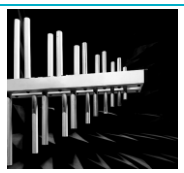
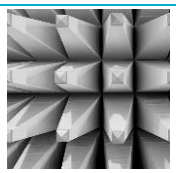



CTC advanced
member of RWTÜV group

Bundesnetzagentur

BNetzA-CAB-02/21-102

TEST REPORT

Test report no.: 1-9152/19-01-07

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 starting with the registration number: D-PL-12076-01.

Applicant

Robert Bosch Car Multimedia GmbH
Robert-Bosch-Straße 200
31139 Hildesheim / GERMANY
Phone: -/-
Contact: Salvatore Miraglia
e-mail: salvatore.miraglia@de.bosch.com
Phone: +49 (0) 5121 49 4983

Manufacturer

Robert Bosch Car Multimedia GmbH
Robert-Bosch-Straße 200
31139 Hildesheim / GERMANY

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

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

Test Item

Kind of test item:	**Radio-Navigation-System**
Model name:	**AIVIH61L1**
FCC ID:	**YBN-AIVIH61L1**
ISED ID:	**9595A-AIVIH61L1**
Frequency:	UNII bands 5150 MHz – 5850 MHz
Technology tested:	WLAN
Antenna:	Integrated antenna
Power supply:	13.5 V DC by vehicle battery
Temperature range:	-30°C to +70°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:

p.o. cn=Rene Oelmann, o=CTC advanced GmbH, ou=OEL-171123, email=rene.oelmann@ctcadvanced.com, c=DE
2019.12.17 10:36:43 +01'00'

Marco Bertolino
Lab Manager
Radio Communications & EMC

Test performed:

Digital unterschrieben von David Lang
DN: cn=David Lang, o=CTC advanced GmbH, ou=LNG-161129, email=david.lang@ctcadvanced.com, c=DE
Datum: 2019.12.17 10:09:54 +01'00'

David Lang
Lab Manager
Radio Communications & EMC

1 Table of contents

1 Table of contents 2

2 General information 4

2.1 Notes and disclaimer 4
2.2 Application details 4
2.3 Test laboratories sub-contracted 4

3 Test standard/s, references and accreditations 5

4 Test environment 6

5 Test item 6

6 Description of the test setup 7

6.1 Shielded semi anechoic chamber 8
6.2 Shielded fully anechoic chamber 9
6.3 Radiated measurements > 18 GHz 10
6.4 Conducted measurements with peak power meter & spectrum analyzer 11
6.5 Shielded fully anechoic chamber 12

7 Sequence of testing 13

7.1 Sequence of testing radiated spurious 9 kHz to 30 MHz 13
7.2 Sequence of testing radiated spurious 30 MHz to 1 GHz 14
7.3 Sequence of testing radiated spurious 1 GHz to 18 GHz 15
7.4 Sequence of testing radiated spurious above 18 GHz 16

8 Measurement uncertainty 17

9 Summary of measurement results 18

10 Additional comments 19

11 Measurement results 22

11.1 Antenna gain 22
11.2 Duty cycle 24
11.3 Maximum output power 25
11.3.1 Maximum output power according to FCC requirements 25
11.3.2 Maximum output power according to IC requirements 28
11.4 Power spectral density 33
11.4.1 Power spectral density according to FCC requirements 33
11.4.2 Power spectral density according to IC requirements 36
11.5 Minimum emission bandwidth for the band 5.725-5.85 GHz 39
11.6 Spectrum bandwidth / 26 dB bandwidth 41
11.7 Occupied bandwidth / 99% emission bandwidth 44
11.8 Band edge compliance radiated 46
11.9 Spurious emissions radiated below 30 MHz 52
11.10 Spurious emissions radiated 30 MHz to 1 GHz 66
11.11 Spurious emissions radiated 1 GHz to 40 GHz 92

12 Observations 136

Annex A Glossary 136

Annex B Document history **137**

Annex C Accreditation Certificate – D-PL-12076-01-04 ..... **137**

Annex D Accreditation Certificate – D-PL-12076-01-05 ..... **138**

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.
The testing service provided by CTC advanced GmbH has been rendered under the current "General Terms and Conditions for CTC advanced GmbH".
CTC advanced GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.
Under no circumstances does the CTC advanced GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.
Under no circumstances does the CTC advanced GmbH test report include or imply any product or service warranties from CTC advanced GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by CTC advanced GmbH.
All rights and remedies regarding vendor's products and services for which CTC advanced GmbH has prepared this test report shall be provided by the party offering such products or services and not by CTC advanced GmbH.
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.

2.2 Application details

Date of receipt of order:	2019-10-21
Date of receipt of test item:	2019-10-17
Start of test:	2019-10-17
End of test:	2019-12-04
Person(s) present during the test:	-/-

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
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	Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus

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
DFS-spezifisch		
UNII: KDB 905462 D02	v02	Compliance measurement procedures for unlicensed - national information infrastructure devices operating in the 5250 - 5350 MHz and 5470 - 5725 MHz bands incorporating dynamic frequency selection
UNII: KDB 905462 D03	v01r02	Client Without DFS New Rules
UNII: KDB 905462 D04	v01	Operational Modes for DFS Testing New Rules

Accreditation	Description
D-PL-12076-01-04	Telecommunication and EMC Canada https://www.dakks.de/as/ast/d/D-PL-12076-01-04.pdf
D-PL-12076-01-05	Telecommunication FCC requirements https://www.dakks.de/as/ast/d/D-PL-12076-01-05.pdf

4 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+24 °C during room temperature tests No tests under extreme temperature conditions required. No tests under extreme temperature conditions required.
Relative humidity content	:		48 %
Barometric pressure	:		1015 hPa
Power supply	:	V_{nom} V_{max} V_{min}	13.5 V DC by vehicle battery No tests under extreme voltage conditions required. No tests under extreme voltage conditions required.

5 Test item

Kind of test item	:	Radio-Navigation-System
Model name	:	AIVIH61L1
HMN	:	-/-
PMN	:	AIVIH61L1
HVIN	:	AIVIH61L1
FVIN	:	-/-
S/N serial number	:	Radiated unit: RSE 30MHz to 1 GHz: 0000029 TST1645901 A 283C32142R 001 001 34K RSE 9kHz to 30 MHz & 1 GHz to 26 GHz: 0000020 TST1645901 A 283C32142R 001 001 34 K Conducted unit UNII-1 & UNII-2A bands: 0000072 TST1645901 A 283C32142R 001 001 33K Conducted unit UNII-2C & UNII-3 bands: 0000069 TST1645901 A 283C32142R 001 001 33K
Hardware status	:	001
Software status	:	2011 (283C33692E)
Frequency band	:	UNII bands 5150 MHz – 5850 MHz
Type of radio transmission Use of frequency spectrum	: :	OFDM
Type of modulation	:	(D)BPSK, (D)QPSK, 16 – QAM, 64 – QAM
Number of channels	:	24 with 20 MHz channel bandwidth 11 with 40 MHz channel bandwidth 5 with 80 MHz channel bandwidth
Antenna	:	Integrated antenna
Power supply	:	13.5 V DC by vehicle battery
Temperature range	:	-30°C to +70°C

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).

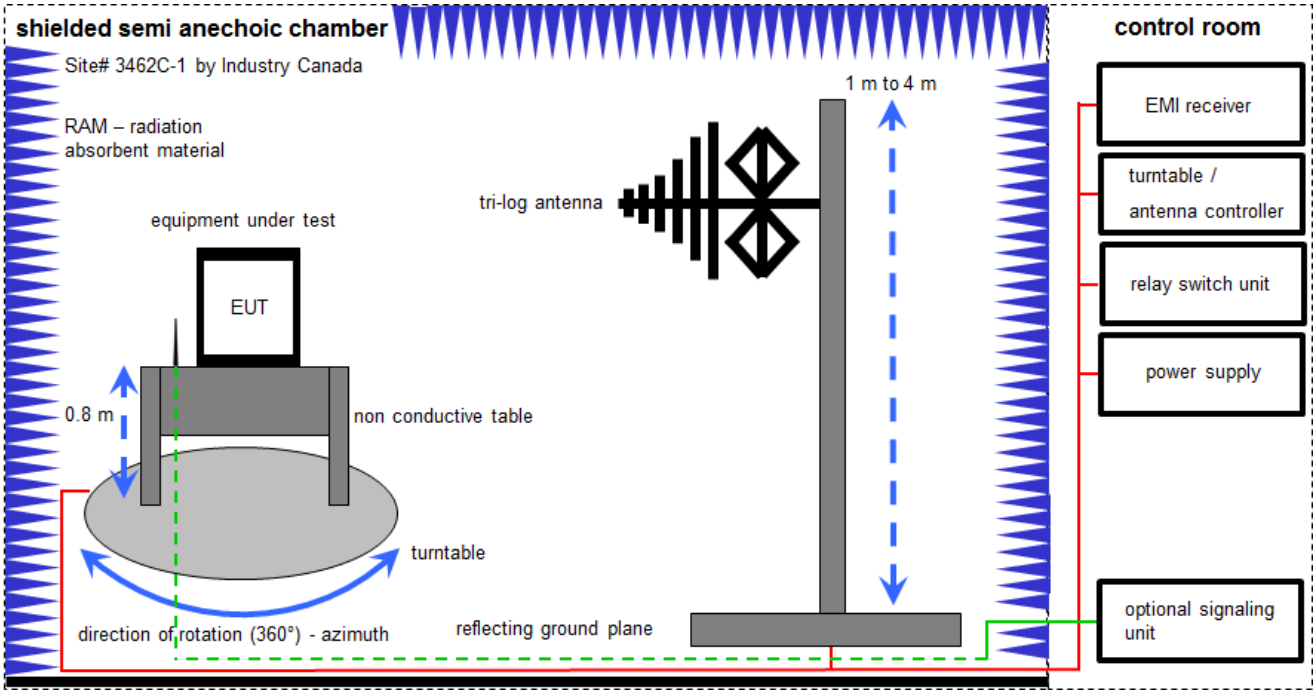
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

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.



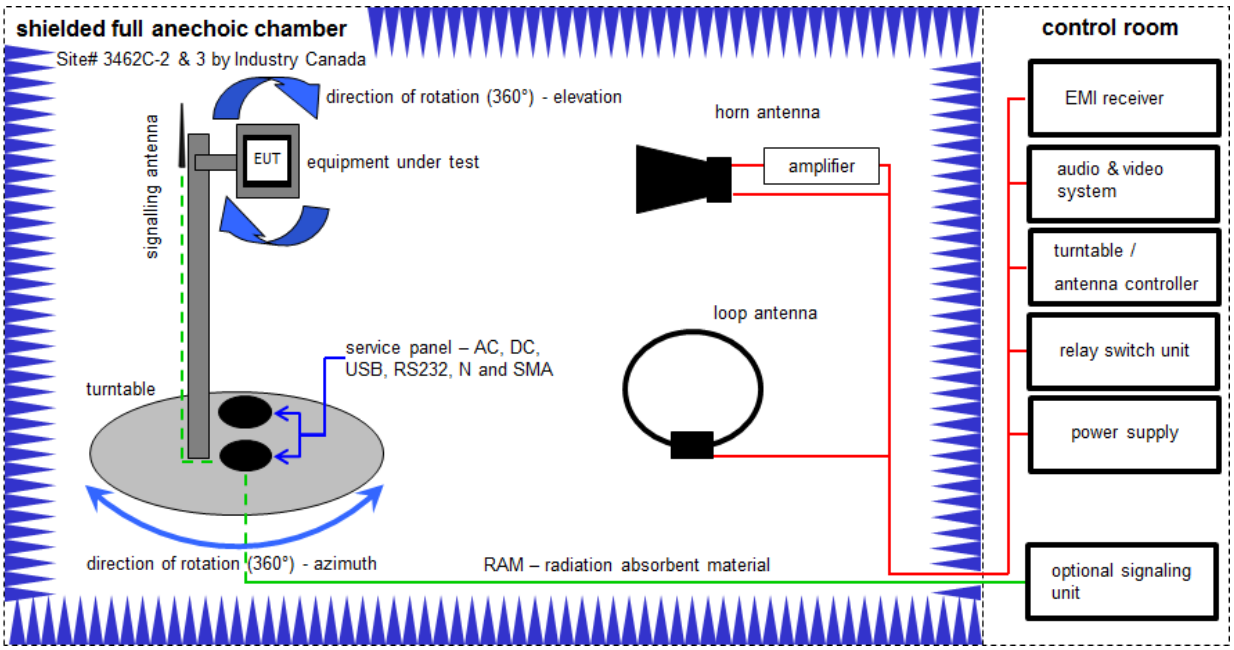
Measurement distance: tri-log antenna 10 meter; EMC32 software version: 10.30.0

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	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
5	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
6	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
7	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	371	300003854	vIKI!	24.11.2017	23.11.2020
8	A	EMI Test Receiver	ESR3	Rohde & Schwarz	102587	300005771	k	21.05.2019	20.05.2020

6.2 Shielded fully anechoic chamber



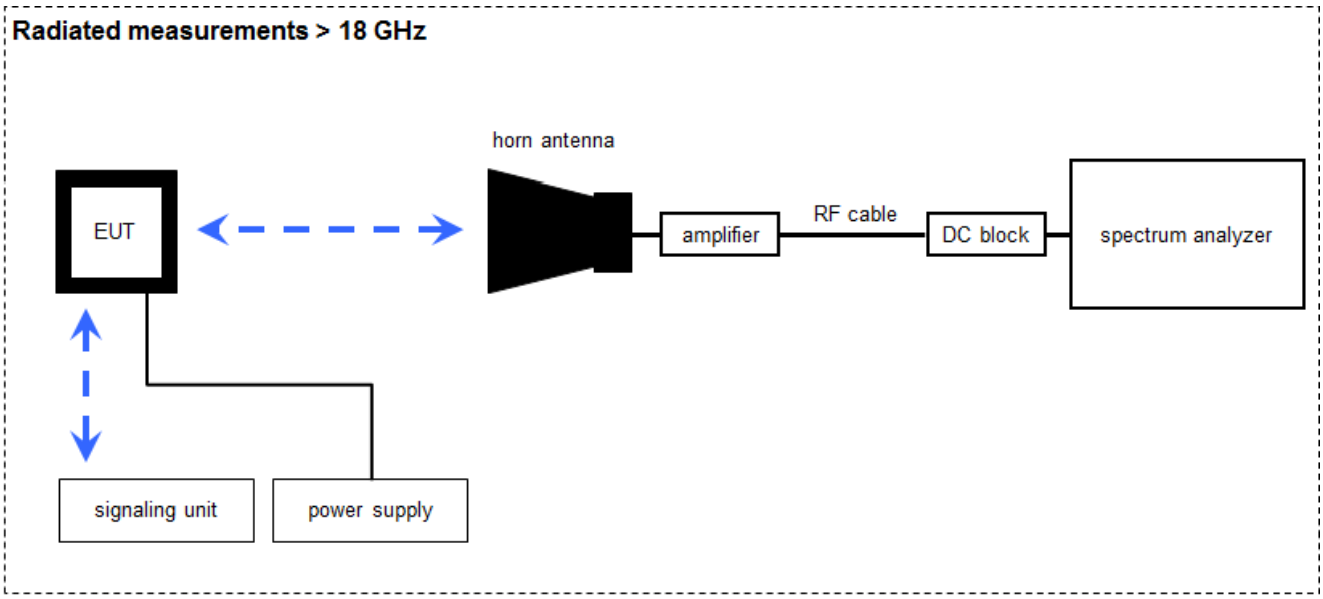
Measurement distance: horn antenna 3 meter; loop antenna 3 meter / 1 meter

FS = UR + CA + AF (FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)
Example calculation:
FS [dBµV/m] = 40.0 [dBµV/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dBµV/m] (71.61 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	C	Active Loop Antenna 9 kHz to 30 MHz	6502	EMCO	2210	300001015	vIKI!	13.06.2019	12.06.2021
2	A+B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9107-3696	300001604	vIKI!	27.02.2019	26.02.2021
3	A+B+C	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2920A04590	300001041	vIKI!	14.12.2017	13.12.2020
4	A+B	Highpass Filter	WHK1.1/15G-10SS	Wainwright	37	400000148	ne	-/-	-/-
5	A+B	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne	-/-	-/-
6	A+B	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22051	300004483	ev	-/-	-/-
7	A+B+C	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-
8	A+B+C	Computer	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A5421	300004591	ne	-/-	-/-
9	A+B+C	NEXIO EMV-Software	BAT EMC V3.19.1.9	EMCO	-/-	300004682	ne	-/-	-/-
10	A+B+C	Anechoic chamber	-/-	TDK	-/-	300003726	ne	-/-	-/-
11	A+B+C	EMI Test Receiver 9kHz-26,5GHz	ESR26	R&S	101376	300005063	k	19.12.2018	18.12.2019
12	A	Band Reject Filter	WRCJV12-5120-5150-5350-5380-40SS	Wainwright	5	300005168	ev	-/-	-/-
13	A	Band Reject Filter	WRCJV12-5695-5725-5850-5880-40SS	Wainwright	5	300005169	ev	-/-	-/-
14	A	Band Reject Filter	WRCJV16-5440-5470-5725-5755-40SS	Wainwright	9	300005170	ev	-/-	-/-
15	A+B	RF Amplifier	AFS4-00100800-28-20P-4-R	MITEQ	2008992	300005204	ne	-/-	-/-

6.3 Radiated measurements > 18 GHz



Measurement distance: horn antenna 50 cm

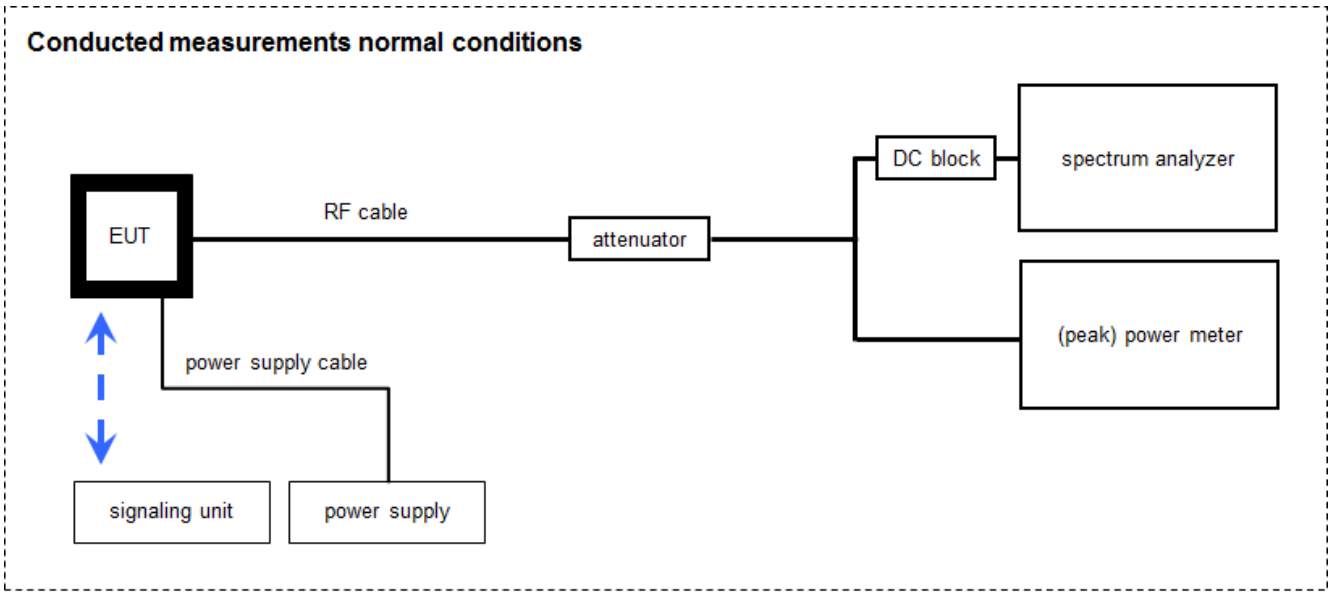
FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss signal path & distance correction; AF-antenna factor)

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	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP	00419	300002268	ev	-/-	-/-
2	A	Std. Gain Horn Antenna 18.0-26.5 GHz	638	Narda	01096	300000486	vlKl!	13.12.2017	12.12.2019
3	B	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	82-16	300000510	vlKl!	13.12.2017	12.12.2019
4	A+B	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	17.12.2018	16.12.2019
5	B	Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273	ev	-/-	-/-
6	A+B	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
7	A+B	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-

6.4 Conducted measurements with peak power meter & spectrum analyzer



WLAN tester version: 1.1.13; LabView2015

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

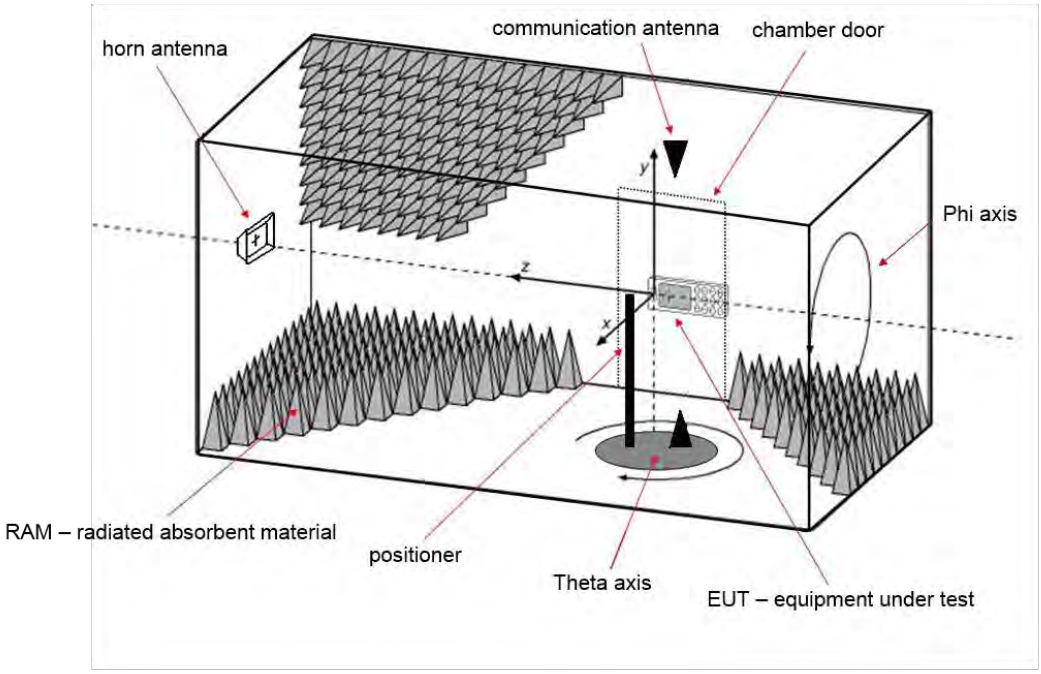
Example calculation:
OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

No.	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	17.12.2018	16.12.2019
2	A+B	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
3	A+B	DC-Blocker 0.1-40 GHz	8141A	Inmet	-/-	400001185	ev	-/-	-/-
4	A+B	PC Tester R005	Intel Core i3 3220/3,3 GHz, Prozessor	-/-	2V2403033A4523	300004589	ne	-/-	-/-
5	A+B	RF-Cable	ST18/SMAm/SMAm/60	Huber & Suhner	Batch no. 606844	400001181	ev	-/-	-/-
6	A+B	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10-2W44+	Mini Circuits	-/-	400001186	ev	-/-	-/-
7	A+B	Synchron Power Meter	SPM-4	CTC	1	300005580	ev	-/-	-/-
8	A+B	DC Power Supply	HMP2020	Rohde & Schwarz	102850	300005517	vIKI!	14.12.2017	13.12.2019
9	B	USB Wideband Power Sensor (50MHz - 18GHz)	U2021XA	Keysight	MY591900010	300005802	k	11.06.2019	10.06.2020

6.5 Shielded fully anechoic chamber

OTA – over the air performance



EM Quest software version: 1.0.7.0

OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation:
OP [dBm] = -40.0 [dBm] + 49.9 [dB] – 12.4 [dBi] + 9 [dB] = 6.5 [dBm] (4.47 mW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Switch Unit	TS-RSP	R&S	100155	300003281	ev	-/-	-/-
2	A	CTIA-Chamber	CTIA-Chamber AMS 8500	ETS-Lindgren Finnland	-/-	300003327	ne	-/-	-/-
3	A	CTIA-Chamber - Positioning Equipment	CTIA-Chamber - Positioning Equipment	EMCO/2	-/-	300003328	ne	-/-	-/-
4	A	CTIA-Chamber - Software	CTIA-Chamber - Software	EMCO/2	-/-	300003328	ne	-/-	-/-
5	A	CTIA-Chamber - Antenna	3164-04	EMCO/2	00041915	300003328	ne	-/-	-/-
6	A	Spectrum Analyzer 9kHz - 30 GHz	FSP30	R&S	100623	300003464	vIKI!	13.12.2018	12.12.2020

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 ± 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. 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 RSS 247, Issue 2	See table	2019-12-17	-/-

Test specification clause	Test case	C	NC	NA	NP	Remark
-/-	Output power verification (cond.)	-/-				Declared
-/-	Antenna gain	-/-				See section 11.1
U-NII Part 15	Duty cycle	-/-				-/-
§15.407(a) RSS - 247 (6.2.x.1)	Maximum output power (conducted & radiated)	☒	☐	☐	☐	-/-
§15.407(a) RSS - 247 (6.2.x.1)	Power spectral density	☒	☐	☐	☐	-/-
RSS - 247 (6.2.4.1)	Spectrum bandwidth 6dB bandwidth	☒	☐	☐	☐	-/-
§15.407(a) RSS - 247 (6.2.x.2)	Spectrum bandwidth 26dB bandwidth	☒	☐	☐	☐	-/-
RSS Gen clause 6.6	Spectrum bandwidth 99% bandwidth	-/-				-/-
§15.205 RSS - 247 (6.2.x.2)	Band edge compliance radiated	☒	☐	☐	☐	-/-
§15.407(b) RSS - 247 (6.2.x.2)	TX spurious emissions radiated	☒	☐	☐	☐	-/-
§15.109 RSS-Gen	RX spurious emissions radiated	☒	☐	☐	☐	-/-
§15.209(a) RSS-Gen	Spurious emissions radiated < 30 MHz	☒	☐	☐	☐	-/-
§15.107(a) §15.207	Spurious emissions conducted emissions< 30 MHz	☐	☐	☒	☐	Vehicular use only!
§15.407 RSS - 247 (6.3)	DFS	-/-				See report 1-9152/19-01-08

Notes:

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

10 Additional comments

Reference documents: AIVIH61L1_External_Pictures.pdf
AIVIH61L1_Internal_Pictures.pdf

Additional applicable documents:

1-9152_18-01-07_log1_conducted.pdf	a-mode
1-9152_18-01-07_log2_conducted.pdf	nHT20-mode
1-9152_18-01-07_log3_conducted.pdf	nHT40-mode
1-9152_18-01-07_log4_conducted.pdf	VHT80-mode

Photo documents:

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: 1-9152/19-01-01_AnnexD

Special test descriptions: None

Configuration descriptions: Labtool was provided by the customer to configure the devices for testing.
Used power settings and data rate:

a-mode:	10 (6Mbit/s)
nHT20-mode:	10 (MCS0)
nHT40-mode:	10 (MCS0)
VHT80-mode:	6 (MCS0)

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 & center 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 & 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**

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**

Channels with 40 MHz channel bandwidth:

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**

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**

U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency		
channel	**151**	**159**
f_c / MHz	**5755**	**5795**

Channels with 80 MHz channel bandwidth:

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**

U-NII-2C (5470 MHz to 5725 MHz) channel number & center frequency		
channel	**106**	**122**
f_c / MHz	**5530**	**5610**

U-NII-3 (5725 MHz to 5850 MHz) channel number & center frequency	
channel	**155**
f_c / MHz	**5775**

Note: The channels used for the tests were marked in bold in the list.

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.

11 Measurement results

11.1 Antenna gain

Description:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz
Video bandwidth:	3 MHz
Trace mode:	Max. hold
External result file(s)	1-9152_18-01-07_log1_conducted.pdf
Test setup:	See chapter 6.5 – A (radiated) See chapter 6.4 – A (conducted)
Measurement uncertainty:	See chapter 8

Limits:

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

Results:

U-NII-1 (5150 MHz to 5250 MHz)	Antenna gain		
	Lowest channel	Middle channel	Highest channel
Conducted power / dBm @ 3 MHz RBW	12.5	-/-	12.1
Radiated power / dBm @ 3 MHz RBW	18.6	-/-	18.7
Gain / dBi (calculated or declared)	6.1	-/-	6.6

U-NII-2A (5250 MHz to 5350 MHz)	Antenna gain		
	Lowest channel	Middle channel	Highest channel
Conducted power / dBm @ 3 MHz RBW	12.3	-/-	11.8
Radiated power / dBm @ 3 MHz RBW	18.5	-/-	17.8
Gain / dBi (calculated or declared)	6.2	-/-	6.0

U-NII-2C (5470 MHz to 5725 MHz)	Antenna gain		
	Lowest channel	Middle channel	Highest channel
Conducted power / dBm @ 3 MHz RBW	11.8	11.6	14.5
Radiated power / dBm @ 3 MHz RBW	13.7	15.0	15.3
Gain / dBi (calculated or declared)	1.9	3.4	0.8

U-NII-3 (5725 MHz to 5850 MHz)	Antenna gain		
	Lowest channel	Middle channel	Highest channel
Conducted power / dBm @ 3 MHz RBW	16.8	16.7	15.4
Radiated power / dBm @ 3 MHz RBW	16.1	15.7	16.8
Gain / dBi (calculated or declared)	-0.7	-1.0	1.4

Note: The conducted output power and power spectral density limits will be reduced by 0.6 dB for all frequency bands to compensate for the maximum amount the antenna gain exceeds 6dBi.

11.2 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
External result file(s)	1-9152_18-01-07_log1_conducted.pdf 1-9152_18-01-07_log2_conducted.pdf 1-9152_18-01-07_log3_conducted.pdf 1-9152_18-01-07_log4_conducted.pdf
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 10 * log(duty cycle) = correction factor			
	T_{on} ($D2_{plot}$)	$T_{complete}$ ($D3_{plot}$)	Duty cycle	Correction factor
a – mode	-/-	-/-	100%	0dB
n/ac HT20 – mode	-/-	-/-	100%	0dB
n/ac HT40 – mode	-/-	-/-	100%	0dB
ac HT80 – mode	-/-	-/-	100%	0dB

11.3 Maximum output power

11.3.1 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
External result file(s)	1-9152_18-01-07_log1_conducted.pdf 1-9152_18-01-07_log2_conducted.pdf 1-9152_18-01-07_log3_conducted.pdf 1-9152_18-01-07_log4_conducted.pdf
Analyzer function	Band power / channel power 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 5.150-5.250 GHz The lesser one of 250mW or 11 dBm + 10 log Bandwidth 5.250-5.350 GHz 250mW or 11 dBm + 10 log Bandwidth 5.470-5.725 GHz (where Bandwidth is the 26dB Bandwidth [MHz]) 1W 5.725-5.85 GHz

Note: The output power limits are reduced by 0.6 dB for all frequency bands to compensate for the maximum amount the antenna gain exceeds 6dBi (see section 11.1).

Results:

a	Maximum output power conducted [dBm]		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	1.5	1.2	1.0
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	1.0	0.6	0.5
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	2.8	5.3	6.3
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	9.3	9.9	9.8

Results:

n/ac HT20	Maximum output power conducted [dBm]		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	1.1	0.8	0.6
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	1.0	0.5	0.3
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	2.9	5.4	6.5
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	9.5	10.0	10.0

Results:

n/ac HT40	Maximum output power conducted [dBm]	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Lowest channel	Highest channel
	-0.2	-0.3
	U-NII-2A (5250 MHz to 5350 MHz)	
	Lowest channel	Highest channel
	-0.1	-0.5
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Middle channel	Highest channel
	2.7	4.2	5.5
	U-NII-3 (5725 MHz to 5850 MHz)	
	Lowest channel	Highest channel
	8.7	9.5

Results:

ac VHT80	Maximum output power conducted [dBm]	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Middle channel	
	-0.1	
	U-NII-2A (5250 MHz to 5350 MHz)	
	Middle channel	
	-0.1	
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Highest channel
	3.4	5.6
	U-NII-3 (5725 MHz to 5850 MHz)	
	Middle channel	
	9.6	

11.3.2 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
External result file(s)	1-9152_18-01-07_log1_conducted.pdf 1-9152_18-01-07_log2_conducted.pdf 1-9152_18-01-07_log3_conducted.pdf 1-9152_18-01-07_log4_conducted.pdf
Analyzer function	Band power / channel power 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 200 mW or 10 dBm + 10 log Bandwidth 5.150-5.250 GHz 1 W or 17 dBm + 10 log Bandwidth 5.250-5.350 GHz 1 W or 17 dBm + 10 log Bandwidth 5.470-5.725 GHz (where Bandwidth is the 99% Bandwidth [MHz]) Conducted power + 6dBi antenna gain 5.725-5.825 GHz	The lesser one of 250mW or 11 dBm + 10 log Bandwidth 5.250-5.350 GHz 250mW or 11 dBm + 10 log Bandwidth 5.470-5.725 GHz (where Bandwidth is the 99% Bandwidth [MHz]) 1W 5.725-5.825 GHz

Note: The output power limits are reduced by 0.6 dB for all frequency bands to compensate for the maximum amount the antenna gain exceeds 6dBi (see section 11.1).

Results:

a	Maximum output power [dBm]		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	1.4	1.1	0.9
	Radiated (calculated – see chapter antenna gain)		
	7.5	7.7	7.5
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	1.0	0.5	0.4
	Radiated (calculated – see chapter antenna gain)		
	7.2	6.7	6.4
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	2.7	5.2	6.2
	Radiated (calculated – see chapter antenna gain)		
	4.6	8.6	7.0
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	9.2	9.8	9.8
	Radiated (calculated – see chapter antenna gain)		
	8.5	8.8	10.9

Results:

n/ac HT20	Maximum output power [dBm]		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	0.9	0.7	0.6
	Radiated (calculated – see chapter antenna gain)		
	7.0	7.3	7.2
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	0.9	0.4	0.2
	Radiated (calculated – see chapter antenna gain)		
	7.1	6.6	6.2
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	2.8	5.2	6.4
	Radiated (calculated – see chapter antenna gain)		
	4.7	8.6	7.2
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	9.4	9.9	9.9
	Radiated (calculated – see chapter antenna gain)		
	8.7	8.9	11.0

Results:

n/ac HT40	Maximum output power [dBm]		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel		Highest channel
	Conducted		
	-0.1		-0.4
	Radiated (calculated – see chapter antenna gain)		
	6.0		6.2
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel		Highest channel
	Conducted		
	-0.1		-0.5
	Radiated (calculated – see chapter antenna gain)		
	6.1		5.5
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	Conducted		
	2.6	4.2	5.4
	Radiated (calculated – see chapter antenna gain)		
	4.5	7.6	6.2
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel		Highest channel
	Conducted		
	8.7		9.4
	Radiated (calculated – see chapter antenna gain)		
	8.0		10.5

Results:

ac VHT80	Maximum output power [dBm]	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Middle channel	
	Conducted	
	-0.2	
	Radiated (calculated – see chapter antenna gain)	
	6.4	
	U-NII-2A (5250 MHz to 5350 MHz)	
	Middle channel	
	Conducted	
	-0.2	
	Radiated (calculated – see chapter antenna gain)	
	6.0	
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Highest channel
	Conducted	
	3.4	5.1
	Radiated (calculated – see chapter antenna gain)	
	5.3	5.9
	U-NII-3 (5725 MHz to 5850 MHz)	
	Middle channel	
	Conducted	
	8.9	
	Radiated (calculated – see chapter antenna gain)	
	7.9	

11.4 Power spectral density

11.4.1 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 500 kHz for U-NII-3
Video bandwidth:	≥ 3xRBW
Span:	> EBW
Trace mode:	Max hold
External result file(s)	1-9152_18-01-07_log1_conducted.pdf 1-9152_18-01-07_log2_conducted.pdf 1-9152_18-01-07_log3_conducted.pdf 1-9152_18-01-07_log4_conducted.pdf
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 5150 – 5250 MHz) power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5250 – 5350 MHz) power spectral density conducted ≤ 11 dBm in any 1 MHz band (band 5470 – 5725 MHz) power spectral density conducted ≤ 30 dBm in any 500 kHz band (band 5725 – 5850 MHz)

Note: The power spectral density limits are reduced by 0.6 dB for all frequency bands to compensate for the maximum amount the antenna gain exceeds 6dBi (see section 11.1).

Results:

a	Power spectral density (dBm/1MHz or dBm/500kHz)		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	-9.6	-9.8	-9.9
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-10.0	-10.5	-10.6
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-8.2	-5.7	-4.8
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	-1.8	-1.1	-1.3

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
	-10.3	-10.6	-10.6
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-10.4	-10.9	-11.0
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-8.3	-5.9	-4.9
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	-1.9	-1.3	-1.4

Results:

n/ac HT40	Power spectral density (dBm/1MHz or dBm/500kHz)		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Highest channel	
	-14.6	-14.6	
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Highest channel	
	-14.4	-14.9	
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-11.4	-9.9	-8.8
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Highest channel	
	-5.6	-4.8	

Results:

ac VHT80	Power spectral density (dBm/1MHz or dBm/500kHz)	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Middle channel	
	-18.0	
	U-NII-2A (5250 MHz to 5350 MHz)	
	Middle channel	
	-18.2	
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Highest channel
	-14.3	-12.5
	U-NII-3 (5725 MHz to 5850 MHz)	
	Middle channel	
	-8.8	

11.4.2 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 500 kHz for U-NII-3
Video bandwidth:	≥ 3xRBW
Span:	> EBW
Trace mode:	Max hold
External result file(s)	1-9152_18-01-07_log1_conducted.pdf 1-9152_18-01-07_log2_conducted.pdf 1-9152_18-01-07_log3_conducted.pdf 1-9152_18-01-07_log4_conducted.pdf
Used test setup:	See chapter 6.4 – A
Measurement uncertainty:	See chapter 8

Limits:

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

Note: The power spectral density limits are reduced by 0.6 dB for all frequency bands to compensate for the maximum amount the antenna gain exceeds 6dBi (see section 11.1).

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		
	-9.6	-9.9	-10.0
	Radiated (calculated – see chapter antenna gain)		
	-3.5	-3.3	-3.4
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-10.0	-10.5	-10.6
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-8.2	-5.7	-4.8
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	-1.8	-1.2	-1.3

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		
	-10.3	-10.6	-10.6
	Radiated (calculated – see chapter antenna gain)		
	-4.2	-4.0	-4.0
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	-10.4	-10.9	-11.0
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-8.4	-5.9	-4.9
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	-1.8	-1.3	-1.4

Results:

n/ac HT40	Power spectral density (dBm/1MHz or dBm/500kHz)		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel		Highest channel
	Conducted		
	-14.4		-14.6
	Radiated (calculated – see chapter antenna gain)		
	-8.3		-8.0
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel		Highest channel
	-14.4		-14.8
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	-11.4	-9.9	-8.8
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel		Highest channel
	-5.6		-4.8

Results:

ac VHT80	Power spectral density (dBm/1MHz or dBm/500kHz)	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Middle channel	
	Conducted	
	-18.0	
	Radiated (calculated – see chapter antenna gain)	
	-11.4	
	U-NII-2A (5250 MHz to 5350 MHz)	
	Middle channel	
	-18.2	
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Highest channel
	-14.3	-12.5
	U-NII-3 (5725 MHz to 5850 MHz)	
	Middle channel	
	-8.9	

11.5 Minimum emission bandwidth for the band 5.725-5.85 GHz

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
According to: KDB789033 D02, C.2.	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	40 MHz
Measurement procedure:	Using marker to find -6dBc frequencies
Trace mode:	Max hold (allow trace to stabilize)
External result file(s)	1-9152_18-01-07_log1_conducted.pdf 1-9152_18-01-07_log2_conducted.pdf 1-9152_18-01-07_log3_conducted.pdf 1-9152_18-01-07_log4_conducted.pdf
Used test setup:	See chapter 6.4 – A
Measurement uncertainty:	See chapter 8

Limits:

FCC	IC
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
	16.55	16.35	16.55

Results:

n/ac HT20	6 dB emission bandwidth (MHz)		
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	17.65	17.65	17.65

Results:

n/ac HT40	6 dB emission bandwidth (MHz)	
	U-NII-3 (5725 MHz to 5850 MHz)	
	Lowest channel	Highest channel
	36.4	36.4

Results:

ac VHT80	6 dB emission bandwidth (MHz)
	U-NII-3 (5725 MHz to 5850 MHz)
	Middle channel
	76.6

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
External result file(s)	1-9152_18-01-07_log1_conducted.pdf 1-9152_18-01-07_log2_conducted.pdf 1-9152_18-01-07_log3_conducted.pdf 1-9152_18-01-07_log4_conducted.pdf
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. **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
	19.90	20.00	19.80
	Lowest frequency	Highest frequency	
	5170.04	5249.95	
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	19.80	20.05	20.00
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	19.90	20.00	19.90
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	20.00	19.800	19.85
	Lowest frequency	Highest frequency	
	5735.00	5834.90	

Results:

n/ac HT20	26 dB bandwidth (MHz)		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	20.30	20.35	20.25
	Lowest frequency	Highest frequency	
	5169.80	5250.16*	
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	20.35	20.50	20.45
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	20.35	20.40	20.35
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	20.35	20.35	25.70
	Lowest frequency	Highest frequency	
	5734.76	5835.12	

* 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 5248.8 MHz and falls completely within the U-NII-1 band.

Results:

n/ac HT40	26 dB bandwidth (MHz)		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel		Highest channel
	40.60		40.90
	Lowest frequency		Highest frequency
	5169.68		5250.40*
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel		Highest channel
	40.70		40.60
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	40.7	41.1	40.7
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel		Highest channel
	40.7		41.1
	Lowest frequency		Highest frequency
	5734.6		5815.4

* 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 5248.18 MHz and falls completely within the U-NII-1 band.

Results:

ac VHT80	26 dB bandwidth (MHz)	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Middle channel	
	82.00	
	Lowest frequency	Highest frequency
	5169.20	5250.96*
	U-NII-2A (5250 MHz to 5350 MHz)	
	Middle channel	
	82.00	
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Highest channel
	81.6	81.6
	U-NII-3 (5725 MHz to 5850 MHz)	
	Middle channel	
	81.4	
	Lowest frequency	Highest frequency
	5734.12	5815.52

* 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 5248.36 MHz and falls completely within the U-NII-1 band.

