# TEST REPORT

**Test report no.: 1-1107/16-02-02**

DAkkS 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

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## 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 1 | 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:** | **Weighing electronic** |
| **Model name:** | **WK60-XS** |
| **FCC ID:** | **2AITQWK60XS** |
| **IC:** | **21743-WK60XS** |
| Frequency: | DTS band 2400 MHz to 2483.5 MHz |
| Technology tested: | WLAN (DSSS/b-mode; OFDM/g-,n HT20 & HT40-mode) |
| Antenna: | 2 external antennas |
| Power supply: | 12 V – 24 V DC by external power supply |
| Temperature range: | -10°C to +55°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. CETECOM ICT Services 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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## 2.2 Application details

| | |
|---|---|
| Date of receipt of order: | 2016-04-27 |
| Date of receipt of test item: | 2016-08-25 |
| Start of test: | 2016-08-25 |
| End of test: | 2016-08-26 |
| Person(s) present during the test: | -/- |

# 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 1 | May 2015 | 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 |
|---|---|---|
| DTS: KDB 558074 D01 | v03r05 | Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 |
| 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 | : | $T_{nom}$<br>$T_{max}$<br>$T_{min}$ | +22 °C during room temperature tests<br>No tests under extreme conditions required.<br>No tests under extreme conditions required. |
| Relative humidity content | : | | 55 % |
| Barometric pressure | : | | not relevant for this kind of testing |
| Power supply | : | $V_{nom}$<br>$V_{max}$<br>$V_{min}$ | 12 V – 24 V DC by external power supply<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 | : | Weighing electronic |
| Type identification | : | WK60-XS |
| HMN | : | -/- |
| PMN | : | WK60-XS |
| HVIN | : | WK60-XS |
| FVIN | : | -/- |
| S/N serial number | : | Radiated & conducted unit: 000001 |
| HW hardware status | : | PL4610.0, PL4611.1, PL4612.2 |
| SW software status | : | -/- |
| Frequency band | : | DTS band 2400 MHz to 2483.5 MHz<br>(lowest channel 2412 MHz; highest channel 2462 MHz) |
| Type of radio transmission<br>Use of frequency spectrum | :<br>: | DSSS, OFDM |
| Type of modulation | : | (D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM |
| Number of channels | : | 11 for 20 MHz<br>9 for 20 MHz |
| Antenna | : | 2 external antennas<br>DelockRP-SMA_88395 – omnidirectional dipole antenna with 2 dBi<br>DelockRP-SMA_88985 – omnidirectional outdoor dipole antenna with 0.6 dBi |
| Power supply | : | 12 V -24 V DC by external power supply |
| Temperature range | : | -10°C to +55°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: 1-1107/16-02-01_AnnexA
1-1107/16-02-01_AnnexB
1-1107/16-02-01_AnnexD

# 6 Test laboratories sub-contracted

None

## 7 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).

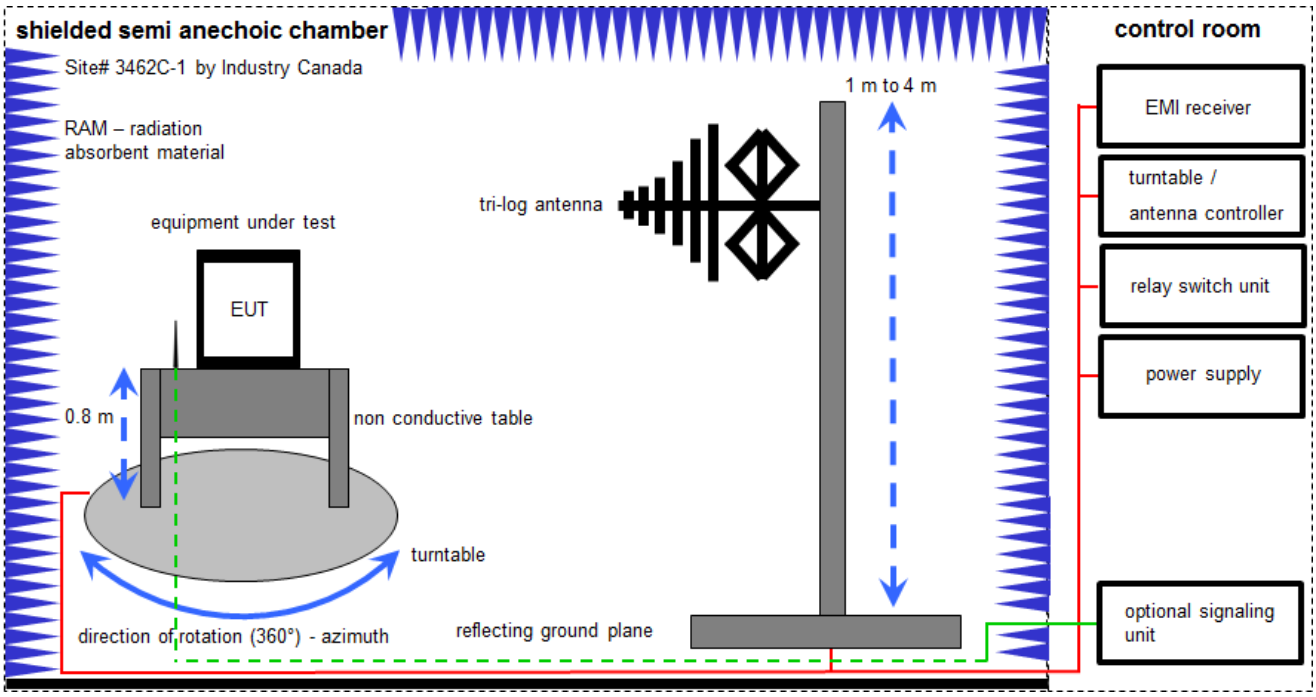
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

**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 |
| vlkl! | Attention: extended calibration interval | | |
| NK! | Attention: not calibrated | *) | next calibration ordered / currently in progress |

## 7.1 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

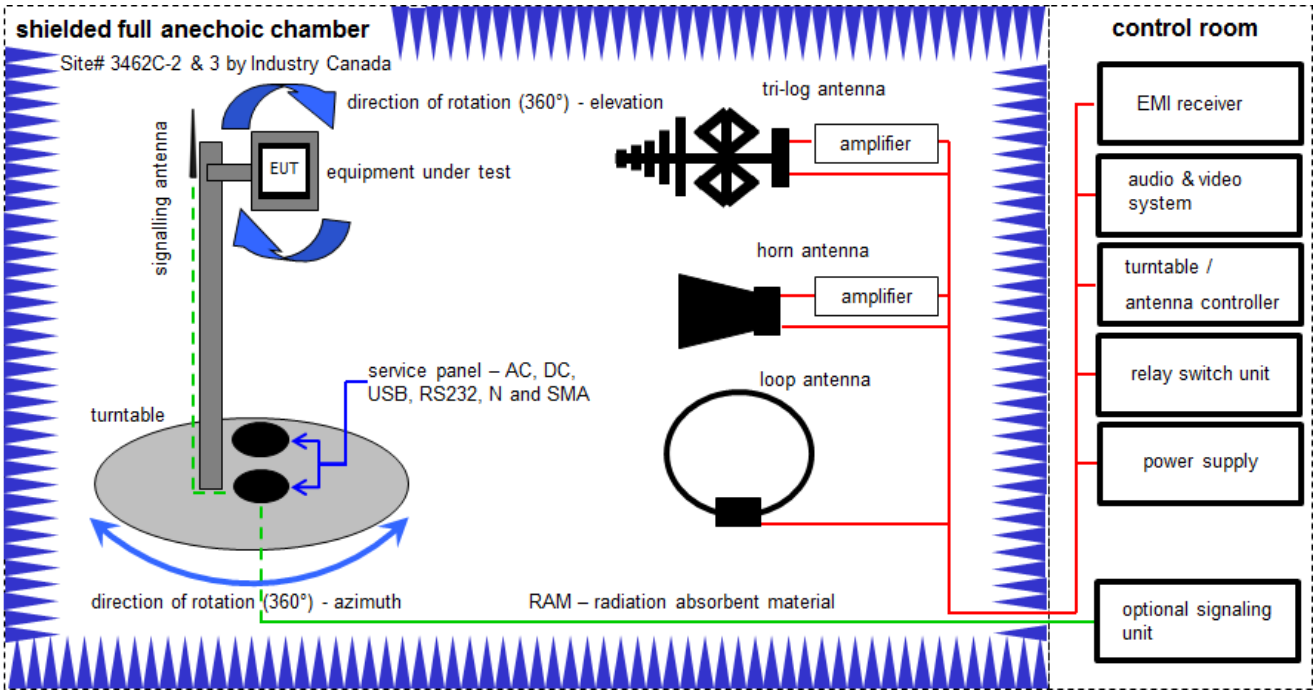
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

*Example calculation:*
FS [dBµV/m] = 12.35 [dBµV/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dBµV/m] (35.69 µV/m)

**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Switch-Unit | 3488A | HP | 2719A14505 | 300000368 | ev | -/- | -/- |
| 2 | A | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP | 2920A04466 | 300000580 | ne | -/- | -/- |
| 3 | A | EMI Test Receiver | ESCI 3 | R&S | 100083 | 300003312 | k | 08.03.2016 | 08.03.2017 |
| 4 | A | Antenna Tower | Model 2175 | ETS-Lindgren | 64762 | 300003745 | izw | -/- | -/- |
| 5 | A | Positioning Controller | Model 2090 | ETS-Lindgren | 64672 | 300003746 | izw | -/- | -/- |
| 6 | A | Turntable Interface-Box | Model 105637 | ETS-Lindgren | 44583 | 300003747 | izw | -/- | -/- |
| 7 | A | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 295 | 300003787 | k | 25.04.2016 | 25.04.2018 |

## 7.2 Shielded fully anechoic chamber




Measurement distance: tri-log antenna and horn antenna 3 meter; loop antenna 3 meter / 1 meter

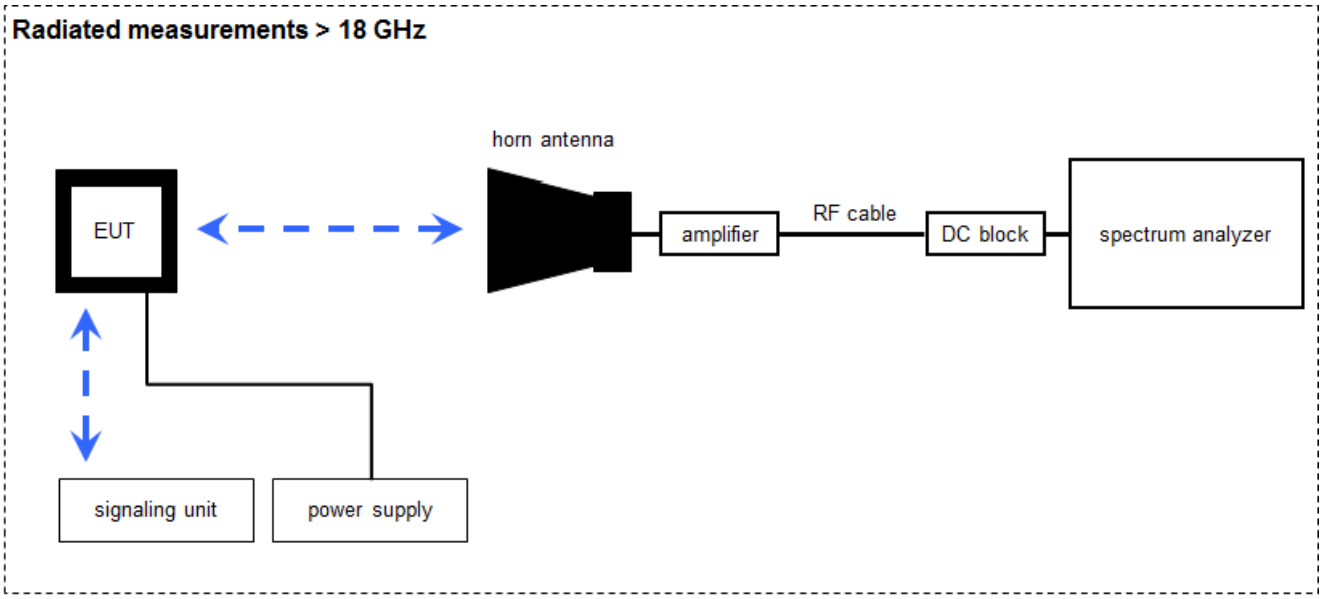
FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

*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 Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A, B | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP | 2818A03450 | 300001040 | Ve | 20.01.2015 | 20.01.2018 |
| 2 | B | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 | vlKI! | 20.05.2015 | 20.05.2017 |
| 3 | A, B | Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 | ev | -/- | -/- |
| 4 | A, B | Switch / Control Unit | 3488A | HP | * | 300000199 | ne | -/- | -/- |
| 5 | A | Active Loop Antenna 10 kHz to 30 MHz | 6502 | EMCO/2 | 8905-2342 | 300000256 | k | 24.06.2015 | 24.06.2017 |
| 6 | B | Amplifier | js42-00502650-28-5a | Parzich GMBH | 928979 | 300003143 | ne | -/- | -/- |
| 7 | B | Band Reject filter | WRCG2400/2483-2375/2505-50/10SS | Wainwright | 11 | 300003351 | ev | -/- | -/- |
| 8 | B | Highpass Filter | WHKX7.0/18G-8SS | Wainwright | 18 | 300003789 | ne | -/- | -/- |
| 9 | A, B | 4U RF Switch Platform | L4491A | Agilent Technologies | MY50000037 | 300004509 | ne | -/- | -/- |
| 10 | A, B | EMI Test Receiver 9kHz-26,5GHz | ESR26 | R&S | 101376 | 300005063 | k | 04.09.2015 | 04.09.2016 |

## 7.3 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)

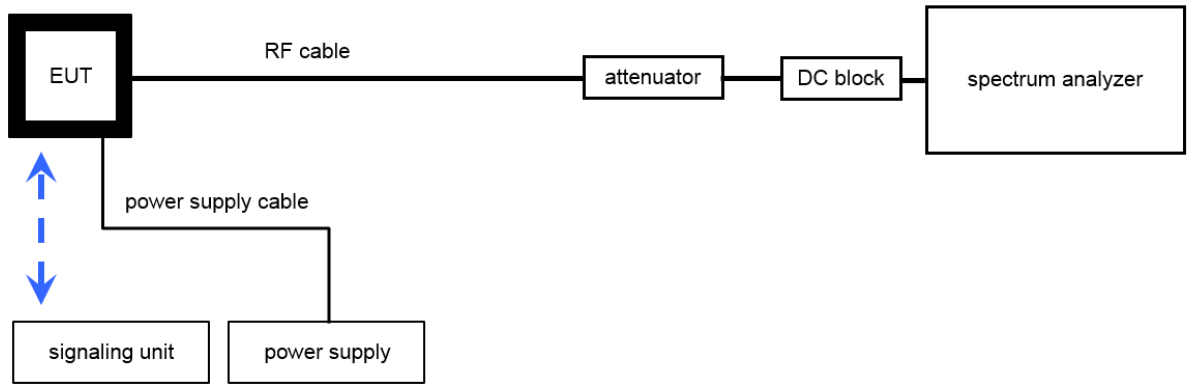
*Example calculation:*
FS [dBµV/m] = 40.0 [dBµV/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dBµV/m] (6.79 µV/m)

**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Power Supply 0-20V, 0-5A | 6632B | Agilent Technologies | GB42110541 | 400000562 | vIKI! | 26.01.2016 | 26.01.2019 |
| 2 | A | Amplifier 2-40 GHz | JS32-02004000-57-5P | MITEQ | 1777200 | 300004541 | ev | -/- | -/- |
| 3 | A | RF-Cable | ST18/SMAm/SMAm/48 | Huber & Suhner | Batch no. 600918 | 400001182 | ev | -/- | -/- |
| 4 | A | RF-Cable | ST18/SMAm/SMm/48 | Huber & Suhner | Batch no. 127377 | 400001183 | ev | -/- | -/- |
| 5 | A | DC-Blocker 0.1-40 GHz | 8141A | Inmet | Batch no. 127377 | 400001185 | ev | -/- | -/- |
| 6 | A | Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | | 300000486 | k | 10.09.2015 | 10.09.2017 |
| 7 | A | Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 | k | 21.01.2016 | 21.01.2017 |

## 7.4 Conducted measurements

**Conducted measurements normal conditions**




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

*Example calculation:*
OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | DC-Blocker 0.1-40 GHz | 8141A | Inmet | Batch no. 127377 | 400001185 | ev | -/- | -/- |
| 2 | A | Switch / Control Unit | 3488A | HP | 2719A15013 | 300000151 | ne | -/- | -/- |
| 3 | A | Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 | k | 21.01.2016 | 21.01.2017 |
| 4 | A | PC-WLAN Tester | Intel Core i3 3220/3,3 GHz, Prozessor | Agilent Technologies | 2V2403033A4523 | 300004589 | ne | -/- | -/- |
| 5 | A | Teststand | Teststand Custom Sequence Editor | National Instruments GmbH | 2V2403033A4523 | 300004590 | ne | -/- | -/- |
| 6 | A | Power Sensor | NRP-Z81 | R&S | 100010 | 300003780 | k | 25.01.2016 | 25.01.2017 |
| 7 | A | RF-Cable | ST18/SMAm/SMAm/60 | Huber & Suhner | Batch no. 606844 | 400001181 | ev | -/- | -/- |
| 8 | A | Coax Attenuator 10 dB 2W 0-40 GHz | MCL BW-K10-2W44+ | Mini Circuits | Batch no. 606844 | 400001186 | ev | -/- | -/- |

# 8 Sequence of testing

## 8.1 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.

## 8.2 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 ± 45° 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.

## 8.3 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.

## 8.4 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.

# 9 Measurement uncertainty

| Measurement uncertainty | |
|---|---|
| **Test case** | **Uncertainty** |
| Antenna gain | ± 3 dB |
| Power spectral density | ± 1.5 dB |
| DTS bandwidth | ± 100 kHz (depends on the used RBW) |
| Occupied bandwidth | ± 100 kHz (depends on the used RBW) |
| Maximum output power | ± 1.5 dB |
| Detailed spurious emissions @ the band edge - conducted | ± 1.5 dB |
| Band edge compliance radiated | ± 3 dB |
| Spurious emissions conducted | ± 3 dB |
| Spurious emissions radiated below 30 MHz | ± 3 dB |
| Spurious emissions radiated 30 MHz to 1 GHz | ± 3 dB |
| Spurious emissions radiated 1 GHz to 12.75 GHz | ± 3.7 dB |
| Spurious emissions radiated above 12.75 GHz | ± 4.5 dB |
| Spurious emissions conducted below 30 MHz (AC conducted) | ± 2.6 dB |

## 10 Summary of measurement results

| | |
|---|---|
| ☒ | No deviations from the technical specifications were ascertained |
| ☐ | There were deviations from the technical specifications ascertained |
| ☐ | 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 1 | See table! | 2016-10-07 | -/- |

| Test specification clause | Test case | Guideline | Temperature conditions | Power source voltages | Mode | C | NC | NA | NP | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| §15.247(b)(4)<br>RSS - 247 / 5.4 (4) | Antenna gain | -/- | Nominal | Nominal | DSSS | -/- | | | | -/- |
| RSS – 247 / 6.0 | Duty cycle | -/- | Nominal | Nominal | DSSS<br>OFDM | -/- | | | | -/- |
| §15.247(e)<br>RSS - 247 / 5.2 (2) | Power spectral density | KDB 558074<br>DTS clause: 10.2 | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.247(a)(2)<br>RSS - 247 / 5.2 (1) | DTS bandwidth | KDB 558074<br>DTS clause: 8.1 | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| RSS Gen clause 4.6.1 | Occupied bandwidth | -/- | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.247(b)(3)<br>RSS - 247 / 5.4 (4) | Maximum output power | KDB 558074<br>DTS clause: 9.1.2 | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.247(d)<br>RSS - 247 / 5.5 | Detailed spurious emissions @ the band edge - conducted | -/- | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.205<br>RSS - 247 / 5.5<br>RSS - Gen | Band edge compliance conducted and radiated | KDB 558074<br>DTS clause: 13.3.2 and clause 12.2.2 | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.247(d)<br>RSS - 247 / 5.5 | TX spurious emissions conducted | KDB 558074<br>DTS clause: 11.1 & 11.2 11.3 | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.209(a)<br>RSS-Gen | TX spurious emissions radiated below 30 MHz | -/- | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.247(d)<br>RSS - 247 / 5.5<br>RSS-Gen | TX spurious emissions radiated 30 MHz to 1 GHz | -/- | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.247(d)<br>RSS - 247 / 5.5<br>RSS-Gen | TX spurious emissions radiated above 1 GHz | -/- | Nominal | Nominal | DSSS<br>OFDM | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.109<br>RSS-Gen | RX spurious emissions radiated 30 MHz to 1 GHz | -/- | Nominal | Nominal | RX / idle | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.109<br>RSS-Gen | RX spurious emissions radiated above 1 GHz | -/- | Nominal | Nominal | RX / idle | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.107(a)<br>§15.207 | Conducted emissions < 30 MHz | -/- | Nominal | Nominal | DSSS<br>OFDM | ☐ | ☐ | ☒ | ☐ | External powered by battery |

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

## 11 Additional comments

Reference documents:

CustomerQuestionnaireCETECOM_WK60XS

DelockRP-SMA_88395

DelockRP-SMA_88985

Kurzanleitung WK60XS Funktests

Special test descriptions:

DSSS – mode tested with power setting 18

OFDM – modes tested with power setting 13

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.*

# 12 Measurement results

## 12.1 Antenna gain

**Limits:**

| FCC | IC |
|---|---|
| 6 dBi / > 6 dBi output power and power density reduction required | |

**Results:** antenna 1 - omnidirectional dipole antenna

| $T_{nom}$ | $V_{nom}$ | DTS band 2400 MHz to 2483.5 MHz |
|---|---|---|
| Gain [dBi] Declared | | 2.0 |

**Results:** antenna 2 - omnidirectional outdoor dipole antenna with antenna cable

| $T_{nom}$ | $V_{nom}$ | DTS band 2400 MHz to 2483.5 MHz |
|---|---|---|
| Gain [dBi] Declared | | 0.6 |

**Datasheet 1:** DelockRP-SMA_88395 - antenna 1 - omnidirectional dipole antenna

# Delock WLAN 802.11 ac/a/b/g/n Antenne RP-SMA Stecker 2 dBi omnidirektional mit Kippgelenk schwarz

## Kurzbeschreibung

Diese WLAN Antenne kann an ein WLAN Gerät mit RP-SMA Anschluss angeschlossen werden, um Signale zu empfangen und zu senden.

## Spezifikation

- Anschlüsse: RP-SMA Stecker
- Frequenzbereich:
  2,400 - 2,500 GHz
  5,150 - 5,875 GHz
- Antennengewinn: 2 dBi
- Impedanz: 50 Ohm
- Polarisation: linear, vertikal
- VSWR: 2,0
- Betriebstemperatur: -10 °C ~ 55 °C
- Gehäusematerial: ABS
- Farbe: schwarz
- Länge:
  ca. 111,70 mm (mit Kippgelenk)
  ca. 83,40 mm (ohne Kippgelenk)
- Durchmesser:
  ca. 7,80 mm (Spitze)
  ca. 10,00 mm (RP-SMA)

## Systemvoraussetzungen

- Gerät mit einer freien RP-SMA Buchse

## Packungsinhalt

- WLAN Antenne

## Artikel-Nr. 88395

EAN: 4043619883950

Ursprungsland: Taiwan, Republic of China

Verpackung: Retail Box

**Datasheet 2:** DelockRP-SMA_88985 - antenna 2 - omnidirectional outdoor dipole antenna with cable

# Delock WLAN Antenne RP-SMA 802.11 ac/a/h/b/g/n 2 dBi omnidirektional weiß Outdoor

## Kurzbeschreibung

Diese WLAN Antenne können Sie an Ihr WLAN Gerät mit RP-SMA Anschluss anschließen, um Signale zu senden und zu empfangen.

## Spezifikation

- WLAN Antenne extern
- Schraubmontage mit 13 mm Bohrung
- RP-SMA Stecker
- Frequenzbereich:
  2.400 ~ 2.500 GHz
  5.150 ~ 5.875 GHz
- Antennengewinn:
  1.4 dBi @ 2.500GHz
  3.0 dBi @ 5.825GHz
- VSWR: 2.0 : 1 ~ 2,5 : 1 max.
- Kabellänge: 1 m
- Kabeltyp: ULA 100 Koax
- Kabeldämpfung:
  1,40 dB@2,500 GHz
  2,30 dB@5,875 GHz
- Betriebstemperaturbereich: -10°C ~ 50°
- Schutzklasse: IP67
- Maße (L): 77 mm
- Durchmesser: 45 mm max.

## Systemvoraussetzungen

- Gerät mit RP-SMA Anschluss

## Packungsinhalt

- WLAN Antenne
- Befestigungsmutter

## Artikel-Nr. 88985

EAN: 4043619889853

Ursprungsland: Taiwan, Republic of China

Verpackung: Poly Bag

## 12.2 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 |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty: | -/- |

**Results:**

| Modulation | Modulation scheme / bandwidth |
|---|---|
| DSSS / b – mode | 1 Mbit/s |
| OFDM / g – mode | 6 Mbit/s |
| OFDM / n HT20 – mode | MCS0 |
| OFDM / n HT40 – mode | MCS0 |

## 12.3 Maximum output power

**Description:**

Measurement of the maximum output power conducted and radiated. The measurements are performed using the data rate producing the highest conducted output power.

**Measurement:**

| Measurement parameter | |
|---|---|
| **According to DTS clause: 9.1.2** | |
| Peak power meter | |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty | See sub clause 9 |

**Limits:**

| FCC | IC |
|---|---|
| Conducted: 1.0 W – Antenna gain with max. 6 dBi | |

**Results:**

| Frequency | Maximum Output Power [dBm] | | |
|---|---|---|---|
| | 2412 MHz | 2437 MHz | 2462 MHz |
| Output power conducted DSSS / b – mode | 18.1 | 19.7 | 19.7 |
| Output power conducted OFDM / g – mode | 20.8 | 20.9 | 20.8 |
| Output power conducted OFDM / n HT20 – mode | 20.4 | 20.3 | 20.3 |
| Frequency | 2422 MHz | 2437 MHz | 2452 MHz |
| Output power conducted OFDM / n HT40 – mode | 20.4 | 20.8 | 20.6 |

## 12.4 Duty cycle

**Measurement:**

**Measurement parameters:**

| Measurement parameter | |
|---|---|
| Detector: | Peak |
| Sweep time: | Depends on the signal see plot |
| Resolution bandwidth: | 10 MHz |
| Video bandwidth: | 10 MHz |
| Trace mode: | Max hold |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty: | See sub clause 9 |

**Limits:**

| FCC | IC |
|---|---|
| -/- | |

**Results:**

| $T_{nom}$ | $V_{nom}$ | lowest channel 2412 MHz | middle channel 2437 MHz | highest channel 2462 MHz |
|---|---|---|---|---|
| DSSS / b – mode | | 100 % / 0.00 dB | 100 % / 0.00 dB | 100 % / 0.00 dB |
| OFDM / g – mode | | 100 % / 0.00 dB | 100 % / 0.00 dB | 100 % / 0.00 dB |
| OFDM / n HT20 – mode | | 100 % / 0.00 dB | 100 % / 0.00 dB | 100 % / 0.00 dB |
| $T_{nom}$ | $V_{nom}$ | lowest channel 2422 MHz | middle channel 2437 MHz | highest channel 2452 MHz |
| OFDM / n HT40 – mode | | 100 % / 0.00 dB | 100 % / 0.00 dB | 100 % / 0.00 dB |

## 12.5 Peak power spectral density

**Description:**

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

**Measurement:**

| Measurement parameter | |
|---|---|
| **According to DTS clause: 10.2** | |
| Detector: | Positive Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | 300 kHz |
| Span: | 30 MHz |
| Trace mode: | Max hold (allow trace to fully stabilize) |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty | See sub clause 9 |

**Limits:**

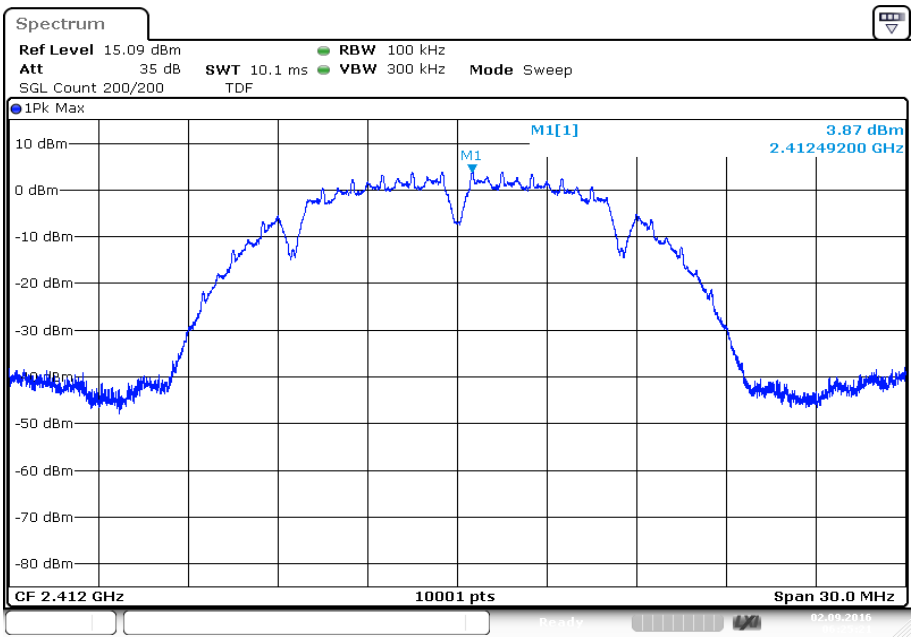
| FCC | IC |
|---|---|
| 8 dBm / 3kHz (conducted) | |

**Results:**

| Modulation | Peak power spectral density [dBm] @ 100 kHz | | |
|---|---|---|---|
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| DSSS / b – mode | 3.87 | 5.61 | 5.55 |
| OFDM / g – mode | -3.82 | -3.32 | -3.12 |
| OFDM / n HT20 – mode | -3.12 | -2.95 | -2.80 |
| Frequency | 2422 MHz | 2437 MHz | 2452 MHz |
| OFDM / n HT40 – mode | -7.15 | -6.13 | -6.28 |

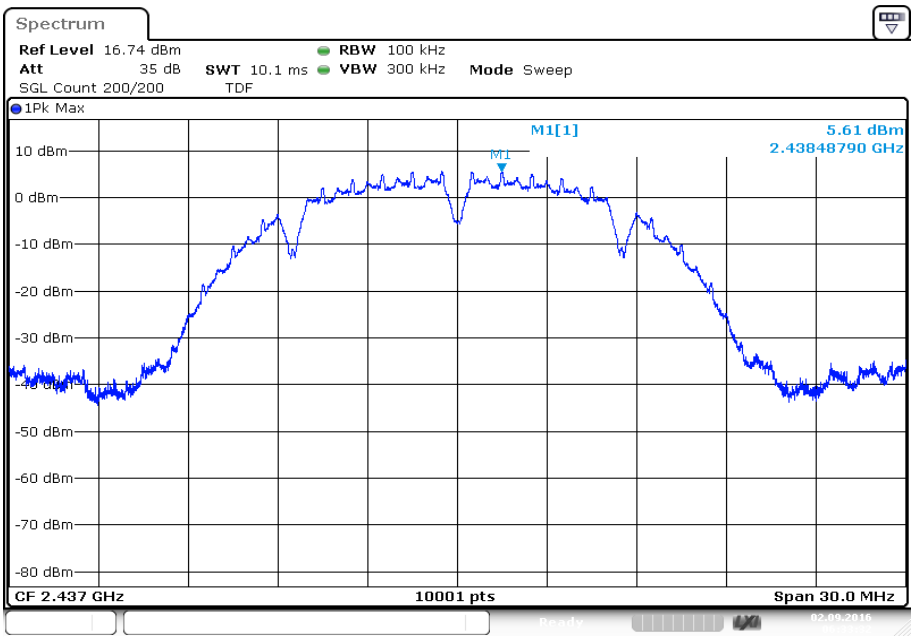
**Plots:** DSSS / b – mode

**Plot 1:** Lowest channel



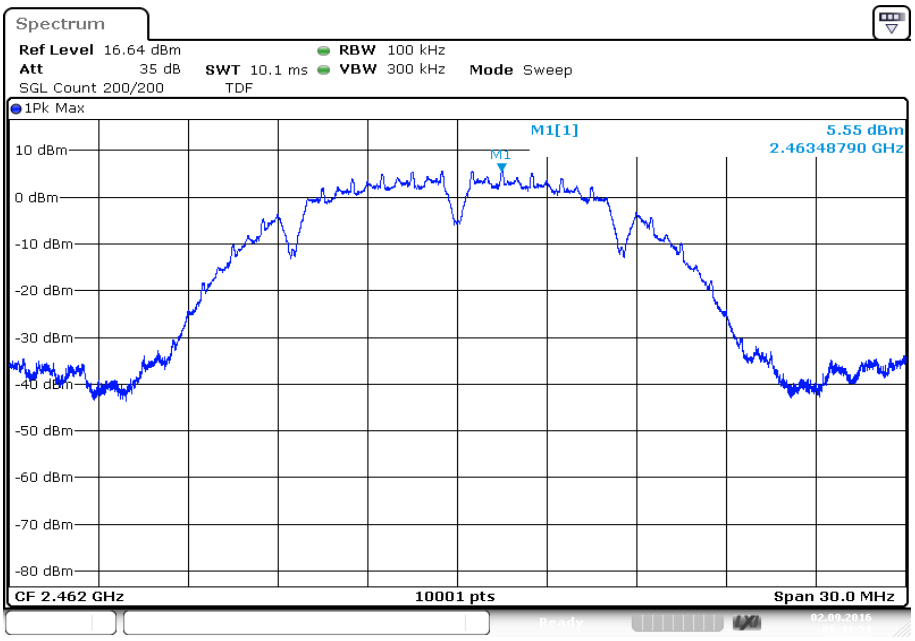

Date: 2.SEP.2016 06:25:21

**Plot 2:** Middle channel




Date: 2.SEP.2016 06:33:32

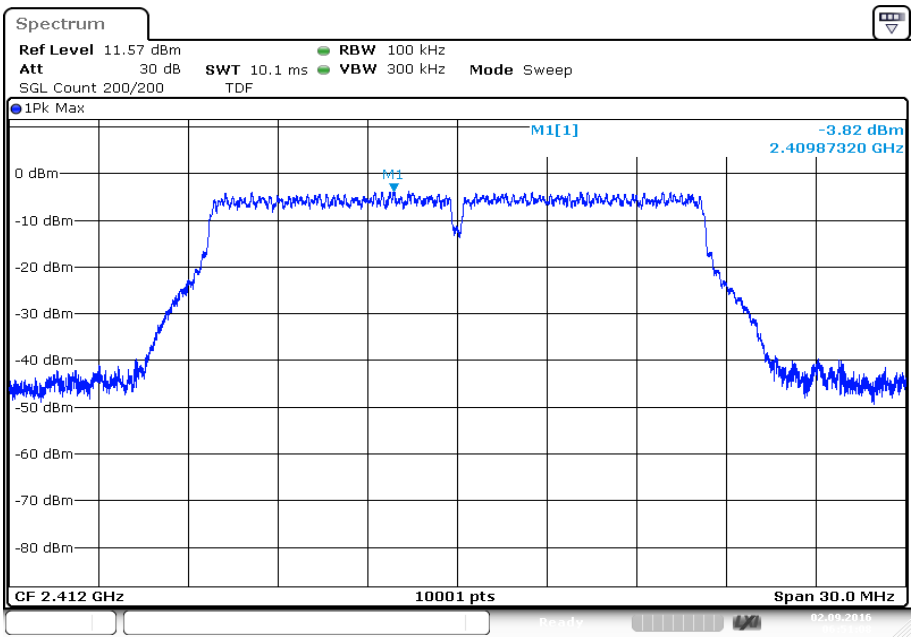
**Plot 3:** Highest channel




Date: 2.SEP.2016 06:41:52

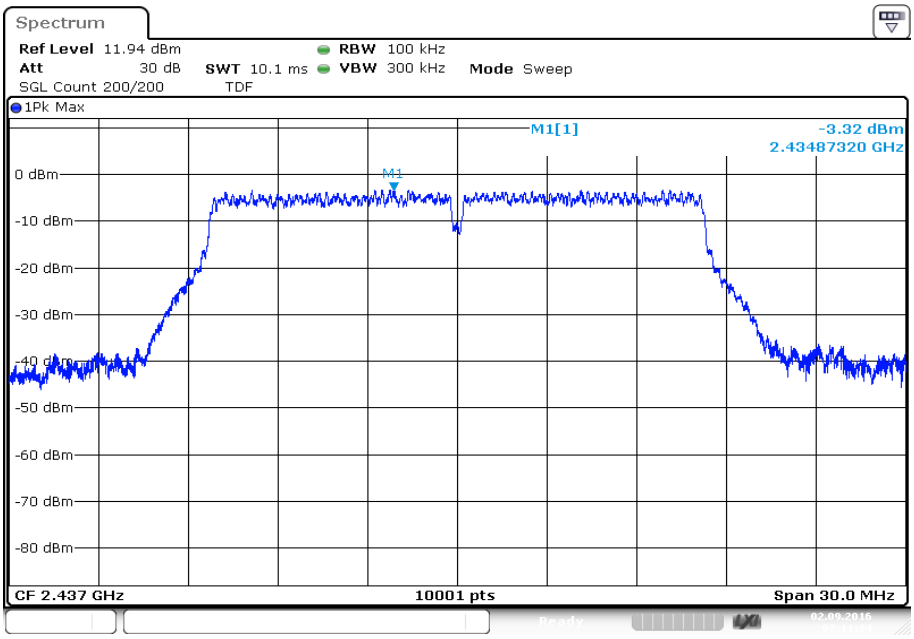
**Plots:** OFDM / g – mode

**Plot 1:** Lowest channel



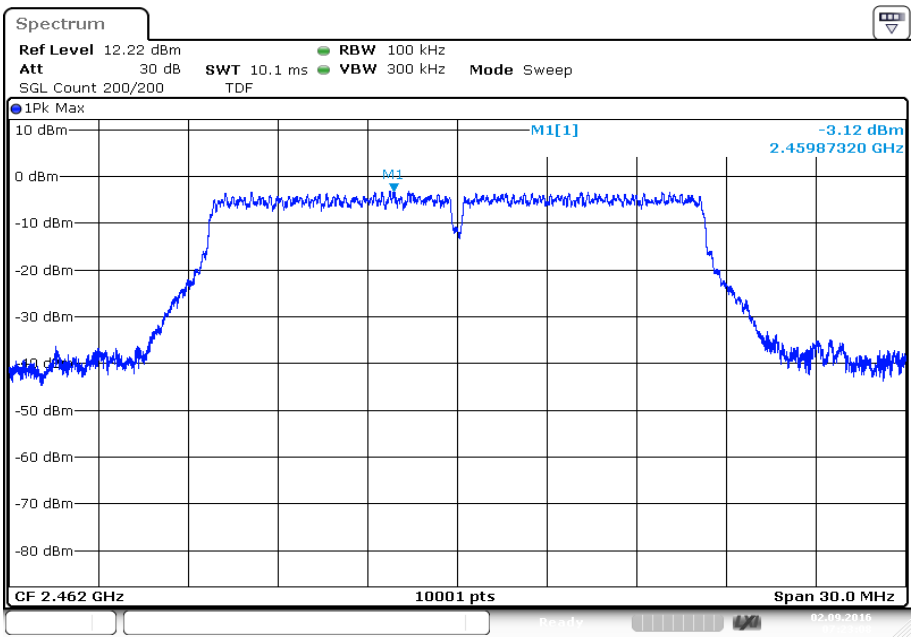

Date: 2.SEP.2016 06:51:09

**Plot 2:** Middle channel




Date: 2.SEP.2016 07:11:34

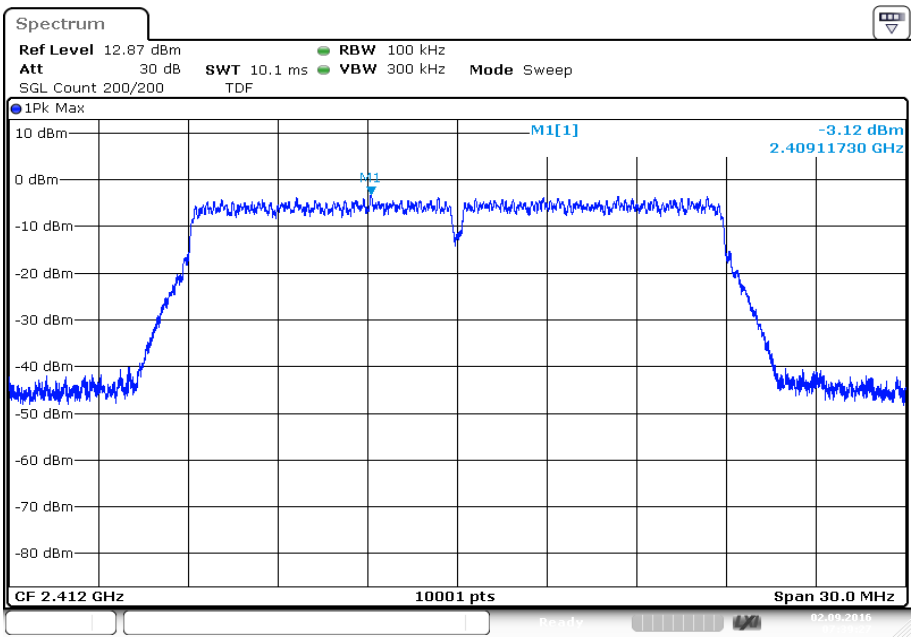
**Plot 3:** Highest channel




Date: 2.SEP.2016 07:23:08

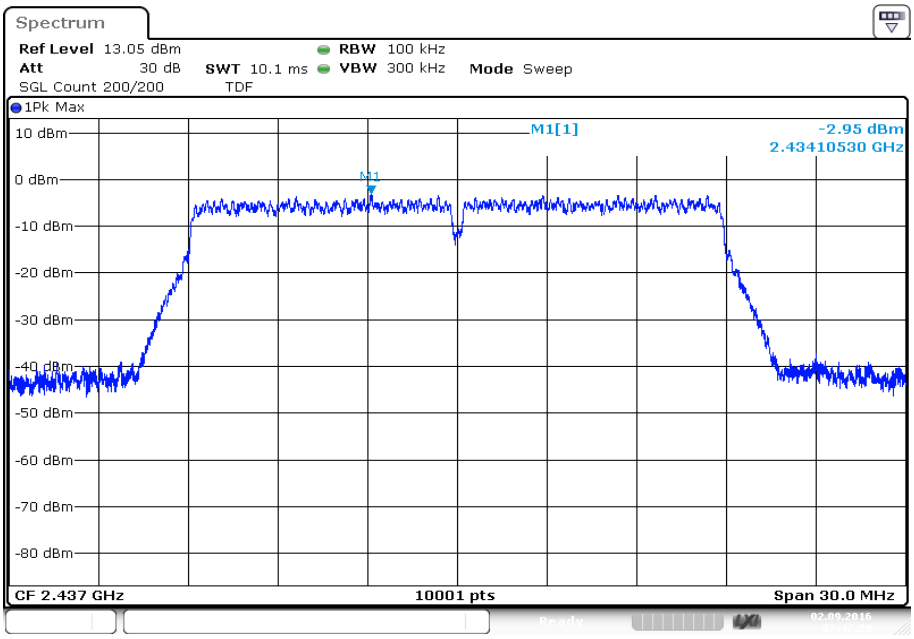
**Plots:** OFDM / n HT20 – mode

**Plot 1:** Lowest channel



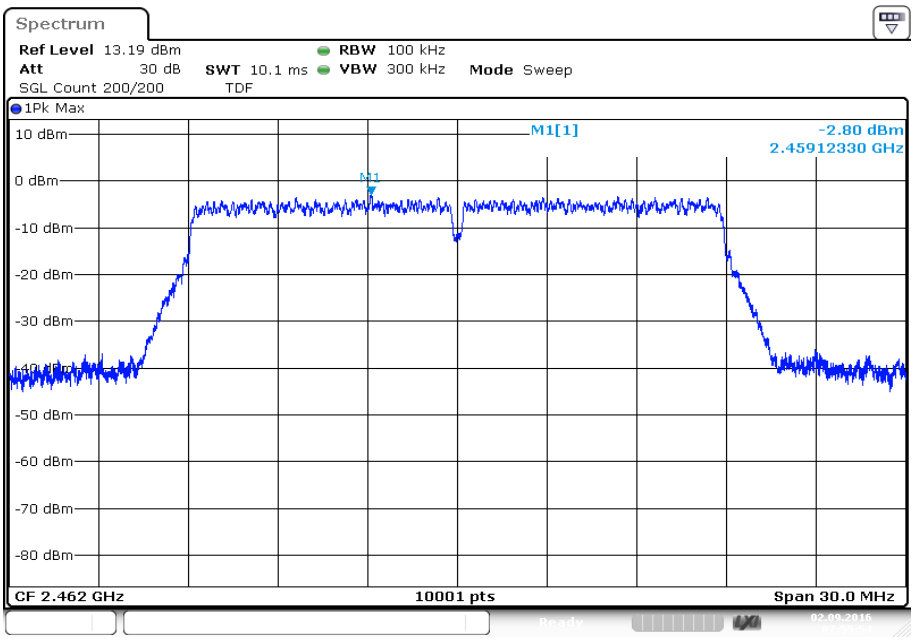

Date: 2.SEP.2016 07:39:27

**Plot 2:** Middle channel




Date: 2.SEP.2016 07:47:30

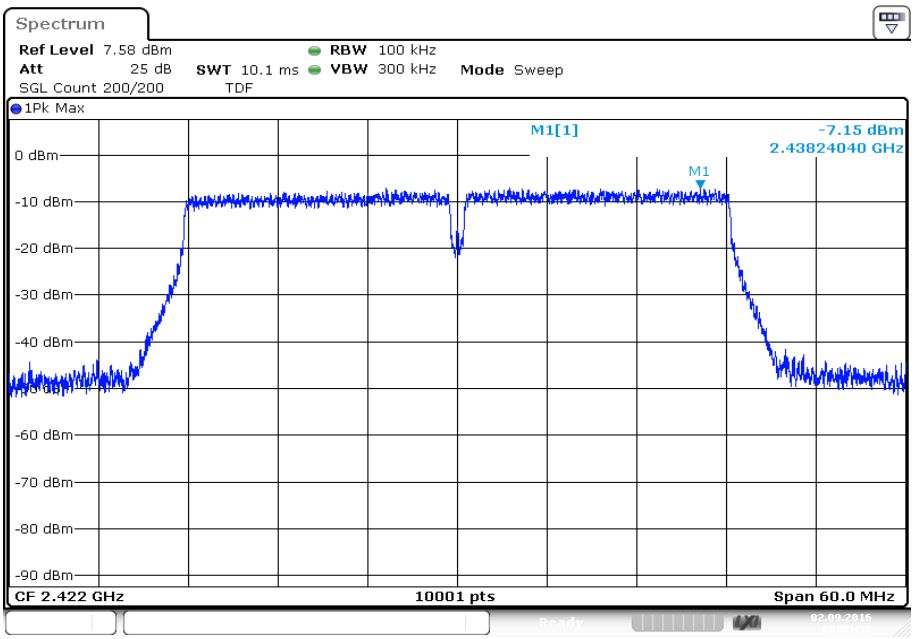
**Plot 3:** Highest channel




Date: 2.SEP.2016 07:55:54

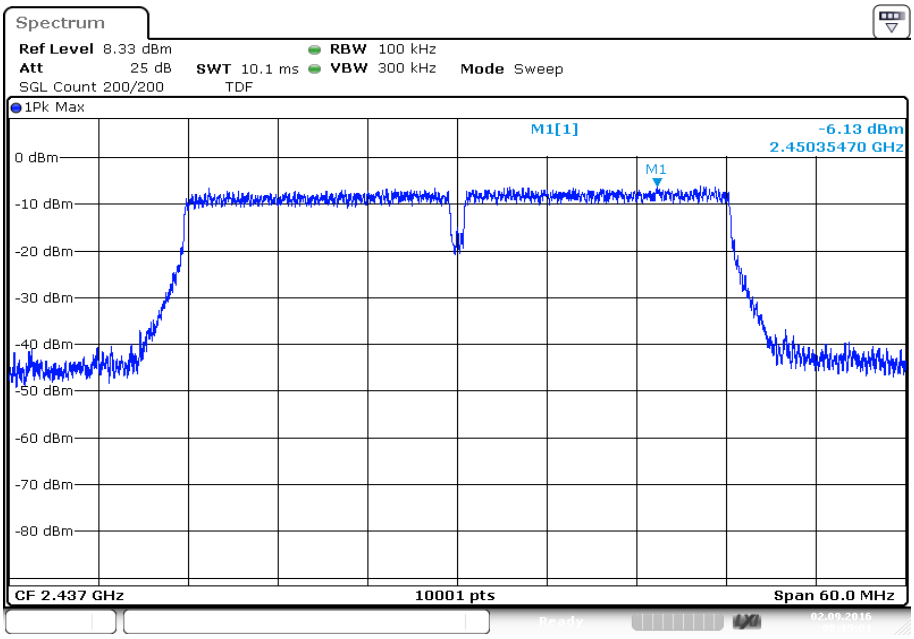
**Plots:** OFDM / n HT40 – mode

**Plot 1:** Lowest channel



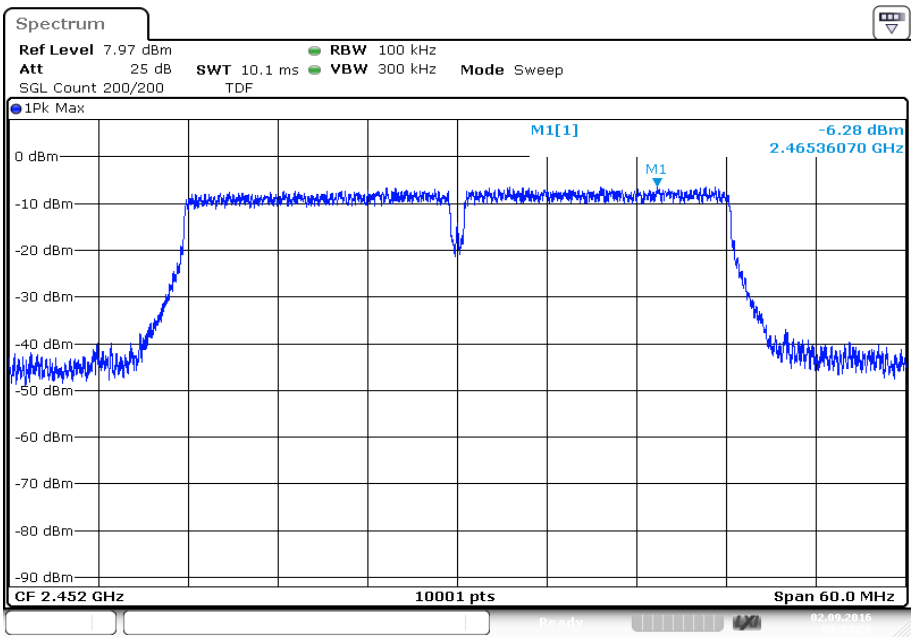

Date: 2.SEP.2016 08:05:38

**Plot 2:** Middle channel




Date: 2.SEP.2016 08:15:01

**Plot 3:** Highest channel




Date: 2.SEP.2016 08:33:29

## 12.6 6 dB DTS bandwidth

**Description:**

Measurement of the 6 dB bandwidth of the modulated signal.

**Measurement:**

| Measurement parameter | |
|---|---|
| **According to DTS clause: 8.1** | |
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | 500 kHz |
| Span: | 30 MHz / 50 MHz |
| Measurement procedure: | Measurement of the 75% bandwidth using the integration function of the analyzer |
| Trace mode: | Single count with 200 counts |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty | See sub clause 9 |

**Limits:**

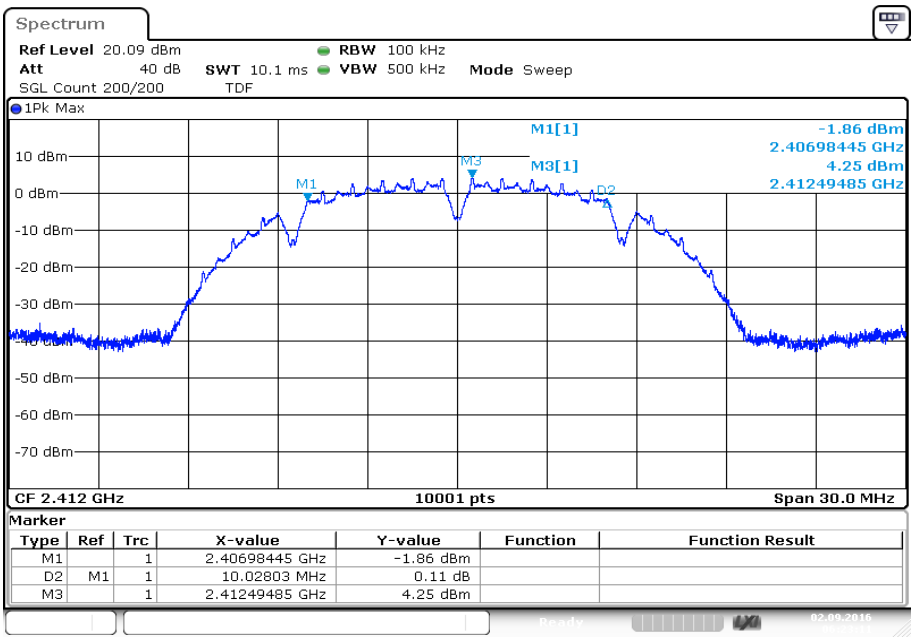
| FCC | IC |
|---|---|
| Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz. | |

**Results:**

| Frequency | 6 dB DTS bandwidth [kHz] | | |
|---|---|---|---|
| | 2412 MHz | 2437 MHz | 2462 MHz |
| DSSS / b – mode | 10028 | 10031 | 10034 |
| OFDM / g – mode | 16564 | 16573 | 16564 |
| OFDM / n HT20 – mode | 17800 | 17800 | 17803 |
| Frequency | 2422 MHz | 2437 MHz | 2452 MHz |
| OFDM / n HT40 – mode | 36554 | 36518 | 36.548 |

