

BNNetzA-CAB-02/21-102

TEST REPORT

Test report no.: 1-7077_23-01-05_TR1_R2



Testing laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) 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-12047-01-00.

ISED Testing Laboratory Recognized Listing Number: DE0001

FCC designation number: DE0002

Applicant

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Manufacturer

SAGEMCOM BROADBAND SAS

4 rue des Messageries

92270 Bois-Colombes / FRANCE

Test standard/s

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

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

Test Item

Kind of test item: **Set top Box**

Model name: **DCIW377 DISH**

FCC ID: **VW3DCIW377D**

Frequency: UNII bands: 5150 MHz to 5250 MHz; 5250 MHz to 5350 MHz; 5470 MHz to 5725 MHz; 5725 MHz to 5850 MHz

Technology tested: **WLAN**

Antenna: **Two integrated antennas**

Power supply: **100 V to 240 V AC by mains**

Temperature range: **0°C to 40°C**

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

Test report authorized:



Marco Bertolino
Supervisor Radio Services
Radio Labs

Test performed:



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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 advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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This test report replaces the test report with the number 1-7077_23-01-05_TR1_R1 and dated 2024-01-31.

2.2 Application details

Date of receipt of order: 2023-12-21

Date of receipt of test item: 2024-01-09

Start of test:* 2024-01-09

End of test:* 2024-01-25

Person(s) present during the test: -/-

*Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

2.3 Test laboratories sub-contracted

None

3 Test standard/s, references and accreditations

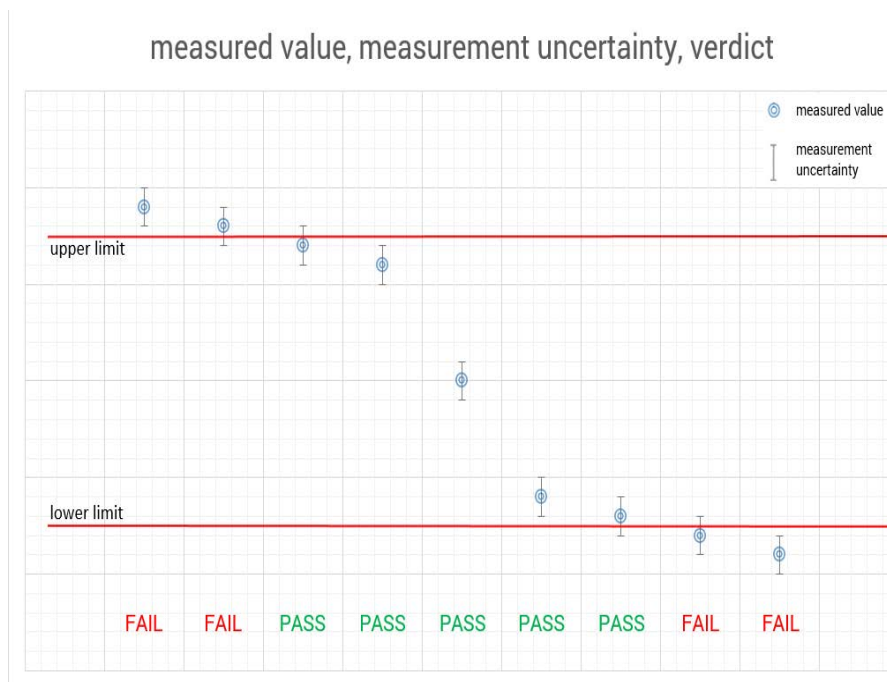
| Test standard | Date | Description |
|----------------------------|------|---|
| FCC - Title 47 CFR Part 15 | | FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices |

| Guidance | Version | Description |
|------------------|---------|---|
| KDB 789033 D02 | v02r01 | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E |
| ANSI C63.4-2014 | -/- | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| ANSI C63.10-2013 | -/- | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| KDB 662911 D01 | v02r01 | Emissions Testing of Transmitters with Multiple Outputs in the Same Band |

4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.

The measurement uncertainty is mentioned in this test report, see chapter 8, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."



5 Test environment

| | | |
|-----------------------------|--|---|
| Temperature : | T _{nom} T _{max} T _{min} | 20 °C during room temperature tests No testing under extreme temperature conditions required No testing under extreme temperature conditions required |
| Relative humidity content : | | 40 % |
| Barometric pressure : | | Not relevant for this kind of testing |
| Power supply : | V _{nom} V _{max} V _{min} | 115 V AC by mains No testing under extreme voltage conditions required No testing under extreme voltage conditions required |

6 Test item

6.1 General description

| | |
|---|---|
| Kind of test item : | Set top Box |
| Model name : | DCIW377 DISH |
| S/N serial number : | Rad. 123456789012 Cond. Config#1 |
| Hardware status : | M377 DISH QAM-1 |
| Software status : | 1.1000 RC25.0 wl0: Oct 5 2023 07:36:55 version 18.40.16.72 (bb9a522af056449c897b27dcf6cff960c9572267 WLTEST) FWID 01-7fcabacb |
| Frequency band : | UNII bands: 5150 MHz to 5250 MHz; 5250 MHz to 5350 MHz; 5470 MHz to 5725 MHz; 5725 MHz to 5850 MHz |
| Type of radio transmission : Use of frequency spectrum : | OFDM |
| Type of modulation : | (D)BPSK, (D)QPSK, 16 – 1024 QAM |
| Number of channels : | 24 with 20 MHz channel bandwidth 11 with 40 MHz channel bandwidth 5 with 80 MHz channel bandwidth |
| Antenna : | Two integrated antennas |
| Power supply : | 100 V to 240 V AC by mains |
| Temperature range : | 0°C to 40°C |

6.2 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:

1-7077_23-01-01_TR1-A101-R1-
1-7077_23-01-01_TR1-A102-R1
1-7077_23-01-01_TR1-A103-R1

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).

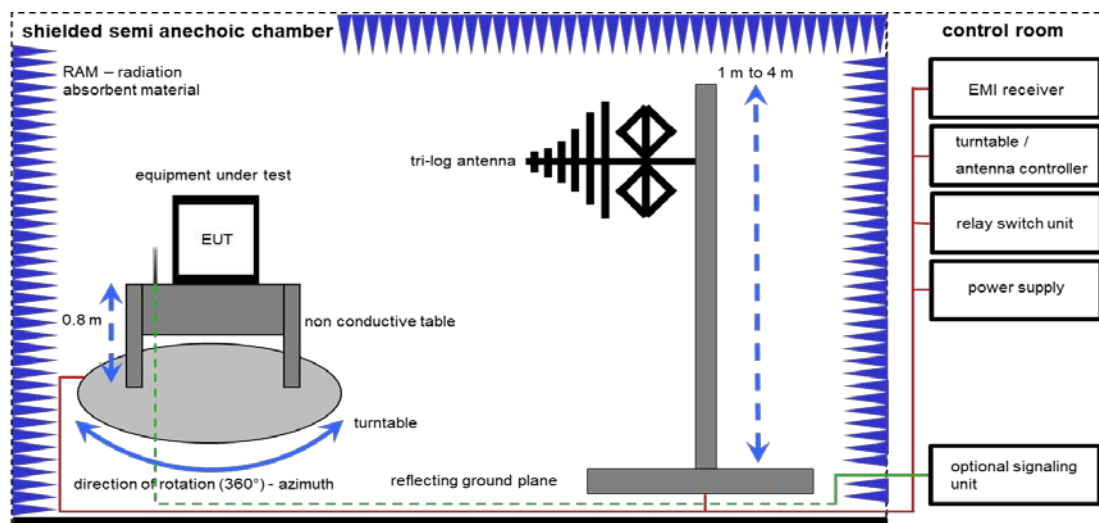
Each block diagram listed can contain several test setup configurations. All devices belonging to a test setup are identified with the same letter syntax. For example: Column Setup and all devices with an A.

Agenda: Kind of Calibration

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

7.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 30 MHz 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 conform to 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

EMC32 software version: 10.59.00

$$FS = UR + CL + AF$$

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

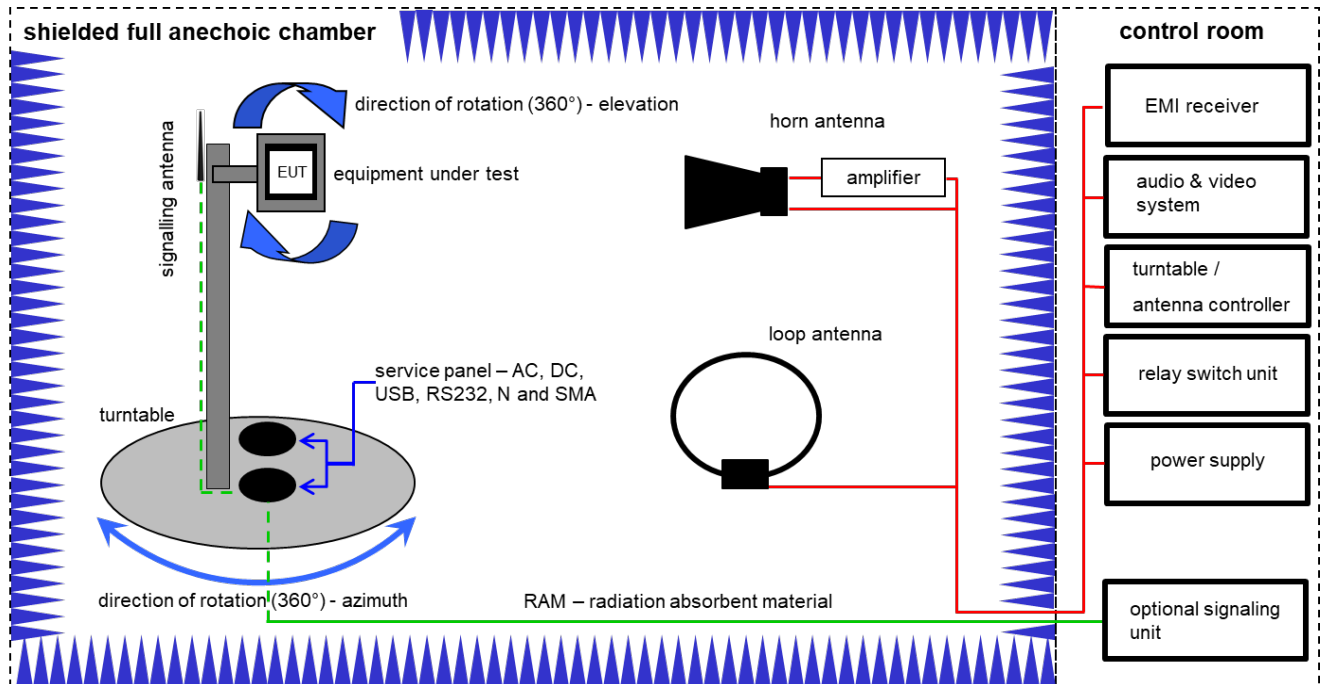
Example calculation:

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

Equipment table:

| No. | Setup | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|-------|--|------------|-------------------------------|------------|-----------|---------------------|------------------|------------------|
| 1 | A | Switch-Unit | 3488A | HP | 2719A14505 | 300000368 | ev | -/- | -/- |
| 2 | A | Semi anechoic chamber | 3000023 | MWB AG | | 300000551 | ne | -/- | -/- |
| 3 | A | Antenna Tower | Model 2175 | ETS-Lindgren | 64762 | 300003745 | izw | -/- | -/- |
| 4 | A | Positioning Controller | Model 2090 | ETS-Lindgren | 64672 | 300003746 | izw | -/- | -/- |
| 5 | A | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck Mess - Elektronik | 295 | 300003787 | vIKI! | 23.05.2023 | 31.05.2025 |
| 6 | A | PC | TecLine | F+W | | 300004388 | ne | -/- | -/- |
| 7 | A | EMI Test Receiver | ESR3 | Rohde & Schwarz | 102587 | 300005771 | k | 06.12.2023 | 31.12.2024 |

7.2 Shielded fully anechoic chamber



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

$$FS = UR + CA + AF$$

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

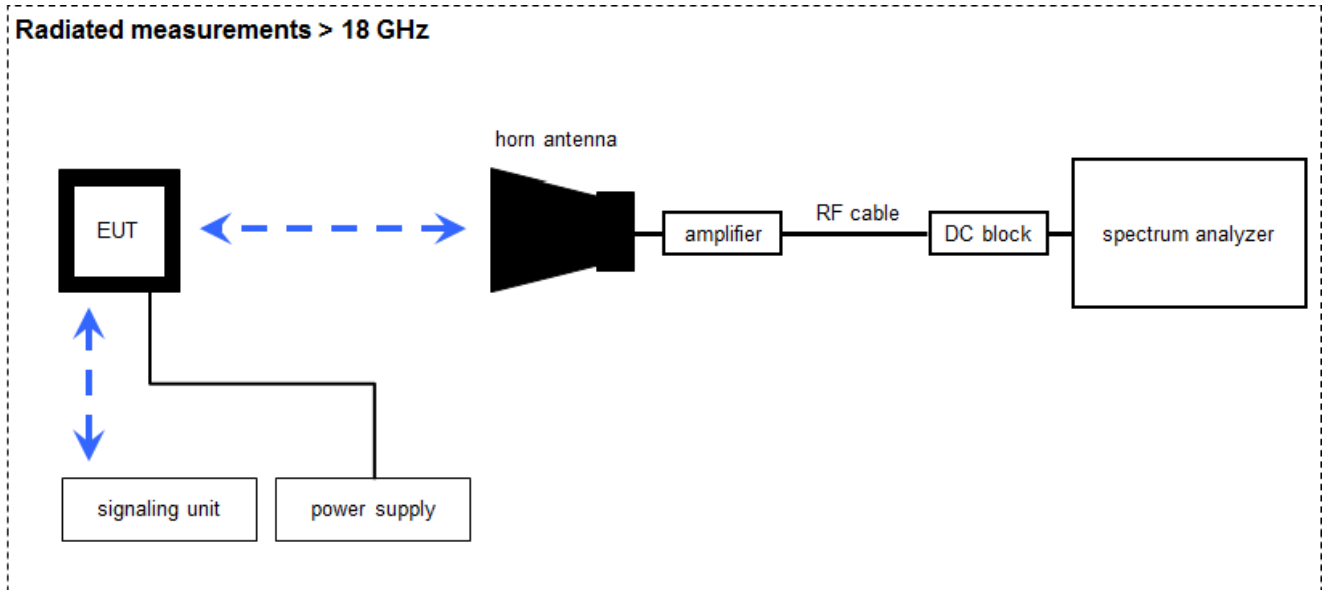
Example calculation:

$$FS \text{ [dB}\mu\text{V/m]} = 40.0 \text{ [dB}\mu\text{V/m]} + (-35.8) \text{ [dB]} + 32.9 \text{ [dB/m]} = 37.1 \text{ [dB}\mu\text{V/m]} \text{ (71.61 } \mu\text{V/m)}$$

Equipment table:

| No. | Setup | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|---------|--|---------------------------------------|----------------------|----------------|-----------|---------------------|------------------|------------------|
| 1 | B, C | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 | vKI! | 10.10.2023 | 31.10.2025 |
| 2 | A | Active Loop Antenna 9 kHz to 30 MHz | 6502 | EMCO | 2210 | 300001015 | vKI! | 02.08.2023 | 31.08.2025 |
| 3 | B | Highpass Filter | WHKX7.0/18G-8SS | Wainwright | 18 | 300003789 | ne | -/- | -/- |
| 4 | B, C | Broadband Amplifier 0.5-18 GHz | CBLU5184540 | CERNEX | 22051 | 300004483 | ev | -/- | -/- |
| 5 | A, B, C | 4U RF Switch Platform | L4491A | Agilent Technologies | MY50000032 | 300004510 | ne | -/- | -/- |
| 6 | A, B, C | Computer | Intel Core i3 3220/3,3 GHz, Prozessor | | 2V2403033A5421 | 300004591 | ne | -/- | -/- |
| 7 | C | Highpass Filter | WHKX2.6/18G-10SS | Wainwright | 12 | 300004651 | ne | -/- | -/- |
| 8 | A, B, C | NEXIO EMV-Software | BAT EMC V2022.0.32.0 | Nexio | | 300004682 | ne | -/- | -/- |
| 9 | B | Band Reject Filter | WRCJV12-5120-5150-5350-5380-40SS | Wainwright | 5 | 300005168 | ev | -/- | -/- |
| 10 | B | Band Reject Filter | WRCJV12-5695-5725-5850-5880-40SS | Wainwright | 5 | 300005169 | ev | -/- | -/- |
| 11 | B | Band Reject Filter | WRCJV16-5440-5470-5725-5755-40SS | Wainwright | 9 | 300005170 | ev | -/- | -/- |
| 12 | B | RF-Amplifier | AMF-6F06001800-30-10P-R | NARDA-MITEQ Inc | 2011571 | 300005240 | ev | -/- | -/- |
| 13 | A, B, C | Signal analyzer | FSW26 | Rohde&Schwarz | 101371 | 300005697 | k | 07.12.2023 | 31.12.2024 |

7.3 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

$$FS = UR + CA + AF$$

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

Example calculation:

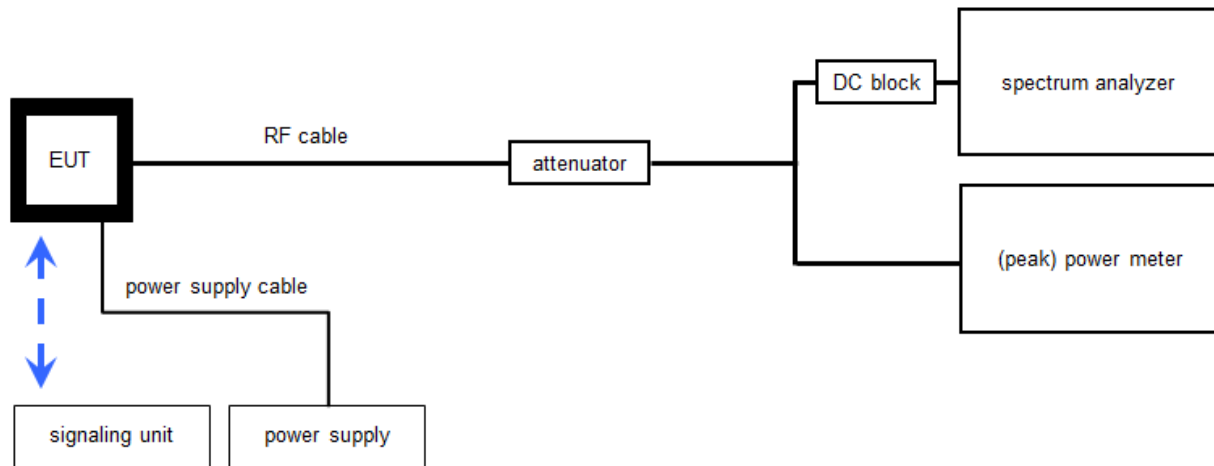
$$FS \text{ [dB}\mu\text{V/m]} = 40.0 \text{ [dB}\mu\text{V/m]} + (-60.1) \text{ [dB]} + 36.74 \text{ [dB/m]} = 16.64 \text{ [dB}\mu\text{V/m]} \text{ (6.79 } \mu\text{V/m)}$$

Equipment table:

| No. | Setup | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|-------|---|---------------|---------------|---------------|-----------|---------------------|------------------|------------------|
| 1 | A | Horn Antenna 18,0-40,0 GHz | LHAF180 | Microw.Devel | 39180-103-021 | 300001747 | vKI! | 17.01.2022 | 31.01.2024 |
| 2 | A | Broadband LNA 18-50 GHz | CBL18503070PN | CERNEX | 25240 | 300004948 | ev | 09.03.2022 | 08.03.2024 |
| 3 | A | Signal- and Spectrum Analyzer 2 Hz - 50 GHz | FSW50 | Rohde&Schwarz | 101560 | 300006179 | k | 04.04.2023 | 30.04.2024 |

7.4 Conducted measurements with peak power meter & spectrum analyzer

Conducted measurements normal conditions



WLAN tester version: 1.1.13; LabView2015

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

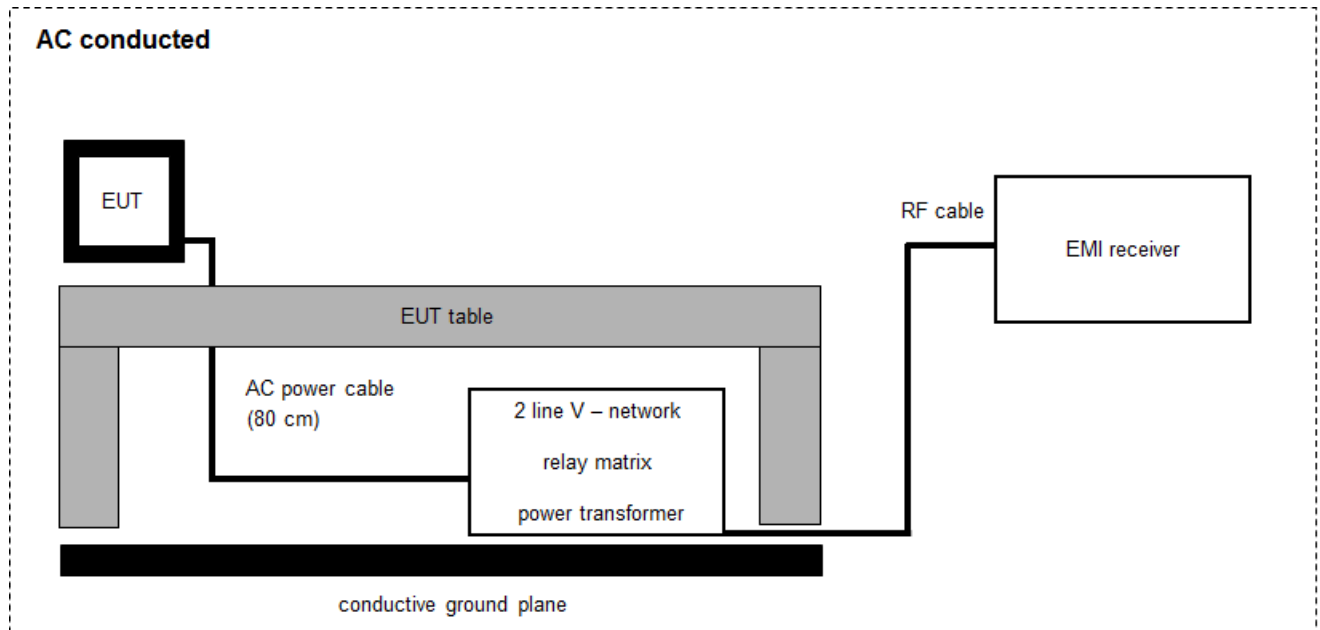
Example calculation:

OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

| No. | Setup | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|-------|---|-------------------|-------------------------------|------------------|-----------|---------------------|------------------|------------------|
| 1 | A | Meßkabine 3 - Halle D2 | HF-Schirmkabine | MWB Messwandler Bau AG 300023 | | 300000557 | ne | -/- | -/- |
| 2 | A | Signal analyzer | FSV40 | Rohde&Schwarz | 101042 | 300004517 | k | 06.12.2023 | 31.12.2024 |
| 3 | A | RF-Cable | ST18/SMAm/SMAm/60 | Huber & Suhner | Batch no. 606844 | 400001181 | ev | -/- | -/- |
| 4 | A | RF-Cable | ST18/SMAm/SMAm/48 | Huber & Suhner | Batch no. 600918 | 400001182 | ev | -/- | -/- |
| 5 | A | DC-Blocker 0.1-40 GHz | 8141A | Inmet | | 400001185 | ev | -/- | -/- |
| 6 | A | Coax Attenuator 10 dB 2W 0-40 GHz | MCL BW-K10-2W44+ | Mini Circuits | | 400001186 | ev | -/- | -/- |
| 7 | A | Tester Software RadioStar (C.BER2 for BT Conformance) | Version 1.0.0.X | CTC advanced GmbH | 0001 | 400001380 | ne | -/- | -/- |

7.5 AC conducted



$$FS = UR + CF + VC$$

(FS-field strength; UR-voltage at the receiver; CR-loss of the cable and filter; VC-correction factor of the ISN)

Example calculation:

$$FS \text{ [dB}\mu\text{V/m]} = 37.62 \text{ [dB}\mu\text{V/m]} + 9.90 \text{ [dB]} + 0.23 \text{ [dB]} = 47.75 \text{ [dB}\mu\text{V/m]} \text{ (244.06 } \mu\text{V/m)}$$

Equipment table:

| No. | Setup | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|-----|-------|---|---------|-------------------------------------|------------------|-----------|---------------------|------------------|------------------|
| 1 | A | Two-line V-Network (LISN) 9 kHz to 30 MHz | ESH3-Z5 | Rohde & Schwarz | 892475/017 | 300002209 | vKI! | 12.12.2023 | 31.12.2025 |
| 2 | A | Hochpass 150 kHz | EZ-25 | R&S | 100010 | 300003798 | ev | -/- | -/- |
| 3 | A | PC | TecLine | F+W | | 300003532 | ne | -/- | -/- |
| 4 | A | Analyzer-Impedance-System | AIS16/1 | Spitzenberger + Spies GmbH & Co. KG | UO2076 07/0 1023 | 400001751 | k | 19.10.2023 | 31.10.2025 |
| 5 | A | EMI Test Receiver 3.6 GHz | ESR3 | Rohde & Schwarz | 102981 | 300006318 | k | 08.12.2023 | 31.12.2024 |

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, it is placed on a table with 0.8 m height.
- 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 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 pre-measurement are maximized by the software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated about its vertical axis for maximum response at each azimuth about the EUT. (For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT)
- 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.

*)Note: The sequence will be repeated three times with different EUT orientations.

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 $\pm 45^\circ$ and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

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 | ± 1.56 dB | |
| DTS bandwidth | ± 100 kHz (depends on the used RBW) | |
| Occupied bandwidth | ± 100 kHz (depends on the used RBW) | |
| Maximum output power conducted | ± 1.56 dB | |
| Detailed spurious emissions @ the band edge - conducted | ± 1.56 dB | |
| Band edge compliance radiated | ± 3 dB | |
| Spurious emissions conducted | > 3.6 GHz | ± 1.56 dB |
| | > 7 GHz | ± 1.56 dB |
| | > 18 GHz | ± 2.31 dB |
| | ≥ 40 GHz | ± 2.97 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

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

| TC Identifier | Description | Verdict | Date | Remark |
|---------------|----------------------|-----------|------------|--------|
| RF-Testing | CFR Title 47 Part 15 | See table | 2024-03-19 | -/- |

| Test specification clause | Test case | C | NC | NA | NP | Remark |
|---------------------------|---|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------------------|
| -/- | Output power verification (cond.) | -/- | | | | Declared |
| -/- | Antenna gain | -/- | | | | Declared |
| U-NII Part 15 | Duty cycle | -/- | | | | -/- |
| §15.407(a) | Maximum output power (conducted & radiated) | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.407(a) | Power spectral density | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| RSS - 247 (6.2.4.1) | Spectrum bandwidth 6dB bandwidth | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.407(a) | Spectrum bandwidth 26dB bandwidth | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| RSS Gen clause 6.6 | Spectrum bandwidth 99% bandwidth | -/- | | | | -/- |
| §15.205 | Band edge compliance radiated | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.407(b) | TX spurious emissions radiated | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.109 | RX spurious emissions radiated | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.209(a) | Spurious emissions radiated < 30 MHz | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.107(a) §15.207 | Spurious emissions conducted emissions< 30 MHz | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | -/- |
| §15.407 | DFS | -/- | | | | See report 1-7077_23-01-06_TR1_R1 |

Notes:

| | | | | | | | |
|----|-----------|-----|---------------|-----|----------------|-----|---------------|
| C: | Compliant | NC: | Not compliant | NA: | Not applicable | NP: | Not performed |
|----|-----------|-----|---------------|-----|----------------|-----|---------------|

11 Additional comments

| | |
|-----------------------------|---|
| Reference documents: | DFS report: 1-7077_23-01-06_TR1_R1 DCIW377DISH - WiFi test commands.docx 24-01-08_Antenna Drawing DCIW377DISH.pptx DCIW377 DISH - Op_Desc.pptx |
| Co-applicable documents : | 1-7077/23-01-05_TR1-A201.pdf (a-mode) 1-7077/23-01-05_TR1-A202.pdf (n20-mode) 1-7077/23-01-05_TR1-A203.pdf (ac20-mode) 1-7077/23-01-05_TR1-A204.pdf (ax20-mode) 1-7077/23-01-05_TR1-A205.pdf (n40-mode) 1-7077/23-01-05_TR1-A206.pdf (ac40-mode) 1-7077/23-01-05_TR1-A207.pdf (ax40-mode) 1-7077/23-01-05_TR1-A208.pdf (ac80-mode) 1-7077/23-01-05_TR1-A209.pdf (ax80-mode) |
| Special test descriptions: | The DUT has been configured using “accessMTool” software version 3.1.0.3. |
| Configuration descriptions: | All tests were performed with both chains active. SISO modes are not supported. |

Provided channels and used power settings for all modes:

a-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | | | | | | | |
|---|-------------|-------------|------|-------------|-------------|-------------|------|-------------|
| channel | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 |
| f _c / MHz | 5180 | 5200 | 5220 | 5240 | 5260 | 5280 | 5300 | 5320 |
| Power setting *) | 70 | 78 | -/- | 78 | 78 | 78 | -/- | 72 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | | | | | | | | | |
|--|-------------|------|------|------|------|-------------|------|------|------|------|-------------|
| channel | 100 | 104 | 108 | 112 | 116 | 120 | 124 | 128 | 132 | 136 | 140 |
| f _c / MHz | 5500 | 5520 | 5540 | 5560 | 5580 | 5600 | 5620 | 5640 | 5660 | 5680 | 5700 |
| Power setting *) | 70 | -/- | -/- | -/- | -/- | 76 | -/- | -/- | -/- | -/- | 76 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | | | | | |
|---|-------------|------|-------------|------|-------------|
| channel | 149 | 153 | 157 | 161 | 165 |
| f _c / MHz | 5745 | 5765 | 5785 | 5805 | 5825 |
| Power setting *) | 80 | -/- | 80 | -/- | 80 |

nHT20-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | | | | | | | |
|---|-------------|-------------|------|-------------|-------------|-------------|------|-------------|
| channel | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 |
| f _c / MHz | 5180 | 5200 | 5220 | 5240 | 5260 | 5280 | 5300 | 5320 |
| Power setting *) | 72 | 78 | -/- | 78 | 80 | 80 | -/- | 72 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | | | | | | | | | |
|--|-------------|------|------|------|------|-------------|------|------|------|------|-------------|
| channel | 100 | 104 | 108 | 112 | 116 | 120 | 124 | 128 | 132 | 136 | 140 |
| f _c / MHz | 5500 | 5520 | 5540 | 5560 | 5580 | 5600 | 5620 | 5640 | 5660 | 5680 | 5700 |
| Power setting *) | 71 | -/- | -/- | -/- | -/- | 78 | -/- | -/- | -/- | -/- | 80 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | | | | | |
|---|-------------|------|-------------|------|-------------|
| channel | 149 | 153 | 157 | 161 | 165 |
| f _c / MHz | 5745 | 5765 | 5785 | 5805 | 5825 |
| Power setting *) | 80 | -/- | 80 | -/- | 80 |

acVHT20-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | | | | | | | |
|---|-------------|-------------|------|-------------|-------------|-------------|------|-------------|
| channel | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 |
| f _c / MHz | 5180 | 5200 | 5220 | 5240 | 5260 | 5280 | 5300 | 5320 |
| Power setting *) | 72 | 78 | -/- | 78 | 80 | 80 | -/- | 72 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | | | | | | | | | |
|--|-------------|------|------|------|------|-------------|------|------|------|------|-------------|
| channel | 100 | 104 | 108 | 112 | 116 | 120 | 124 | 128 | 132 | 136 | 140 |
| f _c / MHz | 5500 | 5520 | 5540 | 5560 | 5580 | 5600 | 5620 | 5640 | 5660 | 5680 | 5700 |
| Power setting *) | 71 | -/- | 78 | -/- | -/- | 78 | -/- | -/- | -/- | -/- | 80 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | | | | | |
|---|-------------|------|-------------|------|-------------|
| channel | 149 | 153 | 157 | 161 | 165 |
| f _c / MHz | 5745 | 5765 | 5785 | 5805 | 5825 |
| Power setting *) | 80 | -/- | 80 | -/- | 80 |

axHE20-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | | | | | | | |
|---|-------------|-------------|------|-------------|-------------|-------------|------|-------------|
| channel | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 |
| f _c / MHz | 5180 | 5200 | 5220 | 5240 | 5260 | 5280 | 5300 | 5320 |
| Power setting *) | 71 | 80 | -/- | 76 | 80 | 80 | -/- | 66 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | | | | | | | | | |
|--|-------------|------|------|------|------|-------------|------|------|------|------|-------------|
| channel | 100 | 104 | 108 | 112 | 116 | 120 | 124 | 128 | 132 | 136 | 140 |
| f _c / MHz | 5500 | 5520 | 5540 | 5560 | 5580 | 5600 | 5620 | 5640 | 5660 | 5680 | 5700 |
| Power setting *) | 72 | -/- | -/- | -/- | -/- | 80 | -/- | -/- | -/- | -/- | 80 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | | | | | |
|---|-------------|------|-------------|------|-------------|
| channel | 149 | 153 | 157 | 161 | 165 |
| f _c / MHz | 5745 | 5765 | 5785 | 5805 | 5825 |
| Power setting *) | 80 | -/- | 80 | -/- | 80 |

nHT40-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | | | |
|---|-------------|-------------|-------------|-------------|
| channel | 38 | 46 | 54 | 62 |
| f _c / MHz | 5190 | 5230 | 5270 | 5310 |
| Power setting *) | 69 | 76 | 76 | 61 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | | | |
|--|------|------|------|------|------|
| channel | 102 | 110 | 118 | 126 | 134 |
| f _c / MHz | 5510 | 5550 | 5590 | 5630 | 5670 |
| Power setting *) | 64 | -/- | 76 | -/- | 76 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | | |
|---|-------------|-------------|
| channel | 151 | 159 |
| f _c / MHz | 5755 | 5795 |
| Power setting *) | 80 | 80 |

acVHT40-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | | | |
|---|-------------|-------------|-------------|-------------|
| channel | 38 | 46 | 54 | 62 |
| f _c / MHz | 5190 | 5230 | 5270 | 5310 |
| Power setting *) | 59 | 76 | 76 | 58 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | | | |
|--|------|------|------|------|------|
| channel | 102 | 110 | 118 | 126 | 134 |
| f _c / MHz | 5510 | 5550 | 5590 | 5630 | 5670 |
| Power setting *) | 64 | -/- | 76 | -/- | 76 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | | |
|---|-------------|-------------|
| channel | 151 | 159 |
| f _c / MHz | 5755 | 5795 |
| Power setting *) | 76 | 76 |

axHE40-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | | | |
|---|-------------|-------------|-------------|-------------|
| channel | 38 | 46 | 54 | 62 |
| f _c / MHz | 5190 | 5230 | 5270 | 5310 |
| Power setting *) | 57 | 76 | 76 | 58 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|
| channel | 102 | 110 | 118 | 126 | 134 |
| f _c / MHz | 5510 | 5550 | 5590 | 5630 | 5670 |
| Power setting *) | 72 | -/- | 80 | -/- | 80 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | | |
|---|-------------|-------------|
| channel | 151 | 159 |
| f _c / MHz | 5755 | 5795 |
| Power setting *) | 80 | 80 |

acVHT80-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | |
|---|-------------|-------------|
| channel | 42 | 58 |
| f _c / MHz | 5210 | 5290 |
| Power setting *) | 57 | 58 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | |
|--|-------------|-------------|-------------|
| channel | 106 | 122 | 138 |
| f _c / MHz | 5530 | 5610 | 5690 |
| Power setting *) | 58 | 80 | 80 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | |
|---|-------------|
| channel | 155 |
| f _c / MHz | 5775 |
| Power setting *) | 72 |

axHE80-mode:

| U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & center frequency | | |
|---|-------------|-------------|
| channel | 42 | 58 |
| f _c / MHz | 5210 | 5290 |
| Power setting *) | 56 | 57 |

| U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency | | | |
|--|-------------|-------------|-------------|
| channel | 106 | 122 | 138 |
| f _c / MHz | 5530 | 5610 | 5690 |
| Power setting *) | 55 | 76 | 76 |

| U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency | |
|---|-------------|
| channel | 155 |
| f _c / MHz | 5775 |
| Power setting *) | 72 |

- EUT selection:
- ☒ Only one device available
 - ☐ Devices selected by the customer
 - ☐ Devices selected by the laboratory (Randomly)

- Test mode:
- ☐ No test mode available.
Iperf is used to transmit data to a companion device
 - ☒ 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 Identify worst case data rate

Worst case data rates declared by the manufacturer:

| OFDM – mode | Modulation scheme / bandwidth | | | | | |
|-----------------|-------------------------------|-----------------|----------------|-----------------|----------------|-----------------|
| | U-NII-1 & U-NII-2A | | U-NII-2C | | U-NII-3 | |
| | lowest channel | highest channel | lowest channel | highest channel | lowest channel | highest channel |
| a – mode | 6 Mbit/s | 6 Mbit/s | 6 Mbit/s | 6 Mbit/s | 6 Mbit/s | 6 Mbit/s |
| n HT20 – mode | MCS8 | MCS8 | MCS8 | MCS8 | MCS8 | MCS8 |
| ac VHT20 – mode | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 |
| ax HE20 – mode | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 |
| n HT40 – mode | MCS8 | MCS8 | MCS8 | MCS8 | MCS8 | MCS8 |
| ac VHT40 – mode | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 |
| ax HE40 – mode | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 |
| ac VHT80 – mode | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 | MCS0NN2 |
| ax HE80 – mode | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 | HE0NSS2 |

12.2 Antenna gain

Description:

The antenna gain is declared by customer. Referenced information and antenna patterns can be found in "24-01-08_Antenna Drawing DCIW377DISH.pptx".

