
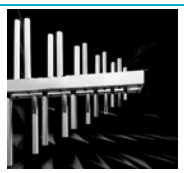
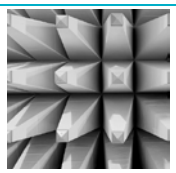

CTC advanced
member of RWTÜV group

Bundesnetzagentur

BNetzA-CAB-02/21-102

# TEST REPORT

**Test report no.: 1-6334/18-01-03-A**

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-03

## Testing laboratory


**CTC advanced GmbH**
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.ctcadvanced.com
e-mail: mail@ctcadvanced.com


**Accredited Testing Laboratory:**
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-03

## Applicant


**CPAC Systems AB**
Bergskroken 3
SE- 431 37 Mölndal / SWEDEN
Phone: +46 31 352 16 00
Contact: Lars-Gunnar Sundin
e-mail: lars-gunnar.sundin@cpacsystems.se
Phone: +46 3 17 34 21 96


## Manufacturer


**CPAC Systems AB**
Bergskroken 3
SE- 431 37 Mölndal / SWEDEN


## 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 |
| RSS - 247 Issue 2 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence - Exempt Local Area Network (LE-LAN) Devices |
| RSS - Gen Issue 5 | General Requirements for Compliance of Radio Apparatus |

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

## Test Item

| | |
|---|---|
| **Kind of test item:** | **Charging Interface Control Unit** |
| **Model name:** | **CPAC-1054** |
| **FCC ID:** | **AHV-CPAC1054** |
| **IC:** | **10111A-CPAC1054** |
| Frequency: | UNII-bands:<br>5250 MHz to 5350 MHz & 5470 MHz to 5725 MHz |
| Technology tested: | WLAN |
| Antenna: | External antenna |
| Power supply: | 24 V DC by external power supply |
| Temperature range: | -40°C to +85°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:

Digital unterschrieben von David Lang
DN: cn=David Lang, o=CTC advanced GmbH, ou=LNG-161129, email=david.lang@ctcadvanced.com, c=DE
Datum: 2018.10.08 12:45:25 +02'00'

David Lang
Lab Manager
Radio Communications & EMC

## Test performed:

cn=Marco Bertolino, o=CTC advanced GmbH, ou=BTL-161128, email=Marco.Bertolino@ctcadvanced.com, c=DE
2018.10.05 11:48:51 +02'00'

Marco Bertolino
Lab Manager
Radio Communications & EMC

# 1 Table of contents

# 2 General information

## 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CTC advanced GmbH.
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In no case this test report can be considered as a Letter of Approval.

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.

**This test report replaces the test report with the number 1-6334/18-01-03 and dated 2018-08-06.**

## 2.2 Application details

| | |
|---|---|
| Date of receipt of order: | 2018-06-04 |
| Date of receipt of test item: | 2018-07-09 |
| Start of test: | 2018-07-09 |
| End of test: | 2018-07-16 |
| Person(s) present during the test: | -/- |

## 2.3 Test laboratories sub-contracted

None

## 3 Test standard/s and references

| 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 |
| RSS - 247 Issue 2 | February 2017 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence - Exempt Local Area Network (LE-LAN) Devices |
| RSS - Gen Issue 5 | April 2018 | General Requirements for Compliance of Radio Apparatus |

| Guidance | Version | Description |
|---|---|---|
| UNII: 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 |

# 4 Test environment

| | | | |
|---|---|---|---|
| Temperature | : | $T_{nom}$<br>$T_{max}$<br>$T_{min}$ | +22 °C during room temperature tests<br>No tests under extreme temperature conditions required.<br>No tests under extreme temperature conditions required. |
| Relative humidity content | : | | 38 % |
| Barometric pressure | : | | 1023 hPa |
| Power supply | : | $V_{nom}$<br>$V_{max}$<br>$V_{min}$ | 24 V DC by external power supply<br>No tests under extreme voltage conditions required.<br>No tests under extreme voltage conditions required. |

# 5 Test item

## 5.1 General description

| | | |
|---|---|---|
| Kind of test item | : | Charging Interface Control Unit |
| Type identification | : | CPAC-1054 |
| HMN | : | -/- |
| PMN | : | CPAC-1054 |
| HVIN | : | CPAC-1054 |
| FVIN | : | 1.0.0 |
| S/N serial number | : | Rad. 00002609<br>Cond. 00002602 |
| HW hardware status | : | Not provided! |
| SW software status | : | Not provided! |
| Frequency band | : | UNII-bands:<br>5250 MHz to 5350 MHz & 5470 MHz to 5725 MHz |
| Type of radio transmission<br>Use of frequency spectrum | :<br>: | OFDM |
| Type of modulation | : | (D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM |
| Antenna | : | External antenna;<br>Huber+Suhner type 1354.17.0001 with 7.5m coaxial feed cable |
| Power supply | : | 24.0 V DC by external power supply |
| Temperature range | : | -40°C to +85°C |

## 5.2 Additional information

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

Test setup and EUT photos are included in test report: 1-6334/18-01-01_AnnexA
1-6334/18-01-01_AnnexB
1-6334/18-01-01_AnnexD

# 6 Description of the test setup

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

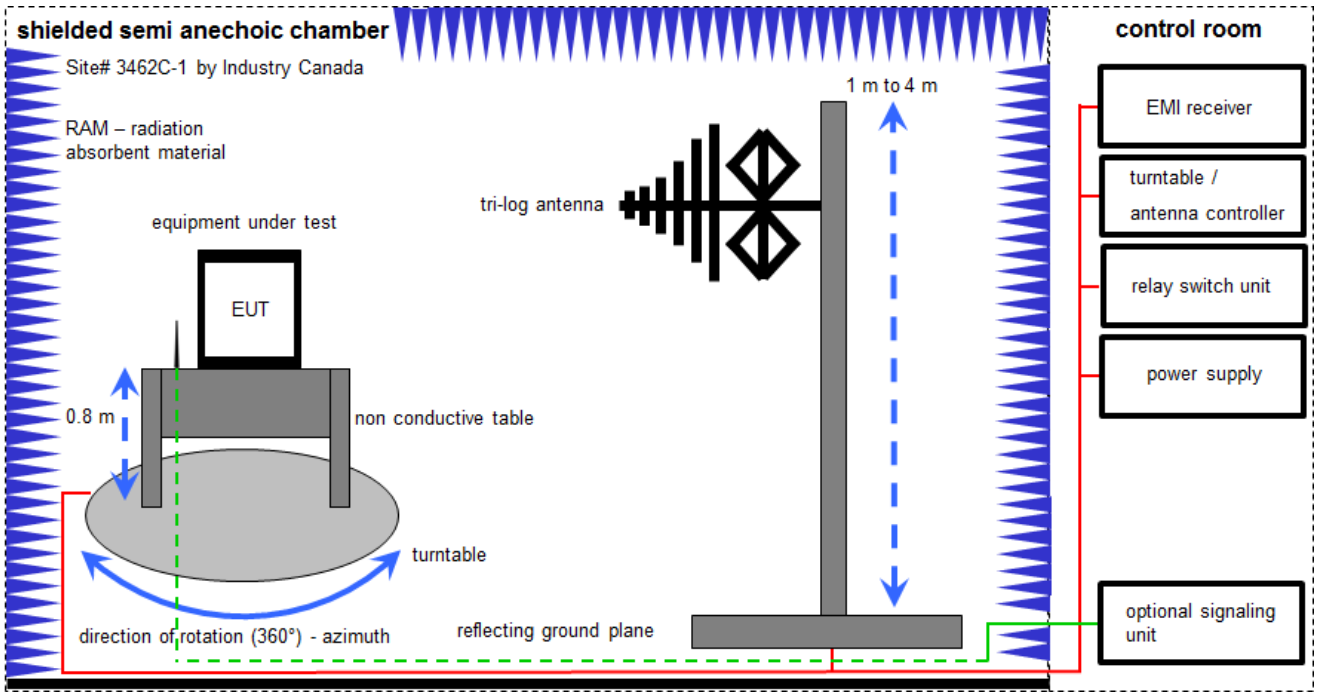
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

**Agenda:** Kind of Calibration

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

## 6.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 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: 10.30.0

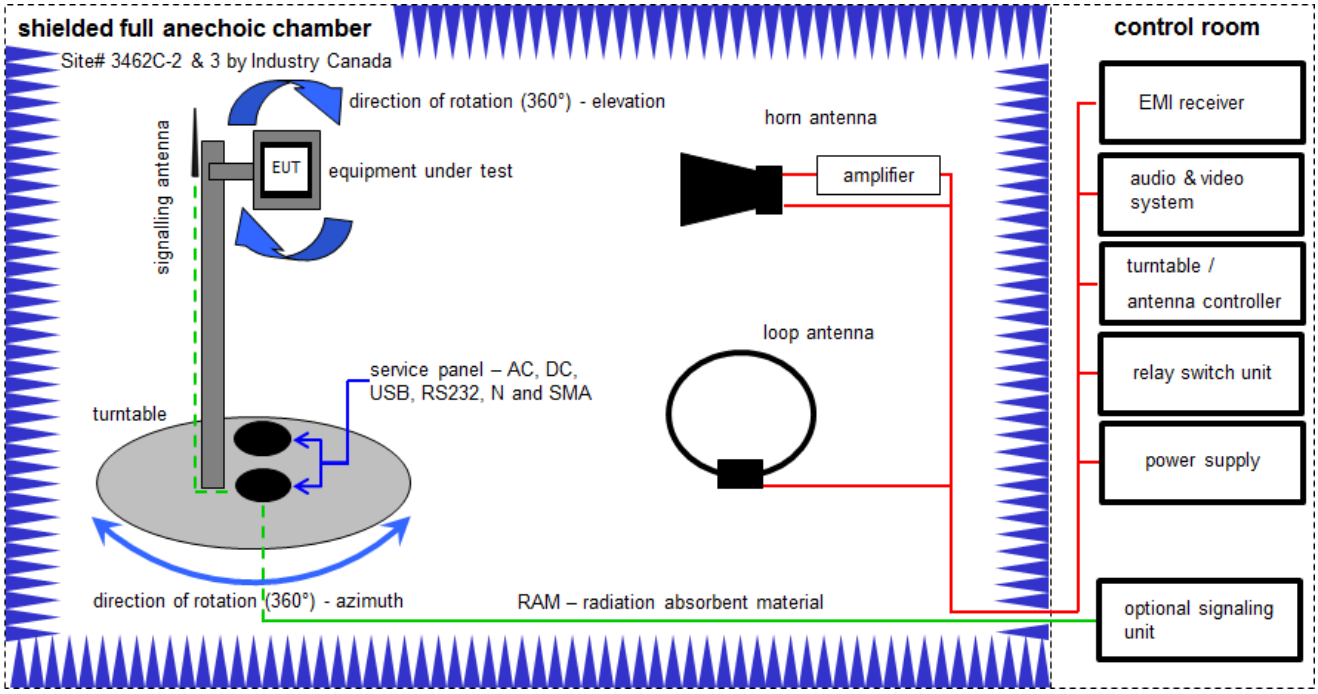
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

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

**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Switch-Unit | 3488A | HP | 2719A14505 | 300000368 | ev | -/- | -/- |
| 2 | A | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP | 2920A04466 | 300000580 | ne | -/- | -/- |
| 3 | A | Meßkabine 1 | HF-Absorberhalle | MWB AG 300023 | | 300000551 | ne | -/- | -/- |
| 4 | A | EMI Test Receiver | ESCI 3 | R&S | 100083 | 300003312 | k | 15.12.2017 | 14.12.2018 |
| 5 | A | Antenna Tower | Model 2175 | ETS-Lindgren | 64762 | 300003745 | izw | -/- | -/- |
| 6 | A | Positioning Controller | Model 2090 | ETS-Lindgren | 64672 | 300003746 | izw | -/- | -/- |
| 7 | A | Turntable Interface-Box | Model 105637 | ETS-Lindgren | 44583 | 300003747 | izw | -/- | -/- |

## 6.2 Shielded fully anechoic chamber




Measurement distance: horn antenna 3 meter; loop antenna 3 meter
BAT-EMC software version: 3.16.0.49

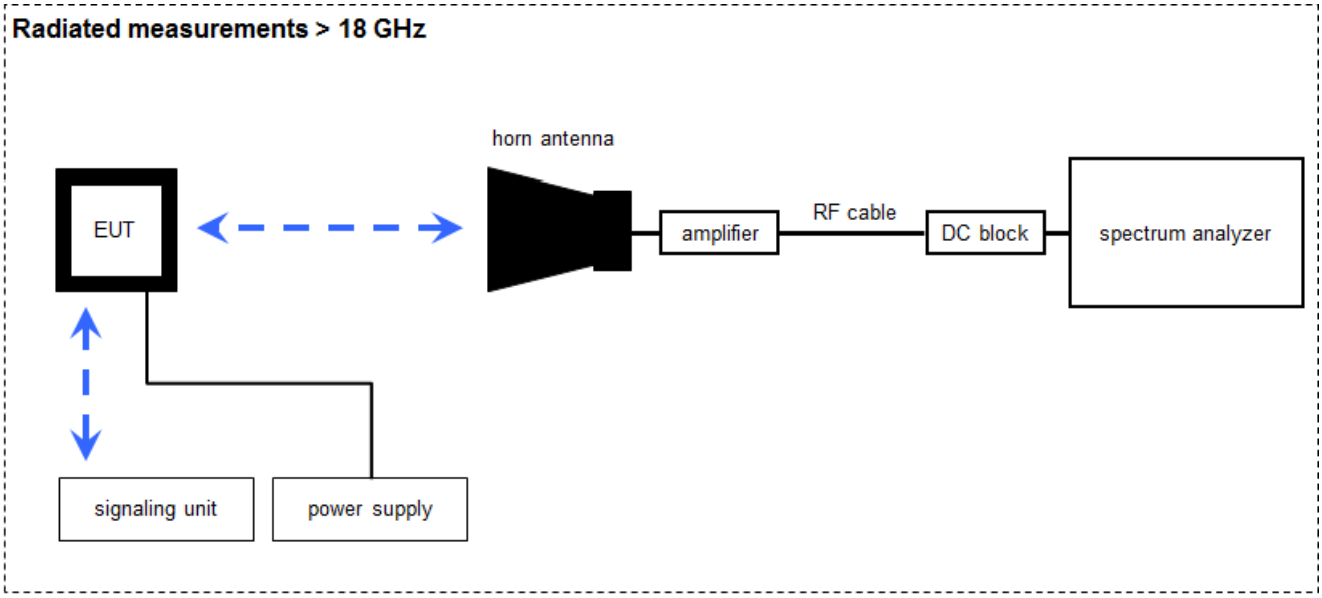
FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

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

**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A+B | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP | 2818A03450 | 300001040 | vIKI! | 12.12.2017 | 11.12.2020 |
| 2 | B | Active Loop Antenna 9 kHz to 30 MHz | 6502 | EMCO | 2210 | 300001015 | vIKI! | 07.07.2017 | 06.07.2019 |
| 3 | A+B | Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 | ev | -/- | -/- |
| 4 | A | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 9107-3697 | 300001605 | vIKI! | 14.02.2017 | 13.02.2019 |
| 5 | A+B | Switch / Control Unit | 3488A | HP | * | 300000199 | ne | -/- | -/- |
| 6 | A+B | EMI Test Receiver 20Hz- 26,5GHz | ESU26 | R&S | 100037 | 300003555 | k | 20.12.2017 | 19.12.2018 |
| 7 | A | Highpass Filter | WHK1.1/15G-10SS | Wainwright | 3 | 300003255 | ev | -/- | -/- |
| 8 | A | Highpass Filter | WHKX7.0/18G-8SS | Wainwright | 19 | 300003790 | ne | -/- | -/- |
| 9 | A | Broadband Amplifier 0.5-18 GHz | CBLU5184540 | CERNEX | 22049 | 300004481 | ev | -/- | -/- |
| 10 | A | Broadband Amplifier 5-13 GHz | CBLU5135235 | CERNEX | 22010 | 300004491 | ev | -/- | -/- |
| 11 | A+B | 4U RF Switch Platform | L4491A | Agilent Technologies | MY50000037 | 300004509 | ne | -/- | -/- |
| 12 | A+B | NEXIO EMV-Software | BAT EMC V3.16.0.49 | EMCO | -/- | 300004682 | ne | -/- | -/- |
| 13 | A+B | PC | ExOne | F+W | -/- | 300004703 | ne | -/- | -/- |

## 6.3 Radiated measurements > 18 GHz




Measurement distance: horn antenna 50 cm

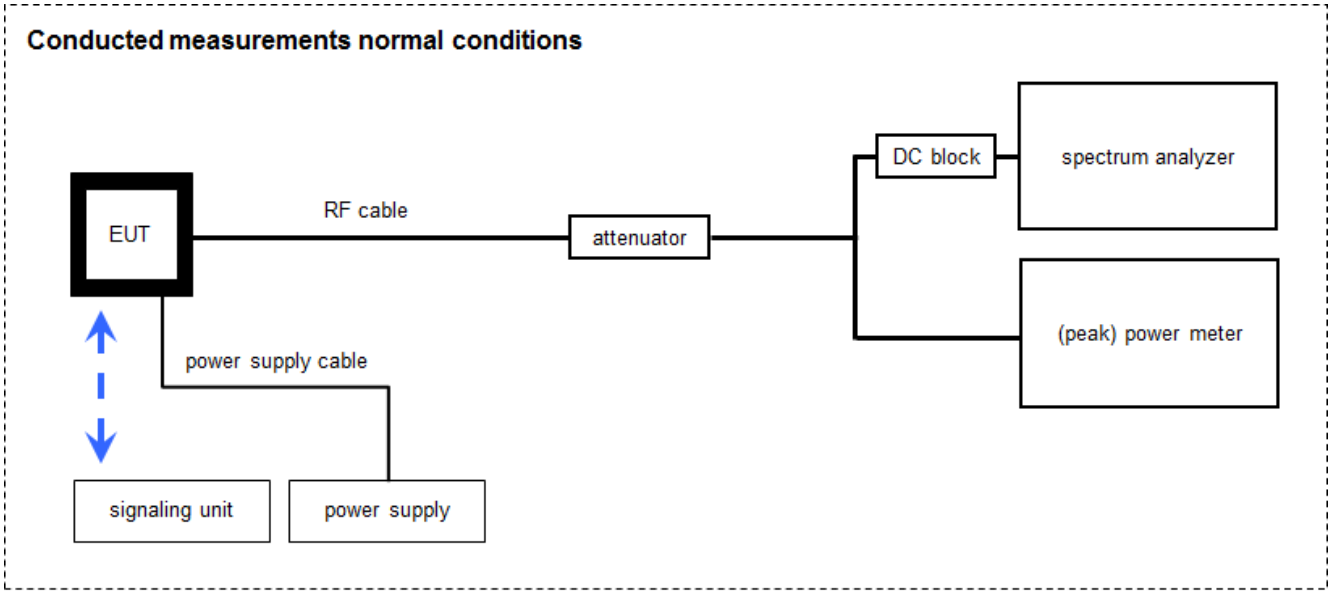
FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

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

**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Std. Gain Horn Antenna 18.0-26.5 GHz | 638 | Narda | -/- | 300000486 | vlKl! | 13.12.2017 | 12.12.2019 |
| 2 | A | Std. Gain Horn Antenna 26.5-40.0 GHz | V637 | Narda | 82-16 | 300000510 | vlKl! | 13.12.2017 | 12.12.2019 |
| 3 | A | Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 | k | 16.01.2018 | 15.01.2019 |
| 4 | A | Amplifier 2-40 GHz | JS32-02004000-57-5P | MITEQ | 1777200 | 300004541 | ev | -/- | -/- |
| 5 | A | RF-Cable | ST18/SMAm/SMAm/48 | Huber & Suhner | Batch no. 600918 | 400001182 | ev | -/- | -/- |
| 6 | A | RF-Cable | ST18/SMAm/SMAm/48 | Huber & Suhner | Batch no. 127377 | 400001183 | ev | -/- | -/- |

## 6.4 Conducted measurements with peak power meter & spectrum analyzer




WLAN tester version: 1.1.13; LabViw2015

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

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

**Equipment table:**

| No. | Lab / Item | Equipment | Type | Manufacturer | Serial No. | INV. No. | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 | k | 16.01.2018 | 15.01.2019 |
| 2 | A | DC-Blocker 0.1-40 GHz | 8141A | Inmet | -/- | 400001185 | ev | -/- | -/- |
| 3 | A | Hygro-Thermometer | -/-, 5-45°C, 20-100%rF | Thies Clima | -/- | 400000108 | ev | 11.05.2018 | 10.05.2020 |
| 4 | A | PC-WLAN Tester | Intel Core i3 3220/3,3 GHz, Prozessor | -/- | 2V2403033A4523 | 300004589 | ne | -/- | -/- |
| | A | Teststand | Teststand Custom Sequence Editor | National Instruments GmbH | -/- | 300004590 | ne | -/- | -/- |
| 5 | A | RF-Cable | ST18/SMAm/SMAm/60 | Huber & Suhner | Batch no. 606844 | 400001181 | ev | -/- | -/- |
| 6 | A | Coax Attenuator 10 dB 2W 0-40 GHz | MCL BW-K10-2W44+ | Mini Circuits | -/- | 400001186 | ev | -/- | -/- |

# 7 Sequence of testing

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

**Setup**

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, 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.

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

**Setup**

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

**Premeasurement**

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

**Final measurement**

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

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

**Setup**

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

**Premeasurement**

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

**Final measurement**

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

## 7.4 Sequence of testing radiated spurious above 18 GHz

**Setup**

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

**Premeasurement**

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

**Final measurement**

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

# 8 Measurement uncertainty

| Measurement uncertainty | | |
|---|---|---|
| **Test case** | **Uncertainty** | |
| Antenna gain | ± 3 dB | |
| Power spectral density | ± 1.15 dB | |
| Spectrum bandwidth | ± 100 kHz (depends on the used RBW) | |
| Occupied bandwidth | ± 100 kHz (depends on the used RBW) | |
| Maximum output power | ± 1.15 dB conducted<br>± 3 dB radiated | |
| Minimum emissions bandwidth | ± 100 kHz (depends on the used RBW) | |
| Band edge compliance radiated | ± 3 dB | |
| Spurious emissions conducted | > 3.6 GHz | ± 1.15 dB |
| | > 7 GHz | ± 1.15 dB |
| | > 18 GHz | ± 1.89 dB |
| | ≥ 40 GHz | ± 3.12 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 | |

# 9 Summary of measurement results

| | |
|---|---|
| ☐ | No deviations from the technical specifications were ascertained |
| ☐ | There were deviations from the technical specifications ascertained |
| ☒ | This test report is only a partial test report.<br>The content and verdict of the performed test cases are listed below. |

| TC Identifier | Description | Verdict | Date | Remark |
|---|---|---|---|---|
| RF-Testing | CFR Part 15<br>RSS 247, Issue 2 | See table | 2018-10-05 | -/- |

| Test specification clause | Test case | Temperature conditions | Power source voltages | C | NC | NA | NP | Remark |
|---|---|---|---|---|---|---|---|---|
| -/- | Output power verification (cond.) | Nominal | Nominal | -/- | | | | Declared |
| -/- | Antenna gain | Nominal | Nominal | -/- | | | | Declared |
| U-NII Part 15 | Duty cycle | Nominal | Nominal | -/- | | | | -/- |
| §15.407(a)<br>RSS - 247 (6.2.1.1)<br>RSS - 247 (6.2.2.1)<br>RSS - 247 (6.2.3.1)<br>RSS - 247 (6.2.4.1) | Maximum output power (conducted & radiated) | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.407(a)<br>RSS - 247 (6.2.1.1)<br>RSS - 247 (6.2.2.1)<br>RSS - 247 (6.2.3.1)<br>RSS - 247 (6.2.4.1) | Power spectral density | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| RSS - 247 (6.2.4.1) | Spectrum bandwidth 6dB bandwidth | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.407(a)<br>RSS - 247 (6.2.1.2) | Spectrum bandwidth 26dB bandwidth | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| RSS Gen<br>clause 6.6 | Spectrum bandwidth 99% bandwidth | Nominal | Nominal | -/- | | | | -/- |
| §15.205<br>RSS - 247 (6.2.1.2)<br>RSS - 247 (6.2.2.2)<br>RSS - 247 (6.2.3.2)<br>RSS - 247 (6.2.4.2) | Band edge compliance radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.407(b)<br>RSS - 247 (6.2.1.2)<br>RSS - 247 (6.2.2.2)<br>RSS - 247 (6.2.3.2)<br>RSS - 247 (6.2.4.2) | TX spurious emissions radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.109<br>RSS-Gen | RX spurious emissions radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.209(a)<br>RSS-Gen | Spurious emissions radiated<br>< 30 MHz | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.107(a)<br>§15.207 | Spurious emissions conducted emissions<br>< 30 MHz | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.407<br>RSS - 247 (6.3) | DFS | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |

**Notes:**

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

## 10 Additional comments

Reference documents: Antenna Data Sheet: HUBER+SUHNER SENCITY SPOT-L WiFi Antenna (1354.17.0001).

Special test descriptions: The measurement of emissions at an elevation angle higher 30° from horizon does not apply in the frequency range tested.

Configuration descriptions:

a-mode:
at+uprodwtx=1,52,4,16,15000,20
at+uprodwtx=1,60,4,16,15000,20
at+uprodwtx=1,64,4,16,15000,20

at+uprodwtx=1,100,4,16,15000,20
at+uprodwtx=1,120,4,16,15000,20
at+uprodwtx=1,140,4,16,15000,20

n/ac HT20 – mode:
at+uprodwtx=1,52,13,16,15000,20
at+uprodwtx=1,60,13,16,15000,20
at+uprodwtx=1,64,13,16,15000,20

at+uprodwtx=1,100,13,16,15000,20
at+uprodwtx=1,120,13,16,15000,20
at+uprodwtx=1,140,13,16,15000,20

Rx-Mode:
at+uprodwrx=0,100,13

Provided channels:

Channels with 20 MHz channel bandwidth:

| **U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz) channel number & centre frequency** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **channel** | 36 | 40 | 44 | 48 | **52** | 56 | **60** | **64** |
| **$f_c$ / MHz** | 5180 | 5200 | 5220 | 5240 | **5260** | 5280 | **5300** | **5320** |

| **U-NII-2C (5470 MHz to 5725 MHz) channel number & centre 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** |

Test mode:

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

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

Antennas and transmit operating modes:

☒ Operating mode 1 (single antenna)

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

☐ Operating mode 2 (multiple antennas, no beamforming)

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

☐ Operating mode 3 (multiple antennas, with beamforming)

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

# 11 Measurement results

## 11.1 Identify worst case data rate

Worst case data rates as declared by the manufacturer:

| OFDM – mode | Modulation scheme / bandwidth | | | | | |
|---|---|---|---|---|---|---|
| | U-NII-1 & U-NII-2A | | U-NII-2C | | U-NII-3 | |
| | Low channel | high channel | Low channel | high channel | Low channel | high channel |
| a – mode | Mbit/s | Mbit/s | 6 Mbit/s | 6 Mbit/s | Mbit/s | Mbit/s |
| n/ac HT20 – mode | MCS | MCS | MCS0 | MCS0 | MCS | MCS |

## 11.2 Antenna gain

Maximum antenna gain: 23dBi (as declared by the manufacturer, see referenced documents in section 9)

Considering the attenuation of the provided antenna cable the gain of the system is calculated as follows.

$$G_s = G_a - A_c$$
$$5.3dBi = 23dBi - 17.8dB$$

Where is:

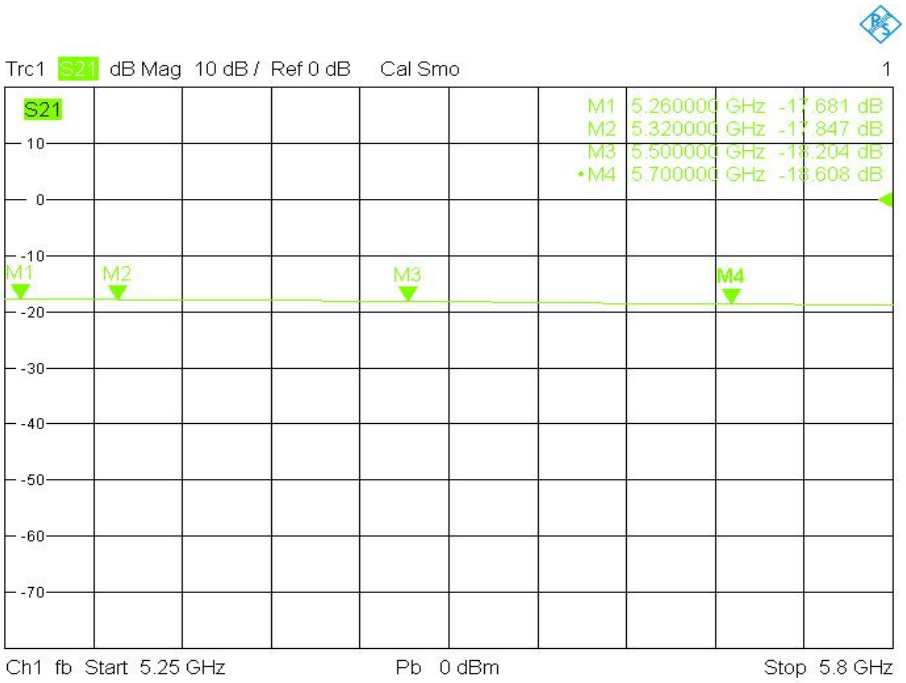
$G_s$ = Gain System (applied to all conducted measurements)
$G_a$ = Gain Antenna (as declared)
$A_c$ = Cable Attenuation (as measured)

**Result:**

| OFDM | antenna gain | | | |
|---|---|---|---|---|
| channel & sub band | lower sub band | | higher sub band | |
| | lowest channel - 5260 MHz | highest channel - 5320 MHz | lowest channel - 5500 MHz | highest channel - 5700 MHz |
| According antenna datasheet & cable loss measurement | 5.3 | 5.2 | 4.8 | 4.4 |

The highest gain of 5.3dBi is considered for all results based on conducted measurements.

