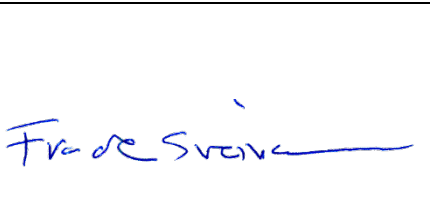
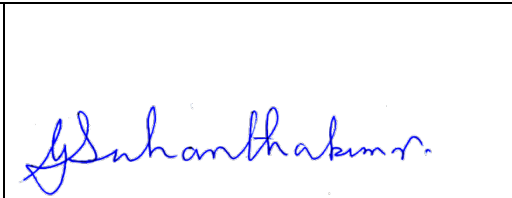


# Test Report

|                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product</b>                                                                                                                                                                                                                                                                                                                                                                                                            | Digital Video Encoder/Decoder with WLAN and BT                                                                                                                                                                   |
| <b>Name and address of the applicant</b>                                                                                                                                                                                                                                                                                                                                                                                  | Cisco Systems, Inc.                                                                                                                                                                                              |
| <b>Name and address of the manufacturer</b>                                                                                                                                                                                                                                                                                                                                                                               | Cisco Norway AS<br>Philip Pedersens vei 1<br>1366 Lysaker, Norway                                                                                                                                                |
| <b>Model</b>                                                                                                                                                                                                                                                                                                                                                                                                              | TTC7-23                                                                                                                                                                                                          |
| <b>Rating</b>                                                                                                                                                                                                                                                                                                                                                                                                             | 120V AC                                                                                                                                                                                                          |
| <b>Trademark</b>                                                                                                                                                                                                                                                                                                                                                                                                          | Cisco                                                                                                                                                                                                            |
| <b>Serial number</b>                                                                                                                                                                                                                                                                                                                                                                                                      | /                                                                                                                                                                                                                |
| <b>Additional information</b>                                                                                                                                                                                                                                                                                                                                                                                             | Bluetooth, 802.11a/b/g/n/ac                                                                                                                                                                                      |
| <b>Tested according to</b>                                                                                                                                                                                                                                                                                                                                                                                                | <b>FCC Part 15.407</b><br>Unlicensed National Information Infrastructure Devices (U-NII)<br><b>Industry Canada RSS-247, Issue 1</b><br>Licence-Exempt Local Area Network (LE-LAN) Devices                        |
| <b>Order number</b>                                                                                                                                                                                                                                                                                                                                                                                                       | 310377                                                                                                                                                                                                           |
| <b>Tested in period</b>                                                                                                                                                                                                                                                                                                                                                                                                   | 2016.09.09 and 2016.12.01 to 2016.12.22                                                                                                                                                                          |
| <b>Issue date</b>                                                                                                                                                                                                                                                                                                                                                                                                         | 2016.12.23                                                                                                                                                                                                       |
| <b>Name and address of the testing laboratory</b>                                                                                                                                                                                                                                                                                                                                                                         | <br>Instituttveien 6<br>Kjeller, Norway<br>FCC No: 994405<br>IC OATS: 2040D-1<br>TEL: +47 22 96 03 30<br>FAX: +47 22 96 05 50 |
| <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <br/> Prepared by [Frode Sveinsen] </div> <div style="text-align: center;"> <br/> Approved by [G.Suhandhakumar] </div> </div> |                                                                                                                                                                                                                  |
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# 1 INFORMATION

## 1.1 Test Item

|                                           |                                                                                                                                                                     |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name :</b>                             | Cisco                                                                                                                                                               |
| <b>Model :</b>                            | TTC7-23                                                                                                                                                             |
| <b>FCC ID :</b>                           | LDK7-23-1377                                                                                                                                                        |
| <b>Industry Canada ID :</b>               | 2461L-7231377                                                                                                                                                       |
| <b>Serial number :</b>                    | /                                                                                                                                                                   |
| <b>Hardware identity and/or version:</b>  | Rev. E                                                                                                                                                              |
| <b>Software identity and/or version :</b> | S01828-1.0.0 Alpha7 72c2185                                                                                                                                         |
| <b>Frequency Ranges :</b>                 | U-NII 1 : 5180 – 5240 MHz: 4 channels<br>U-NII 2A : 5260 – 5320 MHz: 4 channels<br>U-NII 2C : 5500 – 5720 MHz: 12 channels<br>U-NII 3 : 5745 – 5825 MHz: 5 channels |
| <b>Operating Modes :</b>                  | 802.11a<br>802.11n (HT20 / HT40)<br>802.11ac (HT80)                                                                                                                 |
| <b>Type of Modulation :</b>               | Digital (OFDM - Orthogonal frequency-division multiplexing)                                                                                                         |
| <b>Conducted Output Power :</b>           | 5180 – 5240 MHz: 29 mW<br>5260 – 5320 MHz: 85 mW<br>5500 – 5720 MHz: 73 mW<br>5745 – 5825 MHz: 82 mW                                                                |
| <b>Antenna Connector :</b>                | Internal Antennas connected to PCB with U-FL connector                                                                                                              |
| <b>Number of Antennas :</b>               | 2                                                                                                                                                                   |
| <b>Antenna Diversity Supported :</b>      | Yes                                                                                                                                                                 |
| <b>Smart Antennas System :</b>            | MIMO                                                                                                                                                                |
| <b>DFS/TPC :</b>                          | Slave Device                                                                                                                                                        |
| <b>Power Supply :</b>                     | FSP070-AHAN2                                                                                                                                                        |

### Description of Test Item

The EUT is a digital video encoder/decoder with WiFi and Bluetooth transceivers. The WiFi and Bluetooth transceivers are contained in a module with single modular certification (FCC ID: VOB-P2180), however the antennas used in this EUT are not certified.

## 1.2 Normal test conditions

|                      |                |
|----------------------|----------------|
| Temperature:         | 21.2 – 23.4 °C |
| Relative humidity:   | 20 - 57 %      |
| Normal test voltage: | 120 V AC       |

The values are the limit registered during the test period.

## 1.3 Test Engineer(s)

Frode Sveinsen  
Kristian Osvoll (Power Line Conducted Test)

## 1.4 Description of modification for Modification Filing

Not applicable.

## 1.5 Family List Rationale

Not Applicable.

## 1.6 Antenna Requirement

Is the antenna detachable?

☒ Yes

☐ No

If detachable, is the antenna connector non-standard?

☒ Yes

☐ No

Type of antenna connector: U-FL (The antennas are internal with connector on the PCB)

Ref. FCC §15.203

## 1.7 Worst-Case Configuration and Mode

Radiated Emissions and Power Line Conducted Emissions were performed with the EUT set to transmit at the channel with the highest output power as worst-case scenario.

The worst case data rates were:

802.11a mode: 6 Mbps  
802.11n HT20 mode: MCS0 MIMO  
802.11n HT40 mode: MCS0 MIMO  
802.11n HT80 mode: MCS0 MIMO

## 1.8 Antenna Gain

The EUT has two antennas that are connected to the main PCB with a cable and connector. The values below are the antenna gain values provided by the manufacturer:

| Frequency (MHz) | Max Gain Ant #0 (dBi) | Max Gain Ant #1 (dBi) |
|-----------------|-----------------------|-----------------------|
| 5150            | 4.3                   | 4.8                   |
| 5250            | 4.1                   | 5.6                   |
| 5350            | 4.2                   | 5.5                   |
| 5470            | 4.5                   | 5.7                   |
| 5600            | 3.5                   | 5.6                   |
| 5725            | 3.4                   | 4.9                   |
| 5785            | 3.2                   | 4.7                   |
| 5800            | 3.9                   | 5.1                   |
| 5850            | 4.0                   | 5.6                   |

## 1.9 EUT Operating Modes

| Description of operating modes | Additional information                                                       |
|--------------------------------|------------------------------------------------------------------------------|
| Continuous TX, 5 GHz Mode      | Continuous traffic, WLAN 5GHz 20, 40 or 80 MHz with Special software version |

## 1.10 EUT Power Levels

| Channel | Freq (MHz) | 11a  | 11n<br>HT20 | 11n<br>HT40 | 11ac<br>HT80 | 11ac<br>HT160 |
|---------|------------|------|-------------|-------------|--------------|---------------|
| 36      | 5180       | 12.5 | 6.5         |             |              |               |
| 40      | 5200       | 12.0 | 6.5         |             |              |               |
| 44      | 5220       | 12.0 | 6.5         |             |              |               |
| 48      | 5240       | 12.0 | 6.5         |             |              |               |
| 52      | 5260       | 15.0 | 14.0        |             |              |               |
| 56      | 5280       | 15.0 | 14.0        |             |              |               |
| 60      | 5300       | 15.0 | 14.0        |             |              |               |
| 64      | 5320       | 9.0  | 8.0         |             |              |               |
| 100     | 5500       | 10.0 | 9.0         |             |              |               |
| 104     | 5520       | 14.0 | 12.5        |             |              |               |
| 108     | 5540       | 14.0 | 12.5        |             |              |               |
| 112     | 5560       | 14.0 | 12.5        |             |              |               |
| 116     | 5580       | 14.0 | 12.5        |             |              |               |
| 120     | 5600       | D    | D           |             |              |               |
| 124     | 5620       | D    | D           |             |              |               |
| 128     | 5640       | D    | D           |             |              |               |
| 132     | 5660       | 14.0 | 12.5        |             |              |               |
| 136     | 5680       | 14.0 | 12.5        |             |              |               |
| 140     | 5700       | 9.0  | 8.0         |             |              |               |
| 144     | 5720       | D    | D           |             |              |               |
| 149     | 5745       | 12.0 | 8.0         |             |              |               |
| 153     | 5765       | 14.5 | 12.5        |             |              |               |
| 157     | 5785       | 14.5 | 12.5        |             |              |               |
| 161     | 5805       | 14.5 | 12.5        |             |              |               |
| 165     | 5825       | 14.5 | 12.5        |             |              |               |
| 38      | 5190       |      |             | 8.0         |              |               |
| 46      | 5230       |      |             | 9.0         |              |               |
| 54      | 5270       |      |             | 13.5        |              |               |
| 62      | 5310       |      |             | 7.0         |              |               |
| 102     | 5510       |      |             | 7.0         |              |               |
| 110     | 5550       |      |             | 11.5        |              |               |
| 118     | 5590       |      |             | D           |              |               |
| 126     | 5630       |      |             | D           |              |               |
| 134     | 5670       |      |             | 8.0         |              |               |
| 142     | 5710       |      |             | D           |              |               |
| 151     | 5755       |      |             | 7.0         |              |               |
| 159     | 5795       |      |             | 13.5        |              |               |
| 42      | 5210       |      |             |             | 7.5          |               |
| 58      | 5290       |      |             |             | 8.0          |               |
| 106     | 5530       |      |             |             | 8.0          |               |
| 122     | 5610       |      |             |             | D            |               |
| 138     | 5690       |      |             |             | D            |               |
| 155     | 5775       |      |             |             | 9.0          |               |
| 50      | 5250       |      |             |             |              | N/A           |
| 114     | 5550       |      |             |             |              | N/A           |

D = Disabled/ Not Used

Values in red have been reduced from the original values used by NVIDIA.

## 1.11 On Time and Duty Cycle Factors

| Mode             | On Time Burst (ms) | Period (msec) | Duty Cycle (linear) | Duty Cycle Correction: Power (dB) | Duty Cycle Correction: Voltage (dB) |
|------------------|--------------------|---------------|---------------------|-----------------------------------|-------------------------------------|
| 802.11a CDD      | 1.428              | 1.528         | 0.9346              | 0.29                              | 0.59                                |
| 802.11n HT20 CDD | 0.692              | 0.794         | 0.8715              | 0.60                              | 1.19                                |
| 802.11n HT40 CDD | 0.356              | 0.455         | 0.7824              | 1.07                              | 2.13                                |
| 802.11n HT80 CDD | 0.192              | 0.292         | 0.6575              | 1.82                              | 3.64                                |

The results above are from UL report no. 15U21878-E4V2

## 1.12 Comments

This report covers only limited radiated tests to show compliance with the new antenna in this EUT. All other radio tests for 2.4GHz WLAN are covered by UL reports no. 15U21878-E4V2.

The measurements were done with the EUT powered by 115 V AC. It was checked that power variations between 85% and 115% did not have any influence on the measurements.

All ports were populated during spurious emission measurements.

## 2 TEST REPORT SUMMARY

### 2.1 General

All measurements are traceable to national standards.

The tests were conducted for the purpose of demonstrating compliance with FCC CFR 47 Part 15, paragraph 15.407 and Industry Canada RSS-247 Issue 1.

Tests were performed in accordance with ANSI C63.4-2014 and ANSI C63.10-2013.

Radiated tests were performed in a semi-anechoic chamber at measuring distances of 3m and 10m.

A description of the test facility is on file with the FCC and Industry Canada.

☒ New Submission

☒ Production Unit

☐ Class II Permissive Change

☐ Pre-production Unit

**NII** Equipment Code

☐ Family Listing



#### THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

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## 2.2 Test Summary

| Name of test                    | FCC Part 15 reference  | RSS-247, Issue 1 reference | Result                |
|---------------------------------|------------------------|----------------------------|-----------------------|
| Supply Voltage Variations       | 15.31(e)               | 6.11 (RSS-GEN)             | Complies <sup>1</sup> |
| Antenna Requirement             | 15.203                 | 8.3 (RSS-GEN)              | Complies              |
| Power Line Conducted Emission   | 15.107(a)<br>15.207(a) | 8.8 (RSS-GEN)              | Complies              |
| Maximum Output Power            | 15.407(a)              | 6.2                        | Complies              |
| Power Spectral Density          | 15.407(a)              | 6.2                        | Complies              |
| Unwanted Emissions              | 15.407(b)              | 6.2                        | Complies              |
| Discontinuation of Transmission | 15.407(c)              | 6.3                        | Complies <sup>1</sup> |
| Frequency Stability             | 15.407(g)              | N/A                        | Complies <sup>1</sup> |
| Transmit Power Control          | 15.407(h)              | 6.2.3                      | Complies <sup>1</sup> |
| Radiated Emissions              | 15.205<br>15.209       | 8.9 (RSS-GEN)              | Complies              |

<sup>1</sup> Covered by UL Test Report no. 15U21878-E4V2

### Dynamic Frequency Selection

| Name of test                      | FCC Part 15 reference | RSS-247, Issue 1 reference | Result                |
|-----------------------------------|-----------------------|----------------------------|-----------------------|
| Non-Occupancy Period              | 15.407(h)             | 6.3                        | N/A <sup>2</sup>      |
| DFS Detection Threshold           | 15.407(h)             | 6.3                        | N/A <sup>2</sup>      |
| Channel Availability Check Time   | 15.407(h)             | 6.3                        | N/A <sup>2</sup>      |
| U-NII Detection Bandwidth         | 15.407(h)             | 6.3                        | N/A <sup>2</sup>      |
| Channel Closing Transmission Time | 15.407(h)             | 6.3                        | Complies <sup>3</sup> |
| Channel Move Time                 | 15.407(h)             | 6.3                        | Complies <sup>3</sup> |

<sup>2</sup> The EUT is a Slave Device without radar detection.

<sup>3</sup> DFS tests for slave device are covered by UL report no. 15U21878-E5V1.

### 3 TEST RESULTS

#### 3.1 Power Line Conducted Emissions

FCC Part 15.207 (a)

ISED RSS-GEN Issue 4, Clause 8.8

Test Performed By: Kristian Osvoll

Date of Test: 22-Dec-2016

Measurement procedure: ANSI C63.4-2014 using 50  $\mu$ H/50 ohms LISN.

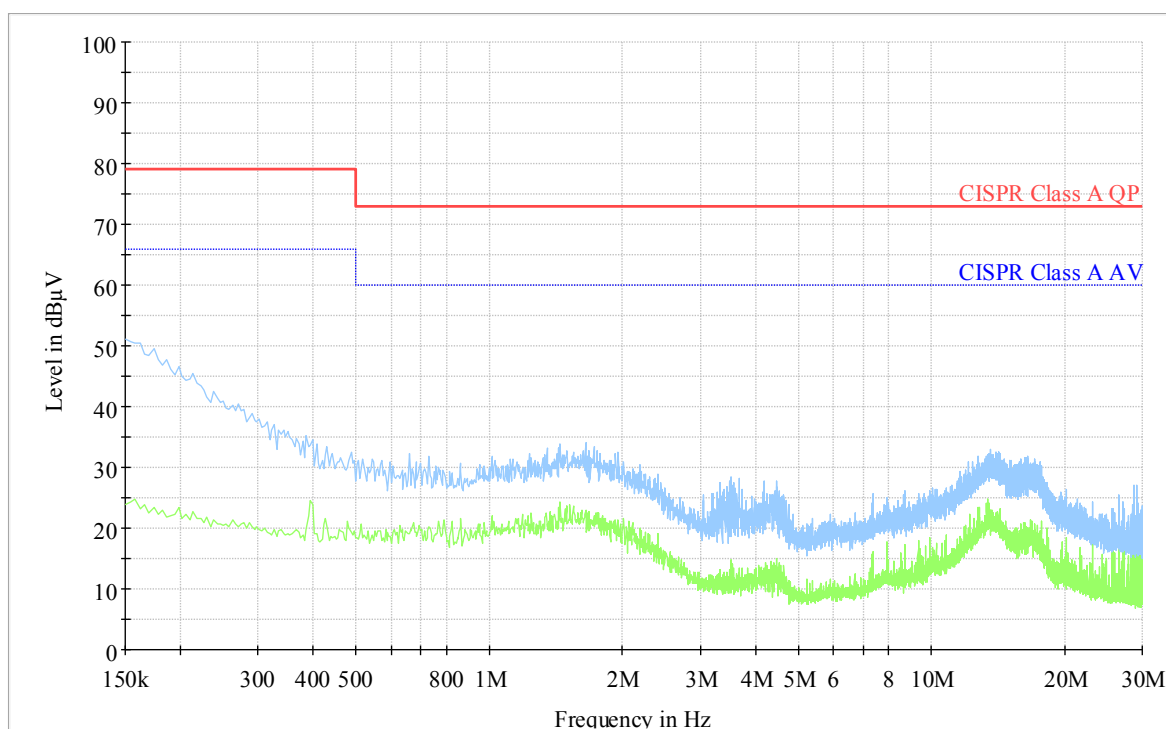
Test Results: Complies.

Measurement Data: See attached graph, (Peak detector).

Highest measured value (L1 and N):

| Frequency (MHz) | QuasiPeak (dB $\mu$ V) | Average (dB $\mu$ V) | Limit (dB $\mu$ V) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | PE | Corr. (dB) |
|-----------------|------------------------|----------------------|--------------------|-------------|-----------------|-----------------|------|----|------------|
| ---             | ---                    | ---                  | ---                | ---         | ---             | ---             |      |    | ---        |

Full Spectrum



All emissions are below the limits in FCC 15.207

### 3.2 Maximum Output Power, EIRP

FCC 15.407 (a)

ISED RSS-247, Issue 1, Clause 6.2

Test Results: Complies

Measurement Data:

| Ch. No. | Nominal Frequency (MHz) | Maximum E.I.R.P. (dBm) |              |              |              |
|---------|-------------------------|------------------------|--------------|--------------|--------------|
|         |                         | 802.11a                | 802.11n HT20 | 802.11n HT40 | 802.11n HT80 |
| 36      | 5180                    | 13.5                   | 12.1         |              |              |
| 40      | 5200                    | 14.2                   | 12.9         |              |              |
| 48      | 5240                    | 14.3                   | 12.5         |              |              |
| 52      | 5260                    | 17.0                   | 20.4         |              |              |
| 60      | 5300                    | 16.7                   | 20.2         |              |              |
| 64      | 5320                    | <b>15.3</b>            | <b>14.4</b>  |              |              |
| 100     | 5500                    | <b>15.2</b>            | <b>14.6</b>  |              |              |
| 116     | 5580                    | 16.9                   | 19.7         |              |              |
| 140     | 5700                    | <b>10.0</b>            | <b>10.5</b>  |              |              |
| 149     | 5745                    | <b>15.8</b>            | <b>12.2</b>  |              |              |
| 157     | 5785                    | 19.6                   | 22.0         |              |              |
| 165     | 5825                    | 20.1                   | 22.9         |              |              |
| 38      | 5190                    |                        |              | <b>14.5</b>  |              |
| 46      | 5230                    |                        |              | 15.2         |              |
| 54      | 5270                    |                        |              | 19.9         |              |
| 62      | 5310                    |                        |              | <b>13.2</b>  |              |
| 102     | 5510                    |                        |              | <b>12.2</b>  |              |
| 110     | 5550                    |                        |              | 19.8         |              |
| 134     | 5670                    |                        |              | <b>13.3</b>  |              |
| 151     | 5755                    |                        |              | <b>11.4</b>  |              |
| 159     | 5795                    |                        |              | 22.8         |              |
| 42      | 5210                    |                        |              |              | <b>13.2</b>  |
| 58      | 5290                    |                        |              |              | <b>14.2</b>  |
| 106     | 5530                    |                        |              |              | <b>12.8</b>  |
| 155     | 5775                    |                        |              |              | 20.5         |

Measured values are corrected for Duty Cycle.

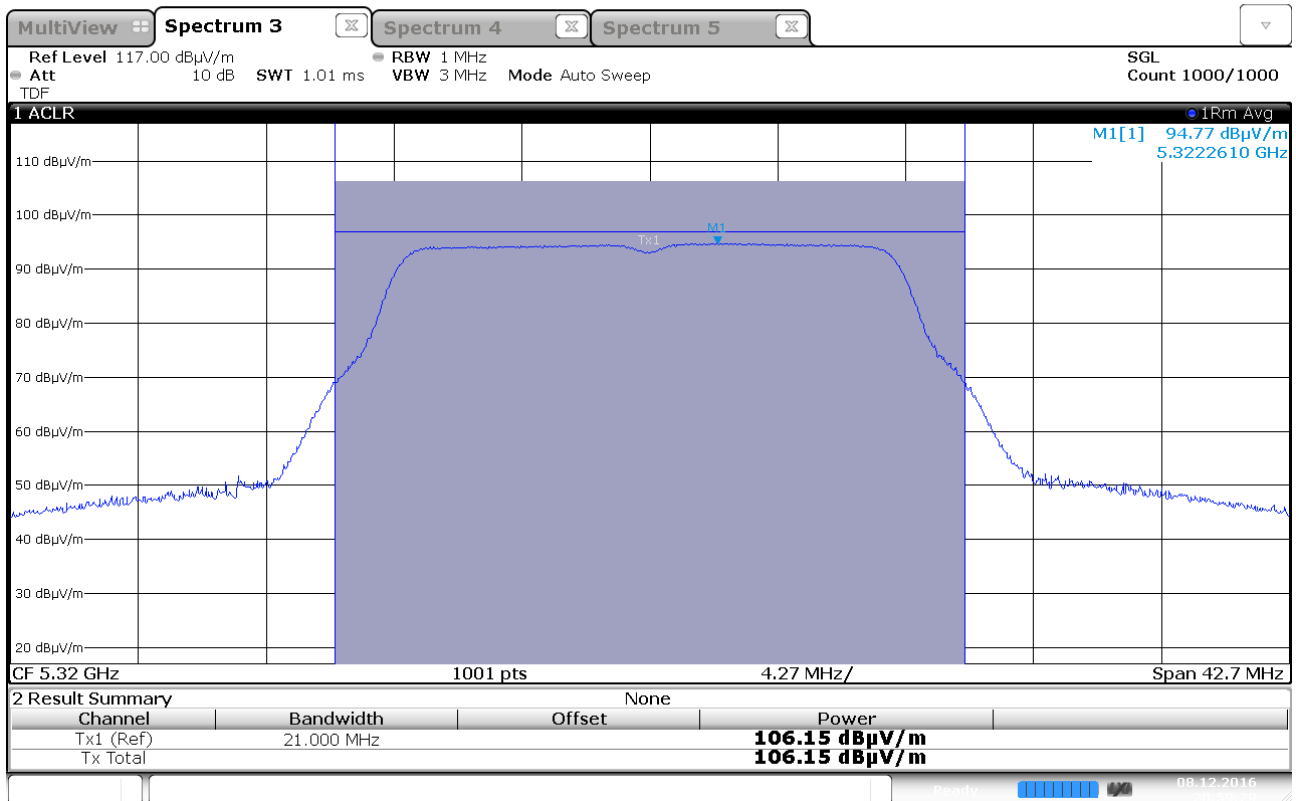
Values in boldface are measured, all other values are calculated from values in UL report no.

#### Power limits

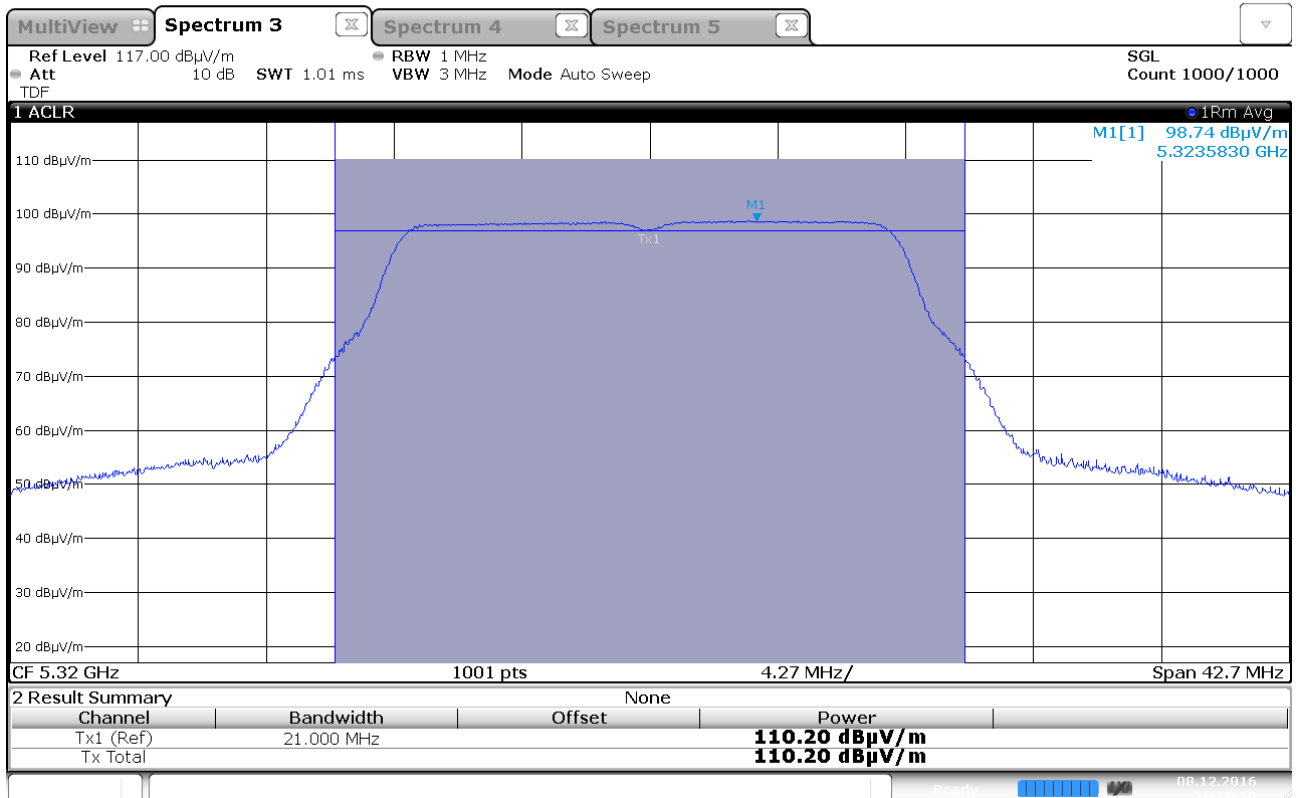
| Frequency Band  | Power limit                                                    |          |
|-----------------|----------------------------------------------------------------|----------|
| 5150 – 5250 MHz | Less than the lesser of 50mW or 4 dBm + 10 log $B$             | 16.9 dBm |
| 5250 – 5350 MHz | Less than the lesser of 250 mW or 11 dBm + 10 log $B$          | 23.9 dBm |
| 5470 – 5725 MHz |                                                                |          |
| 5725 – 5825 MHz | Less than the lesser of 1 Watt (30 dBm) or 17 dBm + 10 log $B$ | 29.9 dBm |

$B$  is the 26 dB emission bandwidth in MHz

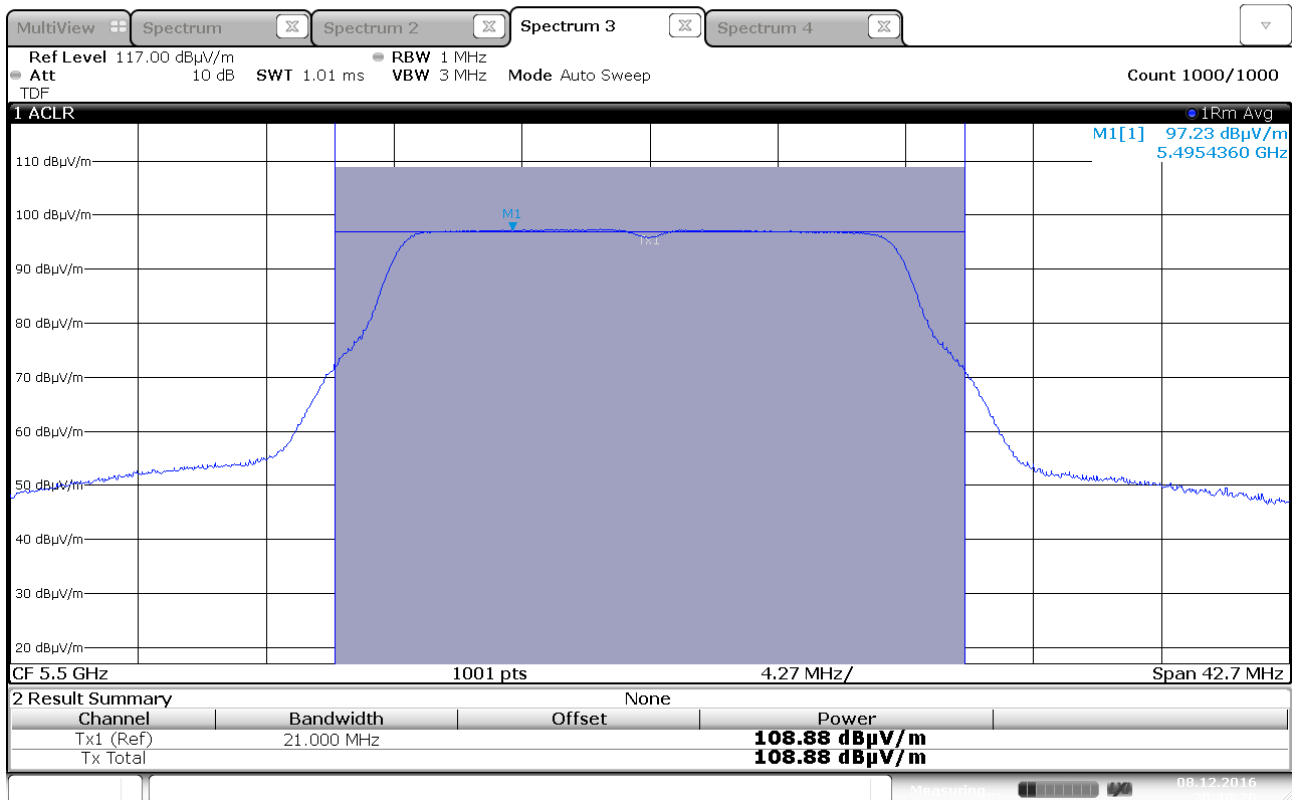
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



