

12.10 Spurious emissions radiated below 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The limits are re-calculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold
Test setup:	See sub clause 7.2 – C
Measurement uncertainty:	See chapter 9

Limits:

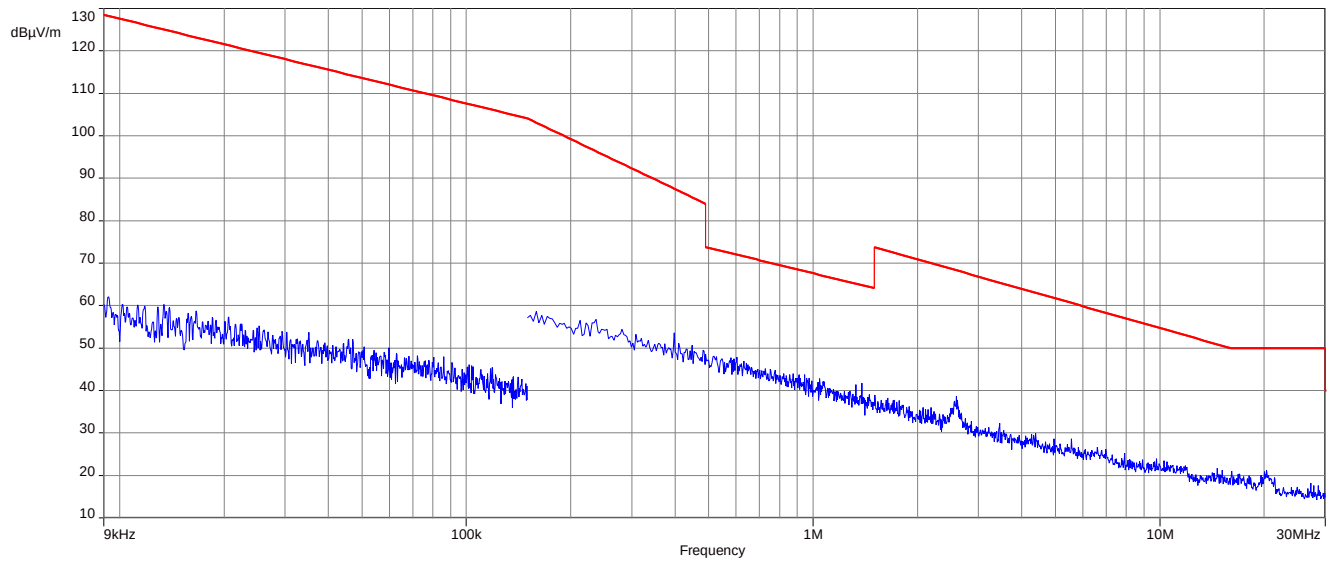
Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dB μ V/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Results: All antennas

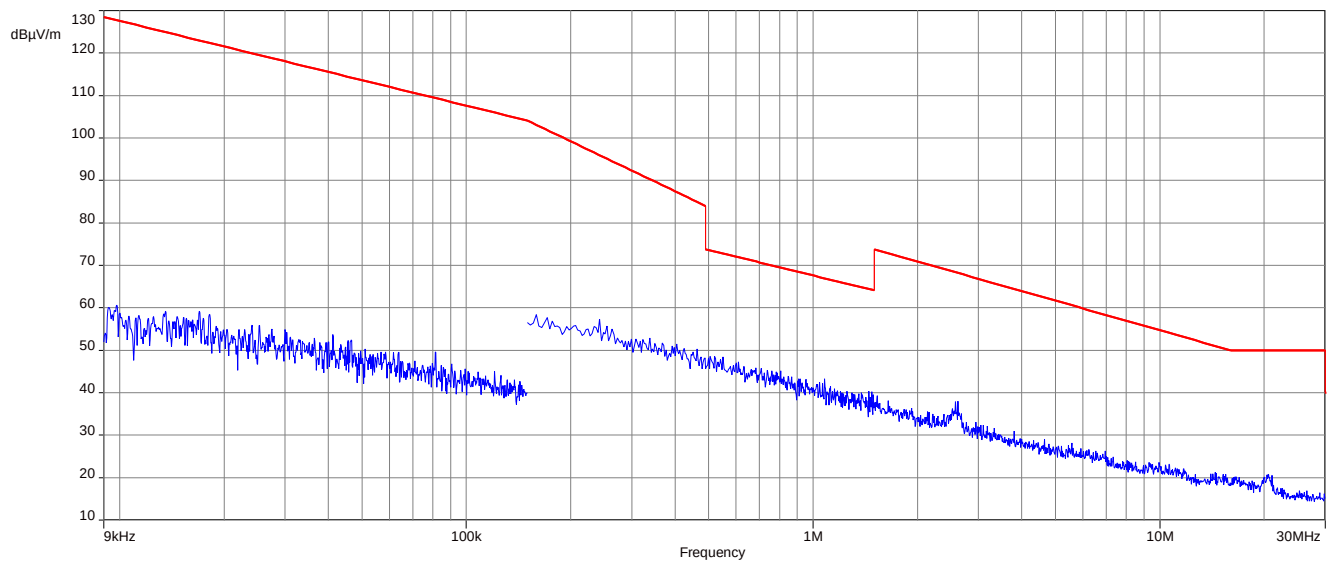
Spurious Emissions Radiated < 30 MHz [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
All detected emissions are more than 20 dB below the limit.		

Plots: 20 MHz channel bandwidth, COLFLY antennas

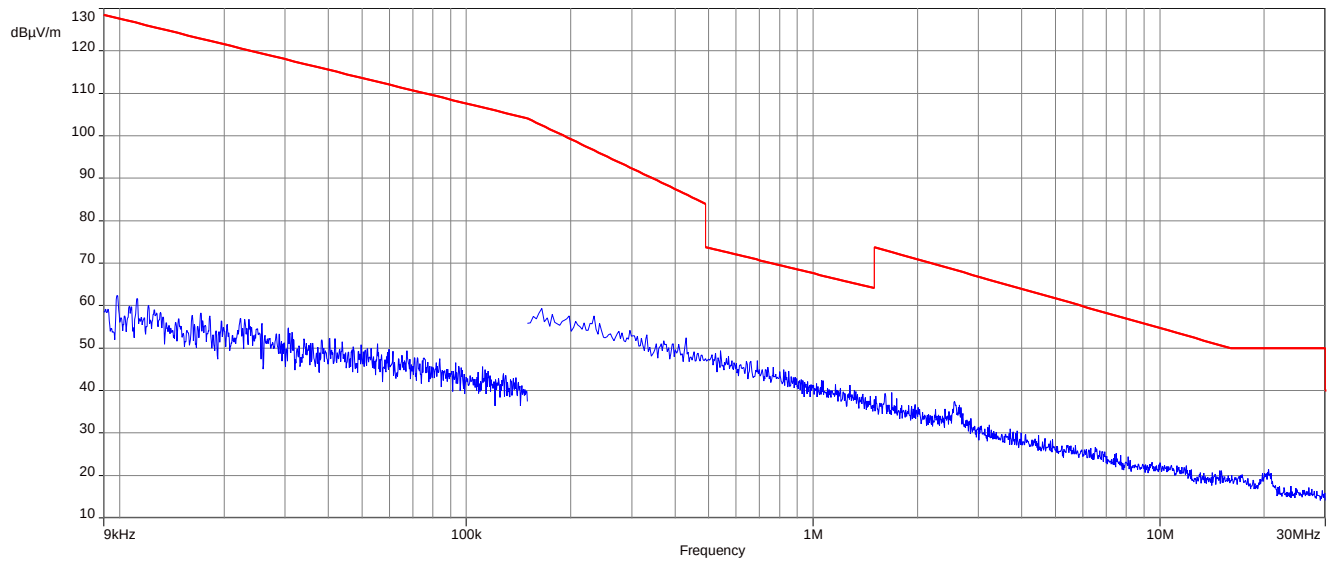
Plot 1: 9 kHz to 30 MHz, U-NII-1; lowest channel



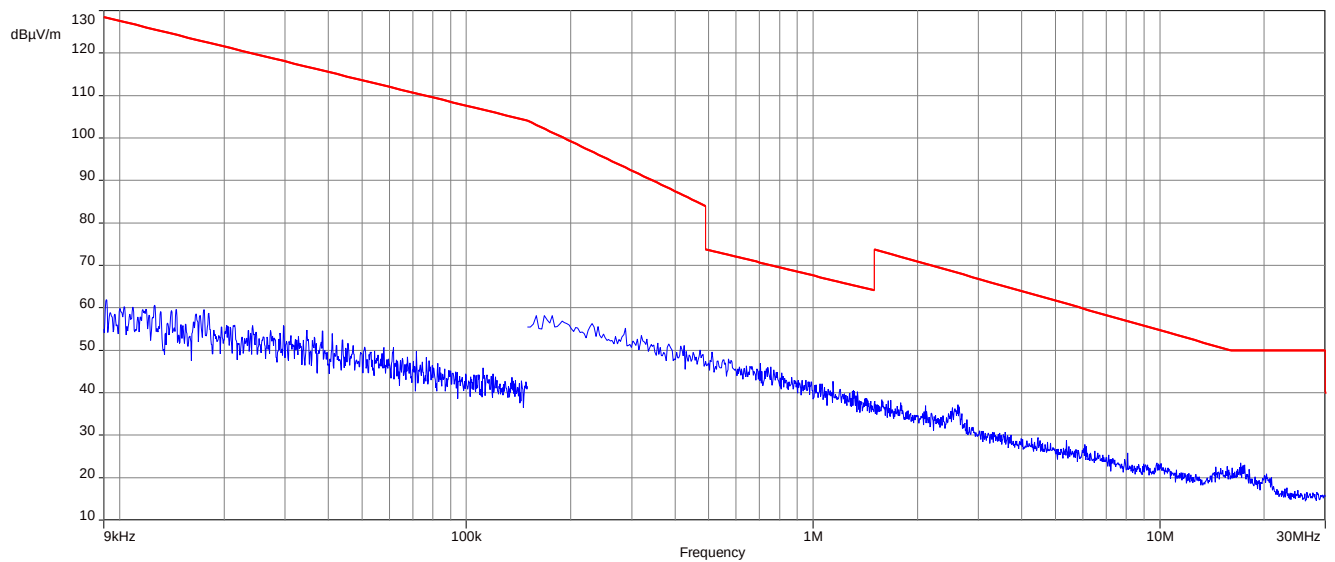
Plot 2: 9 kHz to 30 MHz, U-NII-1; middle channel



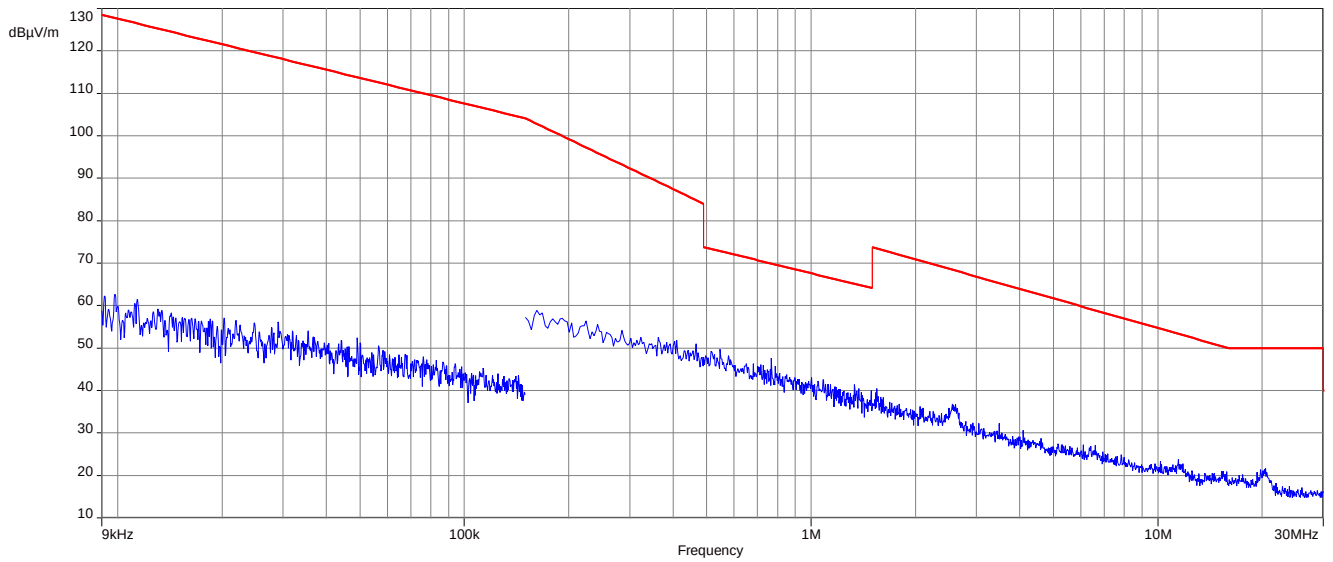
Plot 3: 9 kHz to 30 MHz, U-NII-1; highest channel



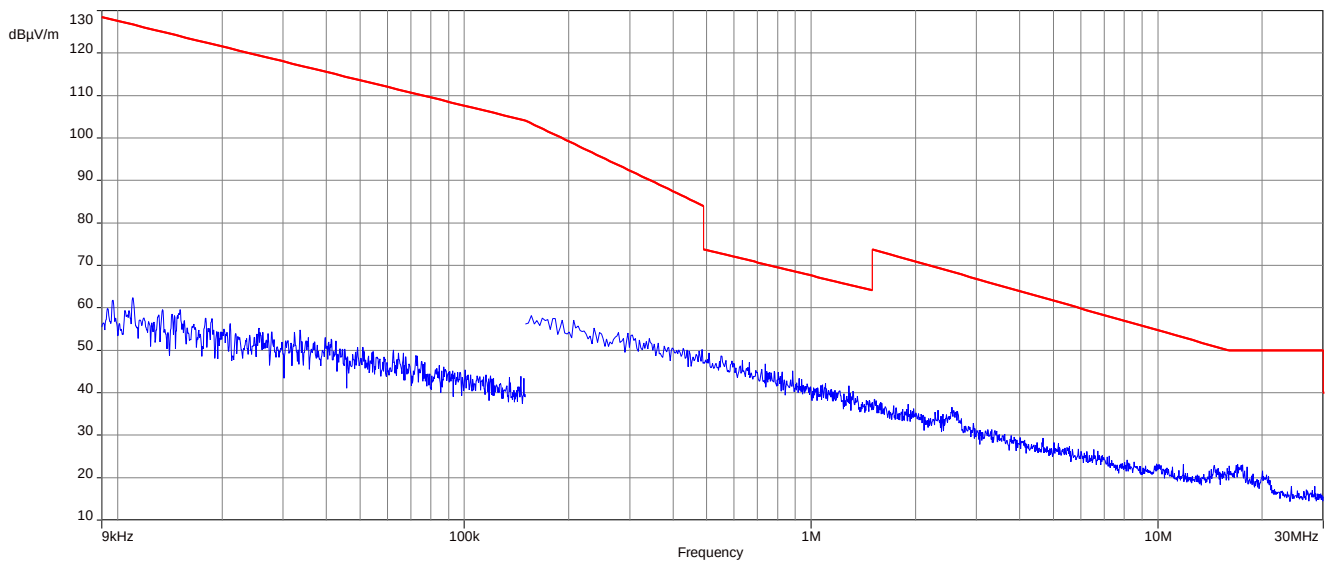
Plot 4: 9 kHz to 30 MHz, U-NII-2A; lowest channel

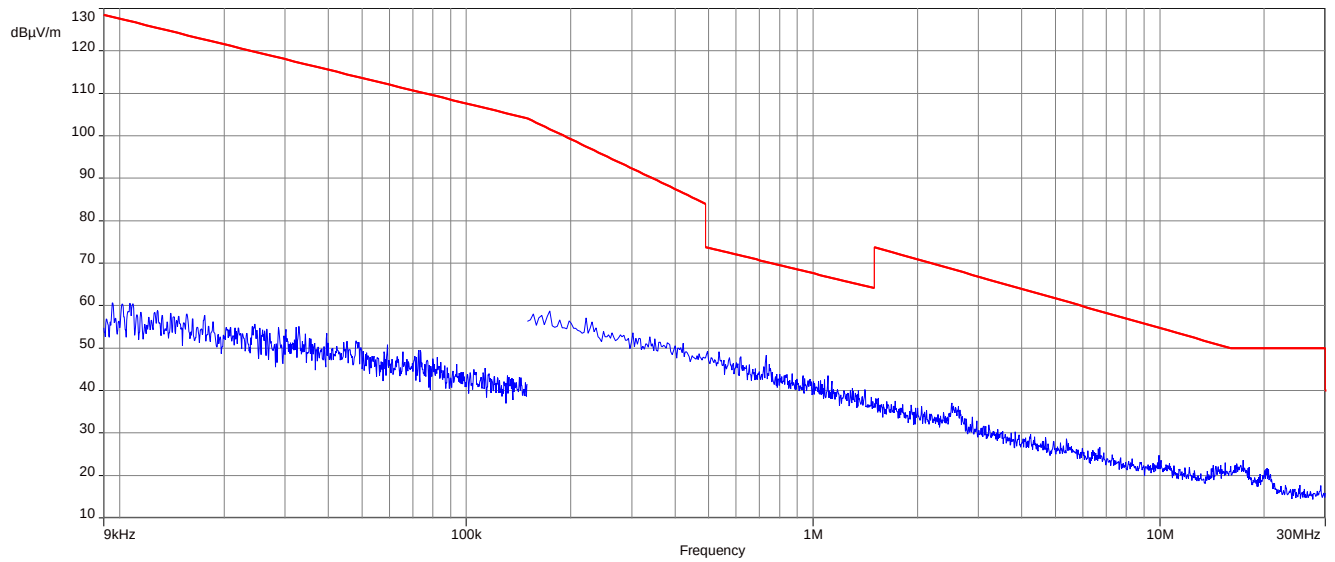
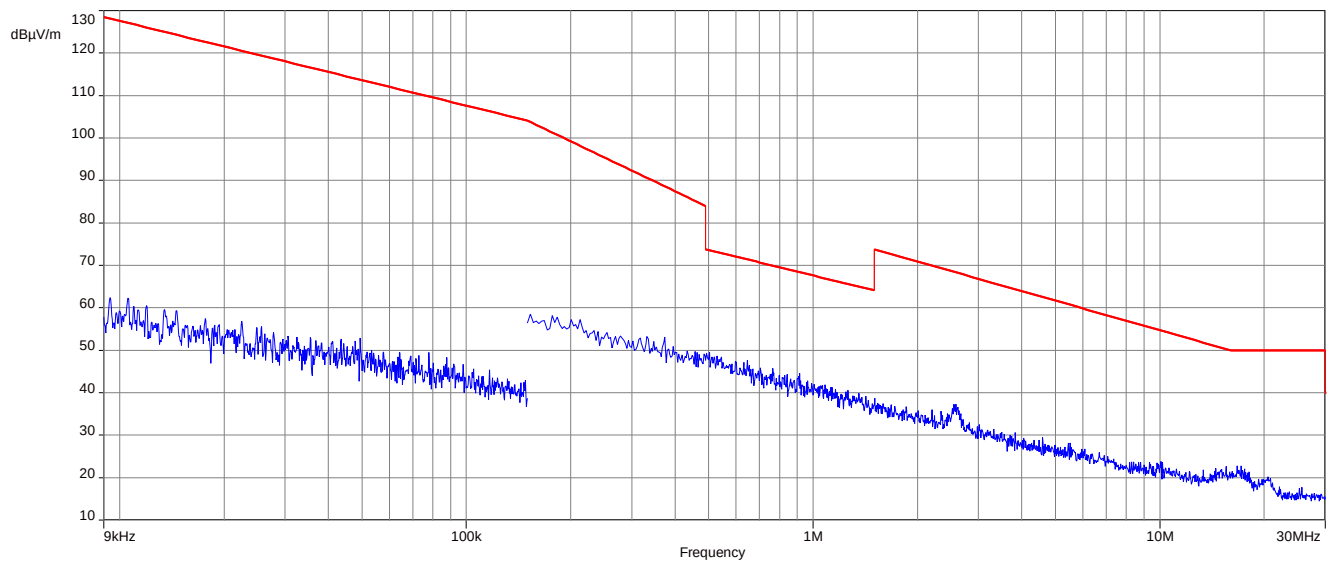


Plot 5: 9 kHz to 30 MHz, U-NII-2A; middle channel

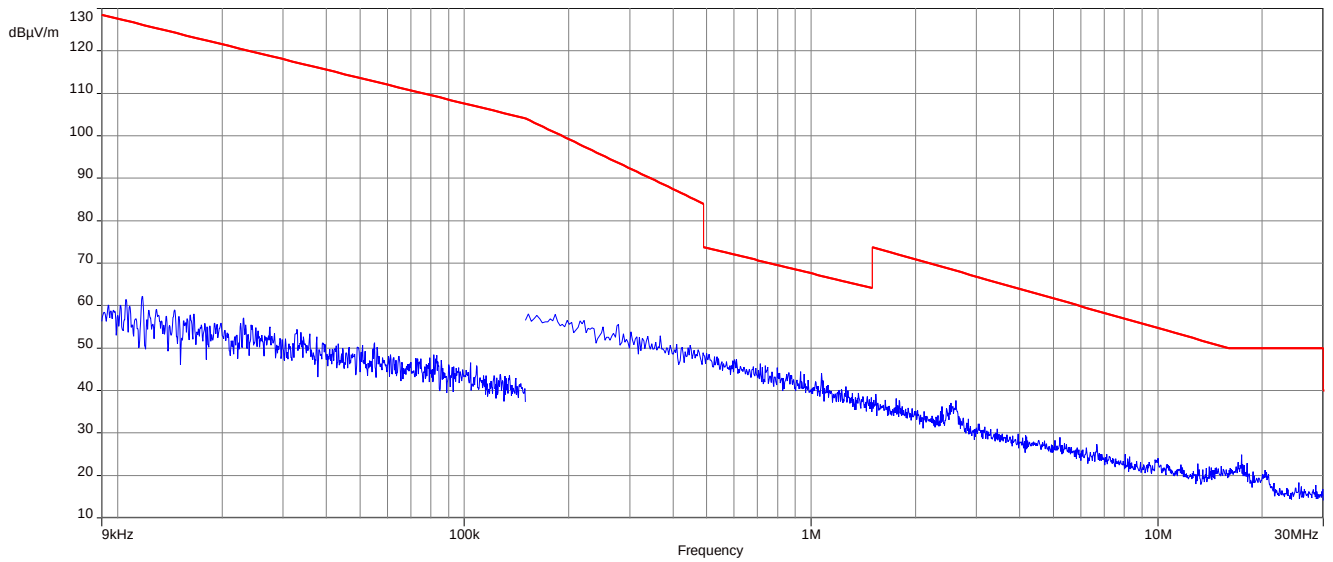


Plot 6: 9 kHz to 30 MHz, U-NII-2A; highest channel

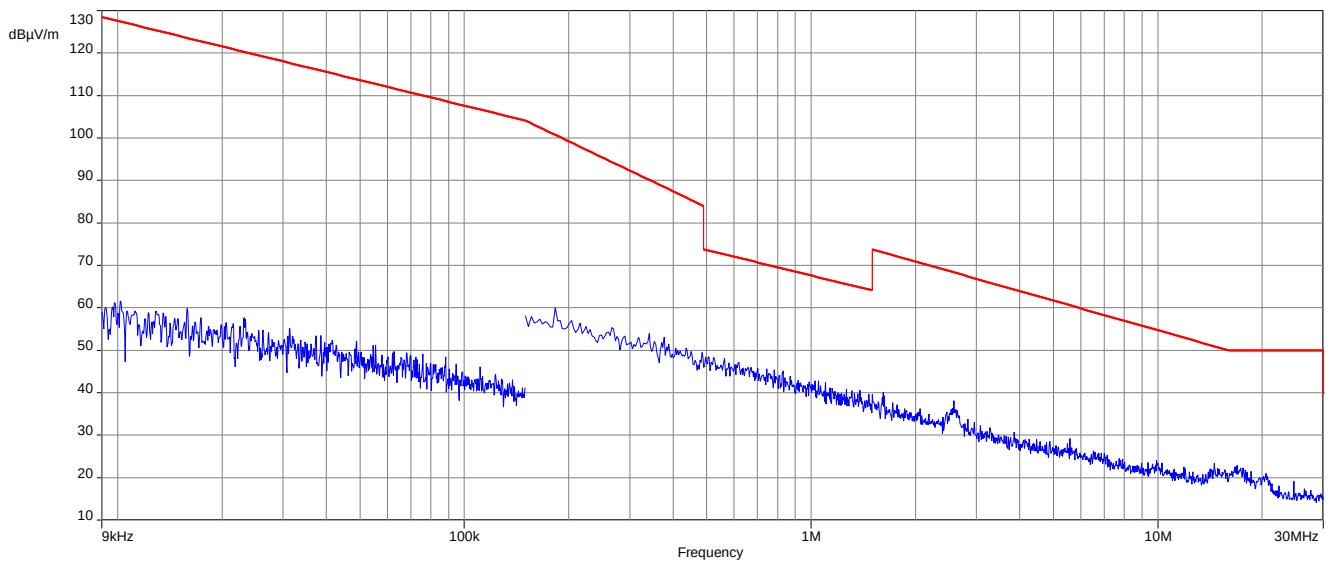


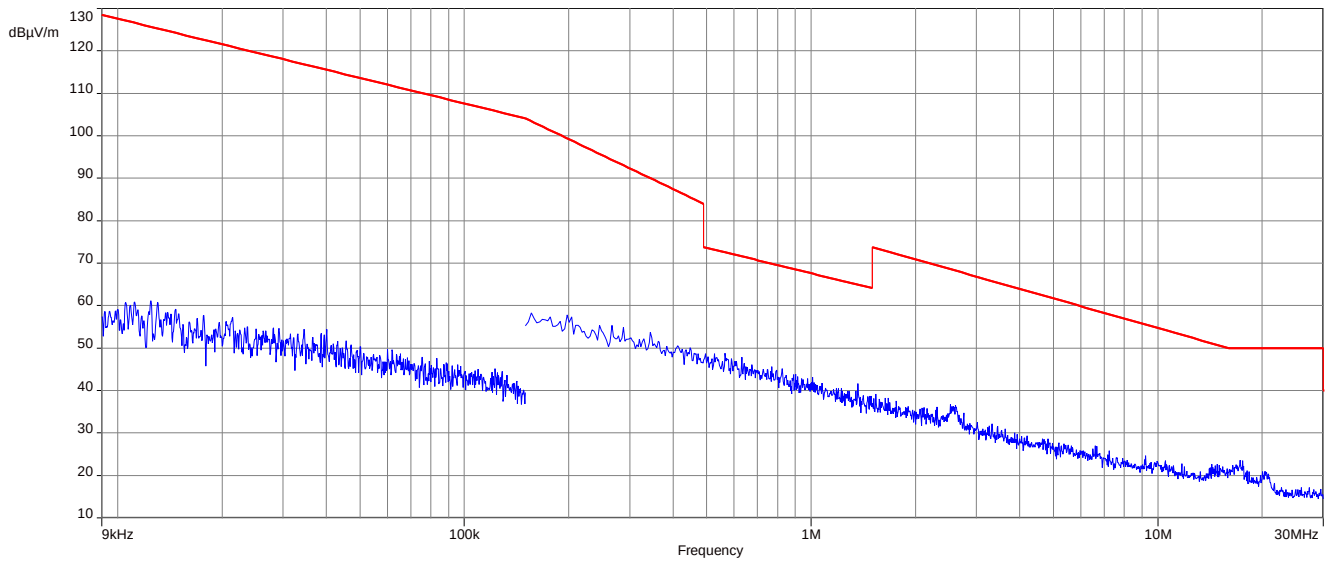
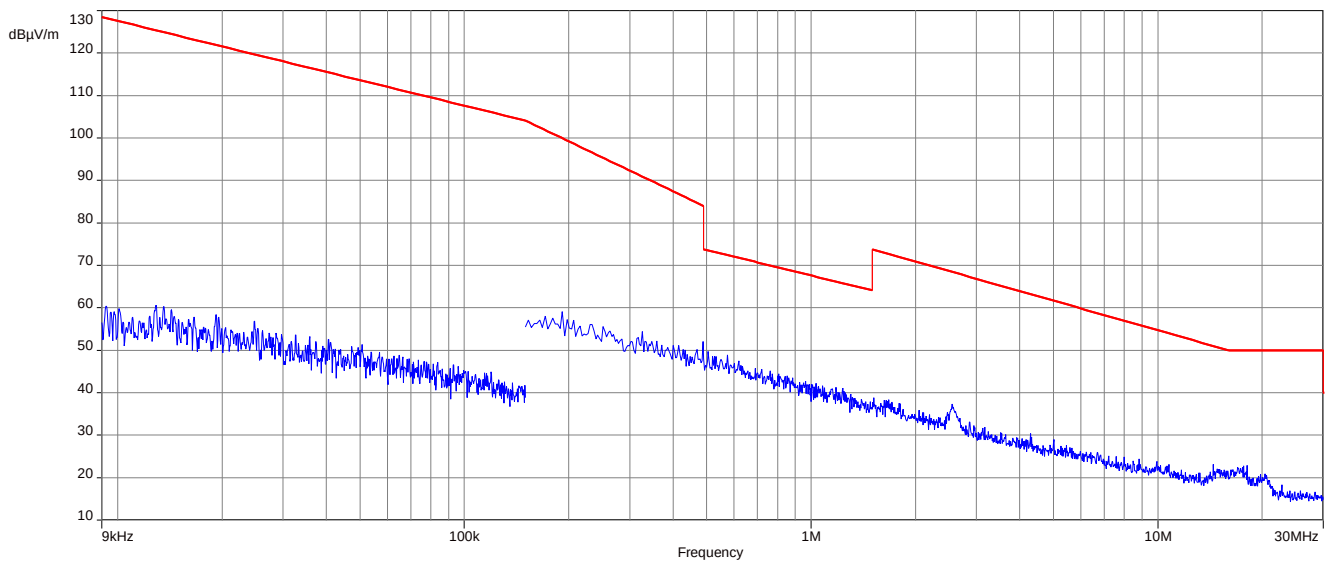
Plot 7: 9 kHz to 30 MHz, U-NII-2C; lowest channel**Plot 8:** 9 kHz to 30 MHz, U-NII-2C; middle channel

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



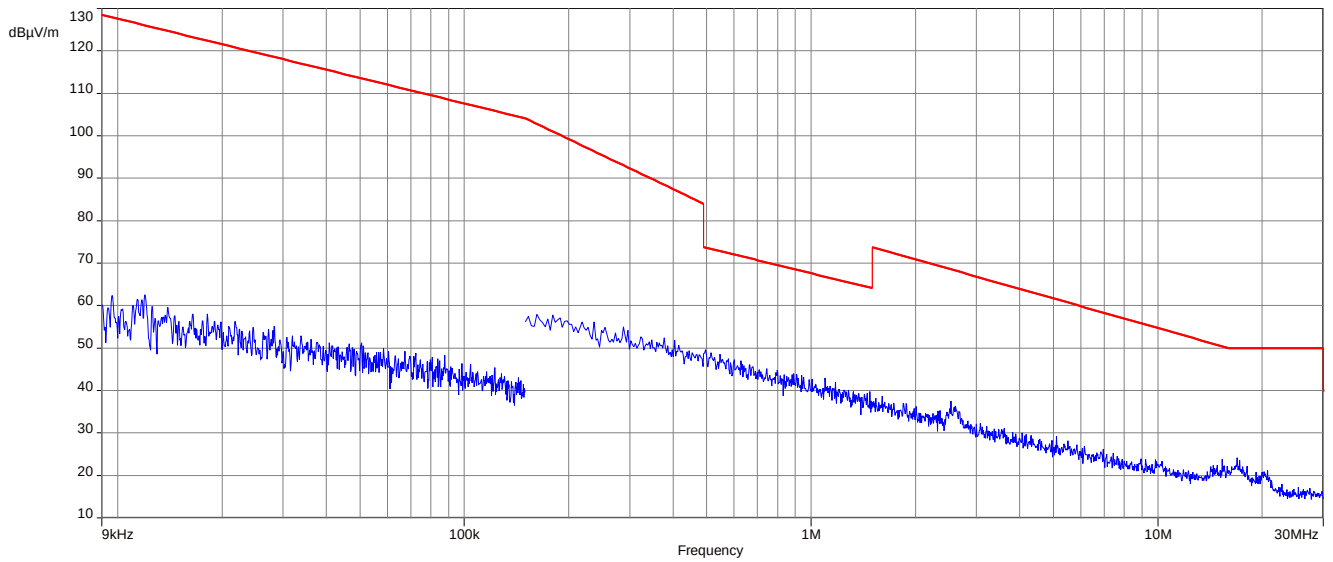
Plot 10: 9 kHz to 30 MHz, U-NII-3; lowest channel



