LTA
Laboratory for Test & Approval Co.,Ltd.

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http://www.ltalab.com

SAMMI
삼미정보시스템(주)

Dates of Tests : Nov 25~Dec 02 2010
Test Report S/N: LR500111012A
Test Site : LTA CO., LTD

# CERTIFICATION OF COMPLIANCE

FCC ID. **RQKWUBR-506N**

APPLICANT **Sammi Information Systems Co., Ltd.**

| | | |
|---|---|---|
| **Equipment Class** | : | **Digital Transmission System (DTS)** |
| **Manufacturing Description** | : | **Wireless LAN Module** |
| **Manufacturer** | : | **SparkLAN Communications, Inc.** |
| **Model name** | : | **WUBR-506N** |
| **Test Device Serial No.:** | : | **Identical prototype** |
| **Rule Part(s)** | : | **FCC Part 15.247 Subpart C; ANSI C-63.4-2003** |
| **Frequency Range** | : | **2412MHz ~ 2462MHz for 802.11b/g/n** |
| | : | **5745MHz ~ 5825MHz for 802.11a/an** |
| **Max. Output Power** | : | **Max 15.32dBm - Conducted (802.11b)** |
| | : | **Max 14.19dBm - Conducted (802.11g)** |
| | : | **Max 19.11dBm - Conducted (802.11n_20MHz)** |
| | : | **Max 18.35dBm - Conducted (802.11n_40MHz)** |
| | : | **Max 15.51dBm - Conducted (802.11a)** |
| | : | **Max 15.98dBm - Conducted (802.11an_20MHz)** |
| | : | **Max 15.97dBm - Conducted (802.11an_40MHz)** |
| **Data of issue** | : | **December 3, 2010** |

This test report is issued under the authority of:

Kyung-Taek LEE, Technical Manager

The test was supervised by:

Hyun-Chae You, Test Engineer

**This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.**

NVLAP®
NVLAP LAB Code.: 200723-0

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**APPENDIX**

APPENDIX TEST EQUIPMENT USED FOR TESTS ---------- 89

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# 1. General information's

## 1-1 Test Performed


| | | |
|---|---|---|
| Company name | : | LTA Co., Ltd. |
| Address | : | 243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822 |
| Web site | : | http://www.ltalab.com |
| E-mail | : | chahn@ltalab.com |
| Telephone | : | +82-31-323-6008 |
| Facsimile | | +82-31-323-6010 |


Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

## 1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

| Agency | Country | Accreditation No. | Validity | Reference |
|---|---|---|---|---|
| NVLAP | U.S.A | 200723-0 | 2011-09-30 | ECT accredited Lab. |
| RRL | KOREA | KR0049 | 2011-06-20 | EMC accredited Lab. |
| FCC | U.S.A | 610755 | 2011-04-22 | FCC filing |
| VCCI | JAPAN | R2133, C2307 | 2011-06-21 | VCCI registration |
| IC | CANADA | IC5799 | 2012-05-14 | IC filing |

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# 2. Information's about test item

## 2-1 Applicant

| | | |
|---|---|---|
| Company name | : | Sammi Information Systems Co., Ltd. |
| Address | : | 11F Kolon Aston Bldg, 505-14, Gasan-dong,Guemcheon-Gu, Seoul,153-803 KOREA |
| Tel / Fax | : | +82 2 790-5505/ +82 2 797-9206 |

## 2-2 Manufacturer

| | | |
|---|---|---|
| Company name | : | SparkLAN Communications, Inc. |
| Address | : | 8F, No.257, Sec.2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan |
| Tel / Fax | : | +886-2-2659-1880/ +886-2-2659-5538 |

## 2-3 Equipment Under Test (EUT)

| | | |
|---|---|---|
| Trade name | : | Wireless LAN Module |
| FCC ID | : | RQKWUBR-506N |
| Model name | : | WUBR-506N |
| Serial number | : | Identical prototype |
| Date of receipt | : | November 25, 2010 |
| EUT condition | : | Pre-production, not damaged |
| Antenna type | : | Dipole antenna with Max. 2.5dBi gain |
| Frequency Range | : | 2412MHz ~ 2462MHz for 802.11b/g/n |
| | : | 5745MHz ~ 5825MHz for 802.11a/an |
| RF output power | : | Max 15.32dBm - Conducted (802.11b) |
| | : | Max 14.19dBm - Conducted (802.11g) |
| | : | Max 19.11dBm - Conducted (802.11n_20MHz) |
| | : | Max 18.35dBm - Conducted (802.11n_40MHz) |
| | : | Max 15.51dBm - Conducted (802.11a) |
| | : | Max 15.98dBm - Conducted (802.11an_20MHz) |
| | : | Max 15.97dBm - Conducted (802.11an_40MHz) |
| Number of channels | : | 13 for 802.11b & 802.11g & 802.11n_20MHz |
| | : | 11 for 802.11n_40MHz |
| | : | 5 for 802.11a & 802.11an_20MHz |
| | : | 2 for 802.11an_40MHz |
| Type of Modulation | : | CCK, DQPSK, DBPSK for DSSS |
| | | 64QAM, 16QAM, QPSK, BPSK for OFDM |
| Transfer Rate | : | 11/5.5/2/1Mbps for 802.11b |
| | : | 54/48/36/24/18/12/9/6Mbps for 802.11g &802.11a |
| | : | Up to 300.0Mbps |
| Power Source | : | DC 3.3V by main system |

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## 2-4 Tested frequency

| | LOW | MID | HIGH |
|---|---|---|---|
| Frequency (MHz) for 802.11b/g/n20 | 2412 | 2437 | 2462 |
| Frequency (MHz) for 802.11n40 | 2422 | 2437 | 2452 |
| Frequency (MHz) for 802.11a/an20 | 5745 | 5785 | 5825 |
| Frequency (MHz) for 802.11an40 | 5755 | - | 5795 |

## 2-5 Ancillary Equipment

| Equipment | Model No. | Serial No. | Manufacturer |
|---|---|---|---|
| Notebook | VOSTRO 1015 | N/A | DELL |

## 2-6 Description of Test modes

**For 2.4GHz:**

**11 channels are provided for 802.11b, 802.11g and 802.11n_20MHz**

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---|---|---|---|
| 1 | 2412MHz | 7 | 2442MHz |
| 2 | 2417MHz | 8 | 2447MHz |
| 3 | 2422MHz | 9 | 2452MHz |
| 4 | 2427MHz | 10 | 2457MHz |
| 5 | 2432MHz | 11 | 2462MHz |
| 6 | 2437MHz | | |

**7 channels are provided for 802.11n_40MHz**

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---|---|---|---|
| 1 | 2422MHz | 5 | 2442MHz |
| 2 | 2427MHz | 6 | 2447MHz |
| 3 | 2432MHz | 7 | 2452MHz |
| 4 | 2437MHz | | |

**For 5.0GHz:**

**5 channels are provided for 802.11a and 802.11an_20MHz**

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---|---|---|---|
| 149 | 5745MHz | 161 | 5805MHz |
| 153 | 5765MHz | 165 | 5825MHz |
| 157 | 5785MHz | | |

**2 channels are provided for 802.11an_40MHz**

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|---|---|---|---|
| 149 | 5745MHz | 165 | 5825MHz |

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# 3. Test Report

## 3.1 Summary of tests

| FCC Part Section(s) | Parameter | Limit | Test Condition | Status (note 1) |
|---|---|---|---|---|
| 15.247(a) | 6 dB Bandwidth | > 500kHz | Conducted | C |
| 15.247(b) | Transmitter Peak Output Power | < 1Watt | | C |
| 15.247(d) | Transmitter Power Spectral Density | < 8dBm @ 3kHz | | C |
| 15.247(d) | Band Edge & Spurious | > 20 dBc | | C |
| 15.209 | Field Strength of Harmonics | Emission | Radiated | C |
| 15.207 | AC Conducted Emissions | Emissions | Conducted | NA note3 |
| 15.203 | Antenna requirement | - | - | C |

*Note 1*: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

*Note 2*: The data in this test report are traceable to the national or international standards.

*Note 3*: This device is only operated by DC

→ Antenna Requirement
The Sammi Information Systems Co., Ltd. FCC ID: RQKWUBR-506N unit complies with the requirement of §15.203. The antenna connector is the reverse polarity SMA connector.

The sample was tested according to the following specification:
FCC Parts 15.247; ANSI C-63.4-2003

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## 3.2 Technical Characteristics Test

### 3.2.1 6 dB Bandwidth

**Procedure:**

The bandwidth at 6dB below the highest in-band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is ( as close as possible to ) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

Span = 30 MHz

VBW = 300 kHz (VBW ≥ RBW)

Sweep = auto

Trace = max hold

Detector function = peak

**Measurement Data: 2.4GHz Band**

| Mode | Frequency (MHz) | Channel No. | Test Results | |
|---|---|---|---|---|
| | | | Measured Bandwidth (MHz) | Result |
| 802.11b | 2412 | 1 | 10.51 | Complies |
| | 2437 | 6 | 11.25 | Complies |
| | 2462 | 11 | 11.20 | Complies |
| 802.11g | 2412 | 1 | 16.54 | Complies |
| | 2437 | 6 | 16.59 | Complies |
| | 2462 | 11 | 16.59 | Complies |
| 802.11n _20MHz | 2412 | 1 | 17.76 | Complies |
| | 2437 | 6 | 17.71 | Complies |
| | 2462 | 11 | 17.76 | Complies |
| 802.11n _40MHz | 2422 | 1 | 36.30 | Complies |
| | 2437 | 4 | 36.30 | Complies |
| | 2452 | 7 | 36.21 | Complies |

- See next pages for actual measured spectrum plots.

**Minimum Standard:**

6 dB Bandwidth > 500kHz

**Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

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**Measurement Data: 5.0GHz Band**

| Mode | Frequency (MHz) | Channel No. | Test Results | |
|---|---|---|---|---|
| | | | Measured Bandwidth (MHz) | Result |
| 802.11a | 5745 | 149 | 16.67 | Complies |
| | 5785 | 157 | 16.67 | Complies |
| | 5825 | 165 | 16.59 | Complies |
| 802.11an _20MHz | 5745 | 149 | 17.76 | Complies |
| | 5785 | 157 | 17.76 | Complies |
| | 5825 | 165 | 17.71 | Complies |
| 802.11an _40MHz | 5745 | 149 | 36.47 | Complies |
| | 5825 | 165 | 36.56 | Complies |

- See next pages for actual measured spectrum plots.

**Minimum Standard:**

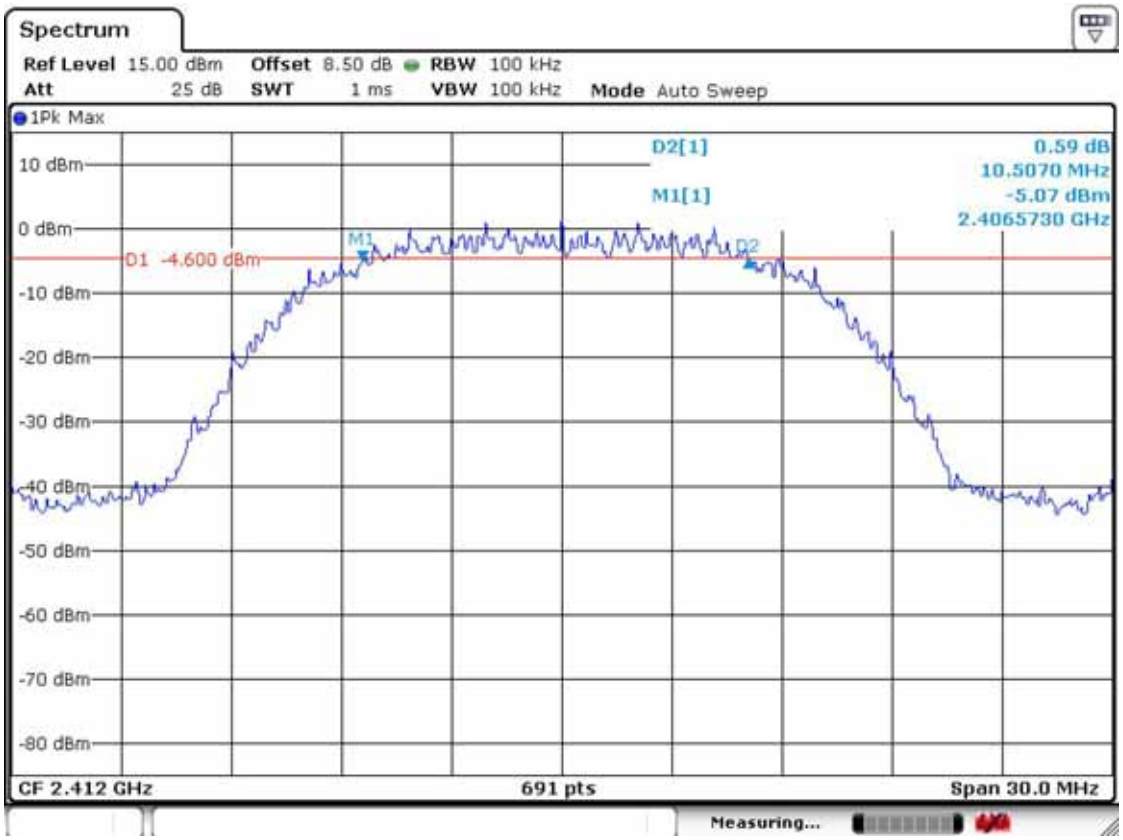
6 dB Bandwidth > 500kHz

**Measurement Setup**

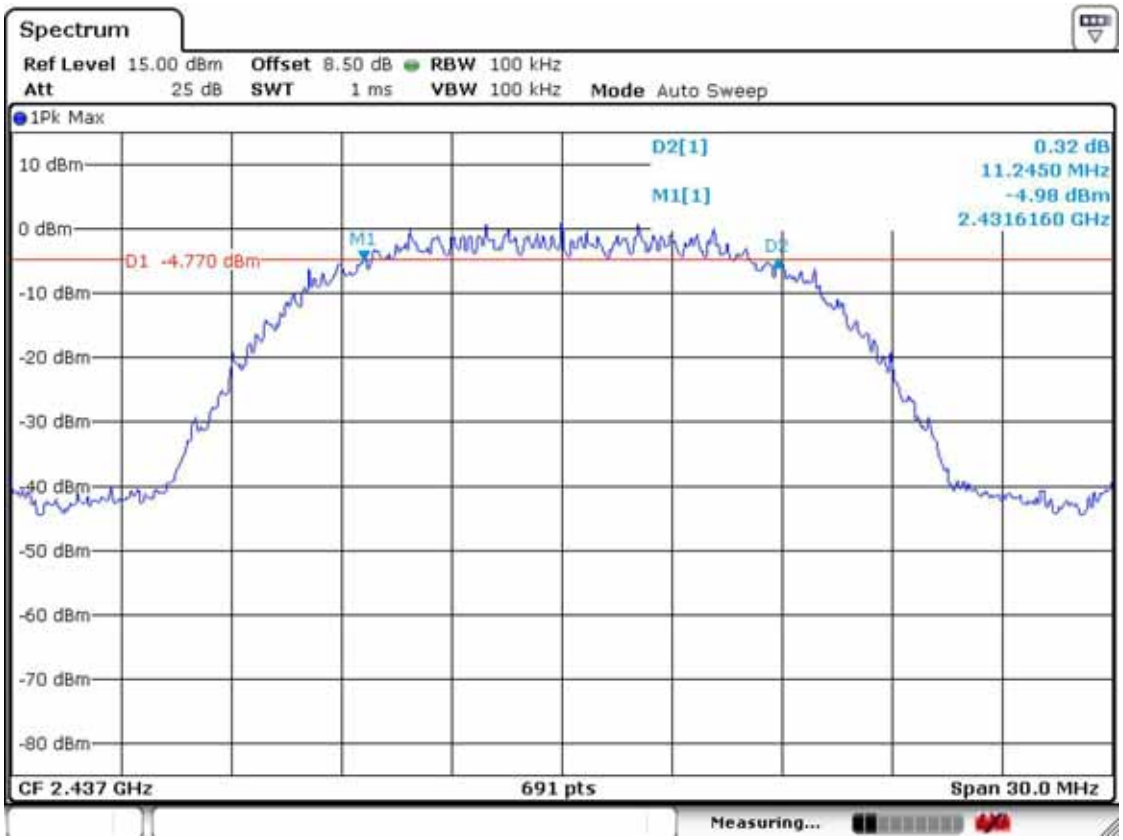
Same as the Chapter 3.2.1 (Figure 1)

# 802.11b

## CH 1




## CH 6

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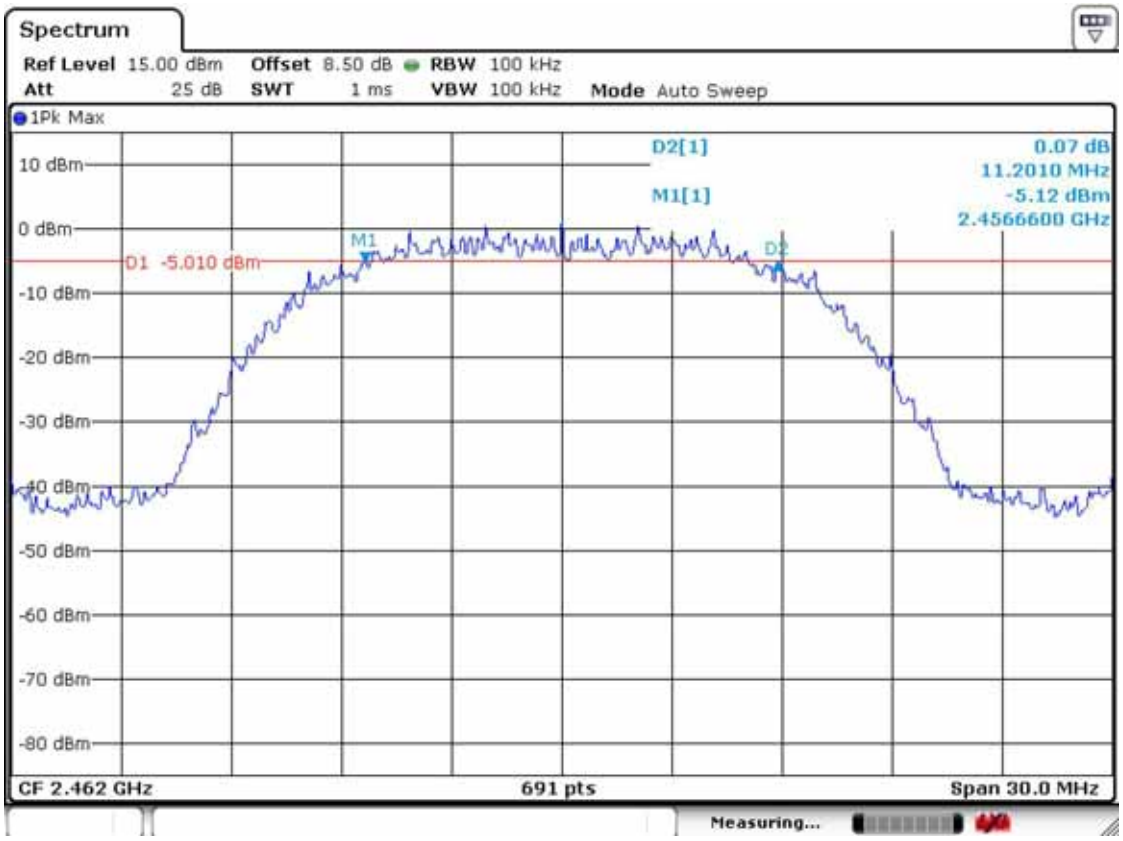
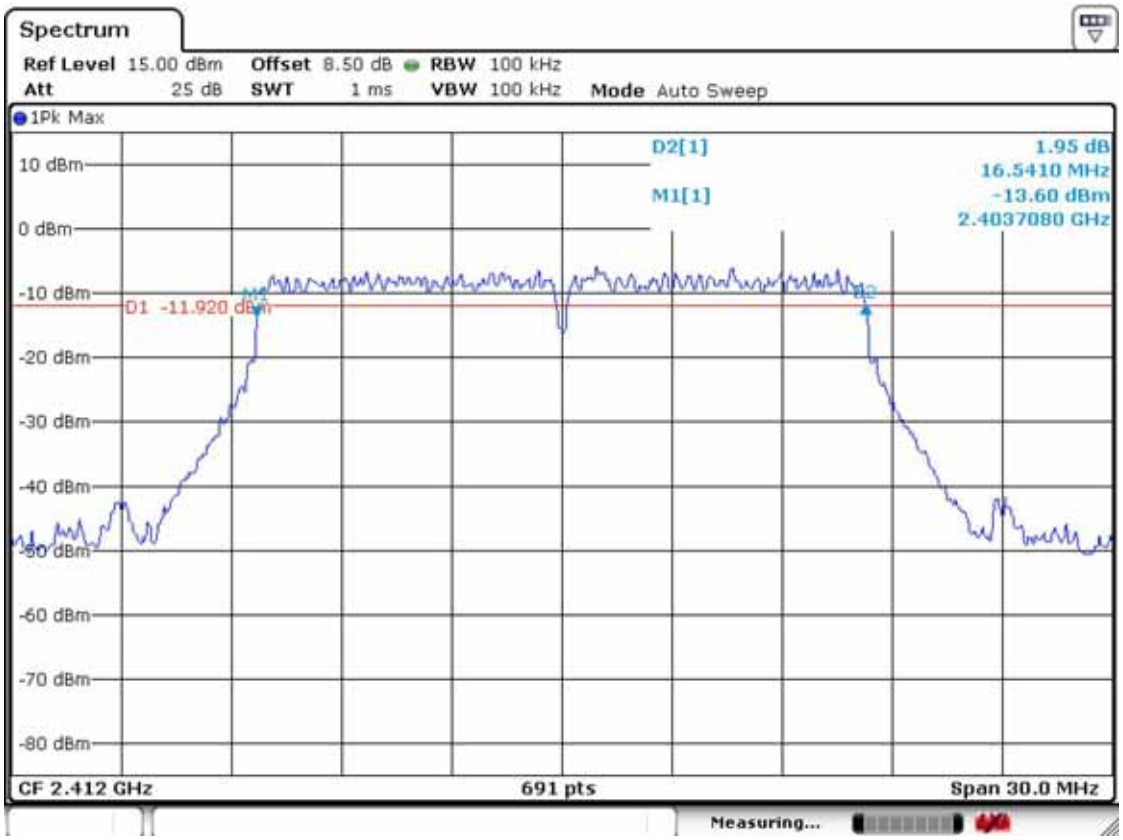
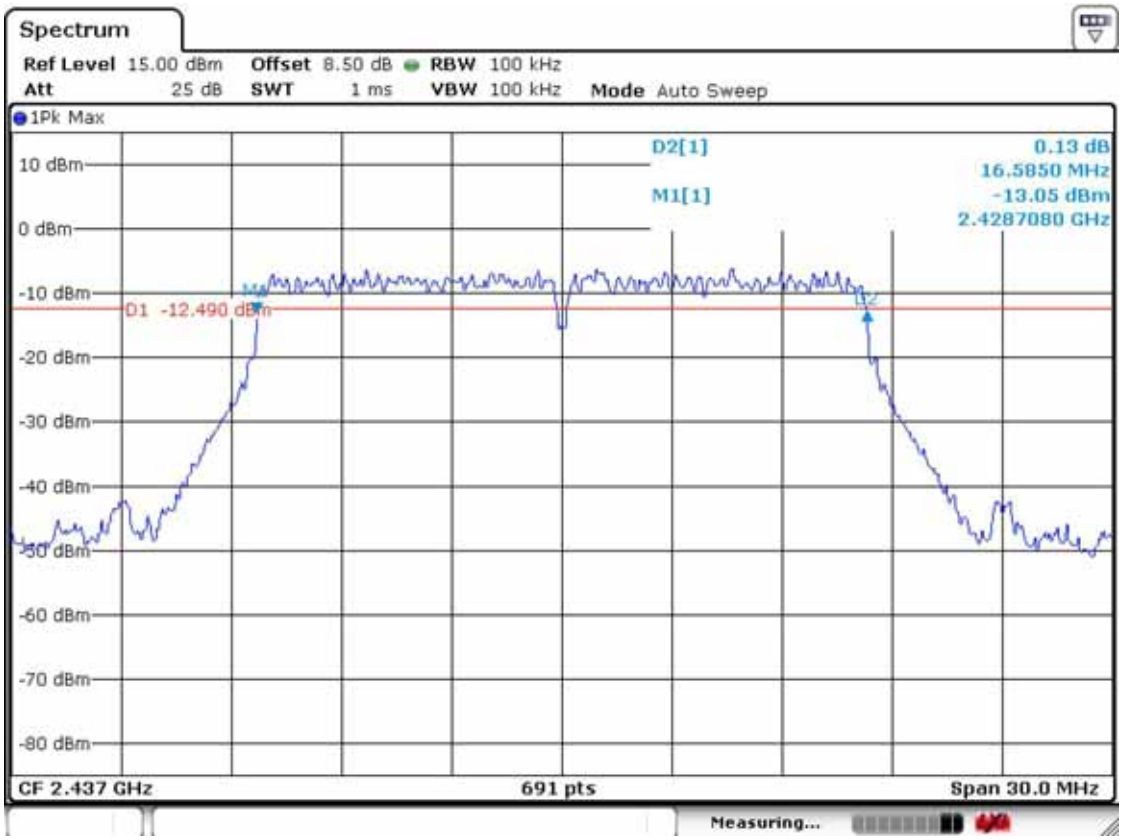
# CH 11


Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 100 kHz
Att 25 dB SWT 1 ms VBW 100 kHz Mode Auto Sweep
1Pk Max
D2[1] 0.07 dB
11.2010 MHz
M1[1] -5.12 dBm
2.4566600 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
D1 -5.010 dBm
M1
D2
CF 2.462 GHz
691 pts
Span 30.0 MHz
Measuring...

# 802.11g
## CH 1




## CH 6

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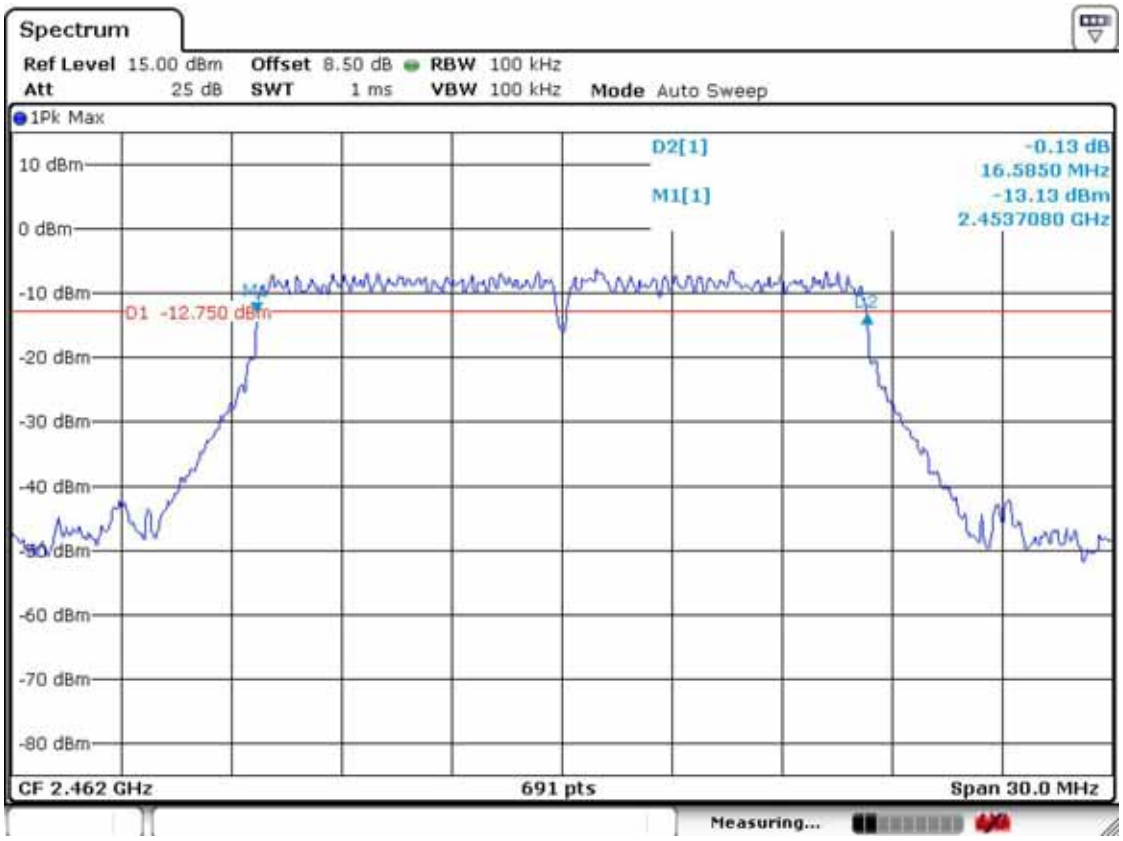
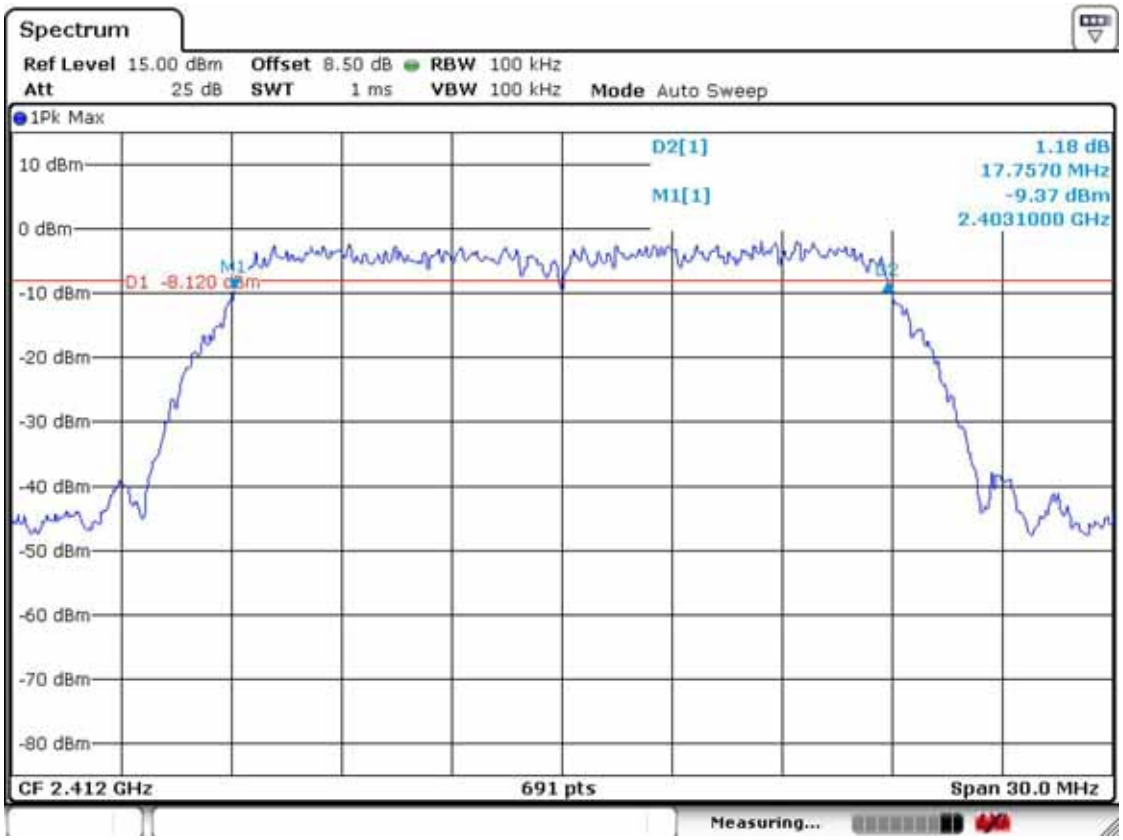
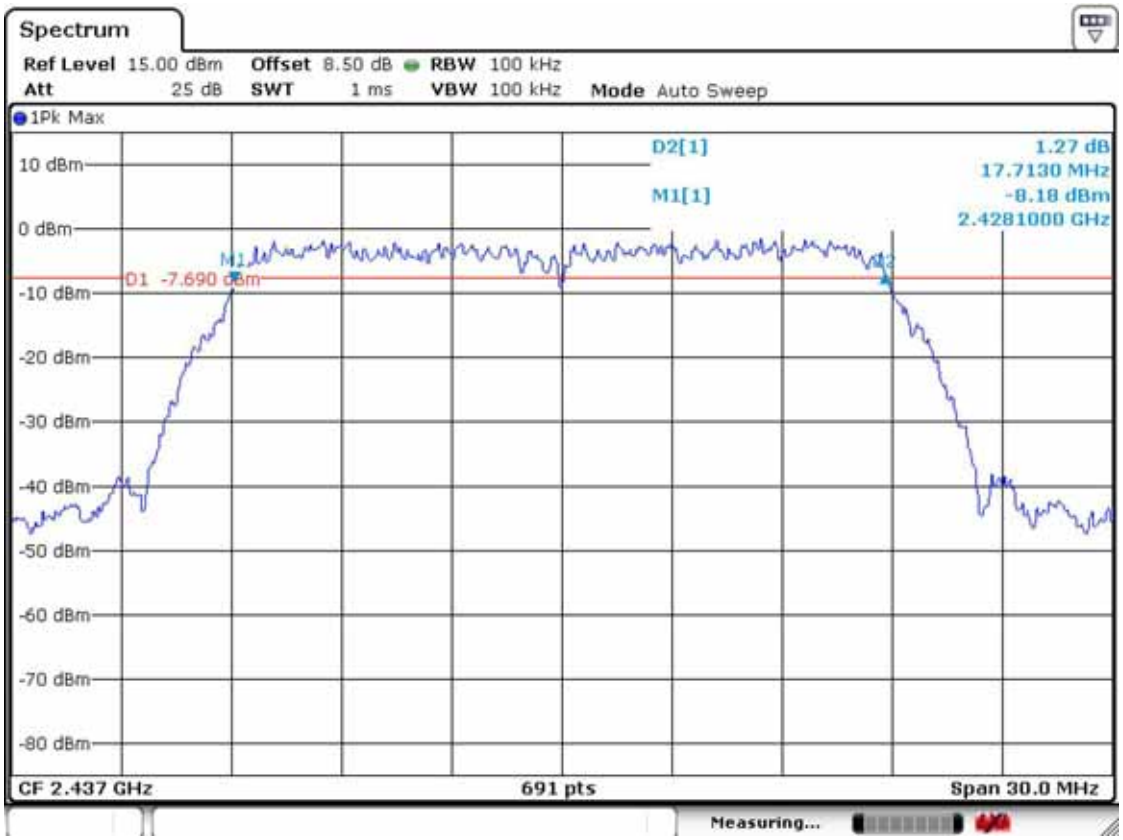
# CH 11


Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 100 kHz
Att 25 dB SWT 1 ms VBW 100 kHz Mode Auto Sweep
1Pk Max
D2[1] -0.13 dB
16.5850 MHz
M1[1] -13.13 dBm
2.4537080 GHz
10 dBm
0 dBm
-10 dBm
D1 -12.750 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.462 GHz
691 pts
Span 30.0 MHz
Measuring...

# 802.11n_20MHz
## CH 1




## CH 6

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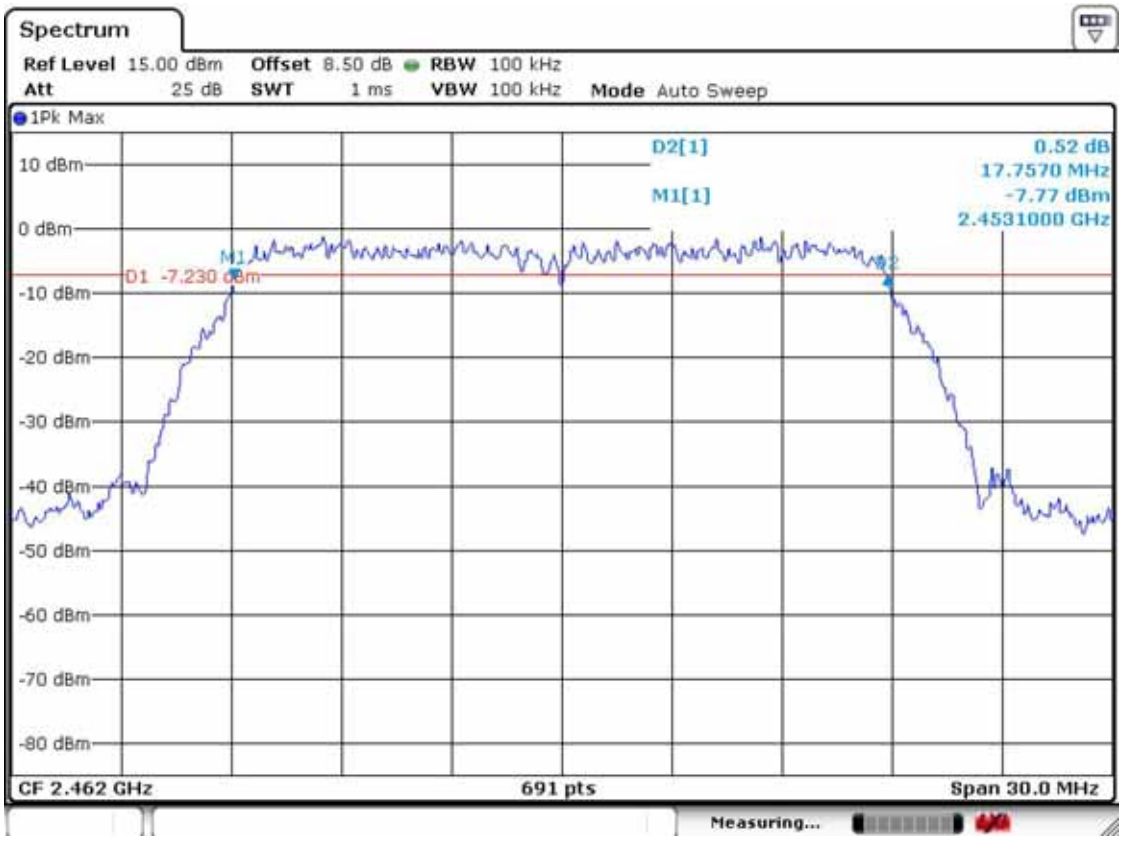
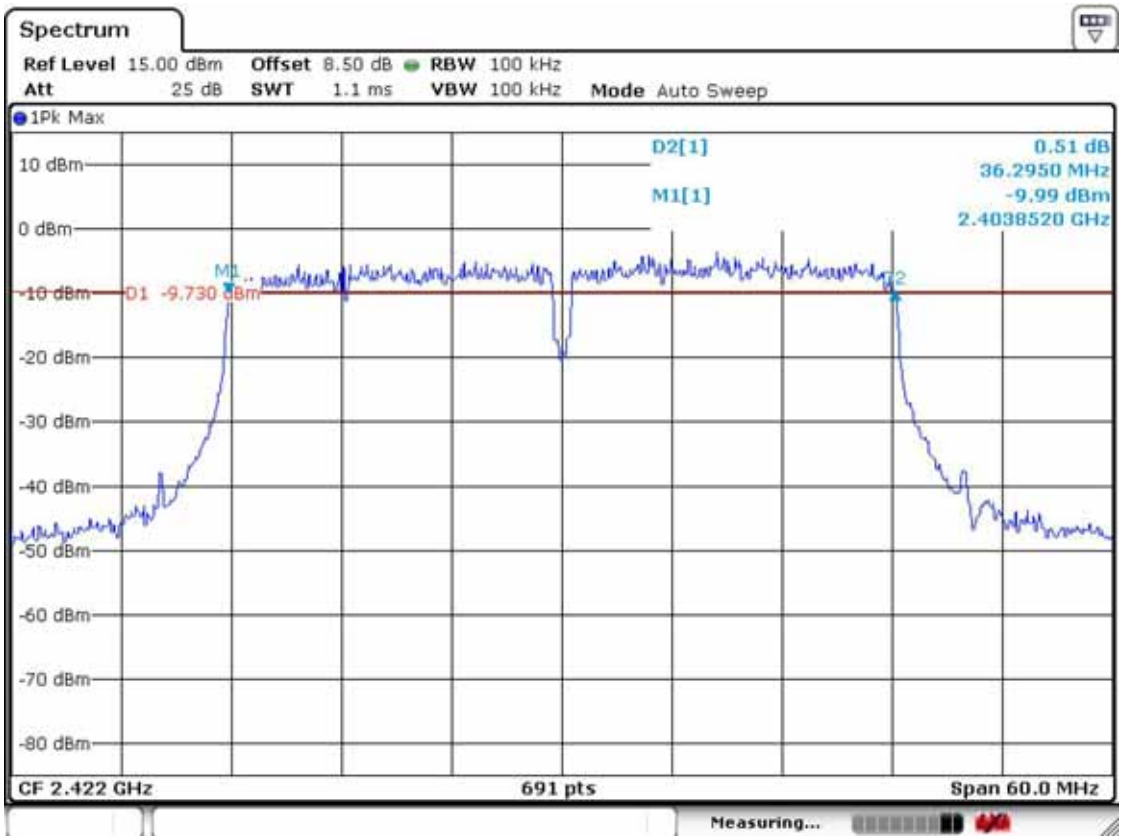
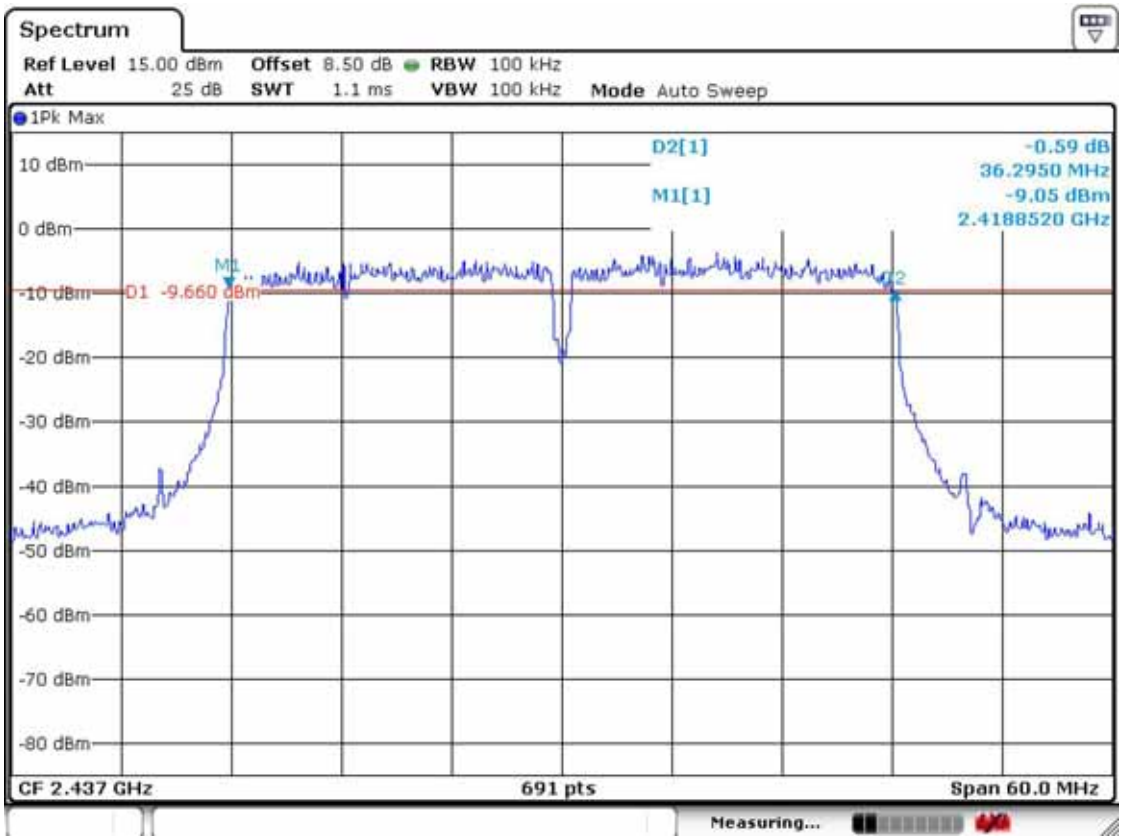
# CH 11


Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 100 kHz
Att 25 dB SWT 1 ms VBW 100 kHz Mode Auto Sweep
1Pk Max
D2[1] 0.52 dB
17.7570 MHz
M1[1] -7.77 dBm
2.4531000 GHz
D1 -7.230 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.462 GHz
691 pts
Span 30.0 MHz
Measuring...