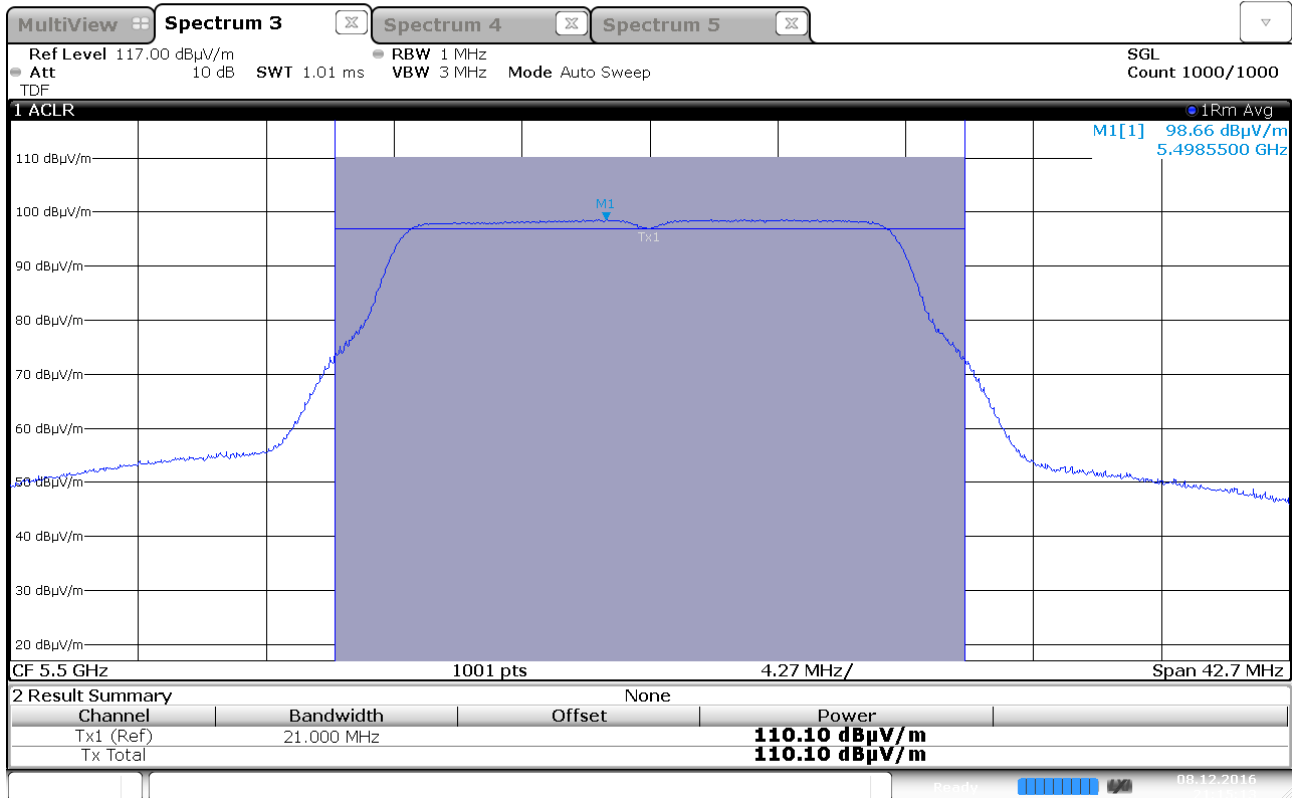
Maximum EIRP, 5320 MHz, 802.11a 6Mbps, Ant 0



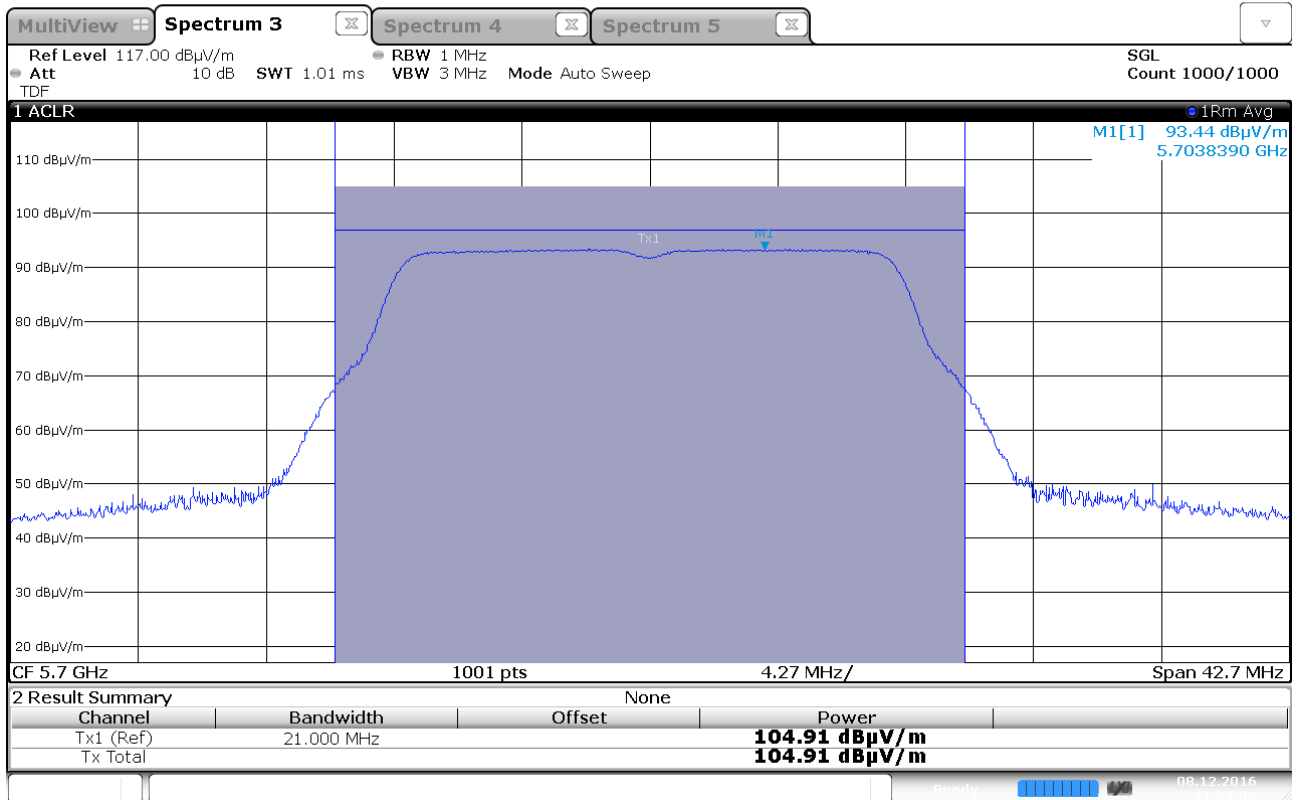
Maximum EIRP, 5320 MHz, 802.11a 6Mbps, Ant 1



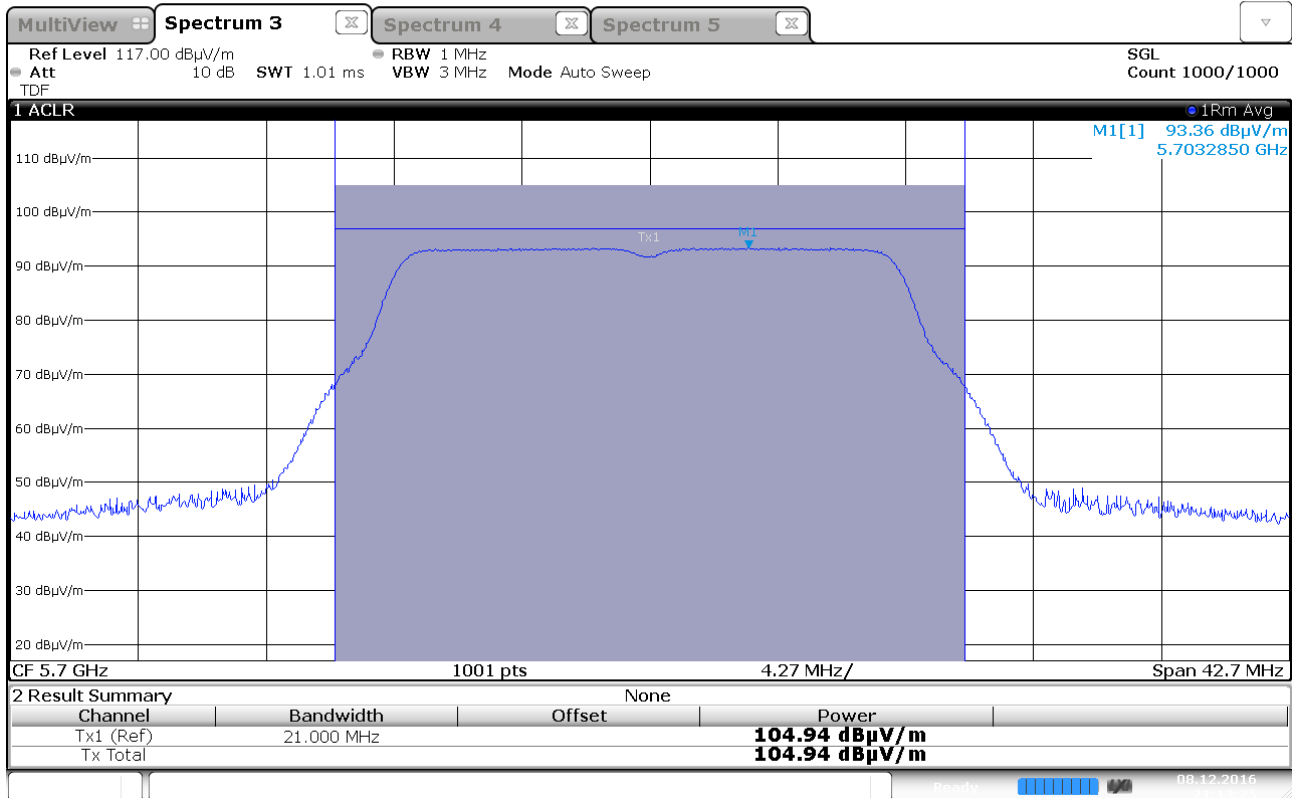
Maximum EIRP, 5500 MHz, 802.11a 6Mbps, Ant 0



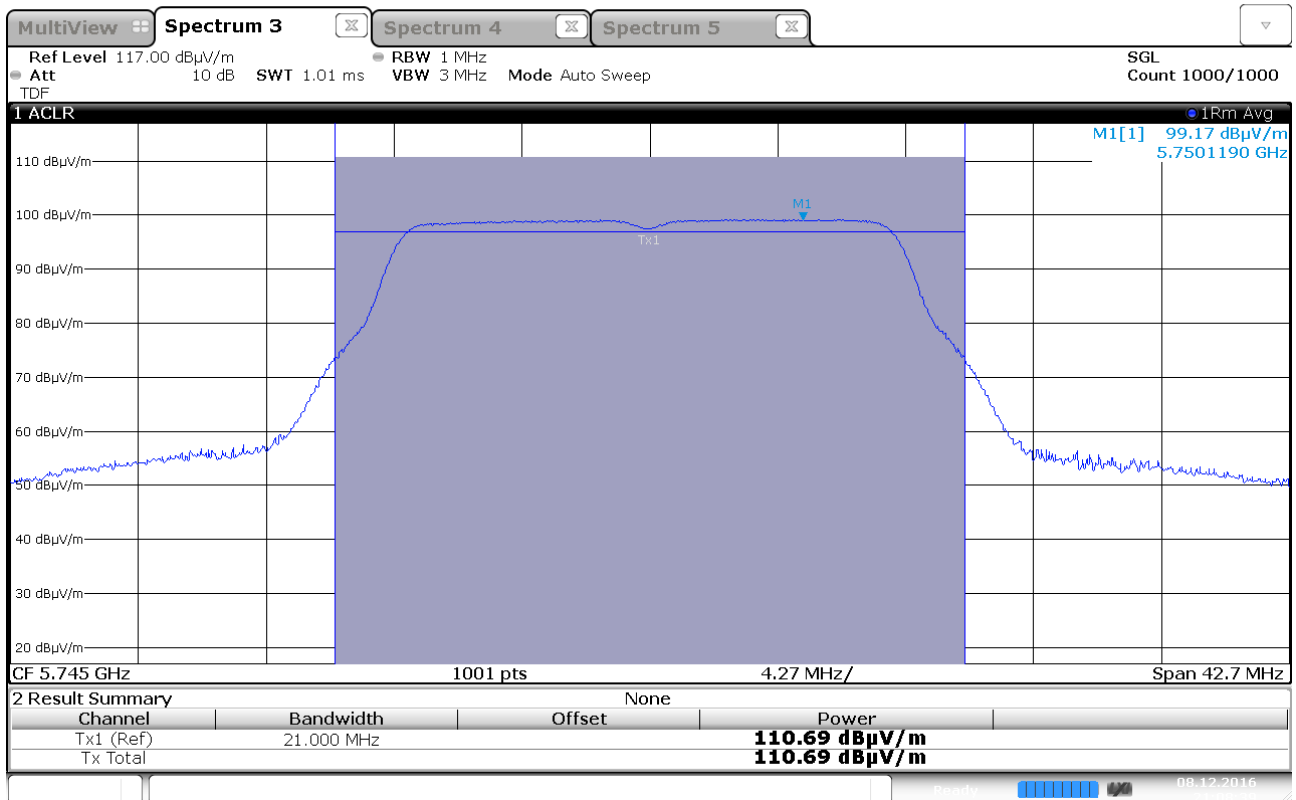
Maximum EIRP, 5500 MHz, 802.11a 6Mbps, Ant 1



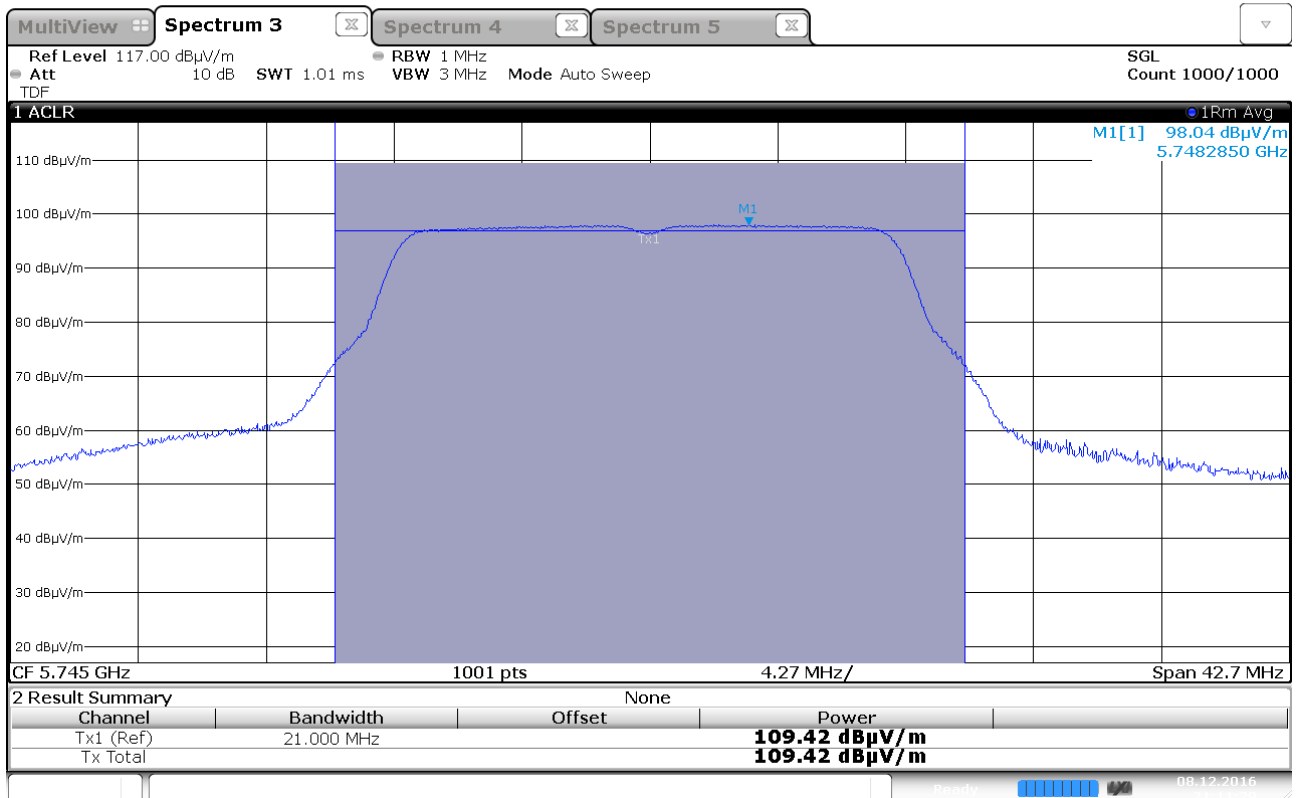
Maximum EIRP, 5700 MHz, 802.11a 6Mbps, Ant 0



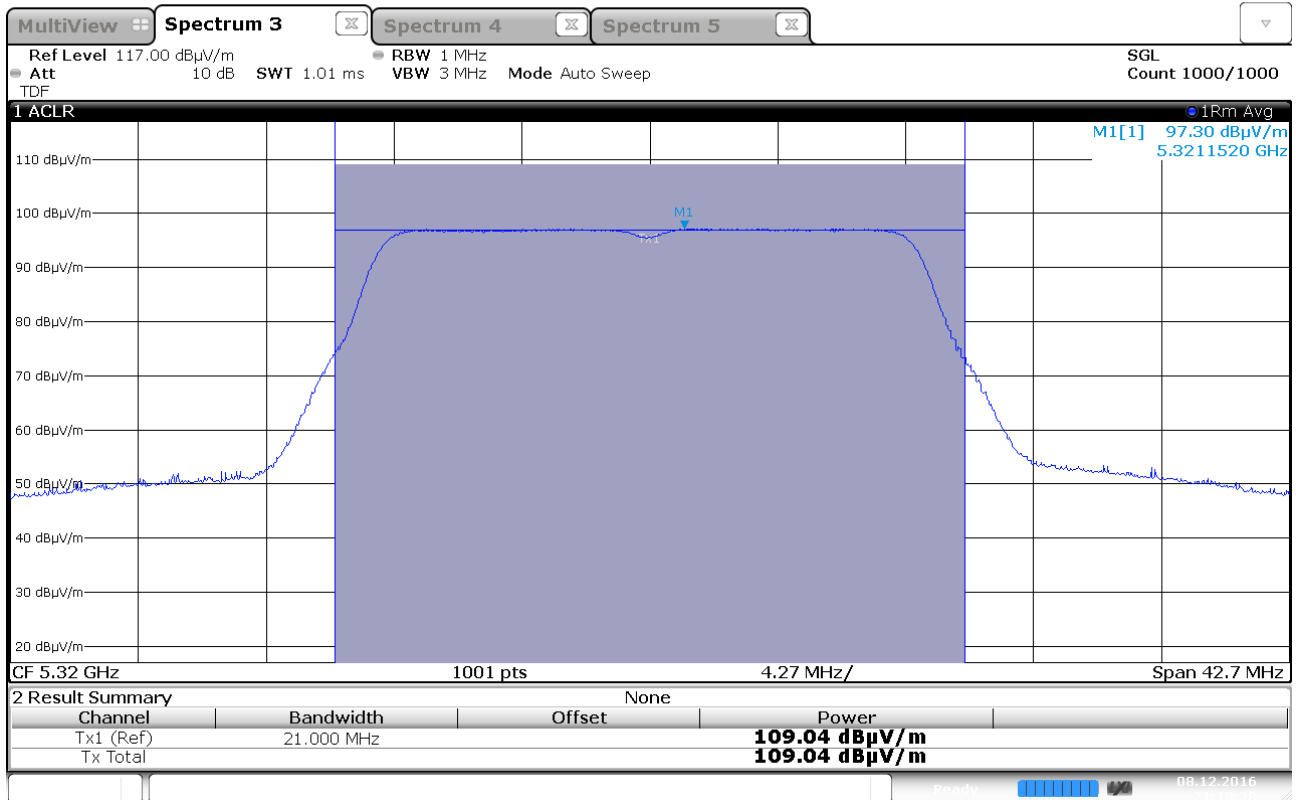
Maximum EIRP, 5700 MHz, 802.11a 6Mbps, Ant 1



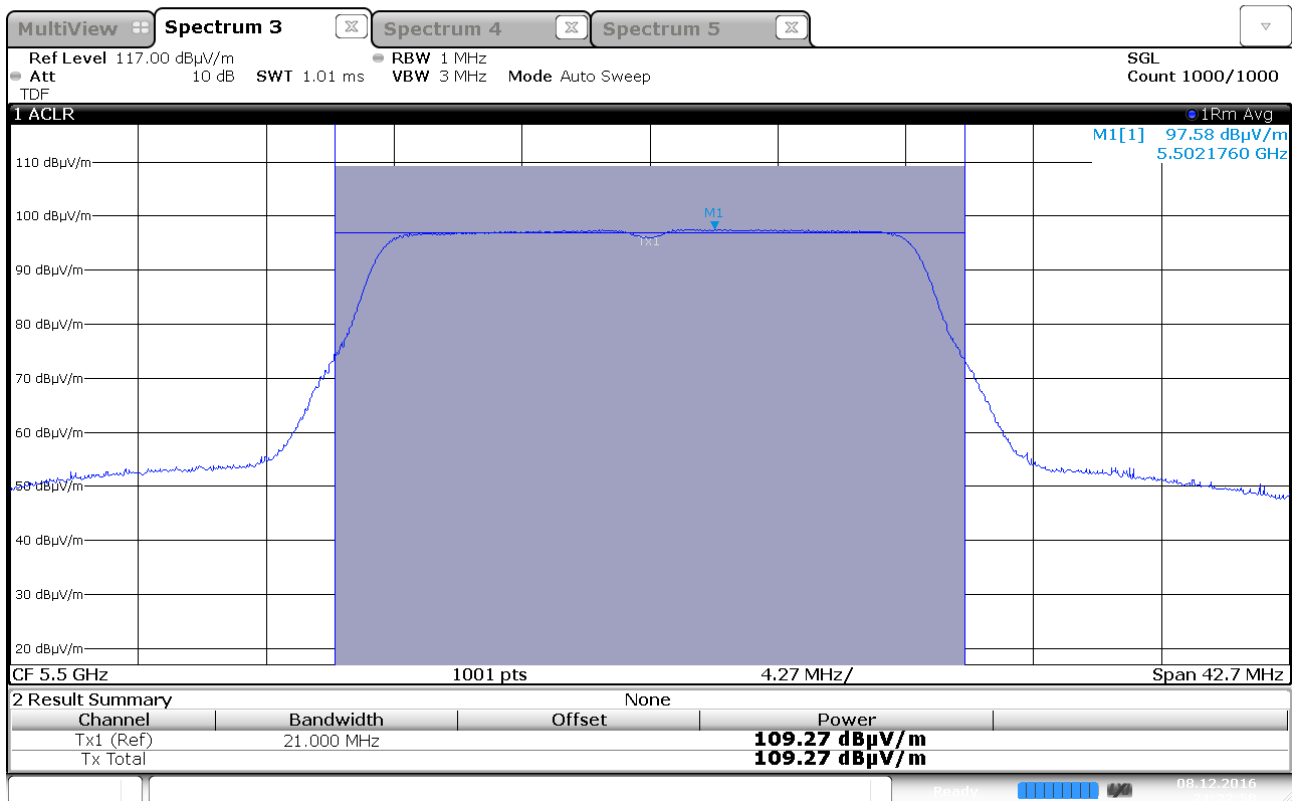
Maximum EIRP, 5745 MHz, 802.11a 6Mbps, Ant 0



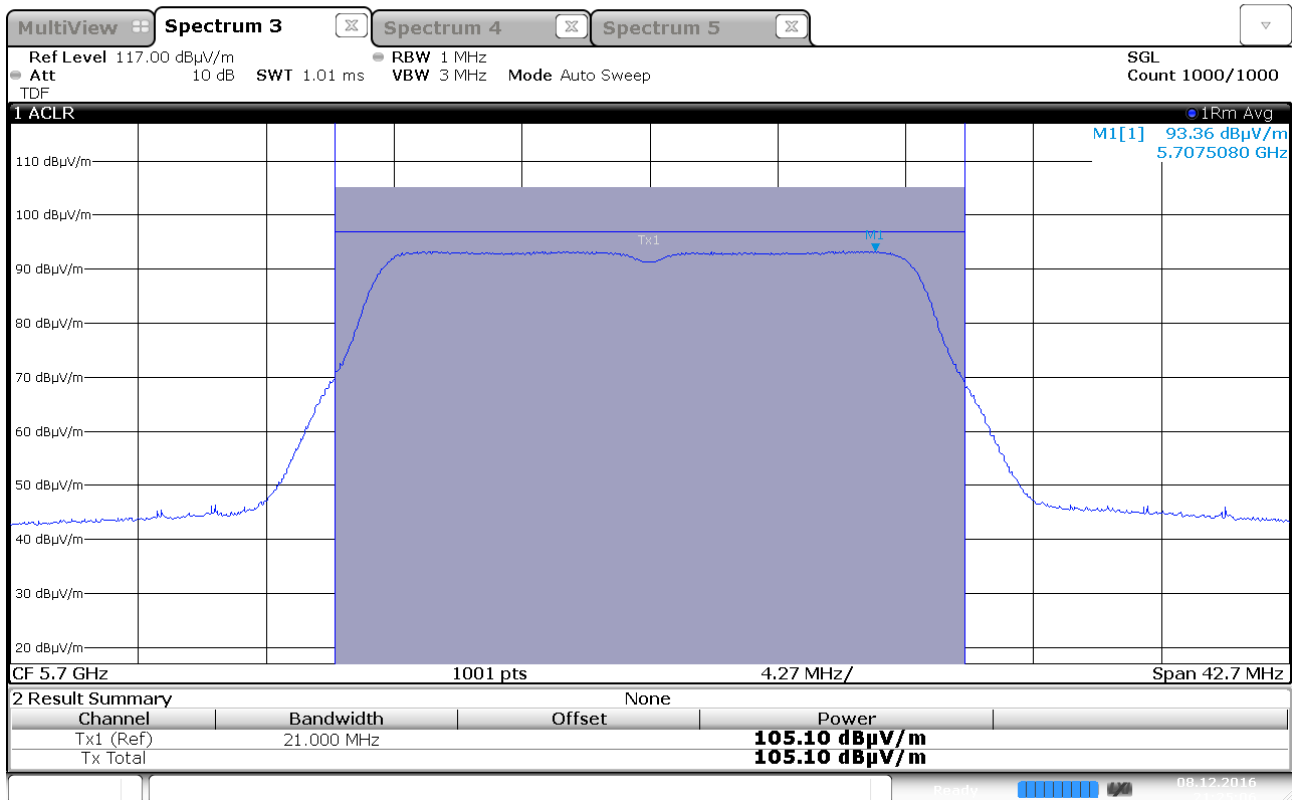
Maximum EIRP, 5745 MHz, 802.11a 6Mbps, Ant 1



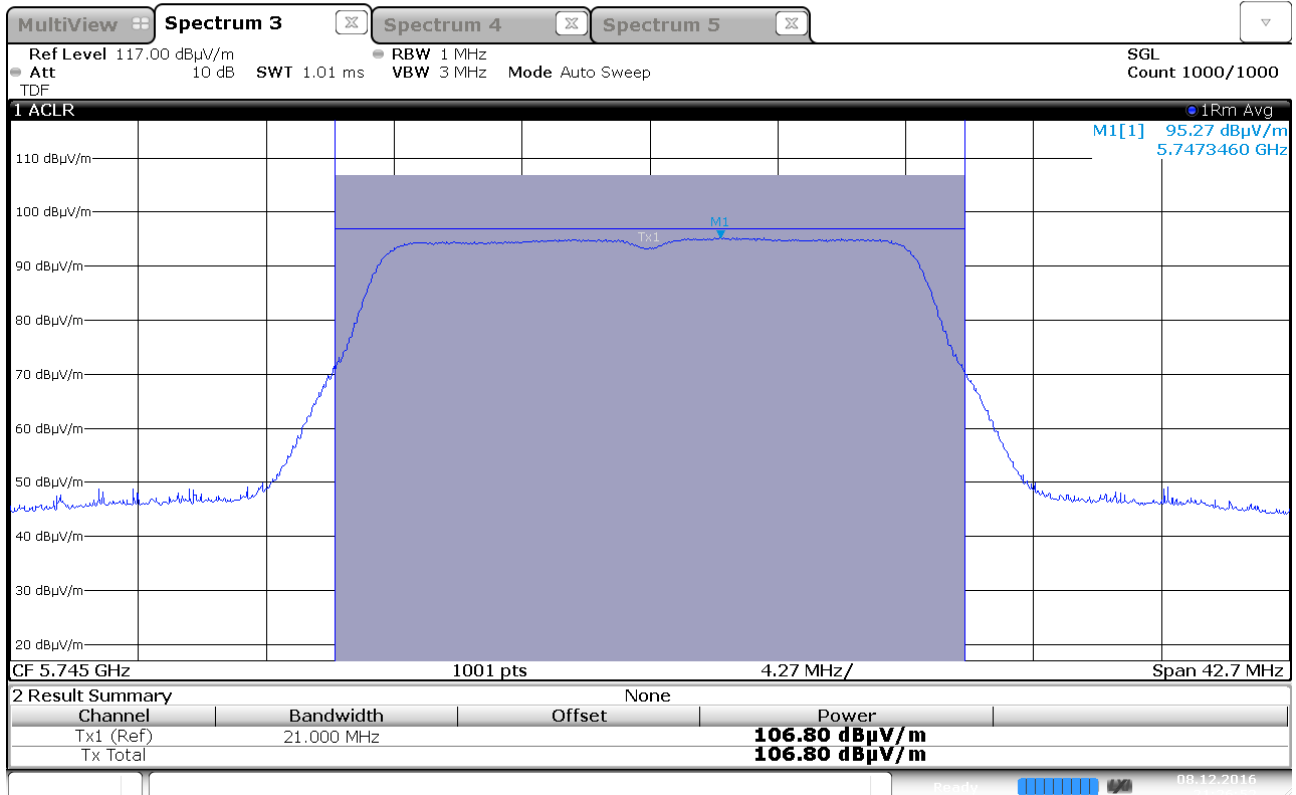
Maximum EIRP, 5320 MHz, 802.11n HT20, MIMO



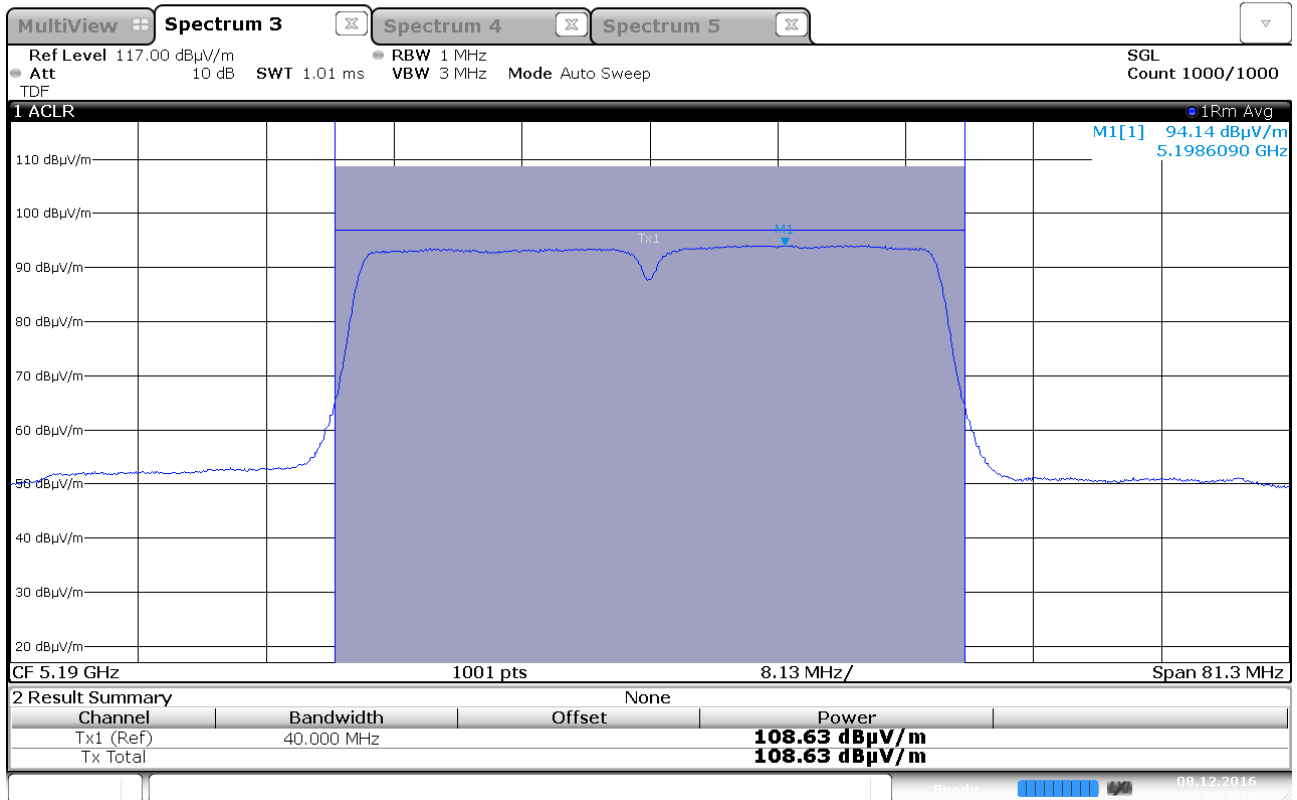
Maximum EIRP, 5500 MHz, 802.11n HT20, MIMO



