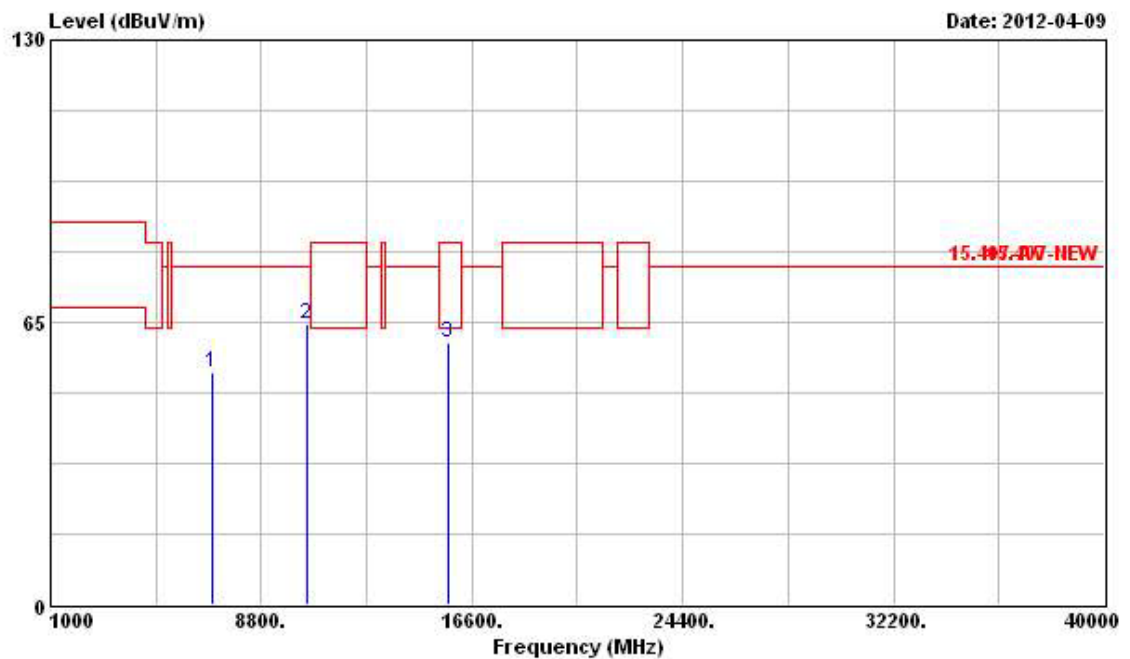
|                        |               |                      |                         |
|------------------------|---------------|----------------------|-------------------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY               |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%                     |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11n Ch. 48 (20 MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6984.000  | 55.62  | -22.22     | 77.84      | 49.16             | 35.89          | 5.59       | 35.02         | Peak   | ---     | ---       |
| 2 | 10480.000 | 68.45  | -9.39      | 77.84      | 58.46             | 38.29          | 6.82       | 35.12         | Peak   | ---     | ---       |
| 3 | 15720.000 | 57.21  | -6.33      | 63.54      | 43.06             | 40.89          | 8.46       | 35.20         | PK     | ---     | ---       |



## Vertical

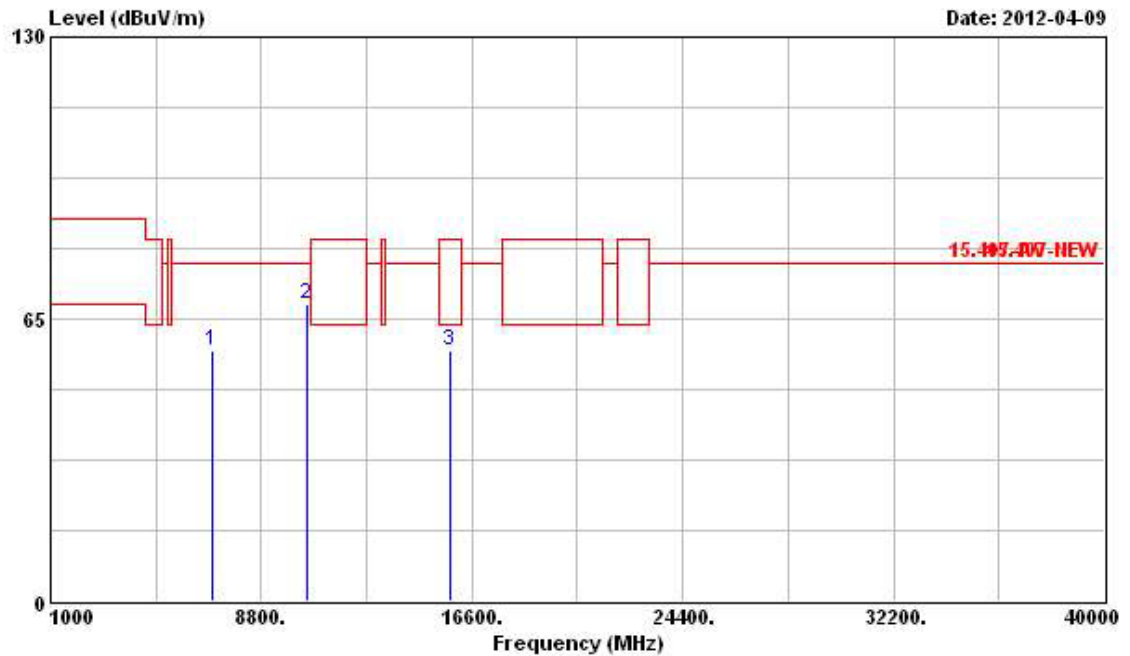


|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6984.000  | 53.35  | -24.49     | 77.84      | 46.89             | 35.89          | 5.59       | 35.02         | Peak   | ---     | ---       |
| 2 | 10480.000 | 64.42  | -13.42     | 77.84      | 54.43             | 38.29          | 6.82       | 35.12         | Peak   | ---     | ---       |
| 3 | 15720.000 | 60.12  | -3.42      | 63.54      | 45.97             | 40.89          | 8.46       | 35.20         | PK     | ---     | ---       |



|                 |               |               |                        |
|-----------------|---------------|---------------|------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY              |
| Temperature     | 23.9°C        | Humidity      | 63%                    |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 52 (20MHz) |

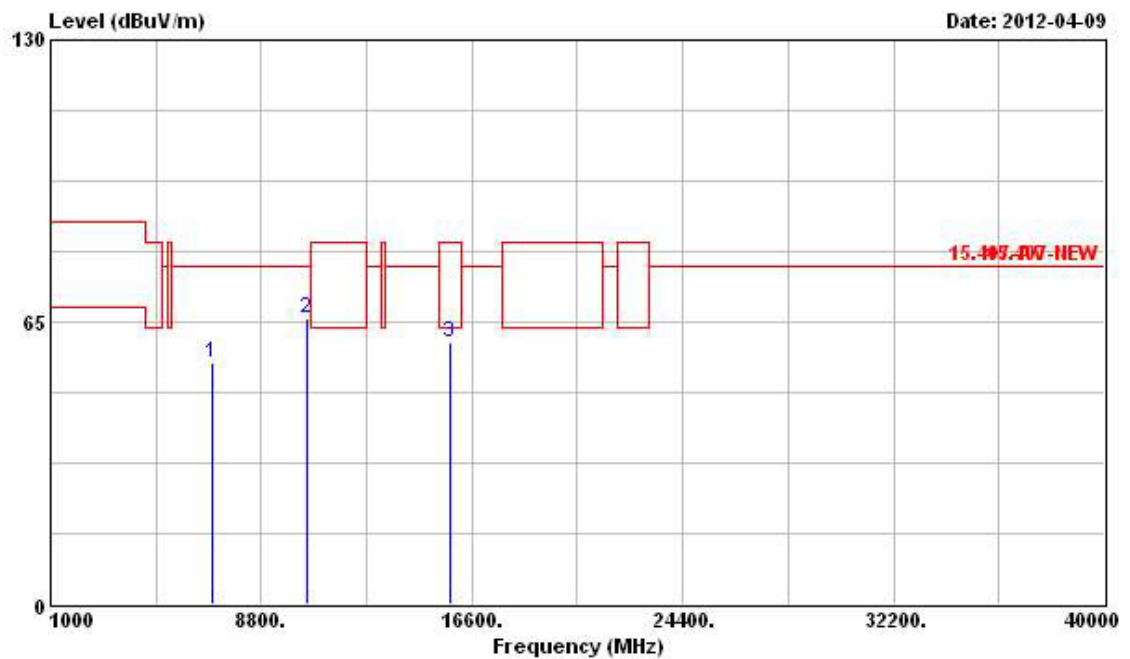
Horizontal



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6996.000  | 57.57  | -20.27     | 77.84      | 51.09             | 35.90          | 5.60       | 35.02         | Peak   | ---     | ---       |
| 2 | 10520.000 | 68.42  | -9.42      | 77.84      | 58.36             | 38.31          | 6.85       | 35.10         | Peak   | ---     | ---       |
| 3 | 15780.000 | 57.57  | -5.97      | 63.54      | 43.48             | 40.91          | 8.46       | 35.28         | PK     | ---     | ---       |



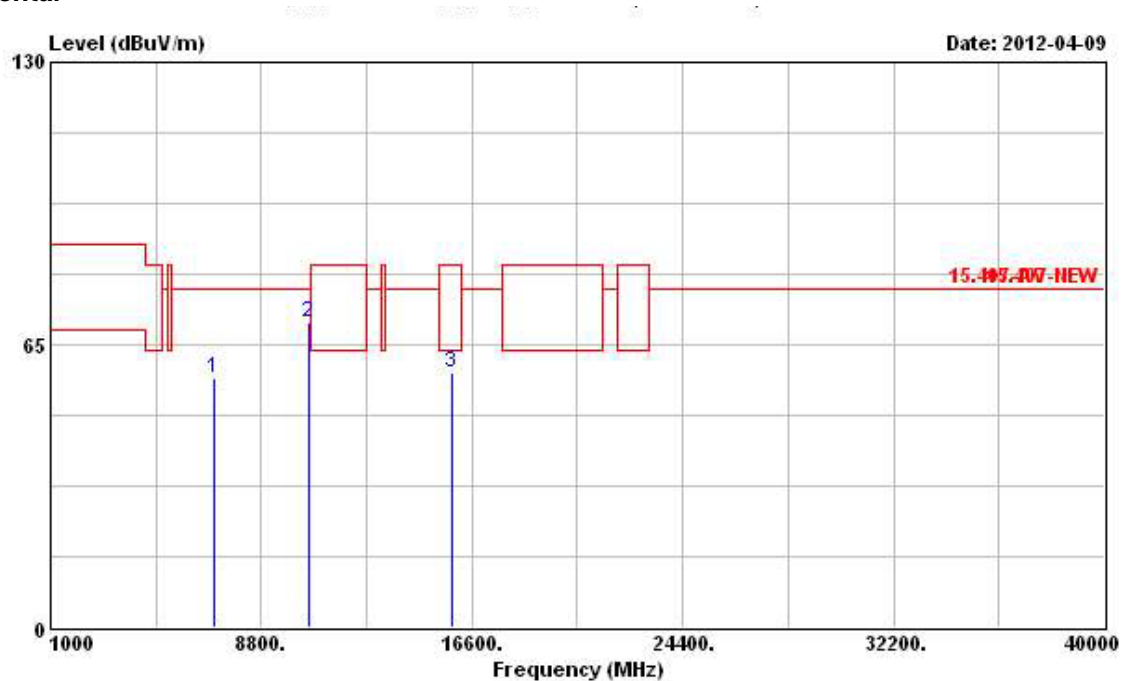
## Vertical



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6996.000  | 55.63  | -22.21     | 77.84      | 49.15             | 35.90          | 5.60       | 35.02         | Peak   | ---     | ---       |
| 2 | 10520.000 | 65.75  | -12.09     | 77.84      | 55.69             | 38.31          | 6.85       | 35.10         | Peak   | ---     | ---       |
| 3 | 15780.000 | 60.39  | -3.15      | 63.54      | 46.30             | 40.91          | 8.46       | 35.28         | PK     | ---     | ---       |



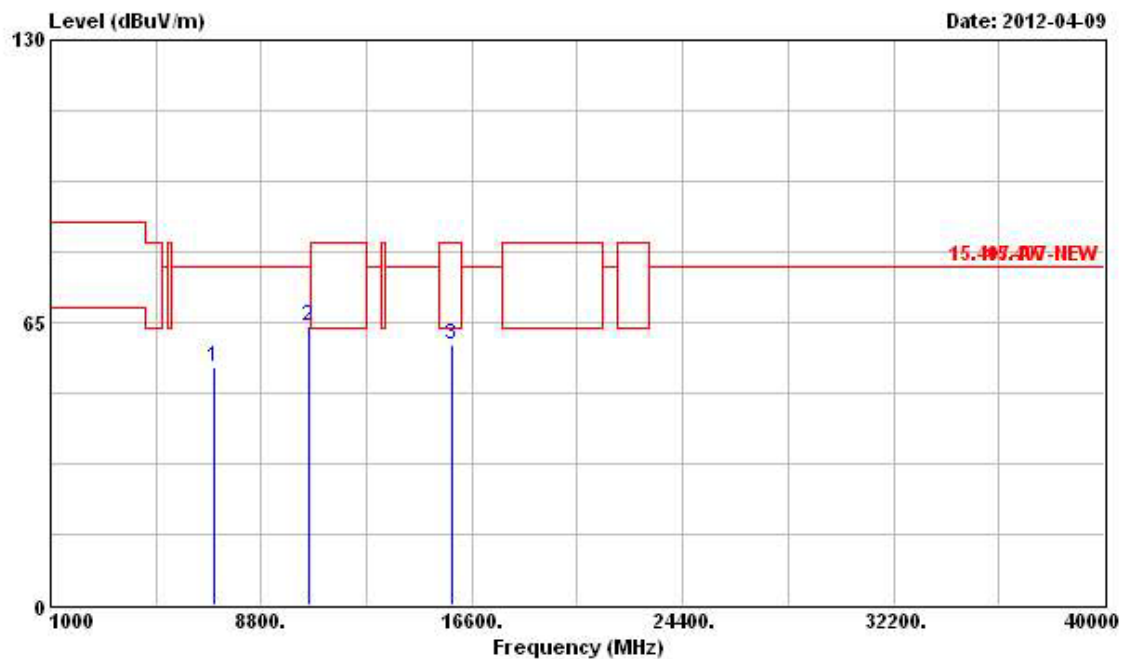
|                        |               |                      |                         |
|------------------------|---------------|----------------------|-------------------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY               |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%                     |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11n Ch. 56 (20 MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 7032.000  | 57.38  | -20.46     | 77.84      | 50.92             | 35.89          | 5.60       | 35.03         | Peak   | ---     | ---       |
| 2 | 10560.000 | 70.15  | -7.69      | 77.84      | 60.00             | 38.33          | 6.88       | 35.06         | Peak   | ---     | ---       |
| 3 | 15840.000 | 58.76  | -4.78      | 63.54      | 44.69             | 40.94          | 8.46       | 35.33         | PK     | ---     | ---       |



## Vertical

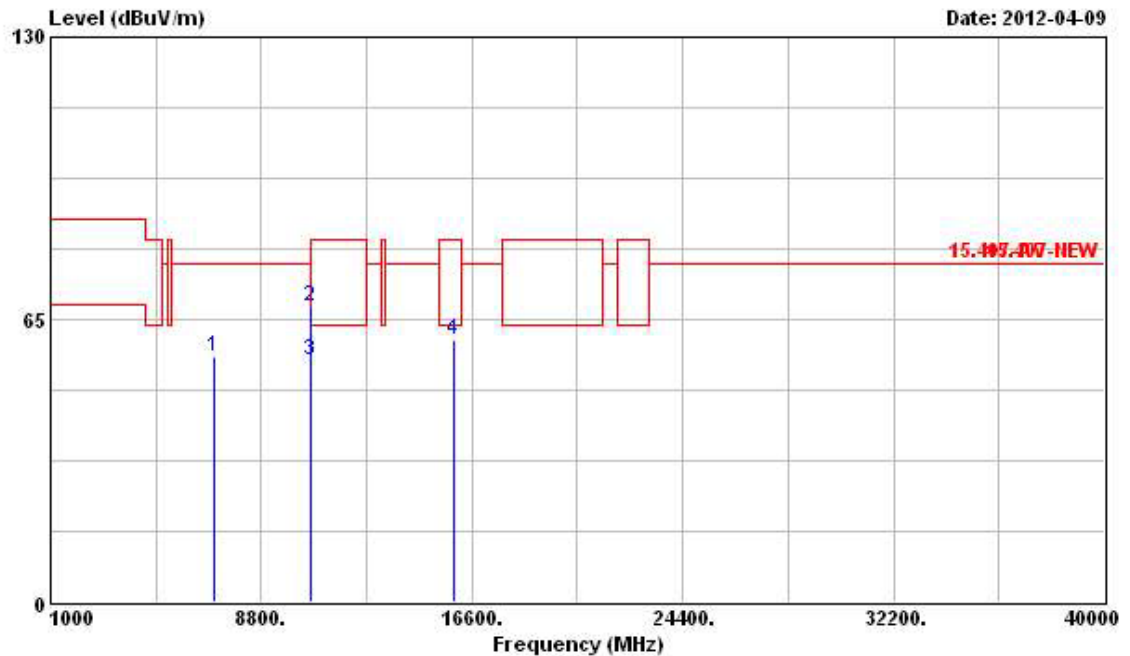


|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 7032.000  | 54.79  | -23.05     | 77.84      | 48.33             | 35.89          | 5.60       | 35.03         | Peak   | ---     | ---       |
| 2 | 10560.000 | 64.33  | -13.51     | 77.84      | 54.18             | 38.33          | 6.88       | 35.06         | Peak   | ---     | ---       |
| 3 | 15840.000 | 59.79  | -3.75      | 63.54      | 45.72             | 40.94          | 8.46       | 35.33         | PK     | ---     | ---       |



|                 |               |               |                         |
|-----------------|---------------|---------------|-------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY               |
| Temperature     | 23.9°C        | Humidity      | 63%                     |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 64 (20 MHz) |

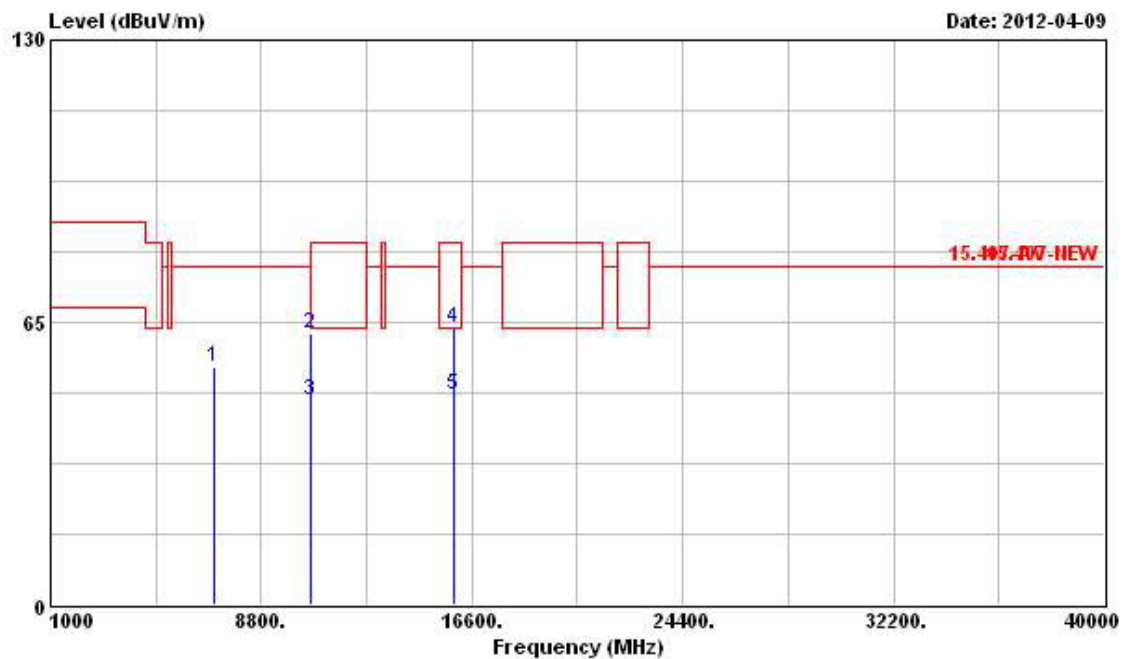
Horizontal



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 7080.000  | 56.66  | -21.18     | 77.84      | 50.21             | 35.88          | 5.61       | 35.04         | Peak    | ---     | ---       |
| 2 | 10640.000 | 67.95  | -15.59     | 83.54      | 57.64             | 38.38          | 6.93       | 35.00         | Peak    | ---     | ---       |
| 3 | 10640.000 | 55.58  | -7.96      | 63.54      | 45.27             | 38.38          | 6.93       | 35.00         | Average | ---     | ---       |
| 4 | 15960.000 | 60.17  | -3.37      | 63.54      | 46.16             | 40.99          | 8.47       | 35.45         | PK      | ---     | ---       |