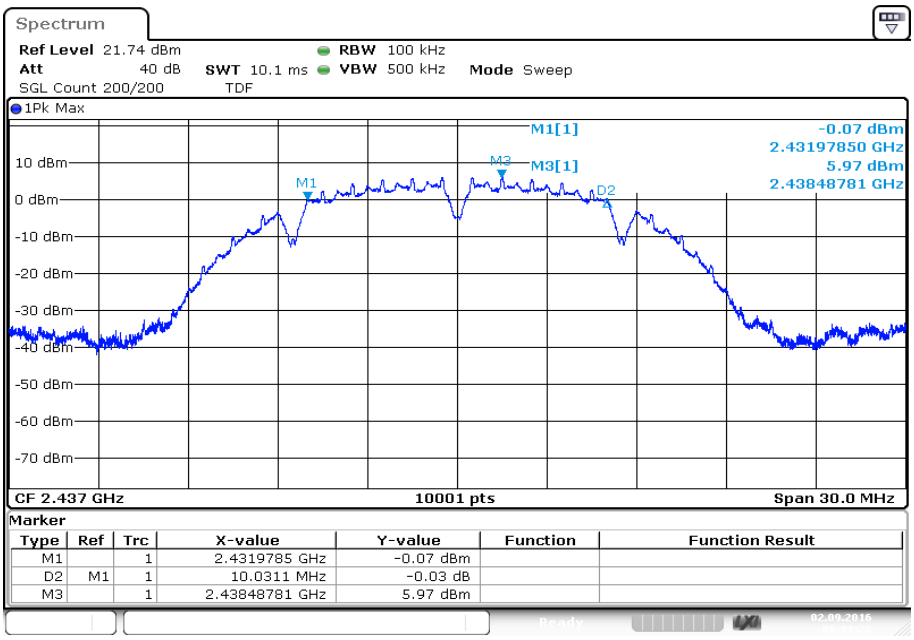
**Plots:** DSSS / b – mode

**Plot 1:** Lowest channel



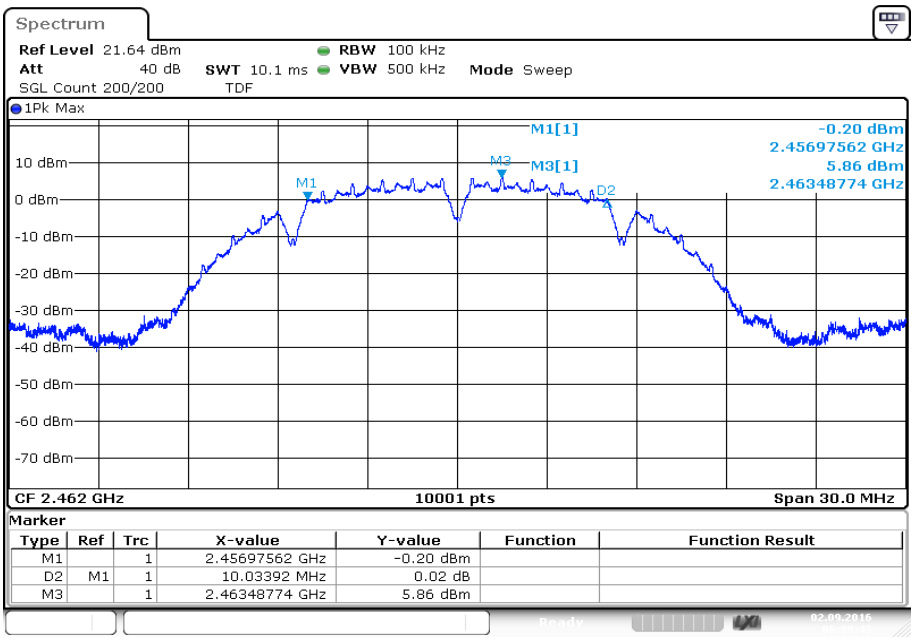

Date: 2.SEP.2016 06:23:11

**Plot 2:** Middle channel




Date: 2.SEP.2016 06:31:23

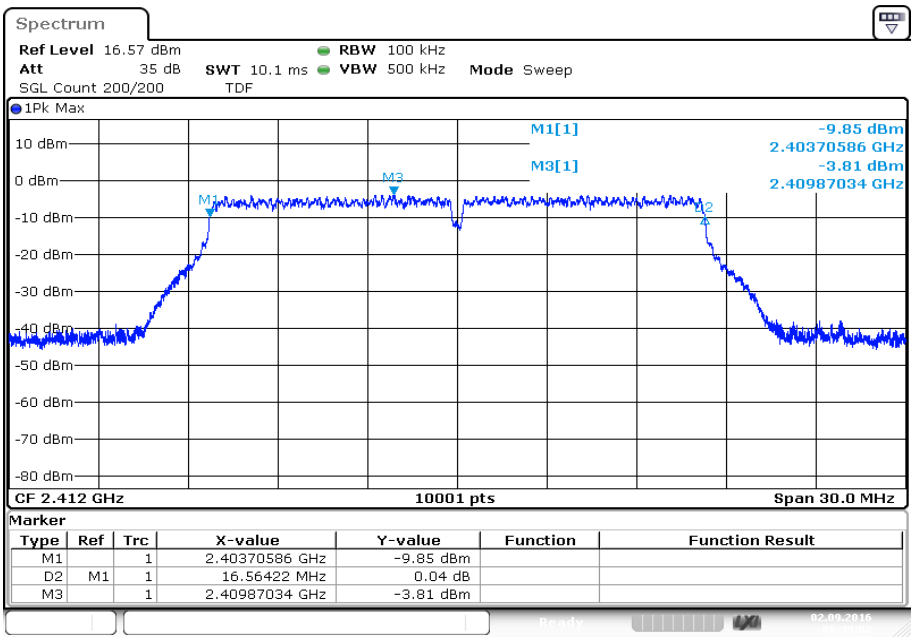
**Plot 3:** Highest channel




Date: 2.SEP.2016 06:39:43

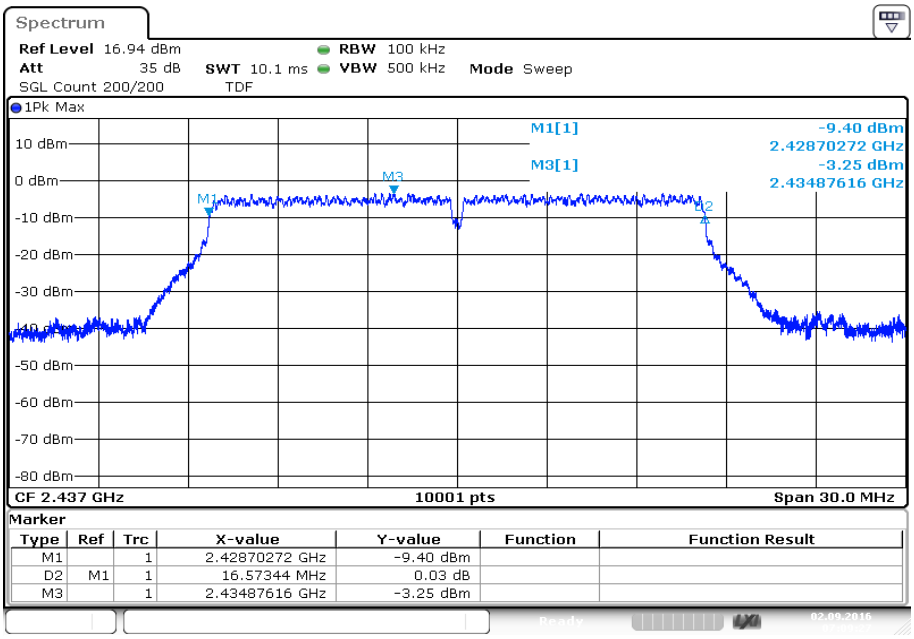
**Plots:** OFDM / g – mode

**Plot 1:** Lowest channel



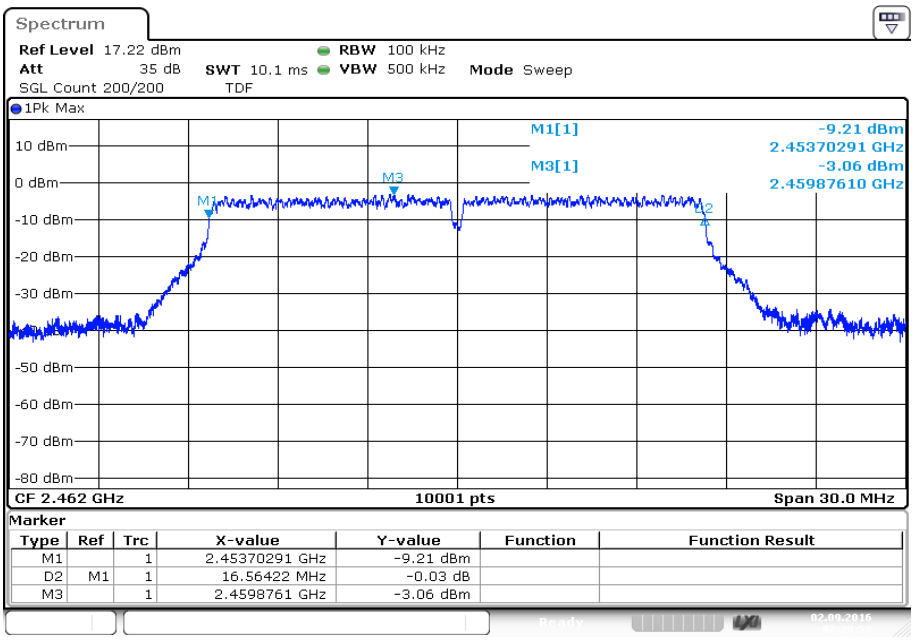

Date: 2.SEP.2016 06:49:02

**Plot 2:** Middle channel




Date: 2.SEP.2016 07:09:27

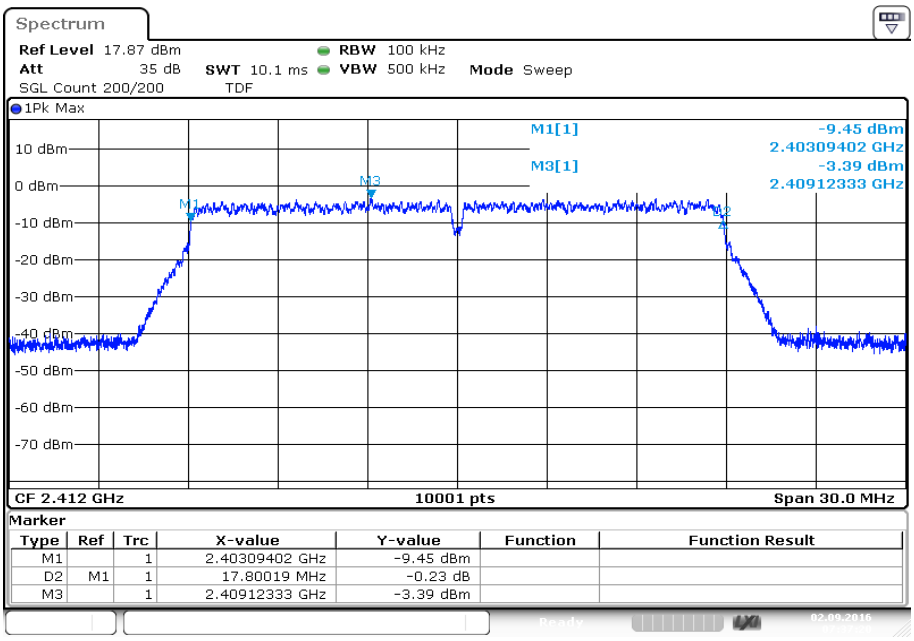
**Plot 3:** Highest channel



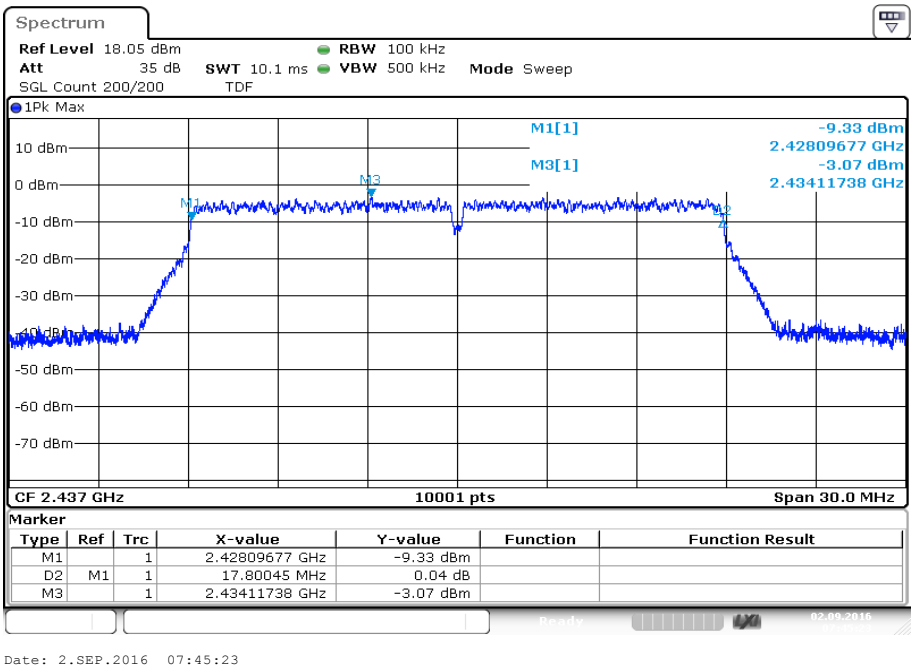

Date: 2.SEP.2016 07:21:00

**Plots:** OFDM / n HT20 – mode

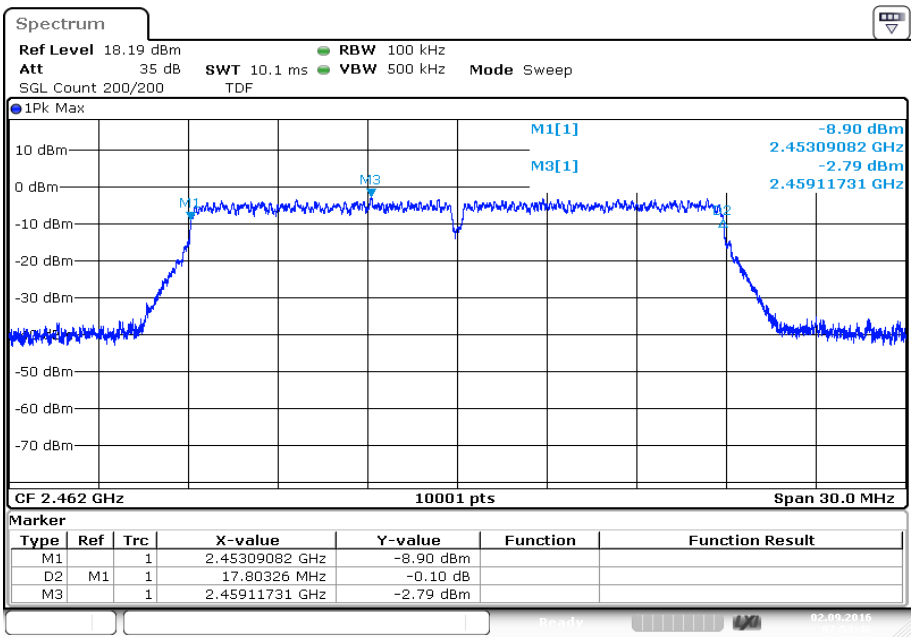
**Plot 1:** Lowest channel




**Plot 2:** Middle channel

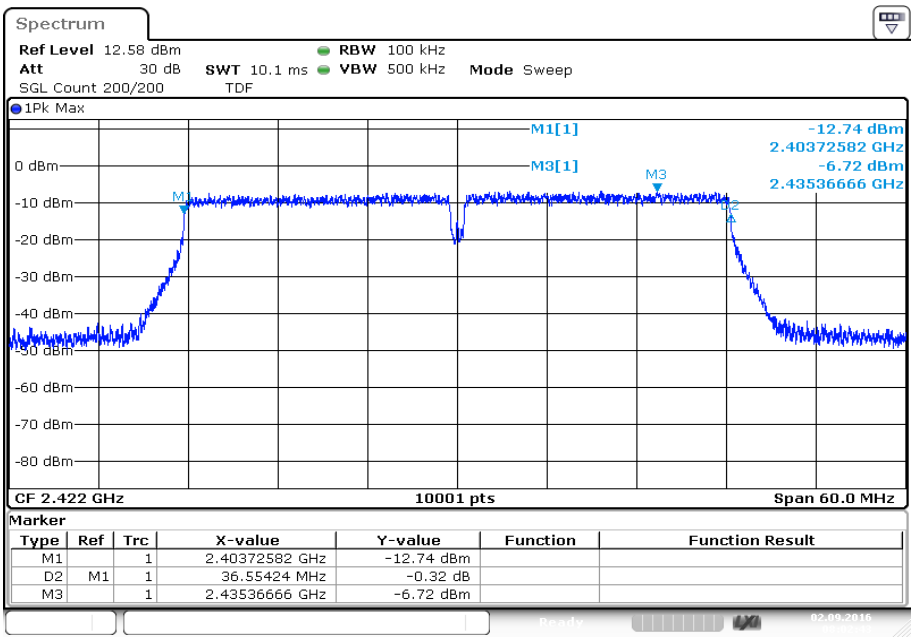


**Plot 3:** Highest channel



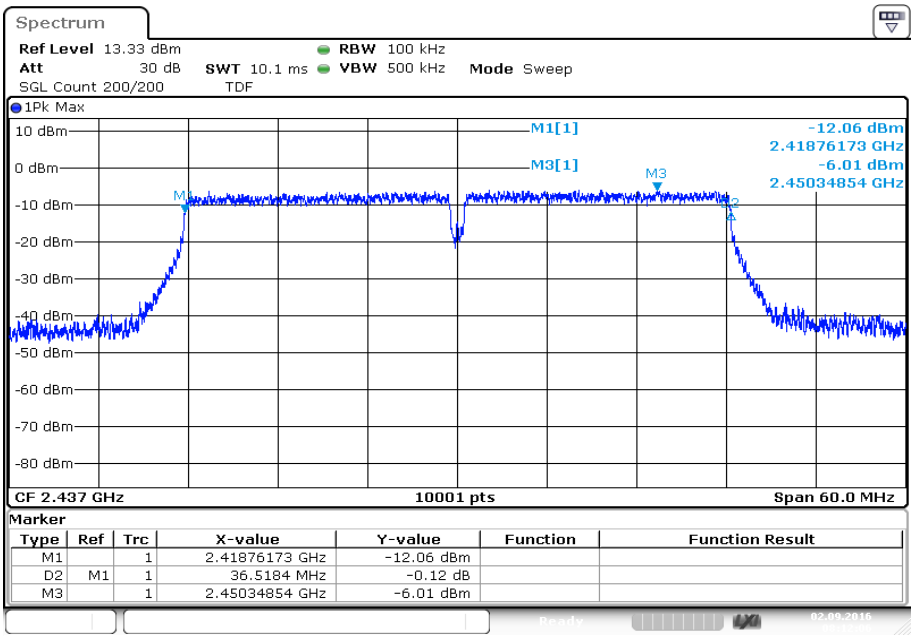
**Plots:** OFDM / n HT40 – mode

**Plot 1:** Lowest channel



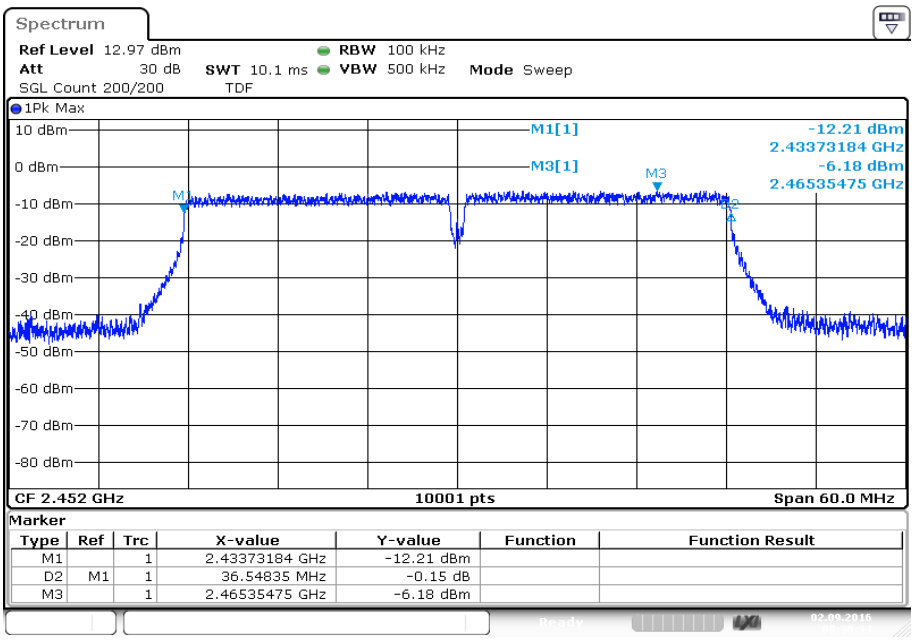

Date: 2.SEP.2016 08:02:43

**Plot 2:** Middle channel




Date: 2.SEP.2016 08:12:06

**Plot 3:** Highest channel




Date: 2.SEP.2016 08:30:34

## 12.7 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 |
| Video bandwidth: | 1 MHz |
| Span: | 30 MHz / 50 MHz |
| Measurement procedure: | Measurement of the 99% bandwidth using the integration function of the analyzer |
| Trace mode: | Single count with 200 counts |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty | See sub clause 9 |

**Usage:**

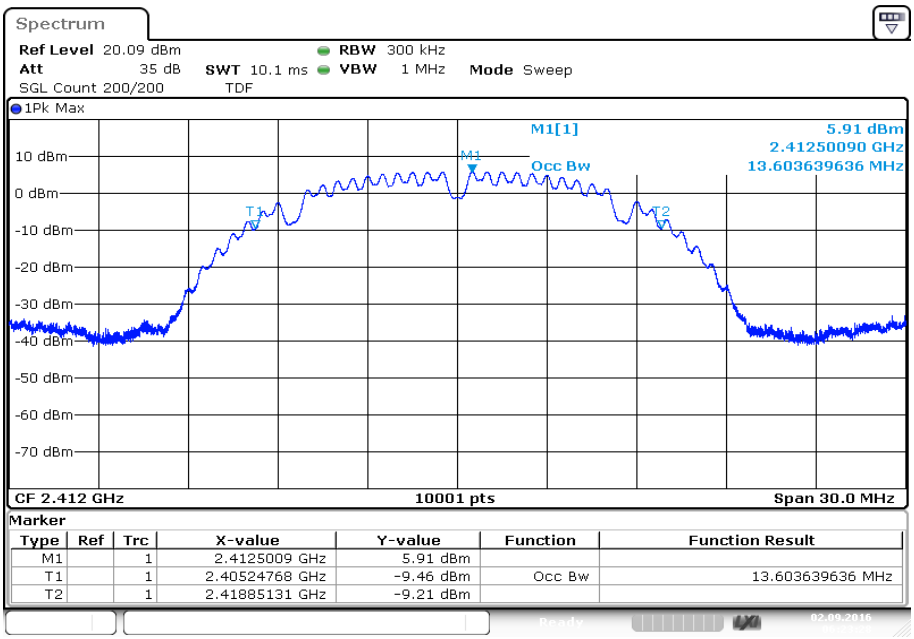
| -/- | IC |
|---|---|
| OBW is necessary for Emission Designator | |

**Results:**

| Modulation | 99% bandwidth [kHz] | | |
|---|---|---|---|
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| DSSS / b – mode | 13604 | 13892 | 13943 |
| OFDM / g – mode | 16723 | 16732 | 16732 |
| OFDM / n HT20 – mode | 17848 | 17848 | 17854 |
| Frequency | 2422 MHz | 2437 MHz | 2452 MHz |
| OFDM / n HT40 – mode | 36746 | 36770 | 36752 |

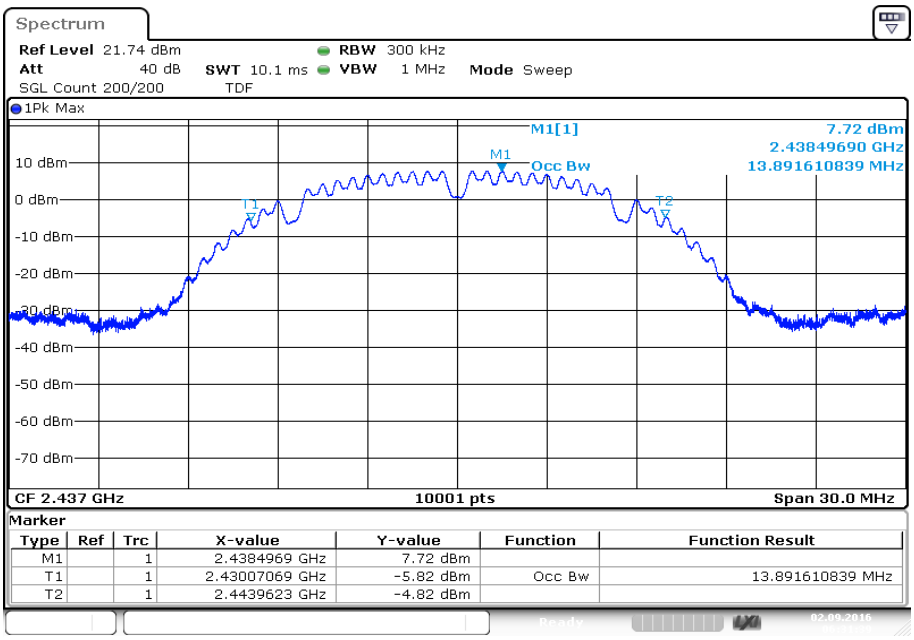
**Plots:** DSSS / b – mode

**Plot 1:** Lowest channel



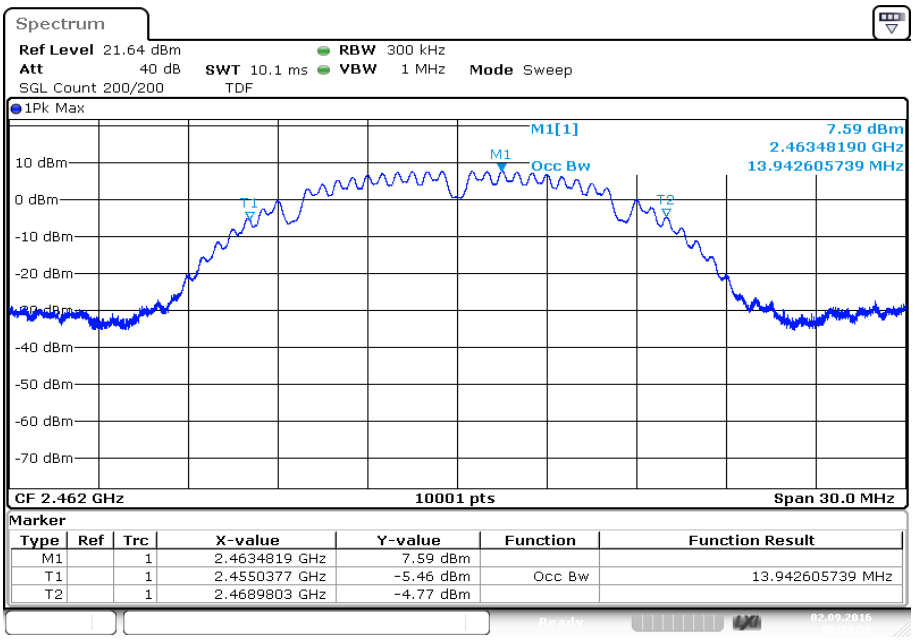

Date: 2.SEP.2016 06:23:28

**Plot 2:** Middle channel




Date: 2.SEP.2016 06:31:39

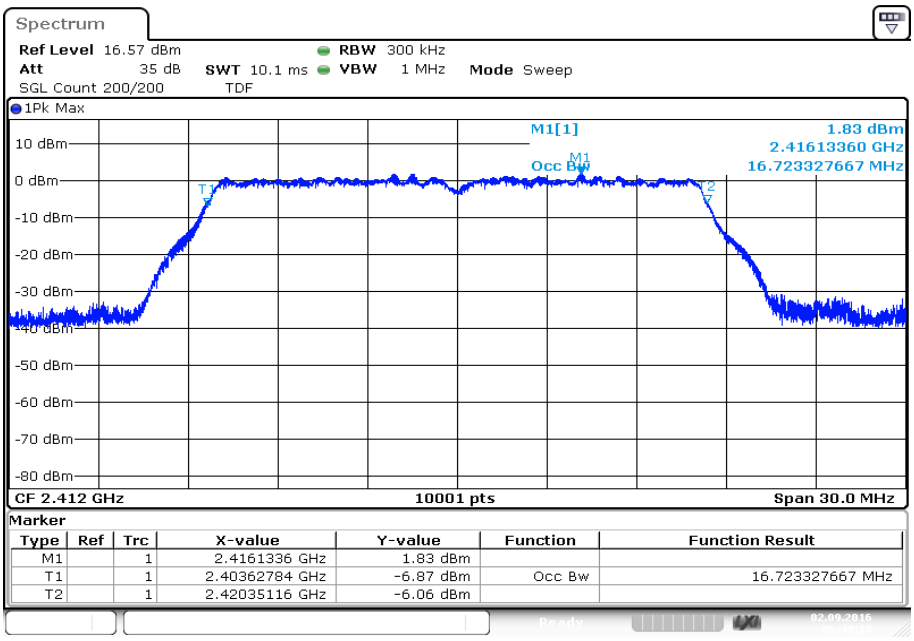
**Plot 3:** Highest channel




Date: 2.SEP.2016 06:40:00

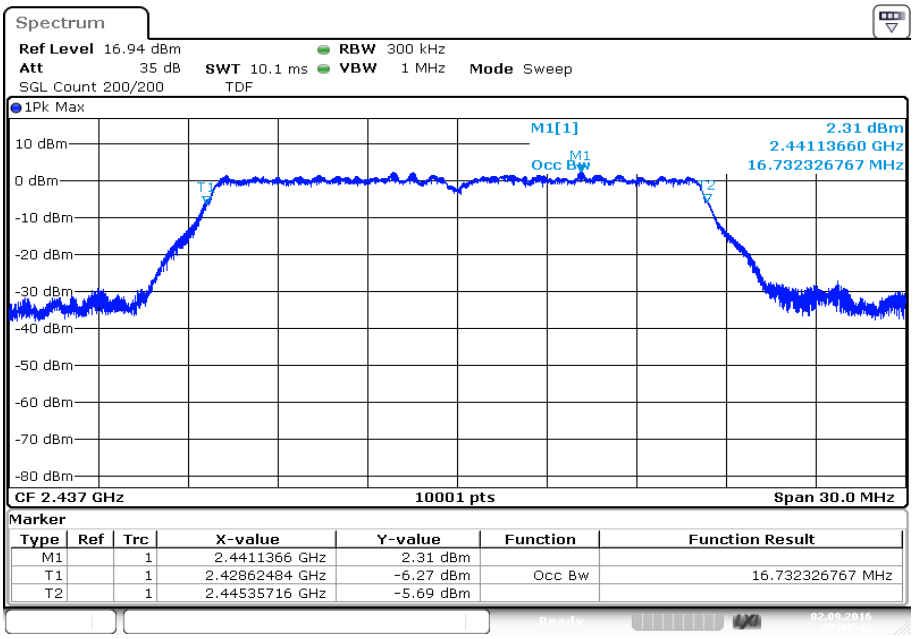
**Plots:** OFDM / g – mode

**Plot 1:** Lowest channel



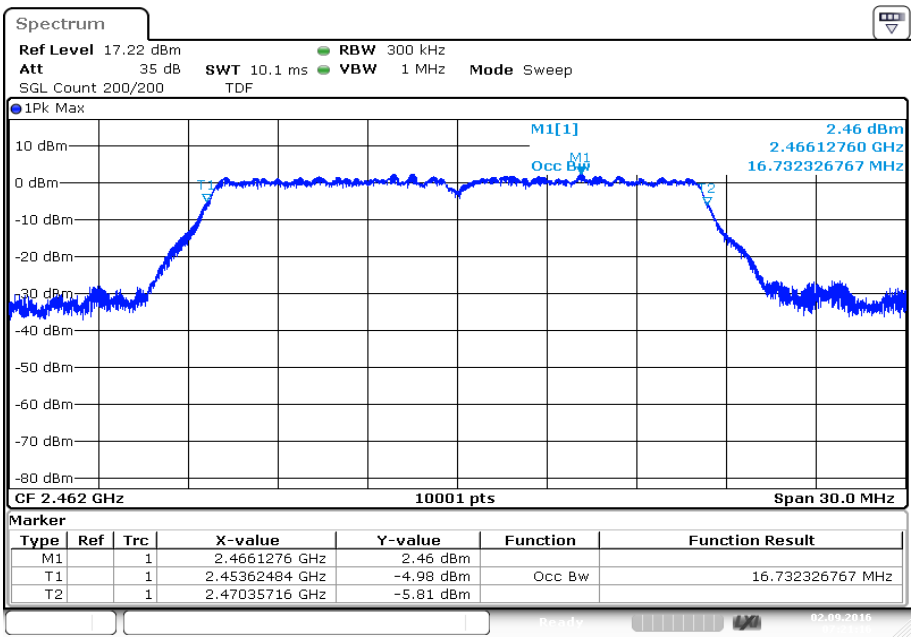

Date: 2.SEP.2016 06:49:17

**Plot 2:** Middle channel




Date: 2.SEP.2016 07:09:43

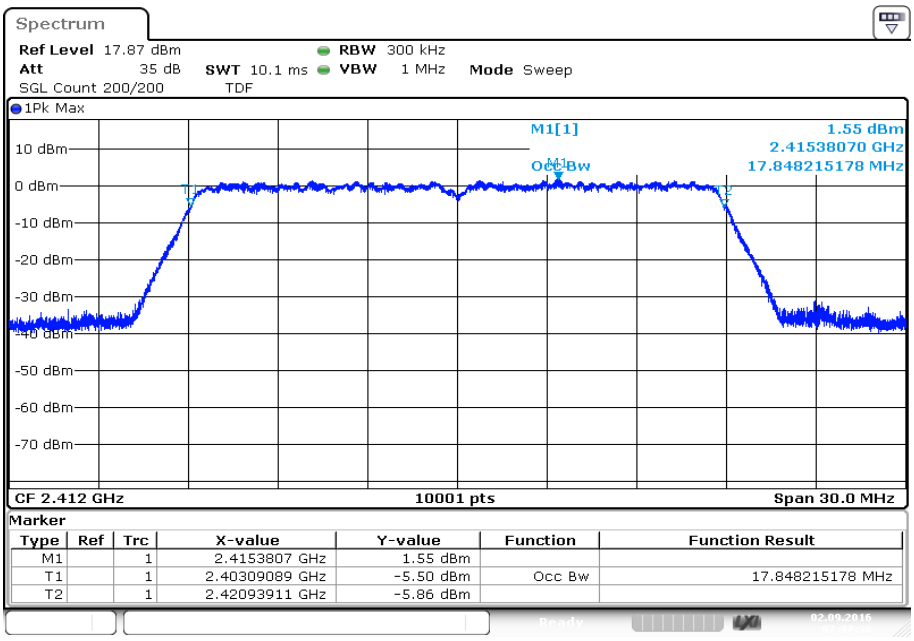
**Plot 3:** Highest channel




Date: 2.SEP.2016 07:21:17

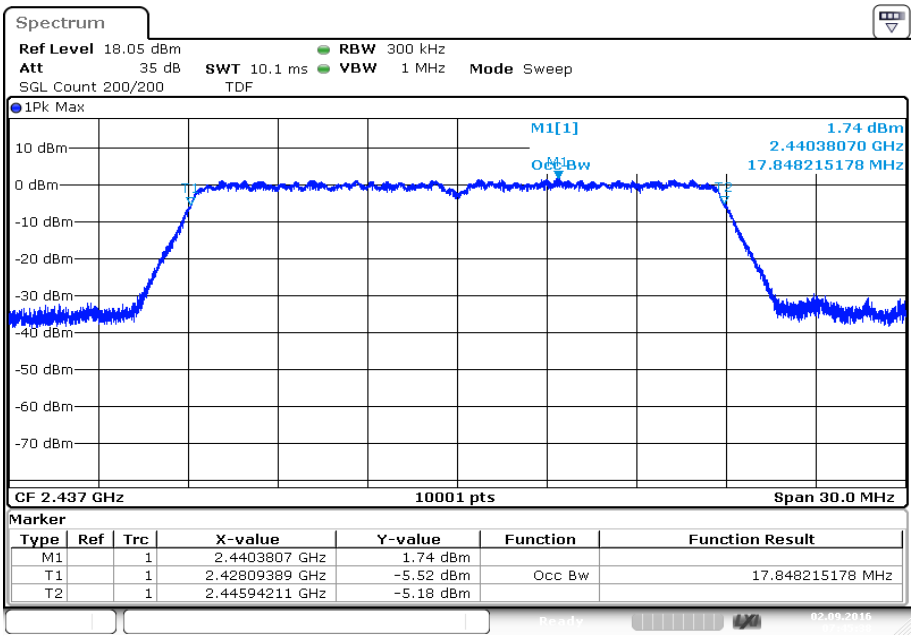
**Plots:** OFDM / n HT20 – mode

**Plot 1:** Lowest channel



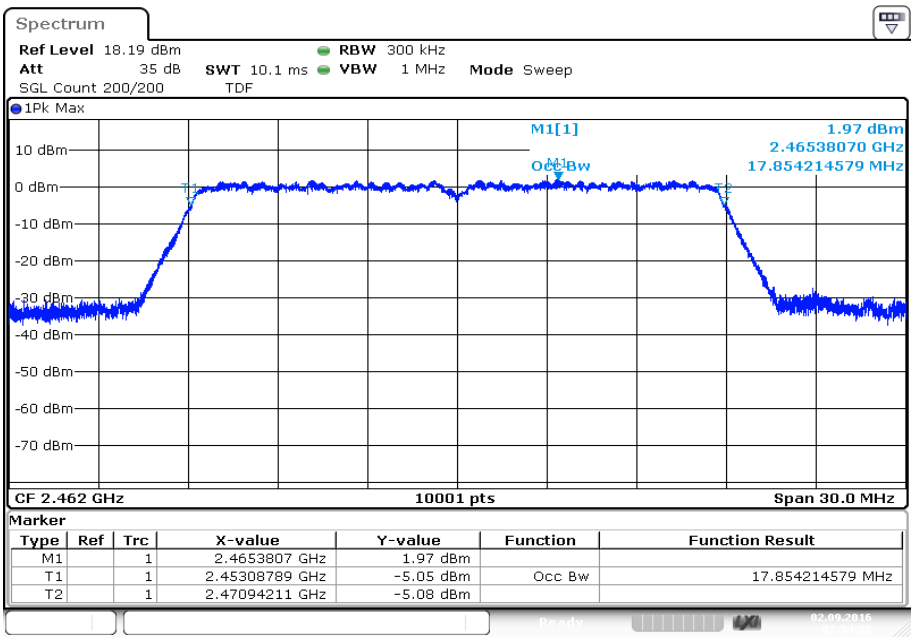

Date: 2.SEP.2016 07:37:36

**Plot 2:** Middle channel




Date: 2.SEP.2016 07:45:38

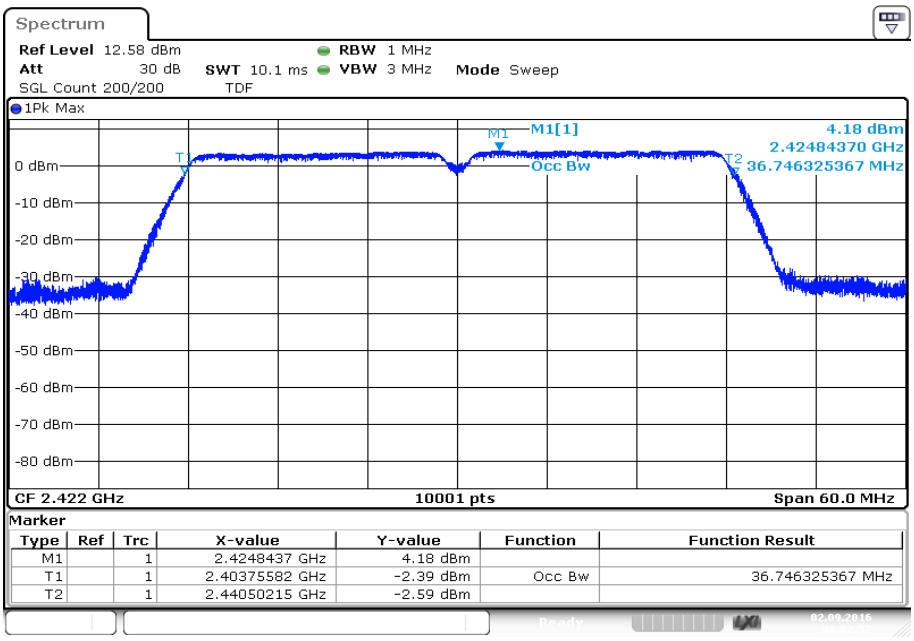
**Plot 3:** Highest channel




Date: 2.SEP.2016 07:54:03

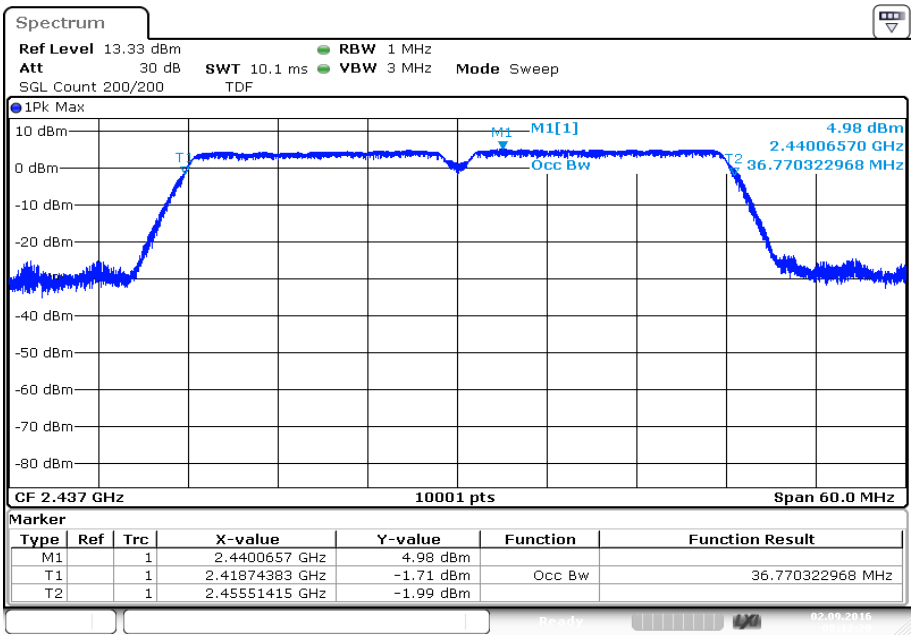
**Plots:** OFDM / n HT40 – mode

**Plot 1:** Lowest channel



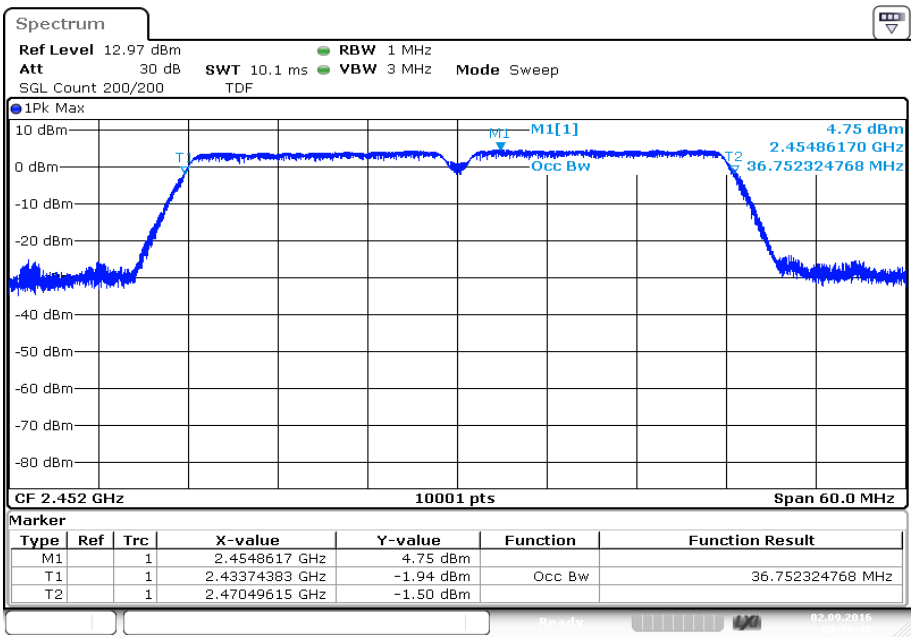

Date: 2.SEP.2016 08:02:57

**Plot 2:** Middle channel




Date: 2.SEP.2016 08:12:20

**Plot 3:** Highest channel




Date: 2.SEP.2016 08:30:48

## 12.8 Occupied bandwidth – 20 dB bandwidth

**Description:**

Measurement of the 20 dB bandwidth of the modulated carrier.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | 500 kHz |
| Span: | 30 MHz / 50 MHz |
| Trace mode: | Single count with min. 200 counts |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty | See sub clause 9 |

**Usage:**

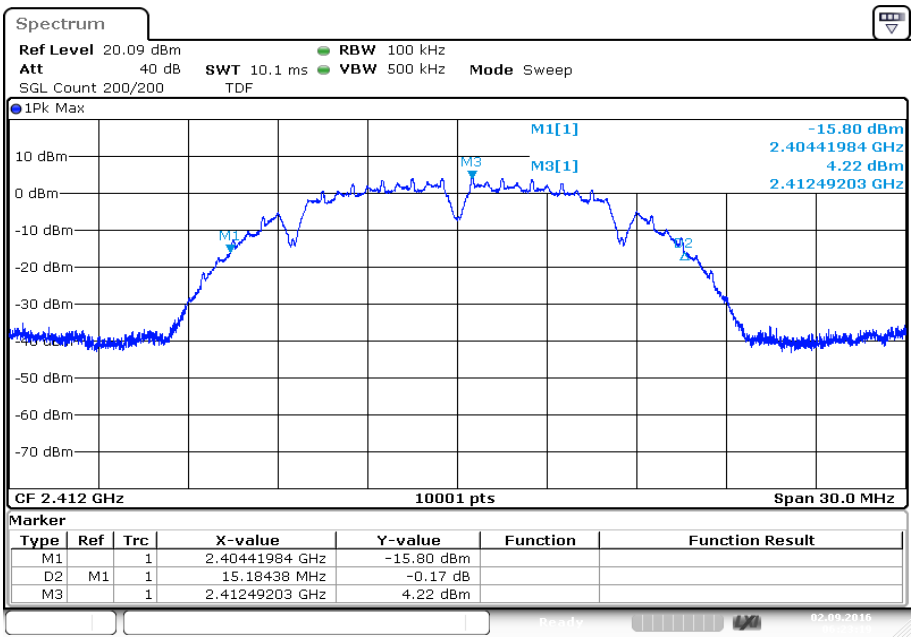
| -/- | IC |
|---|---|
| Within the used band! | |

**Results:**

| Modulation | 20 dB bandwidth [MHz] | | |
|---|---|---|---|
| Frequency | 2412 MHz | 2437 MHz | 2462 MHz |
| DSSS / b – mode | 15.18 | 15.39 | 15.41 |
| OFDM / g – mode | 18.11 | 18.09 | 18.06 |
| OFDM / n HT20 – mode | 19.12 | 19.19 | 19.13 |
| Frequency | 2422 MHz | 2437 MHz | 2452 MHz |
| OFDM / n HT40 – mode | 38.26 | 38.31 | 38.29 |

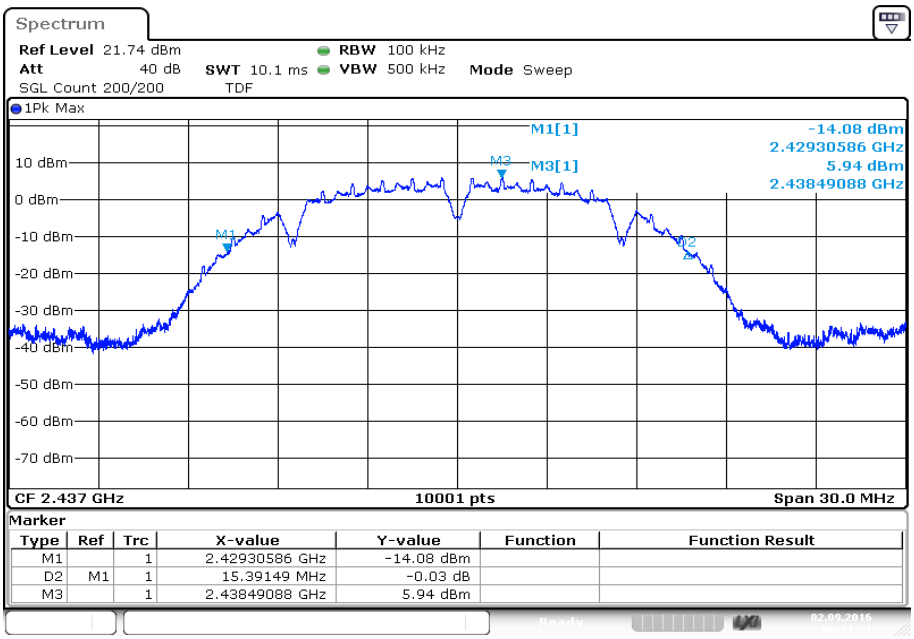
**Plots:** DSSS / b – mode

**Plot 1:** Lowest channel



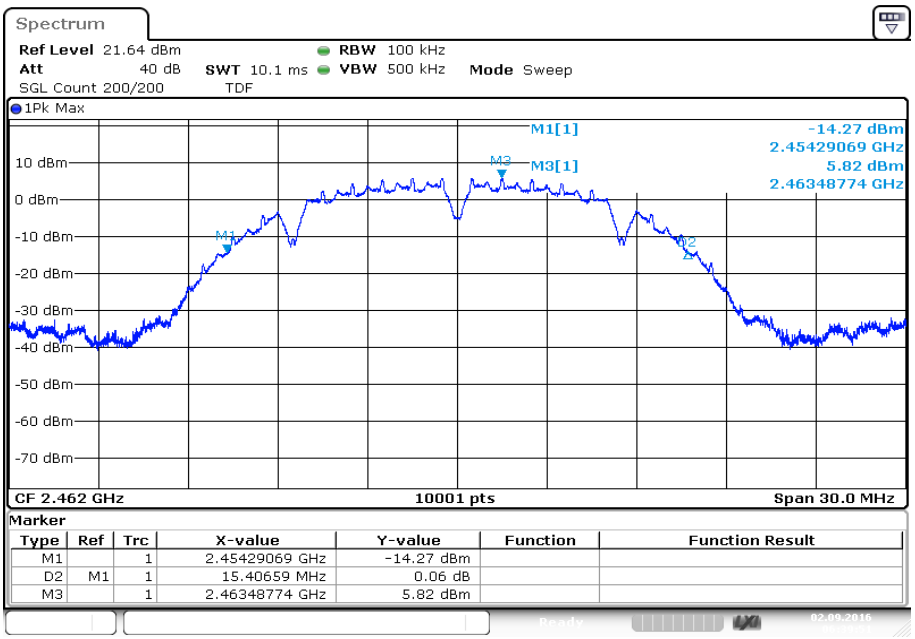

Date: 2.SEP.2016 06:23:20

**Plot 2:** Middle channel




Date: 2.SEP.2016 06:31:31

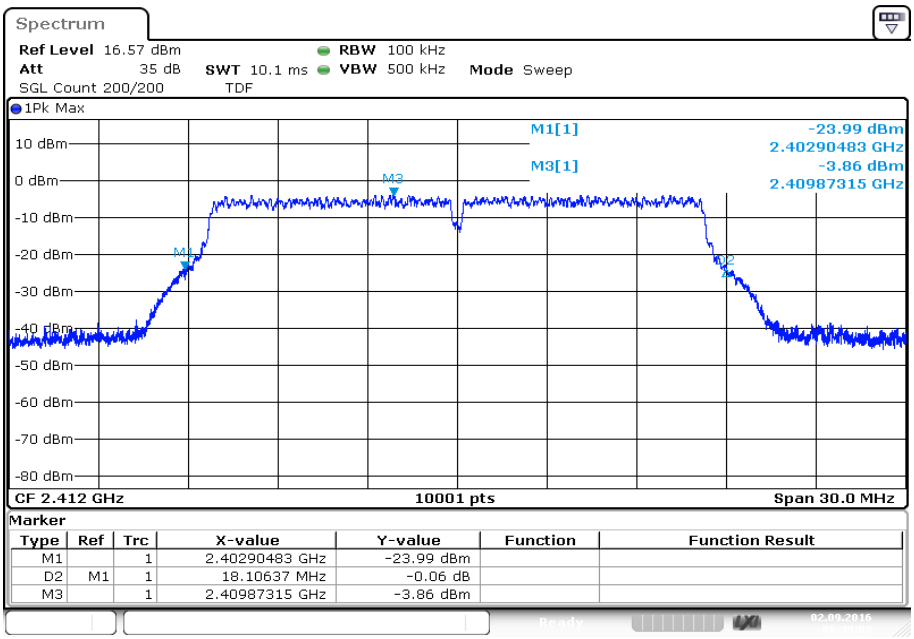
**Plot 3:** Highest channel




Date: 2.SEP.2016 06:39:52

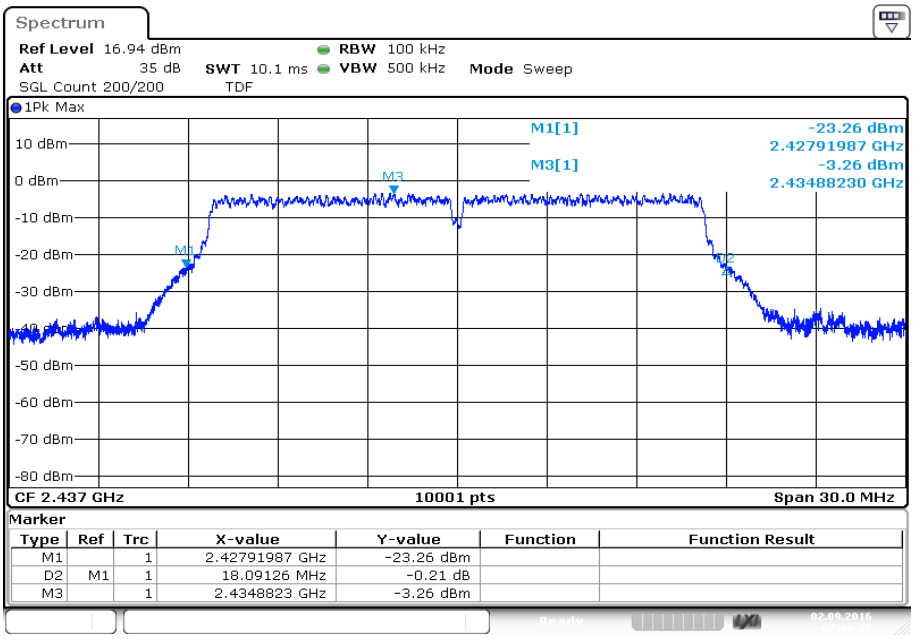
**Plots:** OFDM / g – mode

**Plot 1:** Lowest channel



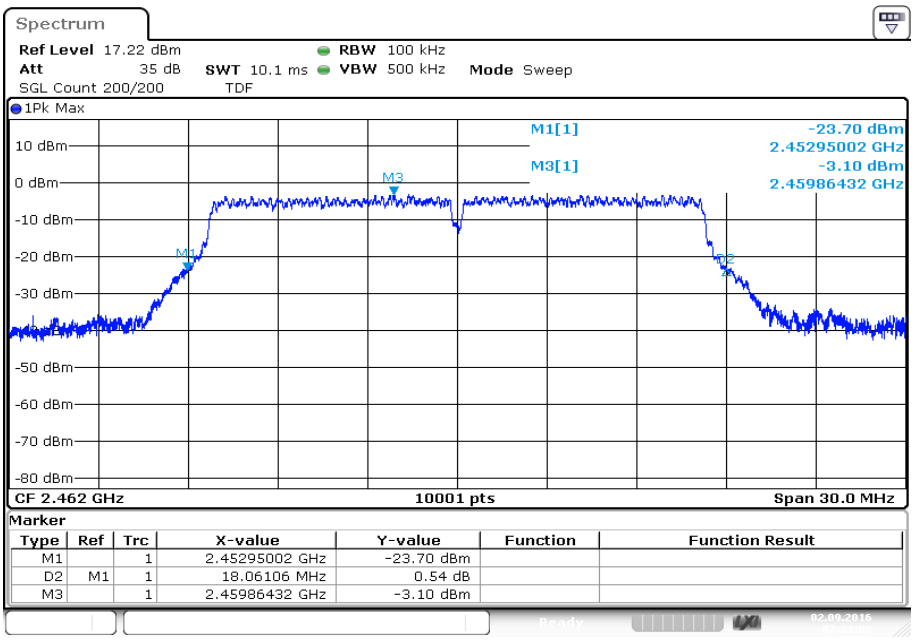

Date: 2.SEP.2016 06:49:10

**Plot 2:** Middle channel




Date: 2.SEP.2016 07:09:35

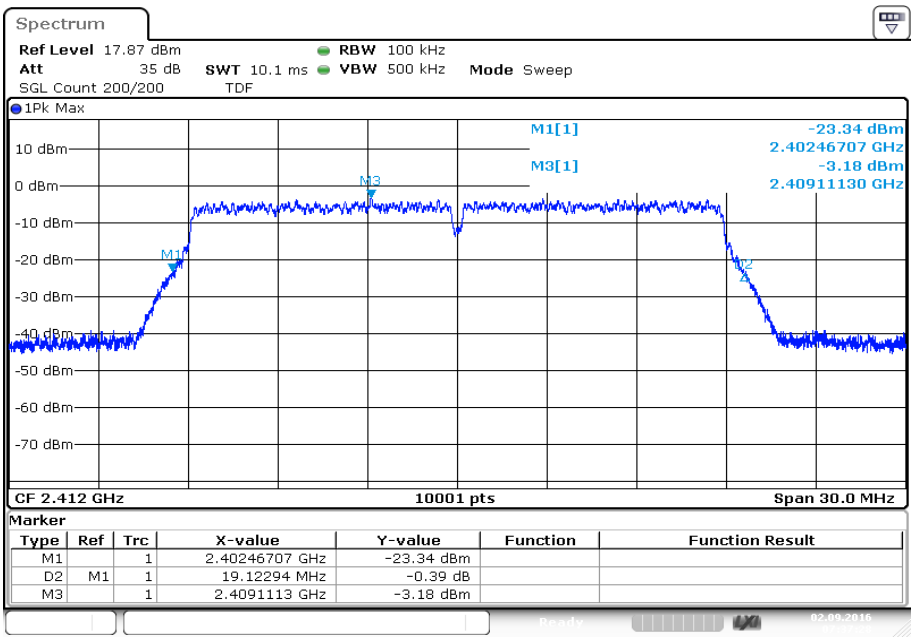
**Plot 3:** Highest channel




Date: 2.SEP.2016 07:21:09

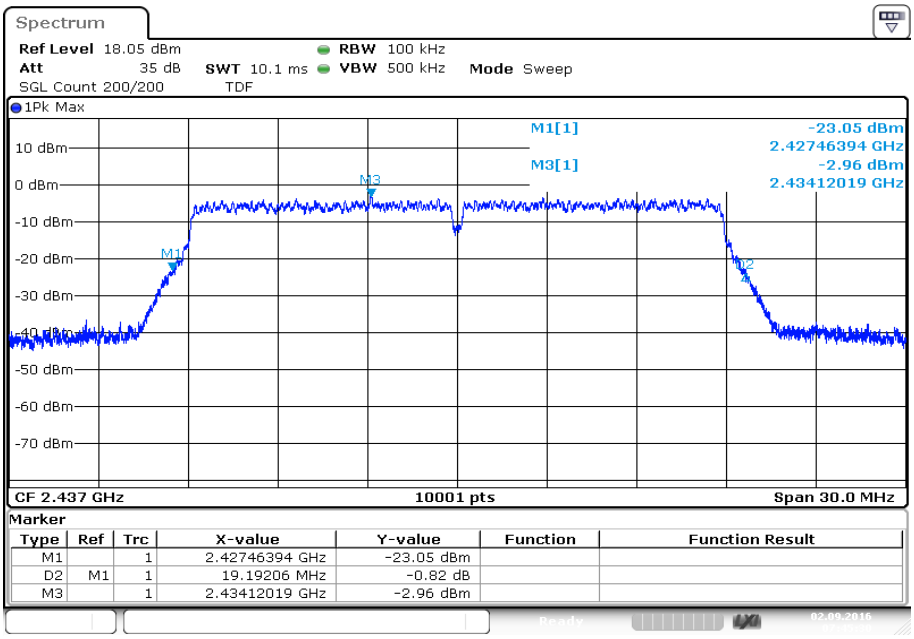
**Plots:** OFDM / n HT20 – mode

**Plot 1:** Lowest channel



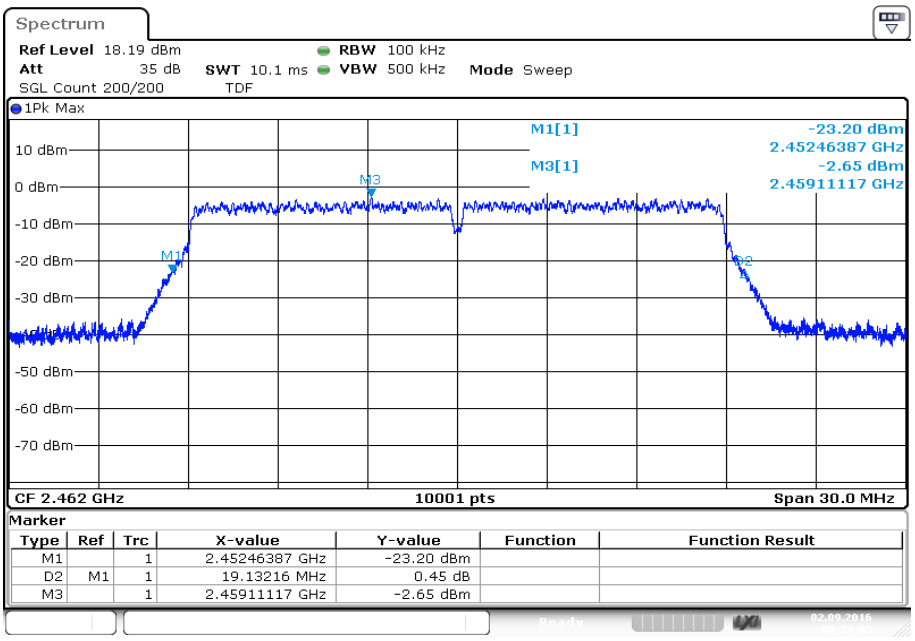

Date: 2.SEP.2016 07:37:28

**Plot 2:** Middle channel




Date: 2.SEP.2016 07:45:31

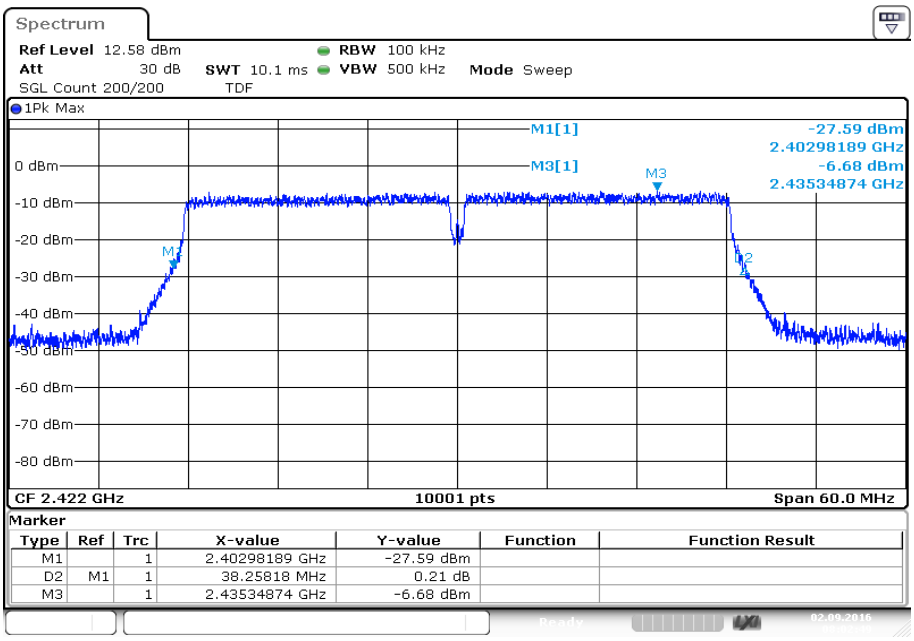
**Plot 3:** Highest channel



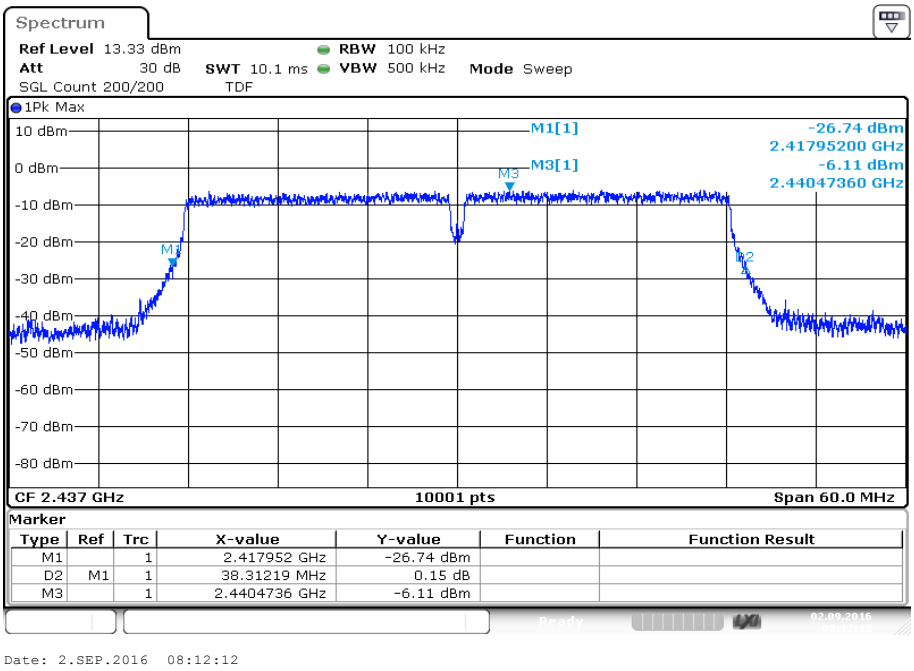

Date: 2.SEP.2016 07:53:55

**Plots:** OFDM / n HT40 – mode

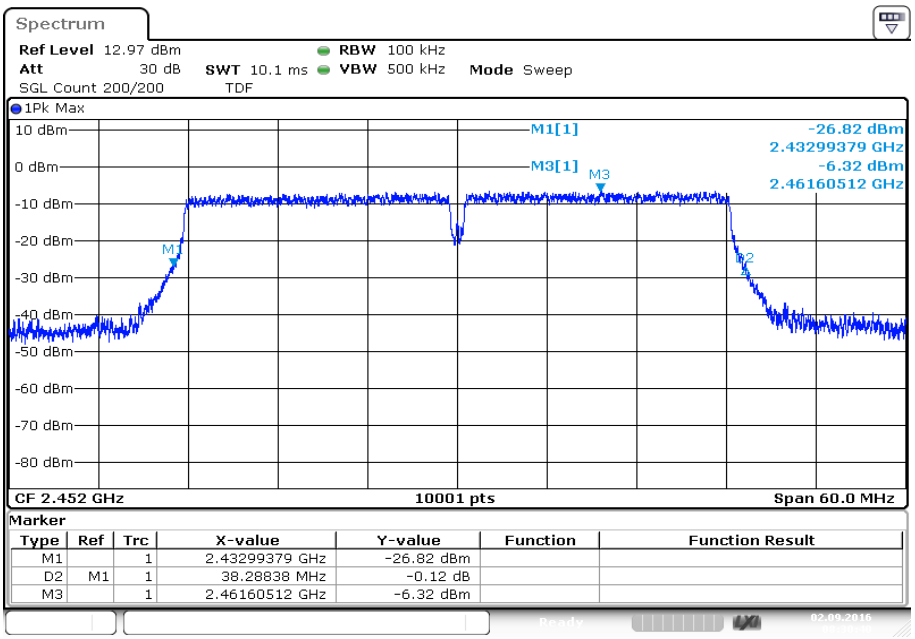
**Plot 1:** Lowest channel




**Plot 2:** Middle channel



**Plot 3:** Highest channel



## 12.9 Band edge compliance conducted

**Description:**

Measurement of the radiated band edge compliance with a conducted test setup.