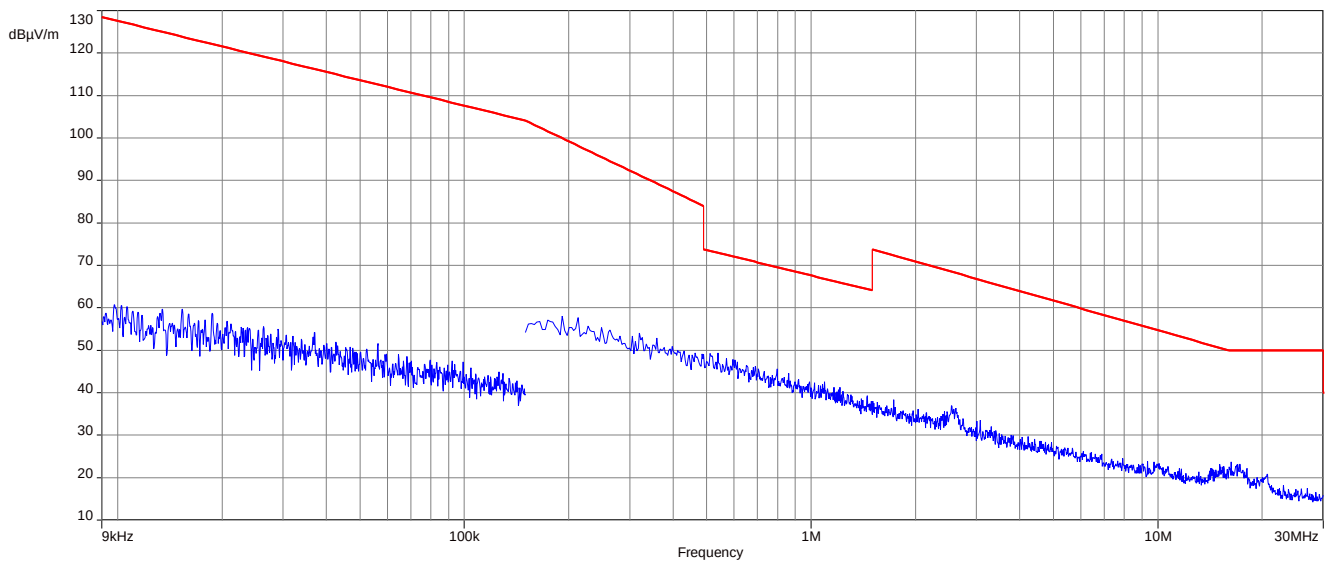
Plot 11: 9 kHz to 30 MHz, U-NII-3; middle channel**Plot 12:** 9 kHz to 30 MHz, U-NII-3; highest channel

Plots: 40 MHz channel bandwidth

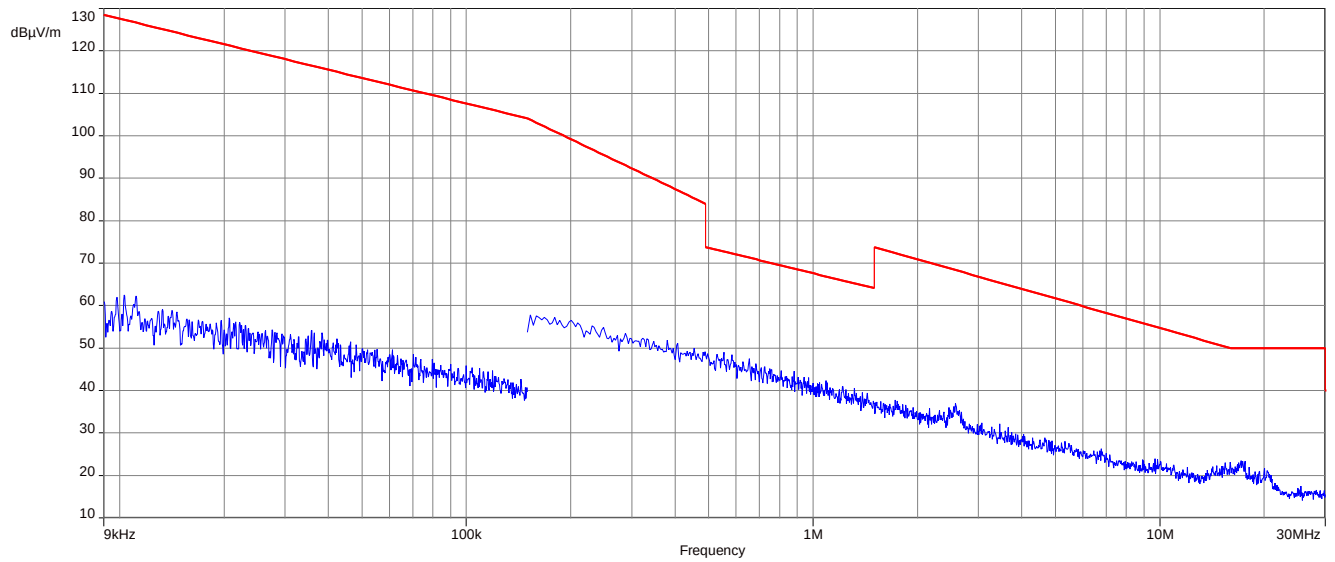
Plot 1: 9 kHz to 30 MHz, U-NII-1; lowest channel



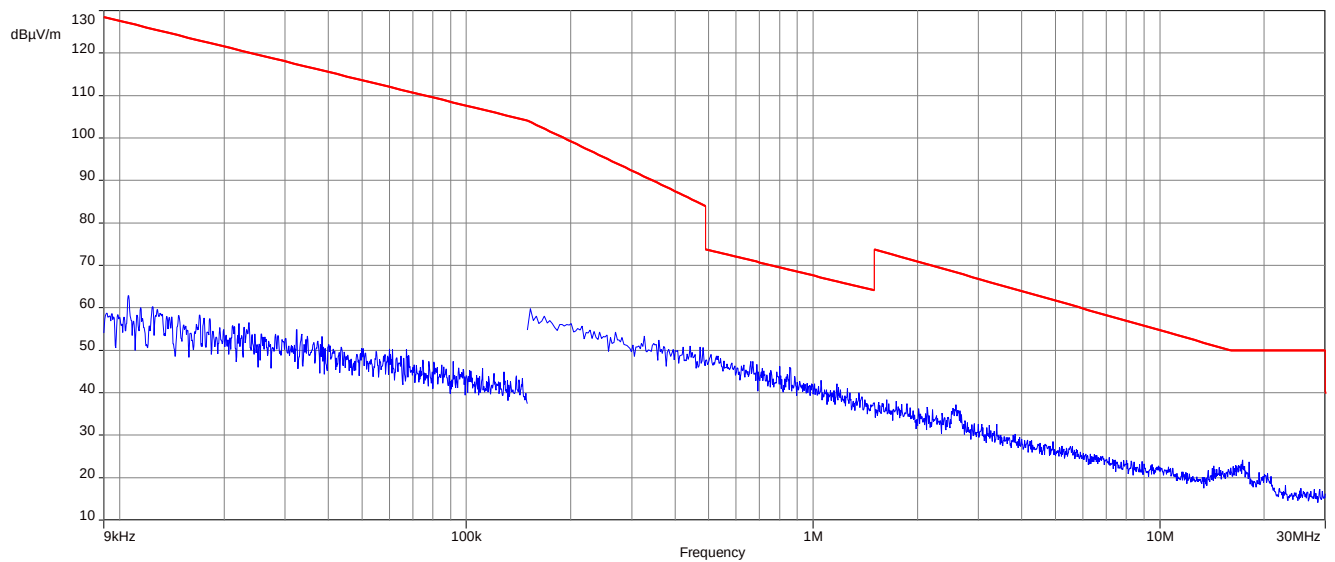
Plot 2: 9 kHz to 30 MHz, U-NII-1; highest channel

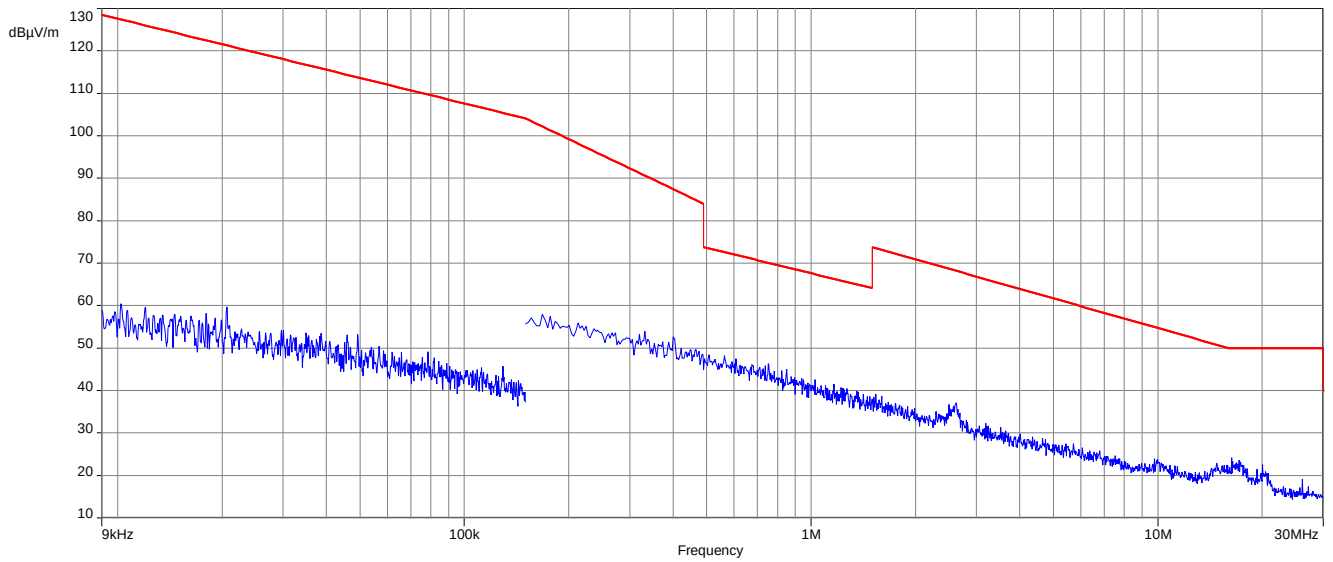
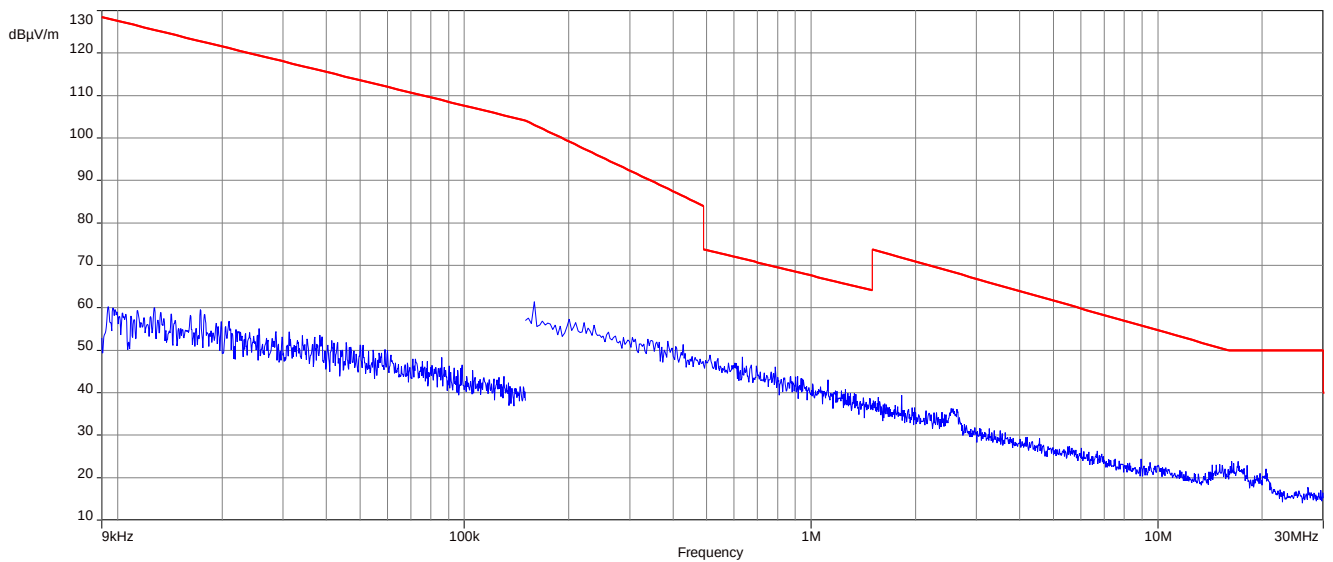


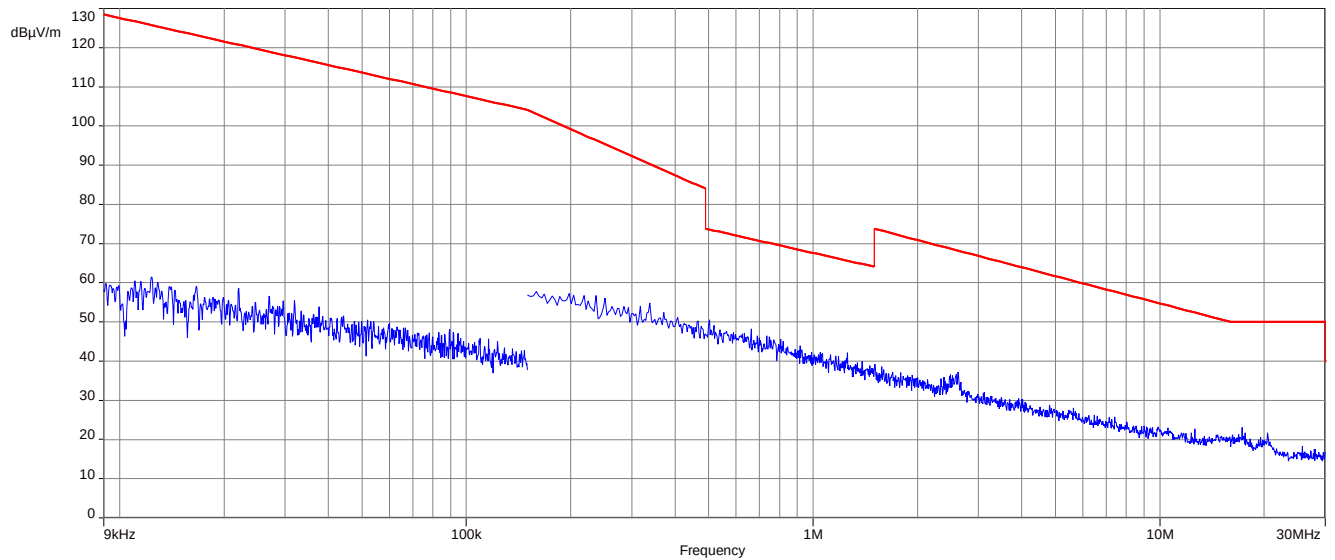
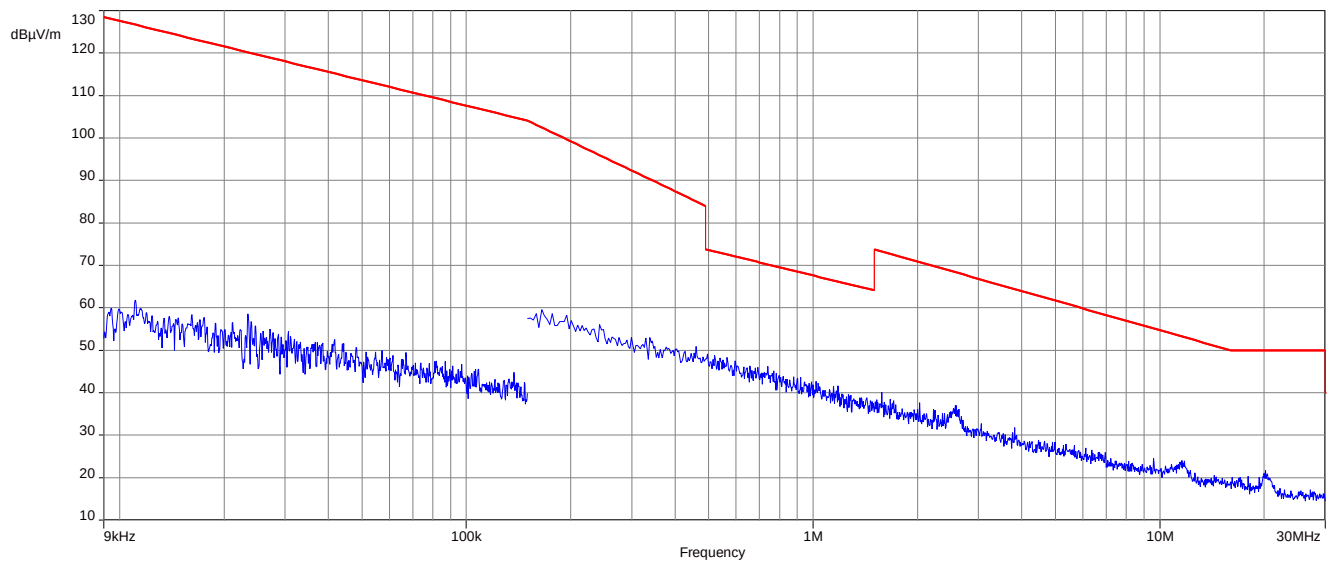
Plot 3: 9 kHz to 30 MHz, U-NII-2A; lowest channel



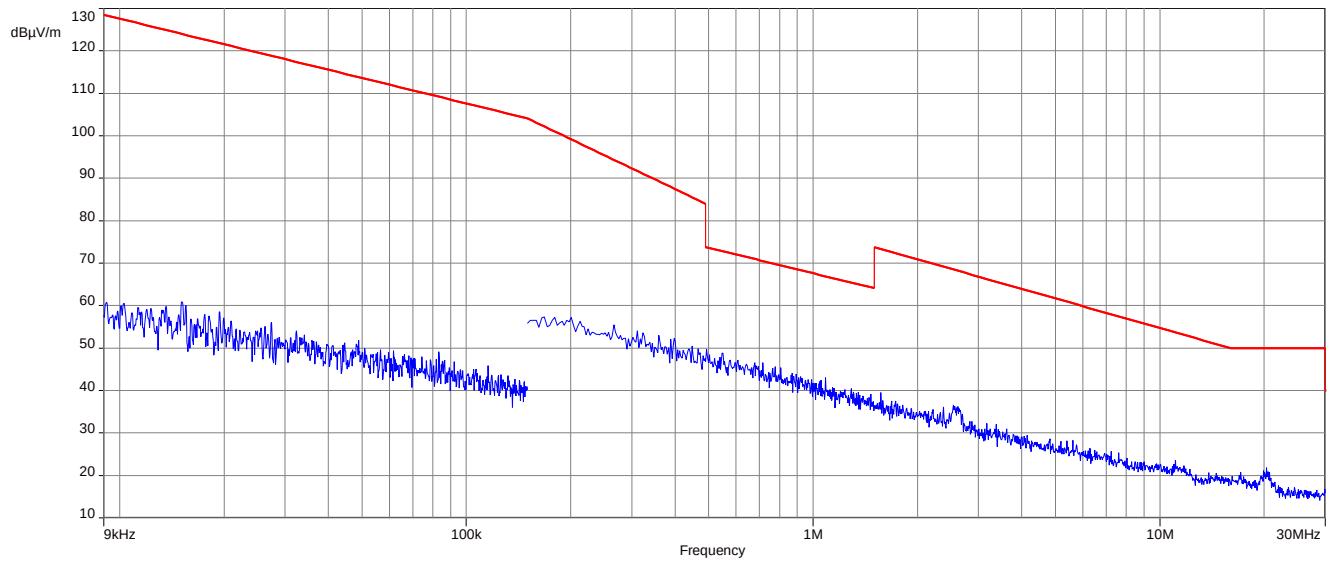
Plot 4: 9 kHz to 30 MHz, U-NII-2A; highest channel



Plot 5: 9 kHz to 30 MHz, U-NII-2C; lowest channel**Plot 6:** 9 kHz to 30 MHz, U-NII-2C; middle channel

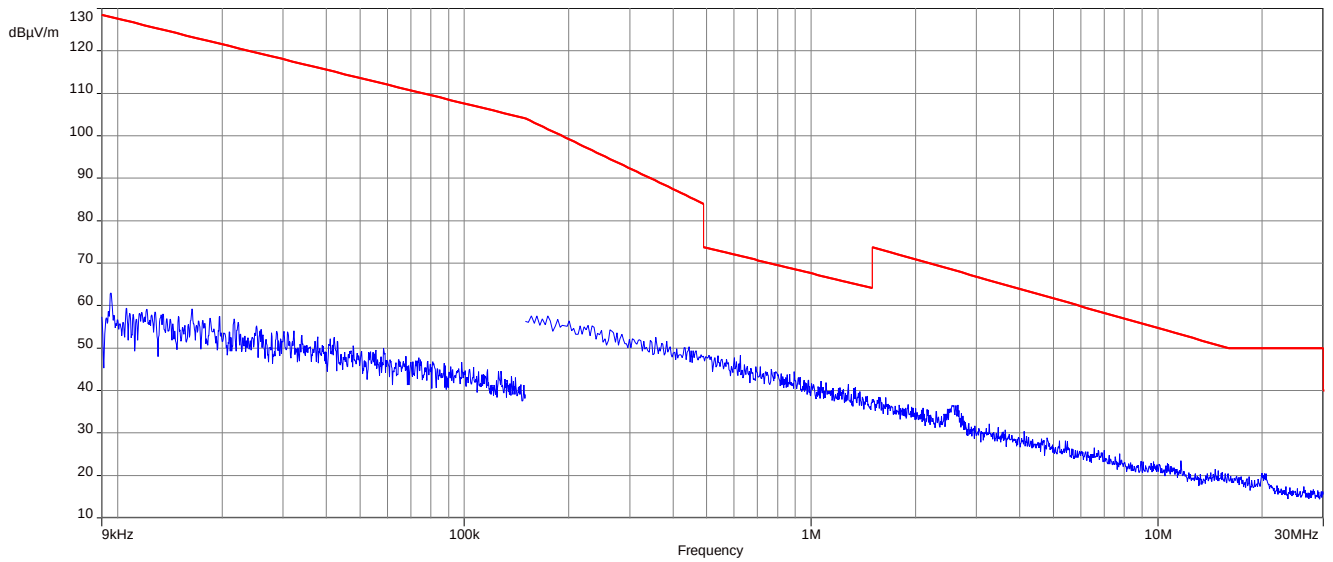
Plot 7: 9 kHz to 30 MHz, U-NII-2C; highest channel**Plot 8:** 9 kHz to 30 MHz, U-NII-3; lowest channel

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

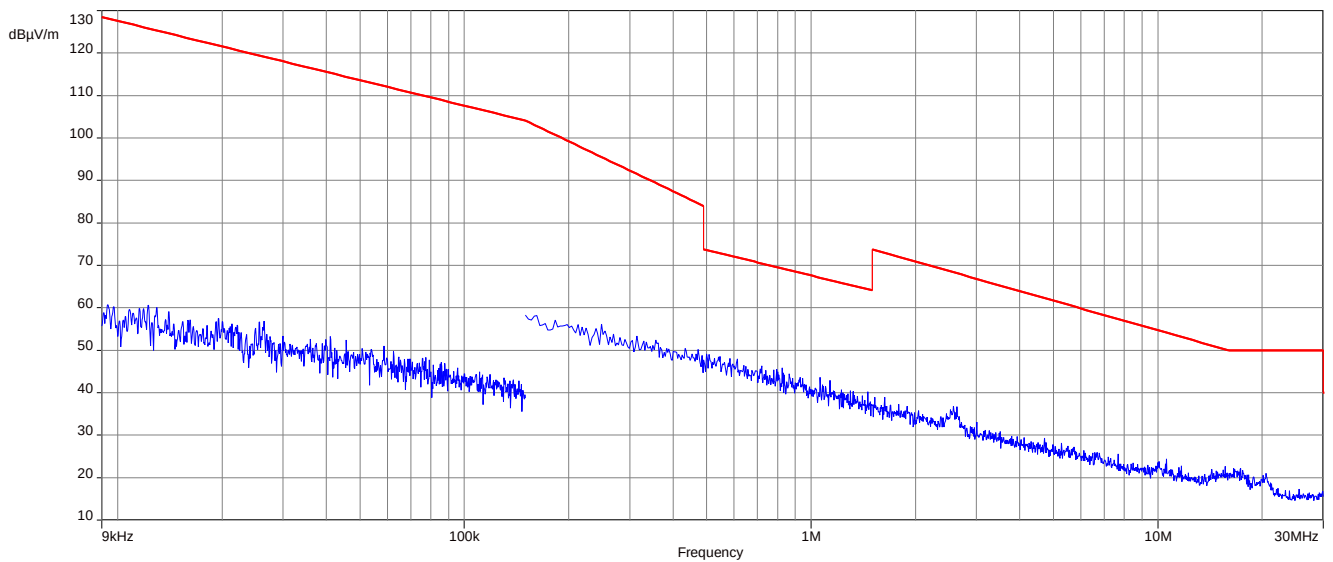


Plots: 80 MHz channel bandwidth

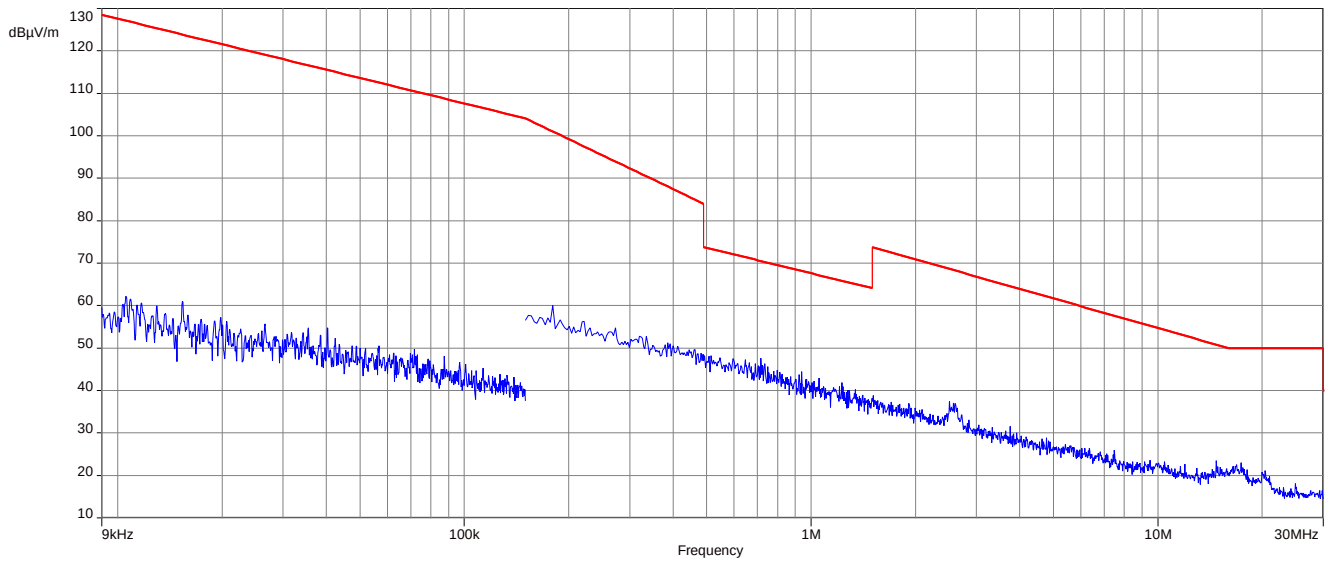
Plot 1: 9 kHz to 30 MHz, U-NII-1; middle channel



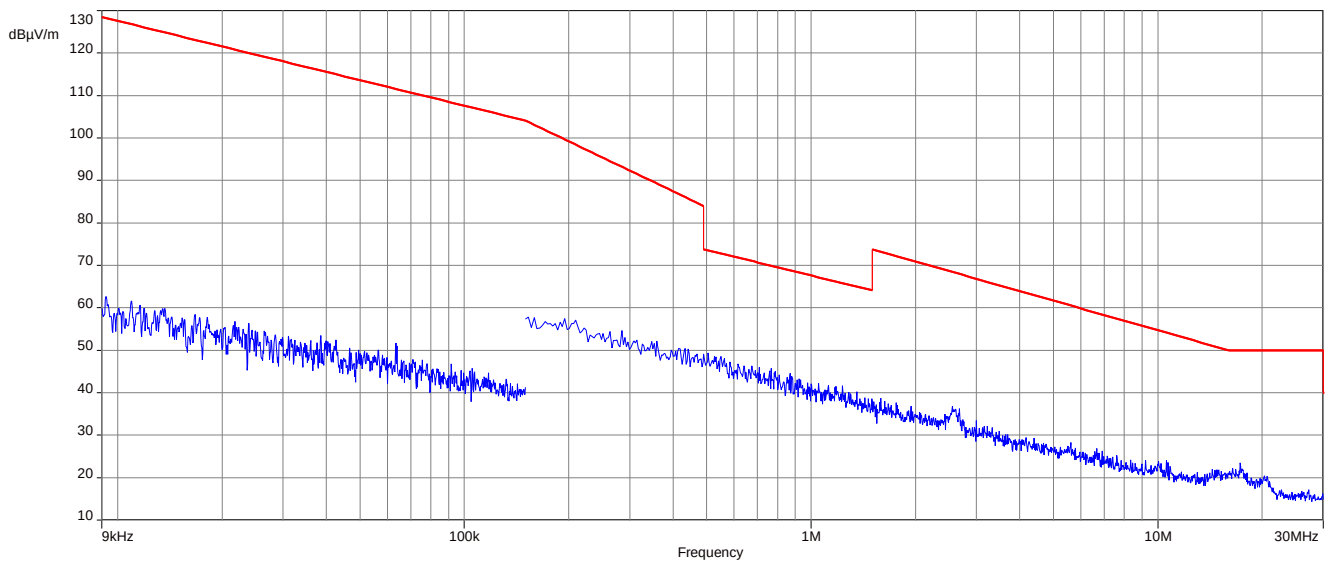
Plot 2: 9 kHz to 30 MHz, U-NII-2A; middle channel