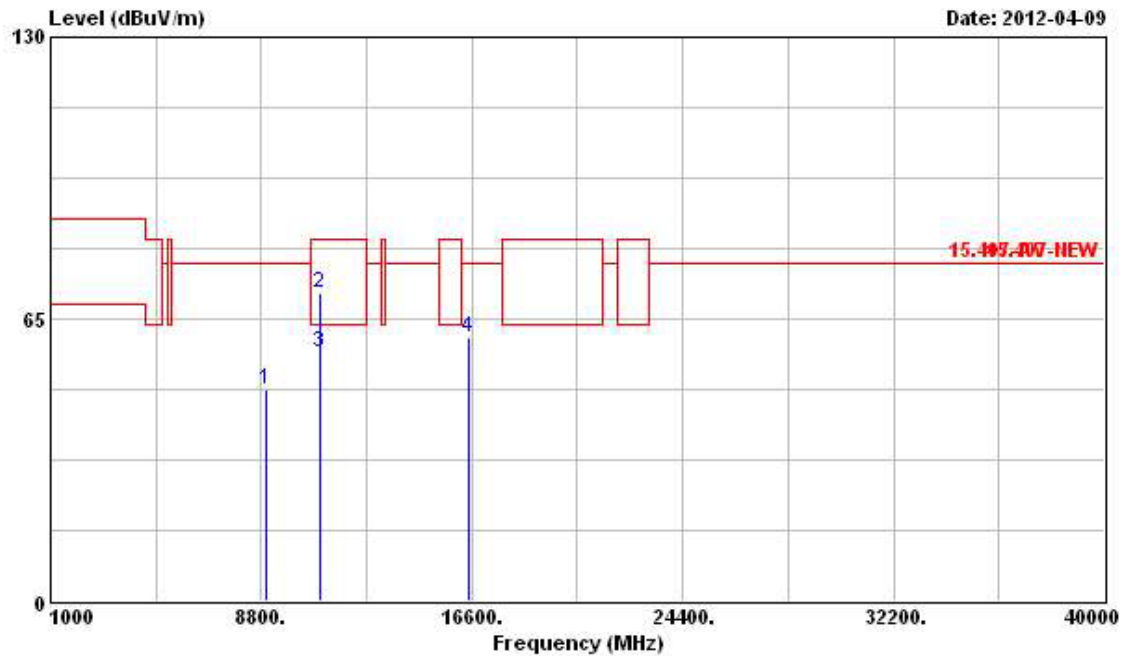
## Vertical



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 7080.000  | 54.53  | -23.31     | 77.84      | 48.08             | 35.88          | 5.61       | 35.04         | Peak    | ---     | ---       |
| 2 | 10640.000 | 62.44  | -21.10     | 83.54      | 52.13             | 38.38          | 6.93       | 35.00         | Peak    | ---     | ---       |
| 3 | 10640.000 | 47.20  | -16.34     | 63.54      | 36.89             | 38.38          | 6.93       | 35.00         | Average | ---     | ---       |
| 4 | 15960.000 | 63.78  | -19.76     | 83.54      | 49.77             | 40.99          | 8.47       | 35.45         | Peak    | ---     | ---       |
| 5 | 15960.000 | 48.14  | -15.40     | 63.54      | 34.13             | 40.99          | 8.47       | 35.45         | Average | ---     | ---       |



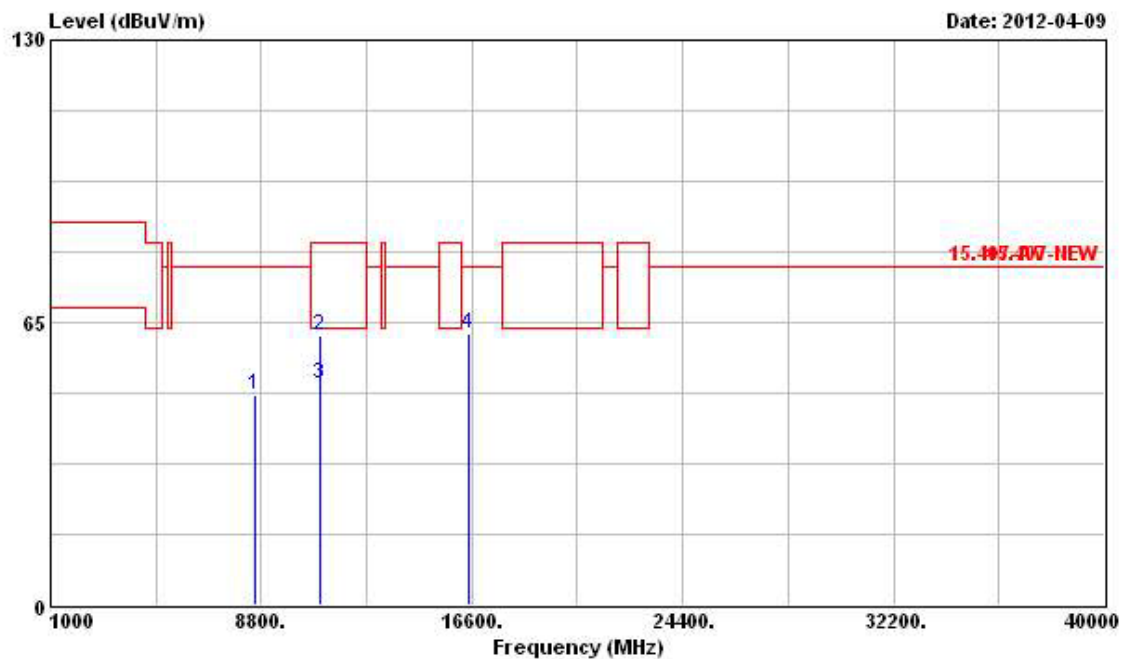
|                 |               |               |                         |
|-----------------|---------------|---------------|-------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY               |
| Temperature     | 23.9°C        | Humidity      | 63%                     |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 100 (20MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8964.000  | 48.86  | -28.98     | 77.84      | 41.46             | 36.57          | 6.14       | 35.31         | Peak    | ---     | ---       |
| 2 | 11000.000 | 70.81  | -12.73     | 83.54      | 59.76             | 38.60          | 7.17       | 34.72         | Peak    | ---     | ---       |
| 3 | 11000.000 | 57.16  | -6.38      | 63.54      | 46.11             | 38.60          | 7.17       | 34.72         | Average | ---     | ---       |
| 4 | 16500.000 | 60.76  | -17.08     | 77.84      | 45.51             | 42.00          | 8.24       | 34.99         | Peak    | ---     | ---       |



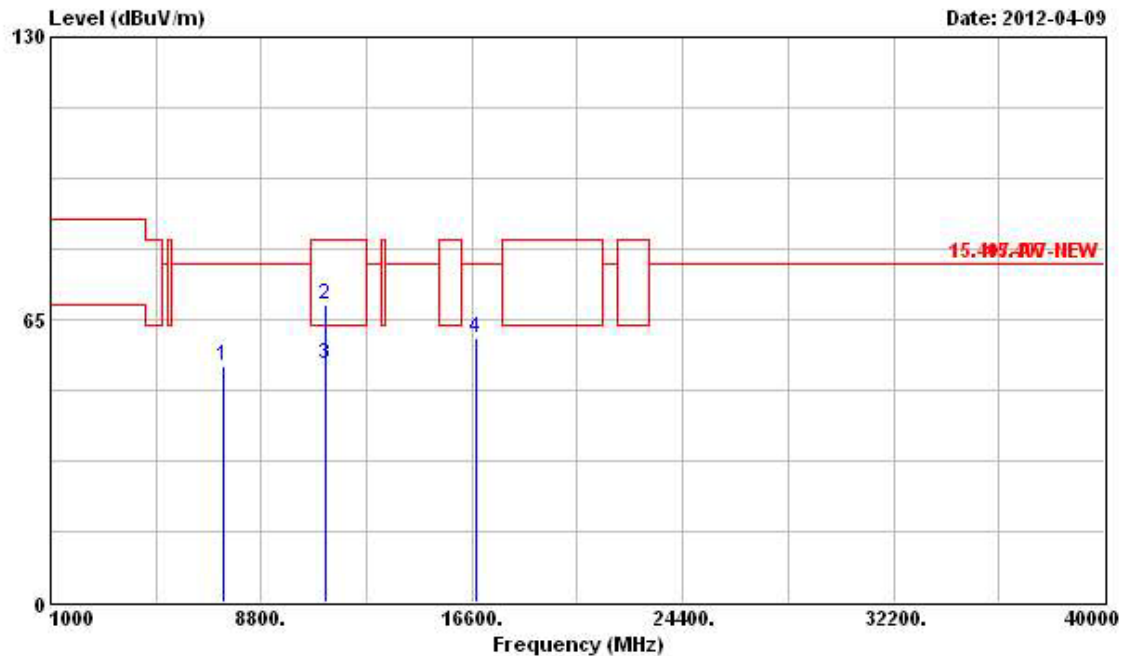
## Vertical



|   | 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 | 8580.000  | 48.52  | -29.32     | 77.84      | 41.45             | 36.35          | 5.97       | 35.25         | Peak    | ---     | ---       |
| 2 | 11000.000 | 62.16  | -21.38     | 83.54      | 51.11             | 38.60          | 7.17       | 34.72         | Peak    | ---     | ---       |
| 3 | 11000.000 | 50.79  | -12.75     | 63.54      | 39.74             | 38.60          | 7.17       | 34.72         | Average | ---     | ---       |
| 4 | 16500.000 | 62.46  | -15.38     | 77.84      | 47.21             | 42.00          | 8.24       | 34.99         | Peak    | ---     | ---       |



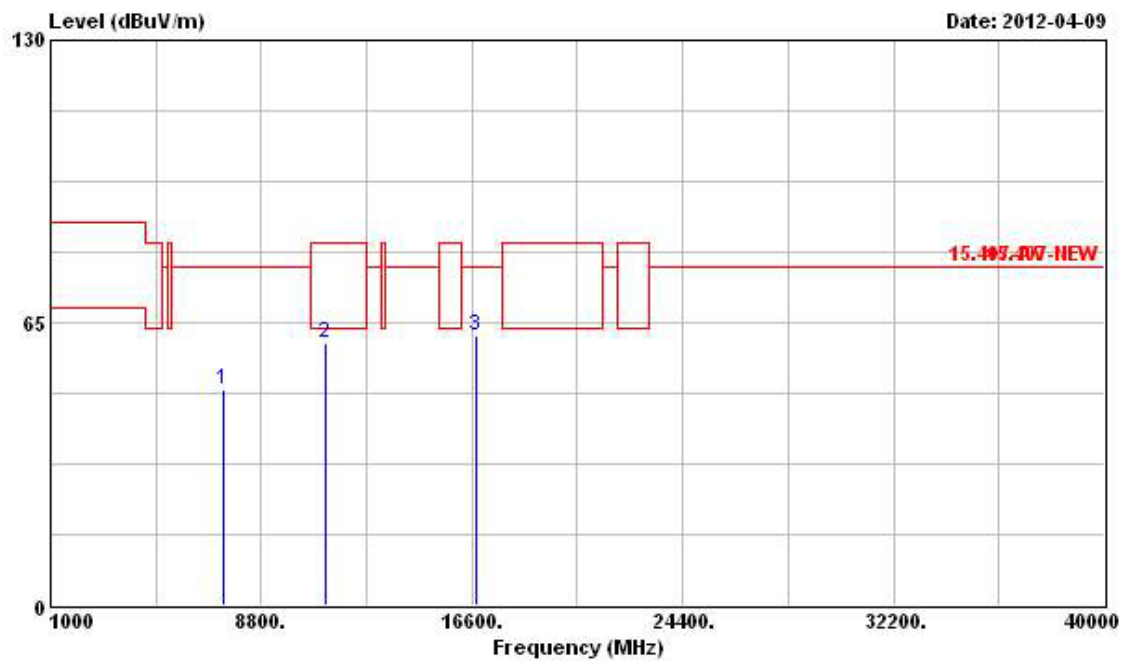
|                        |               |                      |                          |
|------------------------|---------------|----------------------|--------------------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY                |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%                      |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11n Ch. 116 (20 MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 7428.000  | 54.40  | -23.44     | 77.84      | 48.07             | 35.81          | 5.65       | 35.13         | PK      | ---     | ---       |
| 2 | 11160.000 | 68.25  | -15.29     | 83.54      | 57.31             | 38.70          | 6.96       | 34.72         | Peak    | ---     | ---       |
| 3 | 11160.000 | 54.69  | -8.85      | 63.54      | 43.75             | 38.70          | 6.96       | 34.72         | Average | ---     | ---       |
| 4 | 16740.000 | 60.76  | -17.08     | 77.84      | 44.94             | 41.86          | 8.47       | 34.51         | Peak    | ---     | ---       |



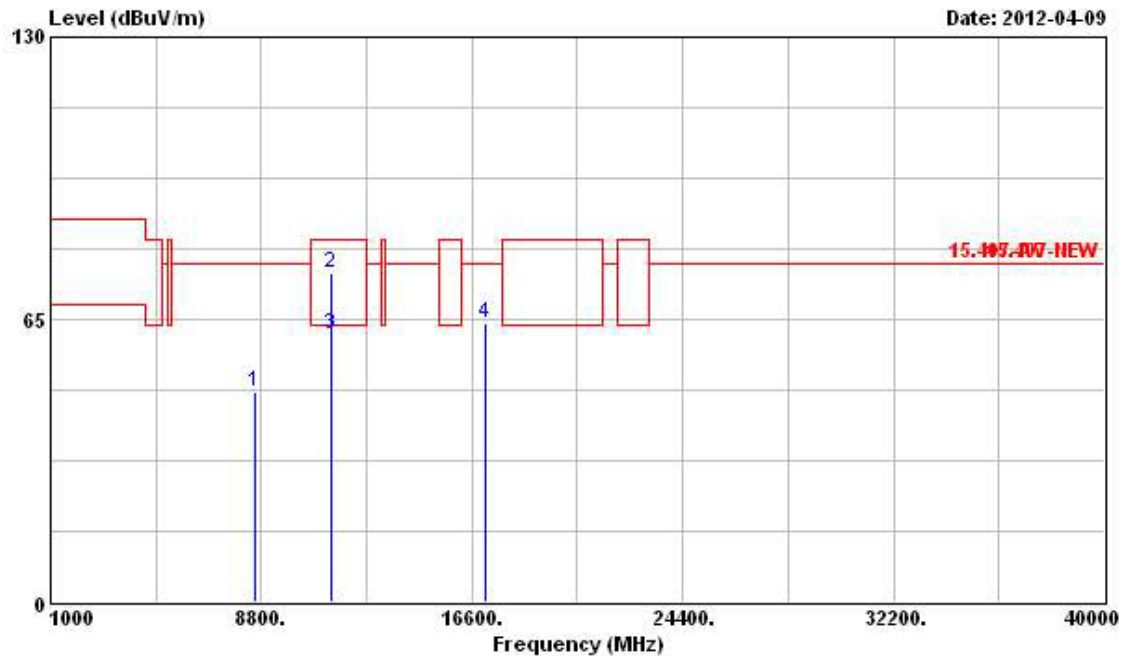
## Vertical



|   | 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 | 7428.000  | 49.64  | -28.20     | 77.84      | 43.31             | 35.81          | 5.65       | 35.13         | PK     | ---     | ---       |
| 2 | 11160.000 | 60.29  | -3.25      | 63.54      | 49.35             | 38.70          | 6.96       | 34.72         | PK     | ---     | ---       |
| 3 | 16740.000 | 62.02  | -15.82     | 77.84      | 46.20             | 41.86          | 8.47       | 34.51         | Peak   | ---     | ---       |



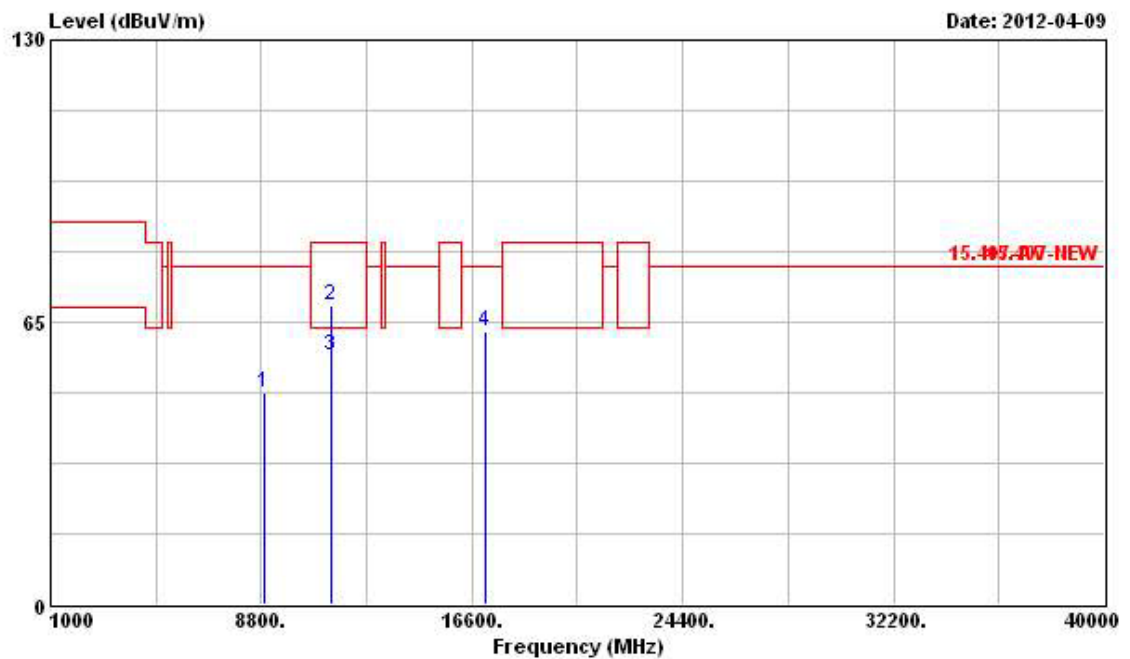
|                 |               |               |                          |
|-----------------|---------------|---------------|--------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY                |
| Temperature     | 23.9°C        | Humidity      | 63%                      |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 140 (20 MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8568.000  | 48.50  | -29.34     | 77.84      | 41.44             | 36.34          | 5.97       | 35.25         | Peak    | ---     | ---       |
| 2 | 11400.000 | 75.85  | -7.69      | 83.54      | 65.02             | 38.84          | 6.71       | 34.72         | Peak    | ---     | ---       |
| 3 | 11400.000 | 61.45  | -2.09      | 63.54      | 50.62             | 38.84          | 6.71       | 34.72         | Average | ---     | ---       |
| 4 | 17100.000 | 63.98  | -13.86     | 77.84      | 47.69             | 41.66          | 8.61       | 33.98         | Peak    | ---     | ---       |