**Measurement:**

| Measurement parameter for measurements | |
|---|---|
| **According to DTS clause: 13.3.2 and clause 12.2.2** | |
| Detector: | RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | 300 kHz |
| Span: | Lower band edge:<br>2388 MHz to 2390 MHz (2 MHz)<br>Upper band edge:<br>2483.5 MHz to 2485.5 MHz (2 MHz) |
| Trace mode: | Trace average with 200 counts |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty | See sub clause 9 |

**Limits:**

| FCC | IC |
|---|---|
| -41.26 dBm | |

**Results:** antenna 1 - omnidirectional dipole antenna

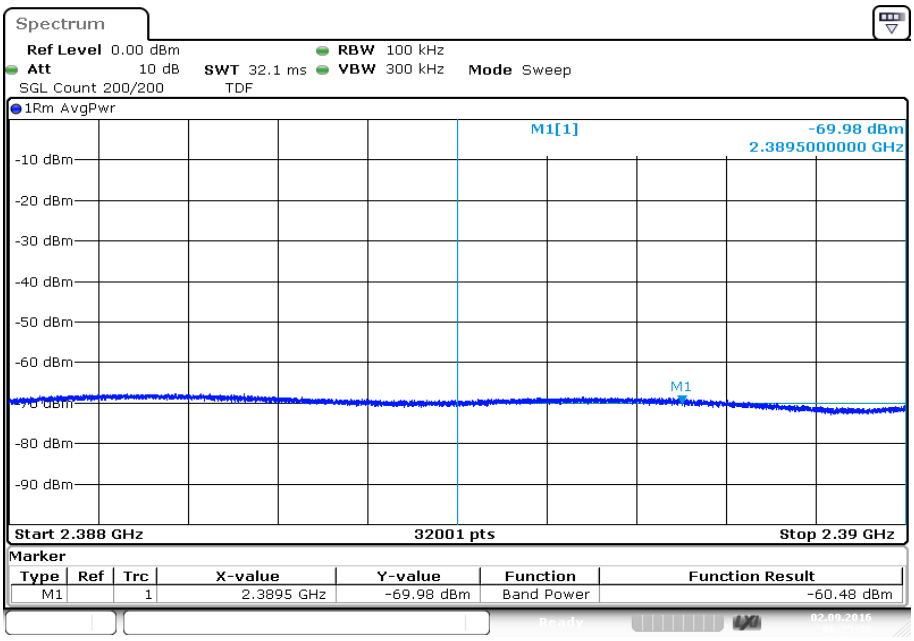
| Scenario | Band edge compliance [dBm] (gain calculation) | | | |
|---|---|---|---|---|
| Modulation | DSSS / b – mode | OFDM / g – mode | OFDM / n HT20 – mode | OFDM / n HT40 – mode |
| Max. lower band edge power conducted | -60.48 | -54.46 | -52.18 | -49.63 |
| Antenna gain | 2.0 | | | |
| Max. lower band edge power radiated | -58.48 | -52.46 | -50.18 | -47.63 |
| | | | | |
| Max. upper band edge power conducted | -50.39 | -49.28 | -47.57 | -44.44 |
| Antenna gain | 2.0 | | | |
| Max. upper band edge power radiated | -48.39 | -47.28 | -45.57 | -42.44 |

**Results:** antenna 2 - omnidirectional outdoor dipole antenna with antenna cable

| Scenario | Band edge compliance [dBm] (gain calculation) | | | |
|---|---|---|---|---|
| Modulation | DSSS / b – mode | OFDM / g – mode | OFDM / n HT20 – mode | OFDM / n HT40 – mode |
| Max. lower band edge power conducted | -60.48 | -54.46 | -52.18 | -49.63 |
| Antenna gain | 0.6 | | | |
| Max. lower band edge power radiated | -59.88 | -53.86 | -51.58 | -49.03 |
| | | | | |
| Max. upper band edge power conducted | -50.39 | -49.28 | -47.57 | -44.44 |
| Antenna gain | 0.6 | | | |
| Max. upper band edge power radiated | -49.79 | -48.68 | -46.97 | -43.84 |

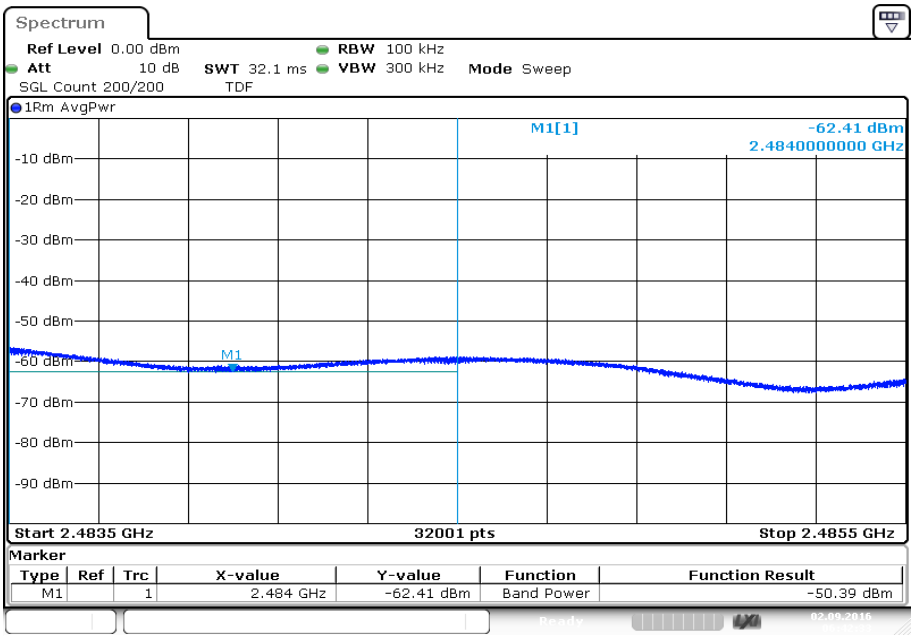
**Plots:** DSSS / b – mode

**Plot 1:** Lower band edge




Date: 2.SEP.2016 06:25:49

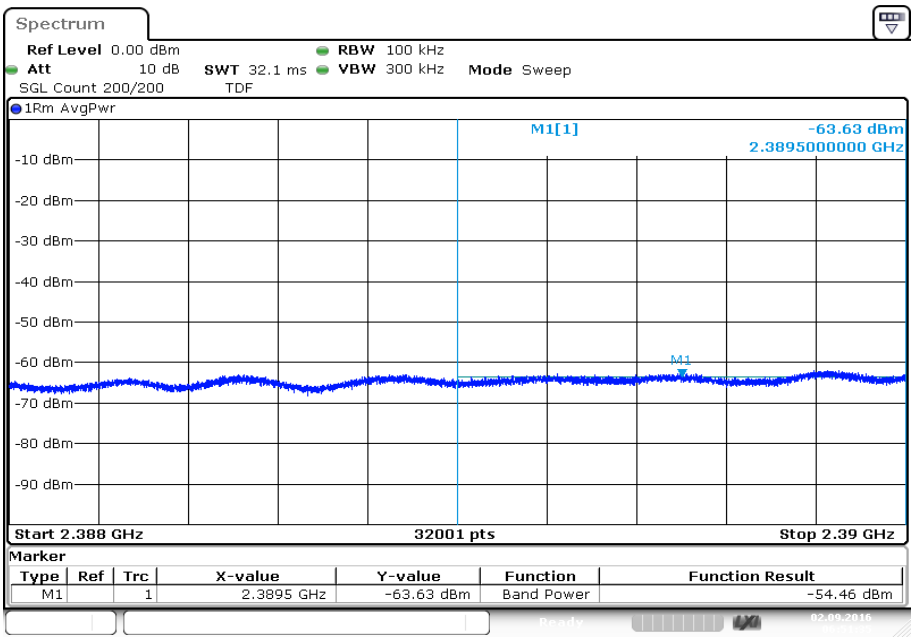
**Plot 2:** Upper band edge




Date: 2.SEP.2016 06:42:33

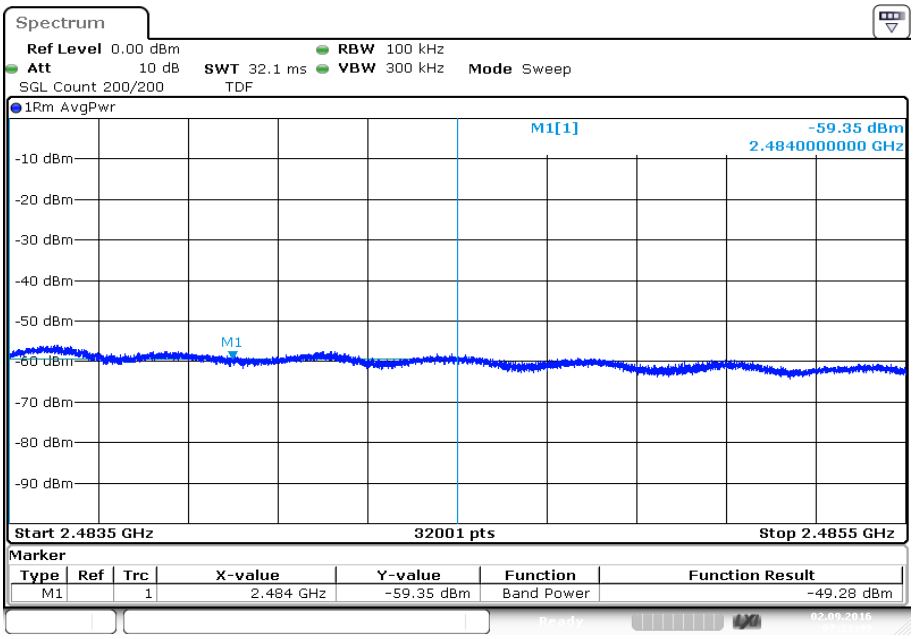
**Plots:** OFDM / g – mode

**Plot 1:** Lower band edge




Date: 2.SEP.2016 06:51:35

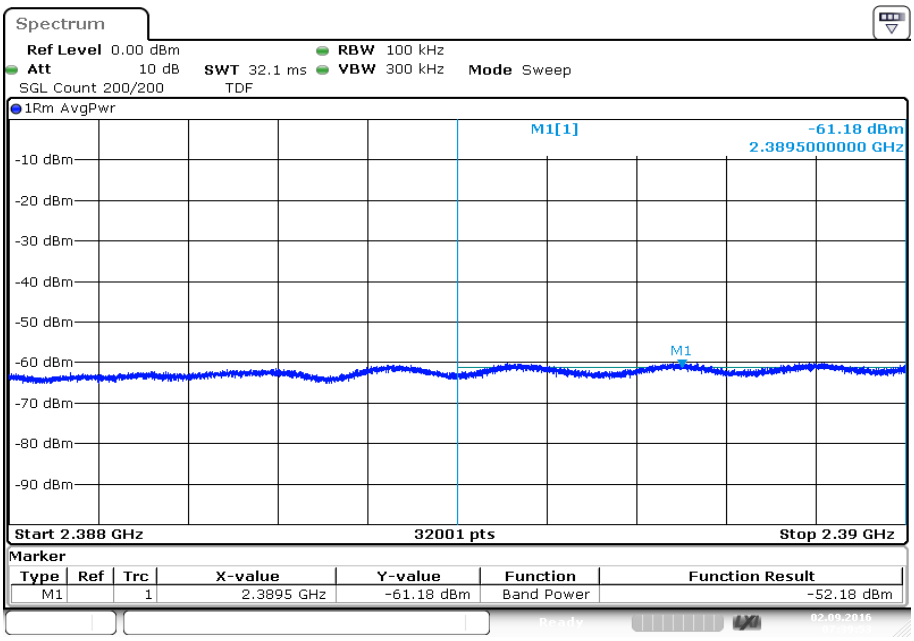
**Plot 2:** Upper band edge




Date: 2.SEP.2016 07:23:49

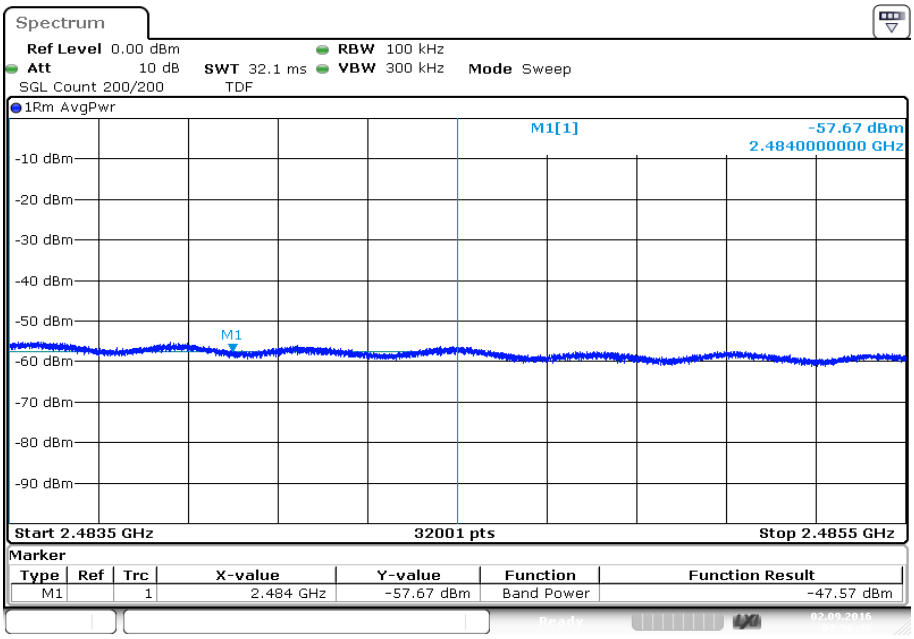
**Plots:** OFDM / n HT20 – mode

**Plot 1:** Lower band edge




Date: 2.SEP.2016 07:39:53

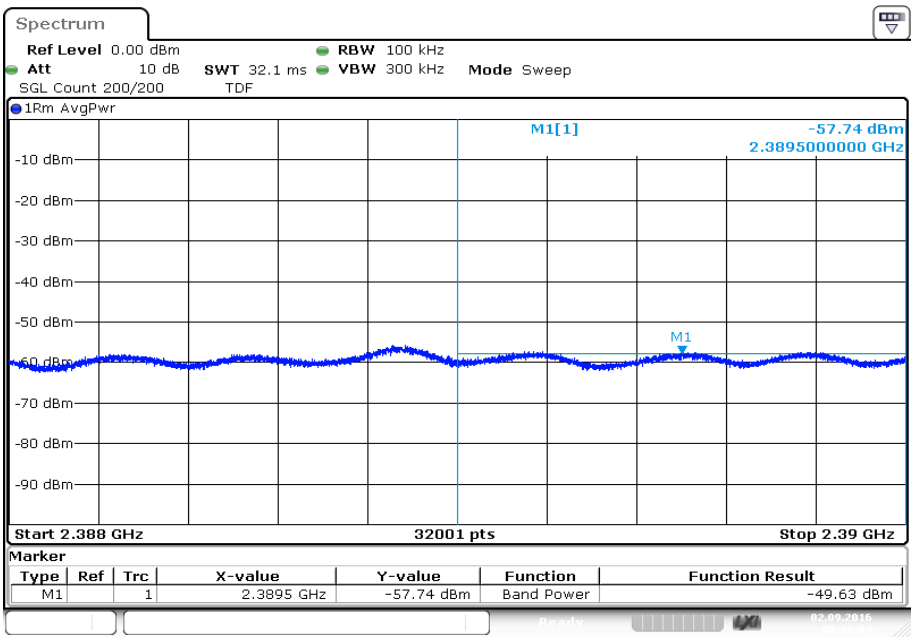
**Plot 2:** Upper band edge




Date: 2.SEP.2016 07:56:36

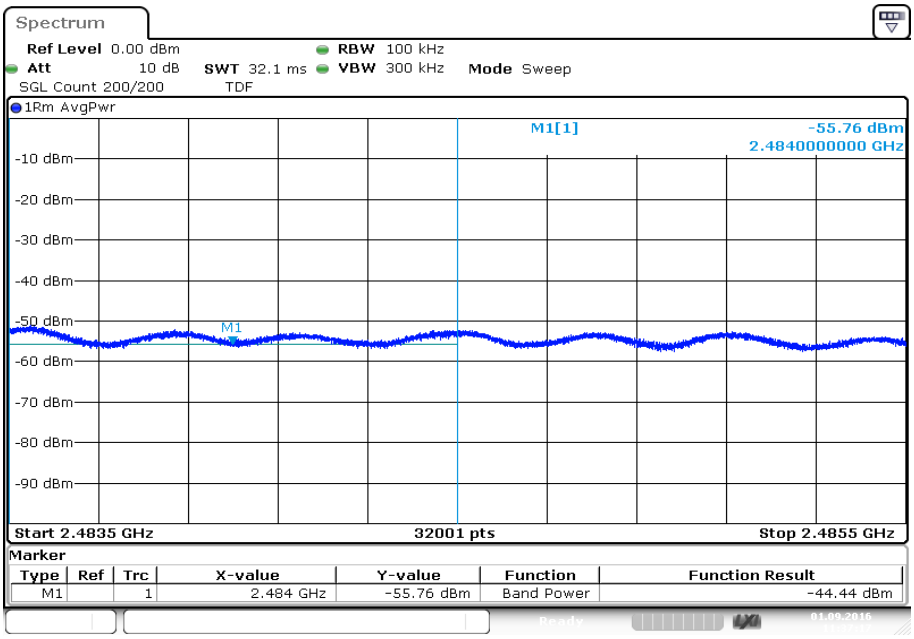
**Plots:** OFDM / n HT40 – mode

**Plot 1:** Lower band edge




Date: 2.SEP.2016 08:06:05

**Plot 2:** Upper band edge




Date: 1.SEP.2016 11:37:18

## 12.10 Spurious emissions conducted

**Description:**

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. The measurement is repeated for all modulations.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | 500 kHz |
| Span: | 9 kHz to 25 GHz |
| Trace mode: | Max Hold |
| Test setup: | See sub clause 7.4 – A |
| Measurement uncertainty | See sub clause 9 |

**Limits:**

| FCC | IC |
|---|---|
| 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 30 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 | |

**Results:** DSSS / b – mode

| TX Spurious Emissions Conducted | | | | | |
|---|---|---|---|---|---|
| DSSS / b – mode | | | | | |
| f [MHz] | | amplitude of emission [dBm] | limit max. allowed emission power | actual attenuation below frequency of operation [dB] | results |
| 2412 | | 3.95 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |
| 2437 | | 5.82 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |
| 2462 | | 5.61 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |

**Results:** OFDM / g – mode

| TX Spurious Emissions Conducted | | | | | |
|---|---|---|---|---|---|
| OFDM / g – mode | | | | | |
| f [MHz] | | amplitude of emission [dBm] | limit max. allowed emission power | actual attenuation below frequency of operation [dB] | results |
| 2412 | | -4.01 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |
| 2437 | | -3.50 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |
| 2462 | | -3.07 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |

**Results:** OFDM / n HT20 – mode

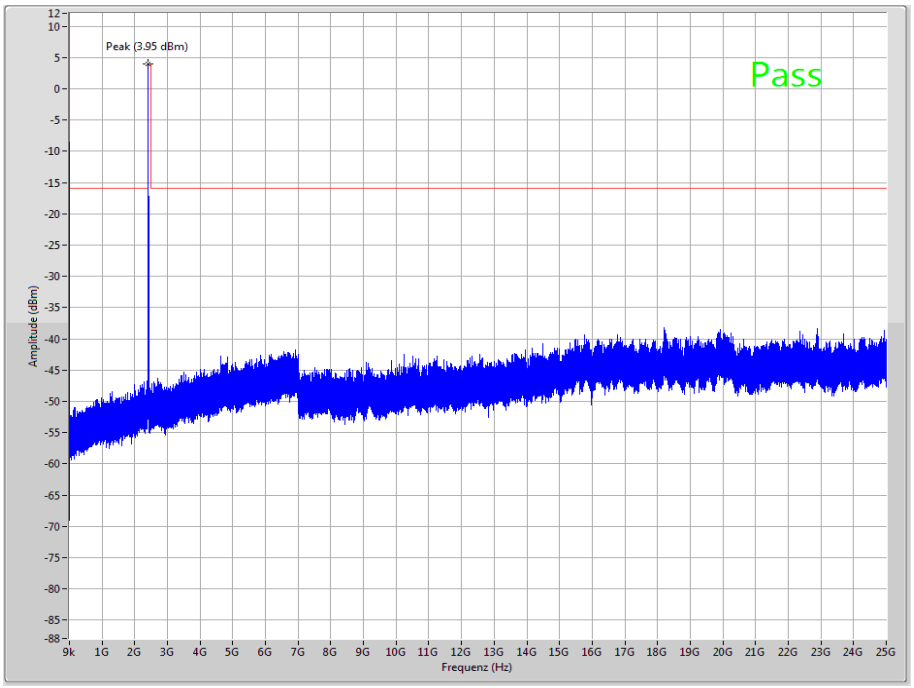
| TX Spurious Emissions Conducted | | | | | |
|---|---|---|---|---|---|
| OFDM / n HT20 – mode | | | | | |
| f [MHz] | | amplitude of emission [dBm] | limit max. allowed emission power | actual attenuation below frequency of operation [dB] | results |
| 2412 | | -3.63 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |
| 2437 | | -3.66 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |
| 2462 | | -2.95 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |

**Results:** OFDM / n HT40 – mode

| TX Spurious Emissions Conducted | | | | | |
|---|---|---|---|---|---|
| OFDM / n HT40 – mode | | | | | |
| f [MHz] | | amplitude of emission [dBm] | limit max. allowed emission power | actual attenuation below frequency of operation [dB] | results |
| 2422 | | -7.30 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |
| 2437 | | -6.35 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |
| 2452 | | -6.37 | 30 dBm | | Operating frequency |
| No peaks detected. | | | -20 dBc (peak)<br>-30 dBc (average) | | compliant |
| | | | | | |
| | | | | | |

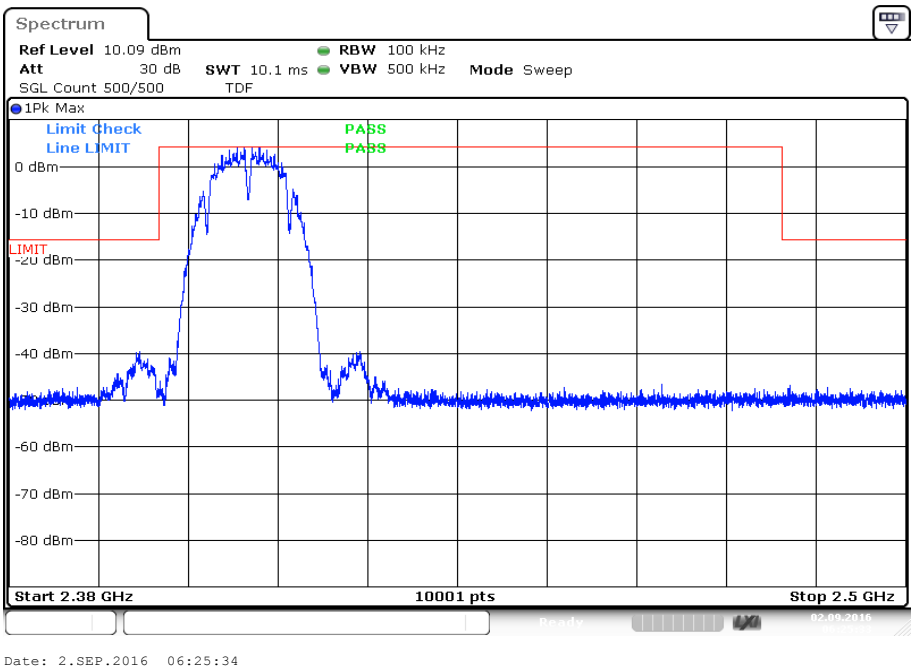
**Plots:** DSSS / b – mode

**Plot 1:** Lowest channel, up to 25 GHz



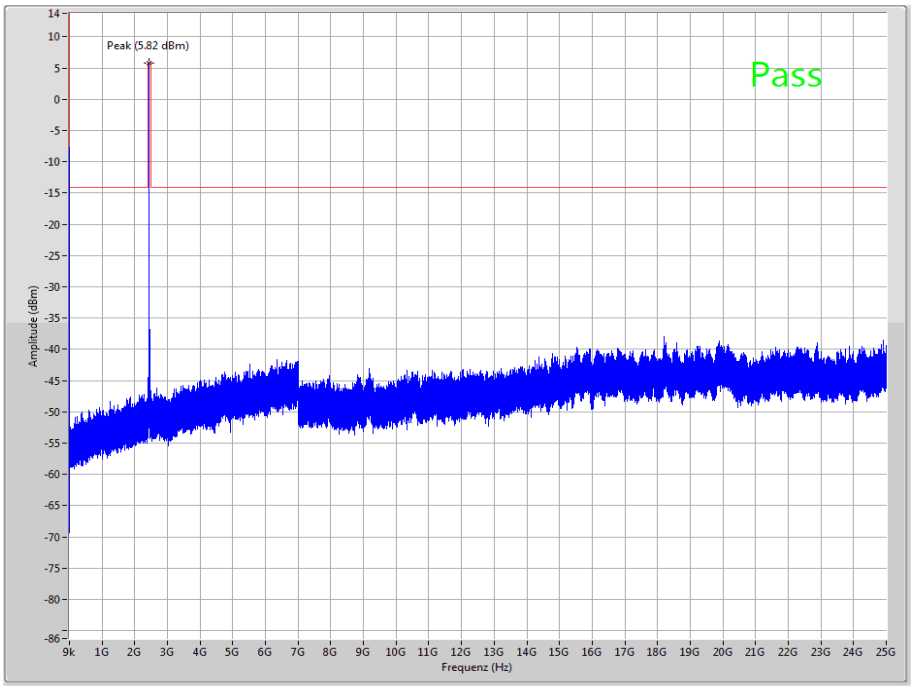

The peak at the beginning of the plot is the LO from the SA.

**Plot 2:** Lowest channel, zoomed carrier



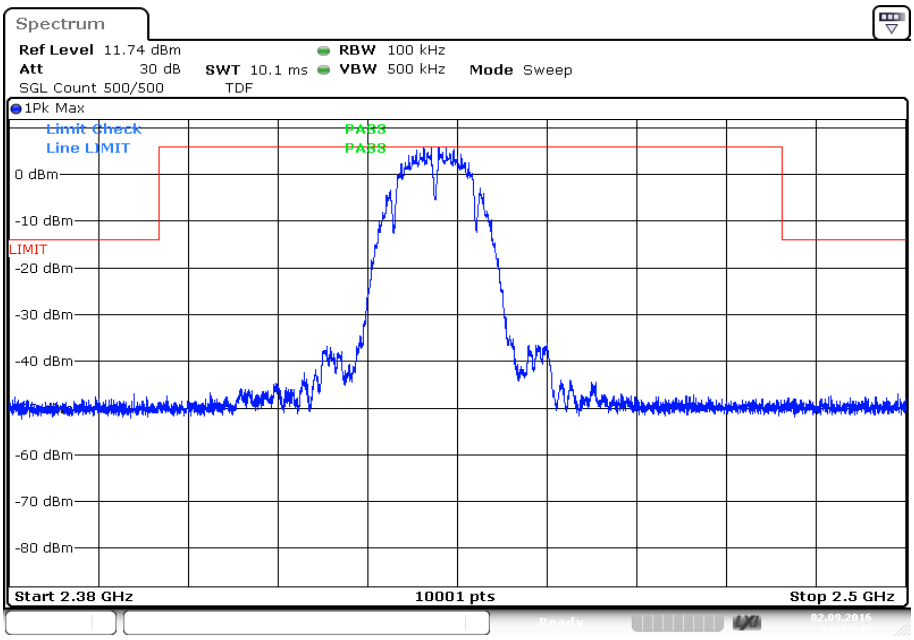

Date: 2.SEP.2016 06:25:34

**Plot 3:** Middle channel, up to 25 GHz



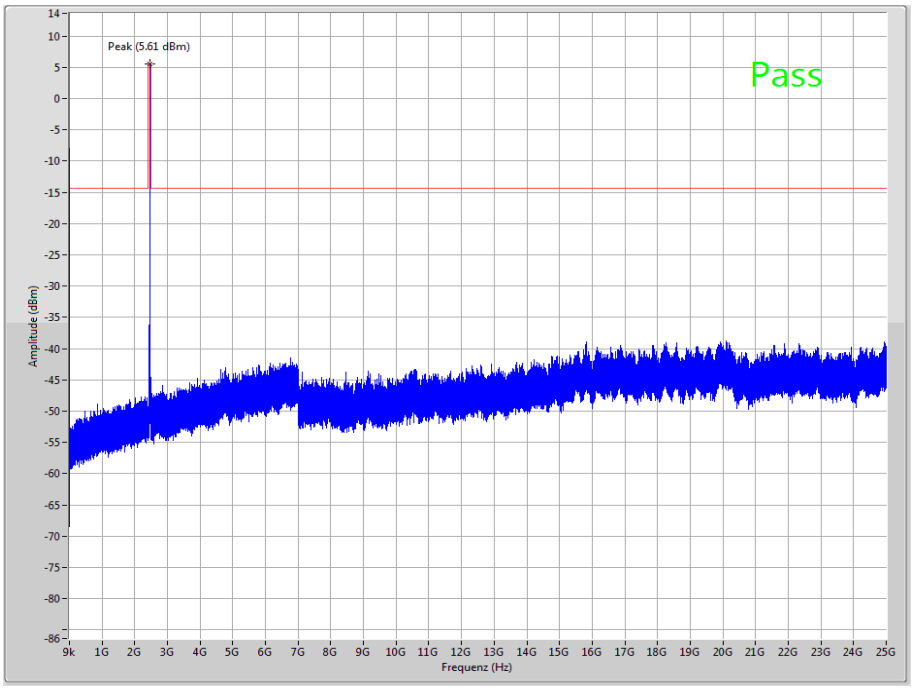

The peak at the beginning of the plot is the LO from the SA.

**Plot 4:** Middle channel, zoomed carrier



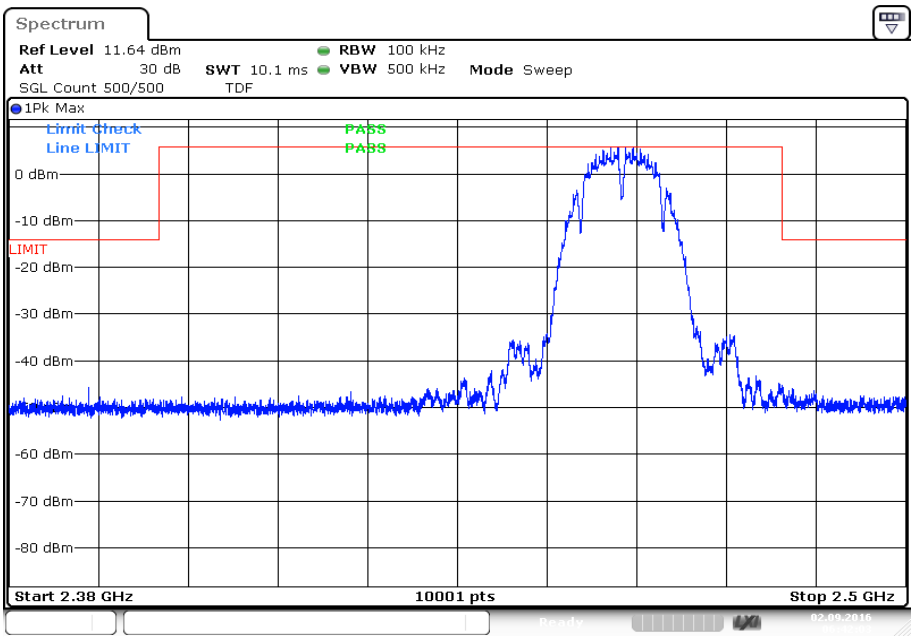

Date: 2.SEP.2016 06:33:44

**Plot 5:** Highest channel, up to 25 GHz




The peak at the beginning of the plot is the LO from the SA.

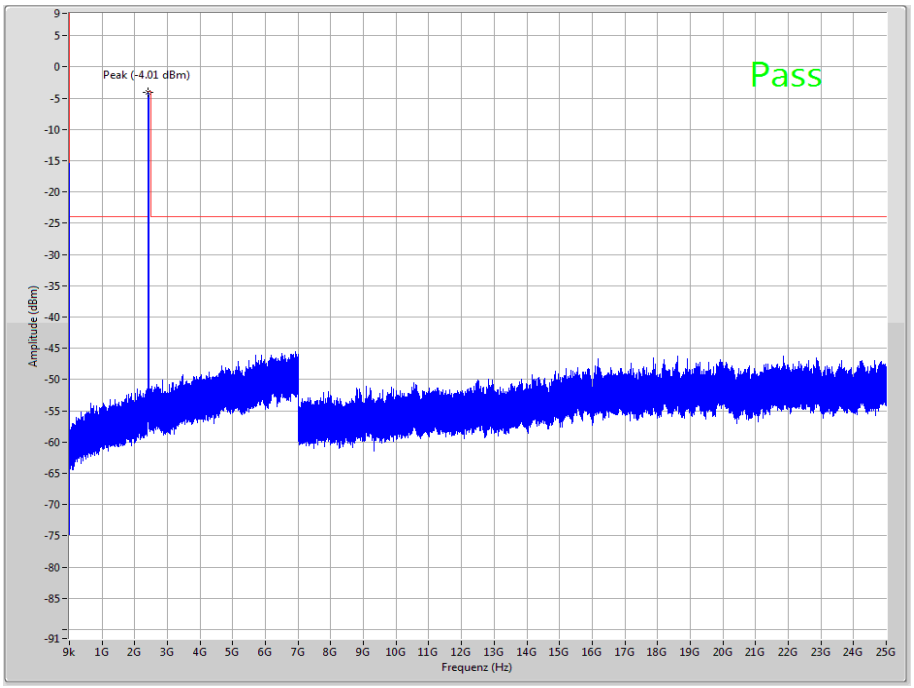
**Plot 6:** Highest channel, zoomed carrier




Date: 2.SEP.2016 06:42:04

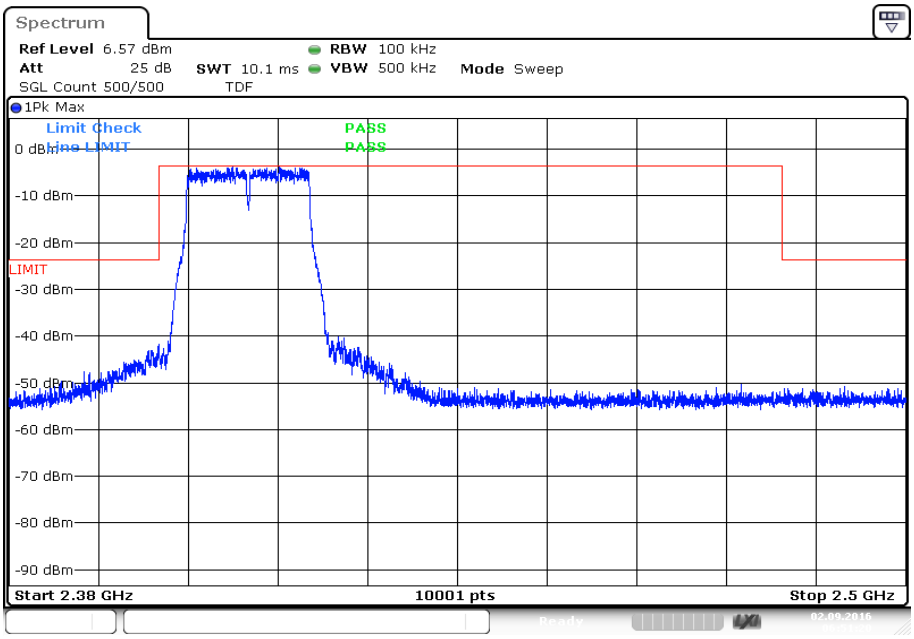
**Plots:** OFDM / g – mode

**Plot 1:** Lowest channel, up to 25 GHz



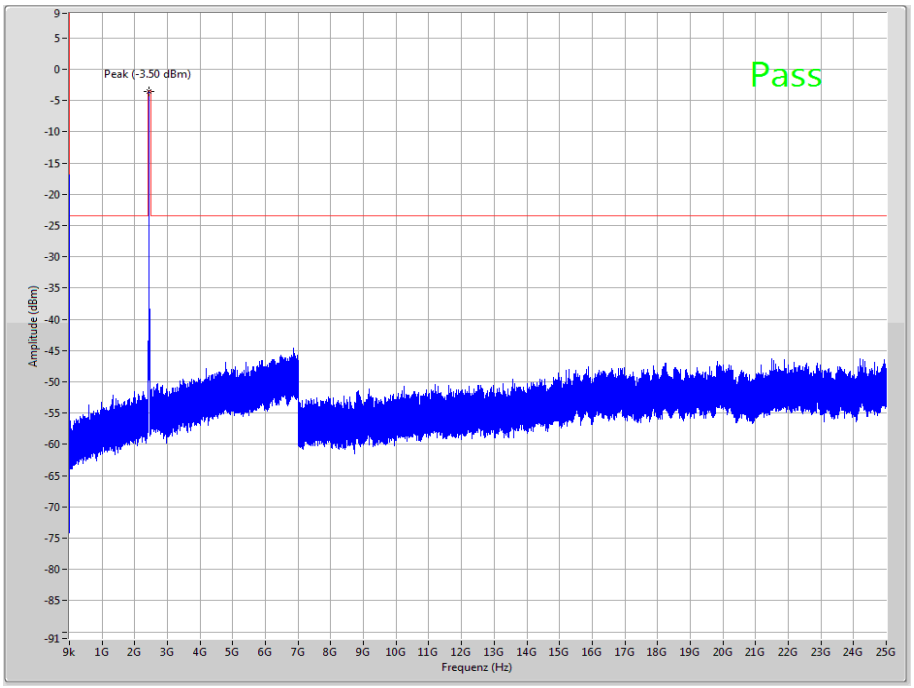

The peak at the beginning of the plot is the LO from the SA.

**Plot 2:** Lowest channel, zoomed carrier



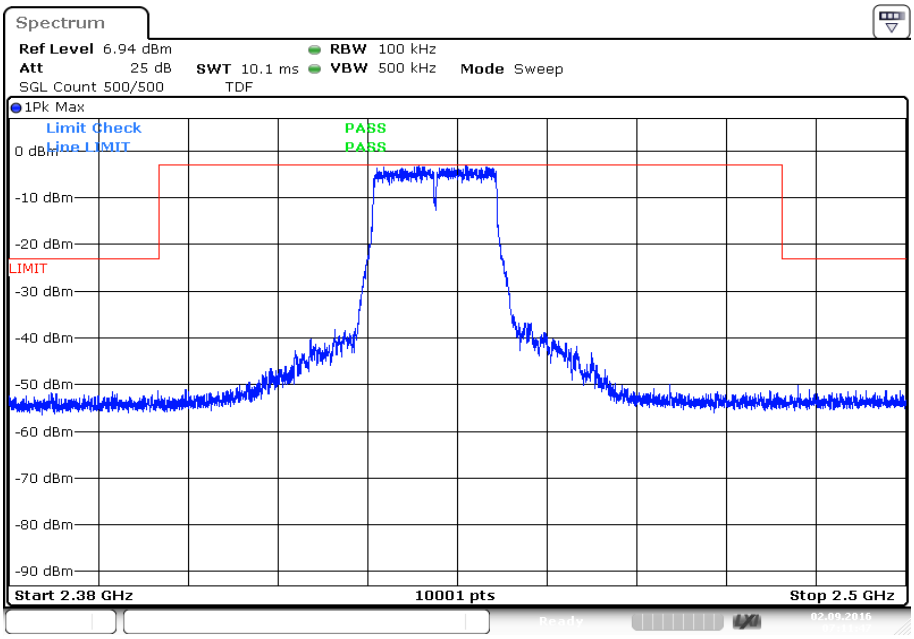

Date: 2.SEP.2016 06:51:20

**Plot 3:** Middle channel, up to 25 GHz



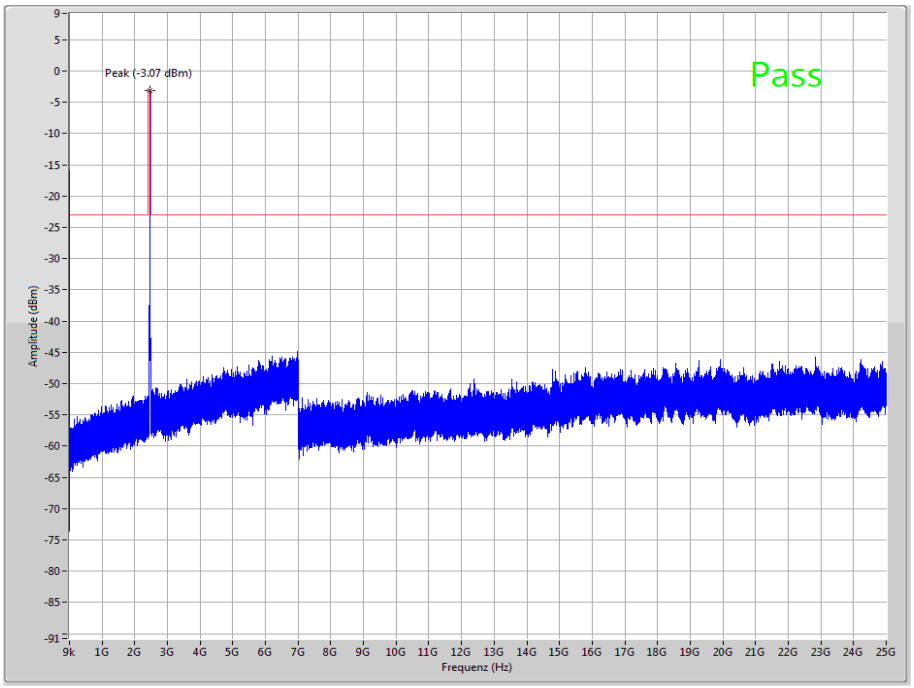

The peak at the beginning of the plot is the LO from the SA.

**Plot 4:** Middle channel, zoomed carrier



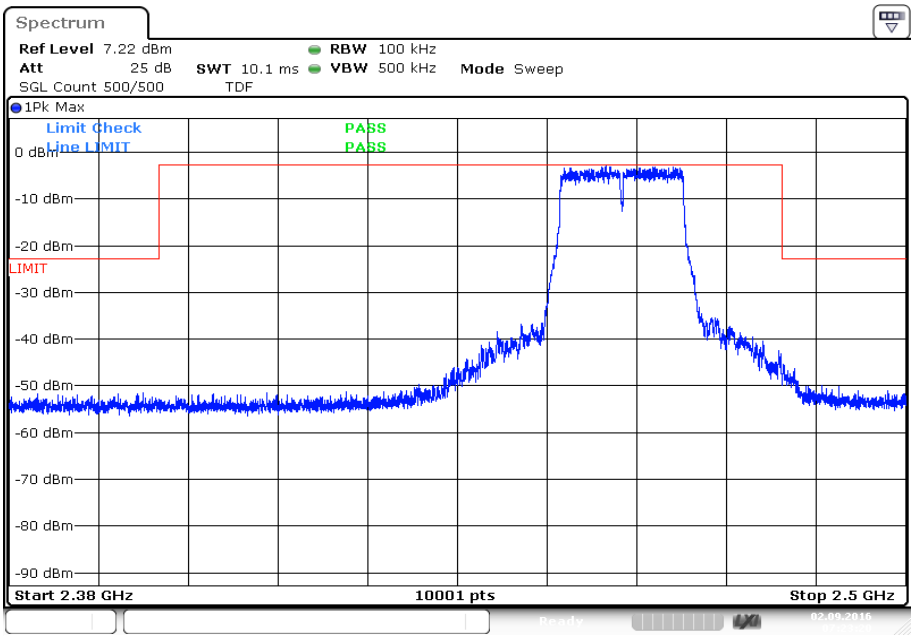

Date: 2.SEP.2016 07:11:47

**Plot 5:** Highest channel, up to 25 GHz




The peak at the beginning of the plot is the LO from the SA.

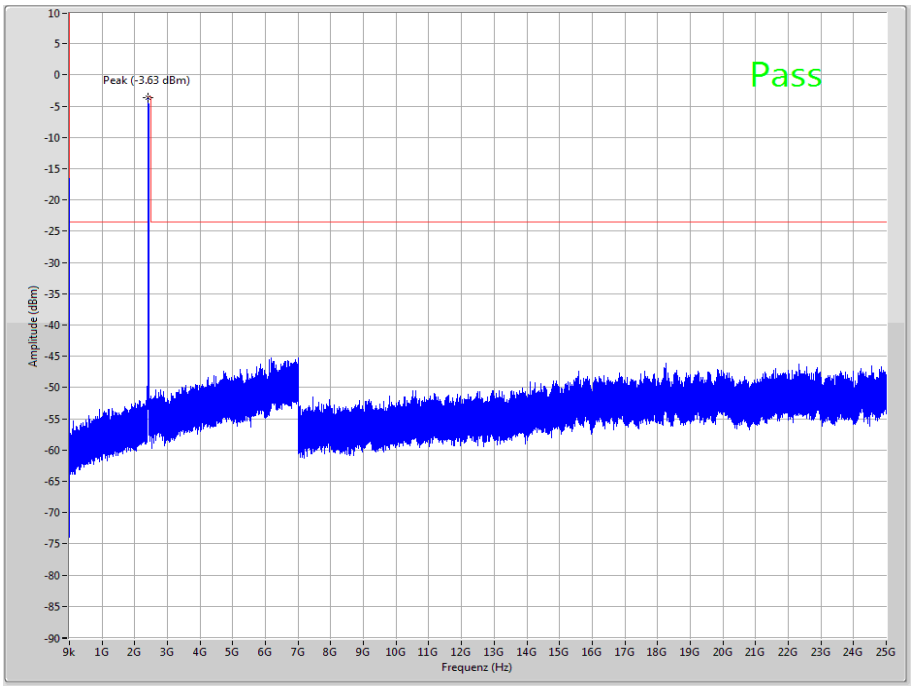
**Plot 6:** Highest channel, zoomed carrier




Date: 2.SEP.2016 07:23:20

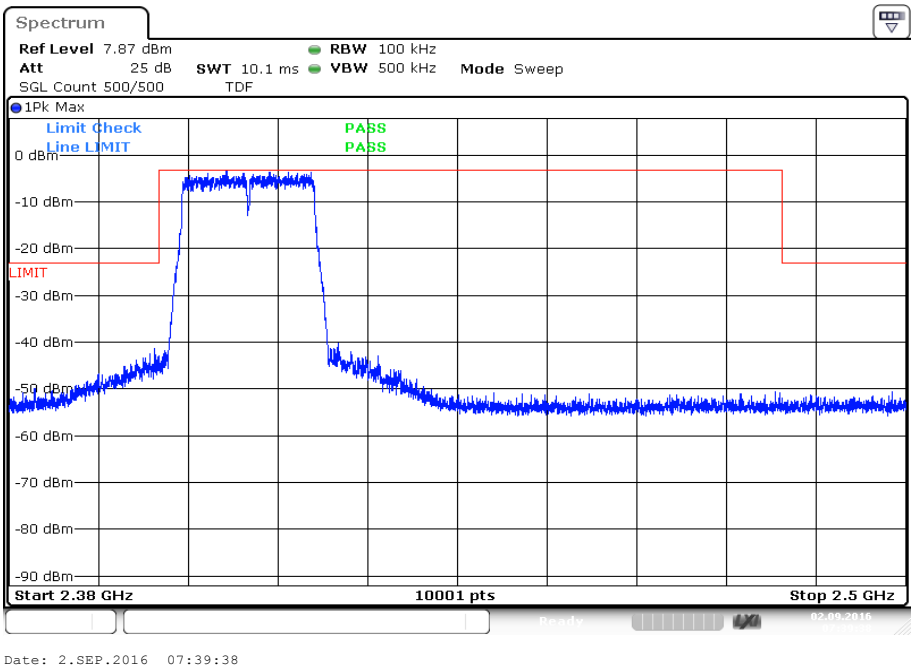
**Plots:** OFDM / n HT 20 – mode

**Plot 1:** Lowest channel, up to 25 GHz

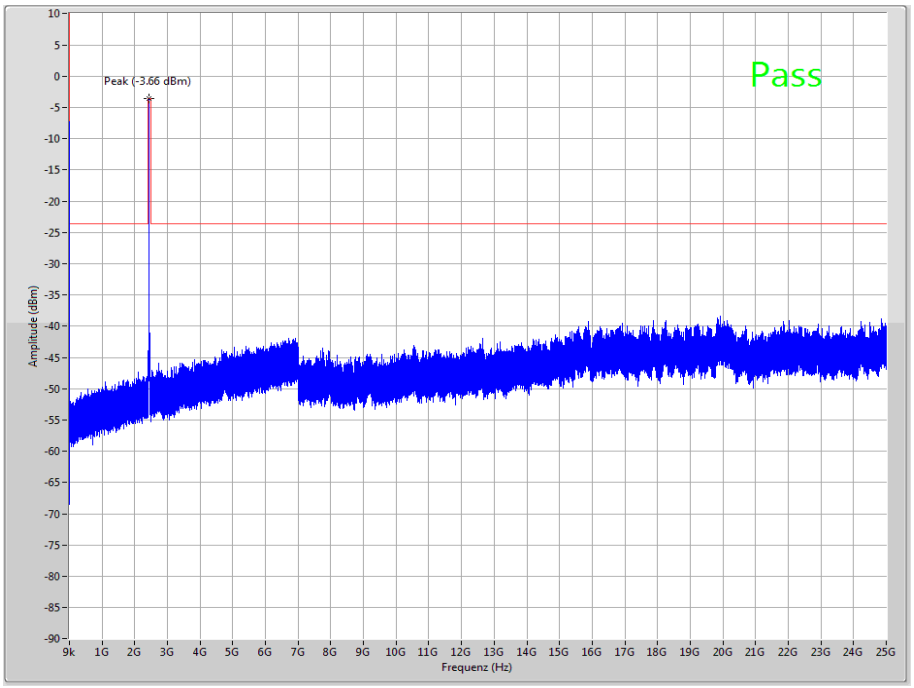



The peak at the beginning of the plot is the LO from the SA.

**Plot 2:** Lowest channel, zoomed carrier

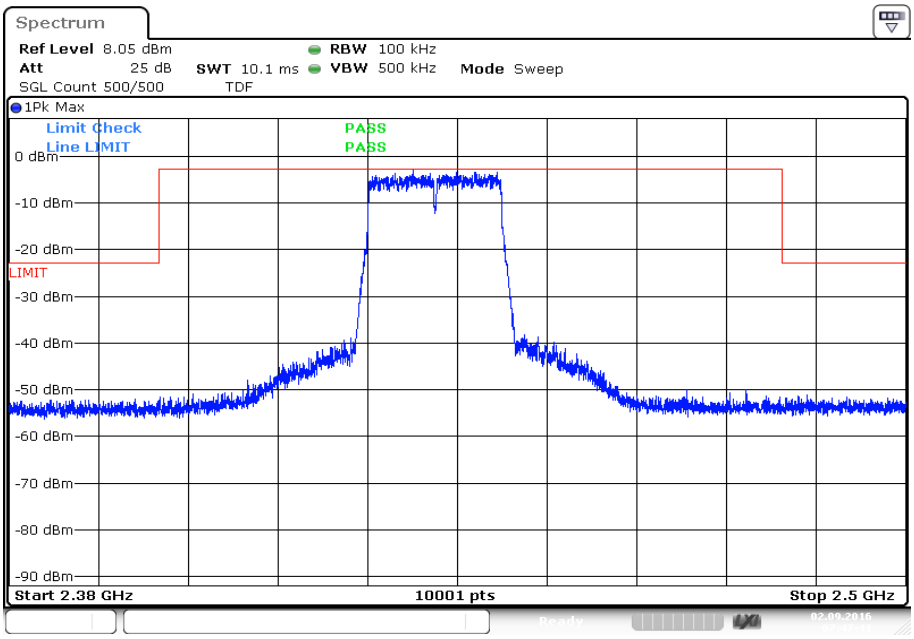


**Plot 3:** Middle channel, up to 25 GHz



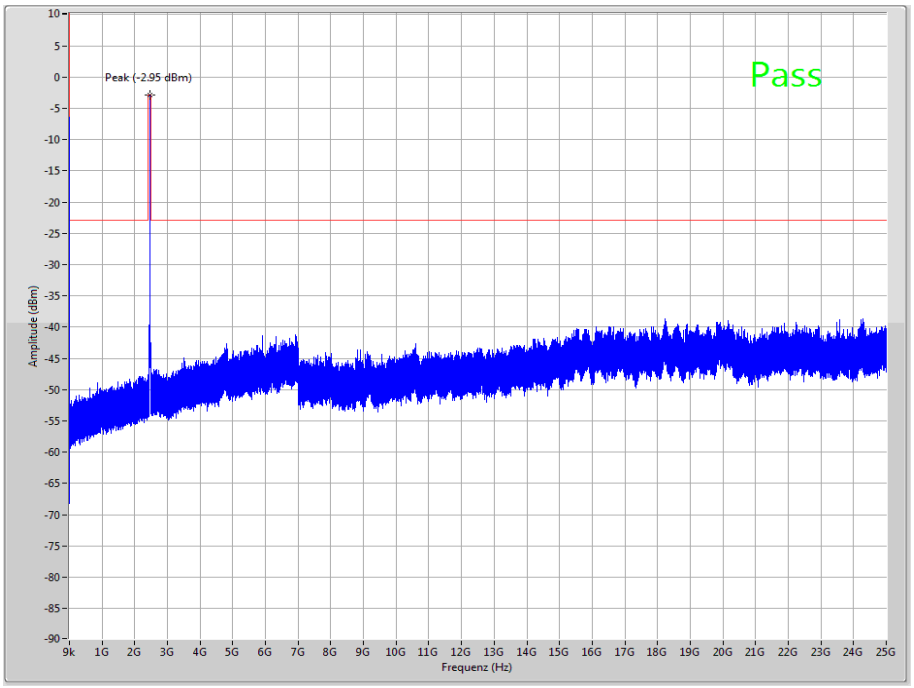

The peak at the beginning of the plot is the LO from the SA.

**Plot 4:** Middle channel, zoomed carrier



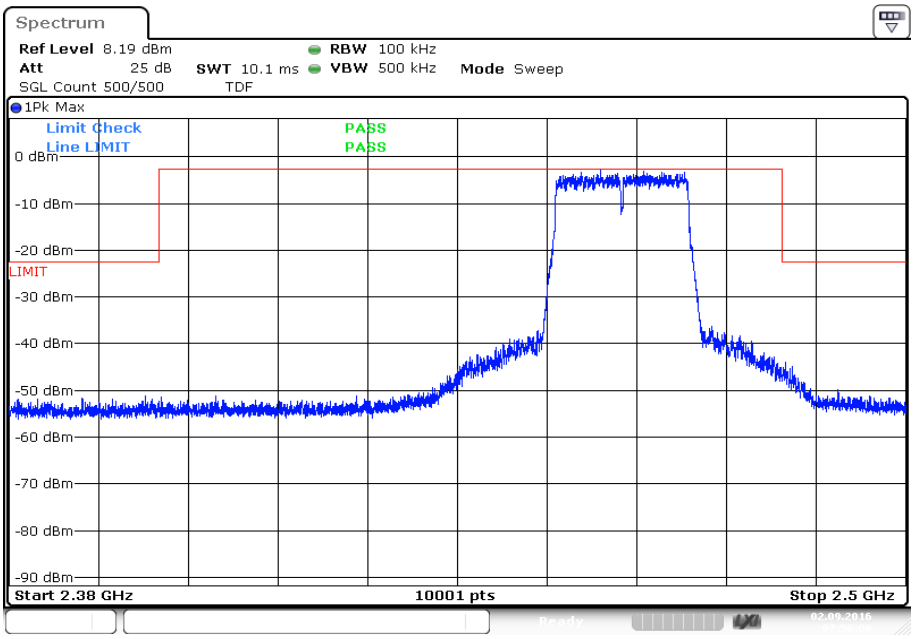

Date: 2.SEP.2016 07:47:41

**Plot 5:** Highest channel, up to 25 GHz




The peak at the beginning of the plot is the LO from the SA.

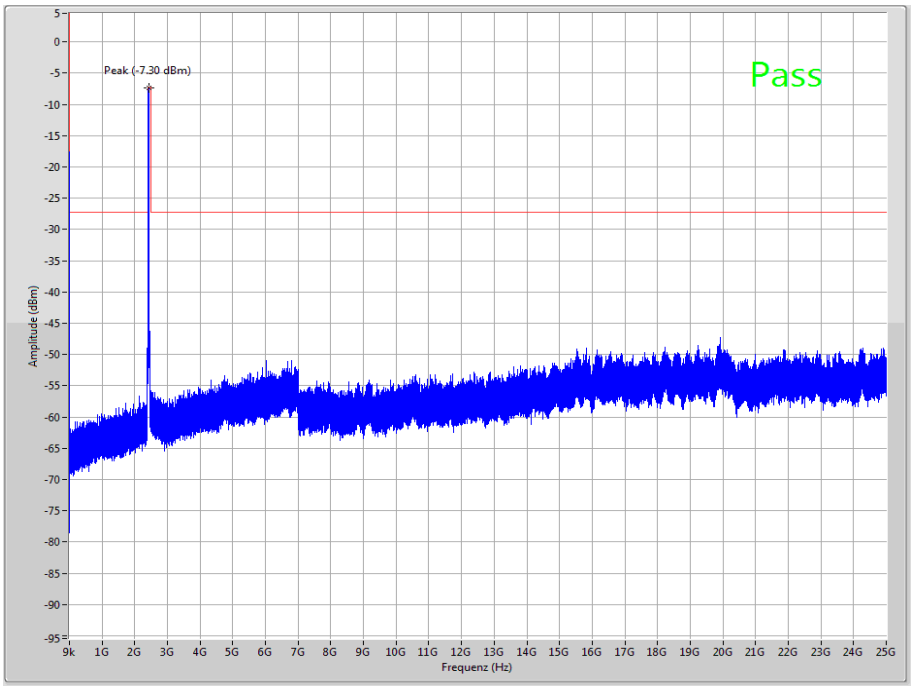
**Plot 6:** Highest channel, zoomed carrier




Date: 2.SEP.2016 07:56:06

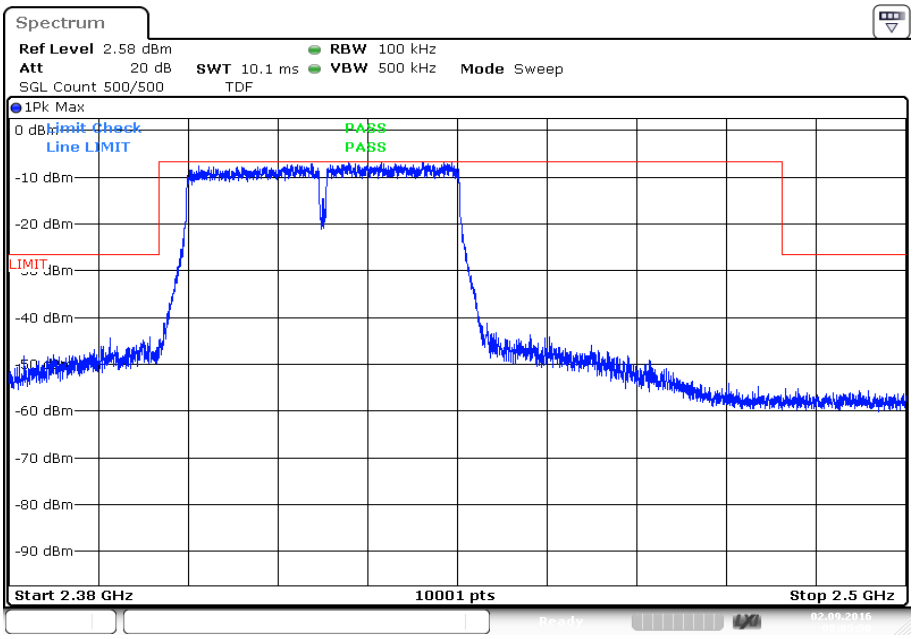
**Plots:** OFDM / n HT 40 – mode

**Plot 1:** Lowest channel, up to 25 GHz



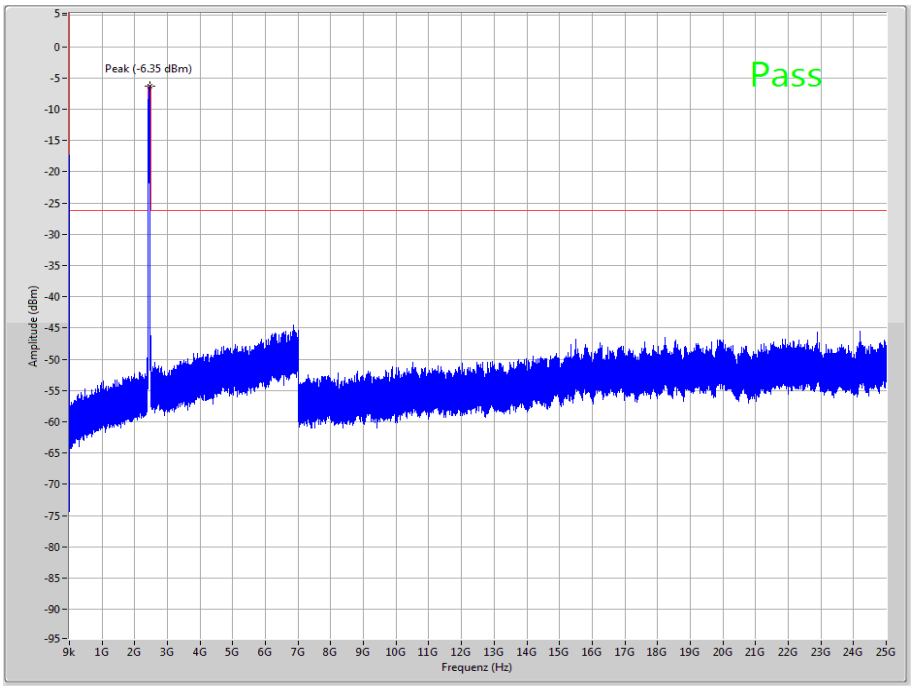

The peak at the beginning of the plot is the LO from the SA.