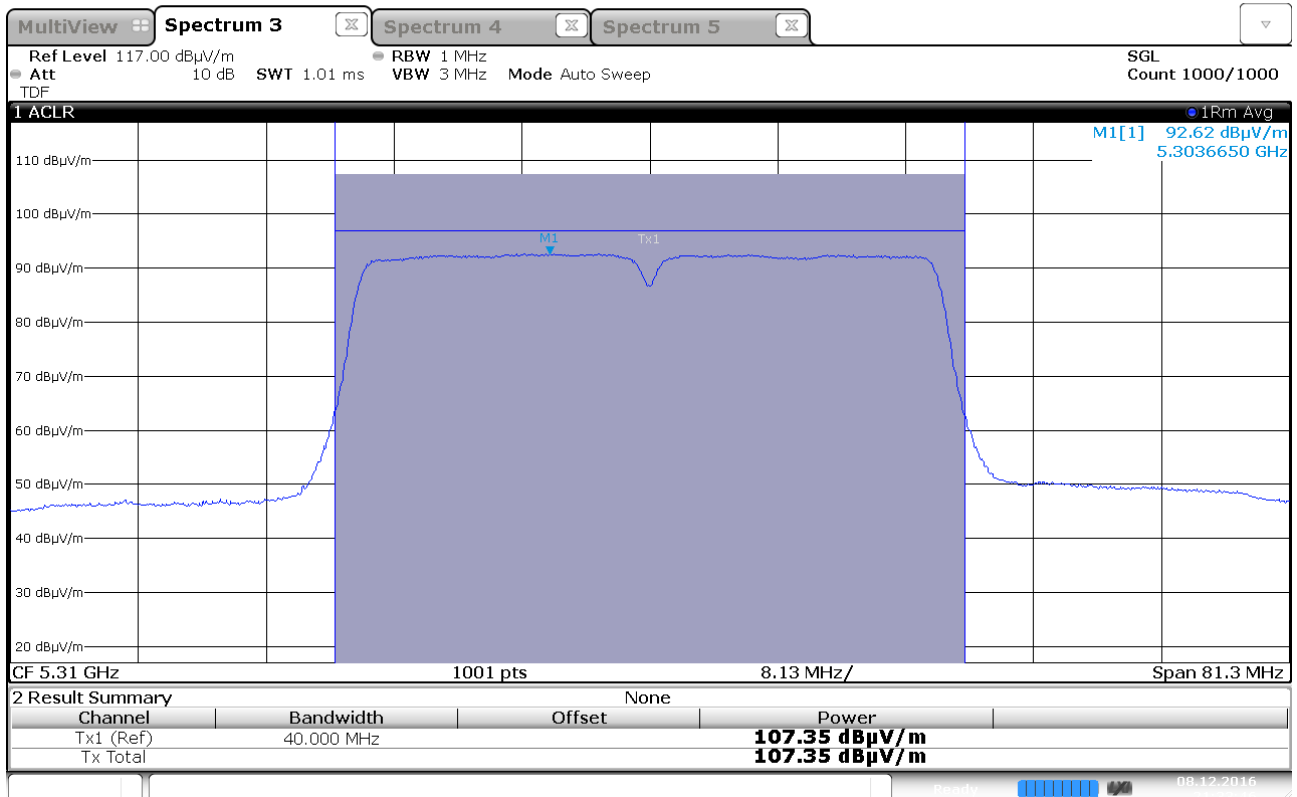
Maximum EIRP, 5700 MHz, 802.11n HT20, MIMO



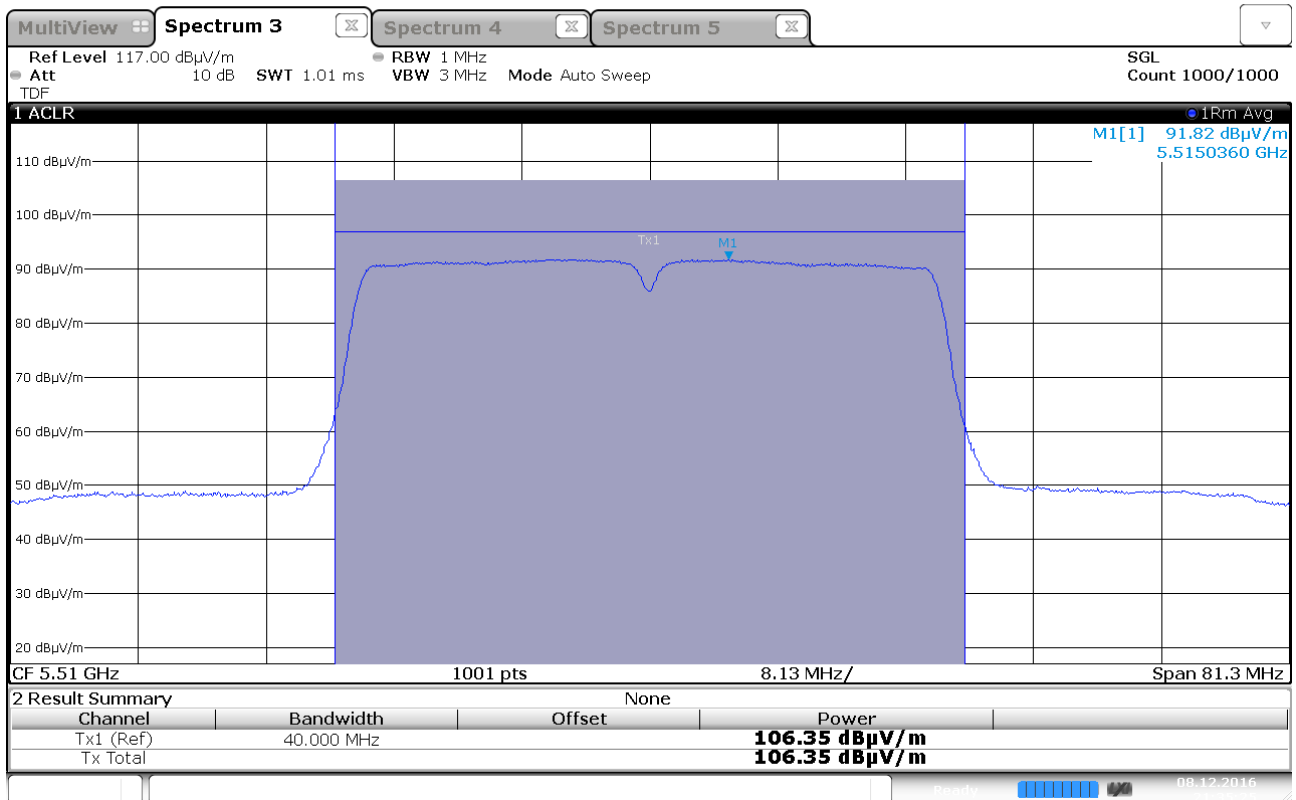
Maximum EIRP, 5745 MHz, 802.11n HT20, MIMO



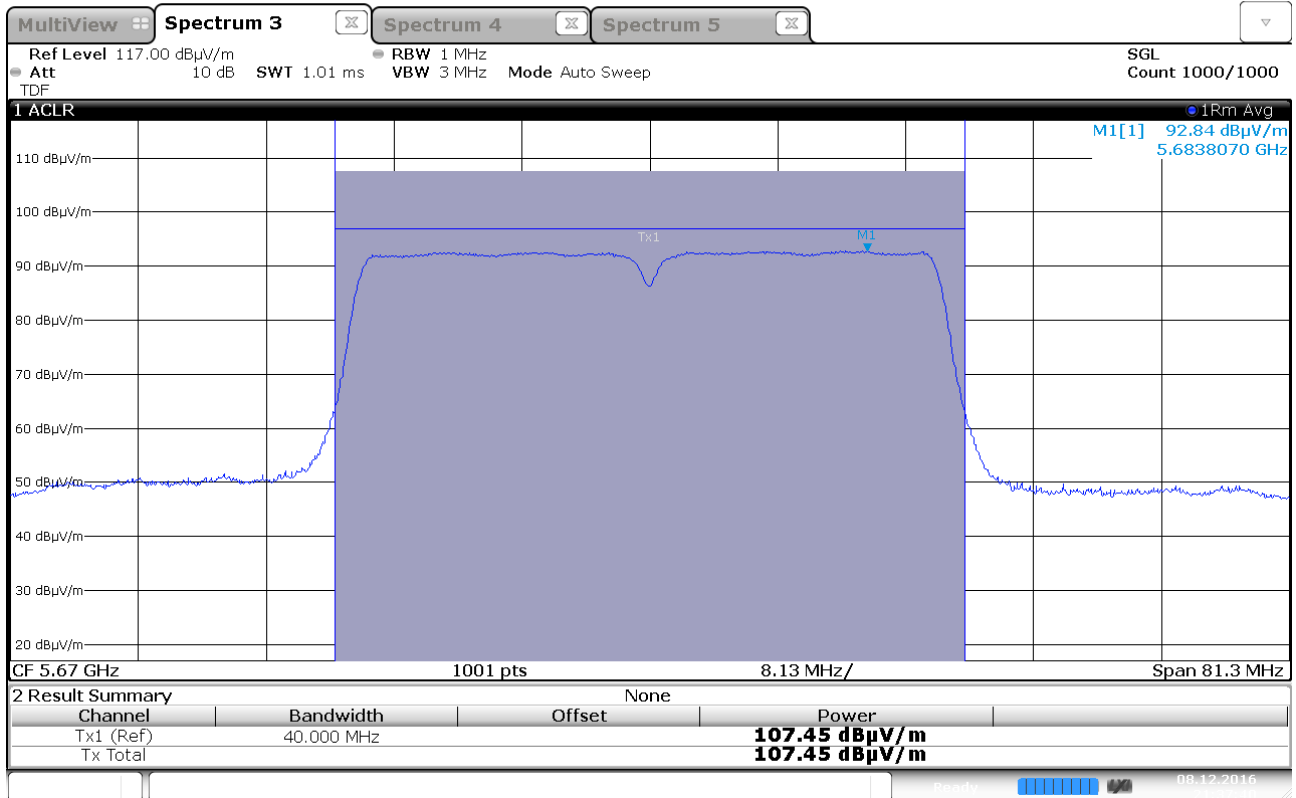
Maximum EIRP, 5190 MHz, 802.11n HT40, MIMO



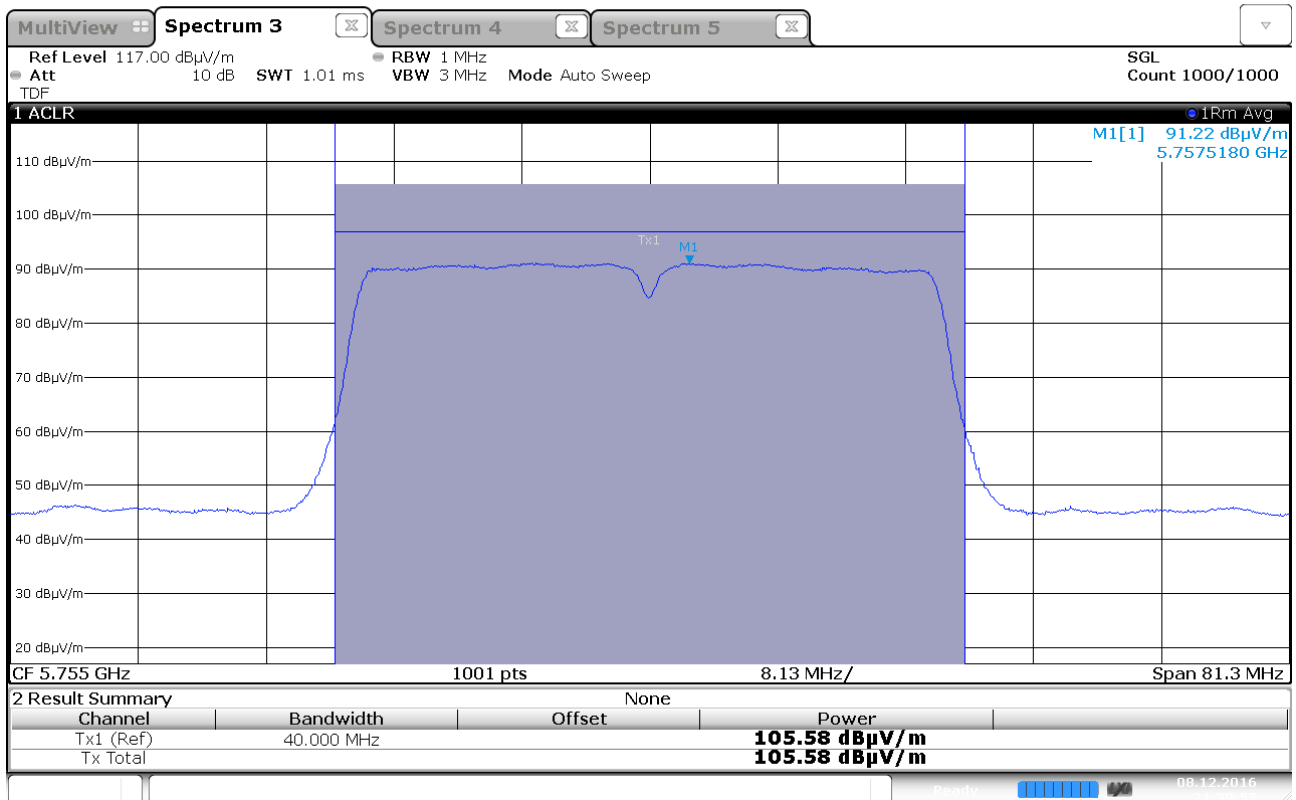
Maximum EIRP, 5310 MHz, 802.11n HT40, MIMO



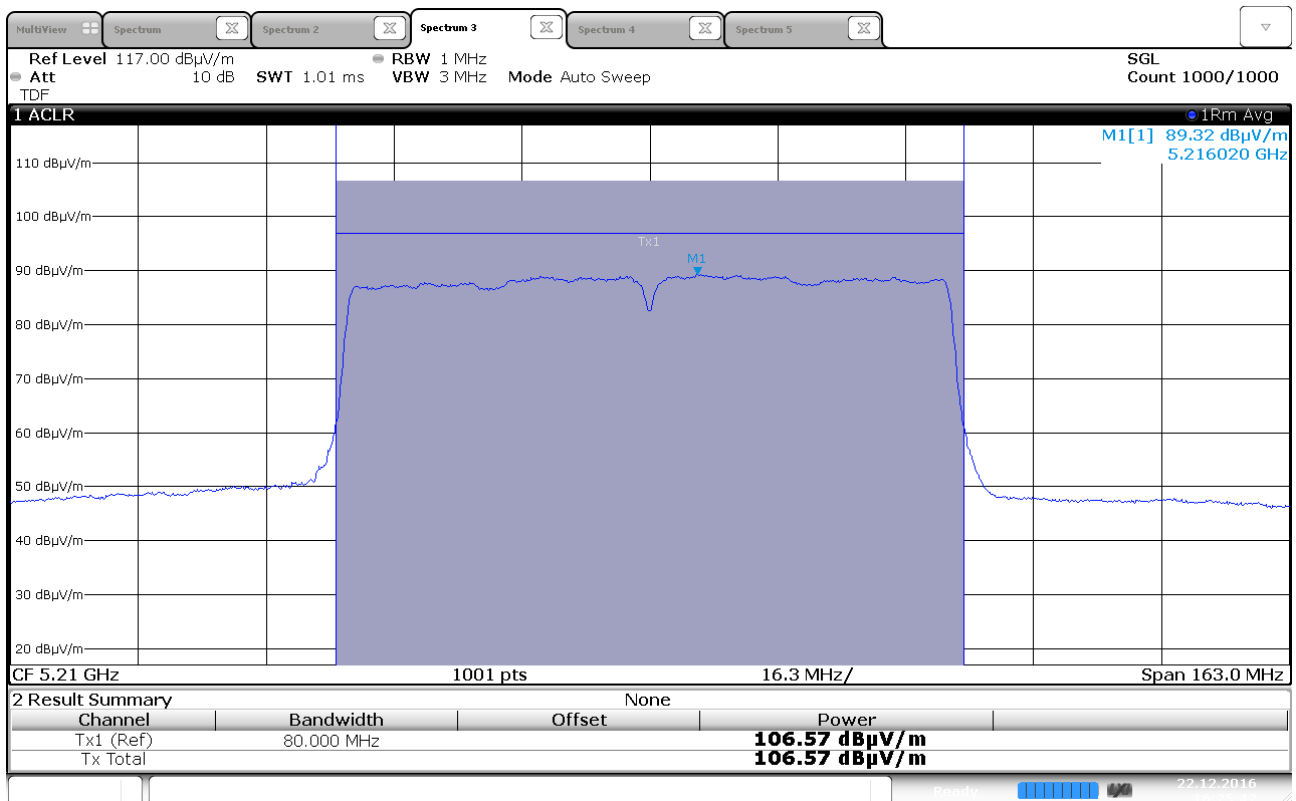
Maximum EIRP, 5510 MHz, 802.11n HT40, MIMO



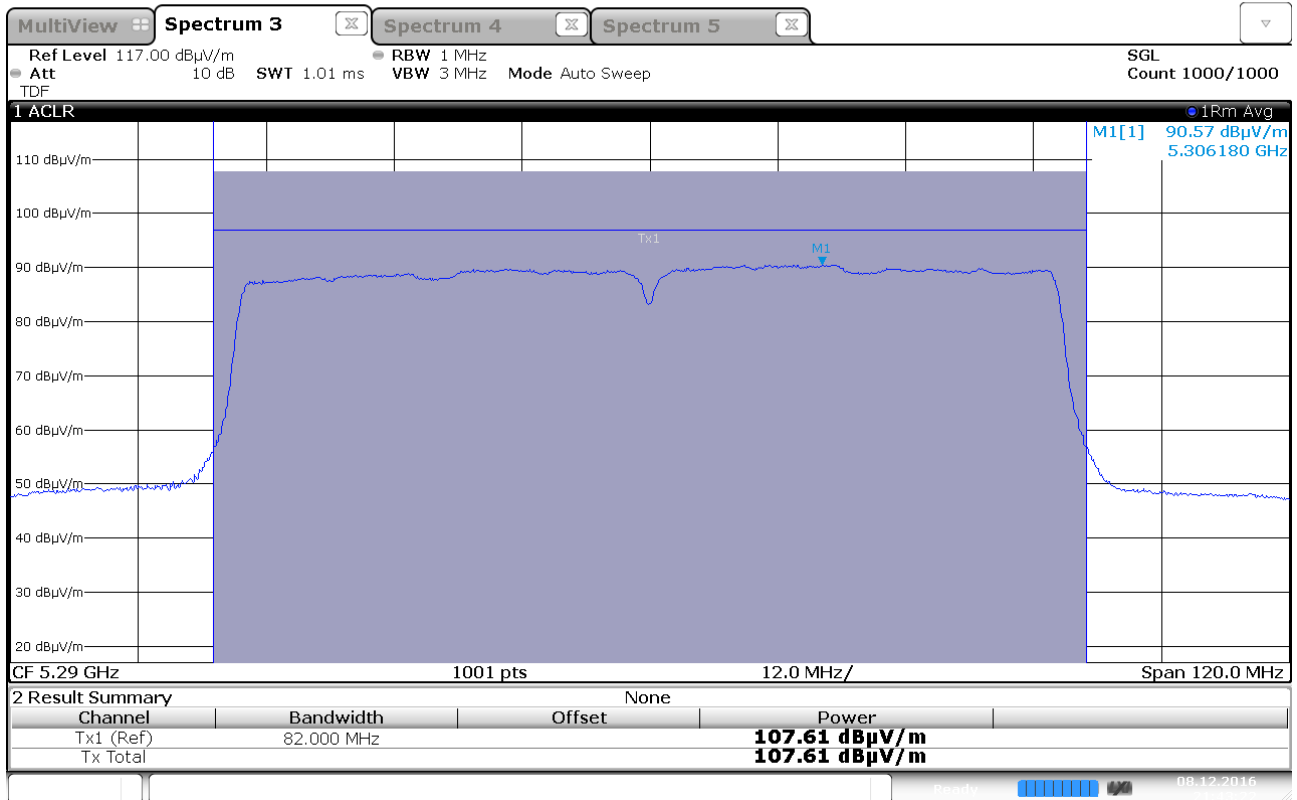
Maximum EIRP, 5670 MHz, 802.11n HT40, MIMO



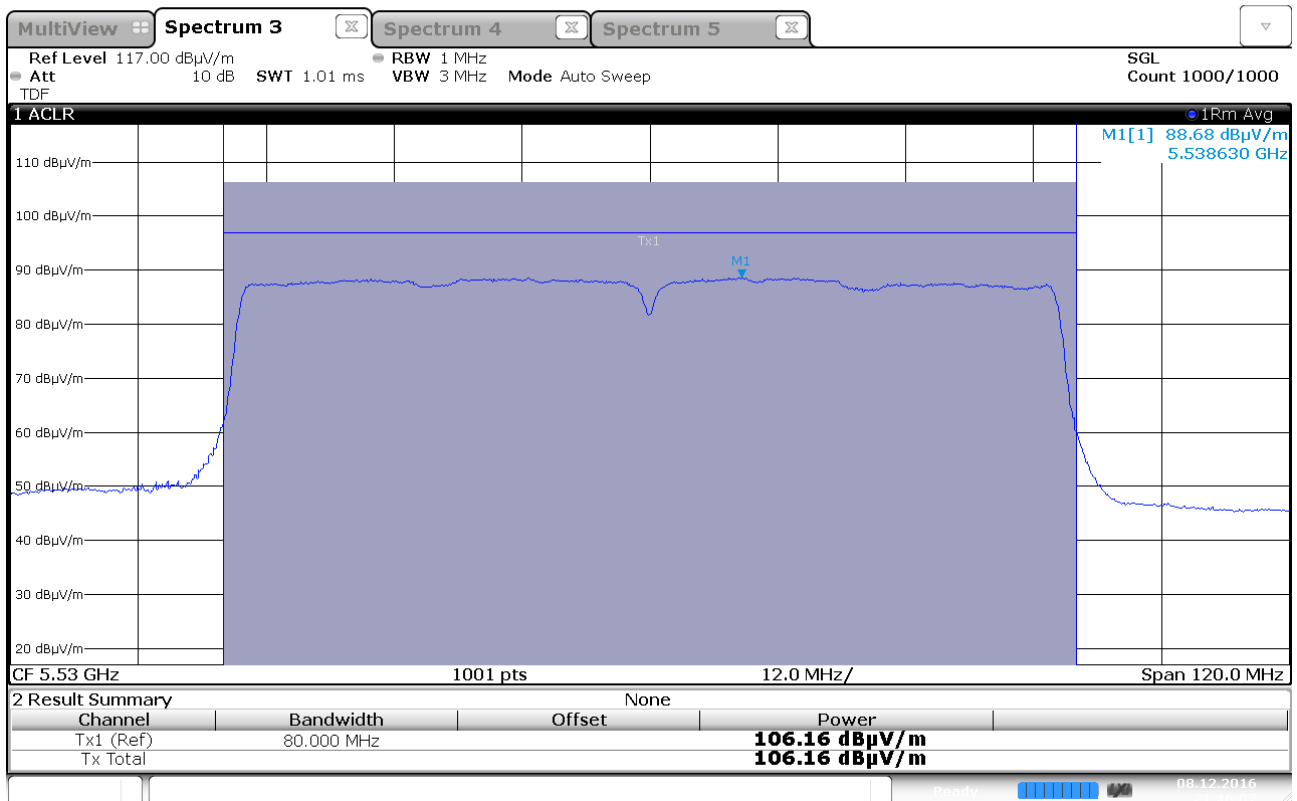
Maximum EIRP, 5755 MHz, 802.11n HT40, MIMO



Maximum EIRP, 5210 MHz, 802.11n HT80, MIMO



Maximum EIRP, 5290 MHz, 802.11n HT80, MIMO



Maximum EIRP, 5530 MHz, 802.11n HT80, MIMO

### 3.3 Emission Bandwidth *B*

Para. No.: 15.407(a)

ISED RSS-GEN, Issue 4, Clause 6.6

Test Results: Complies

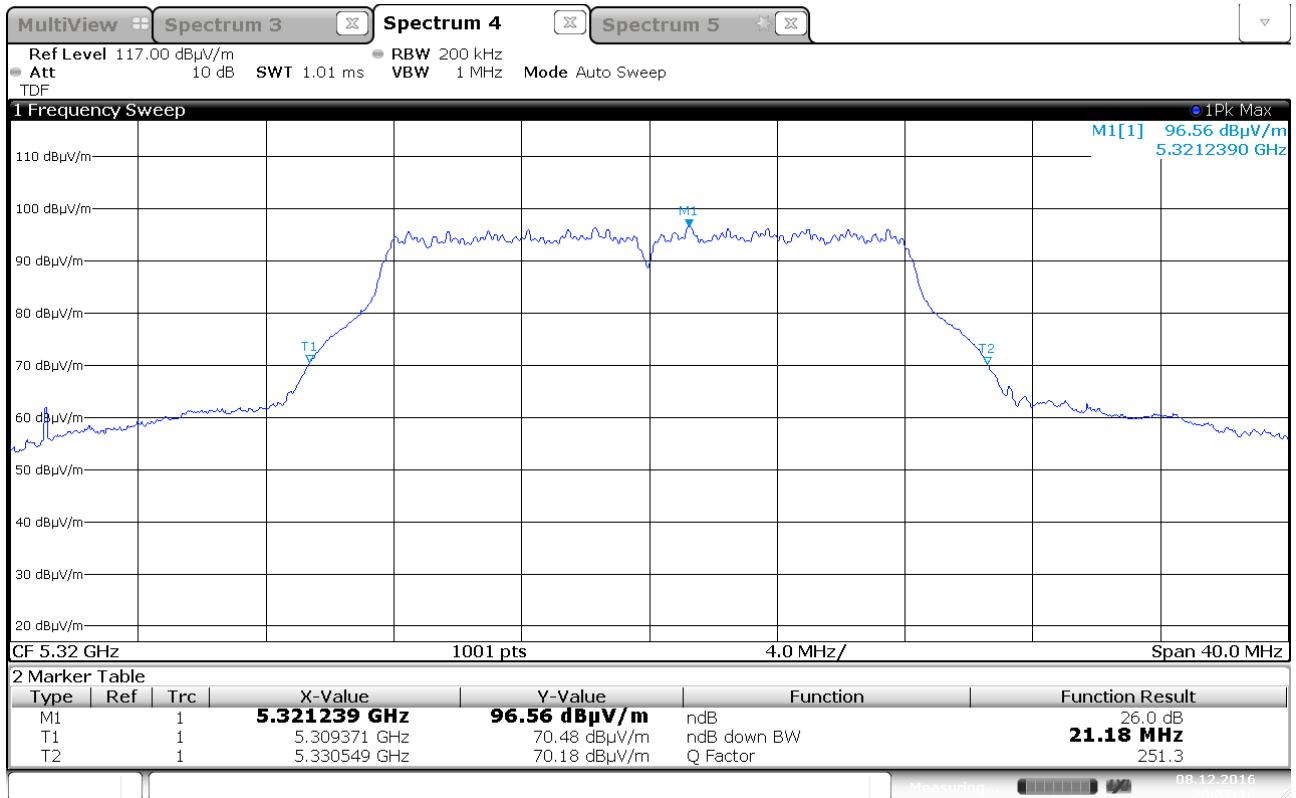
Measurement Data:

| Ch. No. | Nominal Frequency (MHz) | 26dB Bandwidth (MHz) |              |              |              |
|---------|-------------------------|----------------------|--------------|--------------|--------------|
|         |                         | 802.11a              | 802.11n HT20 | 802.11n HT40 | 802.11n HT80 |
| 36      | 5180                    | 21.2                 | 21.3         |              |              |
| 40      | 5200                    | 21.1                 | 21.2         |              |              |
| 48      | 5240                    | 22.0                 | 21.0         |              |              |
| 52      | 5260                    | 20.8                 | 20.9         |              |              |
| 60      | 5300                    | 21.3                 | 21.3         |              |              |
| 64      | 5320                    | <b>21.3</b>          | <b>21.3</b>  |              |              |
| 100     | 5500                    | <b>21.2</b>          | <b>21.5</b>  |              |              |
| 116     | 5580                    | 20.6                 | 21.2         |              |              |
| 140     | 5700                    | <b>21.3</b>          | <b>21.2</b>  |              |              |
| 149     | 5745                    | <b>21.3</b>          | <b>21.1</b>  |              |              |
| 157     | 5785                    | 21.4                 | 21.3         |              |              |
| 165     | 5825                    | 21.7                 | 21.9         |              |              |
| 38      | 5190                    |                      |              | <b>39.3</b>  |              |
| 46      | 5230                    |                      |              | 38.7         |              |
| 54      | 5270                    |                      |              | 39.2         |              |
| 62      | 5310                    |                      |              | <b>38.9</b>  |              |
| 102     | 5510                    |                      |              | <b>39.2</b>  |              |
| 110     | 5550                    |                      |              | 38.9         |              |
| 134     | 5670                    |                      |              | <b>39.0</b>  |              |
| 151     | 5755                    |                      |              | <b>38.8</b>  |              |
| 159     | 5795                    |                      |              | 40.0         |              |
| 42      | 5210                    |                      |              |              | <b>83.6</b>  |
| 58      | 5290                    |                      |              |              | <b>82.5</b>  |
| 106     | 5530                    |                      |              |              | <b>84.3</b>  |
| 155     | 5775                    |                      |              |              | 81.1         |

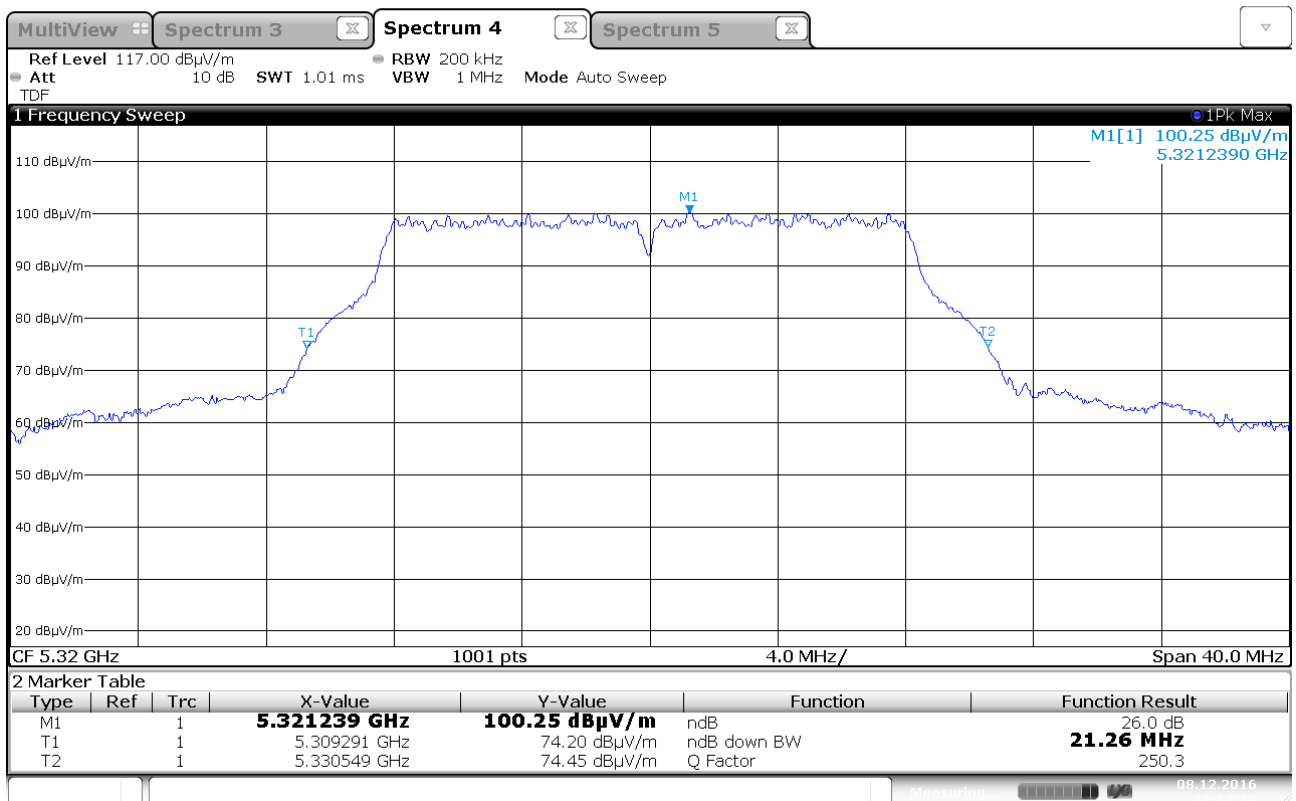
Values in boldface are measured values, all other values are from UL report no. 15U21878-E4V2.