Limits:

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

Results:

| U-NII-1 (5150 MHz to 5250 MHz) | Peak Antenna Gain ANT 0 | Peak Antenna Gain ANT 1 | Combined Antenna gain |
|-----------------------------------|-------------------------|-------------------------|-----------------------|
| Gain / dBi (declared) | 0.3 | -0.3 | 3.0 |

| U-NII-2A (5250 MHz to 5350 MHz) | Peak Antenna Gain ANT 0 | Peak Antenna Gain ANT 1 | Combined Antenna gain |
|------------------------------------|-------------------------|-------------------------|-----------------------|
| Gain / dBi (declared) | 0.3 | -0.3 | 3.0 |

| U-NII-2C (5470 MHz to 5725 MHz) | Peak Antenna Gain ANT 0 | Peak Antenna Gain ANT 1 | Combined Antenna gain |
|------------------------------------|-------------------------|-------------------------|-----------------------|
| Gain / dBi (declared) | -0.5 | 1.6 | 2.0 |

| U-NII-3 (5725 MHz to 5850 MHz) | Peak Antenna Gain ANT 0 | Peak Antenna Gain ANT 1 | Combined Antenna gain |
|-----------------------------------|-------------------------|-------------------------|-----------------------|
| Gain / dBi (declared) | -0.5 | 1.6 | 2.0 |

12.3 Duty cycle

Description:

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

Measurement:

| Measurement parameter | |
|---------------------------------|--|
| According to: KDB789033 D02, B. | |
| External result file(s) | 1-7077/23-01-05_TR1-A201 to A209 FCC Part 15.407 Max Output Power and PSD |
| Used test setup: | See chapter 7.4 – A |
| Measurement uncertainty: | See chapter 9 |

Results:

Duty cycle and correction factor:

| OFDM – mode | Calculation method | | | |
|-----------------|--|----------------------------|------------|-------------------|
| | $T_{on} (D2_{plot}) * 100 / T_{complete} (D3_{plot}) = \text{duty cycle}$ $10 * \log(\text{duty cycle}) = \text{correction factor}$ | | | |
| | $T_{on} (D2_{plot})$ | $T_{complete} (D3_{plot})$ | Duty cycle | Correction factor |
| a – mode | -/- | -/- | 100% | 0dB |
| n HT20 – mode | -/- | -/- | 100% | 0dB |
| ac VHT20 – mode | -/- | -/- | 100% | 0dB |
| ax HE20 – mode | -/- | -/- | 100% | 0dB |
| n HT40 – mode | -/- | -/- | 100% | 0dB |
| ac VHT40 – mode | -/- | -/- | 100% | 0dB |
| ax HE40 – mode | -/- | -/- | 100% | 0dB |
| ac VHT80 – mode | -/- | -/- | 100% | 0dB |
| ax HE80 – mode | -/- | -/- | 100% | 0dB |

12.4 Maximum output power

12.4.1 Maximum output power according to FCC requirements

Description:

Measurement of the maximum output power conducted

Measurement:

| Measurement parameter | |
|-------------------------------------|--|
| According to: KDB789033 D02, E.2.e. | |
| External result file(s) | 1-7077/23-01-05_TR1-A201 to A209 FCC Part 15.407 Max Output Power and PSD |
| Used test setup: | See chapter 7.4 A |
| Measurement uncertainty: | See chapter 9 |
| Standard parts: | FCC: § 15.407 (a) |

Limits:

| Limits | |
|---|---|
| Radiated output power | Conducted output power |
| Band 5150 MHz – 5250 MHz | |
| <p>For an outdoor access point: Conducted power + 6 dBi antenna gain</p> <p>For an indoor access point: Conducted power + 6 dBi antenna gain</p> <p>For fixed point-to-point access points Conducted power + 23 dBi antenna gain</p> <p>For client devices Conducted power + 6 dBi antenna gain</p> <p>(If the Antenna gain is greater than the Limit: 1dB reduction in the max. conducted output power for each 1 dB of antenna gain in excess of the Limit)</p> | <p>For an outdoor access point: output power $\leq 1\text{W}/30\text{dBm}$ The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm)</p> <p>For an indoor access point output power $\leq 1\text{W}/30\text{dBm}$</p> <p>For fixed point-to-point access points output power $\leq 1\text{W}/30\text{dBm}$</p> <p>For client devices output power $\leq 250\text{ mW}/24\text{dBm}$</p> |
| Band 5250MHz – 5350 MHz | |
| <p>Conducted power + 6 dBi antenna gain</p> <p>(Antenna gain higher than the Limit: 1dB reduction in the max. conducted output power for each 1 dB of antenna gain in excess of the Limit)</p> | <p>Output power \leq lesser of 250mW or $11\text{dBm} + 10\log B$ (B is the 26 dB emission bandwidth in megahertz)</p> |
| Band 5470MHz – 5725 MHz | |
| <p>Conducted power + 6 dBi antenna gain</p> <p>(Antenna gain higher than the Limit: 1dB reduction in the max. conducted output power for each 1 dB of antenna gain in excess of the Limit)</p> | <p>Output power \leq lesser of 250mW or $11\text{dBm} + 10\log B$ (B is the 26 dB emission bandwidth in megahertz)</p> |
| Band 5725MHz – 5850 MHz | |
| <p>Conducted power + 6 dBi antenna gain</p> <p>(Antenna gain higher than the Limit: 1dB reduction in the max. conducted output power for each 1 dB of antenna gain in excess of the Limit Exception: fixed point-to-point U-NII devices, no corresponding reduction in transmitter conducted power)</p> | <p>output power $\leq 1\text{W}/30\text{dBm}$</p> |

Results:

| 802.11a Maximum output power [dBm] | | | | | | | | | | | | |
|---------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| SUM | 21.3 | 22.6 | 22.0 | 22.4 | 22.2 | 20.8 | 21.3 | 20.9 | 22.1 | 23.6 | 23.2 | 22.7 |

| 802.11nHT20 Maximum output power [dBm] | | | | | | | | | | | | |
|---|------|------|------|------|------|------|------|------|------|------|------|------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| SUM | 21.6 | 22.7 | 22.3 | 22.9 | 22.6 | 21.0 | 21.5 | 22.8 | 23.0 | 23.7 | 23.4 | 22.8 |

| 802.11ac VHT20 Maximum output power [dBm] | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| SUM | 21.5 | 22.7 | 21.9 | 22.8 | 22.6 | 20.9 | 21.5 | 22.7 | 23.0 | 23.4 | 23.2 | 22.6 |

| 802.11ax20 Maximum output power [dBm] | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| SUM | 21.4 | 23.2 | 22.2 | 22.8 | 22.6 | 19.7 | 21.9 | 23.1 | 22.9 | 23.6 | 23.3 | 22.7 |

Results:

| 802.11 n HT40 Maximum output power [dBm] | | | | | | | | | |
|---|------|------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 142 | 151 | 159 |
| SUM | 18.4 | 22.4 | 22.6 | 18.3 | 19.6 | 23.2 | 23.1 | 23.3 | 22.9 |

| 802.11 ac VHT40 Maximum output power [dBm] | | | | | | | | | |
|---|------|------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| SUM | 19.2 | 22.6 | 22.9 | 18.4 | 20.7 | 23.5 | 23.3 | 23.6 | 23.1 |

| 802.11 ax HE40 Maximum output power [dBm] | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 142 | 151 | 159 |
| SUM | 18.4 | 22.4 | 22.6 | 18.3 | 19.6 | 23.2 | 23.1 | 22.3 | 22.9 |

| 802.11 ac VHT80 Maximum output power [dBm] | | | | | | |
|---|------|------|------|------|------|------|
| Channel | 42 | 58 | 106 | 122 | 138 | 155 |
| SUM | 18.9 | 18.9 | 19.8 | 23.8 | 23.8 | 24.3 |

| 802.11 ax HE80 Maximum output power [dBm] | | | | | | |
|--|------|------|------|------|------|------|
| Channel | 42 | 58 | 106 | 122 | 138 | 155 |
| SUM | 19.0 | 18.8 | 19.3 | 23.8 | 23.6 | 25.2 |

12.5 Power spectral density

12.5.1 Power spectral density according to FCC requirements

Description:

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

Measurement:

| Measurement parameter | |
|---------------------------------|--|
| According to: KDB789033 D02, F. | |
| External result file(s) | 1-7077/23-01-05_TR1-A201 to A209 FCC Part 15.407 Max Output Power and PSD |
| Used test setup: | See chapter 7.4 A |
| Measurement uncertainty: | See chapter 9 |
| Standard parts: | FCC: § 15.407 (a) |

Limits:

| Power Spectral Density |
|---|
| Band 5150 MHz – 5250 MHz |
| <p>For an outdoor access point power spectral density conducted ≤ 17 dBm in any 1 MHz band*</p> <p>For an indoor access point power spectral density conducted ≤ 17 dBm in any 1 MHz band*</p> <p>For fixed point-to-point access points power spectral density conducted ≤ 17 dBm in any 1 MHz band**</p> <p>For client devices point power spectral density conducted ≤ 11 dBm in any 1 MHz band*</p> <p>*If transmitting antennas of directional gain greater than 6 dBi are used the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi</p> <p>**Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.</p> |
| Band 5250MHz – 5350 MHz |
| <p>power spectral density conducted ≤ 11 dBm in any 1 MHz band*</p> <p>*If transmitting antennas of directional gain greater than 6 dBi are used the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi</p> |
| Band 5470MHz – 5725 MHz |
| <p>power spectral density conducted ≤ 11 dBm in any 1 MHz band*</p> <p>*If transmitting antennas of directional gain greater than 6 dBi are used the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi</p> |
| Band 5725MHz – 5850 MHz |
| <p>power spectral density conducted ≤ 30 dBm in any 500 kHz band</p> <p>If transmitting antennas of directional gain greater than 6 dBi are used the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi</p> |

Results:

| 802.11 a Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | | | | | | | |
|---|------|------|------|------|------|------|------|-----|------|-----|-----|-----|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| SUM | 10.8 | 11.0 | 10.3 | 10.7 | 10.5 | 10.3 | 10.8 | 9.3 | 10.4 | 8.8 | 8.5 | 8.0 |

| 802.11 n HT20 Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|-----|-----|-----|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| SUM | 10.9 | 10.7 | 10.3 | 10.9 | 10.7 | 10.2 | 10.7 | 10.8 | 11.0 | 8.5 | 8.3 | 7.7 |

| 802.11 ac VHT20 Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | | | | | | | |
|--|------|------|-----|------|------|------|------|------|------|-----|-----|-----|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| SUM | 10.8 | 10.7 | 9.9 | 10.8 | 10.6 | 10.1 | 10.8 | 10.7 | 10.9 | 8.4 | 8.2 | 7.6 |

| 802.11ax HE20 Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | | | | | | | |
|--|-----|------|-----|------|------|-----|-----|------|------|-----|-----|-----|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| SUM | 9.1 | 10.9 | 9.9 | 10.4 | 10.3 | 7.3 | 9.5 | 10.8 | 10.5 | 8.2 | 8.1 | 7.5 |

Results:

| 802.11 n HT40 | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | | | | |
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| SUM | 8.2 | 7.8 | 8.0 | 5.7 | 7.1 | 8.5 | 8.5 | 5.8 | 5.5 |

| 802.11 ac VHT40 | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | | | | |
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| SUM | 5.6 | 7.7 | 8.0 | 5.9 | 7.0 | 8.6 | 8.4 | 5.8 | 5.4 |

| 802.11ax HE40 | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | | | | |
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| SUM | 3.4 | 7.2 | 7.5 | 3.3 | 4.5 | 8.1 | 8.0 | 5.3 | 5.0 |

| 802.11 ac VHT80 | | | | | | |
|---|-----|-----|-----|-----|-----|-----|
| Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | |
| Channel | 42 | 58 | 106 | 122 | 138 | 155 |
| SUM | 2.4 | 2.5 | 3.2 | 6.0 | 6.0 | 3.6 |

| 802.11ax HE80 | | | | | | |
|---|-----|-----|-----|-----|-----|-----|
| Power spectral density [dBm/1MHz] or [dBm/500kHz] | | | | | | |
| Channel | 42 | 58 | 106 | 122 | 138 | 155 |
| SUM | 1.2 | 1.2 | 1.3 | 5.9 | 5.7 | 4.4 |

12.6 Minimum emission bandwidth for the band 5.725-5.85 GHz

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

| Measurement parameter | |
|-----------------------------------|---|
| According to: KDB789033 D02, C.2. | |
| External result file(s) | 1-7077/23-01-05_TR1-A201 to A209 FCC Part 15.407 & ISSED Minimum Emission BW |
| Used test setup: | See chapter 7.4 A |
| Measurement uncertainty: | See chapter 9 |

Limits:

| FCC | -/- |
|---|-----|
| The minimum 6 dB bandwidth shall be at least 500 kHz. | |

Results:

| a | 6 dB emission bandwidth (MHz) | | |
|-----------|--------------------------------|----------------|-----------------|
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| Antenna 1 | 16.4 | 16.4 | 16.4 |
| Antenna 2 | 16.4 | 16.3 | 16.3 |

| n HT20 | 6 dB emission bandwidth (MHz) | | |
|-----------|--------------------------------|----------------|-----------------|
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| Antenna 1 | 17.6 | 17.6 | 17.6 |
| Antenna 2 | 17.6 | 17.6 | 17.6 |

| ac VHT20 | 6 dB emission bandwidth (MHz) | | |
|-----------|--------------------------------|----------------|-----------------|
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| Antenna 1 | 17.6 | 17.6 | 17.6 |
| Antenna 2 | 17.6 | 17.6 | 17.6 |

| ax HE20 | 6 dB emission bandwidth (MHz) | | |
|-----------|--------------------------------|----------------|-----------------|
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| Antenna 1 | 19.0 | 19.1 | 19.0 |
| Antenna 2 | 19.0 | 19.0 | 19.0 |

Results:

| n HT40 | 6 dB emission bandwidth (MHz) | |
|-----------|--------------------------------|-----------------|
| | U-NII-3 (5725 MHz to 5850 MHz) | |
| | Lowest channel | Highest channel |
| Antenna 1 | 36.4 | 36.3 |
| Antenna 2 | 36.4 | 36.3 |

| ac VHT40 | 6 dB emission bandwidth (MHz) | |
|-----------|--------------------------------|-----------------|
| | U-NII-3 (5725 MHz to 5850 MHz) | |
| | Lowest channel | Highest channel |
| Antenna 1 | 36.4 | 36.3 |
| Antenna 2 | 36.4 | 36.4 |

| ax HE40 | 6 dB emission bandwidth (MHz) | |
|-----------|--------------------------------|-----------------|
| | U-NII-3 (5725 MHz to 5850 MHz) | |
| | Lowest channel | Highest channel |
| Antenna 1 | 37.8 | 37.5 |
| Antenna 2 | 37.6 | 37.3 |

| ac VHT80 | 6 dB emission bandwidth (MHz) | |
|-----------|--------------------------------|--|
| | U-NII-3 (5725 MHz to 5850 MHz) | |
| | Middle channel | |
| Antenna 1 | 75.8 | |
| Antenna 2 | 75.2 | |

| ax HE80 | 6 dB emission bandwidth (MHz) | |
|-----------|--------------------------------|--|
| | U-NII-3 (5725 MHz to 5850 MHz) | |
| | Middle channel | |
| Antenna 1 | 77.0 | |
| Antenna 2 | 75.2 | |

12.7 Spectrum bandwidth / 26 dB bandwidth

Description:

Measurement of the 26 dB bandwidth of the modulated signal.

Measurement:

| Measurement parameter | |
|-----------------------------------|--|
| According to: KDB789033 D02, C.1. | |
| External result file(s) | 1-7077/23-01-05_TR1-A201 to A209 FCC Part 15.407 & ISSED Bandwidths |
| Used test setup: | see chapter 7.4 A |
| Measurement uncertainty: | See chapter 9 |

Limits:

| Spectrum Bandwidth – 26 dB Bandwidth |
|---|
| FCC: Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems. |

Results:

| 802.11a 26 dB bandwidth [MHz] | | | | | | | | | | | | |
|----------------------------------|-------|-------|--------------------|-------|-------|-------|------|-------|-------|-------|-------|-------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| Port 1 | 21.85 | 34.25 | 35.95 ¹ | 35.85 | 35.15 | 23.15 | 21.5 | 23.05 | 30.20 | 34.28 | 33.92 | 34.80 |
| Port 2 | 22.15 | 32.55 | 32.70 ¹ | 33.15 | 33.05 | 23.15 | 22.2 | 21.95 | 29.65 | 37.88 | 38.00 | 37.44 |

| 802.11n HT20 26 dB bandwidth [MHz] | | | | | | | | | | | | |
|---------------------------------------|-------|-------|--------------------|-------|------|-------|-------|-------|-------|-------|-------|-------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| Port 1 | 26.35 | 39.75 | 40.45 ¹ | 43.65 | 44.2 | 22.70 | 24.25 | 39.15 | 35.85 | 38.52 | 38.52 | 39.64 |
| Port 2 | 25.55 | 33.90 | 31.05 ¹ | 41.0 | 40.7 | 27.65 | 28.35 | 37.45 | 40.80 | 40.0 | 39.6 | 39.64 |

| 802.11ac VHT20 26 dB bandwidth [MHz] | | | | | | | | | | | | |
|---|-------|-------|--------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| Port 1 | 28.45 | 40.95 | 37.6 ¹ | 42.35 | 42.10 | 25.9 | 25.70 | 40.35 | 40.0 | 39.88 | 39.92 | 39.48 |
| Port 2 | 23.0 | 35.80 | 34.35 ¹ | 40.50 | 39.25 | 23.2 | 22.45 | 36.05 | 41.65 | 39.60 | 39.92 | 39.52 |

| 802.11ax HE20 26 dB bandwidth [MHz] | | | | | | | | | | | | |
|--|------|------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| Port 1 | 27.8 | 42.7 | 39.3 ¹ | 44.85 | 43.15 | 21.85 | 25.75 | 43.55 | 38.6 | 38.24 | 39.68 | 39.8 |
| Port 2 | 22.6 | 41.1 | 31.45 ¹ | 39.3 | 45.1 | 21.7 | 28.4 | 42.7 | 39.05 | 40.0 | 39.88 | 39.08 |

¹ As per KDB 789033 D02 v02r01 the 99% bandwidth can be used in lieu of the 26dB bandwidth. The highest frequency measured with 99% measurement function is below 5250 MHz and falls completely within the U-NII-1 band.

Results:

| 802.11n HT40 26 dB bandwidth [MHz] | | | | | | | | | |
|---------------------------------------|------|-------------------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| Port 1 | 48.6 | 83.3 ¹ | 84.3 | 39.7 | 40.1 | 77.7 | 79.4 | 75.0 | 69.4 |
| Port 2 | 39.4 | 59.4 ¹ | 67.3 | 39.4 | 39.5 | 64.9 | 65.3 | 67.8 | 64.9 |

| 802.11ac HT40 26 dB bandwidth [MHz] | | | | | | | | | |
|--|------|-------------------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| Port 1 | 39.8 | 85.1 ¹ | 84.3 | 39.9 | 39.9 | 76.2 | 72.7 | 78.3 | 70.6 |
| Port 2 | 39.4 | 63.8 ¹ | 68.3 | 39.4 | 39.5 | 68.4 | 62.6 | 68.8 | 76.3 |

| 802.11ax HE40 26 dB bandwidth [MHz] | | | | | | | | | |
|--|------|-------------------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| Port 1 | 40.4 | 75.2 ¹ | 80.8 | 40.2 | 40.3 | 71.4 | 60.2 | 62.6 | 62.6 |
| Port 2 | 40.0 | 66.5 ¹ | 66.2 | 40.0 | 40.1 | 69.4 | 71.6 | 70.4 | 68.6 |

| 802.11ac VHT80 26 dB bandwidth [MHz] | | | | | | |
|---|-------------------|------|------|-------|-------|--------------------|
| Channel | 42 | 58 | 106 | 122 | 138 | 155 |
| Port 1 | 81.0 ¹ | 81.4 | 81.8 | 181.6 | 160.6 | 159.2 ² |
| Port 2 | 80.8 ¹ | 81.2 | 81.0 | 167.8 | 159.8 | 160.0 ² |

| 802.11ax HE80 26 dB bandwidth [MHz] | | | | | | |
|--|-------------------|------|------|-------|-------|--------------------|
| Channel | 42 | 58 | 106 | 122 | 138 | 155 |
| Port 1 | 82.0 ¹ | 82.0 | 81.8 | 135.4 | 119.2 | 149.6 ² |
| Port 2 | 81.6 ¹ | 81.4 | 81.6 | 116.2 | 117.4 | 158.4 ² |

¹ As per KDB 789033 D02 v02r01 the 99% bandwidth can be used in lieu of the 26dB bandwidth. The highest frequency measured with 99% measurement function is below 5250 MHz and falls completely within the U-NII-1 band.

² The 26dB emission bandwidth does extend the 5725 – 5850 MHz band. Therefore the 20dB bandwidth was measured to show compliance with §15.215 (c). The 20dB bandwidth is reported 23-1-0068401T004a-A6j and compliant with the §15.215 (c) requirement.

12.8 Occupied bandwidth / 99% emission bandwidth

Description:

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

Measurement:

| Measurement parameter | |
|--------------------------|--|
| External result file(s) | 1-7077/23-01-05_TR1-A201 to A209 FCC Part 15.407 & ISSED Bandwidths |
| Test setup: | See sub clause 7.4 A |
| Measurement uncertainty: | See chapter 9 |

Usage:

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

Results:

| 802.11a 99% bandwidth [MHz] | | | | | | | | | | | | |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| Port 1 | 17.13 | 19.23 | 19.23 | 20.08 | 19.68 | 17.23 | 17.03 | 17.43 | 17.58 | 19.23 | 18.93 | 19.58 |
| Port 2 | 17.03 | 17.83 | 17.93 | 18.38 | 18.53 | 17.23 | 17.13 | 17.28 | 17.83 | 20.88 | 20.52 | 20.23 |

| 802.11n HT20 99% bandwidth [MHz] | | | | | | | | | | | | |
|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| Port 1 | 18.38 | 19.83 | 19.63 | 22.03 | 22.43 | 18.08 | 18.18 | 19.73 | 19.23 | 19.83 | 19.63 | 19.93 |
| Port 2 | 18.03 | 18.78 | 18.63 | 19.88 | 20.08 | 18.33 | 18.08 | 19.08 | 19.53 | 20.93 | 21.23 | 20.53 |

| 802.11ac VHT20 99% bandwidth [MHz] | | | | | | | | | | | | |
|---------------------------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| Port 1 | 18.38 | 19.93 | 19.2 | 21.88 | 21.88 | 18.33 | 18.28 | 19.48 | 19.18 | 20.03 | 19.63 | 20.18 |
| Port 2 | 18.08 | 18.73 | 18.4 | 19.78 | 19.93 | 18.03 | 18.08 | 19.18 | 19.68 | 21.43 | 21.23 | 20.93 |

| 802.11ax HE20 99% bandwidth [MHz] | | | | | | | | | | | | |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Channel | 36 | 40 | 48 | 52 | 56 | 64 | 100 | 120 | 140 | 149 | 157 | 165 |
| Port 1 | 19.38 | 20.38 | 19.58 | 21.13 | 21.63 | 19.23 | 19.38 | 20.03 | 19.63 | 19.83 | 19.83 | 20.0 |
| Port 2 | 19.23 | 19.70 | 19.38 | 19.88 | 20.18 | 19.18 | 19.33 | 19.93 | 19.83 | 21.03 | 21.28 | 20.78 |

Results:

| 802.11n HT40 99% bandwidth [MHz] | | | | | | | | | |
|-------------------------------------|------|------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| Port 1 | 36.6 | 38.5 | 40.2 | 36.3 | 36.5 | 37.5 | 37.2 | 37.2 | 36.9 |
| Port 2 | 36.3 | 36.6 | 36.8 | 36.2 | 36.3 | 36.8 | 36.7 | 37.2 | 36.8 |

| 802.11ac VHT40 99% bandwidth [MHz] | | | | | | | | | |
|---------------------------------------|------|------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| Port 1 | 36.4 | 39.0 | 40.8 | 36.3 | 36.5 | 37.7 | 37.2 | 37.2 | 37.2 |
| Port 2 | 36.2 | 36.6 | 36.9 | 36.1 | 36.3 | 36.8 | 36.7 | 36.8 | 37.0 |

| 802.11ax HE40 99% bandwidth [MHz] | | | | | | | | | |
|--------------------------------------|------|------|------|------|------|------|------|------|------|
| Channel | 38 | 46 | 54 | 62 | 102 | 118 | 134 | 151 | 159 |
| Port 1 | 37.7 | 38.3 | 37.9 | 37.7 | 37.7 | 38.1 | 38.1 | 38.0 | 37.8 |
| Port 2 | 37.6 | 38.3 | 38.5 | 37.6 | 37.7 | 38.0 | 38.0 | 38.0 | 38.1 |

| 802.11ac VHT80 99% bandwidth [MHz] | | | | | | |
|---------------------------------------|------|------|------|------|------|------|
| Channel | 42 | 58 | 106 | 122 | 138 | 155 |
| Port 1 | 75.7 | 75.5 | 75.7 | 81.3 | 77.3 | 79.9 |
| Port 2 | 75.5 | 75.5 | 75.5 | 78.7 | 77.5 | 91.9 |

| 802.11ax HE80 99% bandwidth [MHz] | | | | | | |
|--------------------------------------|------|------|------|------|------|------|
| Channel | 42 | 58 | 106 | 122 | 138 | 155 |
| Port 1 | 76.9 | 77.1 | 77.3 | 77.7 | 77.7 | 78.5 |
| Port 2 | 77.1 | 77.3 | 77.3 | 77.7 | 77.5 | 85.3 |

12.9 Undesirable emissions for transmitters operating in the 5725 MHz to 5850 MHz band (conducted)

Description:

Measurement of the spectrum mask as per FCC Part 15.407 (b)(4) and KDB 789033 II.G.2 (c) (ii).
The measurement is repeated at the lowest, middle and highest channel and performed in a conducted way as defined in KDB 789033 II.G.3 (b).

The highest antenna gain is considered and was added to the Reference Level Offset.
Emission levels are further adjusted to consider the number of antenna outputs (2).

Measurement:

| Measurement parameter | |
|--------------------------|--|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | $\geq 3 \times \text{RBW}$ |
| Span: | See plots! |
| Trace mode: | Max Hold |
| Test setup: | See sub clause 7.4 A |
| Measurement uncertainty: | See chapter 9 |
| External result file(s) | 1-7077/23-01-05_TR1-A201 to A209 FCC 15.407, ISED RSS247 # Emission mask (eirp) |

Limits:

| FCC Part 15.407 (b)(4) |
|---|
| All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. |

Results:

Plots can be found in the referenced external result files.

12.10 Band edge compliance radiated

Description:

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

Measurement:

| Measurement parameter | |
|--------------------------|----------------------------|
| Detector: | Peak / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | $\geq 3 \times \text{RBW}$ |
| Span: | See plots! |
| Trace mode: | Max Hold |
| Test setup: | See sub clause 7.2 – C |
| Measurement uncertainty: | See chapter 9 |

Limits:

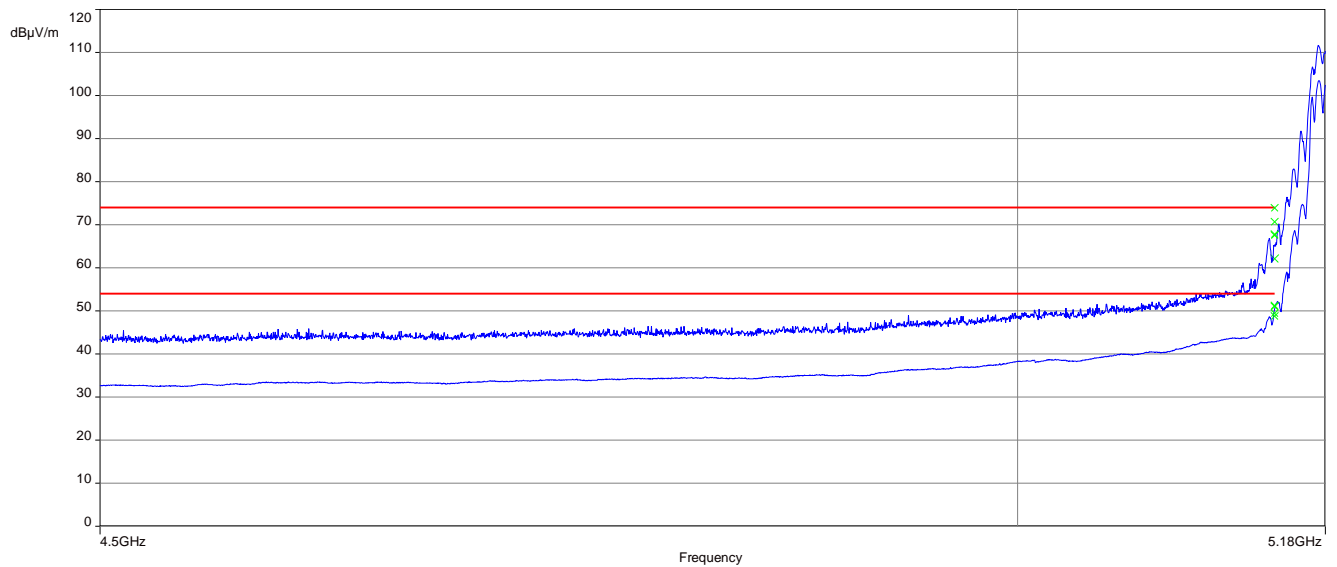
| Band Edge Compliance Radiated |
|--|
| In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz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

Result:

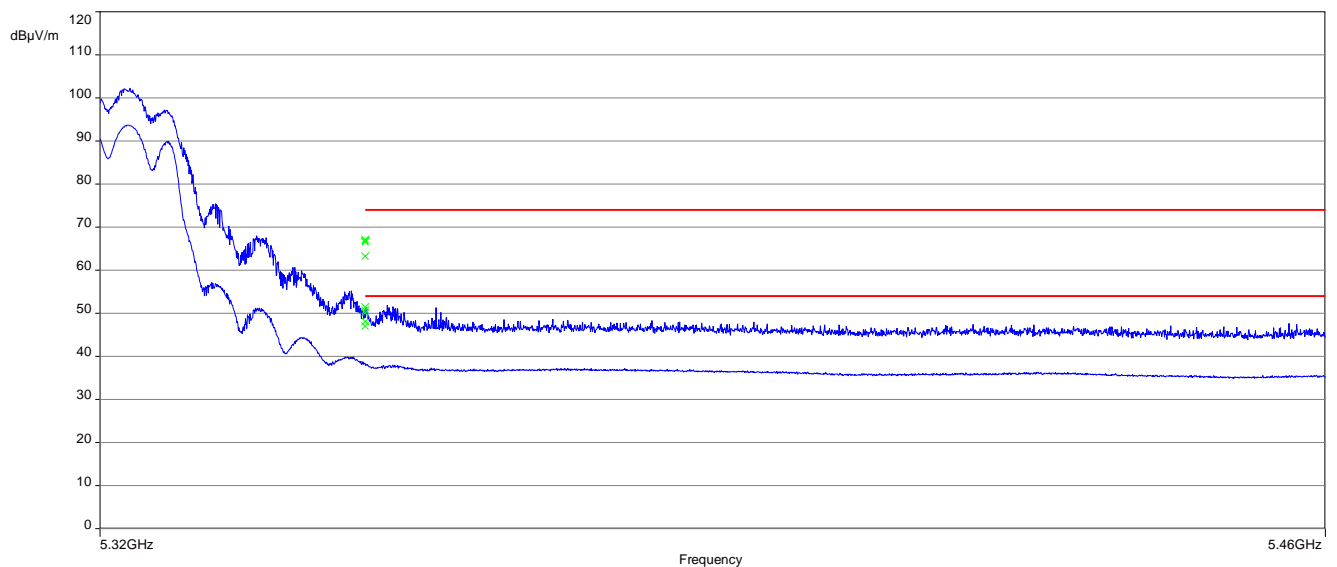
| Scenario | Band Edge Compliance Radiated [dB μ V/m] |
|-----------|---|
| band edge | < 74 dB μ V/m (peak) < 54 dB μ V/m (average) |

Plots:

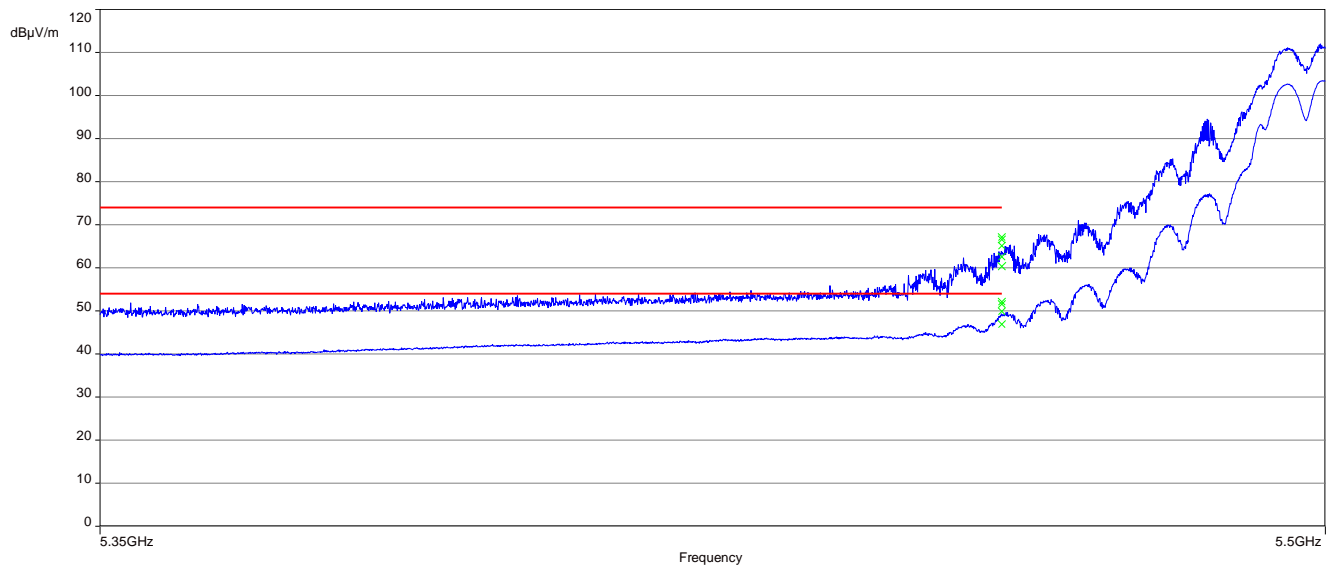
Plot 1: lower band edge; U-NII-1; lowest channel; a-mode



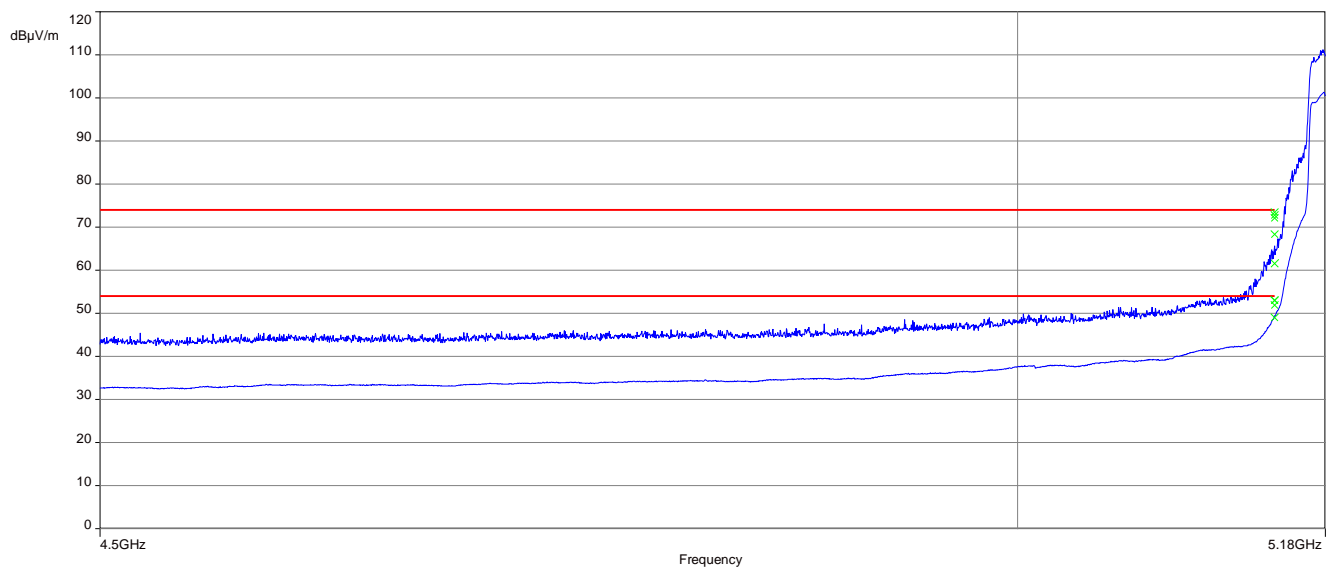
Plot 2: upper band edge; U-NII-2A; highest channel; a-mode



