TESTING CERT #3478.01

# TEST REPORT

| | |
|---|---|
| EUT Description | **WiGig, WLAN and BT, 2x2 PCIe M.2 adapter card** |
| Brand Name | **Intel® Tri-Band Wireless-AC 18260** |
| Model Name | **18260NGW, 18260NGW LC** |
| Serial Number | **WF MAC: 34:13:E8:31:A7:36 / 34:13:E8:06:2F:58**<br>**BT MAC: 34:13:E8:31:A7:3A / 34:13:E8:06:2F:5C**<br>(see section 4) |
| FCC/IC ID | **FCC ID: PD918260NG**<br>**IC ID: 1000M-18260NG** |
| Antenna type | **SkyCross WIMAX/WLAN Reference Antenna** |
| Hardware/Software Version | **HW config: 31.1**<br>**Test SW: DRTU version 1.8.3-01557**<br>**Op SW WiFi: 18.20, Op SW BT: 18.12** |
| Date of Sample Receipt | **2015-08-18** |
| Date of Test Start/End | **2015-08-24 / 2015-09-23** |
| Features | **WiGig + 802.11 a/b/g/n/ac Wireless LAN + BDR/EDR 2.1 + BLE 4.0**<br>(see section 5) |

| | |
|---|---|
| Applicant | **Intel Mobile Communications** |
| Address | **100 Center Point Circle, Suite 200**<br>**Columbia, South Carolina 29210**<br>**USA** |
| Contact Person | **Steven Hackett** |
| Telephone/Fax/ Email | **steven.c.hackett@intel.com** |

| | |
|---|---|
| Reference Standards | **FCC CFR Title 47 Part 15C**<br>**RSS-247 issue 1, RSS-Gen issue 4**<br>(see section 1) |

| | |
|---|---|
| Test Report number | **15081803.TR02** |
| Revision Control | **Rev. 00** |

The test results relate only to the samples tested.
The test report shall not be reproduced in full, without written approval of the laboratory.

| Issued by | Reviewed by | Approved by |
|---|---|---|
| Digitally signed by Olivier FARGANT<br>DN: cn=Olivier FARGANT, o=Intel Mobile Communications, ou=WRF Lab, email=olivier.fargant@intel.com, c=FR<br>Date: 2015.10.12 17:00:26 +02'00' | Digitally signed by Jose M. FORTES<br>DN: cn=Jose M. FORTES, o=Inter Mobile Communications, ou=WRF Lab, email=jose.m.fortes.lopez@intel.com, c=FR<br>Date: 2015.10.13 14:55:35 +02'00' | Digitally signed by Nawfal ASRIH<br>DN: cn=Nawfal ASRIH, o=Intel Mobile Communications, ou=Wireless RF Lab, email=nawfal.asrih@intel.com, c=FR<br>Date: 2015.10.13 15:39:31 +02'00'<br>Adobe Acrobat DC version: 2015.006.30060 |
| Olivier FARGANT<br>(RF Test Lead) | Jose M. FORTES<br>(Technical Manager) | Nawfal ASRIH<br>(Laboratory Manager) |

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## 1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 15 - Subpart C – §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
2. FCC 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements.
3. FCC OET KDB 558074 D01 DTS Meas Guidance v03r03 – Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
4. FCC OET KDB 662911 D01 Multiple Output v02r01 – Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
5. RSS-247 Issue 1 – Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
6. RSS-Gen Issue 4 – General Requirements for Compliance of Radio Apparatus.
7. ANSI C63.10-2009 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

## 2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA).
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm listed by the FCC, with Designation Number FR0011.
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by IC, with IC Assigned Code 1000Y.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

## 3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

| | |
|---|---|
| Temperature | 24ºC ± 2ºC |
| Humidity | 54% ± 5% |



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## 4. Test samples

| Sample | Control # | Description | Model | Serial # | Date of reception | Note |
|---|---|---|---|---|---|---|
| #01 | 15081801.S08 | WiFi/BT High End Module | 8260NGW | WF MAC: 34:13:E8:31:A7:36 | 2015-08-17 | Used for conducted tests |
| | 15081801.S03 | Extender board | PCB00432 | ASS0432-001, 4324612-097 | 2015-08-17 | |
| | 15051101.S15 | Laptop | DELL E5440 | BJSYN32 | 2015-05-20 | |
| #02 | 15081801.S20 | WiFi/BT High End Module | 18260NGW | WF MAC 34:13:E8:06:2F:58 | 2015-08-26 | Used for radiated tests |
| | 15081801.S02 | Extender board | PCB00432 | ASS00432-001, 4322313-048 | 2015-08-17 | |
| | 15040201.S15 | Laptop | Dell E5440 | 9FSYN32 | 2015-05-12 | |

NA: Not Applicable

## 5. EUT features

These are the detailed bands and modes supported by the Equipment Under Test:

| | |
|---|---|
| WiGig | 60GHz (57.24 – 63.72 GHz) |
| 802.11b/g/n | 2.4GHz (2400.0 – 2483.5 MHz) |
| 802.11a/n/ac | 5.2GHz (5150.0 – 5250.0 MHz)<br>5.3GHz (5250.0 – 5350.0 MHz)<br>5.6GHz (5470.0 – 5725.0 MHz)<br>5.8GHz (5725.0 – 5850.0 MHz) |
| BDR/EDR 2.1<br>BLE 4.0 | 2.4GHz (2400.0 – 2483.5 MHz) |

## 6. Remarks and comments

N/A



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# 7. Test Verdicts summary

## 7.1. 802.11 b/g/n – DTS

| FCC part | RSS part | Test name | Verdict |
|---|---|---|---|
| 15.247 (a) (2) | RSS-247 Clause 5.2 (1) | 6dB Bandwidth | P |
| 15.247 (b) (3) | RSS-247 Clause 5.4 (4) | Maximum output power and antenna gain | P |
| 15.247 (d) | RSS-247 Clause 5.5 | Out-of-band Emissions (conducted) | P |
| 15.247 (e) | RSS-247 Clause 5.2 (2) | Power spectral density | P |
| 15.247 (d), 15.209 | RSS-247 Clause 5.5 | Out-of-band Emissions (radiated) | P |

## 7.2. BLE – DTS

| FCC part | RSS part | Test name | Verdict |
|---|---|---|---|
| 15.247 (a) (2) | RSS-247 Clause 5.2 (1) | 6dB Bandwidth | P |
| 15.247 (b) (3) | RSS-247 Clause 5.4 (4) | Maximum output power and antenna gain | P |
| 15.247 (d) | RSS-247 Clause 5.5 | Out-of-band Emissions (conducted) | P |
| 15.247 (e) | RSS-247 Clause 5.2 (2) | Power spectral density | P |
| 15.247 (d), 15.209 | RSS-247 Clause 5.5 | Out-of-band Emissions (radiated) | P |

P: Pass
F: Fail
NM: Not Measured
NA: Not Applicable

# 8. Document Revision History

| Revision # | Date | Modified by | Details |
|---|---|---|---|
| Rev. 00 | 2015-10-09 | O. Fargant | First Issue |


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# Annex A. Test & System Description

## A.1 Test Conditions

For 802.11b/g modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, but not simultaneously.

For 802.11n20 (20 MHz channel bandwidth), 802.11n40 (40MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, and also simultaneously.

For Bluetooth Low Energy mode the EUT can transmit only at CHAIN B RF output.

The conducted RF output power at each chain was adjusted according to the client's supplied Target values (see following table) using the Intel DRTU tool and measuring the power by using a calibrated average power meter. Measured values for adjustment were within -0.2 dB/+0.3 dB from the declared Target values.

| | | | | | Conducted Power, Target Value [dBm] | | |
|---|---|---|---|---|---|---|---|
| Mode | BW (MHz) | Data Rate | CH # | Freq. (MHz) | SISO Chain A | SISO Chain B | MIMO at both ports A and B |
| 802.11b | 20 | 1Mbps | 1 | 2412 | 21 | 21 | - |
| | | | 6 | 2437 | 21 | 21 | - |
| | | | 11 | 2462 | 19.5 | 18.5 | - |
| | | | 12 | 2467 | 16 | 14 | - |
| | | | 13 | 2472 | 9 | 8.5 | - |
| 802.11g | 20 | 6Mbps | 1 | 2412 | 18 | 18 | - |
| | | | 6 | 2437 | 21 | 21 | - |
| | | | 11 | 2462 | 18 | 18 | - |
| | | | 12 | 2467 | 12.5 | 13 | - |
| | | | 13 | 2472 | -3 | -4.5 | - |
| 802.11n | 20 | HT0 HT8* | 1 | 2412 | 17 | 17.5 | 16.5 |
| | | | 6 | 2437 | 21 | 21 | 18 |
| | | | 11 | 2462 | 17 | 17.5 | 17.5 |
| | | | 12 | 2467 | 11.5 | 12.5 | 11 |
| | | | 13 | 2472 | -3.5 | -5 | -4.5 |
| 802.11n | 40 | HT0 HT8* | 3F | 2422 | 16.5 | 17 | 16 |
| | | | 6F | 2437 | 20.5 | 20.5 | 18 |
| | | | 9F | 2452 | 17 | 17 | 17 |
| | | | 10F | 2457 | 10 | 10 | 9.5 |
| | | | 11F | 2462 | -3 | -3.5 | -4.5 |
| Bluetooth Low Energy | 2 | 1Mbps | 0 | 2412 | - | 8 | - |
| | | | 19 | 2437 | - | 9 | - |
| | | | 39 | 2462 | - | 7.5 | - |

* Note: HT8 for MIMO modes only.

Alternative channels to the highest channel have been also tested for Band Edge compliance.

The following data rates were selected based on preliminary testing that identified those rates as the worst cases for output power and spurious levels at the band edges:

802.11b → 1Mbps
802.11g → 6Mbps
802.11n20 and 802.11n40 (SISO) → HT0
802.11n20 and 802.11n40 (MIMO) → HT8


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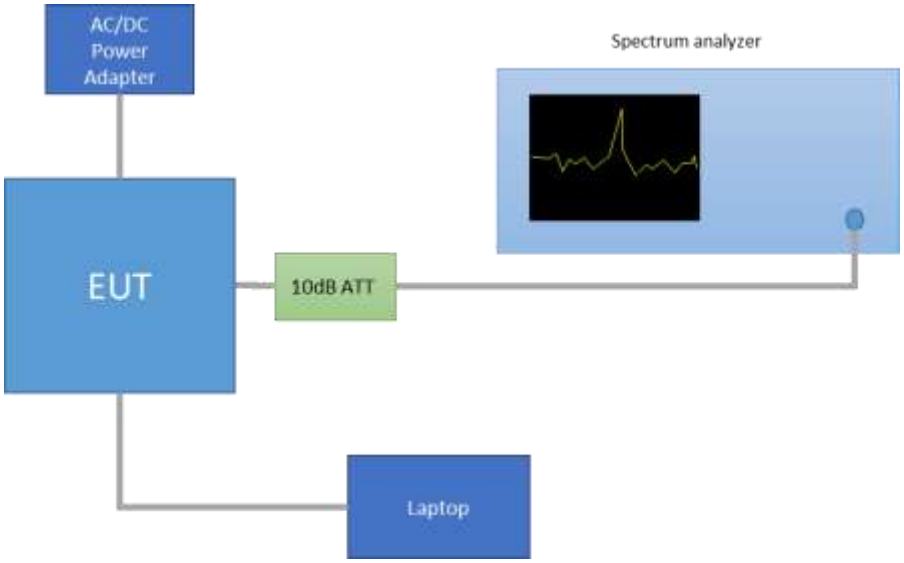
## A.2 Measurement system

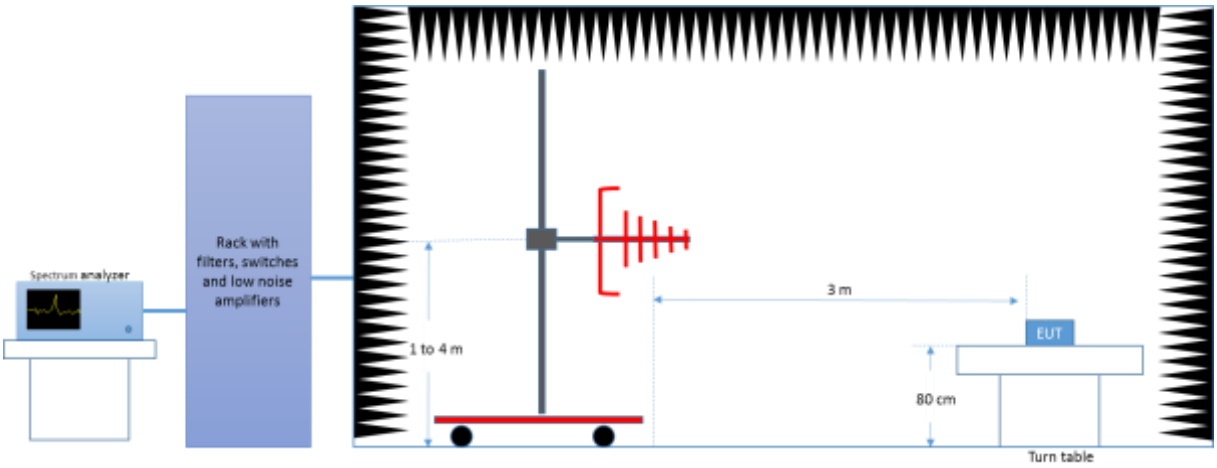
Measurements were performed using the following setups, made in accordance to the general provisions of FCC DTS Measurement KDB 558074 D01 DTS Meas. Guidance v03r03.

The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary tool DRTU.

*Conducted Setup*




*Radiated Setup < 1GHz*





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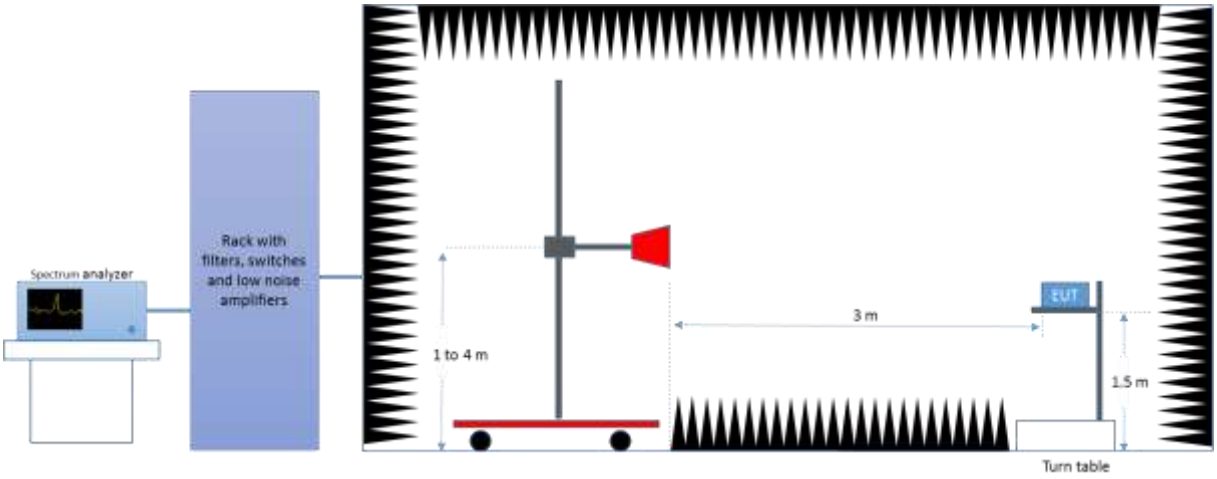
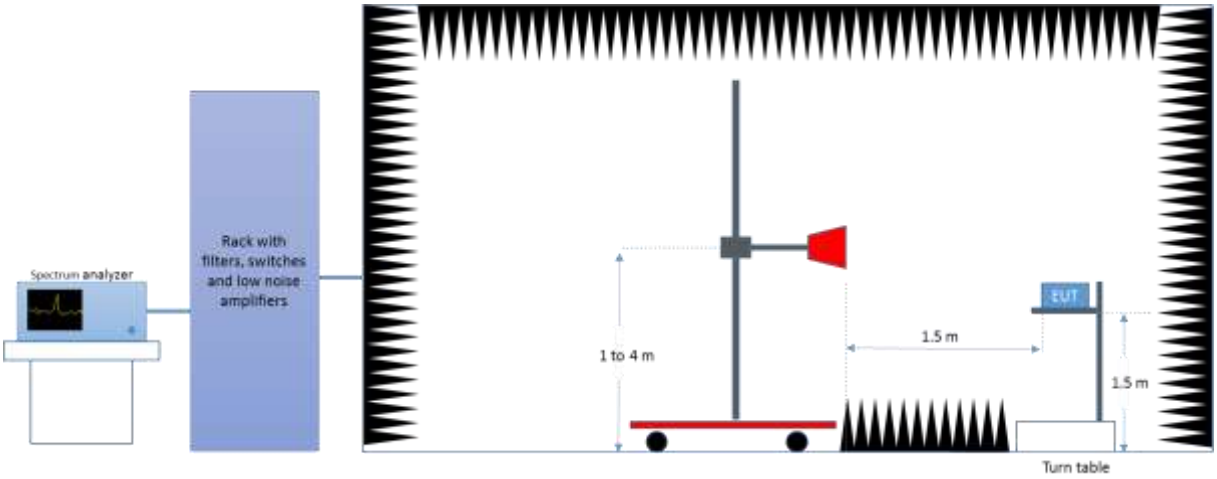
*Radiated Setup 1GHz - 18GHz*




*Radiated Setup > 18GHz*



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## A.3 Test Equipment List

Conducted Setup

| ID# | Device | Type/Model | Serial Number | Manufacturer | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 0310 | Spectrum analyzer | FSV40 | 101425 | Rohde & Schwarz | 2015-03-25 | 2017-03-25 |

Radiated Setup

| ID# | Device | Type/Model | Serial Number | Manufacturer | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 0133 | Spectrum analyzer | FSV40 | 101358 | Rohde & Schwarz | 2014-05-09 | 2016-05-09 |
| 0137 | Log antenna 30 MHz – 1 GHz | 3142E | 00156946 | ETS Lindgren | 2014-03-05 | 2016-03-05 |
| 0138 | Hors antenna 1 GHz – 6.4 GHz | 3117 | 00152266 | ETS Lindgren | 2014-03-04 | 2016-03-04 |
| 0141 | Horn Antenna 6.4 GHz – 18 GHz | 3117-PA | 00157736 | ETS Lindgren | 2014-06-03 | 2016-06-03 |
| 0248 | Horn Antenna 1 GHz – 18 GHz | 3117-PA | 00167062 | ETS Lindgren | 2014-08-13 | 2016-08-13 |
| 0139 | Horn Antenna 18GHz – 26GHz | 114514 | 00167100 | ETS Lindgren | 2014-04-25 | 2016-04-25 |
| 0140 | Horn Antenna 26GHz – 40GHz | 120722 | 00169638 | ETS Lindgren | 2014-08-14 | 2016-08-14 |
| 0135 | Anechoic chamber | FACT 3 | RFD_FA_100 | ETS Lindgren | 2014-05-06 | 2016-05-06 |
| 0329 | Measurement Software | EMC32 | 1300.7027.00 (100401) | Rohde & Schwarz | N/A | N/A |

## A.4 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

| Measurement type | Uncertainty [ ±dB] |
|---|---|
| Conducted Power | ± 1.0 |
| Conducted spurious emission | ± 2.9 |
| Radiated test < 1GHz | ± 3.8 |
| Radiated test 1GHz - 40 GHz | ± 4.7 |


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# Annex B. Test Results DTS

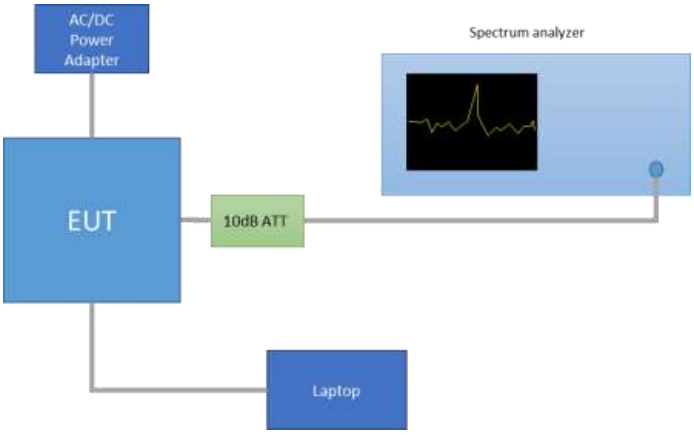
## B.1 6dB & 99% Bandwidth

**Test limits:**

| FCC part | RSS part | Limits |
|---|---|---|
| 15.247 (a) (2) | RSS-247 Clause 5.2 (1) | Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. |

**Test procedure:**

The setup below was used to measure the 6dB & 99% Bandwidth. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.





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**Results tables:**

| Mode | Rate | Antenna | Channel | Frequency [MHz] | 6dB BW [MHz] | 99% BW [MHz] |
|---|---|---|---|---|---|---|
| 802.11b | 6Mbps | SISO CHAIN A | 1 | 2412 | 10.08 | 15.08 |
| | | | 6 | 2437 | 10.08 | 15.00 |
| | | | 11 | 2462 | 10.08 | 14.88 |
| | | | 12 | 2467 | 10.05 | 14.56 |
| | | | 13 | 2472 | 10.08 | 14.88 |
| | | SISO CHAIN B | 1 | 2412 | 10.08 | 15.24 |
| | | | 6 | 2437 | 10.08 | 15.12 |
| | | | 11 | 2462 | 10.05 | 14.84 |
| | | | 12 | 2467 | 10.05 | 14.68 |
| | | | 13 | 2472 | 10.08 | 15.04 |
| 802.11g | 6Mbps | SISO CHAIN A | 1 | 2412 | 15.90 | 16.76 |
| | | | 6 | 2437 | 15.99 | 22.64 |
| | | | 11 | 2462 | 15.33 | 16.56 |
| | | | 12 | 2467 | 15.27 | 16.44 |
| | | | 13 | 2472 | 15.60 | 16.56 |
| | | SISO CHAIN B | 1 | 2412 | 15.69 | 16.72 |
| | | | 6 | 2437 | 16.23 | 23.36 |
| | | | 11 | 2462 | 15.45 | 16.56 |
| | | | 12 | 2467 | 15.69 | 16.52 |
| | | | 13 | 2472 | 15.69 | 16.72 |
| 802.11n20 | HT0 | SISO CHAIN A | 1 | 2412 | 17.22 | 17.76 |
| | | | 6 | 2437 | 17.49 | 22.88 |
| | | | 11 | 2462 | 15.15 | 17.64 |
| | | | 12 | 2467 | 15.90 | 17.56 |
| | | | 13 | 2472 | 15.99 | 17.68 |
| | | SISO CHAIN B | 1 | 2412 | 16.29 | 17.76 |
| | | | 6 | 2437 | 17.16 | 23.60 |
| | | | 11 | 2462 | 16.08 | 17.72 |
| | | | 12 | 2467 | 15.69 | 17.60 |
| | | | 13 | 2472 | 16.08 | 17.80 |
| | HT8 | MIMO CHAIN A | 1 | 2412 | 16.35 | 17.84 |
| | | | 6 | 2437 | 15.15 | 17.84 |
| | | | 11 | 2462 | 15.15 | 17.68 |
| | | | 12 | 2467 | 15.12 | 17.52 |
| | | | 13 | 2472 | 15.99 | 17.68 |
| | | MIMO CHAIN B | 1 | 2412 | 16.89 | 17.76 |
| | | | 6 | 2437 | 16.89 | 17.92 |
| | | | 11 | 2462 | 16.89 | 17.68 |
| | | | 12 | 2467 | 16.32 | 17.64 |
| | | | 13 | 2472 | 16.32 | 17.76 |


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| Mode | Rate | Antenna | Channel | Frequency [MHz] | 6dB BW [MHz] | 99% BW [MHz] |
|---|---|---|---|---|---|---|
| 802.11n40 | HT0 | SISO CHAIN A | 3F | 2422 | 34.39 | 36.32 |
| | | | 6F | 2437 | 33.74 | 38.40 |
| | | | 9F | 2452 | 35.45 | 36.24 |
| | | | 10F | 2457 | 32.79 | 36.08 |
| | | | 11F | 2462 | 30.09 | 36.00 |
| | | SISO CHAIN B | 3F | 2422 | 33.69 | 36.32 |
| | | | 6F | 2437 | 34.99 | 37.60 |
| | | | 9F | 2452 | 33.79 | 36.16 |
| | | | 10F | 2457 | 33.84 | 36.16 |
| | | | 11F | 2462 | 33.84 | 36.16 |
| | HT8 | MIMO CHAIN A | 3F | 2422 | 34.00 | 36.32 |
| | | | 6F | 2437 | 33.79 | 36.32 |
| | | | 9F | 2452 | 35.69 | 36.24 |
| | | | 10F | 2457 | 33.94 | 36.16 |
| | | | 11F | 2462 | 32.54 | 36.00 |
| | | MIMO CHAIN B | 3F | 2422 | 33.85 | 36.00 |
| | | | 6F | 2437 | 35.04 | 36.08 |
| | | | 9F | 2452 | 34.44 | 35.92 |
| | | | 10F | 2457 | 32.84 | 35.84 |
| | | | 11F | 2462 | 33.04 | 35.92 |


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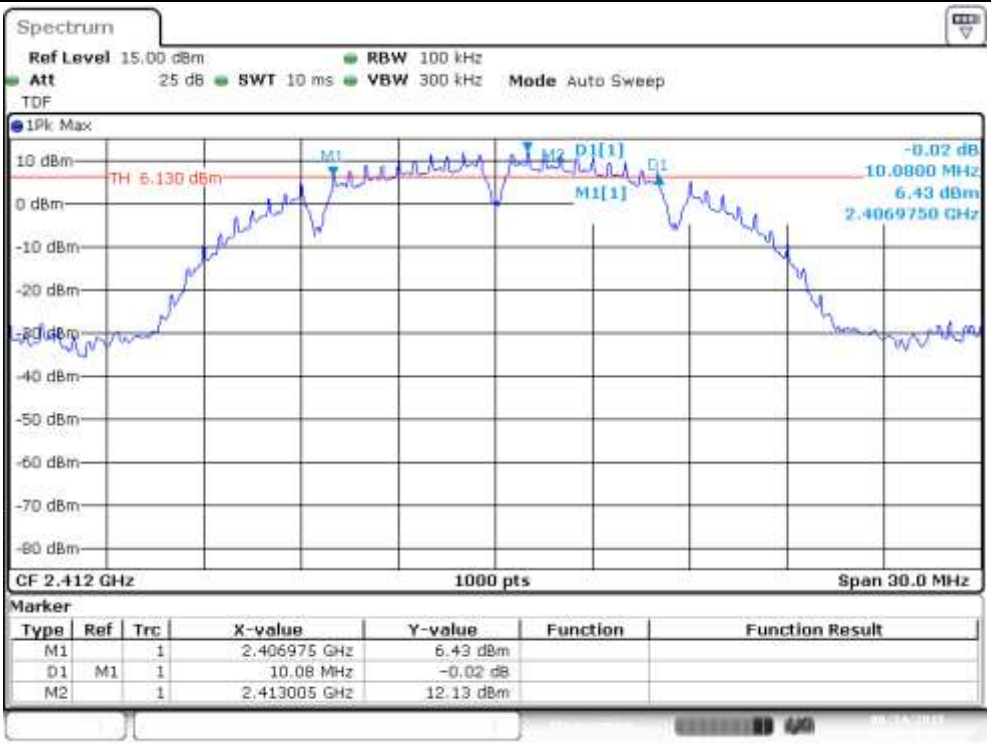
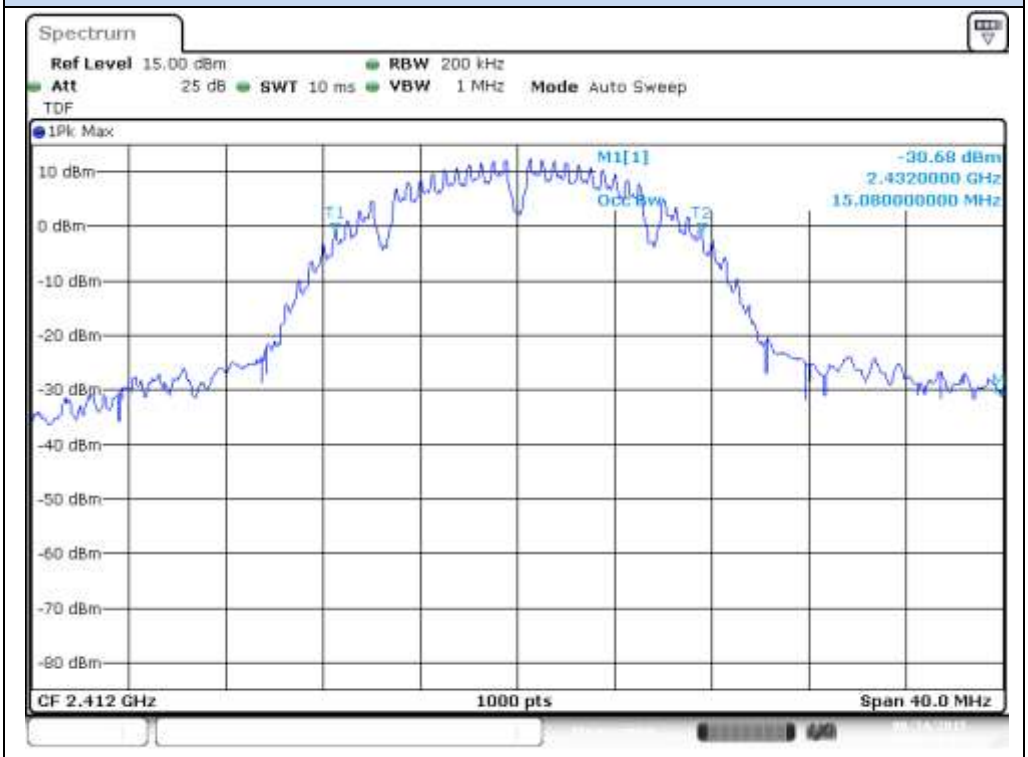
**Results screenshot:**

## 802.11b, 1Mbps – Chain A

### 6dB BW – CH1




### 99% BW – CH1



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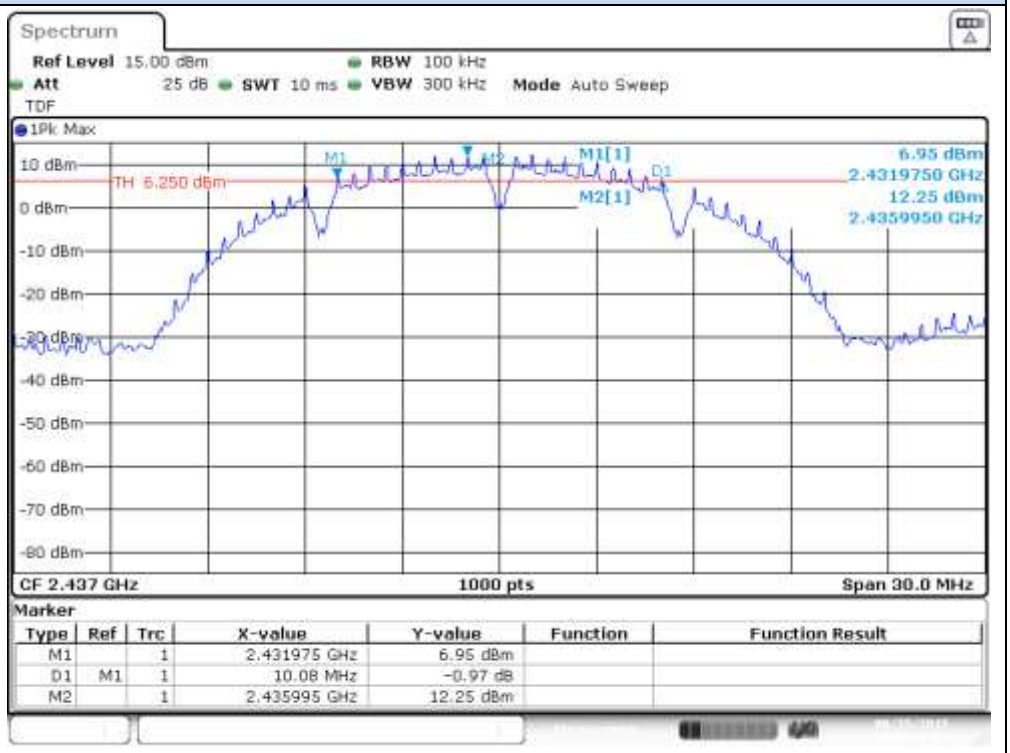
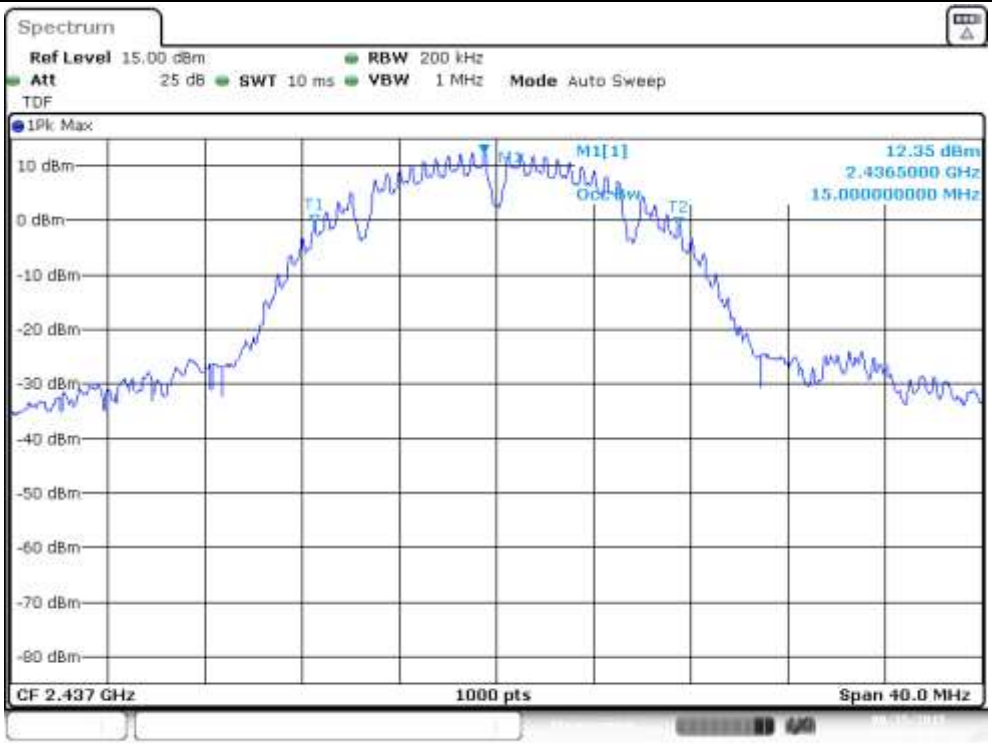
## 6dB BW – CH6




Date: 25.AUG.2015 16:07:28

## 99% BW – CH6




Date: 25.AUG.2015 16:04:30



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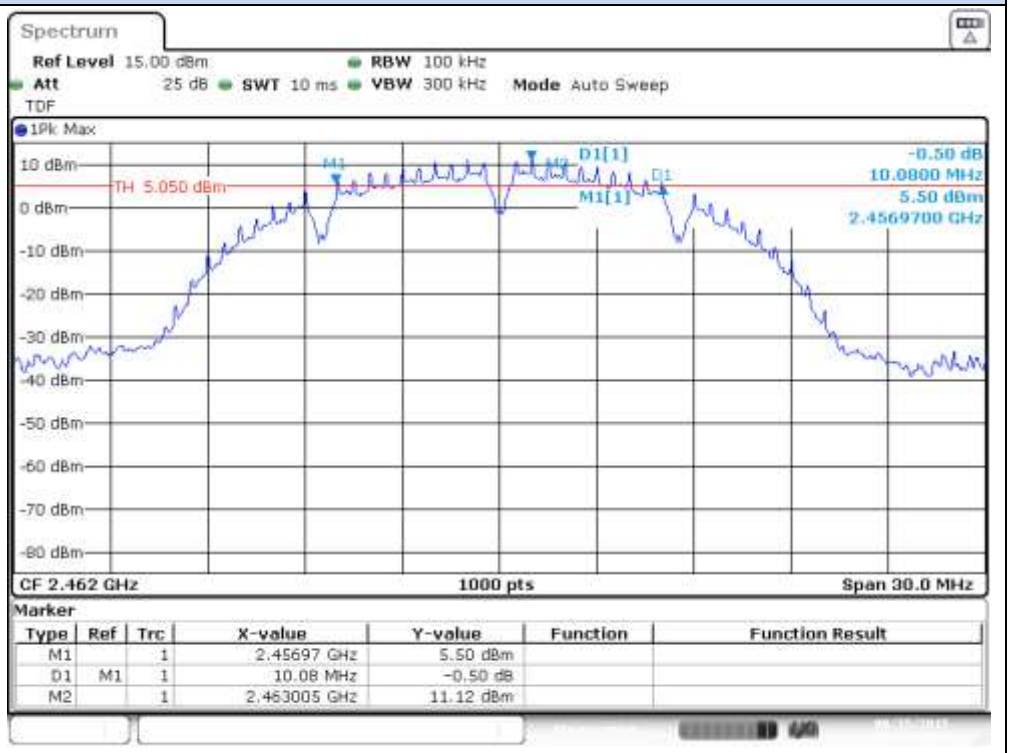
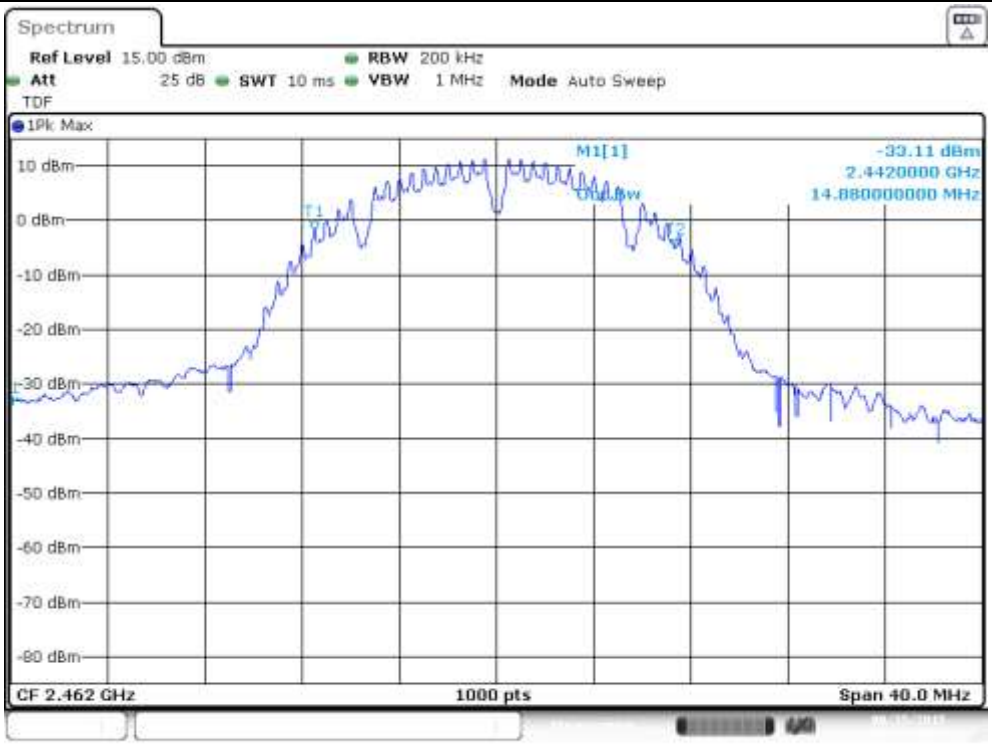
## 6dB BW – CH11




Date: 25.AUG.2015 16:13:54

## 99% BW – CH11




Date: 25.AUG.2015 16:14:53



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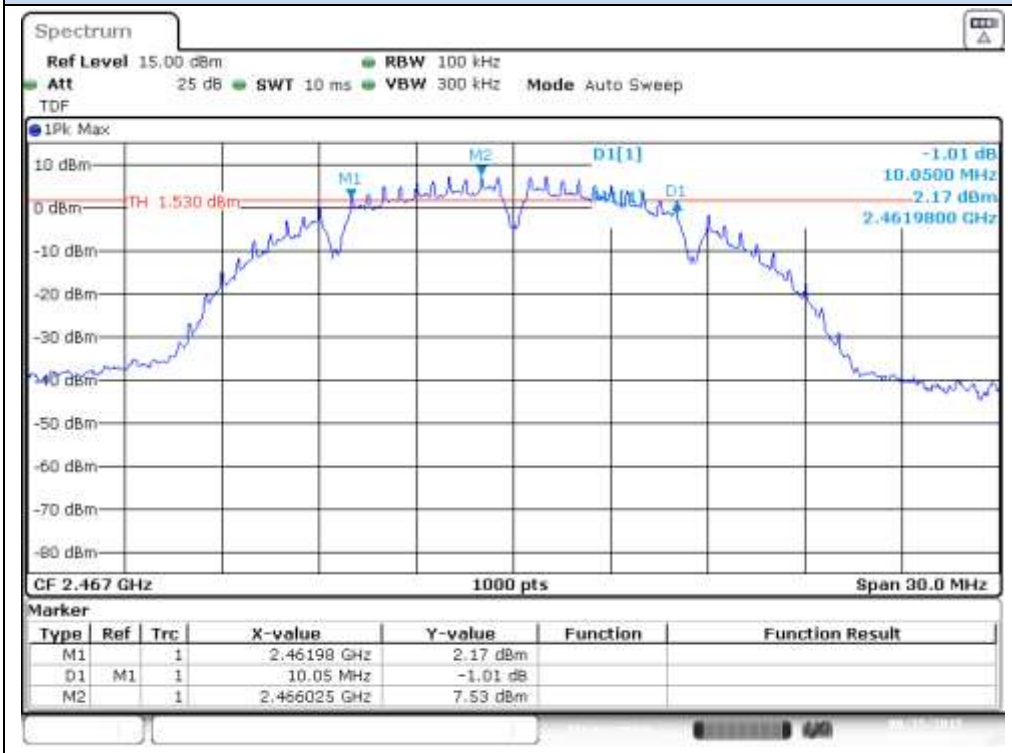
## 6dB BW – CH12




Date: 25.AUG.2015 16:22:05

## 99% BW – CH12

Date: 25.AUG.2015 16:22:46



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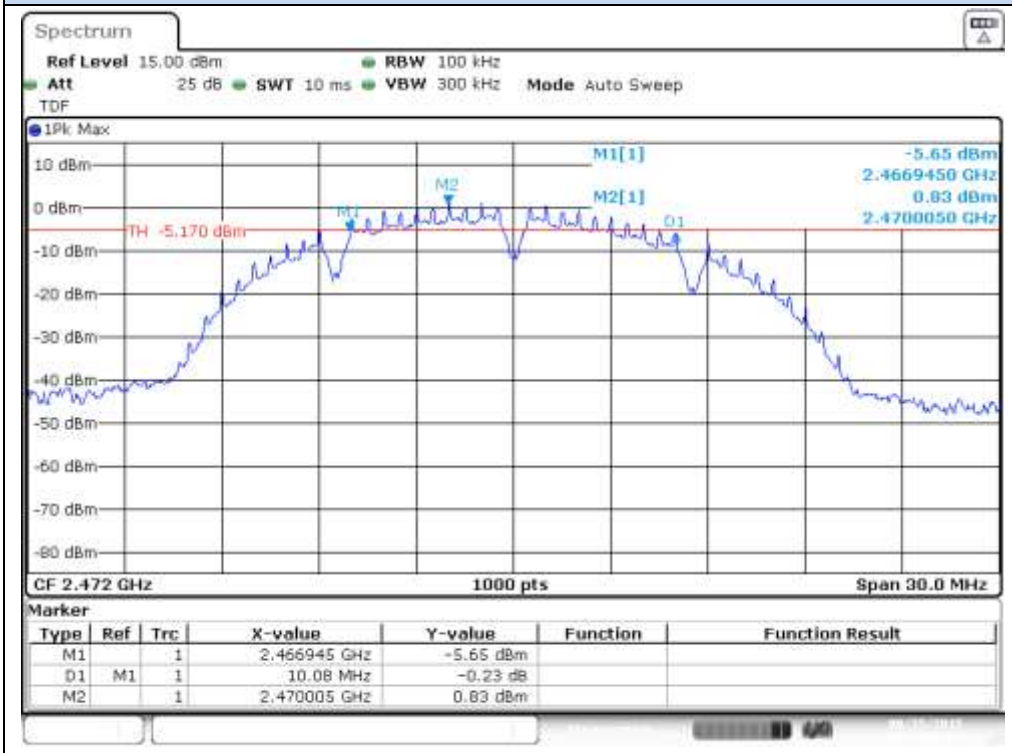
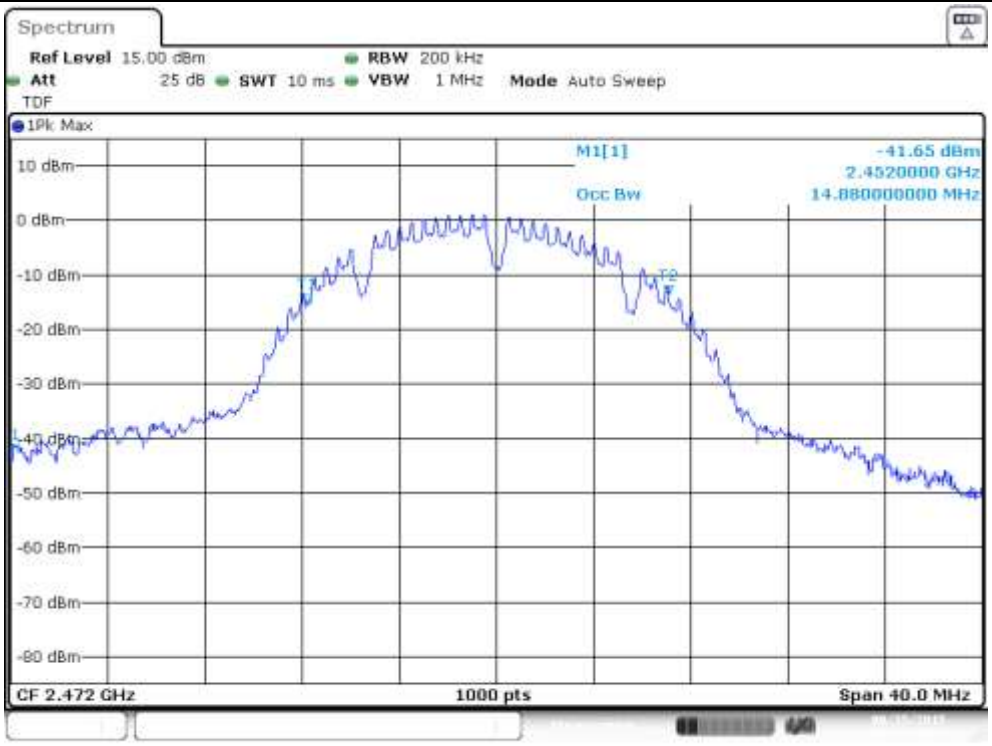
## 6dB BW – CH13