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)
External result file(s)	1-9152_18-01-07_log1_conducted.pdf 1-9152_18-01-07_log2_conducted.pdf 1-9152_18-01-07_log3_conducted.pdf 1-9152_18-01-07_log4_conducted.pdf
Test setup:	See sub clause 6.4 – A
Measurement uncertainty:	See chapter 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
	16833	16733	16783
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
a	16733	16783	16783
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	16783	16783	16783
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	16783	16733	16783

Results:

n/ac HT20	99% bandwidth (kHz)		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel	Middle channel	Highest channel
	17682	17732	17732
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel	Middle channel	Highest channel
	17682	17732	17682
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	17732	17682	17682
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel	Middle channel	Highest channel
	17682	17782	17782

Results:

n/ac HT40	99% bandwidth (kHz)		
	U-NII-1 (5150 MHz to 5250 MHz)		
	Lowest channel		Highest channel
	36164		36264
	U-NII-2A (5250 MHz to 5350 MHz)		
	Lowest channel		Highest channel
	36164		36264
	U-NII-2C (5470 MHz to 5725 MHz)		
	Lowest channel	Middle channel	Highest channel
	36164	36364	36264
	U-NII-3 (5725 MHz to 5850 MHz)		
	Lowest channel		Highest channel
	36364		36264

Results:

ac VHT80	99% bandwidth (kHz)	
	U-NII-1 (5150 MHz to 5250 MHz)	
	Middle channel	
	76523	
	U-NII-2A (5250 MHz to 5350 MHz)	
	Middle channel	
	76523	
	U-NII-2C (5470 MHz to 5725 MHz)	
	Lowest channel	Highest channel
	76324	76523
	U-NII-3 (5725 MHz to 5850 MHz)	
	Middle channel	
	77123	

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 – B
Measurement uncertainty:	See chapter 8

Limits:

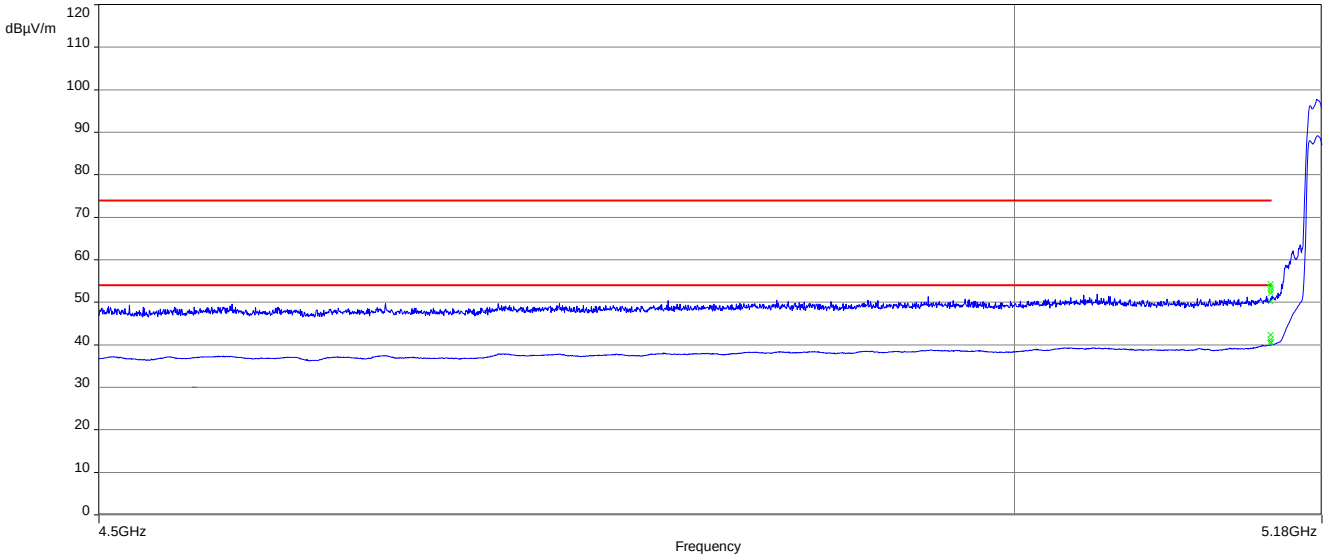
Band Edge Compliance Radiated
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within 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) 54 dBµV/m (average)

Result:

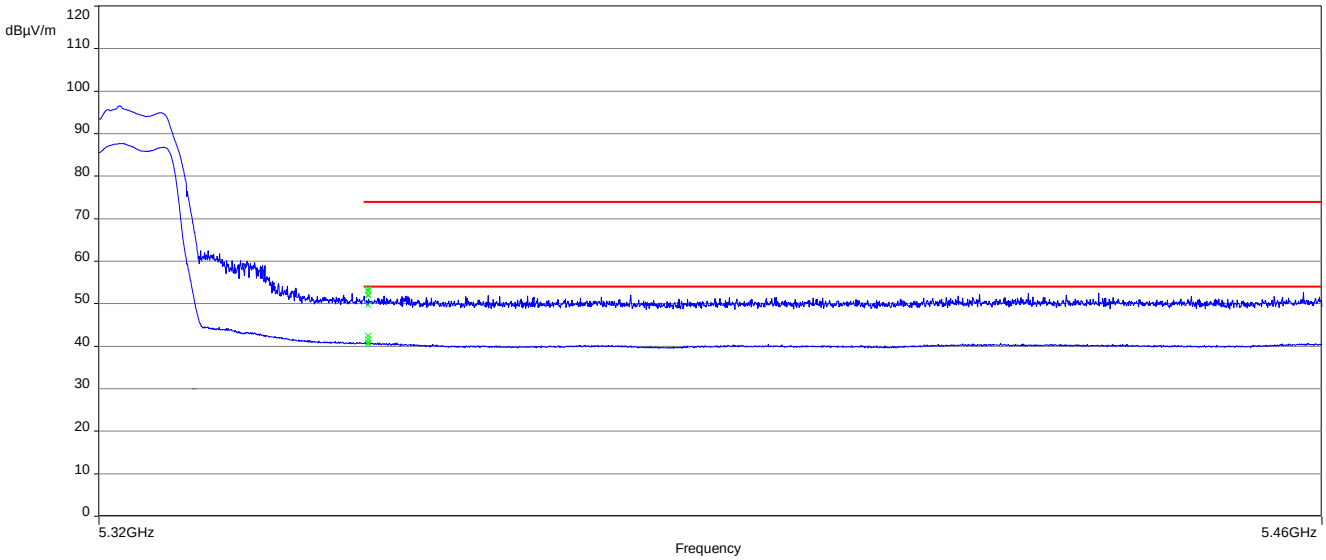
Scenario	Band Edge Compliance Radiated [dBµV/m]
band edge	< 74 dBµV/m (peak) < 54 dBµV/m (average)

Plots:

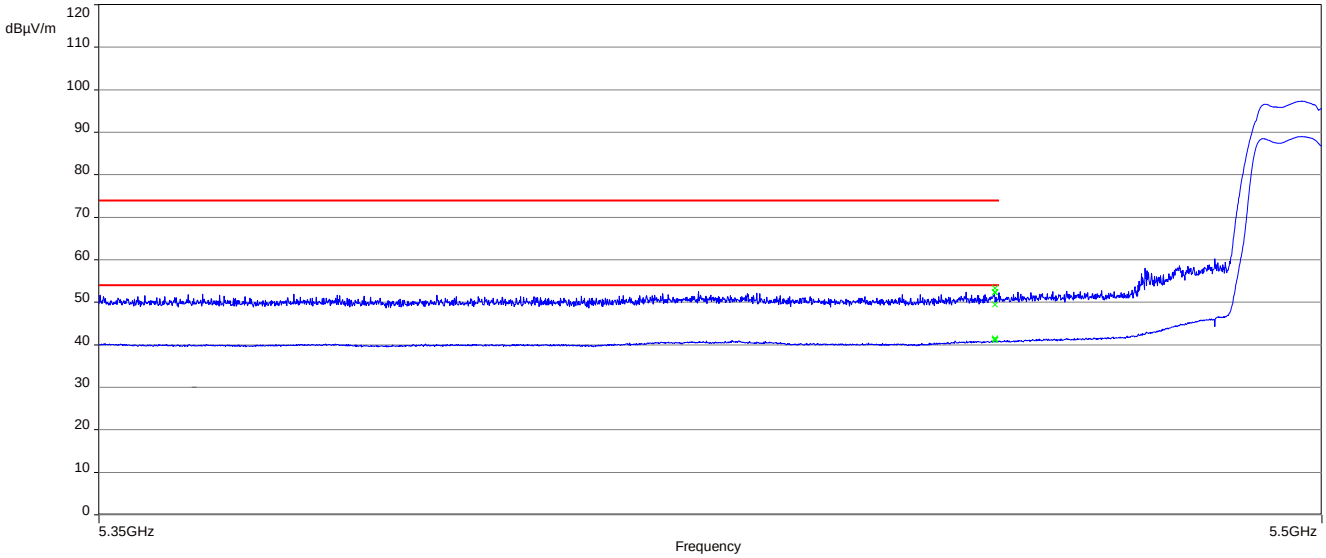
Plot 1: lower band edge; U-NII-1; lowest channel; 20 MHz channel bandwidth



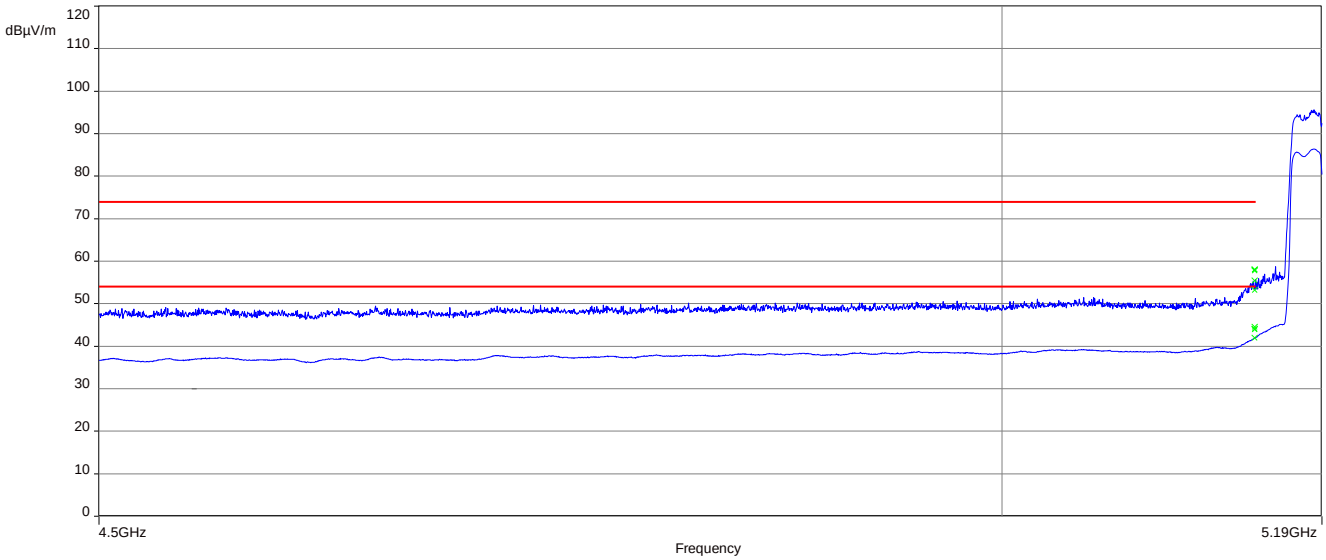
Plot 2: upper band edge; U-NII-2A; highest channel; 20 MHz channel bandwidth



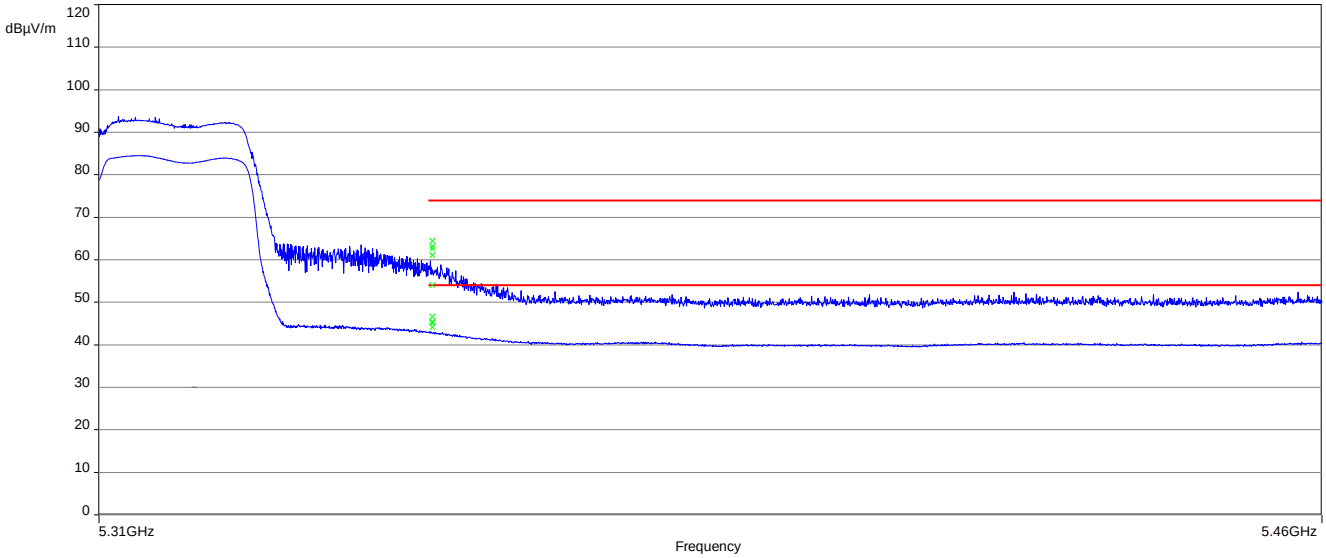
Plot 3: lower band edge; U-NII-2C; lowest channel; 20 MHz channel bandwidth



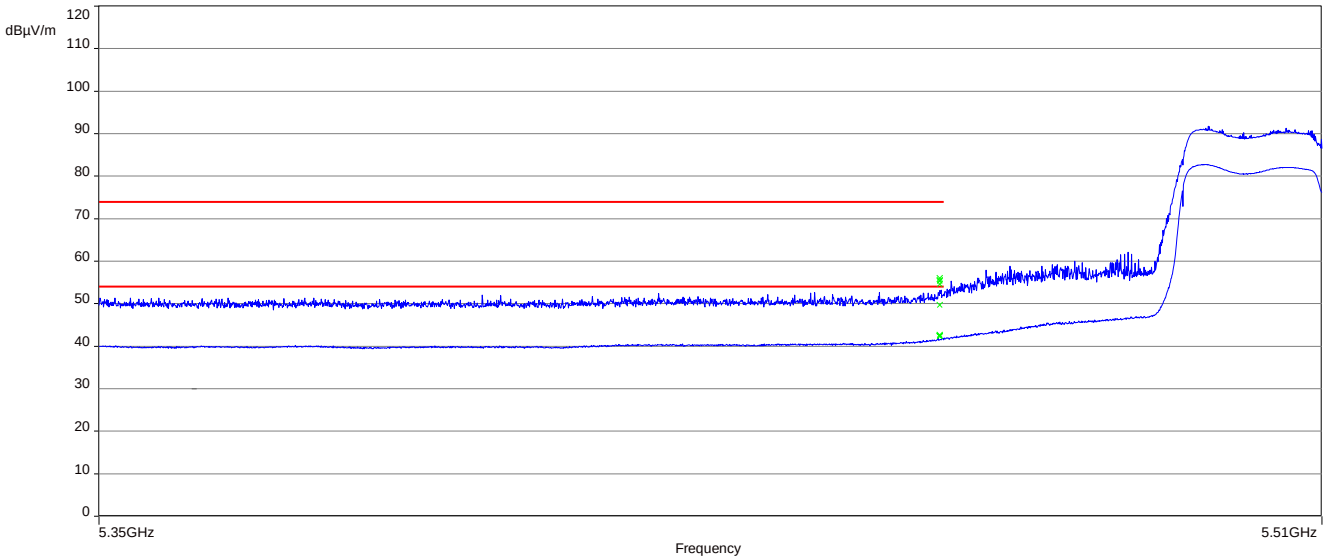
Plot 4: lower band edge; U-NII-1; lowest channel; 40 MHz channel bandwidth



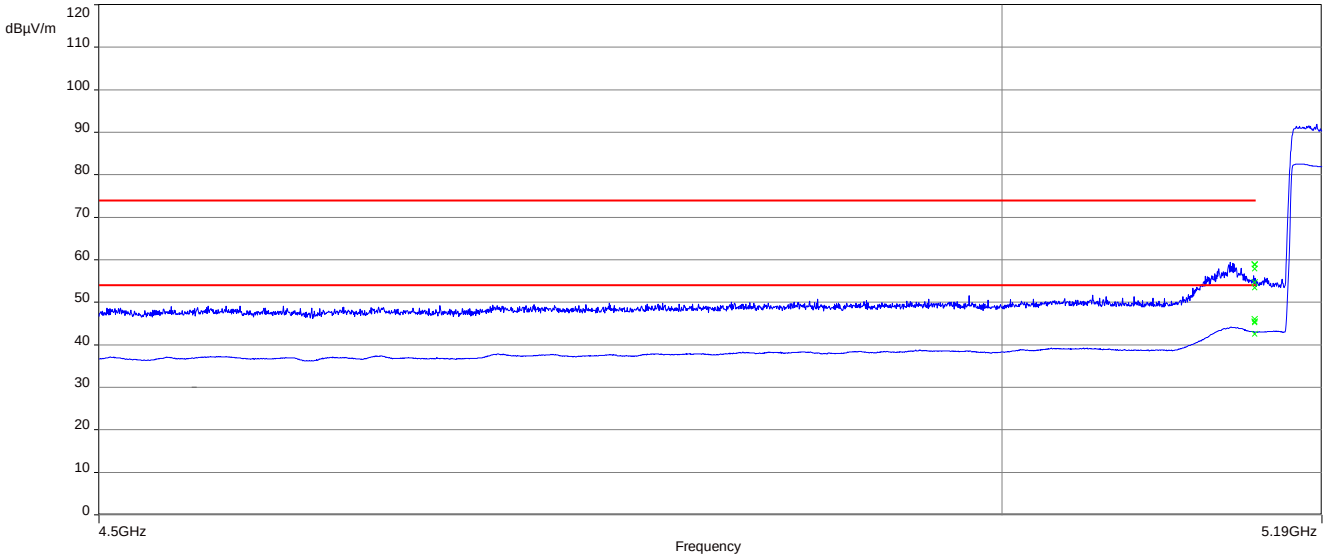
Plot 5: upper band edge; U-NII-2A; highest channel; 40 MHz channel bandwidth



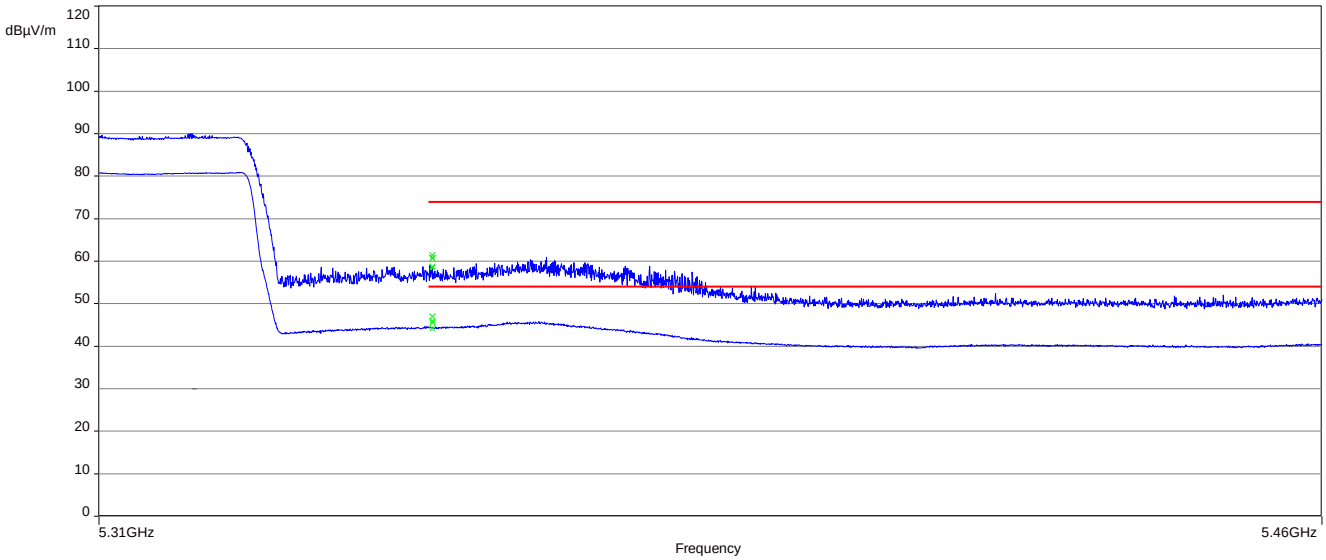
Plot 6: lower band edge; U-NII-2C; lowest channel; 40 MHz channel bandwidth



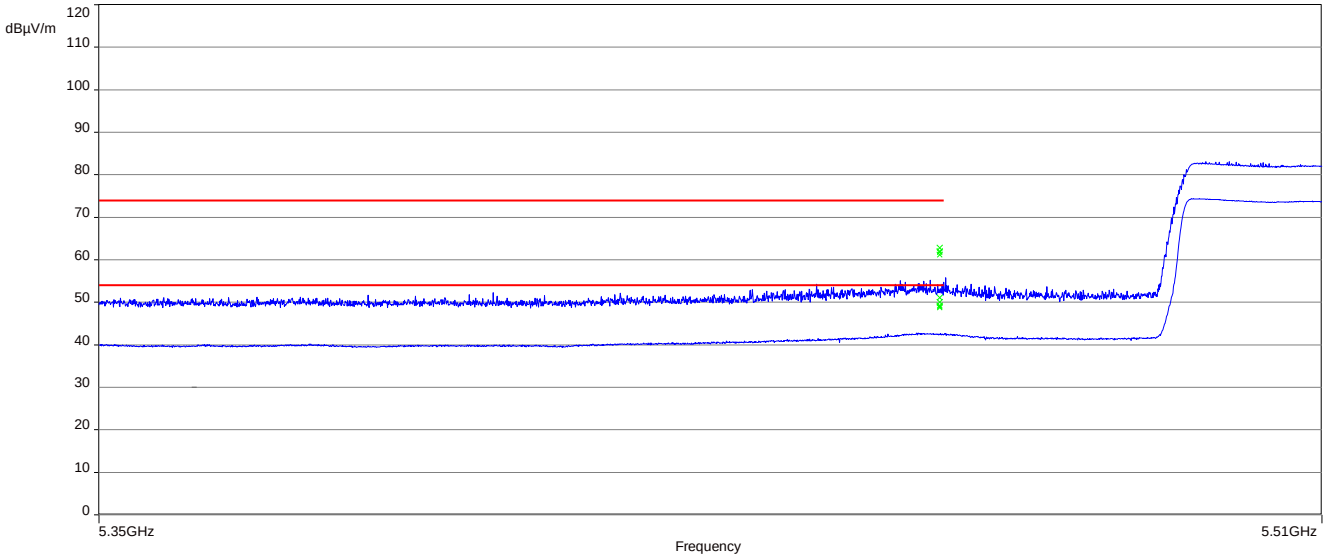
Plot 7: lower band edge; U-NII-1; middle channel; 80 MHz channel bandwidth



Plot 8: upper band edge; U-NII-2A; middle channel; 80 MHz channel bandwidth



Plot 9: lower band edge; U-NII-2C; lowest channel; 80 MHz channel bandwidth



11.9 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 6.2 – C
Measurement uncertainty:	See chapter 8

Limits:

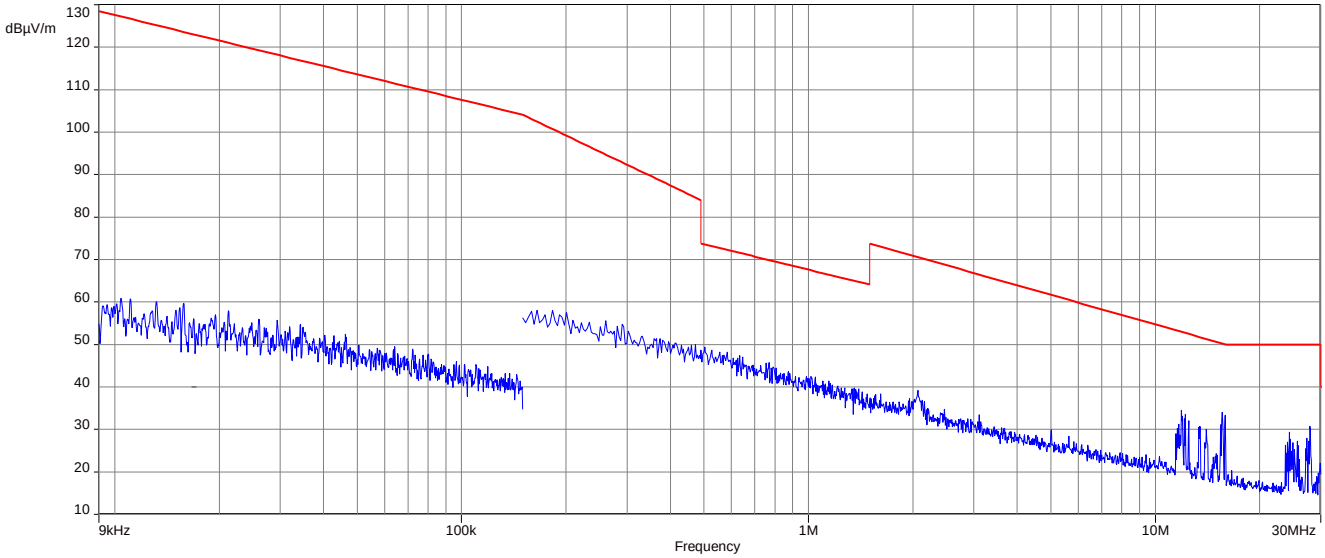
Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Results:

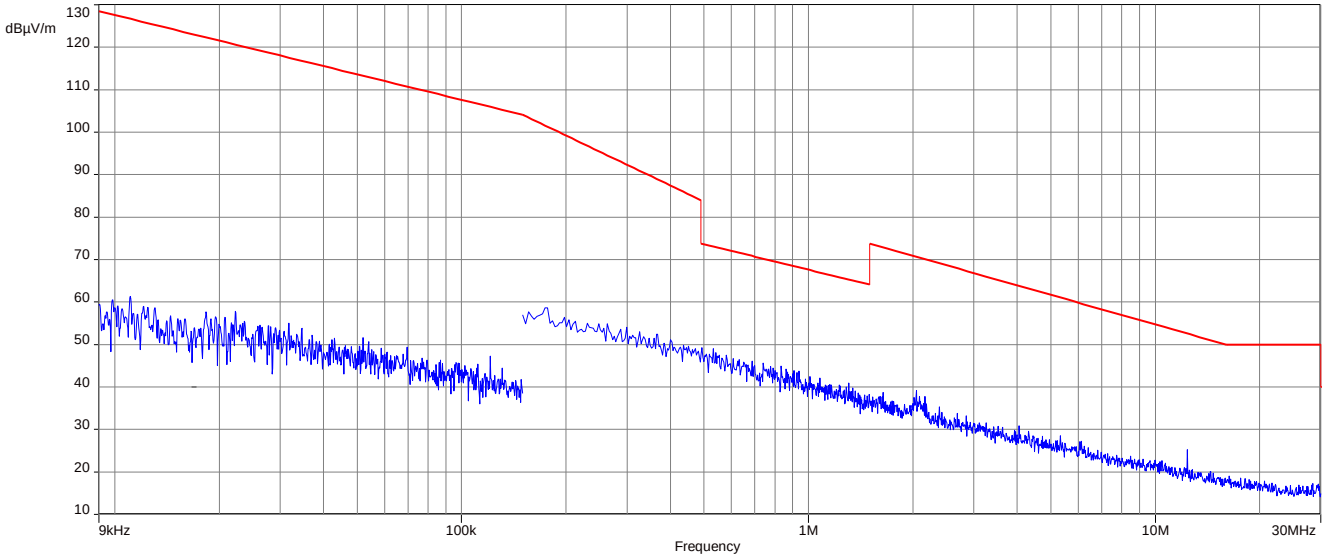
Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected emissions are more than 20 dB below the limit.		

Plots: 20 MHz channel bandwidth

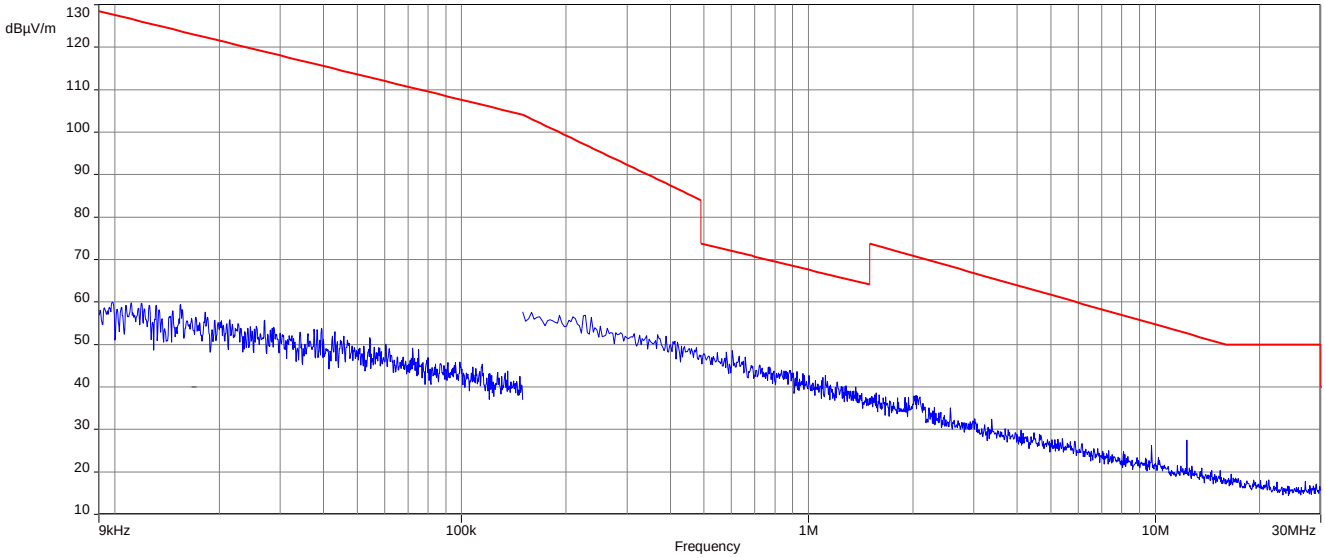
Plot 1: 9 kHz to 30 MHz, U-NII-1; lowest channel



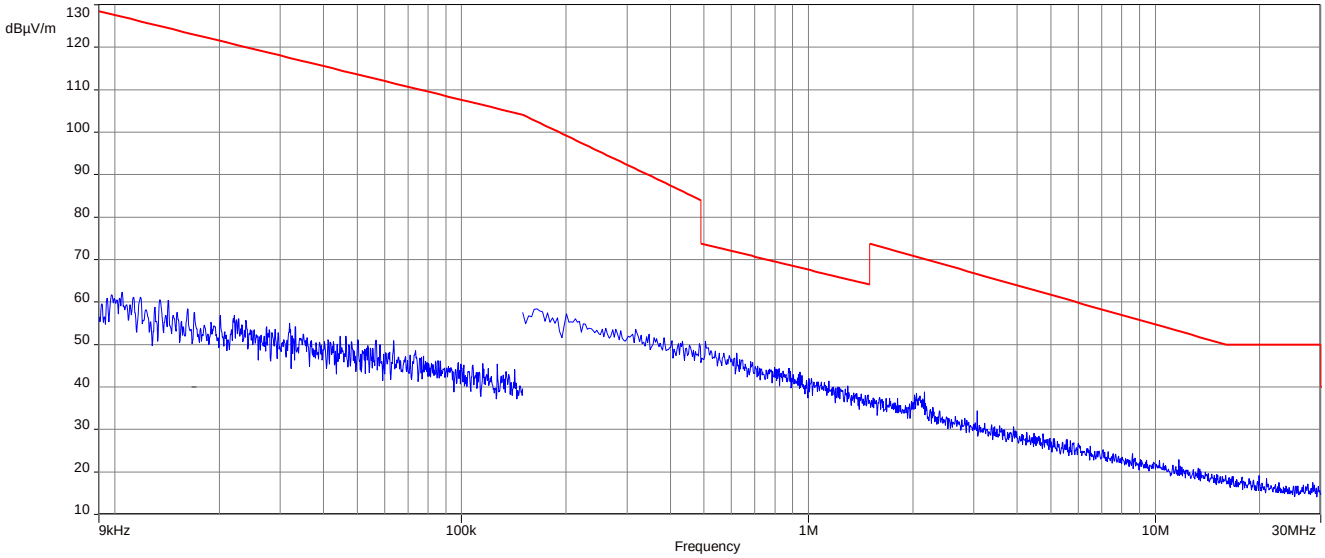
Plot 2: 9 kHz to 30 MHz, U-NII-1; highest channel



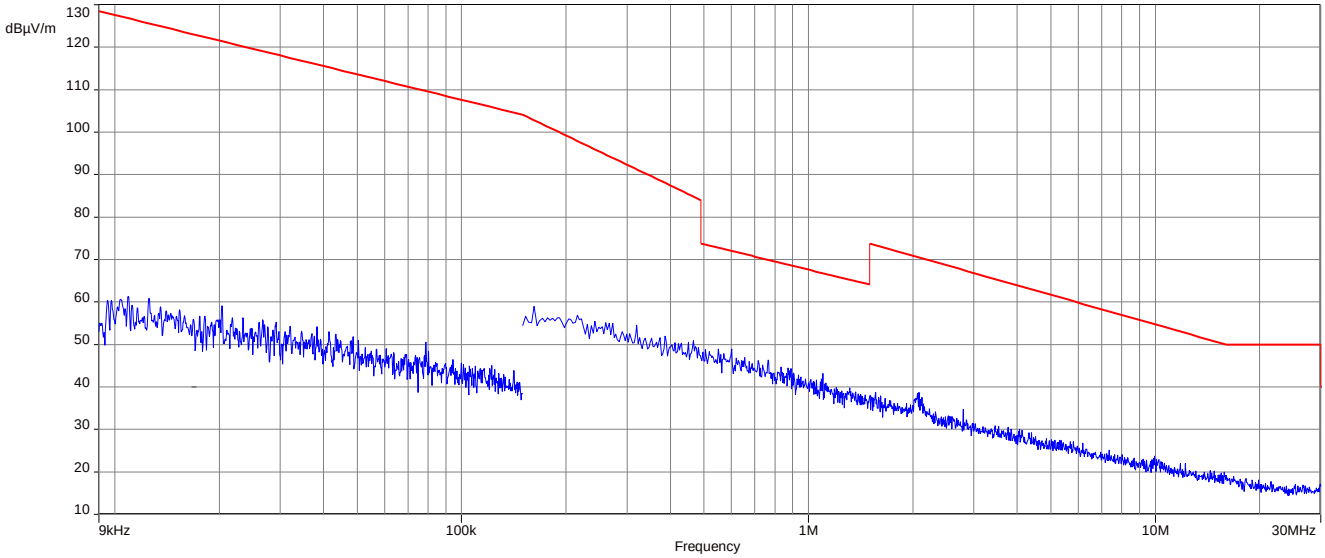
Plot 3: 9 kHz to 30 MHz, U-NII-2A; lowest channel



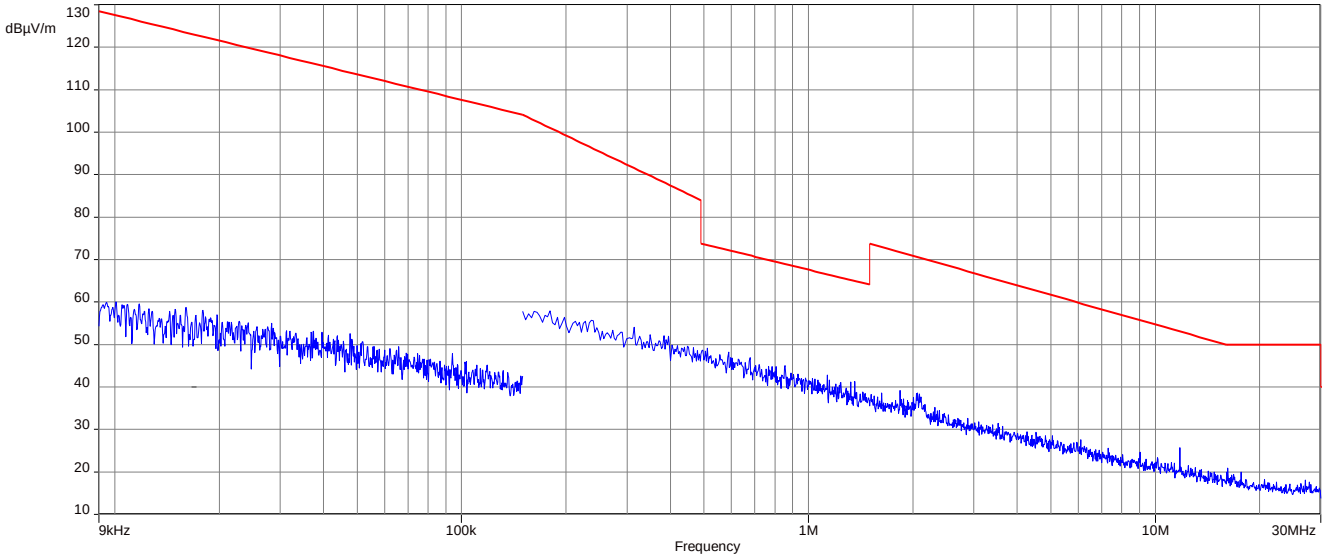
Plot 4: 9 kHz to 30 MHz, U-NII-2A; highest channel



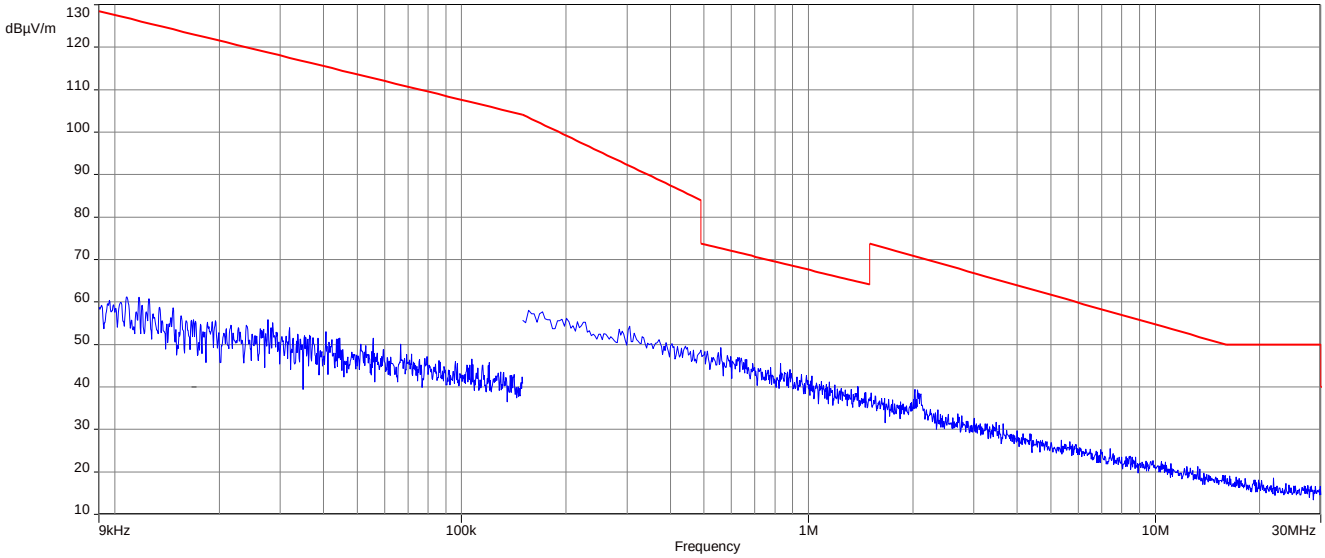
Plot 5: 9 kHz to 30 MHz, U-NII-2C; lowest channel



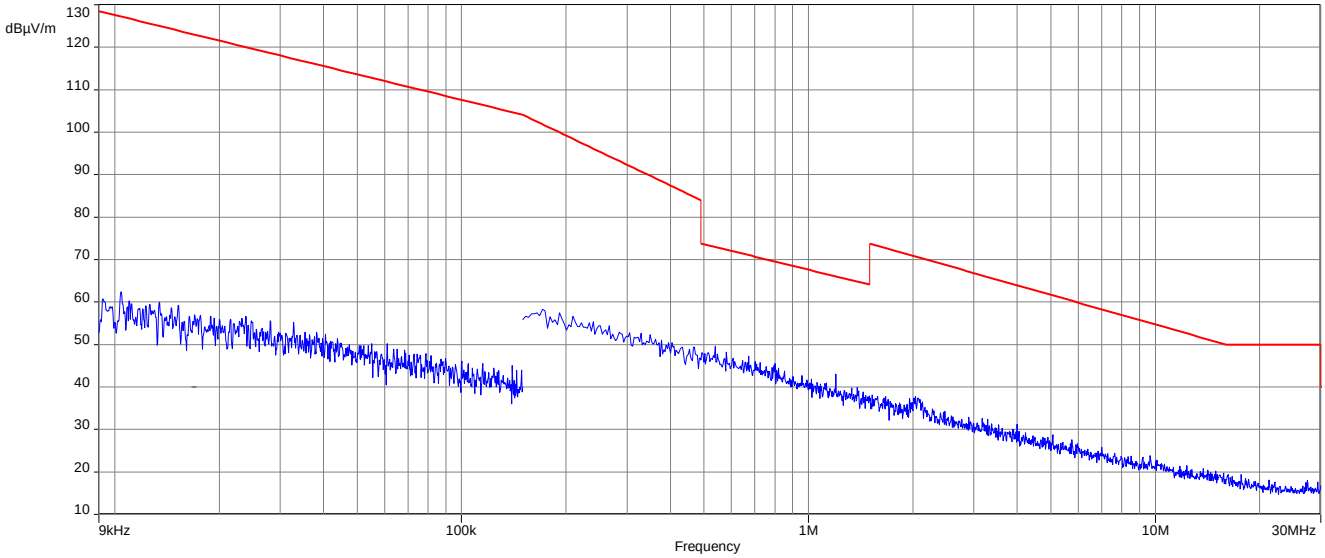
Plot 6: 9 kHz to 30 MHz, U-NII-2C; middle channel



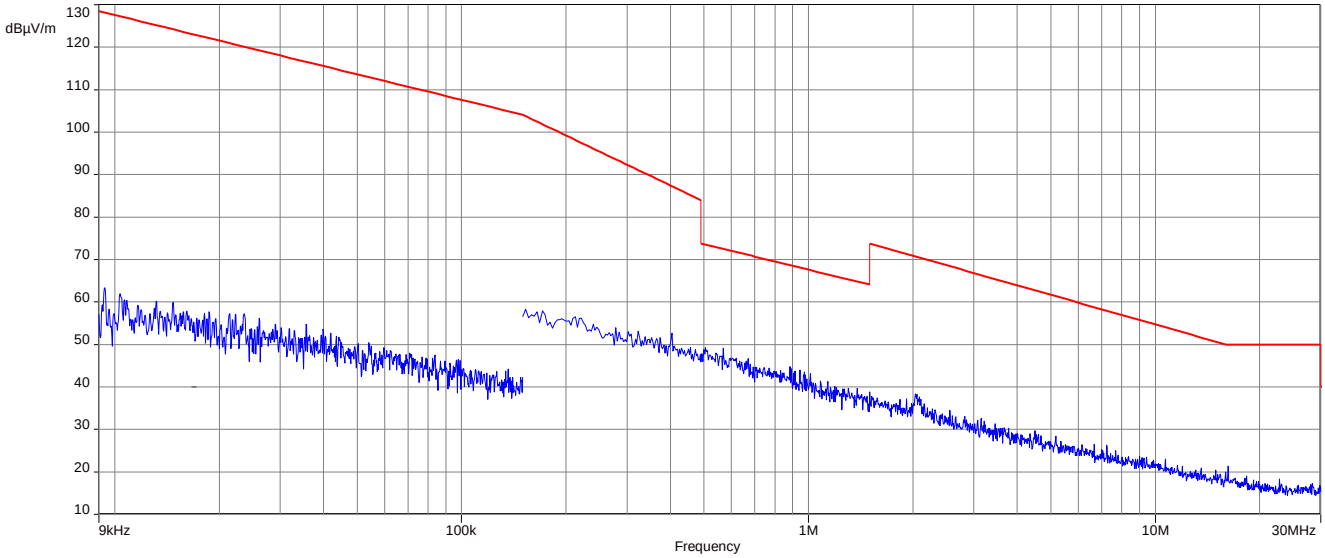
Plot 7: 9 kHz to 30 MHz, U-NII-2C; highest channel



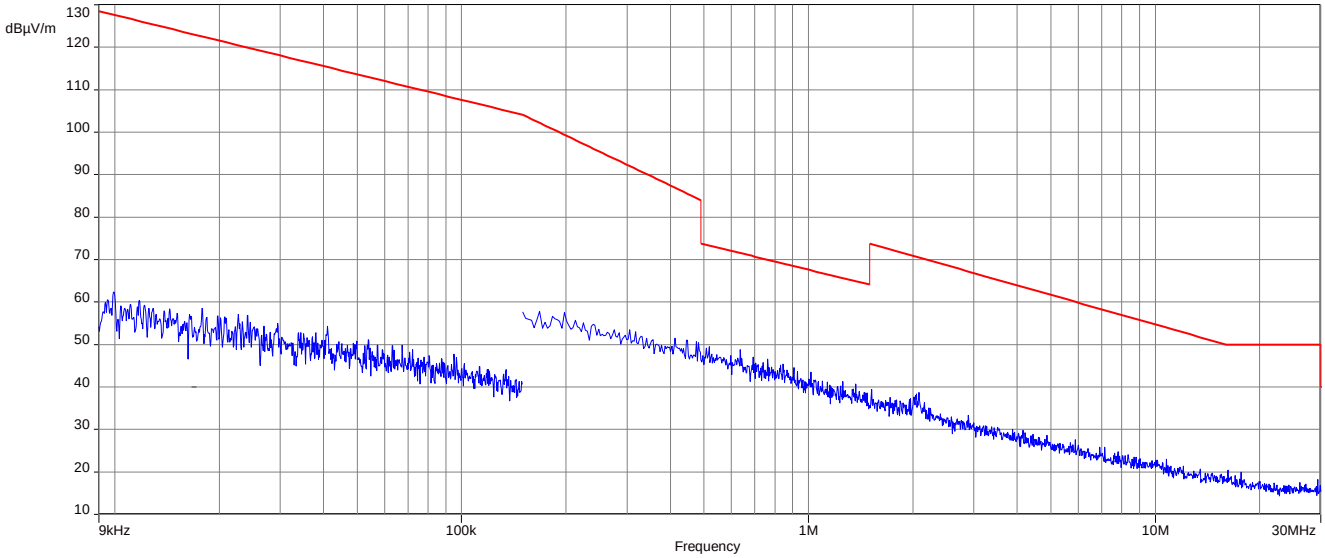
Plot 8: 9 kHz to 30 MHz, U-NII-3; lowest channel



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

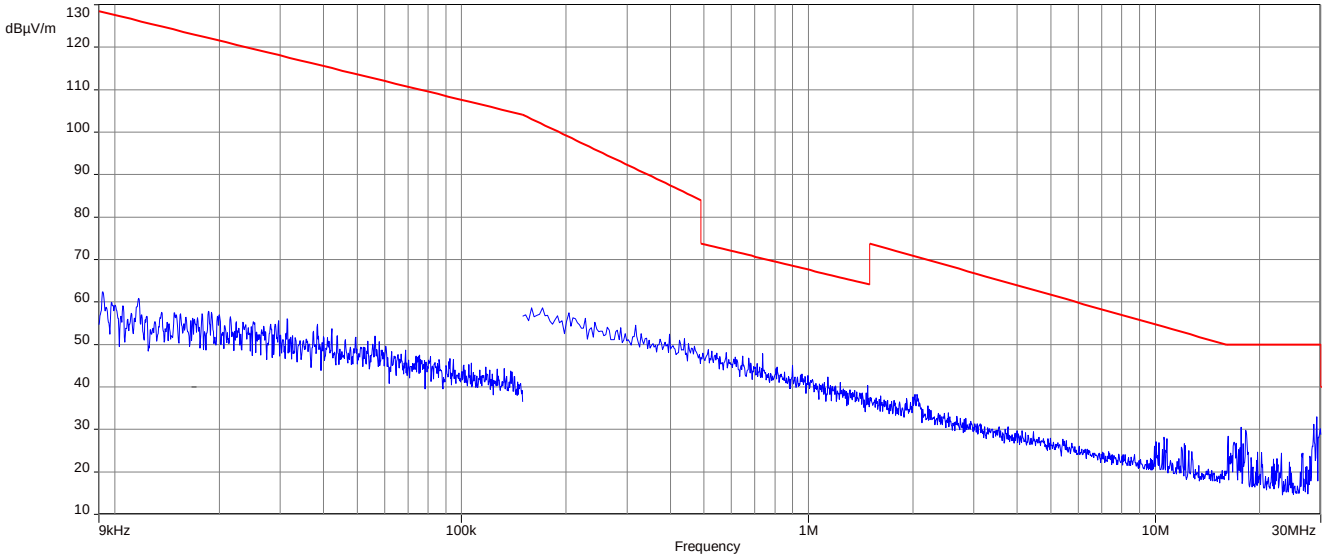


Plot 10: 9 kHz to 30 MHz, U-NII-3; highest channel

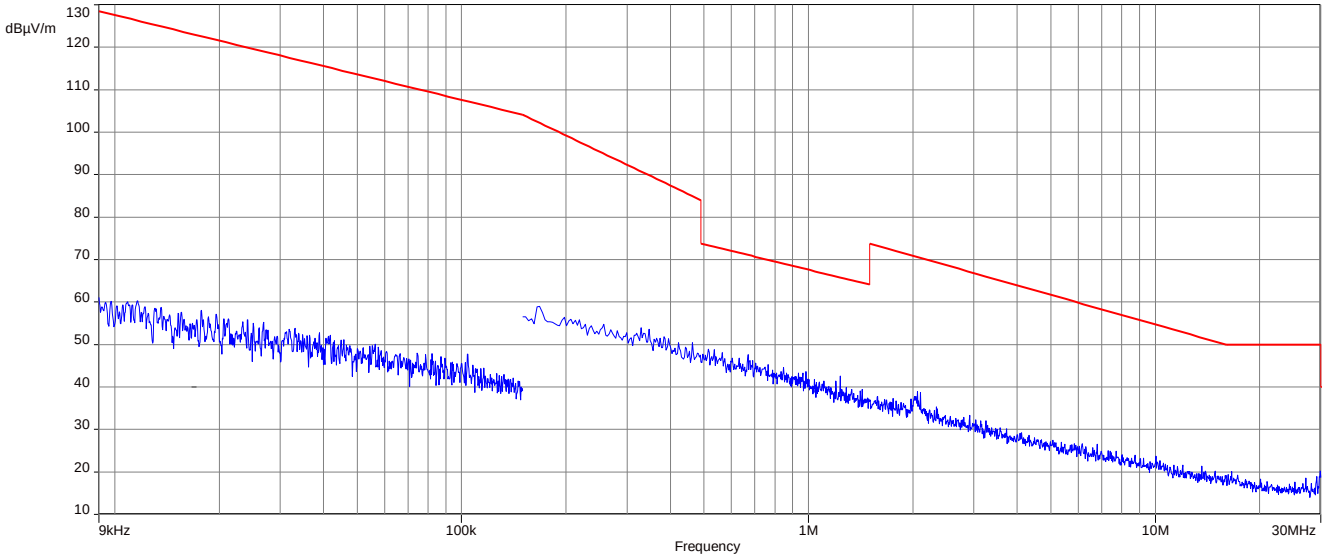


Plots: 40 MHz channel bandwidth

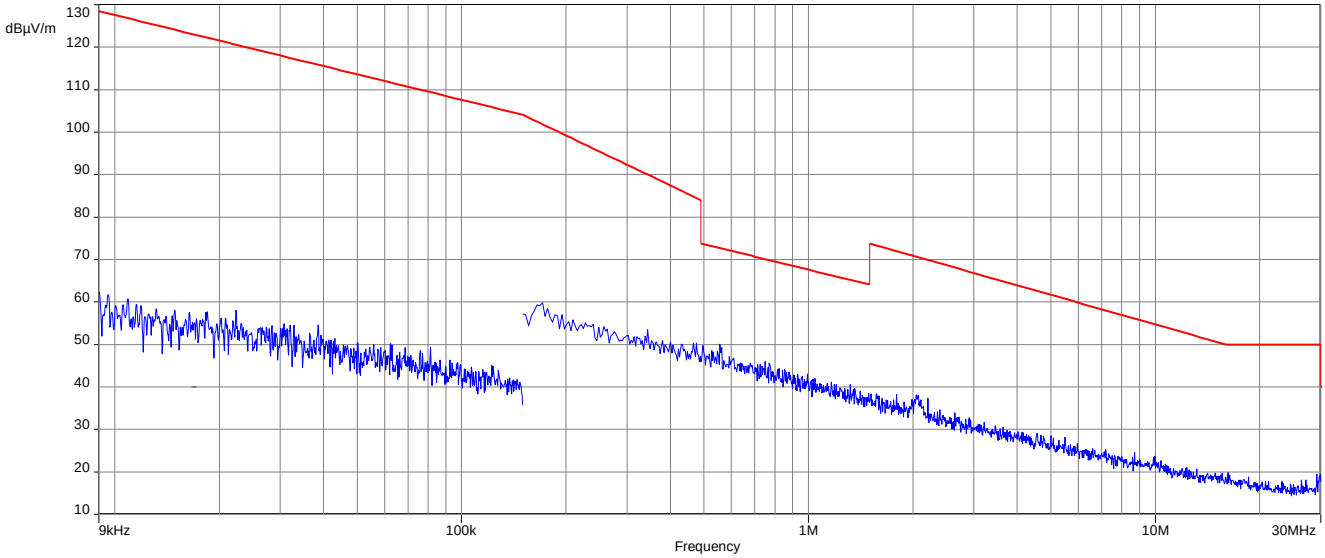
Plot 1: 9 kHz to 30 MHz, U-NII-1; lowest channel