**Limit:**

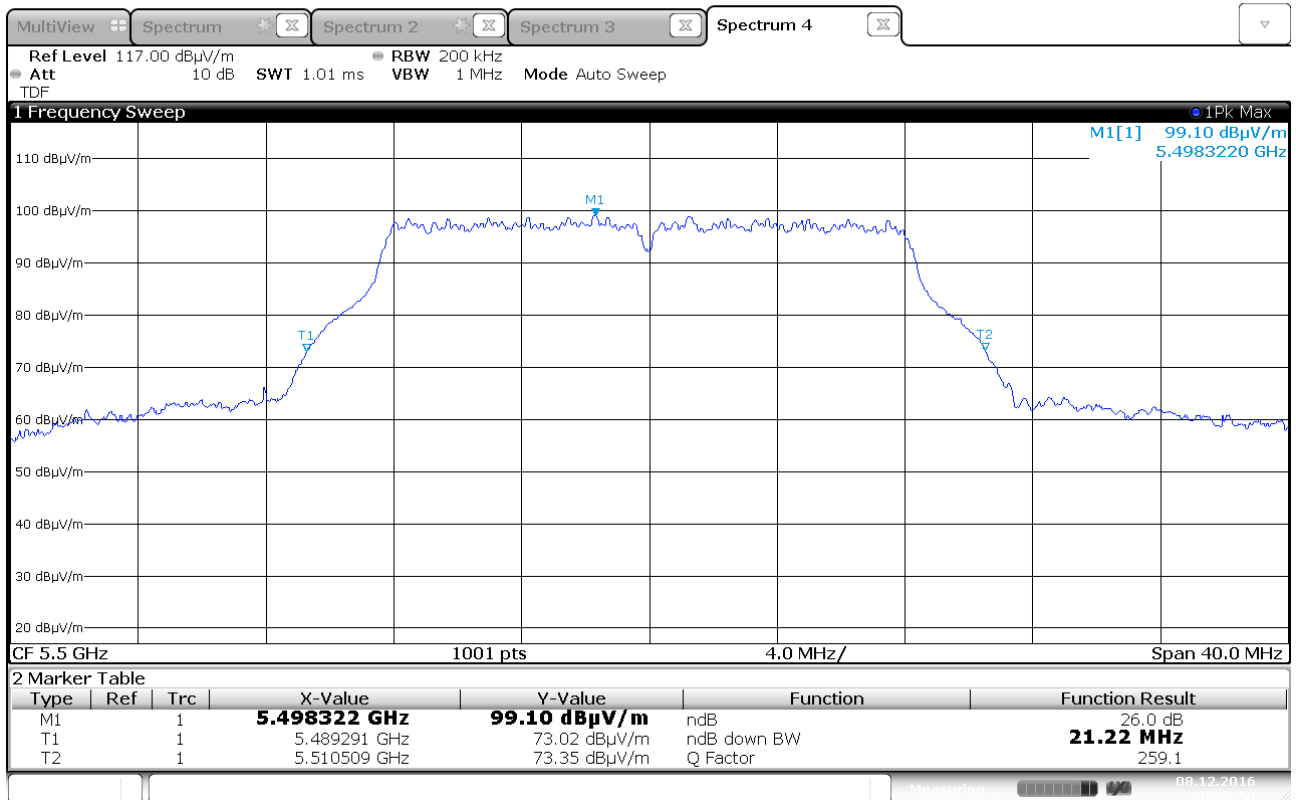
No requirements as long as the emissions are within the band-edges.



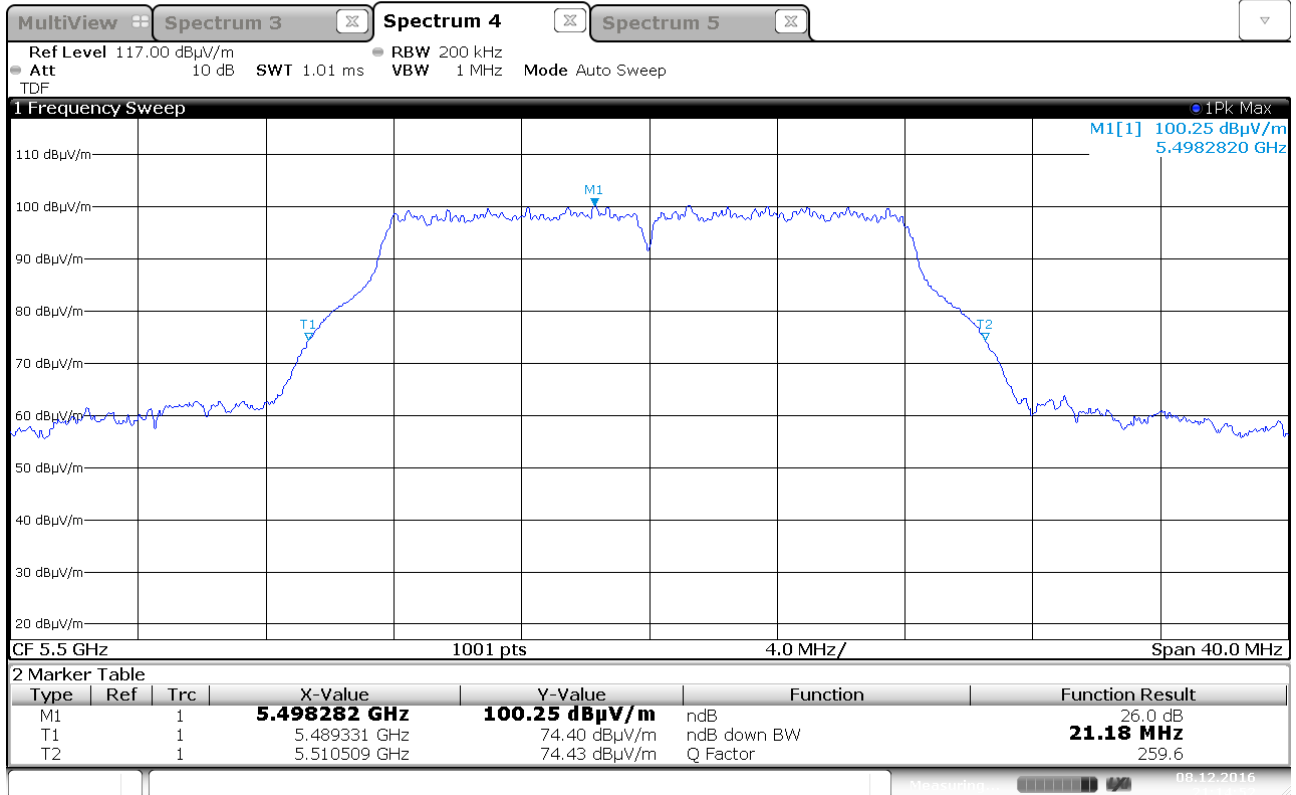
Emission Bandwidth B, 5320 MHz, 802.11a 6Mbps, Ant 0



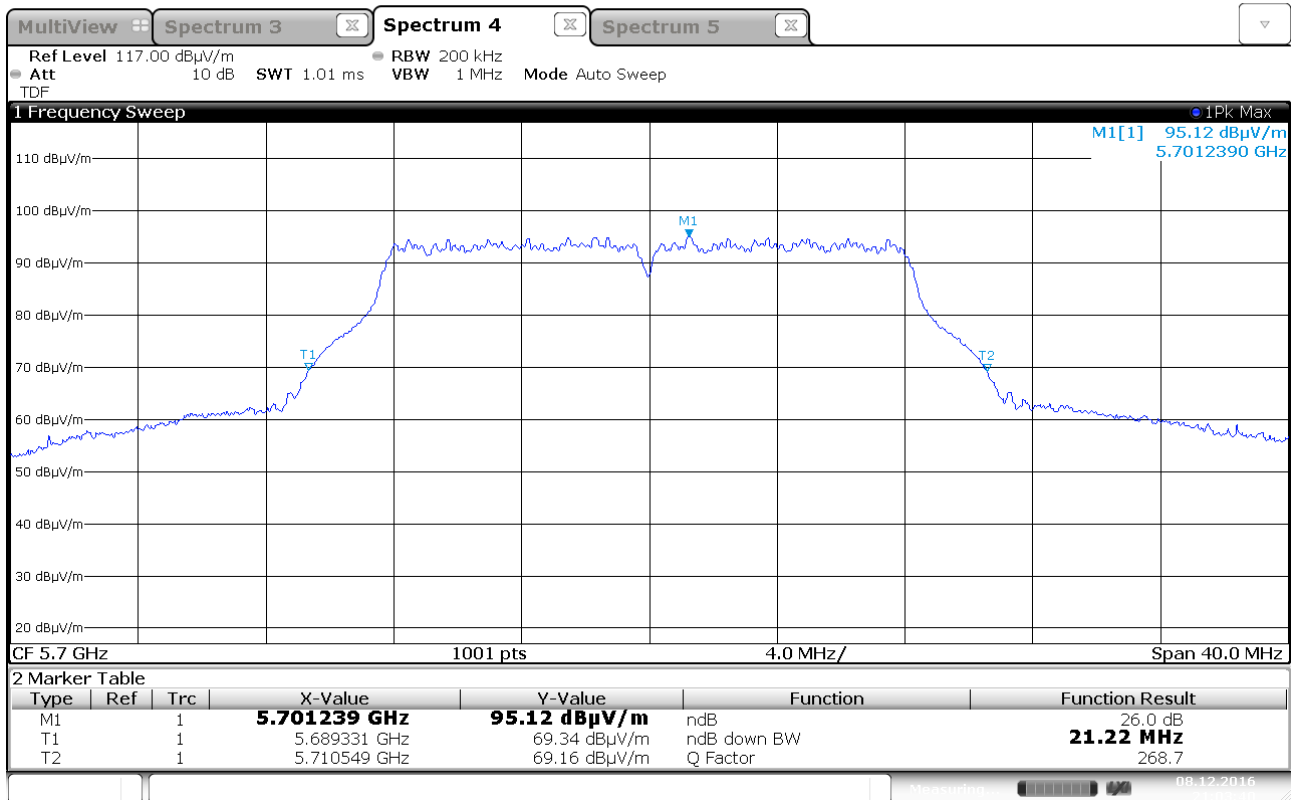
Emission Bandwidth B, 5320 MHz, 802.11a 6Mbps, Ant 1



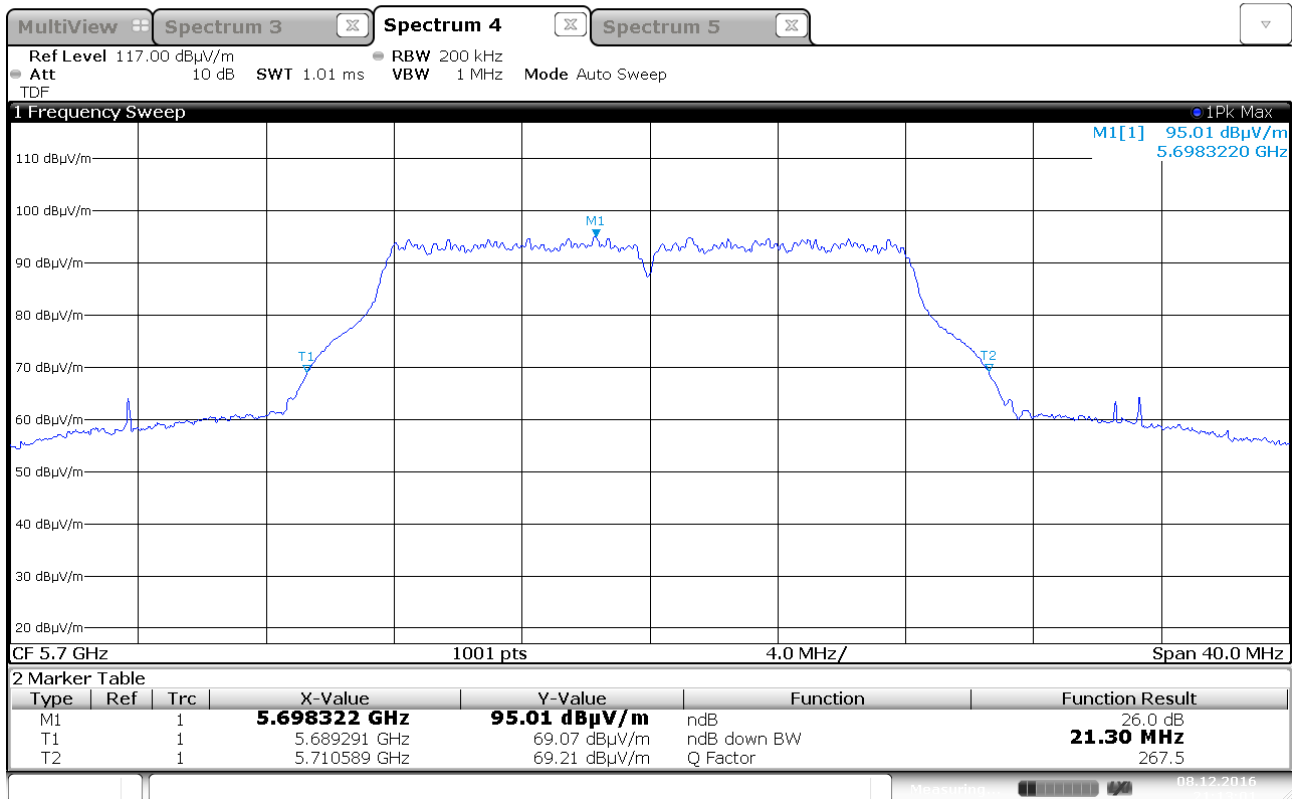
Emission Bandwidth B, 5500 MHz, 802.11a 6Mbps, Ant 0



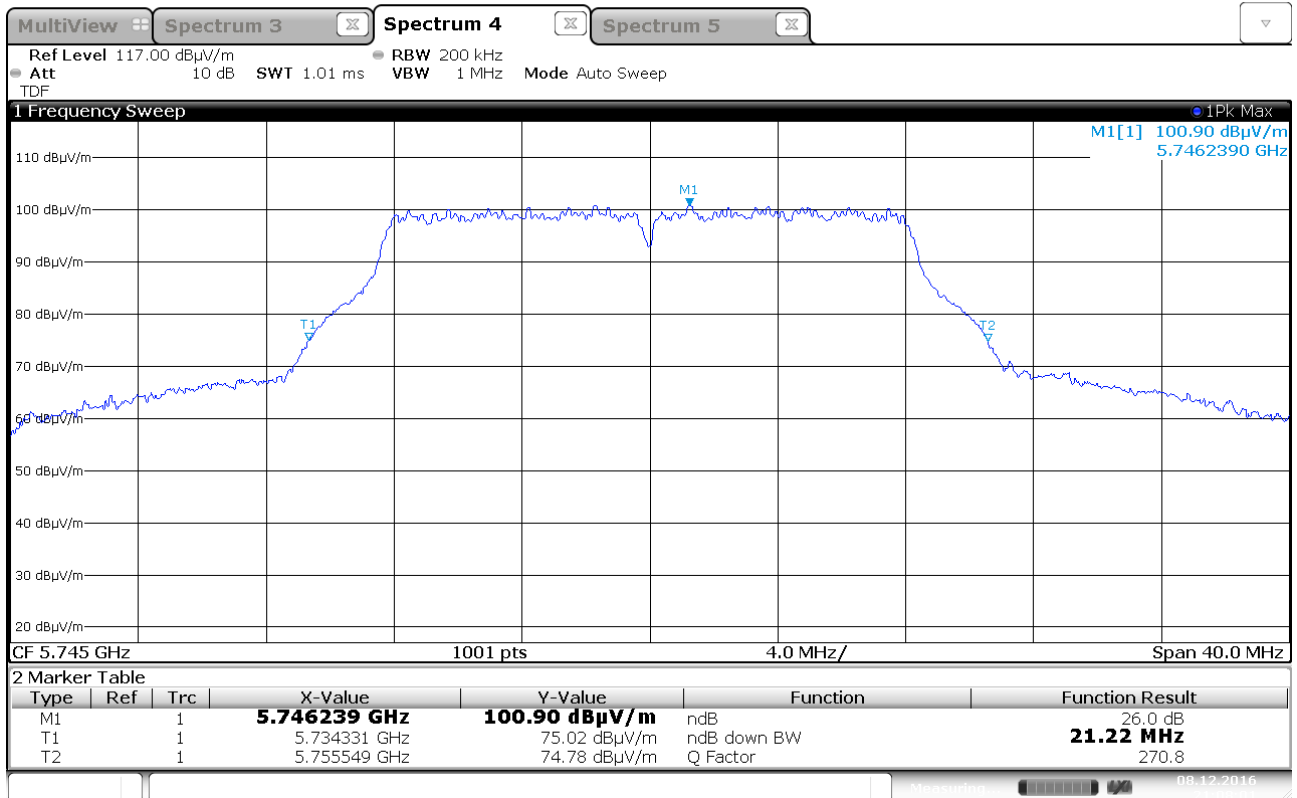
Emission Bandwidth B, 5500 MHz, 802.11a 6Mbps, Ant 1



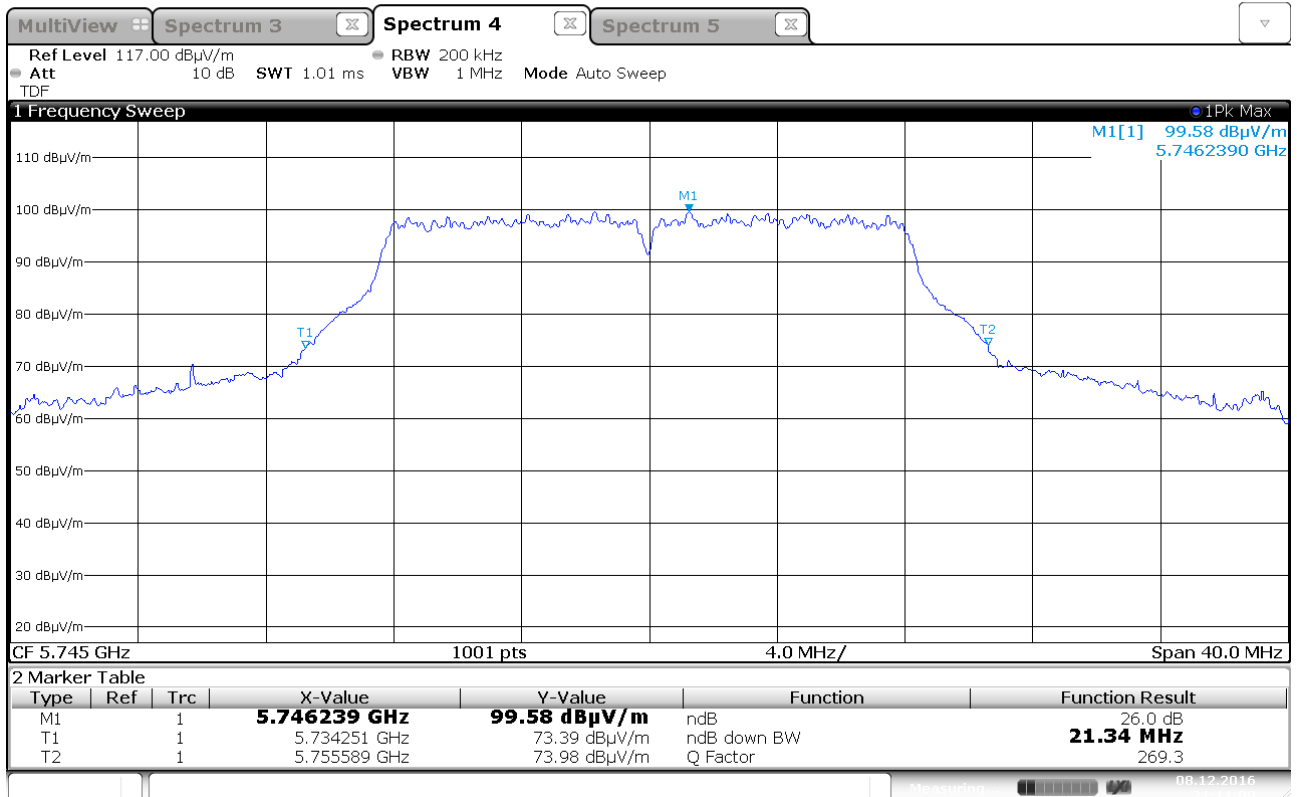
Emission Bandwidth B, 5700 MHz, 802.11a 6Mbps, Ant 0



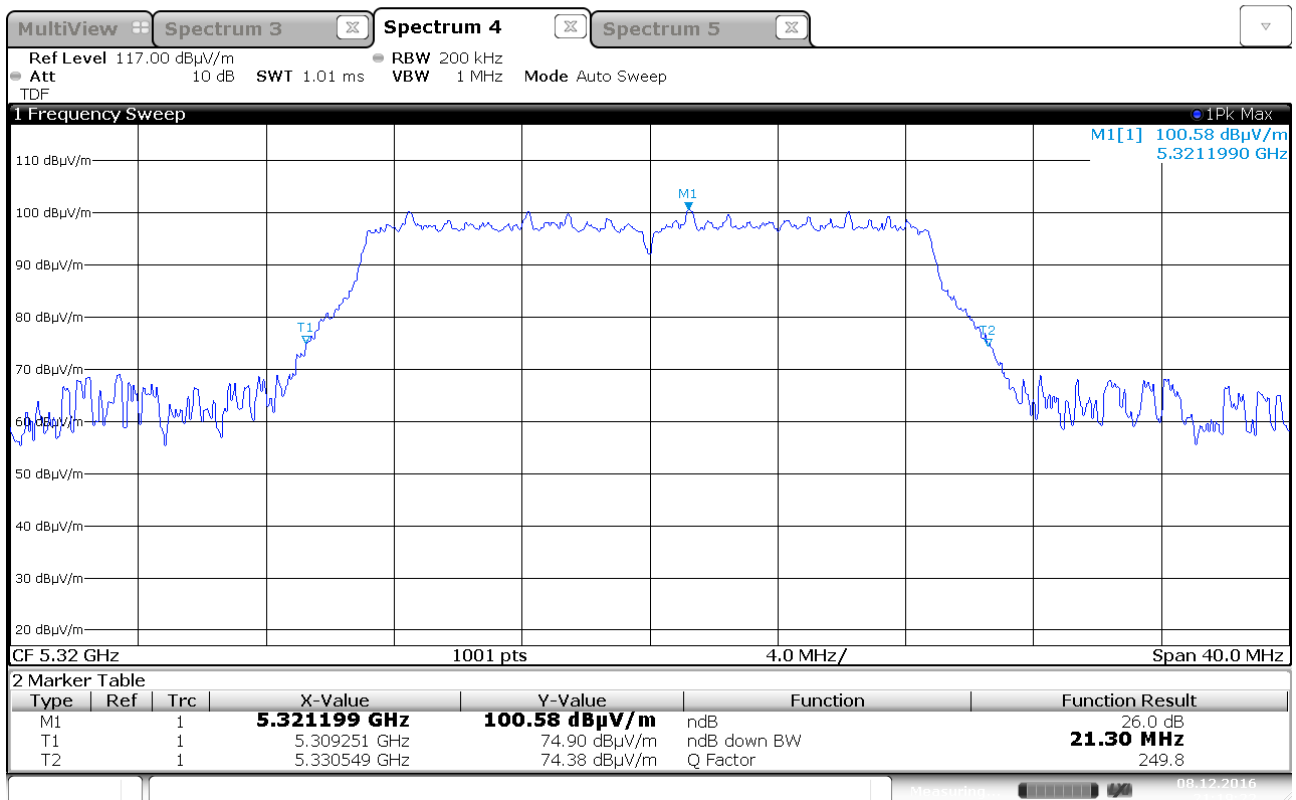
Emission Bandwidth B, 5700 MHz, 802.11a 6Mbps, Ant 1



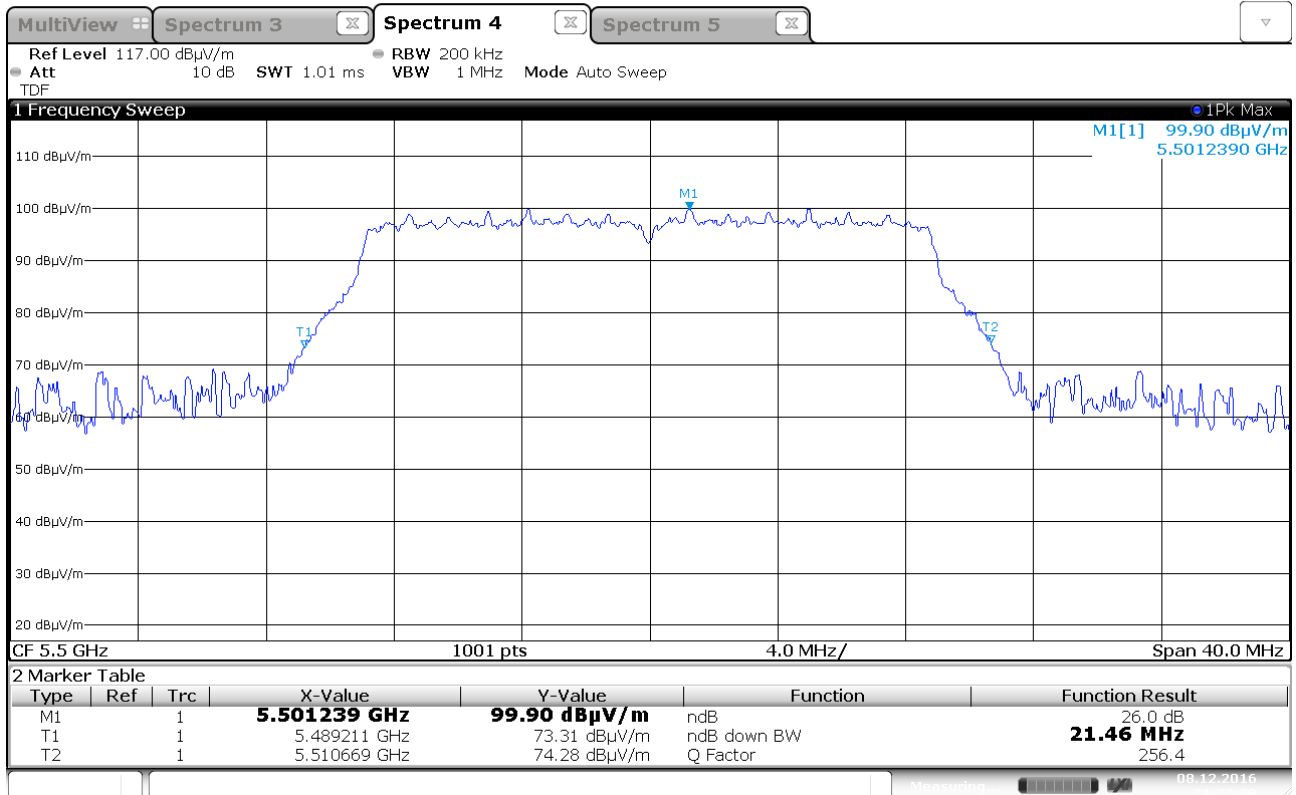
Emission Bandwidth B, 5745 MHz, 802.11a 6Mbps, Ant 0



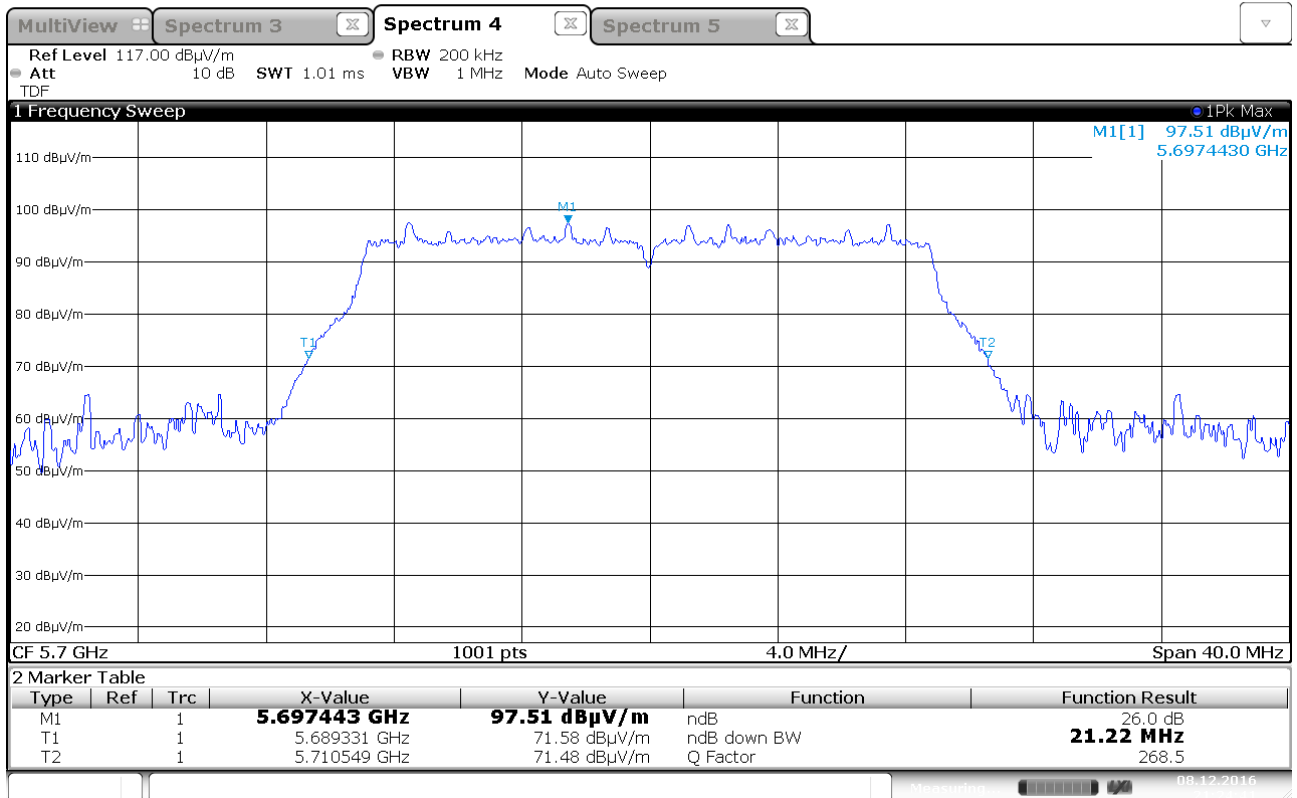
Emission Bandwidth B, 5745 MHz, 802.11a 6Mbps, Ant 1