Date: 25.AUG.2015 16:33:00

## 99% BW – CH13




Date: 25.AUG.2015 16:33:45



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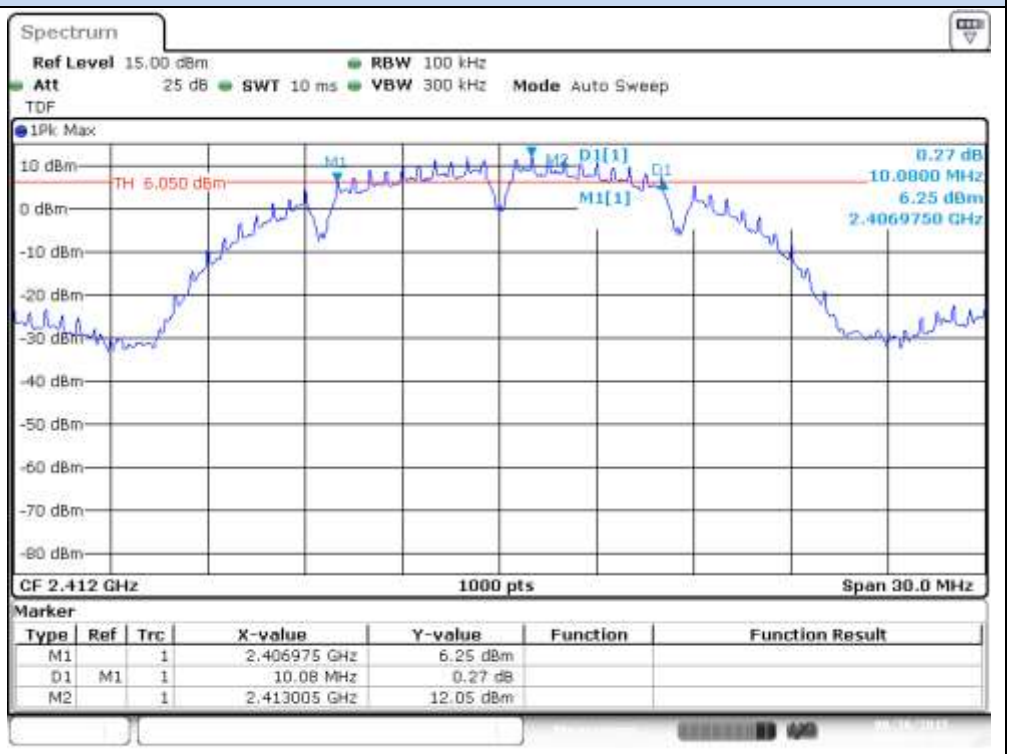
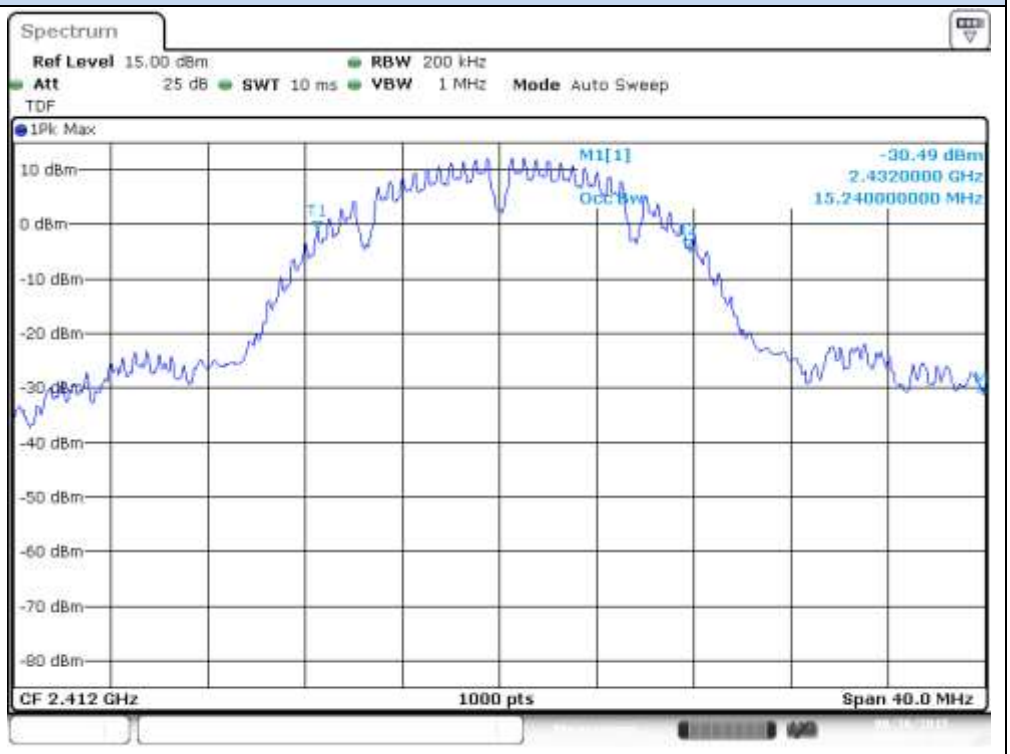
# 802.11b, 1Mbps – Chain B

## 6dB BW – CH1



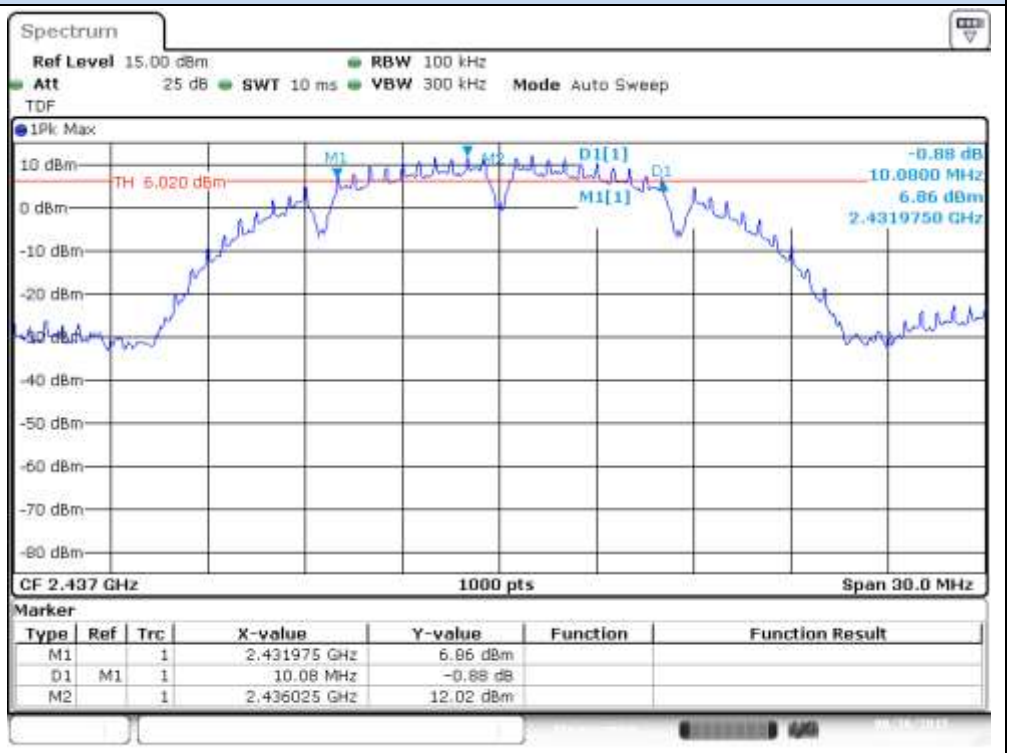

## 99% BW – CH1






Printed copies are not controlled documents

## 6dB BW – CH6

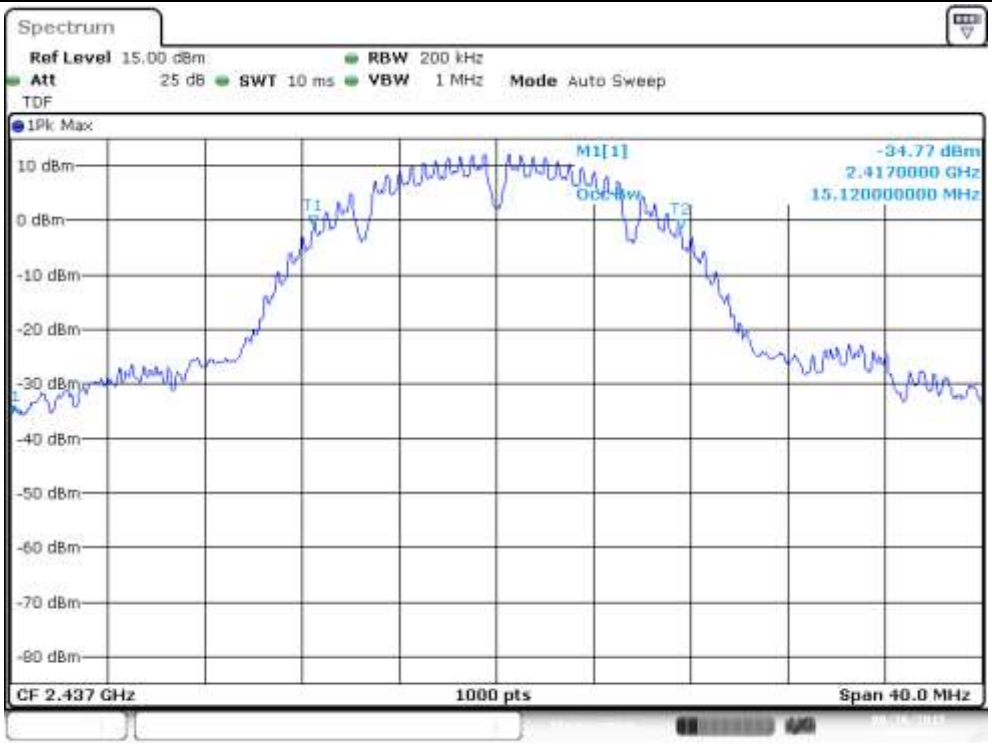



Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.431975 GHz | 6.86 dBm | | |
| D1 | M1 | 1 | 10.08 MHz | -0.88 dB | | |
| M2 | | 1 | 2.436025 GHz | 12.02 dBm | | |

Date: 26.AUG.2015 12:03:07

## 99% BW – CH6




Date: 26.AUG.2015 12:00:03



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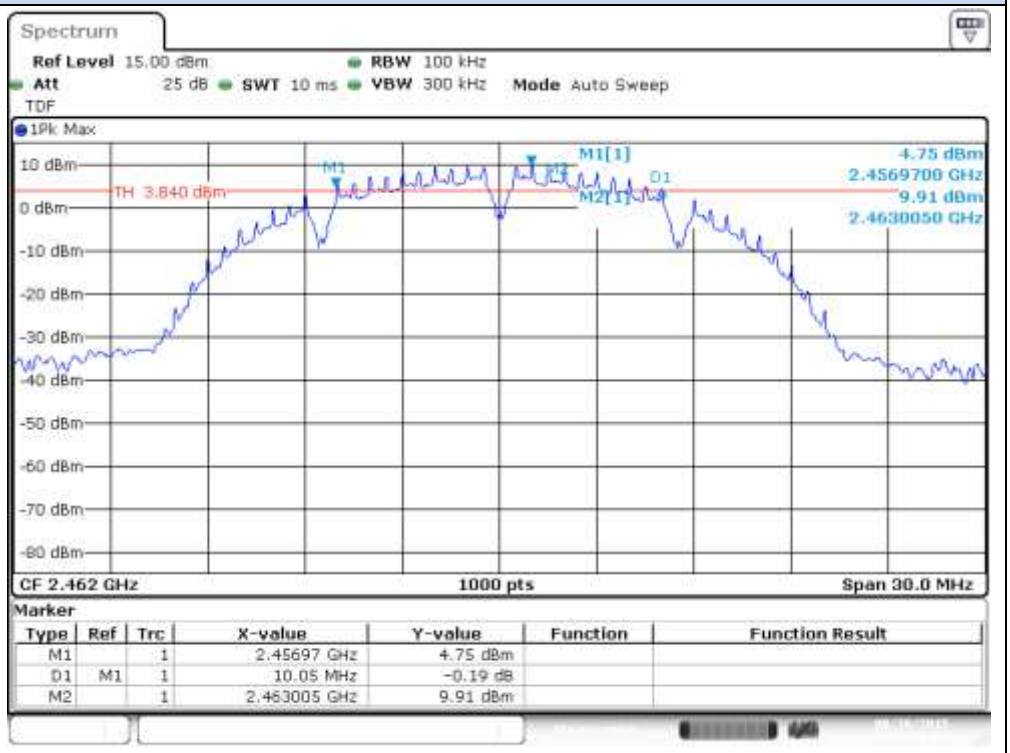
## 6dB BW – CH11




Date: 26.AUG.2015 12:13:28

## 99% BW – CH11

Date: 26.AUG.2015 12:14:45



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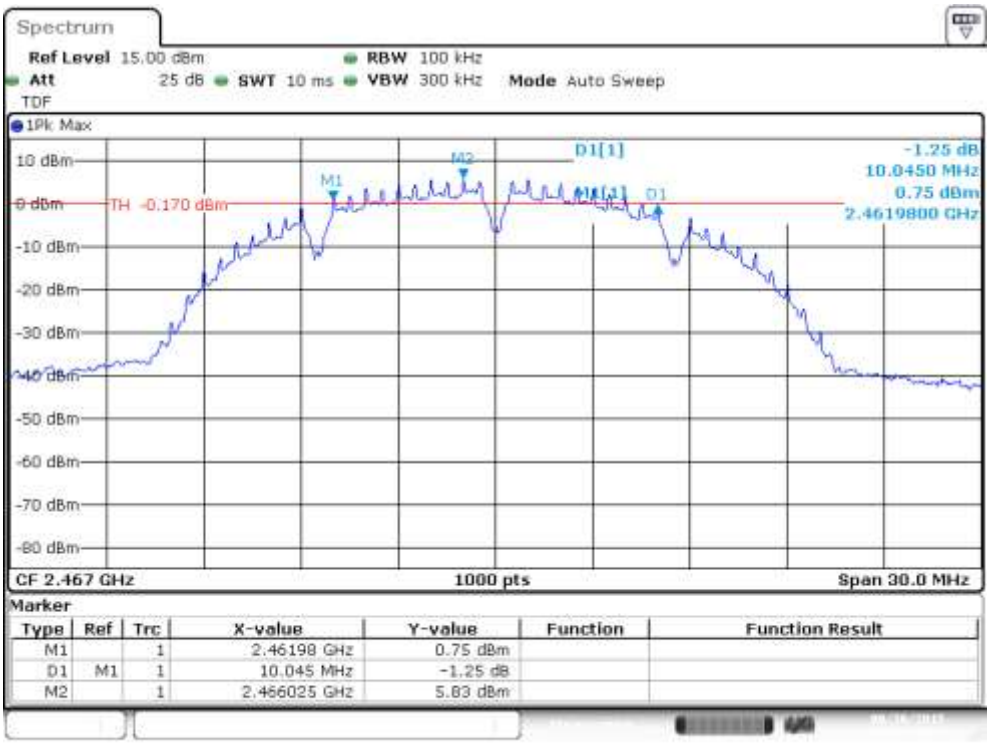
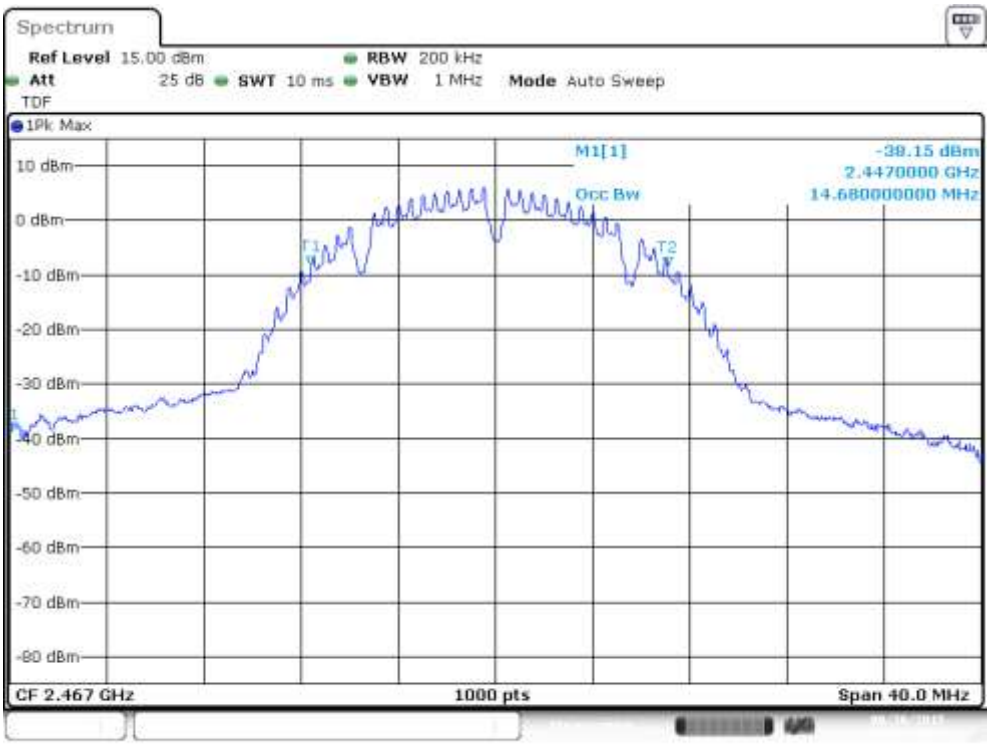
## 6dB BW – CH12




Date: 26.AUG.2015 14:21:02

## 99% BW – CH12

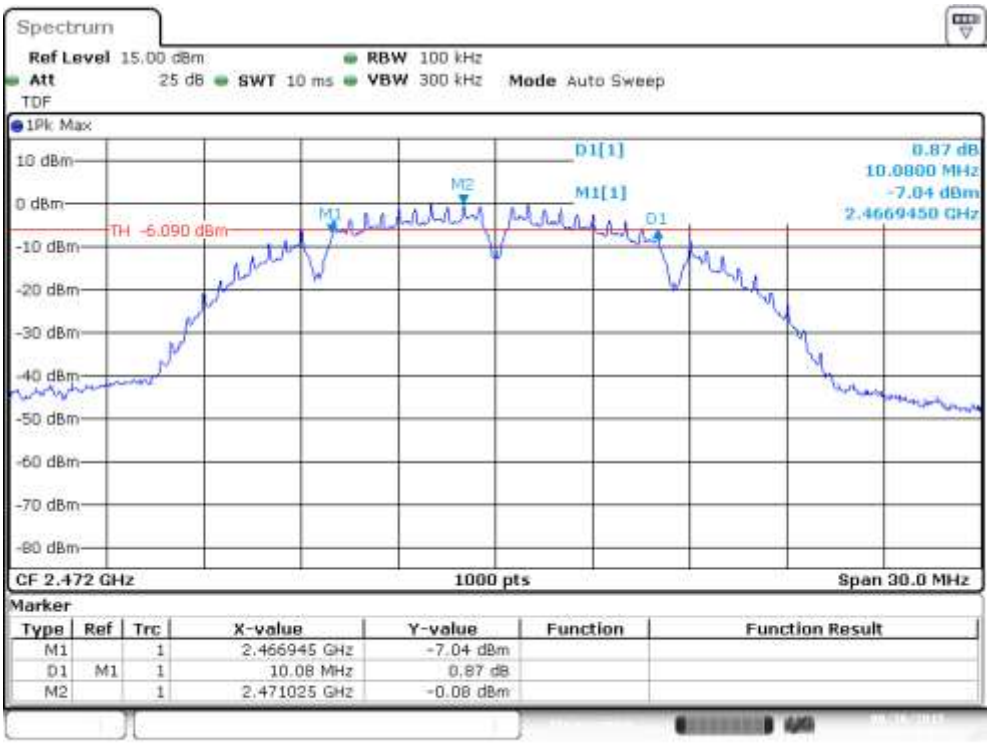



Date: 26.AUG.2015 14:21:42



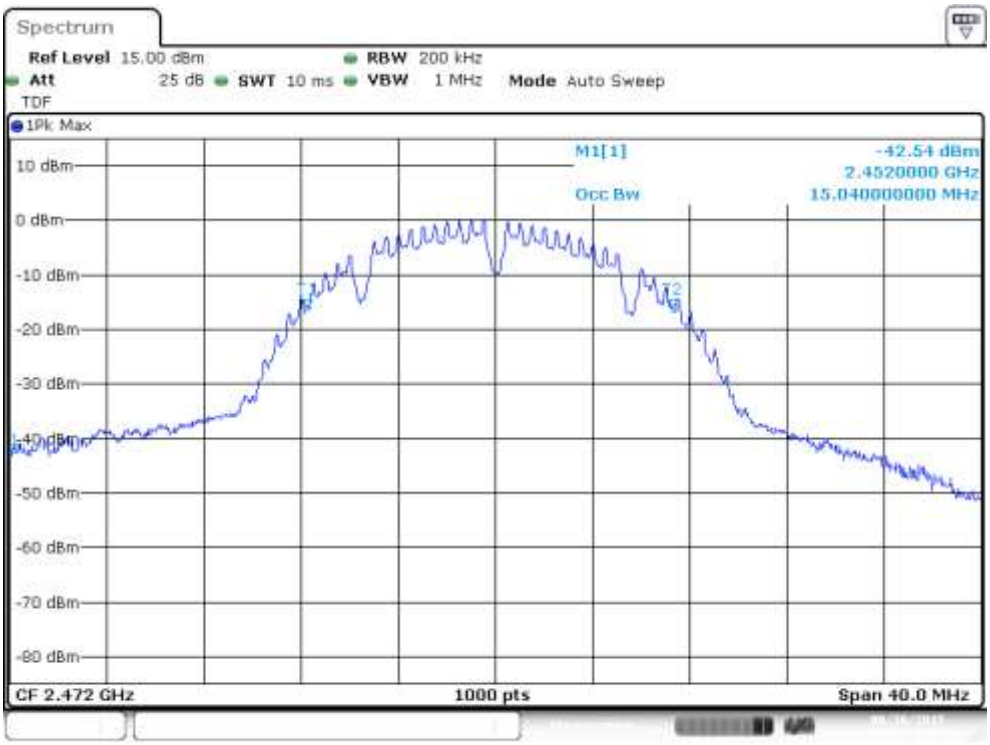
Printed copies are not controlled documents

## 6dB BW – CH13




Date: 26.AUG.2015 14:28:21

## 99% BW – CH13




Date: 26.AUG.2015 14:29:19



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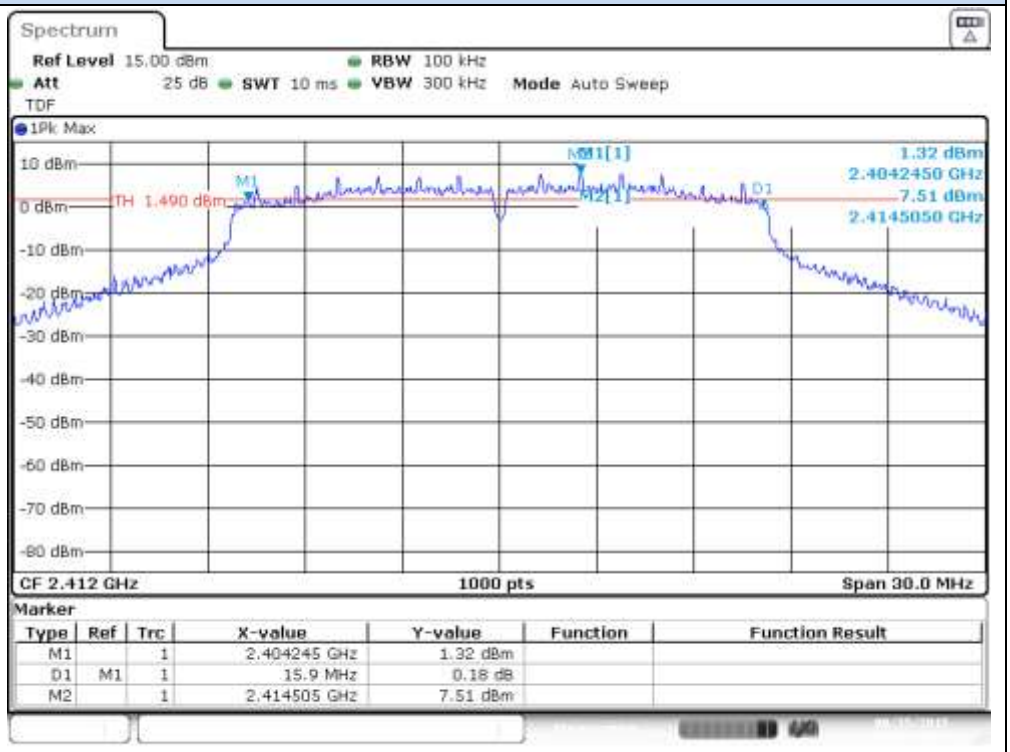
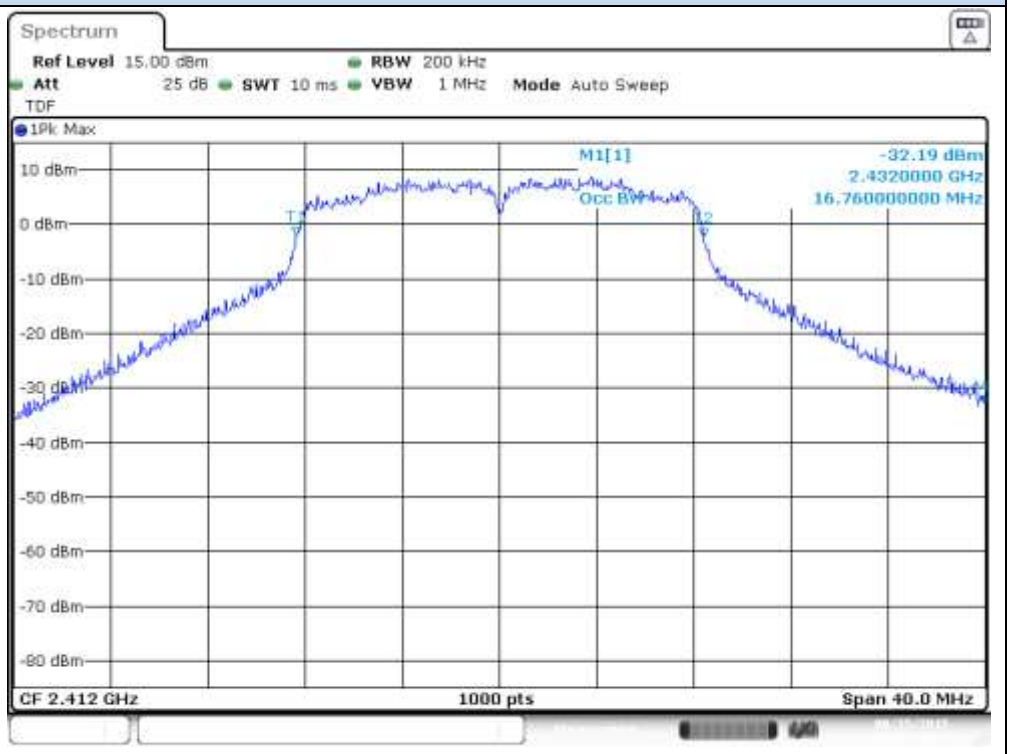
# 802.11g, 6Mbps (SISO) – Chain A

## 6dB BW – CH1




## 99% BW – CH1



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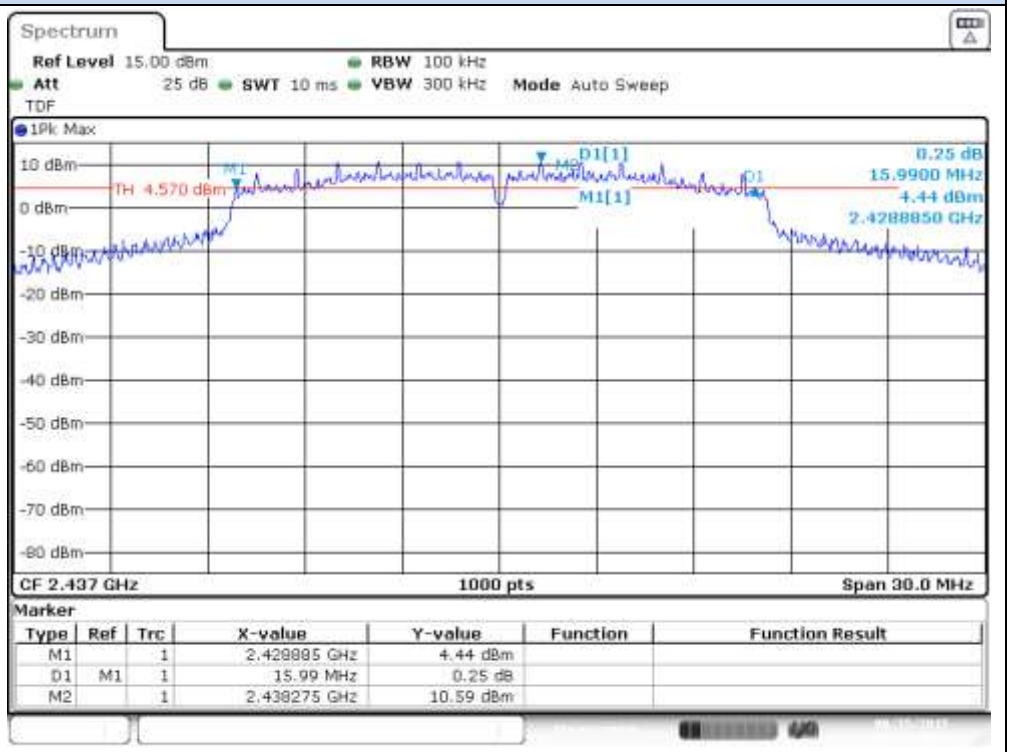
## 6dB BW – CH6

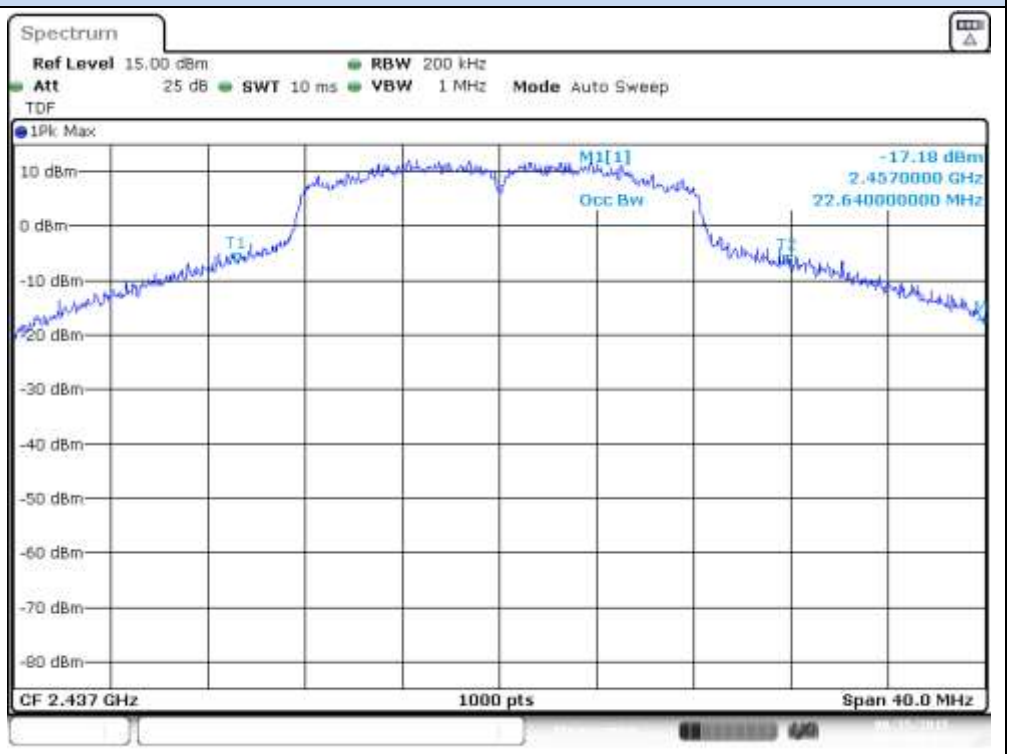



Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.428885 GHz | 4.44 dBm | | |
| D1 | M1 | 1 | 15.99 MHz | 0.25 dB | | |
| M2 | | 1 | 2.438275 GHz | 10.59 dBm | | |

Date: 25.AUG.2015 17:14:13

## 99% BW – CH6




Date: 25.AUG.2015 17:14:57



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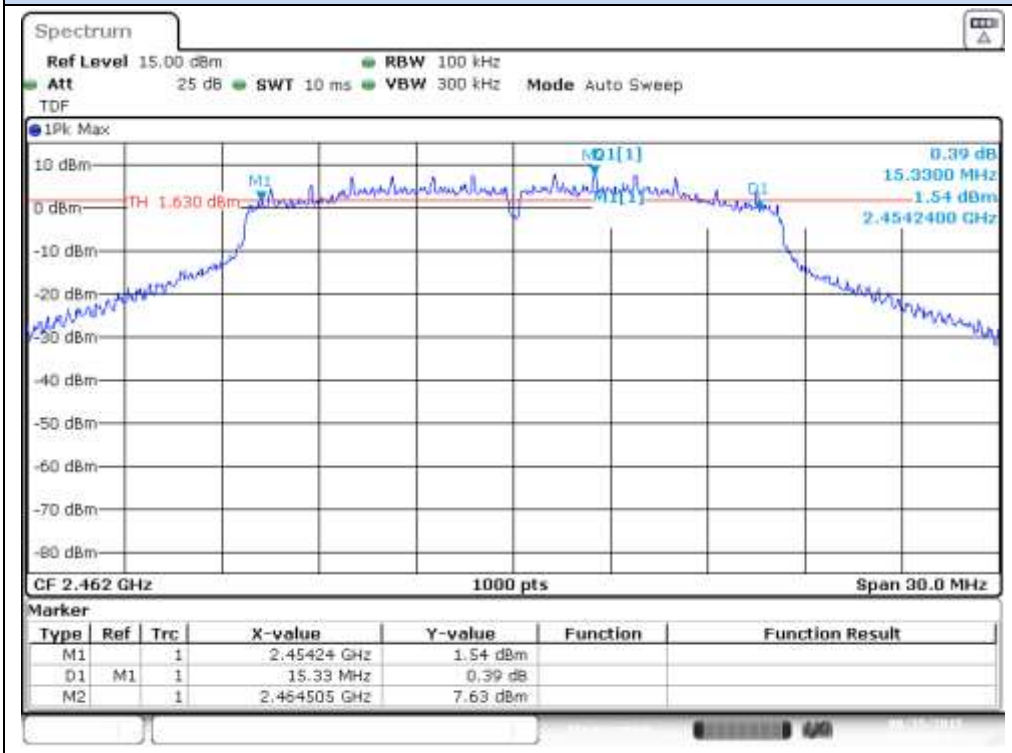
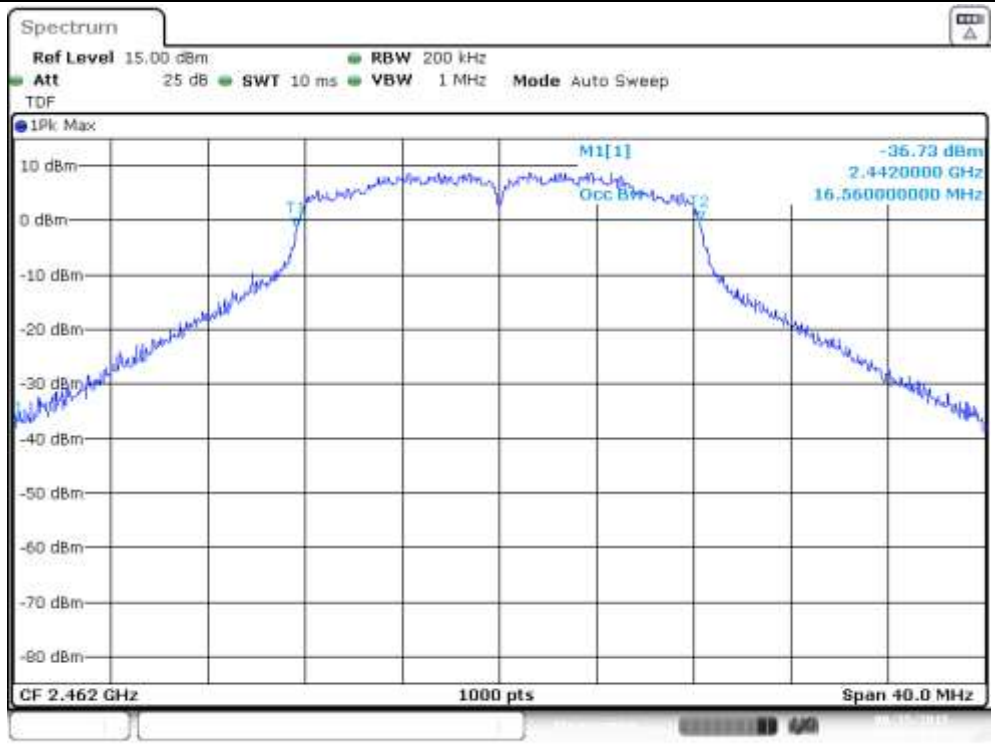
## 6dB BW – CH11




Date: 25.AUG.2015 16:54:45

## 99% BW – CH11

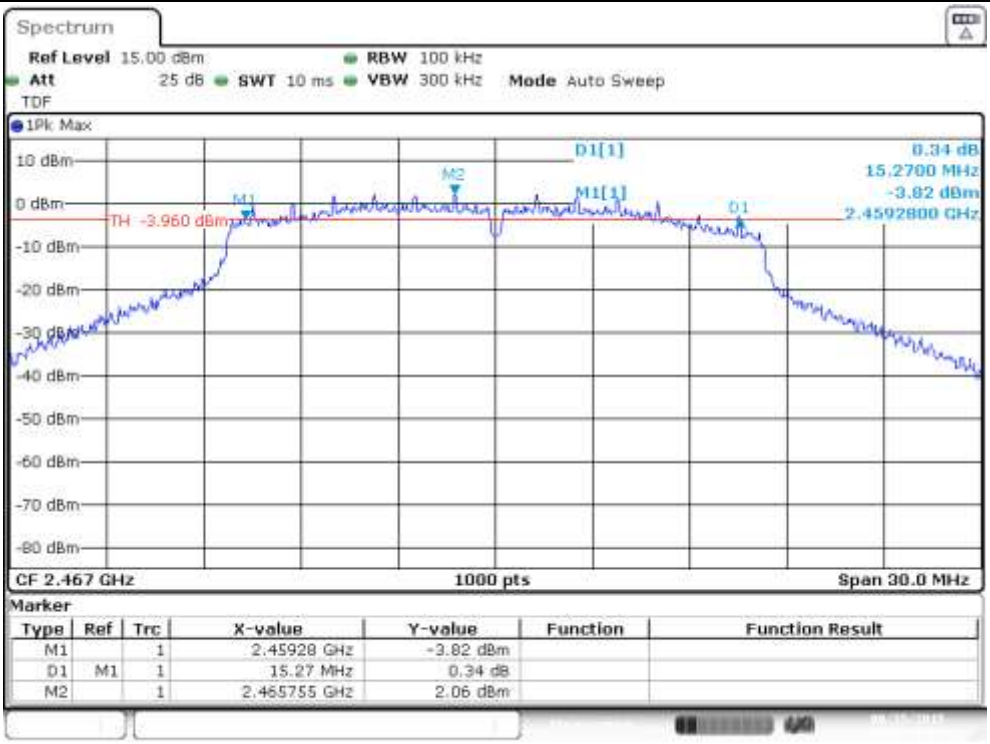



Date: 25.AUG.2015 16:55:41



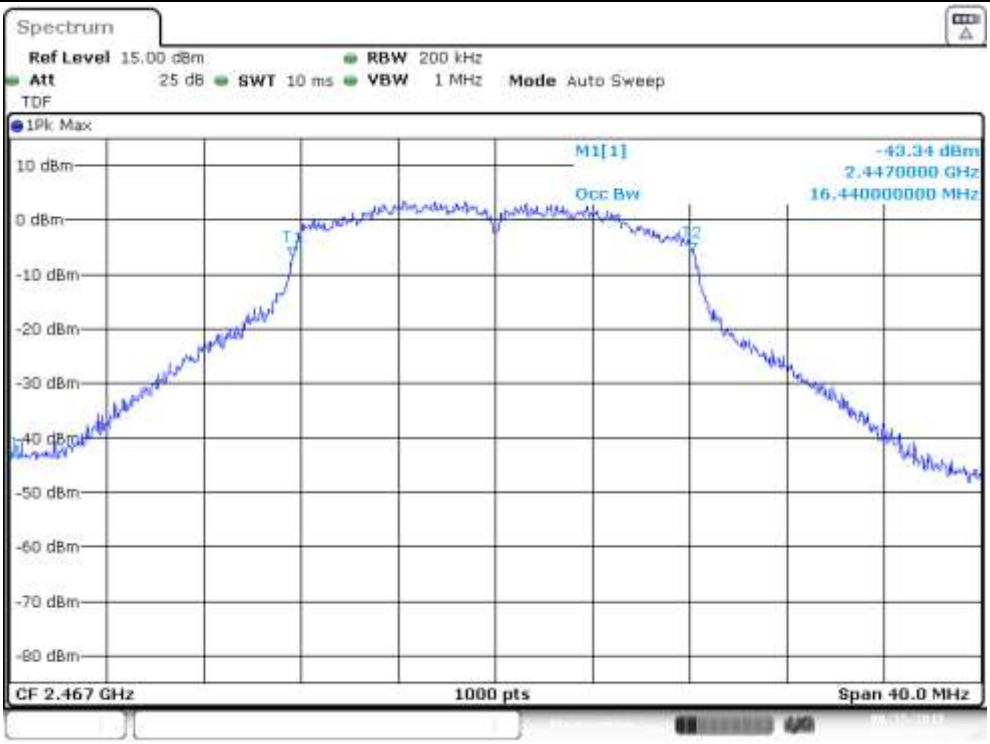
Printed copies are not controlled documents

## 6dB BW – CH12




Date: 25.AUG.2015 17:01:41

## 99% BW – CH12




Date: 25.AUG.2015 17:02:22



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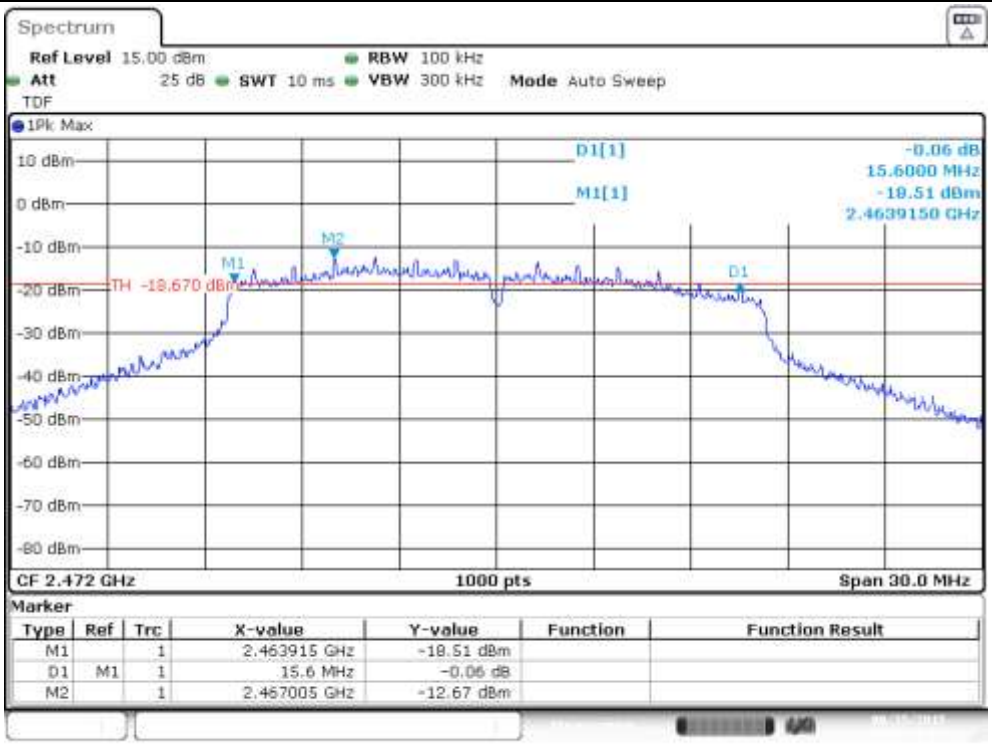
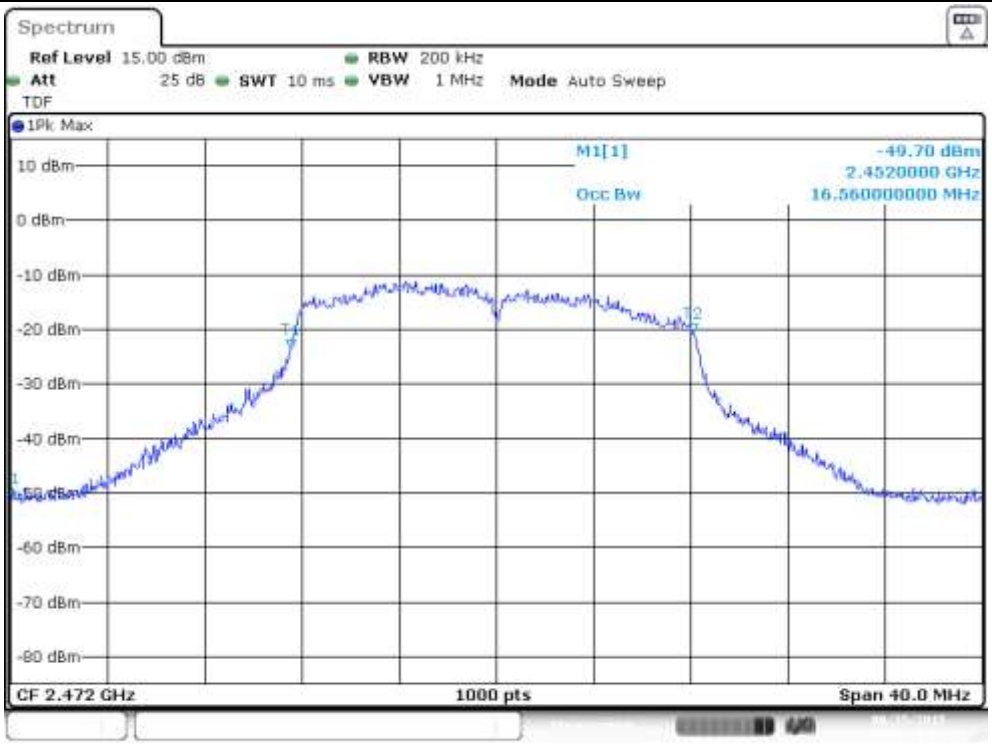
## 6dB BW – CH13