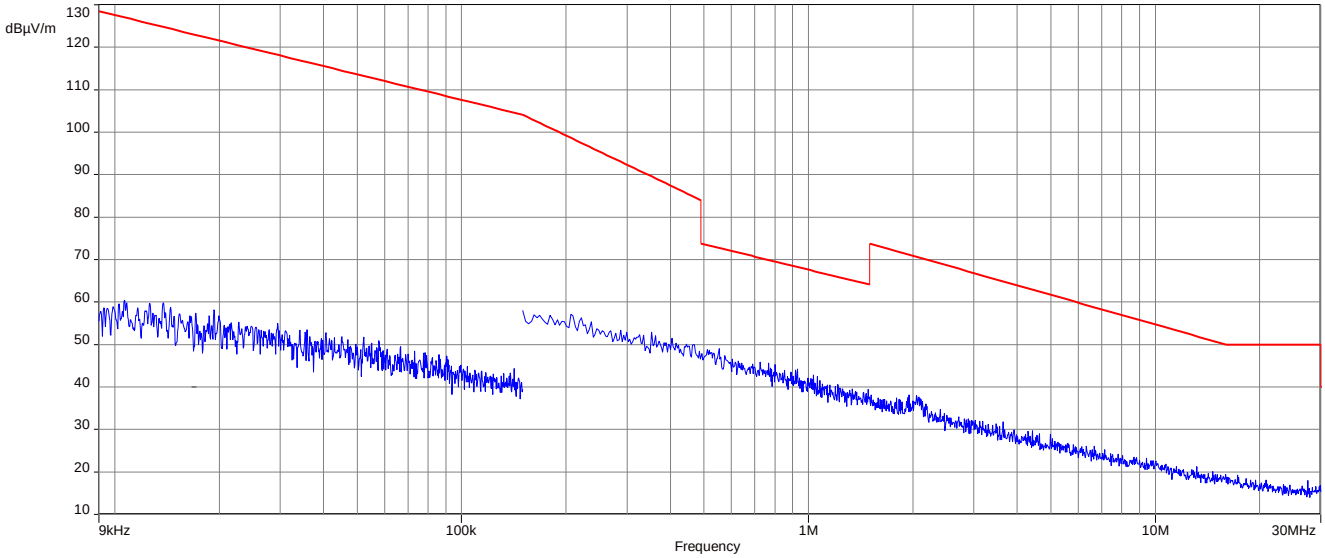
Plot 2: 9 kHz to 30 MHz, U-NII-1; highest channel



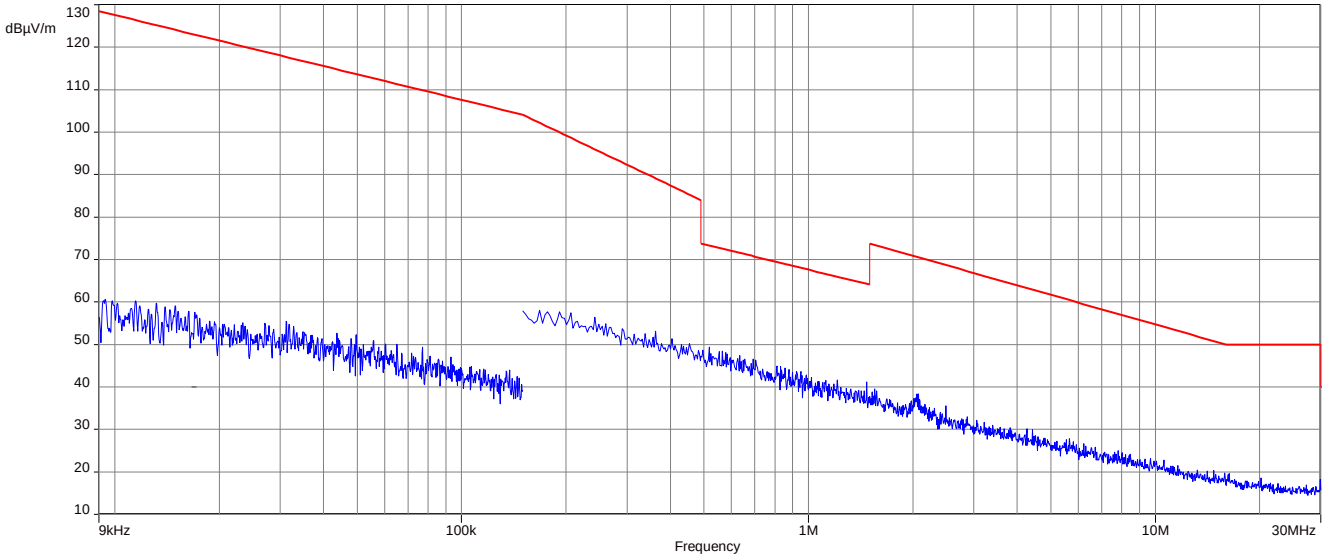
Plot 3: 9 kHz to 30 MHz, U-NII-2A; lowest channel



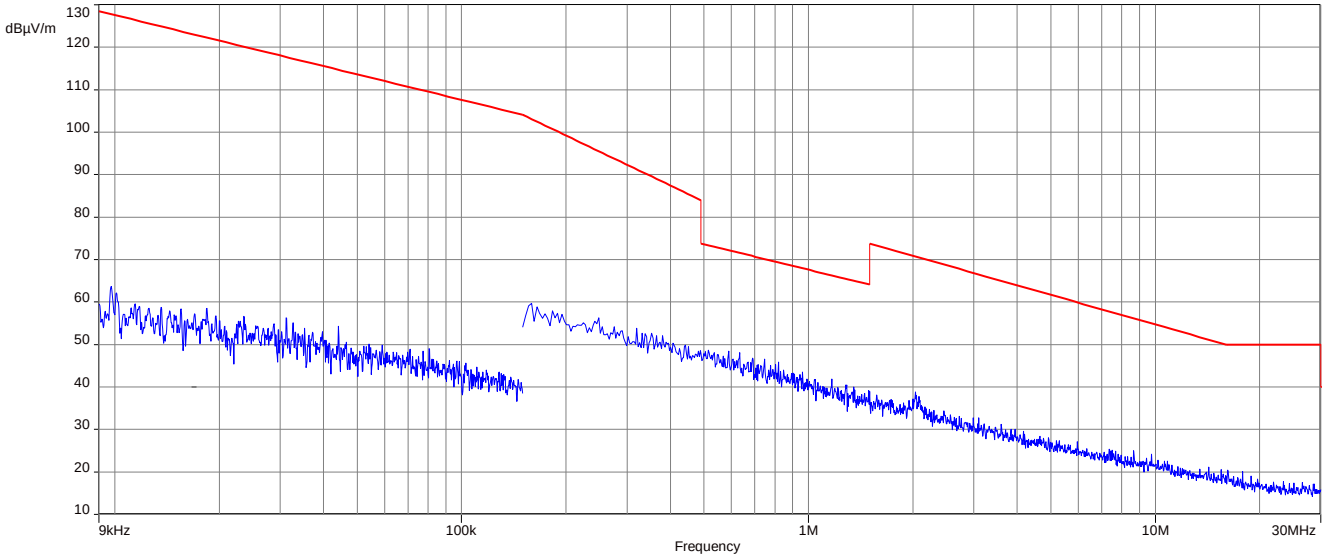
Plot 4: 9 kHz to 30 MHz, U-NII-2A; highest channel



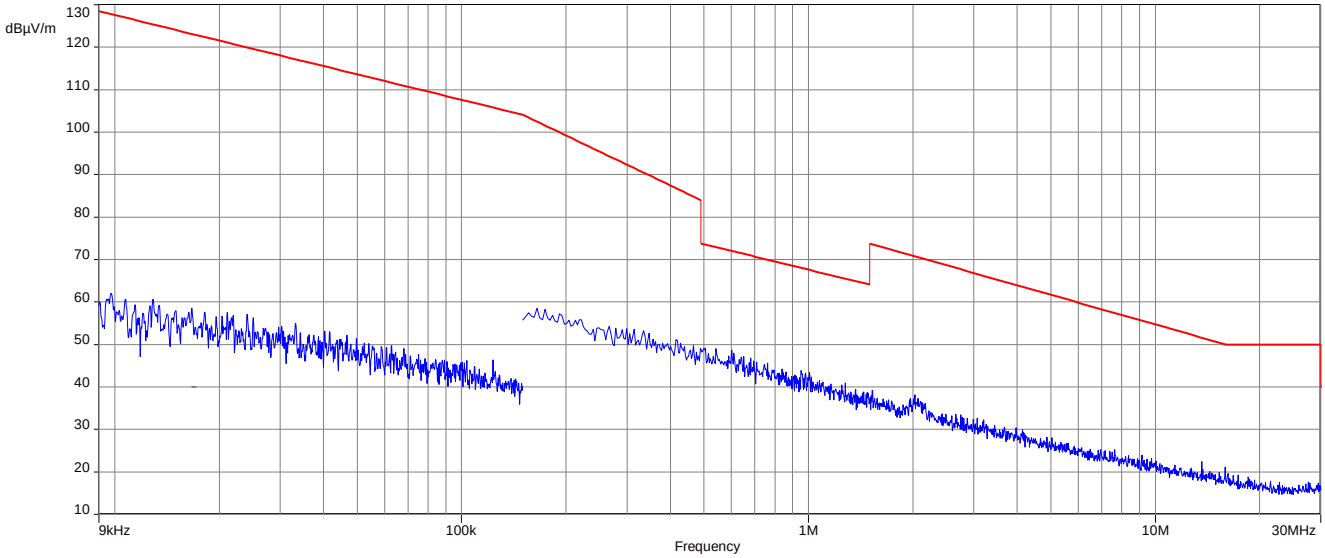
Plot 5: 9 kHz to 30 MHz, U-NII-2C; lowest channel



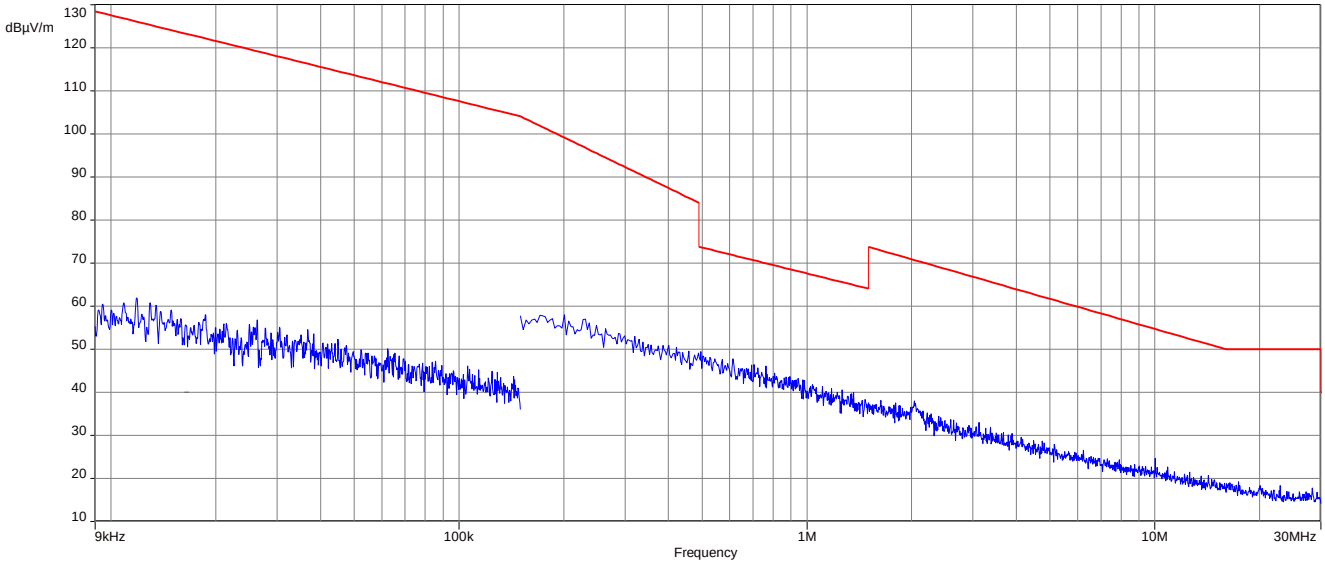
Plot 6: 9 kHz to 30 MHz, U-NII-2C; middle channel



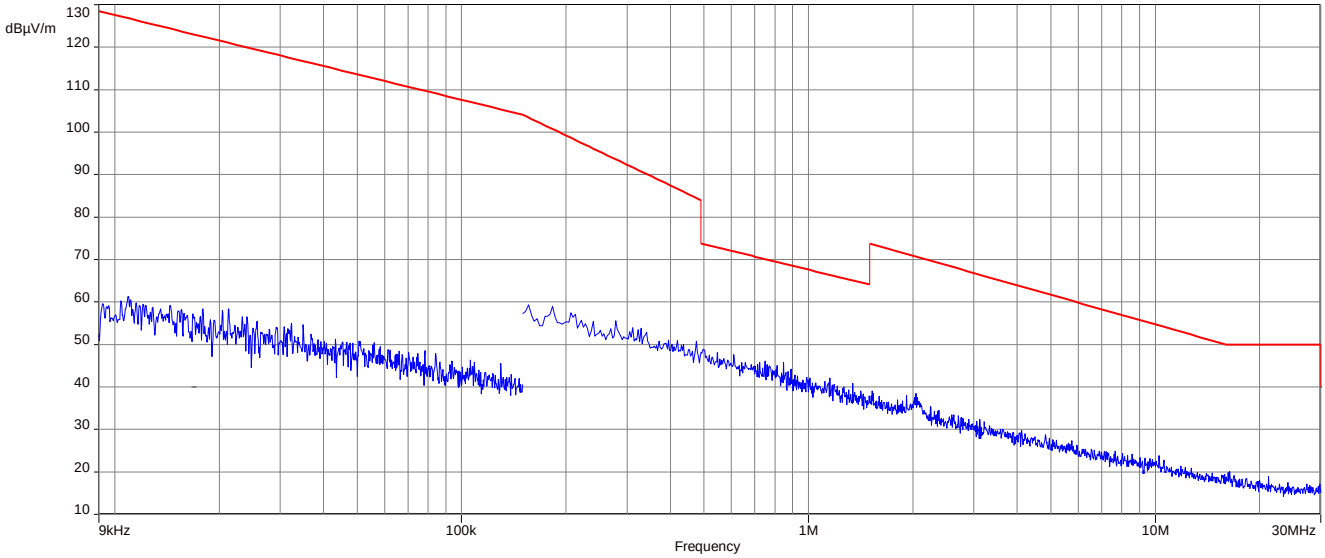
Plot 7: 9 kHz to 30 MHz, U-NII-2C; highest channel



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

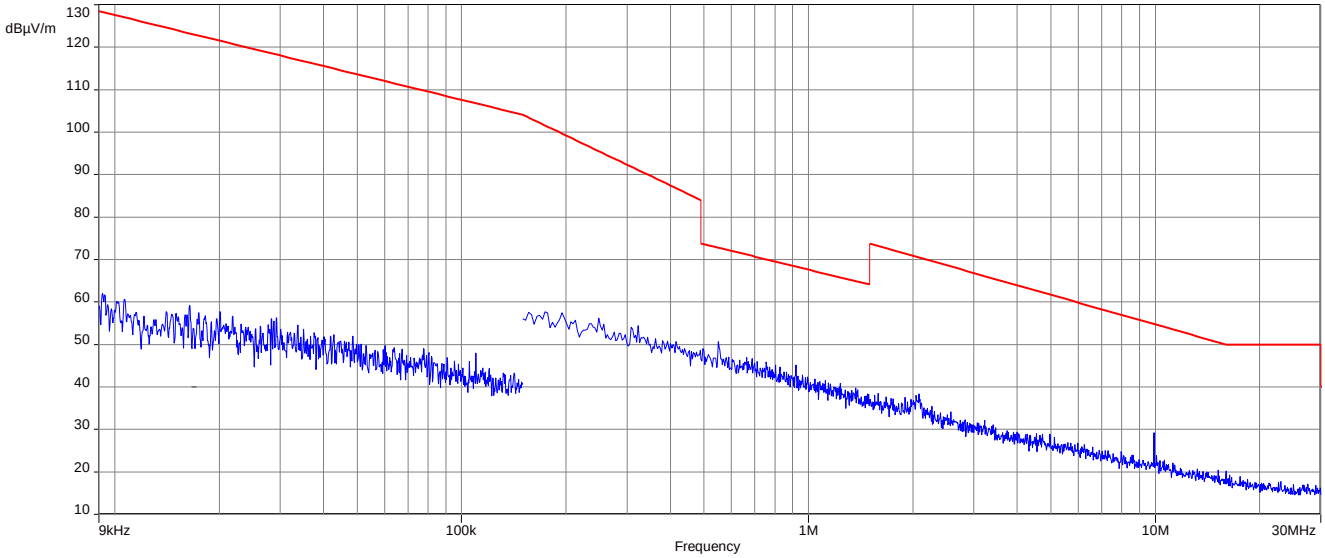


Plot 9: 9 kHz to 30 MHz, U-NII-3; highest channel

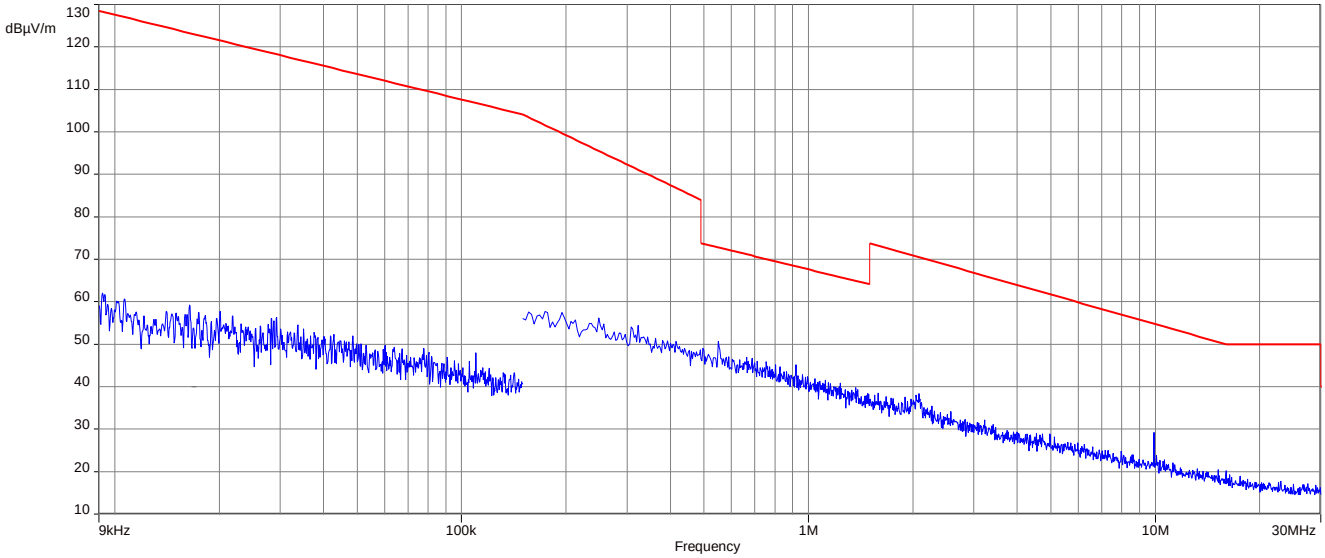


Plots: 80 MHz channel bandwidth

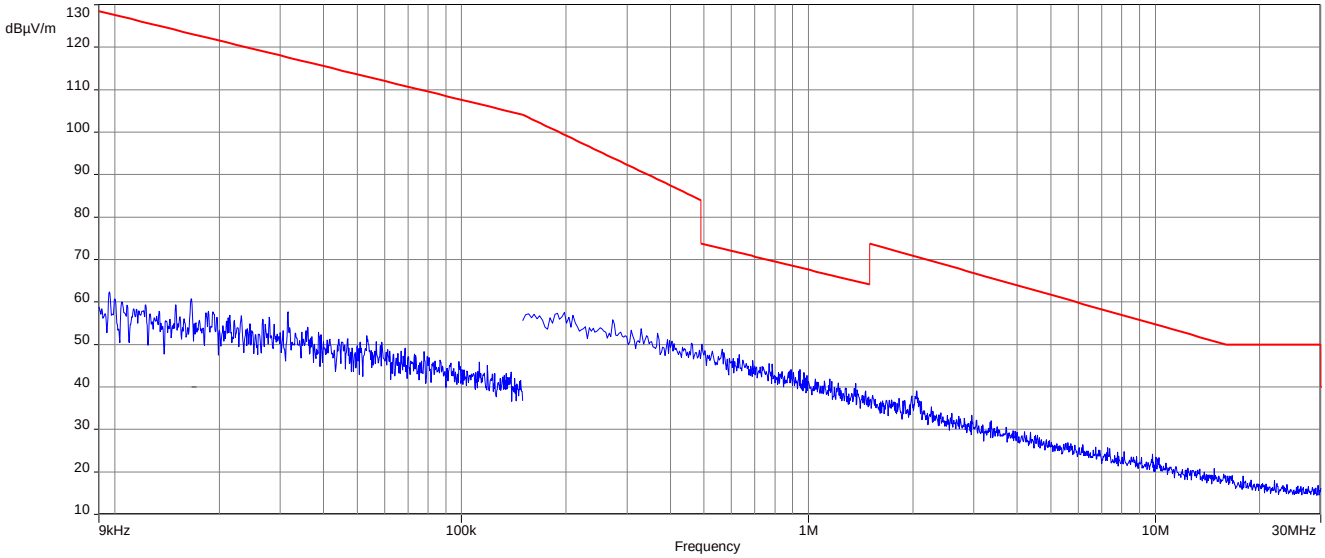
Plot 1: 9 kHz to 30 MHz, U-NII-1; middle channel



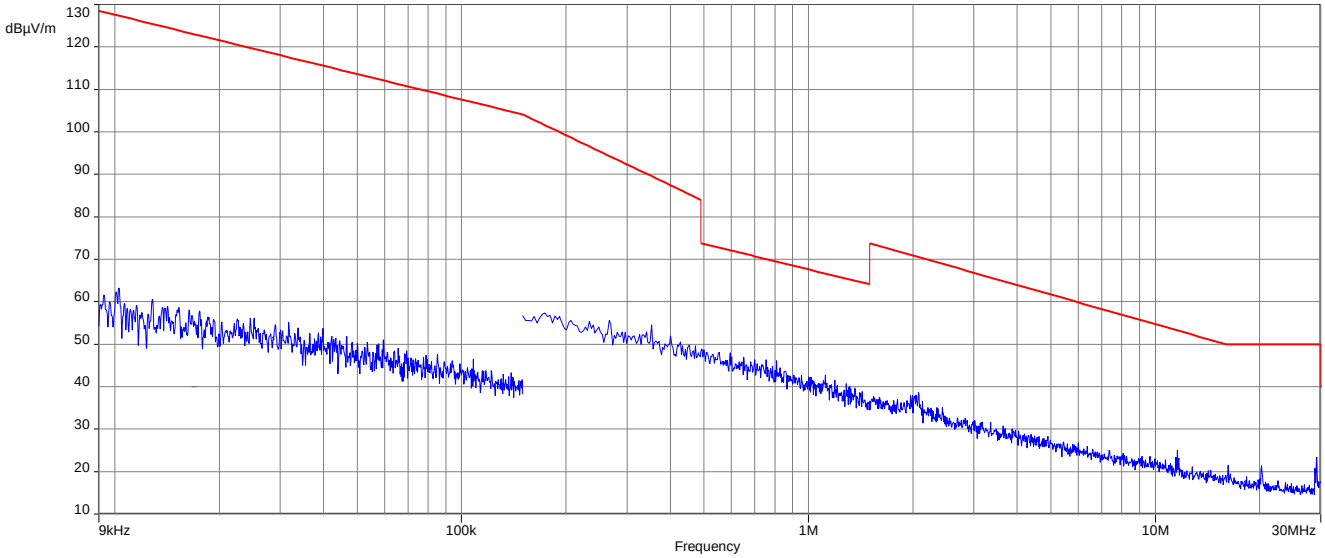
Plot 2: 9 kHz to 30 MHz, U-NII-2A; middle channel



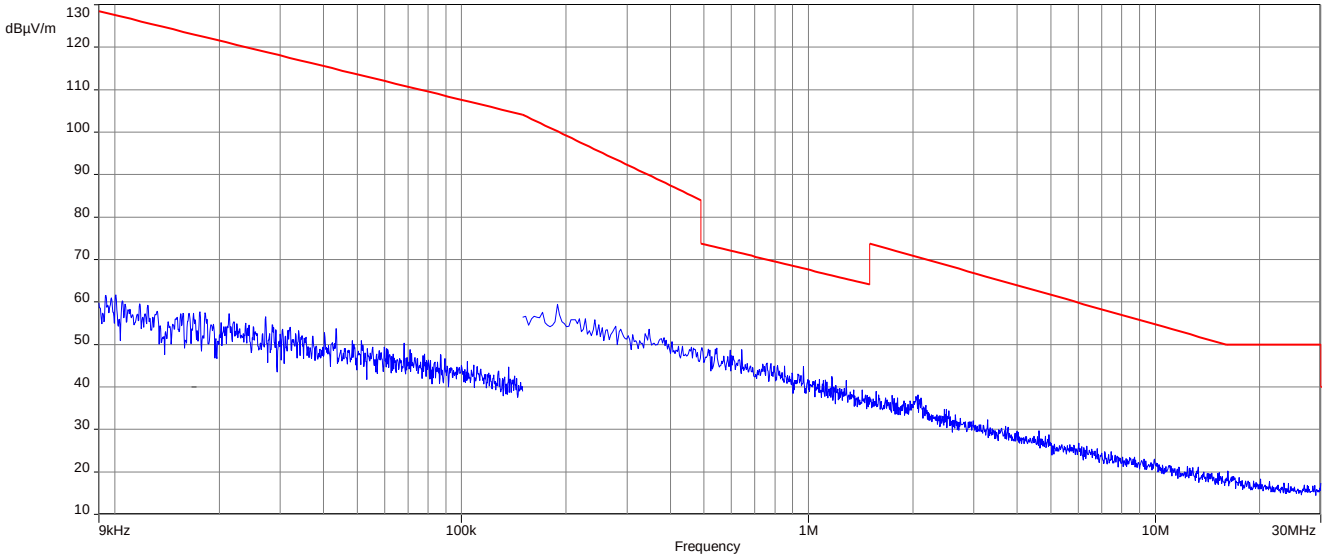
Plot 3: 9 kHz to 30 MHz, U-NII-2C; lowest channel



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



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



11.10 Spurious emissions radiated 30 MHz to 1 GHz

Description:

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

Measurement:

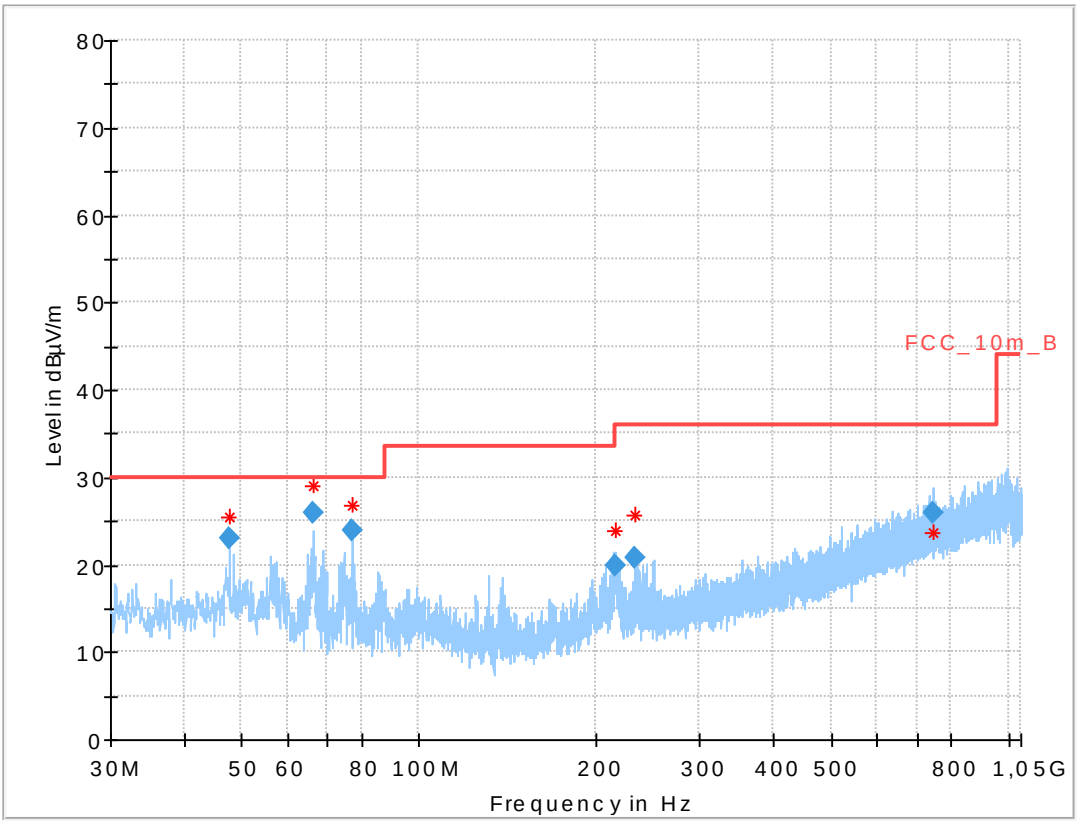
Measurement parameter	
Detector:	Quasi peak
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	> RBW
Span:	30 MHz to 1 GHz
Test setup:	See chapter 6.1 – A
Measurement uncertainty:	See chapter 8

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	

Plots: 20 MHz channel bandwidth

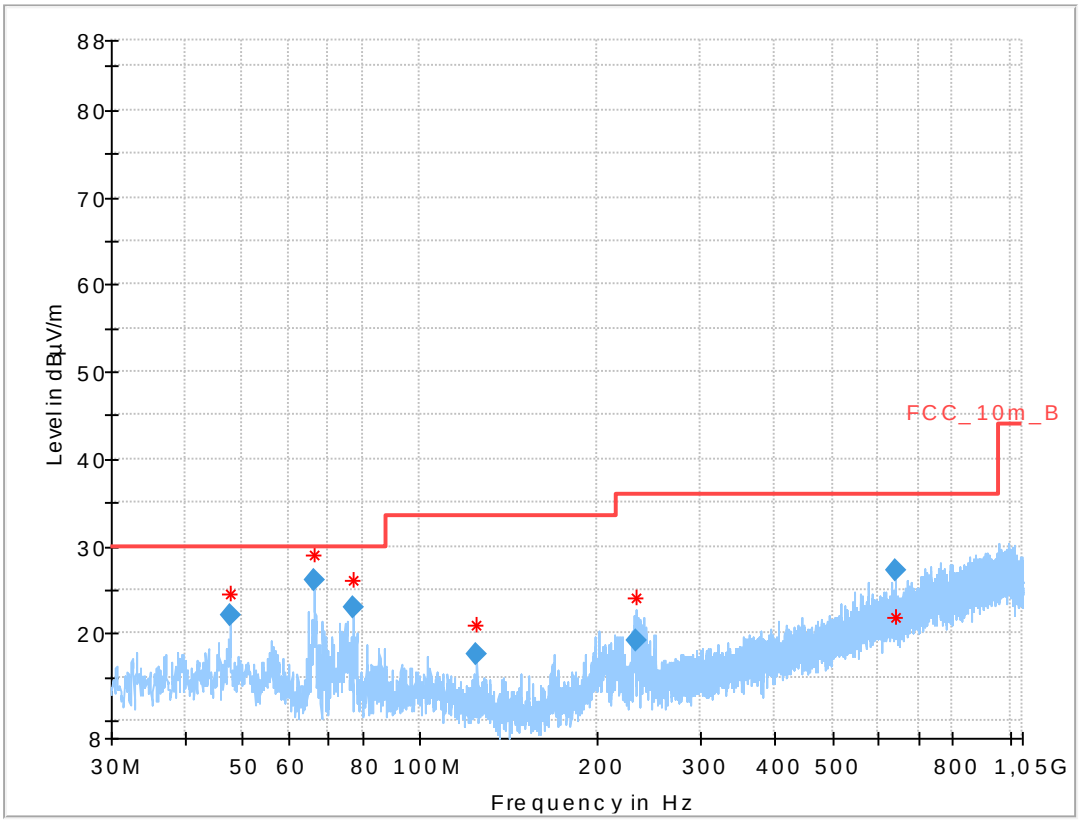
Plot 1: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
47.803	23.03	30.0	6.97	1000	120	113.0	V	265.0	15
66.306	25.90	30.0	4.10	1000	120	170.0	V	6.0	12
77.192	23.93	30.0	6.07	1000	120	170.0	V	-8.0	11
214.866	19.90	33.5	13.60	1000	120	134.0	V	189.0	13
233.039	20.70	36.0	15.30	1000	120	170.0	V	112.0	13
745.687	25.96	36.0	10.04	1000	120	101.0	V	247.0	22

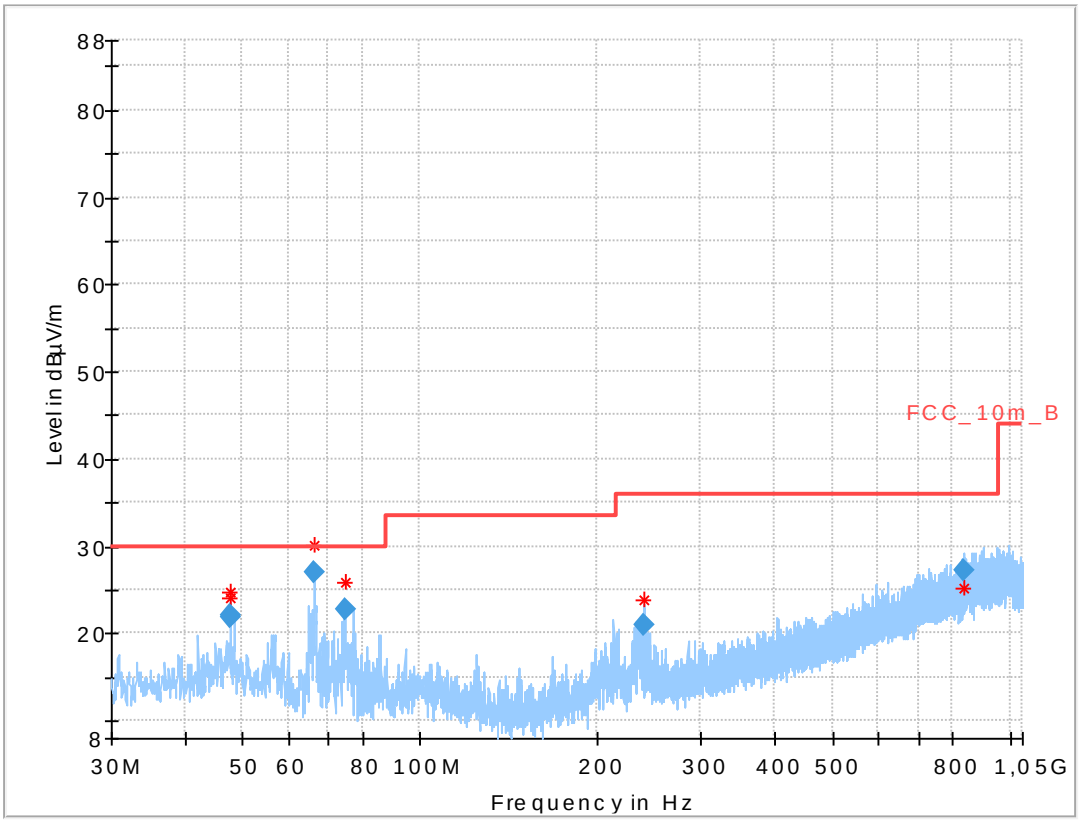
Plot 2: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-1; highest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
47.813	22.15	30.0	7.85	1000	120	98.0	V	202.0	15
66.276	26.20	30.0	3.80	1000	120	170.0	V	161.0	12
77.198	23.08	30.0	6.92	1000	120	170.0	V	-21.0	11
125.006	17.51	33.5	15.99	1000	120	170.0	V	22.0	11
233.408	19.14	36.0	16.86	1000	120	109.0	V	90.0	13
638.550	27.20	36.0	8.80	1000	120	170.0	V	67.0	21

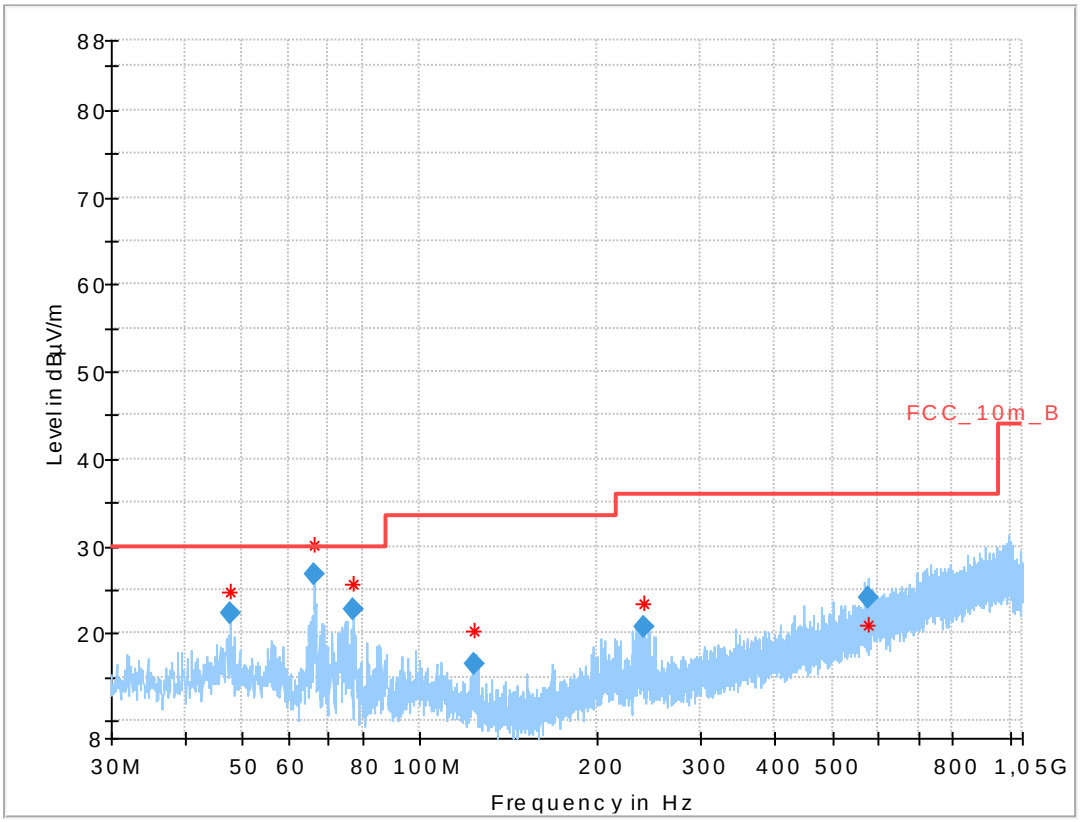
Plot 3: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
47.810	22.15	30.0	7.85	1000	120	98.0	V	182.0	15
47.819	21.85	30.0	8.15	1000	120	98.0	V	247.0	15
66.291	26.96	30.0	3.04	1000	120	170.0	V	263.0	12
74.570	22.71	30.0	7.29	1000	120	170.0	V	247.0	11
239.996	20.95	36.0	15.05	1000	120	104.0	V	-22.0	13
837.081	27.31	36.0	8.69	1000	120	102.0	H	67.0	23

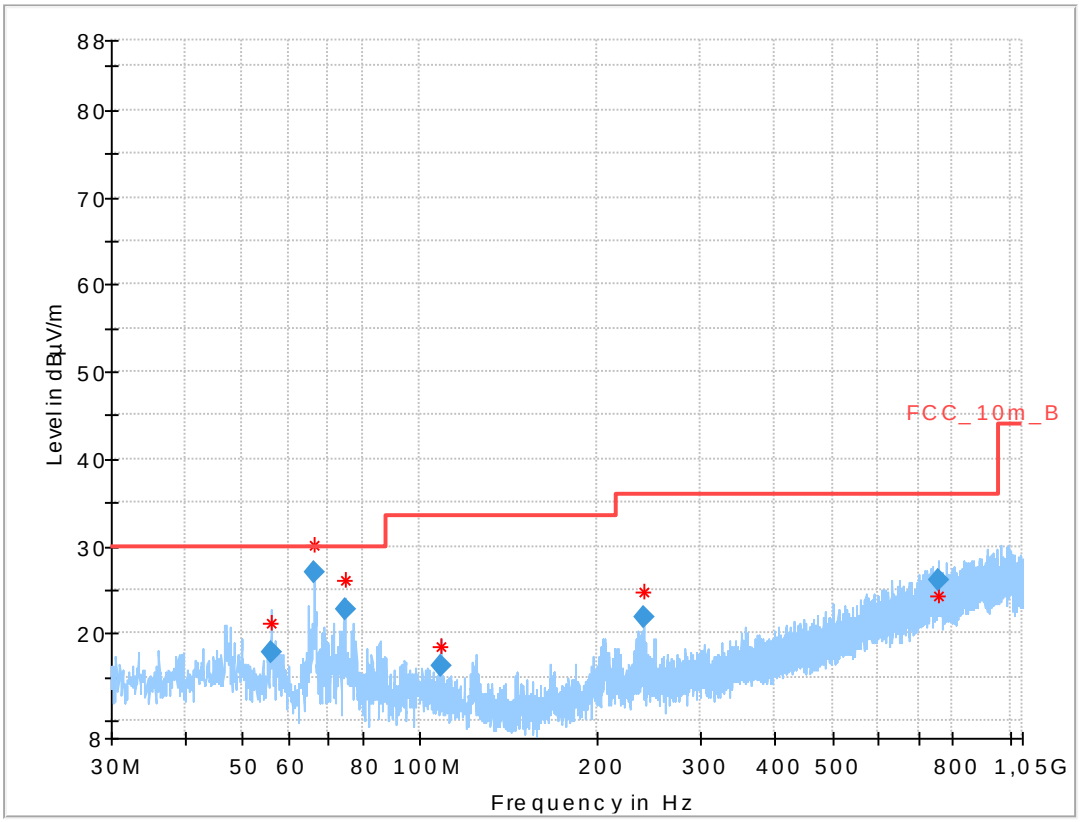
Plot 4: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
47.806	22.32	30.0	7.68	1000	120	101.0	V	157.0	15
66.288	26.78	30.0	3.22	1000	120	170.0	V	-12.0	12
77.204	22.75	30.0	7.25	1000	120	170.0	V	202.0	11
123.741	16.48	33.5	17.02	1000	120	147.0	V	94.0	11
239.990	20.64	36.0	15.36	1000	120	101.0	V	-22.0	13
576.086	23.98	36.0	12.02	1000	120	170.0	V	-19.0	20