# 802.11n_40MHz
## CH 1




## CH 4

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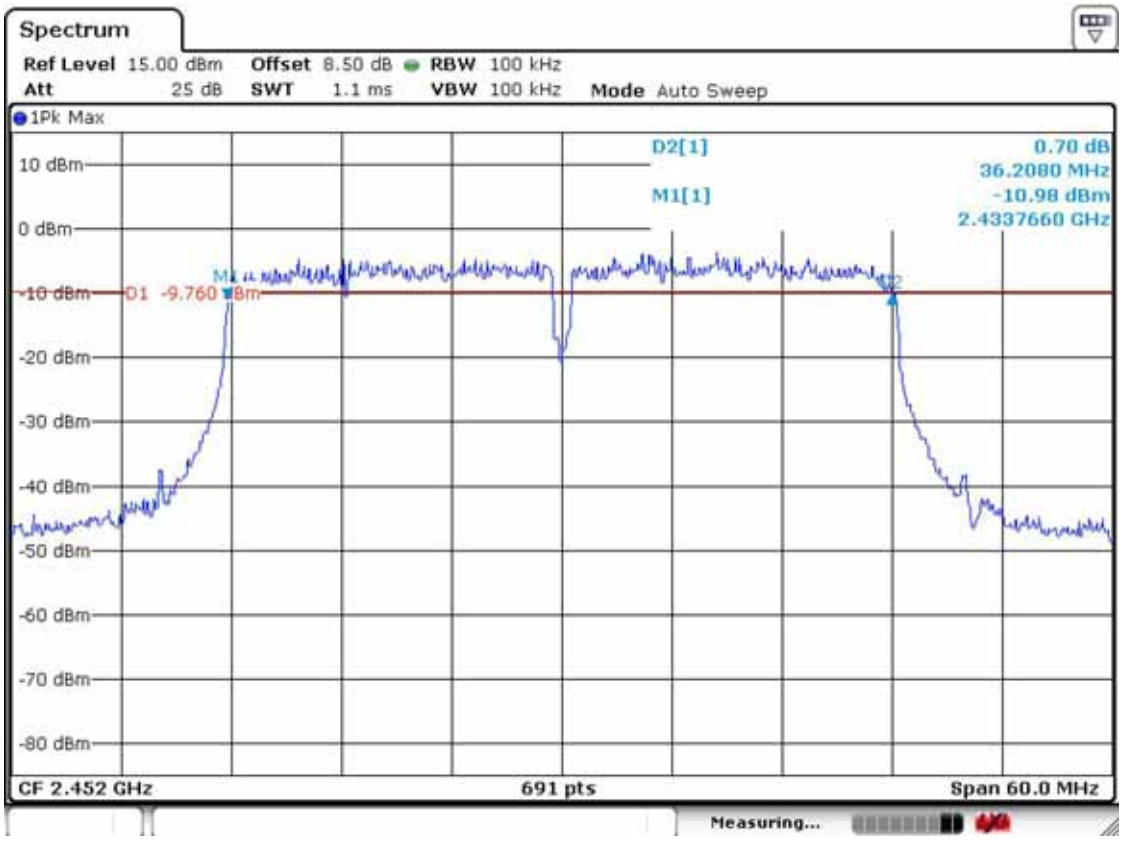
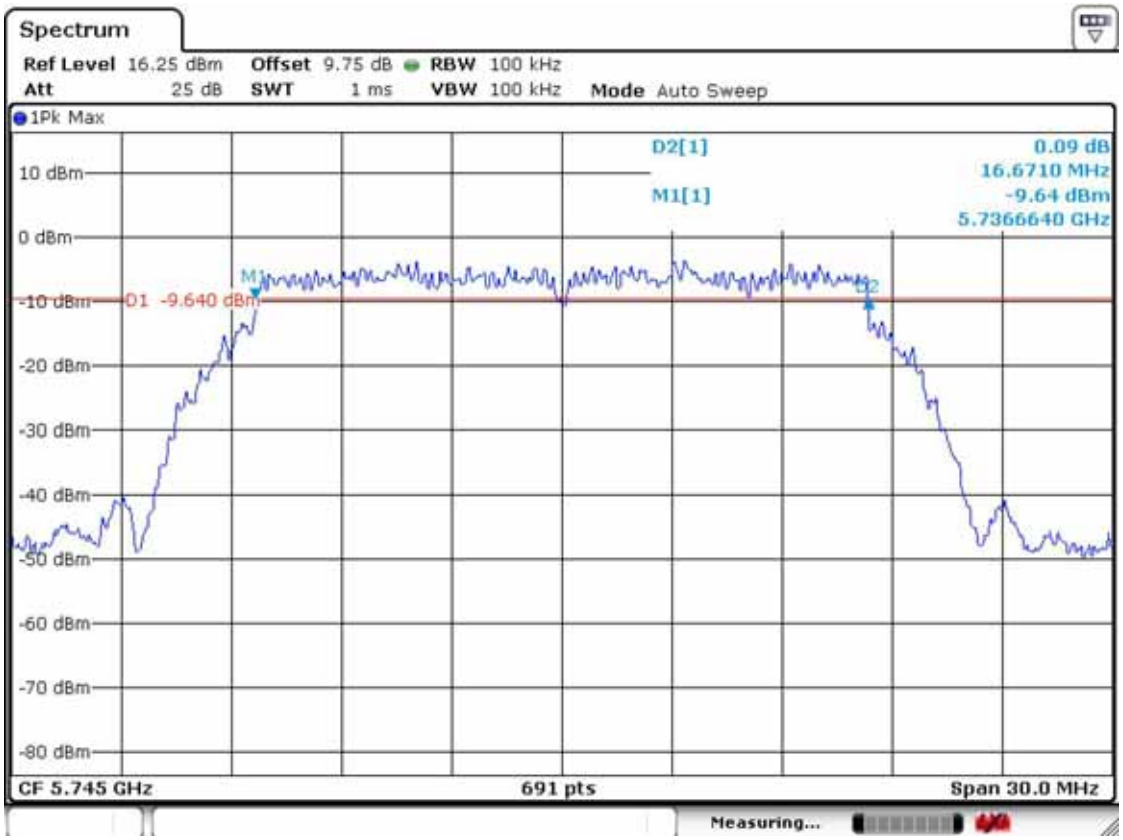
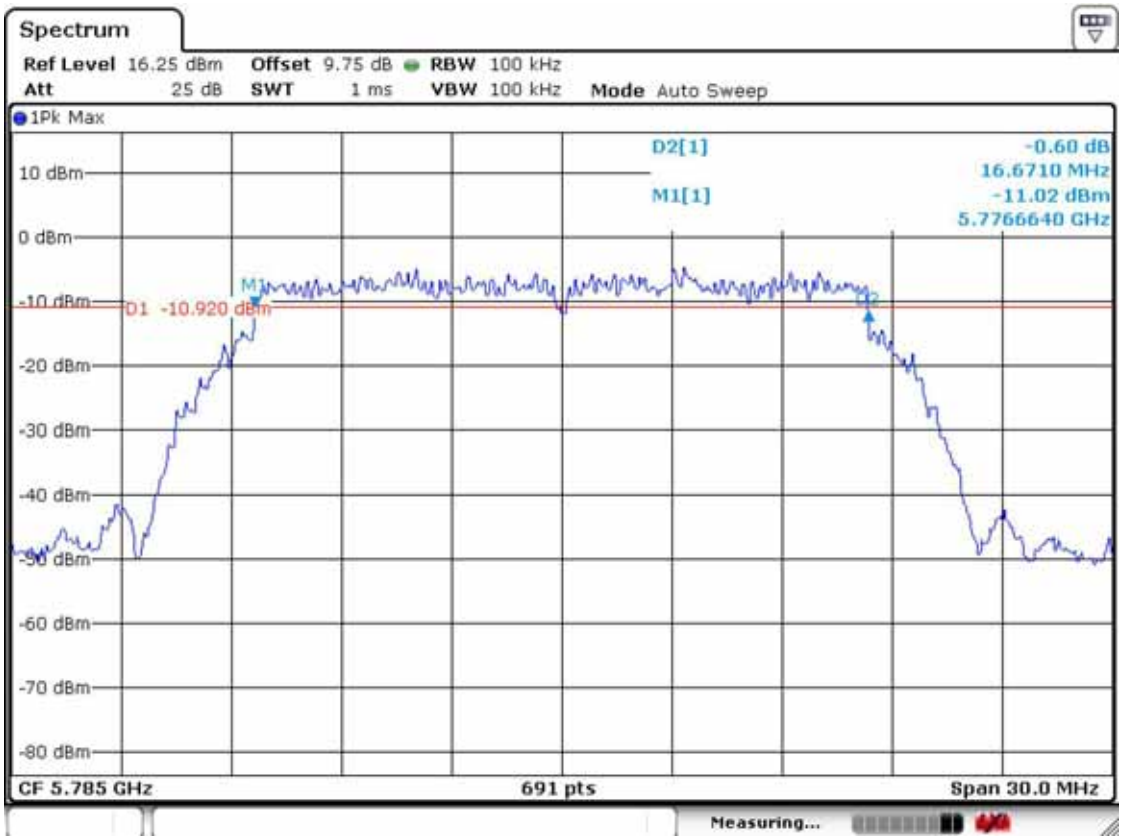
# CH 7


Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 100 kHz
Att 25 dB SWT 1.1 ms VBW 100 kHz Mode Auto Sweep
1Pk Max
D2[1] 0.70 dB
36.2080 MHz
M1[1] -10.98 dBm
2.4337660 GHz
10 dBm
0 dBm
-10 dBm
D1 -9.760 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.452 GHz
691 pts
Span 60.0 MHz
Measuring...

# 802.11a
# CH 149




# CH 157

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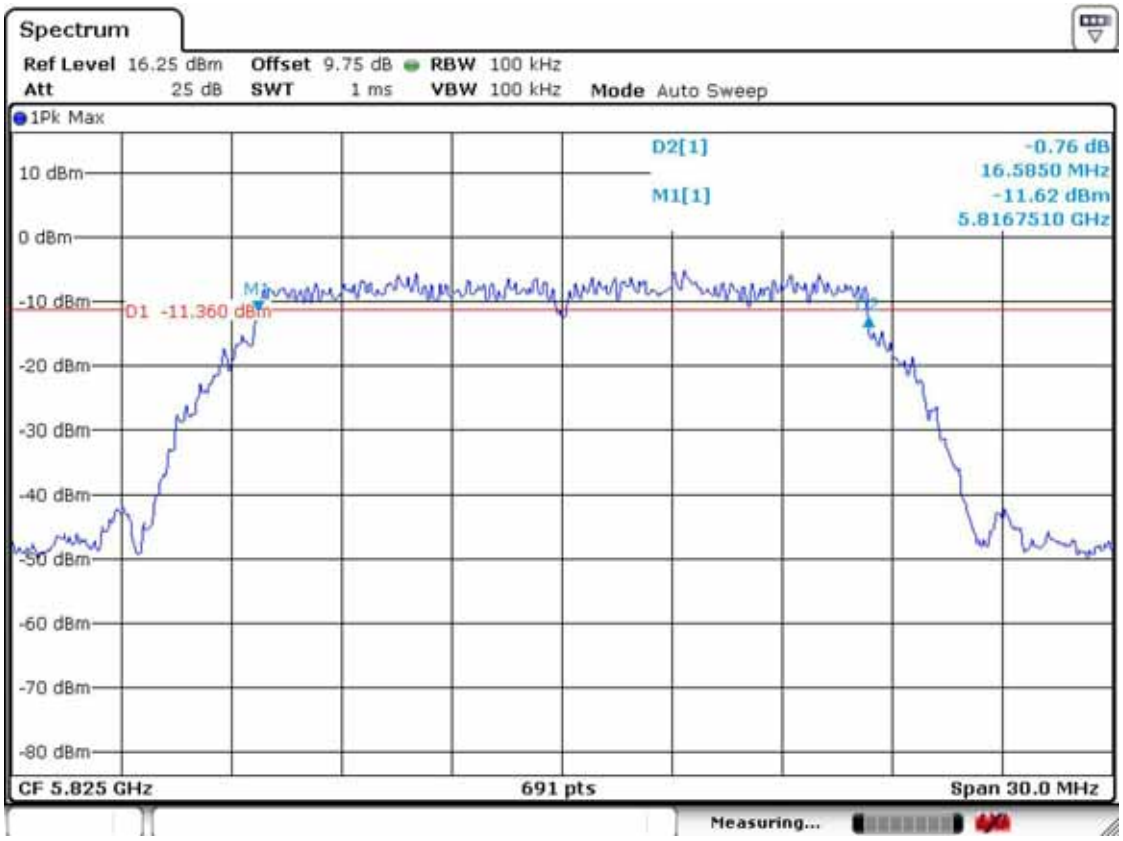
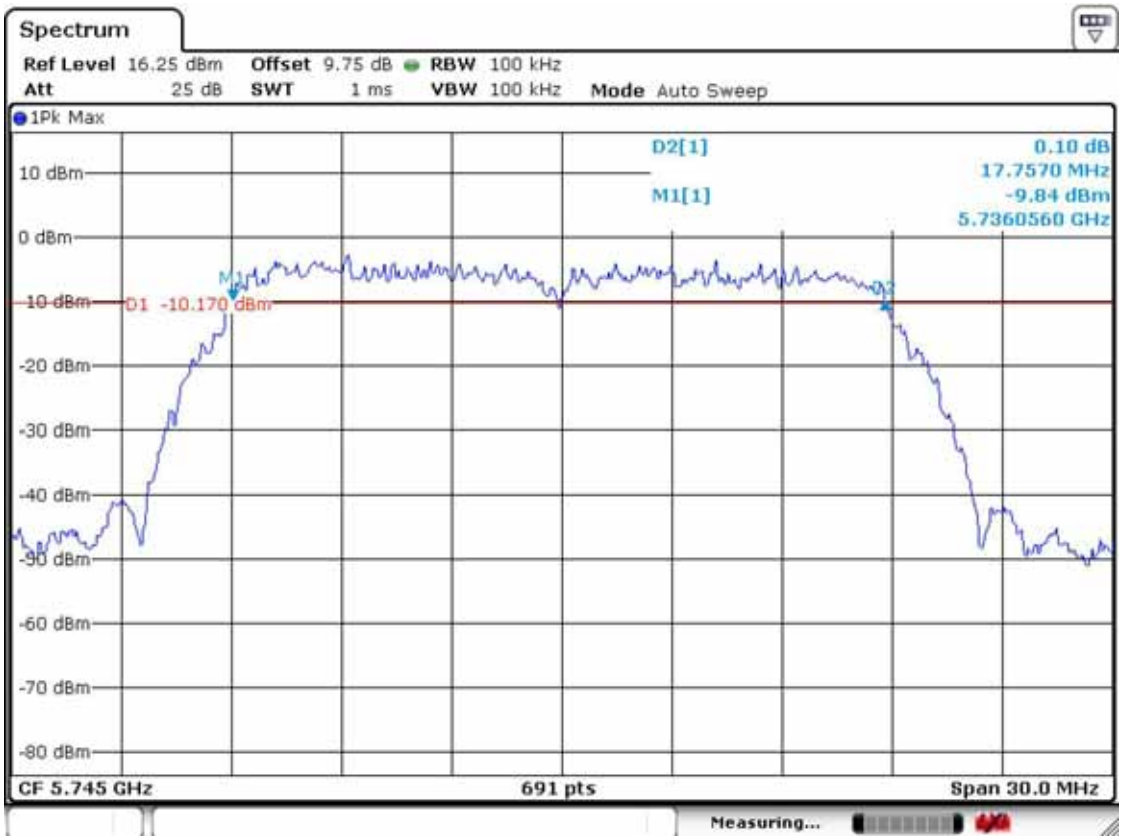
# CH 165


Spectrum
Ref Level 16.25 dBm Offset 9.75 dB RBW 100 kHz
Att 25 dB SWT 1 ms VBW 100 kHz Mode Auto Sweep
1Pk Max
D2[1] -0.76 dB
16.5850 MHz
M1[1] -11.62 dBm
5.8167510 GHz
10 dBm
0 dBm
-10 dBm
D1 -11.360 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.825 GHz
691 pts
Span 30.0 MHz
Measuring...

# 802.11an_20MHz
# CH 149

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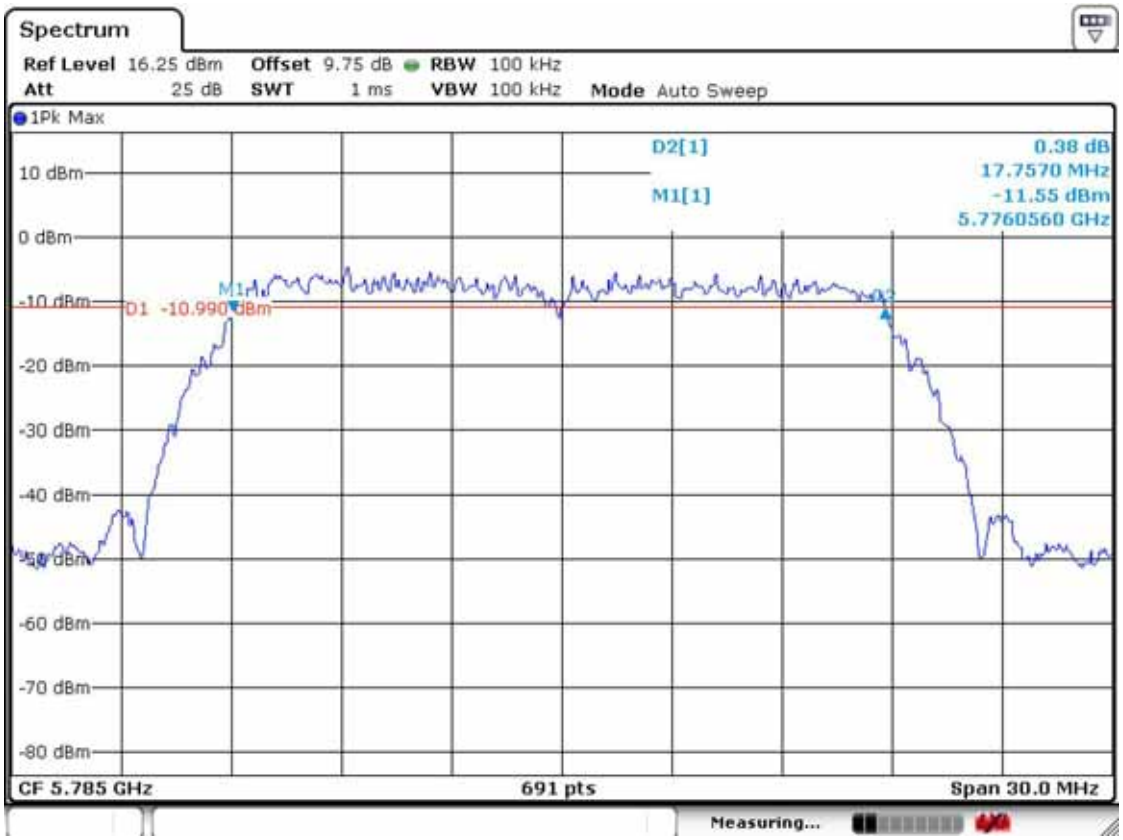


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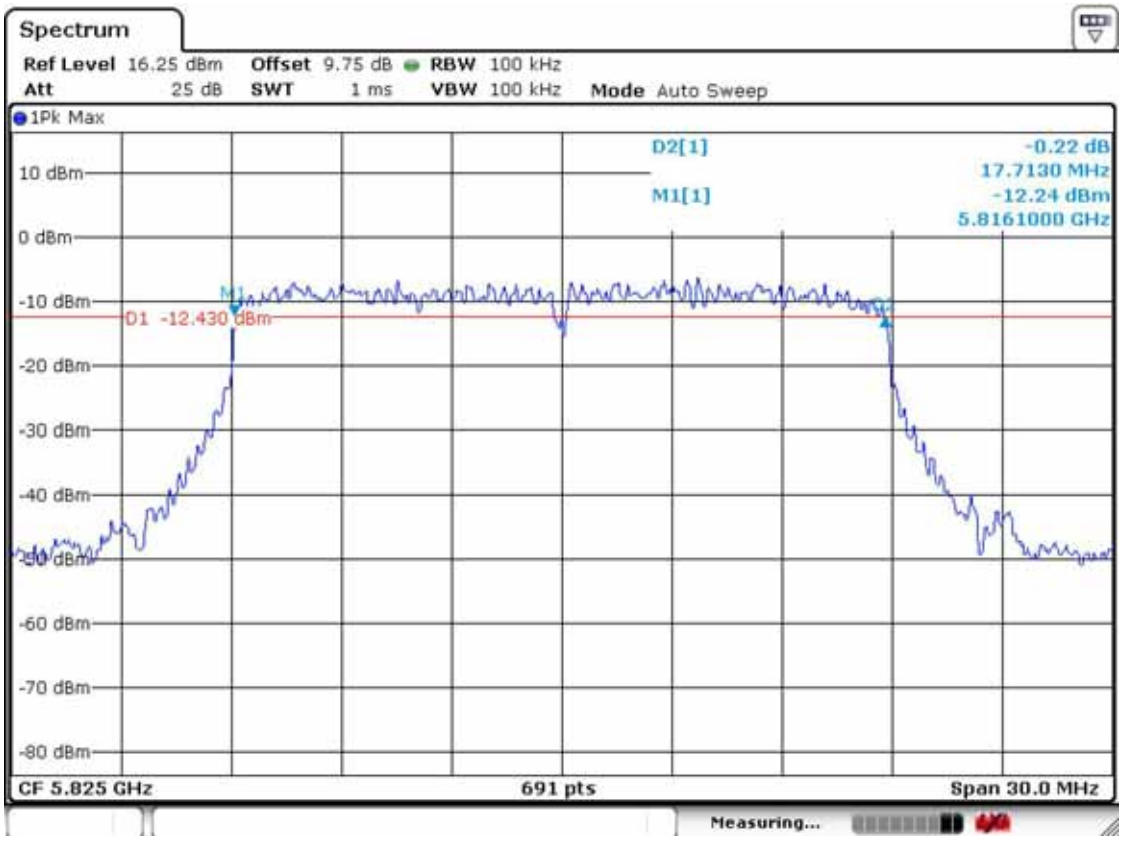
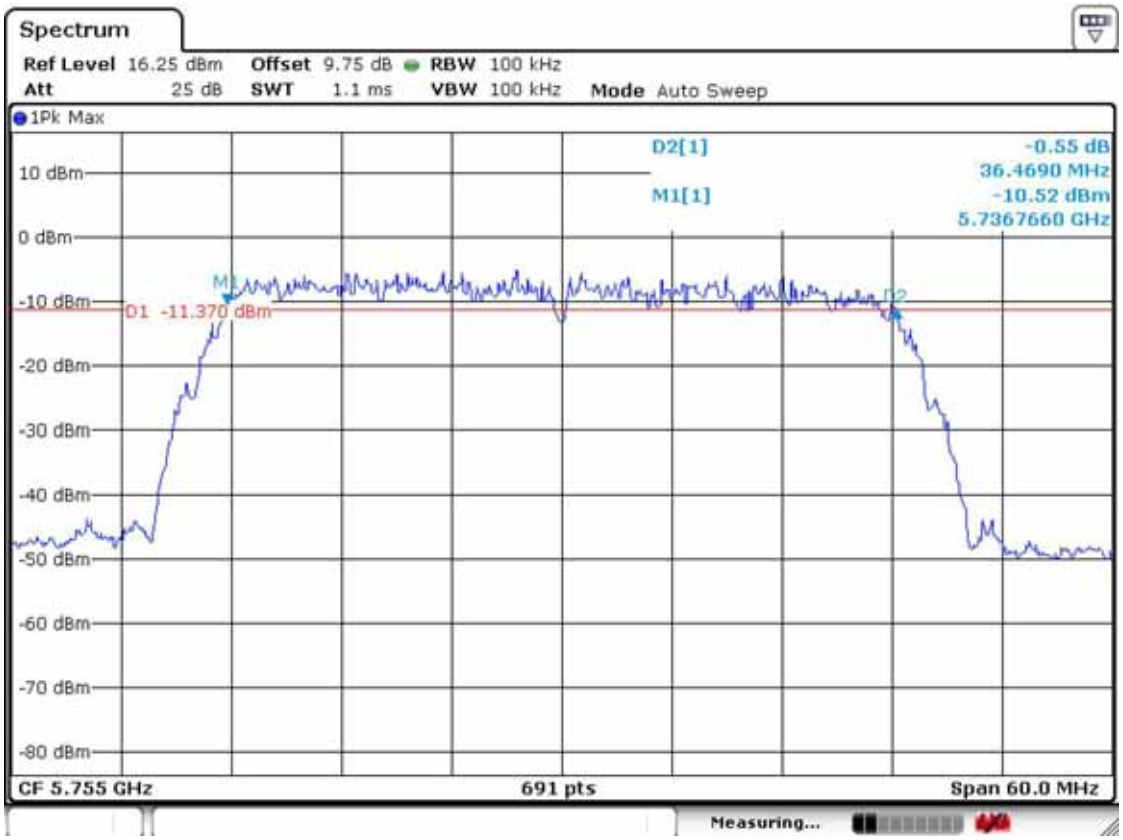
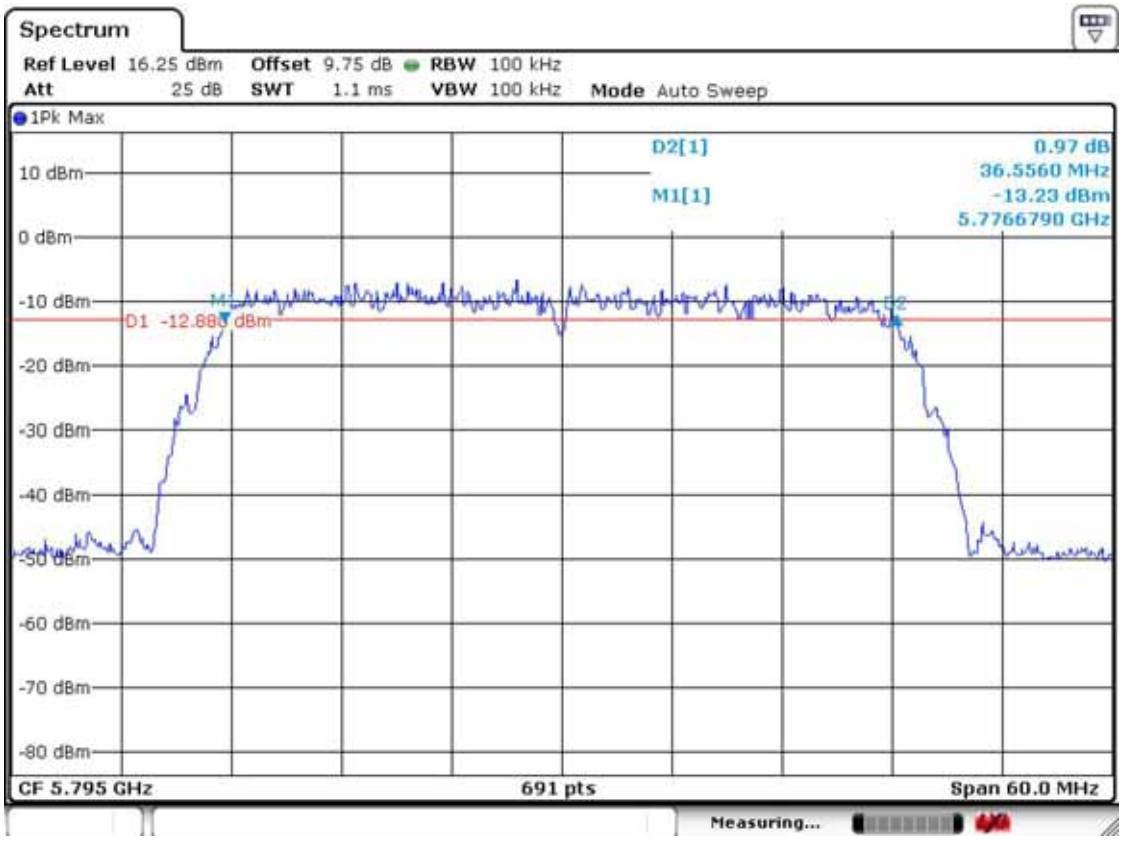
# CH 165


Spectrum
Ref Level 16.25 dBm Offset 9.75 dB RBW 100 kHz
Att 25 dB SWT 1 ms VBW 100 kHz Mode Auto Sweep
1Pk Max
D2[1] -0.22 dB
17.7130 MHz
M1[1] -12.24 dBm
5.8161000 GHz
10 dBm
0 dBm
-10 dBm
D1 -12.430 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.825 GHz
691 pts
Span 30.0 MHz
Measuring...

# 802.11an_40MHz
# CH 151




# CH 159

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### 3.2.2 Peak Output Power Measurement

**Procedure:**

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth. The EUT was operating in transmit mode at the appropriate center frequency.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 1MHz Span = auto

VBW = 3MHz (VBW ≥ RBW) Sweep = auto

Detector function = peak

**Measurement Data: 2.4GHz Band**

| Mode | Frequency (MHz) | Channel No. | Test Results | |
|---|---|---|---|---|
| | | | Measured Bandwidth (MHz) | Result |
| 802.11b | 2412 | 1 | 15.31 | Complies |
| | 2437 | 6 | 15.40 | Complies |
| | 2462 | 11 | 15.32 | Complies |
| 802.11g | 2412 | 1 | 14.01 | Complies |
| | 2437 | 6 | 13.91 | Complies |
| | 2462 | 11 | 14.19 | Complies |
| 802.11n _20MHz | 2412 | 1 | 17.95 | Complies |
| | 2437 | 6 | 18.83 | Complies |
| | 2462 | 11 | 19.11 | Complies |
| 802.11n _40MHz | 2422 | 1 | 17.59 | Complies |
| | 2437 | 4 | 18.09 | Complies |
| | 2452 | 7 | 18.35 | Complies |

**Measurement Data: 5.0GHz Band**

| Mode | Frequency (MHz) | Channel No. | Test Results | |
|---|---|---|---|---|
| | | | Measured Bandwidth (MHz) | Result |
| 802.11a | 5745 | 149 | 15.51 | Complies |
| | 5785 | 157 | 14.44 | Complies |
| | 5825 | 165 | 13.87 | Complies |
| 802.11an _20MHz | 5745 | 149 | 15.98 | Complies |
| | 5785 | 157 | 14.37 | Complies |
| | 5825 | 165 | 13.68 | Complies |
| 802.11an _40MHz | 5745 | 149 | 15.97 | Complies |
| | 5825 | 165 | 14.62 | Complies |

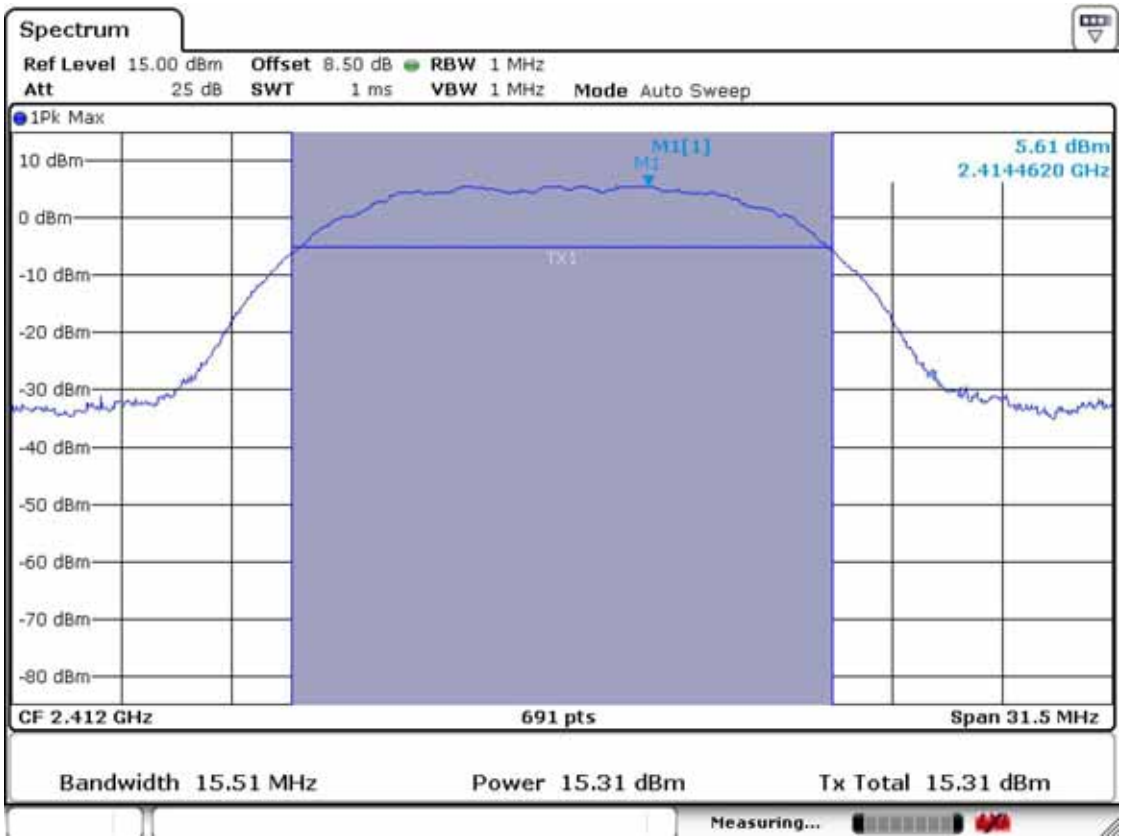
- See next pages for actual measured spectrum plots.