Date: 25.AUG.2015 17:44:50

## 99% BW – CH13




Date: 25.AUG.2015 17:45:25



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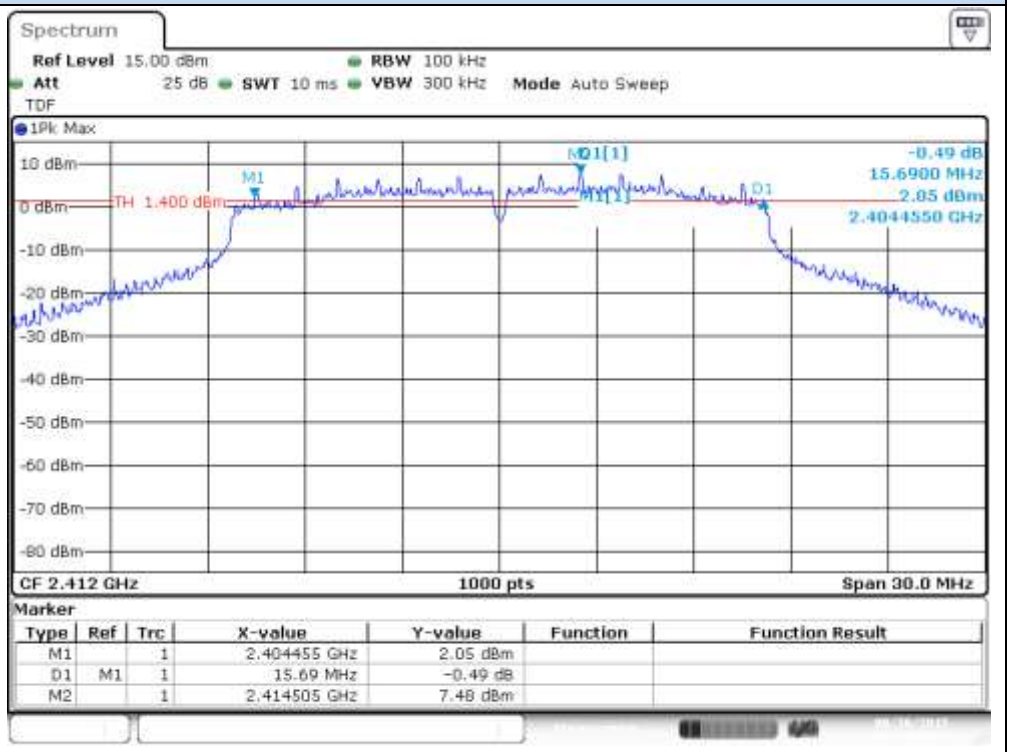
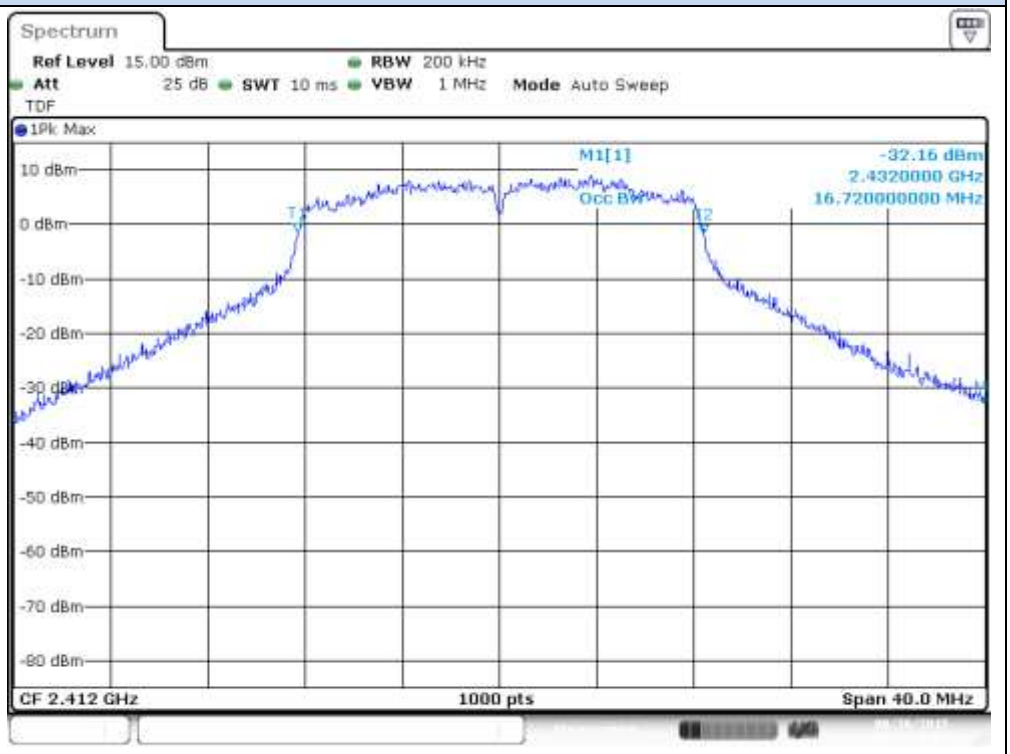
# 802.11g, 6Mbps (SISO) – Chain B

## 6dB BW – CH1




Date: 26.AUG.2015 14:34:06

## 99% BW – CH1




Date: 26.AUG.2015 14:34:49



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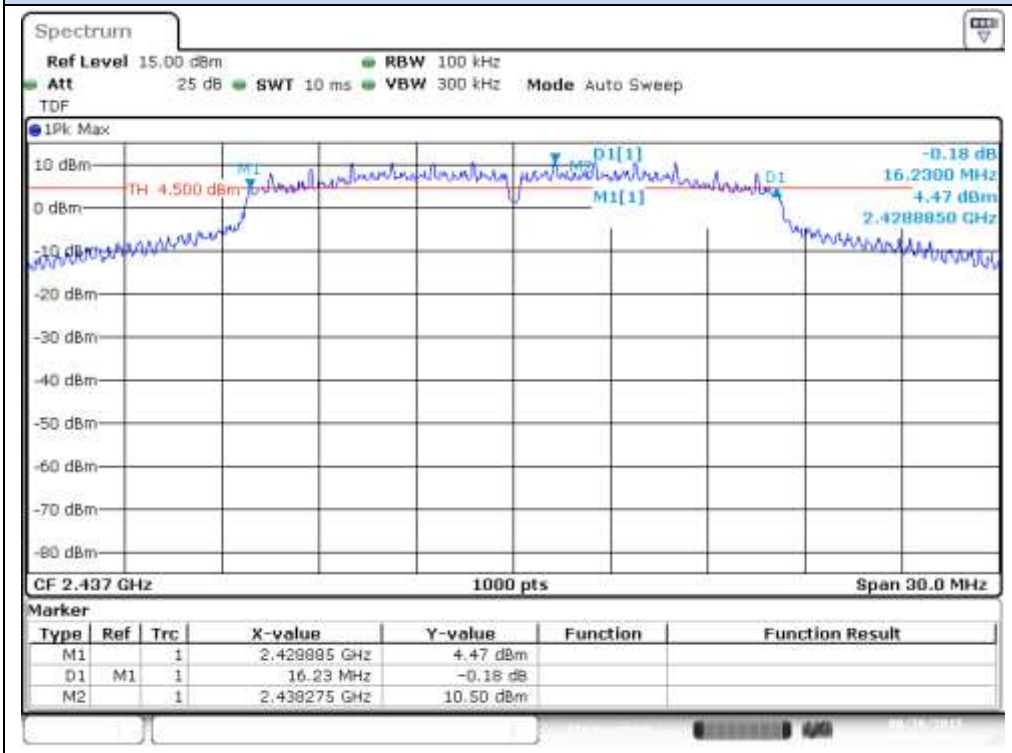
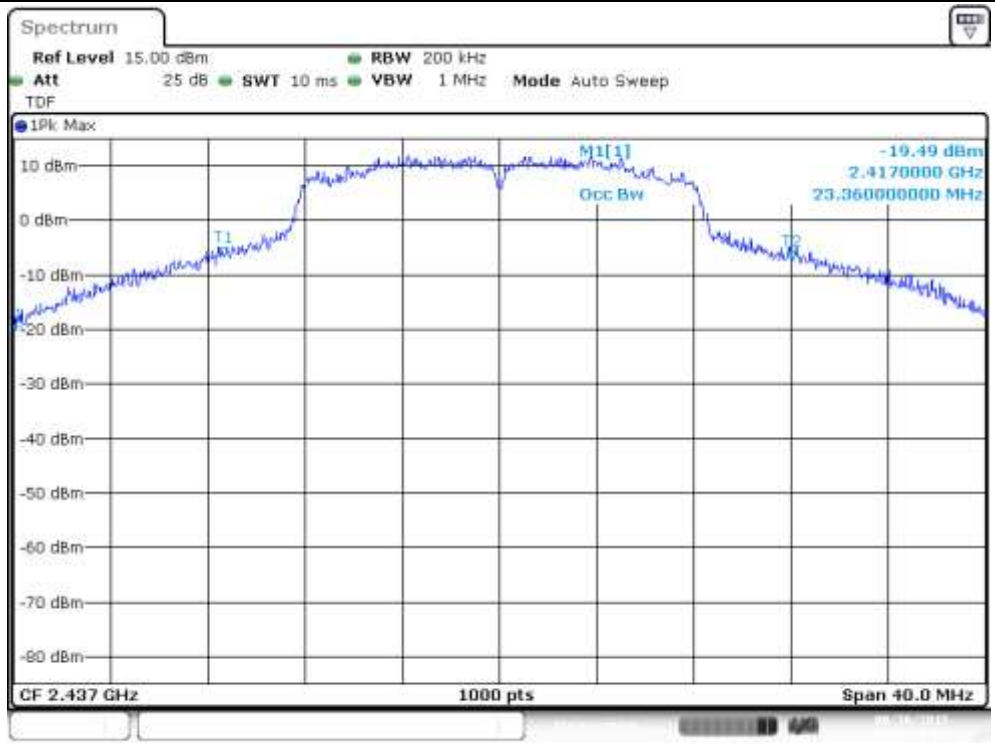
## 6dB BW – CH6




Date: 26.AUG.2015 14:41:43

## 99% BW – CH6

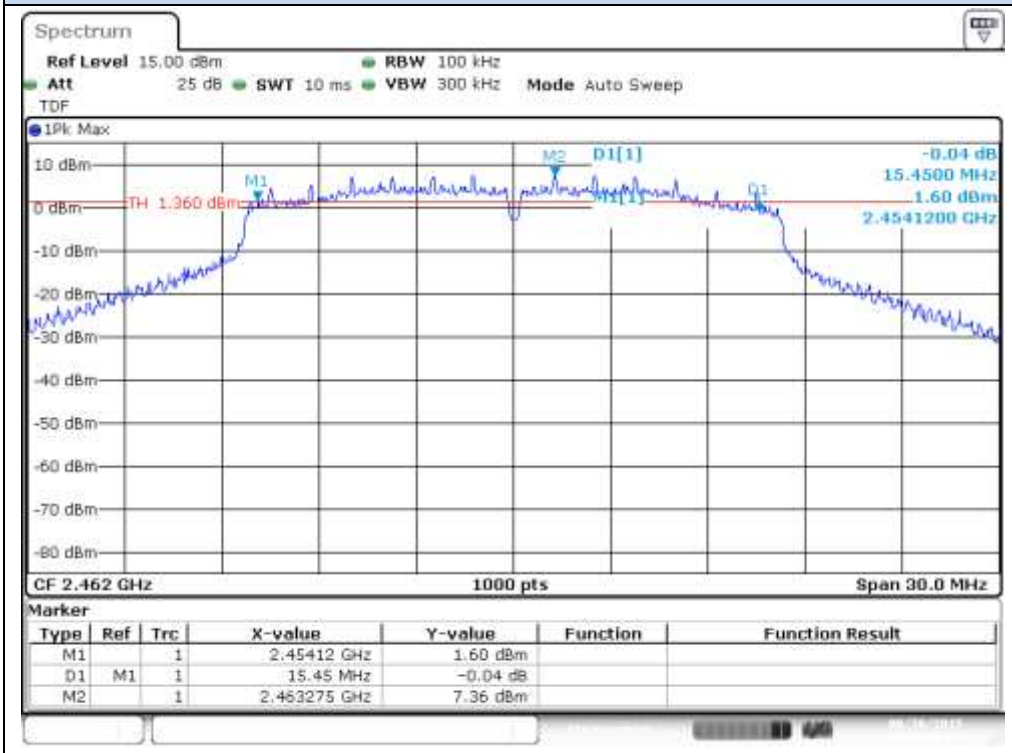



Date: 26.AUG.2015 14:42:37



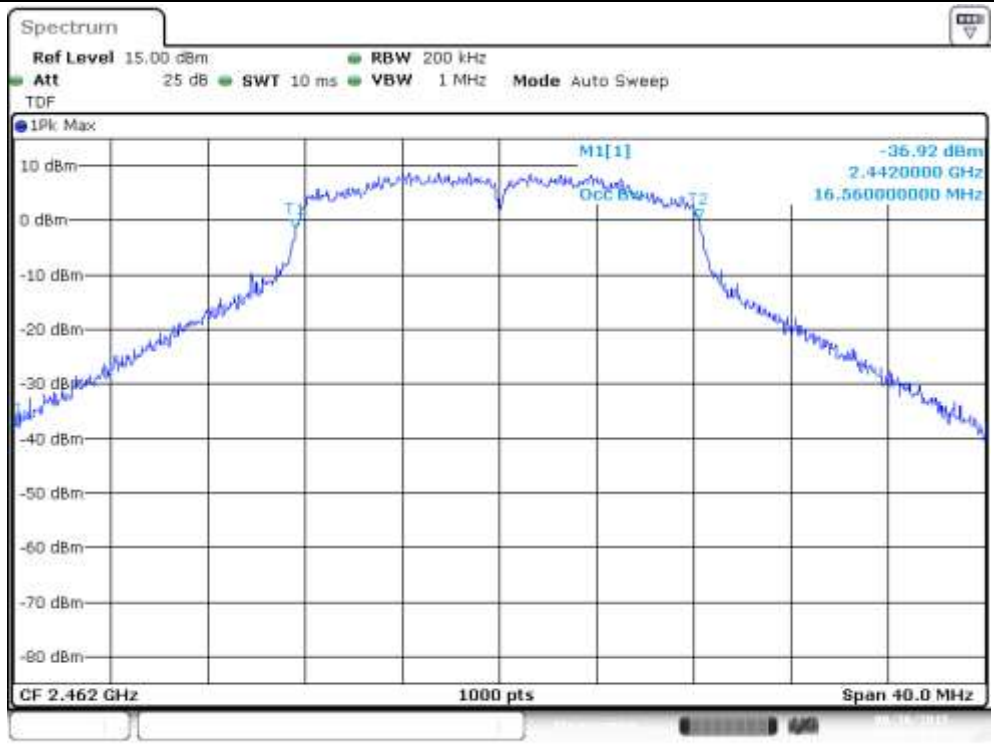
Printed copies are not controlled documents

## 6dB BW – CH11




Date: 26.AUG.2015 14:48:07

## 99% BW – CH11

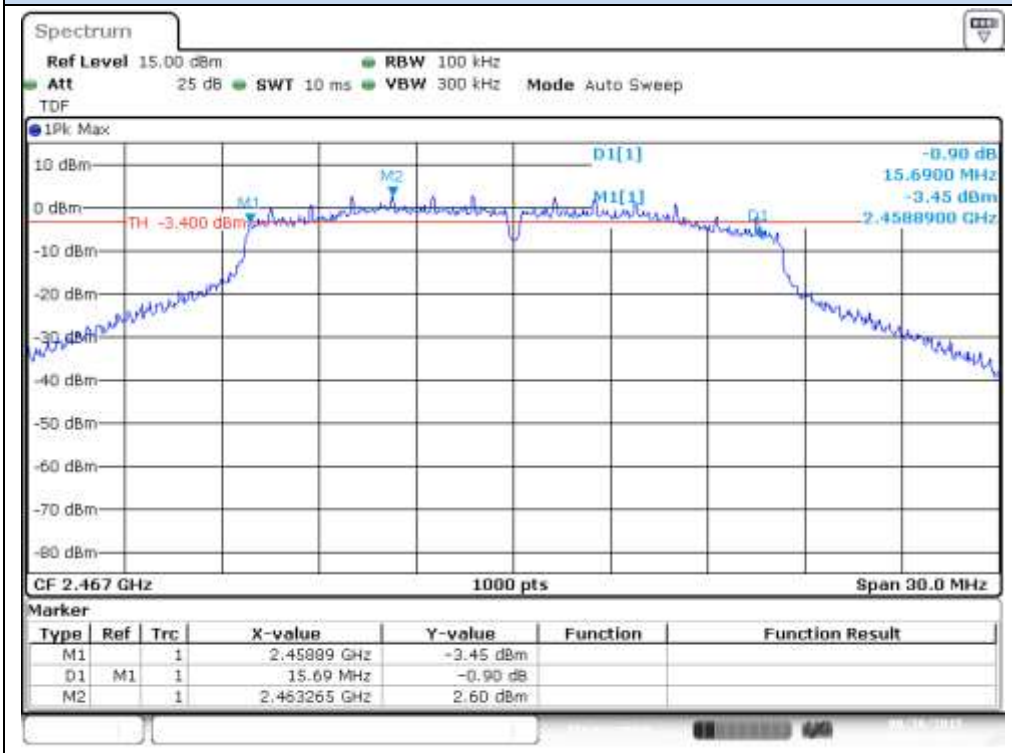



Date: 26.AUG.2015 14:48:46



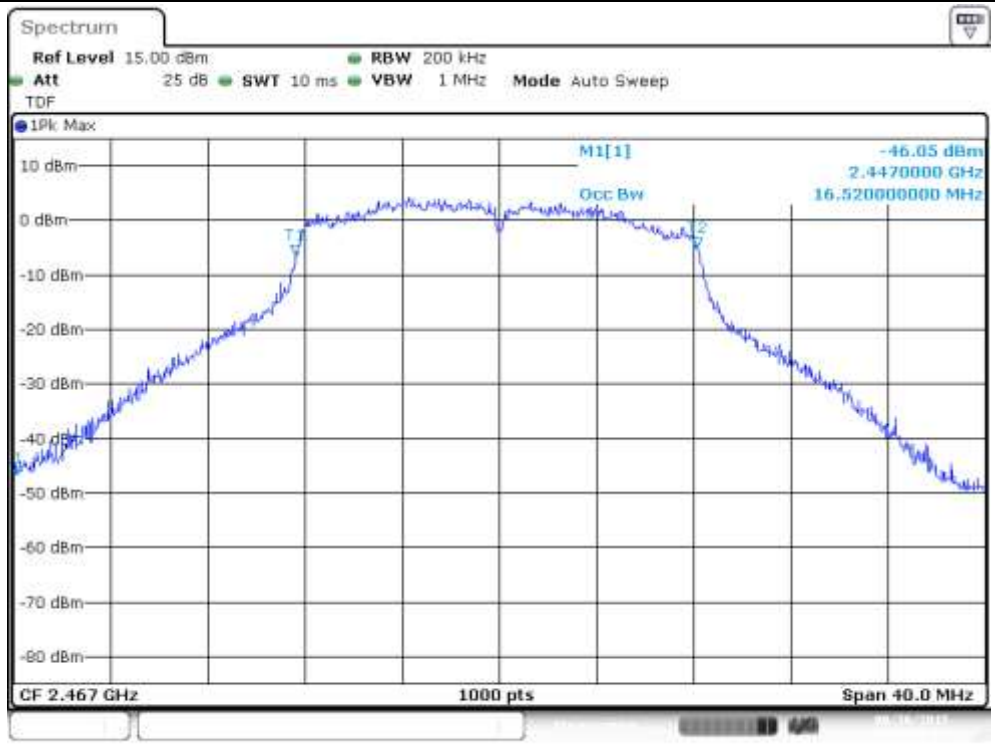
Printed copies are not controlled documents

## 6dB BW – CH12




Date: 26.AUG.2015 14:54:15

## 99% BW – CH12

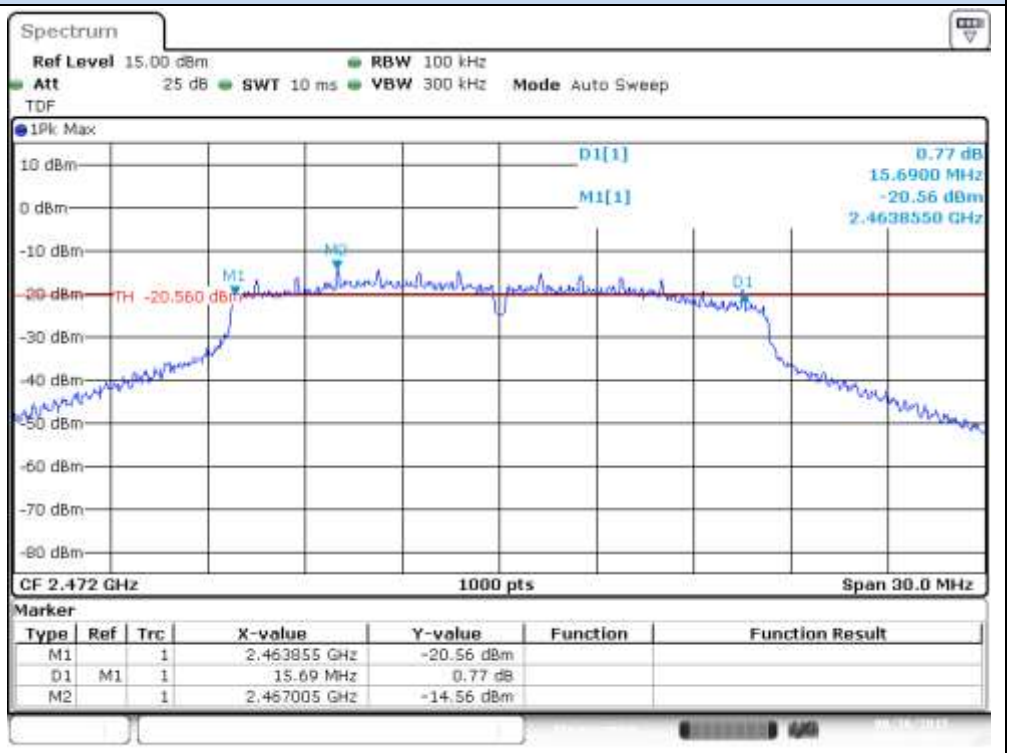



Date: 26.AUG.2015 14:54:56



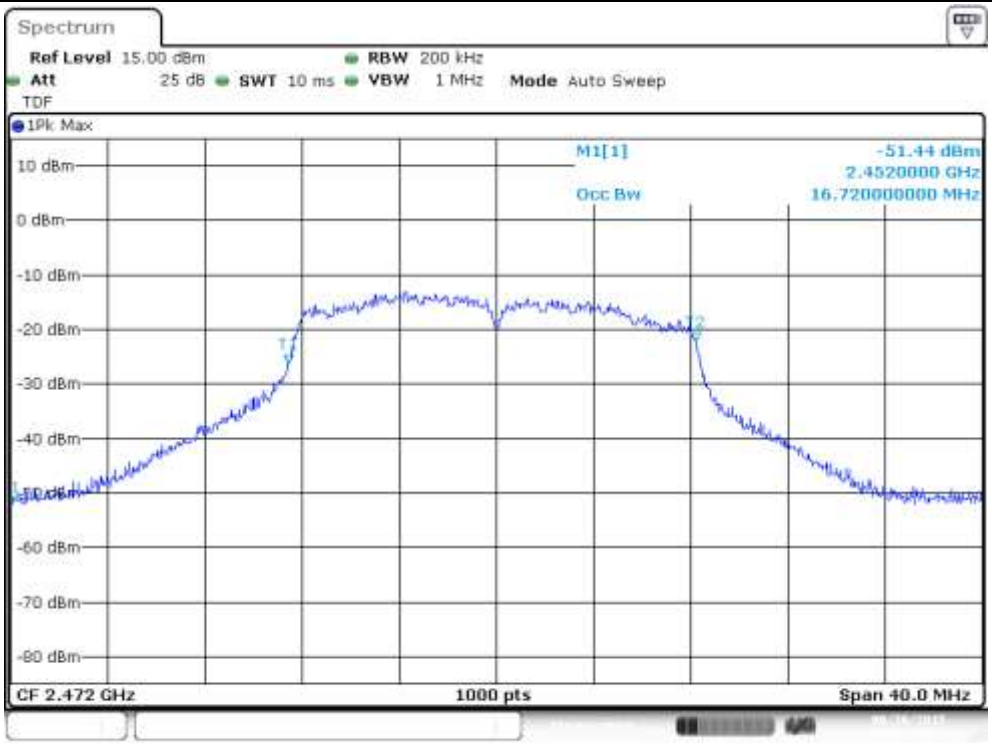
Printed copies are not controlled documents

## 6dB BW – CH13




Date: 26.AUG.2015 15:01:13

## 99% BW – CH13




Date: 26.AUG.2015 15:01:57



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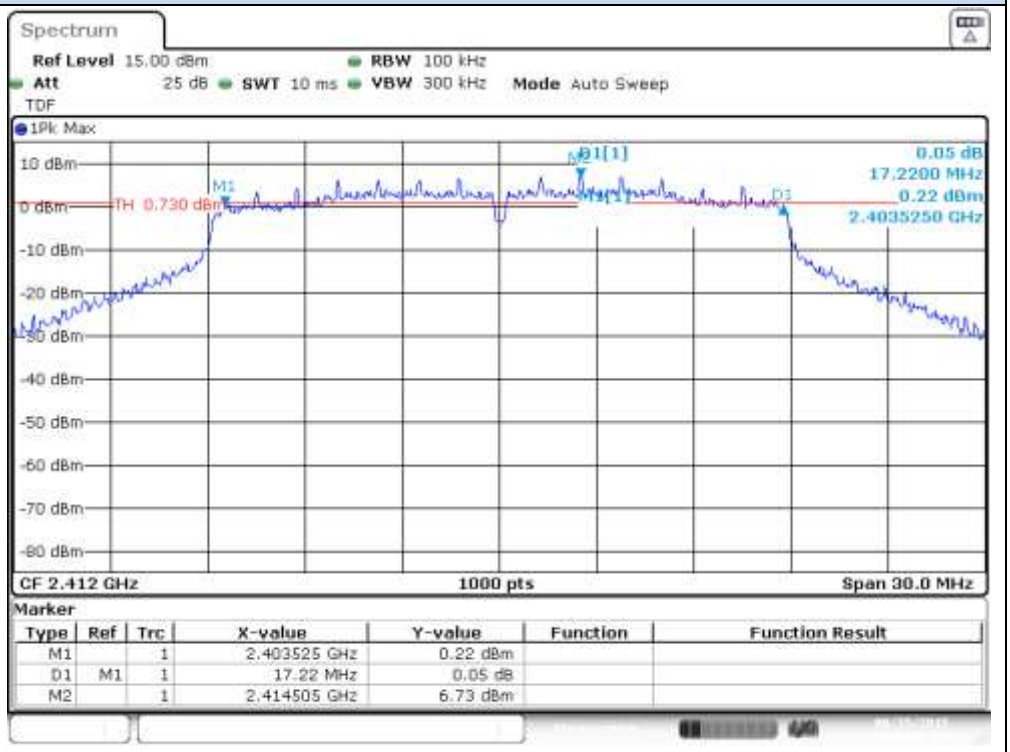
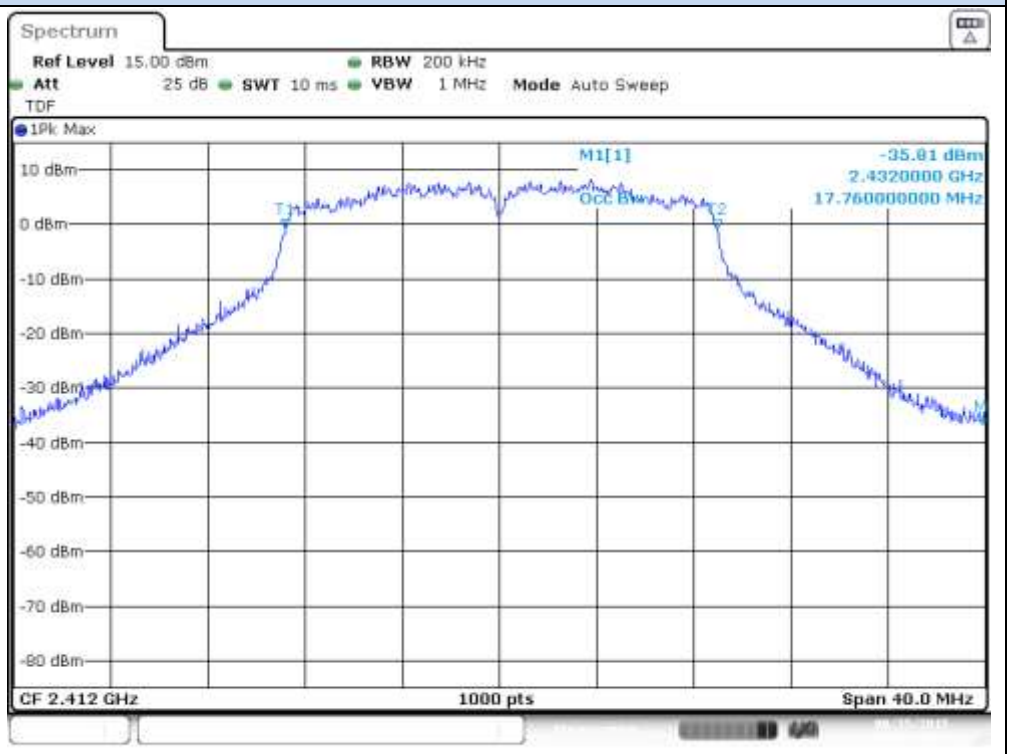
# 802.11n20, HT0 (SISO) – Chain A

## 6dB BW – CH1




## 99% BW – CH1



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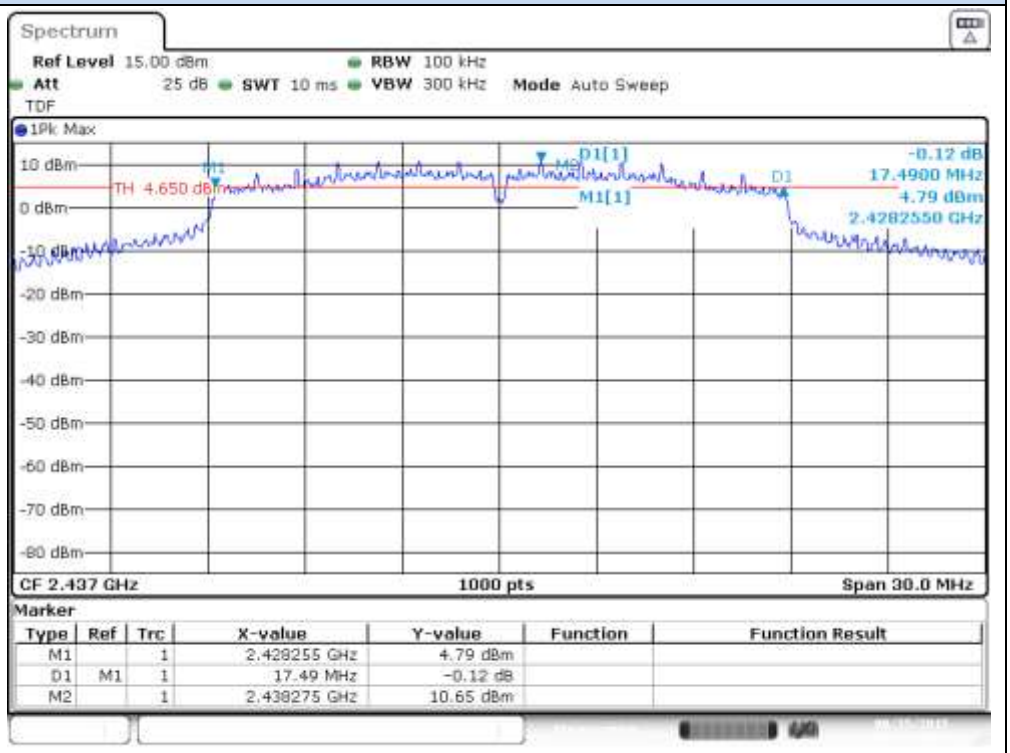
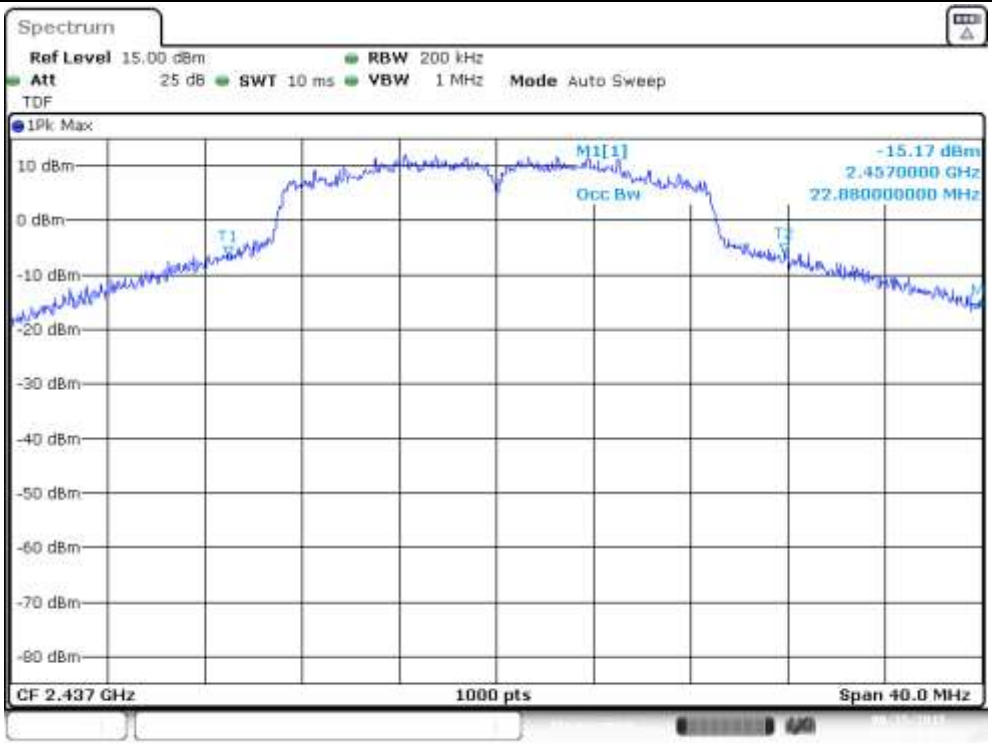
## 6dB BW – CH6



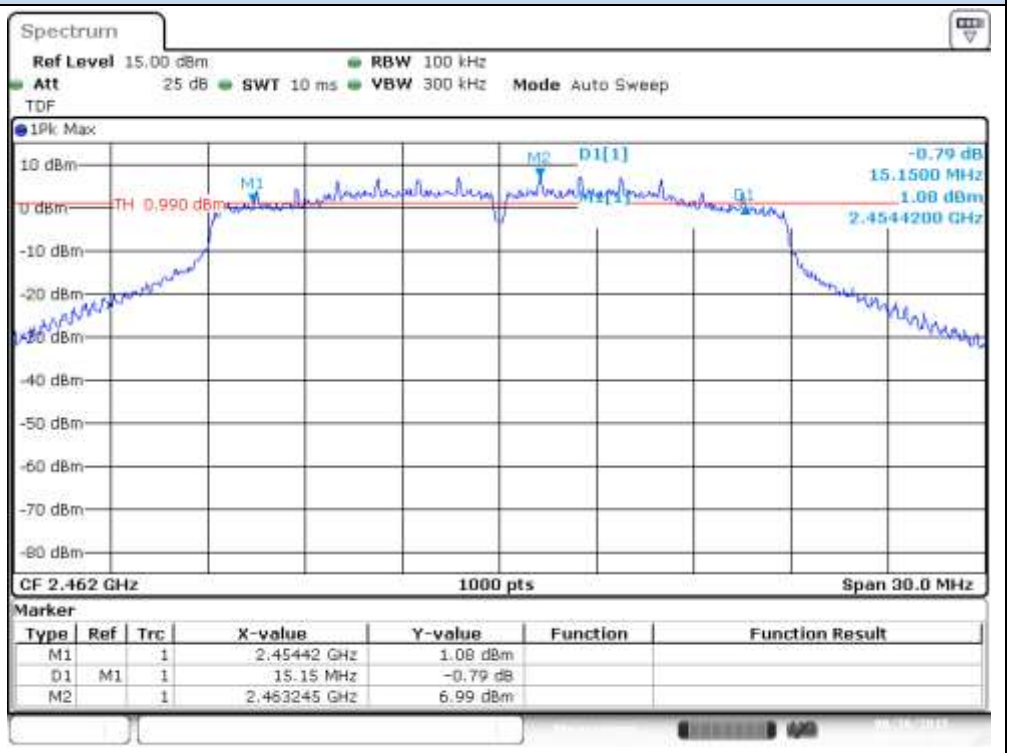

## 99% BW – CH6





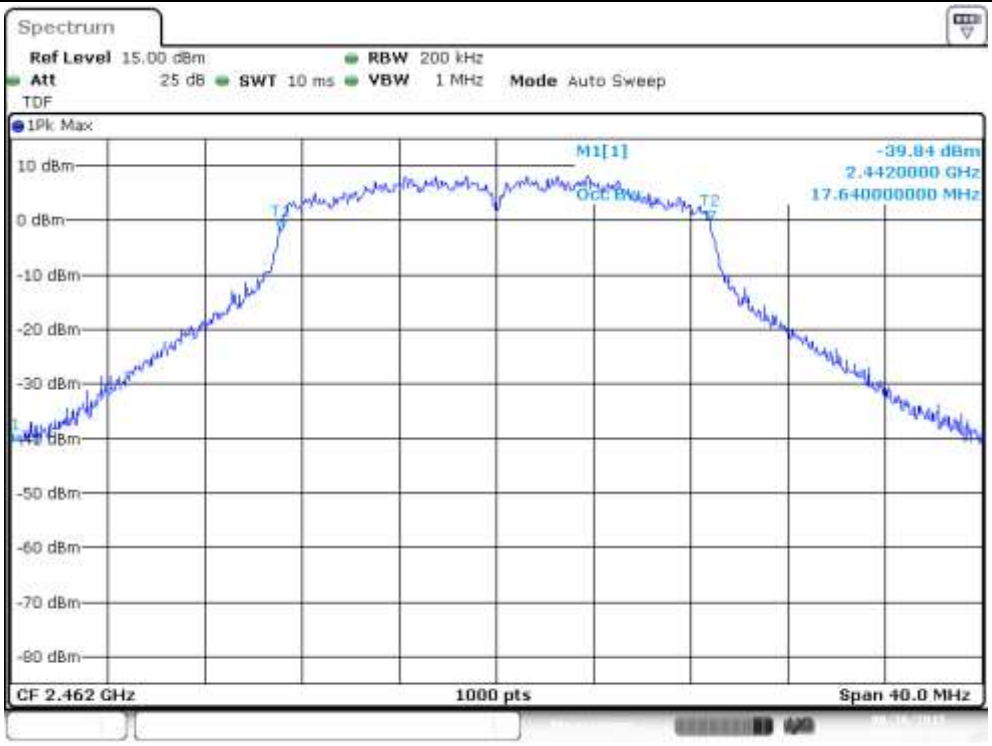

Printed copies are not controlled documents

## 6dB BW – CH11




Date: 26.AUG.2015 10:33:07

## 99% BW – CH11




Date: 26.AUG.2015 10:36:43



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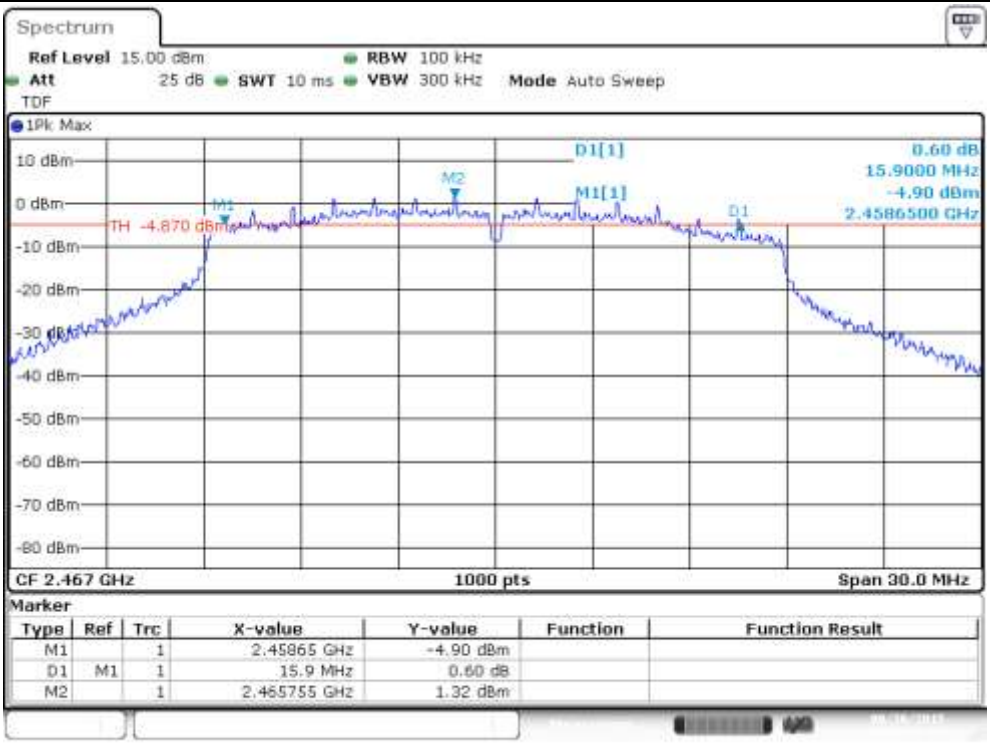
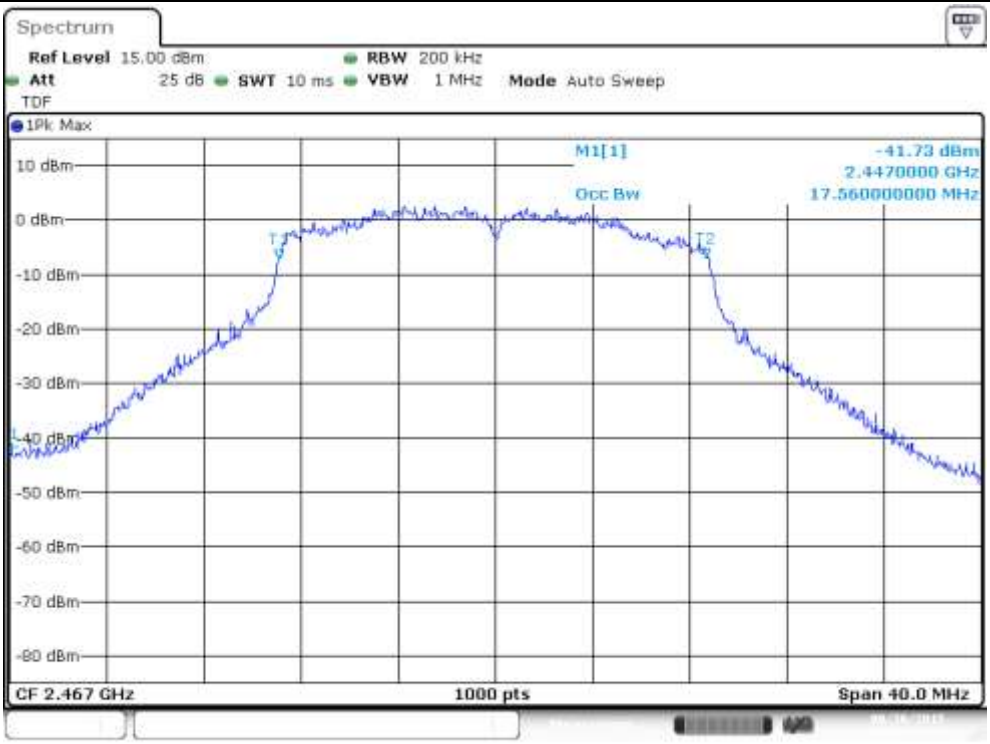
## 6dB BW – CH12




Date: 26.AUG.2015 10:51:09

## 99% BW – CH12




Date: 26.AUG.2015 10:51:52



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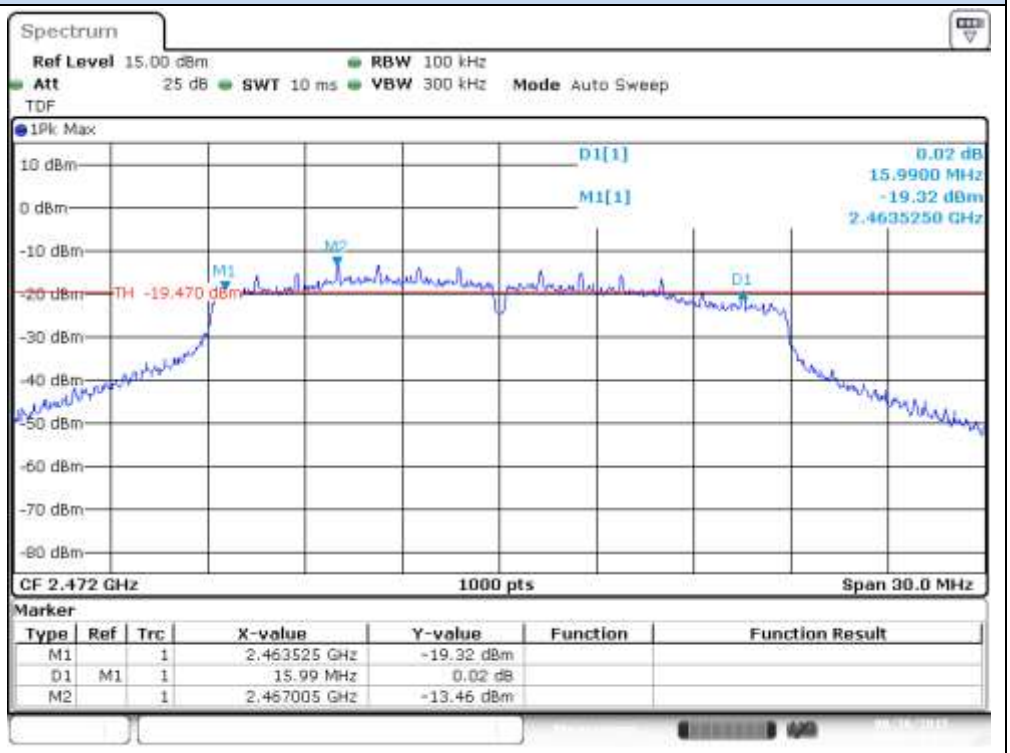
## 6dB BW – CH13