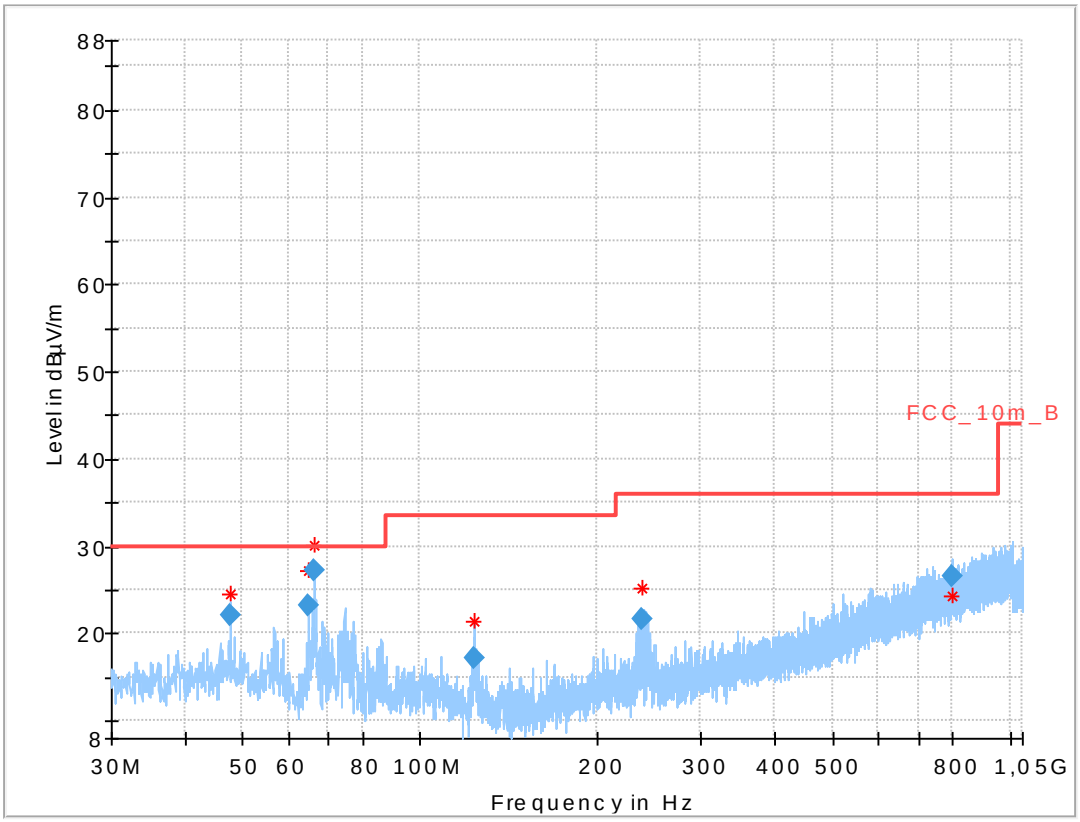
Plot 5: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
55.831	17.76	30.0	12.24	1000	120	105.0	V	292.0	14
66.269	26.96	30.0	3.04	1000	120	170.0	V	292.0	12
74.569	22.67	30.0	7.33	1000	120	170.0	V	85.0	11
108.822	16.17	33.5	17.33	1000	120	114.0	V	157.0	12
239.990	21.82	36.0	14.18	1000	120	98.0	V	3.0	13
756.725	26.21	36.0	9.79	1000	120	170.0	H	247.0	23

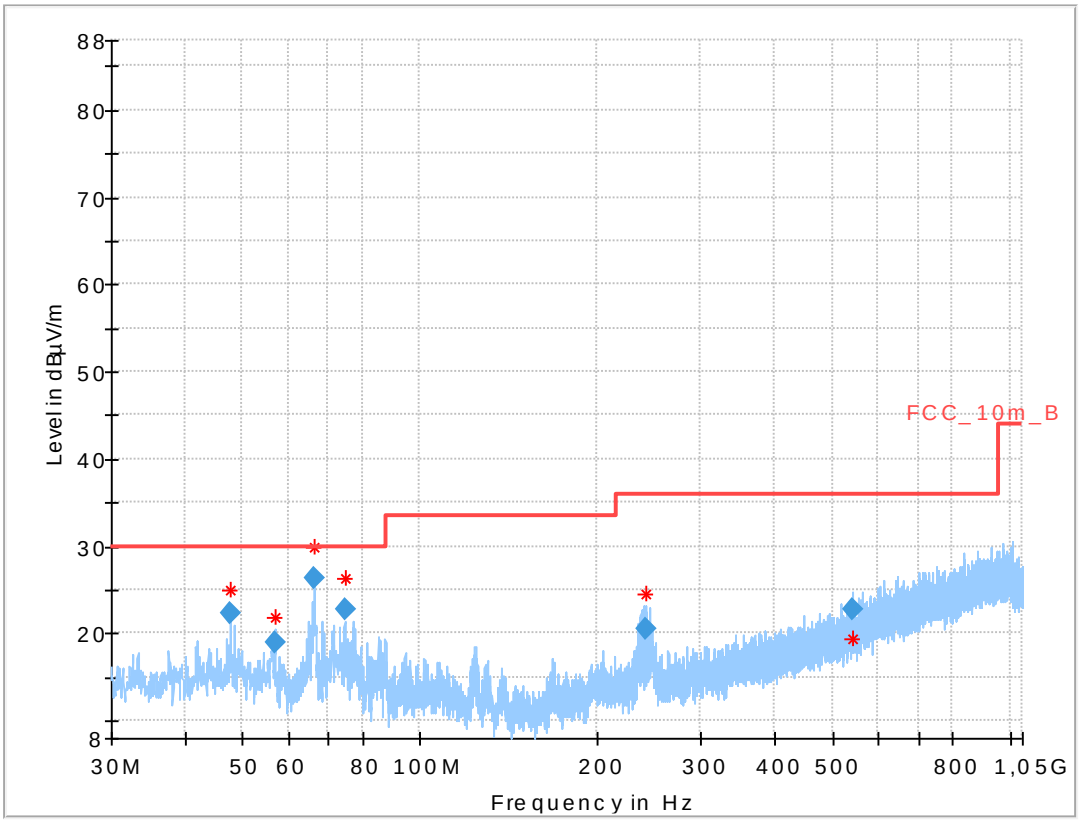
Plot 6: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
47.802	22.07	30.0	7.93	1000	120	114.0	V	103.0	15
64.780	23.24	30.0	6.76	1000	120	170.0	V	159.0	12
66.271	27.11	30.0	2.89	1000	120	170.0	V	202.0	12
123.378	17.06	33.5	16.44	1000	120	170.0	V	22.0	11
238.153	21.55	36.0	14.45	1000	120	98.0	V	22.0	13
799.252	26.58	36.0	9.42	1000	120	170.0	H	-9.0	23

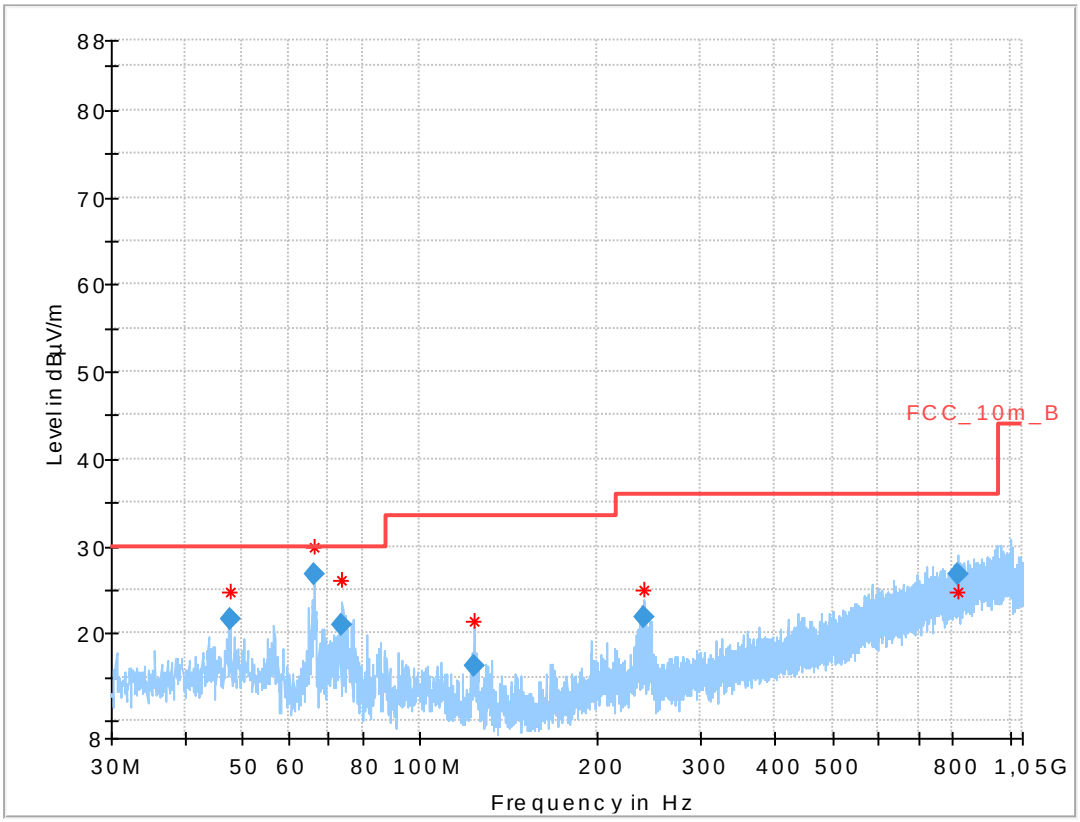
Plot 7: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
47.799	22.35	30.0	7.65	1000	120	101.0	V	202.0	15
56.764	19.02	30.0	10.98	1000	120	115.0	V	202.0	14
66.274	26.27	30.0	3.73	1000	120	170.0	V	3.0	12
74.552	22.80	30.0	7.20	1000	120	170.0	V	-5.0	11
241.829	20.50	36.0	15.50	1000	120	104.0	V	-5.0	14
541.751	22.68	36.0	13.32	1000	120	101.0	V	248.0	19

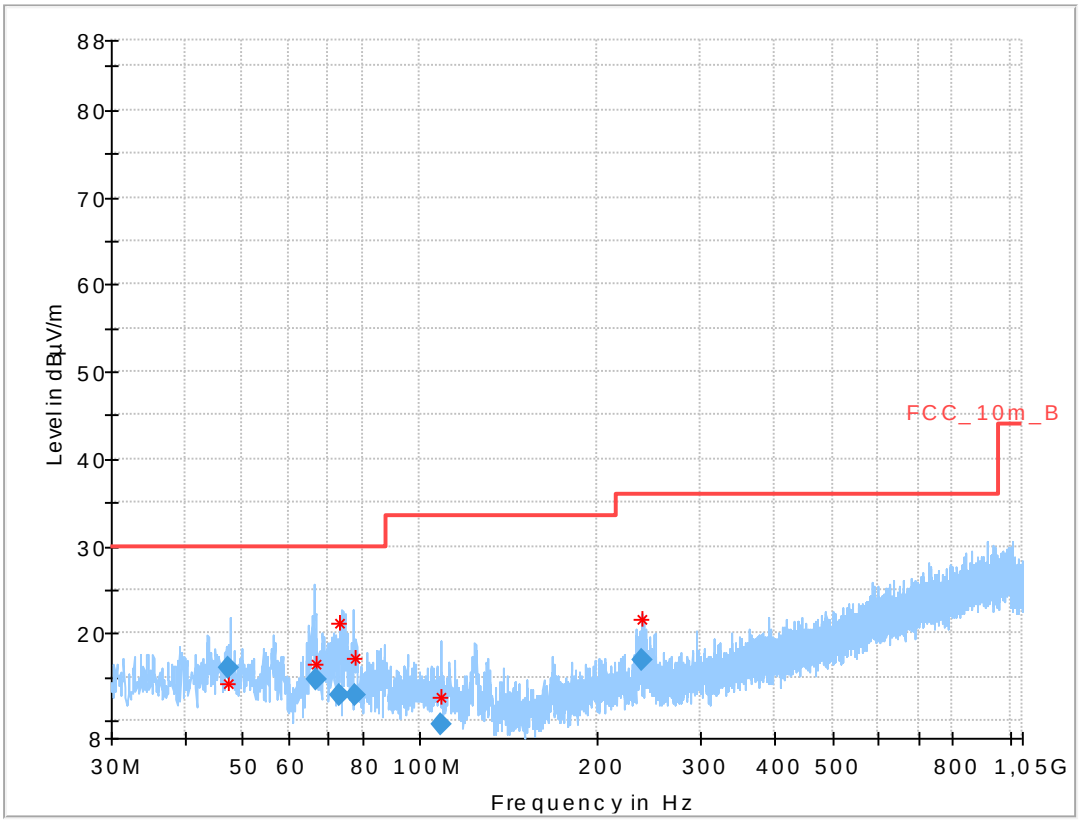
Plot 8: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
47.813	21.65	30.0	8.35	1000	120	98.0	V	-22.0	15
66.262	26.78	30.0	3.22	1000	120	170.0	V	266.0	12
73.926	20.97	30.0	9.03	1000	120	170.0	V	-17.0	11
123.715	16.36	33.5	17.14	1000	120	170.0	V	112.0	11
239.997	21.94	36.0	14.06	1000	120	118.0	V	-14.0	13
818.723	26.82	36.0	9.18	1000	120	111.0	H	247.0	23

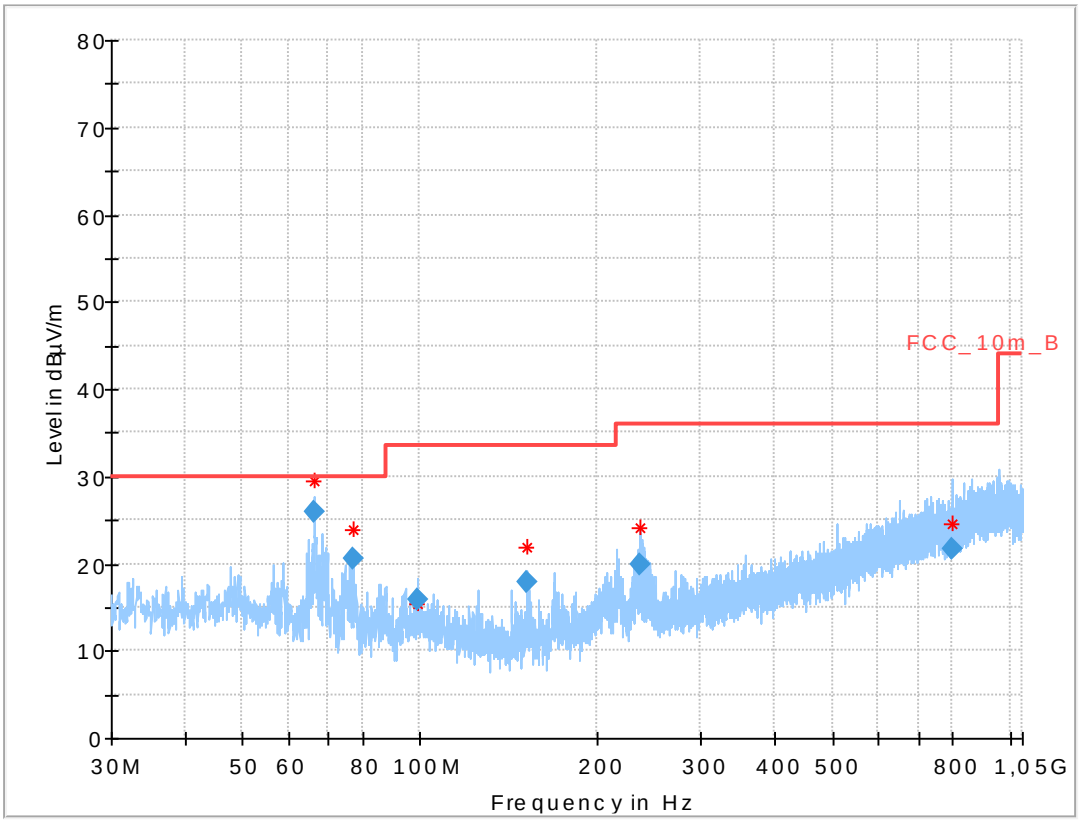
Plot 9: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-3; middle channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
47.332	16.01	30.0	13.99	1000	120	170.0	V	196.0	15
66.777	14.63	30.0	15.37	1000	120	125.0	V	-22.0	12
73.344	12.95	30.0	17.05	1000	120	170.0	V	-9.0	11
77.645	12.83	30.0	17.17	1000	120	146.0	V	-20.0	11
108.787	9.65	33.5	23.85	1000	120	102.0	V	196.0	12
237.229	16.94	36.0	19.06	1000	120	170.0	V	-21.0	13

Plot 10: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-3; highest channel

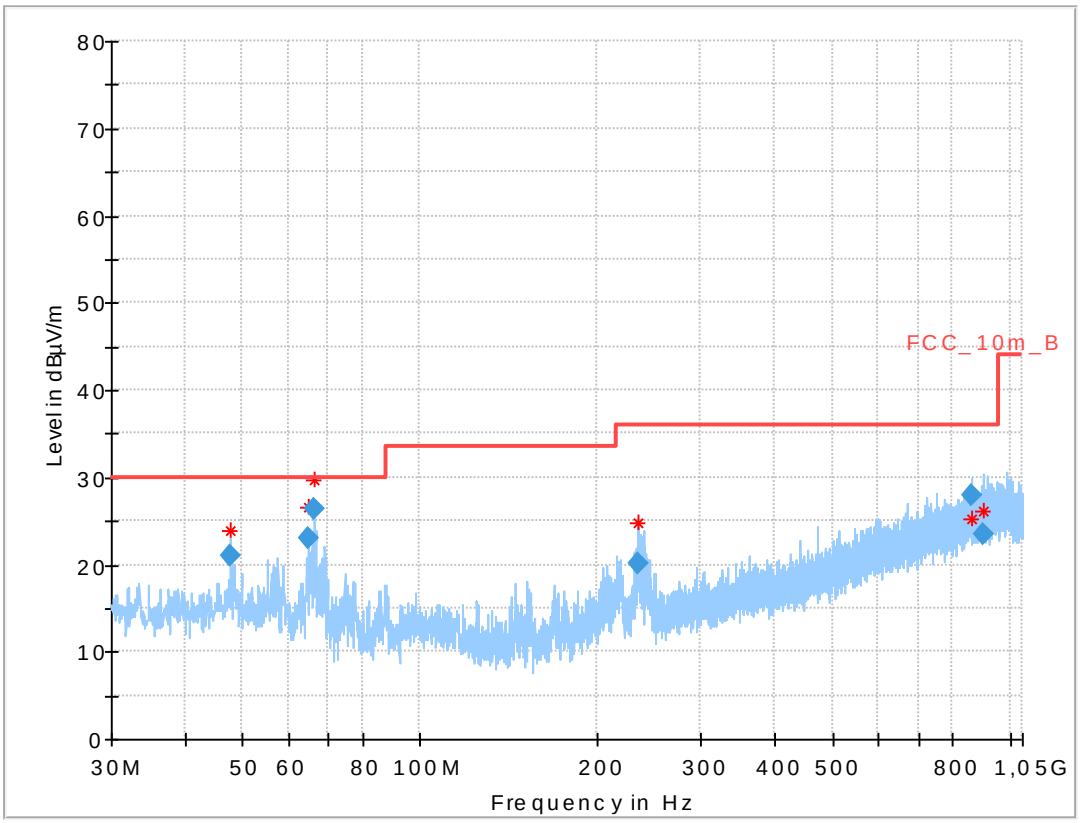


Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
66.316	26.02	30.0	3.98	1000	120	170.0	V	86.0	12
77.202	20.53	30.0	9.47	1000	120	170.0	V	79.0	11
99.143	15.78	33.5	17.72	1000	120	170.0	V	112.0	13
151.585	17.82	33.5	15.68	1000	120	100.0	V	84.0	10
235.918	20.00	36.0	16.00	1000	120	170.0	V	67.0	13
799.354	21.60	36.0	14.40	1000	120	170.0	V	193.0	23

Plots: 40 MHz channel bandwidth

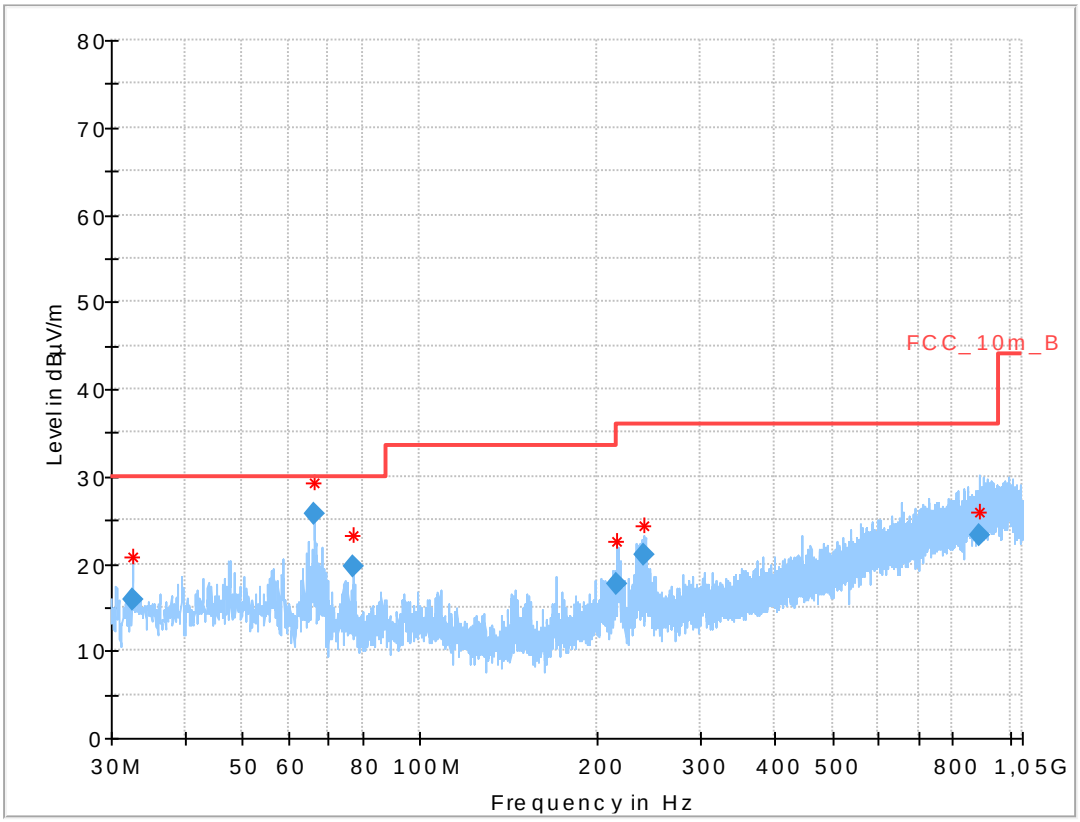
Plot 1: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.793	20.91	30.0	9.09	1000	120	101.0	V	67.0	15
64.800	23.09	30.0	6.91	1000	120	155.0	V	172.0	12
66.285	26.31	30.0	3.69	1000	120	170.0	V	202.0	12
234.448	20.17	36.0	15.83	1000	120	144.0	V	67.0	13
861.545	27.84	36.0	8.16	1000	120	170.0	H	-17.0	24
902.726	23.45	36.0	12.55	1000	120	170.0	V	98.0	24

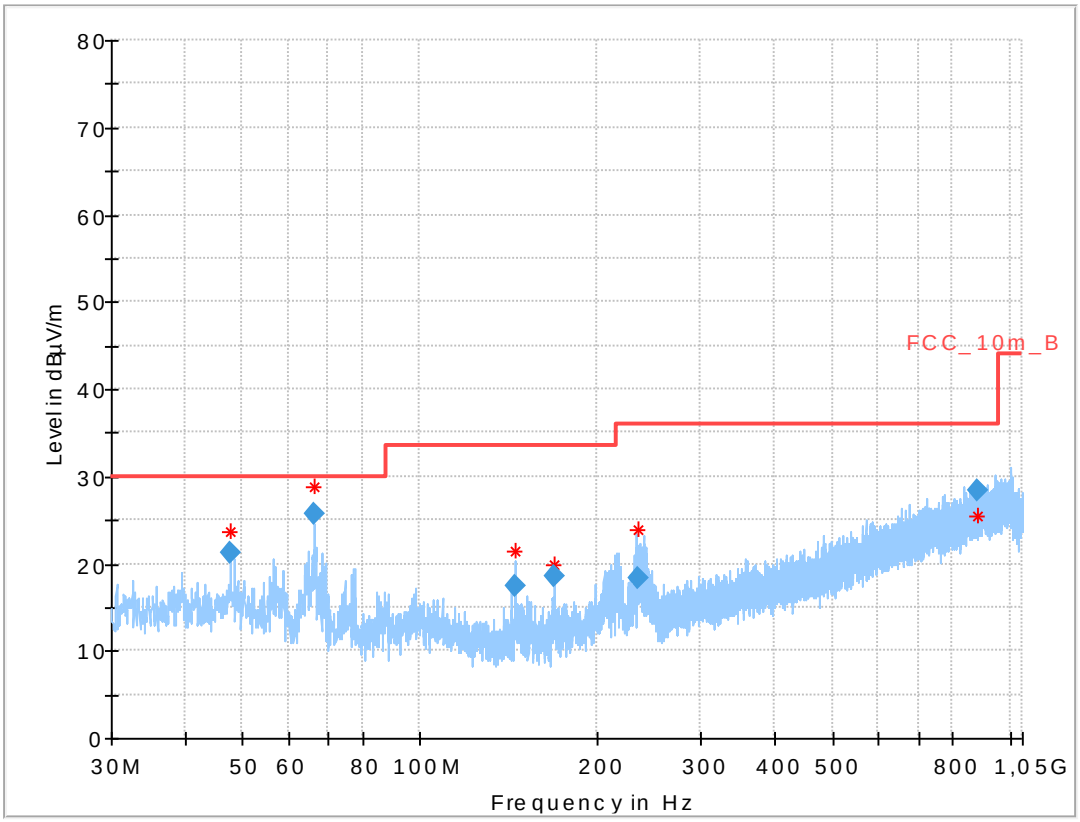
Plot 2: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-1; highest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.634	15.89	30.0	14.11	1000	120	102.0	V	177.0	13
66.289	25.78	30.0	4.22	1000	120	170.0	V	22.0	12
77.214	19.75	30.0	10.25	1000	120	170.0	V	112.0	11
215.612	17.70	33.5	15.80	1000	120	107.0	V	67.0	13
239.276	21.06	36.0	14.94	1000	120	118.0	V	-22.0	13
887.893	23.35	36.0	12.65	1000	120	143.0	H	171.0	24

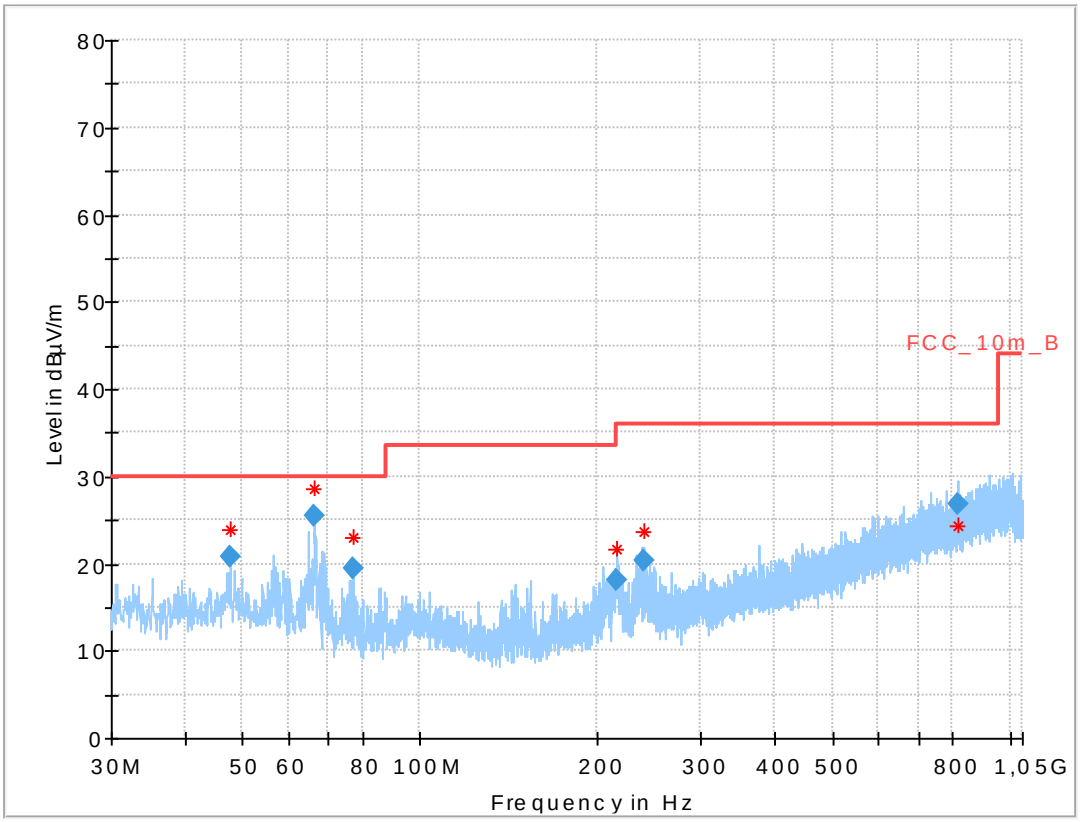
Plot 3: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.796	21.26	30.0	8.74	1000	120	110.0	V	157.0	15
66.289	25.74	30.0	4.26	1000	120	170.0	V	106.0	12
145.248	17.37	33.5	16.13	1000	120	170.0	V	112.0	10
168.784	18.45	33.5	15.05	1000	120	124.0	V	160.0	11
233.816	18.32	36.0	17.68	1000	120	170.0	V	67.0	13
879.906	28.32	36.0	7.68	1000	120	170.0	H	-22.0	24

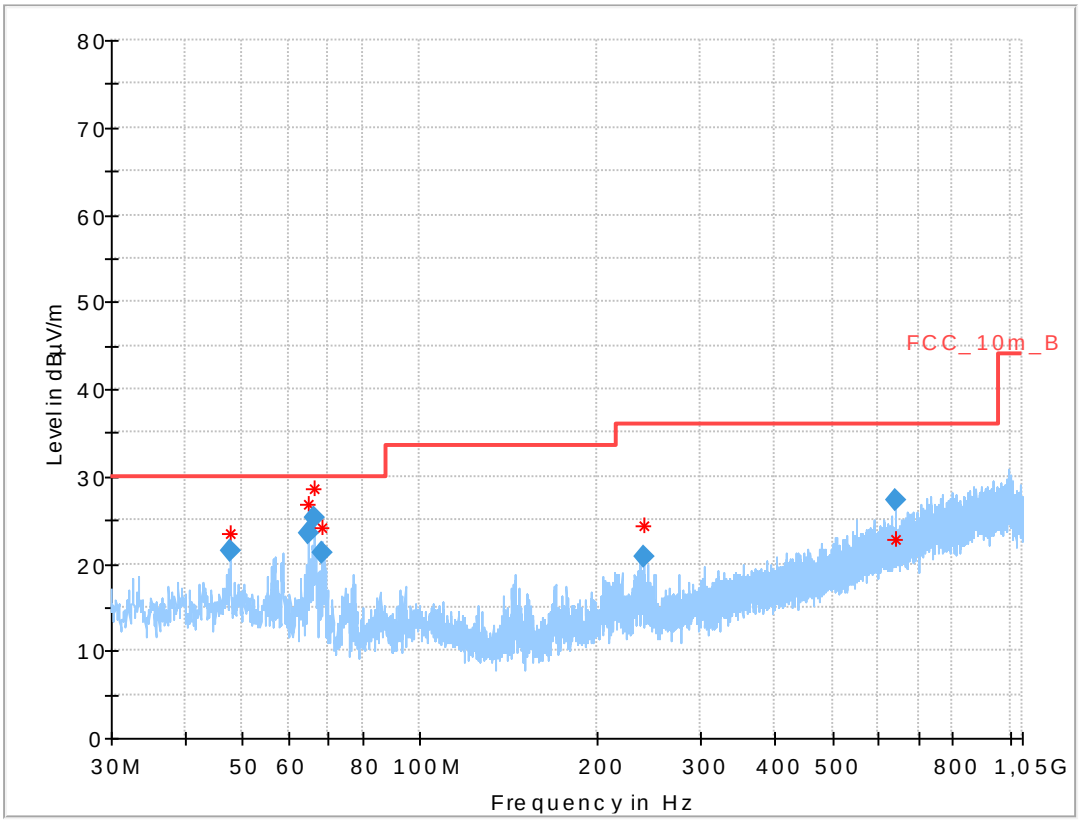
Plot 4: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.802	20.74	30.0	9.26	1000	120	98.0	V	157.0	15
66.262	25.38	30.0	4.62	1000	120	170.0	V	95.0	12
77.199	19.35	30.0	10.65	1000	120	170.0	V	285.0	11
215.940	18.05	33.5	15.45	1000	120	138.0	V	22.0	13
238.907	20.44	36.0	15.56	1000	120	101.0	V	67.0	13
815.568	26.75	36.0	9.25	1000	120	170.0	H	157.0	23

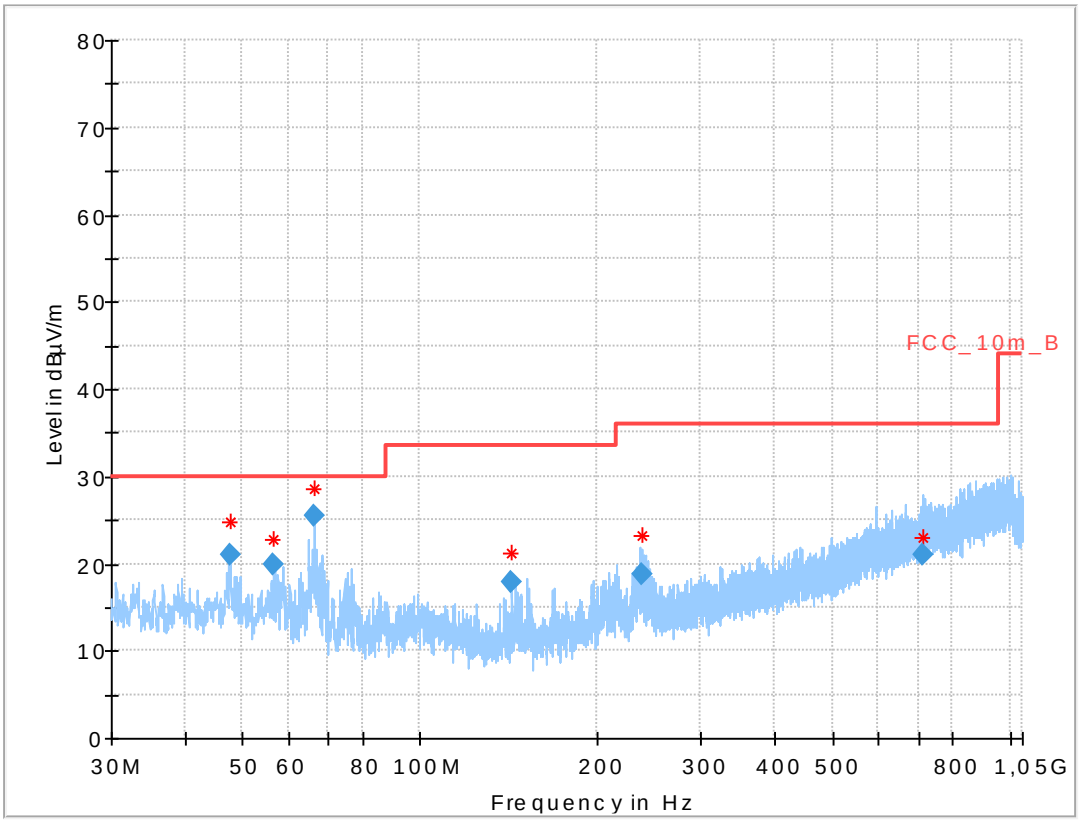
Plot 5: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.785	21.50	30.0	8.50	1000	120	104.0	V	-22.0	15
64.793	23.55	30.0	6.45	1000	120	155.0	V	-13.0	12
66.266	25.26	30.0	4.74	1000	120	170.0	V	7.0	12
68.460	21.14	30.0	8.86	1000	120	170.0	V	165.0	11
240.001	20.71	36.0	15.29	1000	120	151.0	V	67.0	13
638.792	27.23	36.0	8.77	1000	120	170.0	V	-22.0	21

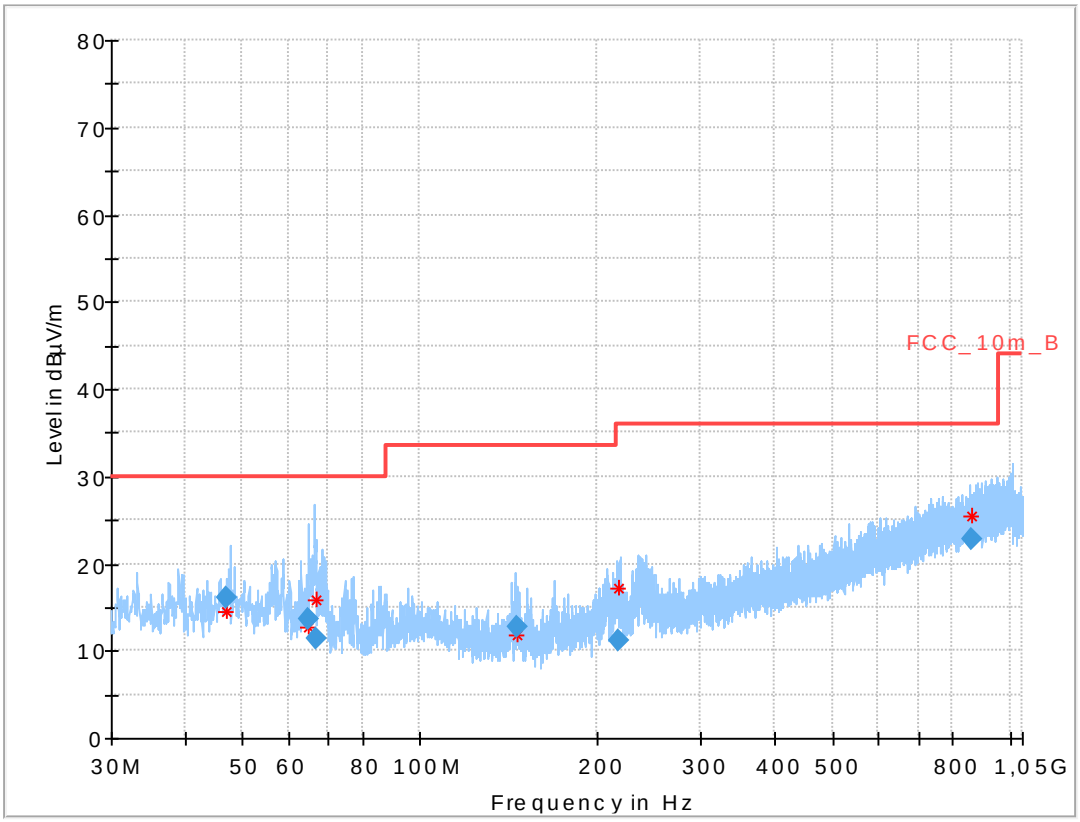
Plot 6: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.804	21.02	30.0	8.98	1000	120	122.0	V	67.0	15
56.520	19.83	30.0	10.17	1000	120	98.0	V	-22.0	14
66.291	25.42	30.0	4.58	1000	120	170.0	V	8.0	12
143.281	17.94	33.5	15.56	1000	120	104.0	V	112.0	10
238.548	18.70	36.0	17.30	1000	120	102.0	V	102.0	13
711.184	21.07	36.0	14.93	1000	120	132.0	V	160.0	22

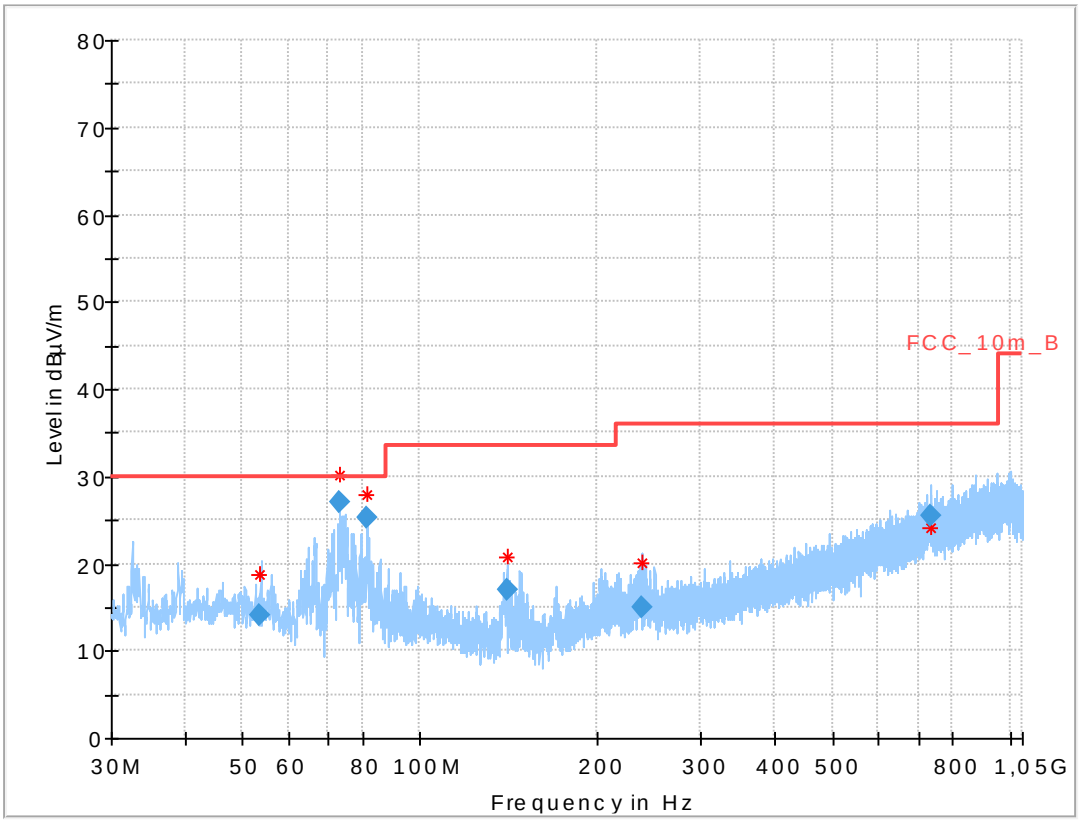
Plot 7: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.185	16.04	30.0	13.96	1000	120	170.0	V	185.0	15
64.832	13.53	30.0	16.47	1000	120	158.0	V	157.0	12
66.788	11.50	30.0	18.50	1000	120	120.0	V	112.0	12
145.626	12.83	33.5	20.67	1000	120	170.0	V	112.0	10
217.803	11.26	36.0	24.74	1000	120	170.0	V	76.0	13
858.185	22.75	36.0	13.25	1000	120	170.0	V	252.0	24

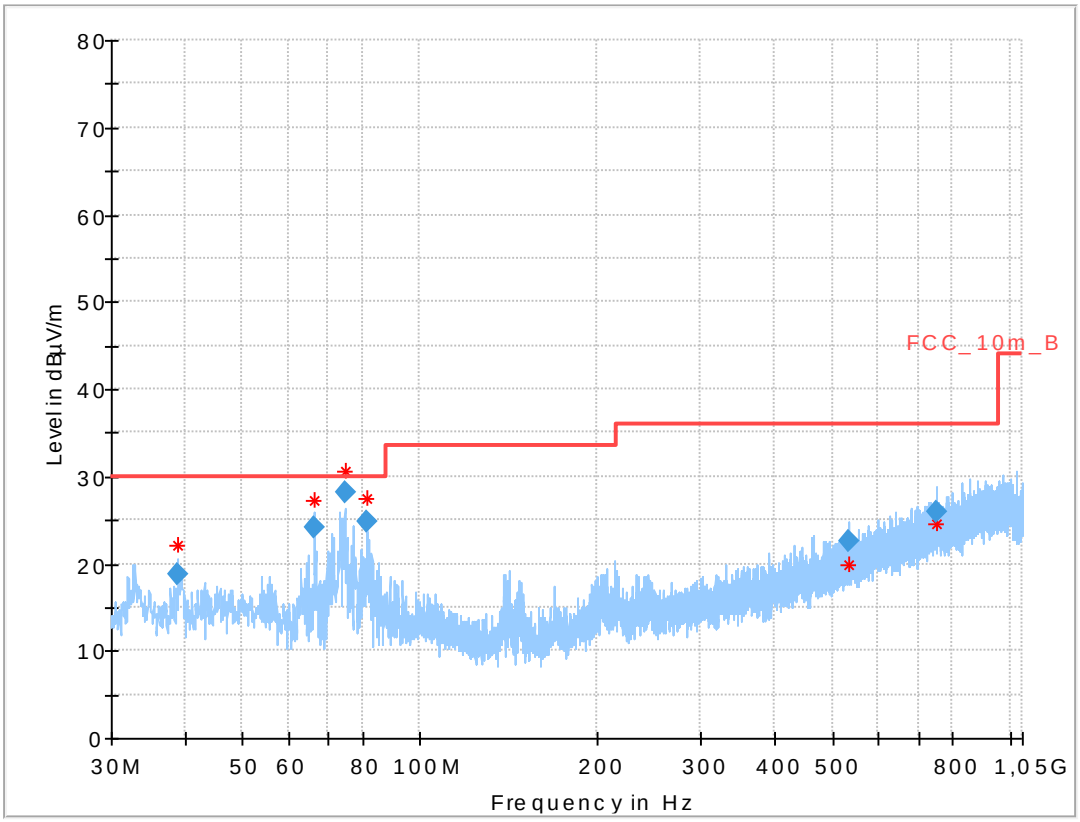
Plot 8: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
53.580	13.98	30.0	16.02	1000	120	170.0	V	-5.0	14
73.190	26.94	30.0	3.06	1000	120	170.0	V	68.0	11
81.195	25.30	30.0	4.70	1000	120	163.0	V	67.0	11
140.609	16.98	33.5	16.52	1000	120	98.0	V	-22.0	10
237.485	15.03	36.0	20.97	1000	120	170.0	V	67.0	13
735.427	25.57	36.0	10.43	1000	120	162.0	H	260.0	22

Plot 9: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-3; highest channel

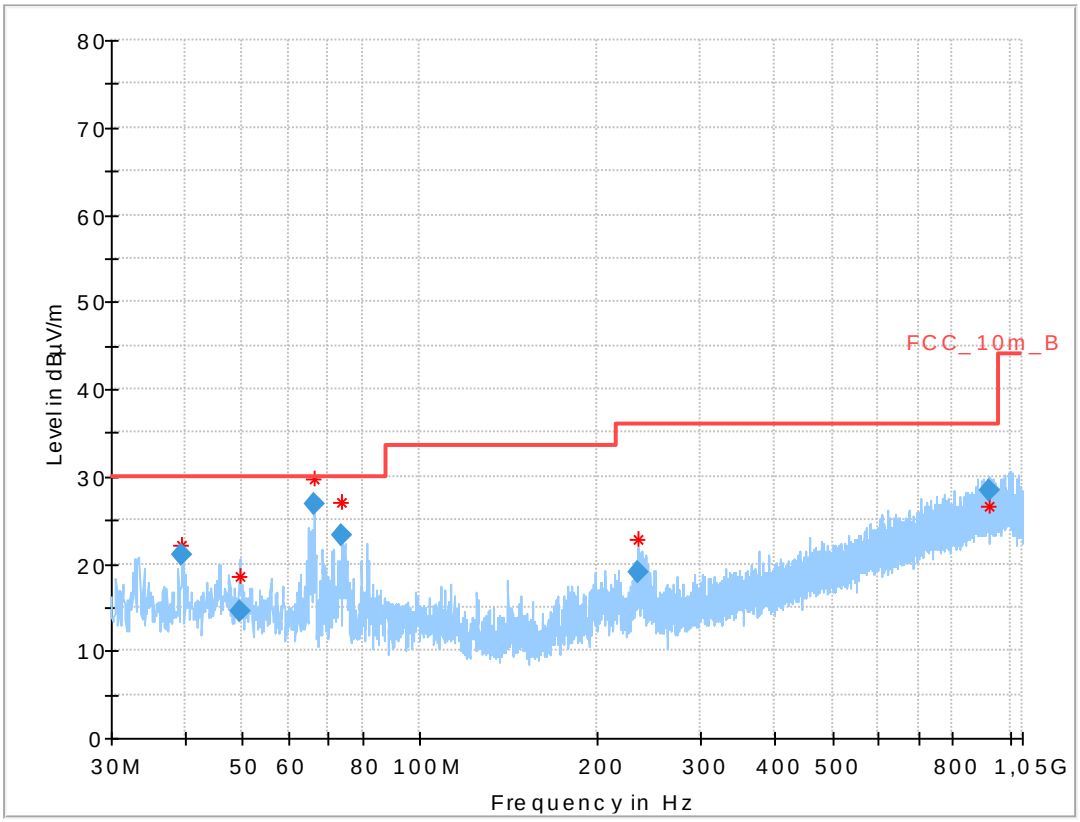


Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.956	18.71	30.0	11.29	1000	120	133.0	V	72.0	14
66.285	24.16	30.0	5.84	1000	120	170.0	V	292.0	12
74.560	28.20	30.0	1.80	1000	120	170.0	V	71.0	11
81.186	24.84	30.0	5.16	1000	120	170.0	V	-22.0	11
531.889	22.51	36.0	13.49	1000	120	170.0	H	247.0	19
748.631	26.01	36.0	9.99	1000	120	121.0	V	99.0	22