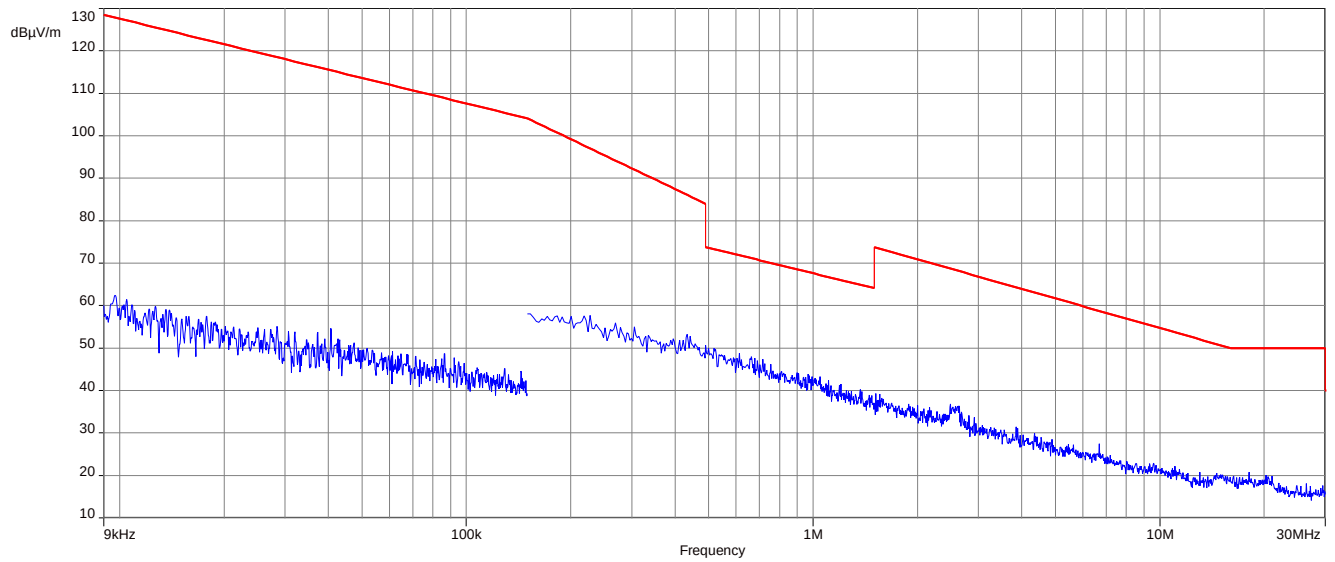
Plot 3: 9 kHz to 30 MHz, U-NII-2C; lowest channel



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

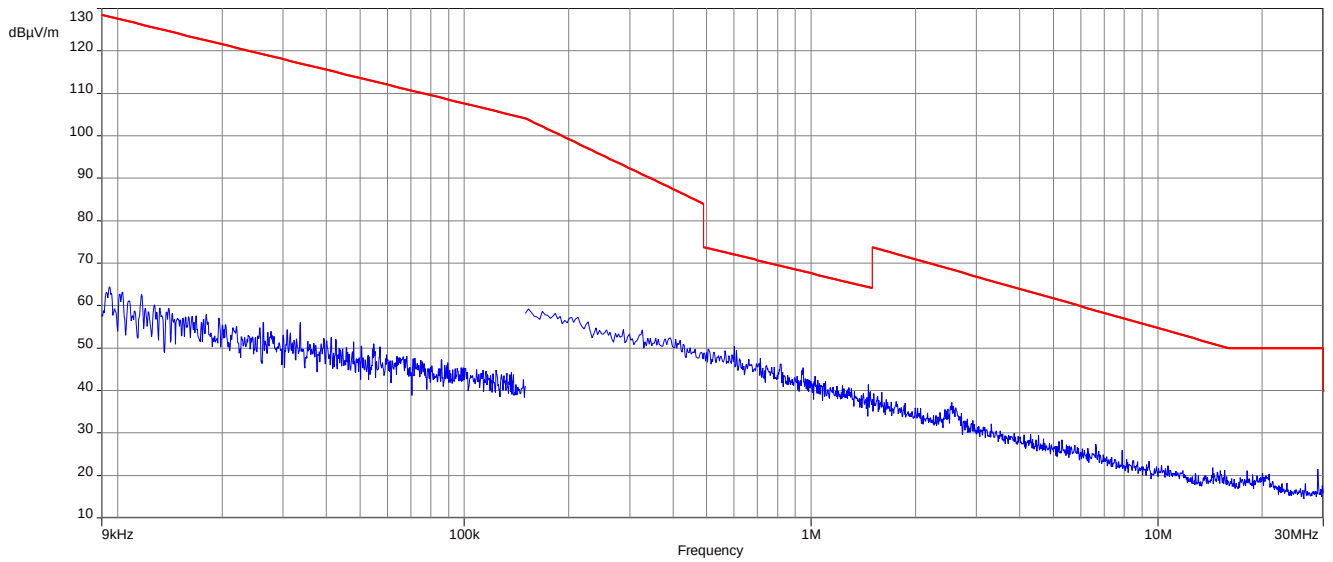


Plot 5: 9 kHz to 30 MHz, U-NII-3; middle channel

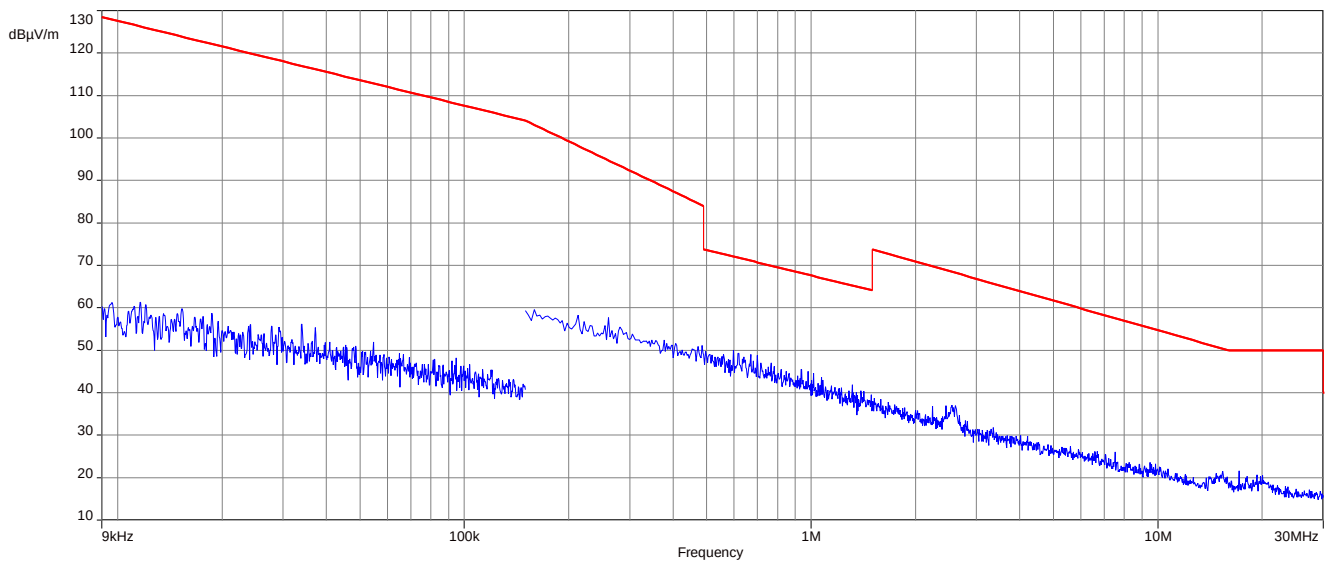


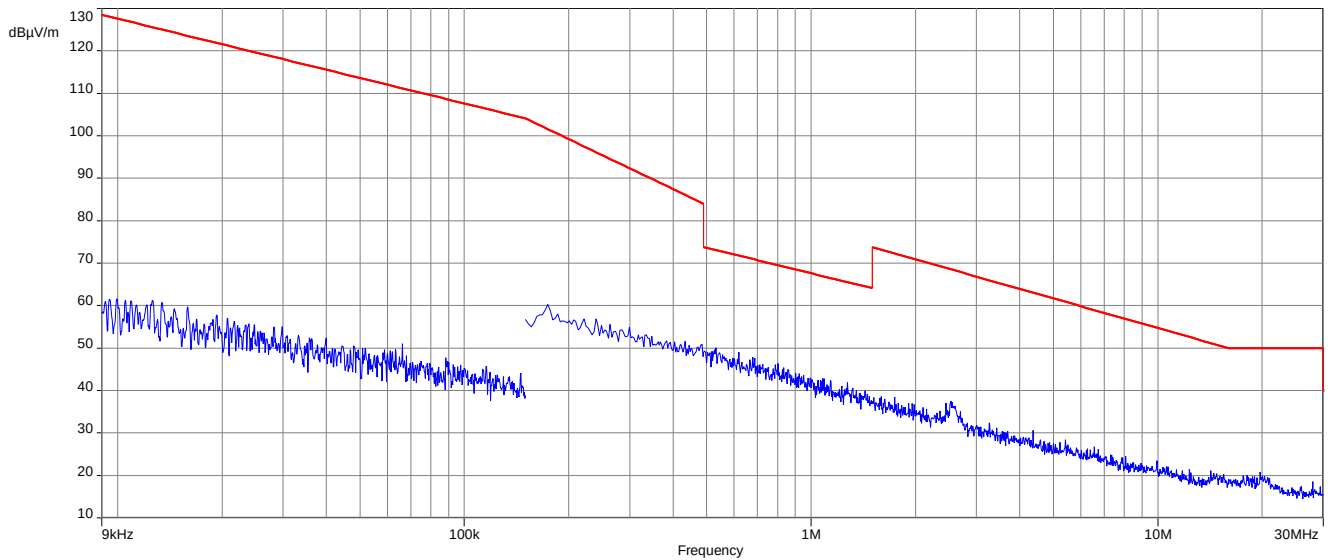
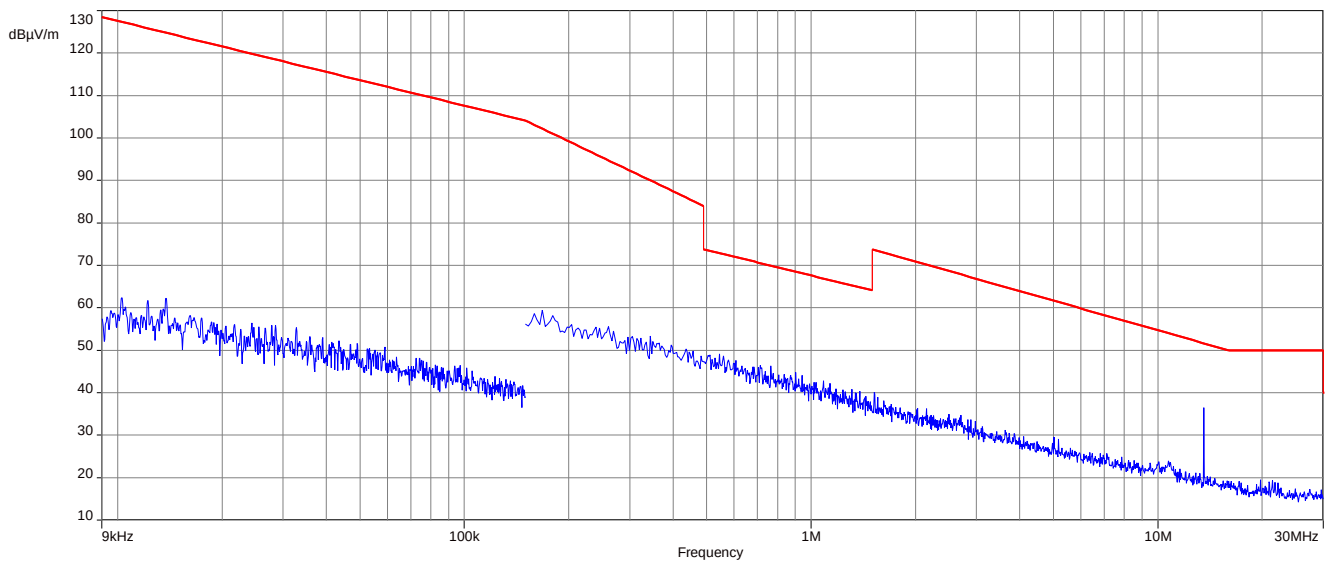
Plots: 80+80 MHz channel bandwidth

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

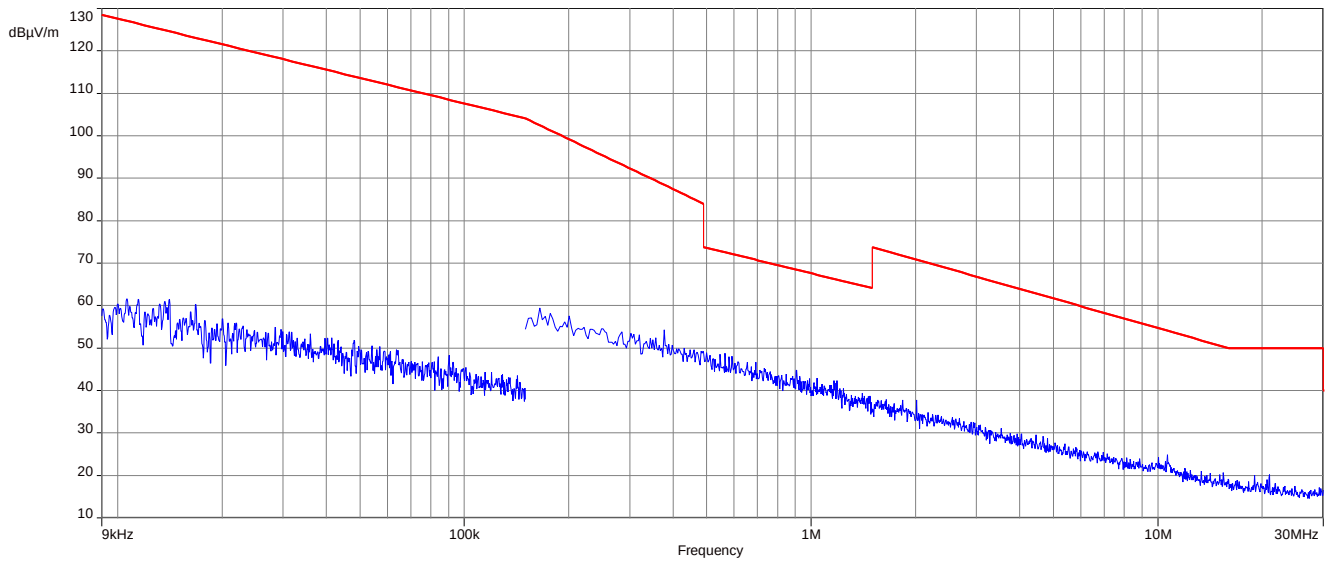


Plot 2: 9 kHz to 30 MHz, U-NII-2C; middle channel

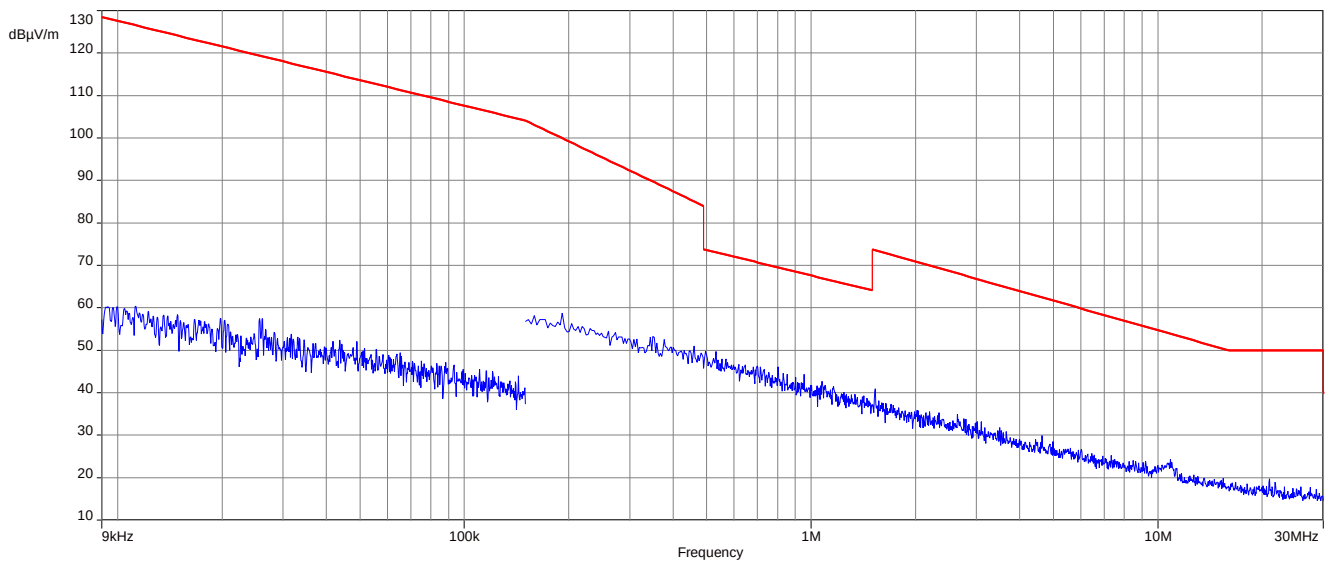


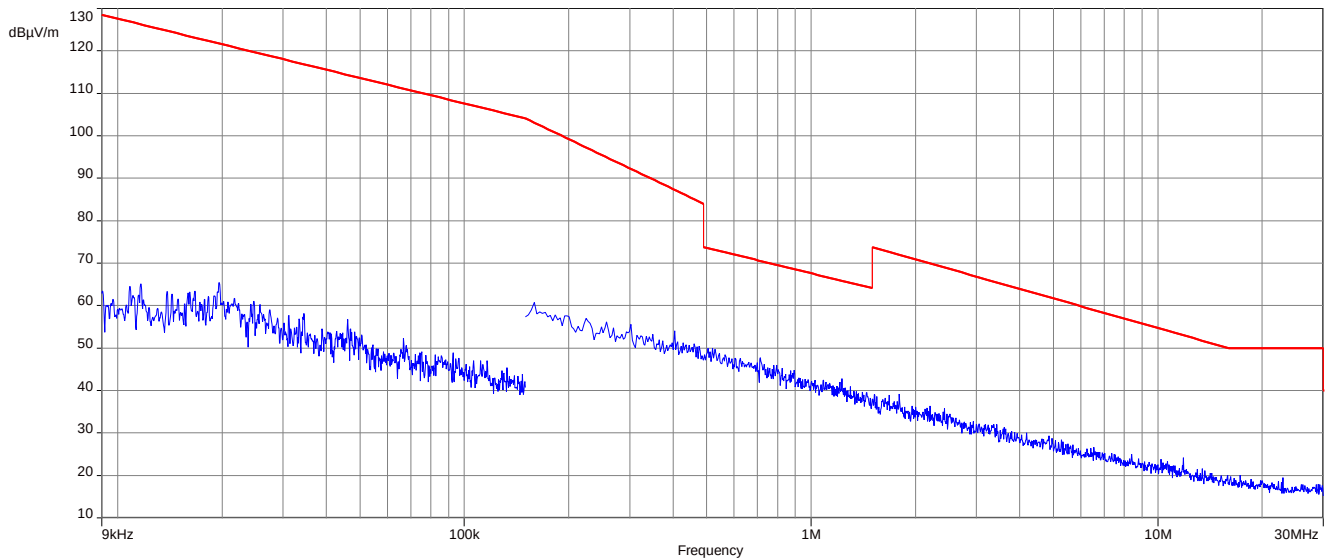
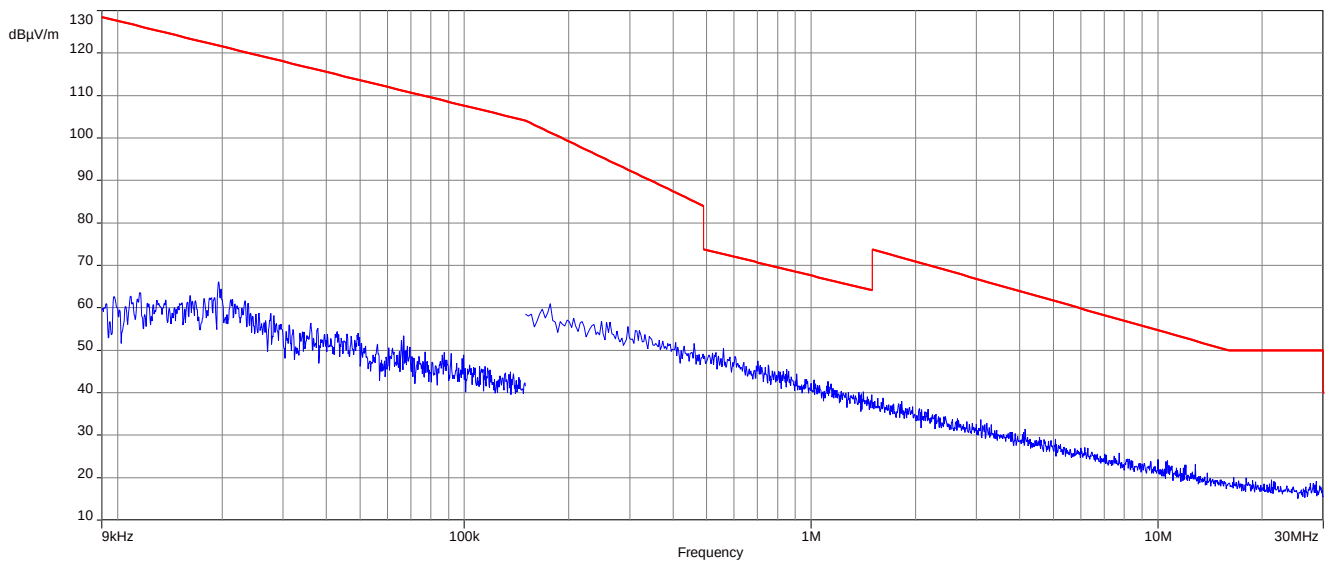
Plots: WALSIN antennas**Plot 1:** 9 kHz to 30 MHz, U-NII-3; lowest channel, 20 MHz OFDM-mode**Plot 2:** 9 kHz to 30 MHz, U-NII-2C; highest channel, 40 MHz OFDM mode

Plot 3: 9 kHz to 30 MHz, U-NII-2C; middle channel 80 MHz OFDM-mode

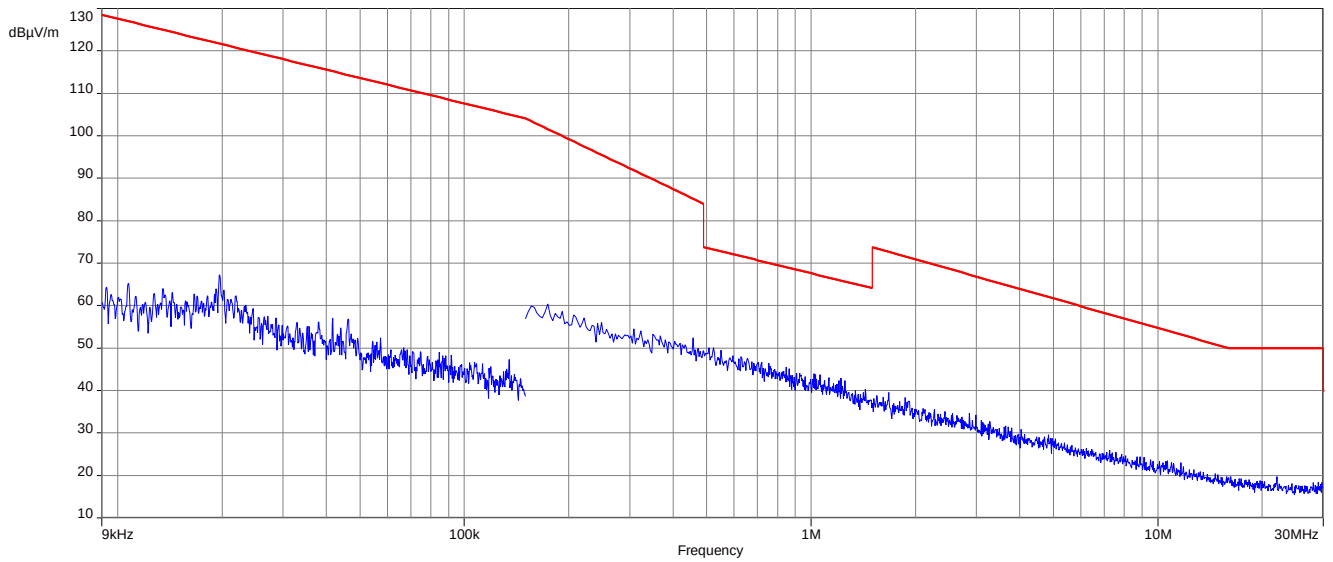


Plot 4: 9 kHz to 30 MHz, U-NII-2C; middle channel, 80+80 MHz OFDM-mode

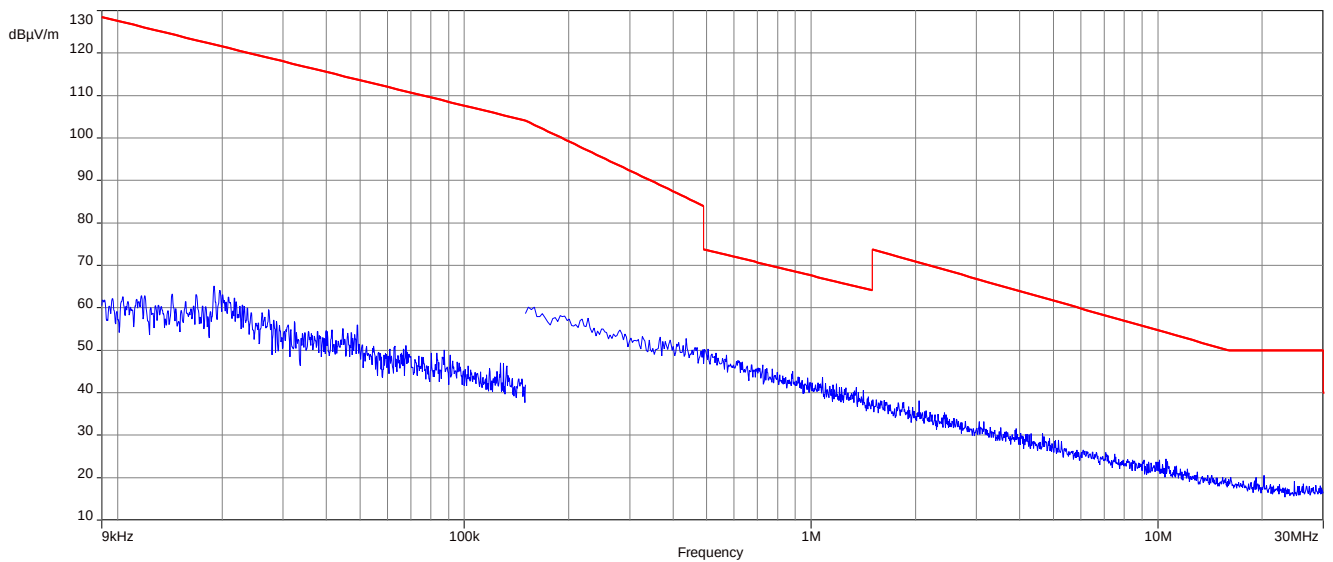


Plots: HL antennas**Plot 1:** 9 kHz to 30 MHz, U-NII-3; lowest channel, 20 MHz OFDM-mode**Plot 2:** 9 kHz to 30 MHz, U-NII-2C; highest channel, 40 MHz OFDM mode

Plot 3: 9 kHz to 30 MHz, U-NII-2C; middle channel 80 MHz OFDM-mode



Plot 4: 9 kHz to 30 MHz, U-NII-2C; middle channel, 80+80 MHz OFDM-mode



12.11 Spurious emissions radiated 30 MHz to 1 GHz

Description:

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

Measurement:

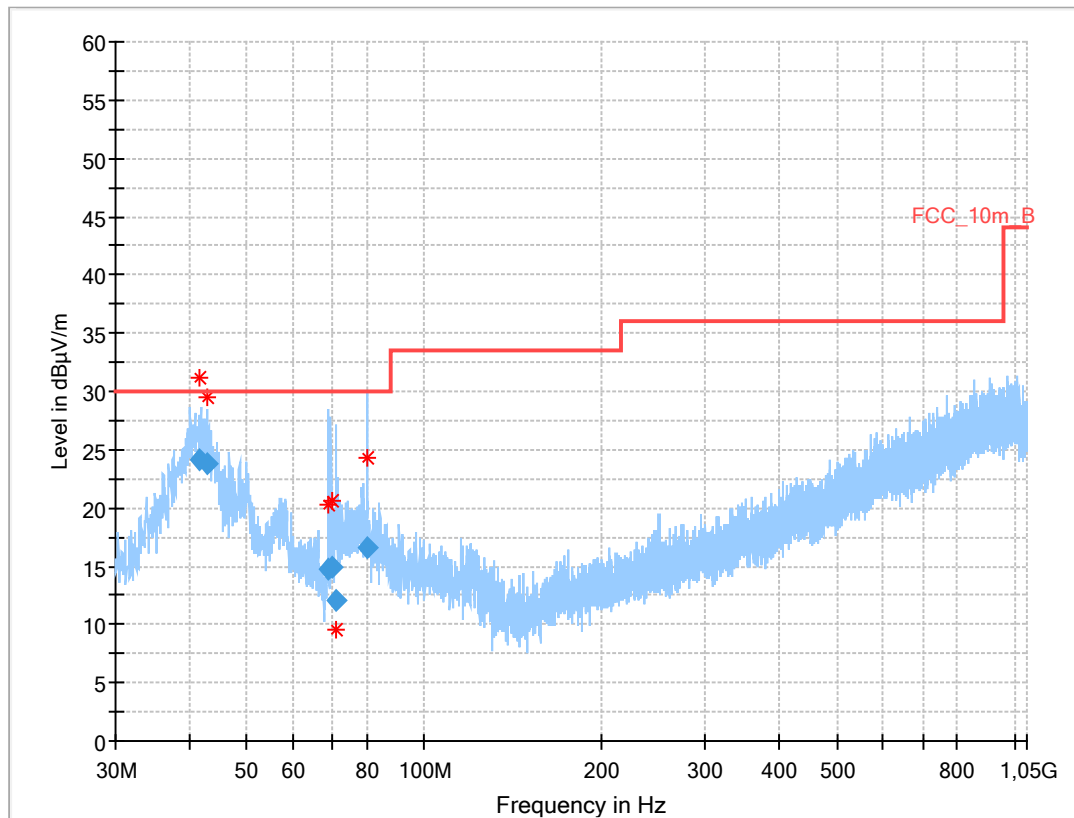
Measurement parameter	
Detector:	Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	500 kHz
Span:	30 MHz to 1 GHz
Test setup:	See sub clause 7.1 – A
Measurement uncertainty:	See chapter 9

Limits:

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

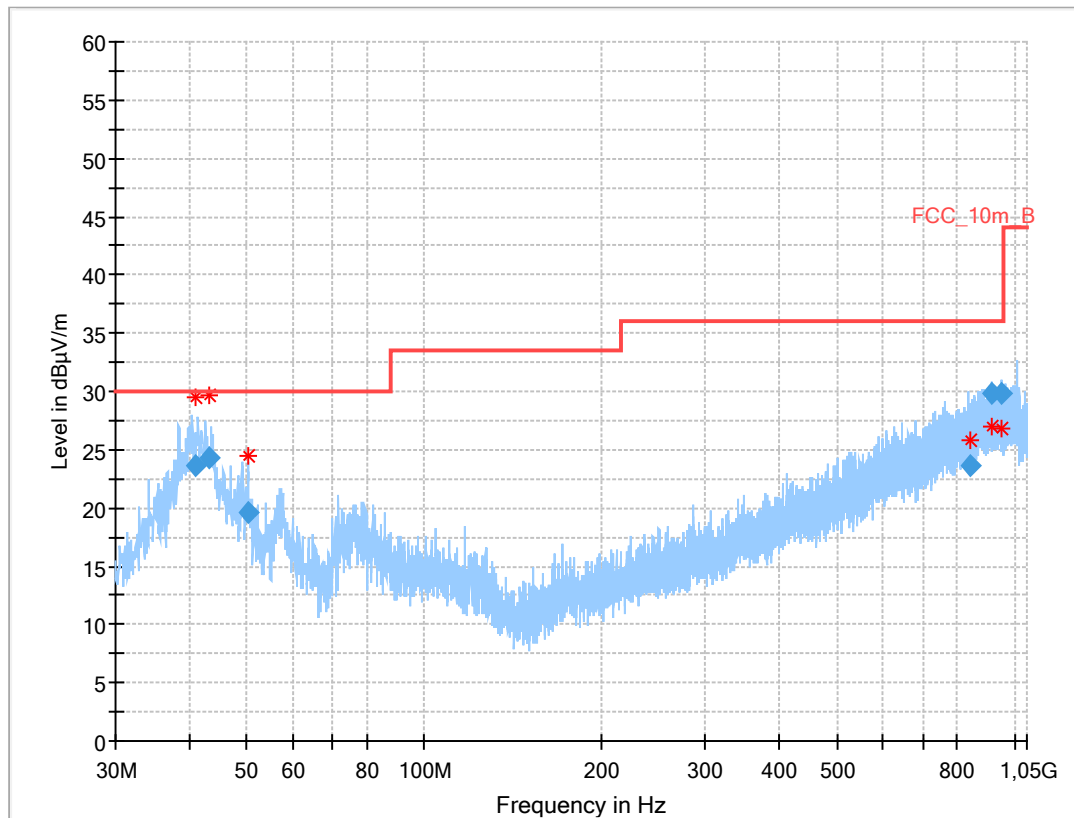
Plots:

Plot 1: 30 MHz to 1 GHz; vertical & horizontal polarization; valid for all channels of all 20 MHz modes and all antenna configurations

**Results:**

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.713	24.13	30.0	5.9	1000	120.0	152.0	V	192	16
42.922	23.79	30.0	6.2	1000	120.0	106.0	V	76	16
68.531	14.68	30.0	15.3	1000	120.0	195.0	V	29	10
70.006	14.97	30.0	15.0	1000	120.0	101.0	V	19	10
70.889	12.02	30.0	18.0	1000	120.0	195.0	H	-37	9
80.147	16.55	30.0	13.5	1000	120.0	195.0	V	57	8

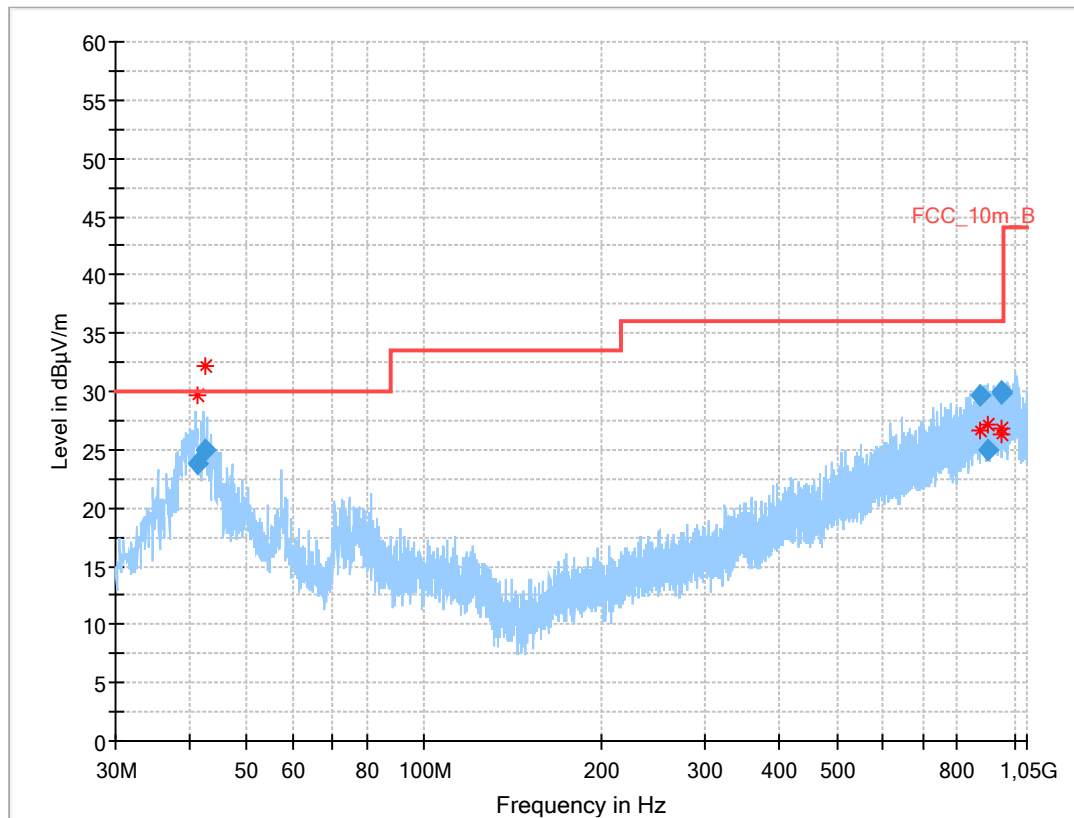
Plot 2: 30 MHz to 1 GHz; vertical & horizontal polarization; valid for all channels of all 40 MHz modes and all antenna configurations



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.954	23.61	30.0	6.4	1000	120.0	98.0	V	-16	15
43.220	24.35	30.0	5.7	1000	120.0	101.0	V	201	16
50.491	19.55	30.0	10.5	1000	120.0	102.0	V	4	16
838.805	23.59	36.0	12.4	1000	120.0	102.0	H	52	24
918.339	29.86	36.0	6.1	1000	120.0	165.0	V	127	26
951.469	29.90	36.0	6.1	1000	120.0	195.0	V	-20	25

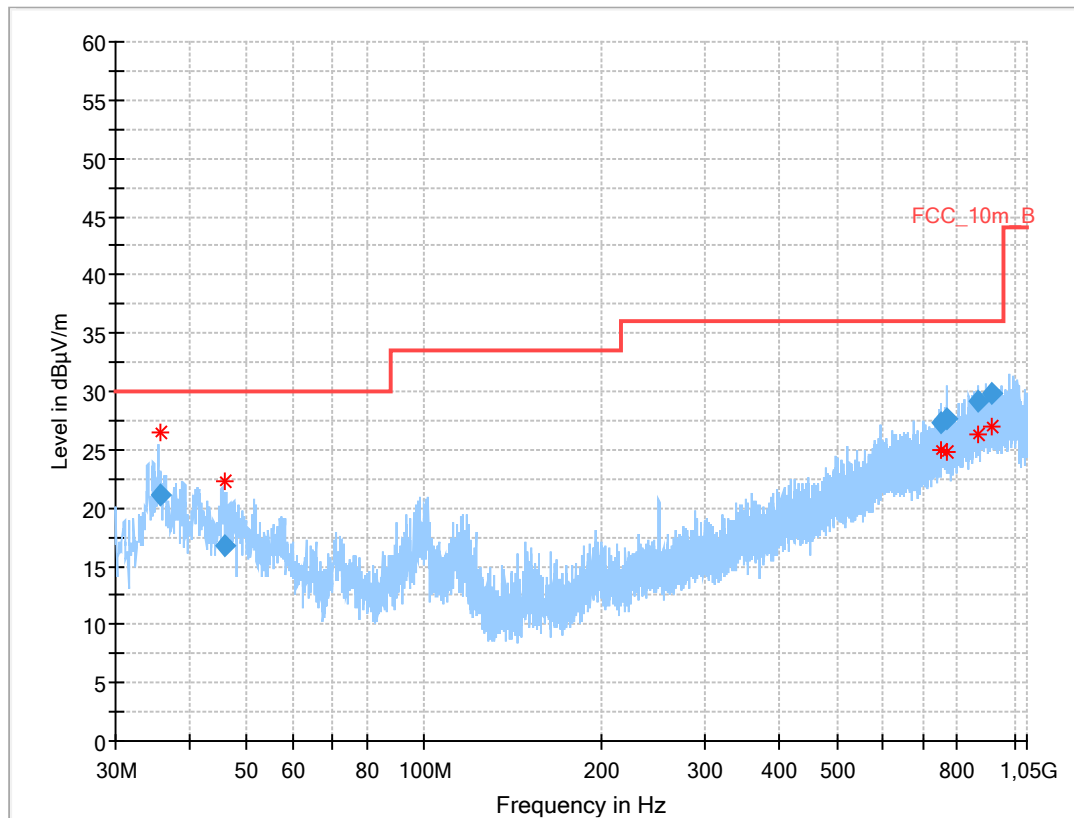
Plot 3: 30 MHz to 1 GHz; vertical & horizontal polarization; valid for all channels of all 80 MHz modes and all antenna configurations



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.377	23.85	30.0	6.2	1000	120.0	109.0	V	254	16
42.425	24.97	30.0	5.0	1000	120.0	107.0	V	-35	16
871.902	29.64	36.0	6.4	1000	120.0	182.0	V	-37	25
898.619	24.97	36.0	11.0	1000	120.0	195.0	H	232	25
948.109	29.97	36.0	6.0	1000	120.0	177.0	V	52	25
951.798	29.84	36.0	6.2	1000	120.0	195.0	H	232	25

Plot 4: 30 MHz to 1 GHz; vertical & horizontal polarization; U-NII-1 & U-NII-2A; 802.11ax HE80+80 and all antenna configurations



Results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.661	21.18	30.0	8.8	1000	120.0	104.0	V	239	14
45.913	16.80	30.0	13.2	1000	120.0	102.0	V	185	16
750.578	27.25	36.0	8.8	1000	120.0	101.0	V	142	24
769.905	27.60	36.0	8.4	1000	120.0	183.0	H	232	24
866.435	29.20	36.0	6.8	1000	120.0	195.0	V	-16	25
915.288	29.89	36.0	6.1	1000	120.0	137.0	H	186	26

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

Limits:

TX Spurious Emissions Radiated		
§15.209		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
Above 960	54.0 (AVG) 74 (Peak)	3
§15.407		
Outside the restricted bands!	-27 dBm / MHz	

NOTE: For emissions between 5 and 6 GHz please see the results in Chapter 12.9. In this chapter the signal was notched with a band rejection filter.

Results: 20 MHz channel bandwidth, COLFLY antennas

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
15606	Peak	51.9		Peak			Peak	
	AVG	36.7		AVG			AVG	

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-2A (5250 MHz to 5350 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-

TX Spurious Emissions Radiated [dBµV/m] / dBm								
U-NII-2C (5470 MHz to 5725 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
-/-	Peak	-/-	11200	Peak	50.2	11440	Peak	54.0
	AVG	-/-		AVG	44.3		AVG	51.1

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]
11490	Peak	54.1	11570	Peak	54.1	11650	Peak	51.8
	AVG	50.1		AVG	48.8		AVG	43.9

Results: 40 MHz channel bandwidth, COLFLY antennas

TX Spurious Emissions Radiated [dB μ V/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
-/-	Peak	-/-		Peak		-/-	Peak	-/-
	AVG	-/-		AVG			AVG	-/-

TX Spurious Emissions Radiated [dB μ V/m] / dBm								
U-NII-2A (5250 MHz to 5350 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
-/-	Peak	-/-		Peak		-/-	Peak	-/-
	AVG	-/-		AVG			AVG	-/-
-/-	Peak	-/-		Peak		-/-	Peak	-/-
	AVG	-/-		AVG			AVG	-/-

TX Spurious Emissions Radiated [dB μ V/m] / dBm								
U-NII-2C (5470 MHz to 5725 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
-/-	Peak	-/-	11180	Peak	50.2	11420	Peak	51.1
	AVG	-/-		AVG	44.6		AVG	46.2

TX Spurious Emissions Radiated [dB μ V/m] / dBm								
U-NII-3 (5725 MHz to 5850 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
11510	Peak	53.7		Peak		11590	Peak	51.4
	AVG	49.8		AVG			AVG	45.6

Results: 80 MHz channel bandwidth, COLFLY antennas

TX Spurious Emissions Radiated [dBµV/m] / dBm		
U-NII-1 (5150 MHz to 5250 MHz)		
Middle channel		
F [MHz]	Detector	Level [dBµV/m]
-/-	Peak	-/-
	AVG	-/-
-/-	Peak	-/-
	AVG	-/-

TX Spurious Emissions Radiated [dBµV/m] / dBm		
U-NII-2A (5250 MHz to 5350 MHz)		
Middle channel		
F [MHz]	Detector	Level [dBµV/m]
-/-	Peak	-/-
	AVG	-/-
-/-	Peak	-/-
	AVG	-/-

TX Spurious Emissions Radiated [dBµV/m] / dBm					
U-NII-2C (5470 MHz to 5725 MHz)					
Lowest channel			Highest channel		
11060	Peak	48.3	11220	Peak	50.2
	AVG	41.7		AVG	45.7

TX Spurious Emissions Radiated [dBµV/m] / dBm		
U-NII-3 (5725 MHz to 5850 MHz)		
Middle channel		
F [MHz]	Detector	Level [dBµV/m]
11550	Peak	53.2
	AVG	48.9

Results: 80+80 MHz channel bandwidth, COLFLY antennas

TX Spurious Emissions Radiated [dB μ V/m] / dBm		
U-NII-1 & U-NII-2A (5150 MHz to 5250 MHz & 5250 MHz to 5350 MHz)		
Middle channel		
F [MHz]	Detector	Level [dB μ V/m]
-/-	Peak	-/-
	AVG	-/-
-/-	Peak	-/-
	AVG	-/-

TX Spurious Emissions Radiated [dB μ V/m] / dBm		
U-NII-2C (5470 MHz to 5725 MHz)		
Middle channel		
F [MHz]	Detector	Level [dB μ V/m]
11220	Peak	53.6
	AVG	50.6
-/-	Peak	-/-
	AVG	-/-

Results: 20 MHz channel bandwidth, WALSIN antennas

TX Spurious Emissions Radiated [dB μ V/m] / dBm								
U-NII-3 (5725 MHz to 5850 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
11490	Peak	51.1		Peak			Peak	
	AVG	44.4		AVG			AVG	

Results: 40 MHz channel bandwidth, WALSIN antennas

TX Spurious Emissions Radiated [dB μ V/m] / dBm								
U-NII-2C (5470 MHz to 5725 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
	Peak			Peak		11340	Peak	51.9
	AVG			AVG			AVG	46.8

Results: 80 MHz channel bandwidth, WALSIN antennas

TX Spurious Emissions Radiated [dB μ V/m] / dBm					
U-NII-2C (5470 MHz to 5725 MHz)					
Lowest channel			Highest channel		
	Peak		11220	Peak	50.0
	AVG			AVG	45.4

Results: 80+80 MHz channel bandwidth, WALSIN antennas

TX Spurious Emissions Radiated [dB μ V/m] / dBm		
U-NII-2C (5470 MHz to 5725 MHz)		
Middle channel		
F [MHz]	Detector	Level [dB μ V/m]
11220	Peak	53.6
	AVG	50.6

Results: 20 MHz channel bandwidth, HL antennas

TX Spurious Emissions Radiated [dB μ V/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
-/-	Peak	-/-		Peak			Peak	
	AVG	-/-		AVG			AVG	

Results: 40 MHz channel bandwidth, HL antennas

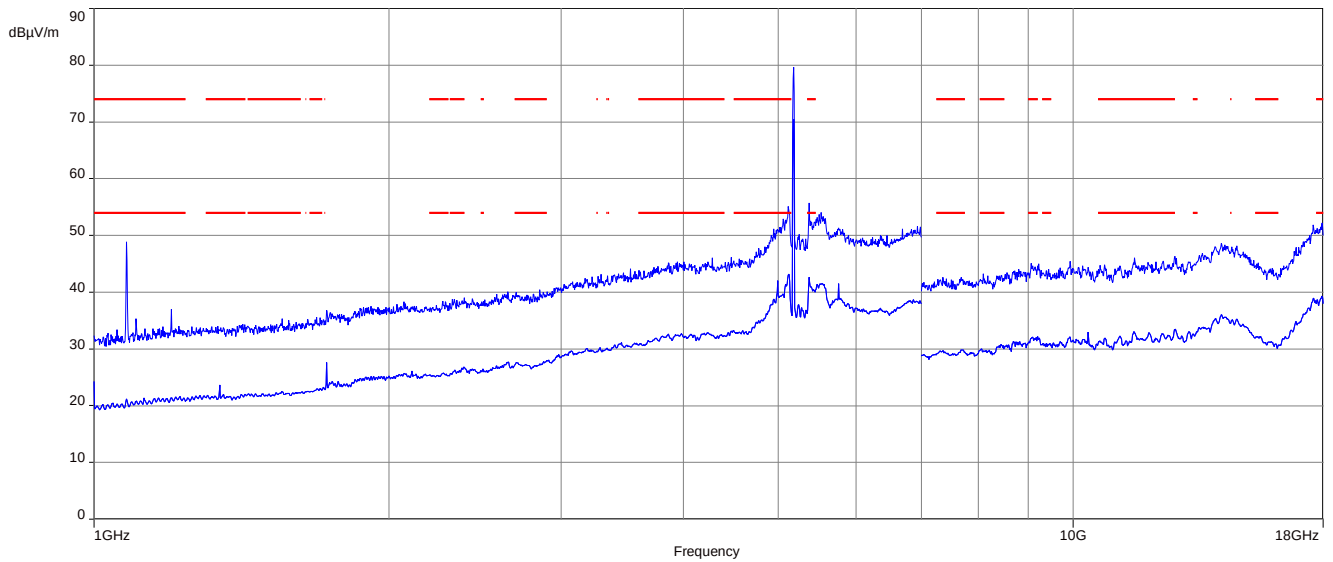
TX Spurious Emissions Radiated [dB μ V/m] / dBm								
U-NII-1 (5150 MHz to 5250 MHz)								
Lowest channel			Middle channel			Highest channel		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
-/-	Peak	-/-		Peak			Peak	
	AVG	-/-		AVG			AVG	

Results: 80 MHz channel bandwidth, HL antennas

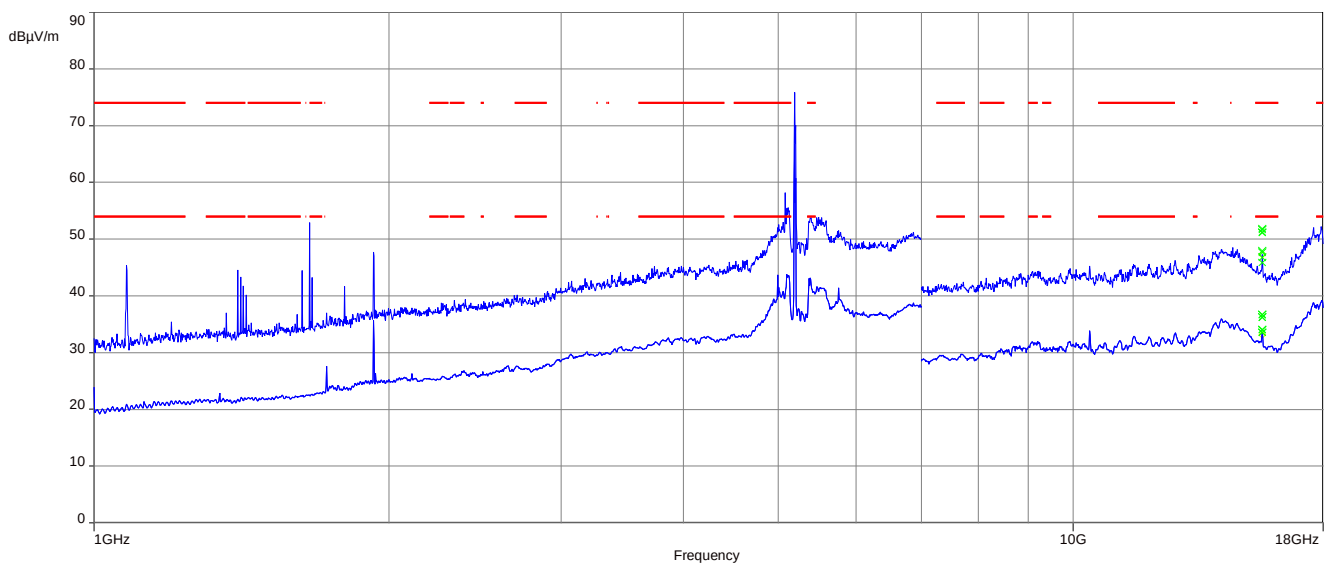
TX Spurious Emissions Radiated [dB μ V/m] / dBm		
U-NII-1 (5150 MHz to 5250 MHz)		
Middle channel		
F [MHz]	Detector	Level [dB μ V/m]
-/-	Peak	-/-
	AVG	-/-

Plots: 20 MHz channel bandwidth, COLFLY antennas

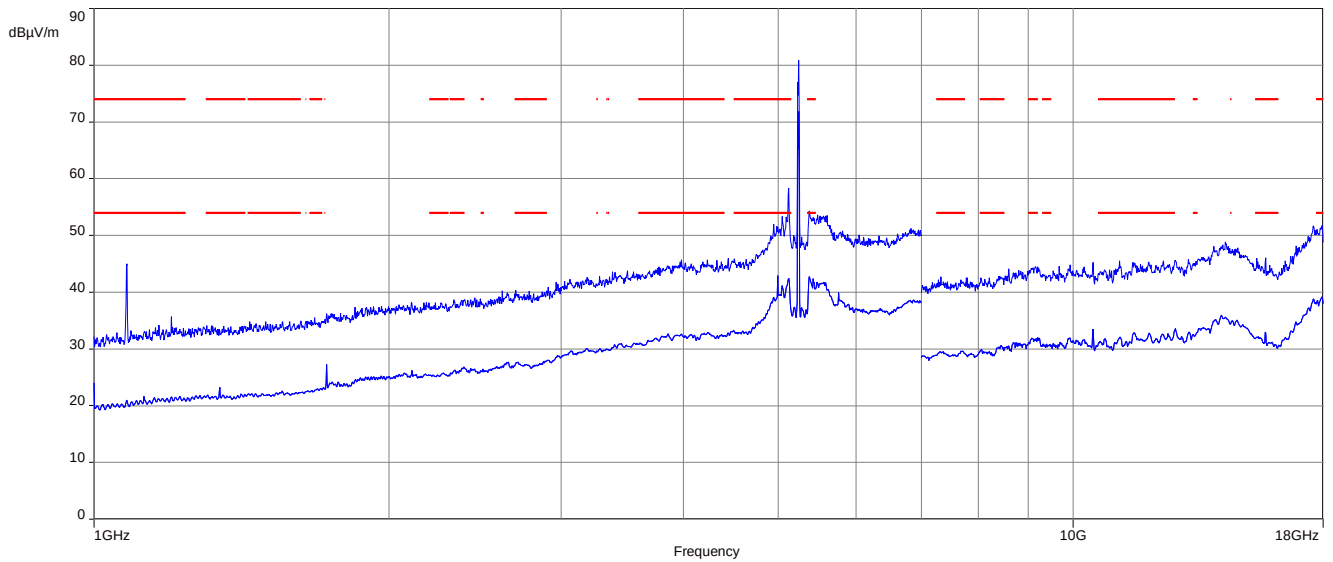
Plot 1: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



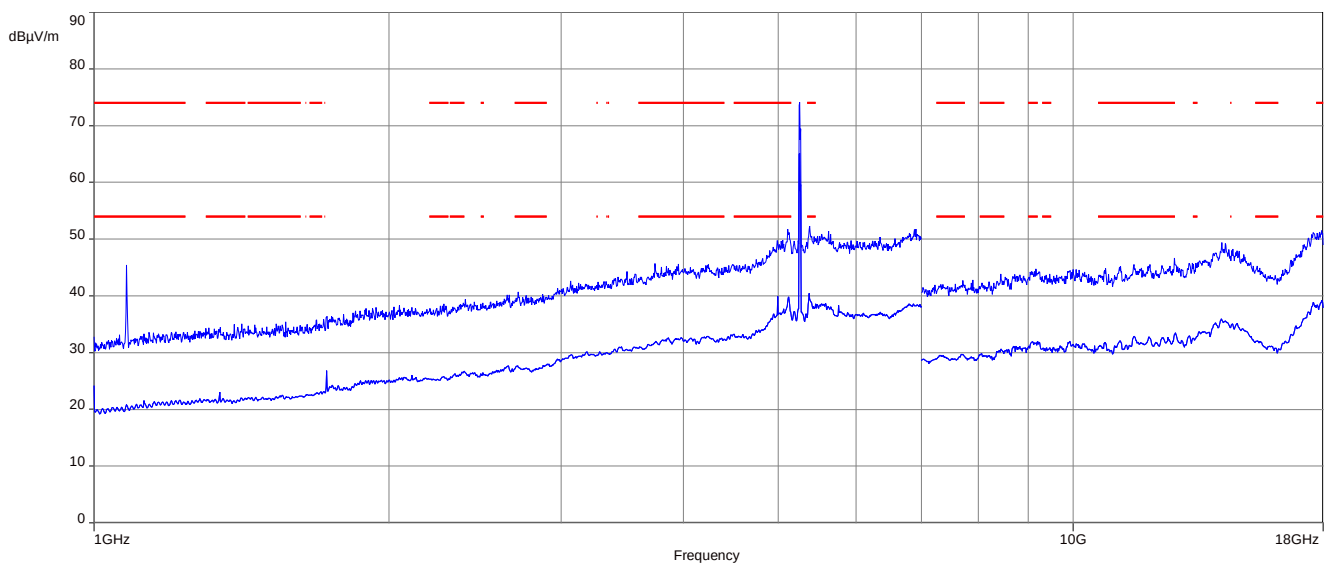
Plot 2: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; middle channel

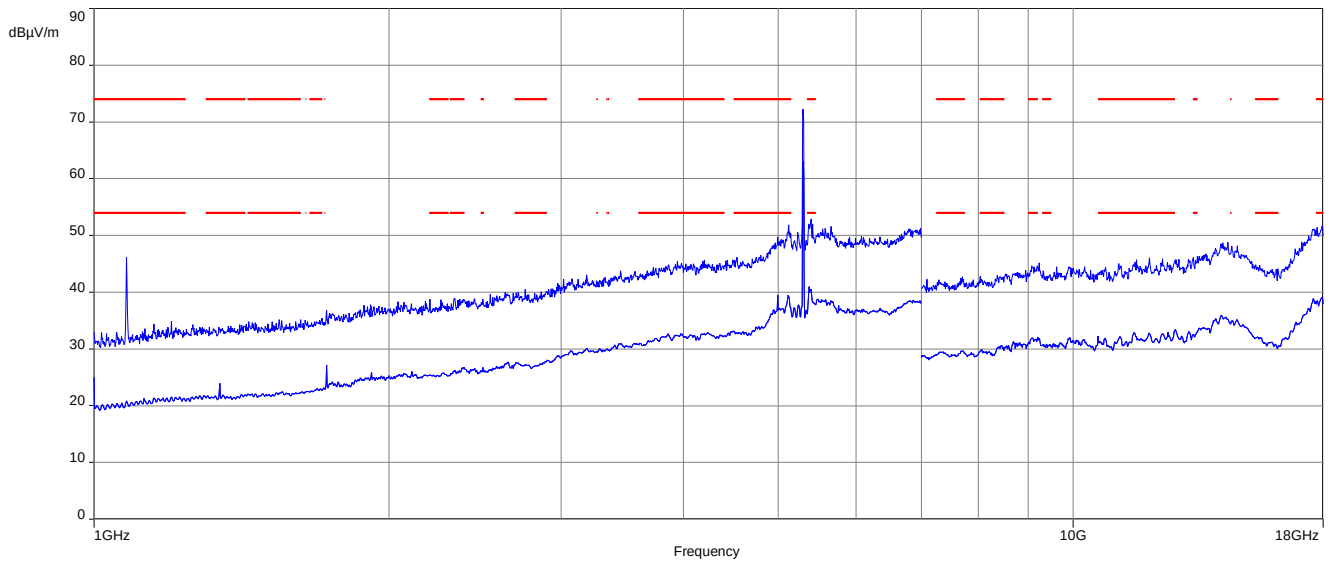
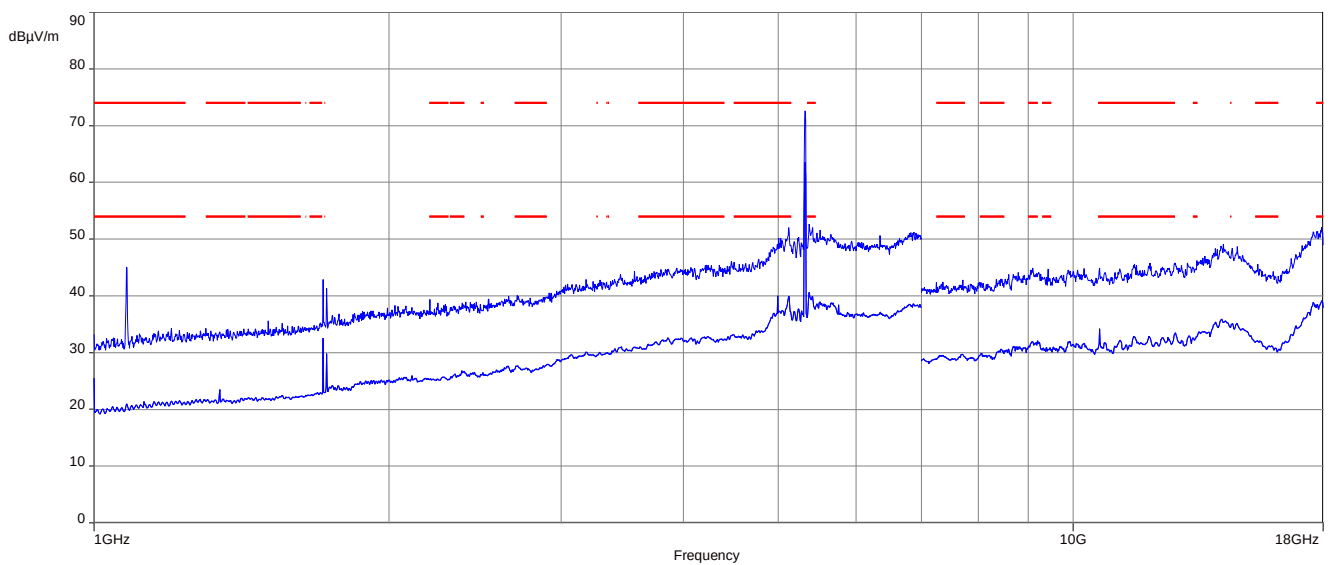