**Minimum Standard:**

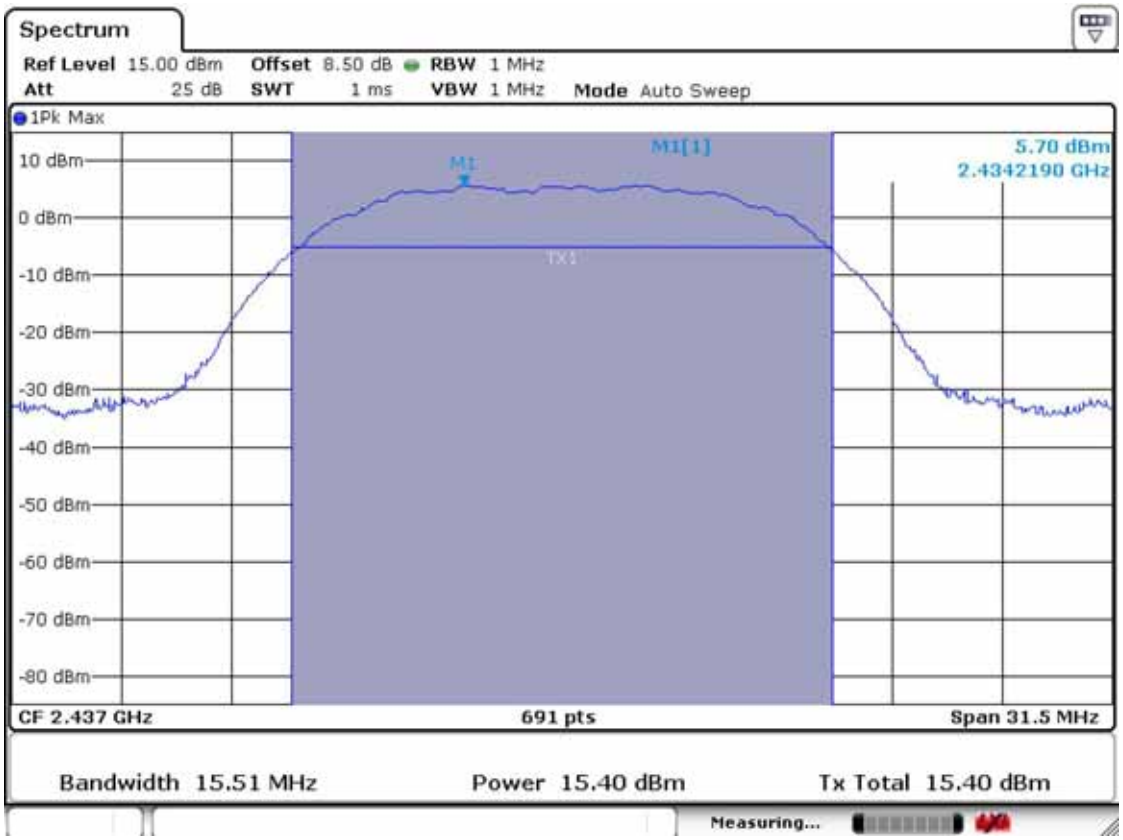
| | |
|---|---|
| Peak output power | < 1W |

# 802.11b

## CH 1




## CH 6

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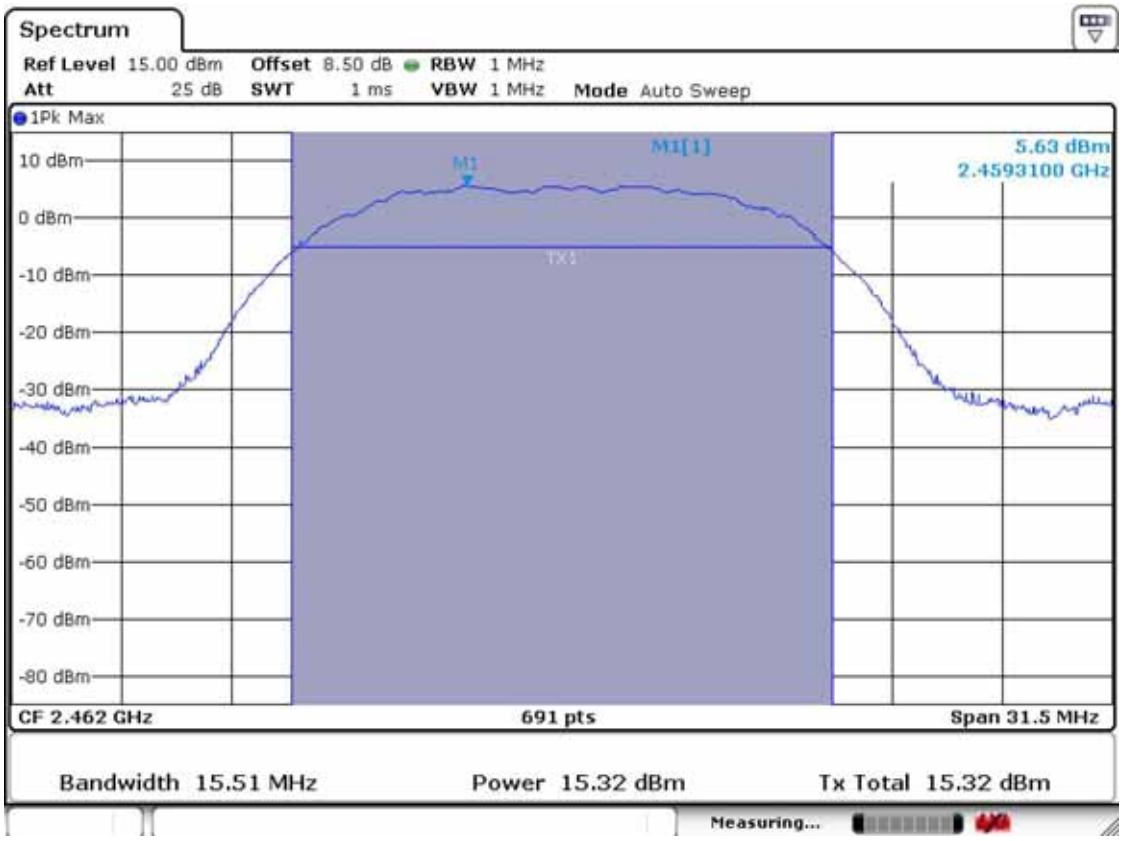
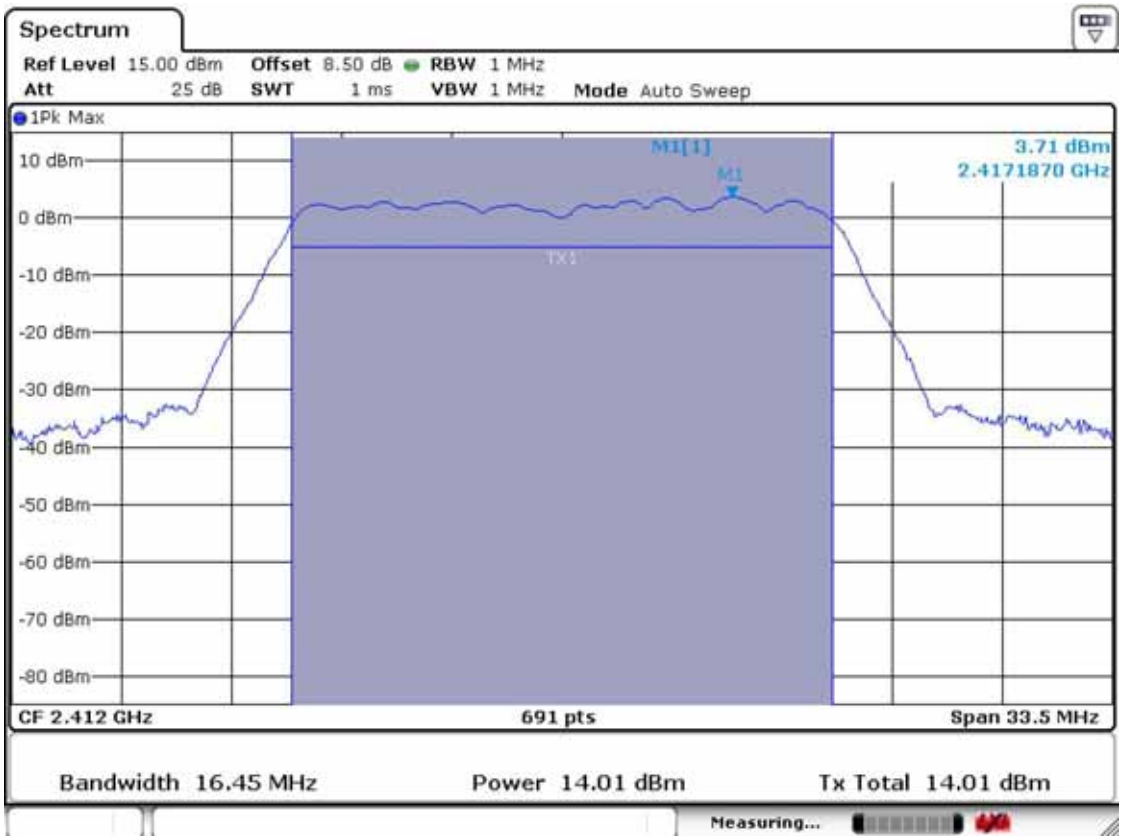
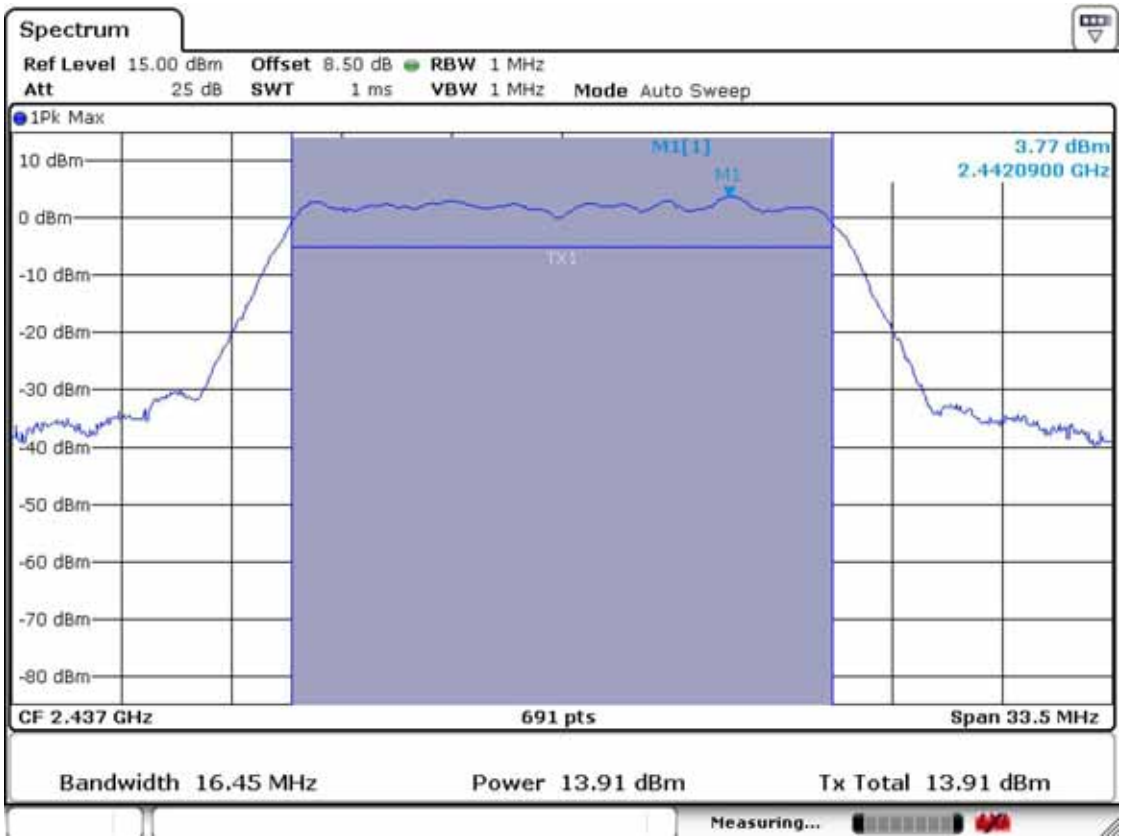
# CH 11


Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 1 MHz
Att 25 dB SWT 1 ms VBW 1 MHz Mode Auto Sweep
1Pk Max
M1[1]
M1
5.63 dBm
2.4593100 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.462 GHz
691 pts
Span 31.5 MHz
Bandwidth 15.51 MHz
Power 15.32 dBm
Tx Total 15.32 dBm
Measuring...

# 802.11g
## CH 1




## CH 6

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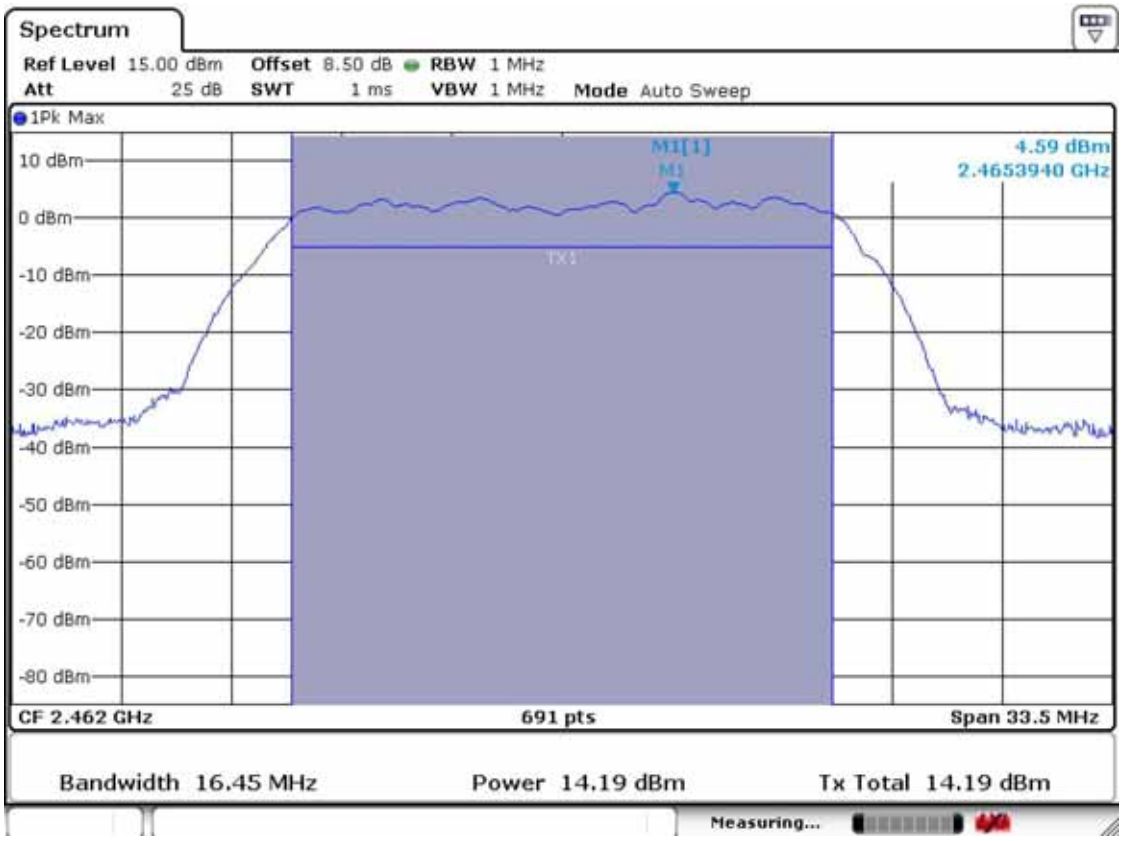
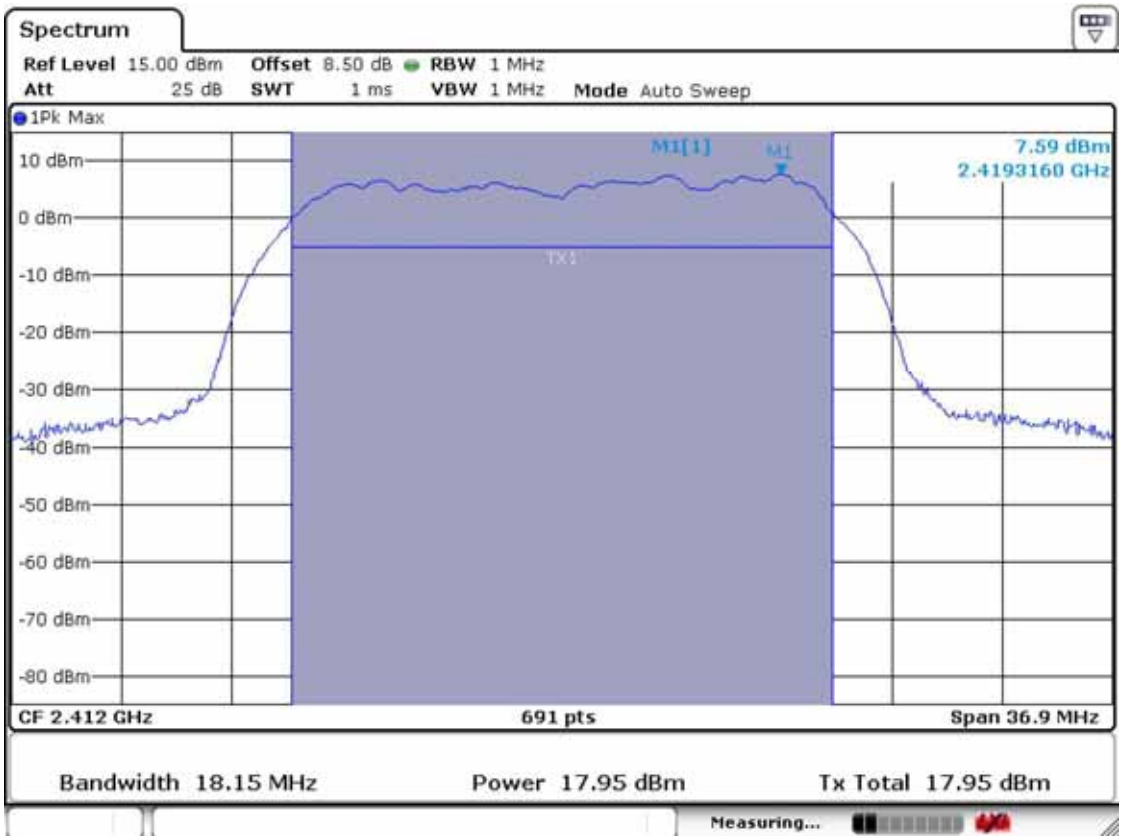
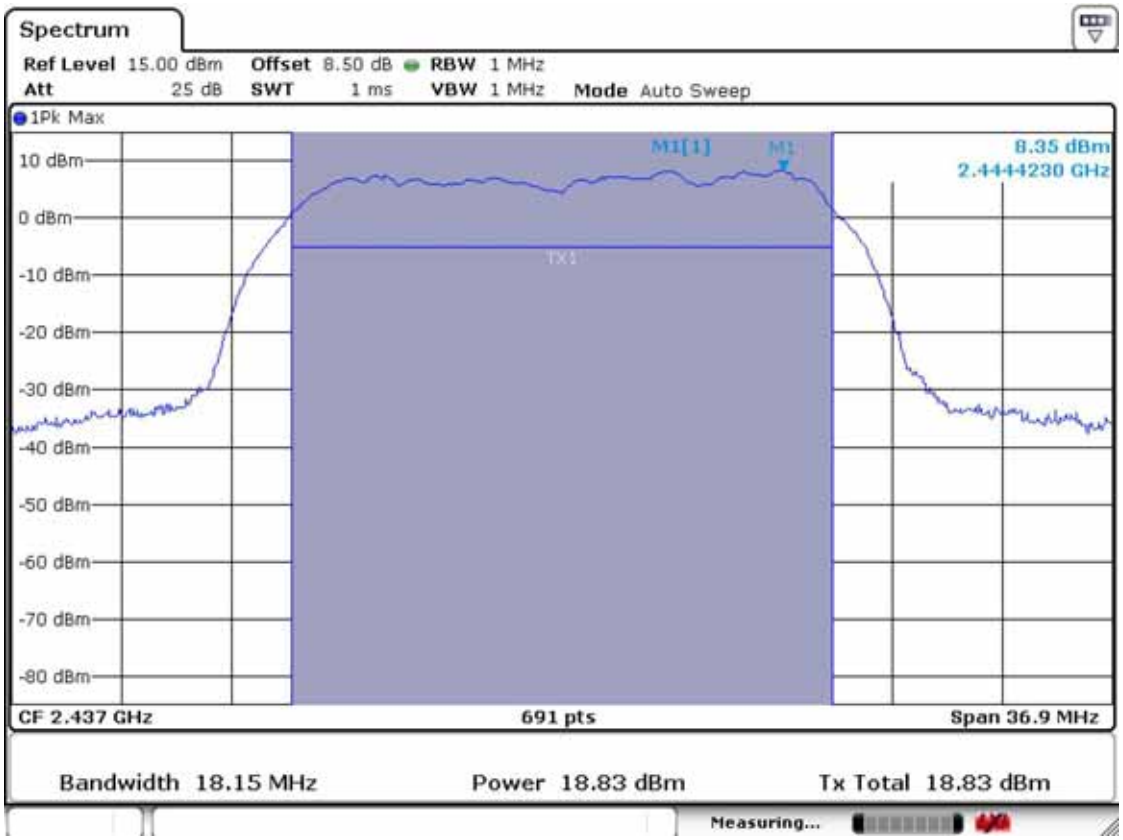
# CH 11


Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 1 MHz
Att 25 dB SWT 1 ms VBW 1 MHz Mode Auto Sweep
1Pk Max
M1[1]
M1
4.59 dBm
2.4653940 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.462 GHz
691 pts
Span 33.5 MHz
Bandwidth 16.45 MHz
Power 14.19 dBm
Tx Total 14.19 dBm
Measuring...

# 802.11n_20MHz
## CH 1




## CH 6

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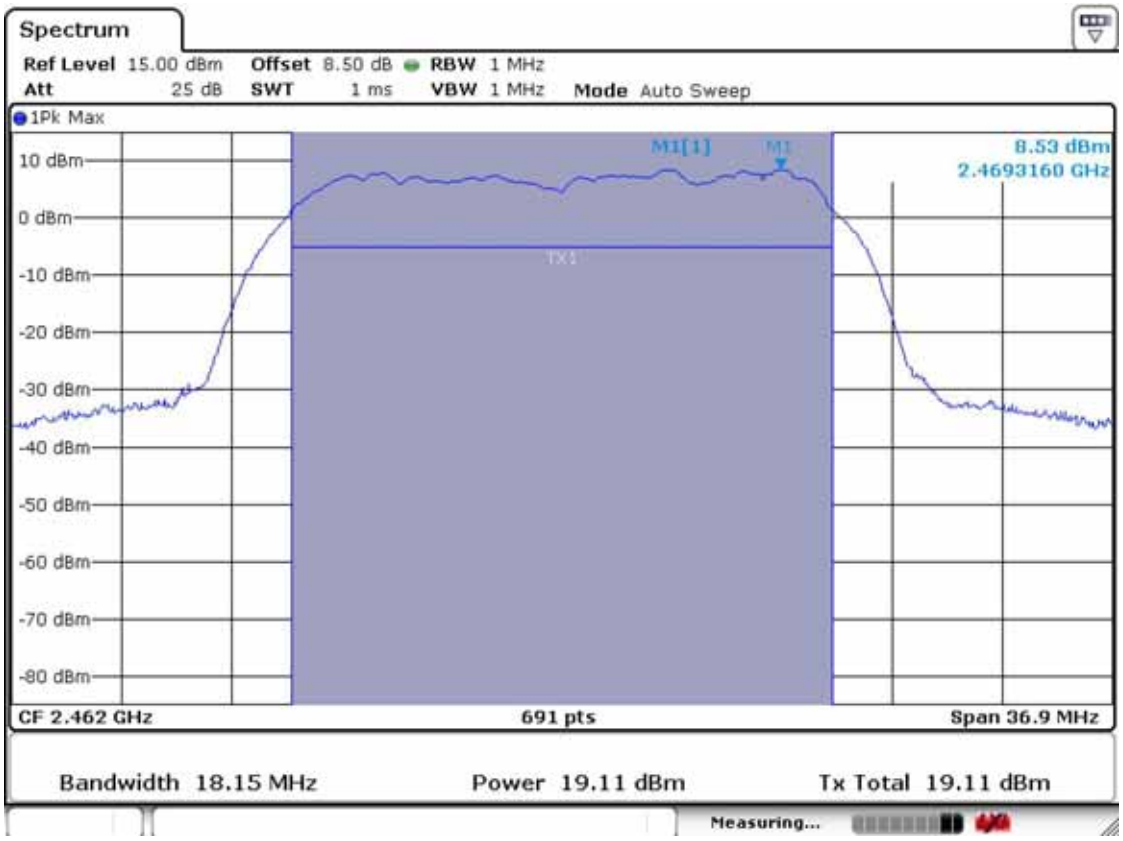
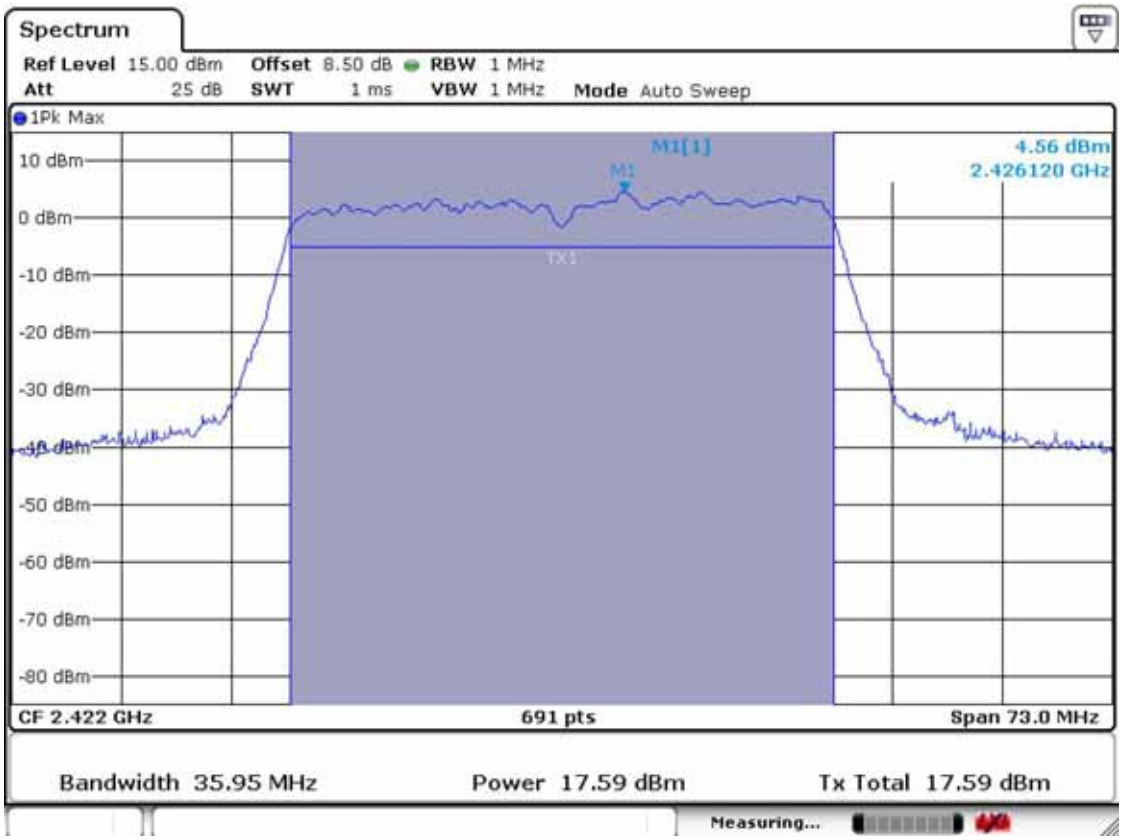
# CH 11

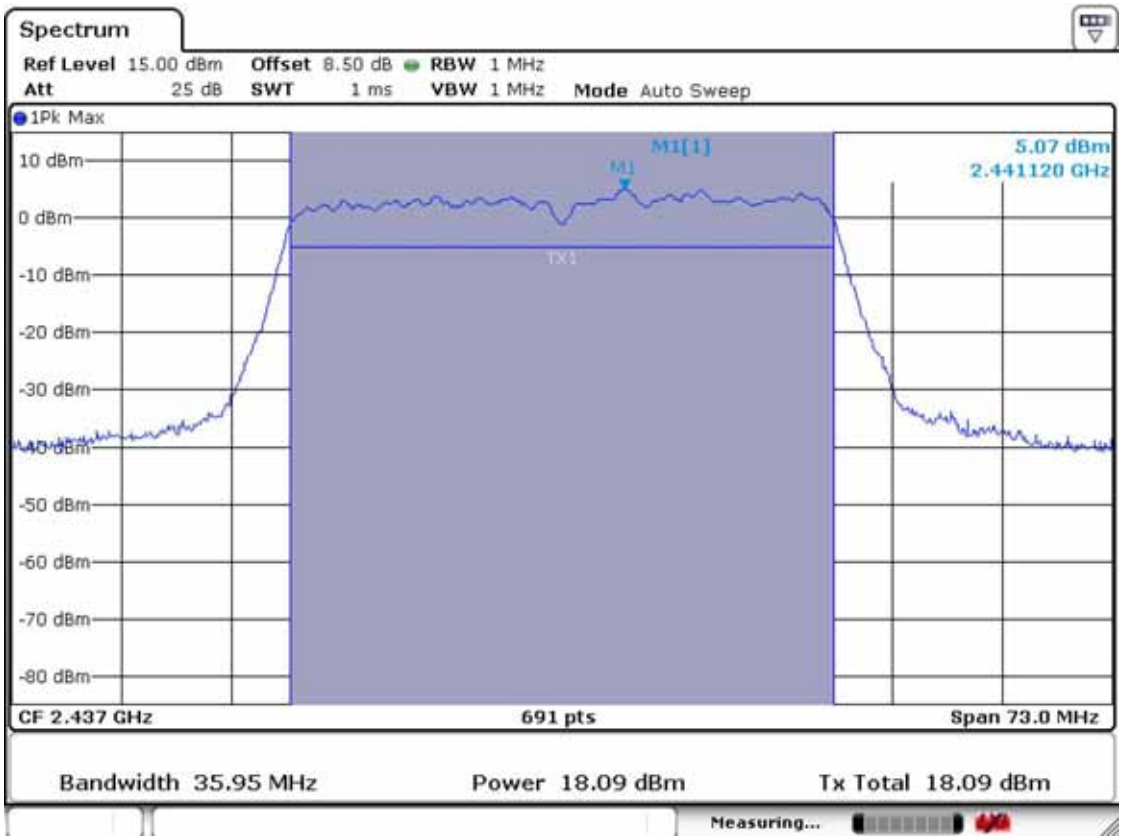

Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 1 MHz
Att 25 dB SWT 1 ms VBW 1 MHz Mode Auto Sweep
1Pk Max
M1[1] M1
8.53 dBm
2.4693160 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.462 GHz
691 pts
Span 36.9 MHz
Bandwidth 18.15 MHz
Power 19.11 dBm
Tx Total 19.11 dBm
Measuring...

# 802.11n_40MHz

## CH 1




## CH 4

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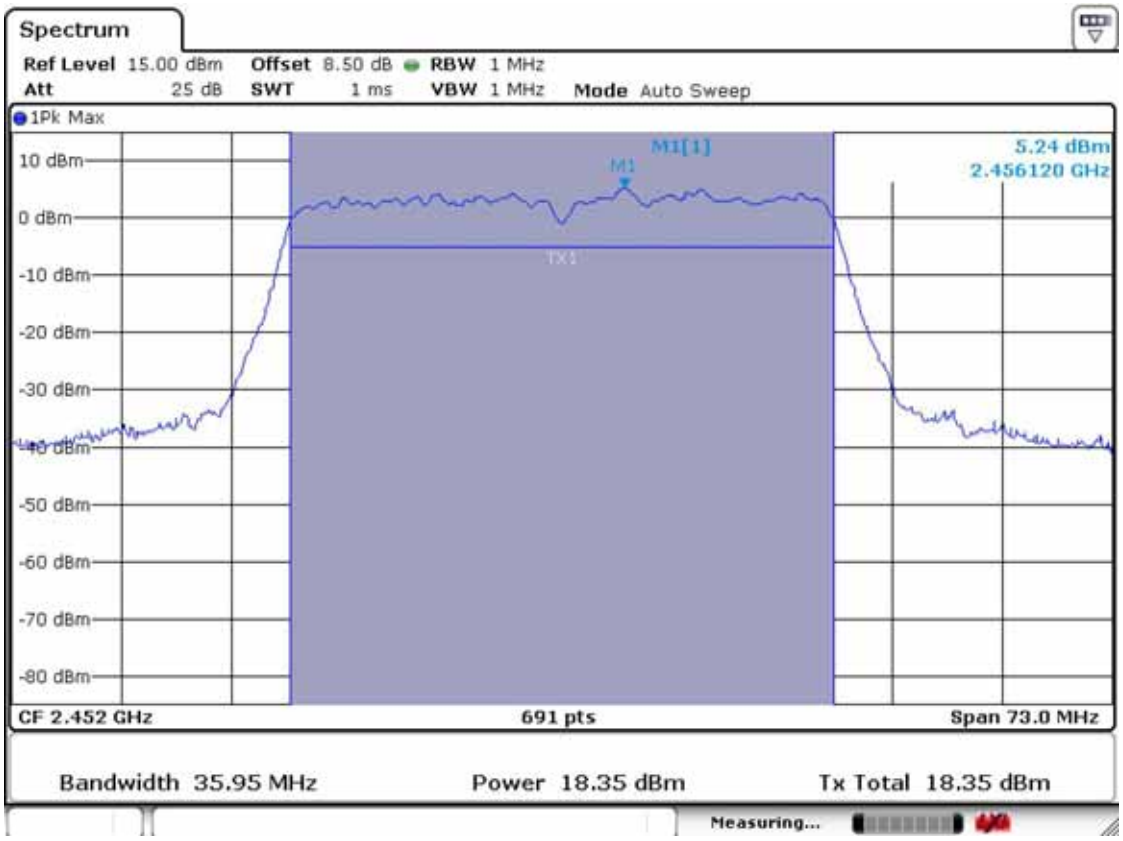
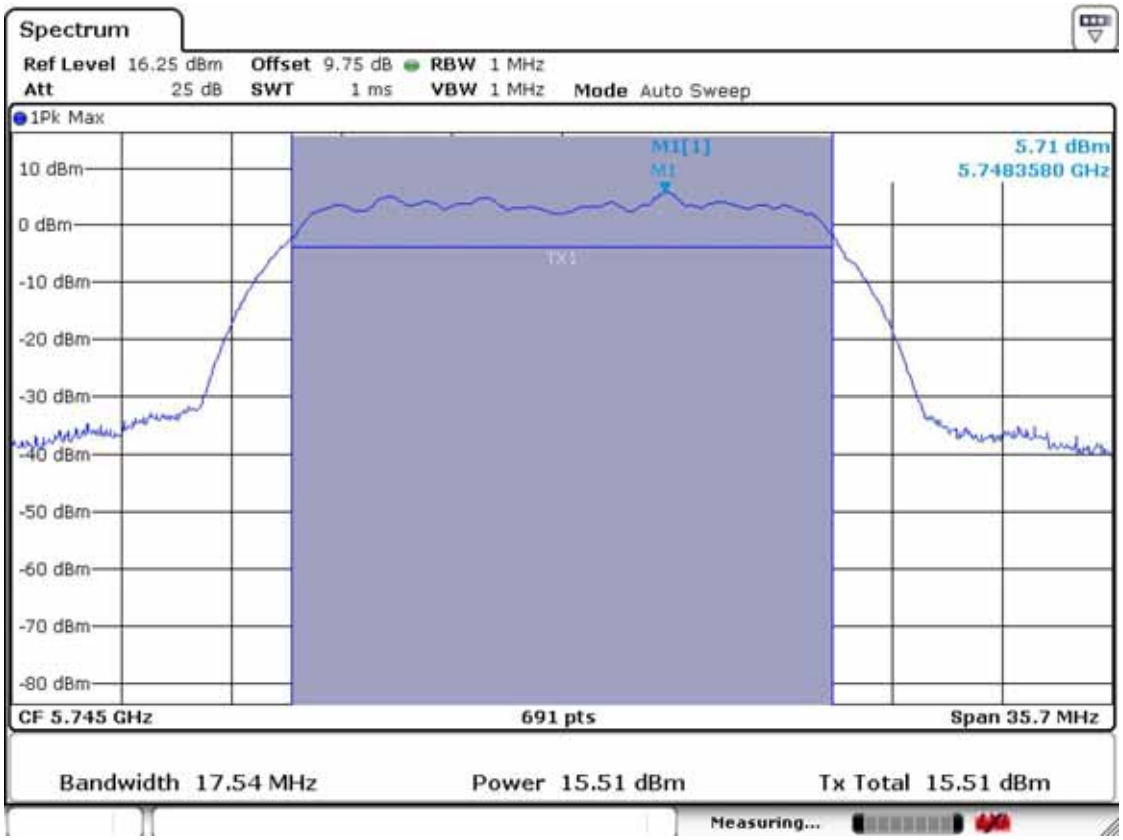
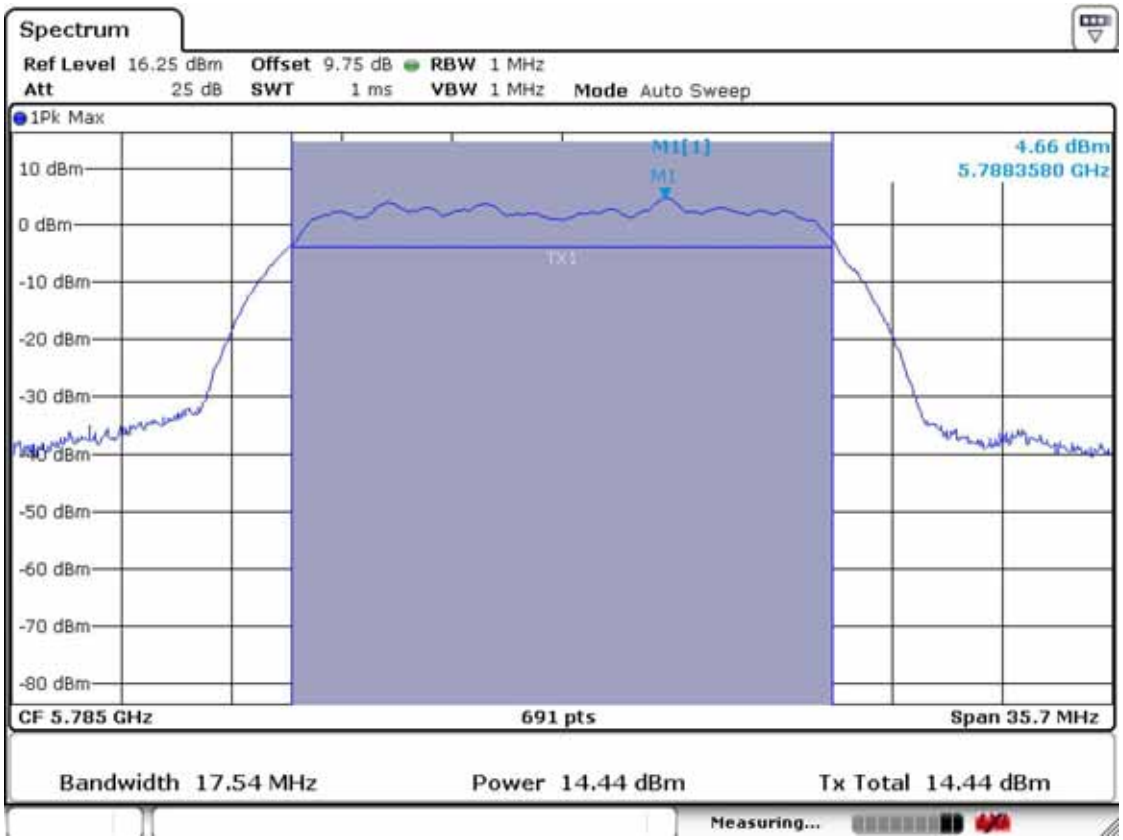
# CH 7


Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 1 MHz
Att 25 dB SWT 1 ms VBW 1 MHz Mode Auto Sweep
1Pk Max
M1[1]
M1
5.24 dBm
2.456120 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.452 GHz
691 pts
Span 73.0 MHz
Bandwidth 35.95 MHz
Power 18.35 dBm
Tx Total 18.35 dBm
Measuring...

# 802.11a
# CH 149




# CH 157

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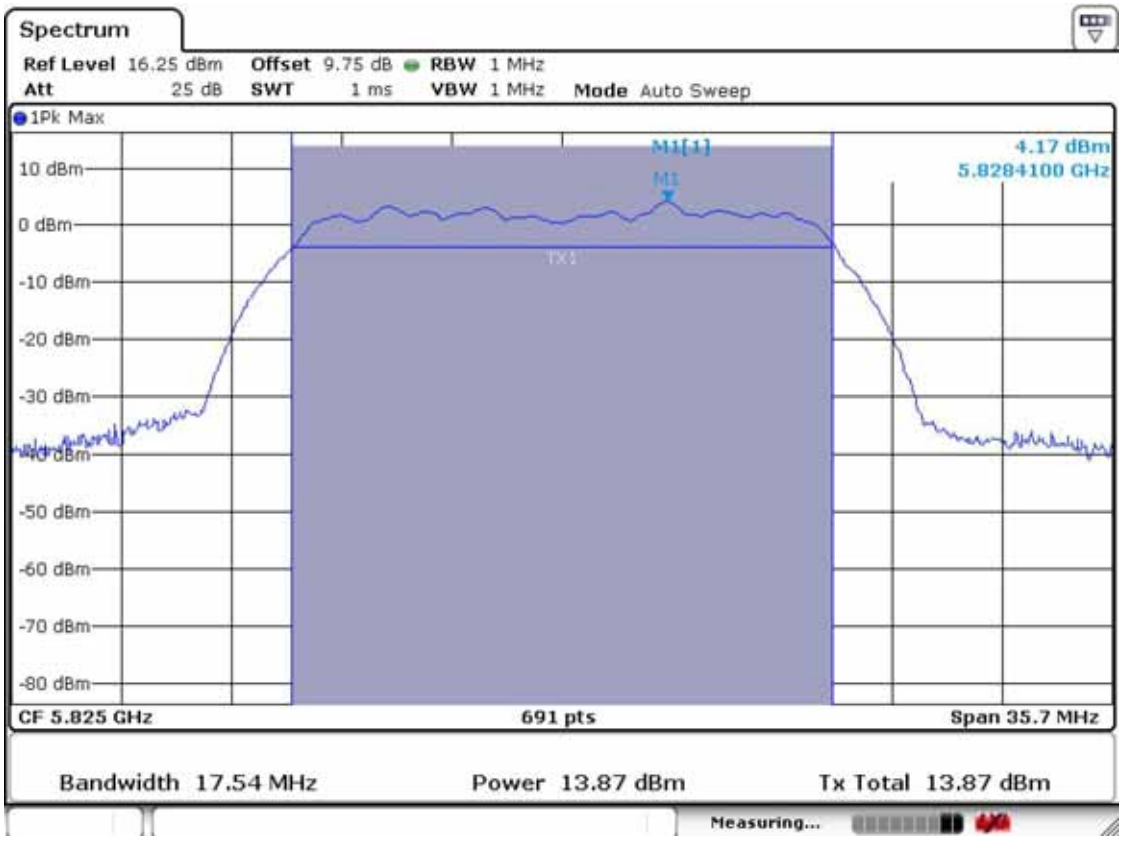
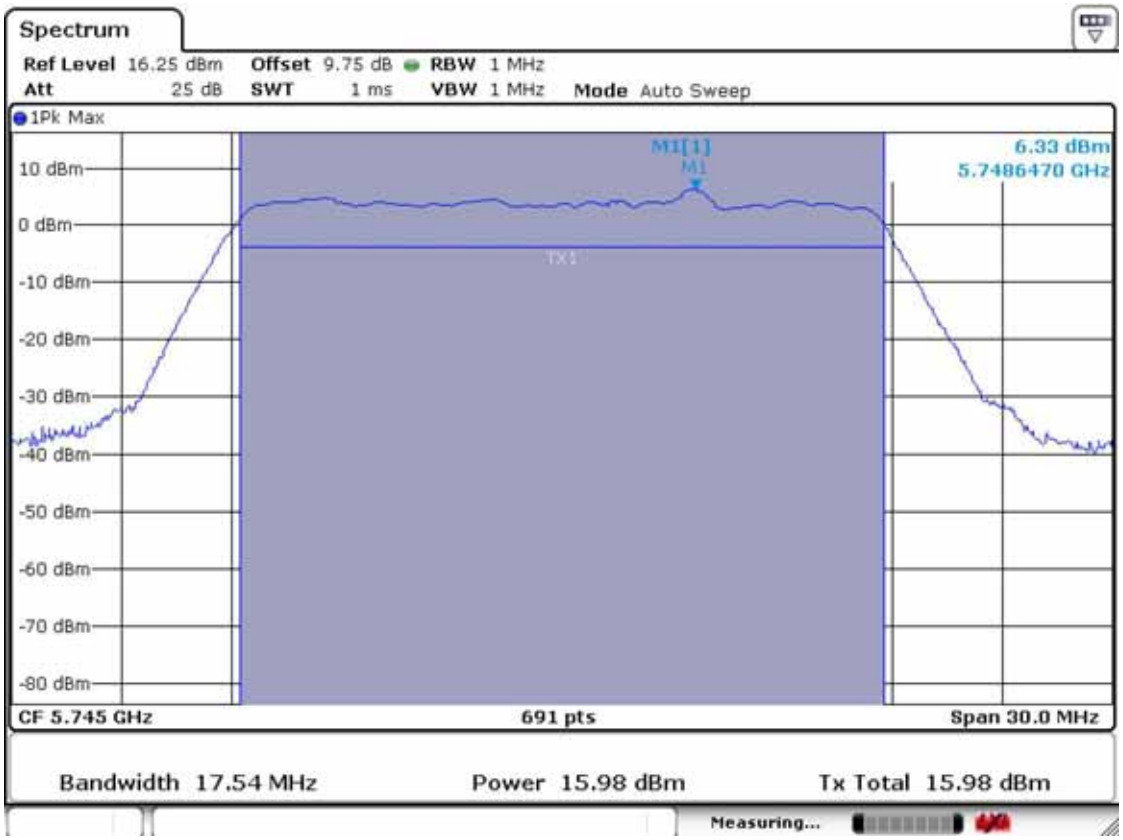
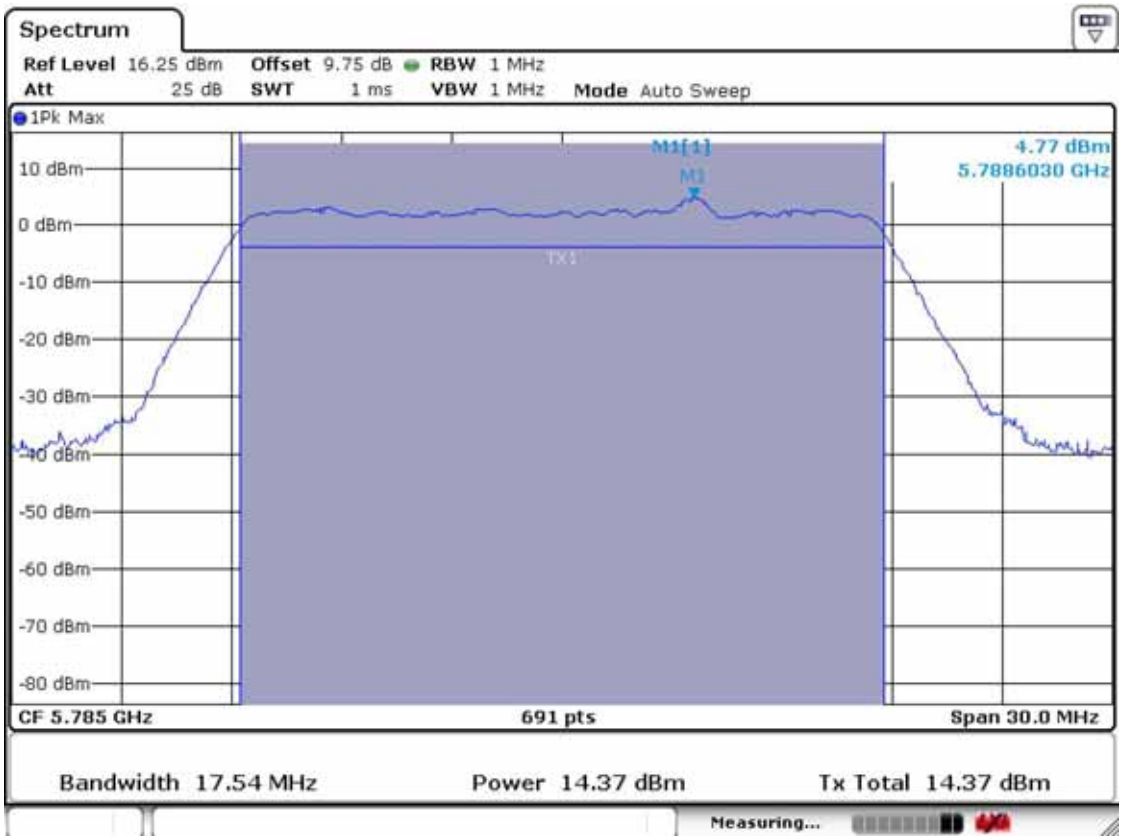
# CH 165


Spectrum
Ref Level 16.25 dBm Offset 9.75 dB RBW 1 MHz
Att 25 dB SWT 1 ms VBW 1 MHz Mode Auto Sweep
1Pk Max
M1[1]
M1
4.17 dBm
5.8284100 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.825 GHz
691 pts
Span 35.7 MHz
Bandwidth 17.54 MHz
Power 13.87 dBm
Tx Total 13.87 dBm
Measuring...