**Plot 2:** Lowest channel, zoomed carrier



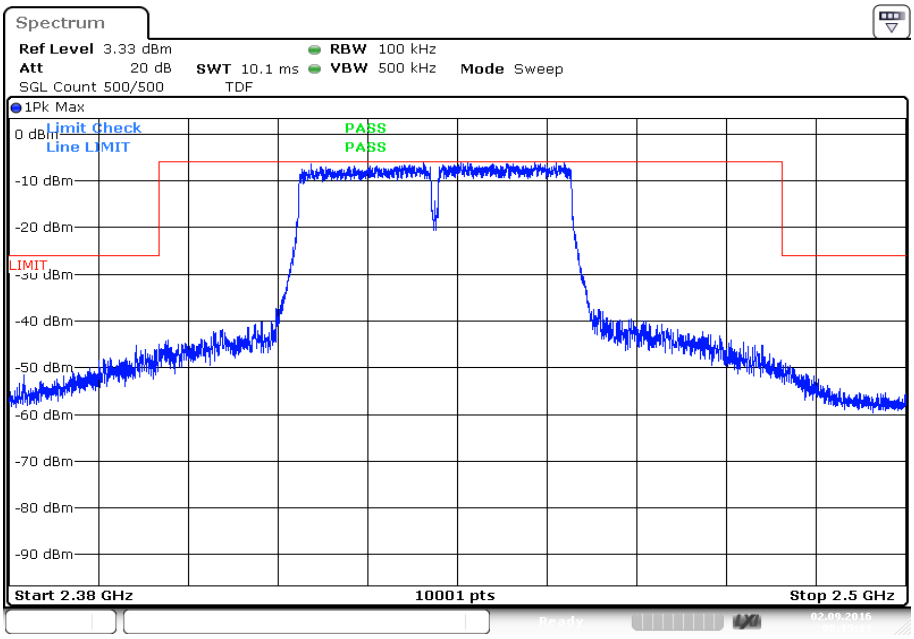

Date: 2.SEP.2016 08:05:50

**Plot 3:** Middle channel, up to 25 GHz



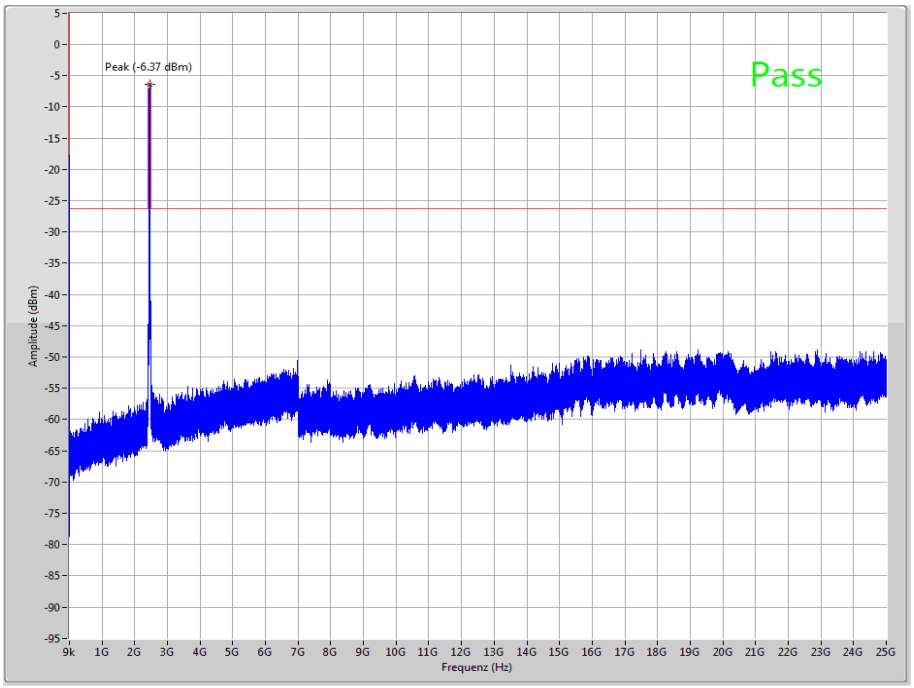

The peak at the beginning of the plot is the LO from the SA.

**Plot 4:** Middle channel, zoomed carrier



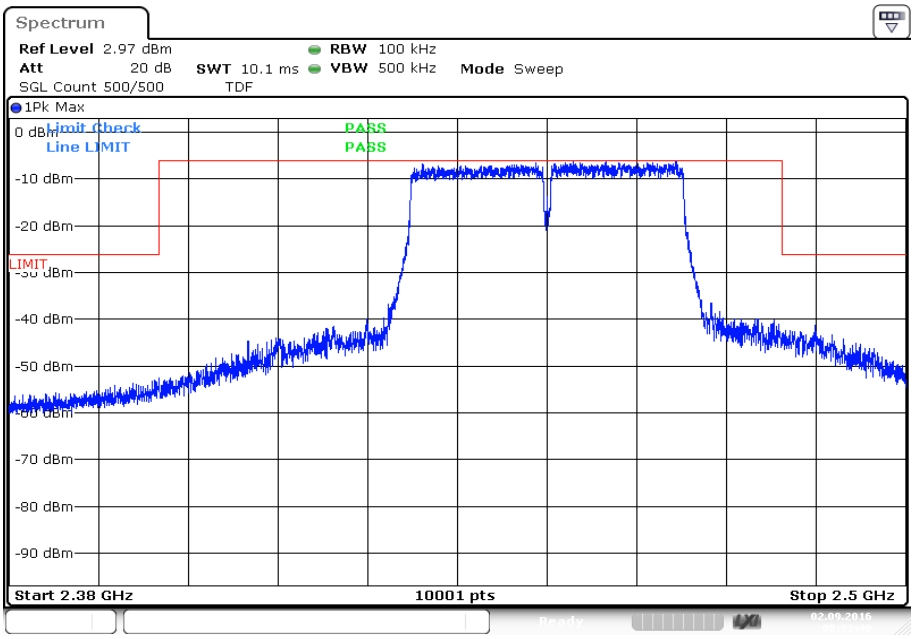

Date: 2.SEP.2016 08:15:13

**Plot 5:** Highest channel, up to 25 GHz




The peak at the beginning of the plot is the LO from the SA.

**Plot 6:** Highest channel, zoomed carrier




Date: 2.SEP.2016 08:33:41

## 12.11 Spurious emissions radiated below 30 MHz

**Description:**

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is representative for all channels and modes. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / Quasi Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | F < 150 kHz: 200 Hz<br>F > 150 kHz: 9 kHz |
| Video bandwidth: | F < 150 kHz: 1 kHz<br>F > 150 kHz: 100 kHz |
| Span: | 9 kHz to 30 MHz |
| Trace mode: | Max Hold |
| Measured modulation | ☒ DSSS b – mode<br>☒ OFDM g – mode<br>☐ OFDM n HT20 – mode<br>☒ OFDM n HT40 – mode |
| Test setup: | See sub clause 7.2 - A |
| Measurement uncertainty | See sub clause 9 |

**Limits:**

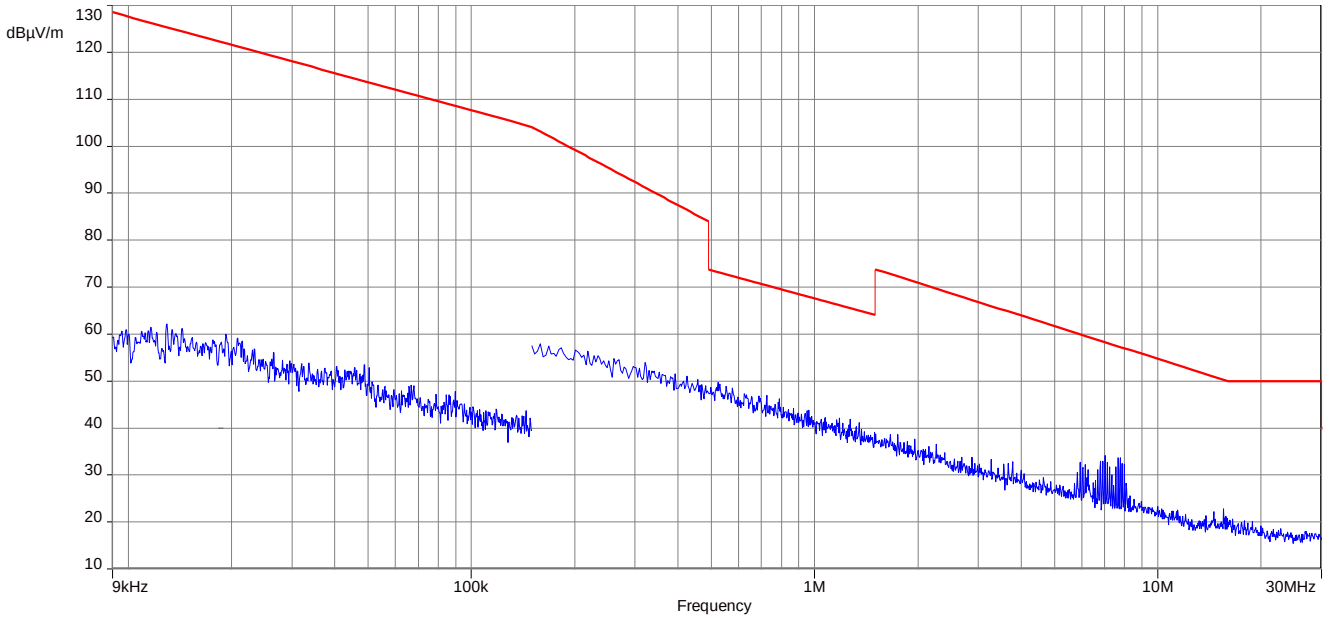
| FCC | | IC |
|---|---|---|
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |

**Results:**

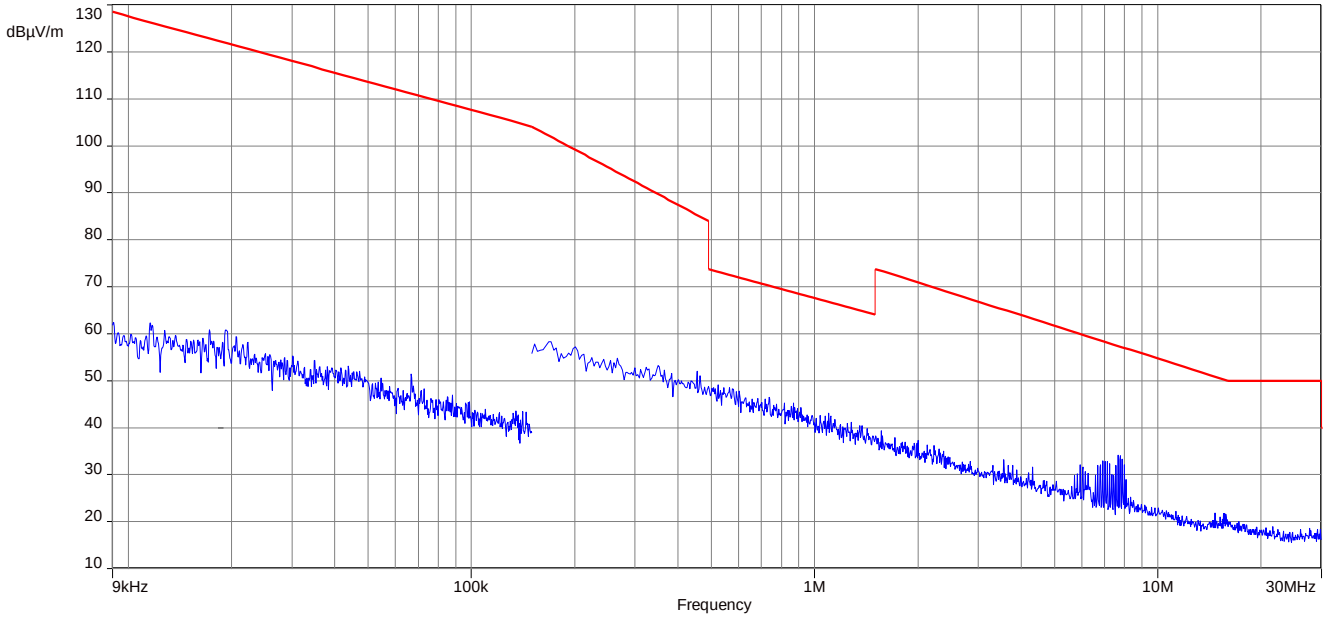
| TX Spurious Emissions Radiated < 30 MHz [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| All detected peaks are more than 20 dB below the limit. | | |
| | | |

**Plots:** DSSS, antenna 1

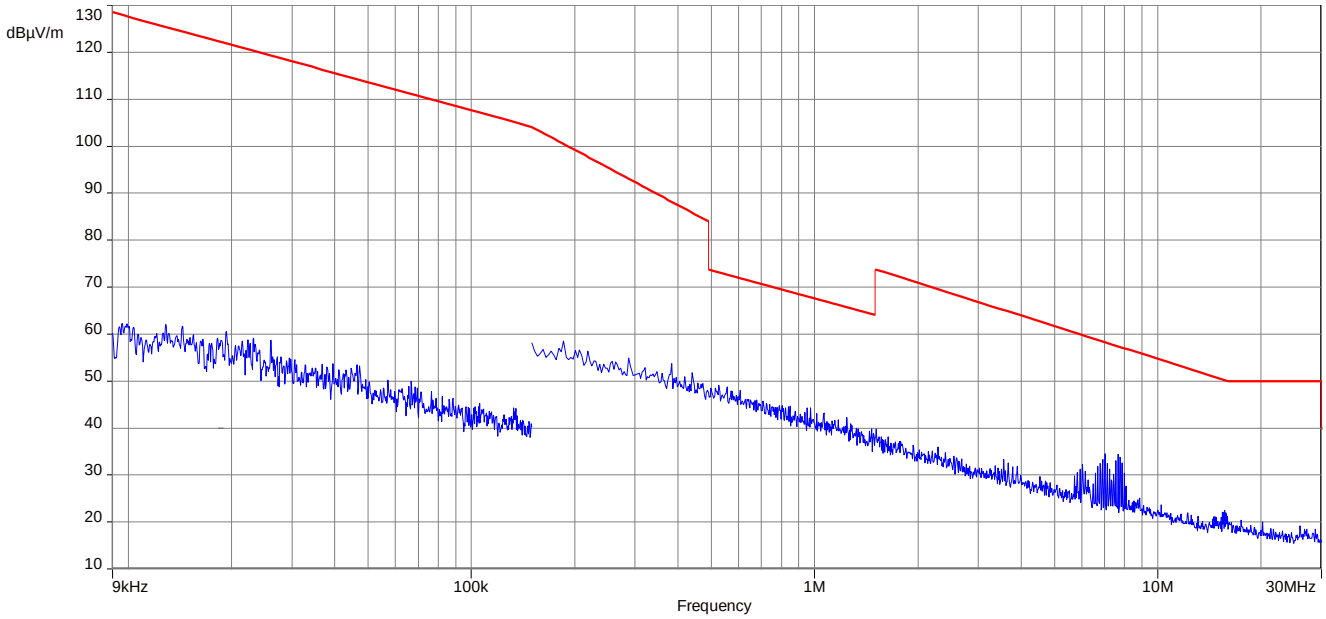
**Plot 1:** 9 kHz to 30 MHz, low channel




**Plot 2:** 9 kHz to 30 MHz, mid channel

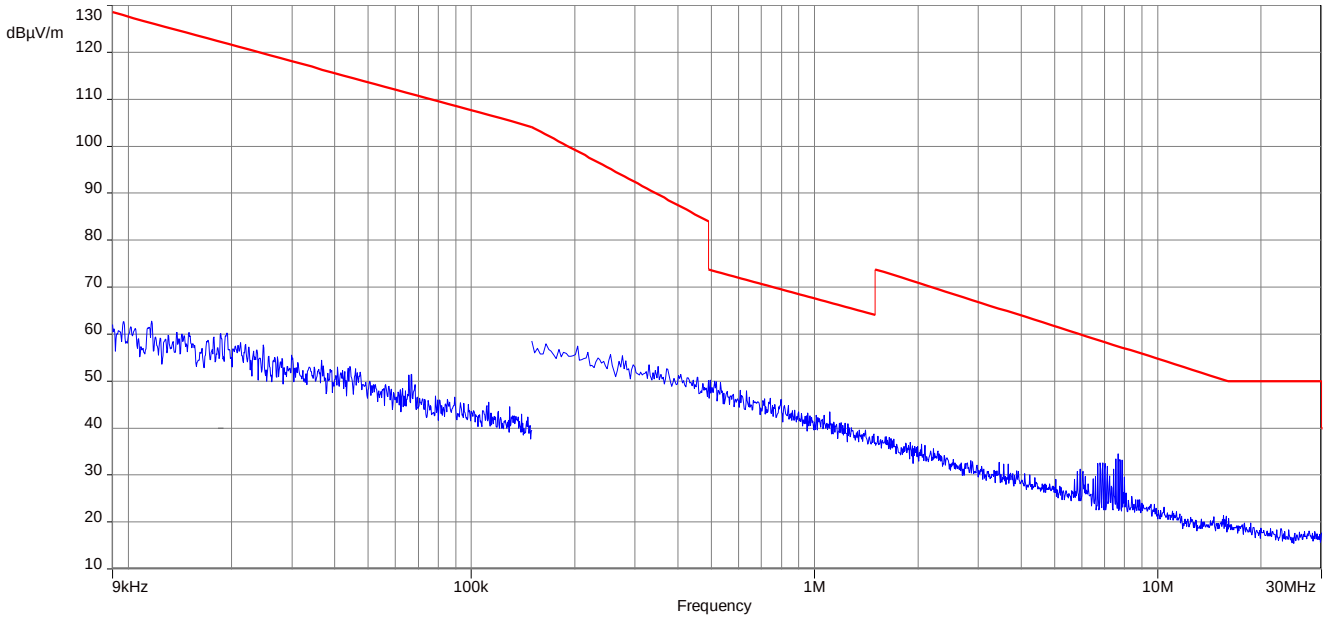


**Plot 3:** 9 kHz to 30 MHz, high channel

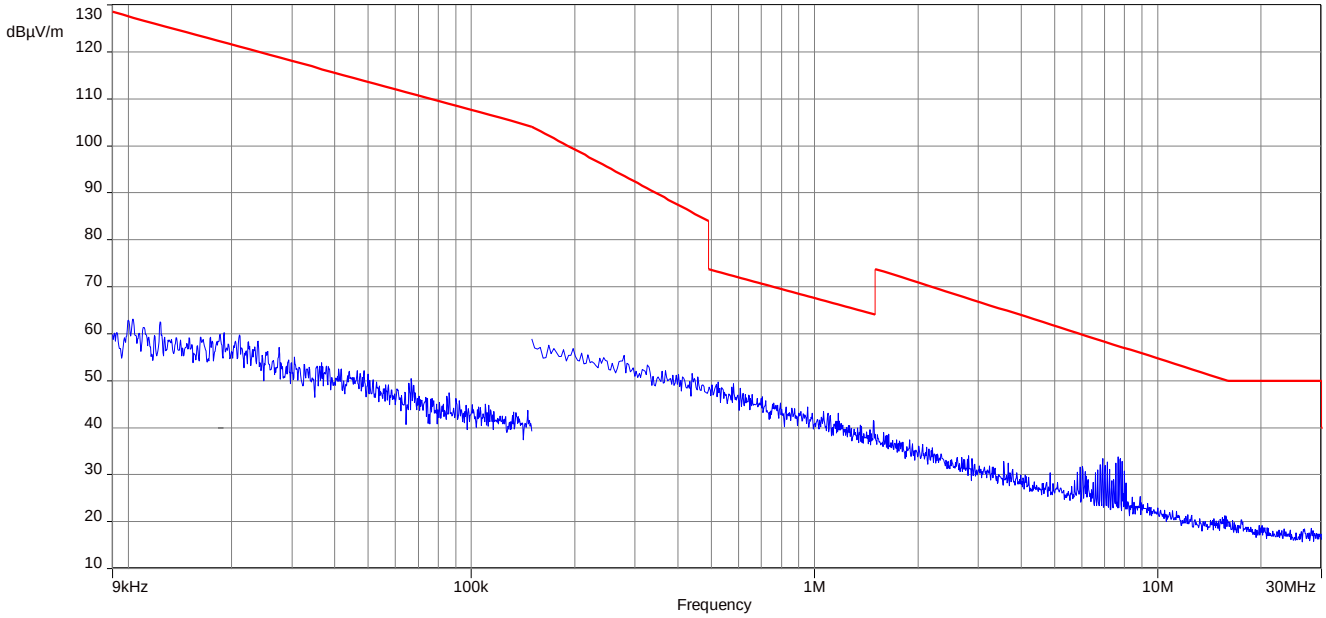


**Plots:** OFDM (20 MHz bandwidth), antenna 1

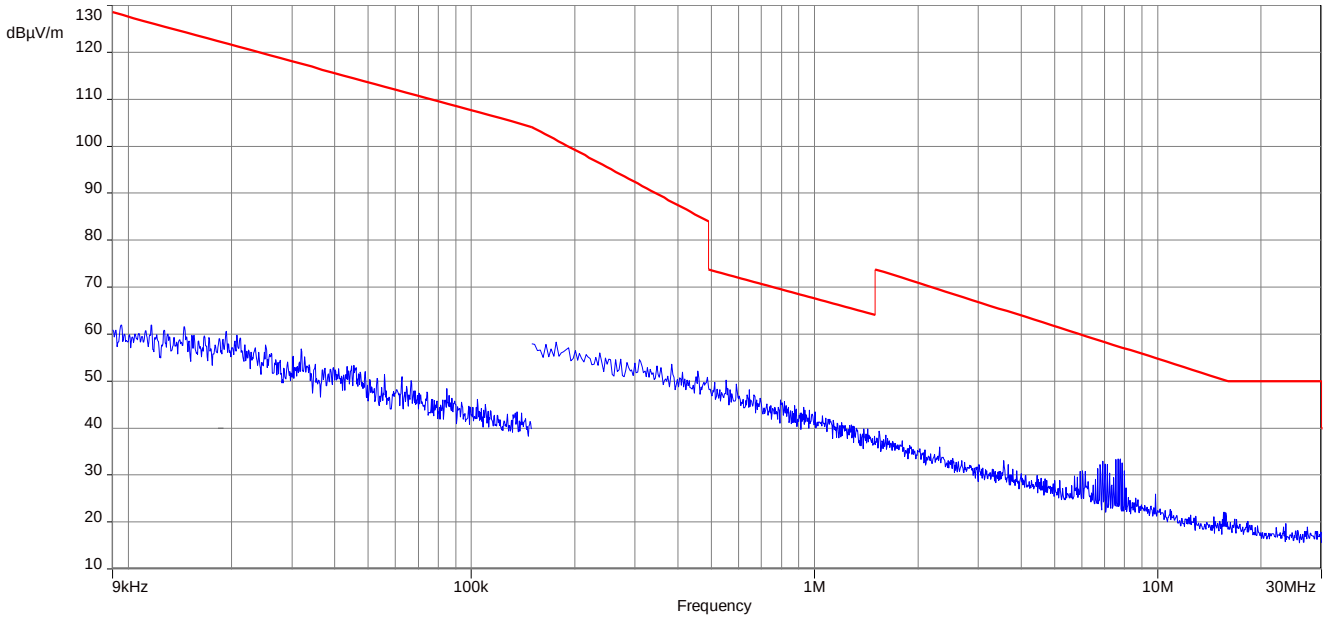
**Plot 1:** 9 kHz to 30 MHz, low channel




**Plot 2:** 9 kHz to 30 MHz, mid channel

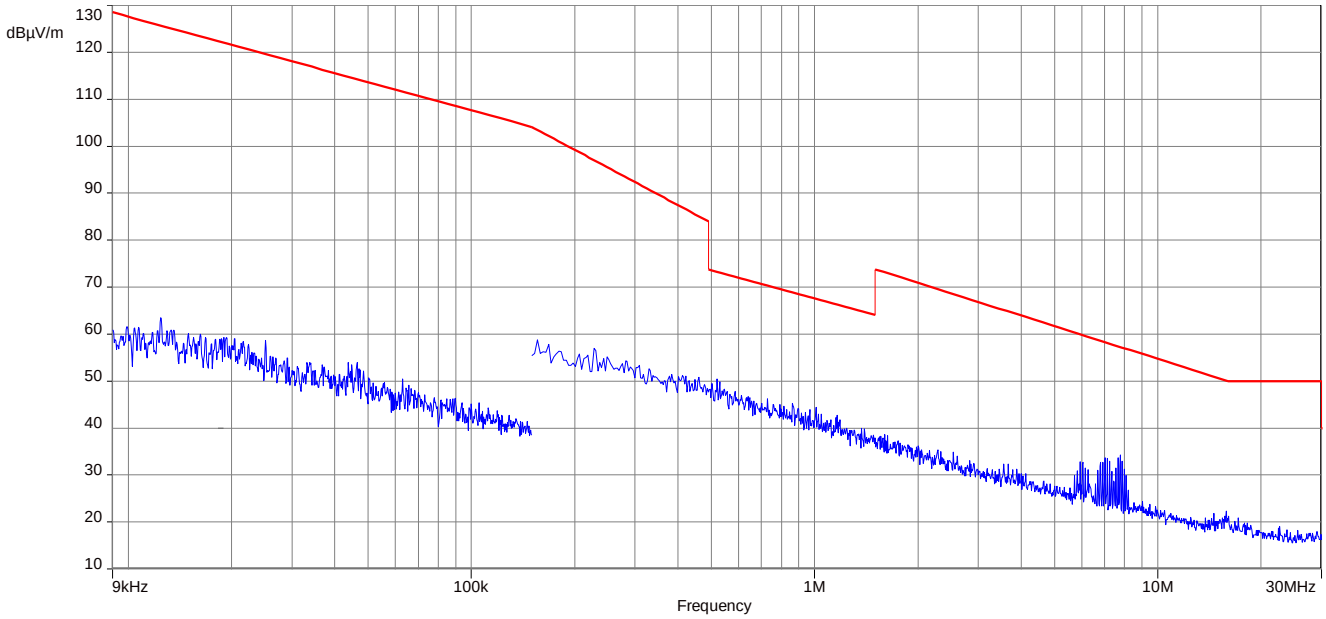


**Plot 3:** 9 kHz to 30 MHz, high channel

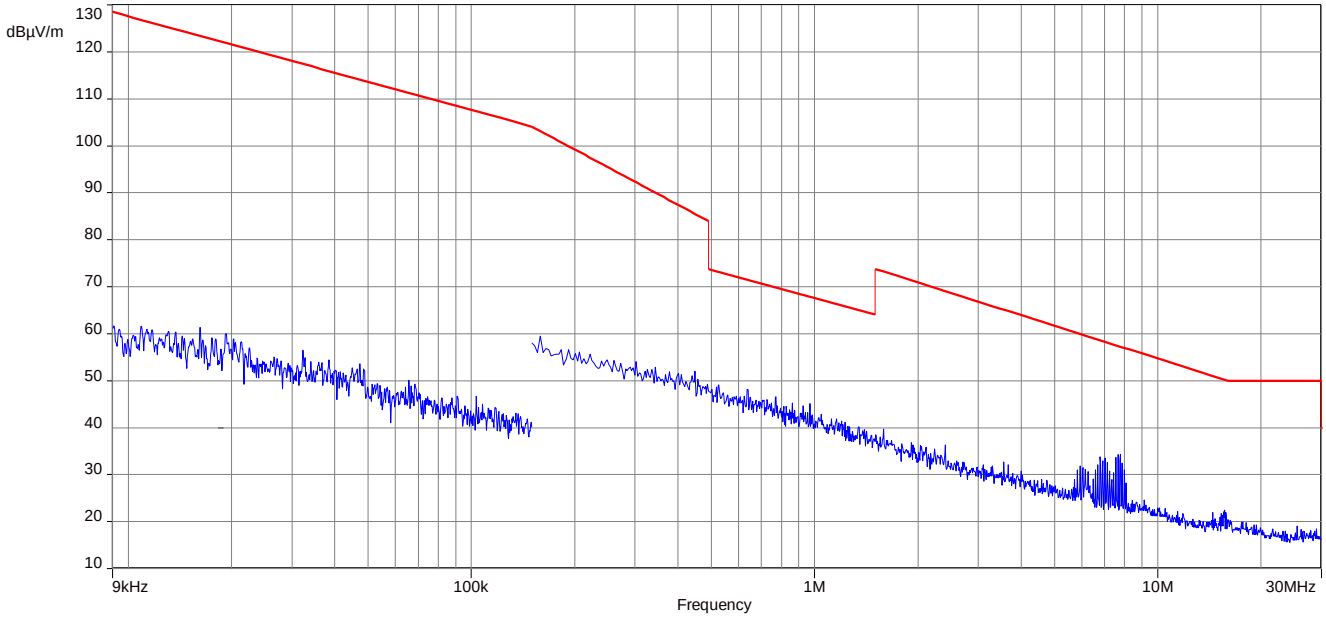


**Plots:** OFDM (40 MHz bandwidth), antenna 1

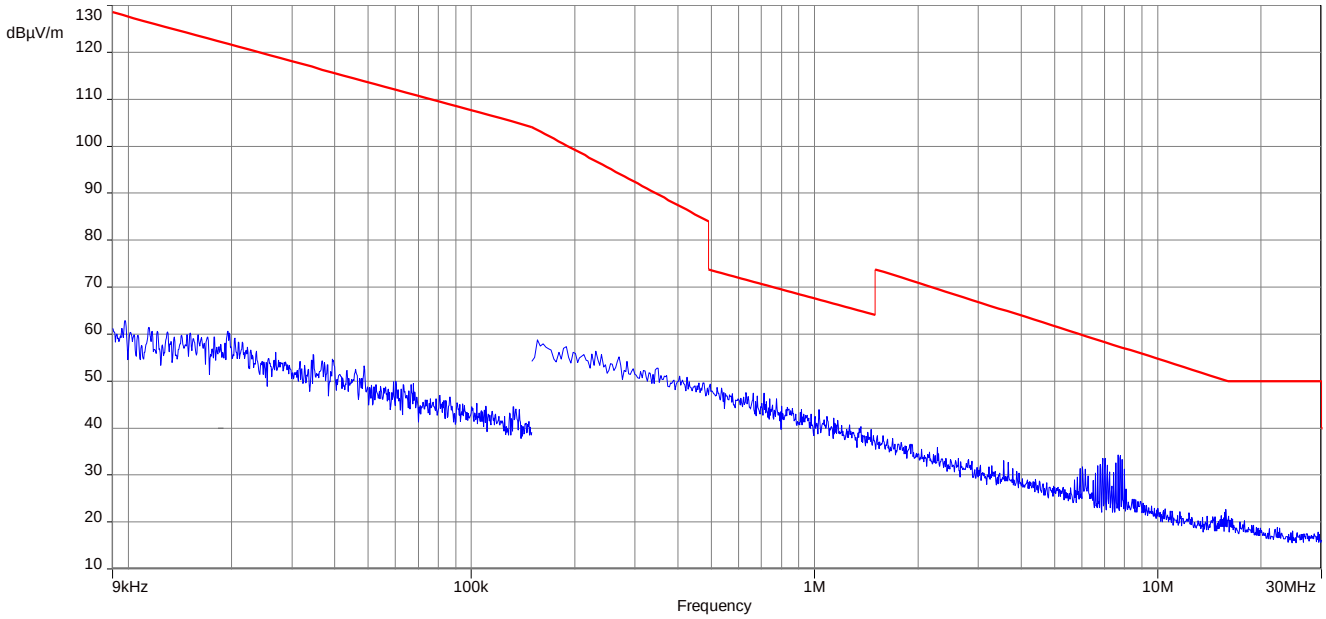
**Plot 1:** 9 kHz to 30 MHz, low channel




**Plot 2:** 9 kHz to 30 MHz, mid channel

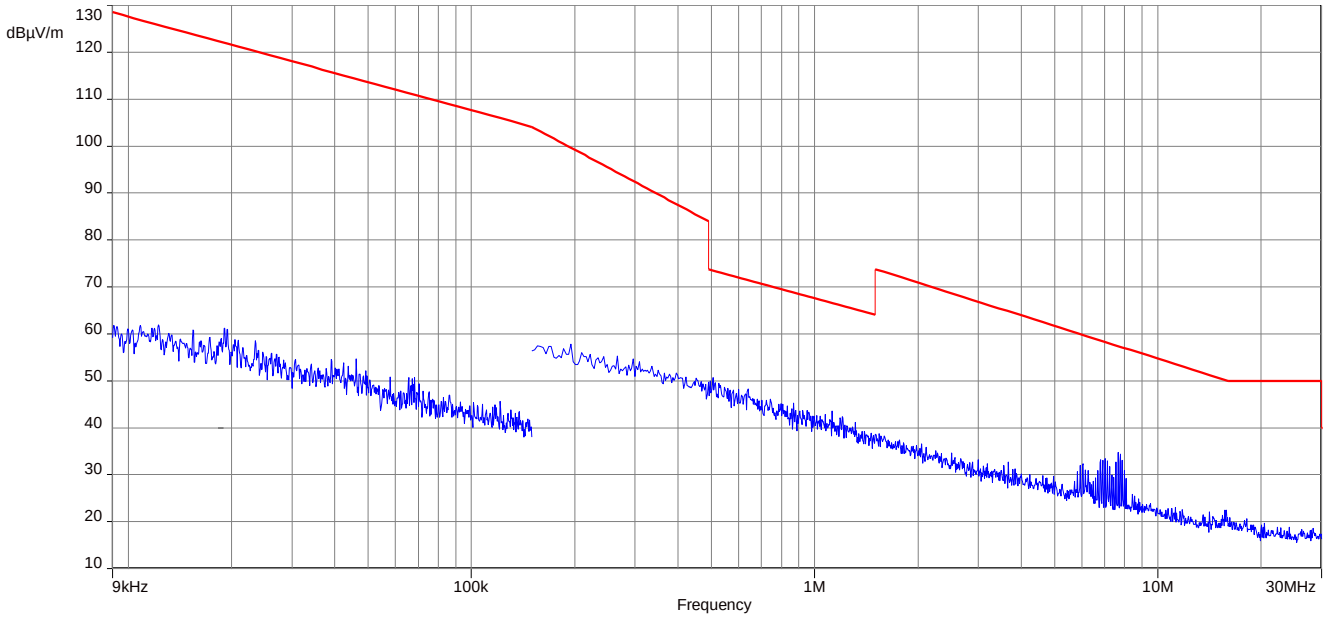


**Plot 3:** 9 kHz to 30 MHz, high channel

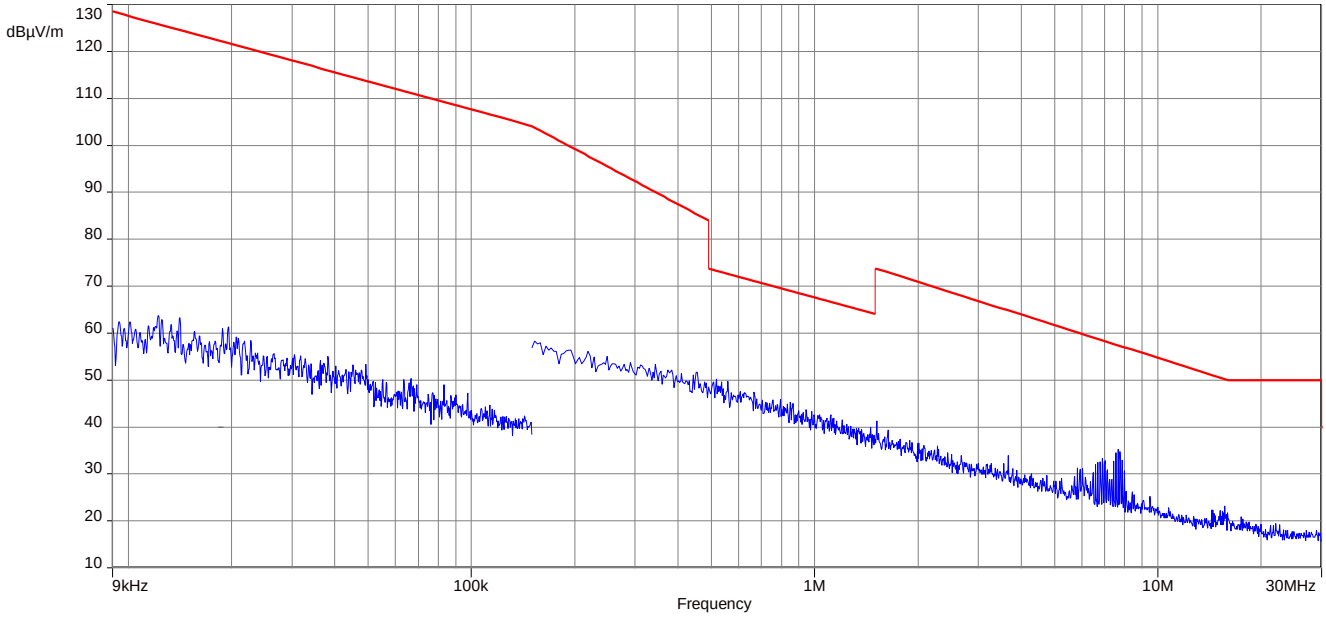


**Plots:** DSSS, antenna 2

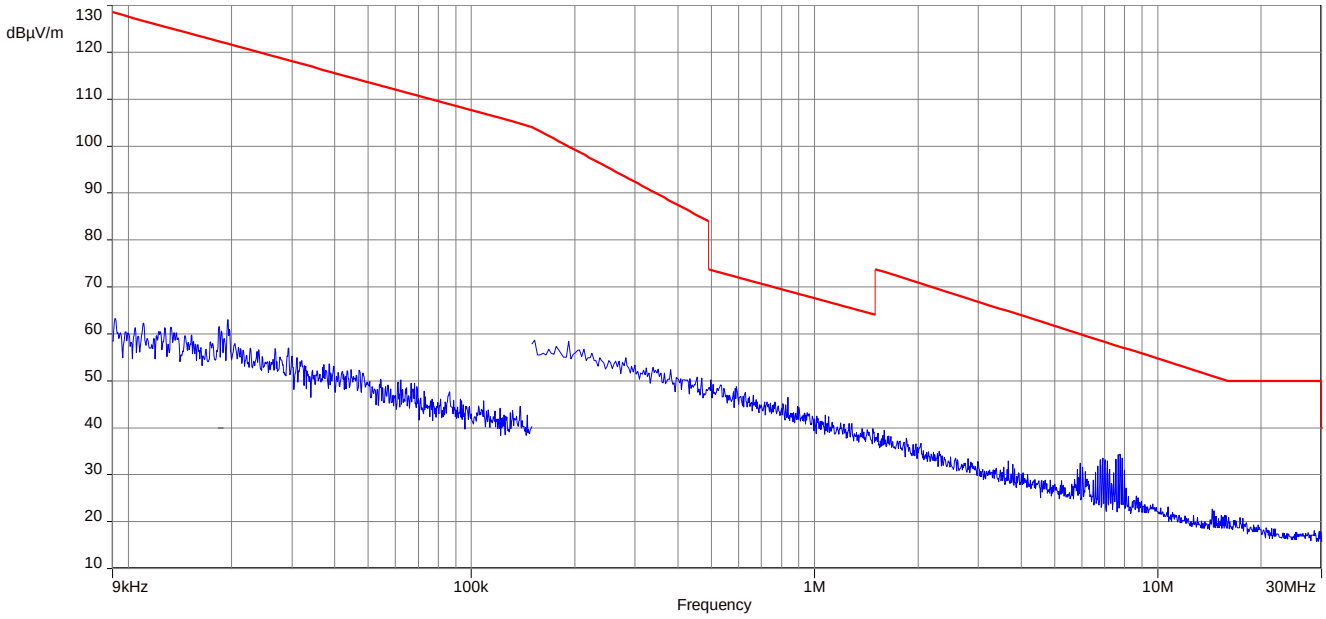
**Plot 1:** 9 kHz to 30 MHz, low channel




**Plot 2:** 9 kHz to 30 MHz, mid channel

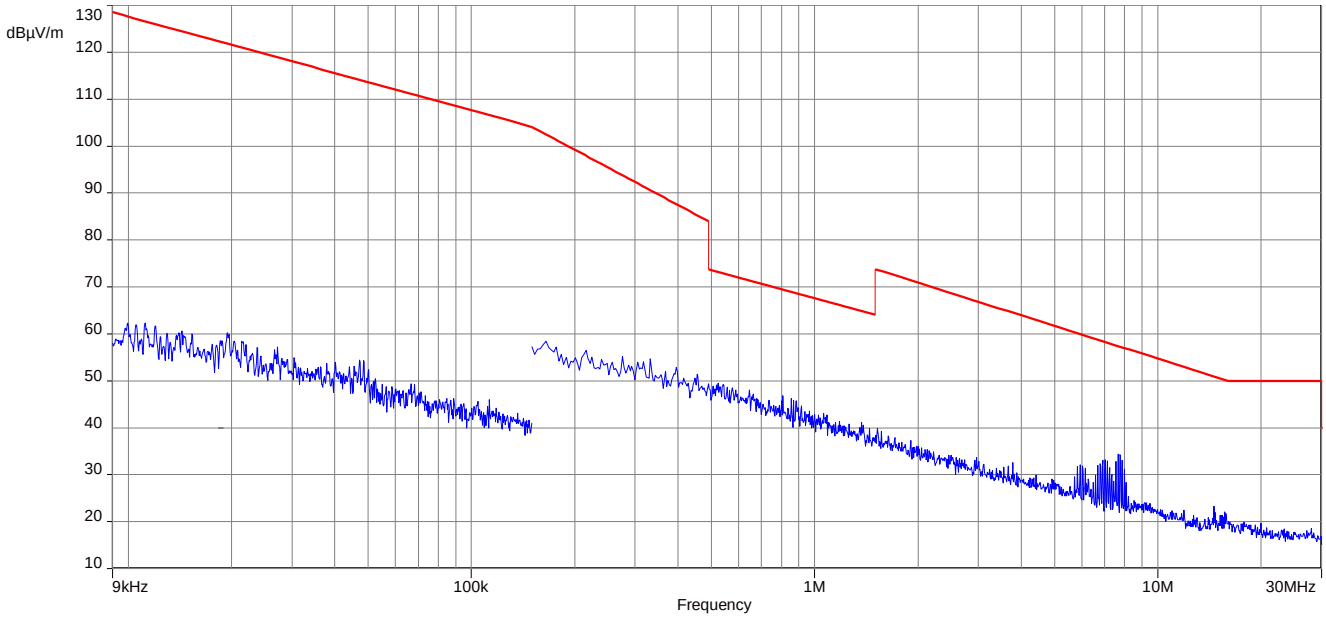


**Plot 3:** 9 kHz to 30 MHz, high channel

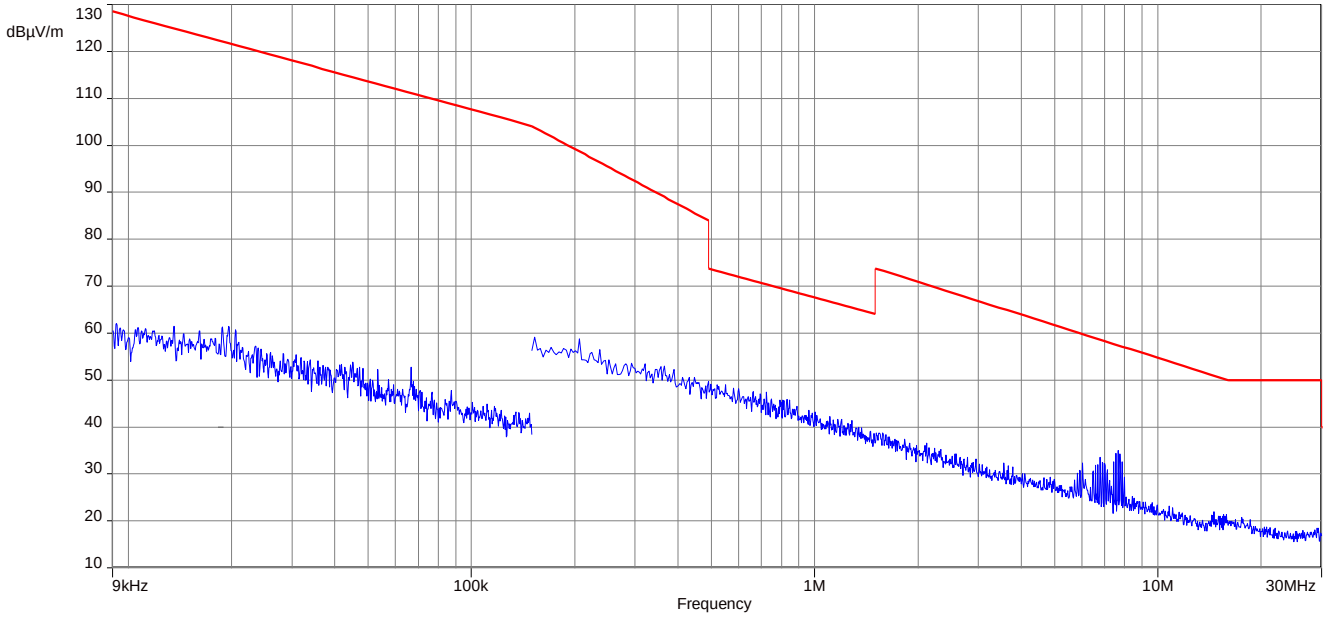


**Plots:** OFDM (20 MHz bandwidth), antenna 2

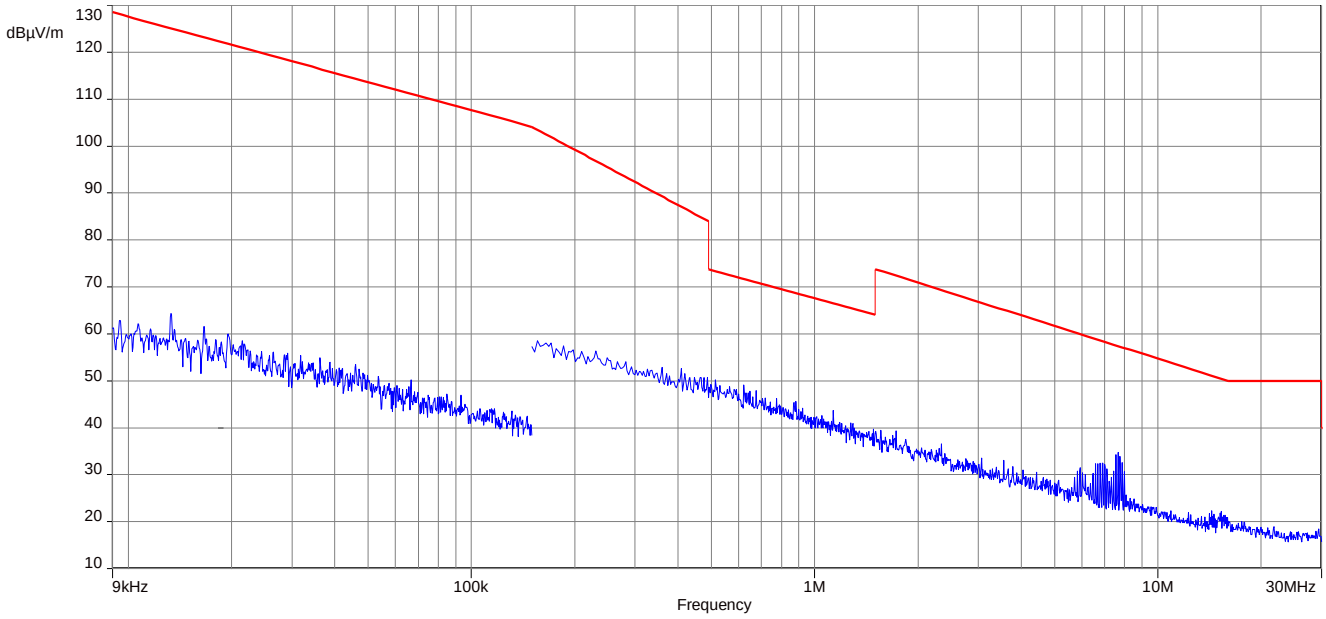
**Plot 1:** 9 kHz to 30 MHz, low channel




**Plot 2:** 9 kHz to 30 MHz, mid channel

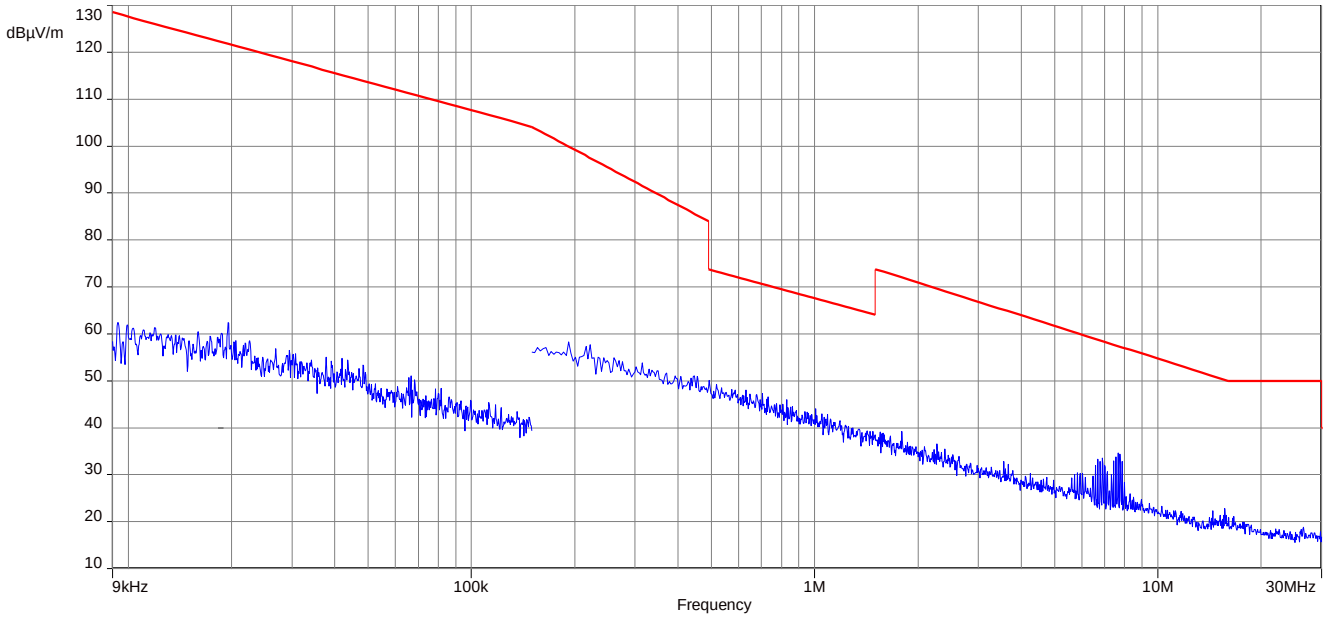


**Plot 3:** 9 kHz to 30 MHz, high channel

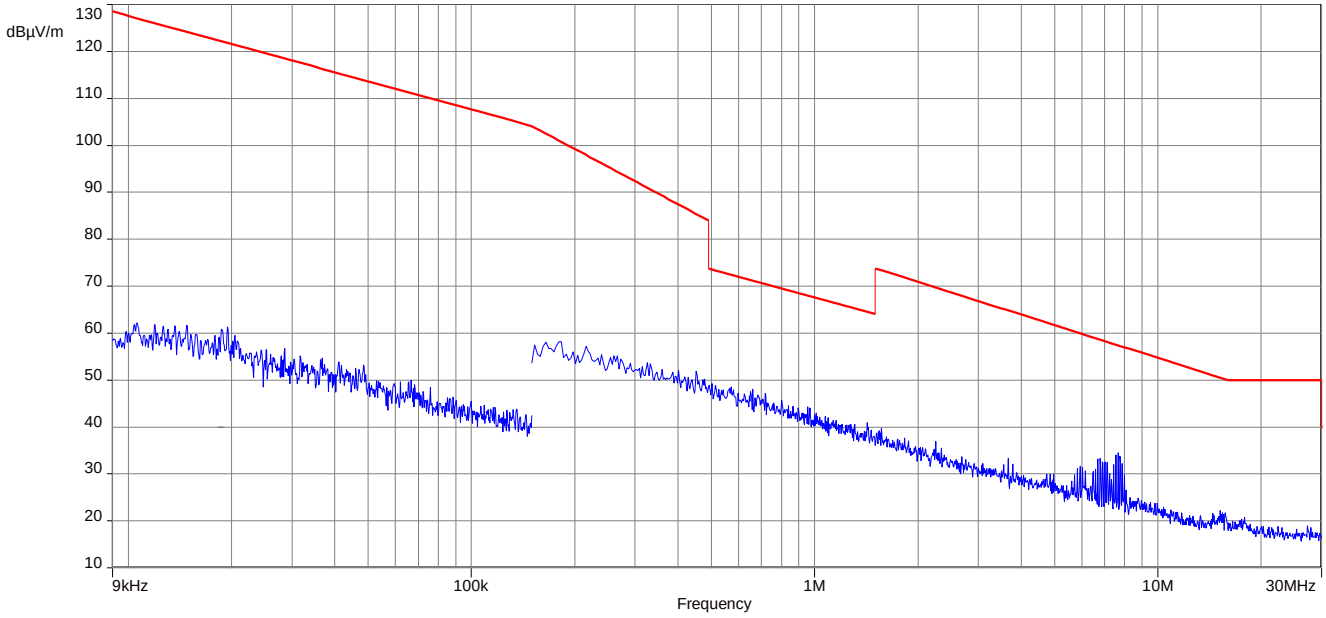


**Plots:** OFDM (40 MHz bandwidth), antenna 2

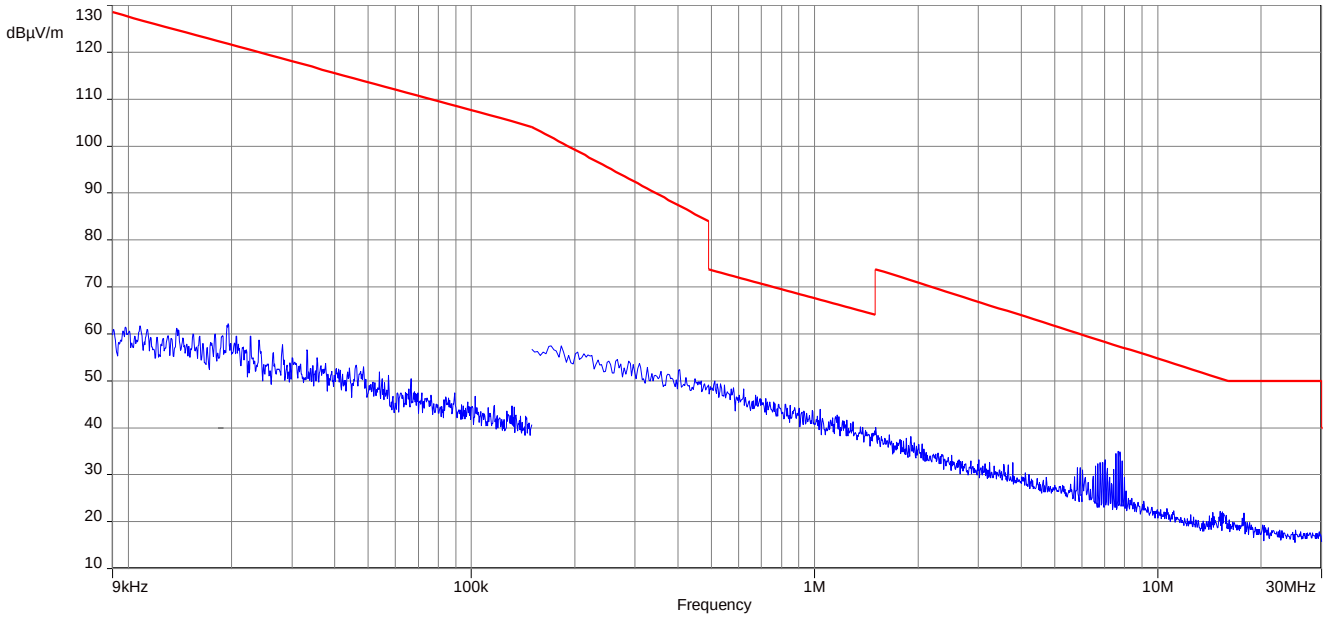
**Plot 1:** 9 kHz to 30 MHz, low channel




**Plot 2:** 9 kHz to 30 MHz, mid channel



**Plot 3:** 9 kHz to 30 MHz, high channel



## 12.12 Spurious emissions radiated 30 MHz to 1 GHz

**Description:**

Measurement of the radiated spurious emissions and cabinet radiations below 1 GHz.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / Quasi Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 120 kHz |
| Video bandwidth: | 3 x RBW |
| Span: | 30 MHz to 1 GHz |
| Trace mode: | Max Hold |
| Measured modulation | ☒ DSSS b – mode<br>☒ OFDM g – mode<br>☐ OFDM n HT20 – mode<br>☒ OFDM n HT40 – mode<br>☒ RX / Idle – mode |
| Test setup: | See sub clause 7.1 - A |
| Measurement uncertainty | See sub clause 9 |

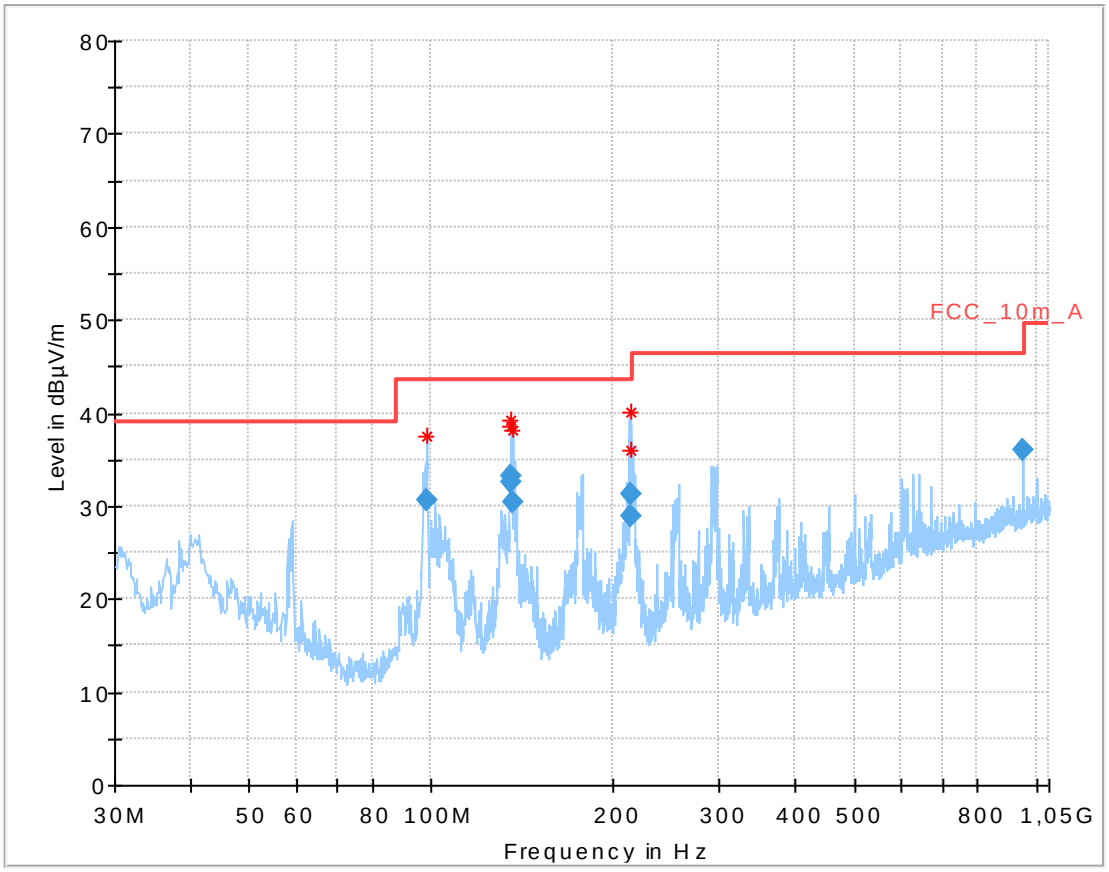
The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

**Limits:**

| FCC | | IC |
|---|---|---|
| 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 §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). | | |
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| 30 - 88 | 30.0 | 10 |
| 88 – 216 | 33.5 | 10 |
| 216 – 960 | 36.0 | 10 |