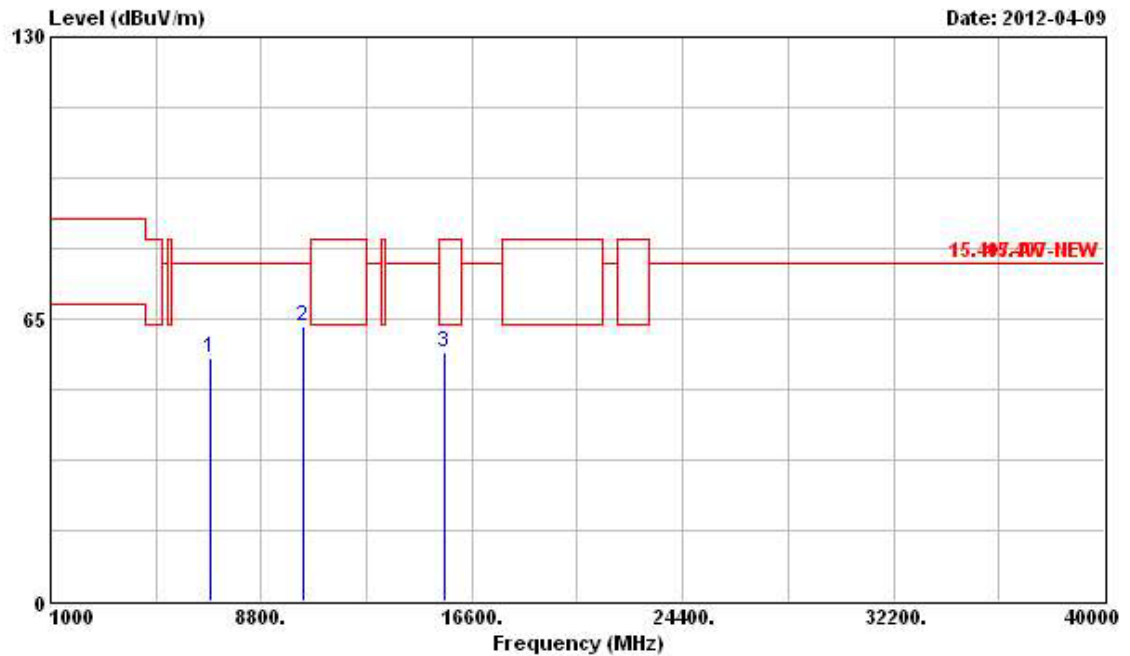
## Vertical



|   | 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 | 8916.000  | 48.58  | -29.26     | 77.84      | 41.20             | 36.55          | 6.13       | 35.30         | Peak    | ---     | ---       |
| 2 | 11400.000 | 68.95  | -14.59     | 83.54      | 58.12             | 38.84          | 6.71       | 34.72         | Peak    | ---     | ---       |
| 3 | 11400.000 | 57.13  | -6.41      | 63.54      | 46.30             | 38.84          | 6.71       | 34.72         | Average | ---     | ---       |
| 4 | 17100.000 | 62.71  | -15.13     | 77.84      | 46.42             | 41.66          | 8.61       | 33.98         | Peak    | ---     | ---       |



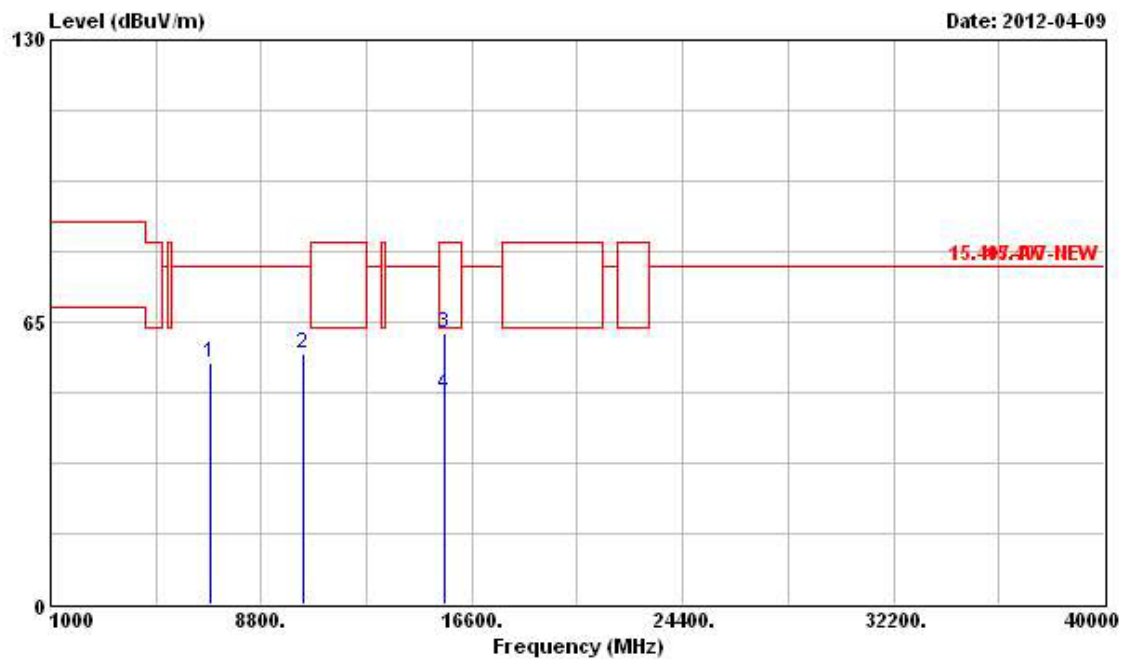
|                        |               |                      |                        |
|------------------------|---------------|----------------------|------------------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY              |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%                    |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11n Ch. 38 (40MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6900.000  | 56.12  | -21.72     | 77.84      | 49.68             | 35.86          | 5.57       | 34.99         | Peak   | ---     | ---       |
| 2 | 10380.000 | 63.41  | -14.43     | 77.84      | 53.63             | 38.23          | 6.75       | 35.20         | Peak   | ---     | ---       |
| 3 | 15570.000 | 57.44  | -6.10      | 63.54      | 43.21             | 40.83          | 8.45       | 35.05         | PK     | ---     | ---       |



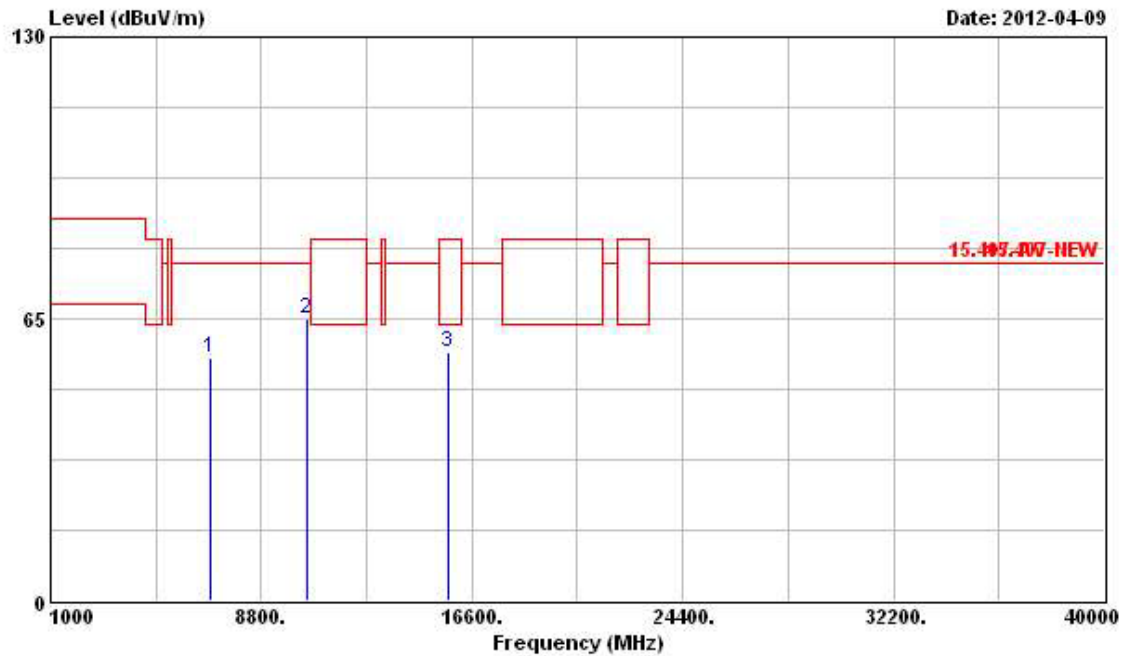
## Vertical



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 6900.000  | 55.40  | -22.44     | 77.84      | 48.96             | 35.86          | 5.57       | 34.99         | Peak    | ---     | ---       |
| 2 | 10380.000 | 57.61  | -20.23     | 77.84      | 47.83             | 38.23          | 6.75       | 35.20         | Peak    | ---     | ---       |
| 3 | 15570.000 | 62.34  | -21.20     | 83.54      | 48.11             | 40.83          | 8.45       | 35.05         | Peak    | ---     | ---       |
| 4 | 15570.000 | 48.25  | -15.29     | 63.54      | 34.02             | 40.83          | 8.45       | 35.05         | Average | ---     | ---       |



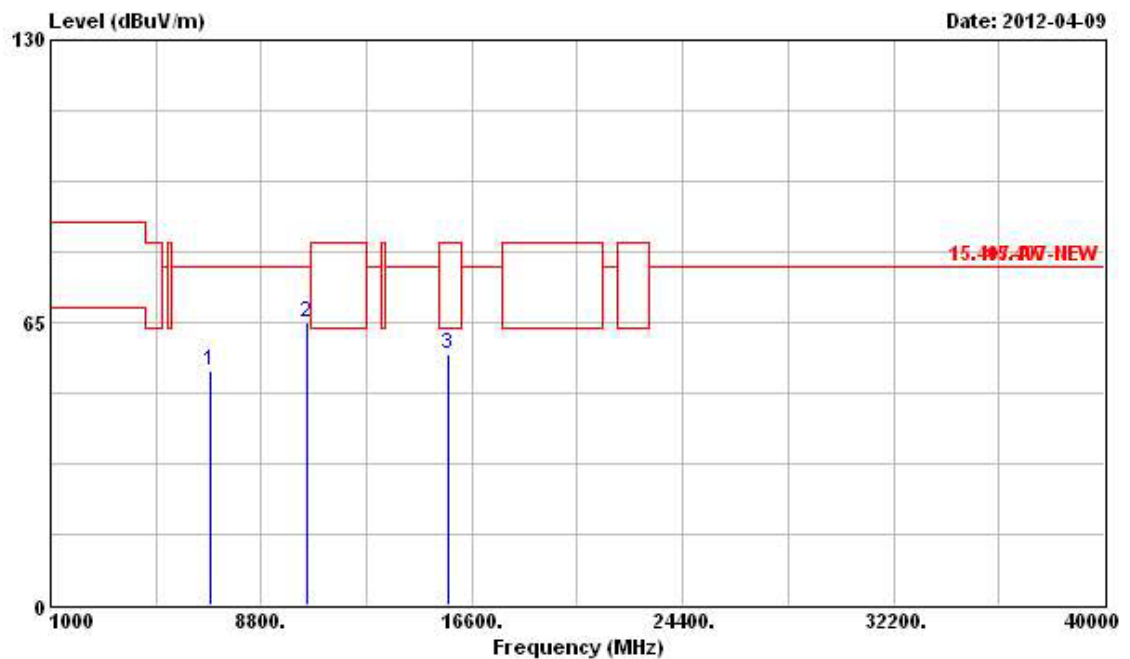
|                        |               |                      |                        |
|------------------------|---------------|----------------------|------------------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY              |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%                    |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11n Ch. 46 (40MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6948.000  | 56.12  | -21.72     | 77.84      | 49.66             | 35.88          | 5.59       | 35.01         | Peak   | ---     | ---       |
| 2 | 10460.000 | 65.11  | -12.73     | 77.84      | 55.16             | 38.27          | 6.82       | 35.14         | Peak   | ---     | ---       |
| 3 | 15690.000 | 57.37  | -6.17      | 63.54      | 43.21             | 40.88          | 8.46       | 35.18         | PK     | ---     | ---       |



## Vertical

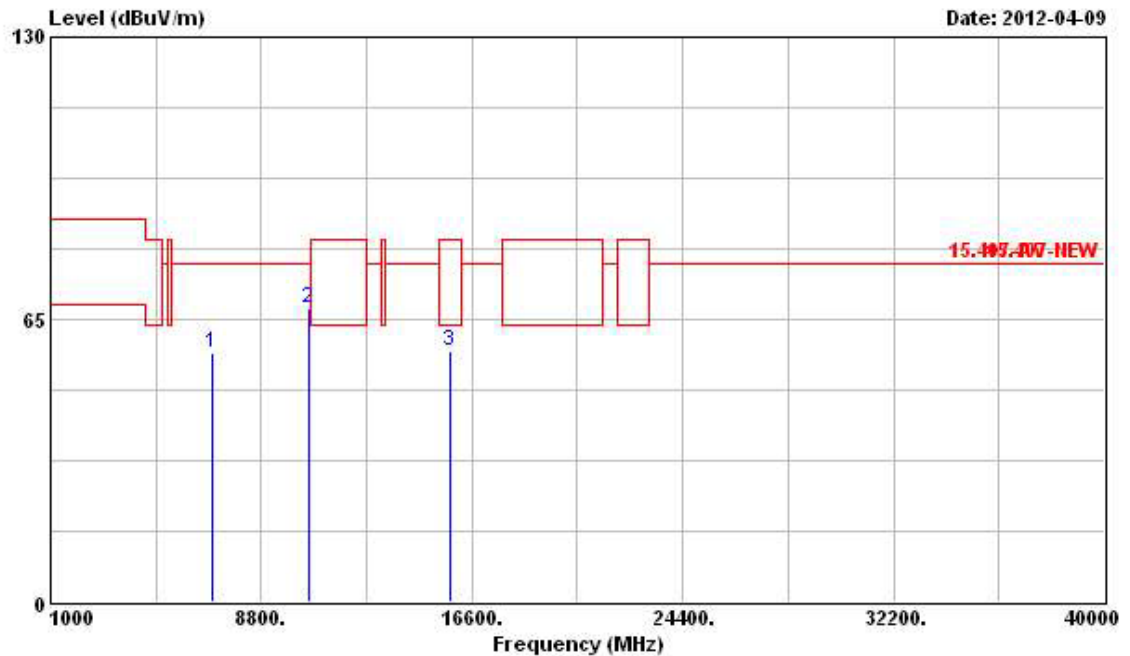


|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6948.000  | 53.85  | -23.99     | 77.84      | 47.39             | 35.88          | 5.59       | 35.01         | Peak   | ---     | ---       |
| 2 | 10460.000 | 64.95  | -12.89     | 77.84      | 55.00             | 38.27          | 6.82       | 35.14         | Peak   | ---     | ---       |
| 3 | 15690.000 | 57.71  | -5.83      | 63.54      | 43.55             | 40.88          | 8.46       | 35.18         | PK     | ---     | ---       |



|                 |               |               |                        |
|-----------------|---------------|---------------|------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY              |
| Temperature     | 23.9°C        | Humidity      | 63%                    |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 54 (40MHz) |

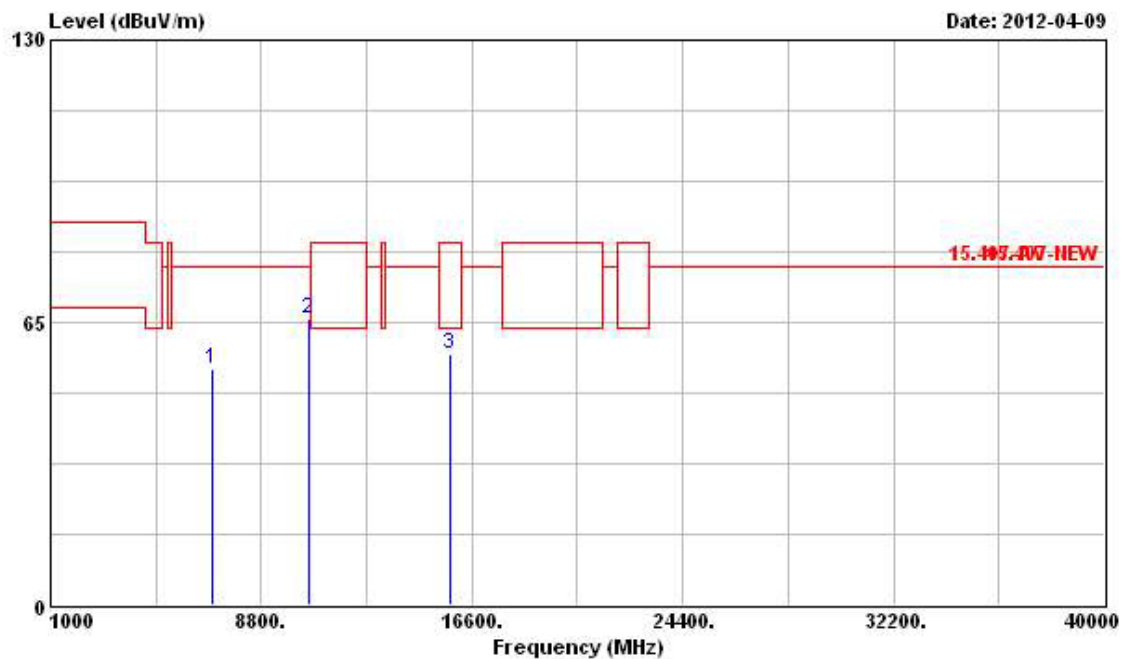
Horizontal



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6996.000  | 57.47  | -20.37     | 77.84      | 50.99             | 35.90          | 5.60       | 35.02         | Peak   | ---     | ---       |
| 2 | 10540.000 | 67.65  | -10.19     | 77.84      | 57.53             | 38.32          | 6.88       | 35.08         | Peak   | ---     | ---       |
| 3 | 15810.000 | 57.72  | -5.82      | 63.54      | 43.64             | 40.92          | 8.46       | 35.30         | PK     | ---     | ---       |



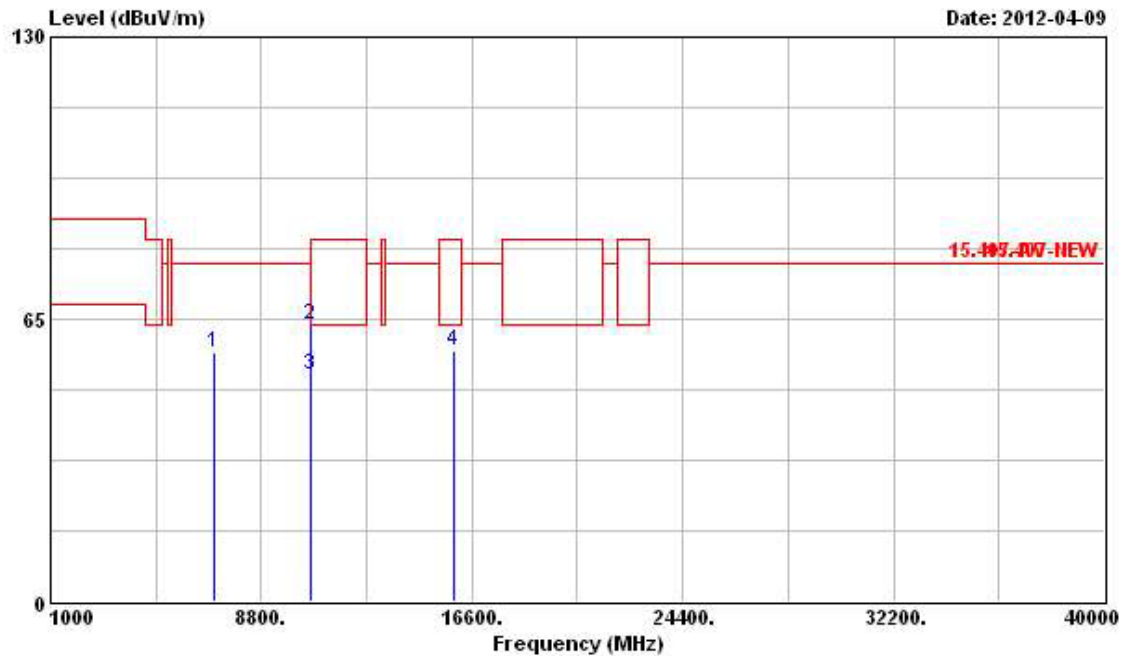
## Vertical



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 6996.000  | 54.28  | -23.56     | 77.84      | 47.80             | 35.90          | 5.60       | 35.02         | Peak   | ---     | ---       |
| 2 | 10540.000 | 65.83  | -12.01     | 77.84      | 55.71             | 38.32          | 6.88       | 35.08         | Peak   | ---     | ---       |
| 3 | 15810.000 | 57.61  | -5.93      | 63.54      | 43.53             | 40.92          | 8.46       | 35.30         | PK     | ---     | ---       |