Plots: 80 MHz channel bandwidth

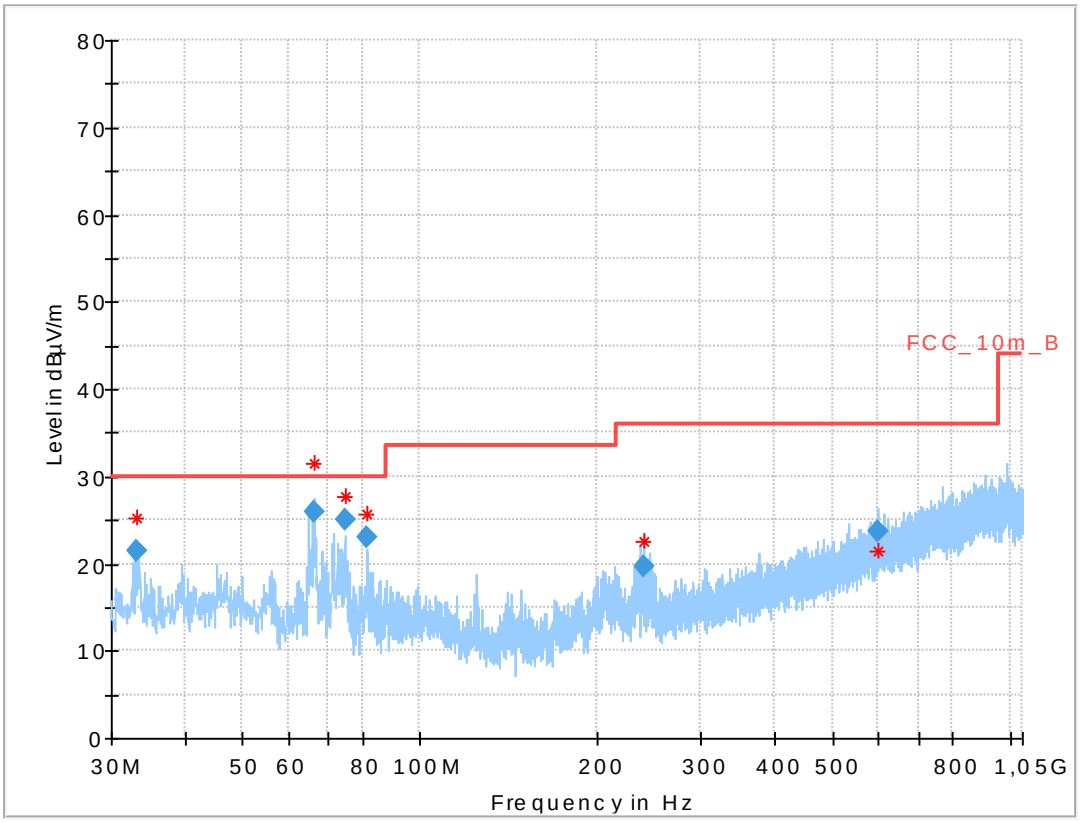
Plot 1: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-1; middle channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
39.459	20.90	30.0	9.10	1000	120	142.0	V	-22.0	14
49.490	14.62	30.0	15.38	1000	120	114.0	V	67.0	15
66.266	26.85	30.0	3.15	1000	120	170.0	V	191.0	12
73.931	23.35	30.0	6.65	1000	120	170.0	V	-22.0	11
234.491	19.02	36.0	16.98	1000	120	146.0	V	67.0	13
924.675	28.45	36.0	7.55	1000	120	170.0	V	67.0	24

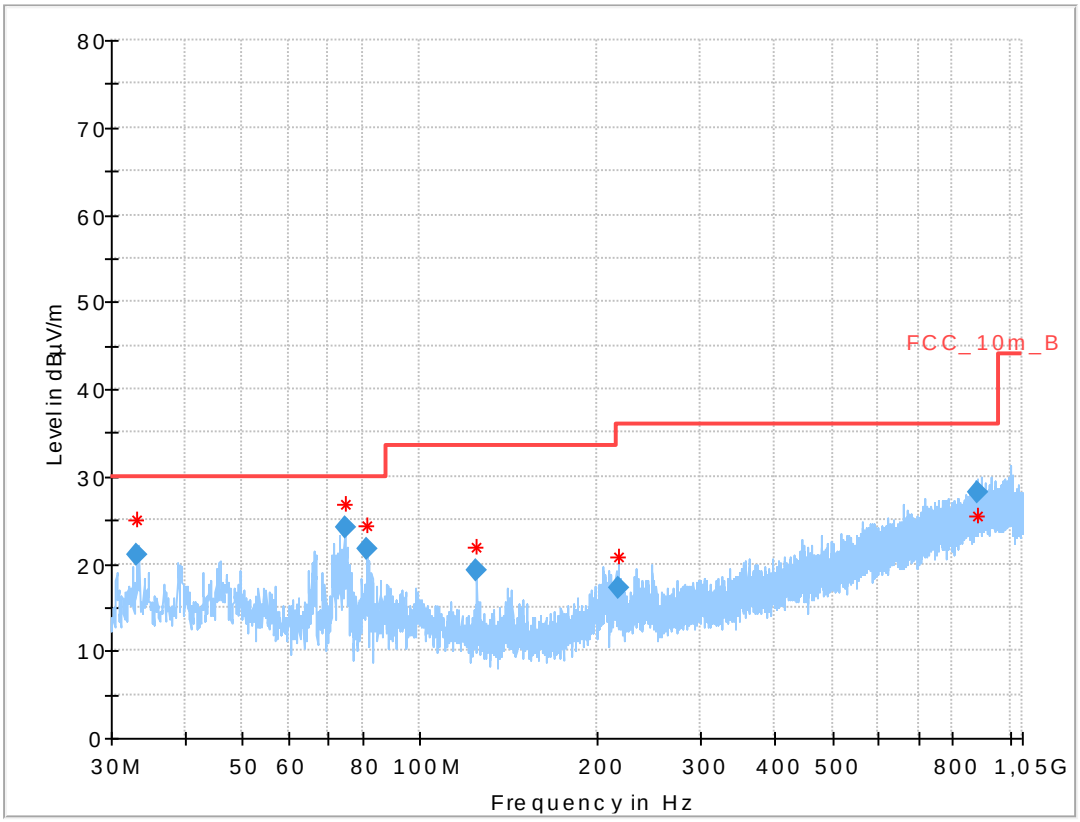
Plot 2: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
33.161	21.35	30.0	8.65	1000	120	101.0	V	112.0	14
66.300	25.89	30.0	4.11	1000	120	170.0	V	22.0	12
74.563	25.04	30.0	4.96	1000	120	170.0	V	22.0	11
81.219	22.97	30.0	7.03	1000	120	170.0	V	-22.0	11
240.018	19.73	36.0	16.27	1000	120	117.0	V	67.0	13
595.603	23.75	36.0	12.25	1000	120	140.0	V	188.0	20

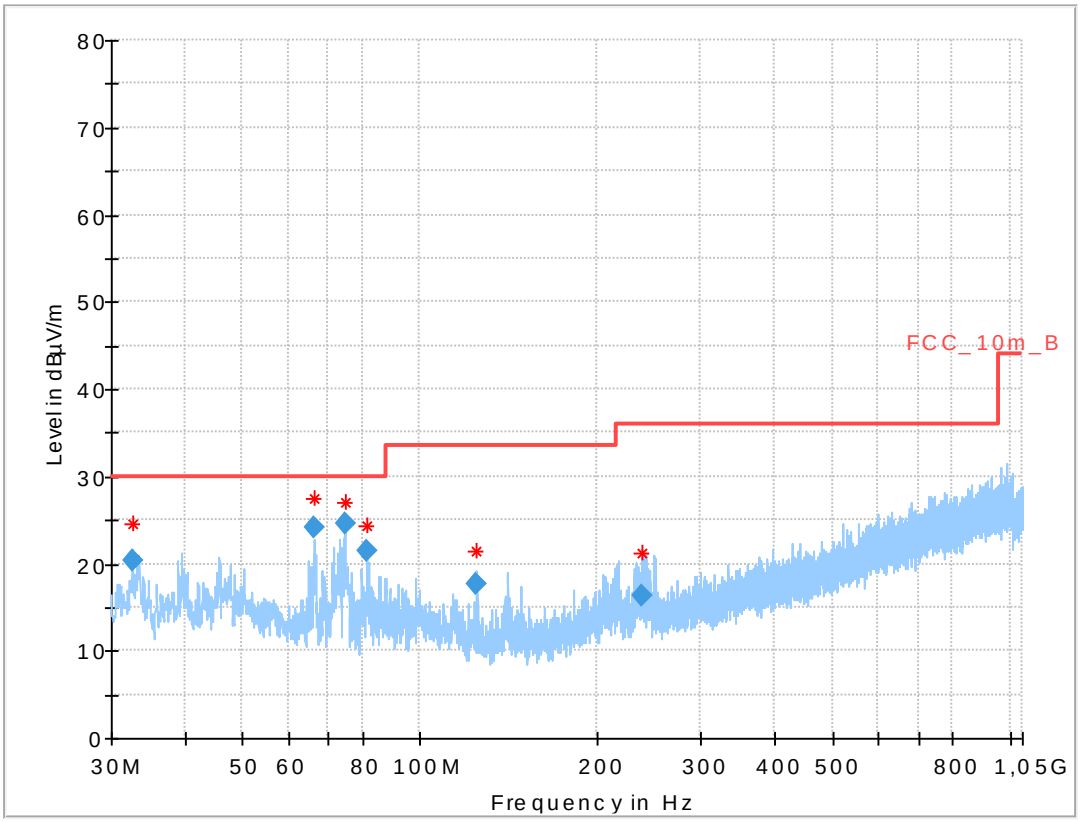
Plot 3: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
33.158	20.95	30.0	9.05	1000	120	98.0	V	202.0	14
74.552	24.18	30.0	5.82	1000	120	170.0	V	-22.0	11
81.216	21.61	30.0	8.39	1000	120	170.0	V	254.0	11
124.987	19.26	33.5	14.24	1000	120	170.0	V	68.0	11
217.130	17.12	36.0	18.88	1000	120	101.0	V	67.0	13
884.351	28.23	36.0	7.77	1000	120	170.0	V	157.0	24

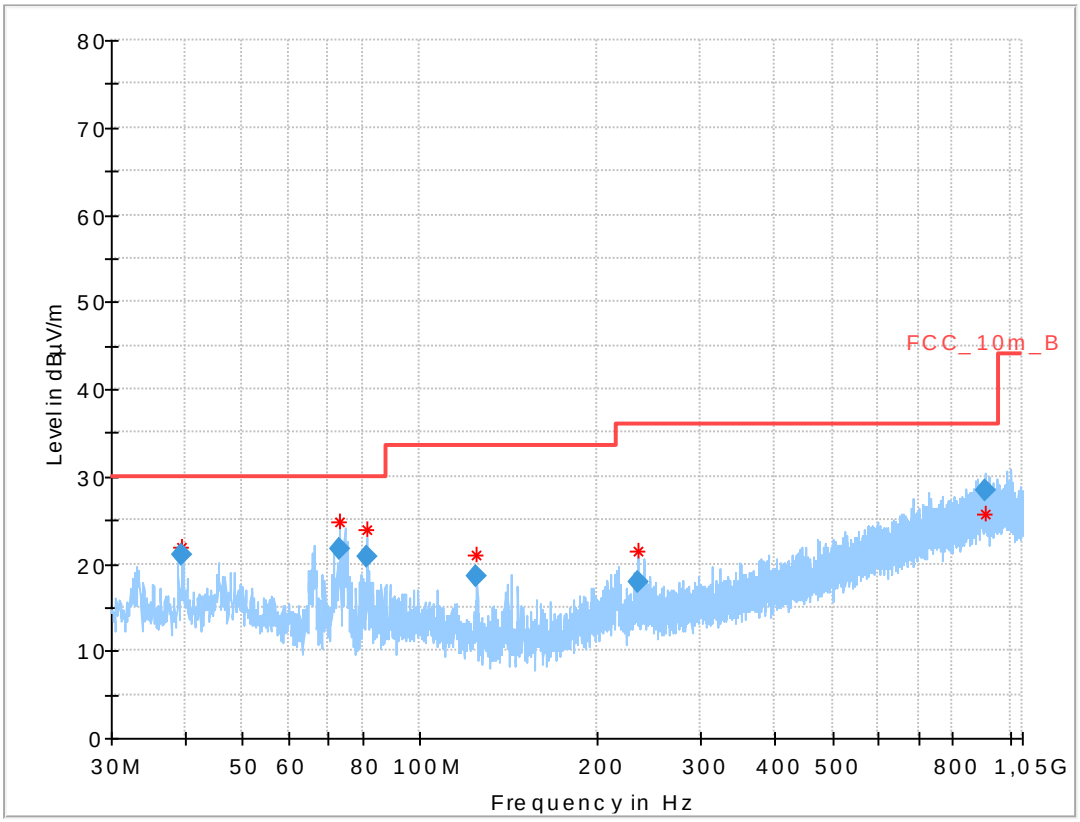
Plot 4: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.638	20.24	30.0	9.76	1000	120	112.0	V	-17.0	13
66.292	24.16	30.0	5.84	1000	120	170.0	V	-21.0	12
74.569	24.48	30.0	5.52	1000	120	170.0	V	184.0	11
81.218	21.44	30.0	8.56	1000	120	170.0	V	202.0	11
124.993	17.58	33.5	15.92	1000	120	158.0	V	157.0	11
238.558	16.26	36.0	19.74	1000	120	117.0	V	67.0	13

Plot 5: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-3; middle channel

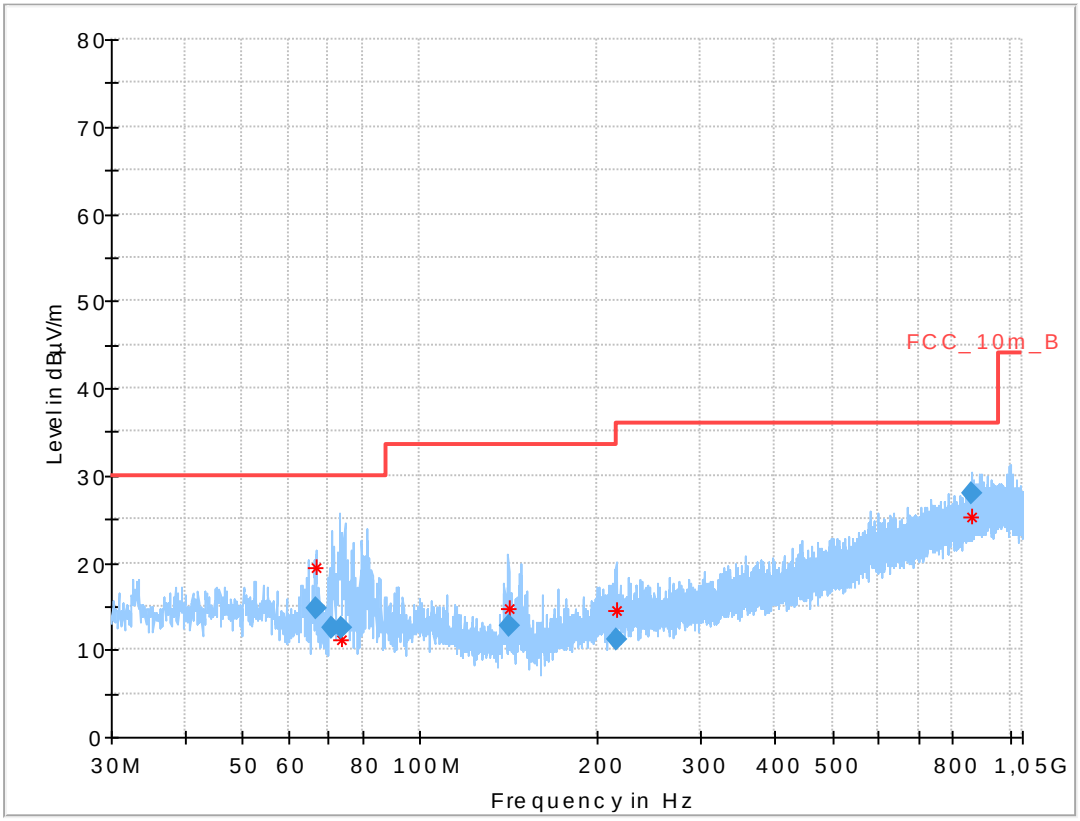


Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
39.501	20.93	30.0	9.07	1000	120	170.0	V	157.0	14
73.159	21.72	30.0	8.28	1000	120	170.0	V	278.0	11
81.179	20.78	30.0	9.22	1000	120	170.0	V	247.0	11
125.002	18.56	33.5	14.94	1000	120	170.0	V	247.0	11
233.719	17.94	36.0	18.06	1000	120	106.0	V	67.0	13
907.199	28.42	36.0	7.58	1000	120	170.0	V	22.0	24

Plots: Rx-Mode

Plot 6: 30 MHz to 1 GHz; vertical & horizontal polarization, Rx-Mode



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
66.567	14.72	30.0	15.28	1000	120	98.0	V	-22.0	12
70.977	12.53	30.0	17.47	1000	120	170.0	V	-22.0	11
73.493	12.56	30.0	17.44	1000	120	103.0	V	-22.0	11
141.710	12.82	33.5	20.68	1000	120	111.0	V	15.0	10
214.712	11.16	33.5	22.34	1000	120	106.0	V	-22.0	13
863.361	27.86	36.0	8.14	1000	120	131.0	H	112.0	24

11.11 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 6.2 – A (Tx) & 6.2 – B (Rx) See sub clause 6.3 – A & B
Measurement uncertainty:	See chapter 8

Limits:

TX Spurious Emissions Radiated		
§15.209		
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 [dBµV/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			-/-			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.			-/-			All peak emissions > 6dB below limit.		
-/-	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 [dBµV/m] / dBm								
U-NII-2A (5250 MHz to 5350 MHz)								
Lowest channel			-/-			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.			-/-			All peak emissions > 6dB below limit.		
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			-/-			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.			All peak emissions > 6dB below limit.			3799	Peak	48.7
							AVG	38.2
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]
All peak emissions > 6dB below limit.			All peak emissions > 6dB below limit.			All peak emissions > 6dB below limit.		
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			-/-			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.			-/-			All peak emissions > 6dB below limit.		
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			-/-			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.			-/-			All peak emissions > 6dB below limit.		
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]
All peak emissions > 6dB below limit.			All peak emissions > 6dB below limit.			All peak emissions > 6dB below limit.		
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			-/-			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.			-/-			All peak emissions > 6dB below limit.		
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 [dBµV/m] / dBm		
U-NII-1 (5150 MHz to 5250 MHz)		
Middle channel		
F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.		
For emissions above 18 GHz please take look at the plots.		

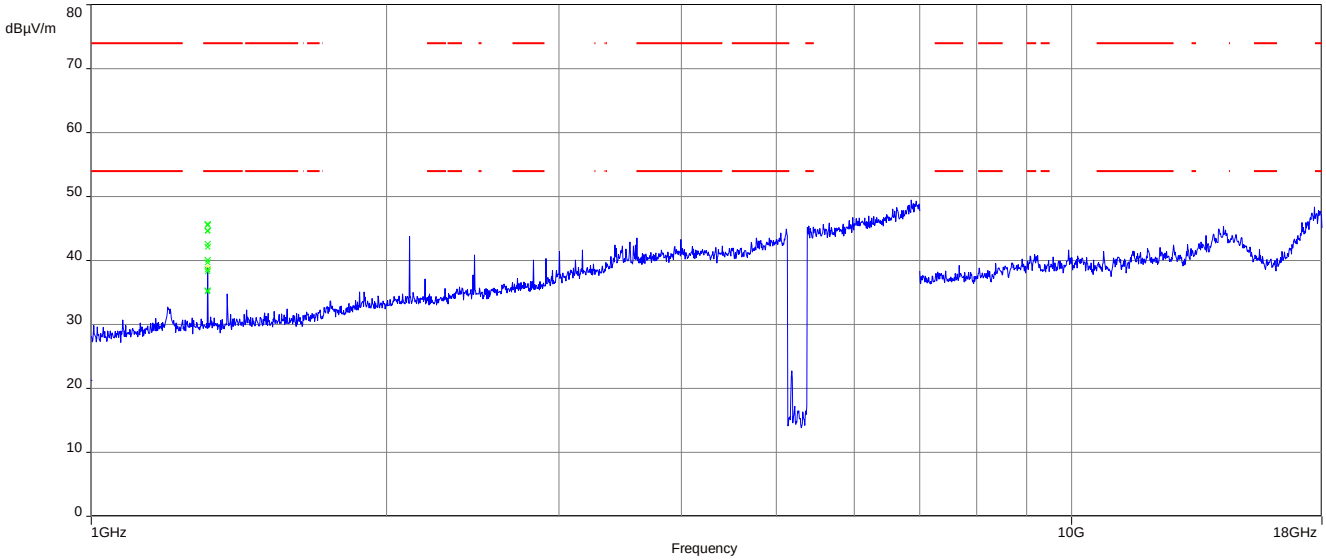
TX Spurious Emissions Radiated [dBµV/m] / dBm		
U-NII-2A (5250 MHz to 5350 MHz)		
Middle channel		
F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.		
For emissions above 18 GHz please take look at the plots.		

TX Spurious Emissions Radiated [dBµV/m] / dBm	
U-NII-2C (5470 MHz to 5725 MHz)	
Lowest channel	Highest channel
All peak emissions > 6dB below limit.	All peak emissions > 6dB below limit.
For emissions above 18 GHz please take look at the plots.	For emissions above 18 GHz please take look at the plots.

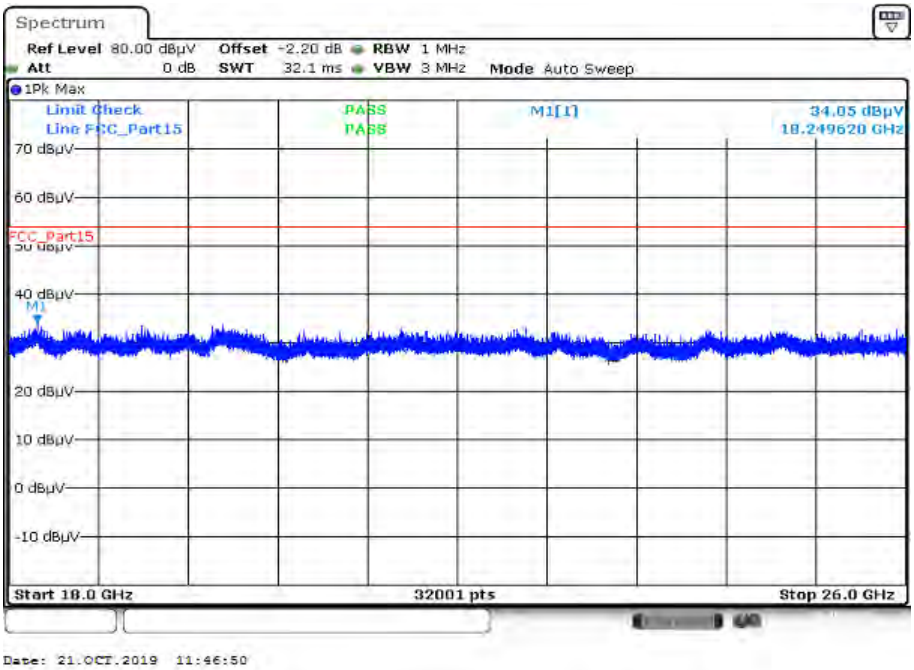
TX Spurious Emissions Radiated [dBµV/m] / dBm		
U-NII-3 (5725 MHz to 5850 MHz)		
Middle channel		
F [MHz]	Detector	Level [dBµV/m]
All peak emissions > 6dB below limit.		
For emissions above 18 GHz please take look at the plots.		

Plots: 20 MHz channel bandwidth

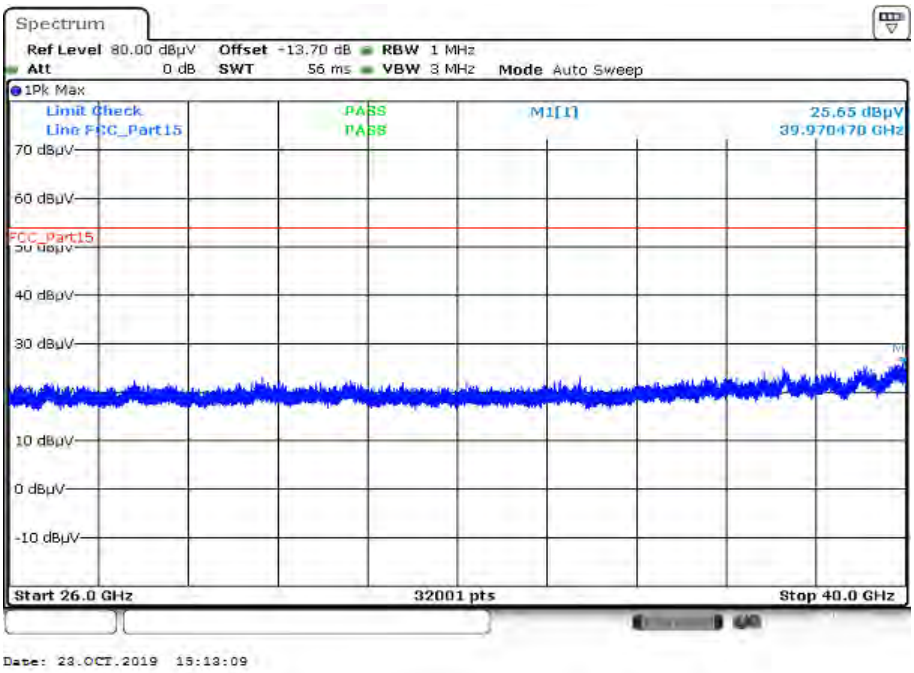
Plot 1: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



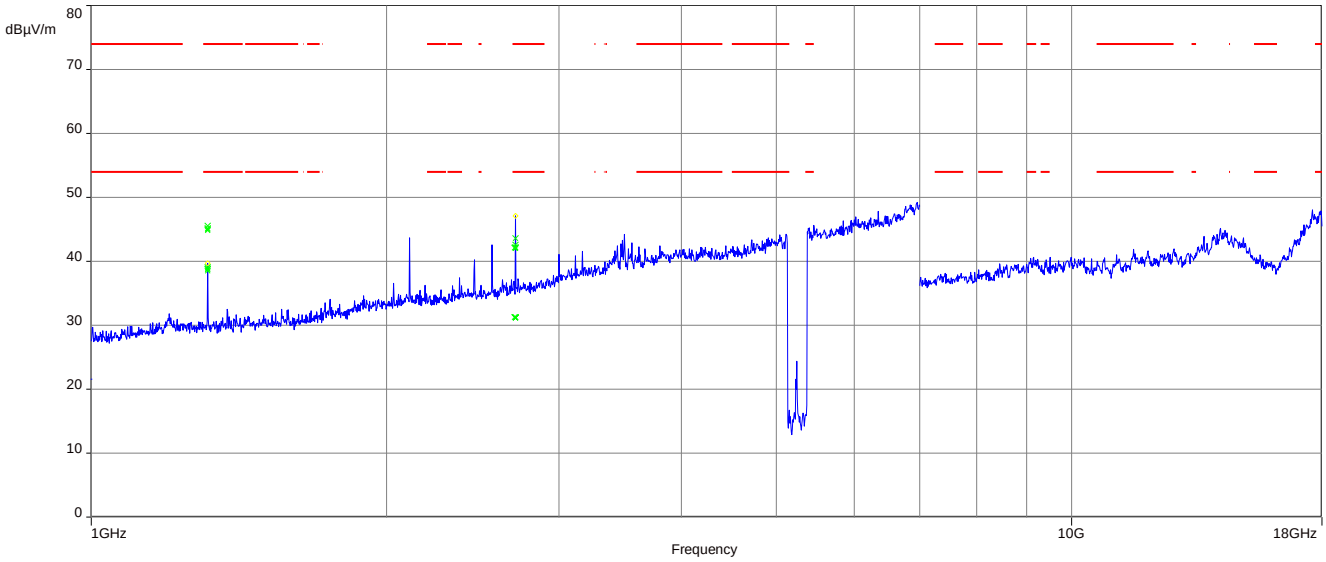
Plot 2: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



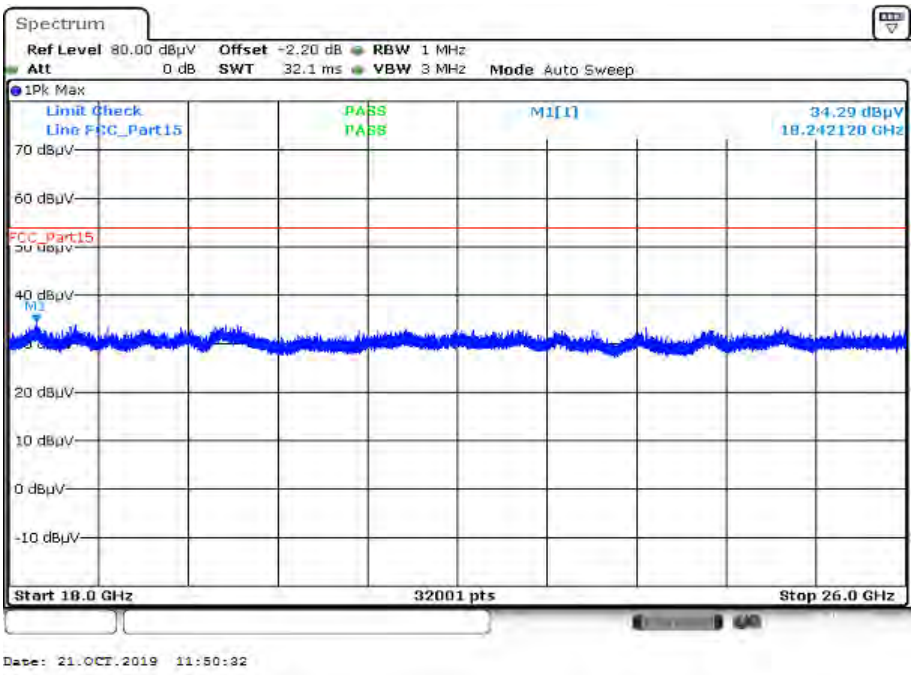
Plot 3: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



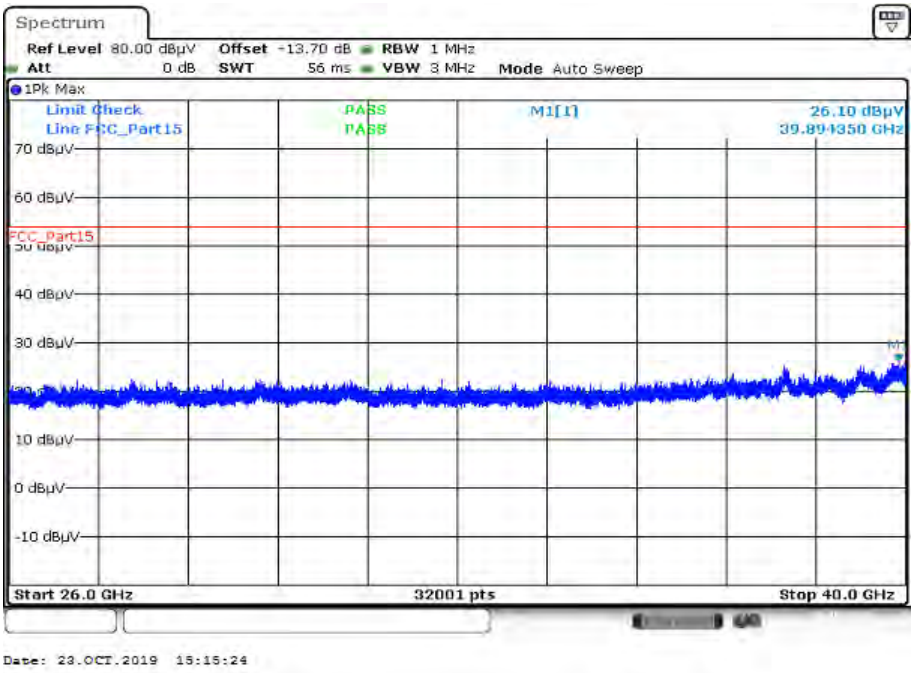
Plot 4: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; highest channel



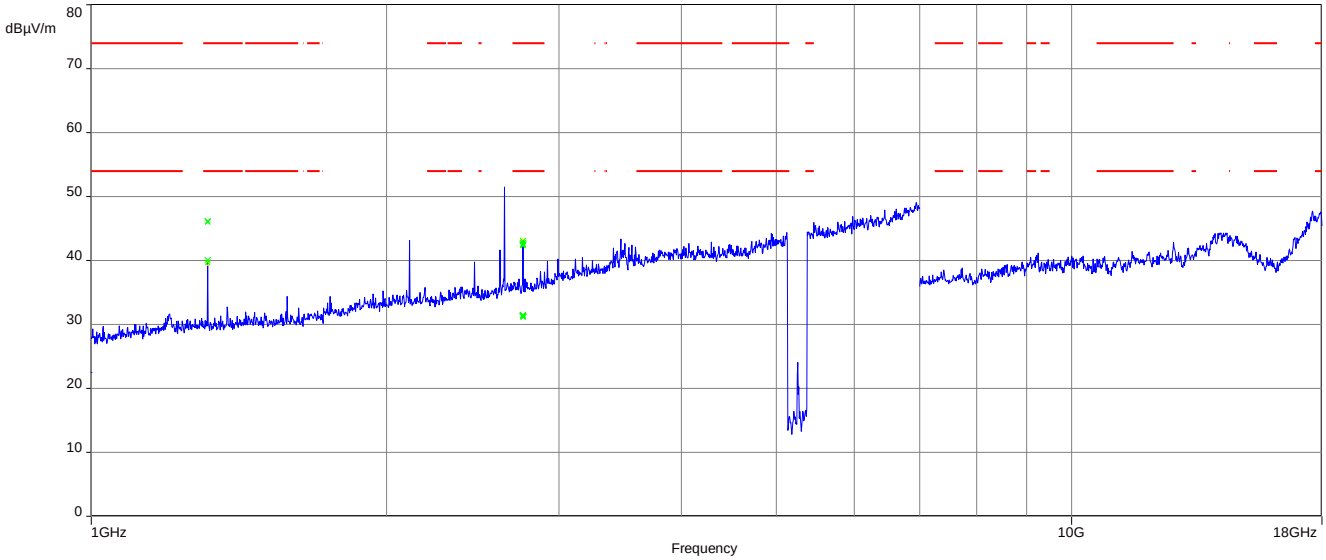
Plot 5: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-1; highest channel



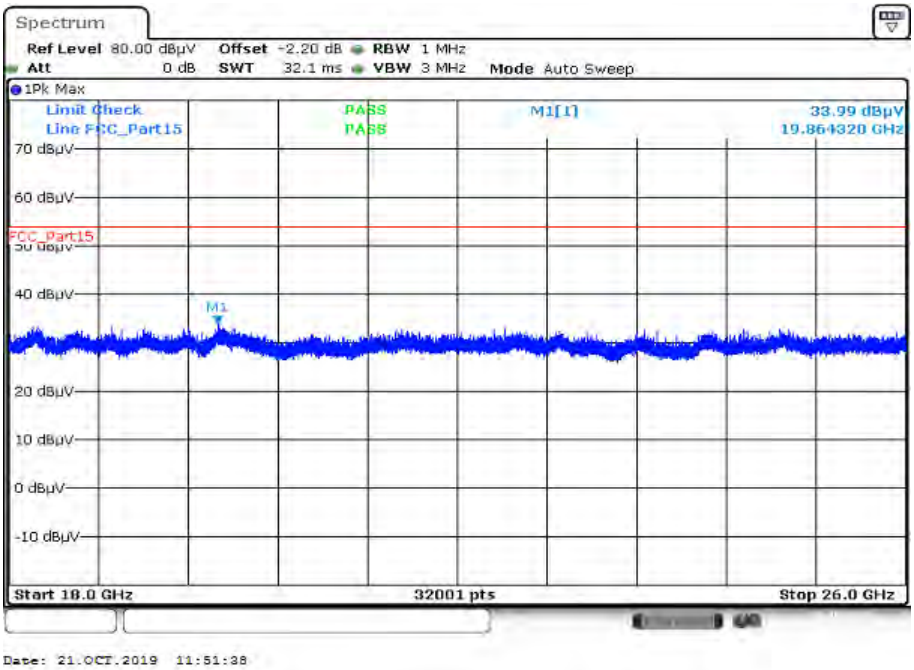
Plot 6: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-1; highest channel



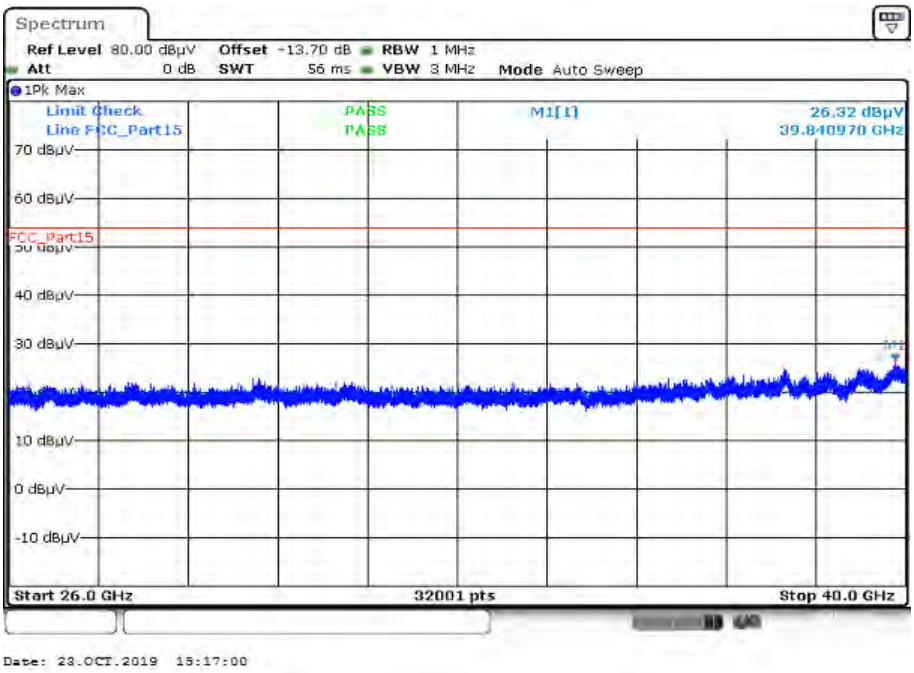
Plot 7: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



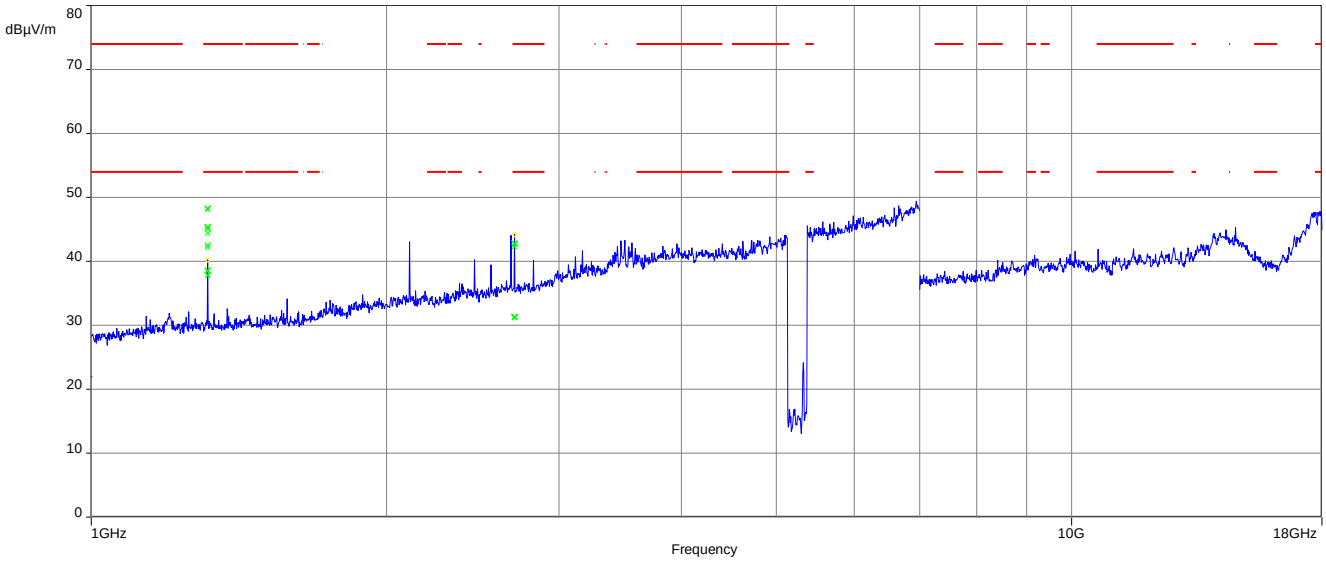
Plot 8: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



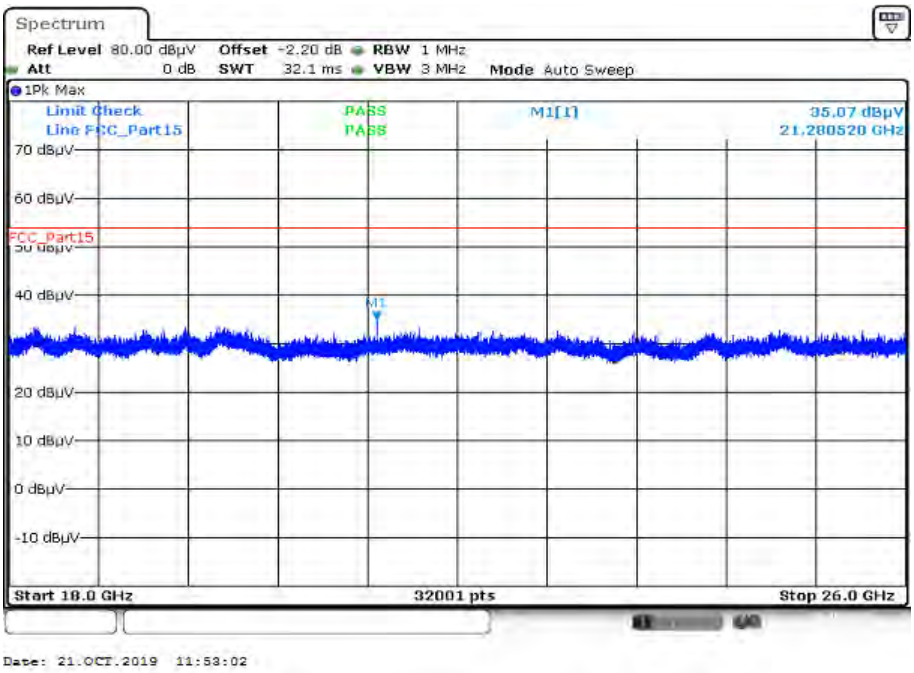
Plot 9: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



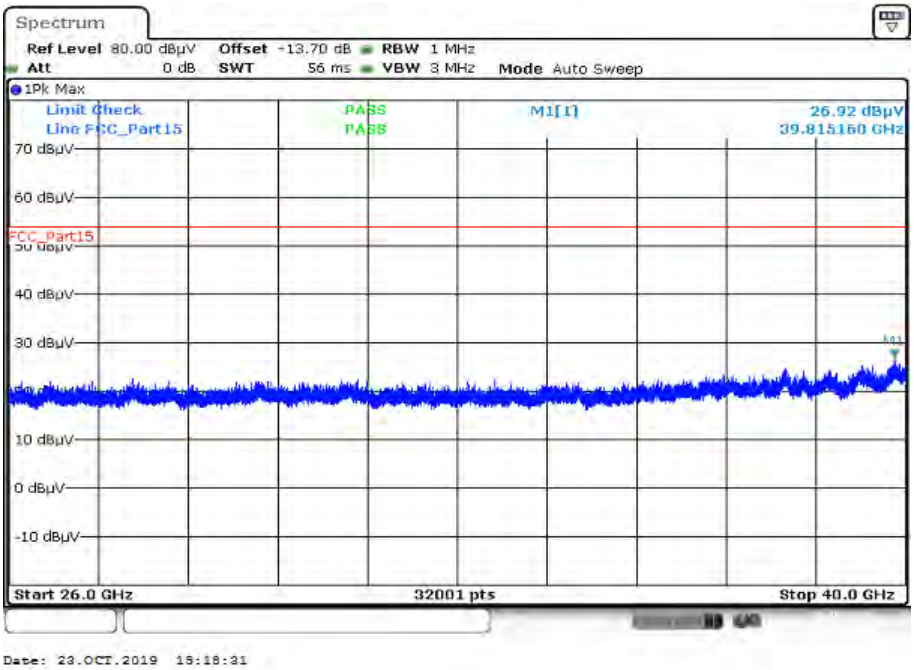
Plot 10: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



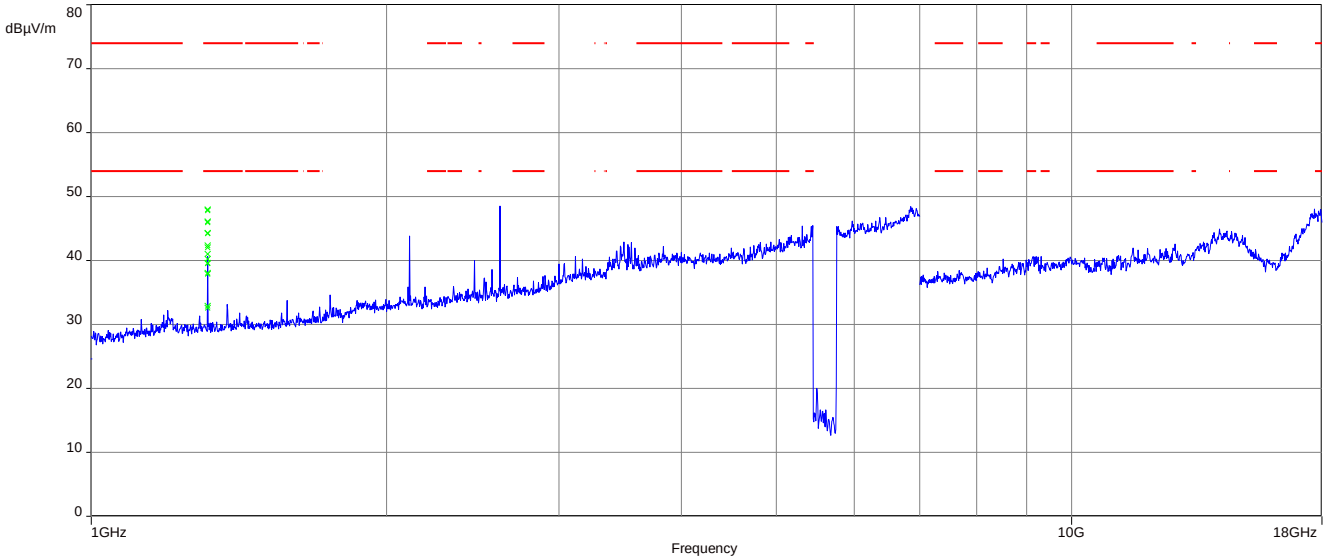
Plot 11: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