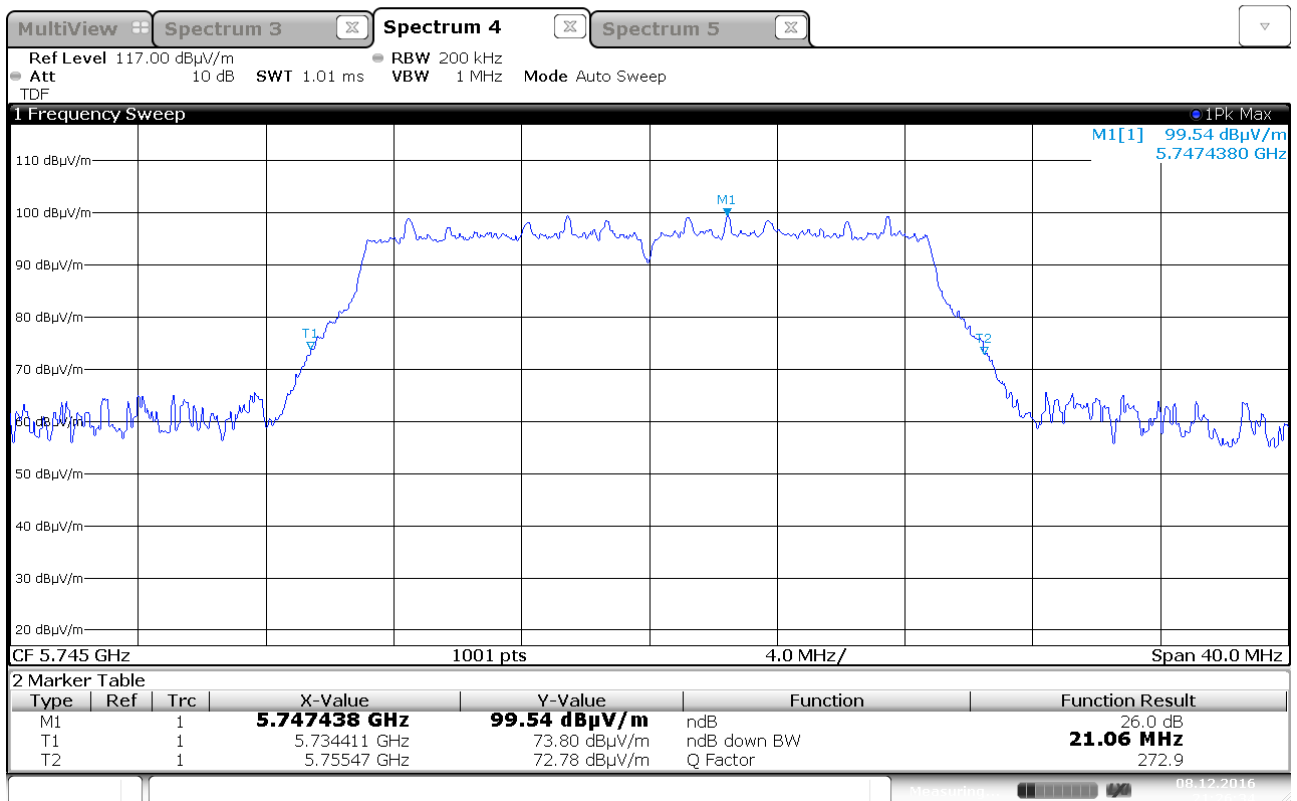
Emission Bandwidth B, 5320 MHz, 802.11n HT20, MIMO



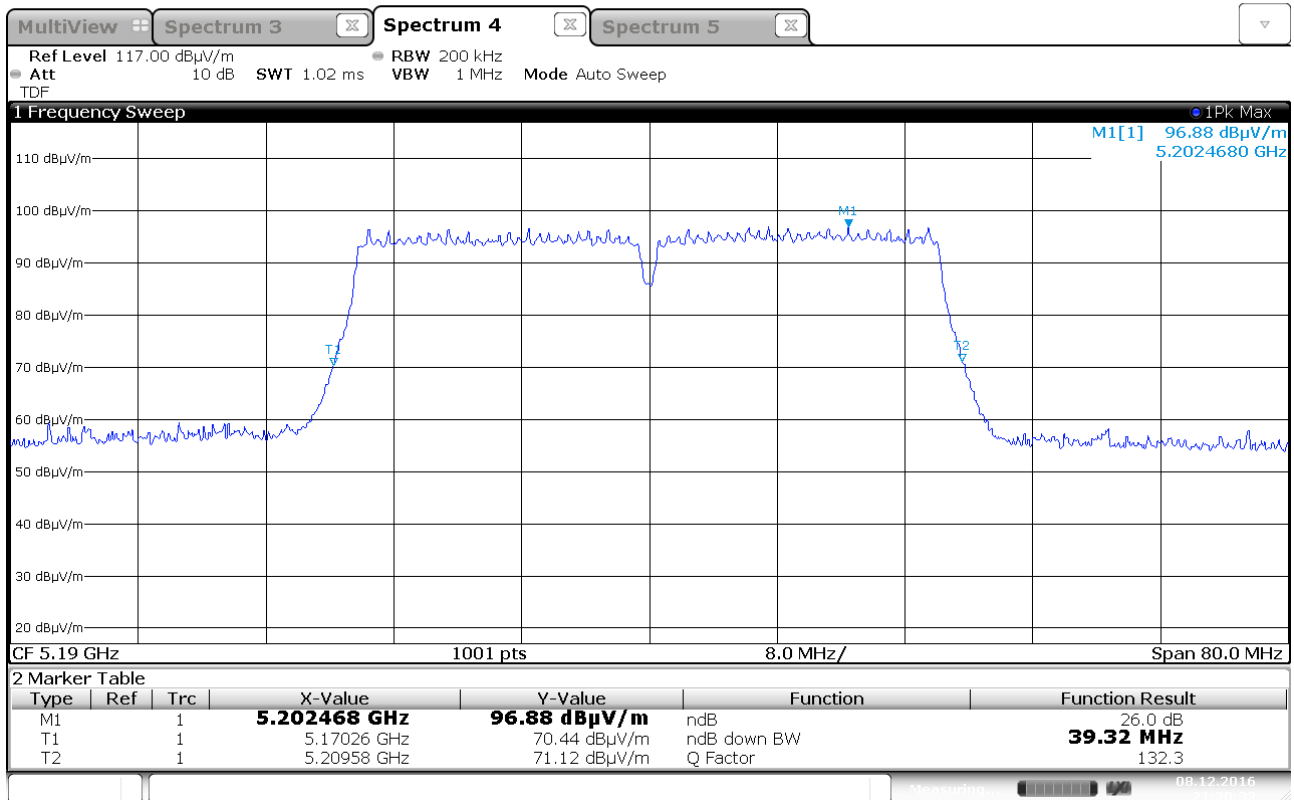
Emission Bandwidth B, 5500 MHz, 802.11n HT20, MIMO



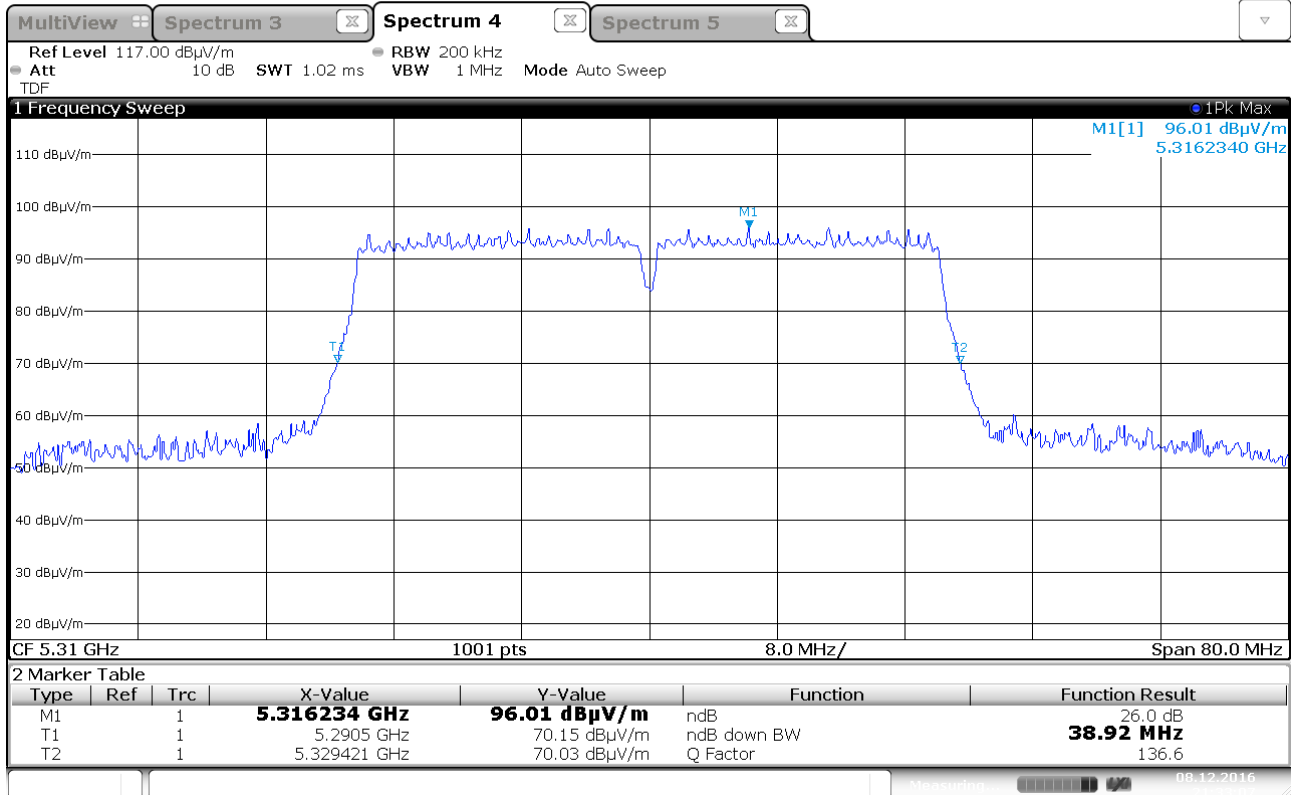
Emission Bandwidth B, 5700 MHz, 802.11n HT20, MIMO



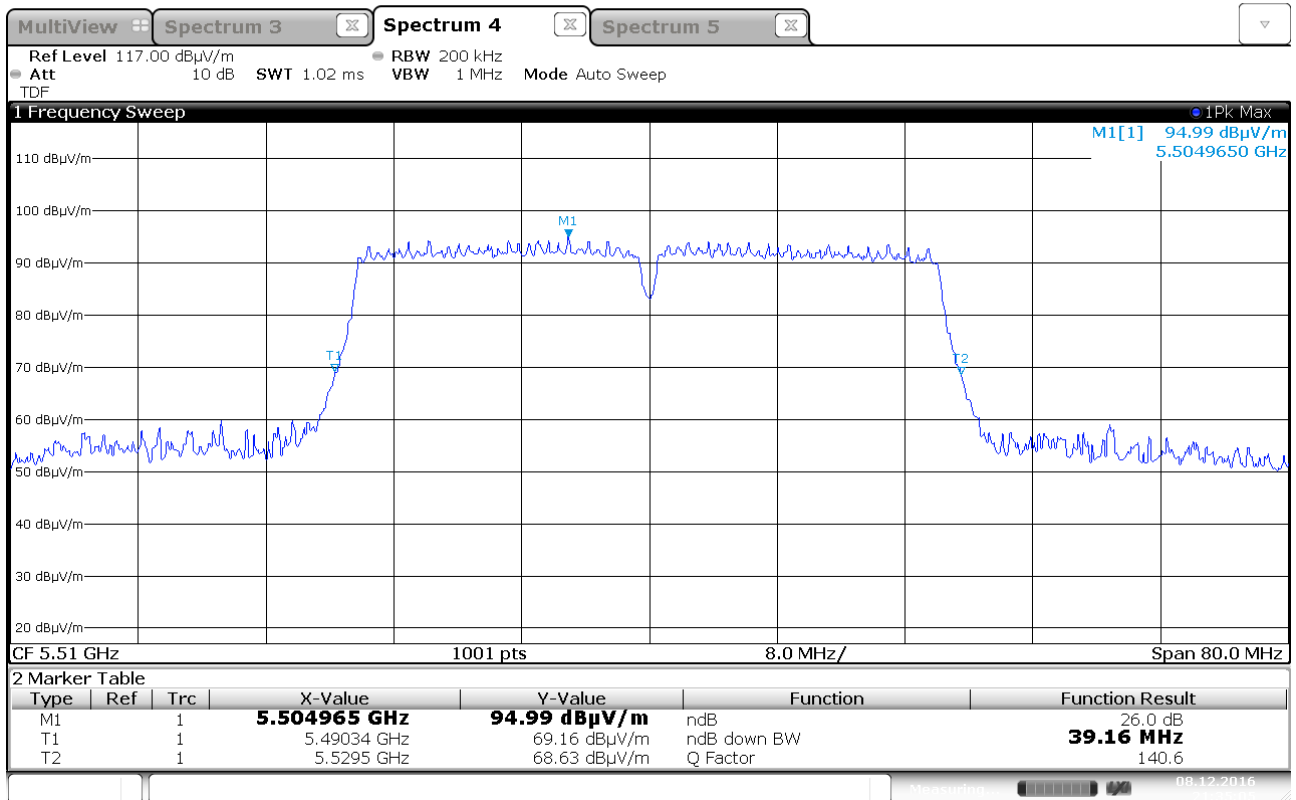
Emission Bandwidth B, 5745 MHz, 802.11n HT20, MIMO



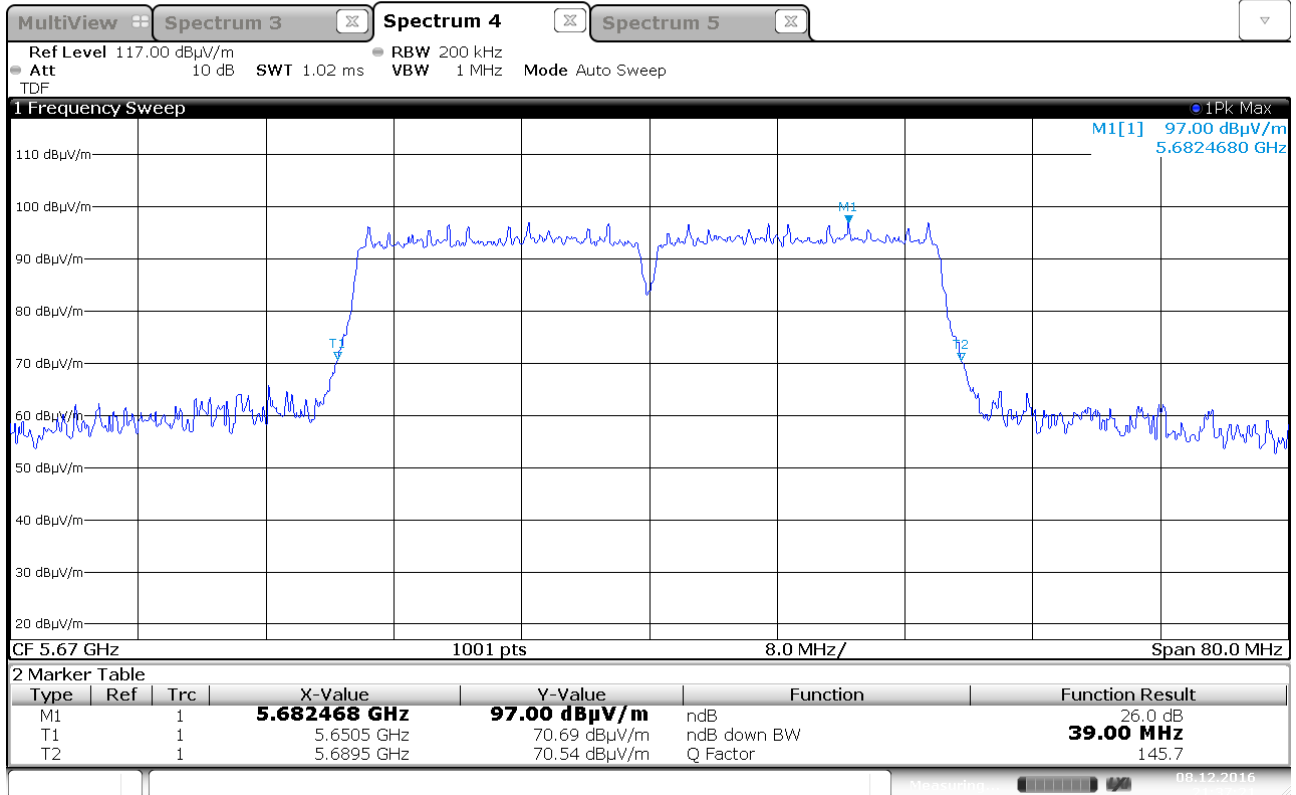
Emission Bandwidth B, 5190 MHz, 802.11n HT40, MIMO



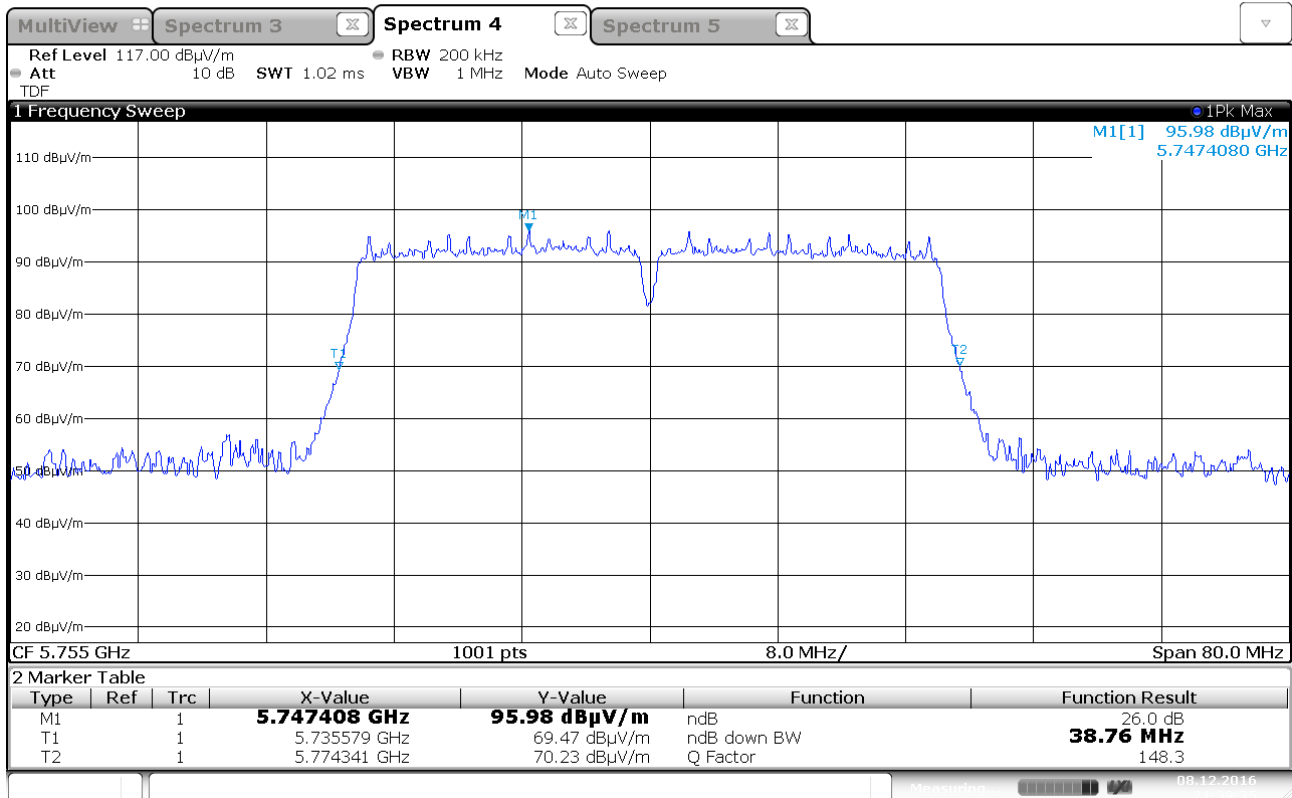
Emission Bandwidth B, 5310 MHz, 802.11n HT40, MIMO



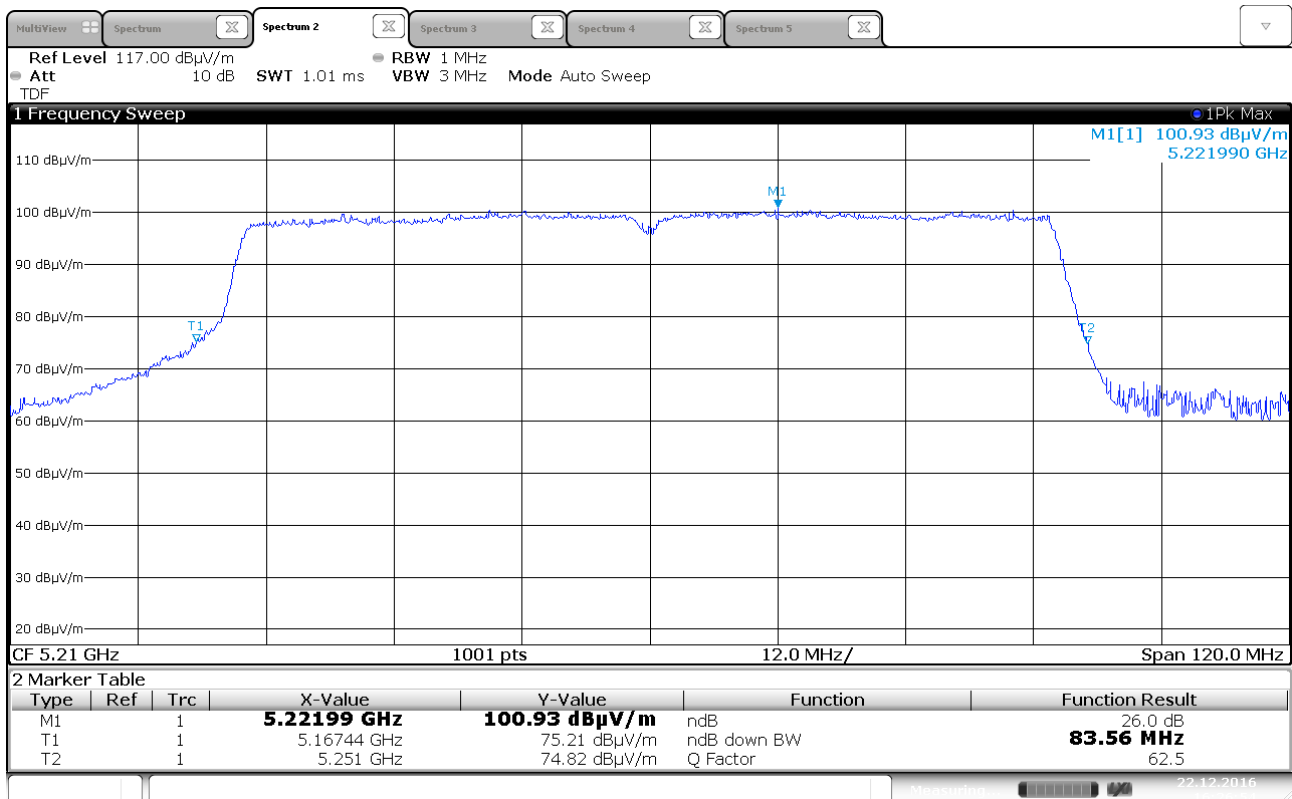
Emission Bandwidth B, 5510 MHz, 802.11n HT40, MIMO



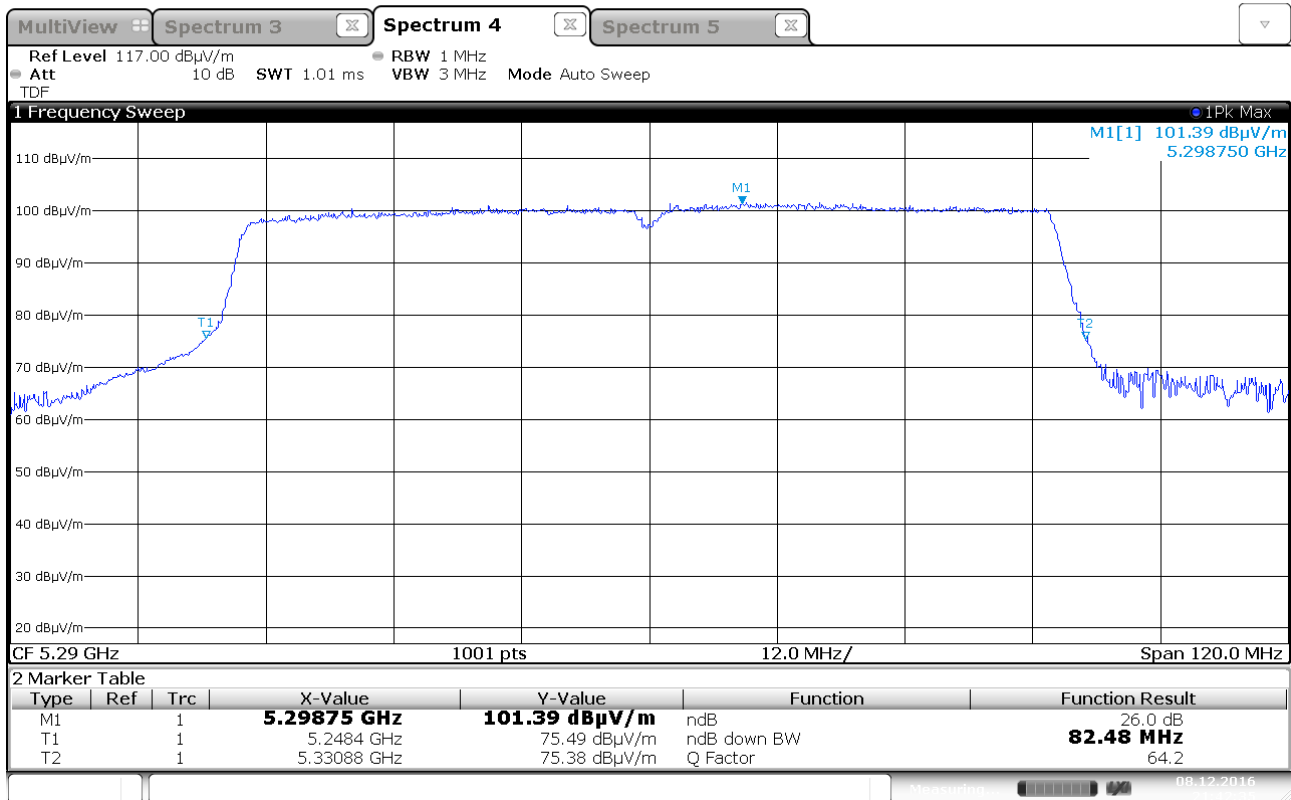
Emission Bandwidth B, 5670 MHz, 802.11n HT40, MIMO



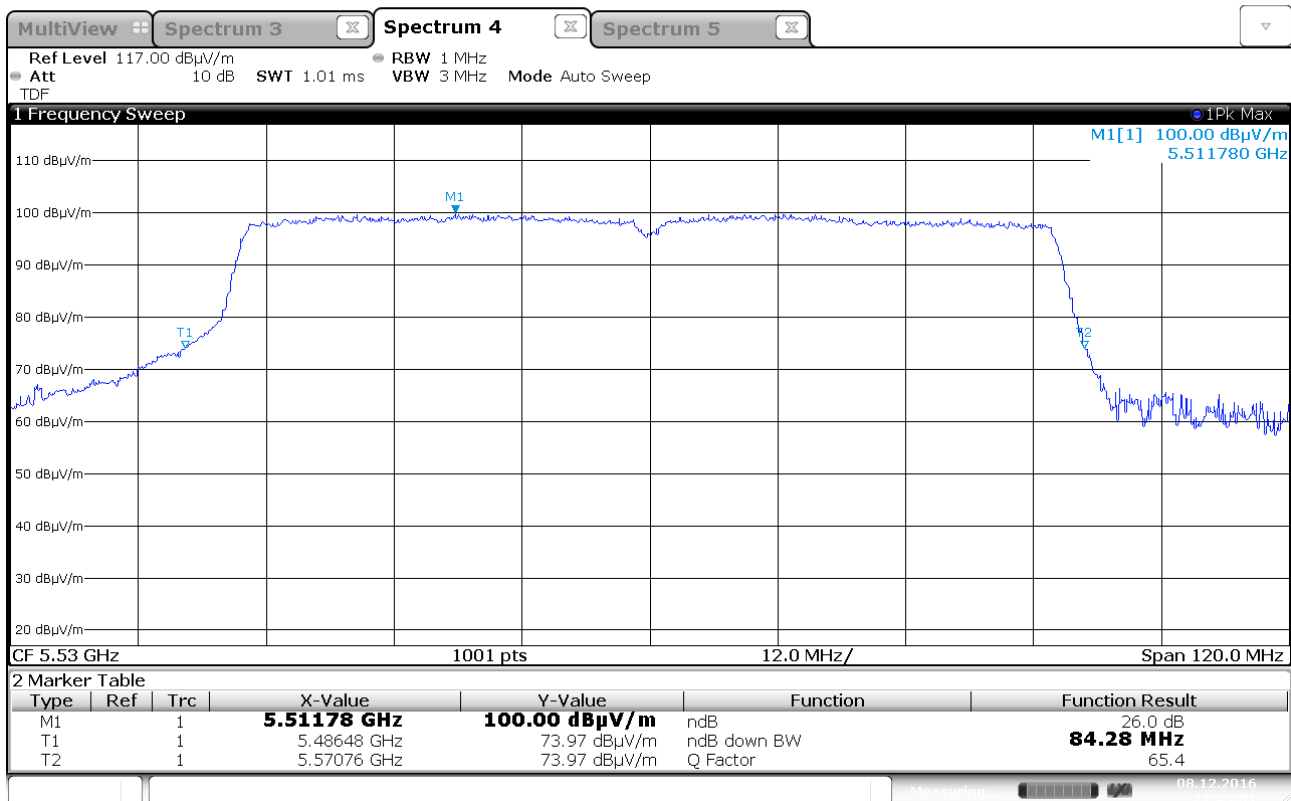
Emission Bandwidth B, 5755 MHz, 802.11n HT40, MIMO



Emission Bandwidth B, 5210 MHz, 802.11n HT80, MIMO



Emission Bandwidth B, 5290 MHz, 802.11n HT80, MIMO



Emission Bandwidth B, 5530 MHz, 802.11n HT80, MIMO

### 3.4 Peak Power Spectral Density, EIRP

FCC 15.407(a)

ISED RSS-247, Issue 1, Clause 6.2

Test Results: Complies

Measurement Data:

| Ch. No. | Nominal Frequency (MHz) | PPSD EIRP (dBm/MHz) |              |              |              |
|---------|-------------------------|---------------------|--------------|--------------|--------------|
|         |                         | 802.11a             | 802.11n HT20 | 802.11n HT40 | 802.11n HT80 |
| 36      | 5180                    | 2.8                 | 1.4          |              |              |
| 40      | 5200                    | 3.6                 | 2.2          |              |              |
| 48      | 5240                    | 4.2                 | 1.8          |              |              |
| 52      | 5260                    | 5.7                 | 8.8          |              |              |
| 60      | 5300                    | 5.4                 | 8.6          |              |              |
| 64      | 5320                    | <b>3.7</b>          | <b>2.7</b>   |              |              |
| 100     | 5500                    | <b>3.8</b>          | <b>2.9</b>   |              |              |
| 116     | 5580                    | 7.5                 | 8.6          |              |              |
| 140     | 5700                    | <b>-1.6</b>         | <b>-1.3</b>  |              |              |
| 149     | 5745                    | <b>4.3</b>          | <b>0.7</b>   |              |              |
| 157     | 5785                    | 9.8*                | 11.3*        |              |              |
| 165     | 5825                    | 10.7*               | 12.4*        |              |              |
| 38      | 5190                    |                     |              | <b>0.0</b>   |              |
| 46      | 5230                    |                     |              | 2.2          |              |
| 54      | 5270                    |                     |              | 5.7          |              |
| 62      | 5310                    |                     |              | <b>-1.4</b>  |              |
| 102     | 5510                    |                     |              | <b>-2.2</b>  |              |
| 110     | 5550                    |                     |              | 6.6          |              |
| 134     | 5670                    |                     |              | <b>-1.3</b>  |              |
| 151     | 5755                    |                     |              | <b>-3.0</b>  |              |
| 159     | 5795                    |                     |              | 9.5*         |              |
| 42      | 5210                    |                     |              |              | <b>-4.1</b>  |
| 58      | 5290                    |                     |              |              | <b>-2.9</b>  |
| 106     | 5530                    |                     |              |              | <b>-4.6</b>  |
| 155     | 5775                    |                     |              |              | 4.2*         |

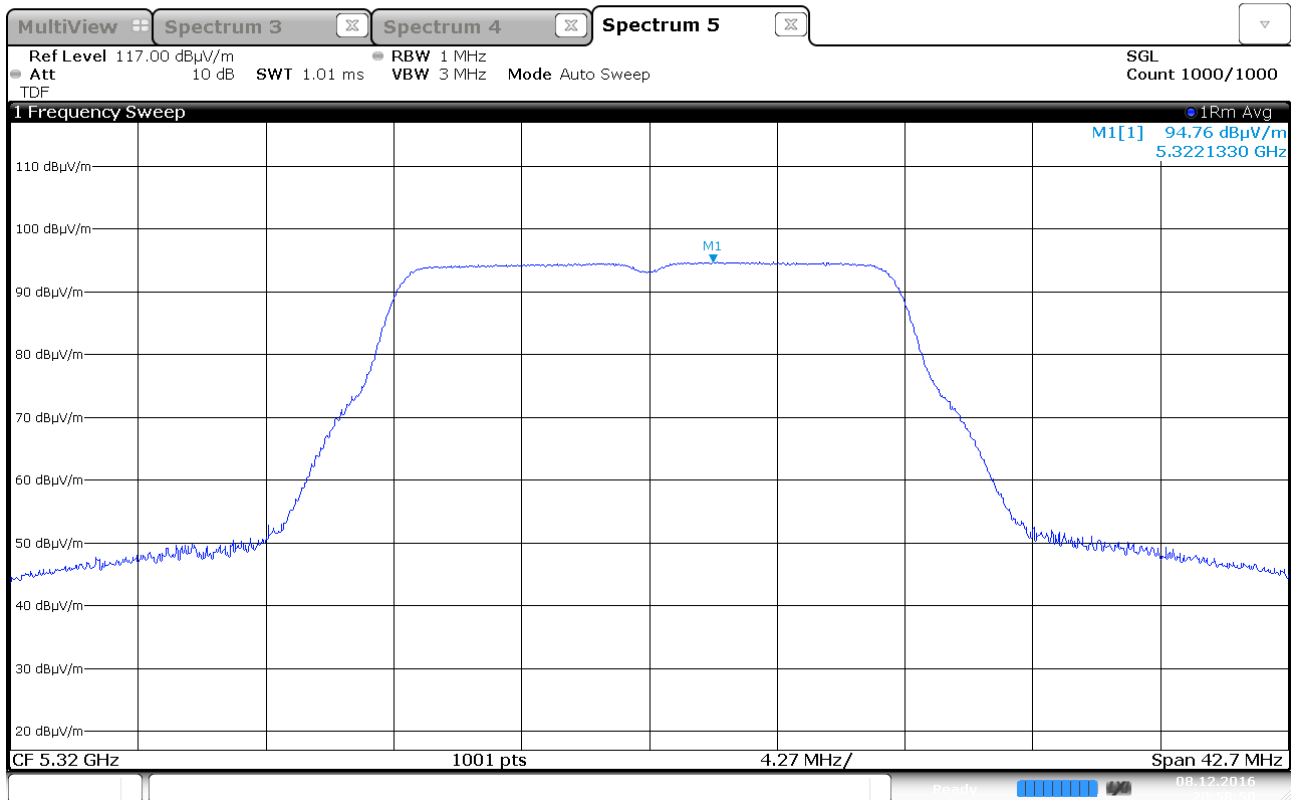
\* Values are dBm/500kHz

Values in boldface are measured values, all other values are calculated from values in UL report no. 15U21878-E4V2, and corrected for antenna gain.