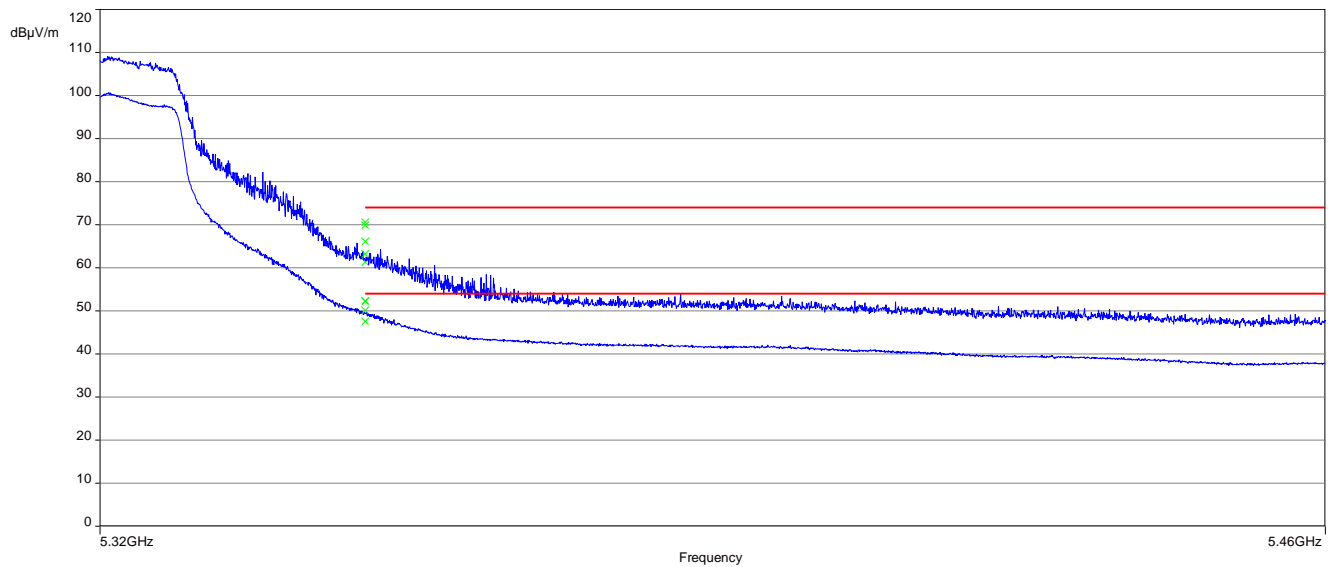
Plot 3: lower band edge; U-NII-2C; lowest channel; a-mode



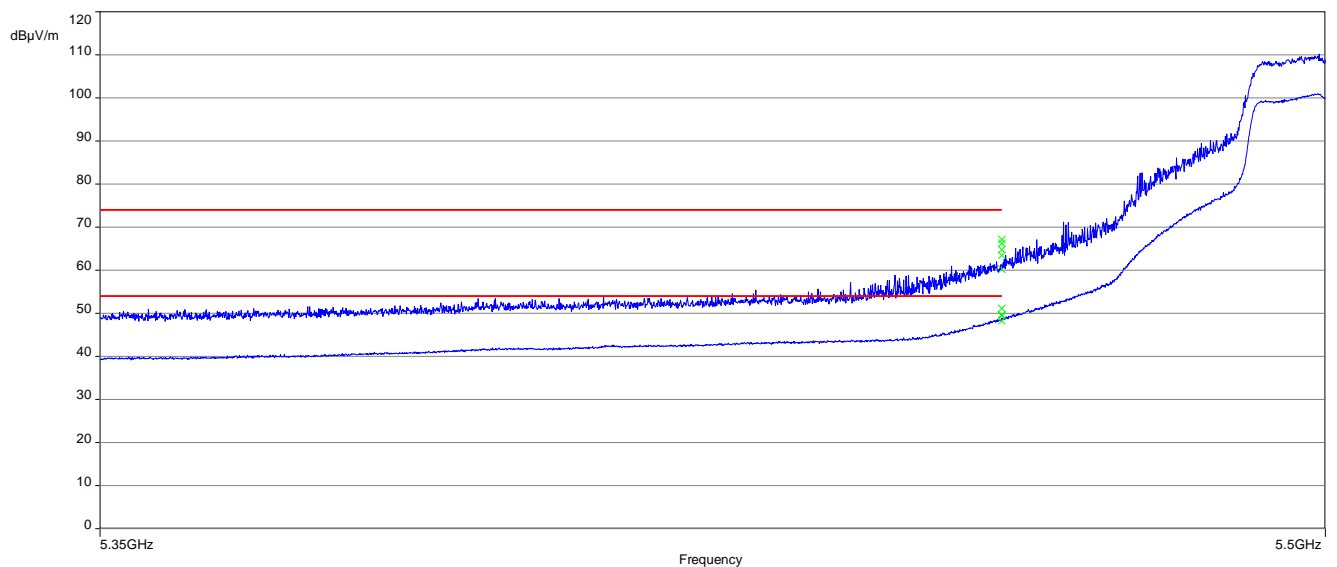
Plot 4: lower band edge; U-NII-1; lowest channel; n20-mode



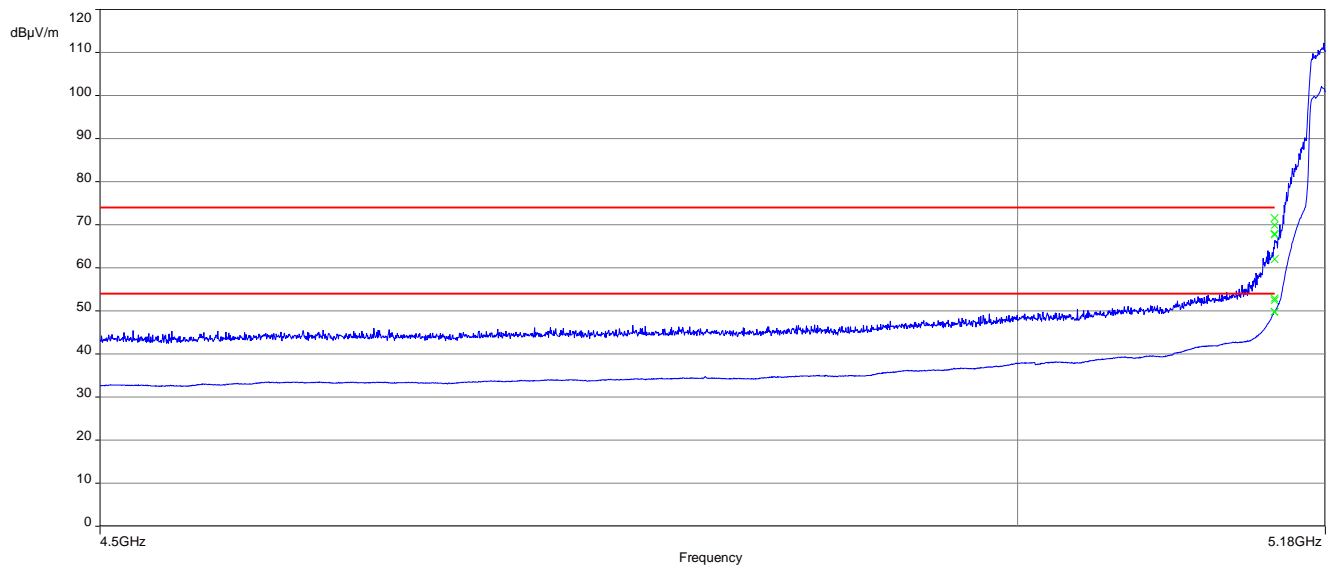
Plot 5: upper band edge; U-NII-2A; highest channel; n20-mode



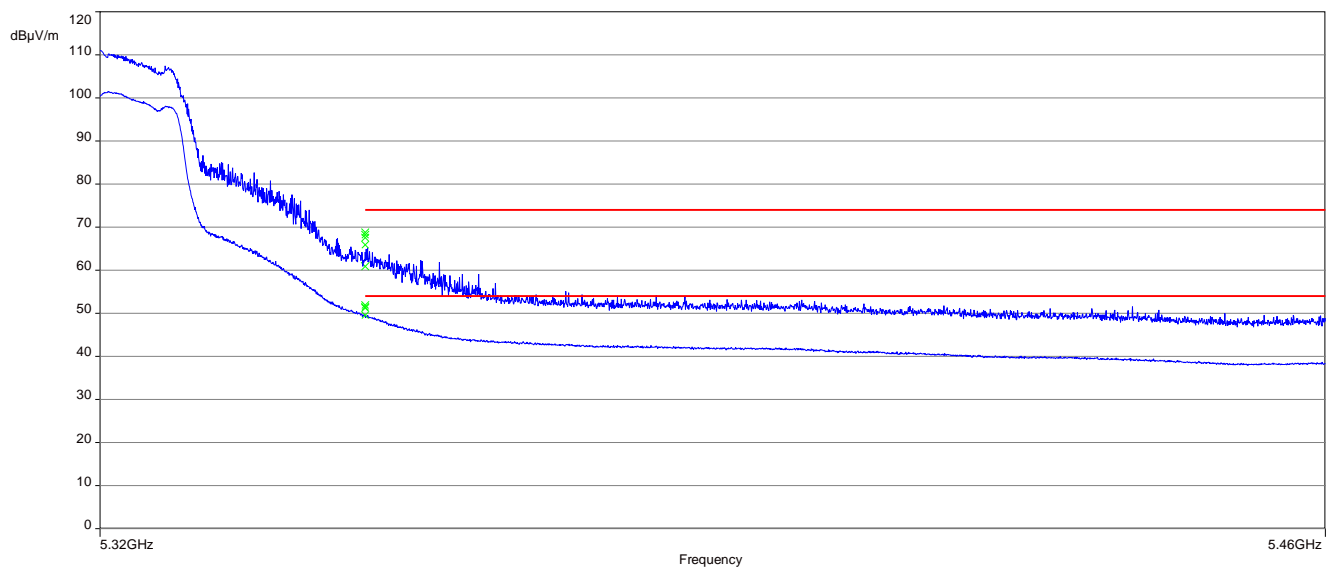
Plot 6: lower band edge; U-NII-2C; lowest channel; n20-mode



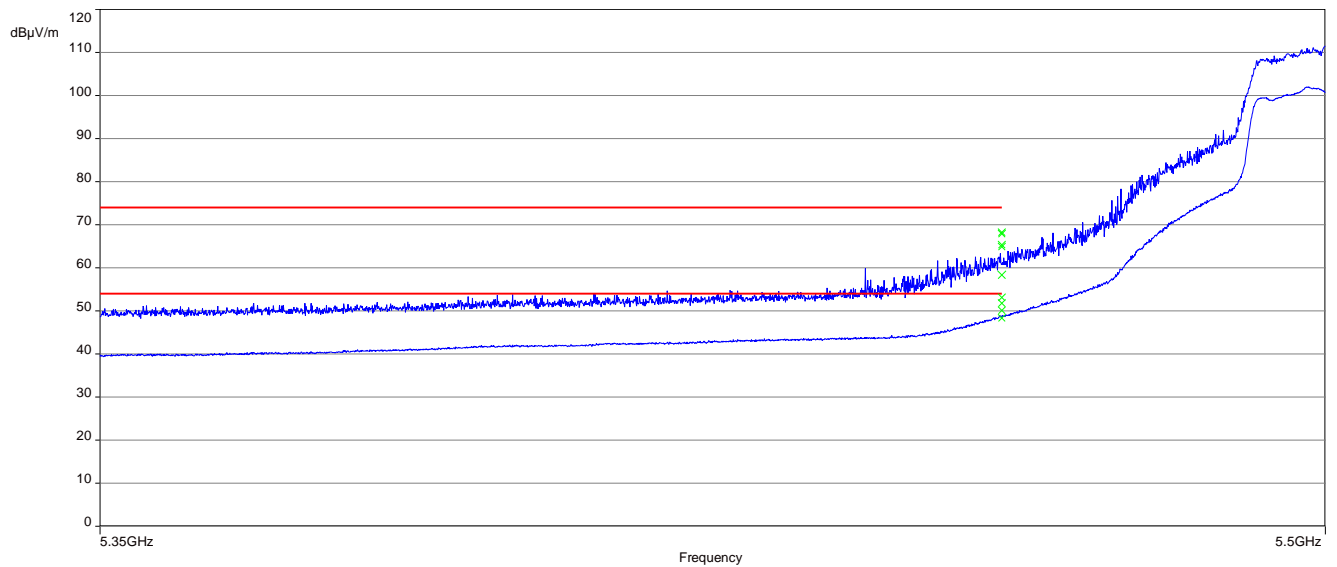
Plot 7: lower band edge; U-NII-1; lowest channel; ac20-mode



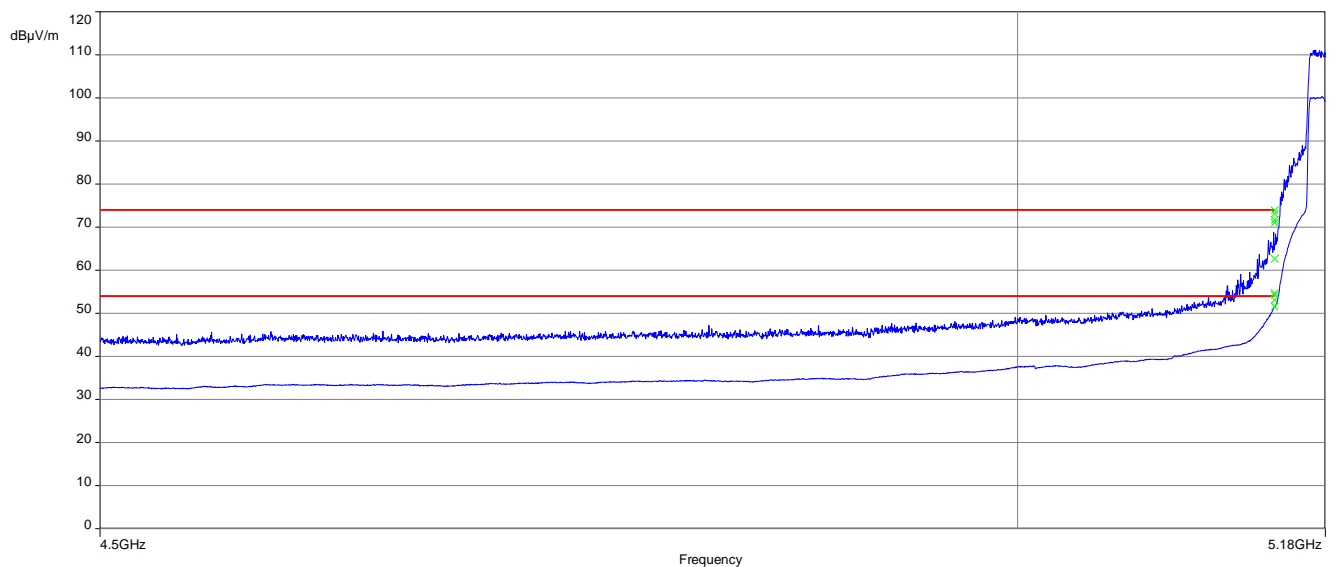
Plot 8: upper band edge; U-NII-2A; highest channel; ac20-mode



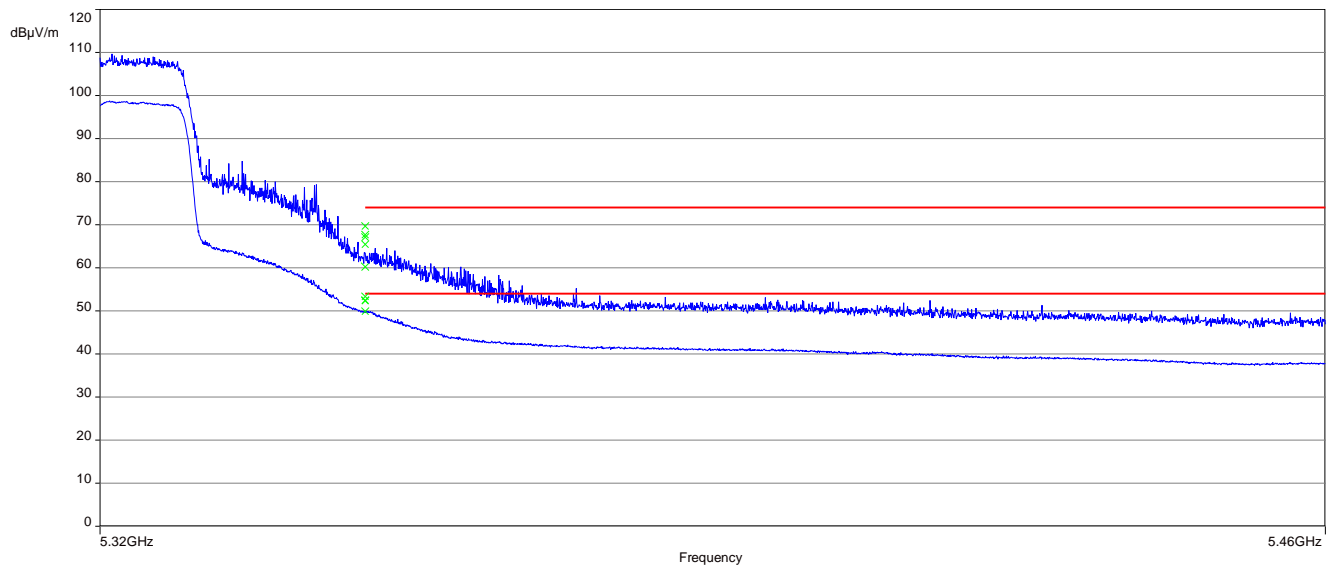
Plot 9: lower band edge; U-NII-2C; lowest channel; ac20-mode



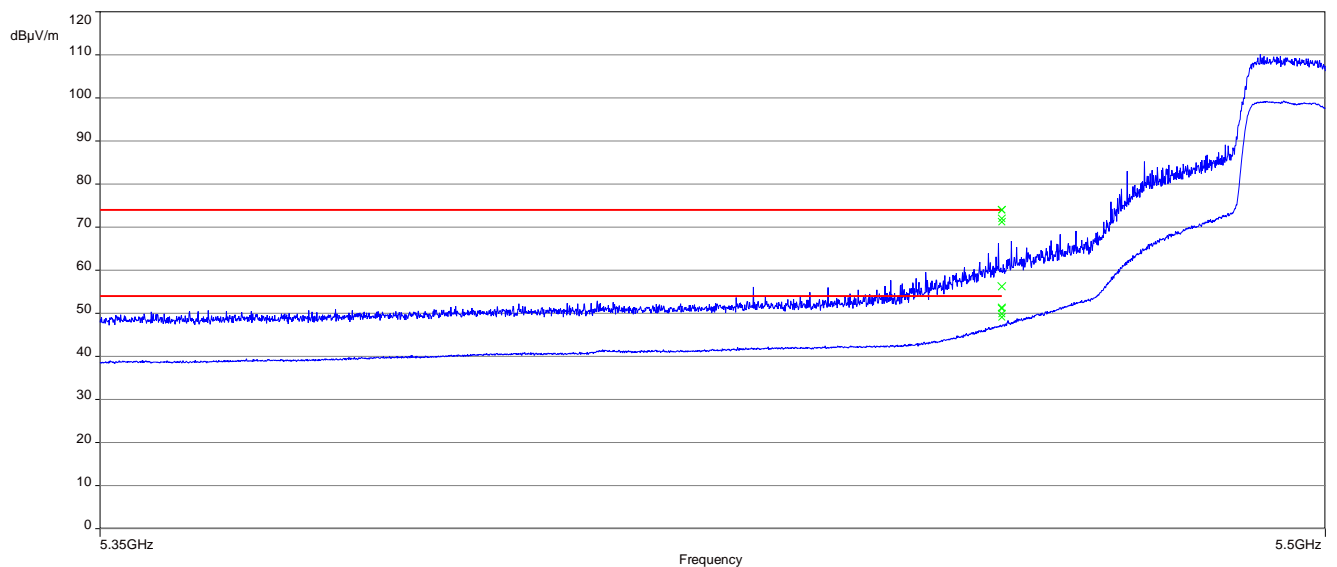
Plot 10: lower band edge; U-NII-1; lowest channel; ax20-mode



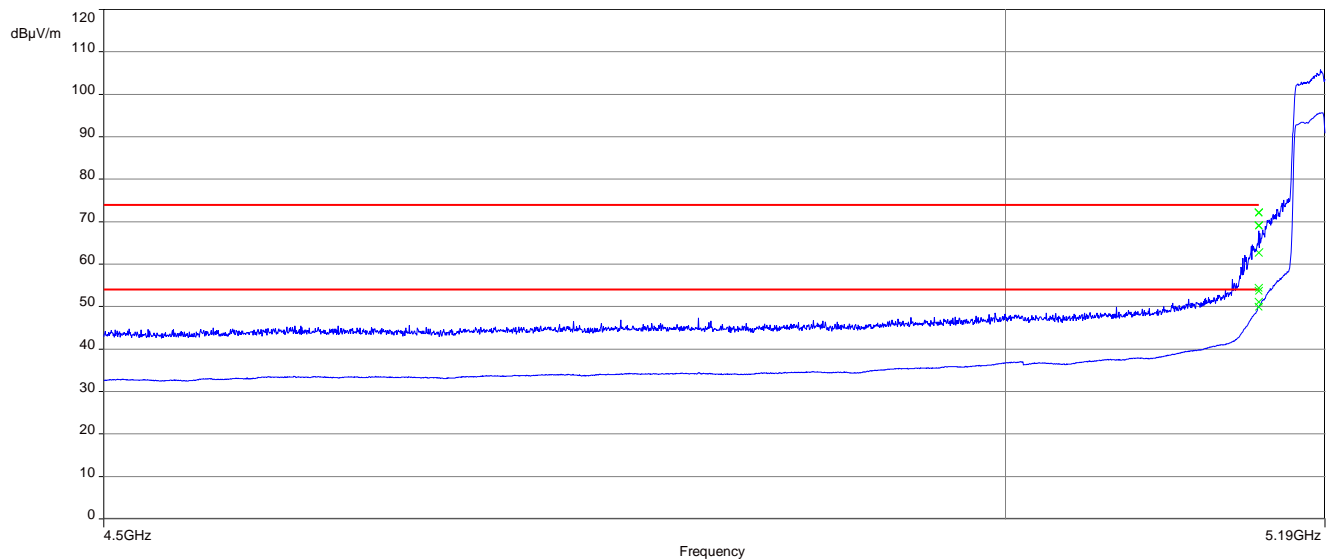
Plot 11: upper band edge; U-NII-2A; highest channel; ax20-mode



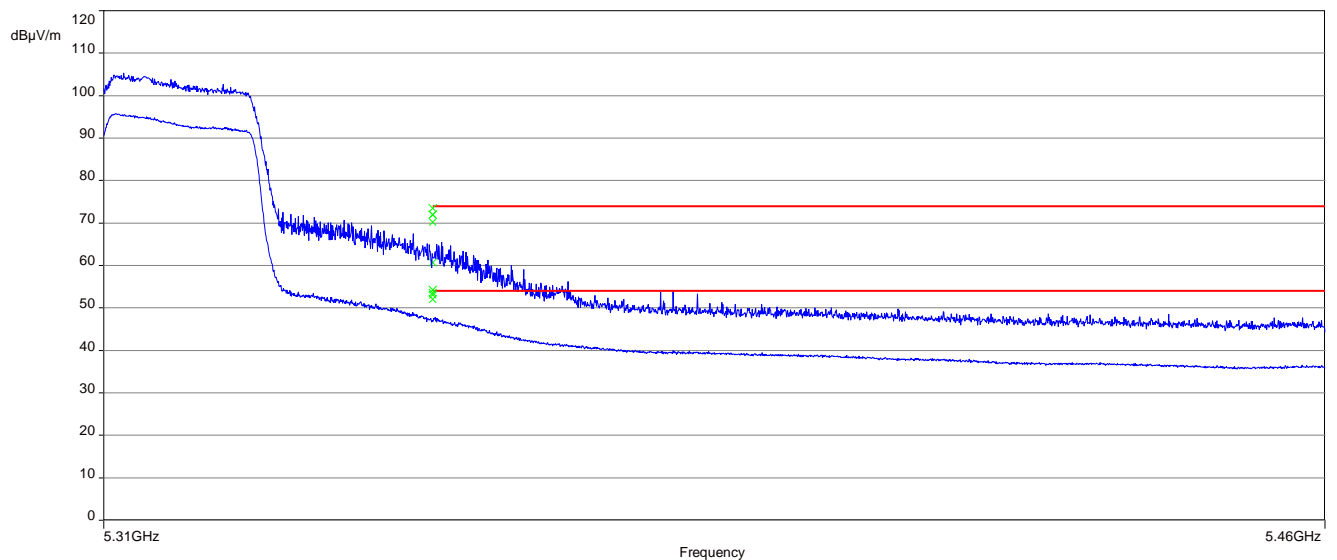
Plot 12: lower band edge; U-NII-2C; lowest channel; ax20-mode



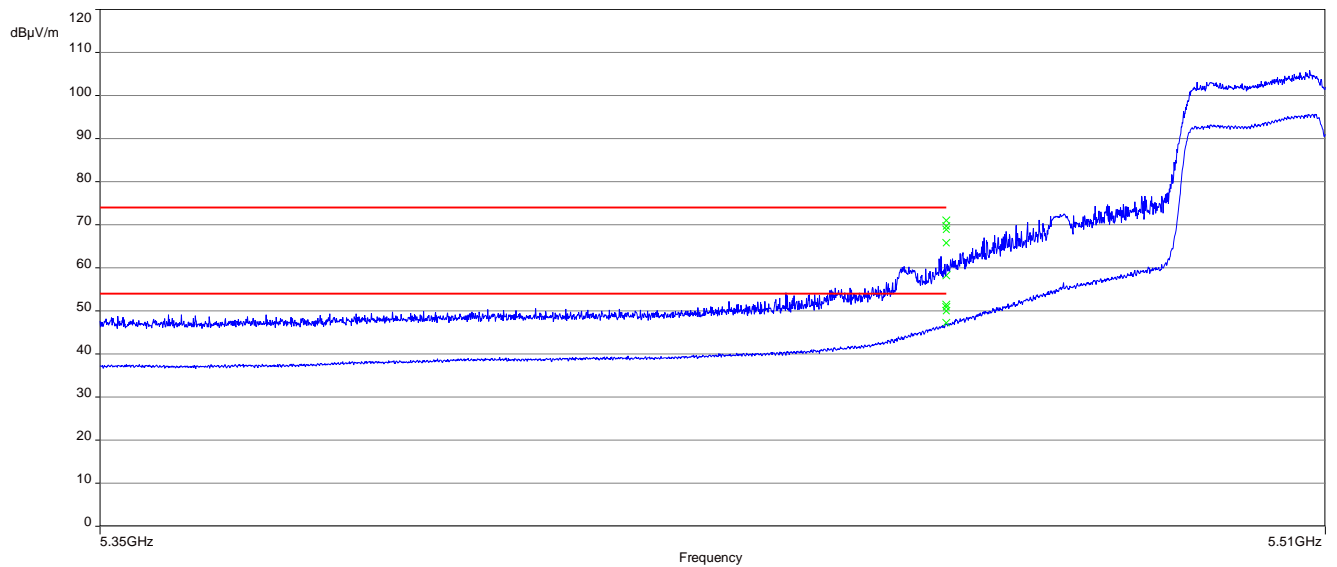
Plot 13: lower band edge; U-NII-1; lowest channel; n40-mode



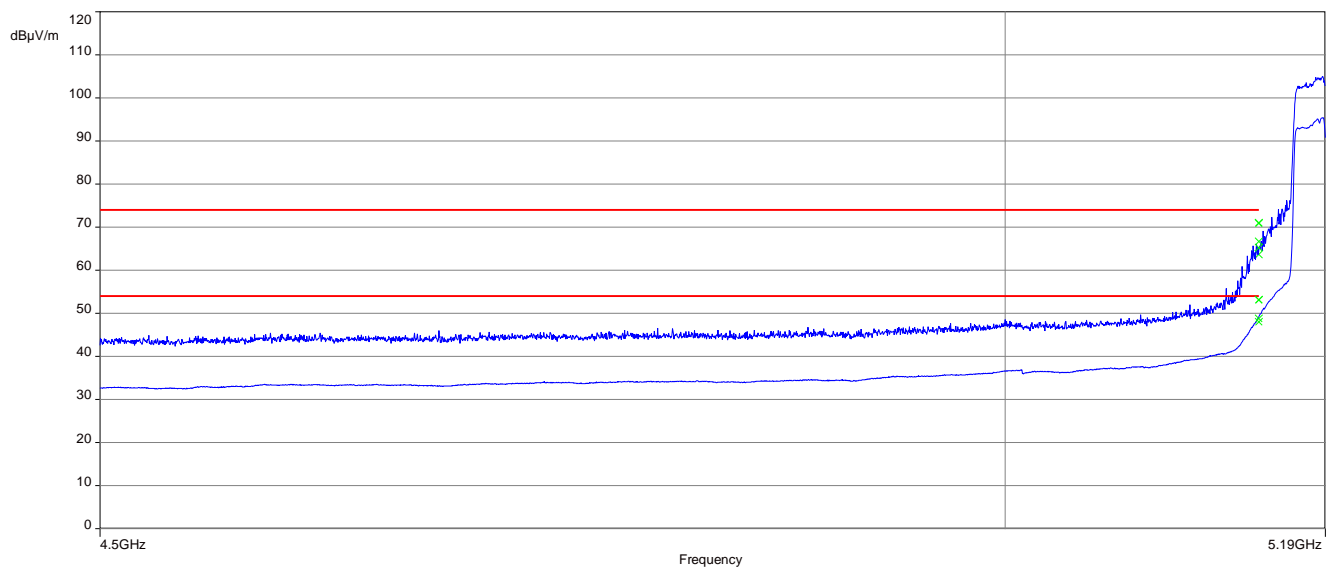
Plot 14: upper band edge; U-NII-2A; highest channel; n40-mode



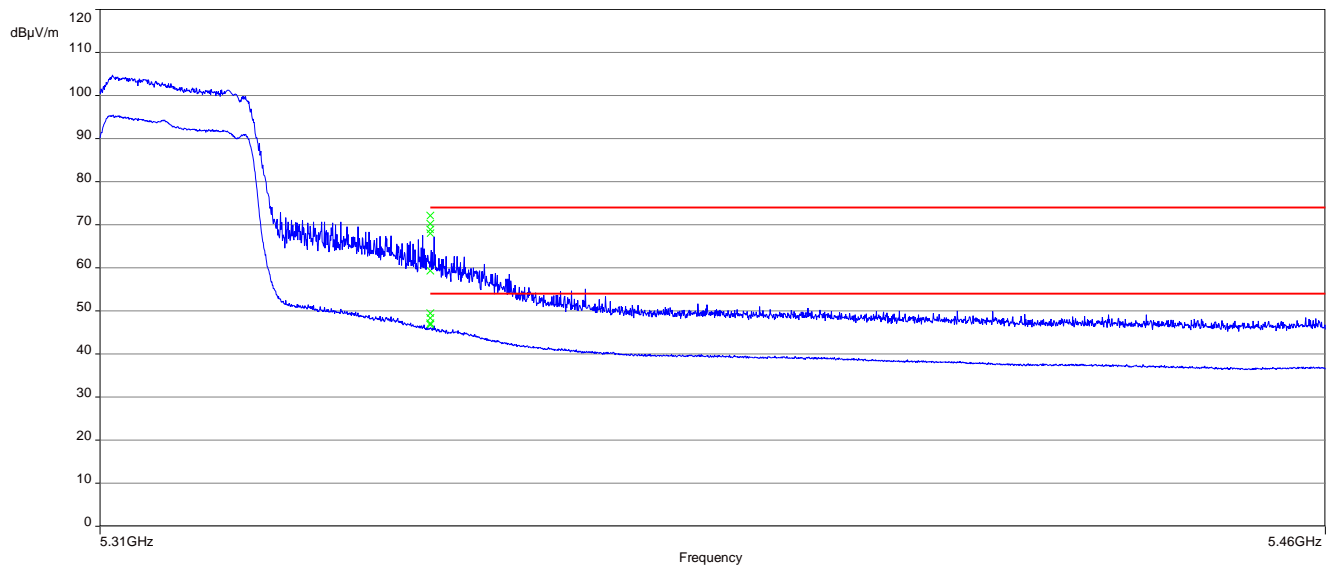
Plot 15: lower band edge; U-NII-2C; lowest channel; n40-mode



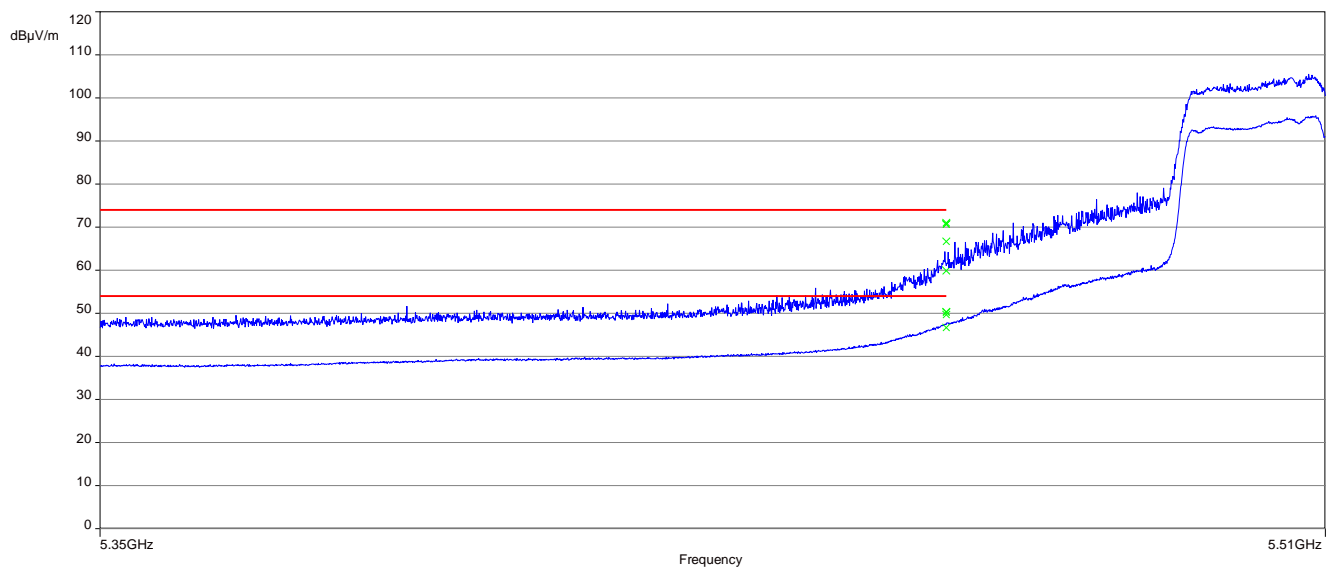
Plot 16: lower band edge; U-NII-1; lowest channel; ac40-mode