**Plot 1:** cable loss (7.5 m cable + connector)



## 11.3 Duty cycle

**Description:**

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

**Measurement:**

| Measurement parameter | |
|---|---|
| **According to: KDB789033 D02, B.** | |
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 10 MHz |
| Video bandwidth: | 10 MHz |
| Span: | Zero |
| Trace mode: | Video trigger / view / single sweep |
| Used test setup: | See chapter 6.4 – A |
| Measurement uncertainty: | See chapter 8 |

**Results:**

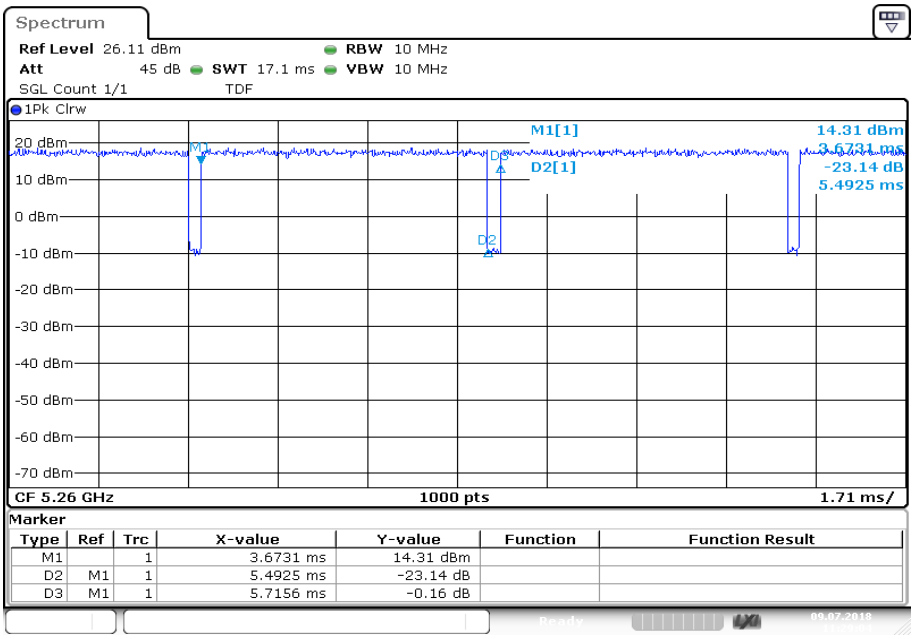
Duty cycle and correction factor:

| OFDM – mode | Calculation method | | | |
|---|---|---|---|---|
| | $T_{on}$ ($D2_{plot}$) * 100 / $T_{complete}$ ($D3_{plot}$) = duty cycle<br>10 * log(duty cycle) = correction factor | | | |
| | **$T_{on}$ ($D2_{plot}$)** | **$T_{complete}$ ($D3_{plot}$)** | **Duty cycle** | **Correction factor** |
| a – mode | 5.5ms | 5.7ms | 96.0% | 0.2dB |
| n/ac HT20 – mode | 5.1ms | 5.3ms | 96.0% | 0.2dB |

**Plots:**

Duty cycle and correction factor (example for one channel & one antenna port):

**Plot 1:** duty cycle of the transmitter; a – mode

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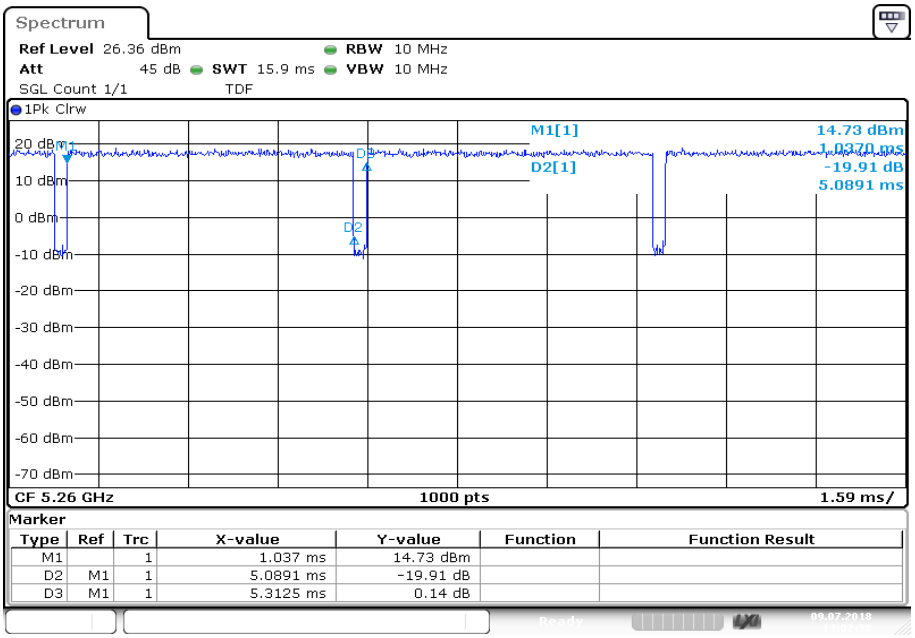
**Plot 2:** duty cycle of the transmitter; n/ac HT20 – mode

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## 11.4 Maximum output power

### 11.4.1 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.** | |
| Detector: | RMS |
| Sweep time: | ≥10*(swp points)*(total on/off time) |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 3 MHz |
| Span: | > EBW |
| Trace mode: | Max hold |
| Analyzer function | Band power / channel power<br>Interval > 26 dB EBW |
| Used test setup: | See chapter 6.4 – A |
| Measurement uncertainty: | See chapter 8 |

**Limits:**

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

**Results:**

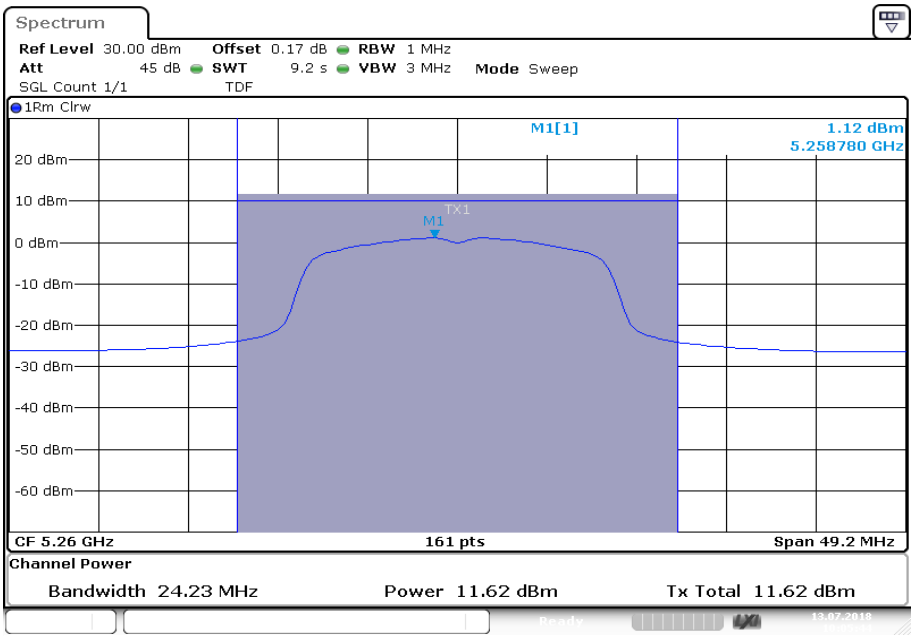
| | | | |
|---|---|---|---|
| | **Maximum output power conducted [dBm]** | | |
| | **U-NII-1 (5150 MHz to 5250 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| **a** | 11.6 | 12.6 | 12.8 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 11.5 | 10.0 | 10.2 |
| | **U-NII-3 (5725 MHz to 5850 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |

**Results:**

| | | | |
|---|---|---|---|
| | **Maximum output power conducted [dBm]** | | |
| | **U-NII-1 (5150 MHz to 5250 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| **n/ac HT20** | 11.6 | 12.7 | 12.9 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 11.7 | 10.1 | 10.3 |
| | **U-NII-3 (5725 MHz to 5850 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |

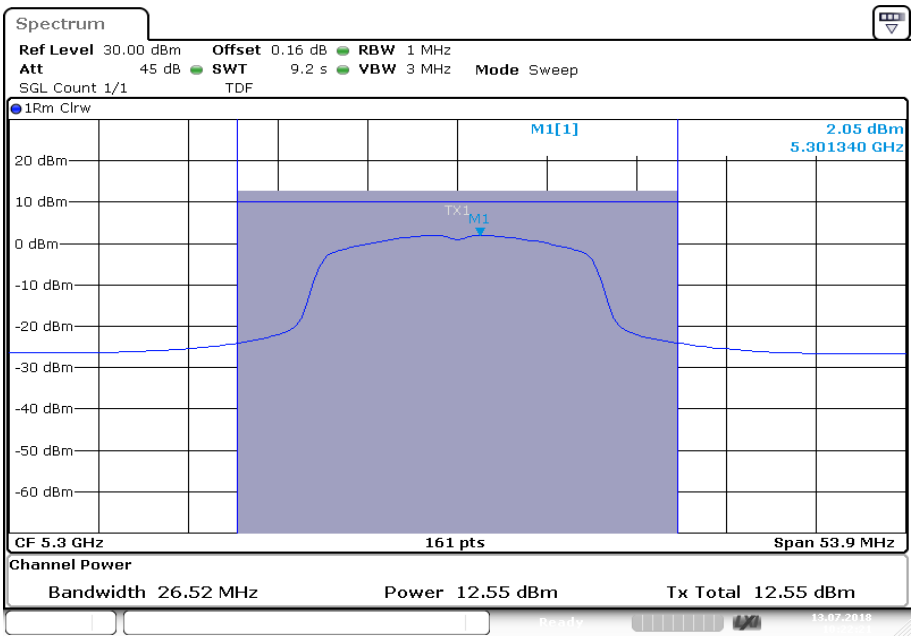
**Plots:** a – mode

**Plot 1:** U-NII-2A; lowest channel



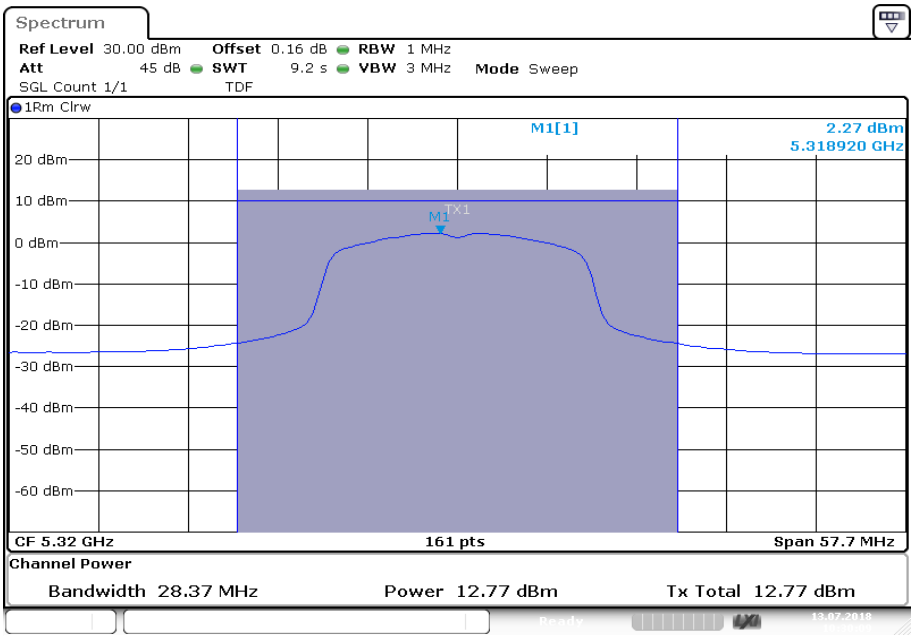

Date: 13.JUL.2018 10:05:44

**Plot 2:** U-NII-2A; middle channel



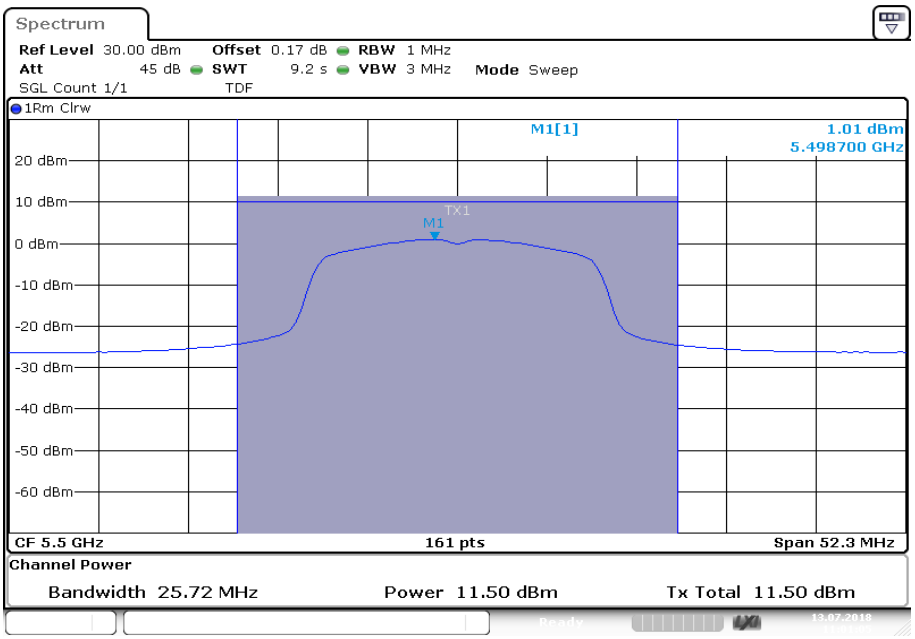

Date: 13.JUL.2018 10:22:21

**Plot 3:** U-NII-2A; highest channel



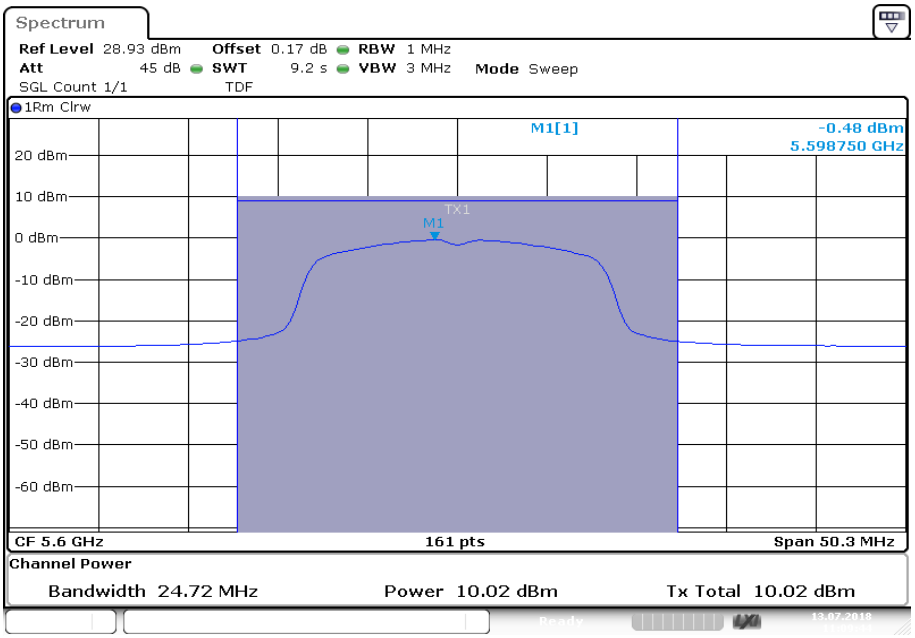

Date: 13.JUL.2018 10:30:10

**Plot 4:** U-NII-2C; lowest channel



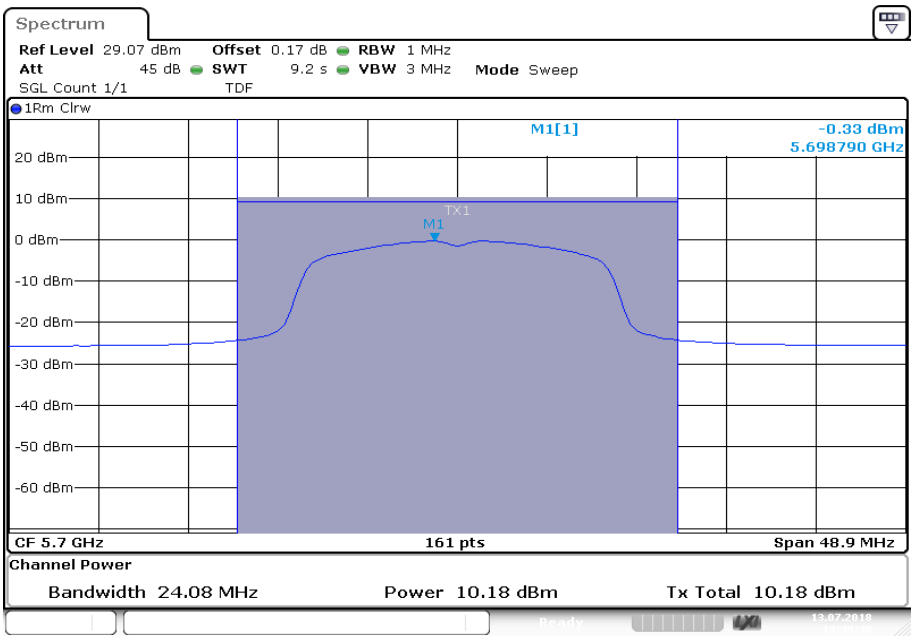

Date: 13.JUL.2018 11:01:05

**Plot 5:** U-NII-2C; middle channel




Date: 13.JUL.2018 11:09:45

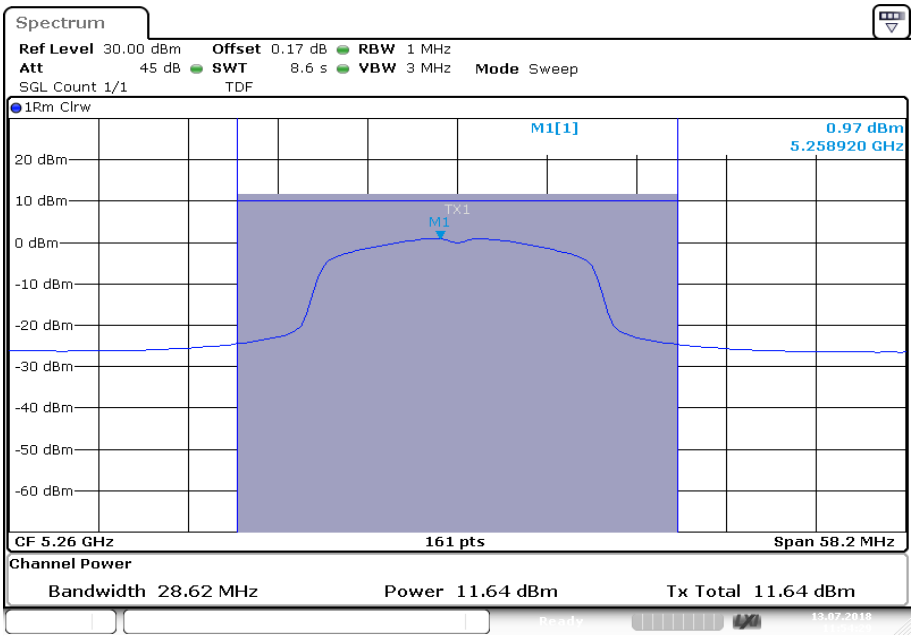
**Plot 6:** U-NII-2C; highest channel




Date: 13.JUL.2018 13:49:50

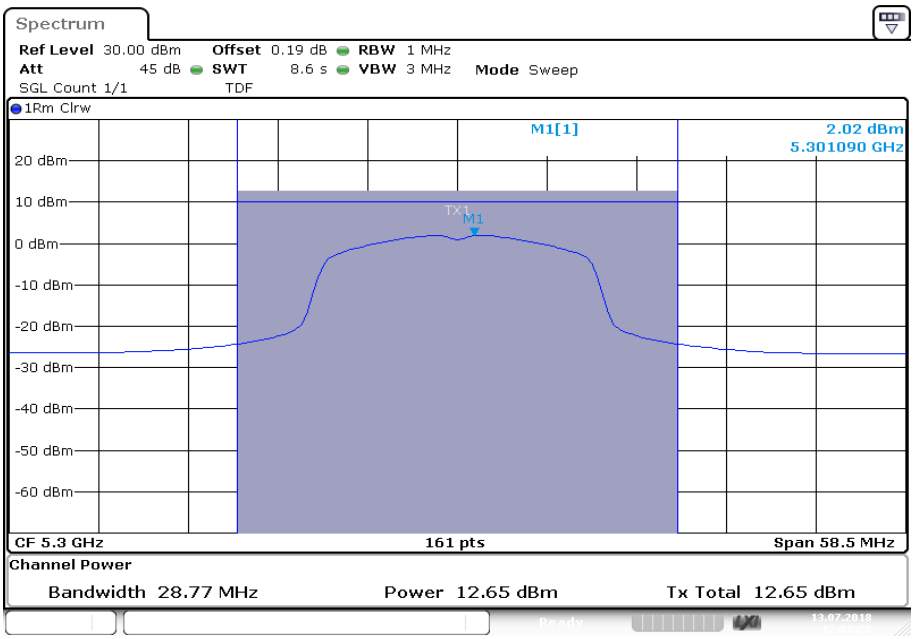
**Plots:** n/ac HT20 – mode

**Plot 1:** U-NII-2A; lowest channel



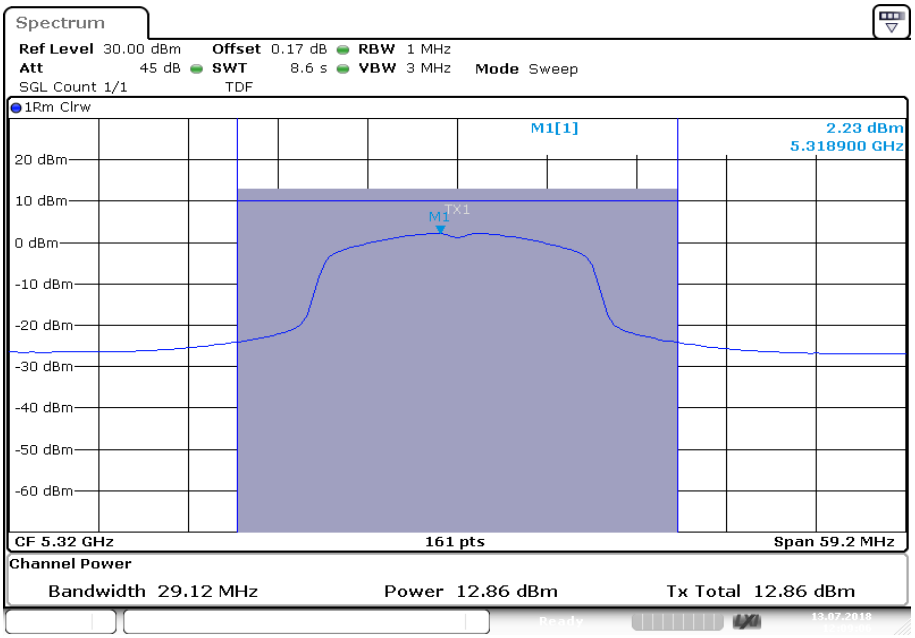

Date: 13.JUL.2018 11:54:30

**Plot 2:** U-NII-2A; middle channel



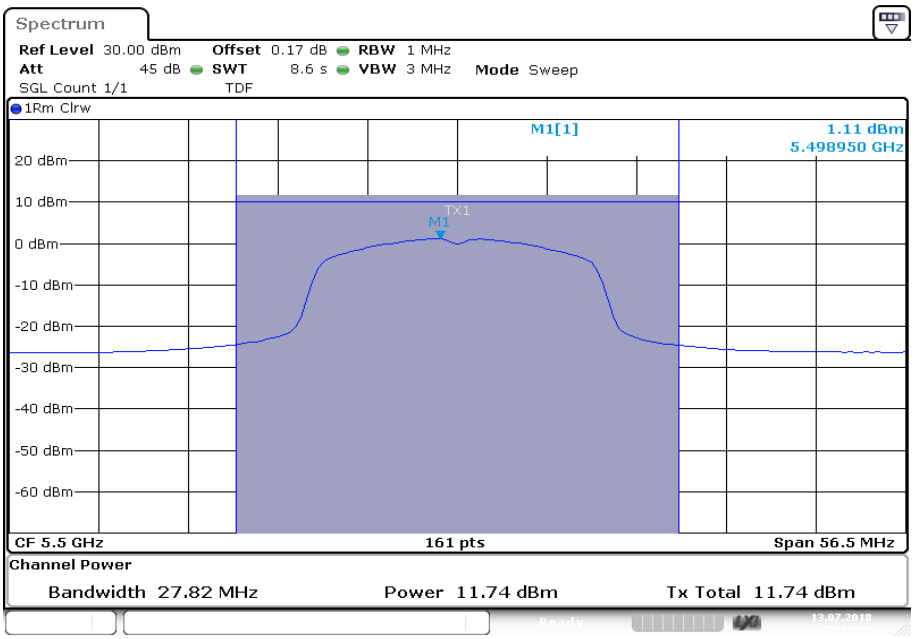

Date: 13.JUL.2018 12:02:27

**Plot 3:** U-NII-2A; highest channel



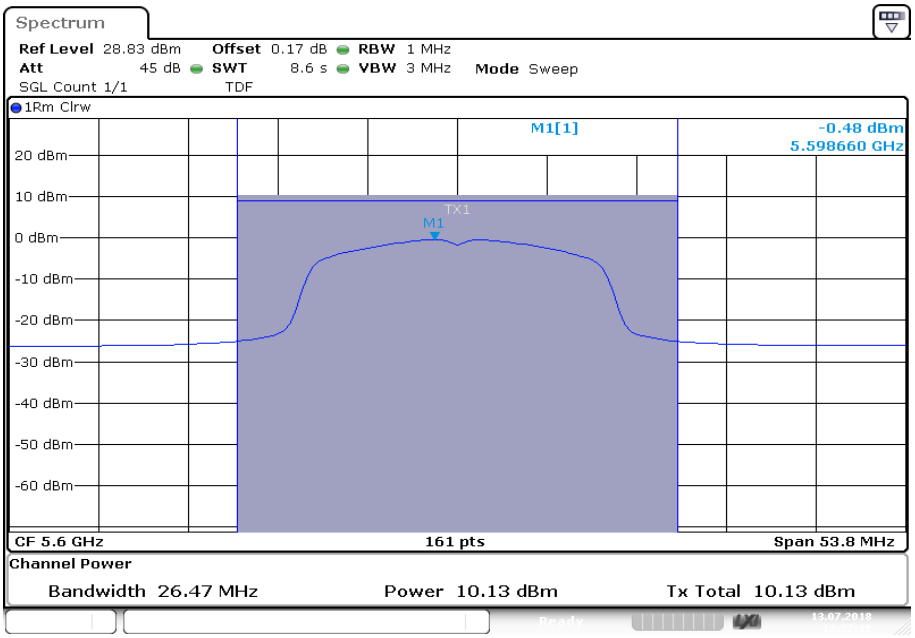

Date: 13.JUL.2018 12:09:06

**Plot 4:** U-NII-2C; lowest channel



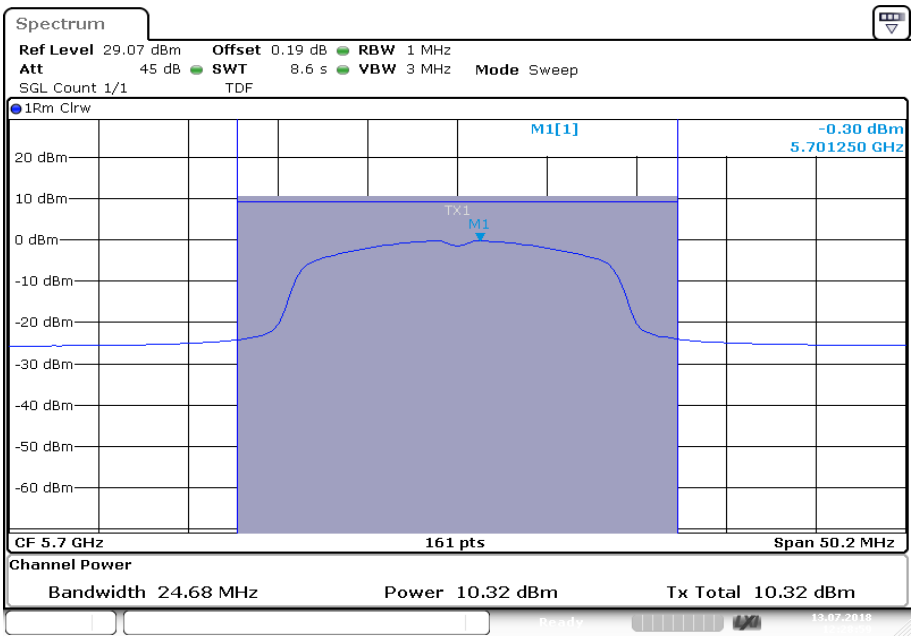

Date: 13.JUL.2018 12:15:36

**Plot 5:** U-NII-2C; middle channel




Date: 13.JUL.2018 12:22:19

**Plot 6:** U-NII-2C; highest channel




Date: 13.JUL.2018 12:29:00

## 11.4.2 Maximum output power according to IC requirements

**Description:**

Measurement of the maximum output power conduced + radiated

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | RMS |
| Sweep time: | ≥10*(swp points)*(total on/off time) |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | ≥ 3 MHz |
| Span: | > EBW |
| Trace mode: | Max hold |
| Analyzer function | Band power / channel power<br>Interval > 99% OBW |
| Used test setup: | See chapter 6.4 – A |
| Measurement uncertainty: | See chapter 8 |