**Plot:** DSSS, antenna 1

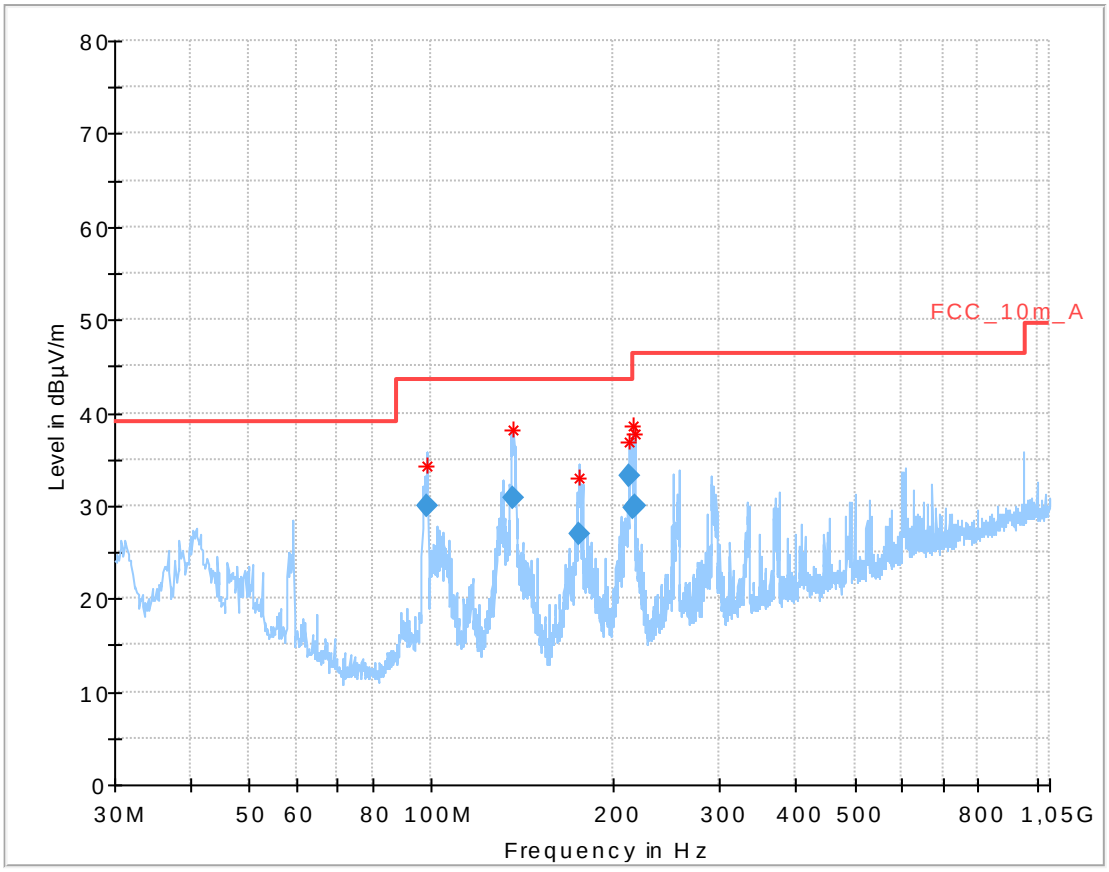
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization, low channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 98.547600 | 30.70 | 43.50 | 12.80 | 1000.0 | 120.000 | 101.0 | V | 4.0 | 11.9 |
| 135.510150 | 33.15 | 43.50 | 10.35 | 1000.0 | 120.000 | 98.0 | V | 75.0 | 9.0 |
| 135.764550 | 32.52 | 43.50 | 10.98 | 1000.0 | 120.000 | 100.0 | V | 276.0 | 9.0 |
| 136.224600 | 30.36 | 43.50 | 13.14 | 1000.0 | 120.000 | 98.0 | V | 276.0 | 9.0 |
| 213.233700 | 31.35 | 43.50 | 12.15 | 1000.0 | 120.000 | 98.0 | V | 122.0 | 12.2 |
| 214.365600 | 28.80 | 43.50 | 14.70 | 1000.0 | 120.000 | 98.0 | V | 149.0 | 12.2 |
| 949.981200 | 35.98 | 46.40 | 10.42 | 1000.0 | 120.000 | 101.0 | H | 149.0 | 24.3 |

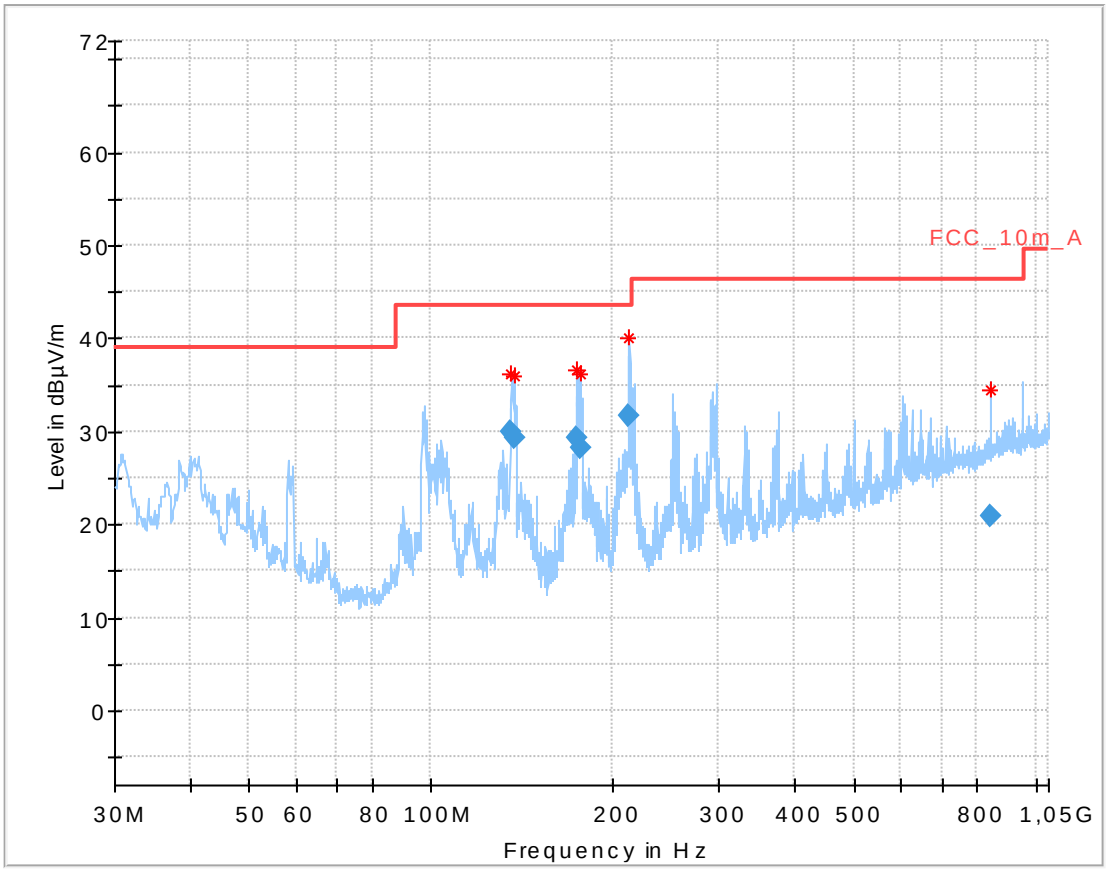
**Plot 2:** 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 98.543100 | 29.87 | 43.50 | 13.63 | 1000.0 | 120.000 | 100.0 | V | 324.0 | 11.9 |
| 136.775550 | 30.90 | 43.50 | 12.60 | 1000.0 | 120.000 | 98.0 | V | 213.0 | 8.9 |
| 175.898100 | 26.94 | 43.50 | 16.56 | 1000.0 | 120.000 | 98.0 | V | 168.0 | 10.1 |
| 212.934600 | 33.31 | 43.50 | 10.19 | 1000.0 | 120.000 | 98.0 | V | 206.0 | 12.2 |
| 214.703550 | 29.69 | 43.50 | 13.81 | 1000.0 | 120.000 | 98.0 | V | 168.0 | 12.2 |
| 216.857100 | 30.07 | 46.40 | 16.33 | 1000.0 | 120.000 | 98.0 | V | 183.0 | 12.3 |

**Plot 3:** 30 MHz to 1 GHz, vertical & horizontal polarization, high channel

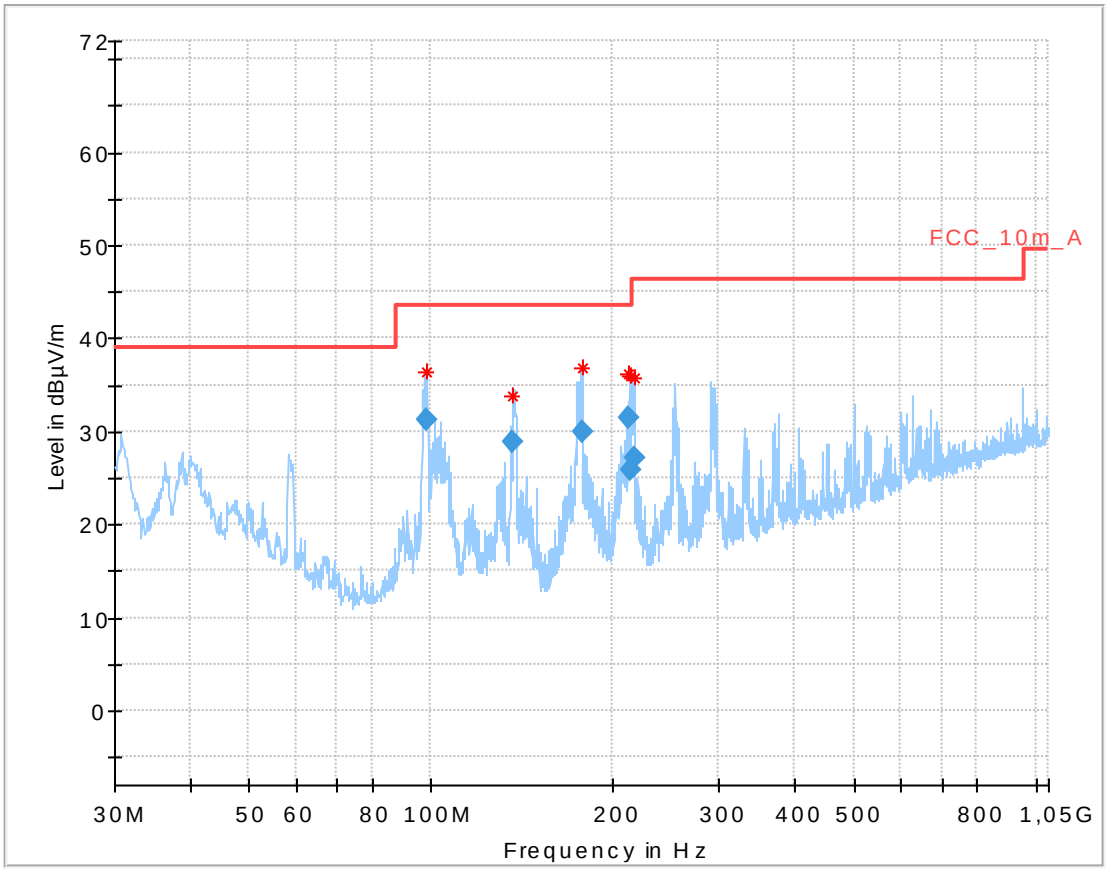



**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 135.588600 | 29.97 | 43.50 | 13.53 | 1000.0 | 120.000 | 98.0 | V | 131.0 | 9.0 |
| 138.041550 | 29.36 | 43.50 | 14.14 | 1000.0 | 120.000 | 185.0 | V | 112.0 | 8.8 |
| 174.282750 | 29.34 | 43.50 | 14.16 | 1000.0 | 120.000 | 98.0 | V | 131.0 | 10.0 |
| 176.328900 | 28.25 | 43.50 | 15.25 | 1000.0 | 120.000 | 98.0 | V | 241.0 | 10.1 |
| 212.996850 | 31.65 | 43.50 | 11.85 | 1000.0 | 120.000 | 98.0 | V | 150.0 | 12.2 |
| 841.497150 | 20.88 | 36.40 | 25.52 | 1000.0 | 120.000 | 98.0 | V | 302.0 | 23.3 |

**Plot:** OFDM (20 MHz bandwidth), antenna 1

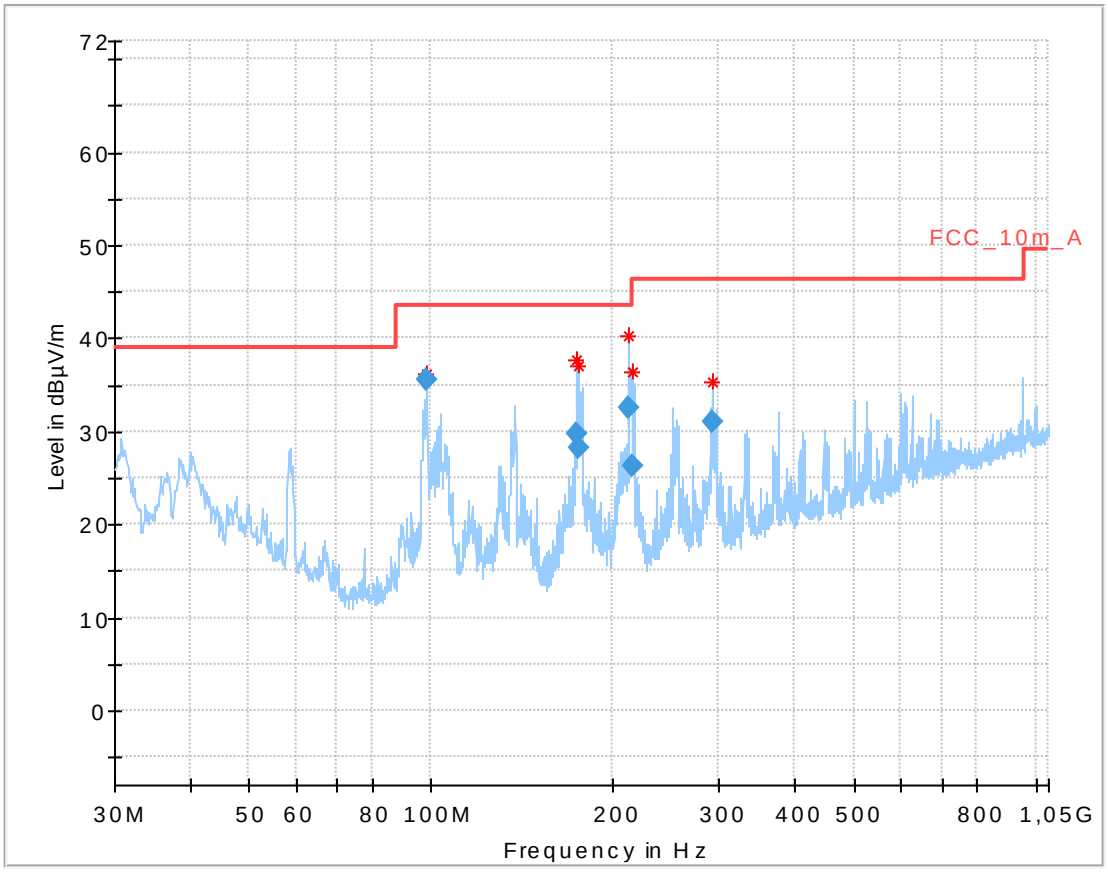
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization, low channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 98.582850 | 31.34 | 43.50 | 12.16 | 1000.0 | 120.000 | 185.0 | V | 343.0 | 11.9 |
| 136.880250 | 28.94 | 43.50 | 14.56 | 1000.0 | 120.000 | 185.0 | V | 59.0 | 8.9 |
| 177.525300 | 29.98 | 43.50 | 13.52 | 1000.0 | 120.000 | 98.0 | V | 275.0 | 10.2 |
| 212.949600 | 31.36 | 43.50 | 12.14 | 1000.0 | 120.000 | 185.0 | H | 120.0 | 12.2 |
| 214.667100 | 25.82 | 43.50 | 17.68 | 1000.0 | 120.000 | 98.0 | V | 89.0 | 12.2 |
| 216.843000 | 27.08 | 46.40 | 18.6 | 1000.0 | 120.000 | 98.0 | V | 154.0 | 12.3 |

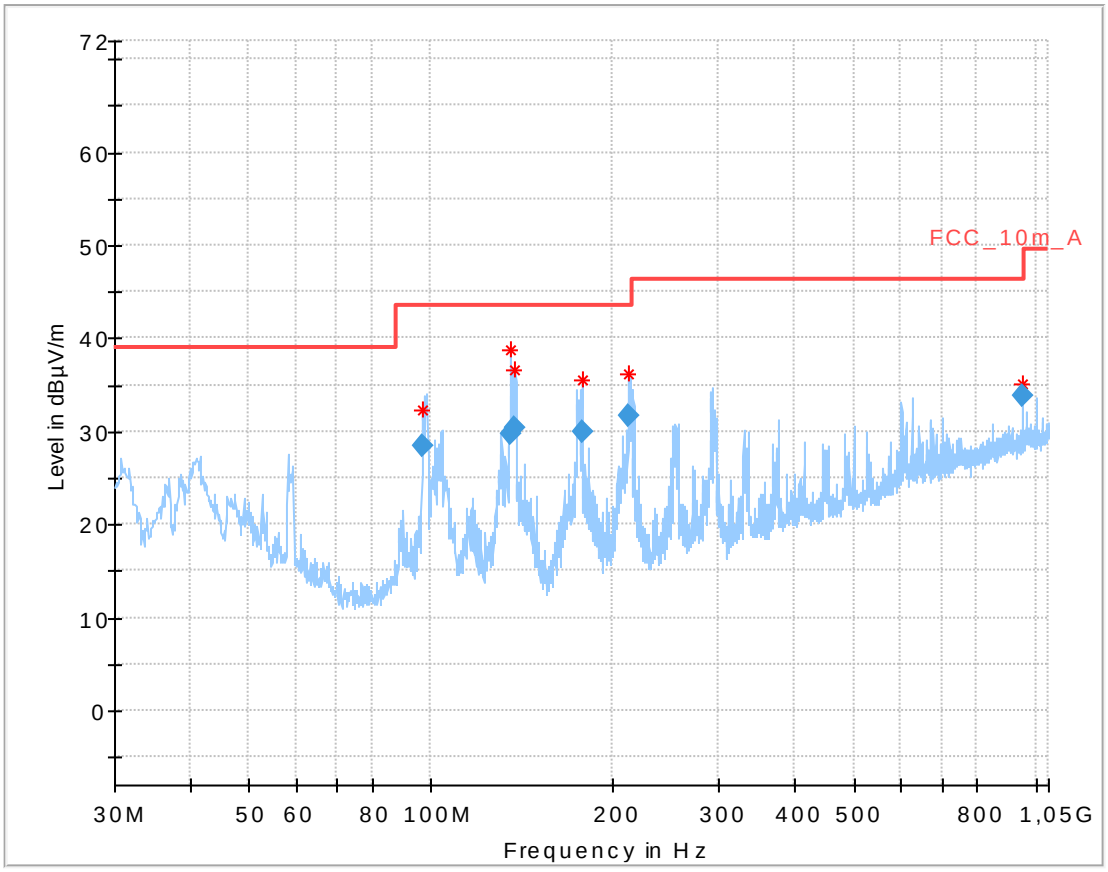
**Plot 2:** 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 98.268300 | 35.58 | 43.50 | 7.92 | 1000.0 | 120.000 | 98.0 | V | 0.0 | 11.9 |
| 174.239550 | 29.70 | 43.50 | 13.8 | 1000.0 | 120.000 | 98.0 | V | 73.0 | 10.0 |
| 175.821300 | 28.26 | 43.50 | 15.24 | 1000.0 | 120.000 | 98.0 | V | 221.0 | 10.1 |
| 212.868750 | 32.49 | 43.50 | 11.01 | 1000.0 | 120.000 | 98.0 | V | 173.0 | 12.2 |
| 214.825650 | 26.30 | 43.50 | 17.2 | 1000.0 | 120.000 | 98.0 | V | 92.0 | 12.2 |
| 291.488550 | 30.98 | 46.40 | 15.42 | 1000.0 | 120.000 | 185.0 | H | 73.0 | 14.3 |

**Plot 3:** 30 MHz to 1 GHz, vertical & horizontal polarization, high channel

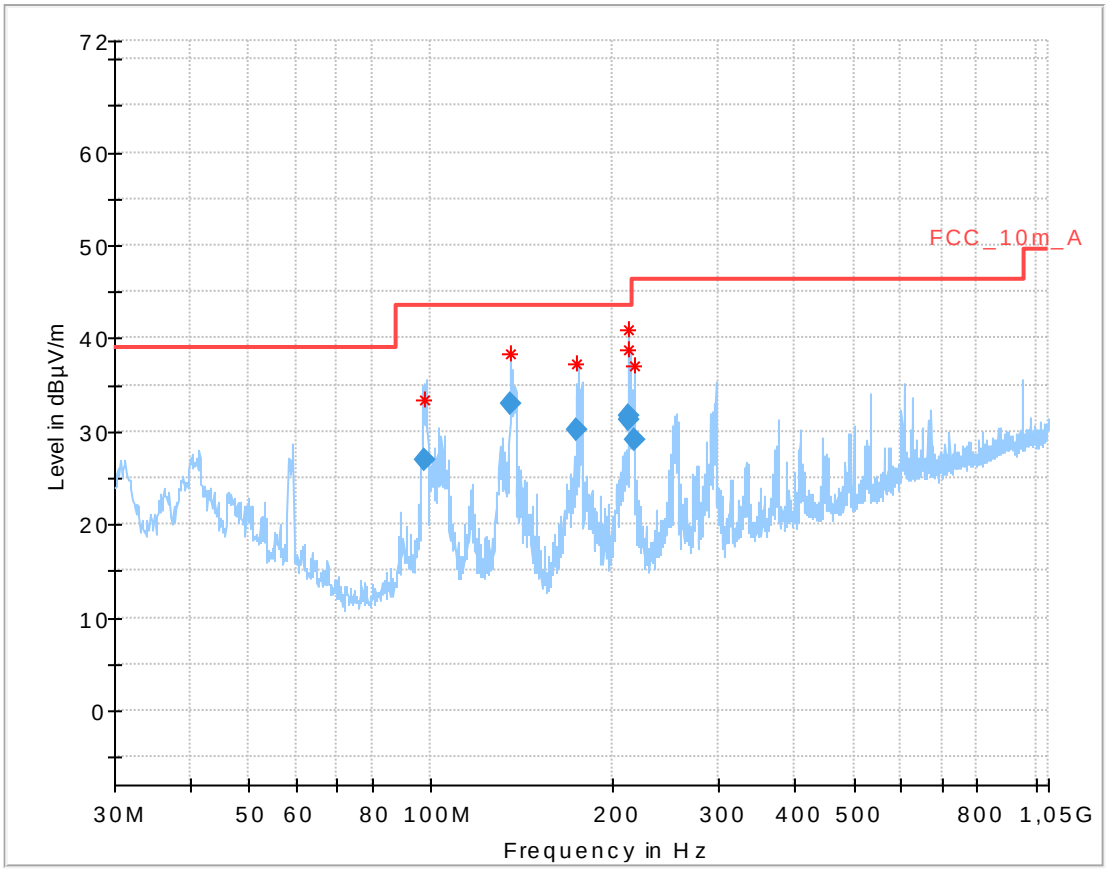



## Final_Result:

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 96.830250 | 28.49 | 43.50 | 15.01 | 1000.0 | 120.000 | 100.0 | V | 353.0 | 11.6 |
| 135.485700 | 29.80 | 43.50 | 13.70 | 1000.0 | 120.000 | 185.0 | V | 315.0 | 9.0 |
| 137.990550 | 30.44 | 43.50 | 13.06 | 1000.0 | 120.000 | 98.0 | V | 60.0 | 8.8 |
| 177.515850 | 29.92 | 43.50 | 13.58 | 1000.0 | 120.000 | 101.0 | V | 276.0 | 10.2 |
| 212.967300 | 31.67 | 43.50 | 11.83 | 1000.0 | 120.000 | 98.0 | V | 212.0 | 12.2 |
| 950.004300 | 33.93 | 46.40 | 12.47 | 1000.0 | 120.000 | 98.0 | H | 194.0 | 24.3 |

**Plot:** OFDM (40 MHz bandwidth), antenna 1

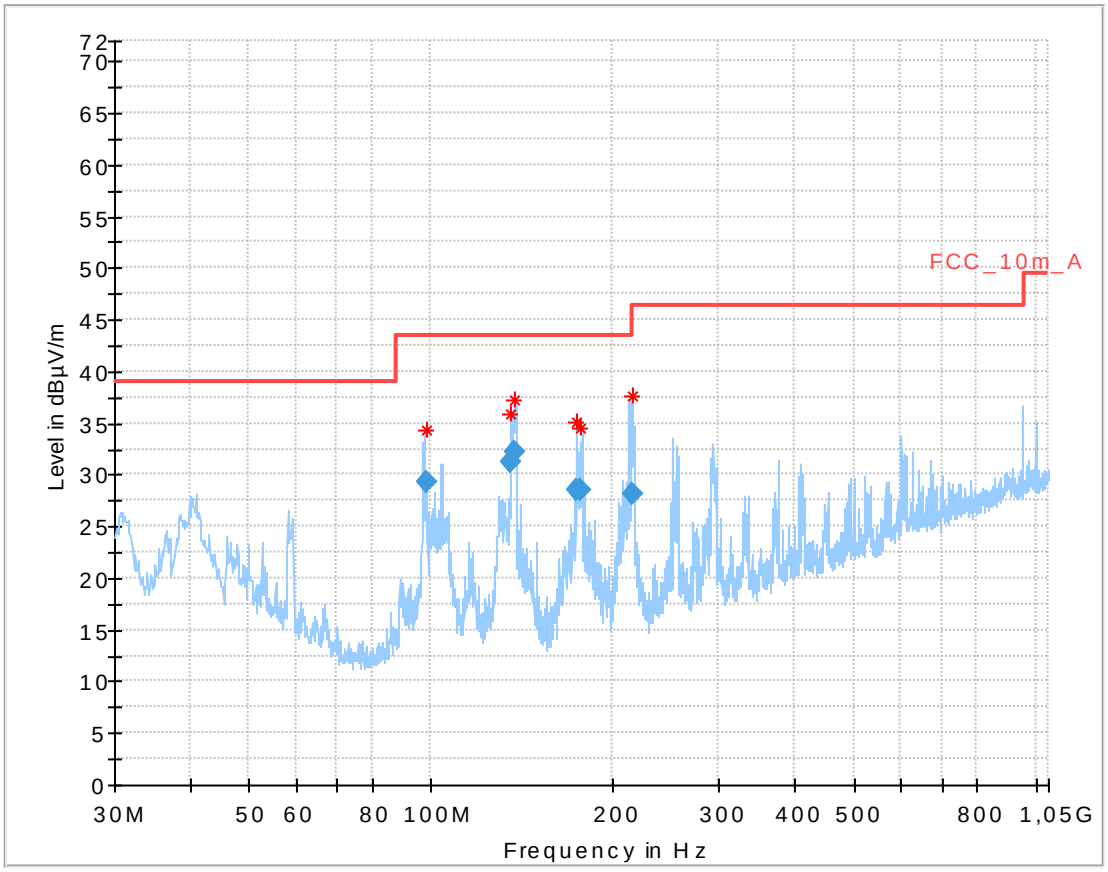
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization, low channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 97.647900 | 26.96 | 43.50 | 16.54 | 1000.0 | 120.000 | 101.0 | V | 307.0 | 11.8 |
| 135.536850 | 33.07 | 43.50 | 10.43 | 1000.0 | 120.000 | 98.0 | V | 114.0 | 9.0 |
| 174.484650 | 30.12 | 43.50 | 13.38 | 1000.0 | 120.000 | 98.0 | V | 95.0 | 10.0 |
| 212.971050 | 31.68 | 43.50 | 11.82 | 1000.0 | 120.000 | 98.0 | V | 174.0 | 12.2 |
| 213.002550 | 31.30 | 43.50 | 12.20 | 1000.0 | 120.000 | 101.0 | V | 174.0 | 12.2 |
| 216.982500 | 29.03 | 46.40 | 17.37 | 1000.0 | 120.000 | 98.0 | V | 174.0 | 12.3 |

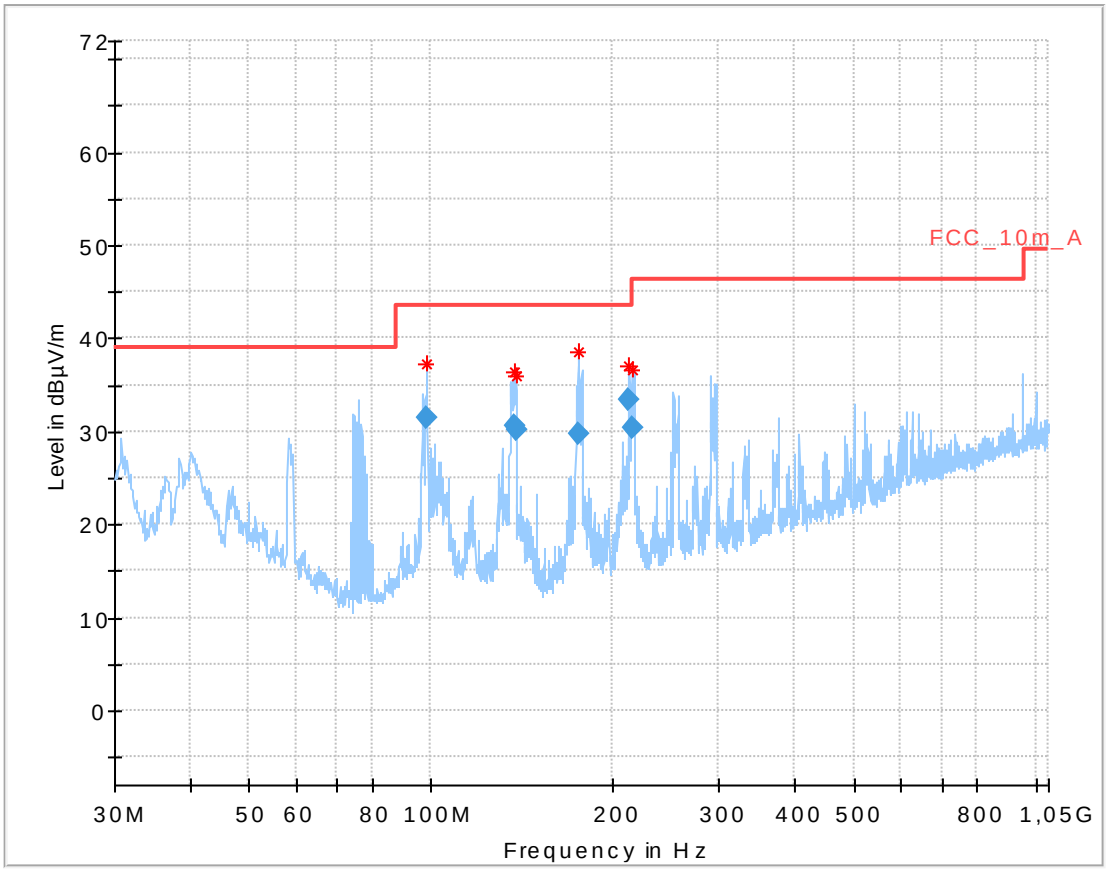
**Plot 2:** 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 98.068200 | 29.29 | 43.50 | 14.21 | 1000.0 | 120.000 | 101.0 | V | 348.0 | 11.9 |
| 135.519750 | 31.17 | 43.50 | 12.33 | 1000.0 | 120.000 | 98.0 | V | 302.0 | 9.0 |
| 137.968500 | 32.30 | 43.50 | 11.20 | 1000.0 | 120.000 | 98.0 | V | 143.0 | 8.8 |
| 174.251400 | 28.61 | 43.50 | 14.89 | 1000.0 | 120.000 | 98.0 | V | 63.0 | 10.0 |
| 177.354150 | 28.48 | 43.50 | 15.02 | 1000.0 | 120.000 | 98.0 | V | 207.0 | 10.2 |
| 214.983000 | 28.17 | 43.50 | 15.33 | 1000.0 | 120.000 | 98.0 | V | 143.0 | 12.2 |

**Plot 3:** 30 MHz to 1 GHz, vertical & horizontal polarization, high channel

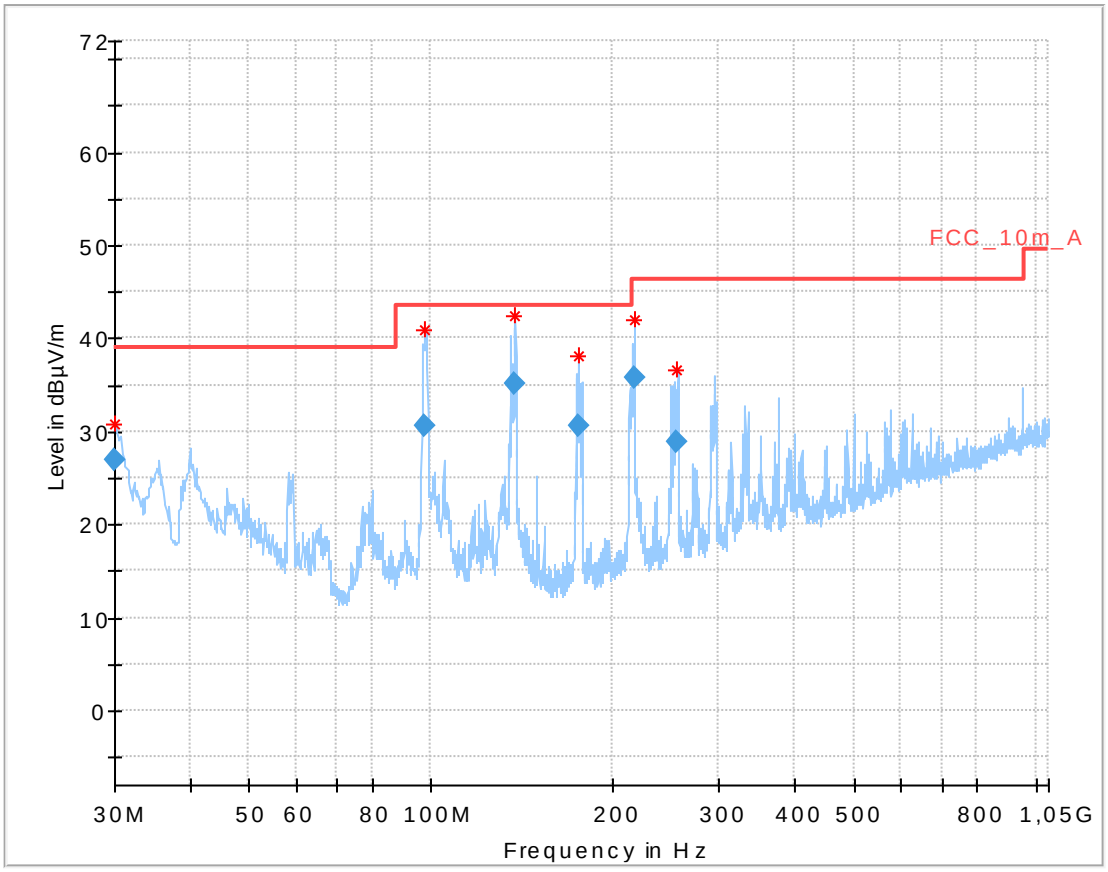



**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 98.521650 | 31.42 | 43.50 | 12.08 | 1000.0 | 120.000 | 98.0 | V | 333.0 | 11.9 |
| 138.047700 | 30.60 | 43.50 | 12.90 | 1000.0 | 120.000 | 185.0 | V | 80.0 | 8.8 |
| 138.071400 | 30.06 | 43.50 | 13.44 | 1000.0 | 120.000 | 98.0 | V | 206.0 | 8.8 |
| 175.764900 | 29.66 | 43.50 | 13.84 | 1000.0 | 120.000 | 98.0 | V | 118.0 | 10.1 |
| 212.927400 | 33.41 | 43.50 | 10.09 | 1000.0 | 120.000 | 185.0 | H | 125.0 | 12.2 |
| 214.764000 | 30.44 | 43.50 | 13.06 | 1000.0 | 120.000 | 98.0 | V | 206.0 | 12.2 |

**Plot:** RX / Idle mode

**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization

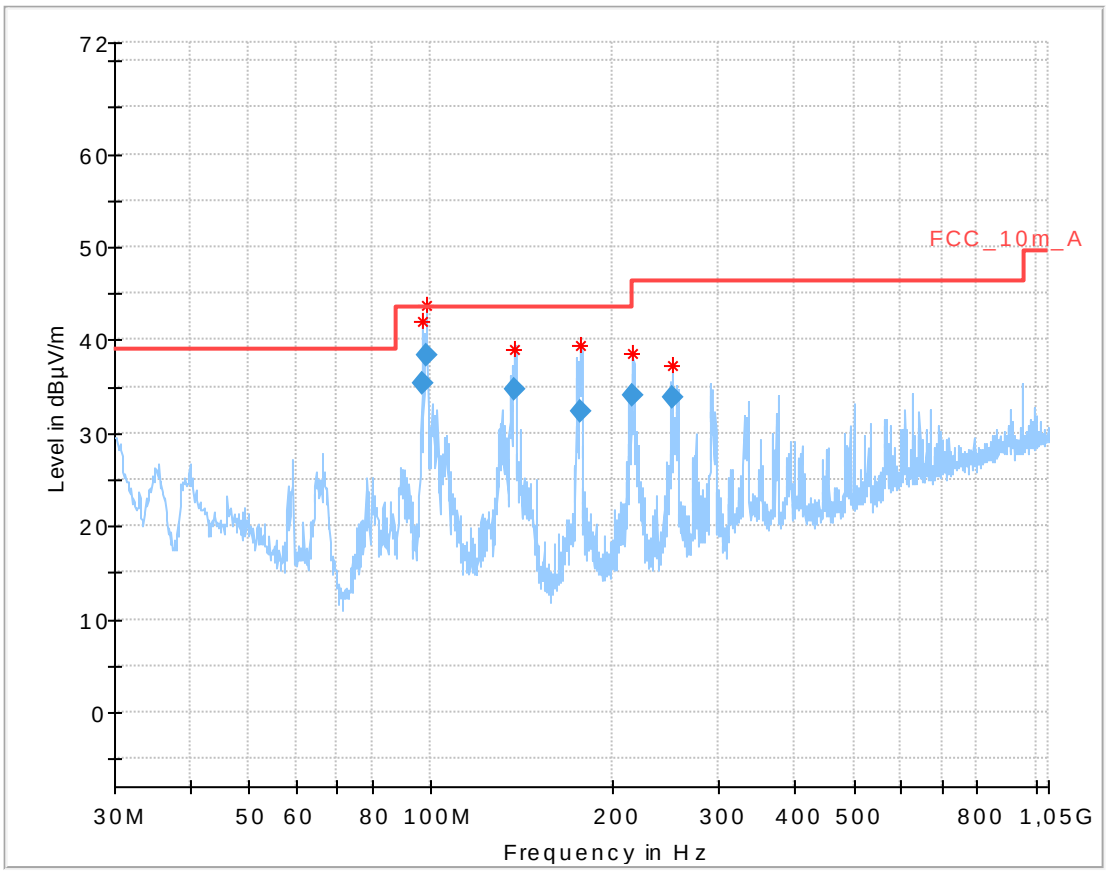



**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 30.029828 | 26.88 | 39.1 | 12.22 | 1000.0 | 120.000 | 101.0 | V | 292.0 | 13.3 |
| 97.660950 | 30.63 | 43.50 | 12.87 | 1000.0 | 120.000 | 98.0 | V | 31.0 | 11.8 |
| 138.037500 | 35.12 | 43.50 | 8.38 | 1000.0 | 120.000 | 98.0 | V | 124.0 | 8.8 |
| 175.783800 | 30.55 | 43.50 | 12.95 | 1000.0 | 120.000 | 98.0 | V | 243.0 | 10.1 |
| 216.952050 | 35.86 | 46.40 | 10.54 | 1000.0 | 120.000 | 98.0 | V | 341.0 | 12.3 |
| 255.415800 | 28.86 | 46.40 | 17.54 | 1000.0 | 120.000 | 98.0 | V | 54.0 | 13.5 |

**Plot:** DSSS, antenna 2

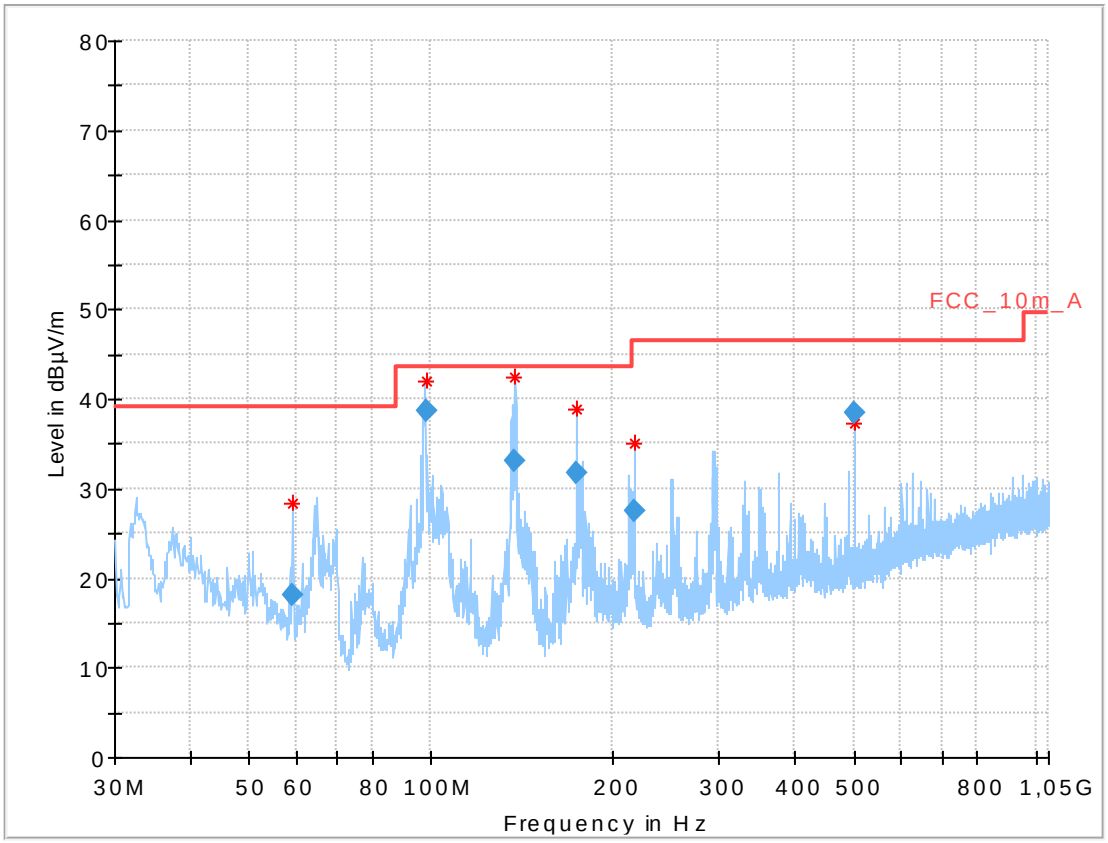
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization, low channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 96.819750 | 35.30 | 43.50 | 8.20 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 11.6 |
| 98.535750 | 38.34 | 43.50 | 5.16 | 1000.0 | 120.000 | 98.0 | V | 275.0 | 11.9 |
| 137.964750 | 34.80 | 43.50 | 8.70 | 1000.0 | 120.000 | 98.0 | V | 171.0 | 8.8 |
| 177.461700 | 32.42 | 43.50 | 11.08 | 1000.0 | 120.000 | 98.0 | V | 267.0 | 10.2 |
| 216.045300 | 33.98 | 46.40 | 12.42 | 1000.0 | 120.000 | 98.0 | V | 351.0 | 12.3 |
| 251.583150 | 33.94 | 46.40 | 12.46 | 1000.0 | 120.000 | 98.0 | V | 23.0 | 13.4 |

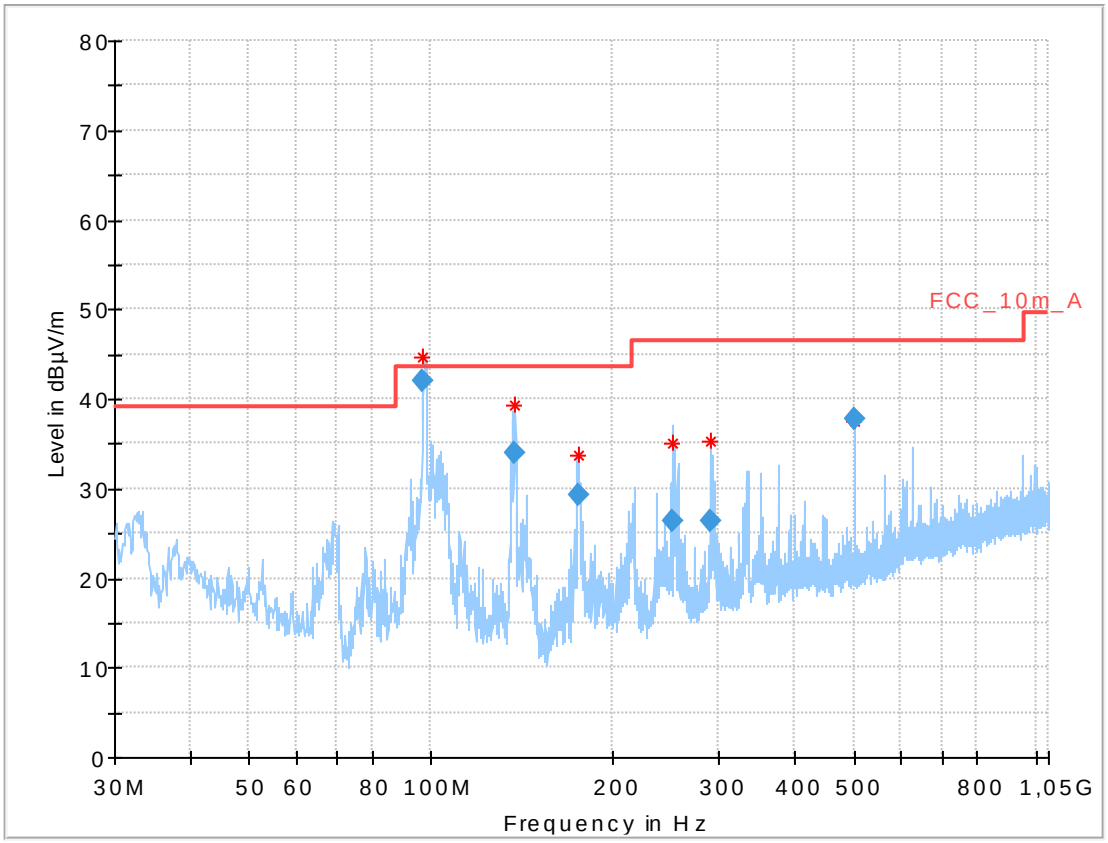
**Plot 2:** 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 59.112150 | 18.09 | 39.10 | 21.01 | 1000.0 | 120.000 | 101.0 | V | -9.0 | 10.8 |
| 98.523000 | 38.59 | 43.50 | 4.91 | 1000.0 | 120.000 | 101.0 | V | 10.0 | 11.9 |
| 137.944350 | 33.00 | 43.50 | 10.50 | 1000.0 | 120.000 | 101.0 | V | 260.0 | 8.8 |
| 174.308250 | 31.84 | 43.50 | 11.66 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 10.0 |
| 216.888450 | 27.50 | 46.40 | 18.90 | 1000.0 | 120.000 | 98.0 | V | 100.0 | 12.3 |
| 499.992000 | 38.45 | 46.40 | 7.95 | 1000.0 | 120.000 | 170.0 | H | 280.0 | 18.7 |

**Plot 3:** 30 MHz to 1 GHz, vertical & horizontal polarization, high channel

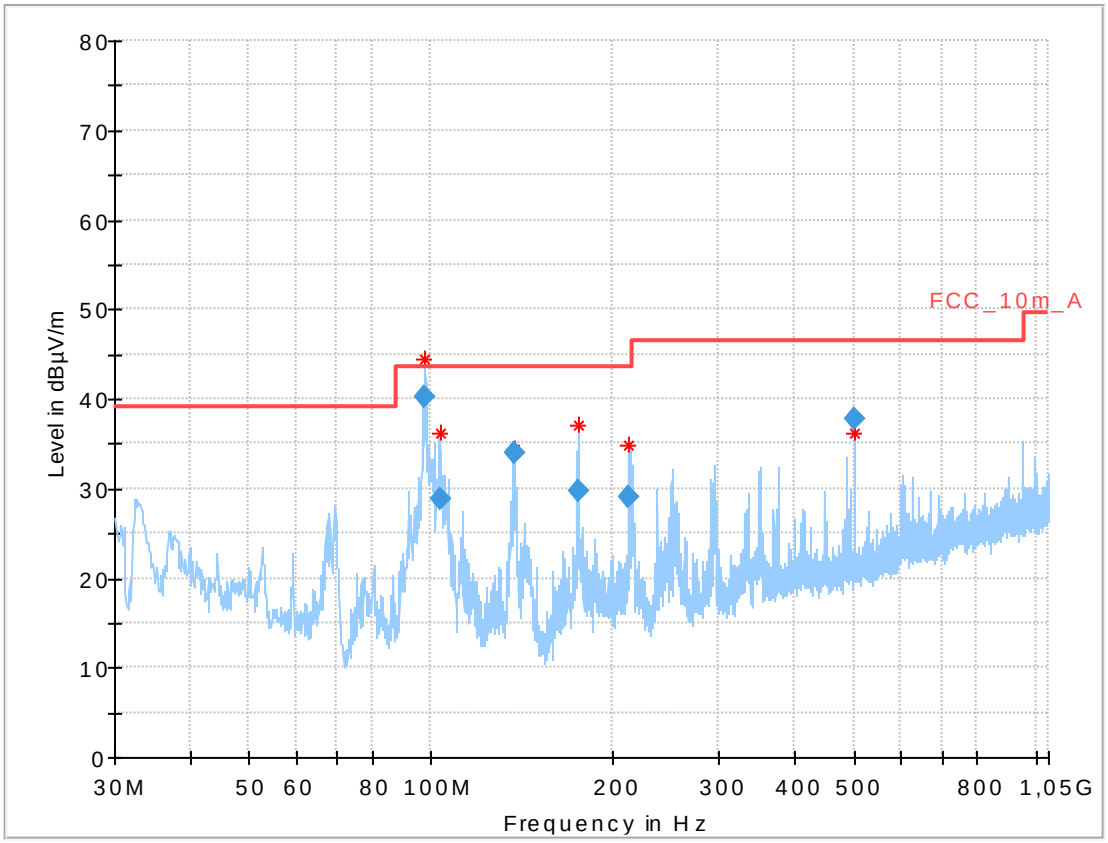



**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 96.855450 | 41.92 | 43.50 | 1.58 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 11.7 |
| 137.992200 | 33.98 | 43.50 | 9.52 | 1000.0 | 120.000 | 98.0 | V | -10.0 | 8.8 |
| 175.853250 | 29.25 | 43.50 | 14.25 | 1000.0 | 120.000 | 101.0 | V | 171.0 | 10.1 |
| 251.726250 | 26.47 | 46.40 | 19.93 | 1000.0 | 120.000 | 98.0 | V | 10.0 | 13.4 |
| 290.342550 | 26.29 | 46.40 | 20.11 | 1000.0 | 120.000 | 170.0 | H | 100.0 | 14.2 |
| 499.985250 | 37.72 | 46.40 | 8.68 | 1000.0 | 120.000 | 170.0 | H | 261.0 | 18.7 |

**Plot:** OFDM (20 MHz bandwidth), antenna 2

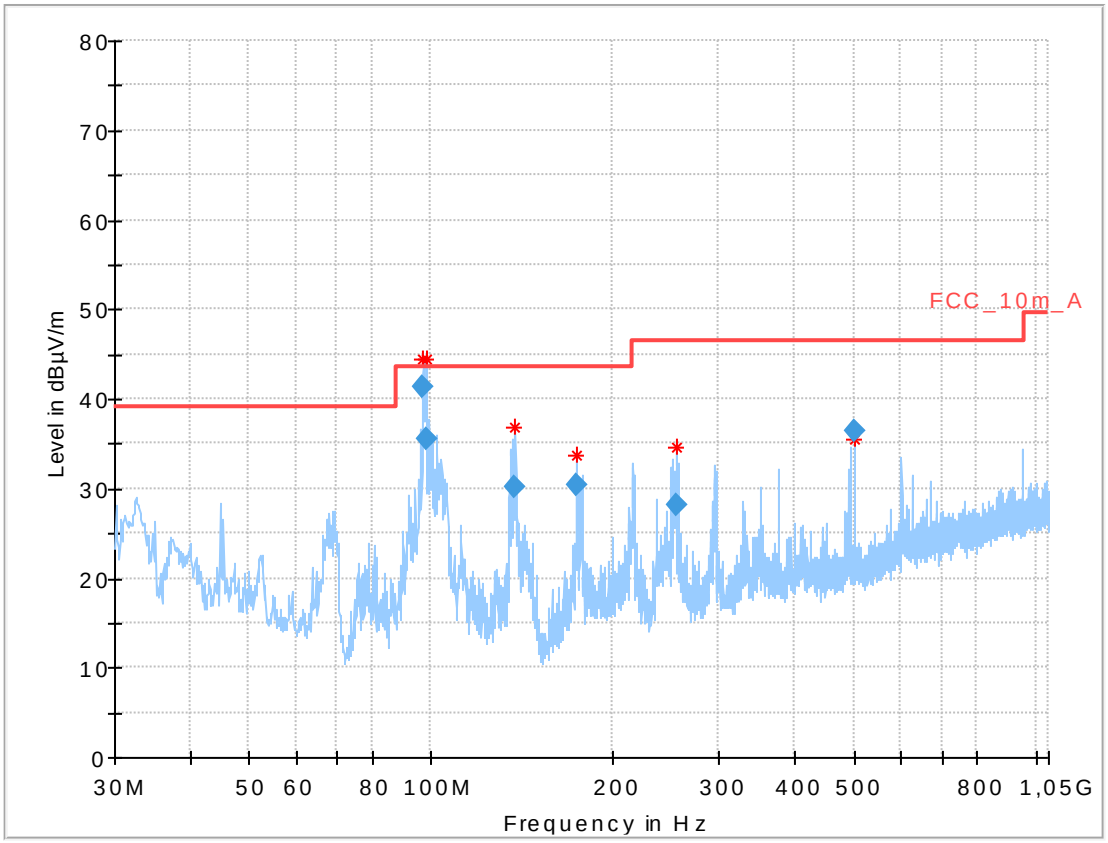
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization, low channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 97.651800 | 40.15 | 43.50 | 3.35 | 1000.0 | 120.000 | 101.0 | V | 260.0 | 11.8 |
| 103.762500 | 28.89 | 43.50 | 14.61 | 1000.0 | 120.000 | 170.0 | V | 100.0 | 11.8 |
| 137.973900 | 33.96 | 43.50 | 9.54 | 1000.0 | 120.000 | 101.0 | V | 80.0 | 8.8 |
| 175.831950 | 29.69 | 43.50 | 13.81 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 10.1 |
| 212.993550 | 28.94 | 43.50 | 14.56 | 1000.0 | 120.000 | 101.0 | V | 280.0 | 12.2 |
| 499.995450 | 37.84 | 46.40 | 8.56 | 1000.0 | 120.000 | 170.0 | H | 261.0 | 18.7 |

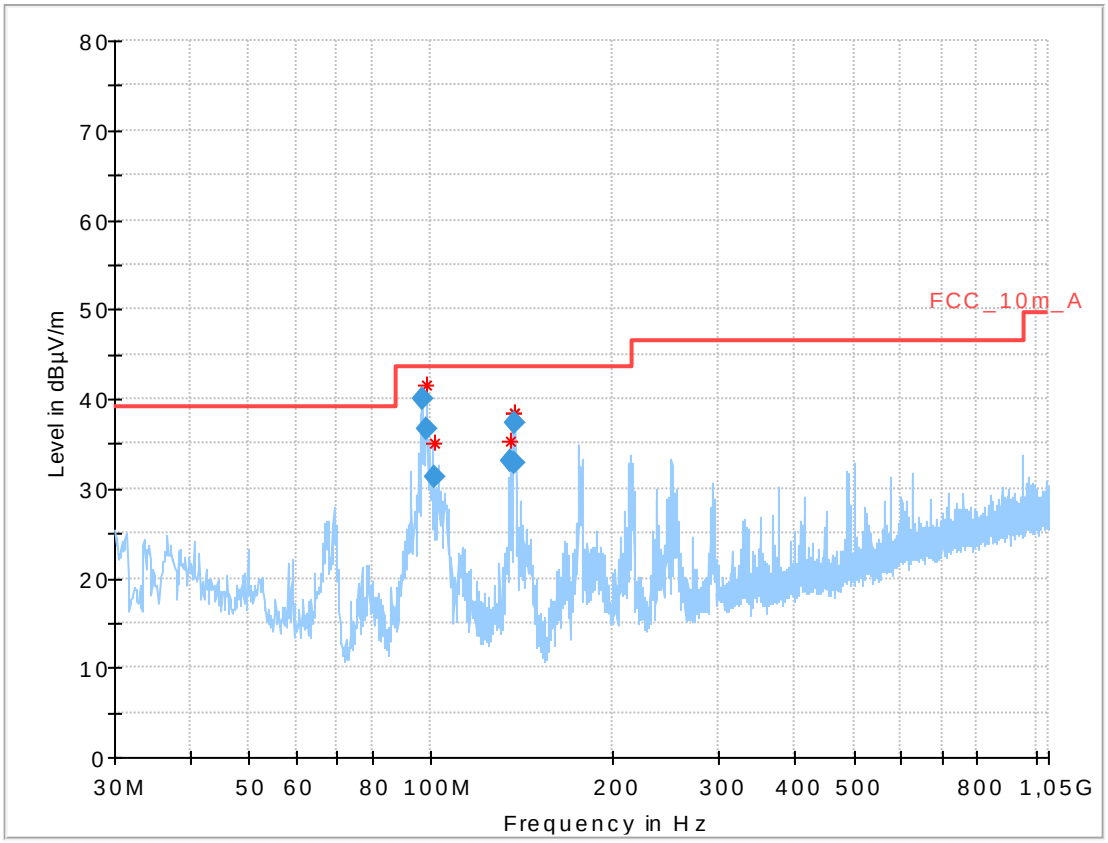
**Plot 2:** 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 96.836850 | 41.43 | 43.50 | 2.07 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 11.6 |
| 98.564850 | 35.42 | 43.50 | 8.08 | 1000.0 | 120.000 | 98.0 | V | 100.0 | 11.9 |
| 138.001200 | 30.18 | 43.50 | 13.32 | 1000.0 | 120.000 | 98.0 | V | 280.0 | 8.8 |
| 174.225900 | 30.35 | 43.50 | 13.15 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 10.0 |
| 255.104850 | 28.25 | 46.40 | 18.15 | 1000.0 | 120.000 | 170.0 | H | 80.0 | 13.5 |
| 499.986900 | 36.47 | 46.40 | 9.93 | 1000.0 | 120.000 | 170.0 | H | 260.0 | 18.7 |

**Plot 3:** 30 MHz to 1 GHz, vertical & horizontal polarization, high channel

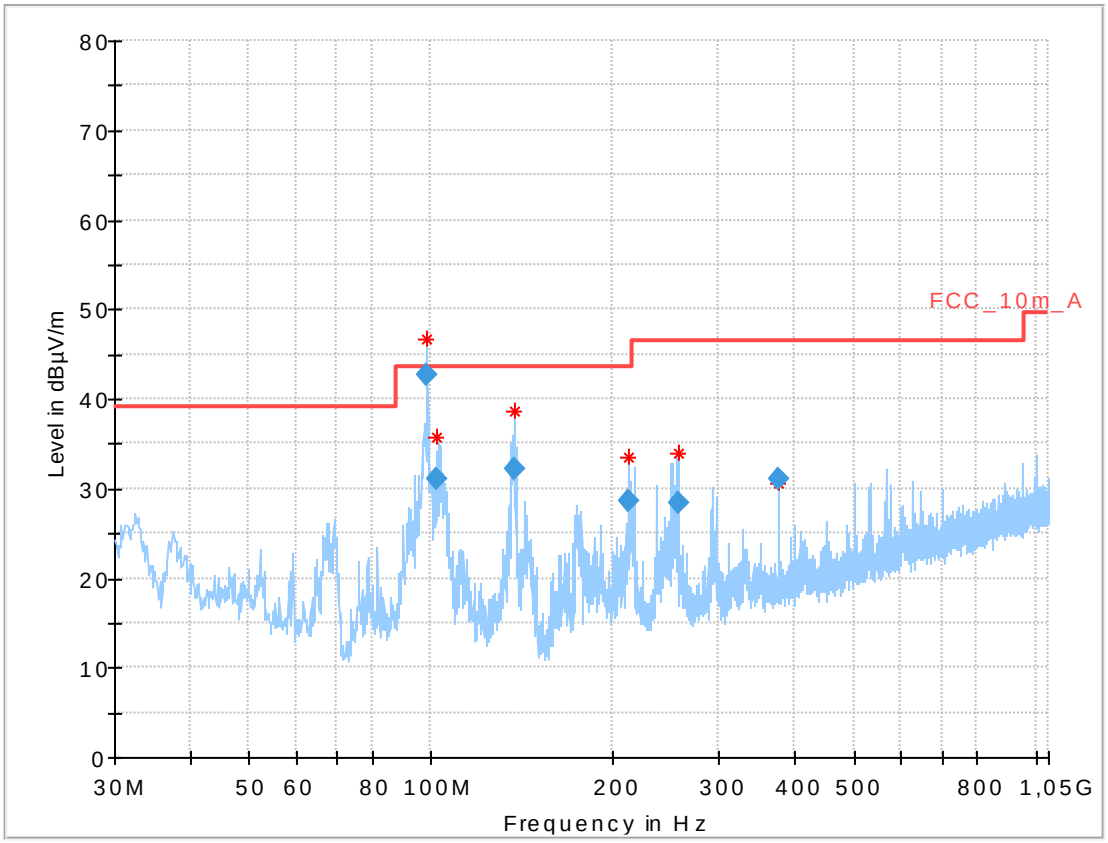



**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 96.792150 | 40.05 | 43.50 | 3.45 | 1000.0 | 120.000 | 98.0 | V | 190.0 | 11.6 |
| 98.617350 | 36.57 | 43.50 | 6.93 | 1000.0 | 120.000 | 101.0 | V | 10.0 | 11.9 |
| 101.312550 | 31.19 | 43.50 | 12.31 | 1000.0 | 120.000 | 98.0 | V | 190.0 | 12.0 |
| 135.518850 | 33.06 | 43.50 | 10.44 | 1000.0 | 120.000 | 98.0 | V | -9.0 | 9.0 |
| 138.016050 | 32.81 | 43.50 | 10.69 | 1000.0 | 120.000 | 98.0 | V | 10.0 | 8.8 |
| 138.021900 | 37.40 | 43.50 | 6.10 | 1000.0 | 120.000 | 101.0 | V | -10.0 | 8.8 |