# 802.11an_20MHz
## CH 149




## CH 157

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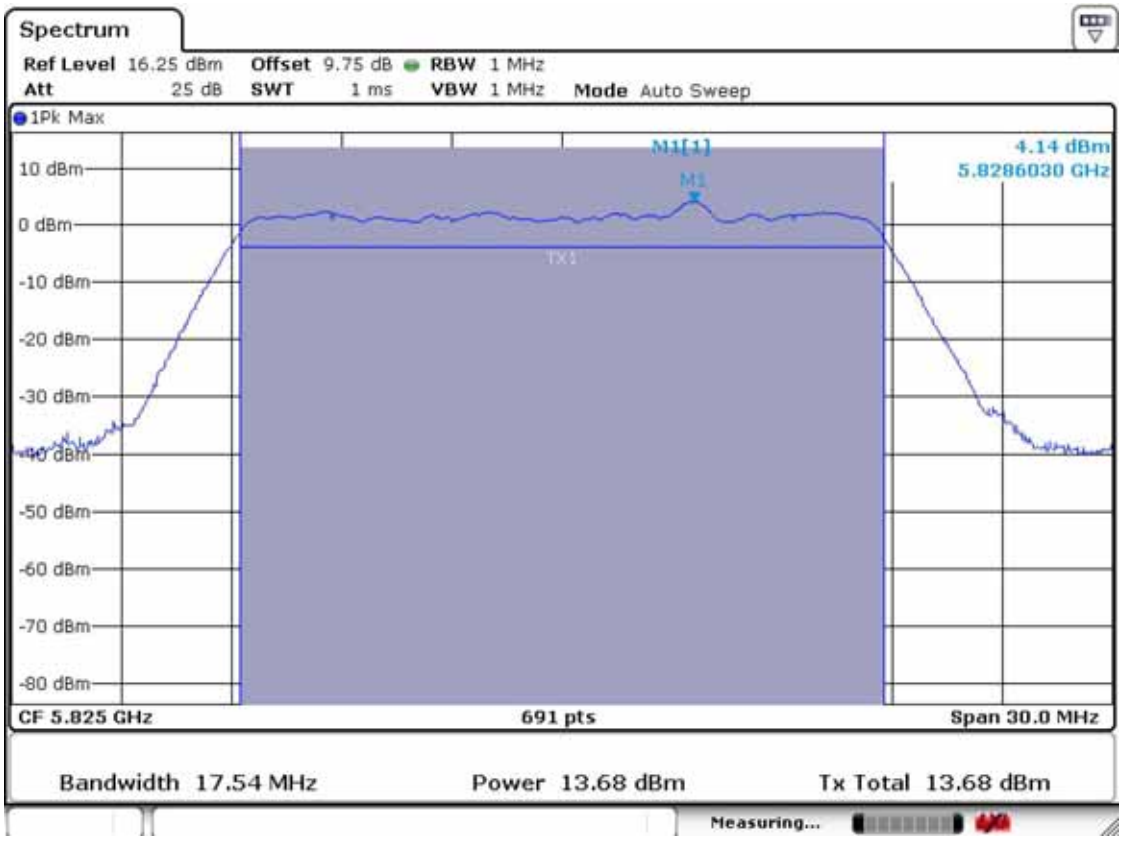
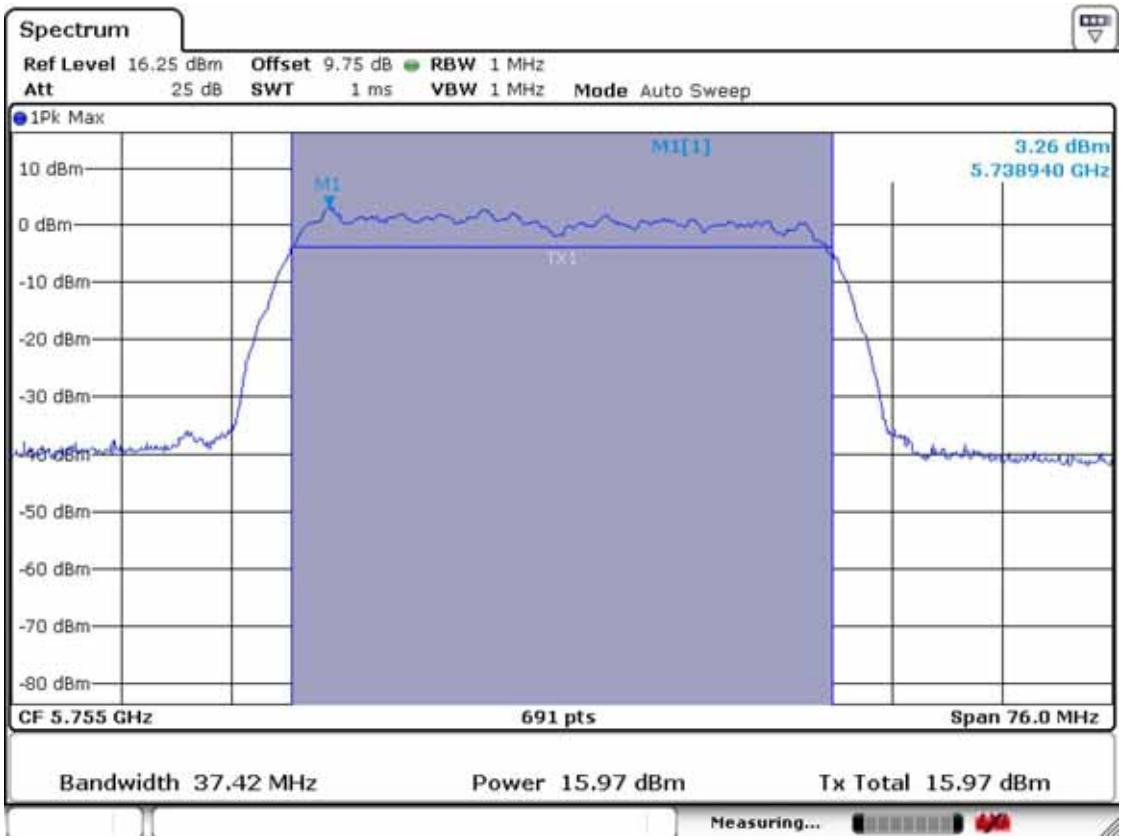
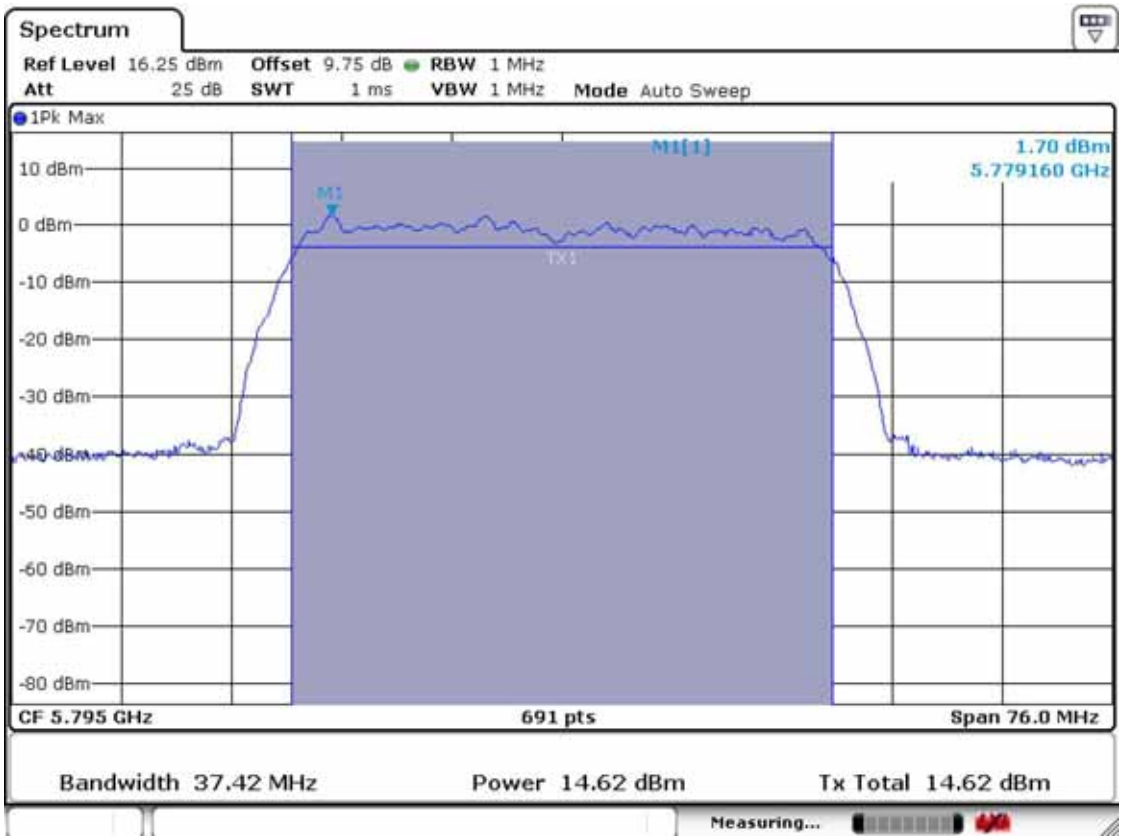
# CH 165


Spectrum
Ref Level 16.25 dBm Offset 9.75 dB RBW 1 MHz
Att 25 dB SWT 1 ms VBW 1 MHz Mode Auto Sweep
1Pk Max
M1[1]
4.14 dBm
5.8286030 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 5.825 GHz
691 pts
Span 30.0 MHz
Bandwidth 17.54 MHz
Power 13.68 dBm
Tx Total 13.68 dBm
Measuring...

# 802.11an_40MHz
# CH 151




# CH 159

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### 3.2.3 Power Spectral Density

**Procedure:**

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The spectrum analyzer is set to:

RBW = 3 kHz Span = 300 kHz

VBW = 3 kHz Sweep = 100 sec

Detector function = peak Trace = max hold

**Measurement Data: 2.4GHz Band**

| Mode | Frequency (MHz) | Channel No. | Test Results | |
|---|---|---|---|---|
| | | | Measured Bandwidth (MHz) | Result |
| 802.11b | 2412 | 1 | -16.47 | Complies |
| | 2437 | 6 | -16.45 | Complies |
| | 2462 | 11 | -16.61 | Complies |
| 802.11g | 2412 | 1 | -21.84 | Complies |
| | 2437 | 6 | -21.87 | Complies |
| | 2462 | 11 | -21.87 | Complies |
| 802.11n _20MHz | 2412 | 1 | -16.57 | Complies |
| | 2437 | 6 | -15.83 | Complies |
| | 2462 | 11 | -15.71 | Complies |
| 802.11n _40MHz | 2422 | 1 | -19.15 | Complies |
| | 2437 | 4 | -18.78 | Complies |
| | 2452 | 7 | -18.60 | Complies |

**Measurement Data: 5.0GHz Band**

| Mode | Frequency (MHz) | Channel No. | Test Results | |
|---|---|---|---|---|
| | | | Measured Bandwidth (MHz) | Result |
| 802.11a | 5745 | 149 | -18.49 | Complies |
| | 5785 | 157 | -19.55 | Complies |
| | 5825 | 165 | -21.85 | Complies |
| 802.11an _20MHz | 5745 | 149 | -19.06 | Complies |
| | 5785 | 157 | -20.99 | Complies |
| | 5825 | 165 | -21.90 | Complies |
| 802.11an _40MHz | 5745 | 149 | -20.80 | Complies |
| | 5825 | 165 | -22.45 | Complies |

- See next pages for actual measured spectrum plots.

**Minimum Standard:**

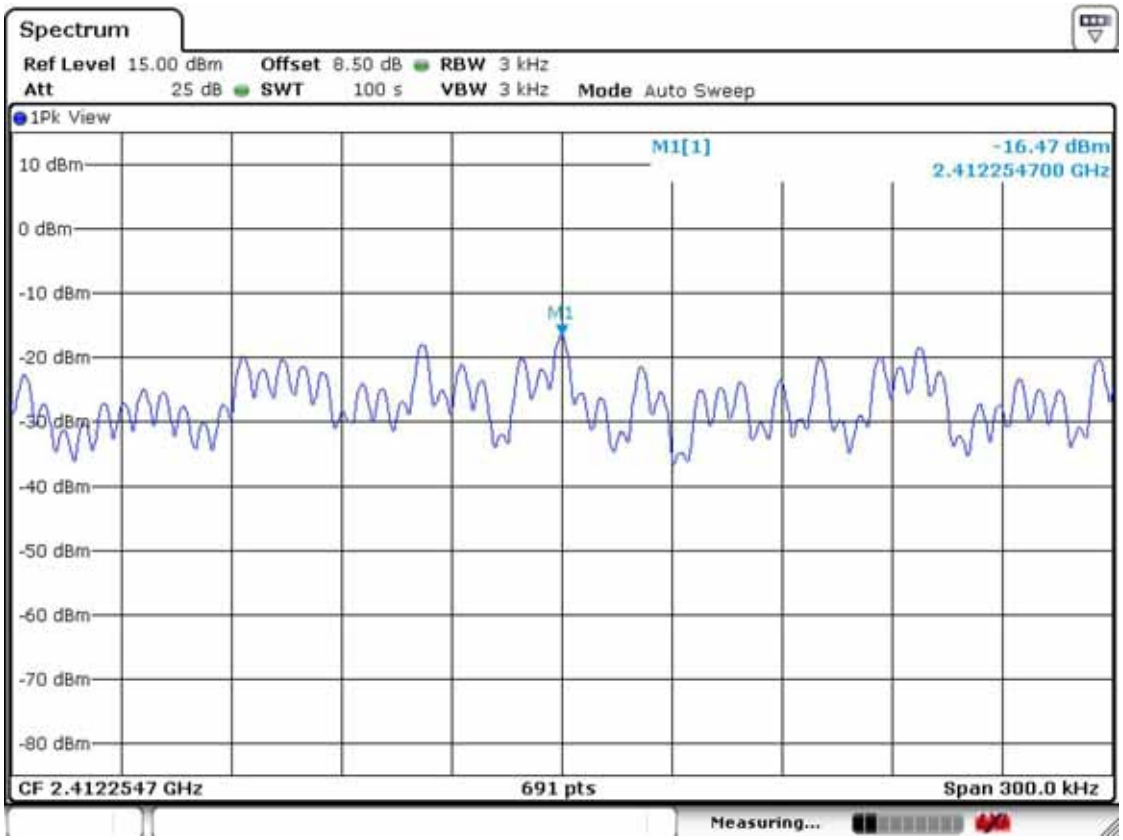
| | |
|---|---|
| Power Spectral Density | < 8dBm @ 3kHz BW |

**Measurement Setup**

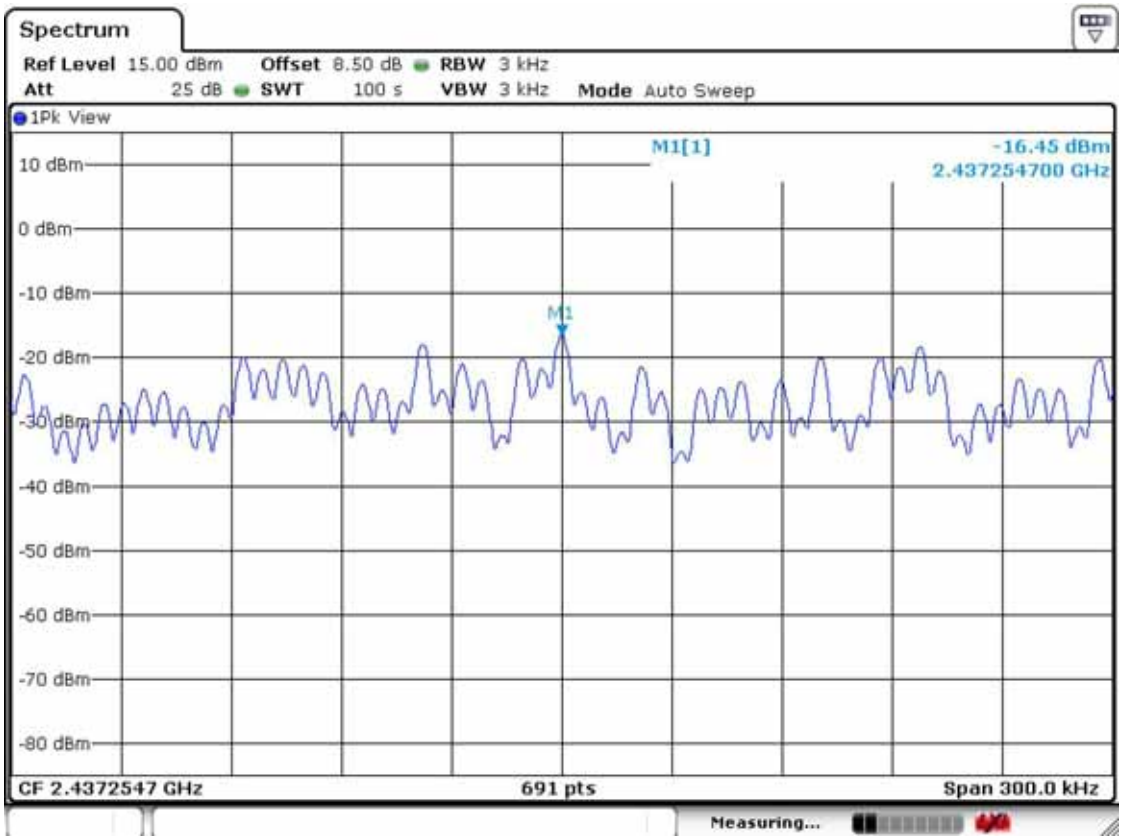
Same as the Chapter 3.2.1 (Figure 1)

# 802.11b Power Density Measurement

## CH 1




## CH 6

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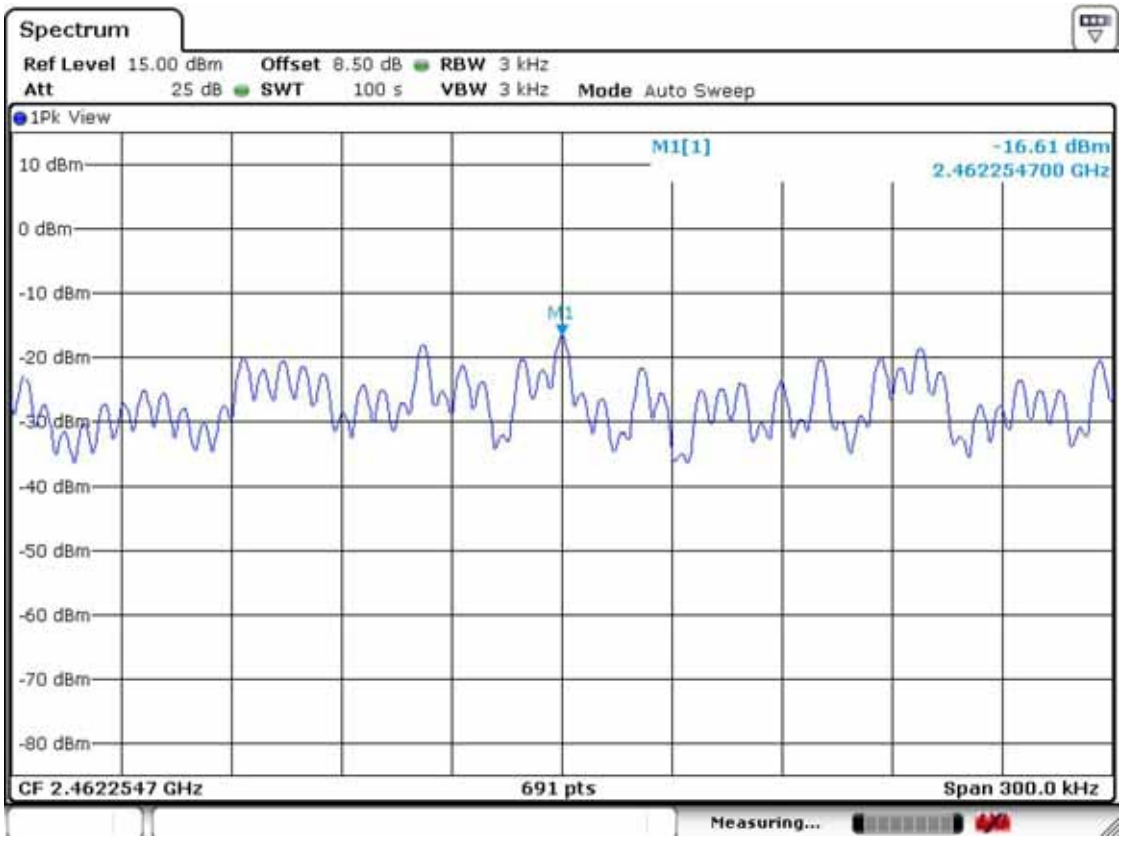
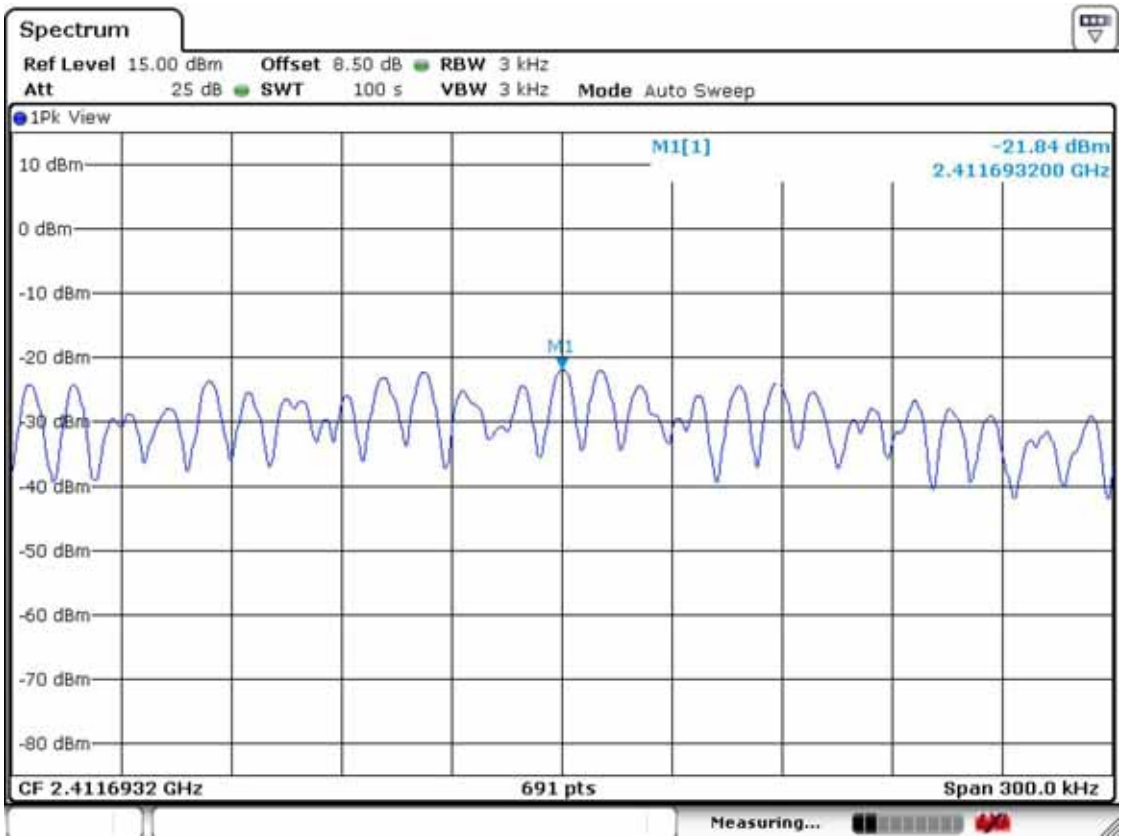
# CH 11

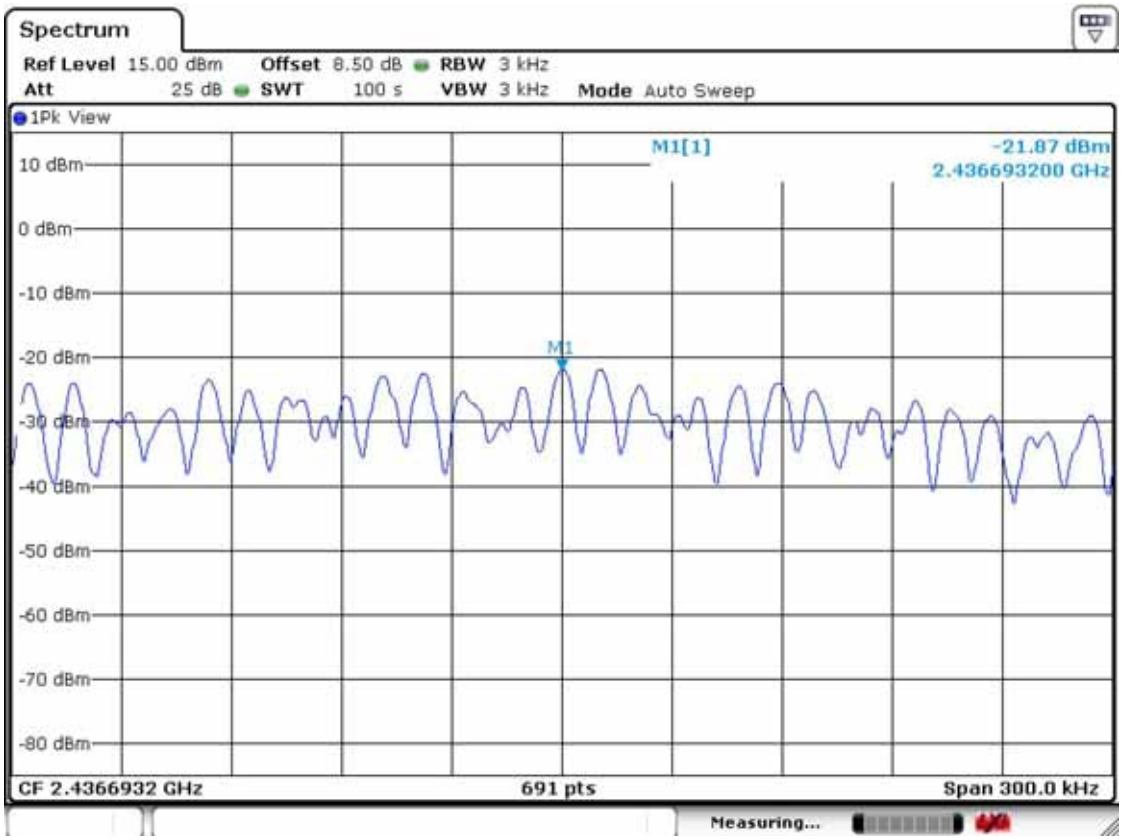

Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 3 kHz
Att 25 dB SWT 100 s VBW 3 kHz Mode Auto Sweep
1Pk View
M1[1] -16.61 dBm
2.462254700 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.4622547 GHz
691 pts
Span 300.0 kHz
Measuring...

# 802.11g Power Density Measurement

## CH 1




## CH 6

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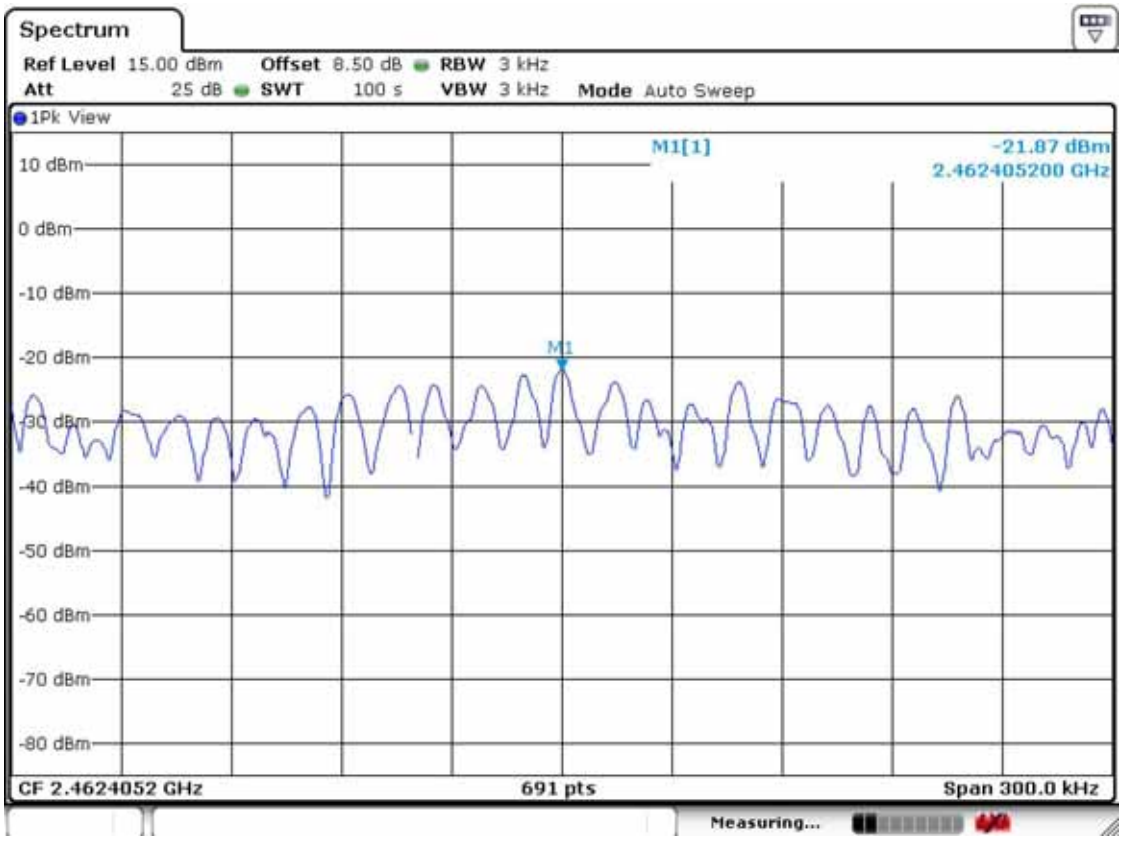
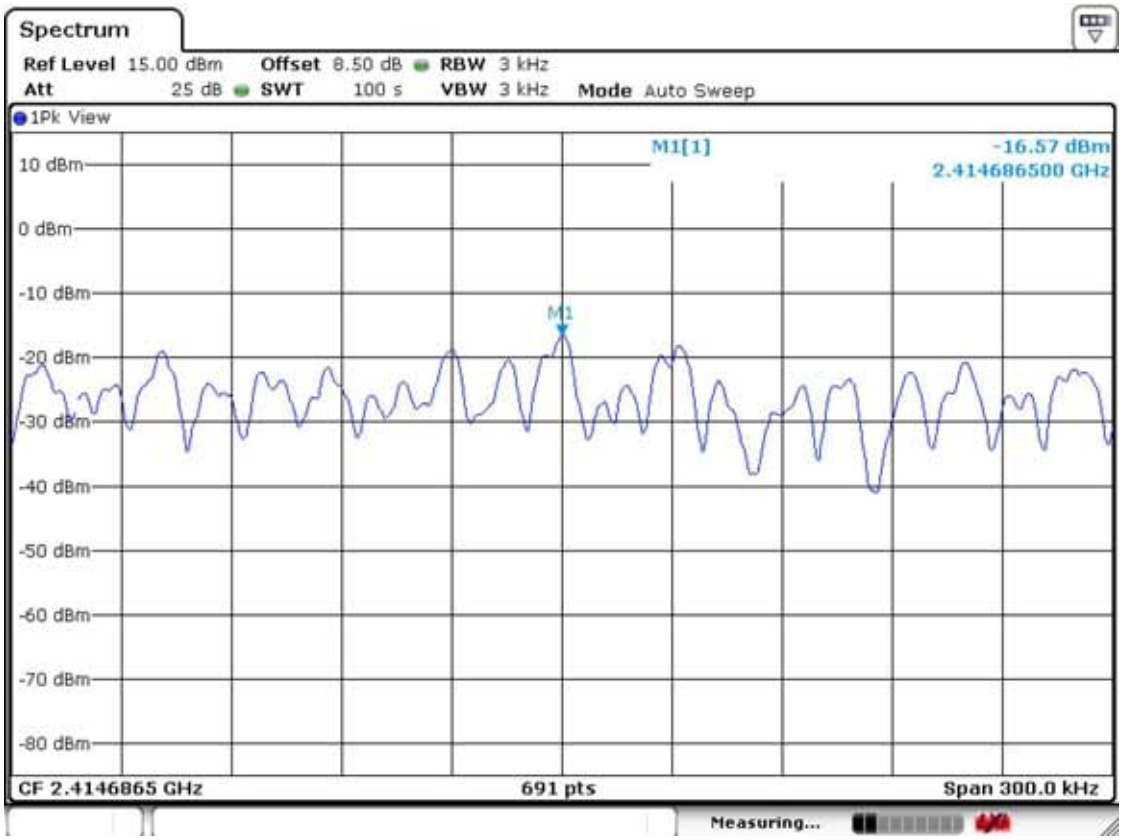
# CH 11

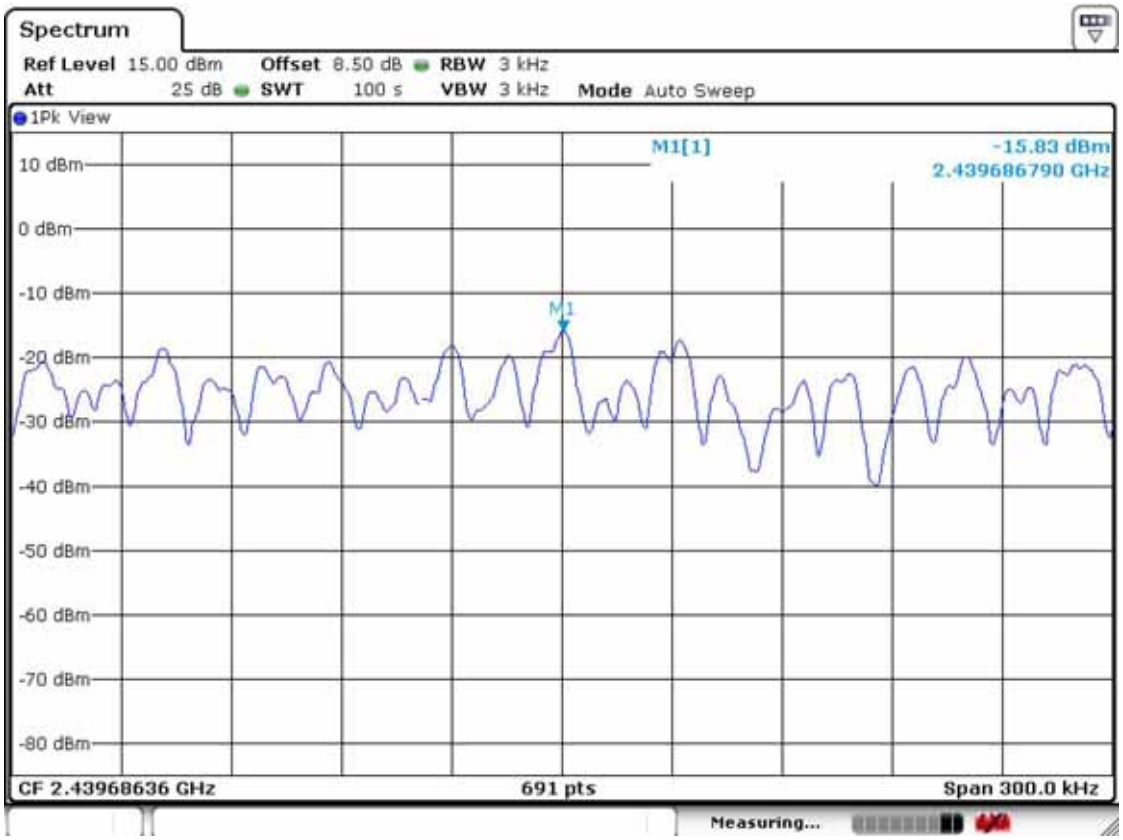

Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 3 kHz
Att 25 dB SWT 100 s VBW 3 kHz Mode Auto Sweep
1Pk View
M1[1] -21.87 dBm
2.462405200 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.4624052 GHz
691 pts
Span 300.0 kHz
Measuring...