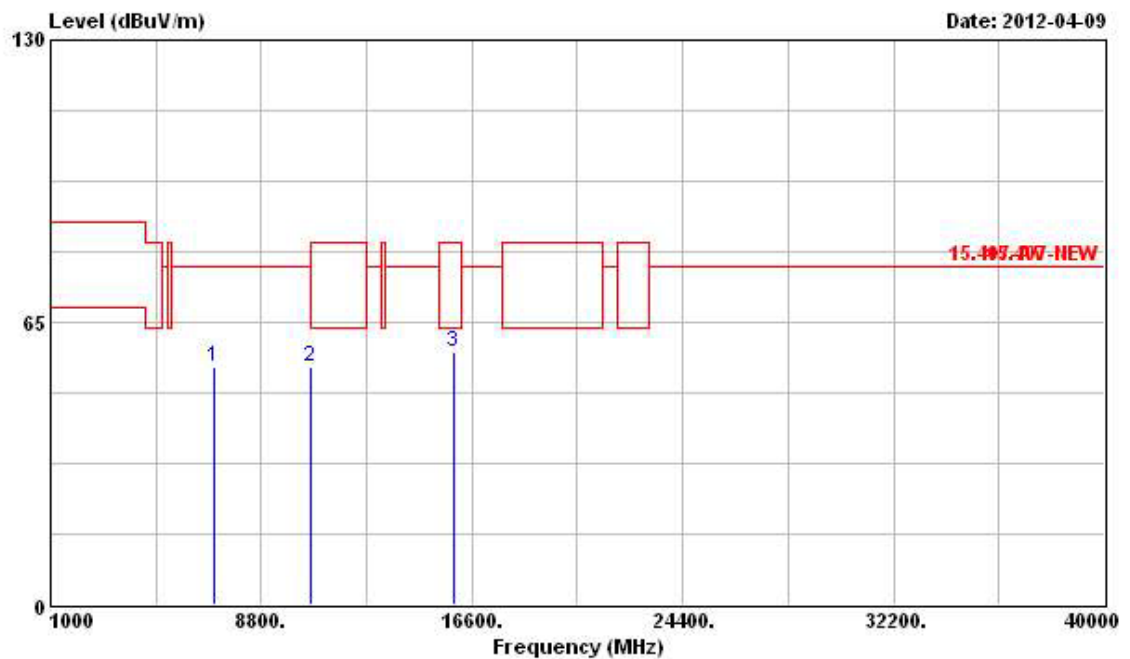
|                        |               |                      |                        |
|------------------------|---------------|----------------------|------------------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY              |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%                    |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11n Ch. 62 (40MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 7080.000  | 57.50  | -20.34     | 77.84      | 51.05             | 35.88          | 5.61       | 35.04         | Peak    | ---     | ---       |
| 2 | 10620.000 | 63.64  | -19.90     | 83.54      | 53.36             | 38.37          | 6.93       | 35.02         | Peak    | ---     | ---       |
| 3 | 10620.000 | 52.16  | -11.38     | 63.54      | 41.88             | 38.37          | 6.93       | 35.02         | Average | ---     | ---       |
| 4 | 15930.000 | 57.81  | -5.73      | 63.54      | 43.77             | 40.97          | 8.47       | 35.40         | PK      | ---     | ---       |



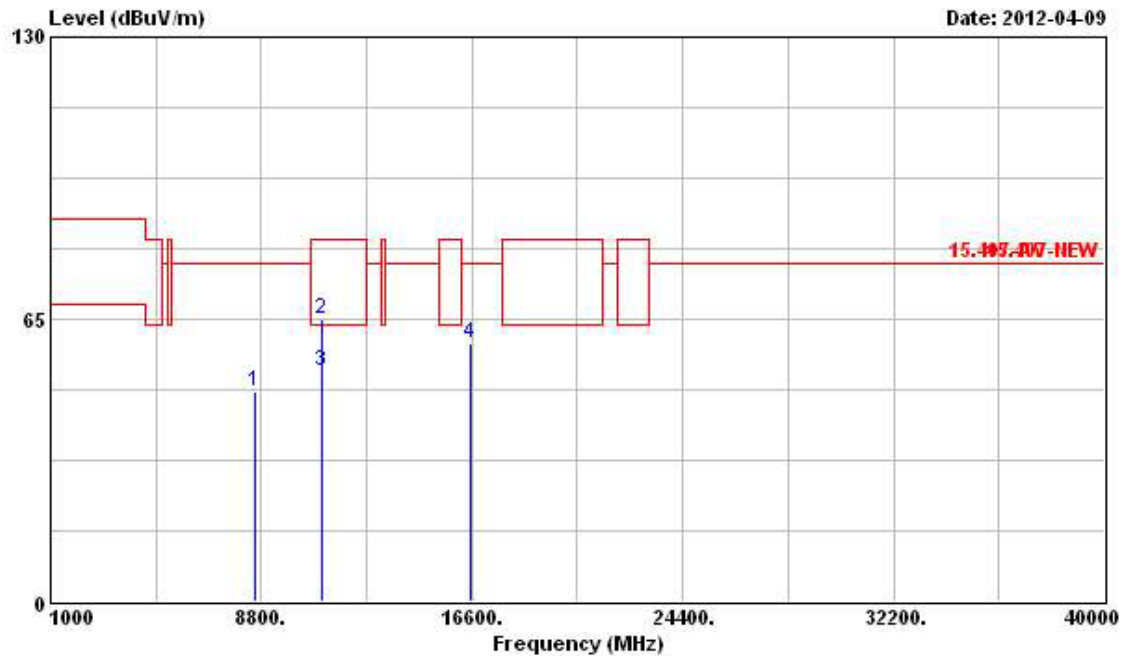
## Vertical



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |        | cm      | deg       |
| 1 | 7080.000  | 54.85  | -22.99     | 77.84      | 48.40             | 35.88          | 5.61       | 35.04         | Peak   | ---     | ---       |
| 2 | 10620.000 | 54.90  | -8.64      | 63.54      | 44.62             | 38.37          | 6.93       | 35.02         | PK     | ---     | ---       |
| 3 | 15930.000 | 57.97  | -5.57      | 63.54      | 43.93             | 40.97          | 8.47       | 35.40         | PK     | ---     | ---       |



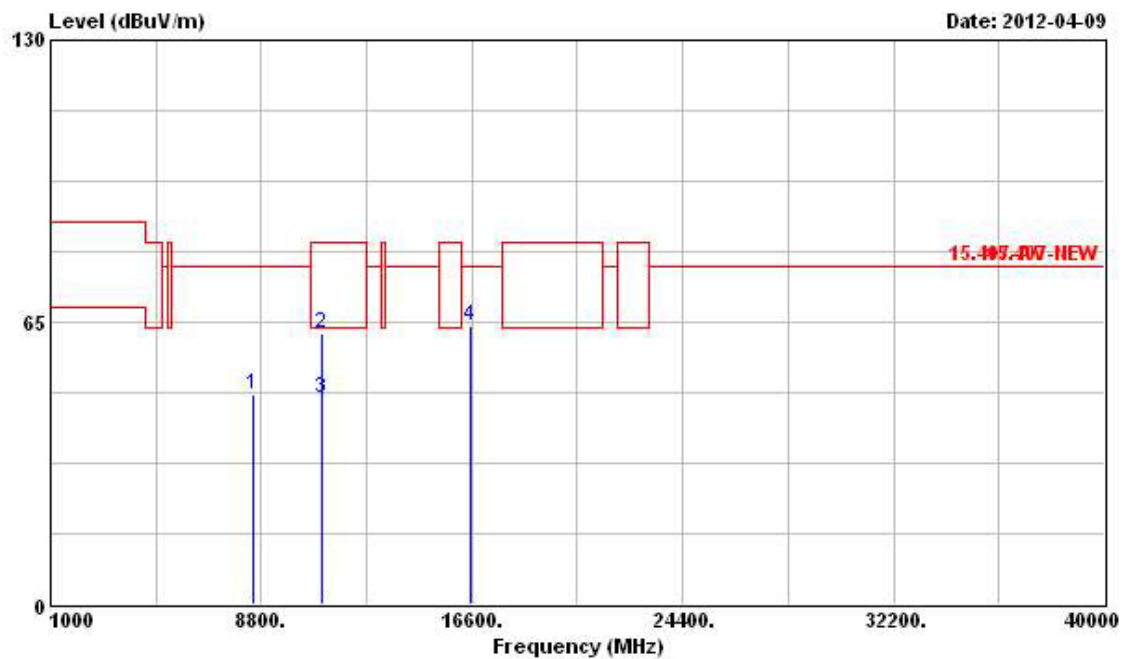
|                 |               |               |                         |
|-----------------|---------------|---------------|-------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY               |
| Temperature     | 23.9°C        | Humidity      | 63%                     |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 102 (40MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8568.000  | 48.29  | -29.55     | 77.84      | 41.23             | 36.34          | 5.97       | 35.25         | Peak    | ---     | ---       |
| 2 | 11020.000 | 65.05  | -18.49     | 83.54      | 54.03             | 38.61          | 7.13       | 34.72         | Peak    | ---     | ---       |
| 3 | 11020.000 | 53.02  | -10.52     | 63.54      | 42.00             | 38.61          | 7.13       | 34.72         | Average | ---     | ---       |
| 4 | 16530.000 | 59.33  | -18.51     | 77.84      | 44.02             | 41.98          | 8.27       | 34.94         | Peak    | ---     | ---       |



## Vertical

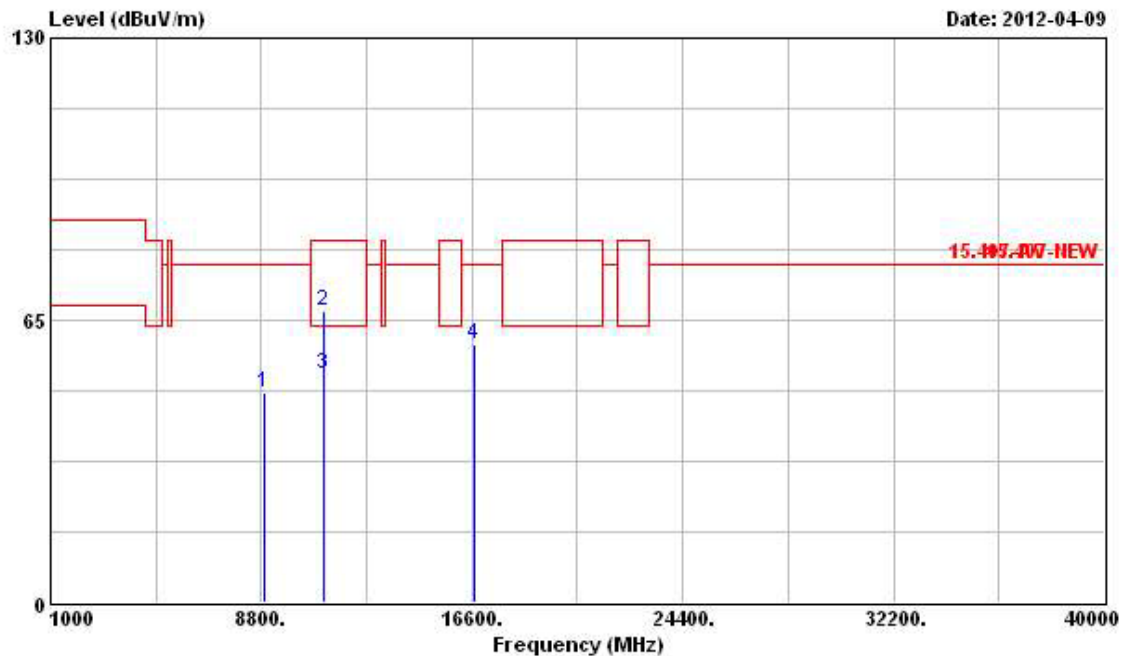


|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8520.000  | 48.46  | -29.38     | 77.84      | 41.43             | 36.31          | 5.96       | 35.24         | Peak    | ---     | ---       |
| 2 | 11020.000 | 62.53  | -21.01     | 83.54      | 51.51             | 38.61          | 7.13       | 34.72         | Peak    | ---     | ---       |
| 3 | 11020.000 | 47.27  | -16.27     | 63.54      | 36.25             | 38.61          | 7.13       | 34.72         | Average | ---     | ---       |
| 4 | 16530.000 | 64.20  | -13.64     | 77.84      | 48.89             | 41.98          | 8.27       | 34.94         | Peak    | ---     | ---       |



|                 |               |               |                         |
|-----------------|---------------|---------------|-------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY               |
| Temperature     | 23.9°C        | Humidity      | 63%                     |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 110 (40MHz) |

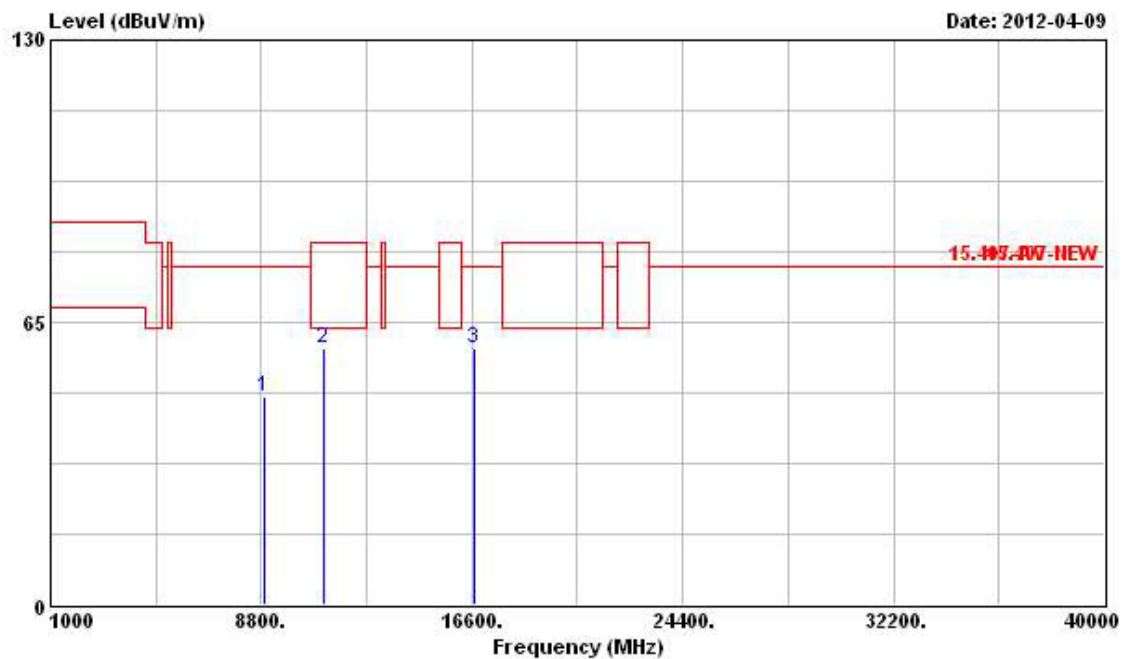
Horizontal



|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8904.000  | 48.22  | -29.62     | 77.84      | 40.85             | 36.54          | 6.13       | 35.30         | Peak    | ---     | ---       |
| 2 | 11100.000 | 66.99  | -16.55     | 83.54      | 56.00             | 38.66          | 7.05       | 34.72         | Peak    | ---     | ---       |
| 3 | 11100.000 | 52.66  | -10.88     | 63.54      | 41.67             | 38.66          | 7.05       | 34.72         | Average | ---     | ---       |
| 4 | 16650.000 | 59.27  | -18.57     | 77.84      | 43.66             | 41.91          | 8.37       | 34.67         | Peak    | ---     | ---       |



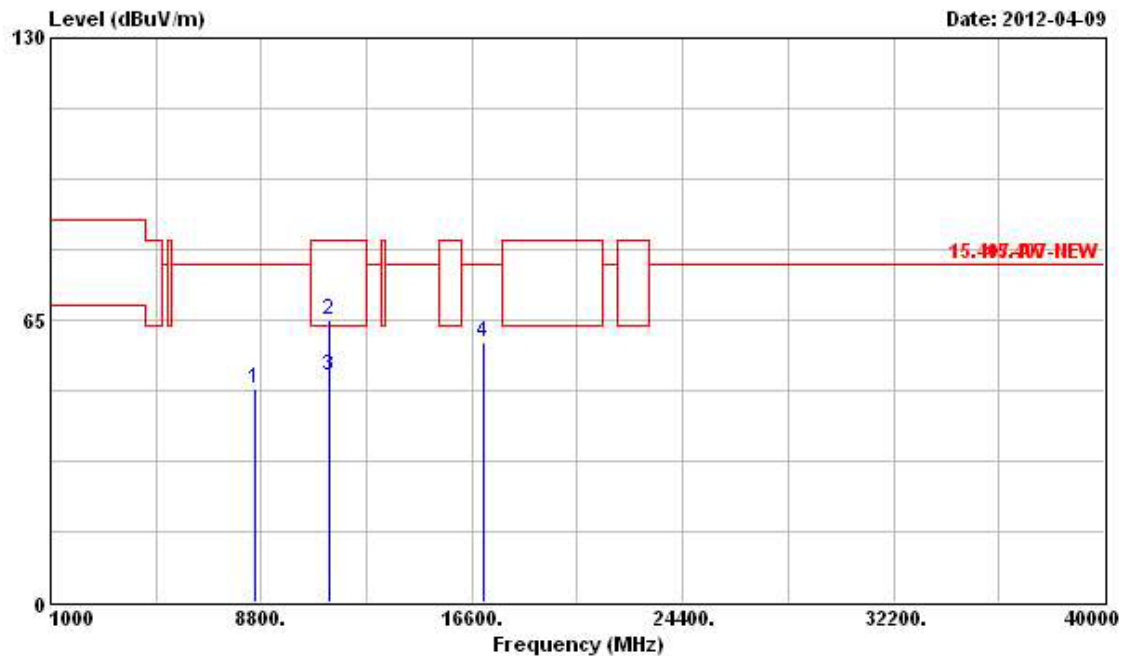
## Vertical



|   | 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 | 8904.000  | 47.94  | -29.90     | 77.84      | 40.57             | 36.54          | 6.13       | 35.30         | Peak   | ---     | ---       |
| 2 | 11100.000 | 58.90  | -4.64      | 63.54      | 47.91             | 38.66          | 7.05       | 34.72         | PK     | ---     | ---       |
| 3 | 16650.000 | 59.21  | -18.63     | 77.84      | 43.60             | 41.91          | 8.37       | 34.67         | Peak   | ---     | ---       |



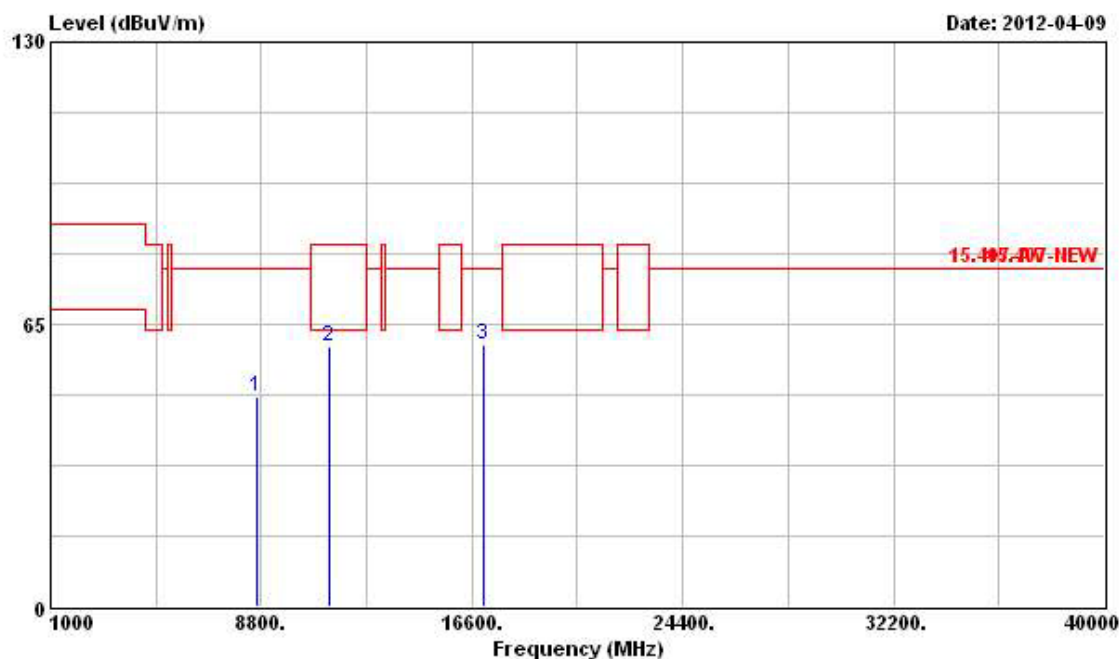
|                 |               |               |                         |
|-----------------|---------------|---------------|-------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY               |
| Temperature     | 23.9°C        | Humidity      | 63%                     |
| Test Engineer   | Streak        | Configuration | 802.11n Ch. 134 (40MHz) |

**Horizontal**

|   | Freq      | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|---|-----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|   | MHz       | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1 | 8568.000  | 49.28  | -28.56     | 77.84      | 42.22             | 36.34          | 5.97       | 35.25         | Peak    | ---     | ---       |
| 2 | 11340.000 | 64.82  | -18.72     | 83.54      | 53.94             | 38.80          | 6.80       | 34.72         | Peak    | ---     | ---       |
| 3 | 11340.000 | 52.02  | -11.52     | 63.54      | 41.14             | 38.80          | 6.80       | 34.72         | Average | ---     | ---       |
| 4 | 17010.000 | 59.97  | -17.87     | 77.84      | 43.61             | 41.69          | 8.65       | 33.98         | 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 | 8616.000  | 48.21  | -29.63     | 77.84      | 41.11             | 36.37          | 5.99       | 35.26         | Peak   | ---     | ---       |
| 2 | 11340.000 | 60.05  | -3.49      | 63.54      | 49.17             | 38.80          | 6.80       | 34.72         | PK     | ---     | ---       |
| 3 | 17010.000 | 60.16  | -17.68     | 77.84      | 43.80             | 41.69          | 8.65       | 33.98         | 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.