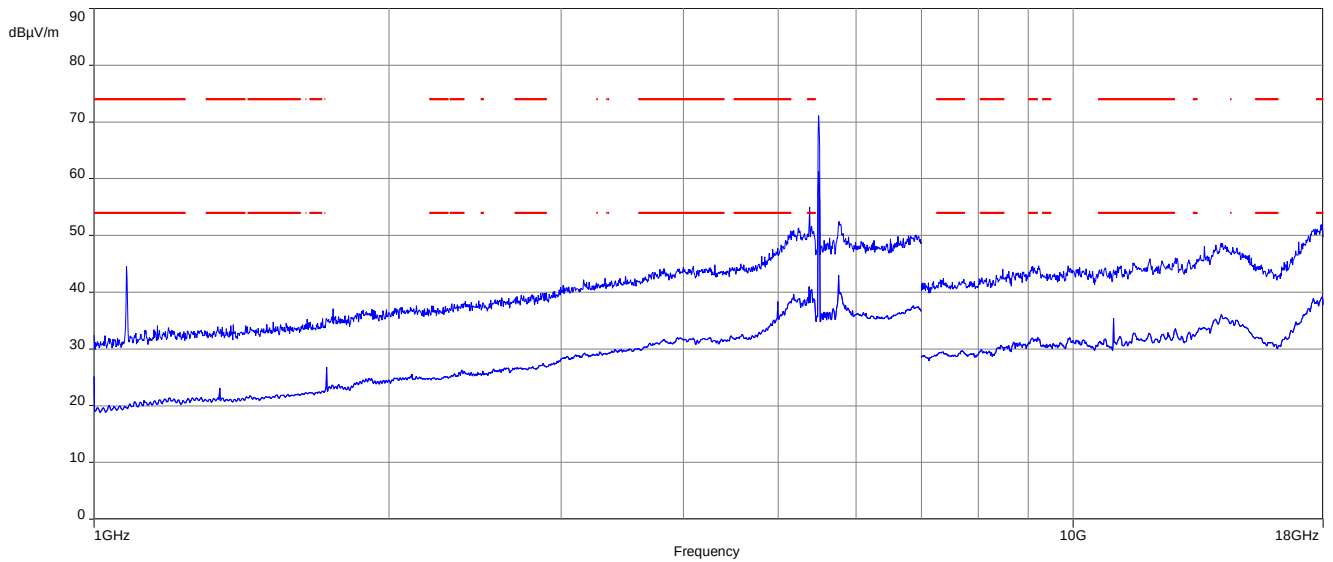
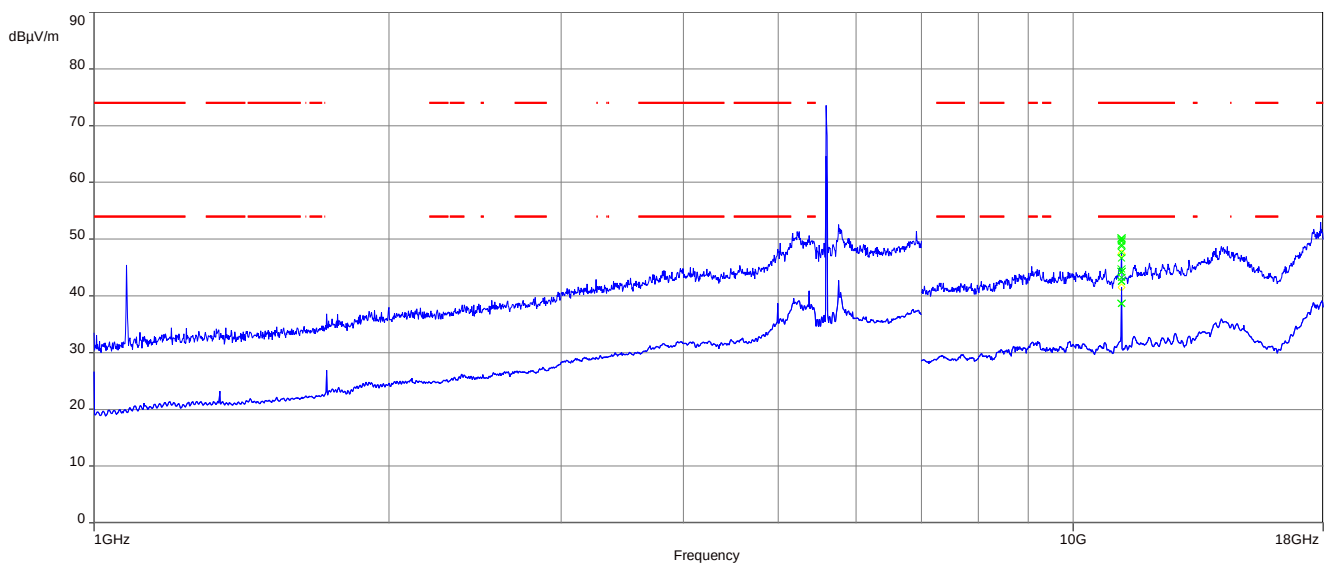
Plot 3: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; highest channel

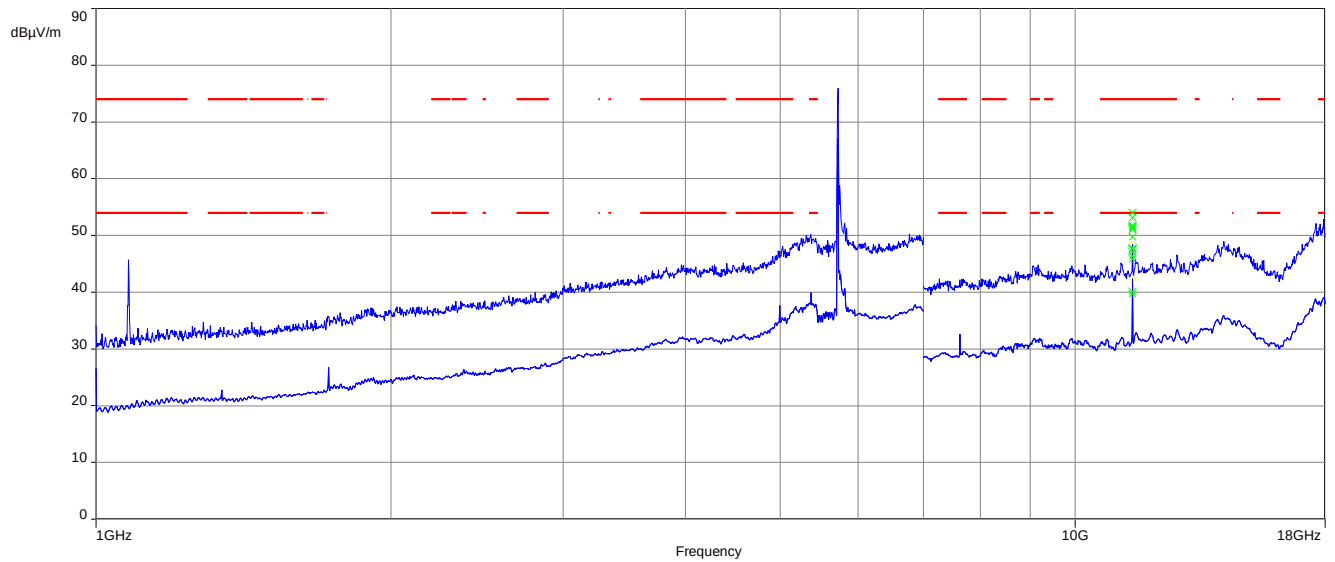
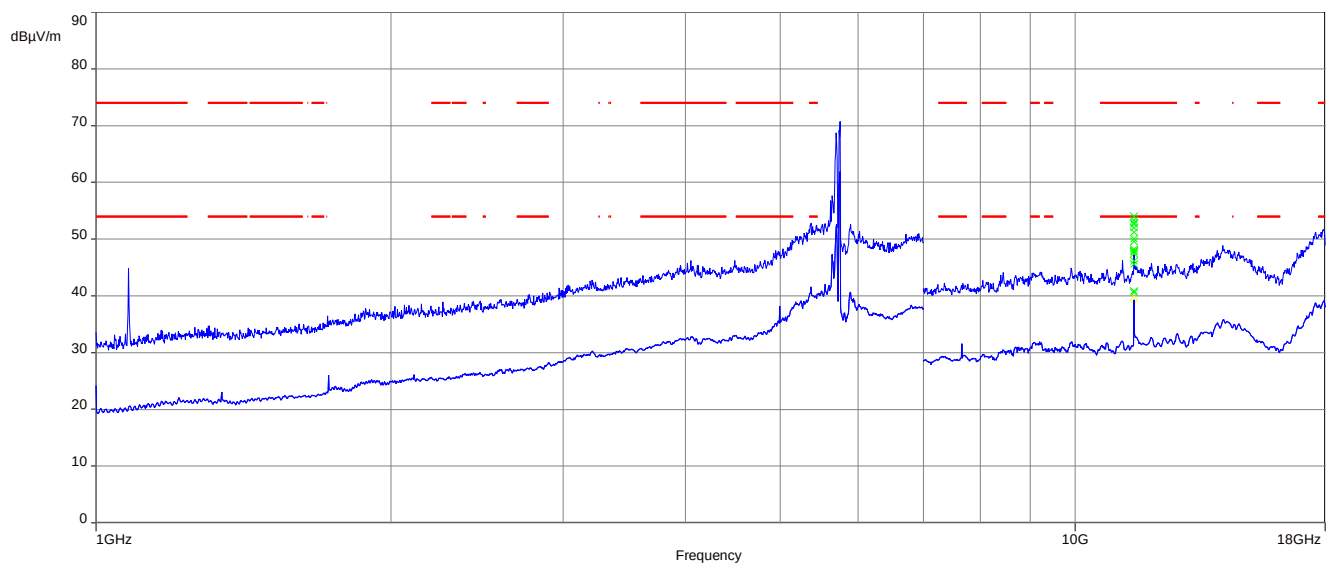


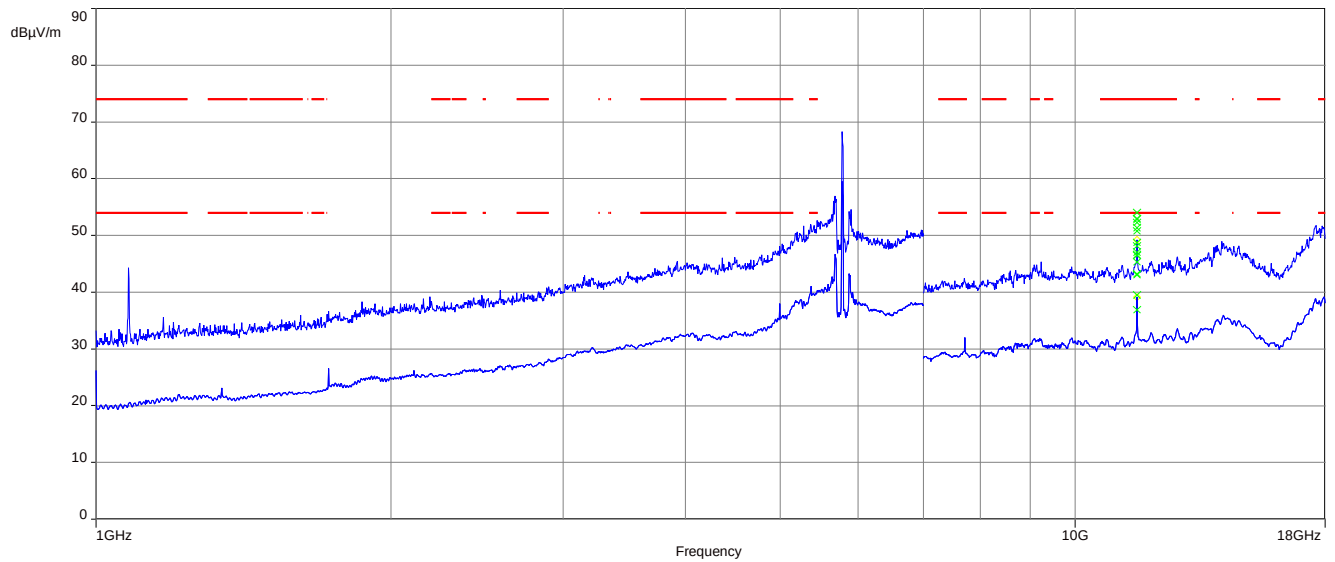
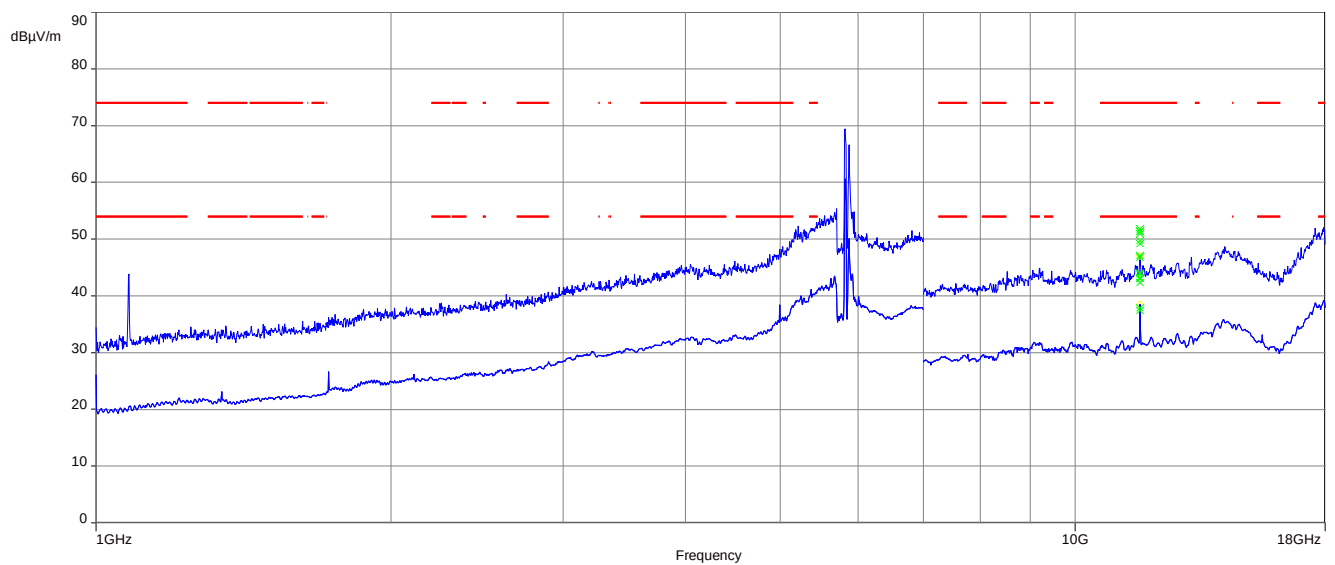
Plot 4: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



Plot 5: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; middle channel**Plot 6:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; highest channel

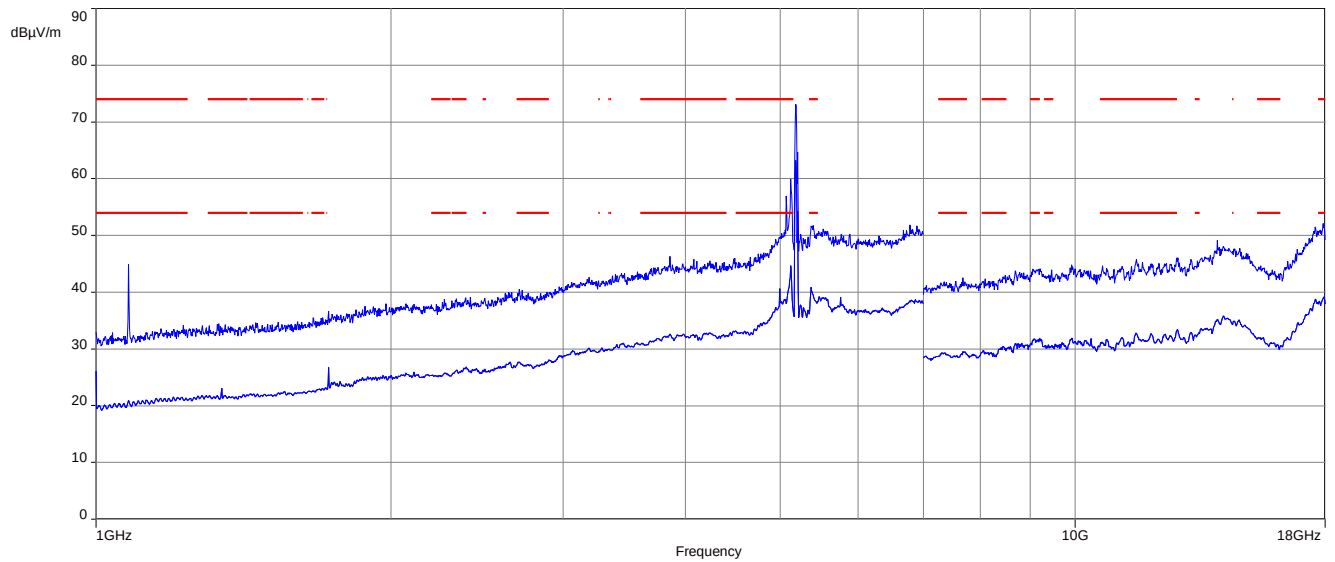
Plot 7: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel**Plot 8:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel

Plot 9: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel**Plot 10:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; lowest channel

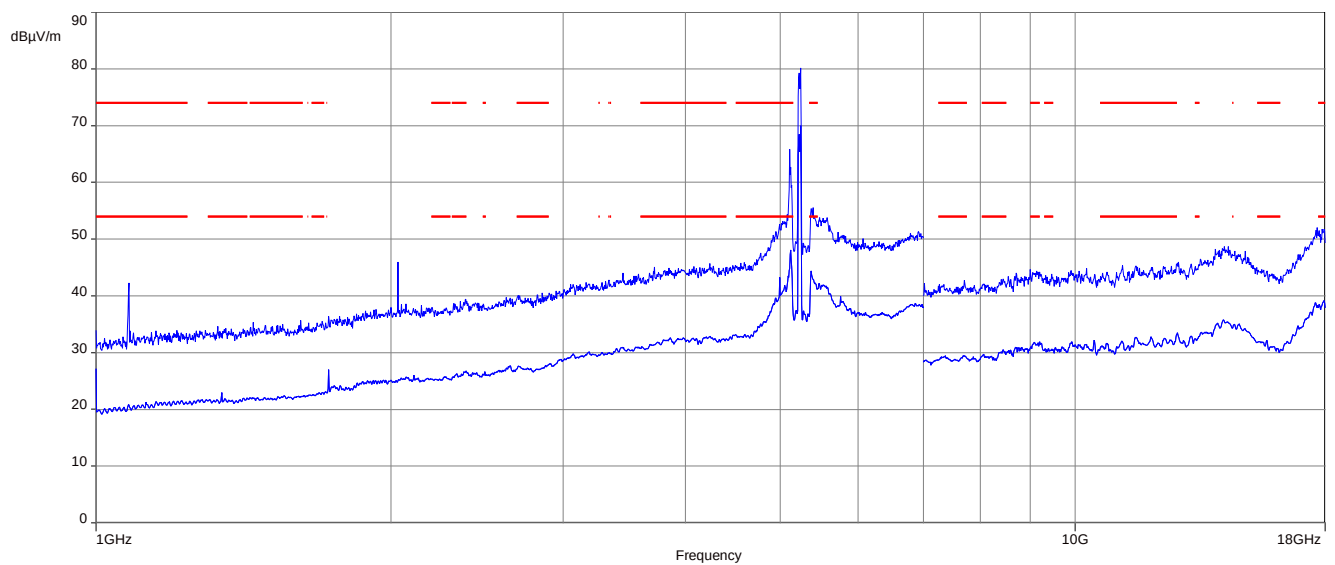
Plot 11: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; middle channel**Plot 12:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; highest channel

Plots: 40 MHz channel bandwidth, COLFLY antennas

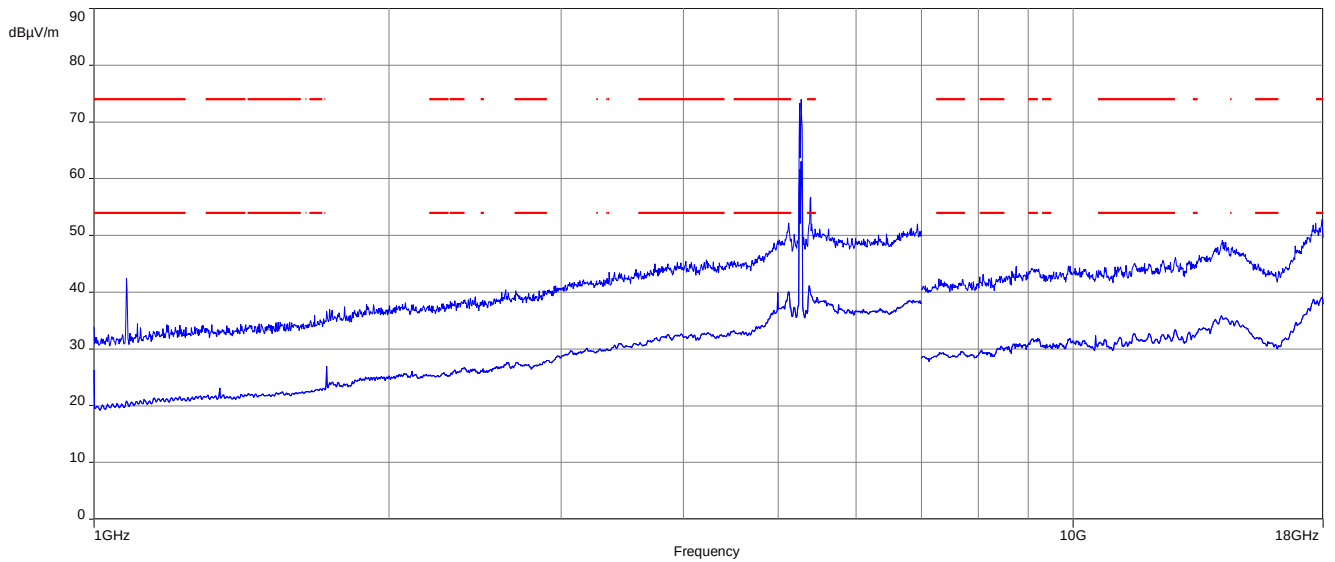
Plot 1: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; lowest channel



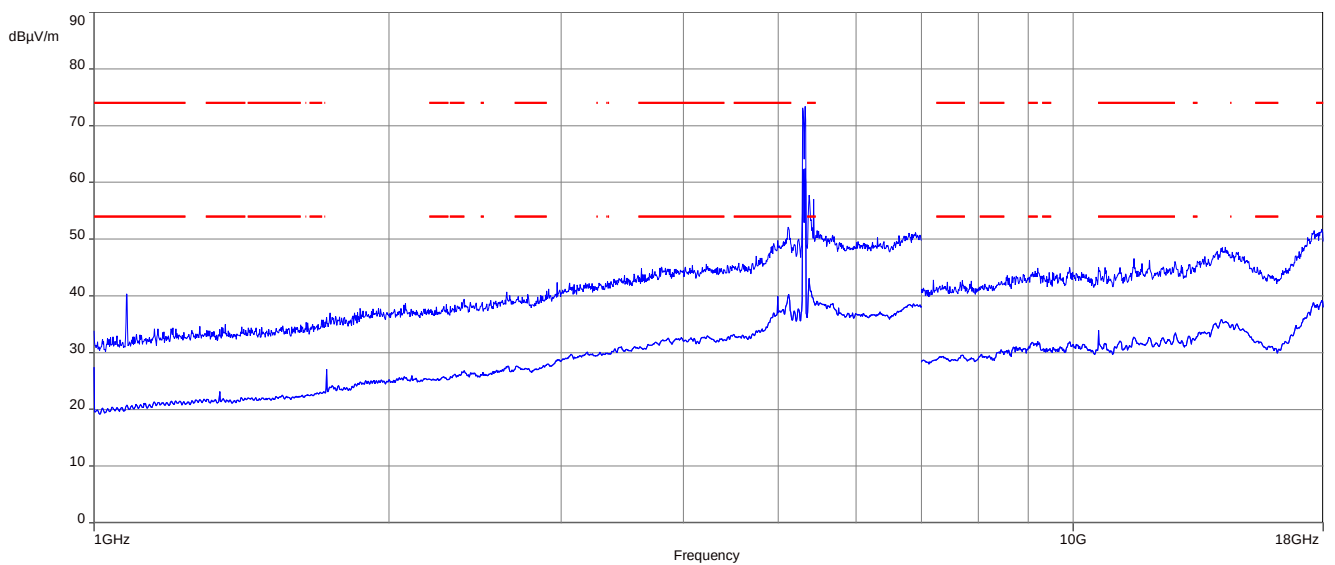
Plot 2: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; highest channel

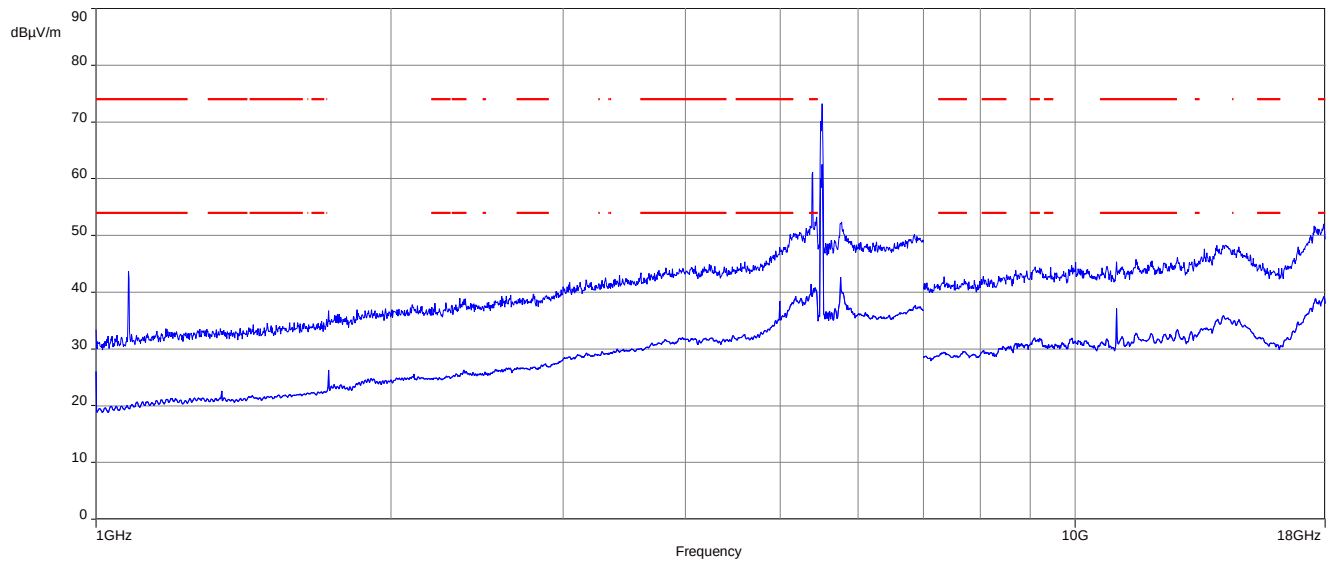
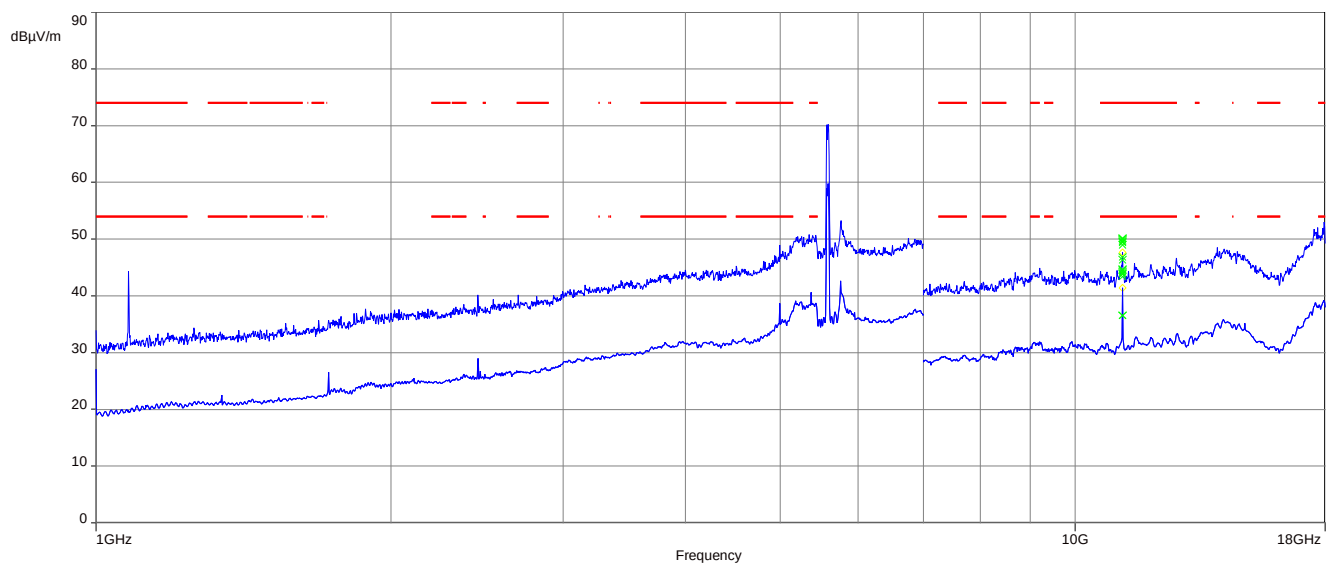


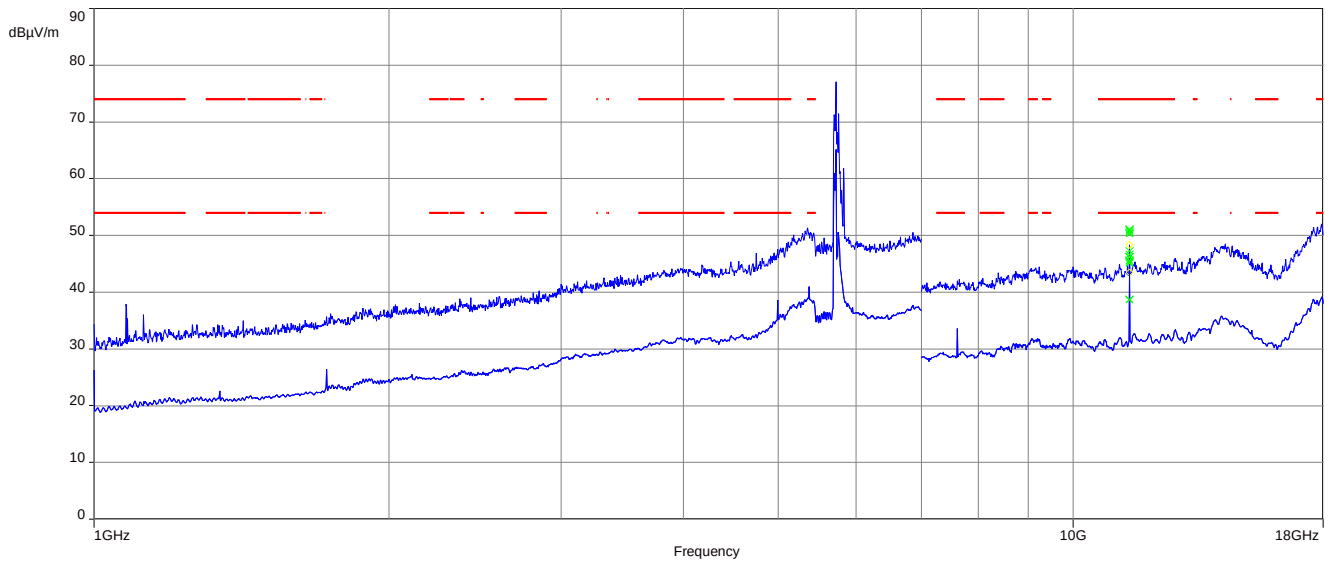
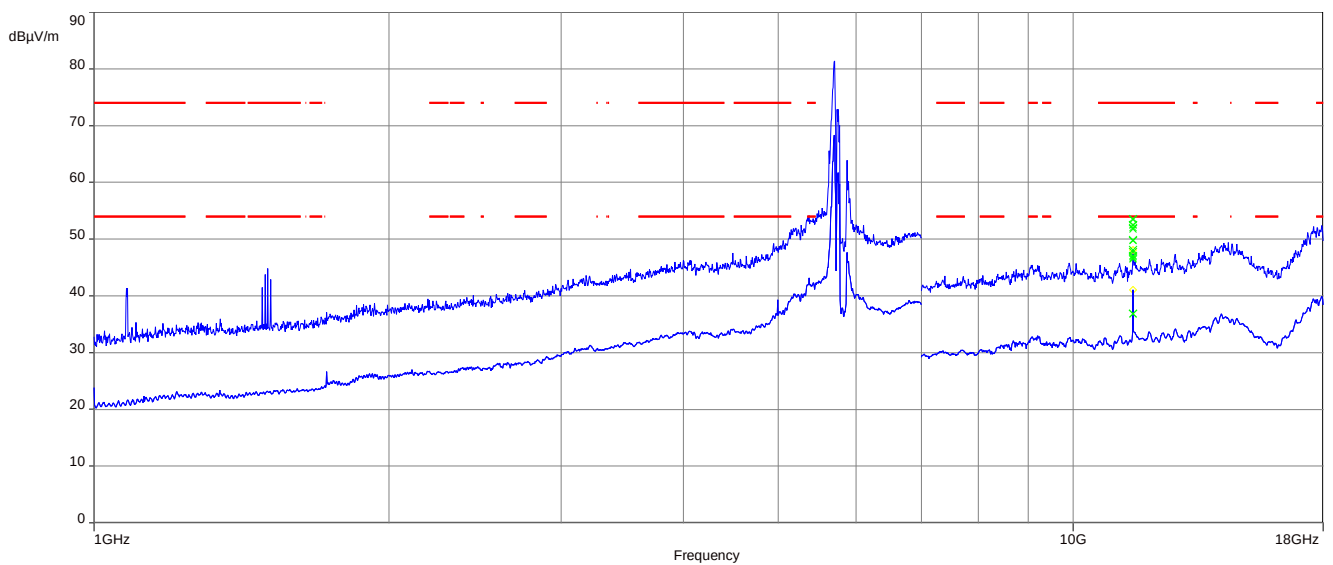
Plot 3: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; lowest channel