**Limits:**

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

**Results:**

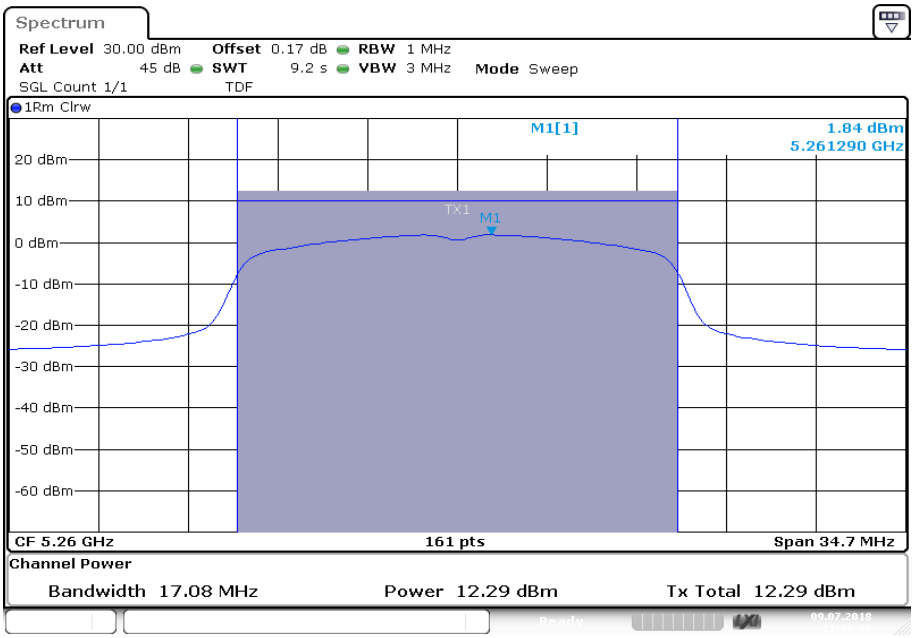
| | | | |
|---|---|---|---|
| | **Maximum output power [dBm]** | | |
| | **U-NII-1 (5150 MHz to 5250 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | -/- | -/- | -/- |
| | Radiated (calculated – see chapter antenna gain) | | |
| | -/- | -/- | -/- |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | 12.3 | 12.3 | 12.5 |
| | Radiated (calculated – see chapter antenna gain) | | |
| **a** | 17.6 | 17.6 | 17.8 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | 12.7 | 10.7 | 10.8 |
| | Radiated (calculated – see chapter antenna gain) | | |
| | 18.0 | 16.0 | 16.1 |
| | **U-NII-3 (5725 MHz to 5850 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | -/- | -/- | -/- |
| | Radiated (calculated – see chapter antenna gain) | | |
| | -/- | -/- | -/- |

**Results:**

| | | | |
|---|---|---|---|
| | **Maximum output power [dBm]** | | |
| | **U-NII-1 (5150 MHz to 5250 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | -/- | -/- | -/- |
| | Radiated (calculated – see chapter antenna gain) | | |
| | -/- | -/- | -/- |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | 12.5 | 12.6 | 12.7 |
| | Radiated (calculated – see chapter antenna gain) | | |
| **n/ac HT20** | 17.8 | 17.9 | 18.0 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | 12.7 | 10.8 | 11.0 |
| | Radiated (calculated – see chapter antenna gain) | | |
| | 18.0 | 16.1 | 16.3 |
| | **U-NII-3 (5725 MHz to 5850 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | -/- | -/- | -/- |
| | Radiated (calculated – see chapter antenna gain) | | |
| | -/- | -/- | -/- |

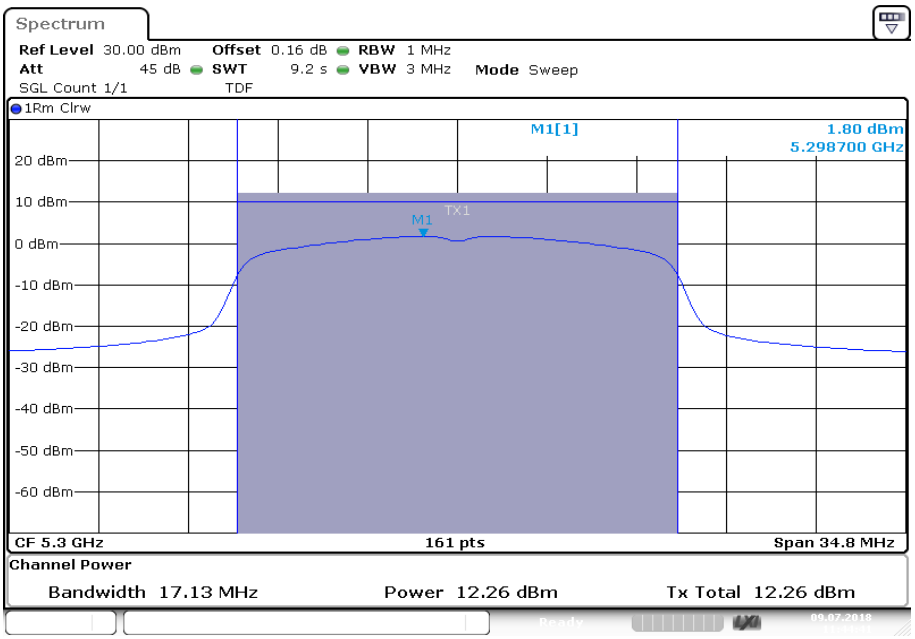
**Plots:** a – mode

**Plot 1:** U-NII-2A; lowest channel



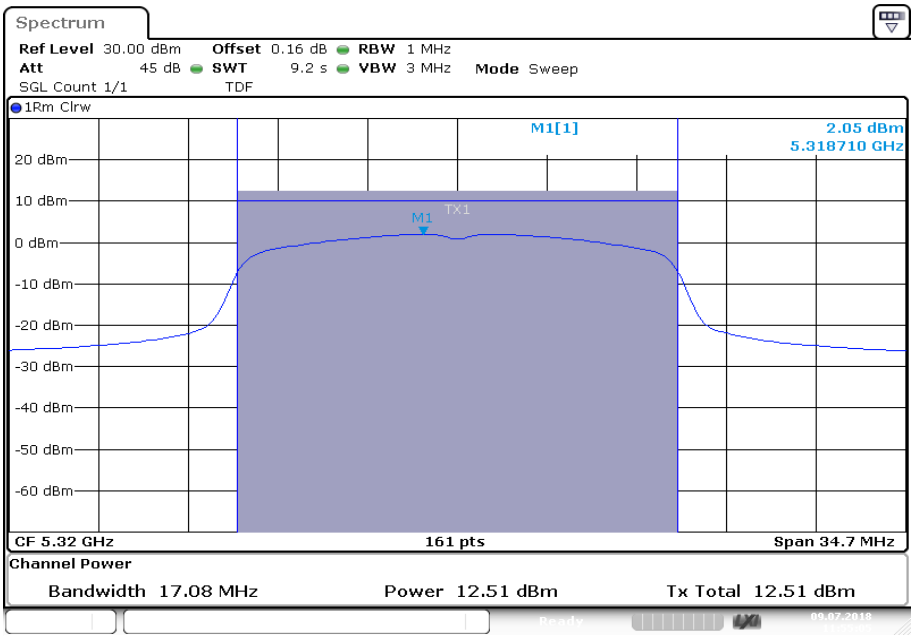

Date: 9.JUL.2018 11:30:01

**Plot 2:** U-NII-2A; middle channel



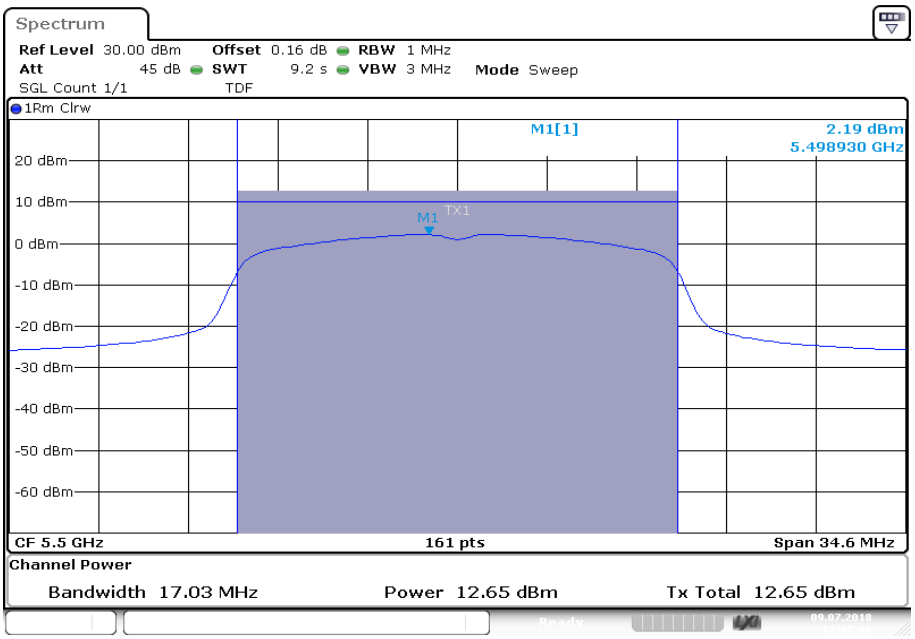

Date: 9.JUL.2018 11:44:42

**Plot 3:** U-NII-2A; highest channel



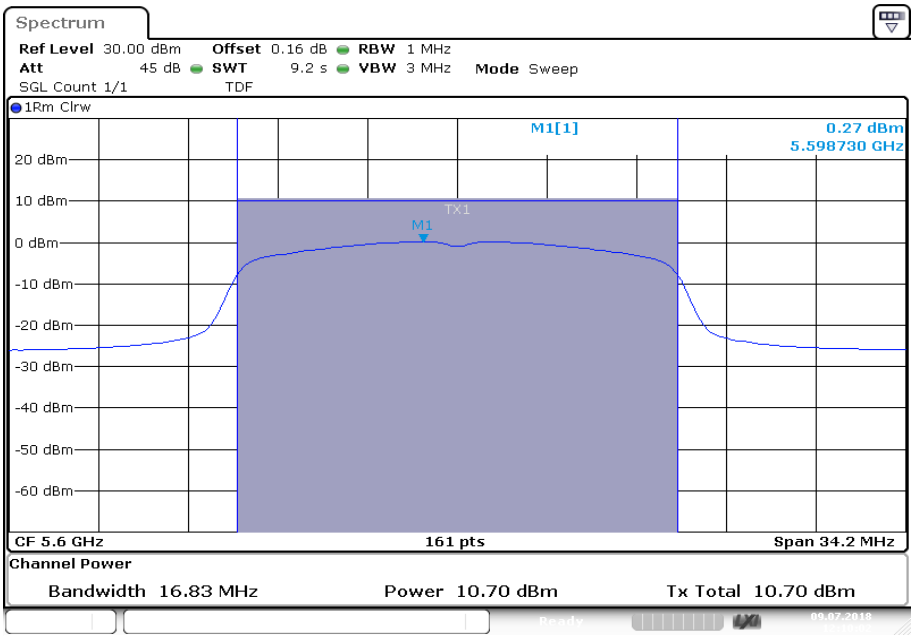

Date: 9.JUL.2018 11:55:06

**Plot 4:** U-NII-2C; lowest channel



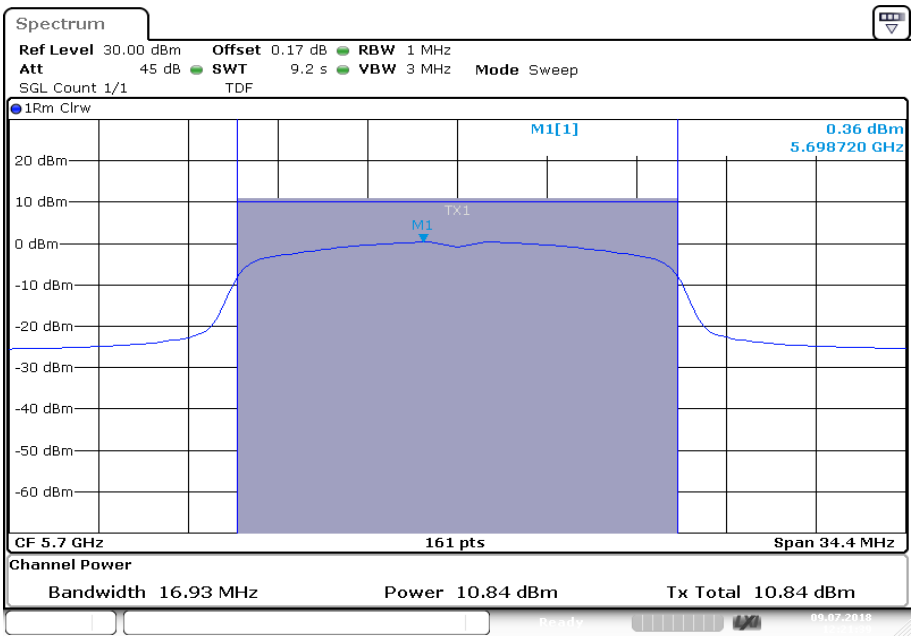

Date: 9.JUL.2018 12:02:37

**Plot 5:** U-NII-2C; middle channel




Date: 9.JUL.2018 12:10:03

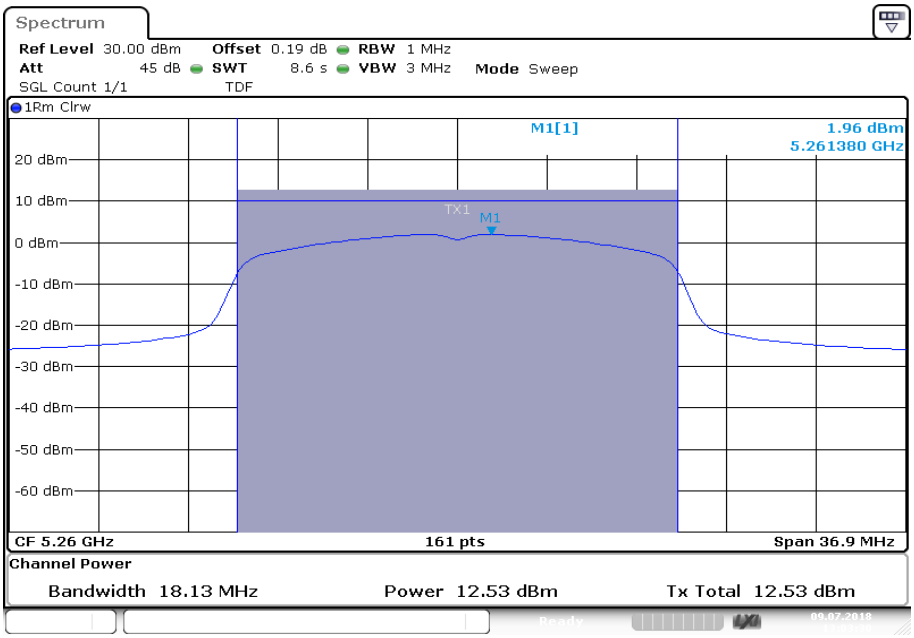
**Plot 6:** U-NII-2C; highest channel




Date: 9.JUL.2018 12:21:39

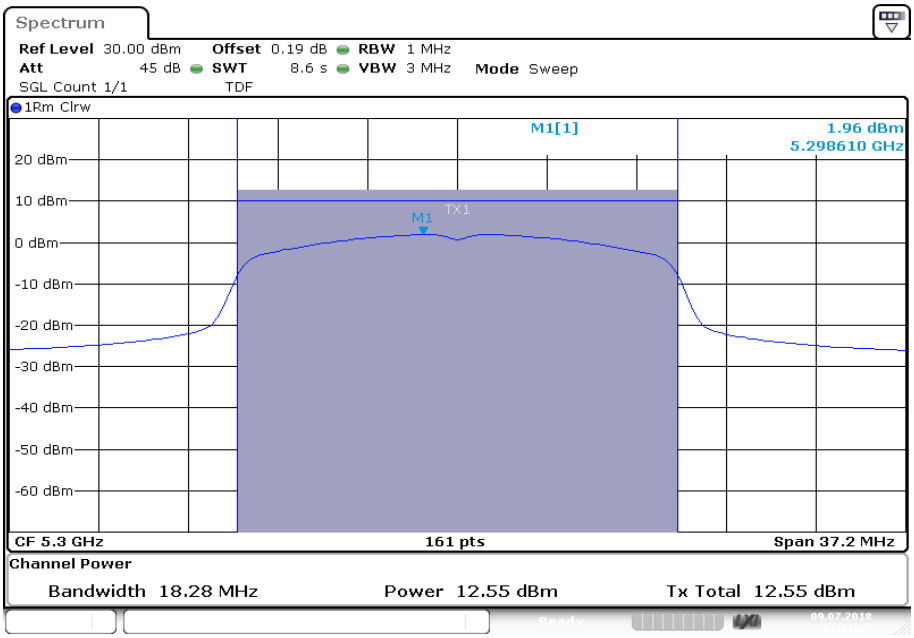
**Plots:** n/ac HT20 – mode

**Plot 1:** U-NII-2A; lowest channel



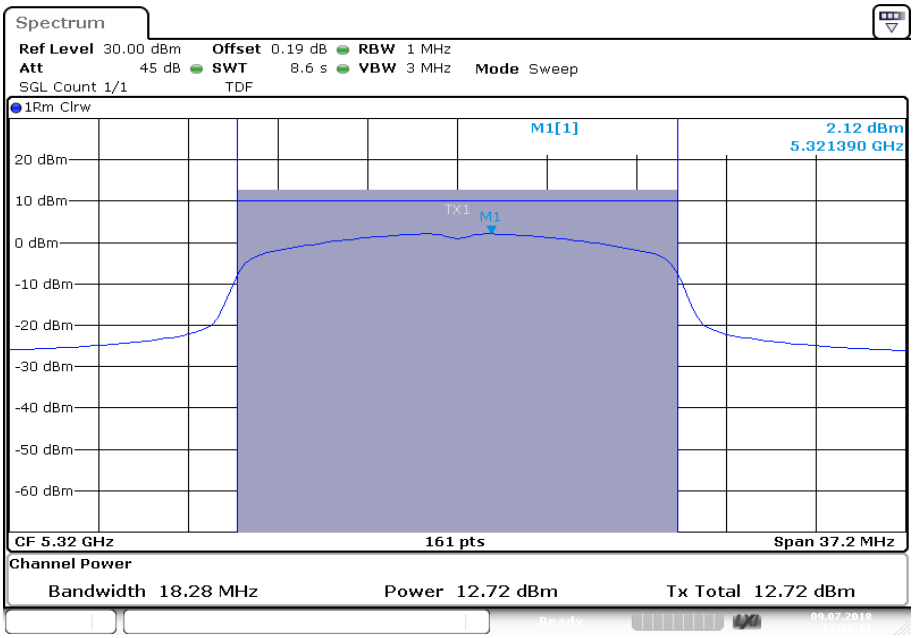

Date: 9.JUL.2018 13:03:30

**Plot 2:** U-NII-2A; middle channel



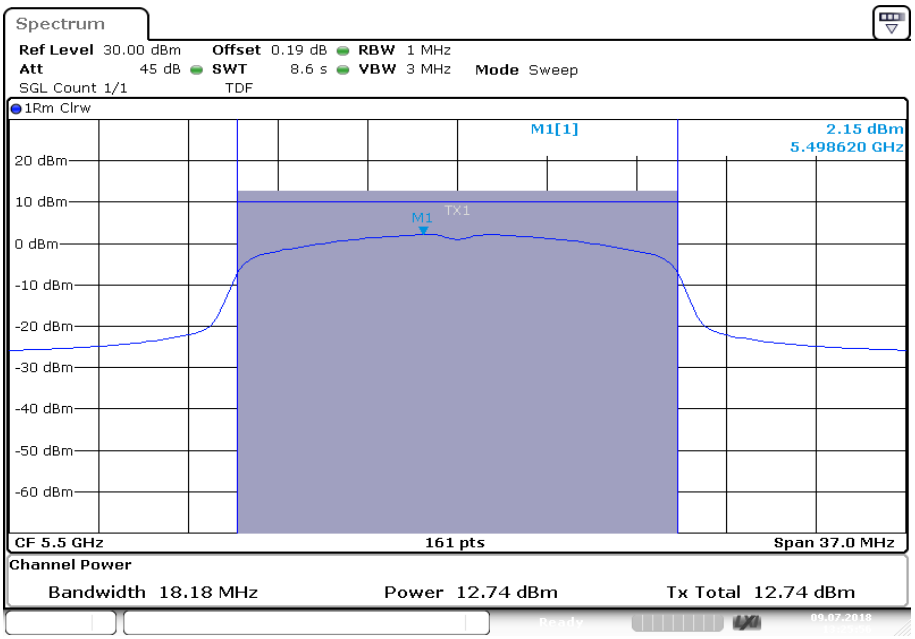

Date: 9.JUL.2018 13:11:04

**Plot 3:** U-NII-2A; highest channel



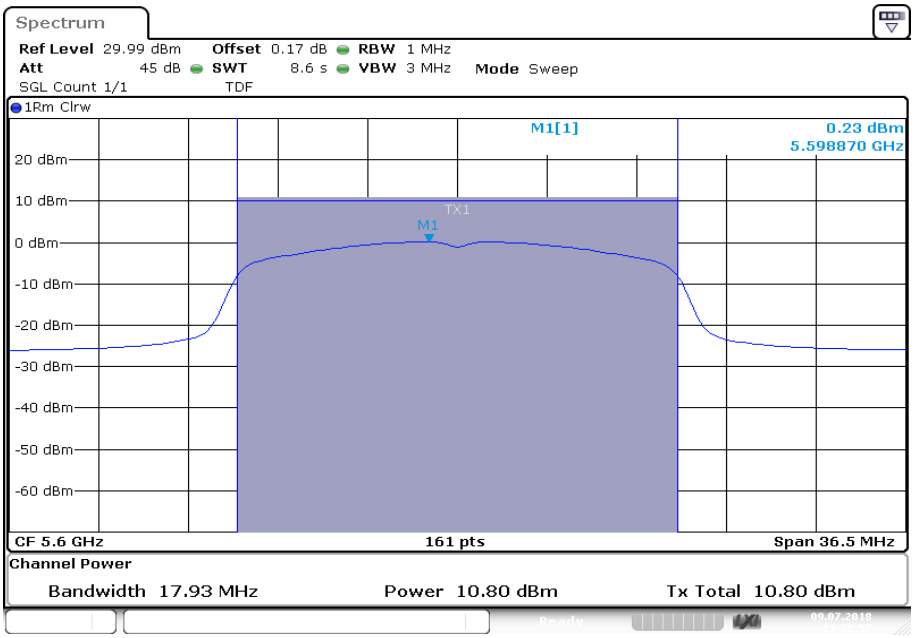

Date: 9.JUL.2018 13:18:12

**Plot 4:** U-NII-2C; lowest channel



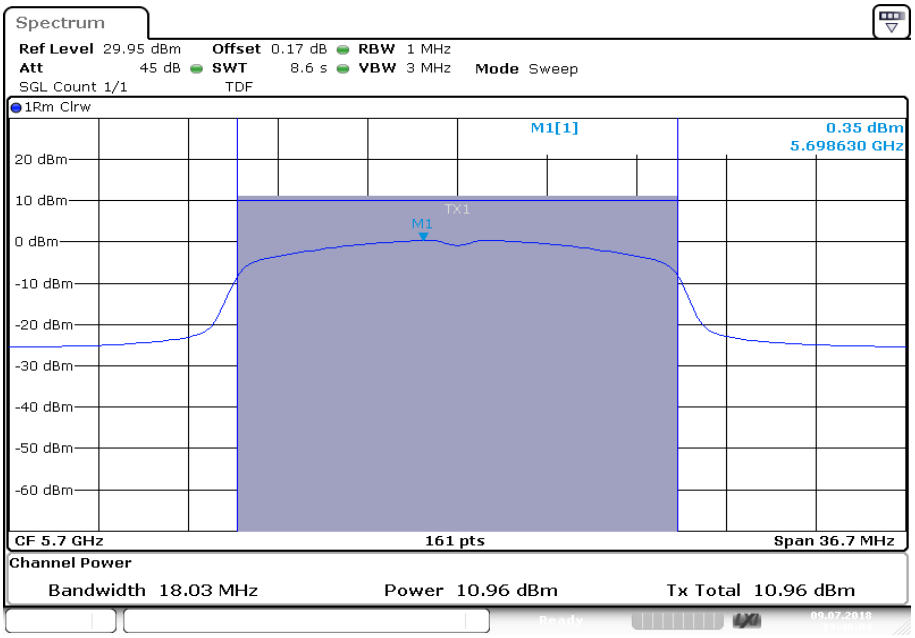

Date: 9.JUL.2018 13:25:57

**Plot 5:** U-NII-2C; middle channel




Date: 9.JUL.2018 13:32:58

**Plot 6:** U-NII-2C; highest channel




Date: 9.JUL.2018 13:40:04

## 11.5 Power spectral density

### 11.5.1 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.** | |
| Detector: | RMS |
| Sweep time: | ≥10*(swp points)*(total on/off time) |
| Resolution bandwidth: | 1 MHz for U-NII-1/2A & 2C<br>500 kHz for U-NII-3 |
| Video bandwidth: | ≥ 3xRBW |
| Span: | > EBW |
| Trace mode: | Max hold |
| Used test setup: | See chapter 6.4 – A |
| Measurement uncertainty: | See chapter 8 |

**Limits:**

| Power Spectral Density |
|---|
| power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5250 – 5350 MHz)<br>power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5470 – 5725 MHz) |

**Results:**

| | Power spectral density (dBm/1MHz or dBm/500kHz) | | |
|---|---|---|---|
| | U-NII-1 (5150 MHz to 5250 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | U-NII-2A (5250 MHz to 5350 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| a | 1.1 | 2.1 | 2.3 |
| | U-NII-2C (5470 MHz to 5725 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | 1.1 | -0.5 | -0.3 |
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |

**Results:**

| | Power spectral density (dBm/1MHz or dBm/500kHz) | | |
|---|---|---|---|
| | U-NII-1 (5150 MHz to 5250 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | U-NII-2A (5250 MHz to 5350 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| n/ac HT20 | 1.0 | 2.0 | 2.2 |
| | U-NII-2C (5470 MHz to 5725 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | 1.1 | -0.5 | -0.3 |
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |

## 11.5.2 Power spectral density according to IC requirements

**Description:**

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

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | RMS |
| Sweep time: | ≥10*(swp points)*(total on/off time) |
| Resolution bandwidth: | 1 MHz for U-NII-1/2A & 2C<br>500 kHz for U-NII-3 |
| Video bandwidth: | ≥ 3xRBW |
| Span: | > EBW |
| Trace mode: | Max hold |
| Used test setup: | See chapter 6.4 – A |
| Measurement uncertainty: | See chapter 8 |

**Limits:**

| Power Spectral Density |
|---|
| power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5250 – 5350 MHz)<br>power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5470 – 5725 MHz) |

**Results:**

| | | | |
|---|---|---|---|
| **a** | **Power spectral density (dBm/1MHz or dBm/500kHz)** | | |
| | U-NII-1 (5150 MHz to 5250 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | -/- | -/- | -/- |
| | Radiated (calculated – see chapter antenna gain) | | |
| | -/- | -/- | -/- |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 1.8 | 1.8 | 2.1 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 2.2 | 0.3 | 0.4 |
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |

**Results:**

| | | | |
|---|---|---|---|
| **n/ac HT20** | **Power spectral density (dBm/1MHz or dBm/500kHz)** | | |
| | U-NII-1 (5150 MHz to 5250 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | Conducted | | |
| | -/- | -/- | -/- |
| | Radiated (calculated – see chapter antenna gain) | | |
| | -/- | -/- | -/- |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 2.0 | 2.0 | 2.1 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 2.2 | 0.2 | 0.4 |
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |

## 11.6 Spectrum bandwidth / 26 dB bandwidth

**Description:**

Measurement of the 26 dB bandwidth of the modulated signal.

