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## TEST REPORT

Test report no.: 1-2846/16-02-05-C



Deutsche  
Akkreditierungsstelle  
D-PL-12076-01-01

### Testing laboratory

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#### Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAKKS)

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

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### Manufacturer

#### Philips Medizin Systeme Böblingen GmbH

Hewlett-Packard-Strasse 2

71034 Böblingen / GERMANY

### Test standard/s

47 CFR Part 15

Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices

RSS - 247 Issue 2

Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS - Gen Issue 4

Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus

For further applied test standards please refer to section 3 of this test report.

### Test Item

Kind of test item: WLAN module IEEE 802.11 a / b / g / n

Model name: WLANBV3-A

FCC ID: PQC-WLANBV3

IC: 3549C-WLANBV3

Frequency: U-NII bands:  
5150-5250 MHz; 5250-5350 MHz; 5470-5600 MHz;  
5650-5725 MHz; 5725-5850 MHz

Technology tested: WLAN (OFDM/a- & ac/n HT20/HT40-mode)

Antenna: 1 Foil antenna + 4 PCB antennas

Power supply: 5 V DC by USB interface

Temperature range: -10°C to +70°C



This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

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## 2 General information

### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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This test report replaces the test report with the number 1-2846/16-02-05-B and dated 2017-04-20.

### 2.2 Application details

|                                    |            |
|------------------------------------|------------|
| Date of receipt of order:          | 2016-11-17 |
| Date of receipt of test item:      | 2017-01-17 |
| Start of test:                     | 2017-01-17 |
| End of test:                       | 2017-02-18 |
| Person(s) present during the test: | -/-        |

### 2.3 Test laboratories sub-contracted

None

### 3 Test standard/s and references

| Test standard     | Date          | Description                                                                                                                                               |
|-------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 47 CFR Part 15    | -/-           | Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices                                                                 |
| RSS - 247 Issue 2 | February 2017 | Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices                              |
| RSS - Gen Issue 4 | November 2014 | Spectrum Management and Telecommunications Radio Standards Specifications - General Requirements and Information for the Certification of Radio Apparatus |

| Guidance             | Version | Description                                                                                                                                                         |
|----------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UNII: KDB 789033 D02 | v01r03  | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E                                            |
| ANSI C63.4-2014      | -/-     | American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz |
| ANSI C63.10-2013     | -/-     | American national standard of procedures for compliance testing of unlicensed wireless devices                                                                      |

#### 4 Test environment

|                           |   |                                                          |                                                                                                                                    |
|---------------------------|---|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Temperature               | : | T <sub>nom</sub><br>T <sub>max</sub><br>T <sub>min</sub> | +22 °C during room temperature tests<br>No tests under extreme conditions required.<br>No tests under extreme conditions required. |
| Relative humidity content | : |                                                          | 35 %                                                                                                                               |
| Barometric pressure       | : |                                                          | 1021 hpa                                                                                                                           |
| Power supply              | : | V <sub>nom</sub><br>V <sub>max</sub><br>V <sub>min</sub> | 5 V DC by USB interface<br>No tests under extreme conditions required.<br>No tests under extreme conditions required.              |

#### 5 Test item

##### 5.1 General description

|                            |   |                                                                                                                                                                                                       |
|----------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kind of test item          | : | WLAN module IEEE 802.11 a / b / g / n                                                                                                                                                                 |
| Type identification        | : | WLANBV3-A                                                                                                                                                                                             |
| HMN                        | : | -/-                                                                                                                                                                                                   |
| PMN                        | : | WLANBV3-A                                                                                                                                                                                             |
| HVIN                       | : | WLANBV3-A                                                                                                                                                                                             |
| FVIN                       | : | -/-                                                                                                                                                                                                   |
| S/N serial number          | : | Radiated unit: 752C94<br>Conducted unit: 752C94                                                                                                                                                       |
| HW hardware status         | : | PW100120BA                                                                                                                                                                                            |
| SW software status         | : | 3.2.0.137 api 3                                                                                                                                                                                       |
| Frequency band             | : | U-NII bands:<br>5150-5250 MHz; 5250-5350 MHz; 5470-5600 MHz;<br>5650-5725 MHz; 5725-5850 MHz<br>(lowest channel 5180 MHz; highest channel 5825 MHz)                                                   |
| Type of radio transmission | : | OFDM                                                                                                                                                                                                  |
| Use of frequency spectrum  | : |                                                                                                                                                                                                       |
| Type of modulation         | : | (D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM                                                                                                                                                                  |
| Number of channels         | : | 22 (20 MHz)<br>10 (40 MHz)                                                                                                                                                                            |
| Antenna                    | : | 1 Foil antenna + 4 PCB antennas<br>Foil antenna: "IV2 TRNS Antenna WLAN IIT 1.4; 453564521811 Rev. 1631"<br>PCB antennas: Ant M3002-66494<br>Ant 453564154611<br>Ant 453564175981<br>Ant 453564271931 |
| Power supply               | : | 5 V DC by USB interface                                                                                                                                                                               |
| Temperature range          | : | -10°C to +70°C                                                                                                                                                                                        |

## 5.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report:

- 1-2846/16-02-01\_AnnexA
- 1-2846/16-02-01\_AnnexB
- 1-2846/16-02-01\_AnnexD

## 6 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

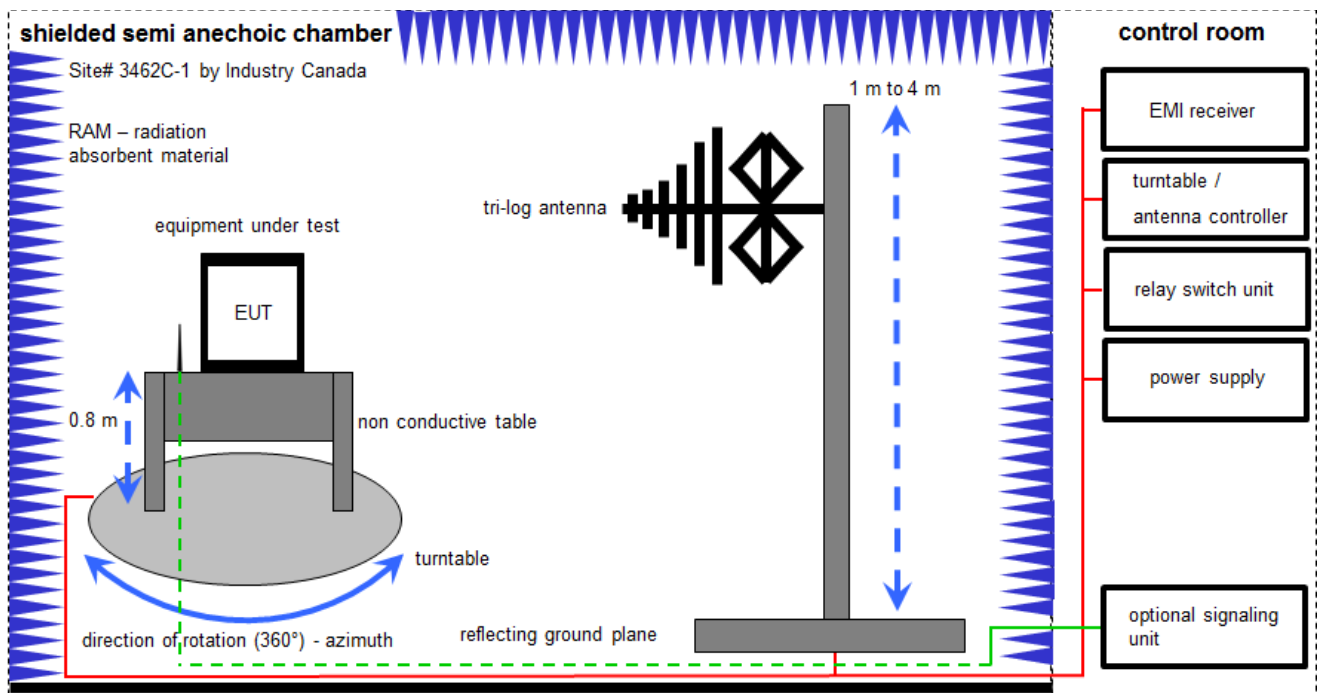
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

### Agenda: Kind of Calibration

|      |                                            |     |                                                      |
|------|--------------------------------------------|-----|------------------------------------------------------|
| k    | calibration / calibrated                   | EK  | limited calibration                                  |
| ne   | not required (k, ev, izw, zw not required) | zw  | cyclical maintenance (external cyclical maintenance) |
| ev   | periodic self verification                 | izw | internal cyclical maintenance                        |
| Ve   | long-term stability recognized             | g   | blocked for accredited testing                       |
| vlk! | Attention: extended calibration interval   |     |                                                      |
| NK!  | Attention: not calibrated                  | *)  | next calibration ordered / currently in progress     |

## 6.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Measurement distance: tri-log antenna 10 meter

$$FS = UR + CL + AF$$

(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

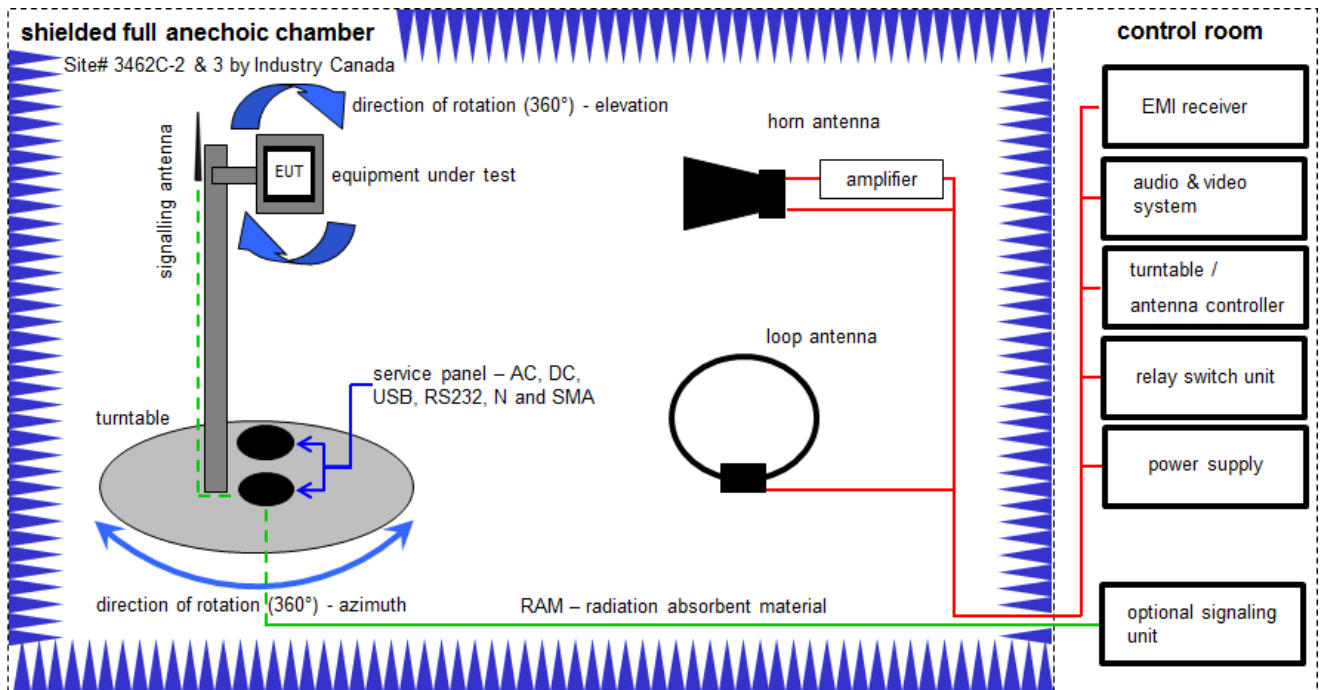
Example calculation:

$$FS [dB\mu V/m] = 12.35 [dB\mu V/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dB\mu V/m] (35.69 \mu V/m)$$

### Equipment table:

| No. | Lab / Item | Equipment                                    | Type         | Manufacturer | Serial No. | INV. No.  | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|----------------------------------------------|--------------|--------------|------------|-----------|---------------------|------------------|------------------|
| 1   | A          | Switch-Unit                                  | 3488A        | HP           | 2719A14505 | 300000368 | ev                  | -/-              | -/-              |
| 2   | A          | EMI Test Receiver                            | ESCI 3       | R&S          | 100083     | 300003312 | k                   | 08.03.2016       | 08.03.2017       |
| 3   | A          | Antenna Tower                                | Model 2175   | ETS-Lindgren | 64762      | 300003745 | izw                 | -/-              | -/-              |
| 4   | A          | Positioning Controller                       | Model 2090   | ETS-Lindgren | 64672      | 300003746 | izw                 | -/-              | -/-              |
| 5   | A          | Turntable Interface-Box                      | Model 105637 | ETS-Lindgren | 44583      | 300003747 | izw                 | -/-              | -/-              |
| 6   | A          | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163     | Schwarzbeck  | 295        | 300003787 | k                   | 25.04.2016       | 25.04.2018       |

## 6.2 Shielded fully anechoic chamber



Measurement distance: horn antenna 3 meter; loop antenna 3 meter / 1 meter

FS = UR + CA + AF

(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

Example calculation:

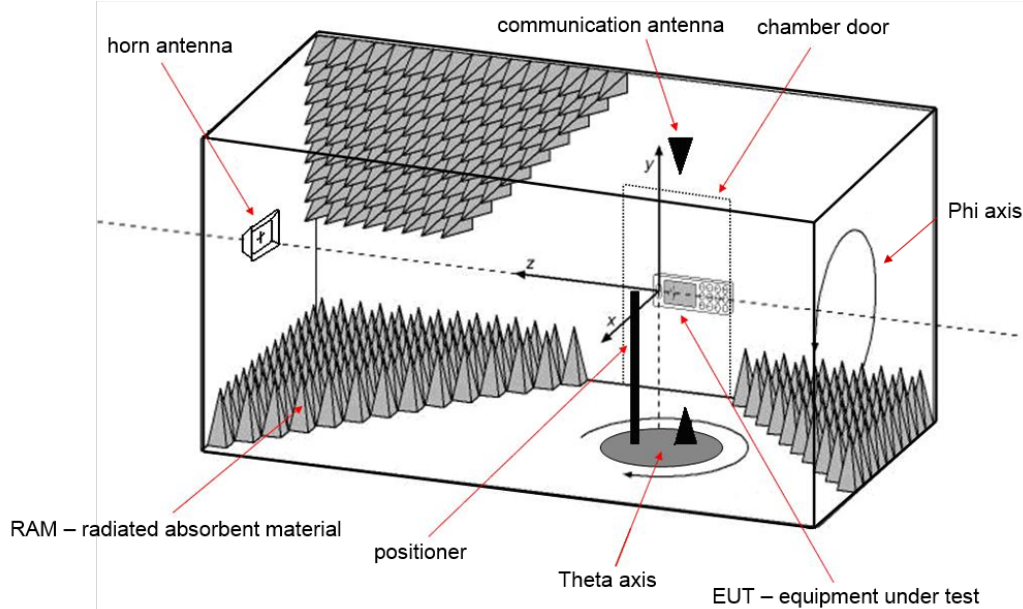
FS [dBμV/m] = 40.0 [dBμV/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dBμV/m] (71.61 μV/m)

### Equipment table:

| No. | Lab / Item | Equipment                                      | Type                                  | Manufacturer         | Serial No.      | INV. No.  | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|------------------------------------------------|---------------------------------------|----------------------|-----------------|-----------|---------------------|------------------|------------------|
| 1   | A          | Active Loop Antenna 10 kHz to 30 MHz           | 6502                                  | EMCO                 | 2210            | 300001015 | k                   | 20.05.2015       | 20.05.2017       |
| 2   | B, C       | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115                                  | EMCO                 | 9709-5290       | 300000212 | k                   | 13.08.2015       | 13.08.2017       |
| 3   | A, B, C    | EMI Test Receiver 20Hz- 26,5GHz                | ESU26                                 | R&S                  | 100037          | 300003555 | k                   | 02.02.2016       | 02.02.2017       |
| 4   | C          | Highpass Filter                                | WHK1.1/15G-10SS                       | Wainwright           | 37              | 400000148 | ne                  | -/-              | -/-              |
| 5   | B, C       | Broadband Amplifier 0.5-18 GHz                 | CBLU5184540                           | CERNEX               | 22050           | 300004482 | ev                  | -/-              | -/-              |
| 6   | C          | Broadband Amplifier 5-13 GHz                   | CBLU5135235                           | CERNEX               | 22011           | 300004492 | ev                  | -/-              | -/-              |
| 7   | A, B, C    | 4U RF Switch Platform                          | L4491A                                | Agilent Technologies | MY50000032      | 300004510 | ne                  | -/-              | -/-              |
| 8   | A, B, C    | Messrechner und Monitor                        | Intel Core i3 3220/3,3 GHz, Prozessor | Agilent Technologies | 2V2403033A54 21 | 300004591 | ne                  | -/-              | -/-              |
| 9   | A, B, C    | NEXIO EMV-Software                             | BAT EMC                               | EMCO                 | 2V2403033A54 21 | 300004682 | ne                  | -/-              | -/-              |
| 10  | A, B, C    | Vollabsorberkammer                             | BAT EMC                               | TDK                  | 2V2403033A54 21 | 300003726 | ne                  | -/-              | -/-              |

### 6.3 Shielded fully anechoic chamber

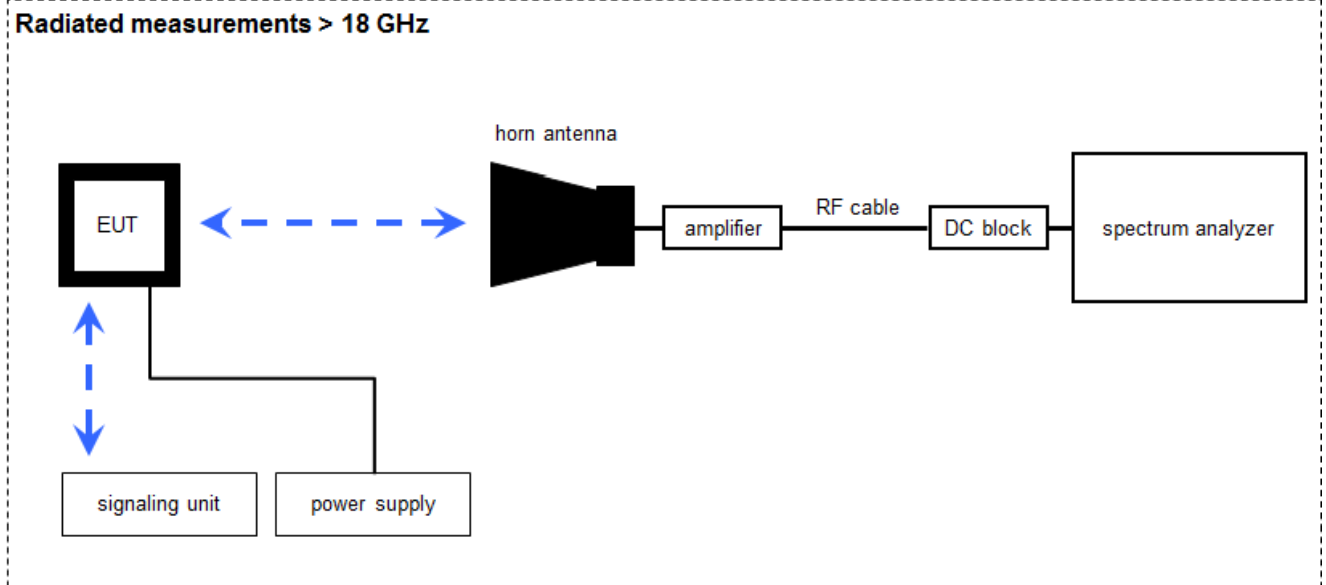
#### OTA – over the air performance



#### Equipment table:

| No. | Lab / Item | Equipment                            | Type                                 | Manufacturer         | Serial No. | INV. No.  | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|--------------------------------------|--------------------------------------|----------------------|------------|-----------|---------------------|------------------|------------------|
| 1   | A          | Splitter                             | 15542                                | Mini Circuits        | 15542      | 400000086 | ev                  | -/-              | -/-              |
| 2   | A          | Splitter                             | 42000                                | Anaren               | 4730       | 400000085 | ev                  | -/-              | -/-              |
| 3   | A          | Switch Unit                          | TS-RSP                               | R&S                  | 100155     | 300003281 | ev                  | -/-              | -/-              |
| 4   | A          | CTIA-Chamber                         | CTIA-Chamber AMS 8500                | ETS-Lindgren Finland | -/-        | 300003327 | ne                  | -/-              | -/-              |
| 5   | A          | CTIA-Chamber - Positioning Equipment | CTIA-Chamber - Positioning Equipment | EMCO/2               | -/-        | 300003328 | ne                  | -/-              | -/-              |
| 6   | A          | Limiting Amplifier                   | JLA 02-801                           | JCA Tech.            | 101        | 300003341 | ne                  | -/-              | -/-              |
| 7   | A          | Spectrum Analyzer                    | FSP30                                | R&S                  | 100623     | 300003464 | Ve                  | 29.01.2017       | 30.01.2018       |

## 6.4 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

$$FS = U_R + CA + AF$$

(FS-field strength;  $U_R$ -voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

### Example calculation:

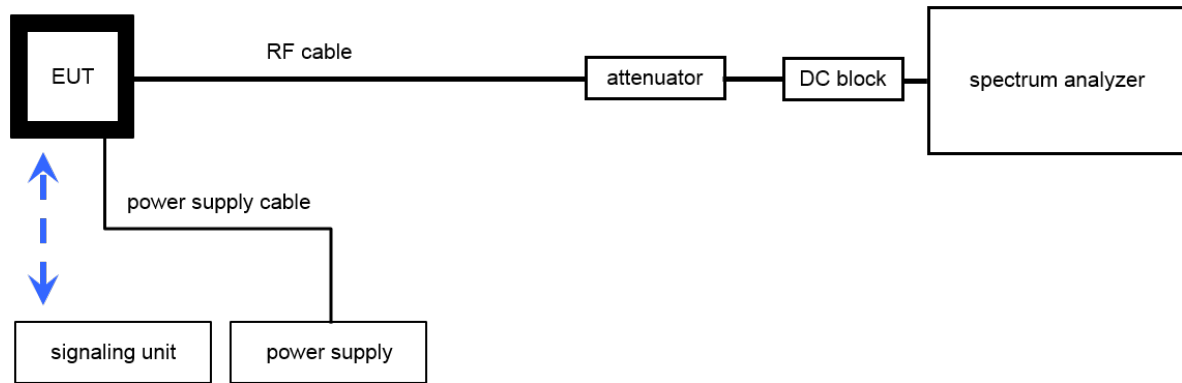
$$FS [dB\mu V/m] = 40.0 [dB\mu V/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dB\mu V/m] (6.79 \mu V/m)$$

### Equipment table:

| No. | Lab / Item | Equipment                               | Type                | Manufacturer   | Serial No.       | INV. No.  | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|-----------------------------------------|---------------------|----------------|------------------|-----------|---------------------|------------------|------------------|
| 1   | A          | RF-Cable                                | ST18/SMAm/SMAm/48   | Huber & Suhner | Batch no. 600918 | 400001182 | ev                  | -/-              | -/-              |
| 2   | A          | RF-Cable                                | ST18/SMAm/SMm/48    | Huber & Suhner | Batch no. 127377 | 400001183 | ev                  | -/-              | -/-              |
| 3   | A          | Amplifier 2-40 GHz                      | JS32-02004000-57-5P | MITEQ          | 1777200          | 300004541 | ev                  | -/-              | -/-              |
| 4   | A          | DC-Blocker 0.1-40 GHz                   | 8141A               | Inmet          | Batch no. 127377 | 400001185 | ev                  | -/-              | -/-              |
| 5   | A          | Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638                 | Narda          | 8402             | 300000486 | k                   | 10.09.2015       | 10.09.2017       |
| 6   | A          | Std. Gain Horn Antenna 26.5 to 40.0 GHz | V637                | Narda          | 82-16            | 300000510 | k                   | 14.08.2015       | 14.08.2017       |

## 6.5 Conducted measurements

### Conducted measurements normal conditions



$$OP = AV + CA$$

(OP-output power; AV-analyzer value; CA-loss signal path)

#### Example calculation:

$$OP \text{ [dBm]} = 6.0 \text{ [dBm]} + 11.7 \text{ [dB]} = 17.7 \text{ [dBm]} \text{ (58.88 mW)}$$

#### Equipment table:

| No. | Lab / Item | Equipment                                 | Type                             | Manufacturer              | Serial No.       | INV. No.  | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|-------------------------------------------|----------------------------------|---------------------------|------------------|-----------|---------------------|------------------|------------------|
| 1   | A          | Teststand                                 | Teststand Custom Sequence Editor | National Instruments GmbH | 2V2403033A4523   | 300004590 | ne                  | -/-              | -/-              |
| 2   | A          | Synchron Power Meter                      | SPM-4                            | CTC                       | 1                | 400001294 | ev                  | -/-              | -/-              |
| 3   | A          | PowerSplitter/Combiner 150-6000MHz N-Type | ZB3PD-63-N+                      | Mini-Circuits             | 100010           | 400000451 | ev                  | -/-              | -/-              |
| 4   | A          | RF-Cable                                  | ST18/SMAM/SMAM/60                | Huber & Suhner            | Batch no. 606844 | 400001181 | ev                  | -/-              | -/-              |
| 5   | A          | DC-Blocker 0.1-40 GHz                     | 8141A                            | Inmet                     | Batch no. 127377 | 400001185 | ev                  | -/-              | -/-              |
| 6   | A          | Coax Attenuator 10 dB 2W 0-40 GHz         | MCL BW-K10-2W44+                 | Mini Circuits             | Batch no. 127377 | 400001186 | ev                  | -/-              | -/-              |
| 7   | A          | Switch / Control Unit                     | 3488A                            | HP                        | 2719A15013       | 300000151 | ne                  | -/-              | -/-              |
| 8   | A          | Hygro-Thermometer                         | -/-, 5-45C, 20-100rF             | HP                        | -/-              | 400000108 | ev                  | 07.09.2015       | 07.09.2017       |
| 9   | A          | Signal Analyzer 40 GHz                    | FSV40                            | R&S                       | 101042           | 300004517 | k                   | 21.01.2016       | 21.01.2017       |

## 7 Sequence of testing

### 7.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

#### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.5 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

#### Final measurement

- Identified emissions during the premeasurement are maximized by the software by rotating the turntable from 0° to 360°. In case of the 2-axis positioner is used the elevation axis is also rotated from 0° to 360°.
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

## 7.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

### Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position  $\pm 45^\circ$  and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

### 7.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

#### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

#### Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

## 7.4 Sequence of testing radiated spurious above 18 GHz

### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet.
- The measurement distance is as appropriate (e.g. 0.5 m).
- The EUT is set into operation.

### Premeasurement

- The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.

### Final measurement

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

**8 Measurement uncertainty**

| Measurement uncertainty                                  |                                         |
|----------------------------------------------------------|-----------------------------------------|
| Test case                                                | Uncertainty                             |
| Antenna gain                                             | $\pm 3$ dB                              |
| Power spectral density                                   | $\pm 1.5$ dB                            |
| Spectrum bandwidth                                       | $\pm 100$ kHz (depends on the used RBW) |
| Occupied bandwidth                                       | $\pm 100$ kHz (depends on the used RBW) |
| Maximum output power                                     | $\pm 1.5$ dB                            |
| Minimum emissions bandwidth                              | $\pm 100$ kHz (depends on the used RBW) |
| Spurious emissions conducted                             | $\pm 3$ dB                              |
| Spurious emissions radiated below 30 MHz                 | $\pm 3$ dB                              |
| Spurious emissions radiated 30 MHz to 1 GHz              | $\pm 3$ dB                              |
| Spurious emissions radiated 1 GHz to 12.75 GHz           | $\pm 3.7$ dB                            |
| Spurious emissions radiated above 12.75 GHz              | $\pm 4.5$ dB                            |
| Spurious emissions conducted below 30 MHz (AC conducted) | $\pm 2.6$ dB                            |

## 9 Summary of measurement results

|                                     |                                                                                                                          |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | No deviations from the technical specifications were ascertained                                                         |
| <input type="checkbox"/>            | There were deviations from the technical specifications ascertained                                                      |
| <input checked="" type="checkbox"/> | This test report is only a partial test report.<br>The content and verdict of the performed test cases are listed below. |

| TC Identifier | Description                     | Verdict   | Date       | Remark |
|---------------|---------------------------------|-----------|------------|--------|
| RF-Testing    | CFR Part 15<br>RSS 247, Issue 2 | see table | 2017-05-10 | -/-    |

| Test specification clause                                                                                      | Test case                                       | Temperature conditions | Power source voltages | C                                   | NC                       | NA                       | NP                       | Remark |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------|-----------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------|
| -/-                                                                                                            | Output power verification (conducted)           | Nominal                | Nominal               | -/-                                 |                          |                          |                          | -/-    |
| -/-                                                                                                            | Antenna gain                                    | Nominal                | Nominal               | -/-                                 |                          |                          |                          | -/-    |
| U-NII Part 15                                                                                                  | Duty cycle                                      | Nominal                | Nominal               | -/-                                 |                          |                          |                          | -/-    |
| §15.407(a)<br>RSS - 247 (6.2.1) (1)<br>RSS - 247 (6.2.2) (1)<br>RSS - 247 (6.2.3) (1)<br>RSS - 247 (6.2.4) (1) | Maximum output power (conducted & radiated)     | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| §15.407(a)<br>RSS - 247 (6.2.1) (1)<br>RSS - 247 (6.2.2) (1)<br>RSS - 247 (6.2.3) (1)<br>RSS - 247 (6.2.4) (1) | Power spectral density                          | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| RSS - 247 (6.2.4)                                                                                              | Spectrum bandwidth 6dB bandwidth                | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| §15.407(a)                                                                                                     | Spectrum bandwidth 26dB bandwidth               | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| RSS Gen clause 6.6                                                                                             | Spectrum bandwidth 99% bandwidth                | Nominal                | Nominal               | -/-                                 |                          |                          |                          | -/-    |
| §15.205<br>RSS - 247 (6.2.1) (2)<br>RSS - 247 (6.2.2) (2)<br>RSS - 247 (6.2.3) (2)<br>RSS - 247 (6.2.4) (2)    | Band edge compliance radiated                   | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| §15.407(b)<br>RSS - 247 (6.2.1) (2)<br>RSS - 247 (6.2.2) (2)<br>RSS - 247 (6.2.3) (2)<br>RSS - 247 (6.2.4) (2) | TX spurious emissions radiated                  | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| §15.109<br>RSS-Gen                                                                                             | RX spurious emissions radiated                  | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| §15.209(a)<br>RSS-Gen                                                                                          | Spurious emissions radiated < 30 MHz            | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| §15.107(a)<br>§15.207                                                                                          | Spurious emissions conducted emissions < 30 MHz | Nominal                | Nominal               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/-    |
| §15.407<br>RSS - 247 (6.3)                                                                                     | DFS                                             | Nominal                | Nominal               | -/-                                 |                          |                          |                          | Note 1 |

**Note:** C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

Note 1: See test report 32IE0154-HO-01-D-R1

## 10 Additional comments

Reference documents: PowerTableWLANBV2-A

| Data rate              | Frequency [MHz] | 2412 | 2417  | 2422  | 2427-2447 | 2452-2457 | 2462 | 2467-2472 | 2484 | 5180 | 5190-5220 | 5230-5300 | 5310 | 5320 | 5500 | 5510-5690 | 5700 | 5745 | 5755-5815 | 5825 |
|------------------------|-----------------|------|-------|-------|-----------|-----------|------|-----------|------|------|-----------|-----------|------|------|------|-----------|------|------|-----------|------|
| -txrate                |                 |      |       |       |           |           |      |           |      |      |           |           |      |      |      |           |      |      |           |      |
| 802.11b 1Mbit/s        | 0               | 13   | 13    | 13    | 13        | 13        | 13   | 13        | 13   | -    | -         | -         | -    | -    | -    | -         | -    | -    | -         | -    |
| 802.11b 2Mbit/s        | 1               | 13   | 13    | 13    | 13        | 13        | 13   | 13        | 13   | -    | -         | -         | -    | -    | -    | -         | -    | -    | -         | -    |
| 802.11b 5.5Mbit/s      | 2               | 13   | 13    | 13    | 13        | 13        | 13   | 13        | 13   | -    | -         | -         | -    | -    | -    | -         | -    | -    | -         | -    |
| 802.11b 11Mbit/s       | 3               | 13   | 13    | 13    | 13        | 13        | 13   | 13        | 13   | -    | -         | -         | -    | -    | -    | -         | -    | -    | -         | -    |
| 802.11a/g 6 - 24Mbit/s | 4-8             | 8    | 13    | 13    | 13        | 13        | 8,5  | 8,5       | -    | 14   | 14        | 14        | 14   | 14   | 14   | 14        | 14   | 13   | 13        | 13   |
| 802.11a/g 36Mbit/s     | 9               | 8    | 13    | 13    | 13        | 13        | 8,5  | 8,5       | -    | 14   | 14        | 14        | 14   | 14   | 14   | 12,5      | 12,5 | 12,5 | 12        | 12   |
| 802.11a/g 48Mbit/s     | 10              | 8    | 12,50 | 12,50 | 12,50     | 12,50     | 8,5  | 8,5       | -    | 12,5 | 12,5      | 12,5      | 12,5 | 12,5 | 12   | 12        | 12   | 11,5 | 11,5      | 11,5 |
| 802.11a/g 54Mbit/s     | 11              | 8    | 11    | 11    | 11        | 11        | 8,5  | 8,5       | -    | 11,5 | 11,5      | 11,5      | 11,5 | 11,5 | 11   | 11        | 11   | 9,5  | 9,5       | 9,5  |
| 802.11n MCS0 HT20      | 12              | 7    | 12,5  | 12,5  | 12,5      | 12,5      | 7,5  | 7,5       | -    | 13   | 13        | 13        | 13   | 14   | 14   | 14        | 14   | 13   | 13        | 13   |
| 802.11n MCS1 HT20      | 13              | 7    | 12,5  | 12,5  | 12,5      | 12,5      | 7,5  | 7,5       | -    | 13   | 13        | 13        | 13   | 14   | 14   | 14        | 14   | 13   | 13        | 13   |
| 802.11n MCS2 HT20      | 14              | 7    | 12,5  | 12,5  | 12,5      | 12,5      | 7,5  | 7,5       | -    | 13   | 13        | 13        | 13   | 14   | 14   | 14        | 14   | 13   | 13        | 13   |
| 802.11n MCS3 HT20      | 15              | 7    | 12    | 12    | 12        | 12        | 7,5  | 7,5       | -    | 13   | 13        | 13        | 13   | 14   | 14   | 14        | 14   | 13   | 13        | 13   |
| 802.11n MCS4 HT20      | 16              | 7    | 12    | 12    | 12        | 12        | 7,5  | 7,5       | -    | 13   | 13        | 13        | 13   | 14   | 14   | 12,5      | 12,5 | 12,5 | 12        | 12   |
| 802.11n MCS5 HT20      | 17              | 7    | 12    | 12    | 12        | 12        | 7,5  | 7,5       | -    | 12,5 | 12,5      | 12,5      | 12,5 | 12,5 | 12,5 | 12,5      | 12,5 | 11   | 11        | 11   |
| 802.11n MCS6 HT20      | 18              | 7    | 10,5  | 10,5  | 10,5      | 10,5      | 7,5  | 7,5       | -    | 11   | 11        | 11        | 11   | 11   | 10   | 10        | 10   | 9,5  | 9,5       | 9,5  |
| 802.11n MCS7 HT20      | 19              | 5    | 5     | 5     | 5         | 5         | 5    | 5         | -    | 8    | 8         | 8         | 8    | 8    | 6,5  | 6,5       | 6,5  | 5    | 5         | 5    |
| 802.11n MCS0 HT40      | 20              | -    | -     | 7     | 12,5      | 7,5       | 7,5  | -         | -    | -    | 9,5       | 14        | 11,5 | -    | -    | 14        | -    | -    | 13        | -    |
| 802.11n MCS1 HT40      | 21              | -    | -     | 7     | 12,5      | 7,5       | 7,5  | -         | -    | -    | 9,5       | 14        | 11,5 | -    | -    | 14        | -    | -    | 13        | -    |
| 802.11n MCS2 HT40      | 22              | -    | -     | 7     | 12,5      | 7,5       | 7,5  | -         | -    | -    | 9,5       | 14        | 11,5 | -    | -    | 14        | -    | -    | 13        | -    |
| 802.11n MCS3 HT40      | 23              | -    | -     | 7     | 12        | 7,5       | 7,5  | -         | -    | -    | 9,5       | 14        | 11,5 | -    | -    | 14        | -    | -    | 13        | -    |
| 802.11n MCS4 HT40      | 24              | -    | -     | 7     | 12        | 7,5       | 7,5  | -         | -    | -    | 9,5       | 14        | 11,5 | -    | -    | 12,5      | -    | -    | 12        | -    |
| 802.11n MCS5 HT40      | 25              | -    | -     | 7     | 12        | 7,5       | 7,5  | -         | -    | -    | 9,5       | 12,5      | 11,5 | -    | -    | 12,5      | -    | -    | 11        | -    |
| 802.11n MCS6 HT40      | 26              | -    | -     | 7     | 8         | 7,5       | 7,5  | -         | -    | -    | 9,5       | 11        | 11   | -    | -    | 10        | -    | -    | 9,5       | -    |
| 802.11n MCS7 HT40      | 27              | -    | -     | 5     | 5         | 5         | 5    | -         | -    | -    | 8         | 8         | 8    | -    | -    | 6,5       | -    | -    | 5         | -    |

DFS test report: 32IE0154-HO-01-D-R1

Special test descriptions: None

Configuration descriptions: None

Test mode: ☐ No test mode available.  
 Iperf was used to ping another device with the largest support packet size

☒ Special software is used.  
 EUT is transmitting pseudo random data by itself

Antennas and transmit operating modes: ☒ Operating mode 1 (single antenna)

- Equipment with 1 antenna,
- Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,
- Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)

☐ Operating mode 2 (multiple antennas, no beamforming)

- Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.

☐ Operating mode 3 (multiple antennas, with beamforming)

- Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously with beamforming.  
 In addition to the antenna assembly gain (G), the beamforming gain (Y) may have to be taken into account when performing the measurements.

## 11 Measurement results

### 11.1 Identify worst case data rate

#### Measurement:

All modes of the module will be measured with an average power meter or spectrum analyzer to identify the maximum transmission power.

In further tests only the identified worst case modulation scheme or bandwidth will be measured and this mode is used as representative mode for all other modulation schemes.

Additional the band edge compliance test will be performed in the lowest and highest modulation scheme.

#### Measurement parameters:

| Measurement parameter    |                   |
|--------------------------|-------------------|
| Detector:                | Peak              |
| Sweep time:              | Auto              |
| Resolution bandwidth:    | 3 MHz             |
| Video bandwidth:         | 3 MHz             |
| Trace mode:              | Max hold          |
| Used test setup:         | See chapter 6.5 A |
| Measurement uncertainty: | See chapter 8     |

#### Results:

| Modulation<br><br>Frequency | Modulation scheme / bandwidth |          |          |          |          |          |
|-----------------------------|-------------------------------|----------|----------|----------|----------|----------|
|                             | 5180 MHz                      | 5320 MHz | 5500 MHz | 5700 MHz | 5745 MHz | 5825 MHz |
| OFDM / a – mode             | 6 Mbit/s                      | 6 Mbit/s | 6 Mbit/s | 6 Mbit/s | 6 Mbit/s | 6 Mbit/s |
| OFDM / n/ac HT20 – mode     | MCS0                          | MCS0     | MCS0     | MCS0     | MCS0     | MCS0     |
| Frequency                   | 5190 MHz                      | 5310 MHz | 5510 MHz | 5670 MHz | 5755 MHz | 5815 MHz |
| OFDM / n/ac HT40 – mode     | MCS0                          | MCS0     | MCS0     | MCS0     | MCS0     | MCS0     |

## 11.2 Gain

### Measurement:

The antenna gain of the complete system was determined Over-The-Air in a fully shielded anechoic chamber. The system's antenna was disconnected from the RF output of the EUT. An external 50 Ohms signal generator was used to feed the system's antenna with a constant signal at the certain frequency and a power level of 0dBm. The EUT was then rotated horizontally and vertically in steps of 15°. The emission at each position was measured with a horizontal and vertical polarized horn antenna. The resulting 3 dimensional antenna diagram displays the radiation character of the system at the tested frequency. The detected peak power (EIRP) equals the antenna gain.