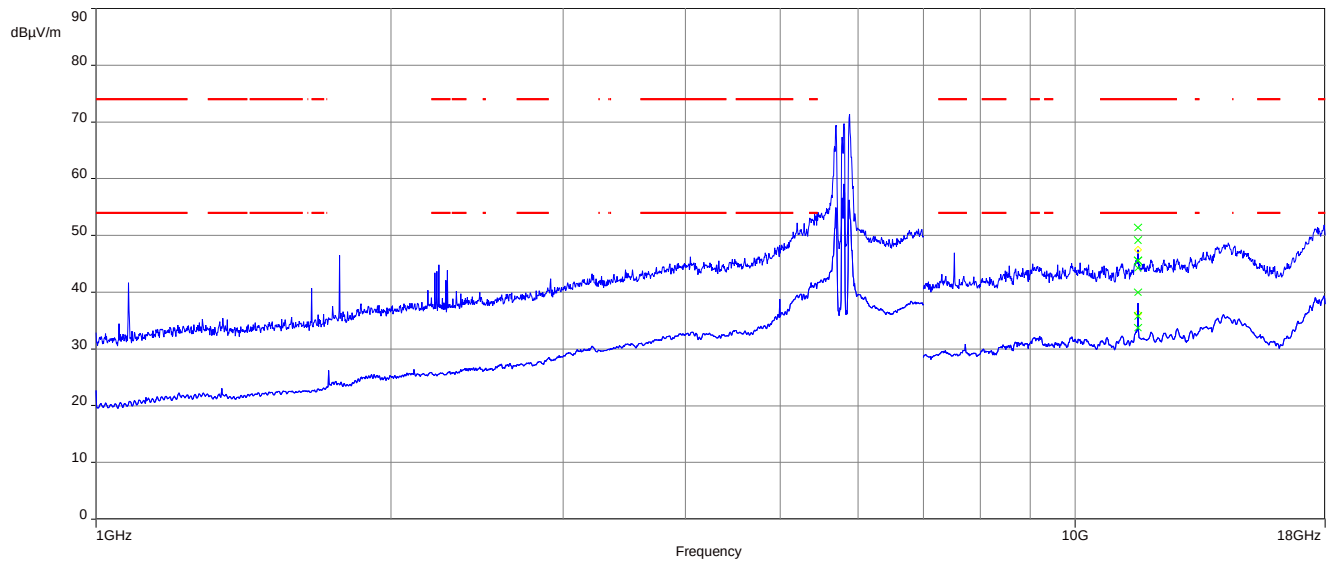
Plot 4: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; highest channel



Plot 5: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel**Plot 6:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel

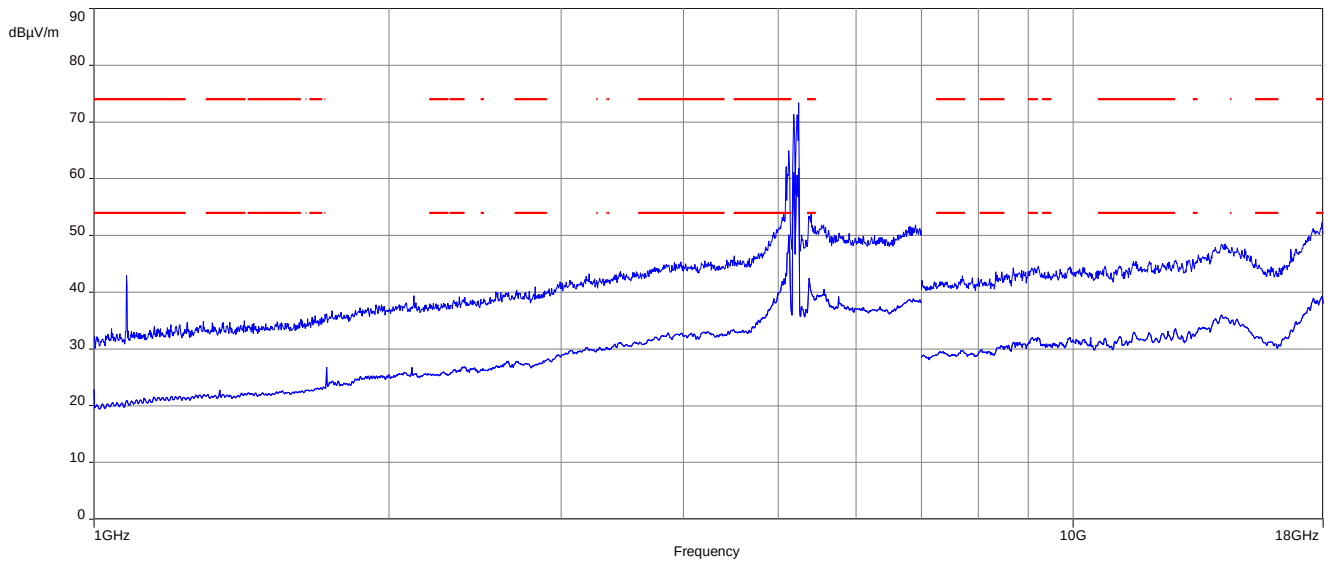
Plot 7: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel**Plot 8:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; lowest channel

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

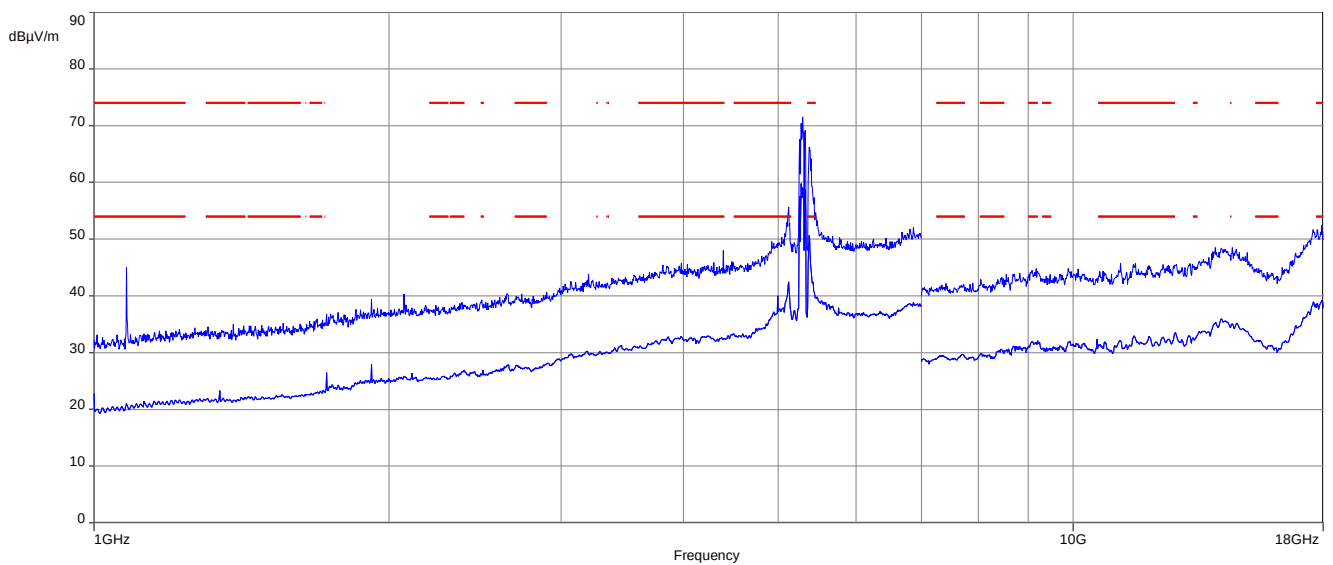


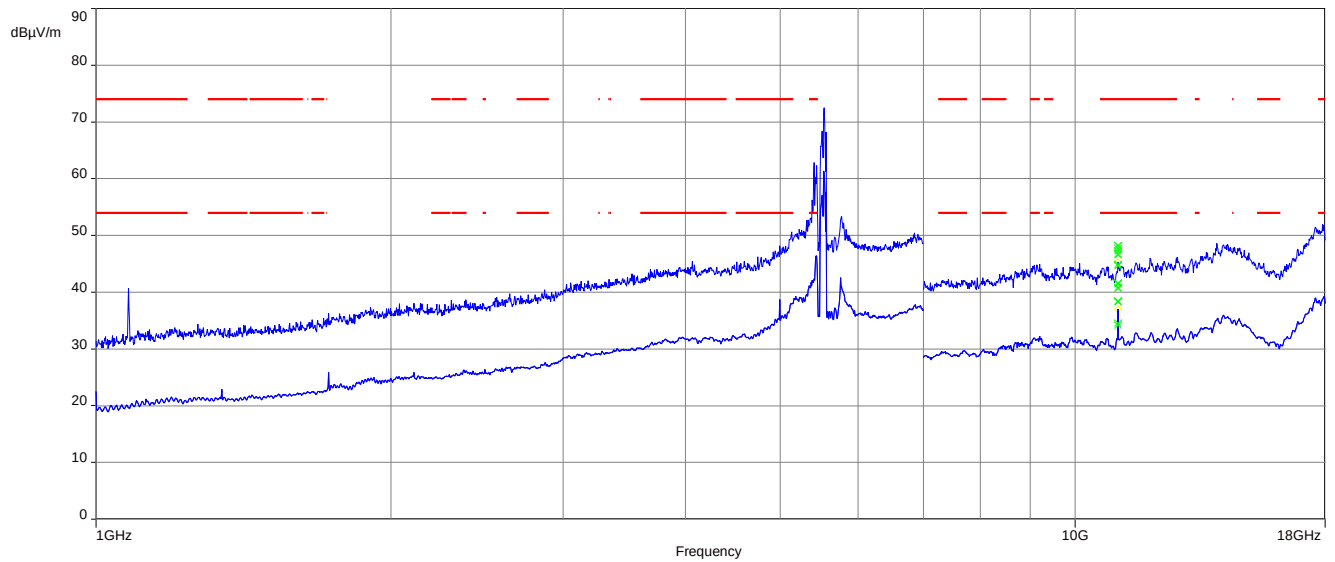
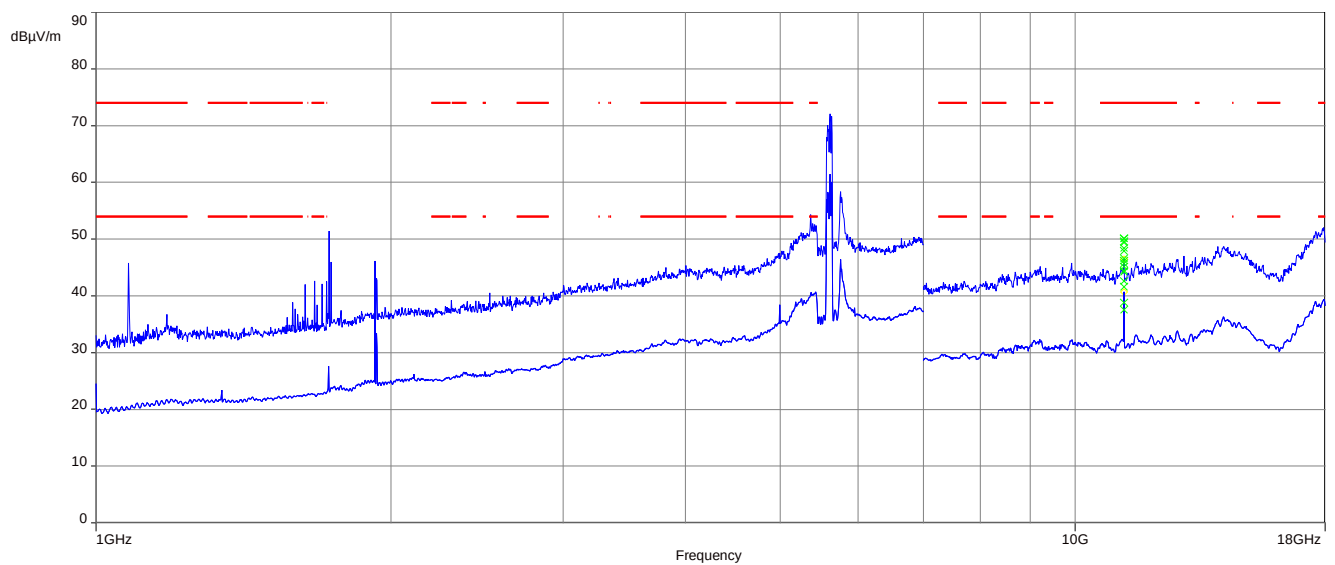
Plots: 80 MHz channel bandwidth, COLFLY antennas

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

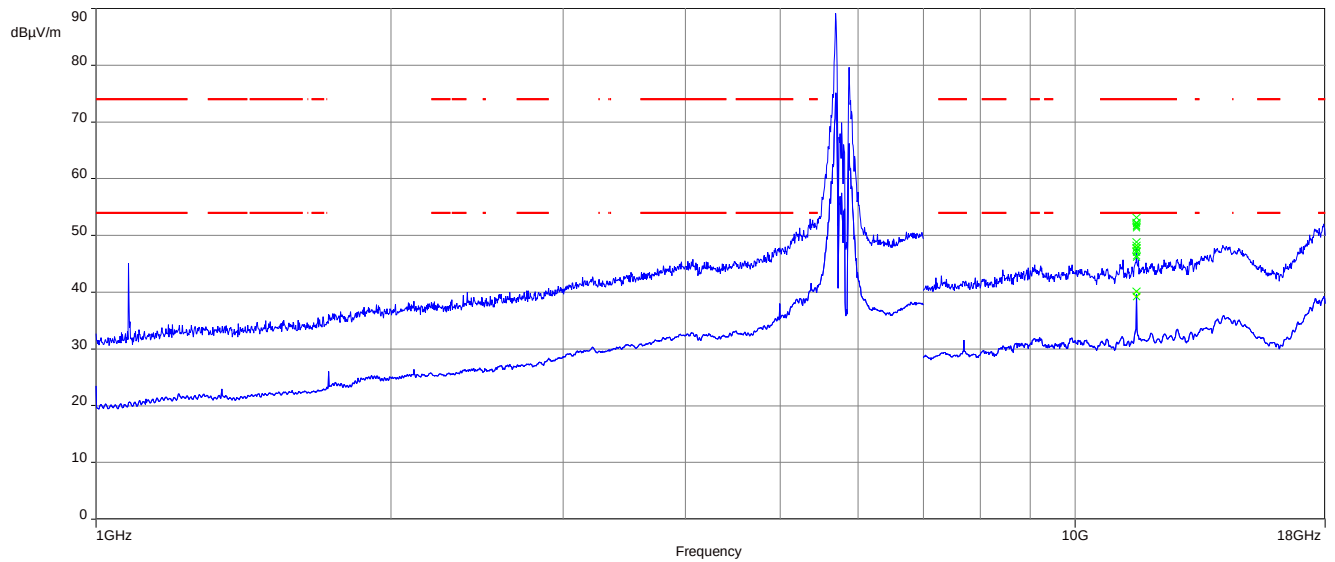


Plot 2: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2A; middle channel



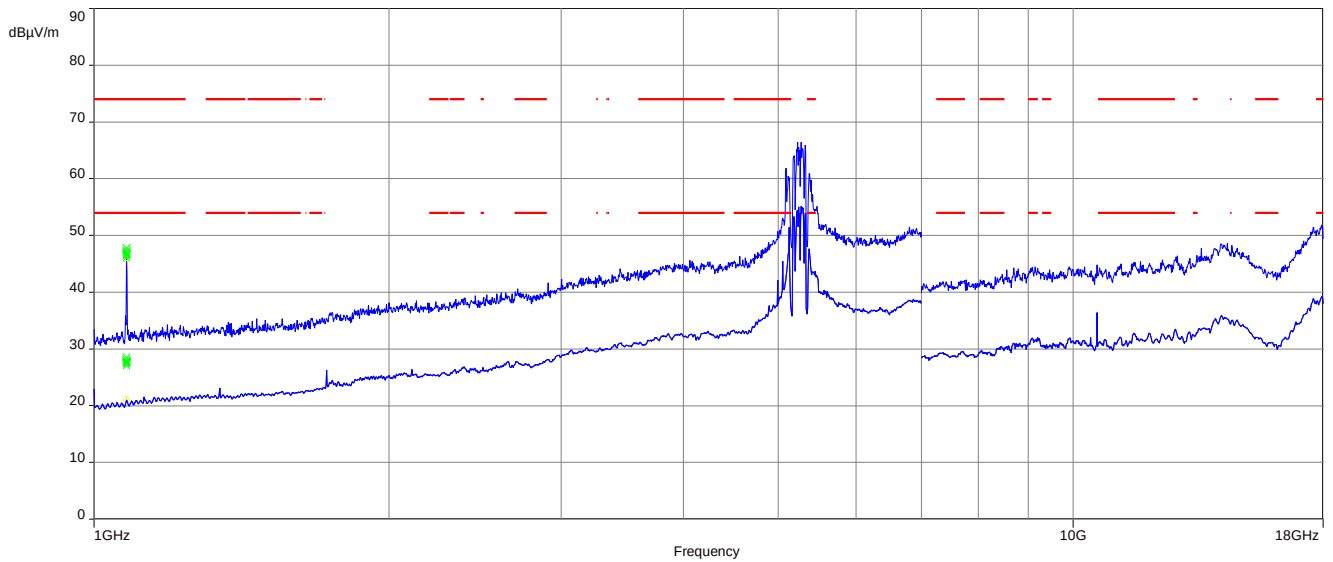
Plot 3: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; lowest channel**Plot 4:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel

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

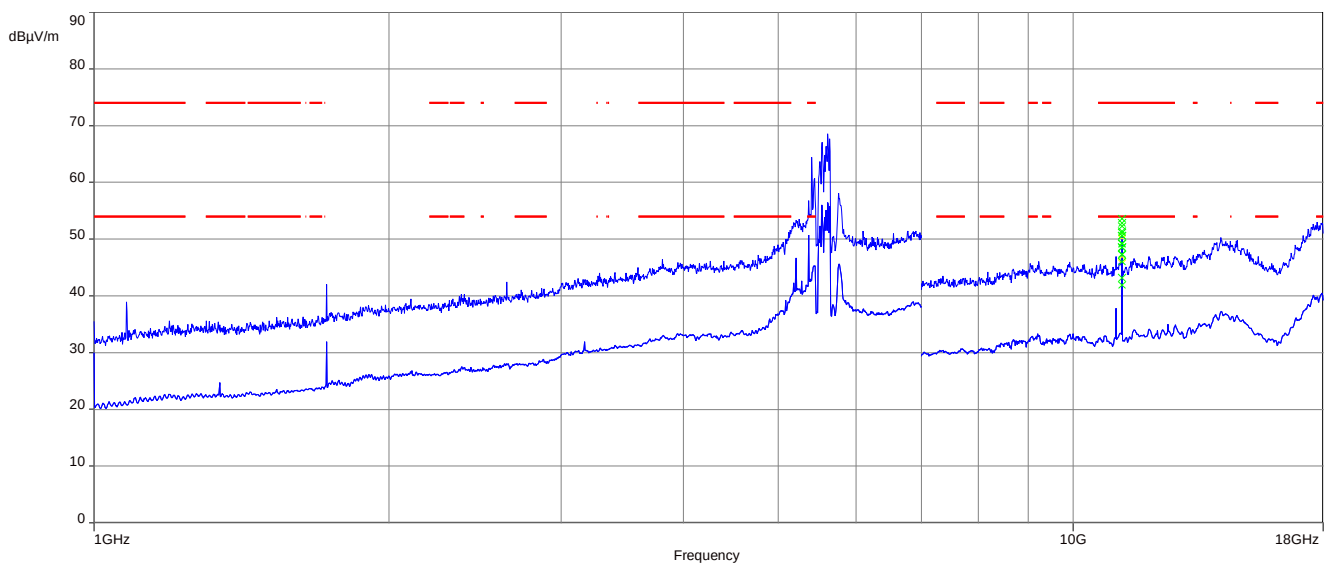


Plots: 80+80 MHz channel bandwidth, COLFLY antennas

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

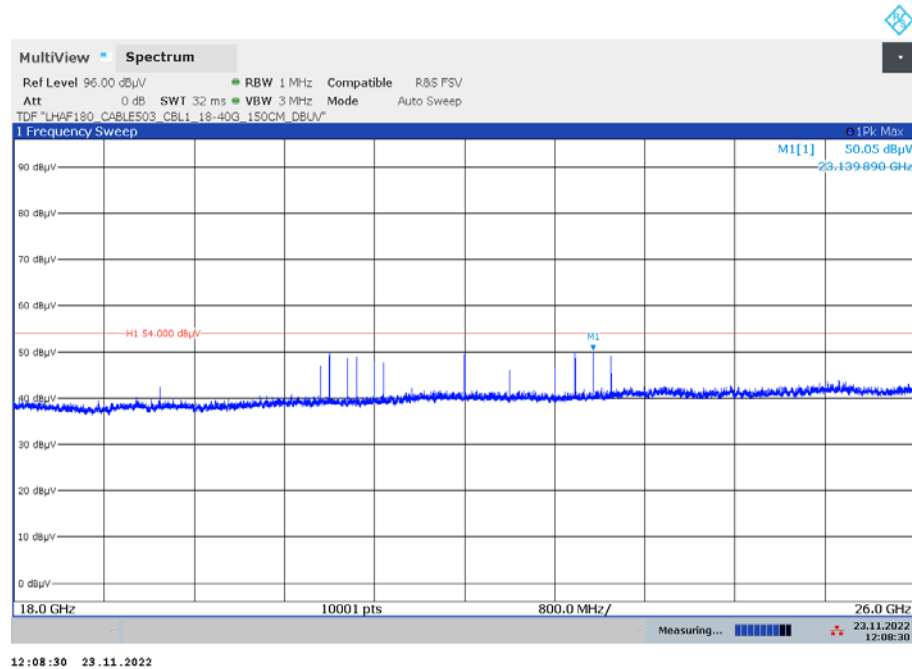


Plot 2: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel

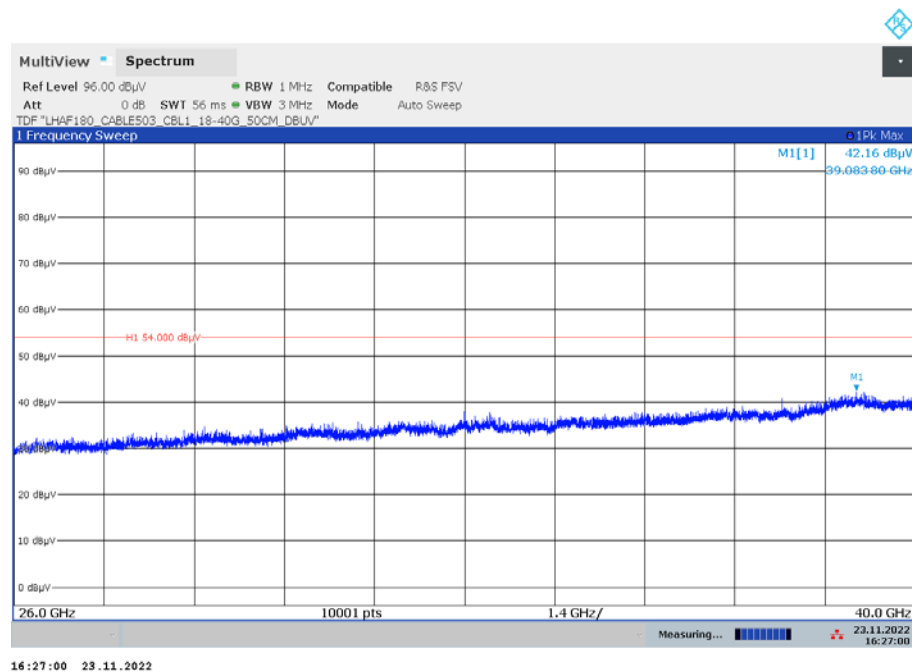


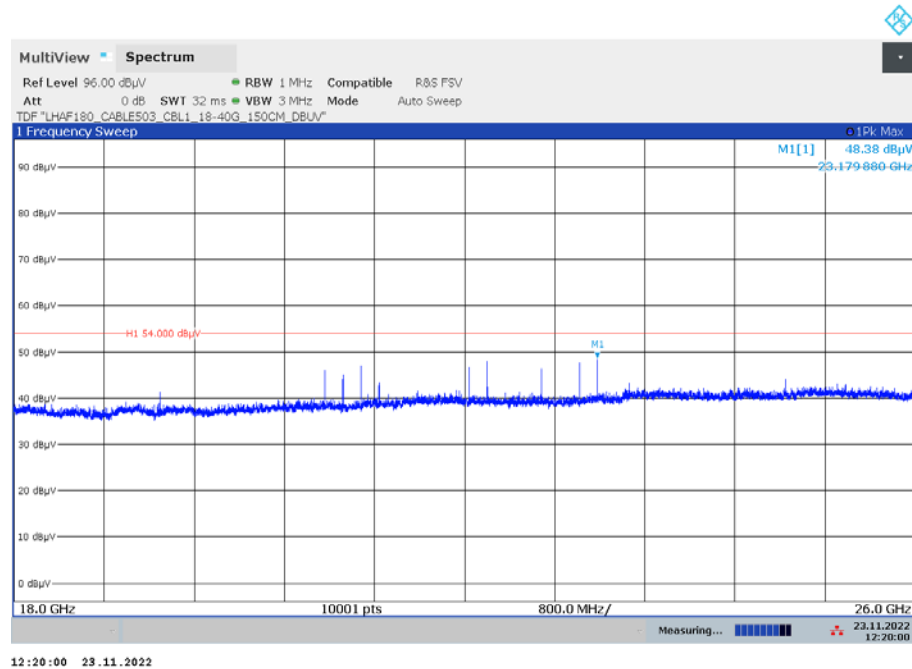
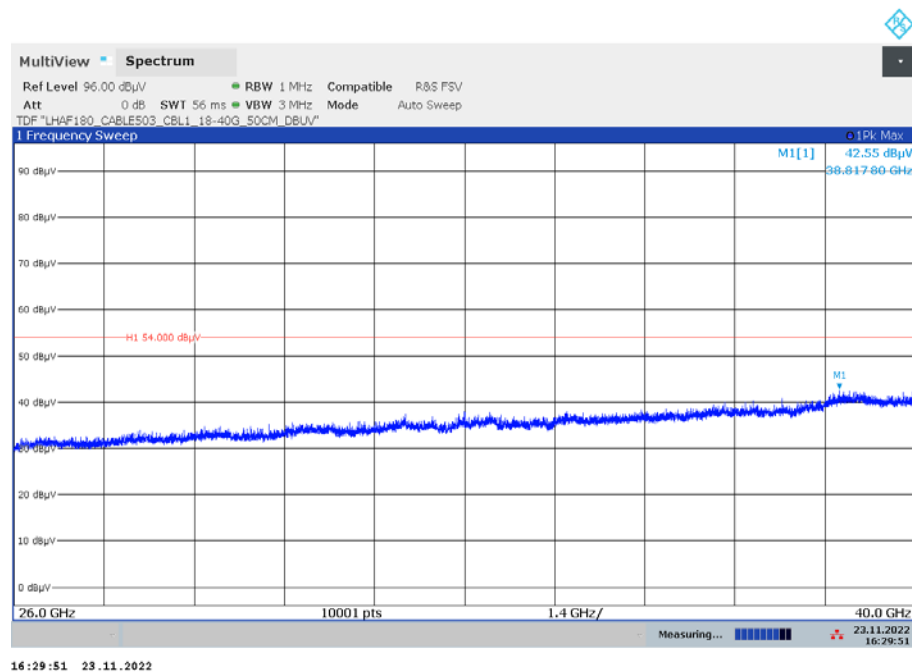
Plots: 18 GHz to 40 GHz, COLFLY antennas