**Measurement:**

| Measurement parameter | |
|---|---|
| **According to: KDB789033 D02, C.1.** | |
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 1% EBW |
| Video bandwidth: | ≥ RBW |
| Span: | > Complete signal |
| Trace mode: | Max hold |
| Used test setup: | see chapter 6.4 – A |
| Measurement uncertainty: | see chapter 8 |

**Limits:**

| Spectrum Bandwidth – 26 dB Bandwidth |
|---|
| **IC:** Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.<br><br>**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:**

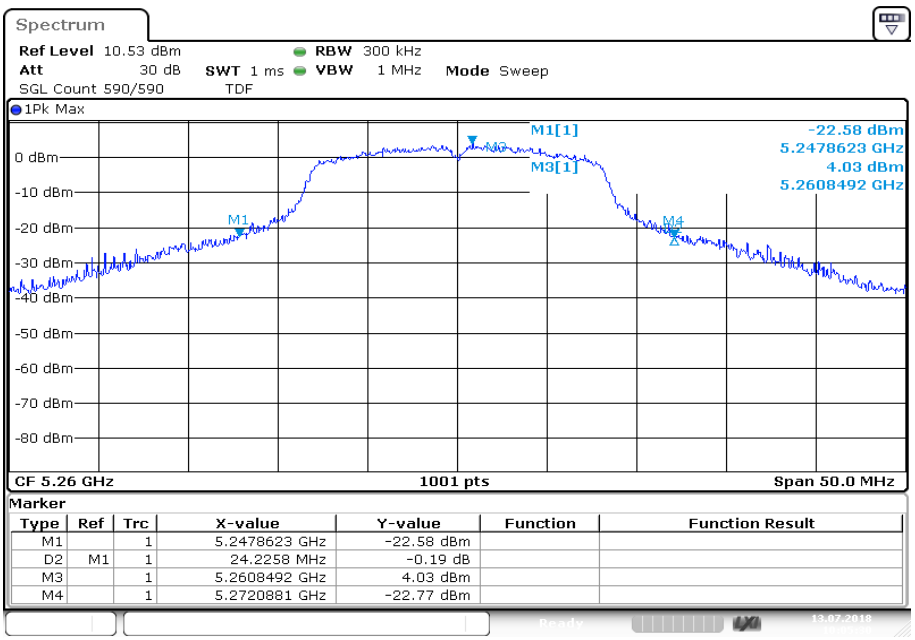
| | | | |
|---|---|---|---|
| **a** | **26 dB bandwidth (MHz)** | | |
| | U-NII-1 (5150 MHz to 5250 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | Lowest frequency | Highest frequency | |
| | -/- | -/- | |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 24.2 | 26.5 | 28.4 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 25.7 | 24.7 | 24.1 |
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | Lowest frequency | Highest frequency | |
| | -/- | -/- | |

**Results:**

| | | | |
|---|---|---|---|
| **n/ac HT20** | **26 dB bandwidth (MHz)** | | |
| | U-NII-1 (5150 MHz to 5250 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | Lowest frequency | Highest frequency | |
| | -/- | -/- | |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 28.6 | 28.8 | 29.1 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 27.8 | 26.5 | 24.7 |
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | Lowest frequency | Highest frequency | |
| | -/- | -/- | |

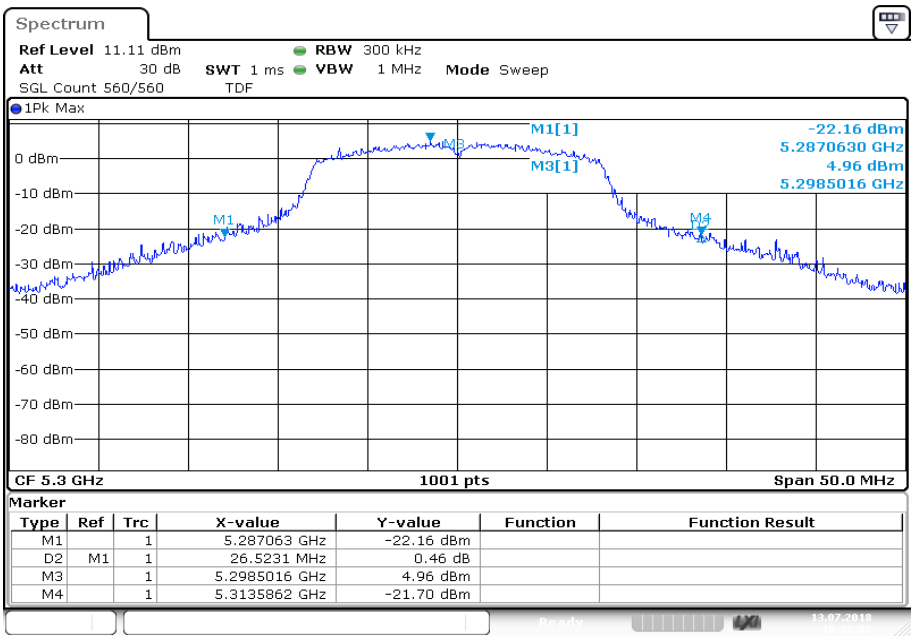
**Plots:** a – mode

**Plot 1:** U-NII-2A; lowest channel



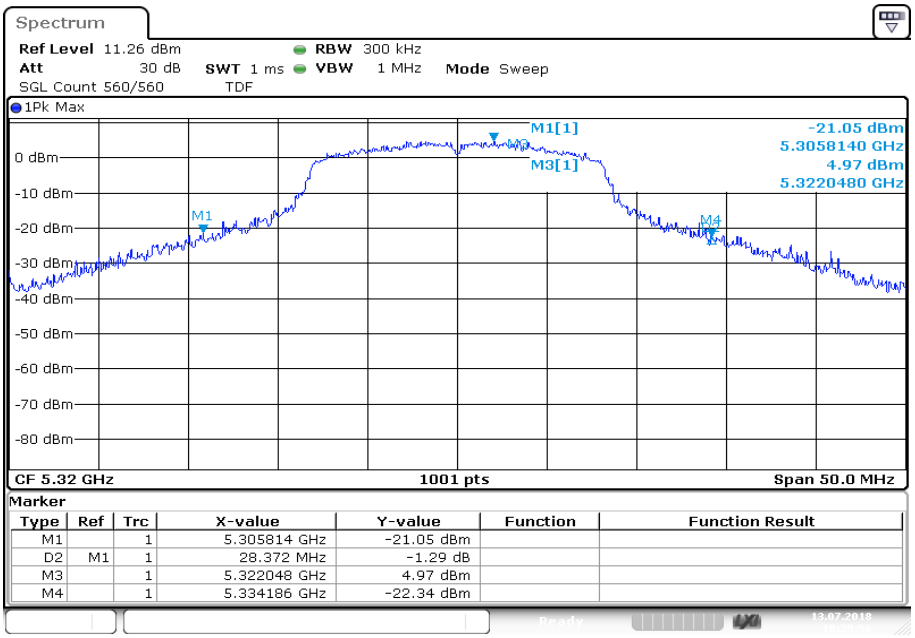

Date: 13.JUL.2018 10:05:30

**Plot 2:** U-NII-2A; middle channel



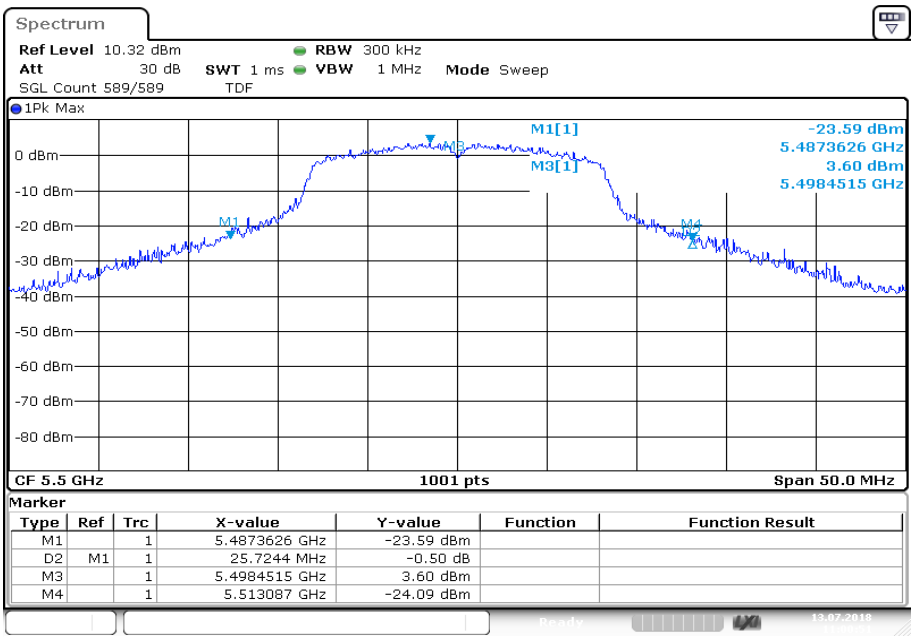

Date: 13.JUL.2018 10:22:07

**Plot 3:** U-NII-2A; highest channel



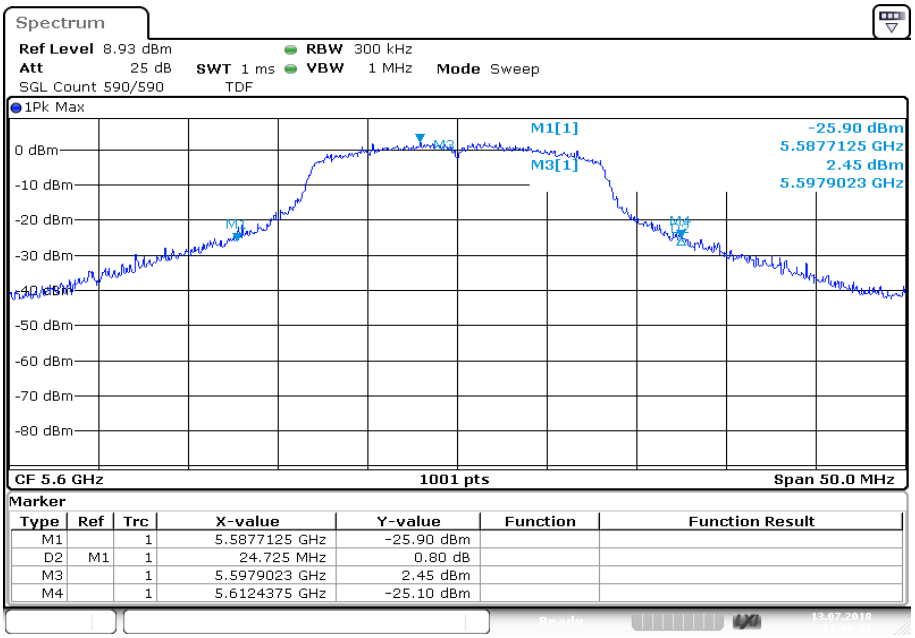

Date: 13.JUL.2018 10:29:56

**Plot 4:** U-NII-2C; lowest channel



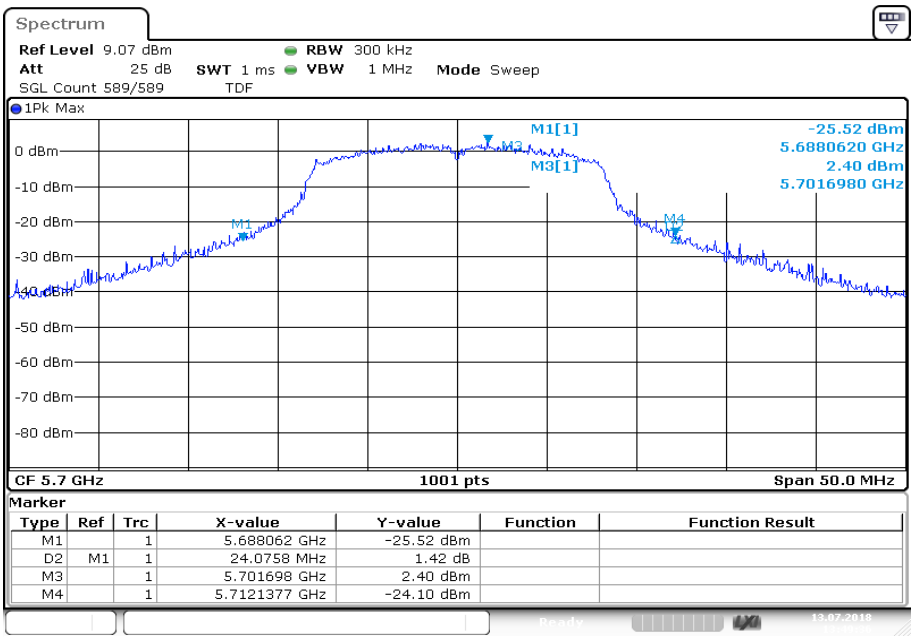

Date: 13.JUL.2018 11:00:52

**Plot 5:** U-NII-2C; middle channel




Date: 13.JUL.2018 11:09:31

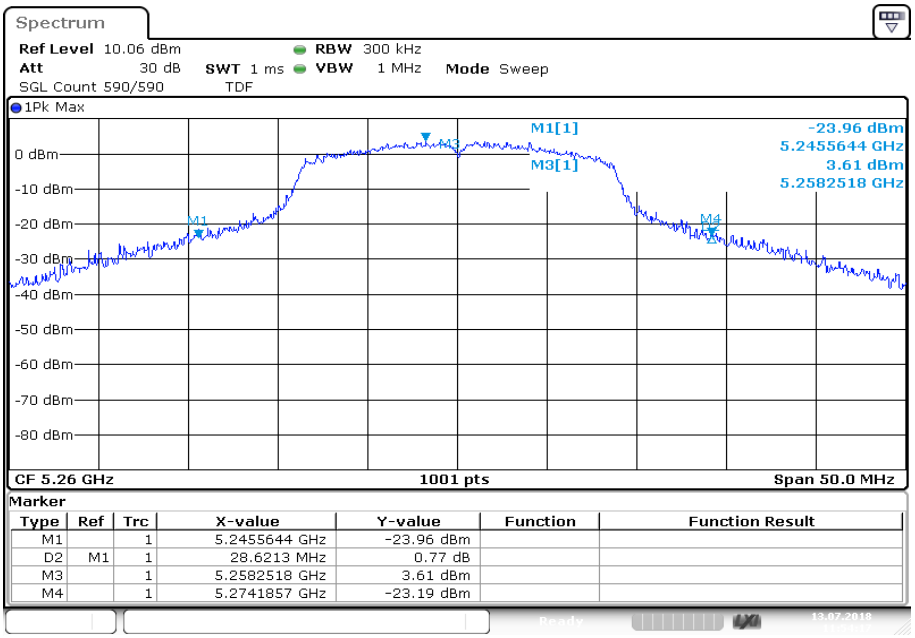
**Plot 6:** U-NII-2C; highest channel




Date: 13.JUL.2018 13:49:36

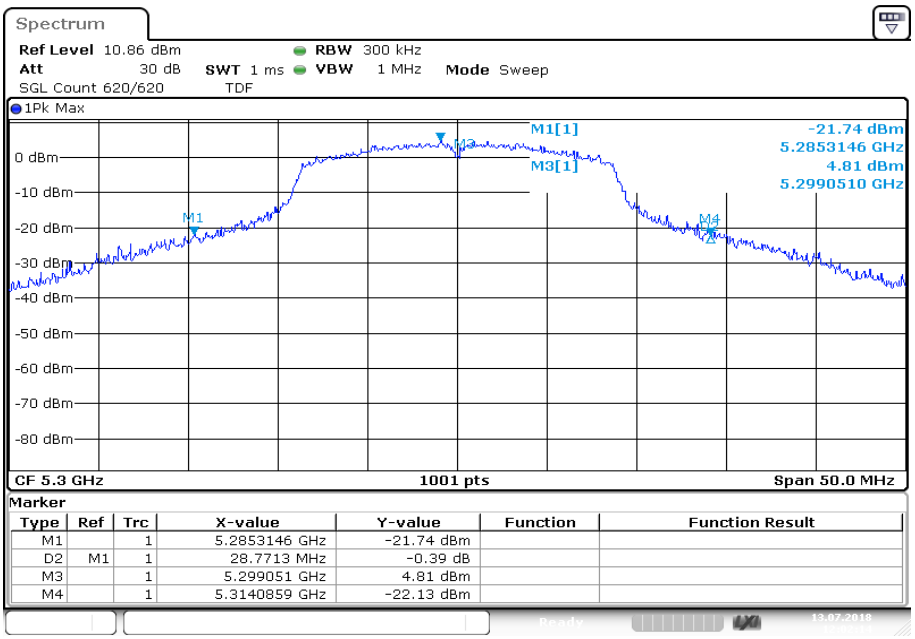
**Plots:** n/ac HT20 – mode

**Plot 1:** U-NII-2A; lowest channel



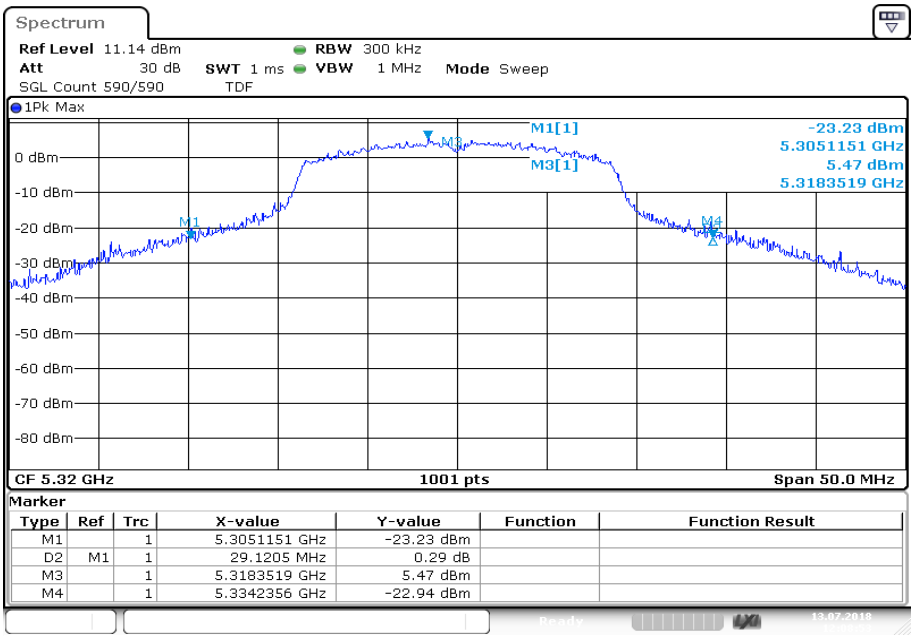

Date: 13.JUL.2018 11:54:17

**Plot 2:** U-NII-2A; middle channel



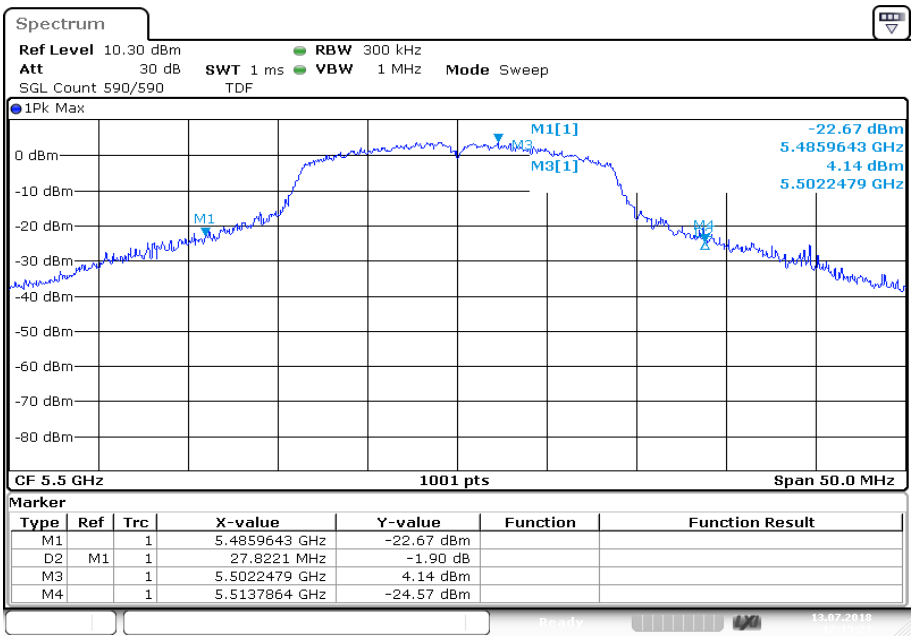

Date: 13.JUL.2018 12:02:15

**Plot 3:** U-NII-2A; highest channel



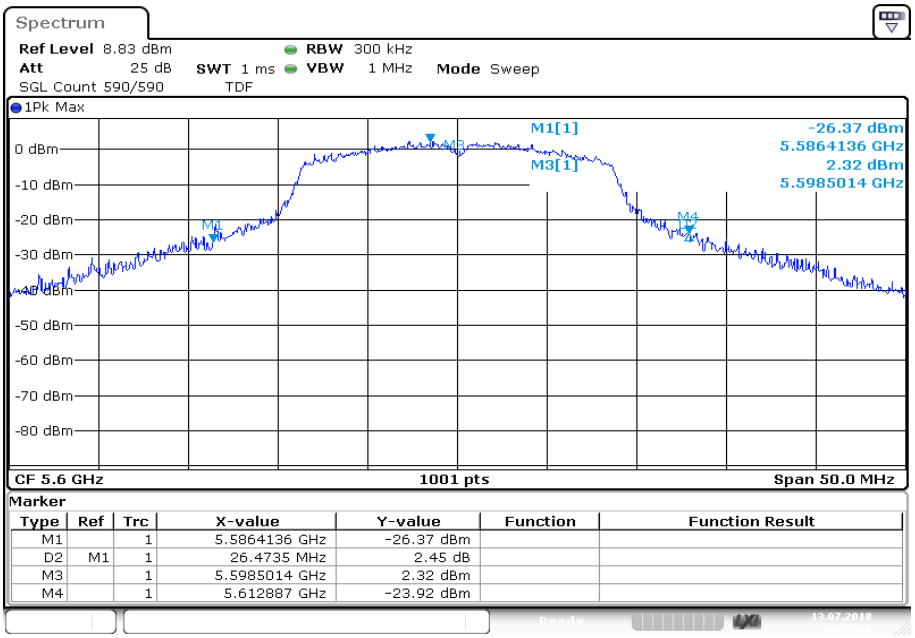

Date: 13.JUL.2018 12:08:53

**Plot 4:** U-NII-2C; lowest channel



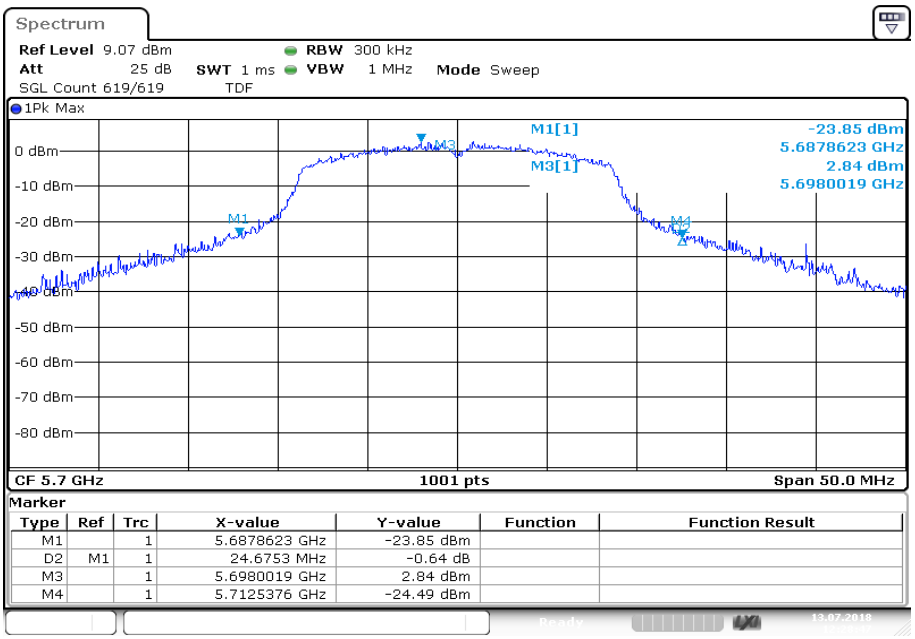

Date: 13.JUL.2018 12:15:23

**Plot 5:** U-NII-2C; middle channel




Date: 13.JUL.2018 12:22:06

**Plot 6:** U-NII-2C; highest channel




Date: 13.JUL.2018 12:28:48

## 11.7 Occupied bandwidth / 99% emission bandwidth

**Description:**

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

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 300 kHz / 500 kHz |
| Video bandwidth: | 1 MHz / 3 MHz |
| Span: | 50 MHz / 100 MHz |
| Measurement procedure: | Measurement of the 99% bandwidth using the integration function of the analyzer |
| Trace mode: | Max hold (allow trace to stabilize) |
| Test setup: | See sub clause 6.4 – A |
| Measurement uncertainty: | See sub clause 8 |

**Usage:**

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

**Results:**

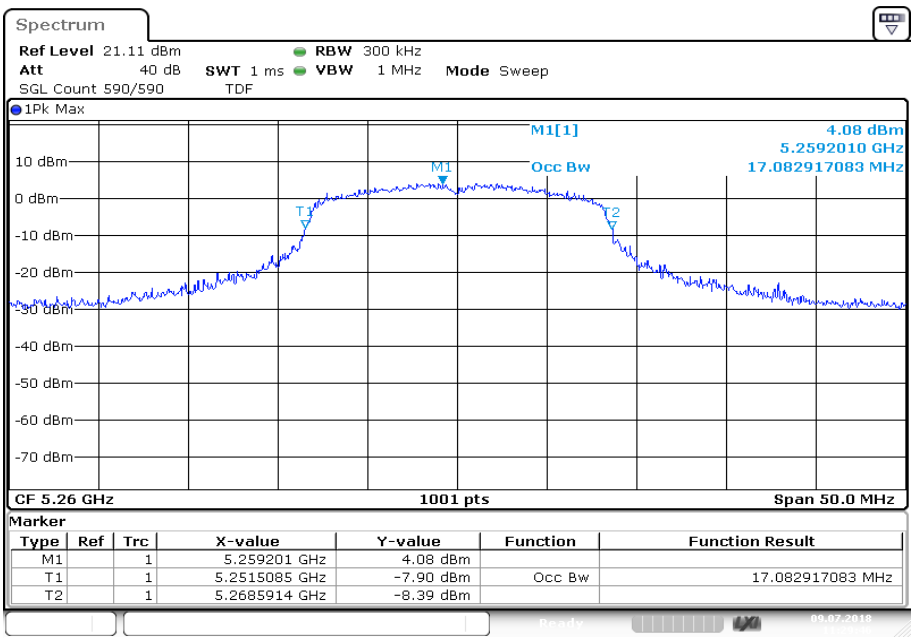
| | 99% bandwidth (kHz) | | |
|---|---|---|---|
| | U-NII-1 (5150 MHz to 5250 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| **a** | 17083 | 17133 | 17083 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 17033 | 16833 | 16933 |
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |

**Results:**

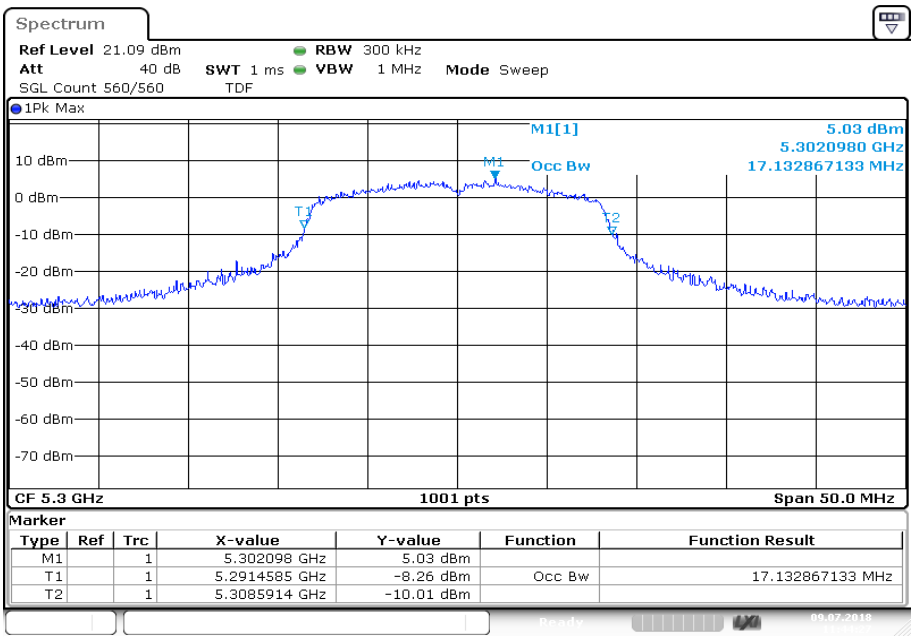
| | 99% bandwidth (kHz) | | |
|---|---|---|---|
| | U-NII-1 (5150 MHz to 5250 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |
| | **U-NII-2A (5250 MHz to 5350 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| **n/ac HT20** | 18132 | 18282 | 17083 |
| | **U-NII-2C (5470 MHz to 5725 MHz)** | | |
| | Lowest channel | Middle channel | Highest channel |
| | 17033 | 16833 | 16933 |
| | U-NII-3 (5725 MHz to 5850 MHz) | | |
| | Lowest channel | Middle channel | Highest channel |
| | -/- | -/- | -/- |