### Measurement parameters:

| Measurement parameter    |                      |
|--------------------------|----------------------|
| Detector:                | Peak                 |
| Sweep time:              | Auto                 |
| Resolution bandwidth:    | 3 MHz                |
| Video bandwidth:         | 3 MHz                |
| Trace mode:              | Max hold             |
| Test setup:              | See sub clause 6.3 A |
| Measurement uncertainty: | See sub clause 8     |

### Limits:

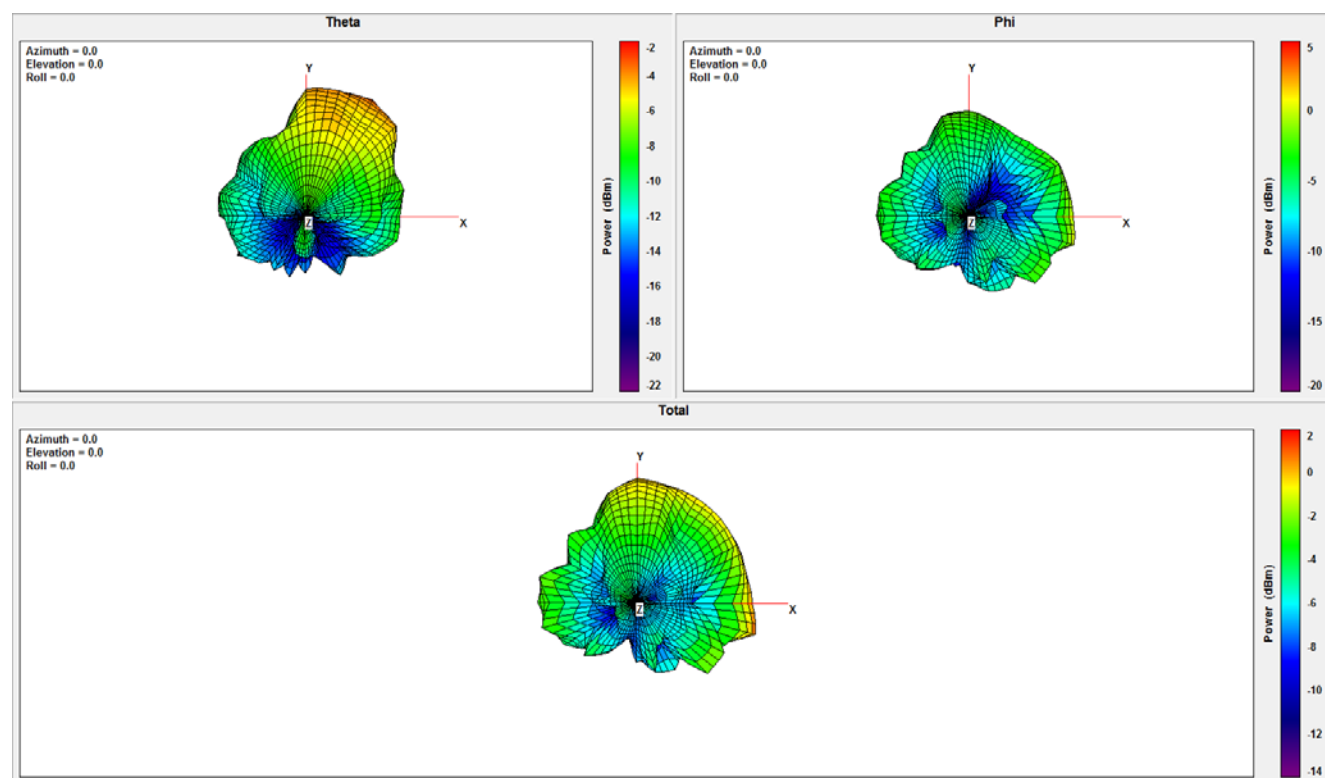
| Antenna Gain                                                      |
|-------------------------------------------------------------------|
| 6 dBi / > 6 dBi output power and power density reduction required |

### Result:

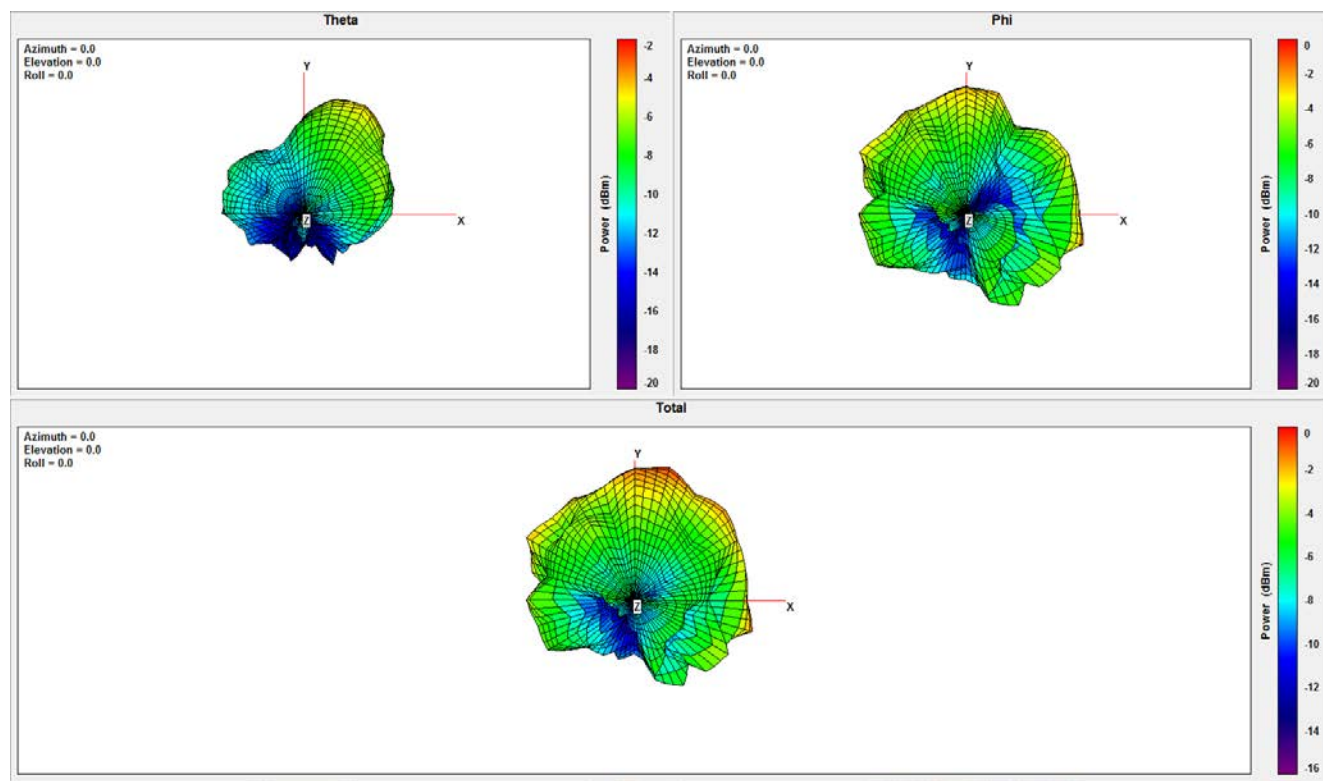
|            | antenna gain              |                            |                           |                            |                           |                            |
|------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|
|            | lowest channel - 5180 MHz | highest channel - 5320 MHz | lowest channel - 5500 MHz | highest channel - 5700 MHz | lowest channel - 5745 MHz | highest channel - 5825 MHz |
| Gain [dBi] | 1.9                       | -0.1                       | 1.0                       | 1.4                        | 1.3                       | 1.4                        |

### Results: (External antennas)

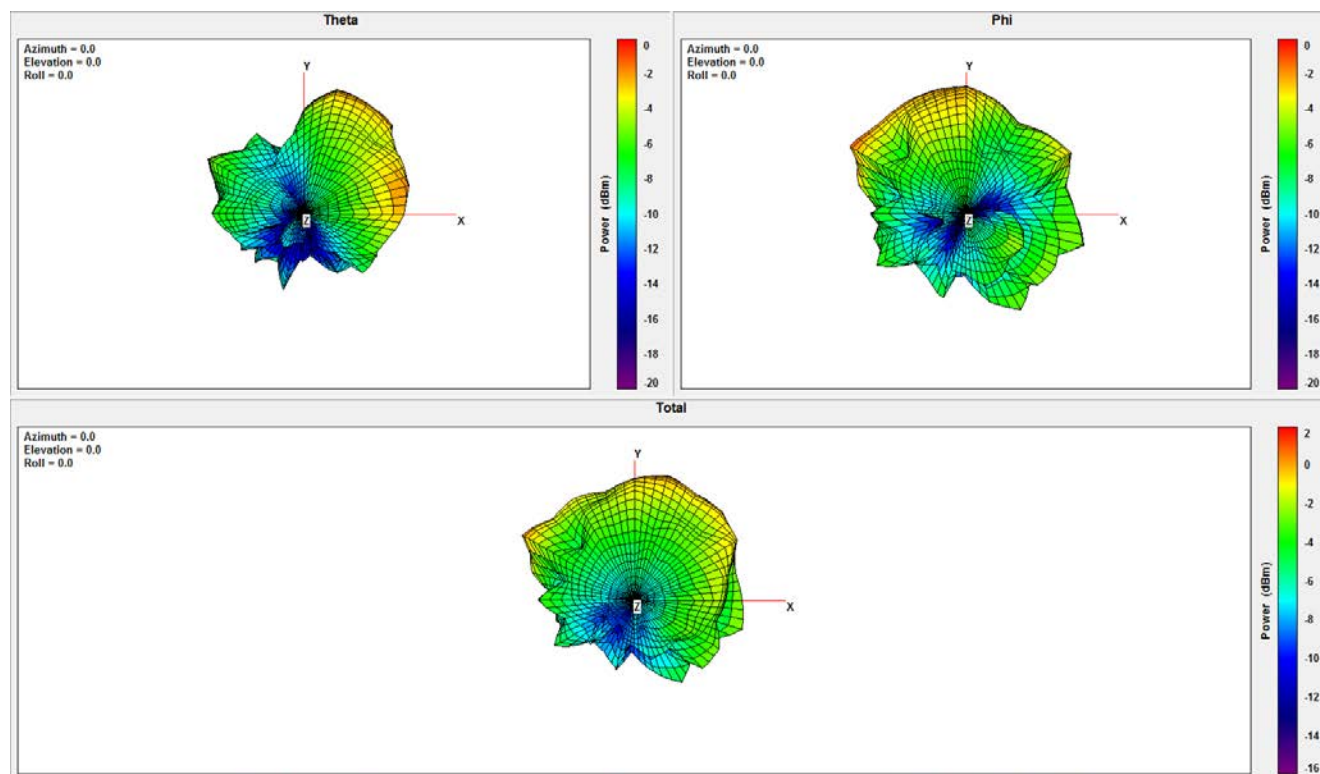
For the results of the antenna gain of all external antennas see "Appendix\_to\_1-2846/16-02-05-B"

**Plots:****Plot 1:** Antenna diagram, 5180 MHz**Plot 2:**

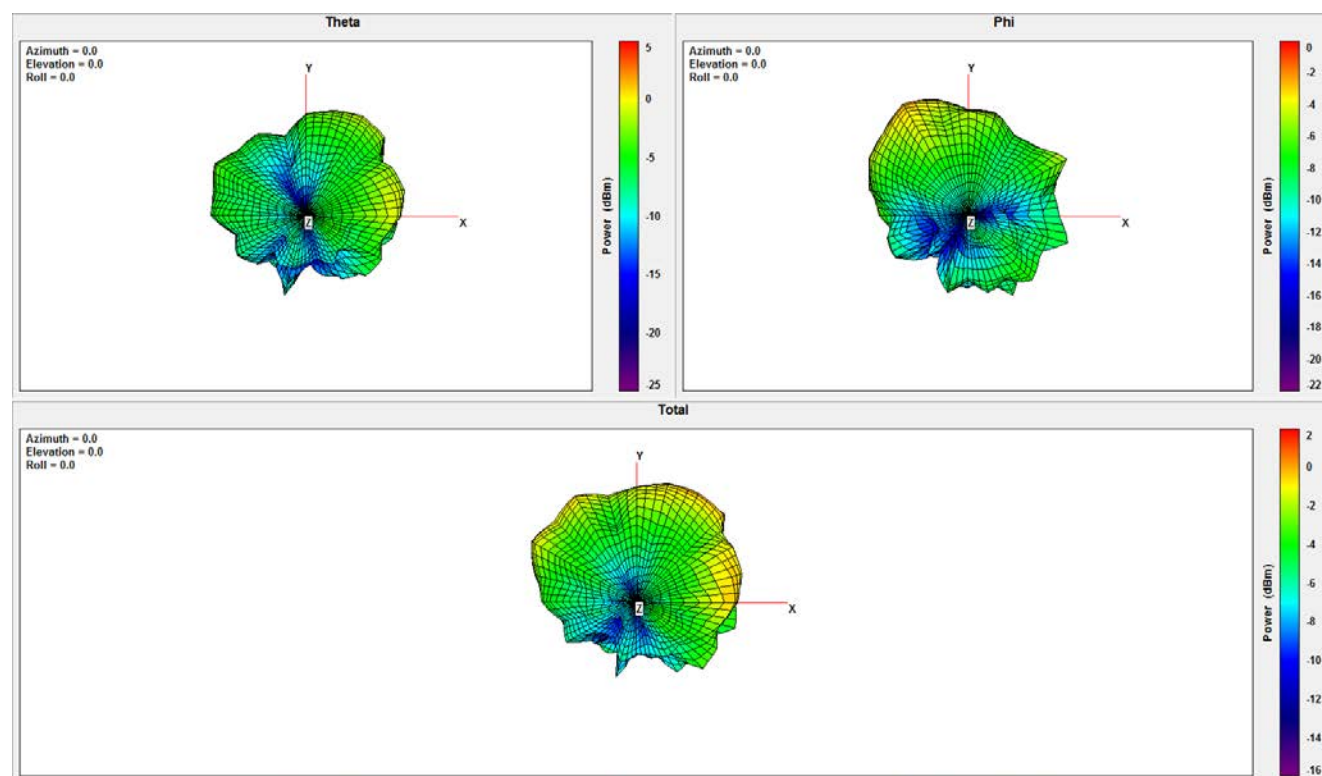
| Total | Point Values               |          |
|-------|----------------------------|----------|
|       | Ant. Port Input Pwr. (dBm) | 0        |
|       | Tot. Rad. Pwr. (dBm)       | -3,85816 |
|       | Peak EIRP (dBm)            | 1,91045  |
|       | Directivity (dBi)          | 5,76861  |
|       | Efficiency (dB)            | -3,85816 |
|       | Efficiency (%)             | 41,1324  |
|       | Gain (dBi)                 | 1,91045  |

**Plot 3:** Antenna diagram, 5320 MHz**Plot 4:**

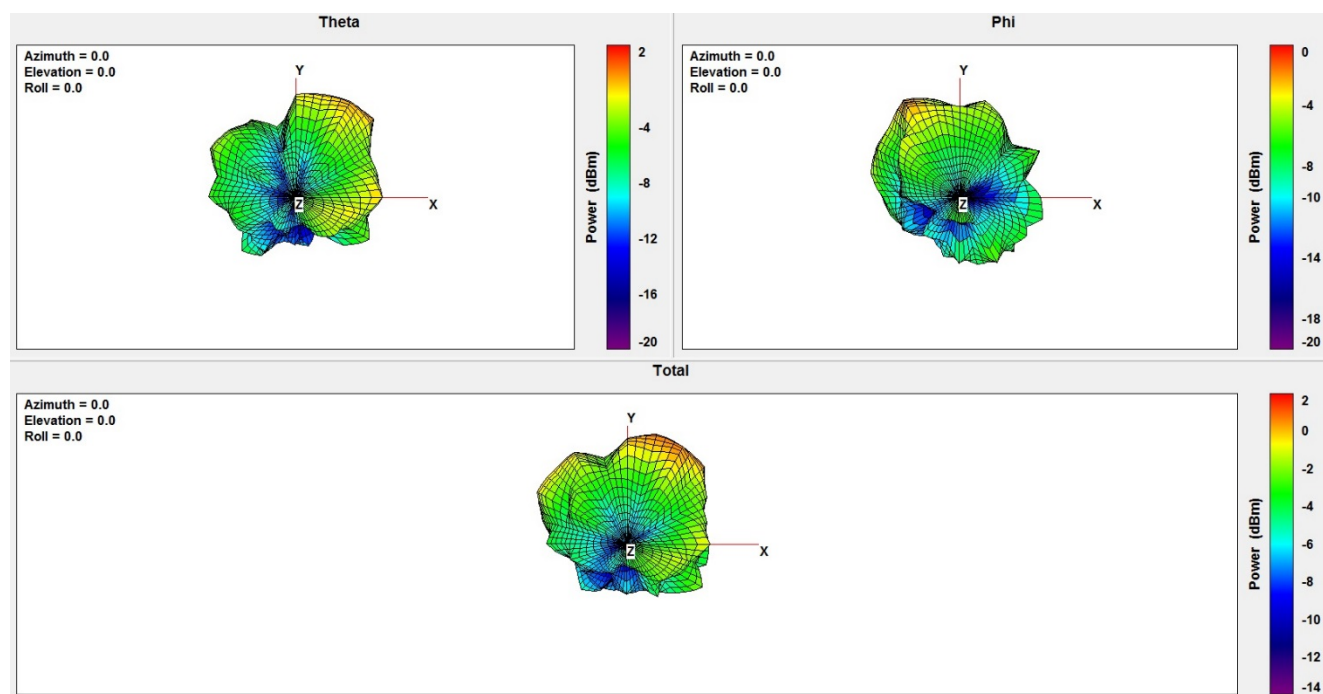
| Total | Point Values               |           |
|-------|----------------------------|-----------|
|       | Ant. Port Input Pwr. (dBm) | 0         |
|       | Tot. Rad. Pwr. (dBm)       | -4,76376  |
|       | Peak EIRP (dBm)            | -0,111799 |
|       | Directivity (dBi)          | 4,65196   |
|       | Efficiency (dB)            | -4,76376  |
|       | Efficiency (%)             | 33,3906   |
|       | Gain (dBi)                 | -0,111799 |

**Plot 5:** Antenna diagram, 5500 MHz**Plot 6:**

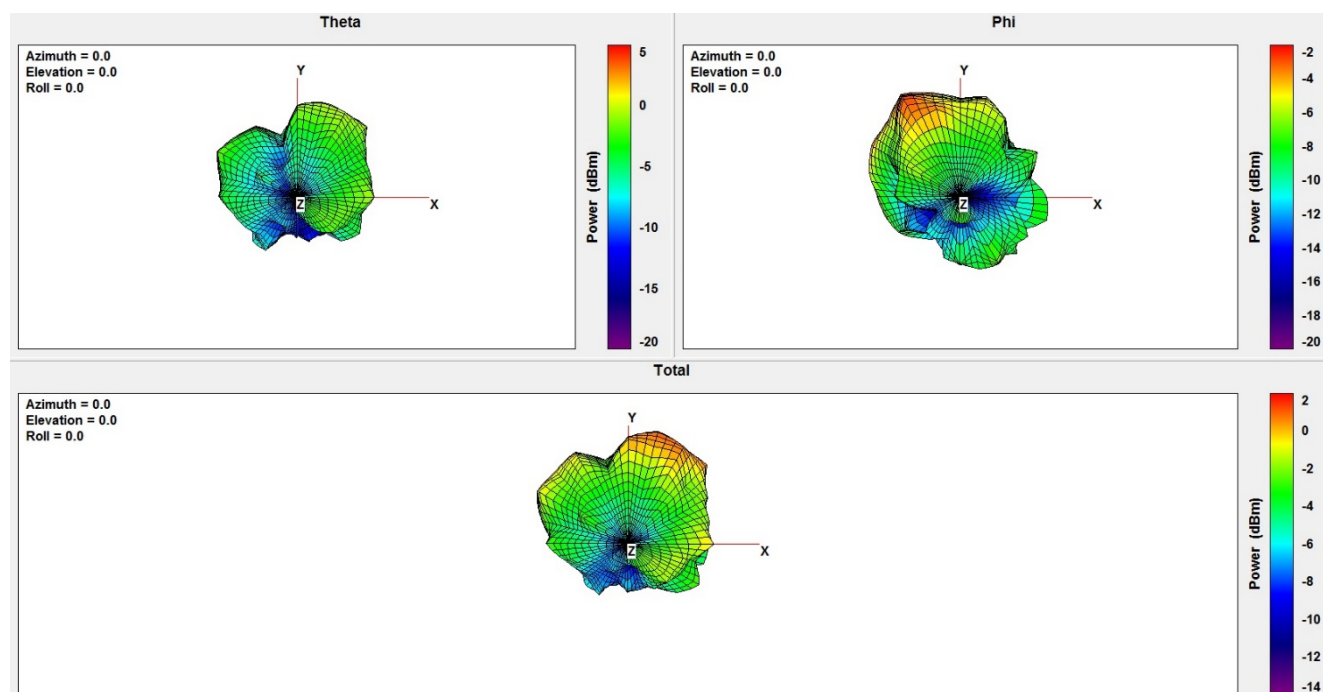
| Total | Point Values               |          |
|-------|----------------------------|----------|
|       | Ant. Port Input Pwr. (dBm) | 0        |
|       | Tot. Rad. Pwr. (dBm)       | -3,68996 |
|       | Peak EIRP (dBm)            | 0,992601 |
|       | Directivity (dBi)          | 4,68256  |
|       | Efficiency (dB)            | -3,68996 |
|       | Efficiency (%)             | 42,7567  |
|       | Gain (dBi)                 | 0,992601 |

**Plot 7:** Antenna diagram, 5700 MHz**Plot 8:**

| Total | Point Values               |          |
|-------|----------------------------|----------|
|       | Ant. Port Input Pwr. (dBm) | 0        |
|       | Tot. Rad. Pwr. (dBm)       | -4,11835 |
|       | Peak EIRP (dBm)            | 1,39913  |
|       | Directivity (dBi)          | 5,51748  |
|       | Efficiency (dB)            | -4,11835 |
|       | Efficiency (%)             | 38,7405  |
|       | Gain (dBi)                 | 1,39913  |

**Plot 9:** Antenna diagram, 5745 MHz**Plot 10:**

| Total | Point Values         |
|-------|----------------------|
|       | Ant. Port            |
|       | Input Pwr. (dBm)     |
|       | 0                    |
|       | Tot. Rad. Pwr. (dBm) |
|       | -3,65115             |
|       | Peak EIRP (dBm)      |
|       | 1,27249              |
|       | Directivity (dBi)    |
|       | 4,92364              |
|       | Efficiency (dB)      |
|       | -3,65115             |
|       | Efficiency (%)       |
|       | 43,1405              |
|       | Gain (dBi)           |
|       | 1,27249              |

**Plot 11:** Antenna Diagram, 5825 MHz**Plot 12:**

| Total | Point Values         |
|-------|----------------------|
|       | Ant. Port            |
|       | Input Pwr. (dBm)     |
|       | 0                    |
|       | Tot. Rad. Pwr. (dBm) |
|       | -3,54355             |
|       | Peak EIRP (dBm)      |
|       | 1,37877              |
|       | Directivity (dBi)    |
|       | 4,92232              |
|       | Efficiency (dB)      |
|       | -3,54355             |
|       | Efficiency (%)       |
|       | 44,2227              |
|       | Gain (dBi)           |
|       | 1,37877              |

### 11.3 Duty cycle

#### Description:

The duty cycle is necessary to compute the maximum power during an actual transmission. The shown plots and values are to show an example of the measurement procedure. The real value is measured direct during the power measurement or power density measurement. The correction value is shown in each plot of these measurements.

#### Measurement:

| Measurement parameter           |                                     |
|---------------------------------|-------------------------------------|
| According to: KDB789033 D02, B. |                                     |
| Detector:                       | Peak                                |
| Sweep time:                     | Auto                                |
| Resolution bandwidth:           | 10 MHz                              |
| Video bandwidth:                | 10 MHz                              |
| Span:                           | Zero                                |
| Trace mode:                     | Video trigger / view / single sweep |
| Used test setup:                | See chapter 6.5 A                   |
| Measurement uncertainty:        | See chapter 8                       |

#### Results:

##### Duty cycle and correction factor:

|                          |                  |    |         |
|--------------------------|------------------|----|---------|
| OFDM / a – mode:         | 100 % duty cycle | => | 0.00 dB |
| OFDM / n/ac HT20 – mode: | 100 % duty cycle | => | 0.00 dB |
| OFDM / n/ac HT40 – mode: | 100 % duty cycle | => | 0.00 dB |

## 11.4 Maximum output power

### 11.4.1 Maximum output power conducted – for FCC requirements

#### Description:

Measurement of the maximum output power conducted

#### Measurement:

| Measurement parameter               |                                                                      |
|-------------------------------------|----------------------------------------------------------------------|
| According to: KDB789033 D02, E.2.e. |                                                                      |
| Detector:                           | RMS                                                                  |
| Sweep time:                         | $\geq 10 \cdot (\text{swp points}) \cdot (\text{total on/off time})$ |
| Resolution bandwidth:               | 1 MHz                                                                |
| Video bandwidth:                    | 3 MHz                                                                |
| Span:                               | > EBW                                                                |
| Trace mode:                         | Max hold                                                             |
| Analyzer function                   | Band power / channel power<br>Interval > 26 dB EBW                   |
| Used test setup:                    | See chapter 6.5 A                                                    |
| Measurement uncertainty:            | See chapter 8                                                        |

#### Limits:

| Radiated output power                | Conducted output power for mobile equipment                                                                                                                                                                                  |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conducted power + 6 dBi antenna gain | 250mW 5.150-5.250 GHz<br>The lesser one of<br>250mW or 11 dBm + 10 log Bandwidth 5.250-5.350 GHz<br>250mW or 11 dBm + 10 log Bandwidth 5.470-5.725 GHz<br>(where Bandwidth is the 26dB Bandwidth [MHz])<br>1W 5.725-5.85 GHz |

**Result:** OFDM / a – mode

| OFDM / a – mode<br><br>Channel | Maximum output power conducted [dBm] |          |          |          |
|--------------------------------|--------------------------------------|----------|----------|----------|
|                                | 5180 MHz                             | 5240 MHz | 5260 MHz | 5320 MHz |
|                                | 10.5                                 | 10.8     | 11.2     | 11.7     |
| Channel                        | 5500 MHz                             | 5600 MHz | 5700 MHz | -/-      |
|                                | 12.7                                 | 12.4     | 12.2     | -/-      |
| Channel                        | 5745 MHz                             | 5785 MHz | 5825 MHz | -/-      |
|                                | 11.0                                 | 10.8     | 10.6     | -/-      |

**Result:** OFDM / n/ac HT20 – mode

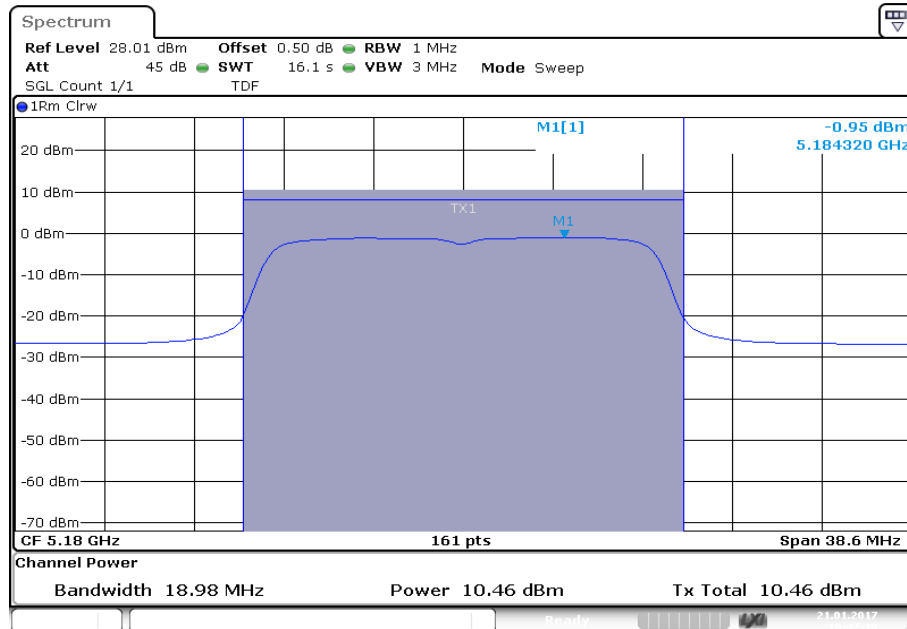
| OFDM / n/ac HT20 – mode<br><br>Channel | Maximum output power conducted [dBm] |          |          |          |
|----------------------------------------|--------------------------------------|----------|----------|----------|
|                                        | 5180 MHz                             | 5240 MHz | 5260 MHz | 5320 MHz |
|                                        | 10.0                                 | 9.5      | 10.0     | 11.2     |
| Channel                                | 5500 MHz                             | 5600 MHz | 5700 MHz | -/-      |
|                                        | 12.9                                 | 12.5     | 12.2     | -/-      |
| Channel                                | 5745 MHz                             | 5785 MHz | 5825 MHz | -/-      |
|                                        | 10.5                                 | 10.9     | 10.6     | -/-      |

**Result:** OFDM / n/ac HT40 – mode

| OFDM / n/ac HT40 – mode<br><br>Channel | Maximum output power conducted [dBm] |          |          |          |
|----------------------------------------|--------------------------------------|----------|----------|----------|
|                                        | 5190 MHz                             | 5230 MHz | 5270 MHz | 5310 MHz |
|                                        | 5.9                                  | 11.1     | 11.3     | 8.3      |
| Channel                                | 5510 MHz                             | 5590 MHz | 5670 MHz | -/-      |
|                                        | 12.3                                 | 12.7     | 12.2     | -/-      |
| Channel                                | 5755 MHz                             | 5795 MHz | -/-      | -/-      |
|                                        | 10.9                                 | 11.2     | -/-      | -/-      |