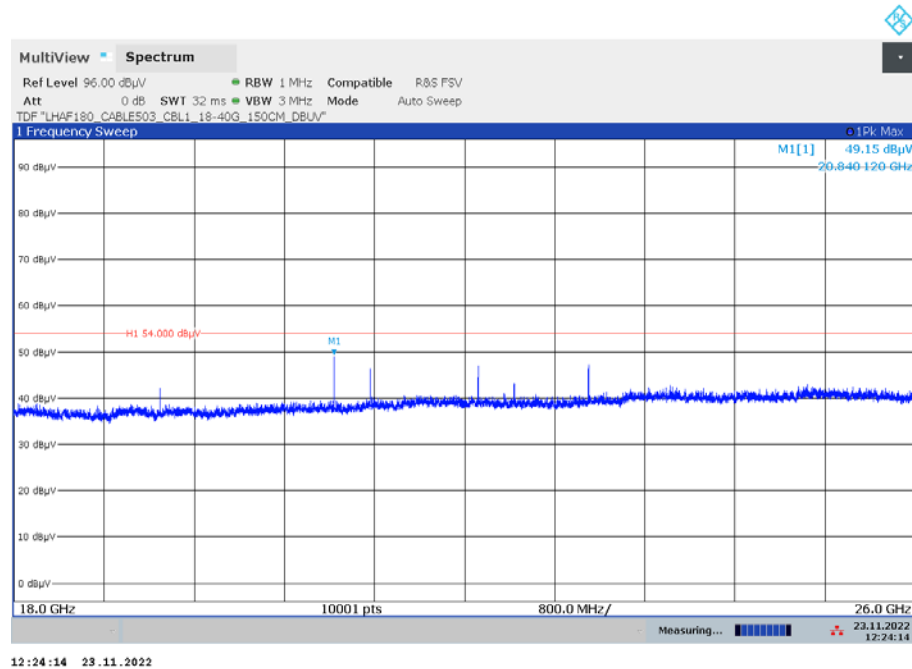
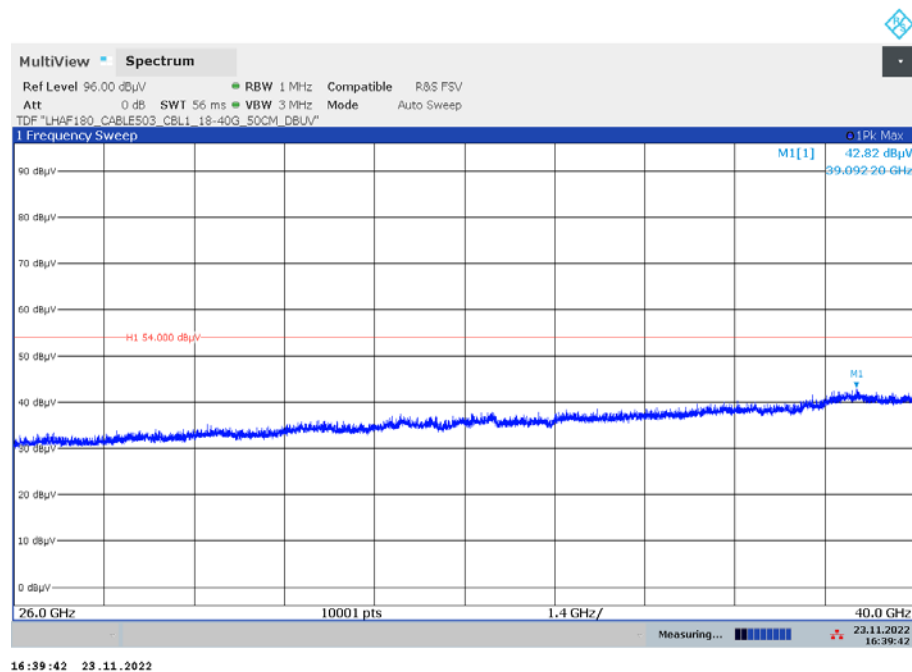
Plot 1: 18 GHz to 26 GHz, valid for all bands, channels and 20 MHz modes

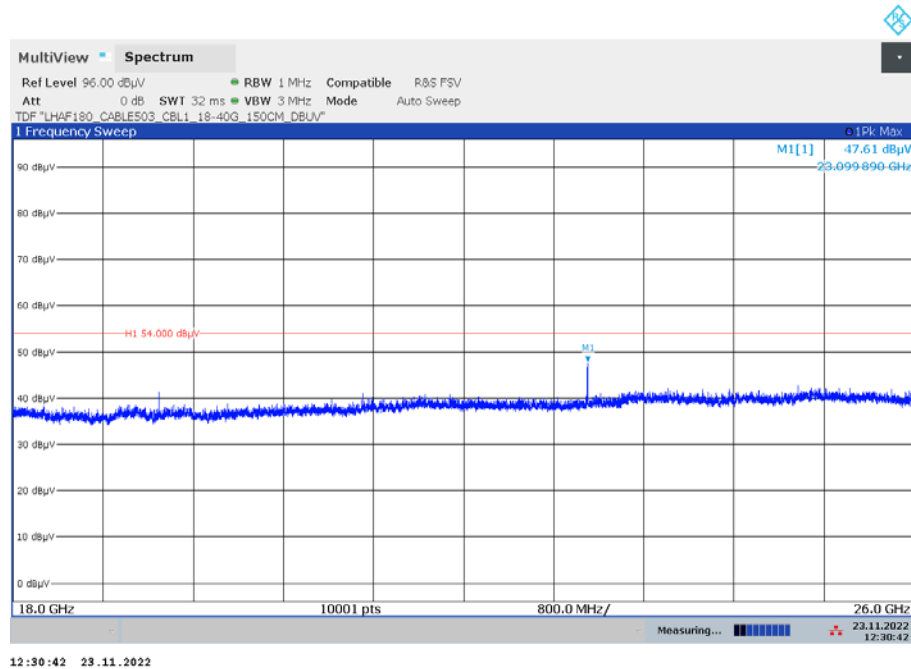
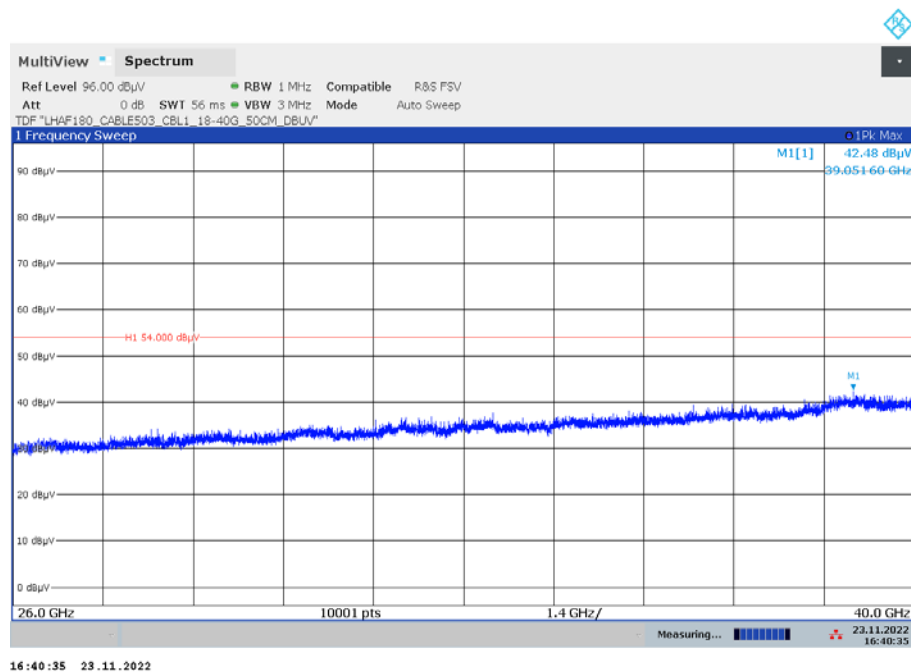


Plot 2: 26 GHz to 40 GHz, valid for all bands, channels and 20 MHz modes



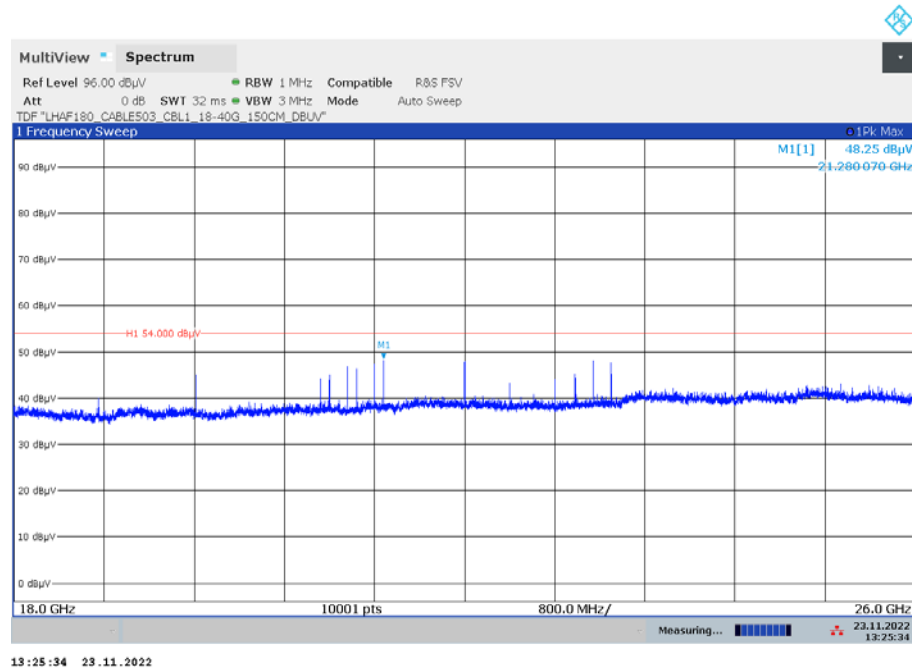
Plot 3: 18 GHz to 26 GHz, valid for all bands, channels and 40 MHz modes**Plot 4:** 26 GHz to 40 GHz, valid for all bands, channels and 40 MHz modes

Plot 5: 18 GHz to 26 GHz, valid for all bands, channels and 80 MHz modes**Plot 6:** 26 GHz to 40 GHz, valid for all bands, channels and 80 MHz modes

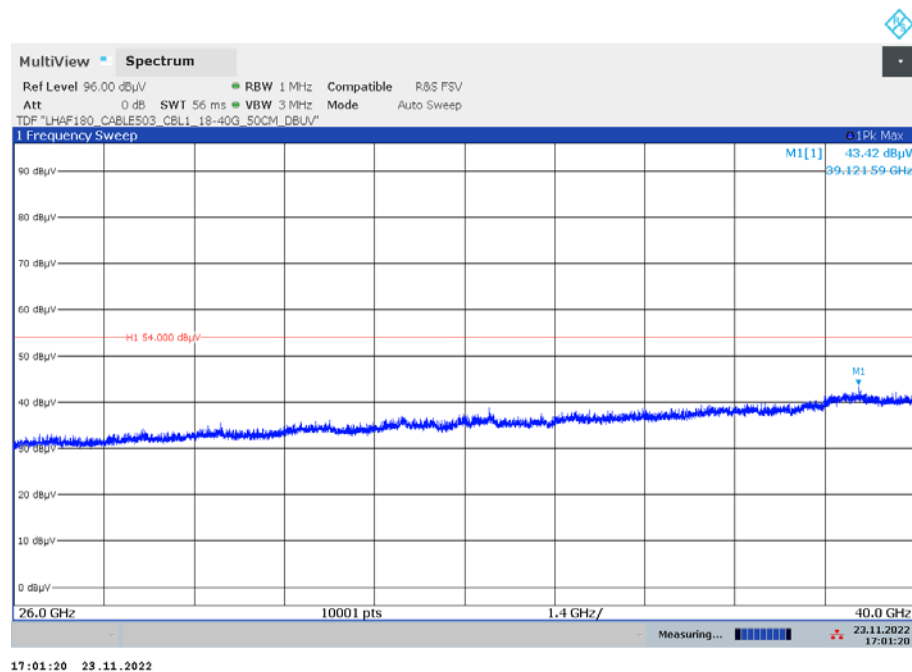
Plot 7: 18 GHz to 26 GHz, valid for all bands, channels and 80+80 MHz modes**Plot 8:** 26 GHz to 40 GHz, valid for all bands, channels and 80+80 MHz modes

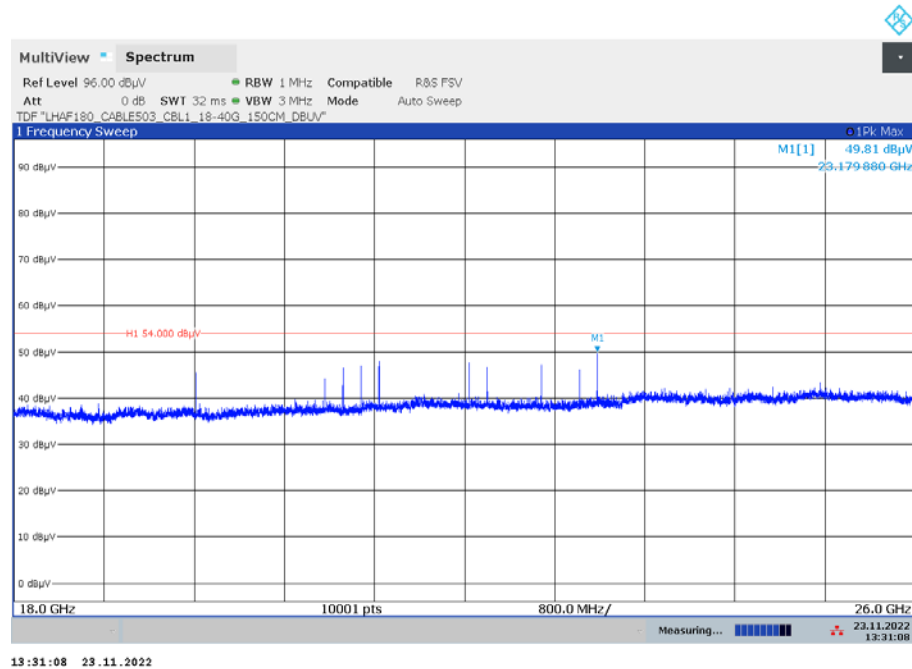
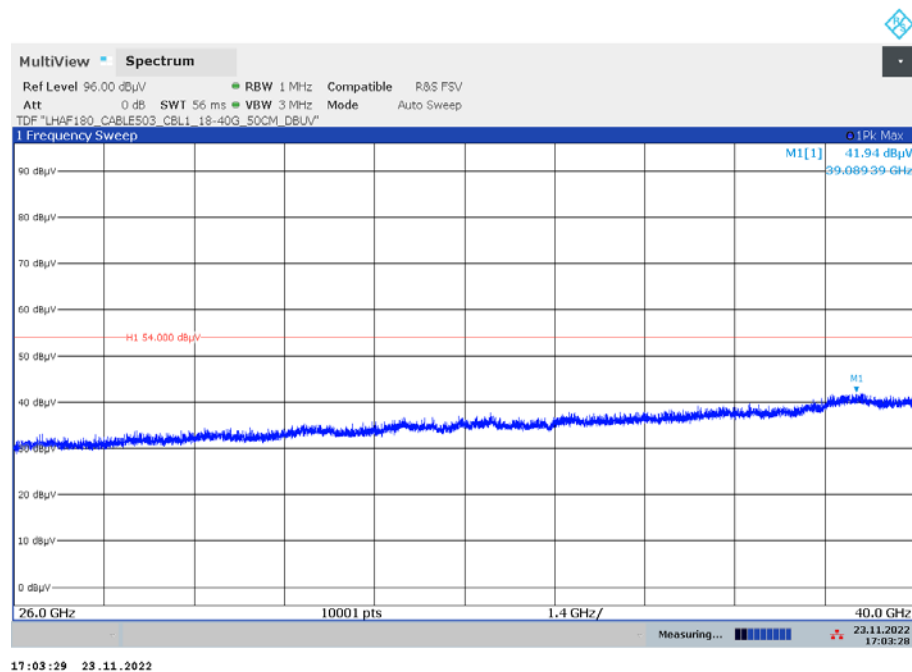
Plots: 18 GHz to 40 GHz, WALSIN antennas

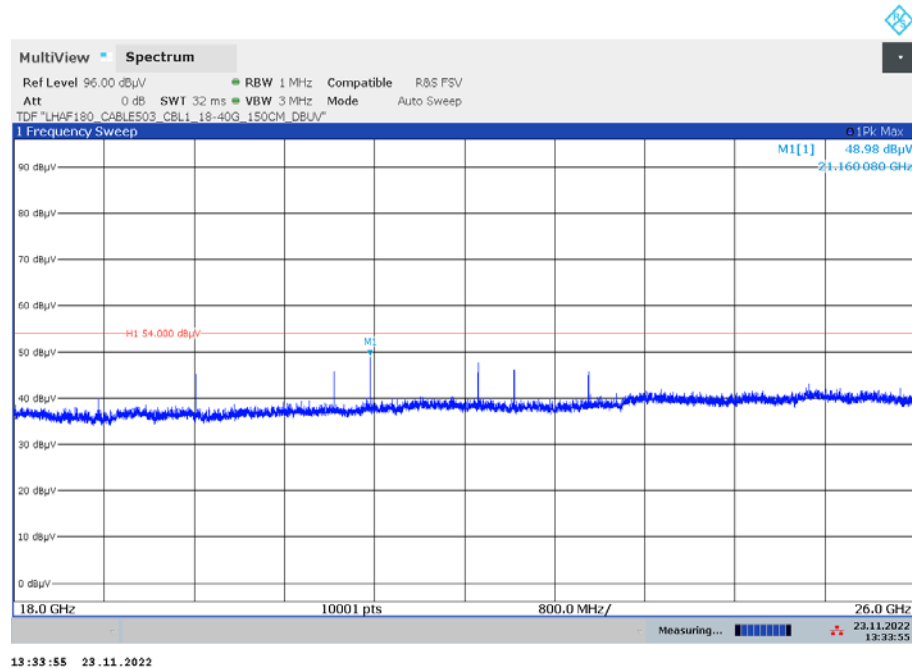
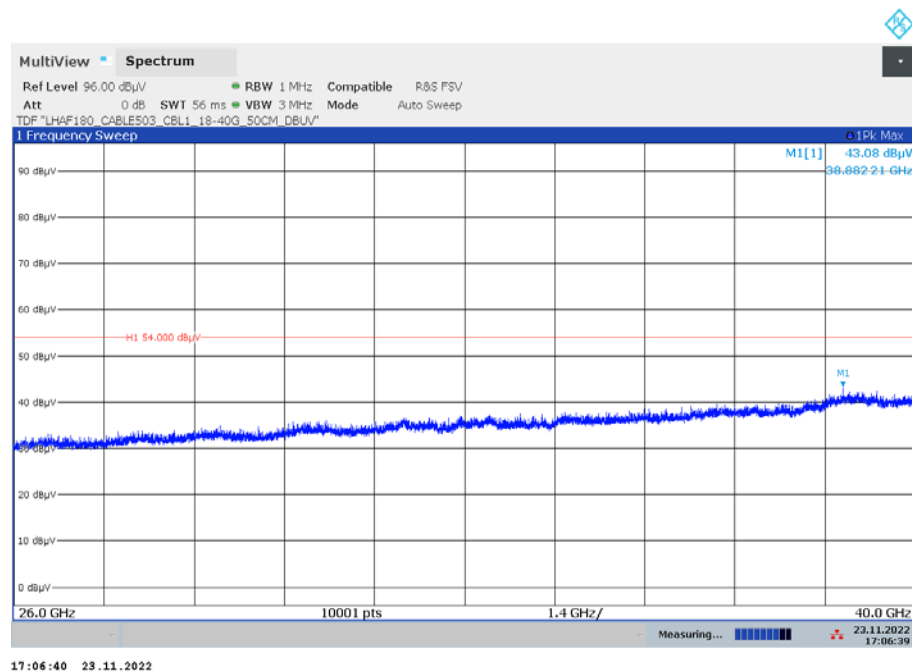
Plot 1: 18 GHz to 26 GHz, valid for all bands, channels and 20 MHz modes

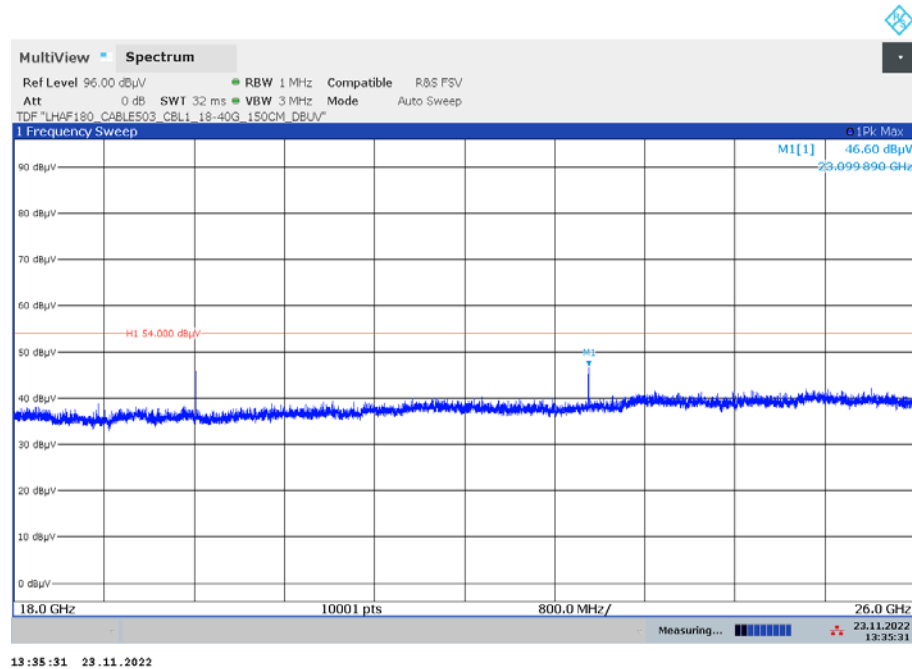
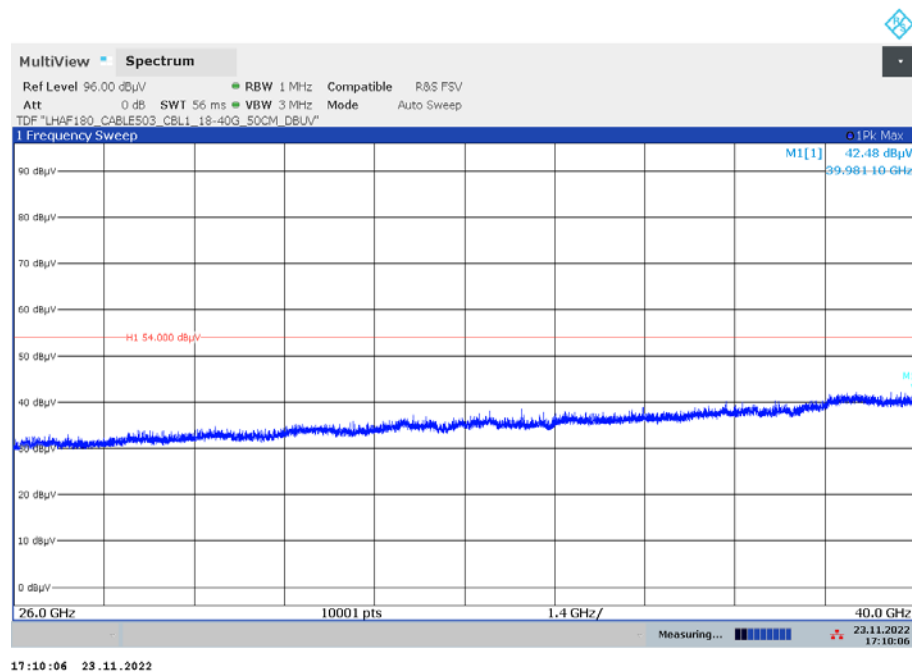


Plot 2: 26 GHz to 40 GHz, valid for all bands, channels and 20 MHz modes



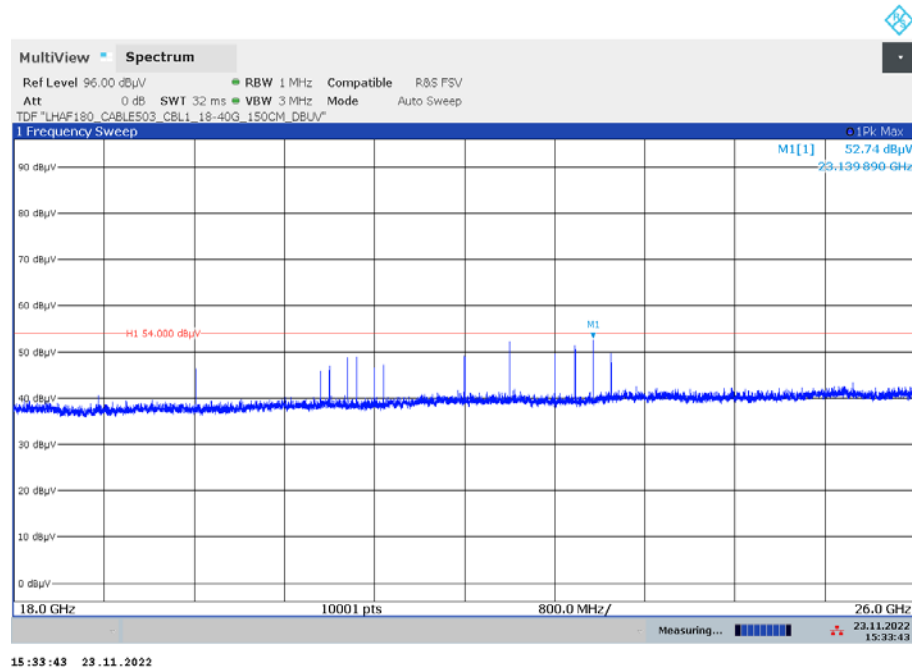
Plot 3: 18 GHz to 26 GHz, valid for all bands, channels and 40 MHz modes**Plot 4:** 26 GHz to 40 GHz, valid for all bands, channels and 40 MHz modes

Plot 5: 18 GHz to 26 GHz, valid for all bands, channels and 80 MHz modes**Plot 6:** 26 GHz to 40 GHz, valid for all bands, channels and 80 MHz modes

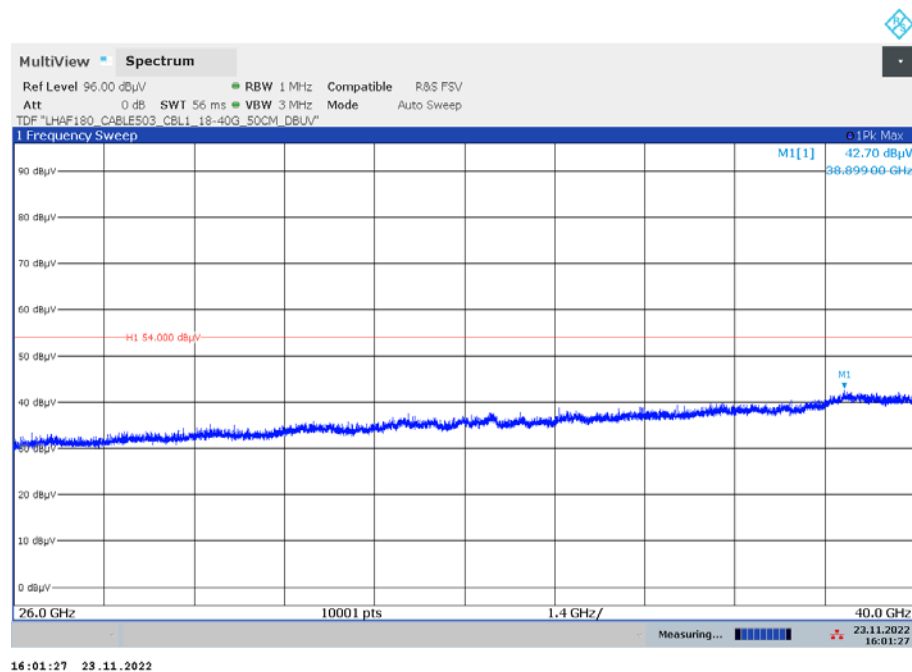
Plot 7: 18 GHz to 26 GHz, valid for all bands, channels and 80+80 MHz modes**Plot 8:** 26 GHz to 40 GHz, valid for all bands, channels and 80+80 MHz modes

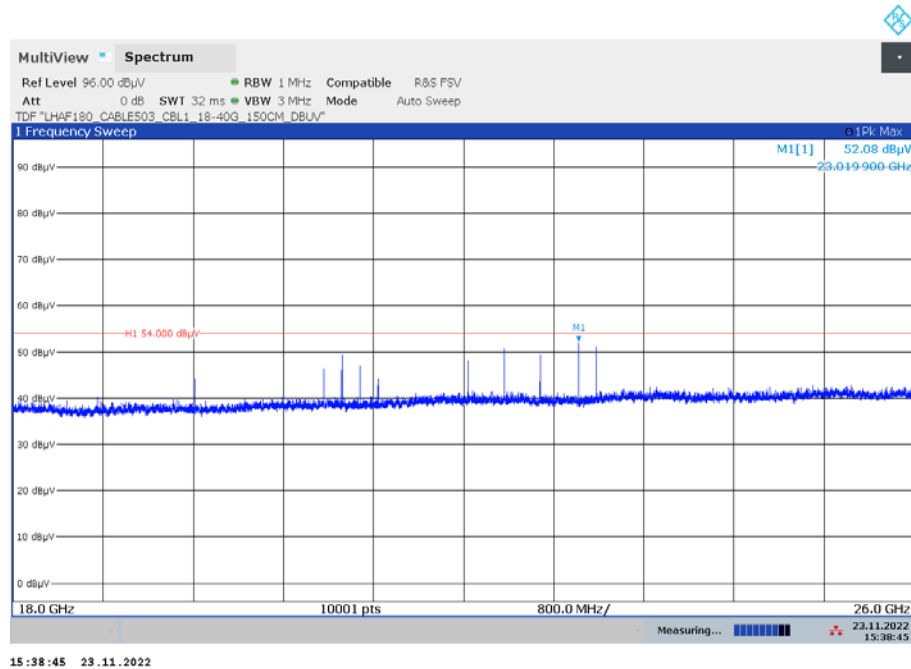
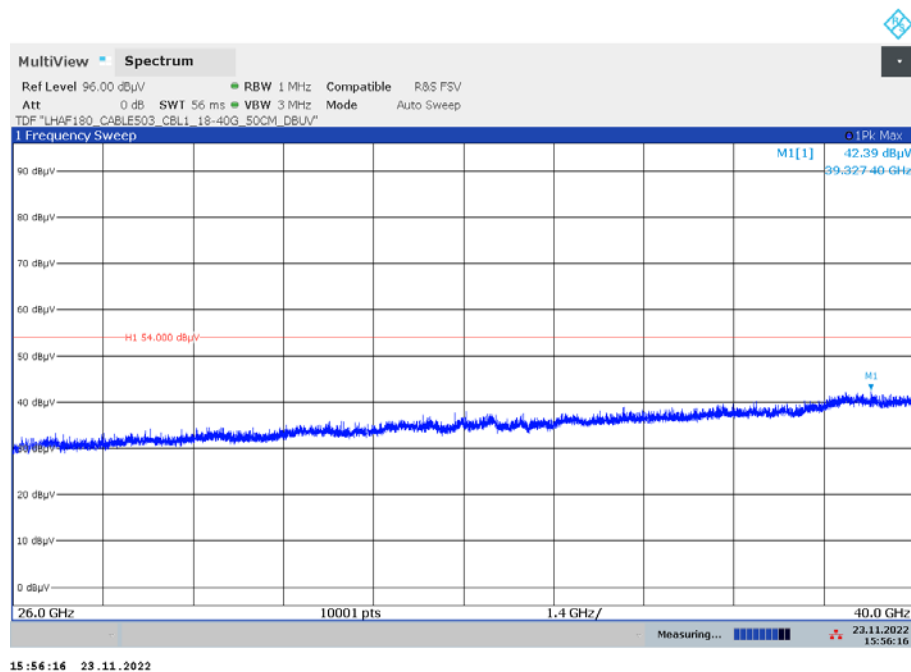
Plots: 18 GHz to 40 GHz, HL antennas