# 802.11n_20MHz Power Density Measurement

## CH 1




## CH 6

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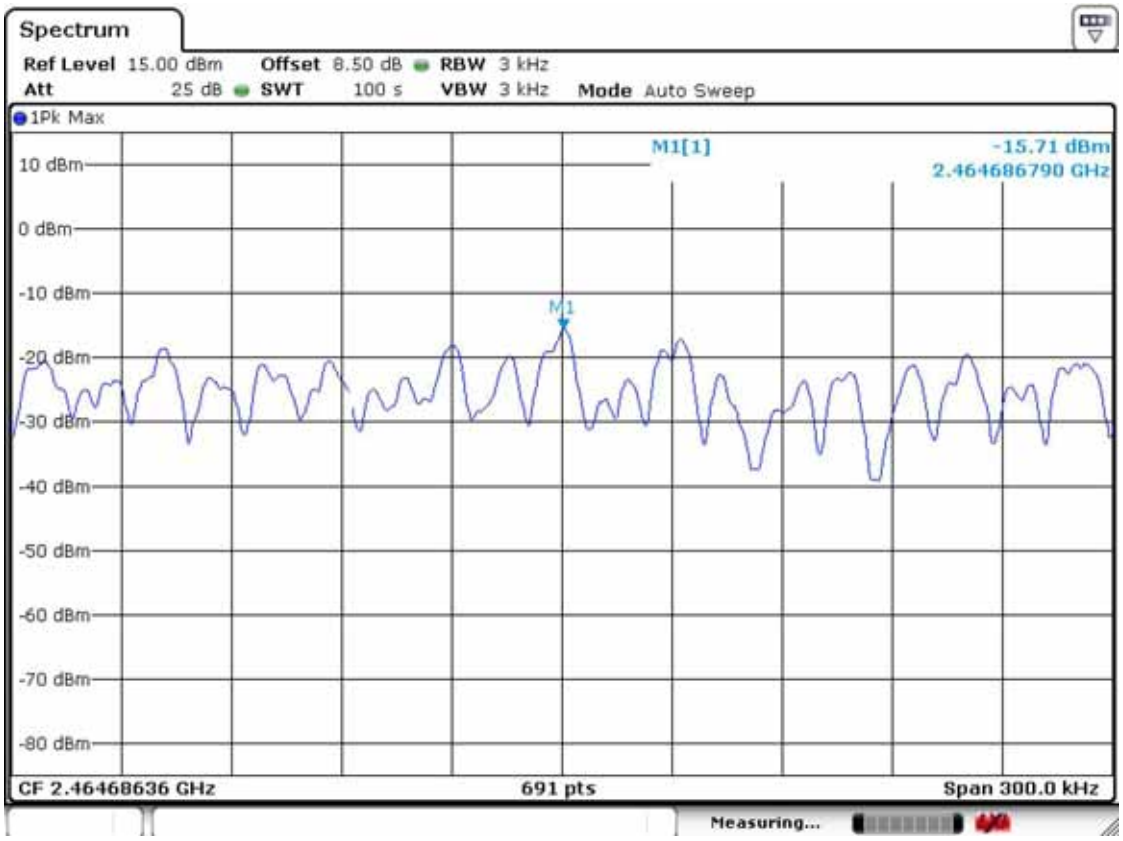
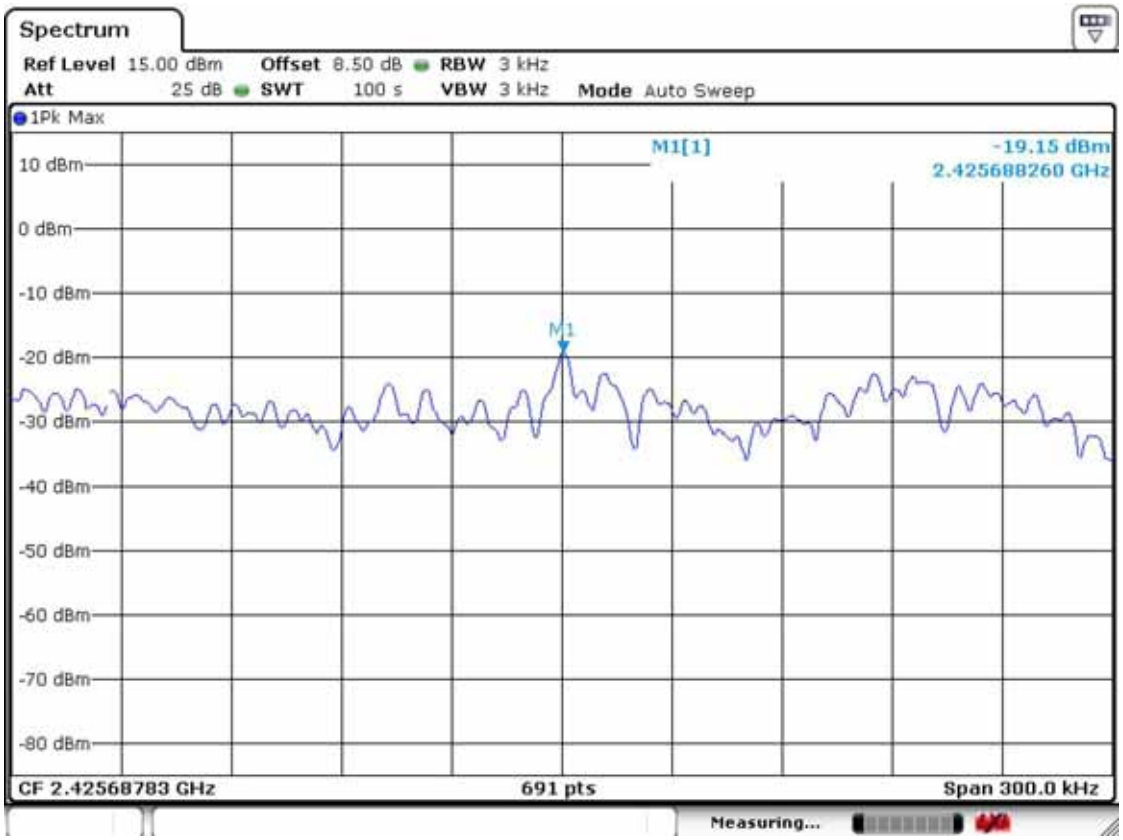
# CH 11

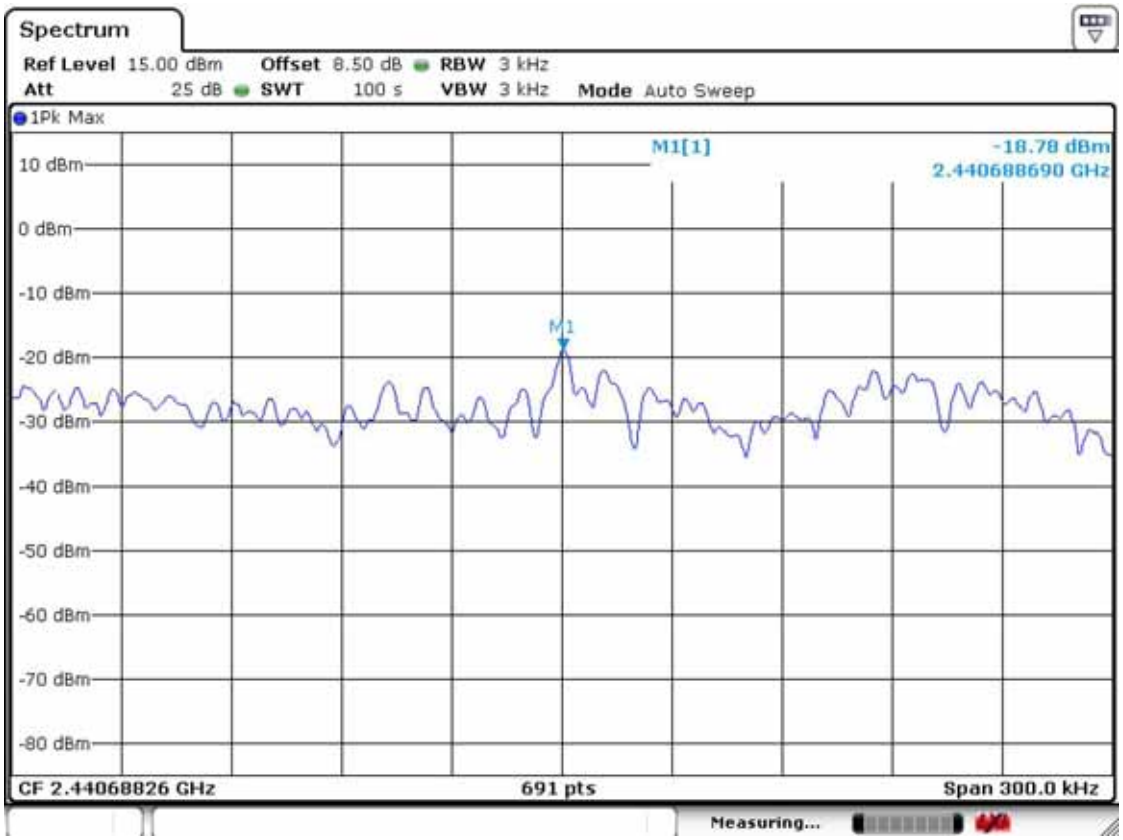

Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 3 kHz
Att 25 dB SWT 100 s VBW 3 kHz Mode Auto Sweep
1Pk Max
M1[1] -15.71 dBm
2.464686790 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.46468636 GHz
691 pts
Span 300.0 kHz
Measuring...

# 802.11n_40MHz Power Density Measurement

## CH 1




## CH 4

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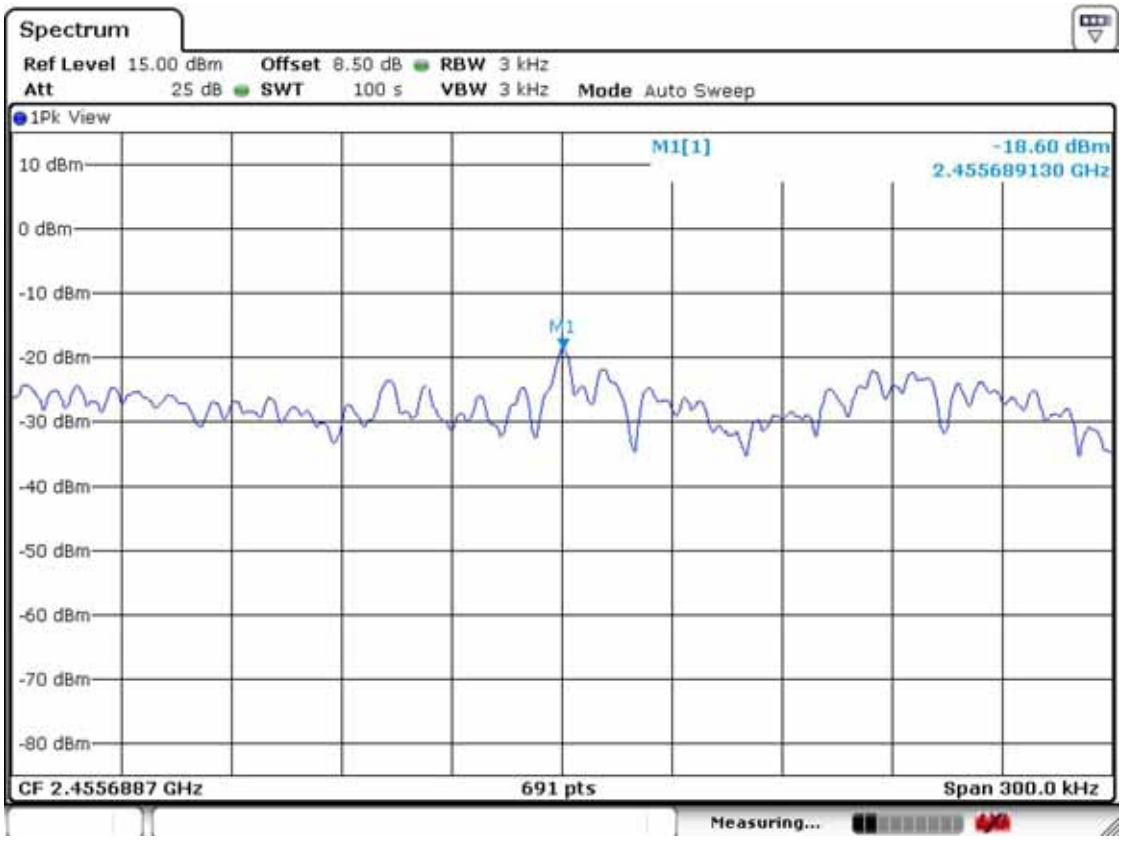
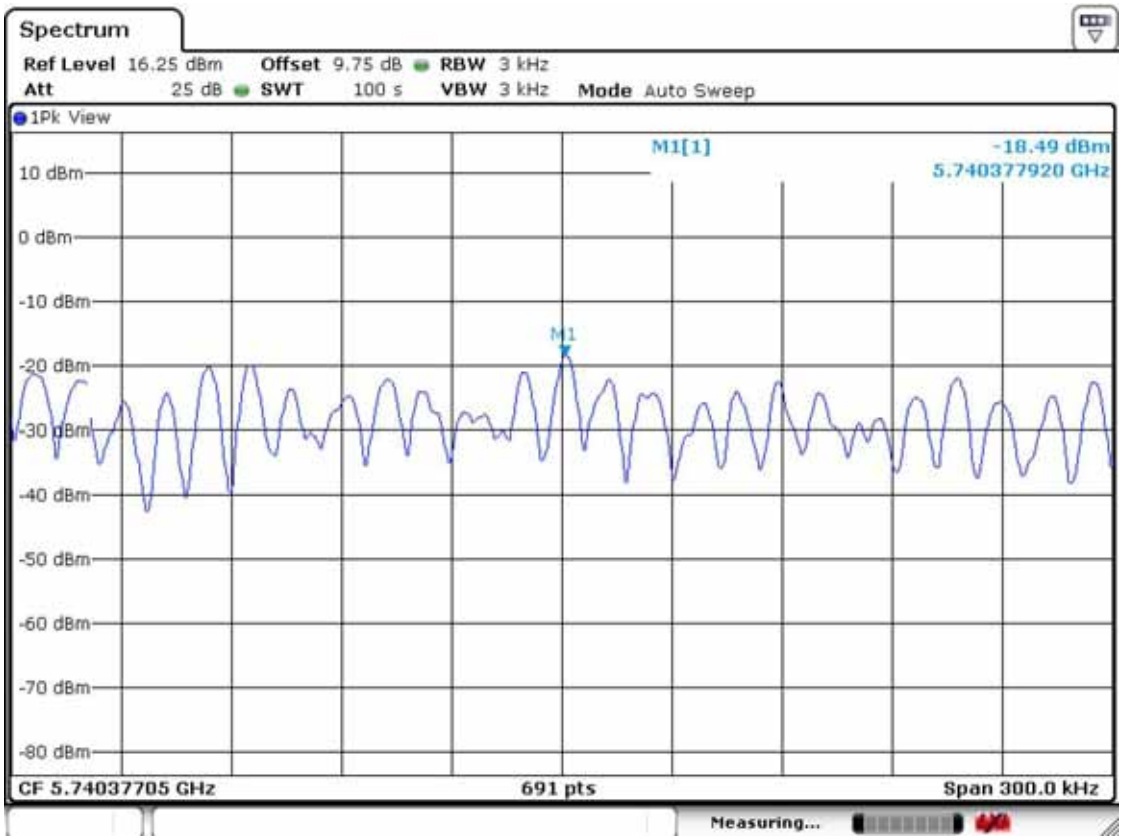
# CH 7

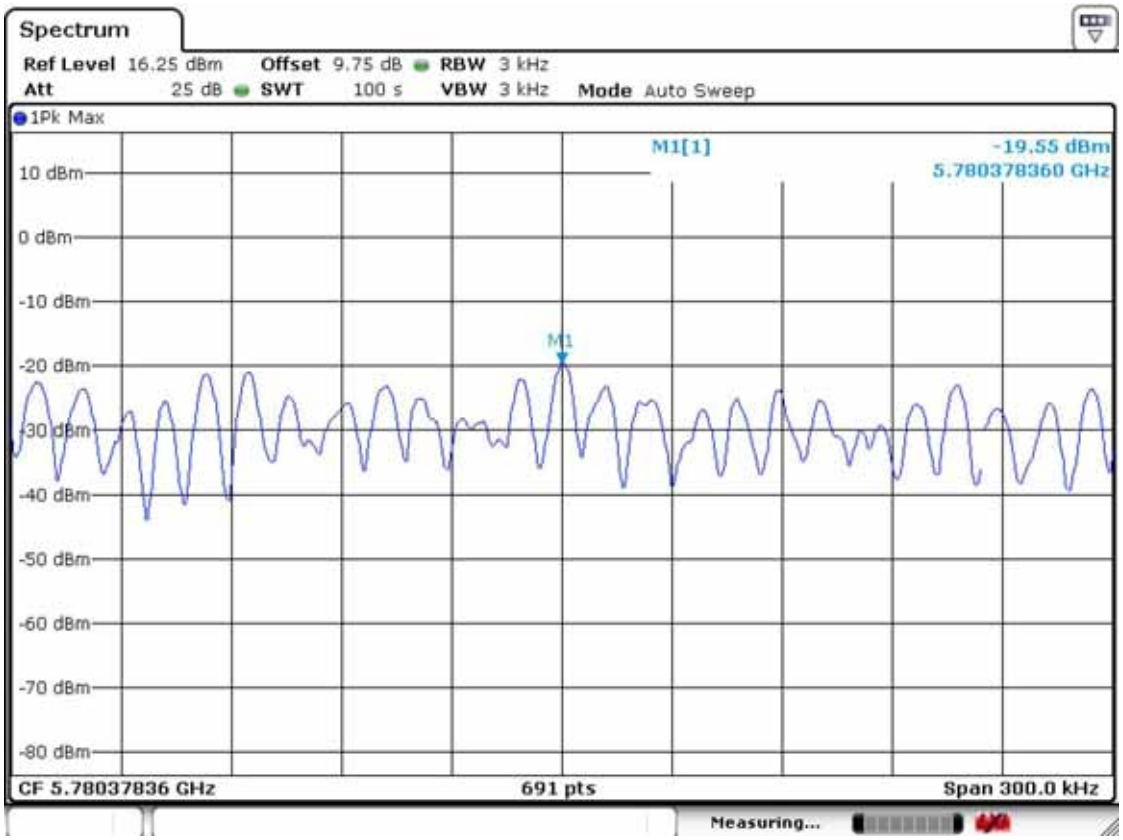

Spectrum
Ref Level 15.00 dBm Offset 8.50 dB RBW 3 kHz
Att 25 dB SWT 100 s VBW 3 kHz Mode Auto Sweep
1Pk View
M1[1] -18.60 dBm
2.455689130 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 2.4556887 GHz
691 pts
Span 300.0 kHz
Measuring...

# 802.11a Power Density Measurement

## CH 149




## CH 157

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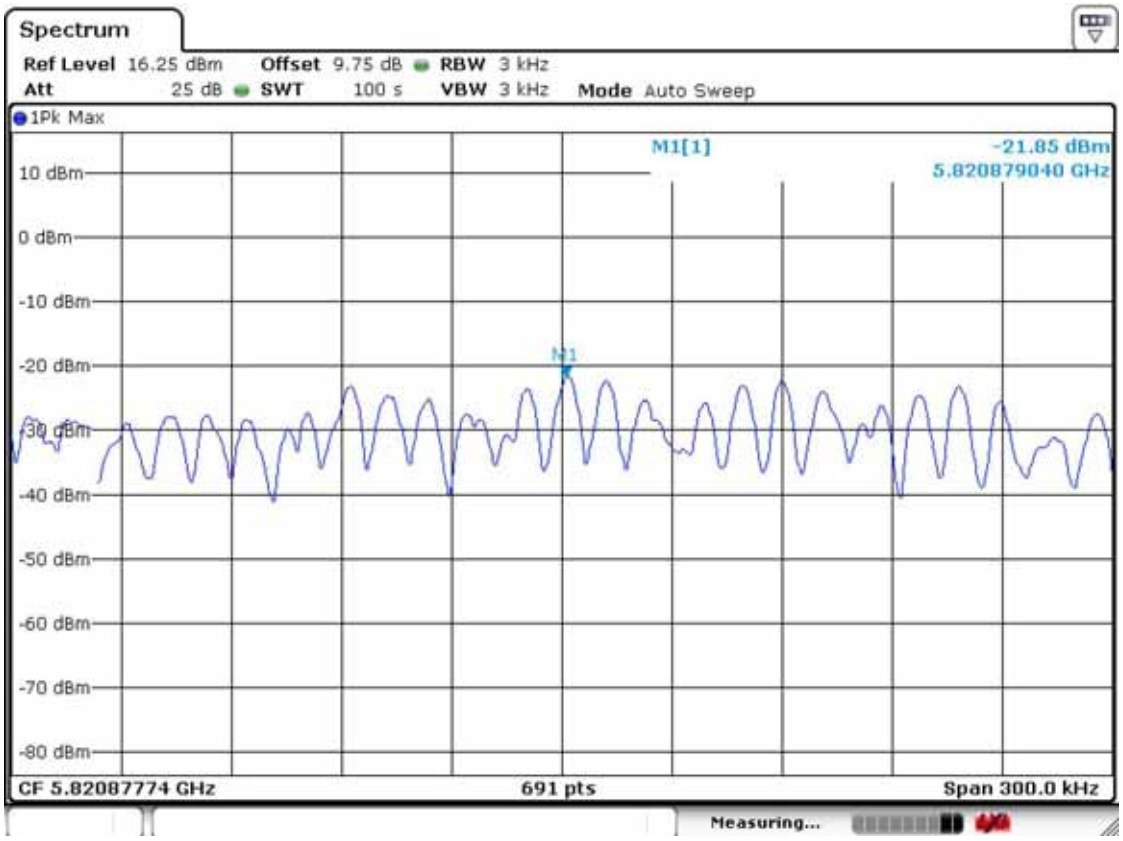
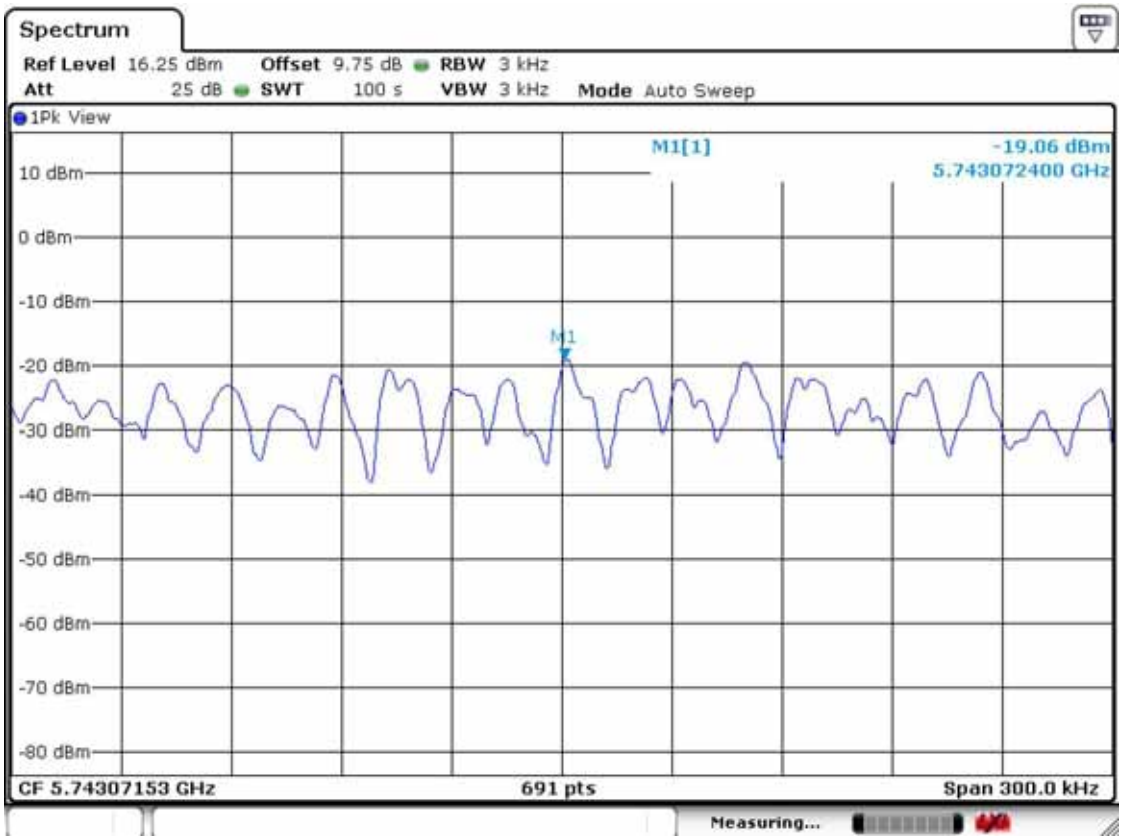
# CH 165

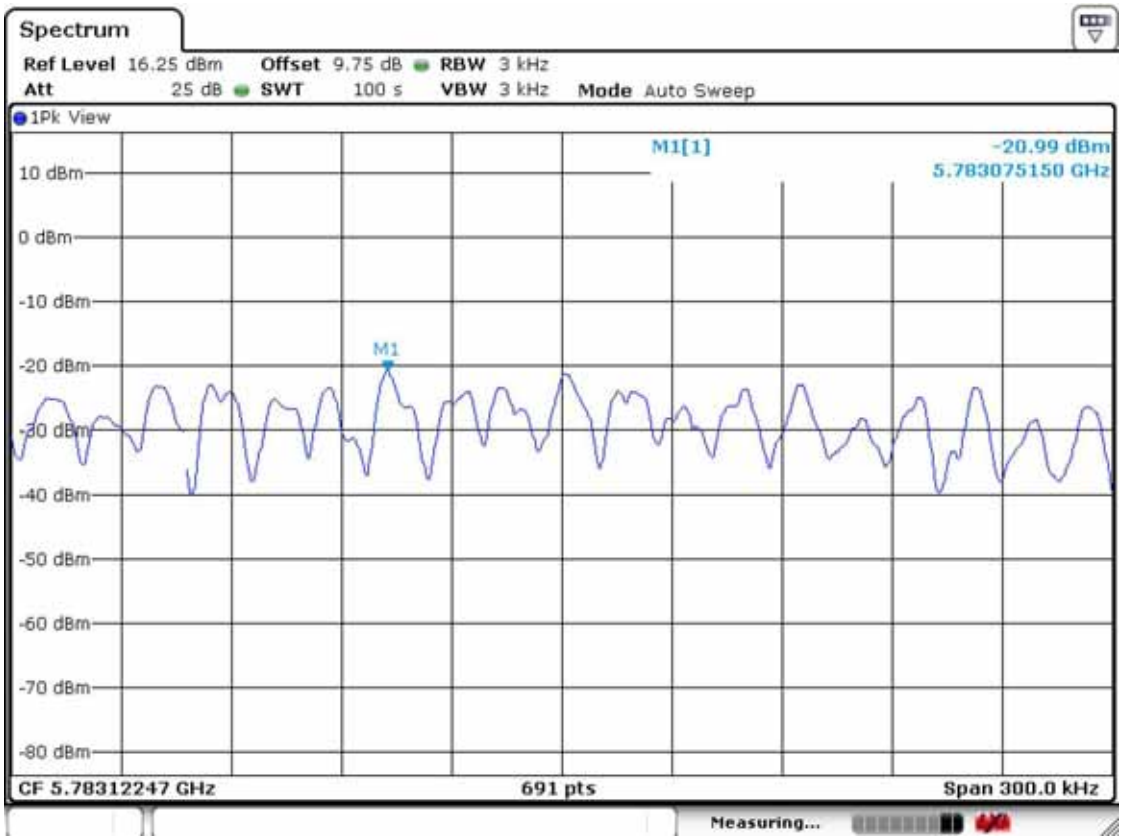

Spectrum
Ref Level 16.25 dBm Offset 9.75 dB RBW 3 kHz
Att 25 dB SWT 100 s VBW 3 kHz Mode Auto Sweep
1Pk Max
M1[1] -21.85 dBm
5.820879040 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 5.82087774 GHz
691 pts
Span 300.0 kHz
Measuring...

# 802.11an_20MHz Power Density Measurement

## CH 149




## CH 157

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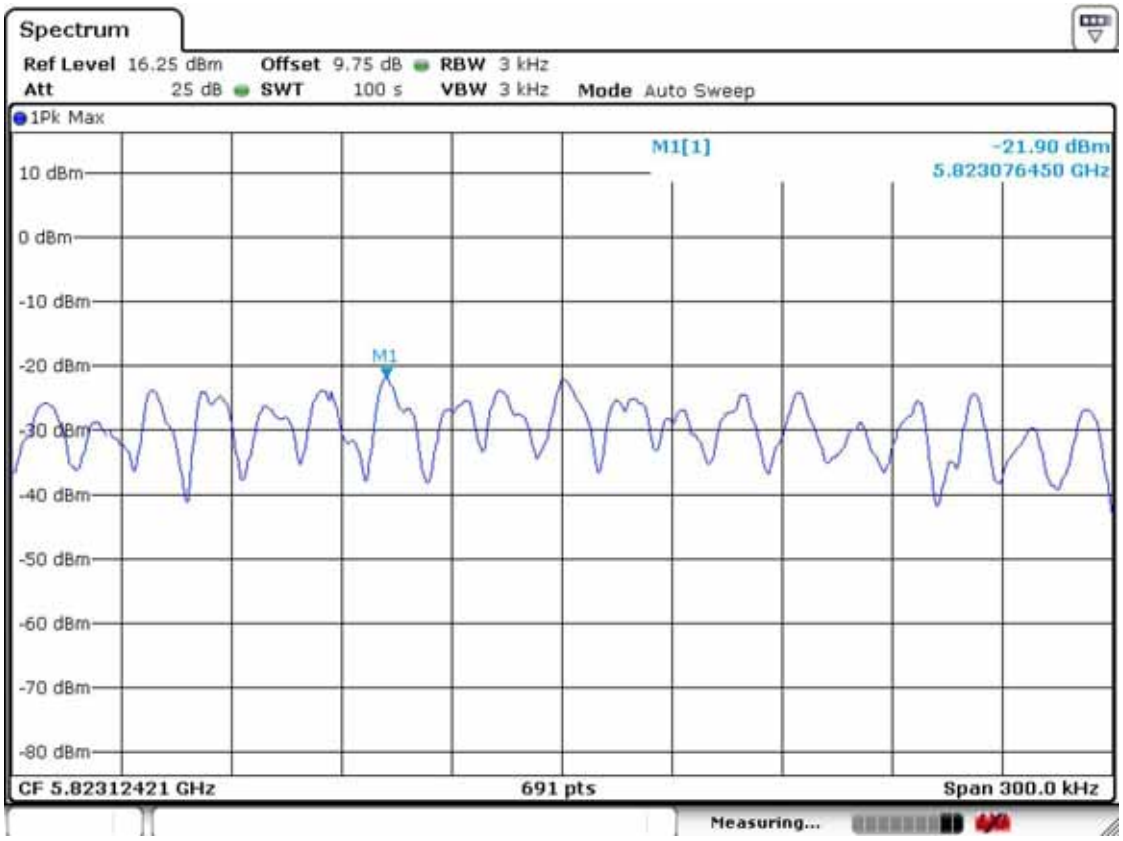
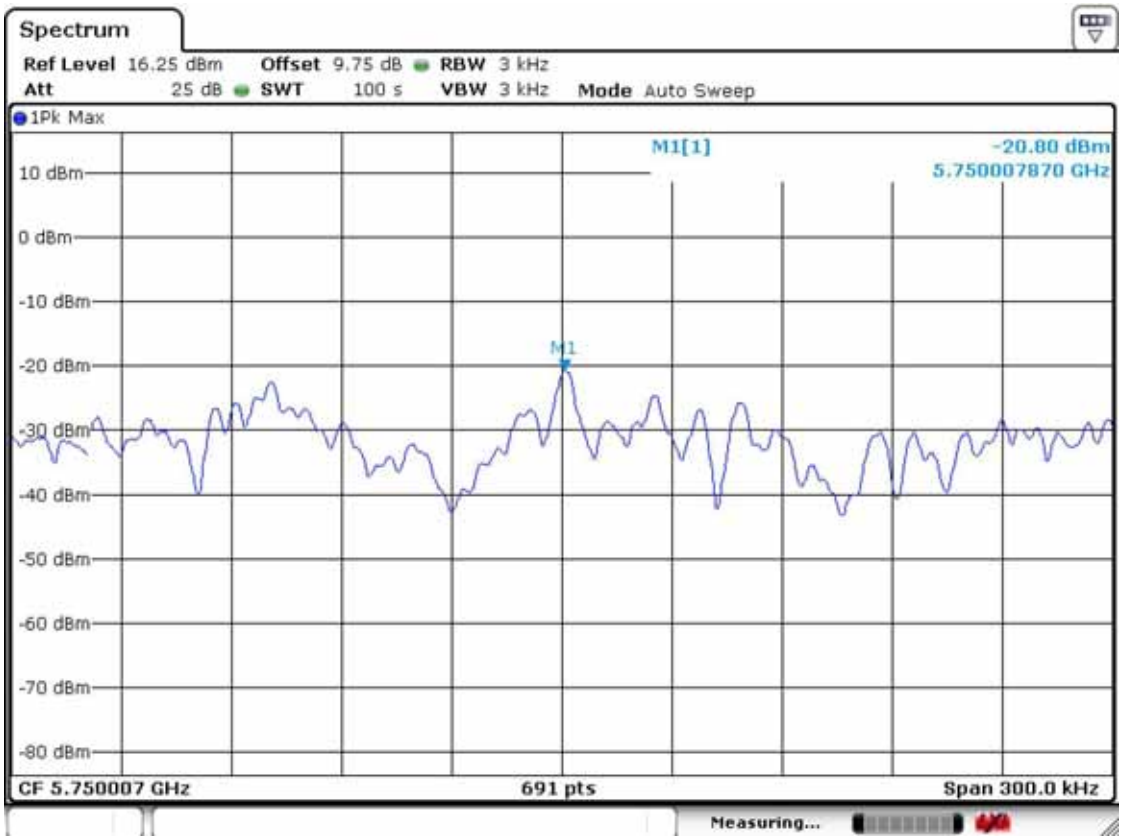
# CH 165

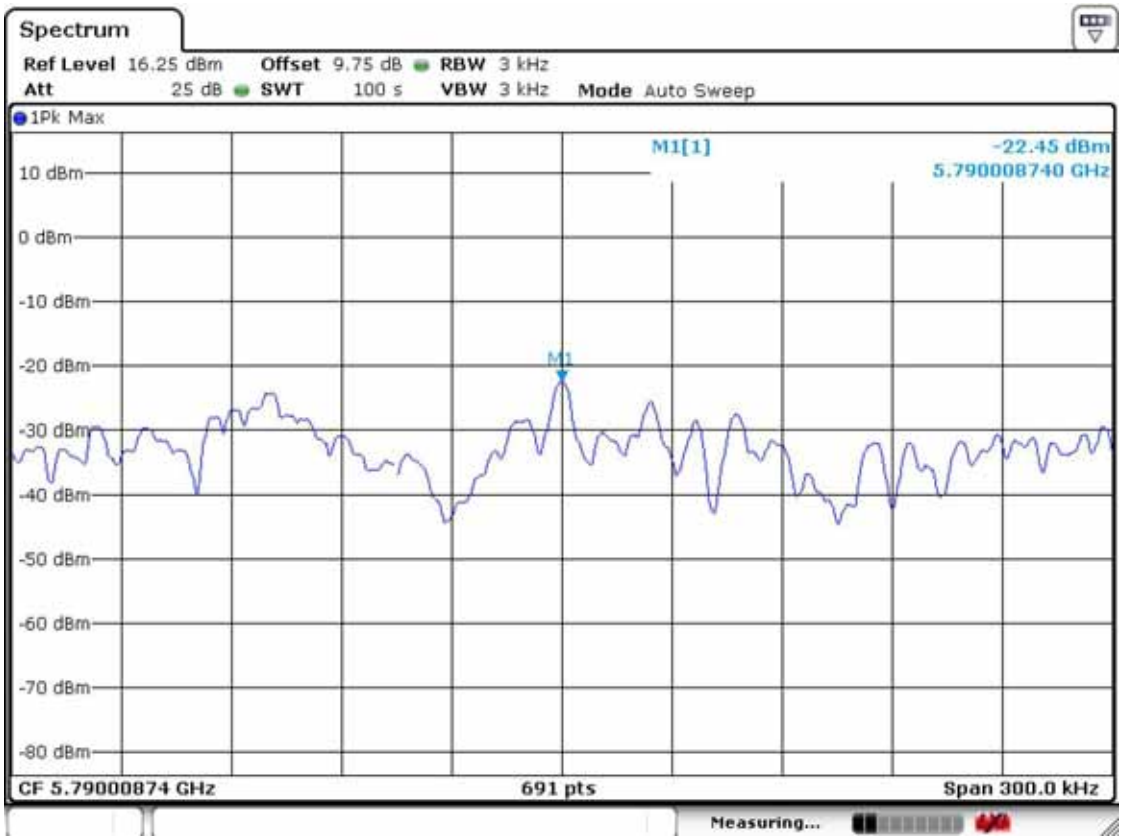

Spectrum
Ref Level 16.25 dBm Offset 9.75 dB RBW 3 kHz
Att 25 dB SWT 100 s VBW 3 kHz Mode Auto Sweep
1Pk Max
M1[1] -21.90 dBm
5.823076450 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
M1
CF 5.82312421 GHz
691 pts
Span 300.0 kHz
Measuring...

# 802.11an_40MHz Power Density Measurement

## CH 151




## CH 159

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### 3.2.4 Band - edge

**Procedure:**

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

| | |
|---|---|
| RBW = 100 kHz | VBW = 100 kHz |
| Span = 40 MHz | Detector function = peak |
| Trace = max hold | Sweep = auto |

**Measurement Data: Complies**

- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

| | |
|---|---|
| **Minimum Standard:** | > 20 dBc |

**Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

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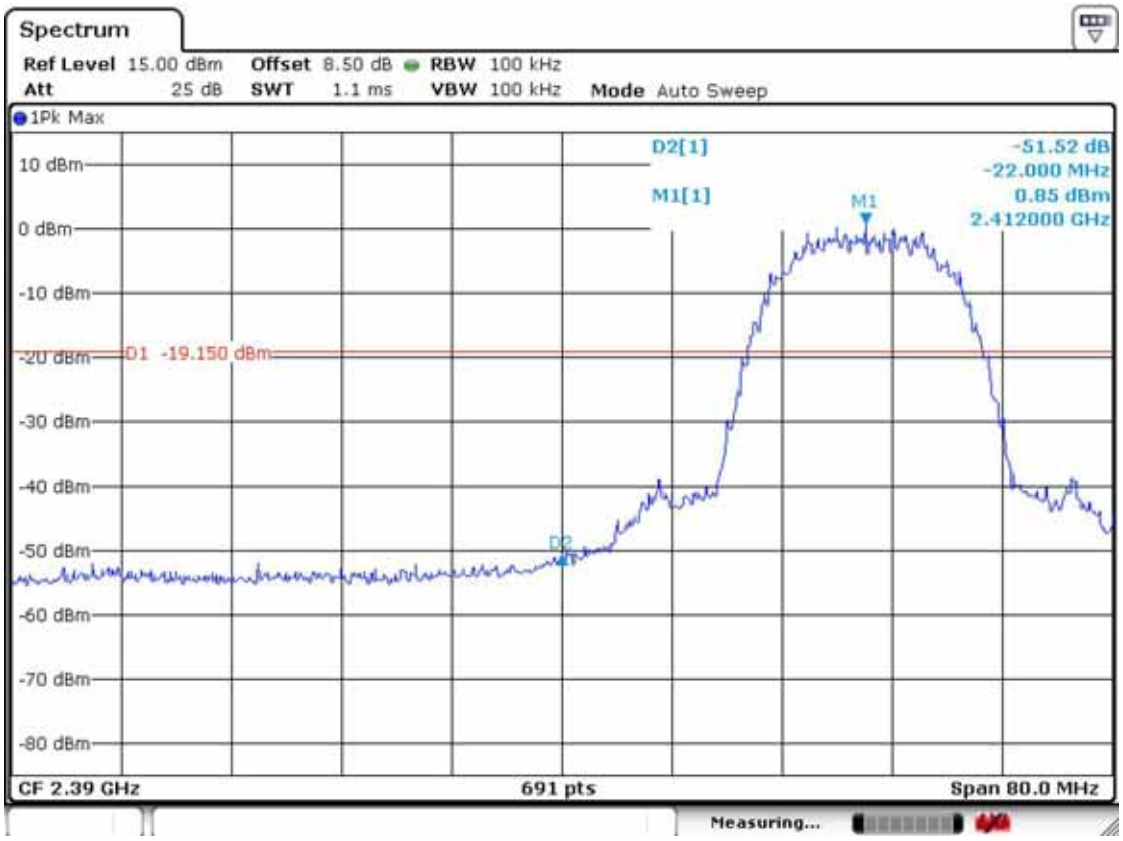
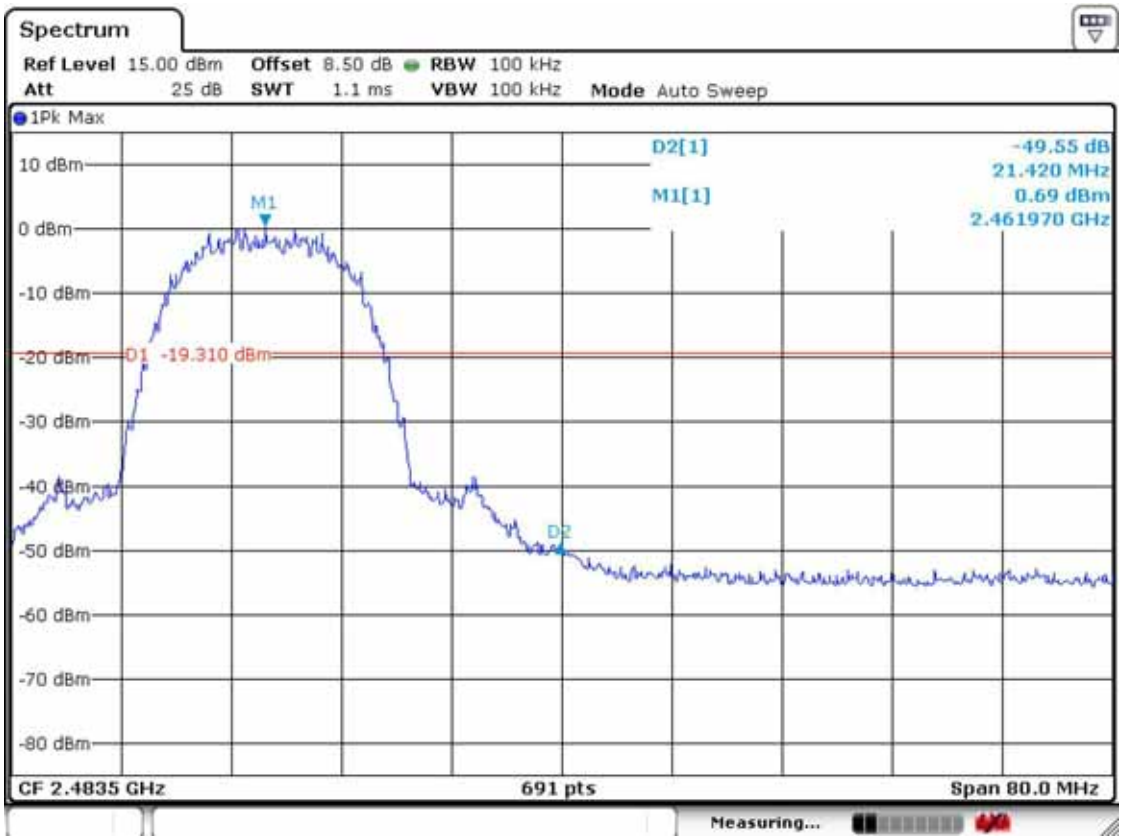
# 802.11b Band–edge : Conducted Measurements