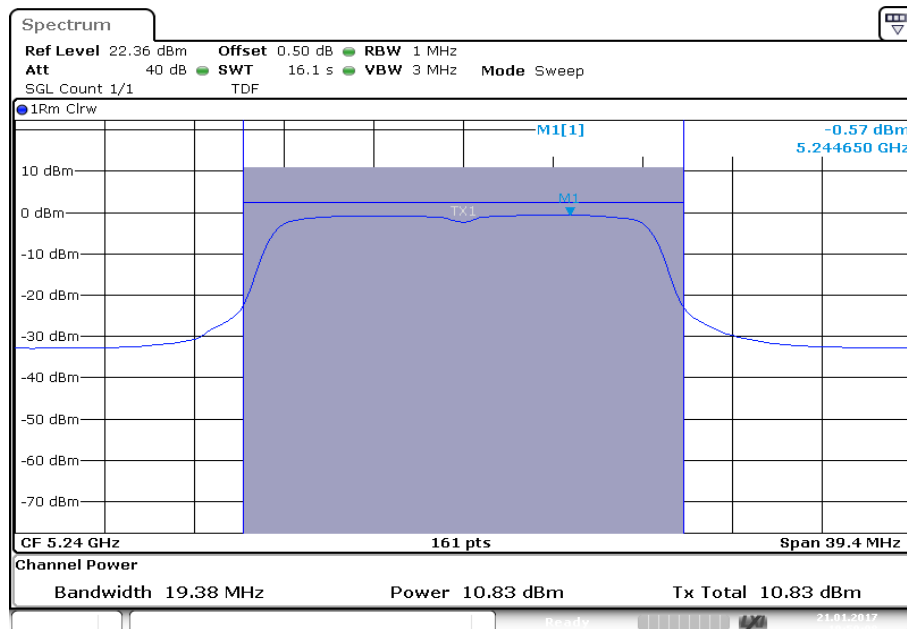
**Plots:** OFDM / a – mode

**Plot 1:** 5180 MHz



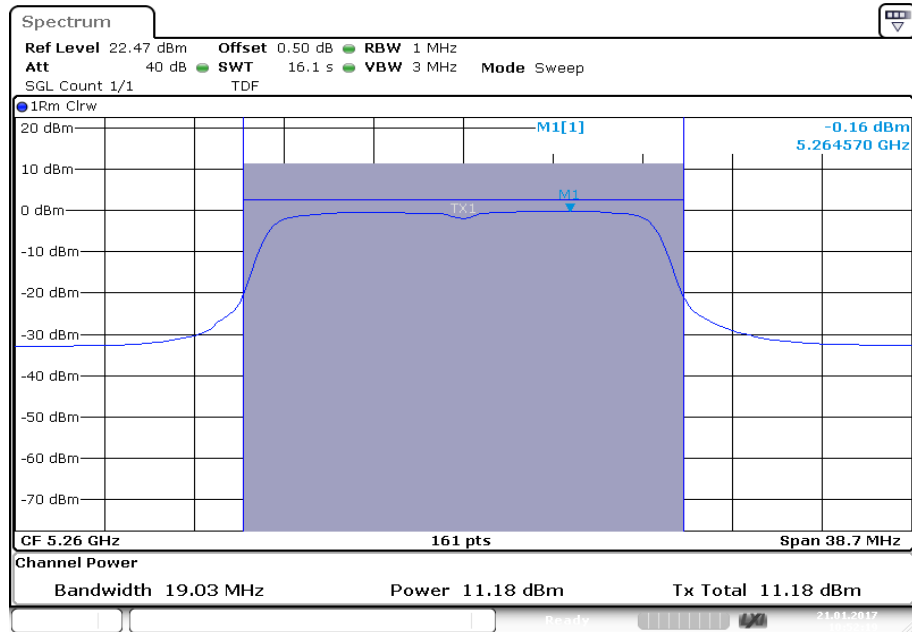
Date: 21.JAN.2017 10:47:18

**Plot 2:** 5240 MHz



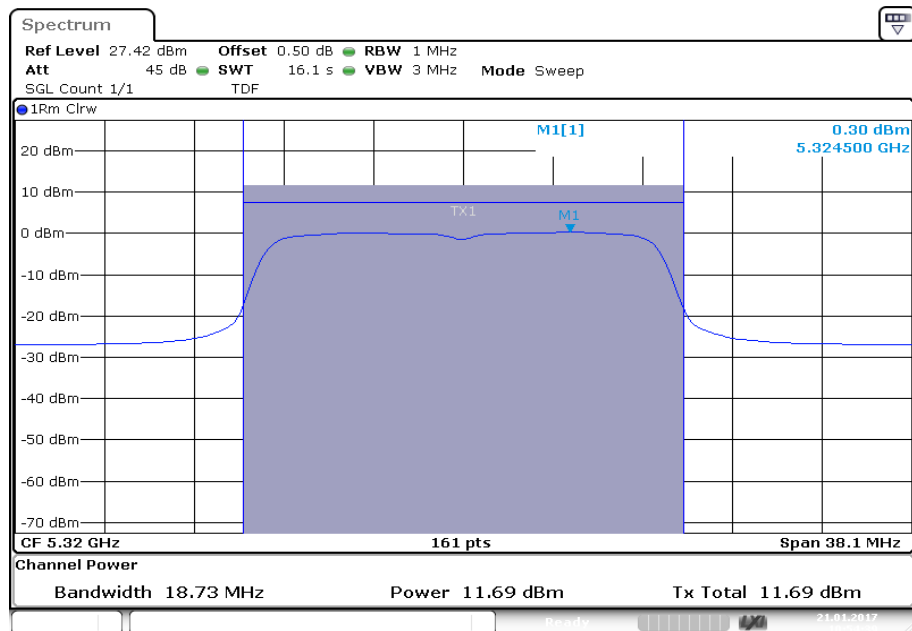
Date: 21.JAN.2017 10:50:08

Plot 3: 5260 MHz



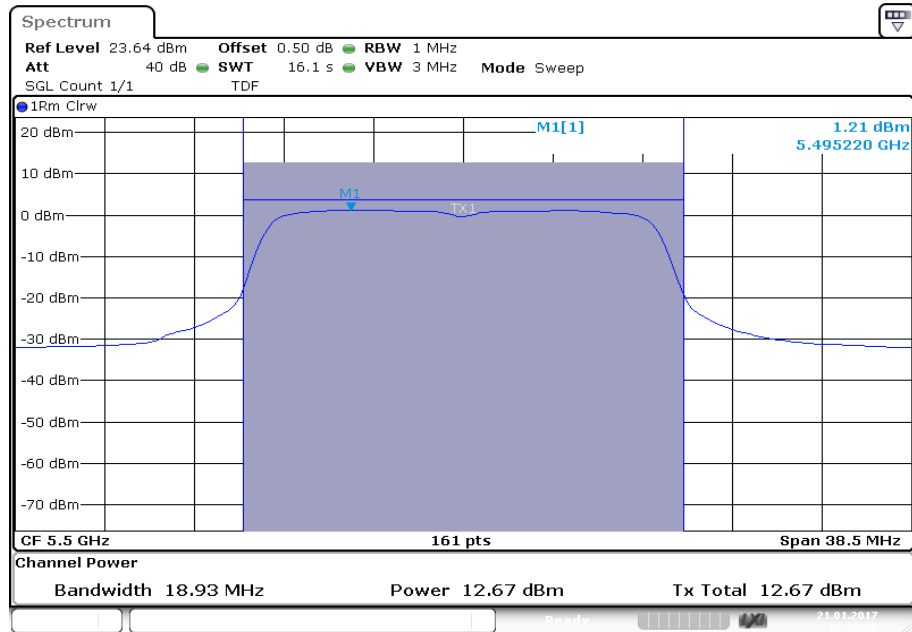
Date: 21.JAN.2017 10:52:19

Plot 4: 5320 MHz



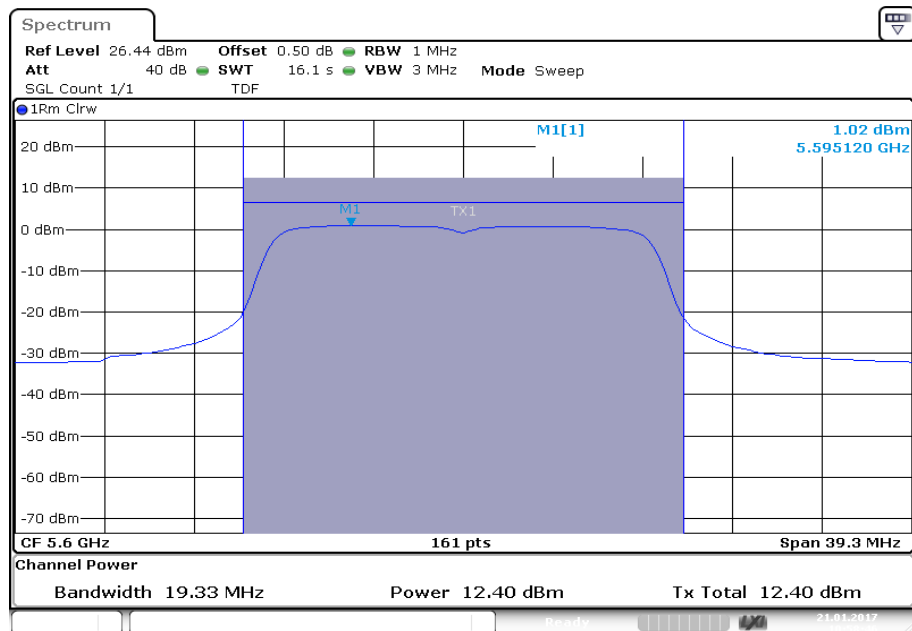
Date: 21.JAN.2017 10:54:39

Plot 5: 5500 MHz



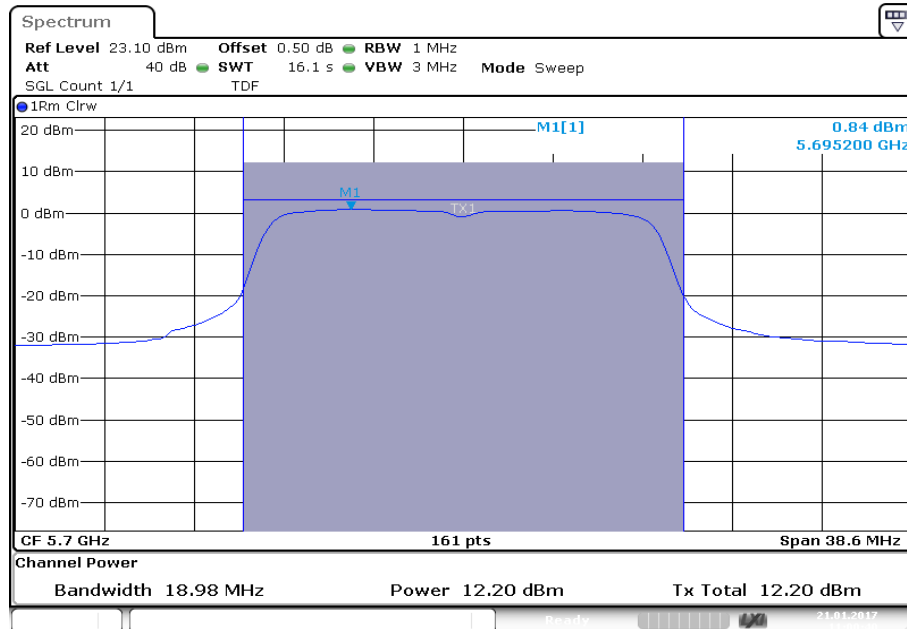
Date: 21.JAN.2017 10:56:29

Plot 6: 5600 MHz

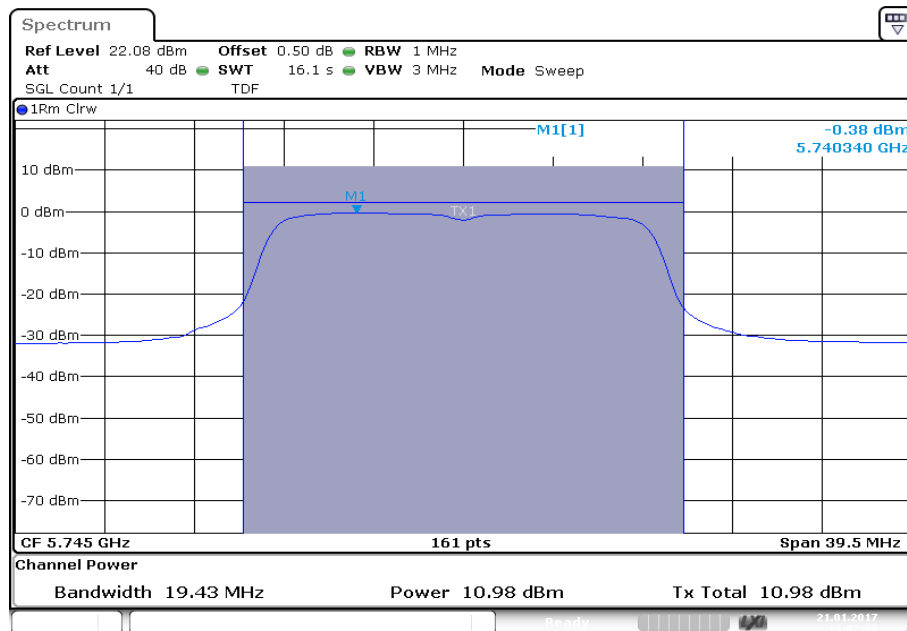


Date: 21.JAN.2017 10:58:45

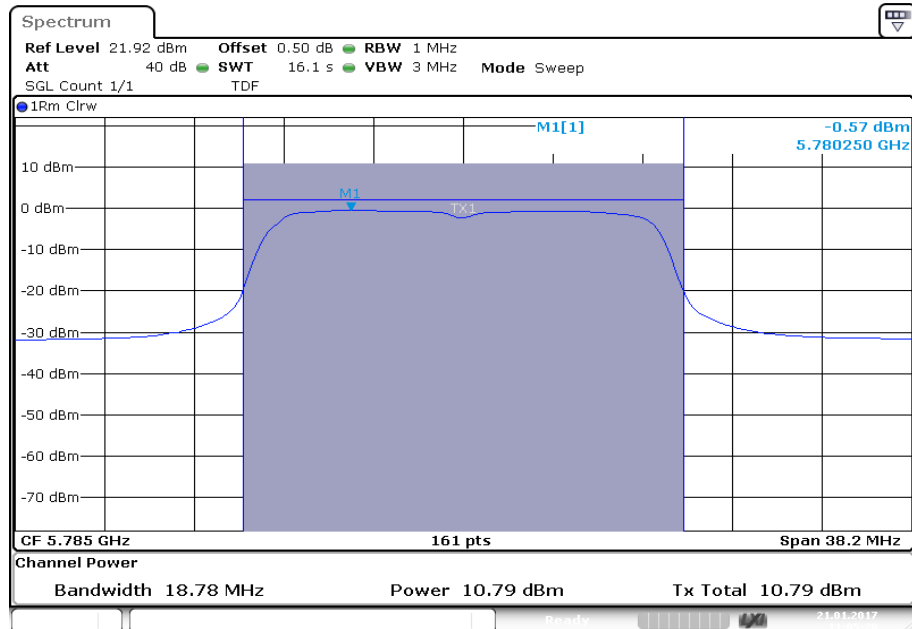
Plot 7: 5700 MHz



Plot 8: 5745 MHz

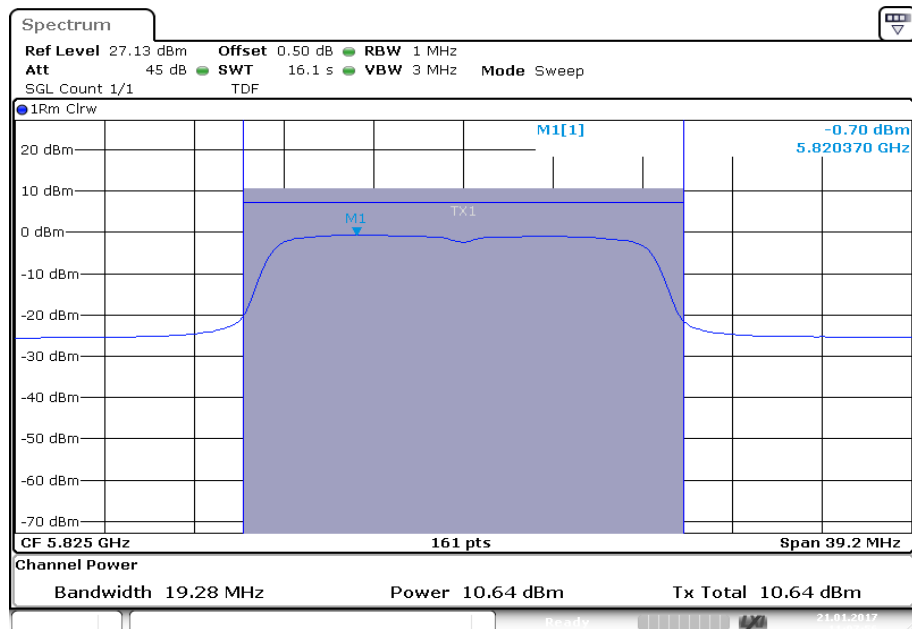


Plot 9: 5785 MHz



Date: 21.JAN.2017 11:05:20

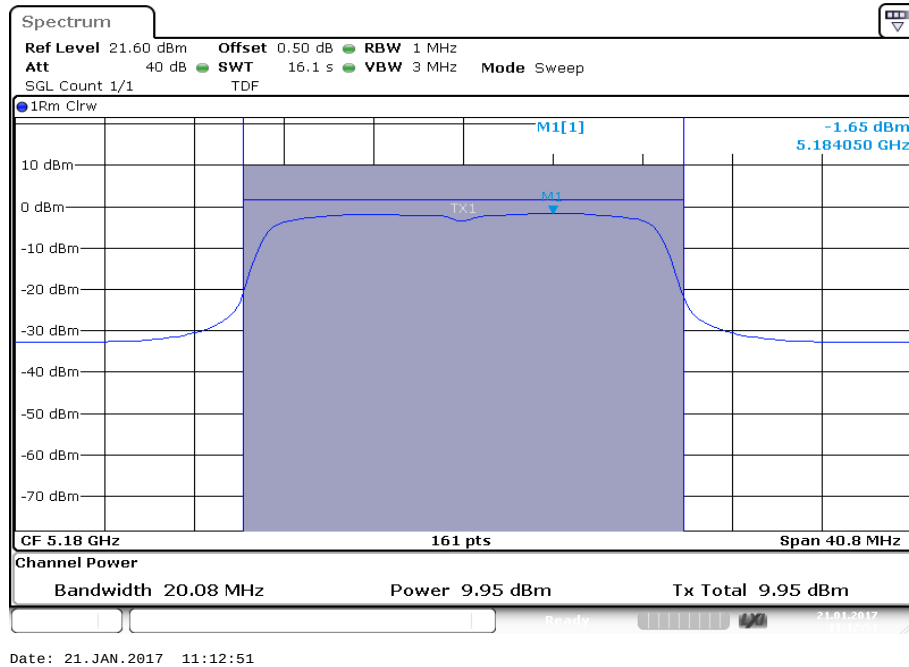
Plot 10: 5825 MHz



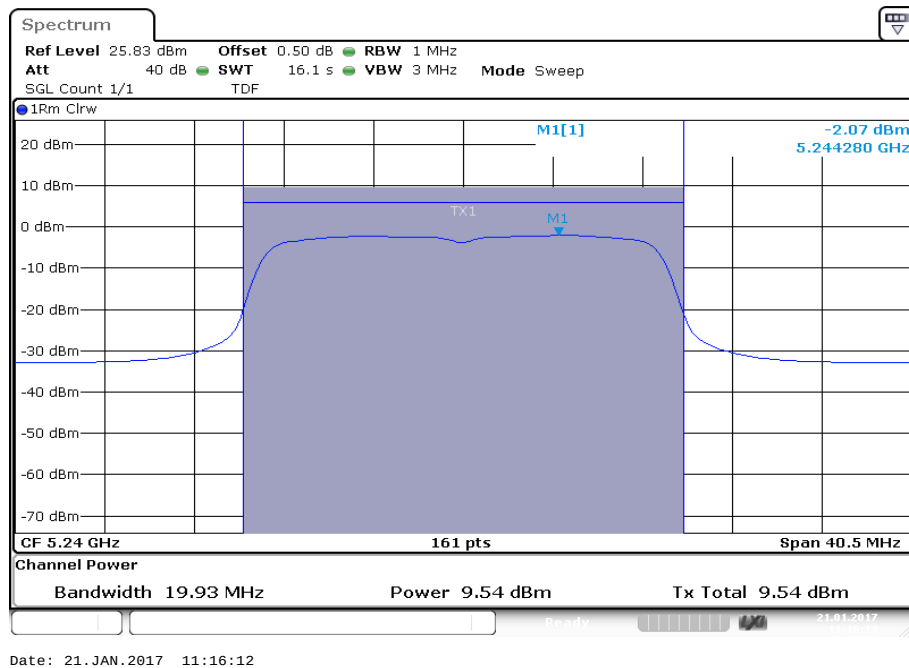
Date: 21.JAN.2017 11:07:56

**Plots:** OFDM / n/ac HT20 – mode

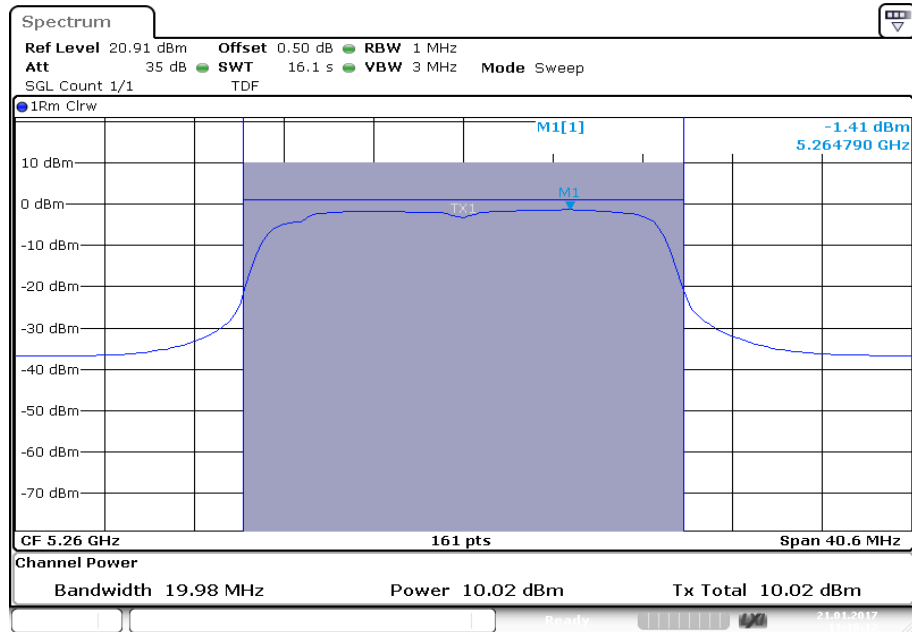
**Plot 1:** 5180 MHz



**Plot 2:** 5240 MHz

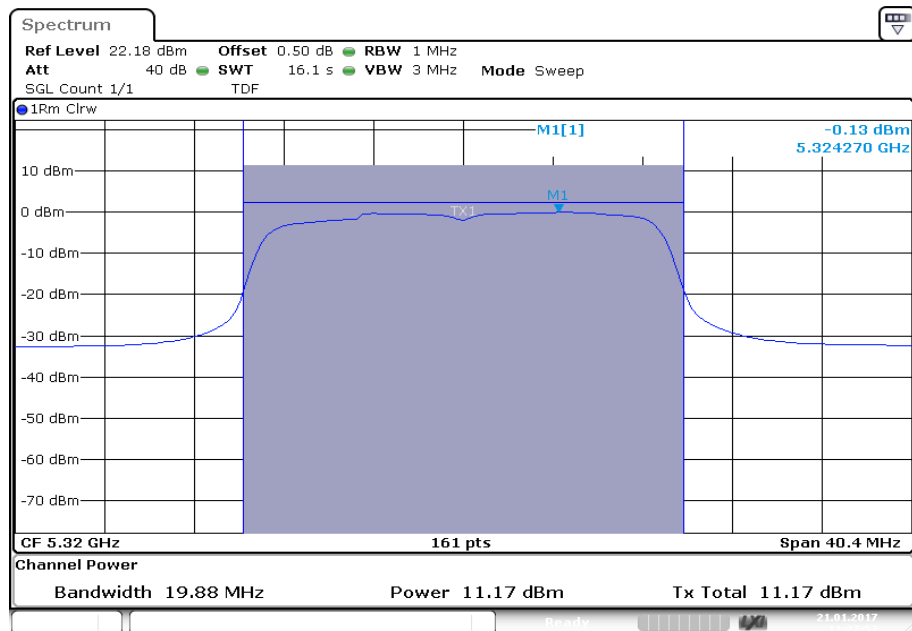


Plot 3: 5260 MHz



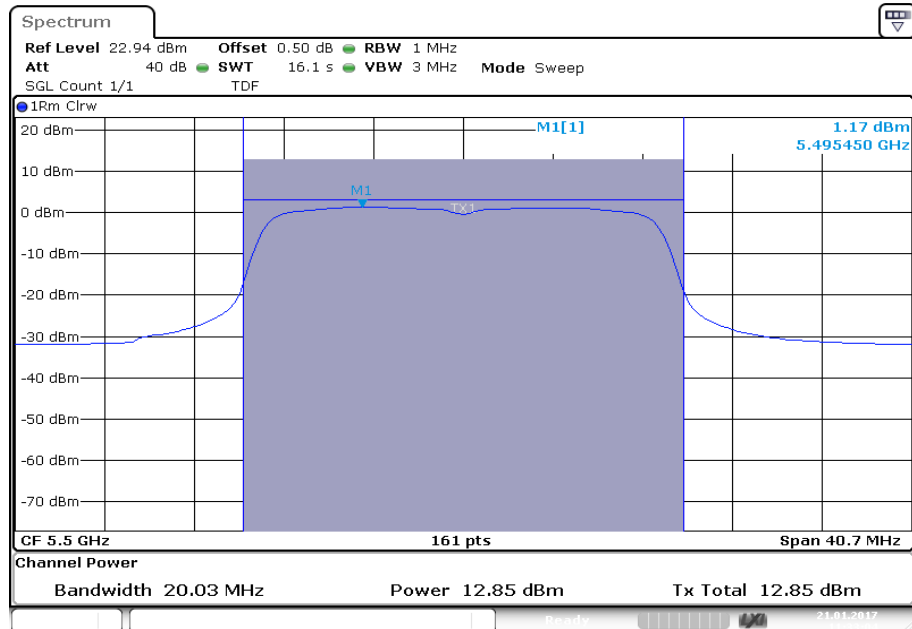
Date: 21.JAN.2017 11:18:12

Plot 4: 5320 MHz

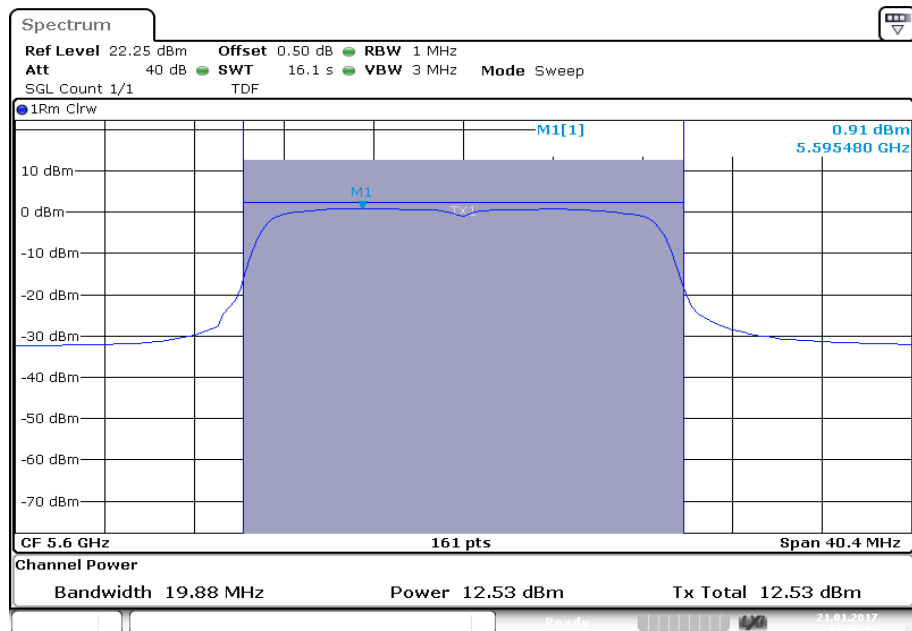


Date: 21.JAN.2017 11:27:57

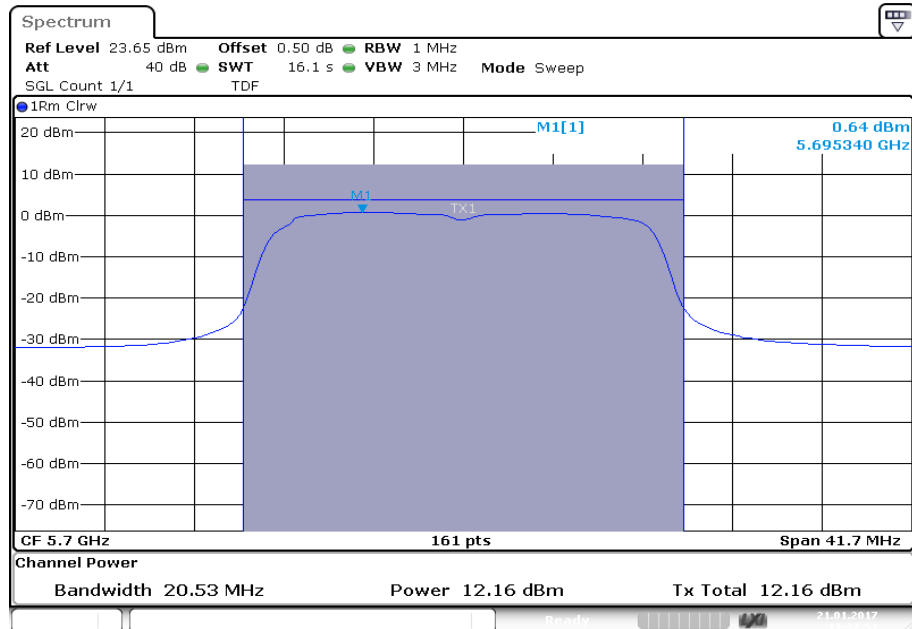
Plot 5: 5500 MHz



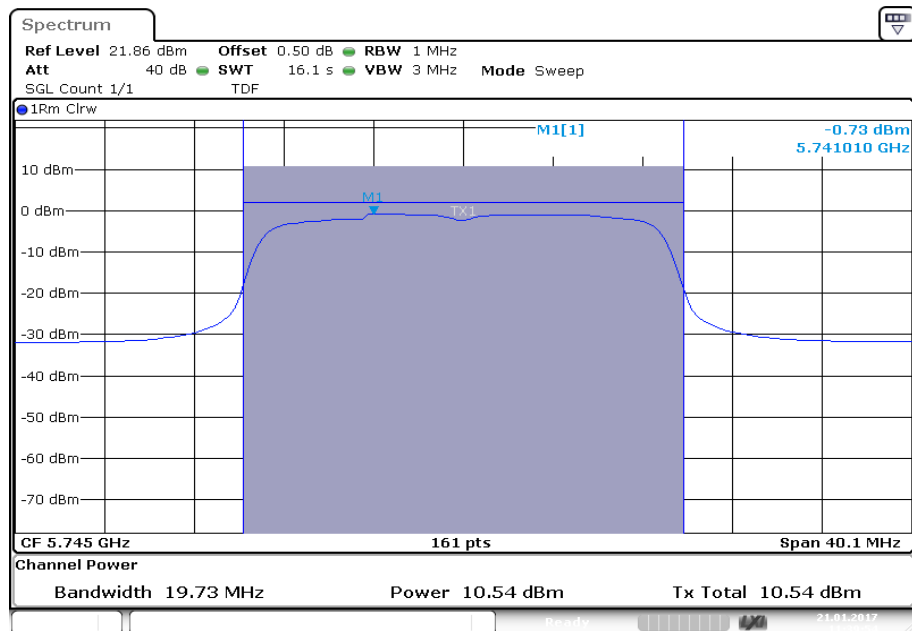
Plot 6: 5600 MHz



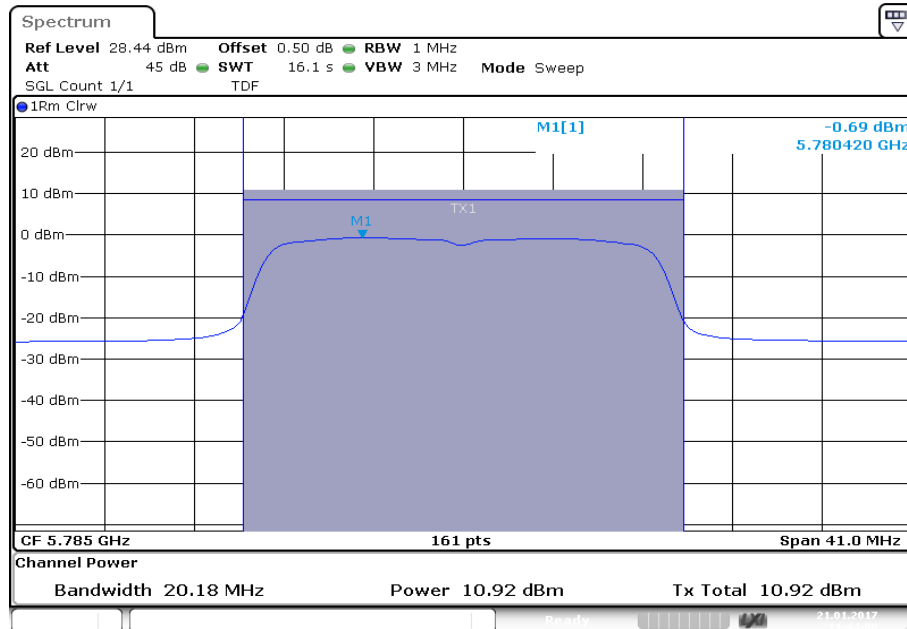
Plot 7: 5700 MHz



Plot 8: 5745 MHz

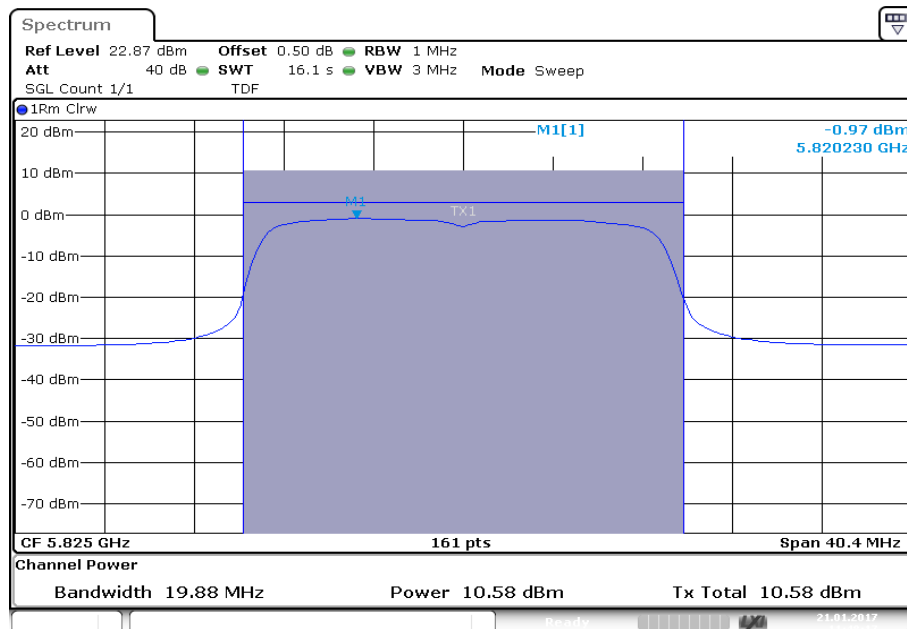


Plot 9: 5785 MHz



Date: 21.JAN.2017 11:44:08

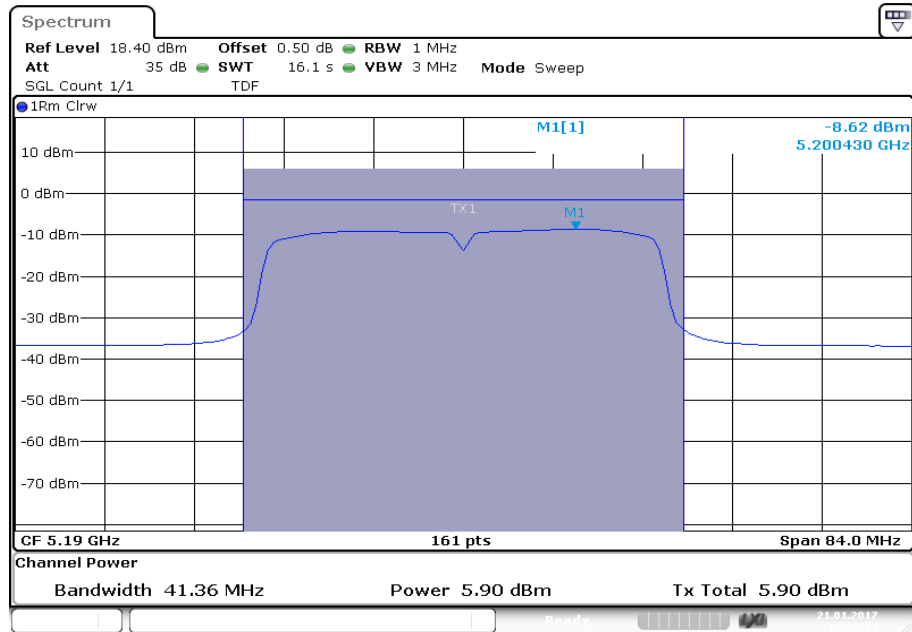
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:48:17

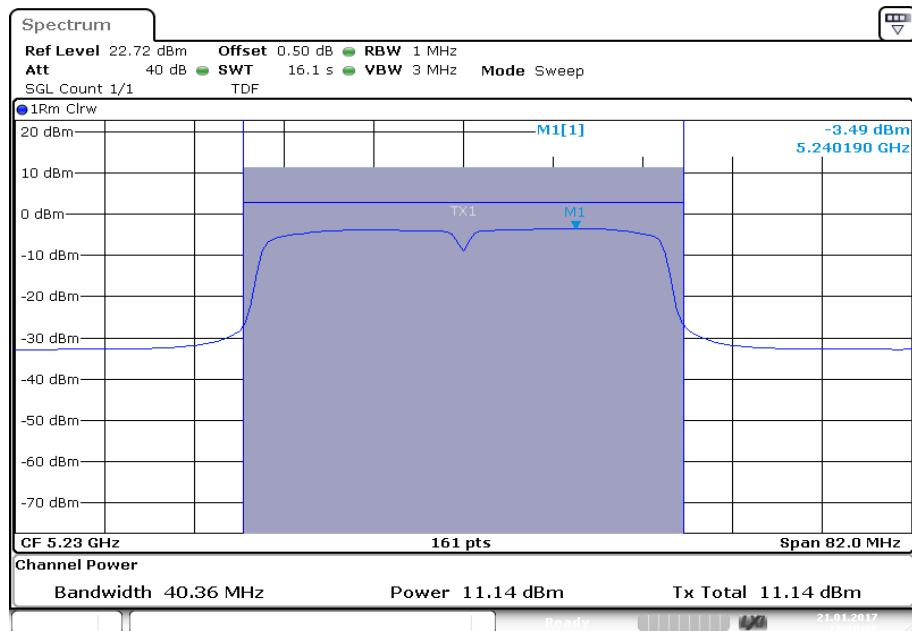
**Plots:** OFDM / n/ac HT40 – mode

**Plot 1:** 5190 MHz



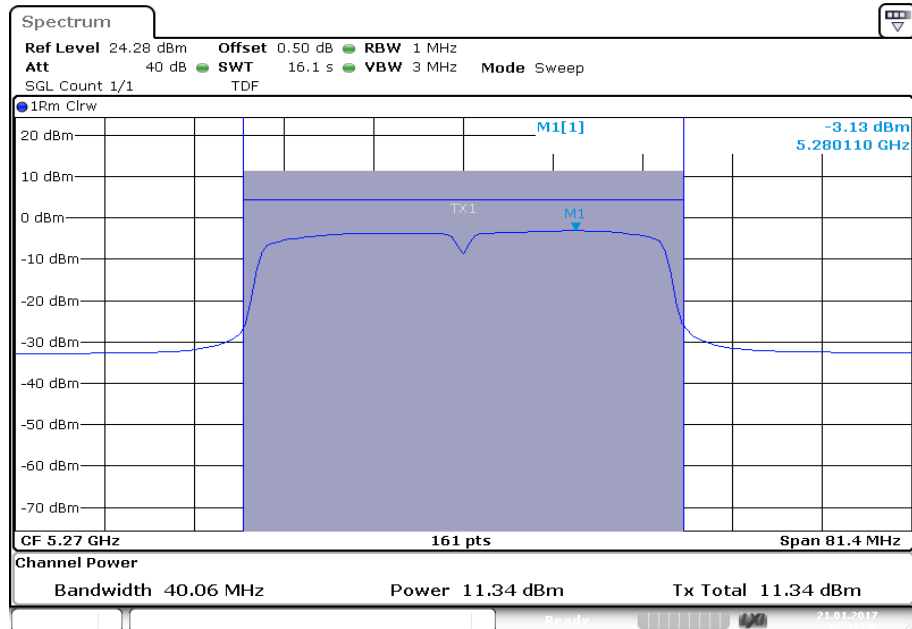
Date: 21.JAN.2017 12:08:34

**Plot 2:** 5230 MHz



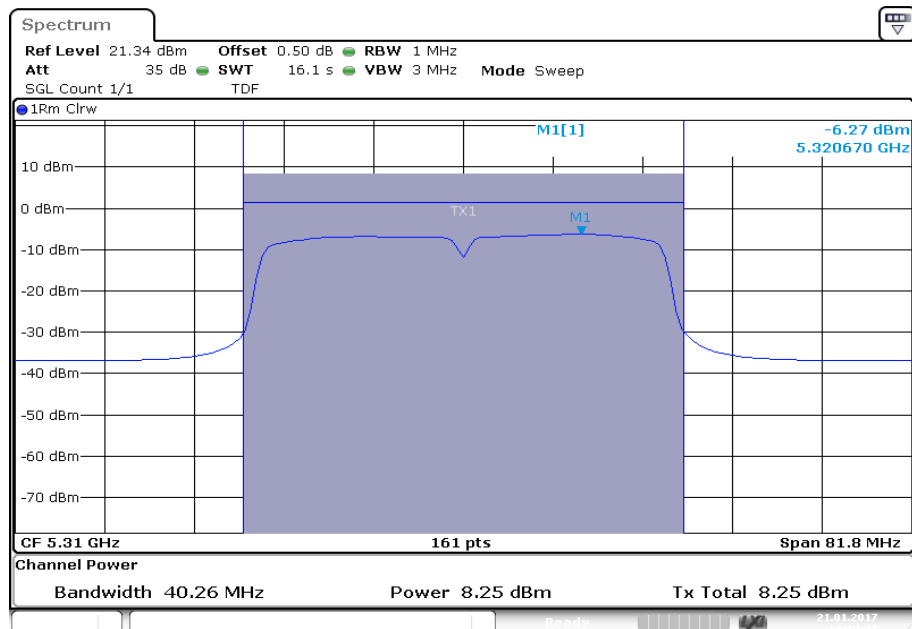
Date: 21.JAN.2017 12:10:36

Plot 3: 5270 MHz



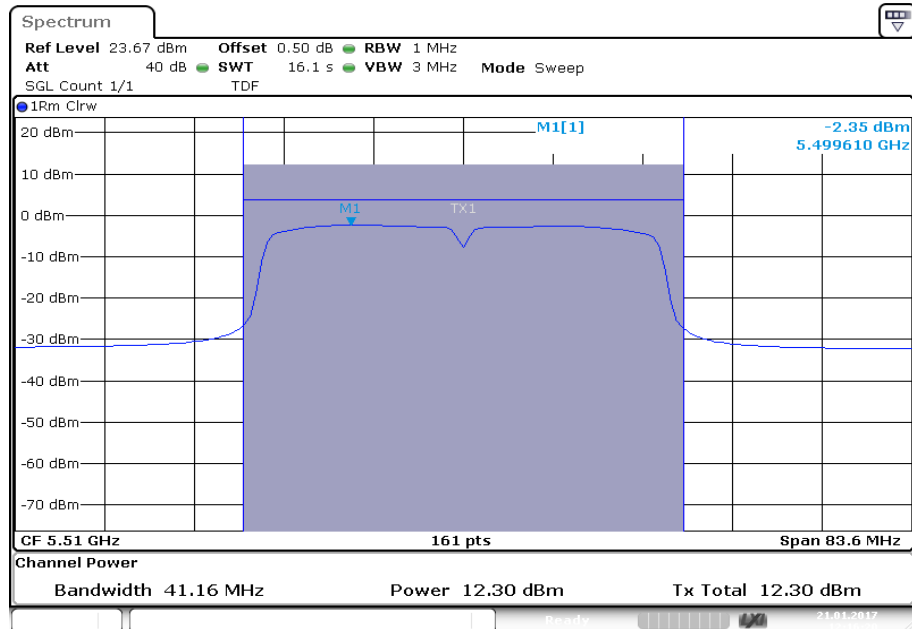
Date: 21.JAN.2017 12:12:30

Plot 4: 5310 MHz



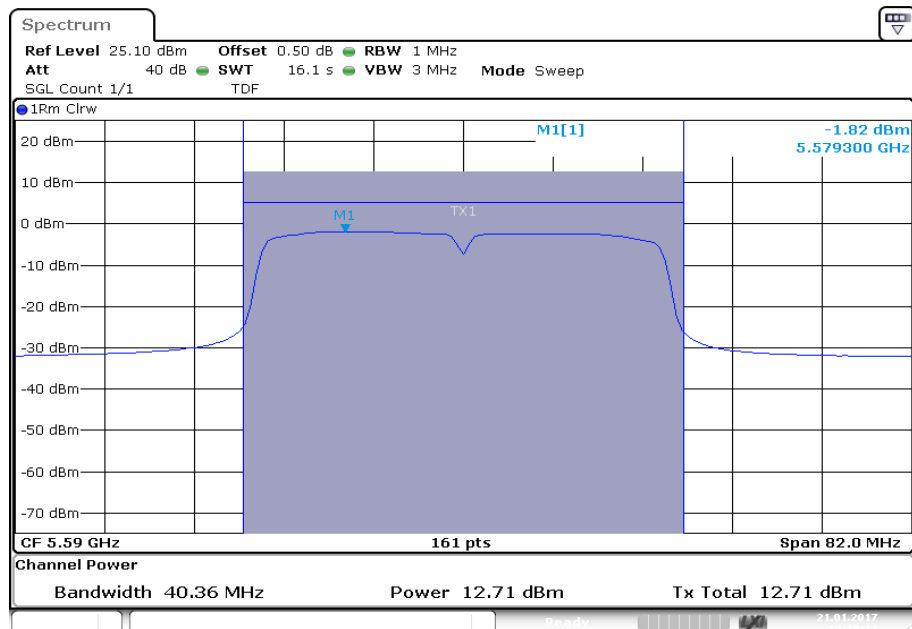
Date: 21.JAN.2017 12:14:27

Plot 5: 5510 MHz



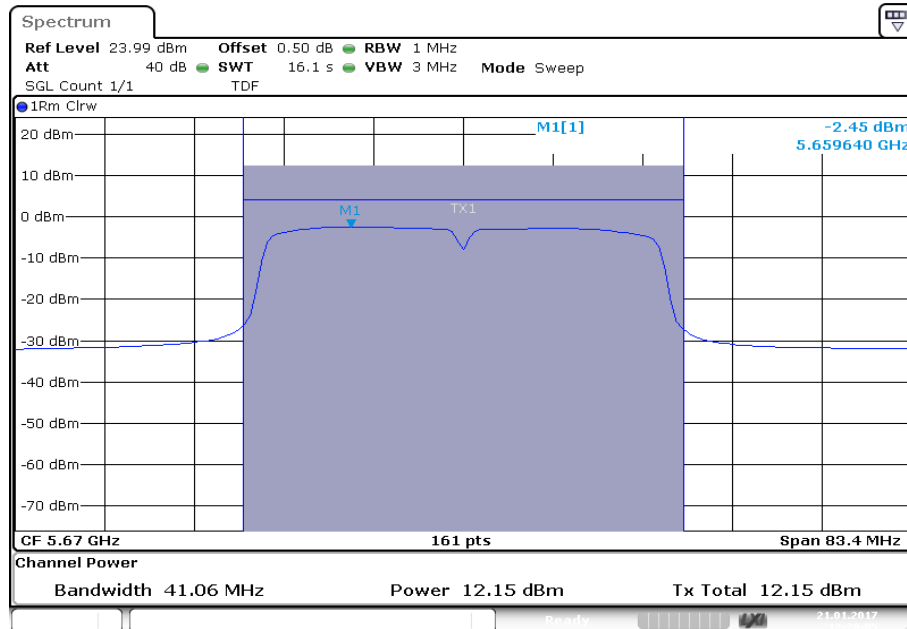
Date: 21.JAN.2017 12:16:20

Plot 6: 5590 MHz



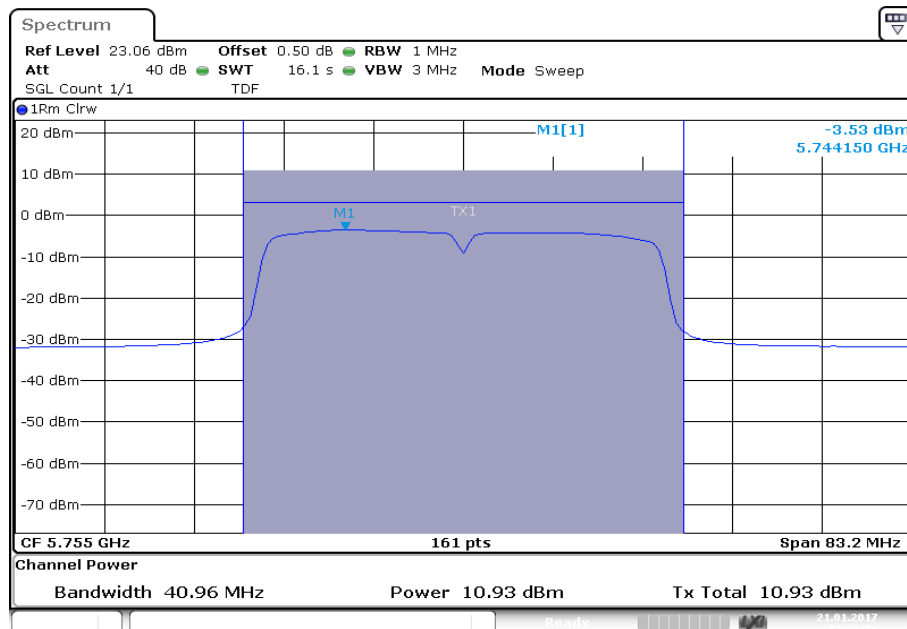
Date: 21.JAN.2017 12:18:13

Plot 7: 5670 MHz



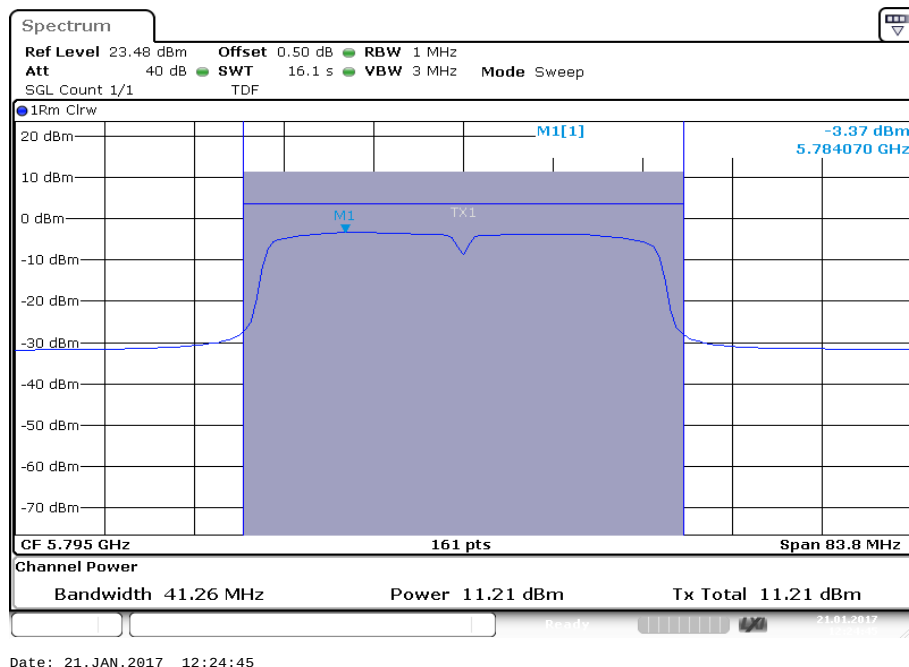
Date: 21.JAN.2017 12:20:04

Plot 8: 5755 MHz



Date: 21.JAN.2017 12:21:56

Plot 9: 5795 MHz



### 11.4.2 Maximum output power – for IC requirements

#### Description:

Measurement of the maximum output power conducted + radiated

#### Measurement:

| Measurement parameter    |                                                                      |
|--------------------------|----------------------------------------------------------------------|
| Detector:                | RMS                                                                  |
| Sweep time:              | $\geq 10 \cdot (\text{swp points}) \cdot (\text{total on/off time})$ |
| Resolution bandwidth:    | 1 MHz                                                                |
| Video bandwidth:         | $\geq 3$ MHz                                                         |
| Span:                    | > EBW                                                                |
| Trace mode:              | Max hold                                                             |
| Analyzer function        | Band power / channel power<br>Interval > 99% OBW                     |
| Used test setup:         | See chapter 6.5 A                                                    |
| Measurement uncertainty: | See chapter 8                                                        |

#### Limits:

| Radiated output power                                                                                                                                                                                                                                                                   | Conducted output power for mobile equipment                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The lesser one of<br>200 mW or 10 dBm + 10 log Bandwidth 5.150-5.250 GHz<br>1 W or 17 dBm + 10 log Bandwidth 5.250-5.350 GHz<br>1 W or 17 dBm + 10 log Bandwidth 5.470-5.725 GHz<br>(where Bandwidth is the 99% Bandwidth [MHz])<br>Conducted power + 6dBi antenna gain 5.725-5.825 GHz | The lesser one of<br>250mW or 11 dBm + 10 log Bandwidth 5.250-5.350 GHz<br>250mW or 11 dBm + 10 log Bandwidth 5.470-5.725 GHz<br>(where Bandwidth is the 99% Bandwidth [MHz])<br>1W 5.725-5.825 GHz |

**Result:** OFDM / a – mode

| OFDM / a – mode                        | Maximum output power [dBm] |           |           |          |          |
|----------------------------------------|----------------------------|-----------|-----------|----------|----------|
|                                        | Channel                    | 5180 MHz* | 5240 MHz* | 5260 MHz | 5320 MHz |
| Including duty cycle correction factor |                            | 10.4      | 10.7      | 11.1     | 11.6     |
| Channel                                |                            | 5500 MHz  | 5600 MHz  | 5700 MHz | -/-      |
| Including duty cycle correction factor |                            | 12.6      | 12.3      | 12.1     | -/-      |
| Channel                                |                            | 5745 MHz  | 5785 MHz  | 5825 MHz | -/-      |
| Including duty cycle correction factor |                            | 11.0      | 10.7      | 10.9     | -/-      |

\*find EIRP values for each antenna on the next page

**Result:** OFDM / n/ac HT20 – mode

| OFDM / n/ac HT20 – mode                | Maximum output power [dBm] |           |          |          |
|----------------------------------------|----------------------------|-----------|----------|----------|
| Channel                                | 5180 MHz*                  | 5240 MHz* | 5260 MHz | 5320 MHz |
| Including duty cycle correction factor | 9.9                        | 9.7       | 10.0     | 11.3     |
| Channel                                | 5500 MHz                   | 5600 MHz  | 5700 MHz | -/-      |
| Including duty cycle correction factor | 12.7                       | 12.4      | 12.1     | -/-      |
| Channel                                | 5745 MHz                   | 5785 MHz  | 5825 MHz | -/-      |
| Including duty cycle correction factor | 10.7                       | 10.9      | 10.4     | -/-      |

\*find EIRP values for each antenna on the next page

**Result:** OFDM / n/ac HT40 – mode

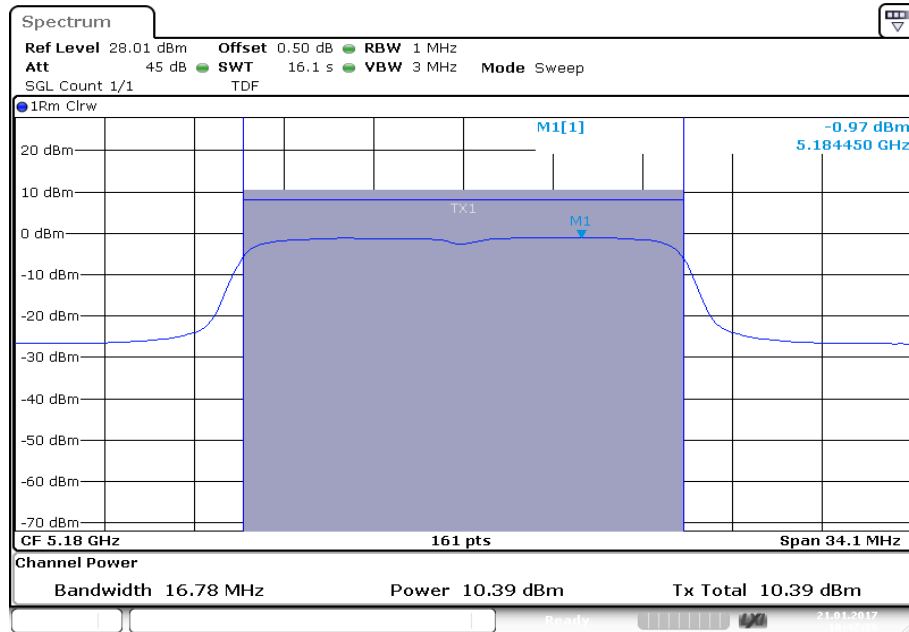
| OFDM / n/ac HT40 – mode                | Maximum output power [dBm] |           |           |          |          |
|----------------------------------------|----------------------------|-----------|-----------|----------|----------|
|                                        | Channel                    | 5190 MHz* | 5230 MHz* | 5270 MHz | 5310 MHz |
| Including duty cycle correction factor |                            | 6.5       | 11.0      | 11.2     | 8.7      |
| Channel                                |                            | 5510 MHz  | 5590 MHz  | 5670 MHz | -/-      |
| Including duty cycle correction factor |                            | 12.2      | 12.6      | 12.0     | -/-      |
| Channel                                |                            | 5755 MHz  | 5795 MHz  | -/-      | -/-      |
| Including duty cycle correction factor |                            | 10.8      | 11.1      | -/-      | -/-      |

\*find EIRP values for each antenna in the next table

|                                  | Maximum output power EIRP [dBm] |                    |                    |                    |                    |                    |
|----------------------------------|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                  | a-mode<br>5180 MHz              | a-mode<br>5240 MHz | n HT20<br>5180 MHz | n HT20<br>5240 MHz | n HT40<br>5190 MHz | n HT40<br>5230 MHz |
| IV2 TRNS Antenna<br>WLAN IIT 1.4 | 12.3                            | 12.6               | 11.8               | 11.6               | 8.4                | 12.9               |
| Ant M3002-66494                  | 11.6                            | 11.9               | 11.1               | 10.9               | 7.7                | 12.2               |
| Ant 453564154611                 | 7.1                             | 7.4                | 6.6                | 6.4                | 3.2                | 7.7                |
| Ant 453564175981                 | 14.0                            | 14.3               | 13.5               | 13.3               | 10.1               | 14.6               |
| Ant 453564271931                 | 10.2                            | 10.5               | 9.7                | 9.5                | 6.3                | 10.8               |