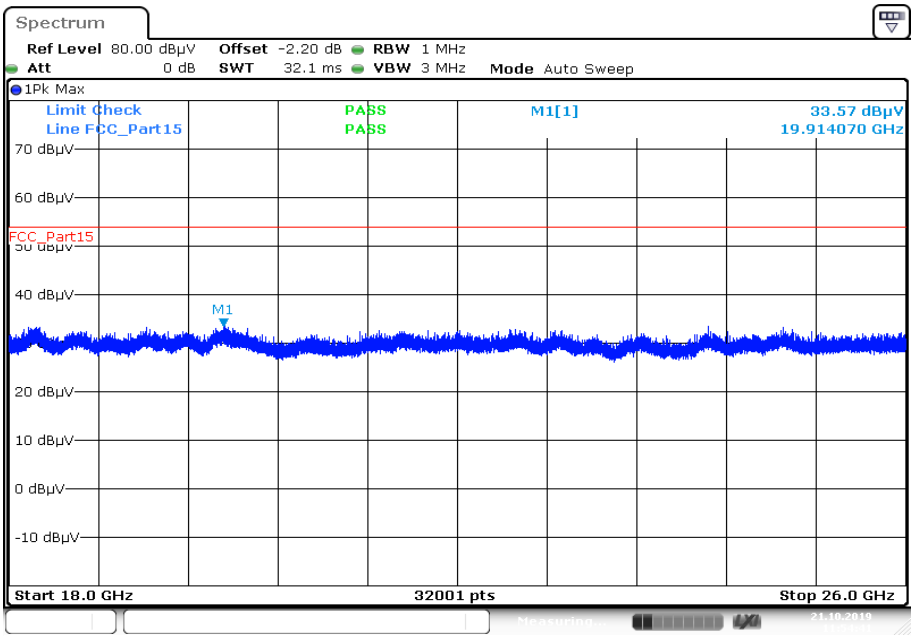
Plot 12: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



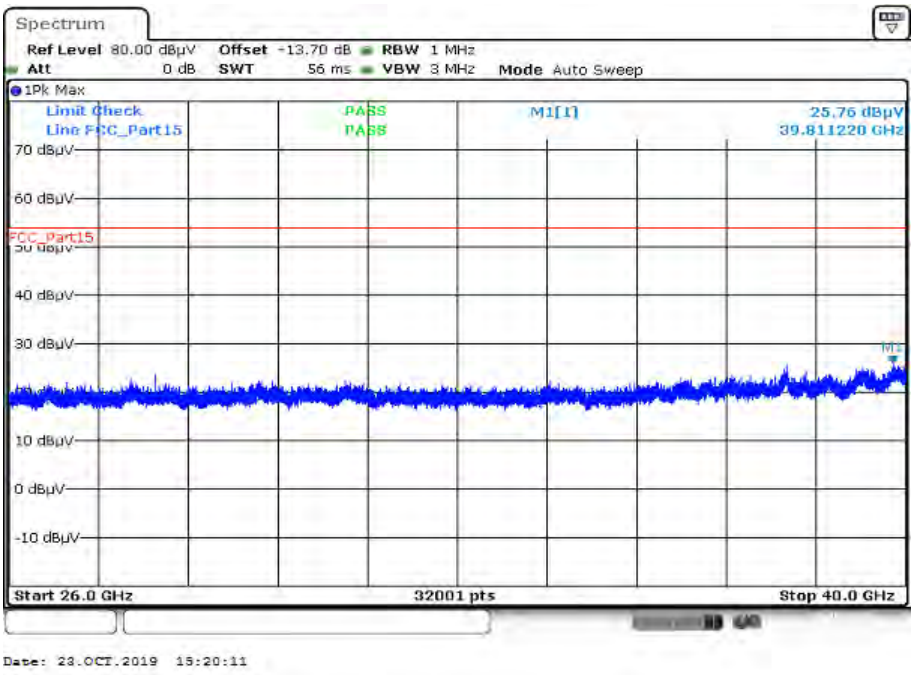
Plot 13: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



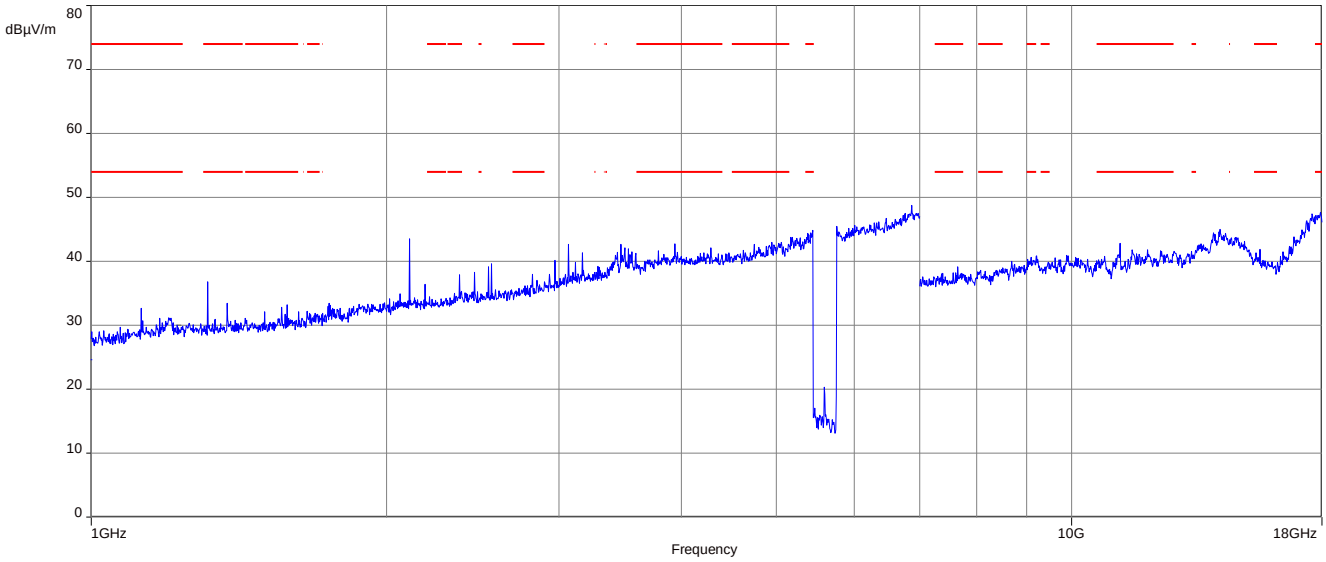
Plot 14: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



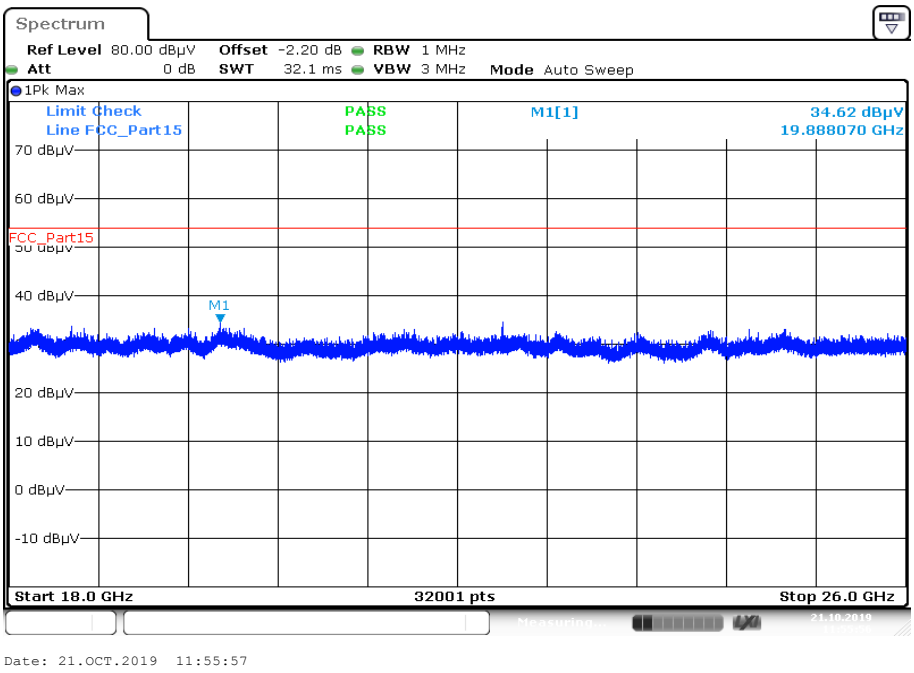
Plot 15: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



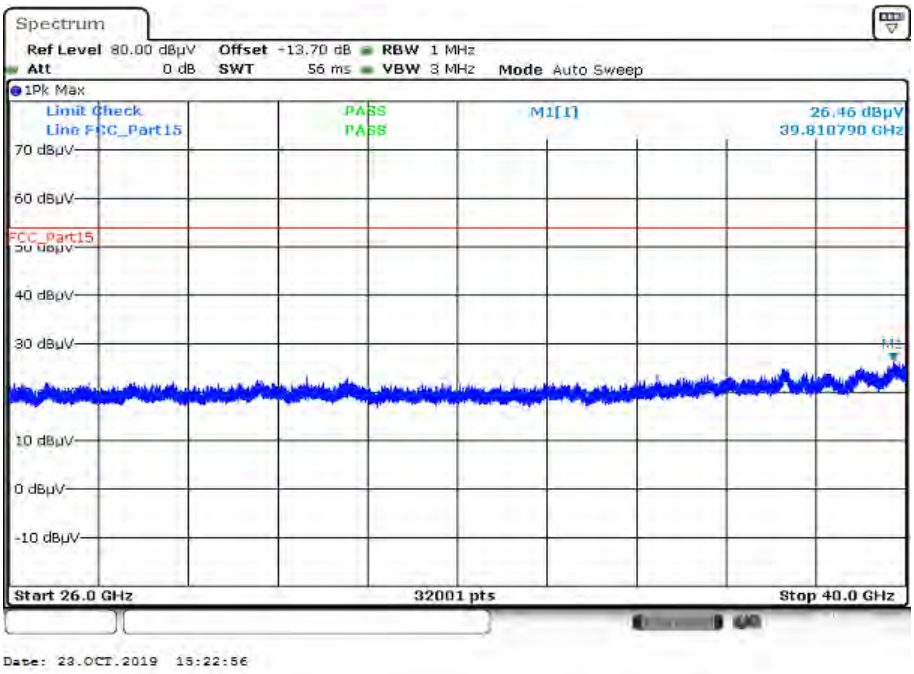
Plot 16: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



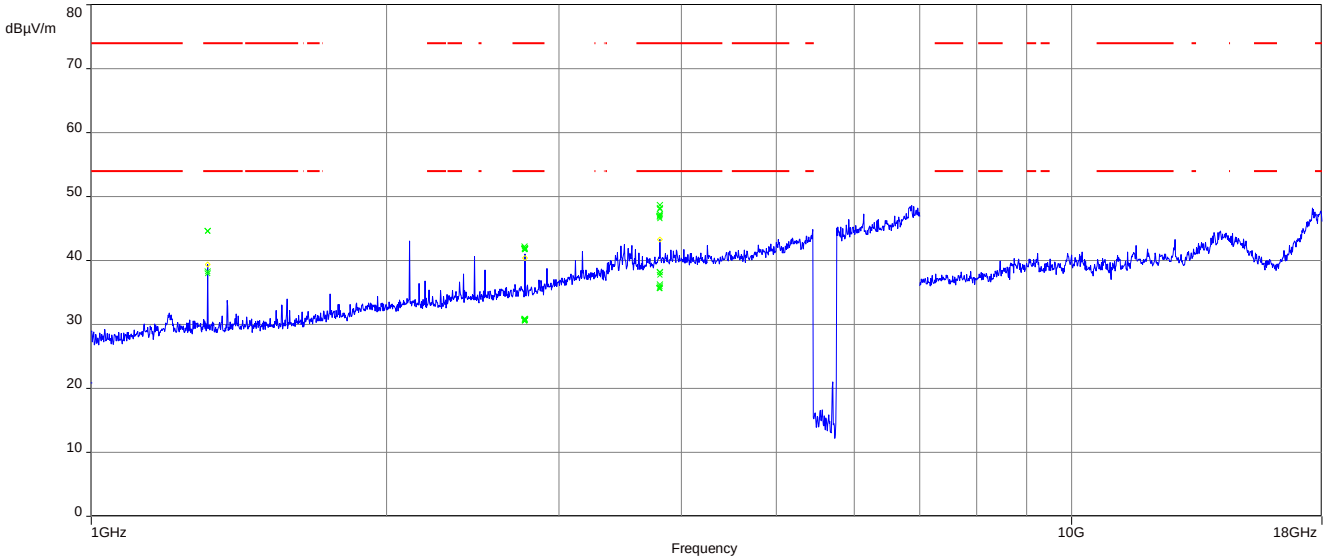
Plot 17: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



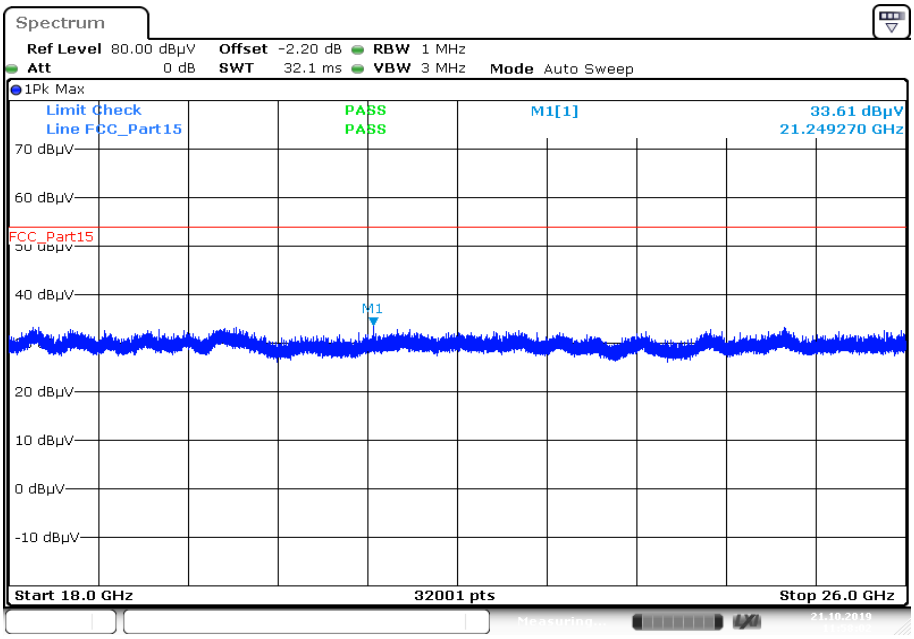
Plot 18: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



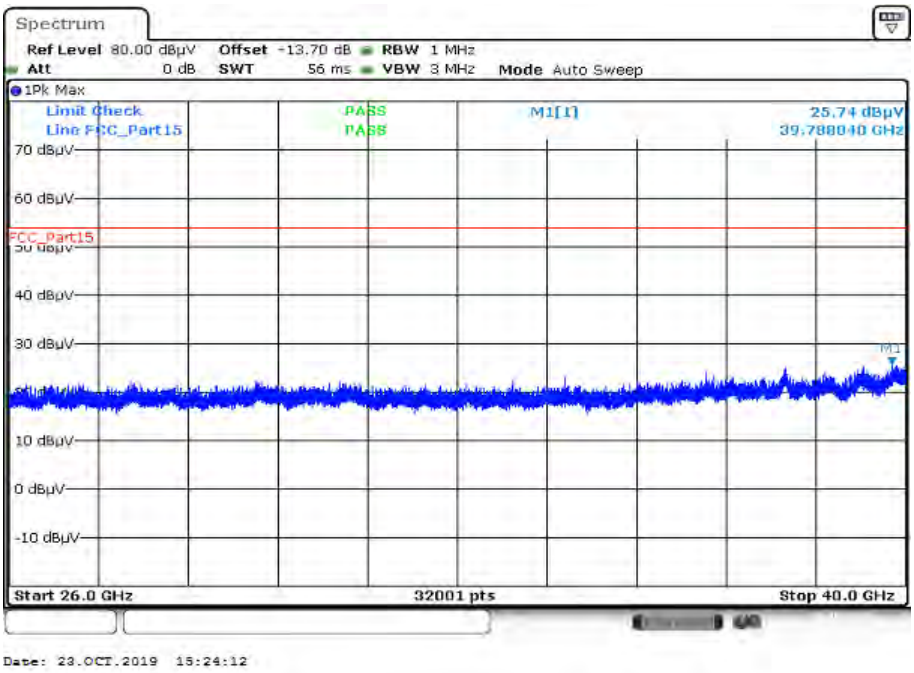
Plot 19: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



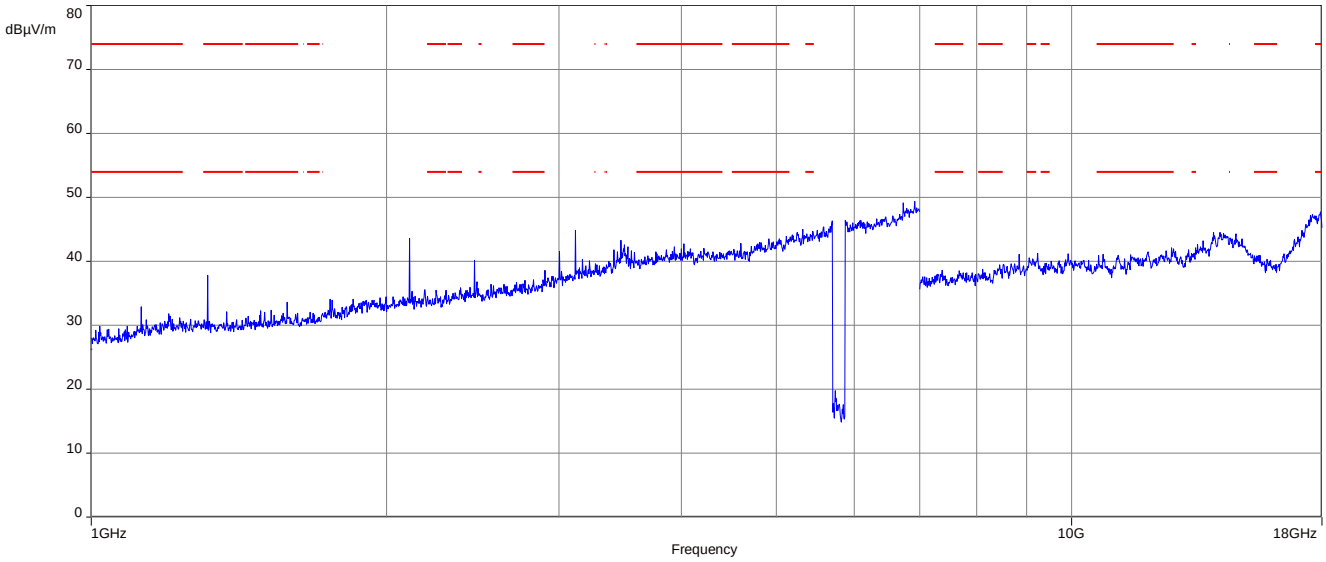
Plot 20: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



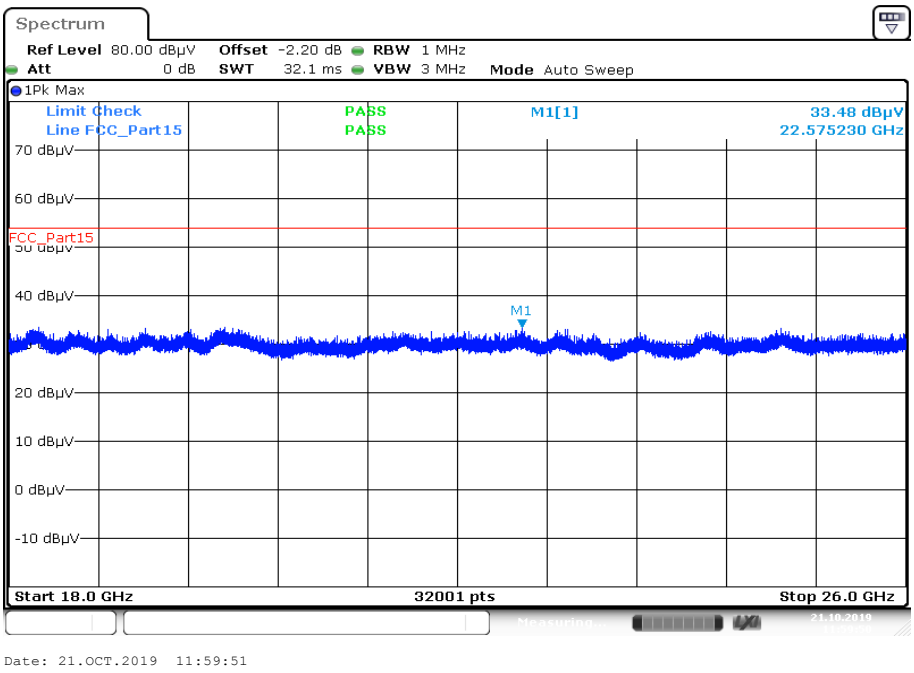
Plot 21: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



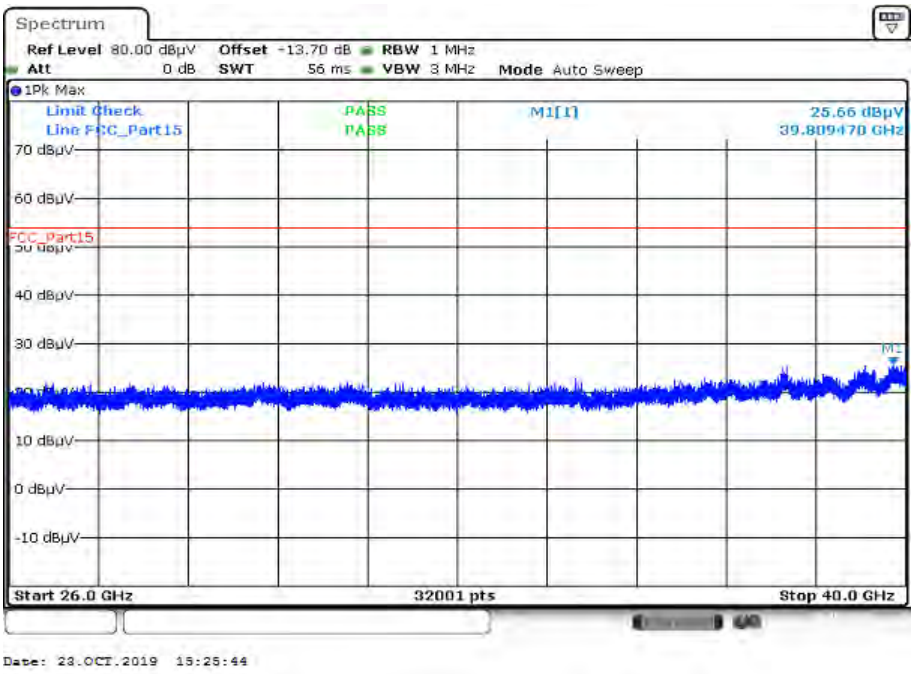
Plot 22: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



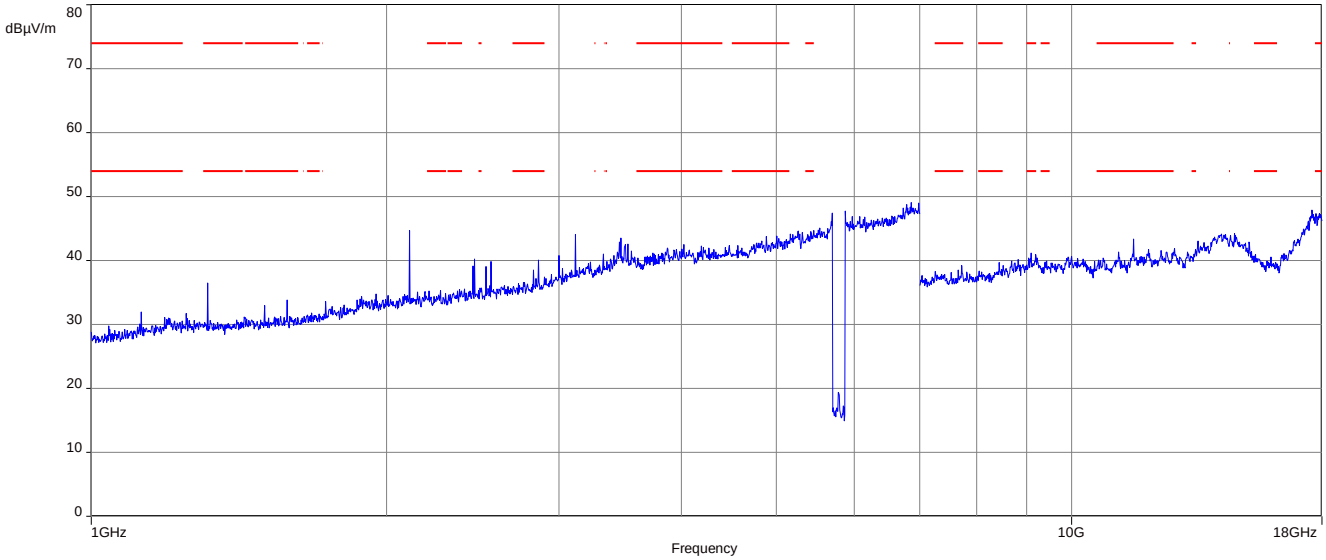
Plot 23: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



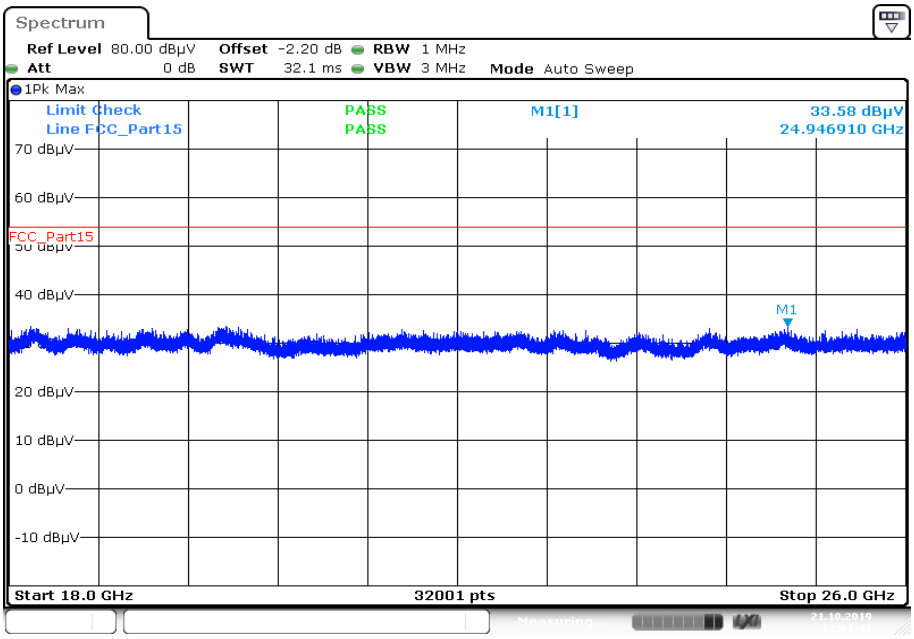
Plot 24: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



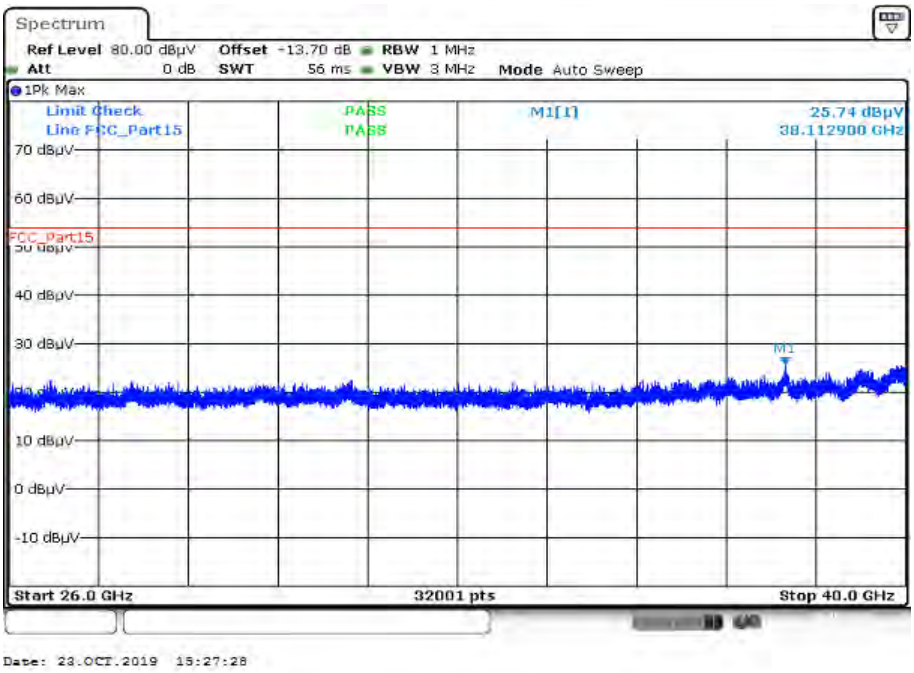
Plot 25: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; middle channel



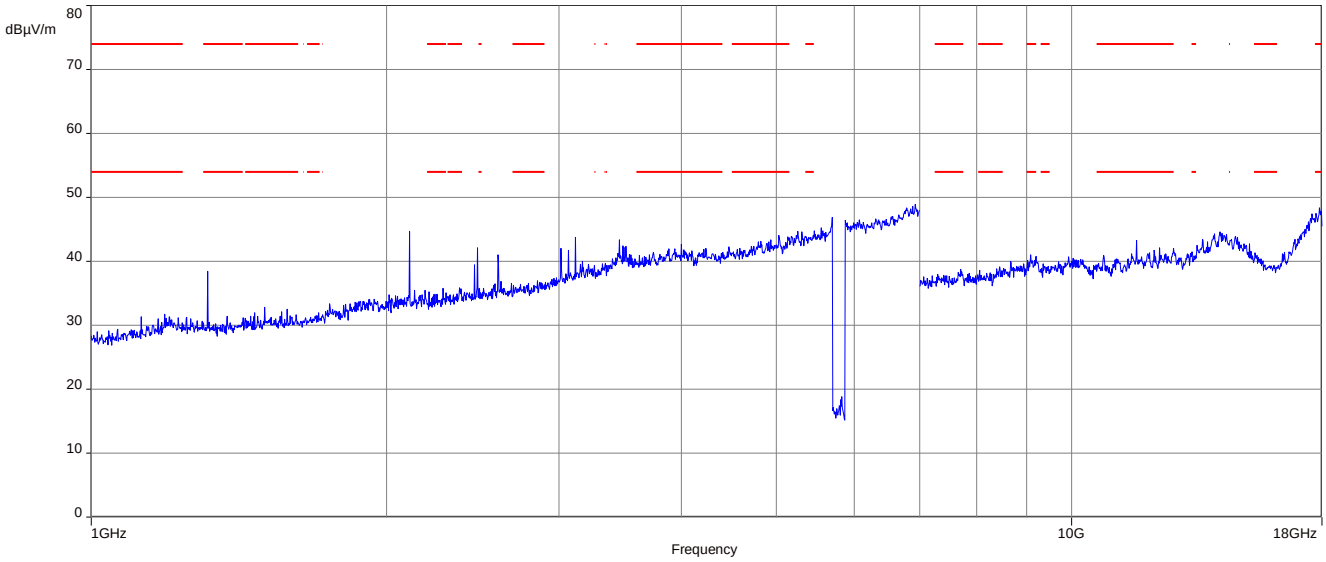
Plot 26: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-3; middle channel



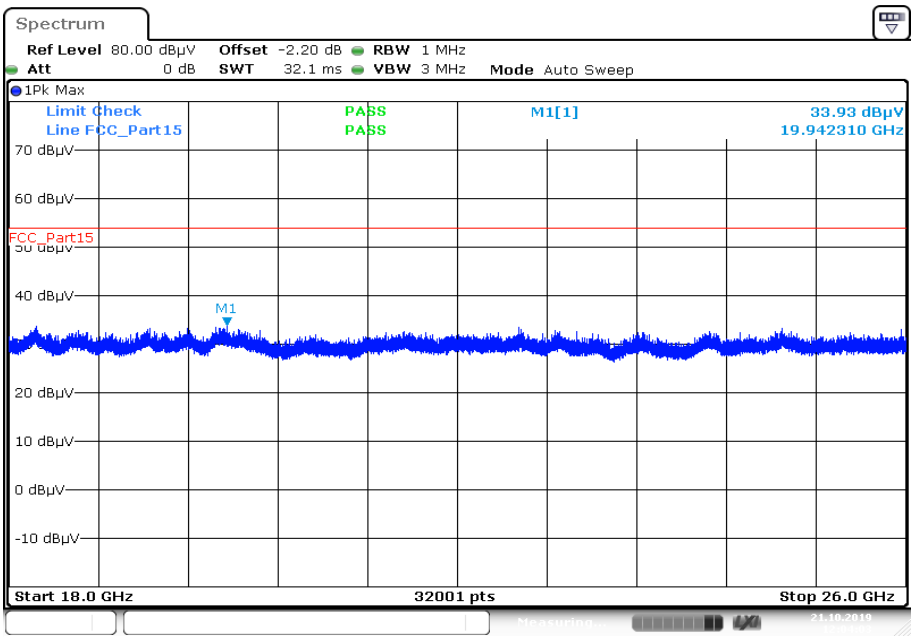
Plot 27: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-3; middle channel



Plot 28: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; highest channel

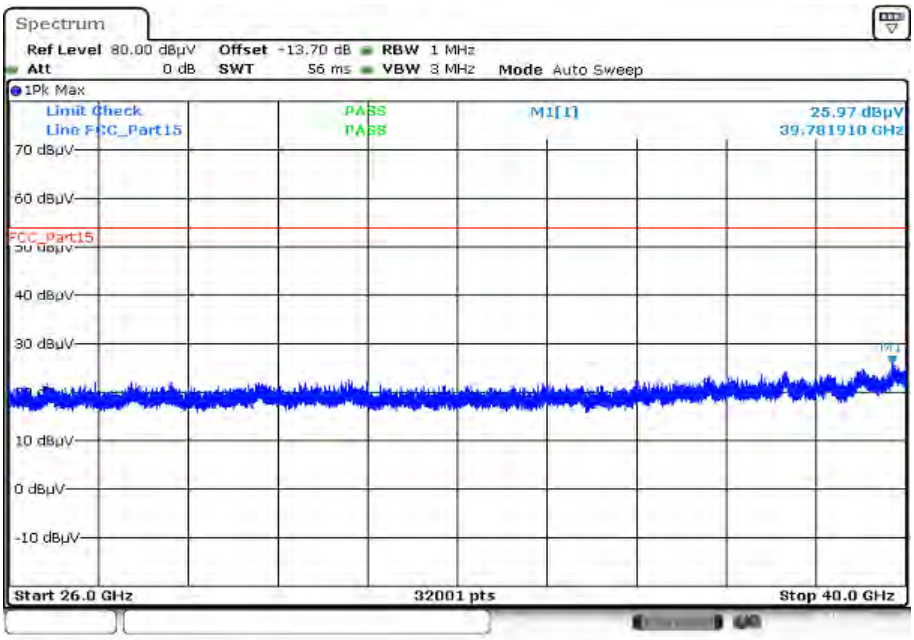


Plot 29: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-3; highest channel



Date: 21.OCT.2019 12:04:03

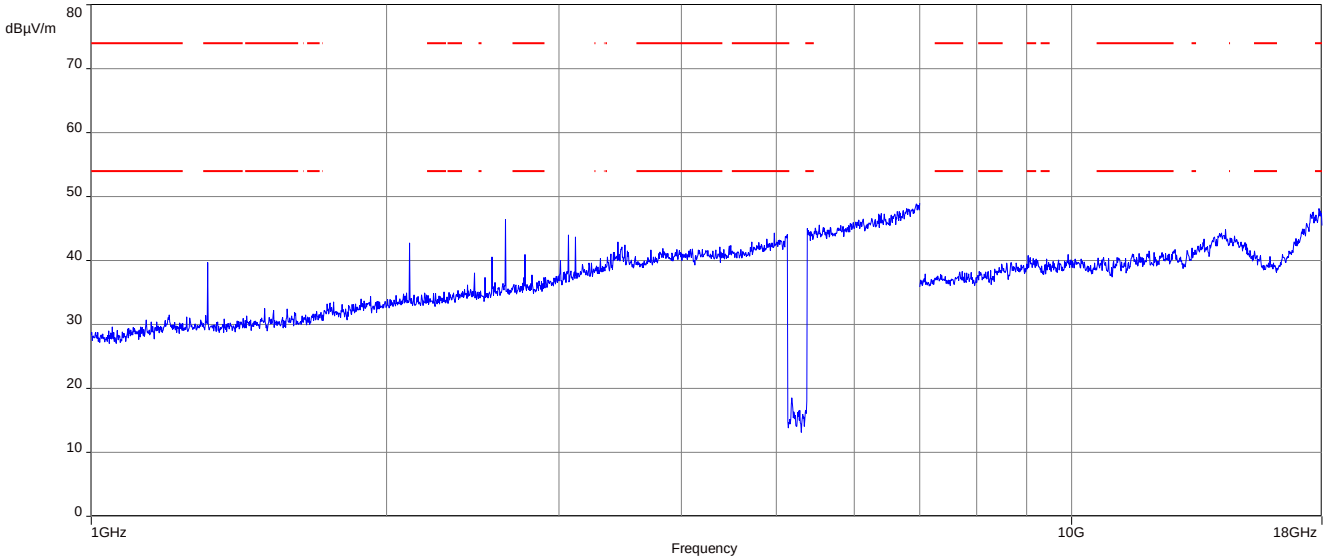
Plot 30: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-3; highest channel



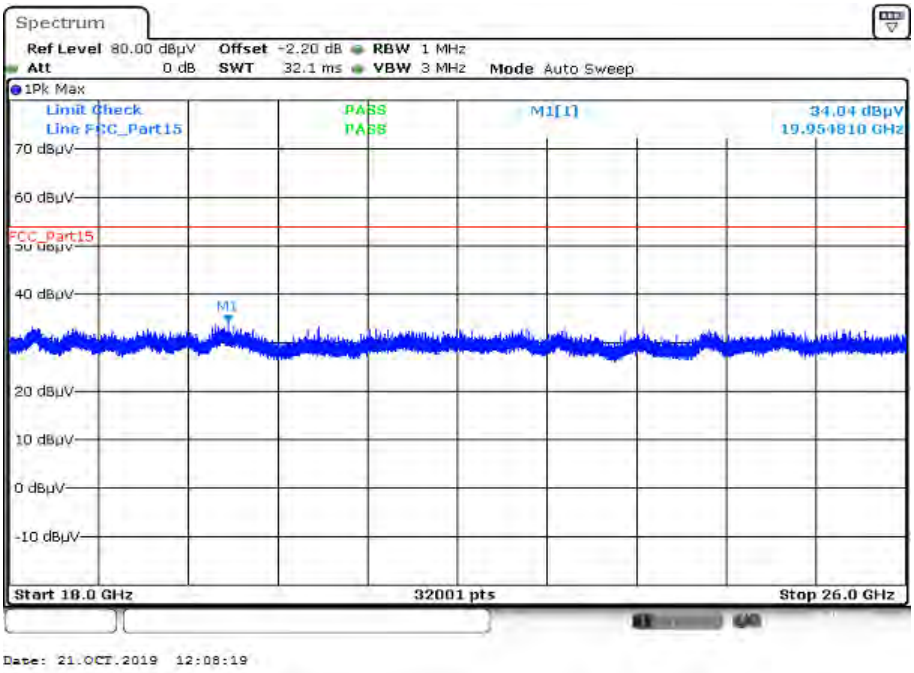
Date: 23.OCT.2019 15:28:40

Plots: 40 MHz channel bandwidth

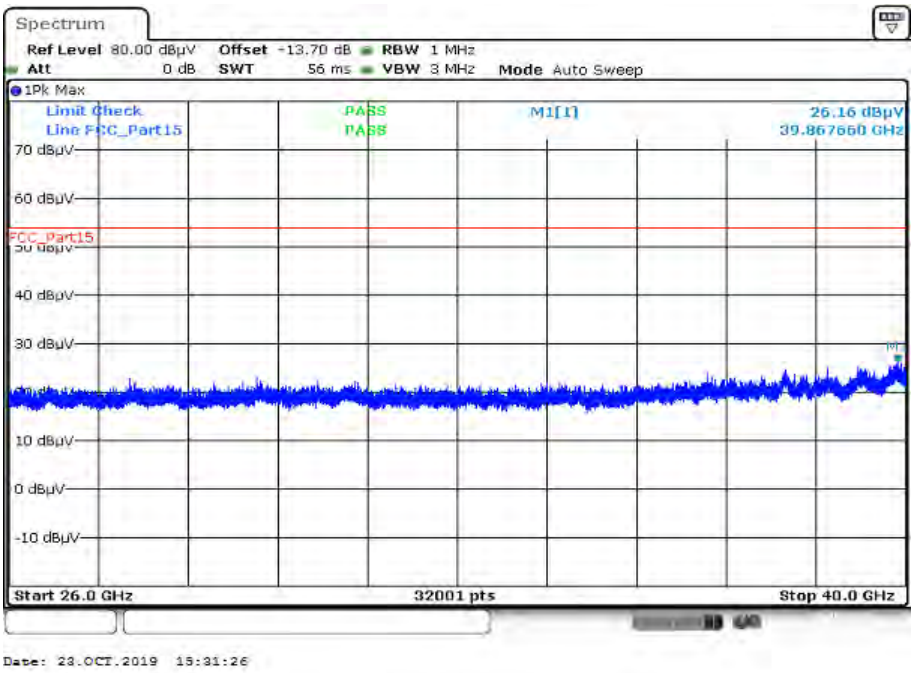
Plot 1: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



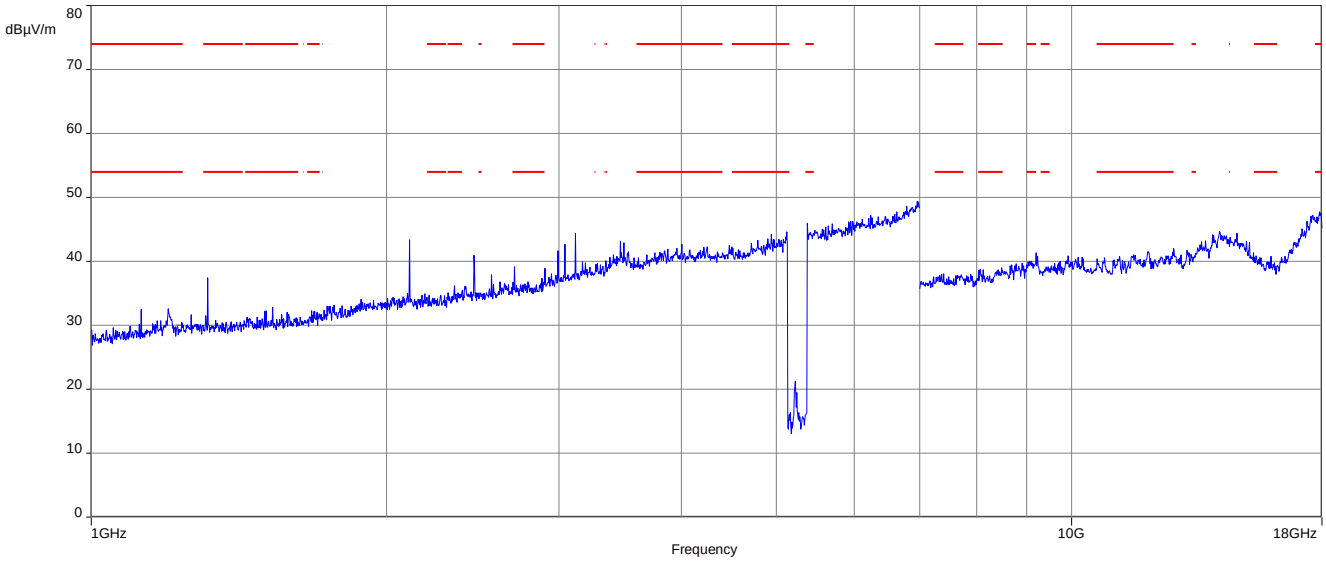
Plot 2: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



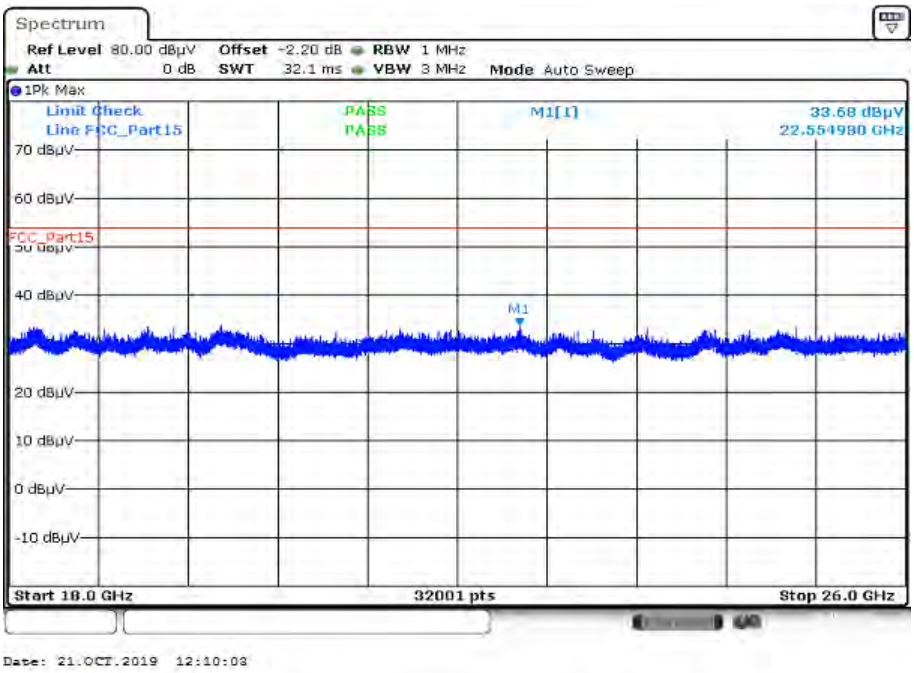
Plot 3: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