**Plots:** a – mode

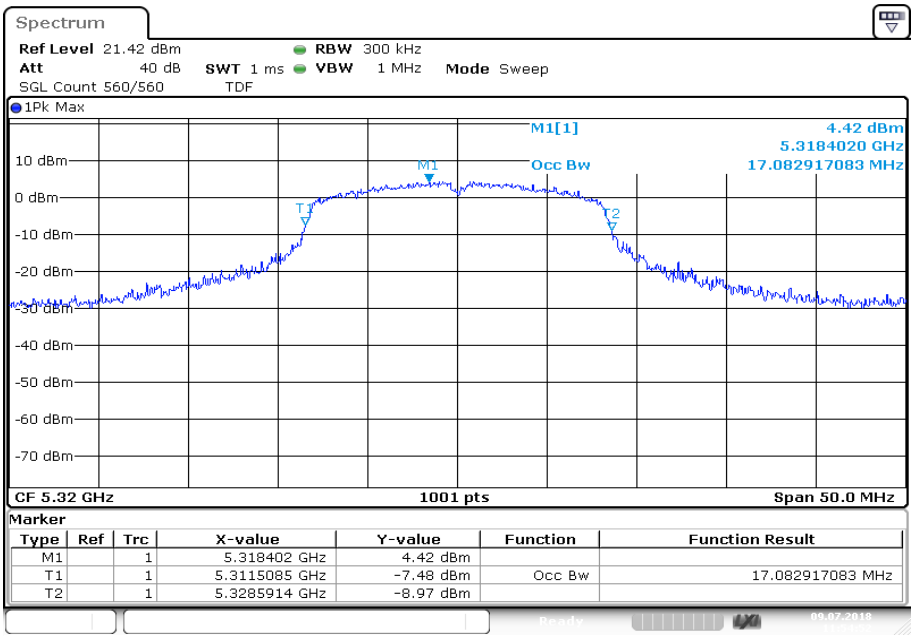
**Plot 1:** U-NII-2A; lowest channel




**Plot 2:** U-NII-2A; middle channel

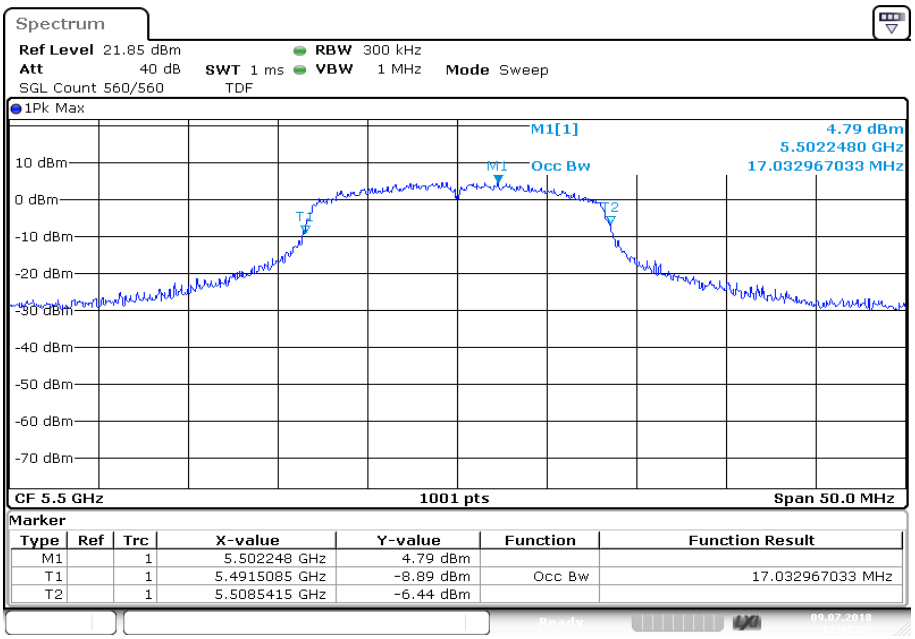


**Plot 3:** U-NII-2A; highest channel



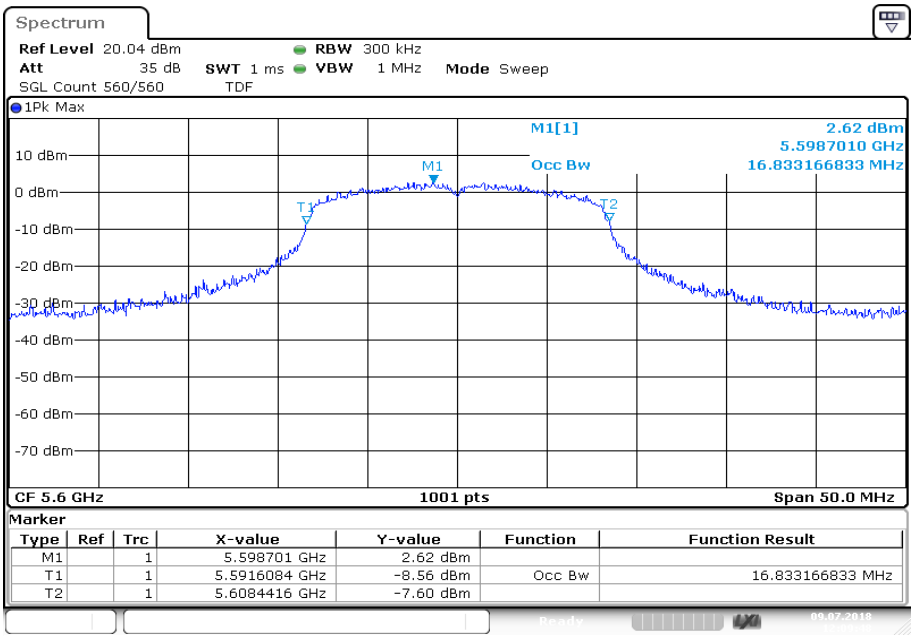

Date: 9.JUL.2018 11:54:52

**Plot 4:** U-NII-2C; lowest channel



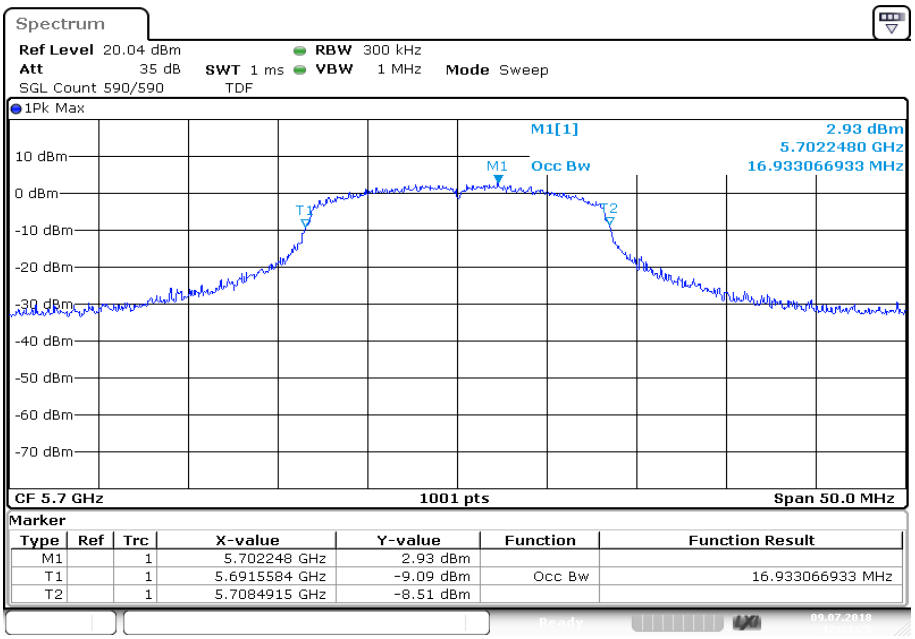

Date: 9.JUL.2018 12:02:23

**Plot 5:** U-NII-2C; middle channel




Date: 9.JUL.2018 12:09:49

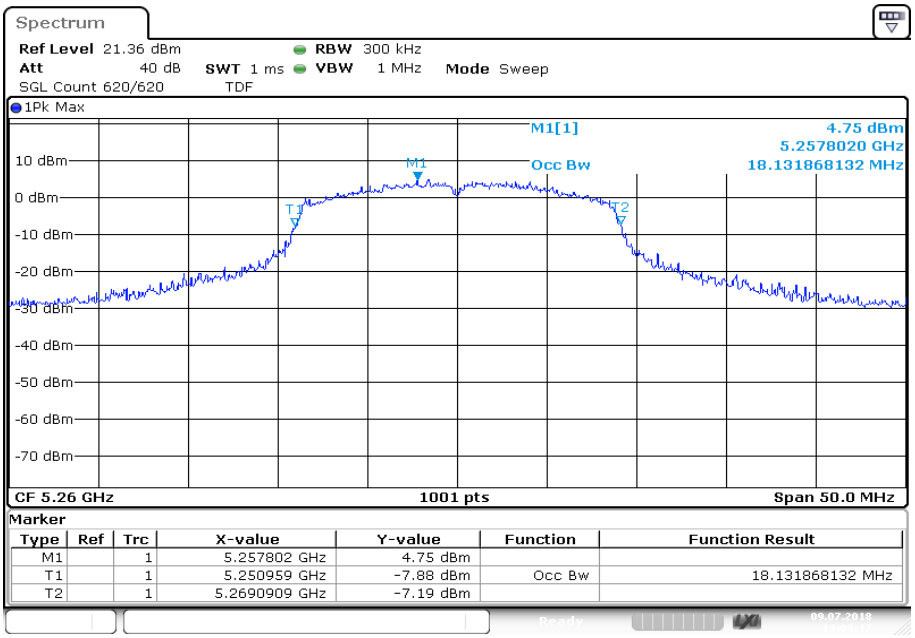
**Plot 6:** U-NII-2C; highest channel




Date: 9.JUL.2018 12:21:26

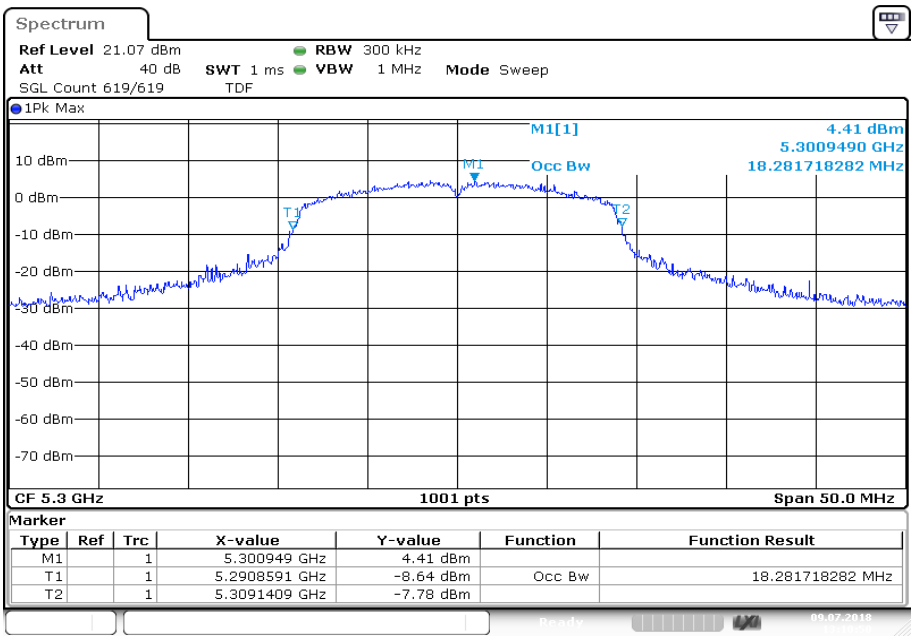
**Plots:** n/ac HT20 – mode

**Plot 1:** U-NII-2A; lowest channel



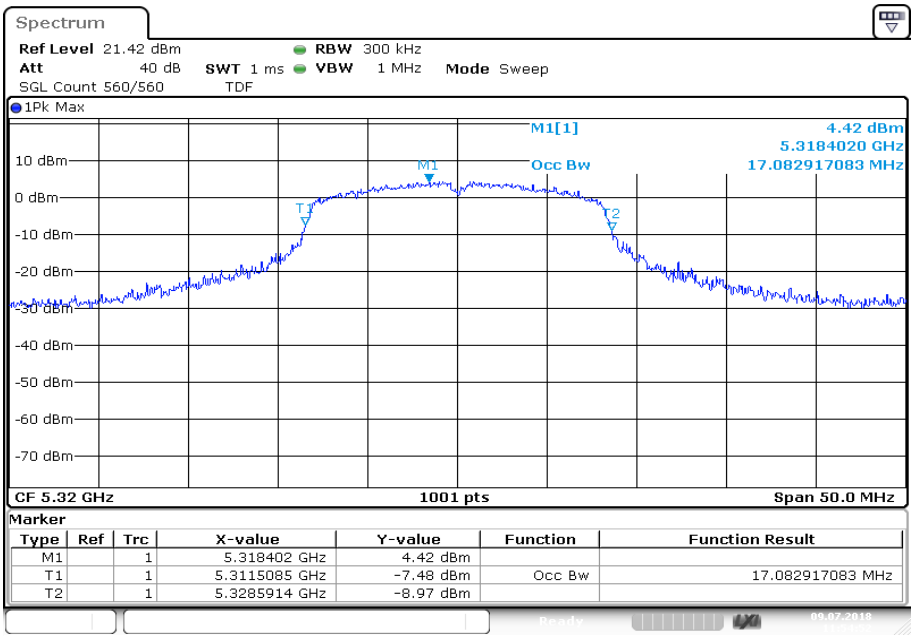

Date: 9.JUL.2018 13:03:17

**Plot 2:** U-NII-2A; middle channel



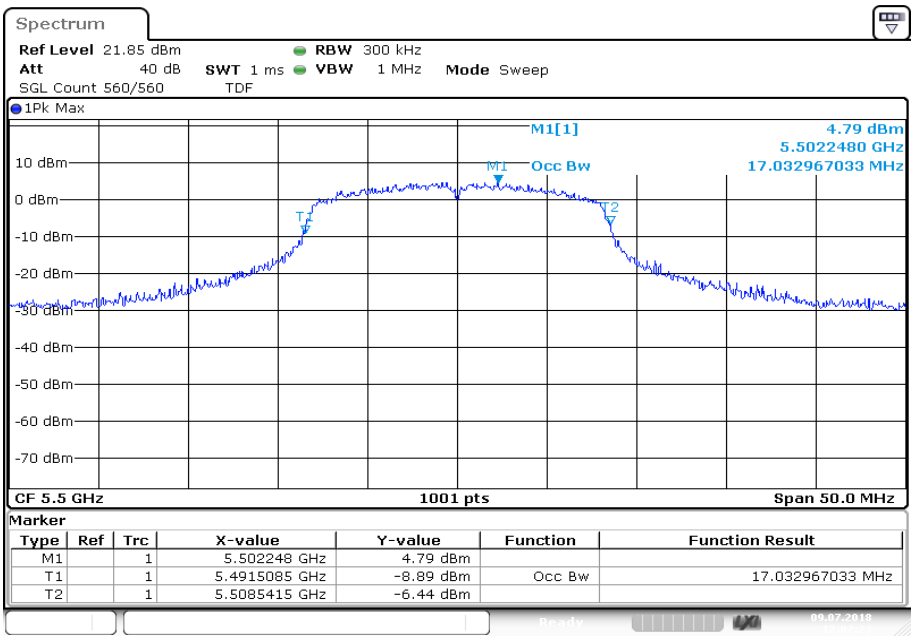

Date: 9.JUL.2018 13:10:51

**Plot 3:** U-NII-2A; highest channel



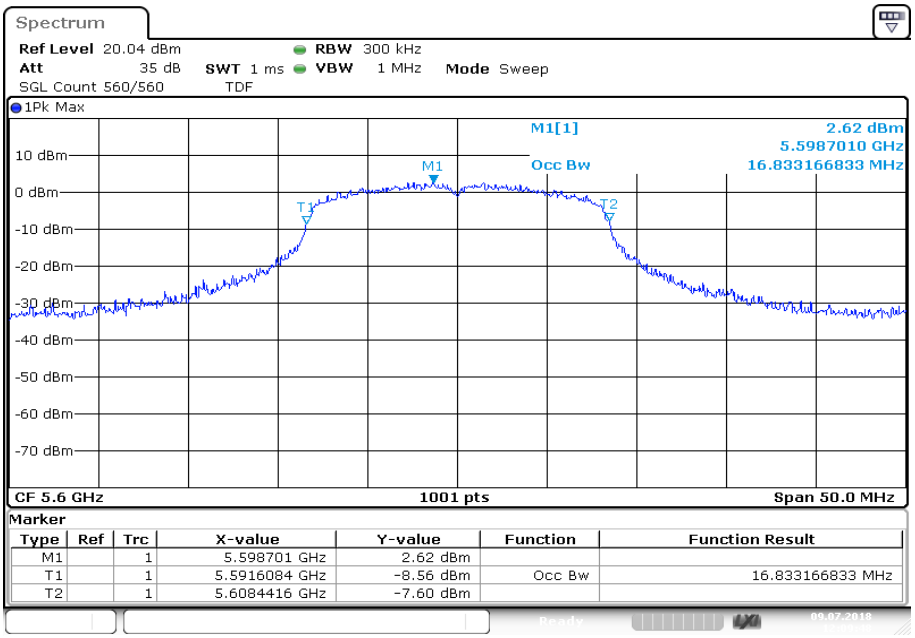

Date: 9.JUL.2018 11:54:52

**Plot 4:** U-NII-2C; lowest channel



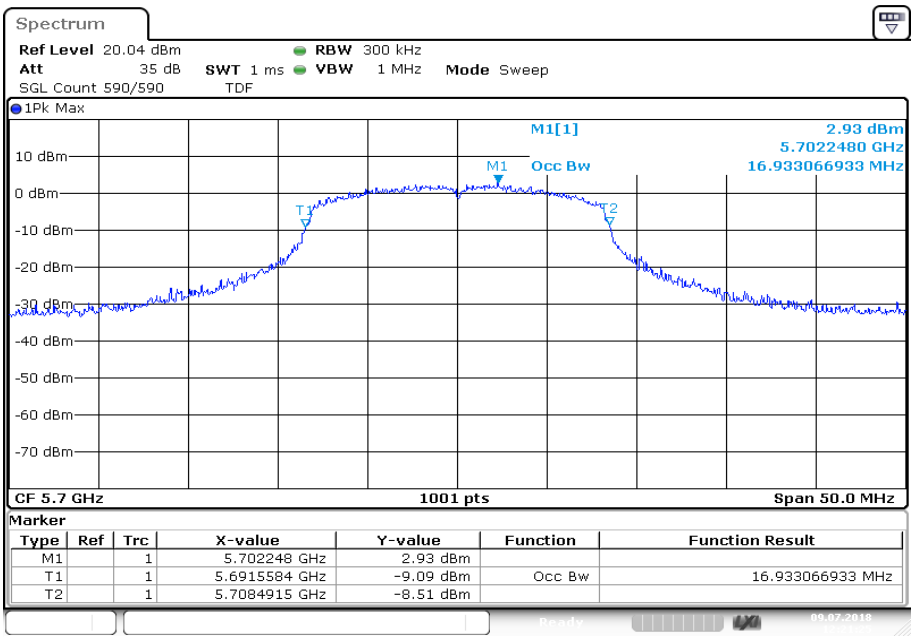

Date: 9.JUL.2018 12:02:23

**Plot 5:** U-NII-2C; middle channel




Date: 9.JUL.2018 12:09:49

**Plot 6:** U-NII-2C; highest channel




Date: 9.JUL.2018 12:21:26

## 11.8 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: | ≥ 3 x RBW |
| Span: | See plots! |
| Trace mode: | Max Hold |
| Test setup: | See sub clause 6.2 – A |
| Measurement uncertainty: | See sub clause 8 |

**Limits:**

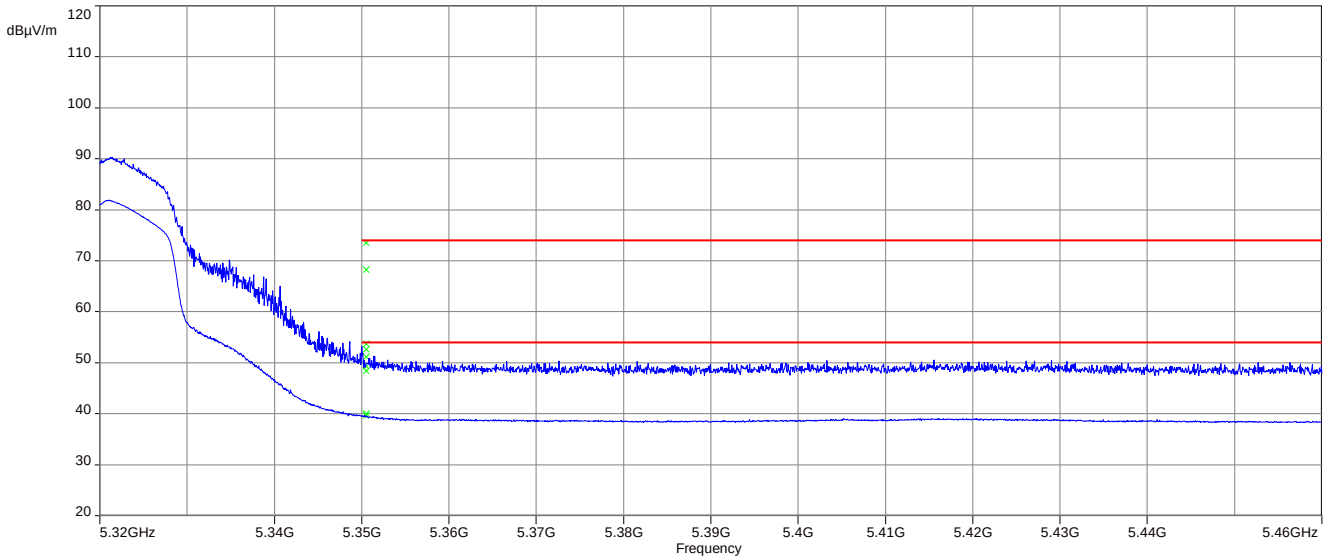
| Band Edge Compliance Radiated |
|---|
| In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz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

**Result:**

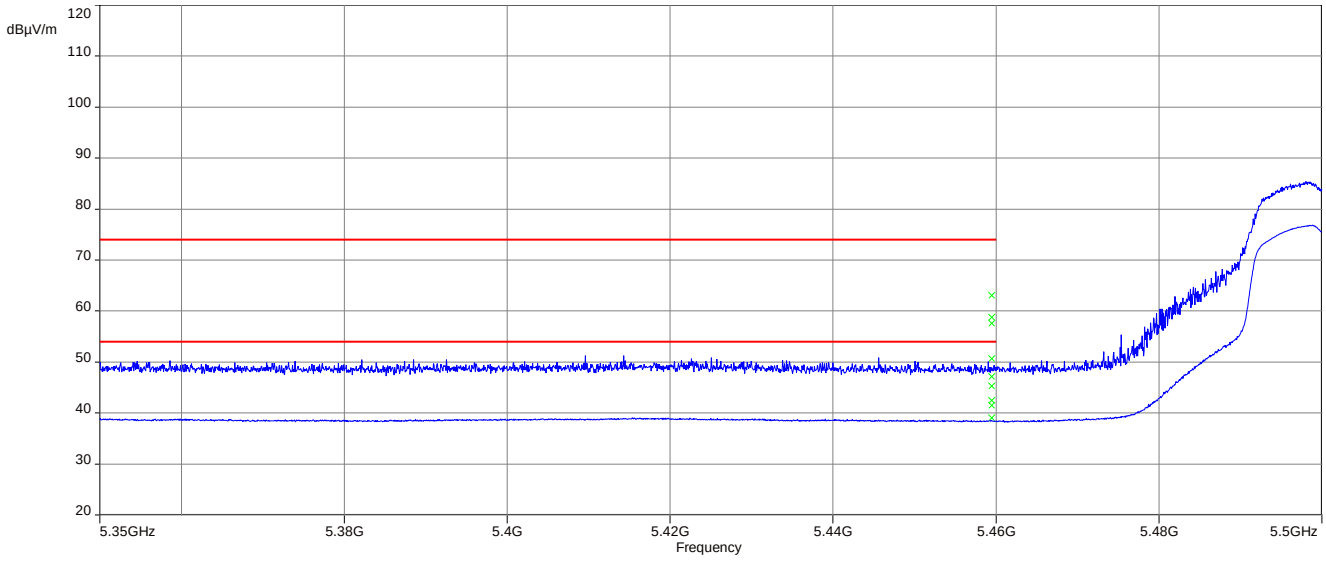
| Scenario | Band Edge Compliance Radiated [dBµV/m] |
|---|---|
| band edge | < 74 dBµV/m (peak)<br>< 54 dBµV/m (average) |

**Plots:**

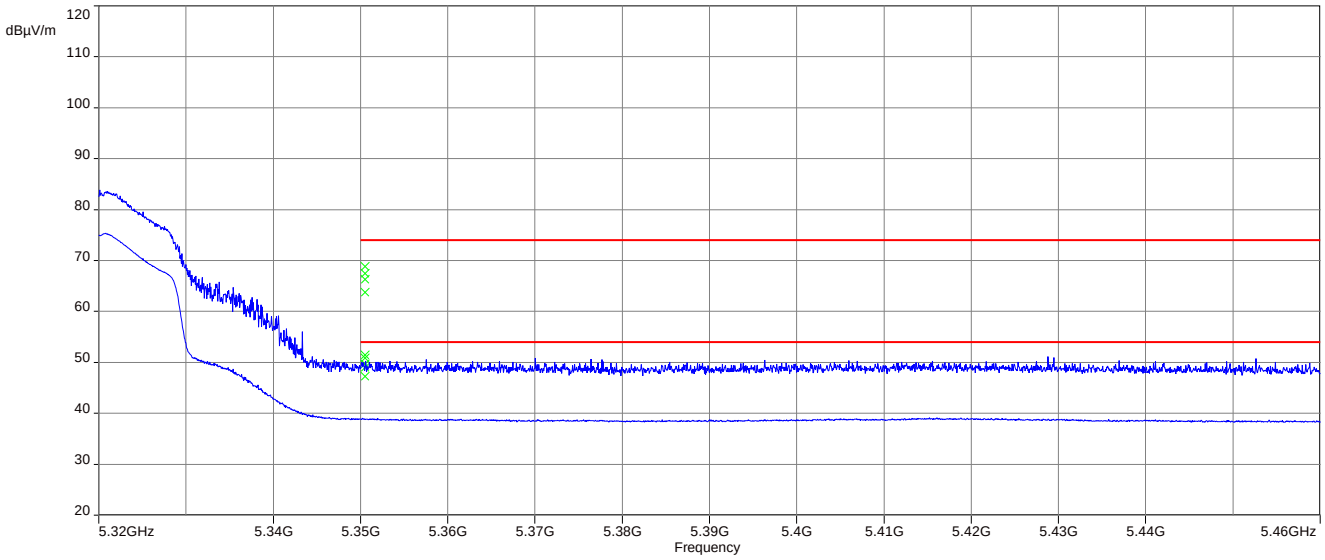
**Plot 1:** upper band edge; U-NII-2A; highest channel; 20 MHz channel bandwidth



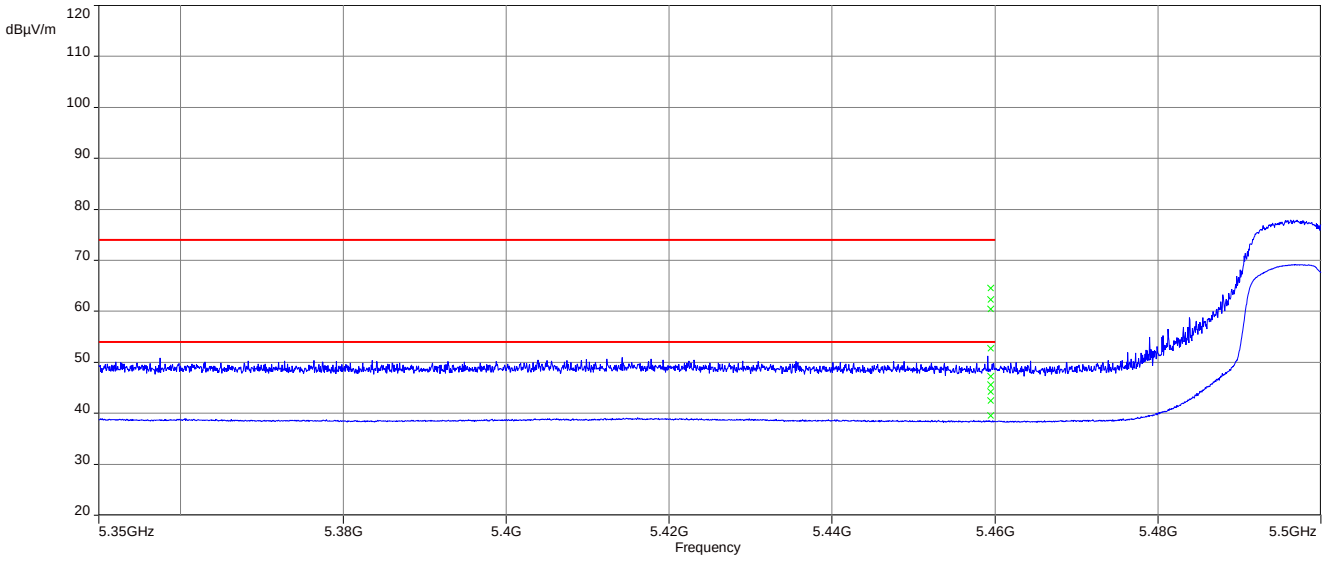

**Plot 2:** lower band edge; U-NII-2C; lowest channel; 20 MHz channel bandwidth



**Plot 3:** upper band edge; U-NII-2A; highest channel; 20 MHz channel bandwidth




**Plot 4:** lower band edge; U-NII-2C; lowest channel; 20 MHz channel bandwidth



## 11.9 Spurious emissions radiated < 30 MHz

**Description:**

Measurement of the radiated spurious emissions in transmit mode and receive mode below 30 MHz. The EUT is set first to middle channel. This measurement is representative for all channels and modes. If critical peaks are found the lowest channel and the highest channel will be measured too. Then the EUT is set to receive or idle mode. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Peak / Quasi Peak |
| Sweep time: | Auto |
| Video bandwidth: | F < 150 kHz: 200 Hz<br>F > 150 kHz: 9 kHz |
| Resolution bandwidth: | F < 150 kHz: 1 kHz<br>F > 150 kHz: 100 kHz |
| Span: | 9 kHz to 30 MHz |
| Trace mode: | Max Hold |
| Test setup: | See sub clause 6.2 – B |
| Measurement uncertainty: | See sub clause 8 |