Date: 26.AUG.2015 10:58:02

## 99% BW – CH13

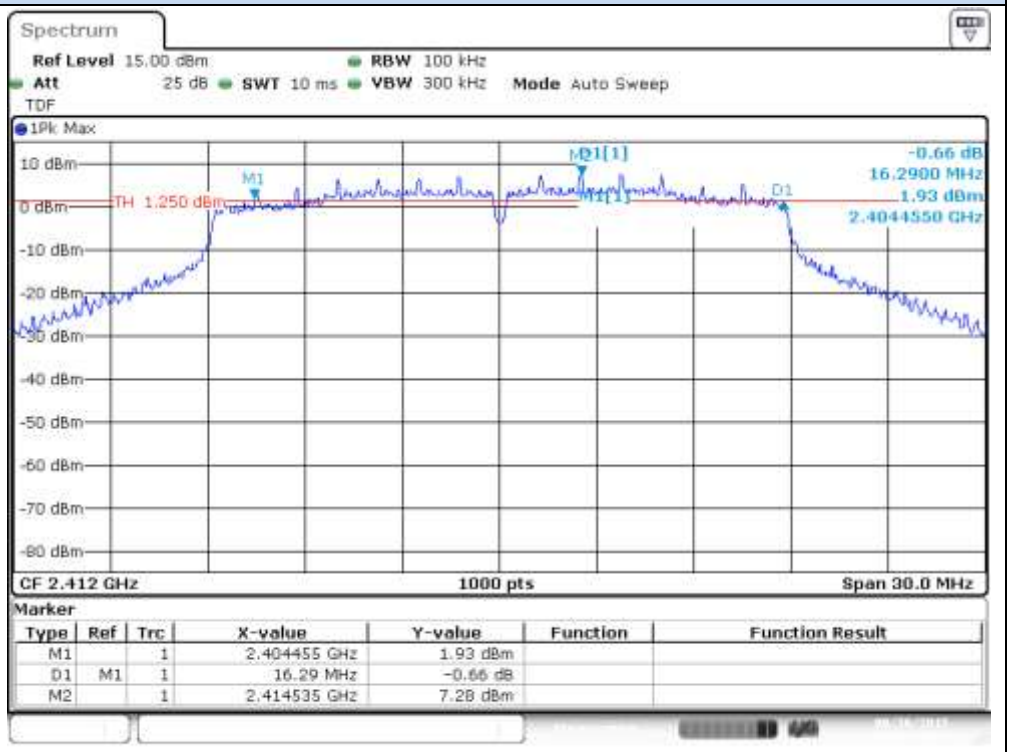
Date: 26.AUG.2015 10:58:37



Printed copies are not controlled documents

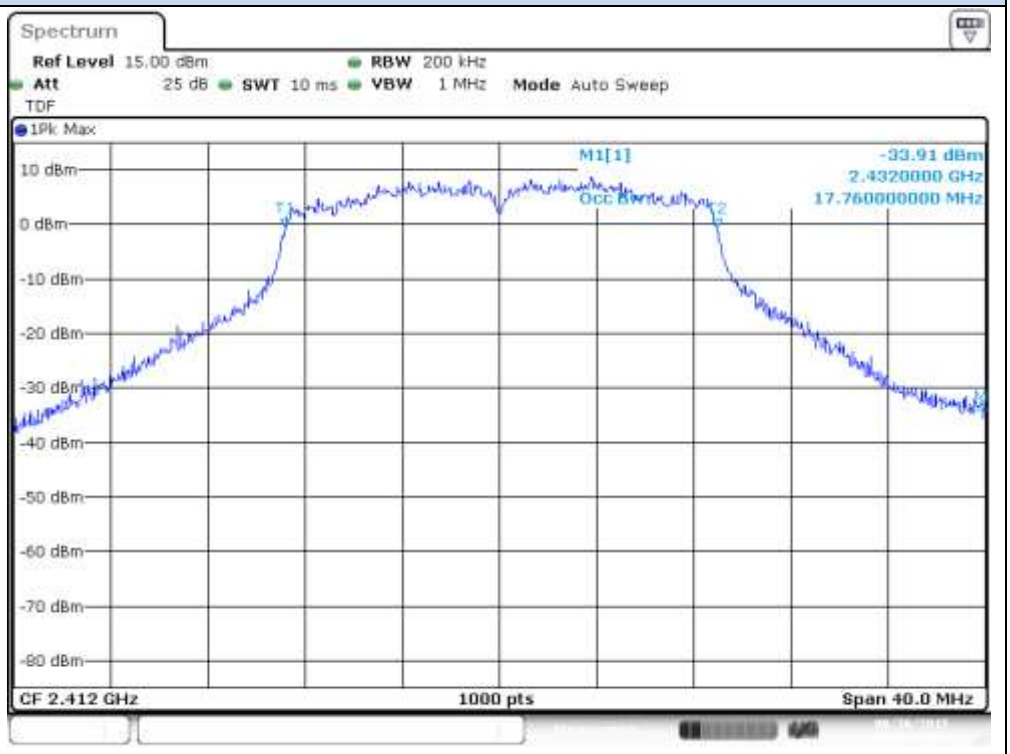
# 802.11n20, HT0 (SISO) – Chain B

## 6dB BW – CH1




Date: 26.AUG.2015 15:30:55

## 99% BW – CH1

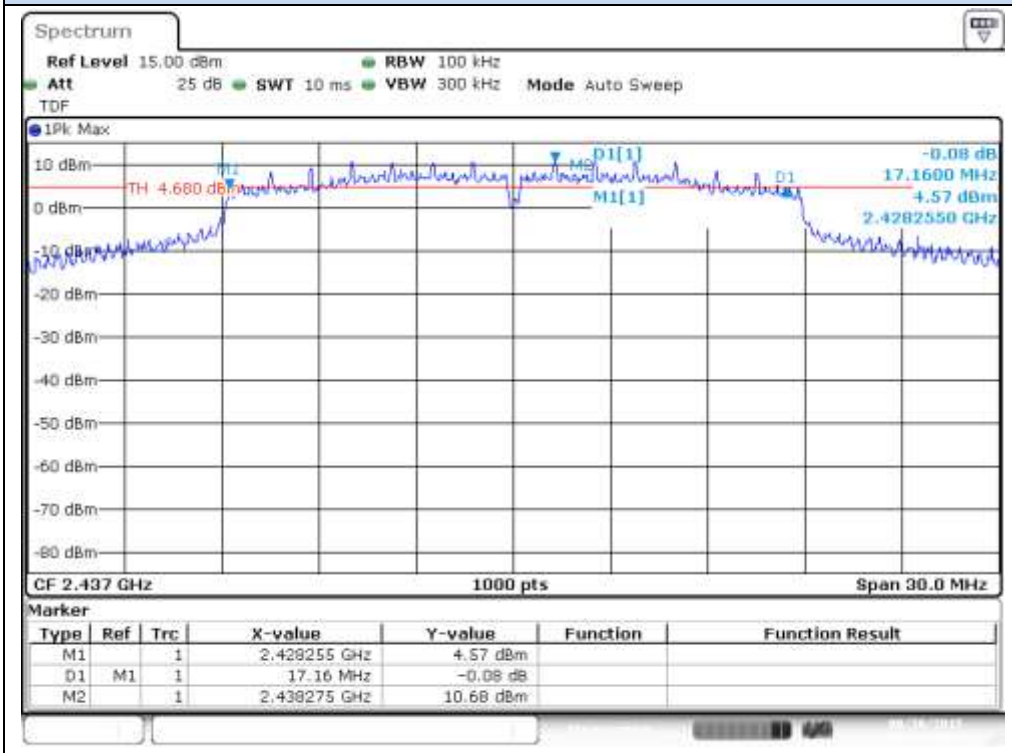



Date: 26.AUG.2015 15:31:23

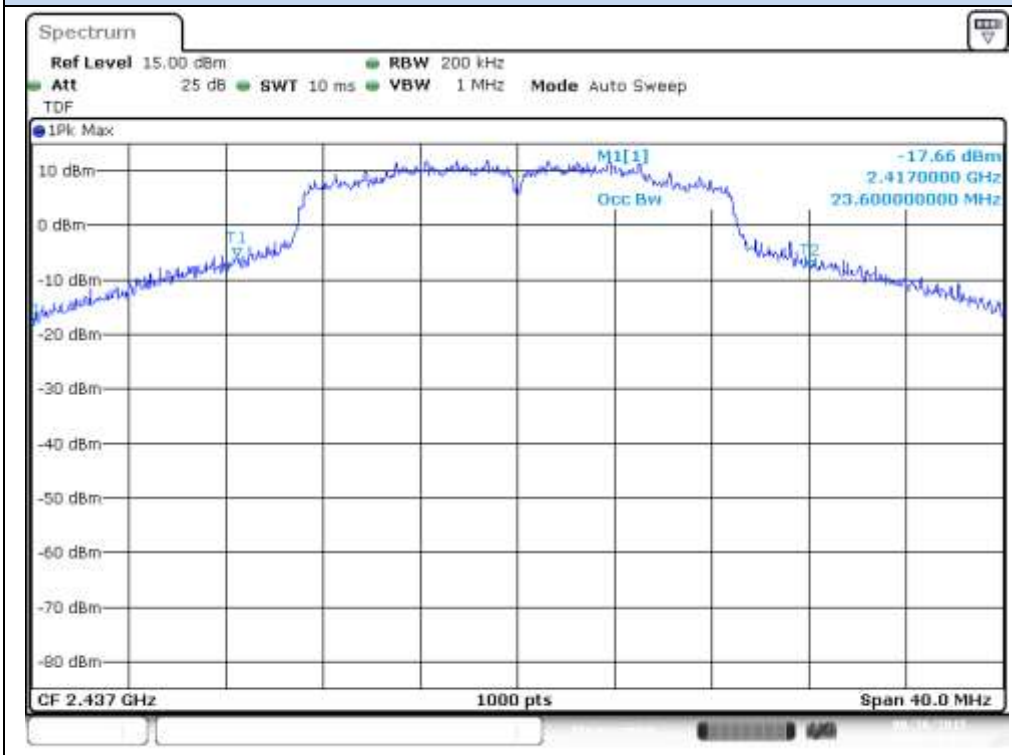


Printed copies are not controlled documents

## 6dB BW – CH6



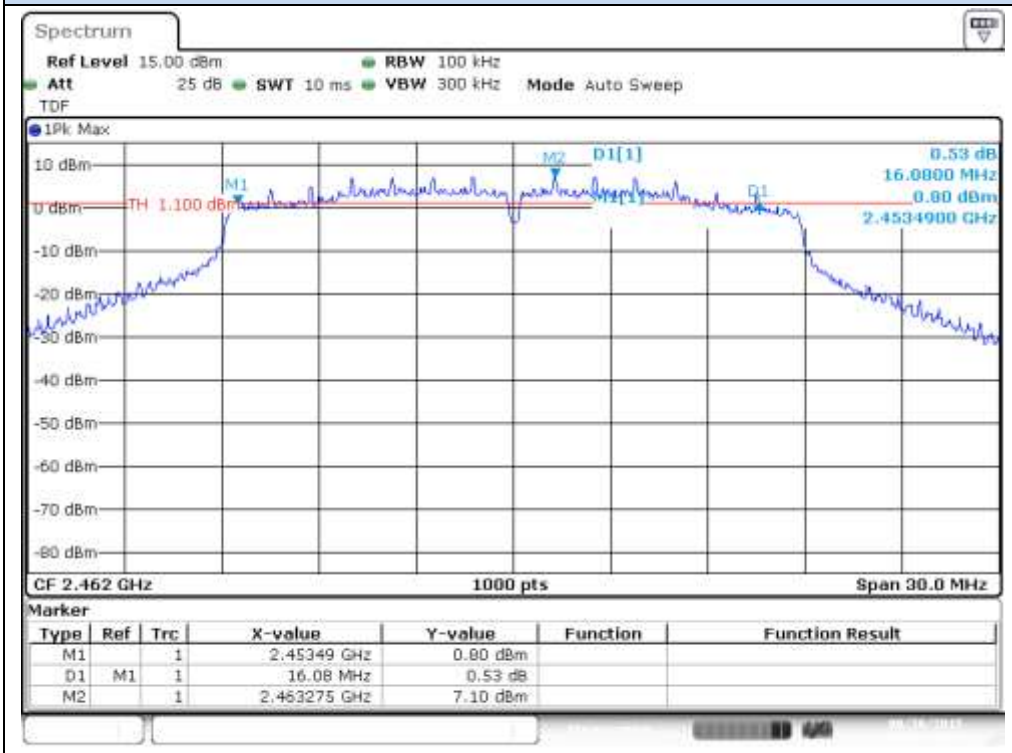

## 99% BW – CH6





Printed copies are not controlled documents

## 6dB BW – CH11




Date: 26.AUG.2015 15:48:04

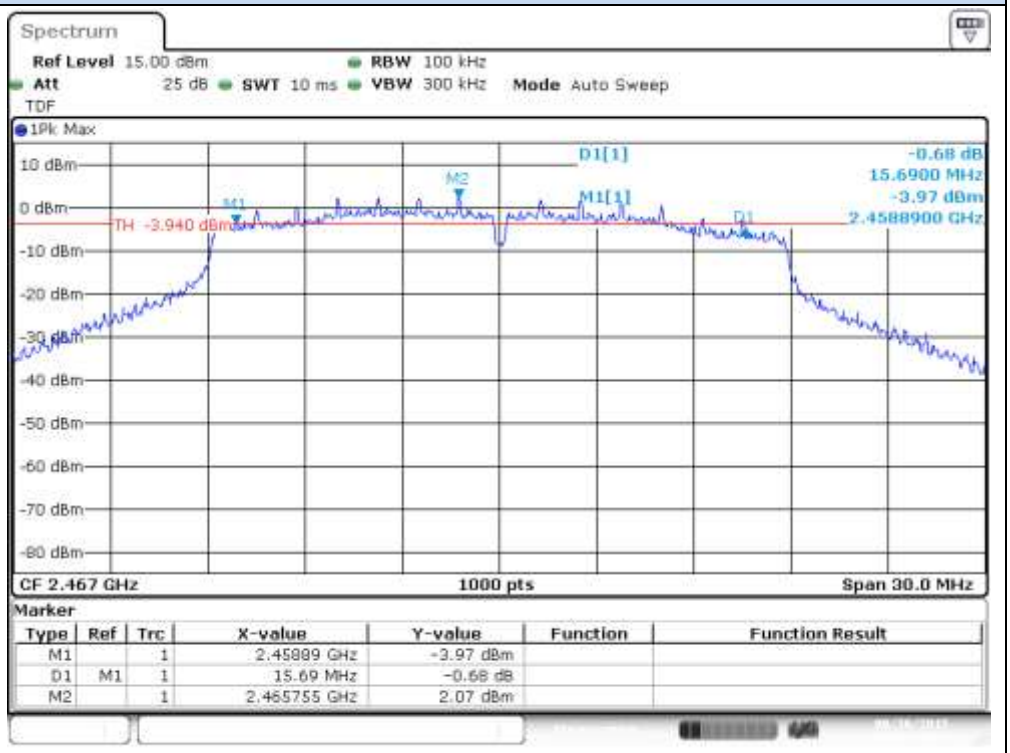
## 99% BW – CH11

Date: 26.AUG.2015 15:57:06



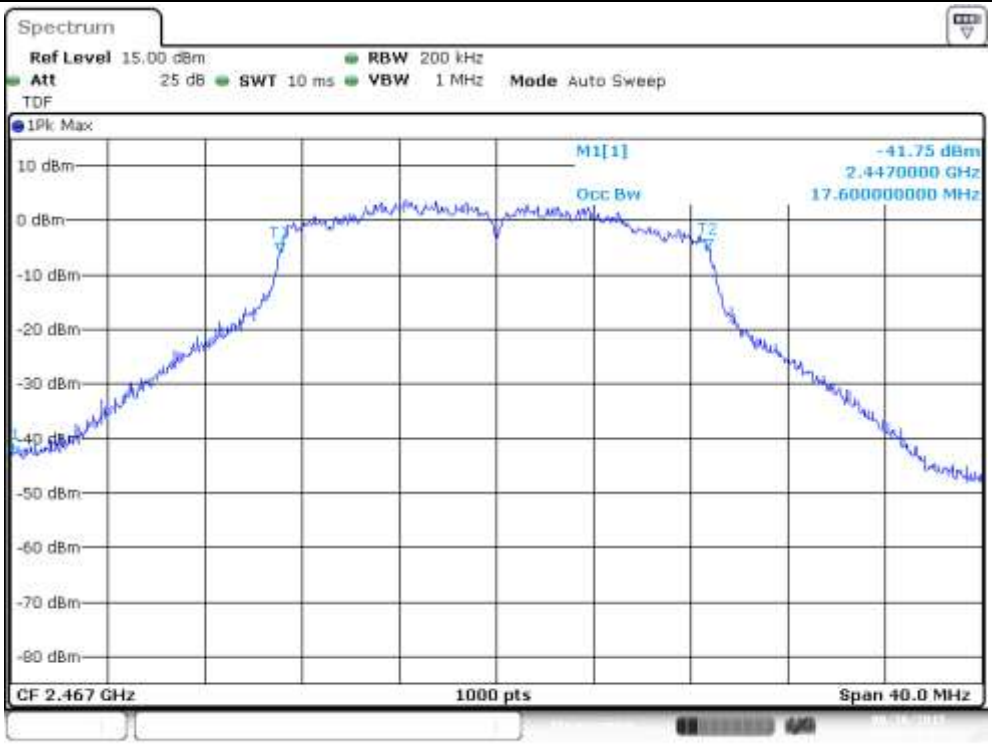
Printed copies are not controlled documents

## 6dB BW – CH12




Date: 26.AUG.2015 16:06:33

## 99% BW – CH12

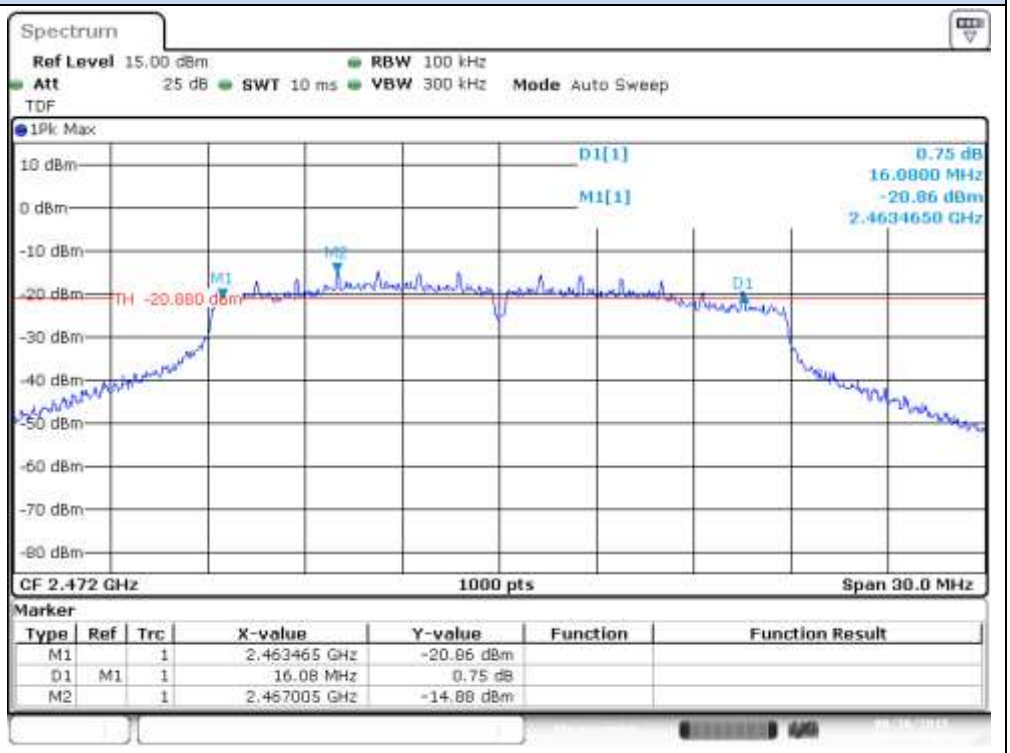



Date: 26.AUG.2015 16:07:20



Printed copies are not controlled documents

## 6dB BW – CH13

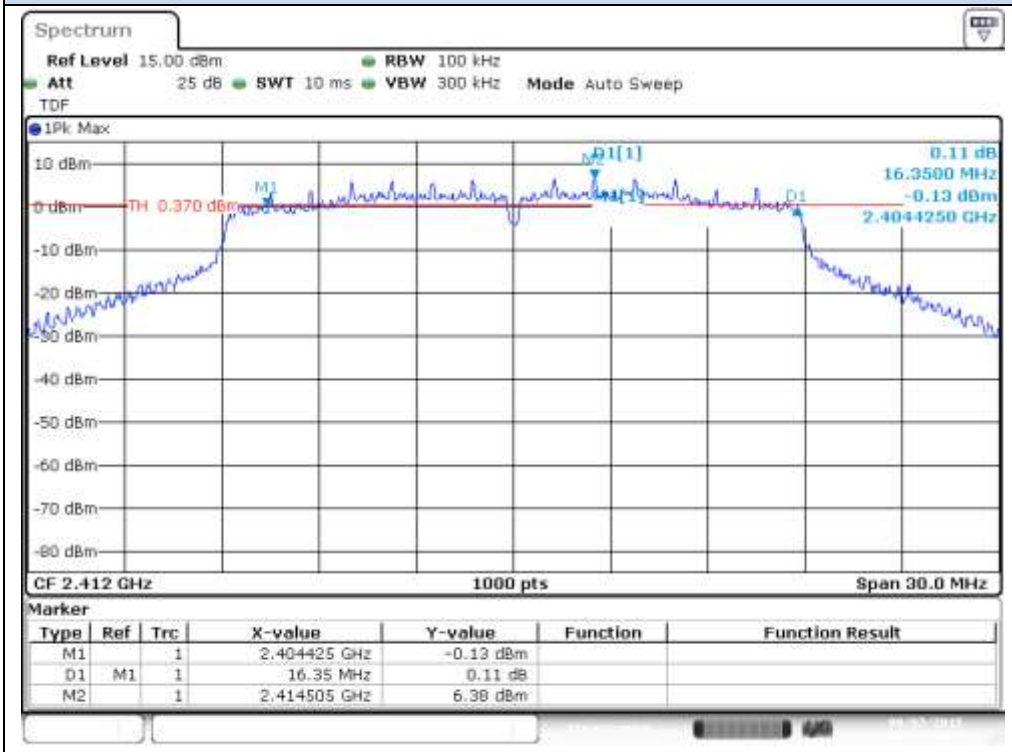



## 99% BW – CH13

Printed copies are not controlled documents

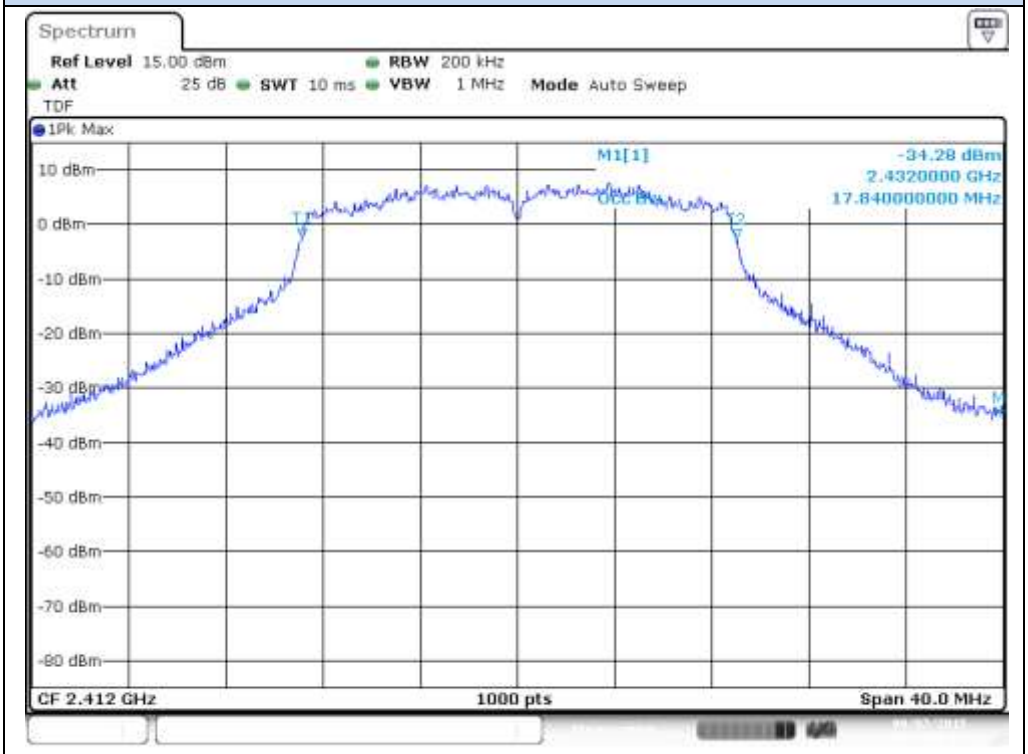
# 802.11n20, HT8 (MIMO) – Chain A

## 6dB BW – CH1




Date: 7.SEP.2015 14:13:22

## 99% BW – CH1




Date: 7.SEP.2015 14:14:06



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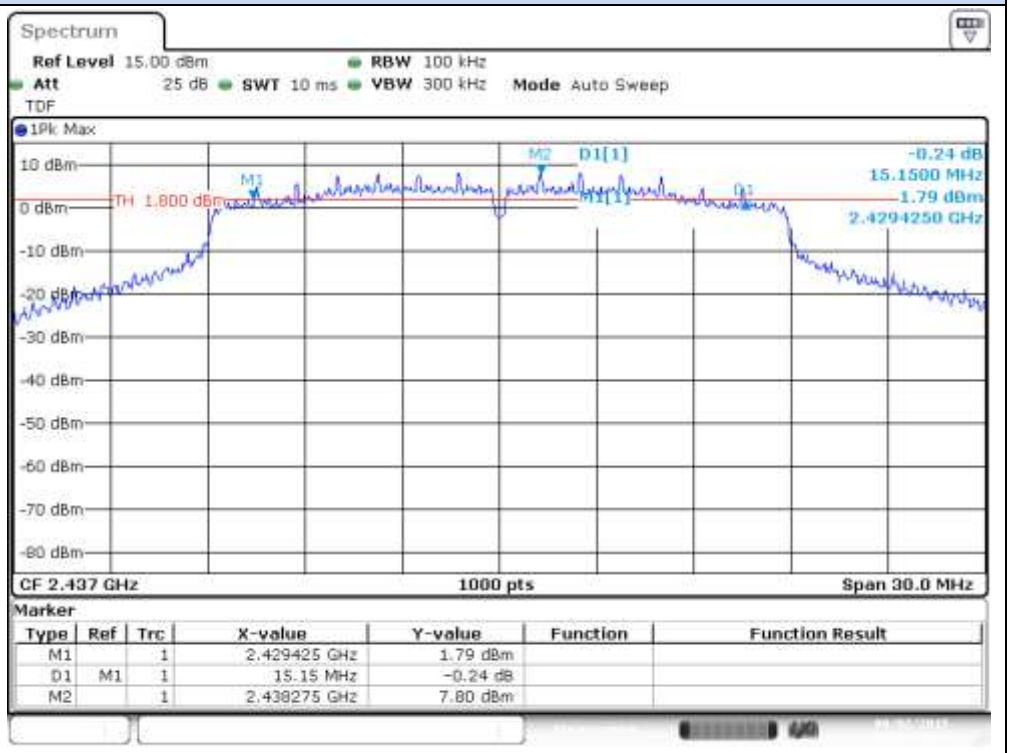
## 6dB BW – CH6




Date: 2 SEP.2015 16:42:33

## 99% BW – CH6

Date: 2 SEP.2015 16:43:45



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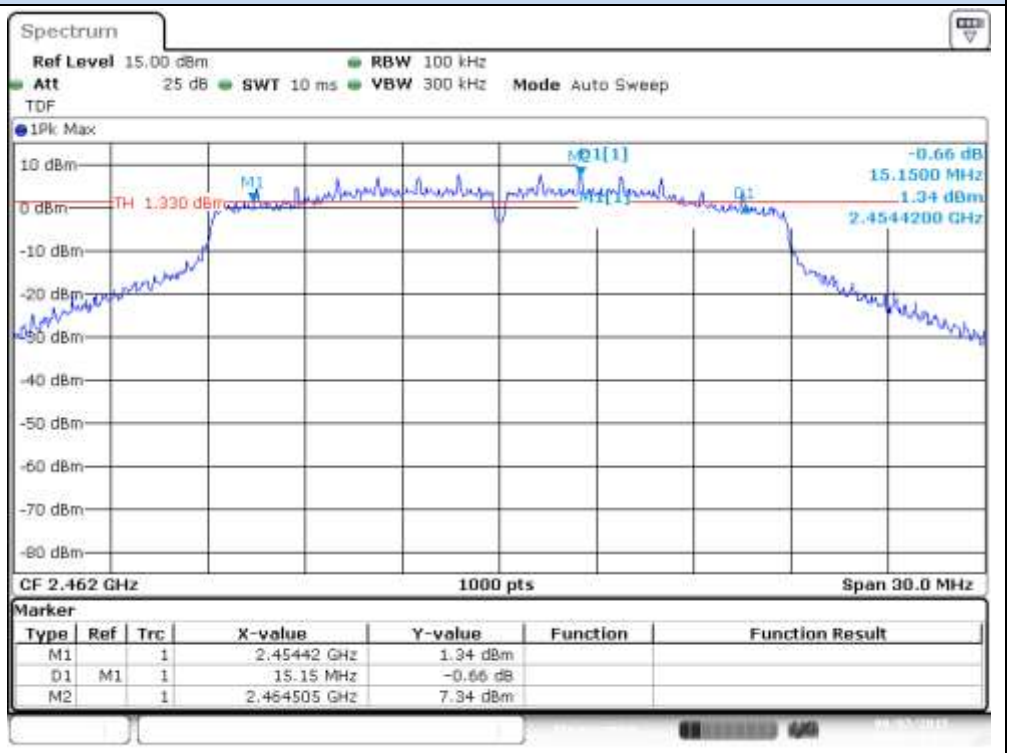
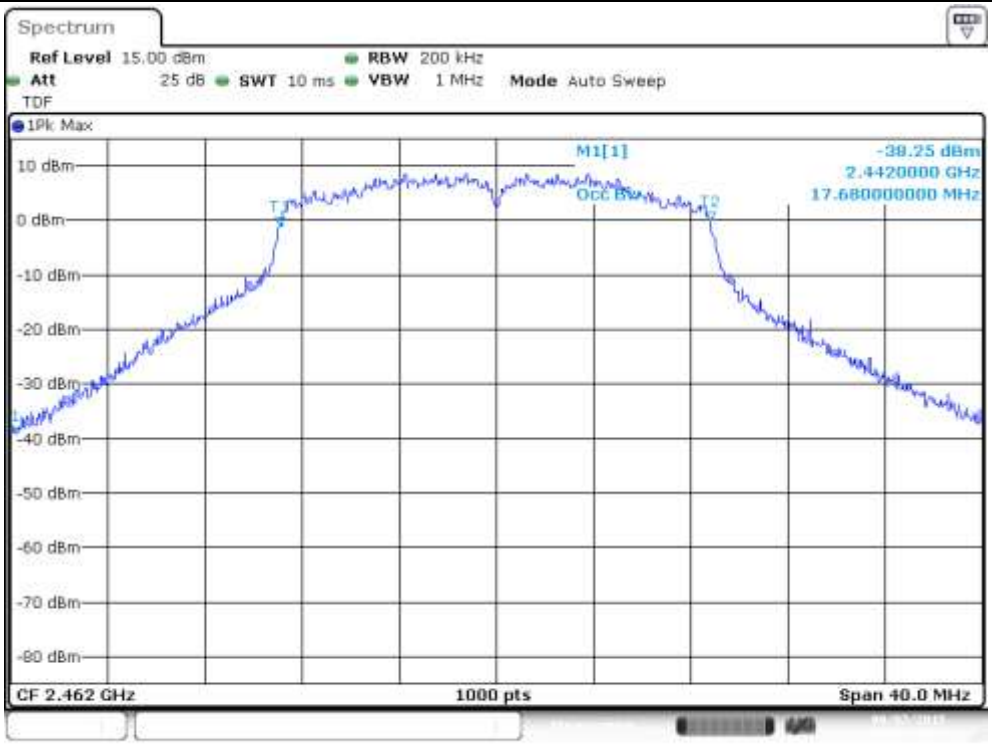
## 6dB BW – CH11




Date: 7.SEP.2015 14:21:06

## 99% BW – CH11

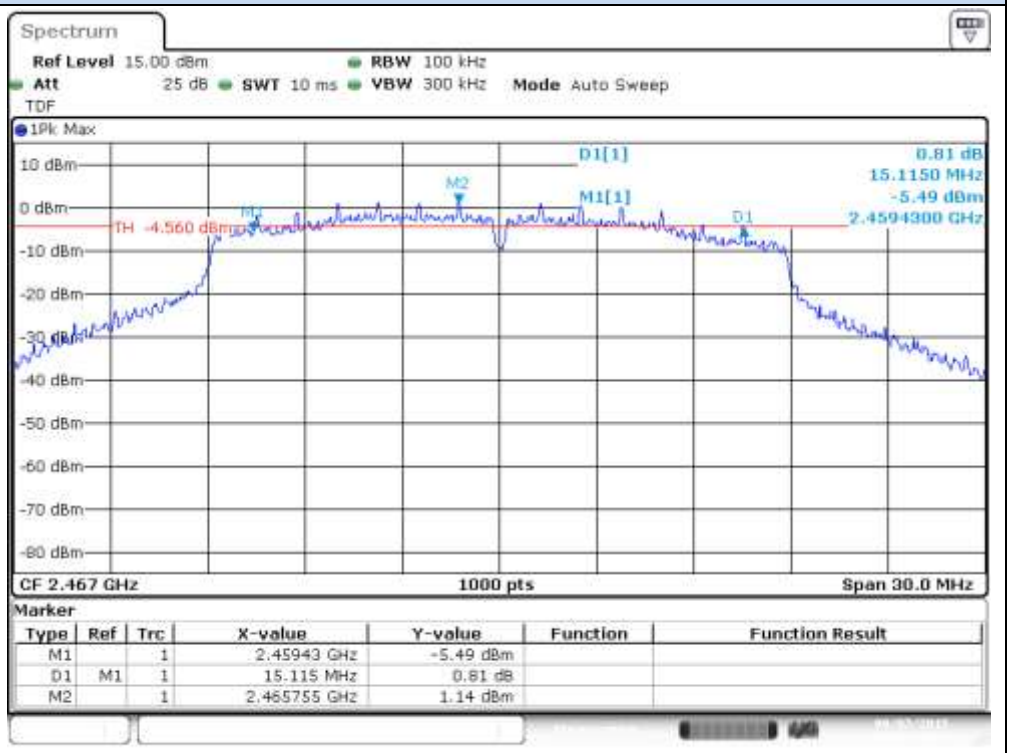



Date: 7.SEP.2015 14:21:47



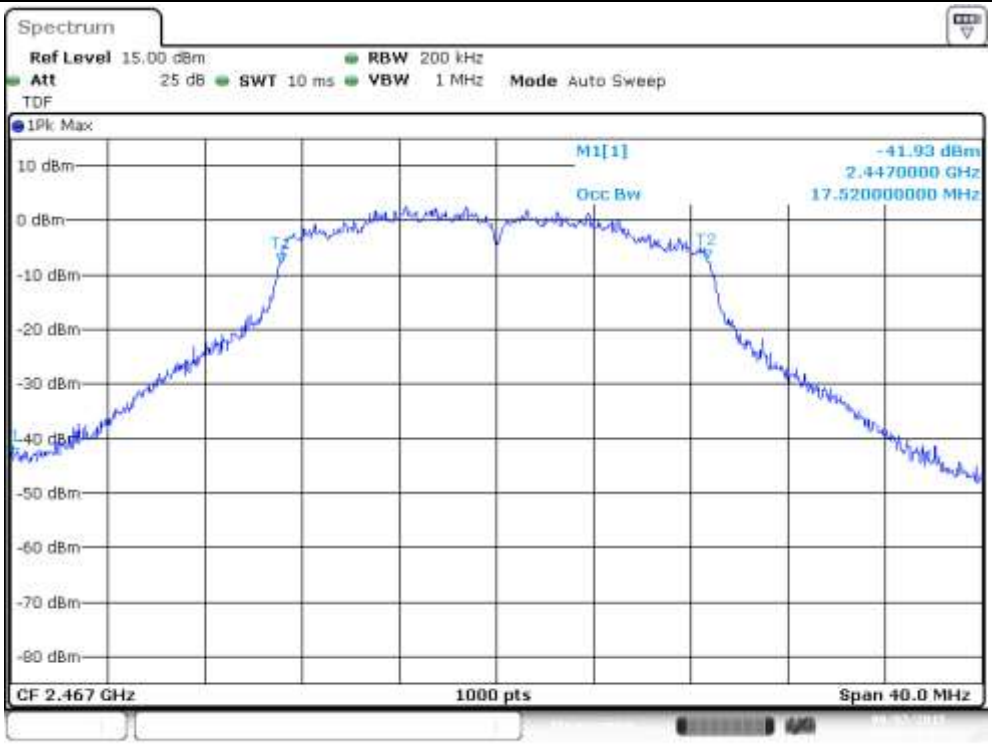
Printed copies are not controlled documents

## 6dB BW – CH12




Date: 7.SEP.2015 14:28:54

## 99% BW – CH12




Date: 7.SEP.2015 14:29:40



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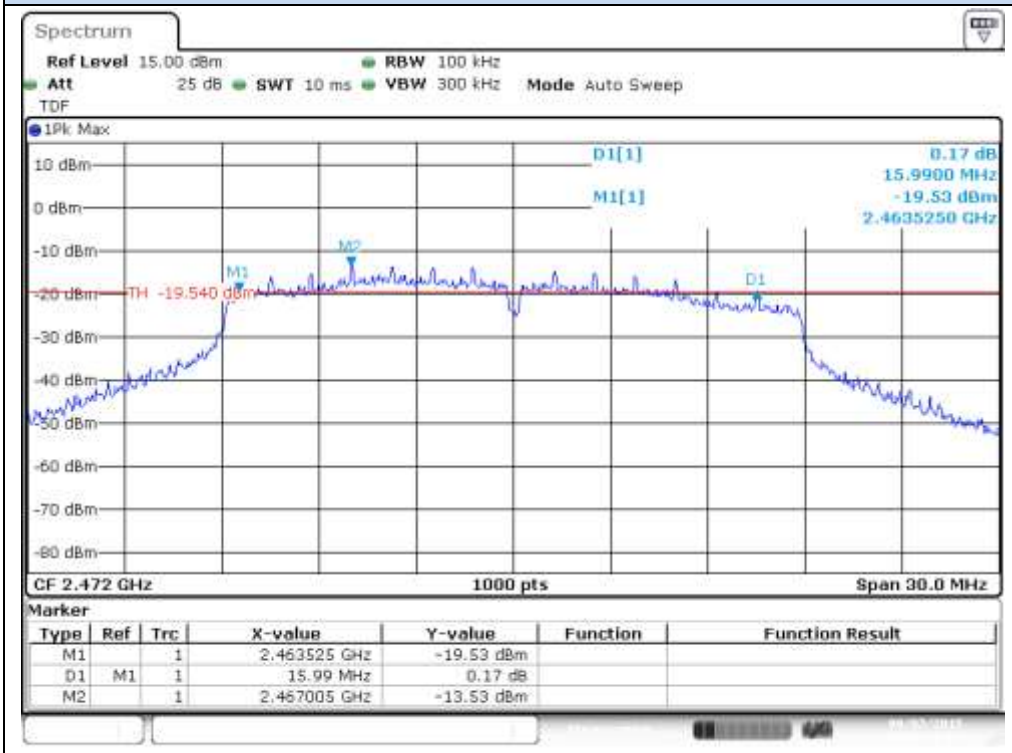
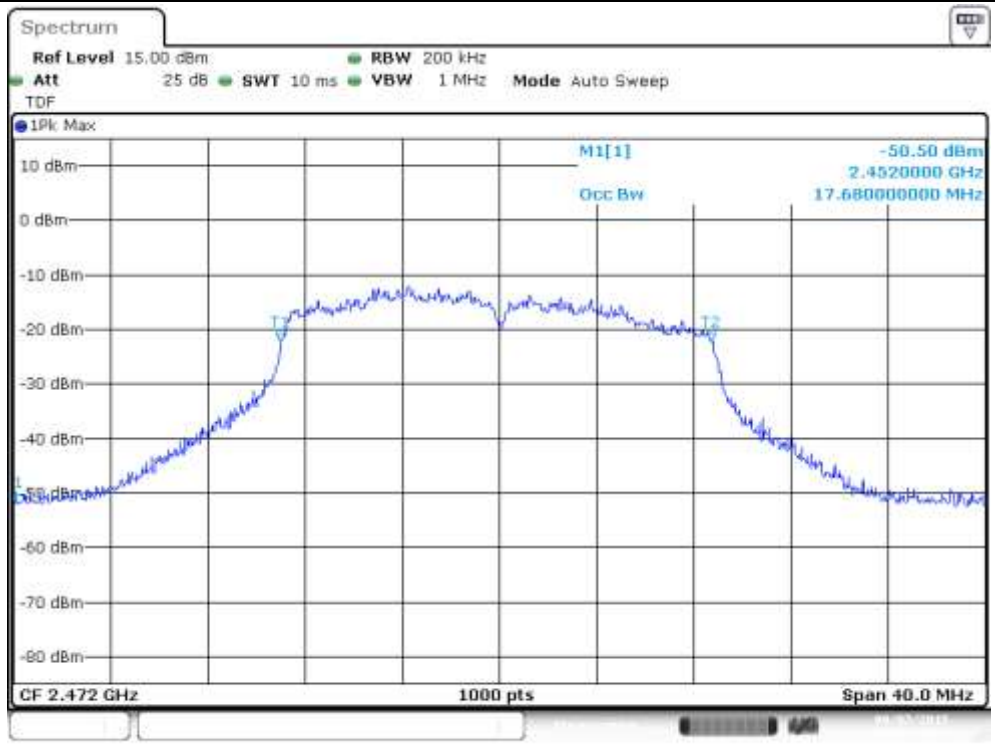
## 6dB BW – CH13




Date: 7.SEP.2015 14:35:11

## 99% BW – CH13




Date: 7.SEP.2015 14:35:44



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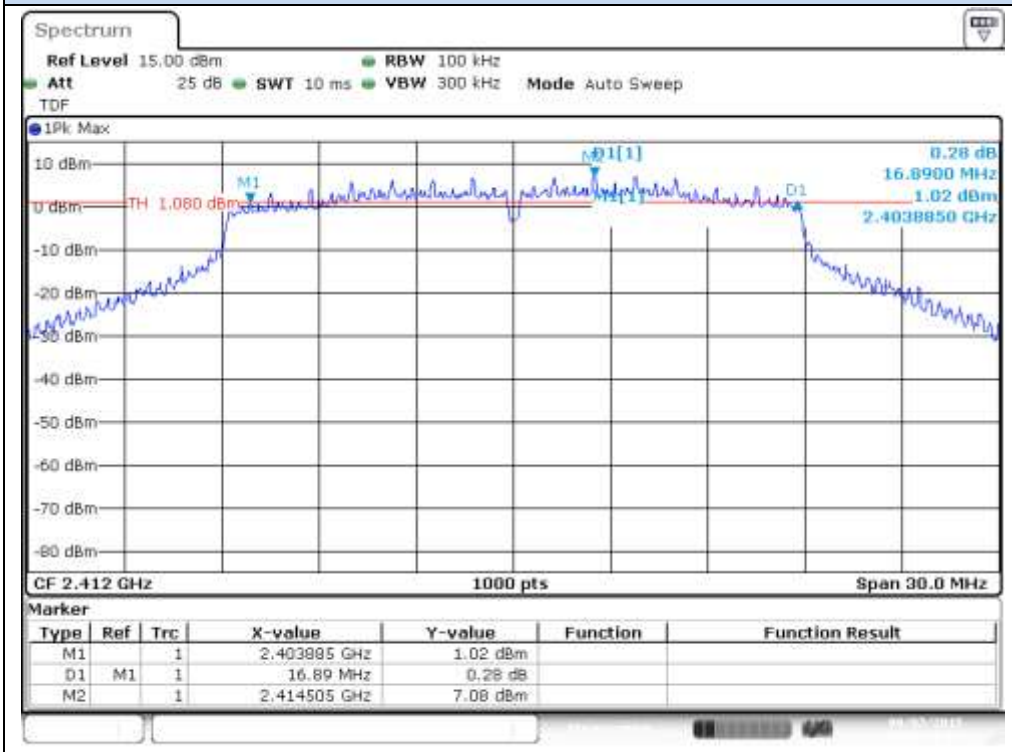
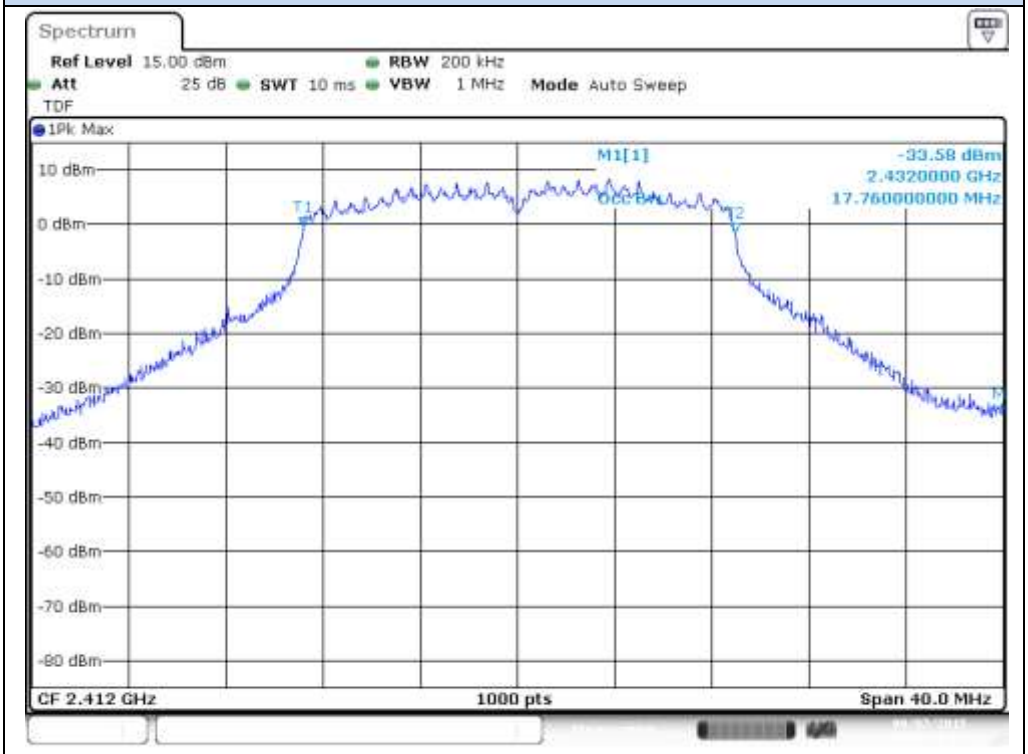
# 802.11n20, HT8 (MIMO) – Chain B