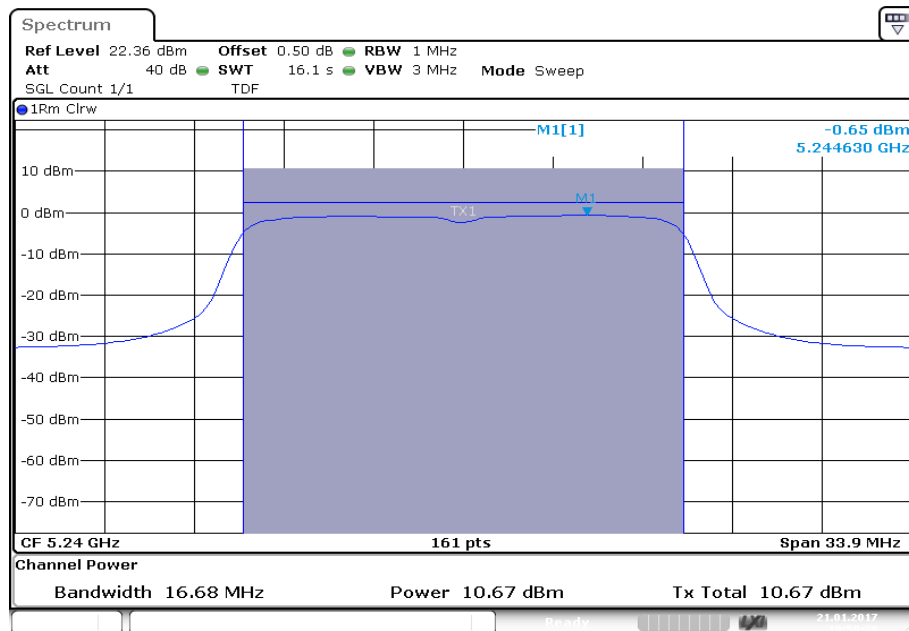
**Plots:** OFDM / a – mode

**Plot 1:** 5180 MHz



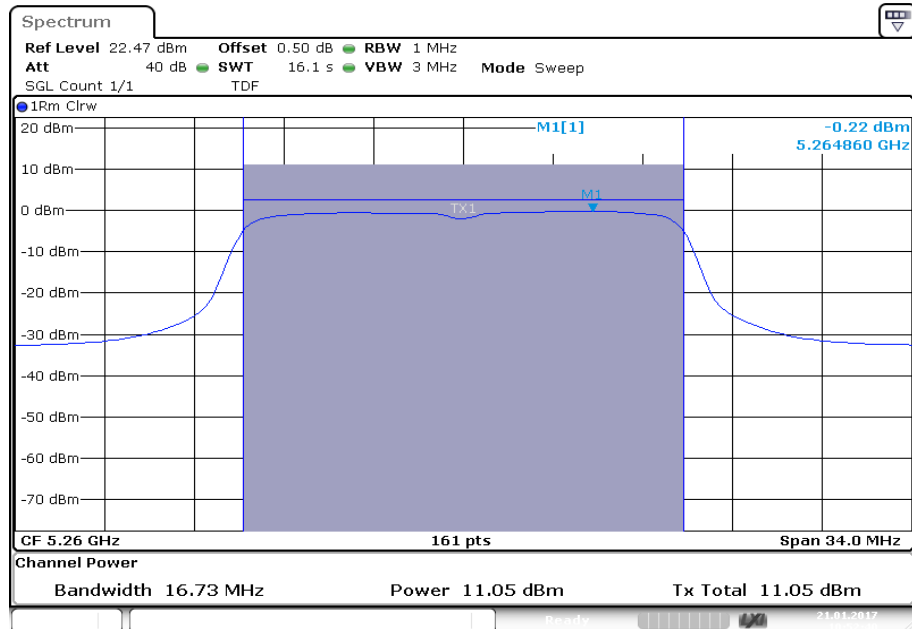
Date: 21.JAN.2017 10:47:38

**Plot 2:** 5240 MHz



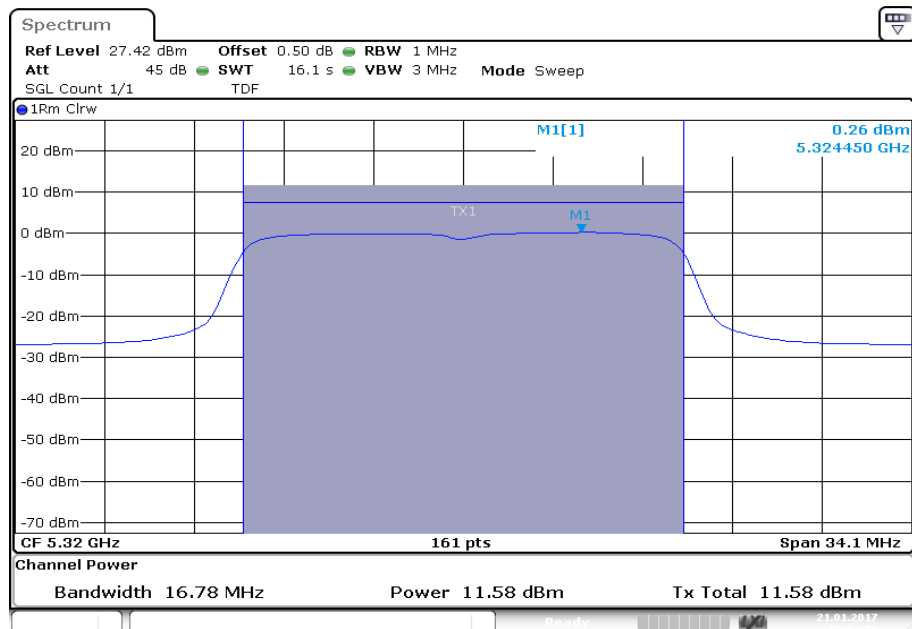
Date: 21.JAN.2017 10:50:28

Plot 3: 5260 MHz



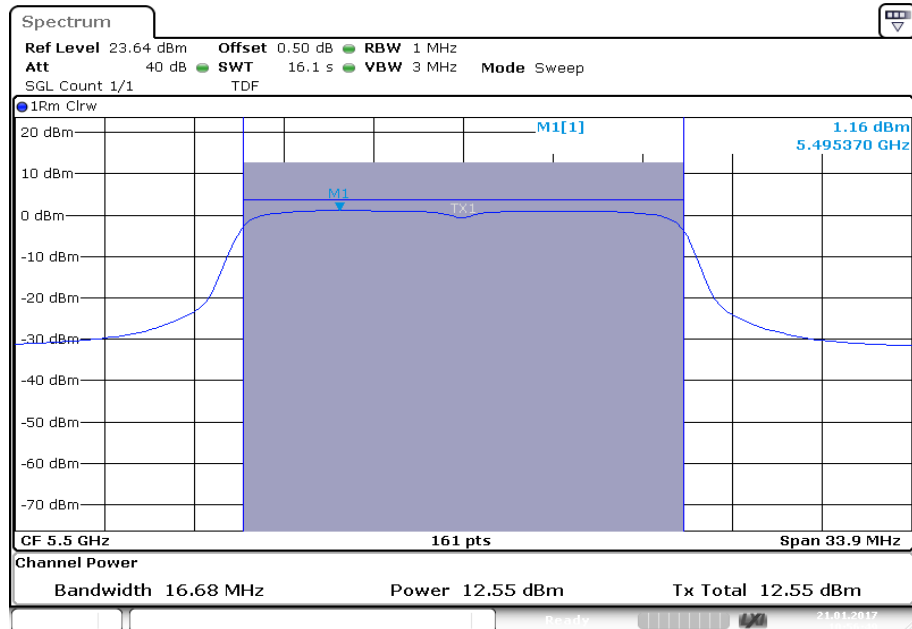
Date: 21.JAN.2017 10:52:40

Plot 4: 5320 MHz



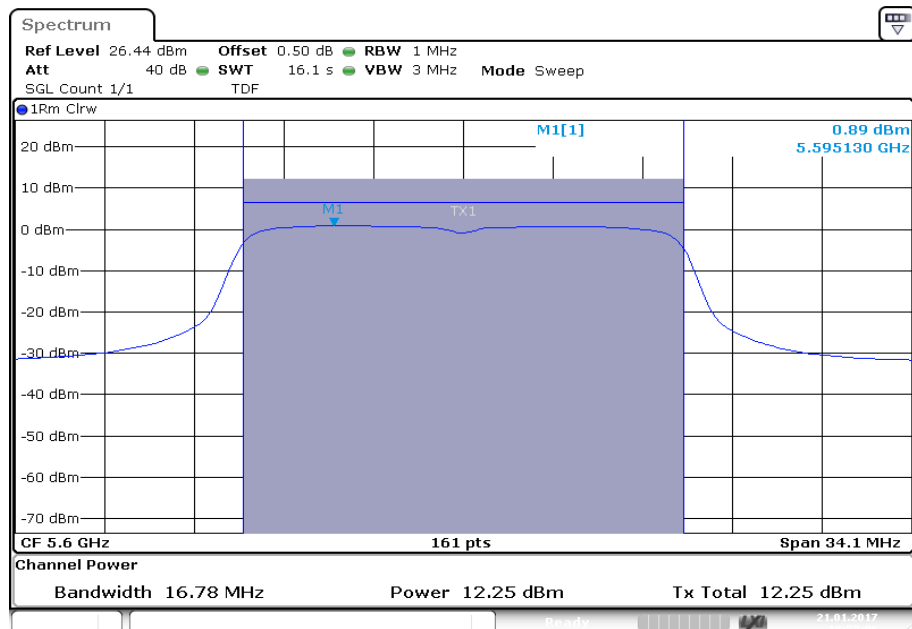
Date: 21.JAN.2017 10:54:59

Plot 5: 5500 MHz



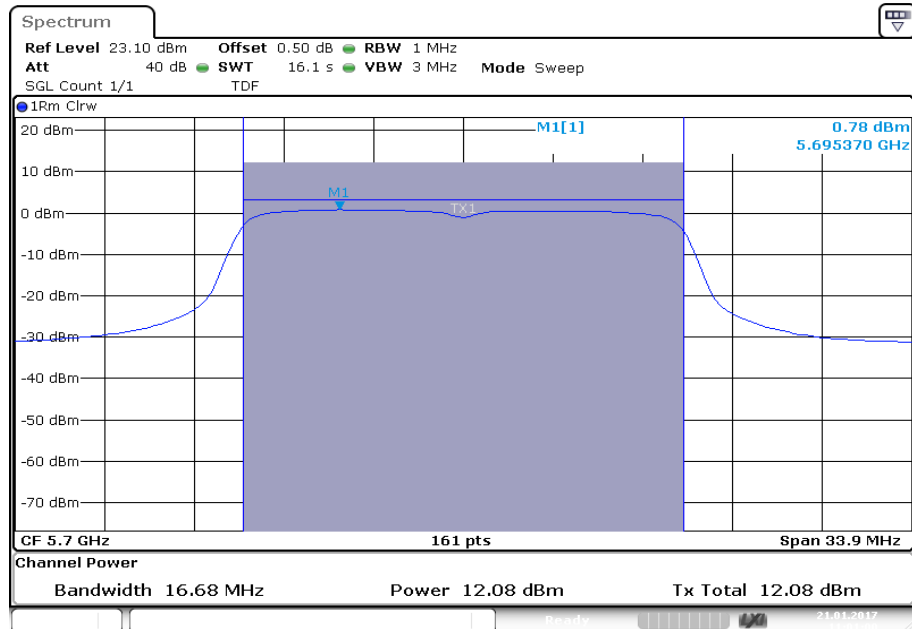
Date: 21.JAN.2017 10:56:49

Plot 6: 5600 MHz



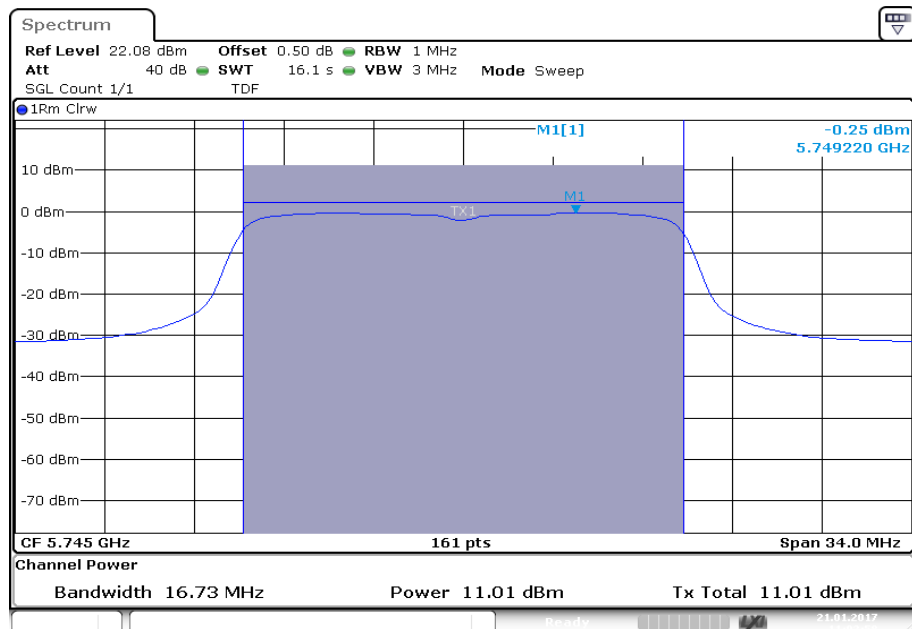
Date: 21.JAN.2017 10:59:05

Plot 7: 5700 MHz



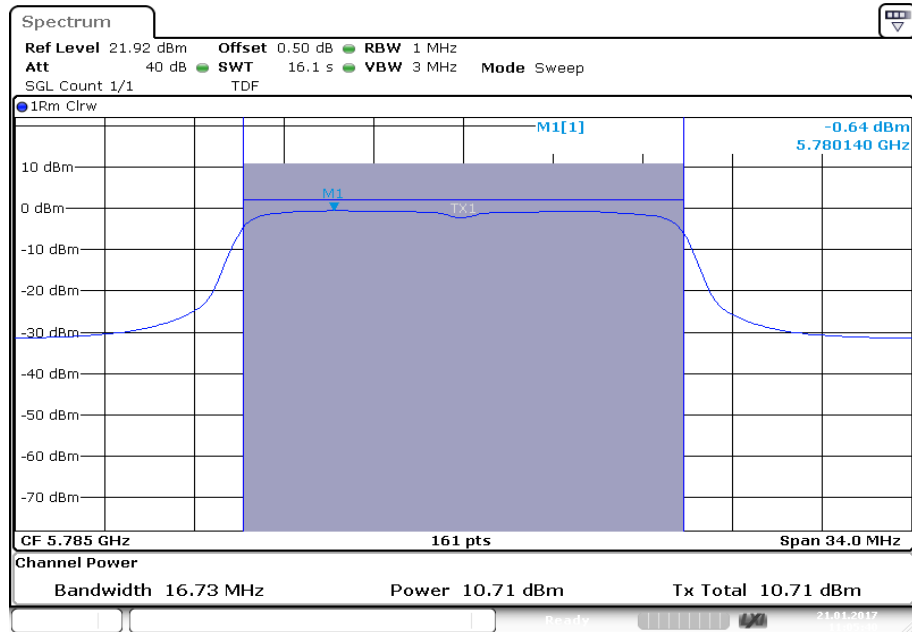
Date: 21.JAN.2017 11:01:00

Plot 8: 5745 MHz

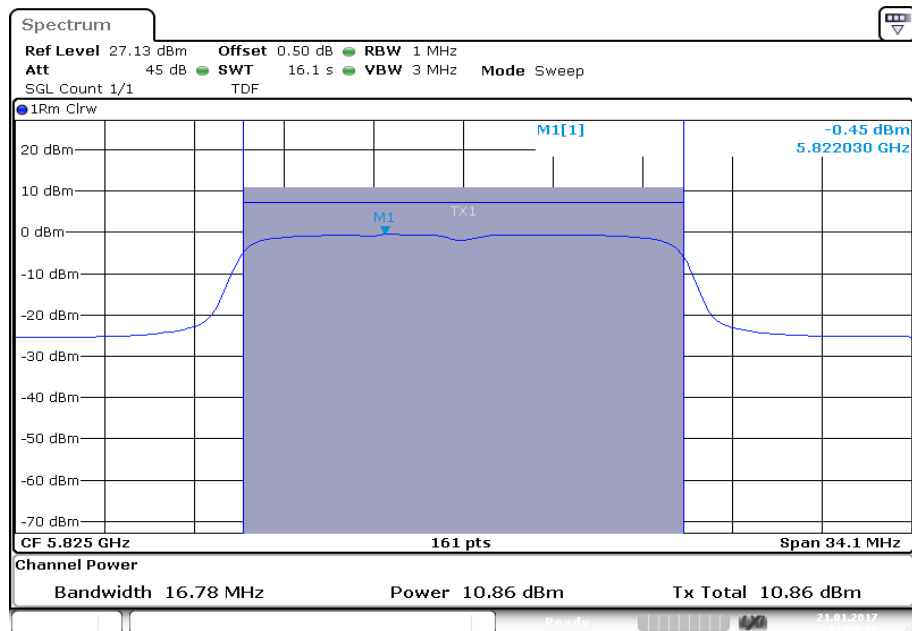


Date: 21.JAN.2017 11:02:58

Plot 9: 5785 MHz

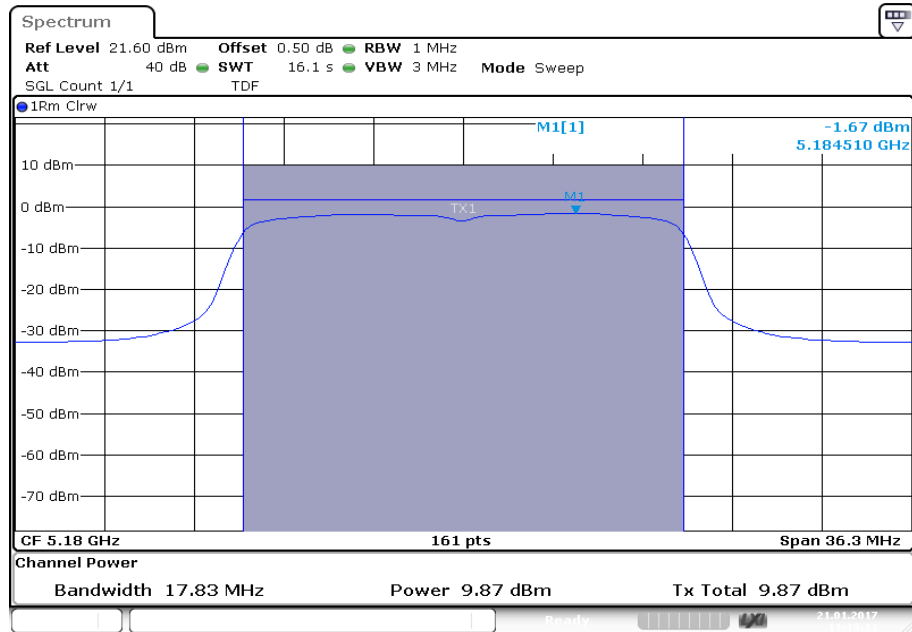


Plot 10: 5825 MHz



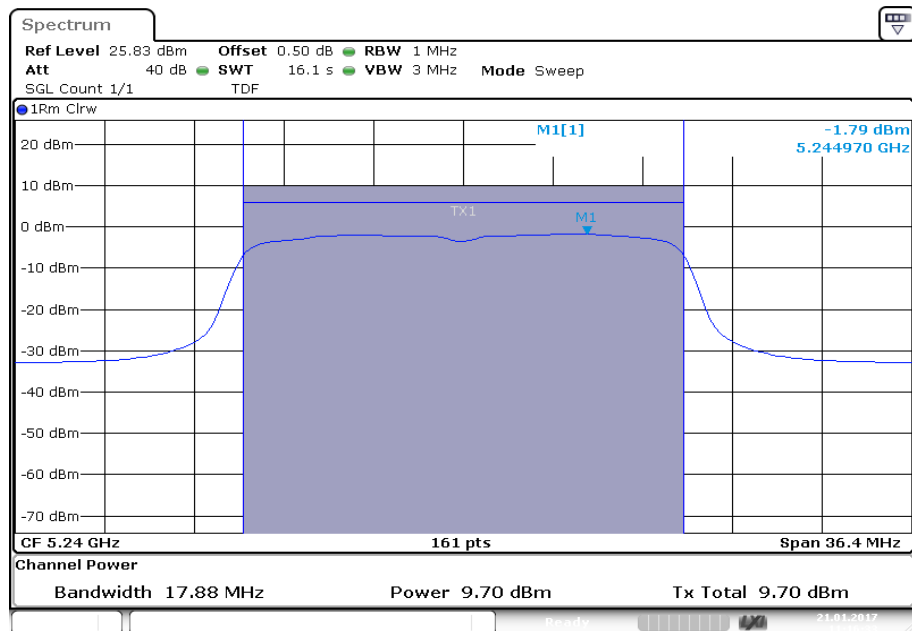
**Plots:** OFDM / n/ac HT20 – mode

**Plot 1:** 5180 MHz



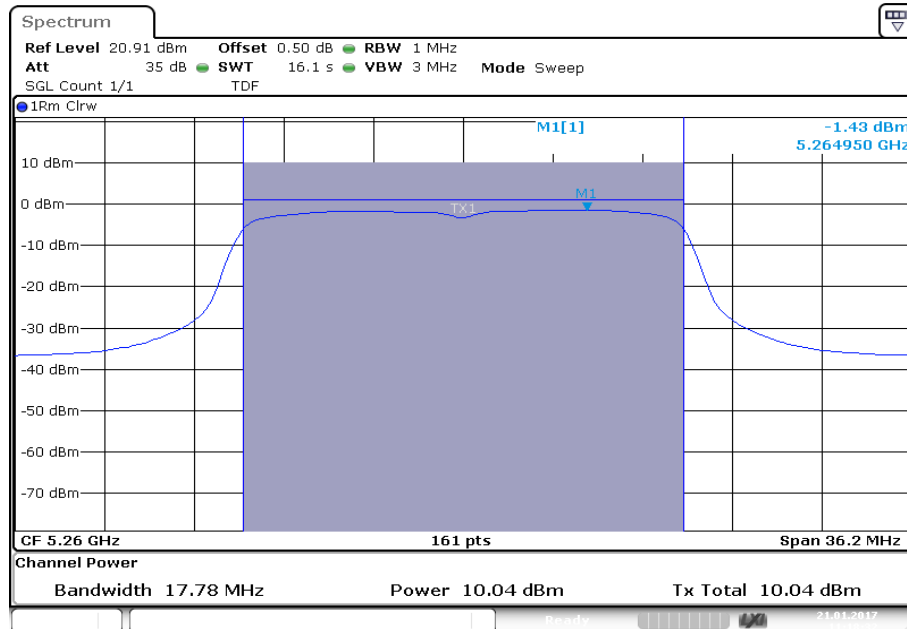
Date: 21.JAN.2017 11:13:11

**Plot 2:** 5240 MHz



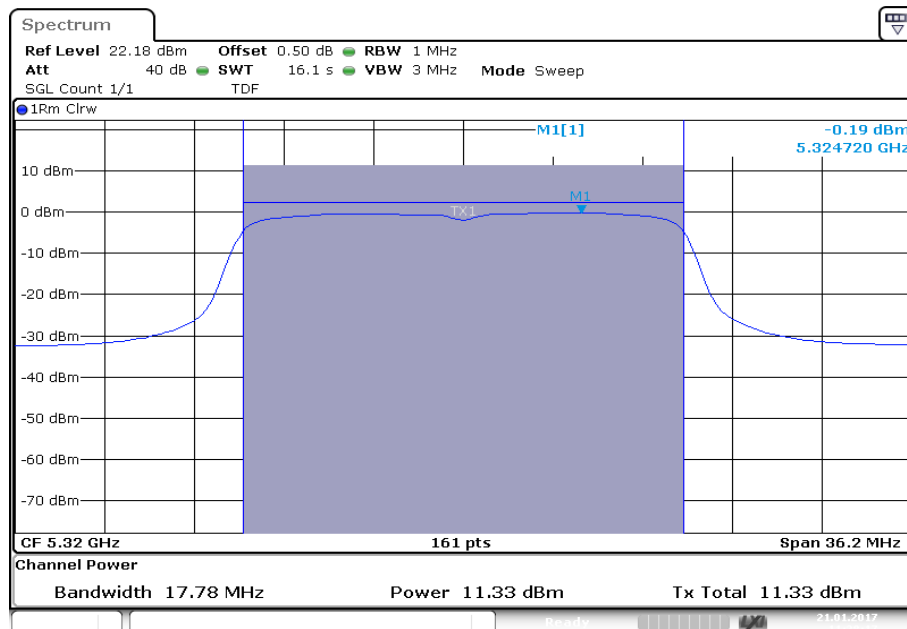
Date: 21.JAN.2017 11:16:33

Plot 3: 5260 MHz



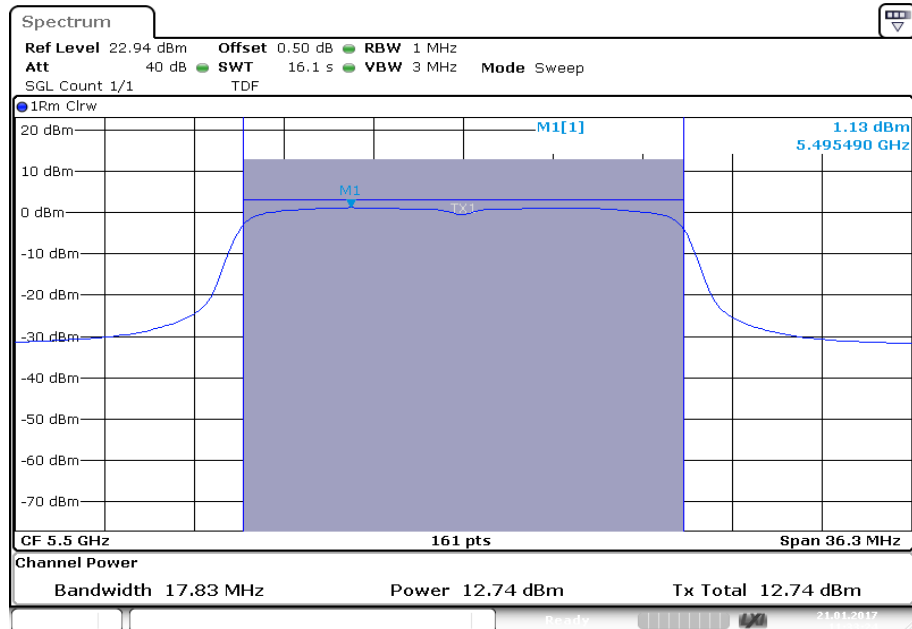
Date: 21.JAN.2017 11:18:32

Plot 4: 5320 MHz

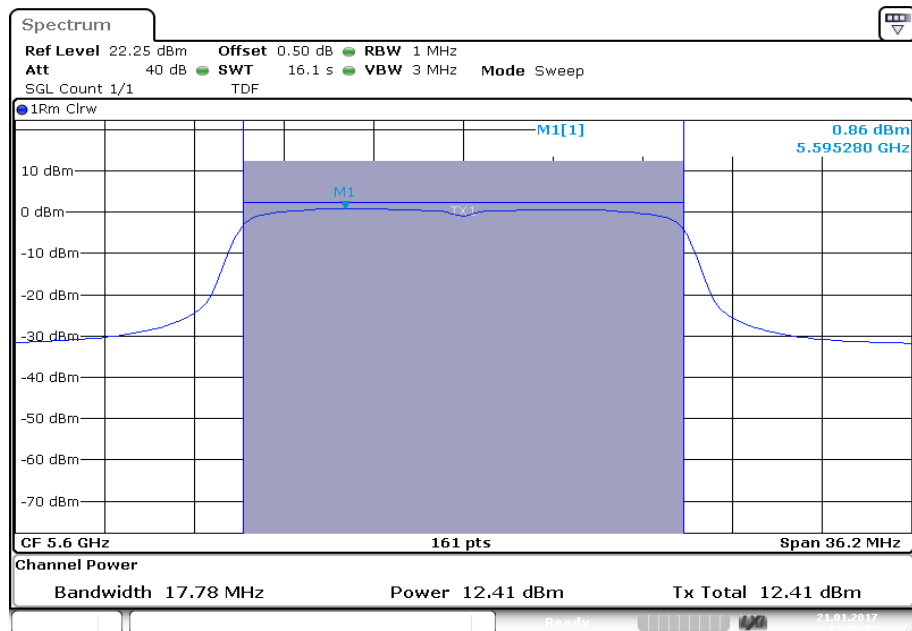


Date: 21.JAN.2017 11:28:17

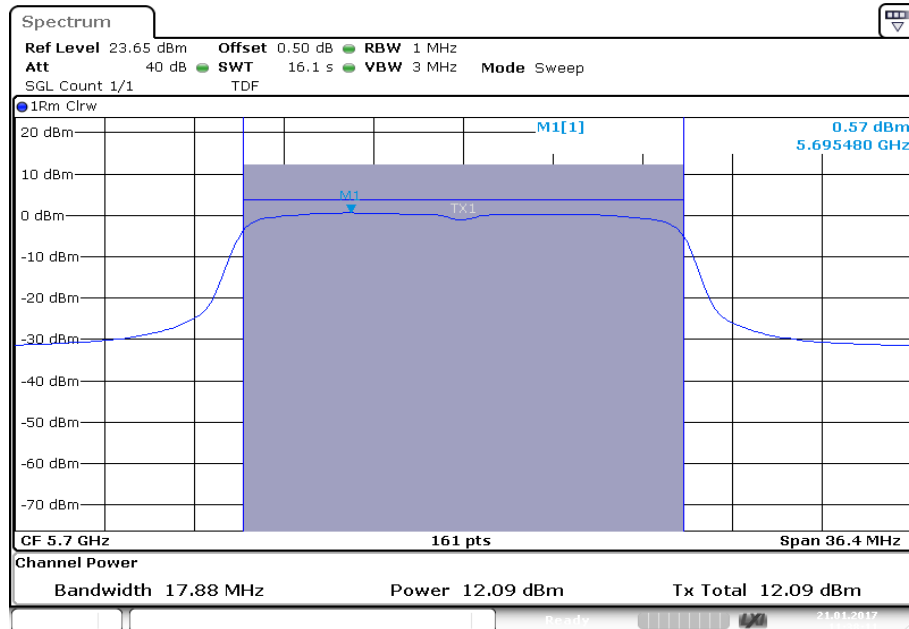
Plot 5: 5500 MHz



Plot 6: 5600 MHz

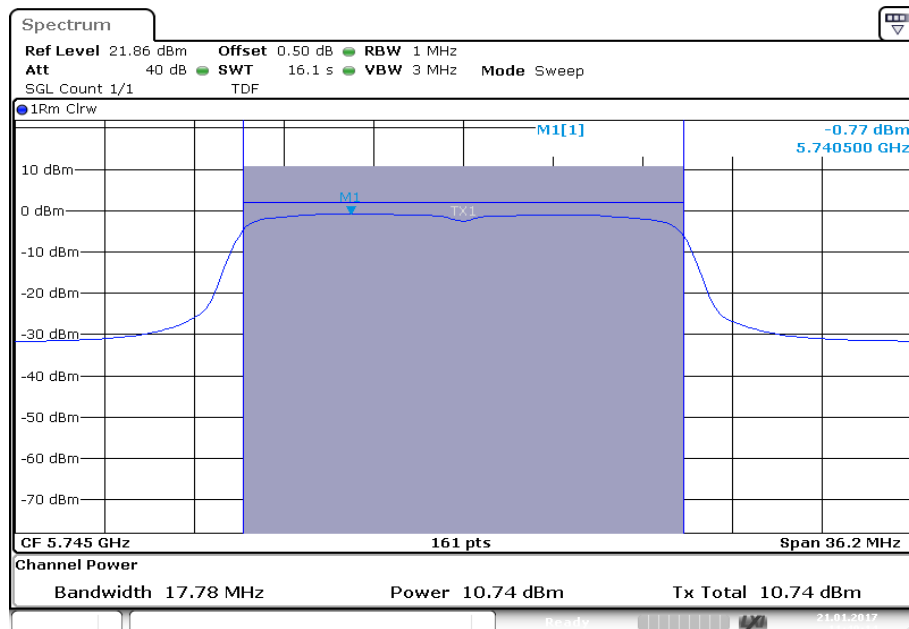


Plot 7: 5700 MHz



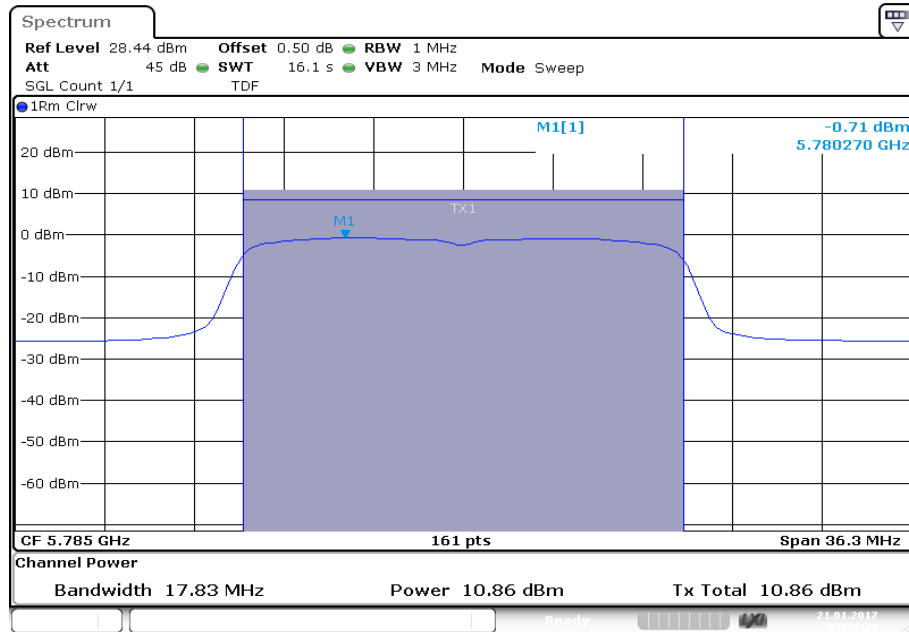
Date: 21.JAN.2017 11:38:11

Plot 8: 5745 MHz

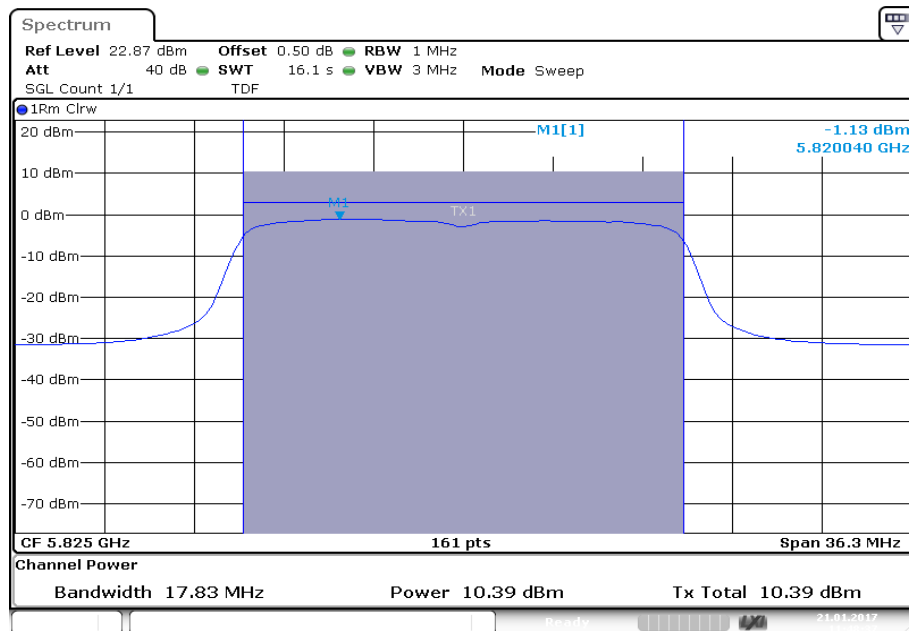


Date: 21.JAN.2017 11:40:14

Plot 9: 5785 MHz

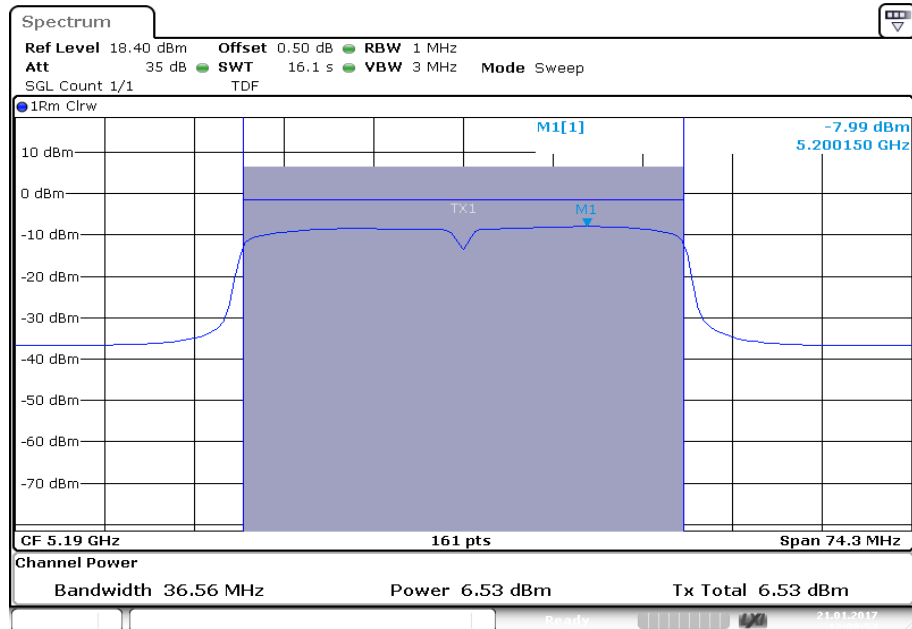


Plot 10: 5825 MHz



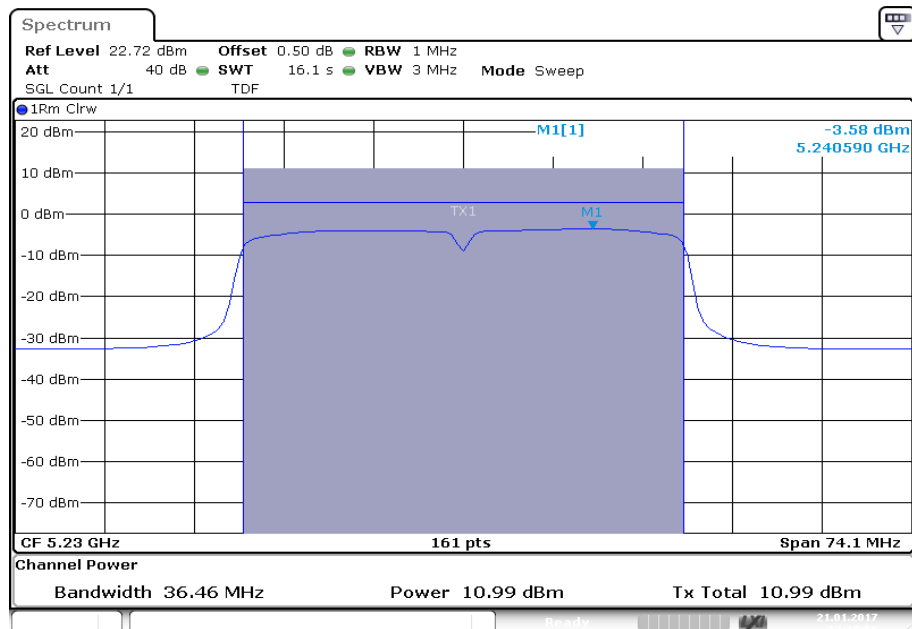
**Plots:** OFDM / n/ac HT40 – mode

**Plot 1:** 5190 MHz



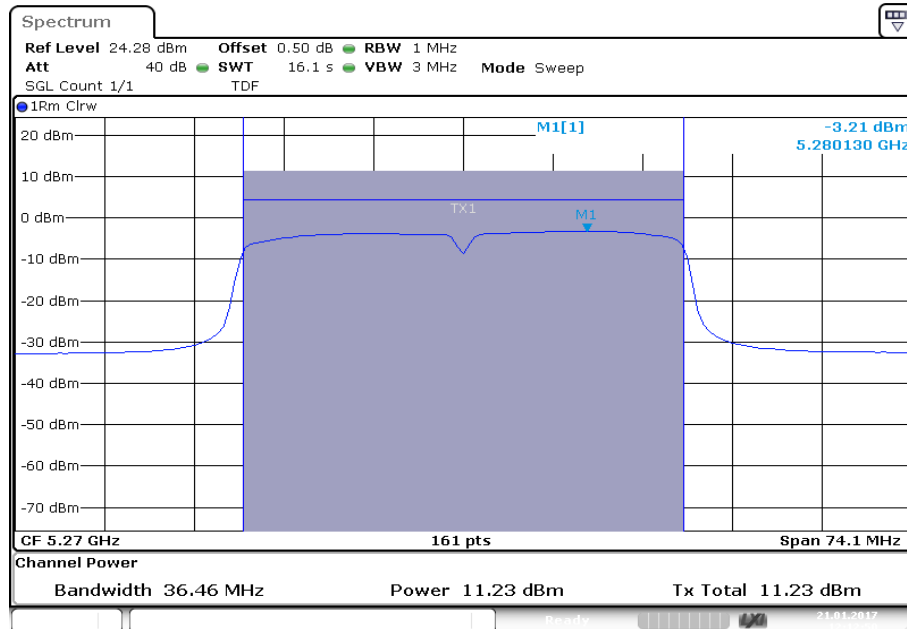
Date: 21.JAN.2017 12:08:54

**Plot 2:** 5230 MHz



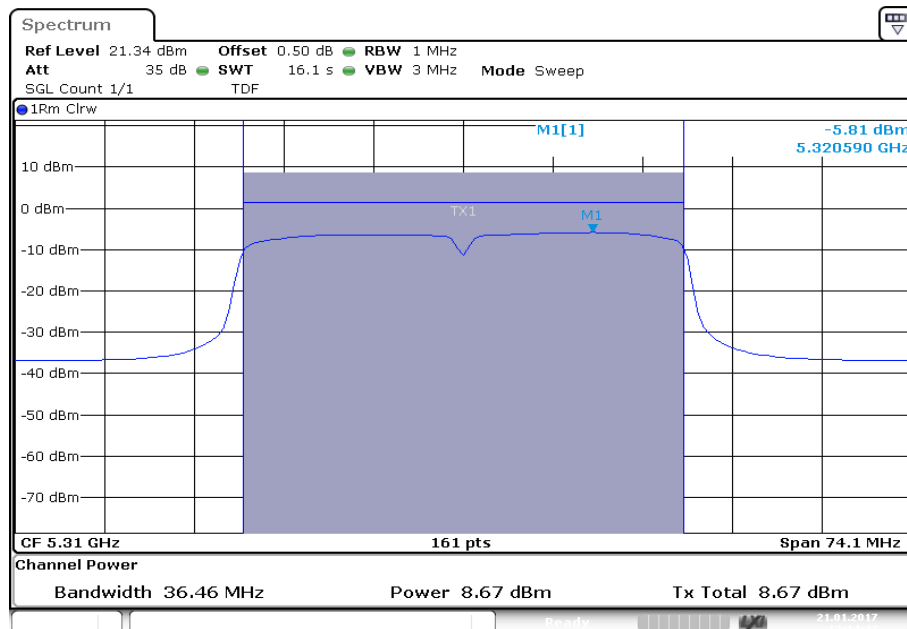
Date: 21.JAN.2017 12:10:56

Plot 3: 5270 MHz



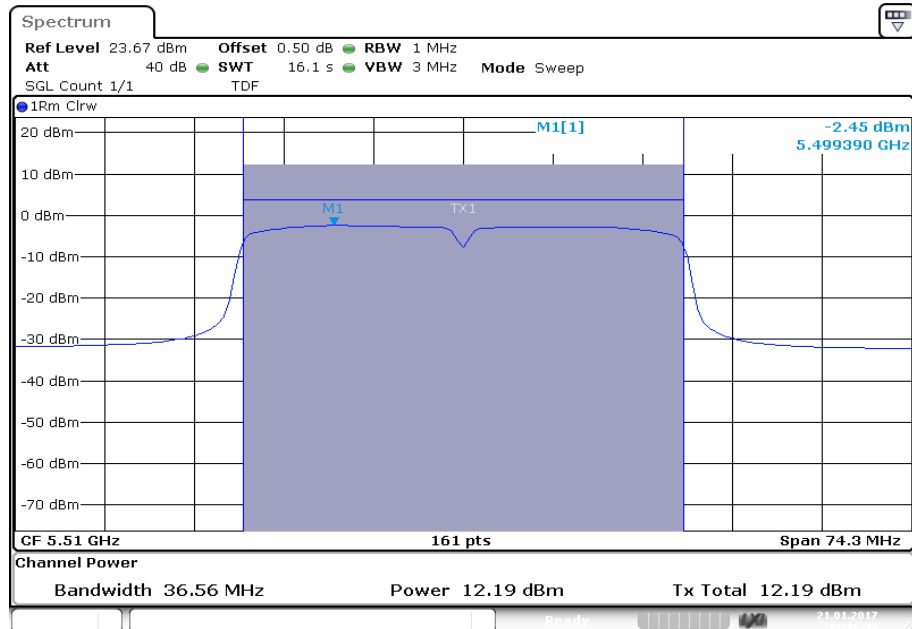
Date: 21.JAN.2017 12:12:50

Plot 4: 5310 MHz



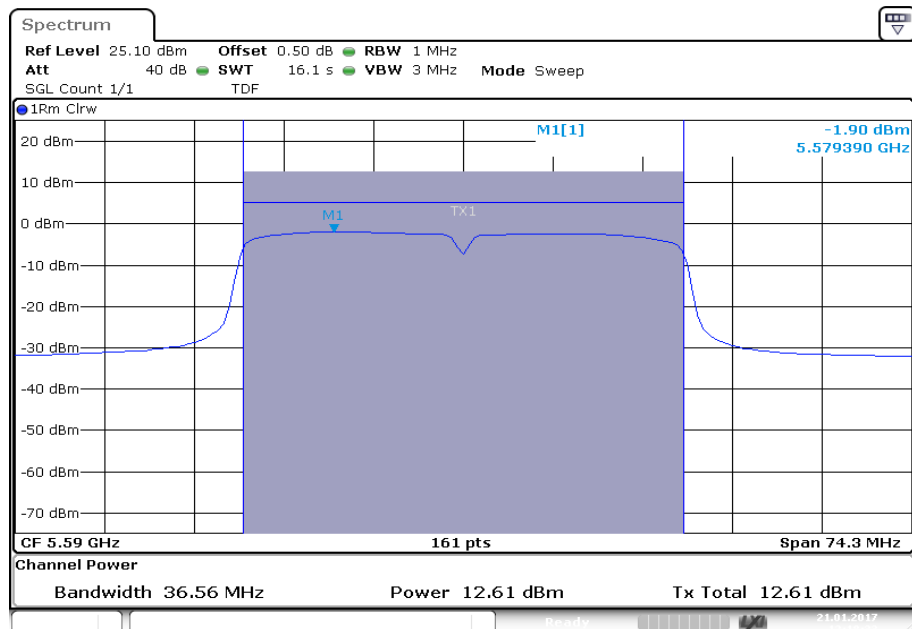
Date: 21.JAN.2017 12:14:47

Plot 5: 5510 MHz



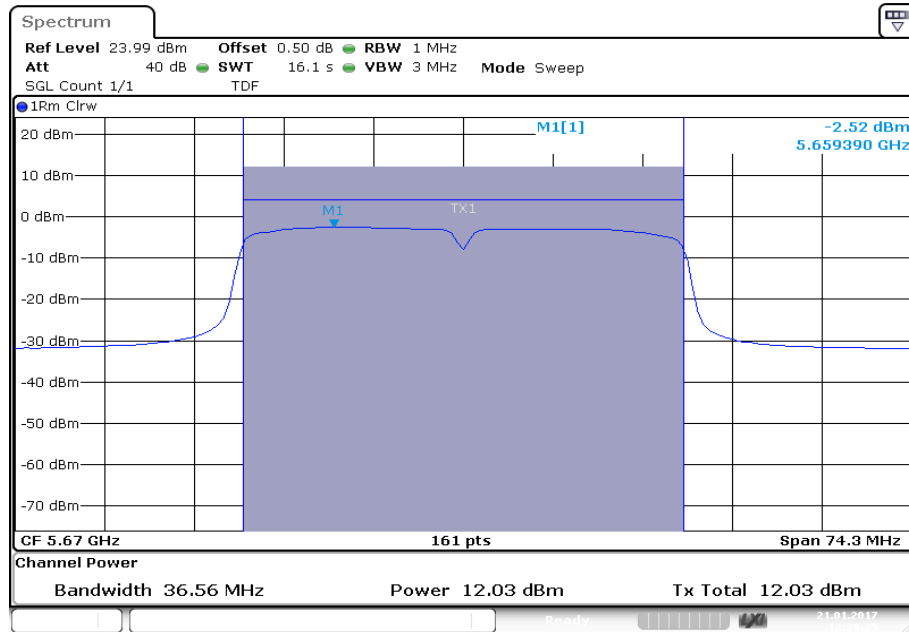
Date: 21.JAN.2017 12:16:40

Plot 6: 5590 MHz



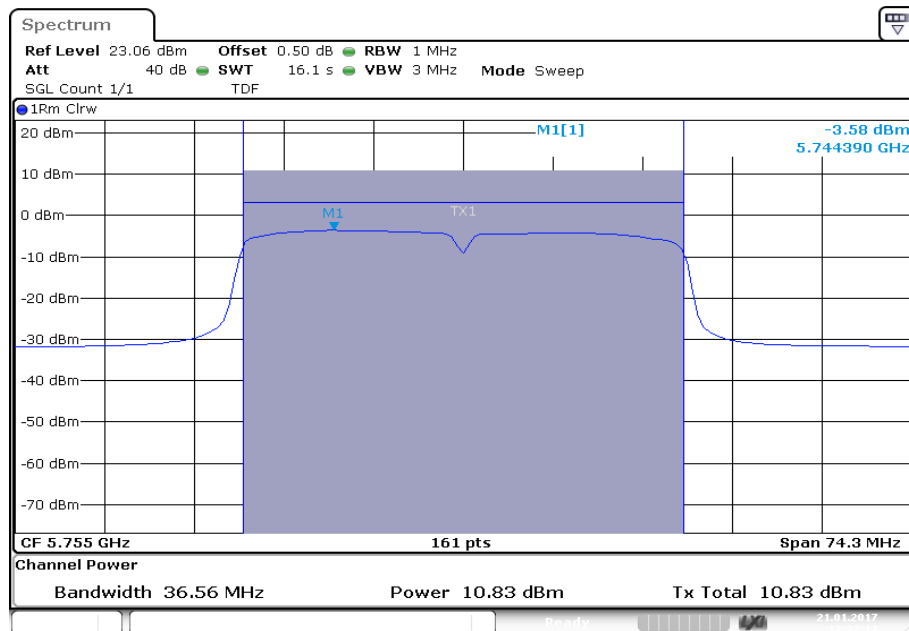
Date: 21.JAN.2017 12:18:33

Plot 7: 5670 MHz



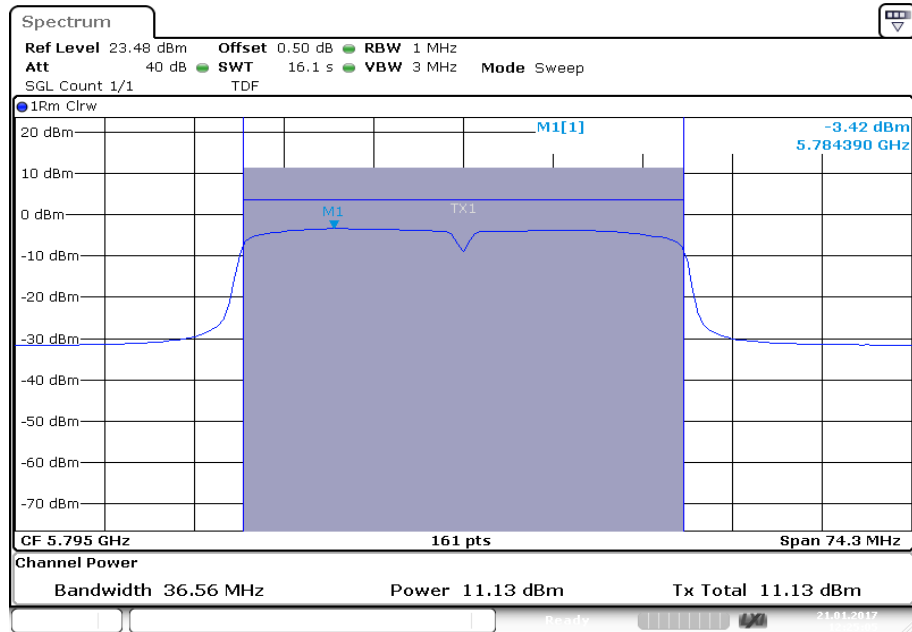
Date: 21.JAN.2017 12:20:25

Plot 8: 5755 MHz



Date: 21.JAN.2017 12:22:16

Plot 9: 5795 MHz



Date: 21. JAN. 2017 12:25:05

## 11.5 Power spectral density

### 11.5.1 Power spectral density – for FCC requirements

#### Description:

Measurement of the power spectral density of a digital modulated system. The measurement is repeated at the lowest, middle and highest channel.