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

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

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



### 3.7 Band Edge and Fundamental Emissions Measurement

#### 3.7.1 Limit

For transmitters operating in the 5.15~5.35 GHz band: all emissions outside of the 5.15~5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.47~5.725 GHz band: all emissions outside of the 5.47~5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 2.2(a), then the 2.2(b) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009~0.490       | 2400/F(kHz)                       | 300                           |
| 0.490~1.705       | 24000/F(kHz)                      | 30                            |
| 1.705~30.0        | 30                                | 30                            |
| 30~88             | 100                               | 3                             |
| 88~216            | 150                               | 3                             |
| 216~960           | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

#### 3.7.2 Measuring Instruments and Setting

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

| Spectrum Parameter                        | Setting  |
|---|--|
| Attenuation                               | Auto   |
| Span Frequency                            | 100 MHz  |
| RB / VB (Emission in restricted band)     | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 1 MHz /1 MHz for Peak                          |

#### 3.7.3 Test Procedures

1. The test procedure is the same as section 3.6.3; only the frequency range investigated is limited to 100MHz around band edges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

#### 3.7.4 Test Setup Layout

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

#### 3.7.5 Test Deviation

There is no deviation with the original standard.

#### 3.7.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



## 3.7.7 Test Result of Band Edge and Fundamental Emissions

For Single Chain:

|                 |               |               |                        |
|-----------------|---------------|---------------|------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY              |
| Temperature     | 23.9℃         | Humidity      | 63%                    |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 36, 40, 48 |

## Channel 36

|     | Freq     | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|-----|----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|     | MHz      | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1   | 5149.900 | 57.94  | -5.60      | 63.54      | 18.27             | 34.89          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5181.900 | 103.09 |            |            | 63.38             | 34.91          | 4.80       | 0.00          | Average | ---     | ---       |
| 1   | 5149.900 | 73.00  | -10.54     | 83.54      | 33.33             | 34.89          | 4.78       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5183.400 | 112.89 |            |            | 73.18             | 34.91          | 4.80       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

## Channel 40

|     | Freq     | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|-----|----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|     | MHz      | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1   | 5147.400 | 56.06  | -7.48      | 63.54      | 16.39             | 34.89          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5196.900 | 103.78 |            |            | 64.05             | 34.92          | 4.81       | 0.00          | Average | ---     | ---       |
| 3   | 5350.000 | 54.65  | -8.89      | 63.54      | 14.77             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1   | 5147.400 | 68.47  | -15.07     | 83.54      | 28.80             | 34.89          | 4.78       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5202.900 | 113.14 |            |            | 73.41             | 34.92          | 4.81       | 0.00          | Peak    | ---     | ---       |
| 3   | 5397.000 | 67.91  | -15.63     | 83.54      | 27.99             | 35.04          | 4.88       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

## Channel 48

|     | Freq     | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|-----|----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|     | MHz      | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1   | 5117.400 | 54.94  | -8.60      | 63.54      | 15.29             | 34.87          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5242.200 | 103.76 |            |            | 63.99             | 34.95          | 4.82       | 0.00          | Average | ---     | ---       |
| 3   | 5351.700 | 54.61  | -8.93      | 63.54      | 14.73             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1   | 5140.500 | 68.06  | -15.48     | 83.54      | 28.39             | 34.89          | 4.78       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5243.400 | 113.47 |            |            | 73.70             | 34.95          | 4.82       | 0.00          | Peak    | ---     | ---       |
| 3   | 5388.600 | 67.86  | -15.68     | 83.54      | 27.95             | 35.03          | 4.88       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.



|                 |               |               |                        |
|-----------------|---------------|---------------|------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY              |
| Temperature     | 23.9°C        | Humidity      | 63%                    |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 52, 56, 64 |

**Channel 52**

|     | 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   | 5143.800 | 54.92  | -8.62      | 63.54      | 15.25             | 34.89          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5256.900 | 104.61 |            |            | 64.84             | 34.95          | 4.82       | 0.00          | Average | ---     | ---       |
| 3   | 5360.100 | 54.68  | -8.86      | 63.54      | 14.80             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1   | 5114.100 | 68.24  | -15.30     | 83.54      | 28.60             | 34.87          | 4.77       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5253.300 | 114.19 |            |            | 74.42             | 34.95          | 4.82       | 0.00          | Peak    | ---     | ---       |
| 3   | 5374.200 | 68.99  | -14.55     | 83.54      | 29.10             | 35.02          | 4.87       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 56**

|     | 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   | 5143.800 | 54.93  | -8.61      | 63.54      | 15.26             | 34.89          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5283.000 | 104.15 |            |            | 64.34             | 34.97          | 4.84       | 0.00          | Average | ---     | ---       |
| 3   | 5353.800 | 54.76  | -8.78      | 63.54      | 14.88             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1   | 5112.600 | 68.72  | -14.82     | 83.54      | 29.08             | 34.87          | 4.77       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5284.200 | 113.62 |            |            | 73.81             | 34.97          | 4.84       | 0.00          | Peak    | ---     | ---       |
| 3   | 5352.900 | 68.07  | -15.47     | 83.54      | 28.19             | 35.01          | 4.87       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 64**

|     | 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 X | 5317.420 | 101.95 |            |            | 62.11             | 34.99          | 4.85       | 0.00          | Average | ---     | ---       |
| 2   | 5372.300 | 55.11  | -8.43      | 63.54      | 15.22             | 35.02          | 4.87       | 0.00          | Average | ---     | ---       |
| 1 X | 5316.020 | 111.74 |            |            | 71.90             | 34.99          | 4.85       | 0.00          | Peak    | ---     | ---       |
| 2   | 5370.900 | 67.29  | -16.25     | 83.54      | 27.40             | 35.02          | 4.87       | 0.00          | Peak    | ---     | ---       |

The item 1 is fundamental emissions.



|                 |               |               |                           |
|-----------------|---------------|---------------|---------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY                 |
| Temperature     | 23.9°C        | Humidity      | 63%                       |
| Test Engineer   | Streak        | Configuration | 802.11a Ch. 100, 116, 140 |

**Channel 100**

|     | 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   | 5447.840 | 55.62  | -7.92      | 63.54      | 15.65             | 35.07          | 4.90       | 0.00          | Average | ---     | ---       |
| 2 X | 5498.320 | 102.88 |            |            | 62.87             | 35.10          | 4.91       | 0.00          | Average | ---     | ---       |
| 1   | 5446.480 | 69.12  | -14.42     | 83.54      | 29.15             | 35.07          | 4.90       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5497.440 | 112.13 |            |            | 72.12             | 35.10          | 4.91       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 116**

|     | 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   | 5450.160 | 55.48  | -8.06      | 63.54      | 15.51             | 35.07          | 4.90       | 0.00          | Average | ---     | ---       |
| 2 X | 5576.880 | 92.14  |            |            | 52.03             | 35.16          | 4.95       | 0.00          | Average | ---     | ---       |
| 3   | 5726.640 | 56.13  | -21.71     | 77.84      | 15.81             | 35.28          | 5.04       | 0.00          | Average | ---     | ---       |
| 1   | 5457.840 | 68.41  | -15.13     | 83.54      | 28.44             | 35.07          | 4.90       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5575.600 | 101.20 |            |            | 61.09             | 35.16          | 4.95       | 0.00          | Peak    | ---     | ---       |
| 3   | 5738.160 | 68.51  | -9.33      | 77.84      | 28.18             | 35.29          | 5.04       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 140**

|     | 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 X | 5697.320 | 100.57 |            |            | 60.30             | 35.25          | 5.02       | 0.00          | Average | ---     | ---       |
| 2   | 5725.000 | 55.81  | -22.03     | 77.84      | 15.49             | 35.28          | 5.04       | 0.00          | Average | ---     | ---       |
| 1 X | 5703.140 | 110.40 |            |            | 70.09             | 35.27          | 5.04       | 0.00          | Peak    | ---     | ---       |
| 2   | 5725.940 | 70.13  | -7.71      | 77.84      | 29.81             | 35.28          | 5.04       | 0.00          | Peak    | ---     | ---       |

The item 1 is fundamental emissions.



For Two Chains:

|                 |               |               |                                   |
|-----------------|---------------|---------------|-----------------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY                         |
| Temperature     | 23.9°C        | Humidity      | 63%                               |
| Test Engineer   | Streak        | Configuration | 802.11n (20MHz)<br>Ch. 36, 40, 48 |

**Channel 36**

|     | Freq     | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|-----|----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|     | MHz      | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1   | 5128.300 | 55.41  | -8.13      | 63.54      | 15.75             | 34.88          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5181.800 | 98.42  |            |            | 58.71             | 34.91          | 4.80       | 0.00          | Average | ---     | ---       |
| 1   | 5105.100 | 68.63  | -14.91     | 83.54      | 29.00             | 34.86          | 4.77       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5182.700 | 110.25 |            |            | 70.54             | 34.91          | 4.80       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 40**

|     | Freq     | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|-----|----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|     | MHz      | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1   | 5147.700 | 55.02  | -8.52      | 63.54      | 15.35             | 34.89          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5197.800 | 97.96  |            |            | 58.23             | 34.92          | 4.81       | 0.00          | Average | ---     | ---       |
| 3   | 5358.600 | 54.49  | -9.05      | 63.54      | 14.61             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1   | 5148.900 | 67.47  | -16.07     | 83.54      | 27.80             | 34.89          | 4.78       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5202.600 | 109.11 |            |            | 69.38             | 34.92          | 4.81       | 0.00          | Peak    | ---     | ---       |
| 3   | 5351.400 | 68.10  | -15.44     | 83.54      | 28.22             | 35.01          | 4.87       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 48**

|     | Freq     | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|-----|----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|     | MHz      | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1   | 5128.200 | 54.60  | -8.94      | 63.54      | 14.94             | 34.88          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5241.300 | 97.99  |            |            | 58.23             | 34.94          | 4.82       | 0.00          | Average | ---     | ---       |
| 3   | 5351.400 | 54.41  | -9.13      | 63.54      | 14.53             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1   | 5127.300 | 67.92  | -15.62     | 83.54      | 28.26             | 34.88          | 4.78       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5243.400 | 109.28 |            |            | 69.51             | 34.95          | 4.82       | 0.00          | Peak    | ---     | ---       |
| 3   | 5352.900 | 67.43  | -16.11     | 83.54      | 27.55             | 35.01          | 4.87       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.



|                 |               |               |                                   |
|-----------------|---------------|---------------|-----------------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY                         |
| Temperature     | 23.9°C        | Humidity      | 63%                               |
| Test Engineer   | Streak        | Configuration | 802.11n (20MHz)<br>Ch. 52, 56, 64 |

**Channel 52**

|     | Freq     | Level  | Over<br>Limit | Limit<br>Line | ReadAntenna<br>Level Factor | Cable<br>Loss | Preamp<br>Factor | Remark | Ant<br>Pos | Table<br>Pos |     |
|-----|----------|--------|---------------|---------------|-----------------------------|---------------|------------------|--------|------------|--------------|-----|
|     | MHz      | dBuV/m | dB            | dBuV/m        | dBuV                        | dB/m          | dB               | dB     | cm         | deg          |     |
| 1   | 5142.600 | 54.72  | -8.82         | 63.54         | 15.05                       | 34.89         | 4.78             | 0.00   | Average    | ---          | --- |
| 2 X | 5257.800 | 100.25 |               |               | 60.48                       | 34.95         | 4.82             | 0.00   | Average    | ---          | --- |
| 3   | 5351.400 | 54.62  | -8.92         | 63.54         | 14.74                       | 35.01         | 4.87             | 0.00   | Average    | ---          | --- |
| 1   | 5141.400 | 67.81  | -15.73        | 83.54         | 28.14                       | 34.89         | 4.78             | 0.00   | Peak       | ---          | --- |
| 2 X | 5262.600 | 111.25 |               |               | 71.47                       | 34.96         | 4.82             | 0.00   | Peak       | ---          | --- |
| 3   | 5355.000 | 67.91  | -15.63        | 83.54         | 28.03                       | 35.01         | 4.87             | 0.00   | Peak       | ---          | --- |

The item 2 is fundamental emissions.

**Channel 56**

|     | Freq     | Level  | Over<br>Limit | Limit<br>Line | ReadAntenna<br>Level Factor | Cable<br>Loss | Preamp<br>Factor | Remark | Ant<br>Pos | Table<br>Pos |     |
|-----|----------|--------|---------------|---------------|-----------------------------|---------------|------------------|--------|------------|--------------|-----|
|     | MHz      | dBuV/m | dB            | dBuV/m        | dBuV                        | dB/m          | dB               | dB     | cm         | deg          |     |
| 1   | 5140.500 | 54.68  | -8.86         | 63.54         | 15.01                       | 34.89         | 4.78             | 0.00   | Average    | ---          | --- |
| 2 X | 5281.800 | 98.96  |               |               | 59.15                       | 34.97         | 4.84             | 0.00   | Average    | ---          | --- |
| 3   | 5362.200 | 54.42  | -9.12         | 63.54         | 14.53                       | 35.02         | 4.87             | 0.00   | Average    | ---          | --- |
| 1   | 5127.000 | 68.04  | -15.50        | 83.54         | 28.38                       | 34.88         | 4.78             | 0.00   | Peak       | ---          | --- |
| 2 X | 5283.000 | 109.91 |               |               | 70.10                       | 34.97         | 4.84             | 0.00   | Peak       | ---          | --- |
| 3   | 5362.500 | 67.84  | -15.70        | 83.54         | 27.95                       | 35.02         | 4.87             | 0.00   | Peak       | ---          | --- |

The item 2 is fundamental emissions.

**Channel 64**

|   |   | Freq     | Level  | Over<br>Limit | Limit<br>Line | ReadAntenna<br>Level Factor | Cable<br>Loss | Preamp<br>Factor | Remark | Ant<br>Pos | Table<br>Pos |
|---|---|----------|--------|---------------|---------------|-----------------------------|---------------|------------------|--------|------------|--------------|
|   |   | MHz      | dBuV/m | dB            | dBuV/m        | dBuV                        | dB/m          | dB               | dB     | cm         | deg          |
| 1 | X | 5319.170 | 97.61  |               |               | 57.77                       | 34.99         | 4.85             | 0.00   | Average    | ---          |
| 2 |   | 5372.370 | 54.60  | -8.94         | 63.54         | 14.71                       | 35.02         | 4.87             | 0.00   | Average    | ---          |
| 1 | X | 5317.420 | 108.74 |               |               | 68.90                       | 34.99         | 4.85             | 0.00   | Peak       | ---          |
| 2 |   | 5365.930 | 68.09  | -15.45        | 83.54         | 28.20                       | 35.02         | 4.87             | 0.00   | Peak       | ---          |

The item 1 is fundamental emissions.



|                 |               |               |                                      |
|-----------------|---------------|---------------|--------------------------------------|
| Final Test Date | Apr. 11, 2012 | Test Site No. | 03CH02-HY                            |
| Temperature     | 23.9°C        | Humidity      | 63%                                  |
| Test Engineer   | Streak        | Configuration | 802.11n (20MHz)<br>Ch. 100, 116, 140 |

**Channel 100**

|     | 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   | 5448.160 | 55.60  | -7.94      | 63.54      | 15.63      | 35.07          | 4.90       | 0.00          | Average | ---     | ---       |
| 2 X | 5501.280 | 100.22 |            |            | 60.21      | 35.10          | 4.91       | 0.00          | Average | ---     | ---       |
| 1   | 5448.400 | 68.38  | -15.16     | 83.54      | 28.41      | 35.07          | 4.90       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5502.880 | 112.12 |            |            | 72.11      | 35.10          | 4.91       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 116**

|     | 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   | 5446.000 | 56.12  | -7.42      | 63.54      | 16.15      | 35.07          | 4.90       | 0.00          | Average | ---     | ---       |
| 2 X | 5579.120 | 102.97 |            |            | 62.86      | 35.16          | 4.95       | 0.00          | Average | ---     | ---       |
| 3   | 5725.360 | 56.37  | -21.47     | 77.84      | 16.05      | 35.28          | 5.04       | 0.00          | Average | ---     | ---       |
| 1   | 5457.520 | 69.19  | -14.35     | 83.54      | 29.22      | 35.07          | 4.90       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5578.160 | 112.82 |            |            | 72.71      | 35.16          | 4.95       | 0.00          | Peak    | ---     | ---       |
| 3   | 5738.160 | 69.62  | -8.22      | 77.84      | 29.29      | 35.29          | 5.04       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 140**

|     | 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 X | 5701.160 | 100.10 |            |            | 59.79      | 35.27          | 5.04       | 0.00          | Average | ---     | ---       |
| 2   | 5725.000 | 56.01  | -21.83     | 77.84      | 15.69      | 35.28          | 5.04       | 0.00          | Average | ---     | ---       |
| 1 X | 5702.840 | 112.34 |            |            | 72.03      | 35.27          | 5.04       | 0.00          | Peak    | ---     | ---       |
| 2   | 5728.100 | 70.12  | -7.72      | 77.84      | 29.80      | 35.28          | 5.04       | 0.00          | Peak    | ---     | ---       |

The item 1 is fundamental emissions.



|                 |               |               |                               |
|-----------------|---------------|---------------|-------------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY                     |
| Temperature     | 23.9°C        | Humidity      | 63%                           |
| Test Engineer   | Streak        | Configuration | 802.11n (40MHz)<br>Ch. 38, 46 |

Channel 38

|     | Freq     | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|-----|----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|     | MHz      | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1   | 5150.000 | 59.25  | -4.29      | 63.54      | 19.58             | 34.89          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5196.030 | 94.32  |            |            | 54.59             | 34.92          | 4.81       | 0.00          | Average | ---     | ---       |
| 1   | 5147.730 | 74.25  | -9.29      | 83.54      | 34.58             | 34.89          | 4.78       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5195.450 | 106.30 |            |            | 66.57             | 34.92          | 4.81       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

Channel 46

|     | Freq     | Level  | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark  | Ant Pos | Table Pos |
|-----|----------|--------|------------|------------|-------------------|----------------|------------|---------------|---------|---------|-----------|
|     | MHz      | dBuV/m | dB         | dBuV/m     | dBuV              | dB/m           | dB         | dB            |         | cm      | deg       |
| 1   | 5138.750 | 54.74  | -8.80      | 63.54      | 15.08             | 34.88          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5241.750 | 94.46  |            |            | 54.69             | 34.95          | 4.82       | 0.00          | Average | ---     | ---       |
| 3   | 5357.750 | 54.53  | -9.01      | 63.54      | 14.65             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1   | 5120.750 | 68.40  | -15.14     | 83.54      | 28.75             | 34.87          | 4.78       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5235.500 | 106.19 |            |            | 66.43             | 34.94          | 4.82       | 0.00          | Peak    | ---     | ---       |
| 3   | 5369.500 | 67.70  | -15.84     | 83.54      | 27.81             | 35.02          | 4.87       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.



|                        |               |                      |                               |
|------------------------|---------------|----------------------|-------------------------------|
| <b>Final Test Date</b> | Apr. 09, 2012 | <b>Test Site No.</b> | 03CH02-HY                     |
| <b>Temperature</b>     | 23.9°C        | <b>Humidity</b>      | 63%                           |
| <b>Test Engineer</b>   | Streak        | <b>Configuration</b> | 802.11n (40MHz)<br>Ch. 54, 62 |

**Channel 54**

|     | 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   | 5145.000 | 54.71  | -8.83      | 63.54      | 15.04             | 34.89          | 4.78       | 0.00          | Average | ---     | ---       |
| 2 X | 5254.200 | 95.33  |            |            | 55.56             | 34.95          | 4.82       | 0.00          | Average | ---     | ---       |
| 3   | 5351.700 | 54.59  | -8.95      | 63.54      | 14.71             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1   | 5116.500 | 67.81  | -15.73     | 83.54      | 28.16             | 34.87          | 4.78       | 0.00          | Peak    | ---     | ---       |
| 2 X | 5256.600 | 106.73 |            |            | 66.96             | 34.95          | 4.82       | 0.00          | Peak    | ---     | ---       |
| 3   | 5365.800 | 67.75  | -15.79     | 83.54      | 27.86             | 35.02          | 4.87       | 0.00          | Peak    | ---     | ---       |

The item 2 is fundamental emissions.