## 6dB BW – CH1




Date: 7.SEP.2015 16:21:48

## 99% BW – CH1

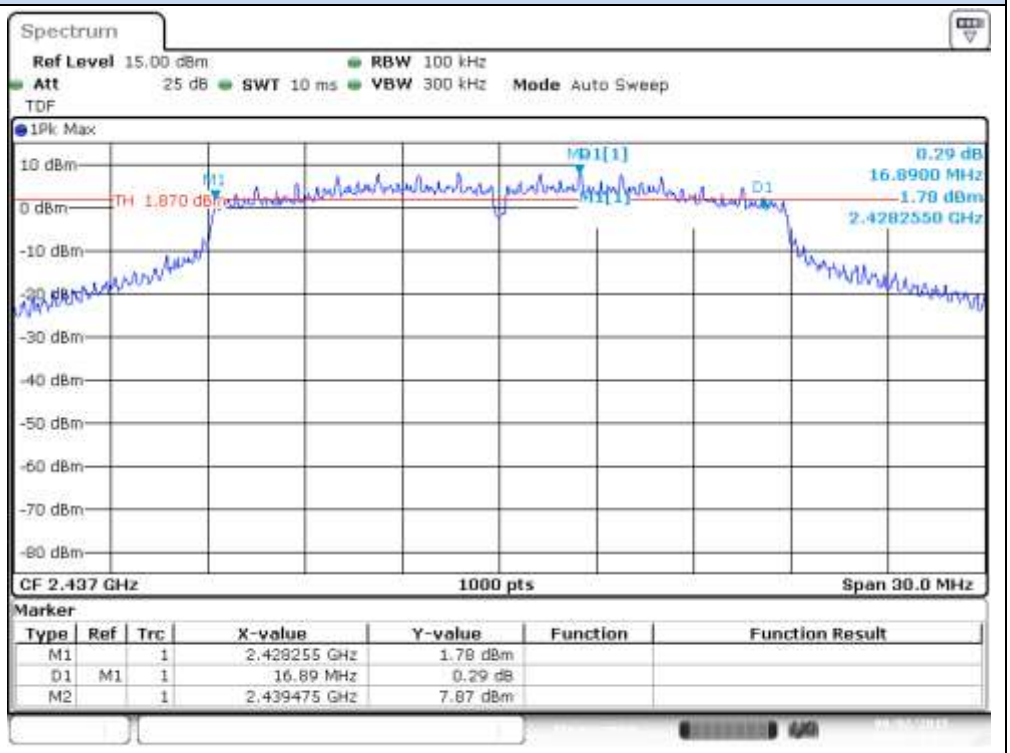



Date: 7.SEP.2015 16:22:31

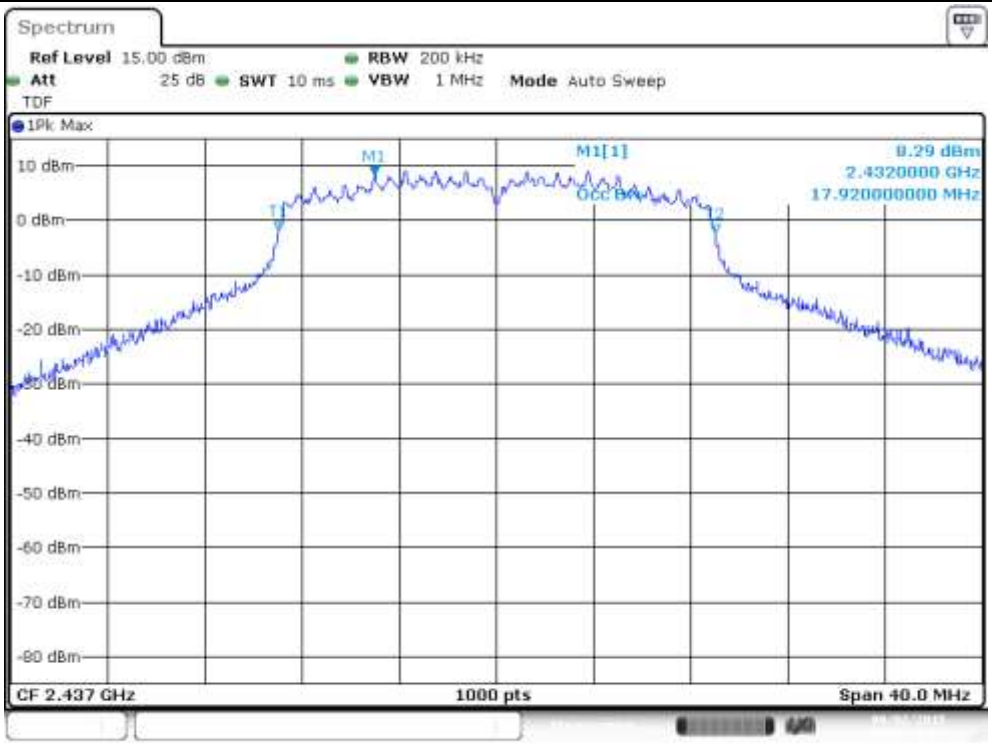


Printed copies are not controlled documents

## 6dB BW – CH6



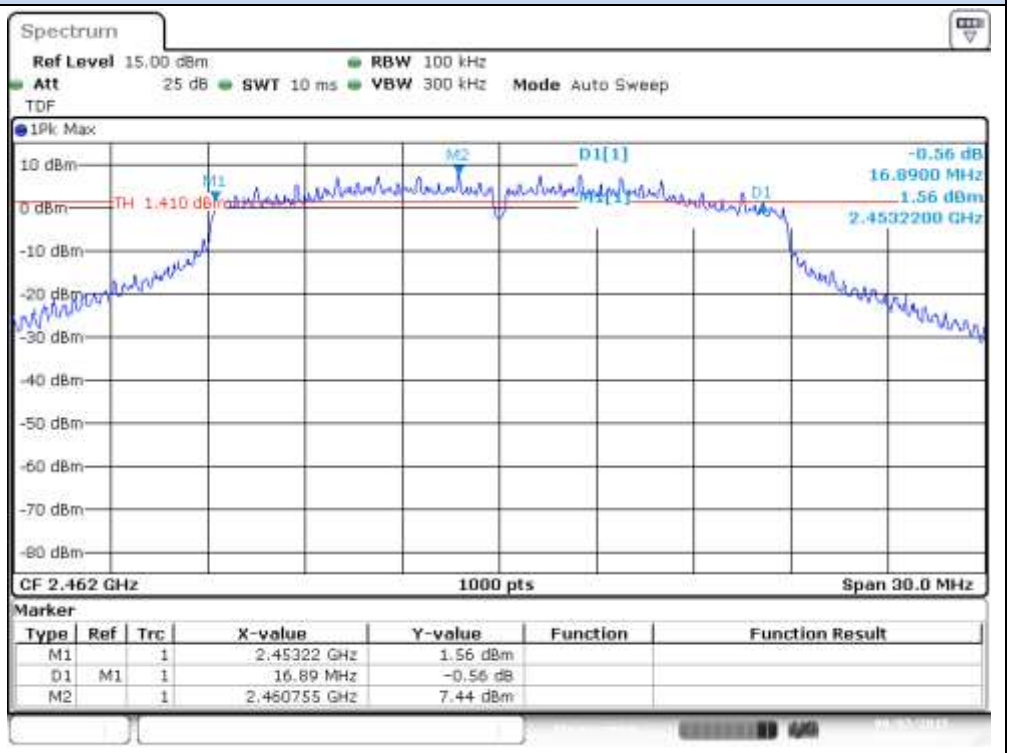

## 99% BW – CH6



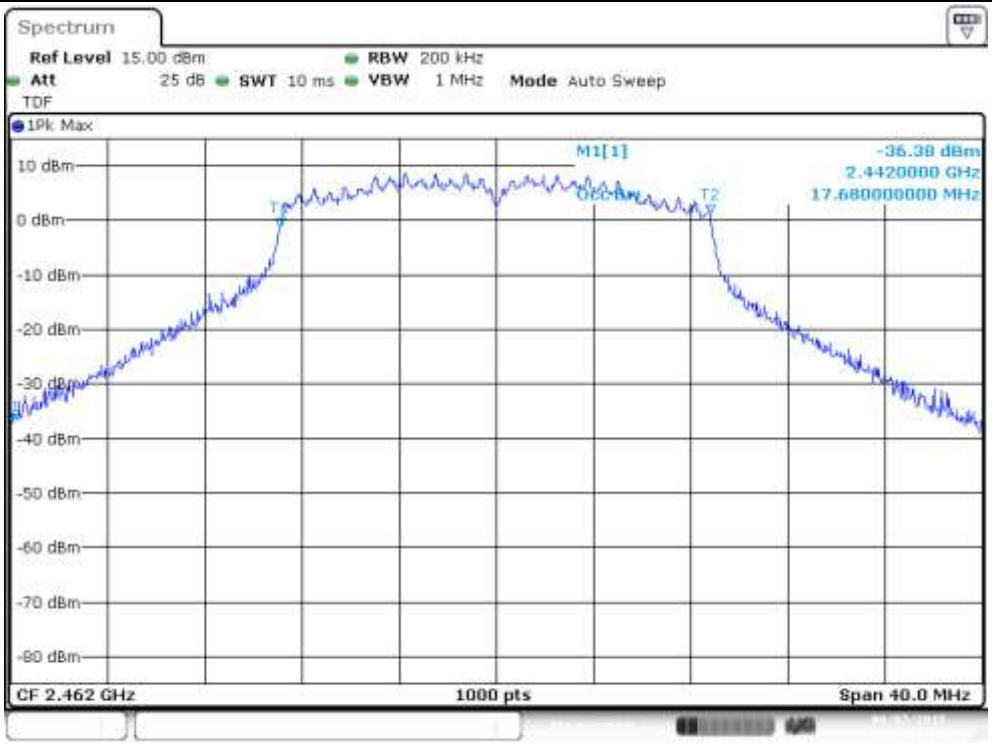


Printed copies are not controlled documents

## 6dB BW – CH11



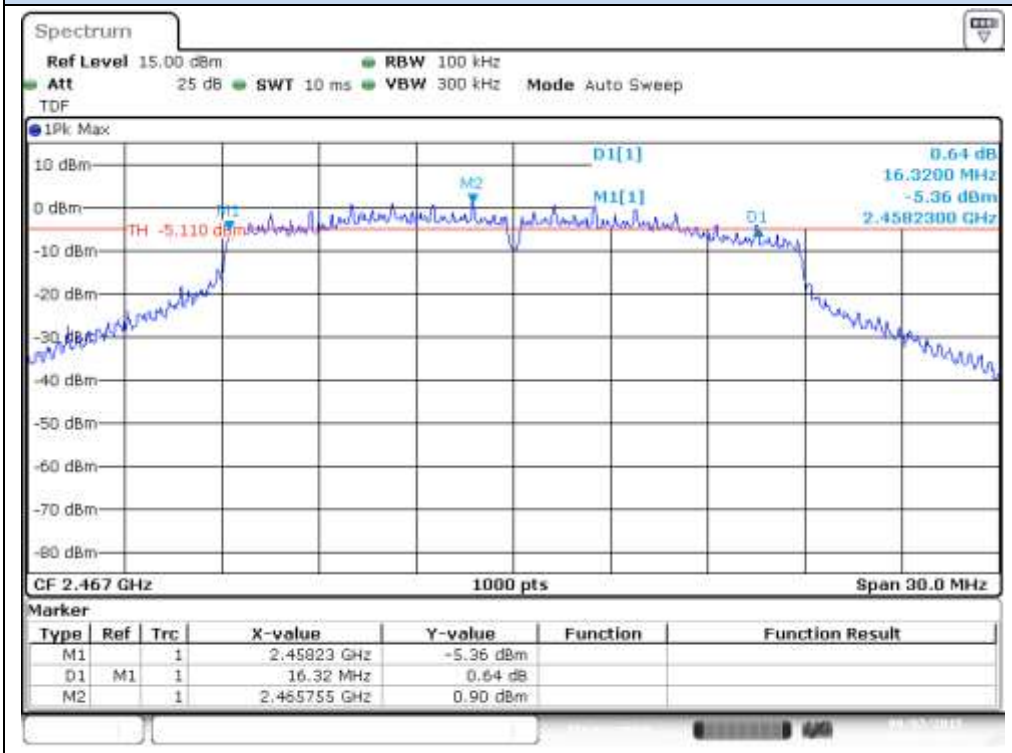

## 99% BW – CH11





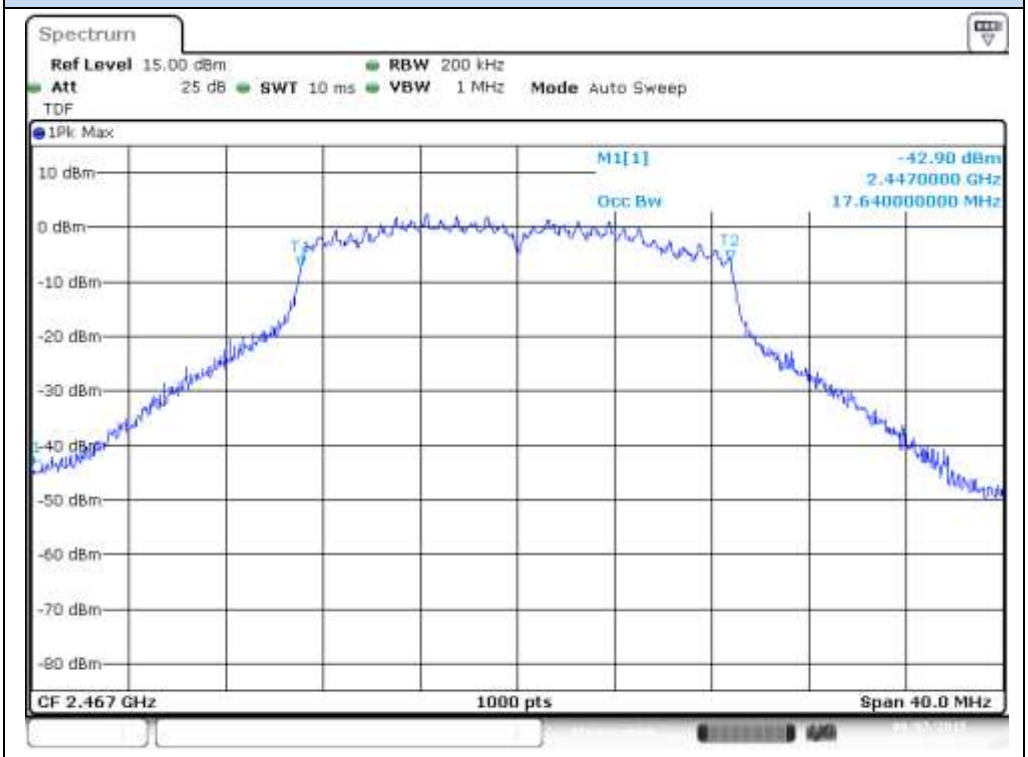
Printed copies are not controlled documents

## 6dB BW – CH12




Date: 7.SEP.2015 16:36:34

## 99% BW – CH12




Date: 7.SEP.2015 16:36:54



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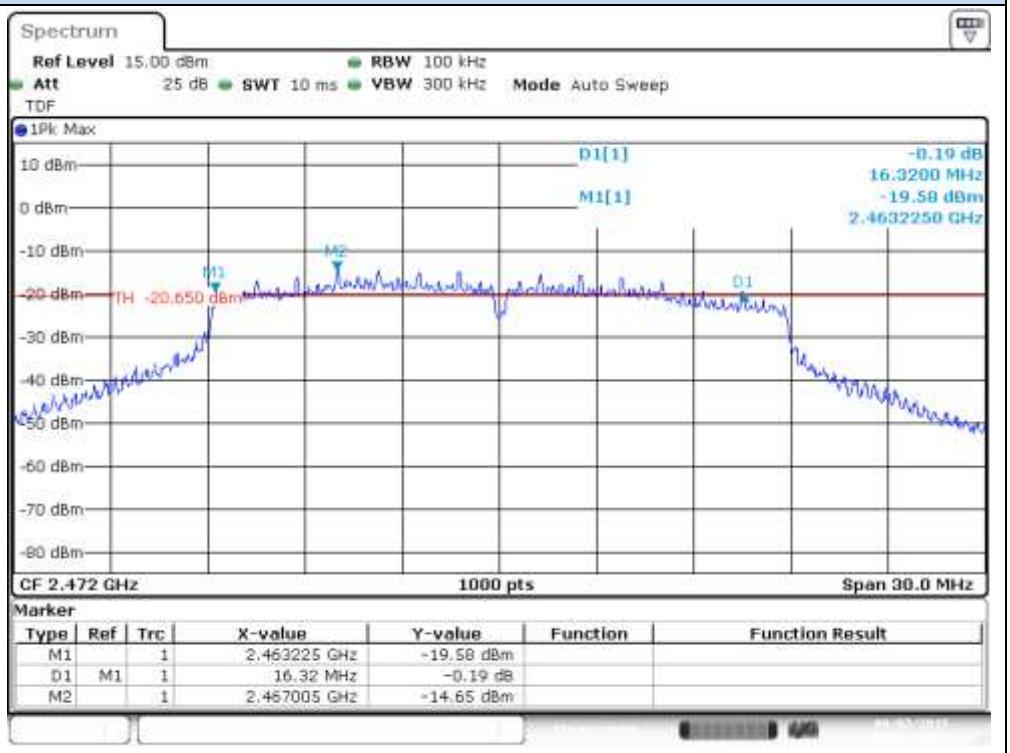
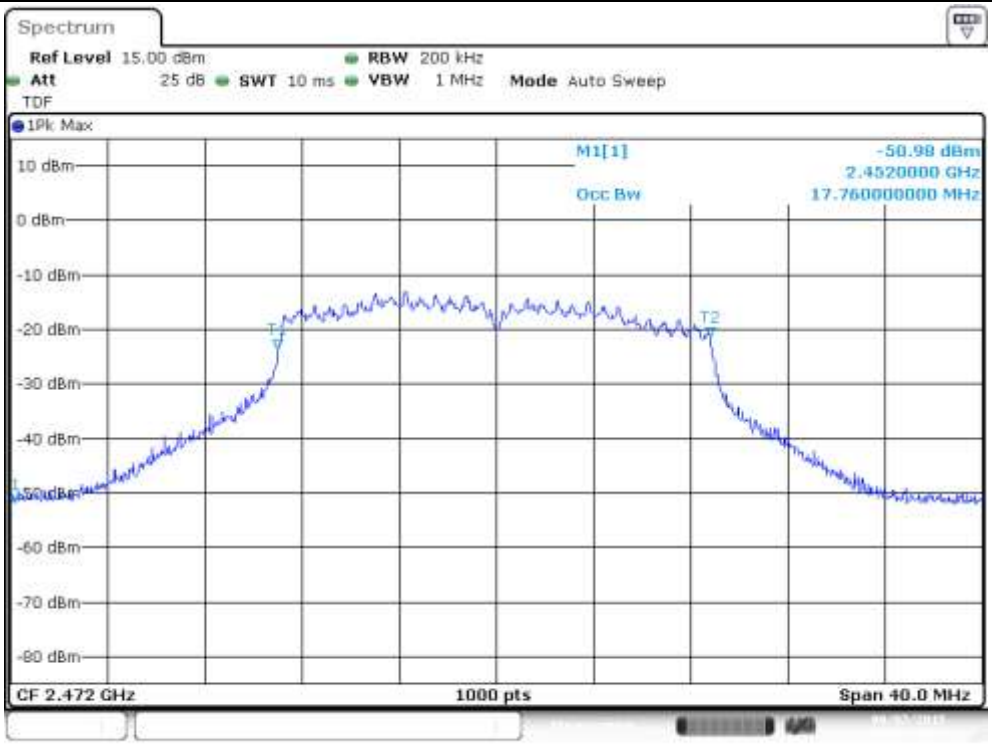
## 6dB BW – CH13




Date: 7.SEP.2015 16:41:54

## 99% BW – CH13




Date: 7.SEP.2015 16:42:27



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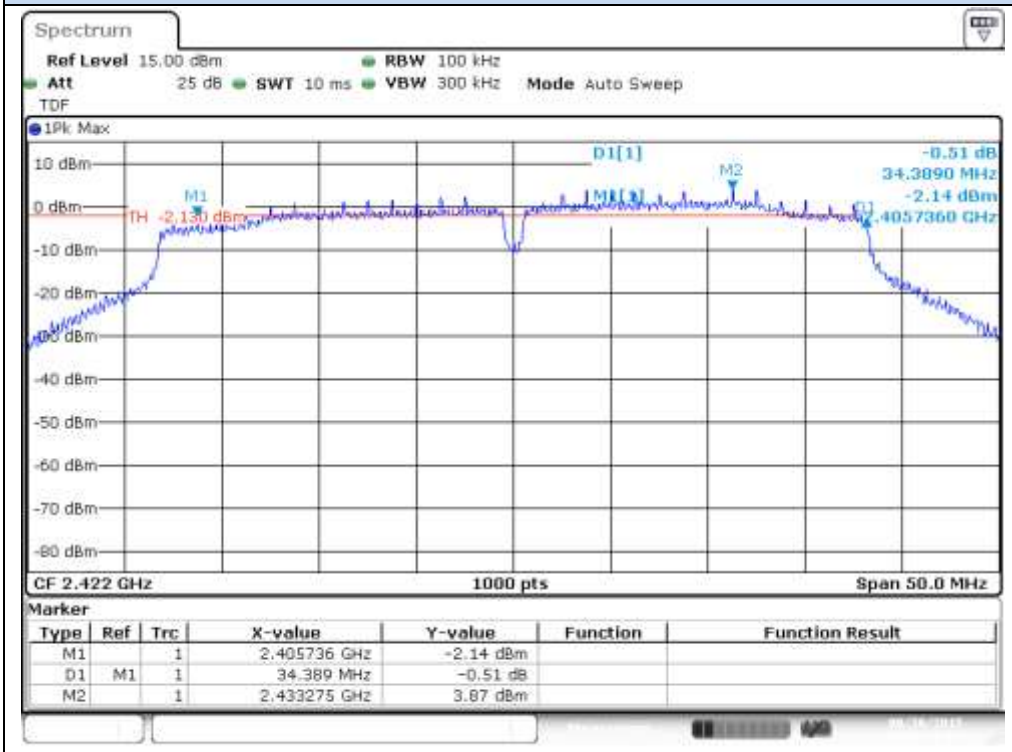
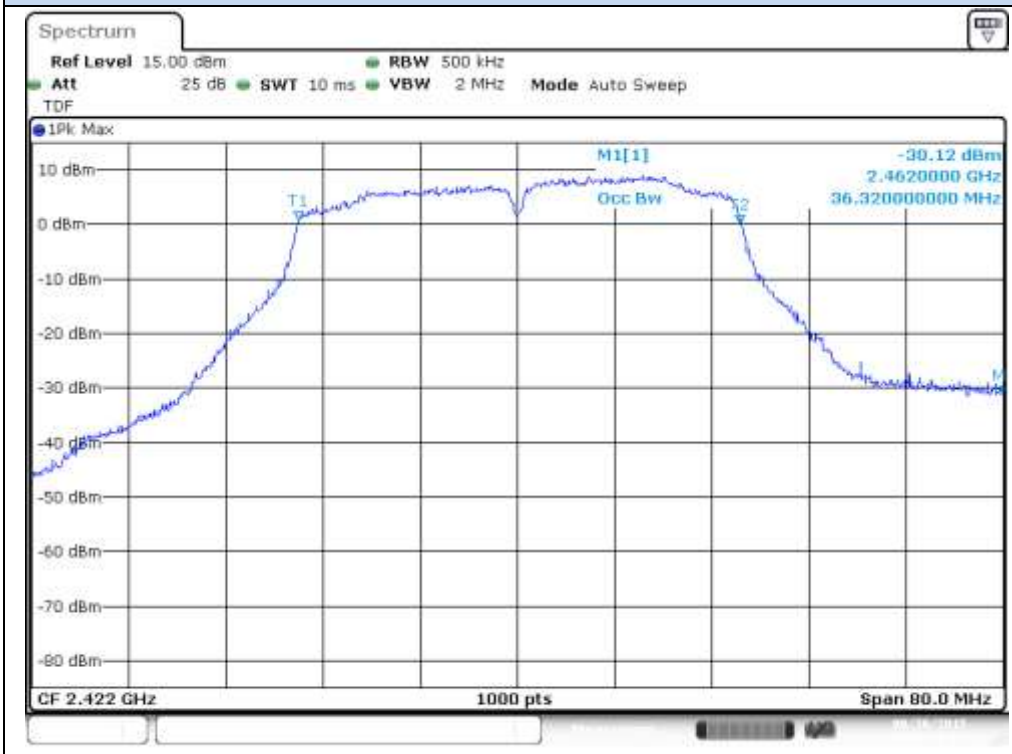
# 802.11n40, HT0 (SISO) – Chain A

## 6dB BW – CH3F



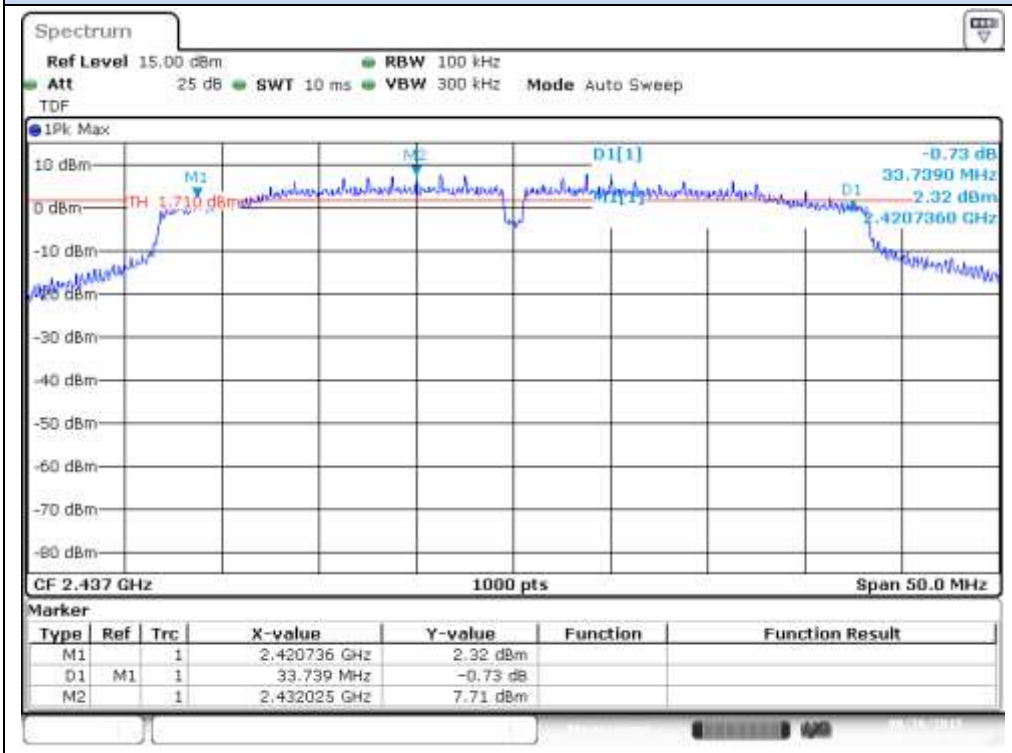

## 99% BW – CH3F






Printed copies are not controlled documents

## 6dB BW – CH6F




Date: 26.AUG.2015 11:17:37

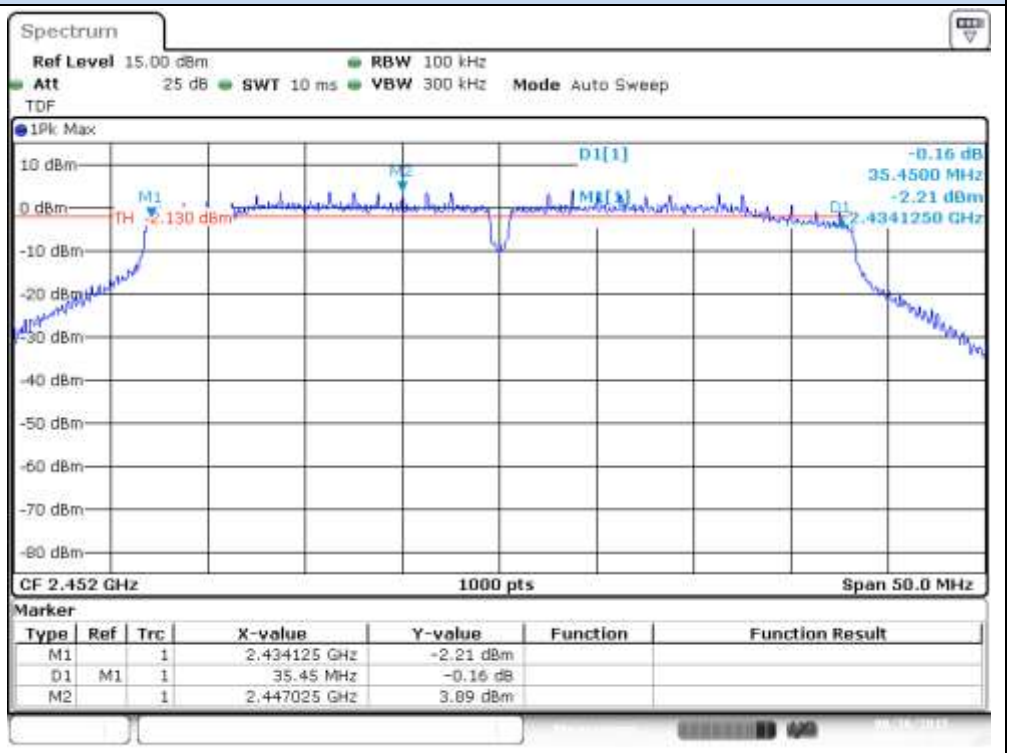
## 99% BW – CH6F

Date: 26.AUG.2015 11:19:17



Printed copies are not controlled documents

## 6dB BW – CH9F




## 99% BW – CH9F

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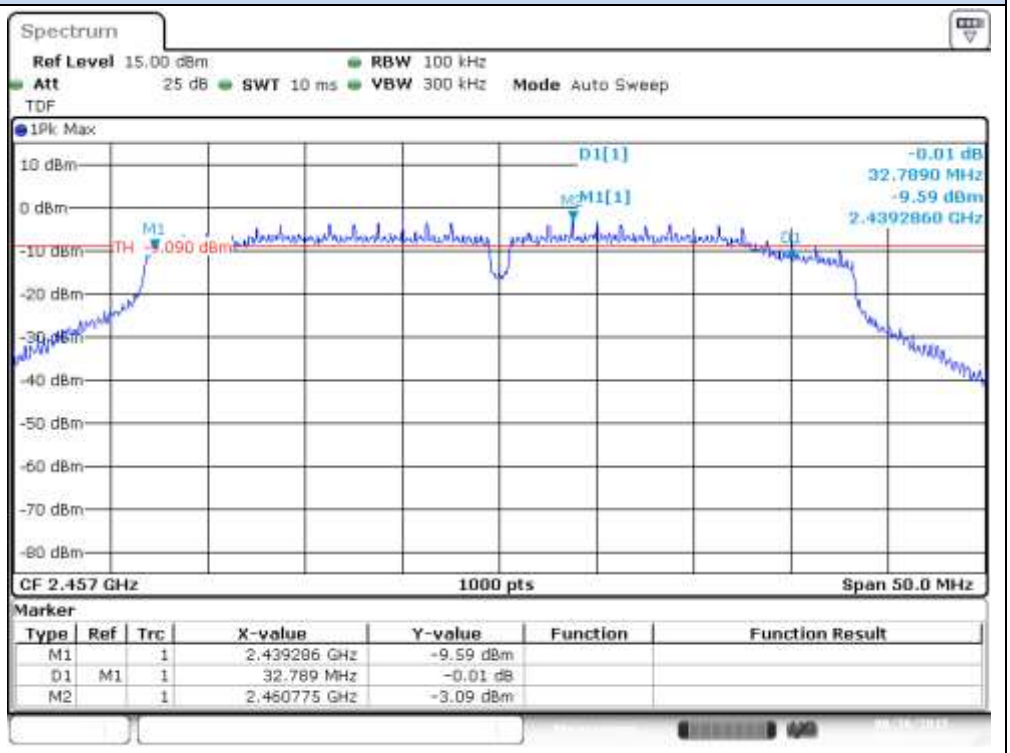
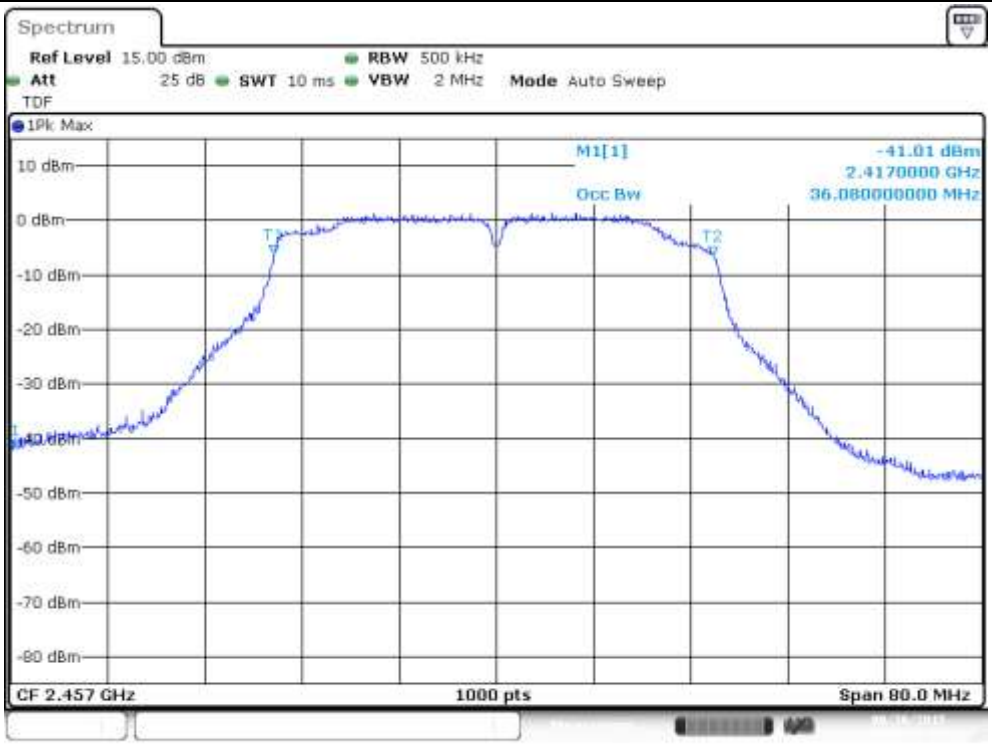
## 6dB BW – CH10F



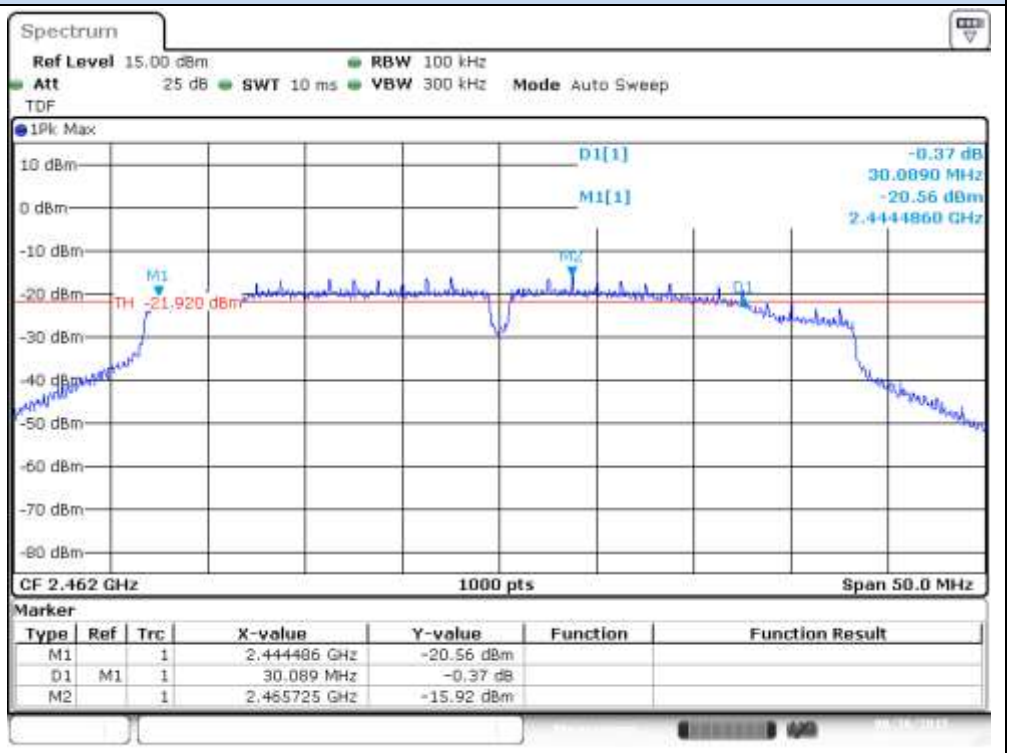

## 99% BW – CH10F





Printed copies are not controlled documents

## 6dB BW – CH11F




Date: 26.AUG.2015 11:41:16

## 99% BW – CH11F

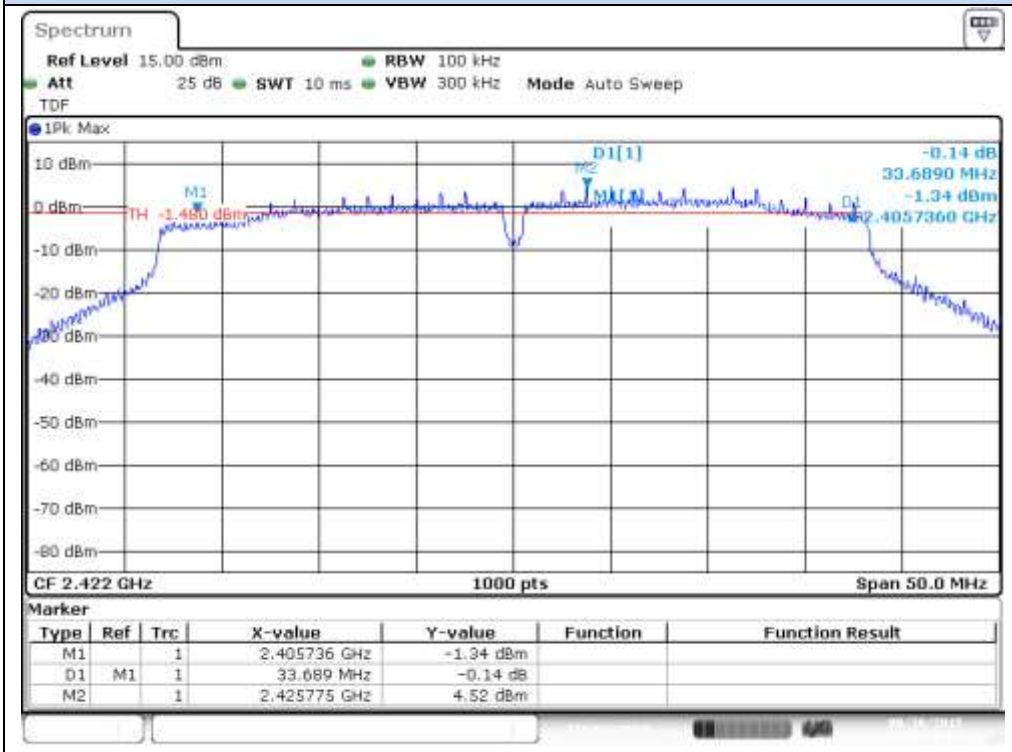
Date: 26.AUG.2015 11:42:11



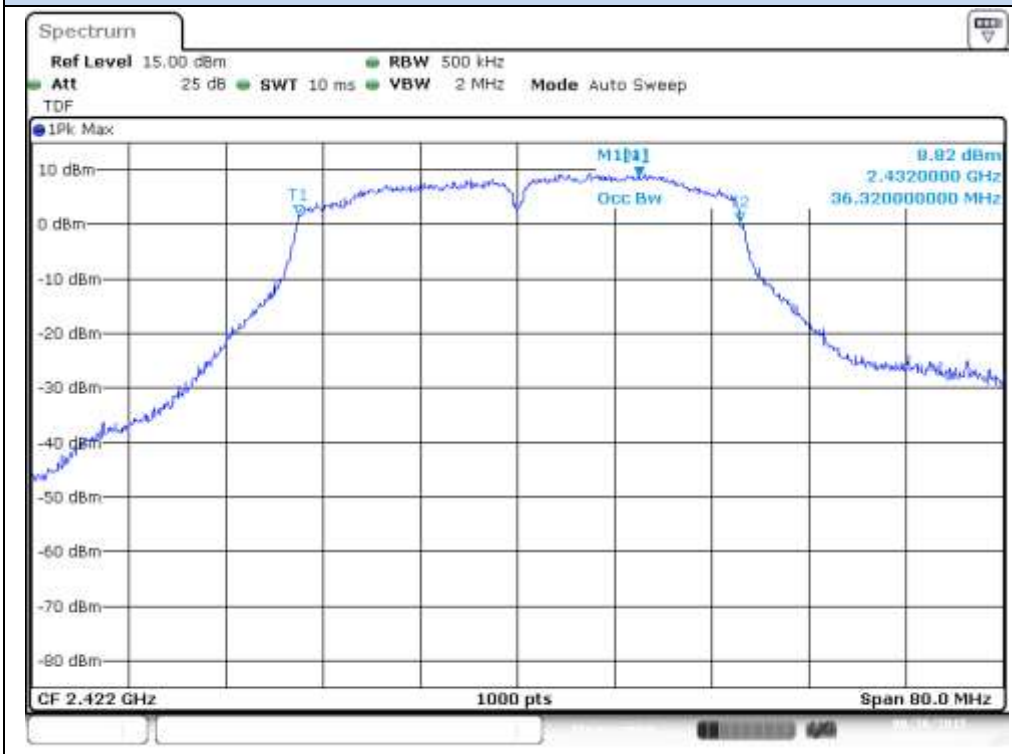
Printed copies are not controlled documents