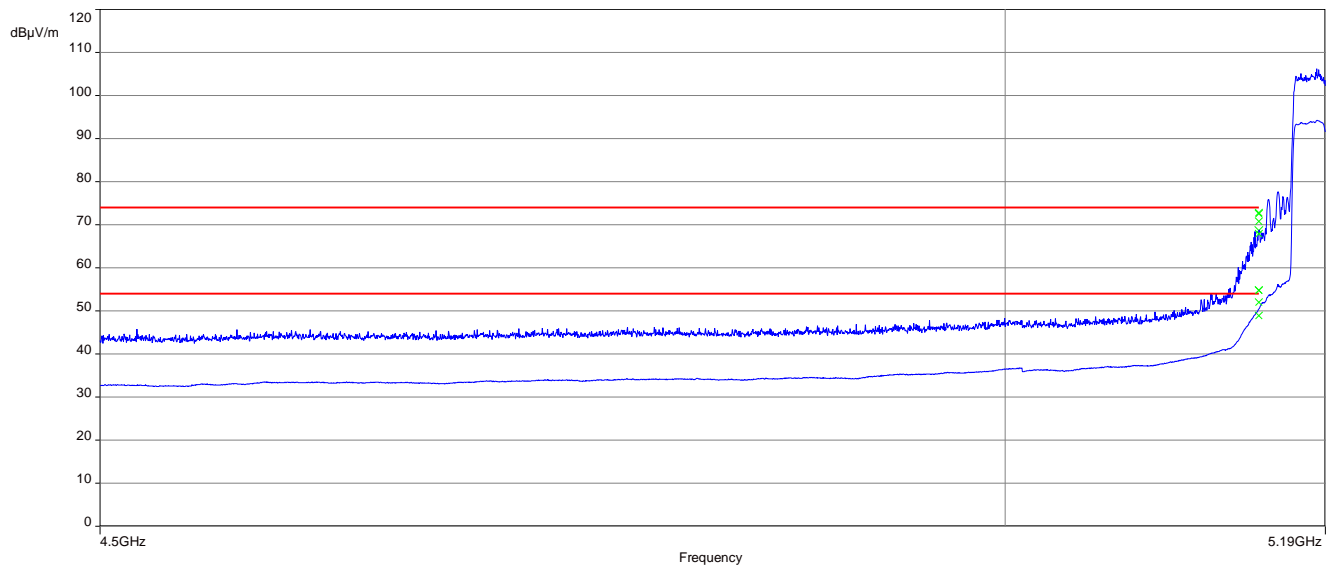
Plot 17: upper band edge; U-NII-2A; highest channel; ac40-mode



Plot 18: lower band edge; U-NII-2C; lowest channel; ac40-mode



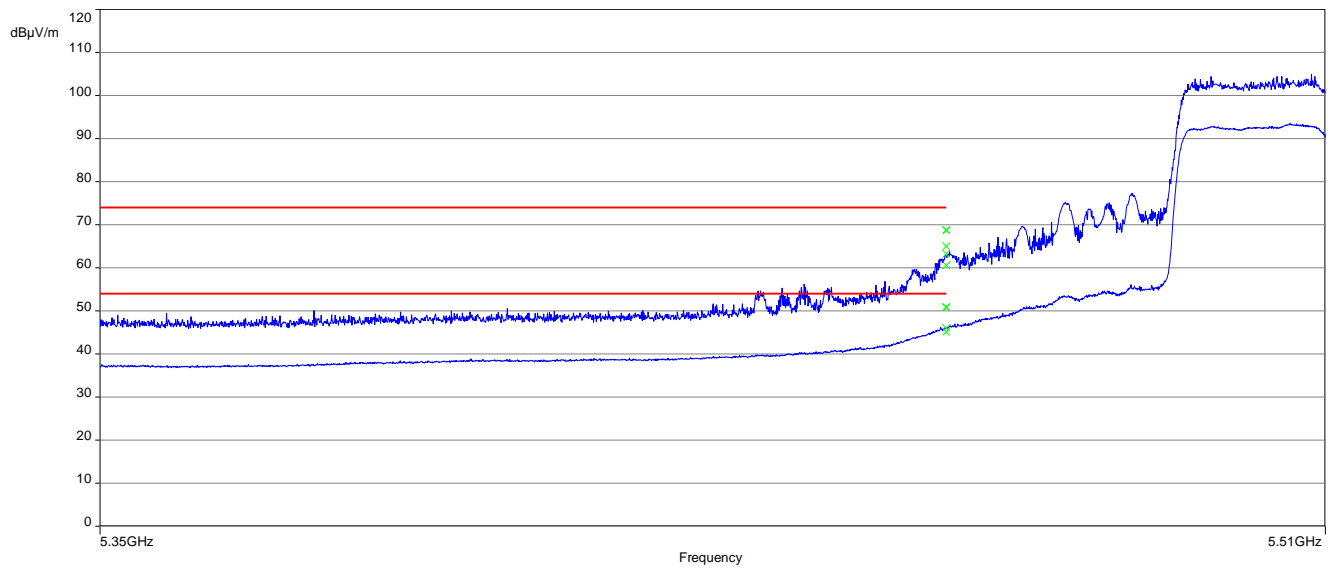
Plot 19: lower band edge; U-NII-1; lowest channel; ax40-mode



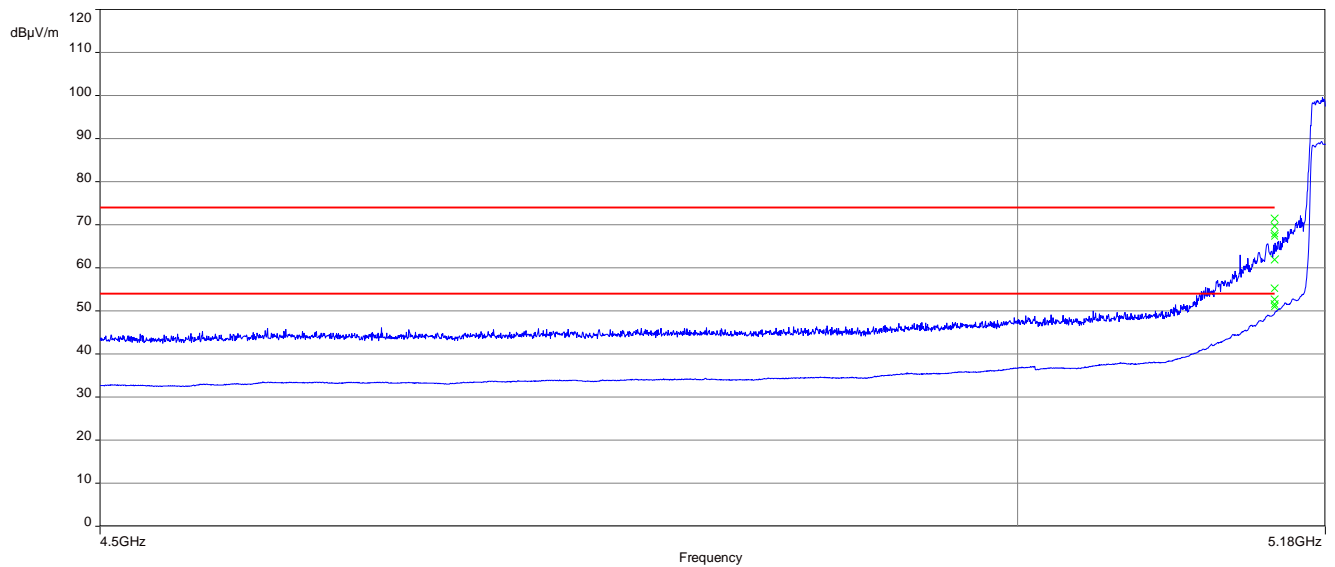
Plot 20: upper band edge; U-NII-2A; highest channel; ax40-mode



Plot 21: lower band edge; U-NII-2C; lowest channel; ax40-mode



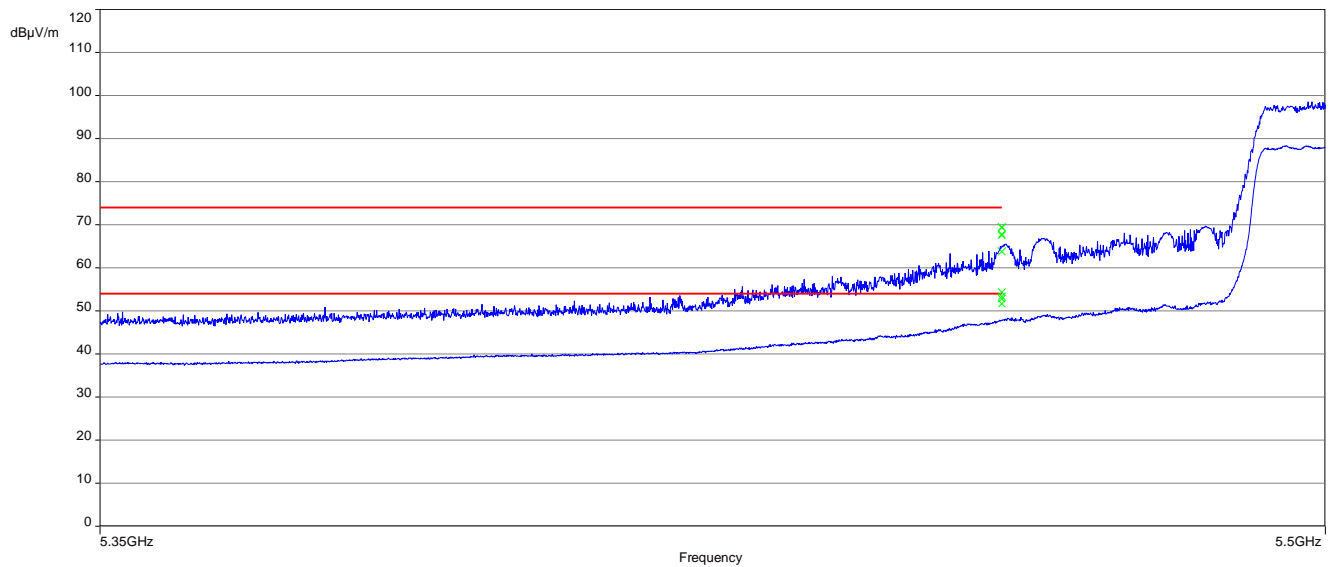
Plot 22: lower band edge; U-NII-1; middle channel; ac80-mode



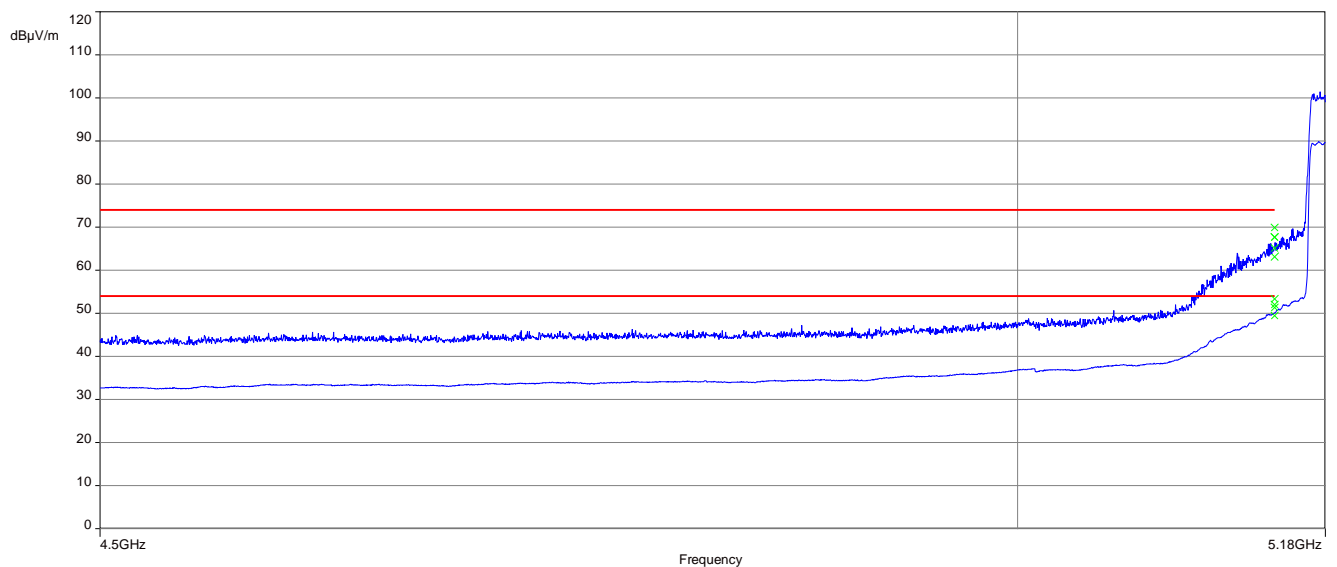
Plot 23: upper band edge; U-NII-2A; middle channel; ac80-mode



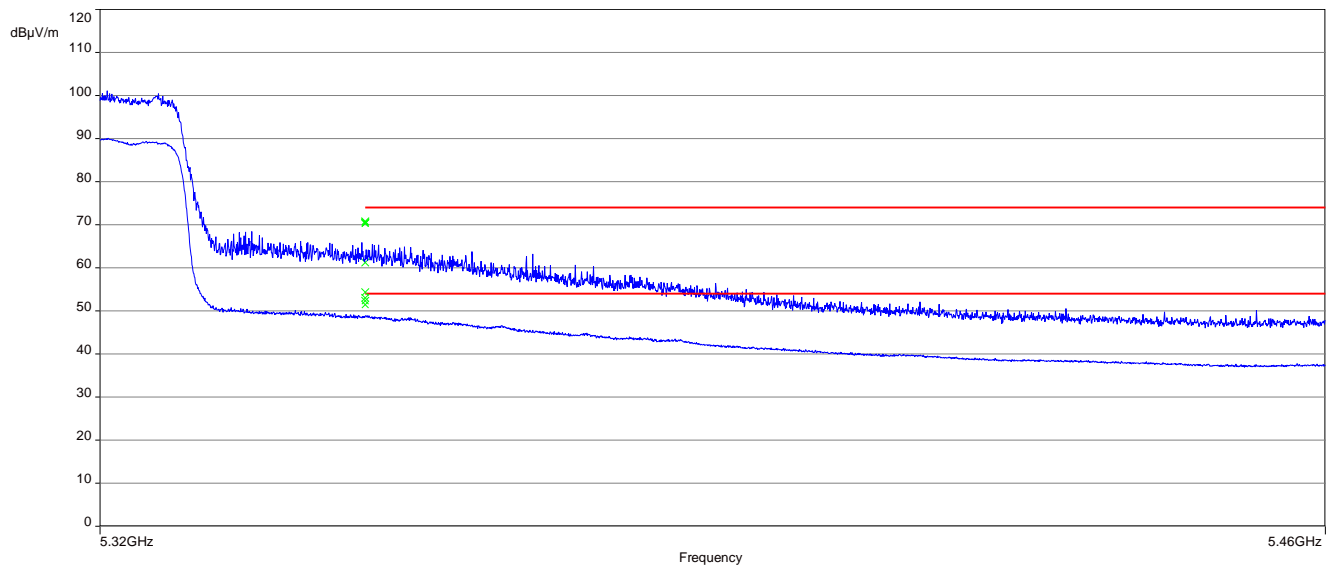
Plot 24: lower band edge; U-NII-2C; lowest channel; ac80-mode



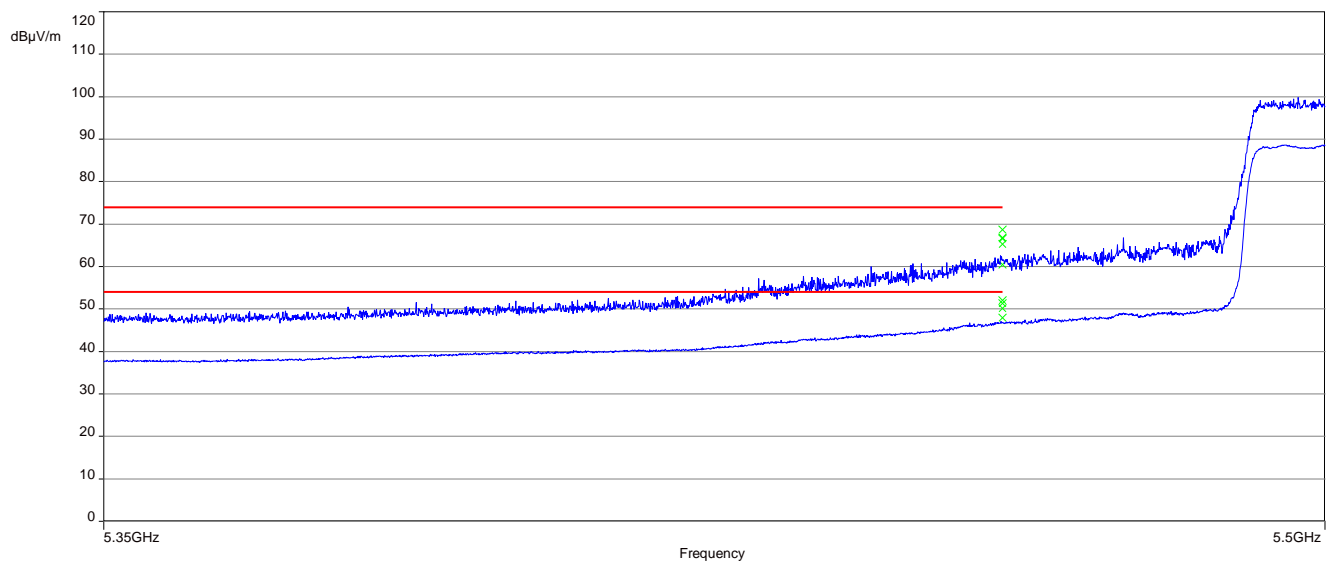
Plot 25: lower band edge; U-NII-1; middle channel; ax80-mode



Plot 26: upper band edge; U-NII-2A; middle channel; ax80-mode



Plot 27: lower band edge; U-NII-2C; lowest channel; ax80-mode



12.11 Spurious emissions radiated below 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The limits are re-calculated 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 |
| Video bandwidth: | F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz |
| Resolution bandwidth: | F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz |
| Span: | 9 kHz to 30 MHz |
| Trace mode: | Max Hold |
| Test setup: | See sub clause 7.2 – A |
| Measurement uncertainty: | See chapter 9 |

Limits:

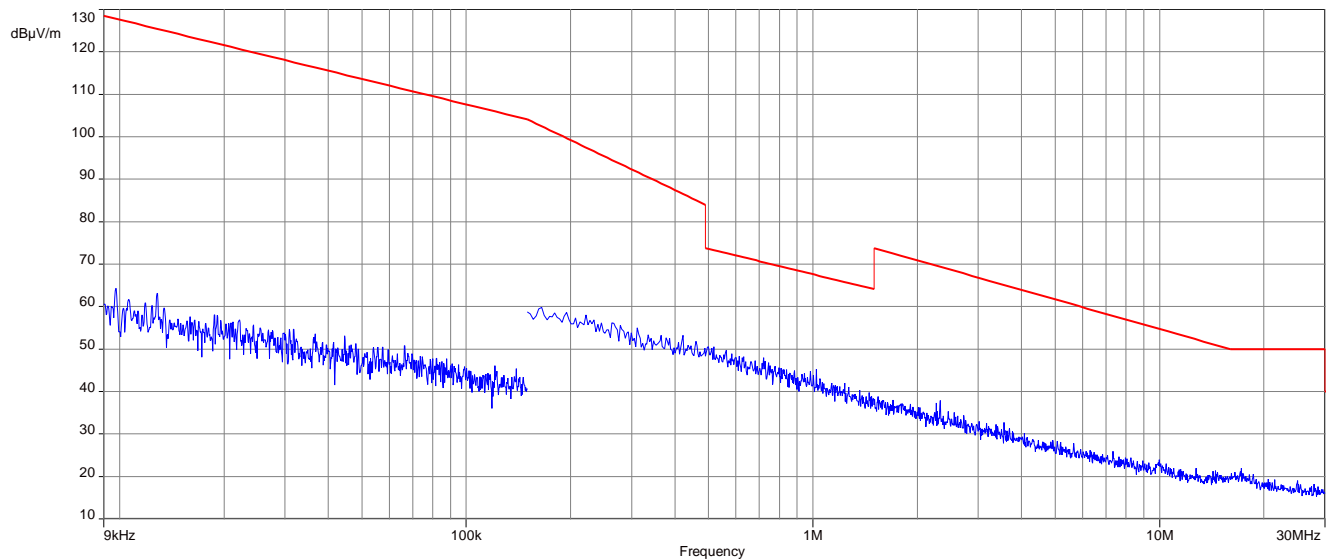
| Spurious Emissions Radiated < 30 MHz | | |
|--------------------------------------|-----------------------|----------------------|
| Frequency (MHz) | Field Strength (µV/m) | Measurement distance |
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |

Results:

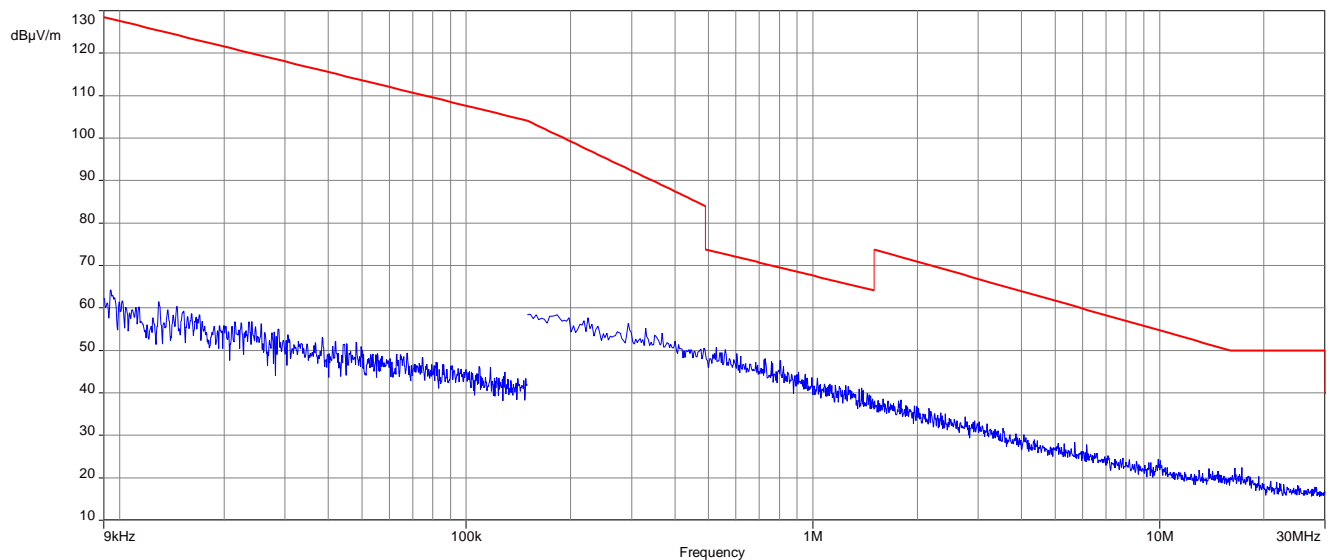
| Spurious Emissions Radiated < 30 MHz [dBµV/m] | | |
|---|----------|----------------|
| F [MHz] | Detector | Level [dBµV/m] |
| All detected emissions are more than 20 dB below the limit. | | |

Plots: 20 MHz channel bandwidth

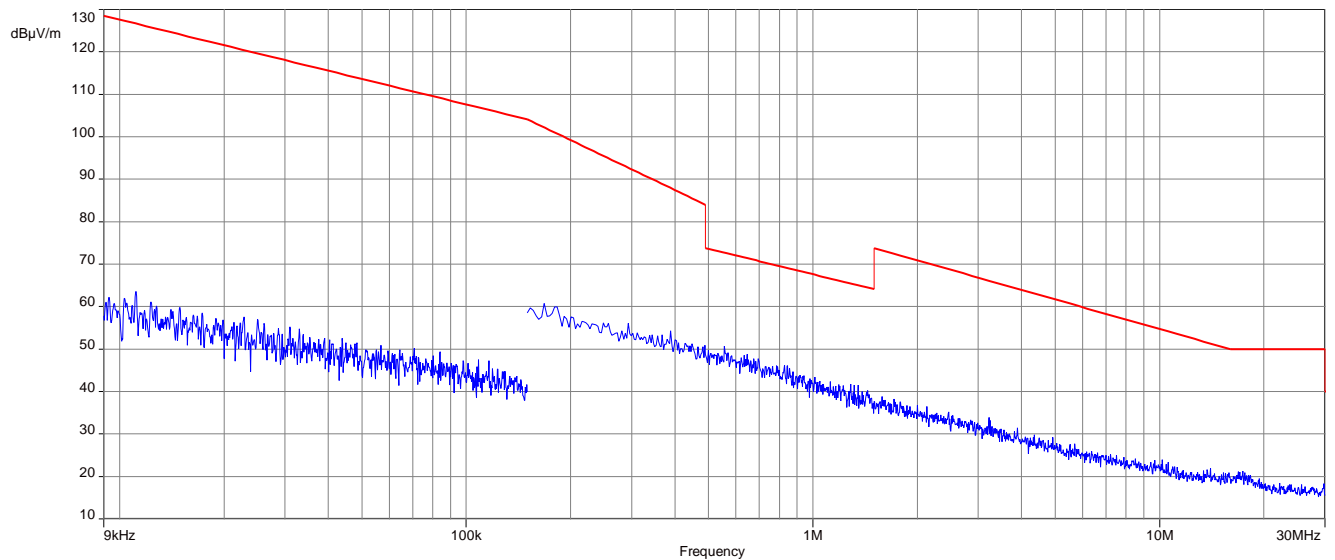
Plot 1: 9 kHz to 30 MHz, U-NII-1; lowest channel



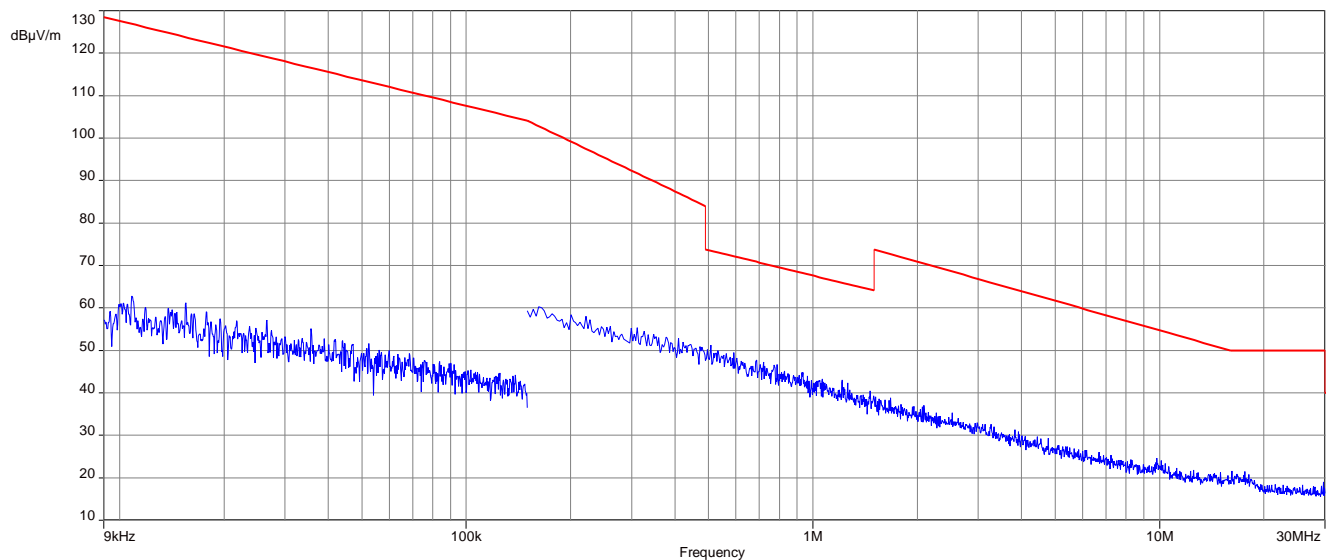
Plot 2: 9 kHz to 30 MHz, U-NII-1; middle channel



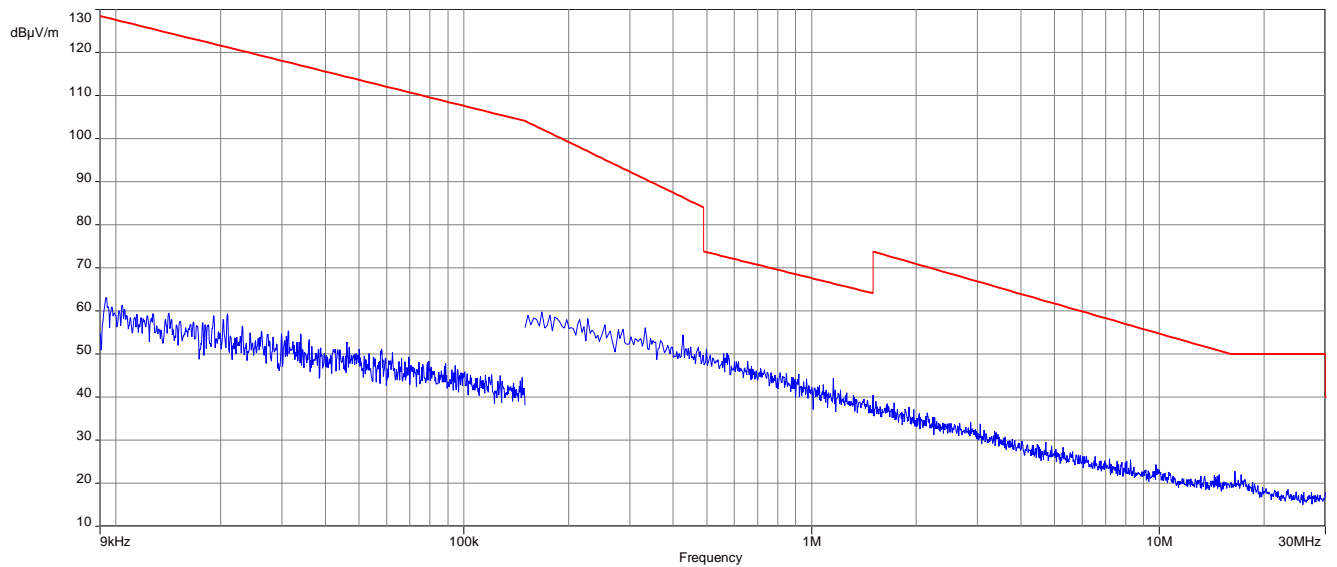
Plot 3: 9 kHz to 30 MHz, U-NII-1; highest channel



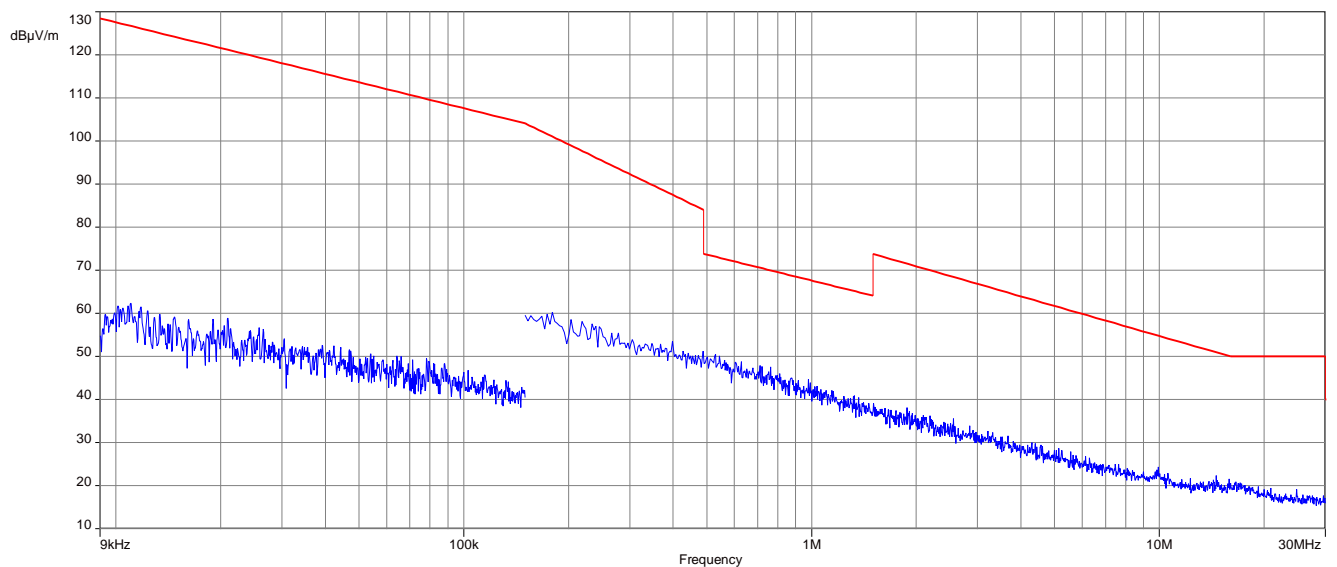
Plot 4: 9 kHz to 30 MHz, U-NII-2A; lowest channel



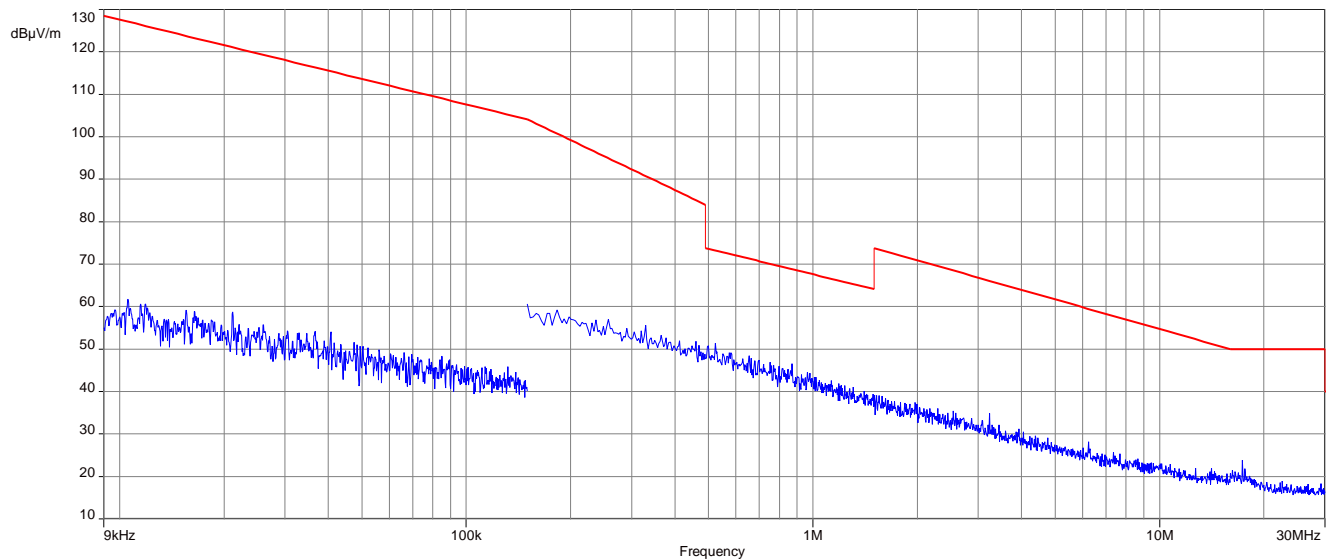
Plot 5: 9 kHz to 30 MHz, U-NII-2A; middle channel



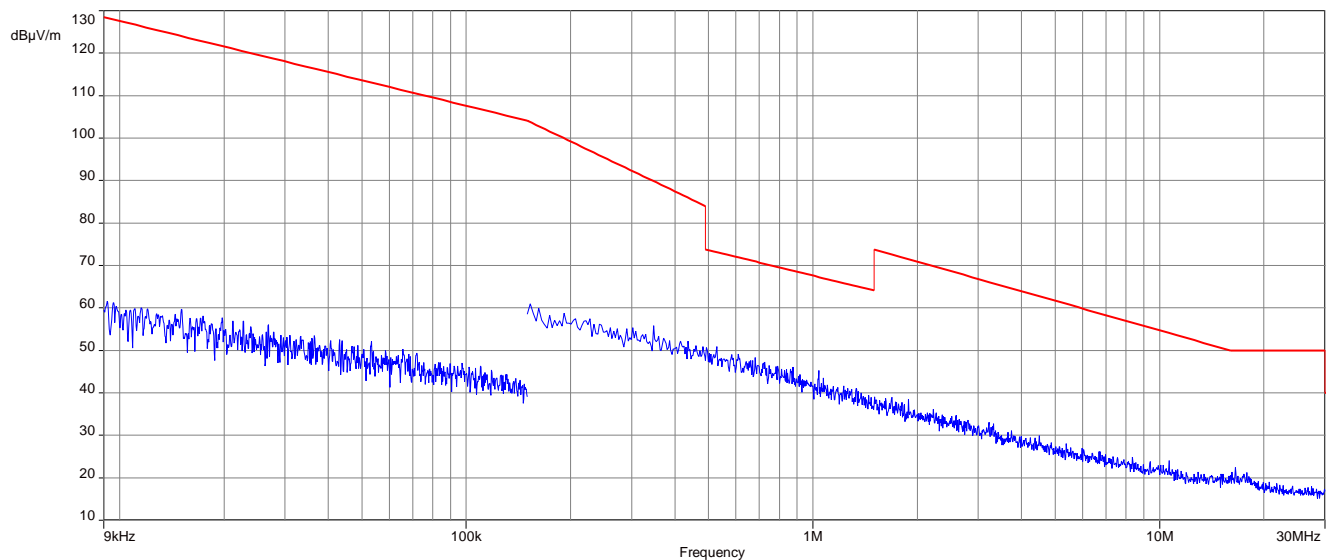
Plot 6: 9 kHz to 30 MHz, U-NII-2A; highest channel