**Plot:** OFDM (40 MHz bandwidth), antenna 2

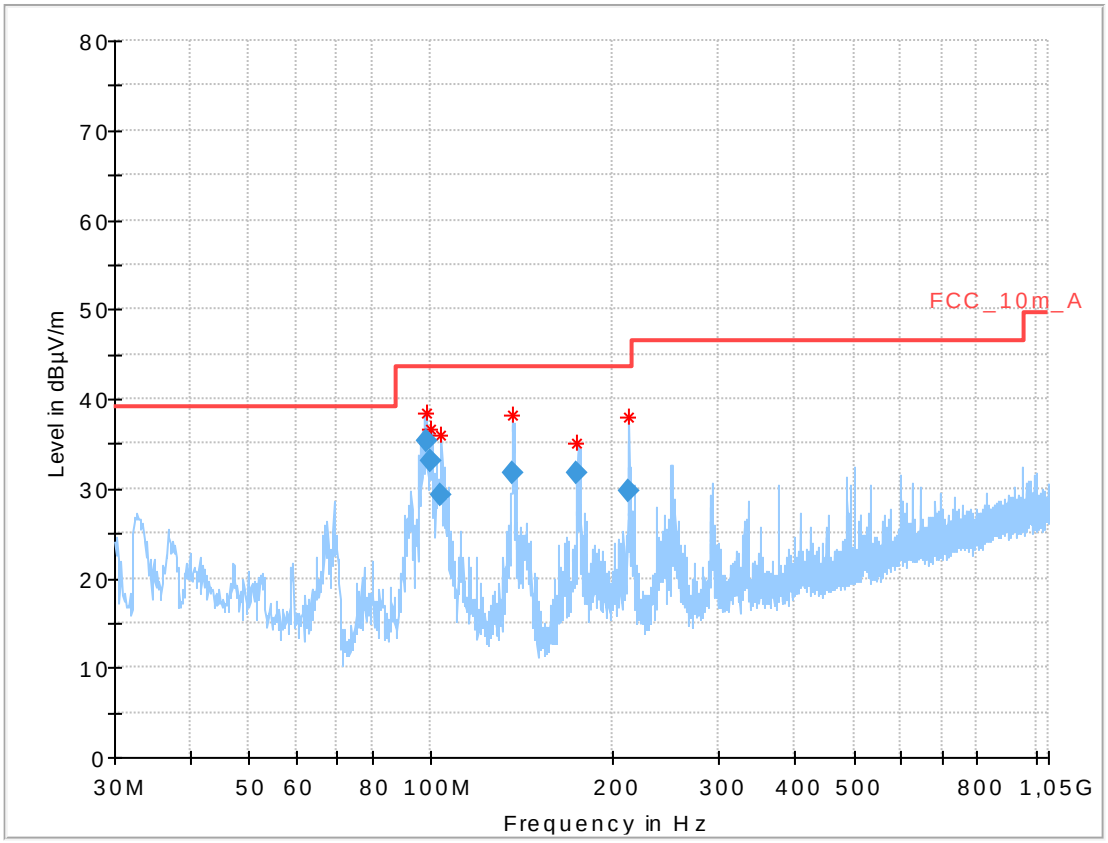
**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization, low channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 98.604150 | 42.63 | 43.50 | 0.87 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 11.9 |
| 102.337950 | 31.03 | 43.50 | 12.47 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 11.9 |
| 137.170500 | 32.26 | 43.50 | 11.24 | 1000.0 | 120.000 | 98.0 | V | 10.0 | 8.9 |
| 212.950800 | 28.54 | 43.50 | 14.96 | 1000.0 | 120.000 | 98.0 | V | 280.0 | 12.2 |
| 255.890850 | 28.43 | 46.40 | 17.97 | 1000.0 | 120.000 | 98.0 | V | 171.0 | 13.5 |
| 374.988000 | 31.16 | 46.40 | 15.24 | 1000.0 | 120.000 | 98.0 | V | 280.0 | 16.5 |

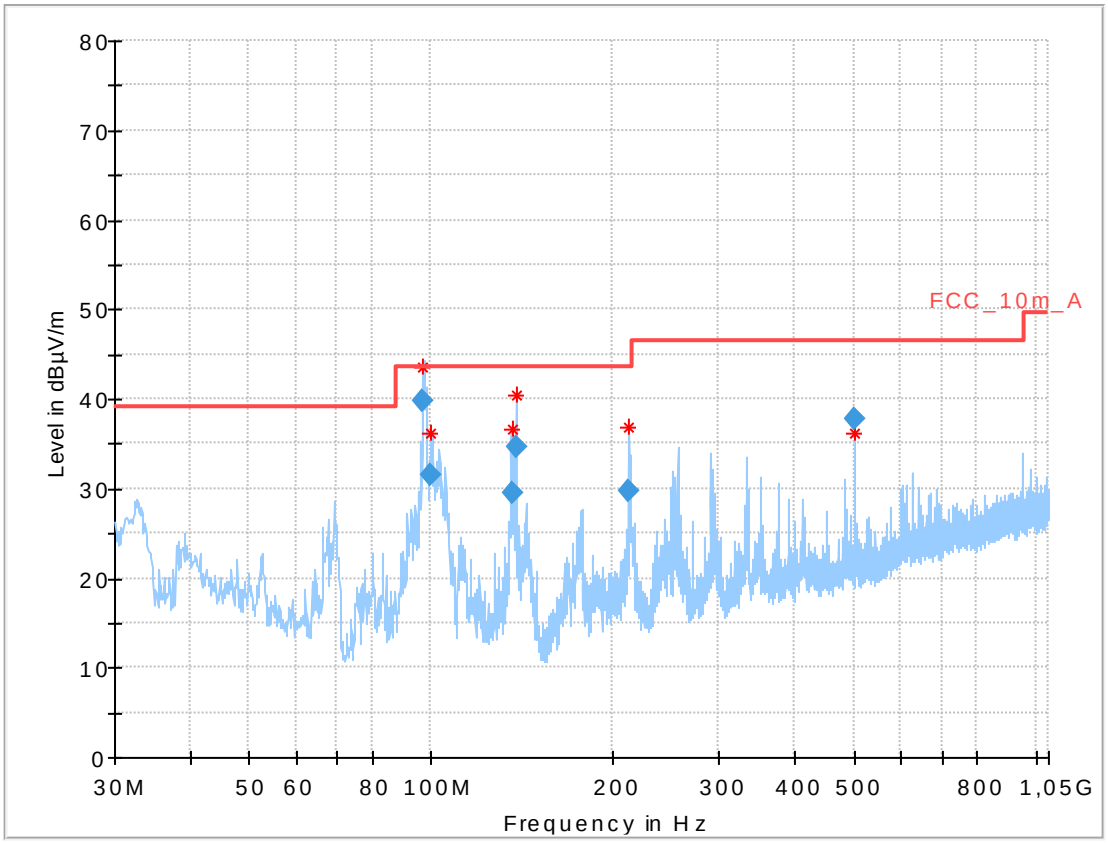
**Plot 2:** 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 98.037900 | 35.37 | 43.50 | 8.13 | 1000.0 | 120.000 | 101.0 | V | 10.0 | 11.9 |
| 99.567600 | 33.03 | 43.50 | 10.47 | 1000.0 | 120.000 | 101.0 | V | 260.0 | 12.1 |
| 103.931850 | 29.36 | 43.50 | 14.14 | 1000.0 | 120.000 | 98.0 | V | 190.0 | 11.8 |
| 136.730100 | 31.80 | 43.50 | 11.70 | 1000.0 | 120.000 | 98.0 | V | -9.0 | 8.9 |
| 174.246900 | 31.73 | 43.50 | 11.77 | 1000.0 | 120.000 | 98.0 | V | 190.0 | 10.0 |
| 212.977050 | 29.79 | 43.50 | 13.71 | 1000.0 | 120.000 | 98.0 | V | 280.0 | 12.2 |

**Plot 3:** 30 MHz to 1 GHz, vertical & horizontal polarization, high channel

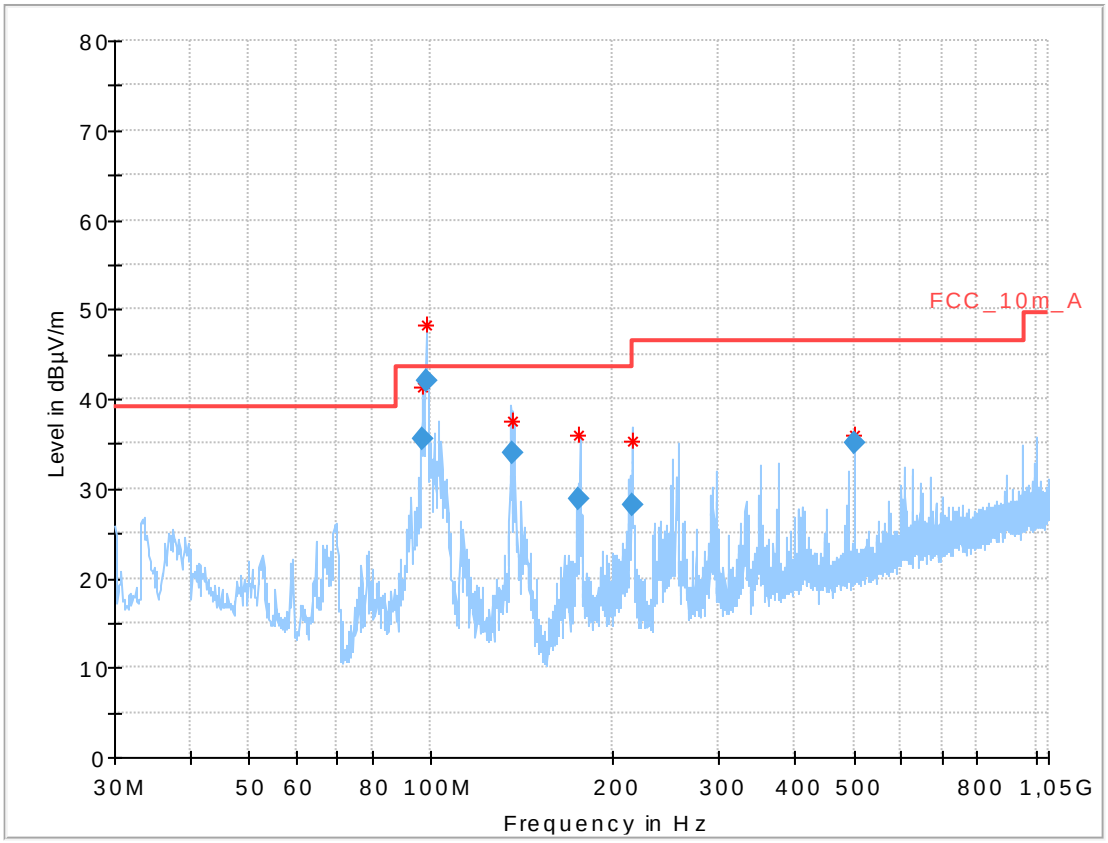



**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 96.818250 | 39.74 | 43.50 | 3.76 | 1000.0 | 120.000 | 101.0 | V | 100.0 | 11.6 |
| 99.976200 | 31.45 | 43.50 | 12.05 | 1000.0 | 120.000 | 101.0 | V | 260.0 | 12.2 |
| 136.745250 | 29.59 | 43.50 | 13.91 | 1000.0 | 120.000 | 98.0 | V | 280.0 | 8.9 |
| 138.082050 | 34.67 | 43.50 | 8.83 | 1000.0 | 120.000 | 101.0 | V | -9.0 | 8.8 |
| 212.932050 | 29.74 | 43.50 | 13.76 | 1000.0 | 120.000 | 101.0 | V | 280.0 | 12.2 |
| 499.996500 | 37.70 | 46.40 | 8.70 | 1000.0 | 120.000 | 170.0 | H | 280.0 | 18.7 |

**Plot:** RX / Idle mode

**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization




**Final_Result:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 96.838950 | 35.58 | 43.50 | 7.92 | 1000.0 | 120.000 | 100.0 | V | 81.0 | 11.6 |
| 98.591250 | 41.93 | 43.50 | 1.57 | 1000.0 | 120.000 | 98.0 | V | 100.0 | 11.9 |
| 136.706850 | 34.03 | 43.50 | 9.47 | 1000.0 | 120.000 | 98.0 | V | -9.0 | 8.9 |
| 175.807050 | 28.86 | 43.50 | 14.64 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 10.1 |
| 214.909650 | 28.09 | 43.50 | 15.41 | 1000.0 | 120.000 | 98.0 | V | 170.0 | 12.2 |
| 499.992150 | 34.99 | 46.40 | 11.41 | 1000.0 | 120.000 | 101.0 | H | 261.0 | 18.7 |

## 12.13 Spurious emissions radiated above 1 GHz

**Description:**

Measurement of the radiated spurious emissions above 1 GHz in transmit mode and receiver / idle mode.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 3 x RBW |
| Span: | 1 GHz to 26 GHz |
| Trace mode: | Max Hold |
| Measured modulation | ☒ DSSS b – mode<br>☒ OFDM g – mode<br>☐ OFDM n HT20 – mode<br>☒ OFDM n HT40 – mode<br>☒ RX / Idle – mode |
| Test setup: | See sub clause 7.2 |
| Measurement uncertainty | See sub clause 9 |

**Limits:**

| FCC | | IC |
|---|---|---|
| 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 30 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 §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). | | |
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| Above 960 | 54.0 | 3 |

**Results:** DSSS, antenna 1

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2412 MHz | | | 2437 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| 1050 | Peak | 47.2 | 1200 | Peak | 62.0 | 1200 | Peak | 62.0 |
| | AVG | -/- | | AVG | 51.1 | | AVG | 51.8 |
| 1200 | Peak | 61.6 | 4002 | Peak | 56.8 | 7386 | Peak | 51.5 |
| | AVG | 51.5 | | AVG | 43.0 | | AVG | 42.3 |
| 1401 | Peak | 54.1 | For emissions above 18 GHz, please look at the plot. | | | For emissions above 18 GHz, please look at the plot. | | |
| | AVG | 41.1 | | | | | | |
| 2794 | Peak | 57.7 | | | | | | |
| | AVG | 42.1 | | | | | | |
| For emissions above 18 GHz, please look at the plot. | | | | | | | | |

**Results:** OFDM (20 MHz bandwidth), antenna 1

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2412 MHz | | | 2437 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| 1050 | Peak | 48.6 | 7314 | Peak | 45.4 | 7391 | Peak | 46.7 |
| | AVG | 36.7 | | AVG | -/- | | AVG | -/- |
| 1200 | Peak | 61.6 | For emissions above 18 GHz, please look at the plot. | | | For emissions above 18 GHz, please look at the plot. | | |
| | AVG | 50.8 | | | | | | |
| 2802 | Peak | 57.1 | | Peak | | | Peak | |
| | AVG | 43.9 | | AVG | | | AVG | |
| For emissions above 18 GHz, please look at the plot. | | | | Peak | | | Peak | |
| | | | | AVG | | | AVG | |

**Results:** OFDM (40 MHz bandwidth), antenna 1

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2422 MHz | | | 2437 MHz | | | 2452 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| 1200 | Peak | 61.0 | 3603 | Peak | 58.9 | 1450 | Peak | 47.6 |
| | AVG | 50.4 | | AVG | 44.9 | | AVG | -/- |
| 1316 | Peak | 46.6 | 4661 | Peak | 51.5 | For emissions above 18 GHz, please look at the plot. | | |
| | AVG | -/- | | AVG | -/- | | | |
| 2380 | Peak | 54.8 | For emissions above 18 GHz, please look at the plot. | | | | | |
| | AVG | 41.5 | | | | | | |
| For emissions above 18 GHz, please look at the plot. | | | | | | | | |

**Results:** RX / idle – mode, antenna 1

| TX Spurious Emissions Radiated [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| 1050 | Peak | 47.2 |
| | AVG | -/- |
| 1200 | Peak | 61.6 |
| | AVG | 51.5 |
| 1316 | Peak | 46.6 |
| | AVG | -/- |
| For emissions above 18 GHz, please look at the plot. | | |

**Results:** DSSS, antenna 2

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2412 MHz | | | 2437 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | | All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | | All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | |
| For emissions above 18 GHz, please look at the plot. | | | For emissions above 18 GHz, please look at the plot. | | | For emissions above 18 GHz, please look at the plot. | | |
| | Peak | | | Peak | | | Peak | |
| | AVG | | | AVG | | | AVG | |

**Results:** OFDM (20 MHz bandwidth), antenna 2

| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2412 MHz | | | 2437 MHz | | | 2462 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | | All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | | All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | |
| For emissions above 18 GHz, please look at the plot. | | | For emissions above 18 GHz, please look at the plot. | | | For emissions above 18 GHz, please look at the plot. | | |
| | Peak | | | Peak | | | Peak | |
| | AVG | | | AVG | | | AVG | |

**Results:** OFDM (40 MHz bandwidth), antenna 2

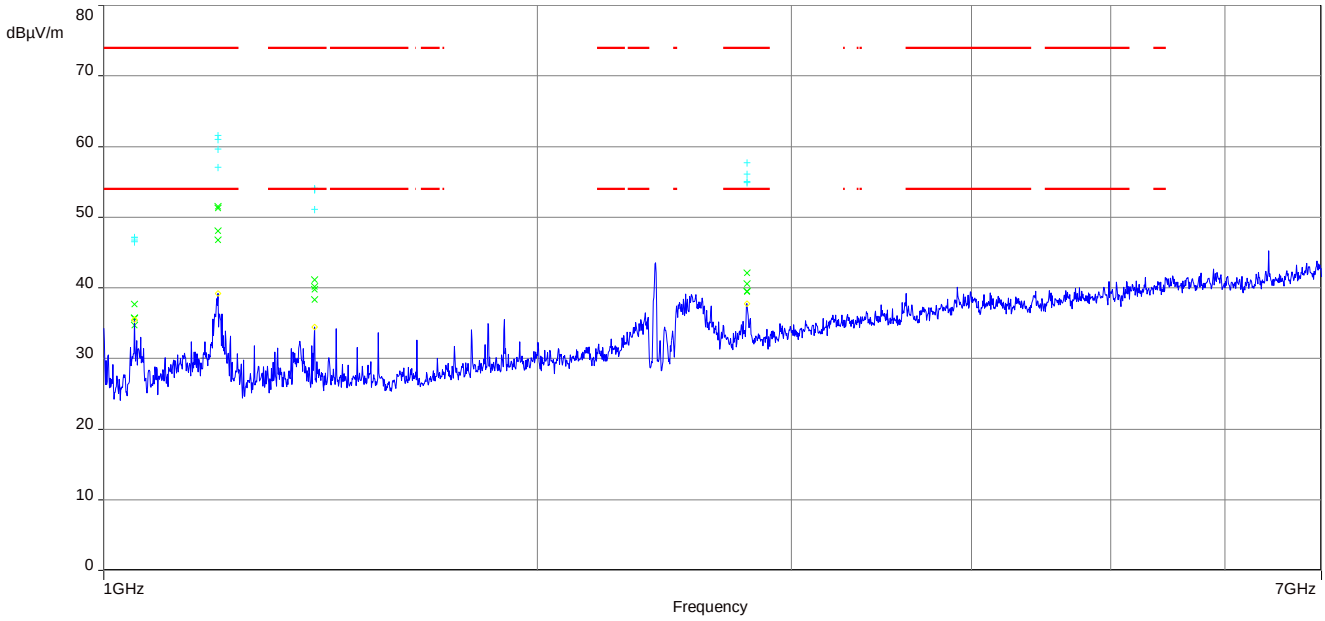
| TX Spurious Emissions Radiated [dBµV/m] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2422 MHz | | | 2437 MHz | | | 2452 MHz | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | | All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | | All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | |
| For emissions above 18 GHz, please look at the plot. | | | For emissions above 18 GHz, please look at the plot. | | | For emissions above 18 GHz, please look at the plot. | | |
| | Peak | | | Peak | | | Peak | |
| | AVG | | | AVG | | | AVG | |

**Results:** RX / idle – mode, antenna 2

| TX Spurious Emissions Radiated [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| All detected emissions are a part of the cabinet radiation; please look at antenna 1 for more information. | | |
| For emissions above 18 GHz, please look at the plot. | | |
| | Peak | |
| | AVG | |

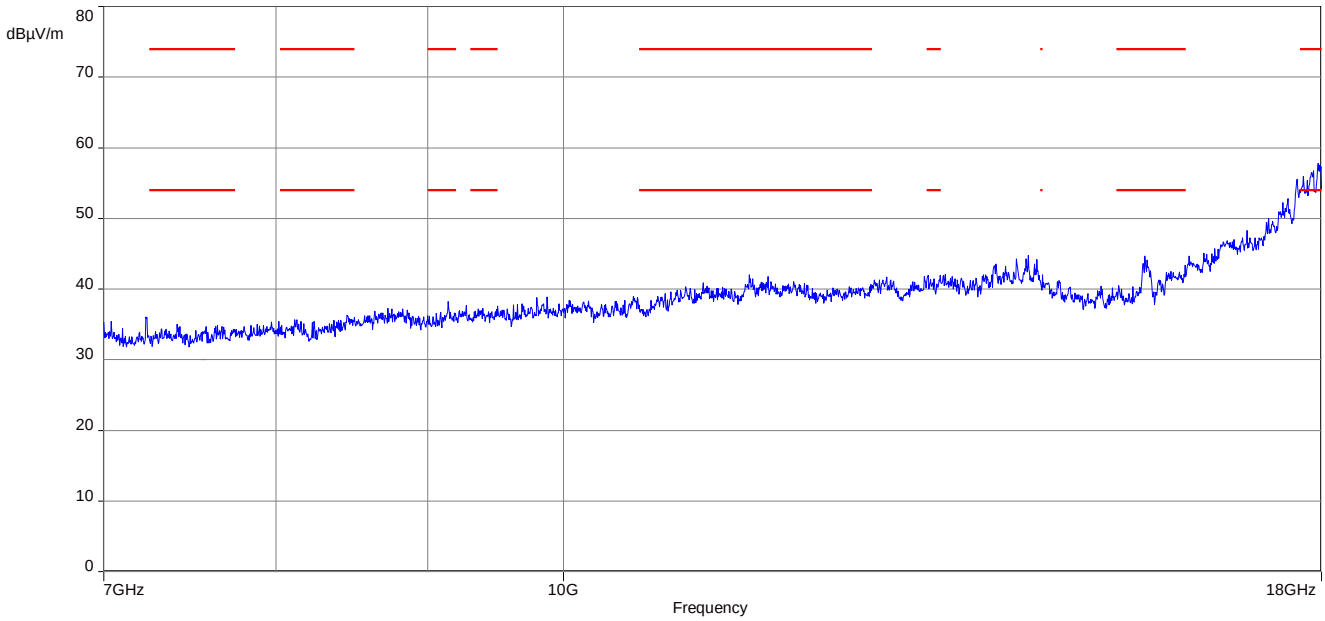
**Plots:** DSSS, antenna 1

**Plot 1:** Lowest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

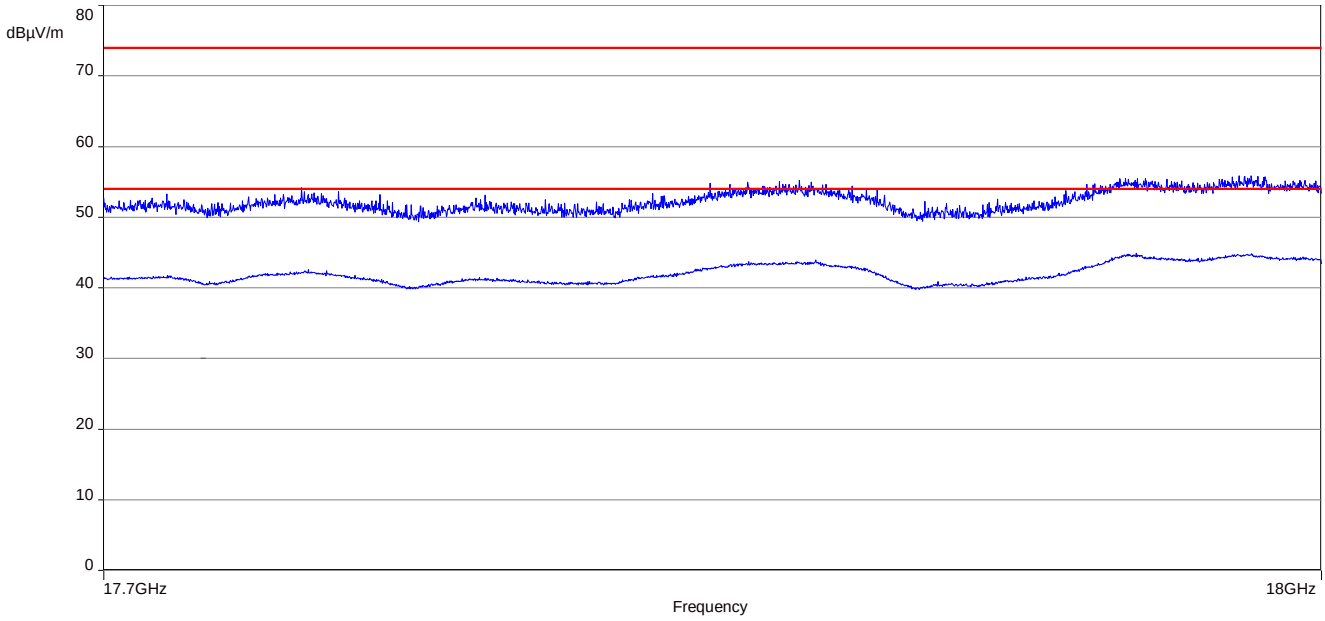



The carrier signal is notched with a 2.4 GHz band rejection filter.

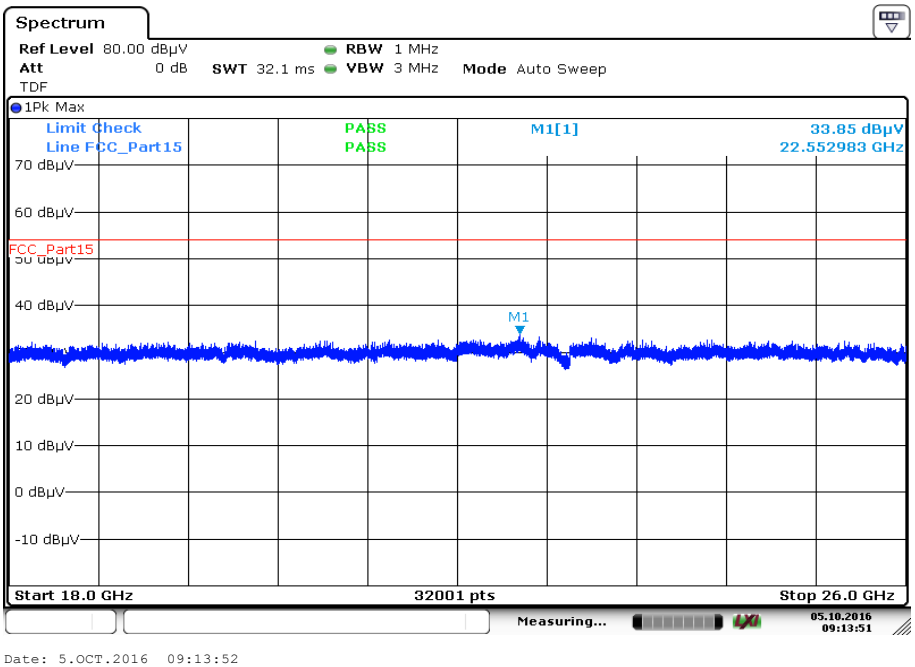
**Plot 2:** Lowest channel, 7 GHz to 18 GHz, vertical & horizontal polarization



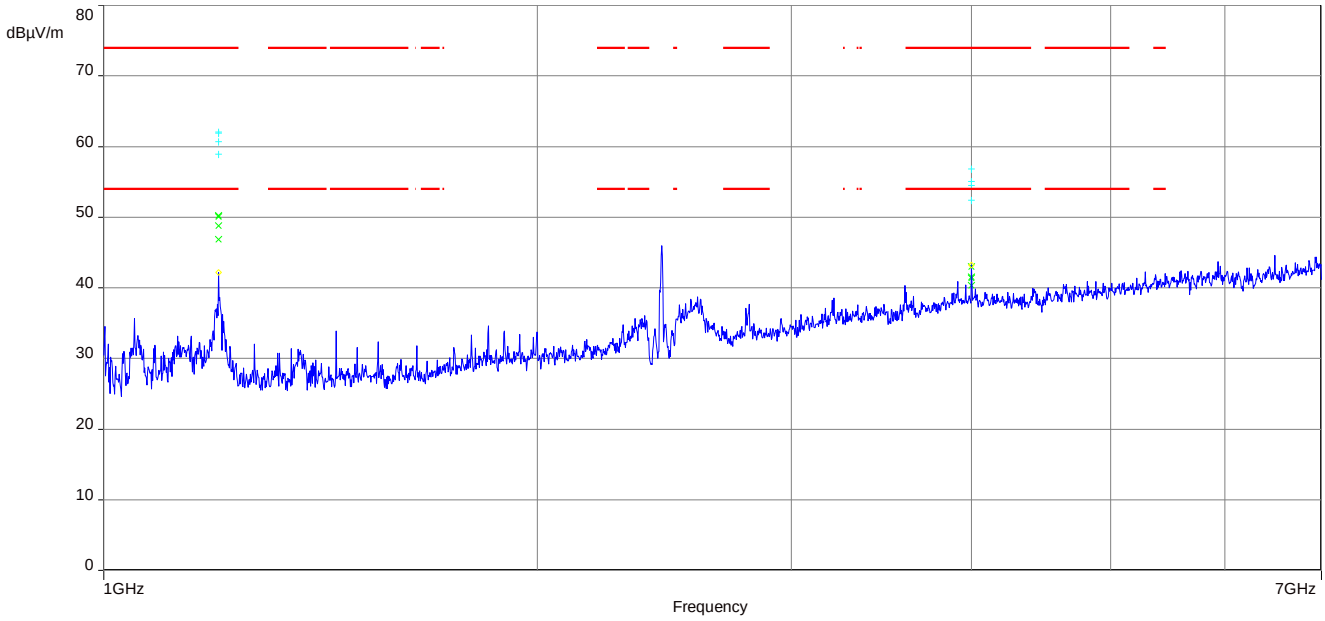
**Plot 3:** Lowest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization




**Plot 4:** Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

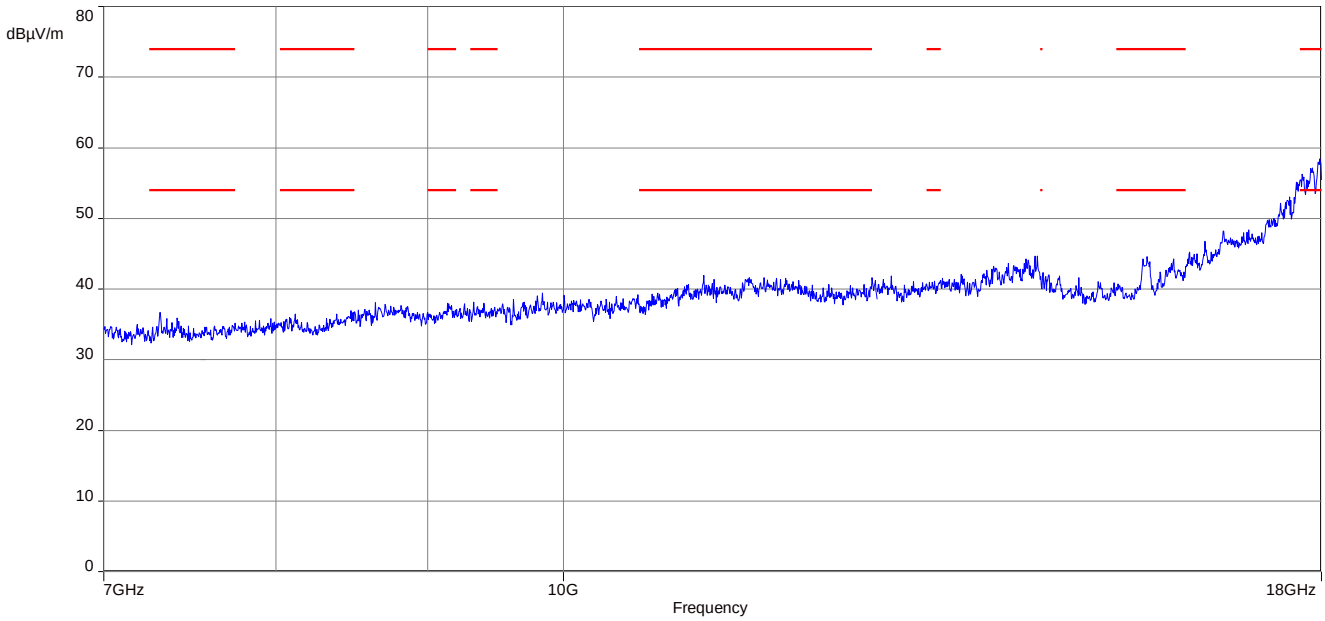


**Plot 5:** Middle channel, 1 GHz to 7 GHz, vertical & horizontal polarization

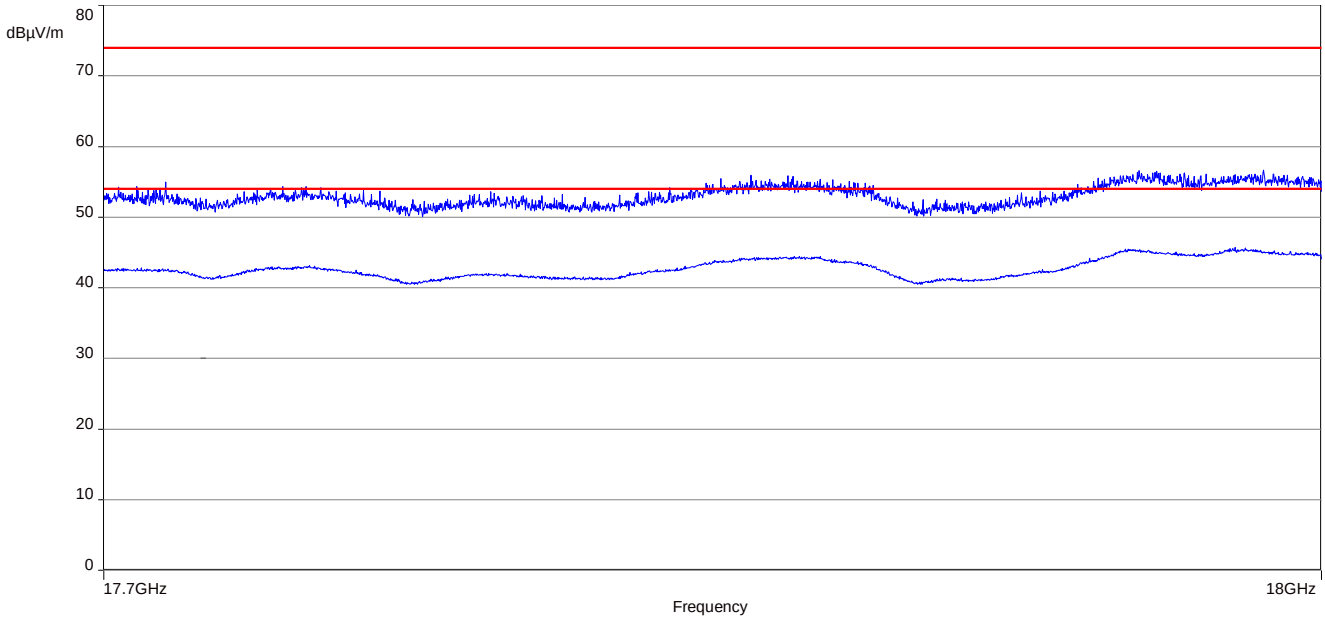



The carrier signal is notched with a 2.4 GHz band rejection filter.

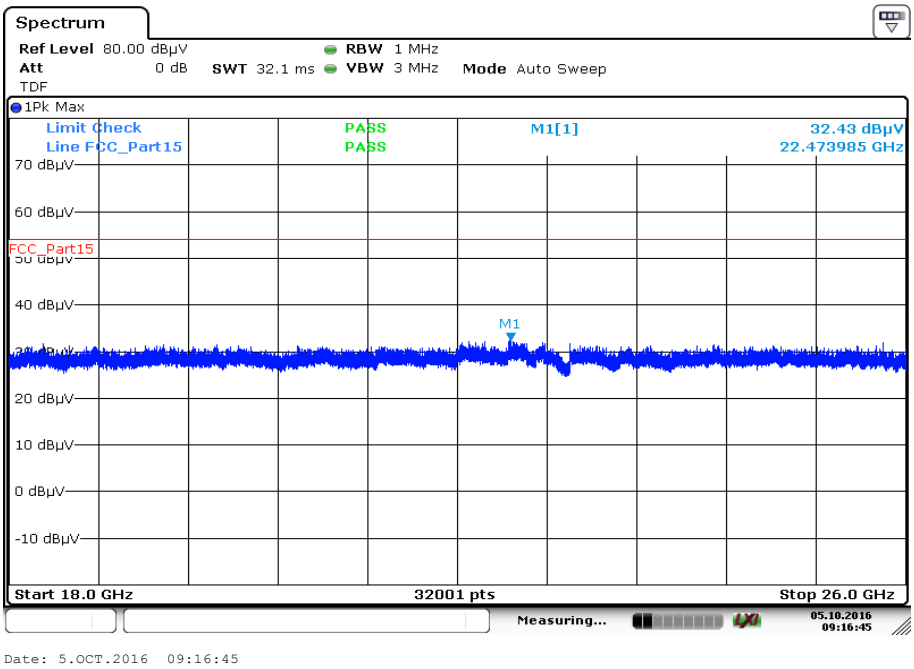
**Plot 6:** Middle channel, 7 GHz to 18 GHz, vertical & horizontal polarization



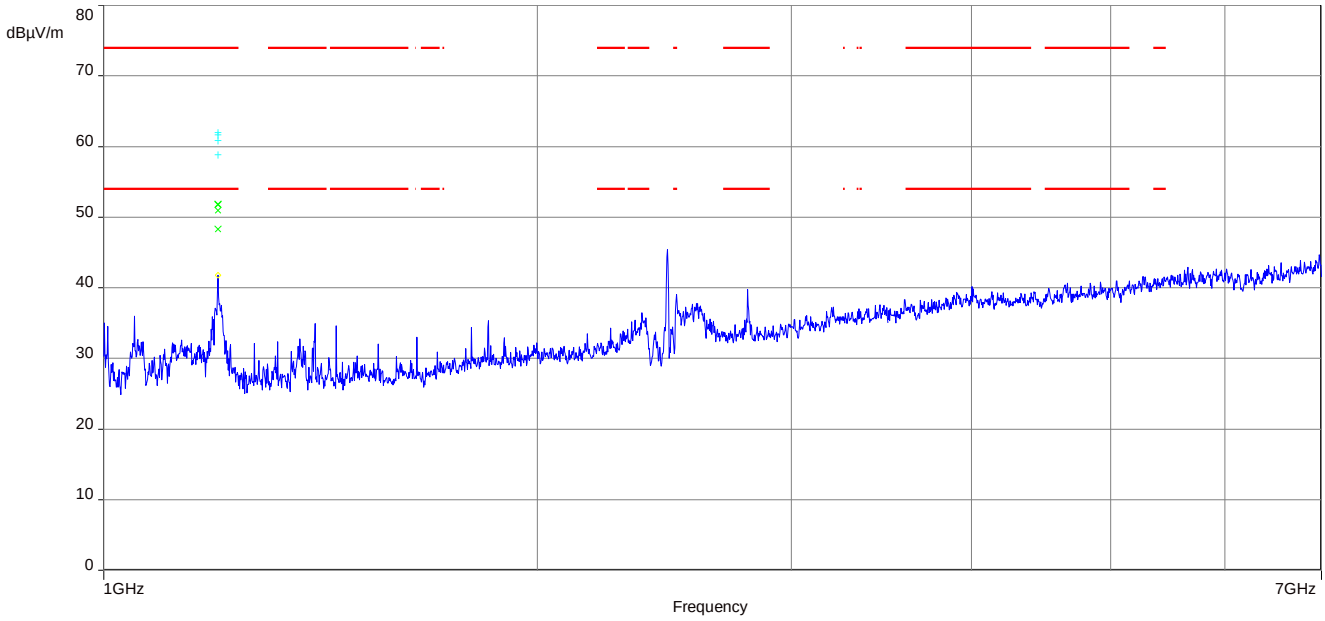
**Plot 7:** Middle channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization




**Plot 8:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

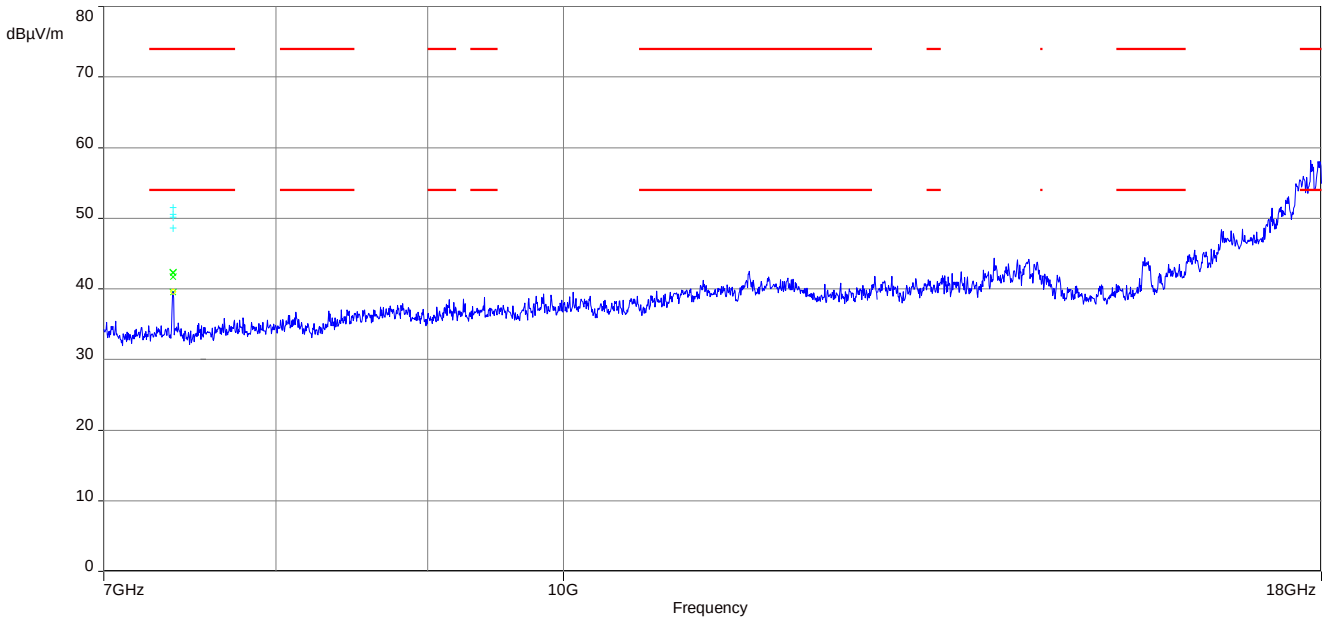


**Plot 9:** Highest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

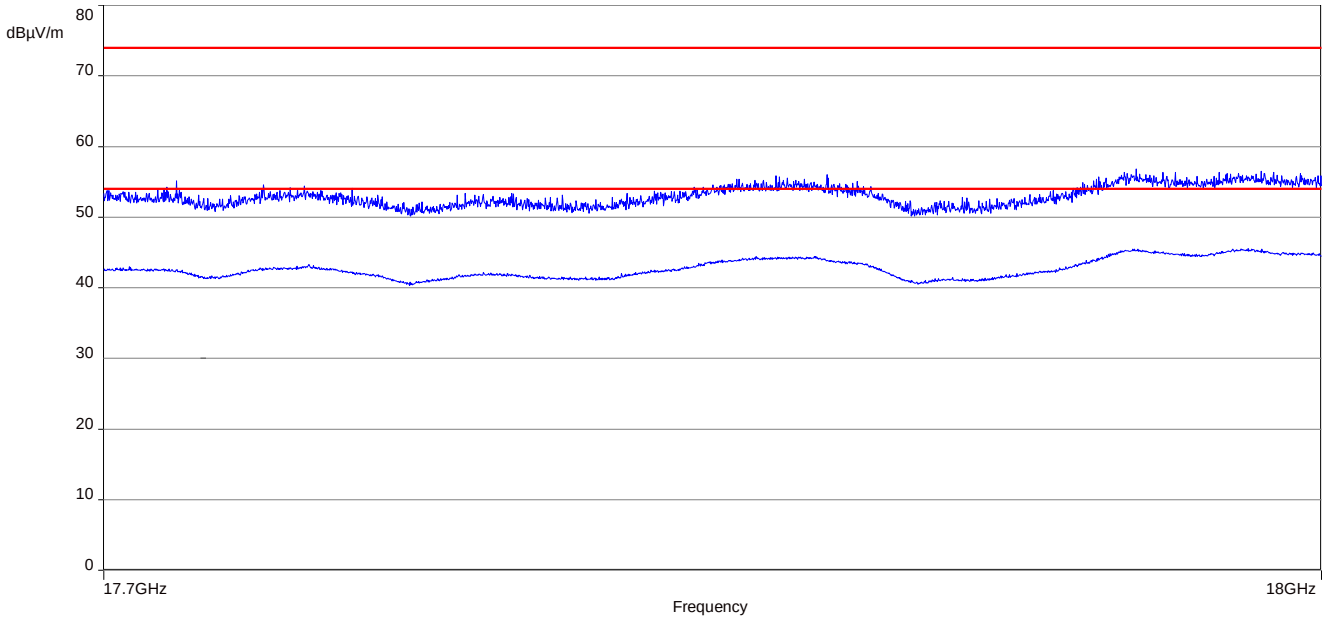



The carrier signal is notched with a 2.4 GHz band rejection filter.

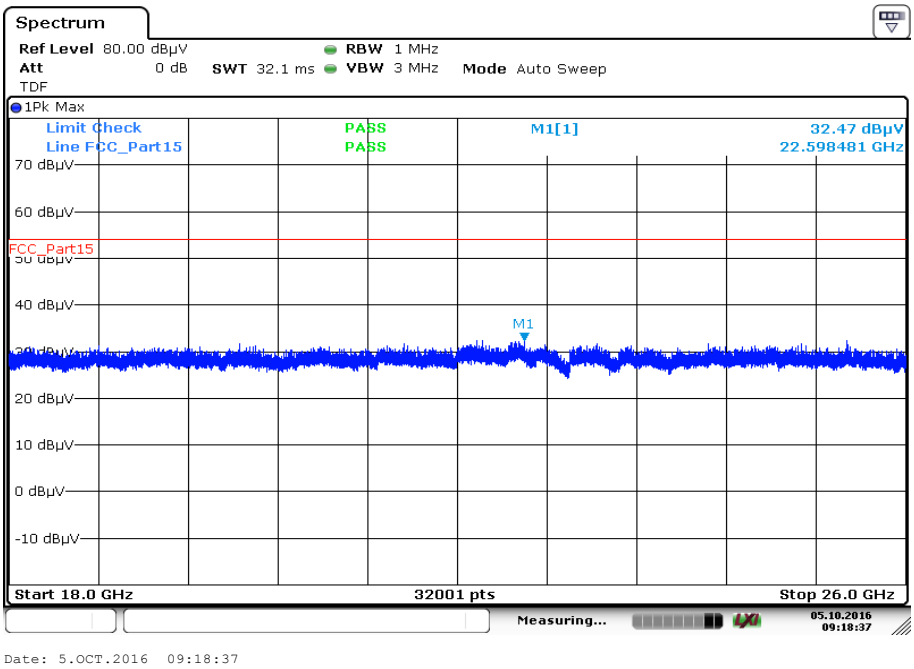
**Plot 10:** Highest channel, 7 GHz to 18 GHz, vertical & horizontal polarization



**Plot 11:** Highest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization

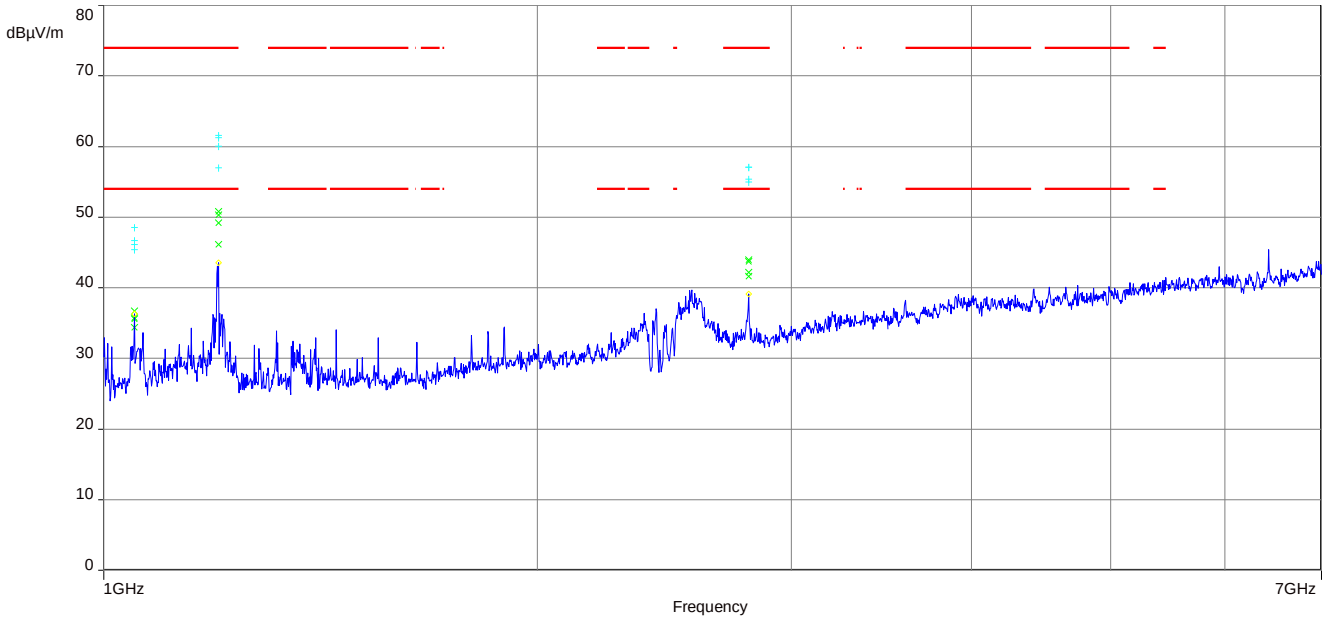



**Plot 12:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



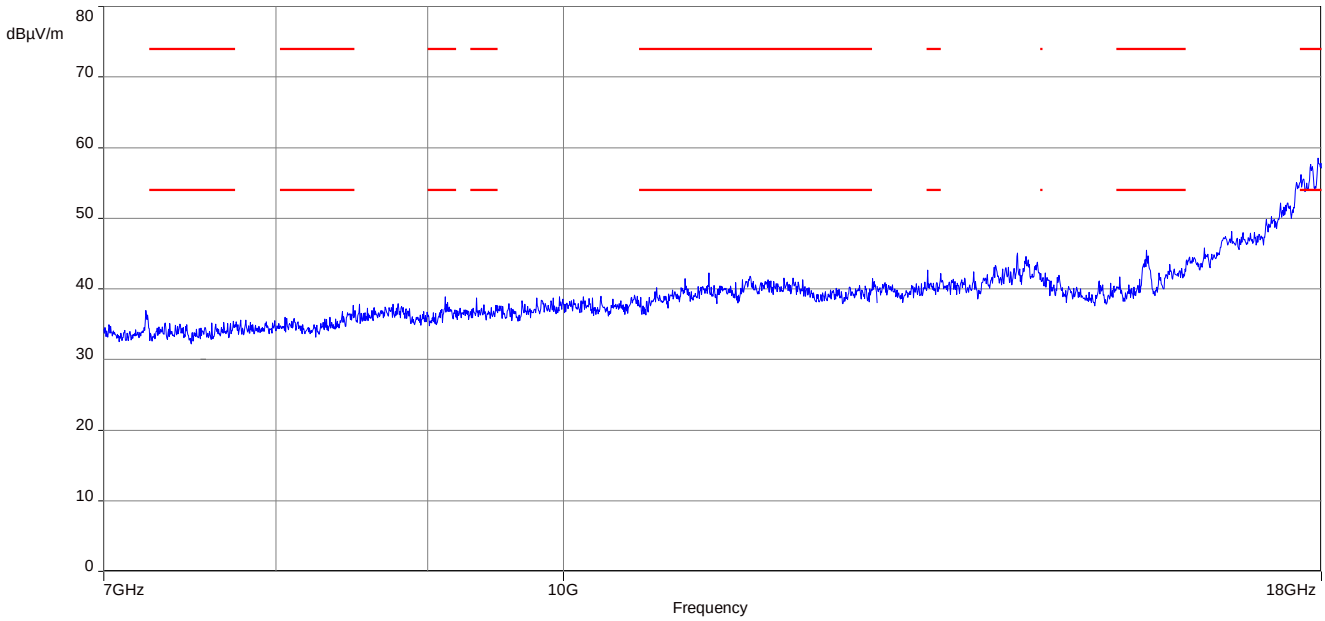
**Plots:** OFDM (20 MHz bandwidth), antenna 1

**Plot 1:** Lowest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

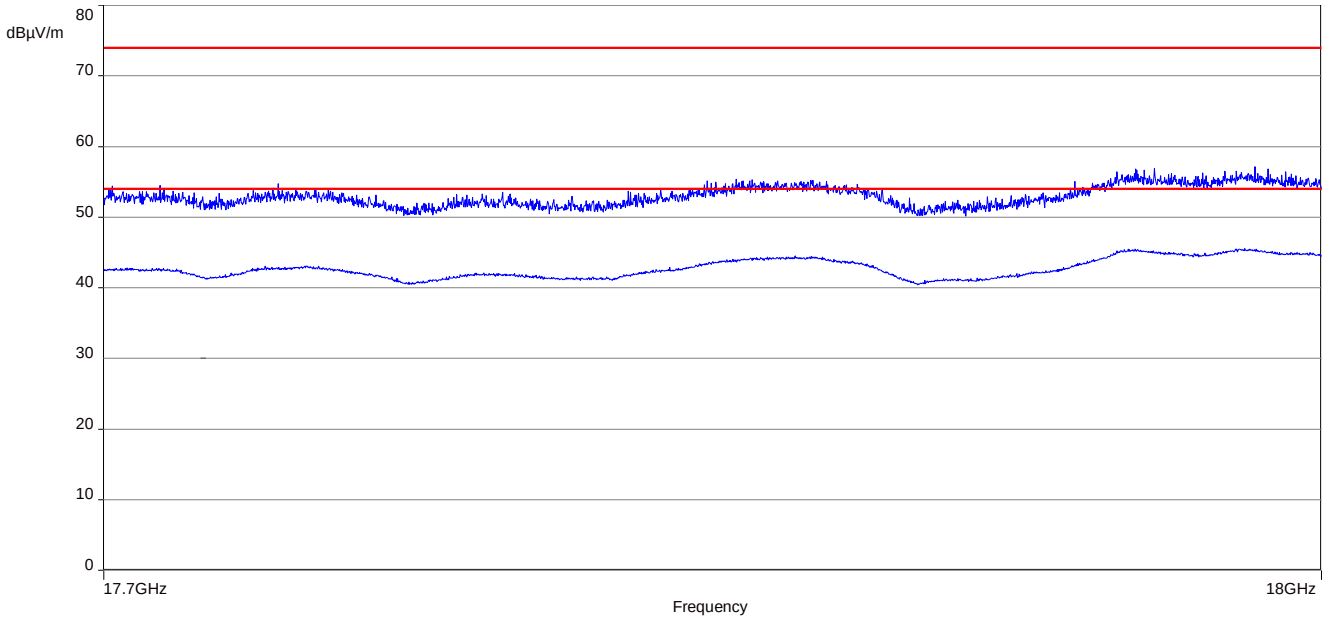



The carrier signal is notched with a 2.4 GHz band rejection filter.

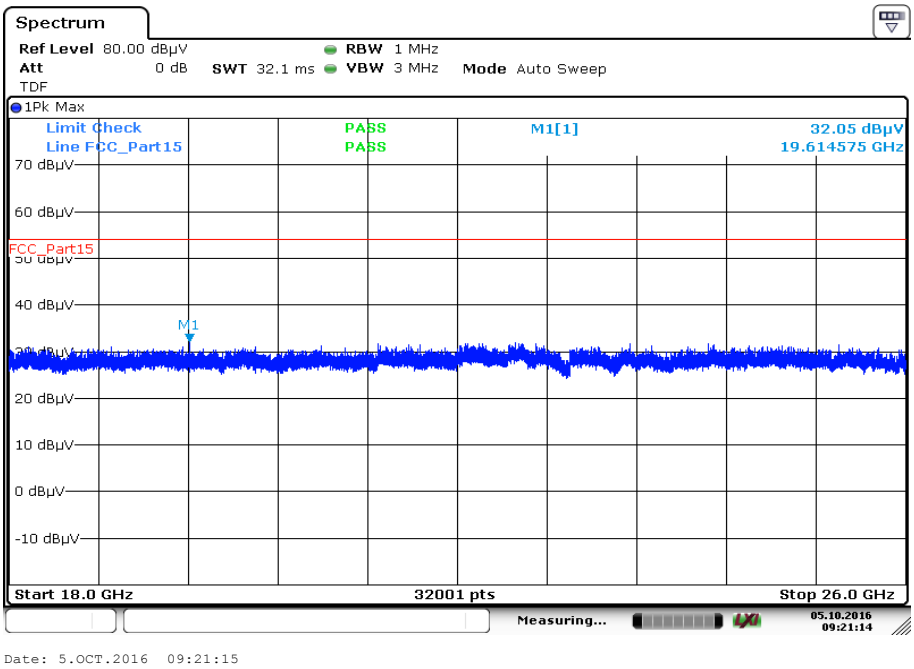
**Plot 2:** Lowest channel, 7 GHz to 18 GHz, vertical & horizontal polarization



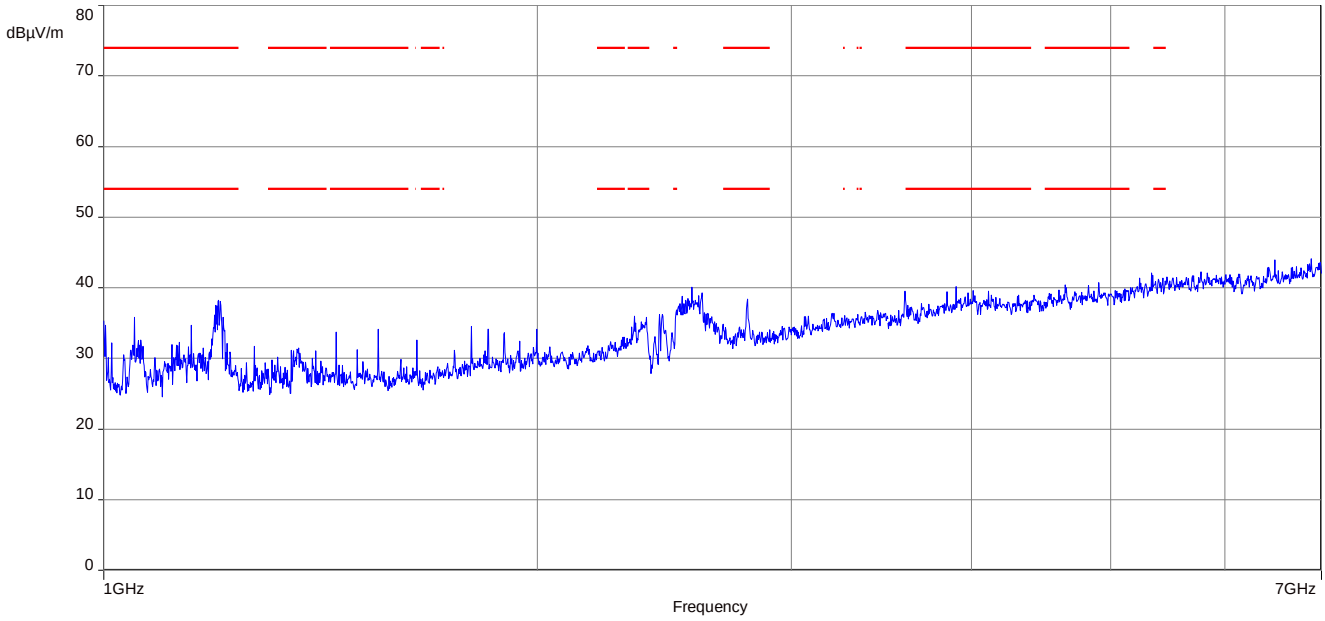
**Plot 3:** Lowest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization




**Plot 4:** Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

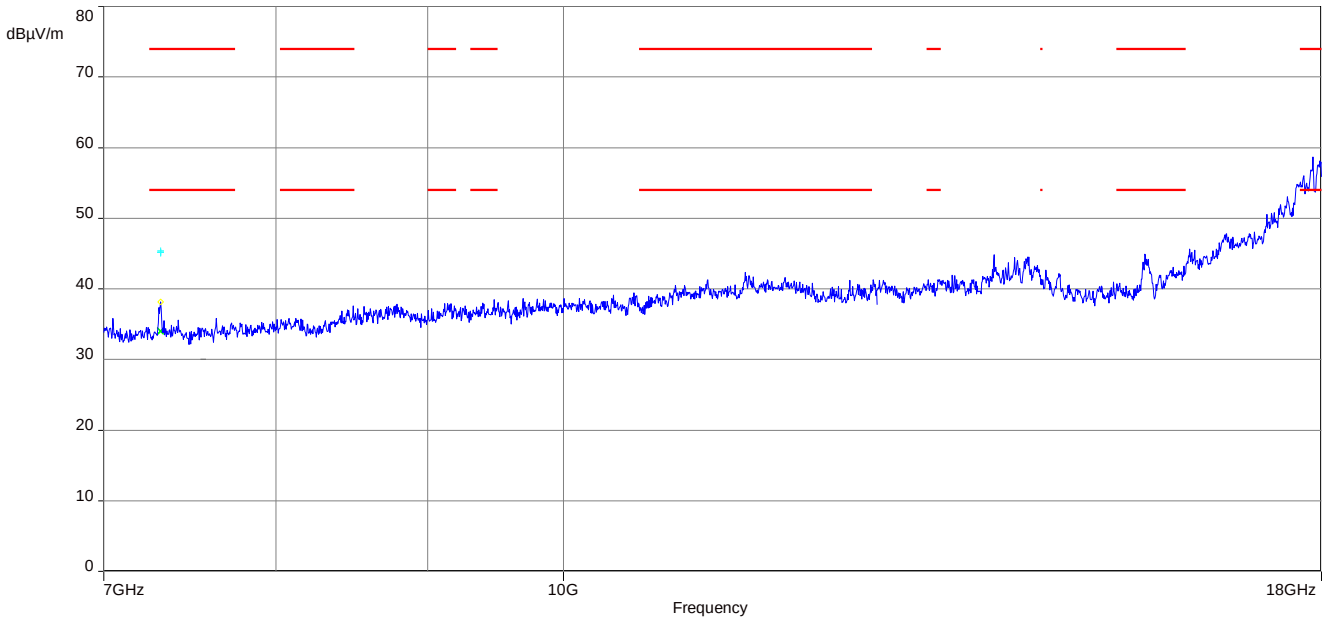


**Plot 5:** Middle channel, 1 GHz to 7 GHz, vertical & horizontal polarization

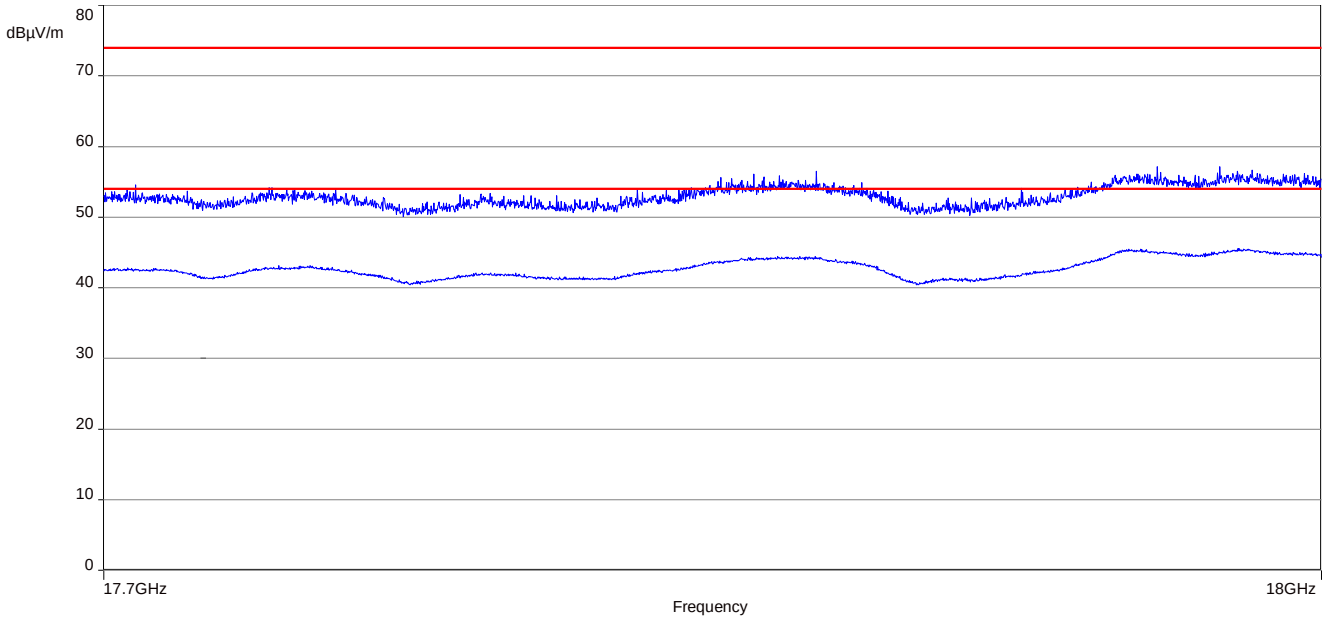



The carrier signal is notched with a 2.4 GHz band rejection filter.