#### Measurement:

| Measurement parameter           |                                                              |
|---------------------------------|--------------------------------------------------------------|
| According to: KDB789033 D02, F. |                                                              |
| Detector:                       | RMS                                                          |
| Sweep time:                     | $\geq 10 * (\text{swp points}) * (\text{total on/off time})$ |
| Resolution bandwidth:           | 1 MHz (500 kHz for 5.8 GHz band)                             |
| Video bandwidth:                | $\geq 3 \times \text{RBW}$                                   |
| Span:                           | > EBW                                                        |
| Trace mode:                     | Max hold                                                     |
| Used test setup:                | See chapter 6.5 A                                            |
| Measurement uncertainty:        | See chapter 8                                                |

#### Limits:

| Power Spectral Density                                                                    |
|-------------------------------------------------------------------------------------------|
| power spectral density conducted $\leq 11$ dBm in any 1 MHz band (band 5150 – 5250 MHz)   |
| power spectral density conducted $\leq 11$ dBm in any 1 MHz band (band 5250 – 5350 MHz)   |
| power spectral density conducted $\leq 11$ dBm in any 1 MHz band (band 5470 – 5725 MHz)   |
| power spectral density conducted $\leq 30$ dBm in any 500 kHz band (band 5725 – 5850 MHz) |

**Result:** OFDM / a – mode

| OFDM / a – mode<br>Channel | Power spectral density [dBm/MHz] |          |          |          |
|----------------------------|----------------------------------|----------|----------|----------|
|                            | 5180 MHz                         | 5240 MHz | 5260 MHz | 5320 MHz |
|                            | -0.95                            | -0.57    | -0.16    | 0.30     |
| Channel                    | 5500 MHz                         | 5600 MHz | 5700 MHz | -/-      |
|                            | 1.21                             | 1.02     | 0.84     | -/-      |
| Channel                    | 5745 MHz                         | 5785 MHz | 5825 MHz | -/-      |
|                            | -2.97                            | -3.34    | -3.31    | -/-      |

**Result:** OFDM / n/ac HT20 – mode

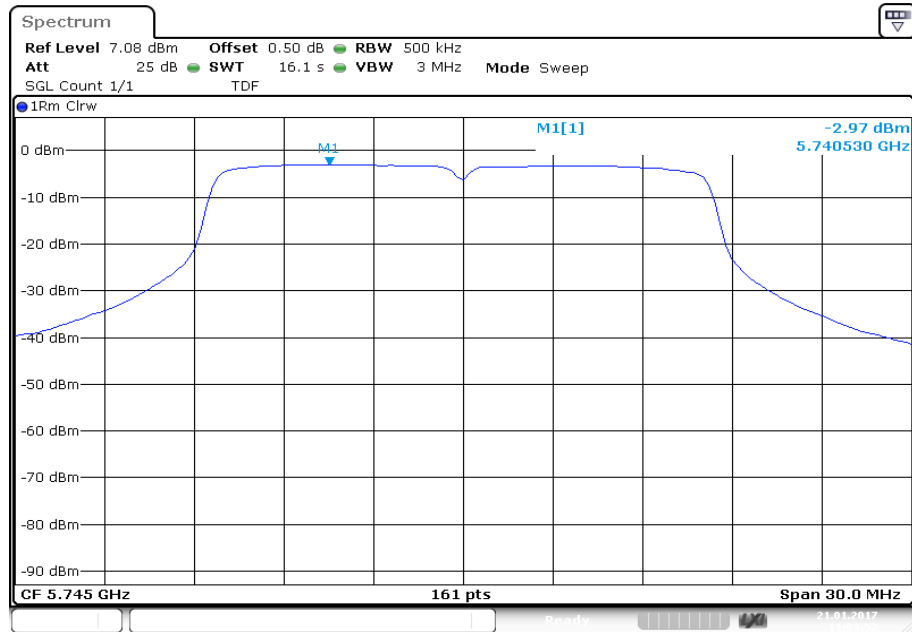
| OFDM / n/ac HT20 – mode<br>Channel | Power spectral density [dBm/MHz] |          |          |          |
|------------------------------------|----------------------------------|----------|----------|----------|
|                                    | 5180 MHz                         | 5240 MHz | 5260 MHz | 5320 MHz |
|                                    | -1.65                            | -2.07    | -1.41    | -0.13    |
| Channel                            | 5500 MHz                         | 5600 MHz | 5700 MHz | -/-      |
|                                    | 1.17                             | 0.91     | 0.64     | -/-      |
| Channel                            | 5745 MHz                         | 5785 MHz | 5825 MHz | -/-      |
|                                    | -3.29                            | -3.67    | -4.04    | -/-      |

**Result:** OFDM / n/ac HT40 – mode

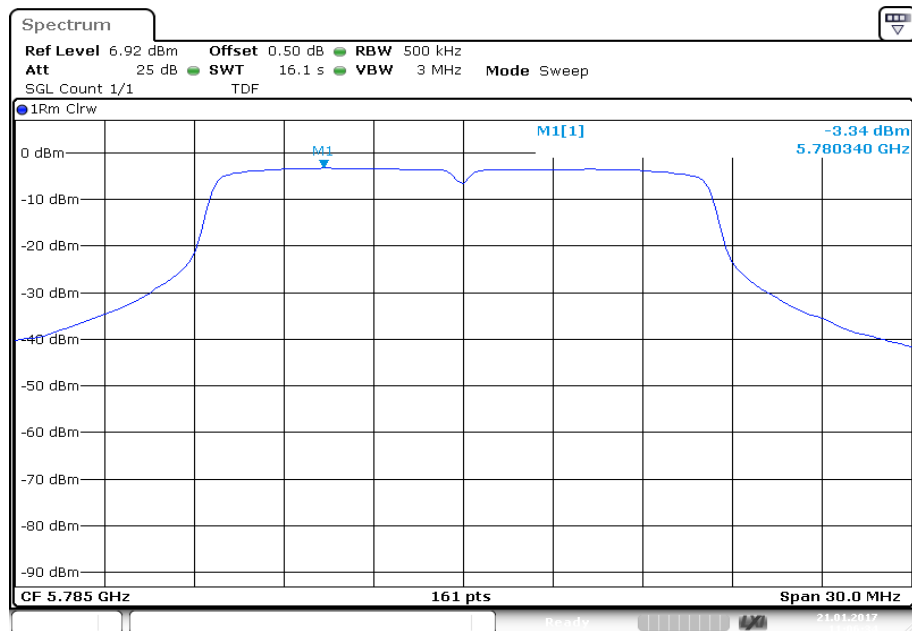
| OFDM / n/ac HT40 – mode<br>Channel | Power spectral density [dBm/MHz] |          |          |          |
|------------------------------------|----------------------------------|----------|----------|----------|
|                                    | 5190 MHz                         | 5230 MHz | 5270 MHz | 5310 MHz |
|                                    | -8.62                            | -3.49    | -3.13    | -6.27    |
| Channel                            | 5510 MHz                         | 5590 MHz | 5670 MHz | -/-      |
|                                    | -2.35                            | -1.82    | -2.45    | -/-      |
| Channel                            | 5755 MHz                         | 5795 MHz | -/-      | -/-      |
|                                    | -6.66                            | -6.54    | -/-      | -/-      |

**Plots:** OFDM / a – mode

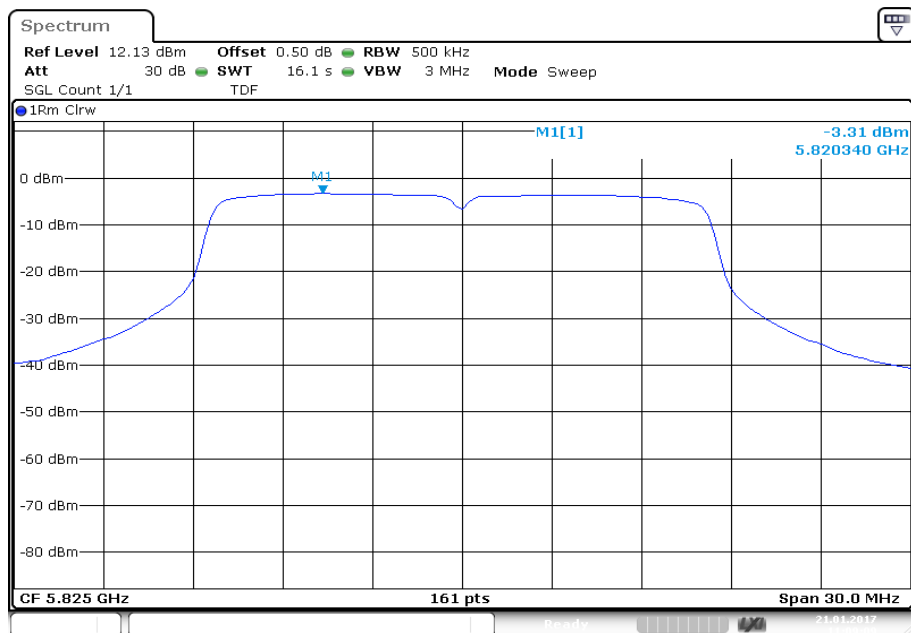
**Plot 1:** 5745 MHz



**Plot 2:** 5785 MHz



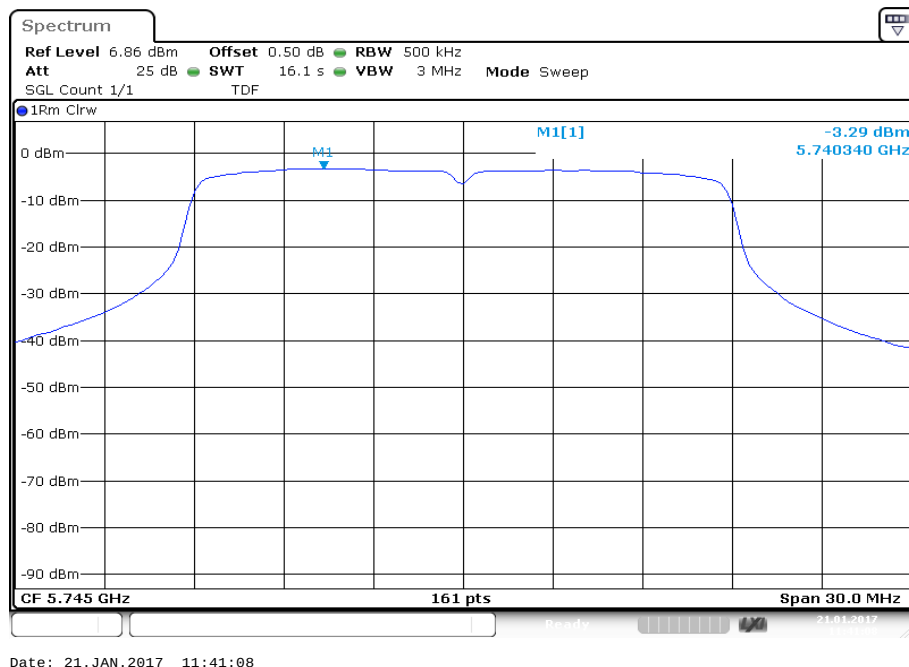
Plot 3: 5825 MHz



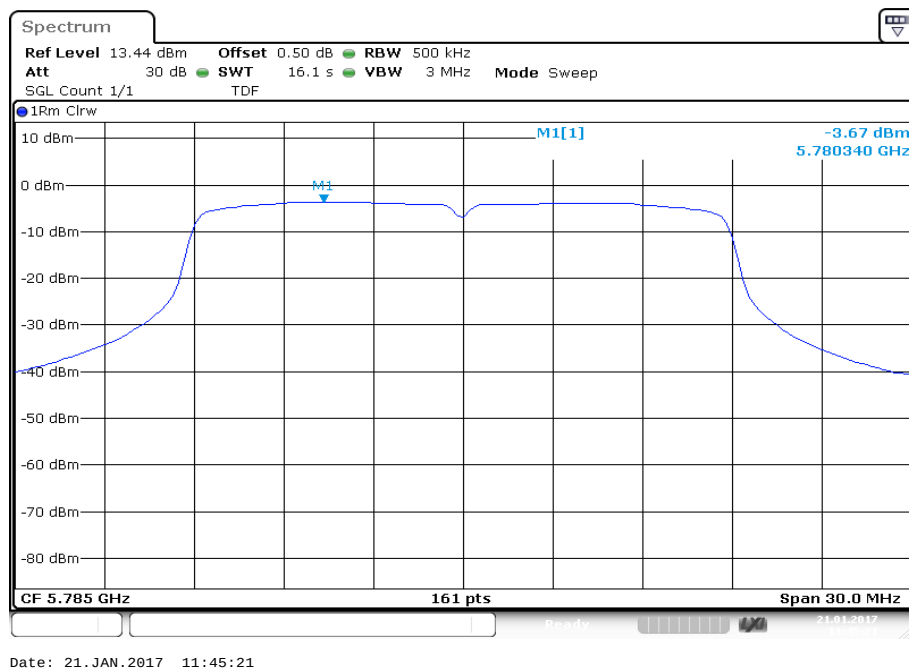
Date: 21. JAN. 2017 11:09:09

**Plots:** OFDM / n/ac HT20 – mode

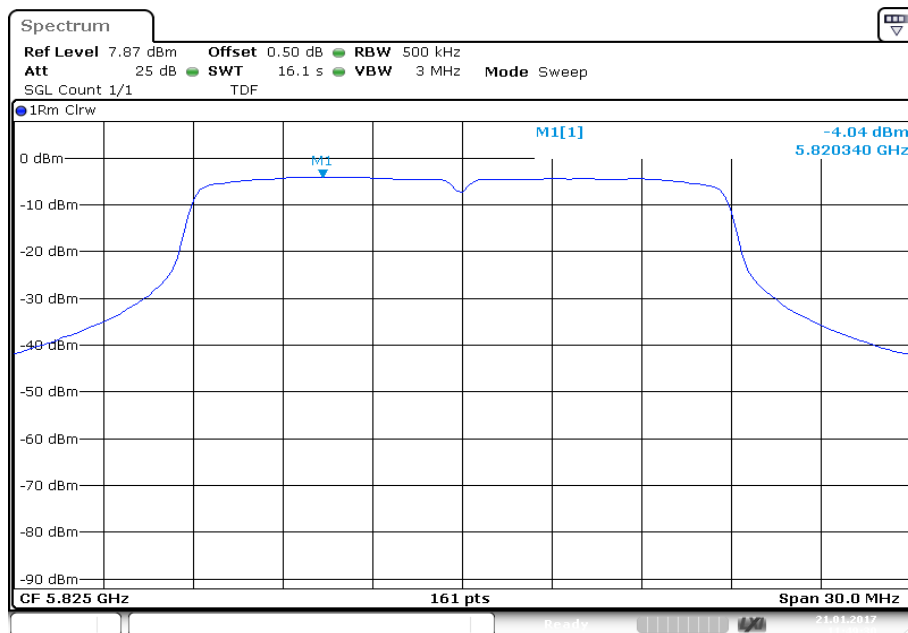
**Plot 1:** 5745 MHz



**Plot 2:** 5785 MHz



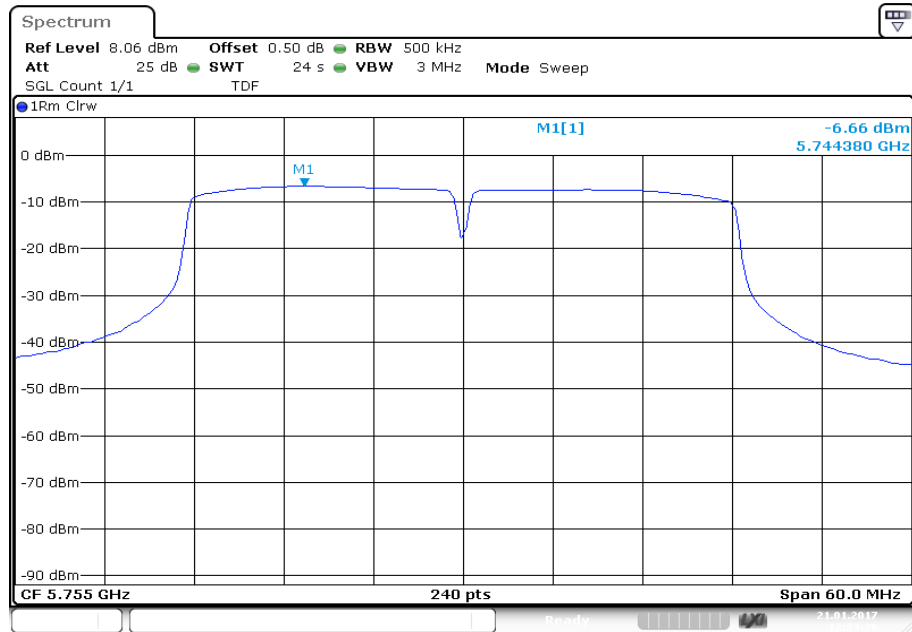
Plot 3: 5825 MHz



Date: 21. JAN. 2017 11:49:30

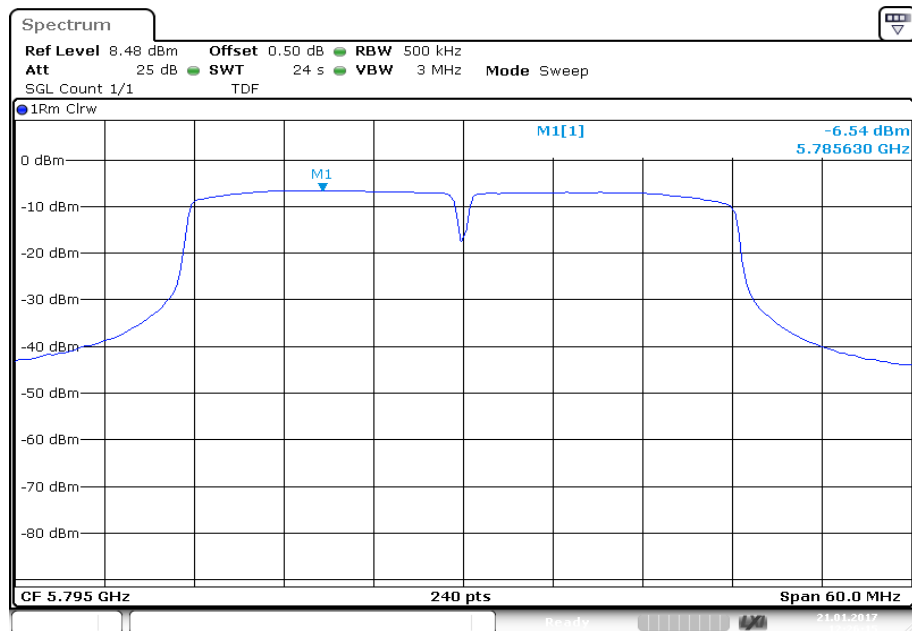
**Plots:** OFDM / n/ac HT40 – mode

**Plot 1:** 5755 MHz



Date: 21. JAN. 2017 12:23:26

**Plot 2:** 5795 MHz



Date: 21. JAN. 2017 12:26:15

### 11.5.2 Power spectral density – for IC requirements

#### Description:

Measurement of the power spectral density of a digital modulated system. The measurement is repeated at the lowest, middle and highest channel.

#### Measurement:

| Measurement parameter    |                                                              |
|--------------------------|--------------------------------------------------------------|
| Detector:                | RMS                                                          |
| Sweep time:              | $\geq 10 * (\text{swp points}) * (\text{total on/off time})$ |
| Resolution bandwidth:    | 1 MHz (500 kHz for 5.8 GHz band)                             |
| Video bandwidth:         | $\geq 3 \times \text{RBW}$                                   |
| Span:                    | $> \text{EBW}$                                               |
| Trace mode:              | Max hold                                                     |
| Used test setup:         | See chapter 6.4 A                                            |
| Measurement uncertainty: | See chapter 8                                                |

#### Limits:

| Power Spectral Density                                                                    |
|-------------------------------------------------------------------------------------------|
| power spectral density e.i.r.p. $\leq 10$ dBm in any 1 MHz band (band 5150 – 5250 MHz)    |
| power spectral density conducted $\leq 11$ dBm in any 1 MHz band (band 5250 – 5350 MHz)   |
| power spectral density conducted $\leq 11$ dBm in any 1 MHz band (band 5470 – 5725 MHz)   |
| power spectral density conducted $\leq 30$ dBm in any 500 kHz band (band 5725 – 5850 MHz) |

**Result:** OFDM / a – mode

| OFDM / a – mode<br>Channel | Power spectral density [dBm/MHz] |           |          |          |
|----------------------------|----------------------------------|-----------|----------|----------|
|                            | 5180 MHz*                        | 5240 MHz* | 5260 MHz | 5320 MHz |
|                            | 0.93                             | 1.25      | -0.22    | 0.26     |
| Channel                    | 5500 MHz                         | 5600 MHz  | 5700 MHz | -/-      |
|                            | 1.16                             | 0.89      | 0.78     | -/-      |
| Channel                    | 5745 MHz                         | 5785 MHz  | 5825 MHz | -/-      |
|                            | -2.94                            | -3.31     | -3.27    | -/-      |

\*find EIRP values for each antenna on the next page

**Result:** OFDM / n/ac HT20 – mode

| OFDM / n/ac HT20 – mode<br>Channel | Power spectral density [dBm/MHz] |           |          |          |
|------------------------------------|----------------------------------|-----------|----------|----------|
|                                    | 5180 MHz*                        | 5240 MHz* | 5260 MHz | 5320 MHz |
|                                    | 0.23                             | 0.11      | -1.43    | -0.19    |
| Channel                            | 5500 MHz                         | 5600 MHz  | 5700 MHz | -/-      |
|                                    | 1.13                             | 0.86      | 0.57     | -/-      |
| Channel                            | 5745 MHz                         | 5785 MHz  | 5825 MHz | -/-      |
|                                    | -3.25                            | -3.66     | -3.96    | -/-      |

\*find EIRP values for each antenna on the next page

**Result:** OFDM / n/ac HT40 – mode

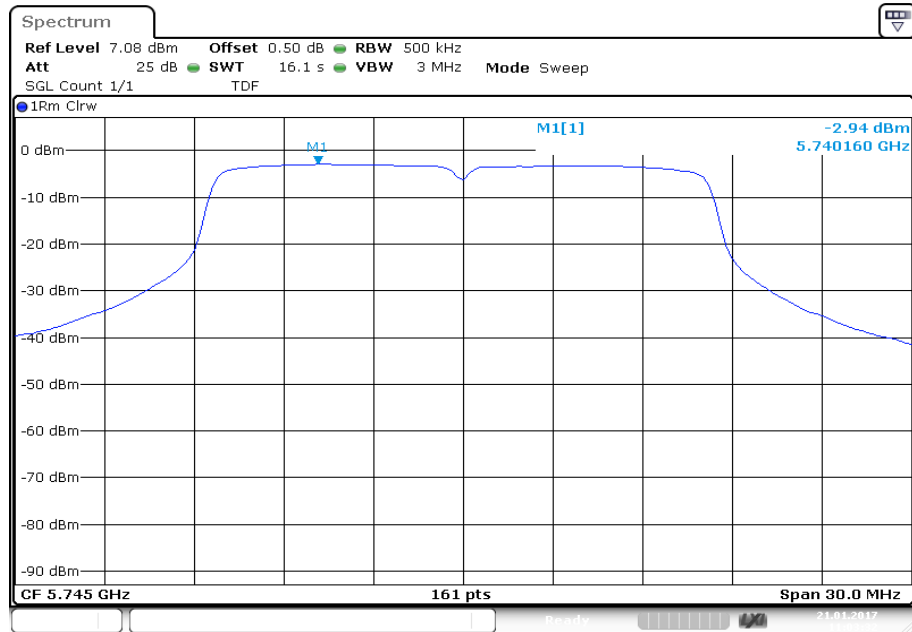
| OFDM / n/ac HT40 – mode<br>Channel | Power spectral density [dBm/MHz] |          |          |          |
|------------------------------------|----------------------------------|----------|----------|----------|
|                                    | 5190 MHz                         | 5230 MHz | 5270 MHz | 5310 MHz |
|                                    | -6.09                            | -1.68    | -3.21    | -5.81    |
| Channel                            | 5510 MHz                         | 5590 MHz | 5670 MHz | -/-      |
|                                    | -2.45                            | -1.90    | -2.52    | -/-      |
| Channel                            | 5755 MHz                         | 5795 MHz | -/-      | -/-      |
|                                    | -6.64                            | -6.49    | -/-      | -/-      |

\*find EIRP values for each antenna in the next table

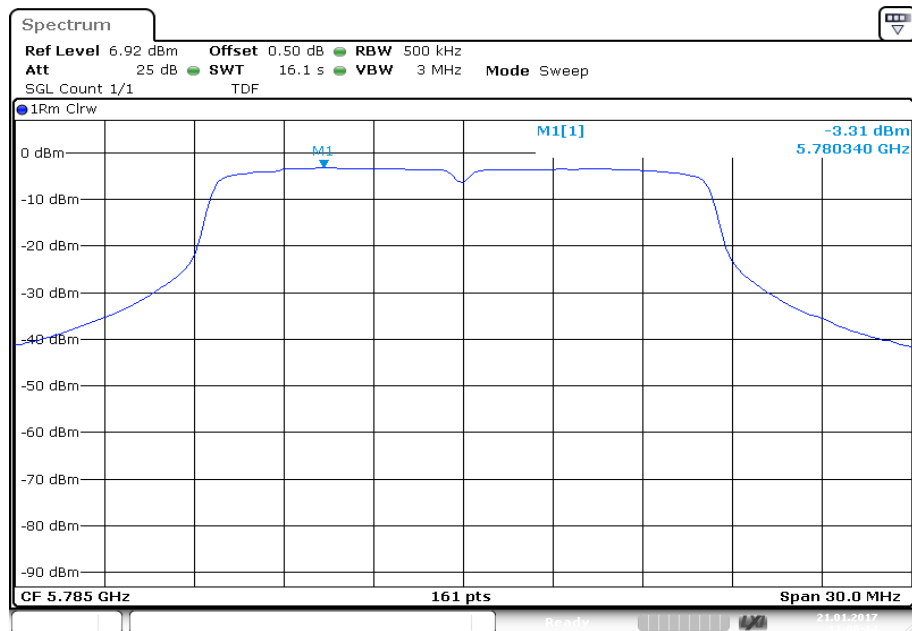
|                                  | Power spectral density EIRP [dBm/MHz] |                    |                    |                    |                    |                    |
|----------------------------------|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                  | a-mode<br>5180 MHz                    | a-mode<br>5240 MHz | n HT20<br>5180 MHz | n HT20<br>5240 MHz | n HT40<br>5190 MHz | n HT40<br>5230 MHz |
| IV2 TRNS Antenna<br>WLAN IIT 1.4 | 2.8                                   | 3.2                | 2.1                | 2.0                | -4.2               | 0.2                |
| Ant M3002-66494                  | 2.1                                   | 2.5                | 1.4                | 1.3                | -4.9               | -0.5               |
| Ant 453564154611                 | -2.4                                  | -2.1               | -3.1               | -3.2               | -9.4               | -5.0               |
| Ant 453564175981                 | 4.5                                   | 4.9                | 3.8                | 3.7                | -2.5               | 1.9                |
| Ant 453564271931                 | 0.7                                   | 1.1                | 0.0                | -0.1               | -6.3               | -1.9               |

**Plots:** OFDM / a – mode

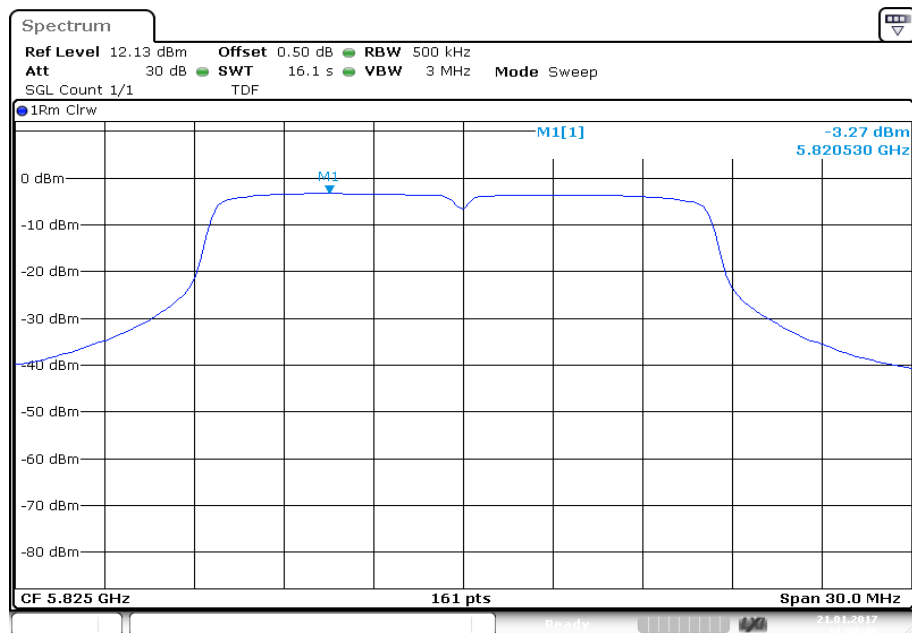
**Plot 1:** 5745 MHz



**Plot 2:** 5785 MHz



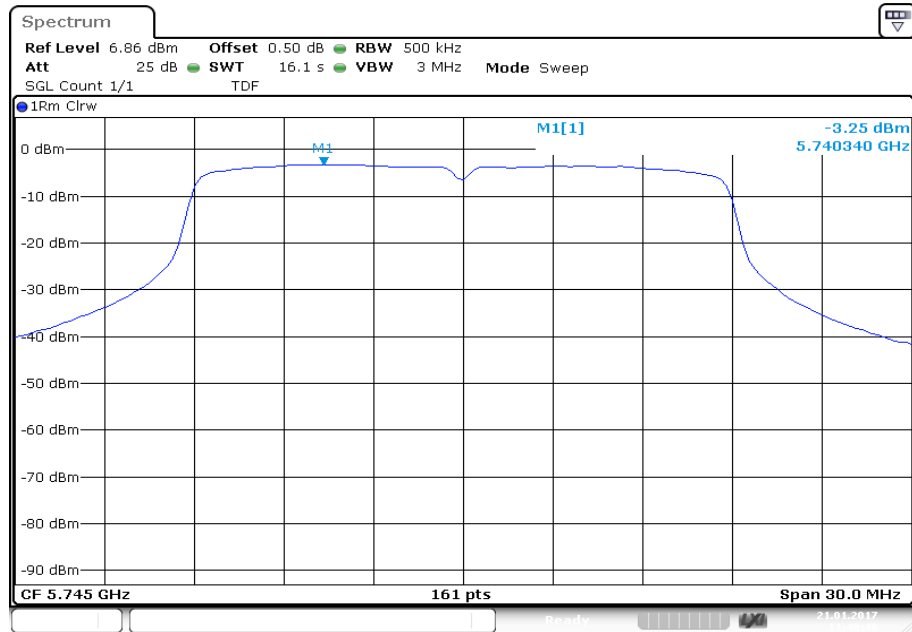
Plot 3: 5825 MHz



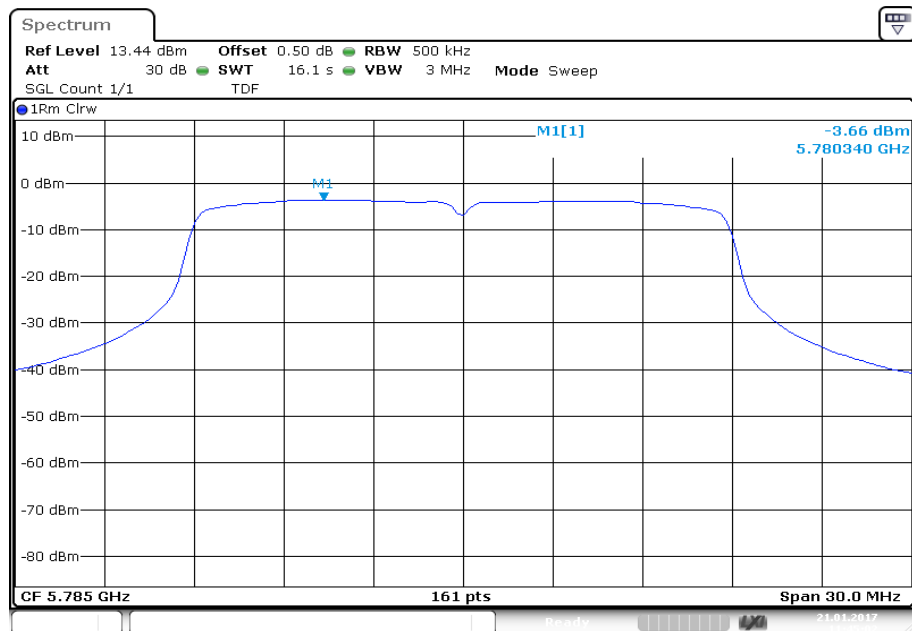
Date: 21. JAN. 2017 11:08:49

**Plots:** OFDM / n/ac HT20 – mode

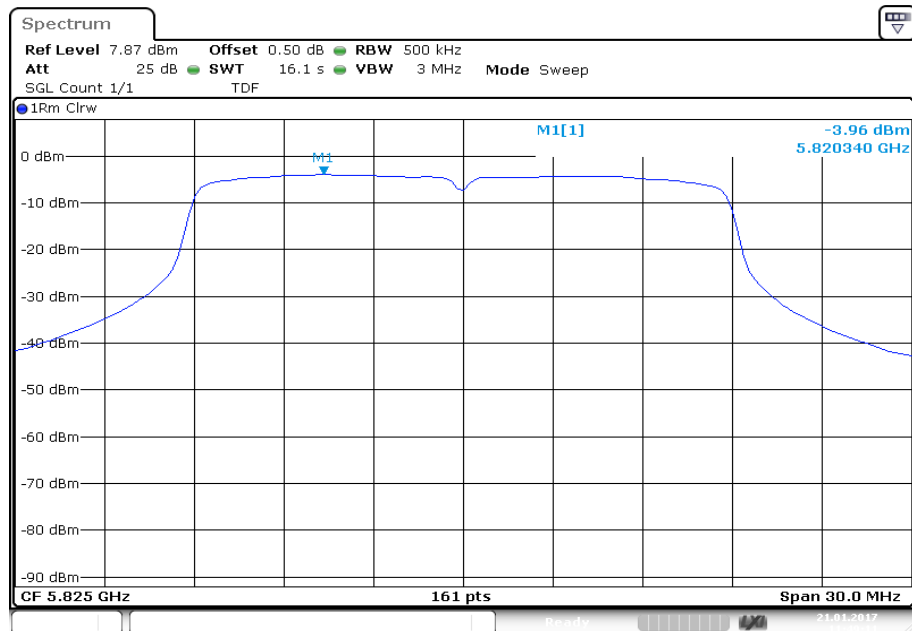
**Plot 1:** 5745 MHz



**Plot 2:** 5785 MHz



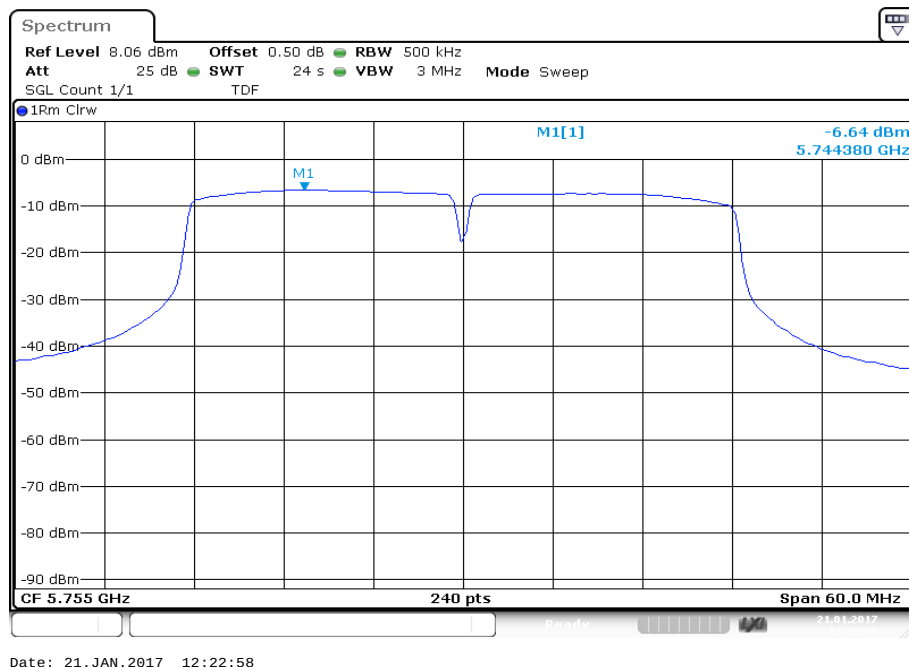
Plot 3: 5825 MHz



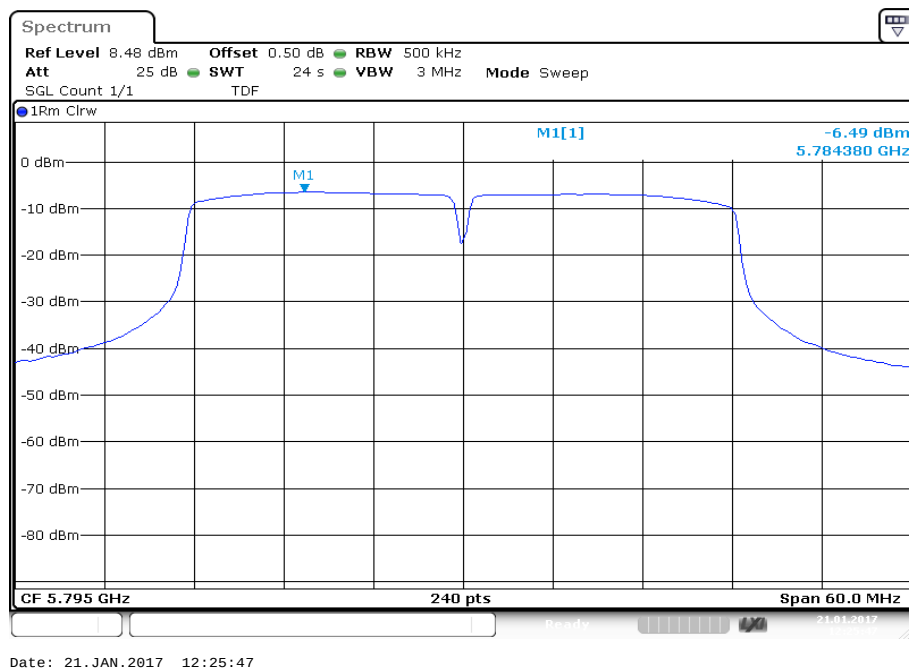
Date: 21. JAN. 2017 11:49:11

**Plots:** OFDM / n/ac HT40 – mode

**Plot 1:** 5755 MHz



**Plot 2:** 5795 MHz



## 11.6 Minimum emission bandwidth for the band 5.725-5.85 GHz

### Description:

Measurement of the 6 dB bandwidth of the modulated signal.

### Measurement:

| Measurement parameter             |                                        |
|-----------------------------------|----------------------------------------|
| According to: KDB789033 D02, C.2. |                                        |
| Detector:                         | Peak                                   |
| Sweep time:                       | Auto                                   |
| Resolution bandwidth:             | 100 kHz                                |
| Video bandwidth:                  | 300 kHz                                |
| Span:                             | 40 MHz                                 |
| Measurement procedure:            | Using marker to find -6dBc frequencies |
| Trace mode:                       | Max hold (allow trace to stabilize)    |
| Used test setup:                  | See chapter 6.5 A                      |
| Measurement uncertainty:          | See chapter 8                          |

### Limits:

| FCC                                                    | IC |
|--------------------------------------------------------|----|
| Minimum Emission Bandwidth for the band 5.725-5.85 GHz |    |
| The minimum 6 dB bandwidth shall be at least 500 kHz.  |    |

**Result:**

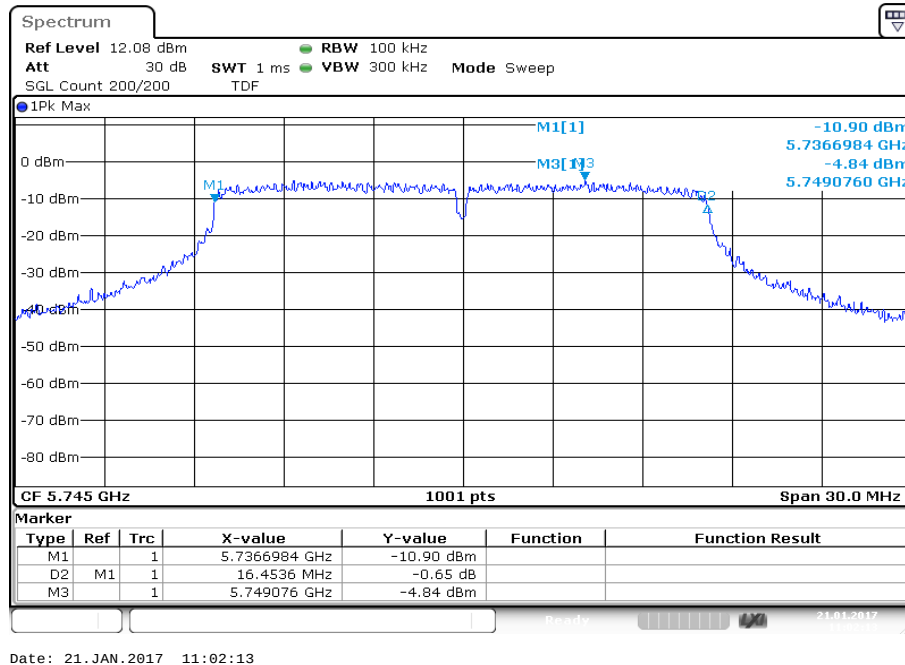
| OFDM / a – mode | 6 dB bandwidth [MHz] |          |          |
|-----------------|----------------------|----------|----------|
| Channel         | 5745 MHz             | 5785 MHz | 5825 MHz |
|                 | 16.45                | 16.48    | 16.48    |

| OFDM / n/ac HT20 – mode | 6 dB bandwidth [MHz] |          |          |
|-------------------------|----------------------|----------|----------|
| Channel                 | 5745 MHz             | 5785 MHz | 5825 MHz |
|                         | 17.65                | 17.65    | 17.62    |

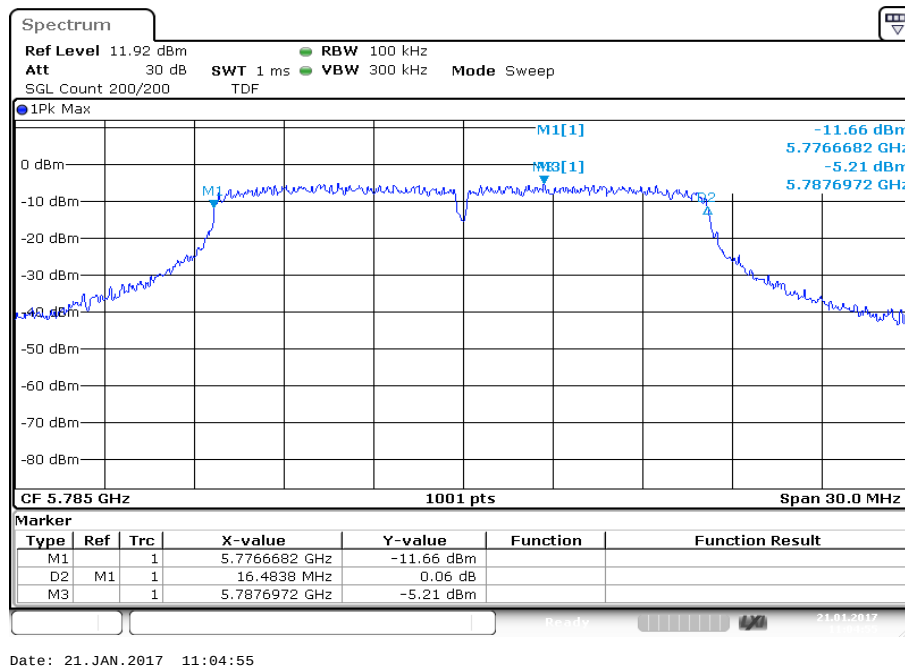
| OFDM / n/ac HT40 – mode | 6 dB bandwidth [MHz] |          |
|-------------------------|----------------------|----------|
| Channel                 | 5755 MHz             | 5795 MHz |
|                         | 36.50                | 36.44    |