# 802.11n40, HT0 (SISO) – Chain B

## 6dB BW – CH3F



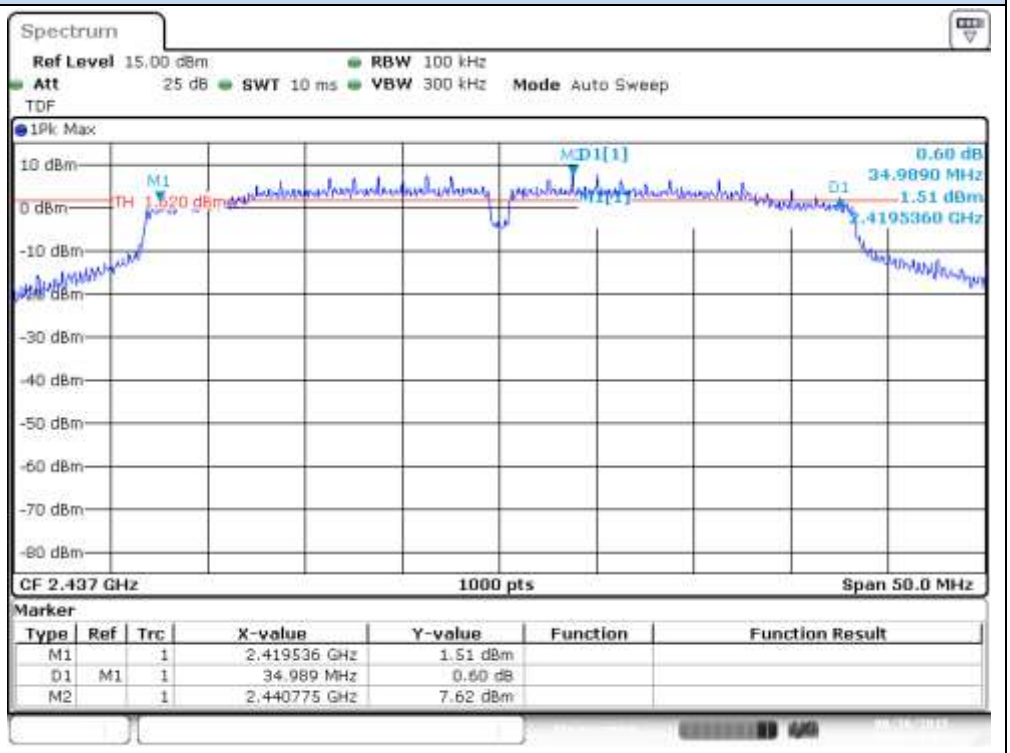

## 99% BW – CH3F






Printed copies are not controlled documents

## 6dB BW – CH6F




## 99% BW – CH6F

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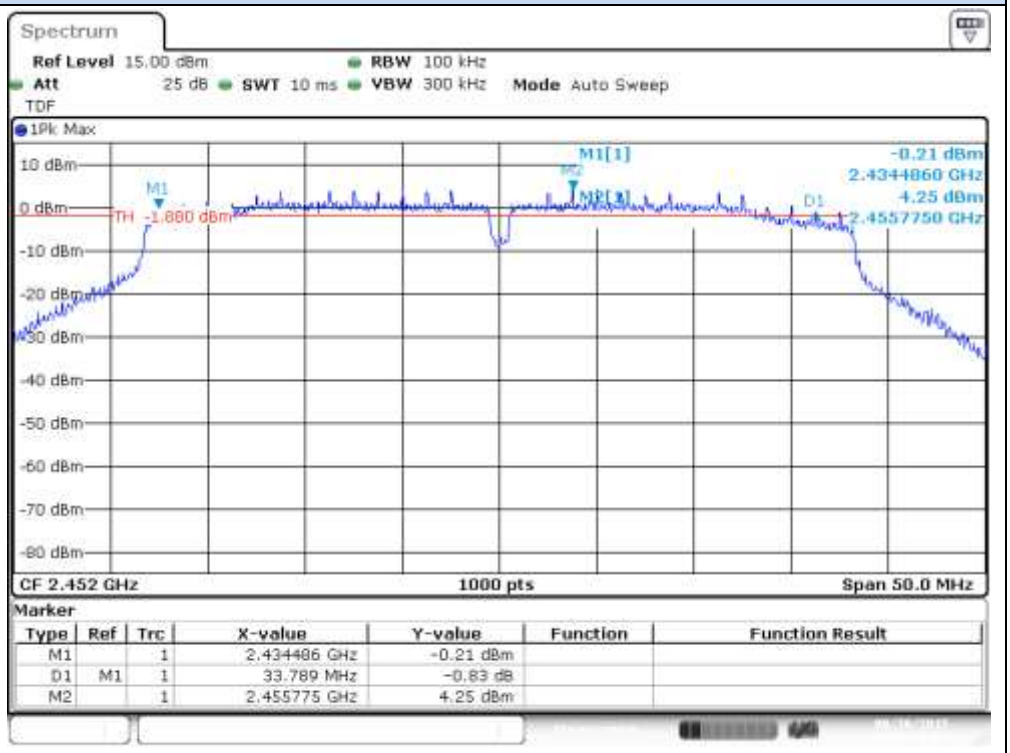
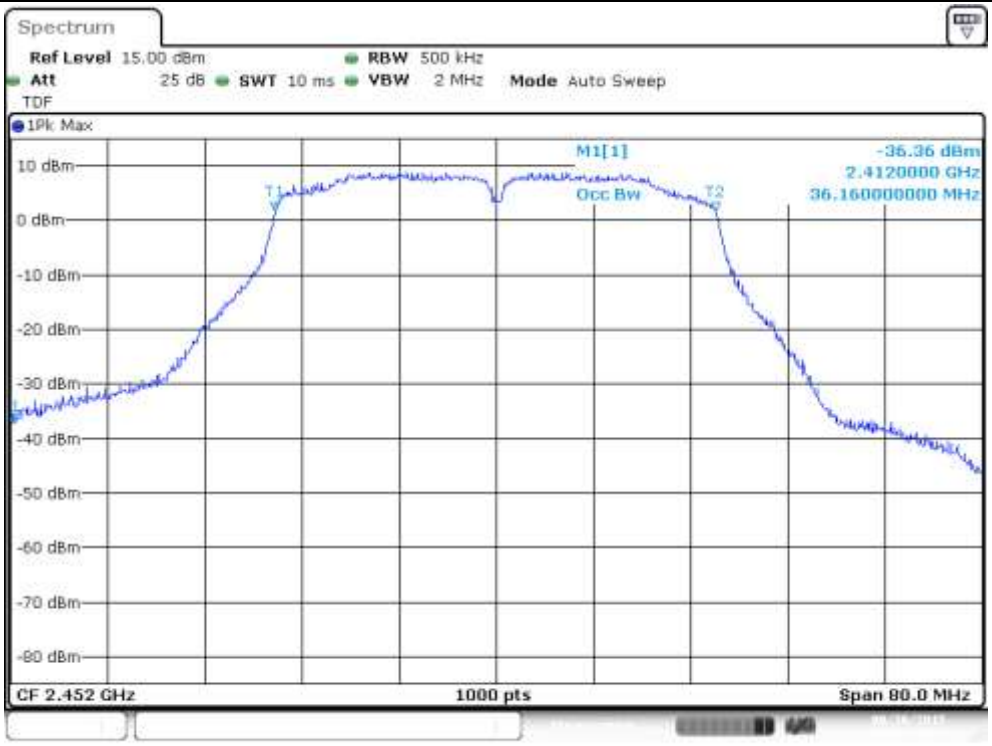
## 6dB BW – CH9F




Date: 26.AUG.2015 17:35:36

## 99% BW – CH9F

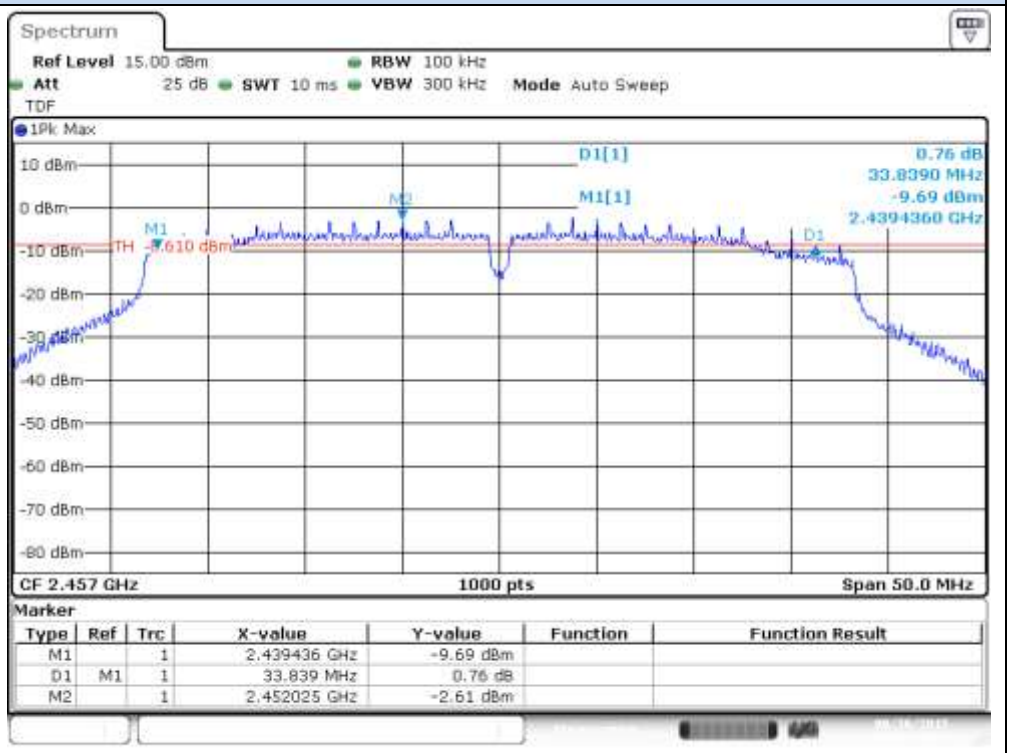



Date: 26.AUG.2015 17:36:34



Printed copies are not controlled documents

## 6dB BW – CH10F




Date: 26.AUG.2015 17:42:27

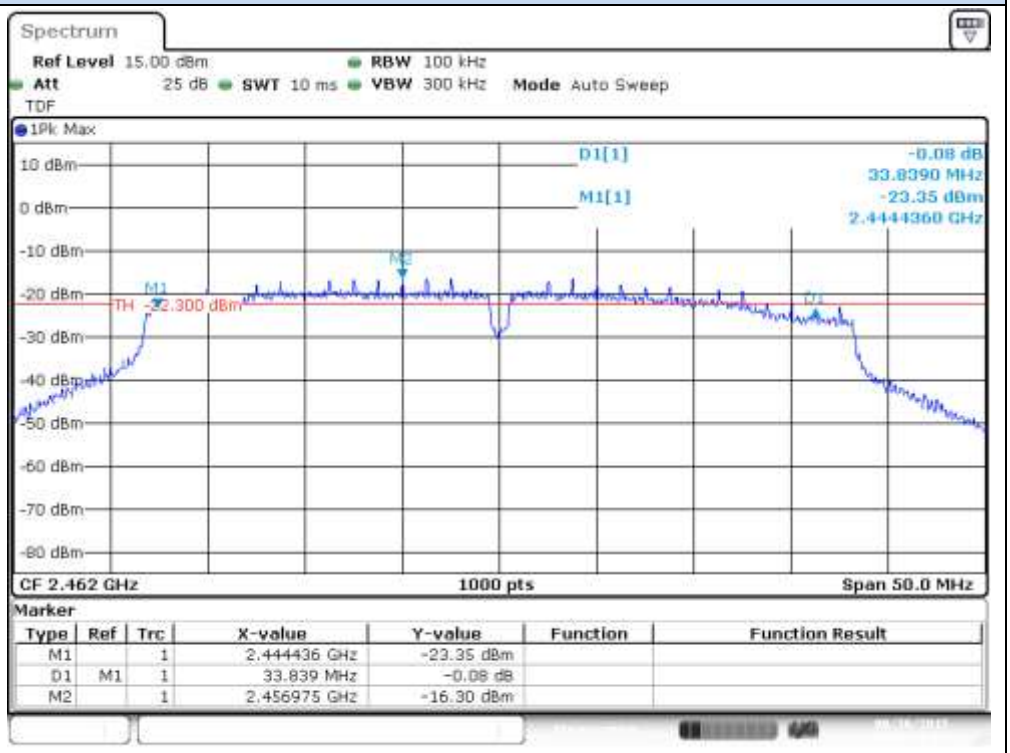
## 99% BW – CH10F

Date: 26.AUG.2015 17:43:31



Printed copies are not controlled documents

## 6dB BW – CH11F




Date: 26.AUG.2015 17:50:19

## 99% BW – CH11F

Date: 26.AUG.2015 17:50:54



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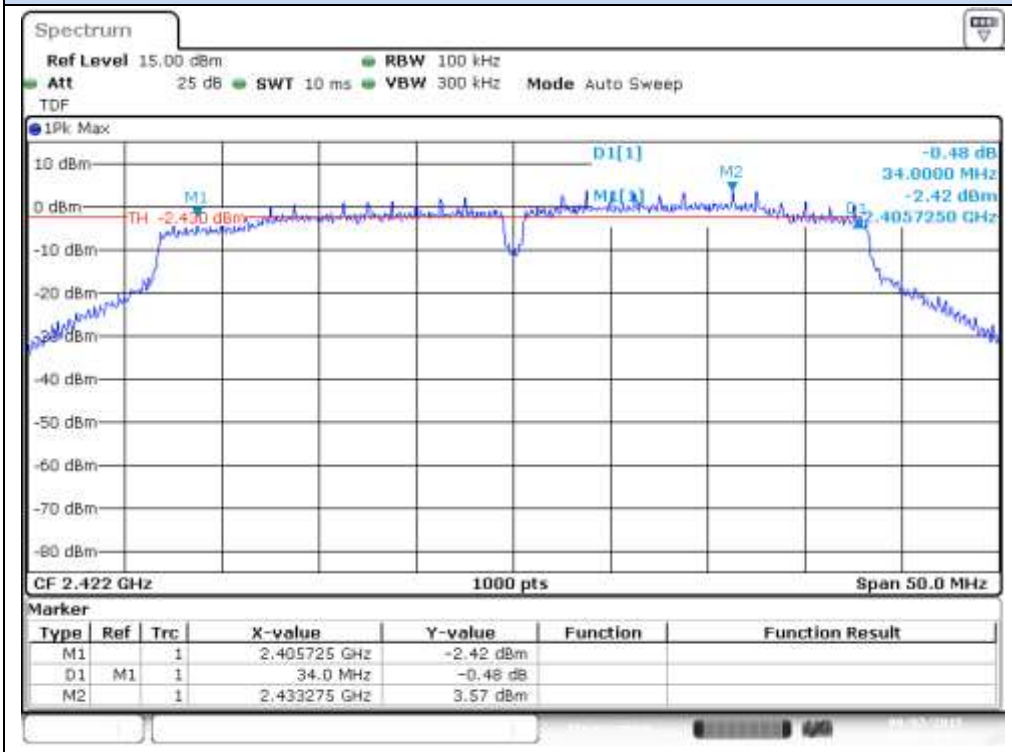
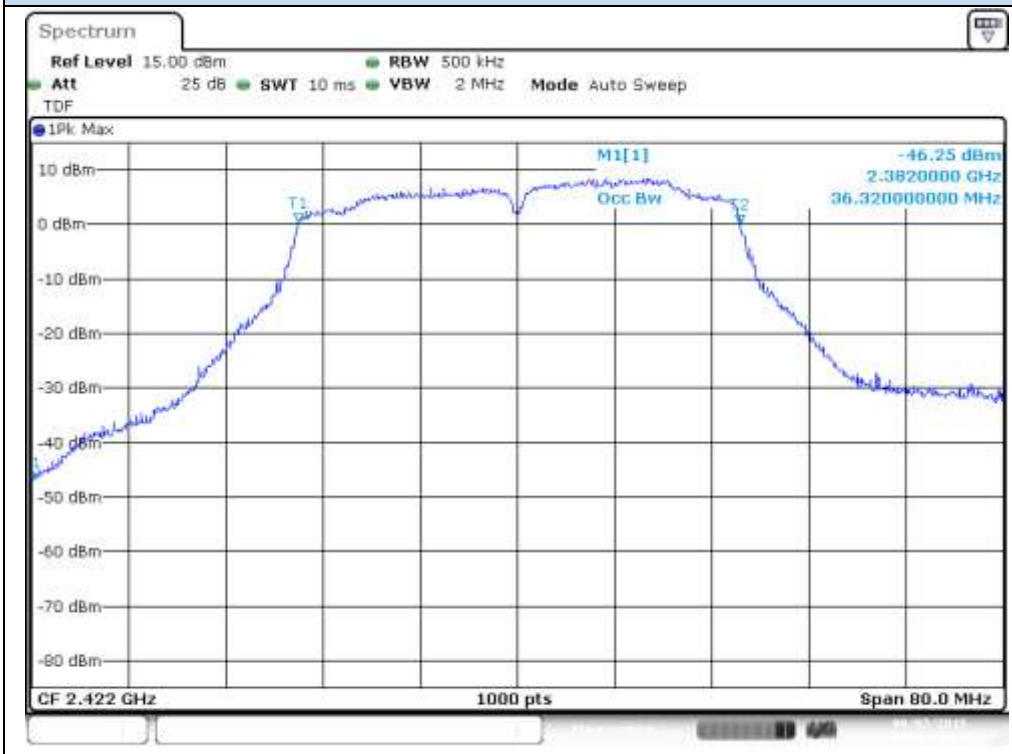
# 802.11n40, HT8 (MIMO) – Chain A

## 6dB BW – CH3F



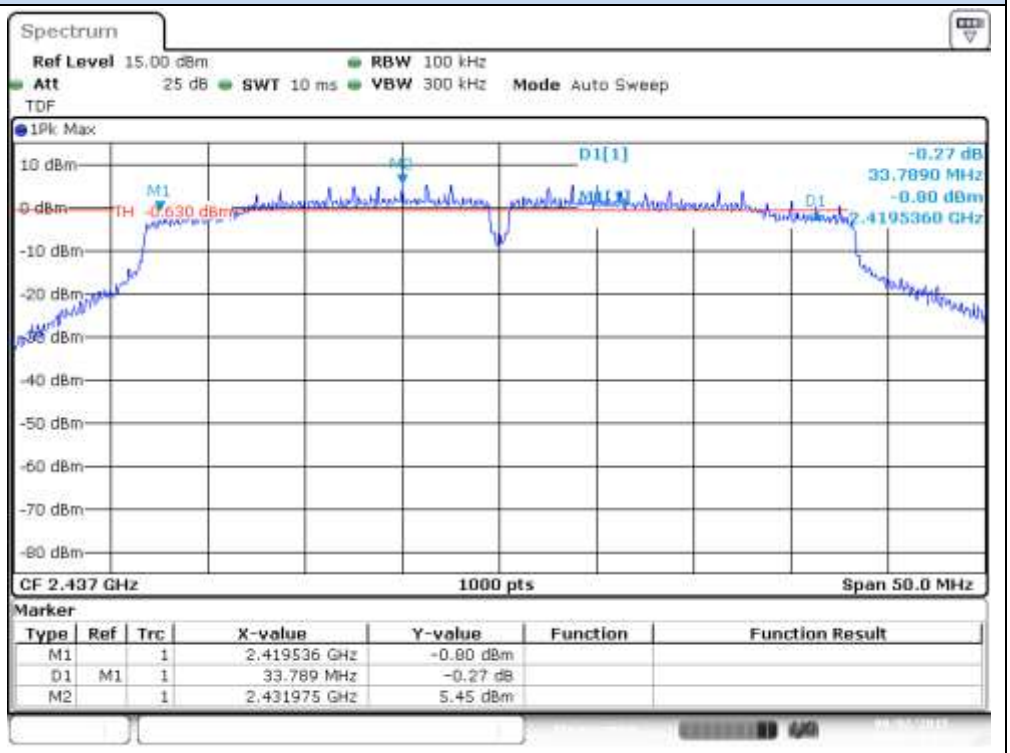

## 99% BW – CH3F



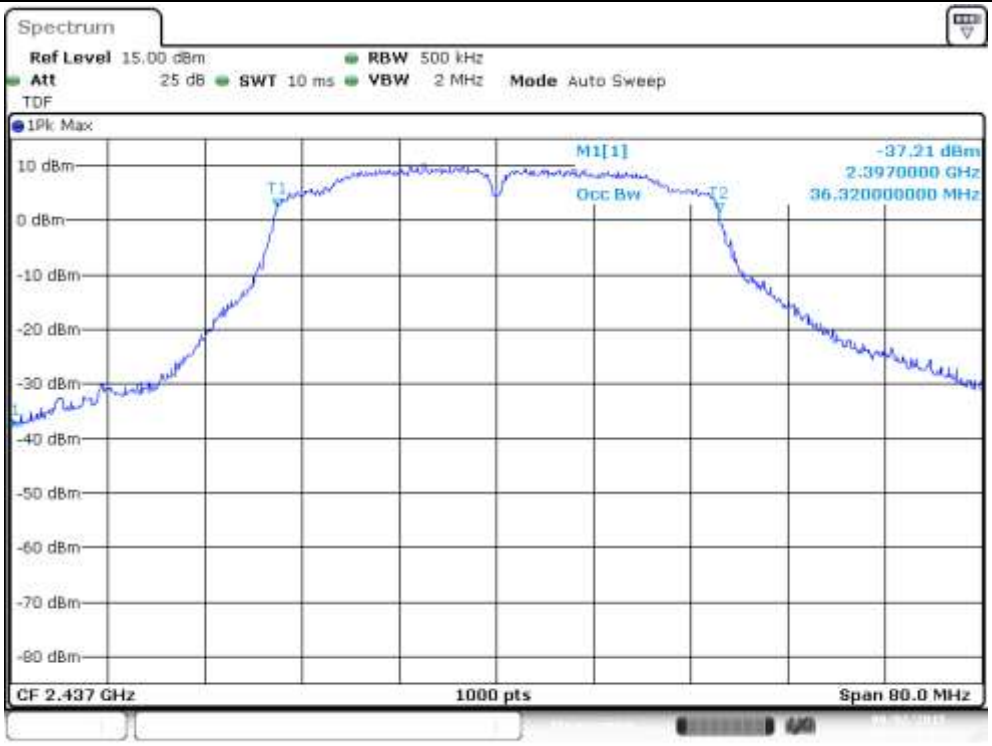



Printed copies are not controlled documents

## 6dB BW – CH6F



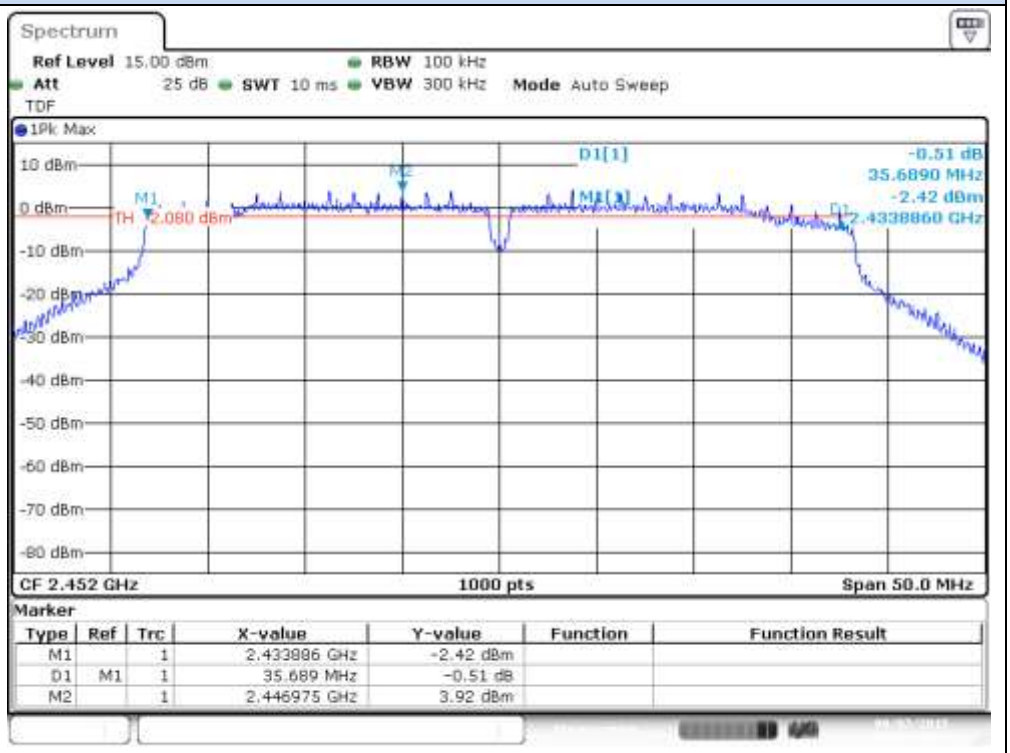

## 99% BW – CH6F





Printed copies are not controlled documents

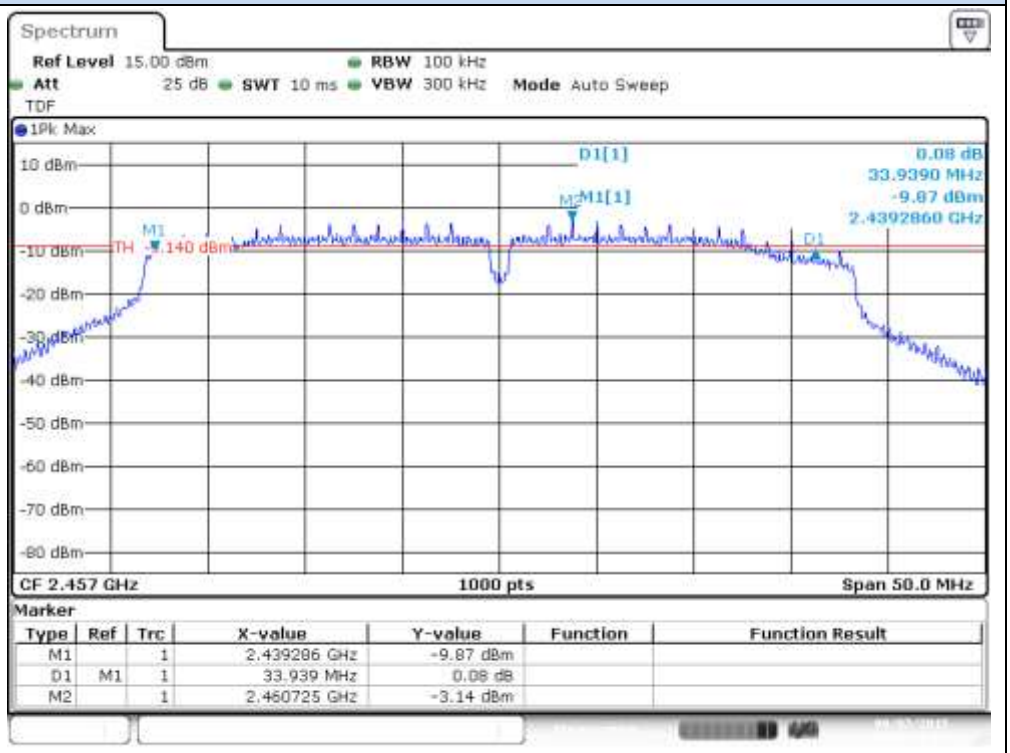
## 6dB BW – CH9F




## 99% BW – CH9F

Printed copies are not controlled documents

## 6dB BW – CH10F




Date: 7.SEP.2015 14:55:20

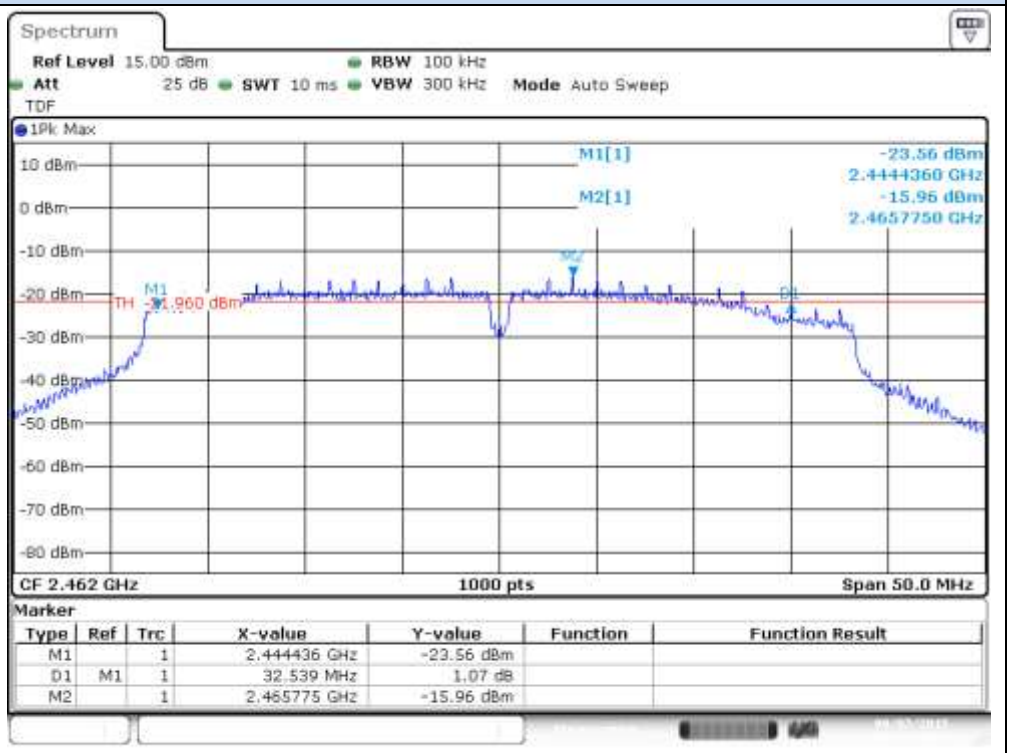
## 99% BW – CH10F

Date: 7.SEP.2015 14:56:11

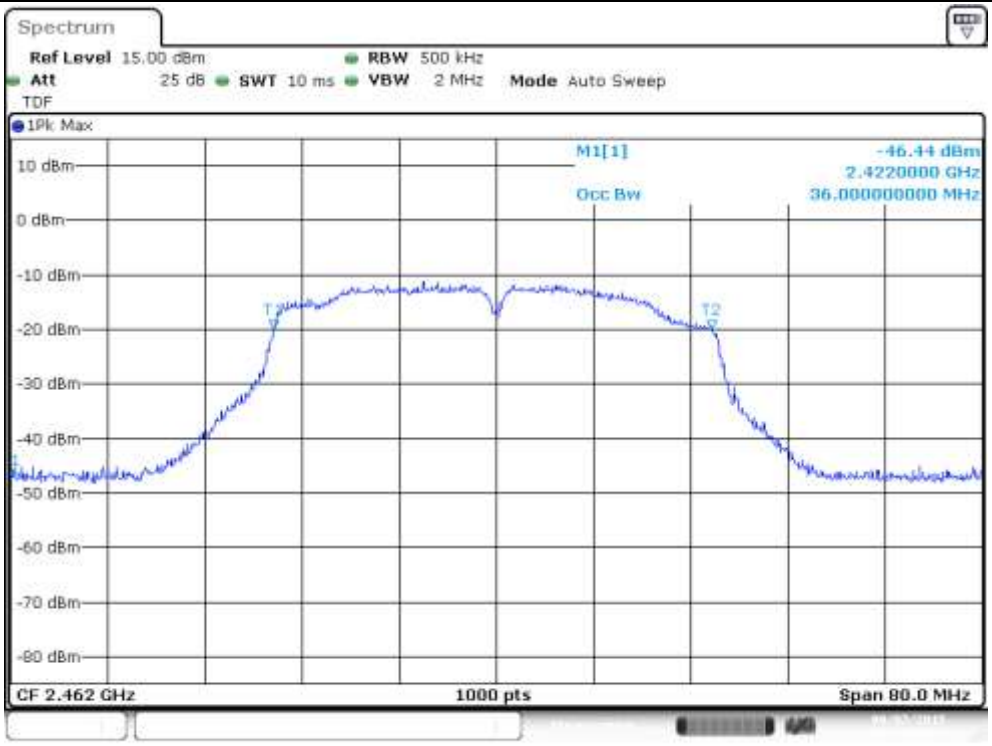


Printed copies are not controlled documents

## 6dB BW – CH11F




## 99% BW – CH11F





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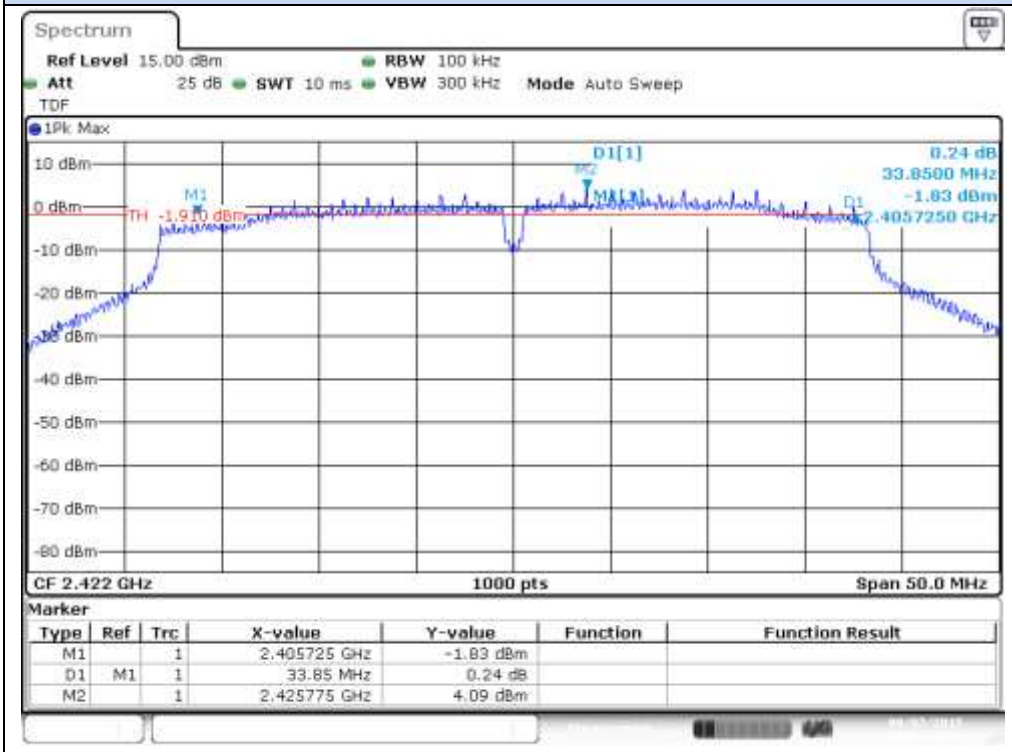
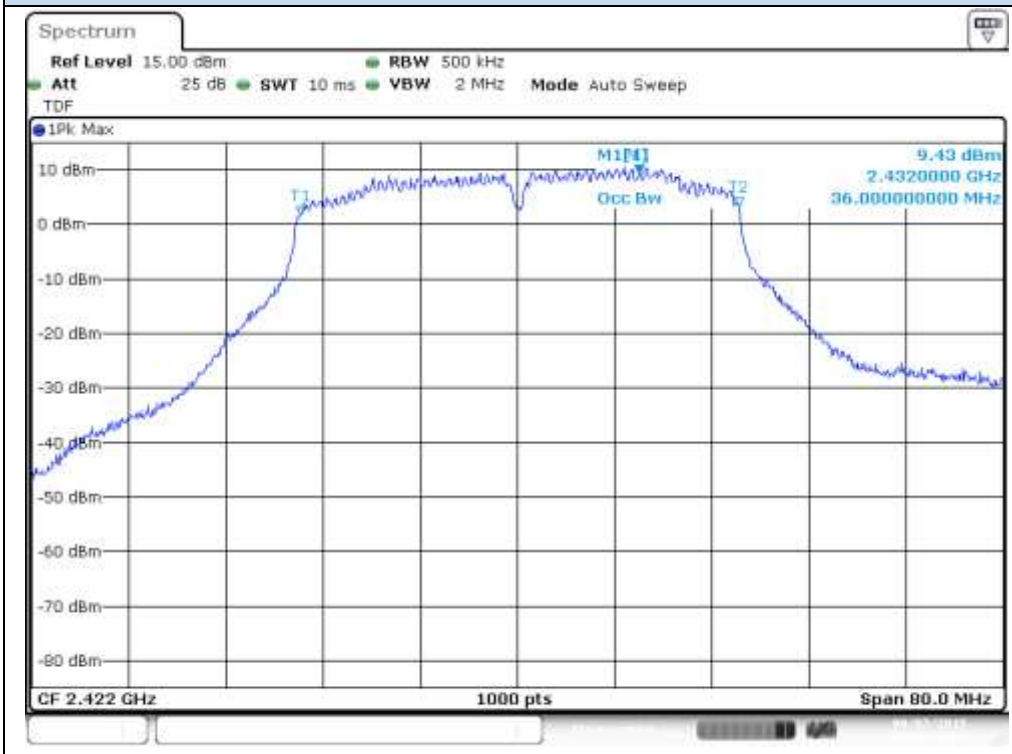
# 802.11n40, HT8 (MIMO) – Chain B

## 6dB BW – CH3F



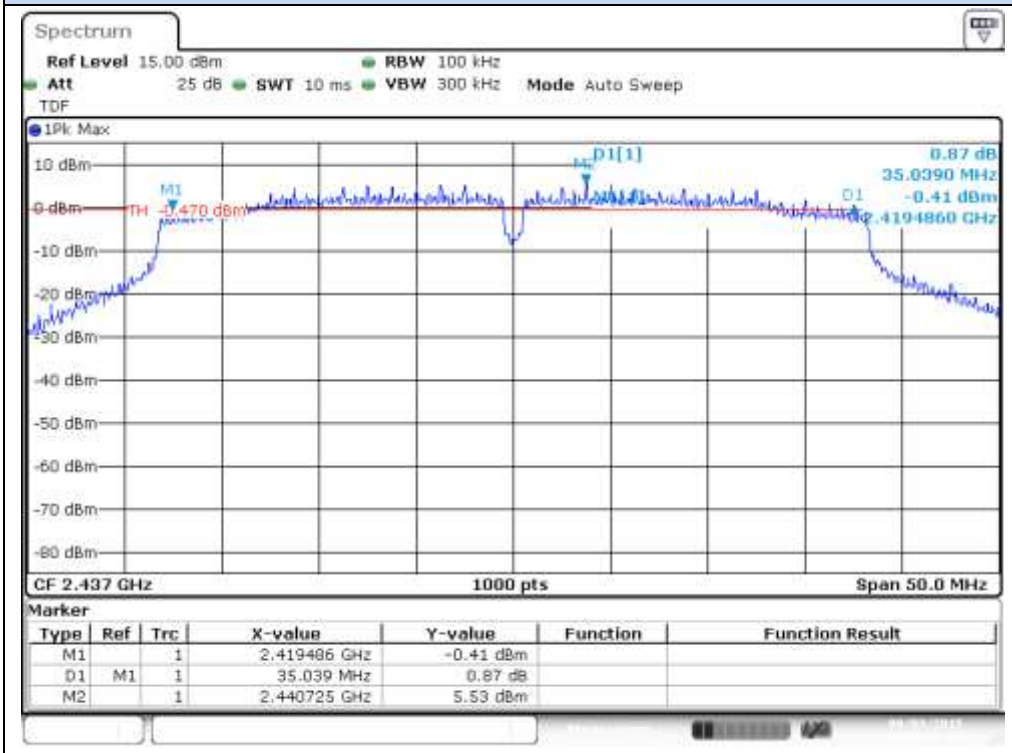

## 99% BW – CH3F






Printed copies are not controlled documents

## 6dB BW – CH6F




Date: 3.SEP.2015 10:28:26

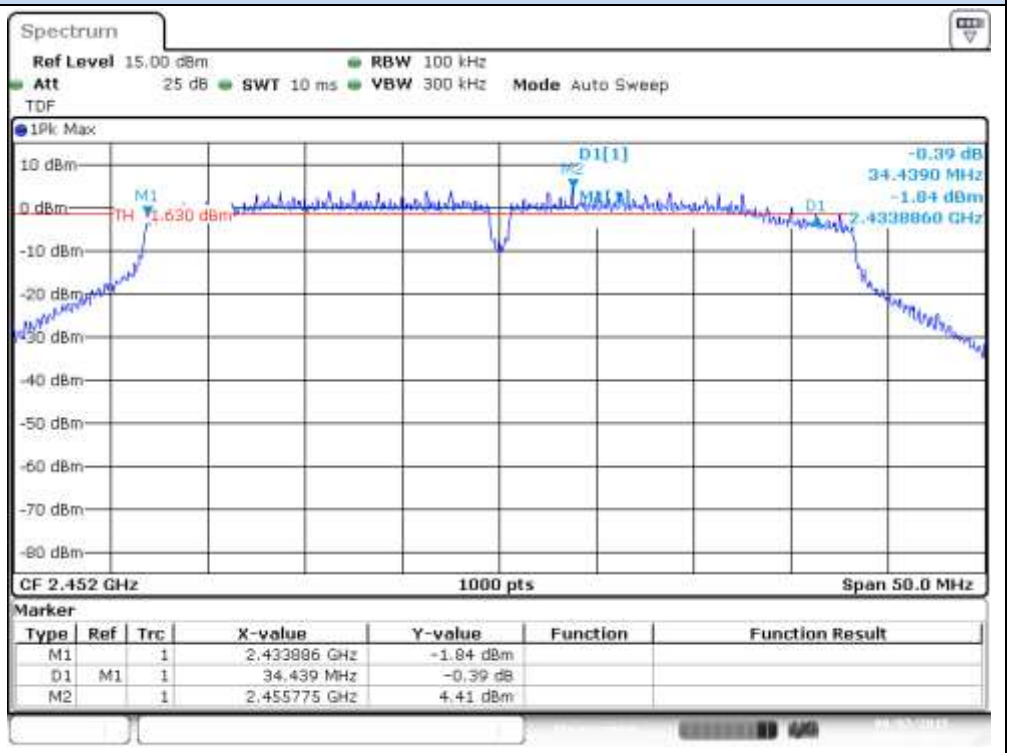
## 99% BW – CH6F

Date: 3.SEP.2015 10:29:04



Printed copies are not controlled documents

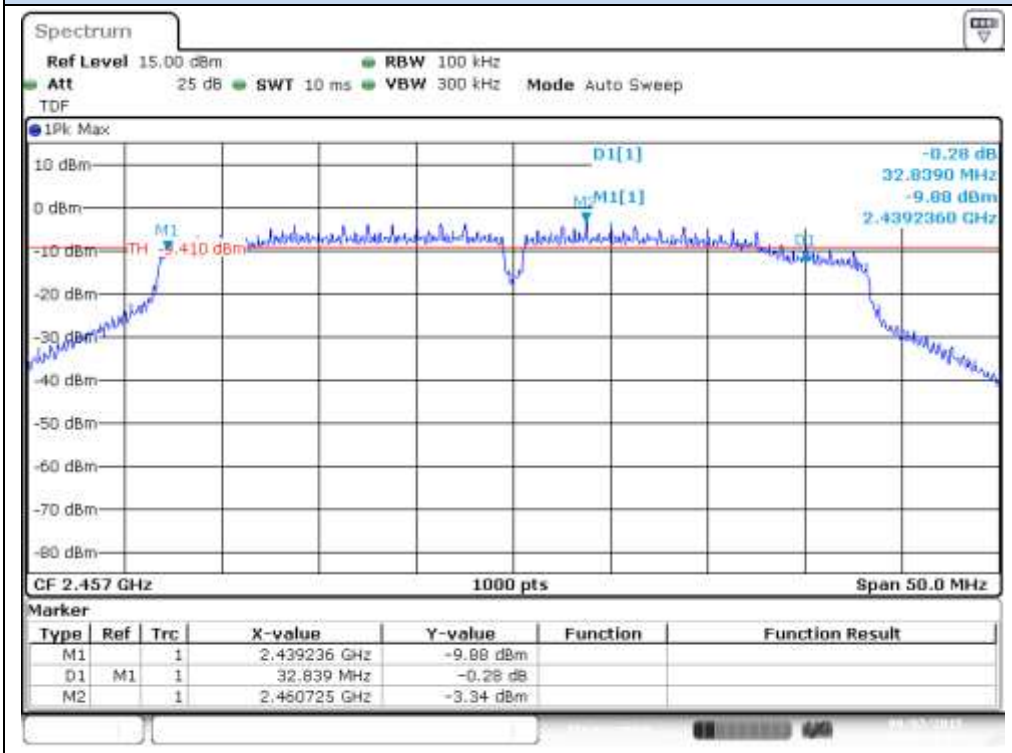
## 6dB BW – CH9F




## 99% BW – CH9F

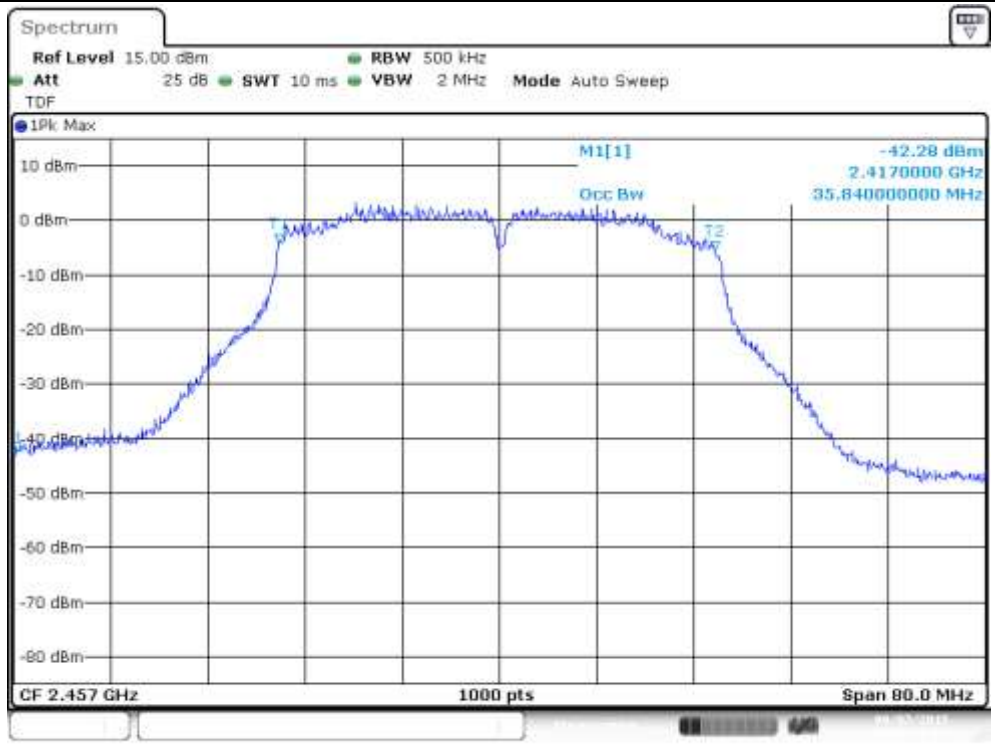
Printed copies are not controlled documents

## 6dB BW – CH10F




Date: 7.SEP.2015 17:03:26

## 99% BW – CH10F




Date: 7.SEP.2015 17:03:56



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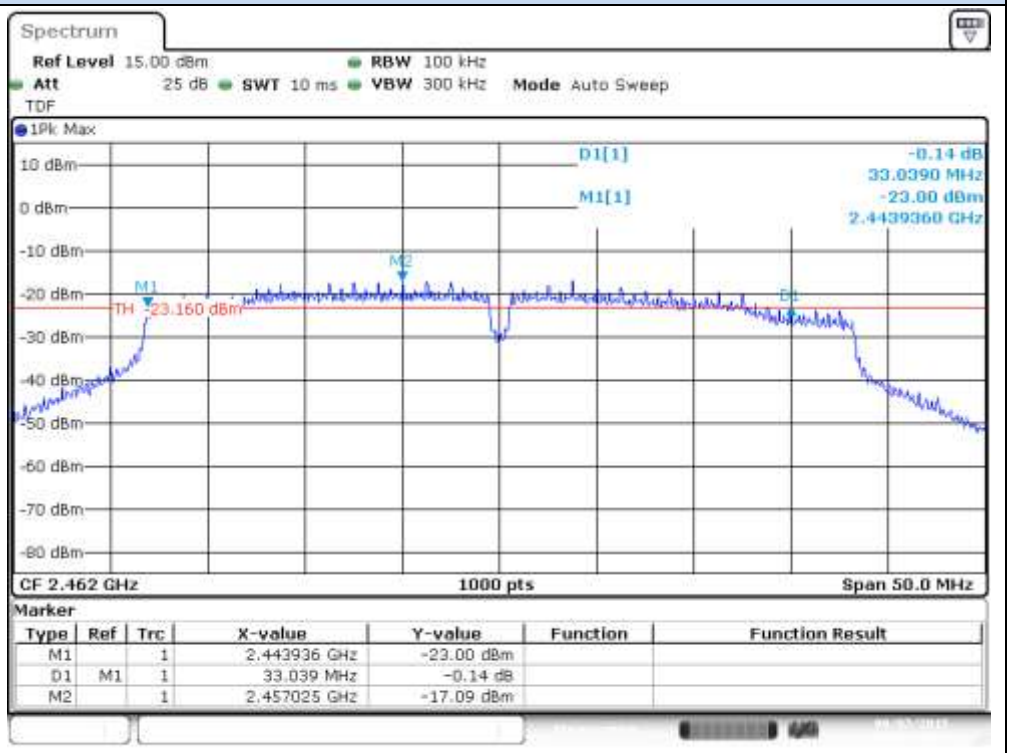
## 6dB BW – CH11F




Date: 7.SEP.2015 17:09:43

## 99% BW – CH11F

Date: 7.SEP.2015 17:10:15



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## B.2 Maximum Output Power and antenna gain

**Test limits:**

| FCC part | RSS part | Limits |
|---|---|---|
| 15.247<br>(b) (3) | RSS-247<br>Clause<br>5.4 (4) | (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:<br><br>(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as 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.<br>(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. |

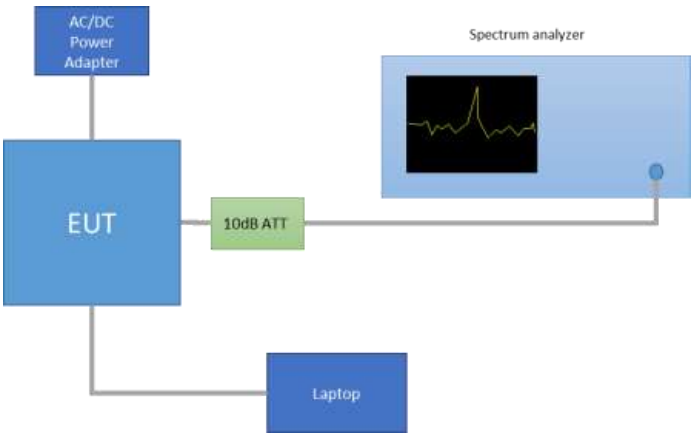
**Test procedure:**

The Maximum Conducted Output Power was measured using the channel integration method according to Method AVGSA-2, defined in paragraph 9.2.2.4 of FCC KDB 558074 D01 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

For MIMO mode, according to the measure-and-sum approach defined in FCC KDB 662911 - Guidance for Emission Testing of Transmitters with Multiple Outputs in the Same Band, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically in linear power units to determine the total emission level from the device.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power. The declared maximum antenna gain is 3dBi.