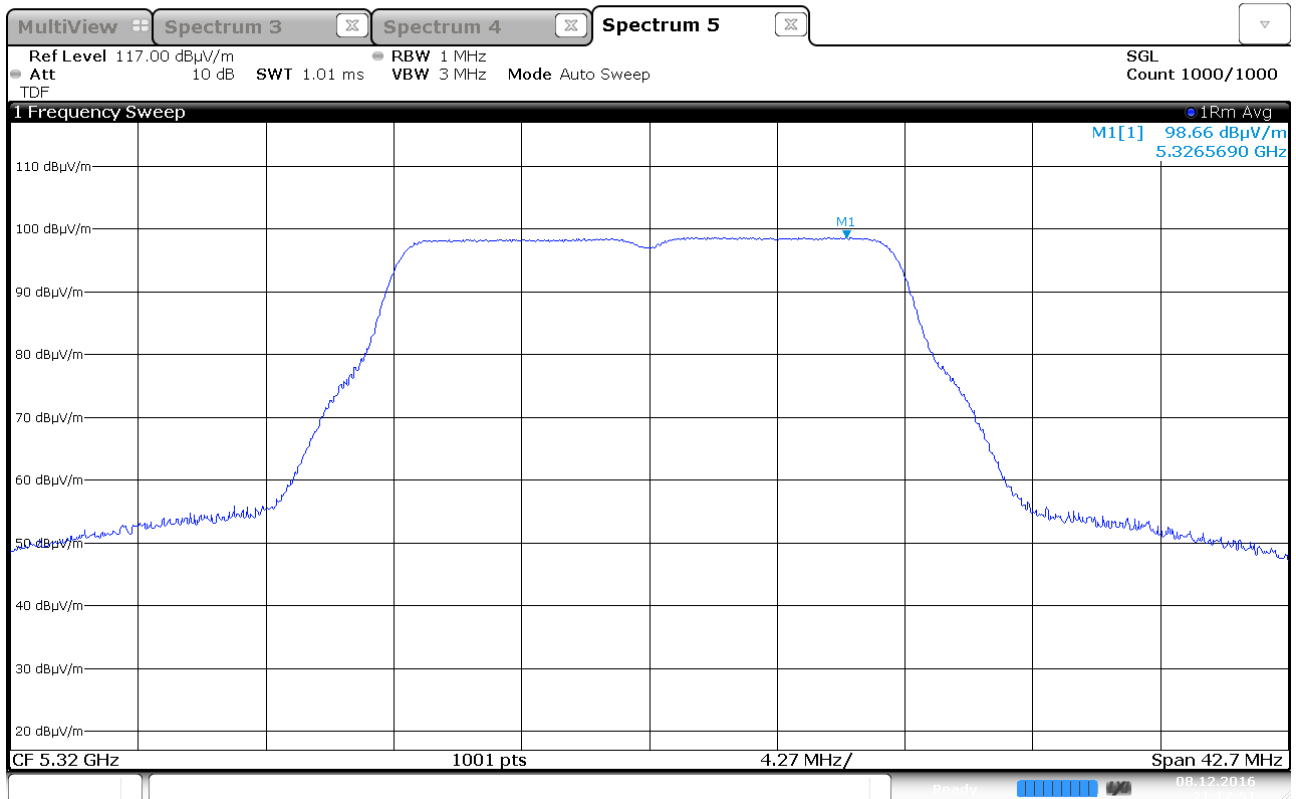
**Power Spectral Density limits:**

| Frequency Band  | Max Conducted Power Spectral Density                                          |                                                                                    |
|-----------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                 | FCC 15.407(a)                                                                 | RSS-247, Issue 1                                                                   |
| 5150 – 5250 MHz | 17 dBm/MHz for master device<br>11 dBm/MHz for mobile/ portable client device | 10 dBm/MHz (only indoor allowed)                                                   |
| 5250 – 5350 MHz | 11 dBm/MHz                                                                    | The lesser of 30 dBm/MHz or<br>$17 + 10\log_{10}B$ dBm/MHz<br>(B is 99% BW in MHz) |
| 5470 – 5725 MHz | 11 dBm/MHz                                                                    | The lesser of 30 dBm/MHz or<br>$17 + 10\log_{10}B$ dBm/MHz<br>(B is 99% BW in MHz) |
| 5725 – 5825 MHz | 30 dBm/500kHz                                                                 | 30 dBm/500kHz                                                                      |

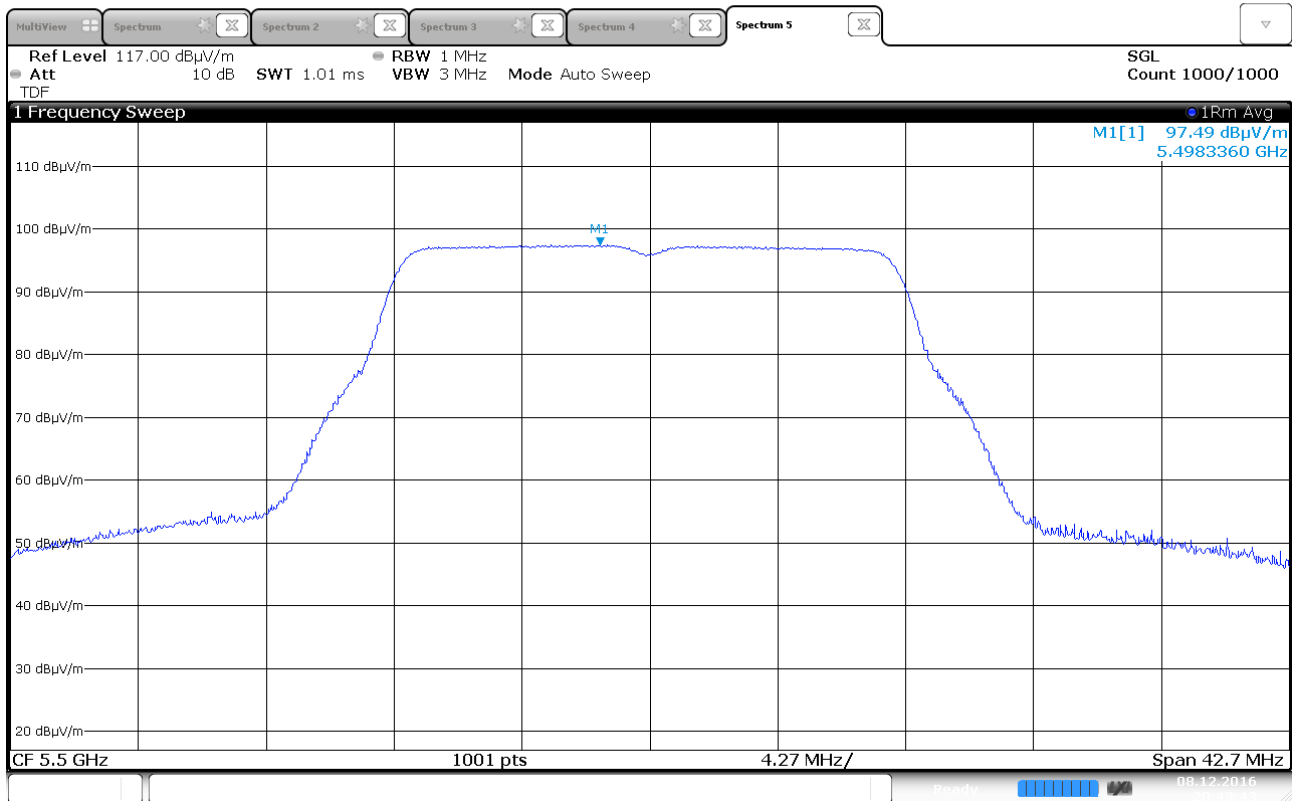
If transmitting antennas of directional gain greater than 6 dBi are used, the power spectral density from the intentional radiator shall be reduced below the stated value above by the amount in dB that the directional gain of the antenna exceeds 6 dBi.



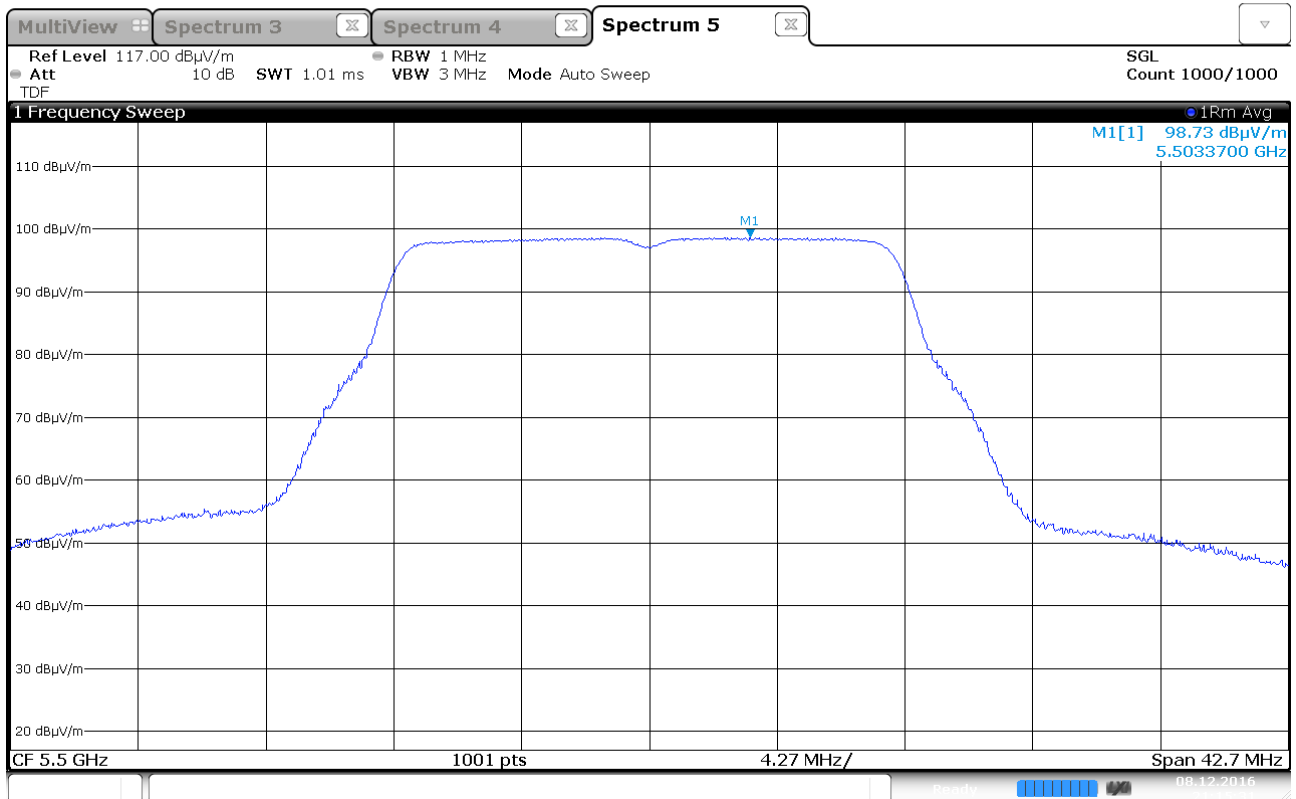
Power Spectral Density, 5320 MHz, 802.11a 6Mbps, Ant 0



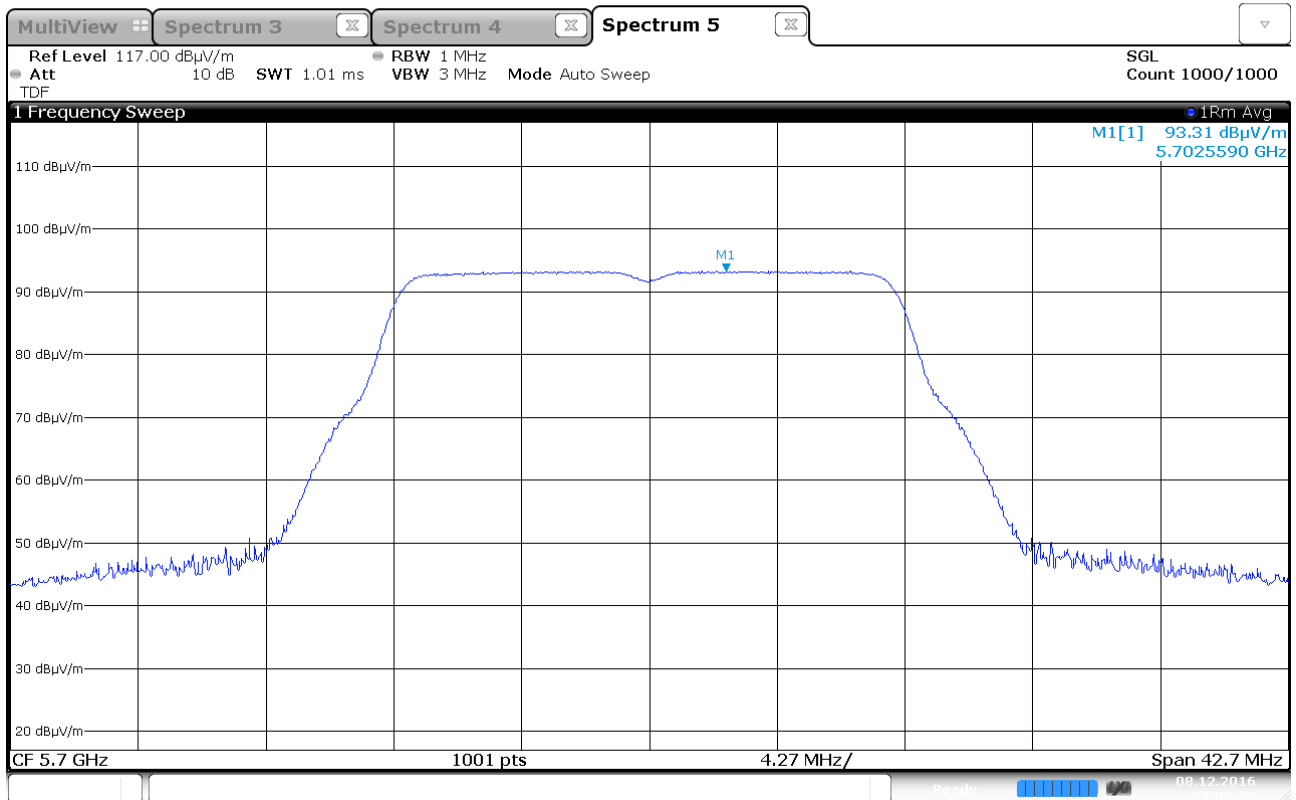
Power Spectral Density, 5320 MHz, 802.11a 6Mbps, Ant 1



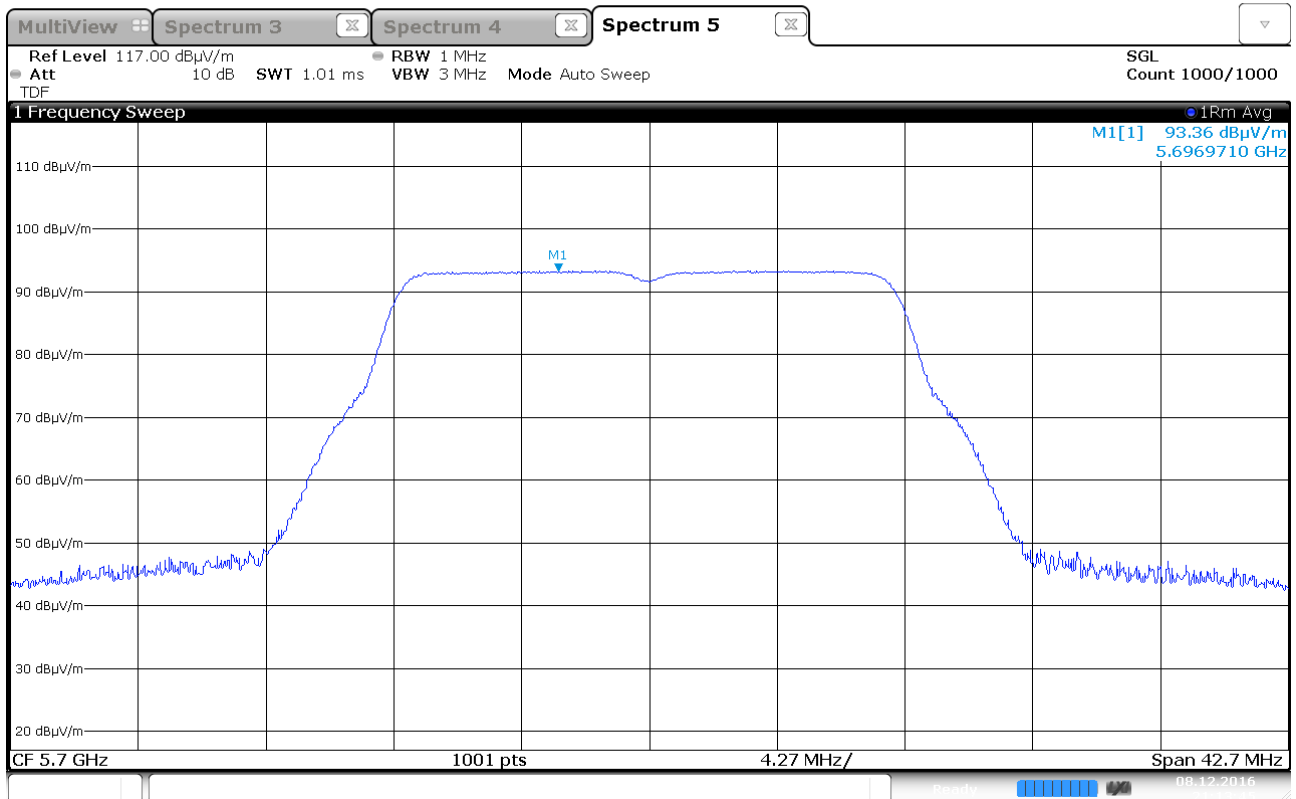
Power Spectral Density, 5500 MHz, 802.11a 6Mbps, Ant 0



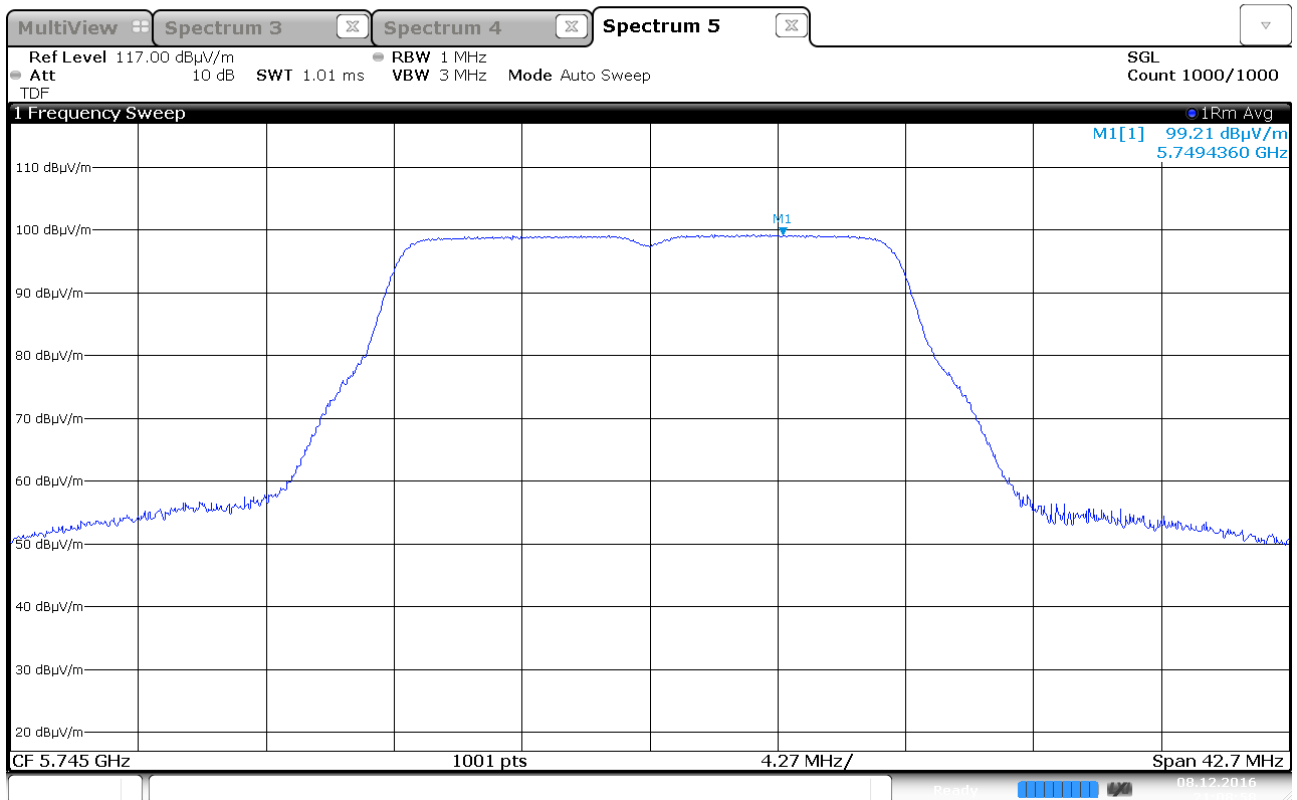
Power Spectral Density, 5500 MHz, 802.11a 6Mbps, Ant 1



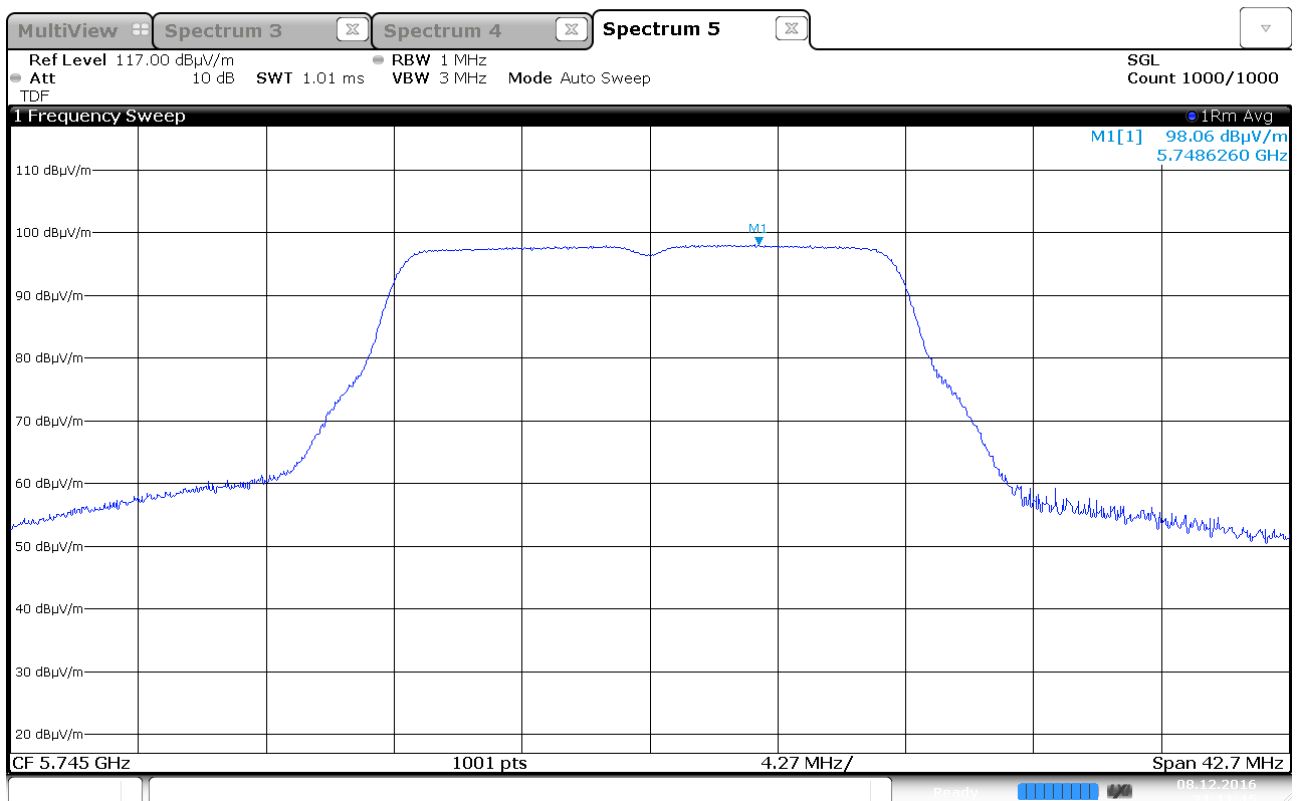
Power Spectral Density, 5700 MHz, 802.11a 6Mbps, Ant 0



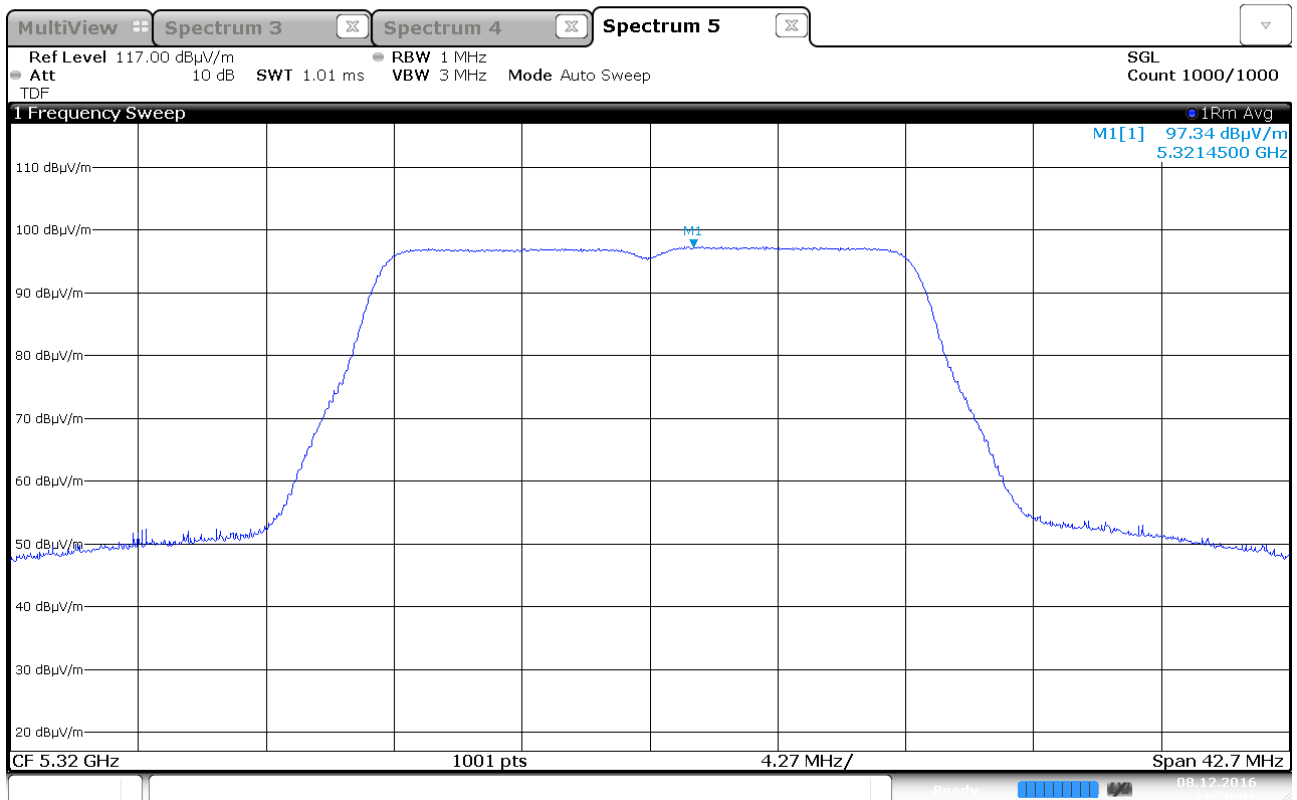
Power Spectral Density, 5700 MHz, 802.11a 6Mbps, Ant 1