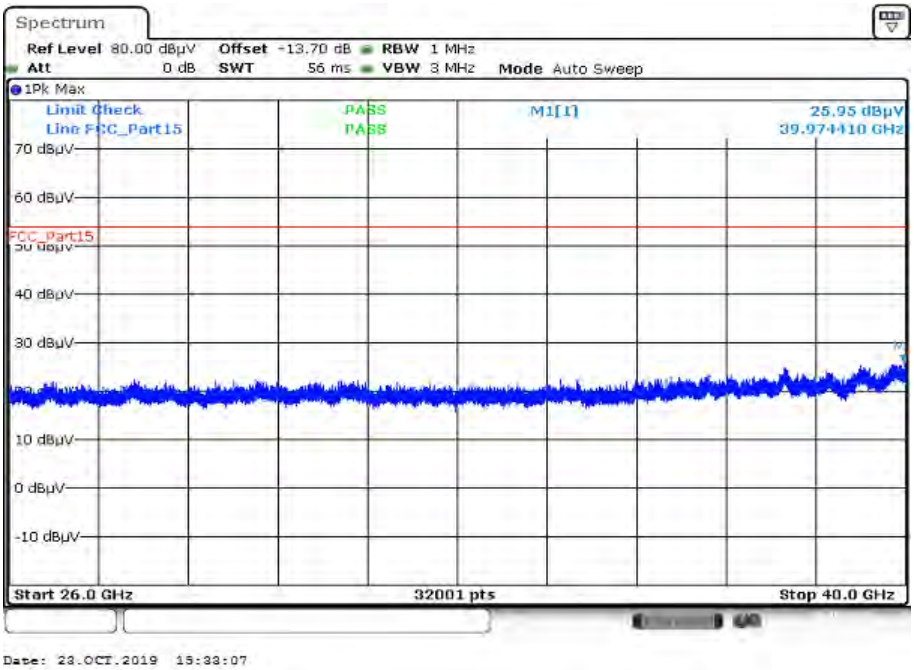
Plot 4: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; highest channel



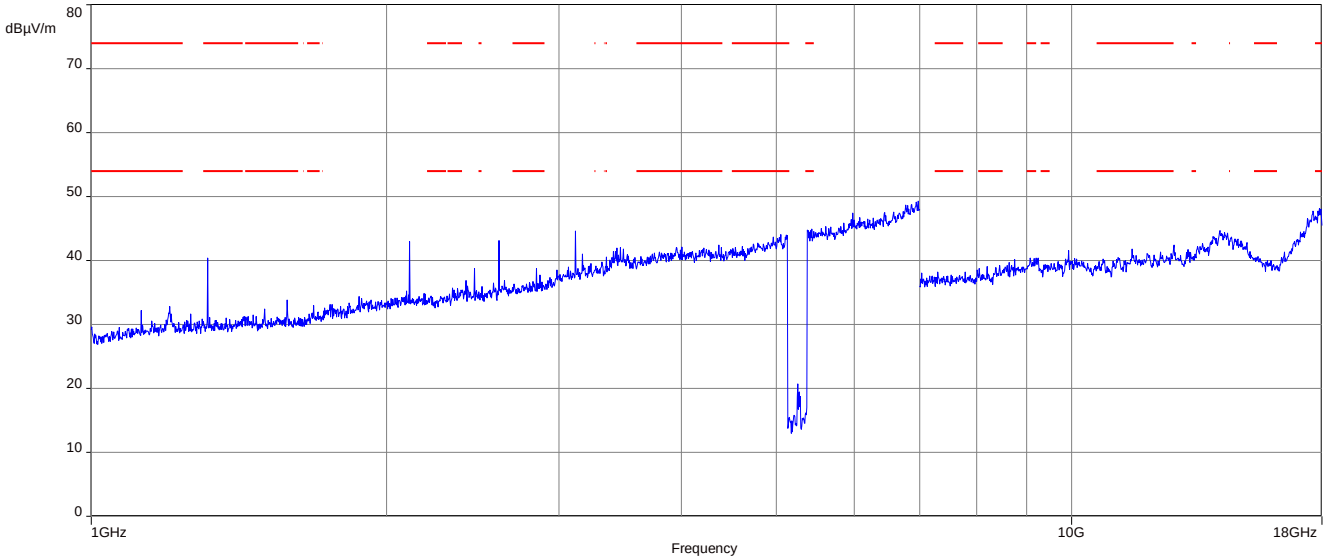
Plot 5: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-1; highest channel



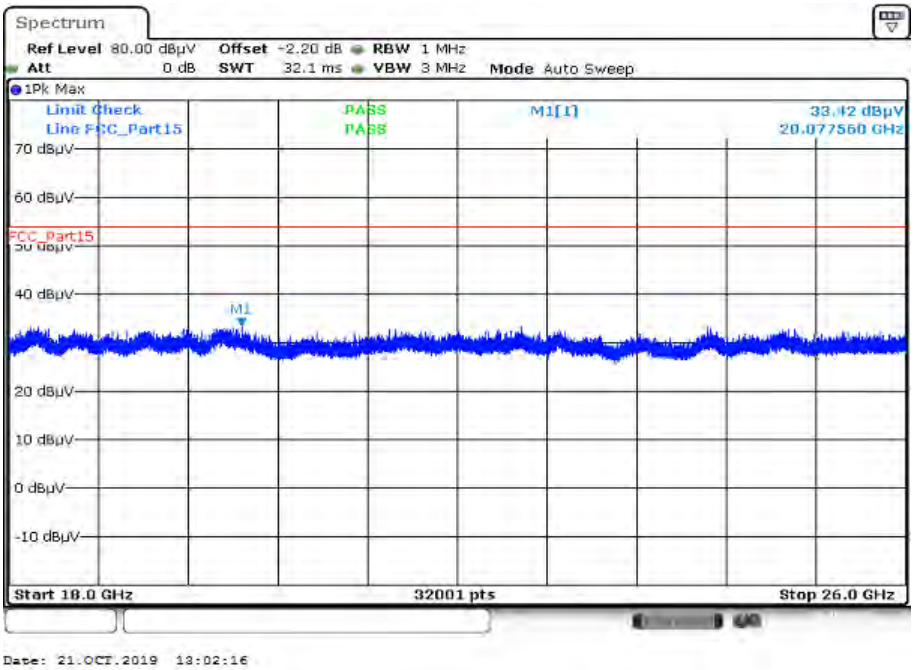
Plot 6: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-1; highest channel



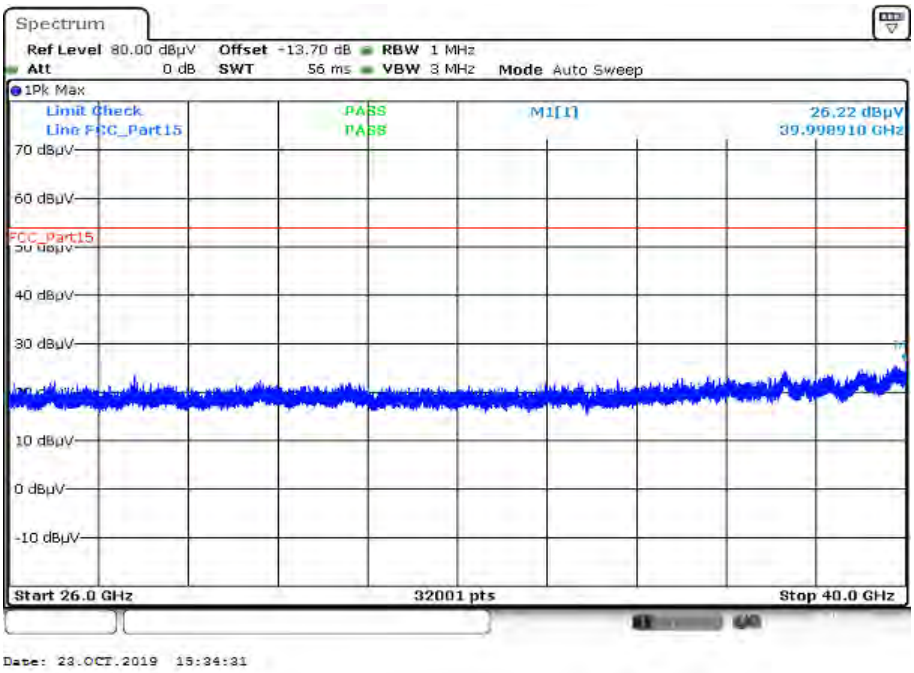
Plot 7: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



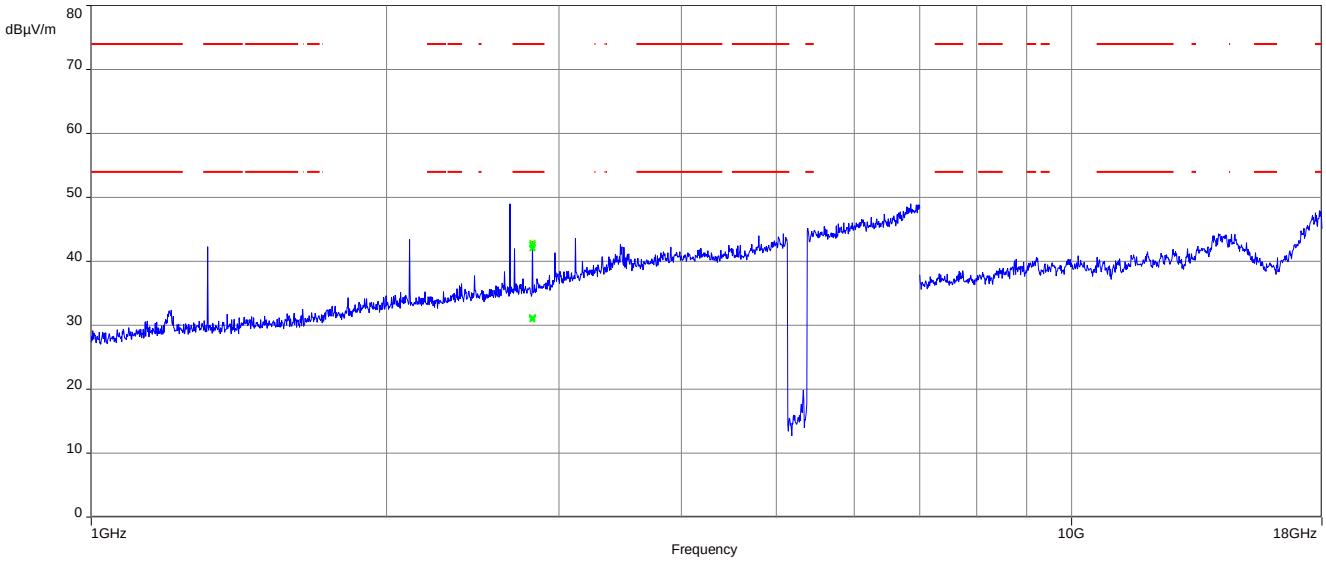
Plot 8: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



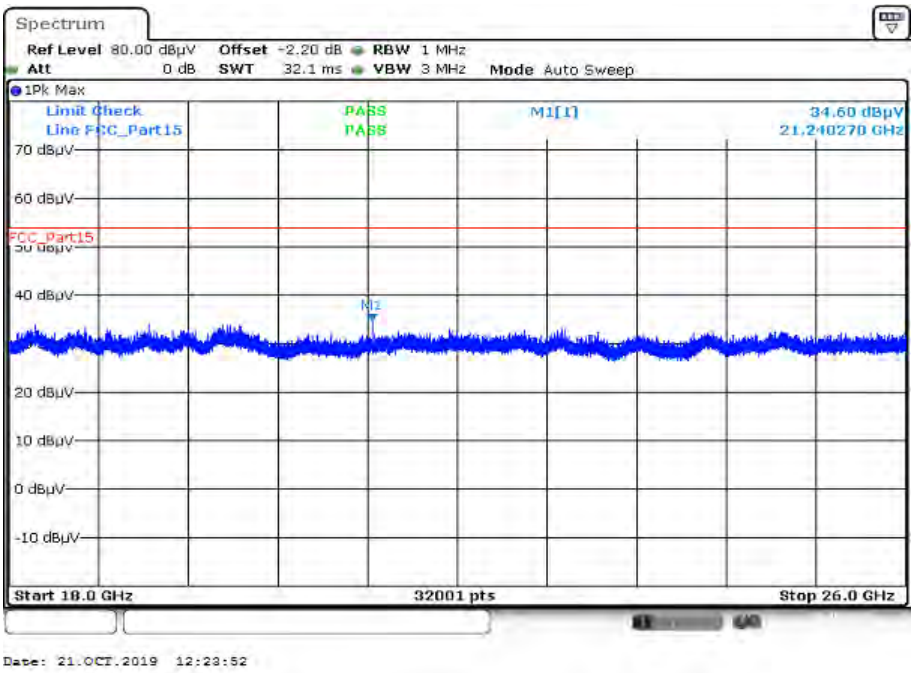
Plot 9: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



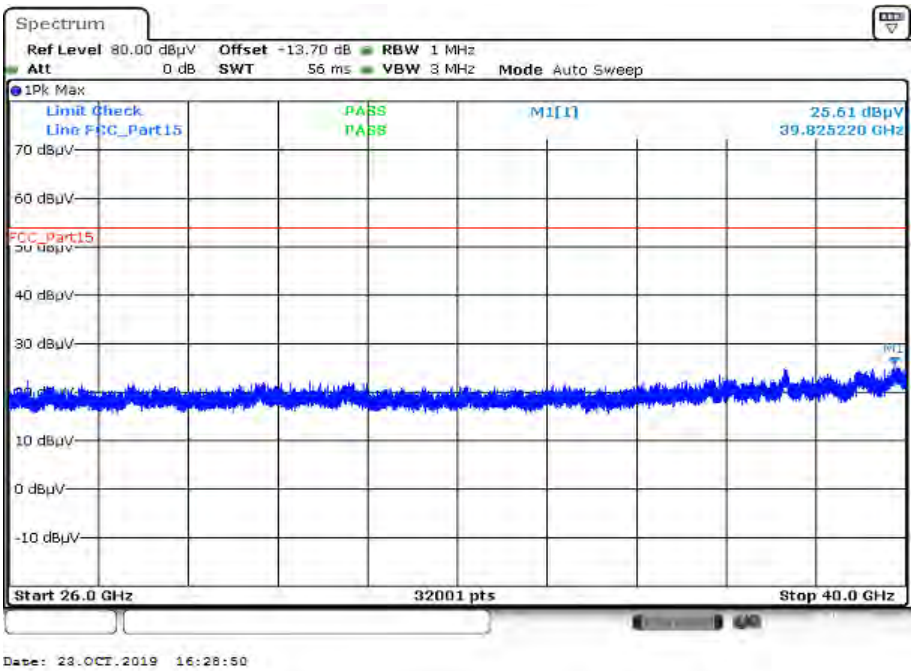
Plot 10: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



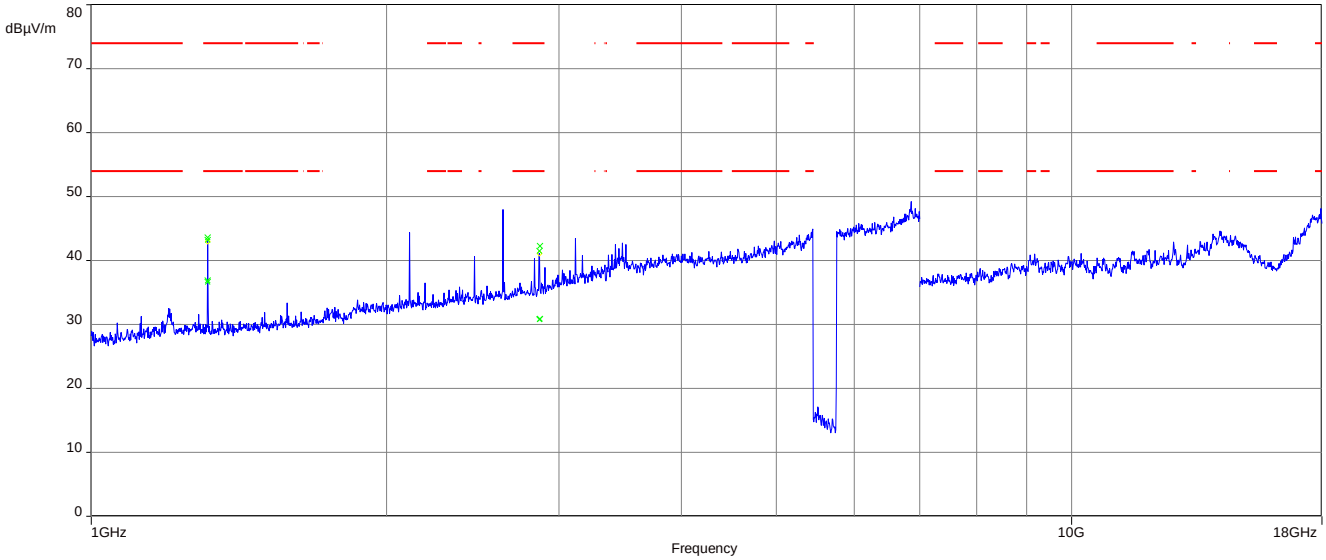
Plot 11: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



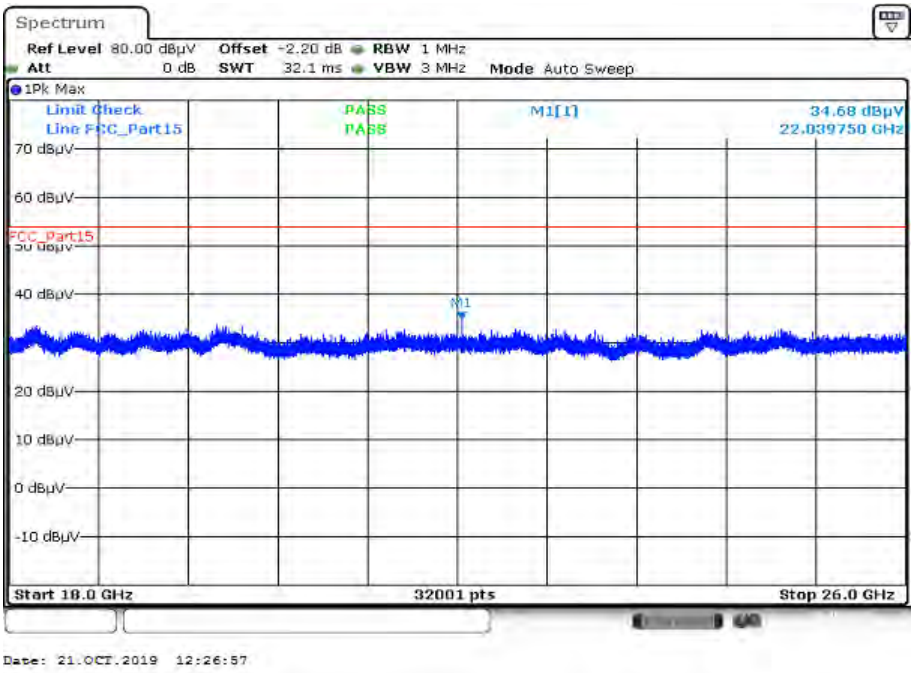
Plot 12: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



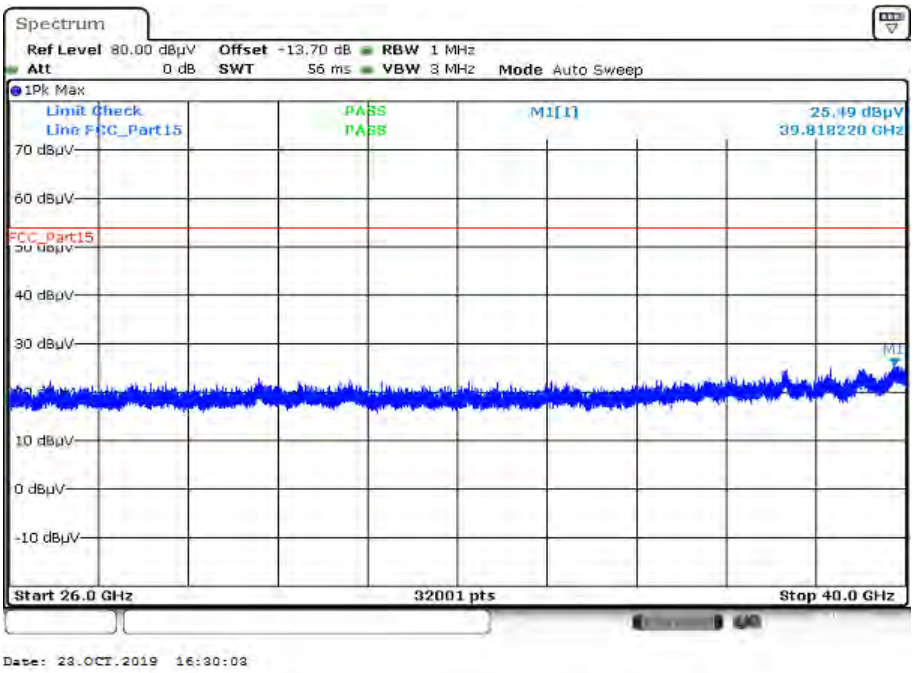
Plot 13: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



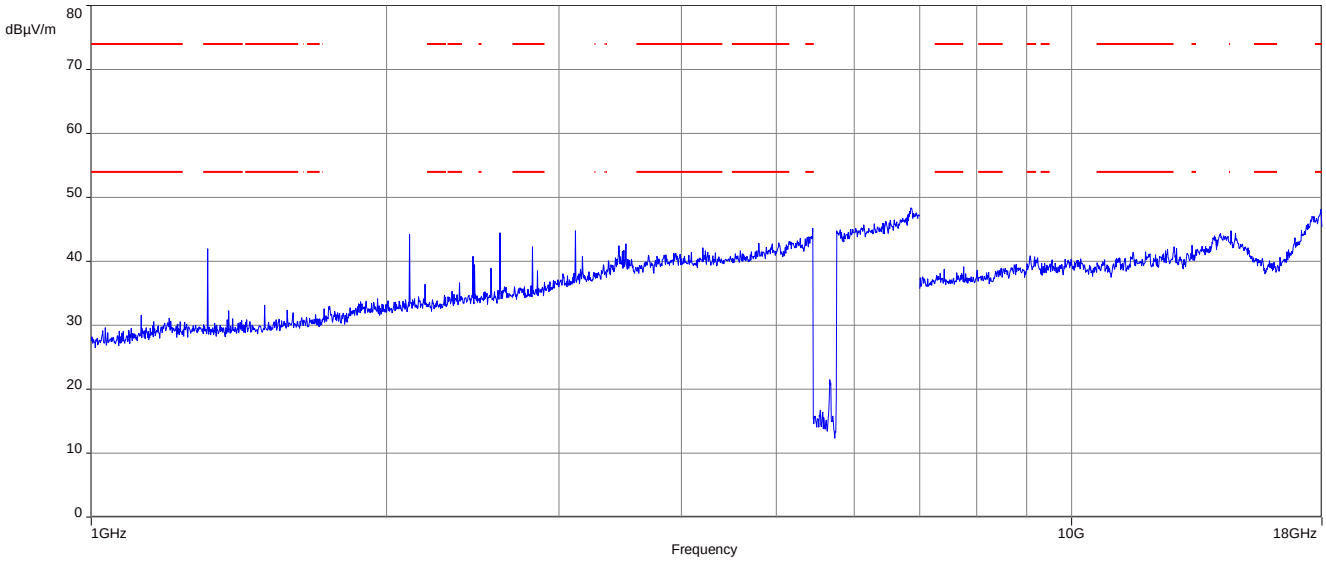
Plot 14: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



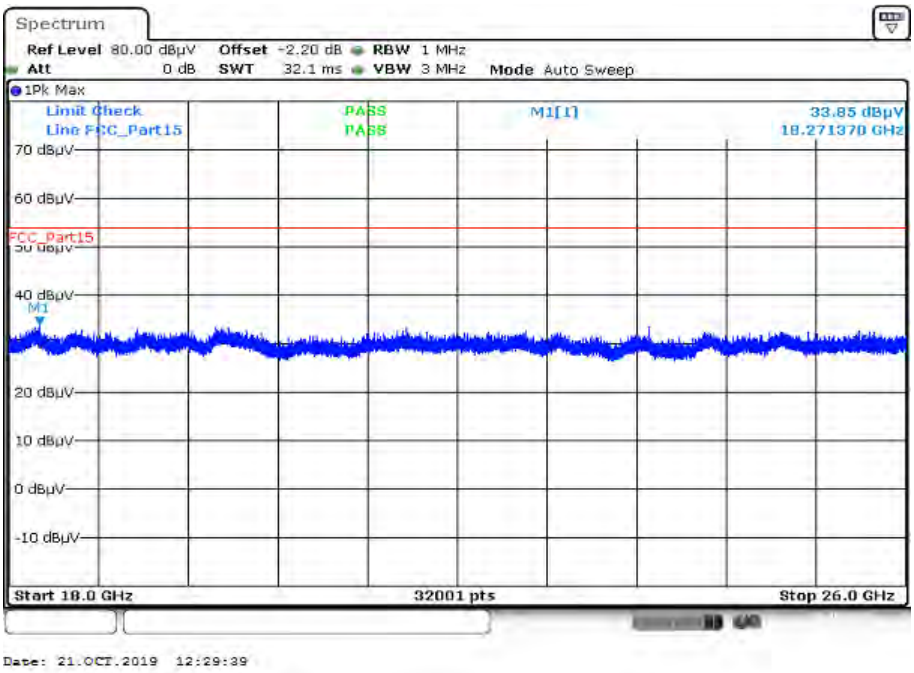
Plot 15: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



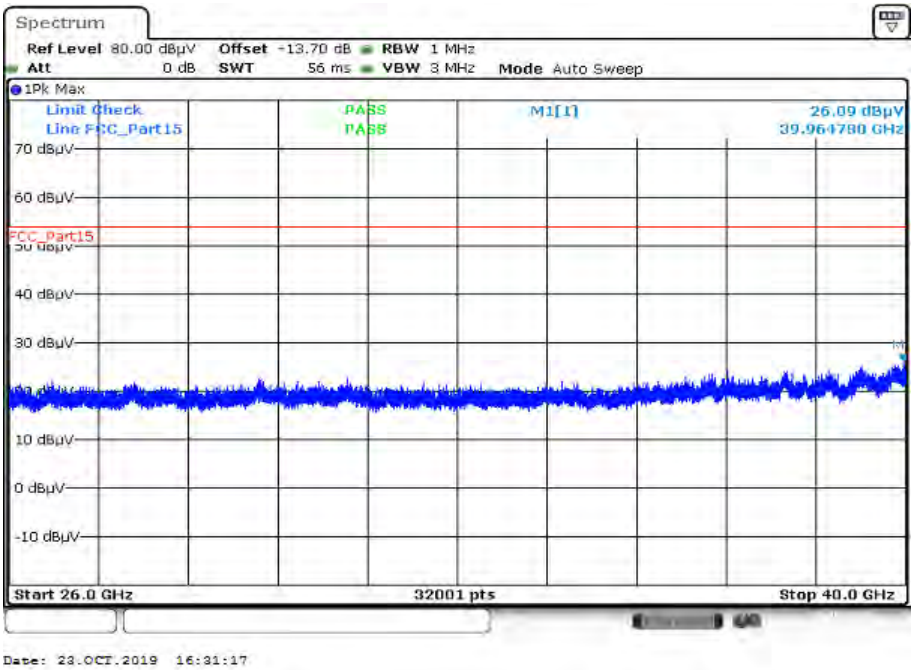
Plot 16: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



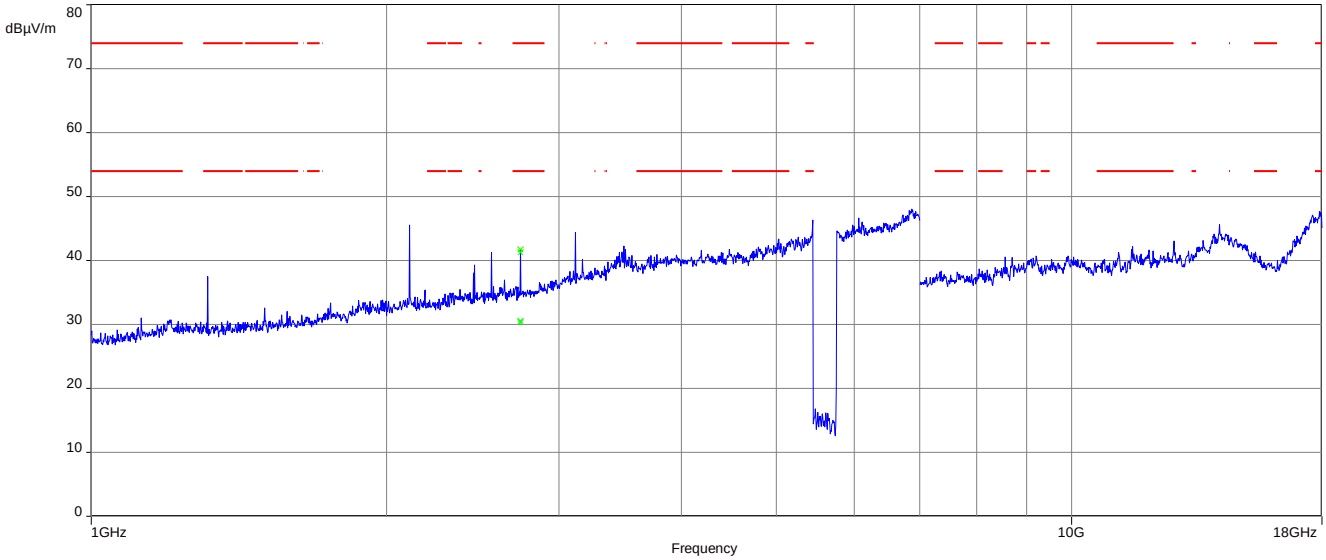
Plot 17: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



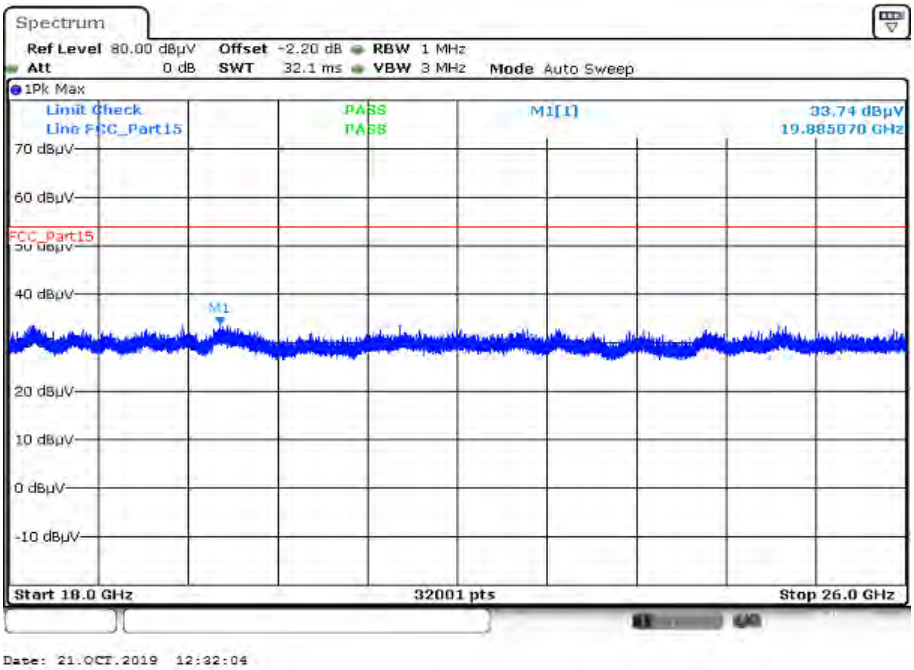
Plot 18: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



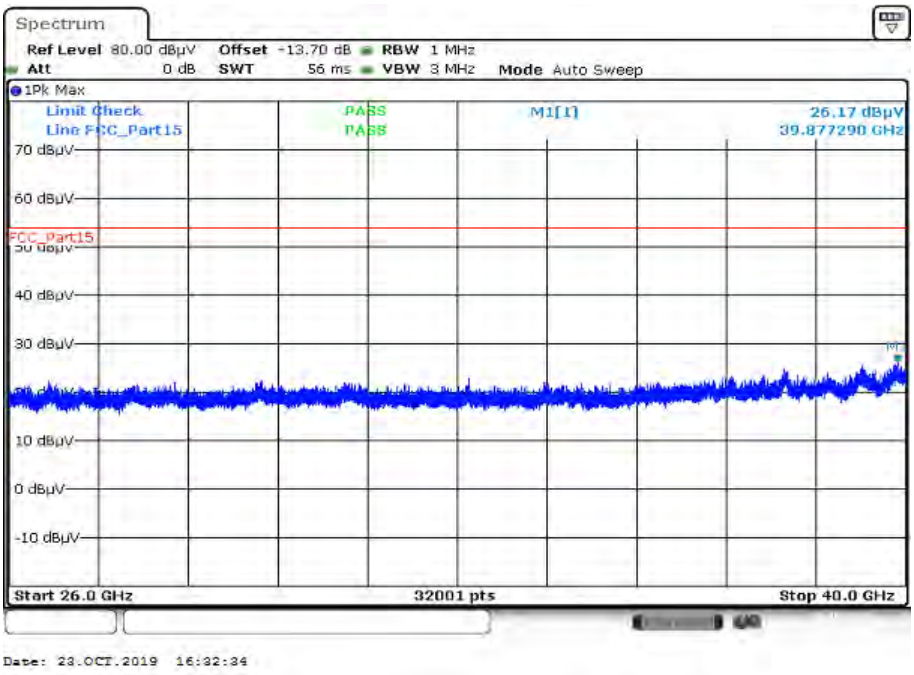
Plot 19: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



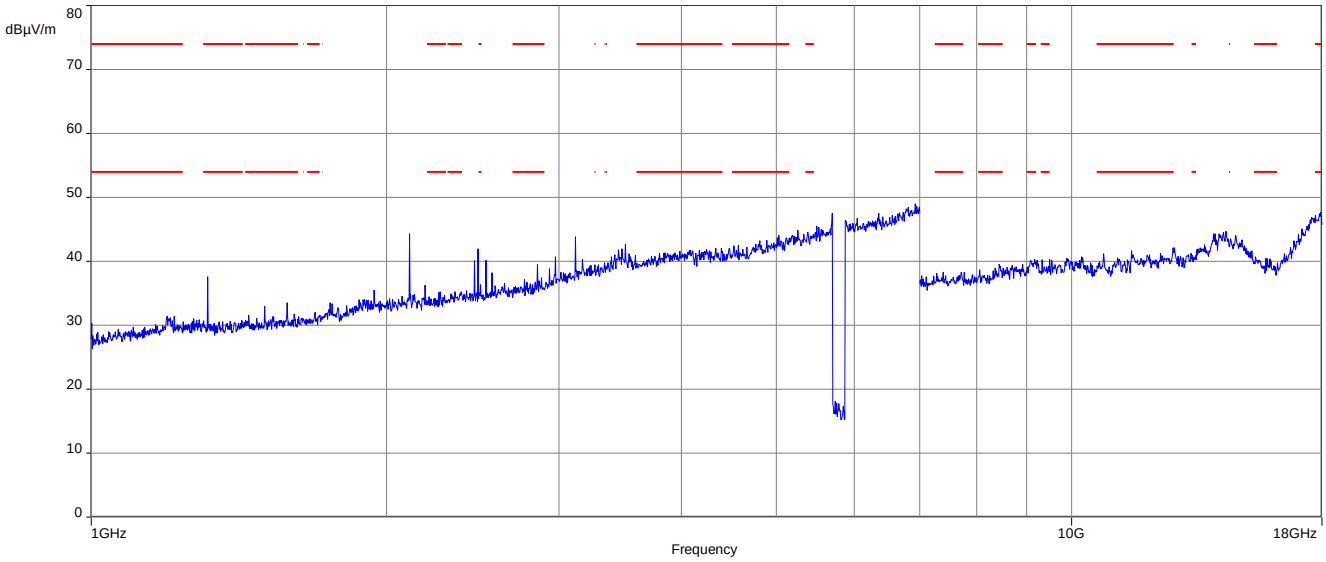
Plot 20: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



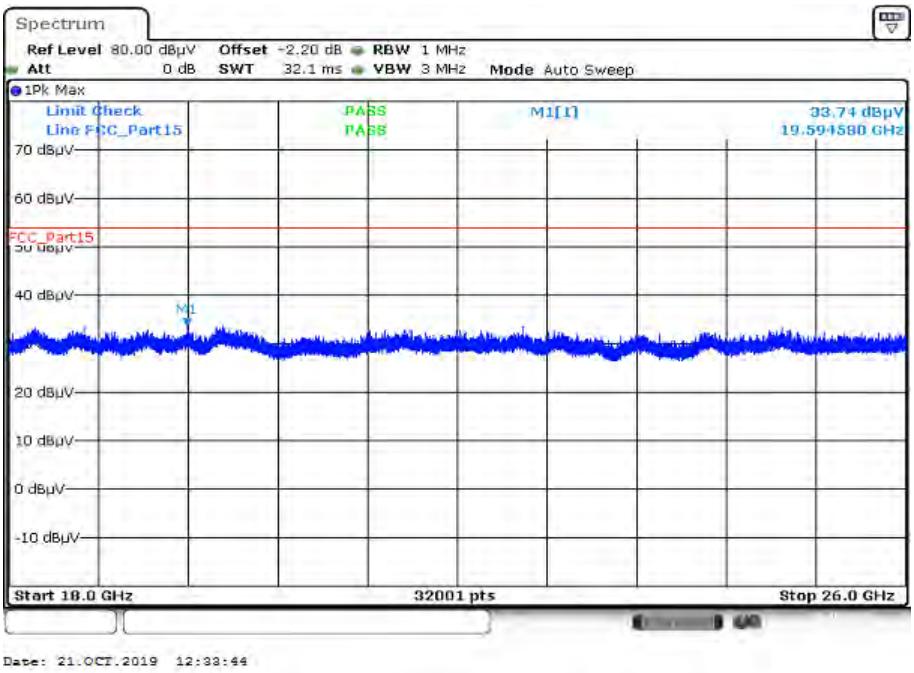
Plot 21: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



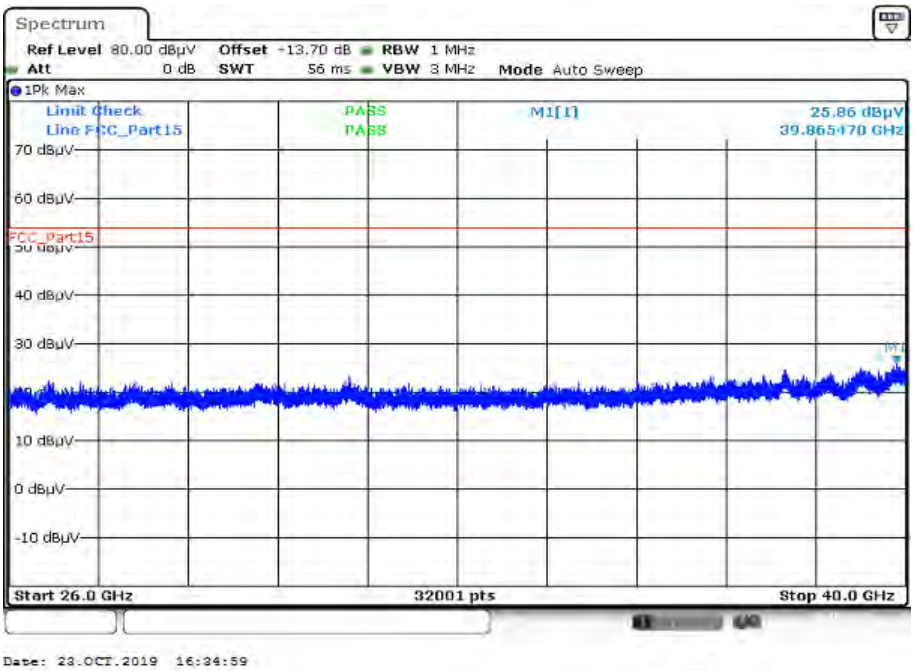
Plot 22: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



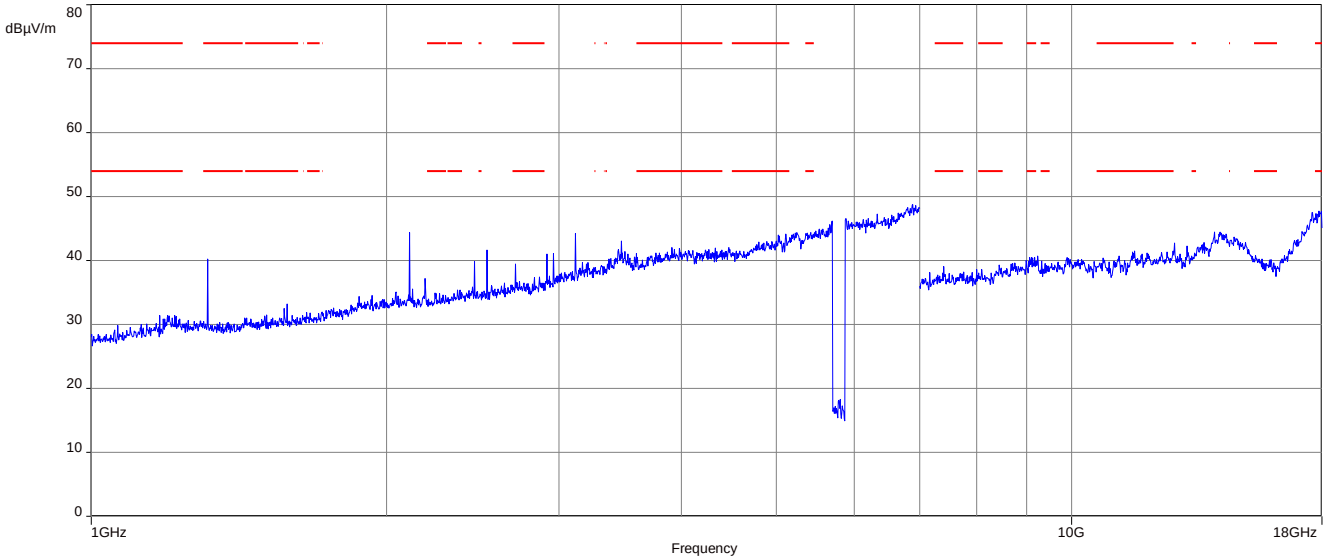
Plot 23: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



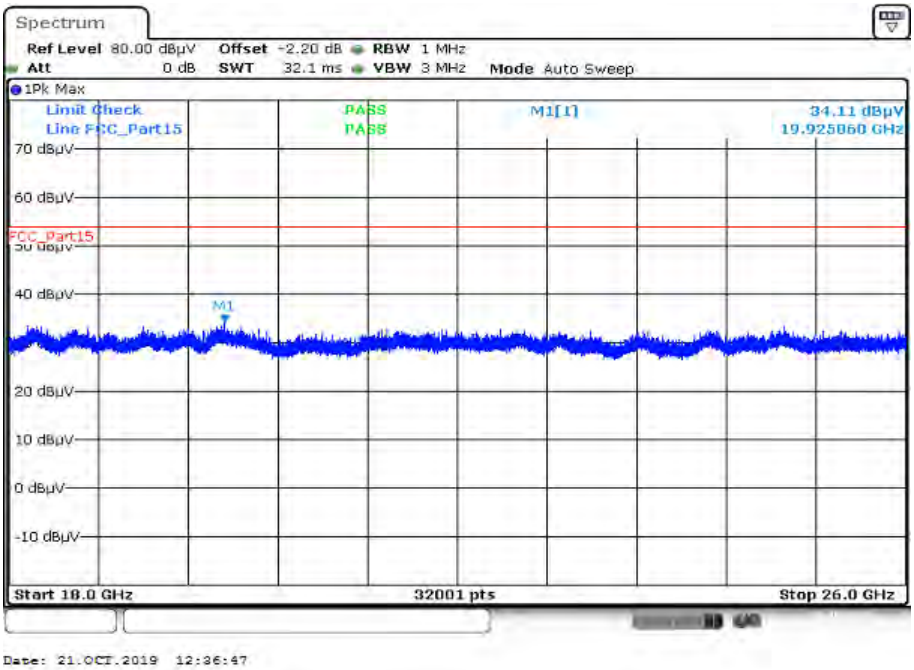
Plot 24: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-3; lowest channel



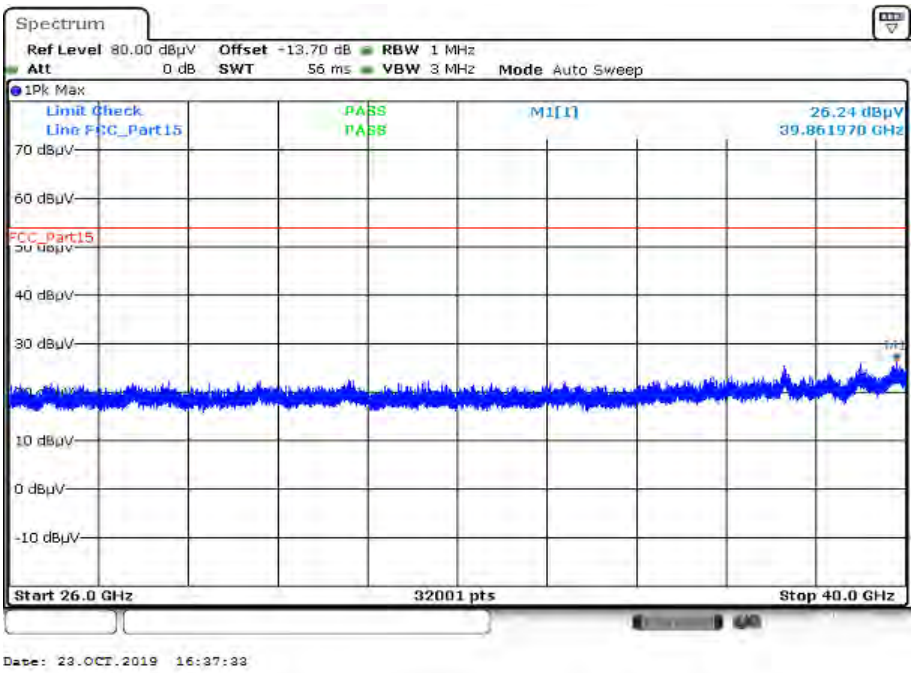
Plot 25: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; highest channel