**Band-edges in the restricted band 2310-2390 MHz measurement**

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2390 | 45.5 | 62.3 | H | 26.0 | 36.0 | 8.2 | 54.0 | 74.0 | 43.7 | 60.5 | 10.3 | 13.5 |

**Band-edges in the restricted band 2483.5-2500 MHz measurement**

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.5 | 47.0 | 66.2 | H | 26.0 | 36.0 | 8.2 | 54.0 | 74.0 | 45.2 | 64.4 | 8.8 | 9.6 |

**Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented**

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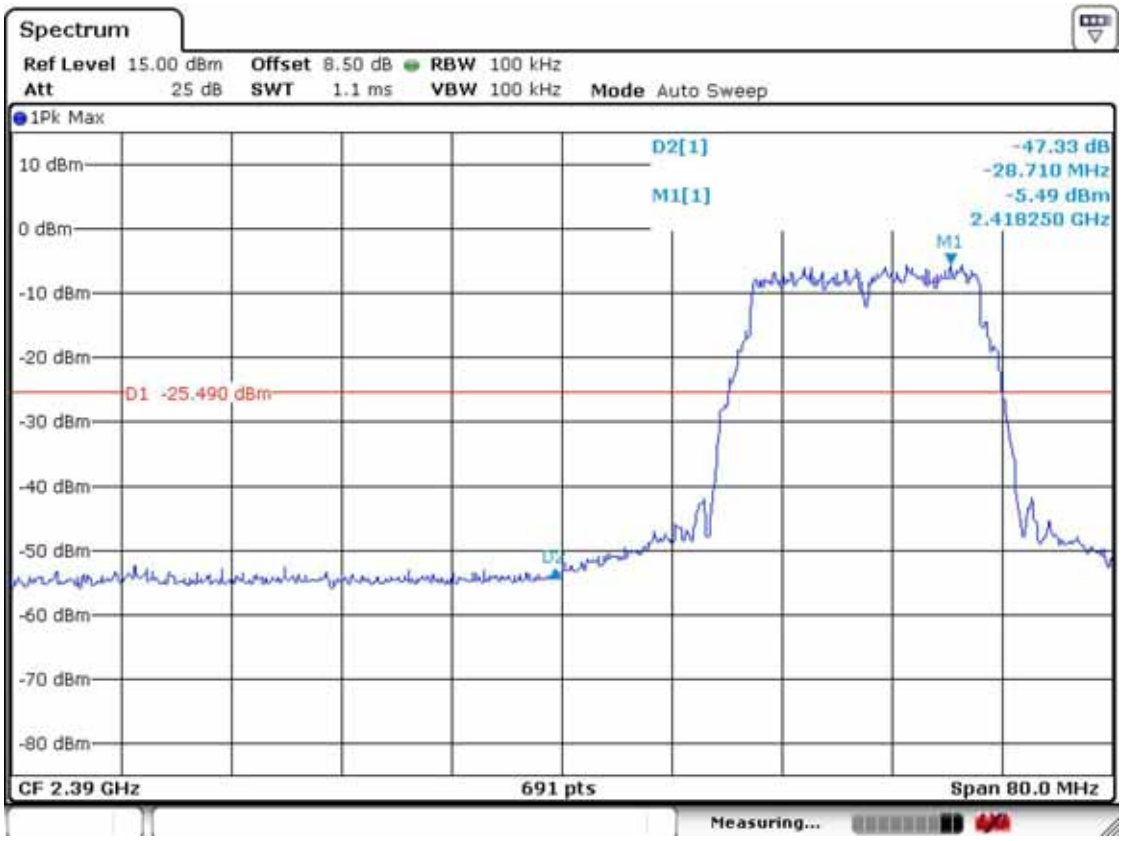
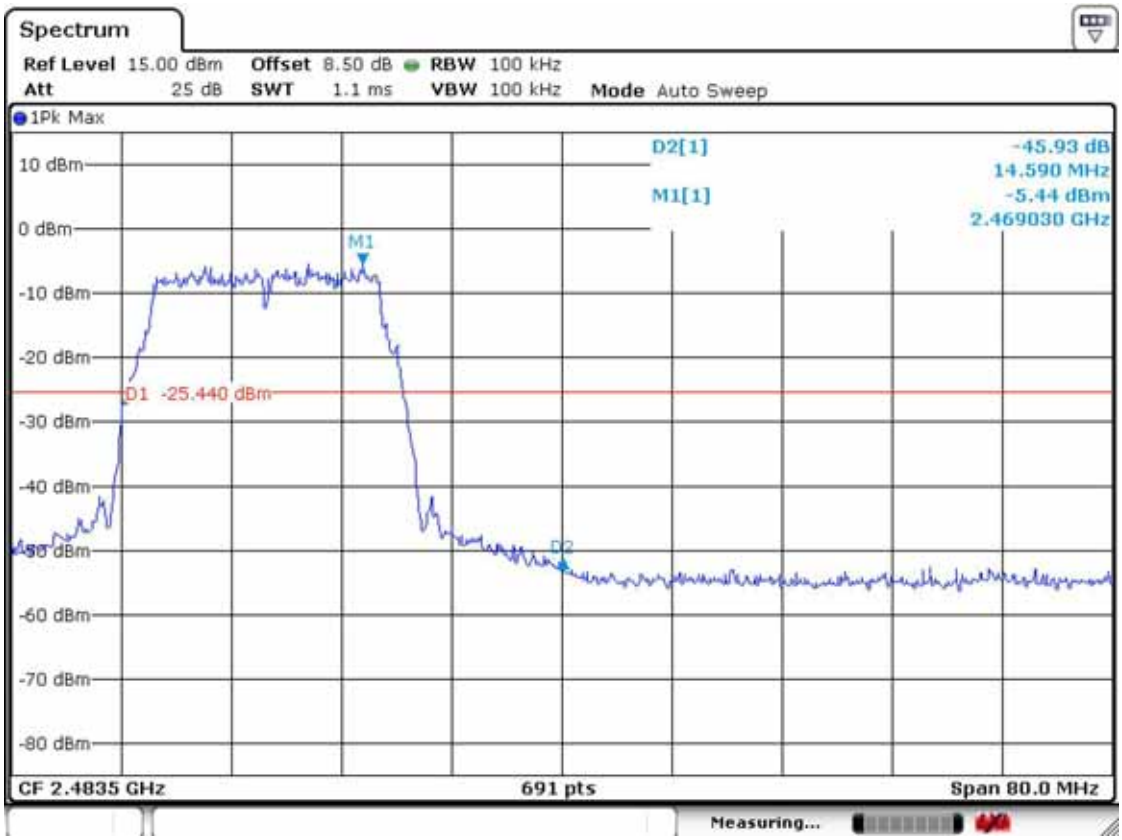
# 802.11g Band–edge : Conducted Measurements



**Band-edges in the restricted band 2310-2390 MHz measurement**

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2390 | 51.5 | 65.2 | H | 26.0 | 36.0 | 8.2 | 54.0 | 74.0 | 49.7 | 63.4 | 4.3 | 10.6 |

**Band-edges in the restricted band 2483.5-2500 MHz measurement**

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.5 | 53.4 | 67.4 | H | 26.0 | 36.0 | 8.2 | 54.0 | 74.0 | 51.6 | 65.6 | 2.4 | 8.5 |

**Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented**

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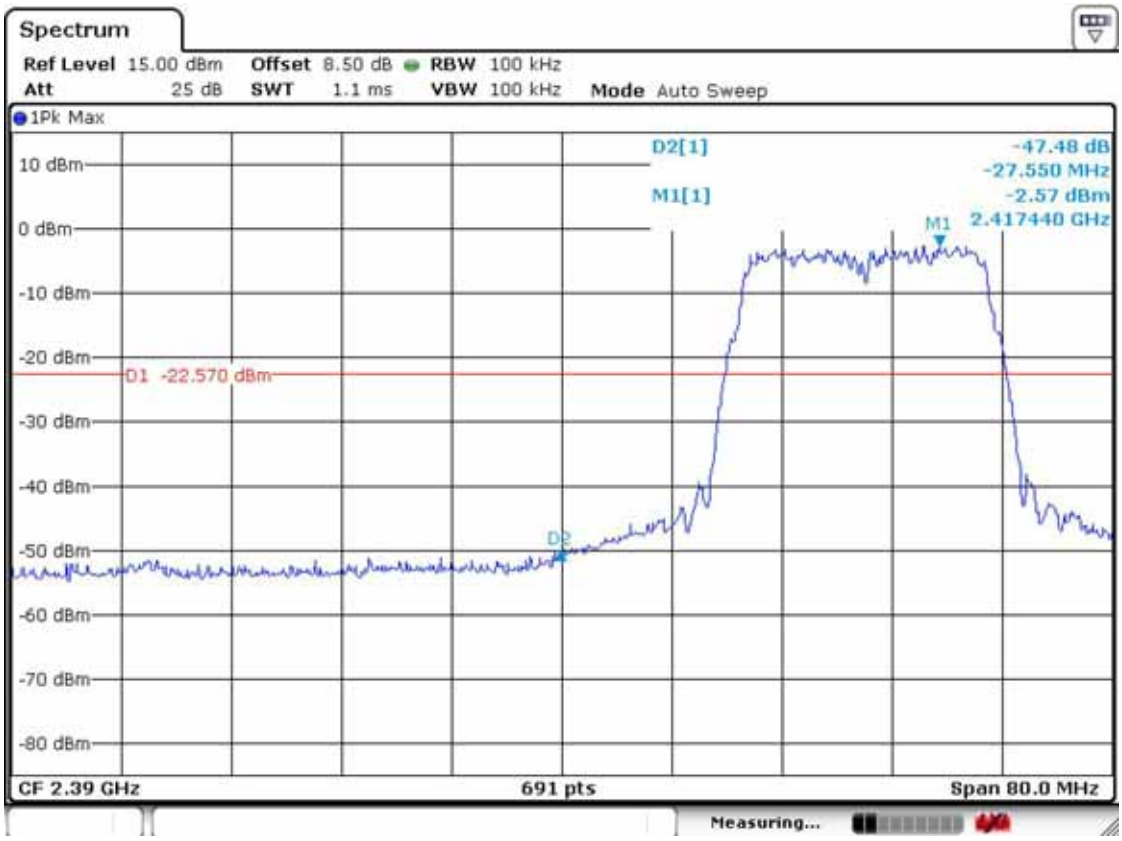
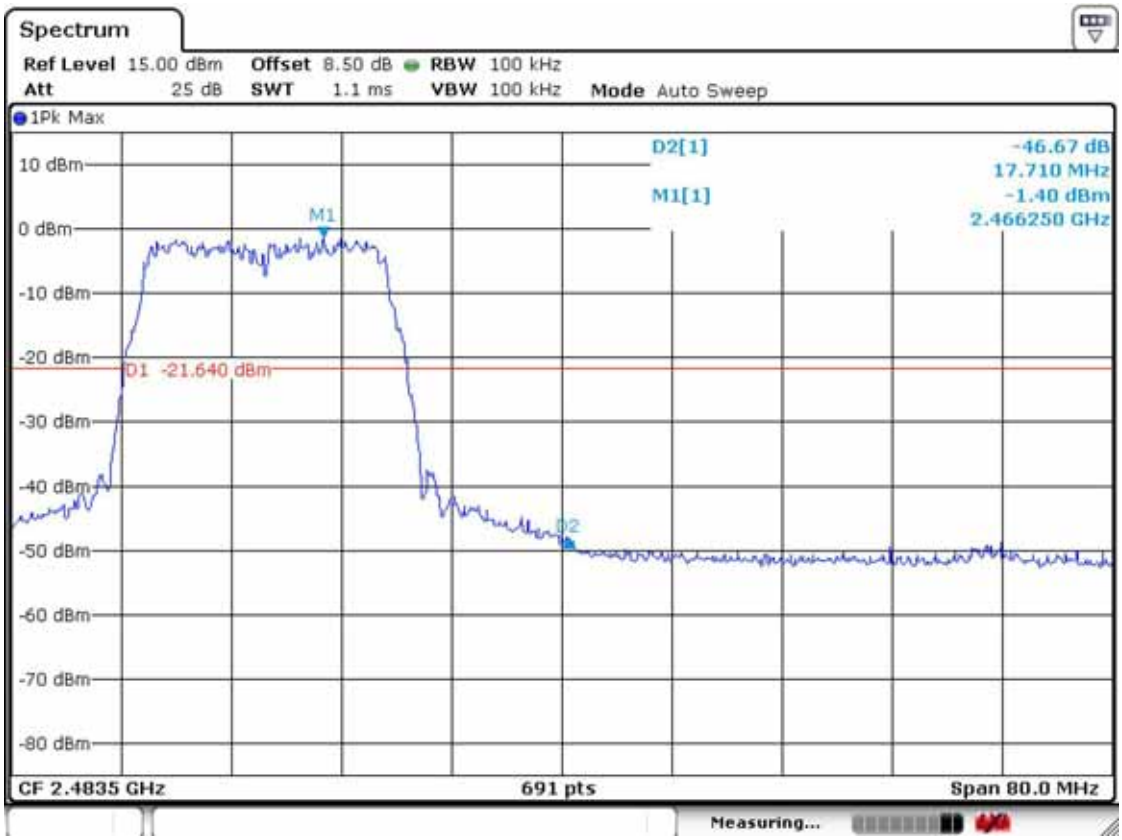
# 802.11n_20MHz Band–edge : Conducted Measurements



**Band-edges in the restricted band 2310-2390 MHz measurement**

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2390 | 52.7 | 65.8 | H | 26.0 | 36.0 | 8.2 | 54.0 | 74.0 | 50.9 | 64.0 | 3.1 | 10.0 |

**Band-edges in the restricted band 2483.5-2500 MHz measurement**

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.5 | 53.2 | 66.1 | H | 26.0 | 36.0 | 8.2 | 54.0 | 74.0 | 51.4 | 64.3 | 2.6 | 9.7 |

**Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented**

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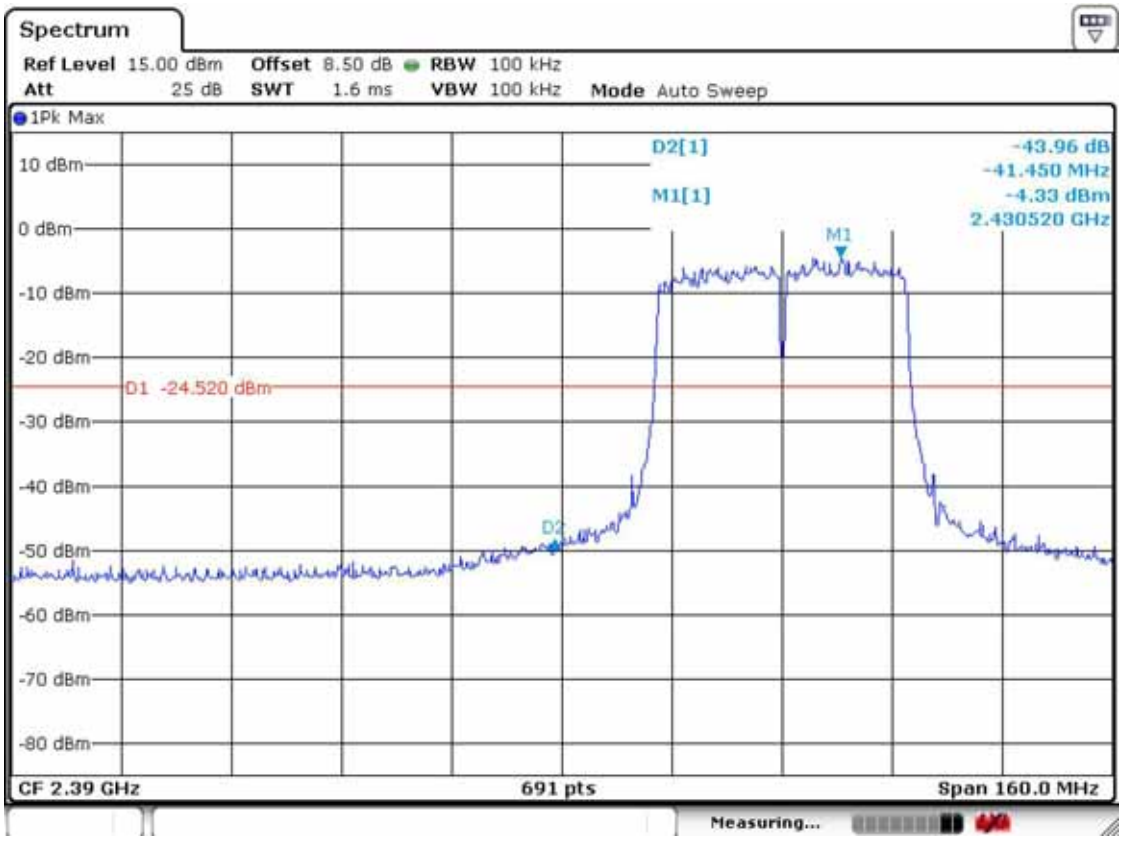
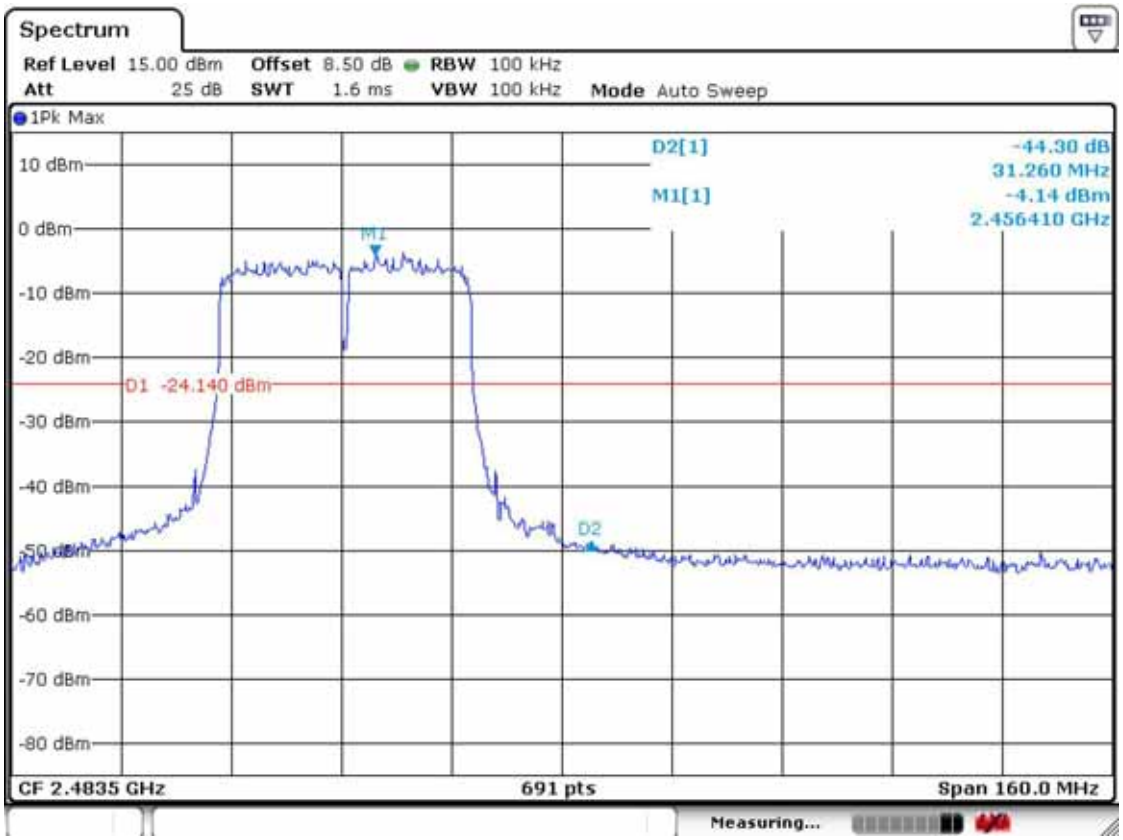
# 802.11n_40MHz Band–edge : Conducted Measurements



**Band-edges in the restricted band 2310-2390 MHz measurement**

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2390 | 54.2 | 66.3 | H | 26.0 | 36.0 | 8.2 | 54.0 | 74.0 | 52.4 | 64.4 | 1.6 | 9.6 |

**Band-edges in the restricted band 2483.5-2500 MHz measurement**

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.5 | 54.0 | 66.2 | H | 26.0 | 36.0 | 8.2 | 54.0 | 74.0 | 52.2 | 64.4 | 1.8 | 9.6 |

**Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented**

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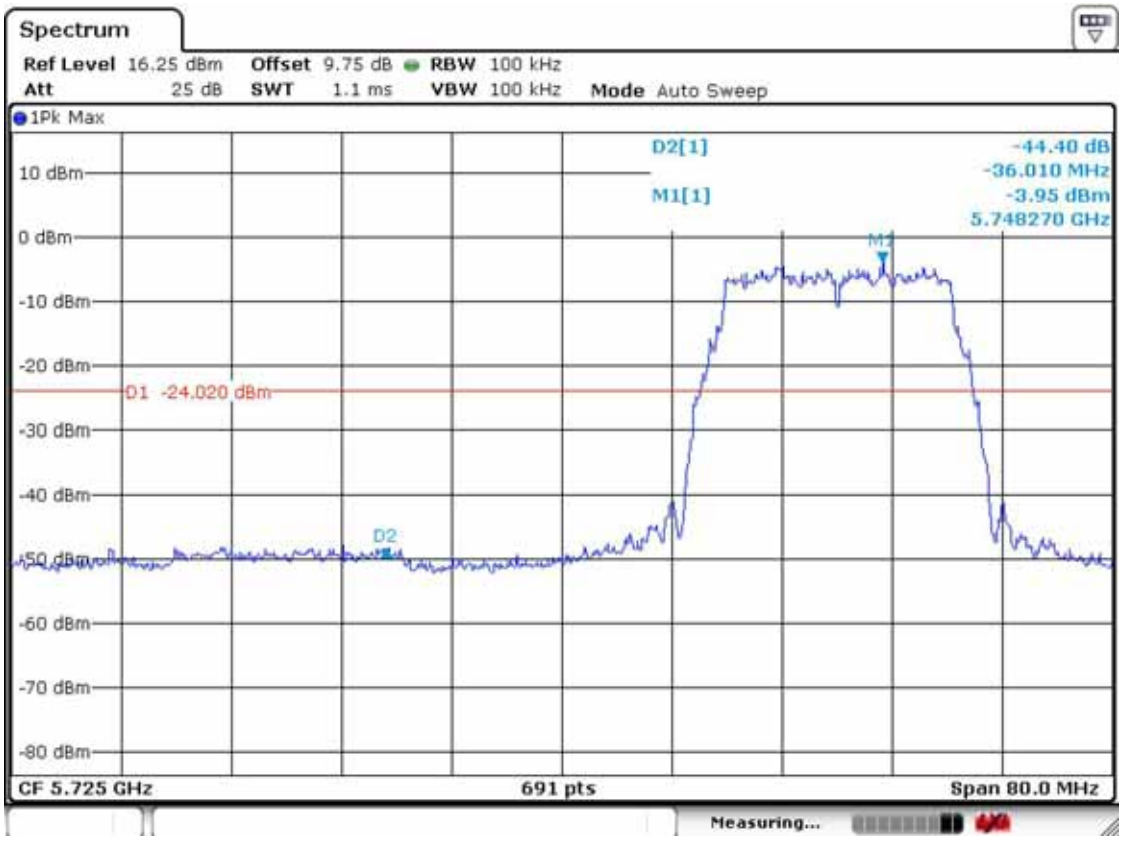
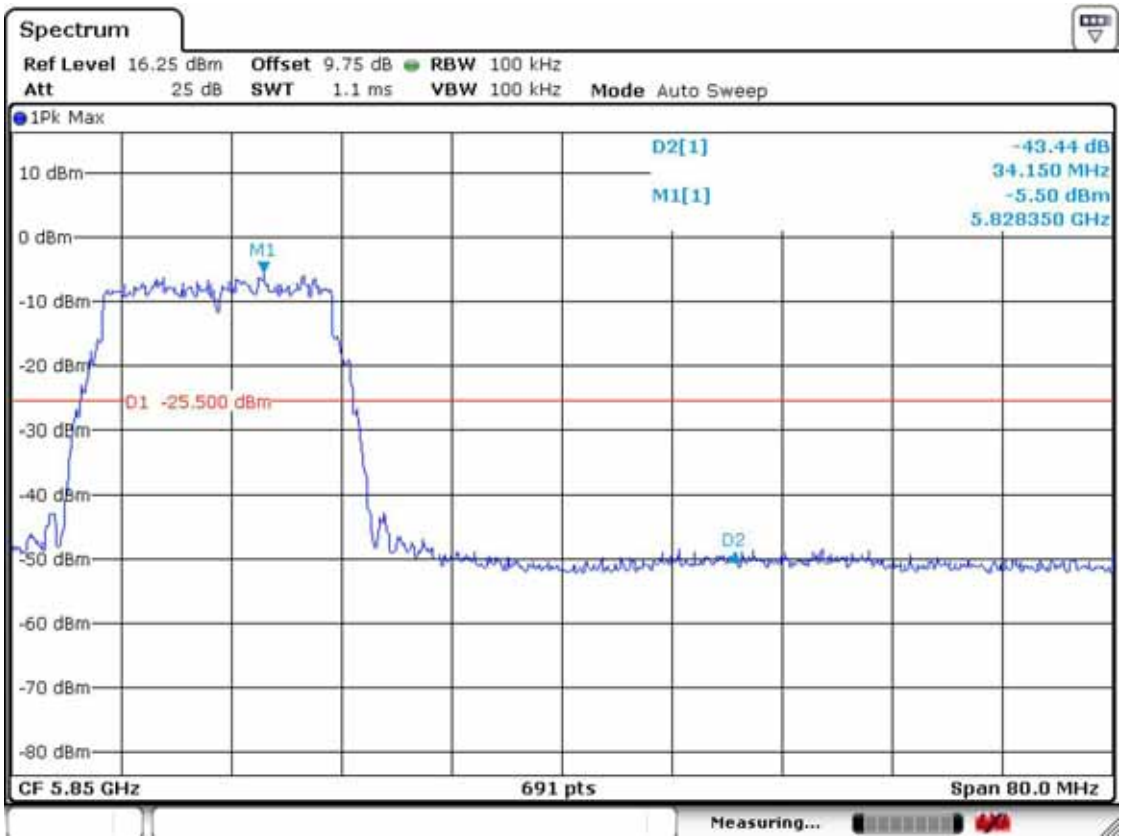
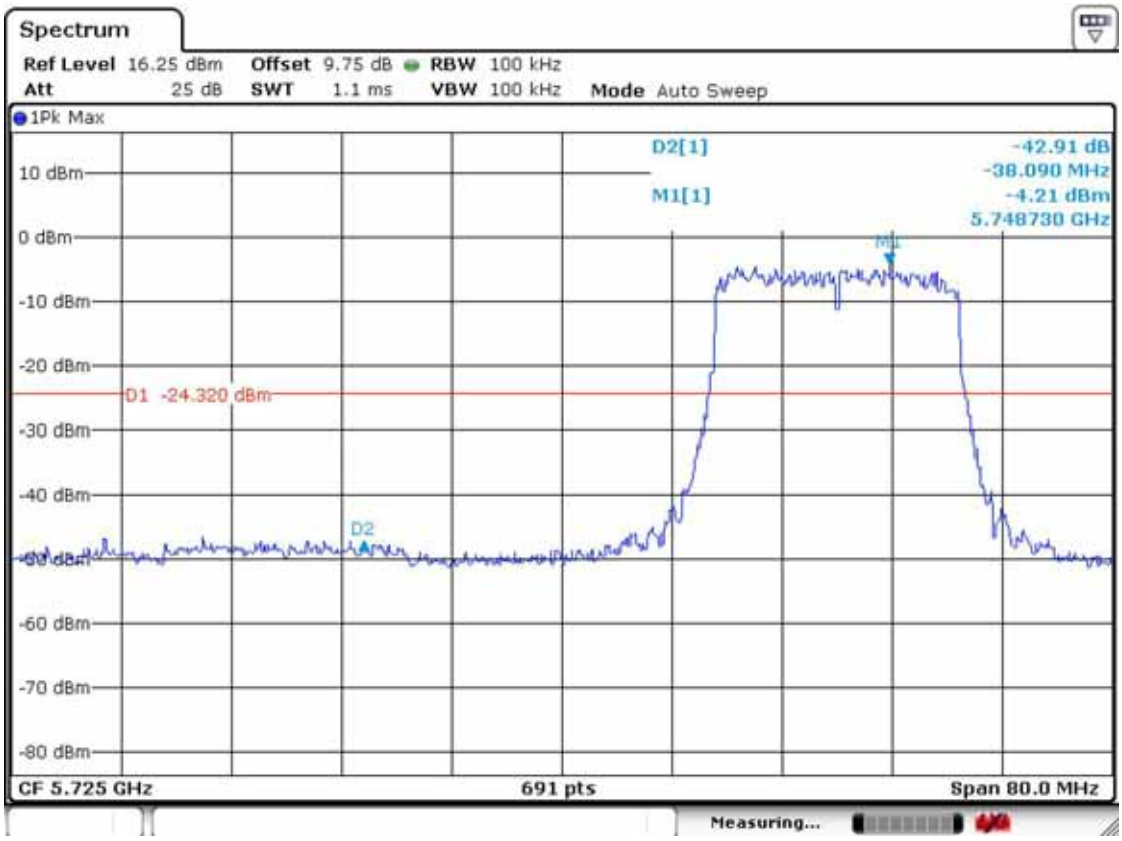
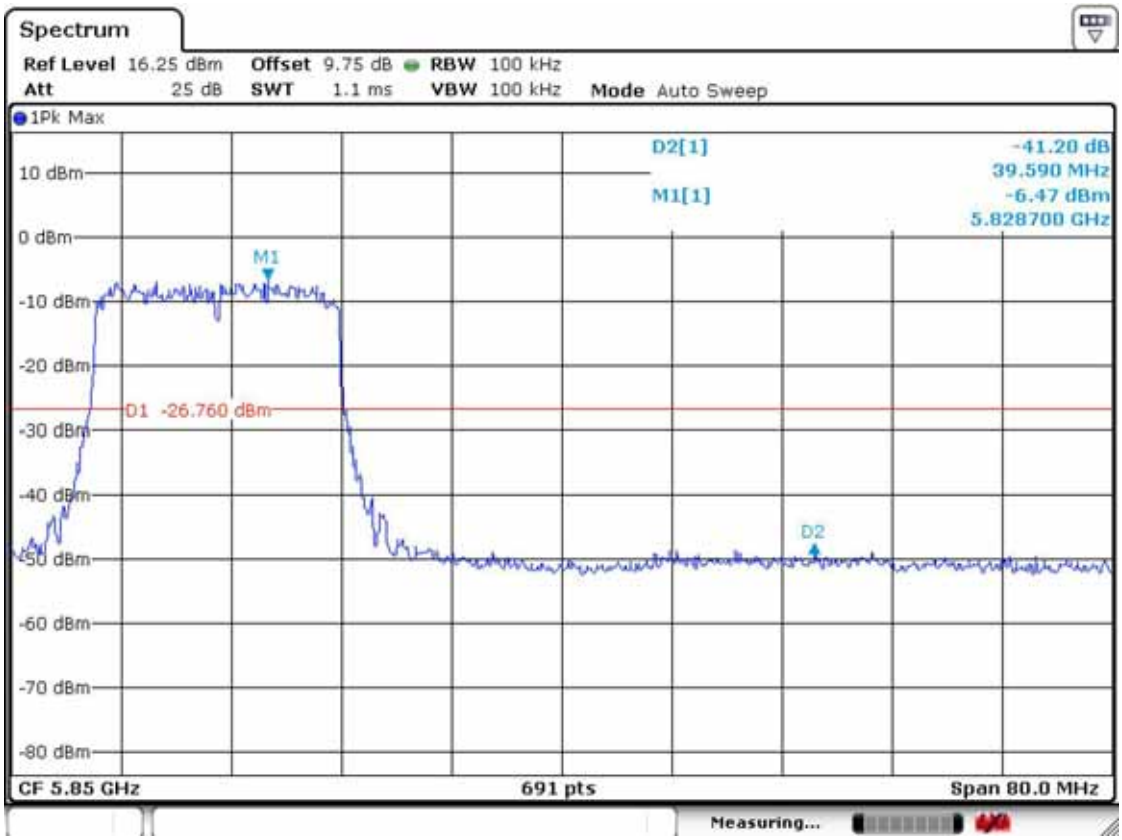
# 802.11a Band–edge : Conducted Measurements



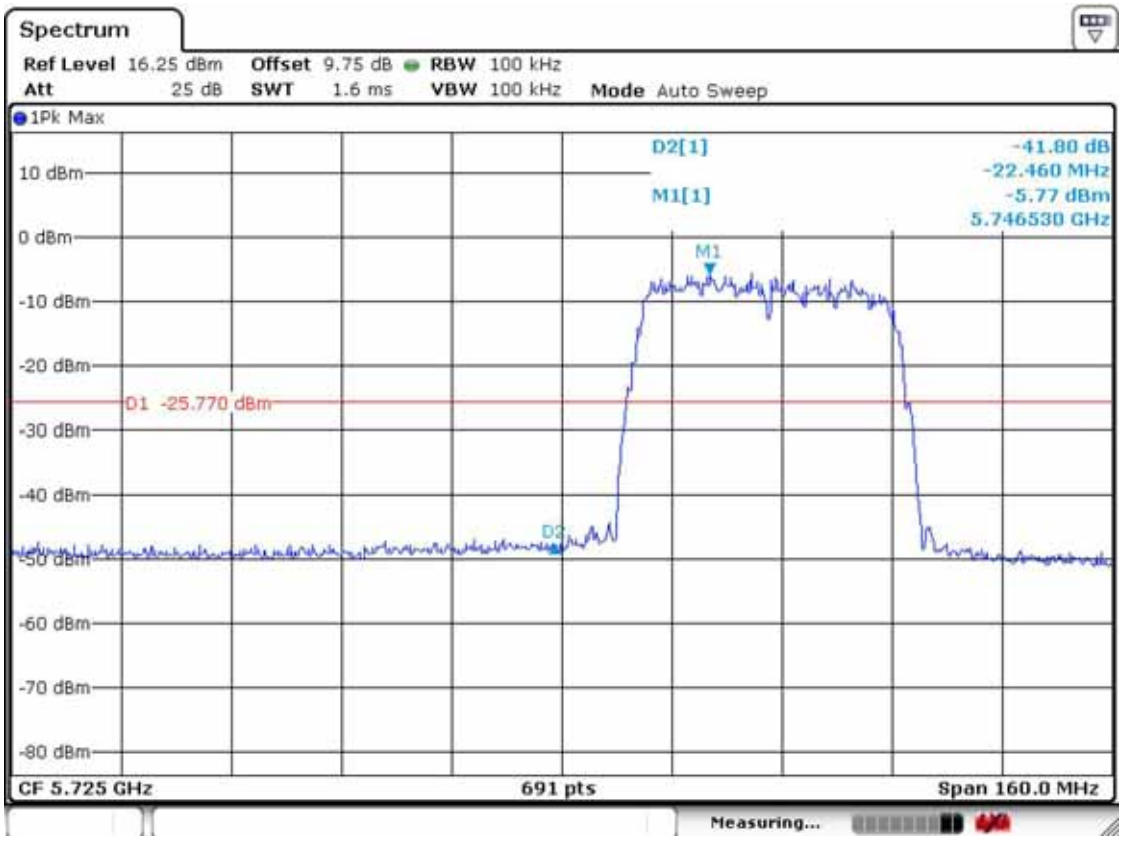



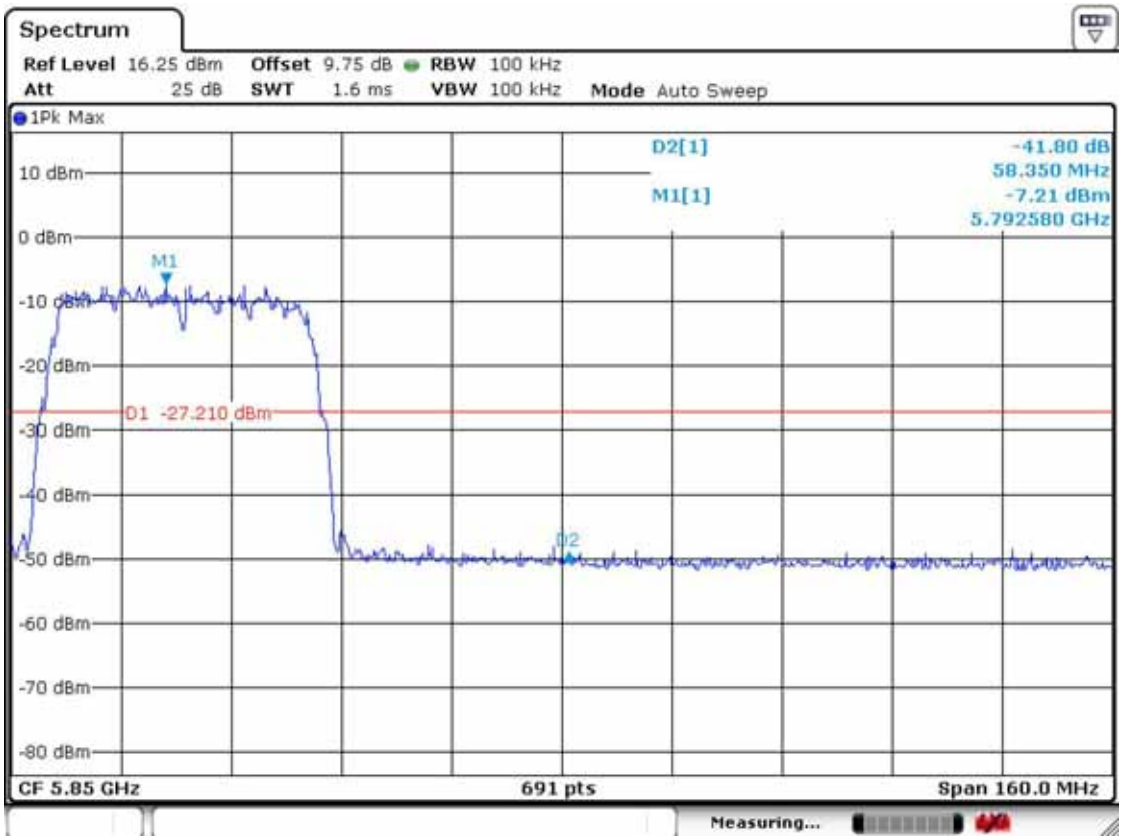
# 802.11an_20MHz Band–edge : Conducted Measurements



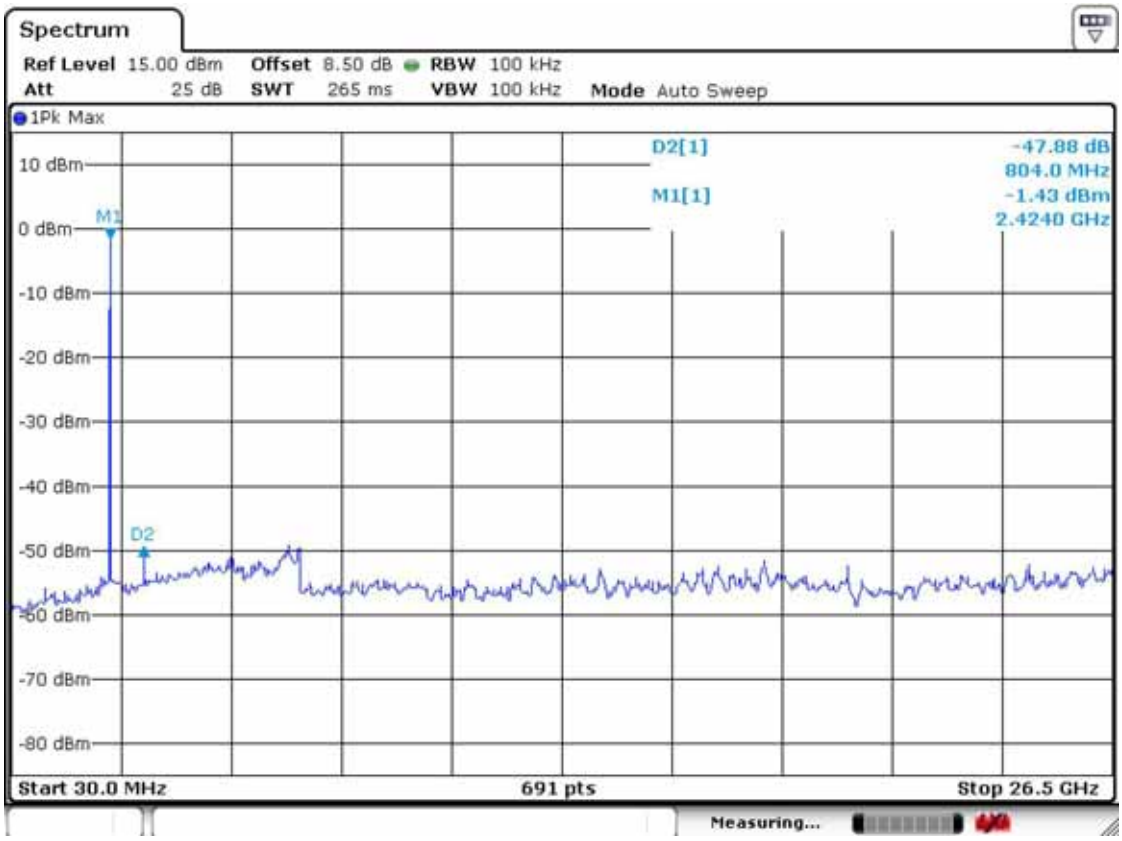
# 802.11an_40MHz Band–edge : Conducted Measurements