**Channel 62**

|     | 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 X | 5294.300 | 95.38  |            |            | 55.56             | 34.98          | 4.84       | 0.00          | Average | ---     | ---       |
| 2   | 5350.000 | 56.89  | -6.65      | 63.54      | 17.01             | 35.01          | 4.87       | 0.00          | Average | ---     | ---       |
| 1 X | 5315.400 | 106.88 |            |            | 67.04             | 34.99          | 4.85       | 0.00          | Peak    | ---     | ---       |
| 2   | 5355.100 | 71.06  | -12.48     | 83.54      | 31.18             | 35.01          | 4.87       | 0.00          | Peak    | ---     | ---       |

The item 1 is fundamental emissions.



|                 |               |               |                                      |
|-----------------|---------------|---------------|--------------------------------------|
| Final Test Date | Apr. 09, 2012 | Test Site No. | 03CH02-HY                            |
| Temperature     | 23.9°C        | Humidity      | 63%                                  |
| Test Engineer   | Streak        | Configuration | 802.11n (40MHz)<br>Ch. 102, 110, 134 |

**Channel 102**

|     | Freq     | Level  | Over<br>Limit | Limit<br>Line | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Remark  | Ant<br>Pos | Table<br>Pos |
|-----|----------|--------|---------------|---------------|----------------------|-------------------|---------------|------------------|---------|------------|--------------|
|     | MHz      | dBuV/m | dB            | dBuV/m        | dBuV                 | dB/m              | dB            | dB               |         | cm         | deg          |
| 1   | 5459.800 | 55.64  | -7.90         | 63.54         | 15.67                | 35.07             | 4.90          | 0.00             | Average | ---        | ---          |
| 2 X | 5499.900 | 96.40  |               |               | 56.39                | 35.10             | 4.91          | 0.00             | Average | ---        | ---          |
| 1   | 5459.800 | 68.67  | -14.87        | 83.54         | 28.70                | 35.07             | 4.90          | 0.00             | Peak    | ---        | ---          |
| 2 X | 5496.600 | 107.43 |               |               | 67.42                | 35.10             | 4.91          | 0.00             | Peak    | ---        | ---          |

The item 2 is fundamental emissions.

**Channel 110**

|     | Freq     | Level  | Over<br>Limit | Limit<br>Line | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Remark  | Ant<br>Pos | Table<br>Pos |
|-----|----------|--------|---------------|---------------|----------------------|-------------------|---------------|------------------|---------|------------|--------------|
|     | MHz      | dBuV/m | dB            | dBuV/m        | dBuV                 | dB/m              | dB            | dB               |         | cm         | deg          |
| 1   | 5447.800 | 54.93  | -8.61         | 63.54         | 14.96                | 35.07             | 4.90          | 0.00             | Average | ---        | ---          |
| 2 X | 5539.300 | 95.57  |               |               | 55.51                | 35.13             | 4.93          | 0.00             | Average | ---        | ---          |
| 3   | 5725.000 | 55.03  | -22.81        | 77.84         | 14.71                | 35.28             | 5.04          | 0.00             | Average | ---        | ---          |
| 1   | 5446.900 | 67.67  | -15.87        | 83.54         | 27.70                | 35.07             | 4.90          | 0.00             | Peak    | ---        | ---          |
| 2 X | 5551.300 | 107.11 |               |               | 67.02                | 35.14             | 4.95          | 0.00             | Peak    | ---        | ---          |
| 3   | 5725.300 | 68.01  | -9.83         | 77.84         | 27.69                | 35.28             | 5.04          | 0.00             | Peak    | ---        | ---          |

The item 2 is fundamental emissions.

**Channel 134**

|     | Freq     | Level  | Over<br>Limit | Limit<br>Line | ReadAntenna<br>Level | Antenna<br>Factor | Cable<br>Loss | Preamp<br>Factor | Remark  | Ant<br>Pos | Table<br>Pos |
|-----|----------|--------|---------------|---------------|----------------------|-------------------|---------------|------------------|---------|------------|--------------|
|     | MHz      | dBuV/m | dB            | dBuV/m        | dBuV                 | dB/m              | dB            | dB               |         | cm         | deg          |
| 1 X | 5659.400 | 94.05  |               |               | 53.83                | 35.22             | 5.00          | 0.00             | Average | ---        | ---          |
| 2   | 5726.300 | 55.04  | -22.80        | 77.84         | 14.72                | 35.28             | 5.04          | 0.00             | Average | ---        | ---          |
| 1 X | 5675.400 | 105.62 |               |               | 65.36                | 35.24             | 5.02          | 0.00             | Peak    | ---        | ---          |
| 2   | 5748.700 | 68.82  | -9.02         | 77.84         | 28.46                | 35.29             | 5.07          | 0.00             | Peak    | ---        | ---          |

The item 1 is fundamental emissions.



### 3.8 Frequency Stability Measurement

#### 3.8.1 Limit

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

#### 3.8.2 Measuring Instruments and Setting

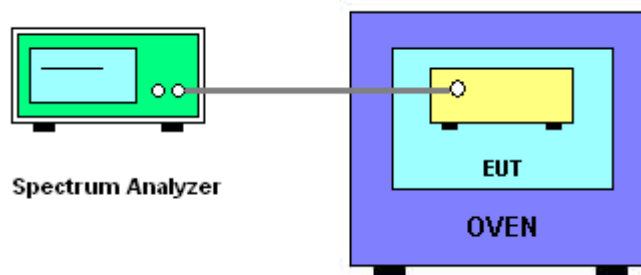
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Spectrum Parameter | Setting  |
|--------------------|--|
| Attenuation        | Auto   |
| Span Frequency     | Entire absence of modulation emissions bandwidth |
| RB                 | 10 kHz   |
| VB                 | 10 kHz   |
| Sweep Time         | Auto   |

#### 3.8.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f)/f_c \times 10^6$  ppm and the limit is less than  $\pm 20\text{ppm}$  (IEEE 802.11a specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is  $-20^\circ\text{C} \sim 50^\circ\text{C}$ .
8. Measuring multiple antennas, the connectors are required to link with Spectrum Analyzer through a combiner.

#### 3.8.4 Test Setup Layout



#### 3.8.5 Test Deviation

There is no deviation with the original standard.

#### 3.8.6 EUT Operation during Test

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



## 3.8.7 Test Result of Frequency Stability

## Voltage vs. Frequency Stability

| Voltage              | Measurement Frequency (MHz) |
|----------------------|-----------------------------|
| (V)                  | 5180 MHz                    |
| 110.00               | 5180.0000                   |
| 93.50                | 5179.9994                   |
| 126.50               | 5179.9994                   |
| Max. Deviation (MHz) | 0.0006                      |
| Max. Deviation (ppm) | 0.12                        |

## Temperature vs. Frequency Stability

| Temperature          | Measurement Frequency (MHz) |
|----------------------|-----------------------------|
| (°C)                 | 5180 MHz                    |
| 50                   | 5179.9526                   |
| 40                   | 5179.9640                   |
| 30                   | 5179.9796                   |
| 20                   | 5180.0006                   |
| 10                   | 5180.0198                   |
| 0                    | 5180.0252                   |
| -10                  | 5180.0288                   |
| -20                  | 5180.0282                   |
| Max. Deviation (MHz) | 0.0474                      |
| Max. Deviation (ppm) | 9.15                        |



### **3.9 Antenna Requirements**

#### **3.9.1 Limit**

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

#### **3.9.2 Antenna Connector Construction**

Please refer to section 2.2 in this test report; antenna connector complied with the requirements.



## 4 LIST OF MEASURING EQUIPMENTS

| Instrument          | Manufacturer | Model No. | Serial No.     | Characteristics | Calibration Date | Remark               |
|---------------------|--------------|-----------|----------------|-----------------|------------------|----------------------|
| EMC Receiver        | R&S          | ESCS 30   | 100132         | 9kHz ~ 2.75GHz  | Feb. 08, 2012    | Conduction (CO01-HY) |
| LISN                | MessTec      | NNB-2/16Z | 2001/004       | 9kHz ~ 30MHz    | Jan. 12, 2012    | Conduction (CO01-HY) |
| LISN (Support Unit) | MessTec      | NNB-2/16Z | 2001/009       | 9kHz ~ 30MHz    | Feb. 20, 2012    | Conduction (CO01-HY) |
| EMI Filter          | LINDGREN     | LRE-2060  | 1004           | < 450Hz         | N/A              | Conduction (CO01-HY) |
| EMI Filter          | LINDGREN     | N6006     | 201052         | 0 ~ 60Hz        | N/A              | Conduction (CO01-HY) |
| RF Cable-CON        | HUBER+SUHNER | RG213/U   | 07611832010001 | 9kHz ~ 30MHz    | Mar. 02, 2012    | Conduction (CO01-HY) |

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

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

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

| Instrument      | Manufacturer | Model No. | Serial No.  | Characteristics | Calibration Date | Remark              |
|-----------------|--------------|-----------|-------------|-----------------|------------------|---------------------|
| AC Power Source | HPC          | HPA-500W  | HPA-9100024 | AC 0 ~ 300V     | Jun. 09, 2011*   | Conducted (TH01-HY) |

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



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

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

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

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



## 5 TEST LOCATION

|        |  |
|--------|--|
| SHIJR  | ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei 221, Taiwan, R.O.C.<br>TEL : 886-2-2696-2468<br>FAX : 886-2-2696-2255 |
| HWA YA | ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL : 886-3-327-3456<br>FAX : 886-3-327-0973         |
| LINKOU | ADD : No. 30-2, Dingfu Vil., Linkou Dist., New Taipei City 244, Taiwan, R.O.C.<br>TEL : 886-2-2601-1640<br>FAX : 886-2-2601-1695       |
| DUNGHU | ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei 114, Taiwan, R.O.C.<br>TEL : 886-2-2631-4739<br>FAX : 886-2-2631-9740            |
| JUNGHE | ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei 235, Taiwan, R.O.C.<br>TEL : 886-2-8227-2020<br>FAX : 886-2-8227-2626           |
| NEIHU  | ADD : 4Fl., No. 339, Hsin Hu 2 <sup>nd</sup> Rd., Taipei 114, Taiwan, R.O.C.<br>TEL : 886-2-2794-8886<br>FAX : 886-2-2794-9777         |
| JHUBEI | ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.<br>TEL : 886-3-656-9065<br>FAX : 886-3-656-9085       |



## 6 TAF CERTIFICATE OF ACCREDITATION

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

Certificate No. : L1190-111208

## Certificate of Accreditation

This is to certify that

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

**is accredited in respect of laboratory**

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

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

P1, total 24 pages

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



## **Appendix A. RF Exposure Evaluation**



## 1. Maximum Permissible Exposure

### 1.1. Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with IC RSS-102 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|--|--|
| 0.3-3.0               | 614                               | 1.63                              | (100)*                                   | 6  |
| 3.0-30                | 1842 / f                          | 4.89 / f                          | (900 / f)*                               | 6  |
| 30-300                | 61.4                              | 0.163                             | 1.0                                      | 6  |
| 300-1500              |                                   |                                   | F/300                                    | 6  |
| 1500-100,000          |                                   |                                   | 5  | 6  |

(B) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|--|--|
| 0.3-1.34              | 614                               | 1.63                              | (100)*                                   | 30   |
| 1.34-30               | 824/f                             | 2.19/f                            | (180/f)*                                 | 30   |
| 30-300                | 27.5                              | 0.073                             | 0.2                                      | 30   |
| 300-1500              |                                   |                                   | F/1500                                   | 30   |
| 1500-100,000          |                                   |                                   | 1.0                                      | 30   |

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 1.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = Peak RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.



**1.3. Calculated Result and Limit****Antenna Type : Orinted Antenna****For Single Chain:****Max Conducted Power for IEEE 802.11a: 17.21dBm**

| <b>Test Frequency (MHz)</b> | <b>Min. User Distance (cm)</b> | <b>Gain (dBi)</b> | <b>Numeric Gain</b> | <b>Conducted Power (dBm)</b> | <b>Conducted Power (mW)</b> | <b>Power Density (mW/cm2)</b> |
|-----------------------------|--------------------------------|-------------------|---------------------|------------------------------|-----------------------------|-------------------------------|
| <b>5280</b>                 | 20                             | 6.64              | 4.613176            | 17.21                        | 52.6017                     | <b>0.0483</b>                 |

**For Two Chain:****Max Conducted Power for IEEE 802.11n: 19.82dBm**

| <b>Test Frequency (MHz)</b> | <b>Min. User Distance (cm)</b> | <b>Gain (dBi)</b> | <b>Numeric Gain</b> | <b>Conducted Power (dBm)</b> | <b>Conducted Power (mW)</b> | <b>Power Density (mW/cm2)</b> |
|-----------------------------|--------------------------------|-------------------|---------------------|------------------------------|-----------------------------|-------------------------------|
| <b>5260</b>                 | 20                             | 6.64              | 4.613176            | 19.82                        | 95.9401                     | <b>0.0881</b>                 |



## **Appendix B. Test Photos**



## **1 Photographs of Conducted Emissions Test Configuration**

**FRONT VIEW**



**REAR VIEW**





**SIDE VIEW**

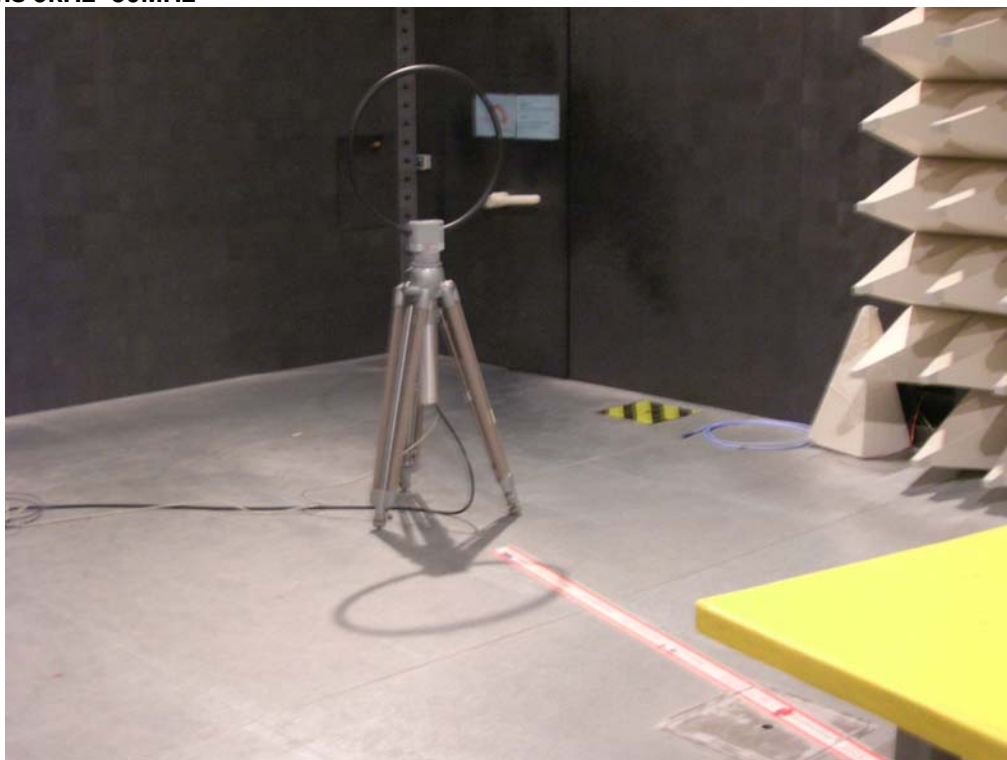




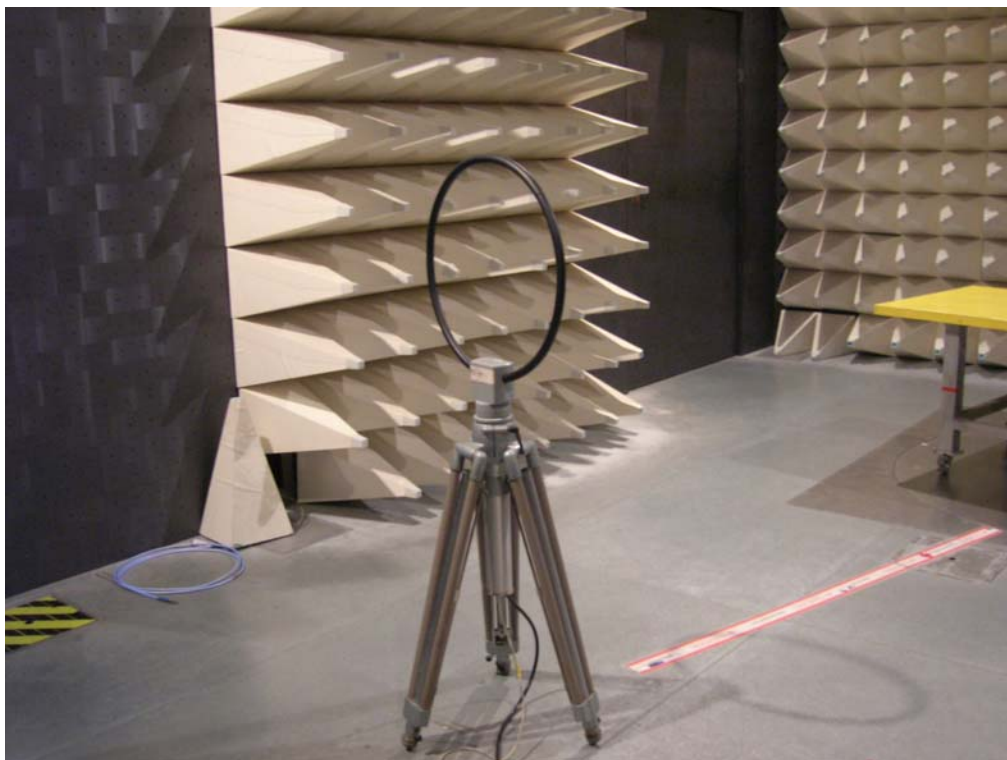
## **2 Photographs of Radiated Emissions Test Configuration**