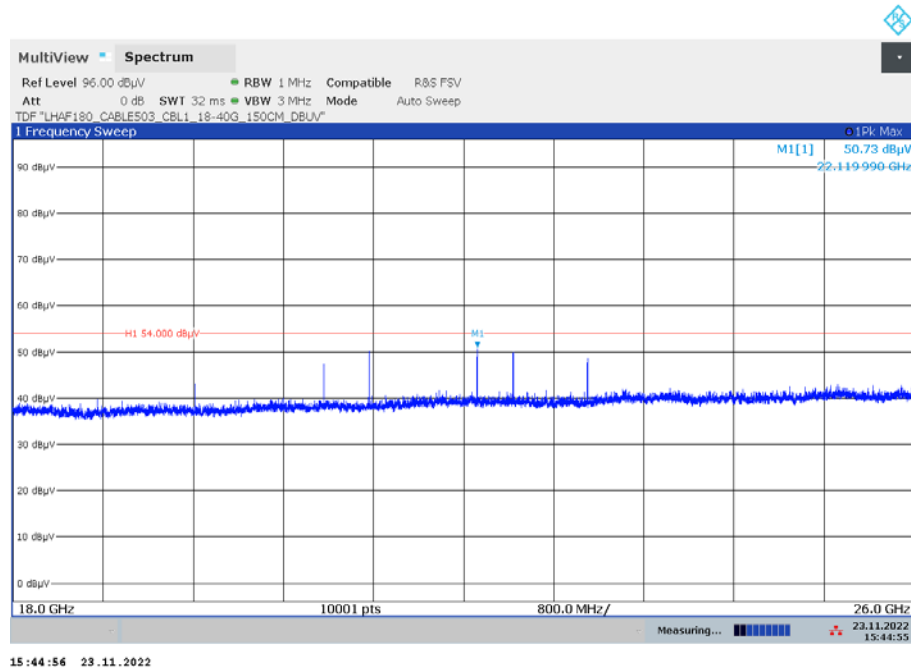
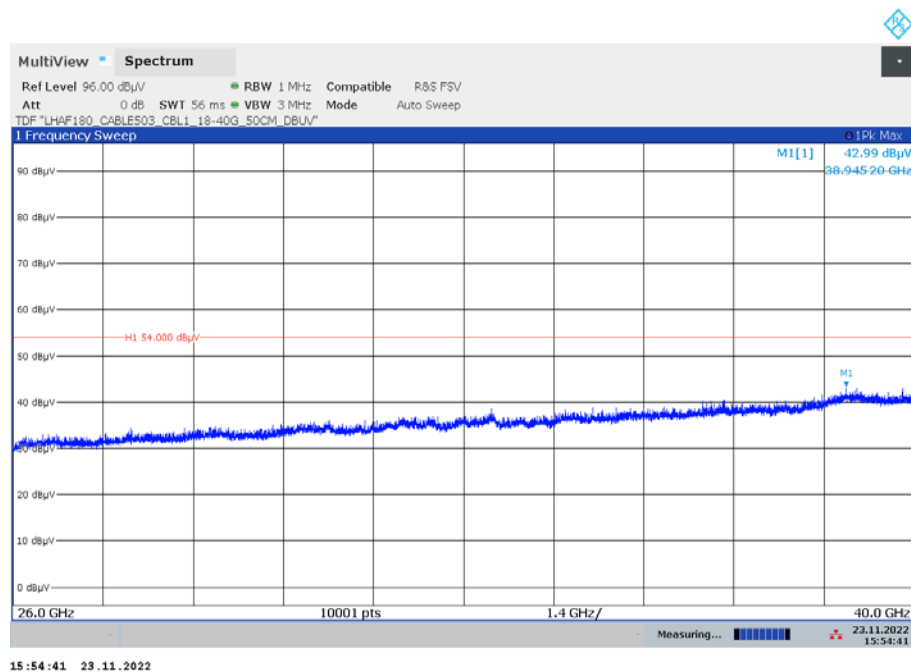
Plot 1: 18 GHz to 26 GHz, valid for all bands, channels and 20 MHz modes

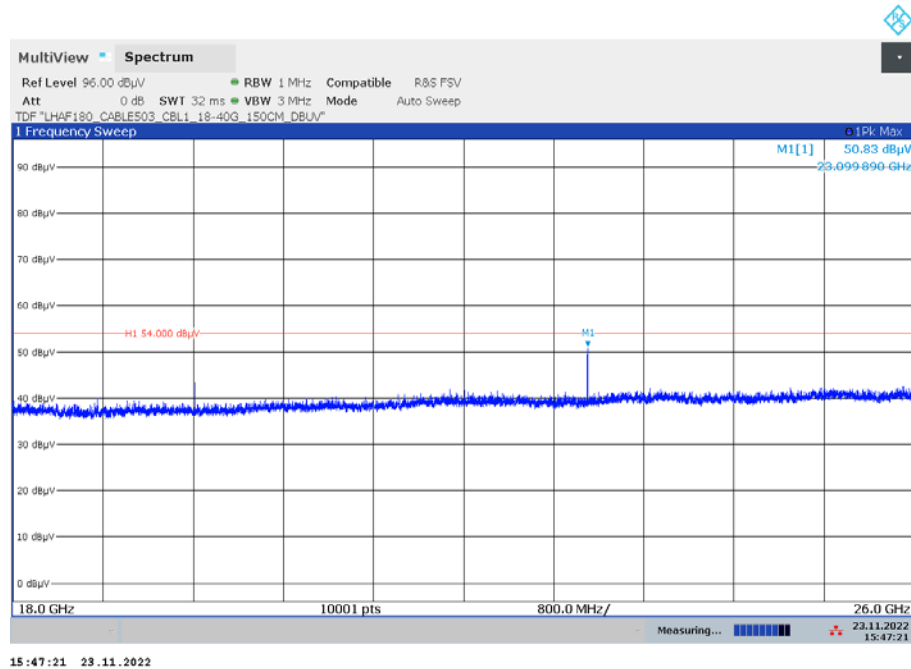
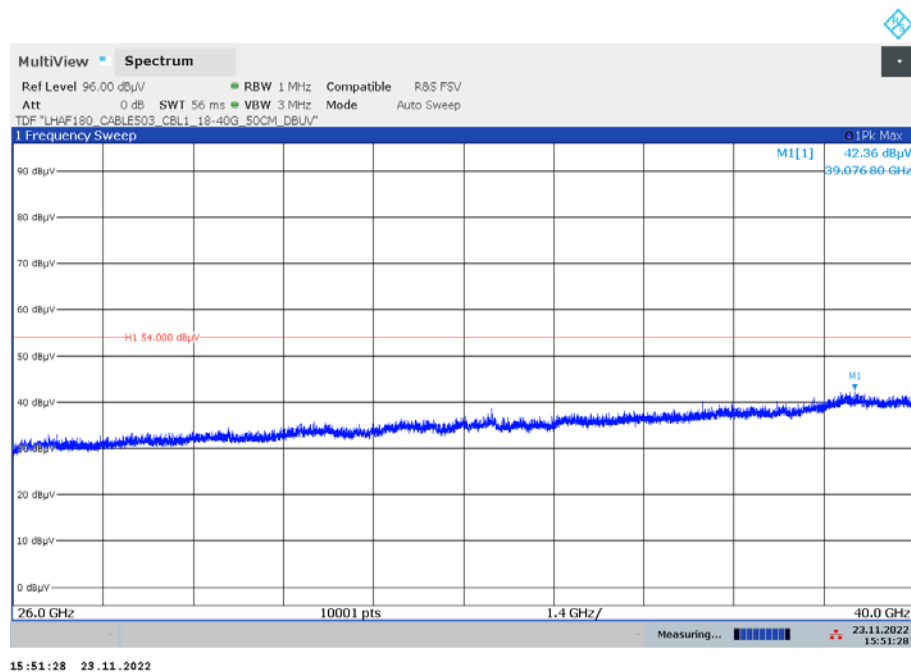


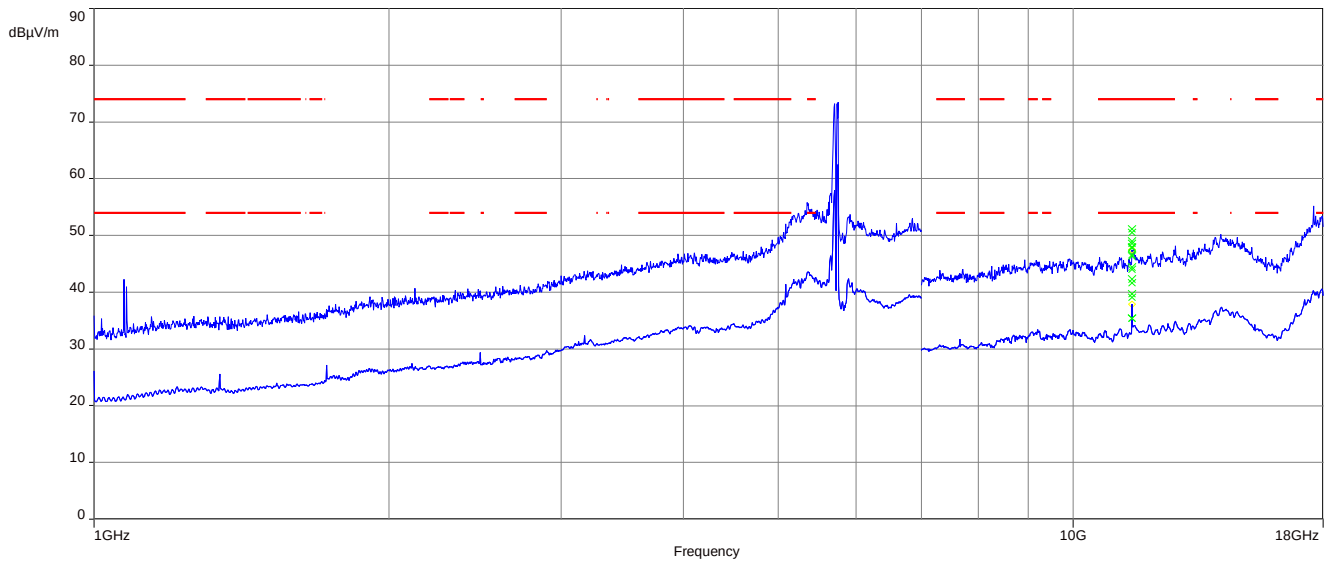
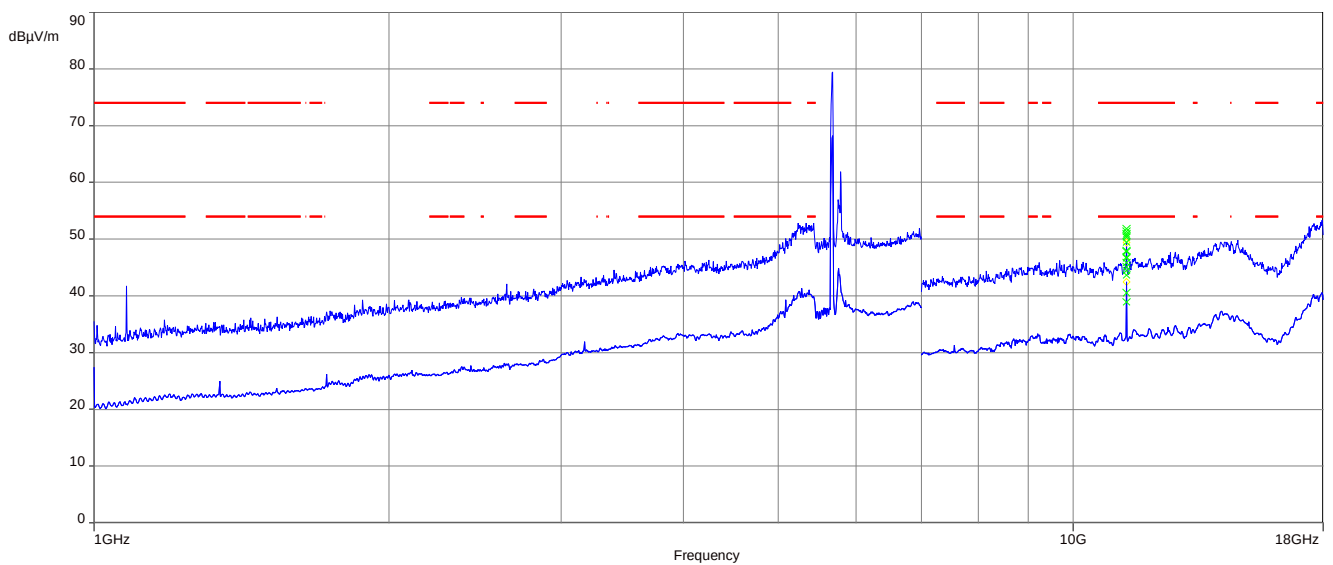
Plot 2: 26 GHz to 40 GHz, valid for all bands, channels and 20 MHz modes

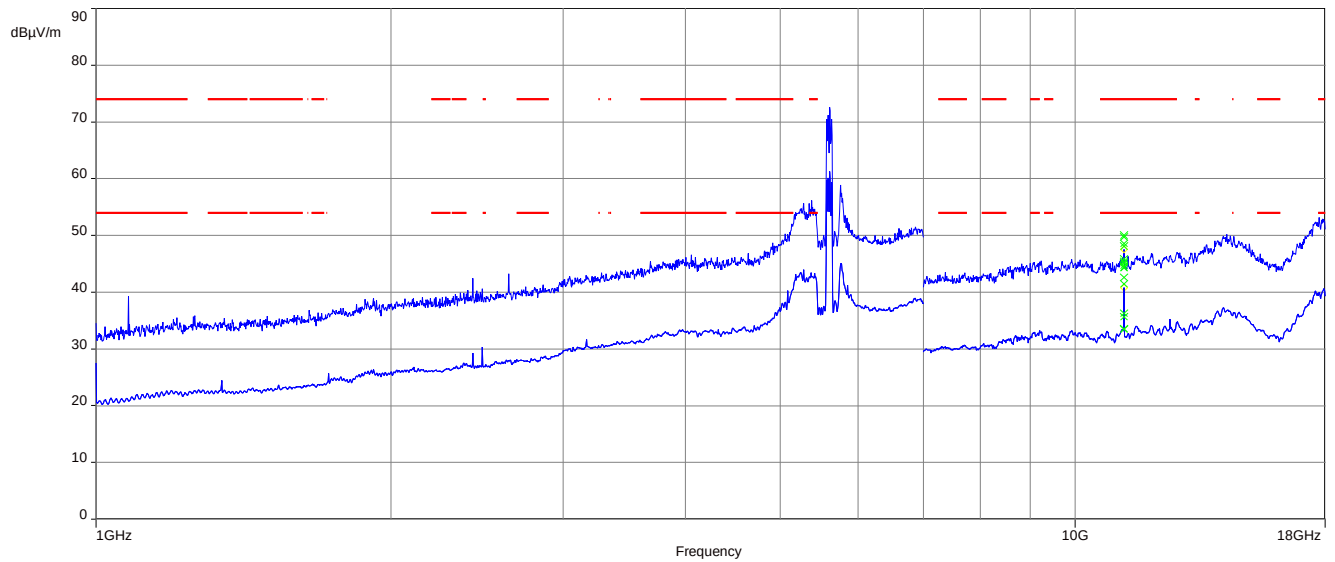
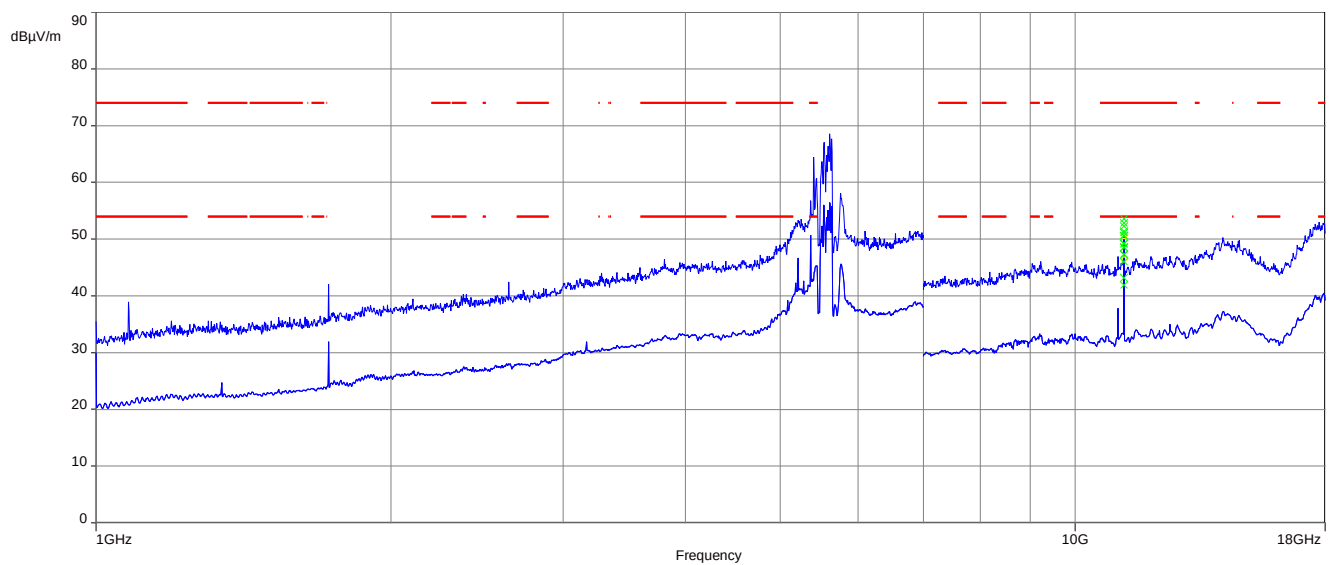


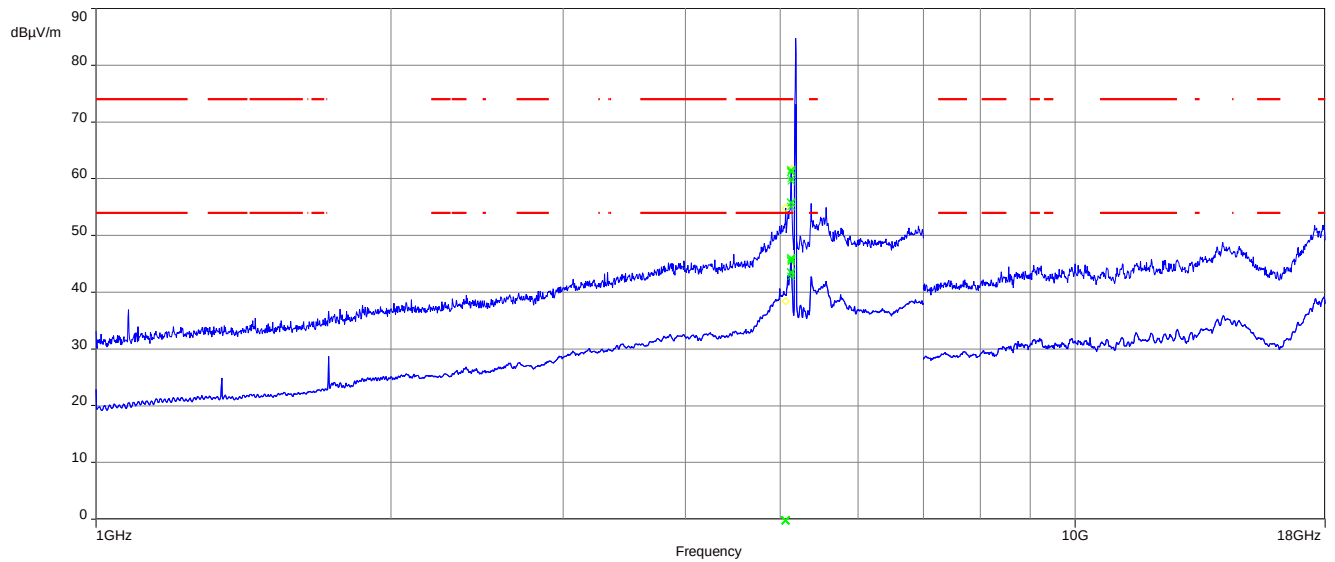
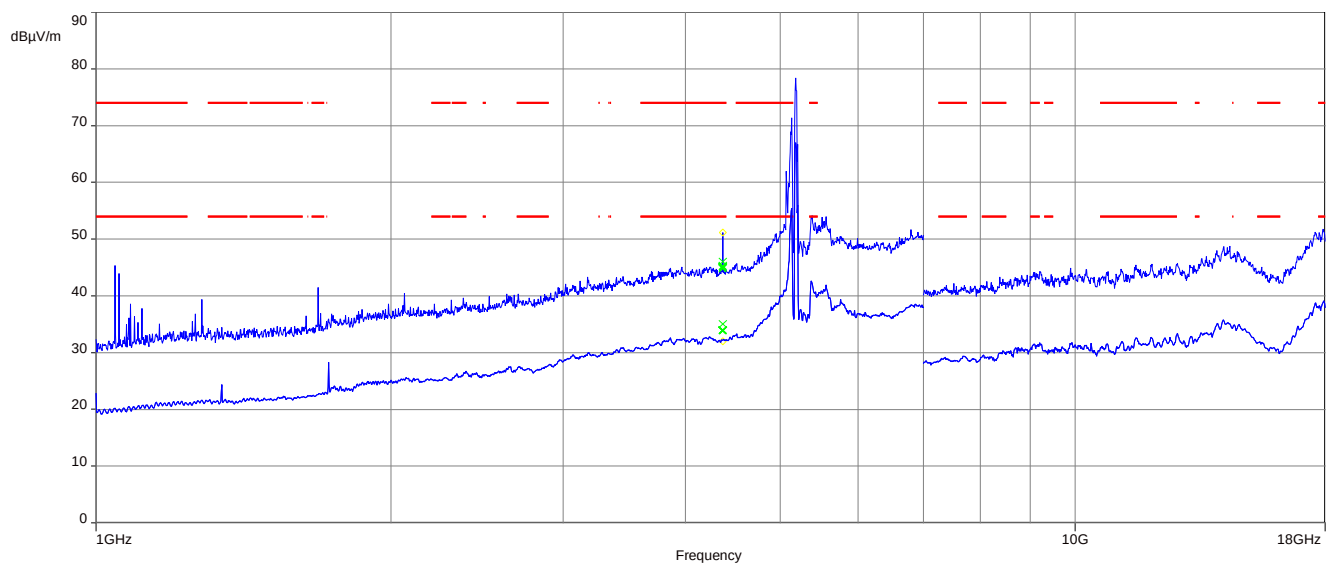
Plot 3: 18 GHz to 26 GHz, valid for all bands, channels and 40 MHz modes**Plot 4:** 26 GHz to 40 GHz, valid for all bands, channels and 40 MHz modes

Plot 5: 18 GHz to 26 GHz, valid for all bands, channels and 80 MHz modes**Plot 6:** 26 GHz to 40 GHz, valid for all bands, channels and 80 MHz modes

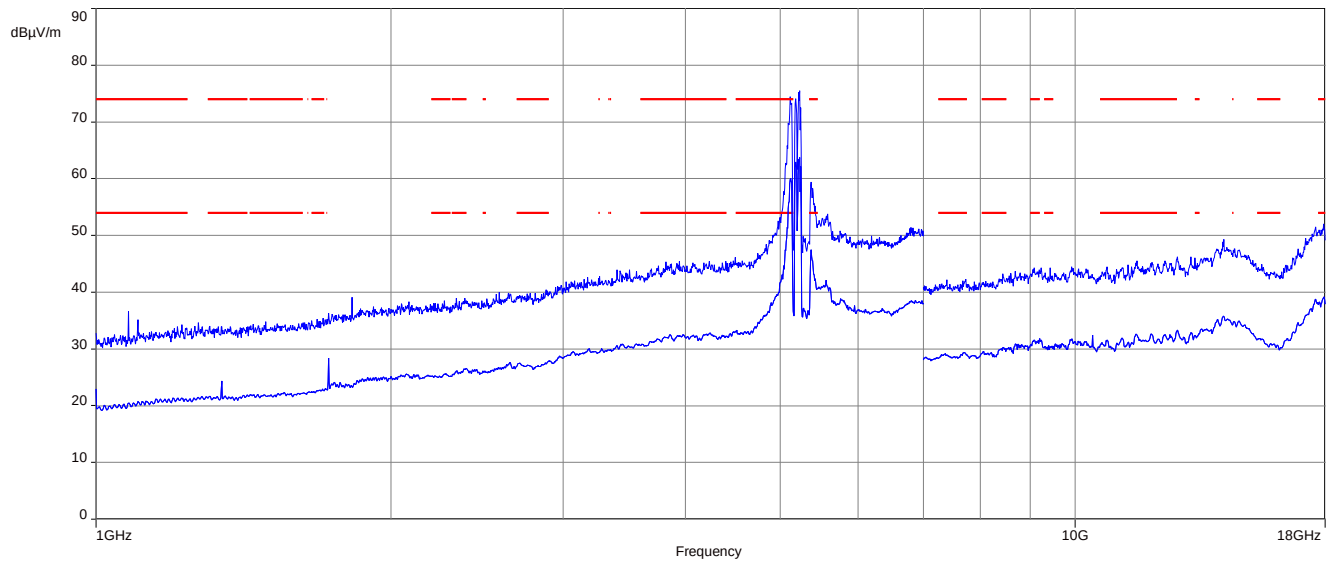
Plot 7: 18 GHz to 26 GHz, valid for all bands, channels and 80+80 MHz modes**Plot 8:** 26 GHz to 40 GHz, valid for all bands, channels and 80+80 MHz modes

Plots: WALSIN antennas**Plot 1:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-3; lowest channel, 20 MHz bandwidth**Plot 2:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel, 40 MHz bandwidth

Plot 3: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; highest channel, 80 MHz bandwidth**Plot 4:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-2C; middle channel, 80+80 MHz bandwidth

Plots: HL antennas**Plot 1:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; lowest channel, 20 MHz bandwidth**Plot 2:** 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; lowest channel, 40 MHz bandwidth

Plot 3: 1 GHz to 18 GHz; vertical & horizontal polarization; U-NII-1; middle channel, 80 MHz bandwidth



12.13 Spurious emissions conducted < 30 MHz

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	9 kHz
Resolution bandwidth:	100 kHz
Span:	150 kHz to 30 MHz
Trace mode:	Max Hold
Test setup:	See sub clause 7.5 – A
Measurement uncertainty:	See chapter 9

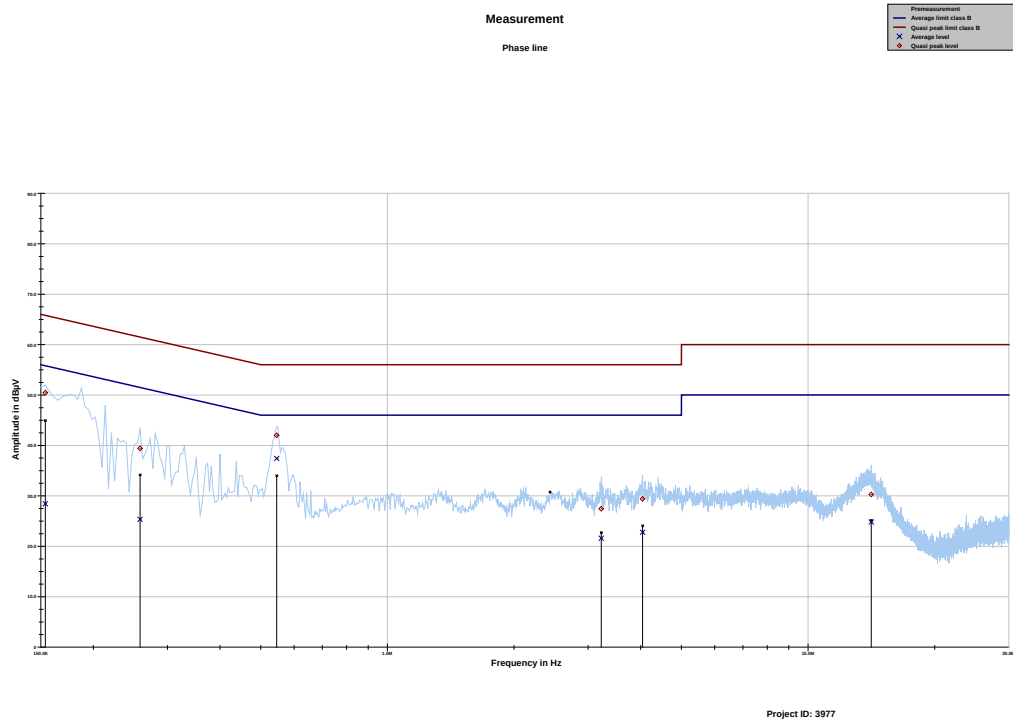
Limits:

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

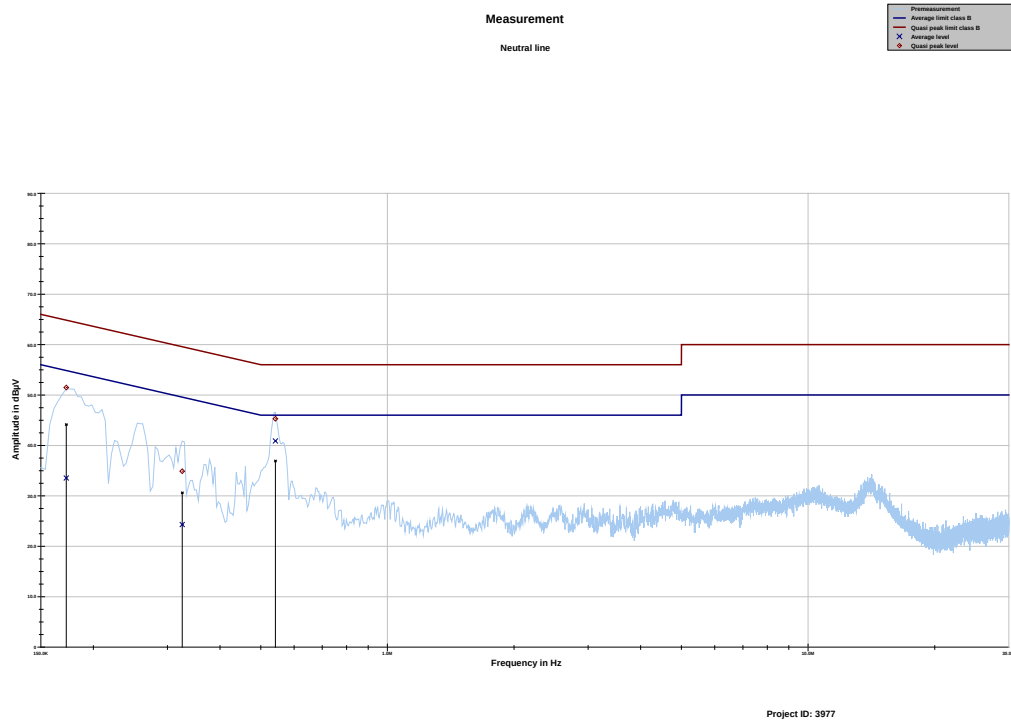
*Decreases with the logarithm of the frequency

Results:

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

Plots:**Plot 1:** 150 kHz to 30 MHz, phase line**Final results:**

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin Average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.153731	50.45	15.35	65.796	28.43	27.47	55.893
0.258206	39.41	22.08	61.489	25.33	27.58	52.908
0.545512	42.00	14.00	56.000	37.41	8.59	46.000
3.224550	27.44	28.56	56.000	21.59	24.41	46.000
4.041694	29.40	26.60	56.000	22.77	23.23	46.000
14.130994	30.29	29.71	60.000	24.80	25.20	50.000

Plot 2: 150 kHz to 30 MHz, neutral line**Final results:**

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin Average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.172387	51.49	13.36	64.845	33.53	21.83	55.360
0.325369	34.88	24.69	59.569	24.31	26.68	50.989
0.541781	45.28	10.72	56.000	40.88	5.12	46.000

13 Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
GUE	GNSS User Equipment
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
GNSS	Global Navigation Satellite System
C/N₀	Carrier to noise-density ratio, expressed in dB-Hz

14 Document history

Version	Applied changes	Date of release
-/-	Initial release	2023-01-16

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

first page	last page
 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 17025:2018 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 09.06.2020 with the accreditation number D-PL-12076-01. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 05 pages. Registration number of the certificate: D-PL-12076-01-05 Frankfurt am Main, 09.06.2020 by order: Dipl.-Ing. (FH) Ralf Egner Head of Division The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH. https://www.dakks.de/en/content/accredited-bodies-dakks last status reviewed:	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 websites (link see below).

<https://www.dakks.de/files/data/as/pdf/D-PL-12076-01-05e.pdf>

or

https://ctcadvanced.com/app/uploads/2020/06/D-PL-12076-01-05_TCB_USA.pdf

END OF TEST REPORT