**Plots:** OFDM / a – mode

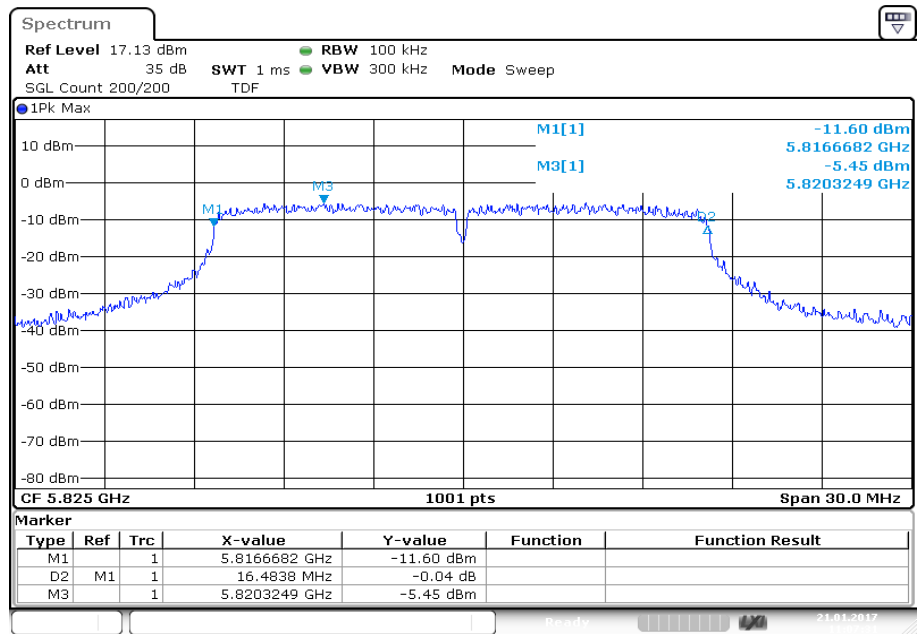
**Plot 1:** 5745 MHz



**Plot 2:** 5785 MHz



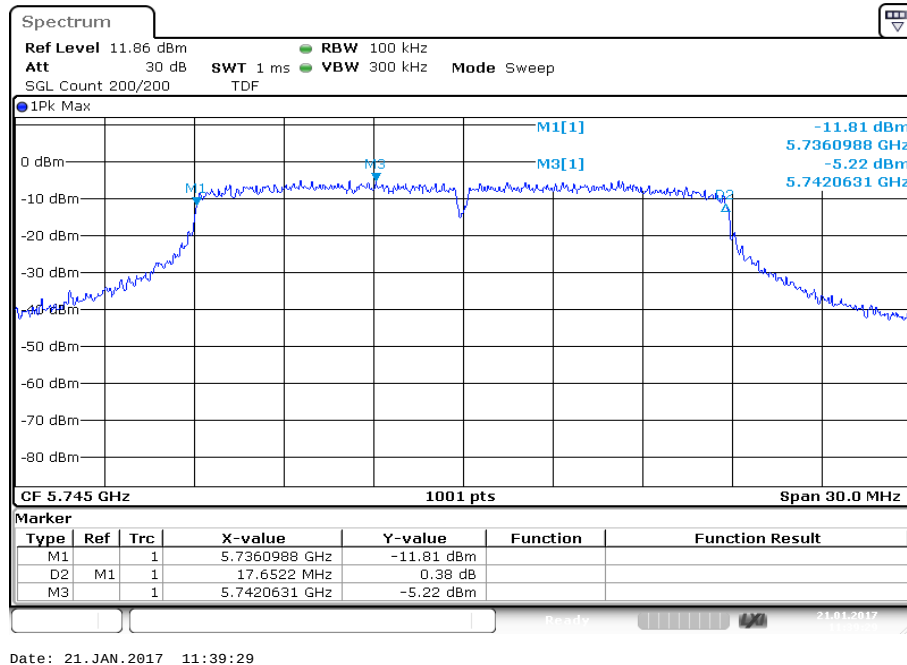
Plot 3: 5825 MHz



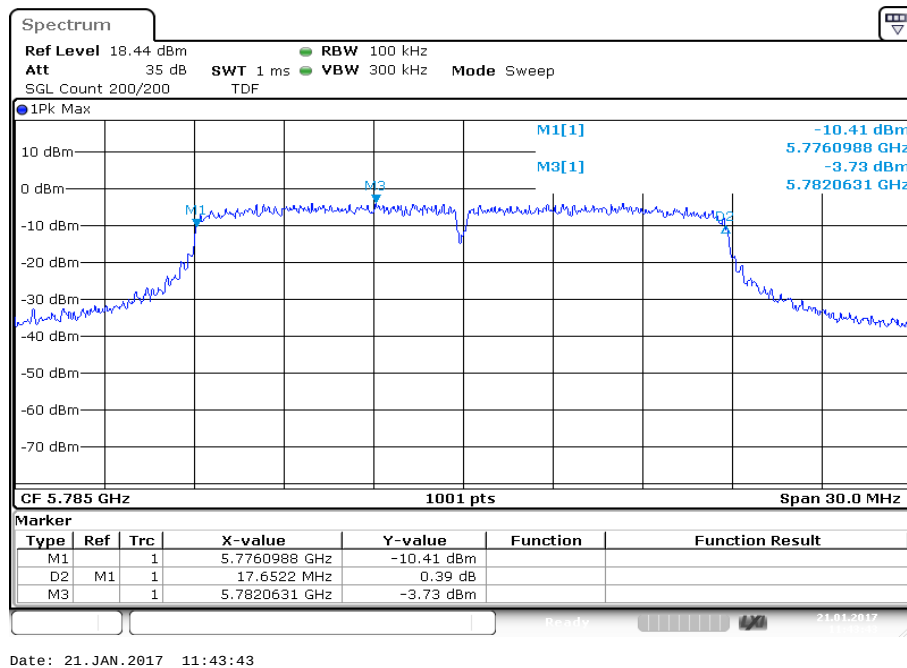
Date: 21.JAN.2017 11:07:30

**Plots:** OFDM / n/ac HT20 – mode

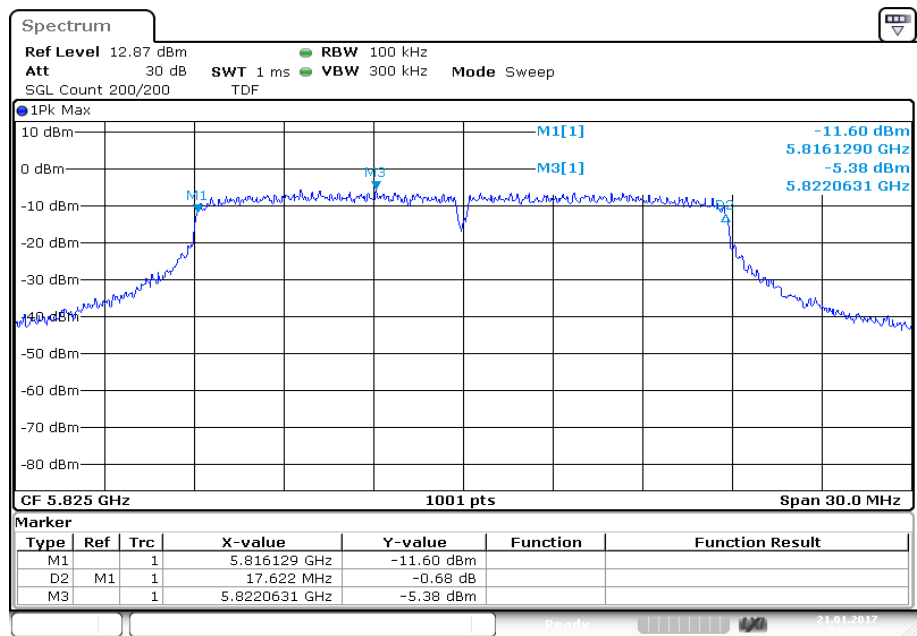
**Plot 1:** 5745 MHz



**Plot 2:** 5785 MHz



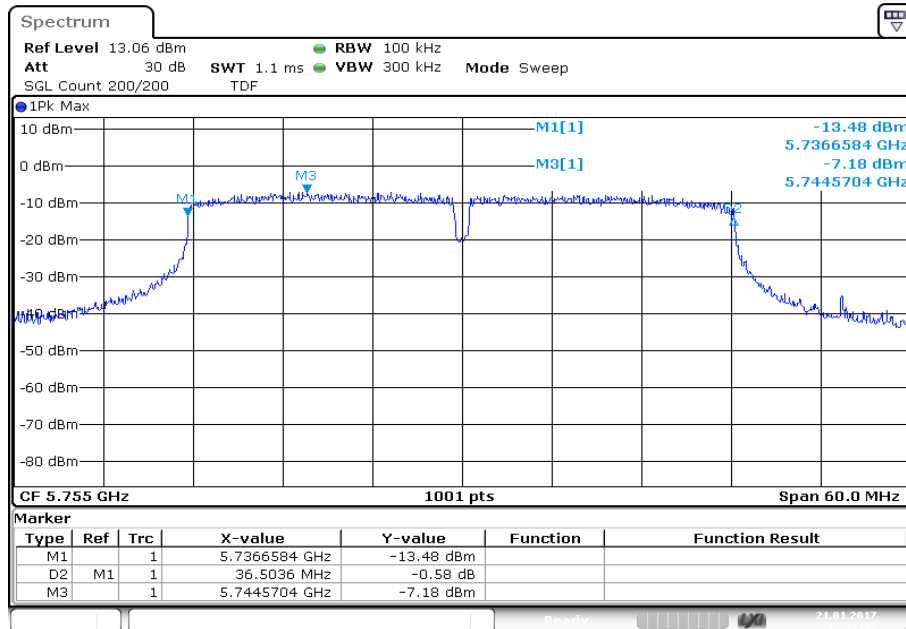
Plot 3: 5825 MHz



Date: 21.JAN.2017 11:47:52

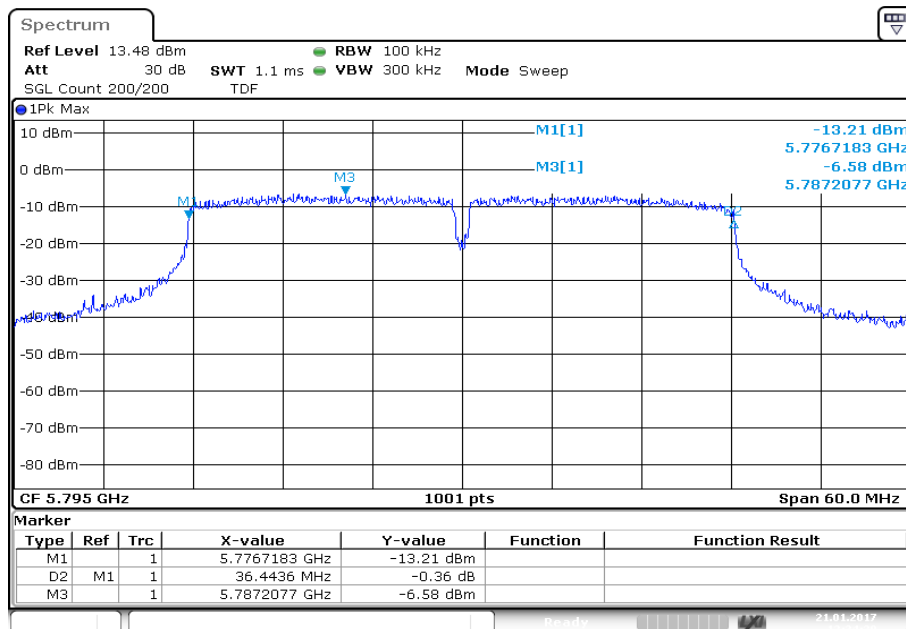
**Plots:** OFDM / n/ac HT40 – mode

**Plot 1:** 5755 MHz



Date: 21.JAN.2017 12:21:32

**Plot 2:** 5795 MHz



Date: 21.JAN.2017 12:24:20

**11.7 Spectrum bandwidth – 26 dB bandwidth****Description:**

Measurement of the 26 dB bandwidth of the modulated signal.

**Measurement:**

| Measurement parameter             |                    |
|-----------------------------------|--------------------|
| According to: KDB789033 D02, C.1. |                    |
| Detector:                         | Peak               |
| Sweep time:                       | Auto               |
| Resolution bandwidth:             | 1% EBW             |
| Video bandwidth:                  | ≥ RBW              |
| Span:                             | > complete signal! |
| Trace-Mode:                       | Max hold           |
| Used test setup:                  | See chapter 6.5 A  |
| Measurement uncertainty:          | See chapter 8      |

**Limits:**

| Spectrum Bandwidth – 26 dB Bandwidth |
|--------------------------------------|
| -/-                                  |

**Result:**

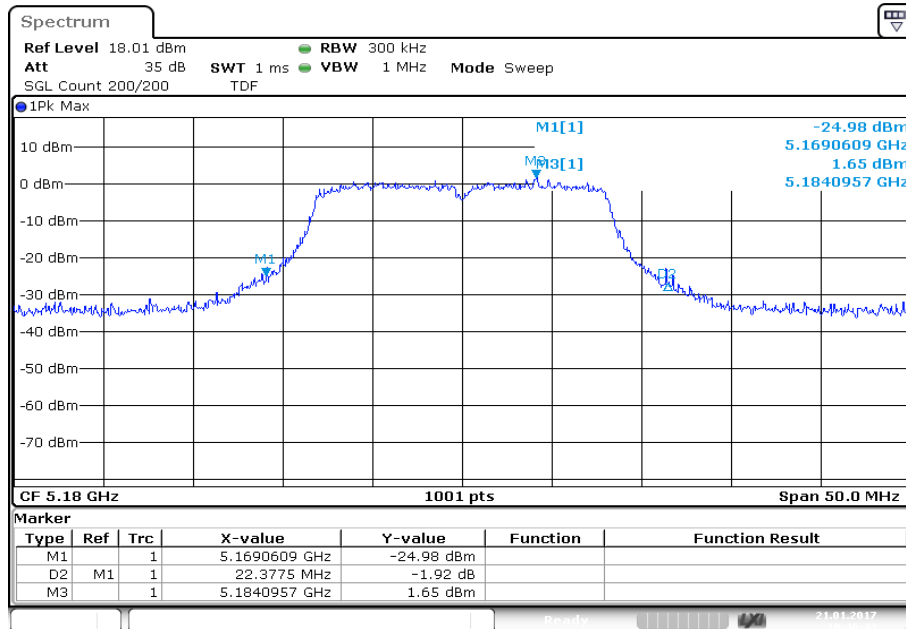
| OFDM / a – mode | 26 dB bandwidth [MHz] |          |          |          |
|-----------------|-----------------------|----------|----------|----------|
| Channel         | 5180 MHz              | 5240 MHz | 5260 MHz | 5320 MHz |
|                 | 22.38                 | 22.78    | 22.28    | 22.68    |
| Channel         | 5500 MHz              | 5600 MHz | 5700 MHz | -/-      |
|                 | 21.93                 | 22.18    | 22.58    | -/-      |
| Channel         | 5745 MHz              | 5785 MHz | 5825 MHz | -/-      |
|                 | 21.93                 | 22.53    | 22.98    | -/-      |

| OFDM / n/ac HT20 – mode | 26 dB bandwidth [MHz] |          |          |          |
|-------------------------|-----------------------|----------|----------|----------|
| Channel                 | 5180 MHz              | 5240 MHz | 5260 MHz | 5320 MHz |
|                         | 22.43                 | 22.98    | 22.83    | 22.68    |
| Channel                 | 5500 MHz              | 5600 MHz | 5700 MHz | -/-      |
|                         | 22.98                 | 23.63    | 22.97    | -/-      |
| Channel                 | 5745 MHz              | 5785 MHz | 5825 MHz | -/-      |
|                         | 22.68                 | 23.33    | 22.63    | -/-      |

| OFDM / n/ac HT40 – mode | 26 dB bandwidth [MHz] |          |          |          |
|-------------------------|-----------------------|----------|----------|----------|
| Channel                 | 5190 MHz              | 5230 MHz | 5270 MHz | 5310 MHz |
|                         | 44.96                 | 46.05    | 44.96    | 45.85    |
| Channel                 | 5510 MHz              | 5590 MHz | 5670 MHz | -/-      |
|                         | 47.65                 | 47.55    | 46.95    | -/-      |
| Channel                 | 5755 MHz              | 5795 MHz | -/-      | -/-      |
|                         | 46.05                 | 45.75    | -/-      | -/-      |

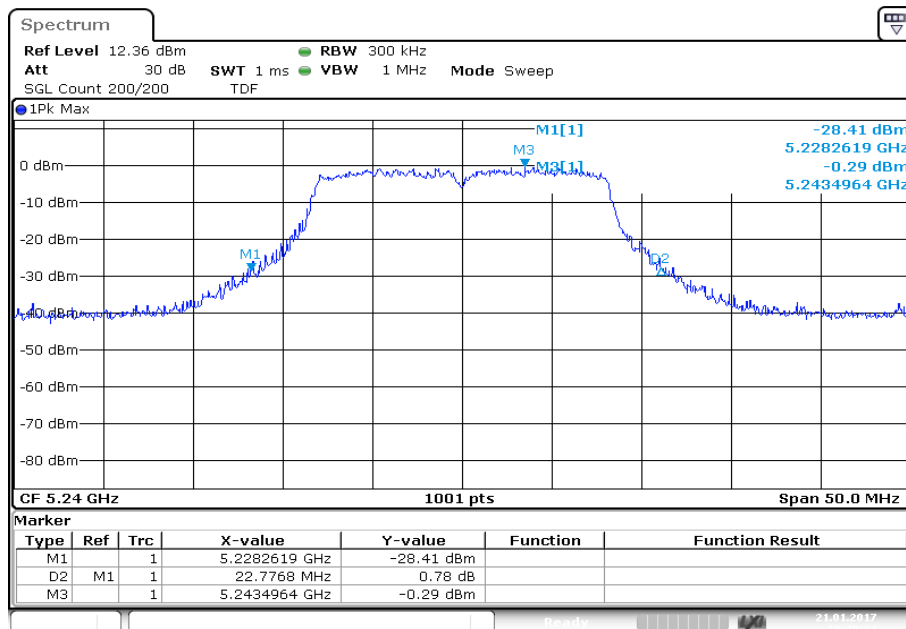
**Plots:** OFDM / a – mode

**Plot 1:** 5180 MHz



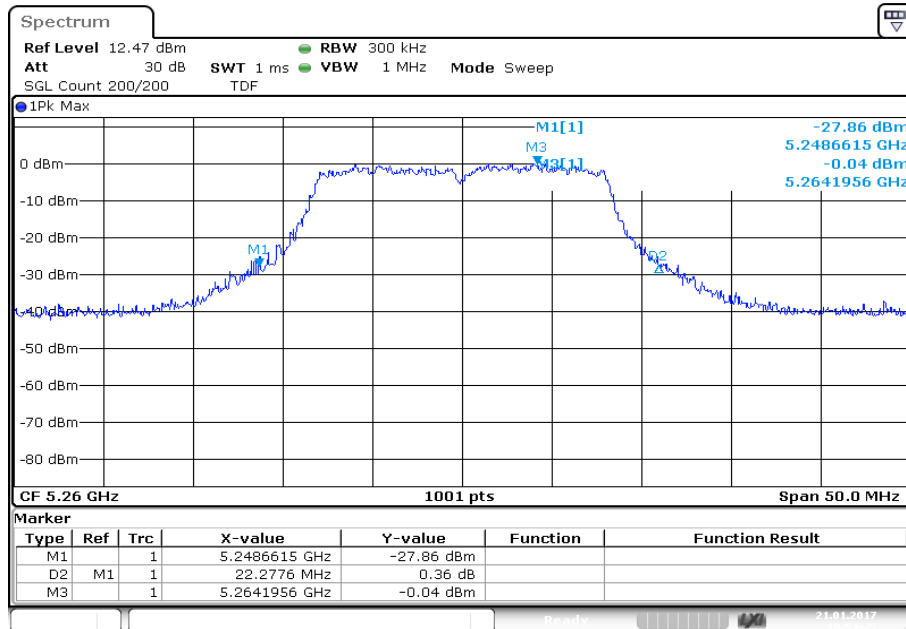
Date: 21.JAN.2017 10:46:42

**Plot 2:** 5240 MHz



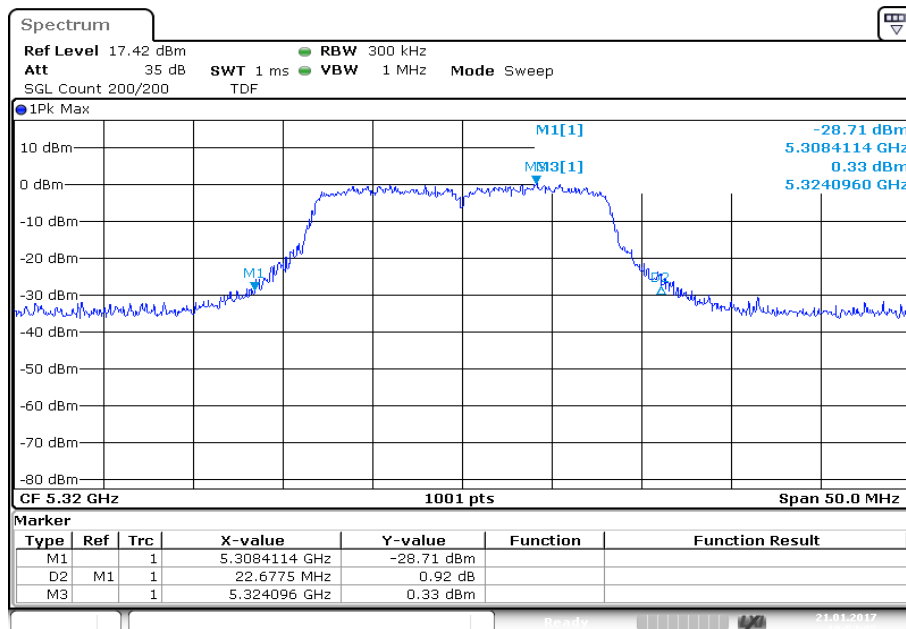
Date: 21.JAN.2017 10:49:34

Plot 3: 5260 MHz



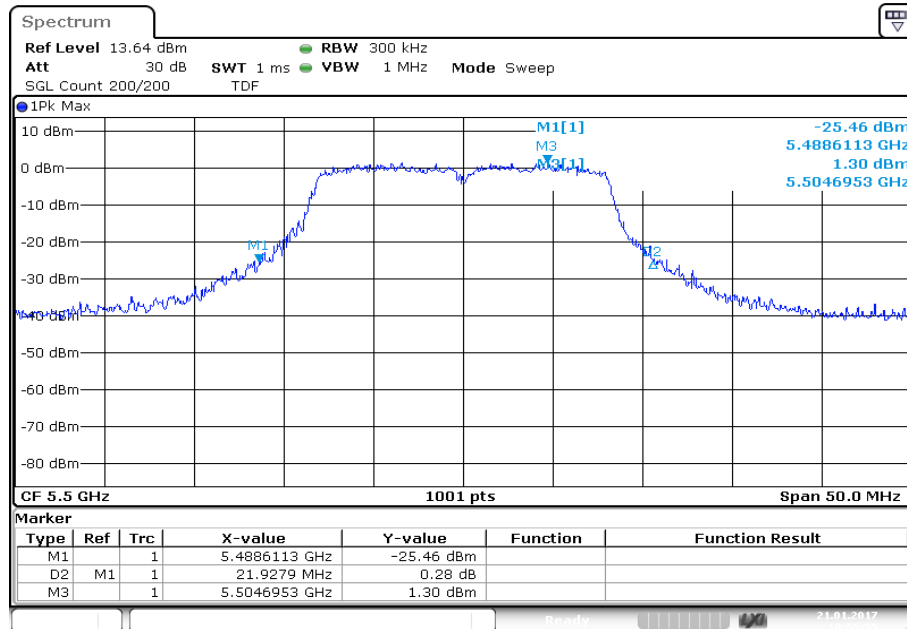
Date: 21.JAN.2017 10:51:45

Plot 4: 5320 MHz



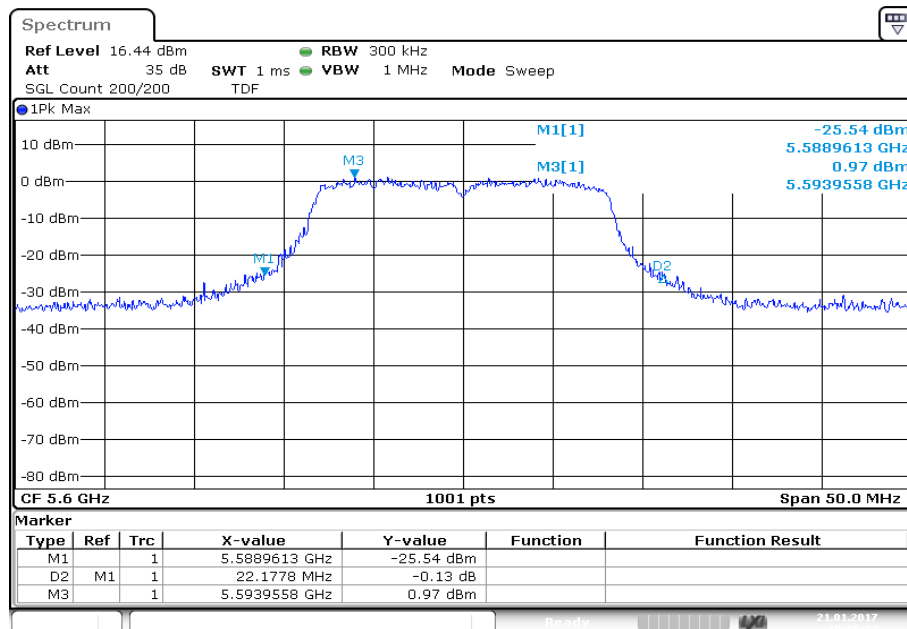
Date: 21.JAN.2017 10:54:05

Plot 5: 5500 MHz



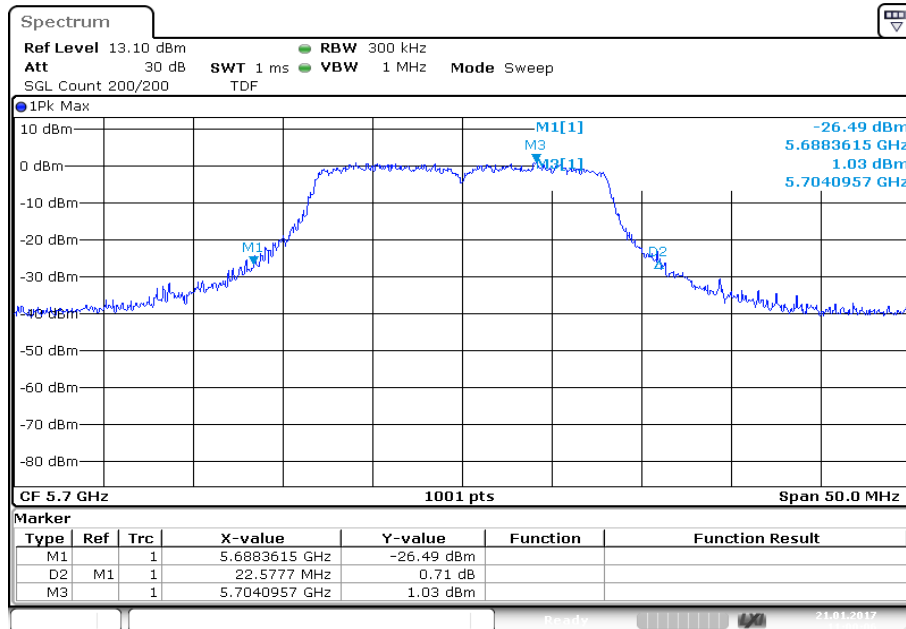
Date: 21.JAN.2017 10:55:55

Plot 6: 5600 MHz



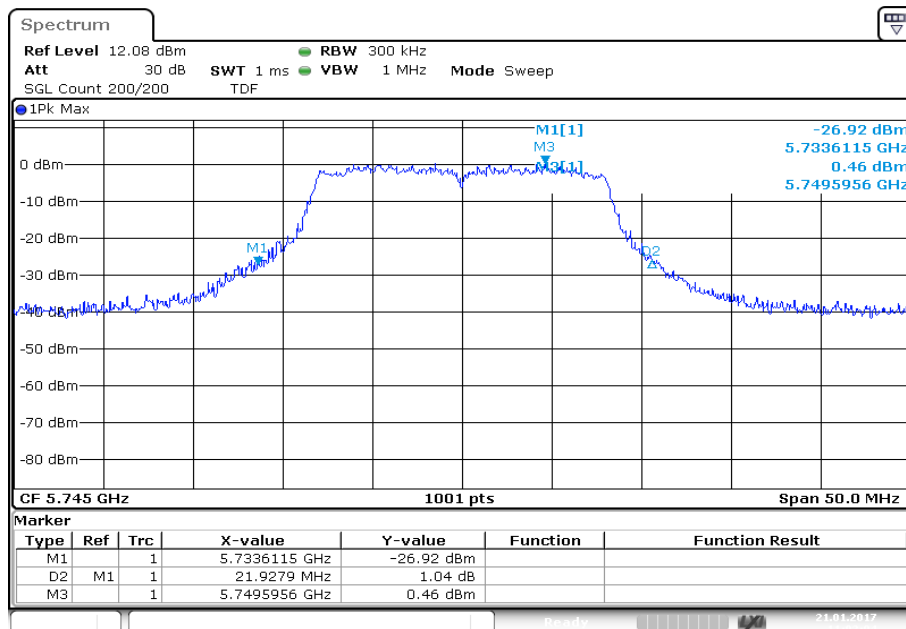
Date: 21.JAN.2017 10:58:12

Plot 7: 5700 MHz



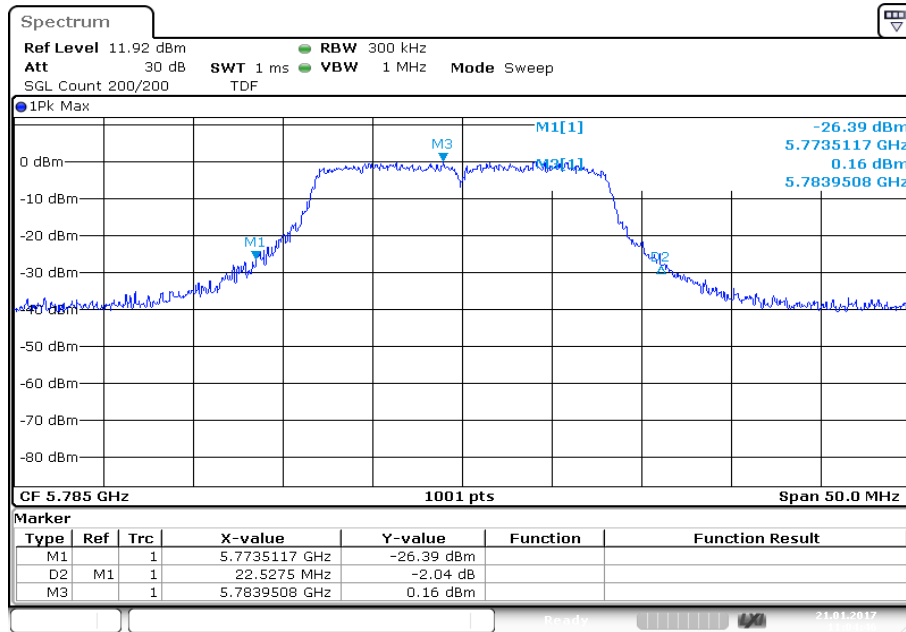
Date: 21.JAN.2017 11:00:05

Plot 8: 5745 MHz



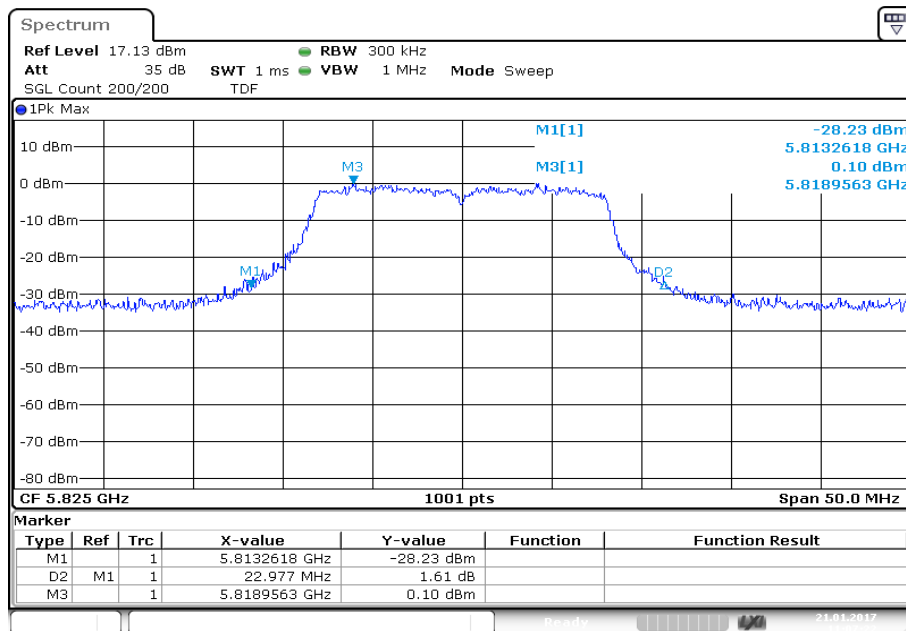
Date: 21.JAN.2017 11:02:04

Plot 9: 5785 MHz

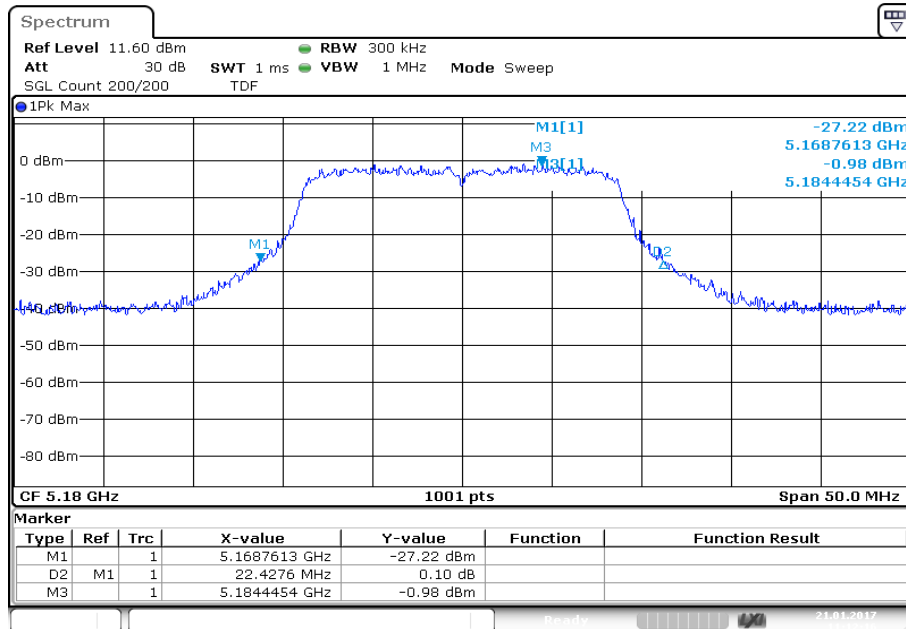


Date: 21.JAN.2017 11:04:46

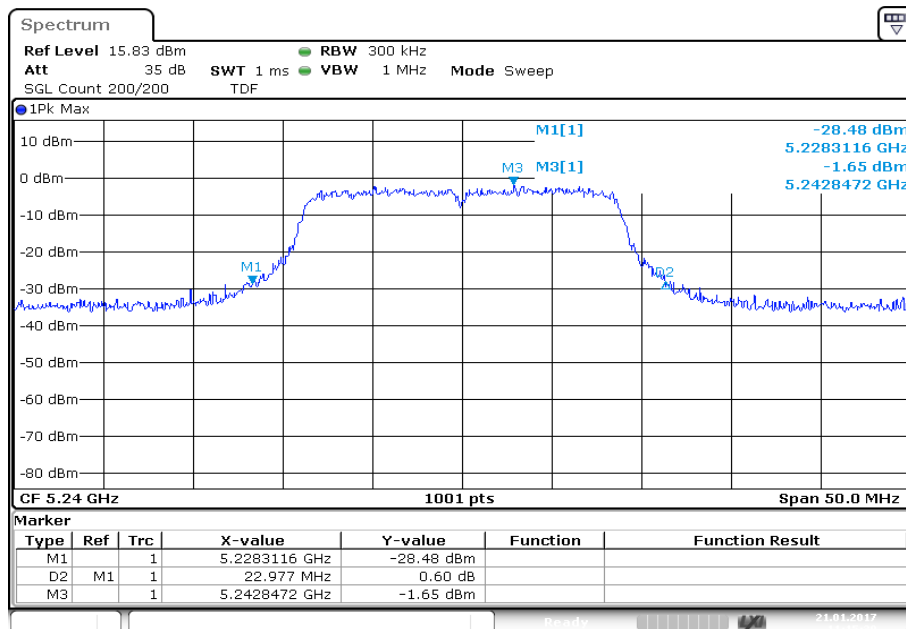
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:07:22

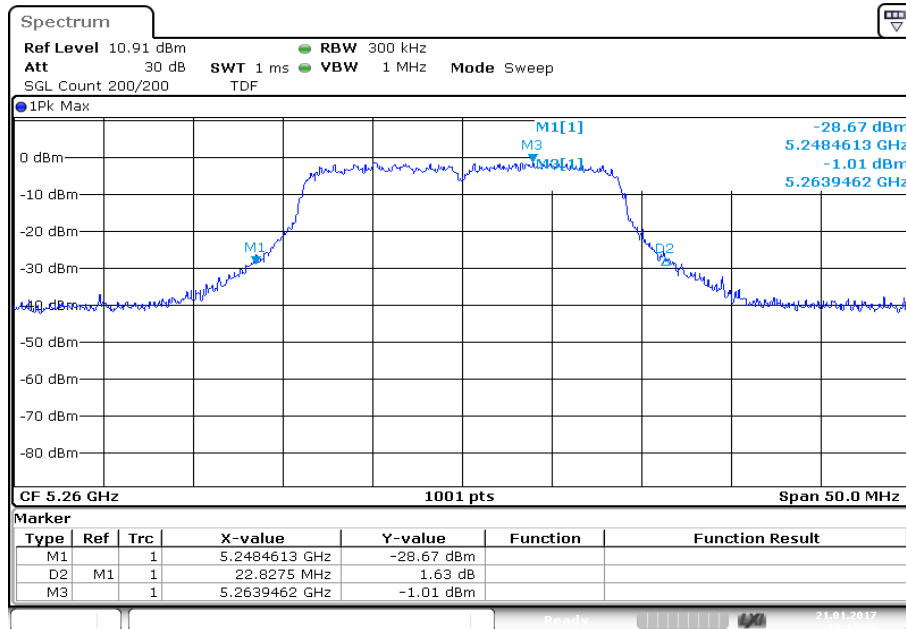
**Plots:** OFDM / n/ac HT20 – mode**Plot 1:** 5180 MHz