**For radiated emissions 9kHz~30MHz**

**FRONT VIEW**



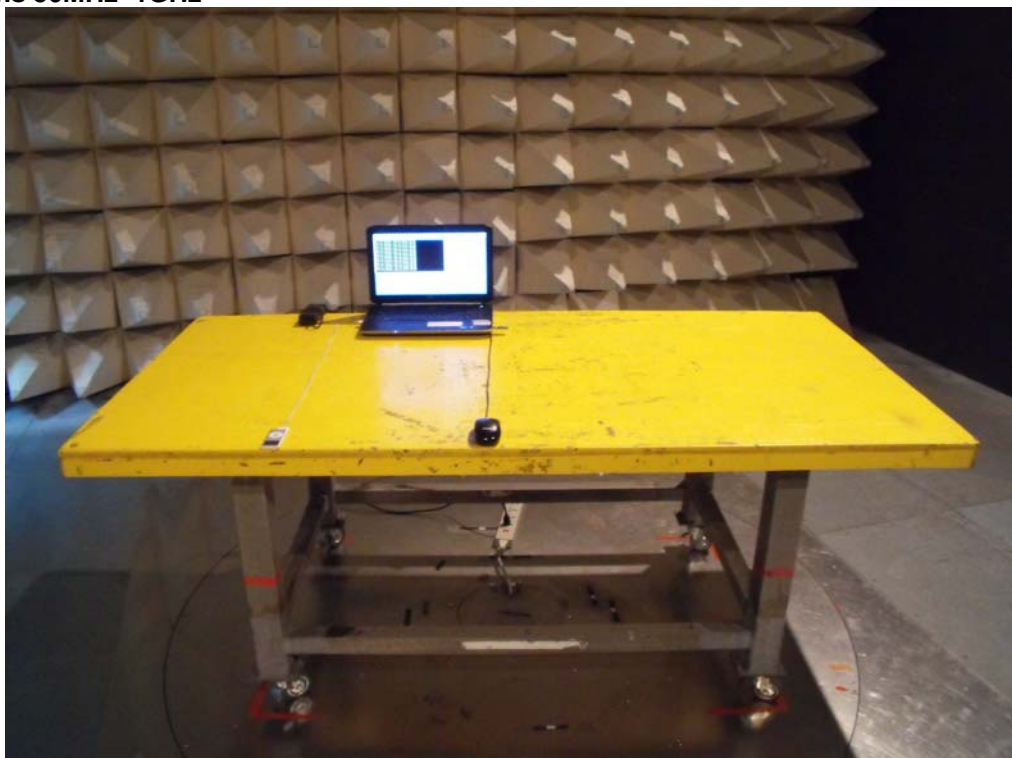
**REAR VIEW**



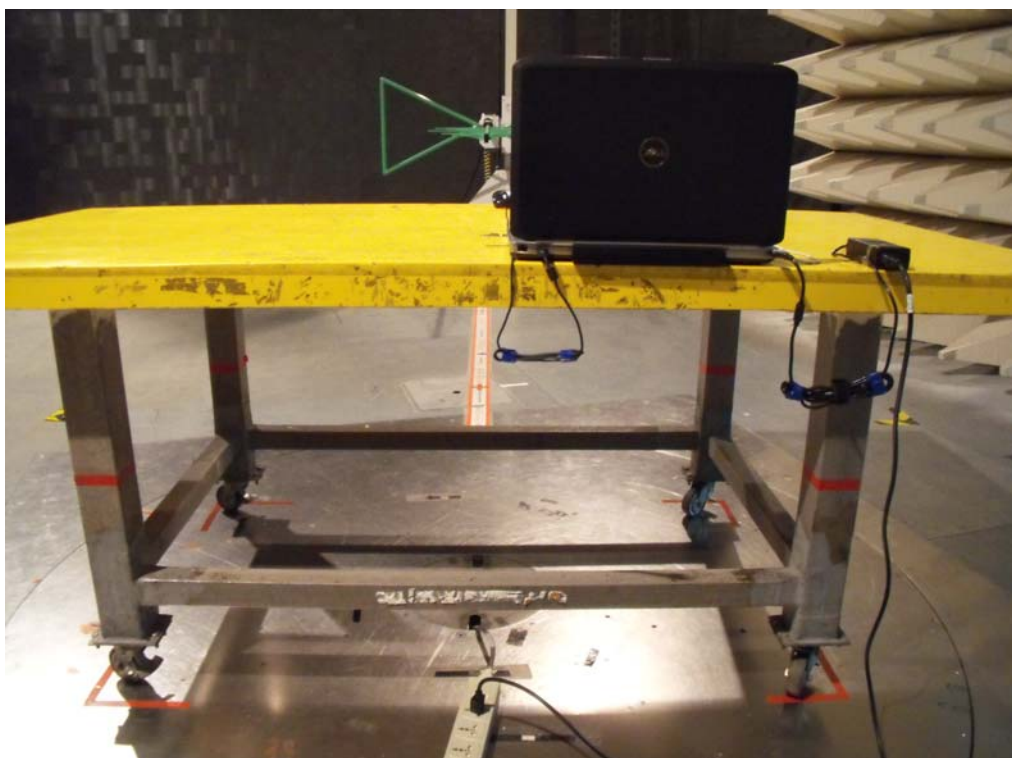


**For radiated emissions 30MHz~1GHz**

**FRONT VIEW**



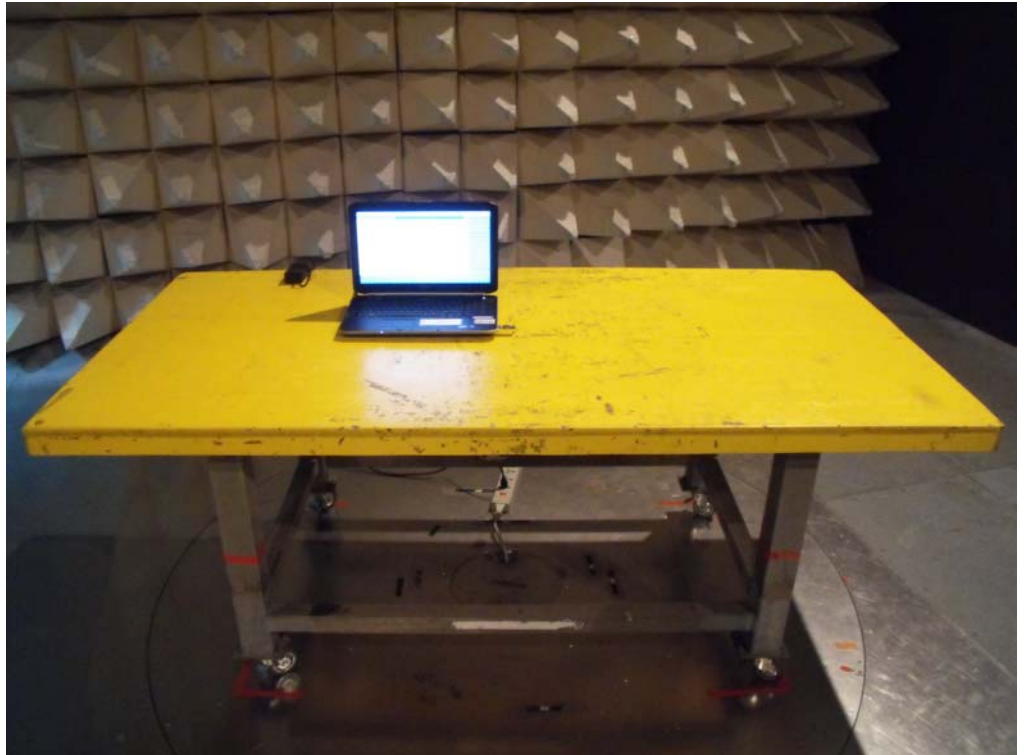
**REAR VIEW**



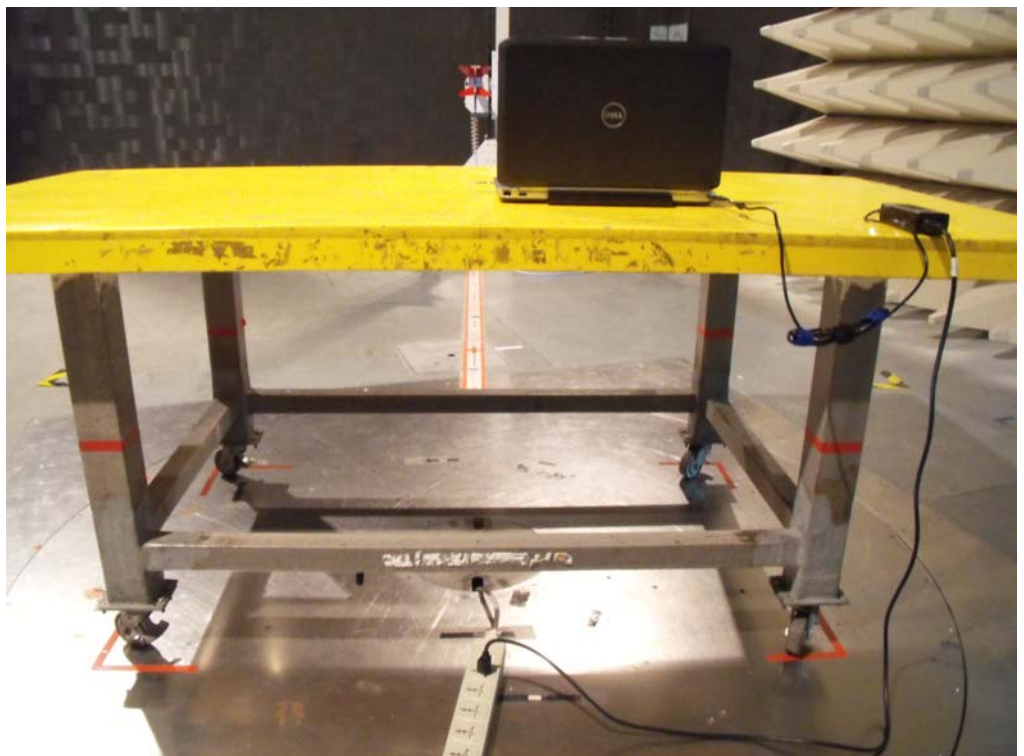


**For radiated emissions above 1GHz**

**FRONT VIEW**



**REAR VIEW**





EUT take a close-up.

FRONT VIEW

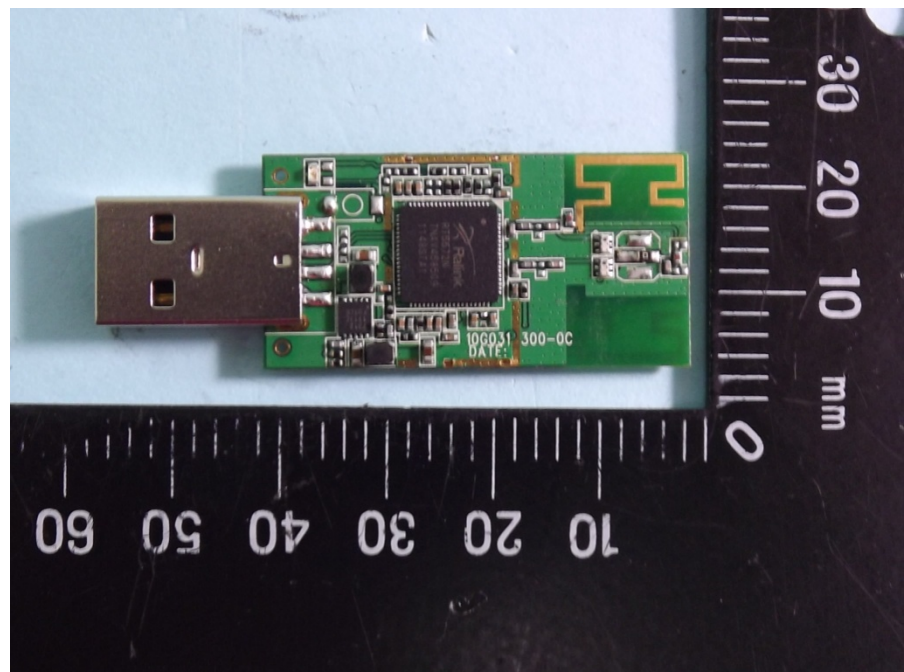
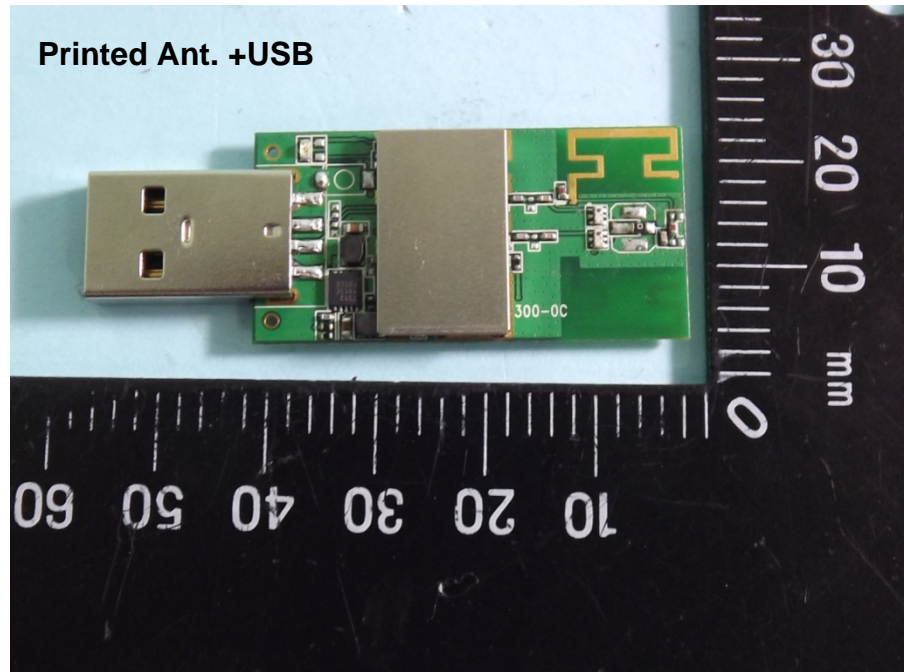




## ***IC TEST REPORT***

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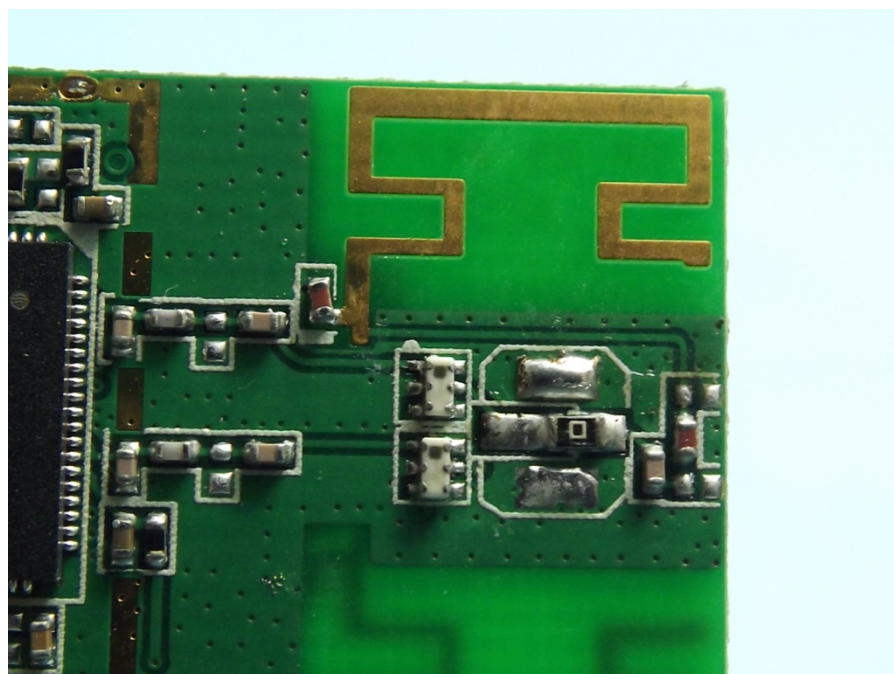
### APPENDIX C. Photographs of EUT





## IC TEST REPORT

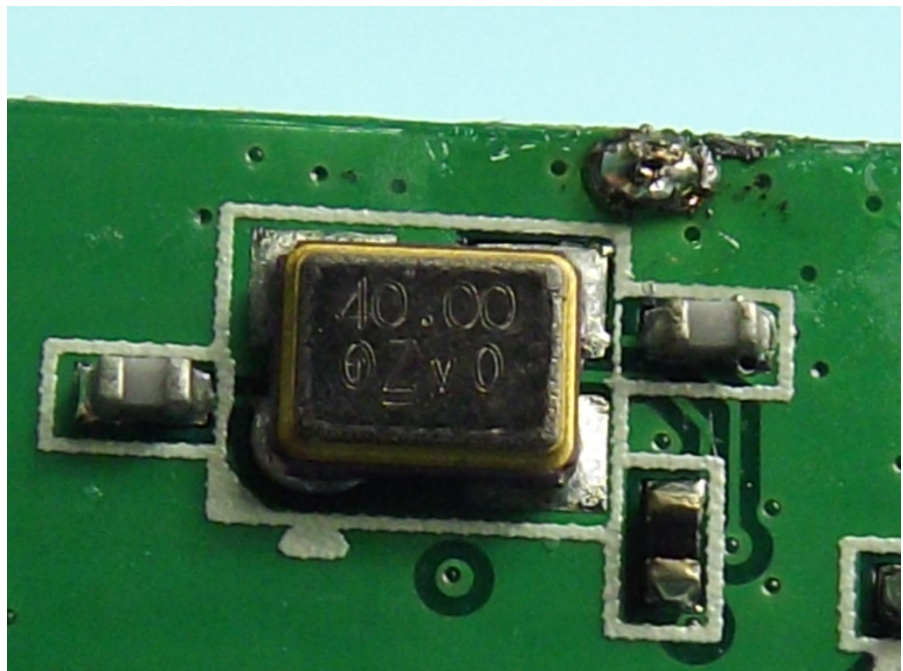
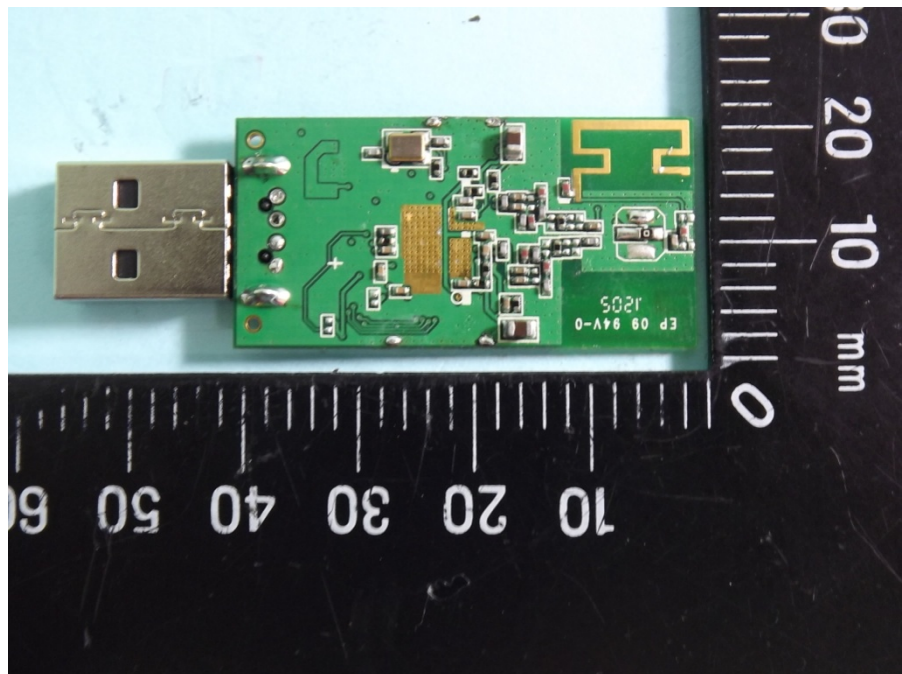
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## IC TEST REPORT