The setup below was used to measure the maximum conducted output power. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.





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**Results tables:**

| Mode | Rate | Meas. Duty Cycle [%] | CH | Frequency [MHz] | Antenna | Power [dBm] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Measured Conducted Peak | Measured Conducted RMS | Duty cycle Compensated RMS | EIRP |
| 802.11b | 1Mbps | 98.0 | 1 | 2412 | SISO CHAIN A | 24.07 | 20.83 | 20.92 | 23.92 |
| | | | | | SISO CHAIN B | 24.01 | 20.78 | 20.87 | 23.87 |
| | | | 6 | 2437 | SISO CHAIN A | 24.27 | 20.95 | 21.04 | 24.04 |
| | | | | | SISO CHAIN B | 24.08 | 20.78 | 20.87 | 23.87 |
| | | | 11 | 2462 | SISO CHAIN A | 22.96 | 19.60 | 19.69 | 22.69 |
| | | | | | SISO CHAIN B | 21.90 | 18.52 | 18.61 | 21.61 |
| | | | 12 | 2467 | SISO CHAIN A | 19.25 | 15.82 | 15.91 | 18.91 |
| | | | | | SISO CHAIN B | 17.51 | 14.11 | 14.20 | 17.20 |
| | | | 13 | 2472 | SISO CHAIN A | 12.68 | 9.17 | 9.26 | 12.26 |
| | | | | | SISO CHAIN B | 11.75 | 8.34 | 8.43 | 11.43 |
| 802.11g | 6Mbps | 98.1 | 1 | 2412 | SISO CHAIN A | 26.41 | 18.00 | 18.08 | 21.08 |
| | | | | | SISO CHAIN B | 26.29 | 17.84 | 17.92 | 20.92 |
| | | | 6 | 2437 | SISO CHAIN A | 29.75 | 20.90 | 20.98 | 23.98 |
| | | | | | SISO CHAIN B | 29.80 | 20.88 | 20.96 | 23.96 |
| | | | 11 | 2462 | SISO CHAIN A | 26.62 | 18.01 | 18.09 | 21.09 |
| | | | | | SISO CHAIN B | 26.30 | 17.89 | 17.97 | 20.97 |
| | | | 12 | 2467 | SISO CHAIN A | 21.05 | 12.30 | 12.38 | 15.38 |
| | | | | | SISO CHAIN B | 21.44 | 12.91 | 12.99 | 15.99 |
| | | | 13 | 2472 | SISO CHAIN A | 5.50 | -2.88 | -2.80 | 0.20 |
| | | | | | SISO CHAIN B | 3.99 | -4.51 | -4.43 | -1.43 |
| 802.11n20 | HT0 | 98.0 | 1 | 2412 | SISO CHAIN A | 25.55 | 17.18 | 17.27 | 20.27 |
| | | | | | SISO CHAIN B | 26.05 | 17.64 | 17.73 | 20.73 |
| | | | 6 | 2437 | SISO CHAIN A | 29.85 | 20.83 | 20.92 | 23.92 |
| | | | | | SISO CHAIN B | 29.79 | 20.92 | 21.01 | 24.01 |
| | | | 11 | 2462 | SISO CHAIN A | 25.57 | 17.18 | 17.27 | 20.27 |
| | | | | | SISO CHAIN B | 26.09 | 17.50 | 17.59 | 20.59 |
| | | | 12 | 2467 | SISO CHAIN A | 19.82 | 11.35 | 11.44 | 14.44 |
| | | | | | SISO CHAIN B | 20.77 | 12.26 | 12.35 | 15.35 |
| | | | 13 | 2472 | SISO CHAIN A | 4.60 | -3.83 | -3.74 | -0.74 |
| | | | | | SISO CHAIN B | 3.61 | -4.91 | -4.82 | -1.82 |


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| Mode | Rate | Mea. Duty Cycle [%] | CH | Frequency [MHz] | Antenna | Power [dBm] Measured Conducted Peak | Measured Conducted RMS | Duty cycle Compensated RMS | EIRP |
|---|---|---|---|---|---|---|---|---|---|
| 802.11n20 | HT8 | 95.5 | 1 | 2412 | MIMO CHAIN A | 25.14 | 16.48 | 16.68 | 19.68 |
| | | | | | MIMO CHAIN B | 26.43 | 17.03 | 17.23 | 20.23 |
| | | | 6 | 2437 | MIMO CHAIN A | 26.27 | 17.92 | 18.12 | 21.12 |
| | | | | | MIMO CHAIN B | 27.24 | 17.94 | 18.14 | 21.14 |
| | | | 11 | 2462 | MIMO CHAIN A | 25.95 | 17.39 | 17.59 | 20.59 |
| | | | | | MIMO CHAIN B | 26.97 | 17.39 | 17.59 | 20.59 |
| | | | 12 | 2467 | MIMO CHAIN A | 19.44 | 10.82 | 11.02 | 14.02 |
| | | | | | MIMO CHAIN B | 20.19 | 10.73 | 10.93 | 13.93 |
| | | | 13 | 2472 | MIMO CHAIN A | 4.54 | -4.12 | -3.92 | -0.92 |
| | | | | | MIMO CHAIN B | 4.61 | -4.87 | -4.67 | -1.67 |
| 802.11n40 | HT0 | 96.4 | 3F | 2422 | SISO CHAIN A | 25.35 | 16.25 | 16.41 | 19.41 |
| | | | | | SISO CHAIN B | 26.14 | 17.05 | 17.21 | 20.21 |
| | | | 6F | 2437 | SISO CHAIN A | 29.59 | 20.31 | 20.47 | 23.47 |
| | | | | | SISO CHAIN B | 29.83 | 20.42 | 20.58 | 23.58 |
| | | | 9F | 2452 | SISO CHAIN A | 26.21 | 17.05 | 17.21 | 20.21 |
| | | | | | SISO CHAIN B | 26.27 | 17.16 | 17.32 | 20.32 |
| | | | 10F | 2457 | SISO CHAIN A | 18.70 | 9.69 | 9.85 | 12.85 |
| | | | | | SISO CHAIN B | 19.33 | 10.16 | 10.32 | 13.32 |
| | | | 11F | 2462 | SISO CHAIN A | 5.53 | -3.36 | -3.20 | -0.20 |
| | | | | | SISO CHAIN B | 5.38 | -3.77 | -3.61 | -0.61 |
| | HT8 | 91.9 | 3F | 2422 | MIMO CHAIN A | 24.96 | 15.60 | 15.96 | 18.96 |
| | | | | | MIMO CHAIN B | 26.04 | 16.13 | 16.49 | 19.49 |
| | | | 6F | 2437 | MIMO CHAIN A | 26.68 | 17.45 | 17.81 | 20.81 |
| | | | | | MIMO CHAIN B | 27.12 | 17.47 | 17.83 | 21.83 |
| | | | 9F | 2452 | MIMO CHAIN A | 26.29 | 16.78 | 17.14 | 20.14 |
| | | | | | MIMO CHAIN B | 26.88 | 16.88 | 17.24 | 20.24 |
| | | | 10F | 2457 | MIMO CHAIN A | 18.66 | 9.26 | 9.62 | 12.62 |
| | | | | | MIMO CHAIN B | 18.87 | 8.99 | 9.35 | 12.35 |
| | | | 11F | 2462 | MIMO CHAIN A | 5.54 | -3.77 | -3.41 | -0.41 |
| | | | | | MIMO CHAIN B | 5.09 | -4.74 | -4.38 | -1.38 |

**Max Value**



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| MIMO modes – Combined results | | | | | Power [dBm] | | |
|---|---|---|---|---|---|---|---|
| Mode | Rate | Channel | Frequency (MHz) | Antenna | Combined Peak | Combined, Duty Cycle compensated RMS | EIRP |
| 802.11n20 | HT8 | 1 | 2412 | MIMO CHAIN A + CHAIN B | 28.84 | 19.97 | 22.97 |
| | | 6 | 2437 | | 29.79 | **21.14** | 24.14 |
| | | 11 | 2462 | | 29.50 | 20.60 | 23.60 |
| | | 12 | 2467 | | 22.84 | 13.98 | 16.98 |
| | | 13 | 2472 | | 7.59 | -1.27 | 1.73 |
| 802.11n40 | HT8 | 3F | 2422 | | 28.54 | 19.25 | 22.25 |
| | | 6F | 2437 | | 29.92 | 20.84 | 23.84 |
| | | 9F | 2452 | | 29.59 | 20.21 | 23.21 |
| | | 10F | 2457 | | 21.78 | 12.50 | 15.50 |
| | | 11F | 2462 | | 8.33 | -0.85 | 2.15 |

**Max Value**



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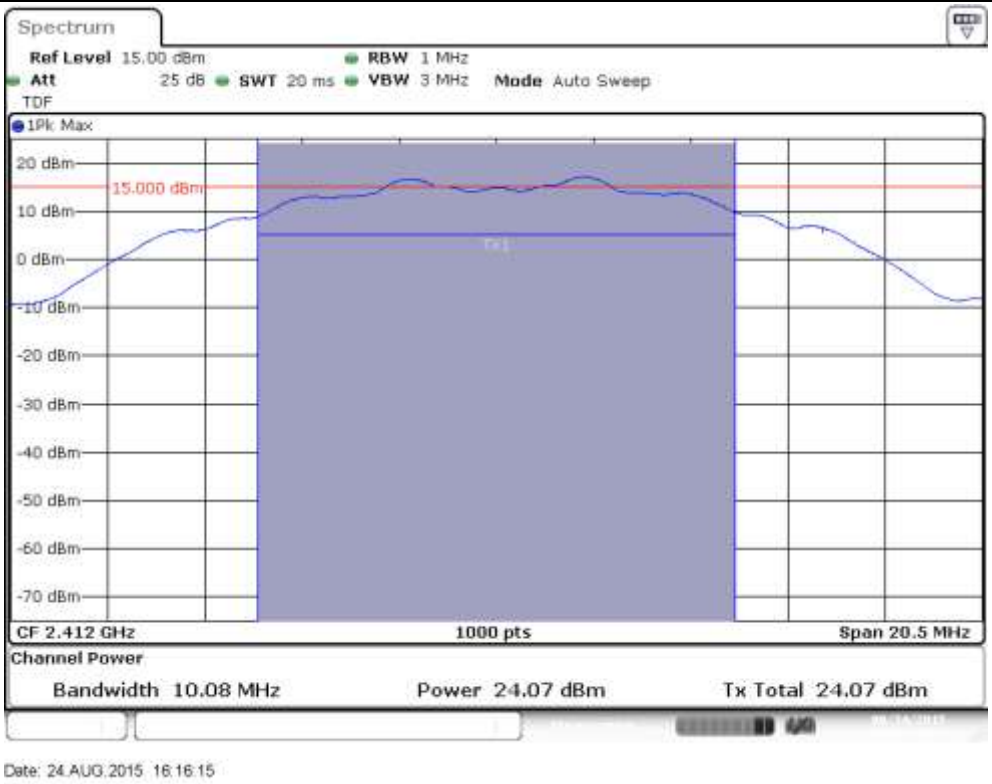
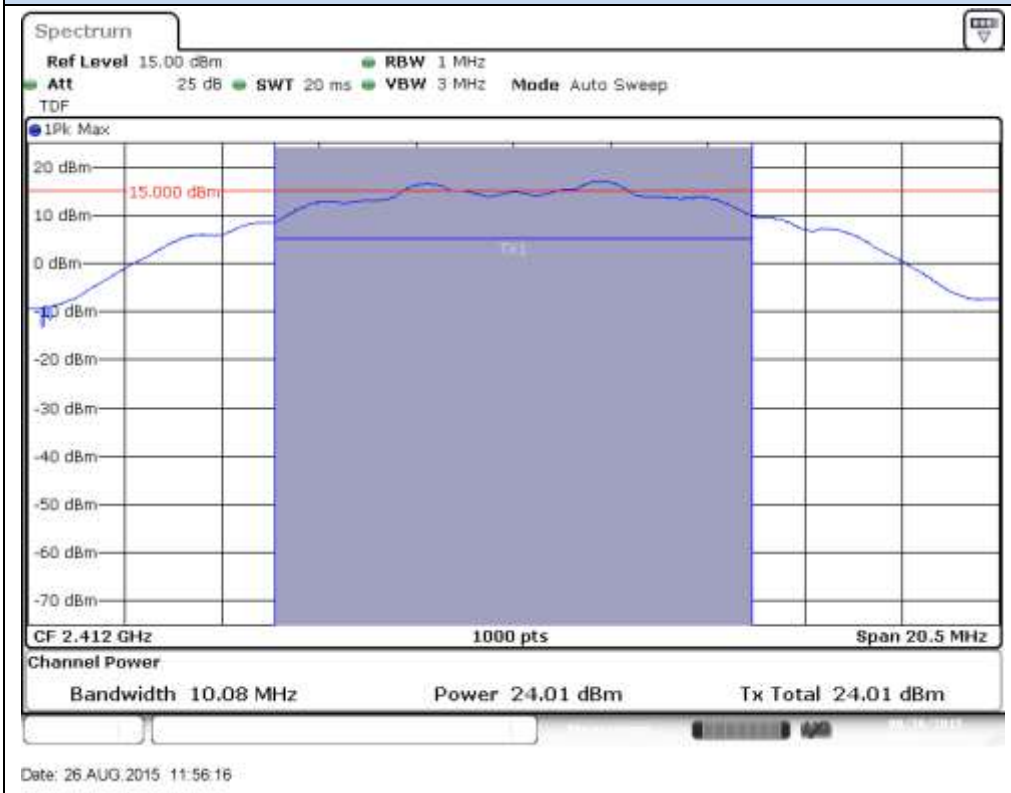
**Results screenshot**

## 802.11b, 1Mbps

### Max Power, Chain A - CH1




### Max Power, Chain B – CH1



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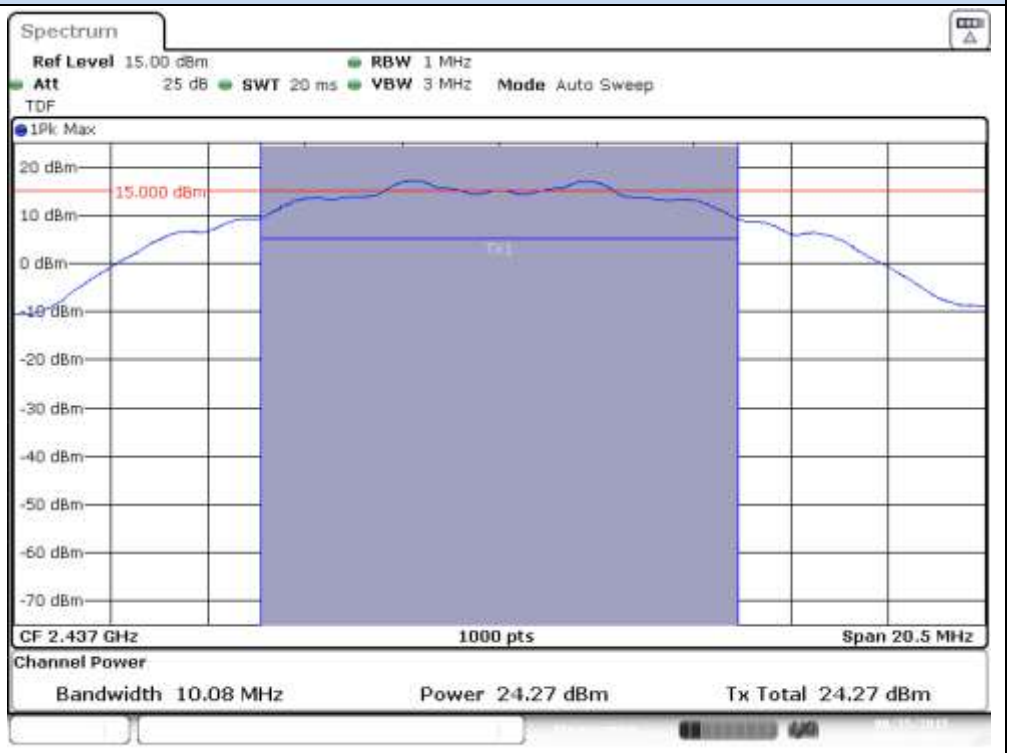
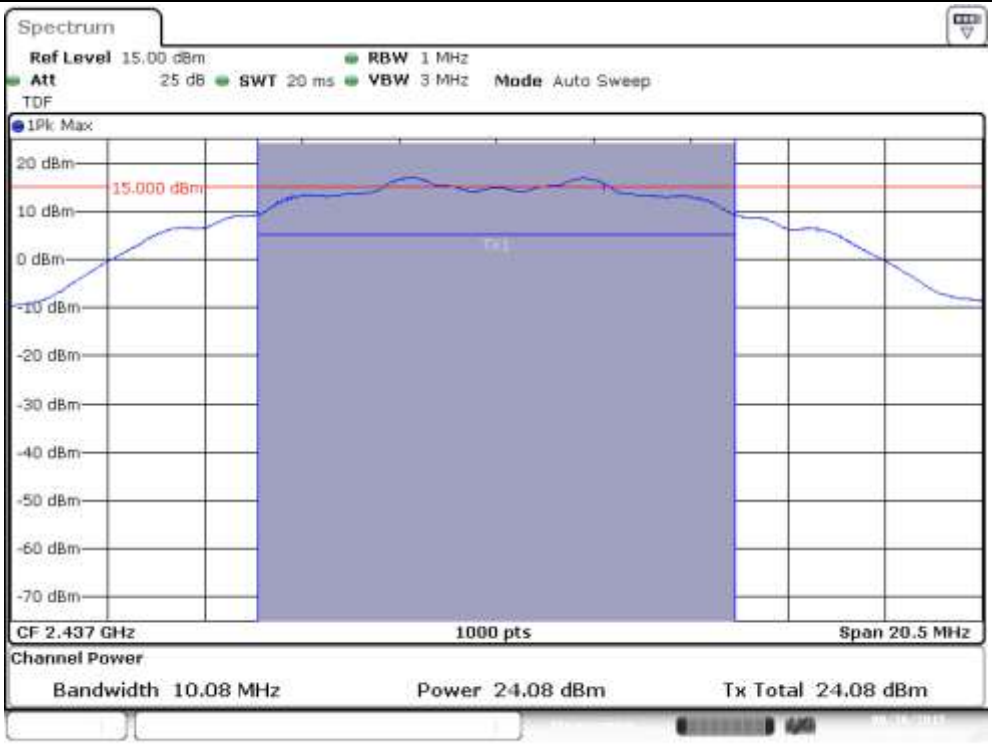
## Max Power, Chain A – CH6




Date: 25.AUG.2015 16:09:27

## Max Power, Chain B – CH6




Date: 26.AUG.2015 12:06:48



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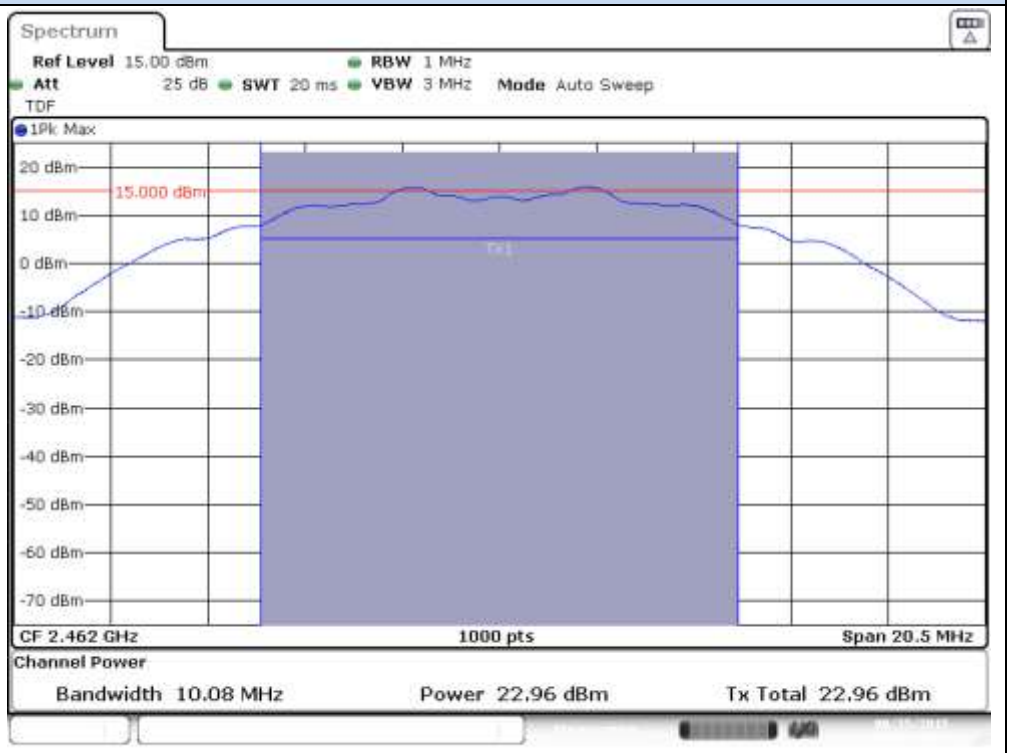
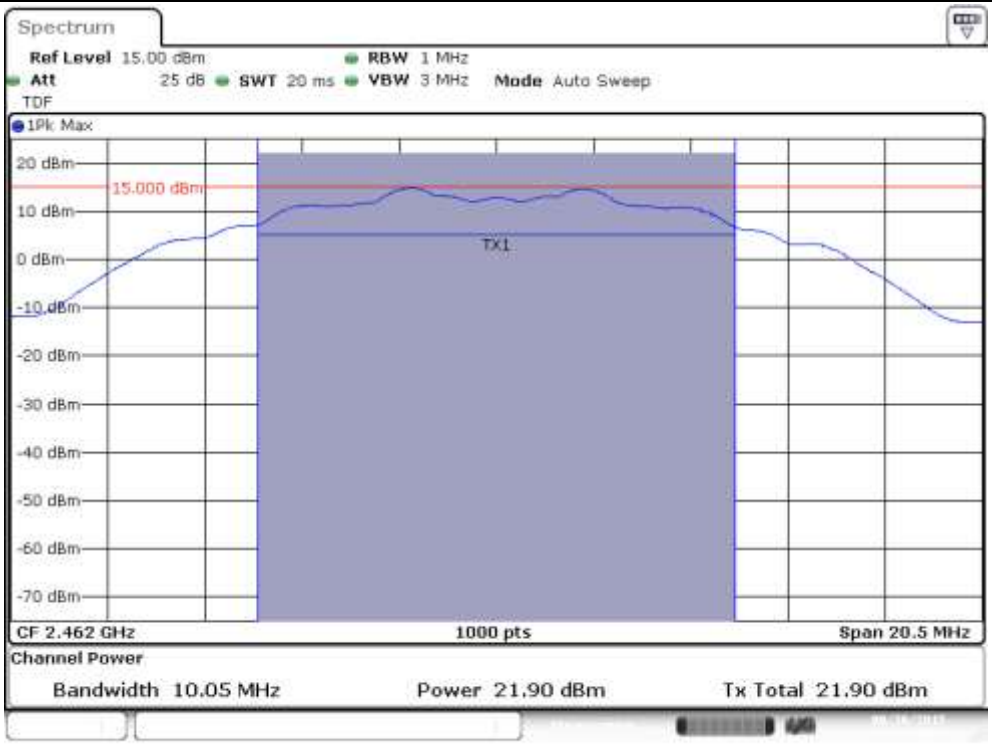
## Max Power, Chain A – CH11




Date: 25.AUG.2015 16:18:43

## Max Power, Chain B – CH11




Date: 26.AUG.2015 12:17:14



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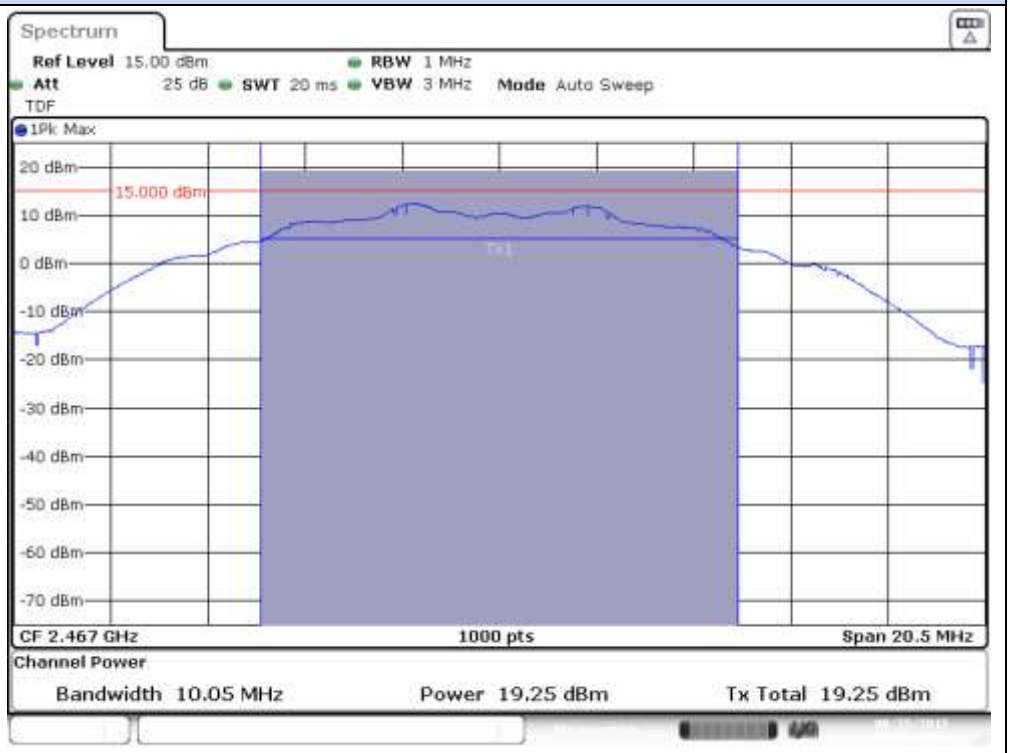
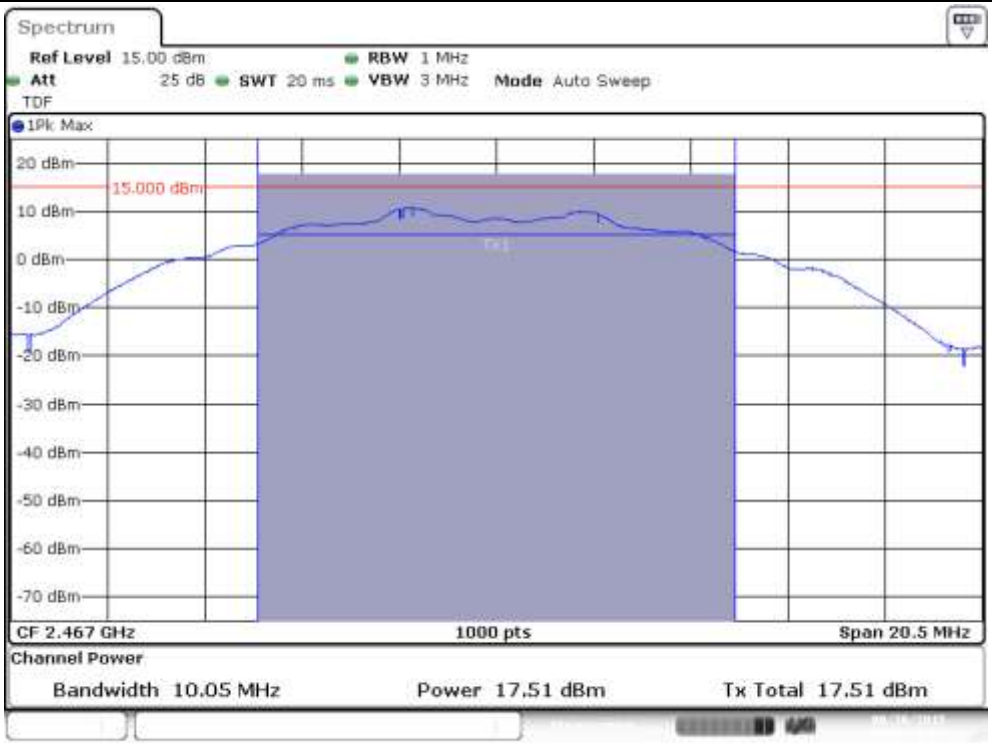
## Max Power, Chain A – CH12




Date: 25.AUG.2015 16:29:23

## Max Power, Chain B – CH12




Date: 26.AUG.2015 14:23:48



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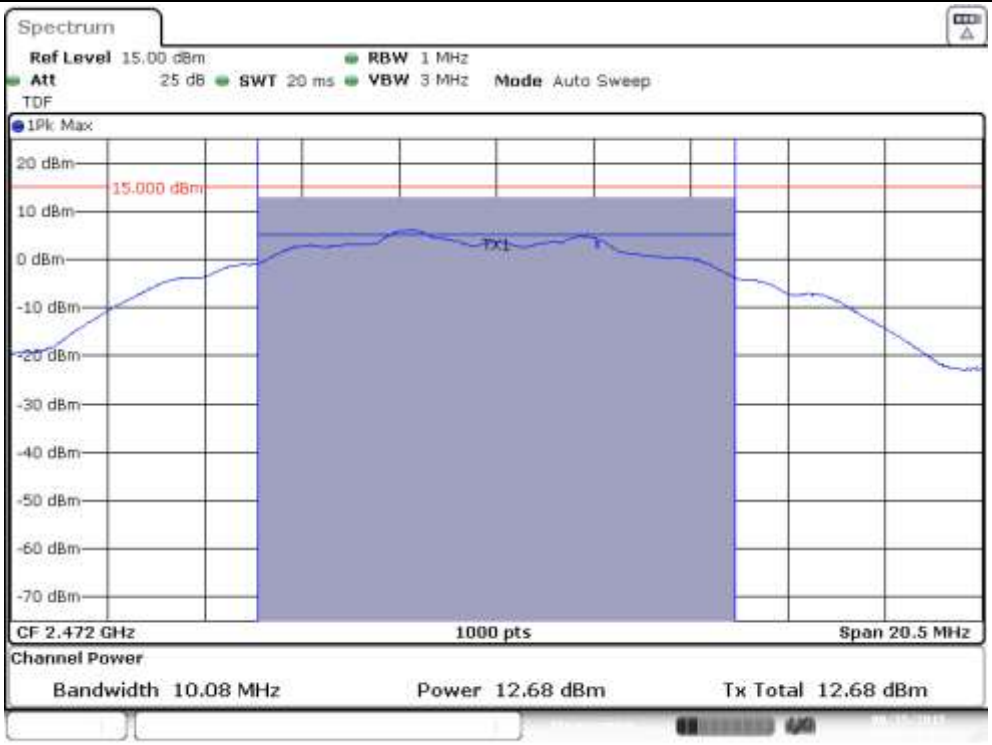
## Max Power, Chain A – CH13




Date: 25.AUG.2015 16:36:12

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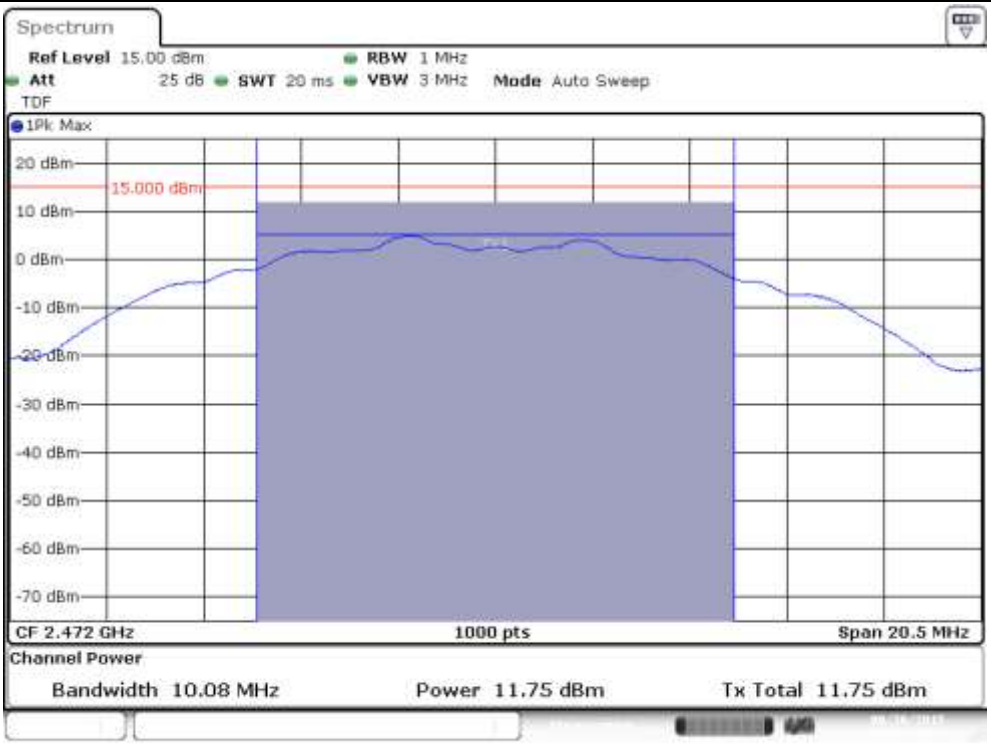


Date: 26.AUG.2015 14:31:27



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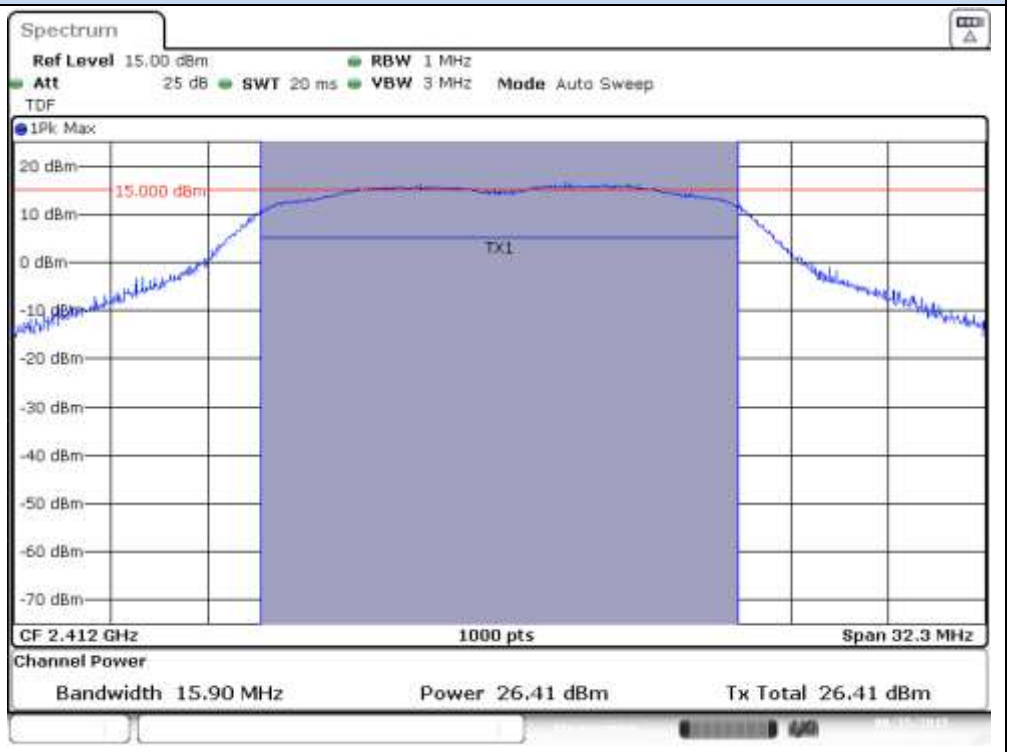
# 802.11g, 6Mbps(SISO)

## Max Power, Chain A – CH1

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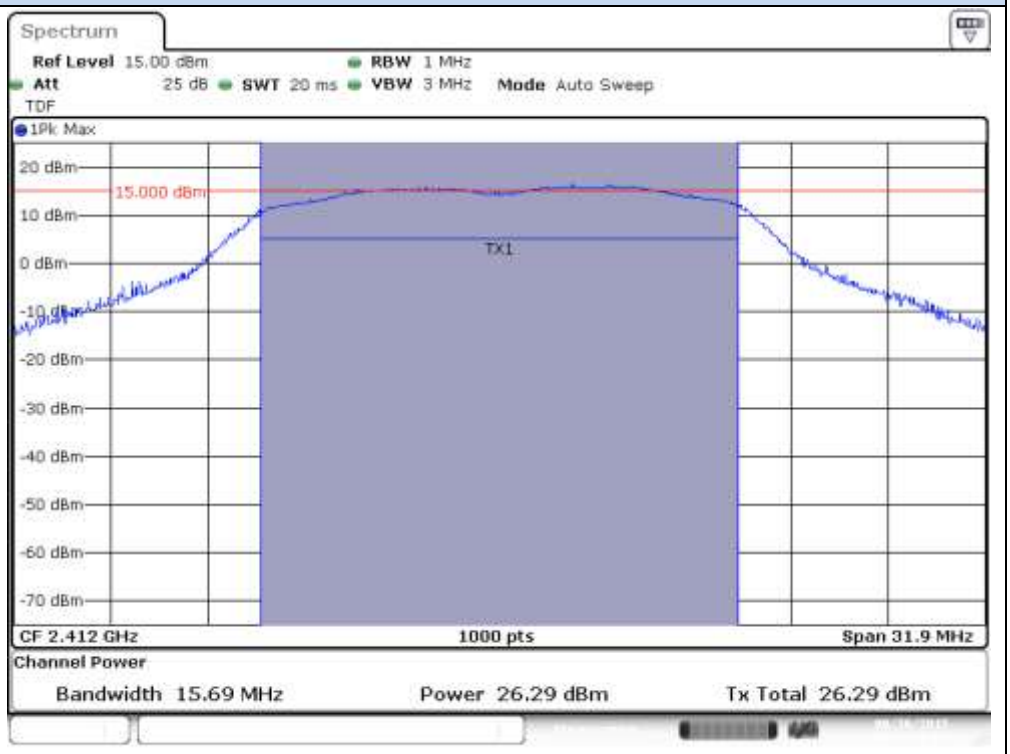
## Max Power, Chain B – CH1




Date: 26.AUG.2015 14:37:29



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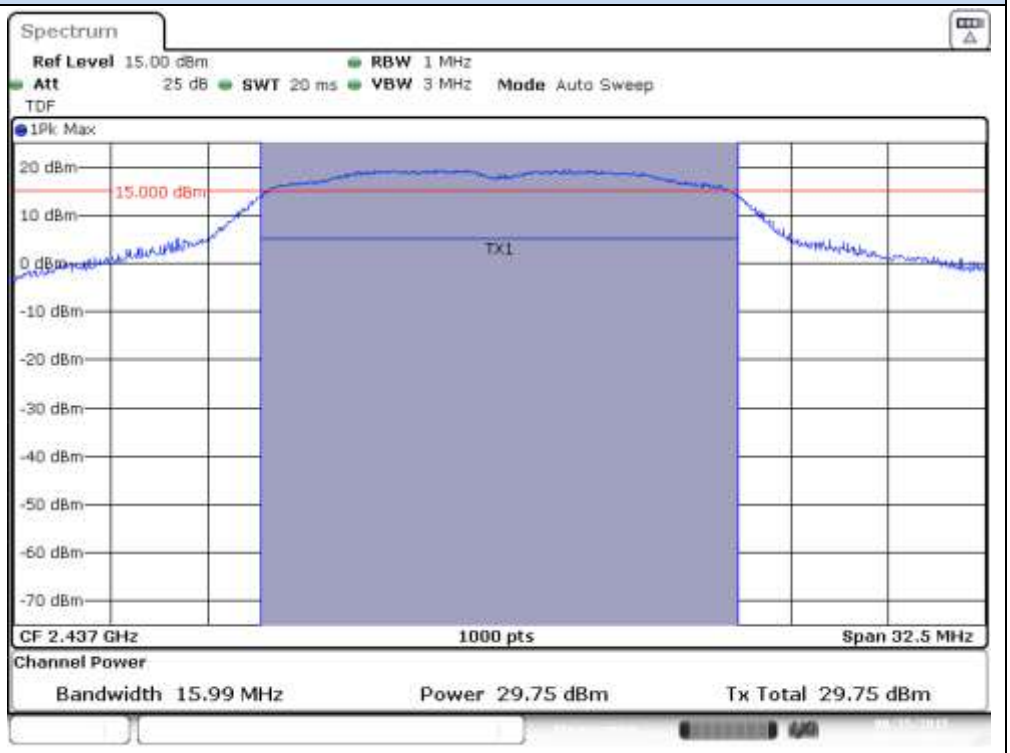
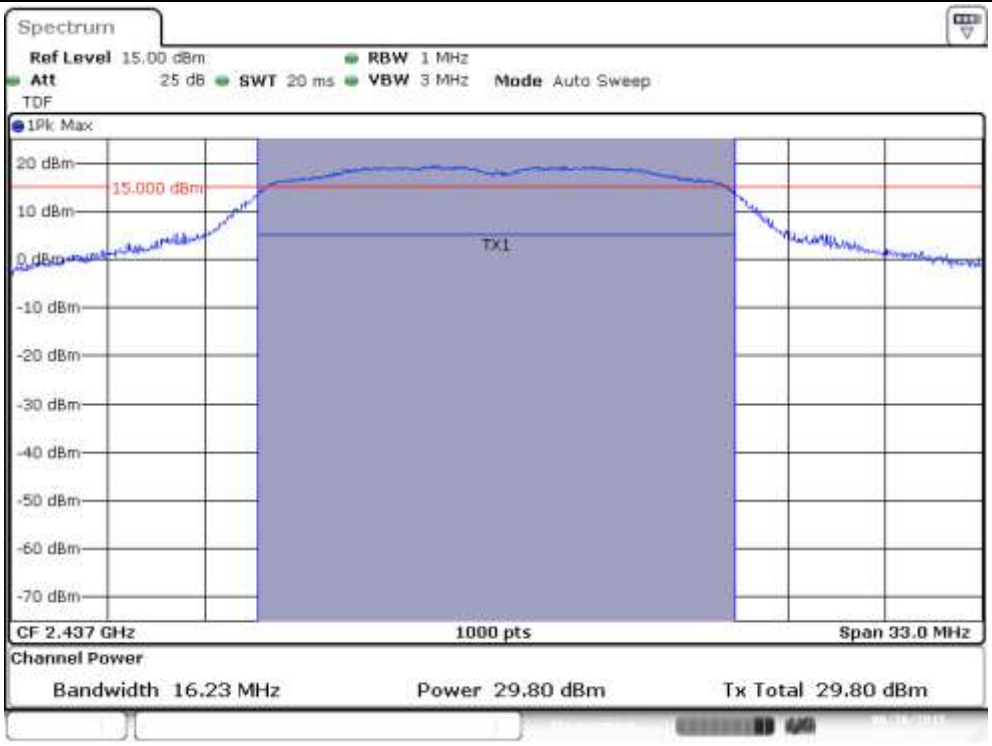
## Max Power, Chain A – CH6




Date: 25.AUG.2015 17:17:14

## Max Power, Chain B – CH6




Date: 26.AUG.2015 14:45:17



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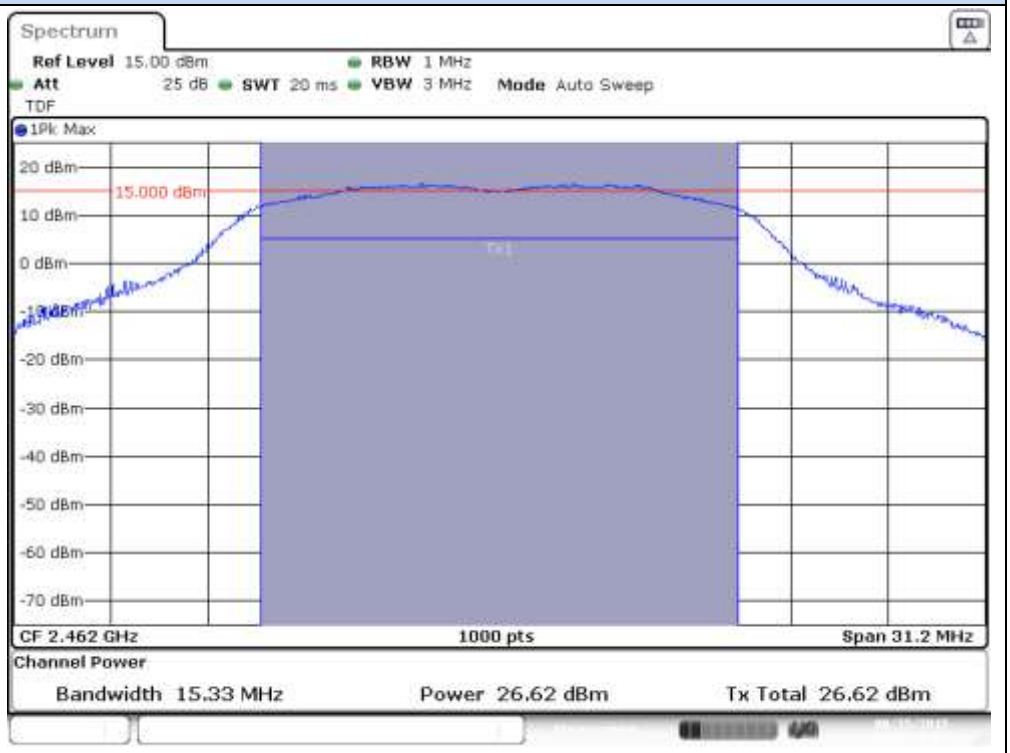
## Max Power, Chain A – CH11