Date: 21.JAN.2017 11:12:16

**Plot 2:** 5240 MHz

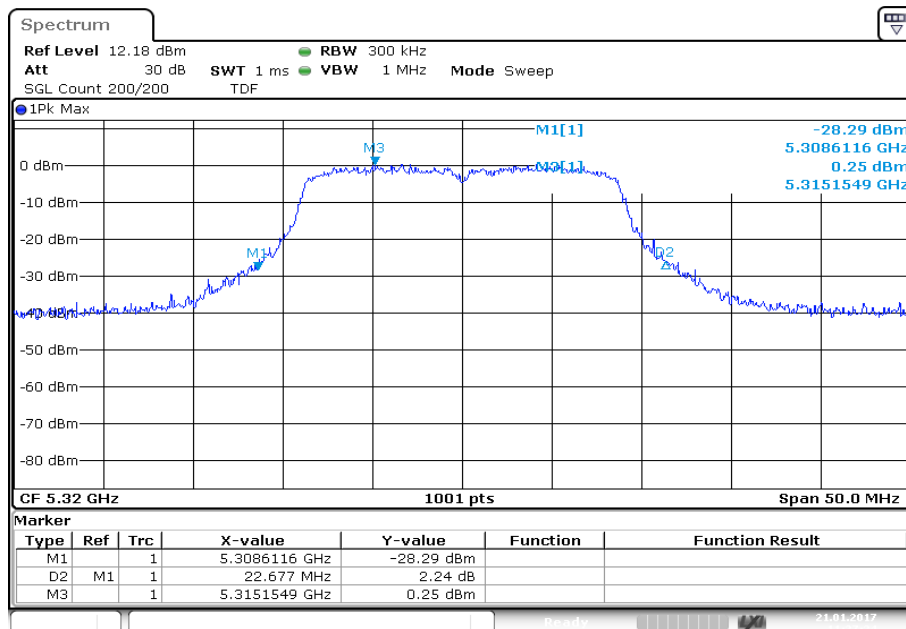
Date: 21.JAN.2017 11:15:39

Plot 3: 5260 MHz



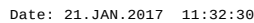
Date: 21.JAN.2017 11:17:38

Plot 4: 5320 MHz

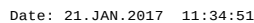


Date: 21.JAN.2017 11:27:23

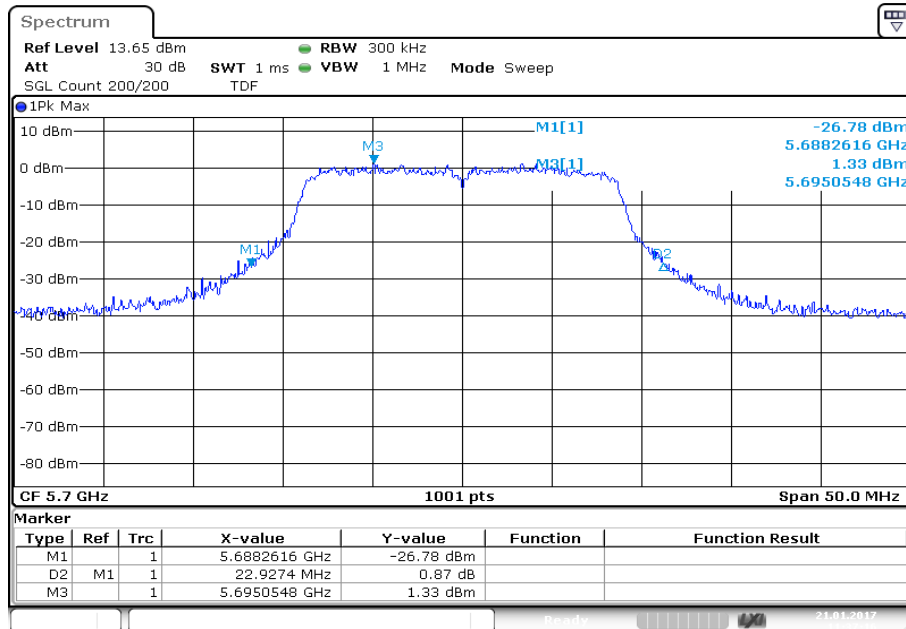
**Plot 5:** 5500 MHz



**Plot 6:** 5600 MHz

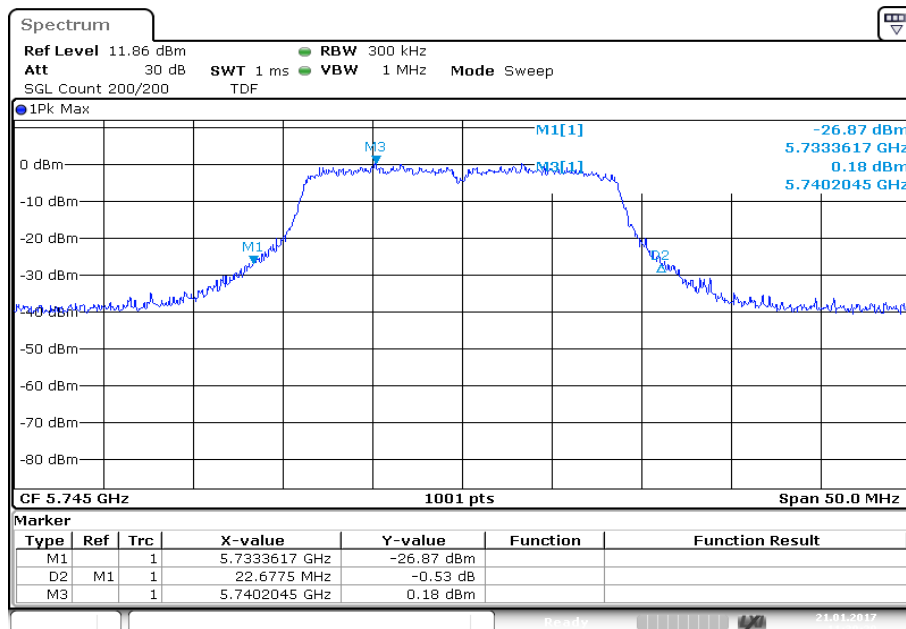


Plot 7: 5700 MHz



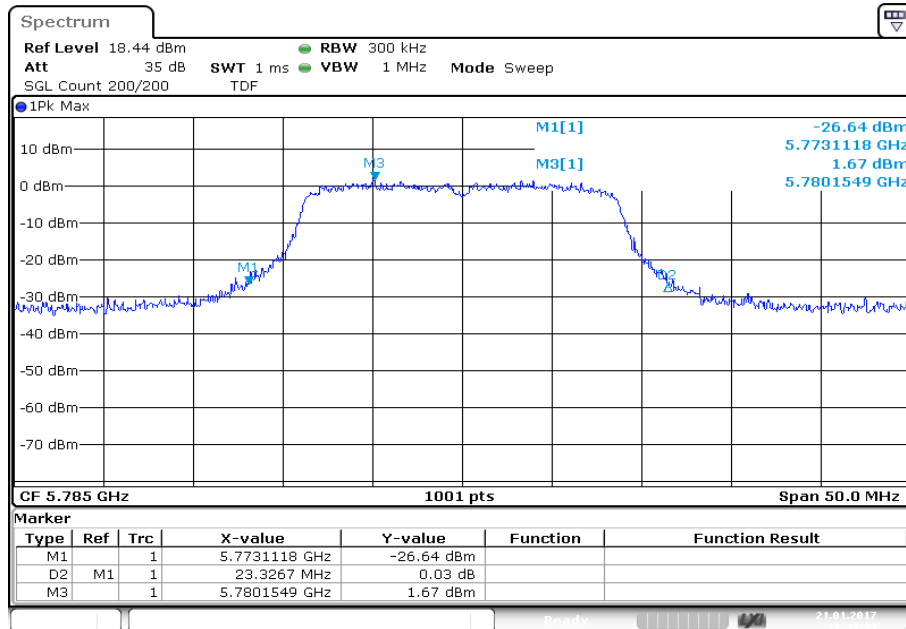
Date: 21.JAN.2017 11:37:16

Plot 8: 5745 MHz

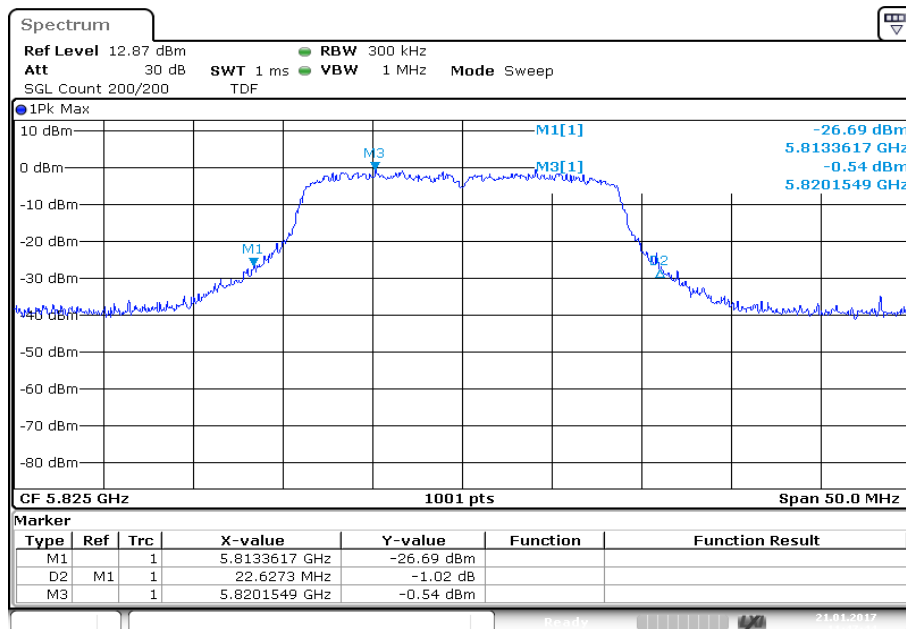


Date: 21.JAN.2017 11:39:20

Plot 9: 5785 MHz

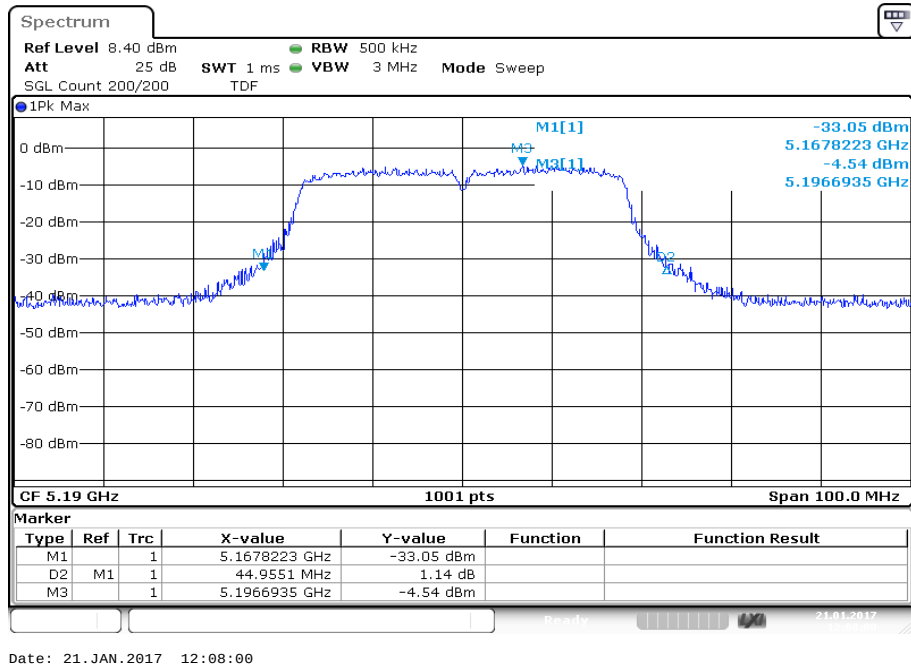


Plot 10: 5825 MHz

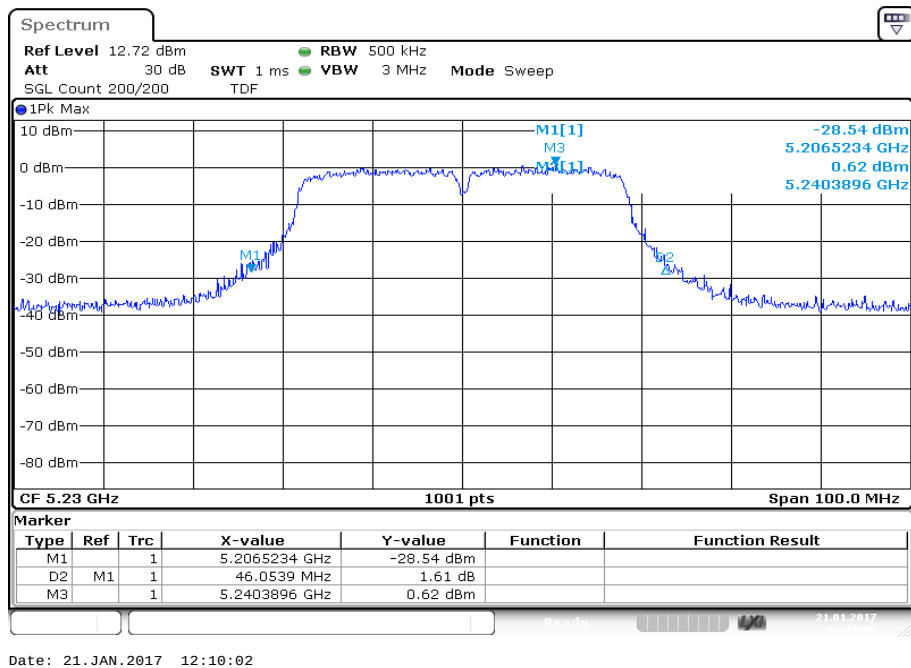


**Plots:** OFDM / n/ac HT40 – mode

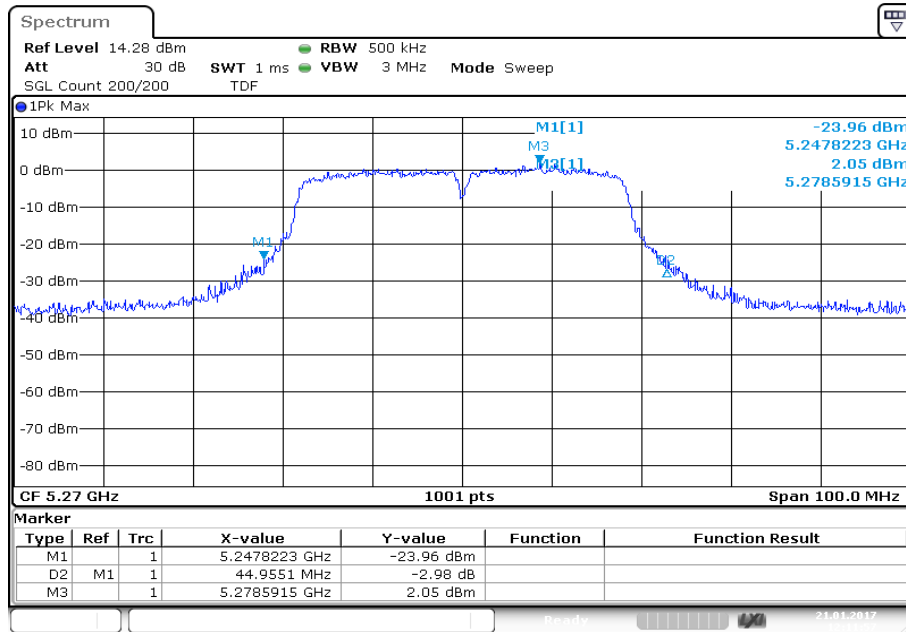
**Plot 1:** 5190 MHz



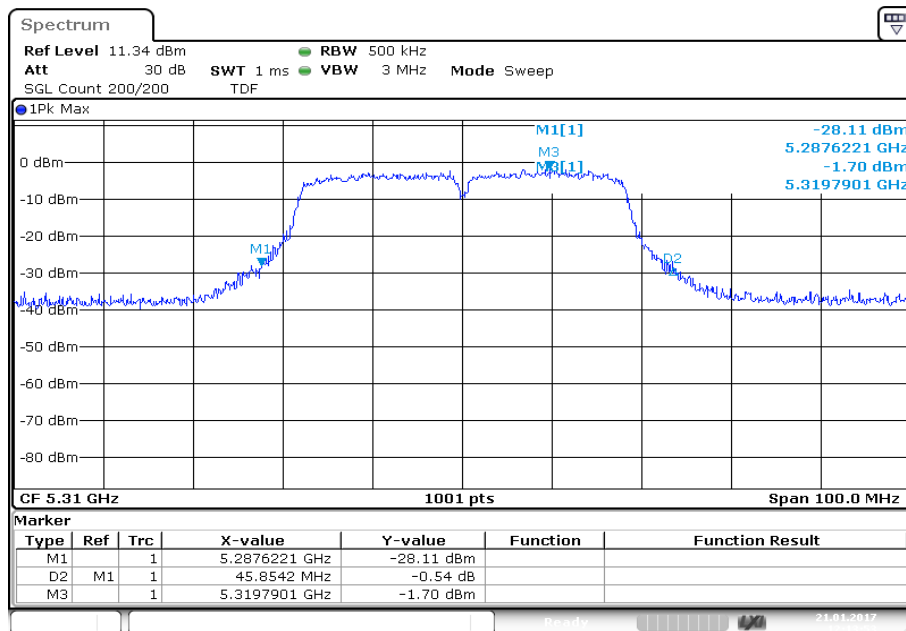
**Plot 2:** 5230 MHz



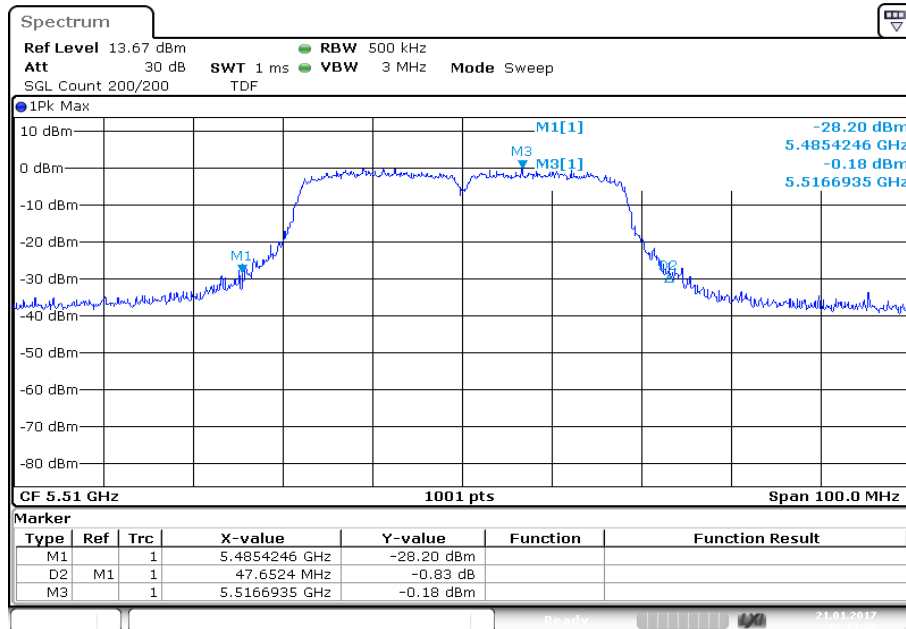
Plot 3: 5270 MHz



Plot 4: 5310 MHz

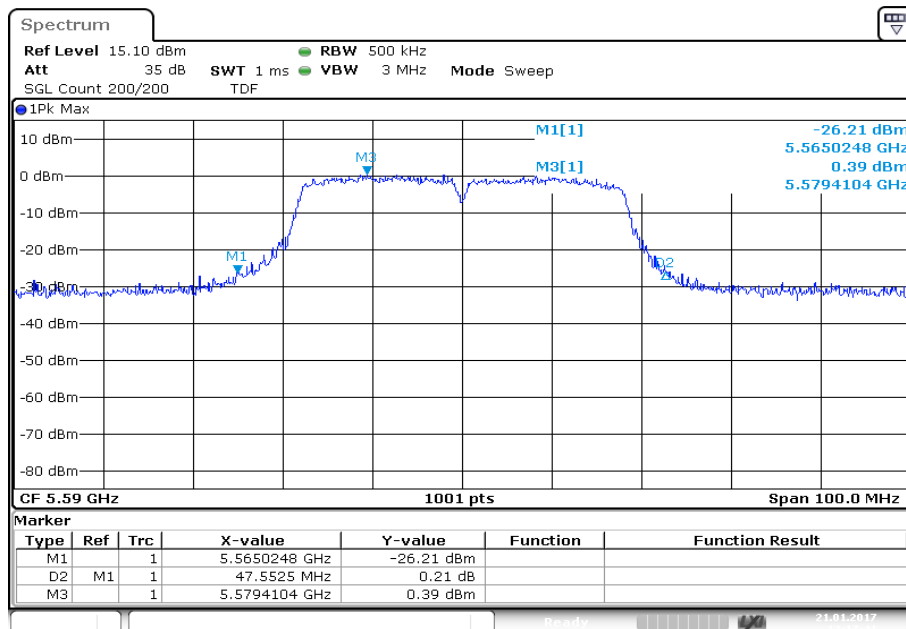


Plot 5: 5510 MHz



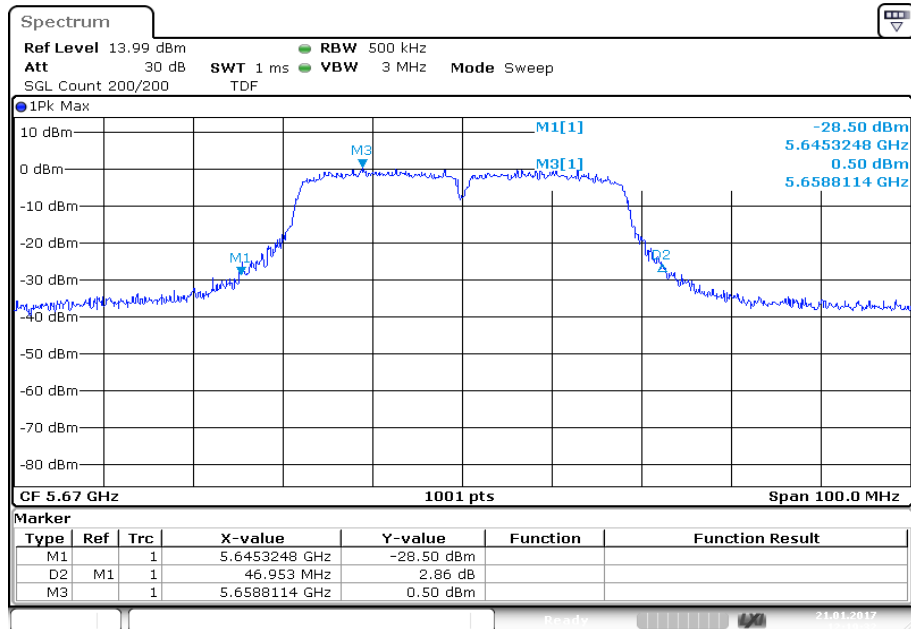
Date: 21.JAN.2017 12:15:48

Plot 6: 5590 MHz



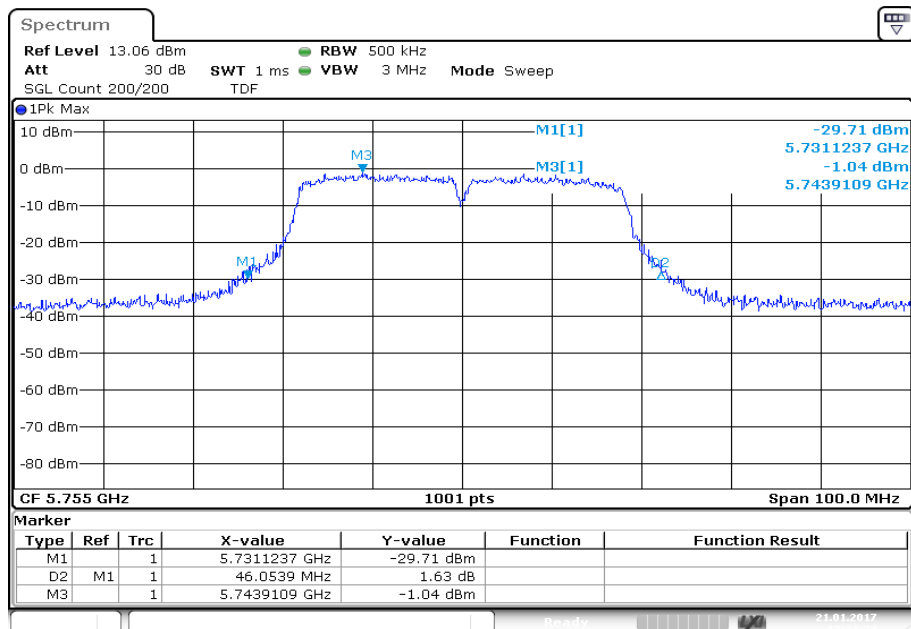
Date: 21.JAN.2017 12:17:41

Plot 7: 5670 MHz



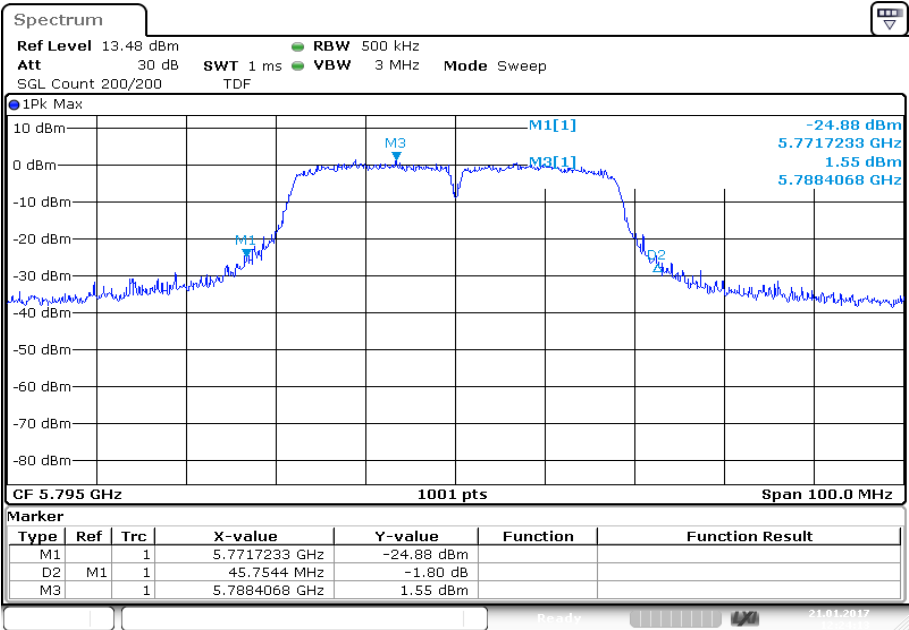
Date: 21.JAN.2017 12:19:32

Plot 8: 5755 MHz



Date: 21.JAN.2017 12:21:24

Plot 9: 5795 MHz



Date: 21.JAN.2017 12:24:13

## 11.8 Occupied bandwidth – 99% emission bandwidth

### Description:

Measurement of the 99% bandwidth of the modulated signal acc. RSS-GEN.

### Measurement:

| Measurement parameter    |                                                                                 |
|--------------------------|---------------------------------------------------------------------------------|
| Detector:                | Peak                                                                            |
| Sweep time:              | Auto                                                                            |
| Resolution bandwidth:    | 300 kHz / 500 kHz                                                               |
| Video bandwidth:         | 1 MHz / 3 MHz                                                                   |
| Span:                    | 50 MHz / 100 MHz                                                                |
| Measurement procedure:   | Measurement of the 99% bandwidth using the integration function of the analyzer |
| Trace – mode:            | Max hold (allow trace to stabilize)                                             |
| Test setup:              | See sub clause 6.5 A                                                            |
| Measurement uncertainty: | See sub clause 8                                                                |

### Usage:

| -/-                                         | IC |
|---------------------------------------------|----|
| Occupied Bandwidth – 99% emission bandwidth |    |
| OBW is necessary for Emission Designator    |    |

**Result:**

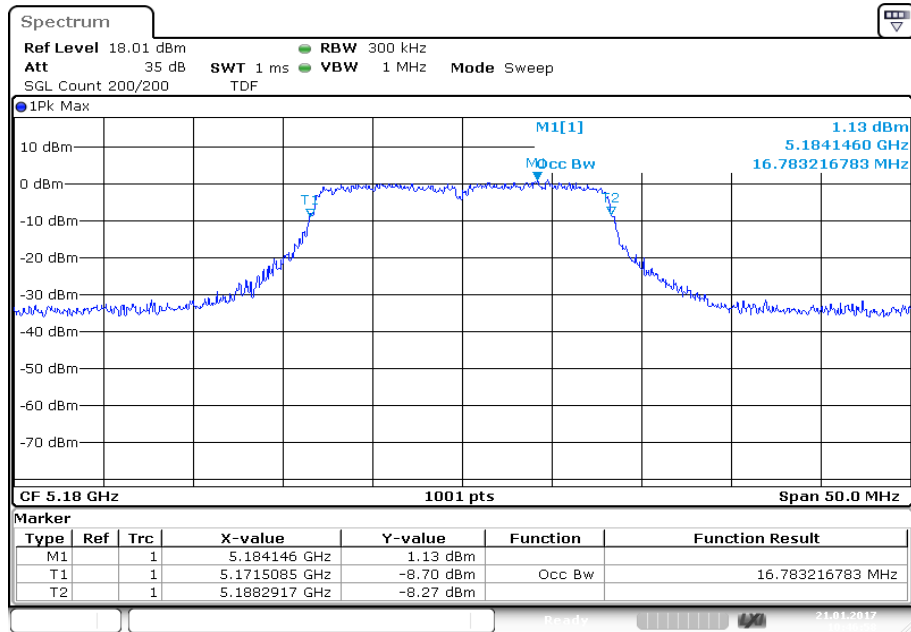
| OFDM / a – mode<br><br>Channel | 99% bandwidth [kHz] |          |          |          |
|--------------------------------|---------------------|----------|----------|----------|
|                                | 5180 MHz            | 5240 MHz | 5260 MHz | 5320 MHz |
|                                | 16783               | 16683    | 16733    | 16783    |
| Channel                        | 5500 MHz            | 5600 MHz | 5700 MHz | -/-      |
|                                | 16683               | 16783    | 16683    | -/-      |
| Channel                        | 5745 MHz            | 5785 MHz | 5825 MHz | -/-      |
|                                | 16733               | 16733    | 16783    | -/-      |

**Result:**

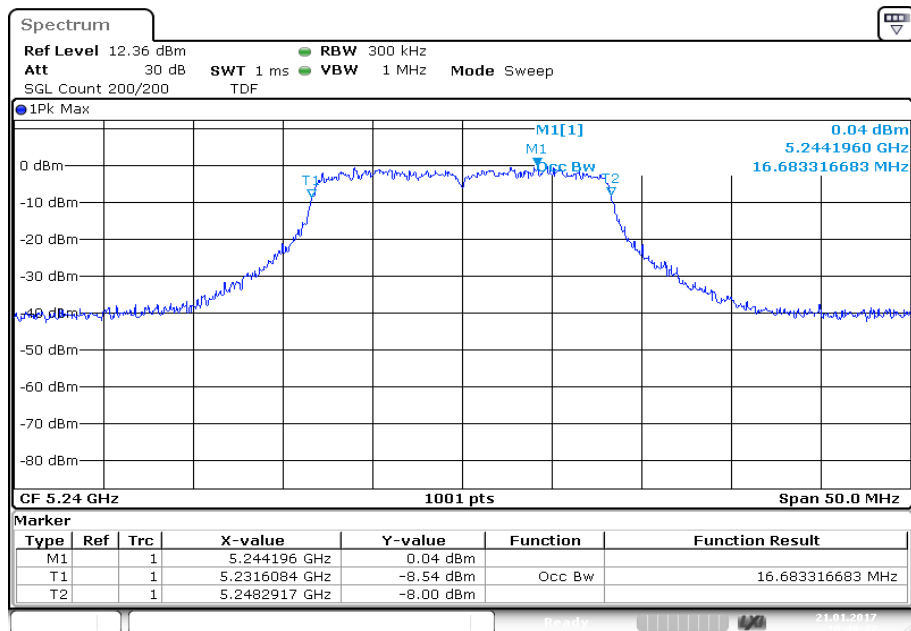
| OFDM / n/ac HT20 – mode<br><br>Channel | 99% bandwidth [kHz] |          |          |          |
|----------------------------------------|---------------------|----------|----------|----------|
|                                        | 5180 MHz            | 5240 MHz | 5260 MHz | 5320 MHz |
|                                        | 17832               | 17882    | 17782    | 17782    |
| Channel                                | 5500 MHz            | 5600 MHz | 5700 MHz | -/-      |
|                                        | 17832               | 17782    | 17882    | -/-      |
| Channel                                | 5745 MHz            | 5785 MHz | 5825 MHz | -/-      |
|                                        | 17782               | 17832    | 17832    | -/-      |

**Result:**

| OFDM / n/ac HT40 – mode<br><br>Channel | 99% bandwidth [kHz] |          |          |          |
|----------------------------------------|---------------------|----------|----------|----------|
|                                        | 5190 MHz            | 5230 MHz | 5270 MHz | 5310 MHz |
|                                        | 36563               | 36464    | 36464    | 36464    |
| Channel                                | 5510 MHz            | 5590 MHz | 5670 MHz | -/-      |
|                                        | 36563               | 36563    | 36563    | -/-      |
| Channel                                | 5755 MHz            | 5795 MHz | -/-      | -/-      |
|                                        | 36563               | 36563    | -/-      | -/-      |

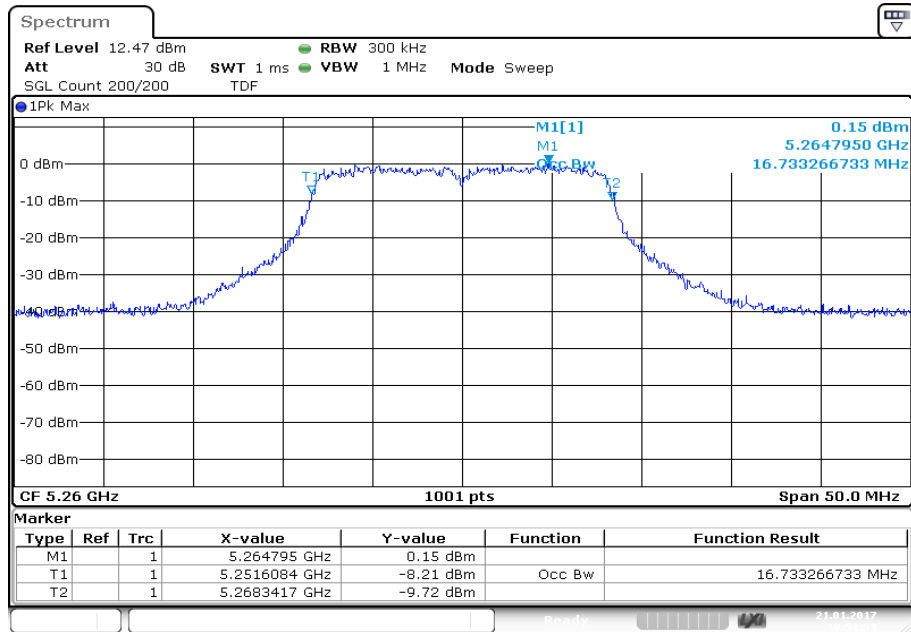
**Plots:** OFDM / a – mode**Plot 1:** 5180 MHz