**Limits:**

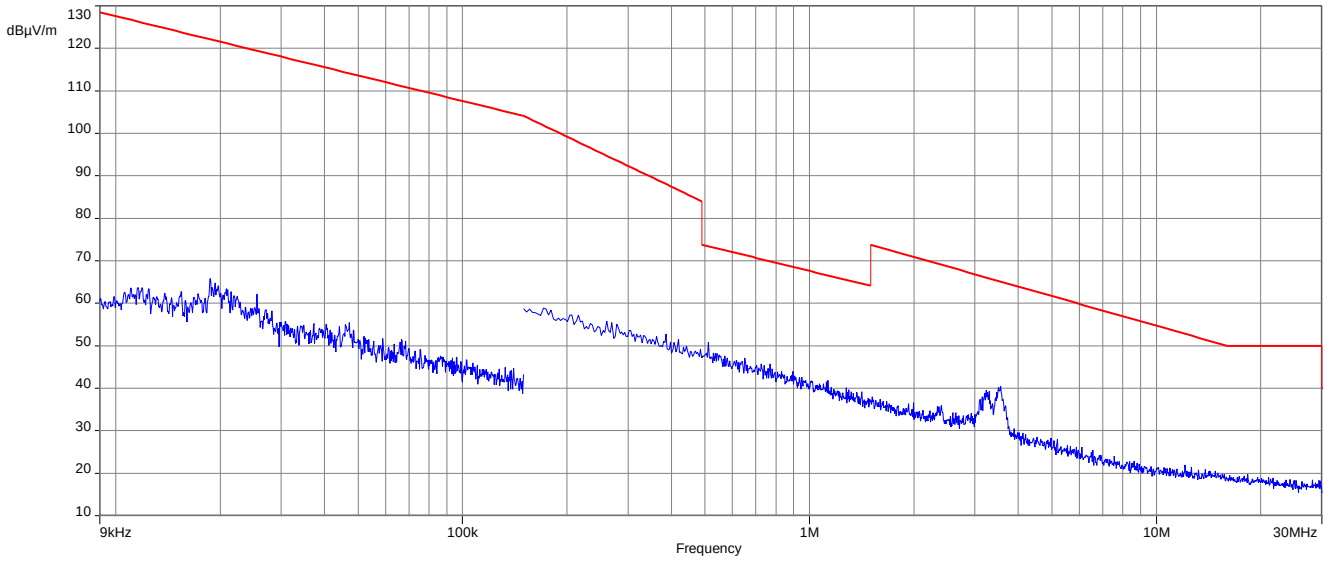
| Spurious Emissions Radiated < 30 MHz | | |
|---|---|---|
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |

**Results:**

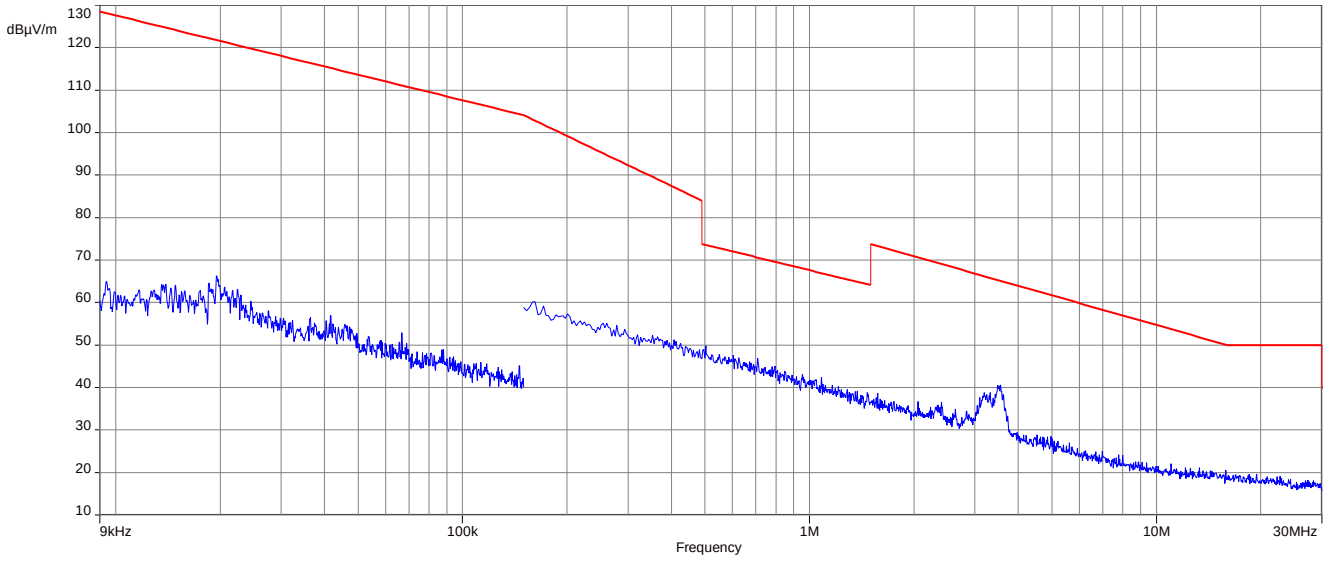
| Spurious Emissions Radiated < 30 MHz [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| All detected emissions are more than 20 dB below the limit. | | |
| | | |
| | | |

**Plots:** 20 MHz channel bandwidth

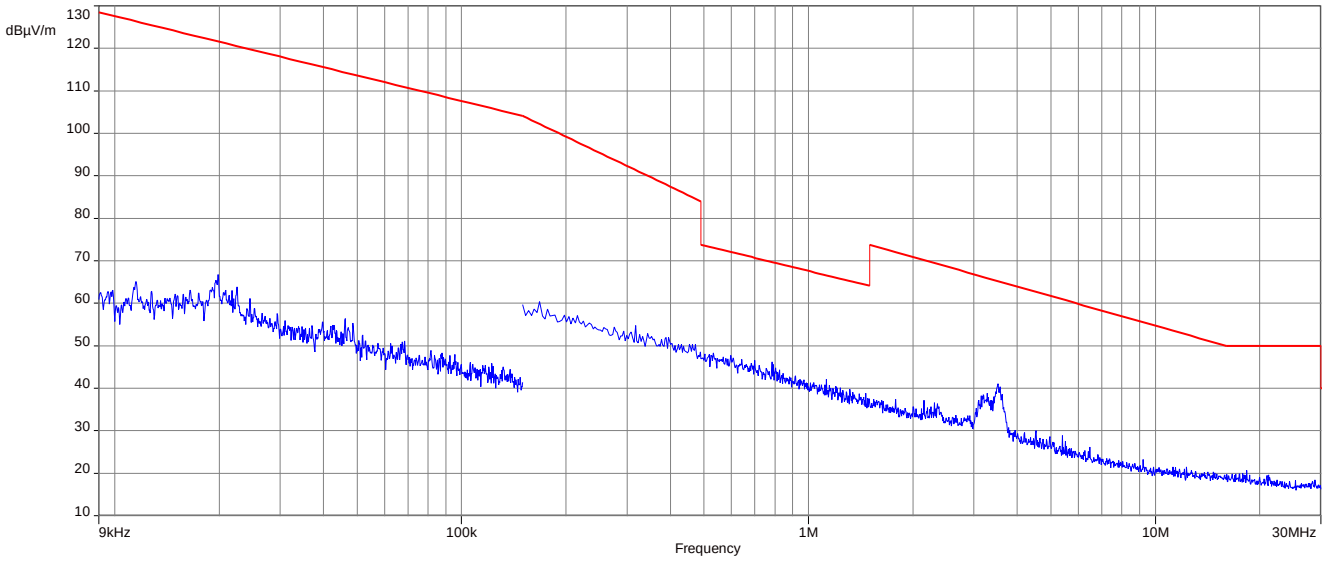
**Plot 1:** 9 kHz to 30 MHz, U-NII-2A; lowest channel



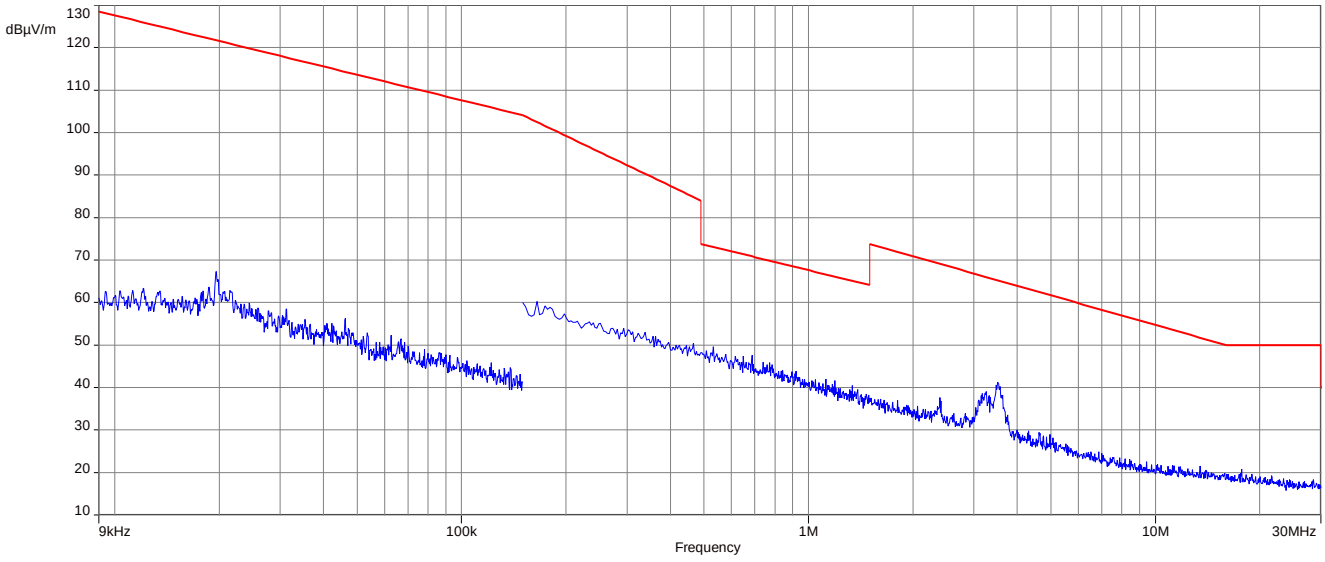

**Plot 2:** 9 kHz to 30 MHz, U-NII-2A; middle channel



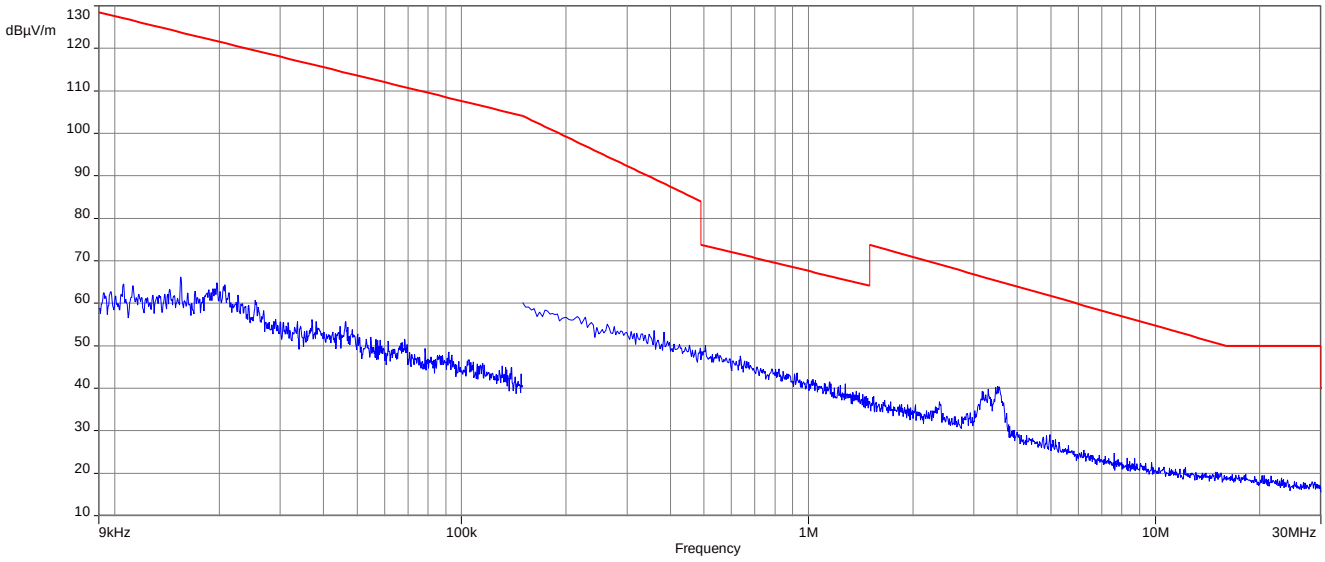
**Plot 3:** 9 kHz to 30 MHz, U-NII-2A; highest channel



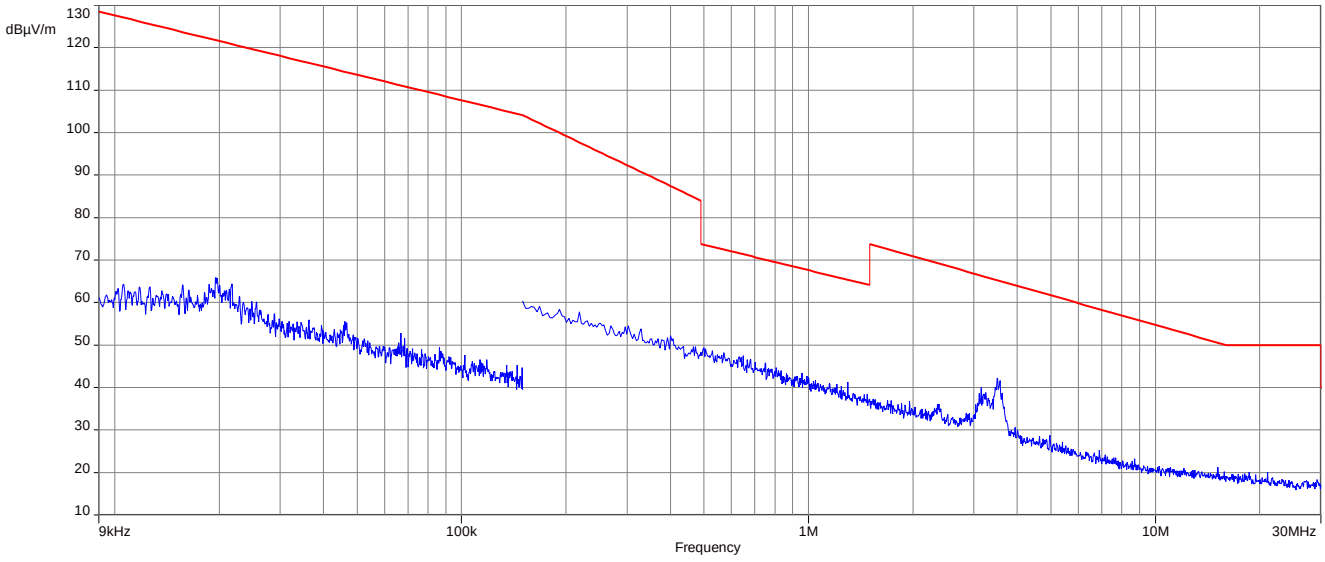

**Plot 4:** 9 kHz to 30 MHz, U-NII-2C; lowest channel



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




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



## 11.10 TX spurious emissions radiated

**Description:**

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at lowest, middle and highest channel.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Quasi Peak below 1 GHz<br>(alternative Peak)<br>Peak above 1 GHz / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F < 1 GHz: 100 kHz<br>F > 1 GHz: 1 MHz |
| Video bandwidth: | F < 1 GHz: 100 kHz<br>F > 1 GHz: ≥ 3 MHz / 1 MHz |
| Span: | 30 MHz to 40 GHz |
| Trace mode: | Max Hold / Average with 100 counts + 20 log (1 / X)<br>for duty cycle lower than 100 % |
| Test setup: | See sub clause 6.1 – A<br>See sub clause 6.2 – B<br>See sub clause 6.3 – A |
| Measurement uncertainty: | See sub clause 8 |

**Limits:**

| TX Spurious Emissions Radiated | | |
|---|---|---|
| §15.209 | | |
| 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 | |

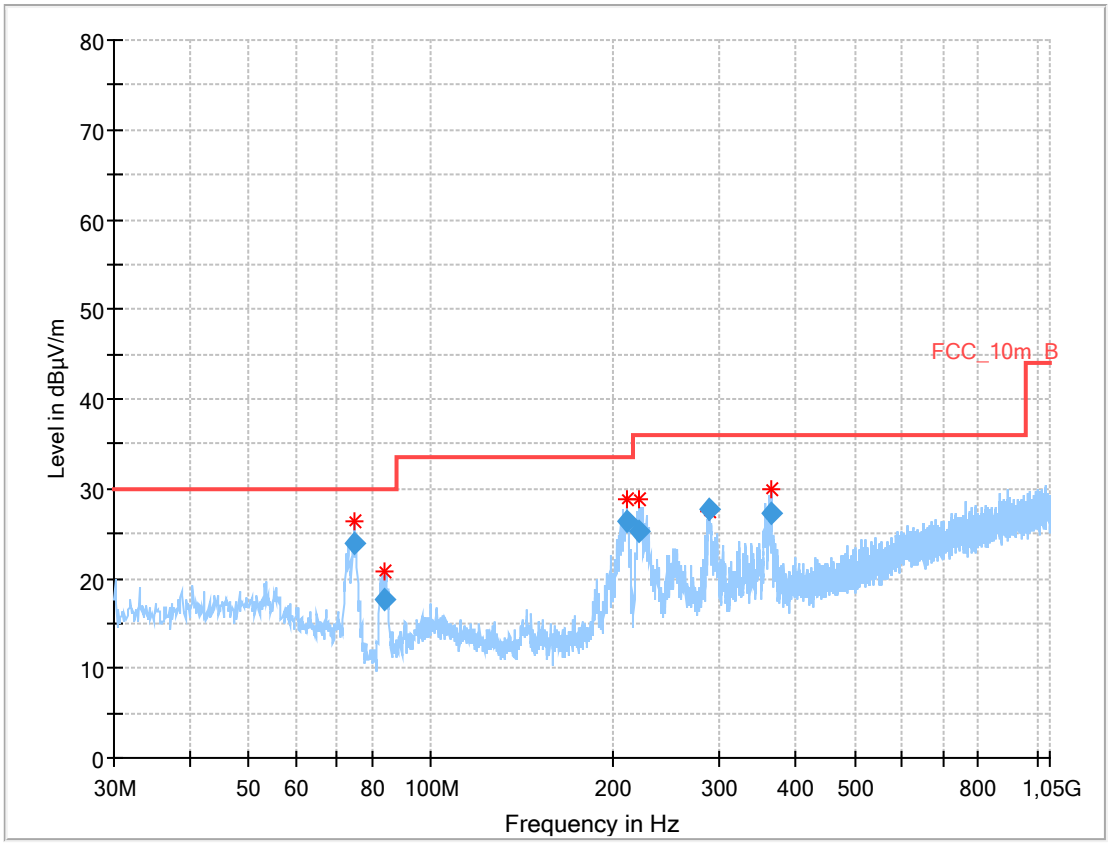
**Results:** 20 MHz channel bandwidth

| 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] |
| For emissions below 1 GHz please take look at the result table below plots. | | | | | | | | |
| 1327 | Peak | 36.2 | -/- | Peak | -/- | 10636 | Peak | 57.8 |
| | AVG | 24.9 | -/- | AVG | -/- | | AVG | 45.7 |
| -/- | Peak | -/- | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | -/- | | AVG | -/- | | AVG | -/- |
| 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] |
| For emissions below 1 GHz please take look at the result table below plots. | | | | | | | | |
| 1847 | Peak | 43.6 | -/- | Peak | -/- | 10636 | Peak | 57.8 |
| | AVG | 38.4 | -/- | AVG | -/- | | AVG | 45.7 |
| 11000 | Peak | 54.6 | -/- | Peak | -/- | -/- | Peak | -/- |
| | AVG | 43.0 | | AVG | -/- | | AVG | -/- |
| For emissions above 18 GHz please take look at the plots. | | | | | | | | |

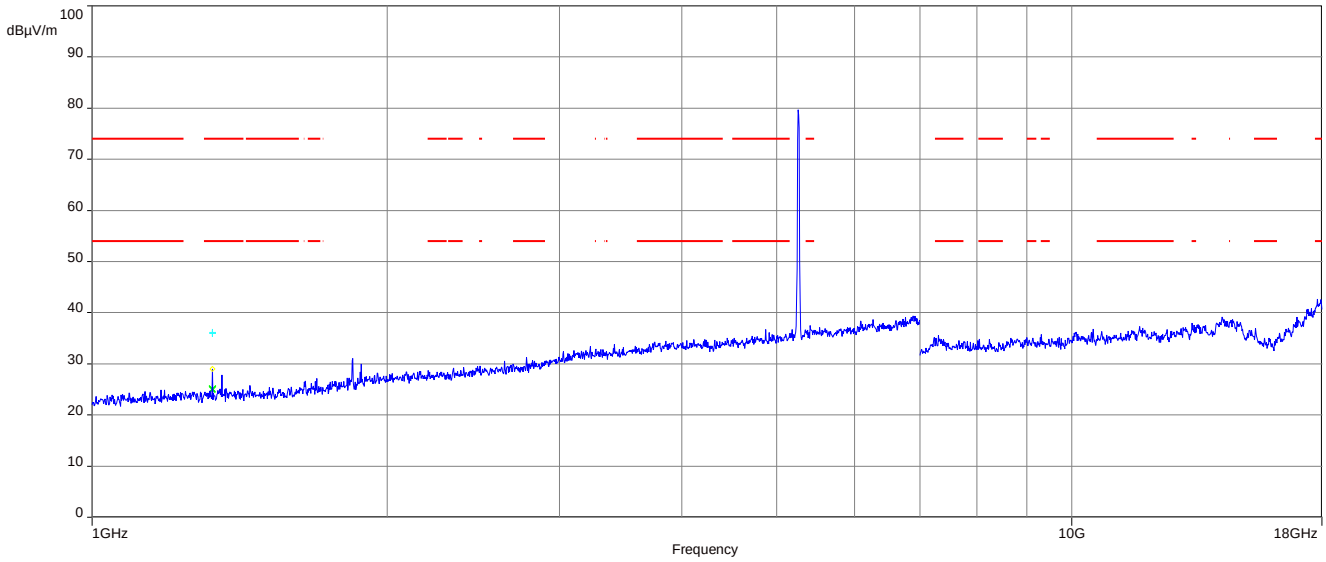
**Plots:** 20 MHz channel bandwidth

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

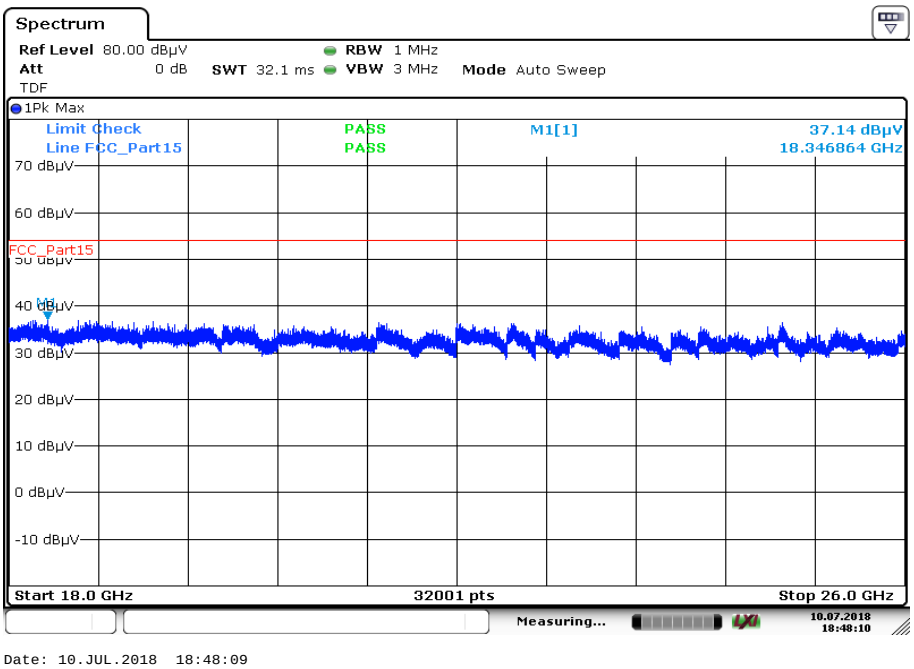



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 74.543 | 23.85 | 30.0 | 6.15 | 1000 | 120 | 170.0 | V | 180.0 | 9.0 |
| 84.092 | 17.75 | 30.0 | 12.25 | 1000 | 120 | 98.0 | V | 0.0 | 8.6 |
| 210.432 | 26.44 | 33.5 | 7.06 | 1000 | 120 | 101.0 | V | 90.0 | 12.2 |
| 220.439 | 25.14 | 36.0 | 10.86 | 1000 | 120 | 101.0 | V | 90.0 | 12.6 |
| 287.899 | 27.72 | 36.0 | 8.28 | 1000 | 120 | 170.0 | H | 90.0 | 14.2 |
| 363.312 | 27.16 | 36.0 | 8.84 | 1000 | 120 | 100.0 | V | 90.0 | 16.2 |

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




**Plot 3:** 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel

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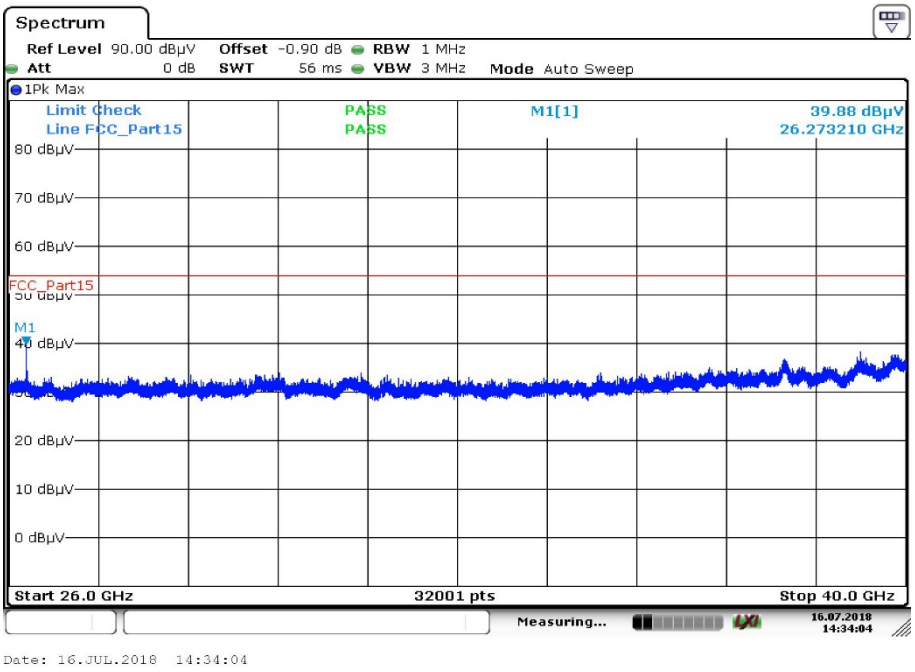
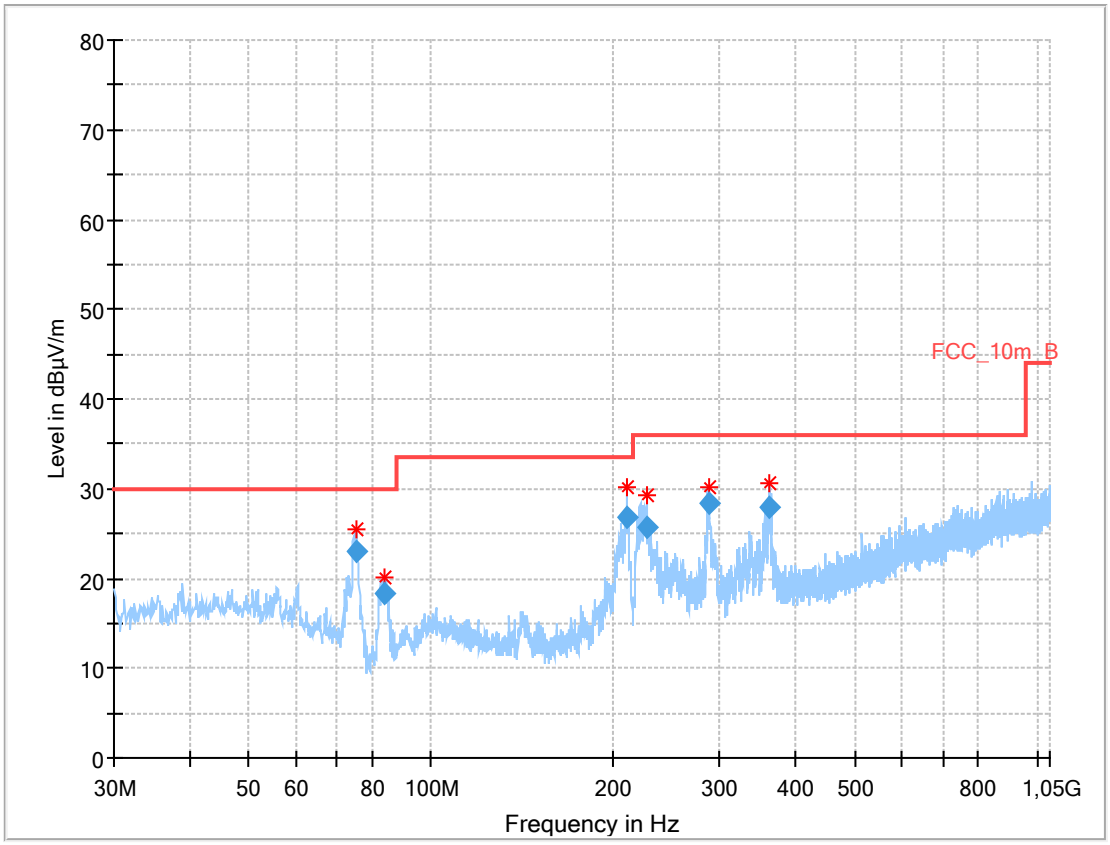
**Plot 4:** 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel

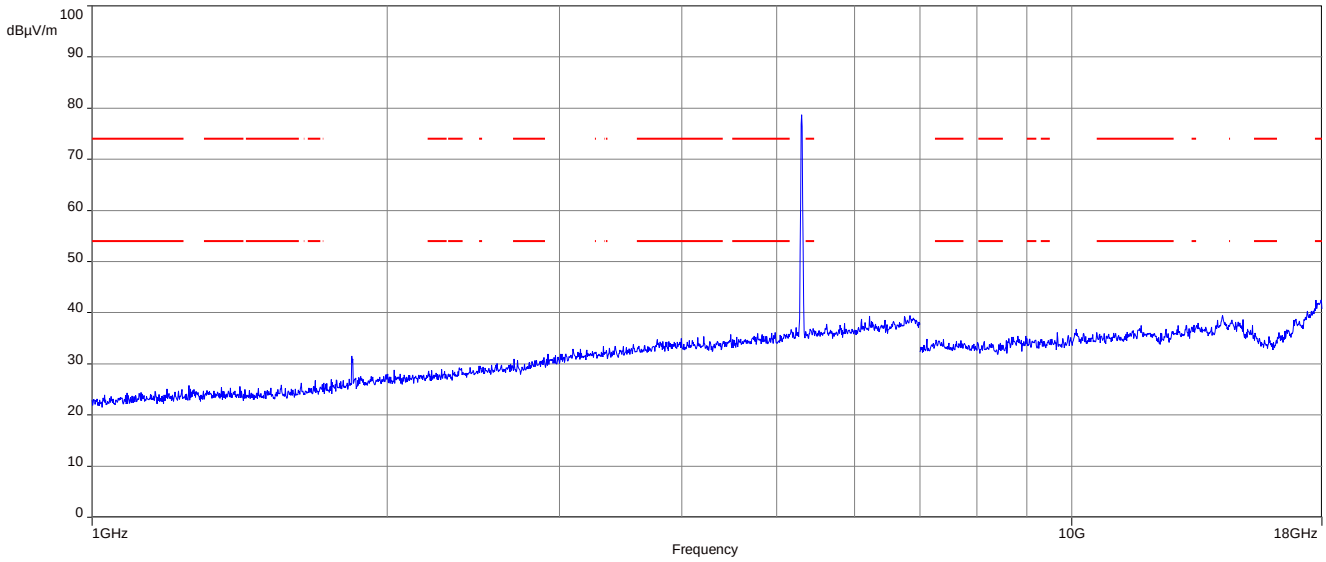


**Plot 5:** 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2A; middle channel

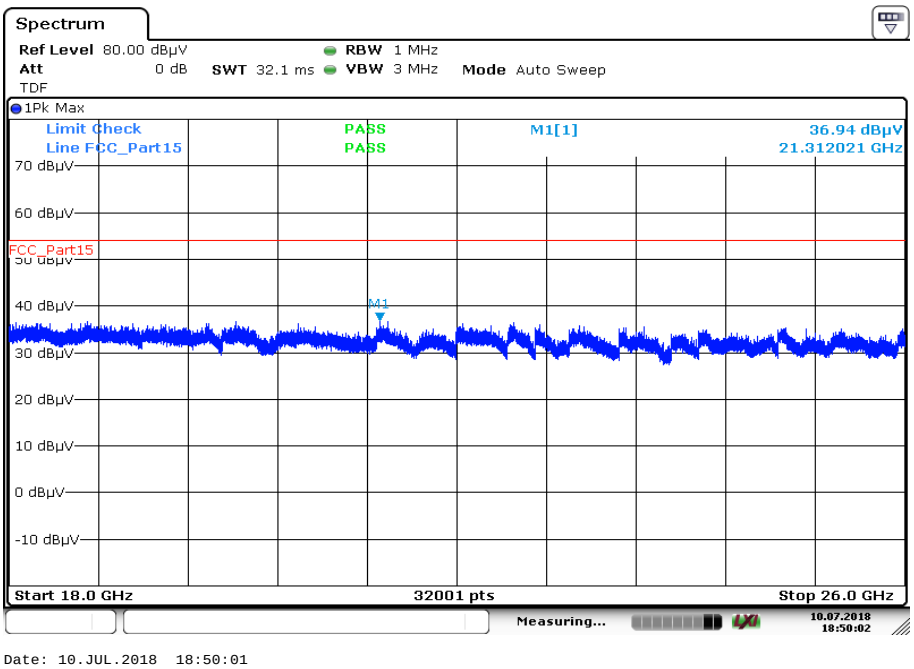



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 75.219 | 23.02 | 30.0 | 6.98 | 1000 | 120 | 170.0 | V | 180.0 | 8.8 |
| 83.900 | 18.36 | 30.0 | 11.64 | 1000 | 120 | 101.0 | V | 90.0 | 8.6 |
| 210.236 | 26.87 | 33.5 | 6.63 | 1000 | 120 | 98.0 | V | 90.0 | 12.2 |
| 226.852 | 25.61 | 36.0 | 10.39 | 1000 | 120 | 98.0 | V | 90.0 | 12.8 |
| 286.732 | 28.39 | 36.0 | 7.61 | 1000 | 120 | 170.0 | H | 90.0 | 14.2 |
| 362.083 | 28.01 | 36.0 | 7.99 | 1000 | 120 | 98.0 | V | 90.0 | 16.2 |

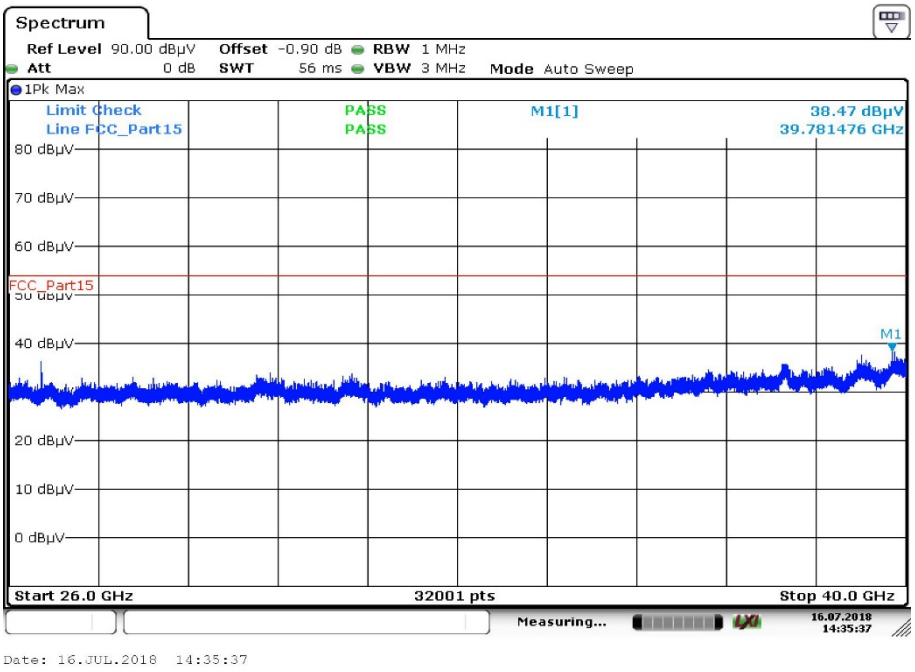
**Plot 6:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



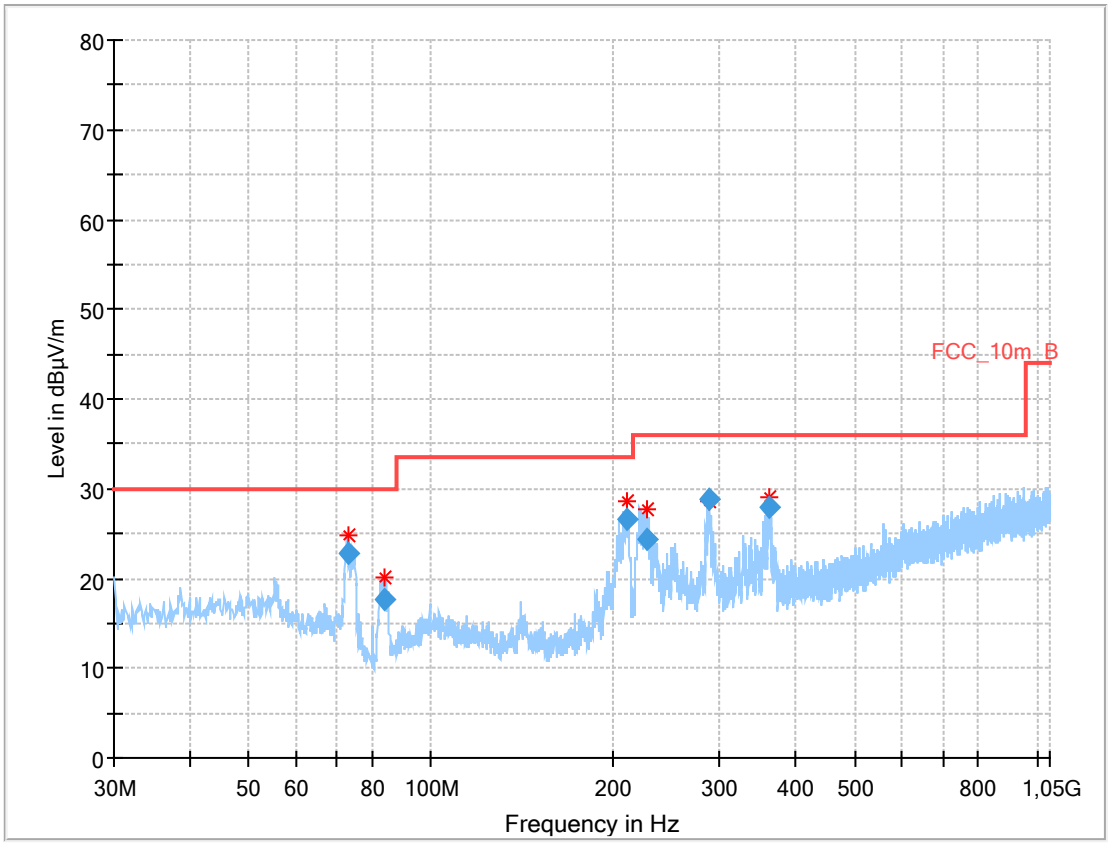

**Plot 7:** 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



**Plot 8:** 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2A; middle channel

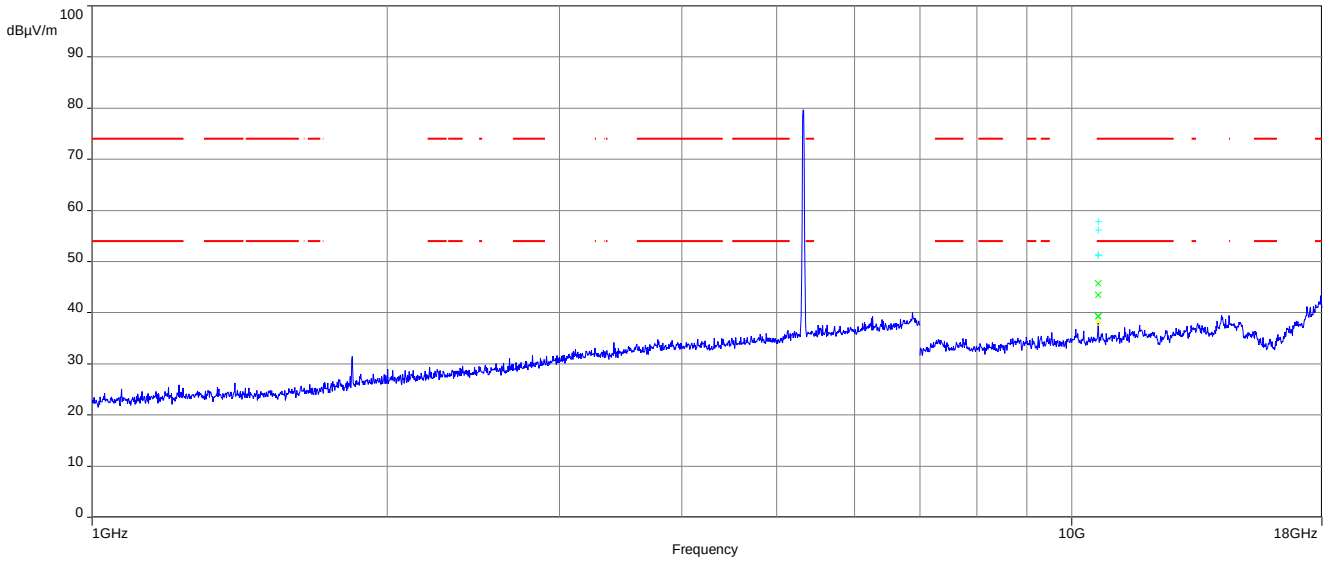


**Plot 9:** 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2A; highest channel

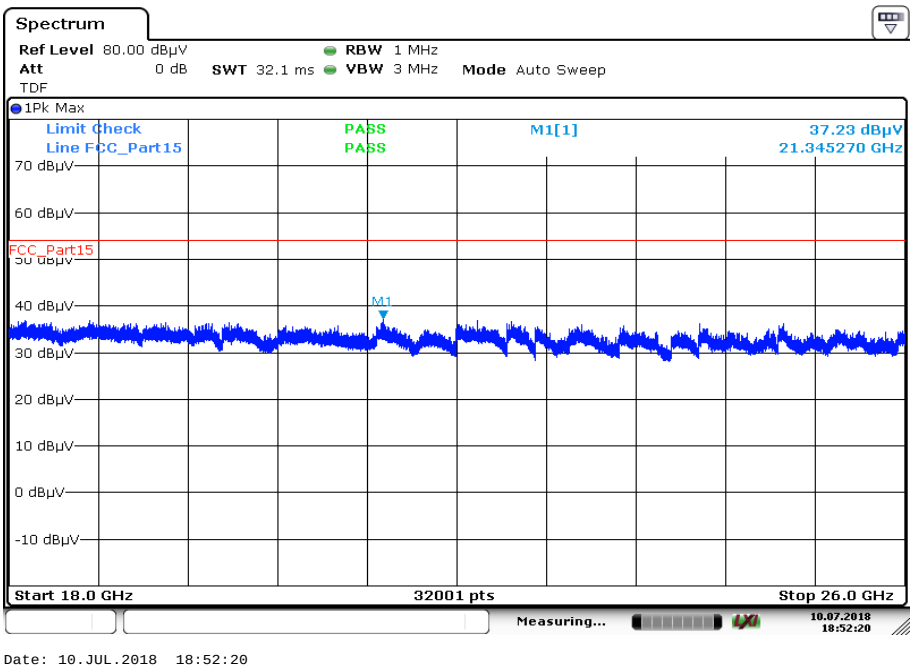



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 73.091 | 22.80 | 30.0 | 7.20 | 1000 | 120 | 170.0 | V | 270.0 | 9.2 |
| 83.944 | 17.69 | 30.0 | 12.31 | 1000 | 120 | 98.0 | V | 90.0 | 8.6 |
| 210.872 | 26.64 | 33.5 | 6.86 | 1000 | 120 | 98.0 | V | 90.0 | 12.3 |
| 227.527 | 24.44 | 36.0 | 11.56 | 1000 | 120 | 101.0 | V | 90.0 | 12.8 |
| 286.808 | 28.87 | 36.0 | 7.13 | 1000 | 120 | 170.0 | H | 90.0 | 14.2 |
| 361.483 | 27.85 | 36.0 | 8.15 | 1000 | 120 | 98.0 | V | 90.0 | 16.2 |

**Plot 10:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; highest channel




**Plot 11:** 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2A; highest channel

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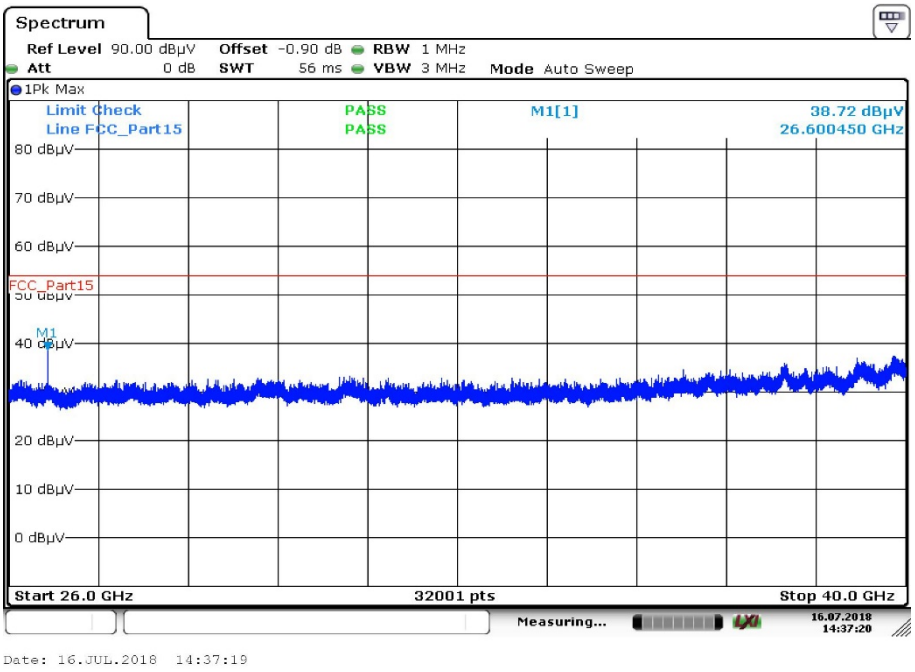
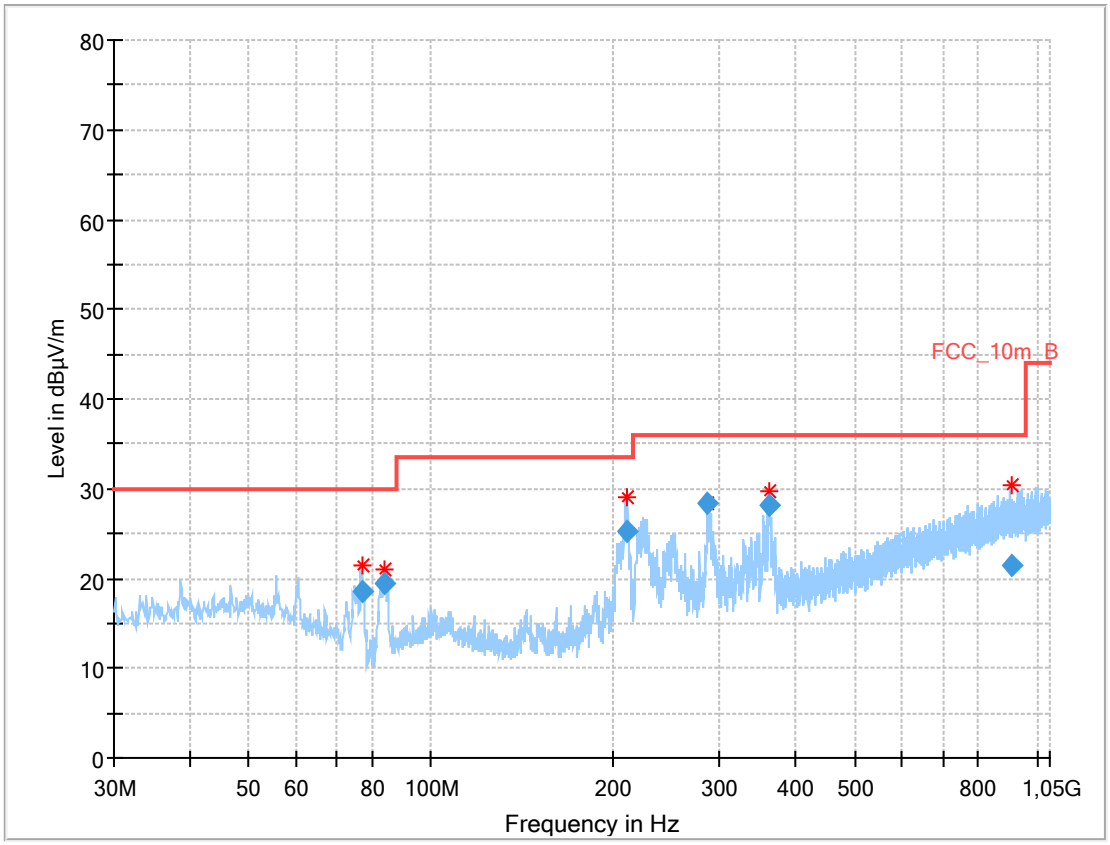
**Plot 12:** 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2A; highest channel

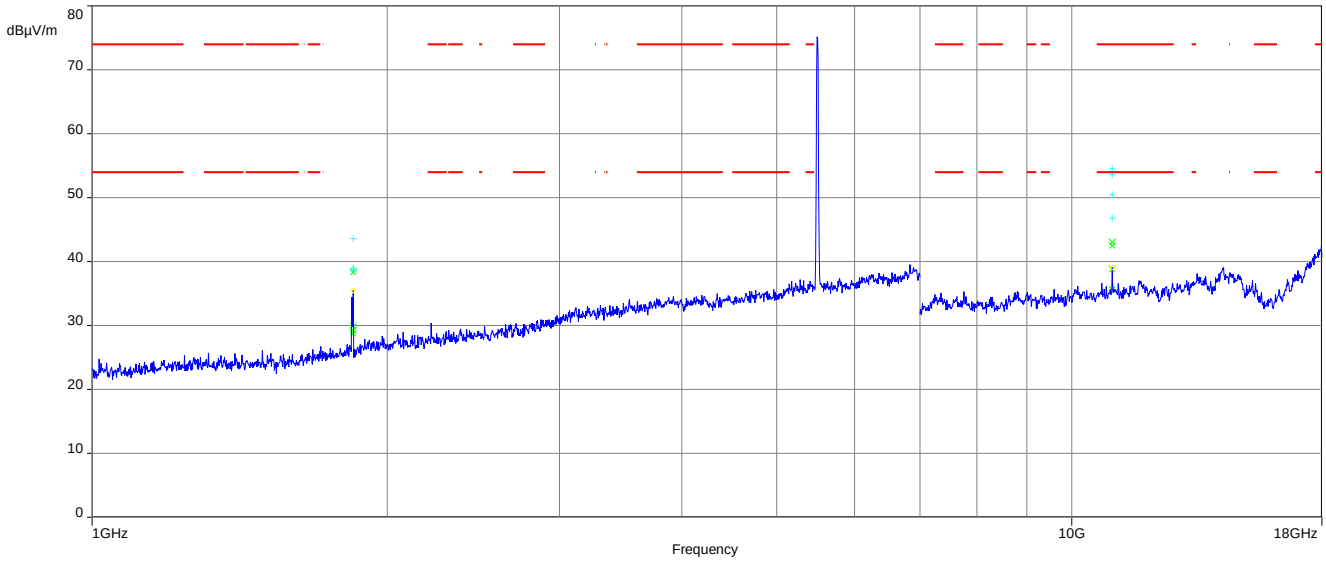


**Plot 13:** 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel

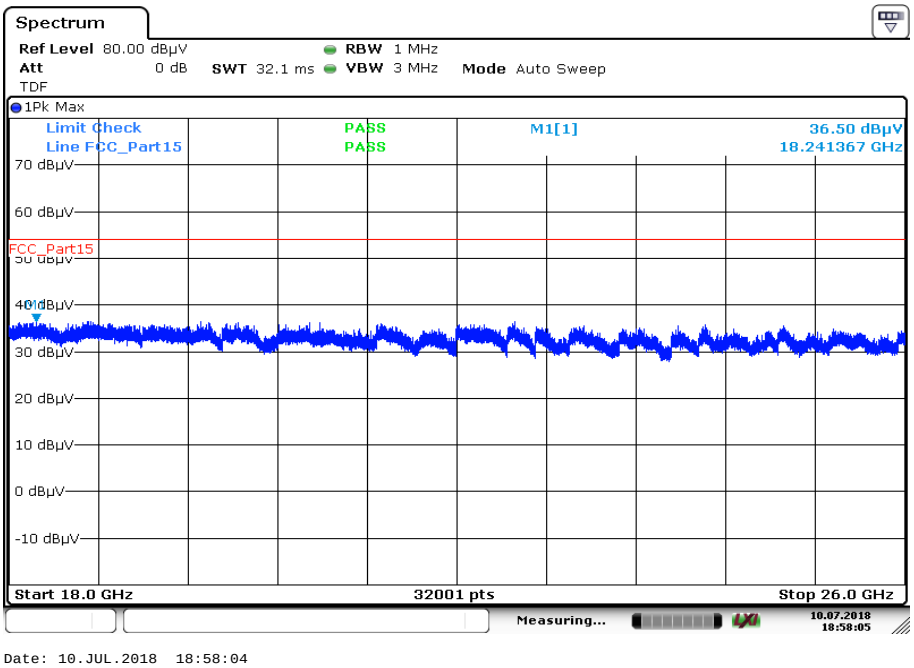



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 76.915 | 18.55 | 30.0 | 11.45 | 1000 | 120 | 170.0 | V | 270.0 | 8.6 |
| 83.856 | 19.41 | 30.0 | 10.59 | 1000 | 120 | 98.0 | V | 90.0 | 8.6 |
| 210.890 | 25.21 | 33.5 | 8.29 | 1000 | 120 | 101.0 | V | 90.0 | 12.3 |
| 286.382 | 28.44 | 36.0 | 7.56 | 1000 | 120 | 170.0 | H | 90.0 | 14.2 |
| 361.837 | 28.05 | 36.0 | 7.95 | 1000 | 120 | 98.0 | V | 90.0 | 16.2 |
| 905.378 | 21.39 | 36.0 | 14.61 | 1000 | 120 | 170.0 | H | 90.0 | 24.2 |

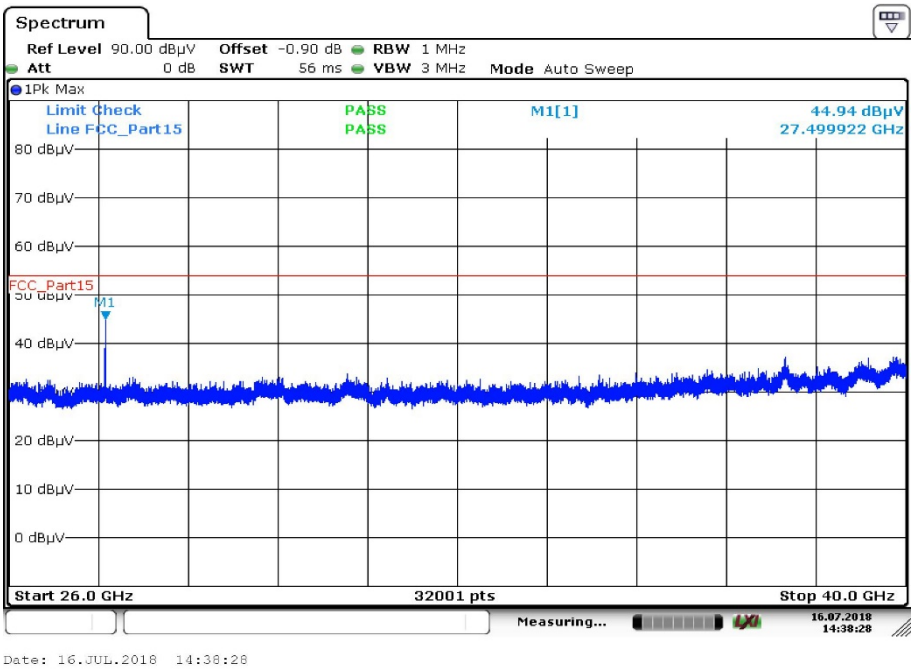
**Plot 14:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