Plot 26: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-3; highest channel

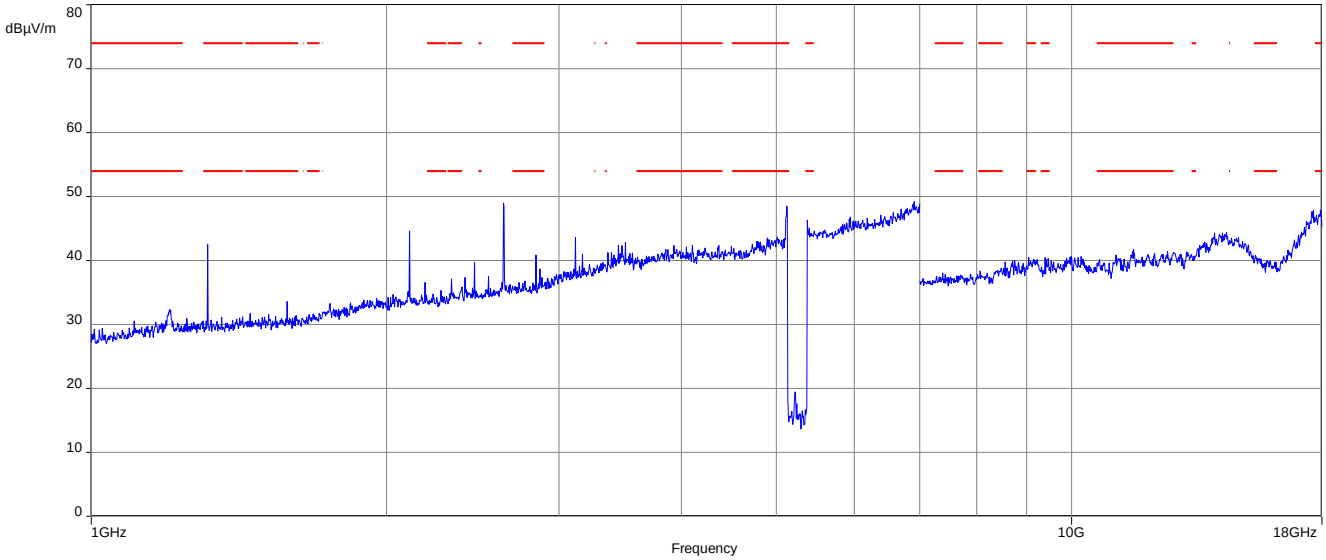


Plot 27: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-3; highest channel

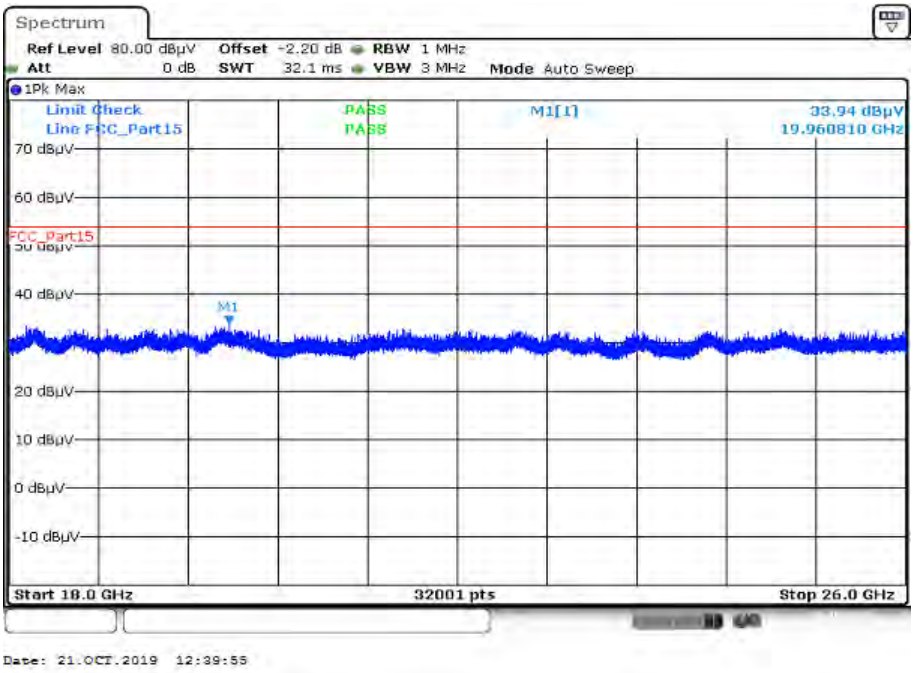


Plots: 80 MHz channel bandwidth

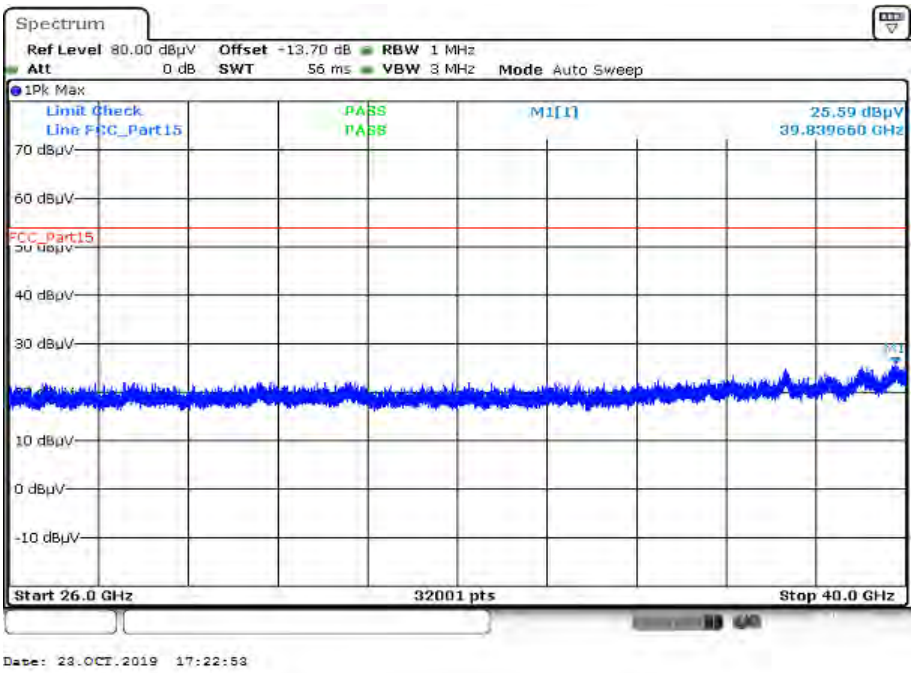
Plot 1: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; middle channel



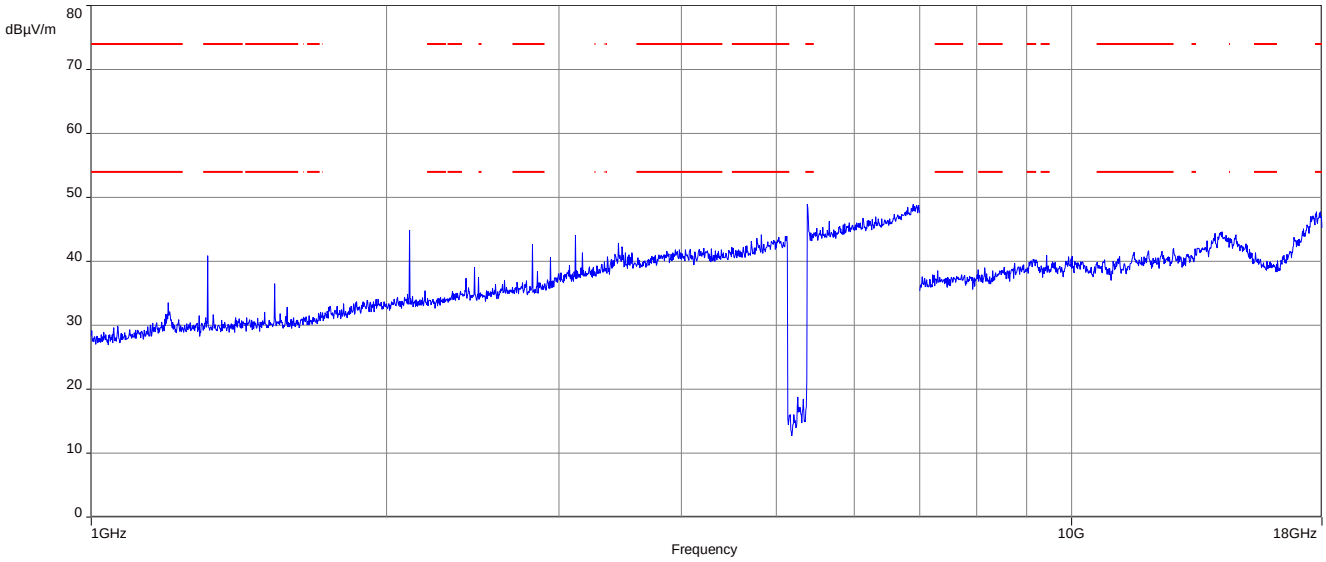
Plot 2: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-1; middle channel



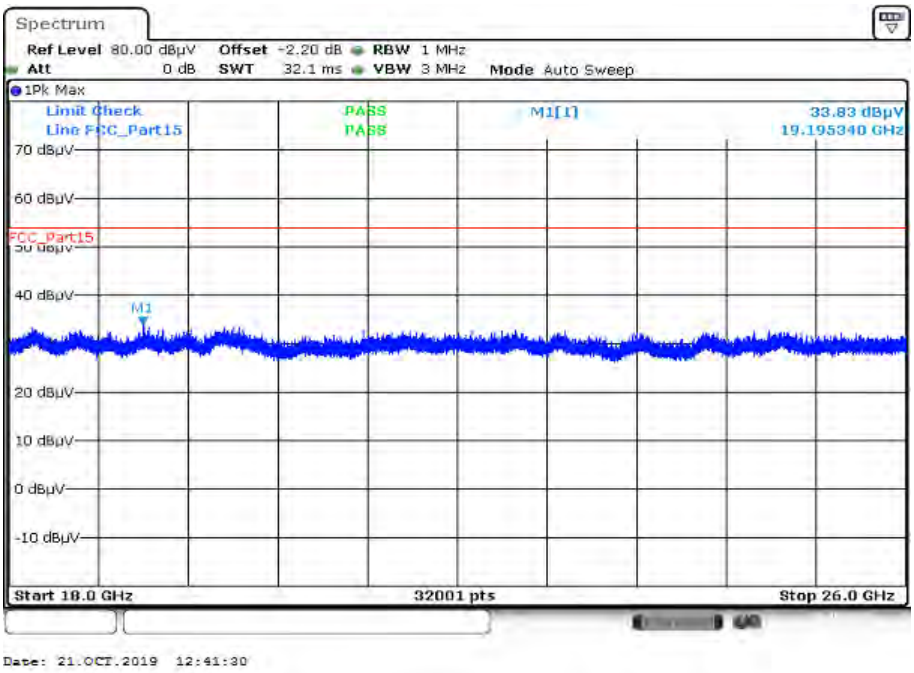
Plot 3: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-1; middle channel



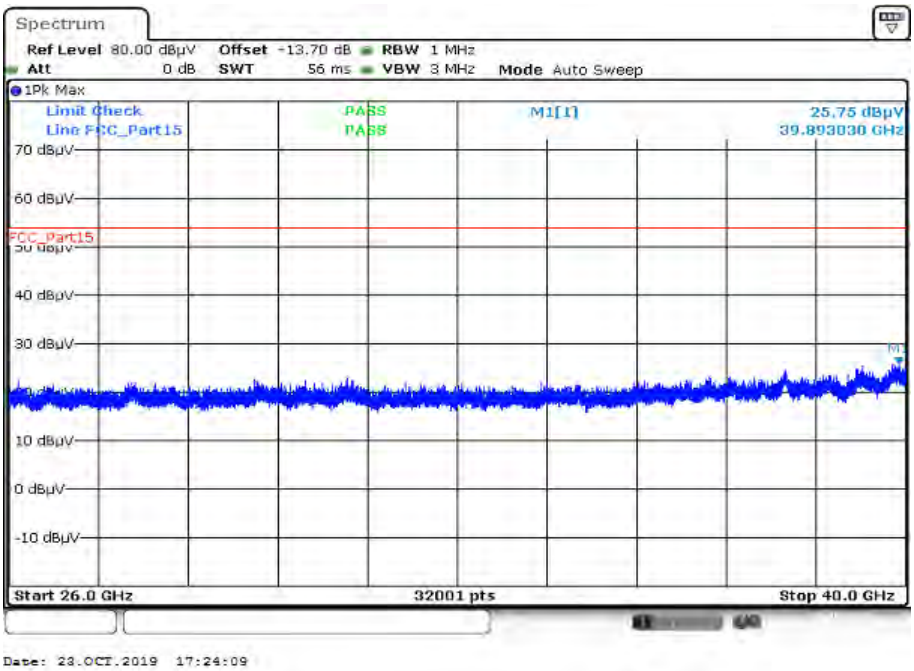
Plot 4: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



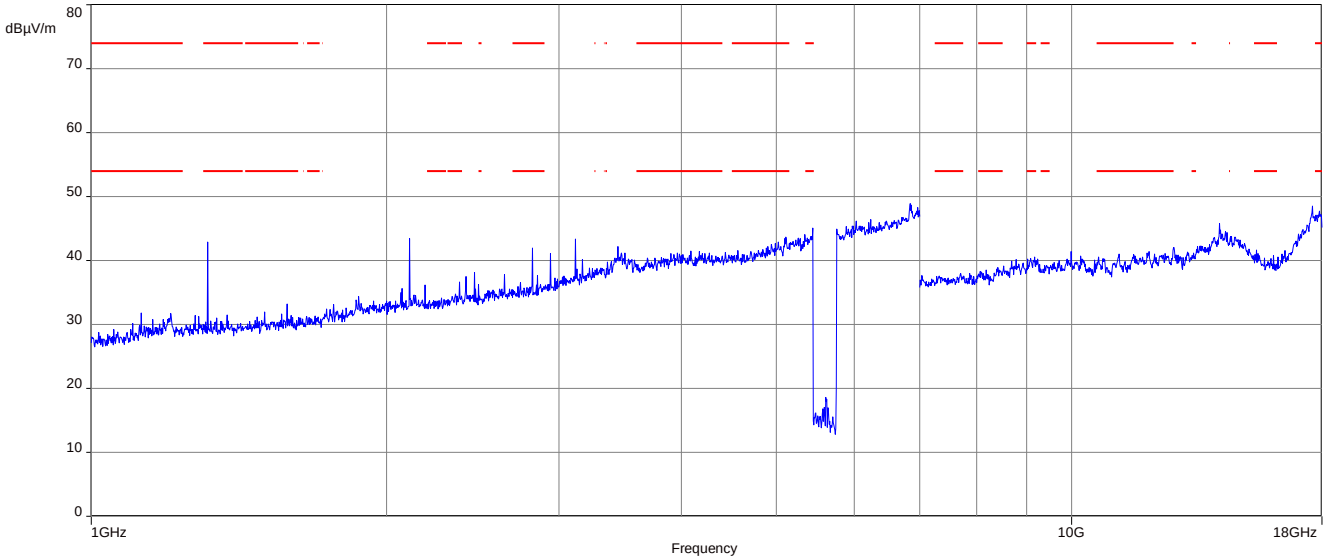
Plot 5: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



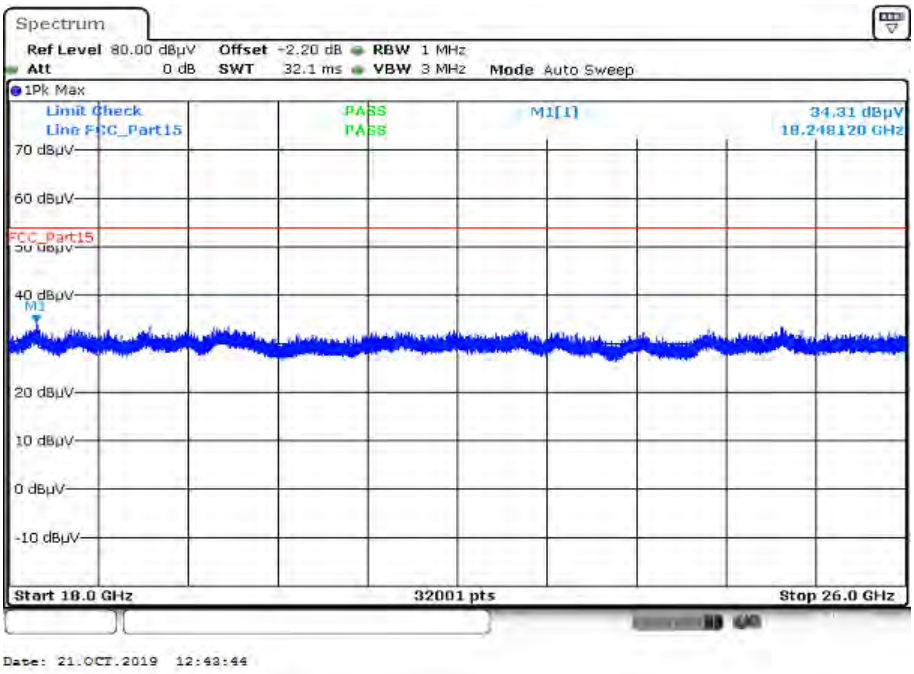
Plot 6: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



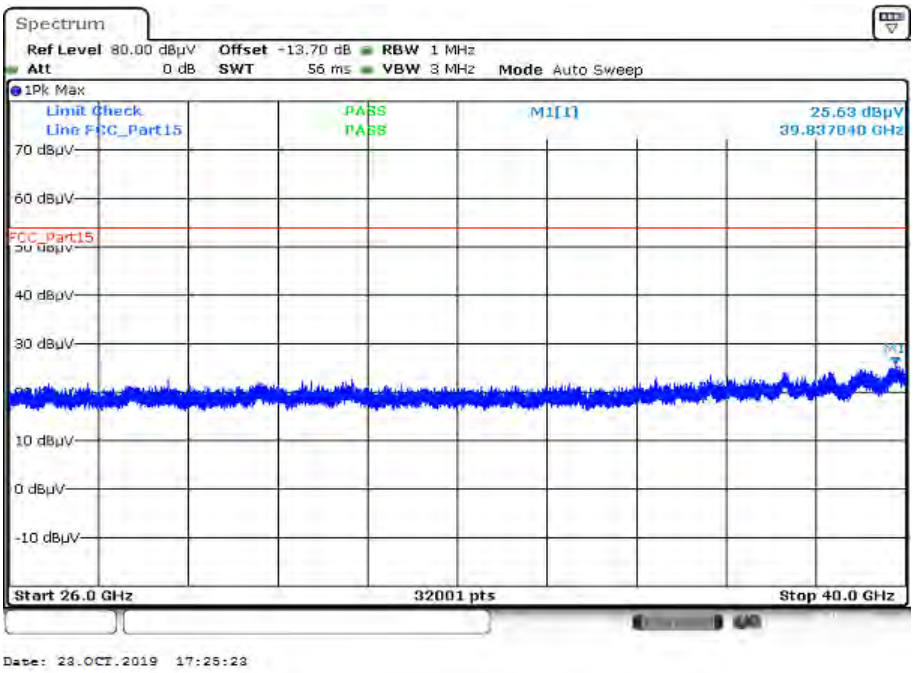
Plot 7: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



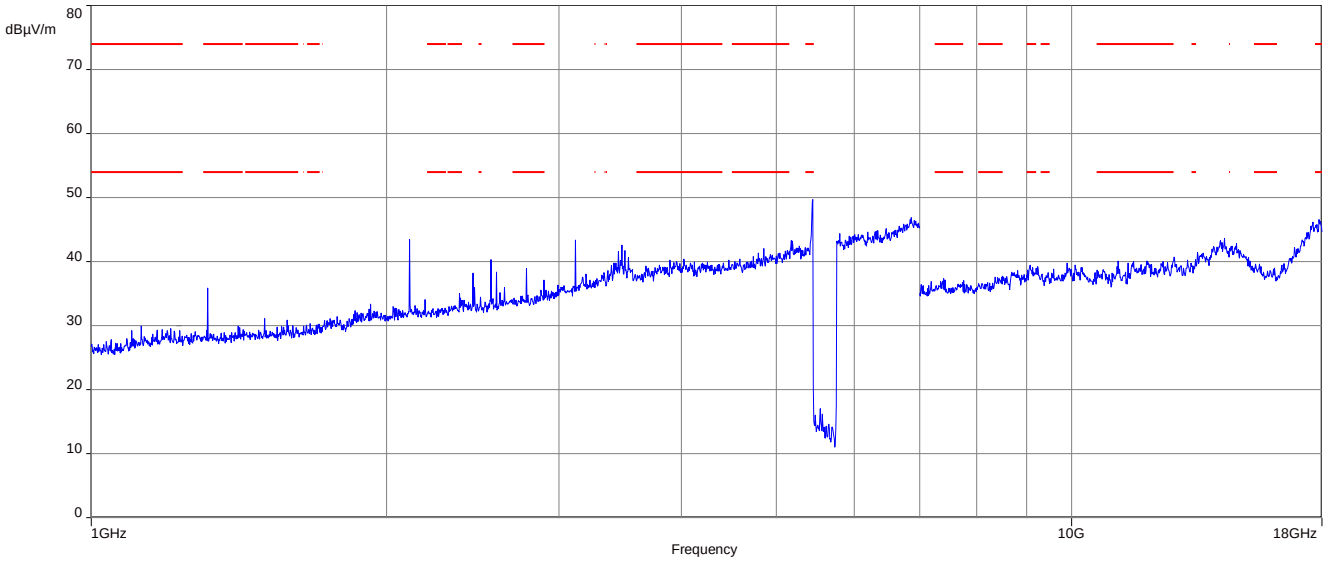
Plot 8: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



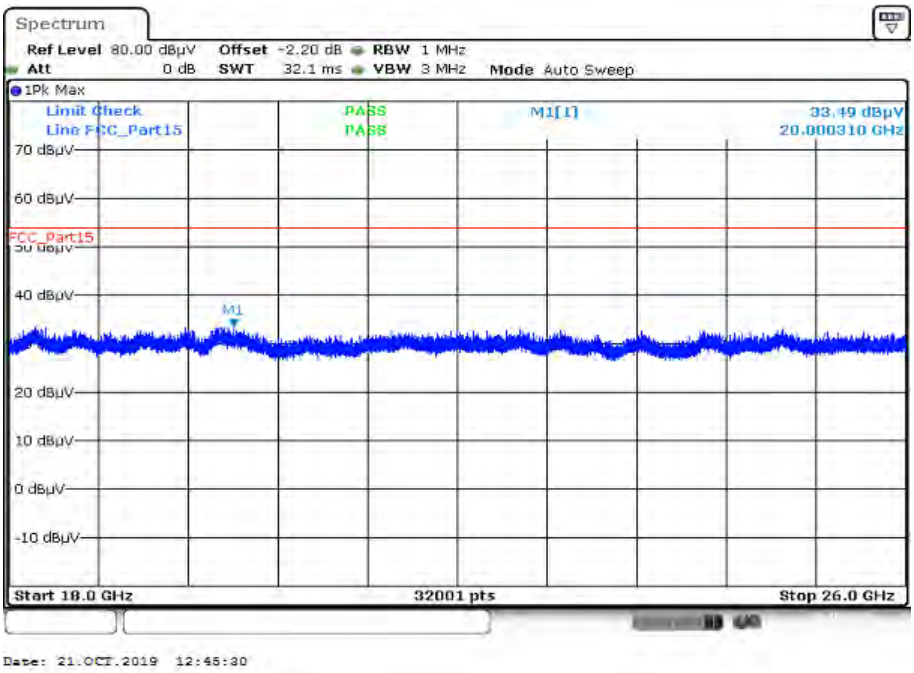
Plot 9: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



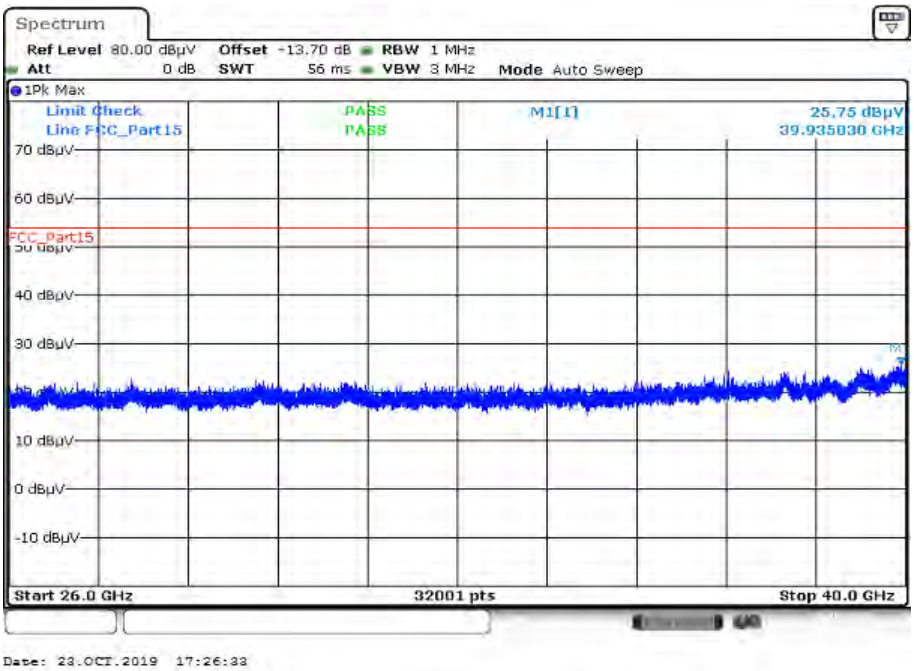
Plot 10: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



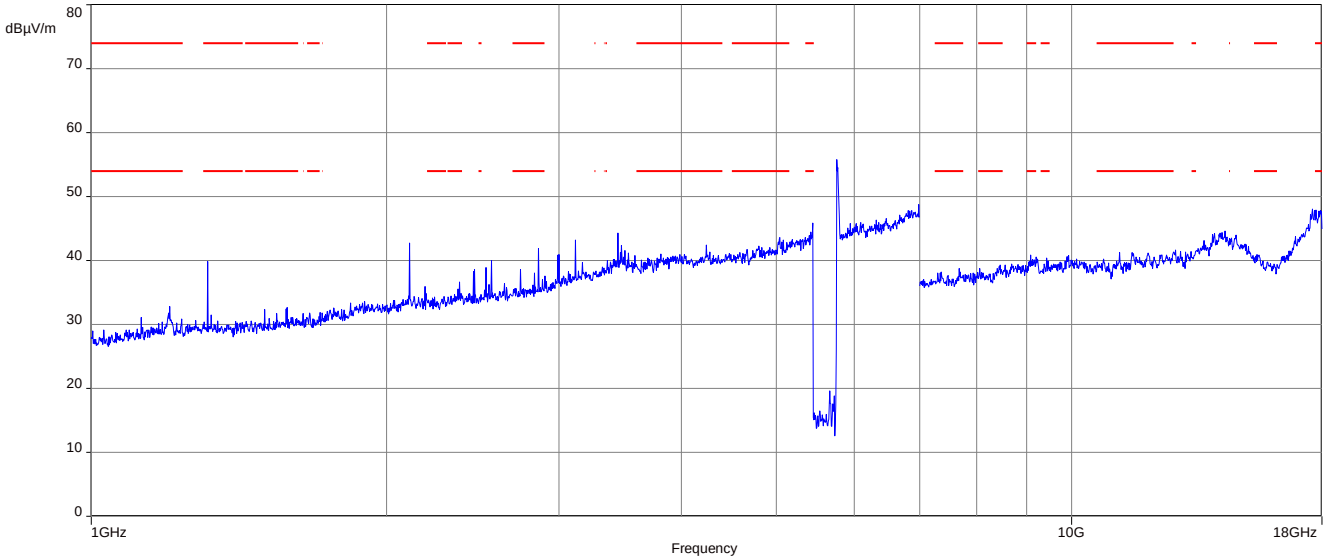
Plot 11: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; middle channel



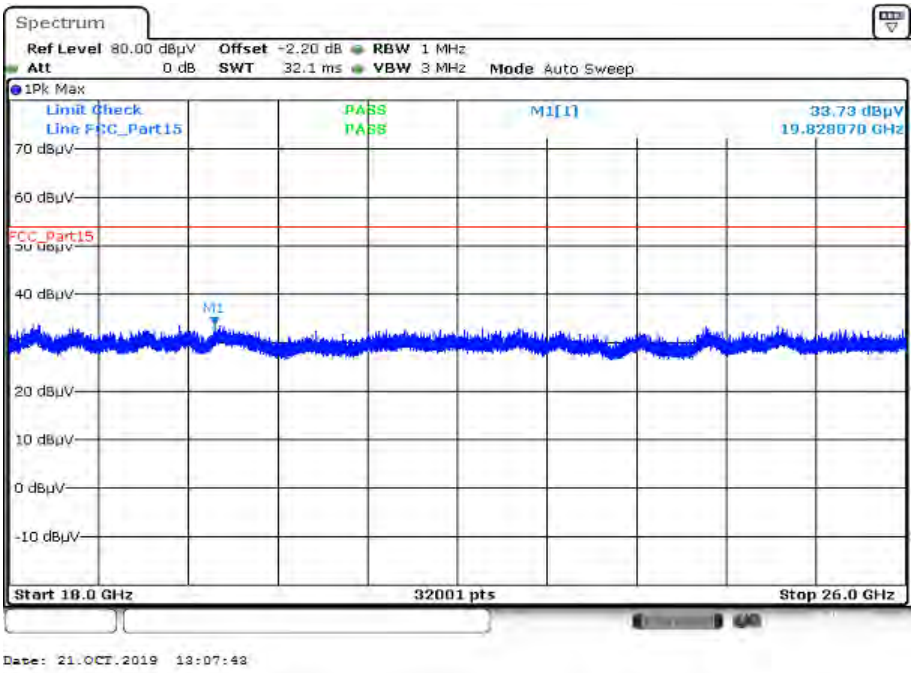
Plot 12: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel



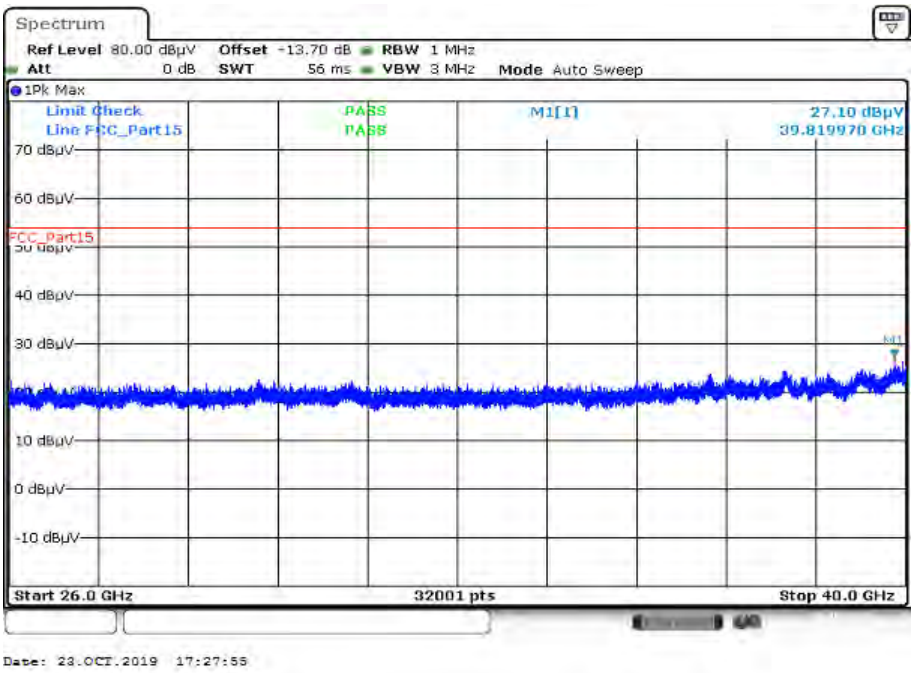
Plot 13: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



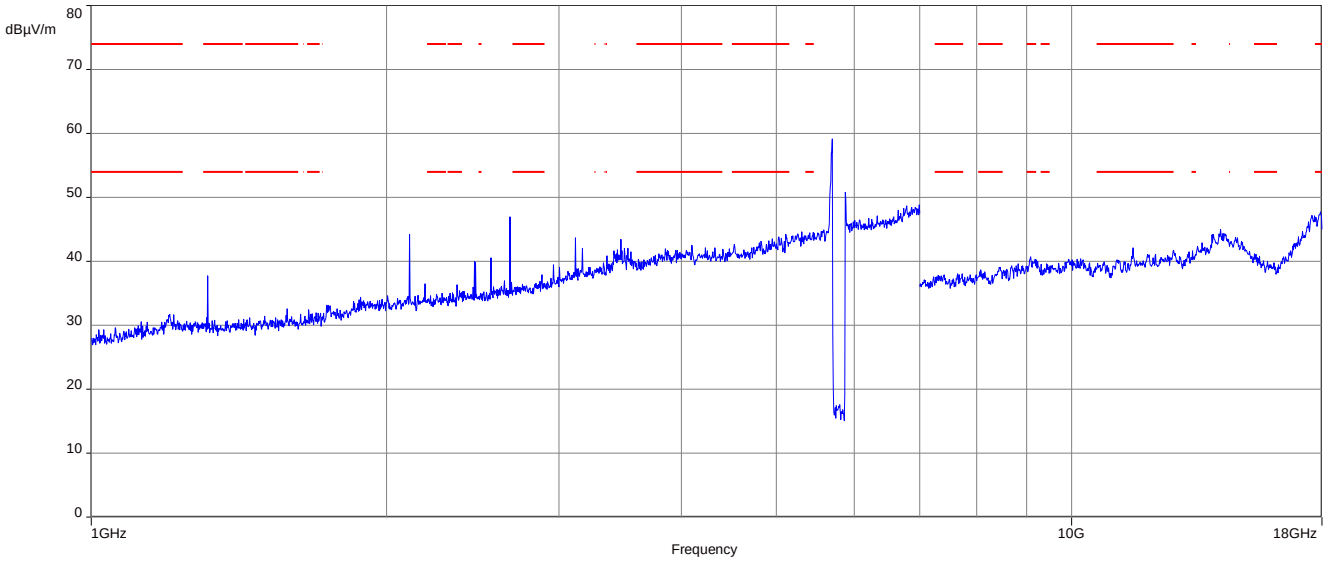
Plot 14: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



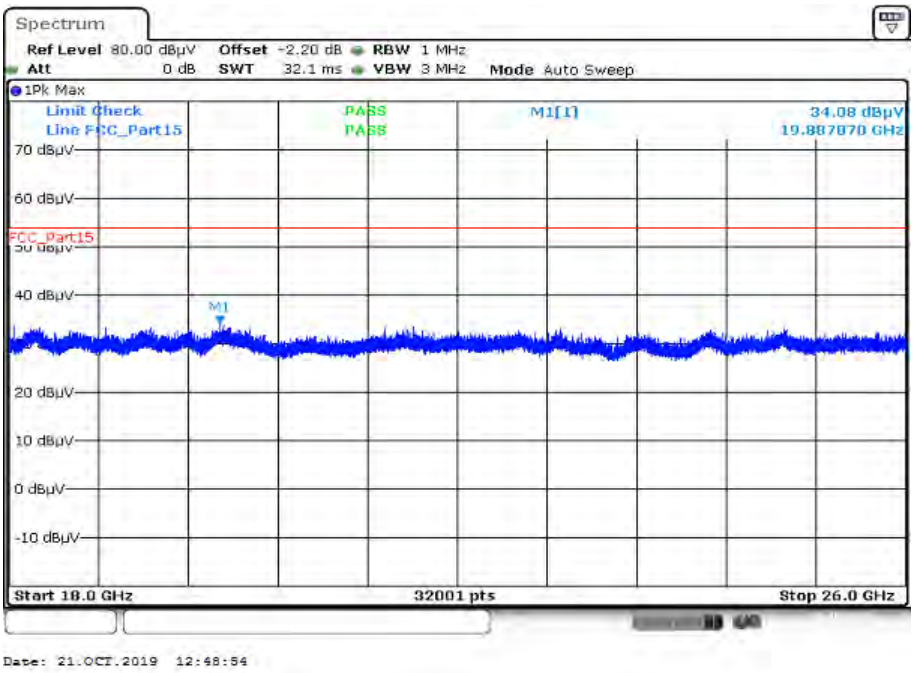
Plot 15: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-2C; highest channel



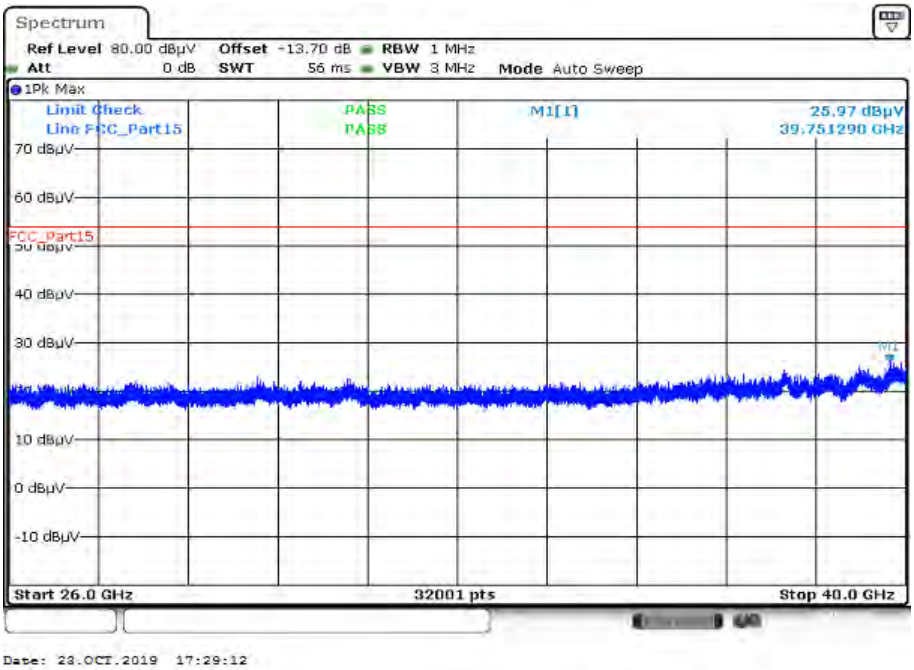
Plot 16: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; middle channel



Plot 17: 18 GHz to 26 GHz; vertical & horizontal polarization; U-NII-3; middle channel

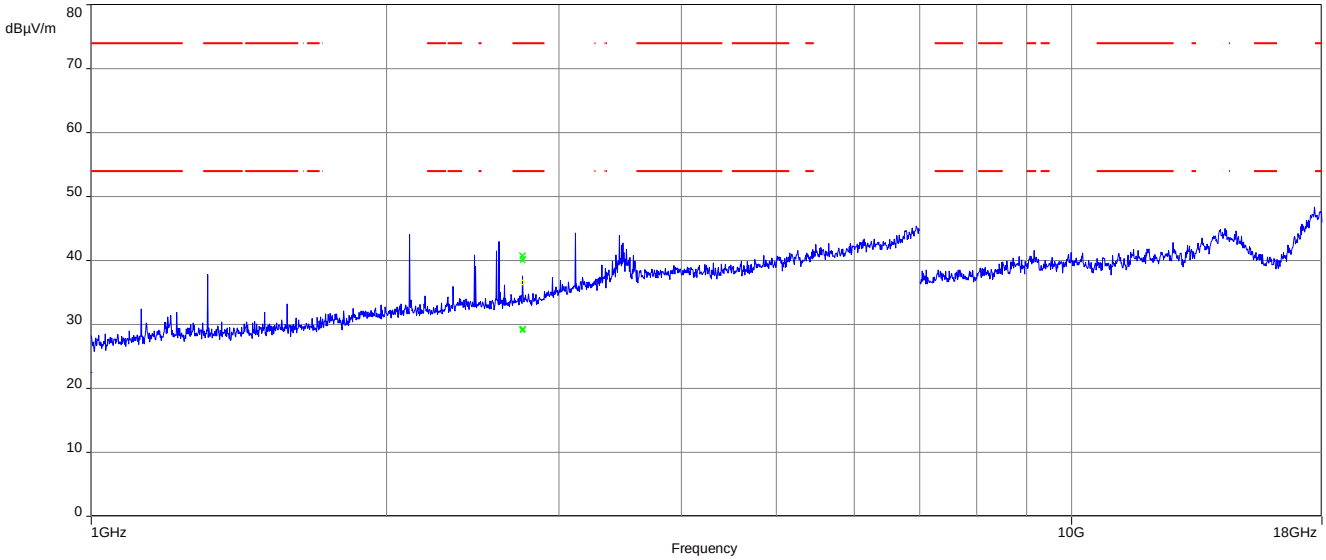


Plot 18: 26 GHz to 40 GHz; vertical & horizontal polarization; U-NII-3; middle channel

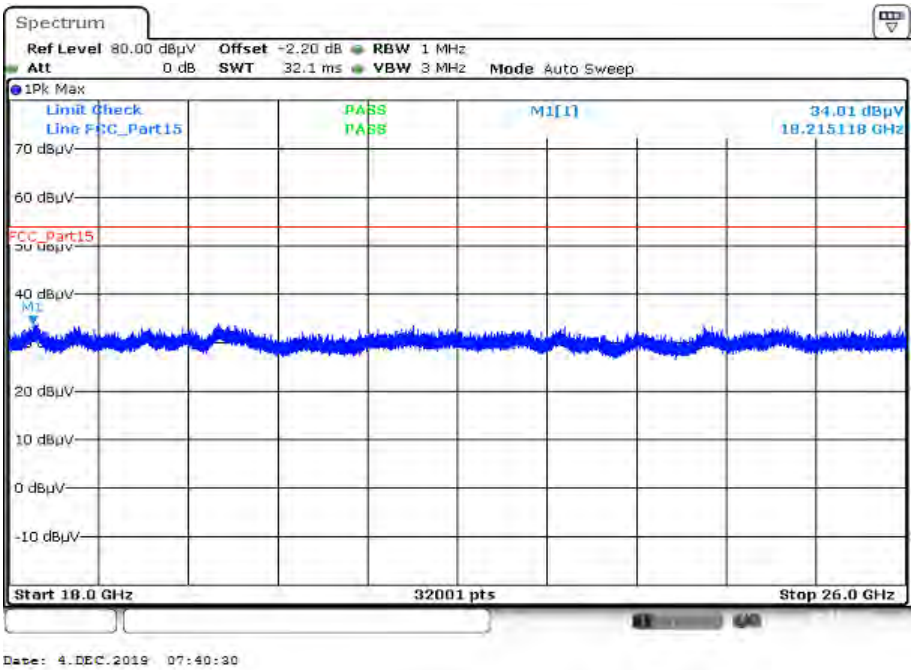


Plots: Rx/ Idle – mode (cabinet radiation)

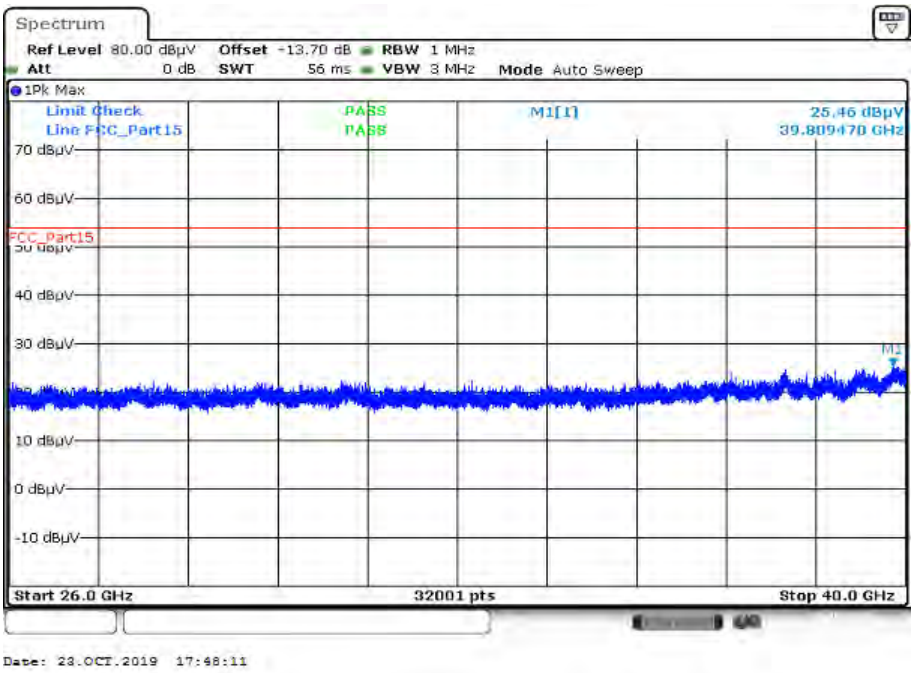
Plot 1: 1 GHz to 18 GHz, 5825 MHz, vertical & horizontal polarization, cabinet radiation



Plot 2: 18 GHz to 26 GHz, 5825 MHz, vertical & horizontal polarization, cabinet radiation



Plot 3: 26 GHz to 40 GHz, 5825 MHz, vertical & horizontal polarization, cabinet radiation



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
ETSI	European Telecommunications Standards Institute
EN	European Standard
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	2019-12-17

Annex C Accreditation Certificate – D-PL-12076-01-04

first page	last page
DAkkS Deutsche Akkreditierungsstelle Deutsche Akkreditierungsstelle GmbH **Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV** Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition **Accreditation** The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory **CTC advanced GmbH** **Untertürkheimer Straße 6-10, 66117 Saarbrücken** is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields: **Telecommunication (TC) and Electromagnetic Compatibility (EMC) for Canadian Standards** The accreditation certificate shall only apply in connection with the notice of accreditation of 11.01.2019 with the accreditation number D-PL-12076-01 and is valid until 21.04.2021. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 7 pages. Registration number of the certificate: **D-PL-12076-01-04** Frankfurt am Main, 11.01.2019 Dipl.-Biol. Uwe Zimmermann Head of Division	Deutsche Akkreditierungsstelle GmbH Office Berlin Spittelmarkt 10 10117 Berlin Office Frankfurt am Main Europa-Allee 52 60327 Frankfurt am Main Office Braunschweig Bundesallee 100 38116 Braunschweig The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkkS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf. No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkkS. The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations. The up-to-date state of membership can be retrieved from the following websites: EA: www.european-accreditation.org ILAC: www.ilac.org IAF: www.iaf.nu

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-12076-01-04.pdf

Annex D Accreditation Certificate – D-PL-12076-01-05

first page	last page
DAkkS Deutsche Akkreditierungsstelle Deutsche Akkreditierungsstelle GmbH **Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV** Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition **Accreditation** The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory **CTC advanced GmbH** **Untertürkheimer Straße 6-10, 66117 Saarbrücken** is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields: **Telecommunication (FCC Requirements)** The accreditation certificate shall only apply in connection with the notice of accreditation of 11.01.2019 with the accreditation number D-PL-12076-01 and is valid until 21.04.2021. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 5 pages. Registration number of the certificate: **D-PL-12076-01-05** Frankfurt am Main, 11.01.2019 Dipl.-Ing. Uwe Zimmermann Head of Division	Deutsche Akkreditierungsstelle GmbH Office Berlin Spittelmarkt 10 10117 Berlin Office Frankfurt am Main Europa-Allee 52 60327 Frankfurt am Main Office Braunschweig Bundesallee 100 38116 Braunschweig The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkkS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf. No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkkS. The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations. The up-to-date state of membership can be retrieved from the following websites: EA: www.european-accreditation.org ILAC: www.ilac.org IAF: www.iaf.nu

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-12076-01-05.pdf

################################ END OF TEST REPORT ################################