Date: 21.JAN.2017 10:46:57

**Plot 2:** 5240 MHz

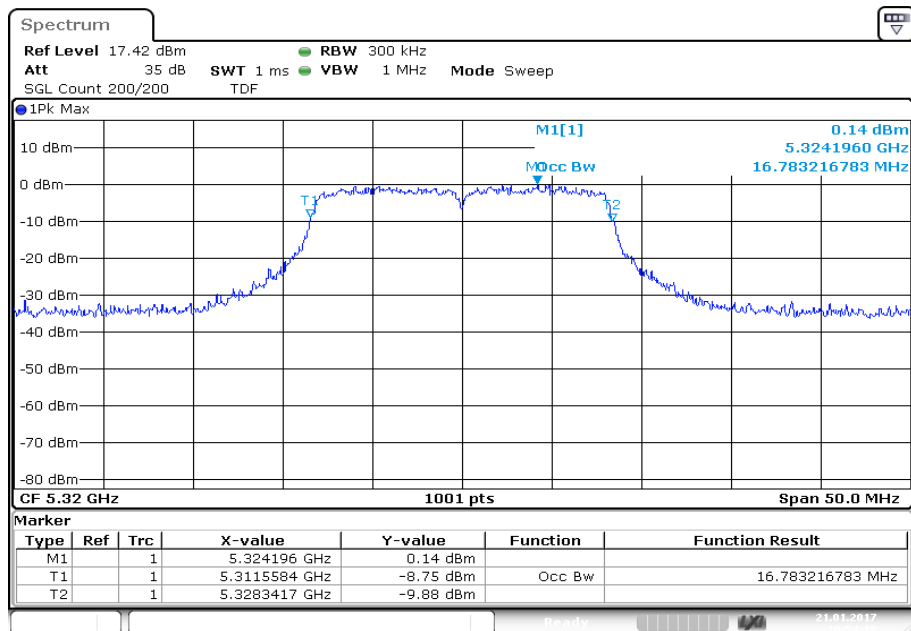
Date: 21.JAN.2017 10:49:47

Plot 3: 5260 MHz



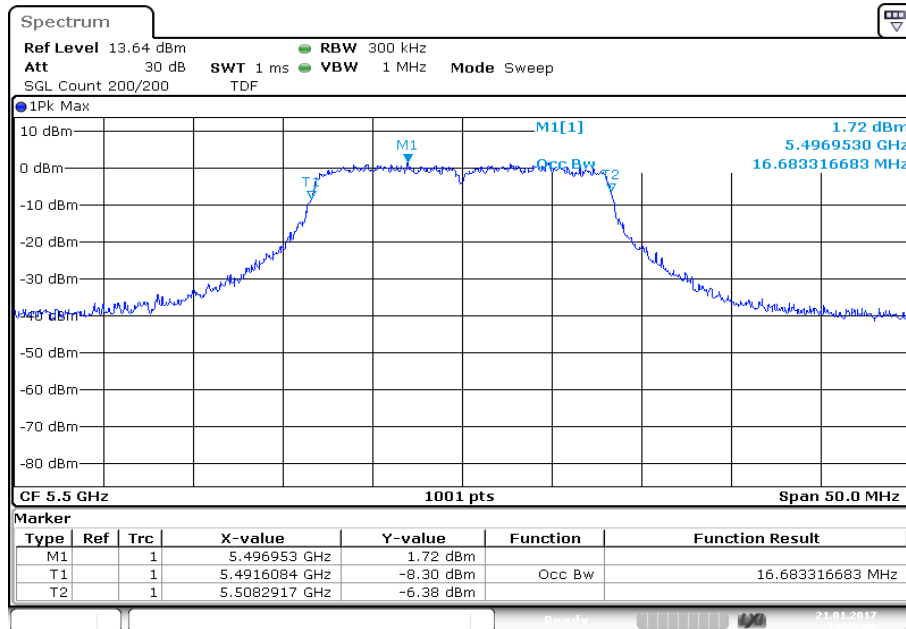
Date: 21.JAN.2017 10:51:59

Plot 4: 5320 MHz



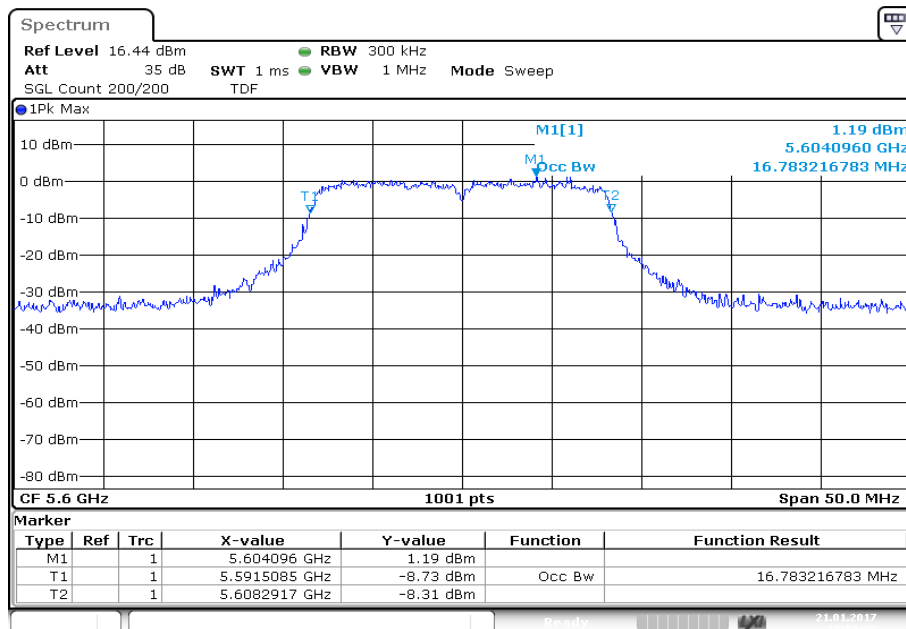
Date: 21.JAN.2017 10:54:18

Plot 5: 5500 MHz



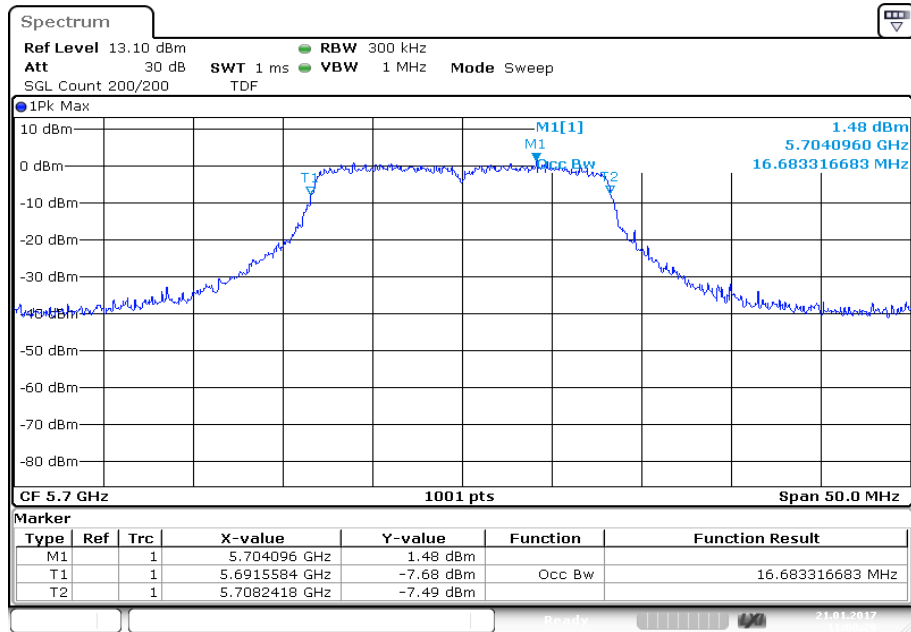
Date: 21. JAN. 2017 10:56:09

Plot 6: 5600 MHz



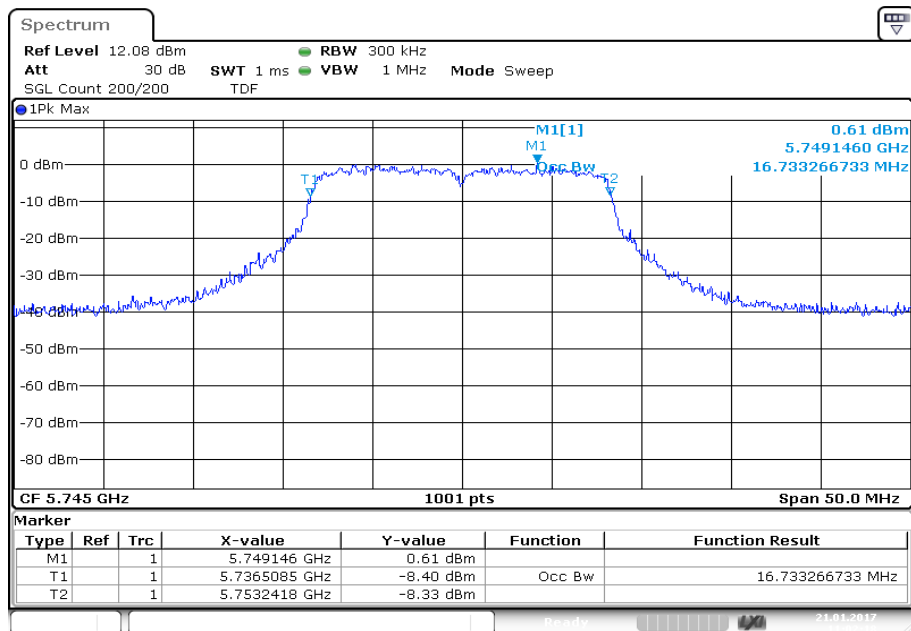
Date: 21. JAN. 2017 10:58:25

Plot 7: 5700 MHz



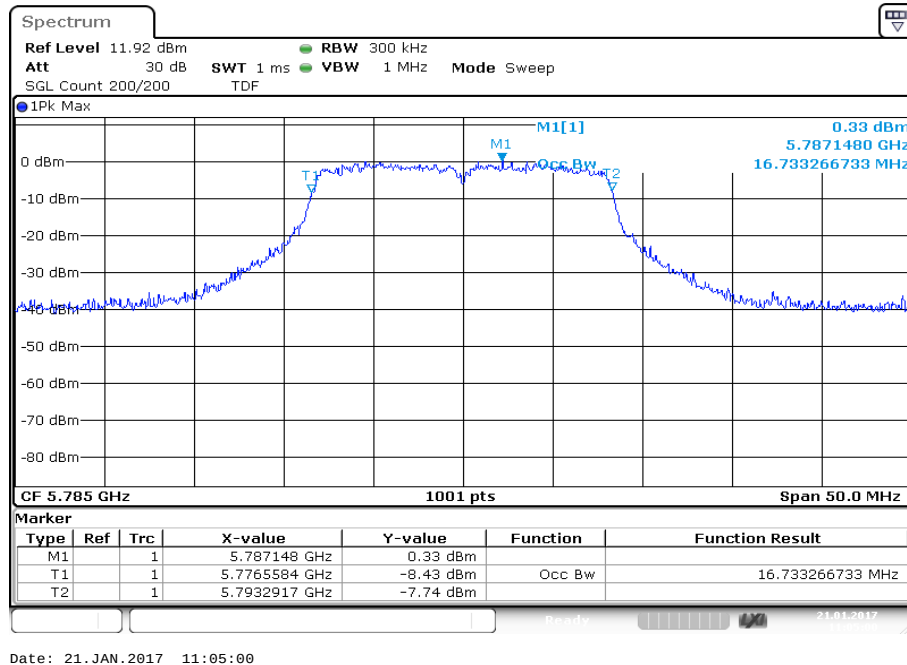
Date: 21.JAN.2017 11:00:20

Plot 8: 5745 MHz

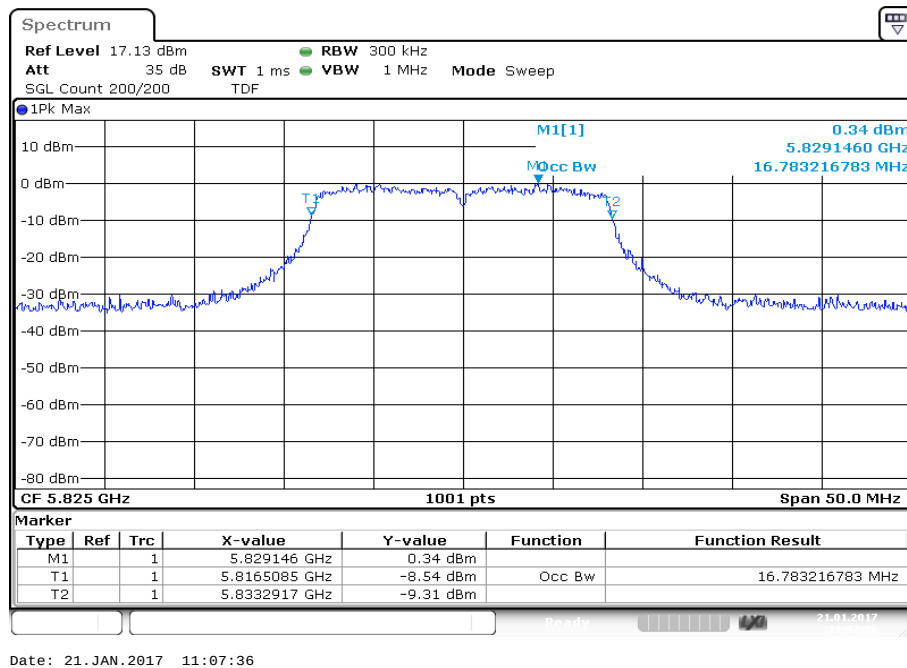


Date: 21.JAN.2017 11:02:18

Plot 9: 5785 MHz

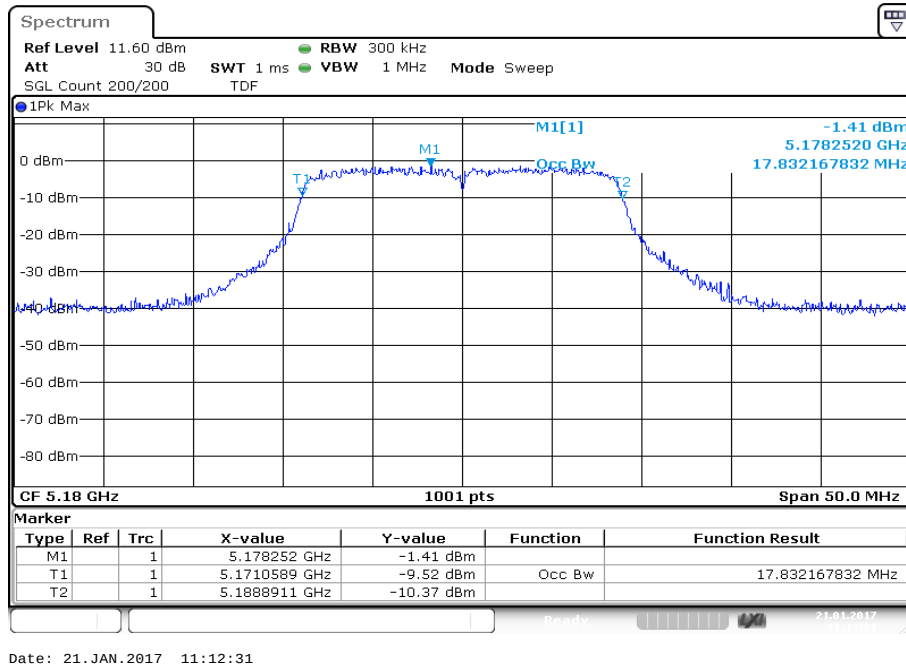


Plot 10: 5825 MHz

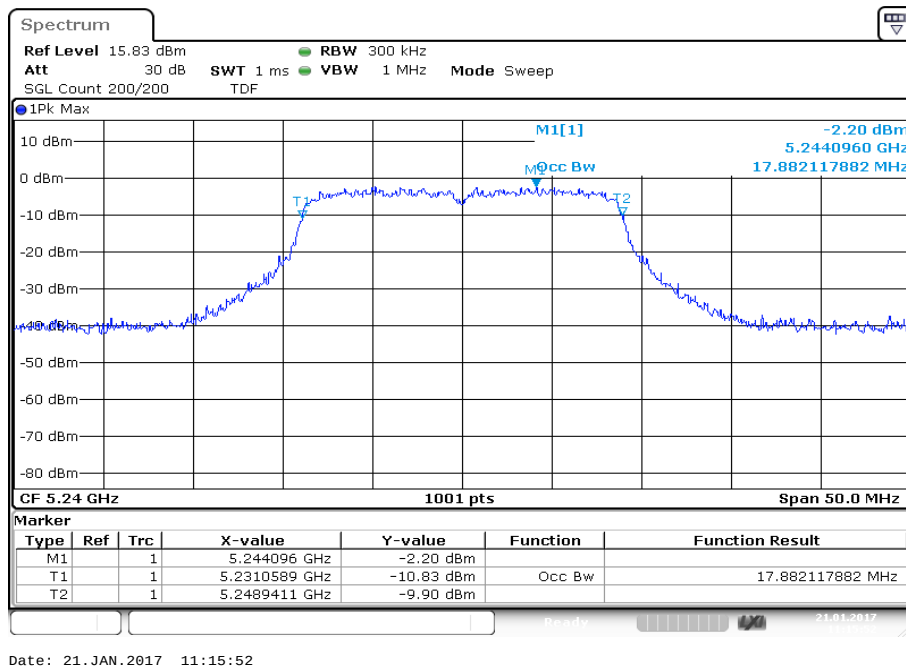


**Plots:** OFDM / n/ac HT20 – mode

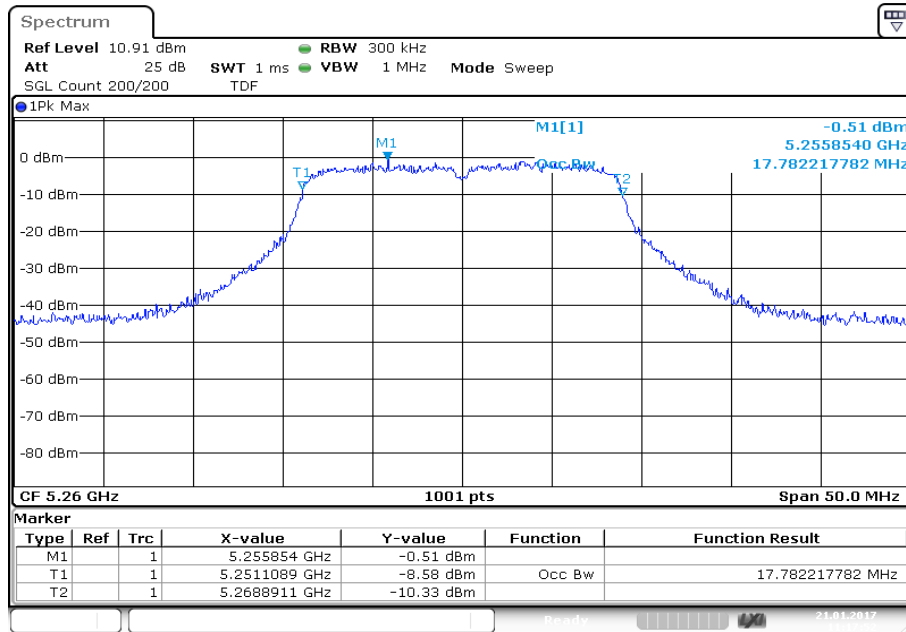
**Plot 1:** 5180 MHz



**Plot 2:** 5240 MHz

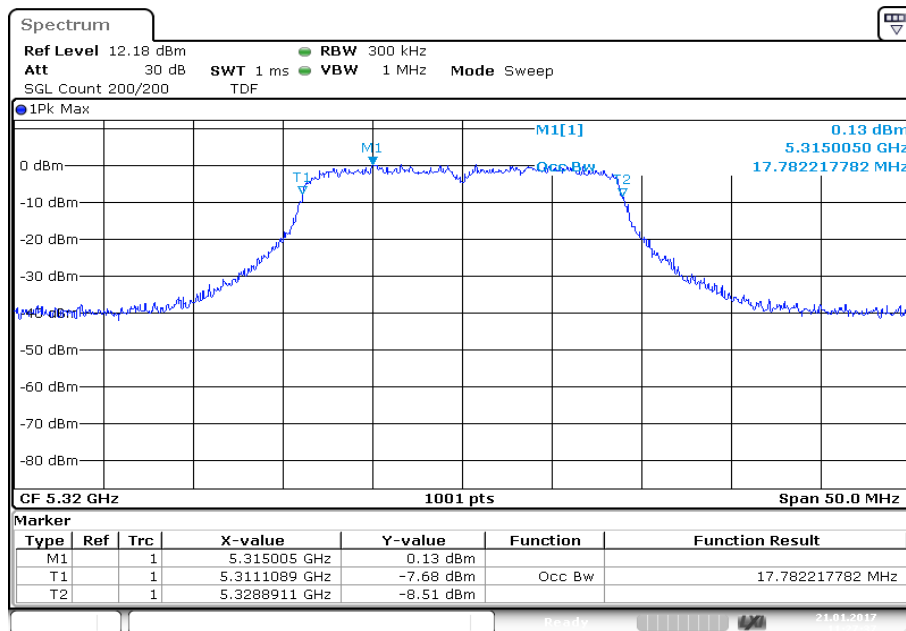


Plot 3: 5260 MHz



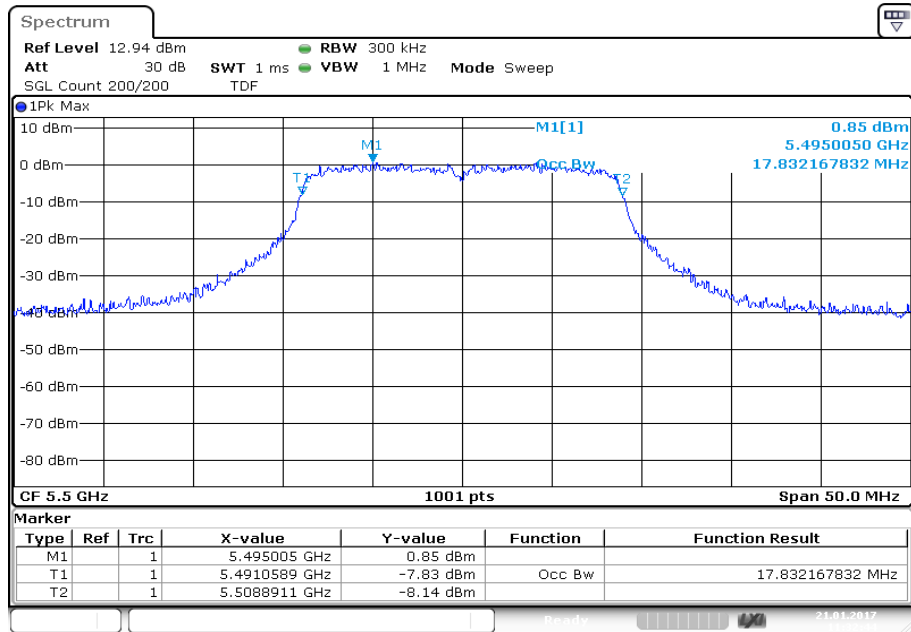
Date: 21.JAN.2017 11:17:51

Plot 4: 5320 MHz



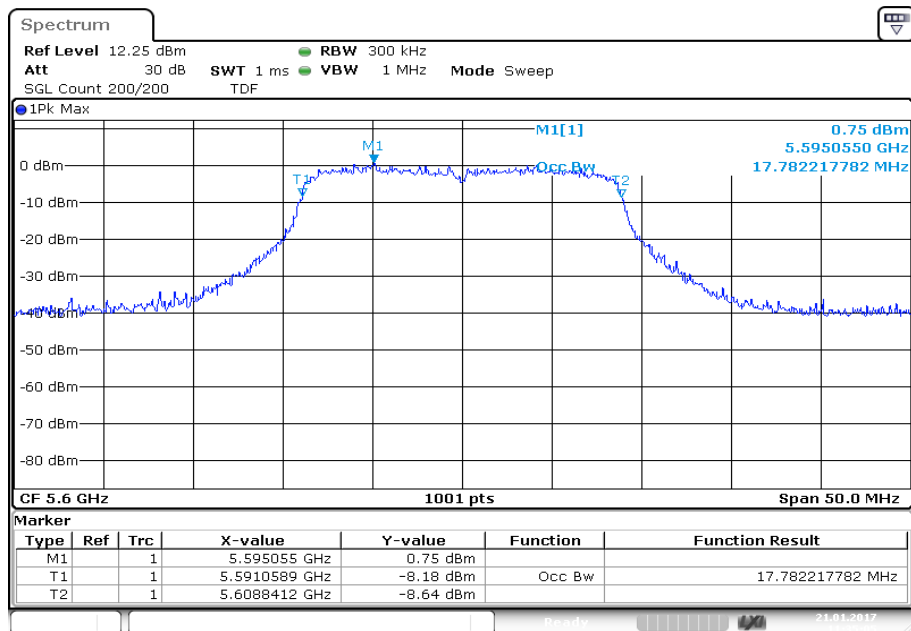
Date: 21.JAN.2017 11:27:36

Plot 5: 5500 MHz



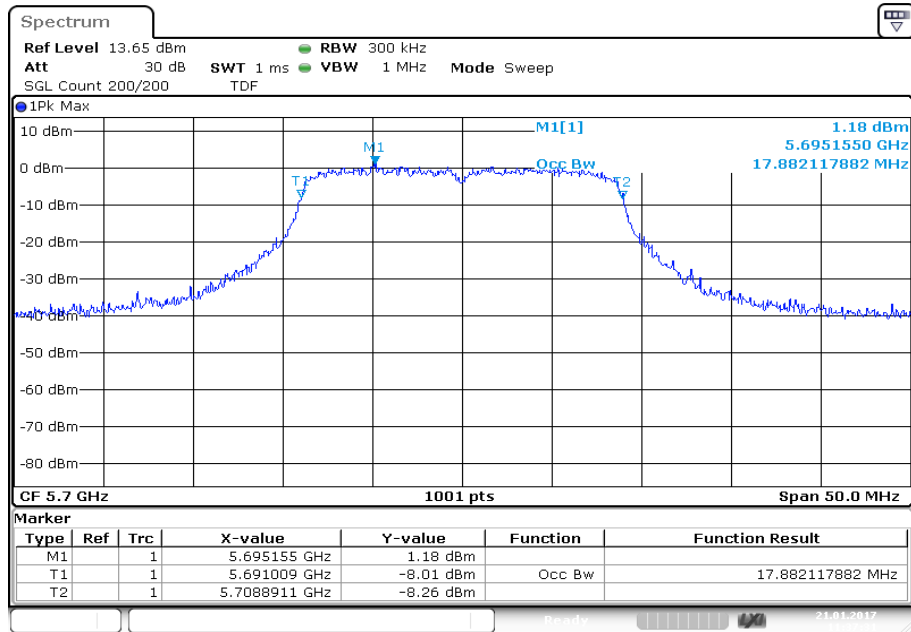
Date: 21.JAN.2017 11:32:43

Plot 6: 5600 MHz



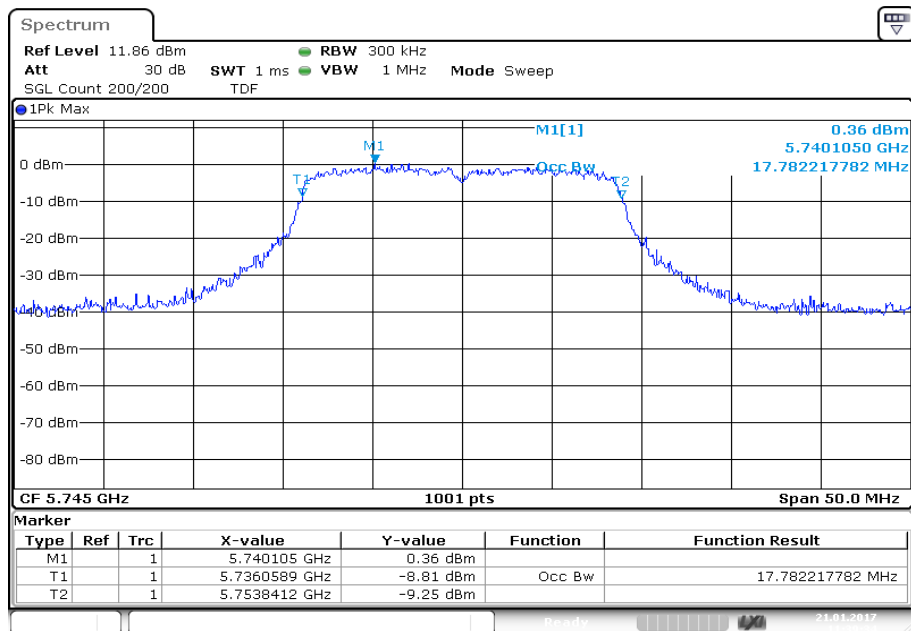
Date: 21.JAN.2017 11:35:04

Plot 7: 5700 MHz



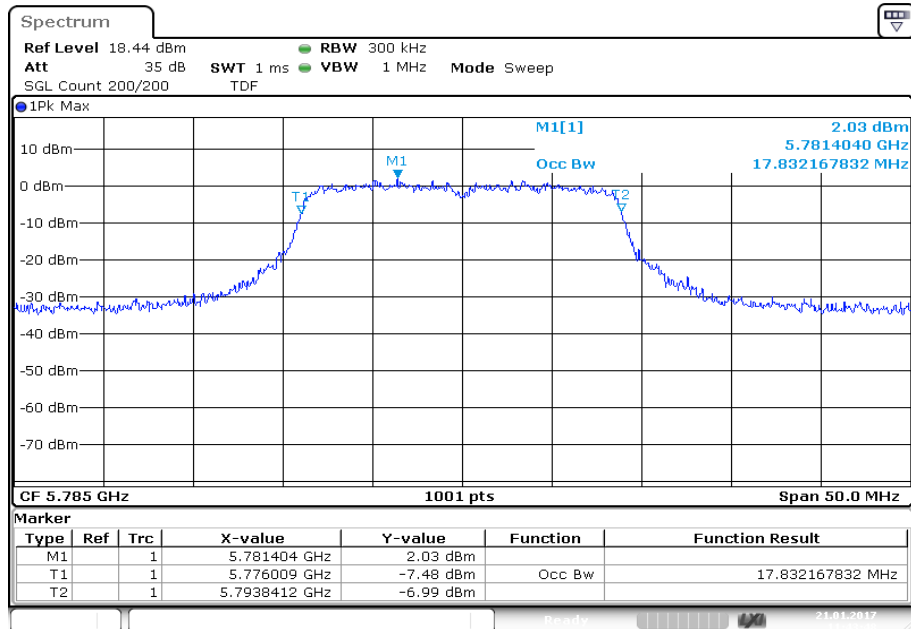
Date: 21.JAN.2017 11:37:31

Plot 8: 5745 MHz



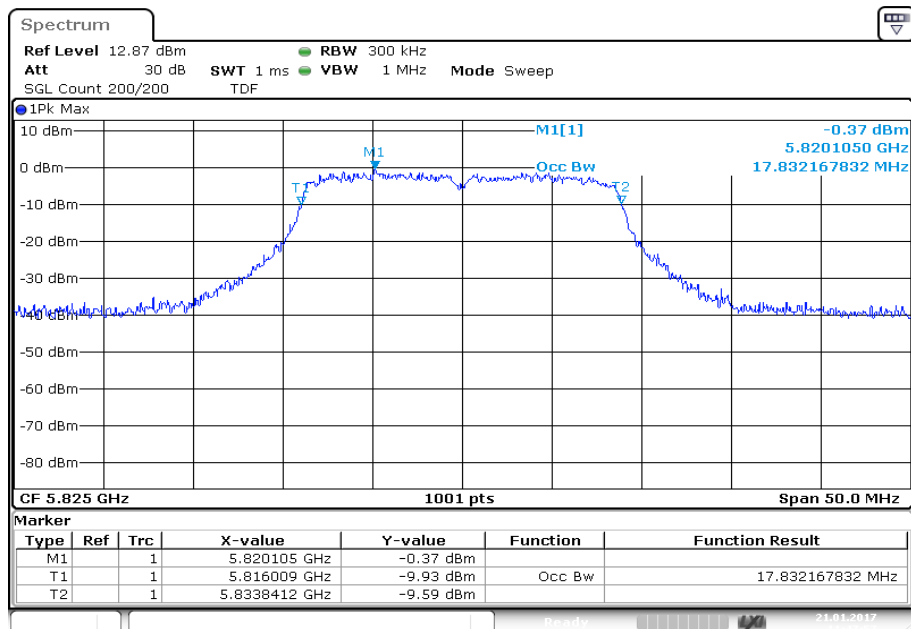
Date: 21.JAN.2017 11:39:34

Plot 9: 5785 MHz



Date: 21.JAN.2017 11:43:48

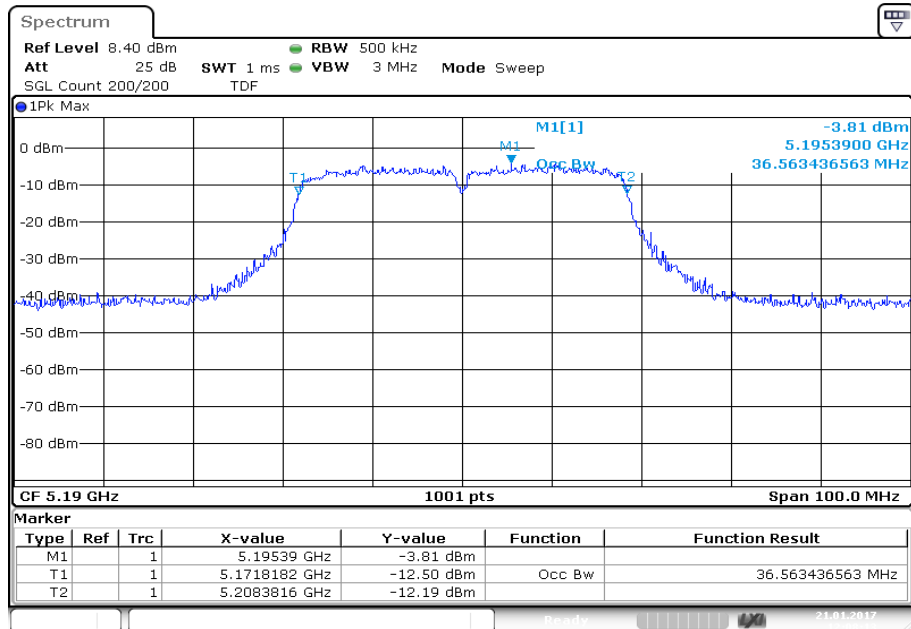
Plot 10: 5825 MHz



Date: 21.JAN.2017 11:47:57

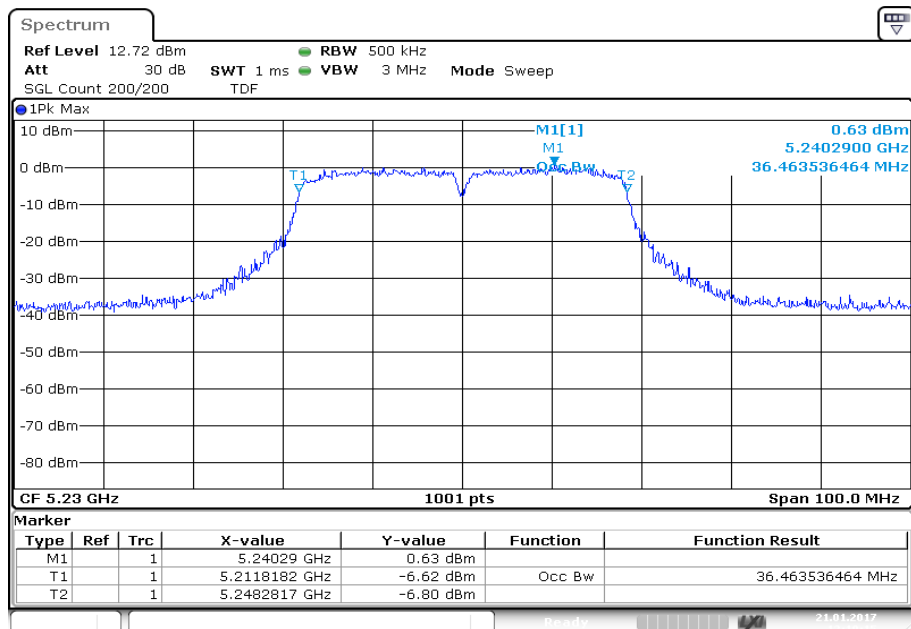
**Plots:** OFDM / n/ac HT40 – mode

**Plot 1:** 5190 MHz



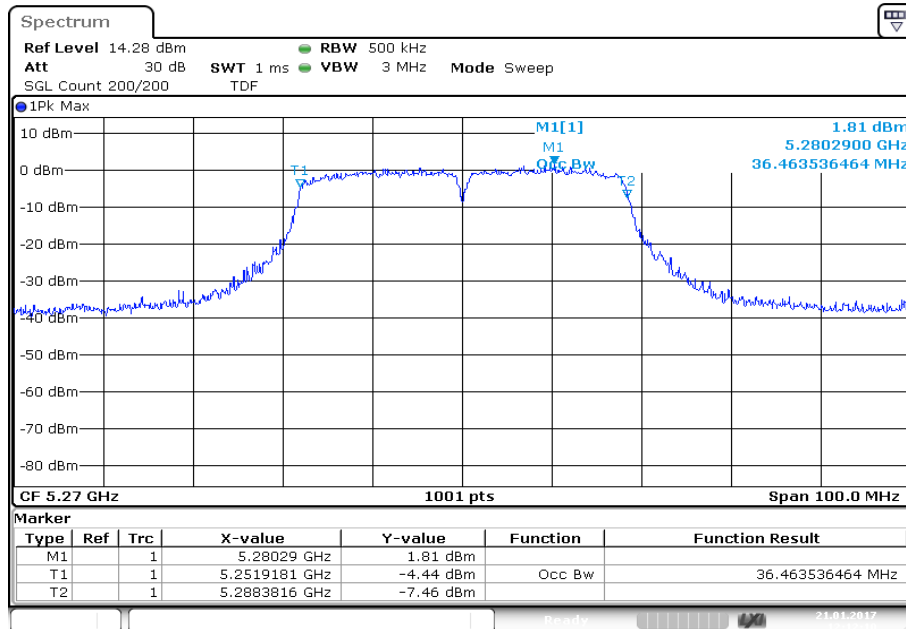
Date: 21.JAN.2017 12:08:13

**Plot 2:** 5230 MHz



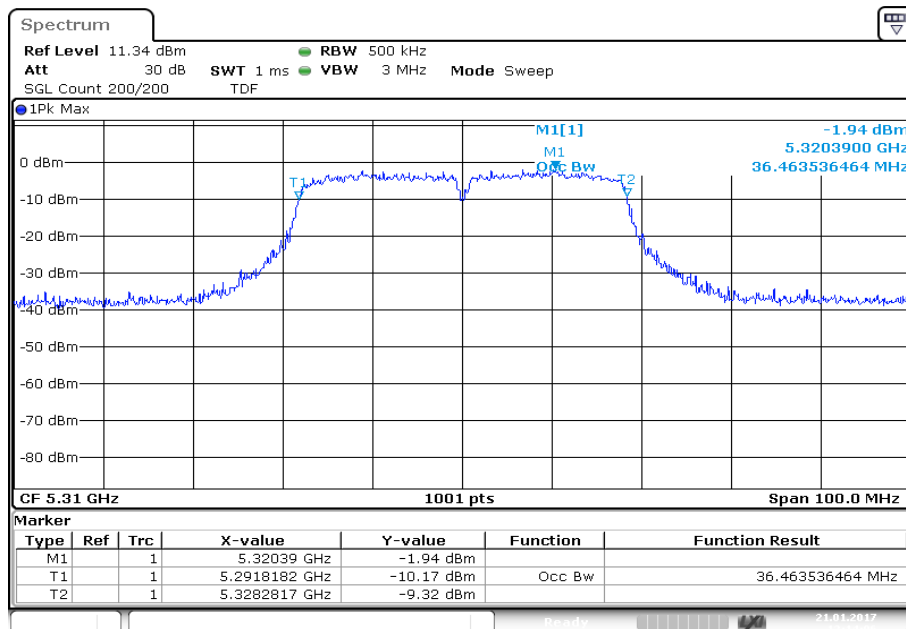
Date: 21.JAN.2017 12:10:15

Plot 3: 5270 MHz



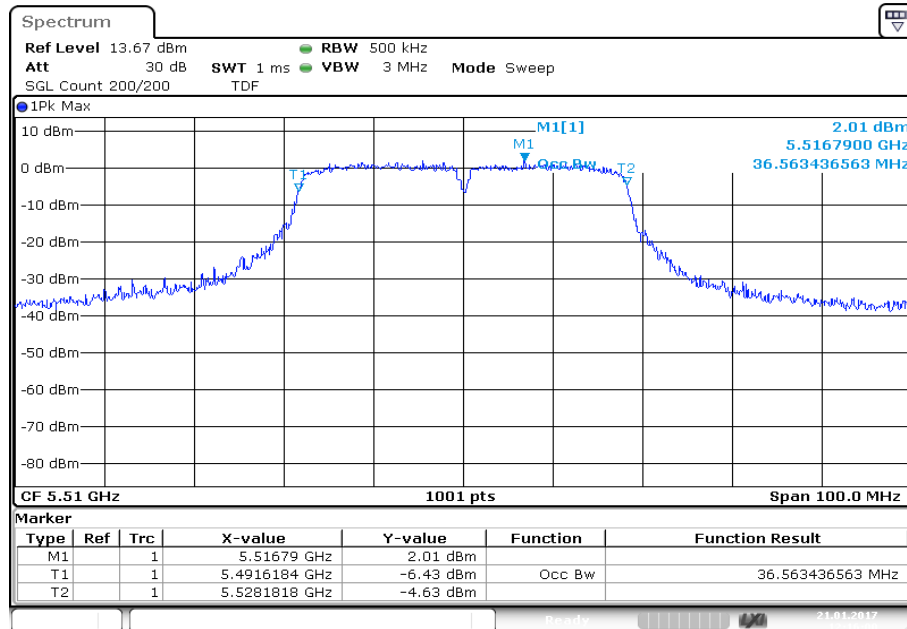
Date: 21.JAN.2017 12:12:10

Plot 4: 5310 MHz



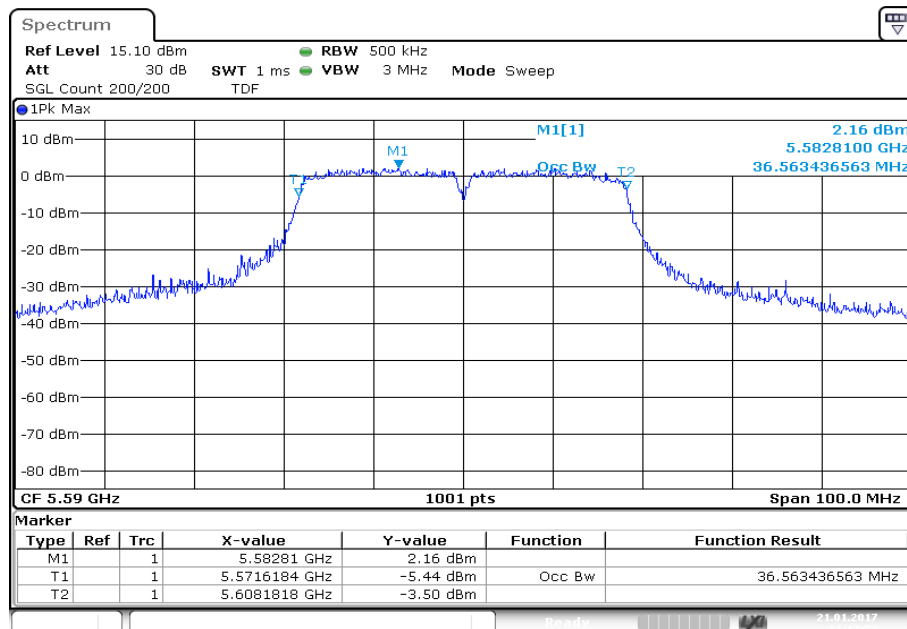
Date: 21.JAN.2017 12:14:06

Plot 5: 5510 MHz



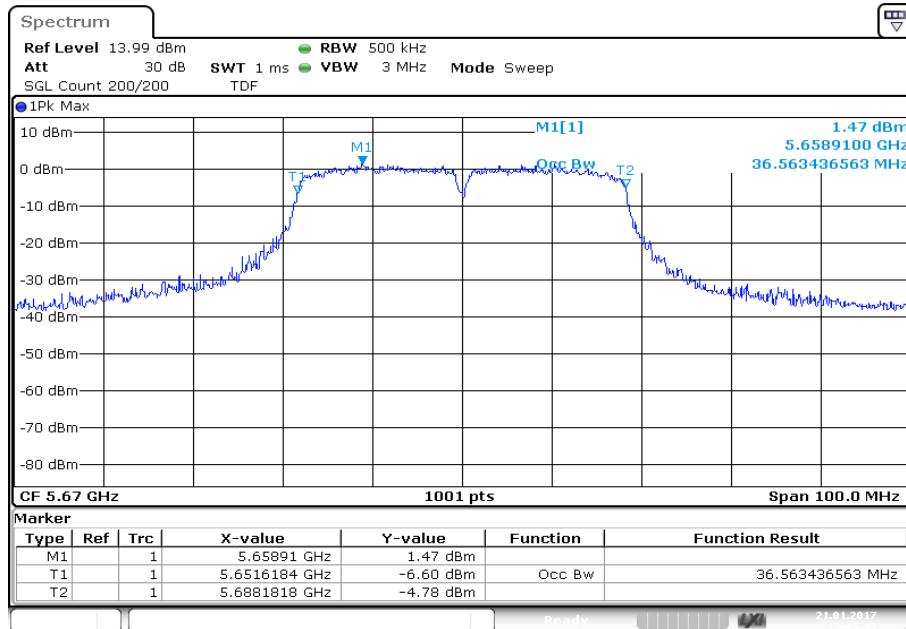
Date: 21.JAN.2017 12:16:00

Plot 6: 5590 MHz



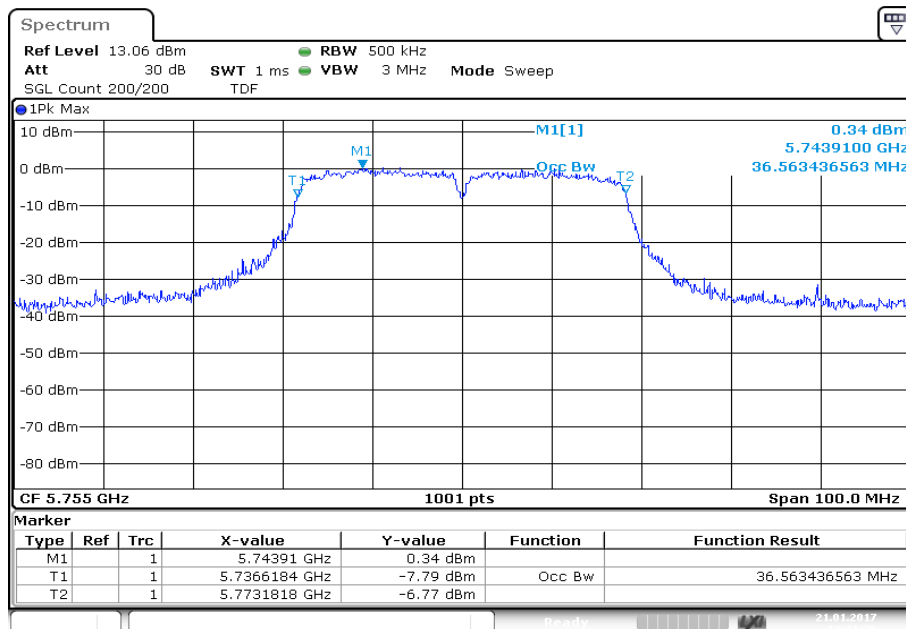
Date: 21.JAN.2017 12:17:53

Plot 7: 5670 MHz



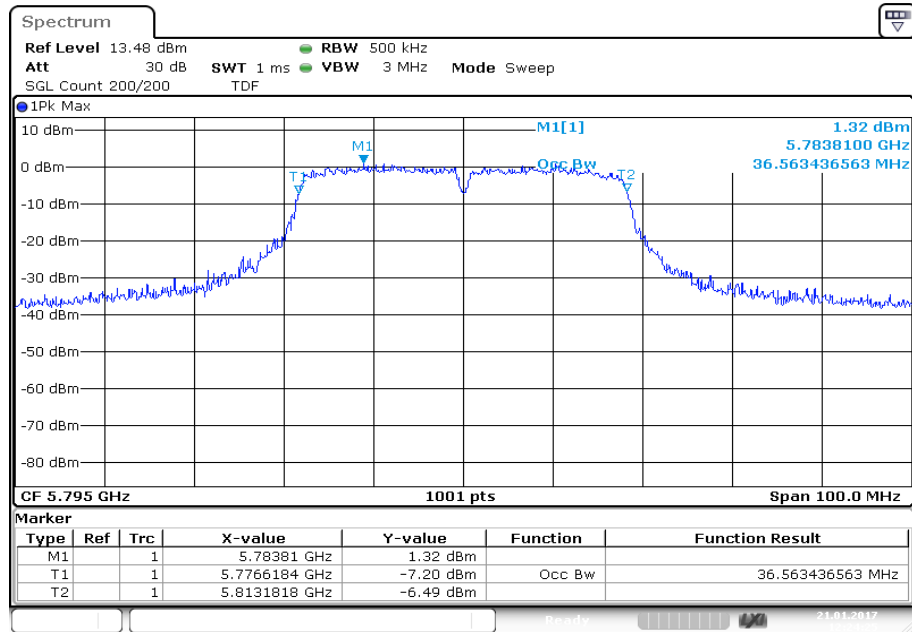
Date: 21.JAN.2017 12:19:44

Plot 8: 5755 MHz



Date: 21.JAN.2017 12:21:36

Plot 9: 5795 MHz



Date: 21. JAN. 2017 12:24:25

## 11.9 Band edge compliance radiated

### Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to the lowest channel for the lower restricted band and to the highest channel for the upper restricted band. Measurement distance is 3m.

### Measurement:

| Measurement parameter    |                            |
|--------------------------|----------------------------|
| Detector:                | Peak / RMS                 |
| Sweep time:              | Auto                       |
| Resolution bandwidth:    | 1 MHz                      |
| Video bandwidth:         | $\geq 3 \times \text{RBW}$ |
| Span:                    | See plots!                 |
| Trace – mode:            | Max Hold                   |
| Test setup:              | See sub clause 6.2 B       |
| Measurement uncertainty: | See sub clause 8           |

### Limits:

| Band Edge Compliance Radiated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)). |
| 74 dB $\mu$ V/m (peak)<br>54 dB $\mu$ V/m (average)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

### Results: (External antennas)

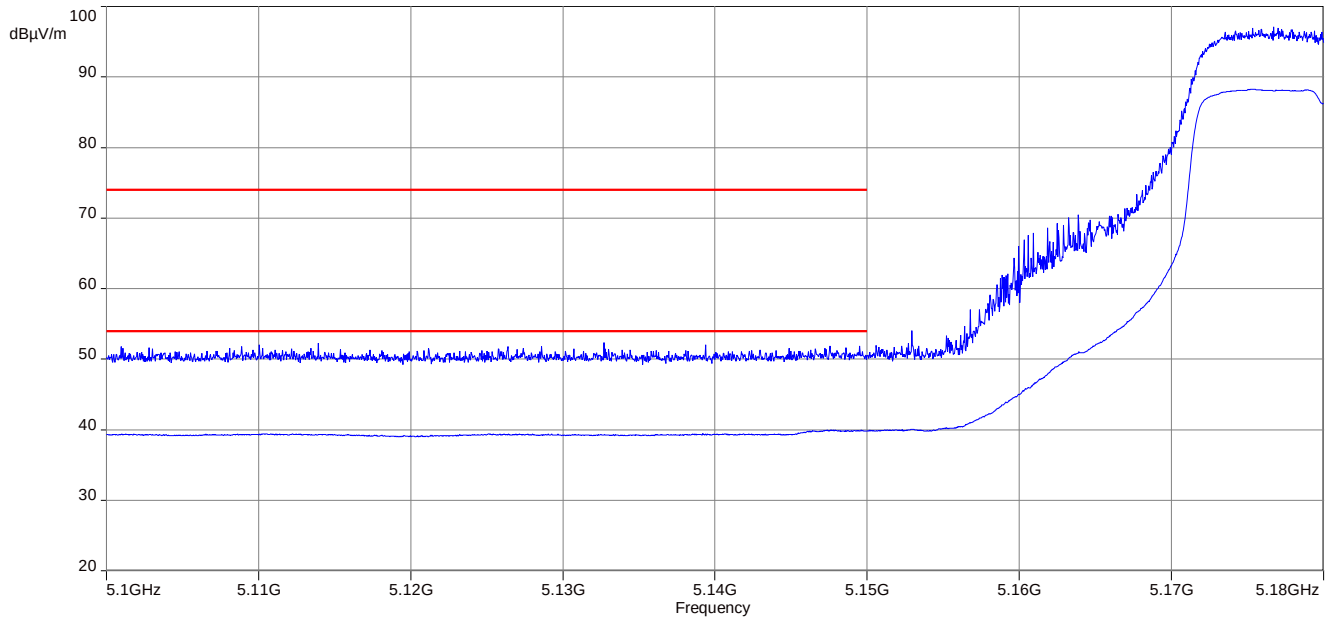
For the results of the band edge compliance radiated of all external antennas see “Appendix\_to\_1-2846/16-02-05-B”

### Result:

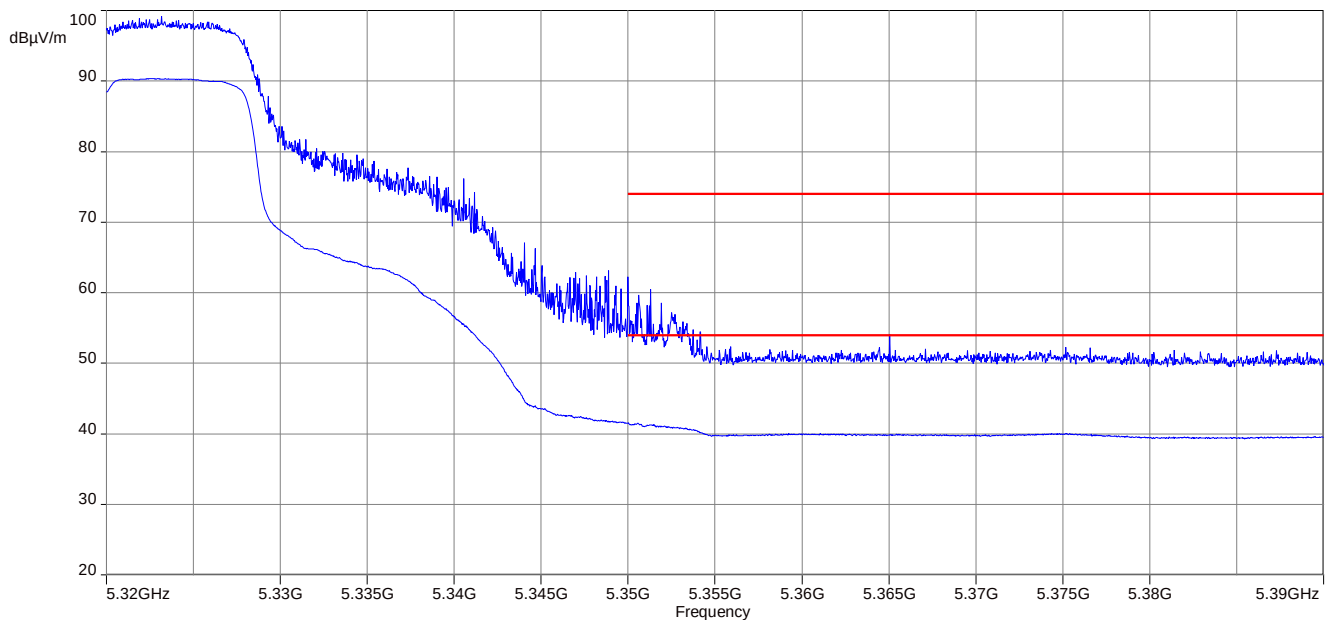
| Scenario  | Band Edge Compliance Radiated [dB $\mu$ V/m]            |
|-----------|---------------------------------------------------------|
| band edge | < 74 dB $\mu$ V/m (peak)<br>< 54 dB $\mu$ V/m (average) |

**Plots:**

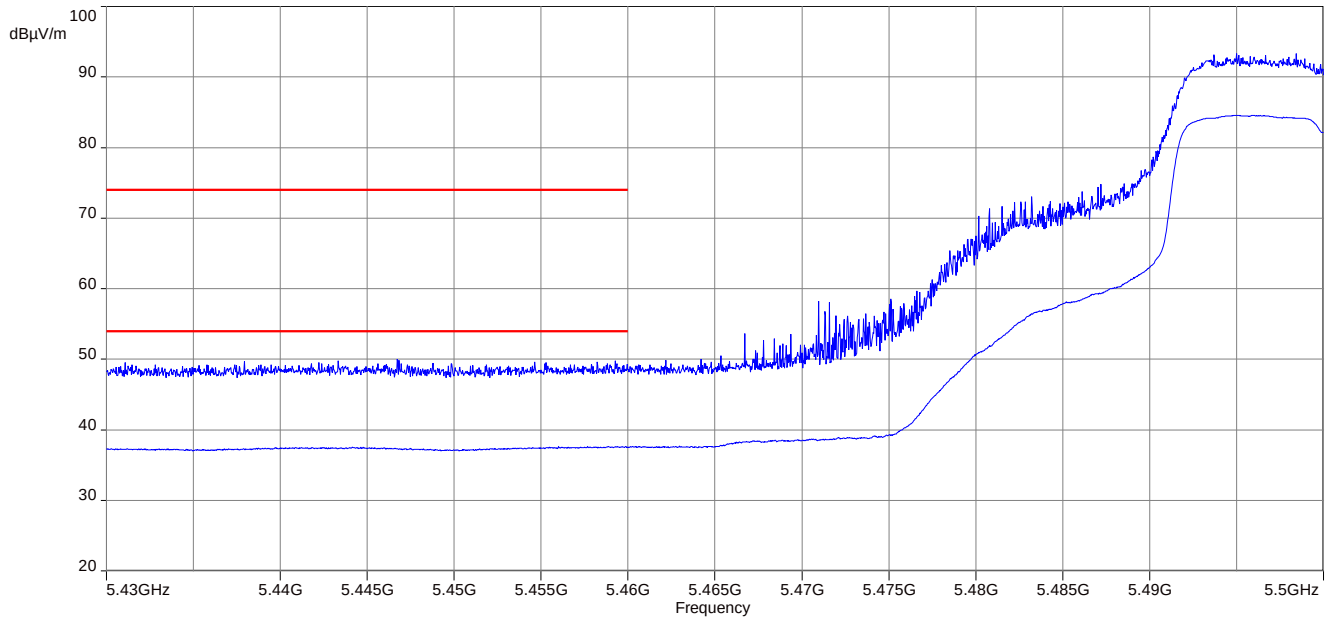
**Plot 1:** lower band edge, vertical & horizontal polarization – OFDM 20 MHz, 5180 MHz



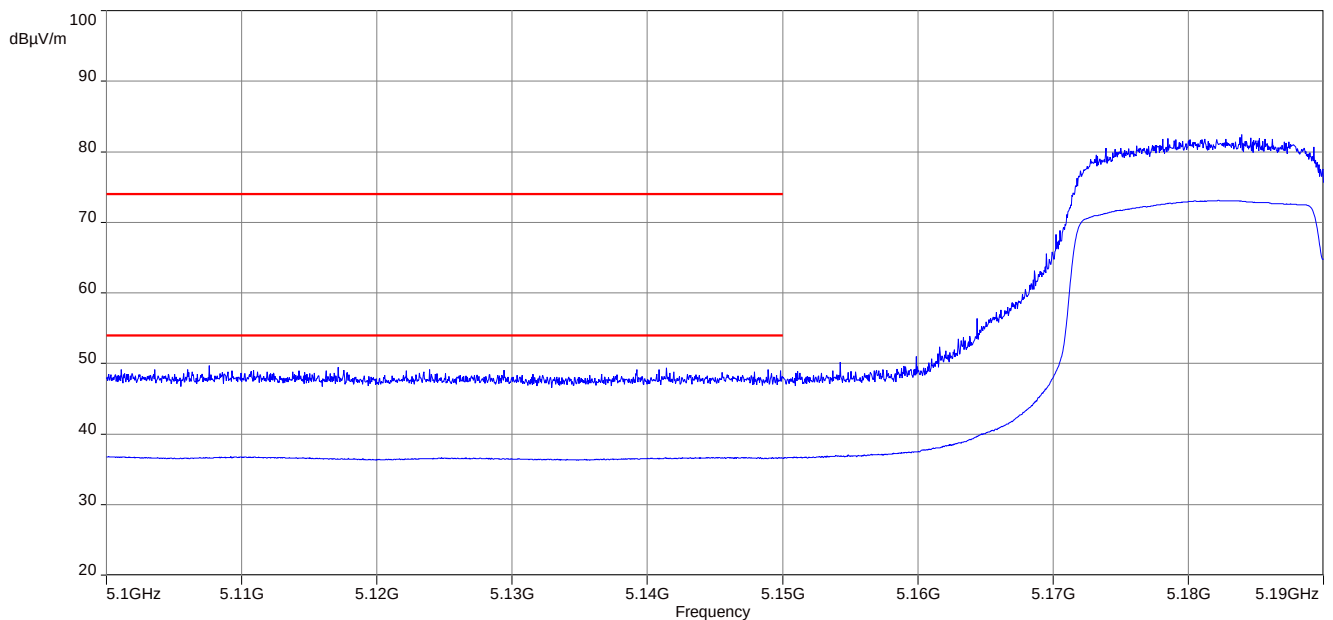
**Plot 2:** upper band edge, vertical & horizontal polarization – OFDM 20 MHz, 5320 MHz

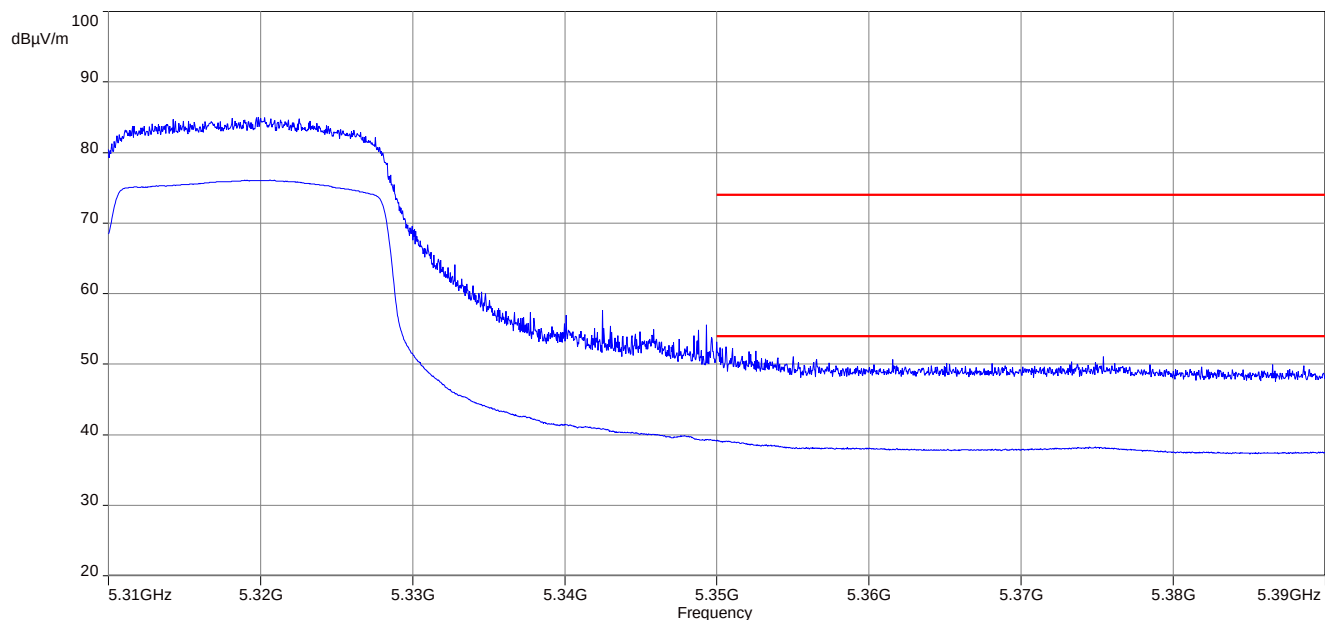


**Plot 3:** lower band edge, vertical & horizontal polarization – OFDM 20 MHz, 5500 MHz



**Plot 4:** lower band edge, vertical & horizontal polarization – OFDM 40 MHz, 5190 MHz



**Plot 5:** upper band edge, vertical & horizontal polarization – OFDM 40 MHz, 5310 MHz**Plot 6:** lower band edge, vertical & horizontal polarization – OFDM 40 MHz, 5510 MHz