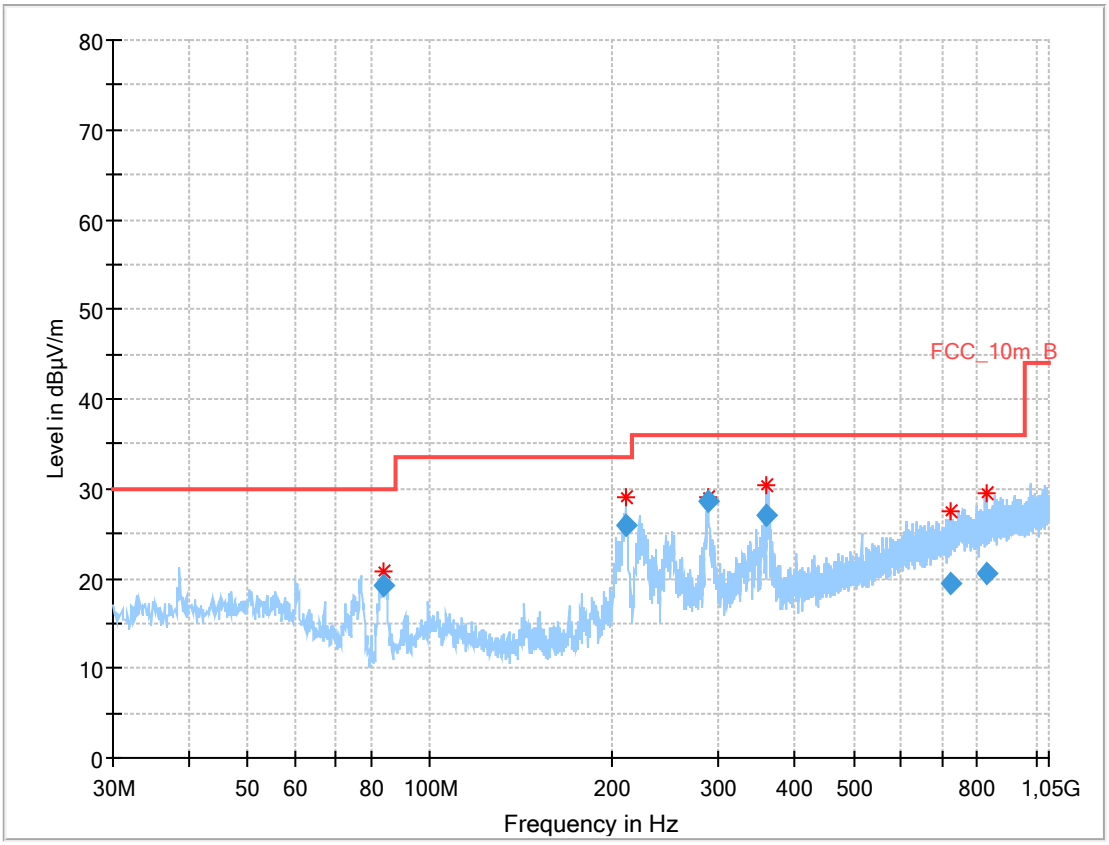

**Plot 15:** 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



**Plot 16:** 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel

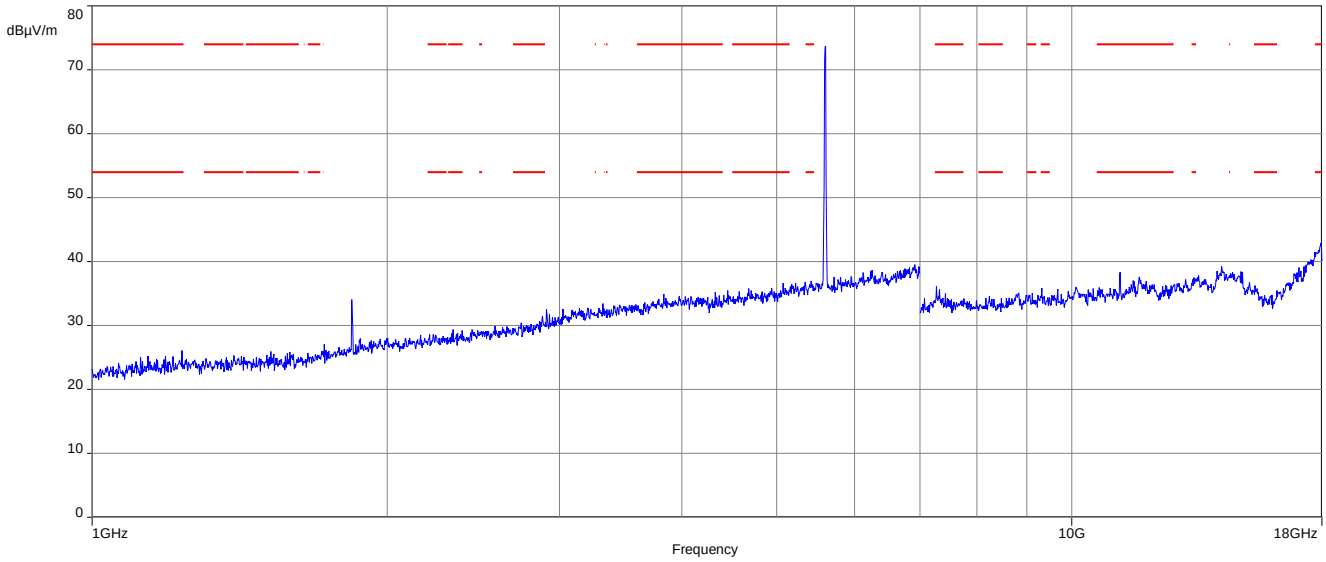


**Plot 17:** 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; middle channel

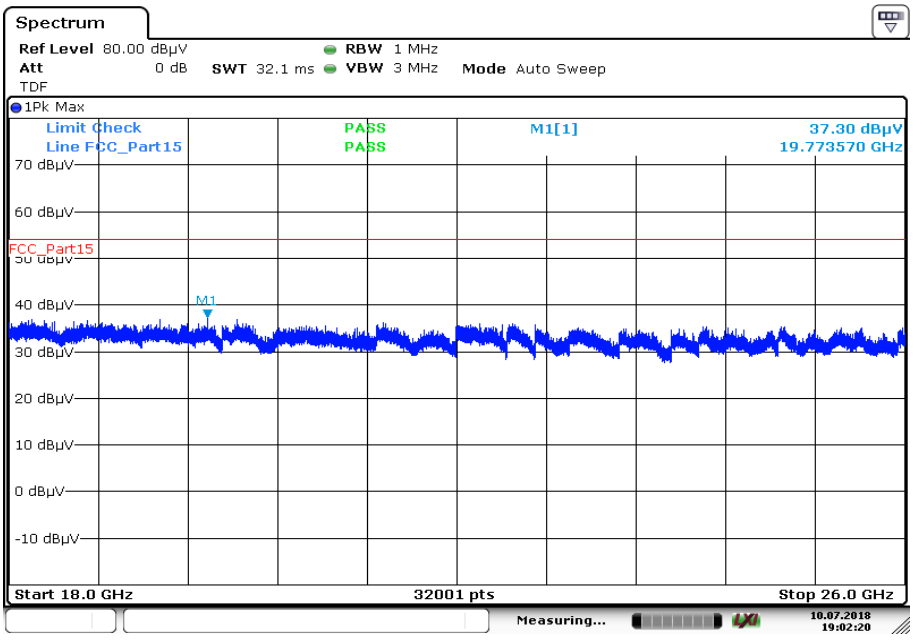



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 84.062 | 19.32 | 30.0 | 10.68 | 1000 | 120 | 98.0 | V | 90.0 | 8.6 |
| 210.359 | 25.84 | 33.5 | 7.66 | 1000 | 120 | 170.0 | V | 90.0 | 12.2 |
| 287.232 | 28.63 | 36.0 | 7.37 | 1000 | 120 | 170.0 | H | 90.0 | 14.2 |
| 360.198 | 27.14 | 36.0 | 8.86 | 1000 | 120 | 98.0 | V | 90.0 | 16.2 |
| 723.954 | 19.45 | 36.0 | 16.55 | 1000 | 120 | 98.0 | H | 180.0 | 22.1 |
| 830.420 | 20.59 | 36.0 | 15.41 | 1000 | 120 | 98.0 | H | 180.0 | 23.2 |

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




**Plot 19:** 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; middle channel

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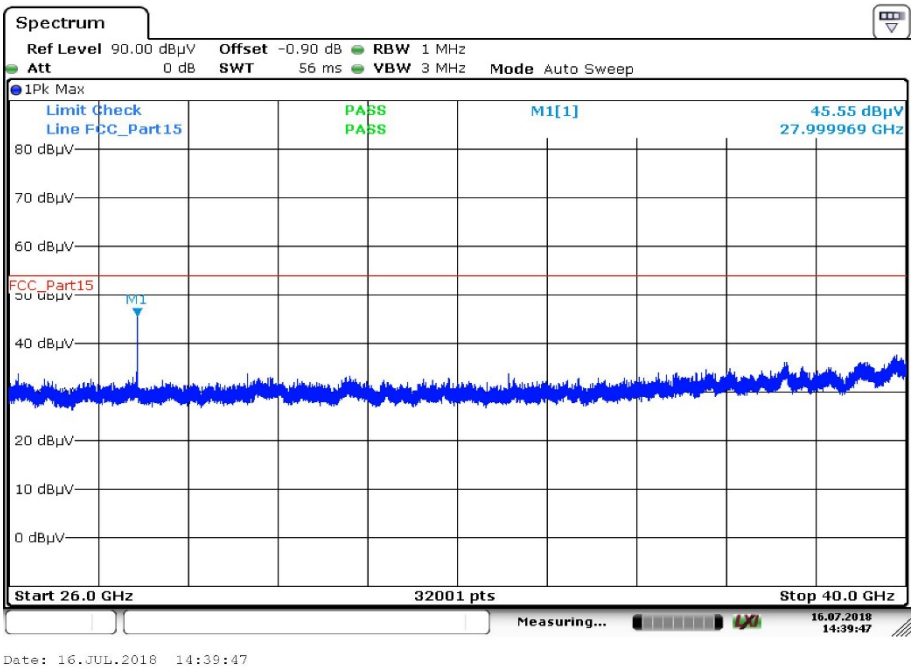
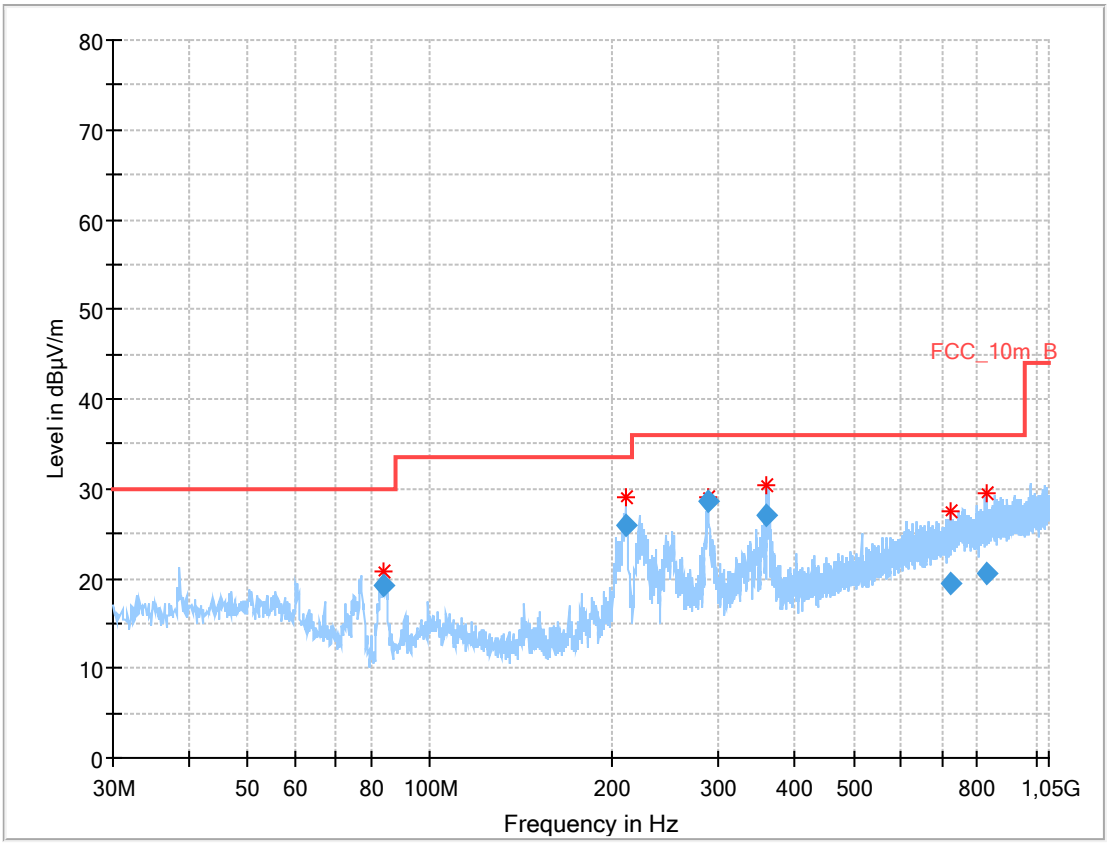
**Plot 20:** 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; middle channel

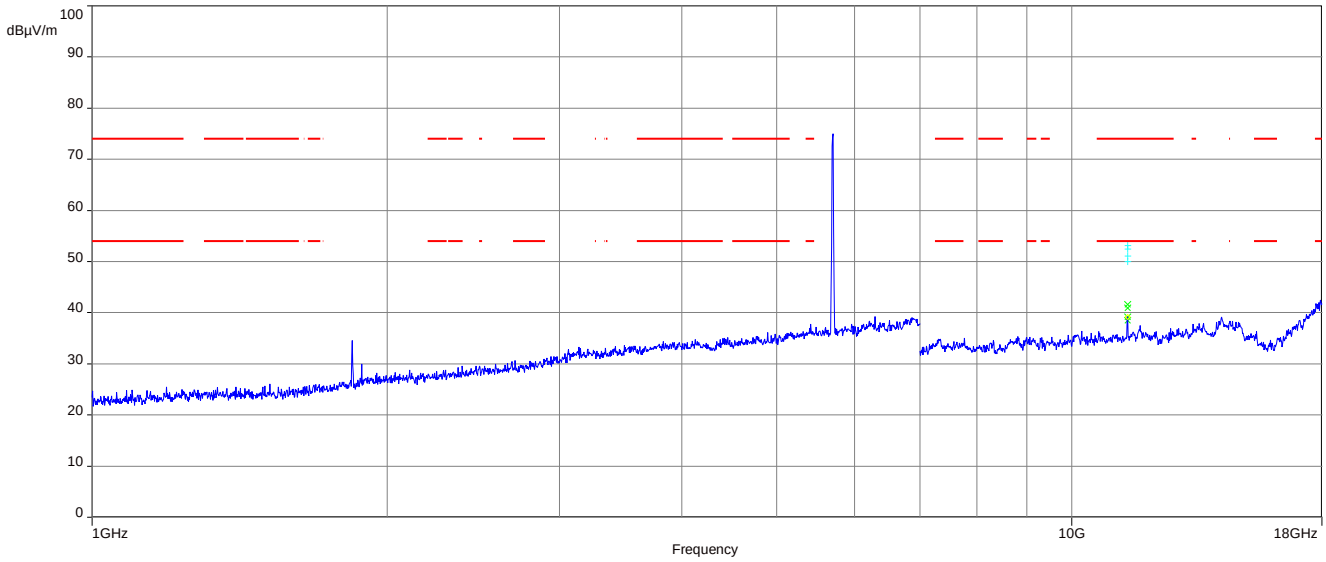


**Plot 21:** 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; highest channel

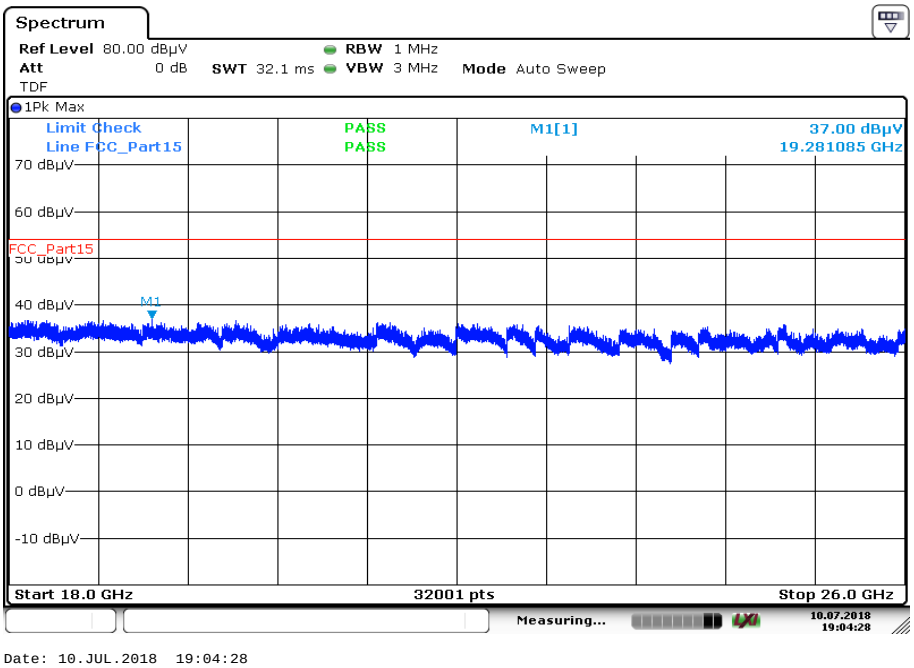



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 84.062 | 19.32 | 30.0 | 10.68 | 1000 | 120 | 98.0 | V | 90.0 | 8.6 |
| 210.359 | 25.84 | 33.5 | 7.66 | 1000 | 120 | 170.0 | V | 90.0 | 12.2 |
| 287.232 | 28.63 | 36.0 | 7.37 | 1000 | 120 | 170.0 | H | 90.0 | 14.2 |
| 360.198 | 27.14 | 36.0 | 8.86 | 1000 | 120 | 98.0 | V | 90.0 | 16.2 |
| 723.954 | 19.45 | 36.0 | 16.55 | 1000 | 120 | 98.0 | H | 180.0 | 22.1 |
| 830.420 | 20.59 | 36.0 | 15.41 | 1000 | 120 | 98.0 | H | 180.0 | 23.2 |

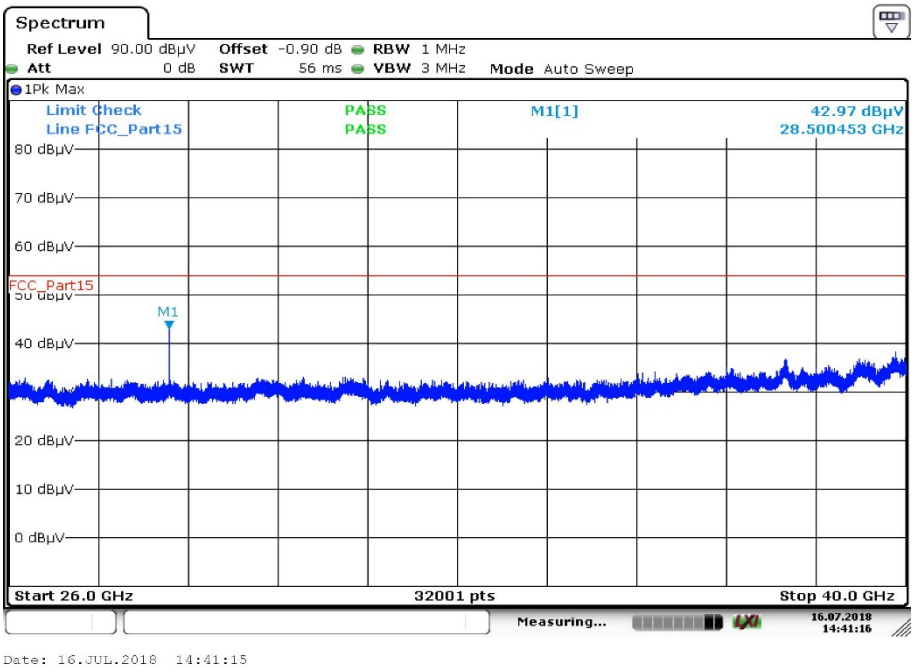
**Plot 22:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel




**Plot 23:** 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



**Plot 24:** 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



## 11.11 RX spurious emissions radiated

**Description:**

Measurement of the radiated spurious emissions in idle/receive mode.

**Measurement:**

| Measurement parameter | |
|---|---|
| Detector: | Quasi Peak below 1 GHz<br>(alternative Peak)<br>Peak above 1 GHz / RMS |
| Sweep time: | Auto |
| Resolution bandwidth: | F < 1 GHz: 100 kHz<br>F > 1 GHz: 1 MHz |
| Video bandwidth: | F < 1 GHz: 100 kHz<br>F > 1 GHz: ≥ 3 MHz |
| Span: | 30 MHz to 40 GHz |
| Trace mode: | Max Hold / Average with 100 counts + 20 log (1 / X)<br>for duty cycle lower than 100 % |
| Test setup: | See sub clause 6.1 – A<br>See sub clause 6.2 – A<br>See sub clause 6.3 – A |
| Measurement uncertainty: | See sub clause 8 |

**Limits:**

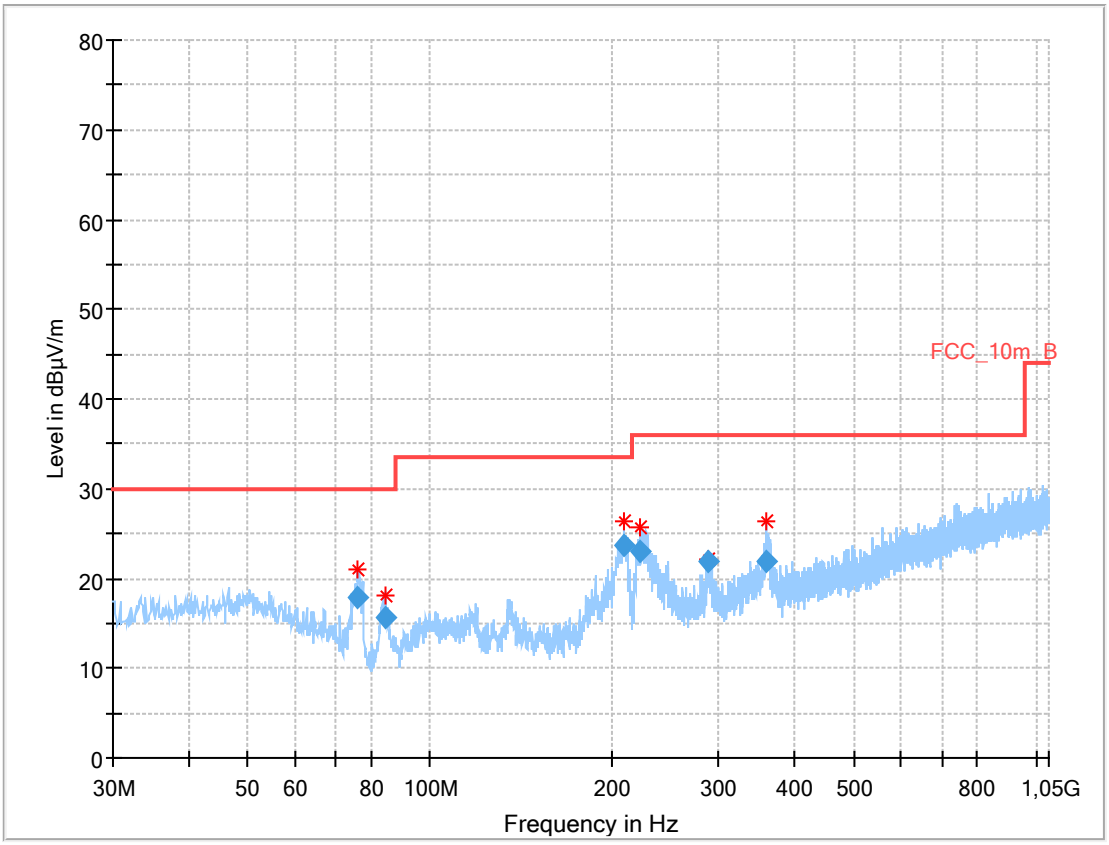
| RX Spurious Emissions Radiated | | |
|---|---|---|
| Frequency (MHz) | Field Strength (dBµV/m) | Measurement distance |
| 30 - 88 | 30.0 | 10 |
| 88 – 216 | 33.5 | 10 |
| 216 – 960 | 36.0 | 10 |
| Above 960 | 54.0 | 3 |

**Results:**

| RX Spurious Emissions Radiated [dBµV/m] | | |
|---|---|---|
| F [MHz] | Detector | Level [dBµV/m] |
| See result table below plots or Markers within respectively | | |

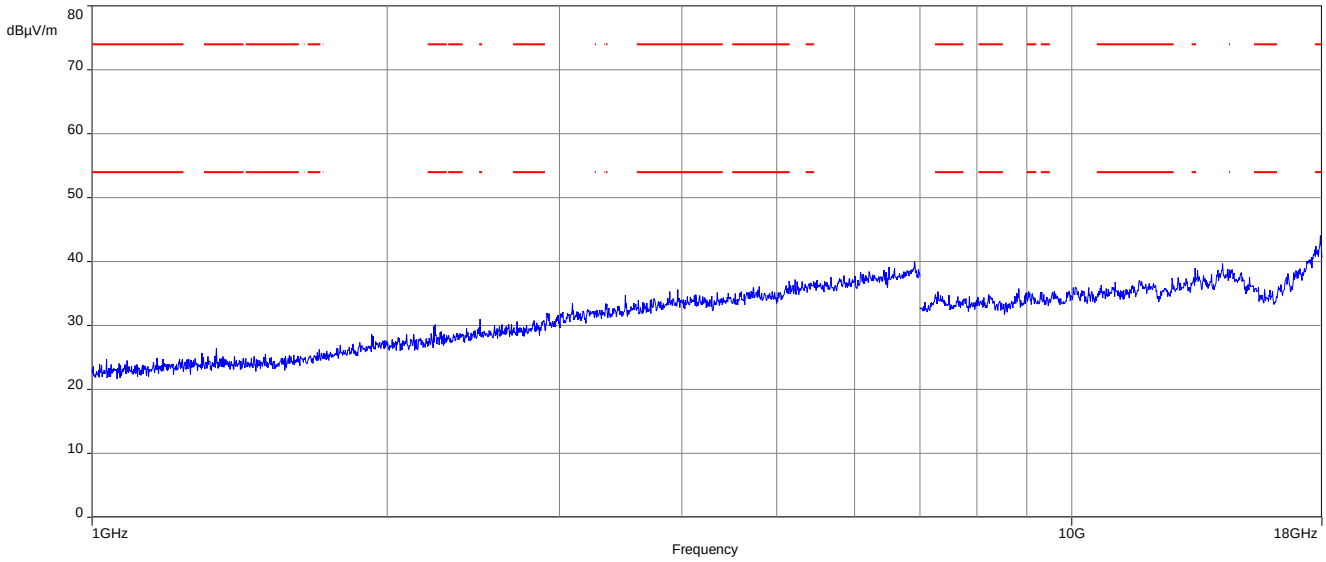
**Plots:**

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

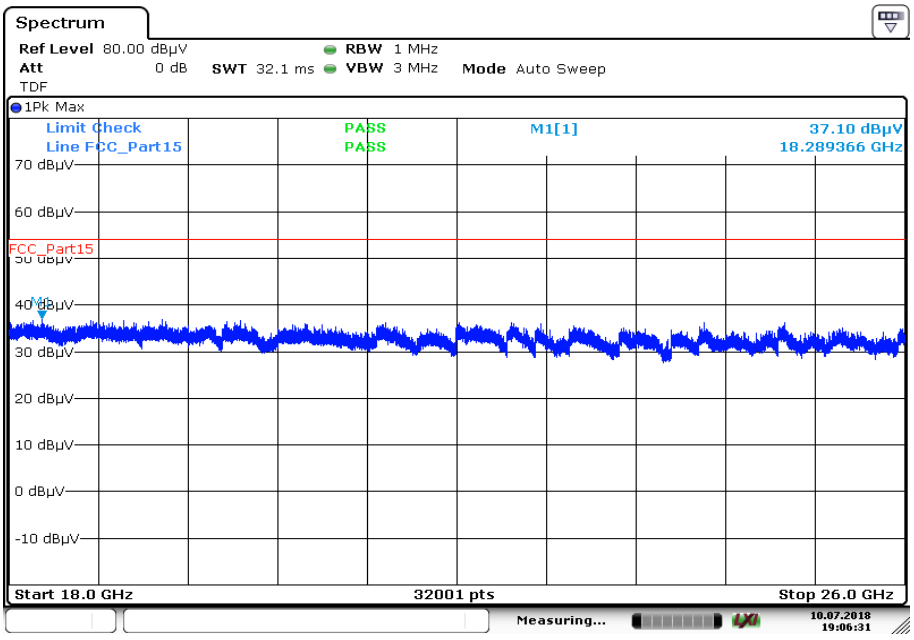



| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 76.165 | 17.96 | 30.0 | 12.04 | 1000 | 120 | 101.0 | V | 270.0 | 8.7 |
| 84.195 | 15.73 | 30.0 | 14.27 | 1000 | 120 | 101.0 | V | 90.0 | 8.6 |
| 209.352 | 23.72 | 33.5 | 9.78 | 1000 | 120 | 98.0 | V | 90.0 | 12.2 |
| 221.885 | 23.02 | 36.0 | 12.98 | 1000 | 120 | 98.0 | V | 90.0 | 12.6 |
| 288.732 | 21.90 | 36.0 | 14.10 | 1000 | 120 | 170.0 | H | 90.0 | 14.2 |
| 359.643 | 21.93 | 36.0 | 14.07 | 1000 | 120 | 101.0 | V | 90.0 | 16.2 |

**Plot 2:** 1 GHz to 18 GHz, vertical & horizontal polarization




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

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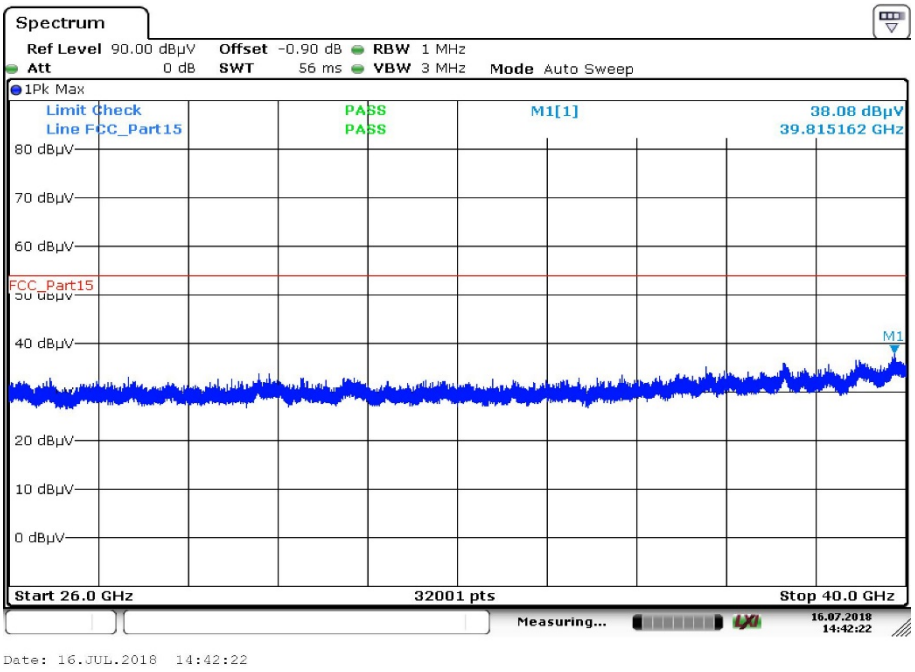
**Plot 4:** 26 GHz to 40 GHz, vertical & horizontal polarization



## 12 Observations

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

## Annex A Glossary

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

## Annex B Document history

| Version | Applied changes | Date of release |
|---|---|---|
| -/- | Initial release | 2018-08-06 |
| A | New FVIN added | 2018-10-05 |

## Annex C Accreditation Certificate

| first page | last page |
|---|---|
|  |  |



**Note: The current certificate annex is published on the website (link see below) of the Accreditation Body DAkkS or may be received by CTC advanced GmbH on request**

https://www.dakks.de/as/ast/d/D-PL-12076-01-03e.pdf