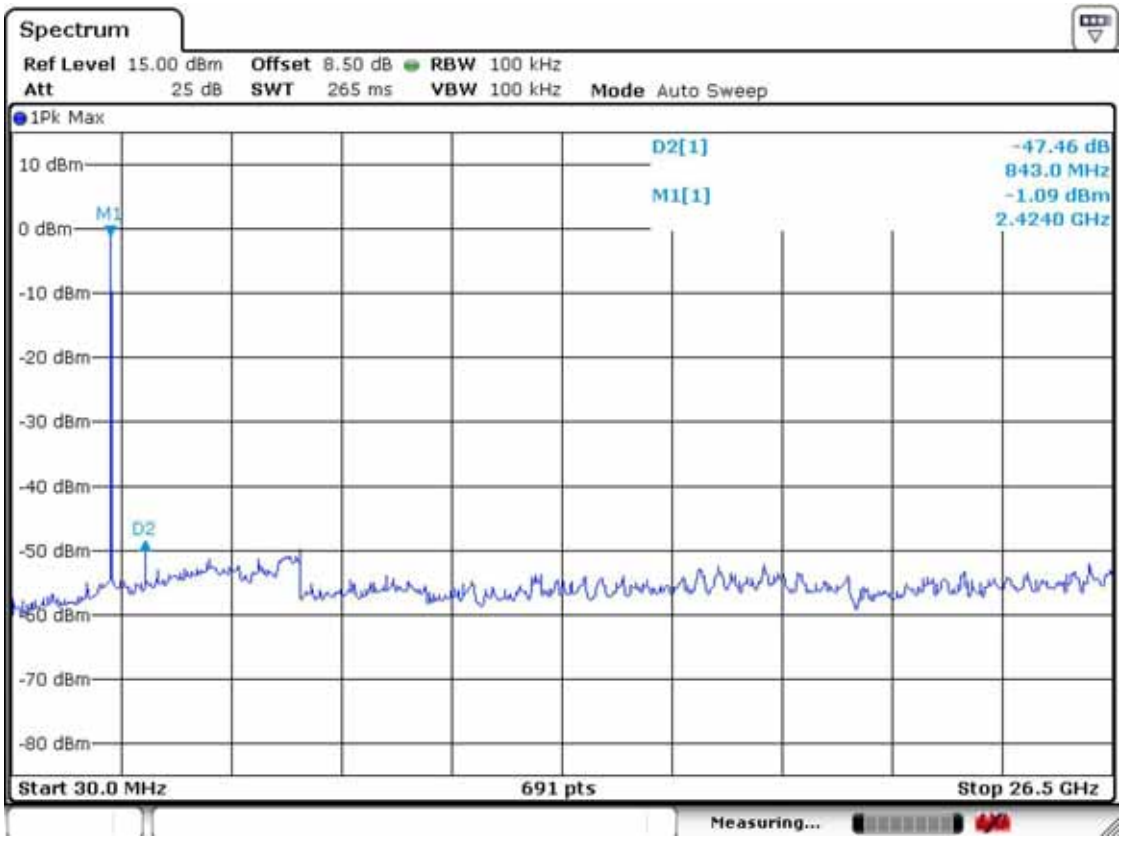
**802.11b – channel 1**

**Frequency Range = 30 MHz ~ 10th harmonic.**




**802.11b – channel 6**

**Frequency Range = 30 MHz ~ 10th harmonic.**

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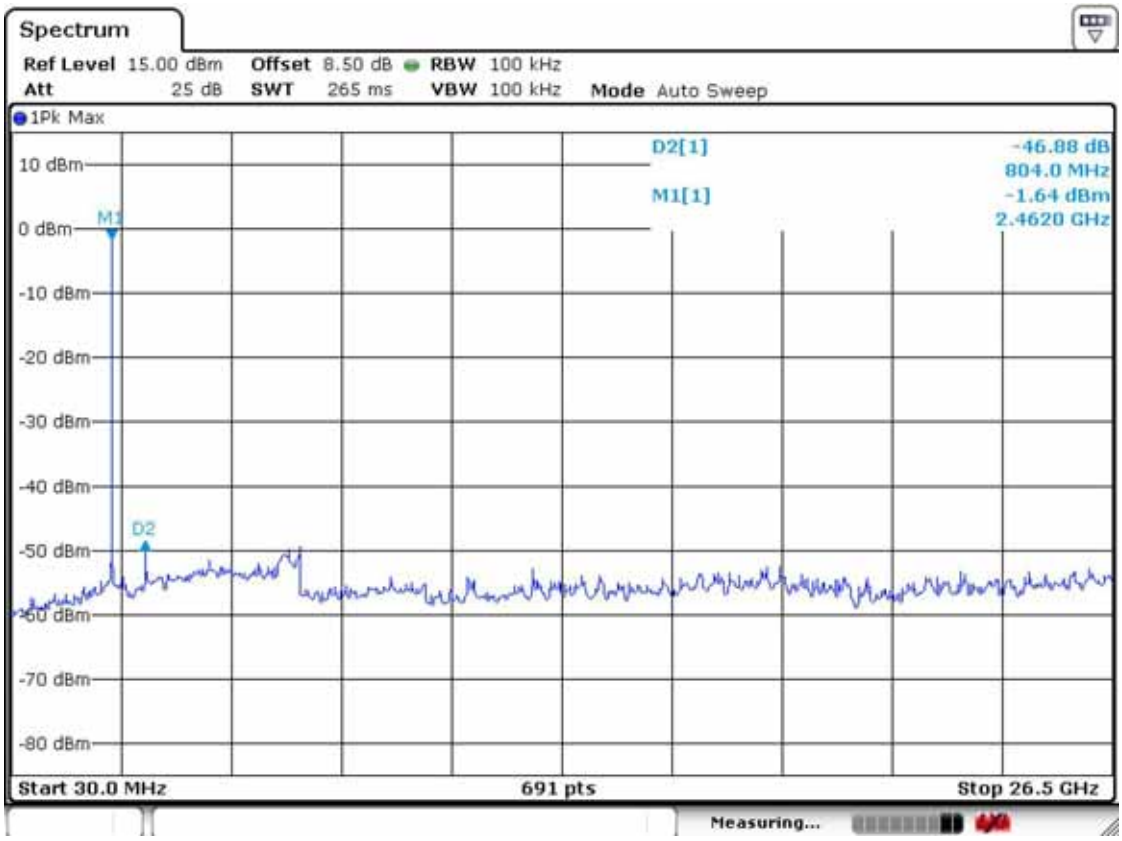
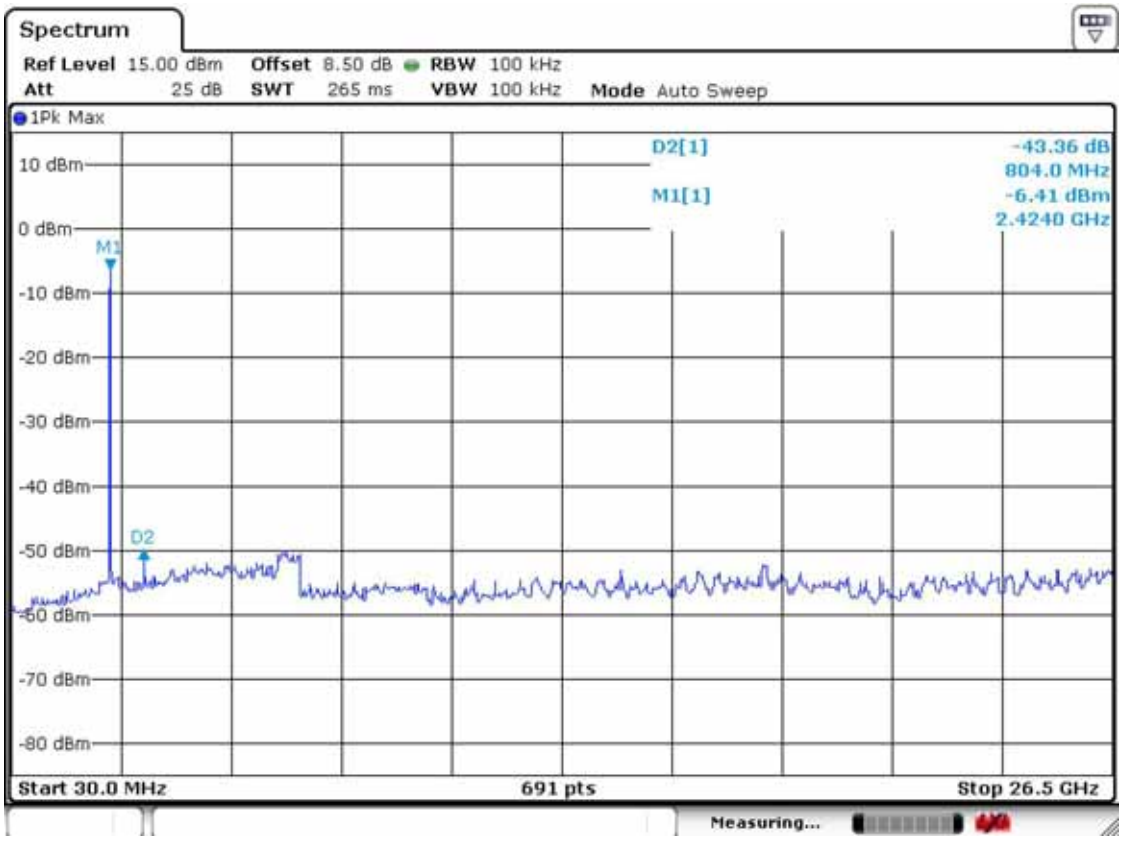
**802.11b –channel 11**

**Frequency Range = 30 MHz ~ 10th harmonic.**



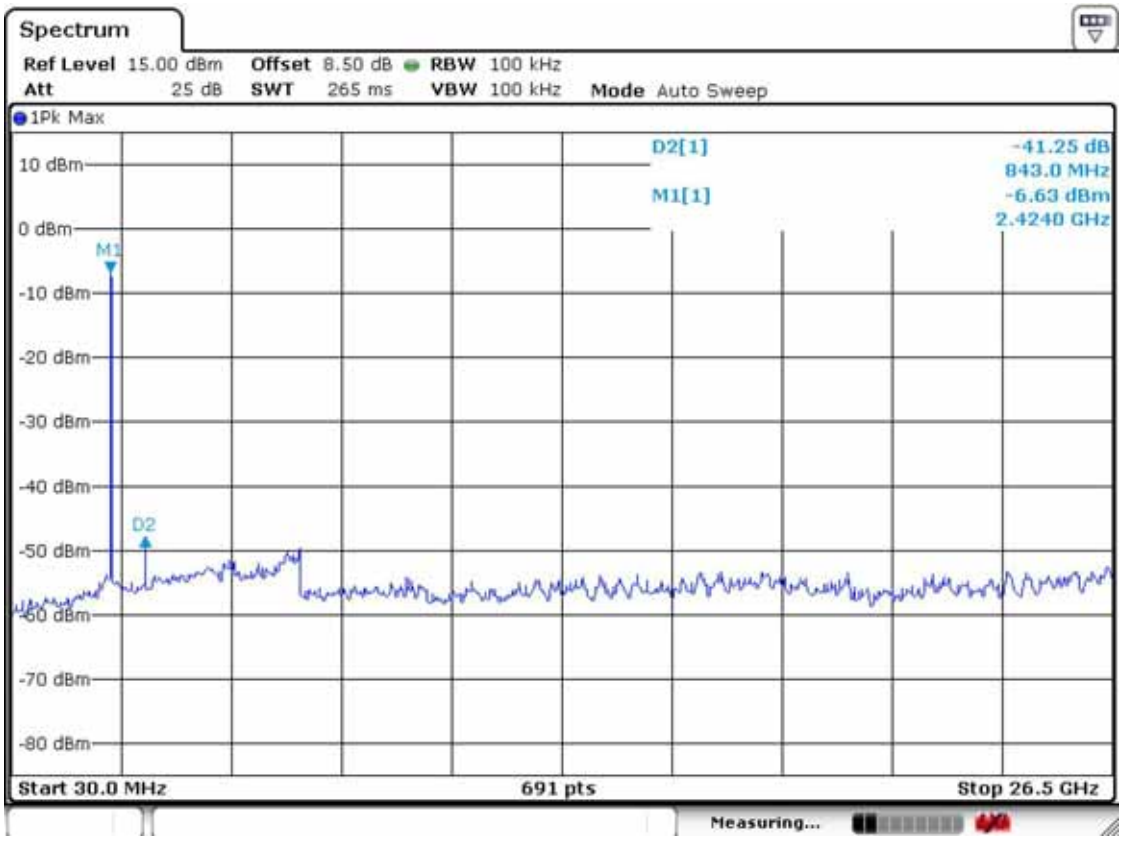
**802.11g – channel 1**

**Frequency Range = 30 MHz ~ 10th harmonic.**




**802.11g – channel 6**

**Frequency Range = 30 MHz ~ 10th harmonic.**

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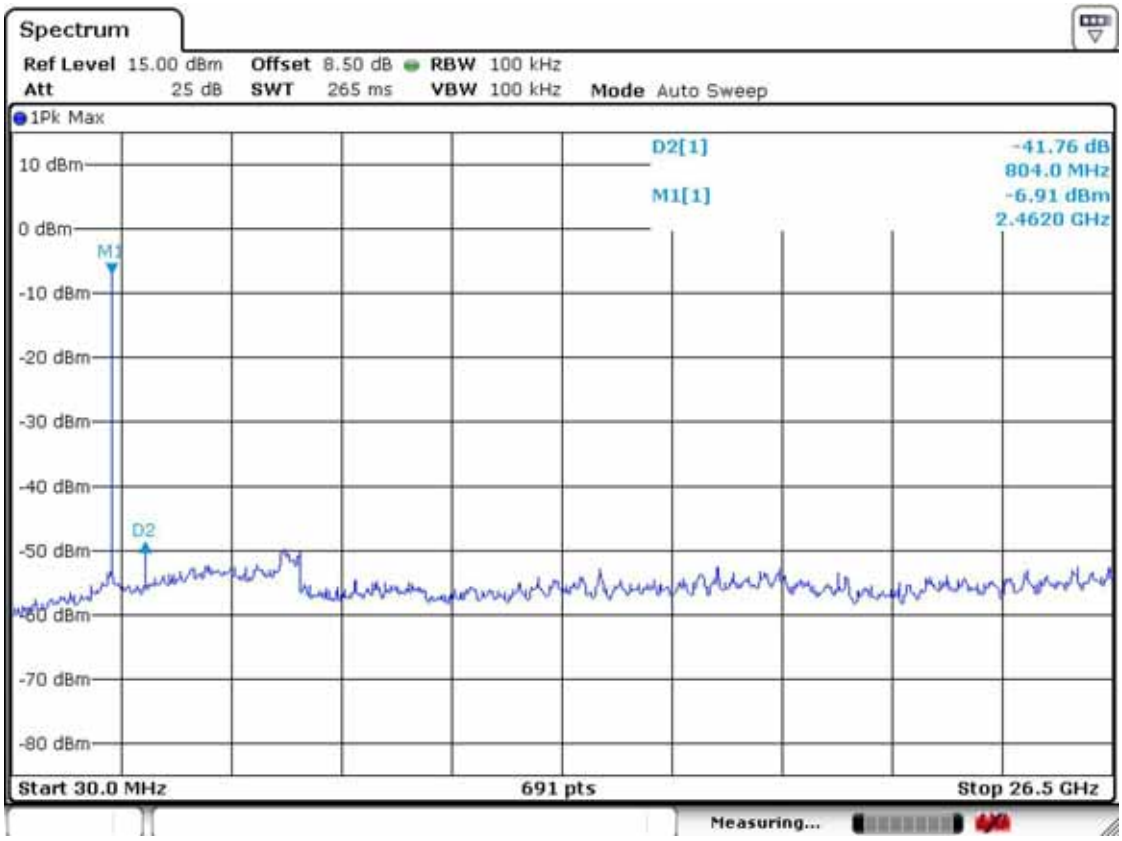
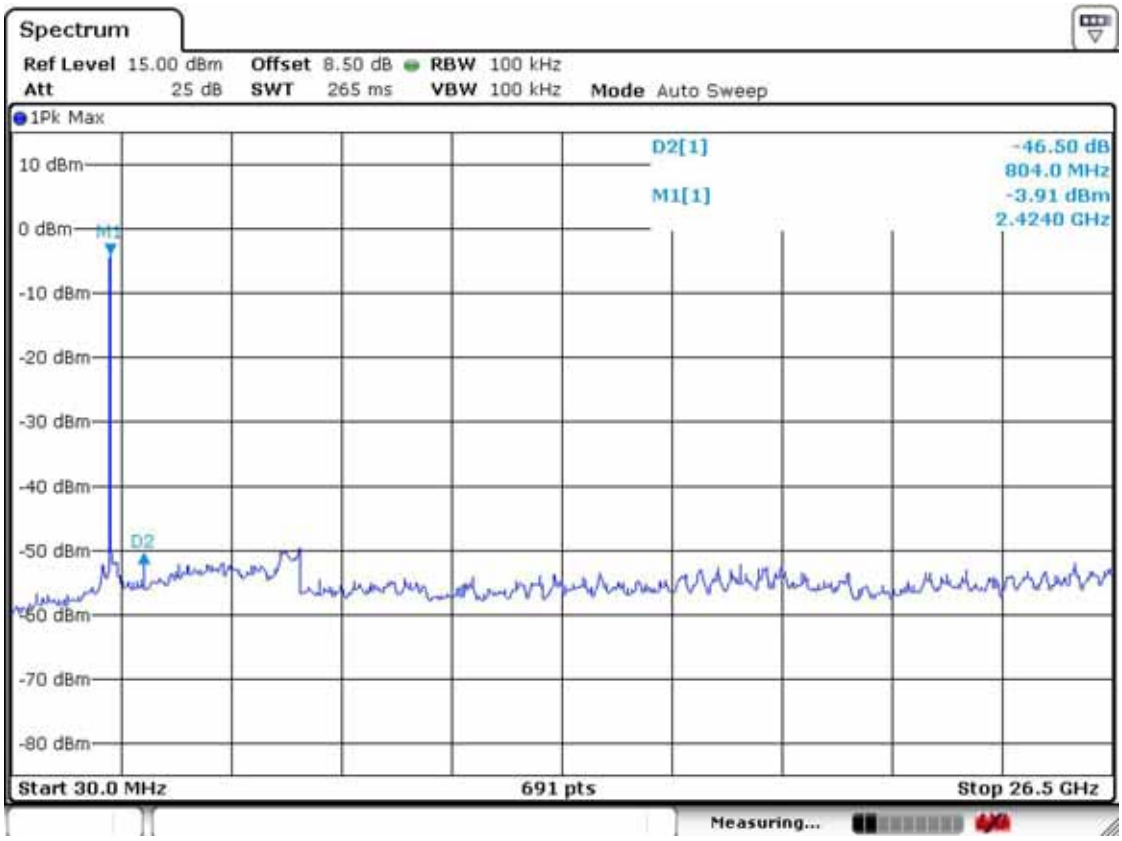
**802.11g –channel 11**

**Frequency Range = 30 MHz ~ 10th harmonic.**



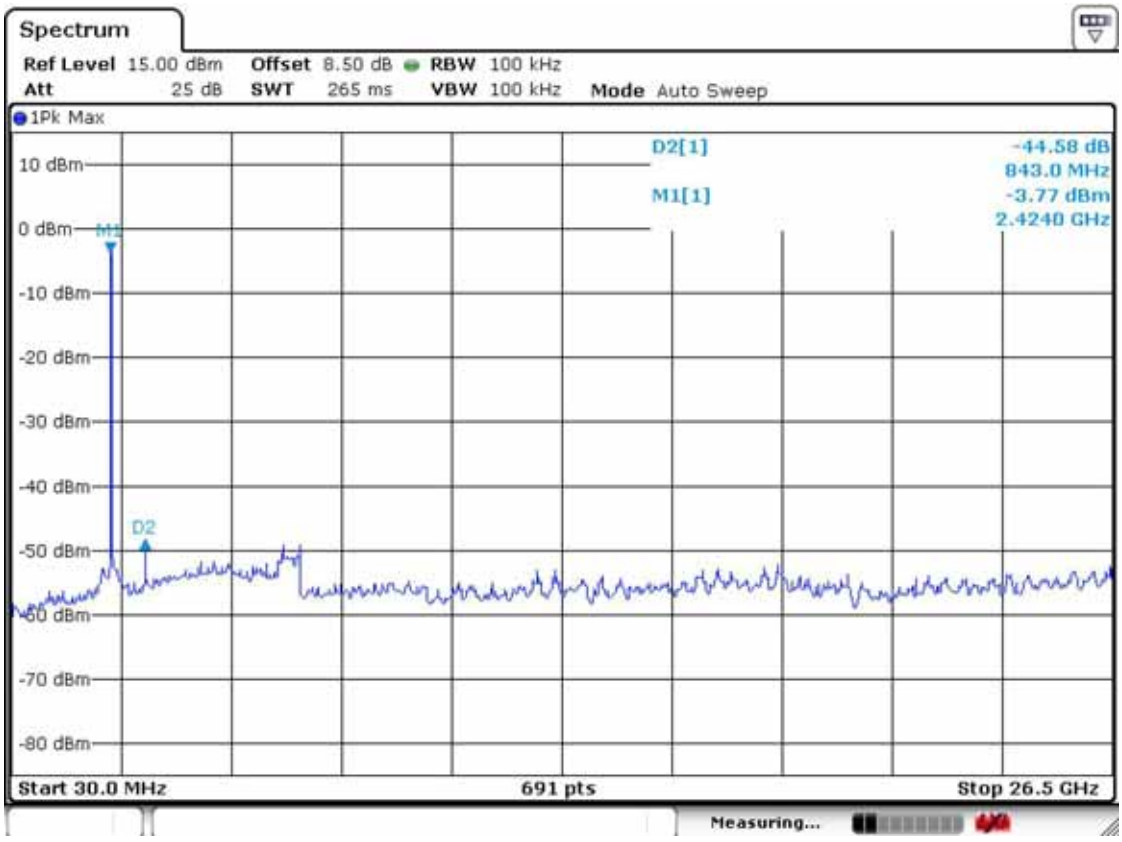
**802.11n_20MHz – channel 1**

**Frequency Range = 30 MHz ~ 10th harmonic.**



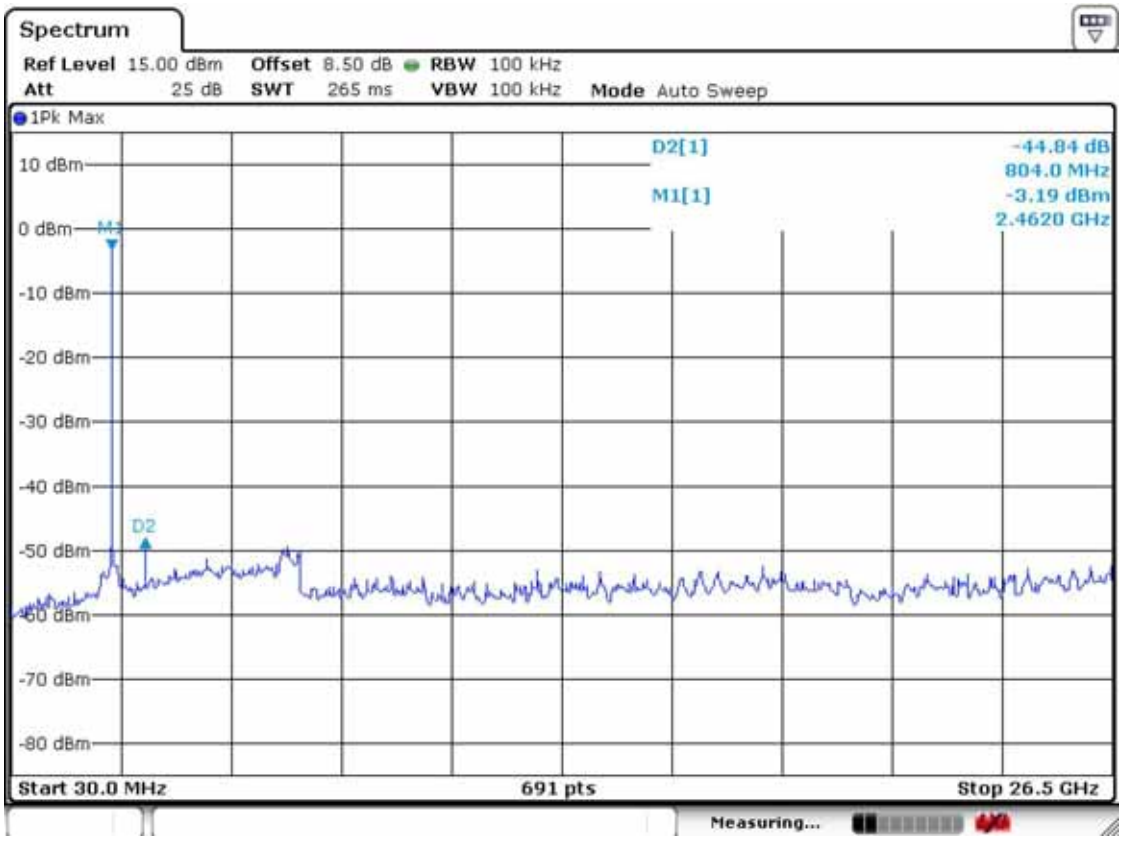

**802.11n_20MHz – channel 6**

**Frequency Range = 30 MHz ~ 10th harmonic.**



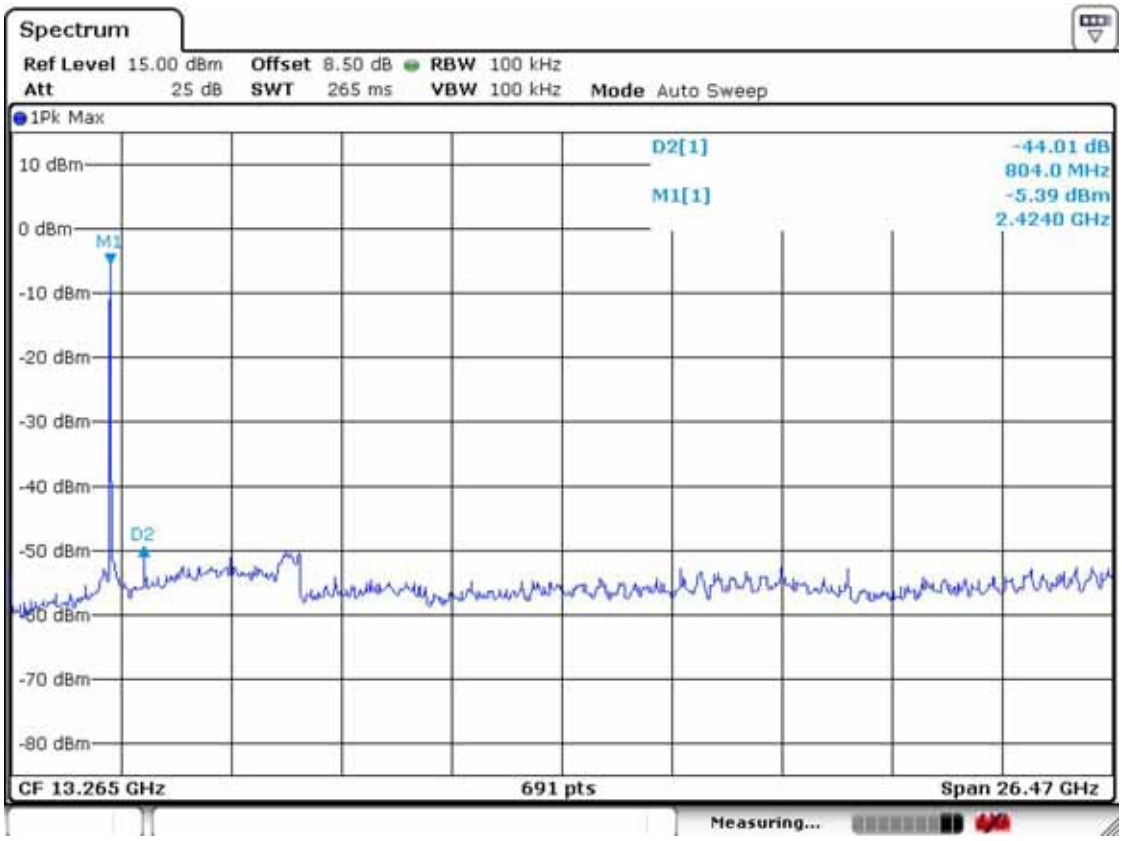
**802.11n_20MHz –channel 11**

**Frequency Range = 30 MHz ~ 10th harmonic.**



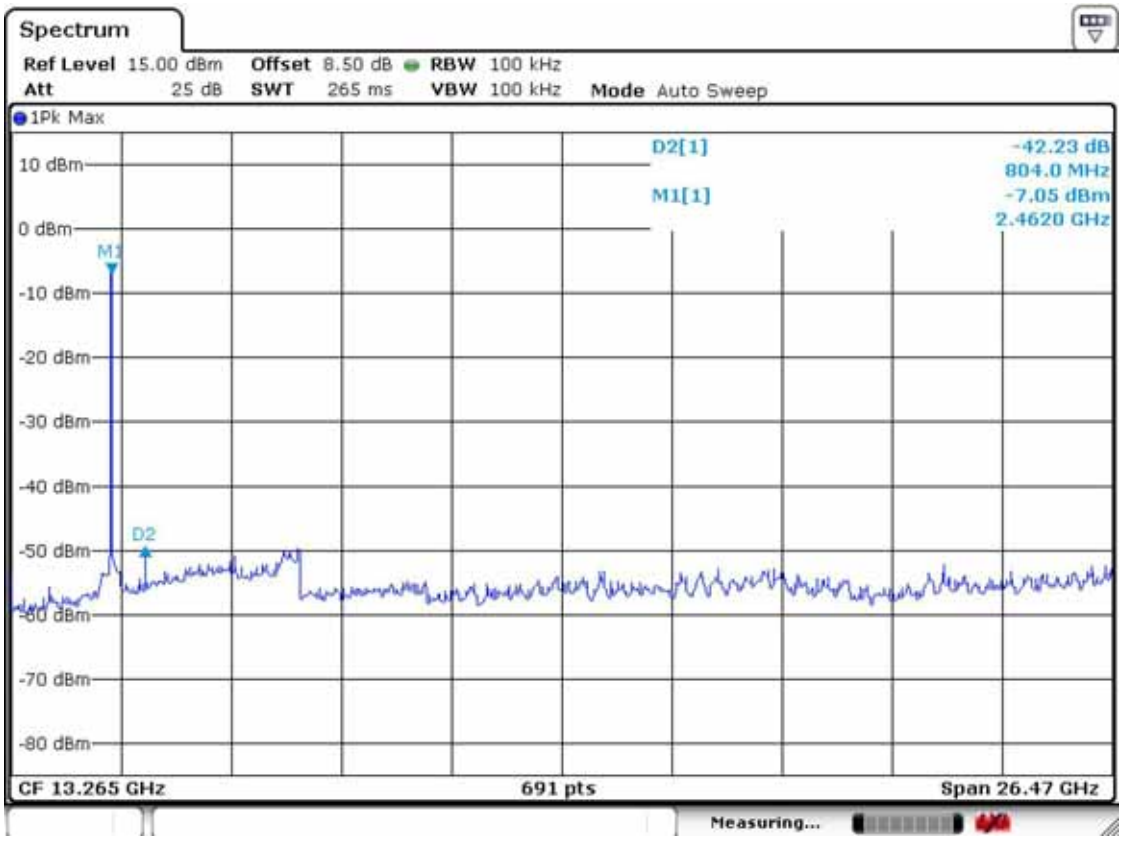
**802.11n_40MHz – channel 1**

**Frequency Range = 30 MHz ~ 10th harmonic.**




**802.11n_40MHz – channel 4**

**Frequency Range = 30 MHz ~ 10th harmonic.**

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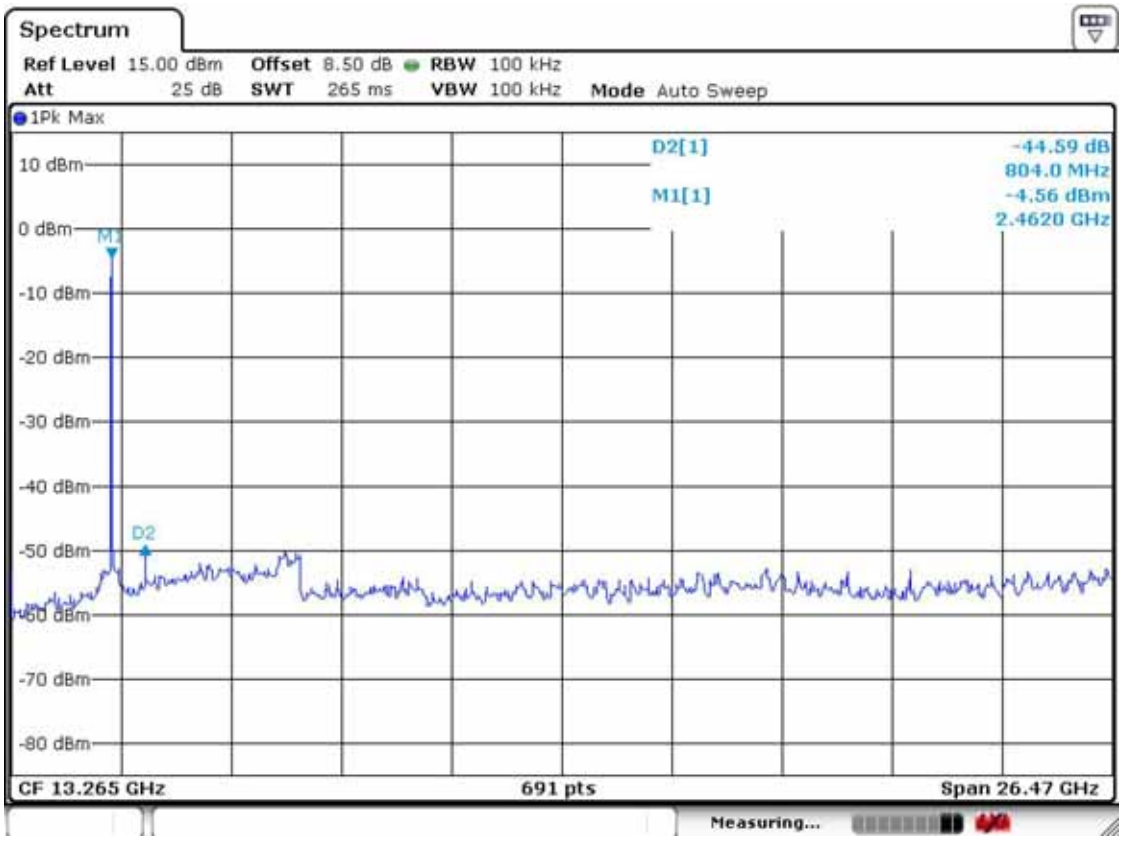
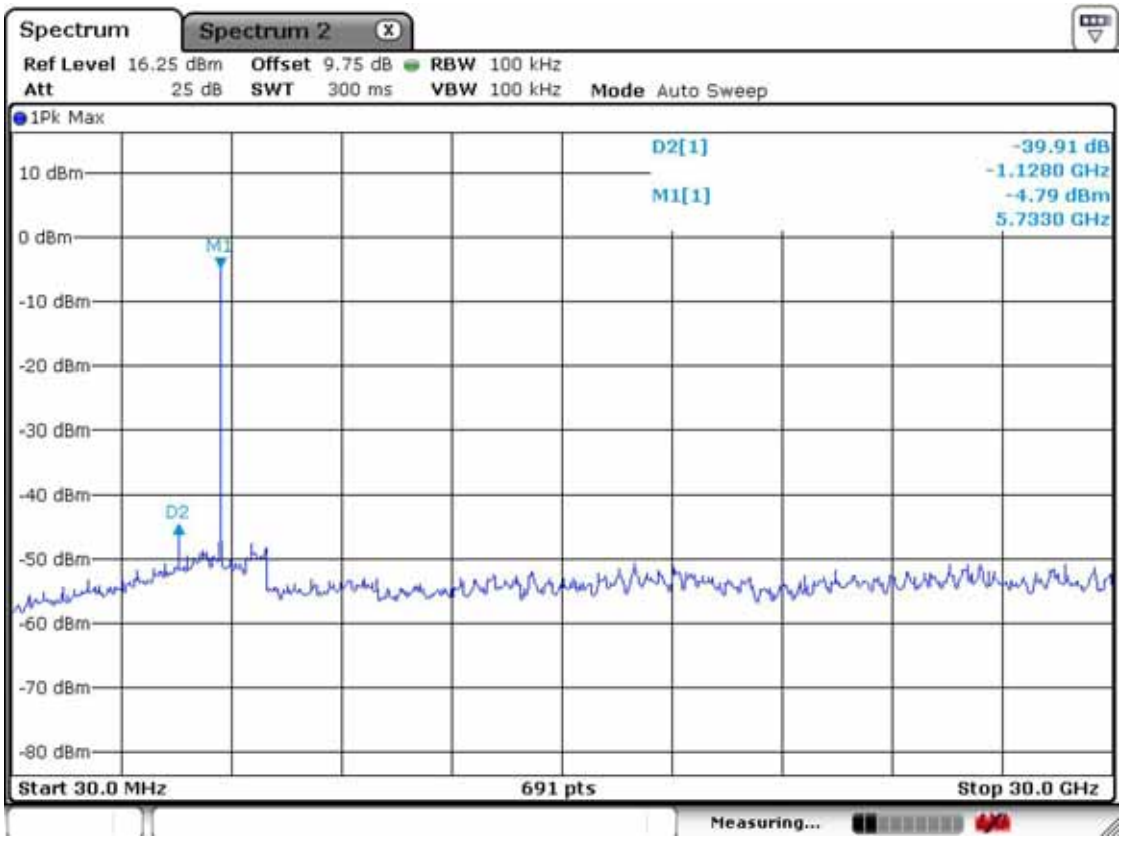
**802.11n_40MHz –channel 7**

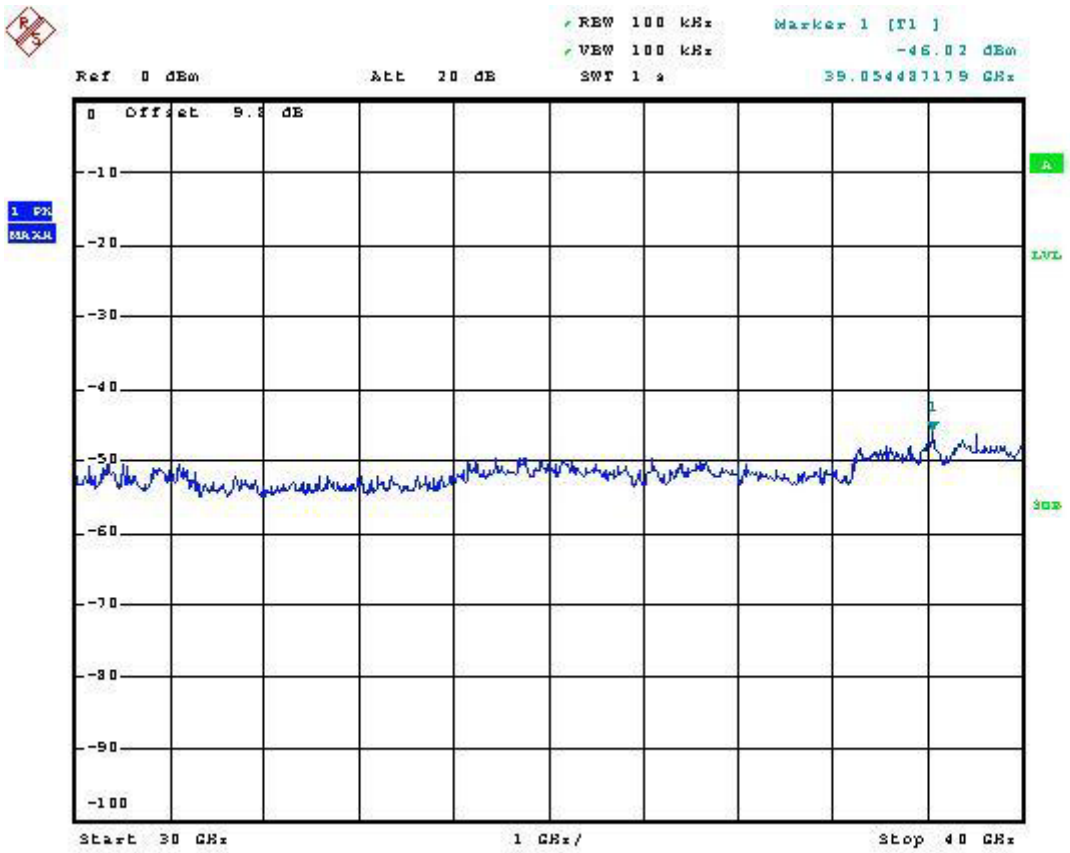
**Frequency Range = 30 MHz ~ 10th harmonic.**