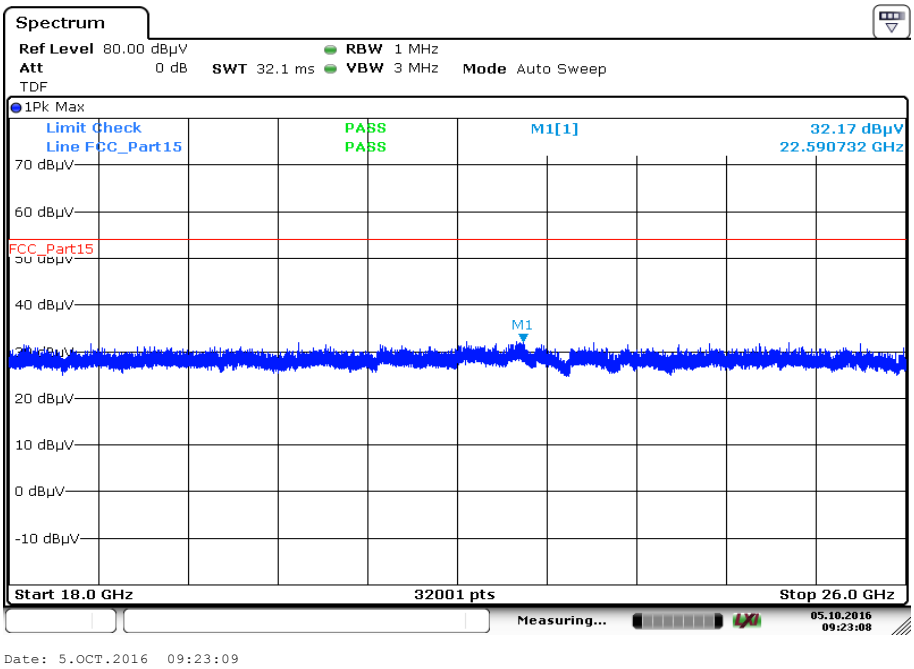
**Plot 6:** Middle channel, 7 GHz to 18 GHz, vertical & horizontal polarization



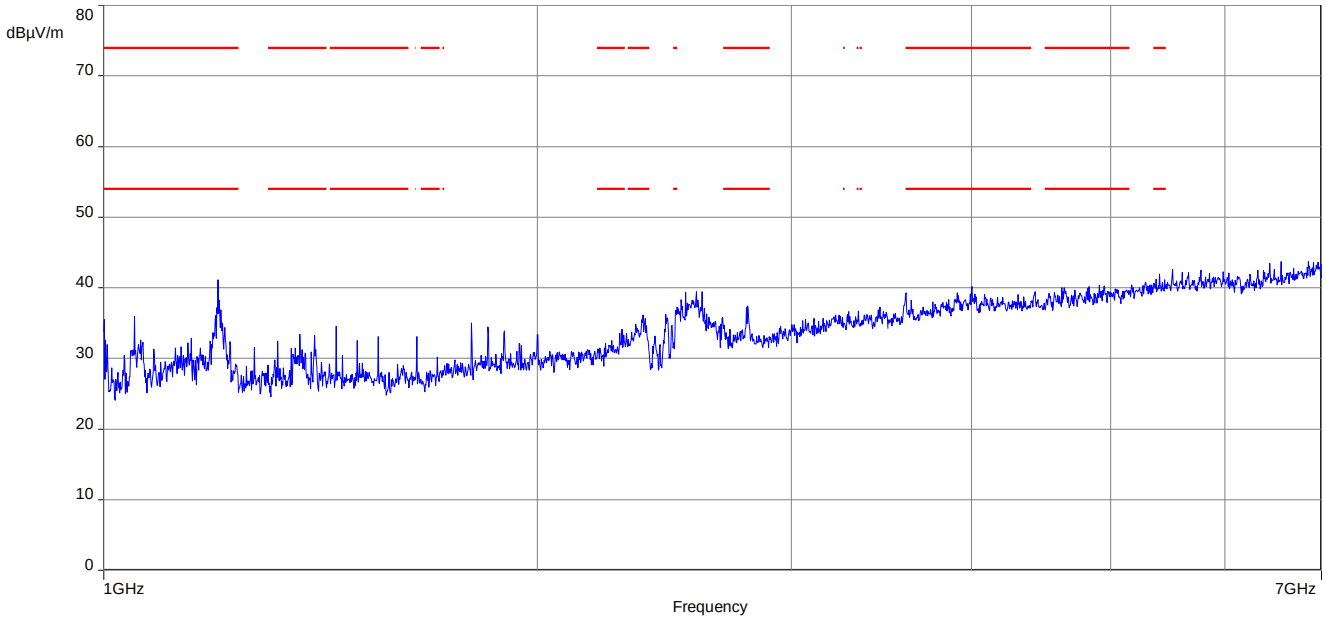
**Plot 7:** Middle channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization




**Plot 8:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

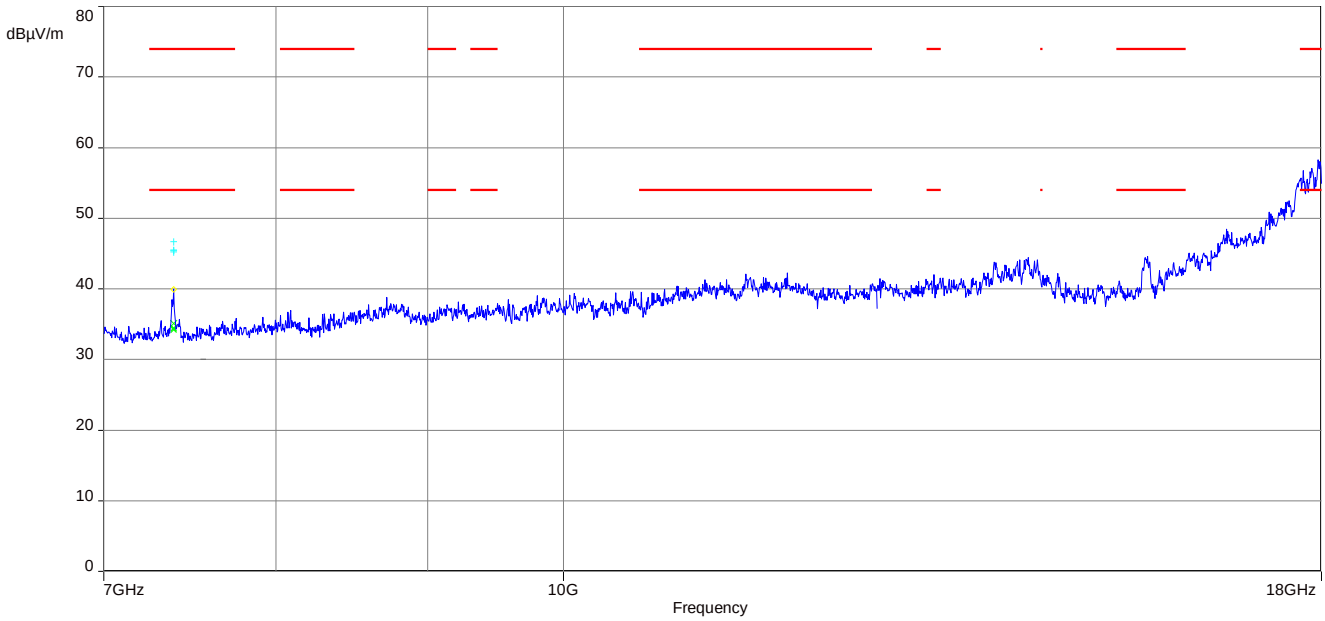


**Plot 9:** Highest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

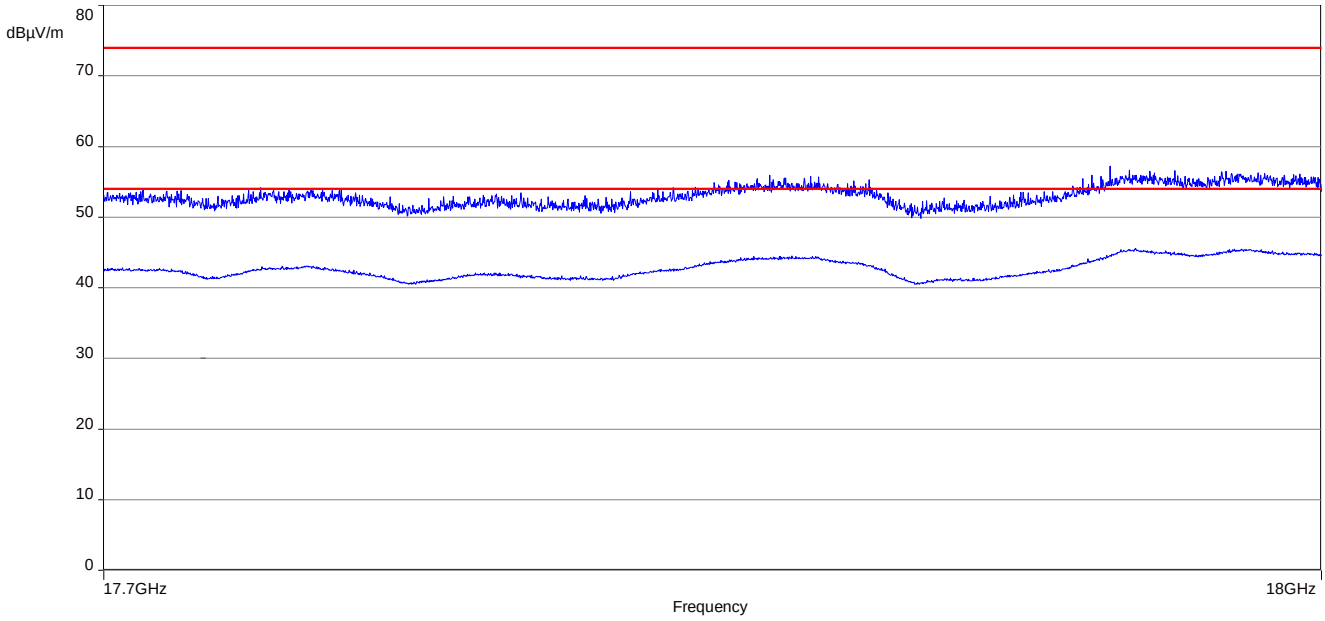



The carrier signal is notched with a 2.4 GHz band rejection filter.

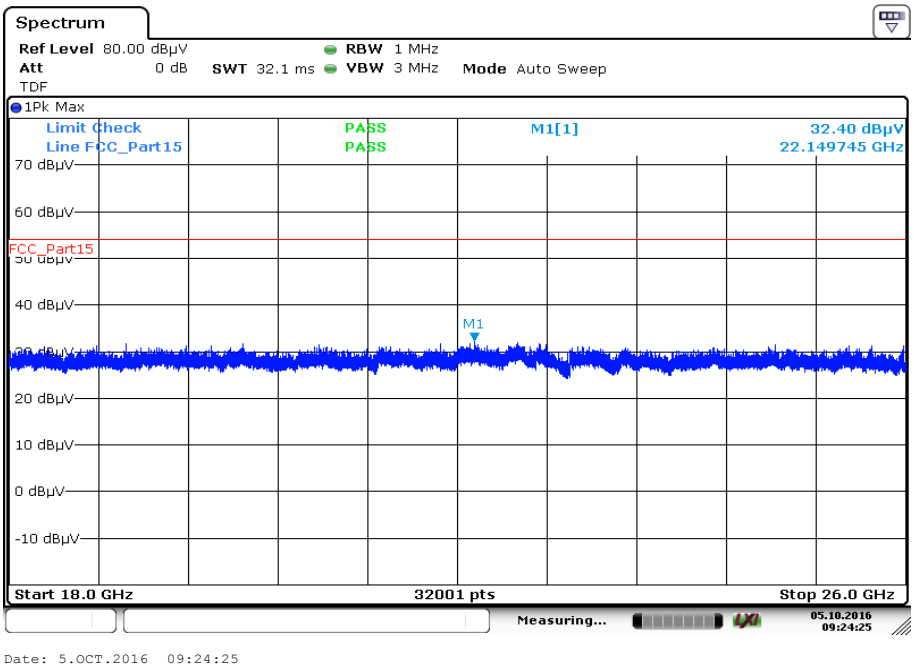
**Plot 10:** Highest channel, 7 GHz to 18 GHz, vertical & horizontal polarization



**Plot 11:** Highest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization

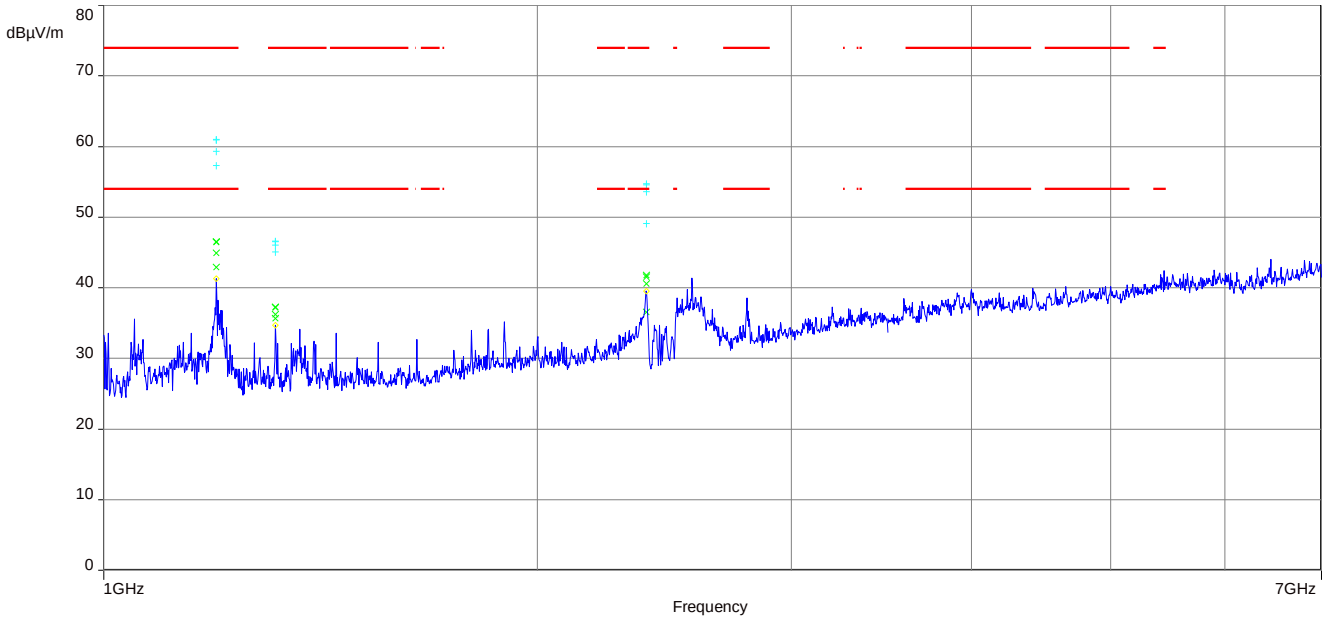



**Plot 12:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



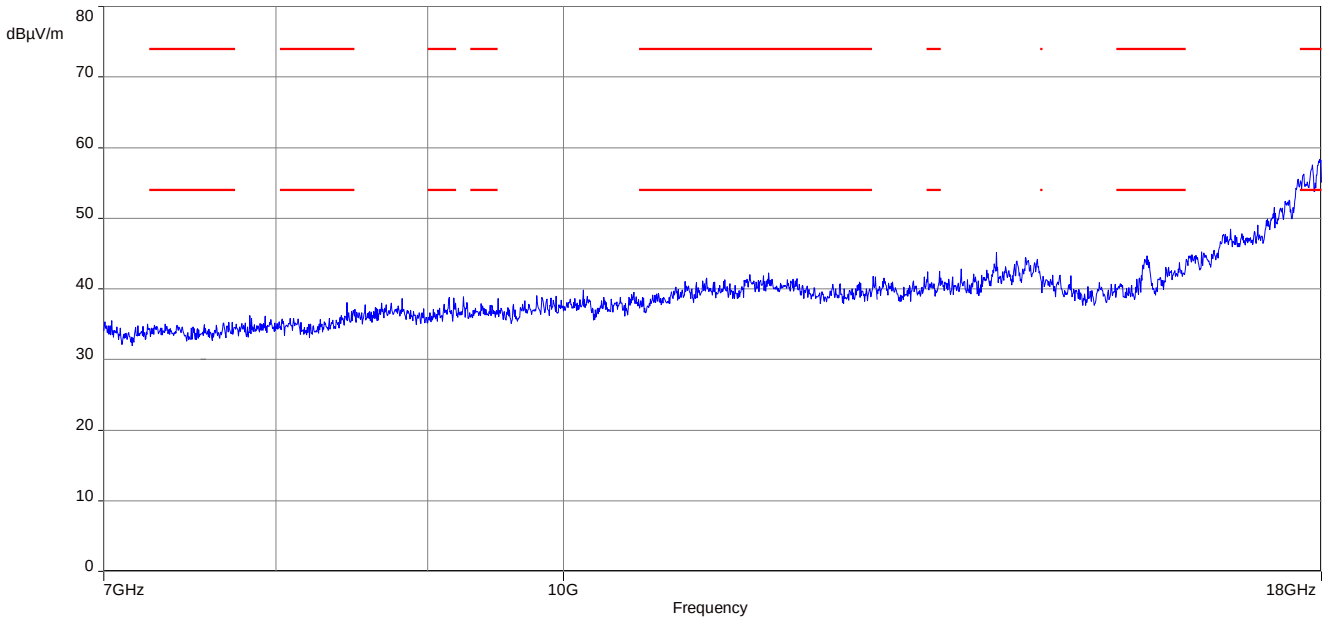
**Plots:** OFDM (40 MHz bandwidth), antenna 1

**Plot 1:** Lowest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

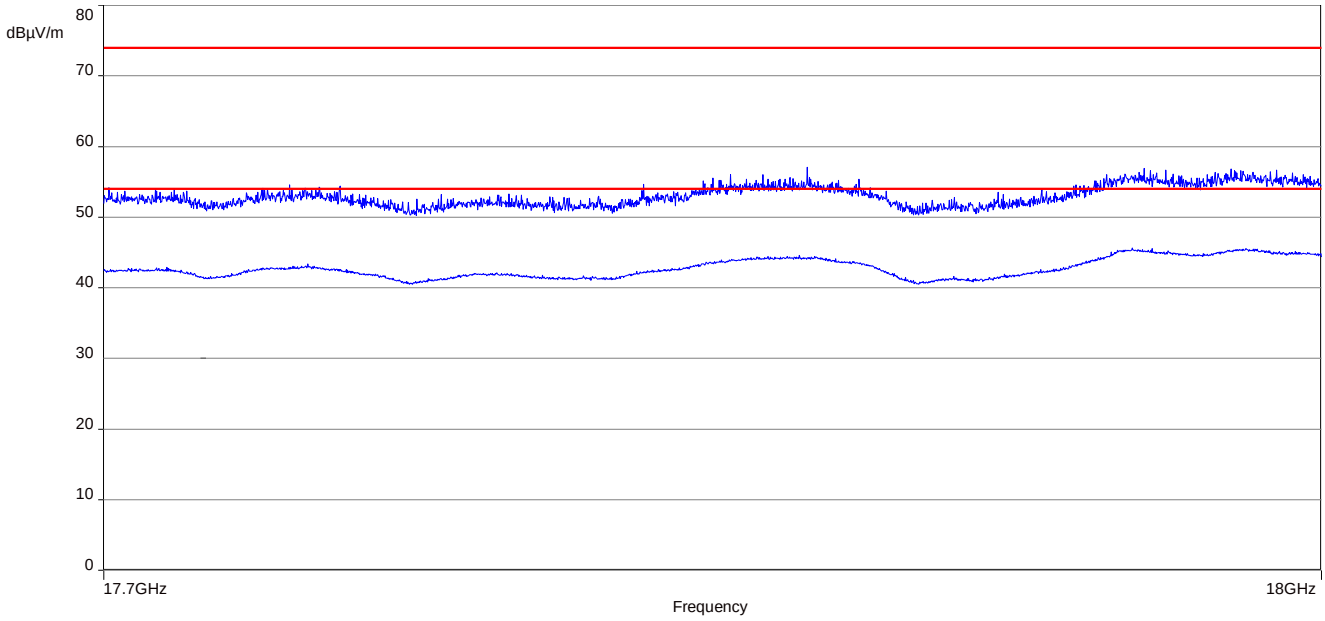



The carrier signal is notched with a 2.4 GHz band rejection filter.

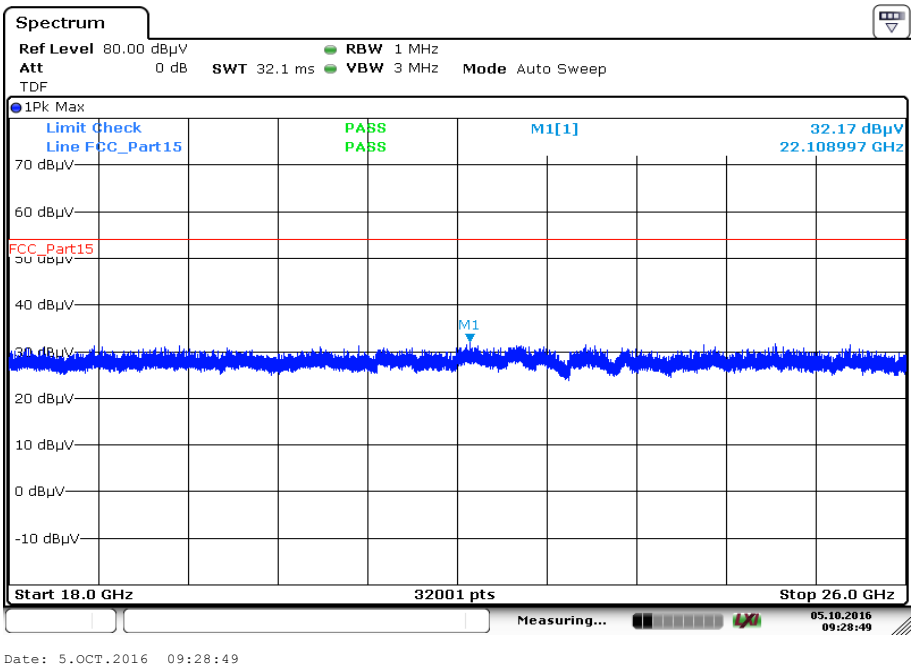
**Plot 2:** Lowest channel, 7 GHz to 18 GHz, vertical & horizontal polarization



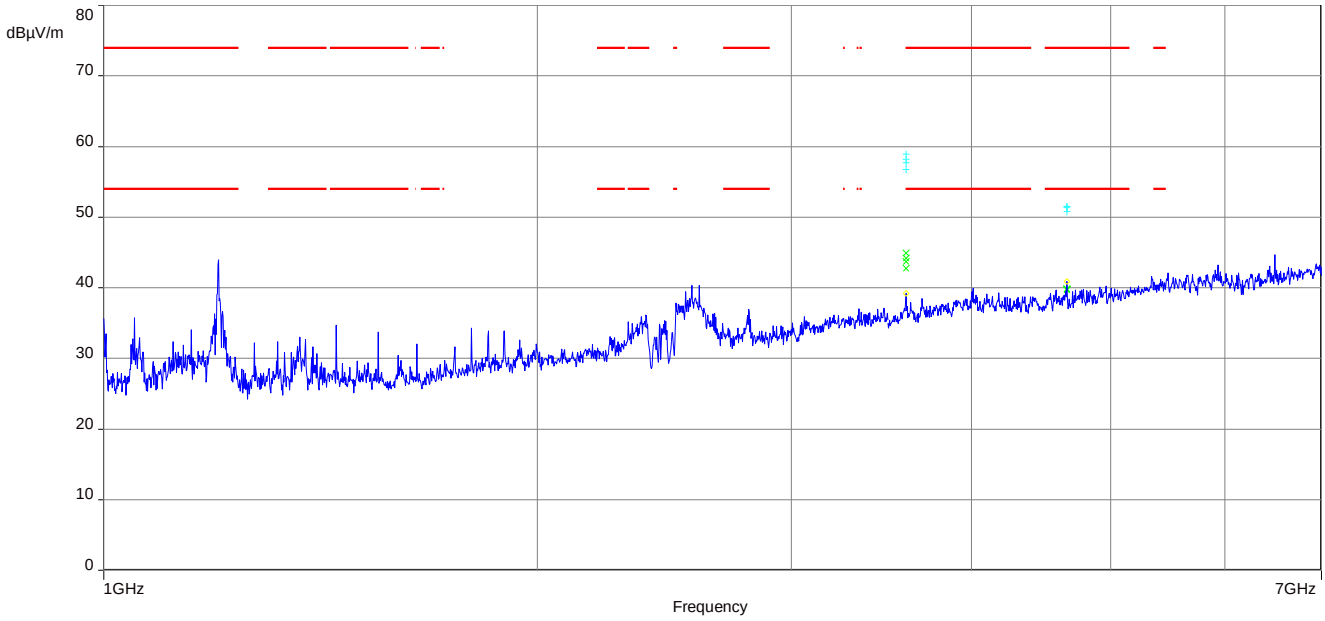
**Plot 3:** Lowest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization




**Plot 4:** Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

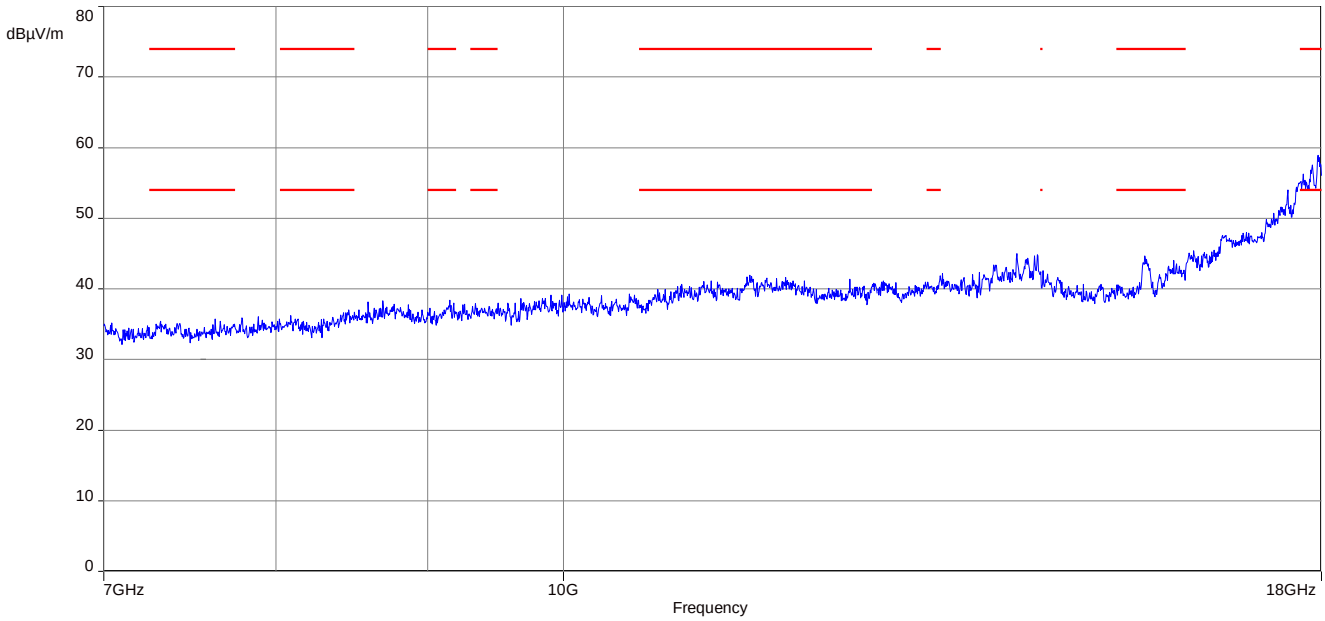


**Plot 5:** Middle channel, 1 GHz to 7 GHz, vertical & horizontal polarization

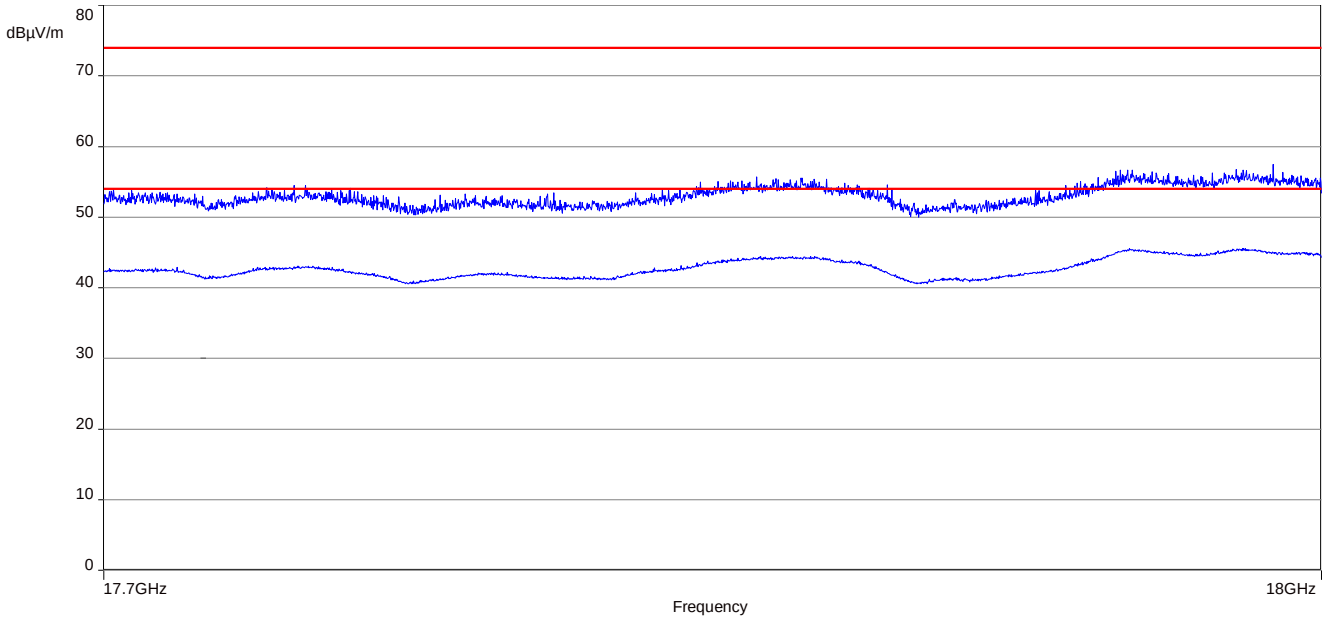



The carrier signal is notched with a 2.4 GHz band rejection filter.

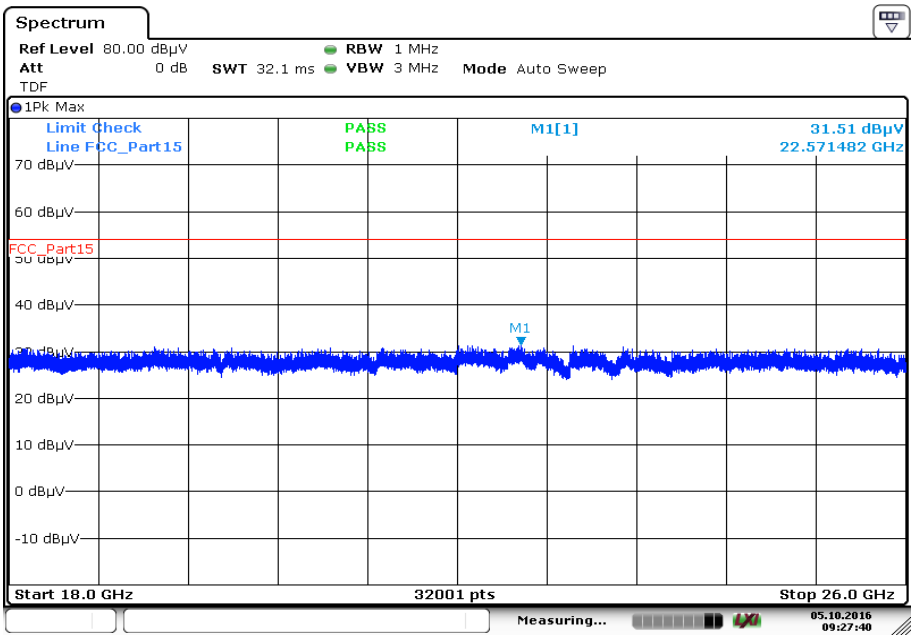
**Plot 6:** Middle channel, 7 GHz to 18 GHz, vertical & horizontal polarization



**Plot 7:** Middle channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization




**Plot 8:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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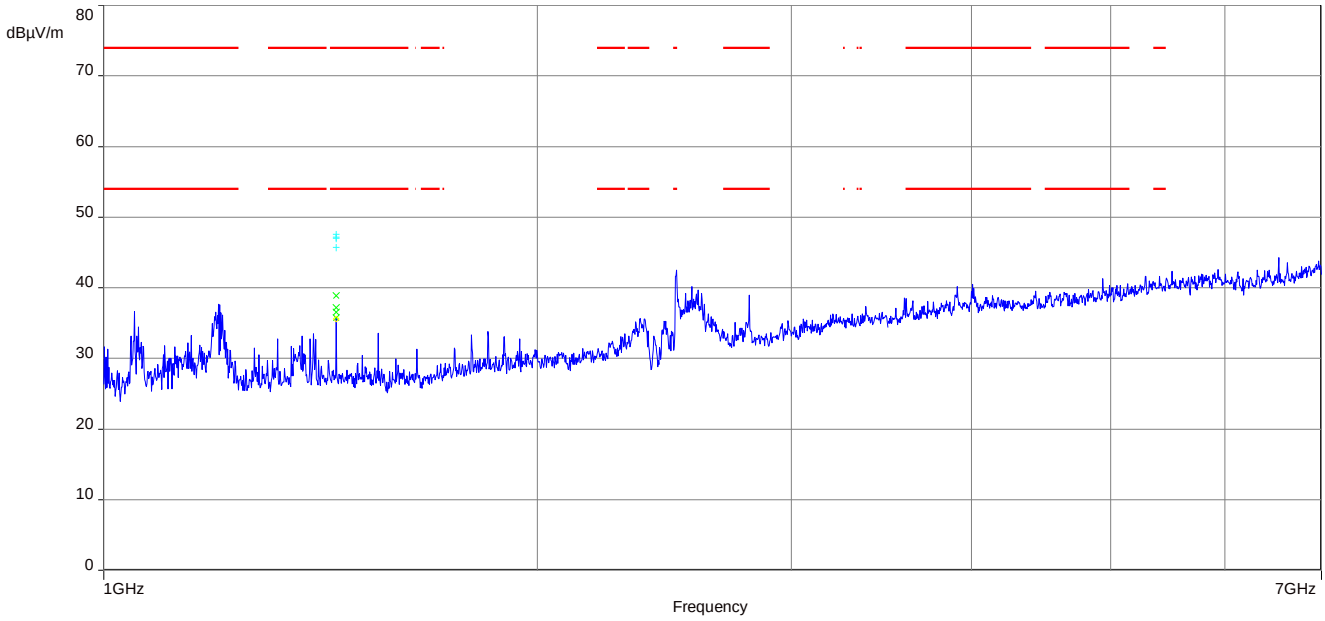
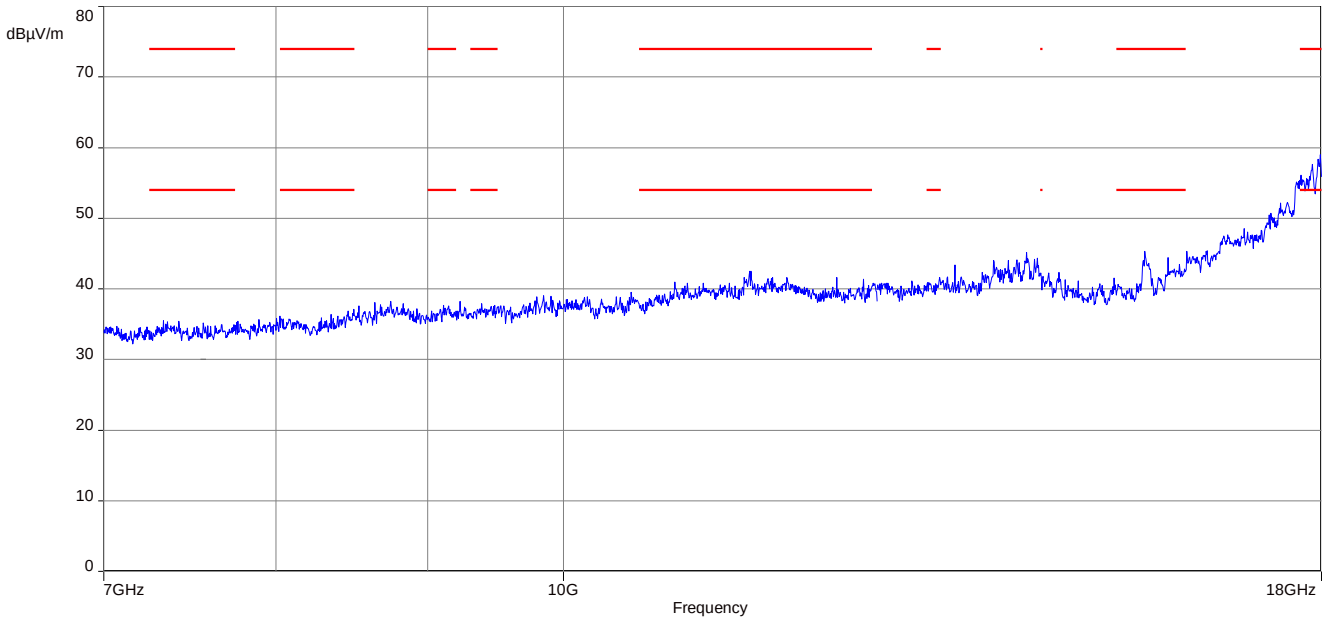
**Plot 9:** Highest channel, 1 GHz to 7 GHz, vertical & horizontal polarization

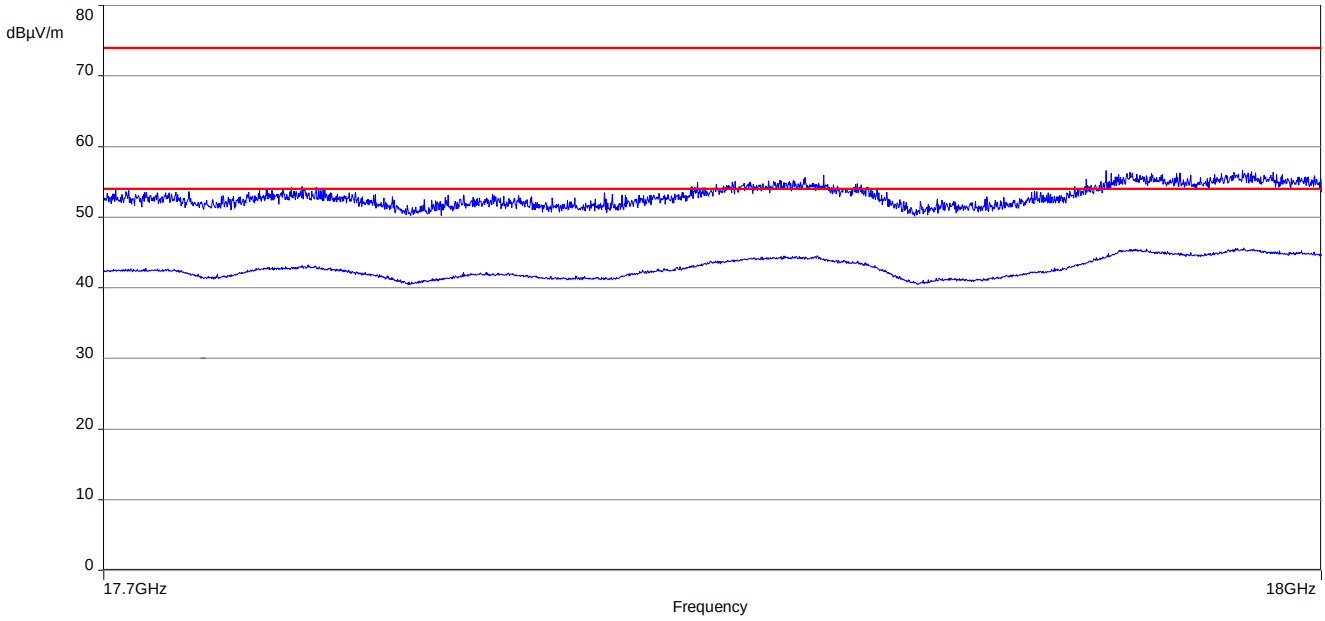



The carrier signal is notched with a 2.4 GHz band rejection filter.

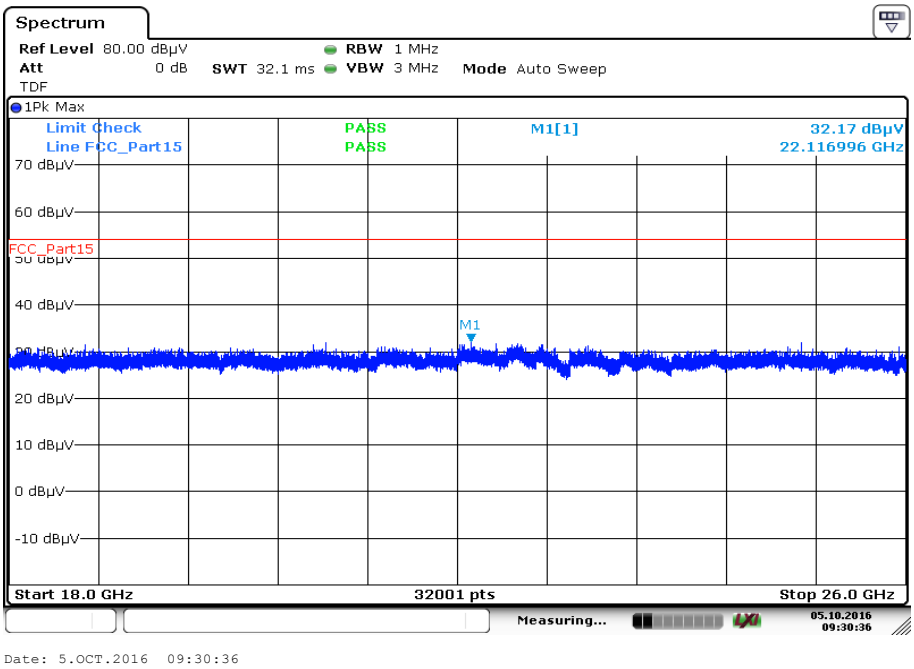
**Plot 10:** Highest channel, 7 GHz to 18 GHz, vertical & horizontal polarization



**Plot 11:** Highest channel, 17.7 GHz to 18 GHz, vertical & horizontal polarization

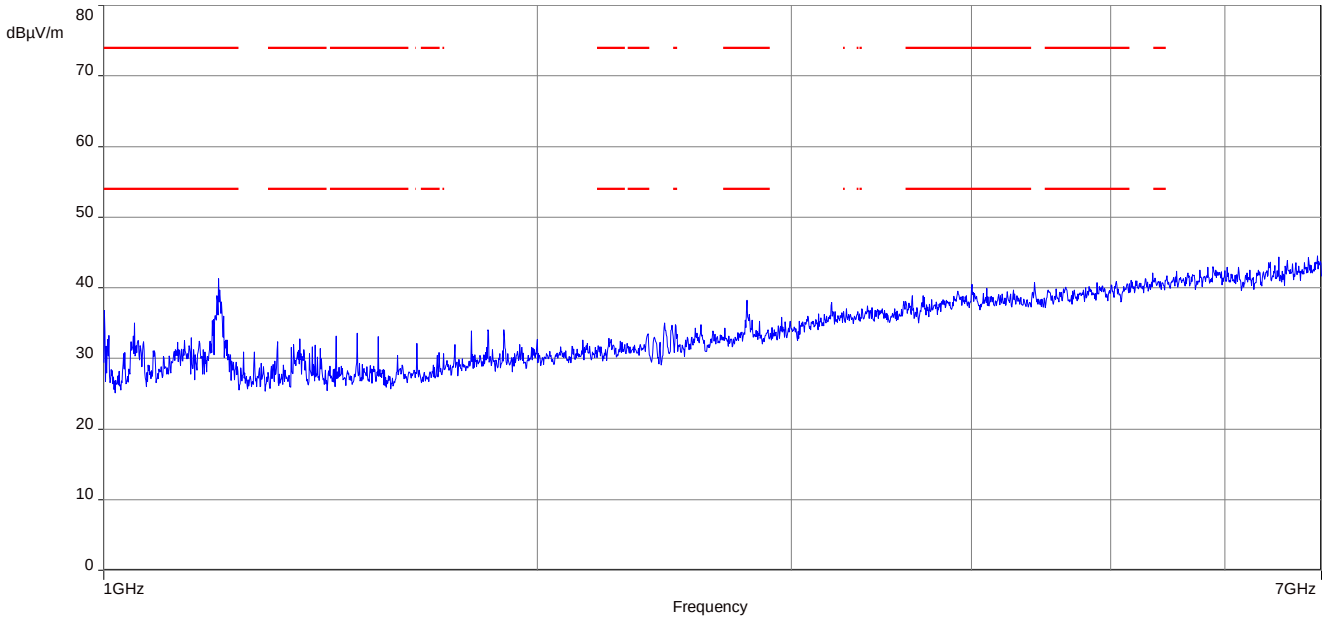



**Plot 12:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

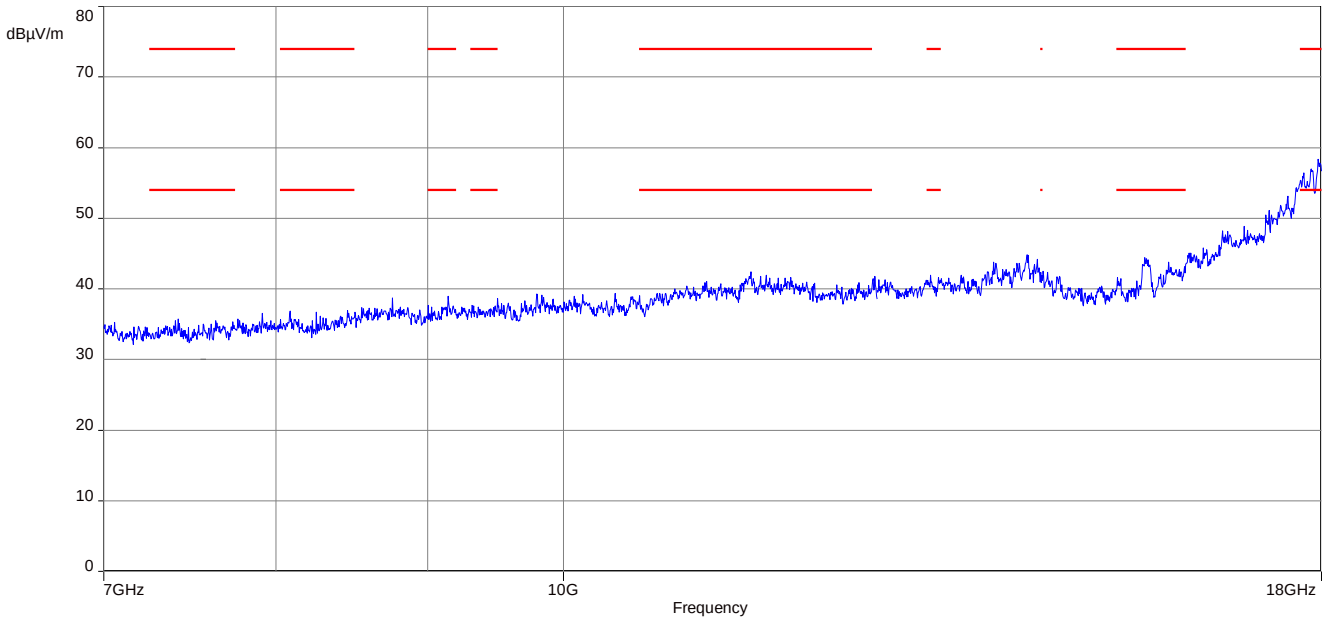


**Plots:** RX / idle mode, antenna 1

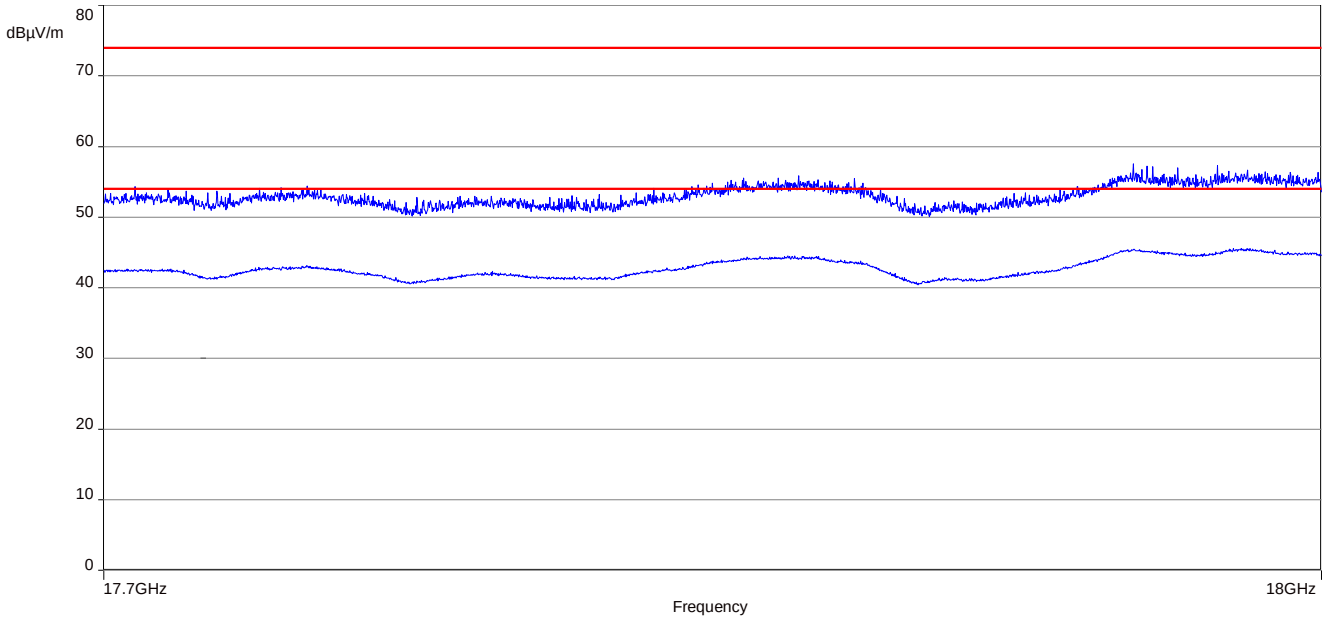
**Plot 1:** 1 GHz to 7 GHz, vertical & horizontal polarization



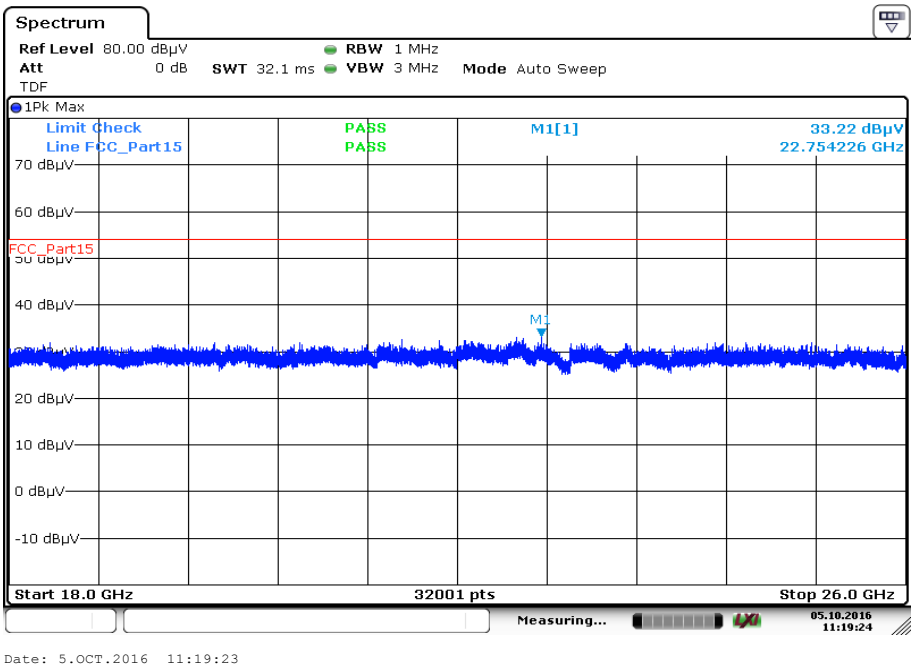

**Plot 2:** 7 GHz to 18 GHz, vertical & horizontal polarization



**Plot 3:** 17.7 GHz to 18 GHz, vertical & horizontal polarization

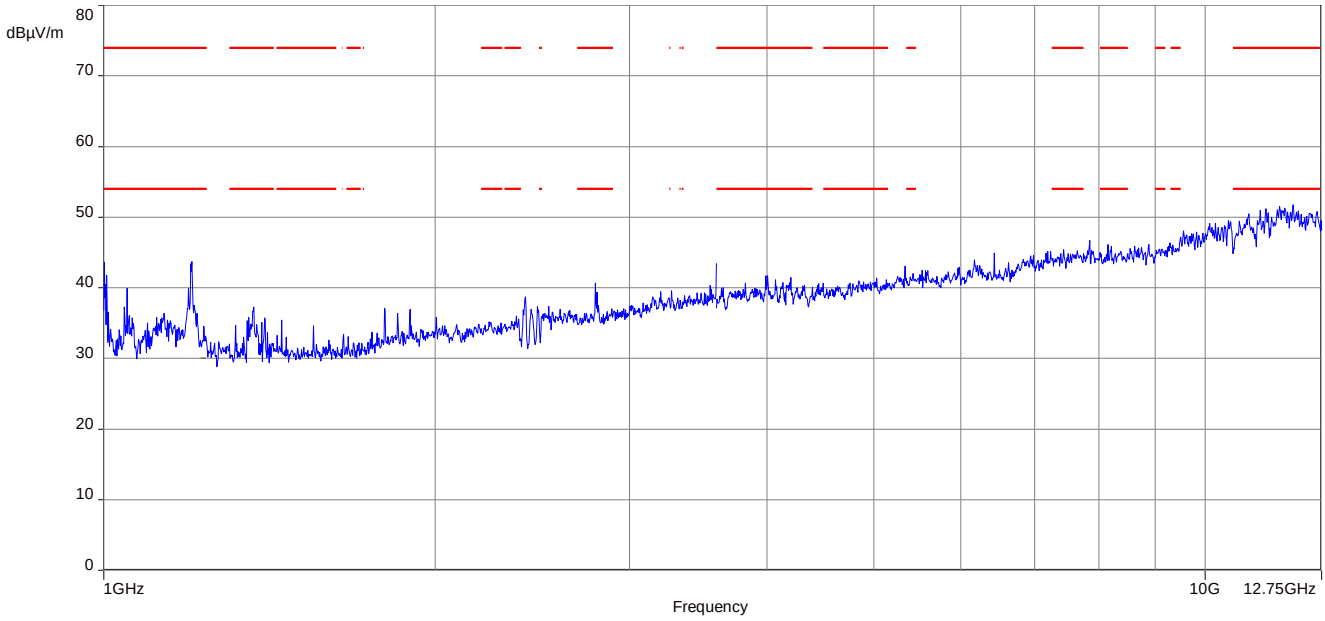



**Plot 4:** 18 GHz to 26 GHz, vertical & horizontal polarization



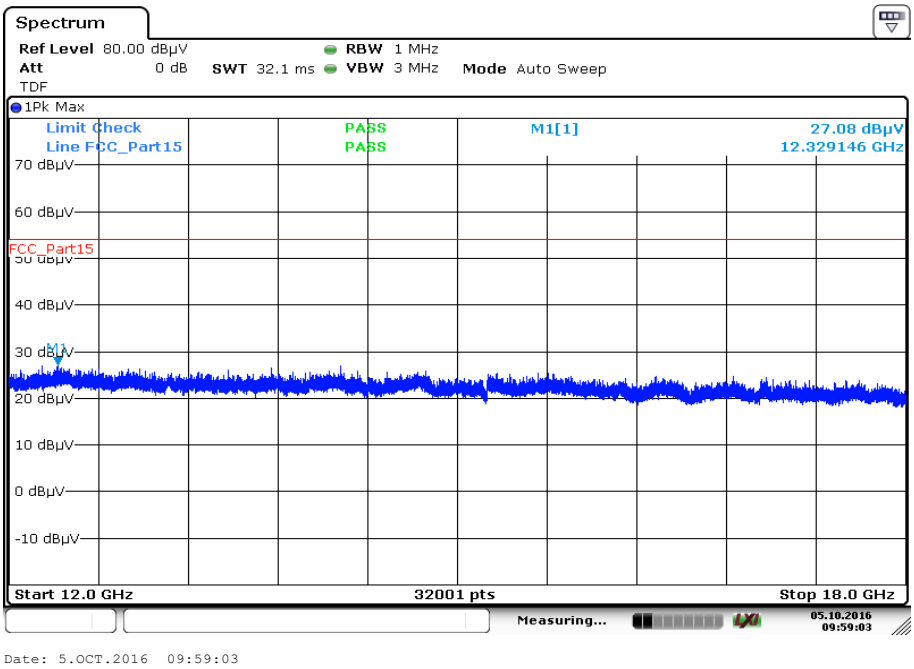
**Plots:** DSSS, antenna 2

**Plot 1:** Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

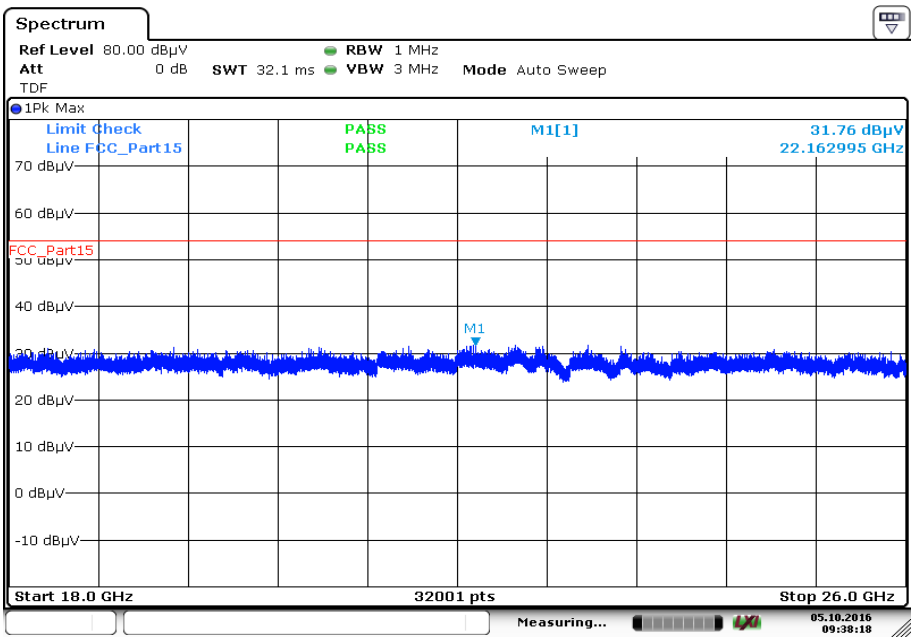



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 2:** Lowest channel, 12 GHz to 18 GHz, vertical & horizontal polarization