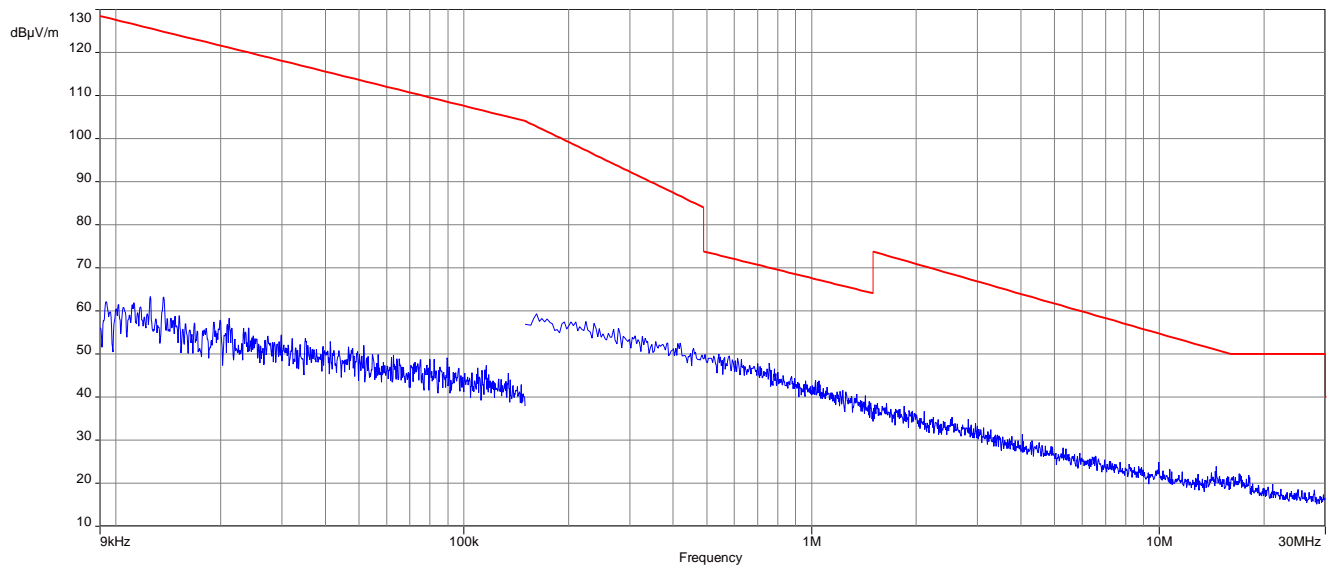
Plot 7: 9 kHz to 30 MHz, U-NII-2C; lowest channel



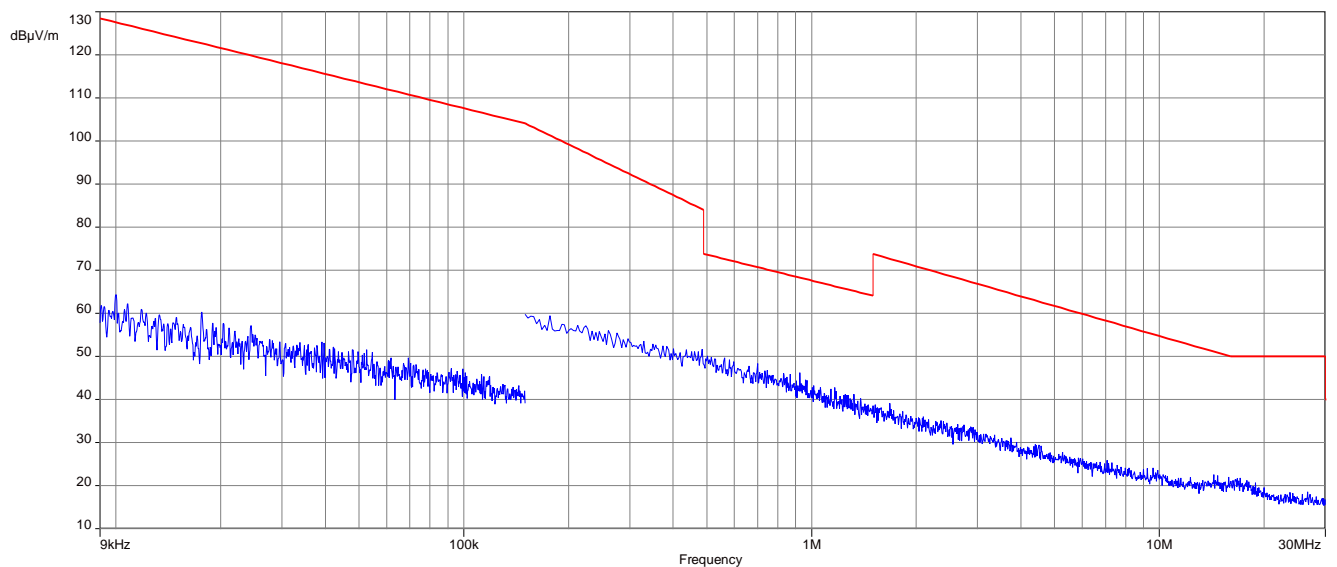
Plot 8: 9 kHz to 30 MHz, U-NII-2C; middle channel



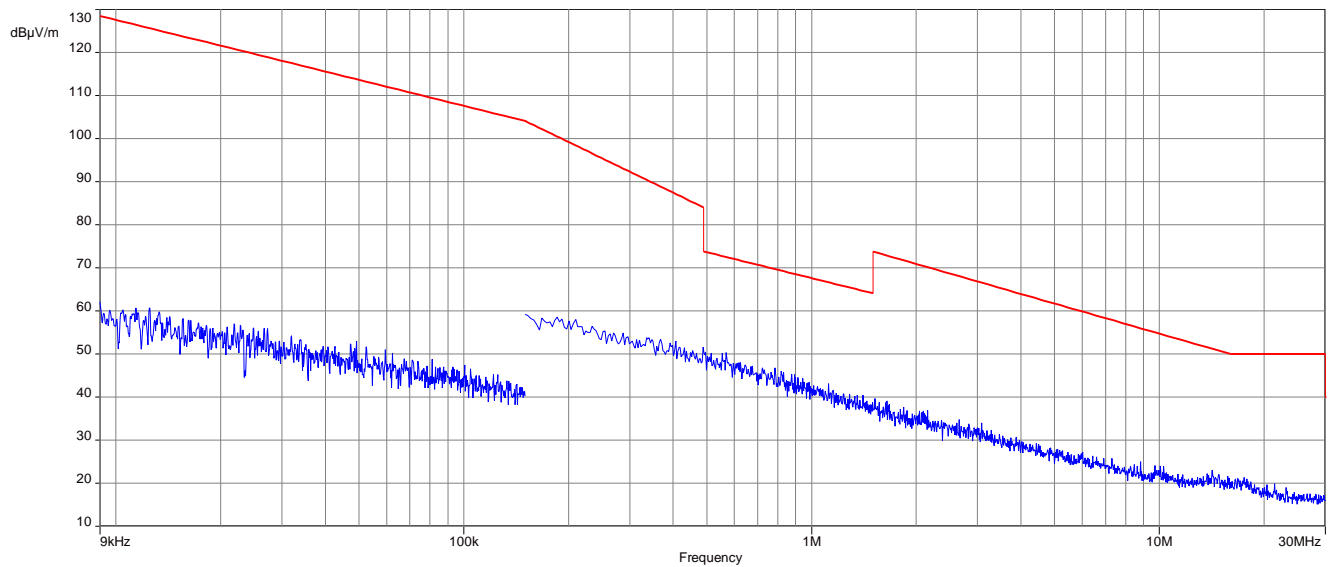
Plot 9: 9 kHz to 30 MHz, U-NII-2C; highest channel



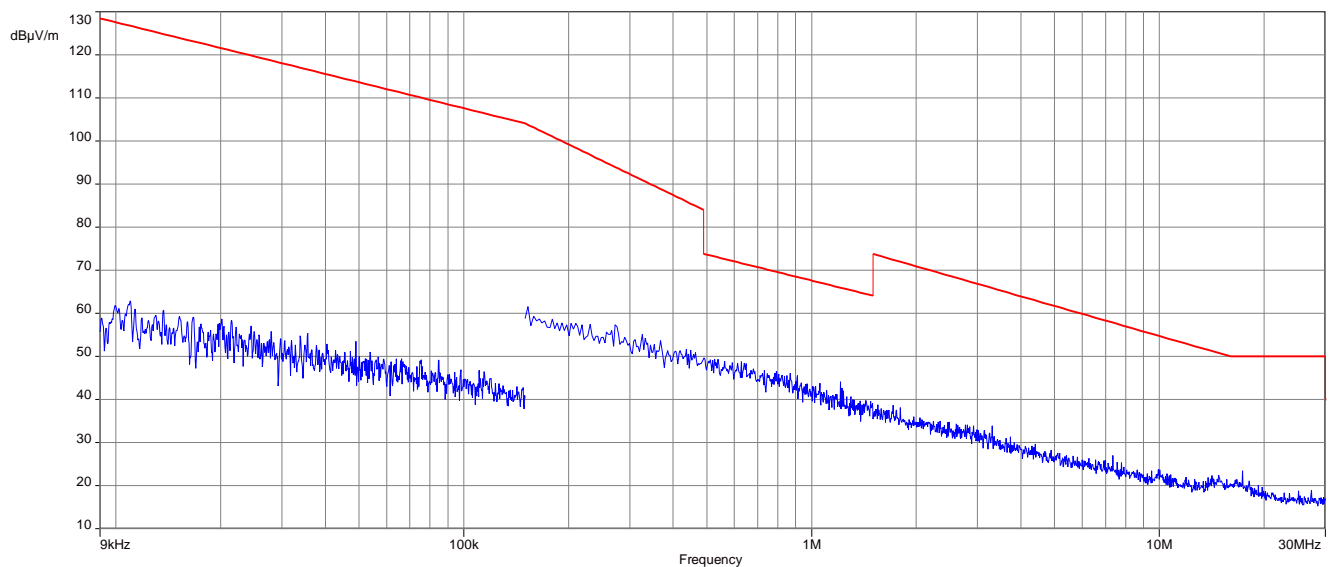
Plot 10: 9 kHz to 30 MHz, U-NII-3; lowest channel



Plot 11: 9 kHz to 30 MHz, U-NII-3; middle channel

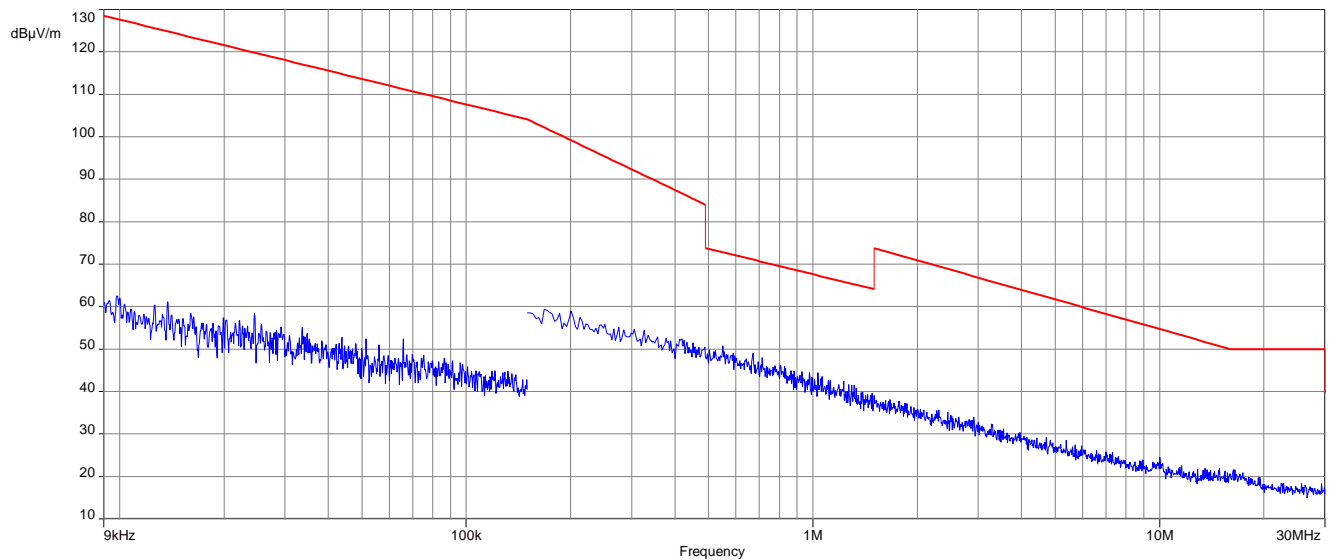


Plot 12: 9 kHz to 30 MHz, U-NII-3; highest channel

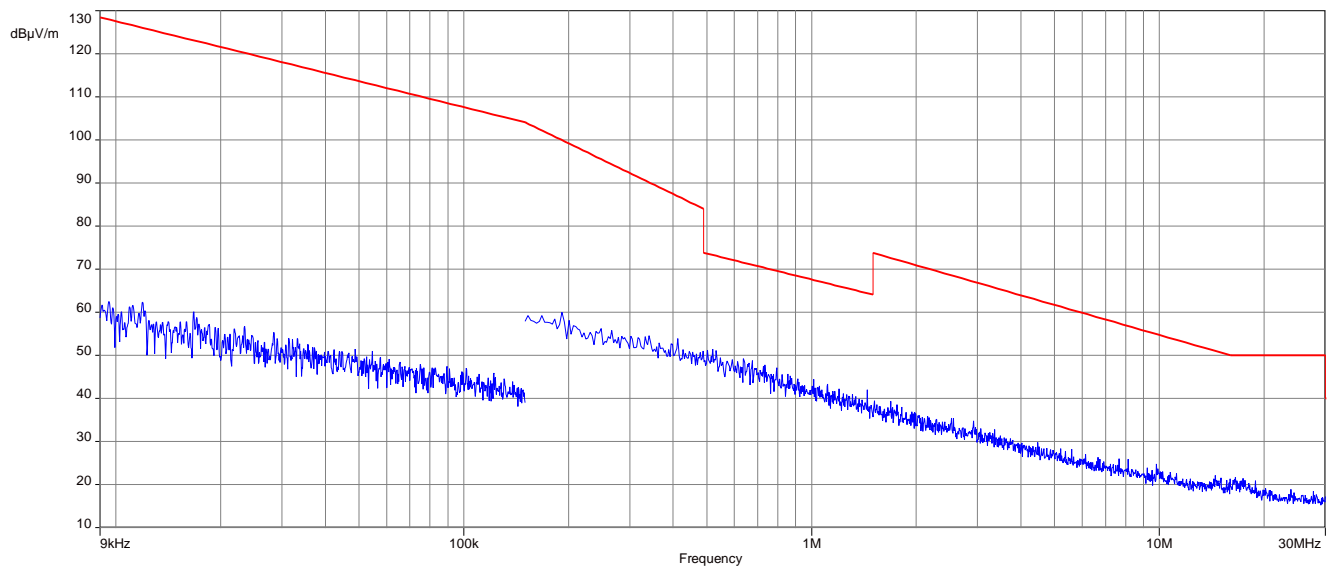


Plots: 40 MHz channel bandwidth

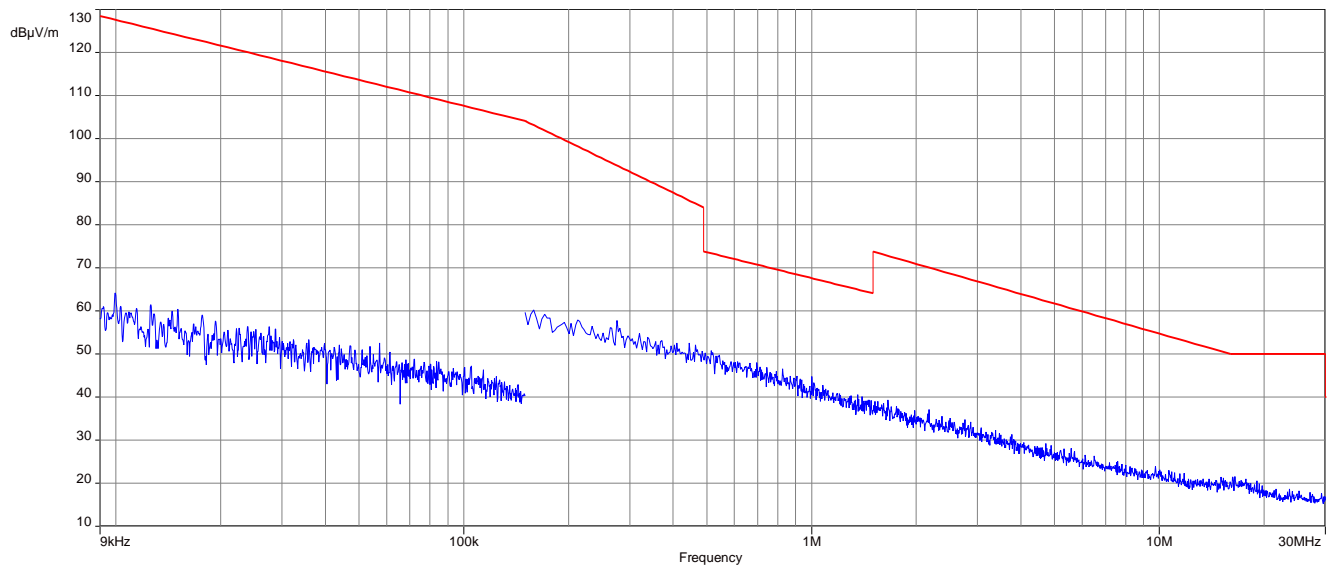
Plot 1: 9 kHz to 30 MHz, U-NII-1; lowest channel



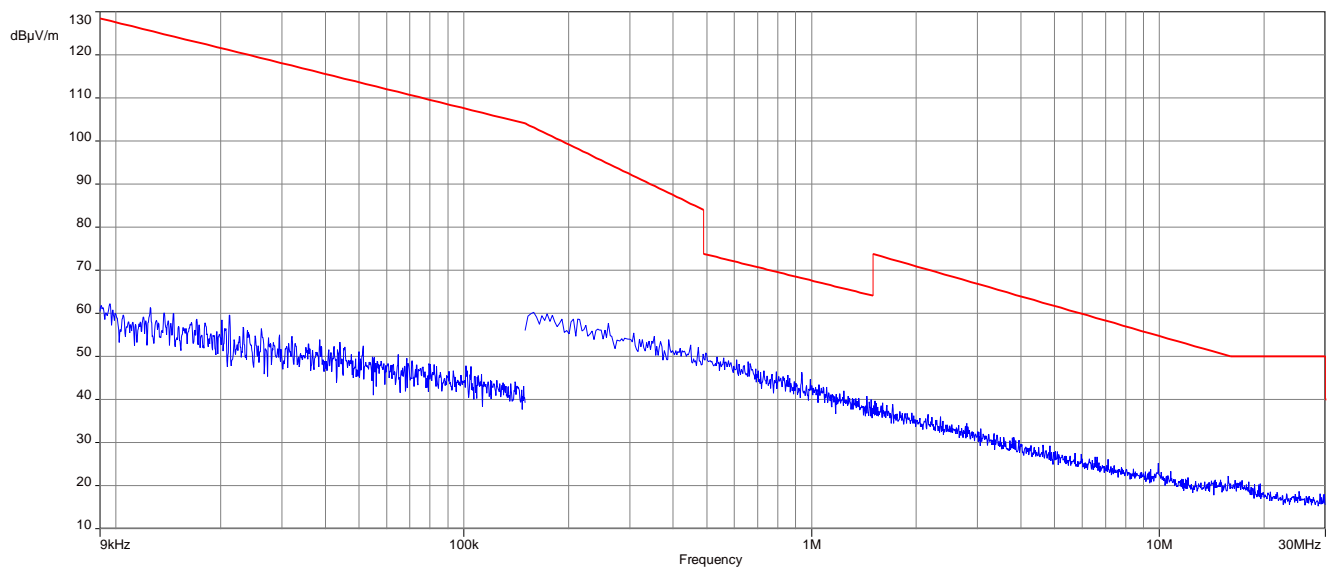
Plot 2: 9 kHz to 30 MHz, U-NII-1; highest channel



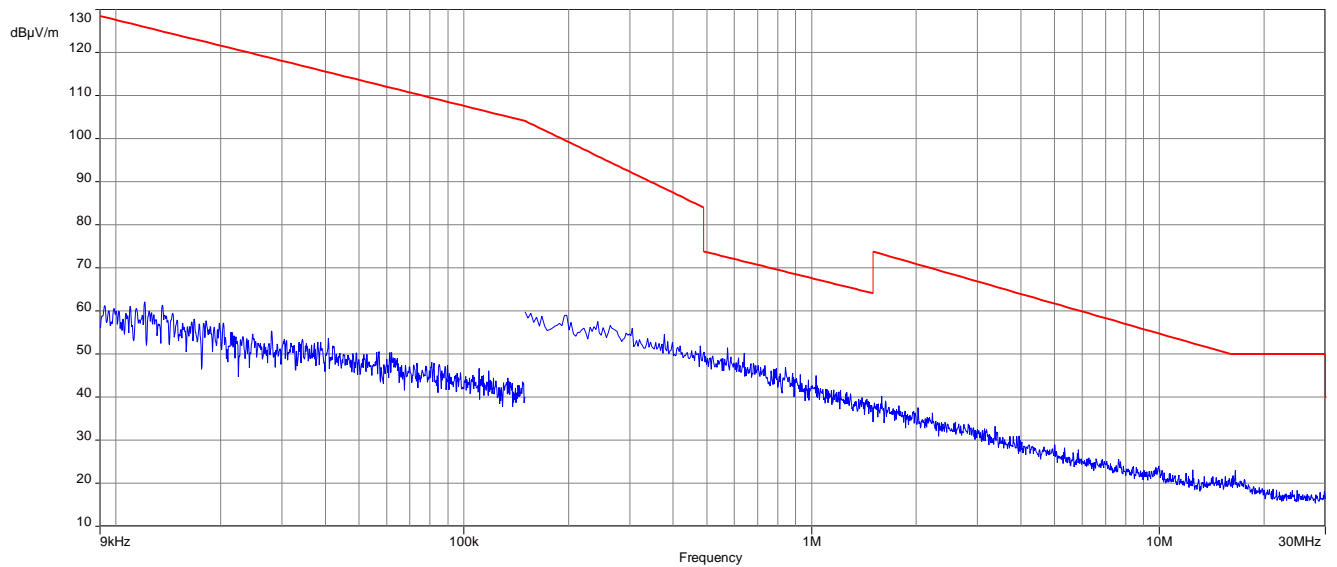
Plot 3: 9 kHz to 30 MHz, U-NII-2A; lowest channel



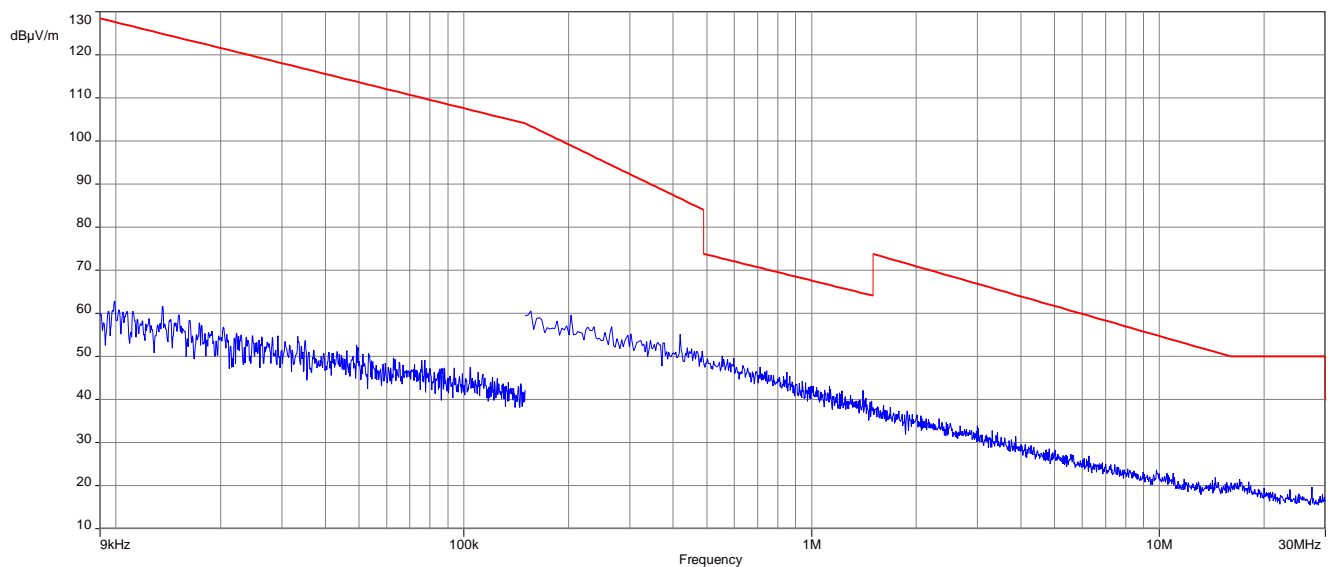
Plot 4: 9 kHz to 30 MHz, U-NII-2A; highest channel



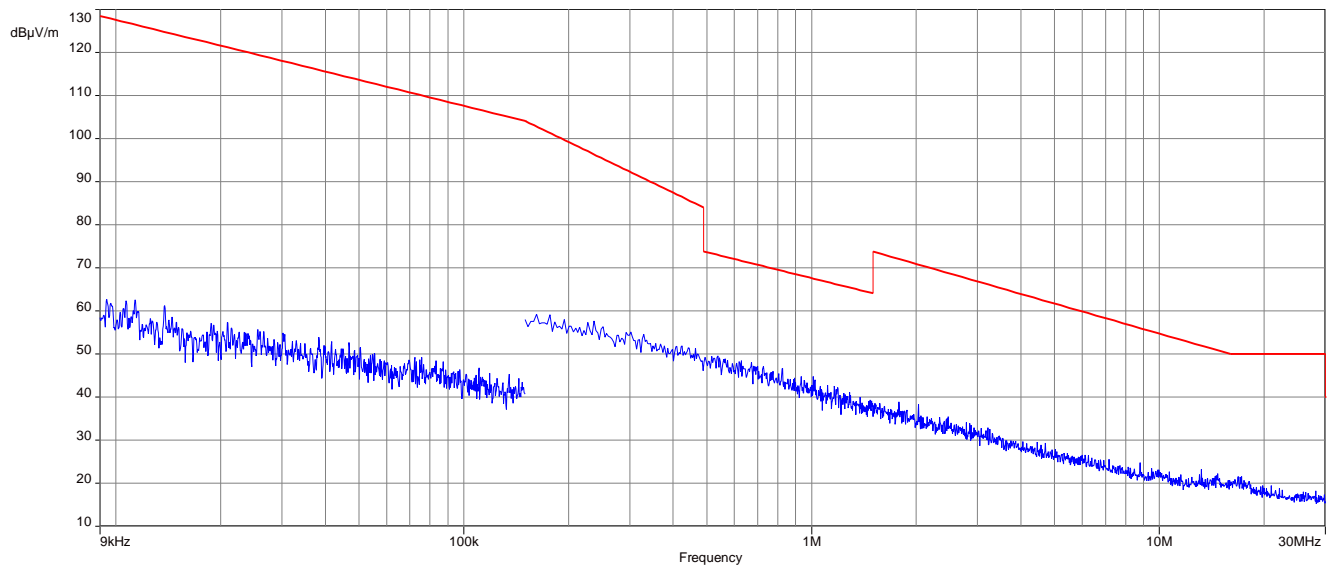
Plot 5: 9 kHz to 30 MHz, U-NII-2C; lowest channel



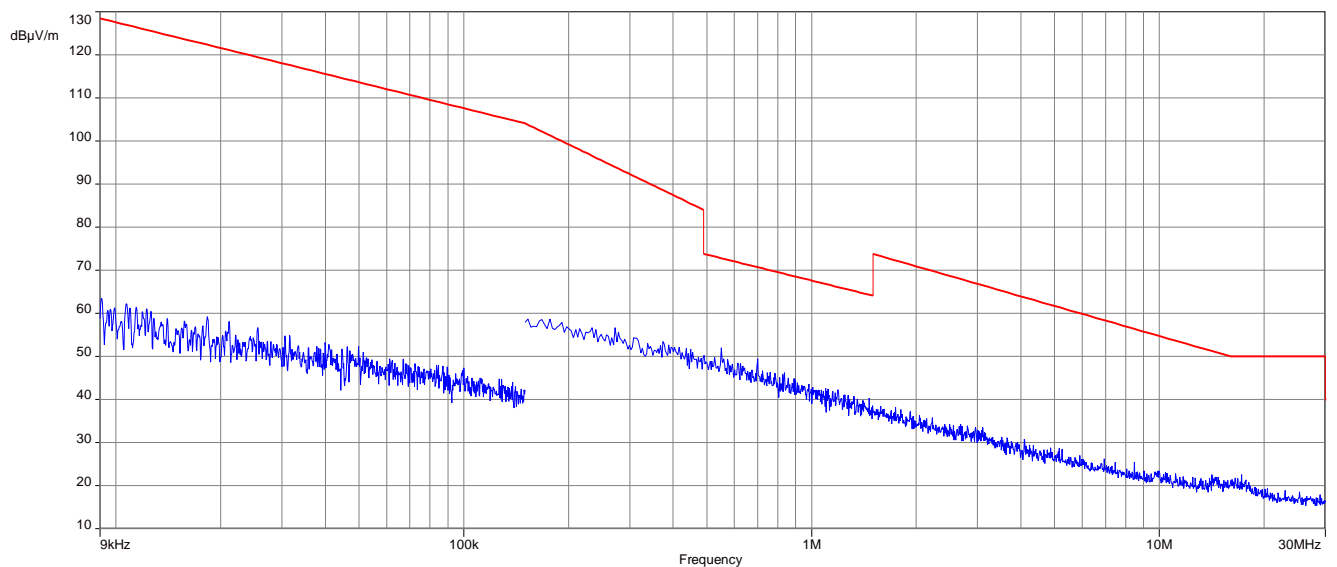
Plot 6: 9 kHz to 30 MHz, U-NII-2C; middle channel



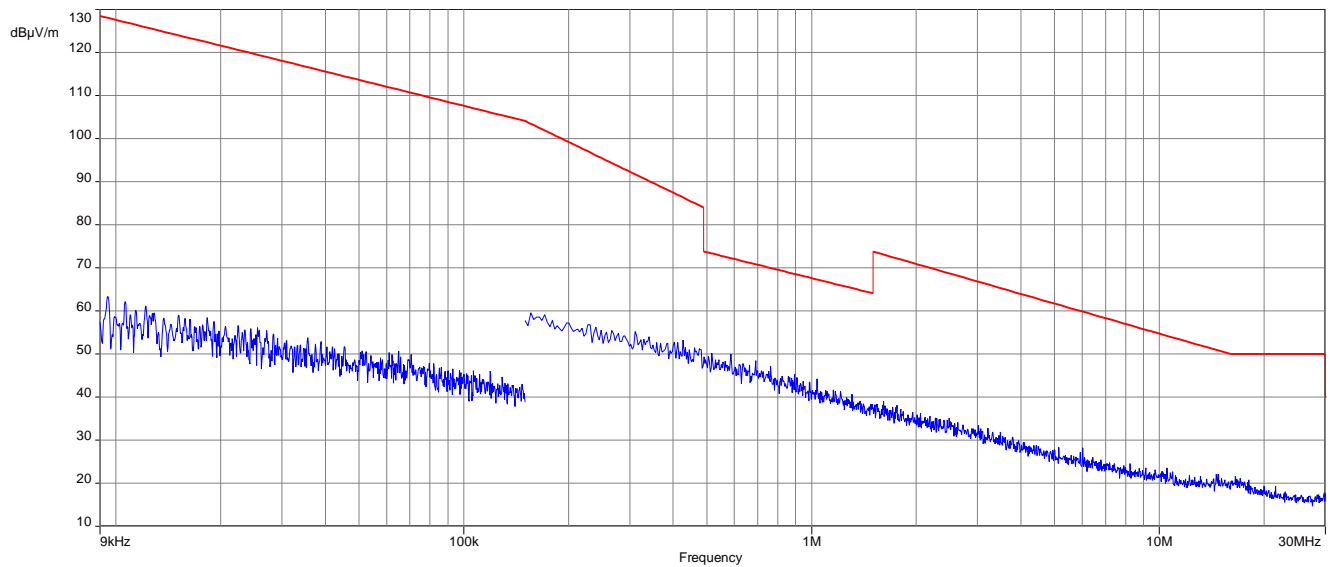
Plot 7: 9 kHz to 30 MHz, U-NII-2C; highest channel



Plot 8: 9 kHz to 30 MHz, U-NII-3; lowest channel

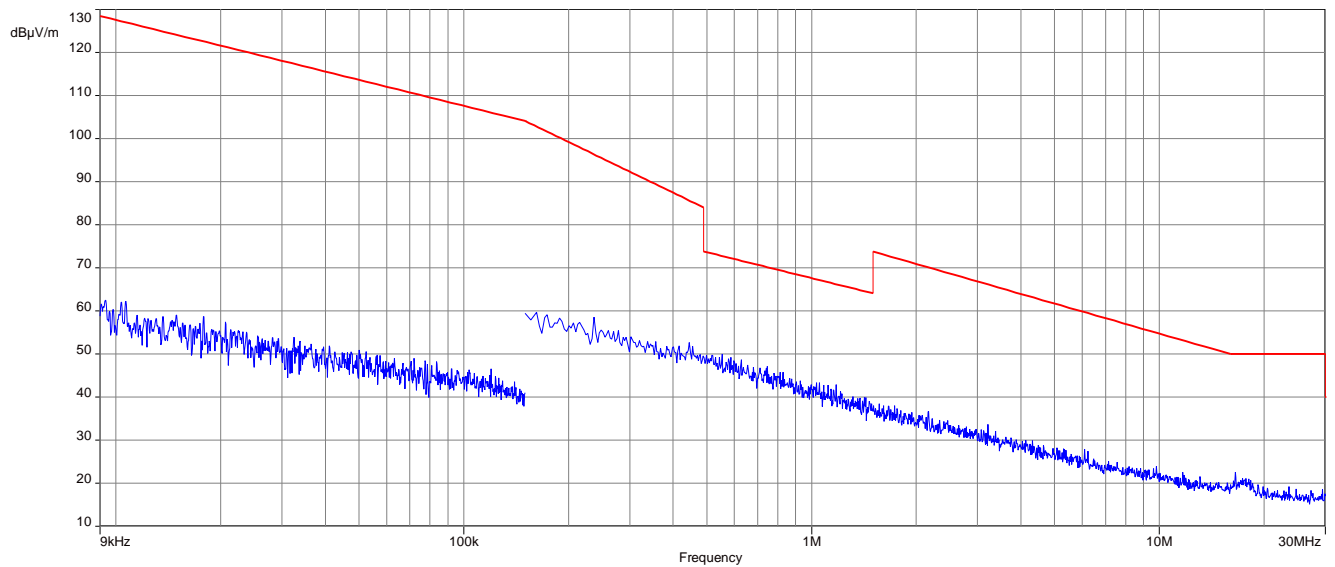


Plot 9: 9 kHz to 30 MHz, U-NII-3; highest channel

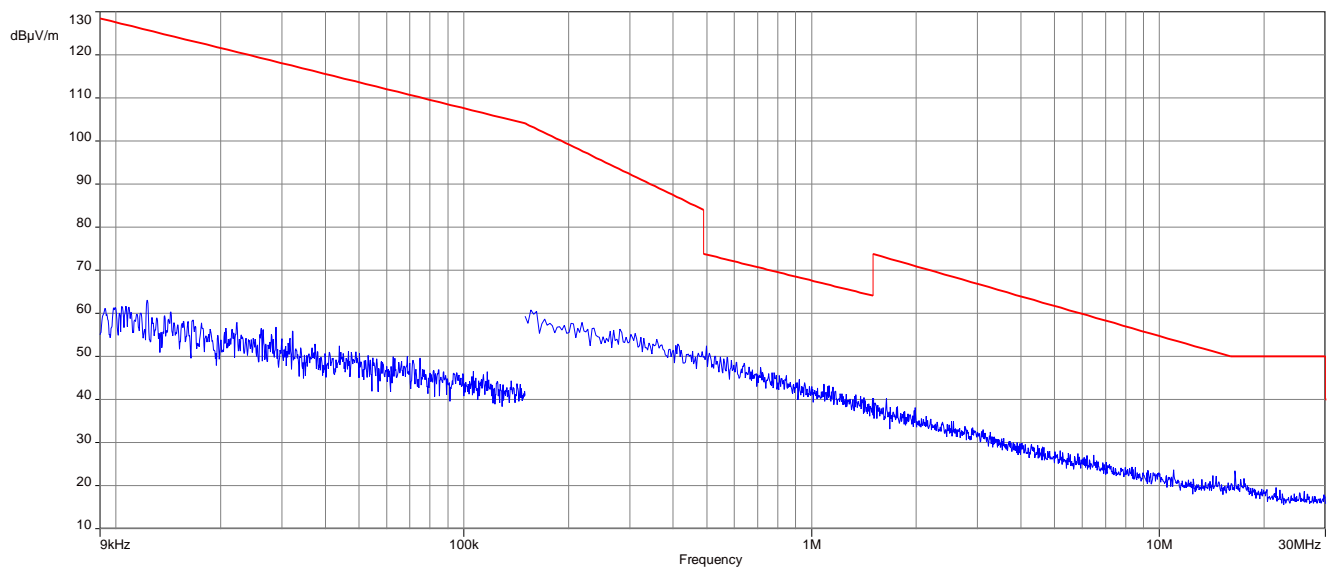


Plots: 80 MHz channel bandwidth

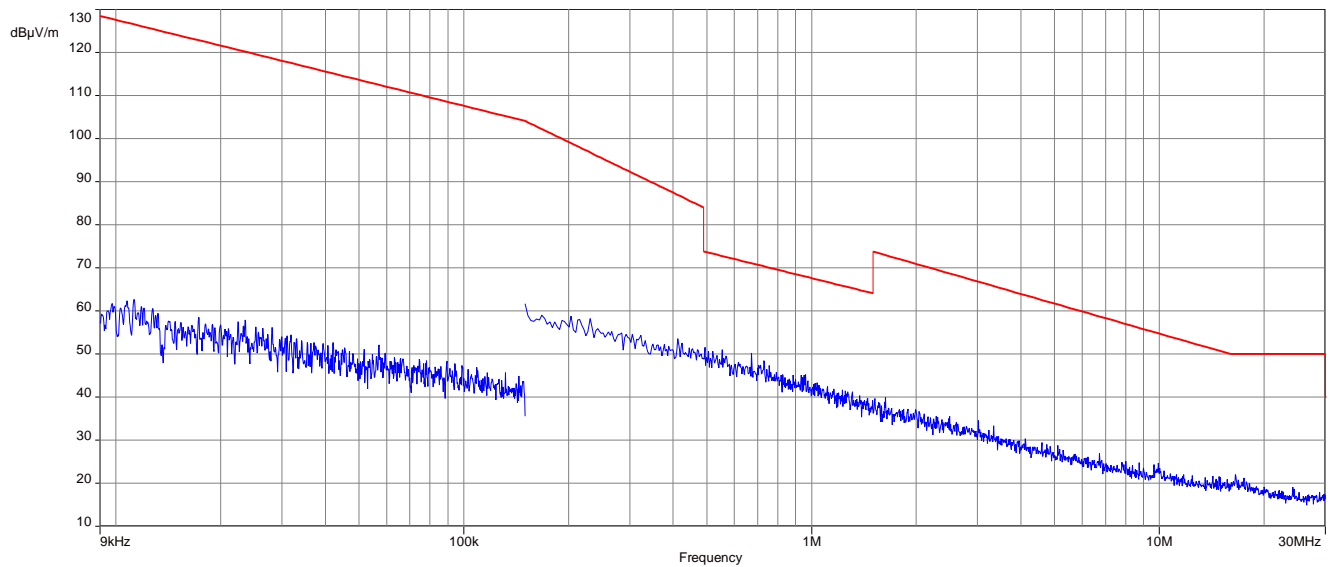
Plot 1: 9 kHz to 30 MHz, U-NII-1; middle channel