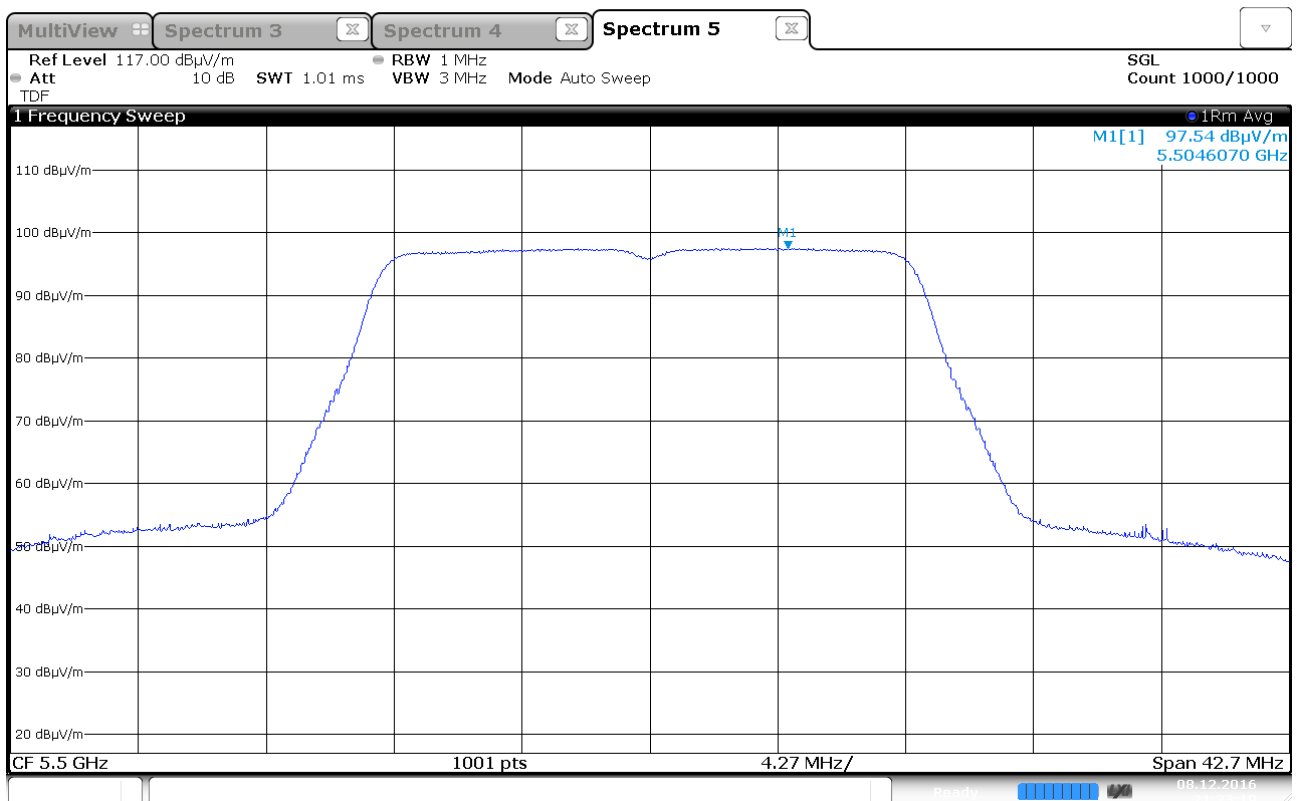
**Power Spectral Density, 5745 MHz, 802.11a 6Mbps, Ant 0**



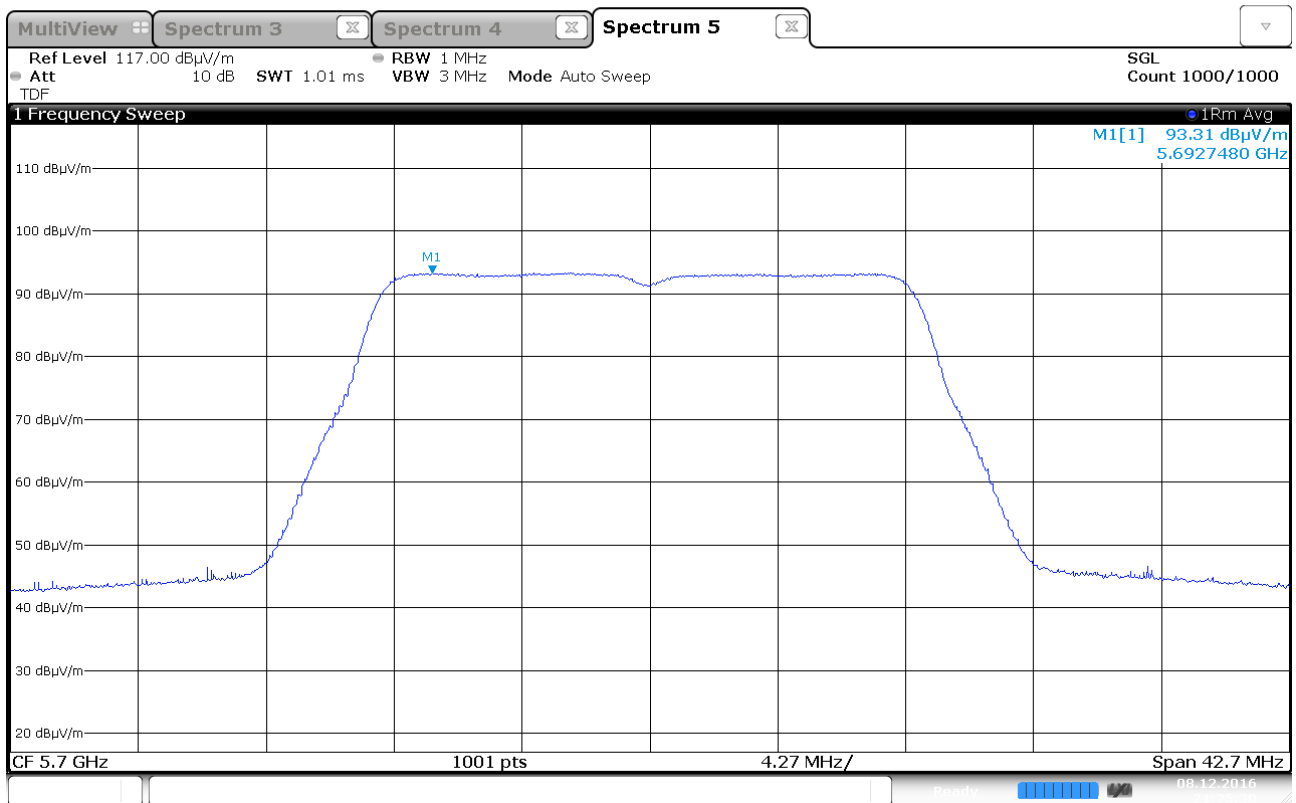
**Power Spectral Density, 5745 MHz, 802.11a 6Mbps, Ant 1**



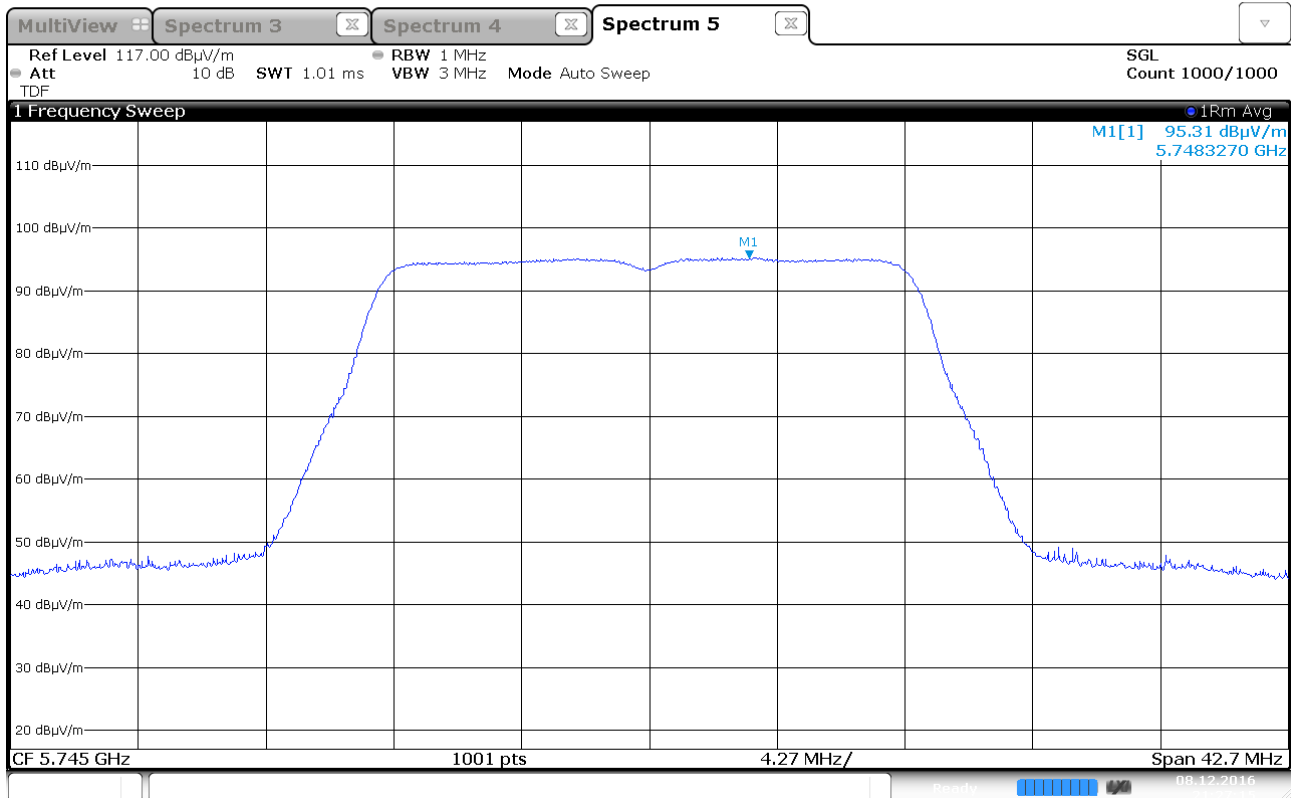
Power Spectral Density, 5320 MHz, 802.11n HT20, MIMO



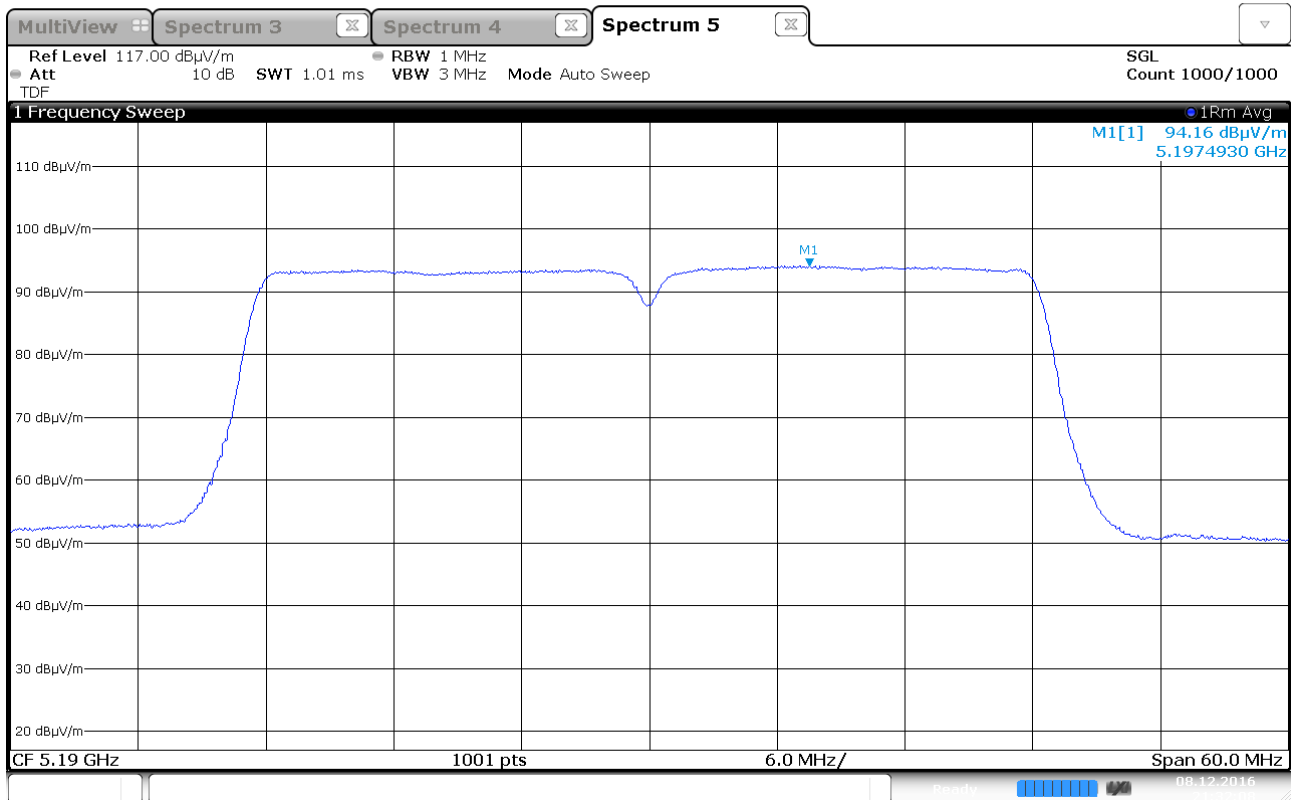
Power Spectral Density, 5500 MHz, 802.11n HT20, MIMO



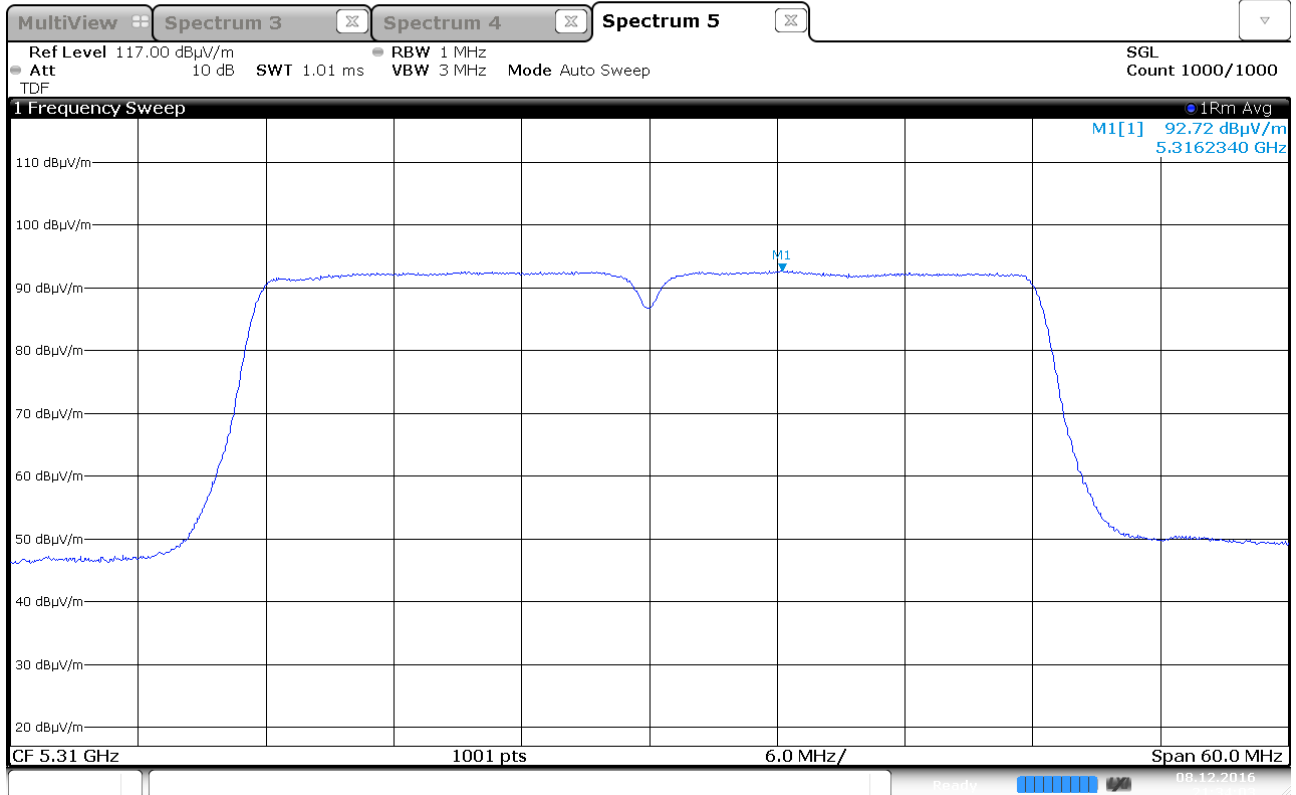
Power Spectral Density, 5700 MHz, 802.11n HT20, MIMO



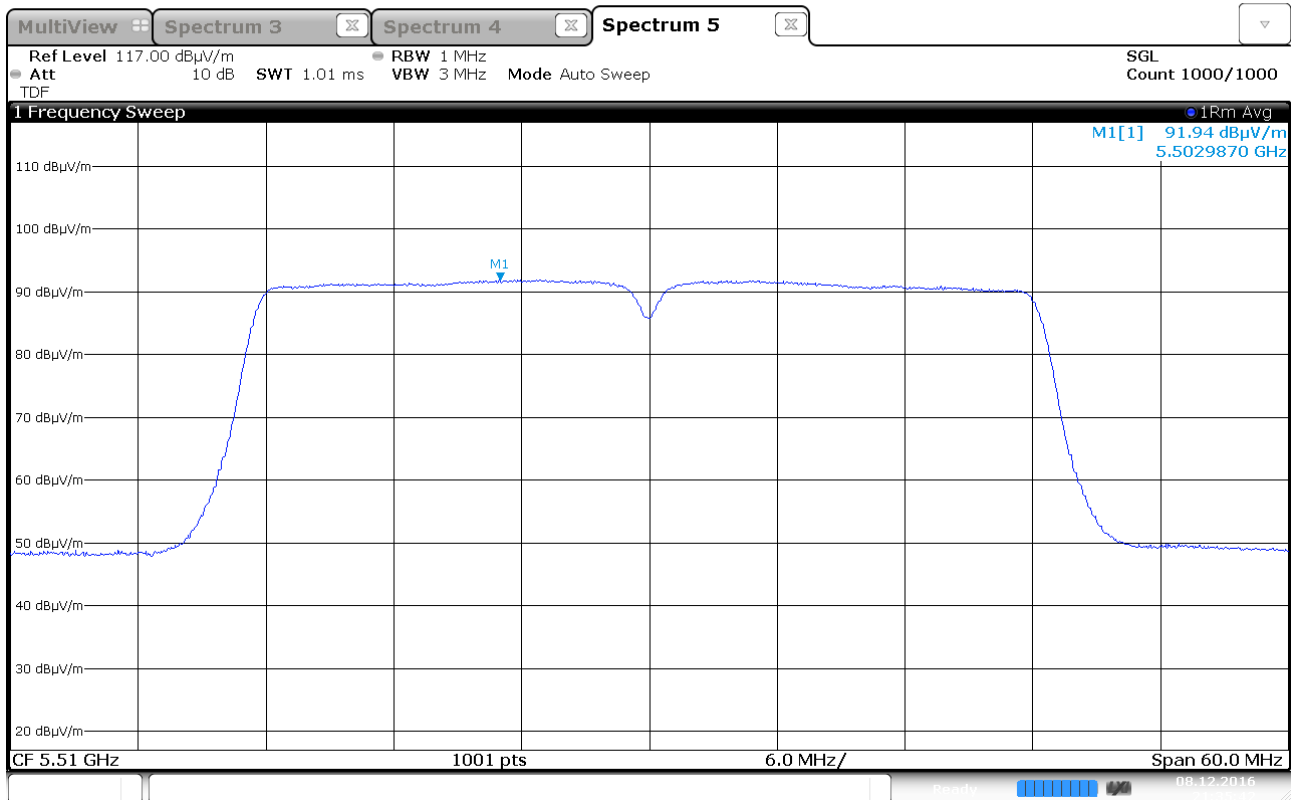
Power Spectral Density, 5745 MHz, 802.11n HT20, MIMO



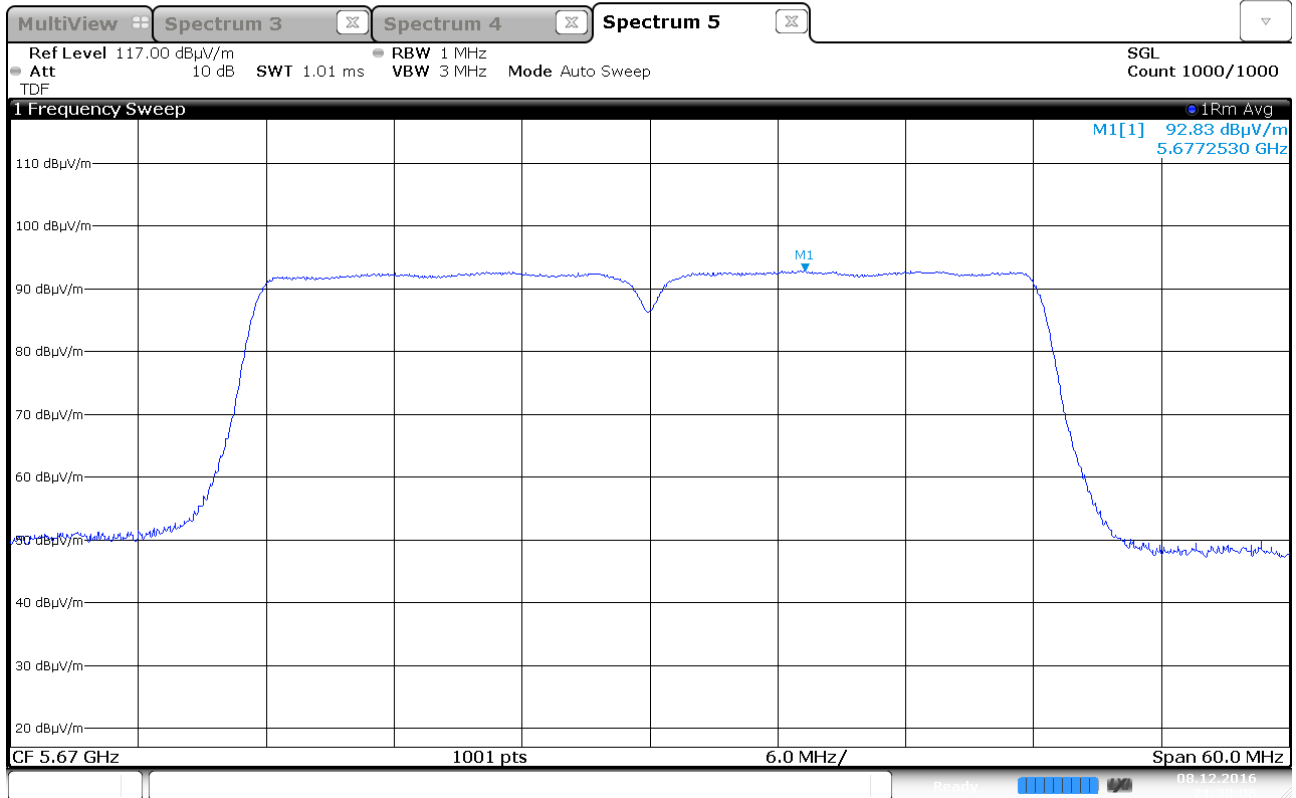
Power Spectral Density, 5190 MHz, 802.11n HT40, MIMO



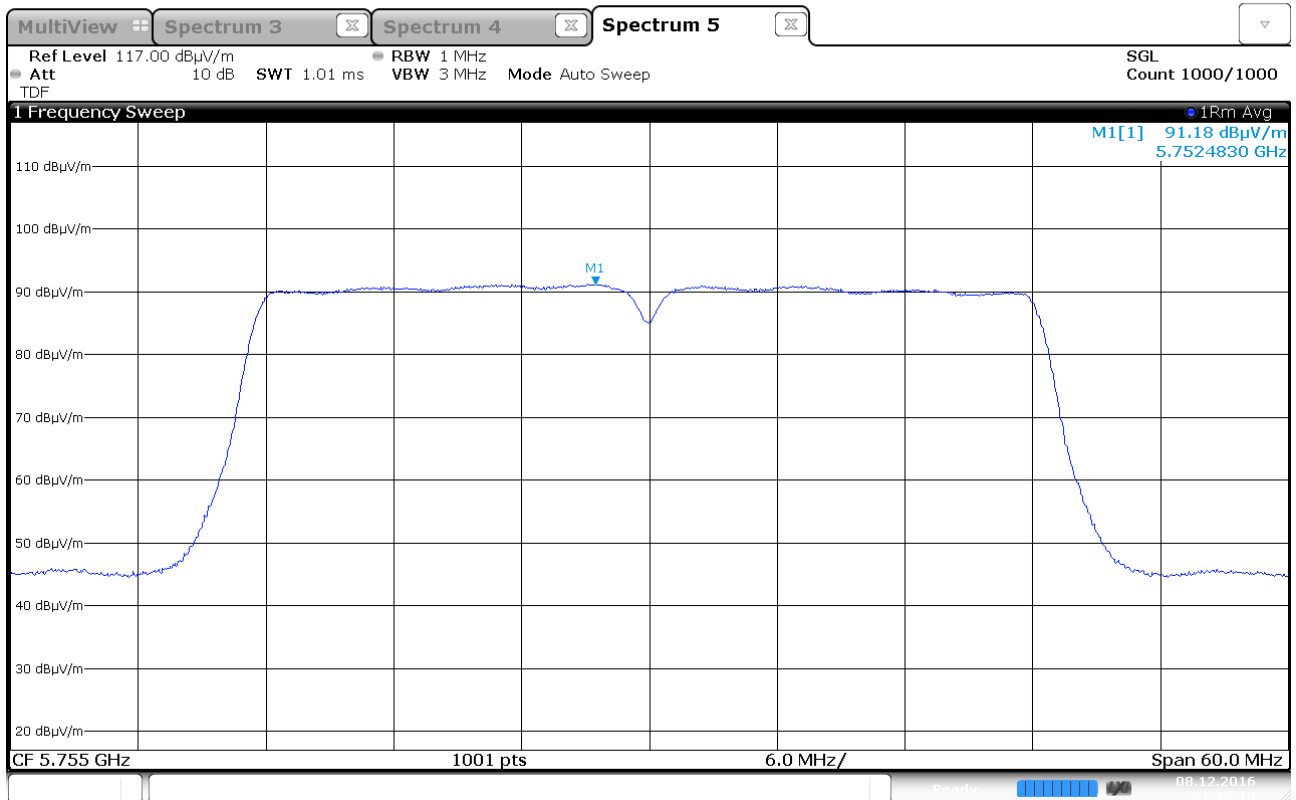
Power Spectral Density, 5310 MHz, 802.11n HT40, MIMO



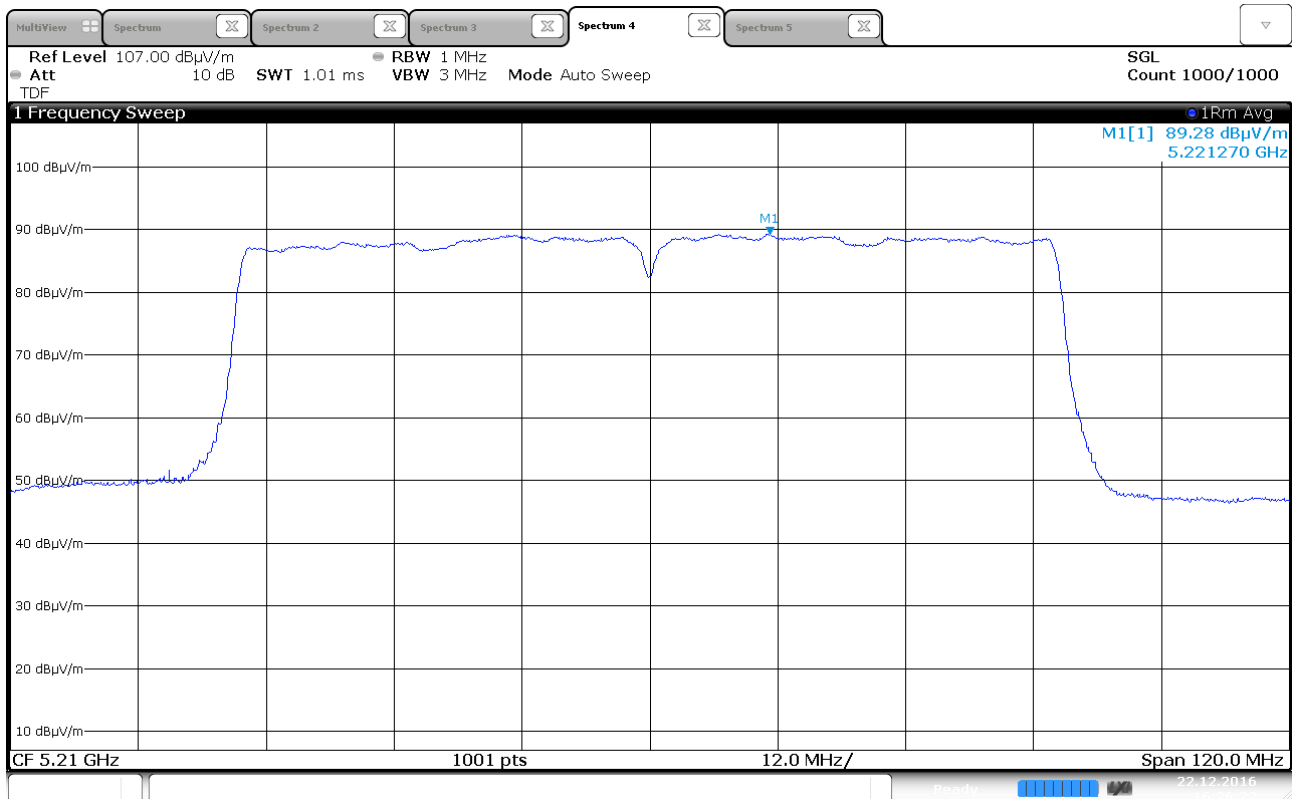
Power Spectral Density, 5510 MHz, 802.11n HT40, MIMO