**Plot 3:** Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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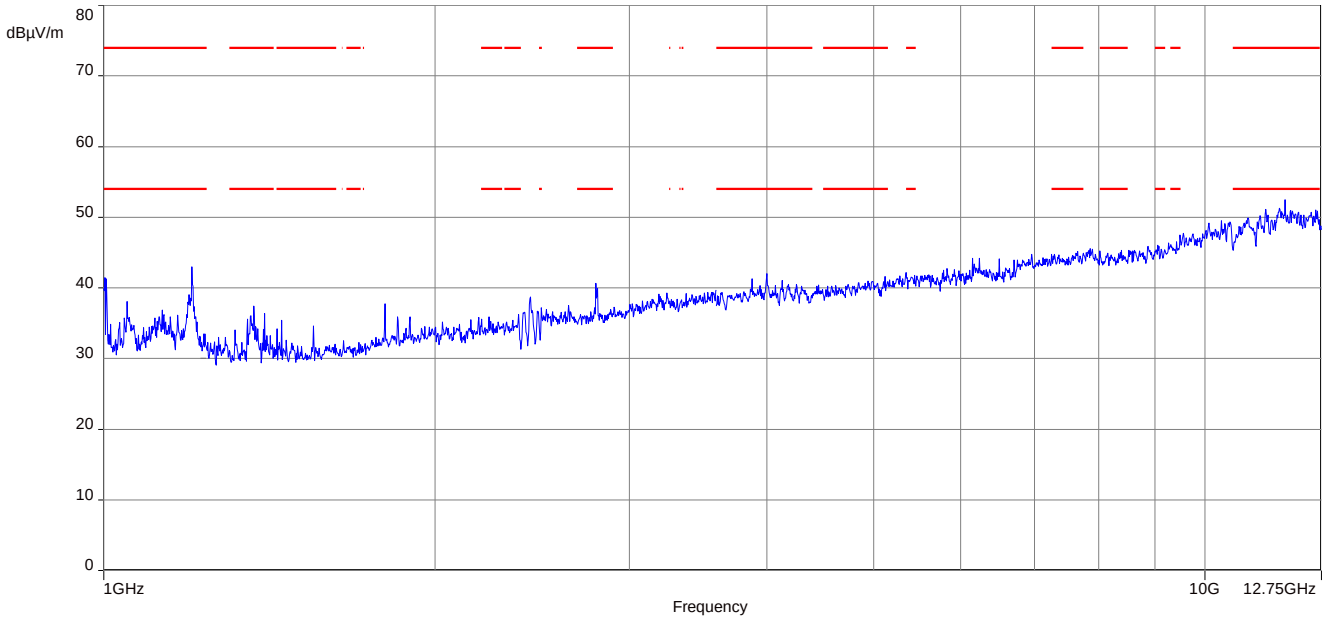
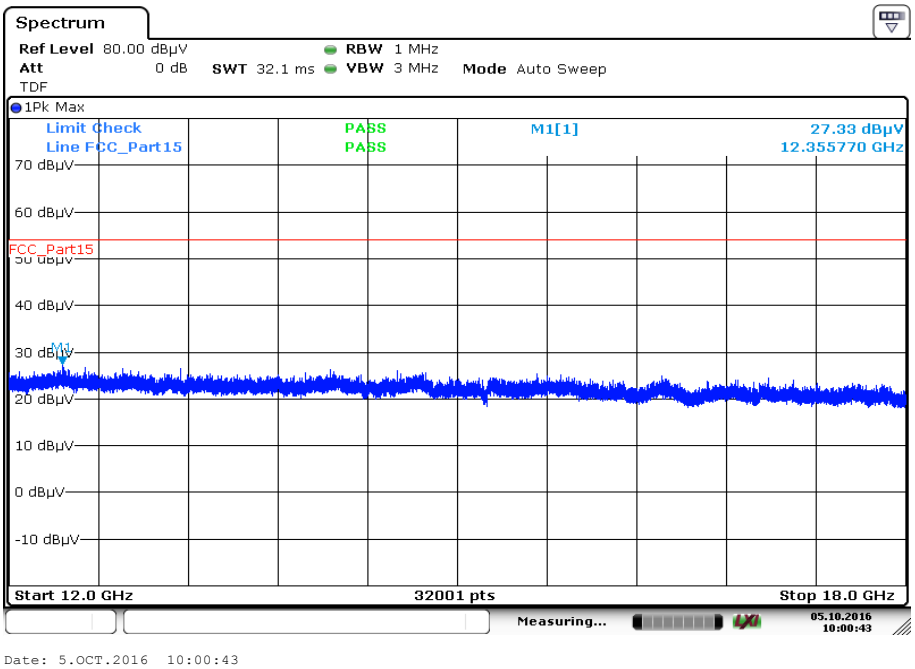
**Plot 4:** Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

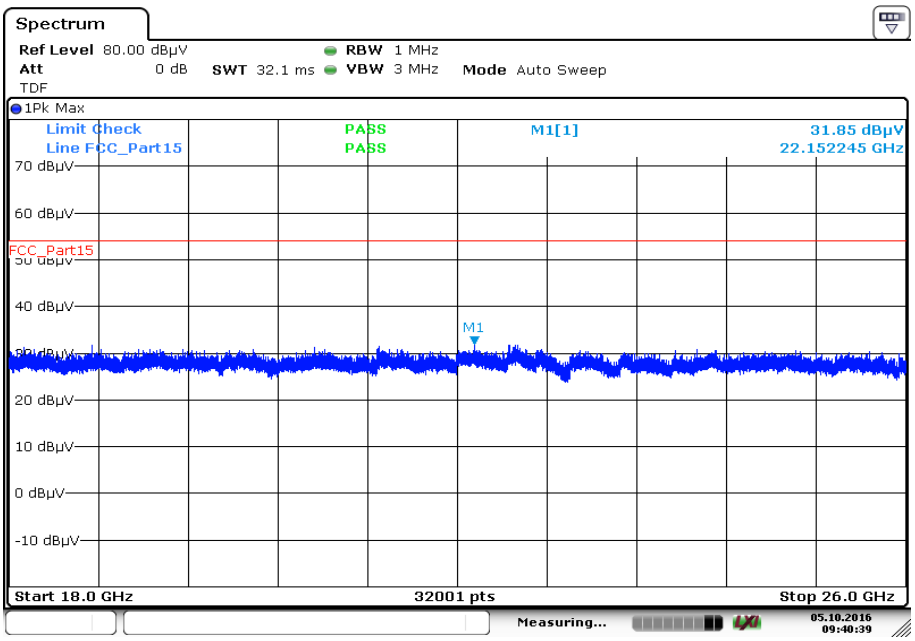



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 5:** Middle channel, 12 GHz to 18 GHz, vertical & horizontal polarization



**Plot 6:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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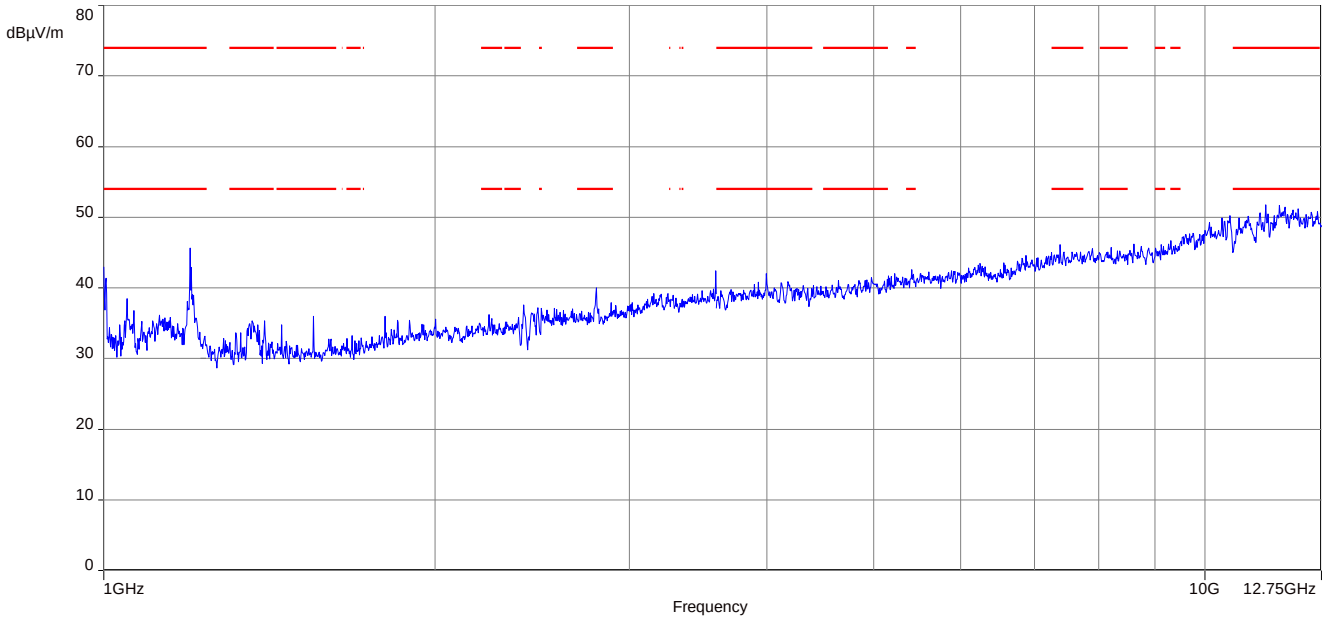
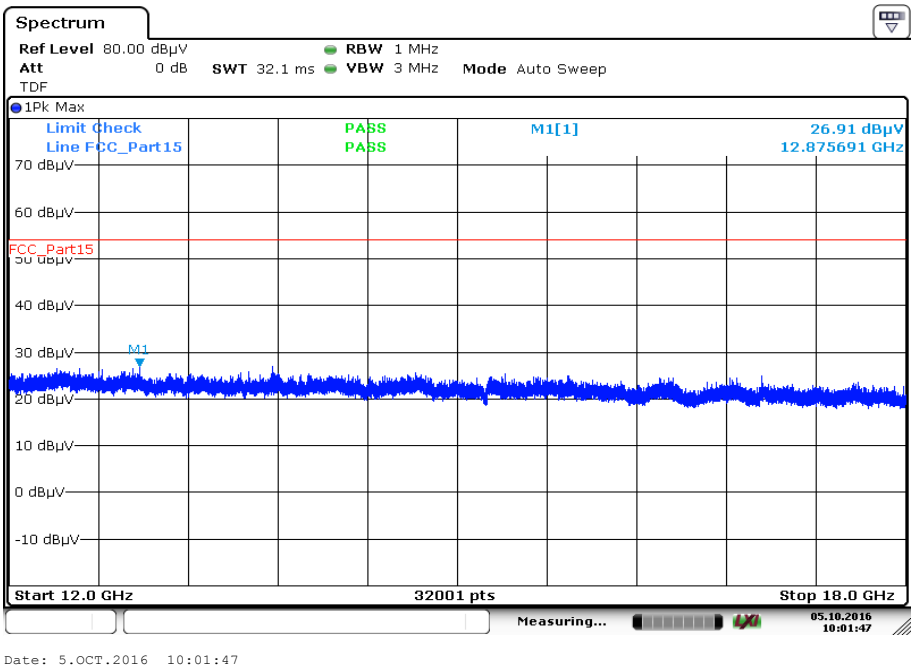
**Plot 7:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

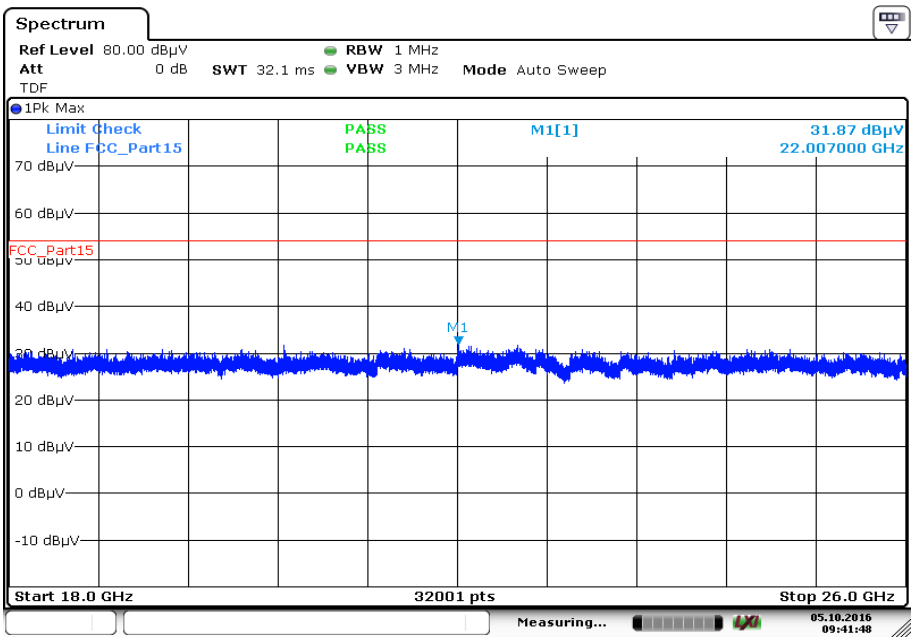



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 9:** Highest channel, 12 GHz to 18 GHz, vertical & horizontal polarization



**Plot 12:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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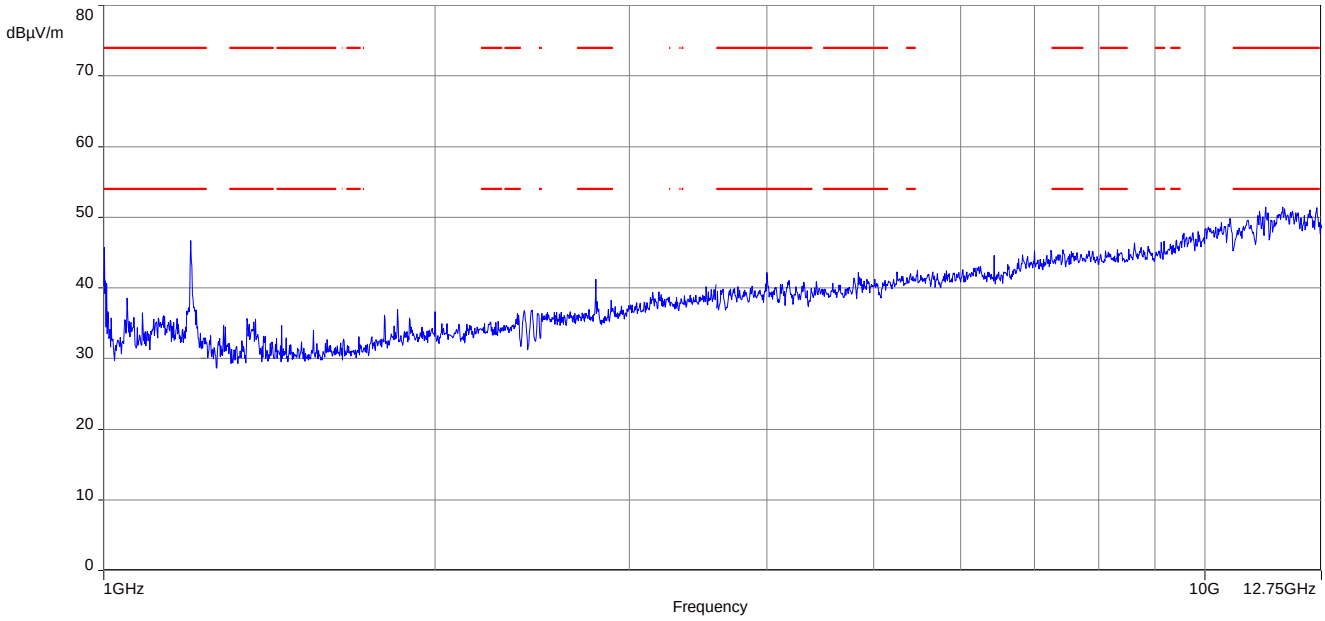
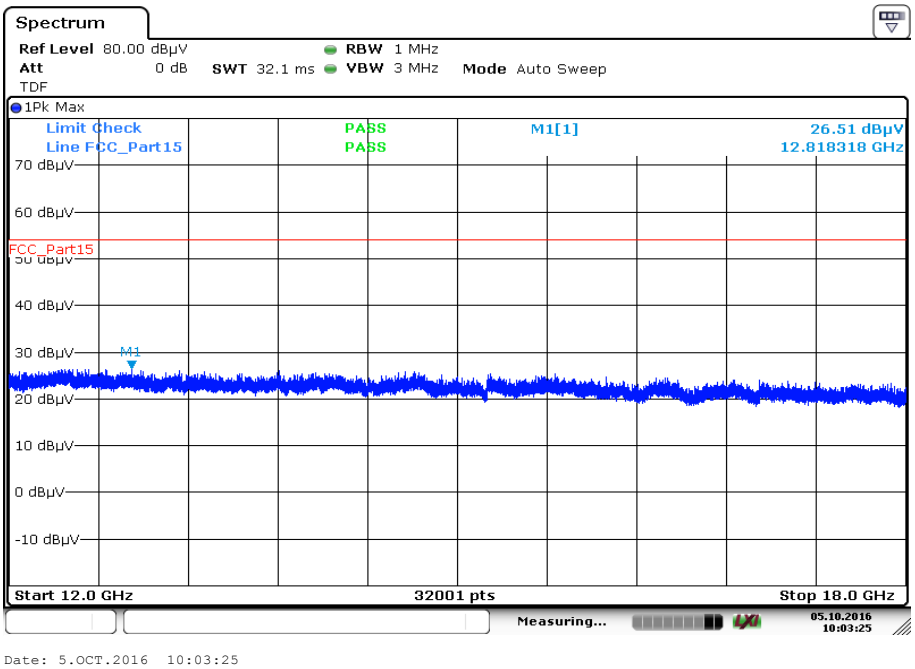
**Plots:** OFDM (20 MHz bandwidth), antenna 2

**Plot 1:** Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

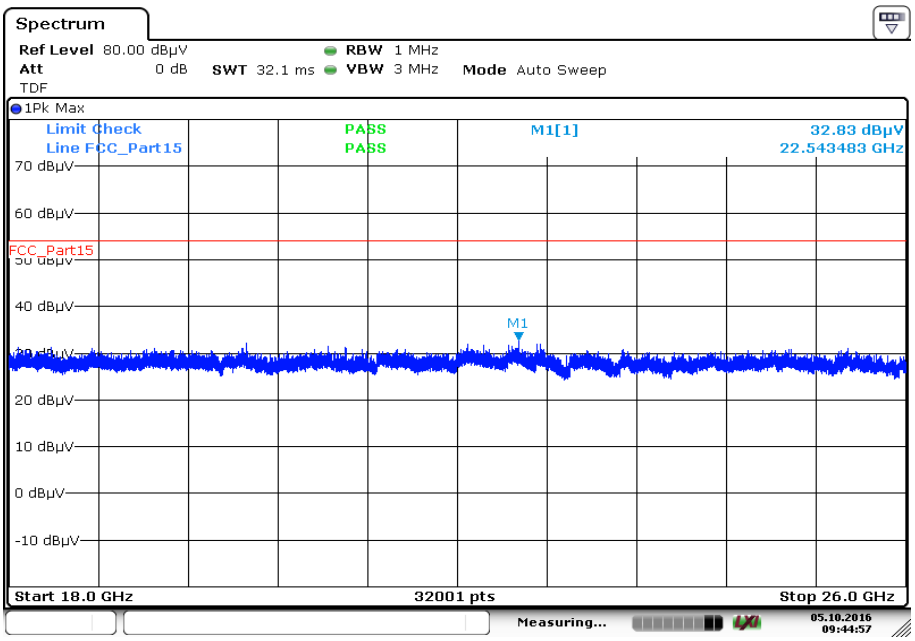



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 2:** Lowest channel, 12 GHz to 18 GHz, vertical & horizontal polarization



**Plot 3:** Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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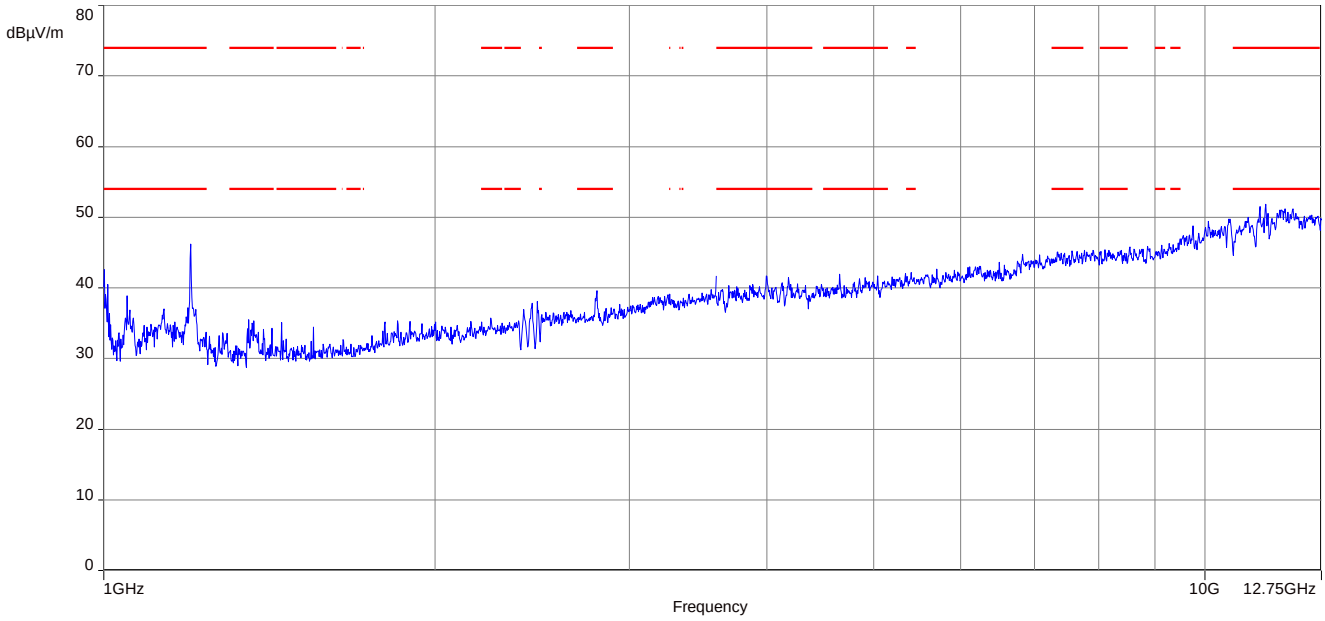
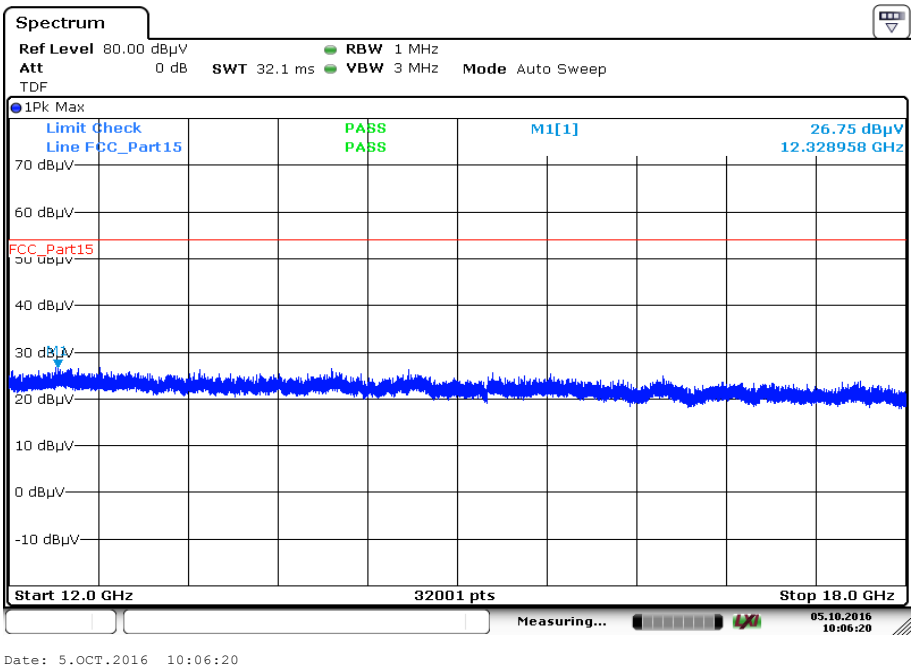
**Plot 4:** Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

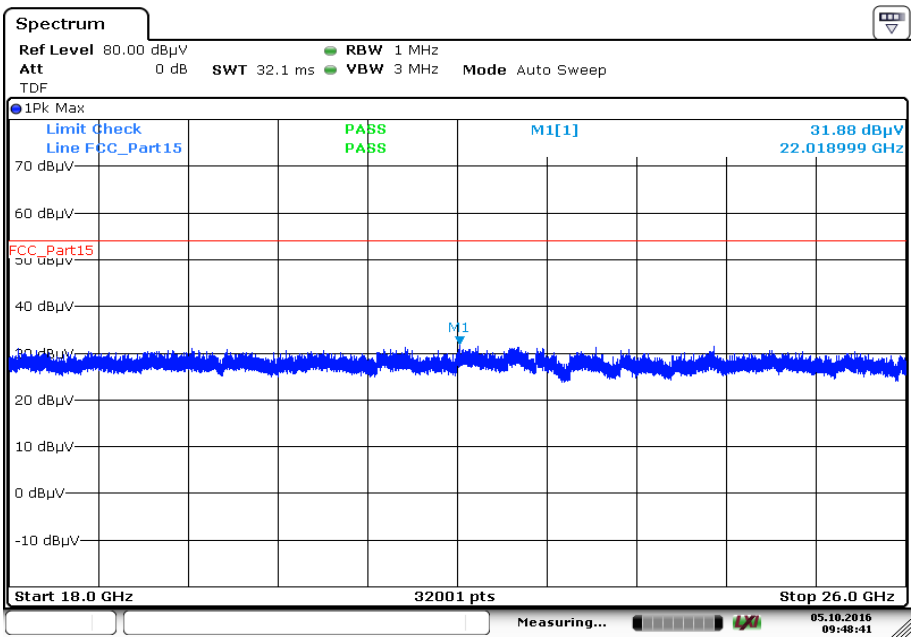



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 5:** Middle channel, 12 GHz to 18 GHz, vertical & horizontal polarization



**Plot 6:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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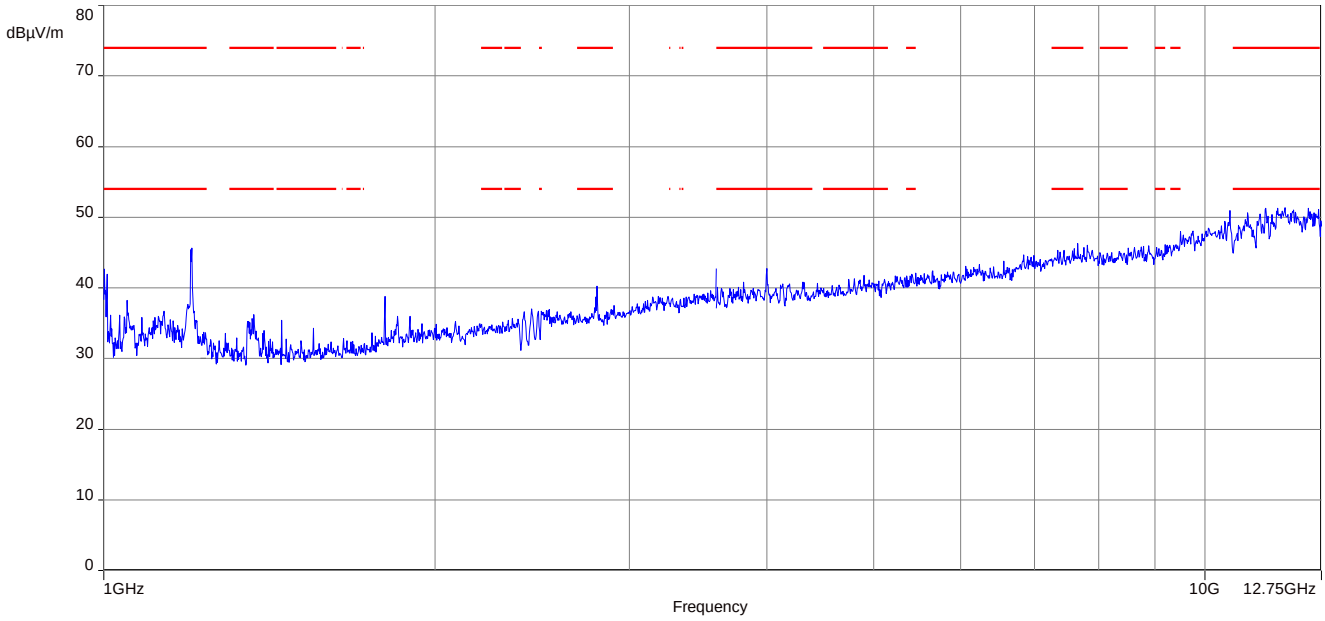
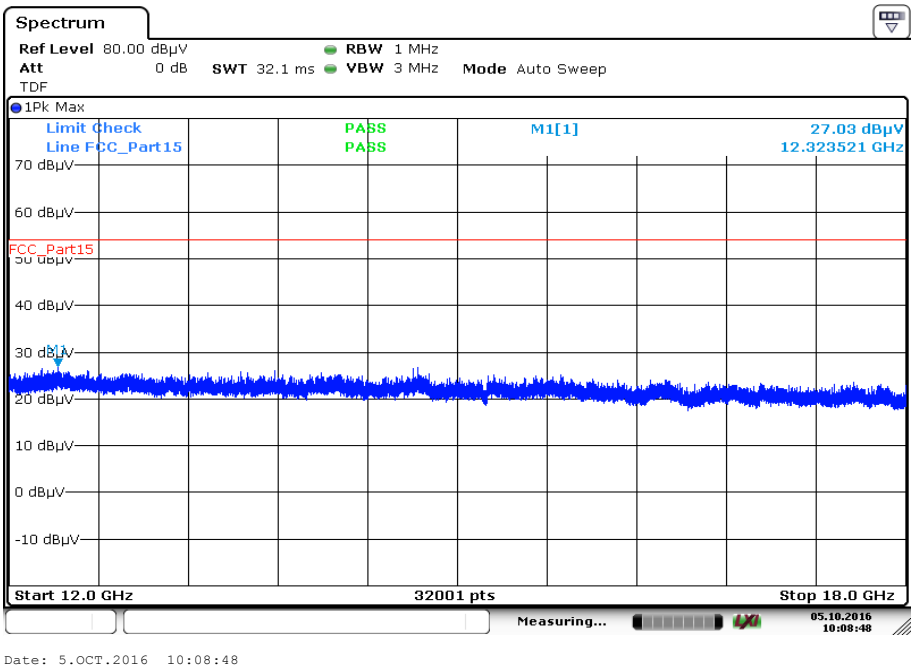
**Plot 7:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

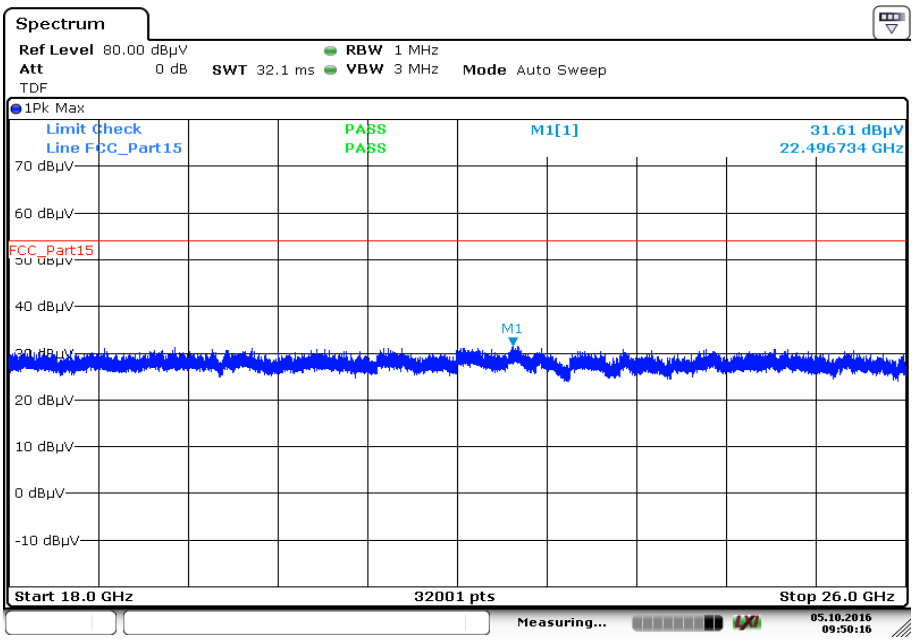



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 8:** Highest channel, 12 GHz to 18 GHz, vertical & horizontal polarization



**Plot 9:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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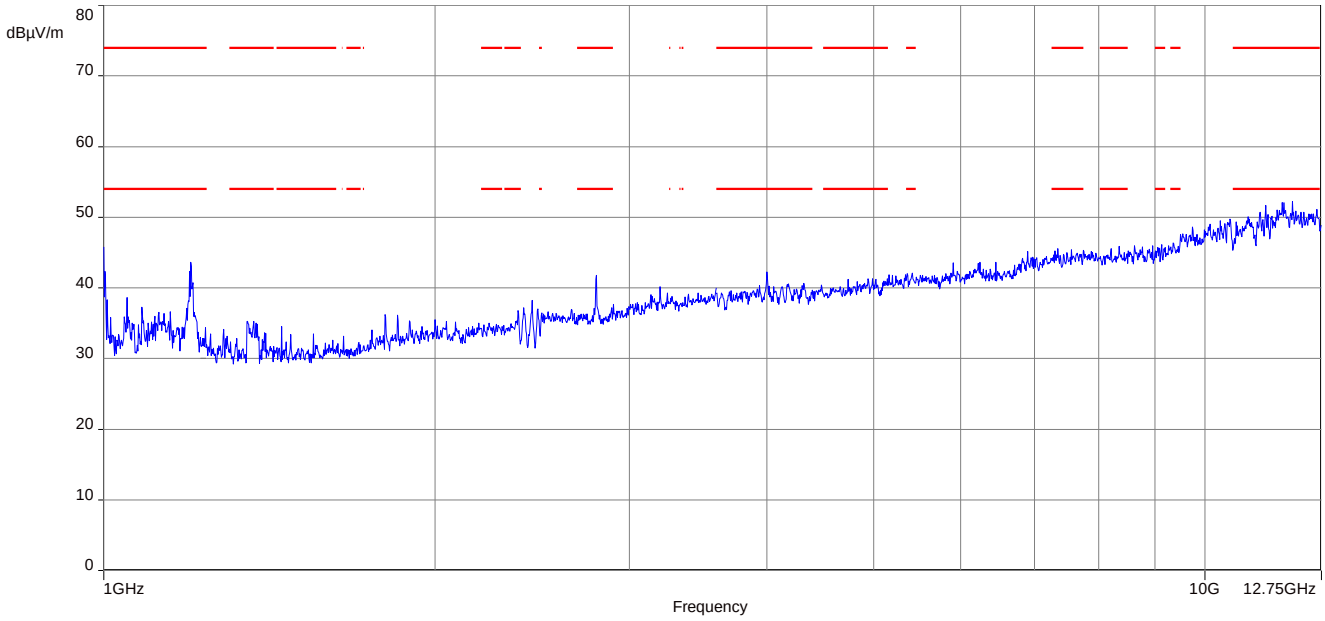
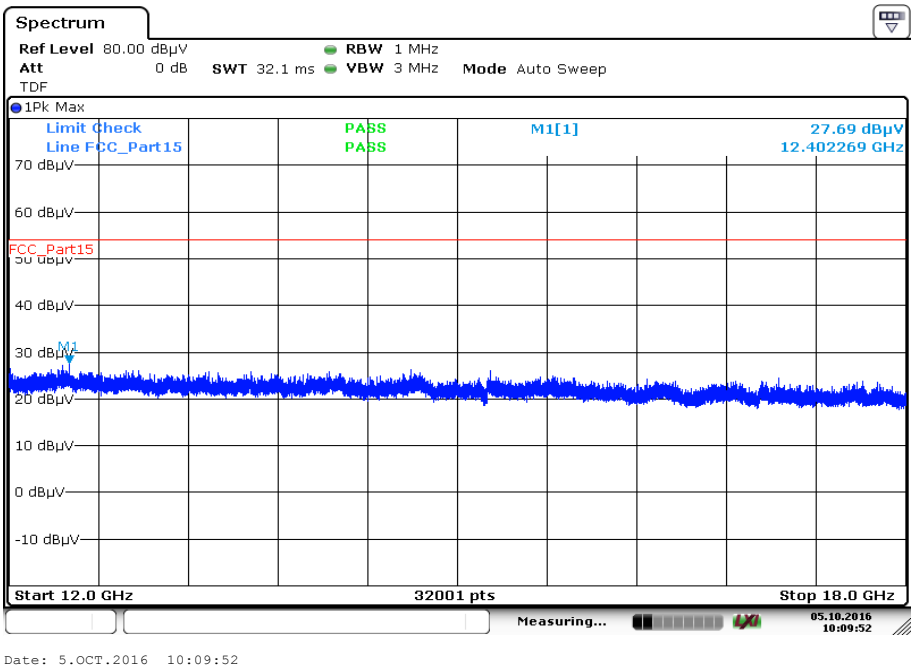
**Plots:** OFDM (40 MHz bandwidth), antenna 2

**Plot 1:** Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

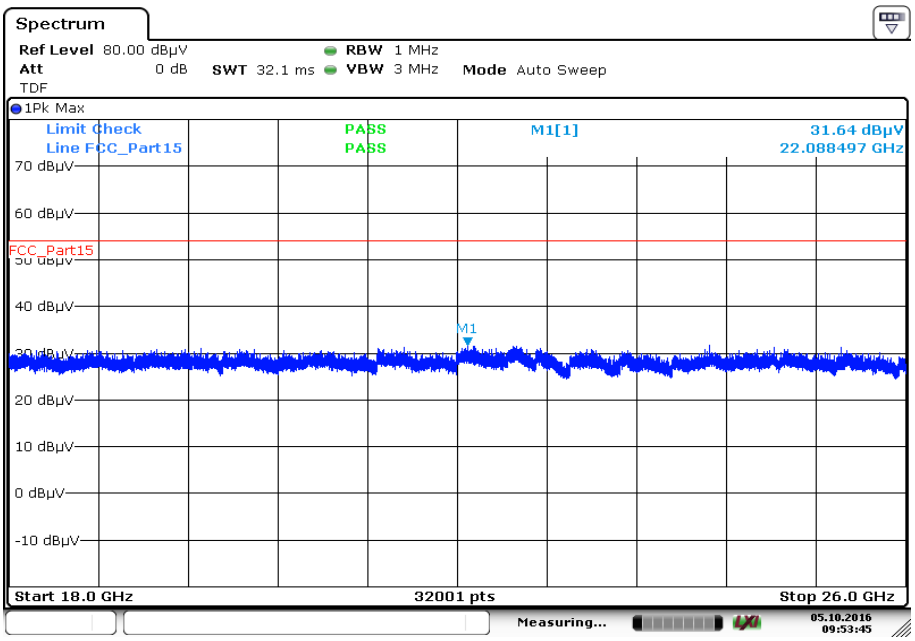



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 2:** Lowest channel, 12 GHz to 18 GHz, vertical & horizontal polarization



**Plot 3:** Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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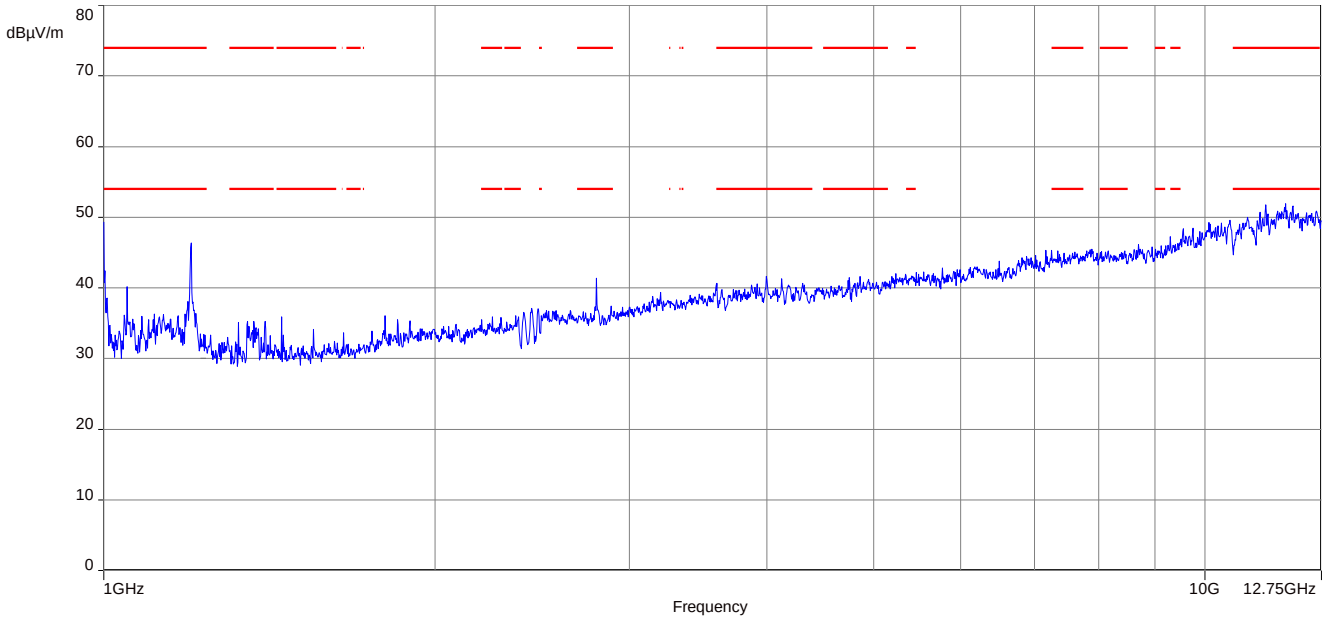
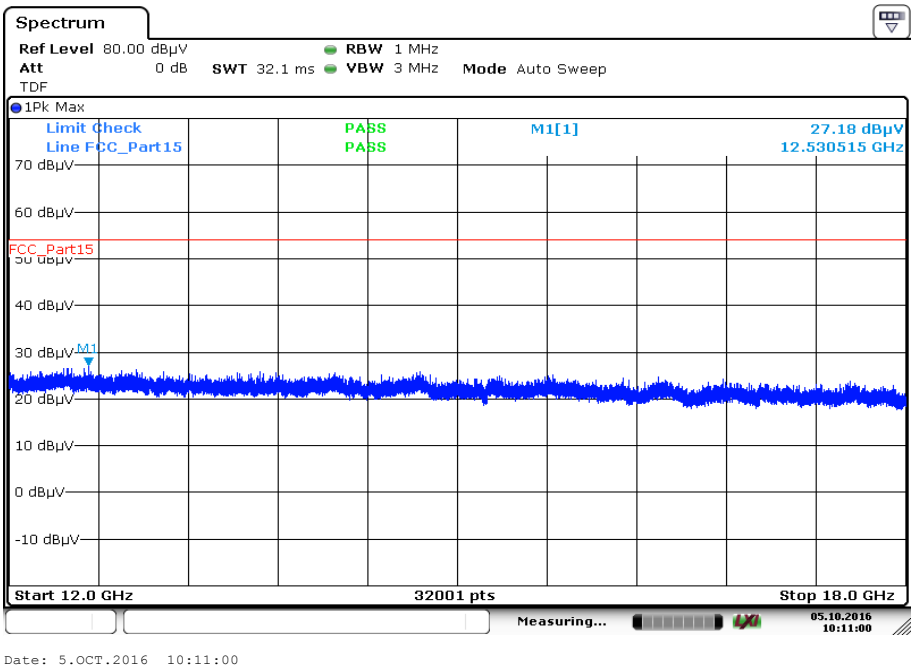
**Plot 4:** Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

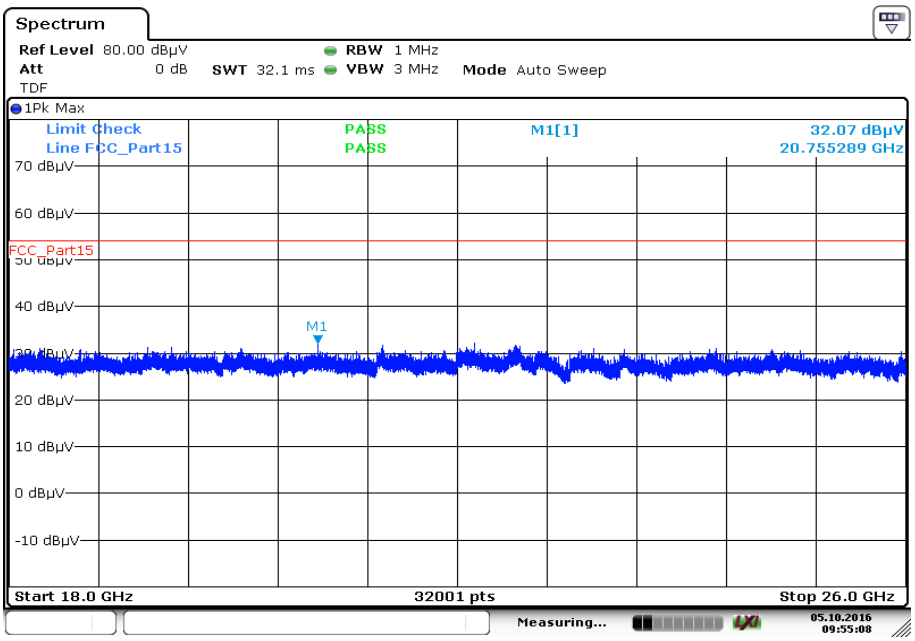



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 5:** Middle channel, 12 GHz to 18 GHz, vertical & horizontal polarization



**Plot 6:** Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization

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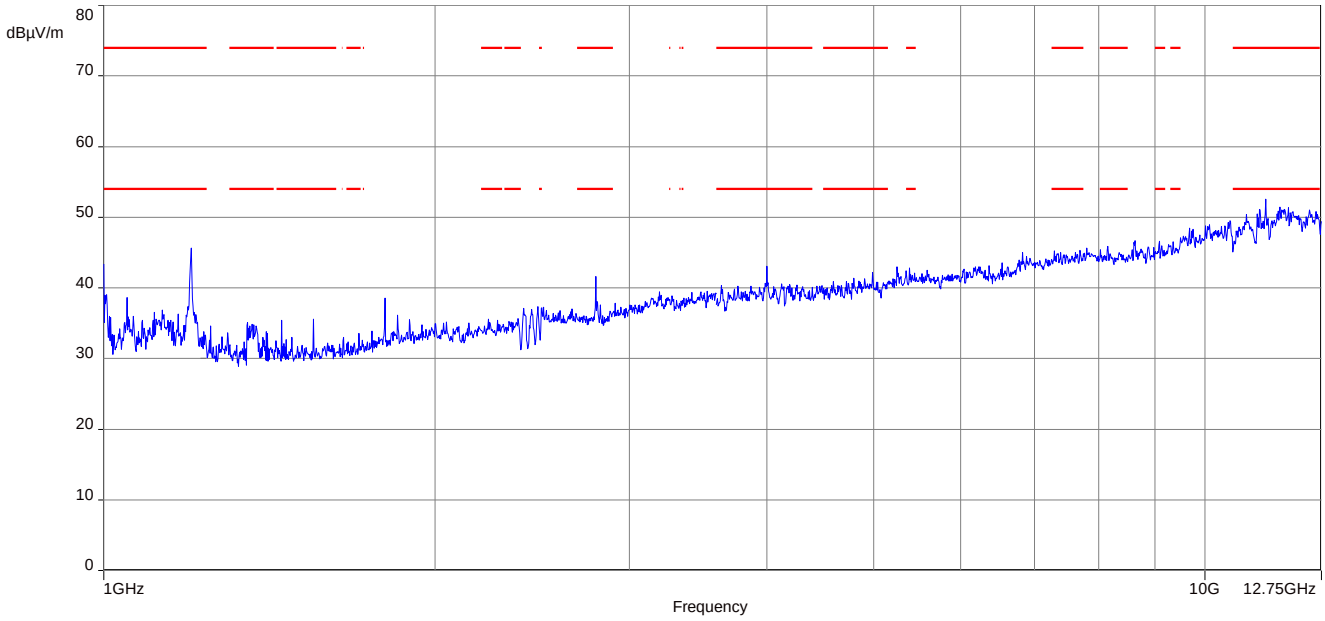
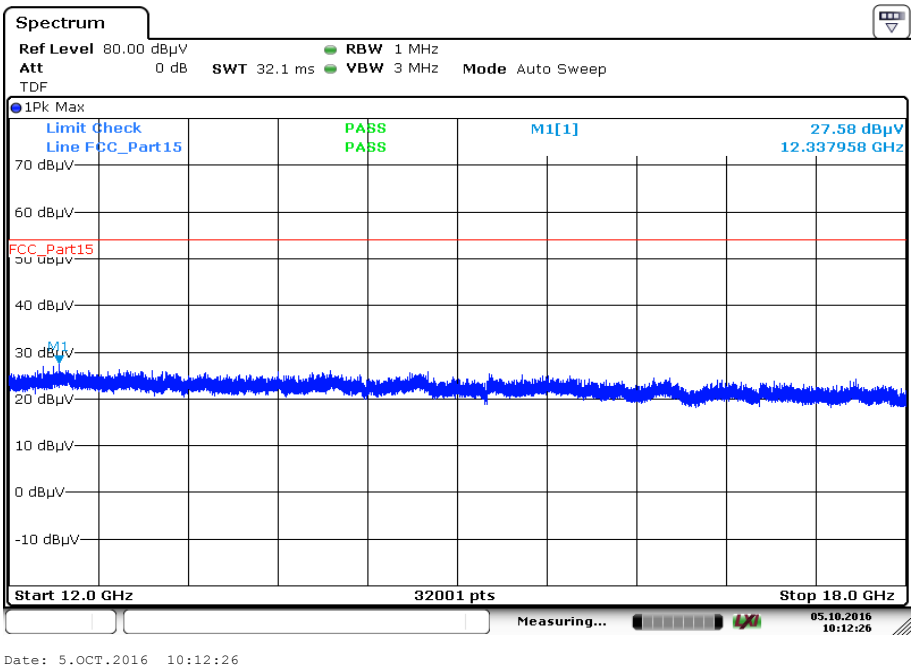
**Plot 7:** Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

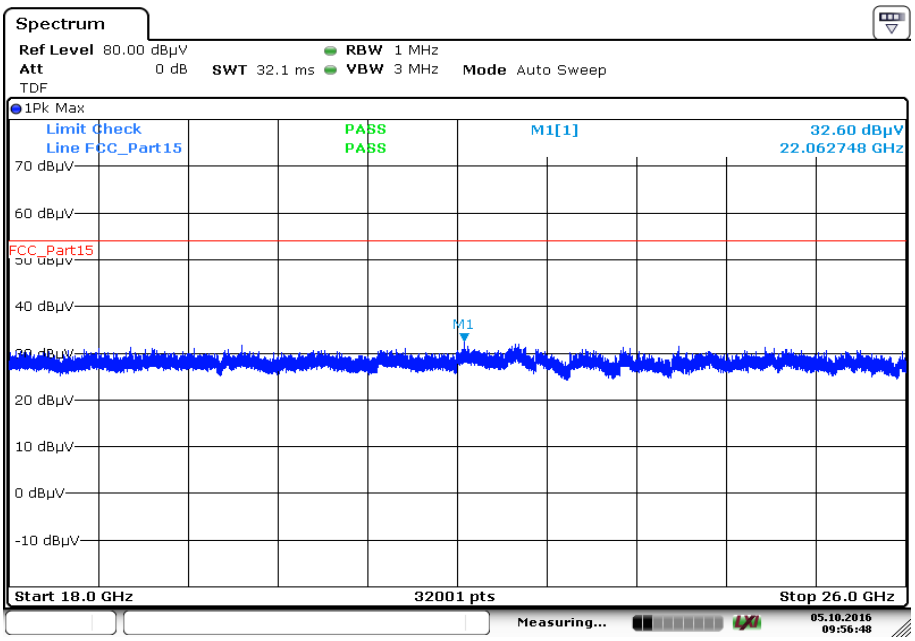



The carrier signal is notched with a 2.4 GHz band rejection filter.

**Plot 8:** Highest channel, 12 GHz to 18 GHz, vertical & horizontal polarization

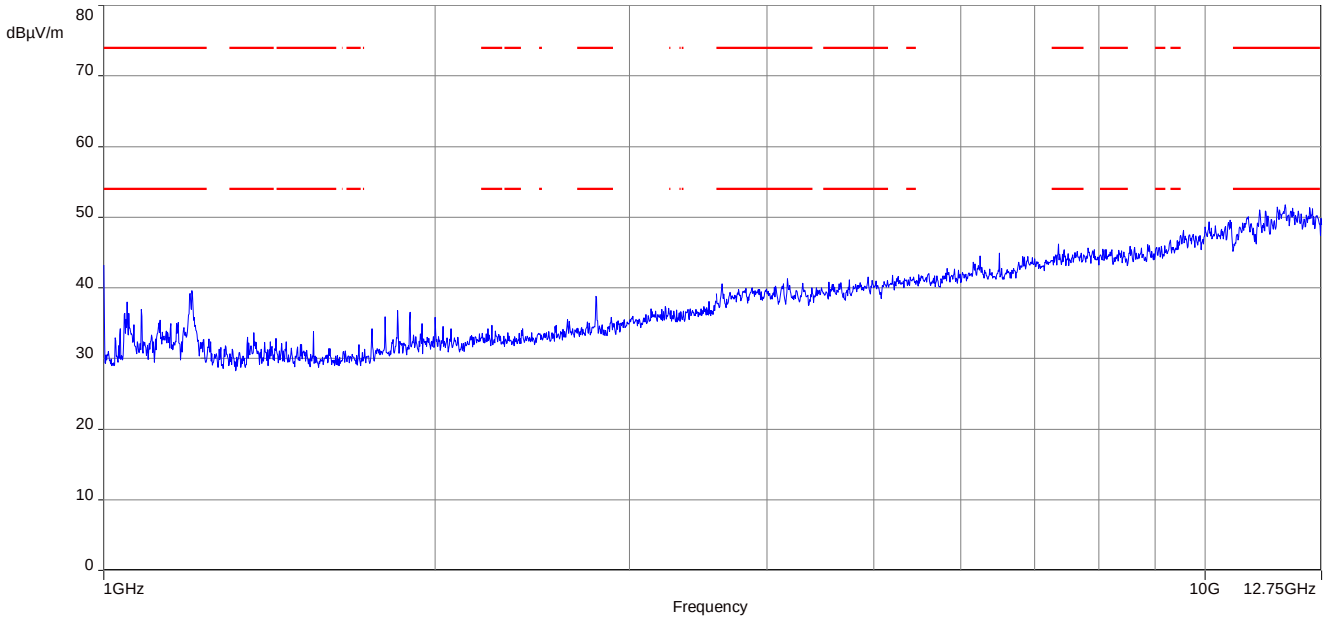


**Plot 9:** Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

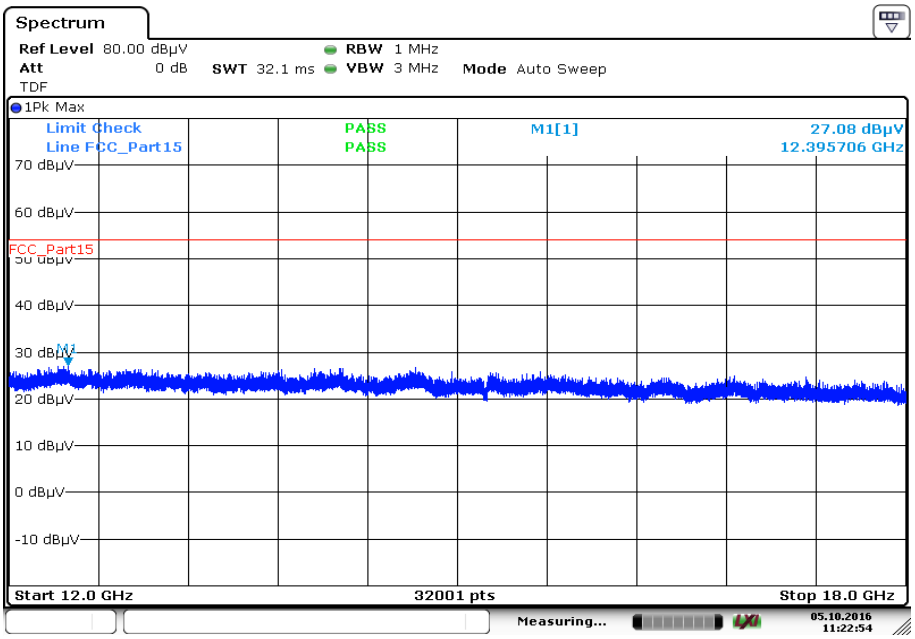


**Plots:** RX / idle mode, antenna 2

**Plot 1:** 1 GHz to 12.75 GHz, vertical & horizontal polarization

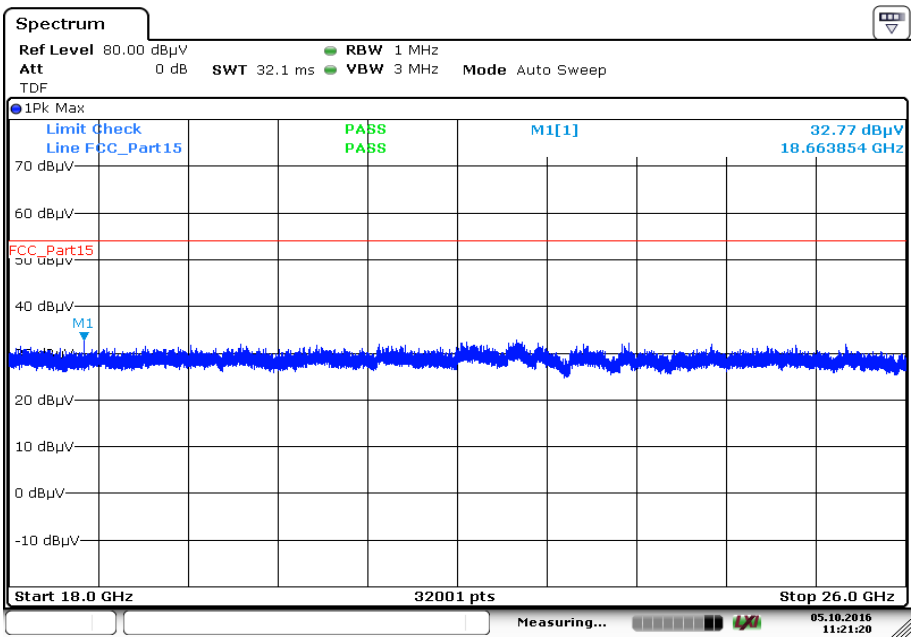



**Plot 2:** 12 GHz to 18 GHz, vertical & horizontal polarization




Date: 5.OCT.2016 11:22:54

**Plot 3:** 18 GHz to 26 GHz, vertical & horizontal polarization




Date: 5.OCT.2016 11:21:20

## 13 Observations

No observations except those reported with the single test cases have been made.

## Annex A Document history

| Version | Applied changes | Date of release |
|---|---|---|
| | Initial release | 2016-10-07 |

## Annex B Further information

**Glossary**

AVG - Average
DUT - Device under test
EMC - Electromagnetic Compatibility
EN - European Standard
EUT - Equipment under test
ETSI - European Telecommunications Standard Institute
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software
PMN - Product marketing name
HMN - Host marketing name
HVIN - Hardware version identification number
FVIN - Firmware version identification number

## Annex C Accreditation Certificate

Front side of certificate

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

**Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV**
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

# Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

**CETECOM ICT Services GmbH**
**Untertürkheimer Straße 6-10, 66117 Saarbrücken**

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

**Funk**
**Mobilfunk (GSM / DCS) + OTA**
**Elektromagnetische Verträglichkeit (EMV)**
**Produktsicherheit**
**SAR / EMF**
**Umwelt**
**Smart Card Technology**
**Bluetooth®**
**Automotive**
**Wi-Fi-Services**
**Kanadische Anforderungen**
**US-Anforderungen**
**Akustik**
**Near Field Communication (NFC )**

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 04.05.2016 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig bis 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 63 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12076-01-01**

Frankfurt, 04.05.2016

Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Abteilungsleiter

Siehe Hinweise auf der Rückseite

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

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Spittelmarkt 10
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Standort Braunschweig
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38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkkS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30).
Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

**Note:**
**The current certificate including annex can be received from CETECOM ICT Services GmbH on request.**