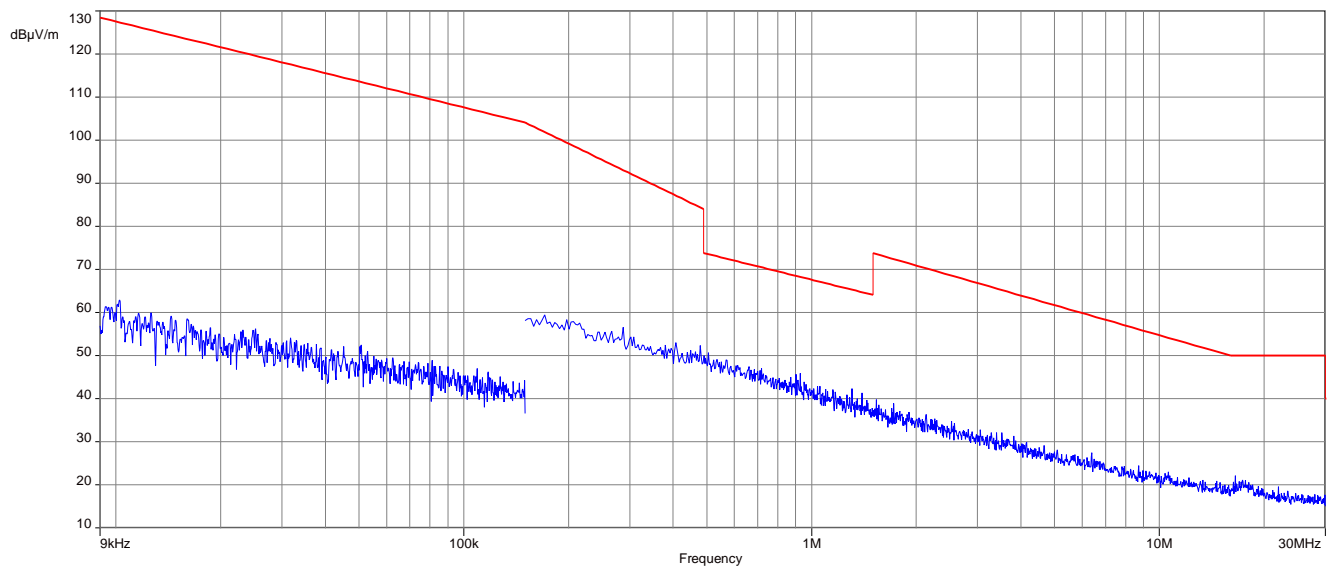
Plot 2: 9 kHz to 30 MHz, U-NII-2A; middle channel



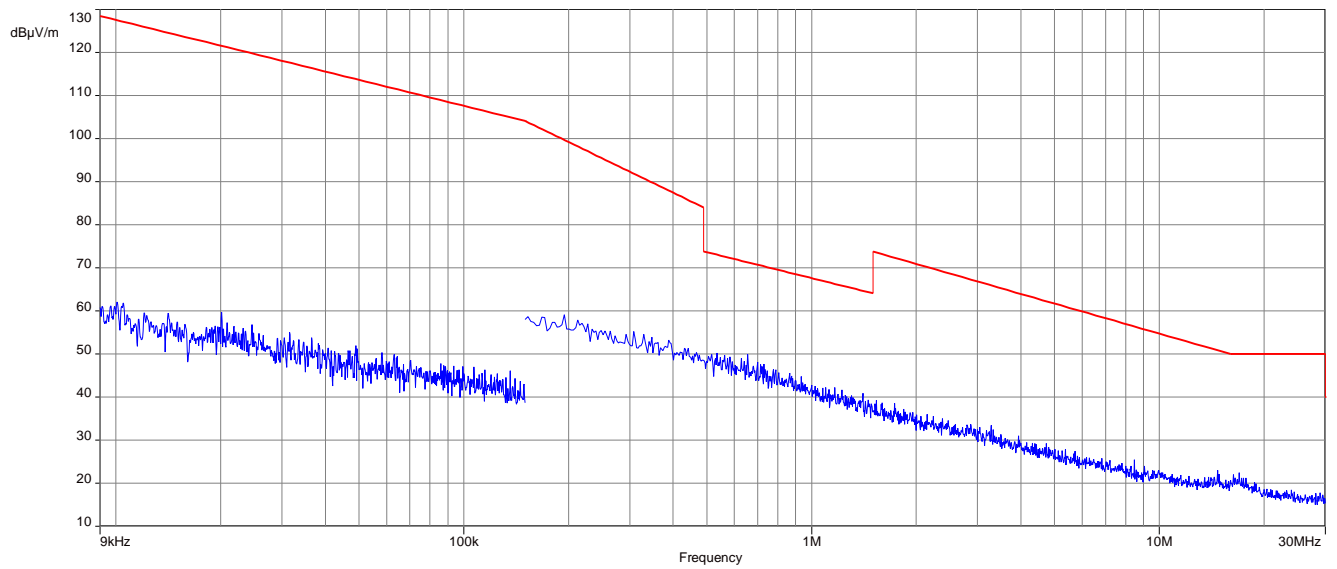
Plot 3: 9 kHz to 30 MHz, U-NII-2C; lowest channel



Plot 4: 9 kHz to 30 MHz, U-NII-2C; highest channel



Plot 5: 9 kHz to 30 MHz, U-NII-3; middle 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:

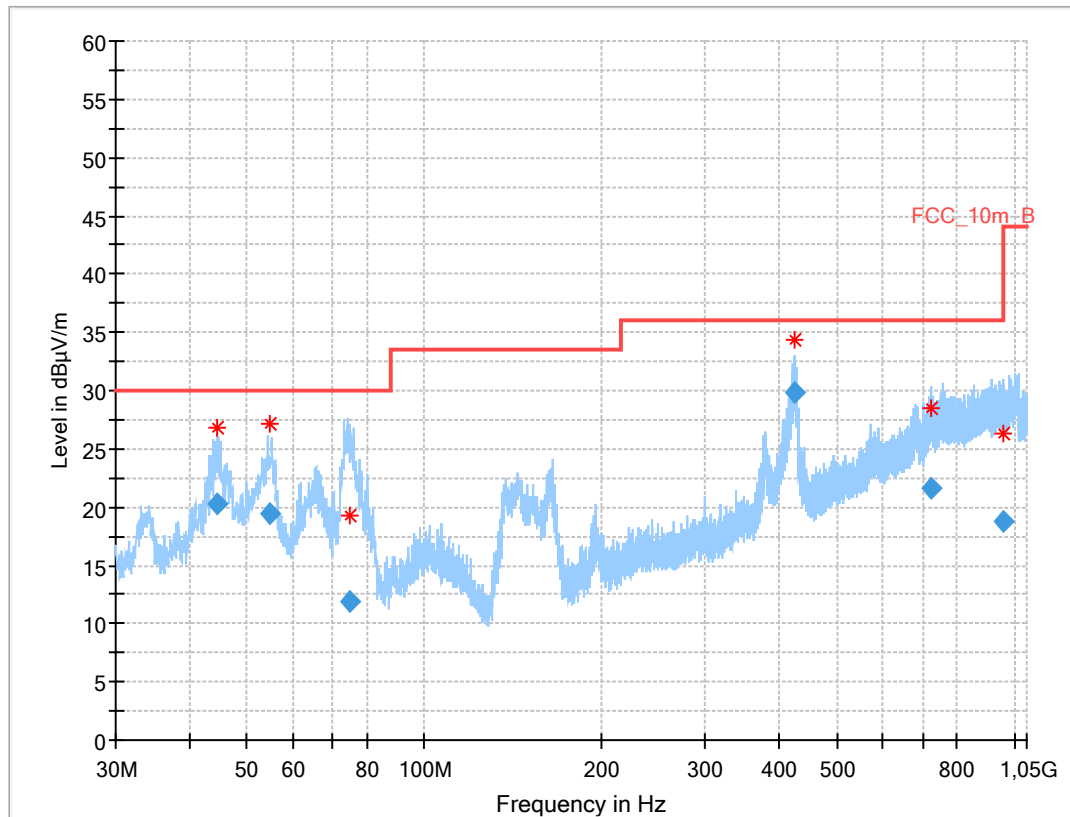
| Measurement parameter | |
|--------------------------|----------------------|
| Detector: | Quasi Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 120 kHz |
| Video bandwidth: | 500 kHz |
| Span: | 30 MHz to 1 GHz |
| Test setup: | See sub clause 7.1 A |
| Measurement uncertainty: | See chapter 9 |

Limits:

| TX Spurious Emissions Radiated | | |
|--------------------------------|-------------------------|----------------------|
| §15.209 / RSS-247 | | |
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| 30 - 88 | 30.0 | 10 |
| 88 – 216 | 33.5 | 10 |
| 216 – 960 | 36.0 | 10 |
| Above 960 | 54.0 | 3 |
| §15.407 | | |
| Outside the restricted bands! | -27 dBm / MHz | |

Plots: 20 MHz channel bandwidth

Plot 1: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-1; lowest channel

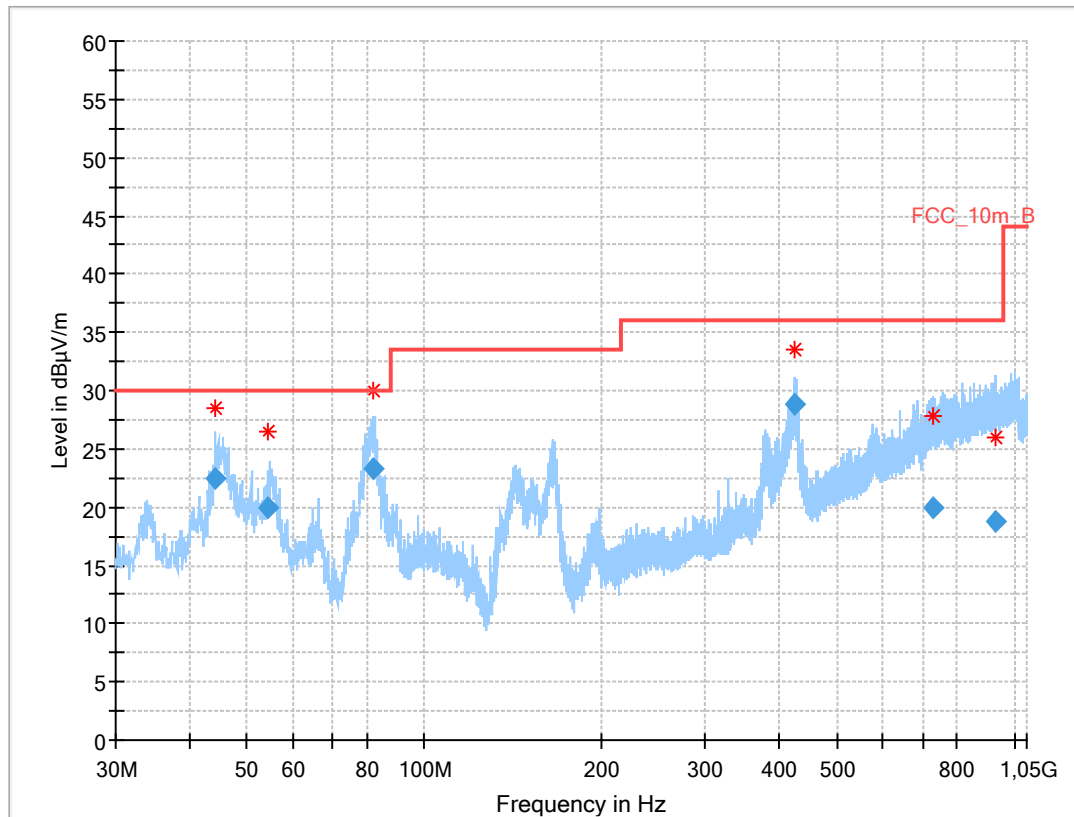


Results:

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 44.677 | 20.32 | 30.0 | 9.7 | 1000 | 120.0 | 119.0 | V | 74 | 15 |
| 54.766 | 19.46 | 30.0 | 10.5 | 1000 | 120.0 | 200.0 | V | 104 | 15 |
| 74.889 | 11.94 | 30.0 | 18.1 | 1000 | 120.0 | 400.0 | V | 192 | 9 |
| 425.338 | 29.85 | 36.0 | 6.2 | 1000 | 120.0 | 209.0 | H | 25 | 19 |
| 721.256 | 21.54 | 36.0 | 14.5 | 1000 | 120.0 | 308.0 | V | 39 | 23 |
| 959.089 | 18.84 | 36.0 | 17.2 | 1000 | 120.0 | 189.0 | V | 228 | 25 |

Plots: 40 MHz channel bandwidth

Plot 1: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2A; highest channel

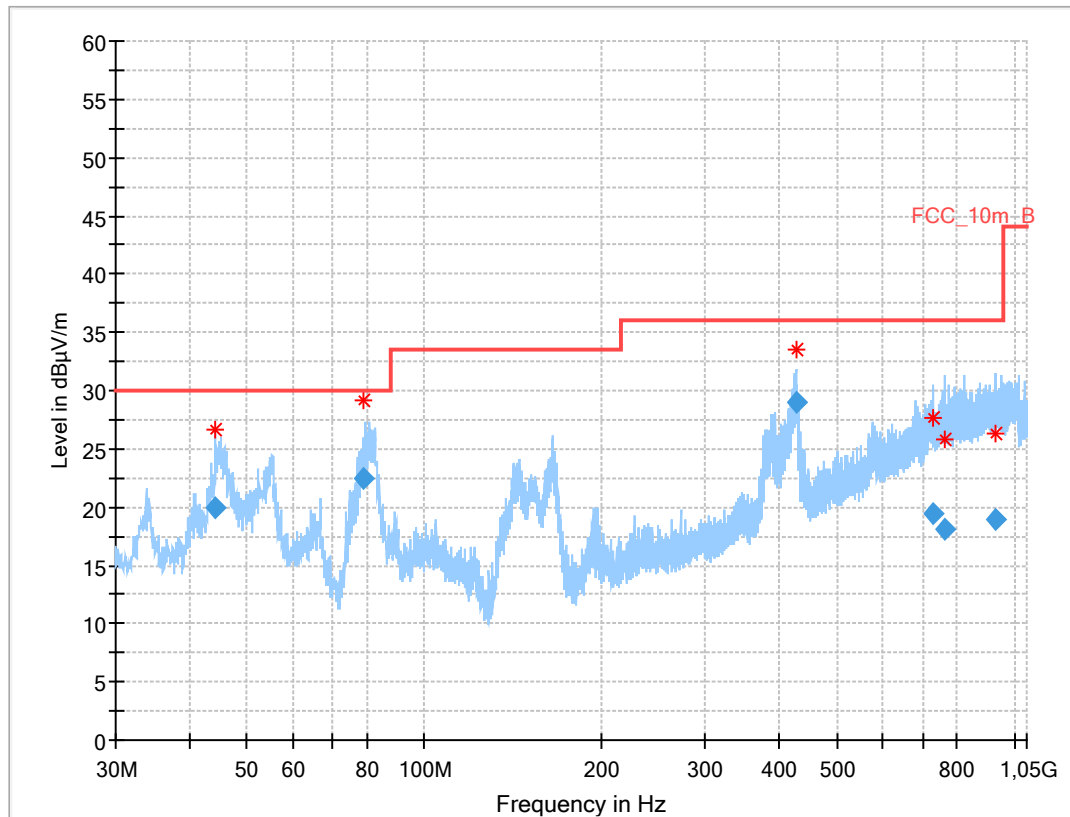


Results:

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 44.262 | 22.43 | 30.0 | 7.6 | 1000 | 120.0 | 116.0 | V | 71 | 15 |
| 54.489 | 20.02 | 30.0 | 10.0 | 1000 | 120.0 | 104.0 | V | 225 | 15 |
| 81.891 | 23.27 | 30.0 | 6.7 | 1000 | 120.0 | 400.0 | V | 94 | 9 |
| 425.055 | 28.91 | 36.0 | 7.1 | 1000 | 120.0 | 209.0 | H | 284 | 19 |
| 726.505 | 19.99 | 36.0 | 16.0 | 1000 | 120.0 | 400.0 | H | 90 | 23 |
| 926.948 | 18.85 | 36.0 | 17.2 | 1000 | 120.0 | 400.0 | V | 225 | 25 |

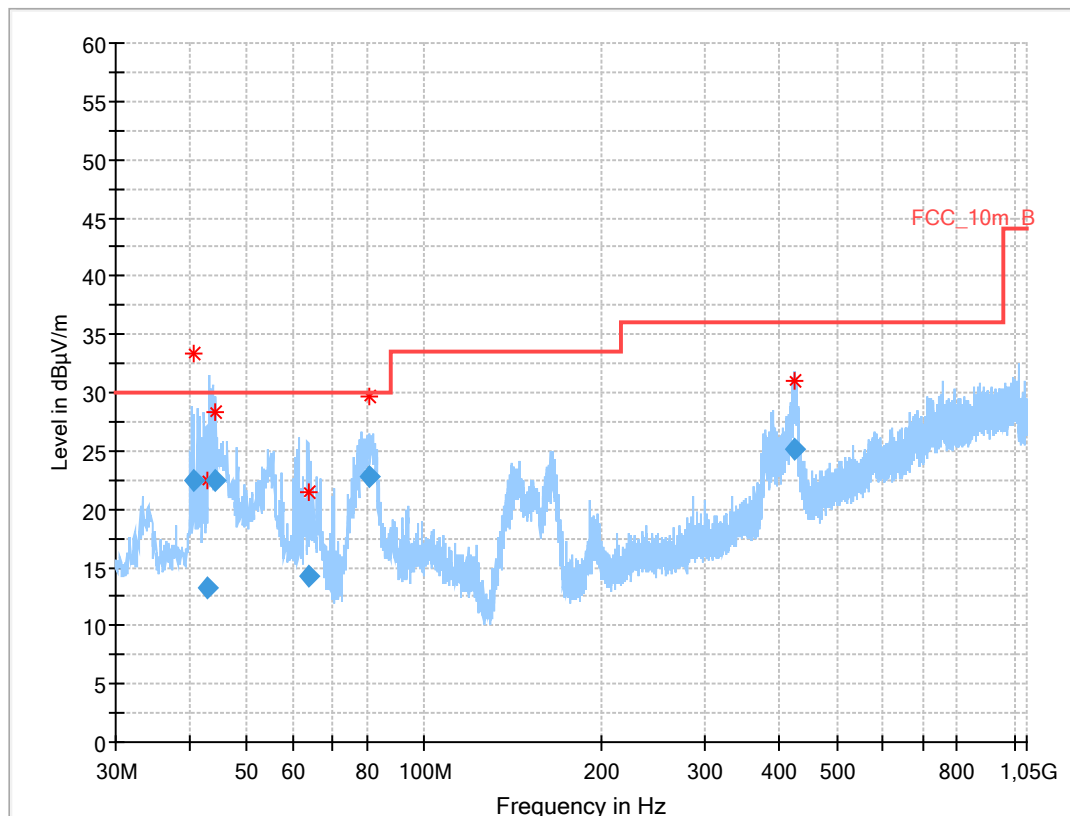
Plots: 80 MHz channel bandwidth

Plot 1: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



Results:

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 44.296 | 19.98 | 30.0 | 10.0 | 1000 | 120.0 | 128.0 | V | 277 | 15 |
| 79.164 | 22.39 | 30.0 | 7.6 | 1000 | 120.0 | 203.0 | V | 235 | 8 |
| 426.159 | 29.01 | 36.0 | 7.0 | 1000 | 120.0 | 228.0 | H | 270 | 19 |
| 727.499 | 19.51 | 36.0 | 16.5 | 1000 | 120.0 | 165.0 | H | 45 | 23 |
| 761.125 | 18.07 | 36.0 | 17.9 | 1000 | 120.0 | 191.0 | H | 45 | 24 |
| 931.430 | 18.97 | 36.0 | 17.0 | 1000 | 120.0 | 200.0 | H | 82 | 25 |

Plot 2: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-3; middle channel**Results:**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|
| 40.834 | 22.39 | 30.0 | 7.6 | 1000 | 120.0 | 200.0 | V | 120 | 14 |
| 42.978 | 13.28 | 30.0 | 16.7 | 1000 | 120.0 | 187.0 | V | 67 | 15 |
| 44.282 | 22.40 | 30.0 | 7.6 | 1000 | 120.0 | 111.0 | V | 67 | 15 |
| 63.666 | 14.27 | 30.0 | 15.7 | 1000 | 120.0 | 292.0 | V | 90 | 13 |
| 80.722 | 22.83 | 30.0 | 7.2 | 1000 | 120.0 | 400.0 | V | 303 | 8 |
| 425.028 | 25.20 | 36.0 | 10.8 | 1000 | 120.0 | 293.0 | H | 41 | 19 |

12.13 Spurious emissions radiated 1 GHz to 40 GHz

Description:

Measurement of the radiated spurious emissions and cabinet radiations from 1 GHz to 40 GHz.

Measurement:

| Measurement parameter | |
|--------------------------|--|
| Detector: | Quasi Peak below 1 GHz (alternative Peak) Peak above 1 GHz / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 3 MHz |
| Span: | 1 GHz to 40 GHz |
| Trace mode: | Max Hold / Average with 100 counts + 20 log (1 / X) for duty cycle lower than 100 % |
| Test setup: | See sub clause 7.2 – B See sub clause 7.3 – A |
| Measurement uncertainty: | See chapter 9 |

Limits:

| TX Spurious Emissions Radiated | | |
|--------------------------------|-------------------------|----------------------|
| §15.209 / RSS-247 | | |
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| Above 960 | 54.0 | 3 |
| §15.407 | | |
| Outside the restricted bands! | -27 dBm / MHz | |

Results: 20 MHz channel bandwidth

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | | | | | | | |
|---|----------|----------------------|---|----------|----------------------|---|----------|----------------------|
| U-NII-1 (5150 MHz to 5250 MHz) | | | | | | | | |
| Lowest channel | | | Middle channel | | | Highest channel | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| -/- | | | -/- | | | -/- | | |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | | | | | | | |
|---|----------|----------------------|---|----------|----------------------|---|----------|----------------------|
| U-NII-2A (5250 MHz to 5350 MHz) | | | | | | | | |
| Lowest channel | | | Middle channel | | | Highest channel | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| -/- | | | -/- | | | -/- | | |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | | | | | | | |
|---|----------|----------------------|---|----------|----------------------|---|----------|----------------------|
| U-NII-2C (5470 MHz to 5725 MHz) | | | | | | | | |
| Lowest channel | | | Middle channel | | | Highest channel | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| -/- | | | -/- | | | -/- | | |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | | | | | | | |
|---|----------|----------------------|---|----------|----------------------|---|----------|----------------------|
| U-NII-3 (5725 MHz to 5850 MHz) | | | | | | | | |
| Lowest channel | | | Middle channel | | | Highest channel | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| -/- | | | -/- | | | -/- | | |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

Results: 40 MHz channel bandwidth

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|----------------|---|----------|----------------|---|----------|----------------|
| U-NII-1 (5150 MHz to 5250 MHz) | | | | | | | | |
| Lowest channel | | | Middle channel | | | Highest channel | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| -/- | Peak | -/- | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- | | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|----------------|---|----------|----------------|---|----------|----------------|
| U-NII-2A (5250 MHz to 5350 MHz) | | | | | | | | |
| Lowest channel | | | Middle channel | | | Highest channel | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| -/- | Peak | -/- | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- | | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|----------------|---|----------|----------------|---|----------|----------------|
| U-NII-2C (5470 MHz to 5725 MHz) | | | | | | | | |
| Lowest channel | | | Middle channel | | | Highest channel | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| -/- | Peak | -/- | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- | | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

| TX Spurious Emissions Radiated [dBµV/m] / dBm | | | | | | | | |
|---|----------|----------------|---|----------|----------------|---|----------|----------------|
| U-NII-3 (5725 MHz to 5850 MHz) | | | | | | | | |
| Lowest channel | | | Middle channel | | | Highest channel | | |
| F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] | F [MHz] | Detector | Level [dBµV/m] |
| -/- | Peak | -/- | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- | | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

Results: 80 MHz channel bandwidth

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | |
|---|----------|----------------------|
| U-NII-1 (5150 MHz to 5250 MHz) | | |
| Middle channel | | |
| F [MHz] | Detector | Level [dB μ V/m] |
| -/- | Peak | -/- |
| | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | |

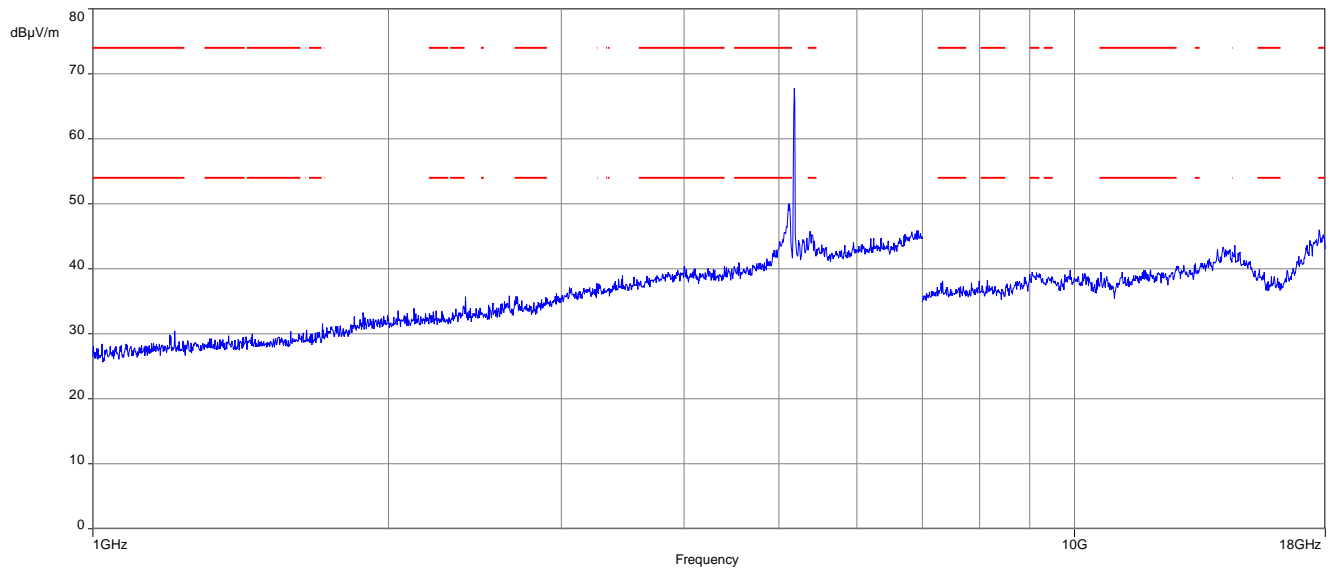
| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | |
|---|----------|----------------------|
| U-NII-2A (5250 MHz to 5350 MHz) | | |
| Middle channel | | |
| F [MHz] | Detector | Level [dB μ V/m] |
| -/- | Peak | -/- |
| | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | |

| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | | | | |
|---|------|-----|---|------|-----|
| U-NII-2C (5470 MHz to 5725 MHz) | | | | | |
| Lowest channel | | | Highest channel | | |
| -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | | For emissions above 18 GHz please take look at the plots. | | |

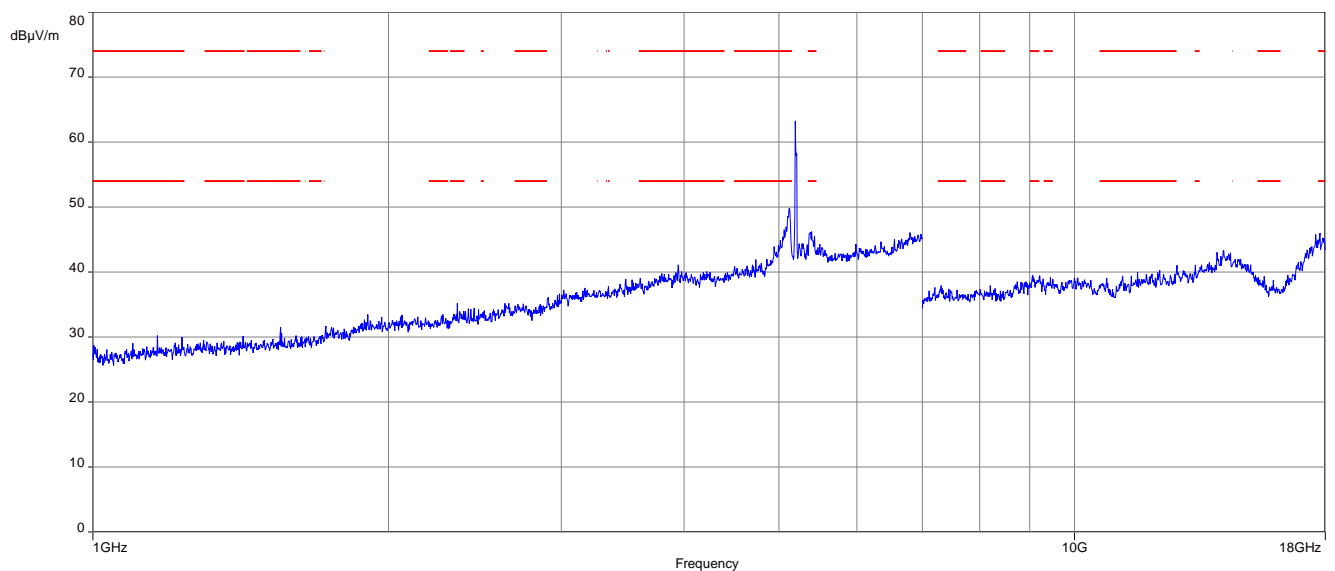
| TX Spurious Emissions Radiated [dB μ V/m] / dBm | | |
|---|----------|----------------------|
| U-NII-3 (5725 MHz to 5850 MHz) | | |
| Middle channel | | |
| F [MHz] | Detector | Level [dB μ V/m] |
| -/- | Peak | -/- |
| | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | |

Plots: 20 MHz channel bandwidth

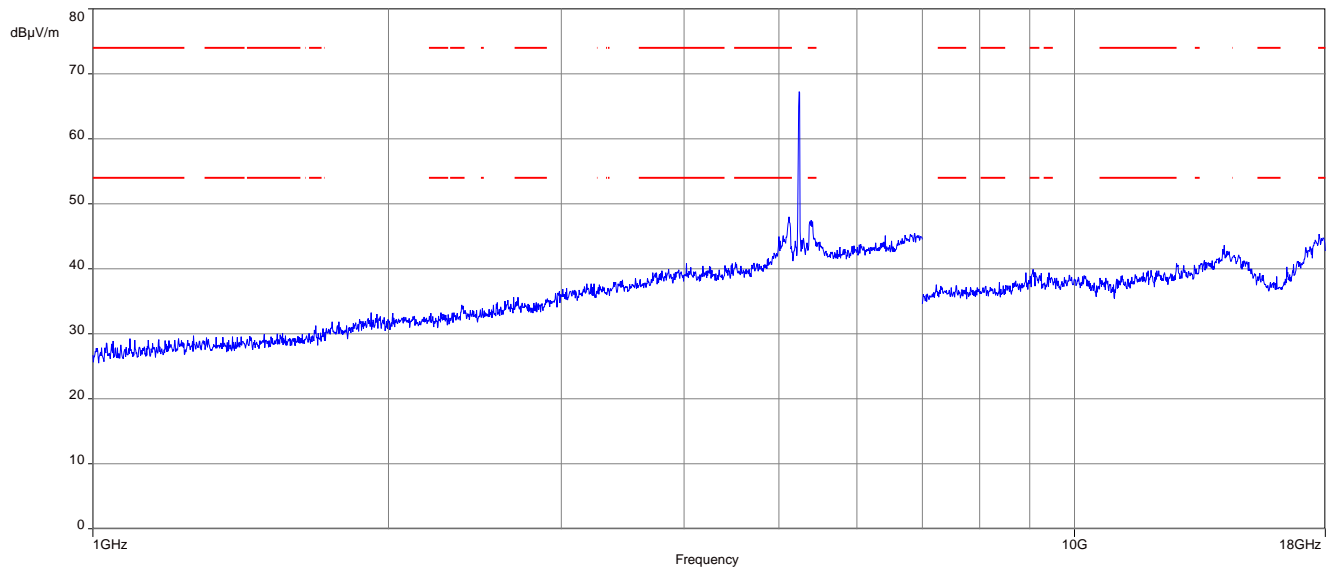
Plot 1: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



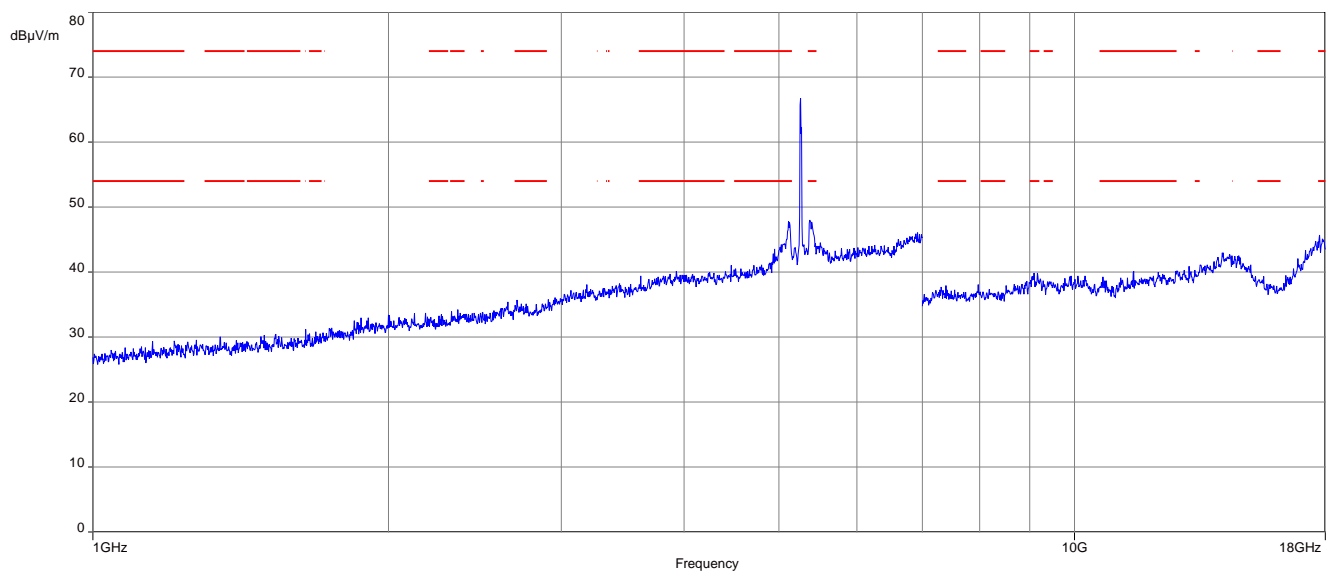
Plot 2: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; middle channel