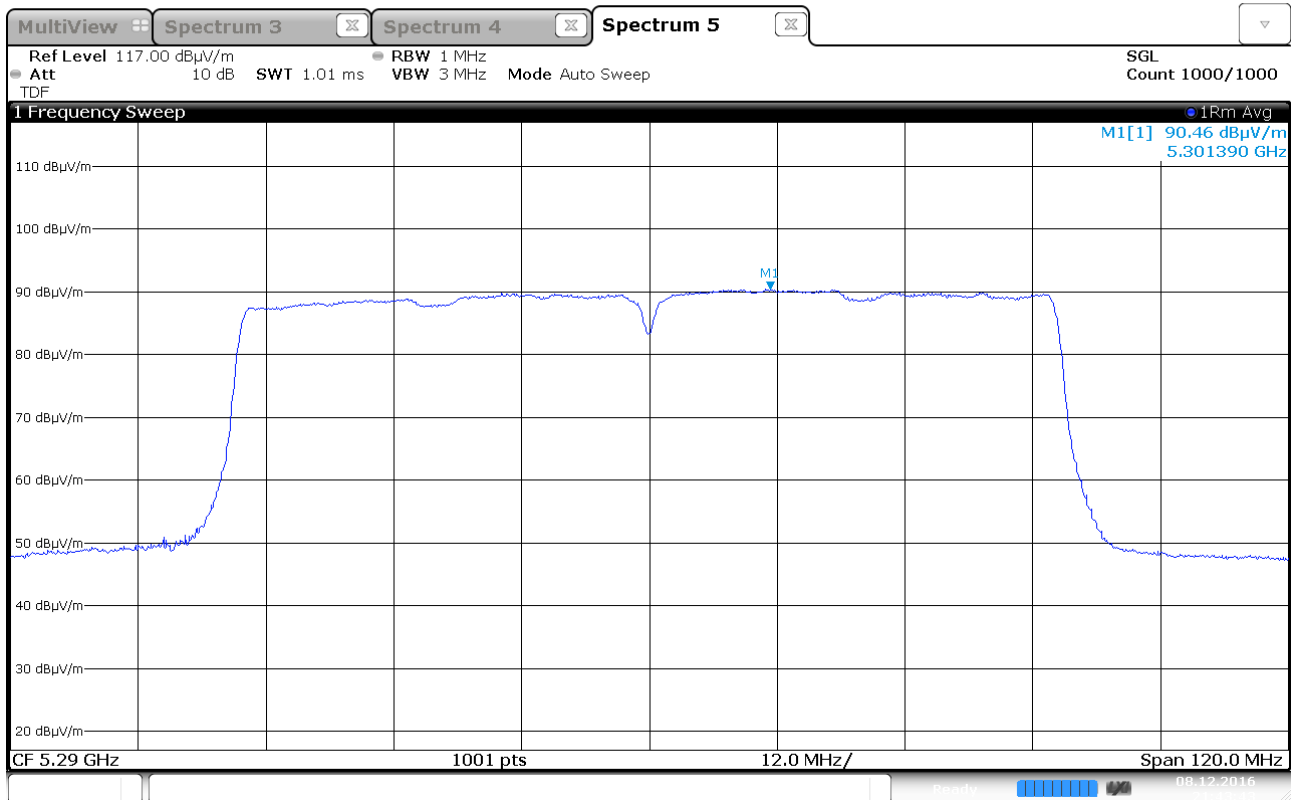
Power Spectral Density, 5670 MHz, 802.11n HT40, MIMO



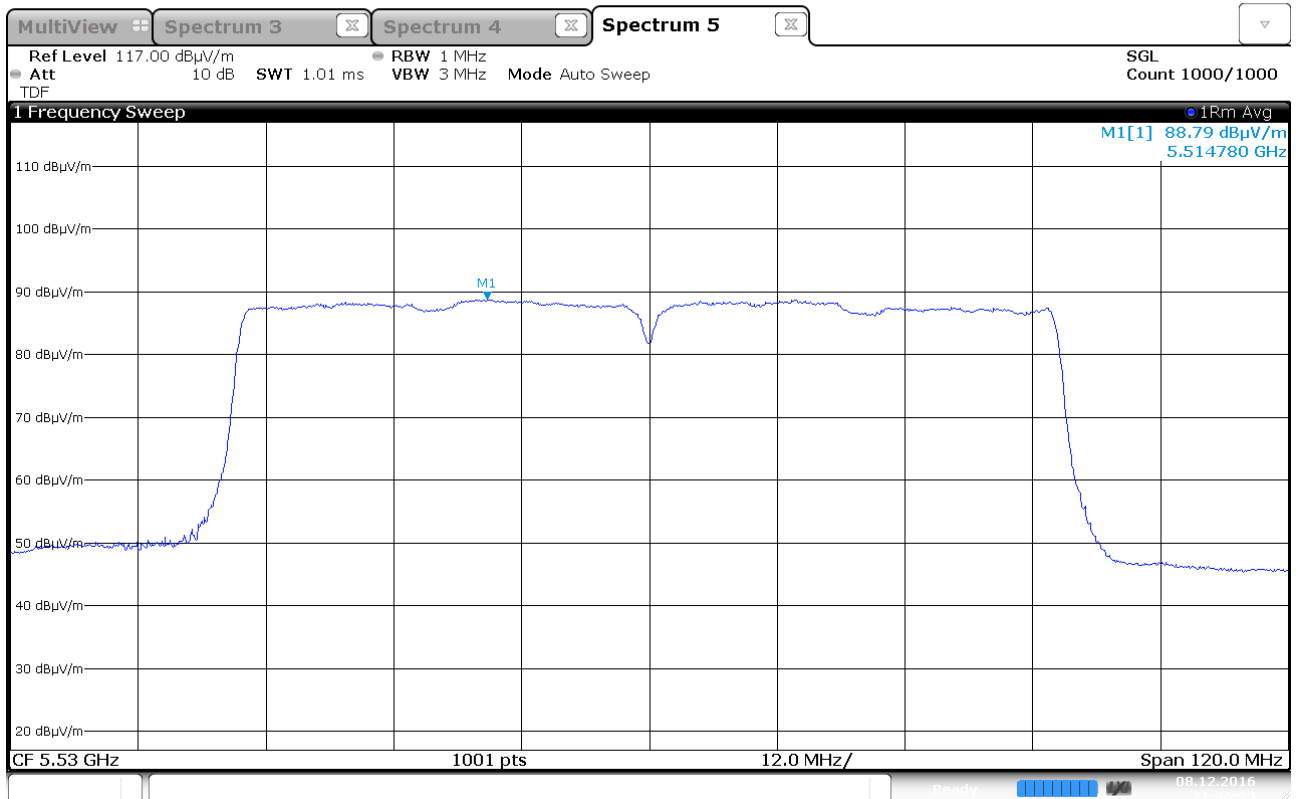
Power Spectral Density, 5755 MHz, 802.11n HT40, MIMO



Power Spectral Density, 5210 MHz, 802.11n HT80, MIMO



Power Spectral Density, 5290 MHz, 802.11n HT80, MIMO



Power Spectral Density, 5530 MHz, 802.11n HT80, MIMO

### 3.5 Unwanted Emissions

FCC 15.407(b)

ISED RSS-247, Issue 1, clause 6.2

Test Results: Complies

Measurement Data:

| Band Edge Emissions, 5150MHz |         |                  |                                |                               |                 |          |
|------------------------------|---------|------------------|--------------------------------|-------------------------------|-----------------|----------|
| Carrier Modulation           | Ch. No. | Carrier Freq MHz | Measured value Peak dBμV/m @3m | Calculated value Peak dBm/MHz | Limit (dBm/MHz) | Verdict  |
| 802.11a, Ant 0               | 36      | 5180             | 61.9                           | -33.3                         | -27             | Complies |
| 802.11a, Ant 1               | 36      | 5180             | 65.5                           | -29.7                         | -27             | Complies |
| 802.11n, HT20, MIMO          | 36      | 5180             | 61.8                           | -33.4                         | -27             | Complies |
| 802.11n, HT40, MIMO          | 38      | 5190             | 67.2                           | -28.0                         | -27             | Complies |
| 802.11n, HT80, MIMO          | 42      | 5210             | 65.1                           | -30.1                         | -27             | Complies |

| Band Edge Emissions, 5350MHz |         |                  |                                |                               |                 |          |
|------------------------------|---------|------------------|--------------------------------|-------------------------------|-----------------|----------|
| Carrier Modulation           | Ch. No. | Carrier Freq MHz | Measured value Peak dBμV/m @3m | Calculated value Peak dBm/MHz | Limit (dBm/MHz) | Verdict  |
| 802.11a, Ant 0               | 64      | 5320             | 58.2                           | -37.0                         | -27             | Complies |
| 802.11a, Ant 1               | 64      | 5320             | 67.1                           | -28.1                         | -27             | Complies |
| 802.11n, HT20, MIMO          | 64      | 5320             | 64.1                           | -31.1                         | -27             | Complies |
| 802.11n, HT40, MIMO          | 62      | 5310             | 67.0                           | -28.2                         | -27             | Complies |
| 802.11n, HT80, MIMO          | 58      | 5290             | 66.9                           | -28.3                         | -27             | Complies |

| Band Edge Emissions, 5470MHz |         |                  |                                |                               |                 |          |
|------------------------------|---------|------------------|--------------------------------|-------------------------------|-----------------|----------|
| Carrier Modulation           | Ch. No. | Carrier Freq MHz | Measured value Peak dBμV/m @3m | Calculated value Peak dBm/MHz | Limit (dBm/MHz) | Verdict  |
| 802.11a, Ant 0               | 100     | 5500             | 57.1                           | -38.1                         | -27             | Complies |
| 802.11a, Ant 1               | 100     | 5500             | 63.3                           | -31.9                         | -27             | Complies |
| 802.11n, HT20, MIMO          | 100     | 5500             | 66.2                           | -29.0                         | -27             | Complies |
| 802.11n, HT40, MIMO          | 102     | 5510             | 67.4                           | -27.8                         | -27             | Complies |
| 802.11n, HT80, MIMO          | 106     | 5530             | 64.1                           | -31.1                         | -27             | Complies |

| Band Edge Emissions, 5725MHz |         |                  |                                |                               |                 |          |
|------------------------------|---------|------------------|--------------------------------|-------------------------------|-----------------|----------|
| Carrier Modulation           | Ch. No. | Carrier Freq MHz | Measured value Peak dBμV/m @3m | Calculated value Peak dBm/MHz | Limit (dBm/MHz) | Verdict  |
| 802.11a, Ant 0               | 140     | 5700             | 64.4                           | -30.9                         | -27             | Complies |
| 802.11a, Ant 1               | 140     | 5700             | 62.8                           | -32.4                         | -27             | Complies |
| 802.11n, HT20, MIMO          | 140     | 5700             | 66.2                           | -29.0                         | -27             | Complies |
| 802.11n, HT40, MIMO          | 134     | 5670             | 61.8                           | -33.4                         | -27             | Complies |
| 802.11n, HT80, MIMO          | 122     | 5610             | N/A                            | N/A                           | -27             | Complies |

| ISED RSS-247 Issue 1, Clause 6.2.4 (2) |         |                  |                                |                               |                 |          |
|----------------------------------------|---------|------------------|--------------------------------|-------------------------------|-----------------|----------|
| Band Edge Emissions, 5715MHz           |         |                  |                                |                               |                 |          |
| Carrier Modulation                     | Ch. No. | Carrier Freq MHz | Measured value Peak dBμV/m @3m | Calculated value Peak dBm/MHz | Limit (dBm/MHz) | Verdict  |
| 802.11a, Ant 0                         | 149     | 5745             | 65.1                           | -30.1                         | -27             | Complies |
| 802.11a, Ant 1                         | 149     | 5745             | 65.0                           | -30.2                         | -27             | Complies |
| 802.11n, HT20, MIMO                    | 149     | 5745             | 63.8                           | -31.4                         | -27             | Complies |
| 802.11n, HT40, MIMO                    | 151     | 5755             | 63.1                           | -32.1                         | -27             | Complies |
| 802.11n, HT80, MIMO                    | 155     | 5775             | 67.7                           | -27.5                         | -27             | Complies |
| Band Edge Emissions, 5725MHz           |         |                  |                                |                               |                 |          |
| Carrier Modulation                     | Ch. No. | Carrier Freq MHz | Measured value Peak dBμV/m @3m | Calculated value Peak dBm/MHz | Limit (dBm/MHz) | Verdict  |
| 802.11a, Ant 0                         | 149     | 5745             | 74.9                           | -20.3                         | -17             | Complies |
| 802.11a, Ant 1                         | 149     | 5745             | 76.7                           | -18.6                         | -17             | Complies |
| 802.11n, HT20, MIMO                    | 149     | 5745             | 71.8                           | -23.5                         | -17             | Complies |
| 802.11n, HT40, MIMO                    | 151     | 5755             | 66.4                           | -28.8                         | -17             | Complies |
| 802.11n, HT80, MIMO                    | 155     | 5775             | 67.9                           | -27.3                         | -17             | Complies |

| ISED RSS-247 Issue 1, Clause 6.2.4 (2) |         |                  |                                |                               |                 |          |
|----------------------------------------|---------|------------------|--------------------------------|-------------------------------|-----------------|----------|
| Band Edge Emissions, 5850MHz           |         |                  |                                |                               |                 |          |
| Carrier Modulation                     | Ch. No. | Carrier Freq MHz | Measured value Peak dBμV/m @3m | Calculated value Peak dBm/MHz | Limit (dBm/MHz) | Verdict  |
| 802.11a, Ant 0                         | 165     | 5825             | 69.6                           | -25.6                         | -17             | Complies |
| 802.11a, Ant 1                         | 165     | 5825             | 72.3                           | -22.9                         | -17             | Complies |
| 802.11n, HT20, MIMO                    | 165     | 5825             | 71.4                           | -23.8                         | -17             | Complies |
| 802.11n, HT40, MIMO                    | 159     | 5795             | 65.2                           | -30.0                         | -17             | Complies |
| 802.11n, HT80, MIMO                    | 155     | 5775             | 62.1                           | -33.1                         | -17             | Complies |
| Band Edge Emissions, 5860MHz           |         |                  |                                |                               |                 |          |
| Carrier Modulation                     | Ch. No. | Carrier Freq MHz | Measured value Peak dBμV/m @3m | Calculated value Peak dBm/MHz | Limit (dBm/MHz) | Verdict  |
| 802.11a, Ant 0                         | 165     | 5825             | 62.7                           | -32.6                         | -27             | Complies |
| 802.11a, Ant 1                         | 165     | 5825             | 65.1                           | -30.2                         | -27             | Complies |
| 802.11n, HT20, MIMO                    | 165     | 5825             | 65.7                           | -29.5                         | -27             | Complies |
| 802.11n, HT40, MIMO                    | 159     | 5795             | 63.9                           | -31.3                         | -27             | Complies |
| 802.11n, HT80, MIMO                    | 155     | 5775             | 61.2                           | -34.1                         | -27             | Complies |

See plots.

The measurement was performed in a 3m fully anechoic chamber. The EUT was first rotated in 3 planes to find the maximum position.

The tested equipment is for indoor use only, no band-edge requirements apply at 5250 MHz.

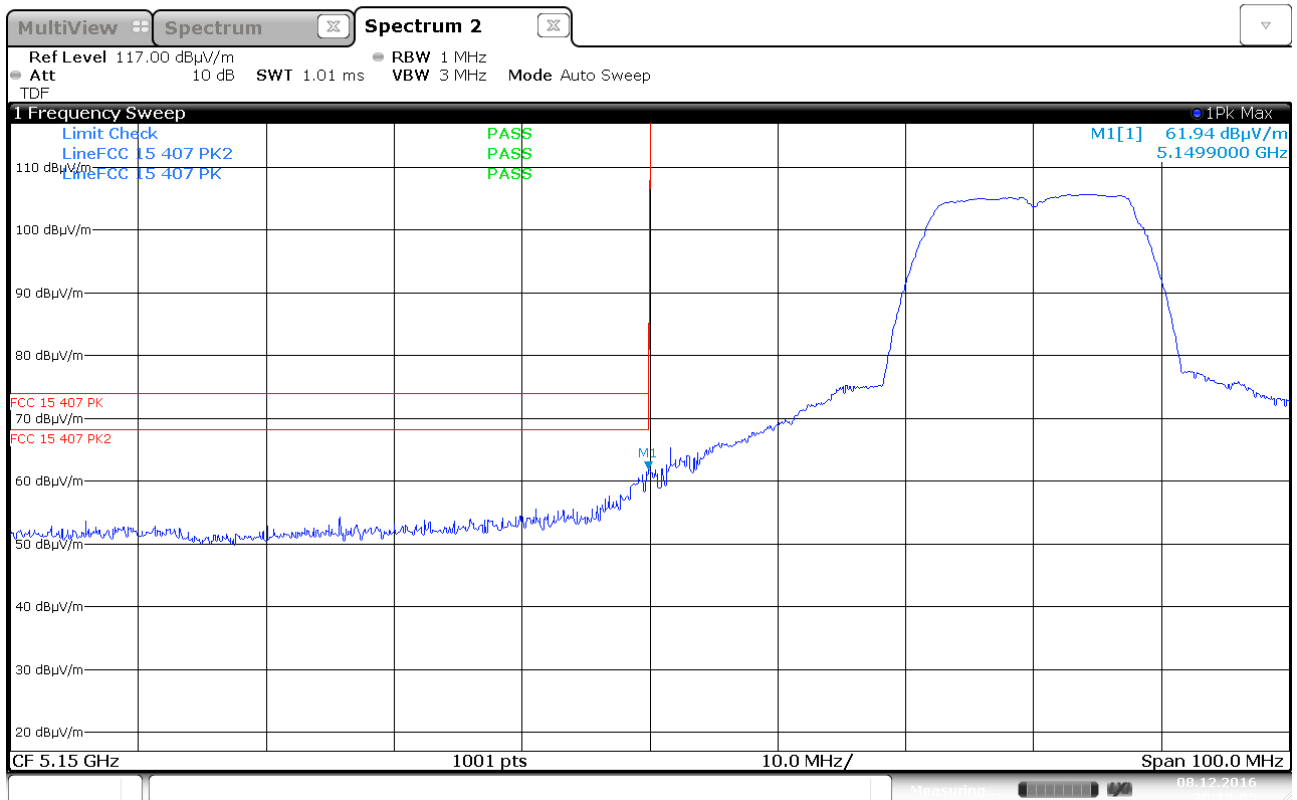
No spurious emissions except the above listed harmonics and band-edge emissions were found.

**Unwanted Emissions limit:**

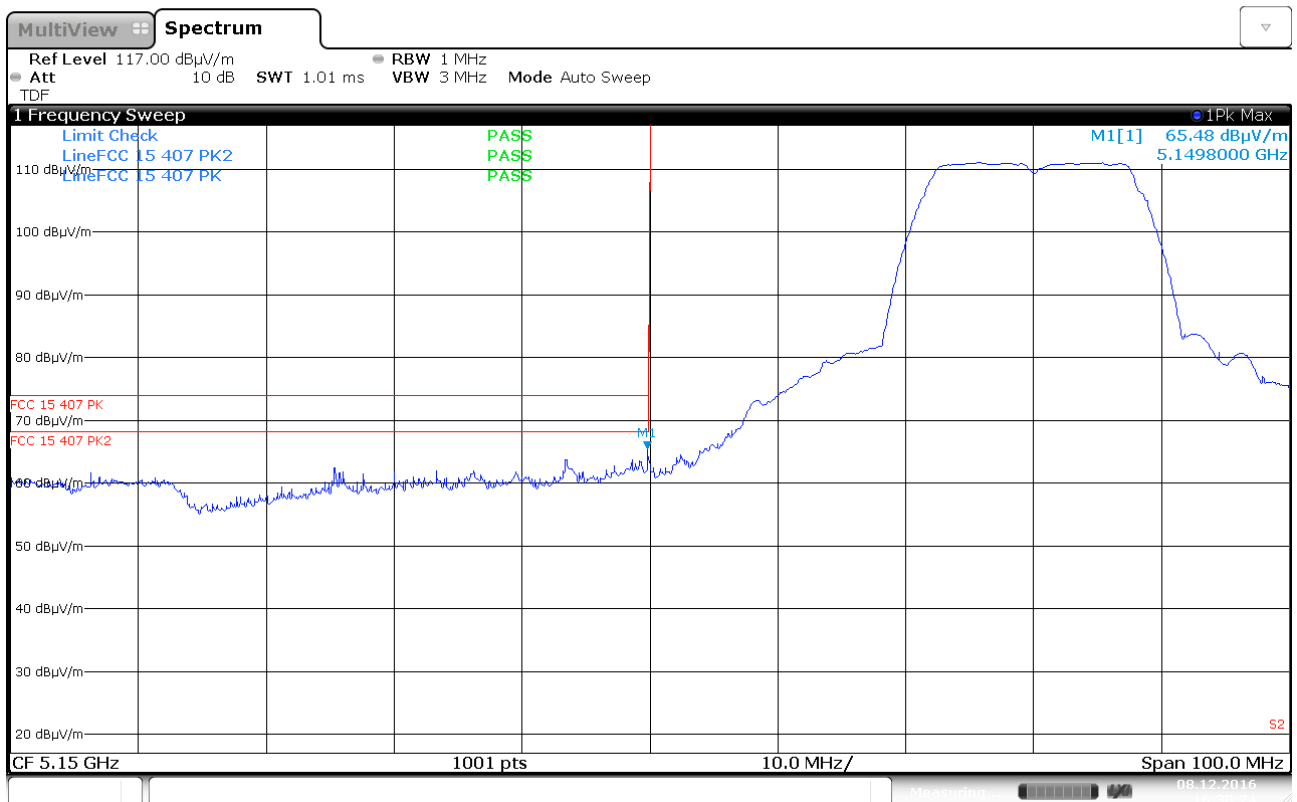
| Operating Frequency band | Limit for Emissions Outside Operating Frequency Band                                      |
|--------------------------|-------------------------------------------------------------------------------------------|
| 5150 – 5250 MHz          | -27 dBm/MHz                                                                               |
| 5250 – 5350 MHz          | -27 dBm/MHz                                                                               |
| 5470 – 5725 MHz          | -27 dBm/MHz                                                                               |
| 5725 – 5850 MHz          | See FCC 15.407(b)(4)(i) or 15.407(b)(4)(ii) and<br>ISED RSS-247 Issue 1, Clause 6.2.4 (2) |

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

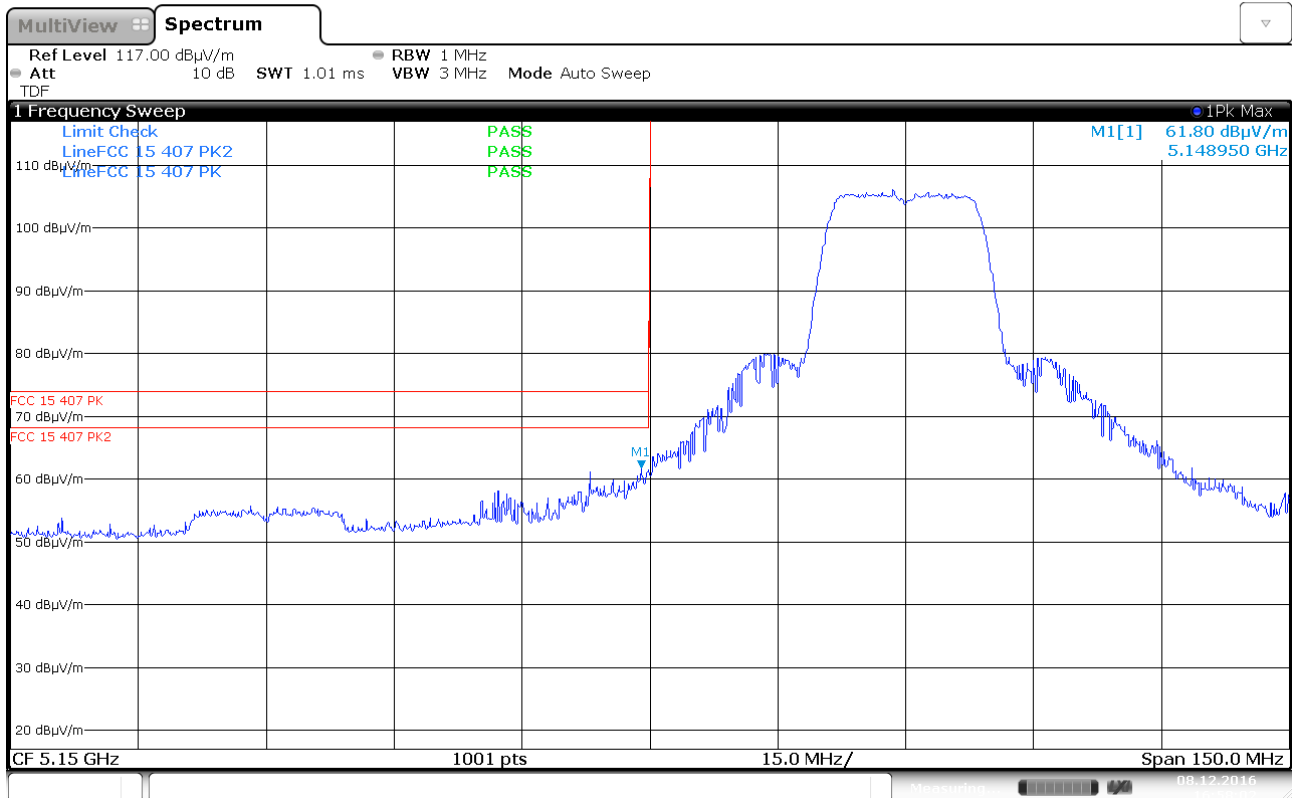
The FCC limits for Band Edge emissions for the 5725 – 5850 MHz frequency band are less strict than the ISED requirements. An EUT that fulfils the ISED requirements will therefore also fulfil the FCC requirements.



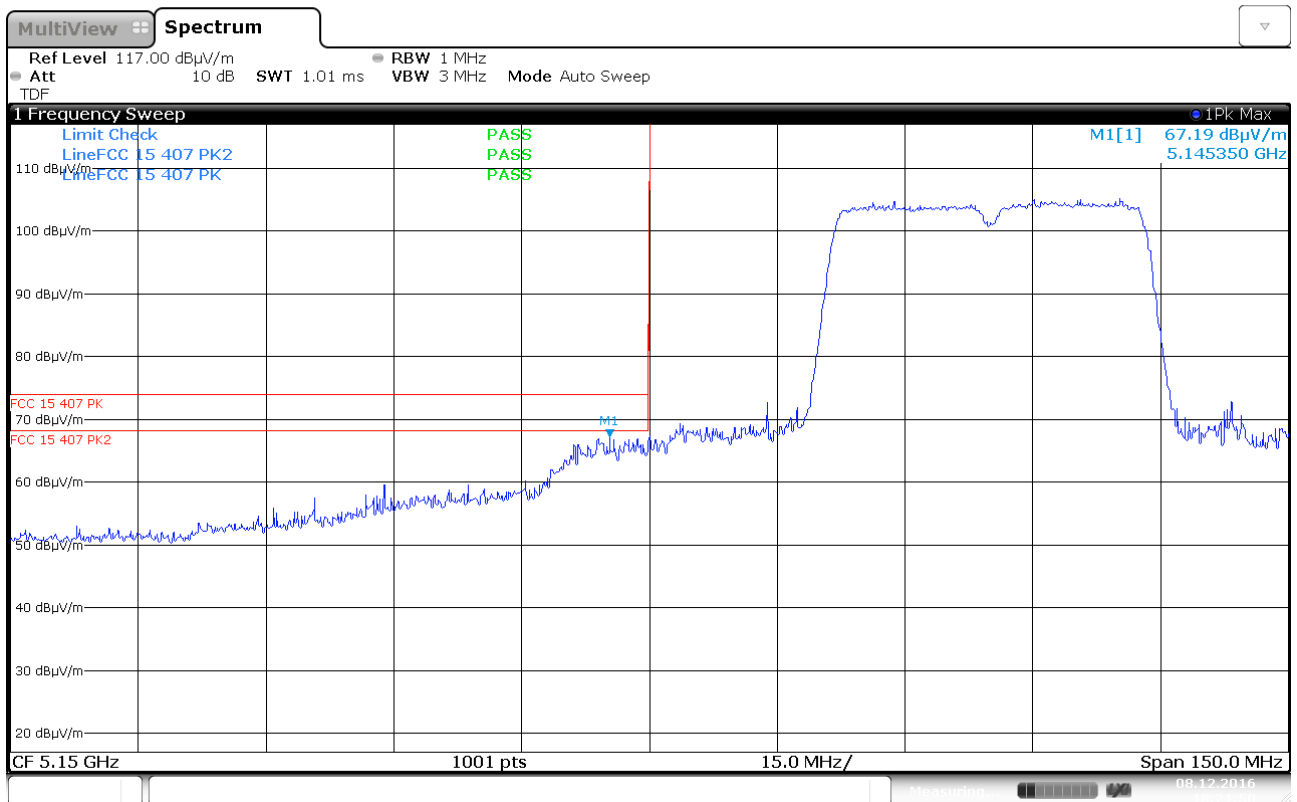
Unwanted Emissions, Band Edge, 5150MHz, ch36, 802.11a 6M, ant 0



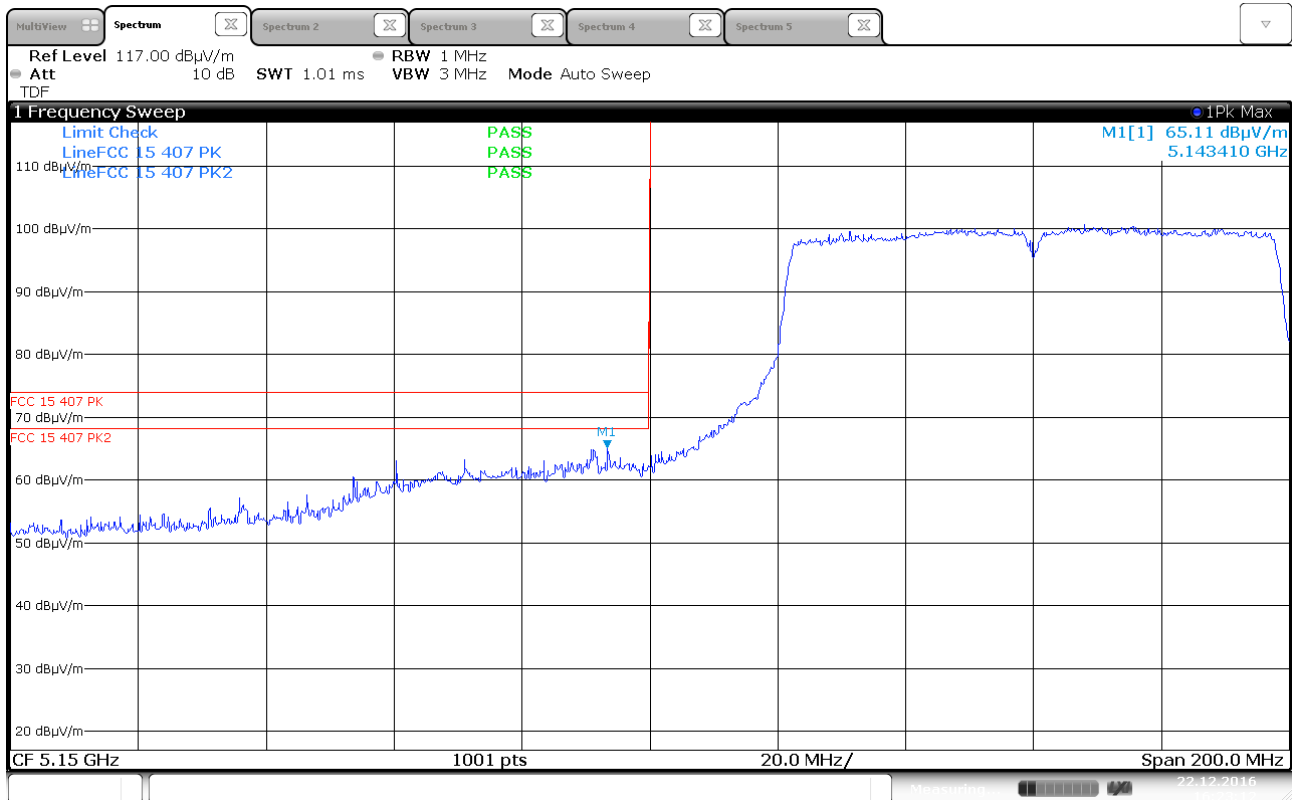
Unwanted Emissions, Band Edge, 5150MHz, ch36, 802.11a 6M, ant 1



Unwanted Emissions, Band Edge, 5150MHz, ch36, 802.11n MCS0 HT20, MIMO



Unwanted Emissions, Band Edge, 5150MHz, ch38, 802.11n MCS0 HT40, MIMO



## Unwanted Emissions, Band Edge, 5150MHz, ch42, 802.11n MCS0 HT80, MIMO