**802.11a – channel 149**

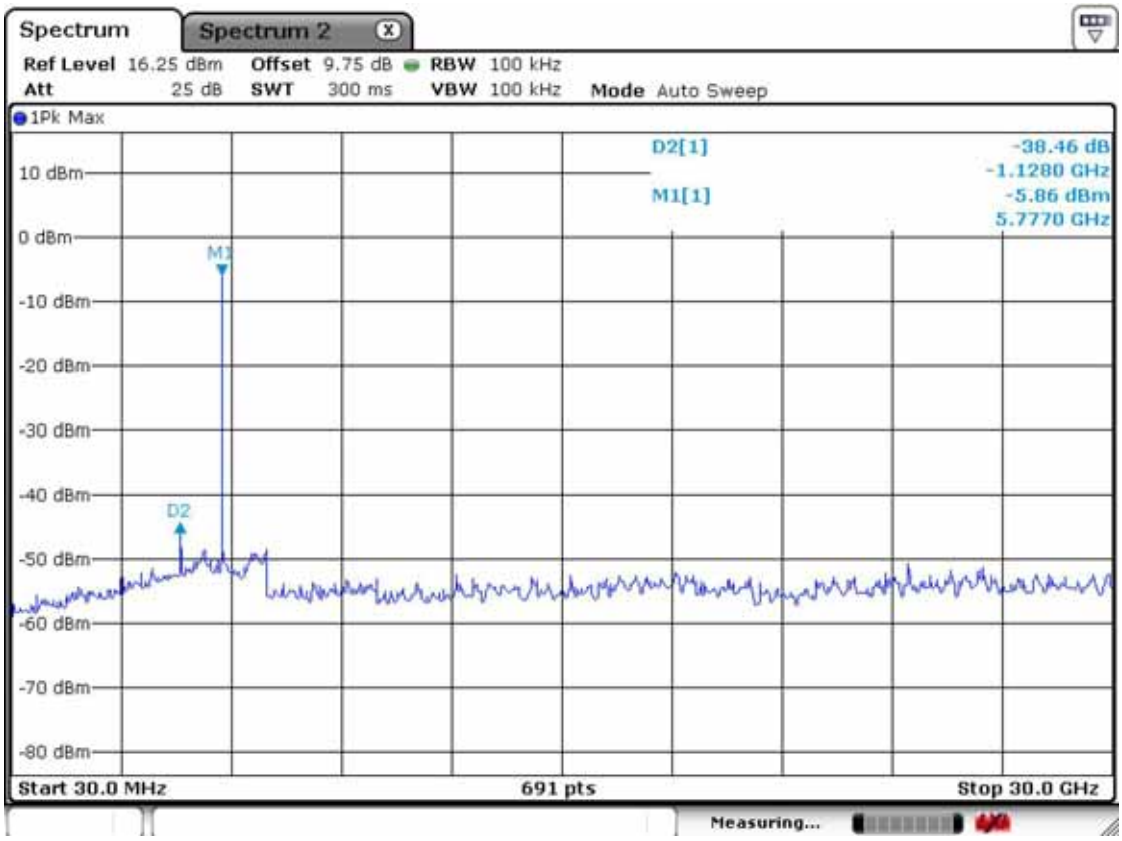
**Frequency Range = 30 MHz ~ 40 GHz**



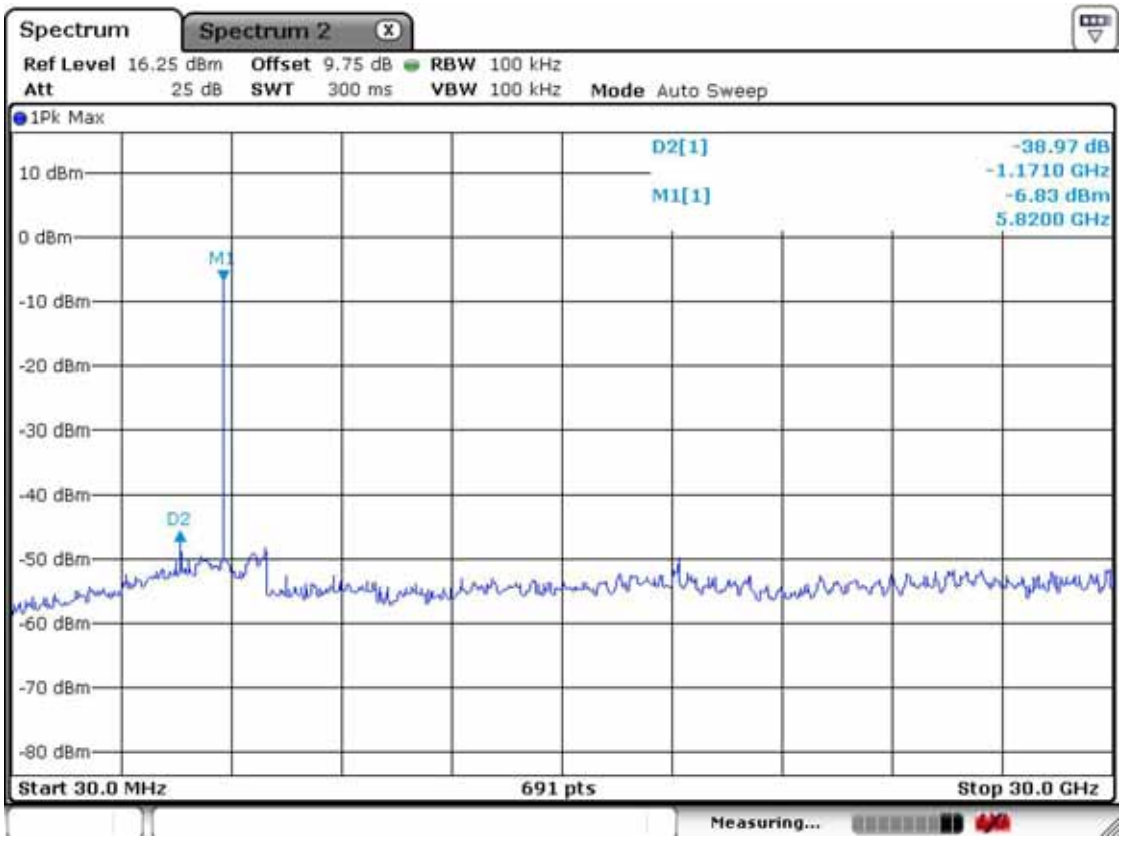
**802.11a – channel 157**

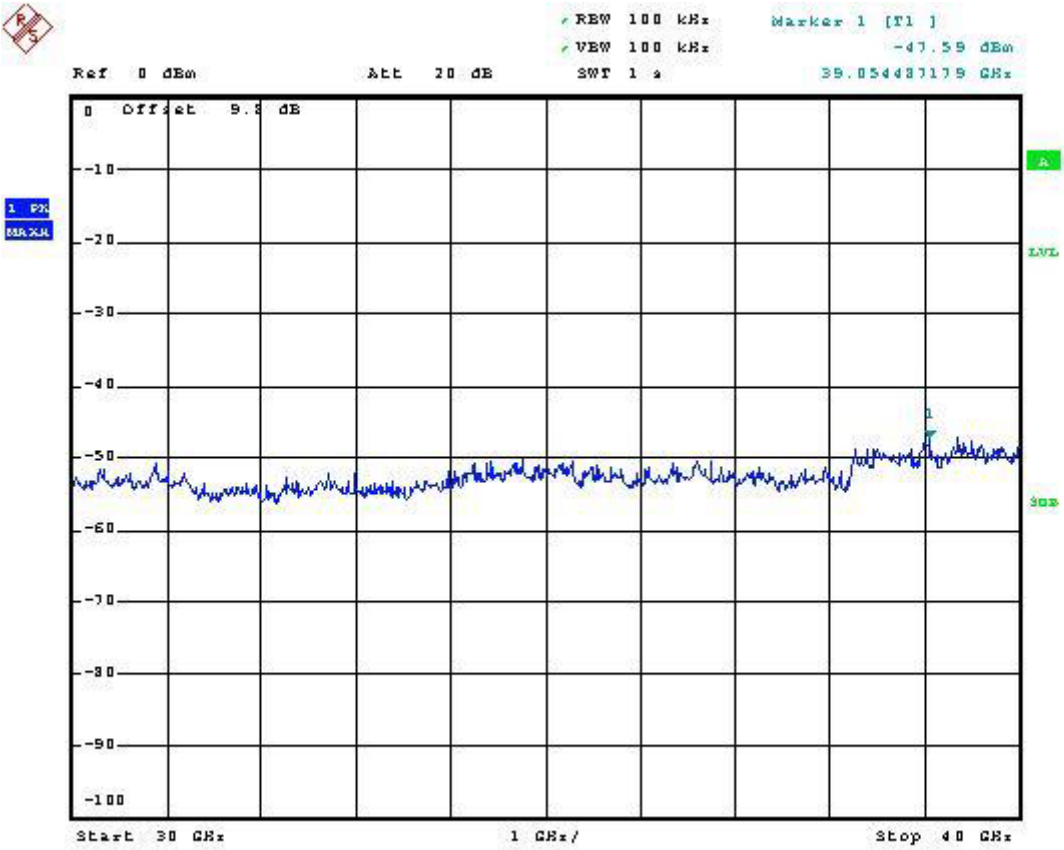
**Frequency Range = 30 MHz ~ 40 GHz**



**802.11a –channel 165**

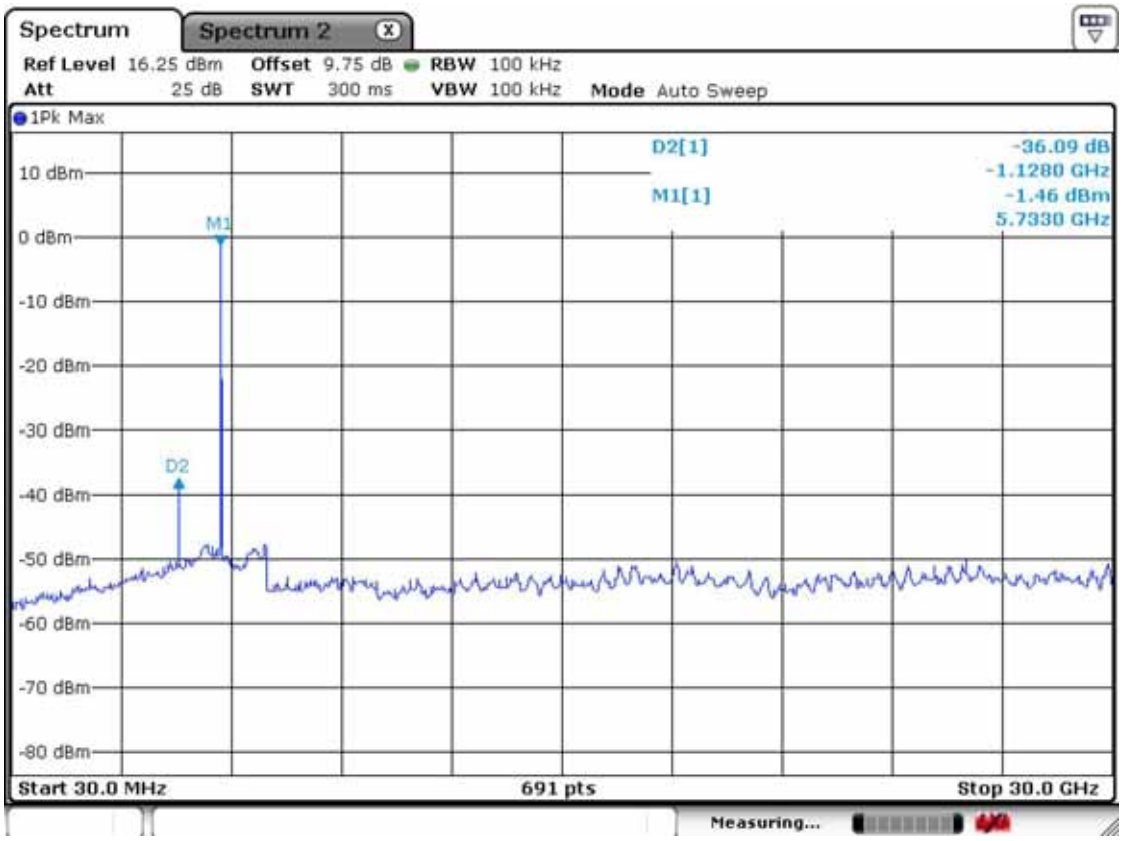
**Frequency Range = 30 MHz ~ 40 GHz**



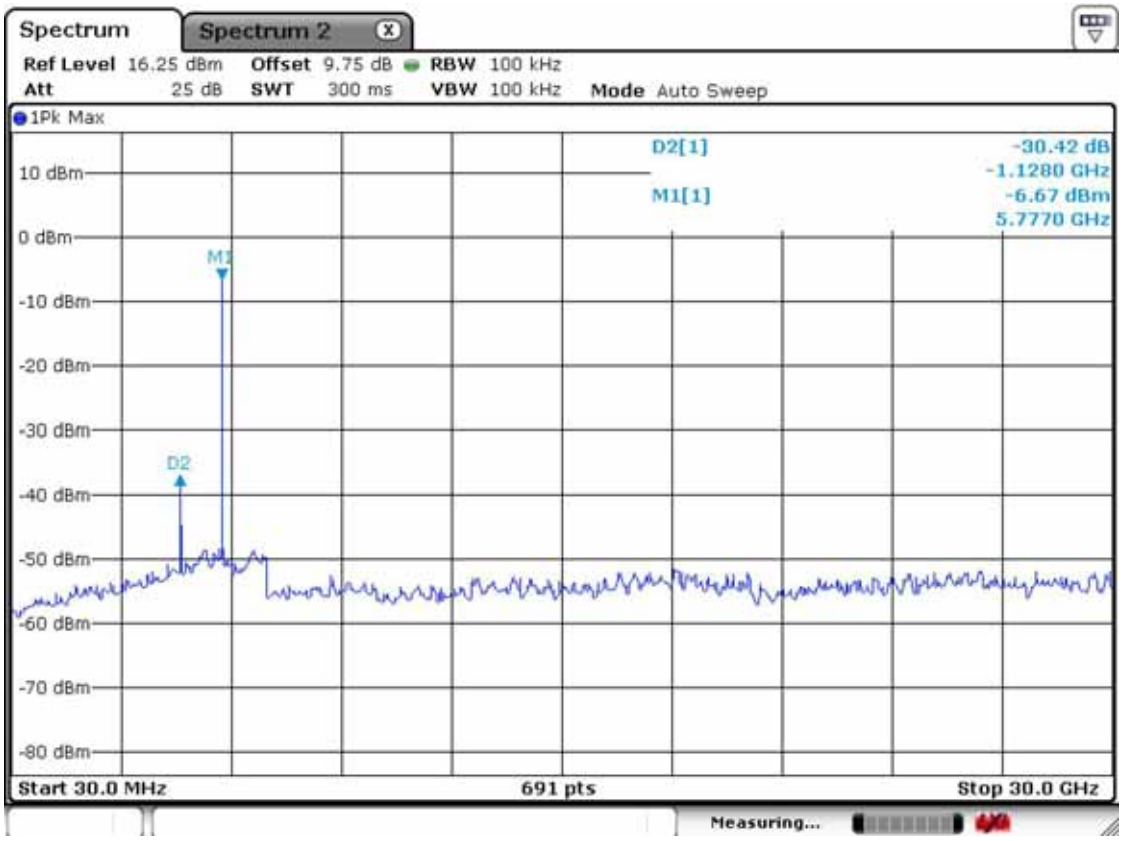
**802.11an_20MHz – channel 149**

**Frequency Range = 30 MHz ~ 40 GHz**



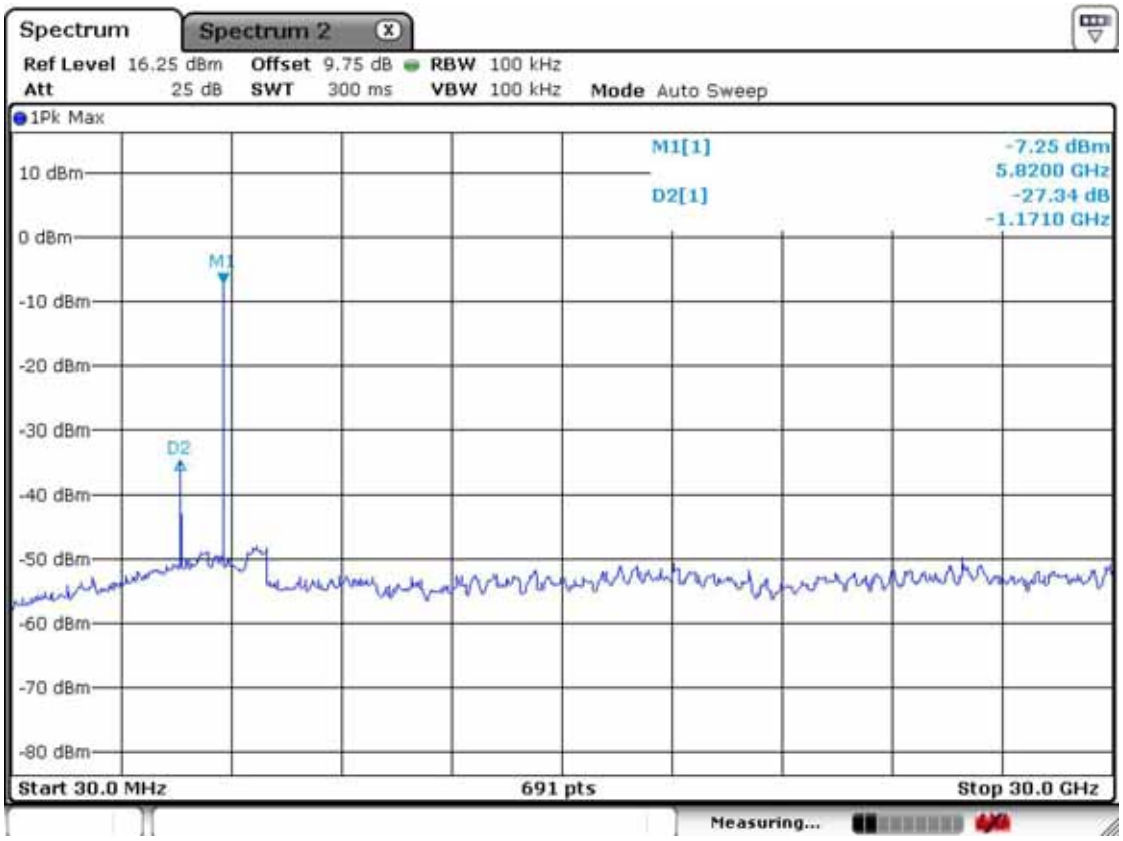
**802.11an_20MHz – channel 157**

**Frequency Range = 30 MHz ~ 40 GHz**



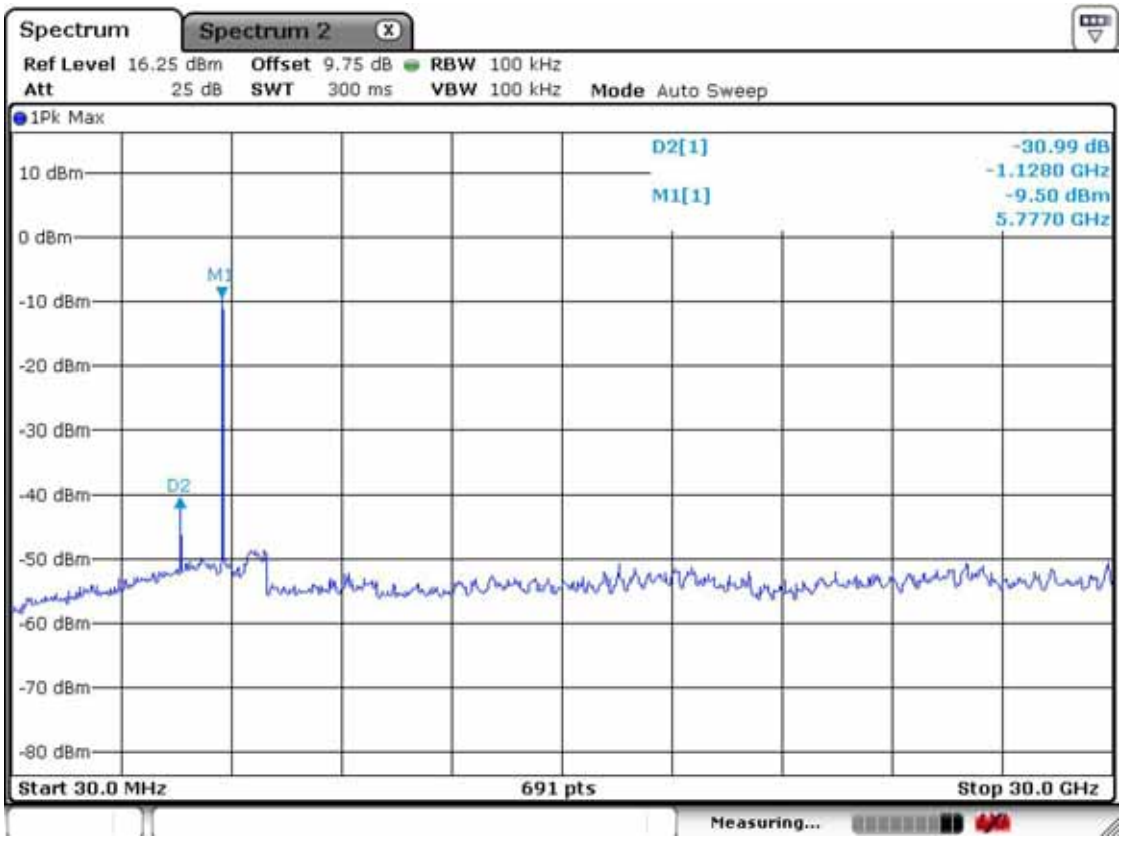
**802.11an_20MHz –channel 165**

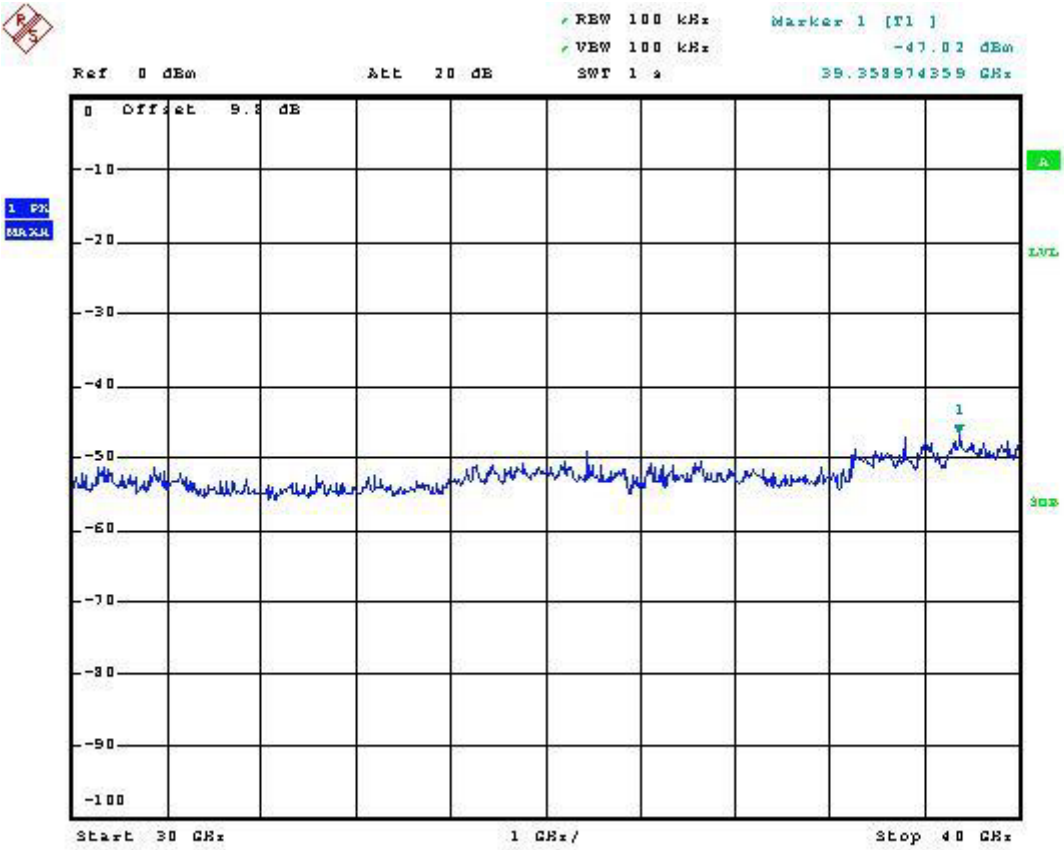
**Frequency Range = 30 MHz ~ 40 GHz**



**802.11an_40MHz – channel 151**

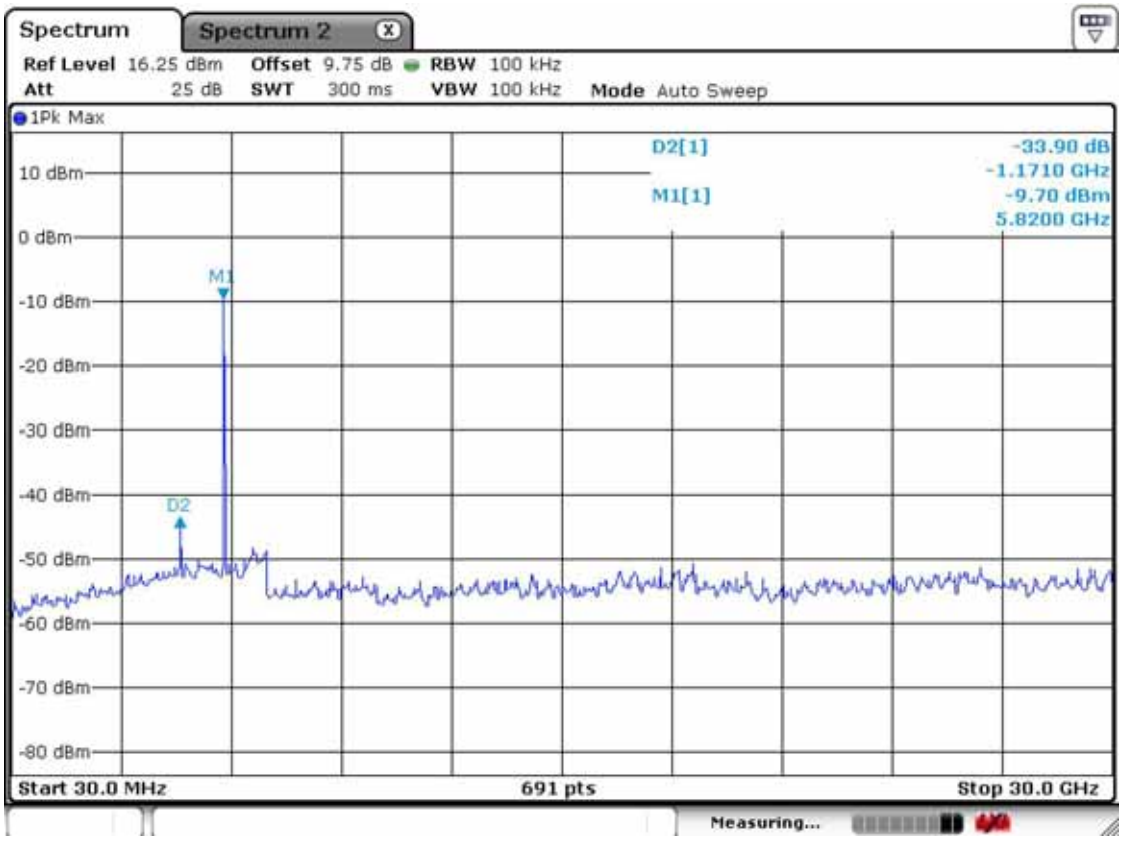
**Frequency Range = 30 MHz ~ 40 GHz**



**802.11an_40MHz – channel 159**

**Frequency Range = 30 MHz ~ 40 GHz**



### 3.2.5 Field Strength of Harmonics

**Procedure:**

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10$^{th}$ harmonic.

RBW = 100 kHz ( 30MHz ~ 1 GHz) VBW $\geq$ RBW

= 1 MHz (1 GHz ~ 10$^{th}$ harmonic )

Span = 100 MHz Detector function = peak

Trace = max hold Sweep = auto

**Measurement Data: Complies**

- See next pages for actual measured data.

**Minimum Standard: FCC Part 15.209(a)**

| Frequency (MHz) | Limit (uV/m) @ 3m |
|---|---|
| 30 ~ 88 | 100 ** |
| 88 ~ 216 | 150 ** |
| 216 ~ 960 | 200 ** |
| Above 960 | 500 |

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

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## 802.11b Measurement Data:

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

No emissions were detected at a level greater than 20dB below limit.

## 802.11g Measurement Data:

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

No emissions were detected at a level greater than 20dB below limit.

## 802.11n_20MHz Measurement Data:

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

No emissions were detected at a level greater than 20dB below limit.

## 802.11n_40MHz Measurement Data:

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

No emissions were detected at a level greater than 20dB below limit.

## 802.11a Measurement Data:

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4596.7 | 38.4 | 50.0 | H | 31.4 | 34.6 | 8.7 | 54.0 | 74.0 | 43.9 | 55.5 | 10.2 | 18.6 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4627.9 | 37.6 | 49.5 | H | 31.4 | 34.6 | 8.7 | 54.0 | 74.0 | 43.1 | 55.0 | 11.0 | 19.1 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4659.90 | 38.8 | 50.3 | H | 31.4 | 34.6 | 8.7 | 54.0 | 74.0 | 44.3 | 55.8 | 9.8 | 18.3 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

No emissions were detected at a level greater than 20dB below limit.

## 802.11an_20MHz Measurement Data:

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4596.7 | 43.5 | 55.4 | H | 31.4 | 34.6 | 8.7 | 54.0 | 74.0 | 49.0 | 60.9 | 5.1 | 13.2 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4627.9 | 42.8 | 54.1 | H | 31.4 | 34.6 | 8.7 | 54.0 | 74.0 | 48.3 | 59.6 | 5.8 | 14.5 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4659.90 | 43.1 | 55.2 | H | 31.4 | 34.6 | 8.7 | 54.0 | 74.0 | 48.6 | 60.7 | 5.4 | 13.4 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

No emissions were detected at a level greater than 20dB below limit.

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## 802.11an_40MHz Measurement Data:

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4596.7 | 40.1 | 52.4 | H | 31.4 | 34.6 | 8.7 | 54.0 | 74.0 | 45.6 | 57.9 | 8.4 | 16.2 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

| Frequency [MHz] | Reading [dBuV/m] AV | Reading [dBuV/m] Peak | Pol. | Correction Factor Antenna | Correction Factor Amp. Gain | Correction Factor Cable | Limits [dBuV/m] AV | Limits [dBuV/m] Peak | Result [dBuV/m] AV | Result [dBuV/m] Peak | Margin [dB] AV | Margin [dB] Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4659.90 | 40.8 | 52.1 | H | 31.4 | 34.6 | 8.7 | 54.0 | 74.0 | 46.3 | 57.6 | 7.8 | 16.5 |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - |

No emissions were detected at a level greater than 20dB below limit.

# Radiated Emissions – Below 1GHz WORST-CASE DATA : 802.11n(20MHz) CH 6 Mode

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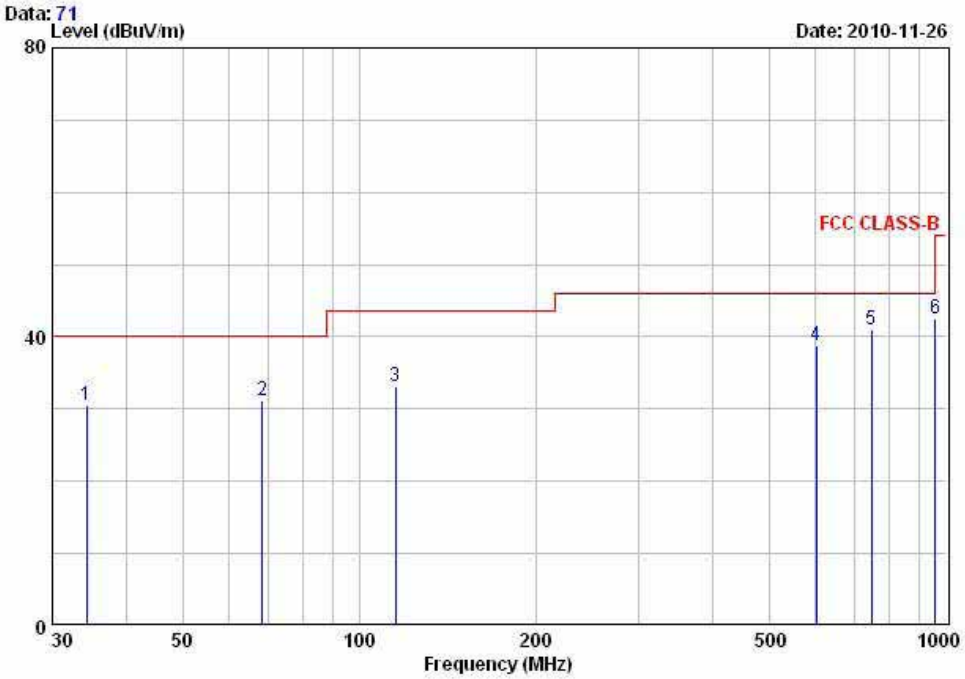
Fax:+82-31-3236010

EUT/Model No.: WUBR-506N TEST MODE: 802.11n(20MHz)_CH 6 mode

Temp Humi : 8 / 43 Tested by: KIM.K.I




| | Freq MHz | Reading dBuV/m | C.F dB/m | Result dBuV/m | Limit QP dBuV/m | Margin dB | Height cm | Angle deg | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 34.31 | 45.90 | -15.33 | 30.57 | 40.00 | 9.43 | 100 | 214 | VERTICAL |
| 2 | 68.33 | 46.80 | -15.66 | 31.14 | 40.00 | 8.86 | 100 | 132 | VERTICAL |
| 3 | 115.20 | 47.60 | -14.43 | 33.17 | 43.50 | 10.33 | 214 | 135 | HORIZONTAL |
| 4 | 602.15 | 41.50 | -2.61 | 38.89 | 46.00 | 7.11 | 205 | 211 | HORIZONTAL |
| 5 | 745.58 | 41.20 | -0.16 | 41.04 | 46.00 | 4.96 | 120 | 110 | VERTICAL |
| 6 | 960.00 | 40.10 | 2.45 | 42.55 | 46.00 | 3.45 | 240 | 121 | HORIZONTAL |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

- 1 -

## Radiated Emissions – Below 1GHz WORST-CASE DATA : 802.11an(20MHz) CH 149 Mode

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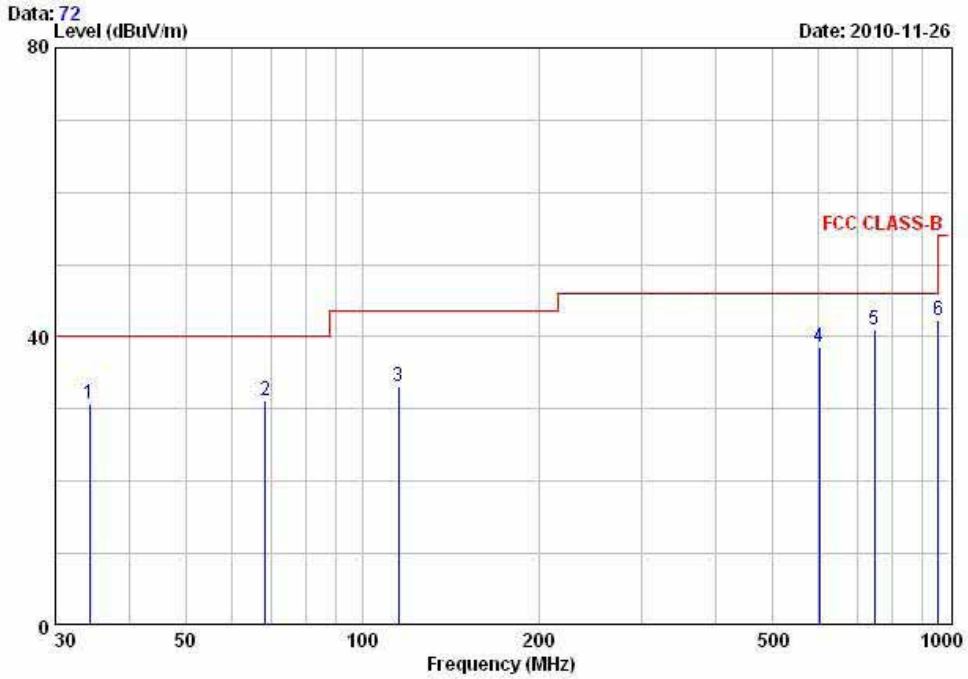
EUT/Model No.: WUBR-506N TEST MODE: 802.11ln(20MHz)_CH 149 mode

Temp Humi : 8 / 43 Tested by: KIM.K.I




| | Freq MHz | Reading dBuV/m | C.F dB/m | Result dBuV/m | Limit QP dBuV/m | Margin dB | Height cm | Angle deg | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 34.32 | 46.00 | -15.33 | 30.67 | 40.00 | 9.33 | 100 | 209 | VERTICAL |
| 2 | 68.32 | 46.80 | -15.66 | 31.14 | 40.00 | 8.86 | 100 | 130 | VERTICAL |
| 3 | 115.21 | 47.60 | -14.43 | 33.17 | 43.50 | 10.33 | 143 | 211 | HORIZONTAL |
| 4 | 602.15 | 41.30 | -2.61 | 38.69 | 46.00 | 7.31 | 182 | 132 | HORIZONTAL |
| 5 | 745.57 | 41.10 | -0.16 | 40.94 | 46.00 | 5.06 | 210 | 132 | VERTICAL |
| 6 | 959.98 | 39.80 | 2.45 | 42.25 | 46.00 | 3.75 | 210 | 141 | HORIZONTAL |

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

- 1 -

### 3.2.8 AC Conducted Emissions

**Procedure:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

**Measurement Data:**

**Not Applicable (-This product is operated by DC)**

**Minimum Standard: FCC Part 15.207(a)/EN 55022**

| Frequency Range (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | Quasi-Peak | Average |
| 0.15 ~ 0.5 | 66 to 56 * | 56 to 46 * |
| 0.5 ~ 5 | 56 | 46 |
| 5 ~ 30 | 60 | 50 |

* Decreases with the logarithm of the frequency

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# APPENDIX

## TEST EQUIPMENT USED FOR TESTS

Copyright ⓒ 2010, LTA Co., Ltd.

| | Description | Model No. | Serial No. | Manufacturer | Next Cal. Date |
|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | FSV-30 | 100757 | R&S | Feb-11 |
| 2 | Spectrum Analyzer | FSQ40 | 200035 | R&S | Feb-11 |
| 3 | Spectrum Analyzer | 8594E | 3710A04074 | HP | Oct-11 |
| 4 | Signal Generator | 8648C | 3623A02597 | HP | Mar-11 |
| 5 | Signal Generator | 83711B | US34490456 | HP | Mar-11 |
| 6 | Attenuator (3dB) | 8491A | 37822 | HP | Oct-11 |
| 7 | Attenuator (10dB) | 8491A | 63196 | HP | Oct-11 |
| 8 | EMI Test Receiver | ESCI7 | 100722 | R&S | Jun-11 |
| 9 | Horn Antenna(18 ~ 40GHz) | SAS-574 | 154 | Schwarzbeck | Nov-12 |
| 10 | Horn Antenna(18 ~ 40GHz) | SAS-574 | 155 | Schwarzbeck | Nov-12 |
| 11 | RF Amplifier | 8447D | 2949A02670 | HP | Oct-11 |
| 12 | RF Amplifier | 8449B | 3008A02126 | HP | Mar-11 |
| 13 | Test Receiver | ESHS10 | 828404/009 | R&S | Mar-11 |
| 14 | TRILOG Antenna | VULB 9160 | 9160-3212 | SCHWARZBECK | Apr-11 |
| 15 | Log.-Per. Antenna | VULP 9118 | 9118 A 401 | SCHWARZBECK | Apr-11 |
| 16 | Biconical Antenna | BBA 9106 | VHA 9103-2315 | SCHWARZBECK | Apr-11 |
| 17 | Horn Antenna | 3115 | 00055005 | ETS LINDGREN | Mar-11 |
| 18 | Horn Antenna | BBHA 9120D | 9120D122 | SCHWARZBECK | Dec-10 |
| 19 | Dipole Antenna | VHA9103 | 2116 | SCHWARZBECK | Nov-12 |
| 20 | Dipole Antenna | VHA9103 | 2117 | SCHWARZBECK | Nov-12 |
| 21 | Dipole Antenna | VHA9105 | 2261 | SCHWARZBECK | Nov-12 |
| 22 | Dipole Antenna | VHA9105 | 2262 | SCHWARZBECK | Nov-12 |
| 23 | Hygro-Thermograph | THB-36 | 0041557-01 | ISUZU | Mar-11 |
| 24 | Splitter (SMA) | ZFSC-2-2500 | SF617800326 | Mini-Circuits | - |
| 25 | RF Switch | MP59B | 6200414971 | ANRITSU | - |
| 26 | Power Divider | 11636A | 6243 | HP | Oct-11 |
| 27 | DC Power Supply | 6622A | 3448A03079 | HP | Oct-11 |
| 28 | Frequency Counter | 5342A | 2826A12411 | HP | Mar-11 |
| 29 | Power Meter | EPM-441A | GB32481702 | HP | Mar-11 |
| 30 | Power Sensor | 8481A | US41030291 | HP | Oct-11 |
| 31 | Audio Analyzer | 8903B | 3729A18901 | HP | Oct-11 |
| 32 | Modulation Analyzer | 8901B | 3749A05878 | HP | Oct-11 |
| 33 | TEMP & HUMIDITY Chamber | YJ-500 | LTAS06041 | JinYoung Tech | Oct-11 |
| 34 | LOOP-ANTENNA | FMZB 1516 | 151602/94 | SCHWARZBECK | Mar-11 |
| 35 | Stop Watch | HS-3 | 601Q09R | CASIO | Mar-11 |
| 36 | LISN | ENV216 | 100408 | R&S | Oct-11 |
| 37 | UNIVERSAL RADIO COMMUNICATION TESTER | CMU200 | 106243 | R&S | May-12 |

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