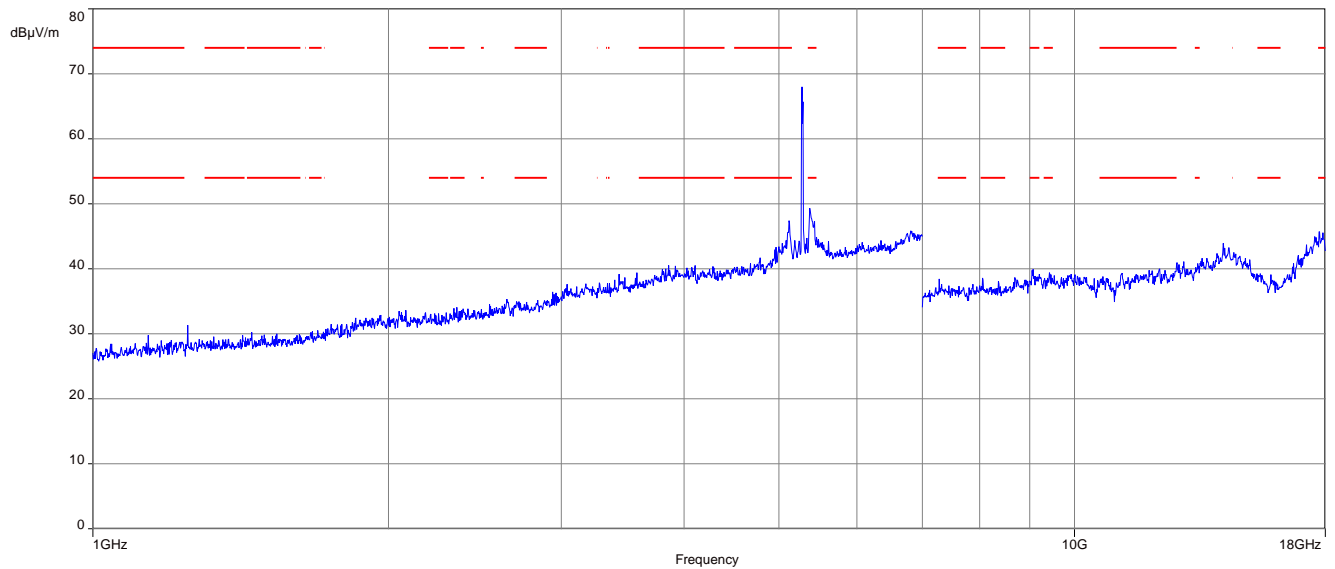
Plot 3: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; highest channel



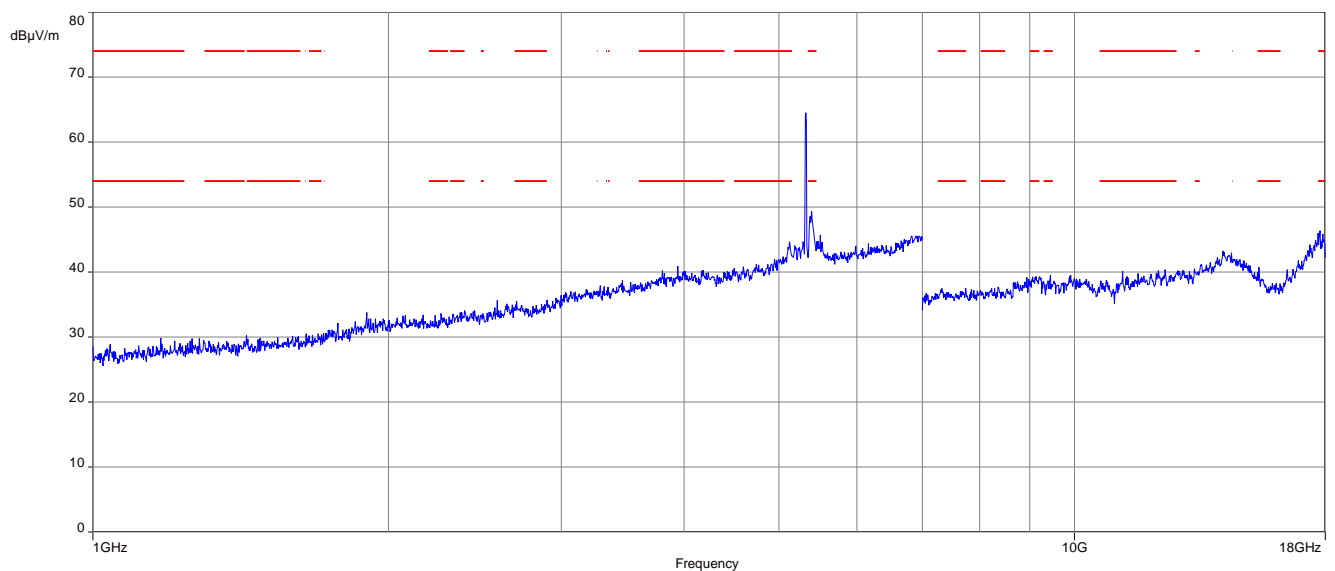
Plot 4: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



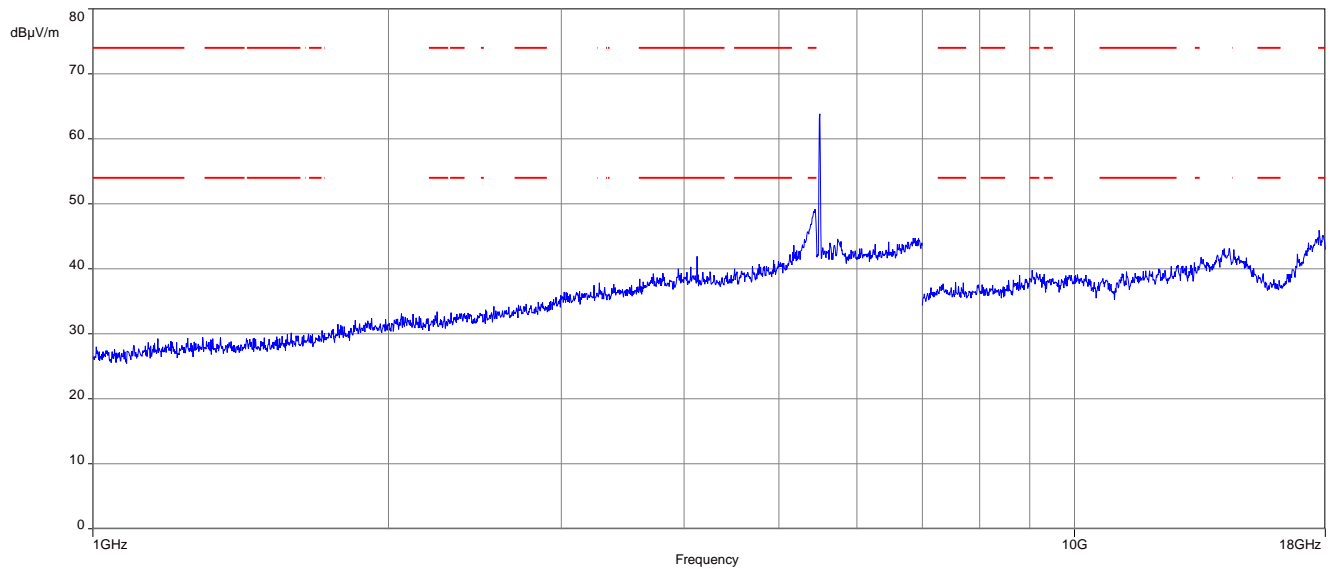
Plot 5: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



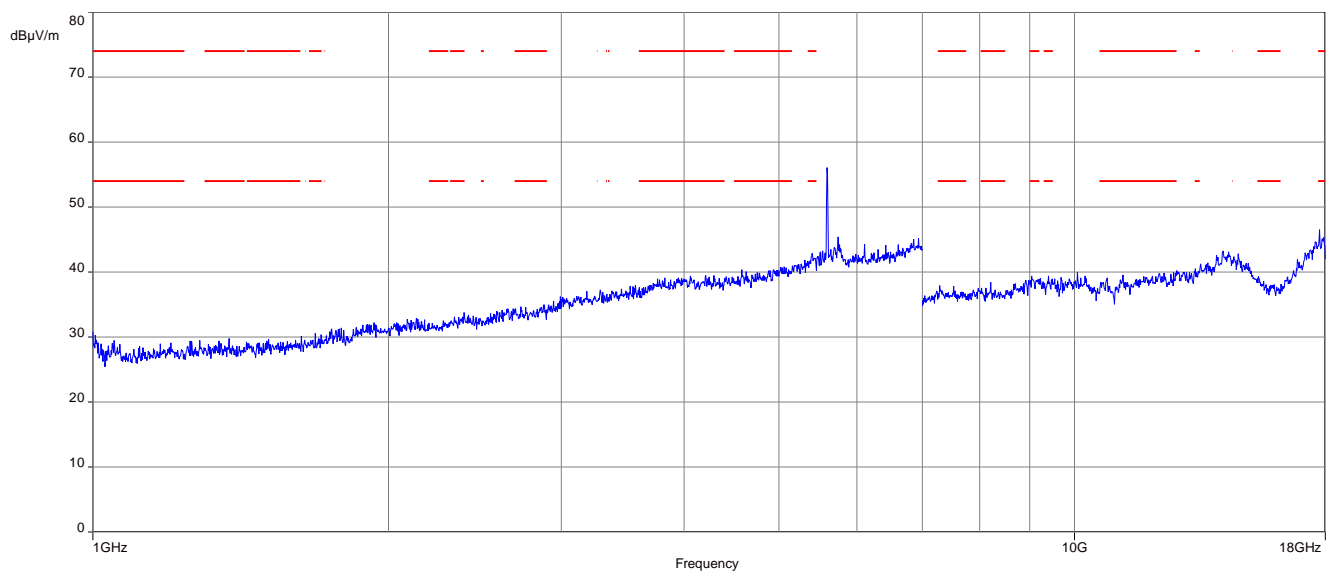
Plot 6: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



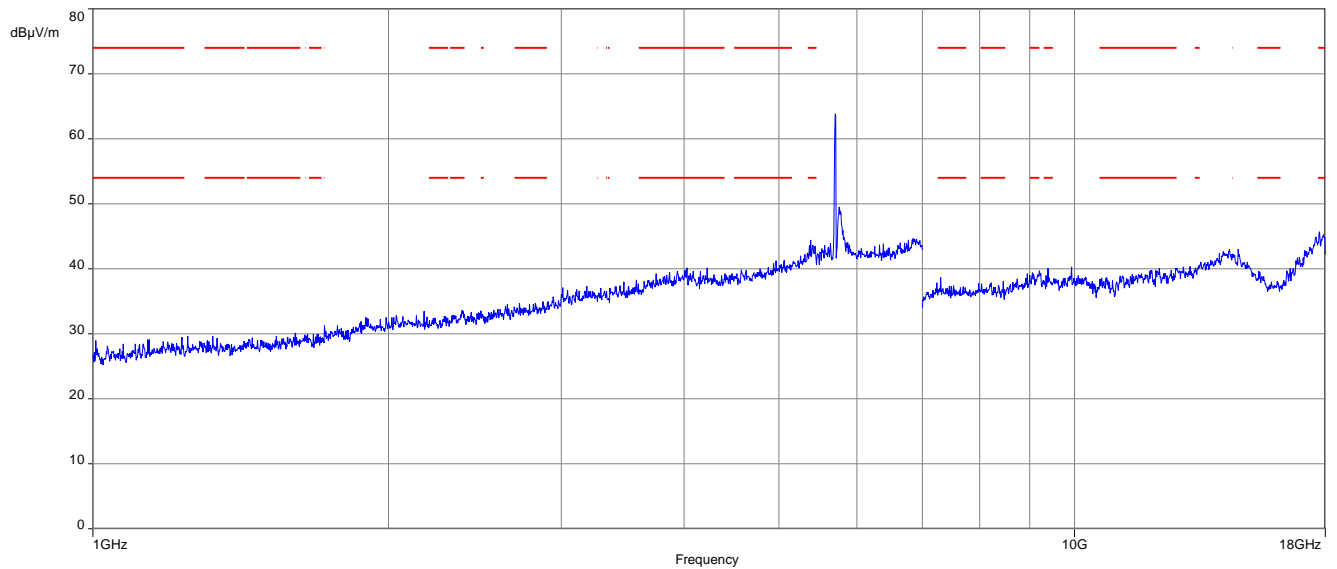
Plot 7: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



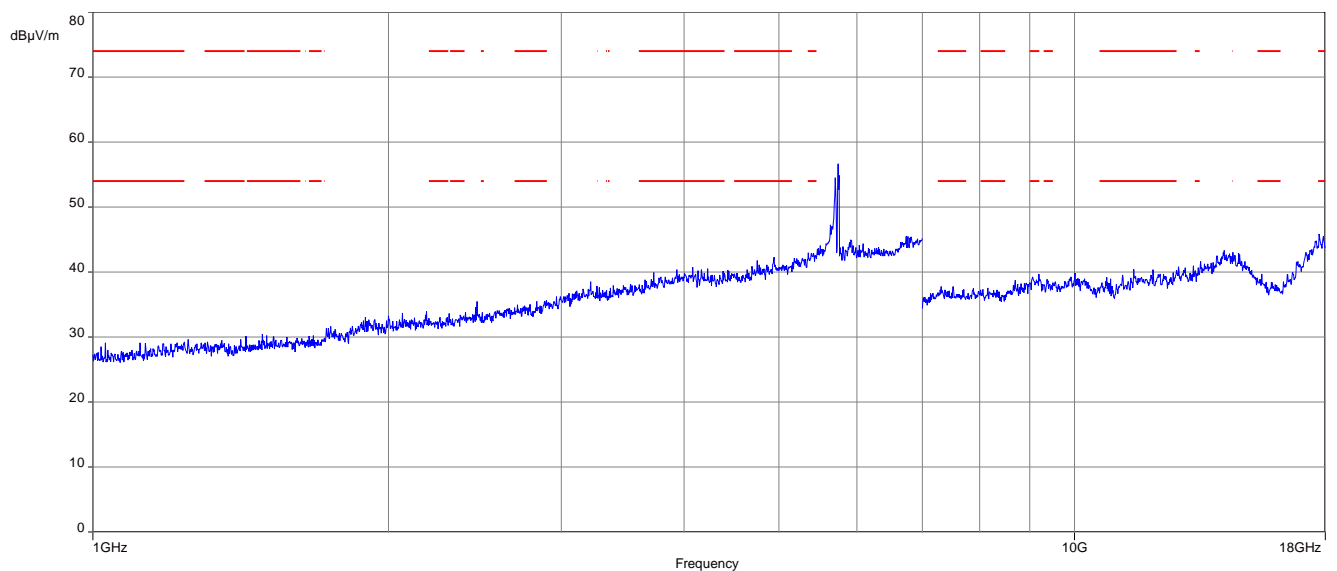
Plot 8: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



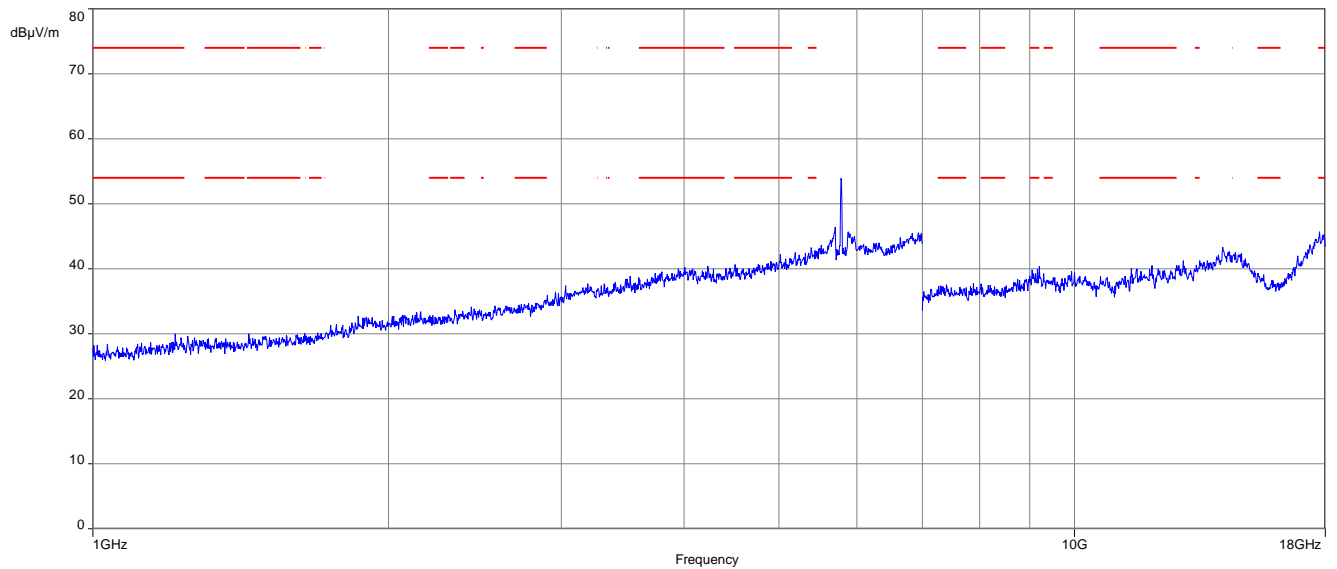
Plot 9: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



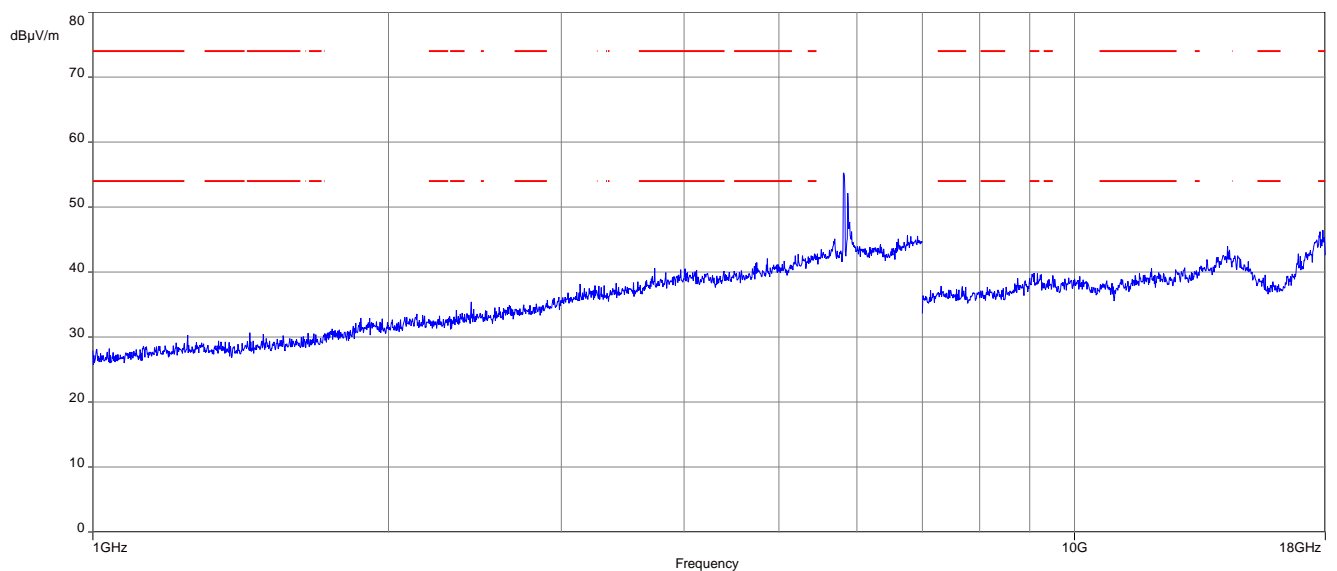
Plot 10: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; lowest channel

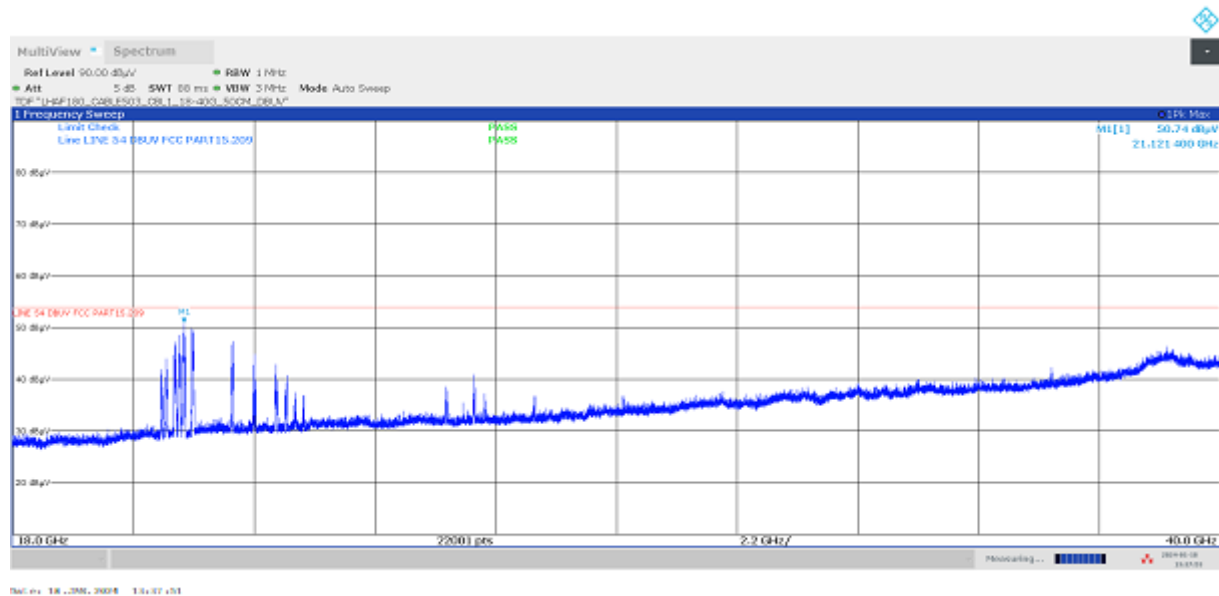
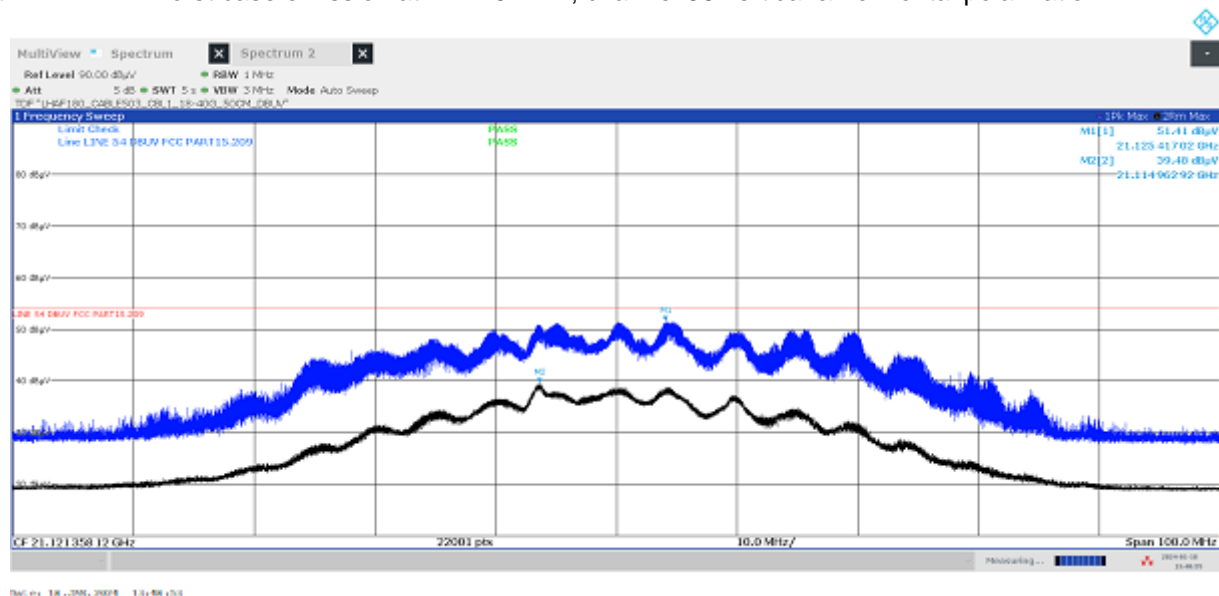


Plot 11: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; middle channel



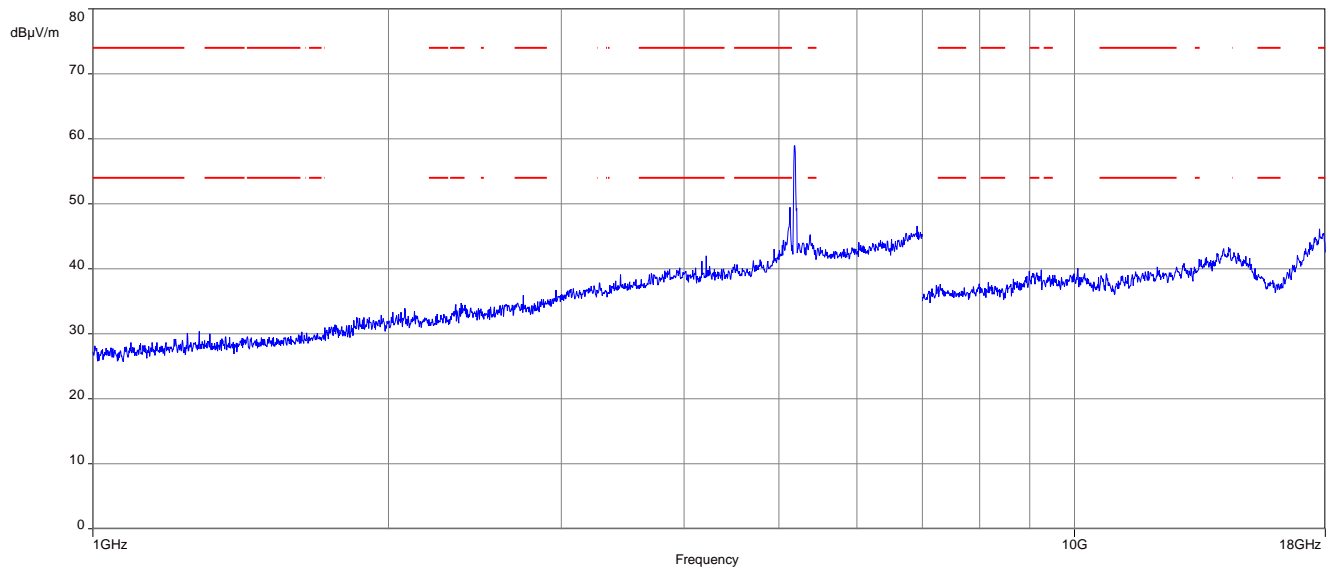
Plot 12: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; highest channel



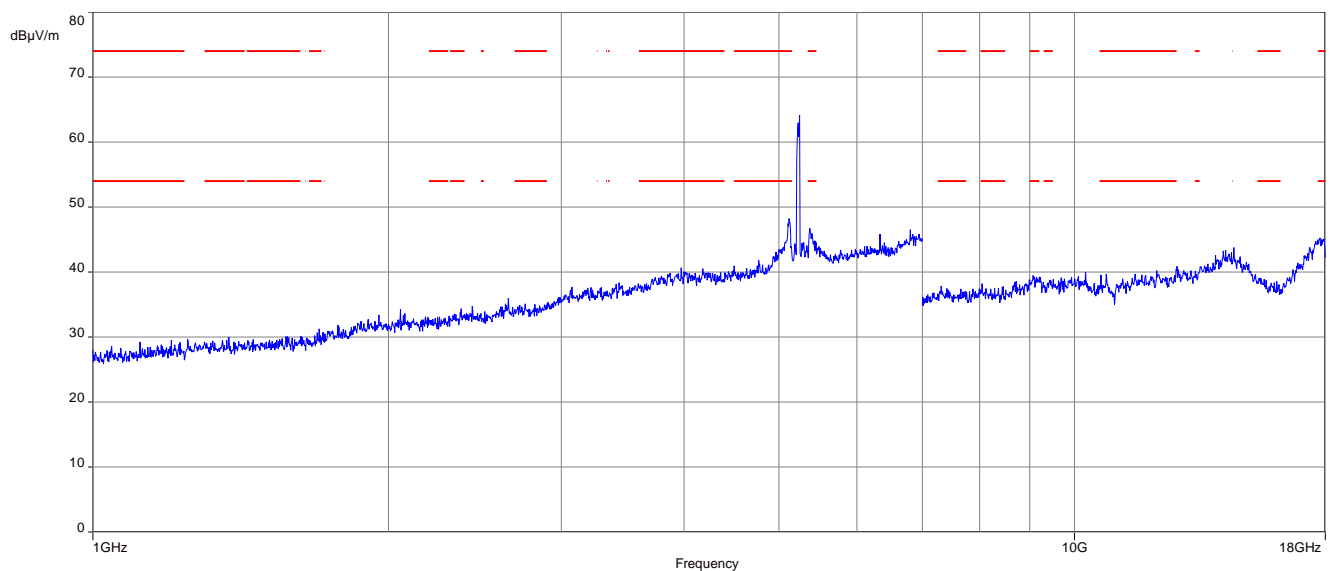
Plot 13: 18 GHz to 40 GHz; vertical & horizontal polarization; all channels (Max Hold)**Plot 14:** Worst case emission at 21.115 MHz; channel 56 vertical & horizontal polarization

Plots: 40 MHz channel bandwidth

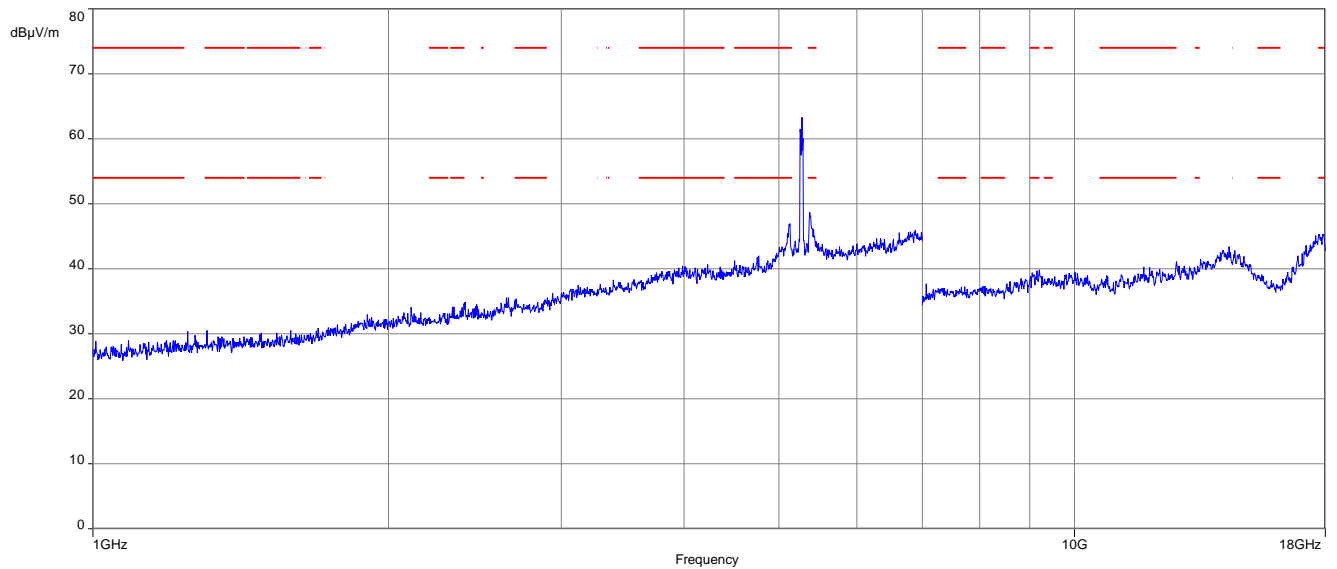
Plot 1: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



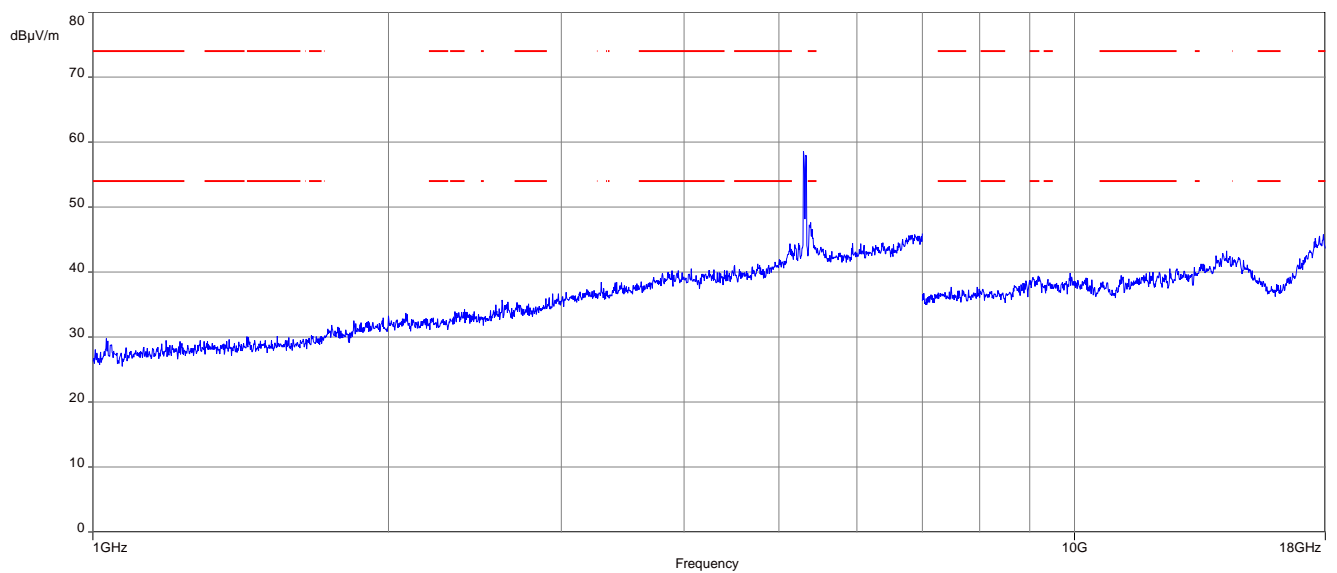
Plot 2: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; highest channel



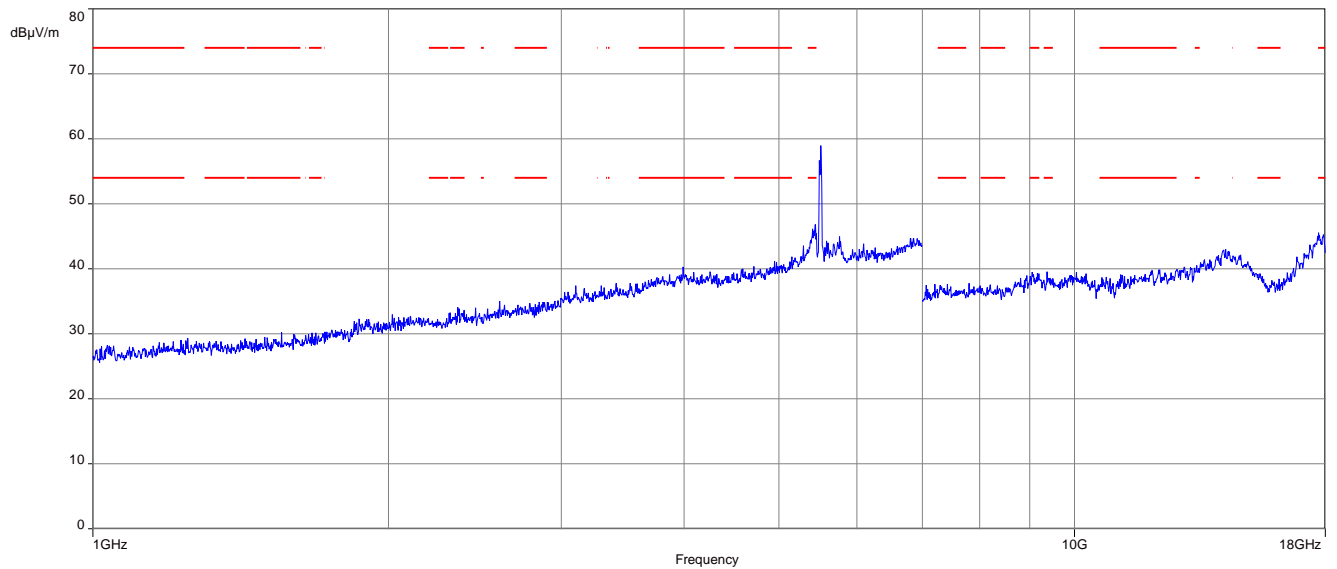
Plot 3: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