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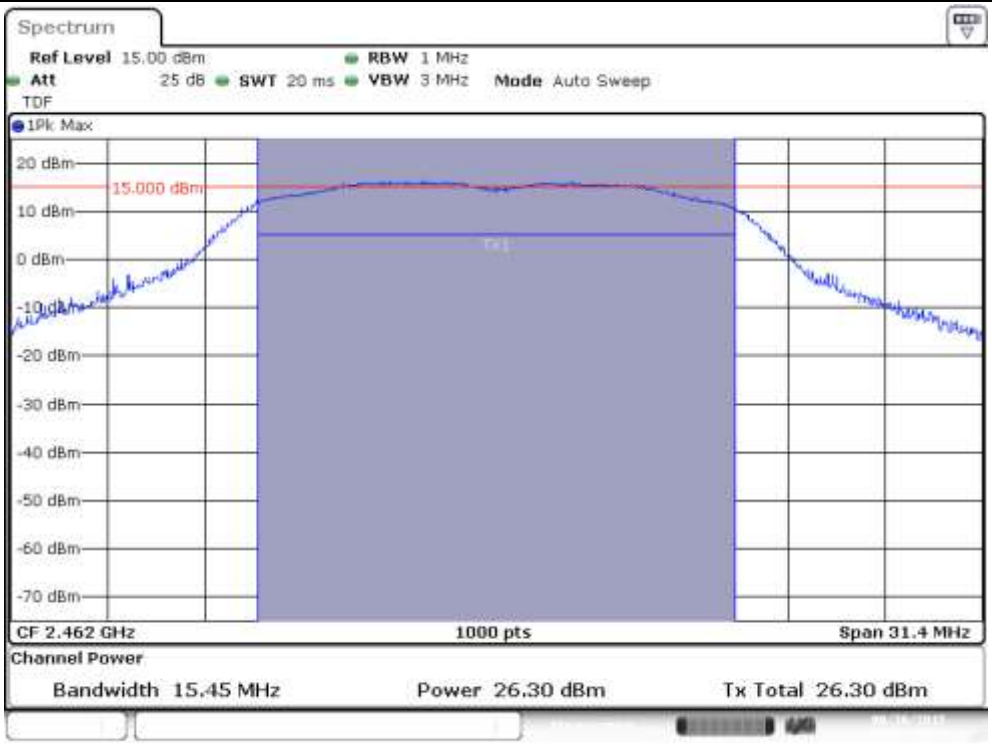
## Max Power, Chain B – CH11




Date: 26.AUG.2015 14:50:53



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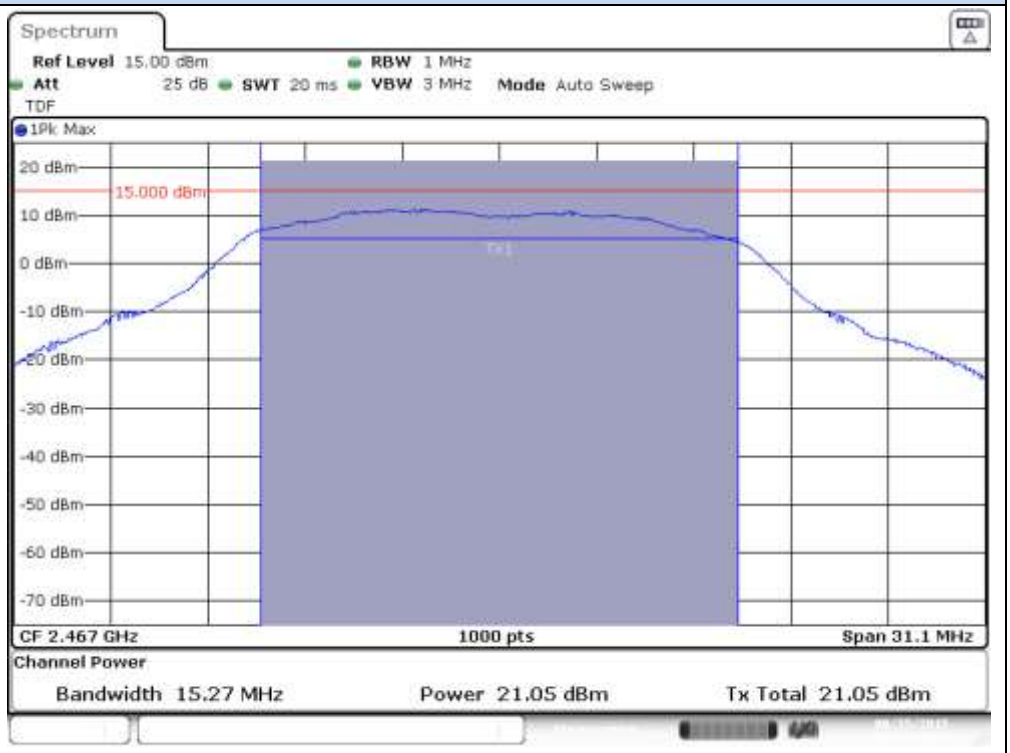
## Max Power, Chain A – CH12

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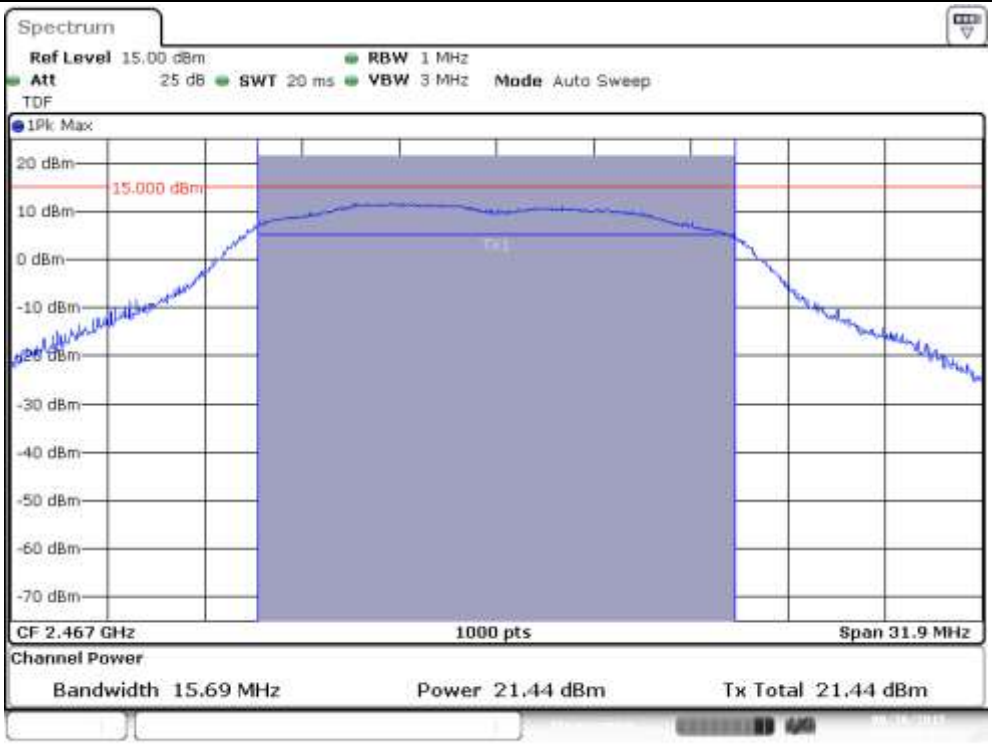
## Max Power, Chain B – CH12

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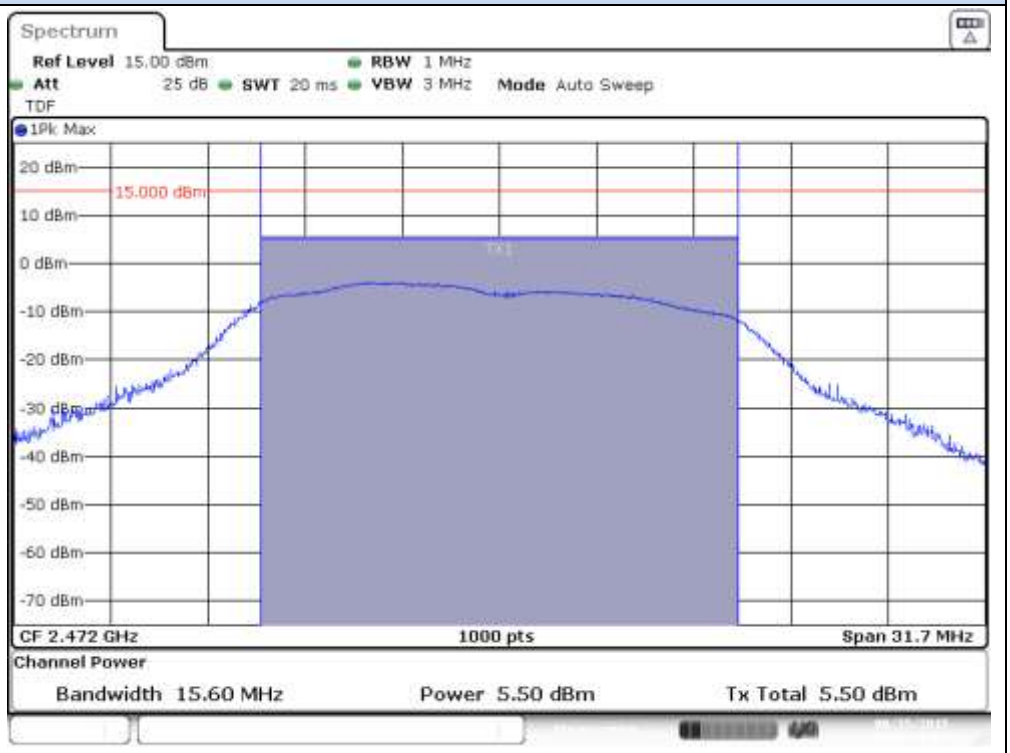
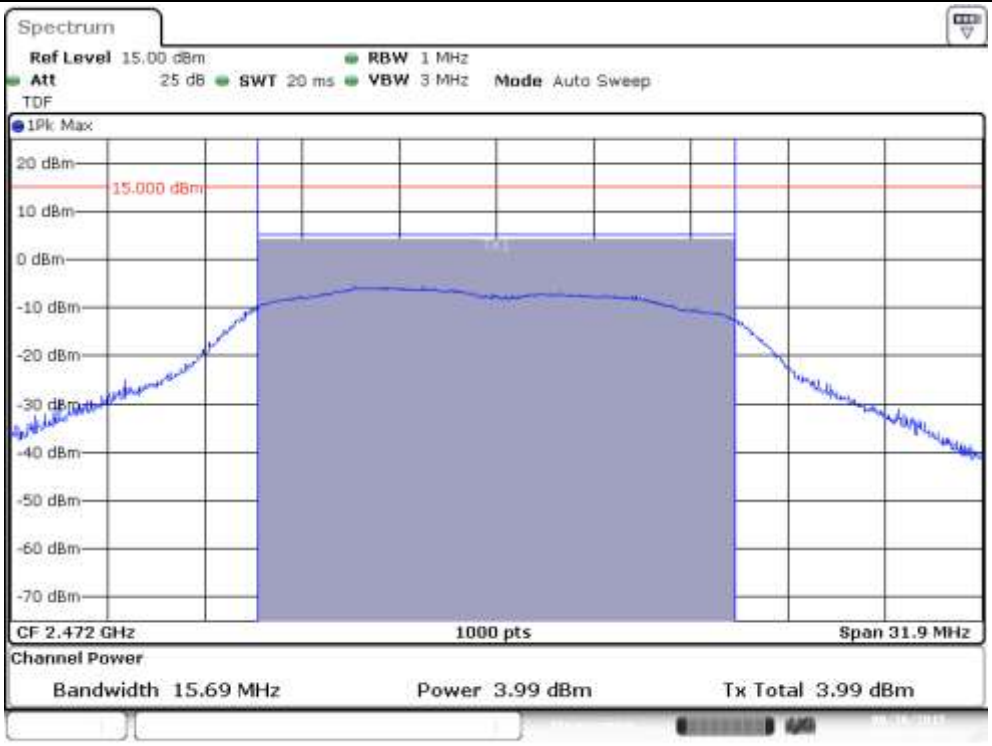
## Max Power, Chain A – CH13




Date: 25.AUG.2015 17:48:19

## Max Power, Chain B – CH13

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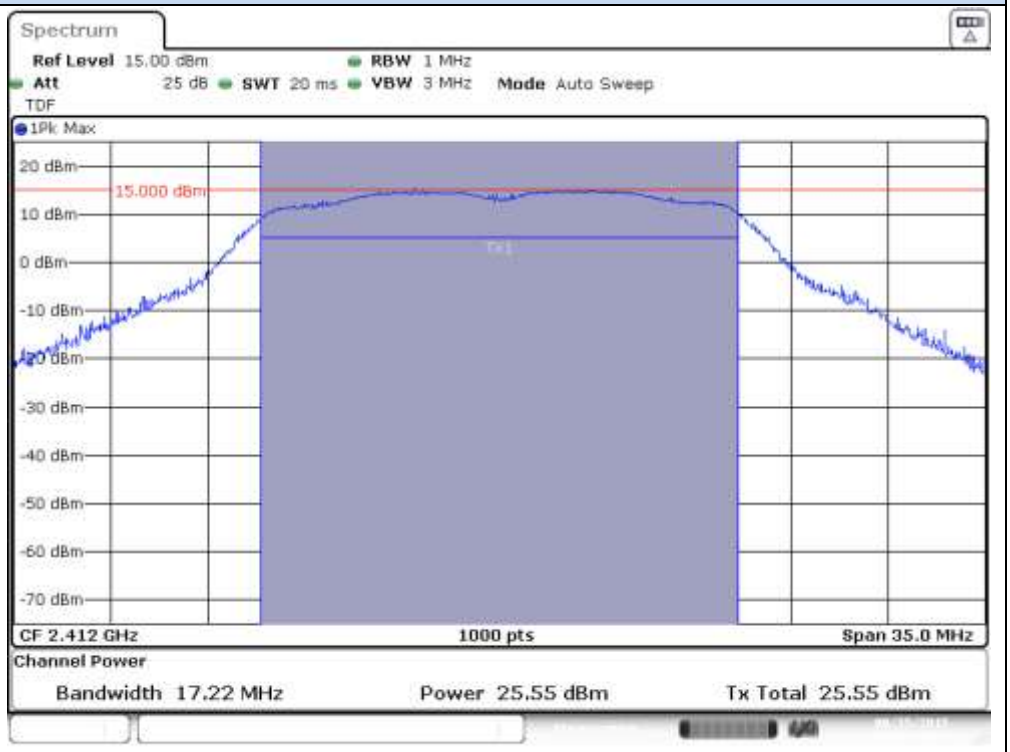
# 802.11n20, HT0 (SISO)

## Max Power, Chain A – CH1

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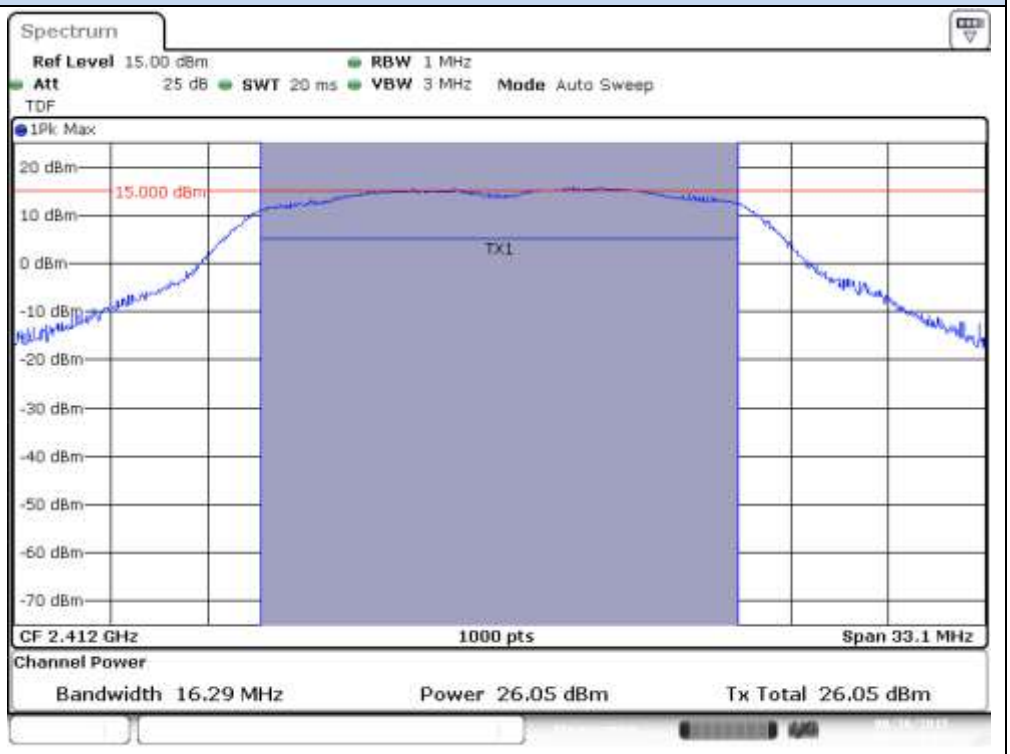
## Max Power, Chain B – CH1

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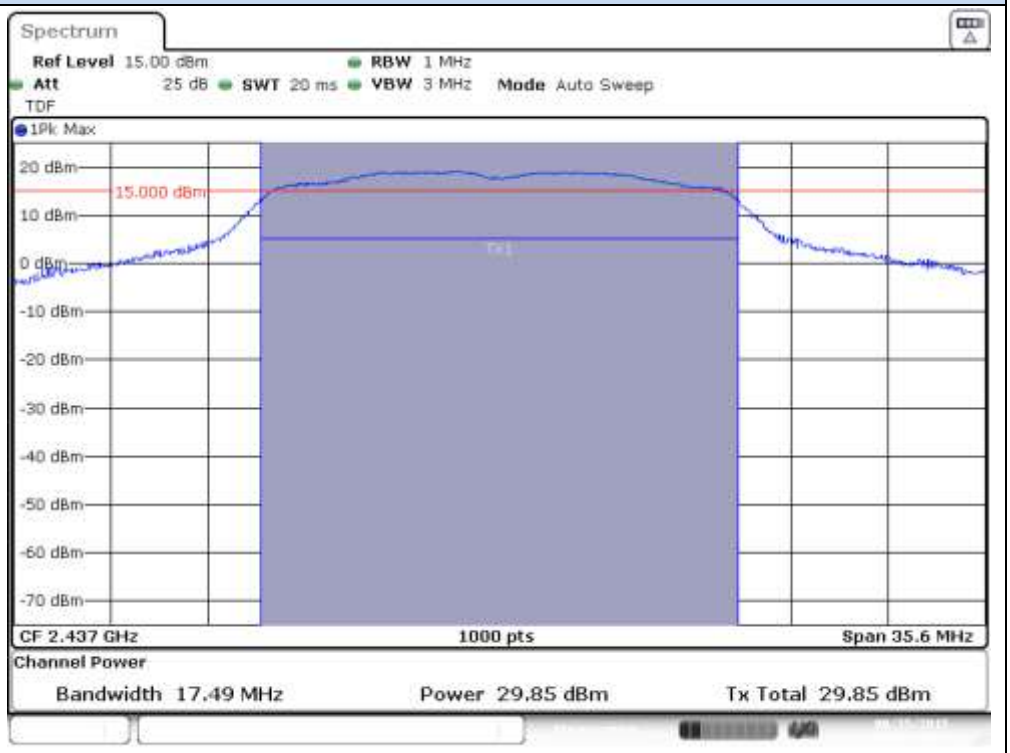
## Max Power, Chain A – CH6

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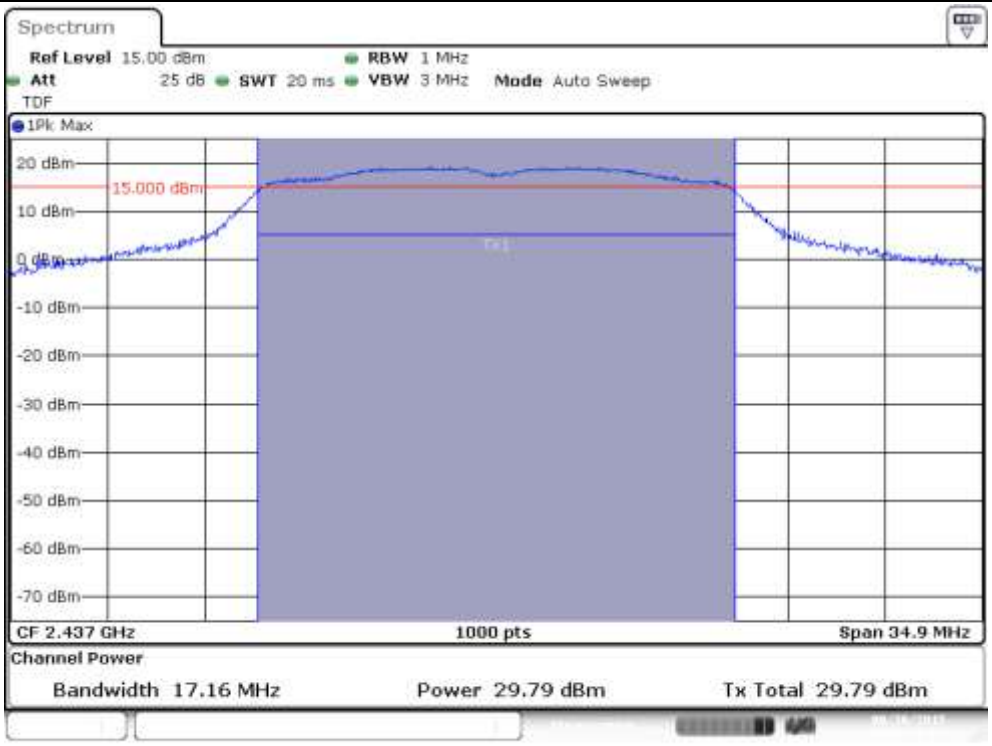
## Max Power, Chain B – CH6

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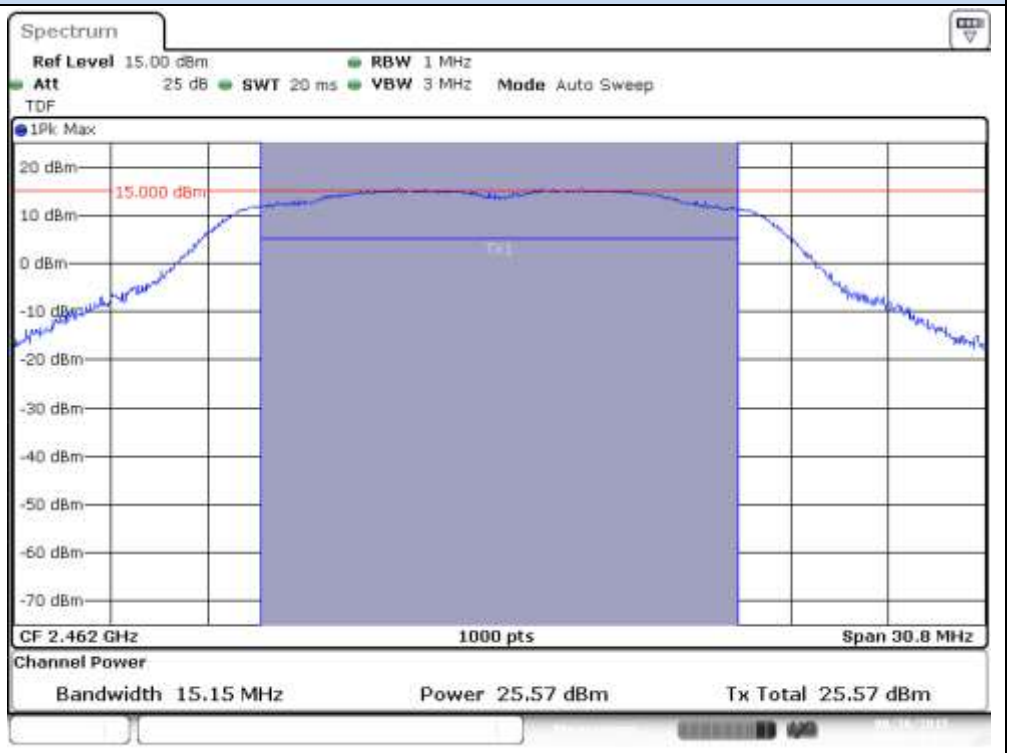
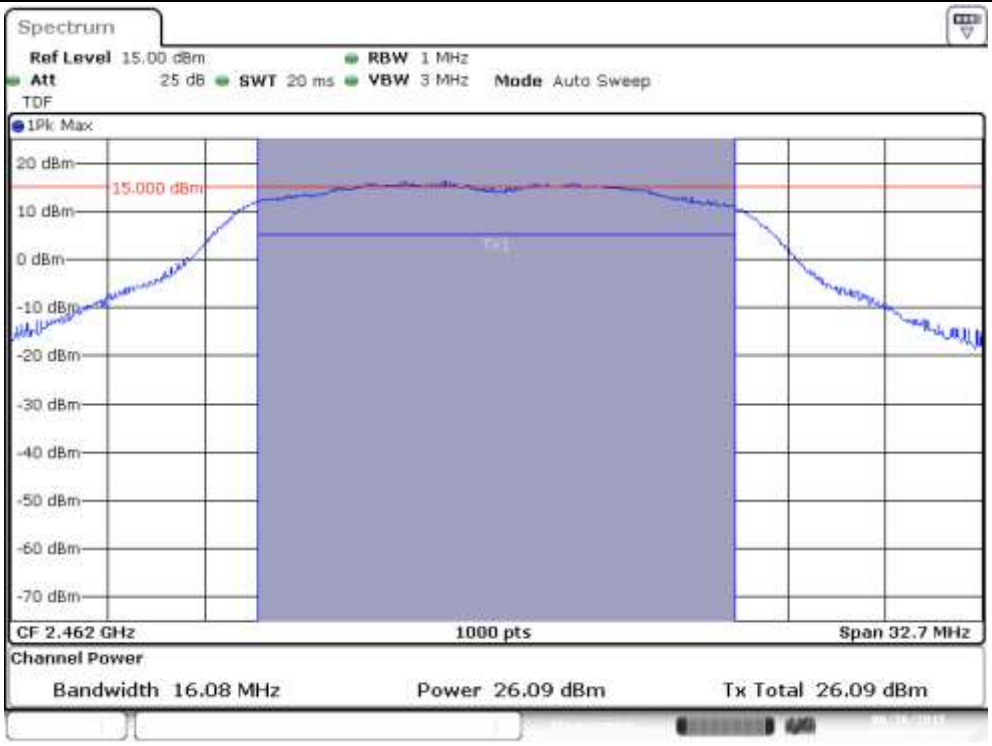
## Max Power, Chain A – CH11




Date: 26.AUG.2015 10:39:55

## Max Power, Chain B – CH11




Date: 26.AUG.2015 16:01:18



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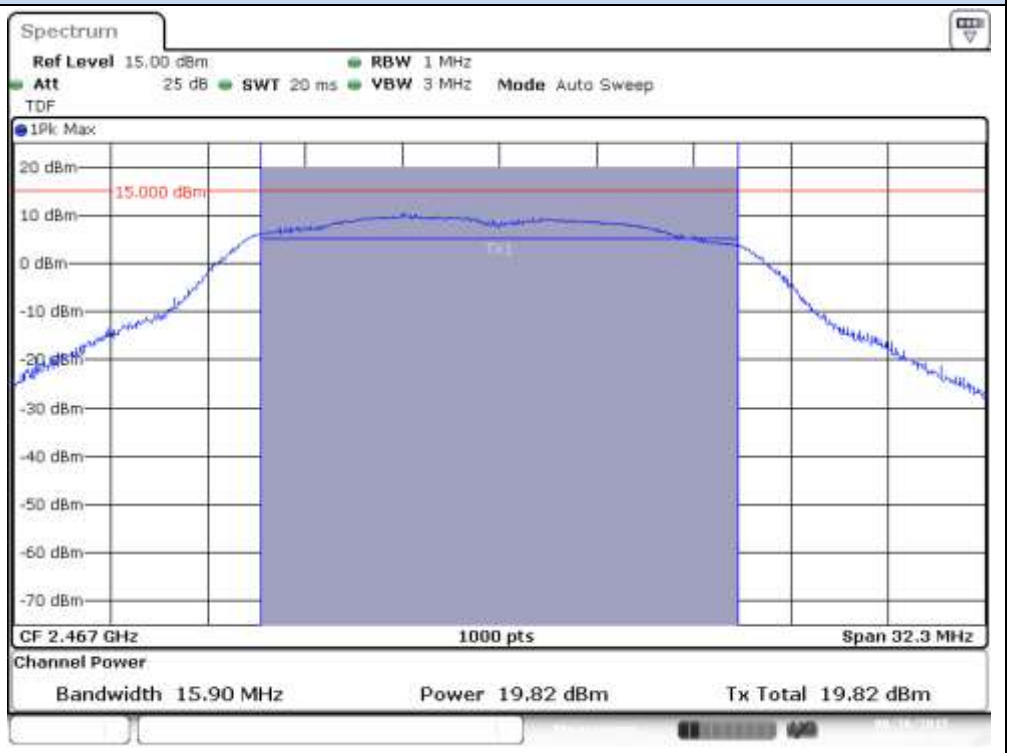
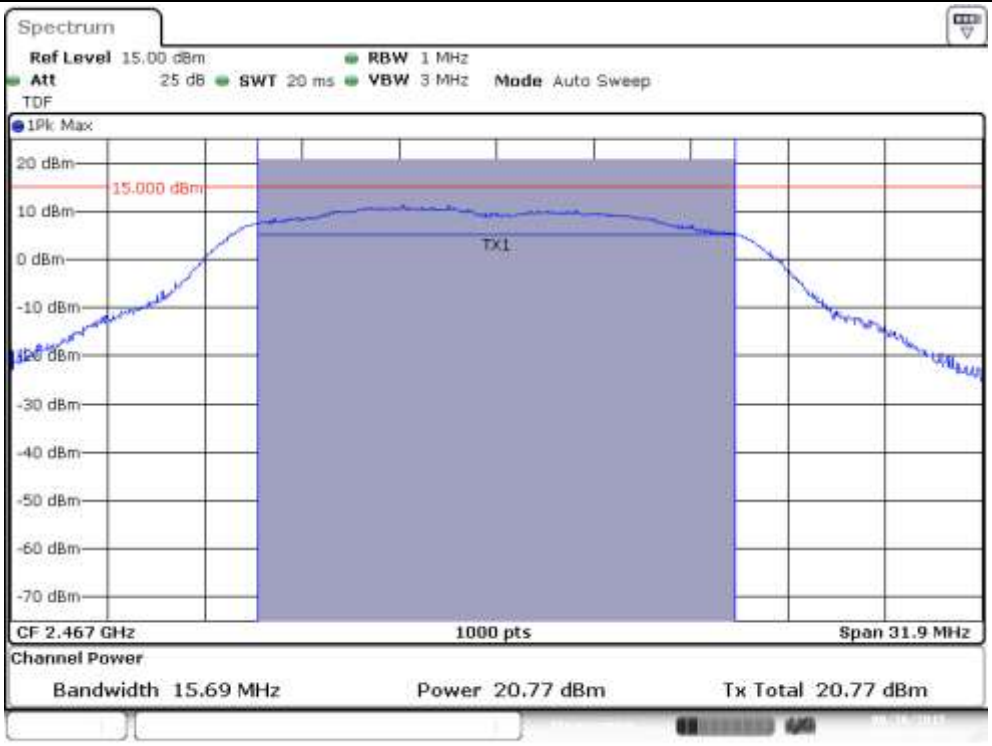
## Max Power, Chain A – CH12




Date: 26.AUG.2015 10:54:58

## Max Power, Chain B – CH12




Date: 26.AUG.2015 16:10:46



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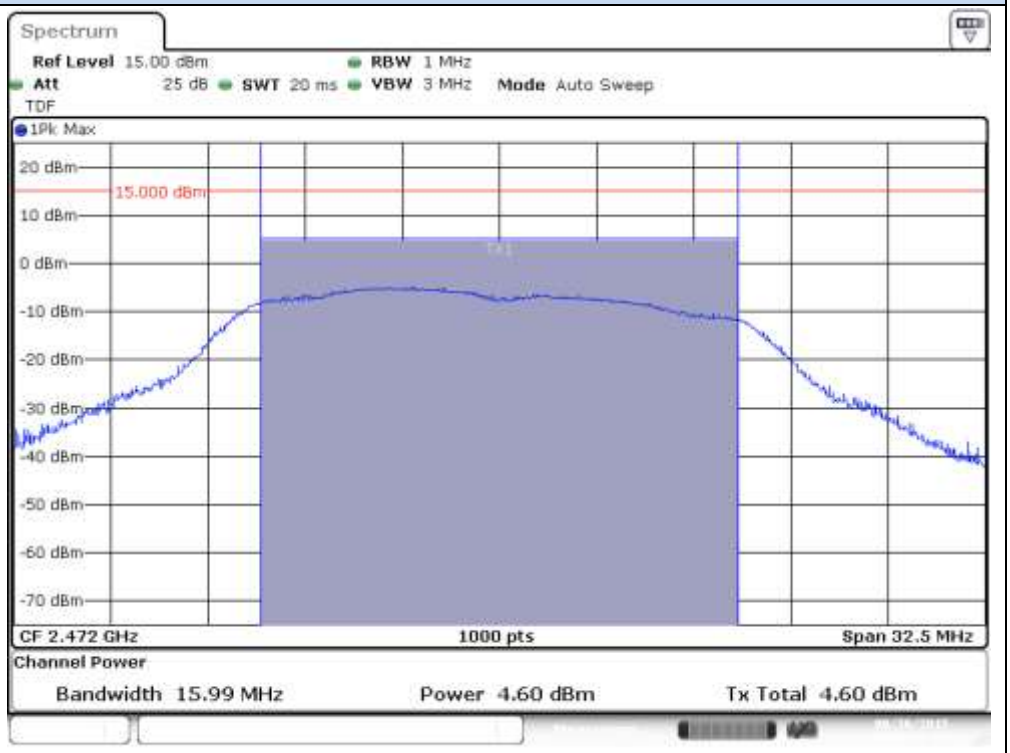
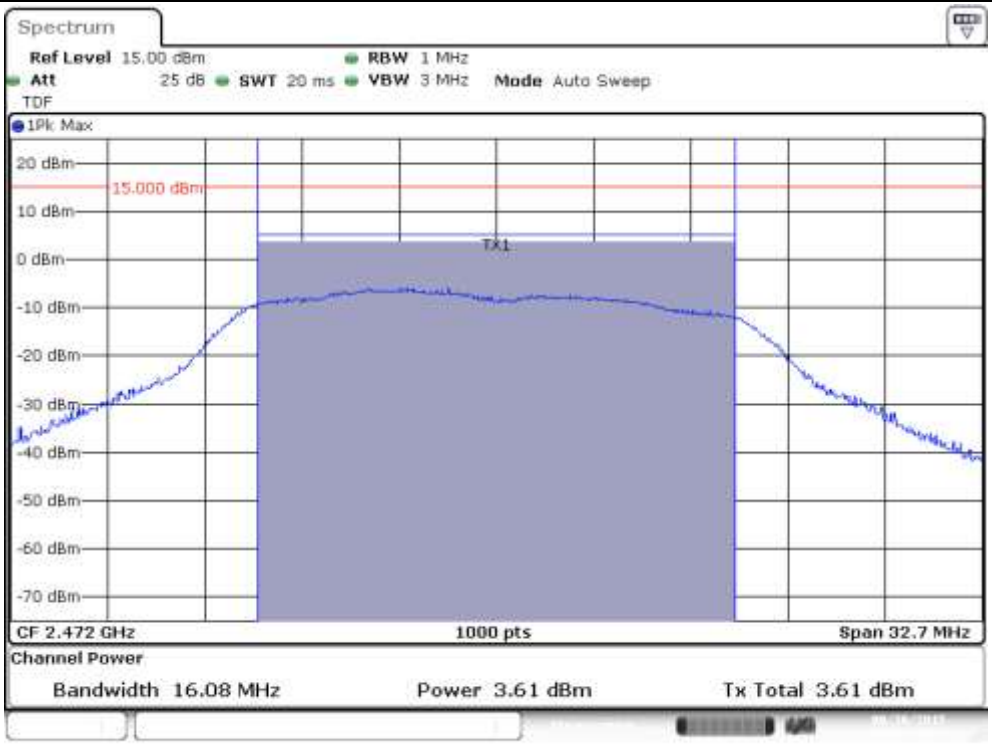
## Max Power, Chain A – CH13




Date: 26.AUG.2015 11:01:36

## Max Power, Chain B – CH13




Date: 26.AUG.2015 16:26:43



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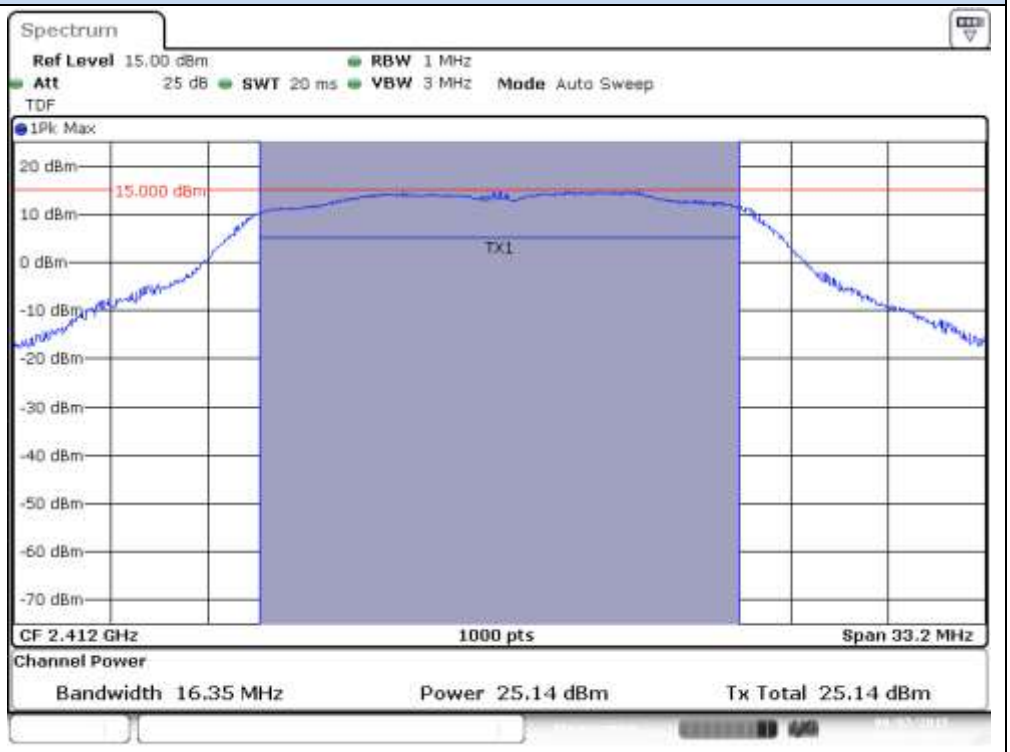
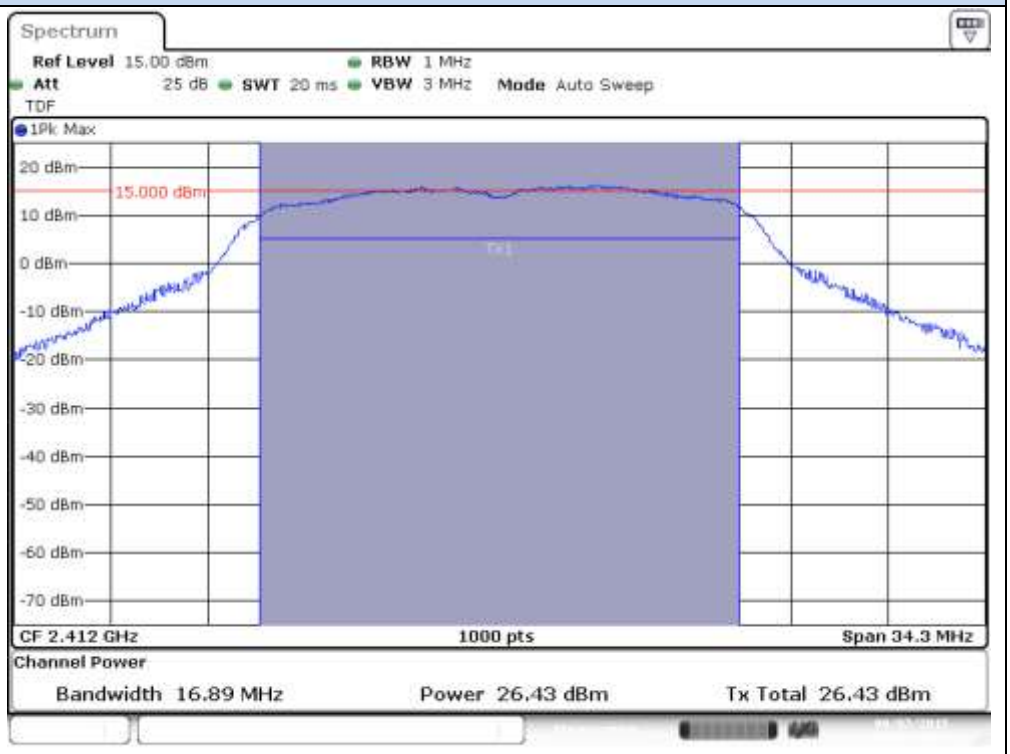
# 802.11n20, HT8 (MIMO)

## Max Power, Chain A – CH1




Date: 7.SEP.2015 14:18:12

## Max Power, Chain B – CH1




Date: 7.SEP.2015 16:26:02



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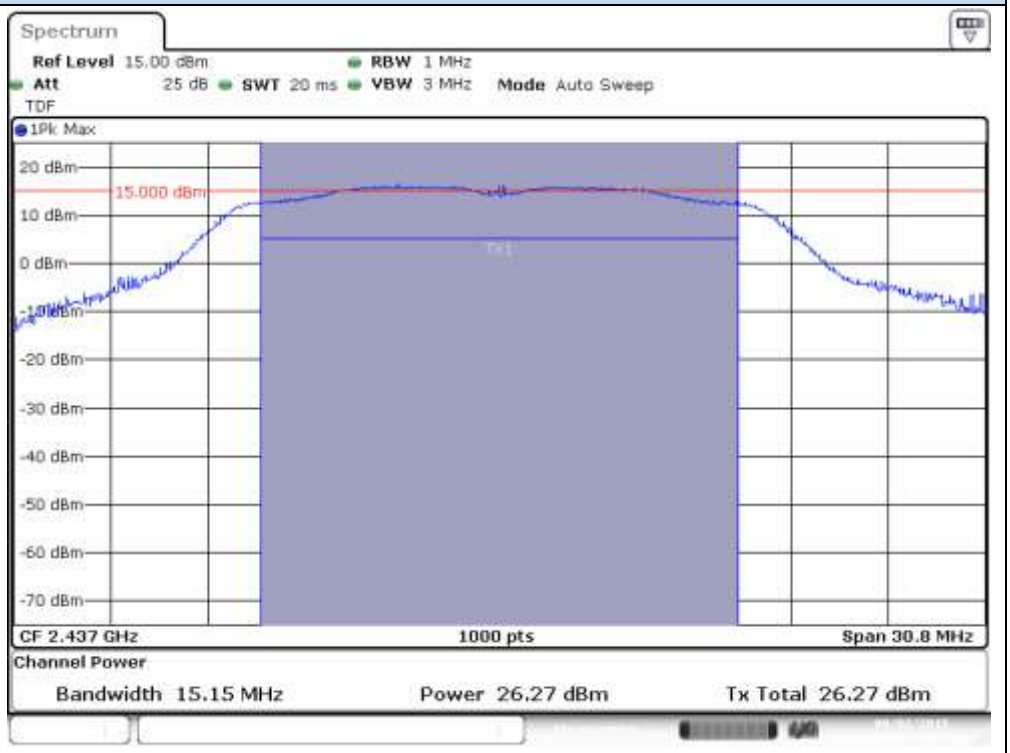
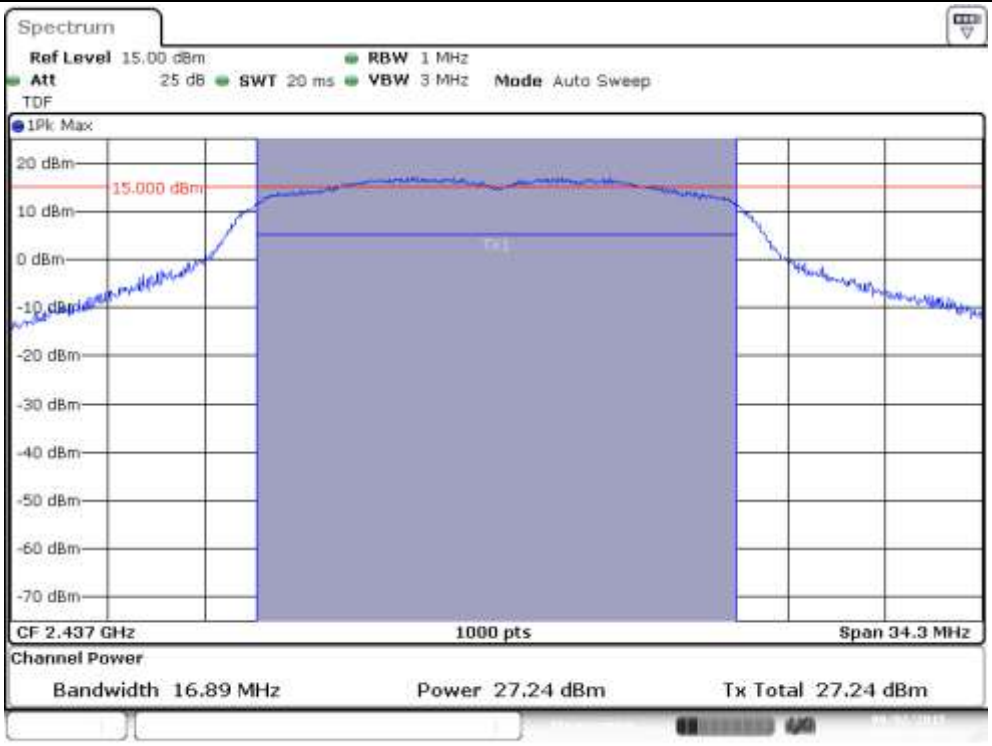
## Max Power, Chain A – CH6




Date: 2 SEP.2015 16:45:52

## Max Power, Chain B – CH6




Date: 2 SEP.2015 18:06:23



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