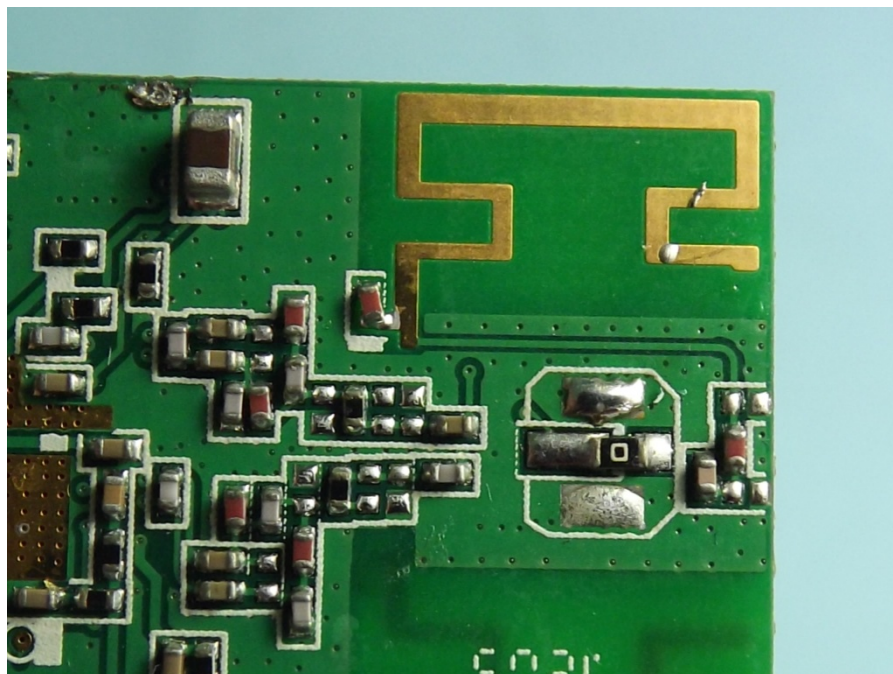
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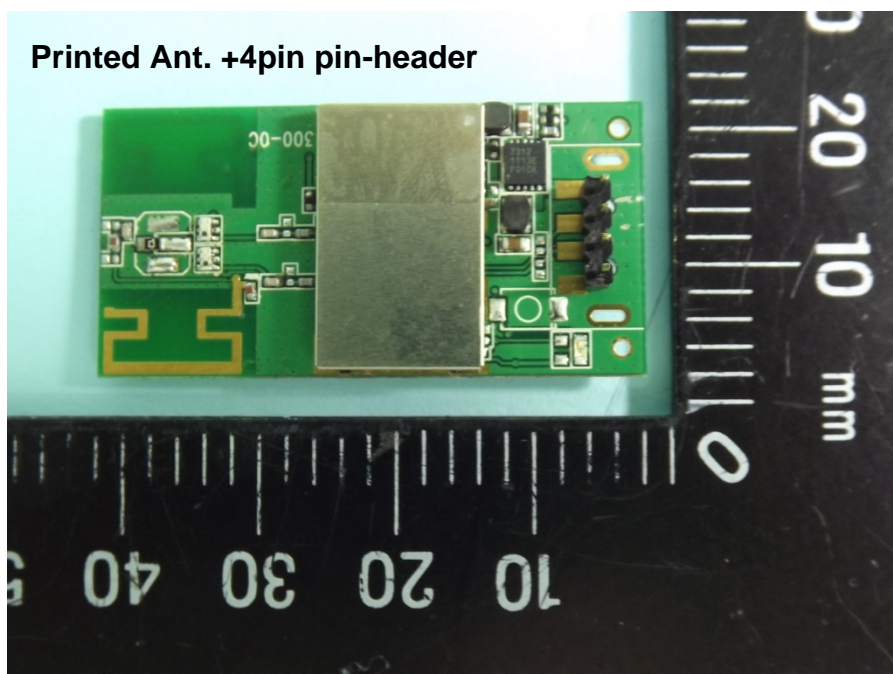


## IC TEST REPORT

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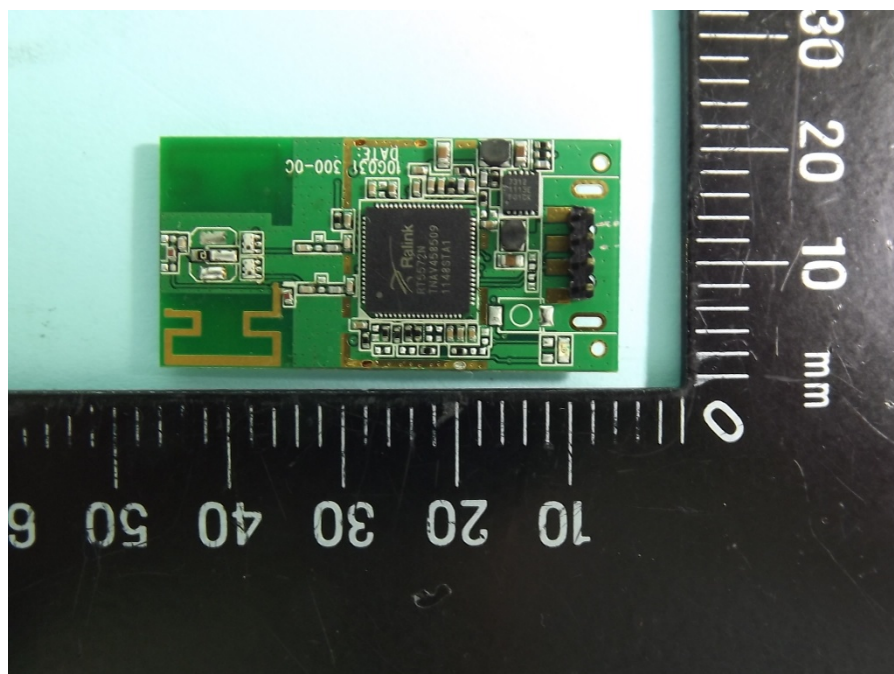
Printed Ant. +4pin pin-header





## IC TEST REPORT

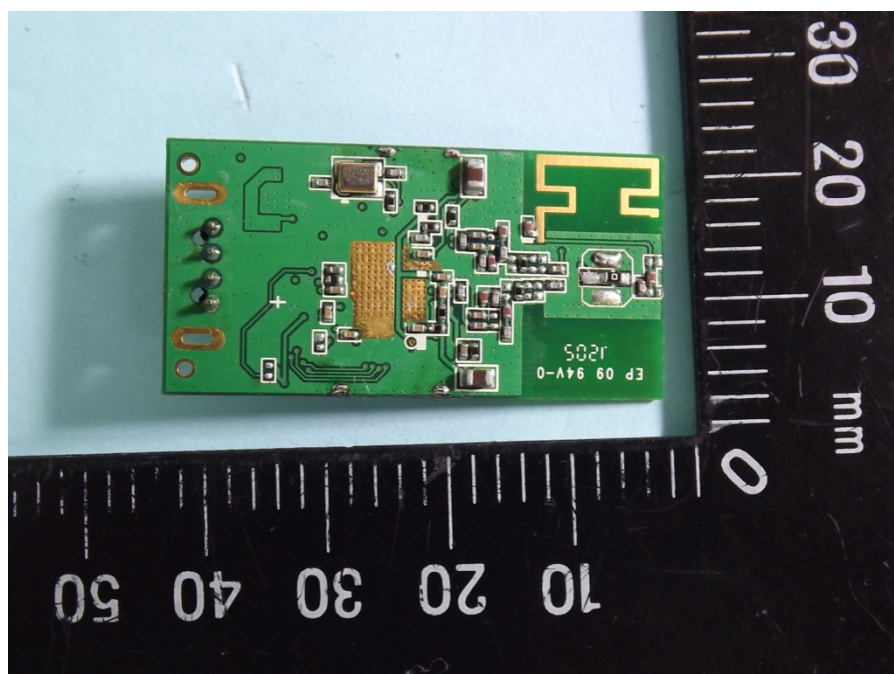
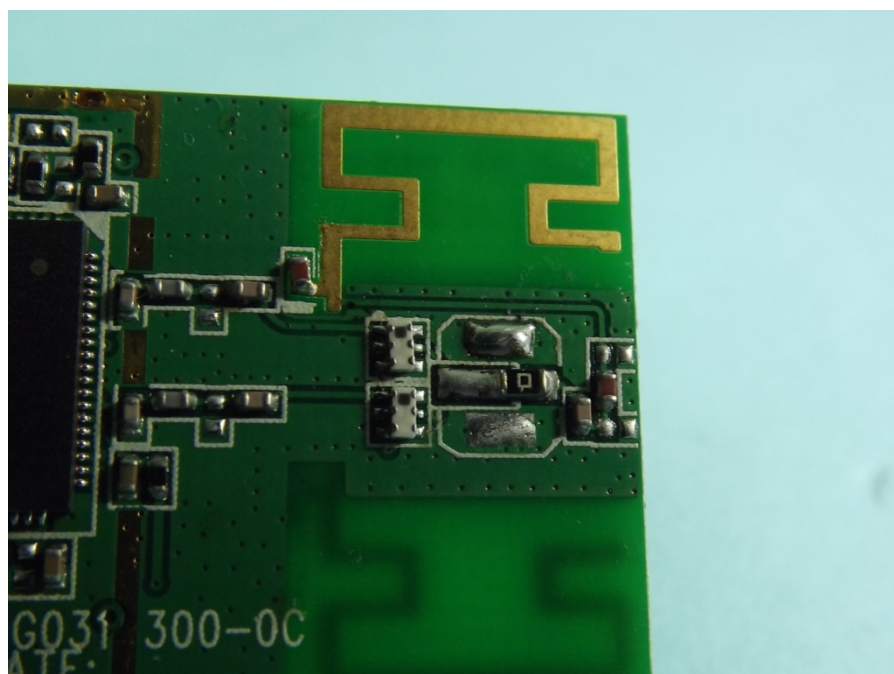
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## IC TEST REPORT

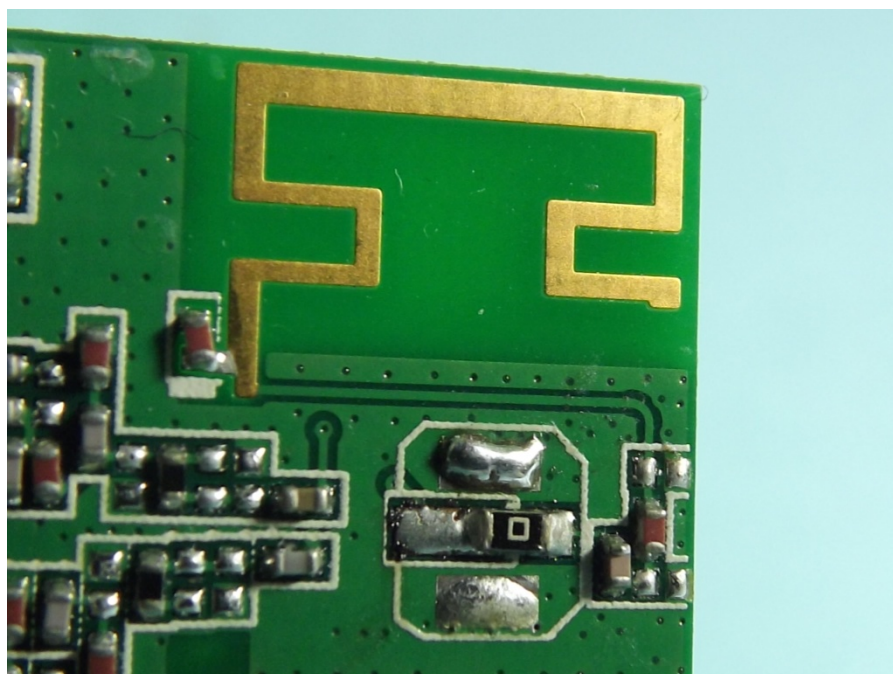
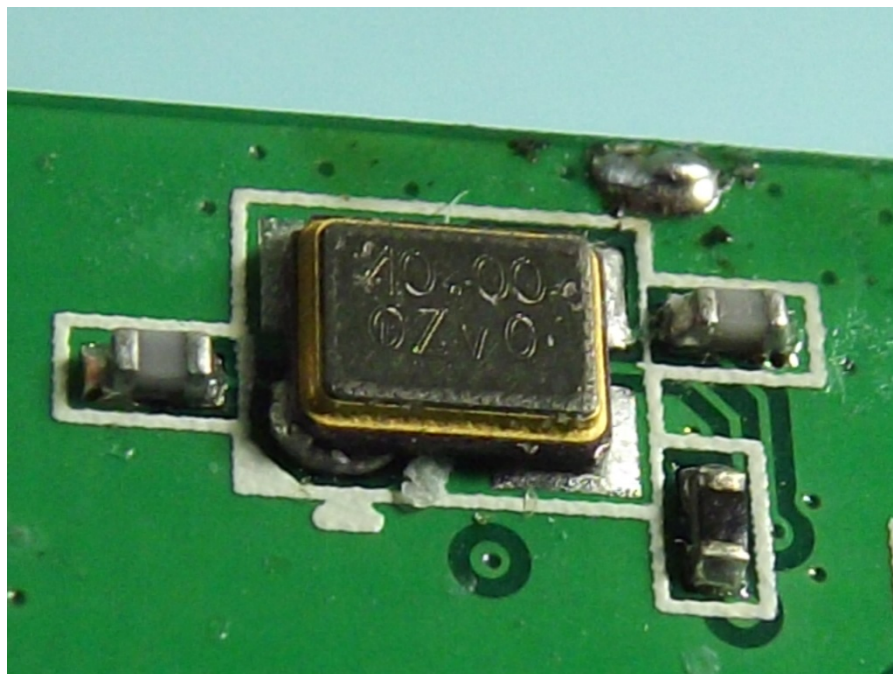
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## **IC TEST REPORT**

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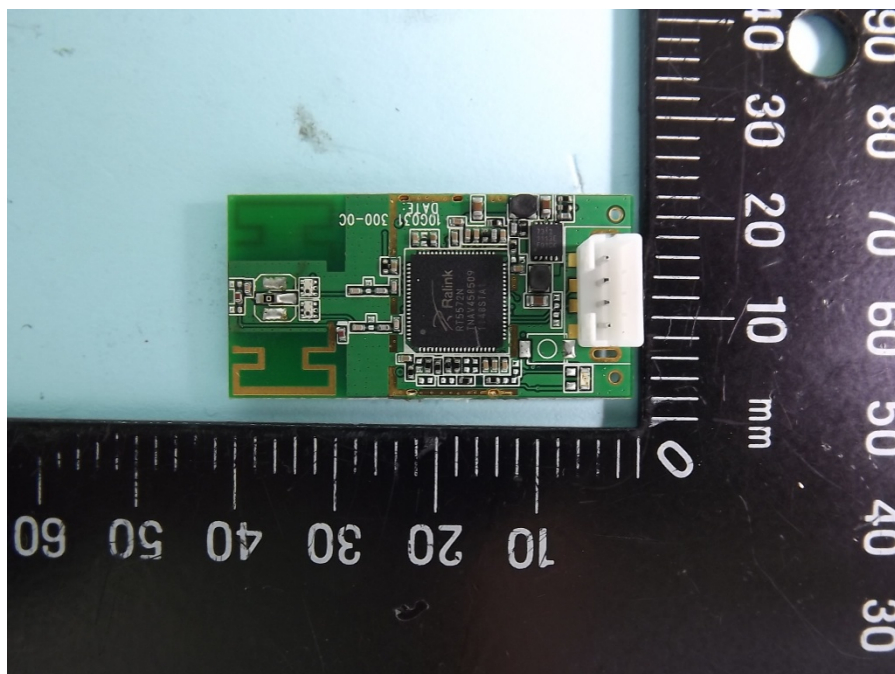




## IC TEST REPORT

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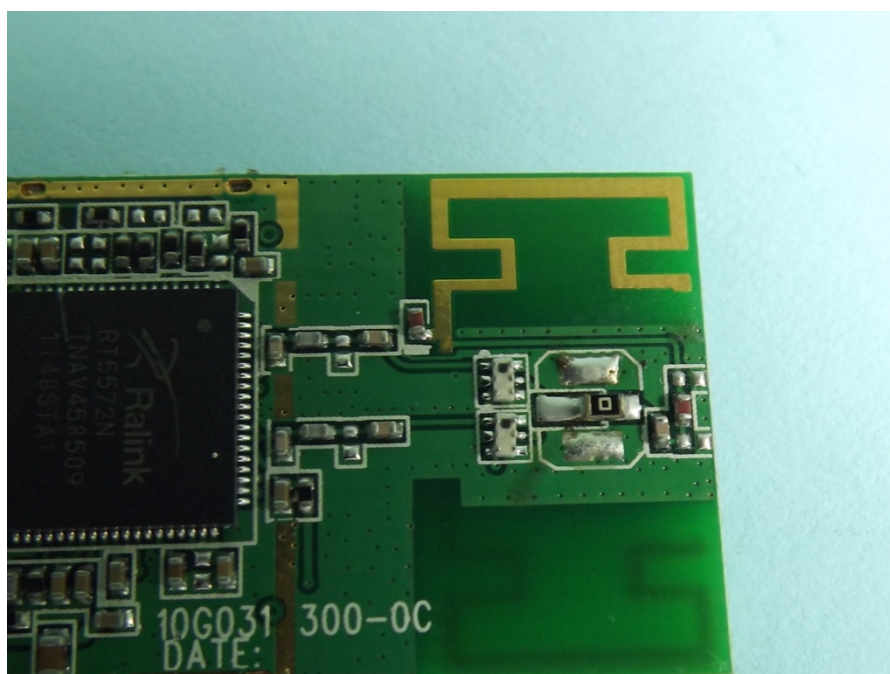
Printed Ant. +4pin wafer con





## IC TEST REPORT

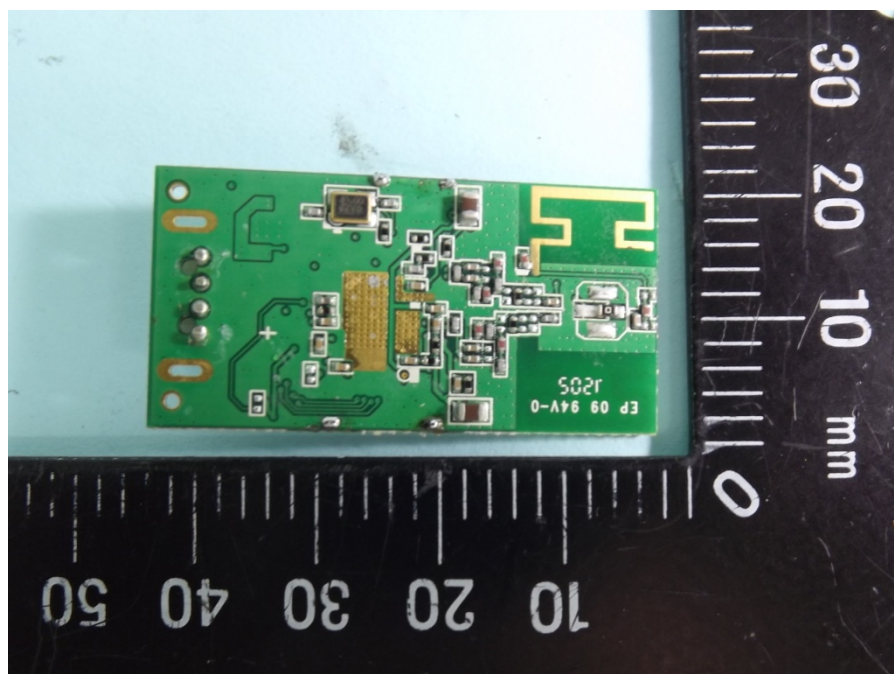
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## IC TEST REPORT

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## ***IC TEST REPORT***

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