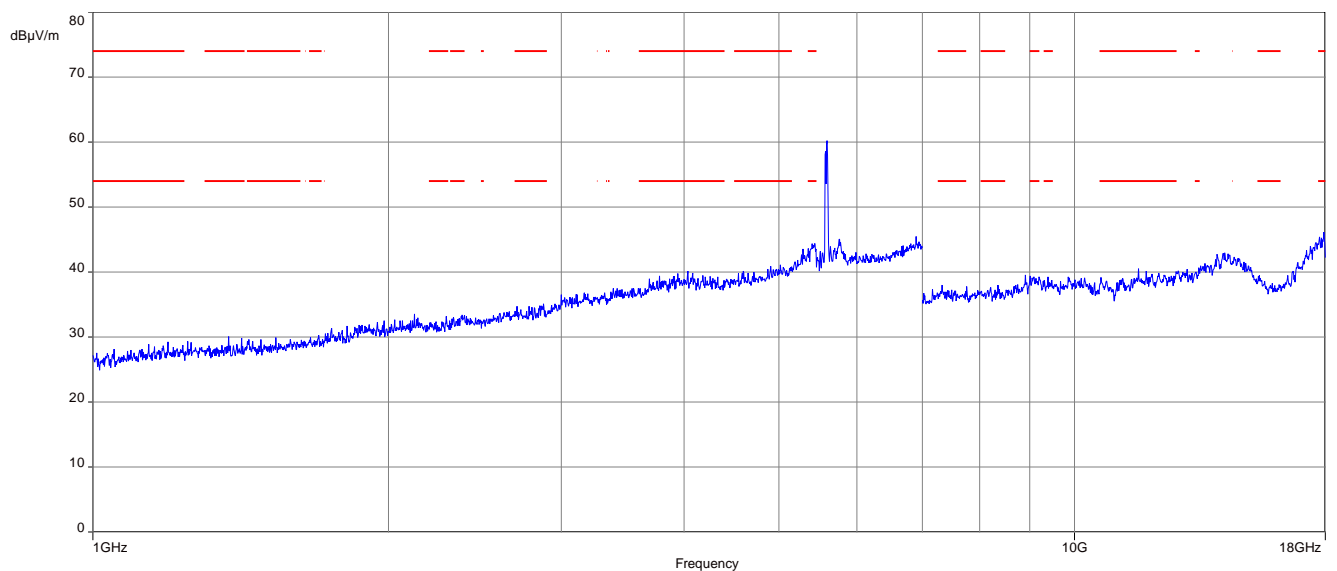
Plot 4: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



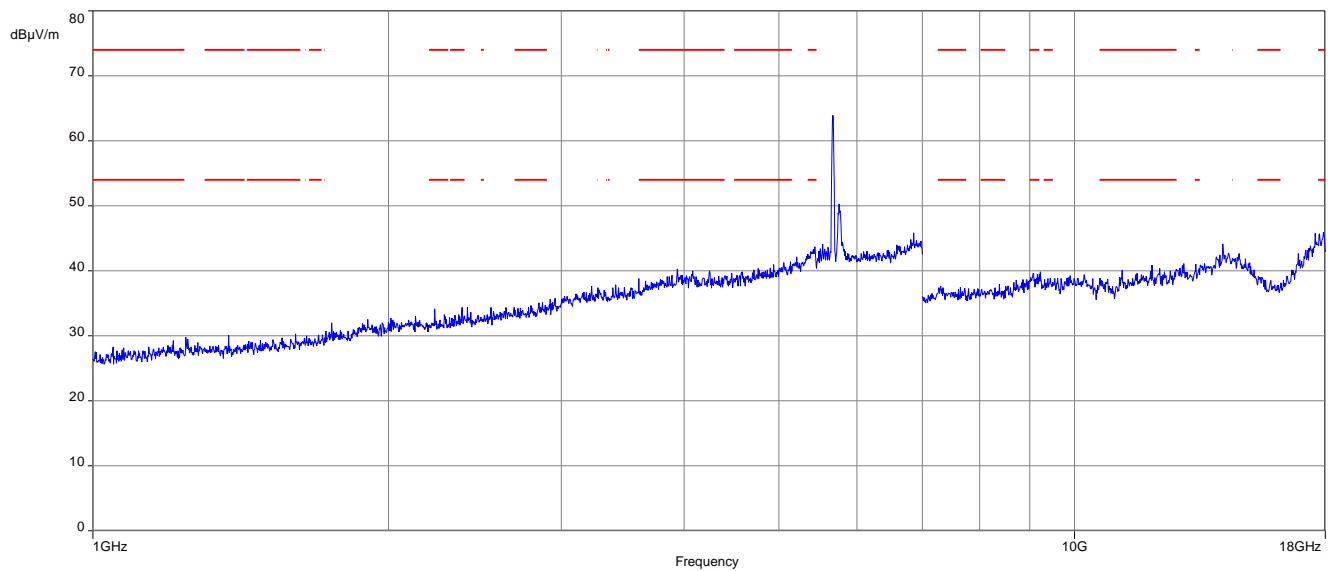
Plot 5: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



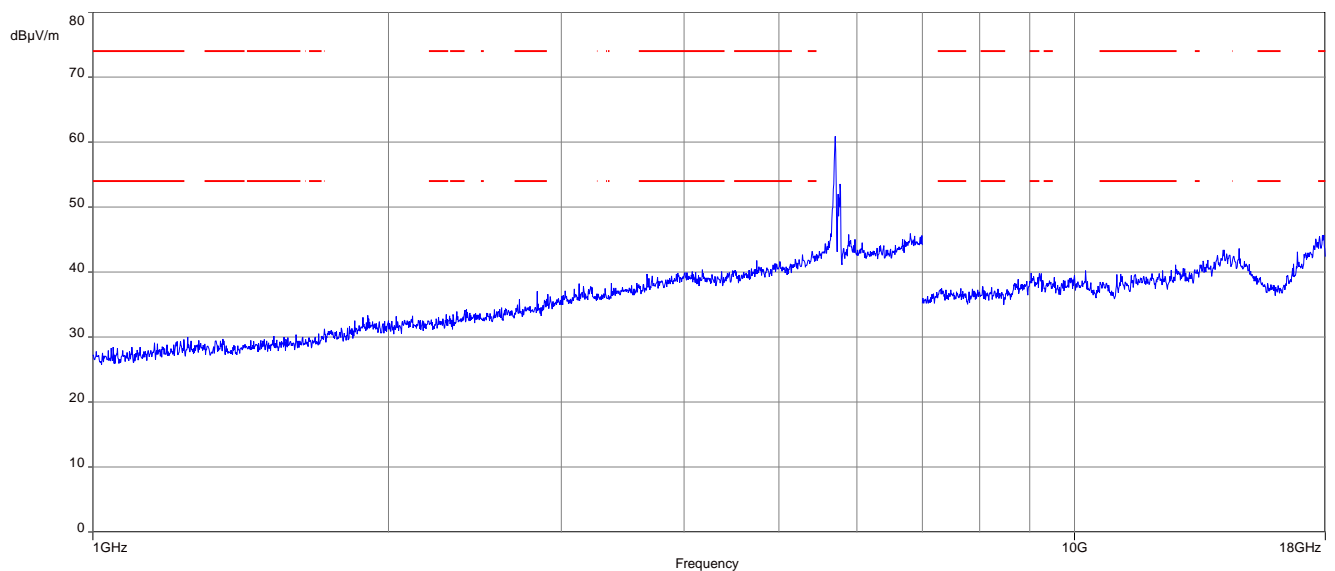
Plot 6: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



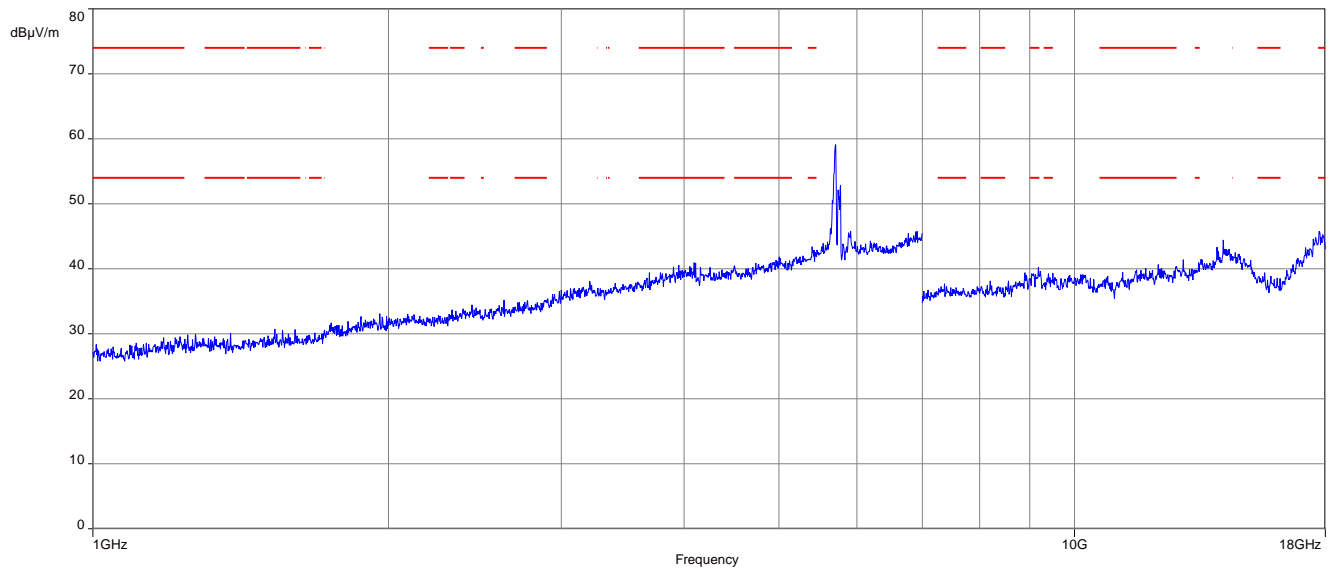
Plot 7: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



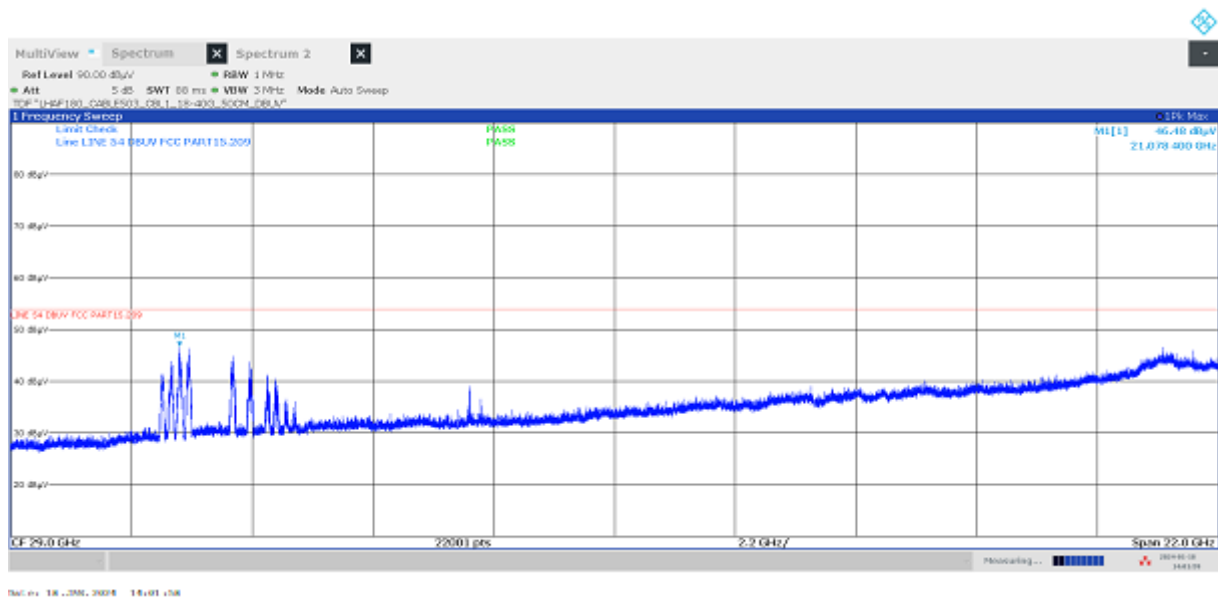
Plot 8: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



Plot 9: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; highest channel

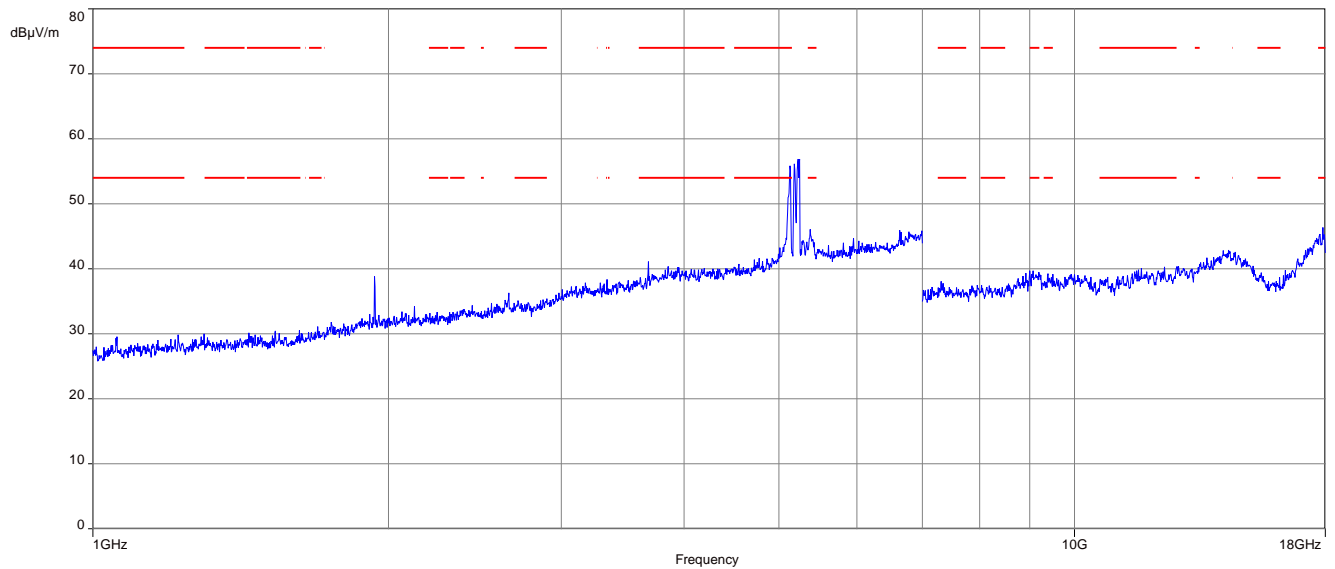


Plot 10: 18 GHz to 40 GHz; vertical & horizontal polarization; all channels (Max Hold)

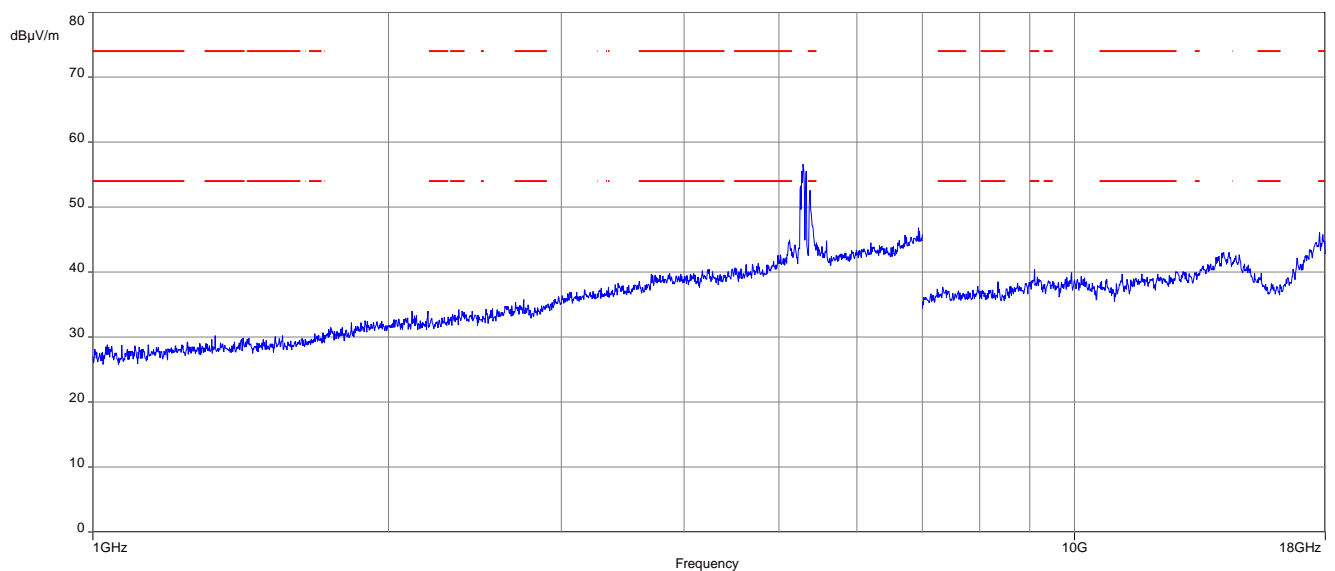


Plots: 80 MHz channel bandwidth

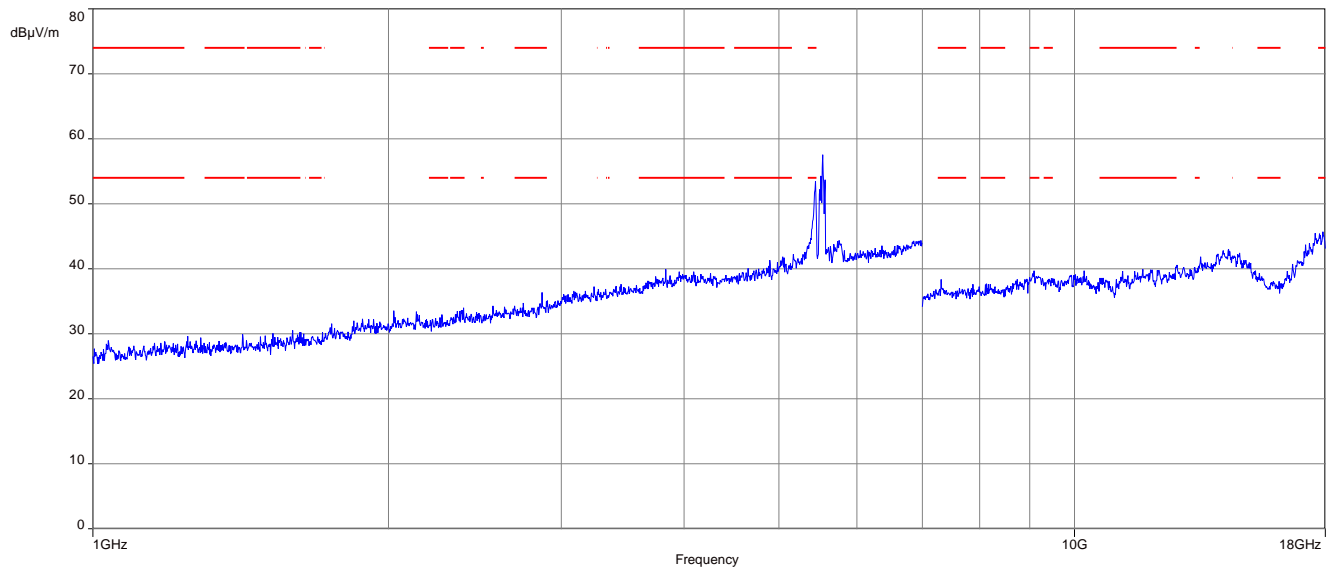
Plot 1: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; middle channel



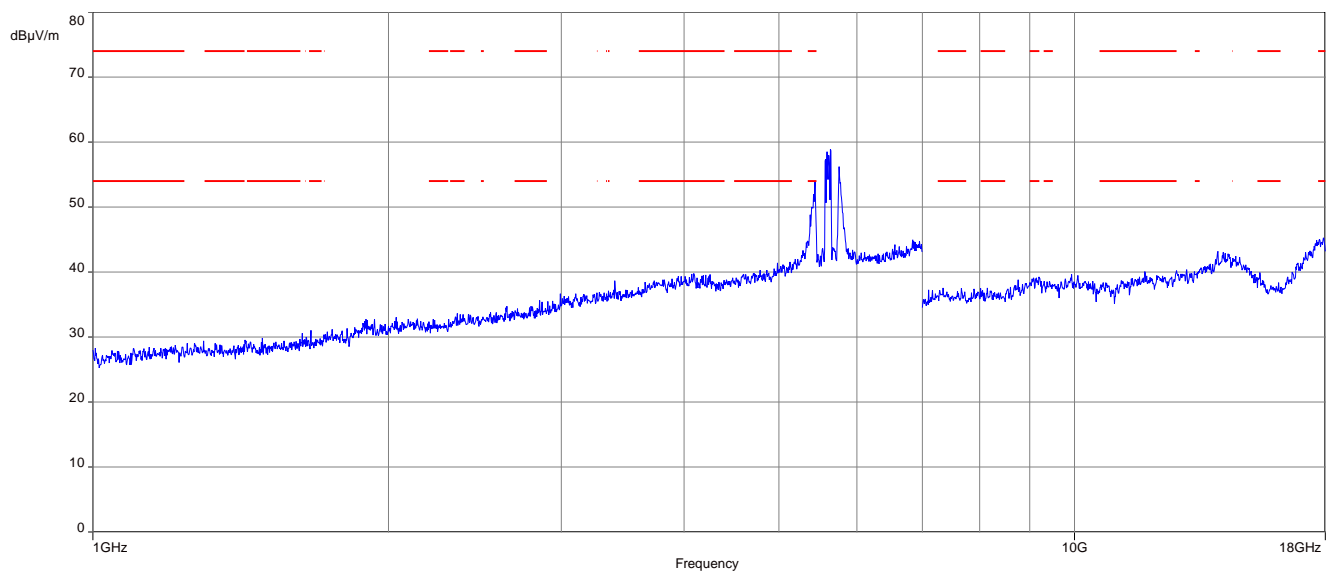
Plot 2: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



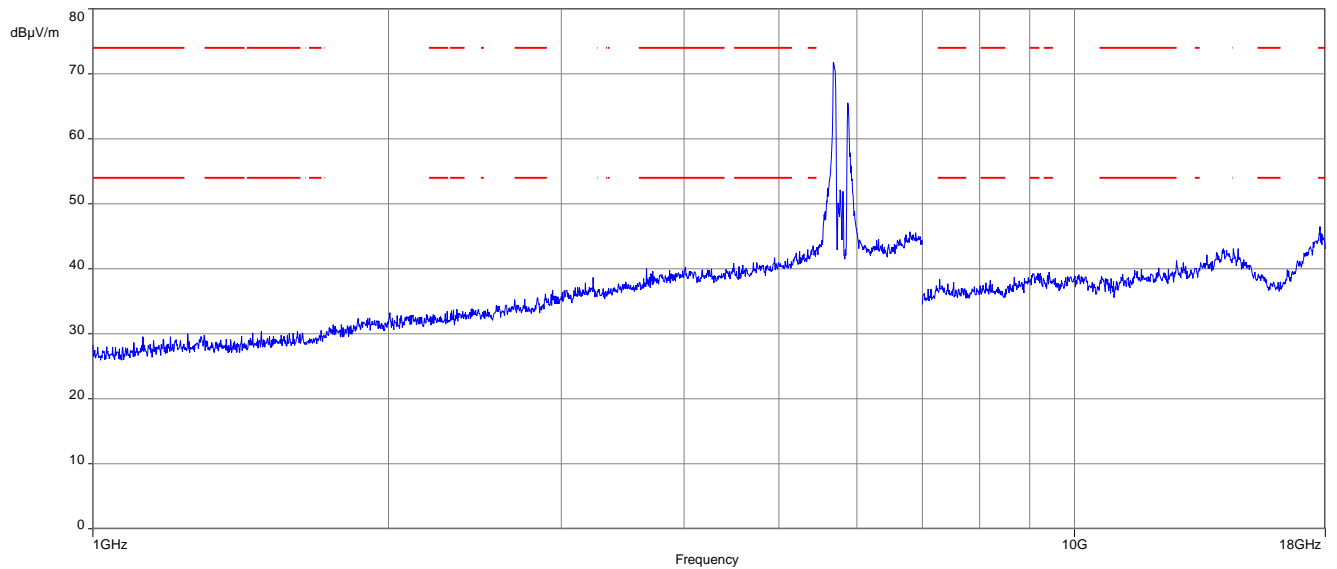
Plot 3: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



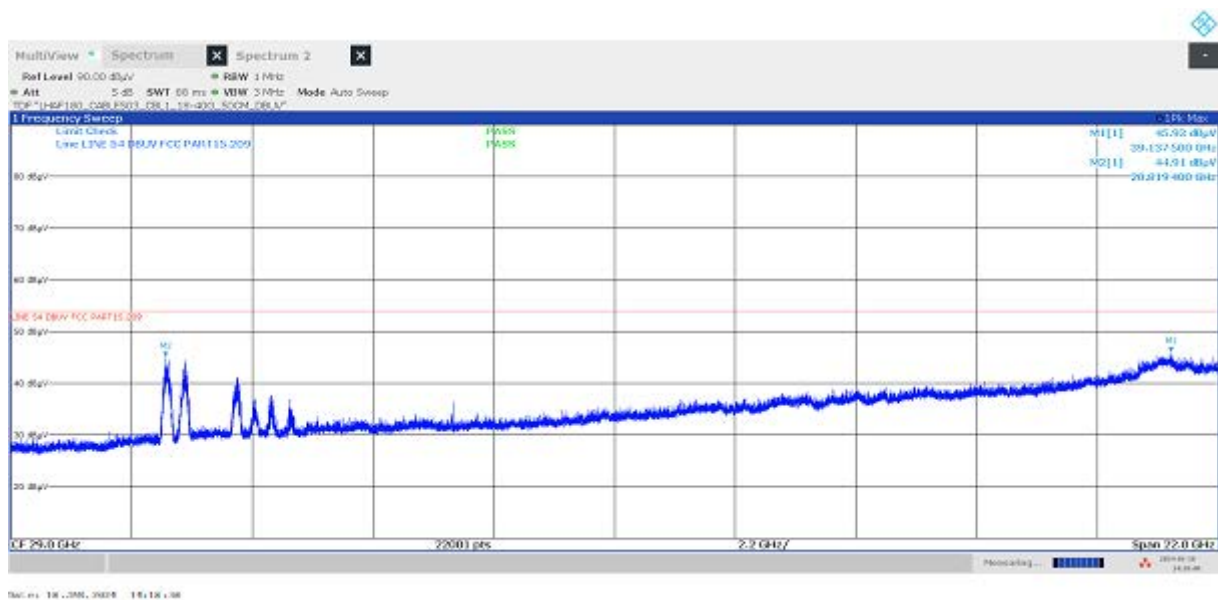
Plot 4: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



Plot 5: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; middle channel



Plot 6: 18 GHz to 40 GHz; vertical & horizontal polarization; all channel (Max Hold)



12.14 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to middle channel. If critical peaks are found the lowest channel and the highest channel will be measured too. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.

Measurement:

| Measurement parameter | |
|--------------------------|-----------------------------|
| Detector: | Peak - Quasi Peak / Average |
| Sweep time: | Auto |
| Video bandwidth: | 9 kHz |
| Resolution bandwidth: | 100 kHz |
| Span: | 150 kHz to 30 MHz |
| Trace mode: | Max Hold |
| Test setup: | See sub clause 6.4 – A |
| Measurement uncertainty: | See chapter 9 |

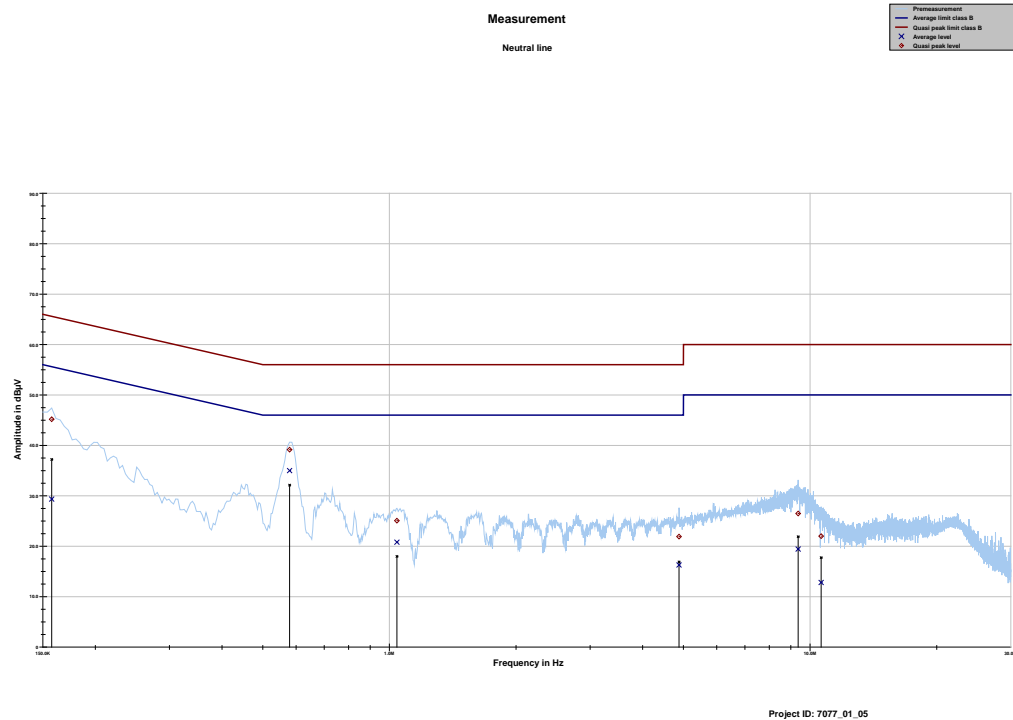
Limits:

| Spurious Emissions Conducted < 30 MHz | | |
|---------------------------------------|---------------------|------------------|
| Frequency (MHz) | Quasi-Peak (dBµV/m) | Average (dBµV/m) |
| 0.15 – 0.5 | 66 to 56* | 56 to 46* |
| 0.5 – 5 | 56 | 46 |
| 5 – 30.0 | 60 | 50 |

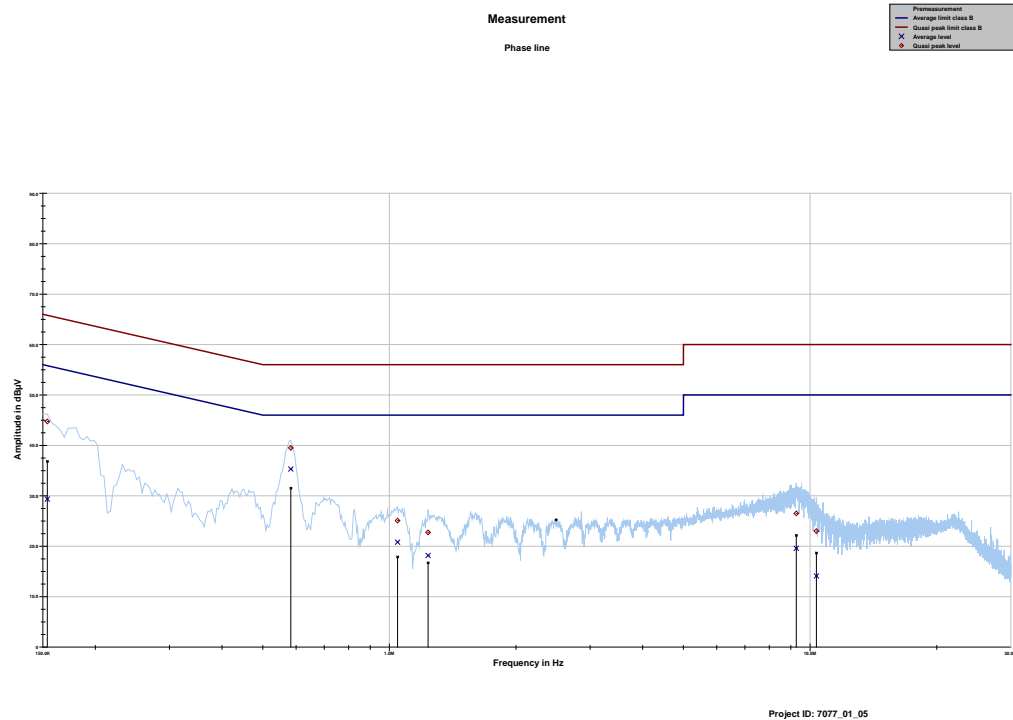
*Decreases with the logarithm of the frequency

Results:

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

Plots:**Plot 1:** 150 kHz to 30 MHz, neutral line

| Frequency | Quasi peak level | Margin quasi peak | Limit QP | Average level | Margin Average | Limit AV |
|-----------|------------------|-------------------|----------|---------------|----------------|----------|
| MHz | dBμV | dB | dBμV | dBμV | dB | dBμV |
| 0.157463 | 45.18 | 20.42 | 65.597 | 29.34 | 26.45 | 55.787 |
| 0.579094 | 39.15 | 16.85 | 56.000 | 34.99 | 11.01 | 46.000 |
| 1.041769 | 25.06 | 30.94 | 56.000 | 20.80 | 25.20 | 46.000 |
| 4.881225 | 21.91 | 34.09 | 56.000 | 16.28 | 29.72 | 46.000 |
| 9.369919 | 26.49 | 33.51 | 60.000 | 19.42 | 30.58 | 50.000 |
| 10.623619 | 22.00 | 38.00 | 60.000 | 12.80 | 37.20 | 50.000 |

Plot 2: 150 kHz to 30 MHz, phase line

| Frequency | Quasi peak level | Margin quasi peak | Limit QP | Average level | Margin average | Limit AV |
|-----------|------------------|-------------------|----------|---------------|----------------|----------|
| MHz | dBμV | dB | dBμV | dBμV | dB | dBμV |
| 0.153731 | 44.74 | 21.05 | 65.796 | 29.34 | 26.55 | 55.893 |
| 0.582825 | 39.49 | 16.51 | 56.000 | 35.31 | 10.69 | 46.000 |
| 1.045500 | 25.07 | 30.93 | 56.000 | 20.79 | 25.21 | 46.000 |
| 1.235794 | 22.73 | 33.27 | 56.000 | 18.16 | 27.84 | 46.000 |
| 9.272906 | 26.50 | 33.50 | 60.000 | 19.59 | 30.41 | 50.000 |
| 10.351237 | 22.99 | 37.01 | 60.000 | 14.10 | 35.90 | 50.000 |

13 Observations

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

14 Glossary

| | |
|------------------------|--|
| AVG | Average |
| C | Compliant |
| C/N₀ | Carrier to noise-density ratio, expressed in dB-Hz |
| CW | Clean wave |
| DC | Duty cycle |
| DFS | Dynamic frequency selection |
| DSSS | Dynamic sequence spread spectrum |
| DUT | Device under test |
| EMC | Electromagnetic Compatibility |
| EUT | Equipment under test |
| FCC | Federal Communications Commission |
| FCC ID | Company Identifier at FCC |
| FVIN | Firmware version identification number |
| HMN | Host marketing name |
| HVIN | Hardware version identification number |
| HW | Hardware |
| IC | Industry Canada |
| Inv. No. | Inventory number |
| MC | Modulated carrier |
| NA | Not applicable |
| NC | Not compliant |
| NOP | Non occupancy period |
| NP | Not performed |
| OBW | Occupied bandwidth |
| OC | Operating channel |
| OCW | Operating channel bandwidth |
| OFDM | Orthogonal frequency division multiplexing |
| OOB | Out of band |
| OP | Occupancy period |
| PER | Packet error rate |
| PMN | Product marketing name |
| PP | Positive peak |
| QP | Quasi peak |
| RLAN | Radio local area network |
| S/N or SN | Serial number |
| SW | Software |
| UUT | Unit under test |
| WLAN | Wireless local area network |

15 Document history

| Version | Applied changes | Date of release |
|---------|----------------------|-----------------|
| -/- | Initial release | 2024-01-31 |
| R2 | Typo in result table | 2024-03-19 |

END OF TEST REPORT